Micro Miniature and Surface Mount Low Pass Filters

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RLC Electronics' Micro Miniature Low Pass Filters utilize proprietary dielectric materials and manufacturing techniques to achieve performance rivaling much larger devices. Standard units are 0.05dB Chebychev design. Other responses can be manufactured when desired.

Specifications

MLP^{-1-2-3}

SMLP^{-1-2-3} (Surface Mount)

Number Model	Cut-Off Frequency fc (MHz)	Number of Sections	Typical 20 dB Point	Typical 30 dB Point	Typical 40 dB Point	Typical 50 dB Point	Minimum 60 dB Point
MLP	10 to 2000	3*	1.36 fc	1.52 fc	1.73 fc	1.98 fc	2.30 fc
		4*	1.21 fc	1.31 fc	1.43 fc	1.57 fc	1.73 fc
		5*	1.16 fc	1.22 fc	1.29 fc	1.37 fc	1.48 fc
		6	1.11 fc	1.16 fc	1.21 fc	1.26 fc	1.34 fc
		7	1.09 fc	1.12 fc	1.16 fc	1.20 fc	1.26 fc
		8	1.07 fc	1.10 fc	1.13 fc	1.16 fc	1.20 fc

3dB Passband: DC to fc
Insertion Loss: DC to 90% of fc per curve
Impedance: 50 Ohms
Environmental: MIL-E-5400, Class 1A

Power Rating: 2 Watts
VSWR: 1.5:1 to 90% of fc
Stopband Attenuation: Per above table min.

* SMLP series limited to 5 sections max.

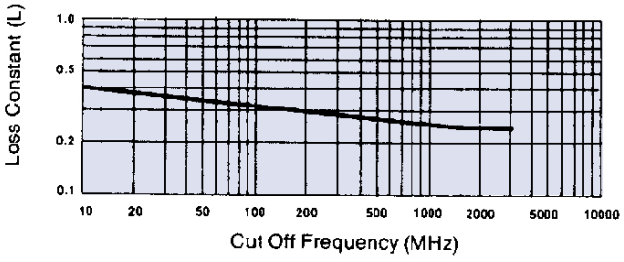
To designate the filter desired use:

1: Cut-off Frequency in MHz
2: Number of Sections
3: Outline configurations: CB, C1, C2, T8S for SMLP series), RA, CR, PR, TP (for MLP series). See page 93 for dimensions.

Examples:
MLP-2000-6-RA is a microminiature lowpass filter with a 3dB cut-off of 2000 MHz, 6 sections and per outline configuration RA.

SMLP-1500-5-CB is a surface mount low pass filter with a 3dB cut-off of 1500 MHz, 5 sections and per outline configuration CB.

Insertion Loss Curve



INSERTION LOSS AT 90%
of Fc = L × (N + 0.5) + 0.2dB.
N is number of sections
Determine L (Loss Factor) from graph at left.

Example: MLP-1000-6-RA. The number of sections (N) is 6 and the loss constant (L) at 1000 MHz is .25. The insertion loss at 90% of Fc will be .25 × (6 + .5) + .2 = 1.8dB.

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Standard Low Pass Filters

RLC Electronics' Standard Low Pass Filters are available with cut off frequencies ranging from 100MHz to 18 GHz. These filters combine minimum insertion loss and low VSWR in the Pass Band, together with sharp skirt selectivity and high rejection in the Stop Band. This is accomplished by the utilization of multisectional, modern network design. Miniaturization of these units is accomplished by utilizing advanced coaxial techniques and optimum selection of materials. Both lumped constant and distributive techniques are utilized in the fabrication of these filters.

Specifications

F^{-1-2-3}

Model Number	Pass Band (MHz)	3 dB Point (Typical) (MHz)	30 dB Point (Typical) (MHz)	60 db (Min.) Stop Band	Insertion Loss dB Max. Pass Band
F-10-100	DC-100	125	150	180-500	.45
F-10-200	DC-200	250	300	360-1000	.35
F-10-300	DC-300	375	450	540-1500	.35
F-10-400	DC-400	500	600	720-2000	.25
F-10-500	DC-500	625	750	900-2500	.25
F-10-600	DC-600	750	900	1080-3000	.25
F-10-800	DC-800	1000	1200	1440-4000	.25
F-10-1000	DC-1000	1250	1500	1800-5000	.25
F-10-1500	DC-1500	1875	2250	2700-7500	.25
F-10-2000	DC-2000	2500	3000	3600-10000	.25
F-10-3000	DC-3000	3750	4500	5400-15000	.25
F-10-4000	DC-4000	5000	6000	7200-20000	.35
F-10-5000	DC-5000	6250	7500	9000-20000	.35
F-30-600	DC-600	630	720	810-3000	.45
F-30-800	DC-800	840	960	1080-4000	.45
F-30-1000	DC-1000	1050	1200	1350-5000	.45
F-30-1500	DC-1500	1575	1800	2025-7500	.45
F-30-2000	DC-2000	2100	2400	2700-10000	.25
F-30-3000	DC-3000	3150	3600	4050-15000	.25
F-30-4000	DC-4000	4200	4800	5400-20000	.35
F-30-5000	DC-5000	5250	6000	6750-20000	.35
F-30-6000	DC-6000	6300	7200	8100-30000	.35
F-30-7000	DC-7000	7350	8400	9450-35000	.35
F-30-8000	DC-8000	8400	9600	10800-40000	.35
F-30-10.0	DC-10000	10500	12000	13500-40000	.35
F-30-12.4	DC-12400	13000	14900	16740-40000	.45
F-30-18.0	DC-18000	18900	21600	24300-40000	.45

Pass Band VSWR:
1.35:1 to 8 GHz
1.45:1 to 12.4 GHz
1.55:1 to 18.0 GHz
Power Rating: 50 Watts Average
Impedance: 50 Ohms
Environmental: MIL-E-5400, Class 1A Except Op temp. range -55C to +85C

Connector Types: (Male & Female)
Type- recommend Frequency Range:

N	DC - 12,400 (stopband level not guaranteed)
BNC	DC - 1,000
TNC	DC - 15,000
SMA	DC - 26,000

To designate the filter desired use:

1: 10 or 30 for model number
2: 100, 200 etc for cutoff frequency
3: "N" for type N, "B" for BNC, "T" for TNC or "R" for SMA connectors. Add "M" or "F" for two male or female.

Example: F-30-1000-NF is a model 30, 1000 MHz cutoff with type N female connectors

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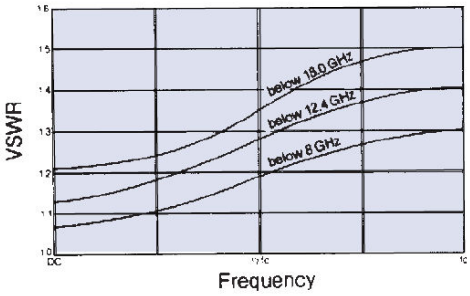
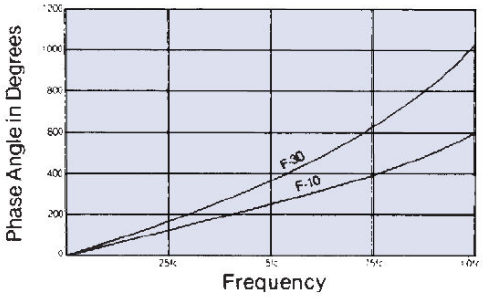
Typical Operating Curves

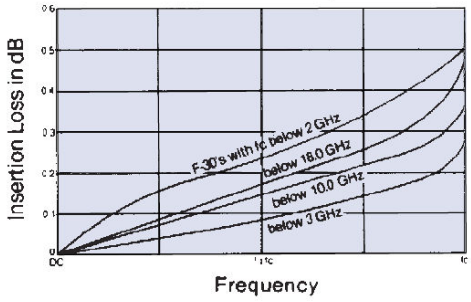
VSWR Vs. Frequency



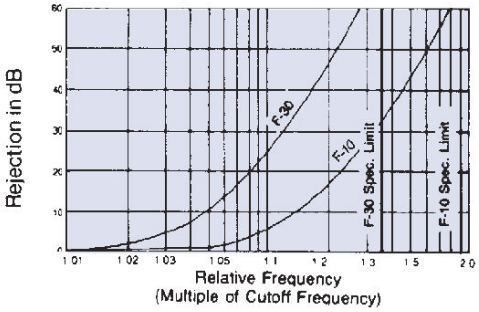
Phase Vs. Frequency



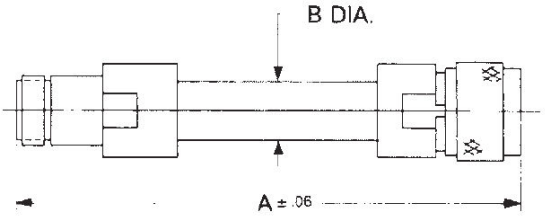
Insertion Loss Vs. Frequency



Response Vs. Frequency



Outline Drawing



MODEL	A			B		WEIGHT* (OUNCES)
	N	BNC/ TNC	SMA	N.BNC TNC	SMA	
F-30-600	6.51	5.93	5.54	.50	.50	4.5
F-30-800	5.57	5.84	4.95	.50	.50	4.0
F-30-1000	5.28	5.01	4.62	.50	.50	3.0
F-30-1500	4.80	4.53	4.14	.50	.50	3.5
F-30-2000	7.00	6.93	6.48	.44	.44	3.5
F-30-3000	5.31	5.09	4.76	.44	.44	3.0
F-30-4000	4.44	4.23	3.90	.44	.44	2.5
F-30-5000	4.14	3.96	3.76	.44	.31	1.5
F-30-6000	3.92	3.67	3.12	.44	.31	1.5
F-30-7000	3.60	2.56	3.25	.44	.31	1.5
F-30-8000	3.40	3.06	2.94	.44	.31	1.5
F-30-10.0	3.35	3.28	2.68	.44	.31	1.0
F-30-12.4	3.12	2.90	2.13	.44	.31	1.0
F-30-18.0	—	—	1.61	—	.25	1.0

*Type SMA connector

MODEL	A			B		WEIGHT* (OUNCES)
	N	BNC/ TNC	SMA	N.BNC TNC	SMA	
F-10-100	6.65	6.42	6.03	.50	.50	5.0
F-10-200	5.02	4.78	4.39	.50	.50	4.5
F-10-300	4.08	3.84	3.45	.50	.50	4.0
F-10-400	3.82	3.57	3.19	.50	.50	4.0
F-10-500	4.62	4.37	3.98	.50	.50	3.5
F-10-600	4.31	4.06	3.67	.50	.50	3.5
F-10-800	3.94	3.70	3.31	.50	.50	3.5
F-10-1000	3.72	3.53	3.14	.50	.50	3.0
F-10-1500	3.49	3.53	2.88	.50	.50	2.5
F-10-2000	6.00	5.40	4.96	.44	.44	2.5
F-10-3000	4.15	4.40	3.87	.44	.44	2.0
F-10-4000	4.00	3.48	3.17	.44	.44	2.0
F-10-5000	3.15	3.40	2.76	.44	.31	2.0

Tolerances unless otherwise specified are: .xx, ± .02; .xxx, ± .005.

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Custom Low Pass Filters

RLC Electronics' computerized Custom Low Pass Filters are available built to your specifications in the cutoff and rejection regions. By varying the number of sections, you not only have direct control of the cutoff frequency but also the skirt selectivity. RLC units are available over the pass band frequencies of 10 to 26,000 MHz. Advanced coaxial techniques and optimum selection of component materials assure low VSWR over the entire pass band.

Specifications

F-80^{-1-2-3}

Model Number	Cut-Off Frequency fc (MHz)	Number of Sections*	3 dB Point (Typical)	30 dB Point (Typical)	60 dB Point (Min.)
F-80	10 to 26,000	2	1.4 fc	2.5 fc	5.2 fc
		3	1.15 fc	1.7 fc	2.8 fc
		4	1.09 fc	1.4 fc	2.0 fc
		5	1.07 fc	1.26 fc	1.62 fc
		6	1.05 fc	1.18 fc	1.44 fc
		7	1.04 fc	1.14 fc	1.33 fc
		8	1.04 fc	1.11 fc	1.26 fc
		9	1.03 fc	1.08 fc	1.19 fc
		10	1.02 fc	1.06 fc	1.14 fc

Pass Band: DC to fc
Pass Band Insertion Loss(max): (see below)
Pass Band VSWR: 1.5**
Power Rating: 25 Watts
Impedance: 50 Ohms
Environmental: MIL-E-5400, Class 1A; except operating temp -55C to +85C

Connector Types: (Male & Female)
Type - Recommend Freq Range:
N DC - 12,400
BNC DC - 1,000
TNC DC - 12,400
SMA DC - 26,000

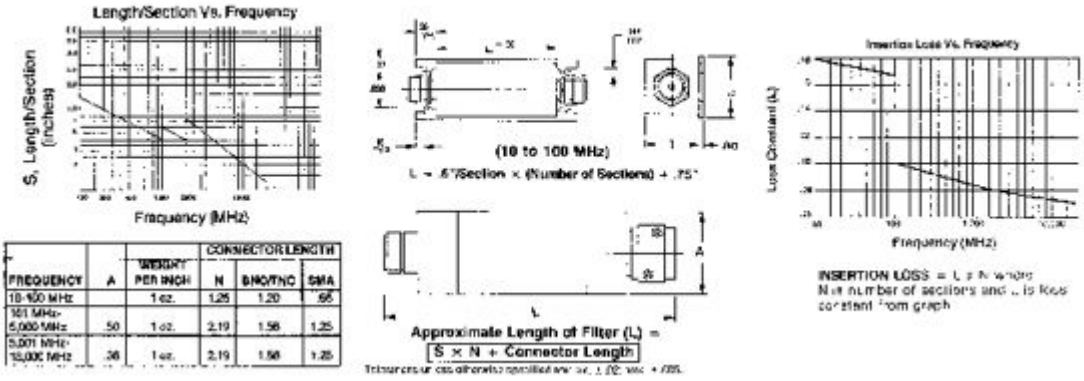
*Refers to number of filter sections N: total number of reactive elements is 2N+1
**VSWR 12.4GHz and above for 8 or more sections to be 1.5+(0.05(N-7)), where N = number of sections

To designate the filter desired use:

1: Cut-off Frequency in MHz
2: Number of Sections
3: "N" for type N, "B" for BNC, "T" for TNC or "R" for SMA. Add "M" or "F" for type male or female.

Example: F-80-500-4-N is a 500 MHz cutoff, 4 section filter with type N connectors.

Outline Drawing



FREQUENCY	A	WEIGHT PER INCH	CONNECTOR LENGTH N	BNC/TNC	SMA
10-100 MHz		1 oz.	1.25	1.20	.95
101 MHz-5,000 MHz	.50	1 oz.	2.19	1.56	1.25
5,001 MHz-10,000 MHz	.36	1 oz.	2.19	1.56	1.25

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Custom High Frequency Lowpass Filters

RLC computerized Low Pass filters are available built to your specifications for both cut-off frequency and rejection regions. This series of filters have cut-off frequencies up to 50.5 GHz with as many as 10 sections. By varying the number of sections you have direct control of the cut-off frequency and the skirt selectivity. Advanced coaxial techniques and optimum selection of component materials ensure stability over temperature and a low VSWR over the entire passband.

Specifications

F-80^{-1-2-3}

Model No.	Cut-Off Frequency (MHz)	Number of Sections	3 dB Point (Typical)	30 dB Point (Typical)	60 dB Point (min)
F-80	26000 to 50500	2	1.4 fc	2.5 fc	5.2 fc
		3	1.15 fc	1.7 fc	2.8 fc
		4	1.09 fc	1.4 fc	2.0 fc
		5	1.07 fc	1.26 fc	1.62 fc
		6	1.05 fc	1.18 fc	1.44 fc
		7	1.04 fc	1.14 fc	1.33 fc
		8	1.04 fc	1.11 fc	1.26 fc
		9	1.03 fc	1.08 fc	1.19 fc
		10	1.02 fc	1.06 fc	1.14 fc

Pass Band: DC to fc

Pass Band Ins Loss: 0.12dB/section up to 40 GHz
0.18dB/section up to 50.5 GHz

Pass Band VSWR: 1.8:1 up to 40GHz2.0:1 up to 50.5GHz

Impedance: 50 ohms

Environmental: MIL-E-5400, Class 1A

Connector Types: 2.92 mm up to 40Hz
2.4 mm or 1.85 mm up to 50.5 GHz

To designate the Filter desired use:

(1) Cut-off frequency in MHz (2) Number of Sections
(3) Connector "2.92","2.4" or 1.85 Add "M" or "F" for both male or female

Example: F-80-42000-6-2.4 is a 42000 MHz cut-off, 6 sections with 2.4 mm M/F connectors

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High Power Low Pass Filters

RLC Electronics' High Power Low Pass filters are designed for high power systems in the frequency range of 100 to 2000 MHz. Conservatively rated at 500W under extreme temperature and altitude conditions these filters have low VSWR and approximately 2/3rds the loss of our F-80 series. These filters offer you the flexibility of choosing your cutoff as well as the number of sections for a truly custom high power low pass product.

Specifications

LPP^{-1-2-3}

Model	Cut-Off Frequency Fc (MHz)	Number Of Sections	3dB Point (Typical)	30dB Point (Typical)	60dB Point (Min)
LPP	100 to 4000	2	1.4	2.5	5.2
		3	1.15	1.7	2.8
		4	1.09	1.4	2.0
		5	1.07	1.26	1.62
		6	1.05	1.18	1.44
		7	1.04	1.14	1.33
		8	1.04	1.11	1.26

Pass Band: DC to Fc
Pass Band Insertion Loss:
.06 dB per section Fc < 1000 MHz
.05 dB per section Fc > 1000Mhz

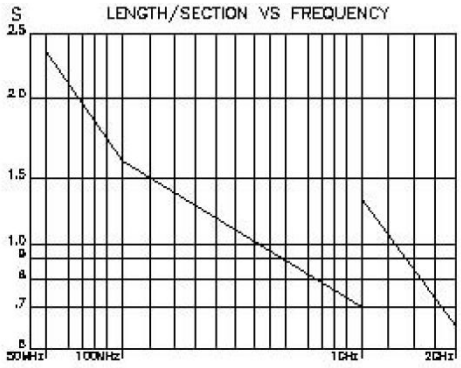
Pass Band VSWR: 1.25:1 (Max)
Power: 500 Watts avg
Connectors: Type N, SC, HN
Environment: Mil-E-5400

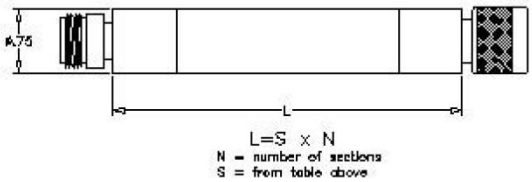
To designate the filter desired use:

1: Cut-off Frequency in MHz
2: Number of sections
3: Connector type. Add "M" or "F" for both male or female type male or female

Example: LPP-452-6-NF is a 452 MHz cutoff, 6 section filter with type N female connectors

Outline Drawing





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4th Order Absorptive Bessel Low Pass Filters

RLC Electronics' 4th Order Absorptive Bessel Filters provide the excellent group delay response of Bessel filters while maintaining impedance matching far into the stop band. Resistive elements are designed into these filters, resulting in a response that closely mimics the classic Bessel in both amplitude and phase. These filters are used in digital systems where truthful reproduction of waveforms is important. These filters are now available with -3dB cut off frequencies as high as 10 GHz. A surface mount configuration in available to 4 GHz.

Specifications

LBA^{-1-2}

Model No.	-3 dB Cut-off Frequency (MHz)	f/fc	Nominal Attenuation (dB)	Attenuation Accuracy (dB) Cut-off < 4 GHz	Attenuation Accuracy (dB) Cut-off > 4 GHz
LBA-	10 to 10,000*	0.2	-0.1	.2	.2
		0.4	-0.4	.2	.25
		0.6	-1.0	.2	.25
		0.8	-1.9	.2	.3
		1.0	-3.0	.2	.3
		1.2	-4.5	.48	.55
		1.33	-5.7	.59	.75
		1.4	-6.4	.64	.85
		1.6	-8.5	.74	1.00
		1.8	-10.9	.89	1.2
		2.0	-13.4	1.00	1.6
		2.67	-21.5	N/A	N/A

To designate the filter desired use:

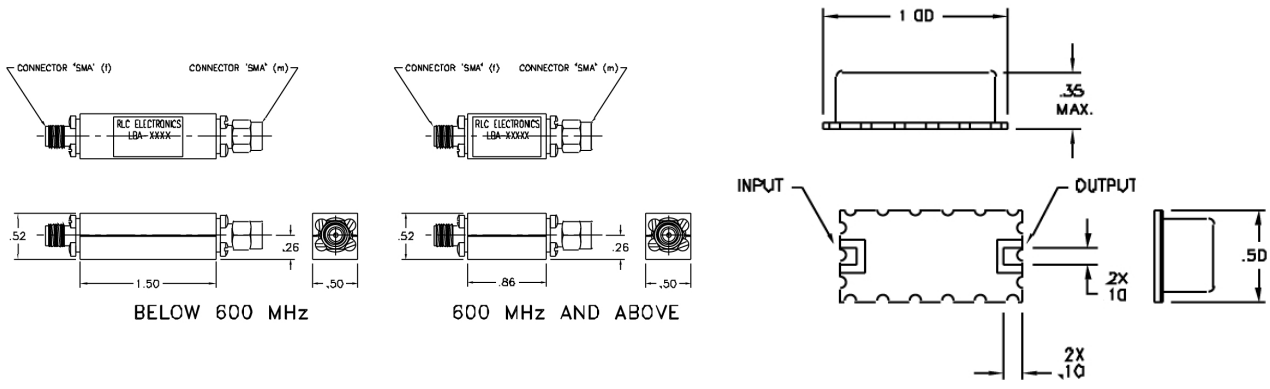
(1): 3dB cut-off frequency in MHz (2): "S" for surface mount

*surface mount configuration to 4Ghz max

Impedance: 50 ohms
VSWR:
1.5:1 to 2X 3dB cut-off or 8GHz (Whichever is less for cut-off < 4,000 MHz)
1.65:1 to 2X 3dB cut-off or 18 GHz (Whichever is less for cut-off > 4,000 MHz)

Connector Type: SMA female / male
Temperature: 55C to +85C
Environment: MIL-E-5400, Class 1A
Power Rating: 0.5 watts average

Outline Drawing



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4th Order Connector and Surface Mount Bessel Lowpass Filters

RLC Electronics now offers 4th Order Surface Mount Bessel Lowpass Filters with the same excellent frequency response as our existing LB filters in a convenient surface mount package. These filters should be regarded as compromise designs, for pulsed systems where truthful reproduction of the pulse shape is important. Primarily used on lightwave receivers to reduce the impact of higher order distortion. Units capable of withstanding automated soldering temperatures can also be supplied.

Specifications

LBS^{-1-2} (Surface-Mount)
LB^{-1}

Model No	-3 dB Cut-off Frequency (MHz)	F/Fc	Attenuation	Attenuation Accuracy (dB)
LBS OR LB	10 to 2100	.2	-.01	+/-.2
		4	-0.4	+/-.2
		.6	-1.0	+/-.2
		.8	-1.9	+/-.2
		1	-3.0	+/-.2
		1.2	-4.5	+/-.48
		1.33	-5.7	+/-.59
		1.4	-6.4	+/-.64
		1.6	-8.5	+/-.74
		1.8	-10.9	+/-.89
		2.0	-13.4	+/-1.0
		2.67	-21.5	N/A

Power Rating: 2 watts average
Impedance: 50 ohms
Connector Type: SMT or SMA

Temperature: -55C to +85C
Environmental: MIL-E-5400, Class 1A Except operating temperature

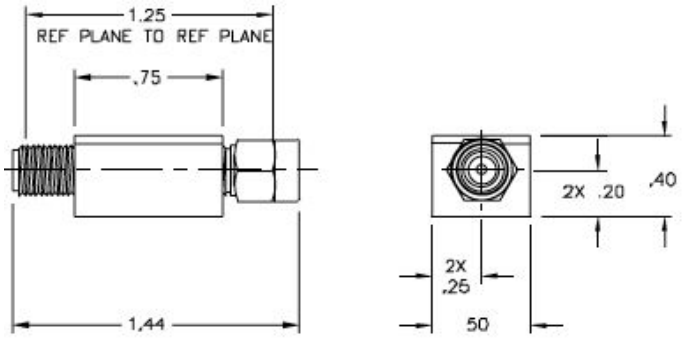
To designate the filter desired use:

1: 3dB cut-off frequency in MHz

2: PB, TP, CB, T8S, C1, C2 (see page 93 for dimensions) configuration

Example: LBS-1500-PB is a 4th order lowpass with a 3dB point of 1500 MHz and 1 dB point @ .6 Fc = 900 MHz in a standard "PB" package
LB-466 is a 4th order lowpass filter with a 3dB point of 466 MHz and 1dB point @ .6xfc(279.6 MHz).

Outline Drawing



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4th Order Tubular Bessel Lowpass Filters

RLC Electronics now offers 4th order tubular Bessel Lowpass Filters with 3dB cutoffs from 1GHz to 20 GHz. Computer design and tubular construction allow us to maintain excellent group delay characteristics with reasonable rejection while extending our 3dB cutoff beyond 26 Giga bits. These filters should be regarded as compromise designs for pulsed systems where truthful reproduction of the pulse shape is important. Primarily used on lightwave receivers to reduce the impact of higher order distortion and noise. These high frequency filters are essential for todays high bit rate applications

Specifications

LBT^{-1}

		1-4 GHz	4-10 GHz	10-20 GHz
F/Fc	**Attenuation**	**Delta**	**Delta**	**Delta**
0.20	-0.1 dB	+/-0.20 dB	+/-0.35 dB	+/-0.40 dB
0.40	-0.4 dB	+/-0.20 dB	+/-0.35 dB	+/-0.40 dB
0.60	-1.0 dB	+/-0.20 dB	+/-0.35 dB	+/-0.40 dB
0.80	-1.9 dB	+/-0.20 dB	+/-0.35 dB	+/-0.40 dB
1.00	-3.0 dB	+/-0.20 dB	+/-0.35 dB	+/-0.40 dB
1.20	-4.5 dB	+/-0.48 dB	+/-0.85 dB	+/-1.00 dB
1.33	-5.7 dB	+/-0.59 dB	+/-1.00 dB	+/-1.20 dB
1.40	-6.4 dB	+/-0.64 dB	+/-1.10 dB	+/-1.50 dB
1.60	-8.5 dB	+/-0.74 dB	+/-1.30 dB	+/-2.00 dB
1.80	-10.9 dB	+/-0.89 dB	+/-1.60 dB	+/-2.40 dB
2.00	-13.4 dB	+/-1.00 dB	+/-1.80 dB	+/-3.00 dB
Recommended Connector		SMA M/F	SMA M/F	K(2.92) M/F
Maximum Overall Length (L)		1.8"	1.54"	1.25"

Power Rating: 2 watts average
Impedance: 50 ohms
Connector Type: See Above

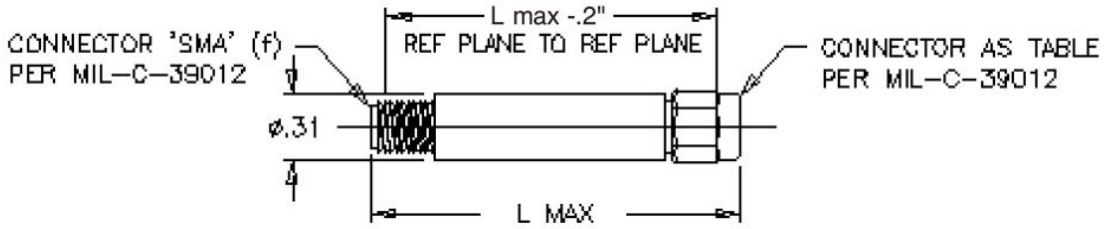
Temperature: -55C to +85C
Environmental: MIL-E-5400, Class 1A
Except operating temperature

To designate the filter desired use:

1: 3dB cut-off frequency in MHz

Example: LBT-14000 is a 4th order lowpass with a 3dB point of 14000 MHz and 1 dB point @ .6 Fc 8400 MHz with a Delta of +/-0.4 dB. The maximum overall length for this filter is 1.25 inches.

Outline Drawing



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Cable Low Pass Filter

RLC Electronics' Cable Lowpass Filters are available in conformable (FCLPF Series) & semi-rigid cable styles (CLPF Series) that are built to your cutoff, rejection and mechanical specifications. Computer designed and advanced coaxial techniques ensure optimal performance in a minimum amount of space.

Specifications

CLPF$^{-1-2-3-4}$ Semi-rigid-Series-
FCLPF$^{-1-2-3-4}$ Conformable-Series

Cut-Off Frequency fc (MHz)	Number of Sections (N)	3 dB Point (Typical)	30 dB Point (Typical)	60 dB Point (Min)
100 to 26,000	2	1.4 fc	2.5 fc	5.2 fc
	3	1.15 fc	1.7 fc	2.8 fc
	4	1.09 fc	1.4 fc	2.0 fc
	5	1.07 fc	1.26 fc	1.62 fc
	6	1.05 fc	1.18 fc	1.44 fc
	7	1.04 fc	1.14 fc	1.33 fc
	8	1.04 fc	1.11 fc	1.26 fc
	9	1.04 fc	1.08 fc	1.19 fc
	10	1.02 fc	1.06 fc	1.14 fc

Pass Band VSWR: See table 2
Pass Band Insertion Loss: See table below
Power Rating: 2 watts average
Impedance: 50 ohms

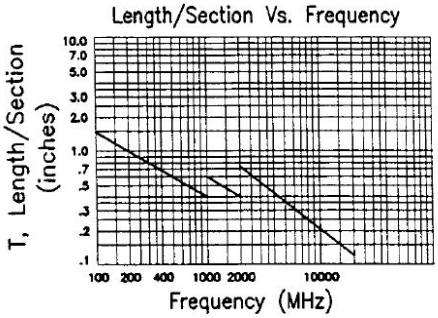
Connector Type: SMA Male
Cable Diameter: .141, .086
Environment: MIL-E-5400, Class 1A except operating temperature range 55C to +85C

To designate the filter desired use:

1: Cut-off frequency in MHz
2: Number of sections (N)
3: Cable length (in inches accurate to .05 inches)
4: Cable diameter AC for .141, BC for .086.

Example: CLPF-5000-5-6AC is a 5000 MHz cutoff, 5 section filter with a cable length of 6 inches, using a .141 diameter cable.
FCLPF-5000-5-6-BC is a 5000 MHz cutoff, 5 section filter with a cable length of 6 inches, using a conformable .086 diameter cable.

Outline Drawing



FREQUENCY (MHz)	A	CONNECTOR LENGTH
100 to 4,500	.50	.85
4,500 to 18,000	.31	.70
18,000 to 26,000	.25	.70

Cable Dia	Minimum Bend Radius
.086	0.23
.141	0.45

Passband Response

VSWR Passband	Cable Loss Constant		Filter Loss Constant in dB per Section
	.141 Diameter	.086 Diameter	
1.4:1 to 2.0 GHz	.14 dB/ft	.24 dB/ft	.10 dB/N
1.5:1 to 8.0 GHz	.30 dB/ft	.61 dB/ft	.08 dB/N
1.6:1 to 12.4 GHz	.33 dB/ft	.67 dB/ft	.075 dB/N
1.8:1 to 18.0 GHz*	.41 dB/ft	.83 dB/ft	.07 dB/N
2.0:1 to 26.0 GHz**	.50 dB/ft	1.00 dB/ft	.07 dB/N

Calculation Notes:
Passband Insertion Loss (Max) = (Filter Loss Constant x N) + Cable Loss *VSWR 12.4 GHz to 18 GHz for more than 8 sections to be 1.8 + (0.05 x (N-7)) **VSWR 18 GHz to 26 GHz for more than 8 sections to be 2.0 + (0.05 x (N-7))

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Standard High Pass Filters

RLC Electronics' High Pass Filters are designed for operation over the frequency range of 100 MHz to 18.0 GHz. Sharp rejection below the cutoff frequency is assured in the use of these filters. Low insertion loss and low VSWR in the pass band are accomplished by the utilization of impedance matching, transforming end sections, and a precise coaxial fabrication. Rugged light weight construction makes the units suitable for extreme environmental conditions.

Specifications

F^{-1-2-3}

Model Number	Pass Band (GHz)	3 dB Point Typical (GHz)	30 dB Point Typical (GHz)	60 dB Point Stop Band (GHz)
F-20-100-	.1 -.20	.09	.07	DC -.05
F-20-200-	.2 - .40	.18	.14	DC -.10
F-20-300-	.3 - .60	.27	.21	DC -.15
F-20-400-	.4 - .80	.36	.28	DC -.20
F-20-500-	.5 - 1.00	.45	.35	DC -.25
F-20-600-	.6 - 1.20	.54	.42	DC -.30
F-20-800-	.8 - 1.60	.72	.60	DC -.40
F-20-1000-	1.0 - 2.00	.90	.70	DC -.50
F-40-1.0-	1.0 - 2.00	.90	.70	DC -.50
F-40-1.5-	1.5 - 3.00	1.35	1.05	DC -.75
F-40-2.0	2.0 - 4.00	1.80	1.40	DC -1.00
F-40-3.0	3.0 - 6.00	2.70	2.10	DC -1.50
F-40-4.0	4.0 - 8.00	3.60	2.80	DC -2.00
F-40-5.0	5.0 - 10.00	4.50	3.50	DC -2.50
F-40-6.0	6.0 - 12.00	5.40	4.20	DC -3.00
F-40-8.0	8.0 - 16.00	7.20	5.60	DC -4.00
F-40-10.0	10.0 - 18.00	9.20	7.00	DC -5.00

Pass Band VSWR: 1.6:1
Pass Band Insertion Loss: F-20;0.7dB max. F-40;0.5dB max
Power Rating(Average): F-20 - 25 Watts F-40 - 100 Watts
Impedance: 50 Ohms
Environmental: MIL-E-5400, Class 1A
Connectors: (Male & Female)

Type - Recommend Freq Range:

N	DC - 12,400
BNC	DC - 1,000
TNC	DC - 15,000
SMA	DC - 26,000

To designate the filter desired use:

1: "20" or "40" for model number
2: "100", "200" etc for pass band
3: "N" for type N, "B" for BNC, "T" for TNC or "R" for SMA connectors. Add "M" or "F" for both male or female.

Example:F-40-10.0-R is a model 40, 10 to 18 GHz filter with type SMA (m/f) connectors.

Typical Operating Curves

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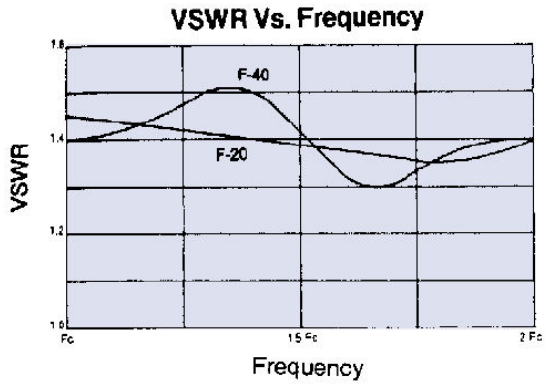
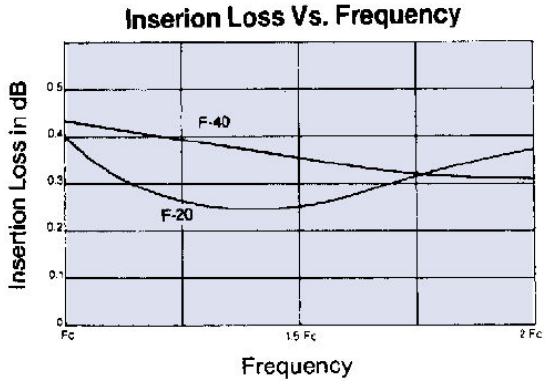
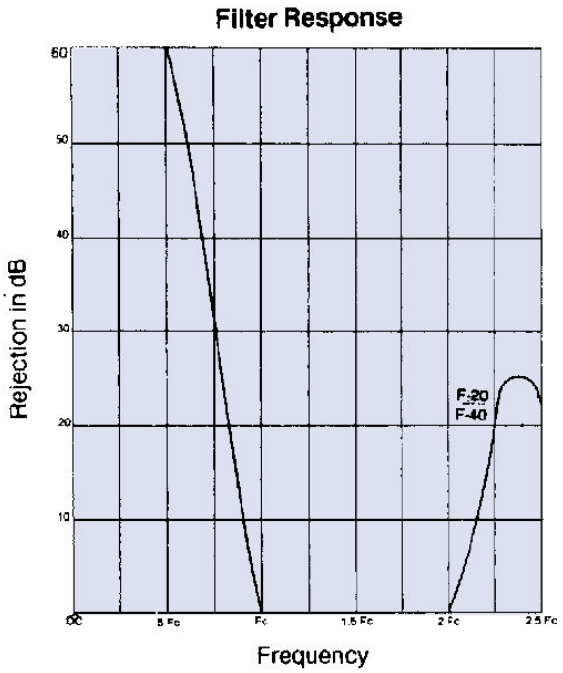
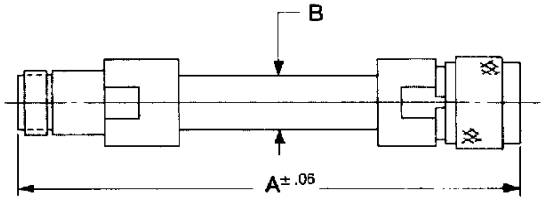






Outline Drawing



MODEL	A			B	WEIGHT (ounces)
	N	BNC/ TNC	SMA		
F-20-100	4.04	3.83	3.44	.625	5.0
F-20-200	4.04	3.83	3.44	.625	5.0
F-20-300	4.04	3.83	3.44	.625	5.0
F-20-400	4.04	3.83	3.44	.625	5.0
F-20-500	4.04	3.83	3.44	.625	5.0
F-20-600	4.04	3.83	3.44	.625	5.0
F-20-800	4.04	3.83	3.44	.625	5.0
F-20-1000	4.04	3.83	3.44	.625	5.0
F-40-1.0	4.20	3.90	3.56	.50	5.0
F-40-1.5	4.20	3.90	3.56	.50	5.0
F-40-2.0	4.20	3.90	3.56	.50	5.0
F-40-3.0	6.28	6.00	5.68	.44	8.0
F-40-4.0	5.13	4.84	4.50	.44	7.0
F-40-5.0	4.44	4.13	3.74	.44	6.0
F-40-6.0	3.84	3.66	3.22	.44	5.5
F-40-8.0	3.32	3.00	2.72	.44	5.0
F-40-10.0	2.90	2.75	2.28	.44	5.0

Custom Wide Band High Pass Filters

RLC Electronics' Customized Wide Band High Pass Filters are designed for operation over the frequency range of 20MHz to 18 GHz. Good VSWR in the pass band, low insertion loss, and good rejection are achieved by utilization of both distributed and lumped component techniques. Miniaturized construction makes the units suitable for many uses.

Specifications

F^{-1-2-3} R

Model Number	Cut-Off Frequency fc (MHz)	Upper** Pass Band Frequency (MHz)	Number of Sections*	20 dB Point (Typical)	40 dB Point (Typical)	60 dB Point (Typical)	3 dB Point (Typical)	Insertion Loss**
F-90	20 to 1,500	4000	2	0.50 fc	0.25 fc	X	0.70 fc	1.0
			3	0.65 fc	0.50 fc	0.35 fc	0.80 fc	1.0
			4	0.73 fc	0.62 fc	0.50 fc	0.84 fc	1.0
			5	0.78 fc	0.72 fc	0.60 fc	0.88 fc	1.0
			6	0.82 fc	0.76 fc	0.68 fc	0.90 fc	
F-100	1,500 to 6,000	18000	2	0.50 fc	0.25 fc	X	0.70 fc	1.0
			3	0.65 fc	0.50 fc	0.35 fc	0.80 fc	1.1
			4	0.73 fc	0.62 fc	0.50 fc	0.84 fc	1.2
			5	0.78 fc	0.72 fc	0.60 fc	0.90 fc	1.3

Pass Band VSWR:
F-90's 1.5 to 25 x fc(4 GHz max)
F-100's 1.8 to 5 x fc (12.4GHz max)
2.0 to 8 x fc (18.0GHz max)

Power Rating: 2 watts avg.
Impedance: 50 Ohms
Environmental: MIL-E-5400, Class 1A
Connectors: Type SMA Female

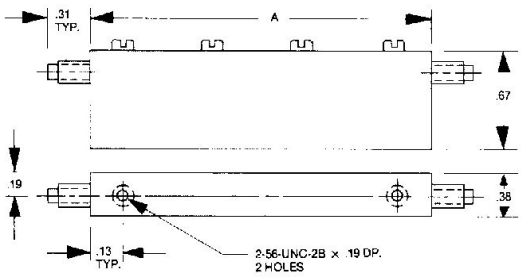
* Refers to number of filter sections N; total number of reactive elements is given by 2N+1.
** From cut off frequency to frequency where VSWR ceases to be specified

To designate the filter desired use:

1: "90" or "100" for model number
2: Cut off frequency in MHz
3: Number of sections

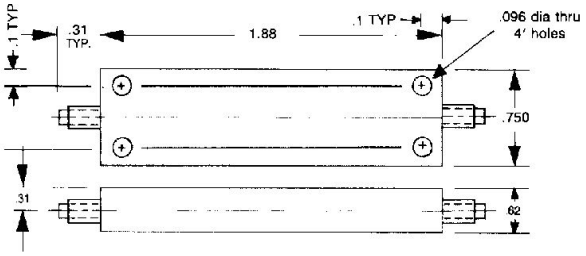
Example:F-90-100-4-R is an F-90 series, 100 - 2500 MHz pass band, 4 section filter, SMA (female) connectors.

Outline Drawing



MODEL F-100

F-100 LENGTH				
Number of Sections	2	3	4	5
"A" Dimension	.98	1.18	1.38	1.58



MODEL F-90

Tolerances unless otherwise specified are: .xx, ± .02; .xxx, ± .005.

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Surface Mount High Pass Filters

RLC Electronics' Surface Mount High Pass Filters provide the excellent response of our F-90 series filters, in a package suitable for surface mounting. Standard packages allow up to 6 sections.Special packages or responses are available.

Specifications

SMHP^{-1-2-3}

Model	Cut Off Frequency (MHz)	Number Of Sections	20 dB Point Typical	40 dB Point Typical	60 dB Point (min.)	3 dB Point Typical	Insertion Loss (max.)
SMHP	50 To 2,000	2	0.50 fc	0.25 fc	X	0.70 fc	1.0
		3	0.65 fc	0.50 fc	0.35 fc	0.80 fc	1.0
		4	0.73 fc	0.62 fc	0.50 fc	0.84 fc	1.0
		5	0.78 fc	0.72 fc	0.60 fc	0.88 fc	1.1
		6	0.82 fc	0.78 fc	0.68 fc	0.90 fc	1.2

Power Rating: 2.0 watts
Temperature: -55C to +85C
Impedance: 50 ohms
Environment: Mil-E-5400, Class 1A
VSWR: 1.5:1, fc to 20x fc (4000 MHz max.)
Mounting: Surface Mount

To designate the filter desired use:

1: Cut-off frequency in MHz
2: Number of Sections
3: See page 93 for configurations from outlines.

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High Pass Cable Filters

RLC Electronics' High Pass Cable Filters combine the excellent response of our F-90 series filters with the mechanical flexibility of formed semi-rigid cable(s).

Specifications

HPC-1-2-3-4

Model	Cut Off Frequency (MHz)	Number Of Sections	20 dB Point Typi-cal	40 dB Point Typical	60 dB Point (Min.)	3 dB Point Typical	Insertion Loss of Filter
HPC	50 To 2,000	2	0.50 fc	0.25 fc	X	0.70 fc	1.0
		3	0.65 fc	0.50 fc	0.35 fc	0.80 fc	1.0
		4	0.73 fc	0.62 fc	0.50 fc	0.84 fc	1.0
		5	0.78 fc	0.72 fc	0.60 fc	0.88 fc	1.1
		6	0.82 fc	0.78 fc	0.68 fc	0.90 fc	1.2

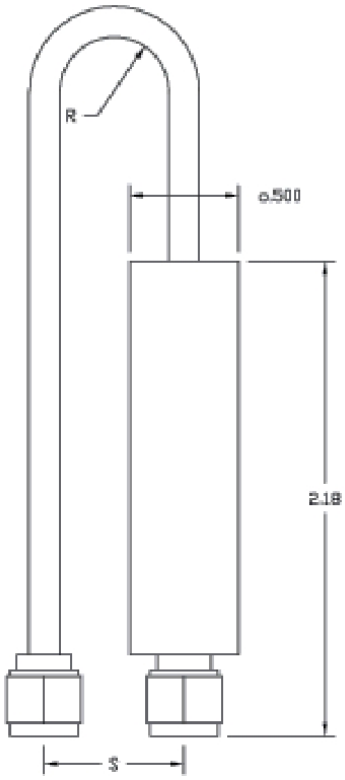
Power Rating: 2.0 watts
Impedance: 50 ohms
VSWR: 1.5:1, fc to 20x fc (4000 MHz max.)
Connector Type: SMA Male
Temperature: -55C to +85C
Environment: Mil-E-5400, Class 1A
Cable diameter: .141, .086
Insertion Loss: Filter Loss + Cable Loss

To designate the filter desired use:

1: Cut-off frequency in MHz
2: Number of Sections
3: Connector Spacing (S in inches)
4: Cable diameter AC for .141, BC for .086

Example: HPC-500-5-2.5-AC is a 500 MHz cut-off, 5 section high pass filter with connectors 2.5 inches apart using .141 diameter cable.

Outline Drawing



CABLE DIA.	MINIMUM BEND RADIUS
.141	.45
.086	.23

PASSBAND	CABLE LOSS CONSTANT	
	.141 DIAMETER	.086 DIAMETER
0 TO 2 GHz	.14 dB/ft.	.24 dB/ft.
2 TO 4 GHz	.30 dB/ft.	.61 dB/ft.

APPROXIMATE CABLE LENGTH = R X TT + 2.18"

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Surface Mount Band Pass Filters

RLC Electronics' surface mount filters offer the same excellent frequency response characteristics as our existing MBP micro miniature filters. Units capable of withstanding automated soldering temperatures can also be suplied, if required.

Specifications

SMBP-1-2-3-4

MODEL No.	CENTER FREQUENCY RANGE (MHz)	3 dB BANDWIDTH (% OF fc)	NUMBER OF SECTIONS	STOPBAND ATTENUATION
SMBP-	10 TO 1500	2 TO 70%	2 TO 8	Seepage 89
	1500 TO 4000	2 TO 50%		
	4000 TO 6000	5 TO 50%	2 TO 6	SEE FIGURE 1

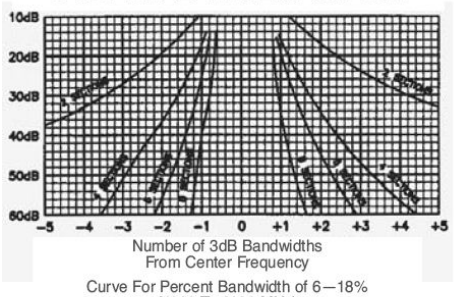
VSWR: 1.5:1
Passband Insertion Loss (max at fc): See Figure 2
Impedance: 50 Ohms
Power Rating: 2 Watts
Environment: MIL-E-5400, Class 1A
Surface Mounting

To designate the PRODUCT desired use:

1: Center frequency in MHz
2: 3dB bandwidth in MHz
3: Number of sections
4: Outline configurationC1 or C2 for up to 4 GHz max; D1 or C3 for 4 to 6 GHz (see page 93 for dimensions)

Example: SMBP-500-4-C1 is a 500MHz center frequency, 50 MHz 3 dB bandwidth, 4 section, Miniature Band Pass Filter with an outline per C1 (see page 36 for dimensions)

STOPBAND ATTENTUATION



Curve For Percent Bandwidth of 6—18%
(4000 To 6000 MHz)

Figure 1

INSERTION LOSS

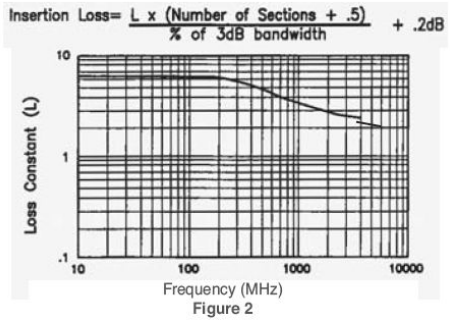


Figure 2

Micro Miniature Band Pass Filters

RLC Electronics' Micro Miniature Band-Pass Filters offer excellent frequency response characteristics with low insertion loss. The small size capability is provided by utilization of miniaturized high Q devices in a microstrip mode. Standard units utilize low ripple, Chebychev design. Other responses are available when desired.

Specifications

MBP-1-2-3-4

Model Number	Center Frequency Range (MHz)	3 dB Bandwidth (% of fc)	Number of Sections	Stopband Attenuation
MBP	10 to 500	2 to 70%	2 to 8	See Curves on page 89
	500 to 2500	2 to 50%		
	2500 to 12,400	2 to 25%		

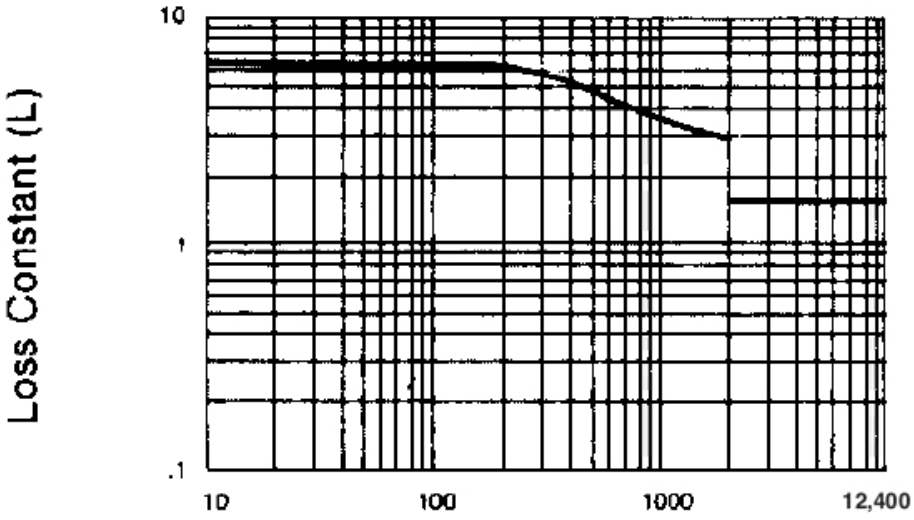
VSWR: 1.5:1, Bandwidth: Curve 1,see page 89
Passband Insertion Loss (max at fc): See chart below
Power Rating: 2 Watts
0.5 dB Bandwidth: Curve 2 on page 89
1 dB Bandwidth: Curve 3 on page 89
Connectors: SMA Female, tabs or pins
Impedance: 50 Ohms
Phase Linearity: 5 deg. Curve 4 on page 89
Spurious: None to 2.8 x fc or 18 GHz whichever is less
Environmental: MIL-E-5400, Class 1A

To designate the filter desired use:

1: Center Frequency in MHz
2: 3dB bandwidth in MHz
3: Number of Sections
4: Outline configurations: PB,TP,T8S,CB,RR,RA, CR,T8,PR (see page 93 for dimensions).

Example: MBP-500-4-RA is a 500MHz center frequency 50 MHz 3 dB bandwidth, 4 section, Micro Miniature Band Pass Filter with outline per configuration RA

$$\text{Insertion Loss} = \frac{\text{Lx (number of sections } +.5)}{\text{\% of 3dB bandwidth}} + 0.2\text{dB}$$



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Tubular Band Pass Filters

RLC Electronics' Tubular Band Pass Filters are designed for operation over the frequency range of 15MHz to 8.0 GHz. These fixed tuned filters are constructed utilizing 2 to 12 sections with 3 dB bandwidths of 2 to 60% of center frequency. These filters utilize direct coupled sections.

Specifications

BPF-1-2-3-4-5

Model Number	Center Frequency Range (MHz)	3 dB Bandwidth (% of fc)	Number of Sections	Stopband Attenuation
BPF-	15 to 1000 (BPF-1250) 30 to 2000 (BPF-750) 50 to 4000 (BPF-500)	2 to 60	2 to 12	See Curves on page 89
	75 to 400 (BPF-250)	3 to 40		
	400 to 8000 (BPF-250)	3 to 60		

VSWR: 1.5:1, Bandwidth: Curve 1, see page 89
Passband Insertion Loss (max at fc): Curve 1, see page 89
0.5 dB Bandwidth: Curve 2, see page 89
1 dB Bandwidth: Curve 3, see page 89

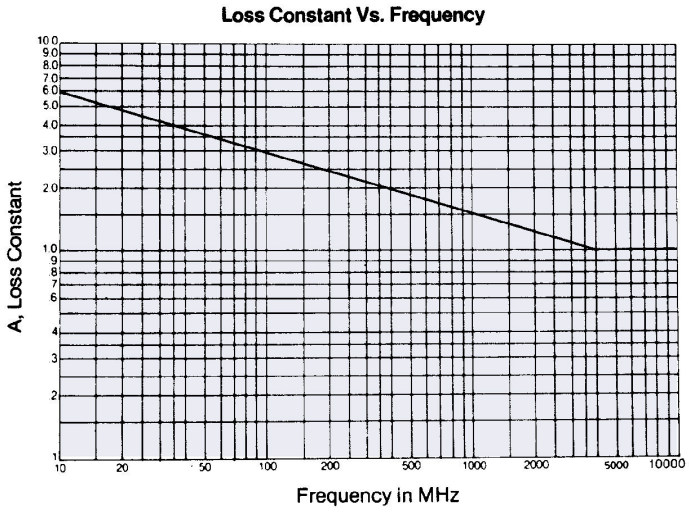
Power,Average, Max:
10 Watts BPF-250 25 Watts BPF-500
50 Watts BPF-750 200 Watts BPF-1250
Impedance: 50 Ohms
Connectors: Type N, BNC, TNC, SMA (male or female)
Environmental: MIL-E-5400, Class 1A
Phase Linearity: 5 deg. Curve 4, see page 89

To designate the filter desired use:

1: Filter diameter, "250" is 1/4 inch "500" is 1/2 inch, "750" is 3/4 inch "1250" is 1 1/4 inch
2: Center frequency in MHz
3: 3dB bandwidth in MHz
4: Number of sections
5: "N" for type N, "B" for BNC, "T" for TNC, "R" for SMA. BPF-250 is available with only SMA. Add "M" or "F" for two male or female.

Example: BPF-500-950-95-5-R is a 1/2" diameter, 950 MHz center frequency, 95 MHz 3 dB bandwidth, 5 sections and sma connectors

Insertion Loss



Filter	Max. Insertion Loss at Center Frequency
BPF 250	2.2 × A × (N + .5) ÷ B + 0.2
BPF 500	A × (N + .5) ÷ B + 0.2
BPF 750	.65 × A × (N + .5) ÷ B + 0.2
BPF 1250	.5 × A × (N + .5) ÷ B + 0.2

N is number of sections
B is percent 3dB bandwidth =
100 x 3 (3 dB bandwidth in MHz) ÷ center frequency in MHz

Outline Drawing

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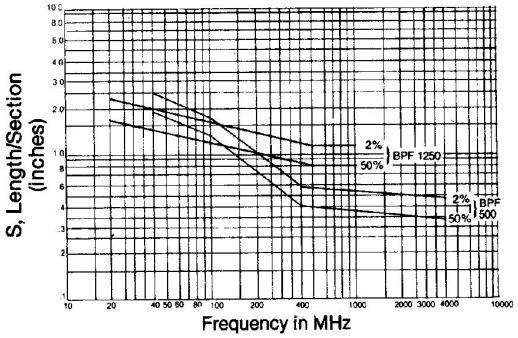
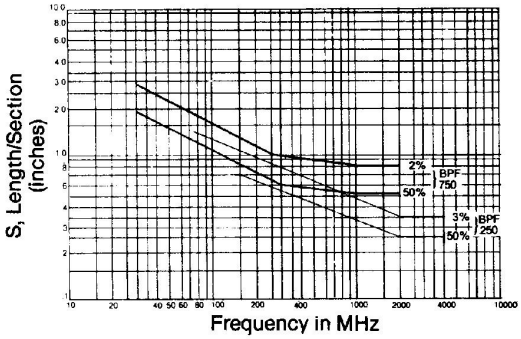
Length per Section Vs. Frequency

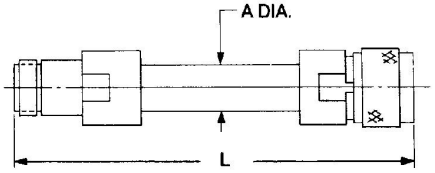




	BPF-	250	500	750	1250
	A DIM	.250	.500	.750	1.250
CONNECTOR LENGTH	SMA	1.28	1.25	1.31	1.31
	BNC/ TNC	—	1.56	2.27	2.27
	N	—	2.19	2.10	2.10

APPROXIMATE LENGTH OF FILTER (L) =

S × (N + .5) + connector length



Tolerances unless otherwise specified are: .xx, ± .02; .xxx, ± .005.

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Cavity, Comb Line and Interdigital Band Pass Filters

RLC Electronics' Cavity, Comb Line and Interdigital Band PassFilters are fixed tuned filters that feature sharp stop band rejection and lower losses that comparable tubular band pass filters.Parallel coupled round rod distributed resonators afford small size and high Q to achieve a near ideal bandpass response. Units are constructed to operate over the most severe military environmental conditions. Integral Low Pass Filters are available to extend the stopband to as high as 40 GHz. The type of filter selected is usually determined by the percentage 3 dB band-width desired.

Specifications

Model Number [1-2-3-4]

Filter Type	Model Number	Center Frequency Range (MHz)	3 dB Bandwidth (% of fc)	Number of Sections	Stopband Attenuation
Cavity	CBPF	500 to 26000	0.2 to 3.0	2 to 14	See Curves on page 89
Comb Line	CF	500 to 36000	3.0 to 25.0	2 to 14	
Interdigital	IBPF	1000 to 26000	25.0 to 67.0	3 to 15	

Insertion Loss(max at fc): Curve 1, see page 89.
***VSWR: 1.5:1, Bandwidth:** Curve 1, see page 89
*For no. of sections <= 8, VSWR is 1.5:1 For N=9 to 11, VSWR is 1.5:1 to 10 GHz, above 10GHz VSWR = 1.5 +0.07(N-8) For N=12 to 15, VSWR is 1.5:1 to 7 GHz, above 7 GHz, VSWR is 1.6+0.1(N-11)
Power Rating: IBPF 100 watts CF and CBPF 15 watts
Impedance: 50 Ohms
Environmental: MIL-E-5400, Class 1A

0.5 dB Bandwidth: Curve 2, see page 89
1 dB Bandwidth: Curve 3, see page 89
Phase Linearity: 5 deg. Curve 4, see page 89
Connectors (female):

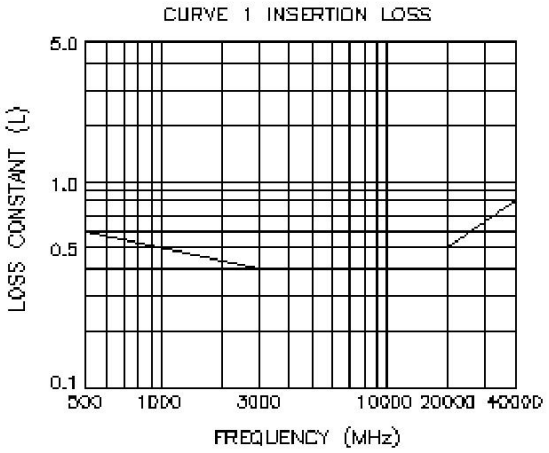
Type	Recommended Freq Rng (MHz)
BNC	DC-1,000
N	DC-12,400
TNC	DC-15,000
SMA	DC-26,000
K	DC-40,000

To designate the filter desired use:

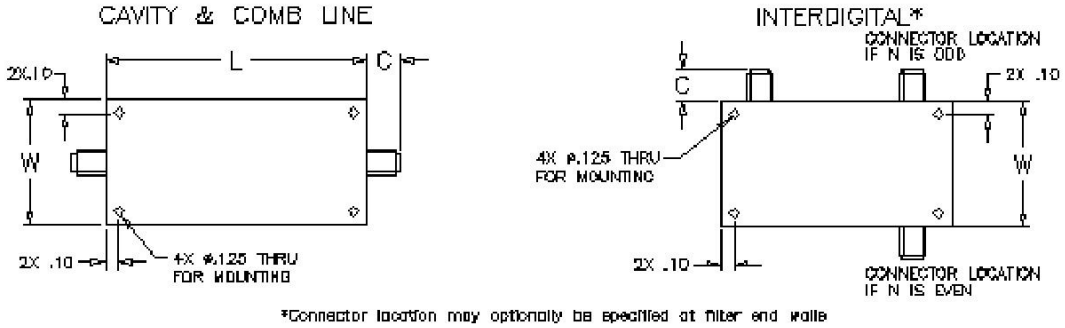
1: Center frequency in MHz
2: 3dB bandwidth in MHz
3: Number of sections
4: "N" for type N, "B" for BNC, "T" for TNC, "R" for SMA (female) "K" for 2.92mm (female)

Example: IBPF-3500-1000-10-R is a 3500 MHz center frequency, 1000 MHz 3 dB BW, 10 section filter with SMA (female) connectors.

Outline Drawings



$$\text{INSERTION LOSS} = \frac{L \times (\text{NUMBER OF SECTIONS} + .5)}{\% \ 3 \text{ dB BANDWIDTH}} + 0.35 \text{ dB}$$



*Connector location may optionally be specified at filter end walls

CenterFrequency(MHz)	Approximate Dimension Table			
	W IBPF	W CBPF,CF	H	L (N is the number of sections)
501-800	2950 ---------- + .4 5 Fc(MHz)	3.75	1.19	1.125xN+.625
801-2000		2.25	1	3.75 for N=2 N+.75 for N>2
2001-4000		1.38	.75	2.50 for N=2 .625xN+.625 for N>2
4001-8000		.94	.63	2.00 for N=2 .50xN+.5 for N>2
8001-12000		.75	.56	1.50 for N=2, 2.00 for N=3 2.50 for N=4 or 5, 3.00 for N=6 3.50 for N=7 or 8
12001-20000		.70	.53	1.75 for N=2 to 4 2.38 for N=5 or 6 3.00 for N=7 or 8
20001-36000		.53	.38	

CONNECTORS	R	N	T/B
"C" Dimension	.30	.60	.52

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Cavity Bandpass Filters--Tunable

Specifications

CBPT[-1-2-3-4]

Model	Center Frequency Range (MHz)	3 dB Bandwidth (% of fc)	Number of Sections	Stopband Attenuation
CBPT	2,000 to 12,000	0.2 to 3.0	2 to 10	See Rejection Curves for Cavity Filters On Page 34

Power Rating: 15 watts
Impedance: 50 ohms
VSWR: 1.5:1
Outlines: Per **CBPF** series outlines, see page 57

Temperature: -55 to +85C
Environment: MIL-E-5400, Class 1A
Connectors: SMA female
Tuning Limit: +-7.5%

To designate the filter desired use:

1: Center Frequency in MHz
2: 3dB Bandwidth in MHz
3: Number of Sections
4: Connectors : N for type N, or R for SMA

Example: CBPT-2500-50-7-R is 2500 MHz center frequency, 50 MHz 3 dB bandwidth, 7 section, tunable from 2312 to 2688 MHz, Band pass filter with SMA female connectors.

Ceramic Resonator Band Pass Filters

RLC Electronics' ceramic resonator filters use 6 mm. ceramic coaxial resonators to achieve cavity filter response in a reduced size. Standard units cover the frequency range of 500 to 2500 MHz. RLC has supplied this filter type in surface mount packages.

Specifications

CRB$^{-1-2-3-4}$

Model No.	Center Frequency Range (MHz)	3 dB Bandwidth (% of fc)	Number of Sections	Stopband Attenuation
CRB-	500 to 2500	1 to 12%	2 to 6	See Curves on Next Page

VSWR: 1.5:1
Passband Insertion Loss (Max at fc): Next Page
Impedance: 50 ohms
Power Rating: 2 watts
Environment: MIL-E -5400, Class 1A
Connectors: SMA

To designate the filter desired use:

1: Center frequency in MHz
2: 3dB bandwidth in MHz
3: Number of sections
4: "R" for SMA `M' and SMA `F'
"RF" for two SMA `F'
"RM" for two SMA `M'

Example: CRB -1000-50-4-R is a 1000 MHz center frequency, 50 MHz 3 dB bandwidth, 4 section, ceramic resonator filter with one SMA `M' and one SMA "F' connector.

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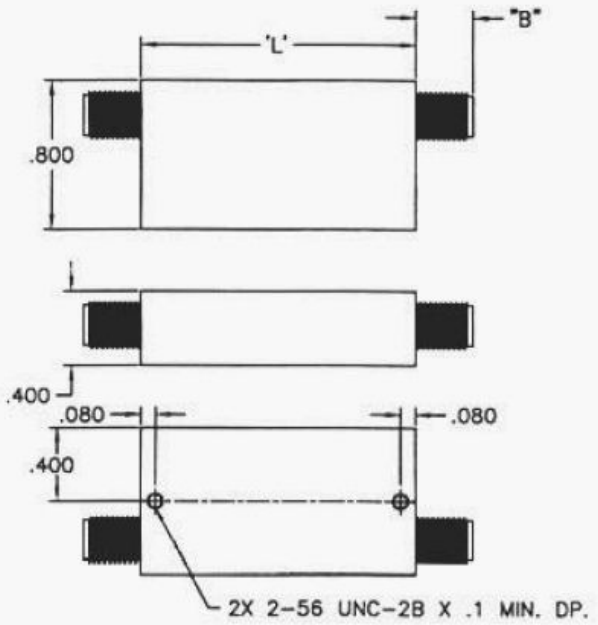
CERAMIC RESONATOR FILTER OUTLINE

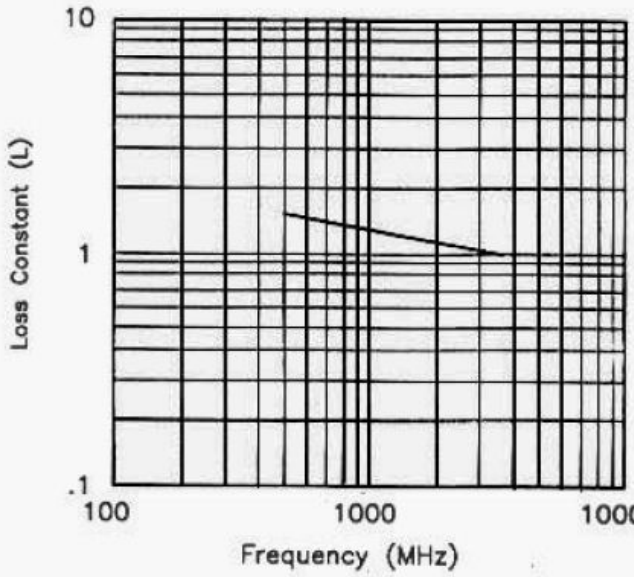
DIMENSIONS ARE IN INCHES



B= .31" FOR SMA 'F'
B=.38" FOR SMA 'M'
L= 1.25" FOR 2 or 3 SECTIONS
L= 1.5" FOR 4 SECTIONS
L= 2.00" FOR 5 or 6 SECTIONS

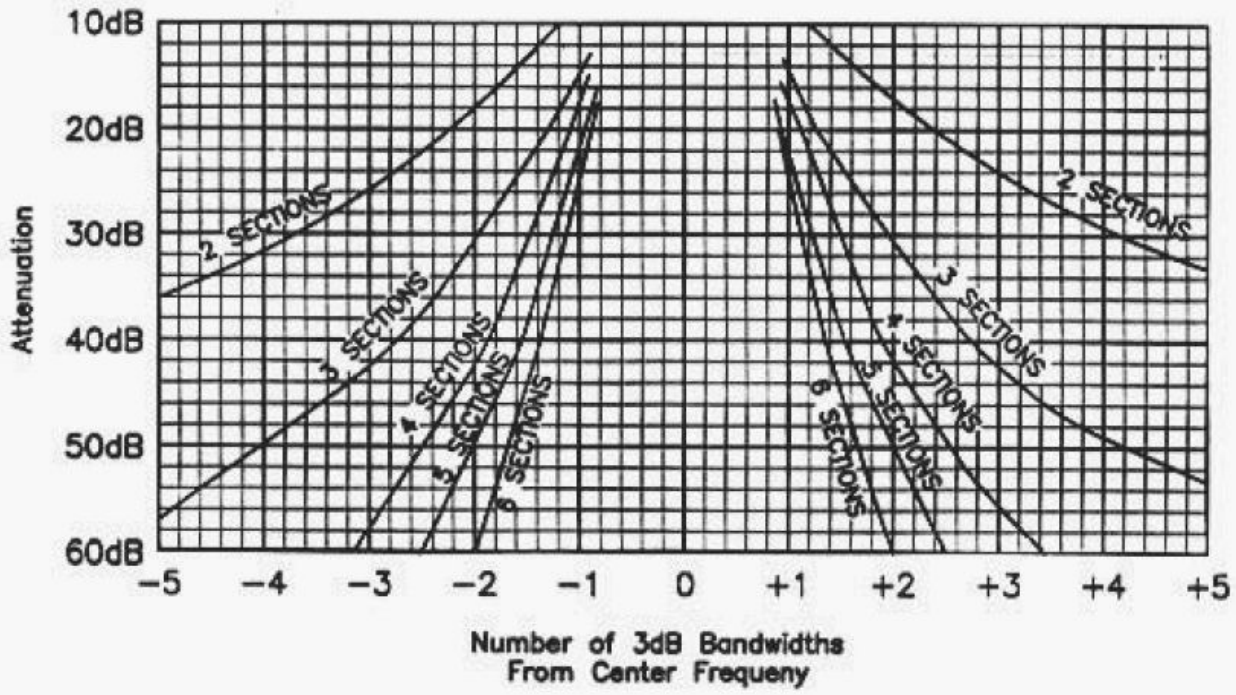
INSERTION LOSS

$$\text{Insertion Loss} = \frac{L \times (\text{number of sections} + .5)}{\% \text{ of 3dB bandwidth}} + 0.$$



STOPBAND ATTENUATION

CERAMIC RESONATOR FILTERS



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Jitter Filters Five Section Cavity

RLC Electronics' Jitter Filters are designed for use with jitter analysis systems. Modern digital networks may generate or transfer jitter. Excessive jitter can cause high bit error rates. Jitter filters are used to suppress the harmonic content of the reference clock and recovered clock signals. Jitter Filters also suppress any sub-harmonics or other spurious signals that may be present. The 30 dB stopband extends to D.C. and to above the third harmonic.

Specifications

JF^{-1}

Model Number	Center Frequency (MHz) fc	Loss at fc	1 dB Bandwidth (min)	20 dB Attenuation Bandwidth (max)	30 dB Attenuation Bandwidth (max)
JF	50 to 200	<= 3.5 dB	fc ± 0.8% of fc	fc ± 1.6% of fc	fc ± 2.4% of fc
	201 to 18,000	<= 3.0 dB			

Power Rating: 0.5 watts average
Impedance: 50 ohms
VSWR: 1.3:1 Over the specified 1 dB bandwidth

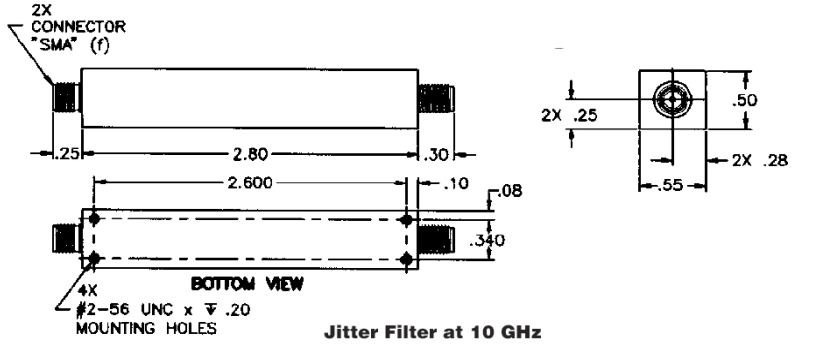
Connectors: SMA Females
Temperature: +10 to +45C Operating
Environment: MILE5400, Class 1A except operating temperature

To designate the filter desired use:

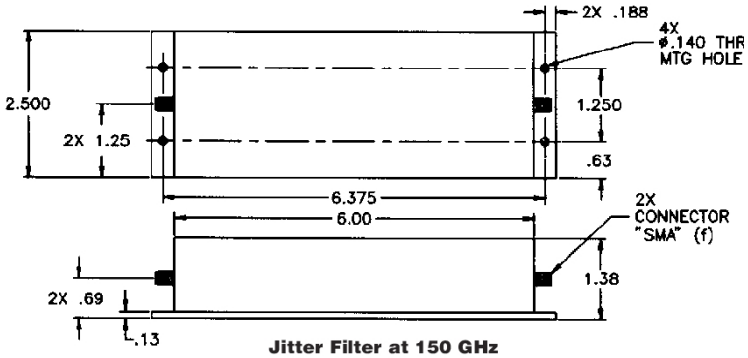
1: Center Frequency (Jitter Frequency) in MHz.

Example: JF500 is a Jitter filter with a center frequency of 500 MHz, The filter has a minimum 1 dB bandwidth of 496 to 504 MHz,
with a return loss of >= 18 dB. Rejection will be a minimum of 20 dBa at 492 and 508 MHz and 30 dB at 488 and 512 MHz.

Outline Drawing



Jitter Filter at 10 GHz



Jitter Filter at 150 GHz

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High Power and Standard Cellular Duplexers

RLC Electronics' Cellular Duplexers provide both high isolation and low insertion loss. The absence of magnetic materials, together with strict attention to structure result in low intermodulation. Both high power and standard duplexers are supplied in a 2U rackmount package. Power ratings of these duplexers assume an operating altitude of 10,000 feet, a base plate temperature of +50C and an antenna VSWR of 2:1.

Specifications

DP-1-2-3

Model Number	Frequency Range (MHz)		Isolation (Min.) RCVR/XMIT	Loss (Max.)		Return Loss	Peak Power (max.)
	Receive	Transmit		Receive	Transmit		
DP-S	824-849	869-894	75dB	.70dB	.80dB	14dB	400 W
DP-S	872905	917-950	60dB	1.00dB	1.00dB	14dB	400 W
DP-S	890--915	935-960	75dB	.75dB	.85dB	14dB	400 W
DP-H	824-849	869-894	75dB	1.00dB	1.00dB	14dB	10,000 W
DP-H	89-0915	935-960	75dB	1.00dB	1.00dB	14dB	10,000 W

Monitor port: (Optional) coupling S-40 +/-5dB, H-50 +/-5dB (Monitor coupling is not directional).
Impedance: 50 ohms.

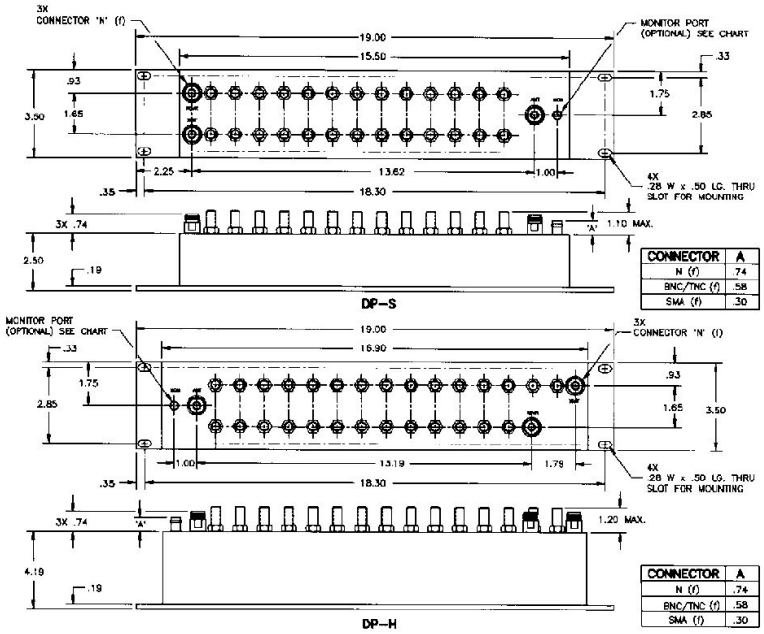
Connectors: Type `N' (f) Monitor port (optional) `BNC' (f) `SMA' (f) `N' (f).

To designate the cellular duplexer desired use:

1: Duplexer Series S (Standard) H (High power)
2: Frequency Range: per above (Designate by `Receive' range)
3: Monitor port MB (`BNC' (f)) MN (`N' (f)) MS (`SMA' (f))

Example: DPH-824-849-MB is a high power, 824-849 MHz (receive) 869-894 MHz (transmit), duplexer with a `BNC' (f) monitor port.

Outline Drawing



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Multiplexers

RLC Electronics' Multiplexers are available in two, three of four channel versions. Adjacent passbands may be designed for a contiguous response, impedance matched through the crossover region with theoretical 3 dB power split at the crossover frequency. Alternatively, non-contiguous passbands may be selected with an out-of-band region between adjacent passbands. Multiplexers with individual channel bandwidths less than an octave are implemented with band pass filters multiplexed to a common input junction. Multiplexers with individual channel bandwidths greater than an octave are normally implemented with a cascade of lowpass/high pass diplexers. For passband frequencies below 2 GHz, lumped element designs will often achieve the desired response in the smallest package. At higher frequencies, distributed coaxial structures are employed to achieve the lowest possible loss. RLC Electronics can supply Multiplexers for most applications, including commercial, telecommunications, and military specifications. Contact the factory with your specifications.

Specifications

Model Number-*

Multiplexer Type	Model Number	Frequency Range (MHz)	3 dB Bandwidth	Number of sections
Diplexer	DP-	10 to 18,000	Up to 70% of Center frequency for bandpass Up to 8 times crossover for Low pass High pass	2 Through 14
Triplexer	TP-			
Quadraplexer	QP-			

*Part numbers will be assigned at factory

Typical Ratings:
VSWR: Non-Contiguous 1.6:1 max. Contiguous 2.0:1 max.
Passband Insertion Loss: 1dB
Crossover Loss(contiguous): 5dB max.
Power: 15 watts
RF Connectors: Type N, TNC, BNC, SMA (female)

Sample Curves

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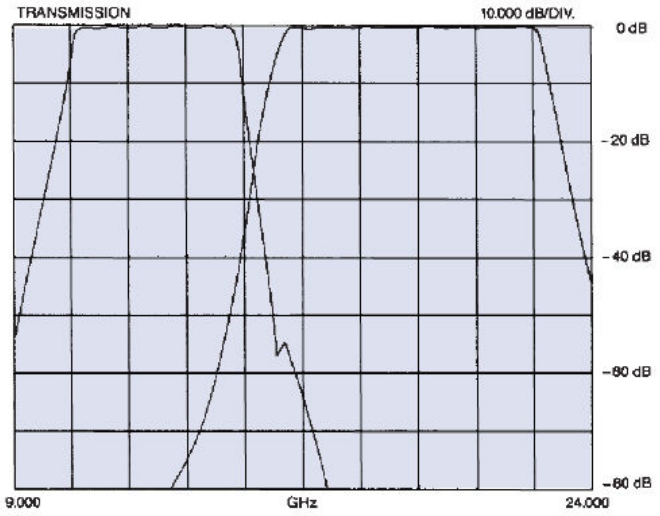
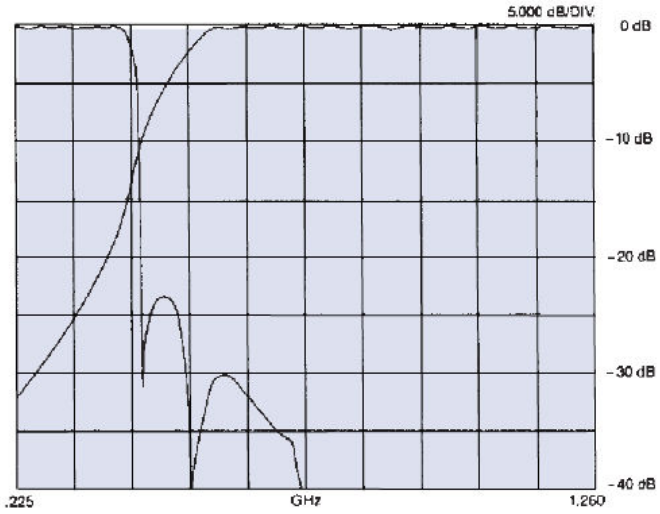
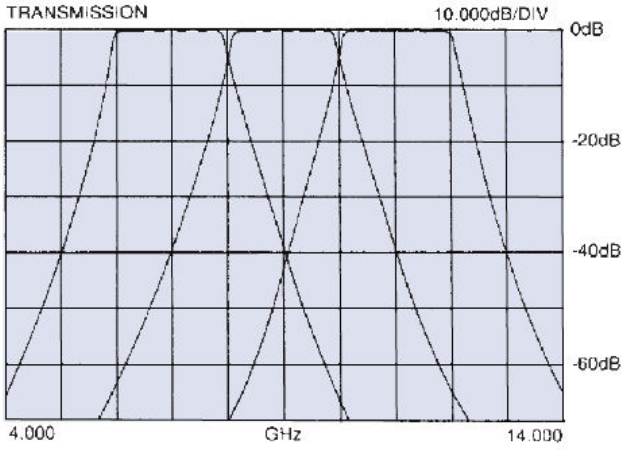
Diplexer
Bandpass, Distributed
Non-contiguous
Insertion Loss
<1.0 dB within Passbands
VSWR
< 2:1 within Passbands
9 sections each side
Size: 3 1/4 x 5/8 x 1/2



Diplexer
Highpass/Lowpass Lumped
Non-Contiguous
Insertion Loss
≤ 0.7 dB within Passbands
VSWR
≤1.3:1 within Passbands
4 section Lowpass
2 section Highpass
Size: 4 x 5/8 x 1/2



Triplexer
Bandpass, Distributed
Contiguous
Insertion Loss
< 1.0 dB within Passbands
VSWR
< 2:1 within Passbands
8 sections each side
Size: 3 x 1 1/2 x 1/2



Band Reject Filters

RLC Electronics' Customized Band Reject Filters are designed to operate over the frequency range of 10 to 12,000 MHz. These filters are characterized by having the reverse properties of band pass filters. The filters are available in compact sizes and are constructed to operate over the most severe military environmental conditions. The 3 dB band reject band-widths may be chosen from 0.5 to 15% of the center frequency. They are available with a choice of the 2 through 9 sections.

Specifications

BRF$^{-1-2-3-4}$

Model Number	Center Frequency Range (MHz)	3 dB Bandwidth (% of fc)	Number of Sections	3 dB Bandwidth 40 dB Ratio
BRF	10 to 1,000	5 to 40	2	30
			3	7
			5	3.4
	1,000 - 12,000	0.5 to 15.0	7	2.7
			9	2.3

VSWR: 1.5:1 DC to 2 x fc <6000 MHz, 1.8:1 DC to 2 x fc >6000 MHz
Insertion Loss: 1dB maximum
Connectors: N, BNC, TNC, SMA, Female
Power Rating: 25 watts
Impedance: 50 ohms

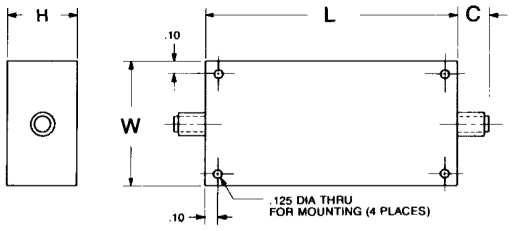
Type Recommended Freq Rng, MHZ:
N DC-12,400
BNC DC-1,000
TNC DC-15,000
SMA DC-26,000
Environment: MIL-E-5400, Class 1A

To designate the filter desired use:

1: Center Frequency in MHz
2: 3 dB Bandwidth in MHz.
3: Number of Sections
4: "N" for type N, "B" for BNC, "T" for TNC and "R" for SMA

Example: BRF-50-5-4-R is a 50 MHz center frequency, 5 MHz 3 dB bandwidth, 4 section, Band reject filter with SMA(f) connectors.

Outline Drawing



Center Frequency (MHz)	Approximate Dimension Table		
	W	H	L (N is the number of sections)
10 to 1000	1.0	0.75	N * .5+1.5
1000 to 6000	$\frac{2950}{fc\ (MHz)}$ +1.0	0.63	$\frac{2950}{fc\ (MHz)}$ * N+.36
6000 to 12,000	$\frac{5900}{fc\ (MHz)}$ +1.0	0.50	$\frac{2950}{fc\ (MHz)}$ * N+.36

CONNECTORS	R	N	T/B
"C" Dimension	.30	.60	.52

Tolerances unless otherwise specified are:
.xx, ± .02; .xxx, ± .005.

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Band Reject Filters--Tunable

RLC Electronics now provides band stop and cavity filters that can be re-adjusted by the customer to new center frequencies. These filters are tunable over a +/-7.5% center frequency range with minimal change in bandwidth.

Specifications

BRFT$^{-1-2-3-4}$

Model	Center Frequency Range (MHz)	3 dB Bandwidth (% of fc)	Number of Sections	3 dB / 40 dB Bandwidth Ratio
BRFT	1,000 to 6,000	0.5 to 12	2	30
			3	7
			5	3.4
			7	2.7
			9	2.3

Power Rating: 2.0 watts
Impedance: 50 ohms
VSWR: 1.5:1, fc to 2 x fc
Outlines: See page 65 for dimensions

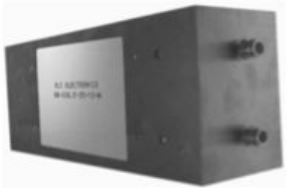
Temperature: -55C +85C
Environment: MIL-E-5400,Class 1A
Connectors: SMA, N (female)

To designate the filter desired use:

1: Center Frequency in MHz
2: 3dB Bandwidth in MHz
3: Number of Sections
4: Connectors : N for type N, or R for SMA

Example: BRFT-1500-15-5-R is 1500 MHz center frequency, 15 MHz 3 dB bandwidth, 5 section, tunable from 1388 to 1612 MHz, Band Reject filter with SMA female connectors.

Wireless Band Reject Filters



RLC Electronics' Wireless Band Reject Filters are available to suppress the most common wireless bands. These standard units employ 12 resonators, and provide a full 40dB of rejection over the bands specified. Large cavities and low loss coupling elements result in low losses over wide pass bands.

Specifications

BR-*-*-12[-1]

Model No.	Rejection Band 40 dB (MHz)	Pass Bands (MHz).	Pass Band Insertion Loss (dB)	Pass Band Edge Insertion Loss (dB)
BR-836.5-25-12-[1]	824-849	0-819 & 854-2200	1.2	3.5
BR-881.5-25-12-[1]	869-894	0-864 & 899-2200	1.2	3.5
BR-897.5-35-12-[1]	880-915	0-873 & 922-2200	1.2	3.0
BR-942.5-35-12-[1]	925-960	0-918 & 967-2200	1.2	3.0
BR-1747.5-75-12-[1]	1710-1785	0-1697 & 1798-3000	1.2	3.0
BR-1842.5-75-12-[1]	1805-1880	0-1792 & 1893-3000	1.2	3.0
BR-1880-60-12-[1]	1850-1910	0-1839 & 1921-3000	1.2	3.0
BR-1950-60-12-[1]	1920-1980	0-1908 & 1992-3000	1.2	3.0
BR-1960-60-12-[1]	1930-1990	0-1918 & 2002-3000	1.2	3.0
BR-2140-60-12-[1]	2110-2170	0-2098 & 2182-3000	1.2	3.0

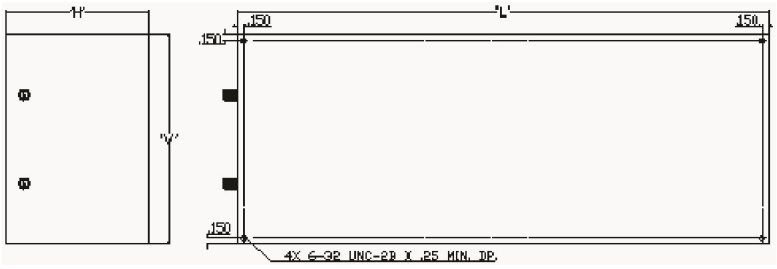
Impedance: 50 ohms
Pass Band VSWR: 1.5:1 max.
Connector: N Female or SMA Female
Temperature: 15 to +40 C

To designate the filter desired use:

[1]: N for N Female connectors or R for SMA Female Connectors

Example: BR-836.5-25-12-R is a 836.5 MHz center frequency, 25 MHz reject band, 12-section, Band Reject Filter with SMA (female) connectors.

Outline Drawing



MODEL NO.	L	H	W
BR-836.5-25-12	12	4.2	4.75
BR-881.5-25-12	12	4.2	4.75
BR-897.5-35-12	12	4.2	4.75
BR-942.5-35-12	12	4.2	4.75
BR-1747.5-75-12	8	2.7	3.75
BR-1842.5-75-12	8	2.7	3.75
BR-1880-60-12	8	2.7	3.75
BR-1950-60-12	8	2.7	3.75
BR-1960-60-12	8	2.7	3.75
BR-2140-60-12	8	2.7	3.75

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Waveguide Bandpass Filters

RLC Electronics' Waveguide Filters are available over the 1 to 40 GHz frequency band. Bandwidths may be as small as 0.1% to as large as 10% of the center frequency. These filters are available with 2 to 12 "high Q" resonant sections. RLC's Waveguide Filters are constructed using rectangular copper waveguide. Invar devices for improved temperature stability are optionally available. These filters are available with cover flanges, choke flanges, or with coaxial transitions to SMA connectors.

Specifications

WG$^{-1-2-3-4}$

Model Number	Center* Frequency Range (MHz)	3 dB Bandwidth (% of fc)	Number of Sections
WG	1000 to 40,000	.1% to 10%	2 to 12

VSWR: 1:5:1
Insertion Loss
.5 dB Bandwidth: *
1.0 dB Bandwidth: *
Stopband Attenuation: *

*(Filter response approaches theoretical. Consult Factory for specifications on units meeting your specific requirements)

Connectors: Cover flange, Choke Flange
Power: 20 Watts
Environment: MIL-E-5400, Class 1A

To designate the filter desired use:

1: Center Frequency in MHz
2: 3 dB Bandwidth in MHz
3: Number of Sections
4: F for cover flange or C for choke flange Outline drawing- Consult factory

Line Loss Equalizer

RLC Electronics' line loss equalizers combine filter and attenuator technology for a flat overall response up to 18 GHz. When transmitting into a coax cable loss increases with frequency and cable length. This loss can become substantial when using broadband devices over long cable distances necessitating compensation to ensure a flat response. By linearly decreasing loss as frequency increases RLC's line loss equalizers offer an effective solution to your line loss problem. With a minimum loss point as low as 1dB and wide variety of attenuation differentials you can compensate for a wide range of cable types and lengths

Specifications

LLE-1-2-3

Frequency Range	VSWR	Attenuation Differential	Linearity	Insertion Loss
10 MHz to 5GHz	1.5:1	Up to 20 dB from 1 to 3 octaves bandwidth	+/- .5 dB	As low as 1dB at Min loss point
5 GHz to 18 GHz	1.8:1		+/- .75 dB	

Impedance: 50 ohms

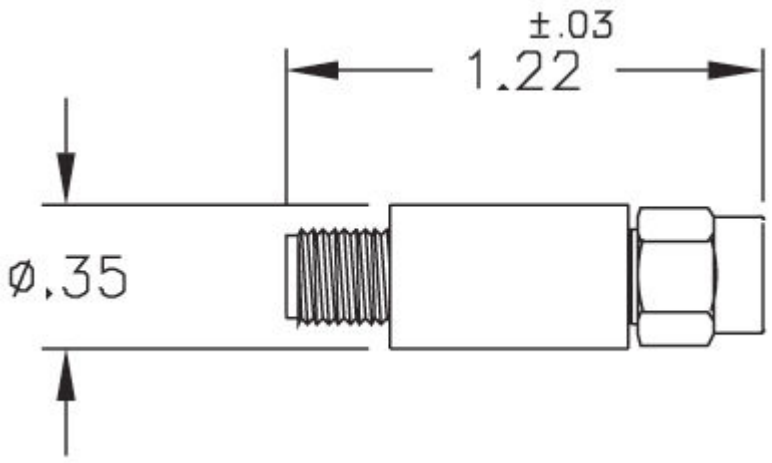
Environment: Mil-E-5400, class 1A Except operating temperature -55 C to + 85 C

To designate the filter desired use:

1: Lower frequency/upper frequency (in MHz)
2: Attenuation differential
3: Connectors: R for SMA, T for TNC, B for BNC, male/female

Example: LLE-2000/4000-8-R is an equalizer with 8dB of difference in attenuation between 2 and 4 GHz with SMA connectors.

Outline Drawing



(Typical outline-Please contact the factory for additional configurations)

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Gain Equalizers

RLC Electronics' gain equalizers combine filter and attenuator technology to achieve a desired response. The typical curves that follow are representative of commonly requested responses. VSWR is dependent on frequency of operation, complexity of equalized response, and bandwidth of response. Power handling is dependent on the physical size of the absorptive elements. Since these elements decrease in size with increasing frequency, power handling by 10 GHz is usually in the hundredths of watts. The power capability of these devices is seldom an issue, since their usage is generally in receive stages or in the low power sections preceding transmit amplifiers. These units are used to compensate for such things as cable losses, to gain flatness in amplifiers, and compensate for devices such as couplers and filters which have frequency dependent outputs.

Specifications

E$^{-1-2-3-4}$

Model Number	Frequency Range (GHz)	VSWR	Insertion Loss
E-	10 MHz to 5 GHz	1.5:1	As Low as 1 dB at Minimum Loss Point
	5 GHz to 18 GHz	1.8:1	

Impedance: 50 ohms

Environment: MIL-E-5400, Class 1A EXCEPT operating temperature -55C to +85C

To designate the gain equalizer desired use:

1: A = linearly increasing loss
B = linearly decreasing loss
C = half sine
D = inverted half sine
E = fine grain

2: Lower frequency/upper frequency in MHz specify each significant frequency

3: RLC assigned*

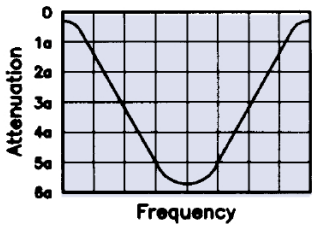
4: Connectors: R for SMA, N, T for TNC, B for BNC (female), P solder pins, M surface mount

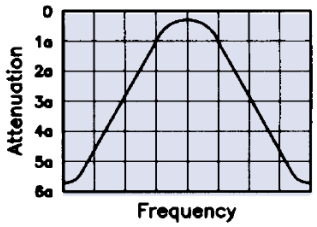
Example: E-A-500/1500-*-R is a .5 to 1.5 GHz equalizer with linearly increasing loss and sma female connectors

Please contact the factory for outline details

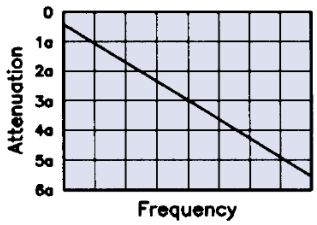
Available Equalizer Responses

Units can have a one–half sine response, with either the greatest or the smallest attenuation being at center frequency. These devices can be used to flatten responses due to devices such as filters and couplers.

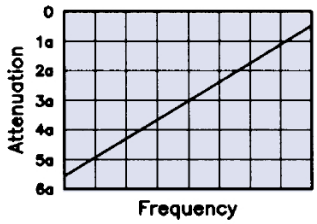




Equalizers can be manufactured with attenuation that increases linearly with increasing frequency.



Linearly decreasing loss with increasing frequency can be used to 'flatten' overall response associated with cable losses.



(Please contact the factory for outline details)

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QPL Approved Switches

RLC Electronics, Inc. a manufacture of high Quality mechanical Switches for over 40 years, is also Qualified to MIL-DTL-3928/xx-xx on the following part numbers:

RLC Part Numbers Per MIL-DTL-3928
Cross Reference Table

QPL P/N*		RLC P/N*
SLASH NO.	OPTION NO.	
MIL-DTL-3928/7	-02 -06 -09 -10 -11 -12 -13 -14 -15 -16 -17 -18 -19 -20 -22 -23 -24 -25 -26	S-6022 S-6023 S-6024 S-6025 S-6026 S-6027 S-6028 S-6029 S-6030 S-6031 S-6032 S-6033 S-6034 S-6035 S-6036 S-6037 S-6038 S-6039 S-6040
MIL-DTL-3928/8	-03 -05 -07 -18 -19 -20 -21 -22	S-6041 S-6042 S-6043 S-6044 S-6045 S-6046 S-6047 S-6048
MIL-DTL-3928/9	-05 -14 -15	S-6049 S-6050 S-6051
MIL-DTL-3928/10	-01 -02 -03 -04 -05 -08 -09 -12	S-6052 S-6053 S-6054 S-6055 S-6056 S-7167 S-6057 S-6058
MIL-DTL-3928/11	-01	S-6059
MIL-DTL-3928/15	-01 -02 -03 -04 -05 -07	S-4379 S-6060 S-4424 S-6061 S-6062 S-6063
MIL-DTL-3928/15	-08 -09 -10 -11 -12 -14 -15 -16 -17 -18 -19 -20	S-5001 S-6064 S-4414 S-6065 S-4905 S-6066 S-6067 S-6068 S-7647 S-7648 S-7649 S-7650
MIL-DTL-3928/16	-02	S-6069
MIL-DTL-3928/17	-01 -02 -03	S-6070 S-3253 S-6071
MIL-DTL-3928/18	-01 -02 -03 -04 -05 -06 -07 -08	S-3031 S-3317 S-4315 S-6072 S-6073 S-6074 S-6075 S-6076
MIL-DTL-3928/19	-02	S-5002
MIL-DTL-3928/20	-02 -03 -04 -05 -06 -07 -08 -09	S-6077 S-6078 S-6079 S-6080 S-6081 S-6082 S-6083 S-6084
MIL-DTL-3928/21	-02	S-4531
MIL-DTL-3928/29	-01 -02 -03 -04 -05 -06 -07 -08 -09 -10 -11 -12	S-7743 S-7900 S-7901 S-7902 S-7903 S-7904 S-7905 S-7906 S-7907 S-7908 S-7909 S-7910

*Screened versions available.

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Miniature Surface Mount Coaxial Switches

RLC Electronics' miniature surface mount coaxial switch is a single pole two position type. The switch provides extremely high reliability, long life, and excellent electrical performance characteristics in a miniature package. The power consumption is approximately one half that of the miniature connectorized switches. The switch is available with a choice of four different operating frequencies, three coil voltages, and two different pin configurations.

Specifications

SR-2-min-min^{-1-2-3}

Switch Type	Single pole two position			
Frequency (GHz)	DC-2.0	2.0-5.0	5.0-12.4	12.4-18
Insertion Loss (Max dB)	0.2	0.3	0.4	0.7
VSWR (Max)	1.3	1.4	1.5	1.7
Isolation (dB Min)	70	60	50	40

Power Rating, RF Cold Switching: See page 79

Impedance: 50 ohms

Operating Power: 5vdc at 310mA
25 deg C 12vdc at 130mA
(ma nominal) 28vdc at 75mA

Connectors: RF and power: .018 DIA. Pins

Life: 1,000,000 operations

Switching Time: 15 milliseconds max.

Weight: 0.6 oz.

Environmental Conditions: MIL- DTL-3928

Operating Mode: Failsafe or Pulse latching

Switching Sequence: Break before make

To designate the Switch desired use:

(1) `H' for 12-15 volts coil `D' for 24-28 volts coil `E' for 5 volt coil

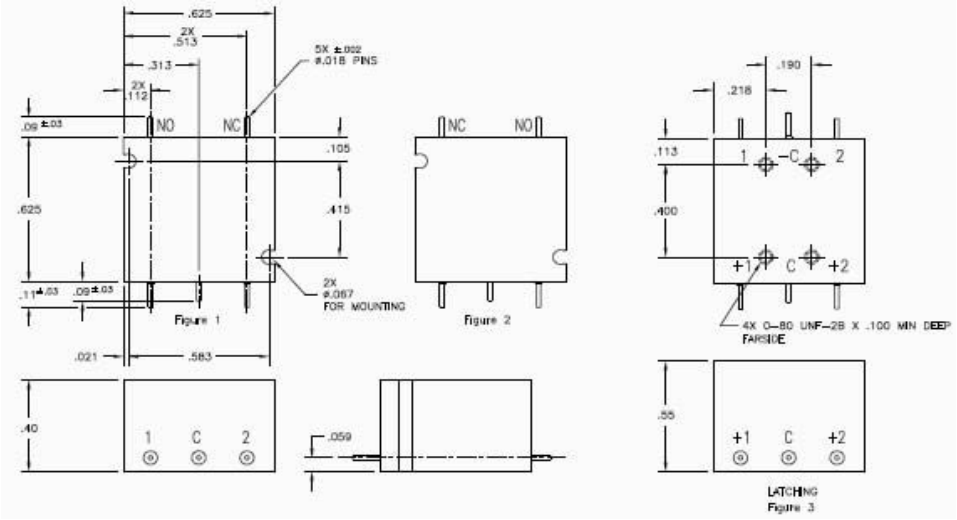
(2) `2' for DC-2GHz `5' for DC-5 GHz `12' for DC-12.4 GHz `18' for DC-18 GHz

(3) `L' for Pulse latching

(4) `A' for Figure 1 (pin configuration) "B' for Figure 2 (pin configuration)

Example: SR-2min-min-D-2-A is a SPDT, 24-28vdc, DC-2 GHz, failsafe switch. (per Figure 1)
SR-2min-min-D-2-L is a SPDT, 24-28vdc, DC-2 GHz Pulse latching switch. (per Figure 3)

Outline Drawing



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Micro Miniature SMA Switch

RLC Electronics' Micro Miniature SMA Switch is a single pole two position type. The switch incorporates SMA connectors to allow high density packaging and excellent electrical performance through 26.5 GHz. The switch is available in failsafe and Pulse latching configurations with a choice of three different frequency ranges and three different coil voltages.

Specifications

SR-2min-min-R^{-1-2-3}

Switch Type	Single Pole Two Position			
Frequency (GHz)	DC-8	8-12.4	12.4-18	18-26.5
Insertion Loss (dB Max.)	0.3	0.5	0.7	0.8
VSWR (Max.)	1.35	1.6	1.7	1.8
Isolation (dB Min.)	70	60	60	50

Power Rating, RF Cold Switching: See page 79
Impedance: 50 ohms
Operating Power: 25 deg C (mA nominal)
5vdc at 310mA
12vdc at 130mA
28vdc at 75mA
Connectors: SMA female

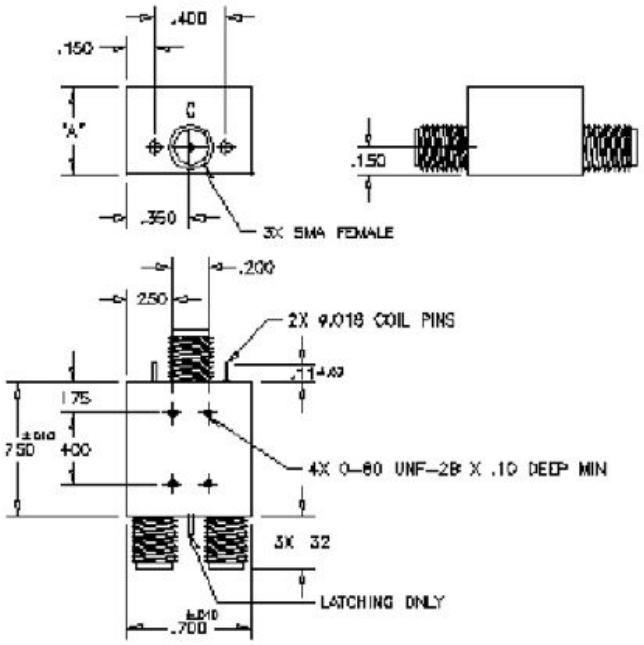
Power Connections: 0.018 dia. pins
Life: 1,000,000 operations
Switching Time: 15 milliseconds max.
Weight: 1.3 oz.
Environmental Conditions: MIL-DTL-3928
Operating Mode: Failsafe or Pulse Latching
Switching Sequence: Break before make

To designate the switch desired use:

1: "E" for 5 volt coil "H" for 12-15 volt coil "D" for 24-28 volt coil
2: "8" for DC-8GHz "18" for DC-18 GHz "26" for DC-26.5
3: "A" for failsafe Figure 1 "B" for Failsafe Figure 2 "L" for Pulse Latching

Example: SR-2min-min-R-D-26-L is SPDT, 24-28vdc, DC-26.5 GHz, Pulse Latching switch

Outline Drawing



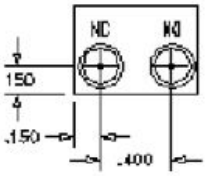


Figure 1

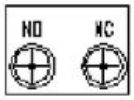


Figure 2

SWITCH TYPE	"A"
Failsafe	.49
Latching	.64

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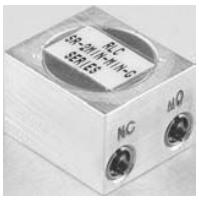
Micro Miniature Coaxial Switches 26.5 GHz



RLC Electronics' Micro Miniature Coaxial Switch is a single pole two position type. The switch incorporates SMP "push on" connectors to allow high density packaging and excellent electrical performance through 26.5 GHz.A pin configuration is also available. The switch is available in failsafe and Pulse latching configurations with a choice of three different frequency ranges and three different coil voltages.

Specifications

SR-2-MIN-MIN-G-1-2-3

Switch Type	Single Pole Two Position			
Frequency (GHz)	DC-8	8-12.4	12.4-18	18-26.5
Insertion Loss (dB Max.)	0.3	0.4	0.7	0.8
VSWR (Max.)	1.35	1.5	1.7	1.8
Isolation (dB Min.)	70	60	60	50

Power Rating RF Cold Switching: See page 79
Impedance: 50 Ohms
Operating Power 25C (mA nominal): 5 Vdc at 310mA, 310mA, 12 Vdc at 130mA and 28 Vdc at 75mA
RF Connectors: SMP male full detent
Power Connections: 0.018 dia. pins

Life: 1,000,000 operations
Switching Time: 15 milliseconds max.
Weight: 1 oz.
Environmental Conditions: MIL-DTL-3928
Operating Mode: Failsafe or Pulse Latching
Switching Sequence: Break before make

To designate the switch desired use:

1: "E" for 5 volt coil, "H" for 12-15 volt coil, "D" for 24-28 volt coil
2: "8" for DC-8 GHz, "18" for DC-18 GHz, "26" for DC-26.5 GHz
3: "A" for failsafe (Figure 1), "B" for failsafe (Figure 2), "L" for Pulse Latching

Example: SR-2 min-min-G-D-26-L is SPDT, 24-28 Vdc, DC 26.5 GHz, Pulse Latching Switch

Outline Drawing

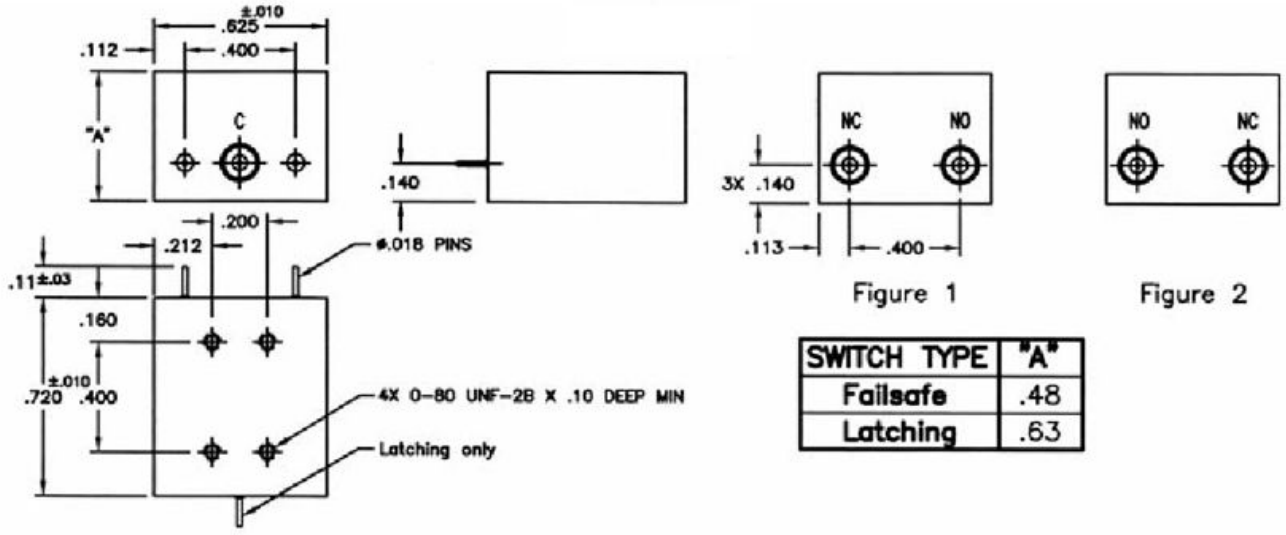


Figure 1

Figure 2

SWITCH TYPE	"A"
Failsafe	.48
Latching	.63

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Miniature Coaxial Switches

This RLC Electronics' Miniature Coaxial Switch is a single pole, two position type. The switch provides extremely high reliability, long life and excellent electrical performance characteristics over the frequency range of DC-65 GHz. The miniature package utilizes high density packaging tech- niques, hence the overall volume of the switch is less than 3/4 cubic inch.

Specifications

S^{1}-2 MIN$^{-2-3-4-5-6-7-8}$

Switch Type	SINGLE POLE TWO POSITION										
Frequency Range	DC-18.0 GHz			26.5 GHz Opt	40.0GHz Option					50.0GHz Opt.	65.0GHz Opt.
Frequency (GHz)	DC-4.0	4.0-12.4	12.4-18.0	18-26.5	DC-6	6-12	12-18	18-26.5	26.5-40	40-50	50-65
Insertion Loss (Max dB)	0.1	0.2	0.3	0.5	0.2	0.4	0.5	0.7	0.9	1.1	1.1
VSWR (Max)	1.2:1	1.3:1	1.5:1	1.5:1	1.3:1	1.4:1	1.5:1	1.7:1	1.9:1	1.9	1.9
Isolation (Min)	80	70	60	60	70	60	60	55	50	50	50

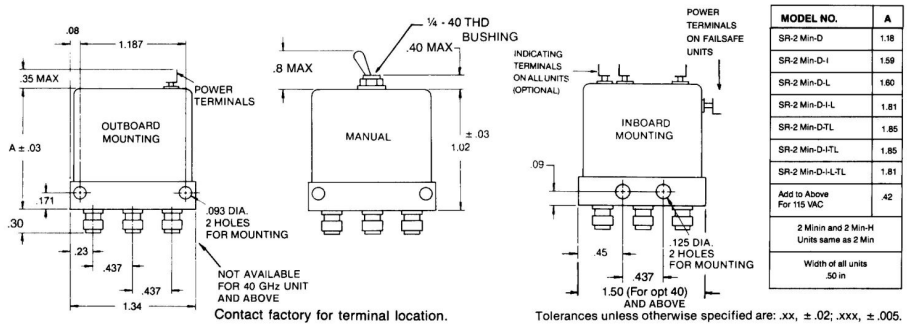
Power Rating, RF Cold Switching: See page 79
Impedance: 50 Ohms
Operating Power 25C:
(Failsafe): 12Vdc at 250 ma nom. 28Vdc at 140 ma nom. 115 Vac at 50 ma nom.
(Latching): 12 Vdc at 120 ma nom. 28 Vdc at 60 ma nom. 115 Vac at 43 ma nom. Current applied 10 ms min. cutthroat circuitry(standard), recovery time 100 ms nom.

Connectors, RF: SMA Female (40 GHz - 2.92 mm) (50 GHz - 2.4 mm) (65 GHz - 1.85 mm)
Connectors, Power: Feed through solder lugs.
Life: 1,000,000 operations.
Switching Time: 15 mS Max.
Weight: 2 oz.
Environmental Conditions: MIL-DTL-3928
Operating Mode: Manual, failsafe or latching.
Switching Sequence: Break before make.

To designate the Switch desired use:

1: "M" for Manual, "R" for Remote.
2: "Min" for outboard mountings or "Minin" for inboard mountings.40 GHz is inboard only.
3: "A" for 115 Vac, "D" for 28 Vdc or "H" for 12 Vdc.
4: "I" for indicators if desired.
5: "L" for latching cutthroat if desired.
6: "TL" for TTL Driver if desired
7: "26" for 26.5 GHz option., "40" for 40 GHz option, "50" for 50 GHz option, "65" for 65 GHz option
8: "Arc" for Arc Suppression diodes (N/A with TTL and Latching)

Outline Drawing



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Type C Coaxial Switches

This RLC Electronics' Mid-Size Coaxial Switch is a single pole, two position type providing extremely high reliability, long life and excellent electrical performance characteristics over the frequency range of DC-18.0 GHz. The package utilizes high density packaging techniques, hence the overall volume of the switch is less than 3 cubic inches.

Specifications

S^{1}-2C$^{-2-3-4-5-6-7}$

Switch Type	SINGLE POLE TWO POSITION		
Frequency Range	DC-18GHz		
Insertion Loss (Max dB)	DC-4.0	4.0-12.4	12.4-18.0
	0.2	0.3	0.4
VSWR (Max)	1.2	1.3	1.5
Isolation (dB Min)	80	70	60

Power Rating, RF Cold Switching: See page 79
Impedance: 50 Ohms/75 Ohms*
Operating Power 25C:
(Failsafe): 12Vdc at 250 ma nom. 28Vdc at 140 ma nom. 115 Vac at 50 ma nom.
(Latching): 12 Vdc at 120 ma nom. 28 Vdc at 60 ma nom. 115 Vac at 50 ma nom.Current applied 10 ms min.cutthroat circuitry(standard), recovery time 100 ms nom.

Connectors, RF: SMA, TNC, BNC. F*Female
Connectors, Power: Feed through solder lugs.
Life: 1,000,000 operations.
Switching Time: 15 mS Max.
Weight: 5 oz.
Environmental Conditions: MIL-S-3928
Operating Mode: Manual, failsafe or latching.
Switching Sequence: Break before make.

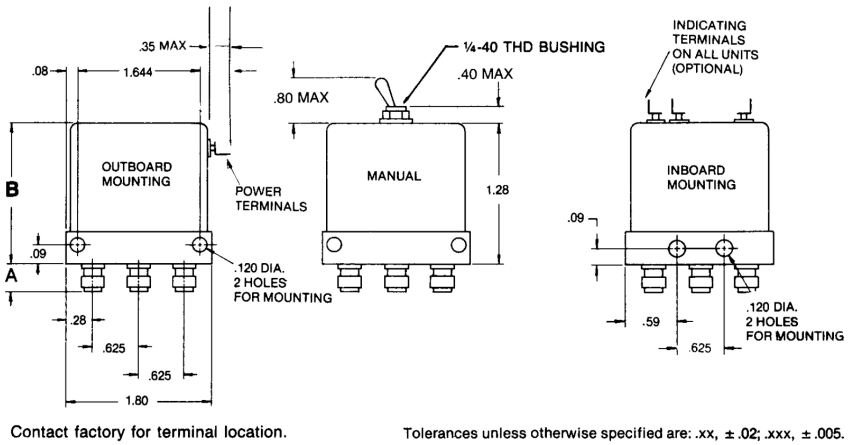
*BNC not recommended for use above 1GHz.
*TNC not recommended for use above 12.4 GHz.
*75 ohm up to 3 GHz.

To designate the Switch desired use:

1: "M" for Manual, "R" for Remote, R75 for 75 ohms
2: "C" for outboard mountings or "Cin" for inboard mountings.
3: "B" for BNC 50 or 75 ohms, "T" for TNC 50 or 75 ohms or "R" for SMA (50 ohms only), F (75 ohms) connector types.
4: "A" for 115 Vac, "D" for 28 Vdc or "H" for 12 Vdc.
5: "I" for indicators.
6: "L" for latching cutthroat.
7: "TL" for TTL Driver.

Example: SR-2C-R-D is a remote, outboard mounting, SMA Connectors, 28 Vdc; without indicators, Failsafe switch 50 ohms. For 75 ohms SR75-2C

Outline Drawing



MODEL NO.	B
SR-2C-*-D	1.50
SR-2C-*-D-I	1.50
SR-2C-*-D-I-L	1.80
SR-2C-*-D-TL	1.80
SR-2C-*-D-I-TL	1.80
SR-2C-*-D-I-L-TL	1.80
Add .5 For 115 VAC	
Width of all units .7 in.	

CONN	A
SMA	.30
BNC/TNC	.56
F	.56

Contact factory for terminal location.

Tolerances unless otherwise specified are: .xx, ± .02; .xxx, ± .005.

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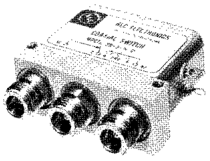
Standard Coaxial Switches



This RLC Electronics' Standard Size Coaxial Switch is a single pole, two position type providing extremely high reliability, long life and excellent electrical performance characteristics over the frequency range of DC-12.4 GHz. The package utilizes high density packaging techniques, hence the overall volume of the switch is less than 6 cubic inches.

Specifications

$S^{1}\text{-}2^{\text{-}2\text{-}3\text{-}4\text{-}5\text{-}6\text{-}7}$

Switch Type	SINGLE POLE TWO POSITION	
Frequency Range	DC-12.4 GHz	
Frequency	DC-7.0	7.0 - 12.4
Insertion Loss (Max dB)	0.3	0.6
VSWR (Max)	1.25	1.6
Isolation (dB Min)	60	55

Power Rating, RF Cold Switching: See page 79
Impedance: 50 Ohms/75 Ohms*
Operating Power 25C
(Failsafe): 12Vdc at 575 ma nom.
28Vdc at 200 ma nom.
115 Vac at 76 ma nom.
(Latching): 12 Vdc at 1 amp nom.
28 Vdc at 430 ma nom. 115 Vac at 30 ma nom. Current applied 10 ms min. cutthroat circuitry (standard), recovery time 100 ms nom.

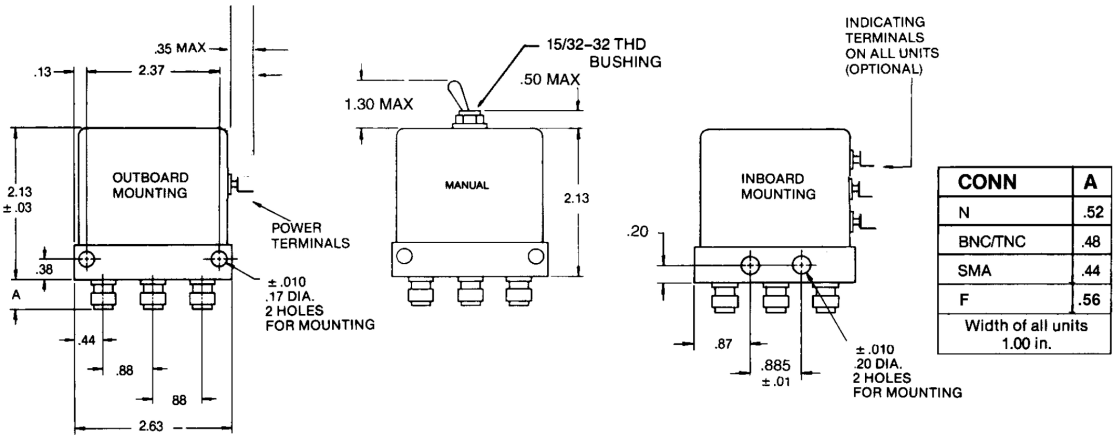
Connectors, RF: N, SMA, TNC, BNC, F * Female
Connectors, Power: Feed through solder lugs.
Life: 1,000,000 operations.
Switching Time: 20 mS Max.
Weight: 9 oz.
Environmental Conditions: MIL-DTL-3928
Operating Mode: Manual, failsafe or latching.
Switching Sequence: Break before make.
*BNC not recommended for use above 1GHz.
*TNC not recommended for use above 12.4 GHz.
*75 ohm up to 3 GHz VSWR 1.5 max.

To designate the switch desired use:

1: "M" for Manual, "R" for Remote, "R75" or "M75" for 75 ohms.
2: "in" for inboard mountings, if desired.
3: "B" for BNC (50 or 75 ohms), "T" for TNC(50 or 75 ohms), "N" (50 or 75 ohms) or "R" for SMA (50 ohms only), F(75 ohms) connector types.
4: "A" for 115 Vac, "D" for 28 Vdc or "H" for 12 Vdc.
5: "I" for indicators.
6: "L" for latching cutthroat.
7: "TL" for TTL Driver.

Example: SR-2-R-D-I is a remote operation, outboard mountings, SMA connectors, 28 Vdc; with indicators, failsafe operation switch 50 ohms. For 75 ohms SR75-2- - -.

Outline Drawing



CONN	A
N	.52
BNC/TNC	.48
SMA	.44
F	.56
Width of all units 1.00 in.	

Contact factory for terminal location.

Tolerances unless otherwise specified are: .xx, ± .02; .xxx, ± .005.

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High Power Coaxial Switches

RLC Electronics' High Power Coaxial Switch is a single pole, two position type providing extremely high reliability, long life and excellent electrical performance over the frequency range of DC-6 GHz. The switches will handle 2000 Watts at 100 MHz to 400 Watts at 6 GHz. The switches utilize thermally conductive, dielectric insulators to allow high power handling capabilities. The package utilizes high density packaging techniques, volume of the switch is less than 6 cubic inches.

Specifications

S^{1}-P-$2^{-2-3-4-5-6}$

Switch Type	SINGLE POLE TWO POSITION	
Frequency Range	DC-6 GHz	
Insertion Loss (Max dB)	DC-4.0	4.0-6.0
	0.2	0.5
VSWR (Max)	1.25	1.5
Isolation (dB)	60	60

Power Rating, RF Cold Switching: See page 79.
Impedance: 50 Ohms.
Operating Power 25C:
(Failsafe): 12Vdc at 575 ma nom. 28Vdc at 200 ma nom. 115 Vac at 50 ma nom.
(Latching): 12 Vdc at 1 amp nom. 28 Vdc at 430 ma nom. 115 Vac at 50 ma nom. Current applied 10 ms min. cutthroat circuitry(standard), recovery time 100 ms nom.

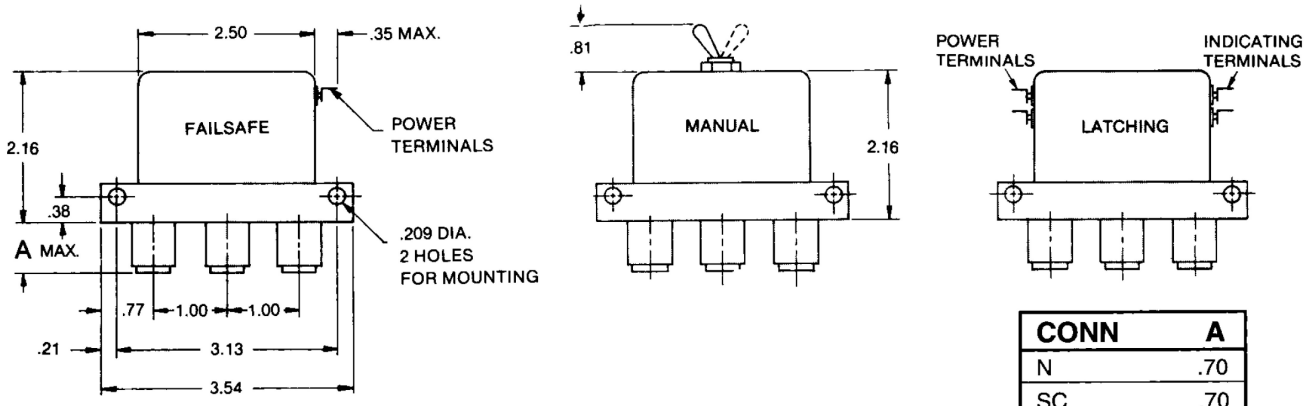
Connectors, RF: N, SC, HN, TNC, Female(HN not recommended for use above 4GHz)
Connectors, Power: Feed through solder lugs.
Life: 1,000,000 operations.
Switching Time: 20 mS Max.
Weight: 12 oz.
Environmental Conditions: MIL-S-3928
Operating Mode: Manual, failsafe or latching.
Switching Sequence: Break before make.

To designate the Switch desired use:

1: "M" for Manual, "R" for Remote.
2: "S" for SC, "H" for HN, "N" or "T" for TNC.
3: "A" for 115 Vac, "D" for 28 Vdc or "H" for 12 Vdc.
4: "I" for indicators.
5: "L" for latching cutthroat.
6: "TL" for TTL Driver.

Example: SRP-2-S-D-I is a remote, SC Connectors, 28 Vdc; with indicators, Failsafe operation switch 50 ohms.

Outline Drawing



CONN	A
N	.70
SC	.70
HN	.70
TNC	1.00
Width of all units 1.03 in.	

Tolerances unless otherwise specified are: .xx, ± .02; .xxx, ± .005.

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Terminated SPDT Coaxial Switches

This RLC Electronics' Terminated Single Pole, Two Position Coaxial Switch provides proven reliability, long life and excellent electrical performance. It features extremely low insertion loss and VSWR over the entire DC-50 GHz range while maintaining high isolation. Standard RF power rating is 2 watts cw limited by the termination. Terminations can be provided in either an internal or external configuration, or can be replaced by SMA "2.92mm" or "2.4mm" connectors for special applications.

Specifications

ST[1]-2-[1-2-3-4]

Switch Type	SINGLE POLE TWO THROW								
Frequency Range	DC-18GHz			26.5 GHz option	40 GHz option			50 GHz option	
Frequency (GHz)	DC-4.0	4.0-12.4	12.4-18.0	18-26.5	DC-4.0	4.0-12.4	12.4-18	18-26.5	26.5-40 | 40-50
Insertion Loss (dB Max)	0.1	0.2	0.3	1.0	0.2	0.4	0.5	0.7	0.9 | 1.1
VSWR (Max)	1.2:1	1.3:1	1.5:1	1.8:1	1.25:1	1.4:1	1.5:1	1.7:1	2.0:1 | 2.0:1
Isolation (dB Min)	80	70	60	40	80	70	60	55	50 | 50

Power Rating: RF Cold Switching: 2 watts average
Impedance: 50 Ohms/75 Ohms.*
Operating Power 25 C:
(Failsafe): 12Vdc at 510ma nom, 28Vdc at 280ma nom
(Latching): 12Vdc at 470ma nom. 28Vdc at 300ma nom. Current applied 10 ms min.cutthroat circuitry (standard), recovery time 100ms nom.
Connectors, RF: SMA, female(2.92mm for 40GHz, 2.4mm for 50GHz)

Connectors, Power: Feed through solder lugs.
Life: 1,000,000 operations
Switching Time: 25ms Max
Weight: 4 oz.
Environmental Conditions: MIL-DTL-3928
Operating Mode: Failsafe or Latching
Switching Sequence: Break before make

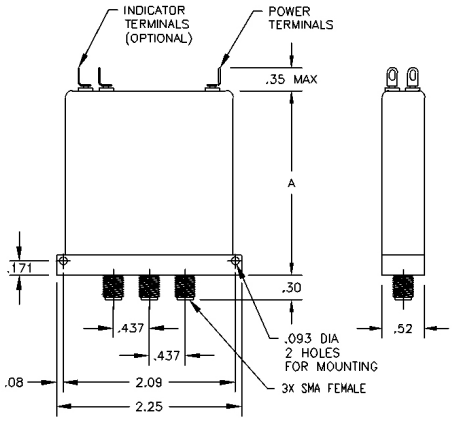
To designate the switch desired use:

1: "M" for Manual, "R" for Remote.
2: "A" for 115 Vac, "D" for 28 Vdc or "H" for 12 Vdc.
3: "I" for indicators if desired.
4: "L" for latching cutthroat if desired.
5: "TL" for TTL Driver if desired
6: "26" for 26 GHz, "40" for 40 GHz, "50" for 50GHz

Example: STR-2-D is a SP2T, 28 Vdc; without indicators, Failsafe switch 50 ohms
A 75 ohm version is available. Please contact factory for details.

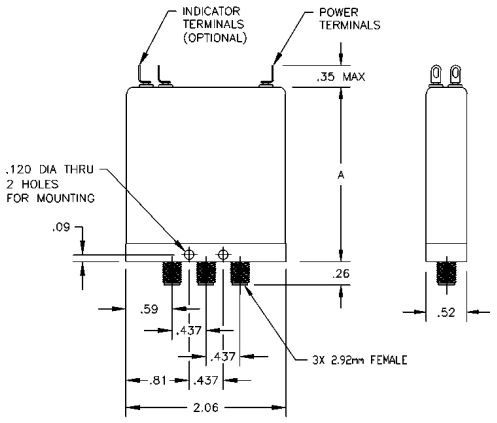
Outline Drawing

DC-18 GHz



MODEL NO.	A
STR-2-D	2.11
STR-2-D-L	2.29
STR-2-H-I-L-TL	2.25

DC-40 GHz



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Miniature Multi-Position Coaxial Switches

RLC Electronics' Miniature Multi-Position Coaxial Switch line provides extremely high reliability, long life and outstanding electrical performance by utilizing high density packaging. The "Multi-Min" electrical characteristics feature low insertion loss and VSWR over the entire DC-18GHz range, with an option to 26.5 GHz, while maintaining high isolation.

Specifications

S-1-2-MIN-3-4-5-6

RF Positions	3	4	5	6
Switch Type:	SP-3T	SP-4T	SP-5T	SP-6T
Frequency Range:(GHz)	DC-18 (18-26.5 option)	DC-18 (18-26.5 option)	DC-18 (18-26.5 option)	DC-18 (18-26.5 option)
Insertion Loss (Max dB)				
DC-4	0.20	0.20	0.20	0.20
4.0-12.4 GHz	0.30	0.30	0.30	0.30
12.4-18 GHz	0.50	0.50	0.50	0.50
18-26.5 GHz (option)	1.00	1.00	1.00	1.00
VSWR (Max)				
DC-4	1.25	1.25	1.25	1.25
4.0-12.4 GHz	1.40	1.40	1.40	1.40
12.4-18 GHz	1.50	1.50	1.50	1.50
18-26.5 GHz (option)	2.00	2.00	2.00	2.00
Isolation (dB Min)				
DC-18 GHz	60	60	60	60
18-26.5 GHz (option)	50	50	50	50

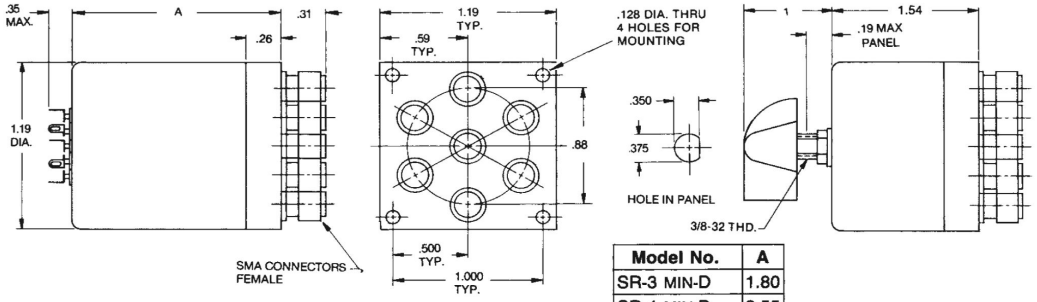
Power Rating, RF Cold Switching:	See page 79.	**Switching Time:**	15 mS Max.
Impedance:	50 Ohms	**Weight:**	3 position 3.5oz, others 7oz.
Operating Power 25C:	(Failsafe):12Vdc at 300 ma nom. 28Vdc at 90 ma nom. 115 Vac at 25 ma nom.	**Environmental Conditions:**	MIL-S-3928
Connectors, RF:	SMA Female	**Operating Mode:**	Manual or failsafe.
Connectors, Power:	Feed through solder lugs.	**Switching Sequence:**	Break before make.
Life:	1,000,000 operations.		

To designate the Switch desired use:

1:	"M" for Manual, "R" for Remote.	**4:**	"I" for indicators
2:	"3", "4", "5" or "6" throw operation	**5:**	"TL" for TTL Driver
3:	"A" for 115 Vac, "D" for 28 Vdc or "H" for 12 Vdc.	**6:**	"26" for the 26.5GHz option

Example: SR-4 Min-D-26 is a remote, 28 Vdc; without indicators, failsafe switch, 26.5 GHz operation

Outline Drawing



Model No.	A
SR-3 MIN-D	1.80
SR-4 MIN-D	2.55
SR-5 MIN-D	2.55
SR-6 MIN-D	2.55
SR-3 MIN-D-TL	2.00
SR-* MIN-D-TL	3.27

Tolerances unless otherwise specified are: .xx, ± .02; .xxx, ± .005.

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Type C Multi-Position Coaxial Switches (3 to 6 Position)

This RLC Electronics' Basic Mid-Size Multi-Position Coaxial Switch line provides up to 6 positions with extremely high reliability, long life and outstanding electrical performance. It features extremely low insertion loss and VSWR over the entire frequency range, while maintaining high isolation.

Specifications

S-1-2-C-3-4-5-6-7

RF Positions	3-6	3-6	3 to 6 for OPTION 40	
Switch Type:	SP-3T...6T	SP-3T...6T	SP-3T-40	SP-6T-40
Frequency Range:(GHz)	DC-18	DC-26.5	DC-40	
Insertion Loss (Max dB)			Ins. Loss: (dB Max)	
DC-4.0 GHz	0.20	0.20	DC-6.0	0.25
4.0-12.4 GHz	0.30	0.30	6.0-12	0.40
12.4-18 GHz	0.50	0.50	12-18.5	0.50
18-26.5 GHz (option 26)		0.75	18.5-26.5	0.75
			26.5-40	0.90
VSWR (Max)			VSWR: (Max)	
DC-4 GHz	1.25	1.25	DC-6.0	1.30
4.0-12.4 GHz	1.40	1.40	6.0-12	1.40
12.4-18 GHz	1.50	1.50	12-18.5	1.50
18-26.5 GHz (option 26)		1.80	18.5-26.5	1.70
			26.5-40	2.00
Isolation (dB Min)			Insolation: (dB Min)	
			DC-18.5	60
DC-18 GHz	60	60	18.5-26.5	55
18-26.5 GHz (option 26)		40	26.5-40	45

Power Rating, RF Cold Switching: See page 79
Impedance: 50 Ohms
Operating Power 25C:
(Failsafe): 12Vdc at 400 ma nom.28Vdc at 150 ma nom. 115 Vac at 50 ma nom.
(Latching): 2 Vdc at 462 ma nom.28 Vdc at 400 ma nom. 115 Vac at 225 ma nom.Cutthroat circuitry (standard), recovery time 100ms nom.

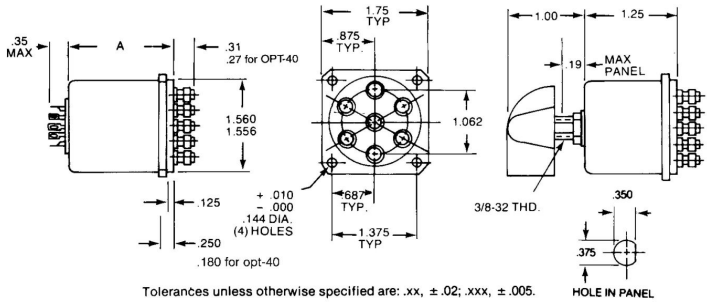
Connectors, RF: SMA Female (40 GHz 2.92 mm)
Connectors, Power: Feed through solderlugs.
Life: 1,000,000 operations.
Switching Time: 15 mS Max. Failsafe 125mS latching
Weight: 10oz.
.**Environmental Conditions:** MIL-S-3928
Operating Mode: Manual, failsafe or latching
Switching Sequence: Break before make.

To designate the Switch desired use

1: "M" for Manual, "R" for Remote.
2: "3C", "4C", "5C" or "6C" throw operation
3: "A" for 115 Vac, "D" for 28 Vdc or "H" for 12 Vdc.
4: "I" for indicators if desired.
5: "L" for latching cutthroat if desired
6: "TL" for TTL Driver if desired
7: "26" for the 26.5GHz option "40" for the 40GHz option

Example: SR-6C-D-I-L is a remote, 6 position, 28 Vdc; with indicators, latching cutthroat switch.

Outline Drawing



MODEL NO.	A
SR- * C-D	1.58
SR- * C-D-I	2.25
SR- * C-D-L	3.73
SR- * C-D-I-L	4.00
SR- * C-D-TL	2.25
SR- * C-D-I-TL	2.25
SR- * C-D-L-TL	4.40
SR- * C-D-I-L-TL	4.40
SR- * C-H same as SR- * C-D	

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Type C Multi-Position Coaxial Switches (7 to 12 Position)

This RLC Electronics' Mid-Size, Extended Multi-Position Coaxial Switch line provides up to 12 positions with extremely high reliability, long life and outstanding electrical performance featuring extremely low insertion loss and VSWR over the entire DC-18GHz range, while maintaining high isolation.

Specifications

S-1-2-C-3-4-5-6

RF Positions	7	8	9	10	11	12
Switch Type:	SP-7T	SP-8T	SP-9T	SP-10T	SP-11T	SP-12T
Frequency Range:(GHz)	DC-18	DC-18	DC-18	DC-18	DC-18	DC-18
Insertion Loss (Max dB)						
DC-6 GHz	0.30	0.30	0.30	0.30	0.30	0.30
6.0-12.0 GHz	0.50	0.50	0.50	0.50	0.50	0.50
12.0-16.0 GHz	0.70	0.70	0.70	0.70	0.70	0.70
16.0-18.0 GHz	1.00	1.00	1.00	1.00	1.00	1.00
VSWR (Max)						
DC-6 GHz	1.40	1.40	1.40	1.40	1.40	1.40
6.0-12.0 GHz	1.50	1.50	1.50	1.50	1.50	1.50
12.0-16.0 GHz	1.70	1.70	1.70	1.70	1.70	1.70
16.0-18.0 GHz	1.80	1.80	1.80	1.80	1.80	1.80
Isolation (dB) (Min) DC-12 GHz	60	60	60	60	50	50
12-18 GHz	55	55	55	55	50	50

Power Rating, RF Cold Switching: See page 79.

Impedance: 50 Ohms

Operating Power 25C(Failsafe): 12Vdc at 333 ma nom.28Vdc at 150 ma nom

Connectors, RF: SMA Female

Connectors, Power: Solder Connections.

Life: 1,000,000 operations.

Switching Time: 15 mS Max.

Weight: 10oz.

Environmental Conditions: MIL-S-3928

Operating Mode: Manual or failsafe

Switching Sequence: Break before make.

To designate the Switch desired use:

1: "M" for Manual, "R" for Remote.

2: "7C", "8C", "9C", "10C", "11C" or "12C" throw operation

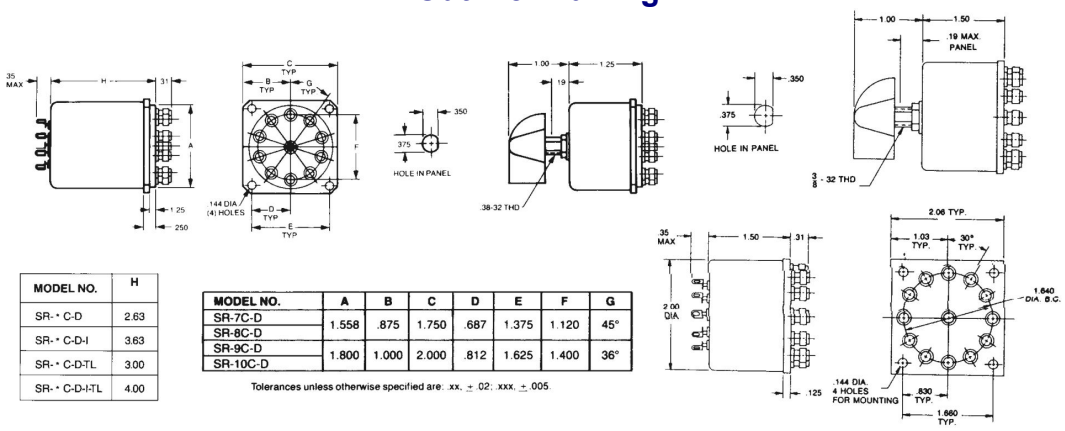
3: "D" for 28 Vdc or "H" for 12 Vdc.

4: "I" for indicators if desired.

5: "TL" for TTL Driver if desired

Example: SR-10C-D-I is a remote, 10 position, 28 Vdc; with indicators, switch

Outline Drawing



MODEL NO.	H
SR-*C-D	2.63
SR-*C-D-I	3.63
SR-*C-D-TL	3.00
SR-*C-D-I-TL	4.00

MODEL NO.	A	B	C	D	E	F	G
SR-7C-D	1.558	.875	1.750	.687	1.375	1.120	45°
SR-8C-D							
SR-9C-D	1.800	1.000	2.000	.812	1.625	1.400	36°
SR-10C-D							

Tolerances unless otherwise specified are: .xx. ± .02; .xxx. ± .005.

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High Power Multi-Position Coaxial Switches

RLC Electronics' High Power Multi-Position Coaxial Switch line provides extremely high reliability, long life and outstanding electrical performance and features extremely low insertion loss and VSWR over the entire DC-6GHz range, while maintaining high isolation.

Specifications

S-1-2-P-3-4-5-6-7

RF Positions	3	4	5	6
Switch Type:	SP-3T	SP-4T	SP-5T	SP-6T
Frequency Range:(GHz)	DC-6	DC-6	DC-6	DC-6
Insertion Loss (Max dB)				
DC-1 GHz	0.15	0.15	0.15	0.15
1.0-3.0 GHz	0.35	0.35	0.35	0.35
3.0-6.0 GHz	0.50	0.50	0.50	0.50
VSWR (Max)				
DC-1 GHz	1.15	1.15	1.15	1.15
1.0-3.0 GHz	1.35	1.35	1.35	1.35
3.0-6.0 GHz	1.50	1.50	1.50	1.50
Isolation (dB) (Min)				
DC-1 GHz	80	80	80	80
1.0-3.0 GHz	70	70	70	70
3.0-6.0 GHz	60	60	60	60

Power Rating, RF Cold Switching: See page 79
Impedance: 50 Ohms
Operating Power 25 C:
(Failsafe): 12Vdc at 270 ma nom.
28Vdc at 190 ma nom.
115Vac at 50 ma nom.
(Latching): 28 Vdc at 310 mA nom. 12 Vdc at 550 mA nom.
Cutthroat circuitry (standard), recovery time 100ms nom.

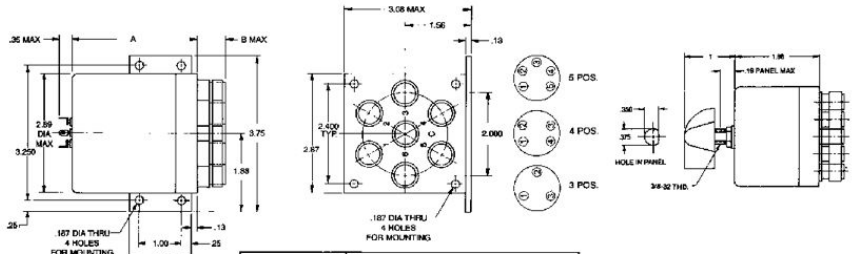
Connectors, Power: Feed through solder lugs.
Connectors, RF: N, HN, SC, TNC Female (HN not recommended above 4GHz)
Life: 1,000,000 operations.
Switching Time: 20 mS Max. Failsafe, 125 ms latching.
Environmental Conditions: MIL-S-3928
Operating Mode: Manual, failsafe or latching
Switching Sequence: Break before make.

To designate the switch desired use:

1: "M" for Manual, "R" for Remote.
2: "3", "4", "5" or "6" throw operation
3: "N", "T" for TNC, "H" for HN or "S" for SC type connectors
4: "A" for 115 Vac, "D" for 28 Vdc or "H" for 12 Vdc.
5: "I" for indicators if desired.
6: "L" for Latching cutthroat if desired
7: "TL" for TTL Driver if desired

Example: SR-6-P-N-D-I-L is a remote, 6 position, N Connector, 28 Vdc; with indicators, latching cutthroat switch

Outline Drawing



MODEL	A FAILSAFE	A LATCHING
SR-*-P-*-D	3.06	3.72
SR-*-P-*-D-I	3.72	3.72
SR-*-P-*-A	3.72	4.34
SR-*-P-*-A-I	3.72	4.34

CONN	B
N	.70
HN	.70
SC	.70
TNC	1.00

Tolerances unless otherwise specified are: .xx, ± .02; .xxx, ± .005.

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Miniature Terminated Multi-Position Coaxial Switches (3 to 6 Position)

RLC Electronics' Miniature Terminated MultiPosition Coaxial Switch line provides proven reliability, long life and outstanding electrical performance. This switch features low current and a significantly reduced height suitable for high density packaging applications.

Specifications

STR-1-min-2-3-4-5-6

SWITCH TYPE	SP-3T thru SP-6T			
Frequency Range	DC-18 GHz			OPT 26
Frequency (GHz)	DC-4.0	4.0-12-4	12.4-18	18-26.5
Insertion Loss (dB Max.)	0.2	0.30	0.50	1.00
VSWR (Max.)	1.25	1.40	1.50	2.00
Isolation (dB Min.)	60	60	60	40

Power Rating: RF Cold Switching: 2 watts average
Impedance: 50 ohms
Operating Power 25 Degree C:
(Failsafe): 12Vdc at 500ma nom, 28Vdc at 250ma nom
(Latching): 12Vdc at 300ma nom. 28Vdc at 160ma nom.
Cutthroat circuitry (standard), recovery time 100ms nom.
Connectors, RF: SMA female

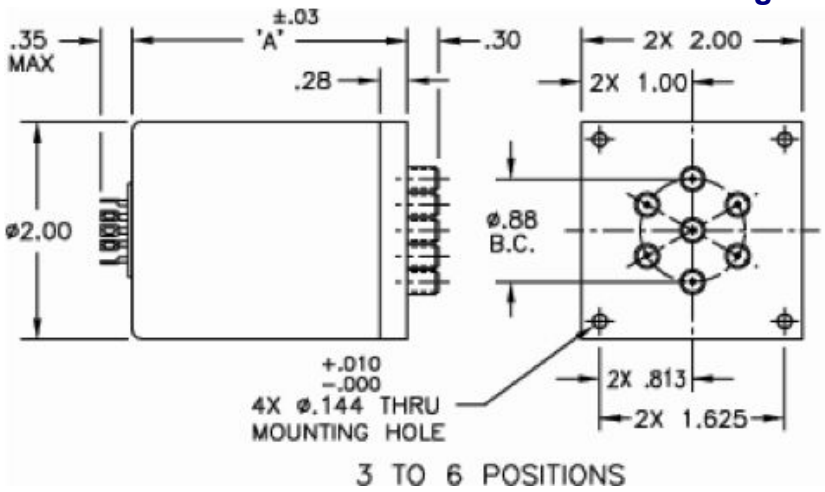
Life: 1,000,000 operations
Switching Time: 25ms Max. failsafe 125ms latching
Environmental Conditions: MIL-DTL-3928
Operating Mode: Failsafe or Latching
Switching Sequence: Break before make

To designate the switch desired use:

1: "3", "4", "5" or "6" throw operation
2: "D" for 28 Vdc or "H" for 12 Vdc
3: "I" for indicators if desired.
4: "L" for Latching cutthroat if desired
5: "TL" for TTL Driver if desired
6: "26" for 26.5GHz option

Example: STR-3min-D is a SP-3T, 28 Vdc, without indicators, failsafe switch that operates at DC to 18GHz.

Outline Drawing



MODEL NO.	'A'
STR−•min−D	2.10
STR−•min−D−I	2.70
STR−•min−D−L	2.10
STR−•min−D−I−L	2.38
STR−•min−D−TL	2.70
STR−•min−D−I−TL	2.70
STR−•min−D−I−L−TL	2.70
STR−•min−H same as STR−•min−D	

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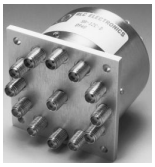
Terminated Multi-Position Coaxial Switches (3 to 6 Position)



RLC Electronics' Terminated Multi-Position Coaxial Switch line provides proven reliability, long life and outstanding electrical performance and features extremely low insertion loss and VSWR over the entire DC-18 GHz range, with an option to 26 and 40 GHz while maintaining high isolation.

Specifications

ST1-2-3-4-5-6-7-8

RF Positions	3	4	5	6	ALL	ALL
Frequency Range:(GHz)	DC-18	DC-18	DC-18	DC-18	18-26.5	26.5-40
Insertion Loss (dB Max)						
DC-4 GHz	0.20	0.20	0.20	0.20	0.20	0.20
4.0-12.4 GHz	0.30	0.30	0.30	0.30	0.30	0.30
12.4-18.0 GHz	0.50	0.50	0.50	0.50	0.50	0.50
18-26.5 GHz					1.00	0.75
26-5-40 GHz						0.90
VSWR (Max)						
DC-4.0 GHz	1.25:1	1.25:1	1.25:1	1.25:1	1.25:1	1.25:1
4.0-12.4 GHz	1.40:1	1.40:1	1.40:1	1.40:1	1.40:1	1.40:1
12.4-18.0 GHz	1.50:1	1.50:1	1.50:1	1.50:1	1.50:1	1.50:1
18-26.5 GHz					1.80:1	1.70:1
26.5-40 GHz						2.0:1
Isolation (dB Min)						
DC-4.0 GHZ	60	60	60	60	60	60
4.0-12.4 GHz	60	60	60	60	60	60
12.4-18 GHz	60	60	60	60	60	60
18-26.5 GHz	40	40	40	40	40	55
26.5-40 GHz						50

Power Rating, RF Cold Switching: 2 watts average
Impedance: 50 Ohms
Operating Power 25C:
(Failsafe): 12Vdc at 600 ma nom. 28Vdc at 260 ma nom. 115Vac at 40 ma nom.
(Latching): 12 Vdc at 480ma nom. 28Vdc at 240ma nom. 115 Vac at 225 ma nom. Cutthroat circuitry (standard), recovery time 100ms nom.

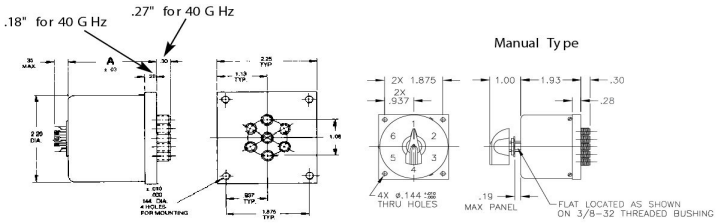
Connectors, RF: SMA Female (40 GHz-2.92 mm)
Life: 1,000,000 operations.
Switching Time: 25 mS Max. failsafe 125 ms latching
Weight: 20oz.
Environmental Conditions: MIL-DTL-3928
Operating Mode: Failsafe, manual or latching
Switching Sequence: Break before make.

To designate the switch desired use:

1: "M" for Manual, "R" for Remote.
2: "3", "4", "5" or "6" throw operation
3: "A" for 115 Vac, "D" for 28 Vdc or "H" for 12 Vdc
4: "I" for indicators if desired.
5: "L" for Latching cutthroat if desired
6: "TL" for TTL Driver if desired
7: "26" for 26.5 GHz options.
8: "40" for 40 GHz option

Example: STR-3-D is a SP-3T, 28 Vdc, without indicators, failsafe switch

Outline Drawing



MODEL NO.	A 18 & 26.5 GHz	A 40 GHz GHz
STR-*-D	2.79	2.69
STR-*-D-1	3.40	3.30
STR-*-D-L	4.03	3.93
STR-*-D-I- L	4.03	3.93
STR-*-D-TL	3.43	3.33
STR-*-D-I-TL	3.75	3.65
STR-*-D-I-L-TL	4.25	4.15
STR-*-H same as STR-*-D		

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Terminated Multi-Position Coaxial Switches (7 to 12 Position)

RLC Electronics' Terminated 7-12 Multi-Position Coaxial Switch line provides proven reliability, long life and outstanding electrical performance. and features extremely low insertion loss and VSWR over the entire DC-18 GHz range, while maintaining high isolation. Standard RF power rating is 2 watts cw limited by the termination.

Specifications

STR-1-2-3-4-5

RF Positions	7	8	9	10	11	12
Switch Type:	SP-7T	SP-8T	SP-9T	SP-10T	SP-11T	SP-12T
Frequency Range:(GHz)	DC-18	DC-18	DC-18	DC-18	DC-18	DC-18
Insertion Loss (Max dB)						
DC-6 GHz	0.30	0.30	0.30	0.30	0.30	0.30
6.0-12.0 GHz	0.50	0.50	0.50	0.50	0.50	0.50
12.0-16.0 GHz	0.70	0.70	0.70	0.70	0.70	0.70
16.0-18.0 GHz	1.00	1.00	1.00	1.00	1.00	1.00
VSWR (Max)						
DC-6 GHz	1.40	1.40	1.40	1.40	1.40	1.40
6.0-12.0 GHz	1.50	1.50	1.50	1.50	1.50	1.50
12.0-16.0 GHz	1.70	1.70	1.70	1.70	1.70	1.70
16.0-18.0 GHz	1.80	1.80	1.80	1.80	1.80	1.80
Isolation (dB) (Min)	60	60	60	60	50	50

Power Rating, RF Cold Switching: 2 watts average
Impedance: 50 Ohms
Operating Power 25C:
(Failsafe):

7 to 10 positions	11 and 12 positions
12 Vdc at 325 mA (nominal)	5Vdc at 600mA (nominal)
28Vdc at 190 mA (nominal)	12Vdc at 250mA (nominal)
	28Vdc at 140mA (nominal)

(Latching): "N/A" for 11-12 position. 12Vdc at 480mA (nominal), 28Vdc at 280 mA (nominal), Cutthroat circuitry (standard), recovery time 100ms (nominal)

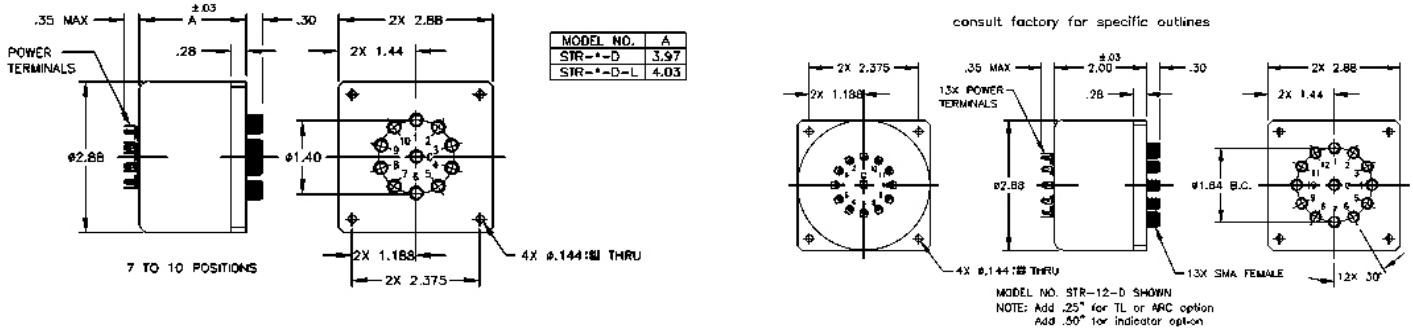
Connectors, RF: SMA Female
Life: 1,000,000 operations.
Switching Time: 25 mS Max. (failsafe) 125 ms (latching)
Weight: 30 oz. 17 oz for 11-12 position
Environmental Conditions: MIL-DTL-3928
Operating Mode: Failsafe/Latching/Manual (11-12 position only)
Switching Sequence: Break before make.

To designate the switch desired use:

1: "7", "8", "9", "10", "11", "12" throw operation
2: "A" for 115 Vac, "D" for 28 Vdc or "H" for 12 Vdc
3: "I" for indicators.
4: "L" for Latching cutthroat. "N/A" for 11-12 position
5: "TL" for TTL Driver
ARCN for arc suppression diodes, common negative
ARCP for arc suppression diodes, common positive
Note: "T" automatically comes with suppression diodes.

Example: STR-10-D is a SP-10T, 28 Vdc, Terminated, failsafe switch

Outline Drawing



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75 OHM Terminated Multi-Position Coaxial Switches (3 to 10 Position)

RLC Electronics' 75 ohm, Terminated, 3-10 Multi-Position Coaxial Switch line provides proven reliability, long life and outstanding electrical performance. These switches offer electrical characteristics featuring extremely low insertion loss and high isolation over the entire DC-2 GHz range and are useable beyond 2.5 GHz. These switches are available in remote failsafe or latching operation. Standard RF power rating is 1 watt cw limited by the termination.

Specifications

STR 75$^{-1-2-3-4-5}$

Model Number	Frequency (DC - 2 GHz)	Insertion Loss (dB) (Max.)	VSWR (Max.)	Isolation (dB) (Max.)
STR-75-	DC - 1	20	1.2	60
	1-2	30	1.3	60

Power Rating: 1 watt average
Impedance: 75 ohms
Operating Power 25C (ma nominal):
(Failsafe): 3-6 position 7-10 position
12 Vdc at 600 ma 12 Vdc at 325 ma
28 Vdc at 260 ma 28 Vdc at 190 ma
(Latching): 3-6 position 7-10 position
12 Vdc at 480 ma 12 Vdc at 480 ma
28 Vdc at 280 ma 28 Vdc at 280 ma Cutthroat circuitry (standard), recovery time 100 ms nominal

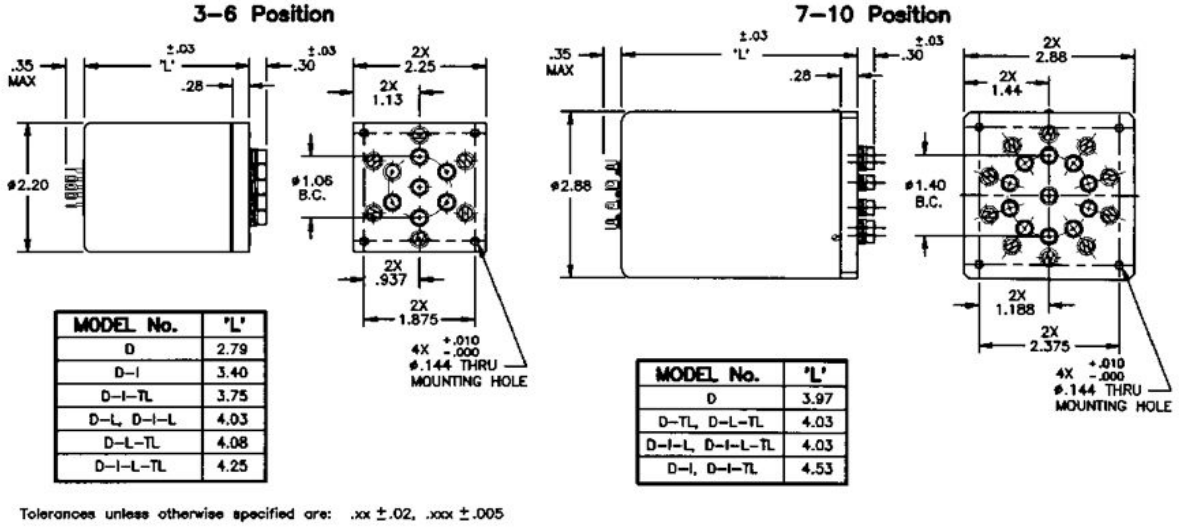
Connectors, RF: 75 ohm SMC jack
Life: 1,000,000 operations
Switching Time: 25 ms max (Failsafe)
125 ms (Latching)
Weight: Approximately 20 oz.
Environmental Conditions: MIL-S-3928
Operating Mode: Failsafe or Latching
Switching Sequence: Break before make

To designate the switch desired use:

1: `3' thru `10' for number of positions
2: `H' for 12 Vdc or `D' for 28 Vdc
3: `I' for indicators if desired
4: `L' for latching cutthroat if desired
5: `TL' for TTL Driver if desired

Example: STR7510D is a SP10T, 28 Vdc, Terminated, failsafe switch

Outline Drawing



MODEL No.	'L'
D	2.79
D–I	3.40
D–I–TL	3.75
D–L, D–I–L	4.03
D–L–TL	4.08
D–I–L–TL	4.25

MODEL No.	'L'
D	3.97
D–TL, D–L–TL	4.03
D–I–L, D–I–L–TL	4.03
D–I, D–I–TL	4.53

Tolerances unless otherwise specified are: .xx ±.02, .xxx ±.005

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Miniature Surface Mount Transfer Switches

RLC Electronics' miniature surface mount transfer switch combines high performance in a compact configuration. The switch provides extremely high reliability, long life, and excellent electrical performance characteristics in a miniature package. The power consumption is less than half that of the miniature connectorized switches. The switch is available with a choice of four different operating frequencies and three coil voltages.

Specifications

SR-Tmin-min^{-1-2-3}

Switch Type	TRANSFER			
Frequency (GHz)	DC-2.0	2.0-5.0	5.0-12.4	12.4-18.0
Insertion Loss (dB Max)	0.2	0.3	0.4	0.7
VSWR (Max)	1.3	1.4	1.5	1.7
Isolation (dB Min)	70	60	50	40

Power Rating, RF Cold Switching: See page 79
Impedance: 50 ohms
Operating Power 25 deg C (mA nominal):
(Failsafe): 5 vdc at 440 mA
12 vdc at 185 mA, 28 vdc at 108 mA
(Latching): 5 vdc at 500 mA
12 vdc at 210 mA, 28 vdc at 122 mA

Connectors, RF and Power: .018 DIA. Pins
Life: 1,000,000 operations
Switching Time: 15 milliseconds max.
Weight: .7 oz.
Environmental Conditions: MIL-DTL-3928
Operating Mode: Failsafe or latching.
Switching Sequence: Break before make

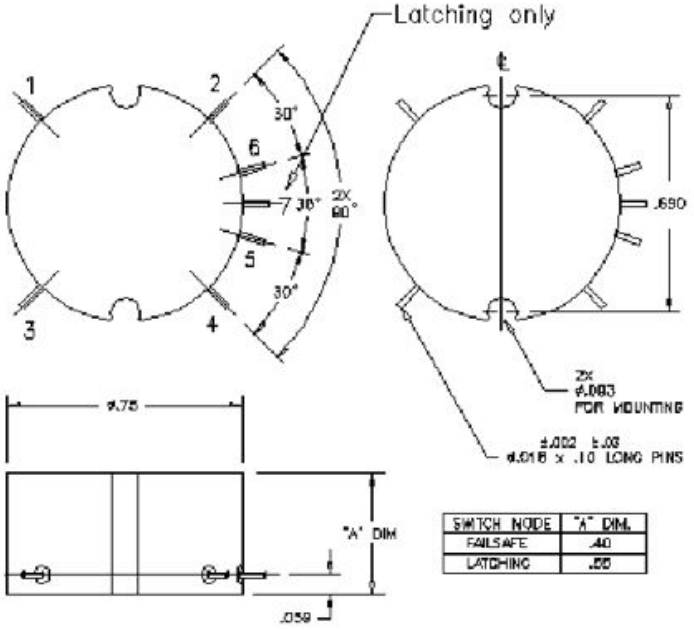
To designate the switch desired use:

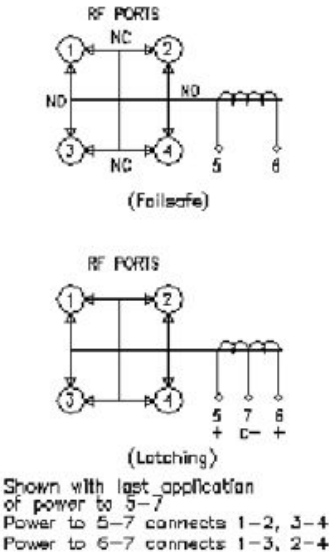
1: "E" for 5 volt coil
"H" for 12 - 15 volt coil
"D" for 24 28 volt coil

2: "2" for DC 2 GHz, "5" for DC 5GHz "12" for DC 12.4 GHz, "18" for DC 18 GHz
3: "L" for pulse latching if desired

Example: SR-Tmin-min-D-2 is a Transfer, 24-28 vdc, DC-2 GHz, failsafe switch

Outline Drawing





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Micro Miniature SMA Transfer Switches

RLC Electronics' Micro Miniature SMA Transfer Switch is a compact design. The switch incorporates SMA connectors to allow high-density packaging and excellent electrical performance through 26.5 GHz. The switch is available in failsafe and latching configurations with a choice of three different frequency ranges and three different coil voltages.

Specifications

SR-TMIN-MIN-R^{-1-2-3}

Switch Type	TRANSFER			
Frequency (GHz)	DC-8	8-12.4	12.4-18	18-26.5
Insertion Loss (dB Max)	0.3	0.5	0.7	0.8
VSWR (Max)	1.35	1.6	1.7	1.8
Isolation (dB Min)	70	60	50	40

Power Rating, RF Cold Switching: See page 79.
Impedance: 50 ohms
Operating power: 25C (mA nominal):
(Failsafe): 5 Vdc at 440 mA, 12 Vdc at 185 mA, 28 Vdc at 108 mA
(Latching): 5 Vdc at 500 mA, 12 Vdc at 210 mA, 28 Vdc at 122mA
Connectors: SMA female

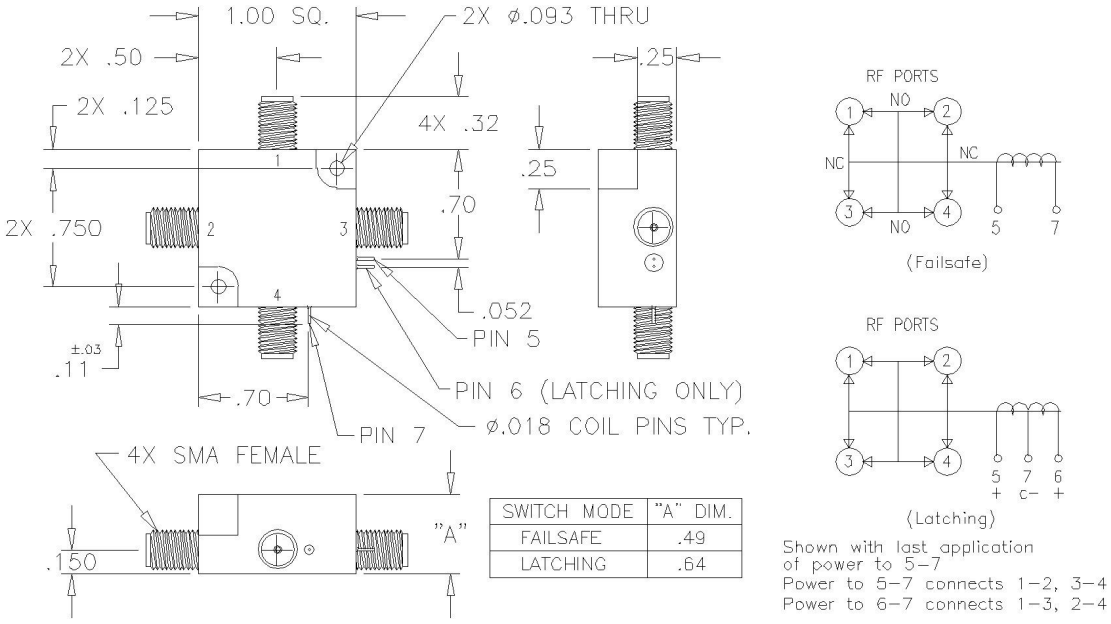
Power Connections: 0.018 dia. pins
Life: 1,000,000 operations
Switching Time: 15 milliseconds max.
Weight: 1.3 oz.
Environmental Conditions: MIL-DTL-3928
Operating Mode: Failsafe or Latching
Switching Sequence: Break before make

To designate the switch desired use:

1: "E" for 5 volt coil "H" for 12-15 volt coil "D" for 24-28 volt coil
2: "8" for DC-8 GHz "18" for DC-18 GHz "26" for DC-26.5
3: "L" for pulse latching if desired

Example: SR-TMIN-MIN-R-D-26-L is a 24-28vdc, DC-26.5 GHz, Latching switch

Outline Drawing



Miniature Transfer Coaxial Switches

This RLC Electronics' Miniature Transfer Switch line provides extremely high reliability, long life and outstanding electrical performance and features extremely low insertion loss and VSWR over the entire DC-18 GHz range, with an option to 26.5 GHz, while maintaining high isolation.

Specifications

S-1-TMIN-2-3-4-5-6

Switch Type	TRANSFER			
Frequency Range	DC-18GHz			OPTION
Frequency (GHz)	DC-4.0	4.0-12.4	12.4-18.0	18 - 26.5
Insertion Loss (Max dB)	0.1	0.2	0.3	1.0
VSWR (Max)	1.2	1.3	1.5	2.0
Isolation (dB Min)	80	70	60	45

Power Rating, RF Cold Switching: See page 79
Impedance: 50 Ohms
Operating Power 25C:
(Failsafe): 12Vdc at 650 ma nom.
28Vdc at 266 ma nom. 115 Vac at 50 ma nom.
(Latching): 12 Vdc at 180 ma nom. 28 Vdc at 90 ma nom.
115 Vac at 225 ma nom. Current applied 10 ms min.
cutthroat circuitry(standard), recovery time 100 ms nom.

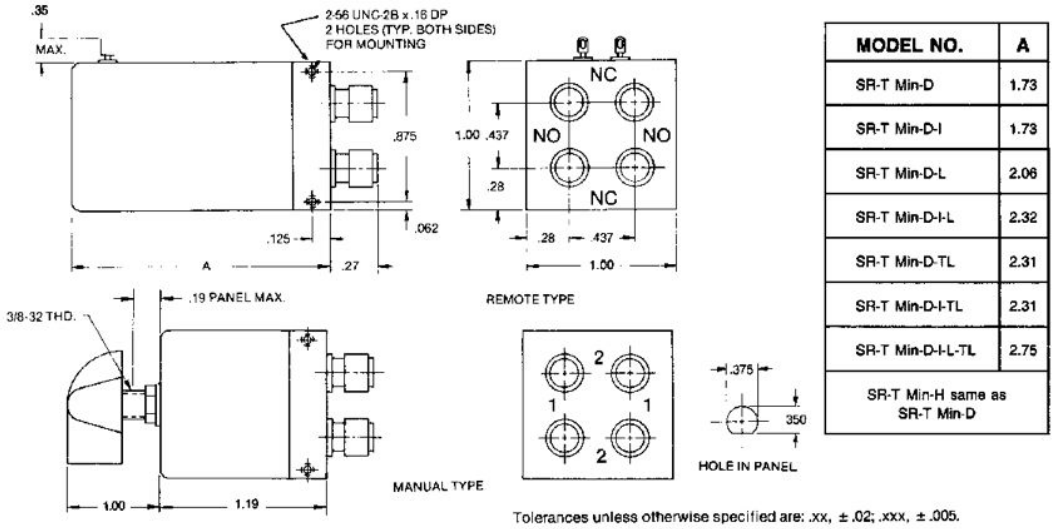
Connectors, RF: SMA Female
Connectors, Power: Feed through solder lugs.
Life: 1,000,000 operations.
Switching Time: 15 mS Max.
Weight: 3 oz.
Environmental Conditions: MIL-S-3928
Operating Mode: Manual, failsafe or latching.
Switching Sequence: Break before make.

To designate the switch desired use:

1: "M" for Manual, "R" for Remote.
2: "A" for 115 Vac, "D" for 28 Vdc or "H" for 12 Vdc.
3: "I" for indicators
4: "L" for latching cutthroat
5: "TL" for TTL Driver
6: "26" for 26.5 GHz operation

Example: SR-Tmin-D-I-L-26 is a remote, 28 Vdc; with indicators, latching cut throat switch. 26.5GHz operation.

Outline Drawing



MODEL NO.	A
SR-T Min-D	1.73
SR-T Min-D-I	1.73
SR-T Min-D-L	2.06
SR-T Min-D-I-L	2.32
SR-T Min-D-TL	2.31
SR-T Min-D-I-TL	2.31
SR-T Min-D-I-L-TL	2.75
SR-T Min-H same as SR-T Min-D	

Tolerances unless otherwise specified are: .xx, ± .02; .xxx, ± .005.

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Type C Transfer Coaxial Switch

This RLC Electronics' Type C C mid-size Transfer Switch provides extremely high reliability, long outstanding electrical performance and features extremely low insertion loss and VSWR over the entire DC-18 GHz range, with option to 26 and 40 GHz,maintaining high isolation.

Specifications

S^{-1}-TC$^{-2-3-4-5-6-7}$

Switch Type:	**TRANSFER**			
Frequency Range:	**DC-18 GHz**	**(Opt. 26)**	**DC-40 GHz (Opt. 40)**	
Insertion Loss (Max dB)			**Ins. Loss: (dB Max)**	
DC-4.0 GHz	0.20	0.20	DC-6.0 GHz	0.25
4.0-12.4 GHz	0.30	0.30	6.0-12 GHz	0.40
12.4-18 GHz	0.40	0.40	12-18.5 GHz	0.50
18-26.5 GHz (option 26)	-	0.70	18.5-26.5 GHz	0.70
			26.5-40 GHz	0.90
VSWR (Max)			**VSWR: (Max)**	
DC-4 GHz	1.20	1.20	DC-6.0 GHz	1.30
4.0-12.4 GHz	1.30	1.30	6.0-12 GHz	1.40
12.4-18 GHz	1.50	1.50	12-18.5 GHz	1.50
18-26.5 GHz (option)	-	1.80	18.5-26.5 GHz	1.70
			26.5-40 GHz	2.00
Isolation (dB Min)			**Isolation: (dB Min)**	
DC-4 GHz	80	80	DC-6.0 GHz	70
4.0-12.4 GHz	70	70	6.0-12 GHz	60
12.4-18 GHz	60	60	12-18.5 GHz	60
18-26.5 GHz (option)	-	40	18.5-26.5 GHz	55
			26.5-40 GHz	45

Power Rating, RF Cold Switching: see page 79
Impedance: 50 Ohms
Operating Power 25C
(Failsafe): 12Vdc at 500 ma nom. 28Vdc at 200 ma nom. 115 Vac at 40 ma nom.
(Latching): 12 Vdc at 500 ma nom. 28 Vdc at 300 ma nom. 115 Vac at 225 ma nom. Current applied cutthroat circuitry (standard), recovery time 100ms nom.
Connectors, RF: SMA, TNC*, BNC* (40 GHz 2.92 mm)

Connectors, Power: Feed through solder lugs.
Life: 1,000,000 operations.
Switching Time: 20 20 mS Max.
Weight: 6 oz.
Environmental Conditions: MIL-DTL-3928
Operating Mode: Manual, failsafe or latching.
Switching Sequence: Break before make.
*BNC not recommended above 1GHz
*TNC not recommended above 12.4GHz

To designate the switch desired use:

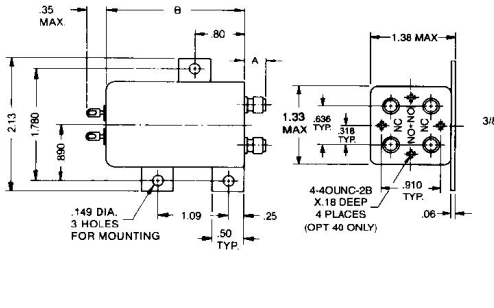
1: "M" for Manual, "R" for Remote.
2: "B" for BNC, "T" for TNC, "R" for SMA type connectors
3: "A" for 115 Vac, "D" for 28 Vdc or "H" for 12 Vdc.
4: "I" for indicators if desired.
5: "L" for latching cutthroat if desired
6: "TL" for TTL Driver if desired
7: "26" for 26.5GHz option "40" for 40 GHz option

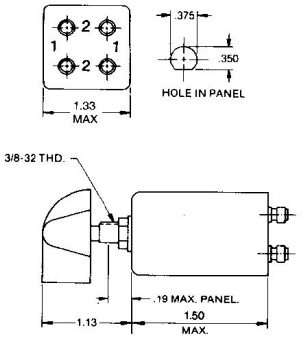
Example: SR-TC-T-D-I-L is a remote, TNC, 28 Vdc; with indicators, latching cutthroat switch

Outline Drawing

CONN	A
SMA	30
BNC/TNC	.56
OPT 40*	.27

*OPT 40 does not have mtg plate.





MODEL NO.	B
SR-TC- * -D	2.16
SR-TC- * -D-I	2.16
SR-TC- * -D-L	2.13
SR-TC- * -D-I-L	2.13
SR-TC- * -D-TL	2.50
SR-TC- * -D-I-TL	2.50
SR-TC- * -D-L-TL	2.16
SR-TC- * -D-I-L-TL	2.16
SR-TC-D-40	1.85
SR-TC- * -H same as SR-TC- * -D	

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Standard Transfer Coaxial Switches

This RLC Electronics' Standard Transfer Switch line provides extremely high reliability, long life and excellent electrical performance, it features extremely low insertion loss and VSWR over the entire DC-12.4 GHz range while maintaining high isolation. On remote latching units a manual override option allows the user to switch manually without power applied.

Specifications

S-1-T-2-3-4-5-6-7

Switch Type	TRANSFER	
Frequency Range	DC-12.4 GHz	
	DC-7.0 GHz	7.0-12.4 GHz
Insertion Loss (Max dB)	0.3	0.6
VSWR (Max)	1.30	1.6
Isolation (dB Min)	60	55

Power Rating, RF Cold Switching: See page 79
Impedance: 50 Ohms/75 Ohms.*
Operating Power 25C:
(Failsafe): 12Vdc at 600 ma nom. 28Vdc at 424 ma nom. 115 Vac at 50 ma nom.
(Latching): 12 Vdc at 350 ma nom. 28 Vdc at 310 ma nom. 115 Vac at 225 ma nom. Current applied 10 ms min. cutthroat circuitry(standard), recovery time 100 ms nom.
Connectors, RF: N, SMA, TNC, BNC* Female

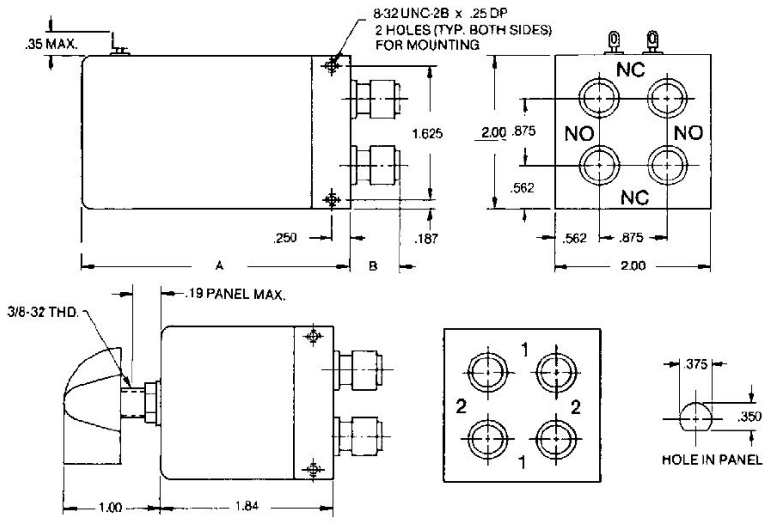
Connectors, Power: Feed through solder lugs.
Life: 1,000,000 operations.
Switching Time: 20 mS Max.
Weight: 19 oz.
Environmental Conditions: MIL-DTL-3928
Operating Mode: Manual, failsafe or latching.
Switching Sequence: Break before make.
*BNC not recommended above 1GHz
*75 ohm up to 3 GHz. VSWR 1.50 max.

To designate the switch desired use:

1: "M" for Manual, "R" for Remote, R75 for 75 Ohms.
2: "N" (50 or 75 Ohms), "R" for SMA, "T" (50 or 75 Ohms) for TNC, or "B" (50 or 75 Ohms) for BNC or "F" type connectors
3: "A" for 115 Vac, "D" for 28 Vdc or "H" for 12 Vdc.
4: "I" for indicators if desired.
5: "L" for latching cutthroat if desired
6: "TL" for TTL Driver if desired
7: "O" for Manual Override.

Example: SR-T-N-D-I-L is a remote, Type "N", 28 Vdc; with indicators, latching cut throat switch. 50 ohms for 75 ohms SR75-T

Outline Drawing



MODEL NO.	A
SR-T-*-D	2.75
SR-T-*-D-I	2.75
SR-T-*-D-I-T-L	3.20
SR-T-*-D-L	2.75
SR-T-*-D-I-L	2.75
SR-T-*-D-I-L-TL	2.75
SR-T-*-A	3.00
SR-T-*-A-1	3.00
SR-T-*-A-L	3.50
SR-*-A-I-L	3.50
CONN	**B**
N	.52
BNC/TNC	.48
SMA	.44
F	.44

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Standard Multi-Position Coaxial Switches

RLC Electronics` Standard Multi-Position Coaxial Switch line provides extremely high reliability, long life and outstanding electrical performance characteristics by utilizing high density packaging. The "Multi-Position" electrical characteristics features extremely low insertion loss and VSWR over the entire DC-12.4GHz range, while maintaining high isolation.

Specifications

S-1-2-3-4-5-6-7

RF Positions	3	4	5	6
Switch Type:	SP-3T	SP-4T	SP-5T	SP-6T
Frequency Range:(GHz)	DC-12.4	DC-12.4	DC-12.4	DC-12.4
Insertion Loss (Max dB)				
DC-7 GHz	0.30	0.30	0.30	0.30
7.0-12.4 GHz	0.60	0.60	0.60	0.60
VSWR (Max)				
DC-7 GHz	1.30	1.30	1.30	1.30
7.0-12.4 GHz	1.60	1.60	1.60	1.60
Isolation (dB) (Min)	55	55	55	55

Power Rating, RF Cold Switching: See page 79
Impedance: 50 Ohms/75 Ohms.*
Operating Power 25C:
(Failsafe): 12Vdc at 270 ma nom.
28Vdc at 190 ma nom. 115Vac at 50 m nom.
(Latching): 28 Vdc at 310 mA nom. 12 Vdc at 550 mA nom.
Cutthroat circuitry (standard), recovery time 100ms nom.
Connectors, RF: N, SMA, TNC, BNC* Female.
Connectors, Power: Feed through solder lugs.

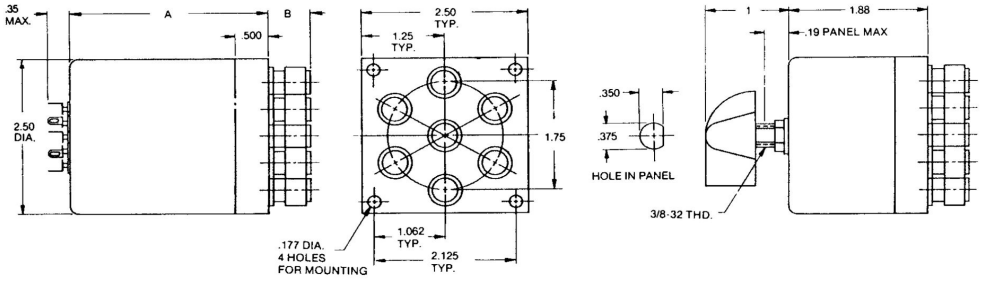
Life: 1,000,000 operations.
Switching Time: 20 mS Max. Failsafe 125mS latching.
Weight: 20oz.
Environmental Conditions: MIL-DTL-3928
Operating Mode: Manual, failsafe or latching
Switching Sequence: Break before make.
*BNC not recommended for use above 1GHz
*75 ohm up to 3 GHz VSWR 1.5 max

To designate the switch desired use:

1: "M" for Manual, "R" for Remote.
2: "3", "4", "5" or "6" throw operation.
3: "N", "T" (50 or 75 ohms) for TNC, "B" (50 or 75 ohms) for BNC or "R" for SMA (50 ohms only) or "F" type connectors.
4: "A" for 115 Vac, "D" for 28 Vdc or "H" for 12 Vdc.
5: "I" for indicators.
6: "L" for Latching cutthroat.
7: "TL" for TTL Driver.

Example: SR-6-N-D-I-L is a remote, 6 position, N connector, 28 Vdc with indicators latching cutthroat switch. 50 ohms.
For 75 ohms SR75-

Outline Drawing



	A	
MODEL	FAILSAFE	LATCHING
SR-*-*-D	3.06	3.72
SR-*-*-D-I	3.72	3.72
SR-*-*-A	3.72	4.34
SR-*-*-A-I	3.72	4.34

CONN	B
N	.54
BNC/TNC	.48
SMA	.44
F	.48

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High Power Transfer Switches

RLC Electronics' High Power transfer switch provides extremely high reliability, long life and excellent electrical performance. It features low insertion loss and VSWR over the entire DC-6.0 GHz range while maintaining high isolation. On remote latching units a manual override option allows the user to switch manually without power applied.

Specifications

S-1-P-T-2-3-4-5-6-7

Switch Type	TRANSFER	
Frequency Range	DC - 6 GHz	
	DC-3.0 GHz	3.0-6.0 GHz
Insertion Loss (Max dB)	0.2	0.5
VSWR (Max)	1.25	1.5
Isolation (Min dB)	65	60

Power Rating, RF Cold Switching: See page 79.
Impedance: 50 ohms
Operating Temp: 25 deg C
(Failsafe): 12vdc at 600 ma nom.
28vdc at 424 ma nom.
(Latching): 12vdc at 350 ma nom.
28vdc at 310 ma nom.
Current applied 10 ms min. cutthroat
Circuitry (standard), recovery time 100 ms nom.

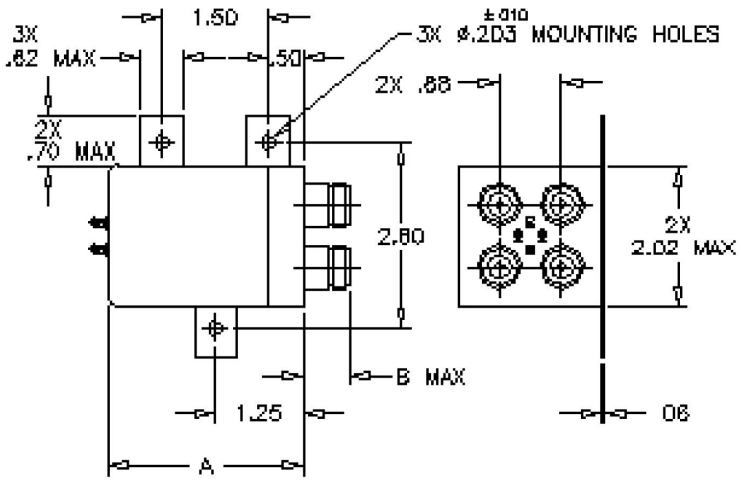
Connectors, RF: N, TNC, SC female
Connectors, Power: solder terminals
Life: 1,000,000 operations
Switching Time: 25 milliseconds max.
Weight: 19 oz.
Environmental Conditions: MIL-DTL-3928
Operating Mode: Manual, failsafe or latching.

To designate the switch desired use:

1: "M" for Manual or `R' for Remote
2: "N", "T" for TNC, or "S" for SC type connectors
3: "D" for 28vdc, "H" for 12vdc
4: "I" for indicators, if desired
5: "L" for latching cutthroat, if desired
6: "TL" for TTL Driver, if desired
7: "O" for manual override

Example: SRP-T-N-D-I-L is a remote, type "N", 28vdc; with indicators, latching cut throat switch.

Outline Drawing



MODEL NO.	A
SRP-T-*-D	2.75
SRP-T-*-D-I	2.75
SRP-T-*-D-I-TL	3.20
SRP-T-*-D-L	2.75
SRP-T-*-D-I-L	2.75
SRP-T-*-D-I-L-TL	2.75
CONNECTOR	B MAX
N	.70
TNC	1.00
SC	.70

Rigid Line Transfer Coaxial Switches

This RLC Electronics' Rigid Line Transfer Switch provides extremely high reliability, long life and outstanding electrical performance across the complete broadcast bands. This switch is available in either automatic or manual switching in 7/8, 1 5/8, line sizes. Standard units are normally available in 50 Ohms, however 75 Ohms can also be furnished. EIA RS225 apply to all switches.*

Specifications

S^{-1}-R-$T^{-2-3-4-5}$

Switch Type	TRANSFER	
Line Size	7/8	1 5/8
Frequency Range	DC-1.5 GHz*	DC-1.5 GHz*
Insertion Loss (Max dB)	0.14	0.12
VSWR (Max)	1.35	1.35
Isolation (dB)	60	60
* Designate actual frequency of use when ordering		

Power Rating, RF Cold Switching: See page 79
Impedance: 50 Ohms/75 Ohms.
Operating Power 25C:
(Failsafe): 28Vdc at 6.5a nom operating current and 1.8a at holding current
(Latching): 28 Vdc at 1.25a nom. 115 Vac at 1.3a nom. Current applied 200 ms min. cutthroat circuitry standard recovery time 200 ms nom for 28Vdc and 1.5 sec for 115Vac.

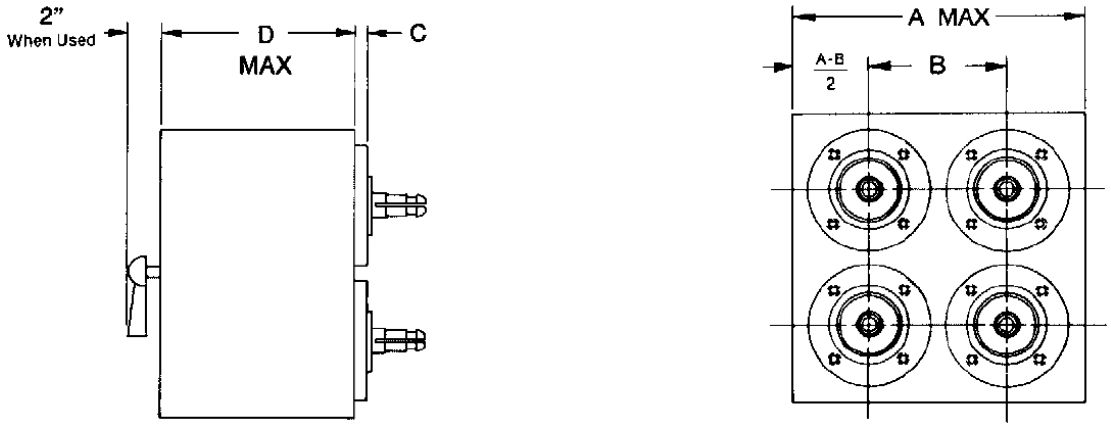
Connectors, RF: Standard EIA
Connectors, Power: Feed through solder lugs.
Life: 100,000 operations.
Switching Time: 500 mS Max.
Environmental Conditions: MIL-DTL-3928
Operating Mode: Manual, failsafe or latching.
Switching Sequence: Break before make.

To designate the switch desired use:

1: "M" for Manual, "R" for Remote.
2: 7/8, 1 5/8 for line size
3: "A" for 115 Vac, "D" for 28 Vdc
4: "I" for indicators if desired.
5: "L" for latching cutthroat if desired

Example: SRR-T-7/8-D-I-L is a remote, 7/8 line, 28 Vdc; with indicators, latching cut throat switch. 50 ohms

Outline Drawing



Line Size	A	B	C	D (Manual)	D (Remote)
7/8	6.04	2.75	.29	6.00	12.00
1 5/8	8.04	3.75	.36	6.00	12.00

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Solid State Switches SPDT

RLC Electronics' Diode Switches cover the range of 0.2 to 18 GHz. Standard units are designed for low power, and high speed applications. Two independent TTL drivers are included for maximum versatility. Close tolerance printed circuit techniques and precision bonding of diodes ensure uniform operation under extreme environmental conditions.

Specifications

SSD

Model Number	Frequency (GHz)	Insertion Loss (dB) (Max.)	Isolation (dB) (Min.)	VSWR
SSD-0205	0.2 - 0.5	2.0 db	60	1.5:1
SSD-0520	0.5 - 2.0	2.0 db	60	1.5:1
SSD-2080	2.0 - 8.0	2.5 db	60	1.75:1
SSD-80124	8.0 - 12.4	3.0 db	60	2.0:1
SSD-12418	12.4 - 18.0	3.5 db	60	2.0:1

Switching Speed:
ON Time: 50 nsec. Max.
OFF Time: 50 nsec. Max.

Power Handling Capability:
Without Performance Degradation:
250 mW cw or peak
Survival Power:
1W average, 10W peak
(1sec. max. pulse width)

Power Supply Requirements:
+5V +/-5%, 90 mA
-12V +/-5%, 75 mA

Control Characteristics

Control Input
Impedance TTL, advanced Schottky, one-unit load (a unit load is 0.6 mA sink current and 20 uA source current.)

Control Logic:
Logic "0" (-0.3 to +0.8V) for switch ON
Logic "1" (+2.0 to +5.0V) for switch OFF

(Please contact the factory for outline details)

SPDT Waveguide Switches

These single pole, double throw waveguide switches are based on RLC Electronics' highly reliable series of coaxial switches. A precision machined waveguide transition assembly is combined with coaxial switch technology to produce a compact device that features the low current and fast switching time of a coaxial switch with waveguide inputs and outputs. Units are available in various waveguide sizes covering 7.05 to 40 GHz with a variety of options.

Specifications

$S^{-1}W^{-2-3-4-5-6}$

Model No.	Waveguide size	Frequency (GHz)	Insertion Loss (dB max)	VSWR (max)	Isolation (dB min)	Power Rating	
						Peak	Average
112	WR112	7.05-10	.7	1.6	60	5kw	130w
90	WR90	8.2-12.4	.7	1.6	60	5kw	120w
75	WR75	10-15	.8	1.7	60	2kw	40w
62	WR62	12.4-18	.9	1.8	60	2kw	40w
42	WR42	18-26.5	1.2	2.0	50	2kw	30w
28	WR28	26.5-40	2.0	2.5	50	2kw	25w
750	WRD750	7.5-18	1.0	2.0	60	2kw	40w

Operating Power: 25deg C
(Failsafe):
12vdc @ 575mA nom. (112, 90)
12vdc @ 250mA nom. (all others)
28vdc @ 200mA nom. (112, 90)
28vdc @ 140mA nom. (all others)
(Latching):
12vdc @ 1 amp nom. (112, 90)
12vdc @ 120mA nom. (all others)
28vdc @ 430mA nom. (112, 90)
28vdc @ 60mA nom. (all others)

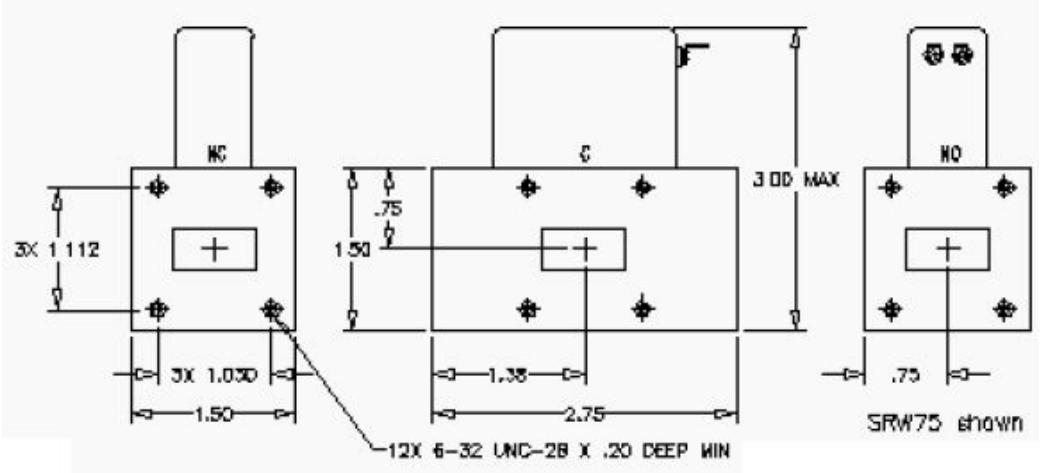
Life: 1,000,000 operations
Switching Time: 25mS (112, 90)**Environmental Conditions:** MIL-DTL-3928
Operating Mode: Manual, Failsafe, or Latching
Switching Sequence: Break before make
Maximum Hot Switching: 1 watt

To designate the switch desired use:

1: "M" for Manual "R" for Remote
2: 112, 90, 75 etc for model number
3: "D" for 28vdc or "H" for 12vdc
4: "I" for indicators, if desired
5: "L" for latching cutthroat, if desired
6: "TL" for TTL driver if desired
7: "Arc" for arc suppression diodes (N/A with TTL and Latching)

Example: SRW75-H-TL is a remote, 12vdc, failsafe WR75 switch with a TTL driver

Outline Drawing



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Waveguide Switches

RLC Electronics' electromechanical waveguide switches offer a compact design utilizing a proprietary non-contacting actuator mechanism that requires low current. Precision machined parts insure optimum electrical performance over the entire waveguide band. These units are available in SPDT and transfer configurations, manual or remote, with a choice of coil voltages and optional indicator contacts. Solid state de-energizing circuiting insures high reliability and is available with common positive, common negative, and TTL control options.

Specifications

WG-1-2-3-4-5-6

Model Number	Wave Guide Size	Frequency	Insertion Loss (GHz)	VSWR (dB) (Max.)	Isolation (dB) (Min.)
28	WR 28	26.5 40.0	0.4	1.25	50
42	WR 42	18.0 26.5	0.4	1.1	60
62	WR 62	12.4 18.0	0.4	1.1	60
75	WR 75	10.0 15.0	0.5	1.05	60
90	WR 90	8.20 12.4	0.5	1.05	60

Input / Output connections: cover flanges with tapped holes
Operating Mode: latching with cutthroat, "fail safe"
Switching Time: 125 milliseconds maximum
Operating Power: 12 VDC, 28 VDC
Life: 100,000 operations minimum
Weight: 5 ounces (WR28)

Outline: Contact factory for details

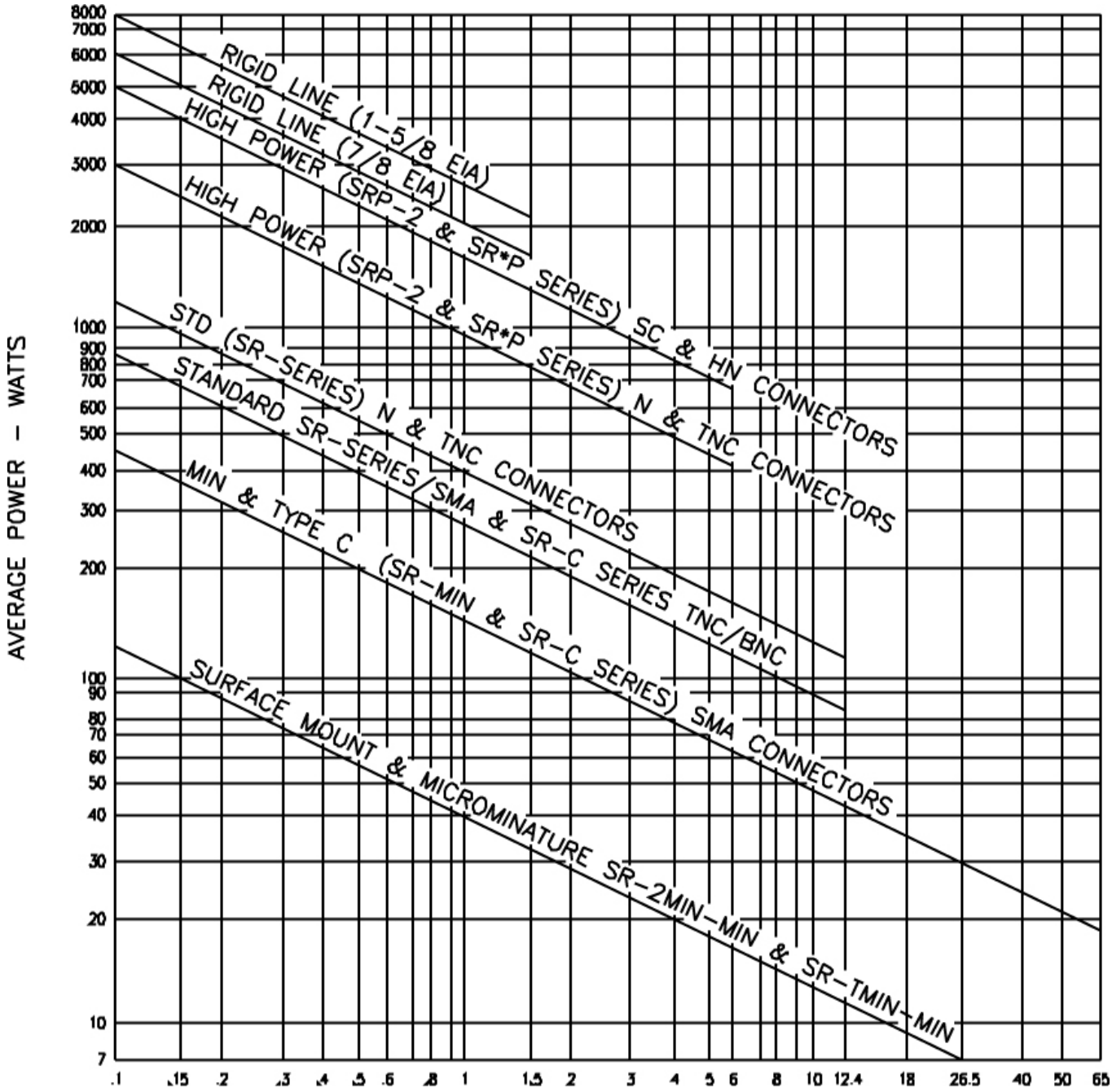
To designate the switch desired use:

1: "M" for manual, "R" for remote
2: 28, 42, etc. for model number
3: "2" for SPDT, "T" for transfer switch
4: "H" for 12VDC Coil, "D" for 28 VDC Coil
5: "I: for indicators if desired
6: "L" for latching, if desired

(Please contact the factory for additional configurations)

Power Rating vs Frequency-Coaxial Switches

Rating stated for 25°C ambient temperature, matched 50 ohm system sea level and cold switching.



FREQUENCY - Ghz

Power level ratings are given for switches equipped with High temperature construction (which must be specified when maximum power handling capacity is required). Standard switches should be derated to 75% of indicated values.

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RLC Switch Offerings: Switches that can be Remotely or Manually Controlled

Description	Examples	
Miniature Coaxial Switches (page 44)	SR-2MIN-D	SM-2MIN
Type C Coaxial Switches (page 45)	SR-2C-R_D	SM-2C
Standard Coaxial Switches (page 46)	SR-2-R-D-I	SM-2R
High Power Coaxial Switch (page 48)	SRP-2-S-D-I	SMP-2-T
Terminated SPDT Coaxial Switches (page 49)	STR-2-D	STM-2
Miniature Multi-Position Coaxial Switches (page 50)	SR-4MIN-D-26	SM-4MIN
Type C Multi-Position Coaxial Switches (3-6 pos) (page 52)	SR-6C-D-I-L	SM-6C
Type C Multi-Position Coaxial Switches (7-12 pos) (page 54	SR-10C-D-I	SM-10C
Standard Multi-Position Coaxial Switches (page 71)	SR-6-N-D-I-L	SM-6-N
High Power Multi-Position Coaxial Switches (page 56)	SR-6-P-N-D-I-L	SM-6-P-N
Terminated Multi-Position Coaxial Switches (3-6 pos) (page 59	STR-3-D	STM-3
Miniature Transfer Coaxial Switches (page 65)	SR-TMIN-D-I-L-26	SM-TMIN
Type C Transfer Coaxial Switch (page 67)	SR-TC-T-D-I-L	SM-TC-T
Standard Transfer Coaxial Switches (page 69)	SR-T-N-D-I-L	SM-T-N
High Power Transfer Switches (page 73)	SRP-T-N-D-I-L	SMP-T-N
Rigid Line Transfer Coaxial Switches (page 74)	SRR-T-7/8-D-I-L	SMR-T-7/8
SPDT Waveguide Switches (page 77)	SRW75-H-TL	SMW75

DC To 1000 MHz Continuously Variable Coaxial Attenuators

RLC Electronics' Low Frequency Continuously Variable Coaxial Attenuators offer wide bandwidths for applications where continuous adjustment of signal level is required with low insertion loss and good impedance matching. Units are available for 50 ohm and 75 ohm applications with three different mounting configurations and four connector options. Both models LAV-V and LAV-C are designed for optimum VSWR and flatness over the respective bands. The LAV-C is specifically for the cellular frequency range.

Specifications

LAV-1-2-3-4

Model Number	Frequency Range (MHz)	Attenuation Range (dB) (Min.)	VSWR (Max.)	Insertion Loss (dB) (Max)	Flatness
LAV-	DC-250	18	1.55	.2	N/A
	250-450	17	1.60	.3	
	450-700	16	1.80	.5	
	700-1000	16	2.00	.7	
LAV-V-	DC-200	18	1.55	.2	±.3 dB
LAV-C-	700-900	10	1.50	.5	±.3 dB

Impedance: 50 ohms, 75 ohms
Power Rating: 0.25 watt

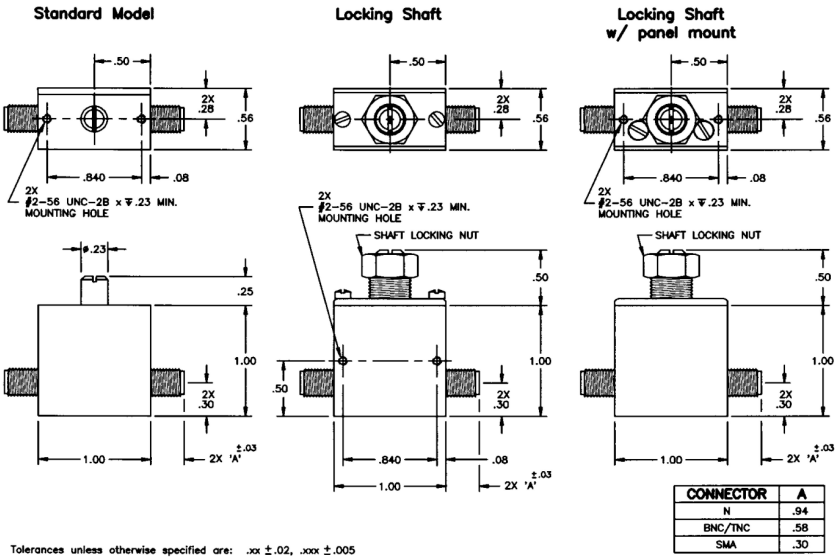
Shaft: Screwdriver adjust with optional shaft lock. Attenuation increases with counter clockwise rotation. Approximately 3.5 turns for maximum attenuation.

To designate the attenuator desired use:

1: Blank, V, C, for model/frequency range
2: 50, 75 for impedance
3: N, T (TNC), B (BNC), R (SMA) for connectors
4: L for locking shaft, LP for locking shaft with panel mount

Example: LAV-50-R-L is a DC-1000 MHz, 50 ohm attenuator with SMA connectors and a locking shaft

Outline Drawing



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Broadband Miniature Attenuators

RLC Electronics' Broadband Miniature Attenuators offer precision impedance matching and bi-directional handling over the extremely broad frequency of DC to 18 GHz. They are also available in the reduced frequency ranges of DC to 12.4 GHz, DC to 8 GHz and DC to 1.5GHz. These miniature microwave structures are uniquely constructed resistive film elements combined with precision connectors meeting the full requirements of MIL-C39012. Units can be supplied in standard attenuation values as listed or other values for specific requirements. Three combinations of connectors are available in the standard models.

Specifications

$A^{-1-2-3-4}$

Model Number	Frequency Range (GHz)	Attenuation Value (dB)	Accuracy (±dB)	VSWR (Max)
A-1	DC-1.5	1 Thru 6	.3	1.20
		7 Thru 20	.5	1.20
		21 Thru 30	.8	1.20
A-8	DC-8	1 Thru 6	.3	1.25
		7 Thru 20	.5	1.25
		21 Thru 30	.8	1.25
A-12	DC-12.4	1 Thru 6	.3	1.35
		7 Thru 20	.5	1.35
		21 Thru 30	.8	1.35
A-18	DC-18	1 Thru 6	.3	1.35
		7 Thru 20	.5	1.35
		21 Thru 30	1.0	1.35

Power Rating: 2 watts avg @ 25 C
Derated linearly to 0.5 watts @ 125 C
Impedance: 50 Ohms
Connectors: SMA male or female, N male or female

Weight: 0.4 oz for SMA, 2 oz for Type N
Material: Stainless Steel
Environment: MIL-A-3933

To designate the attenuator desired use:

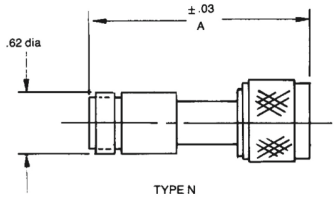
1: 1, 8, 12, 18 for 1.5, 8.0, 12.4 and 18.0 GHz
2: 3, 6, etc for attenuation value
3: "R" for SMA, "N" for Type N: Male and Female is standard
4: F for 2 female connectors M for 2 male connectors

Example: A-18-20-R is a DC-18 GHz, 20 dB attenuator with SMA male and female connectors

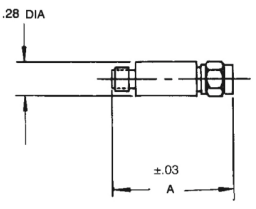
Outline Drawing

	A dimension					
Model No.	R	RM	RF	N	NM	NF
A-1-thru A-12-	.86	.98	.92	1.77	1.70	1.86
A-13-thru A-30-	.98	1.12	1.05	1.77	1.70	1.86

Tolerances unless otherwise specified are: .xx ± .02; .xxx, ± .005.



TYPE N



SMA

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Continuously Variable Coaxial Attenuators

RLC Electronics' Continuously Variable Coaxial Attenuators offer wide bandwidths for microwave applications where continuous adjustment of signal level is required with low insertion loss and good impedance matching. Unique mechanical packaging with a locking, non-translating shaft allow a compact assembly. The slab line construction of the transmission line and shaped, proprietary lossy material give flat response over a wide range of attenuation.

Specifications

AV-1-2-3

Model Number	Frequency Range (GHz)	Attenuation Range (dB)(Min.)	VSWR (Max.)	Insertion Loss (dB) (Max)
AV-0915	.95 1.5	10	1.5	0.3
AV-1020	1.0 2.0	10	1.6	0.4
AV-1922	1.9 2.2	20	1.3	0.4
AV-2040	2.0 4.0	23	1.6	0.5
AV-3060	3.0 6.0	20	1.5	0.5
AV-3742	3.7 4.2	20	1.4	0.5
AV-4080	4.0 - 8.0	20	1.5	0.5
AV-5964	5.9 - 6.4	20	1.4	0.5
AV-70124	7.0 - 12.4	20	1.5	0.5
AV-10150	10.0 - 15.0	20	1.5	0.5
AV-12180	12.4 - 18.0	20	1.5	0.5
AV-18265	18.0 - 26.5	20	1.7	0.7
AV-26540*	26.5 - 40.0	20	2.0	1.0

Power Rating: 5 watts average 25 degrees C
Impedance: 50 Ohms
Connectors: Type N*, TNC*, or SMA Female
Shaft: Locking screwdriver adjust or panel mount

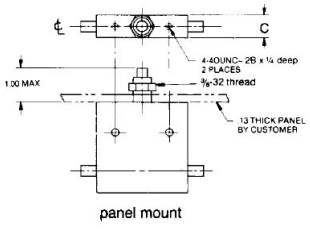
Temperature Range: -55 to +85C
Attenuation vs Frequency: +/- 12% of max attenuation
*Type N and TNC not recommended for use above 12.4 GHz

To designate the attenuator desired use:

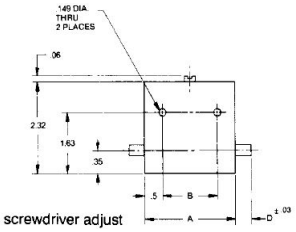
1: 2040,3060 for Model Number
2: N,T(TNC), R(SMA), 2.92mm* for connectors
3: P for panel mount
4: L for locking nut

Example: AV-4080-R-P-L is a 4.0 to 8.0 GHz attenuator with SMA connectors, panel mount with locking nut

Outline Drawing



panel mount



screwdriver adjust

MODEL	A	B	C
AV-0915	4.00	3.00	.75
AV-1020	4.00	3.00	.75
AV-1922	3.25	2.25	.50
AV-2040	2.75	1.75	.50
AV-3060	2.75	1.75	.50
AV- 3742	2.00	1.00	.50
AV-4080	2.75	1.75	.50
AV-5964	2.00	1.00	.50
AV-70124	2.00	1.00	.50
AV-10150	2.00	1.00	.50
AV-12180	2.00	1.00	.50
AV-18265	Figure 1		
AV-26540	Figure 1		

CONNECTOR	D
N	.94
TNC	.58
SMA	.30

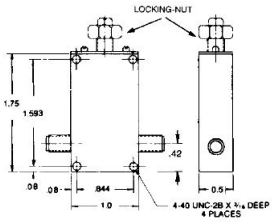


Figure 1
AV-18265 and
AV-26540

Tolerances unless otherwise specified are: .xx, ± .02; .xxx, ± .005.

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VHF Precision Switch Attenuator

RLC Electronics' VHF Switch Attenuator Model AS-120 is a "rocker switch" RF attenuator designed to operate over the frequency range from DC to 1.5 GHz. Attenuation from 1 to 101dB in 1 dB steps is provided by switching individually controlled attenuators connected in series. The total attenuation is the sum of those steps switched to the "in" position. These attenuators have excellent performance characteristics suitable for use in high reliability 50 ohm systems, and are highly repeatable. Attenuation can be easily seen by a quick glance at the rocker positions showing which attenuation values are in the circuit.

Specifications

AS-1-2

Model Number	Frequency Range (GHz)	Attenuation		Attenuation Accuracy (Whichever is greater)	VSWR (Max)	Insertion Loss (Max)
		Range (dB)	Steps (dB)			
AS-120-	DC-0.5	0-101	1	±0.3 dB or 1%	1.35	0.7 dB
	0.5-1.5			±0.5 dB or 1%	1.50	1.3 dB

Power Rating: 2 watts average @ 25C. 200 W peak @ 25C.
Impedance: 50 Ohms
Life: 1.5 X 106 steps

Connectors: Type N, BNC, TNC, or SMA Female
BNC not recommended above 1GHz
Weight: 10oz.

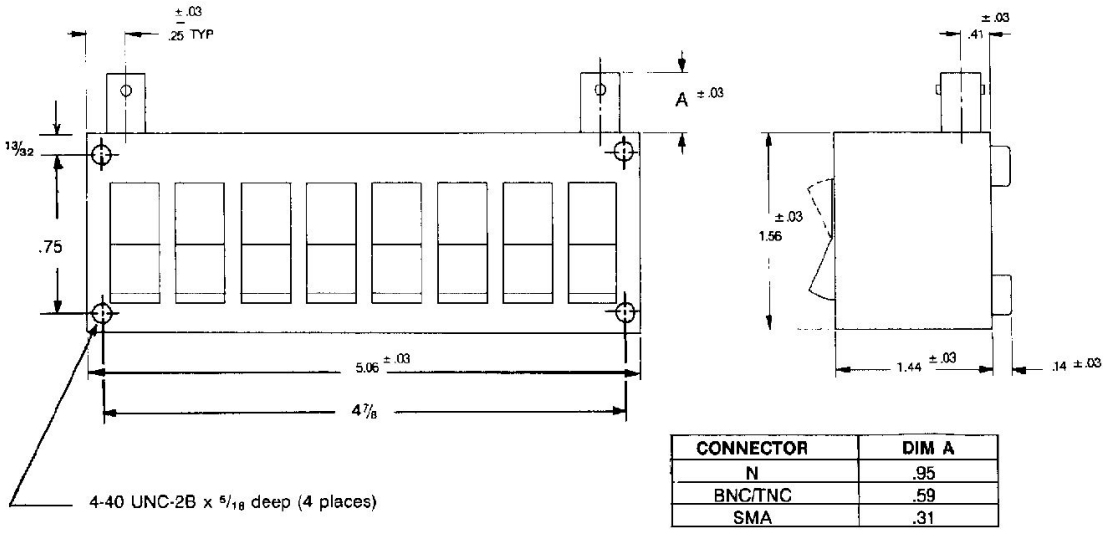
To designate the attenuator desired use:

1: 120 for Model Number

2: N,B (BNC), T(TNC), R(SMA) for connectors

Example: AS-120-T is a 0-101 dB attenuator with 1 dB steps and TNC connectors

Outline Drawing



CONNECTOR	DIM A
N	.95
BNC/TNC	.59
SMA	.31

Tolerances unless otherwise specified are: .xx, ± .02; .xxx, ± .005.

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Programmable Step Attenuators

RLC Electronics' PA Series Attenuators are binary Programmable Step attenuators designed to operate from DC to 18 GHz. Two basic models offer attenuation ranges of 15, and 70 dB. Control is in standard format: 1-2-4-8, etc. The attenuators are available with failsafe or latching operation, 12 or 28 volt coils, optional TTL drivers, and a choice of frequency ranges.

Specifications

PA-1-2-3-4-5

Model No.	Frequency Range (GHz)	Attenuation		Attenuation Cells	VSWR (Max)	Insertion Loss (dB Max)	Accuracy (dB Max)
		Range (dB)	Steps (dB)				
PA-124	DC-5	0-15	1	1,2,4,8	1.5	0.6	+/-.5 per cell
	5-12.4				1.7	1.0	
	12.4-18 (optional)				1.9	1.3	
PA-125	DC-5	0-70	10	10, 20, 40	1.5	0.5	+/-1.0 per cell
	5-12.4				1.7	0.8	
	12.4-18 (optional)				1.8	1.0	

Power Rating: 1 watt average at 25 deg C
Impedance: 50 ohms
Life: 1,000,000 operations
Connectors: SMA Female
Switching Speed: 15 milliseconds max.

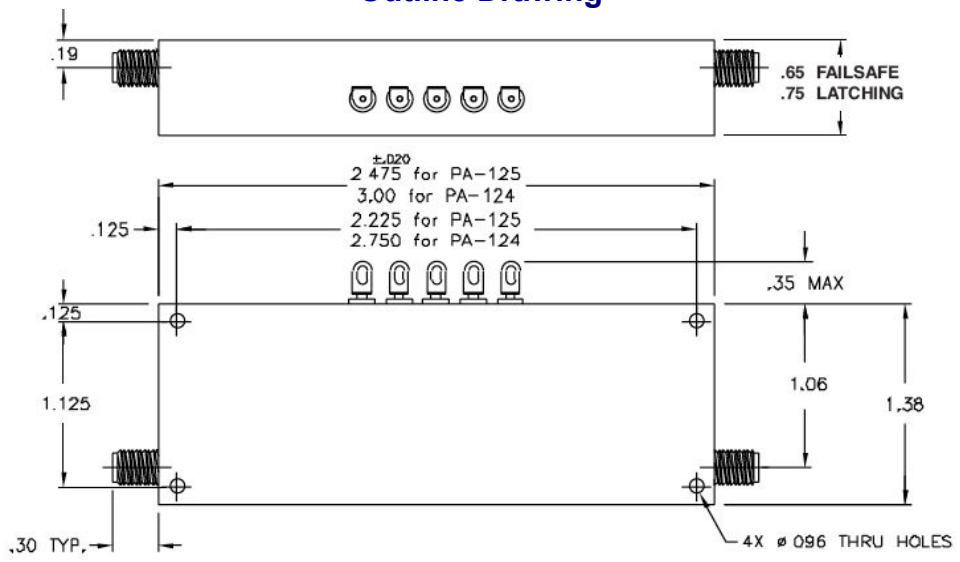
Control Power:
12 Vdc at 185 mA nominal per cell
28 Vdc at 108 mA nominal per cell
Pulse Latching: Optional

To designate the attenuator desired use:

1: "124", "125" for model number
2: "H" for 12 VDC or "D" for 28 VDC
3: "L" for pulse latching
4: "TL" for TTL Driver
5: "5" for DC-5 GHz, "12" for DC-12.4 GHz, "18" for DC-18 GHz, "48" for 4-8 GHz, "812" for 8-12.4 GHz, "1218" for 12.4-18 GHz option

Example: PA-125-D-TL-1218 is a 0-70 dB, 12-18 GHz programmable step attenuator with 10 dB steps, 28 volt coil, and TTL drivers.

Outline Drawing



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600 Ohm Precision Step Attenuator

RLC Electronics' AT-600 Series precision step attenuators are designed to provide an extremely accurate attenuation over the range of DC-1 MHz. Selected precision chip resistors and surface mount construction provide accuracy, long life and repeatability. Units are provided with knobs and are calibrated for nominal attenuation steps.

Specifications

AT^{-1-2}

Model No.	Frequency Range	Attenuation		Attenuation Accuracy
		Range (dB)	Steps (dB)	
AT-600-	DC-1 MHz	0-50	1	0-10dB steps ±.2dB 20-50dB steps ±.5dB
AT-601-	DC-1 MHz	0-90	10	
AT-602-	DC-1 MHz	0-100	1	

Impedance: 600 ohms 5%
Input Voltage: 10 VRMS maximum
Connectors Type: BNC Female or Binding posts

Rotation: Attenuation increases in CCW direction with stops at each extreme
Detent: 30°

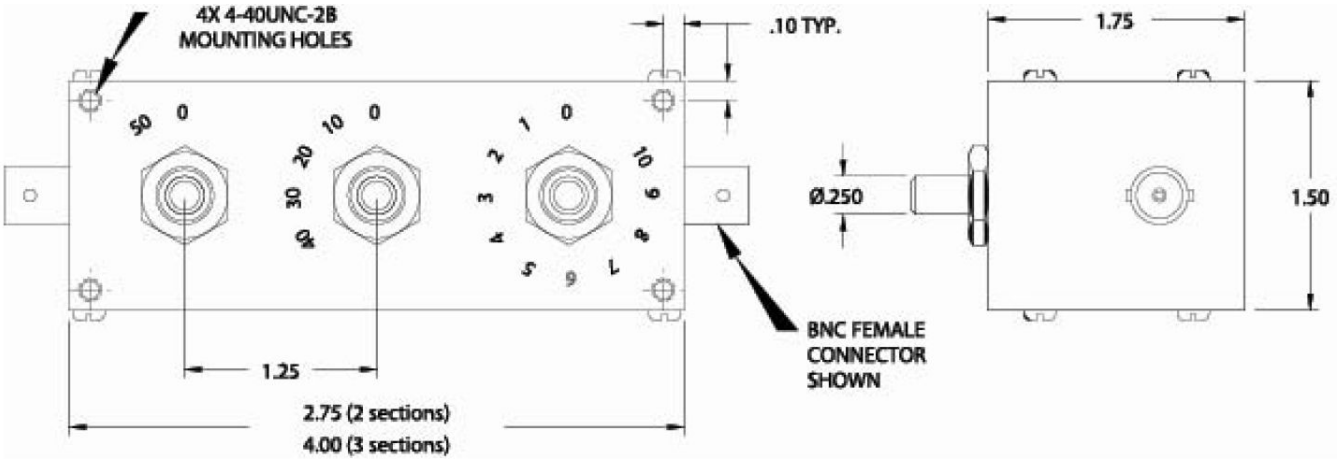
To designate the attenuator desired use:

1: 600 for a 2 section, 0-50dB attenuation in 1dB steps
601 for a 2 section, 0-90dB attenuation in 10dB steps
602 for a 3 section, 0-100dB attenuation in 1dB steps

2: B for BNC female connectors
P for binding posts

Example: AT-602-B is a 0-100dB attenuator with BNC female connectors

Outline Drawing



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About RLC Electronics, Inc

Since its inception in 1959, RLC has been the leading designer and manufacturer of high quality, state-of-the-art coaxial switches, band-pass filters, precision attenuators and other transmission line components for the microwave industry.

In 1969, after ten years of growth and performance in this market, the company moved into its modern facility located in Mt. Kisco, New York. In the last thirty nine years it has continued to grow with concentration towards excellence in passive, coaxial, microwave components. The present plant combines areas for research and development, metal fabrication, assembly, quality control, environmental testing, and general and administrative offices in twenty thousand square feet.

RLC prides itself on building from within, by expanding skills and educating our employees. This has enabled us to maintain high product quality and engineering excellence. This commitment to professionalism has provided a high level of competence and allows us to maintain our present position of leadership in the industry. This catalog describes our standard product line. Any questions regarding the application of these products or requests for nonstandard items can be referred to the RLC Application Engineering Department. We are most happy to assist you in the selection of the proper components for your specific application. Our cage number is 12598. We welcome your comments and questions.

ISO-9001-2000

RLC Electronics, Inc. is committed to maintaining the highest level of quality to all customers. Since 1995 RLC has been a registered ISO-9000 company. Our dedication to customer service and quality will result in recognition as a "world class supplier" of precision microwave components.

Ordering From RLC Electronics

How to Order

Your purchase order should reference an RLC part number and part description, further identified by ratings. To obtain the correct full model number of any RLC component, always refer to the bottom of our catalog page describing the product of interest and note how the model number is completed. The further listing of pertinent specifications will serve to prevent any misunderstandings. Any non-catalog model should be fully described on your order.

Send order to: **RLC Electronics, 83 Radio Circle, Mt. Kisco, New York 10549** or to RLC Electronics, Inc. in care of our local representative. Orders may be placed by phone, e-mail or FAX, however, they should be confirmed on your standard purchase order form.

RLC Terms

Unless otherwise quoted, all prices are F.O.B. Factory, Mt. Kisco, N.Y. payment terms are NET 30 days to rated firms. Unrated firms should establish credit before placing an order.

All sales and quotations are subject to RLC Electronics standard terms and conditions as stated on our quotation form.

Shipping

Unless otherwise specified, shipments will be made via UPS wherever possible. All items ordered will be packed per best commercial practice.

Specifications And Prices

Specifications and prices are subject to change without notice. For this reason, it is best to confirm required specifications and prices at time of order placement. Prices are available from the factory or our local representative. Whenever ordering large quantities of any standard product, or any quantity or a modified product, check with factory for price and delivery quotation.

Repairs

All repairs are made at our factory. Returns for repair should be authorized in advance by RLC and defective or out-ofspec components should be returned and identified as to reason for rejection. Products out of warranty or damaged by shipment or customer fault will be repaired and billed according to the cost of labor and materials plus a small service charge. Estimates will be given when requested.

Warranty

RLC ELECTRONICS, INC. warrants products manufactured or sold by us to be free from defects in material and workmanship. Our obligation under this warranty is limited to repairing or replacing any of our products which shall within twelve months after delivery to the original purchaser, be determined by RLC ELECTRONICS, INC.'s examination to be defective and which are returned to us transportation prepaid. This warranty does not extend to any of our products, which have been subject to abuse, misuse, lack of proper maintenance or negligence in use, storage, transportation or handling, nor shall it extend to products which have been repaired or altered outside our factory. No return of parts shall be accepted unless return has been previously authorized by RLC ELECTRONICS, INC. THIS IS RLC ELECTRONICS, INC.'S SOLE WARRANTY AND IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IM-PLIED, INCLUDING WARRANTIES OF MERCHANT ABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND SETS FORTH BUYER'S SOLE REMEDY.

Applications Assistance

All questions regarding the application of our standard products or requests for non-standard products should be referred to RLC Electronics' application engineering department. We will endeavor to assist you in selecting the proper component for your application.

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Coaxial Switch Glossary

A coaxial switch is used to alter the path of a coaxial transmission line by either opening or closing it, or changing its direction. The coaxial switch is used in the microwave field due to the inherent properties of the structure, which has high isolation and low loss energy transmission, over extremely wide bandwidths. These characteristics plus high RFI and EMI shielding make them ideal for all types of systems such as antenna switching, receivers and many more communications applications.

There are many parameters involved to fully specify a coaxial switch. Listed below are the more important ones: RLC Electronics can ship standard switches from stock and has the ability to produce switches to special specifications, in accordance with your requirements, with minimum delay in delivery. Coaxial switches are ideally suited for such applications as equipment selection, switching antenna feeds, lobing, beam switching, transmitter receiver multiplexing, and many others. RLC Electronics will deliver the best switch for your needs.

1. **Frequency Range -** This is the operational bandwidth in which the unit must meet the electrical specification. RLC offers DC18 GHz frequency range as standard on many switches with extended bands of operation available. Larger switches have a more limited frequency range.
2. **VSWR -** The voltage Standing Wave Ratio is a measure of the switch impedance compared to that of the transmission line in which it is placed. A VSWR of 1.0:1 would be theoretically perfect. All microwave components have VSWR greater than 1.0:1.
3. **Insertion Loss** - the loss of power incurred by placing the switch between two connectors of the transmission like is the insertion loss and is measured in decibels. All microwave components have insertion loss greater than zero.
4. **Isolation** - The resistance to RF leakage between the closed path and the open path is the isolation (or crosstalk) and is measured in decibels. Higher isolation in dB, indicates a lower (or more desirable) level of leakage between paths.
5. **Switching Time** - The time required to the close of the RF contacts after application of the actuating voltage, measured in milliseconds for mechanical types and in microseconds for the solid state type.
6. **Operating Mode** - The characteristic that governs the operation of the switch when the actuating voltage is removed is the operating mode.
   6A. **Failsafe** - In the failsafe mode, which is standard on RLC switches, the switch will move to the closed position when actuating voltage is applied and return to the open position when voltage is removed.
   6B. **Latching** - In the latching mode, which is optional on many RLC switches, the switch will remain in any switched position when the actuating voltage is removed. Standard RLC latching switches are equipped with a "Cutthroat" solid state circuit, which will automatically cut the actuating current after the switch has changed position. At this time the current is not required since the switch is self-latching, and in a stable condition.
7. **Indicators** - Indicators are a DC circuit isolated from the RF path which allows external monitoring of switch operation and position by passing a DC voltage through the indicator terminals. This option is available on many of the RLC switches and is noted at the bottom of each switch page.
8. **TTL Control Circuit -** Users exercising the option of TTL compatibility can apply the power voltage across a pair of designated power terminals and then control switch operation with a 5 volt control circuit. Normal operation is for the switch to be activated by "high" control voltage and deactivated by "low", but low activated TTL is available, as is BCD.
9. **Arc Suppression Diodes** - Internal arc suppression diodes are available, as options for all switches. Other special circuit features such as steering diodes may be obtained upon request.
10. **Break-Before-Make** - Almost all Coaxial R.F. switches are constructed for Break-Before-Make operation. The open time, between break and make, is on the order of one half the switching time. Because of the high quality gold plated contacts used on these switches, hot switching is not recommended. Maximum power applied during switching should not exceed 1 watt cw.

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Filters

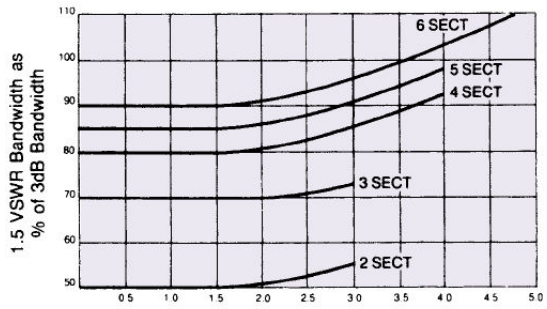
Double click to load an image

RLC manufactures a complete line of RF and Microwave Low Pass, High Pass, Band Pass and Band Reject filters covering nearly every application in the DC to 40 GHz frequency range. RLC offers different filter types, each covering a specific filter need. These filters are built for stringent environment conditions and power ranges from milliwatts to kilowatts while maintaining small size, lightweight and high reliability. In addition to offering these standard filters, RLC has engineered many thousands of custom designs and produced substantial quantities of special units within short time spans. A large engineering staff and high volume production capability give RLC the ability to assist our customer in obtaining, at competitive costs, standard or specialty designed filters within days or a few weeks of order placement.

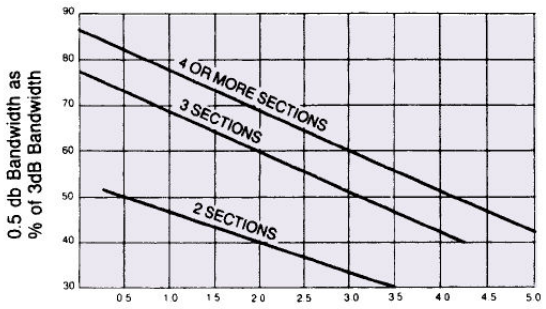
Bandpass Filters Typical Operating Curves

The curves on this page show the approximate relationship between the 3dB bandwidth and other bandwidths which may be of importance to the user. These curves apply to all standard bandpass filters.

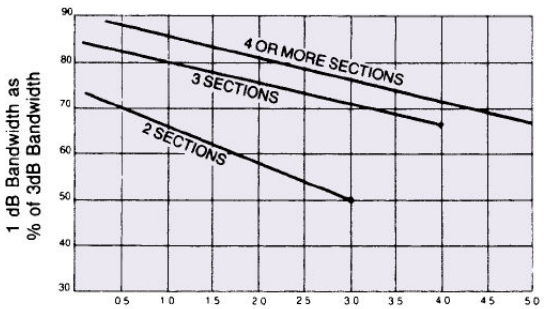
Curve 1 1.5:1 VSWR Bandwidth



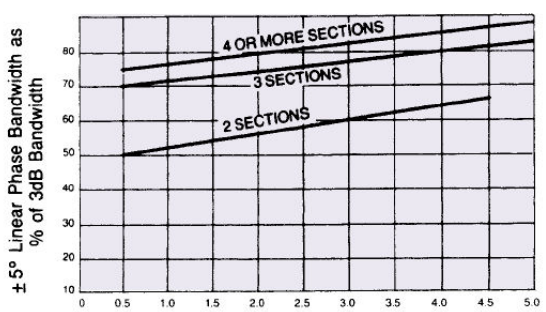
Curve 2 0.5dB Bandwidth



Curve 3 1.0dB Bandwidth



Curve 4 ±5° linear phase Bandwidth



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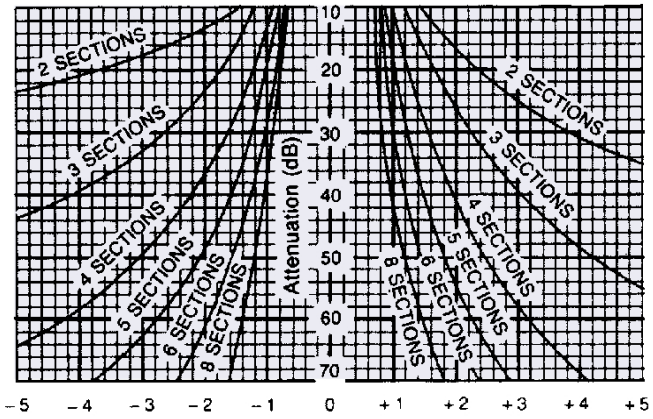
Stopband Attenuation

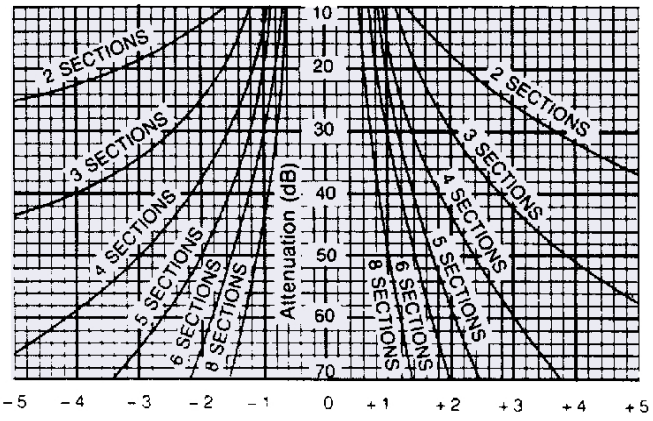
Tubular Bandpass Filters
Expressed as number of 3 dB Bandwidths from Center Frequency

5 to 15% 3dB Bandwidth
(Percentage of Center Frequency)



Number of 3dB Bandwidths
From Center Frequency

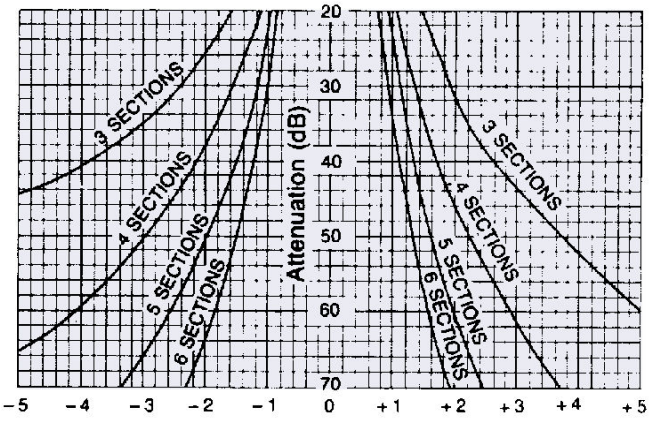
15 to 45% 3 dB Bandwidth
(Percentage of Center Frequency)



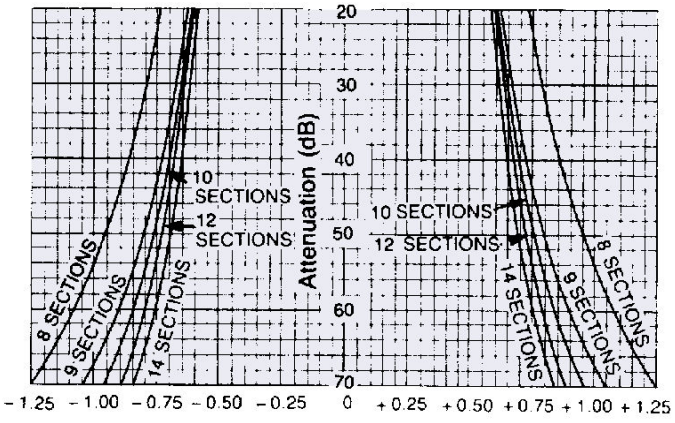
Number of 3dB Bandwidths
From Center Frequency

Stopband Attenuation

Cavity, Comb and Interdigital Bandpass Filters
Expressed as number of 3 dB Bandwidths from Center Frequency



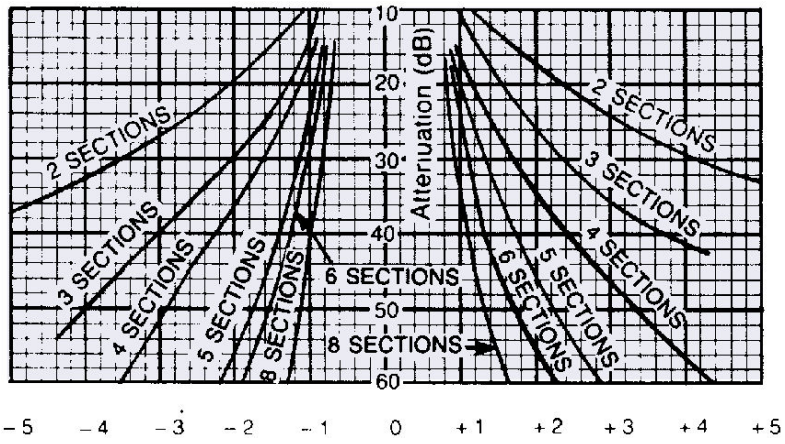
Number of 3dB Bandwidths
from Center Frequency
3 to 6 Sections



Number of 3dB Bandwidths
from Center Frequency
8 to 14 Sections

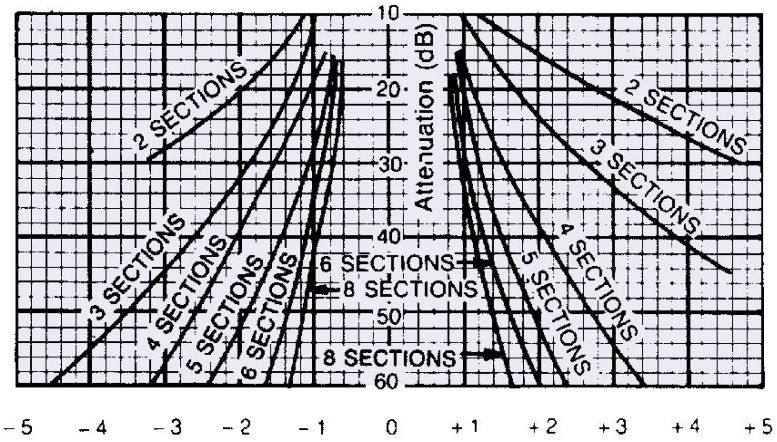
Stopband Attenuation

Miniature Bandpass Filters
Expressed as number of 3 dB Bandwidths from Center Frequency



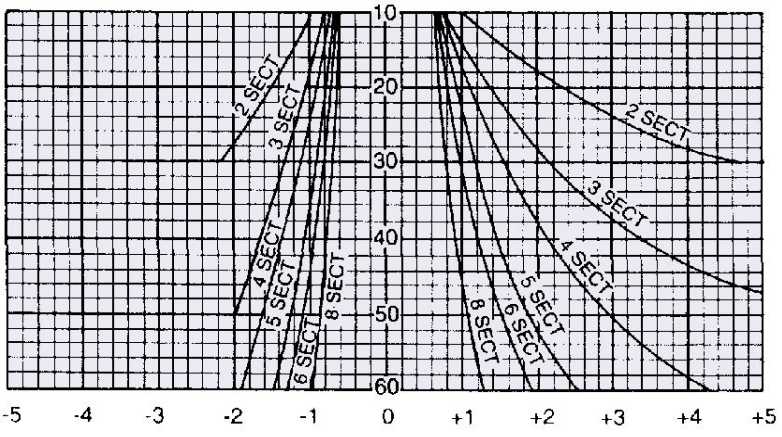
2-6% 3 dB Bandwidth
(Percentage of Center Frequency)

Number of 3dB Bandwidths
from Center Frequency
2 to 8 Sections



6-18% 3 dB Bandwidth
(Percentage of Center Frequency)

Number of 3dB Bandwidths
from Center Frequency
2 to 8 Sections



18-54% 3 dB Bandwidth
(Percentage of Center Frequency)

Number of 3 dB Bandwidths
from Center Frequency
2 to 8 Sections

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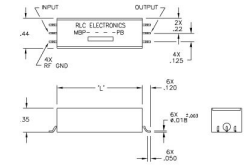
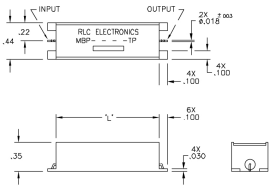
Miniature and Surface Mount Filter Outline Drawings

CONFIGURATION PB



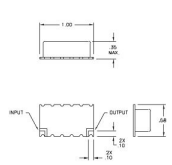
L= 1.25" FOR 4 OR LESS SECTIONS
L= 1.85" FOR 5 TO 8 SECTIONS

CONFIGURATION TP



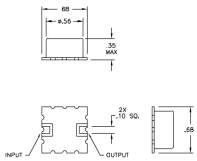
L= 1.25" FOR 4 OR LESS SECTIONS
L= 1.85" FOR 5 TO 8 SECTIONS

CONFIGURATION CB



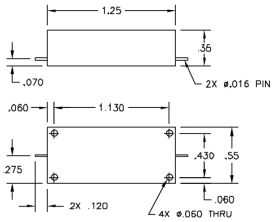
5 OR LESS SECTIONS

CONFIGURATION TBS

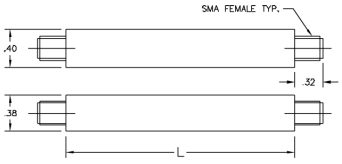


5 OR LESS SECTIONS

Configuration DI



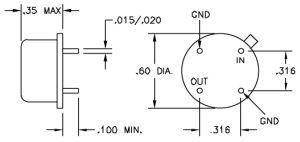
Configuration RA



L = 1.25" FOR 4 OR LESS SECTIONS
L = 1.85" FOR 5 TO 8 SECTIONS

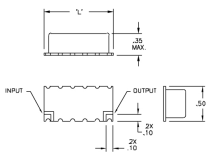
Available for center frequencies of 10–3000 MHz

Configuration T8



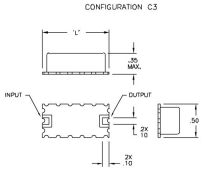
Available for center frequencies of 10–2000 MHz
4 SECTIONS MAX.

CONFIGURATION C1



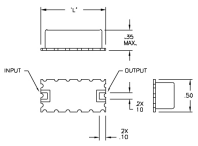
L= 1.00" FOR 5 OR LESS SECTIONS
L= 1.60" FOR 6 TO 8 SECTIONS

CONFIGURATION C3



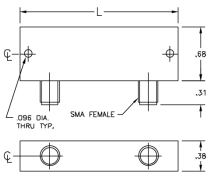
L= 1.00" FOR 5 OR LESS SECTIONS
L= 1.25" FOR 6 TO 8 SECTIONS

CONFIGURATION C3



L= 1.00" FOR 5 OR LESS SECTIONS
L= 1.25" FOR 6 TO 8 SECTIONS

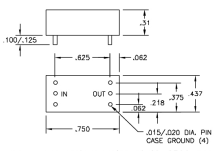
Configuration RR



L = .35 x N + .5 (N IS NO. OF SECTIONS)

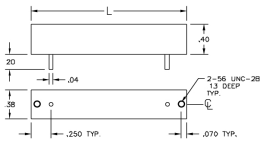
Available 1500–12400 MHz

Configuration CR



Available for center frequencies of 10–2500 MHz
5 SECTIONS MAX.

Configuration PR



L = 1.25" FOR 4 OR LESS SECTIONS
L = 1.85" FOR 5 TO 8 SECTIONS

Available for center frequencies of 10–3000 MHz

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Attenuators, Terminations, Dividers/Combiners, Couplers, Detectors and Bias Tees

RLC Electronics' series of attenuators, terminations, directional couplers, and, in-phase dividers/combiners represents a complete line of stripline, microstrip and airline devices.

In a stripline device, the central conductor is of a thin rectangular shape. Two ground planes parallel the central conductor. Usually the intervening space is fully filled with a dielectric material.A large number of conductors may be enclosed within a common pair of ground planes.

In microstrip there is only one ground plane parallel to the central conductor with the space filled with a dielectric material.

Airline has a thicker central conductor than stripline and no dielectric material betewwn the ground planes.

Advantages of stripline, microstrip and airline construction compared to coaxial or waveguide methods are primarily:

1. Size Reduction: an 8-inch long coaxial line may be "folded" into a one (1) inch square area.

2. Eliminate Connectors: incorporate two (2) directional couplers to sample forward and reverse power, and a diode switch in a single package use three (3) connectors instead of seven (7).

3. Cost Reduction: complex conductor patterns may be photographically reproduced and etched on substrate. The coaxial equivalent might have a dozen separately machined, assembled, and, soldered parts.

Many combinations of these devices can be made to special requirements. Multioctave devices are available upon request.

Attenuators

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An attenuator is a network designed to produce a known loss when inserted between a specific input and output impedance. The value of attenuation is normally expressed as a ratio in decibels and is the same regardless of the direction in which the measurement is taken. There are many methods of fabrication derived from a few basic designs. The structures used to form the resistance networks are T,π or distributed sections.

Terminations

A termination is a single port network designed to terminate a transmission line. This may be used as a dummy load for testing equipment such as transmitters, or, as a reference in microwave test systems. Since it is a one-port device, the termination must be capable of dissipating all the power imparted to it (less any reflected power which is kept to a minimum) by the system.

Dividers/Combiners

The function of a power divider is to direct the energy coming into an input port to two or more output ports. This must be accomplished while maintaining a very good impedance match at each port. In addition, it is usually desirable to maintain high isolation between the output ports over the frequency of operation.

RLC dividers are of the “Wilkinson” type and employ microstrip quarter-wave matching transformers of two or more sections. This type of divider produces identical in-phase outputs. The high isolation is accomplished by means of internal terminating resistors that dissipate no power under perfect matching conditions. These power dividers may be used as in-phase power combiners simply by using the outputs as inputs.

Couplers

The coupler is used for sampling or injecting signals with negligible effect on the transmission line.

Detectors

A crystal detector is a two-port device used to convert RF power to DC power for use in measuring or evaluating the RF while operating in a DC system. The RF port is the RF input and the output is DC voltage directly proportional to the RF power at the input. RLC Electronics’ broadband crystal detectors operate from 10 MHz to 45.5 GHz. These units can be connected to RLC Electronics’ couplers to meet your requirements.

The most common diode device used in detectors was a point contact silicon semiconductor. In recent years this has been replaced by the low barrier Schottky diode which has become available by modern thin film technology. These new semiconductors allow greater uniformity and more consistent specifications.

Bias Tees

RLC Bias Tees are specifically designed to inject a DC or low frequency signal onto the microwave line without effecting the flow of RF in the main transmission line.

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Precision and High Power Terminations

RLC Electronics' Precision Coaxial Terminations provide extremely low VSWR, 50 ohm matched terminations over broad frequency ranges in a wide selection of connectors and power ranges. The Coaxial High Power Terminations provide low VSWR terminations over a full range of RF frequencies. These units utilize either a precision coaxial structure as the terminating element or a lossy dielectric medium. Heat transfer is accomplished efficiently by the utilization of cooling fins. These units are conservatively rated so that for short periods of time, they may be operated at 200% of rated power. Forced air cooling over the load will allow continuous overload operation. These highpower loads are designed for use in 50 ohm systems.

Specifications

T-1-2-3

Model	Power Rating	VSWR				Conn. Types Available*	Size "A" Max
T-13-	1 Watt Avg. 1 kW Peak	**DC-1 GHz**	**1-4 GHz**	**4-12.4 GHz**		**Male or Female**	**(In)**
		1.04	1.07	1.15		N	1.45
		1.10	1.20	1.30		TNC	1.32
		1.10				BNC	1.32
		1.04	1.07	1.25		SMA	1.16
T-18-	1 Watt Avg. 1 kW Peak	**DC-4 GHz**	**4-12.4 GHz**	**12.4-18 GHz**		**Male or Female**	**(In)**
		1.07	1.15	1.25		SMA	1.16
T-130-	10 Watt Avg. 1 kW Peak	**DC-1 GHz**	**1-4 GHz**	**4-12.4 GHz**		**Male or Female**	**(In)**
						BNC/TNC	2.24
		1.10	1.20	1.30		SMA	2.24
						N	1.50
T-180-	10 WattS Avg. 1 kW Peak	**DC-4 GHz**	**4-12.4 GHz**	**12.4-18 GHz**		**Male or Female**	**(In)**
		1.10	1.20	1.30		N	2.06
						SMA	1.90
T-500-	50 Watt Avg.	**DC-1 GHz**	**1-3 GHz**			**Male or Female**	**(In)**
						N	2.06
		1.10	1.25	-		TNC	6.10
						BNC	6.10
						SMA	6.10
							5.53
T-105-	10 Watt Avg. 10 kW Peak	**1-2 GHz**	**2-18 GHz**			**Male or Female**	**(In)**
						N	6.24
		1.35	1.25	-		TNC	6.13
						SMA	5.95
T-1005-	175 Watt Avg. 10 kW Peak	**1-8.5 GHz**	**8.5-12.4 GHz**			**Male or Female**	**(In)**
						N	12.08
		1.30	1.30	-		TNC	11.97
						SMA	11.80
T-40-M	2 watts Avg				**40 GHz**	**Male**	
					1.2:1	2.92mm	0.58

Weight: T-13, T-18, T-40M -- 2oz
T-130, T-105, T-180 -- 4oz
T-500 -- 14oz
T-1005 -- 4lbs

Environment: MIL-DTL-39030
*BNC not recommended for use above 1 GHz
TNC not recommended for use above 12.4 GHz

To designate the termination desired use:

1: 13, 105 etc for model number
2: N, B (BNC), T (TNC), R (SMA), for connectors
3: "M" for Male, "F" for Female

Example: T-130-N-M is a DC - 12.4 GHz termination with N, male connectors

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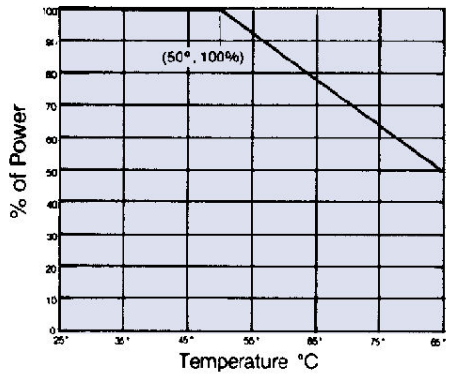
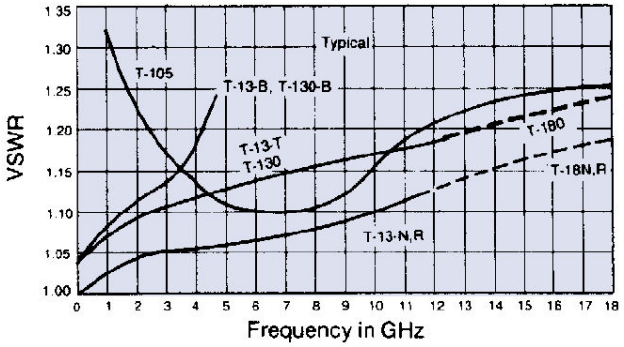
Typical Operating Curves

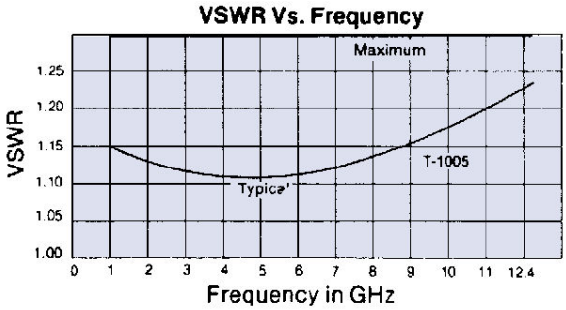
Derating Curve



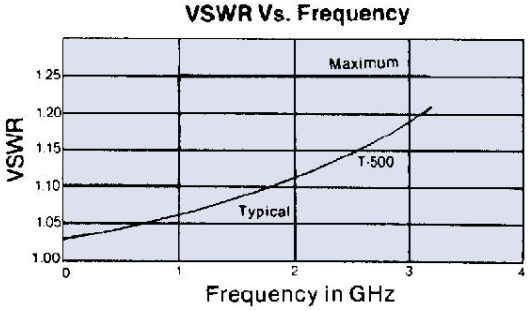
VSWR Vs. Frequency



VSWR Vs. Frequency

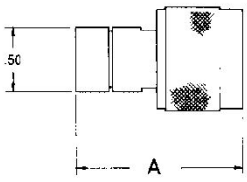


VSWR Vs. Frequency

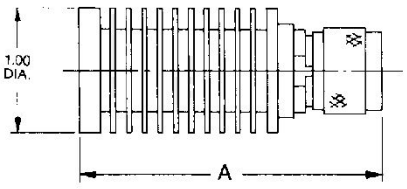


Outline Drawing

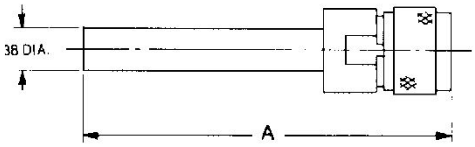
T-13, T-18



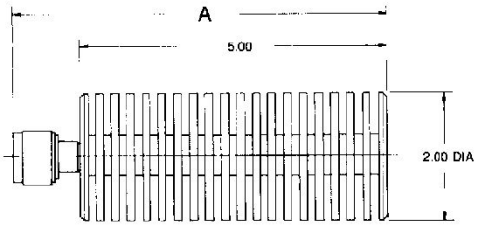
T-130, T-180



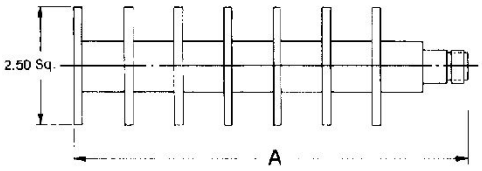
T-105



T-500



T-1005



Tolerances unless otherwise specified are: .xx, ± .02; .xxx, ± .005.

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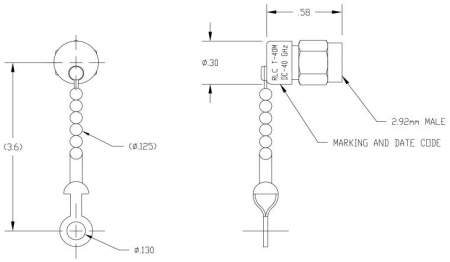


T-40M

Surface Mount Power Dividers

RLC ELECTRONICS' Surface Mount Power Dividers combine the characteristics of a Wilkinson divider in a compact true surface mount package. Currently both two and four way designs are available with a frequency range extending from 0.5 to 2 GHz and still maintain excellent electrical performance.

Specifications

DSM-0520^{-1}

Model No	VSWR IN/OUT (Max.)	Insertion Loss (Max.)	Isolation (Min.)	Amplitude Balance	Phase Balance
DSM-0520-2	1.5:1	0.5dB	20dB	+/-.2dB	±4°
DSM-0520-4	1.5:1	1.0dB	20dB	+/-.2dB	±4°

Power:
10 watts average (outputs terminated with a VSWR less than 1.35)
500 mW average (outputs terminated with any VSWR and phase)

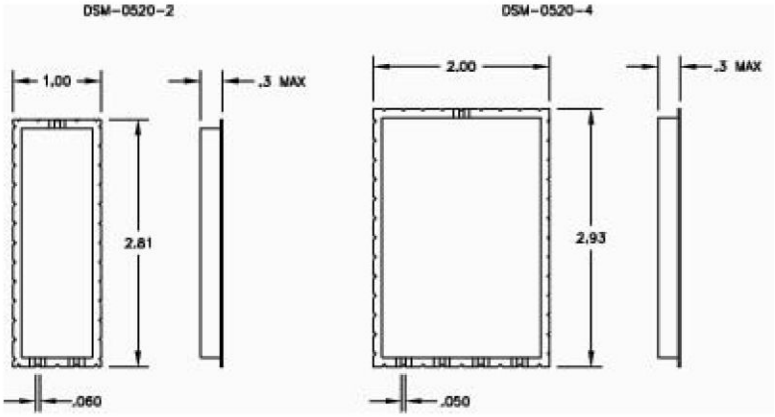
Frequency: 0.5 - 2.0 GHz
Impedance: 50 ohms
Environmental: MIL-E-5400, Class 1A

To designate the PRODUCT desired use:

1: -2 for 2 way, -4 for 4 way

Example: DSM-0520-2 is a 0.5 -2.0 GHz 2 way power divider.

Outline Drawing



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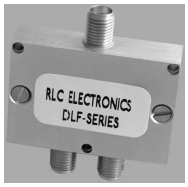
Power Dividers Low Frequency



RLC Electronics' DLF Series Power Dividers/Combiners covers a wide frequency range of 10 to 500 MHz, using unique lumped element designs to achieve the wide bandwidth. They are housed in a convenient low profile (0.4 inch) SMA or Pin package.

Specifications

DLF-10-500^{-1-2}

Model Number	-	Isol. (dB) (Min)	VSWR (Max.)	I. L. (dB) (Max)	Amplitude Balance	Phase Degrees	Configuration R		Configuration P	
							A	B	A	B
DLF10-500-2	2 way	20	1.50	0.8	±.3	±4	1.00	1.44	.50	.55
DLF10-500-3	3 way	18	1.50	1.0	±.4	±4	1.00	1.88	.50	.70
DLF10-500-4	4 way	20	1.50	1.5	±.4	±8	1.00	2.32	.75	.85
DLF10-500-6	6 way	15	1.50	1.75	±.5	±8	1.25	3.20	.90	1.15
DLF10-500-8	8 way	20	1.50	2.0	±.6	±10	1.25	4.08	1.25	1.45

Power: 1 watts avg.
Impedance: 50 Ohms
Connector: SMA or Pin
Environment: MIL-E-5400, Class 1A

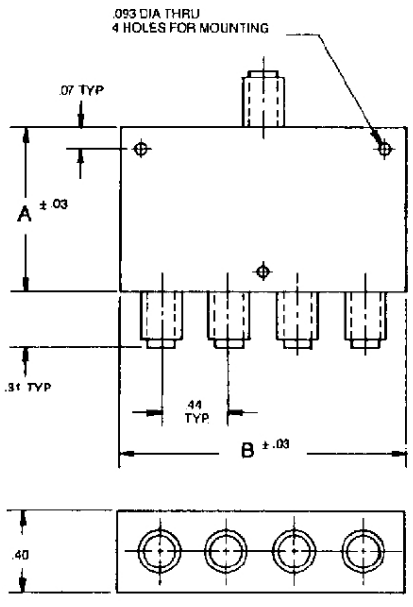
To designate the power divider desired use:

1: -2 for 2-way, -3 for 3way, etc.
2: R for SMA female or P for pins.

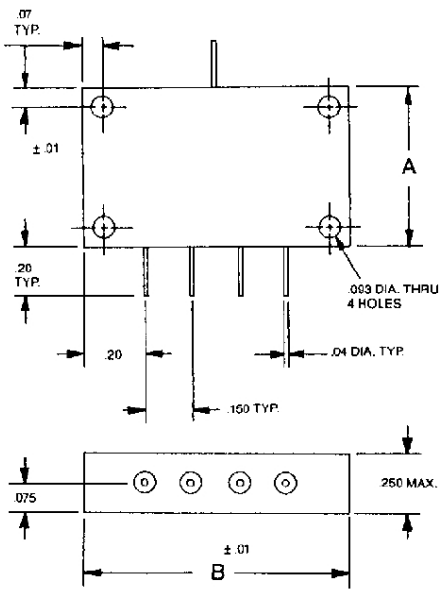
Example: DLF-10-500-4-R is a 4-way power divider with SMA connectors

Outline Drawing

CONFIGURATION R



CONFIGURATION P



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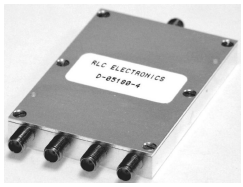
Broadband Power Dividers



RLC Electronics' Series D-05180 (0.5-18 GHz) power dividers have high isolation, small size, and superior performance in a single package. With today's most advanced technology in CAD/CAM equipment & precision etching, complex multi-section designs have been developed using original analysis of microstrip theory.

Specifications

D-05180-2 (2-Way)

Frequency (GHz)	Insertion Loss (dB Max)	Isolation. (dB Max)	VSWR		Amplitude (dB Max)	Phase Balance (°Max)	Input Power (Watts Max)
			In	Out			
0.5-1	0.70	6	2.00	2.00	0.20	2.0	10
1.0-1.5	0.50	10	1.90	1.50	0.20	2.0	10
1.5-2	0.50	10	1.70	1.50	0.20	2.0	10
2-8	0.50	17	1.50	1.40	0.20	3.0	10
8-16	0.80	15	1.70	1.60	0.30	6.0	10
16-18	0.90	14	1.80	1.90	0.40	8.0	10
18-20	1.10	7	2.00	2.00	0.40	10.0	10

D-05180-4 (4-Way)

Frequency (GHz)	Insertion Loss (dB Max)	Isolation. (dB Max)	VSWR		Amplitude (dB Max+/-)	Phase Balance (° Max +/-)	Input Power (Watts Max)
			In	Out			
0.5-1	1.6	5	3.00	1.80	0.20	1.0	10
1-2.0	.6	10	1.70	1.50	0.20	1.0	10
2.0-6	.5	17	1.50	1.30	0.20	2.0	10
6-16	.9	16	1.70	1.35	0.30	5.0	10
16-18	1.2	15	1.70	1.50	0.30	6.0	10

D-05180-8 (8-Way)

Frequency (GHz)	Insertion Loss (dB Max)	Isolation. (dB Max)	VSWR		Amplitude (dB Max+/-)	Phase Balance (° Max +/-)	Input Power (Watts Max)
			In	Out			
0.5-1	2.0	5	3.00	2.00	0.20	1.0	10
1-2.5	.7	10	1.80	1.50	0.20	2.0	10
2.5-6	.8	17	1.60	1.50	0.20	4.0	10
6-16	1.4	15	1.70	1.50	0.30	8.0	10
16-18	1.7	14	1.80	1.60	0.40	10.0	10

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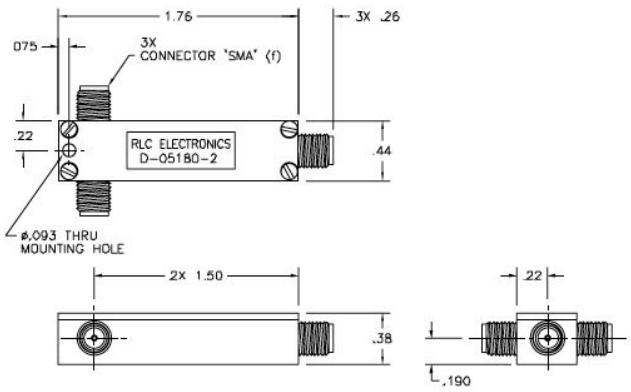
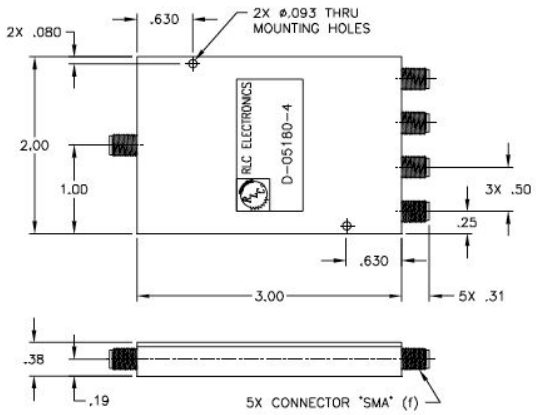
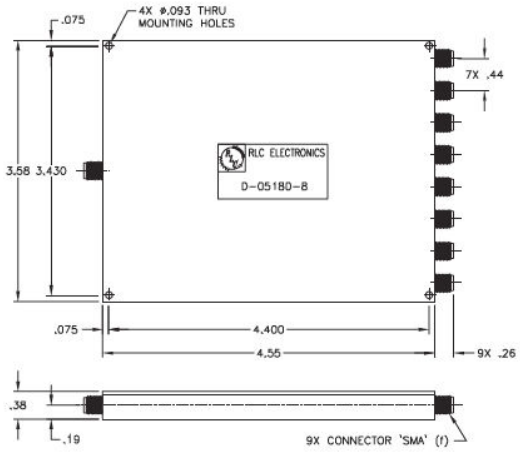
Outline - All Connectors "SMA" (f)



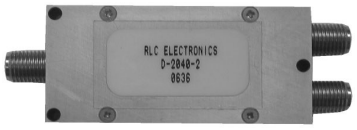
D-05180-4 (4-Way)



D-05180-8 (8-Way)



Isolated Power Dividers 2, 4, 8 & 16 Way



RLC Electronics' In Phase Power Dividers are the smallest units available in the industry today. Performance is improved by utilizing 2-step transformers and two thick film resistive elements. For close phase and amplitude tracking, these "Wilkinson" dividers utilize precision etching of the single microstrip board.

Specifications

2-Way

Model Number	Freq. GHz	ISOL. (dB) min	VSWR* max	I.L. (dB) max	Ampl. Bal(dB)	Phase Bal.
D-0510-2	.50-1.0	20	1.20	.3	±.2	±2°
D-0715-2	.75-1.5	20	1.20	.3	±.2	±2°
D-1020-2	1.0-2.0	20	1.25	.3	±.2	±2.5°
D-1530-2	1.5-3.0	20	1.25	.3	±.2	±3°
D-2040-2	2.0-4.0	20	1.30	.3	±.2	±3°
D-4080-2	4.0-8.0	18	1.50	.5	±.3	±3°
D-70124-2	7.0-12.4	16	1.70	.7	±.3	±4°
D-12180-2	12.0-18.0	18	1.40	.7	±.3	±5°

8-Way

Model Number	Freq. GHz	ISOL. (dB) min	VSWR* max	I.L. (dB) max	Ampl. Bal (dB)	Phase Bal.
D-0510-8	.50-1.0	20	1.20	0.9	±.4	±4°
D-0715-8	.75-1.5	20	1.20	0.9	±.4	±4°
D-1020-8	1.0-2.0	20	1.25	0.9	±.4	±4°
D-1530-8	1.5-3.0	20	1.25	0.9	±.4	±6°
D-2040-8	2.0-4.0	20	1.30	0.9	±.4	±6°
D-4080-8	4.0-8.0	18	1.35	0.8	±.4	±6°
D-70124-8	7.0-12.4	16	1.35	1.3	±.4	±6°
D-12180-8	12.0-18.0	15	1.70	1.5	±.4	±6°

4-Way

D-0510-4	.50-1.0	20	1.20	.6	±.2	±3°
D-0715-4	.75-1.5	20	1.20	.6	±.2	±3°
D-1020-4	1.0-2.0	20	1.25	.6	±.2	±3°
D-1530-4	1.5-3.0	20	1.25	.6	±.2	±5°
D-2040-4	2.0-4.0	20	1.30	.6	±.2	±5°
D-4080-4	4.0-8.0	19	1.40	.5	±.4	±5°
D-70124-4	7.0-12.4	17	1.35	.8	±.4	±5°
D-12180-4	12.0-18.0	17	1.50	.8	±.5	±5°

16-Way

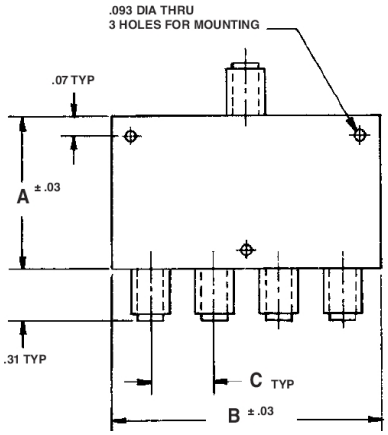
D-0510-16	.50-1.0	20	1.25	1.2	±.4	±5°
D-0715-16	.75-1.5	20	1.25	1.2	±.4	±5°
D-1020-16	1.0-2.0	20	1.30	1.2	±.4	±6°
D-1530-16	1.5-3.0	20	1.30	1.2	±.4	±8°
D-2040-16	2.0-4.0	20	1.35	1.5	±.4	±8°
D-4080-16	4.0-8.0	19	1.40	1.1	±.4	±8°
D-70124-16	7.0-12.4	16	1.40	1.7	±.4	±8°
D-12180-16	12.0-18.0	15	2.05	3.0	±.6	±12°

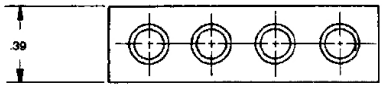
*Add 0.10 to input VSWR for 8 & 16 Way dividers

Power: 10 watts avg. (outputs terminated with a VSWR less that 1.35) 200mW avg. (outputs terminated with any VSWR and phase)
Impedance: 50 ohms

Connectors: SMA female
Environment: MIL-E-5400, Class 1A

Outline Drawing





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Isolated Power Dividers 3, 6, 9 & 12 Way

RLC Electronics' Power Dividers are compact microstrip units with wide bandwidth and multiple outputs. These units provide low VSWR at all ports and high isolation between all the output ports. Phase and amplitude tracking of all outputs are excellent due to the symmetrical designs. Combinations of two-way and three-way power dividers in one package forms the basic building blocks in a variety of custom or standard "N" way output ports.

Specifications

3-Way

Model Number	Freq. GHz	ISOL. (dB) min	VSWR* max	I.L. (dB) max	Ampl. Bal(dB)	Phase Bal.
D-0510-3	.50-1.0	18	1.50	.3	±.2	±2°
D-0715-3	.75-1.5	18	1.50	.3	±.2	±2°
D-1020-3	1.0-2.0	19	1.50	.3	±.25	±3°
D-1530-3	1.5-3.0	19	1.50	.4	±.25	±4°
D-2040-3	2.0-4.0	19	1.50	.5	±.3	±5°
D-4080-3	4.0-8.0	16	1.60	.5	±.3	±5°
D-70124-3	7.0-12.4	16	1.60	.6	±.4	±5°
D-12180-3	12.0-18.0	16	1.80	1.0	±.5	±8°

9-Way

Model Number	Freq. GHz	ISOL. (dB)min	VSWR* max	I.L. (dB) max	Ampl. Bal(dB)	Phase Bal.
D-0510-9	.50-1.0	19	1.50	.6	±.3	±5°
D-0715-9	.75-1.5	19	1.50	.6	±.3	±5°
D-1020-9	1.0-2.0	19	1.60	.6	±.3	±6°
D-1530-9	1.5-3.0	19	1.60	.75	±.4	±6°
D-2040-9	2.0-4.0	18	1.80	.9	±.5	±7°
D-4080-9	4.0-8.0	16	1.80	1.0	±.5	±10°
D-70124-9	7.0-12.4	12	2.00	1.4	±.7	±10°
D-12180-9	12.0-18.0	10	2.00	1.8	±.9	±10°

6-Way

D-0510-6	.50-1.0	19	1.50	.55	±.3	±4°
D-0715-6	.75-1.5	19	1.50	.55	±.3	±4°
D-1020-6	1.0-2.0	19	1.50	.55	±.3	±5°
D-1530-6	1.5-3.0	19	1.50	.65	±.35	±5°
D-2040-6	2.0-4.0	19	1.50	.7	±.35	±6°
D-4080-6	4.0-8.0	16	1.60	.9	±.4	±8°
D-70124-6	7.0-12.4	16	1.80	.9	±.5	±8°
D-12180-6	12.0-18.0	16	2.00	1.4	±.6	±8°

12-Way

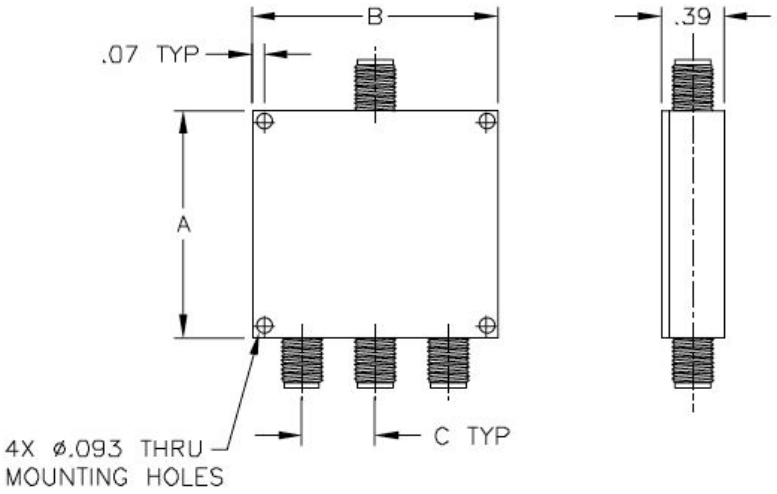
D-0510-12	.50-1.0	19	1.50	.85	±.45	±6°
D-0715-12	.75-1.5	19	1.50	.85	±.45	±6°
D-1020-12	1.0-2.0	19	1.60	.85	±.45	±7°
D-1530-12	1.5-3.0	19	1.60	1.0	±.5	±7°
D-2040-12	2.0-4.0	19	1.80	1.0	±.5	±8°
D-4080-12	4.0-8.0	16	1.80	1.2	±.7	±9°
D-70124-12	7.0-12.4	16	1.80	1.6	±.9	±10°
D-12180-12	12.0-18.0	14	2.00	2.0	±.1.2	±10°

*Add 0.10 to input VSWR for 9 & 12 Way dividers

Power: 10 watts avg. (outputs terminated with a VSWR less that 1.35) 200mW avg. (outputs terminated with any VSWR and phase)
Impedance: 50 ohms

Connectors: SMA female
Environment: MIL-E-5400, Class 1A

Outline Drawing



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Dividers 2, 4, 8 & 16 Way

MODEL	A	B	C
D-0510-2	2.250	1.5	.44
D-0715-2	1.750	1.5	.44
D-1020-2	3.25	.88	.44
D-1530-2	2.38	.88	.44
D-2040-2	1.88	.88	.44
D-4080-2	1.12	.88	.44
D-70124-2	.88	.88	.44
D-12180-2	.88	.88	.44
D-0510-4	3.30	2.40	.60
D-0715-4	2.30	2.40	.60
D-1020-4	2.30	2.40	.60
D-1530-4	1.80	2.40	.60
D-2040-4	3.50	1.76	.44
D-4080-4	1.88	1.76	.44
D-70124-4	1.76	1.76	.44
D-12180-4	1.36	1.76	.44

MODEL	A	B	C
D-0510-8	4.20	4.80	.60
D-0715-8	2.90	4.80	.60
D-1020-8	2.90	4.80	.60
D-1530-8	2.30	4.80	.60
D-2040-8	5.10	3.52	.44
D-4080-8	2.62	3.52	.44
D-70124-8	2.35	3.52	.44
D-12180-8	1.83	3.52	.44
D-0510-16	4.80	9.60	.60
D-0715-16	3.50	9.60	.60
D-1020-16	3.50	9.60	.60
D-1530-16	2.90	9.60	.60
D-2040-16	2.90	7.04	.44
D-4080-16	3.36	7.04	.44
D-70124-16	2.85	7.04	.44
D-12180-16	2.54	7.04	.44

Dividers 3, 6, 9 & 12 Way

MODEL	A	B	C
D-0510-3	2.80	2.20	.60
D-0715-3	2.30	1.80	.60
D-1020-3	2.30	1.80	.60
D-1530-3	2.00	1.44	.44
D-2040-3	1.88	1.44	.44
D-4080-3	1.35	1.44	.44
D-70124-3	1.20	1.44	.44
D-12180-3	1.20	1.44	.44
D-0510-6	3.40	4.00	.60
D-0715-6	2.90	3.60	.60
D-1020-6	2.90	3.60	.60
D-1530-6	2.60	2.76	.44
D-2040-6	2.48	2.76	.44
D-4080-6	2.48	2.76	.44
D-70124-6	1.80	2.76	.44
D-12180-6	1.80	2.76	.44

MODEL	A	B	C
D-0510-9	5.50	5.80	.60
D-0715-9	4.50	5.40	.60
D-1020-9	4.50	5.40	.60
D-1530-9	3.90	4.08	.44
D-2040-9	3.25	4.08	.44
D-4080-9	2.75	4.08	.44
D-70124-9	2.40	4.08	.44
D-12180-9	2.40	4.08	.44
D-0510-12	4.00	7.60	.60
D-0715-12	3.48	7.20	.60
D-1020-12	3.48	7.20	.60
D-1530-12	3.20	5.40	.44
D-2040-12	3.08	5.40	.44
D-4080-12	3.08	5.40	.44
D-70124-12	2.40	5.40	.44
D-12180-12	2.40	5.40	.44

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Isolated Power Dividers .5 to 4 Ghz 2, 4 & 8 way

RLC Electronics' .5 to 4 GHz Power Dividers are one of the best in the industry today. These are compact multi-step "Wilkinson" type power dividers with excellent electrical performance over the frequency range. This was accomplished by the use of today's most advanced technology in design & precision etching of a signal microstrip board.

Specifications

D-0540^{-1}

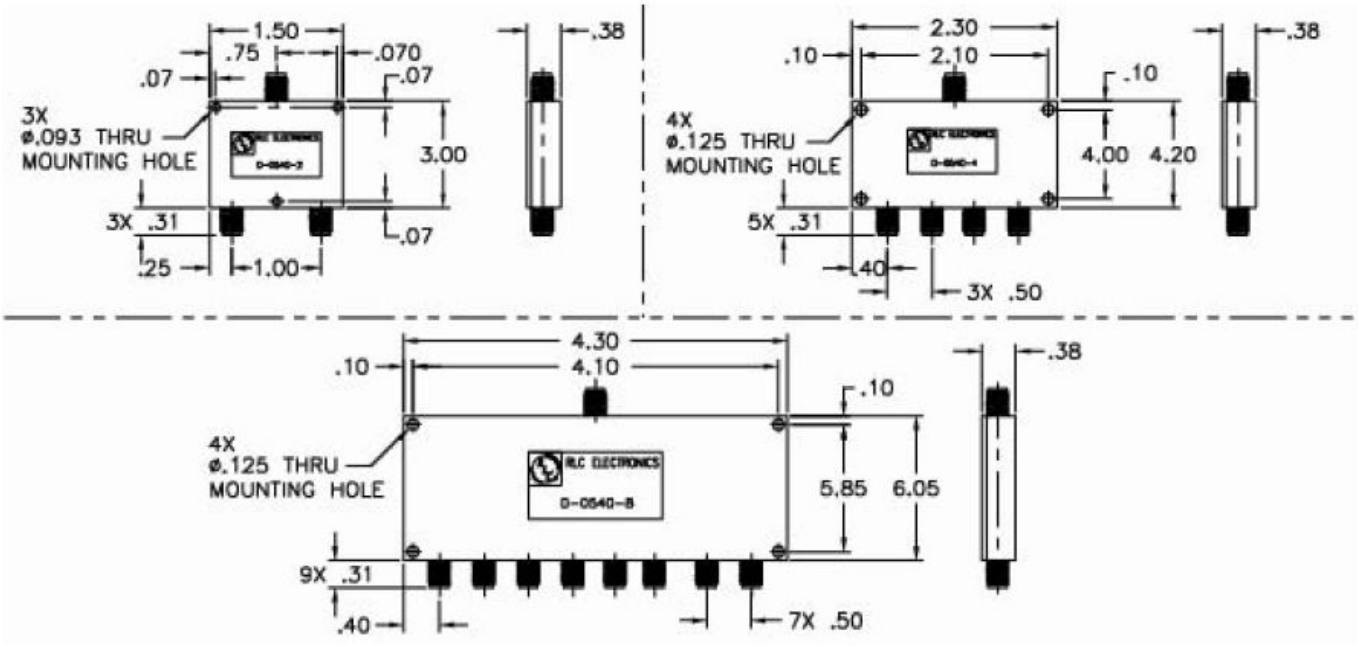
Model No.	VSWR IN/OUT (Max.)	Insertion Loss (Max.)	Isolation (Min.)	Amplitude Balance	Phase Balance
D-0540-2	1.3:1/1.2:1	0.5dB	20dB	+/-.2dB	+/-4 degrees
D-0540-4	1.4:1/1.3:1	1.1dB	20dB	+/-.2dB	+/-4 degrees
D-0540-8	1.5:1/1.4:1	1.6dB	20dB	+/-.25dB	+/-5 degrees

Power: 10 watts average (outputs terminated with a VSWR less than 1.35)
500 mW average (outputs terminated with any VSWR and phase)
Frequency: 0.5 - 4.0 GHz

Connectors: "SMA" female
Impedance: 50 ohms
Environmental: MIL-E-5400, Class 1A

To designate the power divider desired use:
1: -2 for 2-Way, -4 for 4-Way, -8 for 8-Way
Example: D-0540-2 is a 0.5 to 4.0 GHz, 2 output power divider

Outline Drawing



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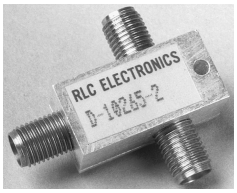
High Frequency Power Dividers



RLC Electronics' D10265 Series of high frequency power dividers are compact microstrip units covering the frequency range of 10 to 26.5 GHz. These units provide low VSWR at all ports and high isolation between all output ports. Phase and amplitude tracking of all outputs are excellent due to the symmetrical designs. Combinations of two way, multistep transformers in one package forms the basic building blocks in these "Wilkinson" type power dividers.

Specifications

D-10265^{-1}

Model Number	VSWR (Max.)	Isolation Loss (Max.)	Insertion (Min.)	Amplitude Balance	Phase Balance
D10265-2	1.6:1	0.8 dB	16 dB	±.5	±.6.0°
D10265-4	1.8:1	1.6 dB	16 dB	±.6	±.8.0°
D10265-8	2.0:1	2.4 dB	16 dB	±.7	±.10.0°

Power: 10 watt average (output terminated with VSWR less than 1.35)
200 mW average (output terminated with any VSWR and phase)
Frequency: 10 - 26.5 GHz

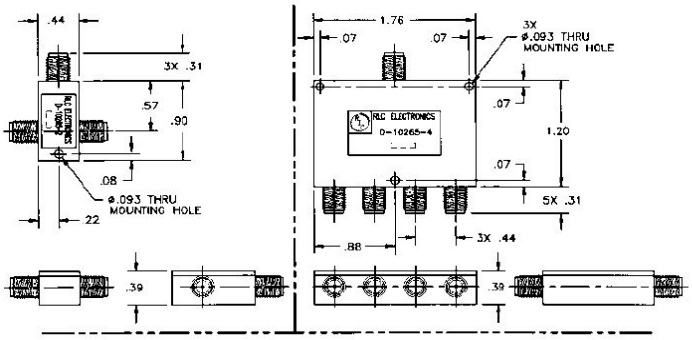
Connectors: SMA female
Impedance: 50 ohms
Environment: MIL-E-5400, Class 1A

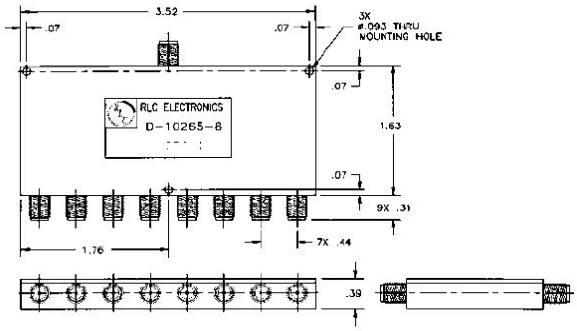
To designate the power divider desired use:

(1): -2 for 2 way, -4 for 4 way, - 8 for 8 way

Example: D-10265-8 is a 10 to 26.5 GHz, 8 output power divider

Outline Drawing





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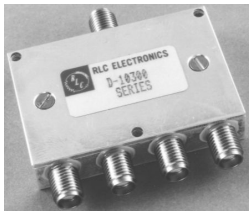
High Frequency Power Dividers 30 GHz



RLC Electronics' D-10300 Series of high frequency power dividers are compact microstrip units covering the frequency range of 10 to 30.0 GHz. These units are the same as D-10265 series, except modified to work up higher in frequency. They also offer 2.92 mm female connectors.

Specifications

D-10300[-1]

Model No.	VSWR (Max.)	Insertion Loss (Max.)	Isolation (Min.)	Amplitude Balance	Phase Balance
D-10300-2	1.6:1	0.8dB	16dB	±0.5	±8º
D-10300-4	1.8:1	1.6dB	16dB	±0.6	±10º
D-10300-8	2.0:1	2.4dB	16dB	±0.7	±14º

Power: 10 watt average (output terminated with VSWR less than 1.35)
200 mW average (output terminated with any VSWR and phase)
Frequency: 10 - 30.0 GHz

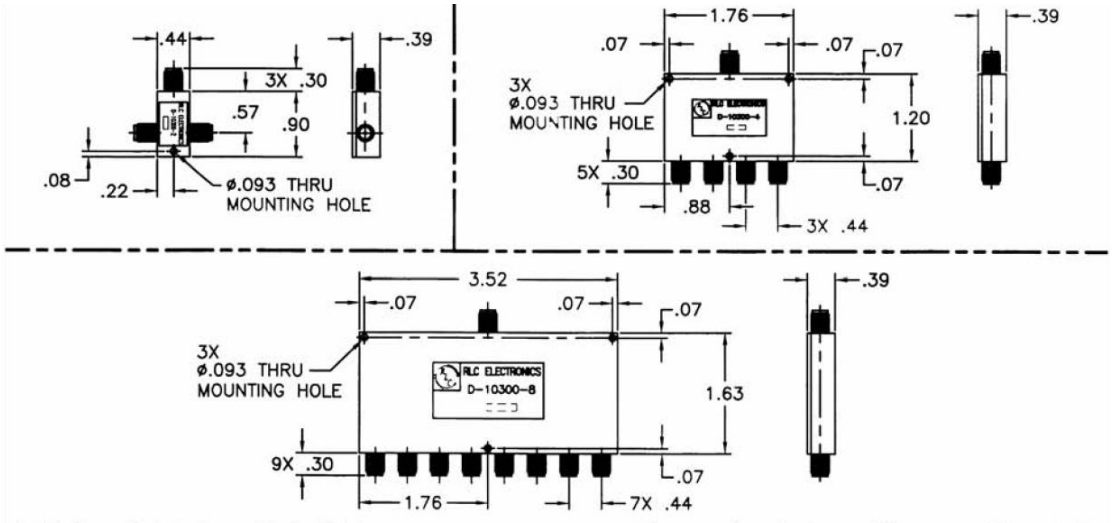
Connectors: 2.92 mm
Impedance: 50 ohms
Environment: MIL-E-5400, Class 1A

To designate the PRODUCT desired use:

1: -2 for 2-Way, -4 for 4-Way, -8 for 8-Way

Example: D-10300-8 is a 10 to 30.0 GHz, 8 output power divider

Outline Drawing



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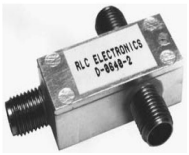
High Frequency 2 and 4 Way Broadband Power Dividers 40 GHz



RLC Electronics' series D-0640-* is a 6.0-40 GHz in phase power divider/combiner with high isolation, small size and superior performance in a single package. It uses a multi-section "Wilkinson" type design with excellent electrical performance over the frequency range. This was accomplished by today's most advanced technology in design & precision etching of a single microstrip board..

Specifications

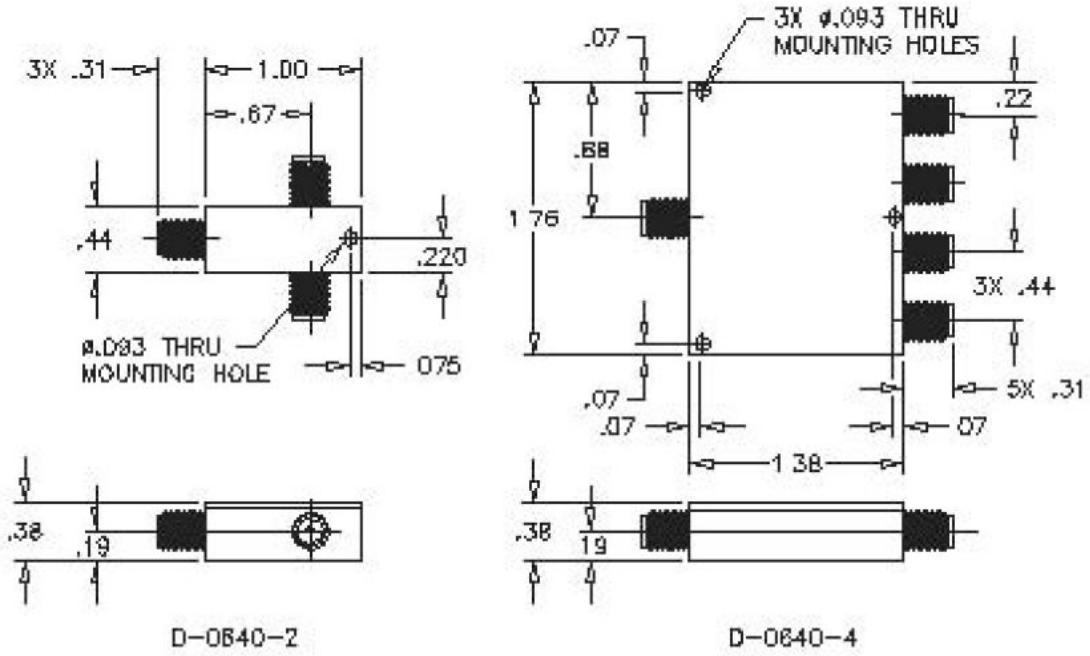
D-0640^{-2-4}

Model. No.	VSWR (Max.)	Insertion Loss (Max.)	Isolation (Min.)	Amplitude Balance	Phase Balance
D-0640-2	2.0:1	1.0 dB	15 dB	+/-.5 dB	+/-15 deg
D-0640-4	2.0:1	1.6 dB	15 dB	+/-.5 dB	+/-15 deg

Power:
10 watt average (outputs terminated with a VSWR less than 1.35)
200 mW average (outputs terminated with any VSWR and phase)

Frequency: 6.0-40.0 GHz
Impedance: 50 ohms
Environment: MIL-E-5400, Class 1A
Connectors: 2.92mm female

Outline Drawing



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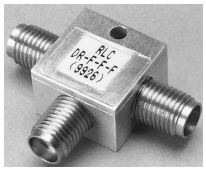
2 Way Resistive Power Dividers



RLC Electronics' broadband resistive power dividers are small and lightweight with stainless steel `SMA' connectors. They have excellent stability over temperature and output power, symmetry over frequency with a division of 6dB from matched ports. Input and outputs are interchangeable and phase difference is nominally 2.5 Degrees between output ports. These dividers utilize 3 resistors to provide excellent output VSWR at the auxiliary arms over the full frequency range enabling wideband measurements to be made accurately.

Specifications

DR^{-1-2-3}

Model Number	Frequency Range (GHz)	Insertion Loss Isolation	VSWR	Amplitude
DR	DC-4.0	6.5 dB	1.2:1	.2 dB
	4.0-10.0	7.0 dB	1.3:1	.4 dB
	10.0-18.0	7.3 dB	1.4:1	.5 dB

Frequency: DC 18GHz
Impedance: 50 ohms
Power rating: 1 watt

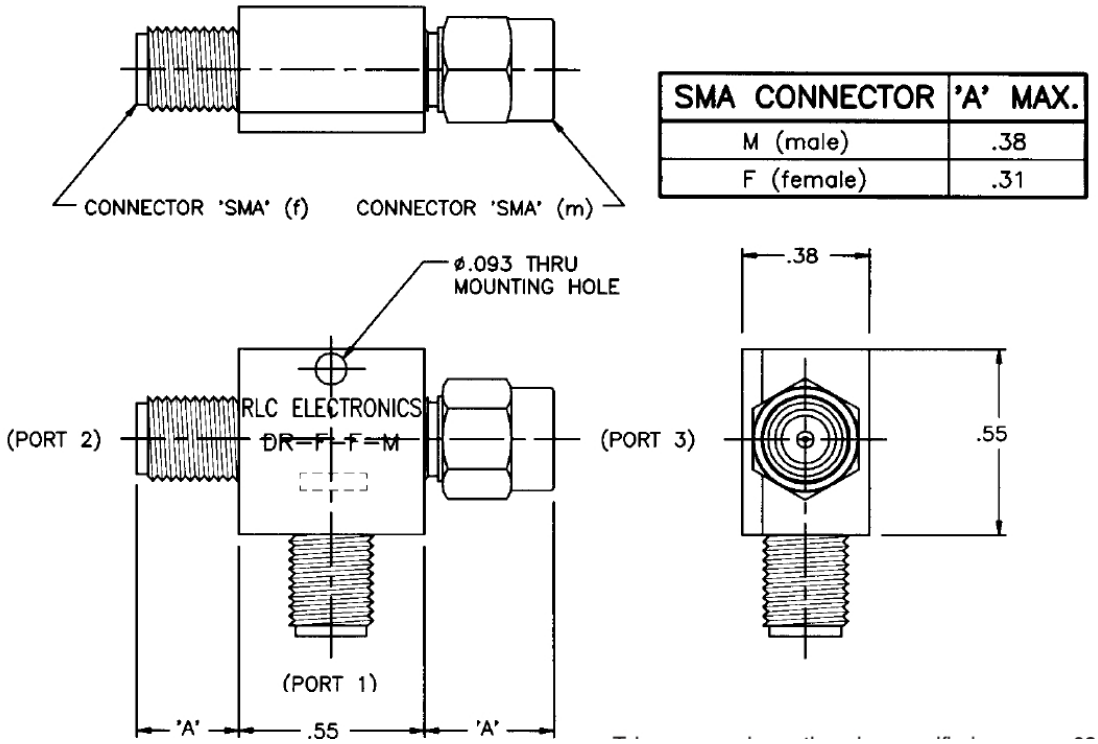
Connectors: `SMA' (male or female)
Environment: MILE5400, Class 1A

To designate the power divider desired use:

1: PORT 1 connector add M for male or F for female.
2: PORT 2 connector add M for male or F for female.
3: PORT 3 connector add M for male or F for female.
NOTE: Refer to outline drawing below for connector location & orientation

Example: DRFFM is a DC to 18GHz resistive power divider w/port 1 (female), port 2 (female), port 3 (male)

Outline Drawing



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2 Way Resistive Power Splitter

RLC Electronics' D--1814A is a broadband DC to 18 GHz resistive power splitter which utilize two resistors, one on each of the output ports, and is a unidirectional device. It provides exceptional amplitude tracking and a very low equivalent output VSWR over the whole frequency range. It can be used in applications in which one of the two outputs is included in a leveling loop as a reference in a ratio system.

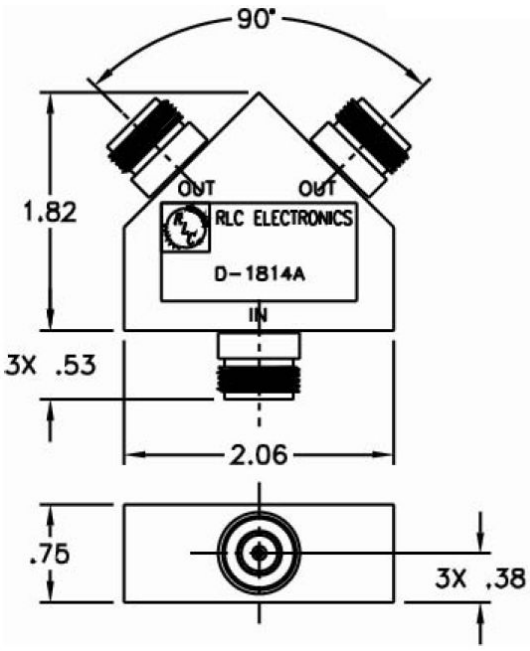
Specifications

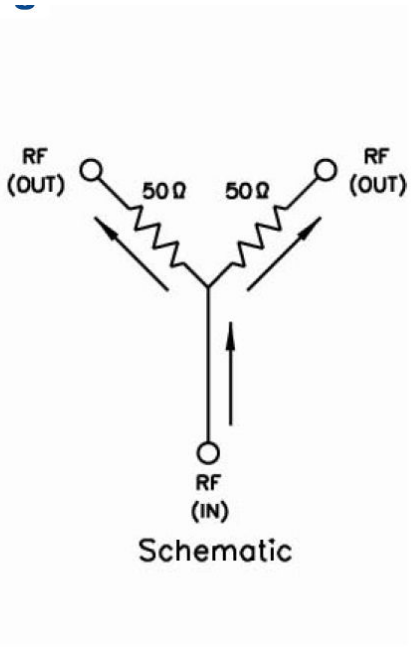
Model No.	Frequency Range (GHz)	INPUT VSWR (Max.)	EQUIVALENT OUTPUT VSWR (Max.)	AMPLITUDE BALANCE (dB) (Max.)	PHASE BALANCE (Typical)
D--1814A	DC--4	1.15:1	1.10:1	± .15	±0.5°
	4--8	1.25:1	1.20:1	± .20	±1.5°
	8--18	1.45:1	1.33:1	± .25	±3.0°

Impedance: 50 ohms nominal
Insertion Loss: 6dB nominal
Input Power: +27 dBM maximum

Connectors: Type N female stainless steel
Environmental Conditions: MIL-E-5400, Class 1A

Outline Drawing





Custom High Power 2 Way Power Dividers/ Combiners 50 watts to 200 watts

RLC Electronics' custom high power 2 way dividers/combiners are in phase "Wilkinson" type designs with excellent electrical performance within the band of +/6% of any center frequency between 750 to 2400 MHz. These devices can be used as dividers or combiners with 50 watts C.W. per channel for failsafe applications, where typically one output is for example, the loss of one element in an antenna array. As a divider, it can handle up to 200 watts assuming a load VSWR of 1.2:1 or better.

Specifications

DHP^{-1}

Model. No.	Center frequency (Fc+/-6%) (MHz)	VSWR (Max)	Insertion Loss (Max.)	Isolation (Min.)	Amplitude Balance	Phase Balance
DHP-	750 to 2400	1.3:1	.25 dB	20 dB	.1dB	2 deg

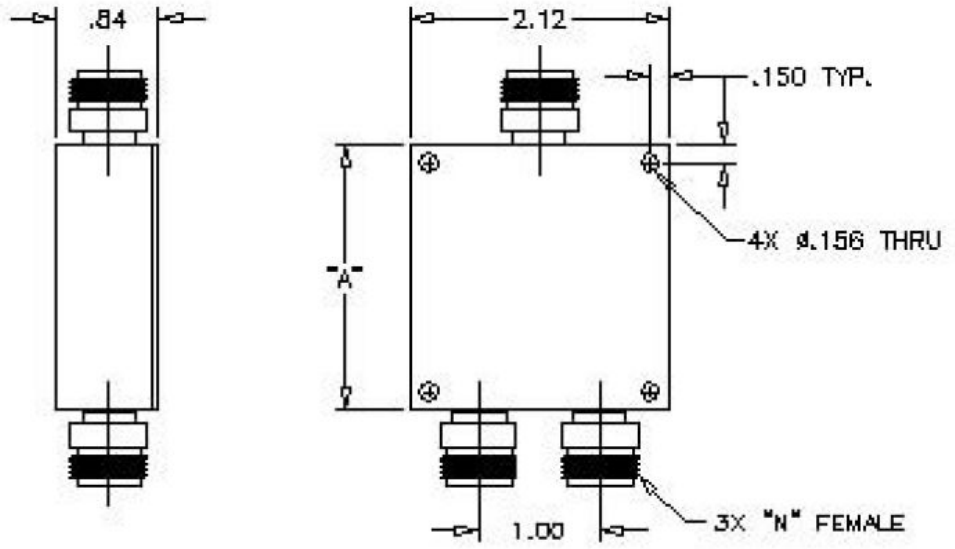
Power:
200 watts avg. (As a divider with output terminated with a VSWR less than 1.2:1)
50 watts avg. (Failsafe)
Connectors: "N" female

Impedance: 50 ohms
Environment: MIL-E-5400, Class 1A

1: Specify frequency, 750 to 2400 MHz (electrical performance within +/-6%).

Example: DHP-1000, frequency range of 940-1060 MHz.

Outline Drawing



$$\text{Approximate length (A)} = \frac{1.966}{fc(GHz)} + 1.38$$

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DC Block Power Dividers & Combiners 1.0 to 2.0 GHz 2, 3 & 4 way

RLC Electronics' series DCB-1020 is an in phase power divider/combiner with high isolation, small size and superior performance in a single package. All microstrip and stripline power dividers typically pass DC on all ports. These units utilize microstrip construction with blocking capacitors on all ports except those that are intended to pass DC.

Specifications

DCB^{-1}020^{-1-2}

Model. No.	Freq. GHz	Isol. (dB) min.	VSWR Max	I.L. (dB) max	Ampl. Bal (dB)	Phase Bal	Dimensions		
							A	B	C
DCB-1020-2-	1.0-2.0	20	1.25	.3	+/-.2	+/-3 deg	3.25	.88	.44
DCB-1020-3-	1.0-2.0	19	1.45	.3	+/-.3	+/-3 deg	2.30	1.80	.60
DCB-1020-4-	1.0-2.0	20	1.30	.6	+/-.3	+/-3 deg	2.30	2.40	.60

Power: 10 watts avg. (outputs terminated with a VSWR less than 1.35) 200 mw avg. (outputs terminated with any VSWR and phase)
Connectors: SMA female

Impedance: 50 ohms
Voltage: 50 vdc max
Environment: MIL-E-5400, Class 1A

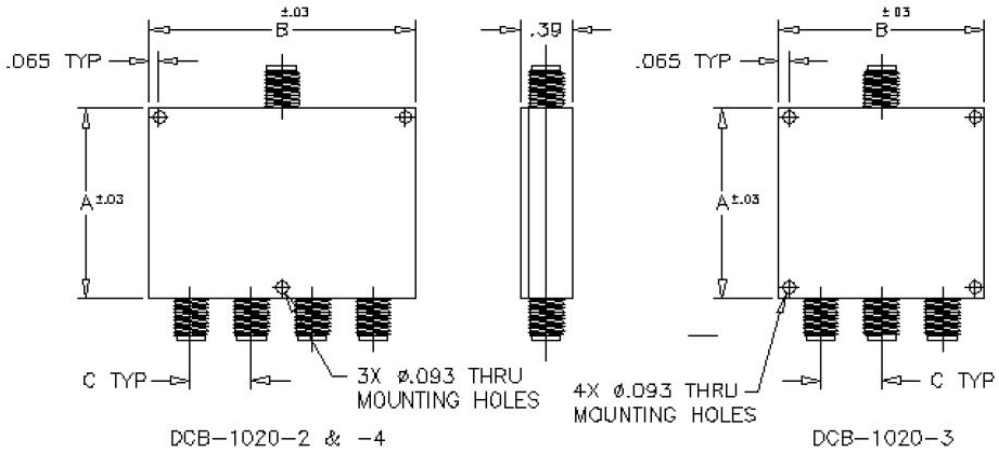
To designate the DC block power divider desired use:

1: -2 for 2 way, -3 for 3 way, -4 for 4 way

2: DC to port thru 1 for port 1, -2 for port 2, -3 for port 3, -4 for port 4, -0 to block all ports

Example: DCB-1020-4-2 is a 1-2 GHz 4 way power divider with "DC" passing thru from input to port 2. (all other ports blocked)

Outline Drawing



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High Frequency Surface Mount Power Divider 2 way

RLC Electronics' Surface Mount Power Dividers combine the characteristics of a multi-section Wilkinson divider in a compact true surface mount package. This 2 way design is available with a frequency range extending from 2 to 18 GHz and still maintain excellent performance.

Specifications

DSM-218^{-2}

Model. No.	VSWR (Max)		Insertion Loss (Max)	Isolation (Min)	Amplitude Balance	Phase Balance
	IN	OUT				
DSM-218-2	2:1	1.9:1	1.75 dB	14 dB	+/-.4 dB	+/-10 deg

Power: 10 watts avg.
(outputs terminated with a VSWR less than 1.35)
200 mW avg.
(outputs terminated with any VSWR and phase)
Frequency: 2.0-18.0 GHz
Impedance: 50 ohms
Temperature range: -55 to +85 deg C

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Surface Mount Directional Couplers

RLC Electronics' Surface Mount Directional Couplers simplify installation, while still providing the high directivity and low VSWR of standard couplers. These units are available in both octave or multi-octave bandwidths, over the frequency range of 500 to 3000 MHz. Coupling values of 10, 16, or 20 dB are standard.

Specifications

SC-1-2-3

Model No	Frequency (GHz)	Directivity Min. (dB)	VSWR Max.	Frequency Deviation(dB)	Loss Max.(dB) *
SC-0510-	.50-1.00	23	1.15	.75	.20
SC-1020-	1.00-2.00	22	1.15	.75	.20
SC-1530-	1.50-3.00	22	1.20	.75	.25
SC-0520-	.50-2.00	20	1.25	.75	.30
SC-0530-	.50-3.00	20	1.25	.75	.30

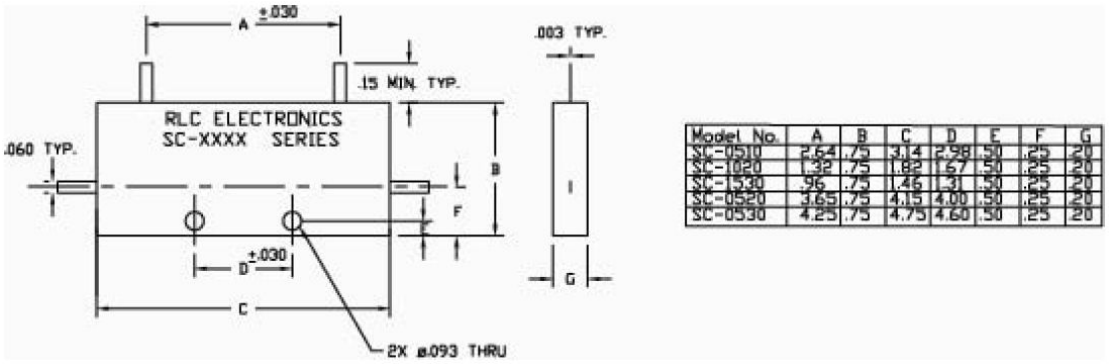
Coupling (nominal): 10 ± .5 dB, 16 ± .5 dB, 20 ± 1.0 dB
Impedance: 50 ohms
Power: 50 watts average, 3 Kw peak
Connector: Tabs for surface mount

Temperature: -55 to +85 C
Environment: Mil-E-5400, Class 1A
Note: *Does not include coupling loss

To designate the coupler desired use:

1: 0510, 1020, etc. for model number U for no termination.
2: Coupling value in dB.
3: T for built in .5 watt termination,

Outline Drawing



Model No.	A	B	C	D	E	F	G
SC-0510	2.64	.75	3.14	2.98	.50	.25	.20
SC-1020	1.32	.75	1.82	1.67	.50	.25	.20
SC-1530	.96	.75	1.46	1.31	.50	.25	.20
SC-0520	3.65	.75	4.15	4.00	.50	.25	.20
SC-0530	4.25	.75	4.75	4.60	.50	.25	.20

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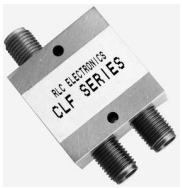
Directional Couplers Low Frequency



RLC Electronics' CLF Series Directional Couplers, covers a wide frequency range of 10 to 500MHz and 25 to 1000 MHz, using unique lumped element designs to achieve the wide bandwidth. They are housed in a convenient low profile (0.4 inch) SMA or Pin package.

Specifications

Model-Number[-1]

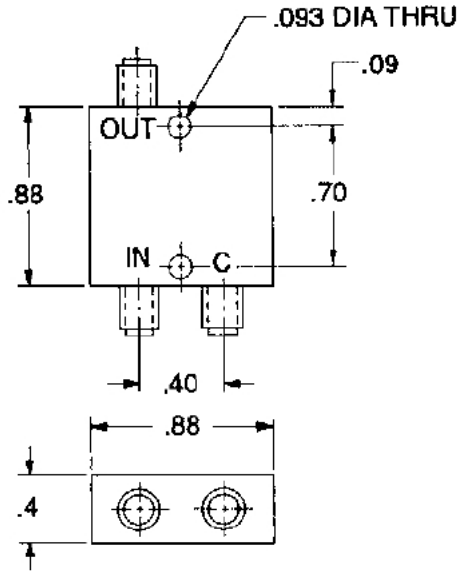
Model Number	Frequency Range (MHz)	Coupling (Nominal) (dB)	Directivity (dB) (Min.)	VSWR (Max)		Maximum Deviation from Nominal (dB)	Frequency Sensitivity (dB)	Insertion Loss Max. (dB)	
				Main Line	Secondary Line			Excluding Coupling	Including Coupling
CLF–10-500–10	10-500	10.7	20	1.5	1.5	±0.5	±0.5	1.0	1.0
CLF–10-500–20	10-500	20.2	20	1.35	1.35	±0.4	±0.4	0.35	0.4
CLF–25-1000–16	25-1000	16.0	20	1.35	1.35	±0.5	±0.4	0.6	0.75

Power: 1 watt avg.

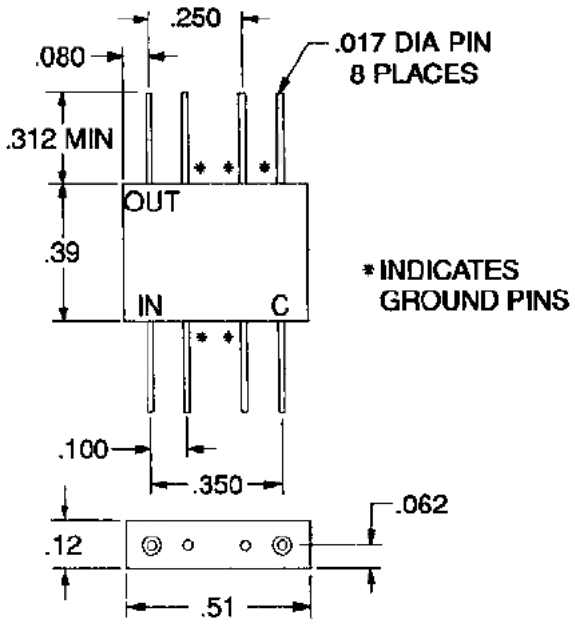
To designate the PRODUCT desired use:

(1): R for SMA female or P for pins

Outline Drawing



CONFIGURATION R



CONFIGURATION P

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Miniature Quadrature Hybrid Couplers

RLC Electronics' Miniature 3 dB 90 Hybrid Couplers offer superior performance over the frequency range of 500 MHz to 12.4 GHz. These devices exhibit exceedingly high isolation with low VSWR. Stripline construction incorporating precision etching and tightly controlled material tolerances, ensures extraordinary reproducibility of electrical parameters as well as excellent phase and amplitude tracking. All units are packaged in lightweight solid aluminum cases with convenient mounting holes.

Specifications

H^{-1-2}

Model Number	Frequency Range (GHz)	Isolation (Min.)	VSWR (Max.)	AMPLITUDE BALANCE (dB)	LOSS Max. (dB)
H-0510-	.50 - 1.00	25	1.25	±.50	.25
H-1020-	1.00 - 2.00	25	1.25	±.50	.25
H-1530-	1.50 - 3.00	25	1.25	±.50	.25
H-2040-	2.00 - 4.00	20	1.25	±.50	.30
H-3060-	3.00 -6.00	20	1.25	±.50	.35
H-4080-	4.00 - 8.00	18	1.30	±.50	.40
H-5965-	5.90 - 6.50	20	1.25	±.25	.40
H-7011-	7.00 - 11.00	16	1.35	±.50	.50
H-8012-	8.00 - 12.40	16	1.35	±.50	.50

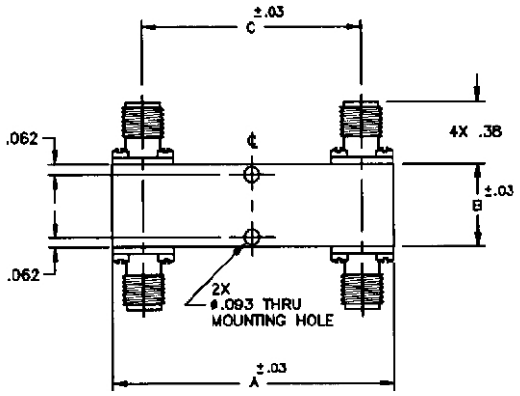
Impedance: 50 ohms
Connector Type: SMA Female
Power: 100 watts average 5KW peak
Temperature: -55 to +85 C
Phase Tracking: +/- 3 Degrees typical
Environment: MIL-E-5400, Class 1A

To designate the hybrid desired use:

1: 0510, 1020, etc. for model number
2: T for built in 2 watt termination, U for no termination

Example: H-2040-T a 2 to 4 GHz frequency band, internal termination

Outline Drawing



H-1020 SHOWN

MODEL	A	B	C
H-0510	3.01	.50	2.56
H-1020	1.70	.50	1.32
H-1530	1.34	.50	.96
H-2040	1.04	.50	.68
H-3060	.86	.50	.48
H-4080	.82	.50	.44
H-5965	.82	.50	.44
H-7011	.82	.50	.44
H-8012	.82	.50	.44
Width of all units .38 in.			

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Octave and Broadband Directional Couplers

RLC Electronics' Broadband Directional Coupler provide the ultimate in flat coupling and high directivity over the 2 to 18 GHz band. These miniaturized units are ideal where stringent wide band specifications must be maintained.

Specifications

C-1-2-3

Model Number	Frequency Range (GHz)	Directivity Min (dB)	VSWR (Max)	Frequency Deviation (dB)	Loss Max. (dB)*
C-0205-	0.25-0.50	25	1.15	±0.75	0.20
C-0510-	0.50-1.00	25	1.15	±0.75	0.20
C-0912-	0.96-1.235	25	1.10	±0.25	0.15
C-1020-	1.00-2.00	20	1.15	±0.75	0.25
C-1530-	1.50-3.00	20	1.20	±0.75	0.25
C-2040-	2.00-4.00	20	1.25	±0.75	0.30
C-3060-	3.00-6.00	20	1.25	±0.75	0.35
C-4080-	4.00-8.00	18	1.35	±0.75	0.40
C-8012-	8.00-12.40	16	1.45	±0.75	0.40
C-12180-	12.40-18.00	15	1.50	±1.00	0.60
C-218-6** C-218-10** C-218-16**	2.00-18.00	15 < 12.4 12 > 12.4	1.5	±1.00	0.90 0.90 0.65
C-0770-10 C-0770-16 C-0770-20	0.7-7.0	20	1.25	±1.00	0.60

Coupling(Nominal): 6+/- .5dB, 10+/- .5dB, 20+/- 1.0dB 30+/- 1.0db
Power: 50 watts ave: C-218; 20 watts average. 5KW peak: C-218; 3 KW peak, C-0770, 50 watts average, 5KW peak
Impedance: 50 Ohms
Operation Curves: See page 101
Connector Type: SMA female

Temperature: -55 C to +85 C
Environment: MIL-E-5400, Class 1A
note: * Does not include coupling loss **Coupling referenced to output port.
Outlines: See page 101

To designate the coupler desired use:

1: 0205, 0510, etc for model number
2: Coupling value in dB
3: "T" for built in 2 watt termination, U for no termination. C-218 and C-0770 are available with terminations only.

Example: C-2040-6-T a 6 dB coupler, 2 to 4 GHz frequency band, with internal termination

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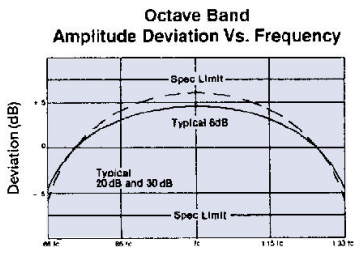
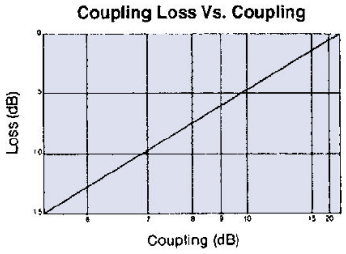
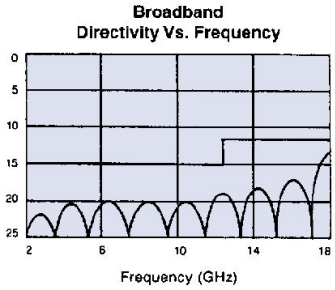
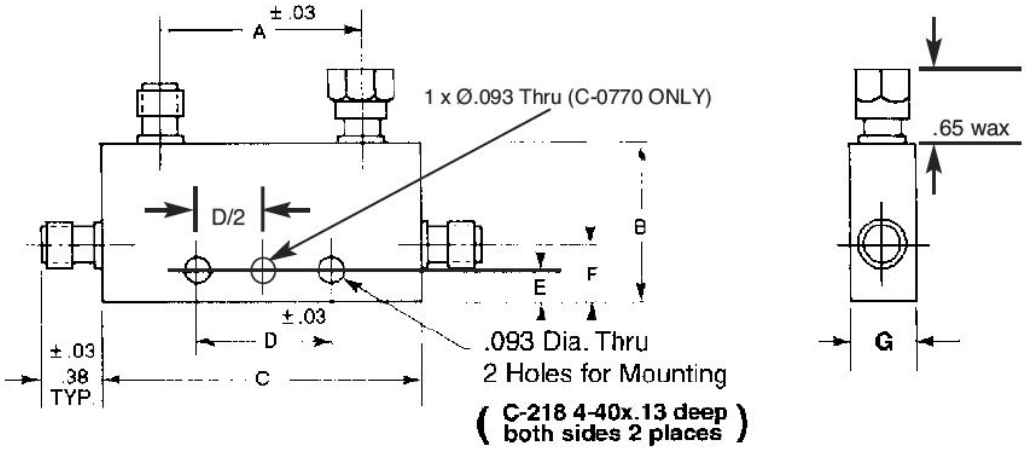
Typical Operating Curves







Outline Drawing



Model No.	A	B	C	D	E	F	G
C-0205	1.50	2.00	2.13	1.97	1.75	.31	.38
C-0510	2.64	.75	3.14	2.98	.50	.25	.38
C-0912	1.92	.75	2.43	2.27	.50	.25	.38
C-1020	1.32	.75	1.83	1.67	.50	.25	.38
C-1530	.96	.75	1.47	1.31	.50	.25	.38
C-2040	.66	.75	1.17	1.01	.50	.25	.36
C-3060	.50	.75	1.00	.84	.50	.25	.38
C-4080	.50	.75	1.00	.84	.50	.25	.38
C-8012	.50	.75	1.00	.84	.50	.25	.38
C-12180	.50	.75	1.00	.84	.50	.25	.38
C-218	1.63	.86	2.12	1.12	.44	.39	.53
C-0770	2.50	.68	3.00	2.00	.075	.25	.39

Octave and Broadband DIrectional Detectors

RLC Electronics' Directional Detectors are available in both broadband and octave versions. These Directional Detectors combine the high directivity, low insertion loss, low VSWR and low frequency sensitivity of RLC's stripline couplers with the flat frequency response and high sensitivity of RLC's miniature Schottky detectors.

Specifications

DD-(1)

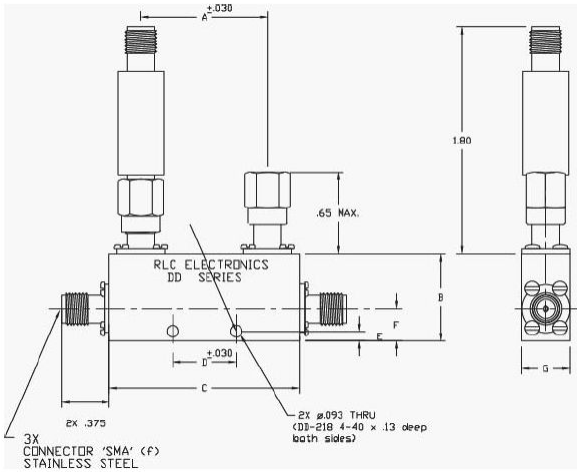
Model Number	Frequency Range (GHz)	Directivity Min. (dB)	VSWR (Max.)	Frequency Deviation (dB)	Insertion Loss Max. (dB)
DD-0205	0.25-0.50	25	1.15	+/-.90	.25
DD-0510	0.50-1.00	25	1.15	+/-.90	.25
DD-1020	1.0-2.00	25	1.15	+/-.90	.25
DD-1530	1.5-3.0	20	1.20	+/-.90	.30
DD-2040	2.0-4.0	20	1.25	+/-.90	.30
DD-3060	3.0-6.0	20	1.25	+/-.90	.40
DD-4080	4.0-8.0	18	1.30	+/-.90	.45
DD-0812	8.0-12.4	16	1.35	+/-.70	.45
DD-12180	12.0-18.0	15	1.35	+/-.70	.65
DD-218	2.0-18.0	12	1.40	+/-.90	.70

Input Power: 10 Watts Max
Video Resistance: 5000 ohms nominal
Sensitivity: 4uV/uW Min.

Connectors: SMA female
Temperature Range: -55 C to +100 C

To designate the directional detector desired use:
1: 0205, 0510, 1020, etc. for Model Number
Example: DD-0205 is a 0.25 to 0.50 GHz Directional Detector with SMA Female connectors.

Model No.	A	B	C	D	E	F	G
DD-0205	1.50	2.00	2.13	1.97	1.75	.31	.38
DD-0510	2.64	.75	3.14	2.98	.50	.25	.38
DD-1020	1.32	.75	1.83	1.67	.50	.25	.38
DD-1530	.96	.75	1.47	1.31	.50	.25	.38
DD-2040	.66	.75	1.17	1.01	.50	.25	.38
DD-3060	.50	.75	1.00	.84	.50	.25	.38
DD-4080	.50	.75	1.00	.84	.50	.25	.38
DD-0812	.50	.75	1.00	.84	.50	.25	.38
DD-12180	.50	.75	1.00	.84	.50	.25	.38
DD-218	1.63	.86	2.12	1.12	.44	.39	.53



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Miniature Air Dielectric Directional Couplers

RLC Electronics' miniature air dielectric directional couplers are rugged lightweight devices that offer lower insertion loss than comparable stripline units. The simplified construction allows for greater flexibility in creating customized configurations. Any port can be used as the input with these symmetrical devices. The standard units are available with a choice of coupling values and frequency ranges and an optional termination.

Specifications

ADC-1-2-3

Model. No	Frequency Range (GHz)	VSWR (Max)	Frequency Deviation(dB)	Loss Max (dB)
ADC-1020-	1.00-2.00	1.15	+/-0.75	.20
ADC-2040-	2.00-4.00	1.20	+/-0.75	.20
ADC-4080-	4.00-8.00	1.25	+/-0.75	.25
ADC-218-	2.00-18.00	1.50	+/-1.00	.60
ADC-418-	4.00-18.00	1.40	+/-1.00	.40
ADC-618-	6.00-18.00	1.35	+/-1.00	.40

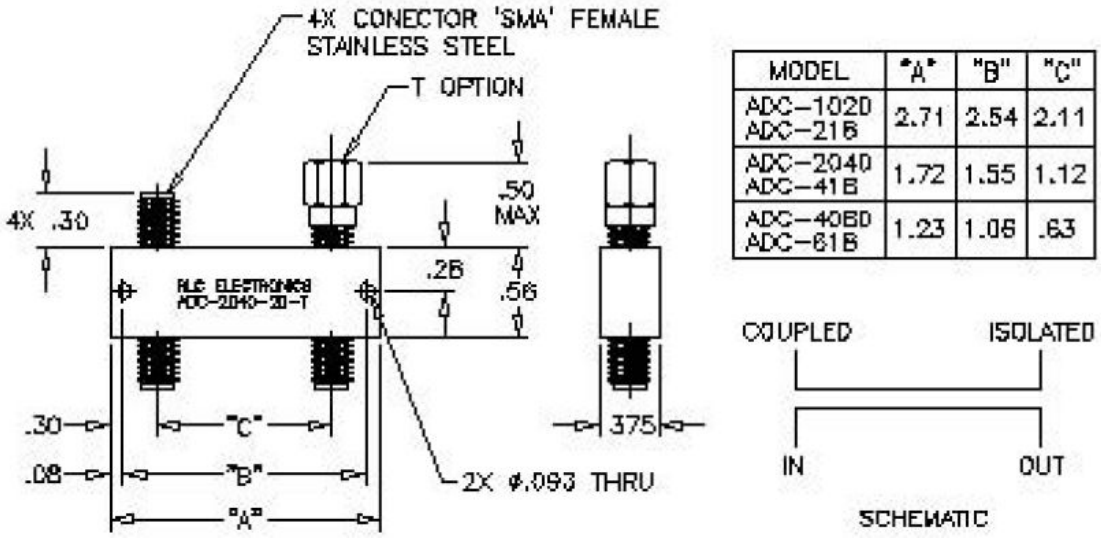
Coupling (Nominal): 20 to 30dB, +/-0.5dB
Power: 100 watts average, 1KW peak
Impedance: 50 Ohms
Connector Type: SMA female
Temperature: -55 deg C to +85 deg C
Environment: MIL-E-5400, Class 1A

To designate the PRODUCT desired use:

1: 1020, 2040 etc for model number
2: Coupling value in dB. Any number between 20 and 30
3: "T" for removable termination, U for no termination.

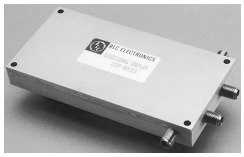
Example: ADC-2040-20-T is a 20dB coupler, 2 to 4 GHz frequency band, with removable termination.

Outline Drawing



MODEL	"A"	"B"	"C"
ADC-1020 ADC-216	2.71	2.54	2.11
ADC-2040 ADC-416	1.72	1.55	1.12
ADC-4080 ADC-816	1.23	1.06	.63

Low Frequency High Power Directional Couplers



RLC Electronics' low frequency high power directional couplers offer accurate coupling, low insertion loss and high directivity in a compact package. The standard units are optimized for octave bandwidths and are available with a choice of coupling values. These units are ideal for sampling power with a negligible effect on the transmission line and very low intermodulation products.

Specifications

LCHP-0205^{-1-2}
LCHP-0510^{-1-2}

Model Number	Frequency Range (MHz)	Directivity (Min.)	Primary VSWR (Max.)	Secondary VSWR (Max.)	Insertion Loss (Max.)
LCHP-0205	250 - 500	25dB	1.15	1.15	.15 dB
LCHP-0510	500 - 1000	25dB	1.15	1.15	.20 dB

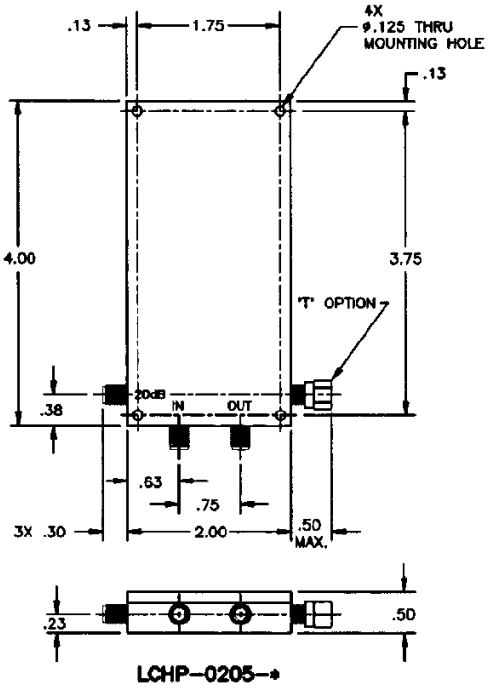
Impedance: 50 ohms
Power: 500 watts avg., 5kw peak
Coupling (NOM): 20 or 30dB
Accuracy (includes frequency variation): 1.25dB
Connectors: `SMA' female

To designate the coupler desired use:

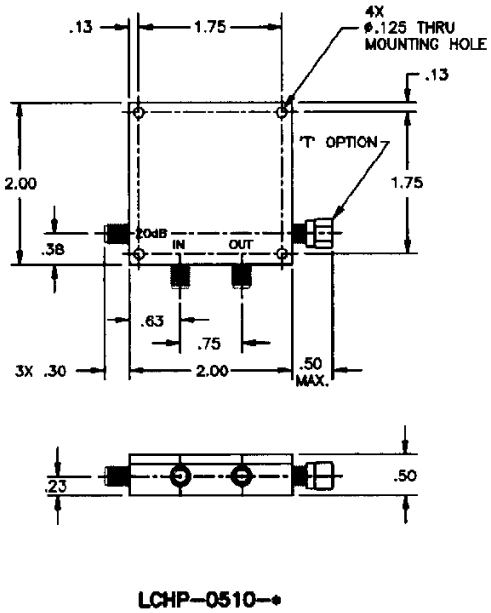
1: Coupling value 20 or 30 **2:** "T" for 2 watt termination

Example: LCHP-020520T is a 250 - 500 MHz, 20dB coupler with 2 watt termination.

Outline Drawing



LCHP–0205–*



LCHP–0510–*

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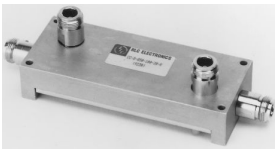
Cellular Band Single and Dual Directional Couplers



RLC Electronics' Cellular Directional Couplers exhibit high directivity, low insertion loss and low VSWR over their respective bandwidths. These basic units may be easily optimized for your particular frequency range.

Specifications

CC-1-2-3-4

Model Number	Frequency Range (MHz)	Directivity (dB) (Min)	VSWR (Max)	Insertion Loss (dB) (Max)
CC-*-800-100-	750-850	25	1.15	.20
CC-*-850-100-	800-900	25	1.15	.20
CC-*-900-100-	850-950	25	1.15	.20
CC-*-950-100-	900-1000	25	1.20	.20
CC-*-1100-200-	1000-1200	20	1.20	.25

Coupling(Nominal): 6+/-0.5dB, 10+/-0.5dB, 20+/-0.5dB (Reference to Output) 30+/-1.0dB, 40+/-1.0dB, 50+/-1.5dB
Power: 500 watts avg
Impedance: 50 Ohms

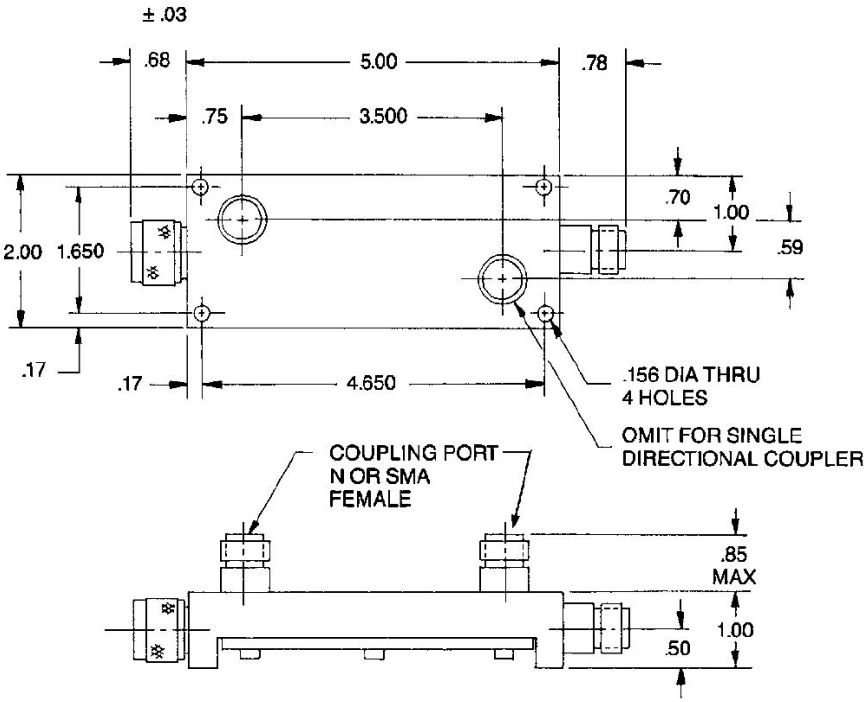
Flatness: +/-0.2dB (6 thru 40 dB) +/-0.5dB(50dB)
Connector Type: SMA, N
Environment: MIL-E-5400, Class 1A

To designate the coupler desired use:

1: S for single or D for Dual
2: 800, 850, etc for model number
3: Coupling value in dB 6, 10, 20, 30, 40 or 50
4: Connector type: Main Line N (female/male) Secondary Line R for SMA (female). N for N (female)

Example: CC-D-850-100-30-R is a 30 dB dual coupler, 800-900 MHz frequency range, with SMA coupling connectors.

Outline Drawing



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High Power Single and Dual Directional Couplers

RLC Electronics' high power directional couplers offer accurate coupling, low insertion loss and high directivity in a compact package. The standard units are optimized for 2 octave bandwidths and are available with a choice of coupling values. These units are ideal for sampling forward and reflected power with a negligible effect on the transmission line and very low intermodulation products.

Specifications

CHP-1040$^{-1-2-3-4}$, CHP-2080$^{-1-2-3-4}$
CHP-3012$^{-1-2-3-4}$, CHP-6018$^{-1-2-3-4}$

Model Number	Frequency Range (GHz)	Directivity (Min.)	Primary VSWR (Max.)	Secondary VSWR (Max.)	Insertion Loss (Max.)
CHP-1040	1-4	23dB	1.20	1.30	.15dB
CHP-2080-	2-8	21dB	1.25	1.30	.20dB
CHP-3012	3-12	18dB	1.30	1.30	.25dB
*CHP-6018	6-18	14dB	1.50	1.50	.35dB

Impedance: 50 ohms
Power: 500 watts avg., 10kw peak, *250 watts
Accuracy (including frequency variation): +/- 1.0dB

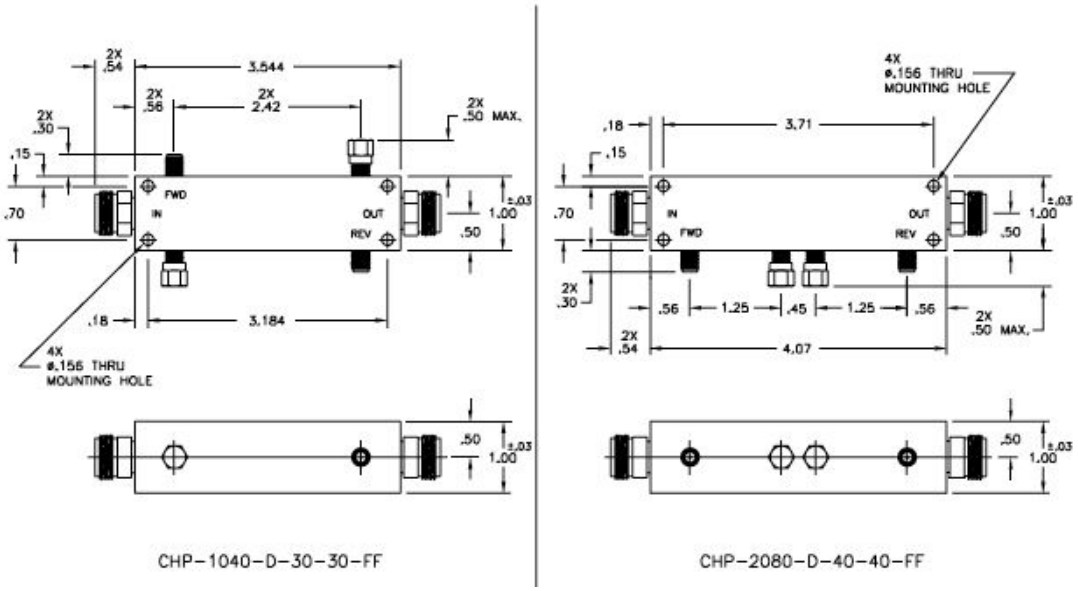
Coupling (nominal): 30, 40 or 50dB
Connectors: Main lineType "N" (male or female)
Secondary line-"SMA" female

To designate the coupler desired use:

1: S for single, D for dual
2: Forward coupling value 30, 40 or 50dB
3: Reverse coupling value 30, 40 or 50dB (dual only)
4: Main line connectors (input/output)
MM (male/male), FF (female/female),
MF (male/female), FM (female/male),

Example: CHP-2080-D-40-40-FF is a 2-8GHz coupler with "N" female connectors on the main line and 40dB forward and reverse coupling.

Outline Drawing



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High Frequency High Power Directional Couplers

RLC Electronics' high frequency high power directional couplers offer accurate coupling, low insertion loss and high directivity in a compact package. The standard units are optimized for four different frequency ranges and are available with a choice of coupling values. These units are ideal for sampling or injecting signals with a negligible effect on the transmission line. They can be easily modified for different coupling responses or frequency ranges.

Specifications

HCHP-12180^{-1-2}, HCHP-18265^{-1-2}
HCHP-26540^{-1-2}, HCHP-1840^{-1-2}

Model Number	Frequency Range (GHz)	Directivity (Min)	VSWR (Max)	Insertion Loss (Max)	Power AV
HCHP-12180-	12-18	15dB	1.5:1	0.3dB	100W
HCHP-18265-	18-26.5	13dB	1.5:1	0.5dB	80W
HCHP-26540-	26.5-40	11dB	1.8:1	0.7dB	60W
HCHP-1840-	18-40	11dB	1.9:1	0.7dB	60W

Impedance: 50 ohms
Coupling (nominal): 20 or 30dB
Accuracy (including frequency variation): ±1.0dB

Connectors: SMA, 2.92 mm for 40 GHz. Main Line- Male or female. Secondary line- female.

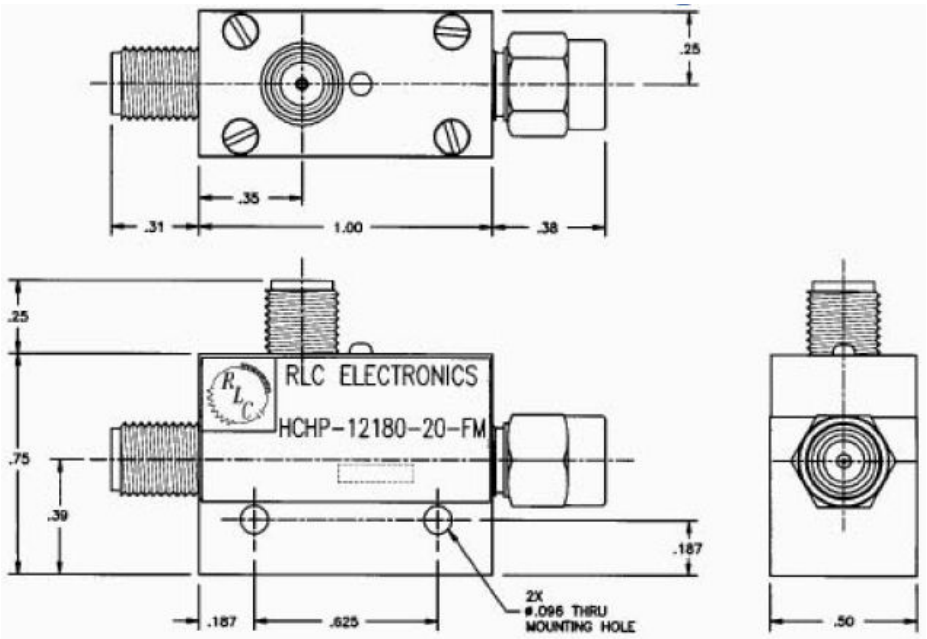
To designate the coupler desired use:

1: Coupling value 20 or 30dB

2: Main line connectors (input/output)
MM (male/male), FF (female/female)
MF (male/female), FM (female/male)

Example: HCHP-12180-20-FM is a 12-18GHz, 20dB coupler with `SMA' female/male connectors (input/output) on the main line

Outline Drawing



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Resistive Pickoff Tee

RLC Electronics' Resistive Pickoff Tee offers excellent through-line insertion loss and pickoff stability from DC to 40 GHz, rise times of <10 Pico-seconds.

Specifications

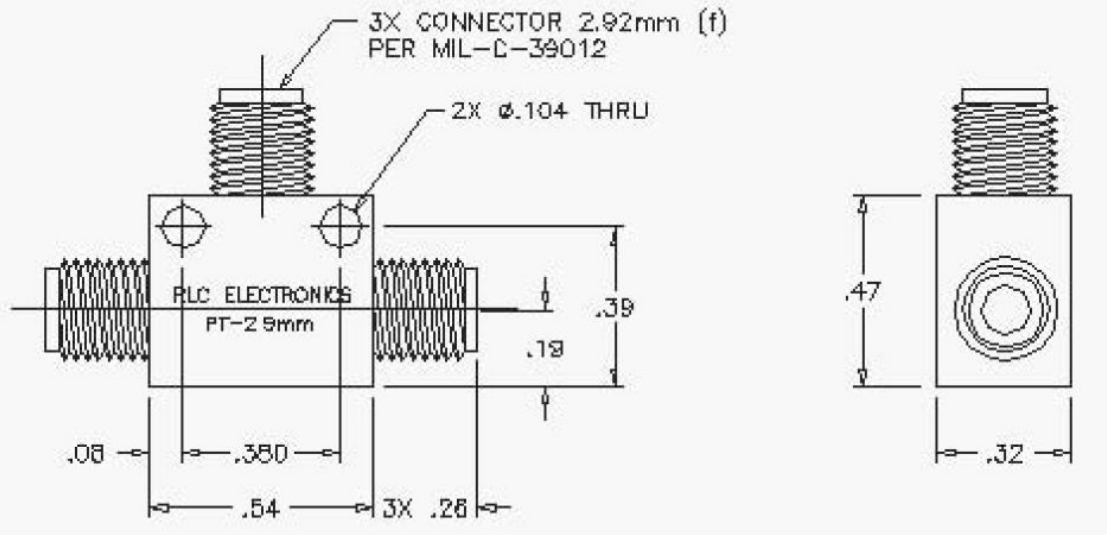
PT-2-92

Bandwidth	DC to 40 GHz
Insertion Loss	<2dB
Pickoff Resistor	200 Ohms
Pickoff Insertion Loss	15dB 0 to 40 GHz
Return Loss	>20dB DC >17dB 0 to 15 GHz >12dB 15 to 40 GHz
Max Input Power	3.5 Watts CW

Operating temperature: -55 toto +85 degree @ @ 3.5 Watts
Environmental: Mil-E-5400, Class 1A

Connectors: 2.92mm female

Outline Drawing



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Waveguide Broadwall Coupler

RLC Electronics offers a standard range of multi-hole broadwall directional couplers covering the frequencies from 40 GHz to 2.6 GHz in standard waveguide sizes. The electrical characteristics of high directivity and coupling flatness are achieved by using a precise machined coupling hole pattern and a precision load in the secondary arm. Non standard configurations or selected electrical parameters are available on request.

Specifications

WBC$^{-1-2-3-4-5}$

Waveguide Size	Frequency	Dimensions		
		A	B	C
WR-28	26.50 - 40.00	9.00	1.25	0.90
WR-42	18.00 - 26.5	10.5	1.38	0.90
WR-62	12.40 - 18.00	12.5	2.00	1.00
WR-75	10.00 - 15.00	14.00	2.00	1.00
WR-90	8.20 - 12.40	17.00	2.00	1.25
WR-137	5.85 - 8.20	22.00	3.00	1.50
WR-284	2.60 - 3.95	46.00	6.50	2.50

VSWR:
Primary: 1.1:1 max
Secondary:1.15:1 max- W.G.
1.30:1 max-Coax

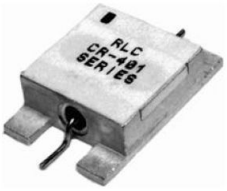
Coupling values: 10, 20, 30, 40, 50 dB +/- 1 dB

Directivity: 35 dB min

Flange Type:
1 = Cover
2 = Choke
3 = CPRF
4 = CMR

Outline Drawing

Miniature Surface Mount Schottky Detectors



RLC Electronics' miniature surface mount detectors utilize a zero-bias Schottky design. The microwave power is coupled directly to the extremely small components reducing package parasitics and transition mismatches. This design results in a low VSWR and a flat, smooth output over a wide bandwidth. Standard unit has frequency range of .01 to 4 GHz, with option of negative or positive output. A higher frequency option is available up to 12.4 GHz.

Specifications

CR^{-1-2}

Frequency Range	.01-4 GHz	.01-12.4 GHz (Option-12)
Frequency Response (Max) **.01-4 GHz** **.01-12.4 GHz**	+/-0.3 dB -----	+/-0.3 dB +/-0.5 dB
VSWR (Max) **.01-4 GHz** **4-12.4 GHz**	1.30 -----	1.30 1.70
Typical Sensitivity **(Pin< - 30 dBm)**	0.5 mV/uW	0.5 mV/uW

Input Power: 100 mW maximum (peak or average)
Video resistance: 5000 ohms nominal
Input/Output Connections: .018 diameter pins

Temperature Range: -55 C to +100 C
Bias: None

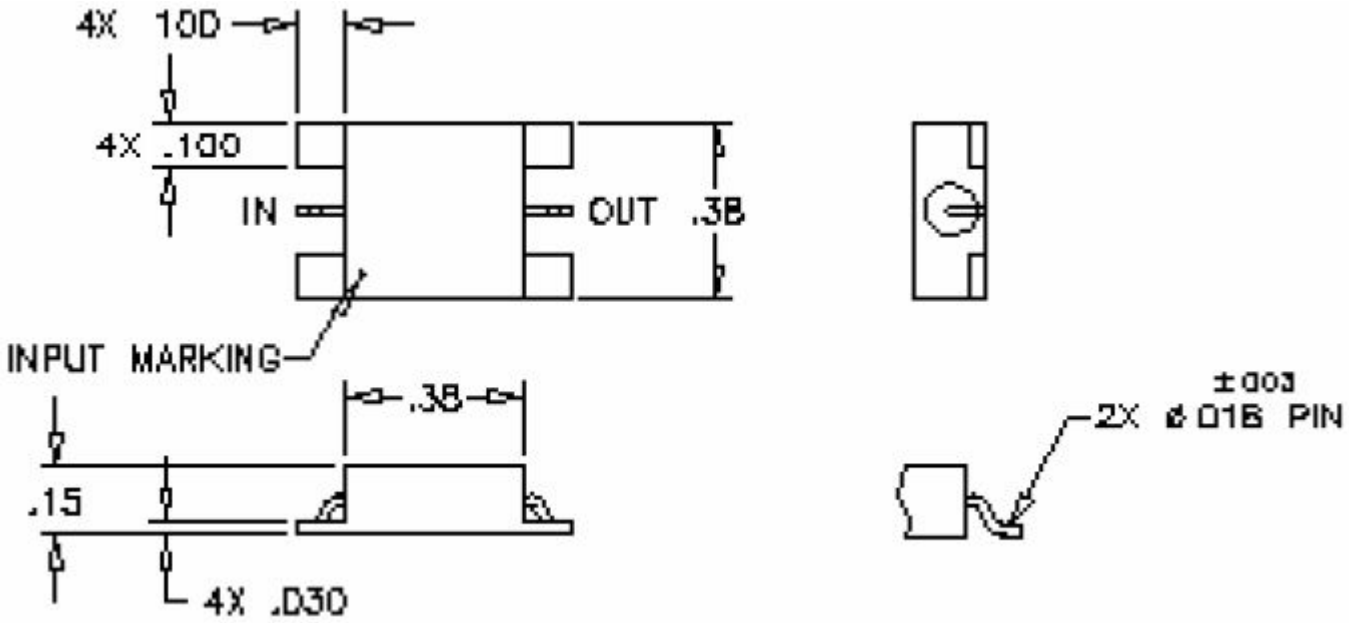
To designate the detector desired use:

1: 401 for negative output, 402 for positive output

2: -12 for 12.4 GHz option

Example: CR-401-12 is a .01-12.4 GHz, negative output detector.

Outline Drawing



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Broadband Schottky and Tunnel Diode Detectors

RLC Electronics' Zero Bias Detectors are designed for use in coaxial systems in the measurement of relative microwave power up to 100 mW over the frequency range of 10 MHz to 18.0 GHz. The design assures flat frequency response combined with high sensitivity. Options available include negative output polarity, positive output polarity, matched pairs, and Square Law response.

Schottly Diode Specifications

Model No.	CR133	CR183
Frequency Range: (MHz)	10 12,400	10 18,000
Frequency Response: *	±0.2 dB/octave to 8 GHz ±0.5 dB/full range	±0.2dB/octave to 8 GHz ±0.5dB to 12.4 GHz ±1.0dB to 18 GHz
Sensitivity: (Typ.) High Low	100 mV output at 0.35 mW 0.4 mV output/uW	
Power: (Max.)	100 mW (peak or average)	
Output Impedance	15k ohms max. shunted to 10 pf	
VSWR: 10 MHz to 4.5 GHz 4.5 GHz to 7.0 GHz 7.0 GHz to 12.4 GHz 12.4 GHz to 18 GHz	1.20 max. 1.35 max. 1.50 max. 1.70 max.	
Polarity:	Negative	

Options

Model No.	Feature
CR133M CR183M	**Matched pair of CR-133's or CR183's** Tracking (Max.): ±0.2 dB to 8 GHz ±0.3 dB from 8 to 12.4 GHz ±0.5 dB from 12.4 to 18 GHz
CR134 CR184	**CR133 or CR183** With positive output polarity
CR135 CR185	**CR133 or CR183** With Square Law load ±0.5 dB max. variation from Square Law up to 50 mV output into 75k min. Sensitivity (Min.): 0.1 mV DC/uWcw

*Note: Frequency Response measured on Square Law measuring device.

Environment: MILE5400, Class 1A

Connectors: Input `SMA' male; or Type `N' for CR133 only. Output Type `BNC' female

To designate the detector desired use:

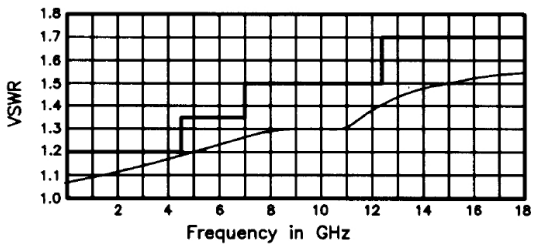
1: 133, 133m, 134, etc. for Model No.

2: N for type `N', R for `SMA' input connector

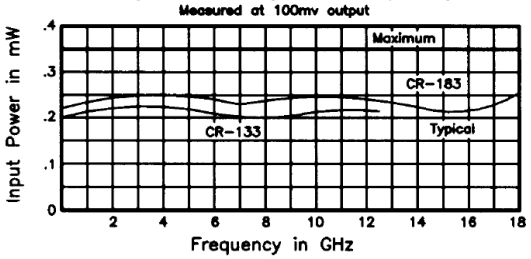
Example: CR-133-N is a CR-133 with a `N' male input connector

Typical Operating Curves

VSWR Vs. Frequency



High Sensitivity Vs. Frequency



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Tunnel Diode Specifications

CRT^{-1-2}

Model No.	Frequency Range (GHz)	Frequency Response (dB Max.)	VSWR (Max.)	Output (mV Min.)	DC blocks	Power (Max.)	Polarity
CRT218	2 18	±1.0	3.5:1	1.8	Not Available	100 mW	Negative
CRT625	5.8 6.7	±.15	2.0:1	2.0	Optional		
CRT1425	13.7 14.8	±.20	2.0:1	2.0	Optional		
CRT1785	17.3 18.4	±.25	2.0:1	2.0	Optional		

Note: Specifications are for 20dBm input and 51 ohm video load.

Video Resistance: 80 ohms nominal
Temperature Sensitivity: .005 dB/C

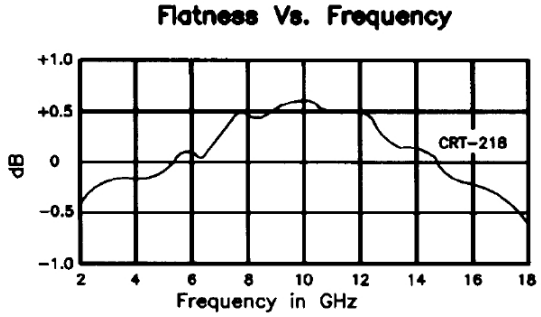
Connectors: Input `SMA' male
Output `SMA' female

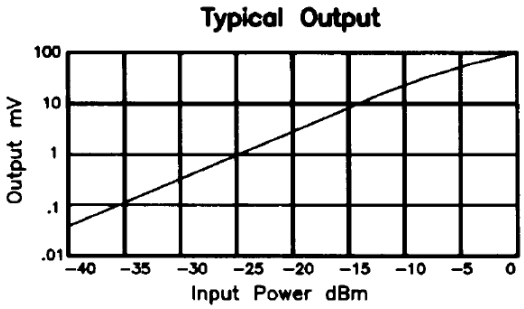
To designate the detector desired use:

1: 218, 625, 1425, 1785 for Model No. **2:** `I' for inner DC block, `IO' for optional inner & outer DC block

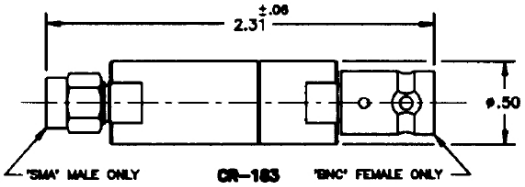
Example: CRT625IO is a 5.86.7 GHz detector with inner and outer DC blocks

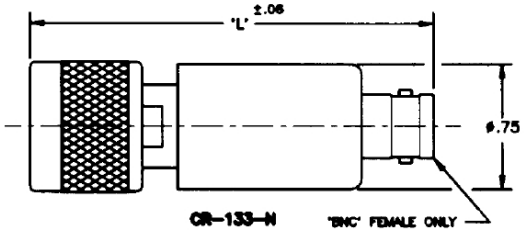
Typical Operating Curves
CRT Series



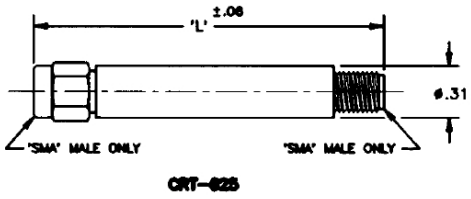


Outline Drawing





MODEL No.	'L'
CR−133−N	2.41
CR−133−R	2.21



MODEL No.	'L'
CRT−218	1.22
CRT−625, 1425, 1785	2.06

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Miniature Ultra-Flat Schottky Detectors

RLC Electronics' miniature ultra-flat detectors utilize a zero-bias Schottky design. The microwave power is coupled directly to the extremely small components reducing package parasitics and transition mismatches. This design results in a very low VSWR and a flat, smooth output over a wide bandwidth. Options available include negative or positive output, a choice of three output connectors and operation to 26.5, 40 GHz or 43.5-45.5 GHz.

Specifications

CR-1-2-3

Frequency Range	.01-18.5GHz CR-301, 302	.01-26.5 GHz (Option-26)	.01-40 GHz (Option-40)	43.5-45.5 GHz CR-455, CR-456
Frequency Response (Max) .01-18 GHz .01-26.5 GHz .01-40 GHz GHz	 +/-0.5 dB ----- ----- ----- -----	 +/-0.5 dB +/-1 dB ----- -----	 +/-0.5 dB +/-1.0 dB +/-1.5 dB	 +/-.5 dB +/-.5 dB +/-.5 dB
VSWR (Max) .01-12.4 GHz 12.4-18.5 GHz 18.5-26.5 GHz 26.5-40 GHz	 1.25 1.50 ----- ----- ----- -----	 1.25 1.5 2.0 -----	 1.25 1.5 2.00 2.00	 2.0 2.0 2.0 2.0
Typical Sensitivity (Pin< - 30 dBm)	0.5 mV/uW	0.5 mV/uW	0.5 mV/uW	0.4 mV/uW

Input Power: 100 mW maximum (peak or average)
Video Resistance: 5000 ohms nominal
Bias: None

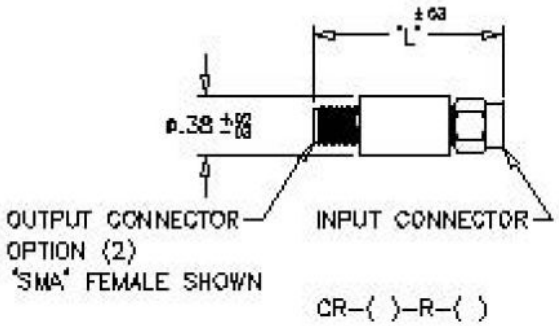
Input Connector Type: 'SMA' male, except 2.92mm for -40 option, and 2.4mm for CR-455,456
Temperature Range: -55 deg C to +100 deg C

To designate the detector desired use:

1: 301 or 455 for negative output 302 or 456 for positive output
2: Output connector: R for `SMA' female B for `BNC' female S for `SMC' jack
3: 26 for 26.5 GHz option, 40 for 40 GHz option (CR-301/302 only)

Example: CR-301-R-26 is a .01-26.5 GHz, negative output detector with a `SMA' female output connector.

Outline Drawing



OUTPUT CONNECTOR	OPTION (2)	'L'
'SMA' FEMALE	R	1.30
'BNC' FEMALE	B	1.56
'SMC' JACK	S	1.28

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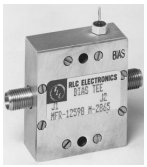
Bias Tees



RLC Electronics' Bias Tees offer excellent performance over the frequency range of .1 to 18 GHz. These units are used to inject a DC current or voltage into an RF circuit without affecting the flow of RF through the main transmission path. Typical applications include biasing amplifiers, DC return, DC blocking, as well as other various digital and analog uses.

Specifications

BT-1-2

Model Number	Frequency Range (GHz)	Connectors (as req'd)
BT-0115	.1 -1.5	IN/OUT
BT-1025	1 - 2.5	IN/OUT
BT-2050	2 - 5.0	IN/OUT
BT-40124	4 - 12.4	IN/OUT
BT-70180	7 -18.0	IN/OUT

Impedance: 50 ohms
RF Power: 25 watts average
DC Current: 750 ma maximum
Voltage Rating: 50 volts maximum

VSWR: 1.3:1 maximum
Insertion Loss: .5dB maximum
Environment: MIL-E-5400, Class 1A except operating temperature -55C to +85C

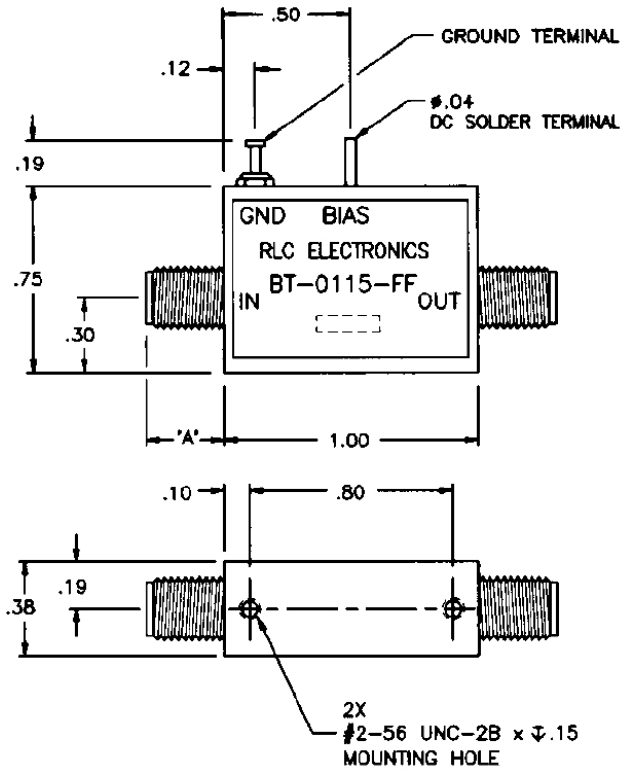
To designate the bias tee desired use:

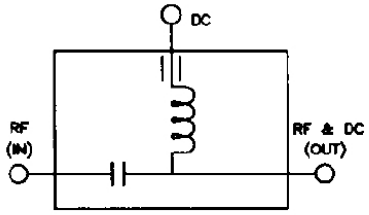
1: 0115, 1025, etc. for model number

2: (SMA) for connectors add MM (male/male), FF (female/female), MF (male/female), FM female/male)

Example: BT-0115-FF is a .1 1.5 GHz with female/female connectors Bias Tee

Outline Drawing





Schematic

SMA CONNECTOR	'A'
M (male)	.38
F (female)	.31

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Broadband Bias Tee

RLC Electronics Broadband Bias Tee offers excellent performance over the frequency range of .005 to 40 GHz. This unit is used to inject a DC current or voltage into an RF circuit without affecting the flow of RF through the main transmission path. Typical applications include biasing amplifiers, DC return, DC blocking, as well as other various digital and analog uses.

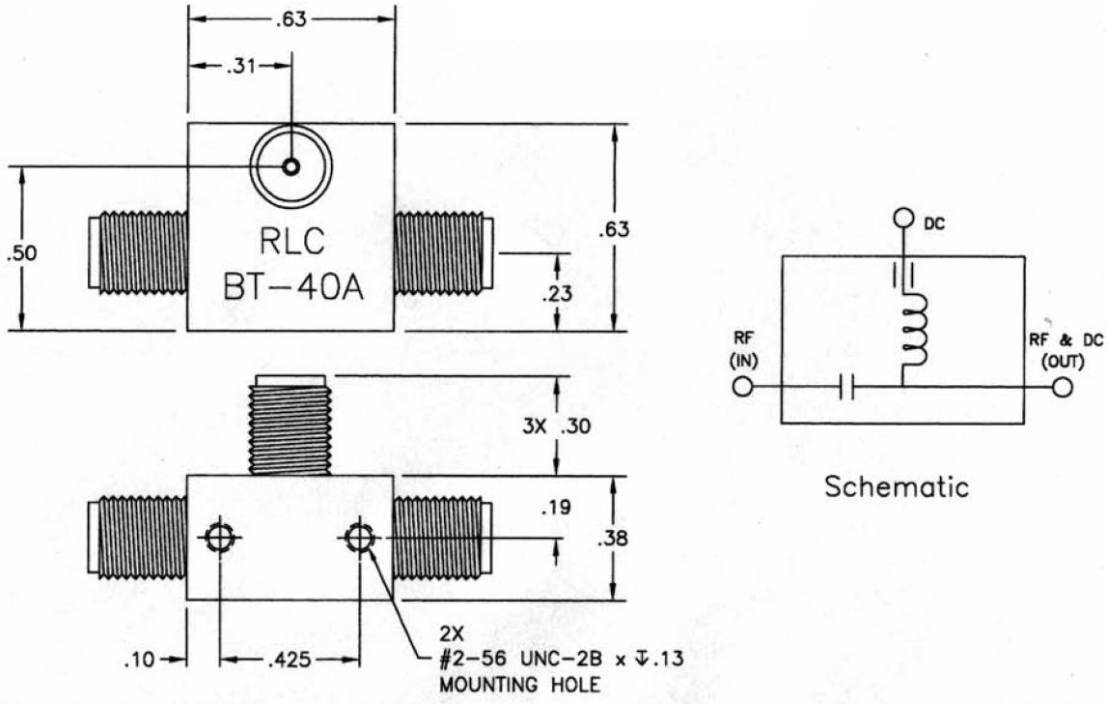
Specifications

Model No.	Frequency Range	Insertion Loss (dB) (Max.)	VSWR Max.
BT-40A	.005 - 12 GHz 12 - 40 GHz	1.0 3.0	1.35 : 1 1.8 : 1

Impedance: 50 ohms
RF Power: 5 watts average
DC Current: 100 ma max
RF Connector: 2.92 mm (female)

Bias Input: 'SMA' (female)
Voltage: 16 vdc max.
Environment: MIL-E-5400, Class 1A EXCEPT operating temperature -55C to +85C

Outline Drawing



HF Broadband DC Block

RLC Electronics' Broadband DC Block provides execellent performance over the frequency range of .0001 to 40 GHz. These units are used to block DC current or voltage from an RF circuit without affecting the flow of RF through the main transmission path.

Specifications

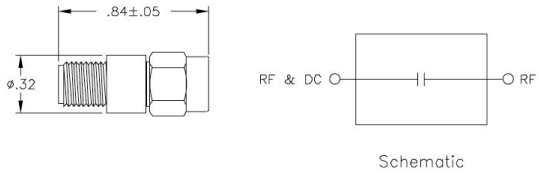
Model No.	Frequency Range GHz	Insertion Loss (dB) (Max.)	VSWR Max.	Voltage
BL -- 20A	.0001-12 12-20	0.5 .75	1.25 1.35	100 vdc Max
BL -- 40A	.005-12 12-40	1.0 2.0	1.5:1 2.0:1	16 vdc Max

Impedance: 50 ohms
RF Power: 5 watts average
RF Connector:
SMA (m/f)-BL- 20A
2.92 mm (f)-BL-40A

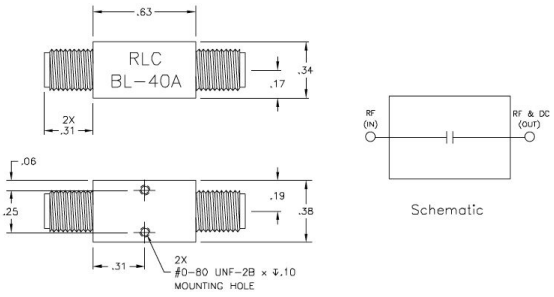
Environment: MIL-E-5400, Class 1A EXCEPT operating temperature -55C C to +85 C

Outline Drawing

BL-20A



BL-40A



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High Frequency Adapters

RLC Electronics now offers high frequency between series adapters in a variety of configurations for your test needs. Computer design and the latest in RF techniques coupled with precision assembly ensure optimal electrical performance in the recommended frequency ranges.

Specifications

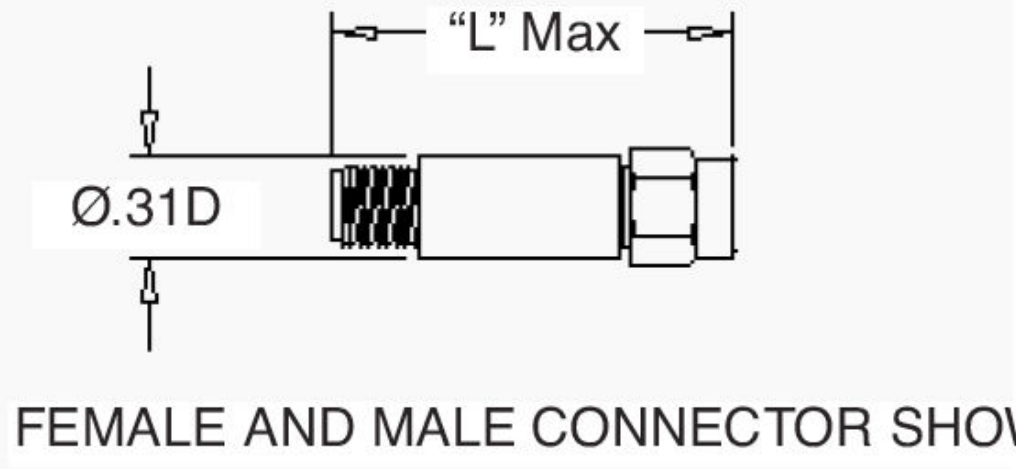
Part #	Input	Output	VSWR DC-26.5GHz	VSWR 26.5-40GHz
AD-1.85M-2.9M	V Male	2.92mm Male	1.1:1	1.3:1
AD-1.85M-2.9F	V Male	2.92mm Female	1.1:1	1.3:1
AD-1.85F-2.9M	V Female	2.92mm Male	1.1:1	1.3:1
AD-1.85F-2.9F	V Female	2.92mm Female	1.1:1	1.3:1
AD-2.4M-2.9M	2.4mm Male	2.92mm Male	1.1:1	1.3:1
AD-2.4M-2.9F	2.4mm Male	2.92mm Female	1.1:1	1.3:1
AD-2.4F-2.9M	2.4mm Female	2.92mm Male	1.1:1	1.3:1
AD-2.4F-2.9F	2.4mm Female	2.92mm Female	1.1:1	1.3:1
AD-1.85M-RM	V Male	SMA Male	1.1:1	NA
AD-1.85M-RF	V Male	SMA Female	1.1:1	NA
AD-1.85F-RM	V Female	SMA Male	1.1:1	NA
AD-1.85F-RF	V Female	SMA Female	1.1:1	NA
AD-2.4M-RM	2.4mm Male	SMA Male	1.1:1	NA
AD-2.4M-RF	2.4mm Male	SMA Female	1.1:1	NA
AD-2.4F-RM	2.4mm Female	SMA Male	1.1:1	NA
AD-2.4F-RF	2.4mm Female	SMA Female	1.1:1	NA

*Other input and output configurations available upon request

L= input length+ output length.
Example: AD-1.85M-2.9f , L=.605+.41=1.015

Type	Male	Female
2.92mm	0.625	.410
V (1.85)	0.605	.449
2.4mm	.665	.455
SMA	.500	.425

Outline Drawing



Coaxial to Waveguide Adapters

RLC Electronics now offers Coaxial to Waveguide Adapters in a variety of configurations for your specific application. Option A are broadband adapters whose excellent electrical specs are maintained over the entire adapter bandwidth. While option B offers enhanced performance over a specific band of the adapters' bandwidth. Computer design and the latest in RF techniques coupled with precision assembly ensure optimal electrical performance in the recommended frequency ranges.

Specifications

WAD$^{-1-2-3-4-*}$

Option A (Broadband)				
Frequency, GHz	**Waveguide**	**Coaxial Connector**	**VSWR**	**Ins. Loss, dB**
3.30 4.90	WR229	N/SMA	1.2	0.05
3.95 5.85	WR187	N/SMA	1.2	0.05
4.90 7.05	WR159	N/SMA	1.2	0.05
5.85 8.20	WR137	N/SMA	1.2	0.05
7.05 10.00	WR112	N/SMA	1.2	0.07
8.20 12.40	WR90	N/SMA	1.2	0.07
10.00 15.00	WR75	N/SMA	1.25	0.1
12.40 18.00	WR62	SMA	1.3	0.1
18.00 26.00	WR42	2.92 mm	1.35	0.15
26.50 - 40	WR28	2.92 mm	1.4	0.15

Option B (Customer Band)					
Center Frequency, GHz	**Bandwidth, GHz**	**Waveguide Connector**	**Coaxial**	**VSWR**	**Ins. Loss, dB**
3.30 4.90	0.80	WR229	N/SMA	1.1	0.05
3.95 5.85	0.95	WR187	N/SMA	1.1	0.05
4.90 7.05	1.07	WR159	N/SMA	1.1	0.05
5.85 8.20	1.17	WR137	N/SMA	1.1	0.05
7.05 10.00	1.47	WR112	N/SMA	1.1	0.07
8.20 12.40	2.10	WR90	N/SMA	1.1	0.07
10.00 15.00	2.50	WR75	N/SMA	1.15	0.1
12.40 18.00	2.80	WR62	SMA	1.15	0.1
18.00 26.00	4.00	WR42	2.92 mm	1.15	0.15
26.50 40	6.75	WR28	2.92 mm	1.20	0.15

Impedance: 50 ohms
Avg power: N 300w, SMA 60w, 2.92 mm 25w

Connector types: N, SMA, 2.92 mm, Male or female

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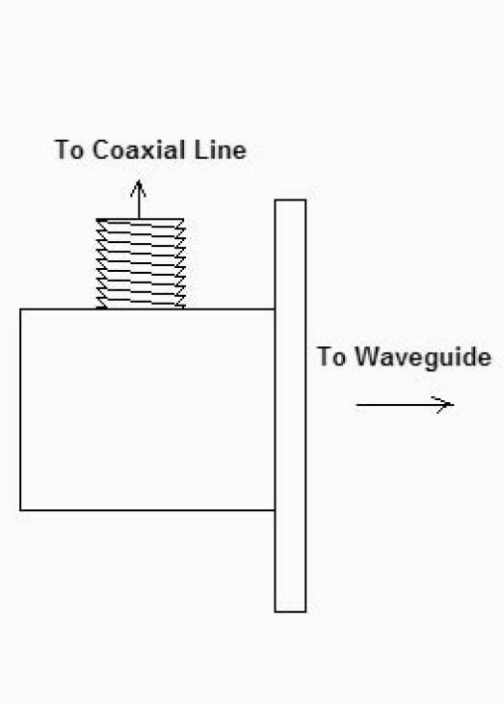
Part Number
WAD1-2-3-4-5*

To designate the PRODUCT desired use:

1 option A (standard), B (customer band)
2 waveguide flange standard
3 Flange Type (1 cover, 2 choke, 3 CPRF, 4 CPRG, 5 CMR, 6 Special)
4 Connector Type (N for N type, R for SMA type, K for 2.9mm, M for male, F for female)
5 center frequency in GHz * for option B only

Example: WADB-WR137-5-NF-6.450 is a WR137 adapter with CMR flange and N female connector matched for 6.45 GHz in 1.17 GHz bandwidth.



Direction of interface connections

Variable Phase Shifter

RLC Electronics' Model PSM-10 is a variable phase shifter constructed using high speed operational amplifiers. A full 360 degrees of phase shift is accomplished over a +/-10% bandwidth using 2 manual adjustment controls of 0-180 degrees each. Input and output impedance is 50 ohms. A 180 degree version with a single control is also available. Different frequency ranges or special packages are available on request.

Specifications

PSM-1 0-1-2

Model Number	Frequency Range (MHz)	Phase Shift (Min)	VSWR (Max)	Insertion Loss (Max)	Control Shafts
PSM-10-180-	9-11	180 degrees	1:25:1	1.5dB	1
PSM-10-360-	9-11	360 degrees	1.25:1	3.0dB	2

Power Rating: +13dBm max
Supply Voltage: +/-5 to +/-15 volts
Temperature Range: -40 to +85 degree C
Impedance: 50 ohms

Phase Control: Single turn shaft, continuously variable
Connectors, RF: SMA, TNC, BNC, female
Connector, Power: Feed through solder lugs

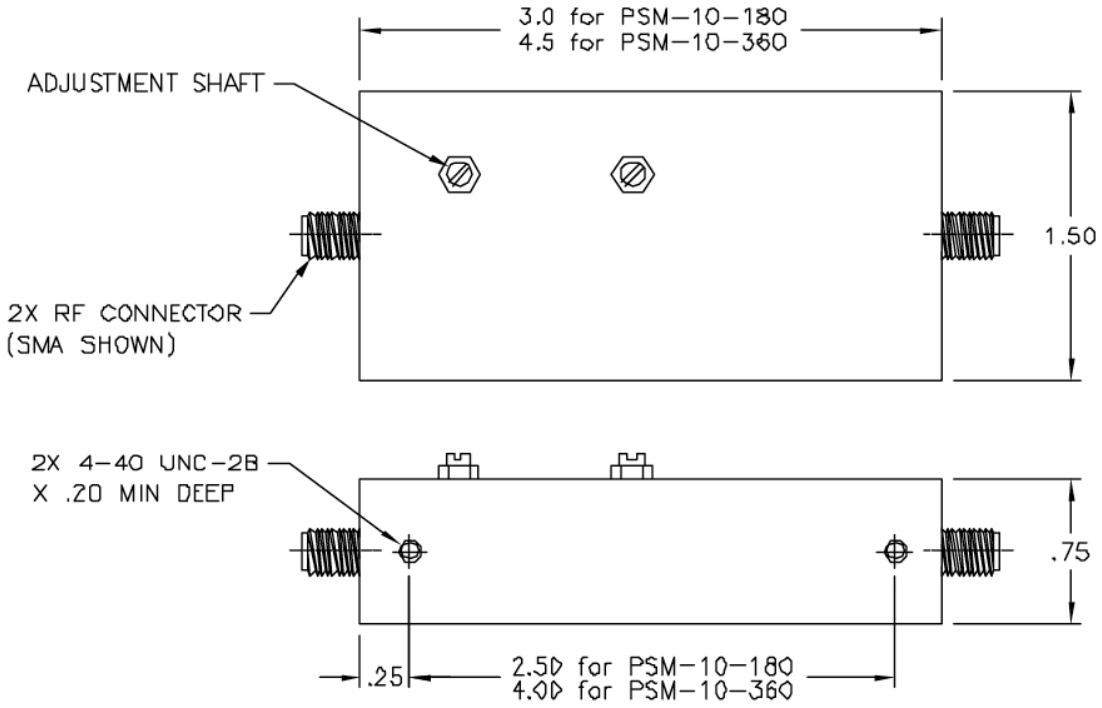
To designate the PRODUCT desired use:

1: "180" for a single control, 0-180 degree unit "360" for a dual control, 0-360 degree unit

2: "R" for SMA, "T" for TNC, "B" for BNC connector type

Example: PSM-10-180-R is a 0-180 degree phase shifter with SMA female connectors.

Outline Drawing



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Adjustable Delay Line

RLC Electronics' manually adjustable delay line (phase shifter) offers continuous adjustment of electrical delay over the frequency range of DC-40 GHz. Adjustment is through a multi-turn, locking shaft. Low insertion loss and VSWR are maintained throughout the adjustment range. The unit comes with a choice of male or female 2.92 mm connectors.

Specifications

PSM40^{-1}

Frequency Range	DC to 40 GHz
Insertion Loss	2.5 dB max
VSWR	2.0:1 max
Delay Adjustment Range	56 picoseconds minimum
Phase shift Range	20 degrees/GHz minimum

Impedance: 50 ohms
Power Rating: 5 watts average
Adjustment: Multi-turn locking shaft. Approximately 5 picoseconds per turn.

Connectors: 2.92mm (mate or female)
Temperature Range: -55 to +85 deg C

To designate the PRODUCT desired use:

(1): Connector Sex (PORT 1/PORT 2)
MM (male/male) FF (female/female)
MF (male/female) FM (female/male

Example: PSM40-FF is a DC-40 GHz adjustable delay line with 2.92mm female connectors on port 1 and port 2.