

YIG-TUNED OSCILLATORS



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PRODUCT DESCRIPTION

Avantek offers an ever expanding line of YIG-Tuned Oscillators in two temperature ranges with frequency expansion into the millimeter band. Frequency coverage from 0.5 to 50 GHz, combined with the industry's highest output power levels, lowest phase noise, harmonics, and smallest package size make these YTOs unique.

All Avantek YIG-Tuned fundamental transistors, used in both commercial and military applications, share a number of unique features which add to the performance and assured reliability under severe conditions. All are built using thin-film construction which offers uniformity and repeatability. Packaging is in a hermetically sealed case filled with a dry inert atmosphere to exclude all moisture and corrosive elements from the internal components.

Tuning curves, f_{tuning} vs. f_{out} , for the Avantek YTOs are extremely linear with deviation typically between $\pm 0.05\%$ and 0.2% . In addition to the main tuning coil, each YTO has a low inductance FM tuning coil. This coil is in close proximity to the YIG sphere and is used to fine-tune the oscillator frequency, to phase lock the YTO, or to frequency modulate the output signal. The sensitivity of this port is much less than that of the main tuning coil, but it has a much wider 3 dB bandwidth and permits input modulation or control signals to deviate the output frequency by as much as 15 to 100 MHz at up to a 1 MHz rate. Also, the rate can be increased to greater than 10 MHz with the removal of the FM feedthrough capacitors.

The power output remains flat within 3.0 to 6.0 dB over the entire tuning range.

Series

The entire Avantek YTO line is divided into several series depending on the application or requirement.

A brief description is provided for each series, as well as a quick selection guide to determine the series vs. frequency range, and catalog page number.

YIG-Tuned Oscillators:

Standard Temperature Range (0° to +65°C)

Frequency coverage is from 0.5 to 18 GHz in octave band, multi-octave band, and wideband segments. This series also includes the low phase noise bipolar oscillators, low harmonic oscillators and oscillators with tracking filter units. Included in the multi-octave band region is the new one-inch cube packaged unit initially covering the 4 to 12.4 GHz band.

All units are designed for wideband applications in receivers and instruments where tuning linearity, phase noise, and spectral purity are crucial. They make ideal oscillators for frequency agile receivers and spectrum analyzers, and are excellent as signal sources for microwave sweep generators and synthesizers.

YIG-Tuned Oscillators: Millimeter Band

These YTOs provide frequency coverage from 18.0 GHz up to 50.0 GHz in both the 0° to +65°C, T_{max} (18-50 GHz) and -54° to +85°C, T_{max} (18 to 26.5 and 26.5 to 40 GHz) versions.

The Avantek millimeter series oscillators are all fundamental output GaAs FET units offering similar advantages as the lower frequency units.

The frequency ranges are divided into various bands such as 18 to 26.5 GHz, 26.5 to 40 GHz and 33 to 50 GHz for standard use. Other ranges offered are ideal for applications with a doubler or tripler to meet the higher frequency standard waveguide bands.

Avantek millimeter units offer the advantage of low power consumption (3.0W) compared to the approximately 15W necessary to power a GUNN or Impatt diode oscillator in similar frequencies.

Overall, the Avantek Millimeter Band YTOs are an excellent choice for all applications where efficiency, tuning linearity and spectral purity are important. They are ideal local oscillators for frequency agile receivers and spectrum analyzers, and make excellent signal sources for microwave sweep generators and synthesizers.

YIG-Tuned Oscillators:

Extended Temperature Range (-54° to +85°C)

Avantek extended temperature range YTOs are designed and manufactured to offer excellent performance and high MTBFs over the -54° to +85°C temperature range. They also meet the environmental conditions of MIL-E-5400 and MIL-E-16400.

This family of YTOs offers complete 1 to 18 GHz frequency coverage and are ideal for systems requiring signal sources with moderate power levels, excellent tuning linearity, low spurious outputs, and flat power output vs. frequency characteristics.

YIG-TUNED OSCILLATORS SELECTION GUIDE

OCTAVE BAND OSCILLATORS

Guaranteed Specifications @ 0° to +65°C Case Temperature

Model Number	Frequency Range (GHz)	Power Output @ 25°C (dBm) Minimum	Power Variation (dB) Maximum	Frequency Drift Over Temperature (MHz) Maximum	Second Harmonic Below Carrier @ 25°C Minimum	Page Number
AV-7104	1.0-2.2	+16	3	10	-15	12-6
AV-7203	2-4	+14	3	10	-12	12-6
AV-7204	2-4	+16	3	10	-20	12-6
AV-7224	2-4	+20	3	10	-12	12-6
AV-7403	4-8	+13	6	20	-12	12-7
AV-7453	4-8	+17	6	20	-12	12-7
AV-7443	4-8	+20	6	20	-12	12-7
AV-77011	7-11	+17.8	6	25	-12	12-7
AV-7871	8-12.4	+14.8	6	25	-12	12-7
AV-7872	8-12.4	+17.8	6	25	-12	12-7
AV-7873	8-12.4	+20	6	25	-12	12-7
AV-71241	12-18	+13	6	40	-12	12-7
AV-71251	12-18	+16	6	40	-12	12-7
AV-71261	12-18	+19	6	40	-12	12-7

MULTI-OCTAVE BAND OSCILLATORS

Guaranteed Specifications @ 0° to +65°C Case Temperature

Model Number	Frequency Range (GHz)	Power Output @ 25°C (dBm) Minimum	Power Variation (dB) Maximum	Frequency Drift Over Temperature (MHz) Maximum	Second Harmonic Below Carrier @ 25°C (dBc) Minimum	Page Number
AV-70502	0.5-2	+14.8	6	10	-10	12-10
AV-7124	1-4	+14.8	6	10	-12	12-10
AV-7236	2-6	+13	6	15	-12	12-10
AV-7288	2-8	+20	6	20	-8	12-10
AV-7238	2-8	+14.8	6	20	-12	12-10
AV-72B8	2-8	+23	6	20	10	12-11
AV-72010	2-10	+14	6	20	-12	12-11
AV-74010	4-10	+16	6	20	-12	12-11
AV-76018	6-18	+14.8	6	40	-10	12-11
AV-77016	7-16	+17	6	40	-12	12-11
AV-78318	8-18	+10	6	40	-12	12-11
AV-78218	8-18	+14.8	6	40	-12	12-11
AV-78518	8-18	+17.8	6	40	-12	12-11
AV-78020	8-20	+13	8	40	-12	12-11
AV-71220	12-20	+16	6	40	-15	12-11

MULTI-OCTAVE BAND OSCILLATORS—ONE-INCH CUBE PACKAGE

Guaranteed Specifications @ 0° to +65°C Case Temperature

Model Number	Frequency Range (GHz)	Power Output @ 25°C (dBm) Minimum	Power Variation (dB) Maximum	Frequency Drift Over Temperature (MHz) Maximum	Second Harmonic Below Carrier @ 25°C Minimum	Page Number
AV-7134	1.2-4.0	+13	6	15	-12	12-13
AV-74012	4-12.4	+16	6	20	-12	12-13
AV-12218	12-18	+16	6	30	-20	12-13

WIDEBAND OSCILLATORS

Guaranteed Specifications @ 0° to +65°C Case Temperature

Model Number	Frequency Range (GHz)	Power Output @ 25°C (dBm) Minimum	Power Variation (dB) Maximum	Frequency Drift Over Temperature (MHz) Maximum	Second Harmonic Below Carrier @ 25°C Minimum	Page Number
AV-74018	4-18	17	6	40	-10	12-16
AV-73018	3-18	13	6	40	-8	12-16
AV-72018	2-18	13	6	30	-8	12-16
AV-72012	2-12.4	16	6	25	-10	12-16

YIG-Tuned Oscillators

YIG-TUNED OSCILLATORS SELECTION GUIDE (continued)

LOW NOISE BIPOLAR OSCILLATORS

Guaranteed Specifications @ 0° to +65°C Case Temperature

Model Number	Frequency Range (GHz)	Power Output @ 25°C (dBm) Minimum	Power Variation (dB) Maximum	Frequency Drift Over Temperature (MHz) Maximum	Second Harmonic @ 25°C Below Carrier (dBc) Minimum	Noise dBc/Hz @ 20 kHz	Page Number
AV-7298	2-8	+14.8	6	20	-12	-108	12-20
AV-72810	2-10	+14.0	6	20	-12	-108	12-20
AV-12018	12-18	+17	6	40	-20	-100 (12-16 GHz)*	12-20
AV-76318	6-18	+16	6	40	-10	-100 (6-16 GHz)*	12-20
AV-78012	8-12.4	+17.8	6	25	-12	-105	12-20
AV-78718	8-18	+16	6	40	-15	-100 (8-16 GHz)*	12-20

*Refer to actual specifications for additional phase noise information.

LOW HARMONIC OSCILLATORS

Guaranteed Specifications @ 0° to +65°C Case Temperature

Model Number	Frequency Range (GHz)	Power Output @ 25°C (dBm) Minimum	Power Variation (dB) Maximum	Frequency Drift Over Temperature (MHz) Maximum	Second Harmonic Below Carrier @ 25°C Maximum	Page Number
AV-7104-9	1.0-2.2	+16	3	10	-20	12-22
AV-7224-9	2-4	+20	3	10	-20	12-22
AV-7238-9	2-8	+14.8	6	20	-20	12-22
AV-7403-9	4-8	+13	6	20	-20	12-22
AV-7453-9	4-8	+16	6	20	-20	12-22
AV-7443-9	4-8	+17.8	6	20	-20	12-23
AV-7871-9	8-12.4	+14.8	6	25	-20	12-23
AV-7872-9	8-12.4	+17.8	6	20	-20	12-23
AV-7873-9	8-12.4	+20	6	25	-20	12-23
AV-78020-9	8-20	+13	8	40	-20	12-23
AV-71241-9	12-18	+13	6	40	-20	12-23
AV-71251-9	12-18	+14.8	6	40	-20	12-23
AV-71261-9	12-18	+17	6	40	-20	12-23

OSCILLATOR WITH TRACKING YIG FILTER

Guaranteed Specifications @ 0° to +65°C Case Temperature

Model Number	Frequency Range (GHz)	Power Output @ 25°C (dBm) Minimum	Power Variation (dB) Maximum	Frequency Drift Over Temperature (MHz) Maximum	Second Harmonic Below Carrier @ 25°C Maximum	Page Number
AV-7248	2-8	+14.8	6	20	40	12-25

MILLIMETER BAND OSCILLATORS

Guaranteed Specifications @ 0° to +65°C Case Temperature

Model Number	Frequency Range (GHz)	Power Output @ 25°C (dBm) Minimum	Power Variation (dB) Maximum	Frequency Drift Over Temperature (MHz) Maximum	Second Harmonic Below Carrier @ 25°C Maximum	Page Number
AV-71826	18-26.5	+13	6	60	—	12-28
AV-718226	18-26.5	+16	6	60	—	12-28
AV-18326	18-26.5	+17.8	6	40	—	12-28
AV-18030	18-30	+16	6	60	—	12-28
AV-20030	20-30	+16	6	60	—	12-28
AV-25037M/W	25-37.5	+13	4	60	—	12-28
AV-26040M/W	26.5-40	+10	6	60	—	12-28
AV-26240M/W	26.5-40	+13	4	60	—	12-29
AV-30045	30-45	+10	6	60	—	12-29
AV-33050	33-50	+7	6	60	—	12-29

YIG-TUNED OSCILLATORS SELECTION GUIDE (continued)

OCTAVE BAND OSCILLATORS—EXTENDED TEMPERATURE RANGE

Guaranteed Specifications @ -54° to +85°C Case Temperature

Model Number	Frequency Range (GHz)	Power Output Over Temperature & Frequency (dBm)		Frequency Drift Over Temperature (MHz) Maximum	Second Harmonic Below Carrier (dBc), Minimum	Page Number
		Minimum	Maximum			
AV-7214	2-4	+17	+23	20	-12	12-34
AV-7413	4-8	+8	+20	40	-12	12-34
AV-7418	4-8	+14.8	+23	40	-12	12-34
AV-77111	7-11	+17	+24	40	-12	12-34
AV-7814	8-12.4	+13	+24	50	-10	12-34
AV-78112	8-12.4	+19	+24	50	-12	12-34
AV-12118	12-18	+16	+23	60	-15	12-34

MULTI-OCTAVE BAND OSCILLATORS—EXTENDED TEMPERATURE RANGE

Guaranteed Specifications -54° to +85°C Case Temperature

Model Number	Frequency Range (GHz)	Power Output Over Temperature & Frequency (dBm)		Frequency Drift Over Temperature (MHz) Maximum	Second Harmonic Below Carrier (dBc) Minimum	Page Number
		Minimum	Maximum			
AV-7114	1-4	+13	+21	20	12	12-36
AV-7246	2-6	+16	+23	30	8	12-36
AV-7218	2-8	+5	+17	40	5	12-36
AV-7278	2-8	+14.8	+23	40	8	12-36
AV-76118	6-18	+13	+23	60	8	12-36
AV-77116	7-16	+16	+24	50	12	12-36
AV-78418	8-18	+13	+24	70	10	12-36
AV-78618	8-18	+16	+24	60	10	12-36

MILLIMETER BAND OSCILLATORS—EXTENDED TEMPERATURE RANGE

Guaranteed Specifications @ -54° to +85°C Case Temperature

Model Number	Frequency Range (GHz)	Power Output Over Temperature & Frequency (dBm)		Frequency Drift Over Temperature (MHz) Maximum	Second Harmonic Below Carrier (dBc) Minimum	Page Number
		Minimum	Maximum			
AV-18126	18-26.5	+16	+23	60	—	12-29
AV-26140M/W	26.5-40	+13	+19	60	—	12-29

LOW COST OSCILLATORS—LUCY SERIES

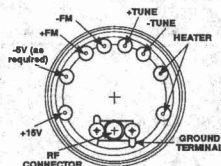
Guaranteed Specifications @ 0° to +50°C Case Temperature

Model Number	Frequency Range (GHz)	Power Output @ 25°C (dBm) Minimum	Power Variation (dB) Maximum	Frequency Drift Over Temperature (MHz) Maximum	Second Harmonic Below Carrier @ 25°C (dBc) Maximum	Page Number
AV-7026	2-6	+13	6	10	8	12-30
AV-7036	3-6	+13	4	5	8	12-30

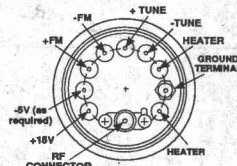
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FEATURES

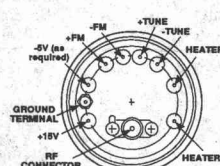
- Full 1.0 to 18 GHz Coverage
- Rugged Hermetic Packaging
- Reliable Thin-Film Construction
- $\pm 0.05\%$ to $\pm 0.2\%$ Tuning Linearity
- 0° to $+65^\circ\text{C}$, Temperature Range



A-45, B-45, C-45, C-38, p. 16-2



M4-45, p. 16-24



M3-45, M3-60, p. 16-24

DESCRIPTION

Avantek® Octave Band Series YIG-tuned fundamental transistor oscillators are compact and lightweight and are cost-effective for commercial instrument applications. They are built using the same Avantek thin-film construction and hermetic packaging that has proven itself ultimately reliable under severe military and aerospace environmental conditions.

This family of oscillators is designed for wideband applications in receivers and instruments where tuning linearity and spectral purity are crucial. They make ideal local oscillators for frequency-agile receivers and spectrum analyzers, and are excellent as signal sources for microwave sweep generators and synthesizers.

The tuning curves (I_{tuning} vs. f_{out}) for this series of YTOs are linear, and will deviate from the ideal straight line only $\pm 0.05\%$.

to $\pm 0.2\%$ (typically). The power output remains flat within ± 1.5 to ± 3.0 dB over the entire tuning range.

These oscillators have compatible tuning port characteristics of 20 MHz/mA and 5 kHz bandwidth up to 12.4 GHz. This helps to simplify the design of multiband equipment and minimizes the number of current drives necessary. All Octave Band Series oscillators have a low inductance FM tuning coil in addition to the main tuning coil. This coil is in close proximity to the YIG sphere and is used to fine-tune the oscillator frequency, to phase lock the YTO or to frequency modulate the output signal. The sensitivity of this port is much less than that of the main tuning coil, but it has a much wider 3 dB bandwidth and permits input modulation or control signals to deviate the output frequency by as much as 15 to 100 MHz at a rate up to 1 MHz.

ELECTRICAL AND PERFORMANCE SPECIFICATIONS

Guaranteed Specifications at 0° to +65°C Case Temperature (Unless Otherwise Noted)

Model No.	AV-7104	AV-7203	AV-7204	AV-7224
Frequency Range, Min.	1-2.2 GHz	2-4 GHz	2-4 GHz	2-4 GHz
Power Output Into 50-ohm Load, Min. at 25°C	40 mW/+16 dBm	25 mW/+14 dBm	40 mW/+16 dBm	100 mW/+20 dBm
Power Output Variation vs. Frequency, Max.	3.0 dB	3.0 dB	3.0 dB	3.0 dB
Operating Case Temperature Range	0° to +65°C	0° to +65°C	0° to +65°C	0° to +65°C
Frequency Drift Over Operating Temperature, Max.	10 MHz	10 MHz	10 MHz	10 MHz
Pulling Figure (12 dB Return Loss), Typ.	.01 MHz	0.5 MHz	0.5 MHz	0.5 MHz
Pushing Figure, +15 VDC Supply, Typ.	0.5 MHz/V	0.5 MHz/V	0.5 MHz/V	0.1 MHz/V
-5 VDC Supply, Typ.	N/A	N/A	N/A	1.5 MHz/V
Magnetic Susceptibility @ 60 Hz, Typ.	70 kHz/Gauss	70 kHz/Gauss	70 kHz/Gauss	70 kHz/Gauss
2nd Harmonic, @ 25°C, Min.	-15 dBc	-12 dBc	-20 dBc	-12 dBc
3rd Harmonic, @ 25°C, Min.	-20 dBc	-20 dBc	-20 dBc	-12 dBc
Spurious Output, Min.	-60 dBc	-60 dBc	-60 dBc	-60 dBc
Main Tuning Port Characteristics				
Sensitivity	20±1 MHz/mA	20±1 MHz/mA	20±1 MHz/mA	20±1 MHz/mA
3 dB Bandwidth, Typ.	5 kHz	5 kHz	5 kHz	5 kHz
Linearity, Typ	±1%	±0.05%	±0.05%	±0.05%
Hysteresis, Typ.	1.7 MHz	3 MHz	3 MHz	3 MHz
Input Impedance @ 1 kHz, Typ.	10 ohms in series with 95 mH	10 ohms in series with 95 mH	10 ohms in series with 95 mH	10 ohms in series with 95 mH
FM Port Characteristics				
Sensitivity, Typ.	310 kHz/mA	310 kHz/mA	310 kHz/mA	310 kHz/mA
3 dB Bandwidth, Typ.	800 kHz	800 kHz	800 kHz	800 kHz
Deviation at 3 dB Bandwidth, Max.	15 MHz	20 MHz	20 MHz	20 MHz
Input Impedance @ 1 MHz, Typ.	1 ohm in series with 1.7 µH	1 ohm in series with 1.7 µH	1 ohm in series with 1.7 µH	1 ohm in series with 1.7 µH
DC Circuit Power, Max.				
+15±0.5V	150 mA	100 mA	90 mA	150 mA
-5±0.1V	—	—	+V _c @ 35 mA*	60 mA
YIG Heater Power				
Input Voltage Range	20 to 28 VDC	20 to 28 VDC	20 to 28 VDC	20 to 28 VDC
Power @ 25°C, Max.	1.5 watts	1.5 watts	1.5 watts	1.5 watts
Power @ 0°C, Max.	2.0 watts	2.0 watts	2.0 watts	2.0 watts
Weight, Max.				
Case Style	10 oz.	10 oz.	10 oz.	10 oz.
	A-45	A-45	B-45	C-45

*Terminal V_c requires a linear voltage ramp proportional to frequency. The voltage at 2 GHz is factory selected within the range +7 to +13 volts and the voltage at 4 GHz is +15.0 volts.

Octave Band YIG-Tuned Oscillators

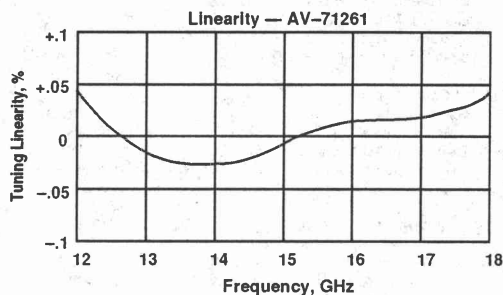
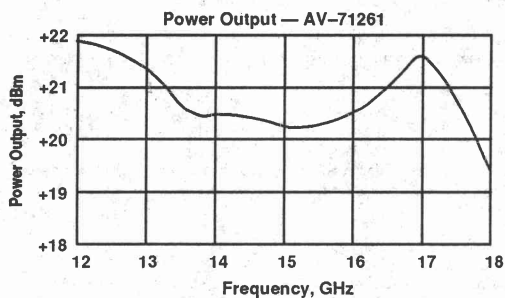
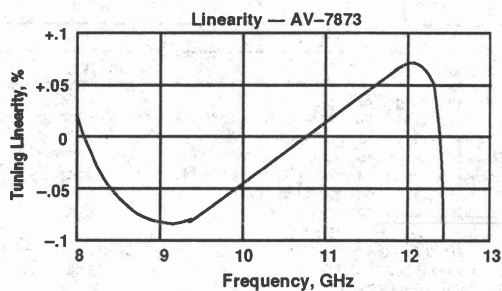
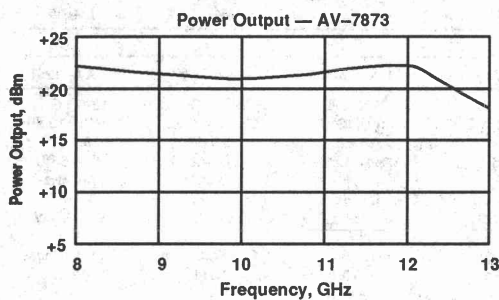
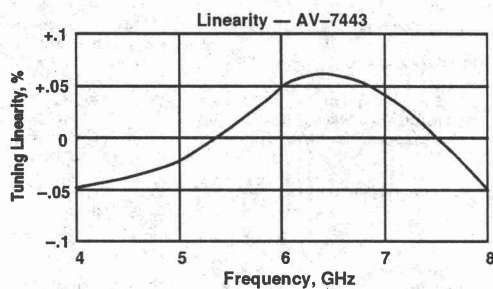
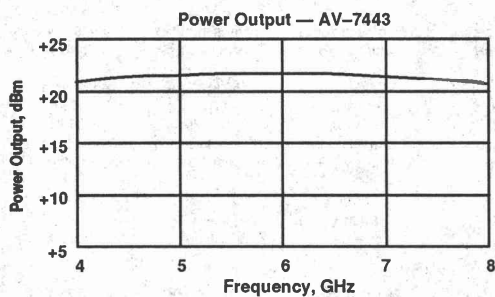
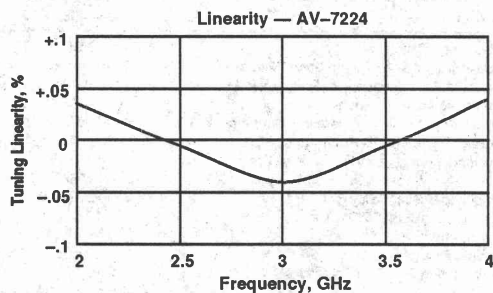
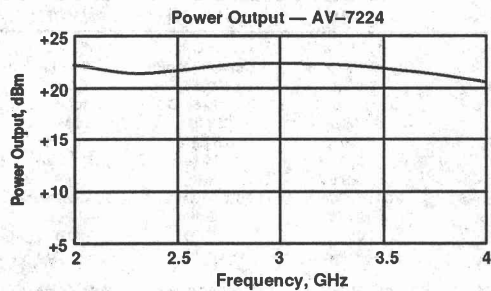
ELECTRICAL AND PERFORMANCE SPECIFICATIONS (continued)

Guaranteed Specifications at 0 to +65°C Case Temperature (Unless Otherwise Noted)

Model No.	AV-7403	AV-7453	AV-7443	AV-77011	AV-7871
Frequency Range, Min.	4-8 GHz	4-8 GHz	4-8 GHz	7-11 GHz	8-12.4 GHz
Power Output into 50-ohm Load, Min. at 25°C	20 mW/+13 dBm	50 mW/+17 dBm	100 mW/+20 dBm	60 mW/+17.8 dBm	30 mW/+14.8 dBm
Power Output Variation vs. Frequency, Max.	6.0 dB	6.0 dB	6.0 dB	6.0 dB	6.0 dB
Operating Case Temperature Range	0° to +65°C	0° to +65°C	0° to +65°C	0° to +65°C	0° to +65°C
Frequency Drift Over Operating Temperature, Max.	20 MHz	20 MHz	20 MHz	25 MHz	25 MHz
Pulling Figure (12 dB Return Loss), Typ.	2.0 MHz	0.5 MHz	0.2 MHz	0.5 MHz	5.0 MHz
Pushing Figure, +15 VDC Supply, Typ.	0.5 MHz/V	0.1 MHz/V	0.1 MHz/V	0.1 MHz/V	0.1 MHz/V
-5 VDC Supply, Typ.	1.5 MHz/V	1.5 MHz/V	2.0 MHz/V	N/A	N/A
Magnetic Susceptibility @ 60 Hz, Typ.	70 kHz/Gauss	70 kHz/Gauss	70 kHz/Gauss	50 kHz/Gauss	50 kHz/Gauss
2nd Harmonic, @ 25°C, Min.	-12 dBc	-12 dBc	-12 dBc	-12 dBc	-12 dBc
3rd Harmonic, @ 25°C, Min.	-20 dBc	-20 dBc	-20 dBc	-15 dBc	-20 dBc
Spurious Output, Min.	-60 dBc	-60 dBc	-60 dBc	-60 dBc	-60 dBc
Main Tuning Port Characteristics					
Sensitivity	20±1 MHz/mA	20±1 MHz/mA	20±1 MHz/mA	20±1 MHz/mA	20±1 MHz/mA
3 dB Bandwidth, Typ.	5 kHz	5 kHz	5 kHz	5 kHz	5 MHz
Linearity, Typ.	±.05%	±.05%	±.05%	±.01%	±.01%
Hysteresis, Typ.	6 MHz	6 MHz	6 MHz	6 MHz	6 MHz
Input Impedance @ 1 kHz, Typ.	10 ohms in series with 95 mH	10 ohms in series with 95 mH	10 ohms in series with 95 mH	9 ohms in series with 60 mH	9 ohms in series with 60 mH
FM Port Characteristics					
Sensitivity, Typ.	310 kHz/mA	310 kHz/mA	310 kHz/mA	450 kHz/mA	450 kHz/mA
3 dB Bandwidth, Typ.	800 kHz	800 kHz	800 kHz	400 kHz	400 kHz
Deviation at 3 dB Bandwidth, Max.	40 MHz	40 MHz	40 MHz	70 MHz	40 MHz
Input Impedance @ 1 MHz, Typ.	1 ohm in series with 1.7 µH	1 ohm in series with 1.7 µH	1 ohm in series with 1.7 µH	.5 ohm in series with 2 µH	.5 ohm in series with 2 µH
DC Circuit Power, Max. +15±0.5V	40 mA	150 mA	200 mA	—	—
-5±0.1V	40 mA	60 mA	60 mA	—	—
+15+0.5/-3.5V	—	—	—	300 mA	125 mA
YIG Heater Power					
Input Voltage Range	20 to 28 VDC	20 to 28 VDC	20 to 28 VDC	20 to 28 VDC	20 to 28 VDC
Power @ 25°C, Max.	1.5 watts	1.5 watts	1.5 watts	1.5 watts	1.5 watts
Power @ 0°C, Max.	2.0 watts	2.0 watts	2.0 watts	2.0 watts	2.0 watts
Weight, Max.	10 oz.	10 oz.	10 oz.	12 oz.	12 oz.
Case Style	C-38	C-38	C-45	M4-45	M4-45

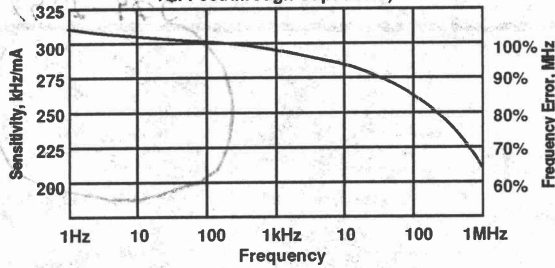
Model No.	AV-7872	AV-7873	AV-71241	AV-71251	AV-71261
Frequency Range, Min.	8-12.4 GHz	8-12.4 GHz	12-18 GHz	12-18 GHz	12-18 GHz
Power Output into 50-ohm Load, Min. at 25°C	60 mW/+17.8 dBm	100 mW/+20 dBm	20 mW/+13 dBm	40 mW/+16 dBm	80 mW/+19 dBm
Power Output Variation vs. Frequency, Max.	6.0 dB	6.0 dB	6.0 dB	6.0 dB	6.0 dB
Operating Case Temperature Range	0° to +65°C	0° to +65°C	0° to +65°C	0° to +65°C	0° to +65°C
Frequency Drift Over Operating Temperature, Max.	25 MHz	25 MHz	40 MHz	40 MHz	40 MHz
Pulling Figure (12 dB Return Loss), Typ.	1 MHz	1 MHz	5 MHz	1 MHz	0.5 MHz
Pushing Figure, +15 VDC Supply, Typ.	0.1 MHz/V	0.1 MHz/V	0.1 MHz/V	0.1 MHz/V	0.1 MHz/V
-5 VDC Supply, Typ.	N/A	N/A	N/A	N/A	N/A
Magnetic Susceptibility @ 60 Hz, Typ.	50 kHz/Gauss	50 kHz/Gauss	50 kHz/Gauss	50 kHz/Gauss	50 kHz/Gauss
2nd Harmonic, @ 25°C, Min.	-12 dBc	-12 dBc	-12 dBc	-12 dBc	-12 dBc
3rd Harmonic, @ 25°C, Min.	-20 dBc	-20 dBc	—	—	—
Spurious Output, Min.	-60 dBc	-60 dBc	-60 dBc	-60 dBc	-60 dBc
Main Tuning Port Characteristics					
Sensitivity	20±1 Hz/mA	20±1 MHz/mA	18±1 MHz/mA	18±1 MHz/mA	18±1 MHz/mA
3 dB Bandwidth, Typ.	5 kHz	5 kHz	5 kHz	5 kHz	5 kHz
Linearity, Typ.	±.1%	±.1%	±.1%	±.1%	±.1%
Hysteresis, Typ.	6 MHz	6 MHz	9 MHz	9 MHz	9 MHz
Input Impedance @ 1 kHz, Typ.	9 ohms in series with 60 mH	9 ohms in series with 60 mH	6 ohms in series with 73 mH	6 ohms in series with 73 mH	6 ohms in series with 73 mH
FM Port Characteristics					
Sensitivity, Typ.	450 kHz/mA	450 kHz/mA	450 kHz/mA	450 kHz/mA	450 kHz/mA
3 dB Bandwidth, Typ.	400 kHz	400 kHz	1 MHz	1 MHz	1 MHz
Deviation at 3 dB Bandwidth, Max.	40 MHz	40 MHz	70 MHz	70 MHz	70 MHz
Input Impedance @ 1 MHz, Typ.	.5 ohm in series with 2.0 µH	.5 ohm in series with 2.0 µH	.5 ohm in series with 2.3 µH	.5 ohm in series with 2.3 µH	.5 ohm in series with 2.3 µH
DC Circuit Power, Max. +15+0.5/-3.5V	250 mA	250 mA	125 mA	150 mA	200 mA
YIG Heater Power					
Input Voltage Range	20 to 28 VDC	20 to 28 VDC	20 to 28 VDC	20 to 28 VDC	20 to 28 VDC
Power @ 25°C, Max.	1.5 watts	1.5 watts	1.5 watts	1.5 watts	1.5 watts
Power @ 0°C, Max.	2.0 watts	2.0 watts	2.0 watts	2.0 watts	2.0 watts
Weight, Max.	12 oz.	12 oz.	17 oz.	17 oz.	17 oz.
Case Style	M4-45	M4-45	M3-45	M3-60	M3-60

OCTAVE BAND TYPICAL PERFORMANCE GRAPHS

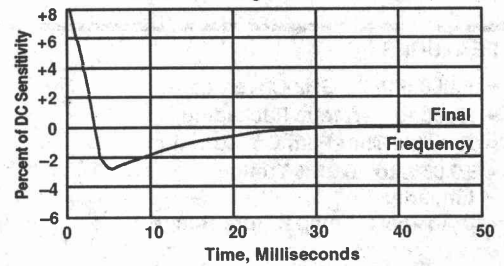


OCTAVE BAND TYPICAL PERFORMANCE GRAPHS (continued)

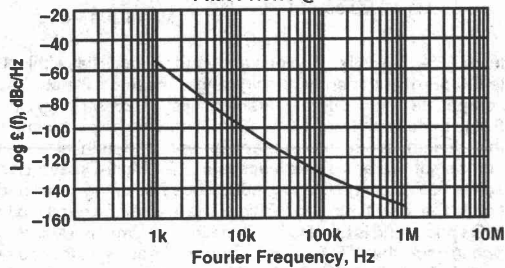
FM Port Sensitivity vs. Modulation Frequency
(Typical All AV Series Without
FM Feedthrough Capacitors)



AV-7224 Settling Time, Full Band Step



Typical Single Sideband
Phase Noise @ 4 GHz

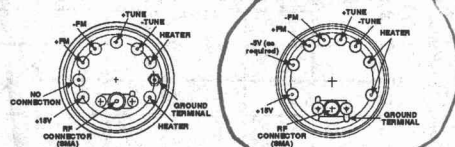


$$470 \mu\text{m} / 106 = \sim 21.3 \text{ MVA/m}$$

509-2291

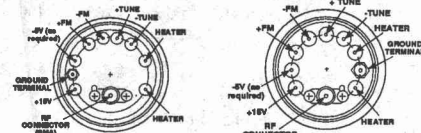
FEATURES

- Full 0.5 to 20 GHz Coverage
- Rugged Hermetic Packaging
- Reliable Thin-Film Construction
- $\pm 0.05\%$ to $\pm 0.25\%$ Tuning Linearity
- 0° to $+65^\circ\text{C}$ Temperature Range



M1-45, p. 16-23

A-45, C-45, C-60, p. 16-2



M3-45, M3-60, p. 16-24

M4-45, p. 16-24

DESCRIPTION

Avantek® Multi-Octave Band series YIG-tuned fundamental transistor oscillators are compact and lightweight and are cost-effective for commercial instrument applications. They are built using the same Avantek thin-film construction and hermetic packaging that has proven itself ultimately reliable under severe military and aerospace environmental conditions.

This family of oscillators is designed for wideband applications in receivers and instruments where tuning linearity and spectral purity are crucial. They make ideal local oscillators for frequency-agile receivers and spectrum analyzers, and are excellent as signal sources for microwave sweep generators and synthesizers.

The tuning curves (f_{tuning} vs. f_{out}) for this series of YTOs are linear, and will deviate from the ideal straight line only $\pm 0.05\%$

to $\pm 0.25\%$ (typically). The power output remains flat within 3.0 to 6.0 dB over the entire tuning range. These oscillators have compatible tuning port characteristics of 20 MHz/mA and 5 kHz bandwidth from 1.0 to 12.4 GHz. This helps to simplify the design of multi-band equipment and minimizes the number of current drives necessary. All Multi-Octave Band series oscillators have a low inductance FM tuning coil in addition to the main tuning coil. This coil is in close proximity to the YIG sphere and is used to fine-tune the oscillator frequency, to phase lock the YTO or to frequency modulate the output signal. The sensitivity of this port is much less than that of the main tuning coil, but it has a much wider 3 dB bandwidth and permits input modulation or control signals to deviate the output frequency by as much as 15 to 100 MHz at a rate up to 1 MHz.

ELECTRICAL AND PERFORMANCE SPECIFICATIONS

Guaranteed Specifications at 0° to $+65^\circ\text{C}$ Case Temperature (Unless Otherwise Noted)

Model No.	AV-70502	AV-7124	AV-7236	AV-7288	AV-7238
Frequency Range, Min.	0.5-2 GHz	1-4 GHz	2-6 GHz	2-8 GHz	2-8 GHz
Power Output into 50-ohm Load, Min. at 25°C	30 mW/ ± 14.8 dBm	30 mW/ ± 14.8 dBm	20 mW/ ± 13 dBm	100 mW/ ± 20 dBm	30 mW/ ± 14.8 dBm
Power Output Variation vs. Frequency, Max.	6.0 dB	6.0 dB	6.0 dB	6.0 dB	6.0 dB
Operating Case Temperature Range	0° to $+65^\circ\text{C}$	0° to $+65^\circ\text{C}$	0° to $+65^\circ\text{C}$	0° to $+65^\circ\text{C}$	0° to $+65^\circ\text{C}$
Frequency Drift Over Operating Temperature, Max.	10 MHz	10 MHz	15 MHz	20 MHz	20 MHz
Pulling Figure (12 dB Return Loss), Typ.	0.5 MHz/V	0.5 MHz/V	0.1 MHz/V	0.2 MHz/V	0.2 MHz/V
Pushing Figure, ± 15 VDC Supply, Typ.	0.5 MHz/V	0.5 MHz/V	0.1 MHz/V	0.1 MHz/V	0.1 MHz/V
-5 VDC Supply, Typ.	N/A	1.5 MHz/V	N/A	2.0 MHz/V	2.0 MHz/V
Magnetic Susceptibility @ 60 Hz, Typ.	50 kHz/Gauss	70 kHz/Gauss	70 kHz/Gauss	70 kHz/Gauss	70 kHz/Gauss
2nd Harmonic, @ 25°C , Min.	-10 dBc	-12 dBc	-12 dBc	-8 dBc	-12 dBc
3rd Harmonic, @ 25°C , Min.	-10 dBc	-12 dBc	-15 dBc	-8 dBc	-12 dBc
Spurious Output, Min.	-60 dBc	-60 dBc	-60 dBc	-60 dBc	-60 dBc
Main Tuning Port Characteristics					
Sensitivity	15 ± 0.8 MHz/mA	20 ± 1 MHz/mA	20 ± 1 MHz/mA	20 ± 1 MHz/mA	20 ± 1 MHz/mA
3 dB Bandwidth, Typ.	5 kHz	5 kHz	5 kHz	5 kHz	5 kHz
Linearity, Typ.	$\pm 0.2\%$	$\pm 0.15\%$	$\pm 0.05\%$	$\pm 0.1\%$	$\pm 0.1\%$
Hysteresis, Typ.	2 MHz	3 MHz	5 MHz	9 MHz	9 MHz
Input Impedance @ 1 kHz, Typ.	10 ohms in series with 42 mH	10 ohms in series with 95 mH	10 ohms in series with 95 mH	10 ohms in series with 95 mH	10 ohms in series with 95 mH
FM Port Characteristics					
Sensitivity, Typ.	310 kHz/mA	310 kHz/mA	310 kHz/mA	310 kHz/mA	310 kHz/mA
3 dB Bandwidth, Typ.	400 kHz	800 kHz	800 kHz	800 kHz	800 kHz
Deviation at 3 dB Bandwidth, Max.	15 MHz	15 MHz	30 MHz	40 MHz	40 MHz
Input Impedance @ 1 MHz, Typ.	1 ohm in series with 1.25 μH	1 ohm in series with 1.7 μH	1 ohm in series with 1.7 μH	1 ohm in series with 1.7 μH	1 ohm in series with 1.7 μH
DC Circuit Power, Max.	$\pm 15 \pm 0.5$ V -5.0 ± 0.1 V	150 mA 50 mA	175 mA	250 mA 60 mA	200 mA 60 mA
YIG Heater Power					
Input Voltage Range	20 to 28 VDC	20 to 28 VDC	20 to 28 VDC	20 to 28 VDC	20 to 28 VDC
Power @ 25°C , Max.	1.5 watts	1.5 watts	1.5 watts	1.5 watts	1.5 watts
Power @ 0°C , Max.	2.0 watts	2.0 watts	2.0 watts	2.0 watts	2.0 watts
Weight, Max.	8 oz.	10 oz.	10 oz.	10 oz.	10 oz.
Case Style	M1-45	C-45	A-45	C-45	C-45

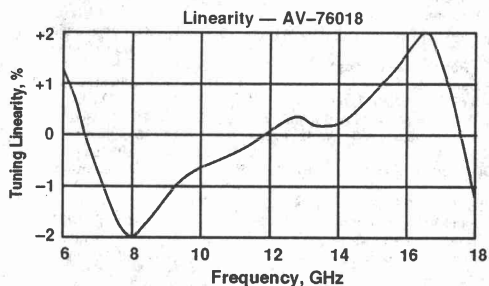
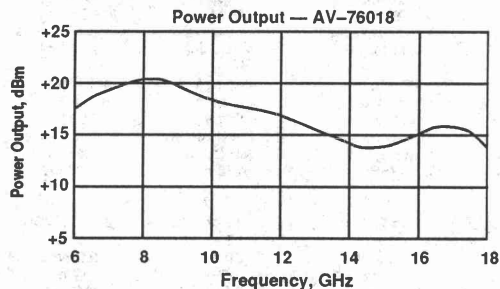
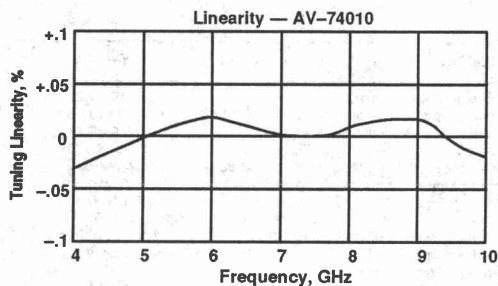
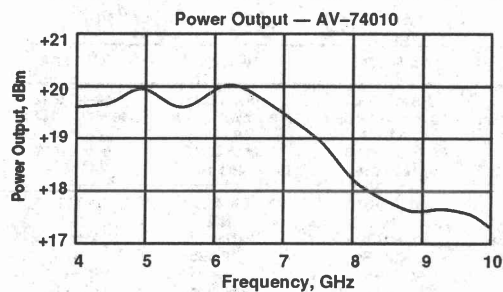
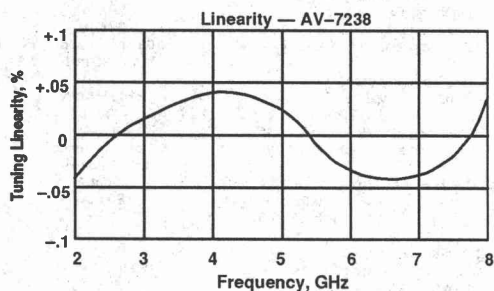
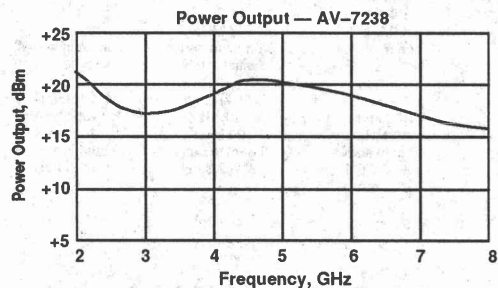
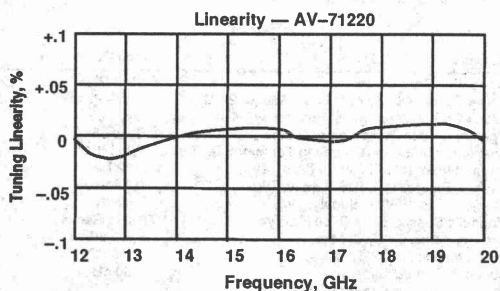
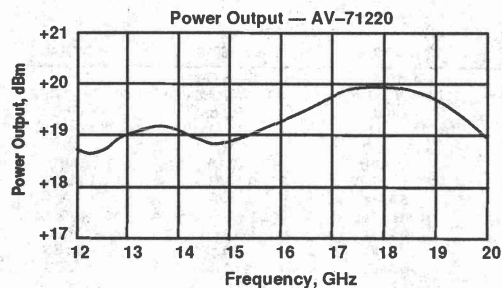
ELECTRICAL AND PERFORMANCE SPECIFICATIONS (continued)

Guaranteed Specifications at 0° to +65°C Case Temperature (Unless Otherwise Noted)

Model No.	AV-72B8	AV-72010	AV-74010	AV-76018	AV-77016
Frequency Range, Min.	2-8 GHz	2-10 GHz	4-10 GHz	6-18 GHz	7-16 GHz
Power Output Into 50-ohm Load, Min. at 25°C	200 mW/+23 dBm	25 mW/+14 dBm	40 mW/+16 dBm	30 mW/+14.8 dBm	50 mW/+17 dBm
Power Output Variation vs. Frequency, Max.	6.0 dB	6.0 dB	6.0 dB	6.0 dB	6.0 dB
Operating Case Temperature Range	0° to +65°C	0° to +65°C	0° to +65°C	0° to +65°C	0° to +65°C
Frequency Drift Over Operating Temperature, Typ.	20 MHz	20 MHz	20 MHz	40 MHz	40 MHz
Pulling Figure (12 dB Return Loss), Typ.	0.2 MHz	0.1 MHz	0.1 MHz	1.0 MHz	0.5 MHz
Pushing Figure, +15 VDC Supply, Typ.	0.1 MHz/V	0.1 MHz/V	0.1 MHz/V	0.1 MHz/V	0.1 MHz/V
-5 VDC Supply, Typ.	N/A	1.0 MHz/V	1.5 MHz/V	N/A	N/A
Magnetic Susceptibility @ 60 Hz, Typ.	70 kHz/Gauss	70 kHz/Gauss	70 kHz/Gauss	50 kHz/Gauss	50 kHz/Gauss
2nd Harmonic, @ 25°C, Min.	10 dB	-12 dBc	-12 dBc	-10 dBc	-12 dBc
3rd Harmonic, @ 25°C, Min.	10 dB	-12 dBc	-15 dBc	-10 dBc	-15 dBc
Spurious Output, Min.	60 dBc	-60 dBc	-60 dBc	-60 dBc	-60 dBc
Main Tuning Port Characteristics					
Sensitivity		20±1.0 MHz/mA	20±1.0 MHz/mA	20±1.0 MHz/mA	18±1.0 MHz/mA
18±1.0 MHz/mA					
3 dB Bandwidth, Typ.	5 MHz	5 MHz	5 kHz	5 kHz	5 kHz
Linearity, Typ.	±0.1%	±0.1%	±0.1%	±0.25%	±0.1%
Hysteresis, Typ.	9 MHz	8 MHz	9 MHz	18 MHz	8 MHz
Input Impedance @ 1 kHz, Typ.	10 ohms in series with 95 mH	10 ohms in series with 95 mH	10 ohms in series with 95 mH	6 ohms in series with 51 mH	9 ohms in series with 60 mH
FM Port Characteristics					
Sensitivity, Typ.	310 kHz/mA	310 kHz/mA	310 kHz/mA	450 kHz/mA	450 kHz/mA
3 dB Bandwidth, Typ.	400 kHz	800 kHz	800 kHz	1 MHz	400 kHz
Deviation at 3 dB Bandwidth, Max.	40 MHz	40 MHz	40 MHz	90 MHz	70 MHz
Input Impedance @ 1 MHz, Typ.	1 ohm in series with 1.25 µH	1 ohm in series with 1.7 µH	1 ohm in series with 2.3 µH	.5 ohm in series with 2.3 µH	.5 ohm in series with 2.3 µH
DC Circuit Power, Max., +15.0±0.5V	350 mA	200 mA	200 mA	—	—
-5.0±0.1V	60 mA	60 mA	60 mA	—	—
+15+.5/-3.5V	—	—	—	275 mA	300 mA
YIG Heater Power					
Input Voltage Range	20 to 28 VDC	20 to 28 VDC	20 to 28 VDC	20 to 28 VDC	20 to 28 VDC
Power @ 25°C, Max.	1.5 watts	1.5 watts	1.5 watts	1.5 watts	1.5 watts
Power @ 0°C, Max.	2.0 watts	2.0 watts	2.0 watts	2.0 watts	2.0 watts
Weight, Max.	10 oz.	10 oz.	10 oz.	17 oz.	12 oz.
Case Style	C-60	C-45	C-45	M3-60	M4-45

Model No.	AV-78318	AV-78218	AV-78518	AV-78020	AV-71220
Frequency Range, Min.	8-18 GHz	8-18 GHz	8-18 GHz	8-20 GHz	12-20 GHz
Power output into 50-ohm Load, Min. @ 25°C	10 mW/+10 dBm	30 mW/+14.8 dBm	60 mW/+17.8 dBm	20 mW/+13 dBm	40 mW/+16 dBm
Power Output Variation vs. Frequency, Max.	6.0 dB	6.0 dB	6.0 dB	8.0 dB	6.0 dB
Operating Case Temperature Range	0° to +65°C	0° to +65°C	0° to +65°C	0° to +65°C	0° to +65°C
Frequency Drift Over Operating Temperature, Typ.	40 MHz	40 MHz	40 MHz	40 MHz	40 MHz
Pulling Figure (12 dB Return Loss), Typ.	5 MHz	0.5 MHz	1 MHz	1 MHz	0.5 MHz
Pushing Figure, +15 VDC Supply, Typ.	0.1 MHz/V	0.1 MHz/V	0.1 MHz/V	0.1 MHz/V	0.1 MHz/V
-5 VDC Supply, Typ.	N/A	N/A	N/A	N/A	N/A
Magnetic Susceptibility @ 60 Hz, Typ.	50 kHz/Gauss	50 kHz/Gauss	50 kHz/Gauss	50 kHz/Gauss	50 kHz/Gauss
2nd Harmonic, @ 25°C, Min.	12 dBc	-12 dBc	-12 dBc	-12 dBc	-15 dBc
3rd Harmonic, @ 25°C, Min.	—	—	—	—	—
Spurious Output, Min.	60 dBc	-60 dBc	-60 dBc	-60 dBc	-60 dBc
Main Tuning Port Characteristics					
Sensitivity	18±1 MHz/mA	18±1 MHz/mA	18±1 MHz/mA	20±1 MHz/mA	18±1 MHz/mA
3 dB Bandwidth, Typ.	5 kHz	5 kHz	5 kHz	5 kHz	5 kHz
Linearity, Typ.	±0.1%	±0.1%	±0.1%	±0.1%	±0.15%
Hysteresis, Typ.	10 MHz	15 MHz	18 MHz	18 MHz	12 MHz
Input Impedance @ 1 kHz, Typ.	6 ohms in series with 73 mH	6 ohms in series with 73 mH	6 ohms in series with 51 mH	7 ohms in series with 73 mH	6 ohms in series with 73 mH
FM Port Characteristics					
Sensitivity, Typ.	450 kHz/mA	450 kHz/mA	450 kHz/mA	450 kHz/mA	450 kHz/mA
3 dB Bandwidth, Typ.	1 MHz	1 MHz	1 MHz	1 MHz	1 MHz
Deviation at 3 dB Bandwidth, Max.	70 MHz	90 MHz	90 MHz	90 MHz	70 MHz
Input Impedance @ 1 MHz, Typ.	.5 ohm in series with 2.3 µH	.5 ohm in series with 2.3 µH	.5 ohm in series with 2.3 µH	.5 ohm in series with 2.3 µH	.5 ohm in series with 2.3 µH
DC Circuit Power, Max., +15+0.5/-3.5V	100 mA	175 mA	275 mA	275 mA	200mA
YIG Heater Power					
Input Voltage Range	20 to 28 VDC	20 to 28 VDC	20 to 28 VDC	20 to 28 VDC	20 to 28 VDC
Power @ 25°C, Max.	1.5 watts	1.5 watts	1.5 watts	1.5 watts	1.5 watts
Power @ 0°C, Max.	2.0 watts	2.0 watts	2.0 watts	2.0 watts	2.0 watts
Weight, Max.	17 oz.	17 oz.	17 oz.	17 oz.	17 oz.
Case Style	M3-45	M3-45	M3-60	M3-60	M3-60

MULTI-OCTAVE BAND TYPICAL PERFORMANCE GRAPHS

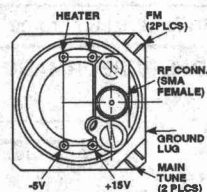


FEATURES

- 1.00-inch Cube Package
- Low Main Coil Inductance
- Light Weight: 3 oz./85 grams

APPLICATIONS

- Test and Measurement Instrumentation
- Portable/Lightweight Systems
- Military Electronic Receivers, Jammers



MM1, p. 16-28

DESCRIPTION

The Avantek one-inch cube series of YIG-tuned oscillators has been designed for both military and commercial applications where space is at a premium. These small, lightweight units are an excellent alternative to the more conventional 2.0 inch diameter units currently available.

The units consist of a Yttrium Iron Garnet sphere coupled with a state of the art Avantek Silicon Bipolar transistor for the 1.2

to 4.0 and 4 to 12.4 GHz frequency bands and an Avantek GaAs FET for the 12 to 18 GHz band. Inherent to the small size is the low inductance which provides for tuning speeds 4 to 5 times faster than conventional YTO's.

This family of YTO's is hermetically sealed to provide for long-term protection from moisture and corrosive gases and liquids even under severe environments.

ELECTRICAL AND PERFORMANCE SPECIFICATIONS

Guaranteed Specifications at 0 to +65°C Case Temperature (unless otherwise noted)

Model No.	AV-7134	AV-74012	AV-12218
Frequency Range, Min.	1.2 to 4.0 GHz	4.0 to 12.4 GHz	12.0 to 18.0 GHz
Power Output (50-ohm load)	+13 dBm/20 mW	+16 dBm/40 mW	+16 dBm/40 mW
Power Variation (Over Frequency Range) Max.	6 dB	6 dB	6 dB
Frequency Drift Over Temperature, Max.	15 MHz	20 MHz	30 MHz
Pulling Figure (12 dB Return Loss), Typ.	0.1 MHz	0.2 MHz	0.4 MHz
Pushing Figure, +15 VDC Supply, Typ.	0.5 MHz/V	0.1 MHz/V	0.1 MHz/V
-5 VDC Supply, Typ.	1.5 MHz/V	1.5 MHz/V	N/A
Magnetic Susceptibility @ 60 Hz, Typ.	110 kHz/Gauss	110 kHz/Gauss	110 kHz/Gauss
2nd Harmonic, Min. -12 dBc	-12 dBc	-20 dBc	-20 dBc
3rd Harmonic, Min. -12 dBc	-12 dBc	-20 dBc	-20 dBc
Spurious Output, Min.	-60 dBc	-60 dBc	-60 dBc
Main Tuning Port Characteristics			
Sensitivity	20±1 MHz/mA	20±1 MHz/mA	20±1 MHz/mA
Bandwidth (3 dB), Typ.	5 kHz	5 kHz	5 kHz
Linearity, Typ. ±0.1%	±0.1%	±0.1%	±0.1%
Hysteresis, Typ.	3 MHz	9 MHz	6 MHz
Input Impedance, Typ.	7 ohms in series with 24 mH	6 ohms in series with 15 mH	6 ohms in series with 15 mH
FM Port Characteristics			
Sensitivity, Typ.	310 kHz/mA	310 kHz/mA	310 kHz/mA
Bandwidth (3 dB), Typ.	400 kHz	400 kHz	400 kHz
Deviation at 3 dB Bandwidth, Max.	40 MHz	40 MHz	40 MHz
Input Impedance, Typ. at 1 MHz	3.5 ohms in series with 2 µH	1.6 ohms in series with 1 µH	1.6 ohms in series with 1 µH
DC Circuit Power, +15V±0.5V Max.	150 mA Max.	200 mA	250 mA
-5V±1V	40 mA	40 mA	—
Input Voltage Range	20 to 28 VDC	20 to 28 VDC	20 to 28 VDC
Power @ 25°C, Max.	1.5 watts	1.5 watts	1.5 watts
Power @ 0°C, Max.	2.0 watts	2.0 watts	2.0 watts
Weight, Max.	3.0 oz.	3.0 oz.	3.0 oz.
Case Style	MM1	MM1	MM1

One-Inch Cube

MAXIMUM RATINGS

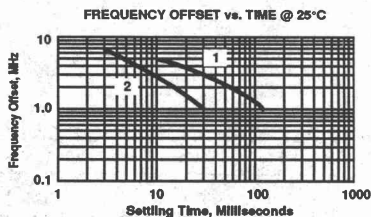
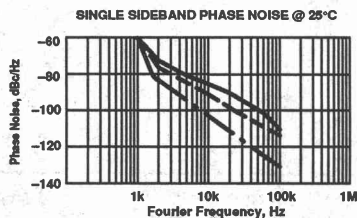
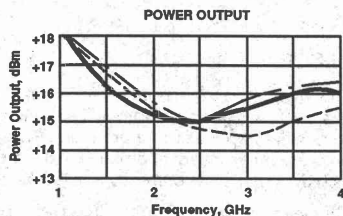
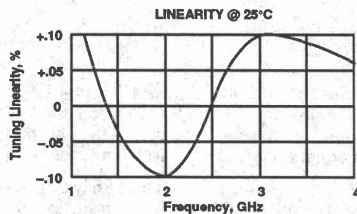
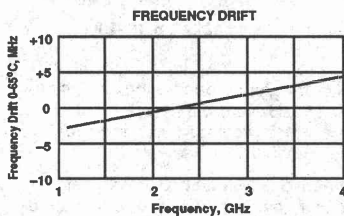
DC Voltage	+15 VDC Typ., +20 VDC, Max., -5 VDC Typ., -5.25 VDC Max.*
FM Tuning Current, Max.	300 mA max.
Operating Case Temperature	-54°C to +85°C
Storage Temperature	-54°C to +100°C

* Not Required for Model AV-12218

WEIGHT: 3 oz./85 grams

TYPICAL PERFORMANCE GRAPHS AV-7134

KEY: 0°C ---
+25°C ———
+85°C - - -



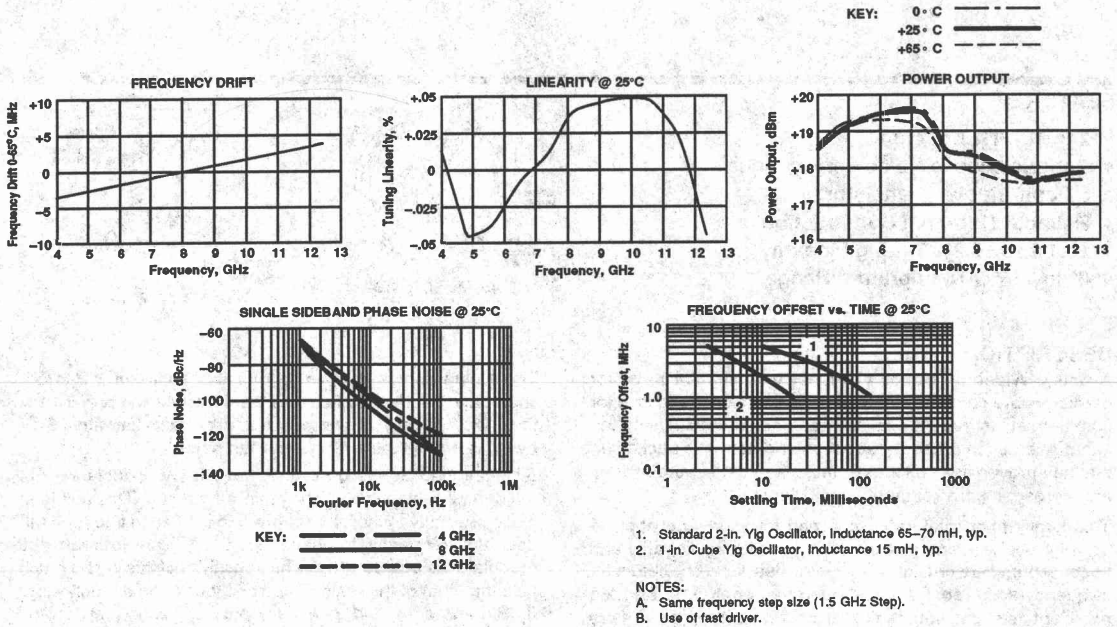
KEY: ——— 1.2 GHz
- - - 2.6 GHz
- - - 4.0 GHz

1. Standard 2-In. Yig Oscillator, Inductance 65–70 mH, typ.
2. 1-In. Cube Yig Oscillator, Inductance 24 mH, typ.

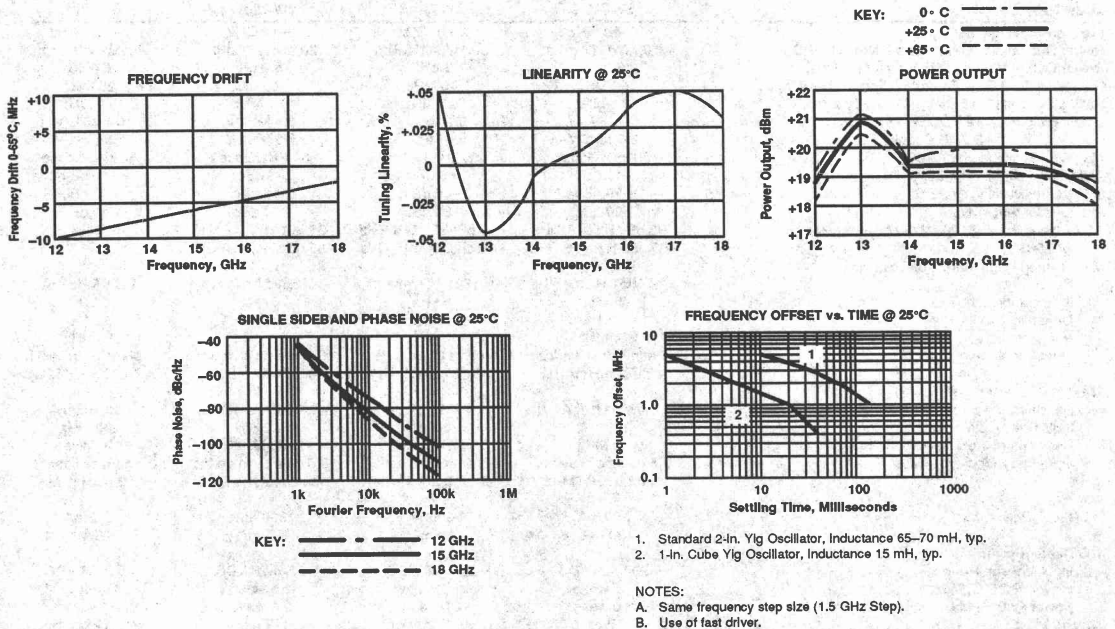
NOTES:

- A. Same frequency step size (1.5 GHz Step).
- B. Use of fast driver.

TYPICAL PERFORMANCE GRAPHS AV-74012



TYPICAL PERFORMANCE GRAPHS AV-12218



FEATURES

- 2 to 18 GHz Coverage
- Superior Phase Noise Performance
- Silicon Bipolar Transistor
- Reliable Thin-Film Construction
- $\pm 0.1\%$ to $\pm 0.2\%$ Tuning Linearity
- 0° to $+65^\circ\text{C}$ Temperature Range

DESCRIPTION

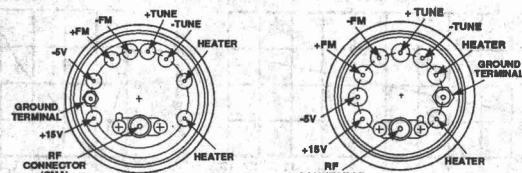
Avantek® Wideband Series YIG-tuned fundamental transistor oscillators are compact, lightweight, and are cost-effective for commercial instrument applications. They are built using the same Avantek thin-film construction and hermetic packaging that has proven itself ultimately reliable under severe military and aerospace environmental conditions.

This family of oscillators is designed for wideband applications in receivers and instruments where tuning linearity and spectral purity are crucial. They make ideal local oscillators for frequency-agile receivers and spectrum analyzers, and are excellent as signal sources for microwave sweep generators and synthesizers.

ELECTRICAL AND PERFORMANCE SPECIFICATIONS

Guaranteed Specifications at 0° to $+65^\circ\text{C}$ Case Temperature (Unless Otherwise Noted)

Model No.	AV-74018	AV-73018	AV-72018	AV-72012
Frequency Range, Min.	4–18 GHz	3–18 GHz	2–18 GHz	2–12.4 GHz
Power Output into 50-ohm Load, Min. @ 25°C	50 mW/ ± 17 dBm	20 mW/ ± 13 dBm	20 mW/ ± 13 dBm	40 mW/ ± 16 dBm
Power Output Variation vs. Frequency, Max.	6.0 dB	6.0 dB	6.0 dB	6.0 dB
Frequency Drift Over Operating Temperature, Max.	40 MHz	40 MHz	40 MHz	25 MHz
Pulling Figure (12 dB Return Loss), Typ.	0.1 MHz	0.1 MHz	0.1 MHz	0.5 MHz
Pushing Figure, ± 15 VDC Supply, Typ.	0.1 MHz/V	0.1 MHz/V	0.1 MHz/V	0.1 MHz/V
–5 VDC Supply, Typ.	2.0 MHz/V	5.0 MHz/V	5.0 MHz/V	1.5 MHz/V
Magnetic Susceptibility @ 60 Hz, Typ.	50 kHz/Gauss	50 kHz/Gauss	50 kHz/Gauss	50 kHz/Gauss
2nd Harmonic, Min., @ 25°C	–10 dBc	–8 dBc	–8 dBc	–10 dBc
3rd Harmonic, Min., @ 25°C	–10 dBc	–10 dBc	–10 dBc	–10 dBc
Spurious Output, Min.	–60 dBc	–60 dBc	–60 dBc	–60 dBc
SSB Phase Noise @ 20 kHz Off Carrier, Min. @ 25°C	–95 dBc/Hz ≤ 16 GHz –85 dBc/Hz, > 16 GHz	–95 dBc/Hz, ≤ 16 GHz –85 dBc/Hz, > 16 GHz	–95 dBc/Hz, ≤ 16 GHz –85 dBc/Hz, > 16 GHz	–95 dBc/Hz —
Main Tuning Port Characteristics				
Sensitivity	18 ± 1 Hz/mA	18 ± 1 MHz/mA	18 ± 1 MHz/mA	20 ± 1 MHz/mA
3 dB Bandwidth, Typ.	5 kHz	5 kHz	5 kHz	5 kHz
Linearity, Typ.	$\pm 0.1\%$	$\pm 0.2\%$	$\pm 0.2\%$	$\pm 0.1\%$
Hysteresis, Typ.	16 MHz	18 MHz	20 MHz	10 MHz
Input Impedance, Typ.	6 ohms dc in series with 73 mH (1 kHz)	6 ohms dc in series with 73 mH (1 kHz)	6 ohms dc in series with 73 mH (1 kHz)	9 ohms dc in series with 60 mH (1 kHz)
FM Port Characteristics				
Sensitivity, Typ.	450 kHz/mA	450 kHz/mA	450 kHz/mA	450 kHz/mA
3 dB Bandwidth, Typ.	200 kHz	200 kHz	200 kHz	200 kHz
Deviation at 3 dB Bandwidth, Max.	70 MHz	70 MHz	70 MHz	40 MHz
Input Impedance @ 1 MHz, Typ.	0.5 ohm dc in series with 2.0 μH (1 MHz)	0.5 ohm dc in series with 2.0 μH (1 MHz)	0.5 ohm dc in series with 2.0 μH (1 MHz)	0.5 ohm dc in series with 2.0 μH (1 MHz)
DC Circuit Power, Max., $\pm 15 \pm 0.5\text{V}$ –5.0 $\pm 0.1\text{V}$	350 mA 30 mA	300 mA 30 mA	300 mA 30 mA	175 mA 25 mA
YIG Heater Power				
Input Voltage Range	20 to 28 VDC	20 to 28 VDC	20 to 28 VDC	20 to 28 VDC
Power @ 25°C , Max.	1.5 watts	1.5 watts	1.5 watts	1.5 watts
Power @ 0°C , Max.	2.0 watts	2.0 watts	2.0 watts	2.0 watts
Weight, Max.	17 oz.	17 oz.	17 oz.	12 oz.
Case Style	M3–60	M3–45	M3–45	M4–45



M3-45, M3-60, p. 16–24

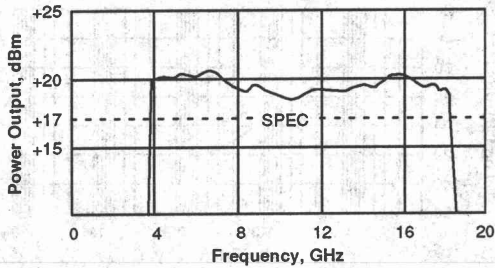
M4-45, p. 16–24

The tuning curves (f_{tuning} vs. f_{out}) for this series of YTOs are linear, and will deviate from the ideal straight line only $\pm 0.1\%$ to $\pm 0.2\%$ (typically). The power output remains flat within 6 dB over the entire tuning range and temperature.

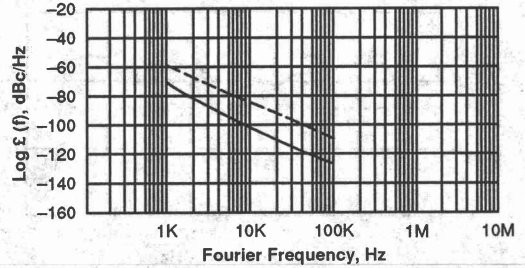
All Wideband Series oscillators have a low inductance FM tuning coil in addition to the main tuning coil. This coil is in close proximity to the YIG sphere and is used to fine-tune the oscillator frequency, to phase lock the YTO or to frequency modulate the output signal. The sensitivity of this port is much less than that of the main tuning coil, but it has a much wider 3 dB bandwidth and permits input modulation or control signals to deviate the output frequency by as much as 70 MHz.

TYPICAL OCTAVE BAND PERFORMANCE

Power Output — AV-74018 @ 25°C

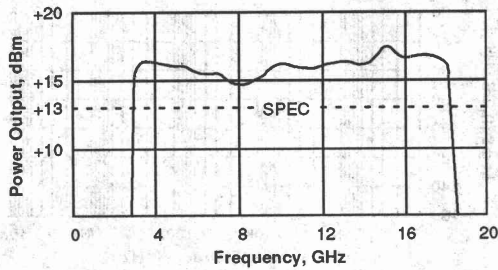


AV-74018, Single Sideband Phase Noise @ 25°C

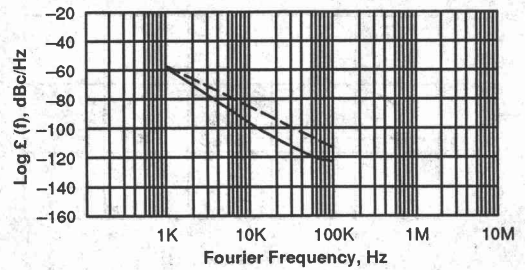


KEY: — 4 GHz
--- 18 GHz

Power Output — AV-73018 @ 25°C

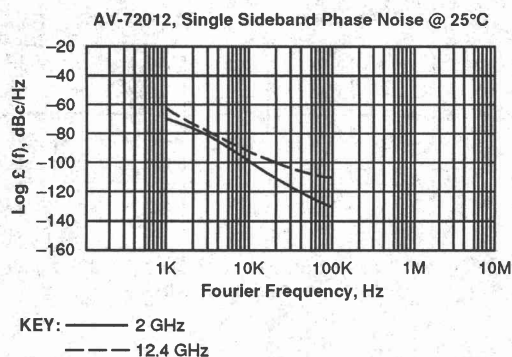
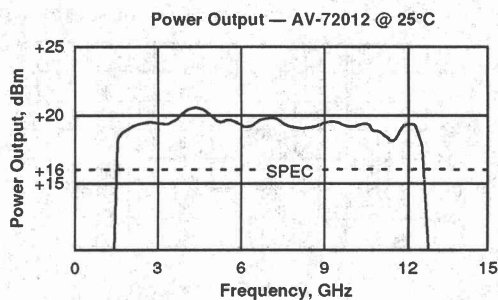
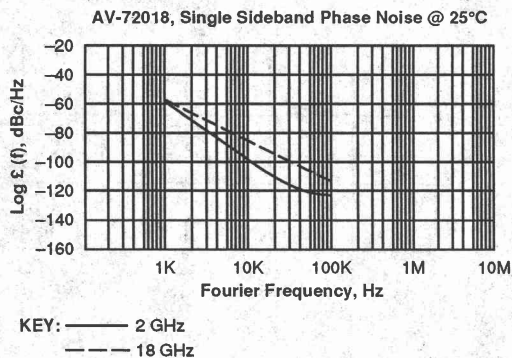
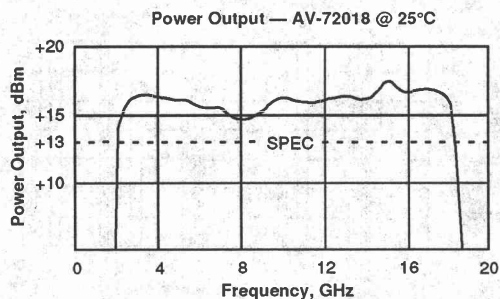


AV-73018, Single Sideband Phase Noise @ 25°C



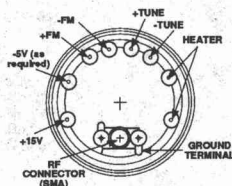
KEY: — 3 GHz
--- 18 GHz

TYPICAL OCTAVE BAND PERFORMANCE (continued)

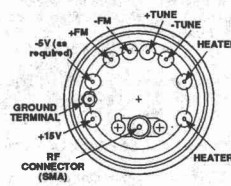


FEATURES

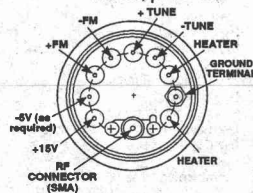
- 2 to 18 GHz Coverage
- Excellent Phase Noise Performance
- Rugged Hermetic Packaging
- Reliable Thin-Film Construction
- Silicon Bipolar Transistors
- 0° to +65°C Temperature Range



C-45, p. 16-2



M3-60, p. 16-24



M4-45, p. 16-24

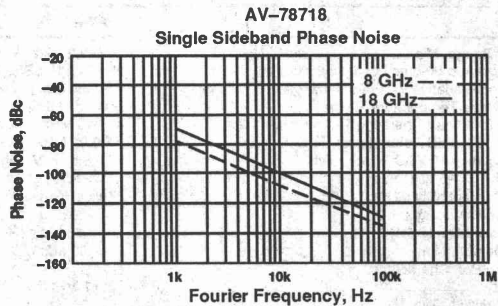
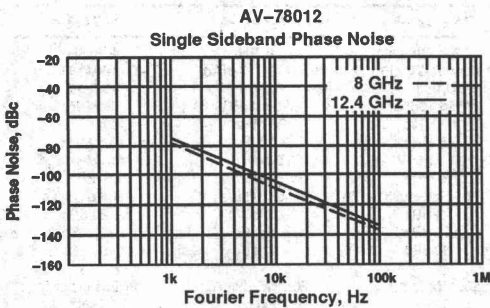
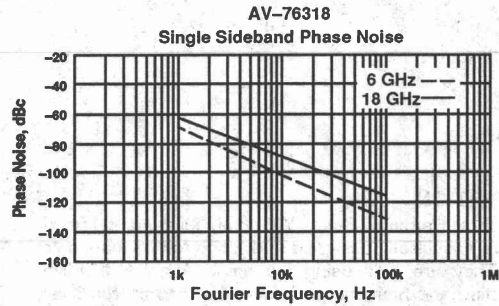
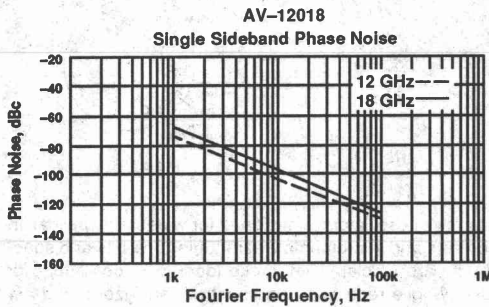
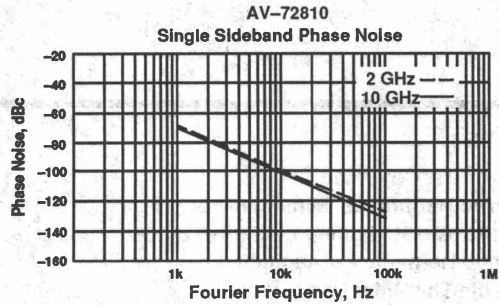
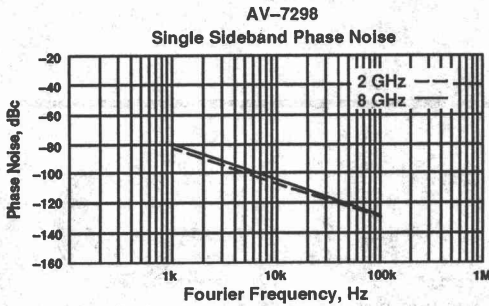
DESCRIPTION

The new Avantek® Low Noise Series YIG-tuned fundamental transistor oscillators are compact, lightweight, and cost-effective for commercial instrument applications. They are built using silicon bipolar transistors which yield a 10-15 dB noise improvement over other available commercial FET oscillators.

This family of oscillators is designed for wideband application in receivers and instruments where tuning linearity and spectral purity are crucial. They make ideal local oscillators for frequency-agile receivers and spectrum analyzers, and are excellent as signal sources for microwave generators and synthesizers.

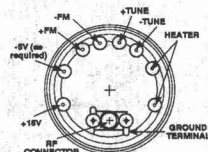
Guaranteed Specifications at 0° to +65°C Case Temperature (Unless Otherwise Noted)

TYPICAL PERFORMANCE GRAPHS

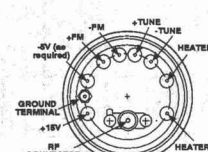


FEATURES

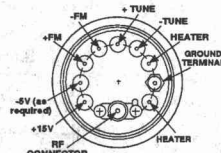
- 1 to 20 GHz Coverage
- -20 dBc Harmonics, Minimum
- ± 0.01 to $\pm 0.15\%$ Tuning Linearity
- Rugged Hermetic Packaging
- Reliable Thin-Film Construction
- 0° to $+65^\circ\text{C}$, Temperature Range



A-45, B-45, C-45, C-38, p. 16-2



M3-45, M3-60, p. 16-24



M4-45, p. 16-24

DESCRIPTION

Avantek Low Harmonic Series YIG-tuned fundamental oscillators are specifically designed and tuned for low harmonic levels. They are built using the same Avantek thin-film construction and hermetic packaging that has proven itself ultimately reliable under severe military and aerospace environmental conditions.

This family of oscillators is designed for wideband application in receivers and instruments where tuning linearity and spectral purity are crucial. They make ideal local oscillators for frequency-agile receivers and spectrum analyzers, and are excellent as signal sources for microwave generators and synthesizers.

ELECTRICAL AND PERFORMANCE SPECIFICATIONS

Guaranteed Specifications at 0° to $+65^\circ\text{C}$ Case Temperature (Unless Otherwise Noted)

Model No.	AV-7104-9	AV-7224-9	AV-7403-9	AV-7453-9
Frequency Range, Min.	1-2.2 GHz	2-4 GHz	4-8 GHz	4-8 GHz
Power Output into 50-ohm Load, @ 25°C , Min.	25 mW/+16 dBm	100 mW/+20 dBm	20 mW/+13 dBm	40 mW/+16 dBm
Power Output Variation vs. Frequency, Max.	3.0 dB	3.0 dB	6.0 dB	6.0 dB
Operating Case Temperature Range	0° to $+65^\circ\text{C}$	0° to $+65^\circ\text{C}$	0° to $+65^\circ\text{C}$	0° to $+65^\circ\text{C}$
Frequency Drift Over Operating Temperature, Max.	10 MHz	10 MHz	20 MHz	25 MHz
Pulling Figure (12 dB Return Loss), Typ.	0.01 MHz	0.5 MHz	2.0 MHz	0.5 MHz
Pushing Figure, +15 VDC Supply, Typ.	0.5 MHz/V	0.1 MHz/V	0.5 MHz/V	0.1 MHz/V
-5 VDC Supply, Typ.	N/A	1.5 MHz	1.5 MHz/V	1.5 MHz/V
Magnetic Susceptibility @ 60 Hz, Typ.	70 kHz/Gauss	70 kHz/Gauss	70 kHz/Gauss	70 kHz/Gauss
2nd Harmonic, Min., @ 25°C	-20 dBc	-20 dBc	-20 dBc	-20 dBc
3rd Harmonic, Min., @ 25°C	-20 dBc	-20 dBc	-20 dBc	-20 dBc
Spurious Output, Min.	-60 dBc	-60 dBc	-60 dBc	-60 dBc
Main Tuning Port Characteristics				
Sensitivity	20 $\pm$ 1 MHz/mA	20 $\pm$ 1 MHz/mA	20 $\pm$ 1 MHz/mA	20 $\pm$ 1 MHz/mA
3 dB Bandwidth, Typ.	5 kHz	5 kHz	5 kHz	5 kHz
Linearity, Typ.	$\pm 1\%$	$\pm 0.05\%$	$\pm 0.05\%$	$\pm 0.05\%$
Hysteresis, Typ.	1.7 MHz	3 MHz	6 MHz	6 MHz
Input Impedance @ 1 kHz, Typ.	10 ohms in series with 95 mH	10 ohms in series with 95 mH	10 ohms in series with 95 mH	10 ohms in series with 95 mH
FM Port Characteristics				
Sensitivity, Typ.	310 kHz/mA	310 kHz/mA	310 kHz/mA	310 kHz/mA
3 dB Bandwidth, Typ.	800 kHz	800 kHz	800 kHz	800 kHz
Deviation at 3 dB Bandwidth, Max.	15 MHz	20 MHz	40 MHz	40 MHz
Input Impedance @ 1 MHz, Typ.	1 ohm in series with 1.7 μH	1 ohm in series with 1.7 μH	1 ohm in series with 1.7 μH	1 ohm in series with 1.7 μH
DC Circuit Power, Max.				
+15 $\pm$ 0.5 VDC	150 mA	150 mA	—	150 mA
-5 $\pm$ 1 VDC	60 mA	60 mA	—	60 mA
+15+0.5/-3.5 VDC	—	—	300 mA	—
YIG Heater Power				
Input Voltage Range	20 to 28 VDC	20 to 28 VDC	20 to 28 VDC	20 to 28 VDC
Power @ 25°C , Max.	1.5 watts	1.5 watts	1.5 watts	1.5 watts
Power @ 0°C , Max.	2.0 watts	2.0 watts	2.0 watts	2.0 watts
Weight, Max.	10 oz.	10 oz.	10 oz.	10 oz.
Case Style	A-45	C-45	C-38	C-38

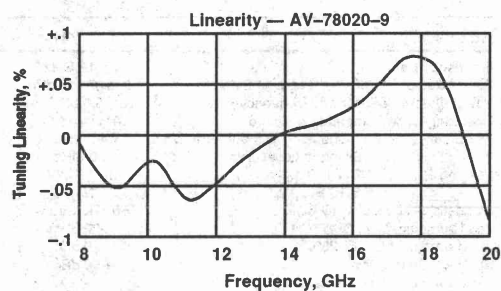
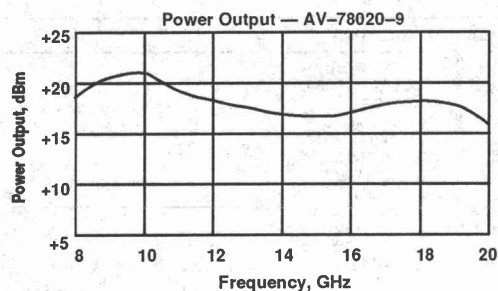
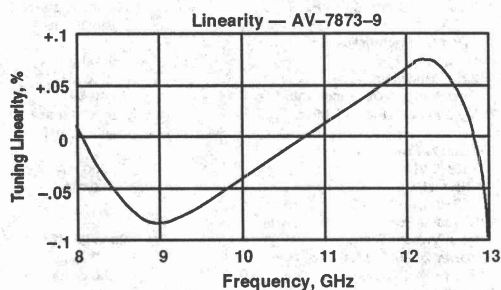
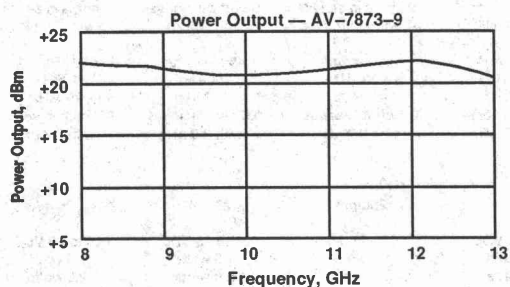
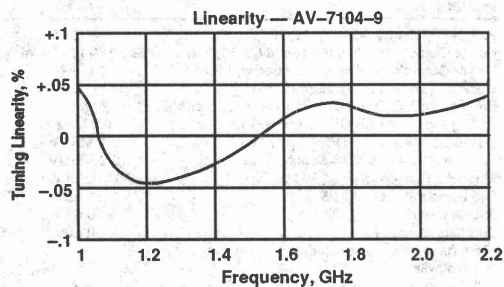
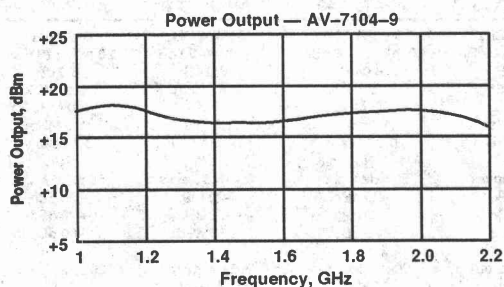
ELECTRICAL AND PERFORMANCE SPECIFICATIONS (continued)

Guaranteed Specifications at 0° to +65°C Case Temperature (Unless Otherwise Noted)

Model No.	AV-7443-9	AV-7871-9	AV-7872-9	AV-7873-9	AV-78020-9
Frequency Range, Min.	4-8 GHz	8-12.4 GHz	8-12.4 GHz	8-12.4 GHz	8-20 GHz
Power Output into 50-ohm Load, @ 25°C, Min.	60 mW/+17.8 dBm	30 mW/+14.8 dBm	60 mW/+17.8 dBm	100 mW/+20 dBm	20 mW/+13 dBm
Power Output Variation vs. Frequency, Max.	6.0 dB	6.0 dB	6.0 dB	6.0 dB	8.0 dB
Operating Case Temperature Range	0° to +65°C	0° to +65°C	0° to +65°C	0° to +65°C	0° to +65°C
Frequency Drift Over Operating Temperature, Max.	20 MHz	25 MHz	25 MHz	25 MHz	40 MHz
Pulling Figure (12 dB Return Loss), Typ.	0.2 MHz	0.5 MHz	1.0 MHz	1.0 MHz	1.0 MHz
Pushing Figure, +15 VDC Supply, Typ.	0.1 MHz/V	0.1 MHz/V	0.1 MHz/V	0.1 MHz/V	0.1 MHz/V
-5 VDC Supply, Typ.	2.0 MHz/V	N/A	N/A	N/A	N/A
Magnetic Susceptibility @ 60 Hz, Typ.	70 kHz/Gauss	50 kHz/Gauss	50 kHz/Gauss	50 kHz/Gauss	50 kHz/Gauss
2nd Harmonic, Min., @ 25°C	-20 dBc	-20 dBc	-20 dBc	-20 dBc	-20 dBc
3rd Harmonic, Min., @ 25°C	-20 dBc	-20 dBc	-20 dBc	-20 dBc	-20 dBc
Spurious Output, Min.	-60 dBc	-60 dBc	-60 dBc	-60 dBc	-60 dBc
Main Tuning Port Characteristics					
Sensitivity	20±1 MHz/mA	20±1 MHz/mA	20±1 MHz/mA	20±1 MHz/mA	20±1 MHz/mA
3 dB Bandwidth, Typ.	5 kHz	5 kHz	5 kHz	5 kHz	5 kHz
Linearity, Typ.	±0.1%	±0.1%	±0.1%	±0.1%	±0.15%
Hysteresis, Typ.	6 MHz	6 MHz	6 MHz	6 MHz	18 MHz
Input Impedance @ 1 kHz, Typ.	10 Ohms in series with 95 mH	9 ohms in series with 60 mH	9 ohms in series with 60 mH	9 ohms in series with 60 mH	7 ohms in series with 73 mH
FM Port Characteristics					
Sensitivity, Typ.	310 kHz/mA	450 kHz/mA	450 kHz/mA	450 kHz/mA	450 kHz/mA
3 dB Bandwidth, Typ.	800 kHz	400 kHz	400 kHz	400 kHz	1 MHz
Deviation at 3 dB Bandwidth, Max.	40 MHz	40 MHz	40 MHz	40 MHz	90 MHz
Input Impedance @ 1 MHz, Typ.	1 ohm in series with 1.7 µH	0.5 ohm in series with 1.7 µH	0.5 ohm in series with 2.0 µH	0.5 ohm in series with 2.0 µH	0.5 ohm in series with 2.3 µH
DC Circuit Power, Max.					
+15±.5 VDC	200 mA	125 mA	—	—	—
-5±.1 VDC	60mA	—	—	—	—
+15+0.5, -3.5 VDC	—	—	250 mA	250 mA	275 mA
YIG Heater Power					
Input Voltage Range	20 to 28 VDC	20 to 28 VDC	20 to 28 VDC	20 to 28 VDC	20 to 28 VDC
Power @ 25°C, Max.	1.5 watts	1.5 watts	1.5 watts	1.5 watts	1.5 watts
Power @ 0°C, Max.	2.0 watts	2.0 watts	2.0 watts	2.0 watts	2.0 watts
Weight, Max.	10 oz.	12 oz.	12 oz.	12 oz.	17 oz.
Case Style	C-45	M4-45	M4-45	M4-45	M3-60

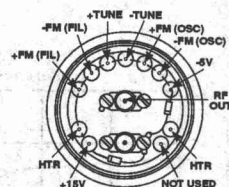
Model No.	AV-71241-9	AV-71251-9	AV-71261-9
Frequency Range, Min.	12-18 GHz	12-18 GHz	12-18 GHz
Power Output into 50-ohm Load, @ 25°C, Min.	20 mW/+13 dBm	30 mW/+14.8 dBm	50 mW/+17 dBm
Power Output Variation vs. Frequency, Max.	6.0 dB	6.0 dB	6.0 dB
Operating Case Temperature Range	0° to +65°C	0° to +65°C	0° to +65°C
Frequency Drift Over Operating Temperature, Max.	40 MHz	40 MHz	40 MHz
Pulling Figure (12 dB Return Loss), Typ.	5.0 MHz	1.0 MHz	0.5 MHz
Pushing Figure, +15 VDC Supply, Typ.	0.1 MHz/V	0.1 MHz/V	0.1 MHz/V
-5 VDC Supply, Typ.	N/A	N/A	N/A
Magnetic Susceptibility @ 60 Hz, Typ.	50 kHz/Gauss	50 kHz/Gauss	50 kHz/Gauss
2nd Harmonic, Min., @ 25°C	-20 dBc	-20 dBc	-20 dBc
3rd Harmonic, Min., @ 25°C	-20 dBc	-20 dBc	-20 dBc
Spurious Output, Min.	-60 dBc	-60 dBc	-60 dBc
Main Tuning Port Characteristics			
Sensitivity	18±1 MHz/mA	18±1 MHz/mA	18±1 MHz/mA
3 dB Bandwidth, Typ.	5 kHz	5 kHz	5 kHz
Linearity, Typ.	±1%	±1%	±1%
Hysteresis, Typ.	9 MHz	9 MHz	9 MHz
Input Impedance @ 1 kHz, Typ.	6 ohms in series with 73 mH	6 ohms in series with 73 mH	6 ohms in series with 73 mH
FM Port Characteristics			
Sensitivity, Typ.	450 kHz/mA	450 kHz/mA	450 kHz/mA
3 dB Bandwidth, Typ.	1 MHz	1 MHz	1 MHz
Deviation at 3 dB Bandwidth, Max.	70 MHz	70 MHz	70 MHz
Input Impedance @ 1 MHz, Typ.	0.5 ohm in series with 2.3 µH	0.5 ohm in series with 2.3 µH	0.5 ohm in series with 2.3 µH
DC Circuit Power, Max.			
+15±0.5 VDC	—	—	—
-5±0.1 VDC	—	—	—
+15 +0.5, -3.5 VDC	125 mA	150 mA	200 mA
YIG Heater Power			
Input Voltage Range	20 to 28 VDC	20 to 28 VDC	20 to 28 VDC
Power @ 25°C, Max.	1.5 watts	1.5 watts	1.5 watts
Power @ 0°C, Max.	2.0 watts	2.0 watts	2.0 watts
Weight, Max.	17 oz.	17 oz.	17 oz.
Case Style	M3-45	M3-60	M3-60

TYPICAL PERFORMANCE GRAPHS



FEATURES

- 2 to 8 GHz Coverage
- -40 dBc Minimum Harmonics
- 30 mW Minimum Output Power
- Automatic Filter Tracking
- $\pm 0.1\%$ Tuning Linearity
- FM/Phase-Lock Port
- 0° to +65°C Temperature Range



F-1, p. 16-16

DESCRIPTION

The Avantek AV-7248 is a fundamental output, buffered YIG-tuned transistor oscillator with an integral tracking YIG filter providing -40 dBc minimum harmonic output over the 2 to 8 GHz frequency range. It offers +14.8 dBm (30 mW) minimum output power with 6.0 dB maximum variation and $\pm 0.1\%$ tuning linearity over the full operating band. This complete YIG-tuned silicon bipolar transistor oscillator, two-stage GaAs FET buffer amplifier and high-Q tracking YIG filter is packaged in a compact hermetic case with a 2-inch diameter and 1.4-inch length, weighing approximately 17 oz.

An AV-7248 is ideal as the swept signal source in a laboratory signal generator due to its low harmonic output, extremely linear tuning curve and excellent frequency resettability. It may also be used as a local oscillator in spectrum analyzers and microwave receivers.

In the AV-7248, both the frequency-determining oscillator YIG sphere and the filter YIG sphere are under the same pole piece in the same magnetic circuit. Since the mechanical

configuration of the magnetic circuit is carefully optimized, the tracking between oscillator and filter is inherently very close. For most applications, the unit is simply used as a conventional YIG-tuned transistor oscillator and no further design work is required. However, by applying current to the special filter fine-tuning (FM) coil provided on the AV-7248, the output power may be increased by approximately 1 dB at a particular frequency (approximately 100 mA at 8 GHz). This current may be fixed—for example to peak the output power at the high end of the frequency range to overcome external circuit losses—or swept with the main tuning current as desired.

As with all other Avantek AV-7000 Series YIG-tuned oscillators, the AV-7248 also includes a low-inductance FM tuning coil as a standard feature. This small coil is in close proximity to the YIG sphere and may be used to fine-tune the oscillator frequency, to phase lock the oscillator or to frequency modulate the output signal. The tuning sensitivity of this coil is less than that of the main tuning coil, but it has an 800 kHz, 3 dB bandwidth and can vary the output frequency as much as 40 MHz.

ELECTRICAL AND PERFORMANCE SPECIFICATIONS

Guaranteed Specifications at 0° to +65°C Case Temperature (Unless Otherwise Noted)

Parameters	Spec.	Parameters	Spec.
Frequency Range, Min.	2 to 8 GHz	Third Harmonic @ 25°C, Min.	-40 dBc
Power Output (50-ohm Load) @ 25°C, Min.	30 mW +14.8 dBm	Spurious Output, Min.	-60 dBc
Power Output Variation, Max.	6.0 dB	FM Port Characteristics (Oscillator and Filter)	
Operating Temperature Range (Case Temperature)	0 to 65°C	Sensitivity	310 kHz/mA
Frequency Drift Over Operating Temp., Max.	20 MHz	Bandwidth (3 dB), Typ.	800 kHz
Pulling Figure (12 dB Return Loss), Typ.	0.2 MHz	Deviation @ 3 dB Bandwidth, Max.	40 MHz
Pushing Figure, Typ.		Input Impedance Typ.	1 ohm in series with 1.7 μ H
+15 VDC Supply	0.1 MHz/V	Filter Tracking Current ²	300 mA @ 8 GHz
-5 VDC Supply	2.0 MHz/V	+15 VDC Circuit Current, Max.	200 mA
Magnetic Susceptibility, Typ. @ 60 Hz	50 kHz/Gauss ¹	-5 VDC Circuit Current, Max.	60 mA
Second Harmonic @ 25°C, Min.	-40 dBc	YIG-Heater Power	20 to 28 VDC 4W max @ 25°C 6W max @ 0°C
Main Tuning Port Characteristics		Weight Nom.	17 oz.
Sensitivity, Typ.	20 $\pm$ 1 MHz/mA	Case Type	F-1
Bandwidth (3dB), Typ.	5 kHz		
Linearity, Typ. $\pm 0.1\%$			
Hysteresis, Typ.	8 MHz		
Input Impedance, Typ.	9 ohms in series with 130 mH		

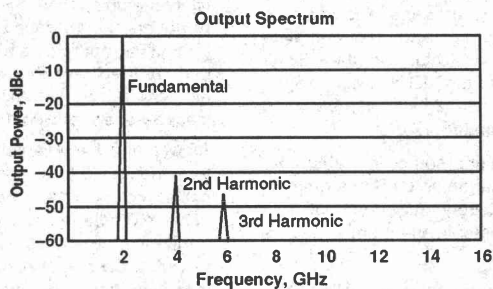
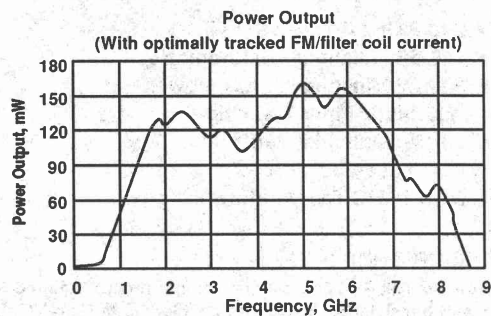
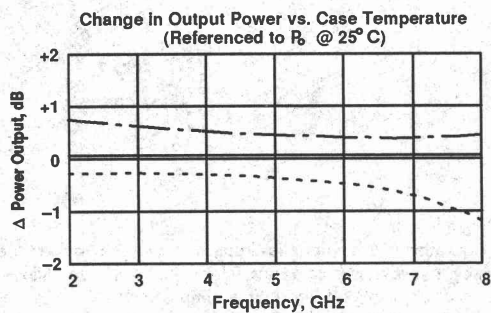
NOTES: 1. 20 kHz/Gauss with optional mu-metal shield.

2. Maximum (applied to filter FM port)

YIG-Tuned Oscillators With Tracking YIG Filter

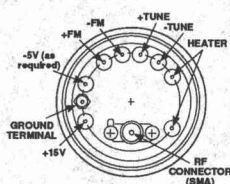
TYPICAL PERFORMANCE @ 25°C Case Temperature (Unless Otherwise Noted)

KEY: +65°C ———
+25°C ———
0°C - - - - -

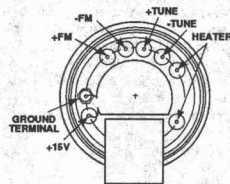


FEATURES

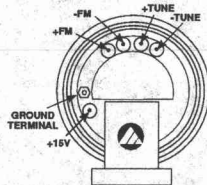
- 18 to 50 GHz Frequency Coverage
- 10 to 60 mW Minimum Output Power
- $\pm 0.05\%$ Tuning Linearity (Typ.)
- Integral FM/Phase Lock Port
- GaAs FET Buffer Amplifiers
- Hermetic Package
- Thin-Film Hybrid Construction
- 0° to +65°C and -54° to +85°C Temperature Range Versions



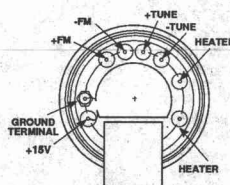
M5-60, p. 16-24



M5-60WR28, p. 16-25



M5-45WR22, p. 16-25



M5-45WR28, p. 16-25

DESCRIPTION

The Avantek® AV Series millimeter oscillators are fundamental-output, buffered GaAs FET YIG-tuned oscillators which provide a choice of +17.8 dBm, +16 dBm, +13 dBm or +10 dBm minimum output power over the 18 to 26.5 GHz frequency range and +13 dBm or +10 dBm 26.5 to 40 GHz range. They offer the features associated with lower-frequency YIG-tuned transistor oscillators, including $\pm 0.05\%$ tuning linearity, 0.5 MHz typical pulling over all phases of a 12 dB (1.67:1 VSWR) return loss, 0.1 MHz/V typical pushing the +15 VDC supply line and spurious outputs at least 60 dB below the selected carrier.

The oscillators are powered from a single +15 VDC source and require either 200 mA or 150 mA (not including YIG heater or coil current)—a maximum of 3.0W compared to the approximately 15W necessary to power a Gunn or Impatt-diode oscillator at similar frequencies. The variation in output power vs. frequency is also far lower with the GaAs FET oscillator than the equivalent two-terminal signal source.

This makes Avantek Millimeter Band YTOs an excellent choice for all applications where efficiency, tuning linearity and spectral purity are important. They are ideal local oscillators for frequency agile receivers and spectrum analyzers, and make excellent signal sources for microwave sweep generators and synthesizers. Each model includes a low-inductance FM tuning coil which may be used for fine-tuning, phase-lock or to frequency-modulate the output signal.

All Avantek AV Series YIG-tuned oscillators are built with thin-film hybrid construction. With components such as transistors and capacitors, in unpackaged chip form, are bonded directly to the ceramic substrate. The cases are filled with a dry, inert atmosphere, hermetically welded, and leak tested to assure long-term protection from moisture and corrosive gases—even under severe humidity and vibration conditions.

Avantek microwave oscillators are built under a quality program that meets the requirements of MIL-Q-9858A. Qualification to the environmental specifications of MIL-E-5400 and MIL-E-16400, as well as other applicable military specifications, is available.

YIG-Tuned Oscillators Millimeter Band

ELECTRICAL AND PERFORMANCE SPECIFICATIONS

Guaranteed Specifications at 0° to +65°C Case Temperature (Unless Otherwise Noted)

Model No.	AV-71826	AV-718226	AV-18326	AV-18030
Frequency Range, Min.	18-26.5 GHz	18-26.5 GHz	18-26.5 GHz	18-30 GHz
Power Output into 50-ohm Load, Min. at 25°C	20 mW/+13 dBm	40 mW/+16 dBm	60 mW/+17.8 dBm	40 mW/+16 dBm
Power Output Variation vs. Frequency, Max.	6.0 dB	6.0 dB	6.0 dB	6.0 dB
Operating Case Temperature Range	0° to 65°C	0° to 65°C	0° to 65°C	0° to 65°C
Frequency Drift Over Operating Temperature, Max.	60 MHz	60 MHz	40 MHz	60 MHz
Pulling Figure (12 dB Return Loss), Typ.	0.5 MHz	0.5 MHz	1.0 MHz	1.0 MHz
Pushing Figure, +15 VDC Supply, Typ.	0.1 MHz/V	0.1 MHz/V	0.1 MHz/V	0.1 MHz/V
Magnetic Susceptibility @ 60 Hz, Typ.	50 kHz/Gauss	50 kHz/Gauss	50 kHz/Gauss	50 kHz/Gauss
Spurious Output, Min.	-60 dBc	-60 dBc	-60 dBc	-60 dBc
Main Tuning Port Characteristics				
Sensitivity	30±1.5 MHz/ma	30±1.5 MHz/ma	30±1.5 MHz/ma	30±1.5 MHz/ma
3 dB Bandwidth, Typ.	5 kHz	5 kHz	5 kHz	5 kHz
Linearity, Typ.	±0.05%	±0.05%	±0.05%	±0.1%
Hysteresis, Typ.	12 MHz	12 MHz	10 MHz	18 MHz
Input Impedance @ 1 kHz, Typ.	6.5 ohms in series with 95 mH	10 ohms in series with 150 mH	6.5 ohms in series with 95 mH	6.5 ohms in series with 95 mH
FM Port Characteristics				
Sensitivity, Typ.	425 kHz/ma	375 kHz/ma	425 kHz/ma	425 kHz/ma
3 dB Bandwidth, Typ.	400 kHz	800 kHz	400 kHz	400 kHz
Deviation at 3 dB Bandwidth, Max.	90 MHz	90 MHz	90 MHz	90 MHz
Input Impedance @ 1 MHz, Typ.	0.35 ohm in series with 2 µH	0.4 ohm in series with 1.2 µH	0.35 ohm in series with 2 µH	0.35 ohm in series with 2 µH
DC Circuit Power, Max., +8.0/+15.5V Min/Max +15+0.5/-3.5V	150 mA	150 mA	200 mA	200 mA
YIG Heater Power				
Input Voltage Range	—	20 to 28 VDC	—	—
Power @ 25°C, Max.	—	1.5 watts	—	—
Power @ 0°C, Max.	—	2.0 watts	—	—
Weight, Max.	19 oz.	20 oz.	20 oz.	20 oz.
Case Style	M5-60	M5-60	M5-60	M5-60

Model No.	AV-20030	AV-25037M/W	AV-26040M/W
Frequency Range, Min.	20-30 GHz	25.0-37.5 GHz	26.5-40 GHz
Power Output into 50-ohm Load, Min. at 25°C	40 mW/+16 dBm	20 mW/+13 dBm	10 mW/+10 dBm
Power Output Variation vs. Frequency, Max.	6.0 dB	4.0 dB	6.0 dB
Operating Case Temperature Range	0° to 65°C	0° to 65°C	0° to 65°C
Frequency Drift Over Operating Temperature, Max.	60 MHz	60 MHz	60 MHz
Pulling Figure (12 dB Return Loss), Typ.	1.0 MHz	0.5 MHz	0.5 MHz
Pushing Figure, +15 VDC Supply, Typ.	0.1 MHz/V	0.1 MHz/V	0.1 MHz/V
Magnetic Susceptibility @ 60 Hz, Typ.	50 kHz/Gauss	50 kHz/Gauss	50 kHz/Gauss
Spurious Output, Min.	-60 dBc	-60 dBc	-60 dBc
Main Tuning Port Characteristics			
Sensitivity	30±1.5 MHz/ma	40±2.0 MHz/ma	40±2 MHz/ma
3 dB Bandwidth, Typ.	5 kHz	2 kHz	2 kHz
Linearity, Typ.	±0.05%	±0.1%	±0.1%
Hysteresis, Typ.	16 MHz	40 MHz	40 MHz
Input Impedance @ 1 kHz, Typ.	6.5 ohms in series with 95 mH	6 ohms in series with 90 mH	10.5 ohms in series with 125 mH
FM Port Characteristics			
Sensitivity, Typ.	425 kHz/ma	430 kHz/ma	500 kHz/ma
3 dB Bandwidth, Typ.	400 kHz	50 kHz	100 kHz
Deviation at 3 dB Bandwidth, Max.	90 MHz	100 MHz	100 MHz
Input Impedance @ 1 MHz, Typ.	0.35 ohm in series with 2 µH	0.3 ohm in series with 0.5 µH	0.4 ohm in series with 2 µH
DC Circuit Power, Max., +8/+15.5V Min/Max +15+0.5/-3.5V	200 mA	200 mA	150 mA
YIG Heater Power			
Input Voltage Range	—	—	—
Power @ 25°C, Max.	—	—	—
Power @ 0°C, Max.	—	—	—
Weight, Max.	20 oz.	20 oz.	20 oz.
Case Style	M5-60	M5-60WR28	M5-45WR28

ELECTRICAL AND PERFORMANCE SPECIFICATIONS (continued)

Guaranteed Specifications at 0° to +65°C Case Temperature (Unless Otherwise Noted)

Model No.	AV-26240M/W	AV-30045	AV-33050
Frequency Range, Min.	26.5-40 GHz	30-45 GHz	33-50 GHz
Power Output Into 50-ohm Load, Min. at 25°C	20 mW/+13 dBm	10 mW/+10 dBm	5 mW/+7 dBm
Power Output Variation vs. Frequency, Max.	4.0 dB	6.0 dB	6.0 dB
Operating Case Temperature Range	0° to 65°C	0° to 65°C	0° to 65°C
Frequency Drift Over Operating Temperature, Max.	60 MHz	60 MHz	60 MHz
Pulling Figure (12 dB Return Loss), Typ.	0.5 MHz	0.1 MHz	0.1 MHz
Pushing Figure, +15 VDC Supply, Typ.	0.1 MHz/V	0.1 MHz/V	0.1 MHz/V
Magnetic Susceptibility @ 60 Hz, Typ.	50 kHz/Gauss	50 kHz/Gauss	50 kHz/Gauss
Spurious Output, Min.	-60 dBc	-60 dBc	-60 dBc
Main Tuning Port Characteristics			
Sensitivity	40±2.0 MHz/mA	50.0±3.0 MHz/mA	50.0±3.0 MHz/mA
3 dB Bandwidth, Typ.	2 kHz	2 kHz	2 kHz
Linearity, Typ.	±0.1%	±0.15%	±0.2%
Hysteresis, Typ.	40 MHz	65 MHz	65 MHz
Input Impedance @ 1 kHz, Typ.	6 ohms in series with 90 mH	10.5 ohms in series with 130 mH	10.5 ohms in series with 130 mH
FM Port Characteristics			
Sensitivity, Typ.	430 kHz/mA	400 kHz/mA	400 kHz/mA
3 dB Bandwidth, Typ.	50 kHz	100 kHz	100 kHz
Deviation at 3 dB Bandwidth, Max.	100 MHz	100 MHz	100 MHz
Input Impedance @ 1 MHz, Typ.	0.3 ohm in series with 0.5 µH	0.3 ohm in series with 1 µH	0.3 ohm in series with 1 µH
DC Circuit Power, Max., +8.0/+15.5V Min/Max	150 mA	150 mA	150 mA
YIG Heater Power			
Input Voltage Range	—	—	—
Power @ 25°C, Max.	—	—	—
Power @ 0°C, Max.	—	—	—
Weight, Max.	20 oz.	20 oz.	20 oz.
Case Style	M5-60WR28	M5-45WR22	M5-45WR22

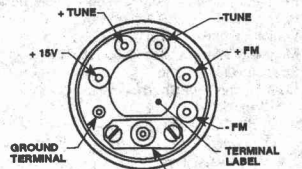
Guaranteed Specifications at -54° to +85°C Case Temperature (Unless Otherwise Noted)

Model No.	AV-18126	AV-26140M/W
Frequency Range, Min.	18-26.5 GHz	26.5-40 GHz
Power Output Into 50-ohm Load, Min. /Max.	+16 dBm/+23 dBm	+13 dBm/+19 dBm
Operating Case Temperature Range	-54° to 85°C	-54° to 85°C
Frequency Drift Over Operating Temperature, Max.	60 MHz	60 MHz
Pulling Figure (12 dB Return Loss), Typ.	1.0 MHz	0.5 MHz
Pushing Figure, +15 VDC Supply, Typ.	0.1 MHz/V	0.1 MHz/V
Magnetic Susceptibility @ 60 Hz, Typ.	50 kHz/Gauss	50 kHz/Gauss
Spurious Output, Min.	-60 dBc	-60 dBc
Main Tuning Port Characteristics		
Sensitivity	30.0±1.5 MHz/mA	40.0±2.0 MHz/mA
3 dB Bandwidth, Typ.	5 kHz	2 kHz
Linearity, Typ.	±0.1%	±0.1%
Hysteresis, Typ.	10 MHz	40 MHz
Input Impedance @ 1 kHz, Typ.	6.5 ohms in series with 90 mH	6 ohms in series with 90 mH
FM Port Characteristics		
Sensitivity, Typ.	425 kHz/mA	430 kHz/mA
3 dB Bandwidth, Typ.	400 kHz	50 kHz
Deviation at 3 dB Bandwidth, Max.	90 MHz	100 MHz
Input Impedance @ 1 MHz, Typ.	0.35 ohm in series with 2 µH	0.3 ohm in series with 0.5 µH
DC Circuit Power, Max., +8.0/+15.5V Min./Max.	200 mA	150 mA
Input Voltage Range	—	—
Power @ 25°C, Max.	—	—
Power @ -54°C, Max.	—	—
Weight, Max.	20 oz.	20 oz.
Case Style	M5-60	M5-60WR28

- 1.00-inch Dia. Package
- Low Coil Inductance: 32 mH (typ.)
- Light Weight: 1.8 oz./51 grams
- Low Prime Power Consumption
- Fast Tuning Speed
- Single +15 VDC Bias

APPLICATIONS

- Test and Measurement Instrumentation
- Portable/Lightweight Systems
- Special Antenna Range Measurement Systems
- Laboratory Test Bench Microwave Source



LC-1, p. 16-21

DESCRIPTION

The AvanteK Low Unit Cost series of YIG-tuned oscillators has been designed specifically for the next generation commercial applications. These small, lightweight, low-cost units are an excellent alternative to the more conventional 1.75 inch diameter units.

The units consist of a Yttrium Iron Garnet sphere coupled with an AvanteK silicon bipolar transistor followed by an AvanteK GaAs FET MMIC amplifier for +13 dBm minimum power output. This low cost Yig-tuned oscillator series has been designed with single input bias and requires no Yig heater power. Inherent to the small size is the low coil inductance which provides for tuning speeds two to three times faster than conventional 1.75" dia. YTOs.

ELECTRICAL AND PERFORMANCE SPECIFICATIONS

Guaranteed Specifications at +25°C Case Temperature (unless otherwise noted)

Model No.	AV-7036	AV-7028
Frequency Range, Min:	3.0 to 6.0 GHz	2.0 to 8.0 GHz
Power Output (50-ohm load), Min:	+13 dBm	+13 dBm
Power Variation (Over Frequency Range) Max:	4.0 dB	6.0 dB
Operating Temperature Range (Case Temperature):	0 to +50°C	0 to +50°C
Frequency Drift Over Temperature, Typ:	5.0 MHz	10.0 MHz
Pulling Figure (12 dB Return Loss), Typ:	0.2 MHz	0.2 MHz
Pushing Figure, +15 VDC Supply, Typ:	0.1 MHz/V	0.1 MHz/V
Magnetic Susceptibility @ 60 Hz, Typ:	150 kHz/Gauss	150 kHz/Gauss
2nd Harmonic, Min:	-8 dBc	-8 dBc
3rd Harmonic, Typ:	-14 dBc	-14 dBc
Spurious Output, Min:	-50 dBc	-50 dBc
SSB Phase Noise (@ 20 KHz From Carrier), Typ:	-100 dBc/Hz	-100 dBc/Hz
(@ 100 KHz From Carrier), Typ:	-120 dBc/Hz	-120 dBc/Hz
Main Tuning Port Characteristics		
Sensitivity:	20 MHz/mA ± 15%	20MHz/mA ± 15%
Bandwidth (3 dB), Typ:	5 kHz	5 kHz
Linearity, Typ:	±0.02%	±0.10%
Hysteresis, Typ:	5 MHz	8 MHz
Input Impedance, Typ. @ 1kHz:	7.3 ohms in series with 32 mH	7.3 ohms in series with 32 mH
FM Port Characteristics		
Sensitivity, Typ:	310 kHz/mA	310 kHz/mA
Bandwidth (3 dB), Typ:	200 kHz	200 kHz
Deviation at 3 dB Bandwidth, Max:	40 MHz	40 MHz
Input Impedance, Typ.:	0.3 ohms in series with 1.4 μH	0.3 ohms in series with 1.4 μH
DC Circuit Power, Max		
+15V DC ± 0.5V DC:	100 mA	100 mA
Weight, Max:	1.8 oz.	1.8 oz.
Case Style:	LC-1	LC-1

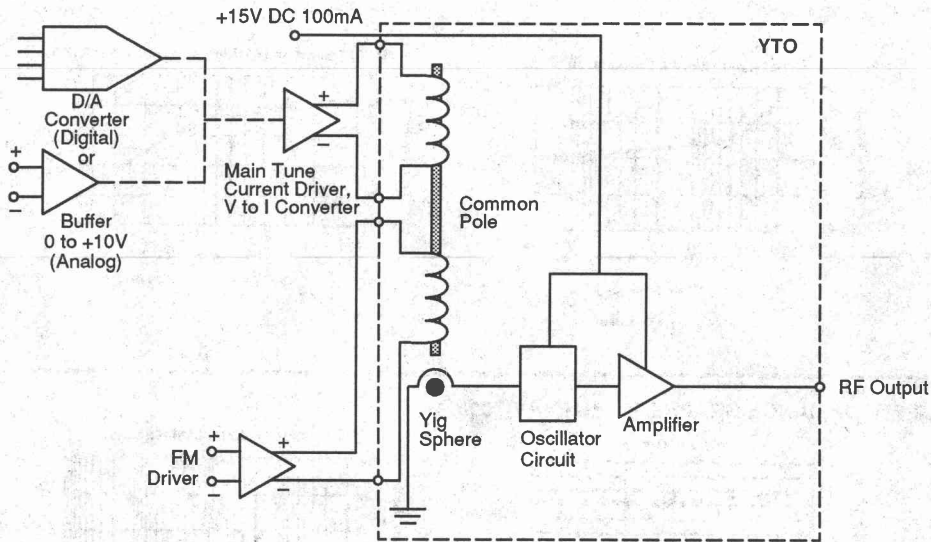
MAXIMUM RATINGS

DC Voltage	+20 VDC, Max.
FM Tuning Current, Max.	300 mA Max.
Operating Case Temperature	0°C to +50°C
Storage Temperature	-10°C to +65°C

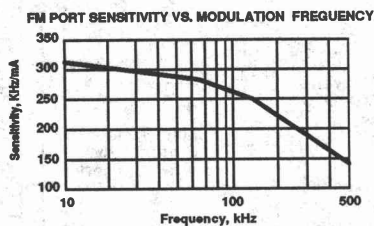
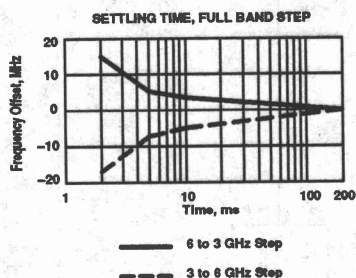
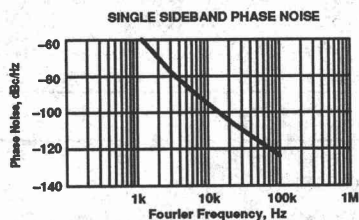
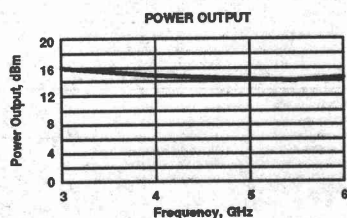
WEIGHT: 1.8 oz./51 grams

BLOCK DIAGRAM

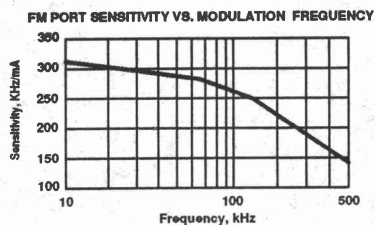
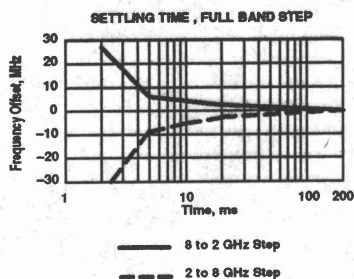
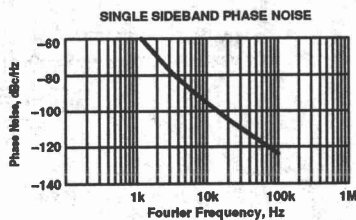
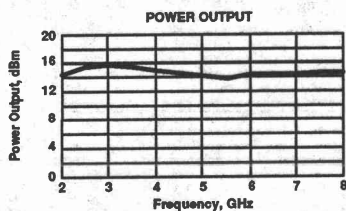
Basic Digital/Analog Driver Hookup to a YTO



TYPICAL PERFORMANCE GRAPHS @ +25°C AV-7036

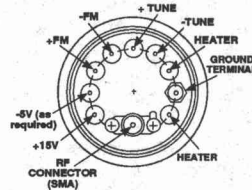


TYPICAL PERFORMANCE GRAPHS @ +25°C AV-7028

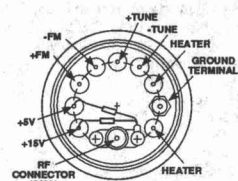


FEATURES

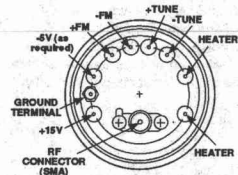
- 2 to 18 GHz Frequency Coverage
- Designed to MIL-E1-5400 and -16400
- Rugged Hermetic Thin-Film Construction
- $\pm 0.05\%$ to $+0.2\%$ Tuning Linearity
- High Rate FM and Phase Lock Capability
- Frequency Stable Under Severe Vibration
- -54° to $+85^\circ\text{C}$ Temperature Range



M4-45, p. 16-24



M4-38, p. 16-23



M3-60, p. 16-24

DESCRIPTION

The Avantek® AV Series Extended Temperature Range fundamental oscillators are extremely compact and lightweight, yet are designed and manufactured to offer excellent performance and high MTBFs over the -54° to $+85^\circ\text{C}$ temperature range. They meet the environmental conditions of MIL-E-5400 and MIL-E-16400.

This family of truly ruggedized YTOs offers complete 2 to 18 GHz frequency coverage. They are ideal for systems requiring signal sources with moderate power levels, excellent tuning linearity, low spurious outputs and a flat power out vs. frequency characteristic.

Greater Than 70,000 Hours MTBF Under Missile Launch Conditions

As an indication of the inherent reliability of the Avantek family of these YTOs, the MTBF of the AV-7214 (2 to 4 GHz) is calculated at 73,900 hours at 71°C under the most severe

condition of MIL-HDBK-217B (M_L —missile launch). Even at temperatures which exceed the normal guaranteed operating range, the MTBF still remains high. For example, under the same M_L conditions, the MTBF of the AV-7214 is 46,600 hours at 100°C .

Resistant To Shock And Vibration

Under the conditions of MIL-STD-810C (method 516.2, procedure 4, figure 516.2-2), with a shock of 50G for 11 ms or 300G for 3 ms, there is no degradation, before and after, of the performance of the AV-7214. The incidental frequency stability of the AV-7214 is equal to or better than 200 kHz with a vibration of 10-2500 Hz at 45G, MIL-STD-202, method 204, test condition E. Note that the mounting and cabling of the oscillator during the vibration test is critical—consult the Avantek factory for information on the procedures for duplicating this test.

YIG-Tuned Oscillators

Extended Temperature Range Octave Band

YIG-TUNED OSCILLATORS, EXTENDED TEMPERATURE RANGE, OCTAVE BAND

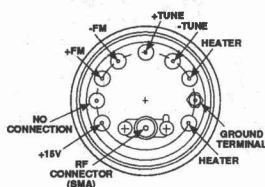
Guaranteed Specifications at -54° to +85°C Case Temperature (Unless Otherwise Noted)

Model No.	AV-7214	AV-7413	AV-7418	AV-77111
Frequency Range, Min.	2-4 GHz	4-8 GHz	4-8 GHz	7-11 GHz
Power Output into 50-ohm Load, Min./Max.	+17 dBm/+23 dBm	+8 dBm/+20 dBm	+14.8 dBm/+23 dBm	+17 dBm/+24 dBm
Frequency Drift Over Operating Temperature, Max.	20 MHz	40 MHz	40 MHz	40 MHz
Pulling Figure (12 dB Return Loss), Typ.	0.5 MHz	0.5 MHz	0.5 MHz	0.5 MHz
Pushing Figure, +15 VDC Supply, Typ.	0.1 MHz/V	0.5 MHz/V	0.1 MHz/V	0.1 MHz/V
-5 VDC Supply, Typ.	1.5 MHz/V	1.5 MHz/V	1.5 MHz/V	N/A
Magnetic Susceptibility @ 60 Hz, Typ.	70 kHz/Gauss	50 kHz/Gauss	50 kHz/Gauss	50 kHz/Gauss
2nd Harmonic, Min.	-12 dBc	-12 dBc	-12 dBc	-12 dBc
3rd Harmonic, Min.	-20 dBc	-15 dBc	-12 dBc	-15 dBc
Spurious Output, Min.	-60 dBc	-60 dBc	-60 dBc	-60 dBc
Main Tuning Port Characteristics				
Sensitivity	15±0.8 MHz/mA	15±0.8 MHz/mA	15±0.8 MHz/mA	20±1 MHz/mA
3 dB Bandwidth, Typ.	5 kHz	5 kHz	5 kHz	5 kHz
Linearity, Typ.	±0.05%	±0.05%	±0.1%	±0.1%
Hysteresis, Typ.	3 MHz	6 MHz	6 MHz	6 MHz
Input Impedance @ 1 kHz, Typ.	7 ohms in series with 51 mH	7 ohms in series with 51 mH	7 ohms in series with 51 mH	7 ohms in series with 60 mH
FM Port Characteristics				
Sensitivity, Typ.	310 kHz/mA	310 kHz/mA	310 kHz/mA	450 kHz/mA
3 dB Bandwidth, Typ.	400 kHz	400 kHz	400 kHz	400 kHz
Deviation at 3 dB Bandwidth, Max.	60 MHz	60 MHz	60 MHz	70 MHz
Input Impedance @ 1 MHz, Typ.	1 ohm in series with 1.7 µH	1 ohm in series with 1.7 µH	1 ohm in series with 1.7 µH	.5 ohm in series with 2.0 µH
DC Circuit Power, Max.,				
+15±0.5V	200 mA	120 mA	200 mA	300 mA
-5.0±0.1V	60 mA	60 mA	60 mA	
+15±0.5/-3.5V				
YIG Heater Power				
Input Voltage Range	20 to 28 VDC	20 to 28 VDC	20 to 28 VDC	20 to 28 VDC
Power @ 25°C, Max.	1.5 watts	1.5 watts	1.5 watts	1.5 watts
Power @ -54°C, Max.	2.5 watts	2.5 watts	2.5 watts	2.5 watts
Weight, Max.	12 oz.	12 oz.	12 oz.	12 oz.
Case Style	M4-45	M4-38	M4-45	M4-45

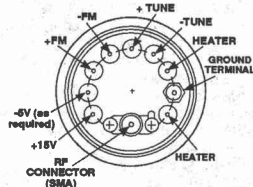
Model No.	AV-7814	AV-78112	AV-12118
Frequency Range, Min.	8-12.4 GHz	8-12.4 GHz	12-18 GHz
Power Output into 50-ohm Load, Min./Max.	+13 dBm/+24 dBm	+19 dBm/+24 dBm	+16 dBm/+23 dBm
Frequency Drift Over Operating Temperature, Max.	50 MHz	50 MHz	60 MHz
Pulling Figure (12 dB Return Loss), Typ.	0.5 MHz	1.0 MHz	1.0 MHz
Pushing Figure, +15 VDC Supply, Typ.	0.1 MHz/V	0.1 MHz/V	0.1 MHz/V
-5 VDC Supply, Typ.	N/A	N/A	N/A
Magnetic Susceptibility @ 60 Hz, Typ.	50 kHz/Gauss	50 kHz/Gauss	50 kHz/Gauss
2nd Harmonic, Min.	-10 dBc	-12 dBc	-15 dBc
3rd Harmonic, Min.	-15 dBc	-15 dBc	-
Spurious Output, Min.	-60 dBc	-60 dBc	-60 dBc
Main Tuning Port Characteristics			
Sensitivity	18±1 MHz/mA	18±1 MHz/mA	18±1 MHz/mA
3 dB Bandwidth, Typ.	5 kHz	5 kHz	5 kHz
Linearity, Typ.	±0.05%	±0.1%	±0.1%
Hysteresis, Typ.	6 MHz	6 MHz	9 MHz
Input Impedance @ 1 kHz, Typ.	6 ohms in series with 60 mH	6 ohms in series with 73 mH	6 ohms in series with 73 mH
FM Port Characteristics			
Sensitivity, Typ.	450 kHz/mA	450 kHz/mA	450 kHz/mA
3 dB Bandwidth, Typ.	1 MHz	1 MHz	1 MHz
Deviation at 3 dB Bandwidth, Max.	70 MHz	90 MHz	90 MHz
Input Impedance @ 1 MHz, Typ.	1 ohm in series with 2.3 µH	.5 ohm in series with 2.3 µH	.5 ohm in series with 2.3 µH
DC Circuit Power, Max.			
+15±0.5V/-3.5V	175 mA	275 mA	275 mA
YIG Heater Power			
Input Voltage Range	20 to 28 VDC	20 to 28 VDC	20 to 28 VDC
Power @ 25°C, Max.	1.5 watts	1.5 watts	1.5 watts
Power @ -54°C, Max.	2.5 watts	2.5 watts	2.5 watts
Weight, Max.	17 oz.	17 oz.	17 oz.
Case Style	M3-60	M3-60	M3-60

FEATURES

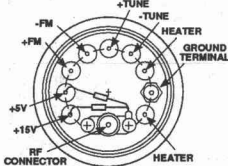
- 2 to 18 GHz Frequency Coverage
- Designed to MIL-E1-5400 and -16400
- Rugged Hermetic Thin-Film Construction
- $\pm 0.05\%$ to $\pm 0.2\%$ Tuning Linearity
- High Rate FM and Phase-Lock Capability
- Frequency Stable Under Severe Vibration
- -54° to $+85^\circ\text{C}$ Temperature Range



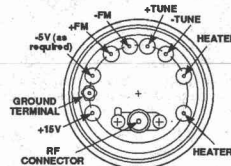
M1-45, p. 16-23



M4-45, p. 16-24



M4-38, p. 16-23



M3-45, M3-60, p. 16-24

DESCRIPTION

The Avantek® AV Series Extended Temperature Range fundamental oscillators are extremely compact and lightweight, yet are designed and manufactured to offer excellent performance and high MTBFs over the -54° to $+85^\circ\text{C}$ temperature range. They meet the environmental conditions of MIL-E-5400 and MIL-E-16400.

This family of truly ruggedized YTOs offers complete 2 to 18 GHz frequency coverage. They are ideal for systems requiring signal sources with moderate power levels, excellent tuning linearity, low spurious outputs and a flat power out vs. frequency characteristic.

Greater Than 70,000 Hours MTBF Under Missile Launch Conditions

As an indication of the inherent reliability of the Avantek family of these YTOs, the MTBF of the AV-7246 (2 to 6 GHz) is calculated at 73,900 hours at 71°C under the most severe

condition of MIL-HDBK-217B (M_L —missile launch). Even at temperatures which exceed the normal guaranteed operating range, the MTBF still remains high. For example, under the same M_L conditions, the MTBF of the AV-7246 is 46,600 hours at 100°C .

Resistant To Shock and Vibration

Under the conditions of MIL-STD-810C (method 516.2, procedure 4, figure 516.2-2), with a shock of 50G for 11 ms or 300G for 3 ms, there is no degradation, before and after, of the performance of the AV-7246. The incidental frequency stability of the AV-7246 is equal to or better than 200 kHz with a vibration of 10-2500 Hz at 45G, MIL-STD-202, method 204, test condition E. Note that the mounting and cabling of the oscillator during the vibration test is critical—consult the Avantek factory for information on the procedures for duplicating this test.

YIG-Tuned Oscillators

Extended Temperature Range Multi-Octave Band

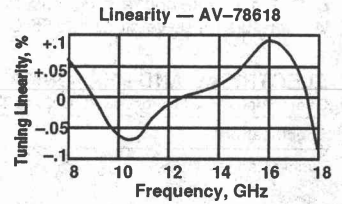
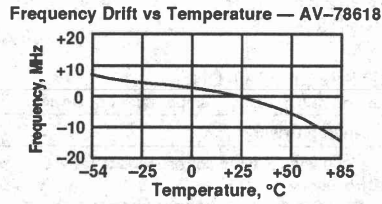
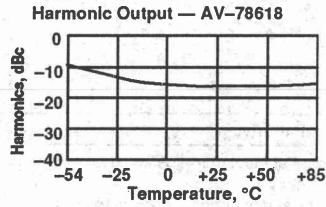
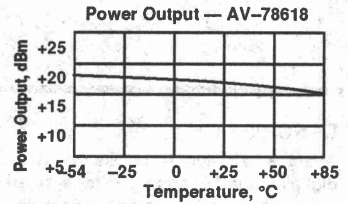
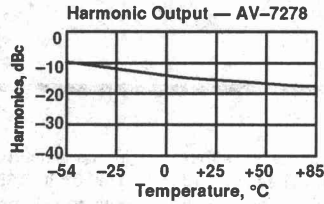
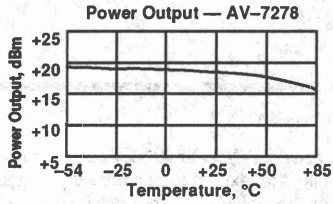
ELECTRICAL AND PERFORMANCE SPECIFICATIONS

Guaranteed Specifications at -54° to +85°C Case Temperature (Unless Otherwise Noted)

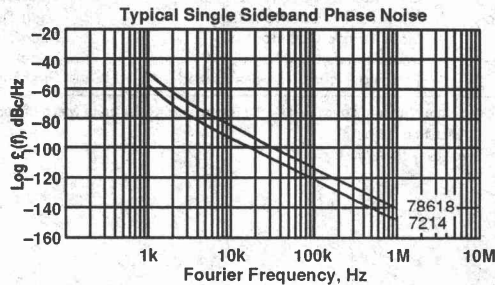
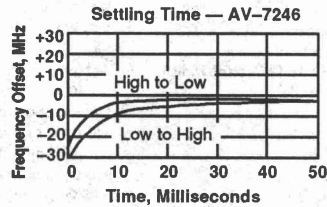
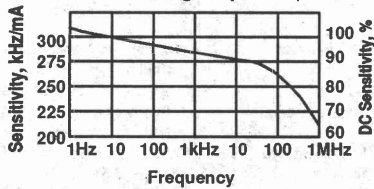
Model No.	AV-7114	AV-7246	AV-7218	AV-7278
Frequency Range, Min.	1-4 GHz	2-6 GHz	2-8 GHz	2-8 GHz
Power Output Into 50-ohm Load, Min./Max.	+13 dBm/+21 dBm	+16 dBm/+23 dBm	+5 dBm/+17 dBm	+14.8 dBm/+23 dBm
Frequency Drift Over Operating Temperature, Max.	20 MHz	30 MHz	40 MHz	40 MHz
Pulling Figure (12 dB Return Loss), Typ.	0.5 MHz	0.5 MHz	0.5 MHz	0.5 MHz
Pushing Figure, +15 VDC Supply, Typ.	0.5 MHz/V	0.1 MHz/V	0.5 MHz/V	0.1 MHz/V
-5 VDC Supply, Typ.	1.5 MHz/V	1.5 MHz/V	1.5 MHz/V	1.5 MHz/V
Magnetic Susceptibility @ 60 Hz, Typ.	50 kHz/Gauss	50 kHz/Gauss	50 kHz/Gauss	50 kHz/Gauss
2nd Harmonic, Min.	-12 dBc	-8 dBc	-5 dBc	-8 dBc
3rd Harmonic, Min.	-20 dBc	-12 dBc	-15 dBc	-12 dBc
Spurious Output, Min.	-60 dBc	-60 dBc	-60 dBc	-60 dBc
Main Tuning Port Characteristics				
Sensitivity	+15±0.8 MHz/mA	15±.8 MHz/mA	15±0.8 MHz/mA	15±.8 MHz/mA
3 dB Bandwidth, Typ.	5 kHz	5 kHz	5 kHz	5 kHz
Linearity, Typ.	±.15%	±0.1%	±0.1%	±0.1%
Hysteresis, Typ.	3 MHz	6 MHz	9 MHz	9 MHz
Input Impedance @ 1 kHz, Typ.	10 Ohms in series with 42 mH	7 ohms in series with 51 mH	7 ohms in series with 51 mH	7 ohms in series with 60 mH
FM Port Characteristics				
Sensitivity, Typ.	310 kHz/mA	310 kHz/mA	310 kHz/mA	310 kHz/mA
3 dB Bandwidth, Typ.	800 kHz	800 kHz	800 kHz	800 kHz
Deviation at 3 dB Bandwidth, Max.	50 MHz	60 MHz	60 MHz	60 MHz
Input Impedance @ 1 kHz, Typ.	1 ohm in series with 1.7 µH	1 ohm in series with 1.7 µH	1 ohm in series with 1.7 µH	1 ohm in series with 1.7 µH
DC Circuit Power, Max., +15±0.5V	150 mA	200 mA	120 mA	200 mA
-5±0.1V	50 mA	60 mA	60 mA	60 mA
YIG Heater Power				
Input Voltage Range	20 to 28 VDC	20 to 28 VDC	20 to 28 VDC	20 to 28 VDC
Power @ 25°C, Max.	1.5 watts	1.5 watts	1.5 watts	1.5 watts
Power @ -54°C, Max.	2.5 watts	2.5 watts	2.5 watts	2.5 watts
Weight, Max.	8 oz.	12 oz.	12 oz.	12 oz.
Case Style	M1-45	M4-45	M4-38	M4-45

Model No.	AV-76118	AV-77116	AV-78418	AV-78618
Frequency Range, Min.	6-18 GHz	7-16 GHz	8-18 GHz	8-18 GHz
Power Output Into 50-ohm Load, Min./Max.	+13 dBm/+23 dBm	+16 dBm/+24 dBm	+13 dBm/+24 dBm	+16 dBm/+24 dBm
Frequency Drift Over Operating Temperature, Max.	60 MHz	50 MHz	70 MHz	60 MHz
Pulling Figure (12 dB Return Loss), Typ.	1.0 MHz	0.5 MHz	0.5 MHz	1.0 MHz
Pushing Figure, +15 VDC Supply, Typ.	0.1 MHz/V	0.1 MHz/V	0.1 MHz/V	0.1 MHz/V
Magnetic Susceptibility @ 60 Hz, Typ.	50 kHz/Gauss	50 kHz/Gauss	50 kHz/Gauss	50 kHz/Gauss
2nd Harmonic, Min.	-8 dBc	-12 dBc	-10 dBc	-10 dBc
3rd Harmonic, Min.	-8 dBc	-15 dBc	-15 dBc	-15 dBc
Spurious Output, Min.	-60 dBc	-60 dBc	-60 dBc	-60 dBc
Main Tuning Port Characteristics				
Sensitivity	+18±1 MHz/mA	20±1 MHz/mA	18±1 MHz/mA	18±1 MHz/mA
3 dB Bandwidth, Typ.	5 kHz	5 kHz	5 kHz	5 kHz
Linearity, Typ.	±0.25%	±0.1%	±0.1%	±0.1%
Hysteresis, Typ.	18 MHz	13 MHz	15 MHz	15 MHz
Input Impedance @ 1 kHz, Typ.	6 ohms in series with 73 mH	9 ohms in series with 60 mH	6 ohms in series with 73 mH	6 ohms in series with 73 mH
FM Port Characteristics				
Sensitivity, Typ.	450 kHz/mA	450 kHz/mA	450 kHz/mA	450 kHz/mA
3 dB Bandwidth, Typ.	1 MHz	400 kHz	1 MHz	1 MHz
Deviation at 3 dB Bandwidth, Max.	90 MHz	70 MHz	90 MHz	90 MHz
Input Impedance @ 1 kHz, Typ.	.5 ohm in series with 2.3 µH	.5 ohm in series with 2.0 µH	.5 ohm in series with 2.3 µH	.5 ohm in series with 2.3 µH
DC Circuit Power, Max., +15±0.5/-3.5V	275 mA	300 mA	175 mA	275 mA
YIG Heater Power				
Input Voltage Range	20 to 28 VDC	20 to 28 VDC	20 to 28 VDC	20 to 28 VDC
Power @ 25°C, Max.	1.5 watts	1.5 watts	1.5 watts	1.5 watts
Power @ -54°C, Max.	2.5 watts	2.5 watts	2.5 watts	2.5 watts
Weight, Max.	17 oz.	12 oz.	17 oz.	17 oz.
Case Style	M3-60	M4-45	M3-45	M3-60

TYPICAL PERFORMANCE @ 25°C Case Temperature



FM Port Sensitivity vs. Modulation Frequency
 (Typical all AV Series Without FM
 Feedthrough Capacitors)



DESCRIPTION

Avantek YIG-tuned oscillators are available with either digitally-tuned or analog voltage-tuned drivers. These drivers control the main tuning coil current via 12-bit digital logic or via an analog voltage, thus eliminating the need to build and align tuning current sources.

Both the digital and analog drivers are available in two temperature range version; 0° to 65°C and -54° to +85°C. The

former is used with any Avantek YIG-tuned devices specified over 0° to +65°C, while the extended temperature range version will meet all of the environmental specifications of Avantek's militarized YIG-tuned devices, including operation over the -54° to +85°C temperature range.

ELECTRICAL AND PERFORMANCE SPECIFICATIONS

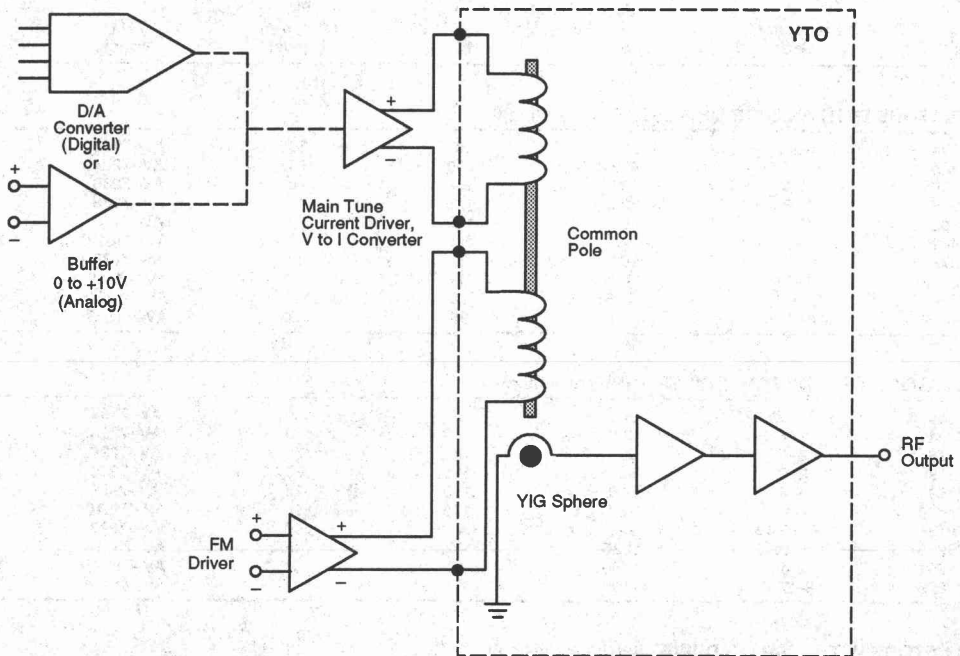
Guaranteed Specifications at 25°C Case Temperature (Operating Temperature Per Device)

Specification ¹	Analog Driver	Digital Driver
Tuning Range	0.000 volts at input corresponds to lowest frequency 10.000 volts at input corresponds to highest frequency	All zeros at input corresponds to lowest frequency All ones at input corresponds to highest frequency
Tuning Accuracy: at 25°C on baseplate, 1/2 hour after turn-on, excluding hysteresis and non-linearity Resolution	±(0.1% of frequency + 2 MHz)	±(0.1% of frequency + 2 MHz)
Interface Logic	NA	12 bit positive true logic for increasing frequency
Tuning Input Resistance	NA	TTL or CMOS
Common Mode Rejection	≥10 kΩ	NA
Residual FM: (15 Hz-15 kHz bandwidth)	≥40 dB	NA
Non-Linearity	4x10 ⁻⁶ of oscillator frequency in hertz +40 kHz, typ.	4x10 ⁻⁶ of oscillator frequency in hertz +40 kHz, typ.
Pushing: +15 Volts:	Device specification applies	±(1/2 bit + device non-linearity)
-15 Volts:	±(0.01% of frequency + 1 MHz + oscillator pushing)/volt, typ.	±(0.001% of frequency + 0.1 MHz + oscillator pushing)/volt, typ.
Power Supply Voltage:	±(0.01% of frequency + 1 MHz)/volt, typ.	±(0.001% of frequency + 1 MHz)/volt, typ.
Power Supply Current: ²	±15 volts: ±5%	±15 volts: ±5%
+15 Volts:	Oscillator bias current + tuning current at max freq +30 mA	Oscillator bias current + tuning current at max freq +40 mA
-15 Volts:	(Current requirement of -5 volts of oscillator if present +30 mA)	(Current requirement of -5 volts of oscillator if present +40 mA)
Weight	Oscillator weight +12 oz.	Oscillator weight +13 oz.
Device Specifications That Do Not Apply	Main Tuning Coil Sensitivity	Main Tuning Coil Sensitivity
	Main Tuning Coil Input Impedance at 1 kHz	Main Tuning Coil Input Impedance at 1 kHz
	Pushing Figure, -5 volts if used	Pushing Figure, -5 volts if used

NOTES: 1. These specifications are in addition to the standard specifications for the basic YIG device to which the driver is coupled except as noted.

$$2. \text{ Tuning current at max freq is: } \frac{\text{Max freq (MHz)}}{\text{Sensitivity (MHz/mA)}} = \text{Max current (mA)}$$

Block Diagram



Basic Digital/Analog Driver Hookup to a YTO

YIG-Tuned Oscillators With Analog or Digital Drivers

YIG-TUNED OSCILLATORS WITH DRIVERS

Guaranteed Specifications at 25°C Case Temperature (Operating Temperature Per Device)

Model Number	Frequency (GHz)	Power Supply Current (mA), Max.		Residual FM (kHz, p-p) Typical	YTO Model	Case Type
		+15 V	-15 V			
OSCILLATORS WITH ANALOG DRIVERS (Partial Listing) ¹						
AVD-7104	1-2.2	300	30	50	AV-7104	AD 1
AVD-7224	2-4	400	100	60	AV-7224	AD 1
AVD-7236	2-6	500	30	70	AV-7236	AD 1
AVD-7238	2-8	625	125	75	AV-7238	AD 1
AVD-7453	4-8	600	100	75	AV-7453	AD 1
AVD-74010	4-10	725	100	80	AV-74010	AD 1
AVD-7873	8-12.4	900	30	90	AV-7873	AD 2
AVD-78218	8-18	1200	30	120	AV-78218	AD 2
AVD-71261	12-18	1225	30	120	AV-71261	AD 2
AVD-71826	18-26.5	1075	30	150	AV-71826	AD 2

OSCILLATORS WITH DIGITAL DRIVERS (Partial Listing)¹

ADD-7104	1-2.2	300	40	50	AV-7104	DD 1
ADD-7224	2-4	400	100	60	AV-7224	DD 1
ADD-7236	2-6	525	40	70	AV-7236	DD 1
ADD-7238	2-8	650	125	75	AV-7238	DD 1
ADD-7453	4-8	600	100	75	AV-7453	DD 1
ADD-74010	4-10	750	100	80	AV-74010	DD 1
ADD-7873	8-12.4	925	40	90	AV-7873	DD 2
ADD-78218	8-18	1225	40	120	AV-78218	DD 2
ADD-71261	12-18	1250	40	120	AV-71261	DD 2
ADD-71826	18-26.5	1100	40	150	AV-71826	DD 2

OSCILLATORS WITH ANALOG DRIVERS (Partial Listing)¹

AVD-7214	2-4	400	100	60	AV-7214	AD 2
AVD-7218	2-8	700	100	75	AV-7218	AD 2
AVD-7413	4-8	700	100	75	AV-7413	AD 2
AVD-7814	8-12.4	900	40	90	AV-7814	AD 2
AVD-78418	8-18	1225	40	120	AV-78418	AD 2
AVD-71214	12-18	1225	40	120	AV-71214	AD 2

OSCILLATORS WITH DIGITAL DRIVERS (Partial Listing)¹

ADD-7214	2-4	400	125	60	AV-7214	DD 2
ADD-7218	2-8	725	125	75	AV-7218	DD 2
ADD-7413	4-8	725	125	75	AV-7413	DD 2
ADD-7814	8-12.4	925	50	90	AV-7814	DD 2
ADD-78418	8-18	1225	50	120	AV-78418	DD 2
ADD-71214	12-18	1225	50	120	AV-71214	DD 2

NOTE: 1. Due to the large number of YTOs available with drivers, only a partial listing is provided with a selection of units covering a broad frequency spectrum.

UNITS NOT AVAILABLE WITH ANALOG OR DIGITAL DRIVER

AV-7204

AV-26040 (Available in digital only as special request)

AV-33050

AV-7298 AV-72810 AV-12018 AV-76318 AV-78012 AV-78718	} CONSULT FACTORY
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