

APPLICATION NOTES

I. PACKAGED FETS and MODULES

A. HANDLING PRECAUTIONS

GaAs FETS are sensitive to electrostatic discharge. Fujitsu ships all GaAs FETs in electrostatic protection packaging. User must pay careful attention to the following precautions when taking FETs out of their packaging.

- 1) Personnel handling GaAs FETs should be properly grounded by a wristlet chain or equivalent.
- 2) When mounting the FET in a circuit, the circuit gate and drain connections should be shorted to ground.
- 3) When soldering the FET leads, an iron with a grounded tip is required.

B. CIRCUIT INSTALLATION

1) Screw Mounting

The flange may be attached using screws. Recommended torque is given in the table below.

Package	Recommended torque	Maximum torque
IB	4.5 Kg-cm (3.9 lb-in)	5.0 Kg-cm (4.3 lb-in)
GA, GJ, IA, IK, IL ME, MG, MK	2.5 Kg-cm (2.2 lb-in)	3.0 Kg-cm (2.6 lb-in)
MH, WF, WG	0.8 Kg-cm (0.7 lb-in)	1.0 Kg-cm (0.9 lb-in)

Table I-1

- 2) Solder Mounting - The recommended soldering procedure is as follows:
 - a. The amplifier case or heat sink should be made of copper or aluminum and its surface nickel or tin plated.
 - b. Prior to soldering, the FET and the amplifier case should be cleaned using acetone followed by an isopropyl alcohol rinse.
 - c. Recommended solder is Sn62 Tin-Lead solder (Tin 62%).
 - d. Recommended soldering temperature is 220~230°C for 10~20 seconds with appropriate pre-heating. Do not exceed 260°C for 20 sec.
 - e. During reflow, pressure on the FET is recommended to minimize solder thickness. The gate terminal and drain terminal should be electrically shorted to the source to prevent ESD problems.
 - f. Type R or RMA flux is recommended. After soldering, the flux residue should be removed by appropriate cleaning methods.

CAUTION: Silicon based heat sink compounds should not be used. They cause poor grounding of the source flange, contamination and long term degradation of thermal resistance between the FET package and heat sink.

C. PACKAGE MARKINGS

Fujitsu marking for SL (commercial) grade devices consists of manufacturers name, part number, and lot number.

Manufacturers Name : \overline{F} or \overline{F} JAPAN

Part Number : 4 to 9 digits

Lot Number : 2 Letters (Year code and Month code)

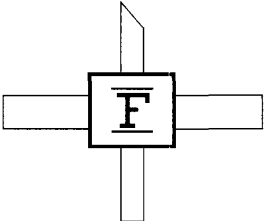
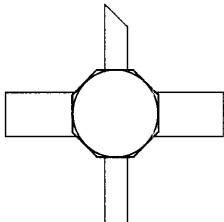
1st Letter : Year code

2nd Letter : Month code

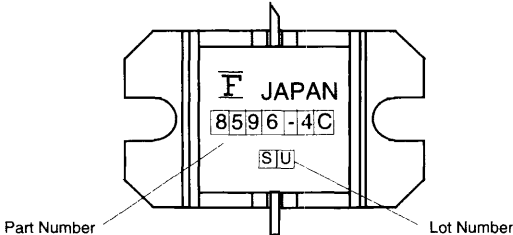
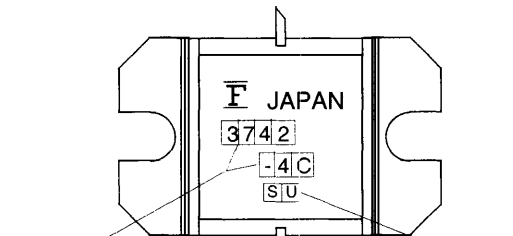
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Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004

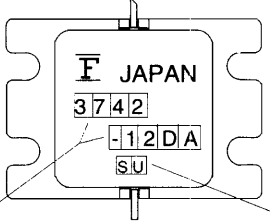
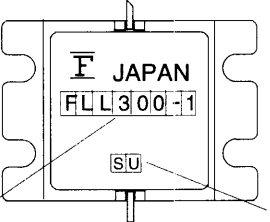
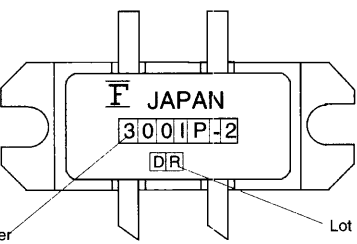
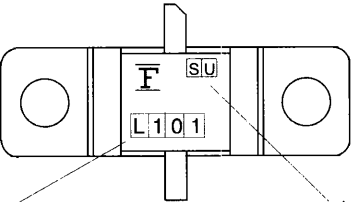
Code	H	M	N	P	R	S	T	U	W	X	Y	Z
Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.

Marking of each device is performed as follows:

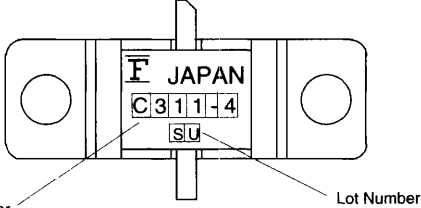
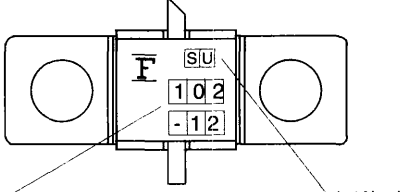
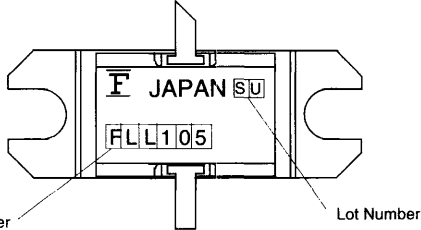
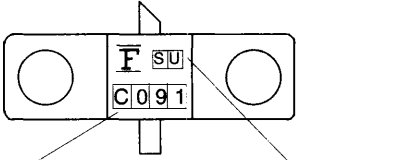
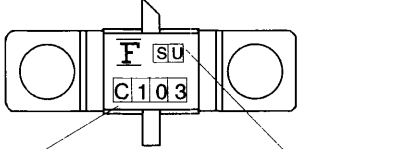
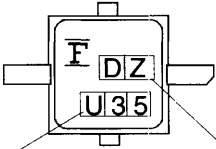
Package Marking Format	Part Number	Marking of Part Number
 <p>Case Style "FH"</p>	<p>FHR02FH FLR016FH FLR026FH</p>	<p>none</p>
 <p>Case Style "LG"</p>	<p>FHC40LG FHX04LG FHX05LG FHX06LG FHX13LG FHX14LG FHX35LG FSX017LG FSU01LG</p>	<p>See "LG PACKAGE MARKING" at the end of this section</p>

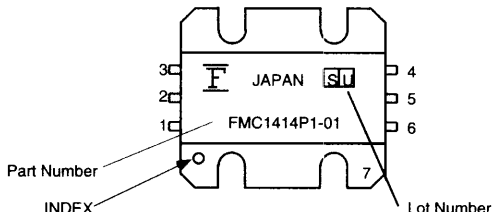
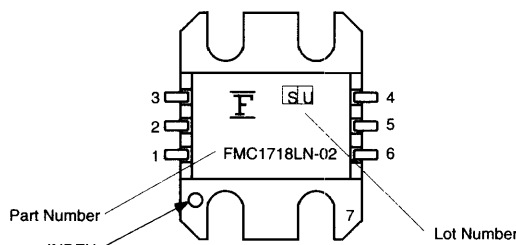
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Package Marking Format	Part Number	Marking of Part Number
 <p style="text-align: center;">Case Style "IA"</p>	FLM1011-2 FLM1011-4C/4D FLM1011-6F FLM1213-4C FLM1213-6F FLM1213-8C FLM1414-2 FLM1414-4C FLM1414-6F FLM1414-8C FLM8596-4C FLM0910-2 FLM0910-4C	1011-2 1011-4C/4D 1011-6F 1213-4C 1213-6F 1213-8C 1414-2 1414-4C 1414-6F 1414-8C 8596-4C 0910-2 0910-4C
 <p style="text-align: center;">Case Style "IB"</p>	FLL200IB-1 FLL200IB-2 FLL200IB-3 FLM1011-8C/8D FLM1011-12F FLM1213-12F FLM1414-12F FLM3742-4C/4E FLM3742-8C/8E FLM4450-4C/4E FLM4450-8C/8E FLM5359-4C FLM5359-8C FLM5964-4C/4D FLM5964-6D FLM5964-8C/8D FLM6472-4C/4D FLM6472-6D FLM6472-8C/8D FLM7177-4C/4D FLM7177-8C/8D FLM7785-4C/4D FLM7785-8C/8D FLM8596-8C FLM0910-8C	FLL200-1 FLL200-2 FLL200-3 1011-8C/8D 1011-12F 1213-12F 1414-12F 3742-4C/4E 3742-8C/8E 4450-4C/4E 4450-8C/8E 5359-4C 5359-8C 5964-4C/4D 5964-6D 5964-8C/8D 6472-4C/4D 6472-6D 6472-8C/8D 7177-4C/4D 7177-8C/8D 7785-4C/4D 7785-8C/8D 8596-8C 0910-8C

Package Marking Format	Part Number	Marking of Part Number
 <p>Case Style "IK"</p>	FLM2527L-20 FLM3742-12DA FLM3742-18DA FLM3742-25DA FLM4450-12DA FLM4450-18DA FLM4450-25DA FLM5964-12DA FLM5964-18DA FLM5964-25DA FLM5964-35DA FLM6472-12DA FLM6472-18DA FLM6472-25DA FLM6472-35DA FLM7177-12DA FLM7177-18DA FLM7785-12DA FLM7785-18DA	2527L-20 3742-12DA 3742-18DA 3742-25DA 4450-12DA 4450-18DA 4450-25DA 5964-12DA 5964-18DA 5964-25DA 5964-35DA 6472-12DA 6472-18DA 6472-25DA 6472-35DA 7177-18DA 7177-12DA 7785-12DA 7785-18DA
 <p>Case Style "IL"</p>	FLL300IL-1 FLL300IL-2 FLL300IL-3	FLL300-1 FLL300-2 FLL300-3
 <p>Case Style "IP"</p>	FLL300IP-2	300IP-2
 <p>Case Style "ME"</p>	FLL101ME FLL171ME FLL351ME	L101 L171 L351

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Package Marking Format	Part Number	Marking of Part Number
 <p style="text-align: center;">Case Style "MG"</p>	FLC311MG-4	C311-4
 <p style="text-align: center;">Case Style "MH"</p>	FLC253MH-6 FLC253MH-8 FLX102MH-12 FLX202MH-12 FLK102MH-14 FLK202MH-14	253-6 253-8 102-12 202-12 102-14 202-14
 <p style="text-align: center;">Case Style "MK"</p>	FLL55MK FLL105MK FLL120MK	FLL55 FLL105 FLL120
 <p style="text-align: center;">Case Style "WF"</p>	FLC091WF FLC161WF FLK012WF FSX017WF FSX51WF FSX52WF	C091 C161 K012 X017 X51 X52
 <p style="text-align: center;">Case Style "WG"</p>	FLC053WG FLC103WG FLK022WG FLK052WG	C053 C103 K022 K052
 <p style="text-align: center;">Case Style "XM"</p>	FLU10XM FLU17XM FLU35XM	U10 U17 U35

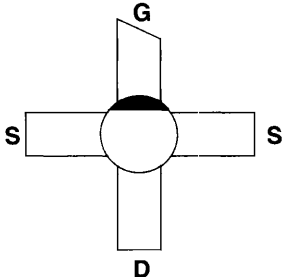
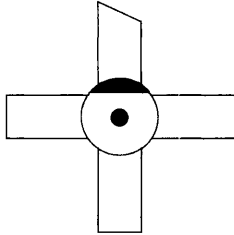
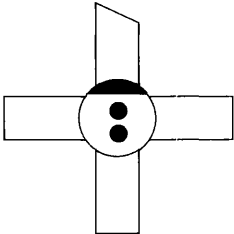
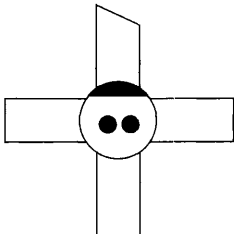
Package Marking Format	Part Number	Marking of Part Number
 <p style="text-align: center;">Case Style "GA"</p>	<p>FMC1414P1-02 FMC141401-02 FMC141501-01</p>	<p>FMC1414P1-02 FMC141401-02 FMC141501-01</p>
 <p style="text-align: center;">Case Style "GJ"</p>	<p>FMC1718LN-02 FMC1718C6-02 FMC1718P1-01 FMC1718P5-01 FMC171801-01 FMC1819LN-02 FMC1819C6-02 FMC1819P1-01 FMC1819P5-01 FMC181901-01 FMC2122LN-03 FMC2122C6-03 FMC2122P1-02 FMC2122P5-01 FMC2223LN-03 FMC2223C6-03 FMC2223P1-02 FMC2223P5-01</p>	<p>FMC1718LN-02 FMC1718C6-02 FMC1718P1-01 FMC1718P5-01 FMC171801-01 FMC1819LN-02 FMC1819C6-02 FMC1819P1-01 FMC1819P5-01 FMC181901-01 FMC2122LN-03 FMC2122C6-03 FMC2122P1-02 FMC2122P5-01 FMC2223LN-03 FMC2223C6-03 FMC2223P1-02 FMC2223P5-01</p>

3.

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LG PACKAGE MARKING

The Fujitsu LG packages are identified by the color stripes and dots given below.

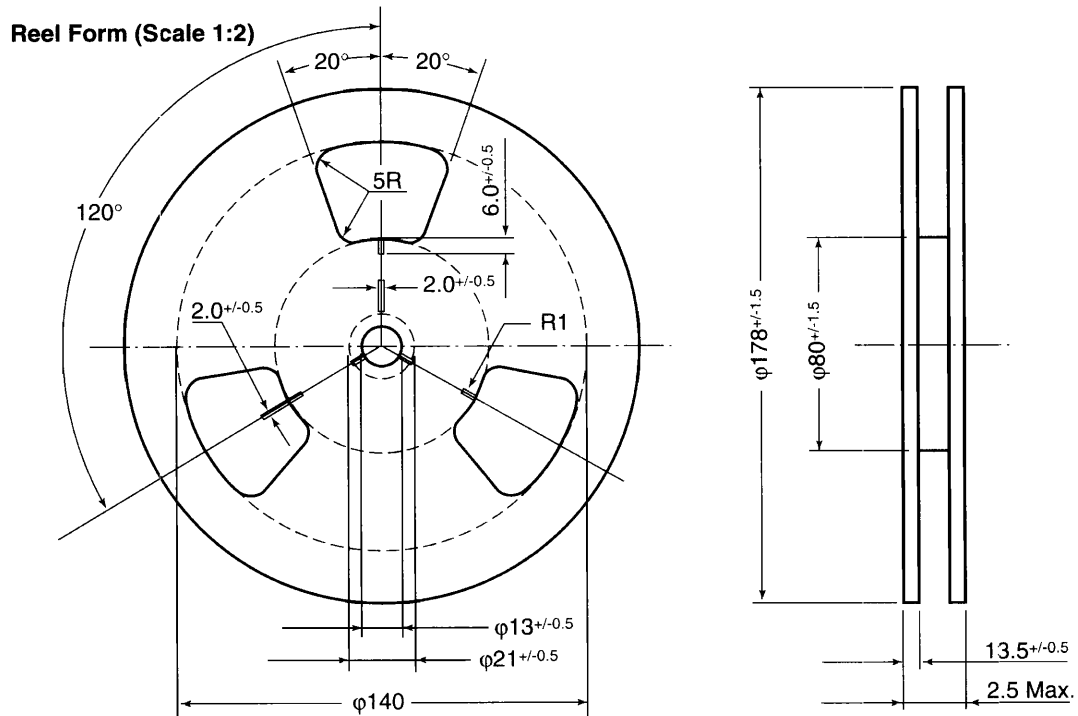
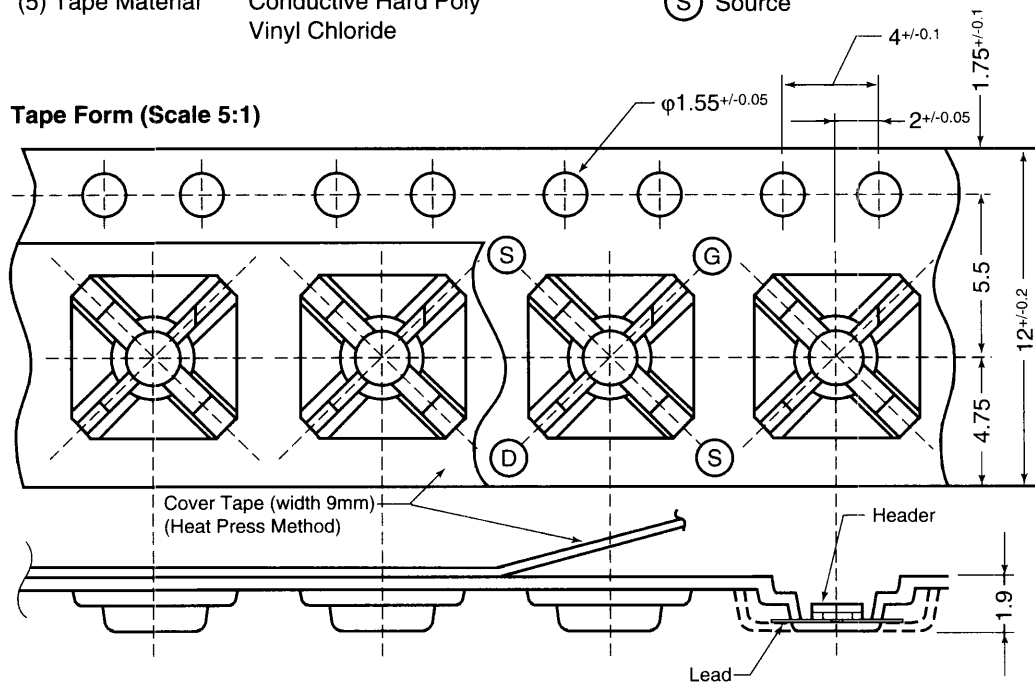
Marking Format	Part Number	Color
	FHX13LG FHX04LG FHX35LG FHC40LG	PURPLE RED BROWN BLACK
	FHX14LG FHX05LG	PURPLE RED
	FHX06LG	RED
	FSX017LG FSU01LG	BLACK BLUE

D. TAPE AND REEL CONFIGURATION

Quantity 500 pcs(max.)/tape

- (1) Tape Width 12mm
- (2) Sprocket Pitch 4mm
- (3) FET Store Pitch 8mm
- (4) FET Store Qty. 500 pcs/Tape (max.)
- (5) Tape Material Conductive Hard Poly Vinyl Chloride

- (G) Gate
- (D) Drain
- (S) Source



3.

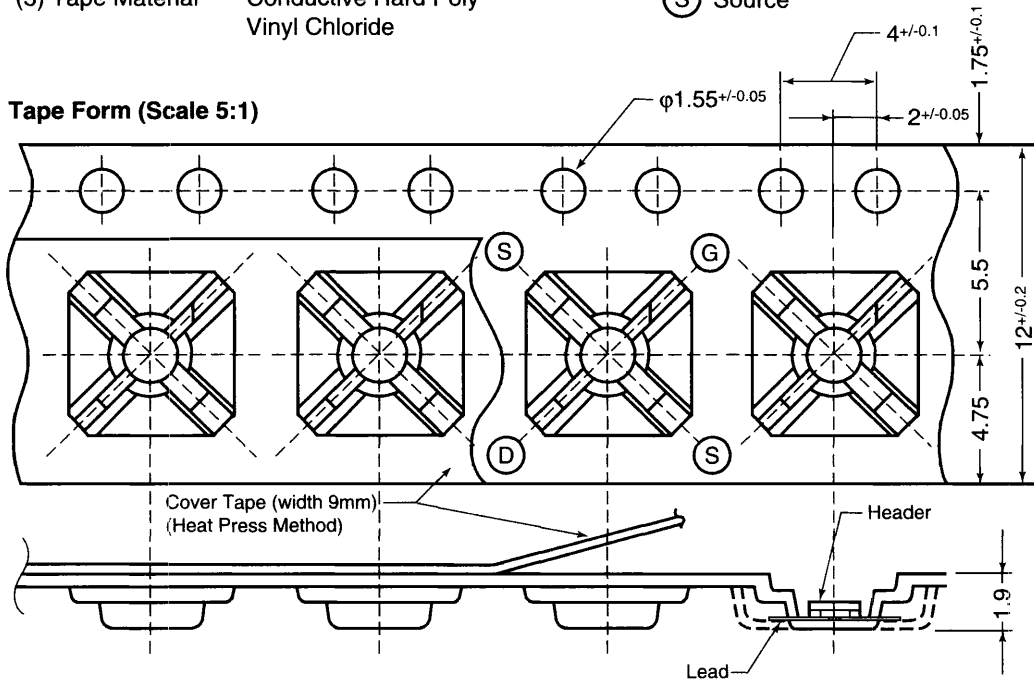
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Quantity 2500 pcs(max.)/tape

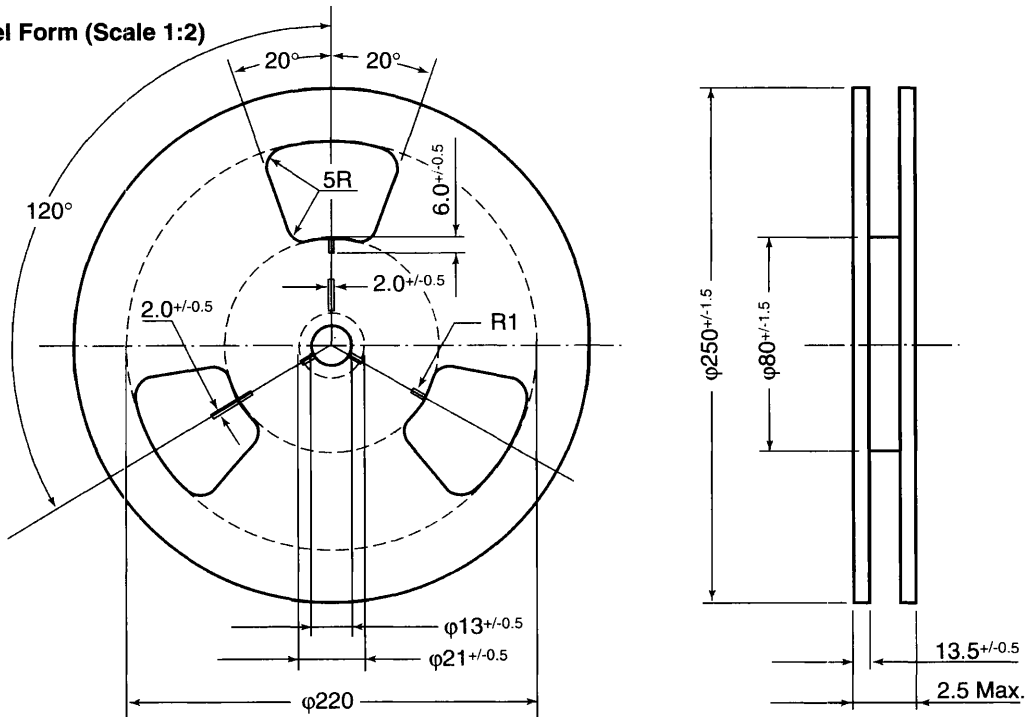
- (1) Tape Width 12mm
- (2) Sprocket Pitch 4mm
- (3) FET Store Pitch 8mm
- (4) FET Store Qty. 2500 pcs/Tape (max.)
- (5) Tape Material Conductive Hard Poly Vinyl Chloride

- ⊙ Gate
- ⊙ Drain
- ⊙ Source

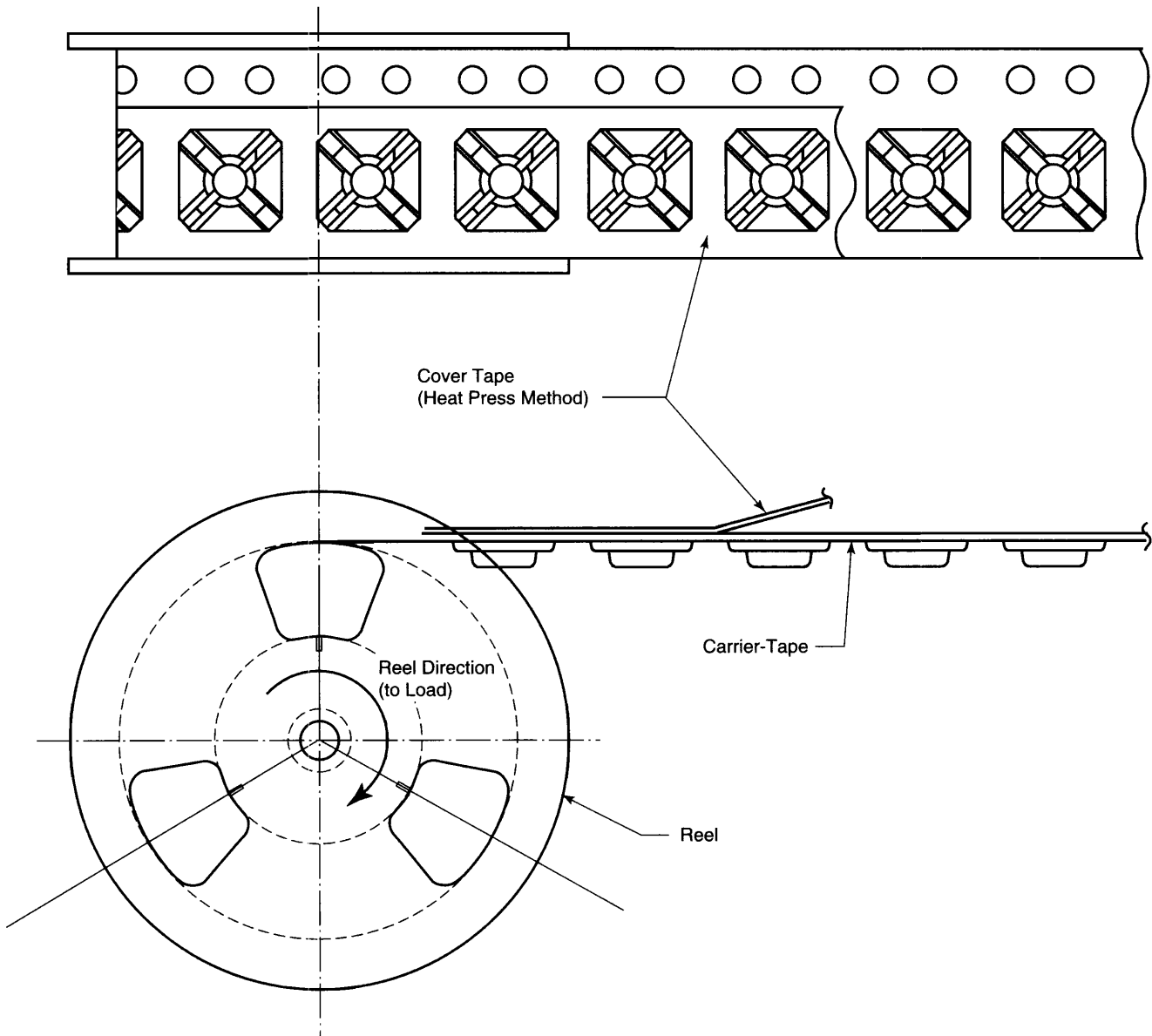
Tape Form (Scale 5:1)



Reel Form (Scale 1:2)



TAPE CARRIER DIRECTION



3.