

Tape and Reel Specifications and Packaging Specifications

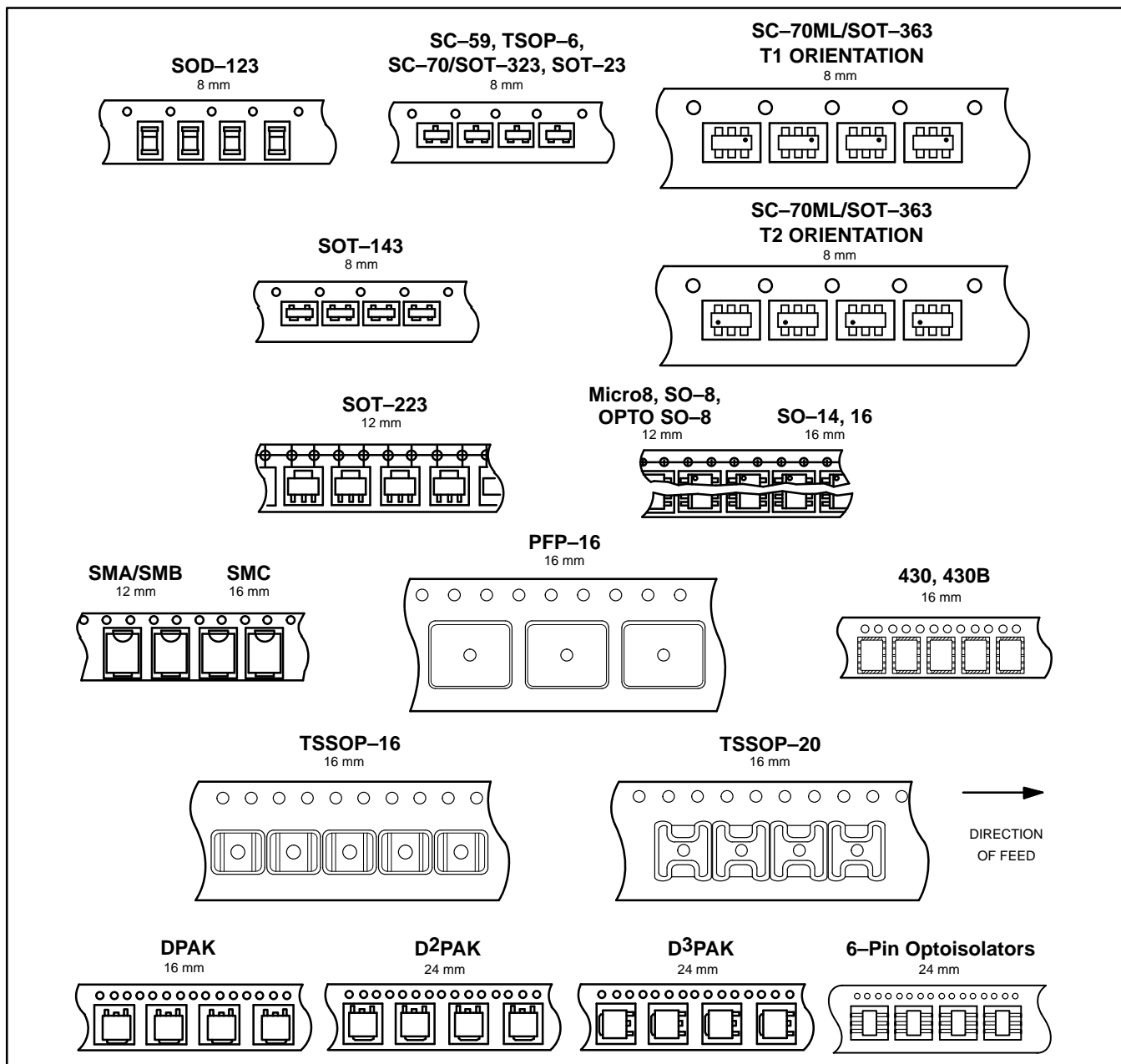
	Page
Tape and Reel Specifications	5.12-2
Embossed Tape and Reel Ordering Information .	5.12-3
Embossed Tape and Reel Data for Discretes ...	5.12-4
Lead Tape Packaging Standards for Axial-Lead Components	5.12-6
Packaging Specifications	5.12-7
TO-92 EIA Radial Tape in Fan Fold Box or on Reel	5.12-7
Fan Fold Box Styles	5.12-9
Adhesion Pull Tests	5.12-9
Reel Styles	5.12-10
DO-35, DO-41, Surmetic 30 Radial Tape in Fan Fold Box or On Reel	5.12-11

Tape and Reel Specifications and Packaging Specifications

Embossed Tape and Reel is used to facilitate automatic pick and place equipment feed requirements. The tape is used as the shipping container for various products and requires a minimum of handling. The antistatic/conductive tape provides a secure cavity for the product when sealed with the "peel-back" cover tape.

- Two Reel Sizes Available (7" and 13")
- Used for Automatic Pick and Place Feed Systems
- Minimizes Product Handling
- EIA 481, -1, -2
- SOD-123, SC-59, SC-70/SOT-323, SC-70ML/SOT-363, SOT-23, SOT-143, TSOP-6, in 8 mm Tape
- SO-8, Micro8, OPTO SO-8, SOT-223, SMA, SMB in 12 mm Tape
- DPAK, PFP-16, SO-14, SO-16, SMC, TSSOP-16, TSSOP-20, 430 and 430B in 16 mm Tape
- D²PAK, D³PAK, 6-Pin Optoisolators in 24 mm Tape

Use the standard device title and add the required suffix as listed in the option table on the following page. Note that the individual reels have a finite number of devices depending on the type of product contained in the tape. Also note the minimum lot size is one full reel for each line item, and orders are required to be in increments of the single reel quantity.

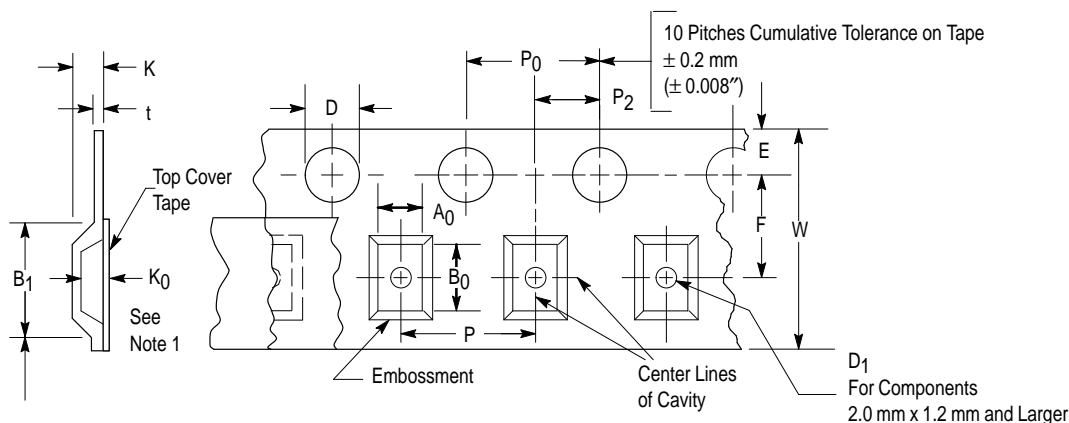


EMBOSSED TAPE AND REEL ORDERING INFORMATION

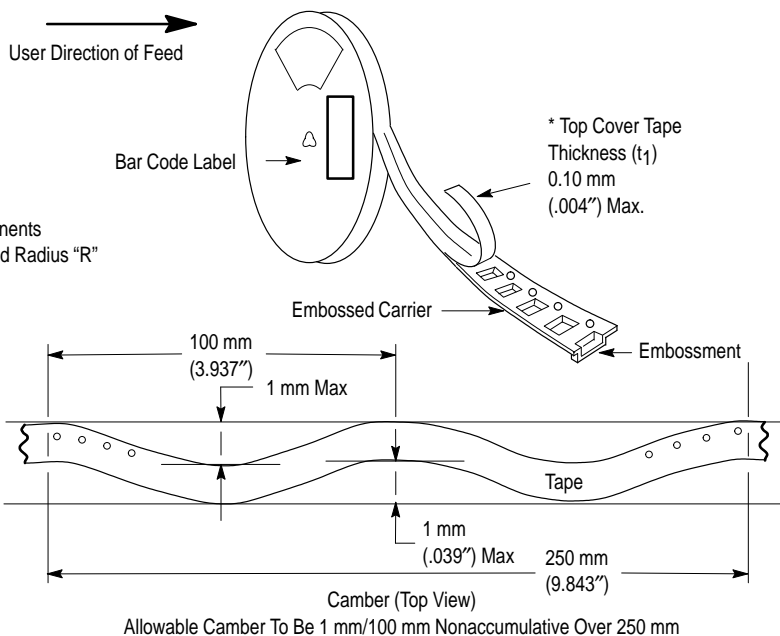
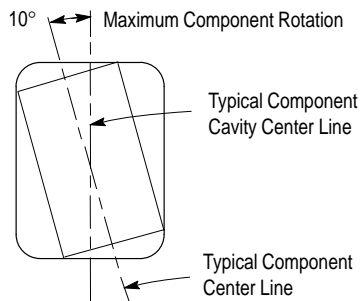
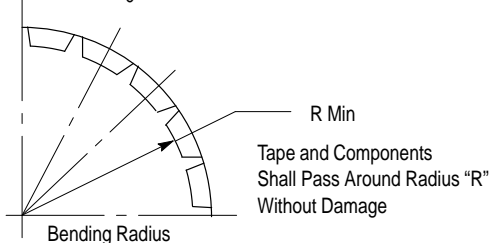
Package	Tape Width (mm)	Pitch mm (inch)	Reel Size mm (inch)	Devices Per Reel and Minimum Order Quantity	Device Suffix
DPAK	16	8.0 ± 0.1 (.315 ± .004)	330 (13)	2,500	T4
D ² PAK	24	16.0 ± 0.1 (.630 ± .004)	330 (13)	800	T4
D ³ PAK	24	24.0 ± 0.1 (.945 ± .004)	330 (13)	500	RL
SC-59/TSOP-6	8	4.0 ± 0.1 (.157 ± .004)	178 (7)	3,000	T1
SC-70/SOT-323	8	4.0 ± 0.1 (.157 ± .004)	178 (7)	3,000	T1
	8		330 (13)	10,000	T3
SC-70ML/SOT-363	8	4.0 ± 0.1 (.157 ± .004)	178 (7)	3,000	T1
	8		178 (7)	3,000	T2
SMA	12	8.0 ± 0.1 (.315 ± .004)	330 (13)	5,000	T3
SMB	12	8.0 ± 0.1 (.315 ± .004)	330 (13)	2,500	T3
SMC	16	8.0 ± 0.1 (.315 ± .004)	330 (13)	2,500	T3
SO-8, OPTO SO-8	12	8.0 ± 0.1 (.315 ± .004)	178 (7)	500	R1
	12		330 (13)	2,500	R2
SO-14	16	8.0 ± 0.1 (.315 ± .004)	178 (7)	500	R1
	16		330 (13)	2,500	R2
SO-16	16	8.0 ± 0.1 (.315 ± .004)	178 (7)	500	R1
	16		330 (13)	2,500	R2
SOD-123	8	4.0 ± 0.1 (.157 ± .004)	178 (7)	3,000	T1
	8		330 (13)	10,000	T3
SOT-23	8	4.0 ± 0.1 (.157 ± .004)	178 (7)	3,000	T1
	8		330 (13)	10,000	T3
SOT-143	8	4.0 ± 0.1 (.157 ± .004)	178 (7)	3,000	T1
	8		330 (13)	10,000	T3
SOT-223	12	8.0 ± 0.1 (.315 ± .004)	178 (7)	1,000	T1
	12		330 (13)	4,000	T3
6-Pin Optoisolators	24	12.0 ± 0.1 (.472 ± .004)	330 (13)	1000	R2
Micro8	12	8.0 ± 0.1 (.315 ± .003)	330 (13)	4000	R2
PFP-16	16	12.0 ± 0.1 (.471 ± .004)	330 (13)	1,500	R2
TSSOP-16	16	8.0 ± 0.1 (.315 ± .004)	330 (13)	2,500	R2
TSSOP-20	16	8.0 ± 0.1 (.315 ± .004)	330 (13)	2,500	R2
430, 430B	16	8.0 ± 0.1 (.315 ± .004)	178 (7)	500	R1

EMBOSSED TAPE AND REEL DATA FOR DISCRETES

CARRIER TAPE SPECIFICATIONS



For Machine Reference Only
Including Draft and RADII
Concentric Around B_0



DIMENSIONS

Tape Size	B_1 Max	D	D_1	E	F	K	P_0	P_2	R Min	T Max	W Max
8 mm	4.55 mm (.179")	1.5 ± 0.1 mm -0.0 (.059 ± .004" -0.0)	1.0 Min (.039")	1.75 ± 0.1 mm (.069 ± .004")	3.5 ± 0.05 mm (.138 ± .002")	2.4 mm Max (.094")	4.0 ± 0.1 mm (.157 ± .004")	2.0 ± 0.1 mm (.079 ± .002")	25 mm (.98")	0.6 mm (.024")	8.3 mm (.327")
12 mm	8.2 mm (.323")		1.5 mm Min (.060")		5.5 ± 0.05 mm (.217 ± .002")	6.4 mm Max (.252")					12 ± .30 mm (.470 ± .012")
16 mm	12.1 mm (.476")		7.5 ± 0.10 mm (.295 ± .004")		7.9 mm Max (.311")	16.3 mm (.642")					
24 mm	20.1 mm (.791")		11.5 ± 0.1 mm (.453 ± .004")		11.9 mm Max (.468")	24.3 mm (.957")					

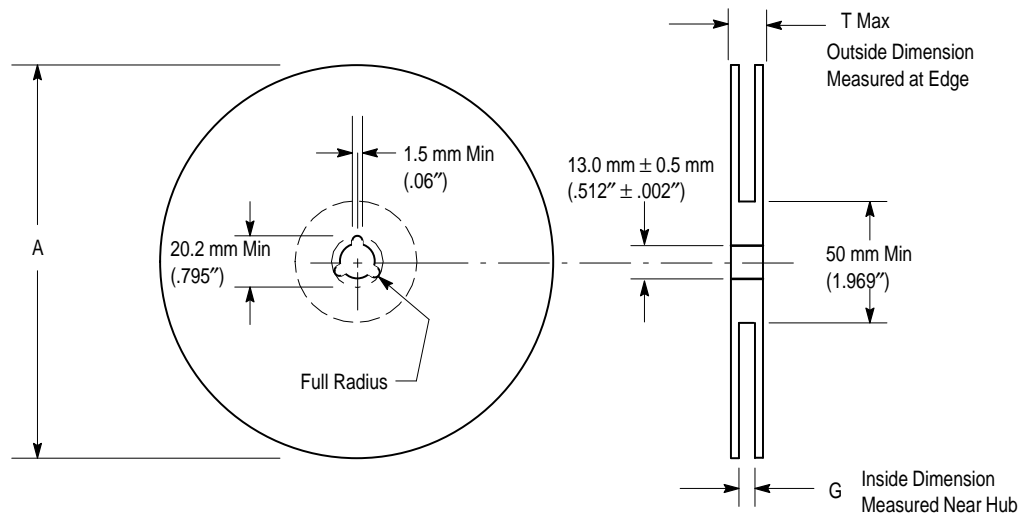
Metric dimensions govern — English are in parentheses for reference only.

NOTE 1: A_0 , B_0 , and K_0 are determined by component size. The clearance between the components and the cavity must be within .05 mm min. to .50 mm max., the component cannot rotate more than 10° within the determined cavity.

NOTE 2: If B_1 exceeds 4.2 mm (.165) for 8 mm embossed tape, the tape may not feed through all tape feeders.

NOTE 3: Pitch information is contained in the Embossed Tape and Reel Ordering Information on pg. 5.12–3.

EMBOSED TAPE AND REEL DATA FOR DISCRETES



Size	A Max	G	T Max
8 mm	330 mm (12.992")	8.4 mm + 1.5 mm, -0.0 (.33" + .059", -0.00)	14.4 mm (.56")
12 mm	330 mm (12.992")	12.4 mm + 2.0 mm, -0.0 (.49" + .079", -0.00)	18.4 mm (.72")
16 mm	360 mm (14.173")	16.4 mm + 2.0 mm, -0.0 (.646" + .078", -0.00)	22.4 mm (.882")
24 mm	360 mm (14.173")	24.4 mm + 2.0 mm, -0.0 (.961" + .070", -0.00)	30.4 mm (1.197")

Reel Dimensions

Metric Dimensions Govern — English are in parentheses for reference only

LEAD TAPE PACKAGING STANDARDS FOR AXIAL-LEAD COMPONENTS

Case Type	Product Category	Device Title Suffix	MPQ Quantity Per Reel (Item 3.3.7)	Component Spacing A Dimension	Tape Spacing B Dimension	Reel Dimension C	Reel Dimension D (Max)	Max Off Alignment E
Case 17-02	Surmetic 40 & 600 Watt TVS	RL	4000	0.2 +/- 0.015	2.062 +/- 0.059	3	14	0.047
Case 41A-02	1500 Watt TVS	RL4	1500	0.4 +/- 0.02	2.062 +/- 0.059	3	14	0.047
Case 51-02	DO-7 Glass (For Reference only)	RL	3000	0.2 +/- 0.02	2.062 +/- 0.059	3	14	0.047
Case 59-03	DO-41 Glass & DO-41 Surmetic 30	RL	6000	0.2 +/- 0.015	2.062 +/- 0.059	3	14	0.047
	Rectifier							
Case 59-04	500 Watt TVS	RL	5000	0.2 +/- 0.02	2.062 +/- 0.059	3	14	0.047
	Rectifier							
Case 194-04	110 Amp TVS (Automotive)	RL	800	0.4 +/- 0.02	1.875 +/- 0.059	3	14	0.047
	Rectifier							
Case 267-02	Rectifier	RL	1500	0.4 +/- 0.02	2.062 +/- 0.059	3	14	0.047
Case 299-02	DO-35 Glass	RL	5000	0.2 +/- 0.02	2.062 +/- 0.059	3	14	0.047

Table 1. Packaging Details (all dimensions in inches)

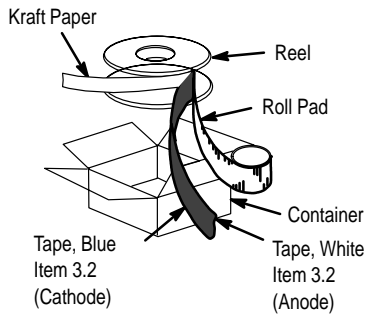


Figure 1. Reel Packing

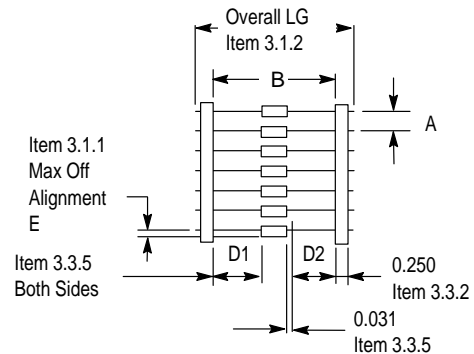


Figure 2. Component Spacing

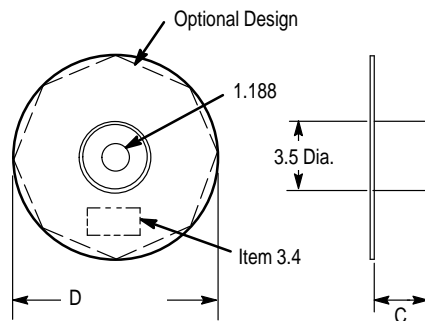


Figure 3. Reel Dimensions

TO-92 EIA, IEC, EIAJ

Radial Tape in Fan Fold Box or On Reel

Radial tape in fan fold box or on reel of the reliable TO-92 package are the best methods of capturing devices for automatic insertion in printed circuit boards. These methods of taping are compatible with various equipment for active and passive component insertion.

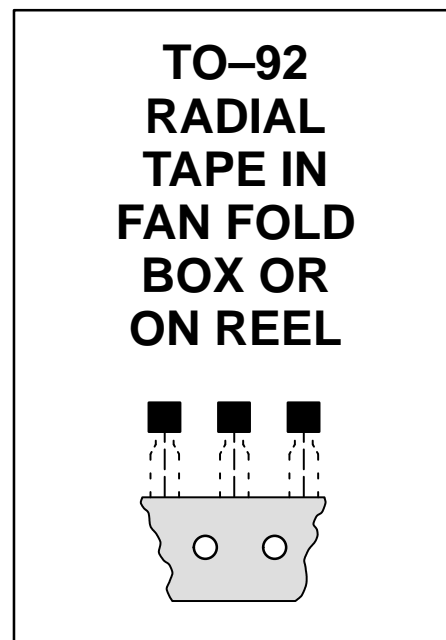
- Available in Fan Fold Box
- Available on 365 mm Reels
- Accommodates All Standard Inserters
- Allows Flexible Circuit Board Layout
- 2.5 mm Pin Spacing for Soldering
- EIA-468, IEC 286-2, EIAJ RC1008B

Ordering Notes:

When ordering radial tape in fan fold box or on reel, specify the style per Figures 3 through 8. Add the suffix "RLR" and "Style" to the device title, i.e. MPS3904RLRA. This will be a standard MPS3904 radial taped and supplied on a reel per Figure 9.

Fan Fold Box Information — Minimum order quantity 1 Box/\$200LL.
Order in increments of 2000.

Reel Information — Minimum order quantity 1 Reel/\$200LL.
Order in increments of 2000.



US/European Suffix Conversions

US	EUROPE
RLRA	RL
RLRE	RL1
RLRM	ZL1

TO-92 EIA RADIAL TAPE IN FAN FOLD BOX OR ON REEL

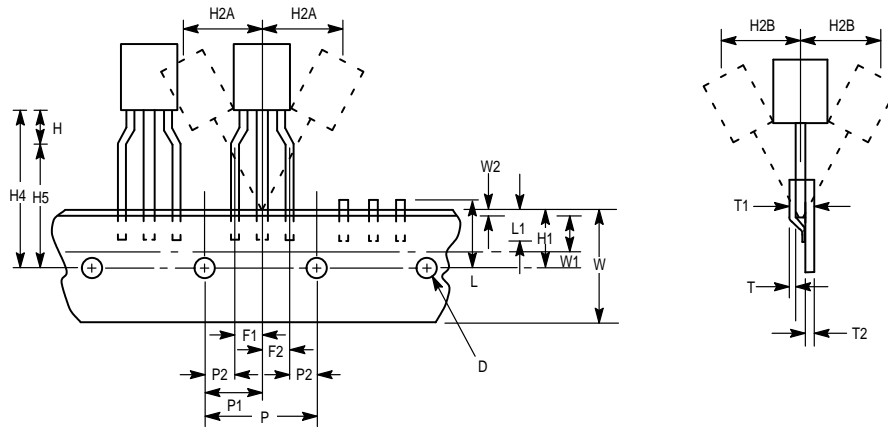


Figure 1. Device Positioning on Tape

Symbol	Item	Specification			
		Inches		Millimeter	
		Min	Max	Min	Max
D	Tape Feedhole Diameter	0.1496	0.1653	3.8	4.2
D2	Component Lead Thickness Dimension	0.015	0.020	0.38	0.51
F1, F2	Component Lead Pitch	0.0945	0.110	2.4	2.8
H	Bottom of Component to Seating Plane	.059	.156	1.5	4.0
H1	Feedhole Location	0.3346	0.3741	8.5	9.5
H2A	Deflection Left or Right	0	0.039	0	1.0
H2B	Deflection Front or Rear	0	0.051	0	1.0
H4	Feedhole to Bottom of Component	0.7086	0.768	18	19.5
H5	Feedhole to Seating Plane	0.610	0.649	15.5	16.5
L	Defective Unit Clipped Dimension	0.3346	0.433	8.5	11
L1	Lead Wire Enclosure	0.09842	—	2.5	—
P	Feedhole Pitch	0.4921	0.5079	12.5	12.9
P1	Feedhole Center to Center Lead	0.2342	0.2658	5.95	6.75
P2	First Lead Spacing Dimension	0.1397	0.1556	3.55	3.95
T	Adhesive Tape Thickness	0.06	0.08	0.15	0.20
T1	Overall Taped Package Thickness	—	0.0567	—	1.44
T2	Carrier Strip Thickness	0.014	0.027	0.35	0.65
W	Carrier Strip Width	0.6889	0.7481	17.5	19
W1	Adhesive Tape Width	0.2165	0.2841	5.5	6.3
W2	Adhesive Tape Position	.0059	0.01968	.15	0.5

NOTES:

1. Maximum alignment deviation between leads not to be greater than 0.2 mm.
2. Defective components shall be clipped from the carrier tape such that the remaining protrusion (L) does not exceed a maximum of 11 mm.
3. Component lead to tape adhesion must meet the pull test requirements established in Figures 5, 6 and 7.
4. Maximum non-cumulative variation between tape feed holes shall not exceed 1 mm in 20 pitches.
5. Holddown tape not to extend beyond the edge(s) of carrier tape and there shall be no exposure of adhesive.
6. No more than 1 consecutive missing component is permitted.
7. A tape trailer and leader, having at least three feed holes is required before the first and after the last component.
8. Splices will not interfere with the sprocket feed holes.

TO-92 EIA RADIAL TAPE IN FAN FOLD BOX OR ON REEL

FAN FOLD BOX STYLES

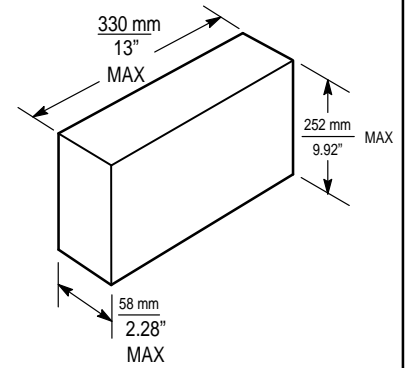
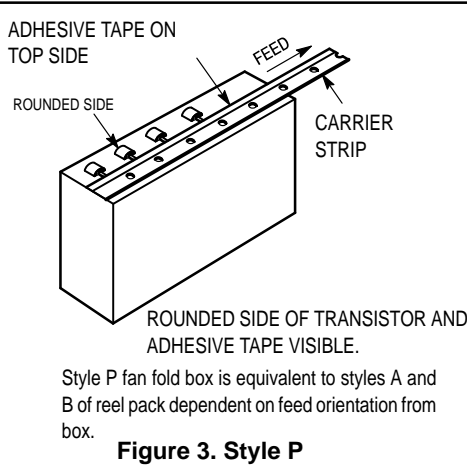
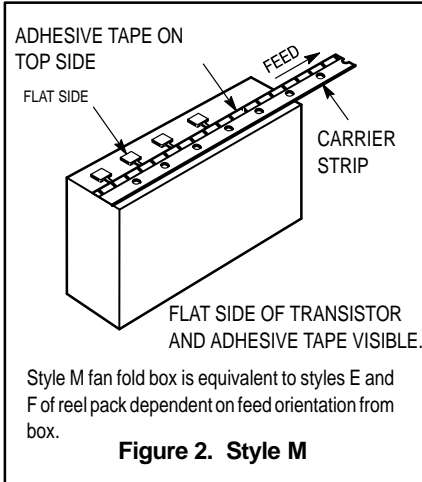
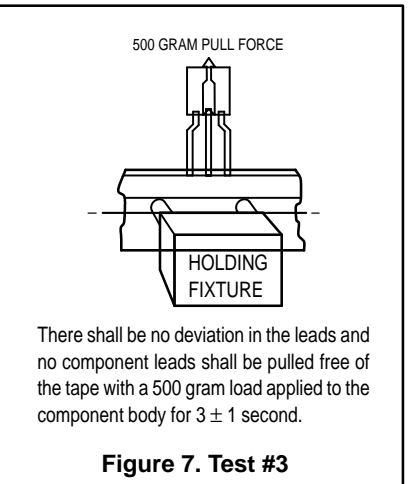
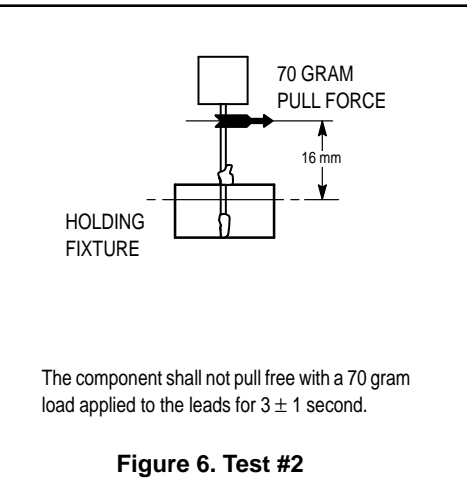
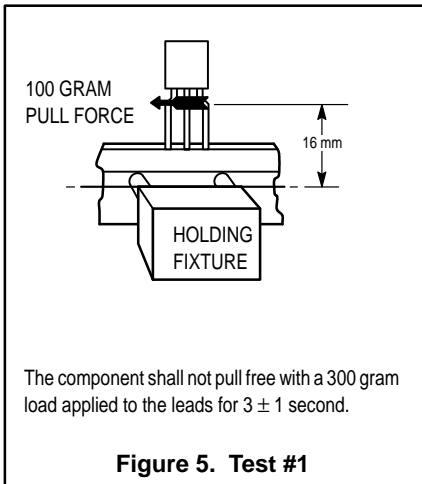


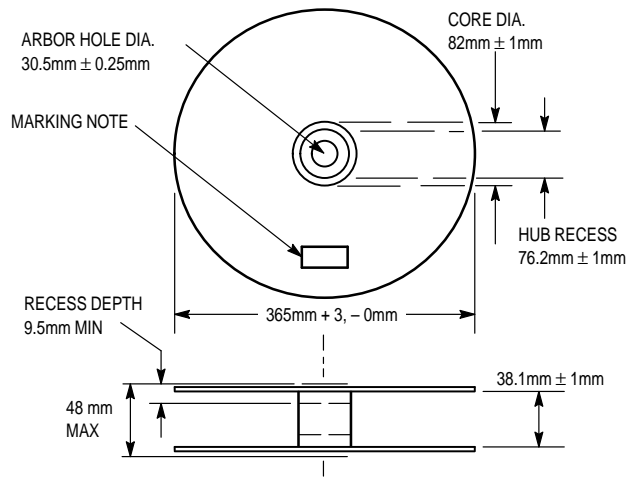
Figure 4. Fan Fold Box Dimensions

ADHESION PULL TESTS



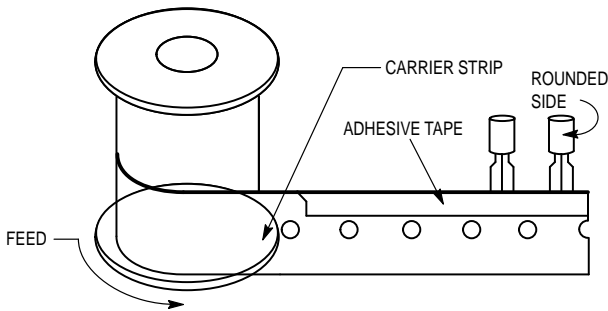
TO-92 EIA RADIAL TAPE IN FAN FOLD BOX OR ON REEL

REEL STYLES



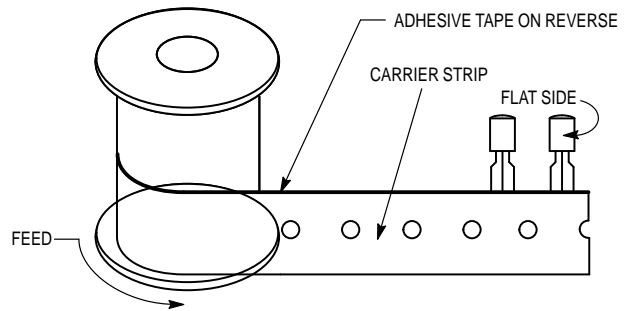
Material used must not cause deterioration of components or degrade lead solderability

Figure 8. Reel Specifications



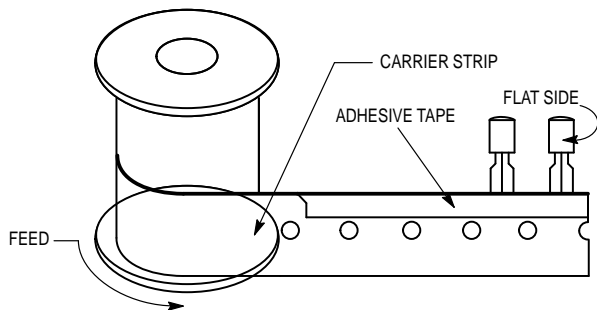
Rounded side of transistor and adhesive tape visible.

Figure 9. Style A



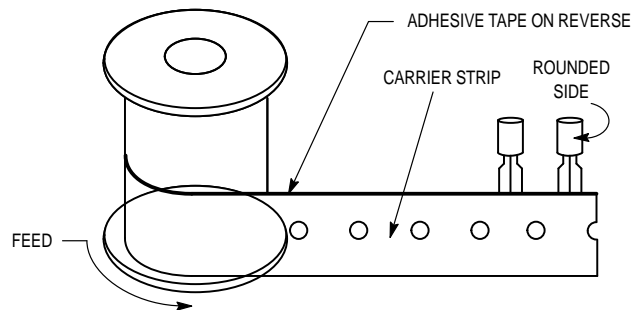
Flat side of transistor and carrier strip visible (adhesive tape on reverse side).

Figure 10. Style B



Flat side of transistor and adhesive tape visible.

Figure 11. Style E



Rounded side of transistor and carrier strip visible (adhesive tape on reverse side).

Figure 12. Style F

DO-35, DO-41, Surmetic 30 Radial Tape in Fan Fold Box or On Reel

Radial tape in fan fold box or on reel for axial leaded devices is the best method of capturing devices for automatic insertion in printed circuit boards. These methods of taping are compatible with various equipment for active and passive component insertion.

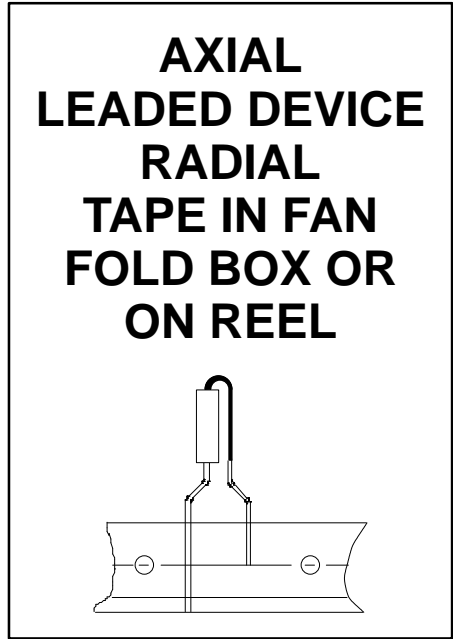
- Available in Fan Fold Box
- Available on 365 mm Reels
- Accommodates All Standard Inserters
- Allows Flexible Circuit Board Layout
- 2.5 mm Pin Spacing for Soldering

Ordering Notes:

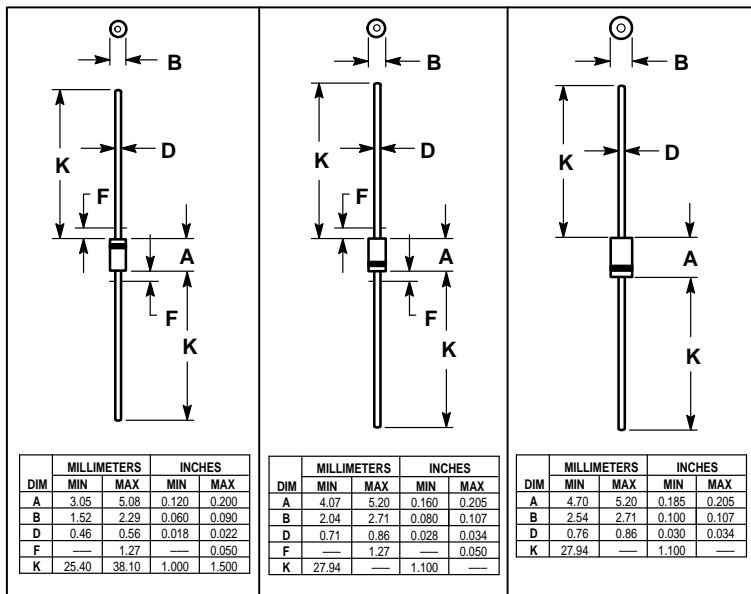
When ordering radial tape in fan fold box or on reel, specify the style per Figures 4 through 13. Add the appropriate suffix per Tables A and B as listed below:

Fan Fold Box Information — Minimum order quantity 1 Box/\$200LL.
Order in increments of 3000.

Reel Information — Minimum order quantity 1 Reel/\$200LL.
Order in increments of 3000.



CASE 299-02 (DO-35) CASE 059-03 (DO-41) CASE 059-01 (Surmetic 30)



DEVICE TITLE SUFFIX DESIGNATOR TABLE

- RR1 Euroform radial format and reeled per Figures 4, 6, 9, 10. Polarity band up with cathode lead off first.
- RR2 Euroform radial format and reeled per Figures 4, 6, 9, 10. Polarity band down with anode lead off first.
- RB1 Euroform radial lead form with polarity band up per Figures 4, 12 and bulk packed.
- RB2 Euroform radial lead form with polarity band down per Figures 4, 13 and bulk packed.
- RA1 Euroform radial format and ammo packed per Figures 4, 10, 11. Polarity band up with cathode lead off first.
- RA2 Euroform radial format and ammo packed per Figures 4, 10, 11. Polarity band down with anode lead off first.

Table A

APPLICABLE SUFFIX DESIGNATIONS versus FIGURE OF REFERENCE

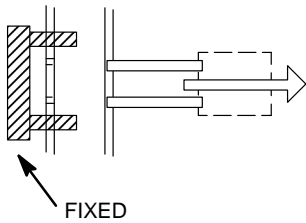
Suffix	Fig. 4	Fig. 5	Fig. 6	Fig. 7	Fig. 8	Fig. 10	Fig. 11	Fig. 12	Fig. 13
RR1	•	•		•	•				
RR2	•			•	•	•			
RB1	•							•	
RB2	•								•
RA1	•	•					•		
RA2	•					•	•		

Table B

DO-35, DO-41, SURMETIC 30 RADIAL TAPE IN FAN FOLD BOX OR ON REEL

TESTS

ADHESIVE POWER STRENGTH TEST



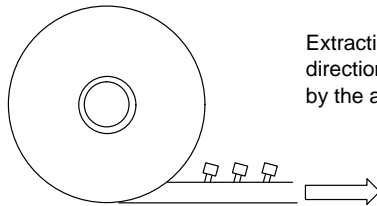
A load of 500 grams, minimum, shall be applied in the direction indicated by the arrow.

CRITERIA

No deviation in the leads, nor shall the part move

Figure 1

TAPE EXTRACTION STRENGTH



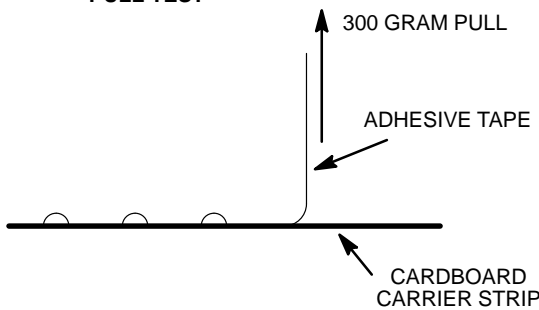
Extraction in the direction indicated by the arrow

CRITERIA

Tape shall be extracted at a force of not more than 500 grams

Figure 2

PULL TEST



CRITERIA

Tape shall withstand a 300-gram pull without being removed from carrier strip.

Figure 3

DO-35, DO-41, SURMETIC 30 RADIAL TAPE IN FAN FOLD BOX OR ON REEL

CONFORMAL COATING SPECIFICATION

EURO FORM RADIAL TAPED

COATING NOT TO INTERFERE WITH SOLDERED LEAD OR DEVICE MARKING

1 – Polarity band up, cathode off first

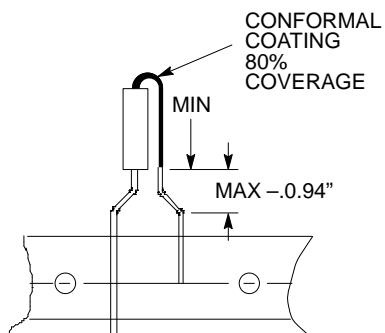


Figure 4

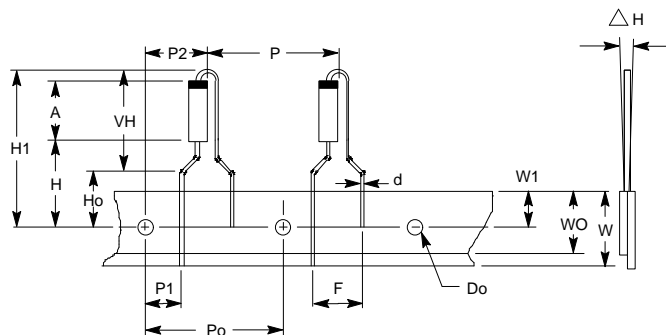


Figure 5

Item	Symbol	Value	Tolerance
Pitch of component	P	12.7	±1.0
Feed hole pitch Cumulative 1.0 mm / 20 pitch	PO	12.7	±0.2
Feed hole center to lead	P1	3.85	±0.7
Lead to lead distance	F	5.0	+8 / -0.2
Component alignment	AH	0	±1.0
Tape width	W	18.0	±0.5
Hold down tape width	Wo	12.0	MIN
Hole position	W1	9.0	+0.75 / -0.5
Hole down tape position	W2	0.5	MAX
Height of component to tape center	H	19.5	±1.0
Lead wire clinch height	Ho	16.0	±0.5
Component height	H1	23.25	MAX
Feed hole diameter	Do	4.0	±0.2
Total tape thickness	t	0.7	±0.2
Vertical in board height For case 299-02 only.	VH	10.0	MAX

DO-35, DO-41, SURMETIC 30 RADIAL TAPE IN FAN FOLD BOX OR ON REEL

REEL ASSEMBLY AND WINDING DIRECTION
TYPICAL CONSTRUCTION DRAWING ONLY

When the parts are wound onto the housing reel, the interlayer paper shall be used to prevent trouble in rewinding and deviations in the taping dimensions, caused by the parts touching one another.

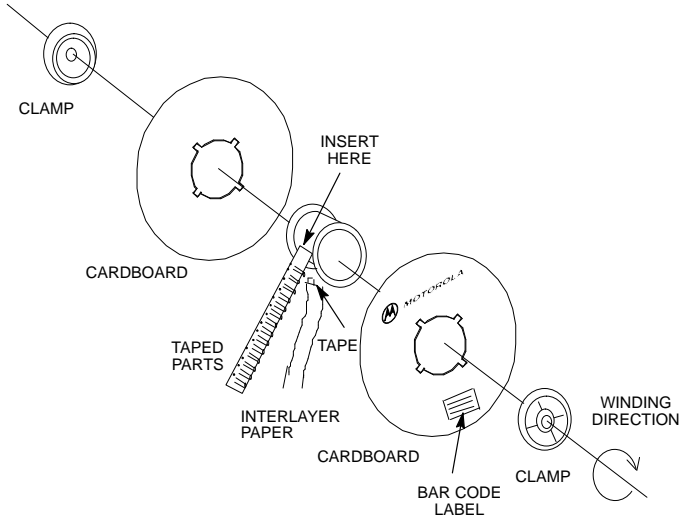


Figure 6

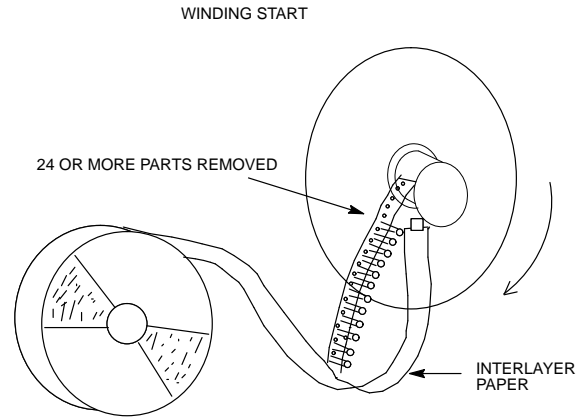


Figure 7

Relative to winding finish, the interlayer paper shall be wound at least once, upon completion of winding. The protective tape shall be wound once on top of the interlayer paper.

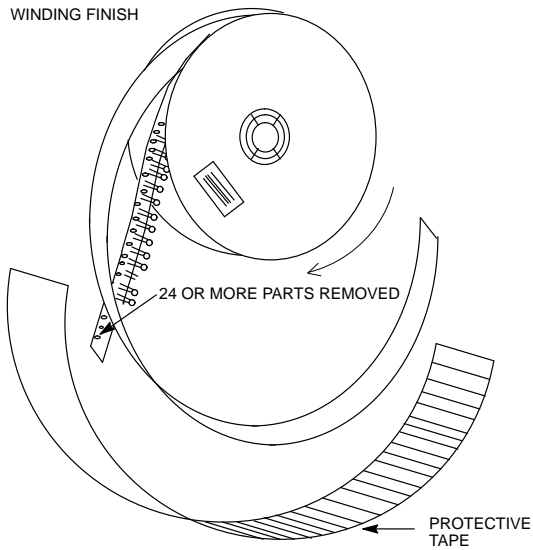


Figure 8

REEL DIMENSIONS AND DETAIL

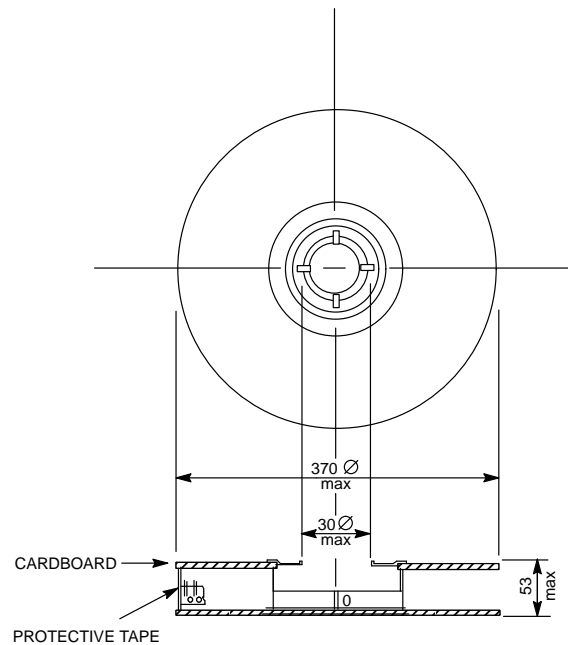


Figure 9

DO-35, DO-41, SURMETIC 30 RADIAL TAPE IN FAN FOLD BOX OR ON REEL

EURO FORM RADIAL TAPED

2 – Polarity band down, anode off first

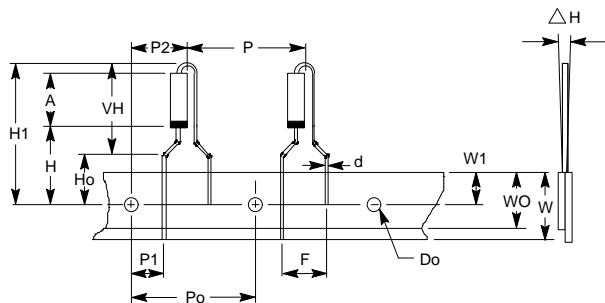


Figure 10

GENERAL GUIDE FOR PACKAGING IN "AMMUNITION BOXES"

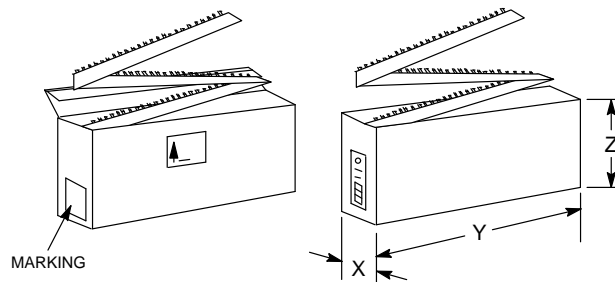


Figure 11

Item	Symbol	Value	Tolerance
Pitch of component	P	12.7	± 1.0
Feed hole pitch Cumulative 1.0 mm / 20 pitch	PO	12.7	± 0.2
Feed hole center to lead	P1	3.85	± 0.7
Lead to lead distance	F	5.0	$+8 / -0.2$
Component alignment	AH	0	± 1.0
Tape width	W	18.0	± 0.5
Hold down tape width	W0	12.0	MIN
Hole position	W1	9.0	$+0.75 / -0.5$
Hole down tape position	W2	0.5	MAX
Height of component to tape center	H	19.5	± 1.0
Lead wire clinch height	Ho	16.0	± 0.5
Component height	H1	23.25	MAX
Feed hole diameter	Do	4.0	± 0.2
Total tape thickness	t	0.7	± 0.2
Vertical in board height For case 299-02 only.	VH	10.0	MAX

"X"	"Y"	"Z"
1 5/8"	12 1/2"	10"
41 mm	318 mm	254 mm

DO-35, DO-41, SURMETIC 30 RADIAL TAPE IN FAN FOLD BOX OR ON REEL

RB1

POLARITY BAND UP

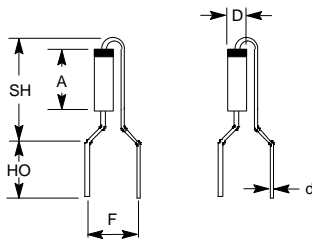


Figure 12

RB2

POLARITY BAND DOWN

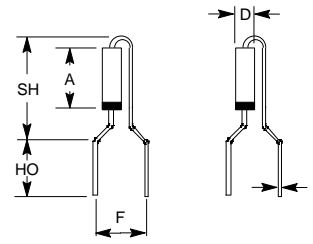


Figure 13

Item	Symbol	Value (mm)	Tolerance	Value (Inch)	Tolerance
Body Diameter	D	2.7	MAX	0.106	MAX
Body Height	A	5.2	MAX	0.207	MAX
Lead Wire Diameter	d	0.9	MAX	0.035	MAX
Seating Height	SH	10	MAX	0.394	MAX
Lead to Lead Distance	F	5	+1.0/-0.5	0.2	+0.26/-0.02
Lead Wire Clinch Height	HO	5	±0.5	0.2	±0.02

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