Features

- Surface Mount Devices
- High voltage surge capabilities
- Binned and sorted resistance ranges
- Compliance to ITU K.20/K.21 specifications
- Withstands lightning power induction
- Agency recognition:

Applications

Used as a secondary overcurrent protection device in:

- Customer Premise Equipment (CPE)
- Central Office (CO)
- Subscriber Line Interface Cards (SLIC)

MF-SM013/250 - Telecom PTC Resettable Fuses

Electrical Characteristics

Model	Max. Oper. Voltage	Max. Interrupt Ratings		Hold Current	Initial Resistance		One Hour Post-Trip Resistance	Nom. Power Dissipation
	Volts	Volts (V)	Amps (A)	Amps at 23°C	Ohms at 23°C	Ohms at 23°C	Ohms at 23°C	Watts at 650V, 23°C
		Max.	Max.	I_H	Max.	Min.	Max.	
MF-SM013/250-2	60	250	3.0	0.13	6.5	12.0	20.0	3.3
MF-SM013/250-A-2	60	250	3.0	0.13	6.5	9.0	20.0	3.3
MF-SM013/250-B-2	60	250	3.0	0.13	9.0	12.0	20.0	3.3
MF-SM013/250-C-2	60	250	3.0	0.13	7.0	10.0	20.0	3.3

Environmental Characteristics

Operating/Storage Temperature	-45°C to +85°C	
Maximum Device Surface Temperature in Tripped State	125°C	
Passive Aging	+85°C, 1000 hours	±2% typical resistance change
	+60°C, 1000 hours	±3% typical resistance change
Humidity Aging	+85°C, 85% R.H. 500 hours	±3% typical resistance change
Thermal Shock	MIL-STD-202F, Method 107G,	±10% typical resistance change
	+125°C to -55°C,10 times	±15% typical resistance change
Solvent Resistance	MIL-STD-202, Method 215B	No change
Lead Solerability	ANSI/J-STD-002	
Flammability	IEC 695-2-2	No Flame for 60 secs.
Vibration	MIL-STD-883C, Method 2007.1, Condition A	No change

Test Procedures And Requirements For Model SM013/250 Series

Test	Test Conditions	Accept/Reject Criteria
Visual/Mech.	Verify dimensions and materials	Per MF physical description
Resistance	In still air @ 23°C	Rmin ≤ R ≤ Rmax
Time to Trip	At specified current, Vmax, 23°C	T ≤ max. time to trip (seconds)
Hold Current	30 min. at Ihold	No trip
Trip Cycle Life	Vmax, Imax, 100 cycles	No arcing or burning
Trip Endurance	Vmax, 48 hours	No arcing or burning
Solderability	MIL-STD-202F, Method 208F	95% min. coverage

UL File Number	E 174545S
CSA File Number	CA 110338
TÜV File Number	R2057213

Thermal Derating Chart - I_{hold} / I_{trip} (Amps)

Model	Ambient Operating Temperature								
	-40˚C	-20˚C	0˚C	23˚C	40˚C	50˚C	60˚C	70˚C	85˚C
MF-SM013/250-2	0.21 / 0.42	0.18 / 0.37	0.16 / 0.31	0.13 / 0.26	0.10 / 0.23	0.09 / 0.18	0.08 / 0.15	0.07 / 0.12	0.05 / 0.10
MF-SM013/250-A-2	0.21 / 0.42	0.18 / 0.37	0.16 / 0.31	0.13 / 0.26	0.10 / 0.23	0.09 / 0.18	0.08 / 0.15	0.07 / 0.12	0.05 / 0.10
MF-SM013/250-B-2	0.21 / 0.42	0.18 / 0.37	0.16 / 0.31	0.13 / 0.26	0.10 / 0.23	0.09 / 0.18	0.08 / 0.15	0.07 / 0.12	0.05 / 0.10
MF-SM013/250-C-2	0.21 / 0.42	0.18 / 0.37	0.16 / 0.31	0.13 / 0.26	0.10 / 0.23	0.09 / 0.18	0.08 / 0.15	0.07 / 0.12	0.05 / 0.10

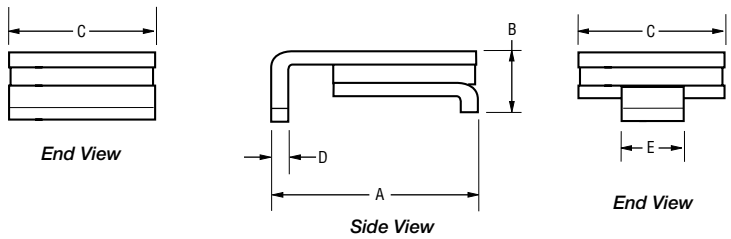
ITU-T K.20/K.21 compliant parts will be available Q3 '01. Please contact Bourns Multifuse® Product Management for more information.

Product Dimensions

Model	A		B	C	D	E
	Min.	Max.	Max.	Min.	Nom.	Nom.
MF-SM013/250-2	8.5 (0.335)	9.4 (0.370)	3.4 (0.134)	7.4 (0.291)	0.3 (0.011)	3.75 (0.148)
MF-SM013/250-A-2	8.5 (0.335)	9.4 (0.370)	3.4 (0.134)	7.4 (0.291)	0.3 (0.011)	3.75 (0.148)
MF-SM013/250-B-2	8.5 (0.335)	9.4 (0.370)	3.4 (0.134)	7.4 (0.291)	0.3 (0.011)	3.75 (0.148)
MF-SM013/250-C-2	8.5 (0.335)	9.4 (0.370)	3.4 (0.134)	7.4 (0.291)	0.3 (0.011)	3.75 (0.148)

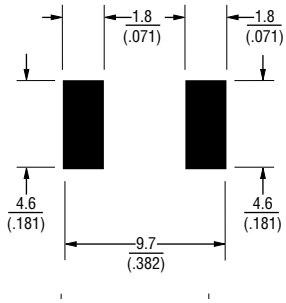
Packaging:
TAPE & REEL: 2000 pcs. per reel

DIMENSIONS = MM / (INCHES)

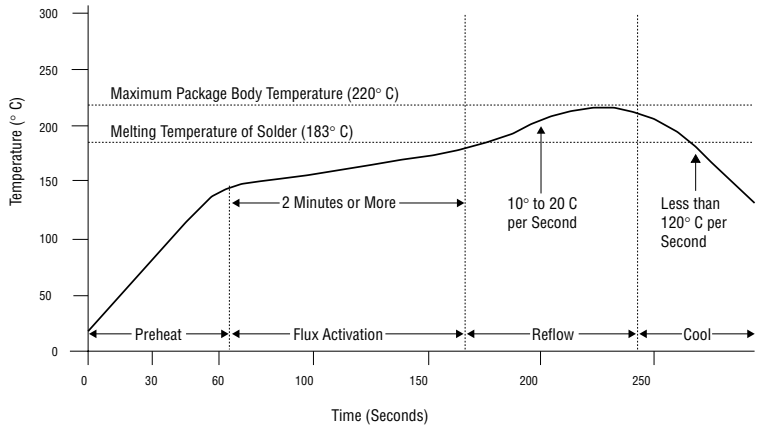


Terminal material:
Tin-plated brass

Recommended Pad Layout



Solder Reflow Recommendations



Solder reflow

- Recommended reflow methods: IR, vapor phase oven, hot air oven.
- Devices are not designed to be wave soldered to the bottom side of the board.
- Gluing the devices is not recommended.
- Recommended maximum paste thickness is 0.25 mm (.010 inch).
- Devices can be cleaned using standard industry methods and solvents.

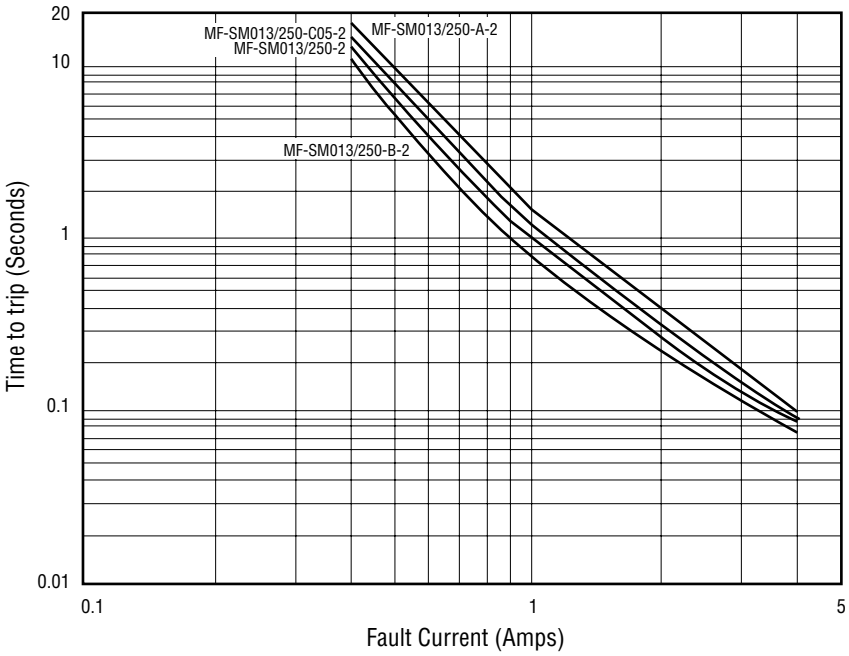
Note:

- If reflow temperatures exceed the recommended profile, devices may not meet the performance requirements.

Rework

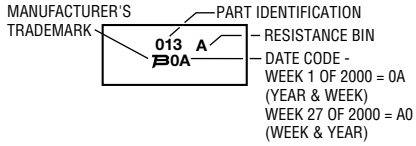
- A device should not be reworked.

Typical Time to Trip at 23°C



Typical Part Marking

Represents total content. Layout may vary.



How to Order

MF - SM 013/250 - __- __- __

Multifuse® Product Designator

Series
- R = Radial Leaded Component
- SM = Surface Mount Component

Hold Current, Ihold
013 (0.13 Amps)

Max. Interrupt Voltage, V

Resistance Sorted
- A = 6.5-9Ω
- B = 9-12Ω
- C = 7-10Ω

Resistance Sorted in Bins of 0.5Ω
- 050 (0.5Ω)

Packaging Options
- __ = Bulk Packaging
- U = Uncoated Parts
- 2 = Tape and Reel*
- AP = Ammo-Pak*

*Packaged per EIA486-B

NOTE: All parts are also available "binned". All parts within a package will be within 0.5Ω of each other within the initial resistance range.

MF-R, MF-RX, MF-RG & MF-R/250 Series Tape and Reel Specs

BOURNS®

Devices taped using EIA468–B/IEC286-2 standards. See table below and Figures 1 and 2 for details.

Dimension Description	IEC Mark	EIA Mark	Dimensions	
			Dimensions	Tolerance
Carrier tape width	*W*	*W*	18 (.709)	-0.5/+1.0 (-0.02/+.039)
Hold down tape width		*W4*	5 (.197)	min.
Hold down tape	*W0*		No protrusion	
Top distance between tape edges	*W2*	*W6*	3 (.118)	max.
Sprocket hole position	*W1*	*W5*	9 (.354)	-0.5/+0.75 (-0.02/+0.03)
Sprocket hole diameter	*D0*	*D0*	4 (.157)	±0.2 (±.0078)
Abscissa to plane (straight lead)	*H*	*H*	18.5 (.728)	±3.0 (±.118)
Abscissa to plane (kinked lead)	*H0*	*H0*	16 (.63)	±0.5 (±.02)
Abscissa to top	*H1*	*H1*	32.2 (1.268)	max.
Overall width w/lead protrusion		*C1*	43.2 (1.7)	max.
Overall width w/o lead protrusion		*C2*	42.5 (1.673)	max.
Lead protrusion	*I1*	*L1*	1.0 (.039)	max.
Protrusion of cutout	*L*	*L*	11 (.433)	max.
Protrusion beyond hold tape	*I2*	*I2*	Not specified	
Sprocket hole pitch	*P0*	*P0*	12.7 (0.5)	±0.3 (±.012)
Pitch tolerance			20 seconds	± 1 second
Device pitch: MF-R010 – MF-R160			12.7 (0.5)	
Device pitch: MF-R185 – MF-R400			25.4 (1.0)	
Device pitch: MF-RX110 – MF-RX160			12.7 (0.5)	
Device pitch: MF-RX185 – MF-RX375			12.7 (0.5)	
Device pitch: MF-RG300, MF-RG500			12.7 (0.5)	
Device pitch: MF-RG700, MF-RG900, MF-RG1100			25.4 (1.0)	
Device pitch: MF-R012/250			25.4 (1.0)	
Tape thickness	*t*	*t*	0.9 (.035)	max.
Tape thickness with splice		*t1*	2.0 (.079)	max.
Splice sprocket hole alignment			0	±0.3 (±.012)
Body lateral deviation	Δ*h*	Δ*h*	0	±1.0 (±.039)
Body tape plane deviation	Δ*p*	Δ*p*	0	±1.3 (±.051)
Lead seating plane deviation	Δ*P1*	*P1*	0	±0.7 (±.028)
Lead spacing	*F*	*F*	5.08 (0.2)	±0.8 (±.035)
Reel width	*w*	*w*	56 (2.205)	max.
Reel diameter	*d*	*a*	370 (14.57)	max.
Space between flanges less device			4.75 (.187)	±3.25 (±.128)

DIMENSIONS = MM (INCHES)

Dimension Description	IEC Mark	EIA Mark	Dimensions	Tolerance
Space between flanges less device			4.75 (.187)	±3.25 (±.128)
Arbor hole diameter	*f*	*c*	26 (1.024)	±12.0 (±.472)
Core diameter	*h*	*n*	80 (3.15)	max.
Box			56 (2.2) 372 (14.6) 372 (14.6)	max.
Consecutive missing places			3 maximum	
Empty places per reel			Not specified	

DIMENSIONS = MM (INCHES)

Taped Component Dimensions

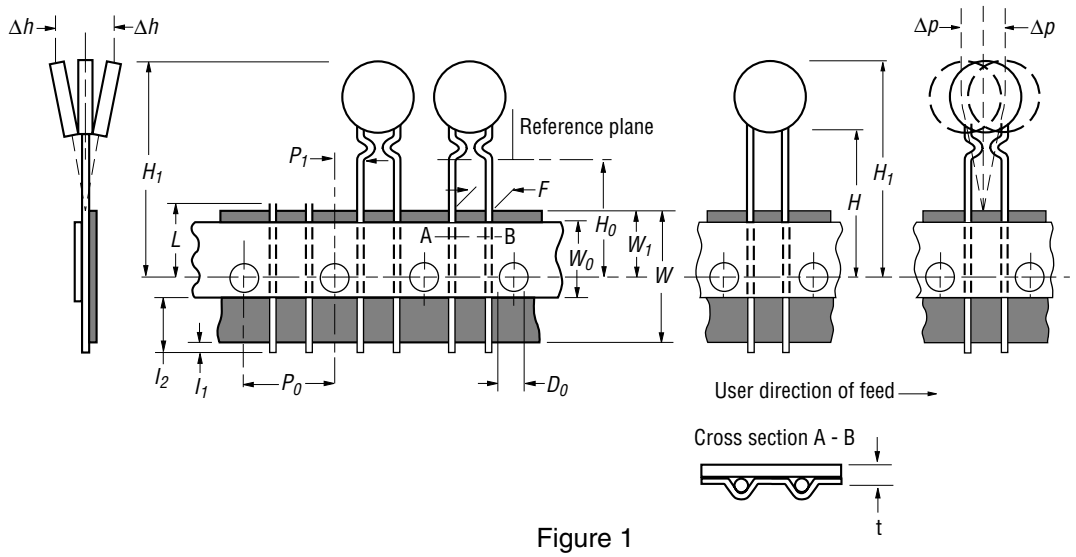


Figure 1

Reel Dimensions

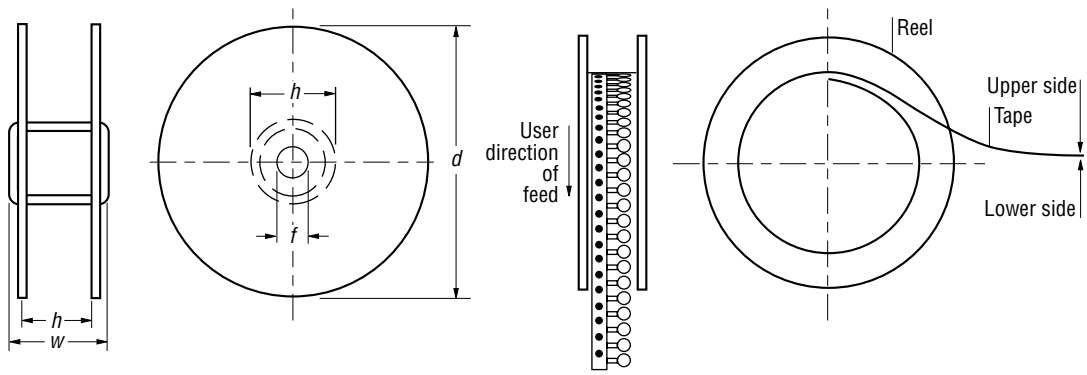


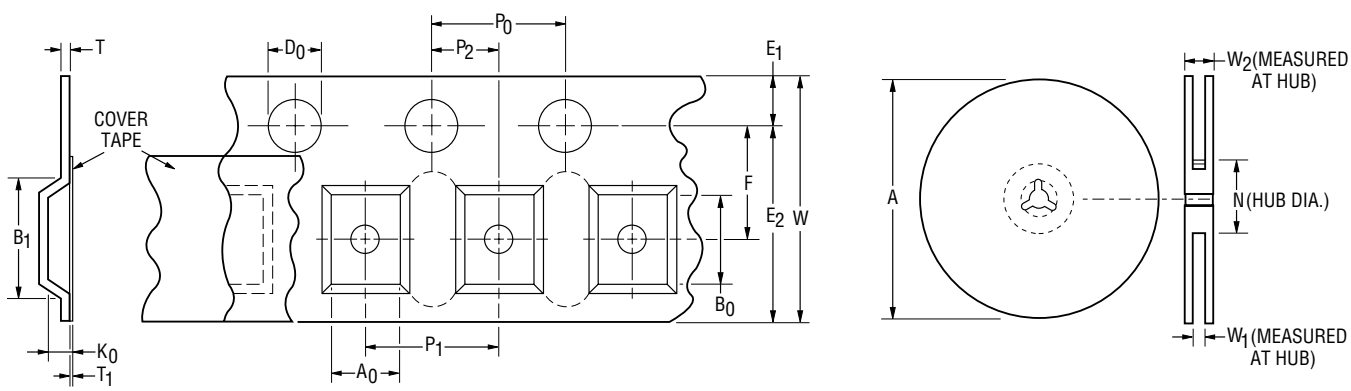
Figure 2

MF-SM Series Tape and Reel Specifications

BOURNS®

Tape Dimension Identifiers	MF-SM030, 050, 075, 100, 125 per EIA-481-2	MF-SM150, 200, 250, 260 per EIA 481-2
W	16 ± 0.3 (63 ± .012)	16 ± 0.3 (63 ± .012)
P_0	4.0 ± 0.10 (.157 ± .004)	4.0 ± 0.10 (.157 ± .004)
P_1	8.0 ± 0.10 (.315 ± .004)	12.0 ± 0.10 (.472 ± .004)
P_2	8.0 ± 0.10 (.315 ± .004)	12.0 ± 0.10 (.472 ± .004)
A_0	2.0 ± 0.10 (.079 ± .004)	2.0 ± 0.10 (.079 ± .004)
B_0	5.7 ± 0.10 (.224 ± .004)	6.9 ± 0.10 (.272 ± .004)
B_1 max.	8.1 ± 0.15 (.319 ± .006)	9.6 ± 0.10 (.378 ± .004)
D_0	9.1 (.358)	11.0 (.433)
F	1.5 + 0.1/ -0 (.059 + .004/-0)	1.5 + 0.1/ -0 (.059 + .004/-0)
E_1	7.5 ± 0.10 (.295 ± .004)	7.5 ± 0.10 (.295 ± .004)
E_2 min.	1.75 ± 0.10 (.069 ± .004)	1.75 ± 0.10 (.069 ± .004)
T max.	14.25 (.561)	14.25 (.561)
T_1 max.	0.4 (.016)	0.4 (.016)
K_0	0.1 (.004)	0.1 (.004)
Leader min.	3.4 ± 0.15 (.134 ± .006)	3.5 ± 0.15 (.138 ± .006)
Trailer min.	390 (15.35)	390 (15.35)
Reel Dimension Identifiers	160 (6.30)	160 (6.30)
A max.	360 (14.17)	360 (14.17)
N min.	50 (1.97)	50 (1.97)
W_1	16.4 + 2.0/ -0 (.65 + .079/-0)	16.4 + 2.0/ -0 (.65 + .079/-0)
W_2 max.	22.4 (.882)	22.4 (.882)

DIMENSIONS = MM / (INCHES)

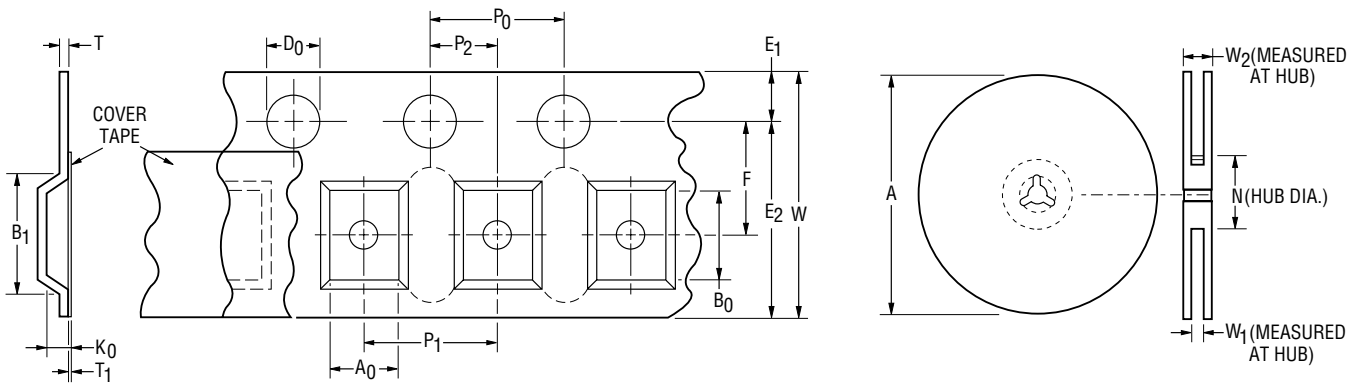


MF-MSMD, MF-USMD & MF-ESMD Series Tape and Reel Specs

BOURNS®

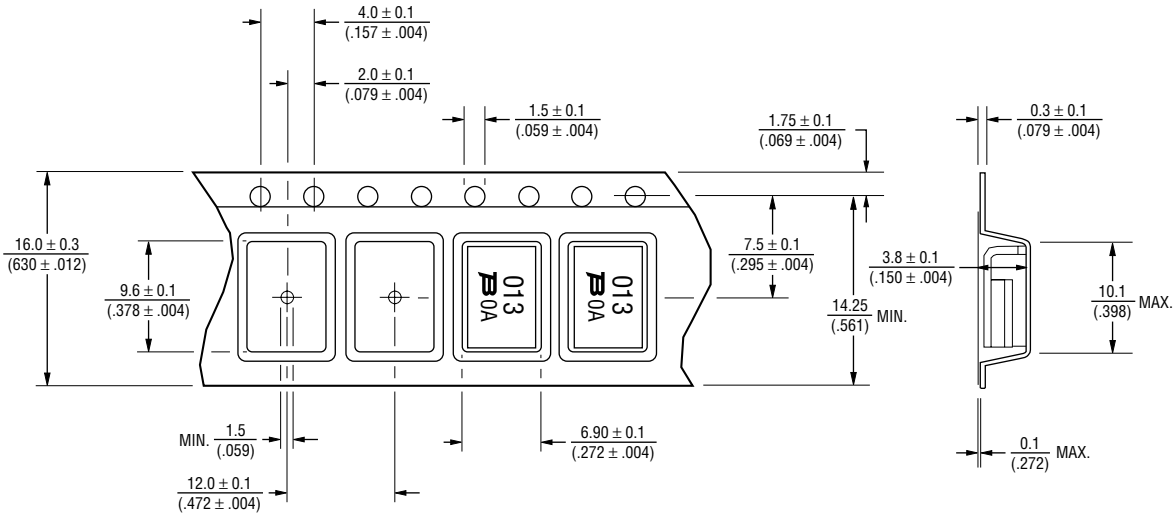
Tape Dimension Identifiers	MF-MSMD Series per EIA-481-1	MF-USMD Series per EIA 481-1	MF-ESMD Series per EIA 481-1
W	12 ± 0.3 (.472 ± .012)	8 ± 0.3 (.040 ± .012)	8 ± 0.3 (.040 ± .012)
P_0	4.0 ± 0.10 (.157 ± .004)	4.0 ± 0.10 (.157 ± .004)	4.0 ± 0.10 (.157 ± .004)
P_1	8.0 ± 0.10 (.315 ± .004)	4.0 ± 0.10 (.157 ± .004)	4.0 ± 0.10 (.157 ± .004)
P_2	2.0 ± 0.05 (.079 ± .039)	2.0 ± 0.05 (.079 ± .039)	2.0 ± 0.05 (.079 ± .039)
A_0	3.5 ± 0.23 (.134 ± .009)	2.8 ± 0.1 (.110 ± .004)	2.8 ± 0.1 (.110 ± .004)
B_0	5.1 ± 0.15 (.201 ± .006)	3.5 ± 0.1 (.138 ± .004)	3.5 ± 0.1 (.138 ± .004)
B_1 max.	5.9 (.232)	4.35 (.171)	4.35 (.171)
D_0	1.5 + 0.1/ -0 (.059 + .004/-0)	1.5 + 0.1/ -0 (.059 + .004/-0)	1.5 + 0.1/ -0 (.059 + .004/-0)
F	5.5 ± 0.05 (2.165 ± .002)	3.5 ± 0.05 (.138 ± .002)	3.5 ± 0.05 (.138 ± .002)
E_1	1.75 ± 0.10 (.069 ± .004)	1.75 ± 0.10 (.069 ± .004)	1.75 ± 0.10 (.069 ± .004)
E_2 min.	10.25 (.404)	6.25 (.246)	6.25 (.246)
T max.	0.6 (.024)	0.6 (.024)	0.6 (.024)
T_1 max.	0.1 (.004)	0.1 (.004)	0.1 (.004)
K_0	0.9 ± 0.15 (.035 ± .006)	1.1 ± 0.05 (.043 ± .002)	0.8 ± 0.1 (.031 ± .004)
Leader min.	390 (15.35)	390 (15.35)	390 (15.35)
Trailer min.	160 (6.30)	160 (6.30)	160 (6.30)
Reel Dimension Identifiers			
A max.	185 (7.283)	185 (7.283)	185 (7.283)
N min.	50 (1.97)	50 (1.97)	50 (1.97)
W_1	12.4 + 2.0/ -0 (.488 + .075/-0)	8.4 + 1.5/ -0 (.331 + .059/-0)	8.4 + 1.5/ -0 (.331 + .059/-0)
W_2 max.	18.4 (.724)	14.4 (.567)	14.4 (.567)

DIMENSIONS = MM (INCHES)

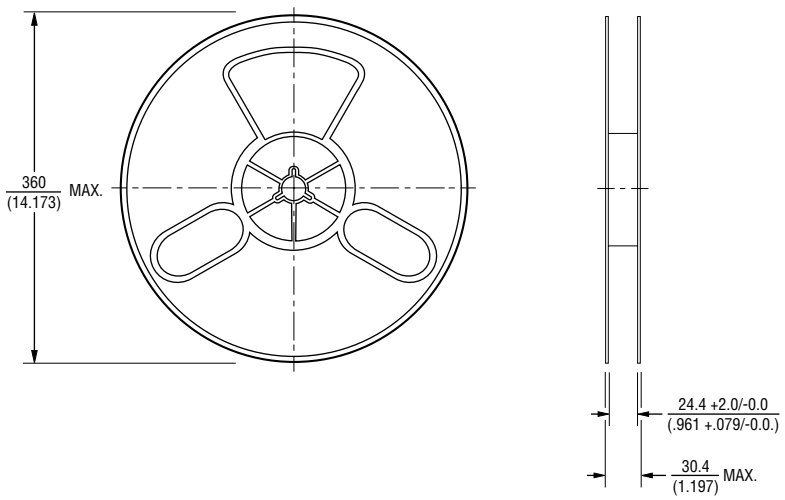


Specifications are subject to change without notice.

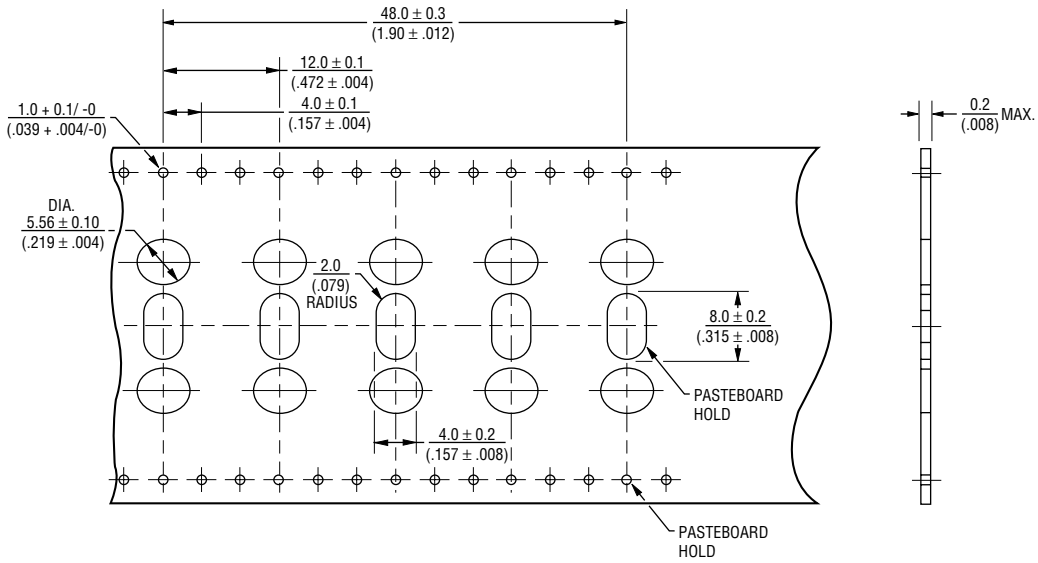
Taped Component Dimensions



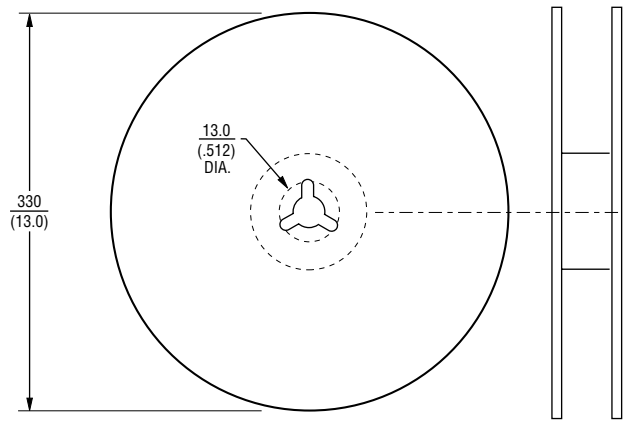
Reel Dimensions



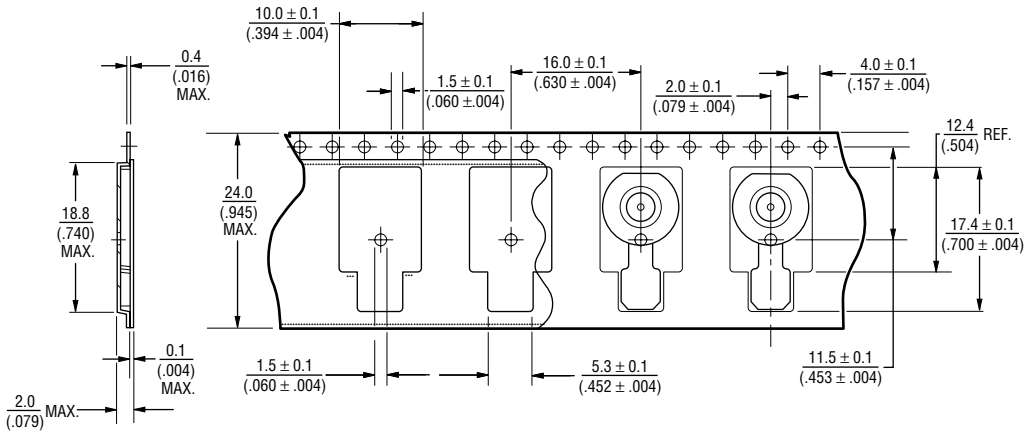
Taped Component Dimensions



Reel Dimensions



Taped Component Dimensions



Reel Dimensions