SMD1812 LF Series Surface Mount PTC Devices

U.S. Patent#6377467

- The SMD1812 Lead(Pb) Free Series, a polymer-based Positive Temperature Coefficient (PTC) device to protect electrical circuits against overcurrent conditions with resettable feature, is fully compatible with current industrial standards.
- The new designed SMD1812 Lead(Pb) Free Series provides surface mount overcurrent protection with superior performance that is compliant with RoHS Directive 2002/95/EC.
- Application: The small sized SMD1812 Lead(Pb) Free Series is ideal for computers and peripherals and can be applied to almost anywhere there is a low voltage power supply and a load to be protected.
- The gold or solder plated termination is designed to meet or exceed solderability specifications and provide excellent solder joint inspectability.
- Agency Approval: UL/CSA File No. E201431.
  TÜV Certificate # R9956421

ELECTRICAL CHARACTERISTICS

Part Number	I_{hold} (A)	I_{trip} (A)	V_{max} (Vdc)	I_{max} (A)	P_d max. (W)	Maximum Time To Trip		Resistance			Agency Approval
						Current (A)	Time (Sec.)	R_{min} (Ω)	R_{typ} (Ω)	R_{1max} (Ω)	
SMD1812P010TF	0.10	0.30	30	10	0.8	0.50	1.50	1.600	7.000	15.000	UL/CSA/TÜV
SMD1812P014TF	0.14	0.34	60	10	0.8	1.50	0.15	1.500	4.000	6.000	UL/CSA/TÜV
SMD1812P020TF	0.20	0.40	30	10	0.8	8.00	0.02	0.800	2.900	5.000	UL/CSA/TÜV
SMD1812P050TF	0.50	1.00	15	40	0.8	8.00	0.15	0.150	0.600	1.000	UL/CSA/TÜV
SMD1812P075TF	0.75	1.50	13.2	40	0.8	8.00	0.20	0.100	0.260	0.450	UL/CSA/TÜV
SMD1812P075TF/24	0.75	1.50	24	40	0.8	8.00	0.20	0.110	0.200	0.290	UL/CSA/TÜV
SMD1812P075TF/33	0.75	1.50	33	20	0.8	8.00	0.20	0.110	0.260	0.400	UL/CSA
SMD1812P110TF	1.10	2.20	6	40	0.8	8.00	0.30	0.040	0.120	0.210	UL/CSA/TÜV
SMD1812P110TF/16	1.10	1.95	16	40	0.8	8.00	0.50	0.060	0.120	0.180	UL/CSA/TÜV
SMD1812P110TF/33	1.10	1.95	33	20	0.8	8.00	0.50	0.060	0.120	0.200	UL/CSA
SMD1812P125TF	1.25	2.50	15	40	0.8	8.00	0.40	0.050	0.160	0.250	UL/CSA/TÜV
SMD1812P125TF/6,4L	1.25	2.50	6	100	0.8	8.00	0.40	0.050	0.090	0.140	UL/CSA
SMD1812P150TF	1.50	3.00	6	40	0.8	8.00	0.50	0.040	0.070	0.110	UL/CSA/TÜV
SMD1812P150TF/8	1.50	3.00	8	40	0.8	8.00	0.50	0.040	0.070	0.110	UL/CSA/TÜV
SMD1812P150TF/12	1.50	3.00	12	20	0.8	8.00	0.50	0.040	0.070	0.110	UL/CSA/TÜV
SMD1812P150TF/24	1.50	3.00	24	20	0.8	8.00	1.50	0.040	0.070	0.120	UL/CSA
SMD1812P160TF	1.60	2.80	6	40	0.8	8.00	1.00	0.030	0.066	0.100	UL/CSA/TÜV
SMD1812P160TF/8(4L)	1.60	2.80	8	40	0.8	8.00	1.00	0.030	0.066	0.100	UL/CSA/TÜV
SMD1812P160TF/12	1.60	2.80	12	20	0.8	8.00	1.00	0.030	0.066	0.100	UL/CSA/TÜV
SMD1812P200TF	2.00	3.50	8	40	0.8	8.00	2.00	0.020	0.040	0.060	UL/CSA/TÜV
SMD1812P260TF	2.60	5.20	6	40	0.8	8.00	2.50	0.015	0.030	0.047	UL/CSA/TÜV

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Http://www.pttc.com.tw

Note: I_{hold} = Hold current: maximum current device will pass without tripping in 20°C still air.
I_{trip} = Trip current: minimum current at which the device will trip in 20°C still air.
V_{max} = Maximum voltage device can withstand without damage at rated current (I_{max})
I_{max} = Maximum fault current device can withstand without damage at rated voltage (V_{max})
P_d = Power dissipated from device when in the tripped state at 20°C still air.
R_{min}= Minimum resistance of device in initial (un-soldered) state.
R_{typ} = Typical resistance of device in initial (un-soldered) state.
R_{1max}= Maximum resistance of device at 20°C measured one hour after tripping or reflow soldering of 260°C for 20 sec.

Caution: Operation beyond the specified rating may result in damage and possible arcing and flame.

Recognitions: UL, CSA, TÜV **recognized.**

◎ **Specifications are subject to change without notice.**

How to Select a Polymer PTC fuse:

(1) Determine the following operating parameters for the circuits:
   (A) Normal Operating Current (I hold)
   (B) Maximum Circuit Voltage (V max)
   (C) Maximum Interrupt Current (I max)
   (D) Normal Operating Temperature (min℃/max℃)

(2) Select the device form factor and dimension suitable for the application:
   Surface Mount Device (SMD Series)
   Radial Leaded Device (RLD Series)
   Axial Leaded Strap Device (STD Series)
   Other Custom-designed Device (Disc/Chip)

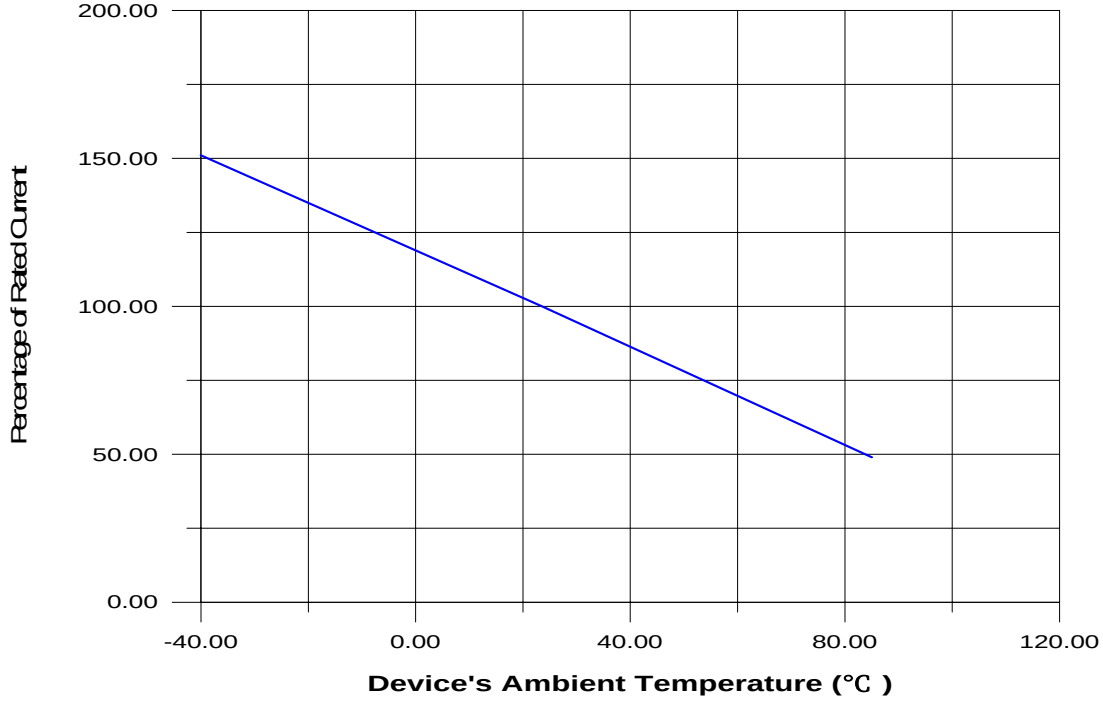
(3) Compare the maximum ratings for V max and I max of the PTC device with the circuit in application and make sure that the circuit's requirement does not exceed the device ratings.

(4) Check that the PTC device's trip time (time-to-trip) will protect the circuit.

(5) Verify that the circuit operating temperatures are within the PTC device's normal operating temperature range.

(6) Verify the performance and suitability of the chosen PTC device in the application.

THERMAL DERATING CURVE FOR SMD1812 SERIES

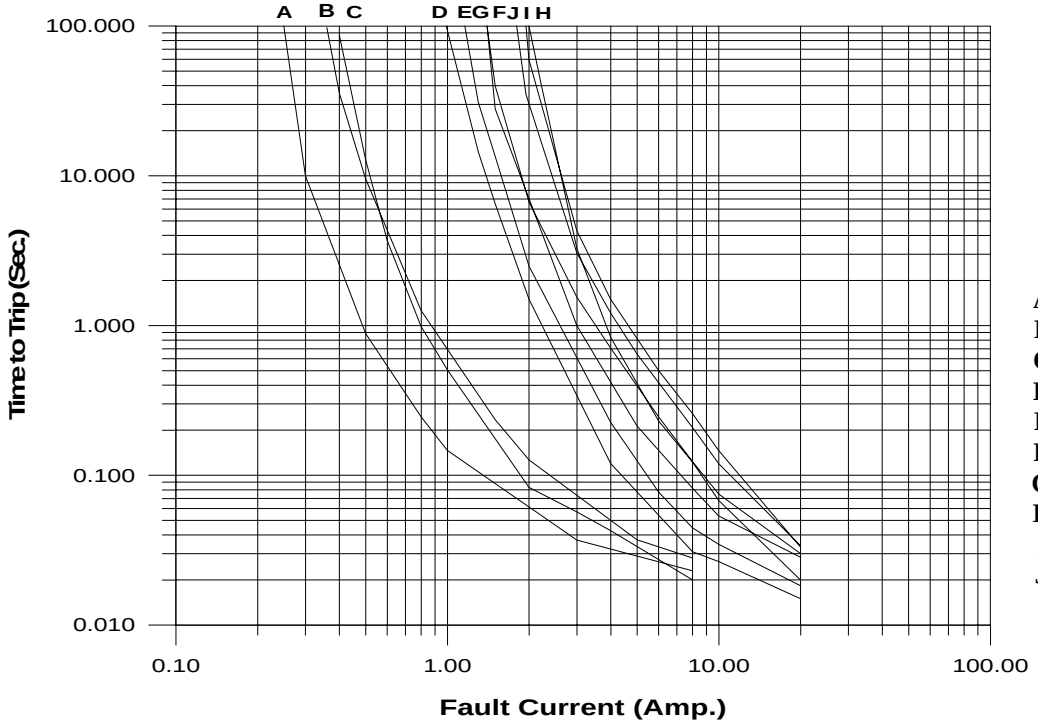


THERMAL DERATING CHART FOR SMD1812 SERIES – Ihold(Amps)

(RECOMMENDED DATA)

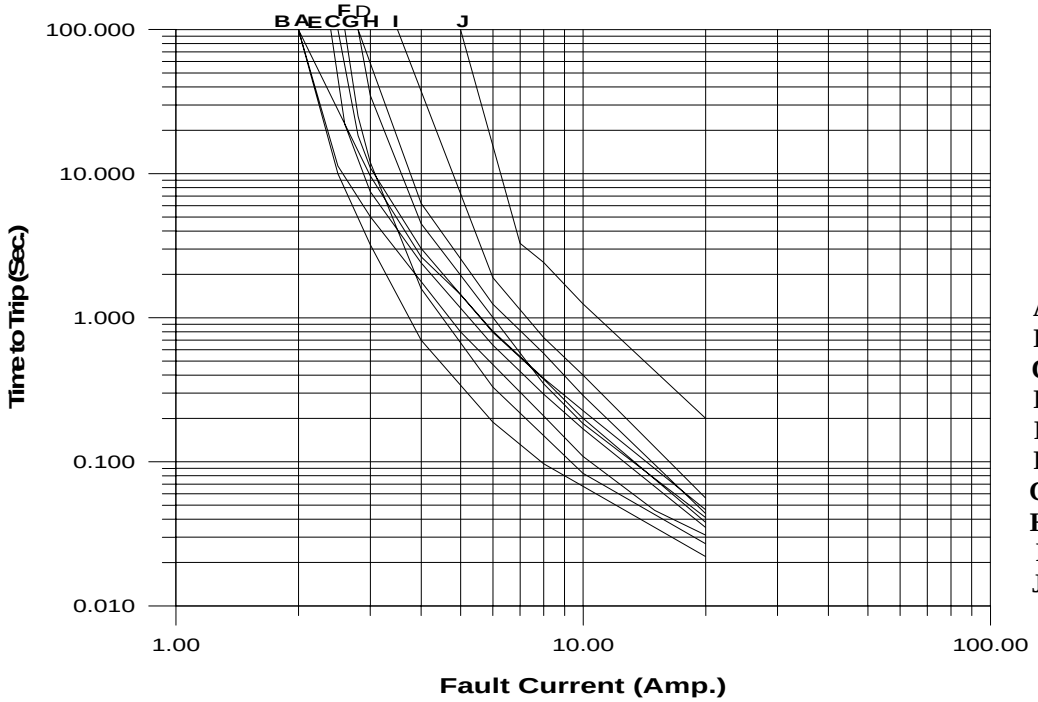
Model	Ambient Operation Temperature								
	-40°C	-20°C	0°C	23°C	40°C	50°C	60°C	70°C	85°C
SMD1812P010TF	0.16	0.14	0.12	0.10	0.08	0.07	0.06	0.05	0.03
SMD1812P014TF	0.23	0.19	0.17	0.14	0.12	0.10	0.09	0.08	0.06
SMD1812P020TF	0.29	0.26	0.23	0.20	0.17	0.15	0.14	0.12	0.10
SMD1812P050TF	0.77	0.68	0.59	0.50	0.44	0.40	0.37	0.33	0.29
SMD1812P075TF	1.15	1.01	0.88	0.75	0.65	0.60	0.55	0.49	0.43
SMD1812P075TF/24	1.06	0.95	0.84	0.75	0.60	0.55	0.50	0.45	0.37
SMD1812P075TF/33	1.10	1.00	0.88	0.75	0.66	0.60	0.56	0.47	0.36
SMD1812P110TF	1.59	1.43	1.26	1.10	0.95	0.87	0.80	0.71	0.60
SMD1812P110TF/16	1.58	1.43	1.27	1.10	0.95	0.85	0.77	0.71	0.58
SMD1812P110TF/33	1.55	1.40	1.25	1.10	0.93	0.83	.073	.063	.050
SMD1812P125TF	2.00	1.75	1.52	1.25	1.00	0.95	0.90	0.75	0.53
SMD1812P125TF/6,4L	2.00	1.75	1.52	1.25	1.00	0.95	0.90	0.75	0.53
SMD1812P150TF	2.30	2.03	1.76	1.50	1.25	1.10	1.00	0.80	0.60
SMD1812P150TF/8	2.06	1.93	1.79	1.50	1.28	1.10	1.02	0.80	0.68
SMD1812P150TF/12	2.04	1.88	1.68	1.50	1.25	1.10	1.00	0.80	0.60
SMD1812P150TF/24	2.05	1.87	1.67	1.50	1.25	1.08	0.95	0.77	0.60
SMD1812P160TF	2.27	2.05	1.83	1.60	1.35	1.25	1.15	1.00	0.85
SMD1812P160TF/8(4L)	2.20	2.06	1.91	1.60	1.36	1.17	1.09	0.85	0.72
SMD1812P160TF/12	2.18	2.01	1.79	1.60	1.34	1.16	1.07	0.83	0.60
SMD1812P200TF	3.08	2.71	2.35	2.00	1.80	1.60	1.50	1.07	0.80
SMD1812P260TF	4.00	3.52	3.06	2.60	2.34	2.08	1.95	1.39	1.04

AVERAGE TIME-CURRENT CURVE FOR SMD1812 SERIES



A:SMD1812P010TF
B:SMD1812P014TF
C:SMD1812P020TF
D:SMD1812P050TF
E:SMD1812P075TF
F:SMD1812P075TF/24
G:SMD1812P075TF/33
H:SMD1812P110TF
I :SMD1812P110TF/16
J :SMD1812P110TF/33

AVERAGE TIME-CURRENT CURVE FOR SMD1812 SERIES



A:SMD1812P125TF
B:SMD1812P125TF/6,4L
C:SMD1812P150TF
D:SMD1812P150TF/12
E:SMD1812P150TF/24
F:SMD1812P160TF
G:SMD1812P160TF/8(4L)
H:SMD1812P160TF/12
I :SMD1812P200TF
J :SMD1812P260TF

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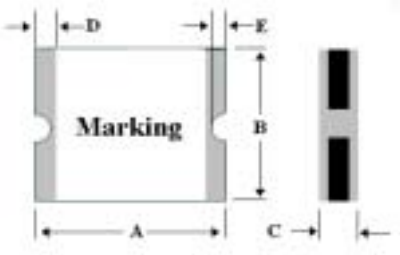
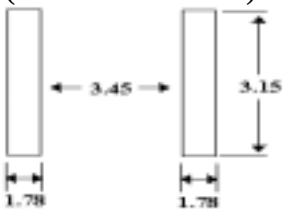
FIGURE



SOLDER PAD LAYOUTS
(Dimension in mm)



PHYSICAL DIMENSIONS (mm)

Part Number	A		B		C		D	E	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Min.	Max.
SMD1812P010TF	4.37	4.73	3.07	3.41	0.75	1.25	0.30	0.25	0.65
SMD1812P014TF	4.37	4.73	3.07	3.41	0.75	1.95	0.30	0.25	0.65
SMD1812P020TF	4.37	4.73	3.07	3.41	0.55	1.00	0.30	0.25	0.65
SMD1812P050TF	4.37	4.73	3.07	3.41	0.50	0.75	0.30	0.25	0.50
SMD1812P075TF	4.37	4.73	3.07	3.41	0.50	0.75	0.30	0.25	0.50
SMD1812P075TF/24	4.37	4.73	3.07	3.41	0.75	1.55	0.30	0.25	0.65
SMD1812P075TF/33	4.37	4.73	3.07	3.41	0.75	1.55	0.30	0.25	0.65
SMD1812P110TF	4.37	4.73	3.07	3.41	0.50	0.75	0.30	0.25	0.50
SMD1812P110TF/16	4.37	4.73	3.07	3.41	0.75	1.25	0.30	0.25	0.65
SMD1812P110TF/33	4.37	4.73	3.07	3.41	1.20	2.00	0.30	0.25	0.65
SMD1812P125TF	4.37	4.73	3.07	3.41	0.75	1.25	0.30	0.25	0.50
SMD1812P125TF/6,4L	4.37	4.73	3.07	3.41	0.45	0.75	0.30	0.25	0.65
SMD1812P150TF	4.37	4.73	3.07	3.41	0.75	1.25	0.30	0.25	0.50
SMD1812P150TF/8	4.37	4.73	3.07	3.41	0.40	0.75	0.30	0.25	0.65
SMD1812P150TF/12	4.37	4.73	3.07	3.41	0.75	1.25	0.30	0.25	0.65
SMD1812P150TF/24	4.37	4.73	3.07	3.41	0.80	1.80	0.30	0.25	0.65
SMD1812P160TF	4.37	4.73	3.07	3.41	0.75	1.25	0.30	0.25	0.65
SMD1812P160TF/8(4L)	4.37	4.73	3.07	3.41	0.40	0.75	0.30	0.25	0.65
SMD1812P160TF/12	4.37	4.73	3.07	3.41	0.75	1.25	0.30	0.25	0.65
SMD1812P200TF	4.37	4.73	3.07	3.41	0.75	1.55	0.30	0.25	0.50
SMD1812P260TF	4.37	4.73	3.07	3.41	0.80	1.80	0.30	0.25	0.50

ENVIRONMENTAL SPECIFICATIONS

Operating/Storage Temperature	-40℃ to +85℃	
Maximum Device Surface Temperature in Tripped State	125℃	
Passive Aging	+85℃, 1000 hours	±5% typical resistance change
Humidity Aging	+85℃, 85%R.H. 1000 hours	±5% typical resistance change
Thermal Shock	MIL-STD-202 Method 107G +85℃/-40℃ 20 times	-30% typical resistance change
Solvent Resistance	MIL-STD-202, Method 215	No change
Vibration	MIL-STD-883C, Method 2007.1, Condition A	No change

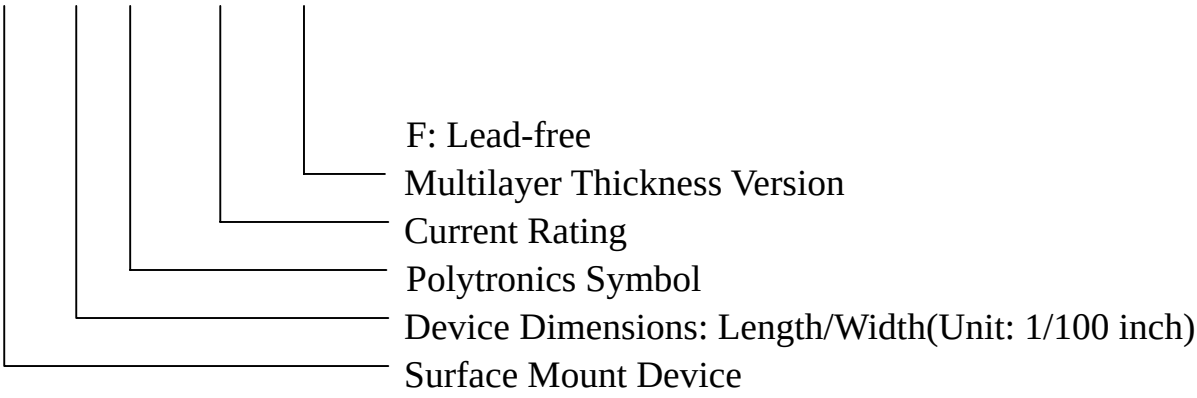
PHYSICAL SPECIFICATIONS

Terminal Material	Gold-Plated Copper or Solder-Plated Copper (Solder Material: Tin(Sn) or other)
Lead Solderability	Meets EIA Specification RS186-9E, ANSI/J-STD-002 Category 3.
Packaging	12mm tape on 7 inch reel per EIA-481-1(equivalent to IEC286, part3) 1000 devices per reel for P110TF/33,P150TF/24&P260TF 2000 devices per reel for P020TF,P050TF,P075TF,P110TF,P125TF/6,4L,P150TF/8&P160TF/8(4L) for the others: 1500 devices per reel.

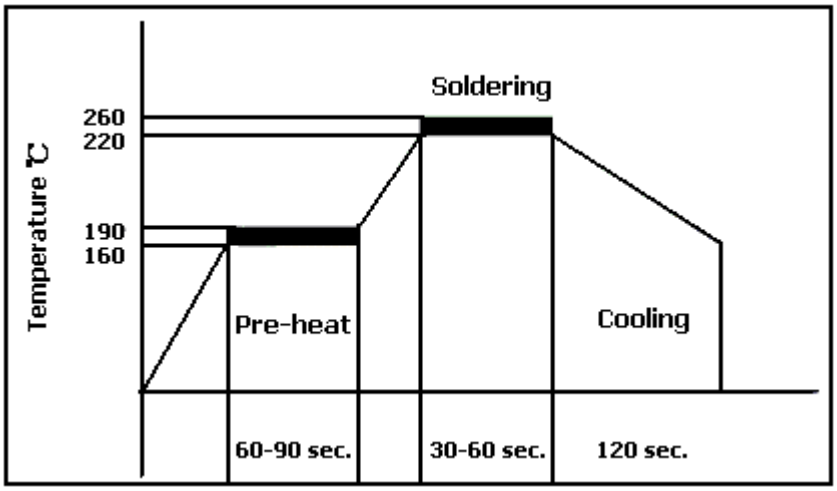
◎Specifications are subject to change without notice.

PART NUMBERING SYSTEM

SMD 1812 P □□□ TF



SOLDER REFLOW



RECOMMENDED CONDITIONS

Condition	Reflow
Peak Temp/Time	245°C≧ 5 Sec
≧220°C	30 Sec ~ 60 Sec
Preheat 160°C~ 190°C	60 Sec ~ 90 Sec
Storage Condition	0°C~35°C, ≦70%RH

- Recommended reflow methods: IR, vapor phase oven, hot air oven, N_2 environment for lead-free
- Devices are not designed to be wave soldered to the bottom side of the board.
- Recommended maximum paste thickness is 0.25mm (0.010 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.

TAPE SPECIFICATIONS: EIA-481-1

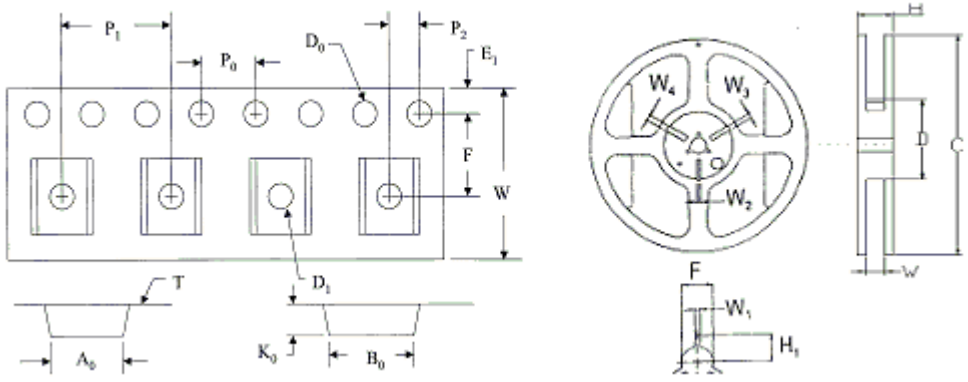
	P020TF, P050TF P075TF, P110TF P125TF/6,4L P150TF/8, P160TF/8(4L)	P010TF,P014TF, P075TF24,P075TF/33 P110TF/16,P125TF P150TF,P150TF/12, P160TF,P160TF/12, P200TF	P110TF/33 P150TF/24 P260TF
W	12.00+0.30-0.10	12.00+/-0.30	12.00+/-0.30
F	5.50+/-0.05	5.50+/-0.05	5.50+/-0.05
E_1	1.75+/-0.10	1.75+/-0.10	1.75+/-0.10
D_0	1.50+0.10	1.55+/-0.05	1.55+/-0.05
D_1	1.50+0.25	1.50 (MIN)	1.50 (MIN)
P_0	4.00+/-0.10	4.00+/-0.10	4.00+/-0.10
P_1	8.00+/-0.10	8.00+/-0.10	8.00+/-0.10
P_2	2.00+/-0.05	2.00+/-0.05	2.00+/-0.05
A_0	3.58+/-0.10	3.58+/-0.10	3.58+/-0.10
B_0	4.93+/-0.10	4.93+/-0.10	4.93+/-0.10
T	0.279+/-0.02	0.25+/-0.10	0.25+/-0.10
K_0	1.02+/-0.10	1.30+/-0.10	2.10+/-0.10
Leader min.	390	390	390
Trailer min.	160	160	160

(mm)

REEL DIMENSIONS: EIA-481-1

H	16.0+/-0.2
W	13.2+/-1.5
D	Ø60.2+/-0.5
F	Ø13.0+/-0.5
C	Ø178+/-1.0
H_1	11+/-0.5
W_1	2.5+0.5
W_2	3.0+0.5
W_3	4.0+0.5
W_4	5.0+0.5

(mm)



CROSS REFERENCE

Polytronics/ EVERFUSE™	Cross Reference	
	Raychem/ PolySwitch®	Bourns/ Multifuse®
SMD1812P010TF	miniSMDC010F	MF-MSMF010
SMD1812P014TF	miniSMDC014F	MF-MSMF020
SMD1812P020TF	miniSMDC020F	MF-MSMF020
SMD1812P050TF	miniSMDC050F	MF-MSMF050
SMD1812P075TF	miniSMDC075F	MF-MSMF075
SMD1812P075TF/24	miniSMDM075F/24	MF-MSMF075/24
SMD1812P075TF/33	N/A	N/A
SMD1812P110TF	miniSMDC110F	MF-MSMF110
SMD1812P110TF/16	miniSMDC110F/16	MF-MSMF110/16
SMD1812P110TF/33	N/A	N/A
SMD1812P125TF	miniSMDC125F	MF-MSMF125
SMD1812P125TF/6,4L	miniSMDC125F	MF-MSMF125
SMD1812P150TF	miniSMDC150F	MF-MSMF150
SMD1812P150TF/8	miniSMDC150F	N/A
SMD1812P150TF/12	N/A	N/A
SMD1812P150TF/24	miniSMDM150/24	N/A
SMD1812P160TF	miniSMDM160F	MF-MSMF160
SMD1812P160TF/8(4L)	miniSMDM160F	MF-MSMF160
SMD1812P160TF/12	N/A	N/A
SMD1812P200TF	miniSMDC200F	MF-MSMF200
SMD1812P260TF	miniSMDC260F	MF-MSMF260