SMD1210 LF Series Surface Mount PTC Devices

U.S. Patent#6377467

- The SMD1210 Lead(Pb) Free Series, a smaller sized surface mountable device, is a new product extension of Polymeric Positive Temperature Coefficient (PPTC) resettable fuse.
- The new designed SMD1210 Lead(Pb) Free Series provides smallest footprint in a 3225(mm) package with current ratings from 0.05A to 1.5A and voltage ratings from 6V to 30V. The SMD1206 Lead(Pb) Free Series is compliant with RoHS Directive 2002/65/EC.
- Application: The exciting new SMD1210 Lead(Pb) Free product family is ideal for palm-top PC, personal digital assistants (PDAs), digital camera and other peripherals.
- 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)	UL/CSA	TÜV
SMD1210P005TF	0.05	0.15	30	10	0.60	0.25	1.50	3.600	25.00	50.00	✓	✓
SMD1210P010TF	0.10	0.30	30	10	0.60	0.50	1.50	1.600	7.000	15.00	✓	✓
SMD1210P020TF	0.20	0.40	30	10	0.60	8.00	0.02	0.800	2.900	5.000	✓	✓
SMD1210P035TF	0.35	0.70	6	100	0.60	8.00	0.20	0.320	0.810	1.300	✓	✓
SMD1210P050TF	0.50	1.00	13.2	100	0.60	8.00	0.10	0.250	0.550	0.900	✓	✓
SMD1210P075TF	0.75	1.50	6	100	0.60	8.00	0.10	0.130	0.290	0.400	✓	✓
SMD1210P110TF	1.10	2.20	6	100	0.60	8.00	0.30	0.060	0.140	0.210	✓	✓
SMD1210P150TF	1.50	3.00	6	100	0.80	8.00	0.50	0.040	0.070	0.110	✓	✓

Note: I_{hold} = Hold current: maximum current device will pass without tripping in 20℃ still air.

I_{trip} = Trip current: minimum current at which the device will trip in 20℃ 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℃ 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℃ measured one hour after tripping or reflow soldering of 260℃ for 20 sec.

*Value specified were determined using the PWB with 0.030"*1.5oz copper traces.

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

◎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)

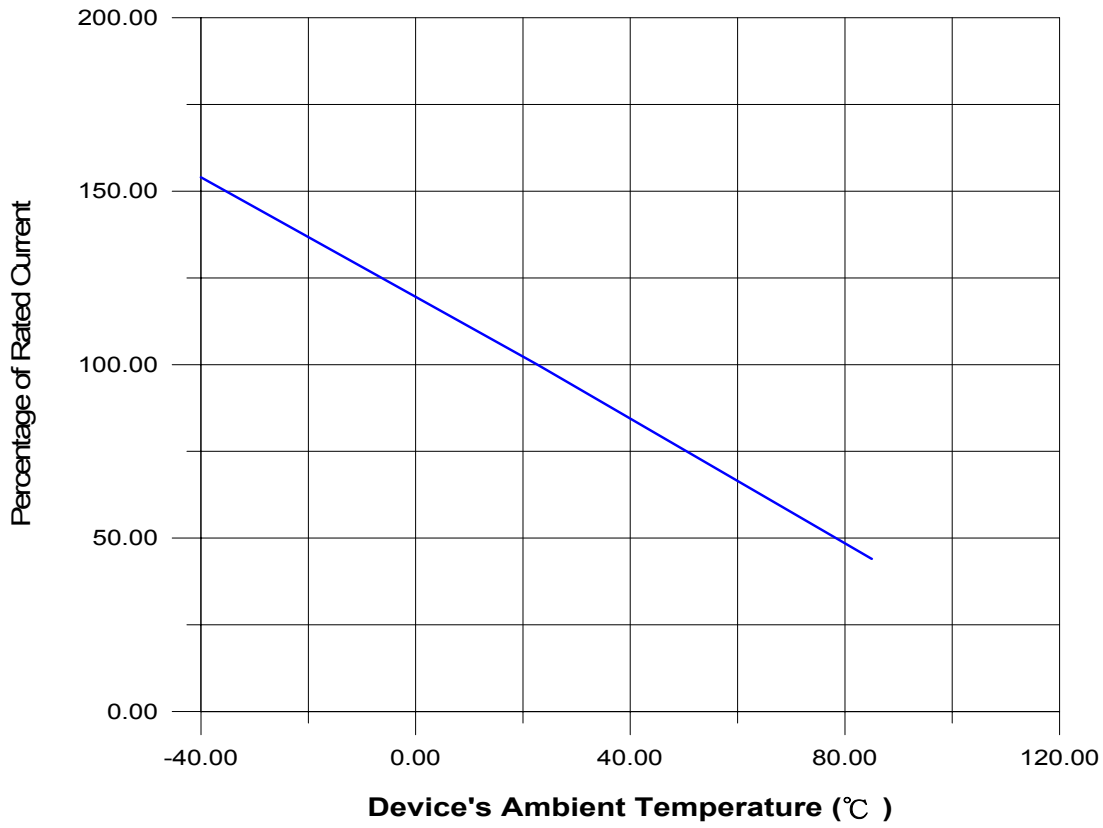
(3) Compare the maximum ratings for V max and I max of the PTC device with the circuit in application and make sure that the circuit's requirement does not exceed the device ratings.

(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.

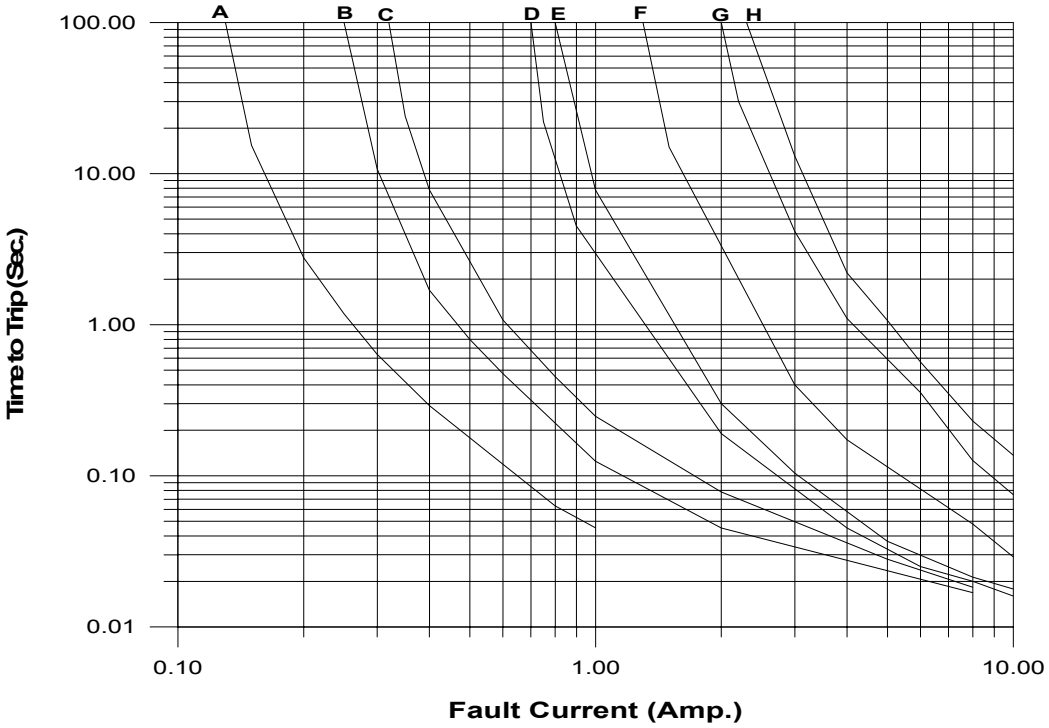
THERMAL DERATING CURVE FOR SMD1210 SERIES



THERMAL DERATING CHART FOR SMD1210 SERIES – Ihold (Amps) (RECOMMENDED DATA)

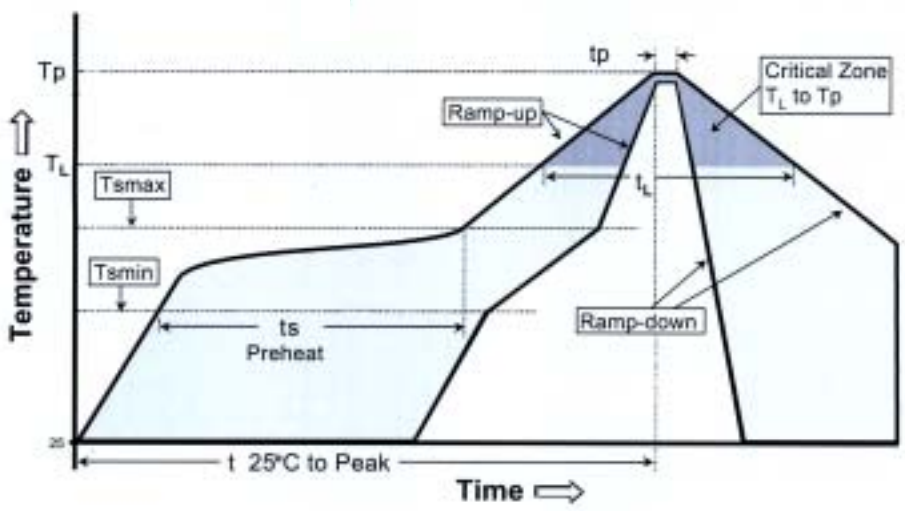
Model	Ambient Operation Temperature								
	-40℃	-20℃	0℃	23℃	40℃	50℃	60℃	70℃	85℃
SMD1210P005TF	0.08	0.07	0.06	0.05	0.04	0.04	0.03	0.03	0.02
SMD1210P010TF	0.16	0.14	0.12	0.10	0.08	0.07	0.06	0.05	0.03
SMD1210P020TF	0.29	0.26	0.22	0.20	0.16	0.14	0.13	0.11	0.08
SMD1210P035TF	0.47	0.45	0.40	0.35	0.33	0.28	0.24	0.21	0.18
SMD1210P050TF	0.76	0.67	0.58	0.50	0.43	0.40	0.36	0.32	0.28
SMD1210P075TF	1.00	0.97	0.86	0.75	0.64	0.59	0.54	0.48	0.40
SMD1210P110TF	1.69	1.48	1.29	1.10	0.88	0.76	0.65	0.57	0.43
SMD1210P150TF	2.13	1.92	1.71	1.50	1.26	1.14	1.01	0.89	0.71

AVERAGE TIME-CURRENT CURVE FOR SMD1210 SERIES



A:SMD1210P005TF
B:SMD1210P010TF
C:SMD1210P020TF
D:SMD1210P035TF
E:SMD1210P050TF
F:SMD1210P075TF
G:SMD1210P110TF
H:SMD1210P150TF

SOLDER REFLOW



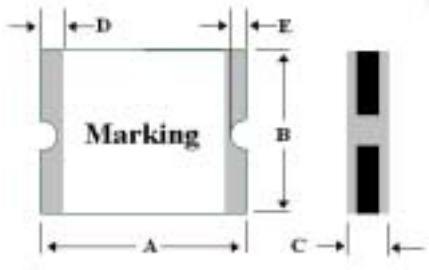
RECOMMENDED CONDITIONS

Profile Feature	Pb-Free Assembly
Average ramp-up rate (T_L to T_P)	3℃/second max.
Preheat -Temperature Min (Ts_{min}) -Temperature Max (Ts_{max}) -Time (min to max) (ts)	 150℃ 200℃ 60-180 seconds
Tsmax to T_L -Ramp-up Rate	 3℃/second max.
Time maintained above: -Temperature (T_L) -Time (t_L)	 217℃ 60-150 seconds
Peak Temperature (Tp)	260℃
Time within 5℃ of actual Peak Temperature (tp)	20-40 seconds
Ramp-down Rate	6℃/second max.
Time 25℃ to Peak Temperature	8 minutes max.
Storage Condition	0℃~35℃, ≦70%RH

Note 1: All temperature refer to topside of the package, measured on the package body surface.
Note 2: If reflow temperatures exceed the recommended profile, devices may not meet the performance requirements.

- Recommended reflow methods: IR, vapor phase oven, hot air oven, N_2 environment for lead-free
- Recommended maximum paste thickness is 0.25mm (0.010 inch)
- Devices can be cleaned using standard industry methods and solvents.
- Devices can be reworked using the standard industry practices.

FIGURE



PHYSICAL DIMENSIONS (mm)

Part Number	A		B		C		D	E	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Min.	Max.
SMD1210P005TF	3.00	3.43	2.35	2.80	0.75	1.25	0.25	0.20	0.50
SMD1210P010TF	3.00	3.43	2.35	2.80	0.75	1.25	0.25	0.20	0.50
SMD1210P020TF	3.00	3.43	2.35	2.80	0.60	1.00	0.25	0.20	0.50
SMD1210P035TF	3.00	3.43	2.35	2.80	0.50	0.85	0.25	0.20	0.50
SMD1210P050TF	3.00	3.43	2.35	2.80	0.50	0.85	0.25	0.20	0.50
SMD1210P075TF	3.00	3.43	2.35	2.80	0.50	0.85	0.25	0.20	0.50
SMD1210P110TF	3.00	3.43	2.35	2.80	0.90	1.30	0.25	0.20	0.50
SMD1210P150TF	3.00	3.43	2.35	2.80	0.80	1.80	0.25	0.20	0.50

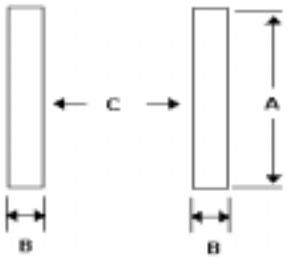
ENVIRONMENTAL SPECIFICATIONS

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

*Customer should verify the device performance in their specified conditions.

PACKAGING

SOLDER PAD LAYOUTS
(Dimension in mm)



Part Number	Tape & Reel Quantity	Recommended Pad layout Figure (mm)		
		Dimension (A)	Dimension (B)	Dimension (C)
SMD1210P005TF	3000	2.50	1.00	2.00
SMD1210P010TF	3000	2.50	1.00	2.00
SMD1210P020TF	3000	2.50	1.00	2.00
SMD1210P035TF	4000	2.50	1.00	2.00
SMD1210P050TF	4000	2.50	1.00	2.00
SMD1210P075TF	4000	2.50	1.00	2.00
SMD1210P110TF	3000	2.50	1.00	2.00
SMD1210P150TF	2000	2.50	1.00	2.00

◎ 8 mm tape on 7 inch reel per EIA-481-1(equivalent to IEC286, part3)

PHYSICAL SPECIFICATIONS

Terminal Material	Solder-Plated Copper (Solder Material: Matte Tin (Sn))
Lead Solderability	Meets EIA Specification RS186-9E, ANSI/J-STD-002 Category 3.

◎ Specifications are subject to change without notice.

TAPE SPECIFICATIONS: EIA-481-1

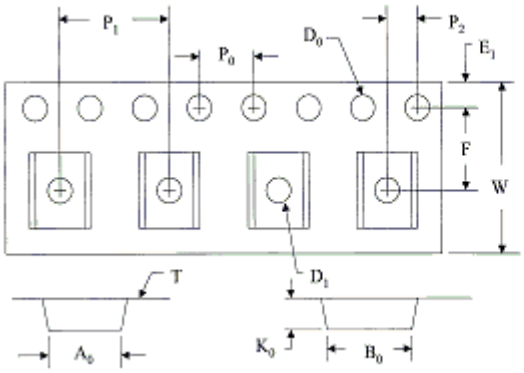
	P035TF P050TF P075TF	P005TF, P010TF P020TF, P110TF	P150TF
W	8.0+/-0.30	8.0+/-0.30	8.0+/-0.30
F	3.5+/-0.05	3.5+/-0.05	3.5+/-0.05
E_1	1.75+/-0.10	1.75+/-0.10	1.75+/-0.10
D_0	1.55+/-0.05	1.55+/-0.05	1.55+/-0.05
D_1	1.0 (min)	1.0 (min)	1.0 (min)
P_0	4.0+/-0.10	4.0+/-0.10	4.0+/-0.10
P_1	4.0+/-0.10	4.0+/-0.10	4.0+/-0.10
P_2	2.0+/-0.05	2.0+/-0.05	2.0+/-0.05
A_0	2.82+/-0.10	2.82+/-0.10	2.67+/-0.10
B_0	3.46+/-0.10	3.46+/-0.10	3.36+/-0.10
T	0.25+/-0.10	0.25+/-0.10	0.25+/-0.10
K_0	1.00+/-0.10	1.30+/-0.10	1.65+/-0.10
Leader min.	390	390	390
Trailer min.	160	160	160

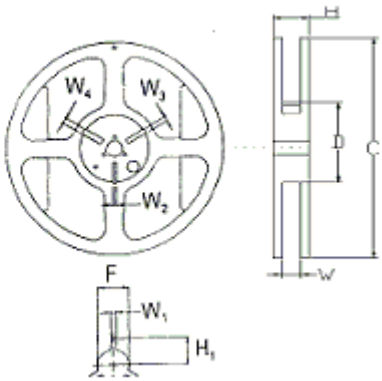
(mm)

REEL DIMENSIONS: EIA-481-1

H	12.0+/-0.05
W	9.0+/-0.5
D	Ø60+0.5
F	Ø13.0+/-0.2
C	Ø178+/-1.0
H_1	11+/-0.5
W_1	2.2+/-0.5
W_2	3.0+0.5
W_3	4.0+0.5
W_4	5.5+0.5

(mm)



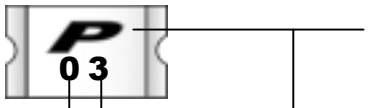


PART NUMBERING SYSTEM

SMD 1210 P □□□ TF

- F: Lead-free
- Multilayer Thickness Version
- Current Rating
- Polytronics Symbol
- Device Dimensions: Length/Width(Unit: 1/100 inch)
- Surface Mount Device

PART MARKING SYSTEM



- P : Polytronics Logo
- P•: Polystar Logo
- Part identification

Note: Polystar is Polytronics's manufacturing site in China.

CROSS REFERENCE

Polytronics/ EVERFUSE™	Cross Reference	
	Raychem/ PolySwitch®	Bourns/ Multifuse®
SMD1210P005TF	MicroSMD005F	MF-USMF005
SMD1210P010TF	MicroSMD010F	MF-USMF010
SMD1210P020TF	-	MF-USMF020
SMD1210P035TF	MicroSMD035F	MF-USMF035
SMD1210P050TF	MicroSMD050F	MF-USMF050
SMD1210P075TF	MicroSMD075F	MF-USMF075
SMD1210P110TF	MicroSMD110F	MF-USMF110
SMD1210P150TF	MicroSMD150F	-