Innovative Service Around the Globe YAGEO

DATA SHEET

POSITIVE TEMPERATURE COEFFICIENT AC/DC POWER SUPPLY

PPTC Low Rho SMDL1210 Series

RoHS compliant & Halogen free

Product specification– November 06, 2024 V.2

Positive Temperature Coefficient (PTC) Data Sheet

Description

The Low Rho SMDL1210 Series Surface Mount PPTC (Polymer Positive Temperature Coefficient) devices provide overcurrent protection for applications where ultra low internal resistance, ultra low voltage drop and automatic resettable protection are desired. This new series allows a higher hold current device in a smaller factor and lower profile as compared to a standard PPTC. It offers ultra low internal resistance while maintaining the high level electrical characteristics and performances of standard PPTC products. And have maximum fault current of 50A. The SMDL1210 series provides miniature surface mount resettable overcurrent protection with holding current from 1.75A to 6.0A

Features

- Ultra low internal resistance
- Miniature size saves board space
- Fast response to fault currents
- Compatible with high temperature solders
- UL/CUL/ TUV/ RoHS/Halogen Free
- RoHS compliant, Lead Free and Halogen Free

Applications

- USB peripherals including new USB 3.0 / 2.0 ports
- Smart phones
- E-readers
- Computer peripherals
- Hard disk drives
- Li-ion / Li-Polymer battery packs
- Tablet and Notebook PCs
- LCD / LED HDTV
- Digital cameras and video cameras
- Game consoles

Electrical Characteristics

Part Number	I_{hold} (A)	I_{trip} (A)	V_{max} (Vdc)	I_{max} (A)	$P_{d\ typ.}$ (W)	Maximum Time To Trip		Resistance	
						Time (Sec.)	Current (A)	R_{min} (Ω)	R_{1max} (Ω)
SMDL1210B175TF	1.75	3.50	6	50	0.8	2.5	8.0	0.006	0.040
SMDL1210B200TF	2.0	4.0	6	50	0.8	3.0	8.0	0.005	0.024
SMDL1210B260TF	2.6	5.0	6	50	0.8	4.0	8.0	0.003	0.020
SMDL1210B300TF	3.0	6.0	6	50	0.8	2.0	15.0	0.003	0.020
SMDL1210B350TF	3.5	7.0	6	50	0.8	2.0	17.5	0.003	0.018
SMDL1210B380TF	3.8	8.0	6	50	1.0	5.0	8.0	0.002	0.016
SMDL1210B400TF	4.0	8.0	6	50	1.0	5.0	8.0	0.001	0.014
SMDL1210B450TF	4.5	9.0	6	50	1.0	2.0	22.5	0.001	0.014
SMDL1210B500TF	5.0	10.0	6	50	1.2	2.0	25.0	0.001	0.012
SMDL1210B550TF	5.5	11.0	6	50	1.2	2.0	27.5	0.001	0.011
SMDL1210B600TF	6.0	12.0	6	50	1.2	2.0	30.0	0.001	0.010

Note on Electrical Characteristics

■ Vocabulary

- I_{hold} = Hold current: maximum current device will pass without tripping in 23℃ still air.
- I_{trip} = Trip current: minimum current at which the device will trip in 23℃ 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})
- $P_{d\ typ.}$ = Typical power dissipated from device when in the tripped state at 23℃ still air.
- R_{min} = Minimum resistance of device in initial (un-soldered) state.
- R_{1max} = Maximum resistance of device at 23℃ measured one hour after tripping or reflow soldering of 260℃ for 20 sec.

■ Value specified is determined by 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.

Polymeric PTC Selecting Guide

■ Determine the following operating parameters for the circuits:

- Normal operating current (I_{hold})
- Maximum interrupt current (I_{max})
- Maximum circuit voltage (V_{max})
- Normal operating temperature surrounding device (min℃/max℃)

■ Select the device from factor and dimension suitable for the application

■ Compare the maximum rating for V_{max} and I_{max} of the PPTC device with the circuit in application and make sure the circuit’s requirement does not exceed the device rating.

■ Check that PPTC device’s trip time (time-to-trip) will protect the circuit.

■ Verify that the circuit operating temperature is within the PPTC device’s normal operating temperature range.

■ Verify that performance and suitability of the chosen PPTC device in the application.

⚠ WARNING

■ Mechanical Stress

- PPTC devices will undergo a thermal expansion during fault condition. If PPTC devices are installed or placed in an application where the space between PPTC devices and the surrounding materials (e.g., covering materials, packaging materials, encapsulate materials and the like) is insufficient, it will cause an inhibiting effect upon the thermal expansion. Pressing, twisting, bending and other kinds of mechanical stress will also adversely affect the performance of the PPTC devices, and shall not be used or applied.

■ Chemical Pollutants

- Silicone-based oils, oils, solvents, gels, electrolytes, fuels, acids, and the like will adversely affect the properties of PPTC devices, and shall not be used or applied.

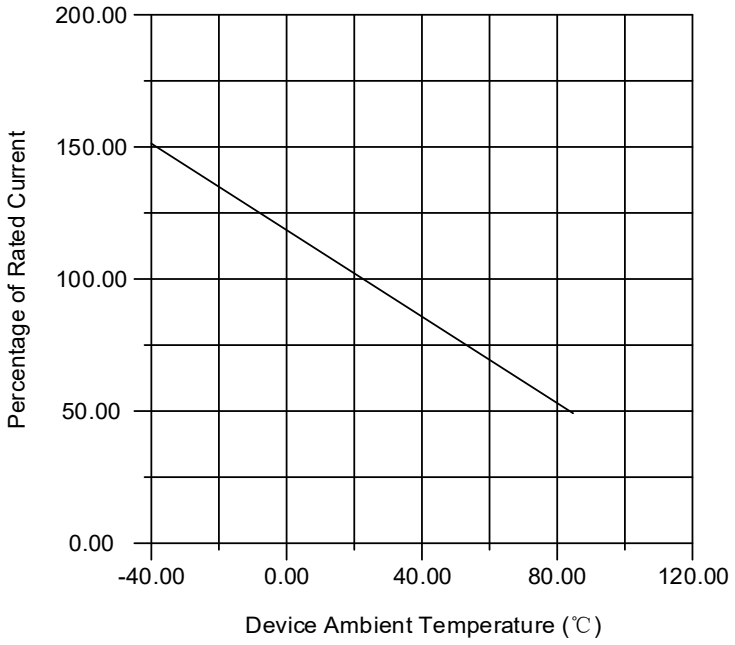
■ Electronic and Thermal Effect

- PPTC devices are secondary protection devices and are used solely for sporadic, accidental over-current or over temperature error condition, and shall NOT be used if or when constant or repeated fault conditions (such fault conditions may becaused by,among others, incorrect pin-connection of a connector) or over-extensive trip events may occur.
- PPTC devices are different from fuses and, when a fault condition occurs, will go into high-resistance state and do not open circuit, in which case the voltage at such PPTC devices may reach a hazardous level.
- Operation over the maximum rating or other forms of improper use may cause failure, arcing, flame and/or other damage to the PPTC devices.
- Conductive material contamination, such as metal particle, may induce shortage, flame or arcing.
- Due to the inductance, the operation circuits may generate a circuit voltage (Ldi/dt) above the rated voltage of PPTC devices, which shall not be used under such circumstances.

■ General

- Customers shall evaluate and test the properties of PPTC devices independently to verify and ensure that their individual applications will be met.
- The performance of PPTC devices will be adversely affected if they are improperly used under electronic, thermal and/or mechanical procedures and/or conditions non-conformant to those recommended by manufacturer.
- Customers shall be responsible for determining whether it is necessary to have back-up, failsafe and/or fool-proof protection To avoid or minimize damage that may result from extra-ordinary, irregular function or failure of PPTC devices.
- Any and all responsibilities and liabilities are disclaimed if any item under this notice of warning is not complied with.

Thermal Derating Curve

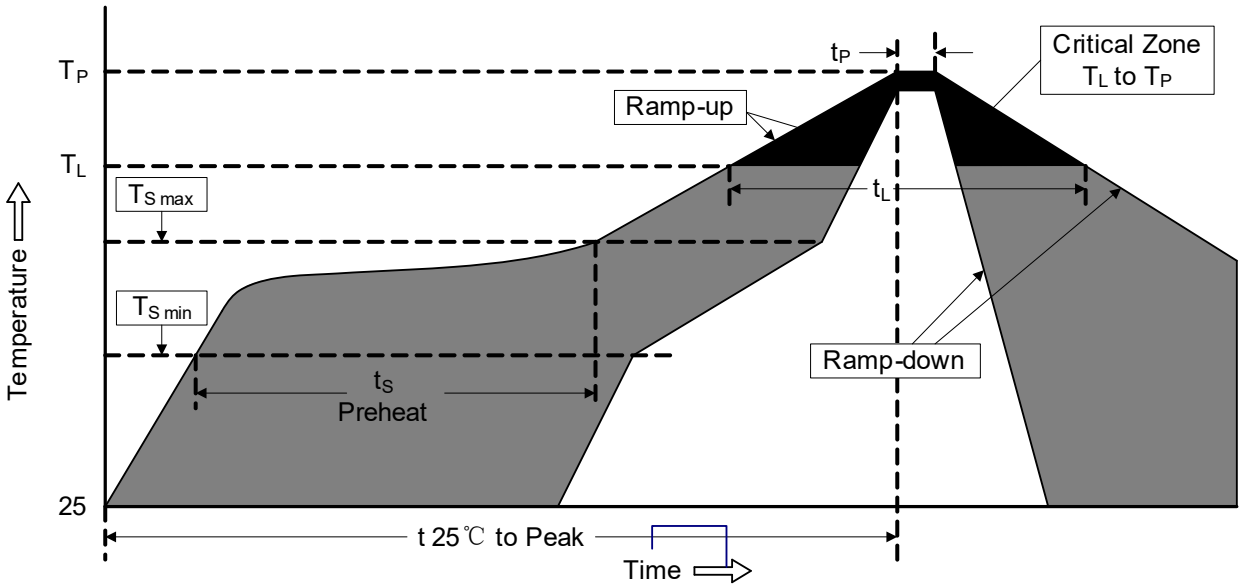


Thermal Derating Chart

Recommended Hold Current (A) at Ambient Temperature (℃)

Part Number	Ambient Operation Temperature							
	-40℃	-20℃	0℃	23℃	40℃	60℃	70℃	85℃
SMDL1210B175TF	2.65	2.30	2.05	1.75	1.40	1.05	0.60	0.20
SMDL1210B200TF	3.30	2.80	2.40	2.00	1.90	1.60	0.85	0.41
SMDL1210B260TF	4.20	3.75	3.30	2.60	2.20	1.70	0..96	0.53
SMDL1210B300TF	4.70	4.15	3.60	3.00	2.50	1.90	1.20	0.82
SMDL1210B350TF	5.00	4.60	4.05	3.50	2.80	2.00	1.25	0.86
SMDL1210B380TF	5.70	5.10	4.40	3.80	3.20	2.25	1.48	1.00
SMDL1210B400TF	5.70	5.25	4.60	4.00	3.20	2.25	1.52	1.00
SMDL1210B450TF	6.45	5.85	5.15	4.50	3.45	2.50	1.63	1.10
SMDL1210B500TF	7.20	6.50	5.85	5.00	4.45	3.75	1.75	1.16
SMDL1210B550TF	8.00	7.15	6.35	5.50	4.90	4.10	1.75	1.16
SMDL1210B600TF	8.65	7.80	7.00	6.00	5.30	4.50	1.81	1.23

Soldering Parameters



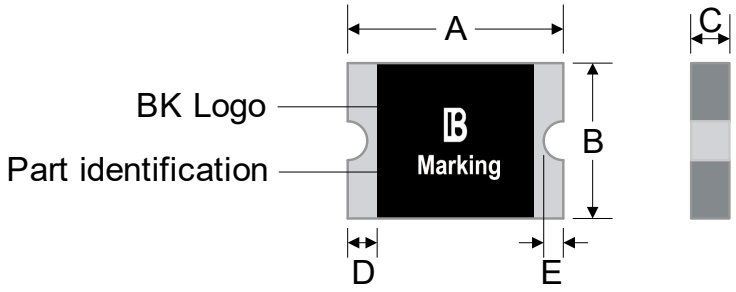
Profile Feature	Pb-Free Assembly
Average ramp-up rate ($T_{S\,max}$ to T_P)	3℃ /second max.
Preheat -Temperature Min ($T_{S\,min}$) -Temperature Max ($T_{S\,max}$) -Time (min to max) ($T_{S\,min}$ to $T_{S\,max}$)	 150℃ 200℃ 60-180 seconds
Time maintained above: -Temperature (T_L) -Time (t_L)	 217℃ 60-150 seconds
Peak Temperature (T_P)	260℃
Time within 5℃ of actual Peak Temperature (t_P)	20-40 seconds
Ramp-down Rate	6℃ /second max.
Time 25℃ to Peak Temperature	8 minutes max.

- 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)
- Device can be cleaned using standard industry methods and solvents.

Note 1: All temperature refer to topside of the package, measured on the package body surface.

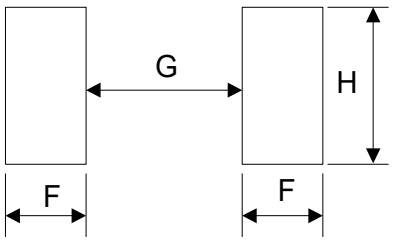
Note 2: If reflow temperatures exceed the recommended profile, devices may not meet the performance requirements.

Physical Dimensions (mm)



Part Number	A		B		C		D		E		Recommended Pad Layout (typ.)		
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	F	G	H
SMDL1210B175TF	3.0	3.43	2.35	2.80	0.40	0.75	0.25	0.75	0.1	0.5	1.0	2.0	2.5
SMDL1210B200TF	3.0	3.43	2.35	2.80	0.40	0.75	0.25	0.75	0.1	0.5	1.0	2.0	2.5
SMDL1210B260TF	3.0	3.43	2.35	2.80	0.40	0.75	0.25	0.75	0.1	0.5	1.0	2.0	2.5
SMDL1210B300TF	3.0	3.43	2.35	2.80	0.60	1.20	0.25	0.75	0.1	0.5	1.0	2.0	2.5
SMDL1210B350TF	3.0	3.43	2.35	2.80	0.60	1.20	0.25	0.75	0.1	0.5	1.0	2.0	2.5
SMDL1210B380TF	3.0	3.43	2.35	2.80	0.40	1.00	0.25	0.75	0.1	0.5	1.0	2.0	2.5
SMDL1210B400TF	3.0	3.43	2.35	2.80	0.60	1.20	0.25	0.75	0.1	0.5	1.0	2.0	2.5
SMDL1210B450TF	3.0	3.43	2.35	2.80	0.60	1.20	0.25	0.75	0.1	0.5	1.0	2.0	2.5
SMDL1210B500TF	3.0	3.43	2.35	2.80	0.60	1.20	0.25	0.75	0.1	0.5	1.0	2.0	2.5
SMDL1210B550TF	3.0	3.43	2.35	2.80	0.60	1.00	0.25	0.75	0.1	0.5	1.0	2.0	2.5
SMDL1210B600TF	3.0	3.43	2.35	2.80	0.60	1.00	0.25	0.75	0.1	0.5	1.0	2.0	2.5

Recommended Pad Layout



Environmental Specifications

Operating temperature	-40℃ to +85℃
Maximum Device Surface Temperature in Tripped State	125℃
Passive Aging	+85℃, 1000 hours ±50% typical resistance change
Humidity Aging	+85℃, 85%R.H. 100 hours ±50% typical resistance change
Thermal Shock	MIL-STD-202, Method 107G +85℃/-40℃ 20 times -50% typical resistance change
Solvent Resistance	MIL-STD-202, Method 215 No change
Vibration	MIL-STD-883C, Method 2007.1, Condition A No change
Moisture Level Sensitivity	Level 1, J-STD-020C

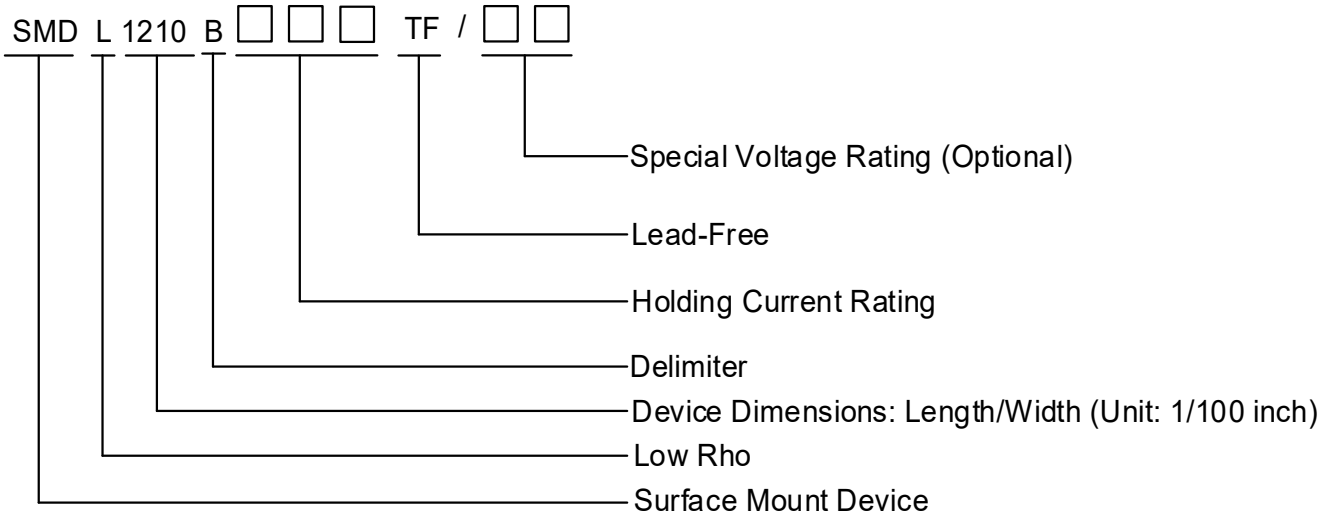
Packaging Quantity and Marking

Part Number	Marking	Quantity	Part Number	Marking	Quantity
SMDL1210B175TF	L7	4000	SMDL1210B400TF	40	3000
SMDL1210B200TF	L2	4000	SMDL1210B450TF	45	3000
SMDL1210B260TF	26	4000	SMDL1210B500TF	B	3000
SMDL1210B300TF	30	3000	SMDL1210B550TF	55	3000
SMDL1210B350TF	35	3000	SMDL1210B600TF	60	3000
SMDL1210B380TF	38	4000	/	/	/

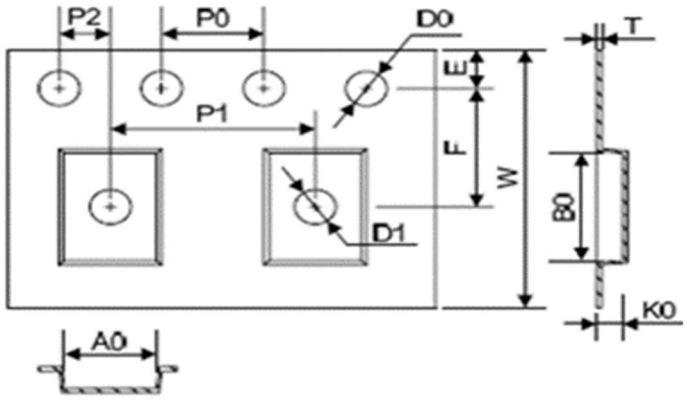
Physical Specifications

Terminal Material	Solder-Plated Copper (Solder Material: Matte Tin (Sn))
Plating Thickness	Sn：≥15μm ,Cu：≥20μm
Lead Solderability	Meets EIA Specification RS186-9E, ANSI/J-STD-002 Category 3.

Part Number System

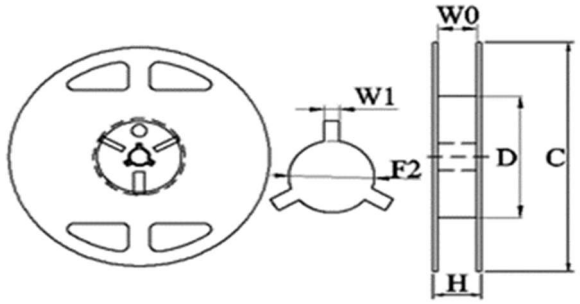


Packaging



Symbol	Dimensions (mm)	
	L1210B175TF L1210B200TF L1210B260TF L1210B300TF L1210B350TF L1210B380TF L1210B400TF	L1210B450TF L1210B500TF L1210B550TF L1210B600TF
W	8.00±0.30	8.00±0.30
F	3.50±0.05	3.50±0.05
E_1	1.75±0.10	1.75±0.10
D_0	1.55±0.05	1.55±0.05
D_1	0.50±0.10	1.00(MIN)
P_0	4.00±0.10	4.00±0.10
P_1	4.00±0.10	4.00±0.10
P_2	2.00±0.05	2.00±0.05
A_0	1.10±0.10	2.92±0.1
B_0	1.92±0.10	3.65±0.10
T	0.20±0.10	0.25±0.10
K_0	0.75±0.10	1.30±0.10
Leader min.	390	
Trailer min.	160	

Reel Dimensions: EIA-481-1(mm)



C	Ø178±2.0
D	Ø60.2±0.5
H	11.0±0.5
W0	9.0±1.5
F2	13.0±0.05
W1	2.2±0.5

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