POLYTRONICS
POLYTRONICS TECHNOLOGY CORP.

SMD2920 HF Series Surface Mount PTC Devices

SMD2920 HF Series Surface Mount PTC Devices

Description

The 2920 series provides surface mount resettable overcurrent protection with holding current from 0.3A to 7.0A. This series is suitable for applications with higher holding currant and higher working voltage up to 60V.

Features

- RoHS compliant and lead-free
- Halogen-free
- High voltage
- Low profile
- Fast response to fault current
- Compatible with high temperature solders

Applications

- Power over Ethernet (POE)
- Powered USB for POS and IPC
- Automotive electronics control module protection
- IEEE 1394 port protection
- Low voltage telecom equipment
- Industrial control
- Security systems

Agency Approval and Environmental Compliance

Agency	File Number
c UL us	E201431
TÜVRheinland	R50099121

Regulation	Standard
RoHS	2011/65/EU
Halogen Free	IEC 61249-2-21:2003

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		Agency Approval	
						Current (A)	Time (Sec.)	R_{min} (Ω)	R_{1max} (Ω)	c UL us	TÜVRheinland
SMD2920P030TF	0.30	0.60	60	10	1.50	1.50	3.00	1.200	4.800	✓	✓
SMD2920P050TF	0.50	1.00	60	10	1.50	2.50	4.00	0.350	1.400	✓	✓
SMD2920P075TF	0.75	1.50	30	40	1.50	8.00	0.30	0.350	1.000	✓	✓
SMD2920P075TF/60	0.75	1.50	60	10	1.50	8.00	0.30	0.300	0.950	✓	✓
SMD2920P100TF	1.10	2.20	33	40	1.50	8.00	0.50	0.120	0.410	✓	✓
SMD2920P110TF	1.10	2.20	60	20	2.00	8.00	0.50	0.120	0.410	✓	✓
SMD2920P125TF	1.25	2.50	15	40	1.50	8.00	2.00	0.070	0.250	✓	✓
SMD2920P150TF	1.50	3.00	33	40	1.50	8.00	2.00	0.080	0.230	✓	✓
SMD2920P185TF	1.85	3.70	33	40	1.50	8.00	2.50	0.050	0.150	✓	✓
SMD2920P200TF/24	2.00	4.00	24	40	1.50	8.00	5.00	0.050	0.125	✓	✓
SMD2920P250TF	2.50	5.00	15	40	1.50	8.00	5.00	0.035	0.085	✓	✓
SMD2920P260TF	2.60	5.00	6	40	1.50	8.00	10.00	0.025	0.075	✓	✓
SMD2920P260TF/24	2.60	5.00	24	40	1.50	8.00	5.00	0.025	0.075	✓	✓
SMD2920P300TF/15	3.00	5.00	15	40	1.50	8.00	20.00	0.015	0.048	✓	✓
SMD2920P330TF	3.30	5.50	24	40	2.00	8.00	5.00	0.015	0.055	✓	✓
SMD2920P400TF	4.00	8.00	15	40	1.50	20.00	4.00	0.010	0.040	✓	✓

SMD2920 HF Series Surface Mount PTC Devices

Electrical Characteristics

Cont'd

Part Number	I_{hold} (A)	I_{trip} (A)	V_{max} (Vdc)	I_{max} (A)	$P_{d\ typ}$ (W)	Maximum Time To Trip		Resistance		Agency Approval	
						Current (A)	Time (Sec.)	R_{min} (Ω)	R_{1max} (Ω)	c UL us	TÜVRheinland
SMD2920P500TF	5.00	10.00	12	40	1.50	20.00	5.00	0.005	0.025	✓	✓
SMD2920P500TF/16	5.00	10.00	16	40	2.00	20.00	5.00	0.005	0.025	✓	✓
SMD2920P600TF/12	6.00	12.00	12	50	2.00	30.00	2.00	0.004	0.020	✓	✓
SMD2920P600TF/16	6.00	12.00	16	40	2.20	30.00	2.00	0.004	0.020	—	—
SMD2920P700TF/12	7.00	14.00	12	50	2.00	35.00	2.00	0.0035	0.0180	✓	✓

SMD2920 HF Series Surface Mount PTC Devices

Note on Electrical Characteristics

- **Vocabulary**
  - I_{hold} = Hold current: maximum current device will pass without tripping in 23ºC still air.
  - I_{trip} = Trip current: minimum current at which the device will trip in 23 ºC 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 ºC still air.
  - R_{min} = Minimum resistance of device in initial (un-soldered) state.
  - R_{1max} = Maximum resistance of device at 23 ºC measured one hour after tripping or reflow soldering of 260 ºC for 20 sec.
- **Value specified is determined by using the PWB with 0.150"*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.**

Polymeric PTC Selecting Guide

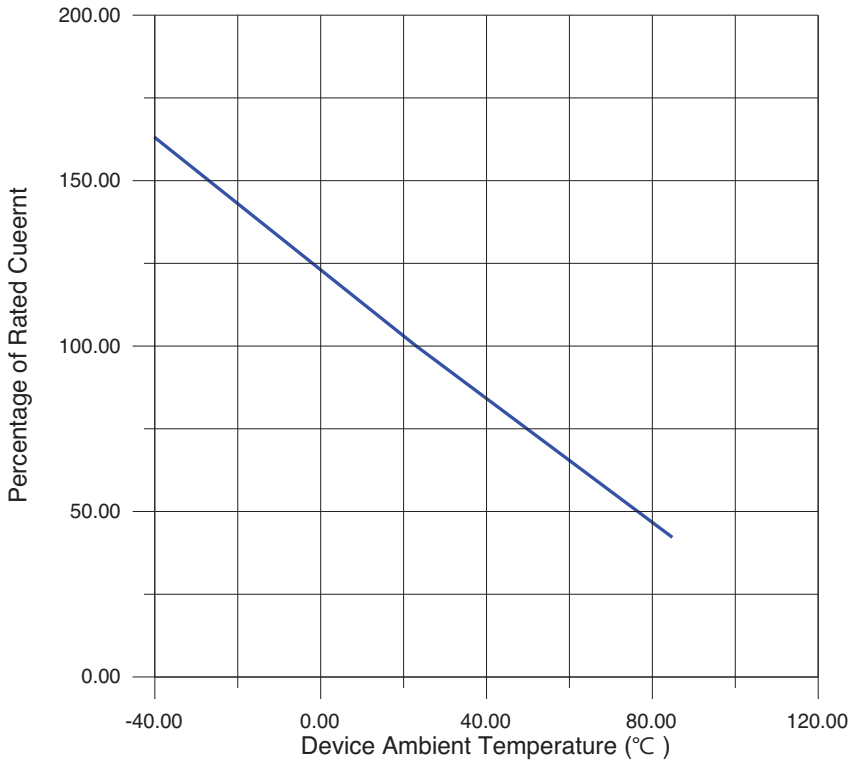
- **Determine the following operating parameters for the circuits:**
  - Normal operating current (I_{hold})
  - Maximum interrupt current (I_{max})
  - Maximum circuit voltage (V_{max})
  - Normal operating temperature surrounding device (minºC/maxºC)
- **Select the device form factor and dimension suitable for the application:**
  - Surface Mount Device (SMD)
  - Axial Leaded Device (ALD)
  - Other Customized Form Factors
  - Radial Leaded Device (RLD)
  - DISC Device
- **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 the 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 be caused by, among others, incorrect pin-connection of a connector) or over-extensive trip events may occur.
  - PTTC 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.

SMD2920 HF Series Surface Mount PTC Devices

Thermal Derating Curve



Thermal Derating Chart

Recommended Hold Current (A) at Ambient Temperature (°C)

Part Number	Ambient Operation Temperature								
	-40 °C	-20 °C	0 °C	23 °C	40 °C	50 °C	60 °C	70 °C	85 °C
SMD2920P030TF	0.45	0.40	0.35	0.30	0.25	0.23	0.20	0.17	0.14
SMD2920P050TF	0.76	0.67	0.59	0.50	0.42	0.38	0.33	0.29	0.23
SMD2920P075TF	1.13	1.01	0.88	0.75	0.62	0.56	0.50	0.44	0.34
SMD2920P075TF/60	1.13	1.01	0.88	0.75	0.62	0.56	0.50	0.44	0.34
SMD2920P100TF	1.66	1.47	1.29	1.10	0.91	0.83	0.73	0.64	0.50
SMD2920P110TF	1.66	1.47	1.29	1.10	0.91	0.83	0.73	0.64	0.50
SMD2920P125TF	1.89	1.68	1.46	1.25	1.04	0.94	0.83	0.73	0.56
SMD2920P150TF	2.27	2.01	1.76	1.50	1.25	1.13	1.00	0.87	0.74
SMD2920P185TF	2.80	2.47	2.17	1.85	1.54	1.39	1.22	1.07	0.85
SMD2920P200TF/24	3.14	2.77	2.42	2.00	1.73	1.56	1.38	1.20	0.98
SMD2920P250TF	3.78	3.35	2.93	2.50	2.08	1.88	1.65	1.45	1.13
SMD2920P260TF	3.64	3.25	2.91	2.60	2.26	2.08	1.95	1.74	1.48
SMD2920P260TF/24	3.64	3.25	2.91	2.60	2.26	2.08	1.95	1.74	1.48
SMD2920P300TF/15	4.20	3.85	3.44	3.00	2.69	2.50	2.31	2.12	1.83
SMD2920P330TF	4.60	4.20	3.75	3.30	2.95	2.75	2.50	2.25	1.70
SMD2920P400TF	5.50	5.00	4.50	4.00	3.40	3.10	2.80	2.50	2.10

SMD2920 HF Series Surface Mount PTC Devices

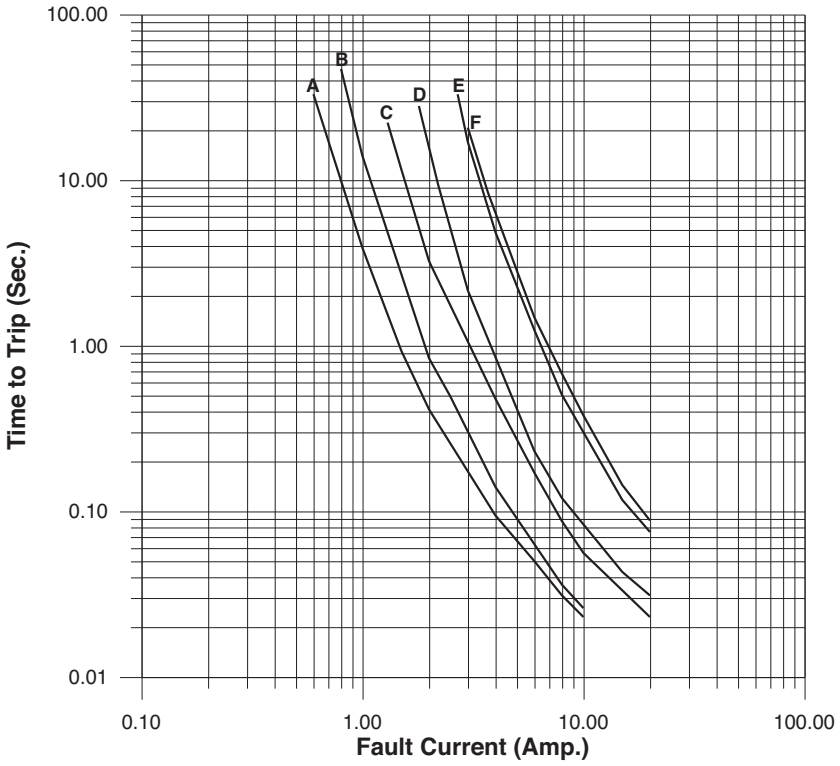
Thermal Derating Chart Cont'd

Recommended Hold Current (A) at Ambient Temperature (°C)

Part Number	Ambient Operation Temperature								
	-40 °C	-20 °C	0 °C	23 °C	40 °C	50 °C	60 °C	70 °C	85 °C
SMD2920P500TF	7.55	6.70	5.85	5.00	4.15	3.75	3.30	2.90	2.25
SMD2920P500TF/16	7.55	6.70	5.85	5.00	4.15	3.75	3.30	2.90	2.25
SMD2920P600TF/12	8.58	7.83	7.05	6.00	5.27	4.87	4.48	4.05	3.38
SMD2920P600TF/16	8.58	7.83	7.05	6.00	5.27	4.87	4.48	4.05	3.38
SMD2920P700TF/12	9.48	8.73	7.92	7.00	6.36	5.88	5.41	4.83	3.94

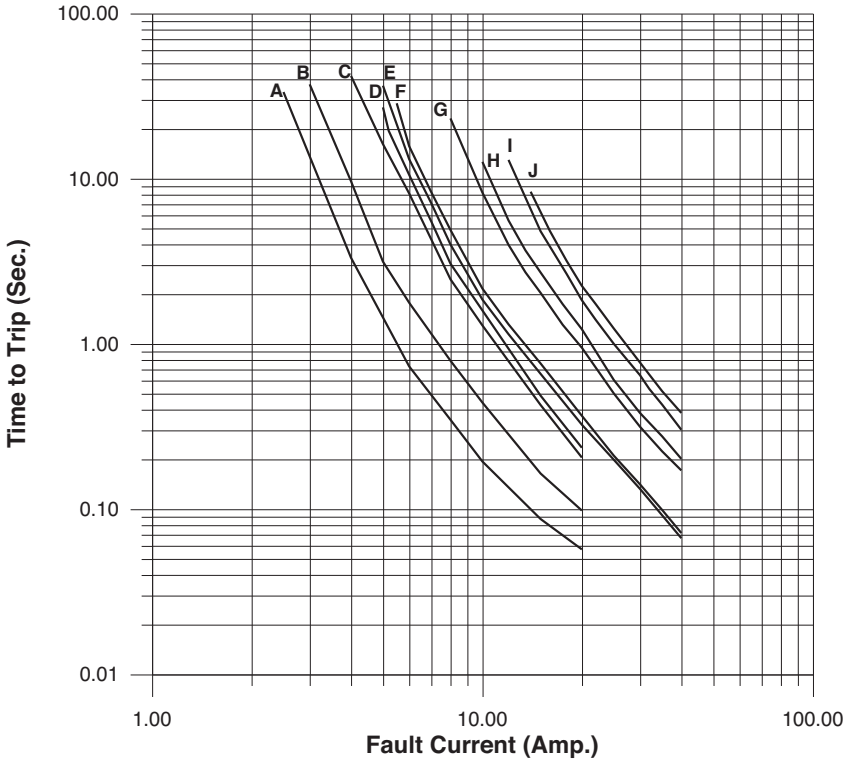
SMD2920 HF Series Surface Mount PTC Devices

Average Time-Current Curve



A—SMD2920P030TF
B—SMD2920P050TF
C—SMD2920P075TF
SMD2920P075TF/60
D—SMD2920P100TF
SMD2920P110TF
E—SMD2920P150TF
F—SMD2920P185TF

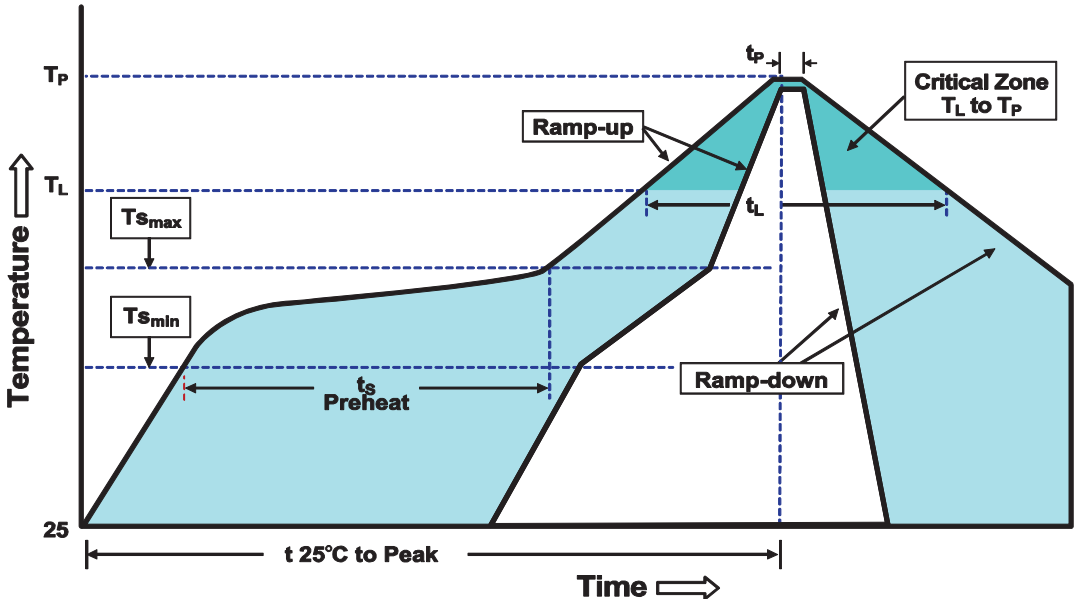
Average Time-Current Curve



A—SMD2920P125TF
B—SMD2920P200TF/24
C—SMD2920P250TF
D—SMD2920P260TF
SMD2920P260TF/24
E—SMD2920P300TF/15
F—SMD2920P330TF
G—SMD2920P400TF
H—SMD2920P500TF
SMD2920P500TF/16
I —SMD2920P600TF/12
SMD2920P600TF/16
J —SMD2920P700TF/12

SMD2920 HF Series Surface Mount PTC Devices

Soldering Parameters



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

- 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.

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.

SMD2920 HF Series Surface Mount PTC Devices

Physical Dimensions (mm.)

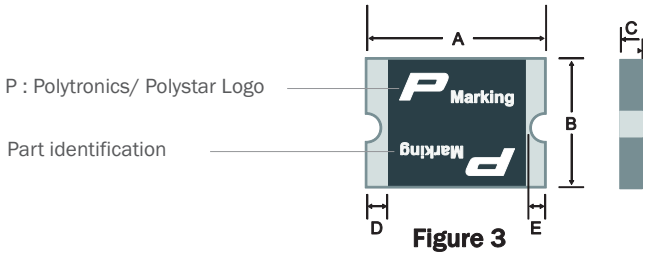


Figure 3

Part Number	A		B		C		D		E	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
SMD2920P030TF	6.73	7.98	4.80	5.44	0.75	1.25	0.30	2.50	0.25	2.00
SMD2920P050TF	6.73	7.98	4.80	5.44	0.75	1.25	0.30	2.50	0.25	2.00
SMD2920P075TF	6.73	7.98	4.80	5.44	0.75	1.25	0.30	2.50	0.25	2.00
SMD2920P075TF/60	6.73	7.98	4.80	5.44	1.20	1.80	0.30	2.50	0.25	2.00
SMD2920P100TF	6.73	7.98	4.80	5.44	0.55	1.00	0.30	2.50	0.25	2.00
SMD2920P110TF	6.73	7.98	4.80	5.44	1.20	2.00	0.30	2.50	0.25	2.00
SMD2920P125TF	6.73	7.98	4.80	5.44	0.55	1.00	0.30	2.50	0.25	2.00
SMD2920P150TF	6.73	7.98	4.80	5.44	0.75	1.25	0.30	2.50	0.25	2.00
SMD2920P185TF	6.73	7.98	4.80	5.44	0.75	1.25	0.30	2.50	0.25	2.00
SMD2920P200TF/24	6.73	7.98	4.80	5.44	0.75	1.25	0.30	2.50	0.25	2.00
SMD2920P250TF	6.73	7.98	4.80	5.44	0.75	1.25	0.30	2.50	0.25	2.00
SMD2920P260TF	6.73	7.98	4.80	5.44	0.55	1.00	0.30	2.50	0.25	2.00
SMD2920P260TF/24	6.73	7.98	4.80	5.44	0.75	1.25	0.30	2.50	0.25	2.00
SMD2920P300TF/15	6.73	7.98	4.80	5.44	0.75	1.25	0.30	2.50	0.25	2.00
SMD2920P330TF	6.73	7.98	4.80	5.44	1.20	2.00	0.30	2.50	0.25	2.00
SMD2920P400TF	6.73	7.98	4.80	5.44	0.80	1.60	0.30	2.50	0.25	2.00
SMD2920P500TF	6.73	7.98	4.80	5.44	0.80	1.60	0.30	2.50	0.25	2.00
SMD2920P500TF/16	6.73	7.98	4.80	5.44	0.80	1.60	0.30	2.50	0.25	2.00
SMD2920P600TF/12	6.73	7.98	4.80	5.44	0.80	1.60	0.30	2.50	0.25	2.00
SMD2920P600TF/16	6.73	7.98	4.80	5.44	0.80	1.60	0.30	2.50	0.25	2.00
SMD2920P700TF/12	6.73	7.98	4.80	5.44	0.80	1.60	0.30	2.50	0.25	2.00

SMD2920 HF Series Surface Mount PTC Devices

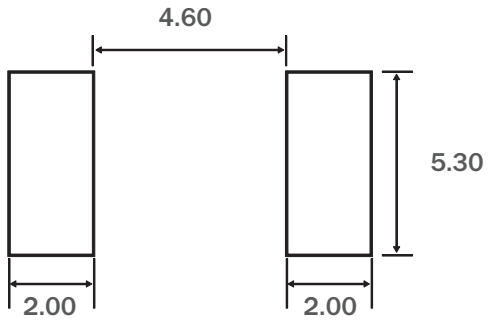
Environmental Specifications

Operating Temperature	-40°C to +85 °C
Maximum Device Surface Temperature in Tripped State	125°C
Passive Aging	+85°C , 1000 hours ±5% typical resistance change
Humidity Aging	+85°C , 85%R.H. 1000 hours ±5% typical resistance change
Thermal Shock	MIL-STD-202 Method 107G +85°C /-40°C 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
Moisture Sensitivity Level	Level 1, J-STD-020C

SMD2920 HF Series Surface Mount PTC Devices

Packaging Quantity and Marking

Recommended Pad Layout (mm.)



Part Number	Marking	Quantity
SMD2920P030TF	030	1500
SMD2920P050TF	050	1500
SMD2920P075TF	075	1500
SMD2920P075TF/60	0760	1000
SMD2920P100TF	100	2000
SMD2920P110TF	110	1000
SMD2920P125TF	125	2000
SMD2920P150TF	150	1500
SMD2920P185TF	185	1500
SMD2920P200TF/24	2024	1500
SMD2920P250TF	250	1500
SMD2920P260TF	260	2000
SMD2920P260TF/24	2624	1500
SMD2920P300TF/15	3015	1500
SMD2920P330TF	3324	1000
SMD2920P400TF	400	1000
SMD2920P500TF	500	1000
SMD2920P500TF/16	5016	1000
SMD2920P600TF/12	6012	1000
SMD2920P600TF/16	6016	1000
SMD2920P700TF/12	7012	1000

◎ 16 mm tape on 7 inch reel per EIA-481 (equivalent to IEC286, part 3)

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.

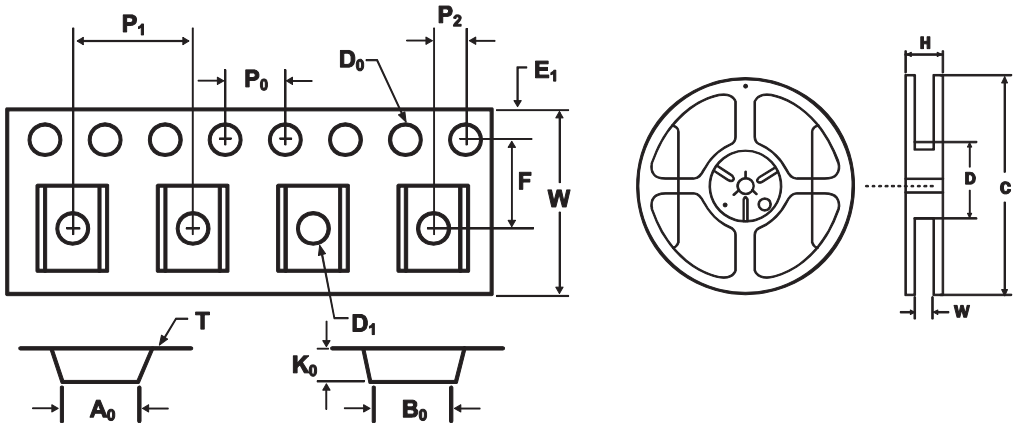
SMD2920 HF Series Surface Mount PTC Devices

Tape Specifications: EIA-481 (mm.)

	P030TF, P050TF, P075TF P150TF, P185TF P200TF/24, P250TF P260TF/24 P300TF/15	P100TF P125TF P260TF	P110TF, P075TF/60 P330TF, P400TF P500TF, P500TF/16 P600TF/12, P600TF/16 P700TF/12
W	16.00 ± 0.30	16.00 ± 0.30	16.00 ± 0.30
F	7.50 ± 0.10	7.50 ± 0.10	7.50 ± 0.10
E_1	1.75 ± 0.10	1.75 ± 0.10	1.75 ± 0.10
D_0	1.55 ± 0.05	1.55 ± 0.05	1.50 + 0.10
D_1	1.50 ± 0.10	1.50 ± 0.10	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 ± 0.10	2.00 ± 0.10	2.00 ± 0.10
A_0	5.74 ± 0.10	5.74 ± 0.10	5.45 ± 0.10
B_0	8.02 ± 0.10	8.02 ± 0.10	7.90 ± 0.10
T	0.30 ± 0.10	0.30 ± 0.10	0.30 ± 0.05
K_0	1.30 ± 0.10	0.91 ± 0.10	2.00 ± 0.10
Leader min.	390	390	390
Trailer min.	160	160	160

Reel Dimensions: EIA-481 (mm.)

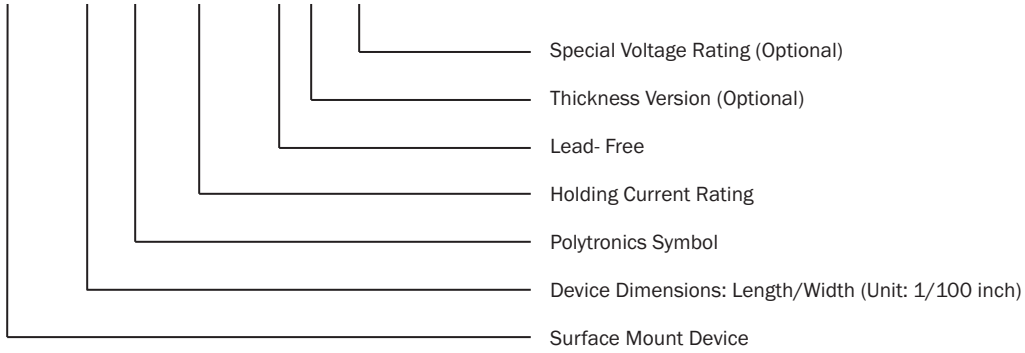
C	Ø180.0+/-3.0
D	Ø60+/-0.5
H	19.5+/-1.0
W	17+/-0.2



SMD2920 HF Series Surface Mount PTC Devices

Part Number System

SMD 2920 P □□□ TF T /□□



Cross Reference

Polytronics / EVERFUSE®	Cross Reference	
	TE Connectivity / PolySwitch®	Bourns / Multifuse®
SMD2920P030TF	SMD030F	MF-SM030
SMD2920P050TF	SMD050F	MF-SM050
SMD2920P075TF	SMD075F	MF-SM075
SMD2920P075TF/60	SMD075F/60	MF-SM075/60
SMD2920P100TF	SMD100F/33	MF-SM100/33
SMD2920P110TF	-	-
SMD2920P125TF	SMD125F	MF-SM125
SMD2920P150TF	SMD150F/33 (3425)	MF-SM150/33
SMD2920P185TF	SMD185F (3425)	MF-SM185/33 (3425)
SMD2920P200TF/24	SMD200F (3425)	MF-SM200 (3425)
SMD2920P250TF	SMD250F (3425)	MF-SM250 (3425)
SMD2920P260TF	SMD260F	MF-SM260
SMD2920P260TF/24	-	MF-LSMF260X
SMD2920P300TF/15	SMD300F	MF-SM300
SMD2920P330TF	-	-
SMD2920P400TF	-	-
SMD2920P500TF	-	-
SMD2920P500TF/16	-	-
SMD2920P600TF/12	-	-
SMD2920P600TF/16	-	-
SMD2920P700TF/12	-	-