SMD2920 HF Series Surface Mount PTC Devices

U.S. Patent#6377467

- The SMD2920 Halogen and 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 SMD2920 Halogen and Lead(Pb) Free Series provides surface mount overcurrent protection with superior performance that are compliant with IEC 61249-2-21:2003 and RoHS Directive 2002/95/EC.
- Application: The SMD2920 Halogen and 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 solder plated termination is designed to meet or exceed solderability specifications and provide excellent solder joint inspectability.
- Agency Approval: **UL / CSA File # E201431.**
  TÜV Certificate # R50099121.

RoHS Halogen Free

POLYTRONICS TECHNOLOGY CORP.
REGISTERED TO ISO 9001, TL 9000, ISO/TS 16949, AND ISO 14001
FILE NUMBER A8727 AND A10971

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_{1max} (Ω)	UL/CSA	TÜV
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	✓	✓
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	0.065	0.150	✓	✓
SMD2920P200TF	2.00	4.00	15	40	1.50	8.00	5.00	0.050	0.125	✓	✓
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	10.00	0.035	0.085	✓	✓
SMD2920P260TF	2.60	5.00	6	40	1.50	8.00	10.00	0.025	0.075	✓	✓
SMD2920P300TF	3.00	5.00	6	40	1.50	8.00	20.00	0.015	0.048	✓	✓
SMD2920P300TF/15	3.00	5.00	15	40	1.50	8.00	20.00	0.015	0.048	✓	✓

Note: 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 = 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 were determined 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.

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

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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 surrounding device (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.

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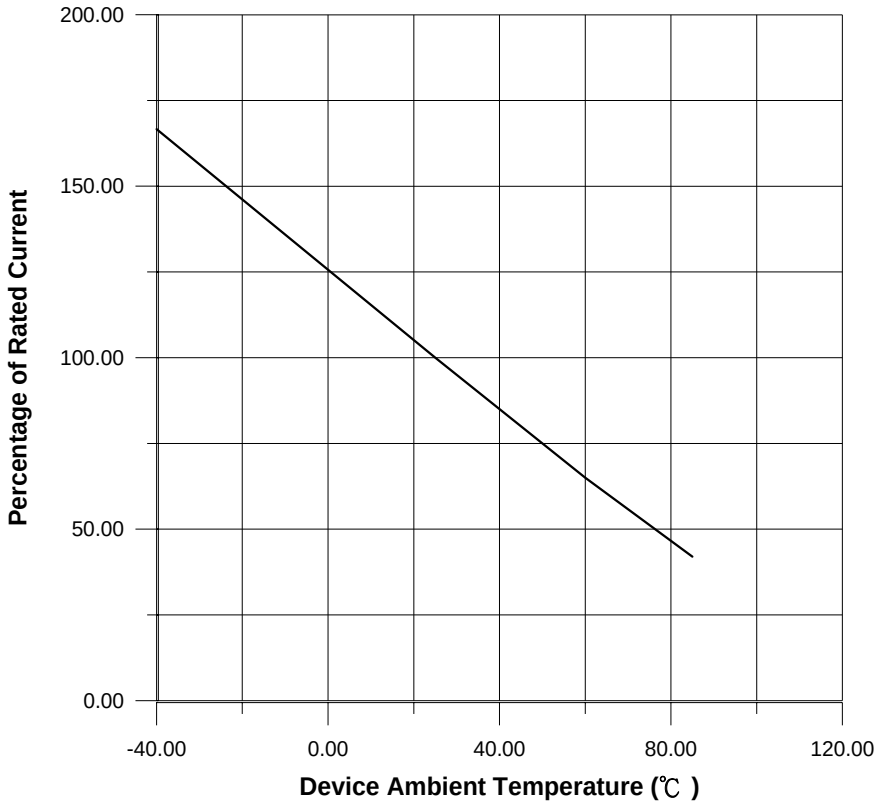
THERMAL DERATING CURVE FOR SMD2920 SERIES



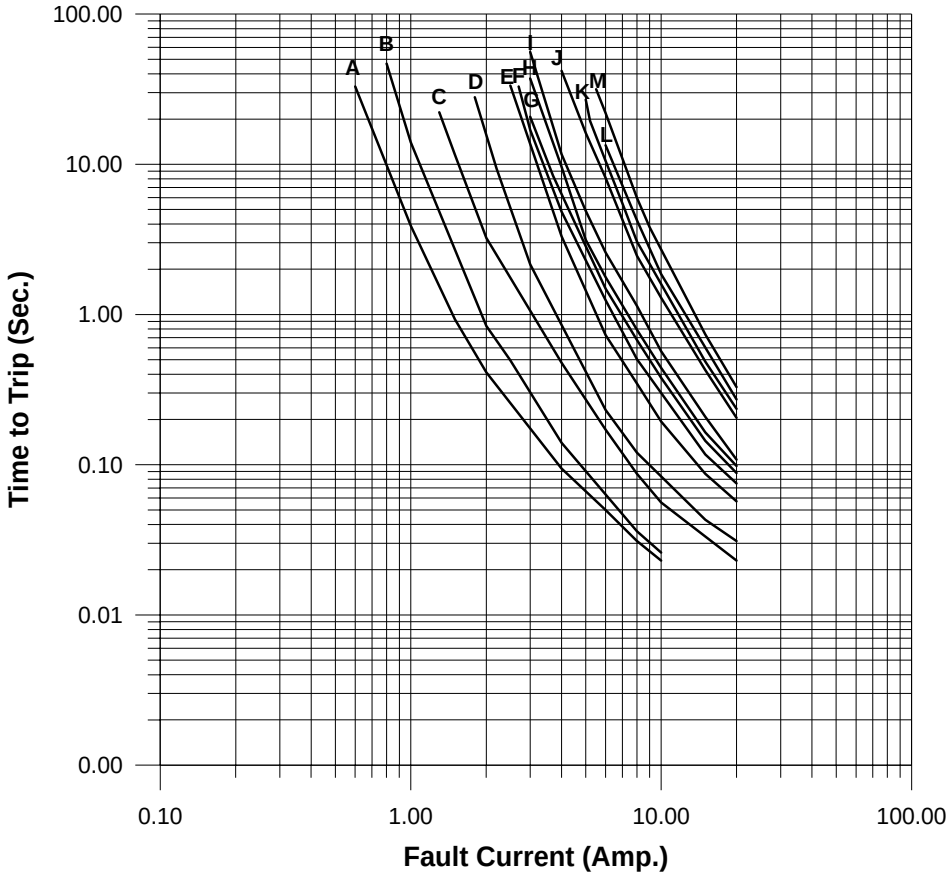
THERMAL DERATING CHART FOR SMD2920 SERIES – Ihold(Amps)

RECOMMENDED DATA

Model	Ambient Operation Temperature								
	-40℃	-20℃	0℃	23℃	40℃	50℃	60℃	70℃	85℃
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
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	3.02	2.68	2.34	2.00	1.66	1.50	1.32	1.16	0.90
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
SMD2920P300TF	4.53	4.02	3.51	3.00	2.52	2.26	1.99	1.75	1.34
SMD2920P300TF/15	4.20	3.85	3.44	3.00	2.69	2.50	2.31	2.12	1.83

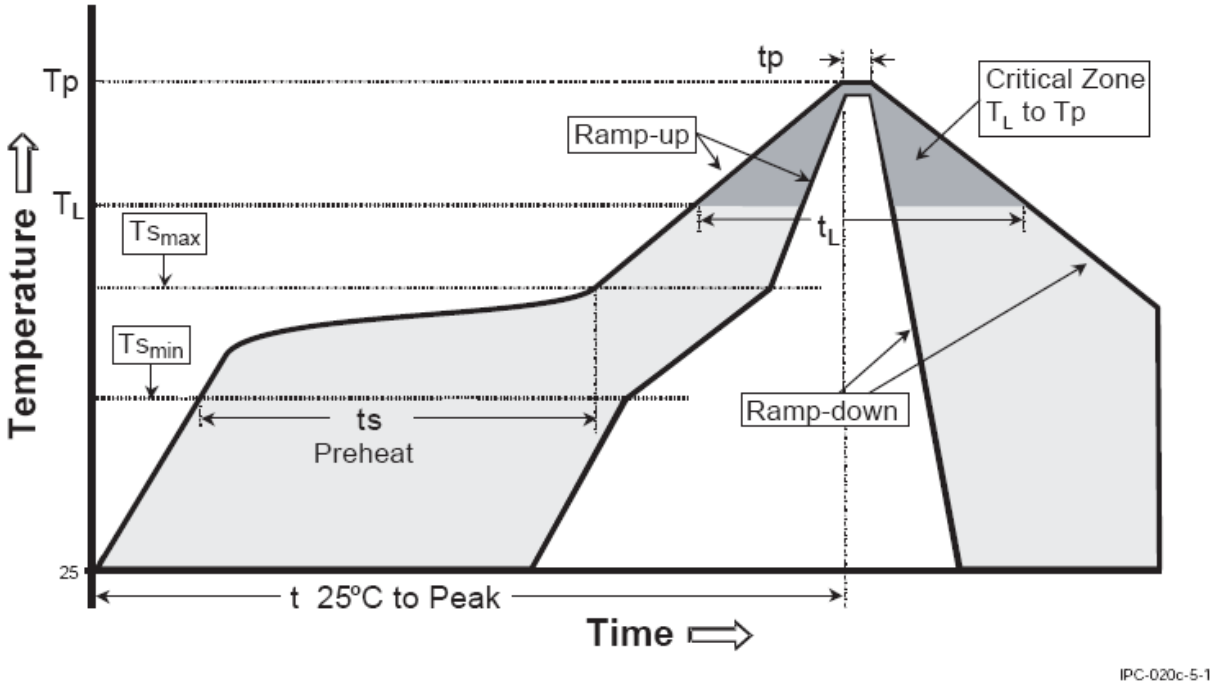
*Customer should verify the device performance in their specified conditions.

AVERAGE TIME-CURRENT CURVE FOR SMD2920 SERIES



A—SMD2920P030TF
B—SMD2920P050TF
C—SMD2920P075TF
SMD2920P075TF/60
D—SMD2920P100TF
E—SMD2920P125TF
F—SMD2920P150TF
G—SMD2920P185TF
H—SMD2920P200TF/24
I—SMD2920P200TF
J—SMD2920P250TF
K—SMD2920P260TF
L—SMD2920P300TF/15
M—SMD2920P300TF

SOLDER REFLOW



RECOMMENDED CONDITIONS

Profile Feature	Pb-Free Assembly
Average Ramp-Up Rate (Ts_{max} to Tp)	3℃/second max.
Preheat -Temperature Min (Ts_{min}) -Temperature Max (Ts_{max}) -Time (Ts_{min} to Ts_{max})	 150℃ 200℃ 60-180 seconds
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

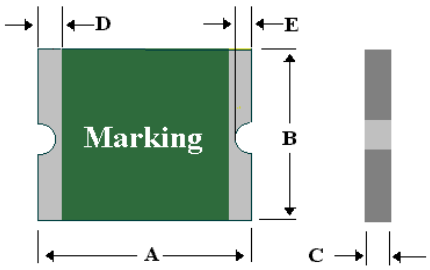
Note 1: All temperature refer to topside of the package, measured on the package body surface.

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.

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

FIGURE



PHYSICAL DIMENSIONS (mm)

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
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	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
SMD2920P300TF	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

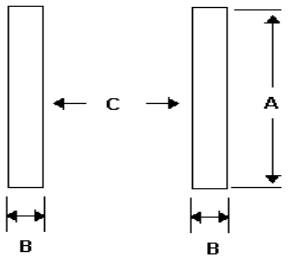
ENVIRONMENTAL SPECIFICATIONS

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)
SMD2920P030TF	1500	5.30	2.00	4.60
SMD2920P050TF	1500	5.30	2.00	4.60
SMD2920P075TF	1500	5.30	2.00	4.60
SMD2920P075TF	1000	5.30	2.00	4.60
SMD2920P100TF	2000	5.30	2.00	4.60
SMD2920P125TF	2000	5.30	2.00	4.60
SMD2920P150TF	1500	5.30	2.00	4.60
SMD2920P185TF	1500	5.30	2.00	4.60
SMD2920P200TF	1500	5.30	2.00	4.60
SMD2920P200TF/24	1500	5.30	2.00	4.60
SMD2920P250TF	1500	5.30	2.00	4.60
SMD2920P260TF	2000	5.30	2.00	4.60
SMD2920P300TF	1500	5.30	2.00	4.60
SMD2920P300TF/15	1500	5.30	2.00	4.60

◎ 16 mm tape on 7 inch reel per EIA-481-1 (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.

◎ Specifications are subject to change without notice.

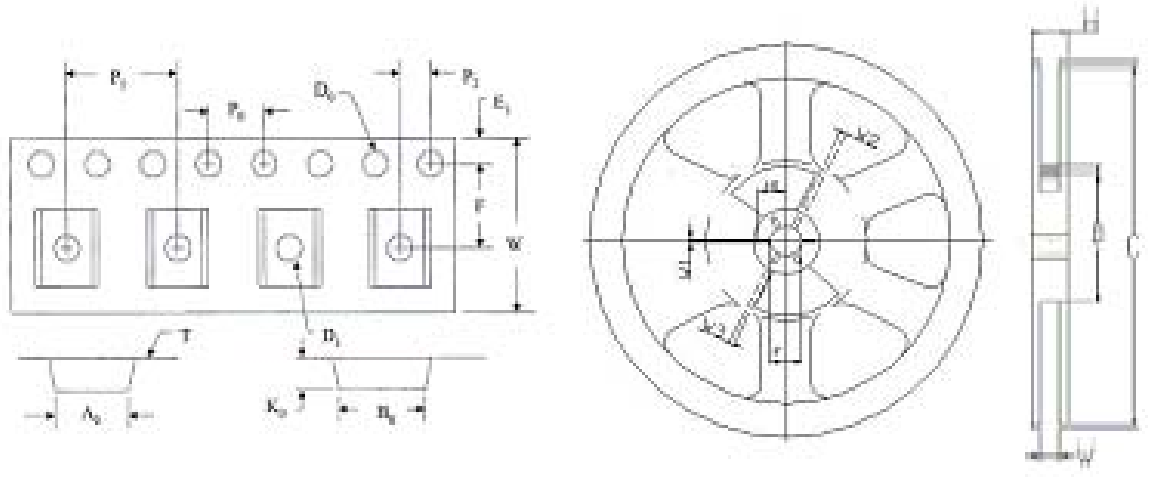
TAPE SPECIFICATIONS: EIA-481-1 REEL DIMENSIONS: EIA-481-1

	P030TF,P050TF,P075TF P150TF,P185TF,P200TF P200TF/24,P250TF P300TF,P300TF/15	P100TF P125TF P260TF	P075TF/60
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	7.90 ± 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

(mm)

C	Ø180 ± 3.0	
D	Ø60 ± 0.5	
F	Ø13.0 ± 0.5	
W1	2.5 + 0.5	
W2	3.0 + 0.5	
W3	4.0 + 0.5	
W4	5.0 + 0.5	
W	17.0 ± 0.2	
H	19.5 ± 1.0	

(mm)

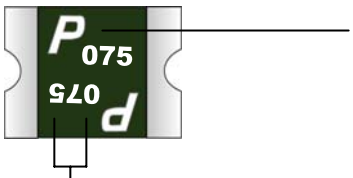


PART NUMBERING SYSTEM

SMD 2920 P □□□ TF /□□

- **Maximum Voltage Version (Optional)**
- **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/ Polystar Logo

Part identification

Note: Polystar is Polytronics's manufacturing site in China. The Polystar ID marking shall appear on smallest package.

CROSS REFERENCE

Polytronics/ EVERFUSE®	Cross Reference	
	Raychem/ 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
SMD2920P125TF	SMD125F	MF-SM125
SMD2920P150TF	SMD150F/33 (3425)	MF-SM150/33
SMD2920P185TF	SMD185F (3425)	MF-SM185/33 (3425)
SMD2920P200TF	SMD200F (3425)	MF-SM200 (3425)
SMD2920P200TF/24	-	-
SMD2920P250TF	SMD250F (3425)	MF-SM250 (3425)
SMD2920P260TF	SMD260F	MF-SM260
SMD2920P300TF	SMD300F	MF-SM300
SMD2920P300TF/15	-	-