



## SMD1206 HF Series Surface Mount PTC Devices

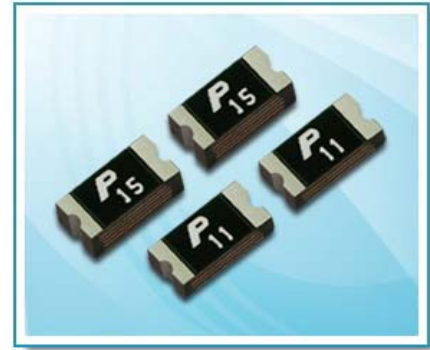
## SMD1206 HF Series Surface Mount PTC Devices

### Description

The 1206 series provides miniature surface mount overcurrent protection with holding current from 0.12A to 2.0A. This series is suitable for wide range of applications in modern electronics where space is limited.

### Features





- RoHS compliant and lead-free
- Halogen-free
- Compact design saves board space
- Low profile
- Fast response to fault current
- Compatible with high temperature solders



### Applications

- Mobile Internet Device (MID)
- Battery PCM
- USB hubs, ports and peripherals
- Set-top-box and HDMI
- Game console port protection
- General electronics

### Agency Approval and Environmental Compliance

Agency	File Number	Regulation	Standard
	E201431		2002/95/EC
	R50099121		IEC 61249-2-21:2003

### Electrical Characteristics

Part Number	I <sub>hold</sub> (A)	I <sub>trip</sub> (A)	V <sub>max</sub> (Vdc)	I <sub>max</sub> (A)	P <sub>d typ</sub> (W)	Maximum Time To Trip		Resistance		Agency Approval	
						Current (A)	Time (Sec.)	R <sub>min</sub> (Ω)	R <sub>1max</sub> (Ω)		
SMD1206P012TF	0.125	0.29	30	100	0.6	1.00	0.20	1.500	6.000	✓	✓
SMD1206P016TF	0.16	0.37	30	100	0.6	1.00	0.30	1.200	4.500	✓	✓
SMD1206P020TF/24	0.20	0.42	24	100	0.6	8.00	0.10	0.650	2.600	✓	✓
SMD1206P025TF	0.25	0.50	16	100	0.6	8.00	0.08	0.550	2.300	✓	✓
SMD1206P035TF/16	0.35	0.75	16	100	0.6	8.00	0.10	0.300	1.200	✓	✓
SMD1206P050TF	0.50	1.00	6	100	0.6	8.00	0.10	0.150	0.700	✓	✓
SMD1206P050TF/15	0.50	1.00	15	100	0.6	8.00	0.10	0.150	0.750	✓	✓
SMD1206P075TFT	0.75	1.50	8	100	0.6	8.00	0.20	0.090	0.290	✓	✓
SMD1206P075TF/13.2	0.75	1.50	13.2	100	0.6	8.00	0.20	0.090	0.350	✓	✓
SMD1206P110TFT	1.10	2.20	8	100	0.8	8.00	0.10	0.040	0.210	✓	✓
SMD1206P150TFT	1.50	3.00	8	100	0.8	8.00	0.30	0.040	0.120	✓	✓
SMD1206P175TF	1.75	3.50	6	100	0.8	8.00	0.50	0.020	0.090	✓	✓
SMD1206P200TF	2.00	3.50	6	100	0.8	8.00	1.50	0.018	0.080	✓	✓

## SMD1206 HF Series Surface Mount PTC Devices

### Note on Electrical Characteristics

#### ■ Vocabulary

$I_{hold}$  = Hold current: maximum current device will pass without tripping in 23°C still air.

$I_{trip}$  = Trip current: minimum current at which the device will trip in 23 °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 ( $V_{max}$ )

$P_{d\ typ}$  = Typical power dissipated from device when in the tripped state at 23 °C still air.

$R_{min}$  = Minimum resistance of device in initial (un-soldered) state.

$R_{1max}$  = Maximum resistance of device at 23 °C measured one hour after tripping or reflow soldering of 260 °C 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.
- 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 circuit voltage ( $V_{max}$ )
- Maximum interrupt current ( $I_{max}$ )
- Normal operating temperature surrounding device (min°C/max°C)

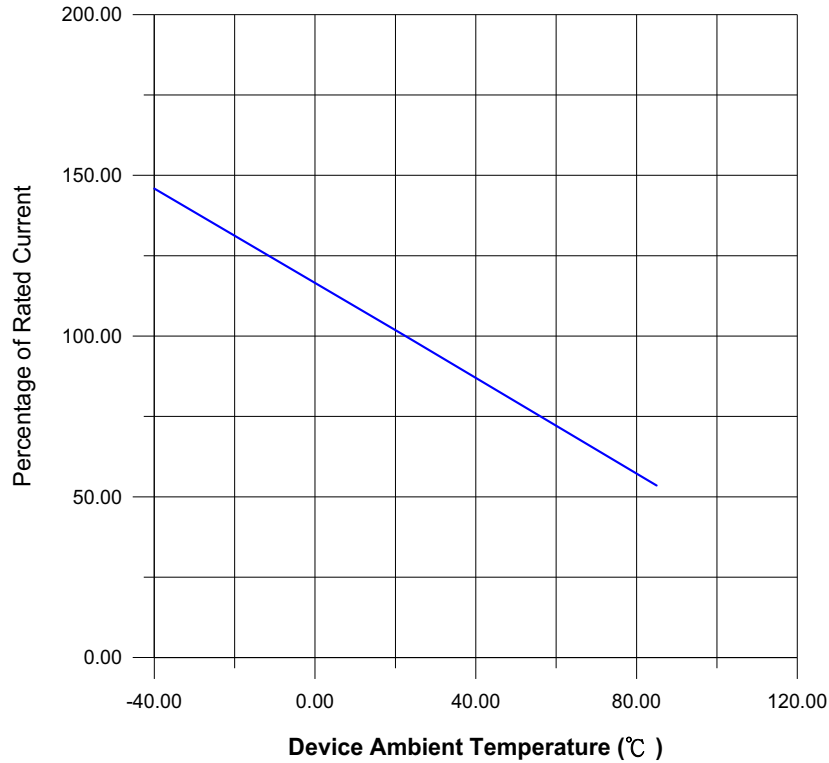
#### ■ Select the device form factor and dimension suitable for the application:

- Surface Mount Device (SMD)
- Radial Leaded Device (RLD)
- Axial Leaded Device (ALD)
- DISC Device
- Other Customized Form Factors

- 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.

## SMD1206 HF Series Surface Mount PTC Devices

### Thermal Derating Curve



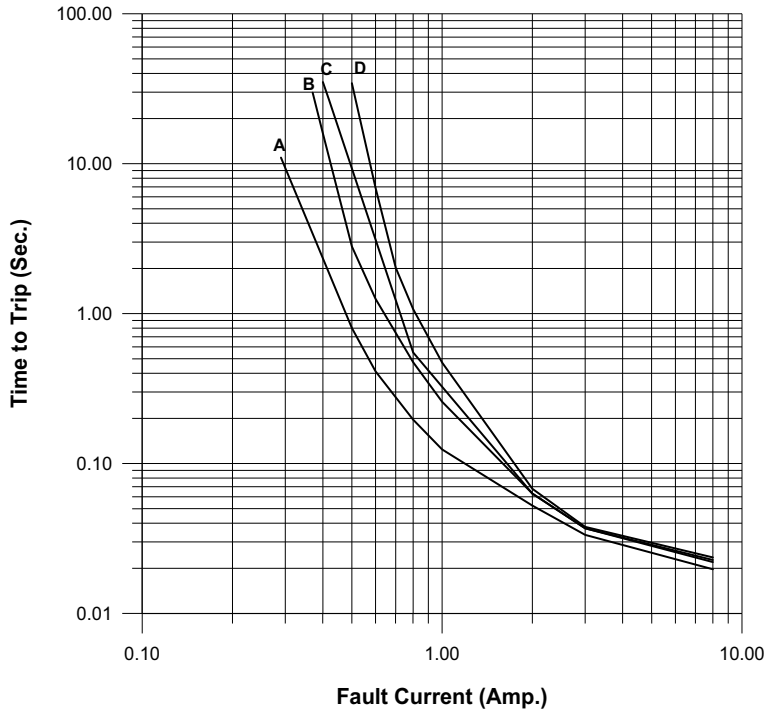
### Thermal Derating Chart

#### 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
SMD1206P012TF	0.18	0.16	0.14	0.125	0.10	0.09	0.08	0.07	0.05
SMD1206P016TF	0.22	0.20	0.18	0.16	0.14	0.12	0.10	0.09	0.08
SMD1206P020TF/24	0.28	0.25	0.23	0.20	0.17	0.15	0.14	0.12	0.09
SMD1206P025TF	0.37	0.33	0.29	0.25	0.22	0.20	0.17	0.15	0.12
SMD1206P035TF/16	0.50	0.45	0.40	0.35	0.30	0.27	0.24	0.21	0.15
SMD1206P050TF	0.71	0.64	0.57	0.50	0.42	0.39	0.35	0.31	0.25
SMD1206P050TF/15	0.71	0.64	0.57	0.50	0.42	0.39	0.35	0.31	0.25
SMD1206P075TFT	1.14	1.01	0.88	0.75	0.65	0.59	0.54	0.49	0.41
SMD1206P075TF/13.2	1.14	1.01	0.88	0.75	0.65	0.59	0.54	0.49	0.41
SMD1206P110TFT	1.64	1.46	1.30	1.10	0.92	0.83	0.80	0.65	0.52
SMD1206P150TFT	2.20	1.99	1.77	1.50	1.34	1.23	1.10	1.01	0.84
SMD1206P175TF	2.50	2.25	2.00	1.75	1.55	1.45	1.35	1.25	1.10
SMD1206P200TF	2.60	2.44	2.35	2.00	1.78	1.67	1.50	1.45	1.10

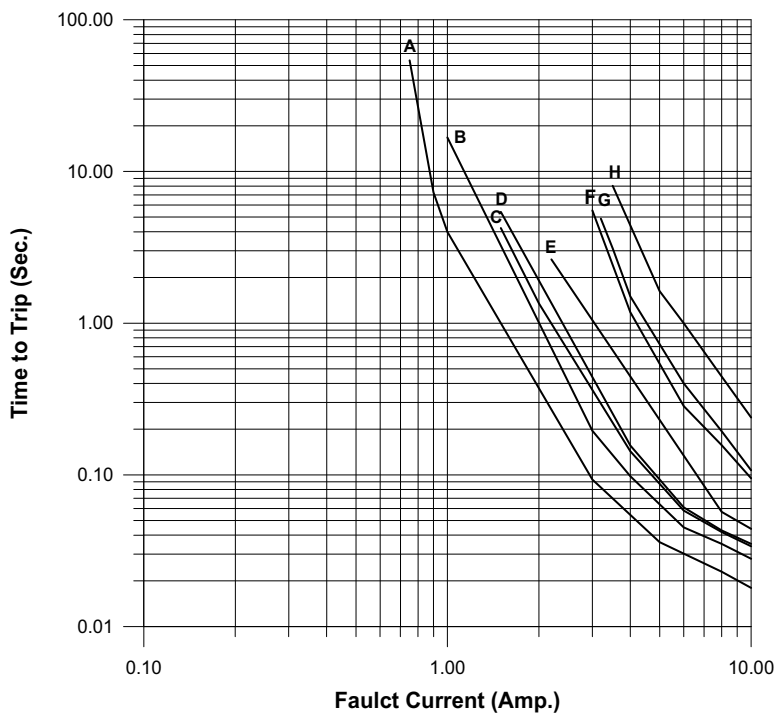
## SMD1206 HF Series Surface Mount PTC Devices

### Average Time-Current Curve



- A – SMD1206P012TF
- B – SMD1206P016TF
- C – SMD1206P020TF/24
- D – SMD1206P025TF

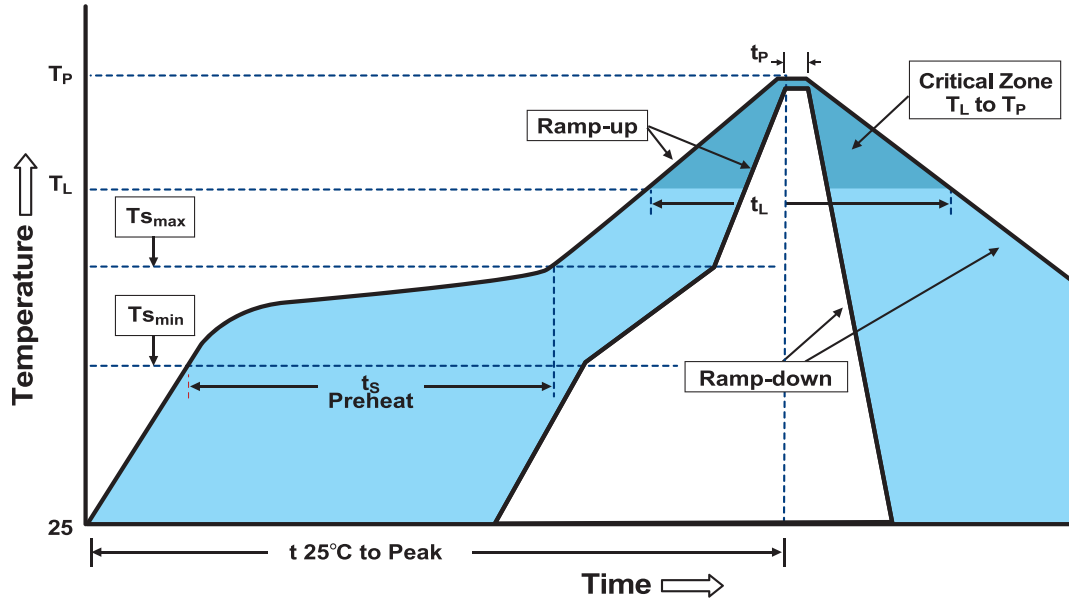
### Average Time-Current Curve



- A – SMD1206P035TF/16
- B – SMD1206P050TF/15
- C – SMD1206P075TFT
- D – SMD1206P075TF/13.2
- E – SMD1206P110TFT
- F – SMD1206P150TFT
- G – SMD1206P175TF
- H – SMD1206P200TF

## SMD1206 HF Series Surface Mount PTC Devices

### Soldering Parameters



Profile Feature	Pb-Free Assembly
Average Ramp-Up Rate ( $T_{smax}$ to $T_P$ )	3°C/second max.
Preheat	
-Temperature Min ( $T_{smin}$ )	150°C
-Temperature Max ( $T_{smax}$ )	200°C
-Time ( $T_{smin}$ to $T_{smax}$ )	60-180 seconds
Time maintained above:	
-Temperature ( $T_L$ )	217°C
-Time ( $t_L$ )	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

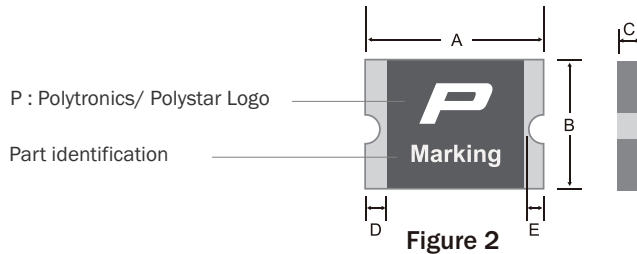
- Recommended reflow methods: IR, vapor phase oven, hot air oven, N<sub>2</sub> environment for lead-free
- Recommended maximum paste thickness is 0.25mm (0.010 inch)
- Devices can be cleaned using standard industry methods and solvents.

**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.

## SMD1206 HF Series Surface Mount PTC Devices

### Physical Dimensions (mm.)



Part Number	A		B		C		D		E	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
SMD1206P012TF	3.00	3.40	1.50	1.80	0.65	1.45	0.25	0.75	0.05	0.45
SMD1206P016TF	3.00	3.40	1.50	1.80	0.65	1.45	0.25	0.75	0.05	0.45
SMD1206P020TF/24	3.00	3.40	1.50	1.80	0.50	1.00	0.25	0.75	0.05	0.45
SMD1206P025TF	3.00	3.40	1.50	1.80	0.50	1.00	0.25	0.75	0.05	0.45
SMD1206P035TF/16	3.00	3.40	1.50	1.80	0.45	0.75	0.25	0.75	0.05	0.45
SMD1206P050TF	3.00	3.40	1.50	1.80	0.45	0.75	0.25	0.75	0.05	0.45
SMD1206P050TF/15	3.00	3.40	1.50	1.80	0.45	0.75	0.25	0.75	0.05	0.45
SMD1206P075TFT	3.00	3.40	1.50	1.80	0.40	0.60	0.25	0.75	0.05	0.45
SMD1206P075TF/13.2	3.00	3.40	1.50	1.80	0.75	1.25	0.25	0.75	0.05	0.45
SMD1206P110TFT	3.00	3.40	1.50	1.80	0.30	0.60	0.25	0.75	0.05	0.45
SMD1206P150TFT	3.00	3.40	1.50	1.80	0.50	1.00	0.25	0.75	0.05	0.45
SMD1206P175TF	3.00	3.40	1.50	1.80	0.80	1.80	0.25	0.75	0.05	0.45
SMD1206P200TF	3.00	3.40	1.50	1.80	0.80	1.60	0.25	0.75	0.05	0.45

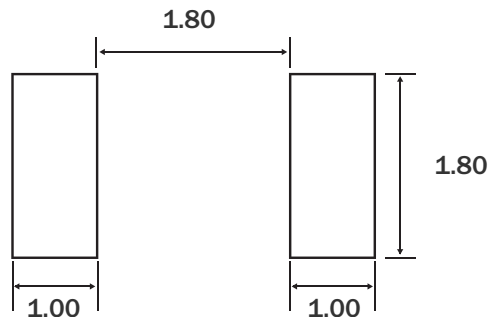
### Environmental Specifications

Operating/Storage 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 Level Sensitivity	Level 1, J-STD-020C

## SMD1206 HF Series Surface Mount PTC Devices

### Packaging Quantity and Marking

Recommended Pad Layout (mm.)



Part Number	Marking	Quantity
SMD1206P012TF	1	3000
SMD1206P016TF	01	3000
SMD1206P020TF/24	2	4000
SMD1206P025TF	02	4000
SMD1206P035TF/16	03	4000
SMD1206P050TF	05	4000
SMD1206P050TF/15	5	4000
SMD1206P075TFT	07	4000
SMD1206P075TF/13.2	07	3000
SMD1206P110TFT	C	4000
SMD1206P150TFT	15	3000
SMD1206P175TF	17	2000
SMD1206P200TF	20	2000

© 8 mm tape on 7 inch reel per EIA-481-1 (equivalent to IEC286, part 3)

### Physical Specifications

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



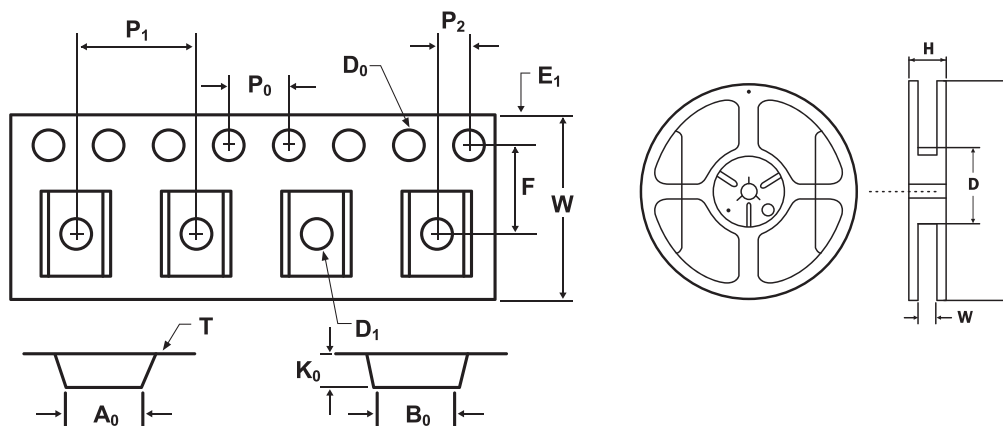
## SMD1206 HF Series Surface Mount PTC Devices

### Tape Specifications: EIA-481-1 (mm.)

	P025TF,P020TF/24 P035TF,P035TF/16 P050TF,P050TF/15 P075TFT,P110TFT	P012TF,P016TF P075TF/13.2 P150TFT	P175TF P200TF
W	8.20 +0.10/-0.30	8.15 +0.15/-0.30	8.20 +0.10/-0.30
F	3.50 ± 0.05	3.50 ± 0.05	3.50 ± 0.05
E <sub>1</sub>	1.75 ± 0.10	1.75 ± 0.10	1.75 ± 0.10
D <sub>0</sub>	1.55 ± 0.05	1.55 ± 0.05	1.55 ± 0.05
D <sub>1</sub>	1.00 ± 0.10	1.00 ± 0.10	1.00 ± 0.10
P <sub>0</sub>	4.00 ± 0.10	4.00 ± 0.10	4.00 ± 0.10
P <sub>1</sub>	4.00 ± 0.10	4.00 ± 0.10	4.00 ± 0.10
P <sub>2</sub>	2.00 ± 0.05	2.00 ± 0.05	2.00 ± 0.05
A <sub>0</sub>	1.95 ± 0.10	1.92 ± 0.10	1.95 ± 0.10
B <sub>0</sub>	3.65 ± 0.10	3.65 ± 0.10	3.65 ± 0.10
T	0.20 ± 0.10	0.25 ± 0.10	0.25 ± 0.10
K <sub>0</sub>	0.87 ± 0.10	1.30 ± 0.10	1.70 ± 0.10
Leader min.	390	390	390
Trailer min.	160	160	160

### Reel Dimensions: EIA-481-1 (mm.)

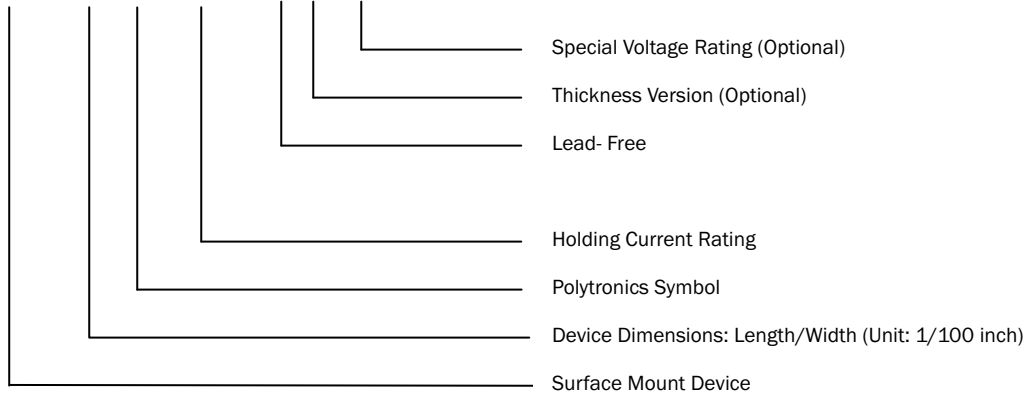
C	Ø178 ± 1.0
D	Ø60.2 ± 0.5
H	11.0 ± 0.5
W	9.0 ± 1.5



## SMD1206 HF Series Surface Mount PTC Devices

### Part Number System

SMD 1206 P □□□ TF T / □□



### Cross Reference

Polytronics / EVERFUSE <sup>®</sup>	Cross Reference	
	Tyco / PolySwitch <sup>®</sup>	Bourns / Multifuse <sup>®</sup>
SMD1206P012TF	nanoSMDC012F	MF-NSMF012
SMD1206P016TF	nanoSMDC016F	-
SMD1206P020TF/24	nanoSMDC020F	MF-NSMF020
SMD1206P025TF	nanoSMDC025F	-
SMD1206P035TF/16	nanoSMDC035F	MF-NSMF035
SMD1206P050TF	nanoSMDM050F	-
SMD1206P050TF/15	nanoSMDC050F/13.2	MF-NSMF050
SMD1206P075TFT	nanoSMDC075F	MF-NSMF075
SMD1206P075TF/13.2	-	-
SMD1206P110TFT	nanoSMDC110F	MF-NSMF110
SMD1206P150TFT	nanoSMDC150F	MF-NSMF150
SMD1206P175TF	-	-
SMD1206P200TF	nanoSMDC200F	MF-NSMF200

“EVERFUSE” is a registered trademark of Polytronics Technology Corp.

“Multifuse” is a registered trademark of Bourns , Inc.

“PolySwitch” is a registered trademark of Tyco Electronics.