

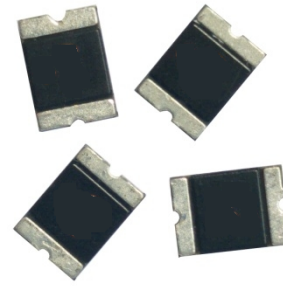


# SMD1812P Series

## POSITIVE THERMAL COEFFICIENT(PTC)

### Description

The 1812 series provides miniature surface mount resettable over-current protection with holding current from 0.1A to 4.0A. This series is suitable for ultra portable applications where space is at a premium and the device current is low.



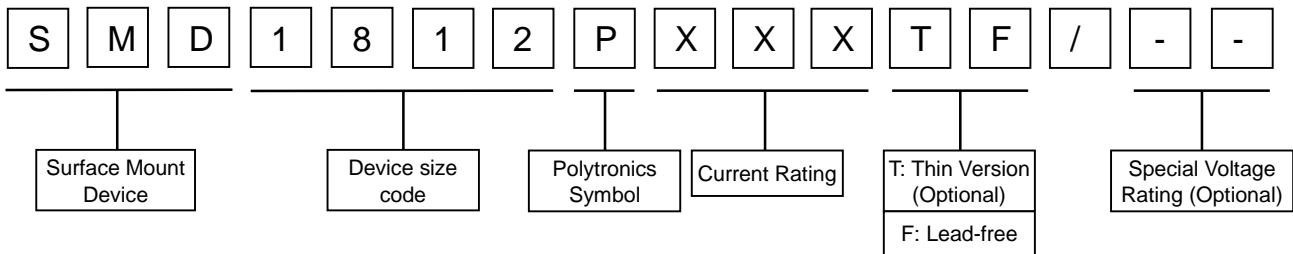
### Features

- I I(hold): 0.1~4.0A
- I Very high voltage surge capabilities
- I Available in lead-free version
- I Fast response to fault current
- I RoHS compliant, Lead- Free and Halogen-Free
- I Low resistance
- I Compact design saves board space
- I Compatible with high temperature solders

### Applications

- I USB peripherals
- I Disk drives
- I CD-ROMs
- I General electronics
- I Disk drives
- I Set-top-box and HDMI
- I Mobile Internet Device (MID)
- I PDAs / digital cameras
- I Game console port protection
- I Plug and play protection for motherboards and peripherals
- I Mobile phones - battery and port protection

### Part Number Code



### Environmental Specifications

Test	Conditions	Resistance change
Passive aging	+85°C, 1000 hrs	±5% typical
Humidity aging	+85°C, 85%R.H., 168 hours	±5% typical
Thermal shock	+85°C to -40°C, 20times	±33% typical
Resistance to solvent	MIL-STD-202, Method 215	No change
Vibration	MIL-STD-202, Method 201	No change

Ambient operating conditions : - 40 °C to +85 °C

Maximum surface temperature of the device in the tripped state is 125 °C



## Performance Specification

Type Number	$I_{hold}$	$I_{trip}$	$V_{max}$	Max. Time to Trip		$I_{max}$	$P_d$ typ	$R_{i_{min}}$	$R_{1_{max}}$	Package
	A	A	$V_{DC}$	Current A	$T_{max}$ S	A	W	$\Omega$	$\Omega$	
SMD1812P010TF	0.1	0.3	30	0.5	1.5	30	0.8	0.75	15	1812
SMD1812P010TF/60	0.1	0.3	60	0.5	1.5	30	0.8	0.75	15	1812
SMD1812P014TF	0.14	0.34	60	1.5	0.15	30	0.8	0.65	6	1812
SMD1812P020TF	0.2	0.4	30	8	0.02	30	0.8	0.35	5	1812
SMD1812P020TF/60	0.2	0.4	60	8	0.02	30	0.8	0.35	5	1812
SMD1812P030TF	0.3	0.6	30	8	0.1	30	0.8	0.25	3	1812
SMD1812P030TF/60	0.3	0.6	60	8	0.1	30	0.8	0.25	3	1812
SMD1812P050TF	0.5	1.0	15	8	0.15	30	0.8	0.15	1.0	1812
SMD1812P050TF/30	0.5	1.0	30	8	0.15	30	0.8	0.15	1.0	1812
SMD1812P050TF/60	0.5	1.0	60	8	0.15	30	0.8	0.15	1.4	1812
SMD1812P075TF	0.75	1.5	13.2	8	0.2	30	0.8	0.09	0.45	1812
SMD1812P075TF/24	0.75	1.5	24	8	0.2	30	0.8	0.09	0.45	1812
SMD1812P075TF/33	0.75	1.5	33	8	0.2	30	0.8	0.09	0.45	1812
SMD1812P110TF	1.1	2.2	8	8	0.3	35	0.8	0.045	0.25	1812
SMD1812P110TF/16	1.1	2.2	16	8	0.3	35	0.8	0.05	0.25	1812
SMD1812P110TF/24	1.1	2.2	24	8	0.3	35	0.8	0.05	0.25	1812
SMD1812P110TF/33	1.1	2.2	33	8	0.3	35	0.8	0.05	0.25	1812
SMD1812P125TF	1.25	2.5	16	8	0.4	35	0.8	0.05	0.14	1812
SMD1812P150TF	1.5	3	8	8	0.5	35	0.8	0.04	0.16	1812
SMD1812P150TF/16	1.5	3	16	8	0.5	35	0.8	0.04	0.16	1812
SMD1812P150TF/24	1.5	3	24	8	0.5	35	0.8	0.04	0.16	1812
SMD1812P150TF/33	1.5	3	33	8	0.5	35	0.8	0.04	0.16	1812
SMD1812P160TF	1.6	2.8	8	8	1	35	0.8	0.03	0.13	1812
SMD1812P200TF	2	4	8	8	2	35	0.8	0.02	0.1	1812
SMD1812P200TF/16	2	4	16	8	2	35	0.8	0.02	0.1	1812
SMD1812P200TF/24	2	4	24	8	2	35	0.8	0.02	0.1	1812
SMD1812P260TF	2.6	5	8	8	2.5	35	0.8	0.01	0.05	1812
SMD1812P260TF/16	2.6	5	16	8	2.5	35	0.8	0.01	0.05	1812
SMD1812P300TF	3	5	8	8	4	35	0.8	0.01	0.04	1812
SMD1812P300TF/16	3	5	16	8	4	35	0.8	0.01	0.04	1812
SMD1812P350TF	3.5	6	6	10	4	35	2	0.008	0.03	1812
SMD1812P350TF/16	3.5	6	16	10	4	35	2	0.008	0.03	1812
SMD1812P400TF	4	7	6	10	4	35	2	0.005	0.025	1812

$V_{max}$  = Maximum operating voltage device can withstand without damage at rated current ( $I_{max}$ ).

$I_{max}$  = Maximum fault current device can withstand without damage at rated voltage ( $V_{max}$ ).

$I_{hold}$  = Hold Current. Maximum current device will not trip in 25°C still air.

$I_{trip}$  = Trip Current. Minimum current at which the device will always trip in 25°C still air.

$P_d$  = Power dissipation when device is in the tripped state in 25°C still air environment at rated voltage.

$R_{i_{min/max}}$  = Minimum/Maximum device resistance prior to tripping at 25°C.

$R_{1_{max}}$  = Maximum device resistance is measured one hour post reflow.

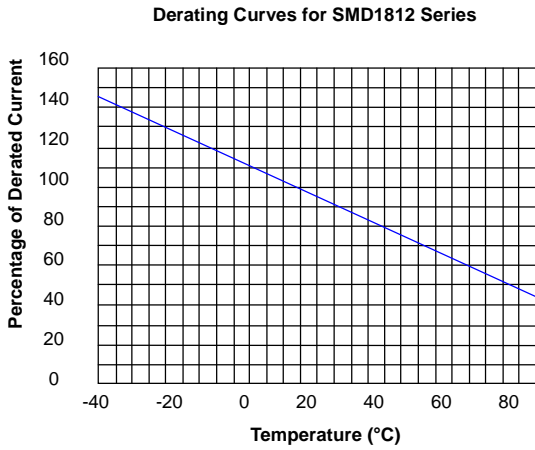


### Thermal Derating Chart-Ih(A)

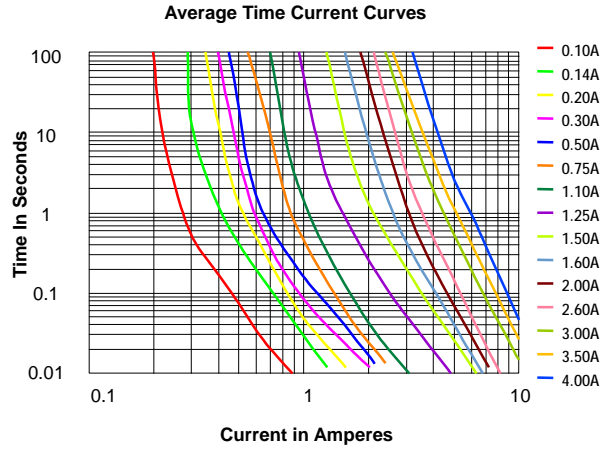
Part Number	Ambient Operation Temperature								
	-40 °C	-20 °C	0 °C	25 °C	40 °C	50 °C	60 °C	70 °C	85 °C
SMD1812P010TF	0.16	0.14	0.12	0.10	0.08	0.07	0.06	0.05	0.03
SMD1812P010TF/60	0.16	0.14	0.12	0.10	0.08	0.07	0.06	0.05	0.03
SMD1812P014TF	0.23	0.19	0.17	0.14	0.12	0.10	0.09	0.08	0.06
SMD1812P020TF	0.29	0.26	0.23	0.20	0.17	0.15	0.14	0.12	0.10
SMD1812P020TF/60	0.29	0.26	0.23	0.20	0.17	0.15	0.14	0.12	0.10
SMD1812P030TF	0.44	0.39	0.35	0.30	0.26	0.23	0.21	0.18	0.15
SMD1812P030TF/60	0.44	0.39	0.35	0.30	0.26	0.23	0.21	0.18	0.15
SMD1812P050TF	0.59	0.57	0.55	0.50	0.45	0.43	0.35	0.30	0.23
SMD1812P050TF/30	0.59	0.57	0.55	0.50	0.45	0.43	0.35	0.30	0.23
SMD1812P050TF/60	0.59	0.57	0.55	0.50	0.45	0.43	0.35	0.30	0.23
SMD1812P075TF	1.10	0.99	0.87	0.75	0.63	0.57	0.49	0.45	0.35
SMD1812P075TF/24	1.10	0.99	0.87	0.75	0.63	0.57	0.49	0.45	0.35
SMD1812P075TF/33	1.10	0.99	0.87	0.75	0.63	0.57	0.49	0.45	0.35
SMD1812P110TF	1.60	1.45	1.28	1.10	0.92	0.83	0.71	0.66	0.52
SMD1812P110TF/16	1.60	1.45	1.28	1.10	0.92	0.83	0.71	0.66	0.52
SMD1812P110TF/24	1.60	1.45	1.28	1.10	0.92	0.83	0.71	0.66	0.52
SMD1812P110TF/33	1.60	1.45	1.28	1.10	0.92	0.83	0.71	0.66	0.52
SMD1812P125TF/8	2.00	1.75	1.52	1.25	1.00	0.95	0.90	0.75	0.53
SMD1812P125TF	2.00	1.75	1.52	1.25	1.00	0.95	0.90	0.75	0.53
SMD1812P150TF	2.10	1.96	1.77	1.50	1.23	1.09	0.95	0.82	0.61
SMD1812P150TF/16	2.10	1.96	1.77	1.50	1.23	1.09	0.95	0.82	0.61
SMD1812P150TF/24	2.10	1.96	1.77	1.50	1.23	1.09	0.95	0.82	0.61
SMD1812P150TF/33	2.10	1.96	1.77	1.50	1.23	1.09	0.95	0.82	0.61
SMD1812P160TF	2.30	2.05	1.88	1.60	1.26	1.12	0.98	0.84	0.63
SMD1812P200TF	2.88	2.61	2.25	2.00	1.80	1.66	1.45	1.09	0.80
SMD1812P200TF/16	2.88	2.61	2.25	2.00	1.80	1.66	1.45	1.09	0.80
SMD1812P200TF/24	2.88	2.61	2.25	2.00	1.80	1.66	1.45	1.09	0.80
SMD1812P260TF	3.90	3.42	2.96	2.60	2.33	2.07	1.94	1.35	1.00
SMD1812P260TF/16	3.90	3.42	2.96	2.60	2.33	2.07	1.94	1.35	1.00
SMD1812P300TF	4.15	3.76	3.46	3.00	2.55	2.28	2.01	1.61	1.33
SMD1812P300TF/16	4.15	3.76	3.46	3.00	2.55	2.28	2.01	1.61	1.33
SMD1812P350TF	4.84	4.39	4.04	3.50	2.98	2.66	2.35	1.88	1.55
SMD1812P350TF/16	4.84	4.39	4.04	3.50	2.98	2.66	2.35	1.88	1.55
SMD1812P400TF	5.80	5.20	4.60	4.00	3.35	3.12	2.75	2.45	2.10



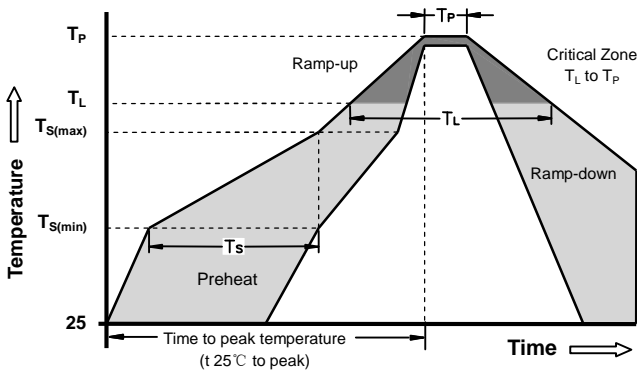
## Thermal Derating Curve



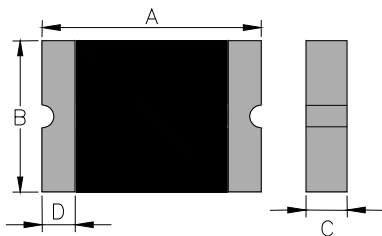
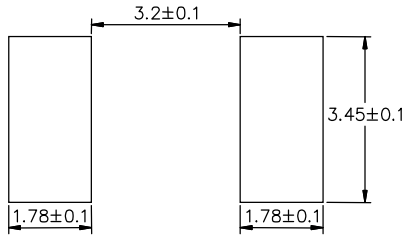
## Average Time-Current Curve



## Soldering Parameters



Reflow Condition		Pb - Free assembly
Pre Heat	-Temperature Min ( $T_{s(min)}$ )	150°C
	-Temperature Max ( $T_{s(max)}$ )	200°C
	- Time (min to max) ( $t_s$ )	60 -180 Seconds
Average ramp up rate ( Liquids Temp $T_L$ ) to peak		3°C/second max
$T_{s(max)}$ to $T_L$ - Ramp-up Rate		3°C/second max
Reflow	- Temperature ( $T_L$ ) (Liquids)	217°C
	- Time (min to max) ( $t_s$ )	60 -150 Seconds
Peak Temperature ( $T_P$ )		260 +0/-5°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 ( $T_P$ )		8 minutes Max
Do not exceed		260°C

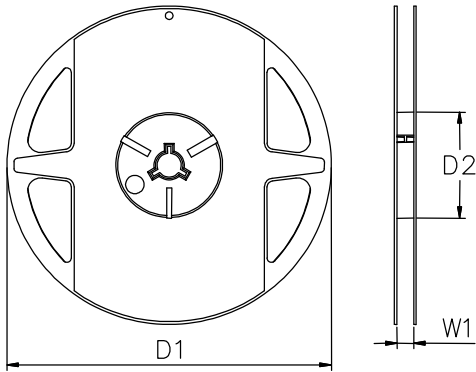
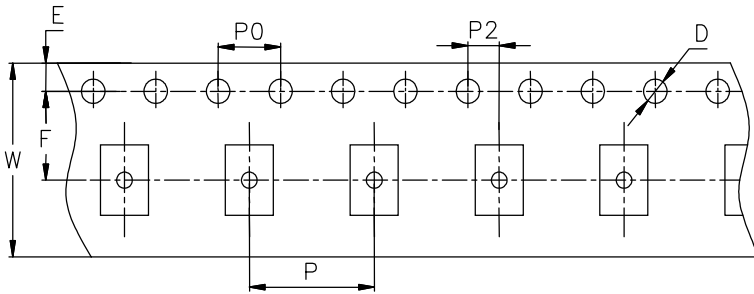
Lead style code	Recommended Pad Layout (mm.)
	

## Dimensions

Type Number	Package Dimensions (mm)							Package Dimensions (in)						
	A		B		C		D	A		B		C		D
	min	max	min	max	min	max	min	min	max	min	max	min	max	min
SMD1812P010TF	4.37	4.73	3.07	3.41	0.50	1.10	0.3	0.172	0.186	0.121	0.134	0.02	0.043	0.012
SMD1812P010TF/60	4.37	4.73	3.07	3.41	0.50	1.10	0.3	0.172	0.186	0.121	0.134	0.02	0.043	0.012
SMD1812P014TF	4.37	4.73	3.07	3.41	0.50	1.10	0.3	0.172	0.186	0.121	0.134	0.02	0.043	0.012
SMD1812P020TF	4.37	4.73	3.07	3.41	0.50	1.10	0.3	0.172	0.186	0.121	0.134	0.02	0.043	0.012
SMD1812P020TF/60	4.37	4.73	3.07	3.41	0.50	1.10	0.3	0.172	0.186	0.121	0.134	0.02	0.043	0.012
SMD1812P030TF	4.37	4.73	3.07	3.41	0.50	1.10	0.3	0.172	0.186	0.121	0.134	0.02	0.043	0.012
SMD1812P030TF/60	4.37	4.73	3.07	3.41	0.50	1.10	0.3	0.172	0.186	0.121	0.134	0.02	0.043	0.012
SMD1812P050TF	4.37	4.73	3.07	3.41	0.40	1.00	0.3	0.172	0.186	0.121	0.134	0.016	0.039	0.012
SMD1812P050TF/30	4.37	4.73	3.07	3.41	0.40	1.00	0.3	0.172	0.186	0.121	0.134	0.016	0.039	0.012
SMD1812P050TF/60	4.37	4.73	3.07	3.41	0.50	1.10	0.3	0.172	0.186	0.121	0.134	0.02	0.043	0.012
SMD1812P075TF	4.37	4.73	3.07	3.41	0.50	1.10	0.3	0.172	0.186	0.121	0.134	0.02	0.043	0.012
SMD1812P075TF/24	4.37	4.73	3.07	3.41	0.60	1.30	0.3	0.172	0.186	0.121	0.134	0.024	0.051	0.012
SMD1812P075TF/33	4.37	4.73	3.07	3.41	0.60	1.30	0.3	0.172	0.186	0.121	0.134	0.024	0.051	0.012
SMD1812P110TF	4.37	4.73	3.07	3.41	0.40	1.00	0.3	0.172	0.186	0.121	0.134	0.016	0.039	0.012
SMD1812P110TF/16	4.37	4.73	3.07	3.41	0.40	1.00	0.3	0.172	0.186	0.121	0.134	0.016	0.039	0.012
SMD1812P110TF/24	4.37	4.73	3.07	3.41	0.60	1.30	0.3	0.172	0.186	0.121	0.134	0.024	0.051	0.012
SMD1812P110TF/33	4.37	4.73	3.07	3.41	0.60	1.30	0.3	0.172	0.186	0.121	0.134	0.024	0.051	0.012
SMD1812P125TF/8	4.37	4.73	3.07	3.41	0.40	1.00	0.3	0.172	0.186	0.121	0.134	0.016	0.039	0.012
SMD1812P125TF	4.37	4.73	3.07	3.41	0.40	1.00	0.3	0.172	0.186	0.121	0.134	0.016	0.039	0.012
SMD1812P150TF	4.37	4.73	3.07	3.41	0.50	1.10	0.3	0.172	0.186	0.121	0.134	0.02	0.043	0.012
SMD1812P150TF/16	4.37	4.73	3.07	3.41	0.50	1.10	0.3	0.172	0.186	0.121	0.134	0.02	0.043	0.012
SMD1812P150TF/24	4.37	4.73	3.07	3.41	0.50	1.10	0.3	0.172	0.186	0.121	0.134	0.02	0.043	0.012
SMD1812P150TF/33	4.37	4.73	3.07	3.41	0.80	1.50	0.3	0.172	0.186	0.121	0.134	0.031	0.059	0.012
SMD1812P160TF	4.37	4.73	3.07	3.41	0.50	1.10	0.3	0.172	0.186	0.121	0.134	0.02	0.043	0.012
SMD1812P200TF	4.37	4.73	3.07	3.41	0.50	1.10	0.3	0.172	0.186	0.121	0.134	0.02	0.043	0.012
SMD1812P200TF/16	4.37	4.73	3.07	3.41	0.50	1.10	0.3	0.172	0.186	0.121	0.134	0.02	0.043	0.012
SMD1812P200TF/24	4.37	4.73	3.07	3.41	0.80	1.50	0.3	0.172	0.186	0.121	0.134	0.031	0.059	0.012
SMD1812P260TF	4.37	4.73	3.07	3.41	0.80	1.50	0.3	0.172	0.186	0.121	0.134	0.031	0.059	0.012
SMD1812P260TF/16	4.37	4.73	3.07	3.41	0.80	1.50	0.3	0.172	0.186	0.121	0.134	0.031	0.059	0.012
SMD1812P300TF	4.37	4.73	3.07	3.41	0.80	1.50	0.3	0.172	0.186	0.121	0.134	0.031	0.059	0.012
SMD1812P300TF/16	4.37	4.73	3.07	3.41	0.80	1.50	0.3	0.172	0.186	0.121	0.134	0.031	0.059	0.012
SMD1812P350TF	4.37	4.73	3.07	3.41	0.80	1.50	0.3	0.172	0.186	0.121	0.134	0.031	0.059	0.012
SMD1812P350TF/16	4.37	4.73	3.07	3.41	0.80	1.50	0.3	0.172	0.186	0.121	0.134	0.031	0.059	0.012
SMD1812P400TF	4.37	4.73	3.07	3.41	0.80	1.50	0.3	0.172	0.186	0.121	0.134	0.031	0.059	0.012



### Taping and Reel Specifications



Symbol	Millimeters	Inches
W	12.0±0.3	0.472±0.012
P	8.0±0.1	0.315±0.004
F	5.5±0.05	0.217±0.002
E	1.75±0.1	0.069±0.004
D	1.55±0.05	0.061±0.002
P0	4.0±0.1	0.157±0.004
P2	2.0±0.05	0.079±0.002
D1(max.)	178.0	7.007
D2(min.)	60	2.362
W1	12.4±0.5	0.488±0.02

Part Number	Halogen Free	Packaging Option	Quantity	Quantity & Packaging Codes
SMD1812PxxxTF	Yes	Tape and Reel	1500	YR