

# PolySwitch Resettable Devices

## Surface-mount Devices

More than 15 years ago, Raychem Circuit Protection introduced the SMD product family. Since then, surface-mount polymeric PTC devices quickly became the industry standard for computer, consumer, multimedia, portable, and automotive electronics protection. In 1995, Raychem Circuit Protection advanced the technology, reducing the size and price of surface-mount resettable devices with the introduction of its miniSMD product series followed by microSMD and nanoSMD family. The nanoSMD series reduces the size to a 3216mm (1206 mils) foot print, one-third the size of the popular miniSMD series.

The recent addition to the surface-mount family include 24V miniSMD 4532mm (1812 mils), 60V decaSMD 5050mm (2018 mils), as well as 1.75A microSMD 3225mm (1210 mils) devices.



### Benefits:

- Smaller size saves board space and cost
- Many product choices give engineers more design flexibility
- Compatible with high-volume electronics assembly
- Assists in meeting regulatory requirements
- Higher voltage ratings allow use in new applications

### Features:

- RoHS complaint
- Broadest range of resettable devices available in the industry
- Current ratings from 0.05 to 3A
- Voltage ratings from 6V computer and electronic applications to 60V telecom applications
- Agency recognition: UL, CSA, TÜV
- Small footprint
- Fast time-to-trip
- Low resistance

### Applications:

- Computer
- Portable electronics
- Multimedia
- Game machines
- Telephony and broadband
- Mobile phones
- Automotive
- Industrial controls
- Battery

## Protection Application Selection Table for Surface-mount Devices

- The table below lists PolySwitch devices and SiBar devices typically used in these applications.
- Specifications for the suggested device part numbers can be found in this section.
- Once a part has been selected, the user should evaluate and test each product for the intended application.

Protection Application	Additional Comments	Overcurrent Overvoltage	PolySwitch Resettable Devices - Key Selection Criteria		
			Small Size	Low Resistance	Fast Time-to-trip (Temperature Protection)
AC adapter input power	use w/ Zener & triac		SMD250F	SMD250F	SMD200F
Battery pack protection			nanoSMDC150F	miniSMDC260F	miniSMDE190F
Charger protection			nanoSMDC050F	miniSMDC110F/16	nanoSMDC075F
CPU/IC protection			nanoSMDC110F	nanoSMDC150F	nanoSMDC075F
Data acquisition/sensor			microSMD005F	-	microSMD005F
DC input/output power	≤6V		nanoSMDC075F	nanoSMDC150F	nanoSMDC050F/13.2
	≤12V		miniSMDC075F	miniSMDC110F/16	miniSMDC075F
DDC			nanoSMDC075F	nanoSMDC110F	nanoSMDC050F/13.2
Device Bay system	DB12, DB20		miniSMDC200F	miniSMDC260F	miniSMDC200F
	DB32		miniSMDC260F	SMD300F	miniSMDC200F
Ethernet/Lan			nanoSMDC050F/13.2	miniSMDC110F/16	nanoSMDC075F
Fan			microSMD035F	microSMD050F	microSMD035F
IEEE 802.3af	VOIP		decaSMDC050F/60	decaSMDC050F/60	decaSMDC050F/60
IEEE-1394	power provider		SMD100F/33	SMD185F	SMD100F/33
	alt. power provider		SMD185F	SMD185F	SMD150F/33
	self-powered		SMD185F	SMD185F	SMD150F/33
LCD inverter			nanoSMDC050F/13.2	miniSMDC110F/16	nanoSMDC075F
LCD screen power			nanoSMDC050F/13.2	nanoSMDC050F/13.2	microSMD035F
LNB (Low Noise Block)			SMD075F	SMD075F	SMD050F
Motor	≤6V		nanoSMDC110F	nanoSMDC150F	microSMD075F
	≤13.2V		miniSMDC075F	miniSMDC110F/16	miniSMDC075F
PS/2 mouse/keyboard			nanoSMDC075F	nanoSMDC110F	nanoSMDC050F/13.2
Signal - data communication	≤6V		nanoSMDC075F	nanoSMDC075F	nanoSMDC075F
	≤13.2V		miniSMDC050F	miniSMDC075F	miniSMDC020F
	≤30V		SMD030F-2018	SMD075F	SMD050F
SCSI			nanoSMDC110F	nanoSMDC150F	nanoSMDC075F
Smart card reader			microSMD010F	microSMD035F	microSMD005F
Telecom - modem	Digital line	OC	miniSMDC014F	miniSMDC014F	miniSMDC014F
		OV	TVB270SC-L*	TVB270SC-L*	TVB270SC-L*
Telecom - PBX	Subscriber	OC	miniSMDC014F	miniSMDC014F	miniSMDC014F
Temperature sensor	CPU		nanoSMDC050F/13.2	nanoSMDC075F	nanoSMDC050F/13.2
USB	Individual Port		nanoSMDC075F	nanoSMDC110F	nanoSMDC050F/13.2
	2 port ganged		nanoSMDC150F	miniSMDC150F	miniSMDC125F
	3 port ganged		miniSMDC200F	miniSMDC200F	miniSMDC200F

\*Refer to the SiBar thyristor product section for more information.

This list is not exhaustive. Raychem Circuit Protection welcomes our customers' input for additional application ideas for Polyswitch Resettable devices.

**Table S1 - Product Series: Size, Current Rating, Voltage Rating/Maximum Resistance for Surface-mount Devices**

	nanoSMD	microSMD	miniSMD	midSMD	SMD	SMD2	miniSMDE	decaSMD
<b>Size mm (mils)</b>	3216 (1206)	3225 (1210)	4532 (1812)	5050 (2018)	7555 (2920)	8763 (3425)	11550 (4420)	5050 (2018)
<b>Hold Current (A)</b>	-	-	-	-	-	-	-	-
0.050	-	30V <sub>DC</sub> /50Ω	-	-	-	-	-	-
0.100	-	30V <sub>DC</sub> /15Ω	-	-	-	-	-	-
0.120	48V <sub>DC</sub> /6.50Ω	-	-	-	-	-	-	-
0.140	-	-	60V <sub>DC</sub> /6.0Ω	-	-	-	-	-
0.160	48V <sub>DC</sub> /5.00Ω	-	-	-	-	-	-	-
0.200	24V <sub>DC</sub> /3.30Ω	-	30V <sub>DC</sub> /3.3Ω	-	-	-	-	-
0.300	-	-	-	60V <sub>DC</sub> /2.30Ω	60V <sub>DC</sub> /4.80Ω	-	-	-
0.350	16V <sub>DC</sub> /1.50Ω	6V <sub>DC</sub> /1.3Ω	-	-	-	-	-	-
0.500	13.2V <sub>DC</sub> /0.80Ω	13.2V <sub>DC</sub> /0.90Ω	24V <sub>DC</sub> /1.00Ω	60V <sub>DC</sub> /1.10Ω	60V <sub>DC</sub> /1.40Ω	-	-	60V <sub>DC</sub> /1.10Ω
0.750	6V <sub>DC</sub> /0.40Ω	6V <sub>DC</sub> /0.40Ω	13.2V <sub>DC</sub> /0.45Ω	-	30V <sub>DC</sub> /1.00Ω	-	-	-
	-	-	24V <sub>DC</sub> /0.29Ω	-	60V <sub>DC</sub> /1.00Ω	-	-	-
1.000	6V <sub>DC</sub> /1.50Ω	-	-	15V <sub>DC</sub> /0.40Ω	30V <sub>DC</sub> /0.48Ω	-	-	-
	-	-	-	-	33V <sub>DC</sub> /0.41Ω	-	-	-
1.100	6V <sub>DC</sub> /0.20Ω	6V <sub>DC</sub> /0.21Ω	8V <sub>DC</sub> /0.21Ω	-	-	-	-	-
	-	-	16V <sub>DC</sub> /0.18Ω	-	-	-	-	-
	-	-	24V <sub>DC</sub> /0.18Ω	-	-	-	-	-
1.200	-	-	-	-	16V <sub>DC</sub> /0.34Ω	-	-	-
1.250	-	-	6V <sub>DC</sub> /0.14Ω	-	15V <sub>DC</sub> /0.25Ω	-	-	-
	-	-	16V <sub>DC</sub> /0.14Ω	-	-	-	-	-
1.500	6V <sub>DC</sub> /0.11Ω	6V <sub>DC</sub> /0.11Ω	6V <sub>DC</sub> /0.11Ω	15V <sub>DC</sub> /0.18Ω	-	15V <sub>DC</sub> /0.25Ω	-	-
	-	-	12V <sub>DC</sub> /0.11Ω	-	-	33V <sub>DC</sub> /0.23Ω	-	-
	-	-	24V <sub>DC</sub> /0.12Ω	-	-	-	-	-
1.600	-	-	9V <sub>DC</sub> /0.10Ω	-	-	16V <sub>DC</sub> /0.15Ω	-	-
1.750	-	6V <sub>DC</sub> /0.08Ω	-	-	-	-	-	-
1.850	-	-	-	-	-	33V <sub>DC</sub> /0.165Ω	-	-
1.900	-	-	-	-	-	-	16V <sub>DC</sub> /0.08Ω	-
2.000	6V <sub>DC</sub> /0.07Ω*	-	8V <sub>DC</sub> /0.07Ω	6V <sub>DC</sub> /0.10Ω	-	15V <sub>DC</sub> /0.125Ω	-	-
2.500	-	-	-	-	-	15V <sub>DC</sub> /0.85Ω	-	-
2.600	-	-	6V <sub>DC</sub> /0.043Ω	-	6V <sub>DC</sub> /0.075Ω	-	-	-
	-	-	12V <sub>DC</sub> /0.47Ω	-	-	-	-	-
	-	-	16V <sub>DC</sub> /0.47Ω*	-	-	-	-	-
3.000	-	-	-	-	6V <sub>DC</sub> /0.048Ω	-	-	-

\* Data is preliminary

**Table S2 - Thermal Derating for Surface-mount Devices [Hold Current (A) at Ambient Temperature (°C)]**

Part Number	Maximum Ambient Temperature												
	-40°C	-20°C	0°C	20°C	25°C	40°C	50°C	60°C	70°C	80°C	85°C	125°C	
<b>nanoSMDC Series</b>													
<b>Size 3216 mm/1206 mils</b>													
<b>New</b>	nanoSMDC012F	0.20	0.17	0.15	0.13	0.12	0.11	0.10	0.09	0.08	0.07	0.07	-
<b>New</b>	nanoSMDC016F	0.21	0.20	0.18	0.16	0.16	0.14	0.13	0.12	0.11	0.10	0.09	-
	nanoSMDC020F	0.34	0.30	0.26	0.22	0.20	0.17	0.15	0.13	0.11	0.09	0.08	-
	nanoSMDC035F	0.58	0.51	0.44	0.38	0.35	0.31	0.28	0.24	0.21	0.18	0.16	-
	nanoSMDC050F/13.2	0.78	0.69	0.61	0.52	0.50	0.44	0.39	0.35	0.30	0.25	0.24	-
	nanoSMDC075F	1.15	1.04	0.92	0.78	0.75	0.69	0.63	0.58	0.51	0.46	0.43	-
	nanoSMDC110F	1.64	1.46	1.30	1.10	1.06	0.92	0.83	0.80	0.65	0.56	0.52	-
	nanoSMDC150F	2.20	1.99	1.77	1.55	1.50	1.34	1.23	1.10	1.01	0.90	0.84	-
<b>Coming Soon</b>	nanoSMDC200F*	3.56	3.08	2.60	2.12	2.00	1.79	1.64	1.50	1.36	1.21	1.14	-

\* Data is preliminary

Table S2 - Thermal Derating for Surface-mount Devices [Hold Current (A) at Ambient Temperature (°C)] ... Cont'd

Part Number	Maximum Ambient Temperature											
	-40°C	-20°C	0°C	20°C	25°C	40°C	50°C	60°C	70°C	80°C	85°C	125°C
<b>microSMD Series</b> Size 3225 mm/1210 mils												
microSMD005F	0.08	0.07	0.06	0.05	0.05	0.04	0.04	0.03	0.03	0.02	0.02	-
microSMD010F	0.15	0.13	0.12	0.10	0.10	0.09	0.08	0.06	0.06	0.05	0.05	-
microSMD035F	0.51	0.46	0.40	0.35	0.34	0.30	0.27	0.24	0.22	0.19	0.18	-
microSMD050F	0.76	0.66	0.58	0.50	0.48	0.42	0.38	0.35	0.29	0.25	0.23	-
microSMD075F	1.10	0.97	0.86	0.75	0.72	0.64	0.58	0.55	0.47	0.42	0.39	-
microSMD110F	1.60	1.42	1.26	1.10	1.06	0.94	0.86	0.80	0.70	0.62	0.58	-
microSMD150F	2.30	2.02	1.76	1.50	1.43	1.24	1.11	1.00	0.85	0.72	0.65	-
New microSMD175F	2.80	2.45	2.10	1.75	1.70	1.55	1.45	1.35	1.25	1.15	1.10	-
<b>miniSMDC Series</b> Size 4532 mm/1812 mils												
miniSMDC014F	0.23	0.20	0.17	0.14	0.13	0.11	0.10	0.09	0.07	0.06	0.05	-
miniSMDC020F	0.30	0.27	0.23	0.20	0.19	0.17	0.15	0.13	0.12	0.10	0.09	-
miniSMDC050F	0.59	0.57	0.55	0.50	0.48	0.45	0.43	0.35	0.30	0.25	0.23	-
miniSMDC075F	1.10	0.99	0.87	0.75	0.72	0.63	0.57	0.49	0.45	0.39	0.35	-
New miniSMDC075F/24	1.50	1.25	1.00	0.75	0.73	0.65	0.60	0.55	0.50	0.45	0.43	-
miniSMDC110F	1.60	1.45	1.28	1.10	1.07	0.92	0.83	0.71	0.66	0.57	0.52	-
miniSMDC110F/16	1.68	1.49	1.30	1.10	1.05	0.92	0.83	0.75	0.64	0.55	0.50	-
New miniSMDC110F/24	2.00	1.70	1.40	1.10	1.06	0.95	0.88	0.80	0.73	0.65	0.61	-
miniSMDC125F	2.00	1.69	1.47	1.25	1.17	1.03	0.92	0.90	0.69	0.58	0.53	-
miniSMDC125F/16	2.00	1.69	1.47	1.25	1.17	1.03	0.92	0.90	0.69	0.58	0.53	-
miniSMDC150F	2.30	2.05	1.77	1.50	1.44	1.23	1.09	0.95	0.82	0.68	0.61	-
New miniSMDC150F/12	2.40	2.10	1.80	1.50	1.44	1.25	1.13	1.00	0.88	0.75	0.69	-
New miniSMDC150F/24	2.10	1.90	1.70	1.50	1.44	1.25	1.13	1.00	0.88	0.75	0.69	-
miniSMDC160F	2.50	2.19	1.89	1.60	1.53	1.31	1.16	1.10	0.95	0.79	0.71	-
miniSMDC200F	2.60	2.44	2.22	2.00	1.96	1.78	1.67	1.50	1.45	1.34	1.29	-
miniSMDC260F	3.40	3.16	2.80	2.60	2.54	2.32	2.18	2.00	1.90	1.76	1.69	-
miniSMDC260F/12	3.40	3.16	2.90	2.60	2.54	2.32	2.18	2.00	1.90	1.76	1.69	-
New miniSMDC260F/13.2	3.40	3.16	2.90	2.60	2.54	2.32	2.18	2.00	1.90	1.76	1.69	-
coming soon miniSMDC260F/16*	3.50	3.20	2.90	2.60	2.53	2.30	2.15	2.00	1.85	1.70	1.63	-
<b>miniSMDE Series</b> Size 11550 mm/4420 mils												
miniSMDE190F	3.16	2.74	2.20	1.90	1.74	1.48	1.27	1.10	0.80	0.50	0.35	-
<b>midSMD Series</b> Size 5050 mm/2018 mils												
SMD030F-2018	0.48	0.42	0.35	0.30	0.28	0.24	0.21	0.17	0.15	0.12	0.10	-
New decaSMDC050F/60	1.00	0.85	0.70	0.55	0.53	0.45	0.40	0.35	0.30	0.25	0.23	-
SMD100F-2018	1.59	1.43	1.20	1.10	1.03	0.94	0.85	0.72	0.69	0.61	0.57	-
SMD150F-2018	2.21	1.97	1.70	1.50	1.43	1.26	1.15	1.00	0.91	0.79	0.73	-
SMD200F-2018	2.81	2.54	2.27	2.00	1.93	1.73	1.59	1.46	1.32	1.19	1.12	-
<b>SMD Series</b> Size 7555 mm/2920 mils												
SMD030F	0.44	0.39	0.32	0.30	0.28	0.26	0.23	0.19	0.18	0.17	0.15	-
SMD050F	0.73	0.65	0.55	0.50	0.47	0.43	0.39	0.33	0.31	0.28	0.26	-
SMD075F	1.11	0.99	0.84	0.75	0.71	0.63	0.57	0.49	0.45	0.39	0.36	-
SMD075F/60	1.11	0.99	0.84	0.75	0.71	0.63	0.57	0.49	0.45	0.39	0.36	-
SMD100F	1.59	1.43	1.20	1.10	1.03	0.94	0.85	0.72	0.69	0.61	0.57	-
SMD100F/33	1.48	1.35	1.20	1.10	1.06	0.98	0.91	0.83	0.79	0.73	0.69	-
New SMDH120	2.34	1.96	1.58	1.20	1.15	1.02	0.92	0.83	0.74	0.65	0.60	0.26
SMD125F	1.89	1.68	1.50	1.25	1.21	1.04	0.93	0.85	0.71	0.61	0.55	-
SMD260F	3.82	3.41	2.90	2.60	2.45	2.19	1.99	1.70	1.58	1.38	1.28	-
SMD300F	4.13	3.75	3.30	3.00	2.87	2.62	2.43	2.25	2.00	1.87	1.78	-
<b>SMD2 Series</b> Size 8763 mm/3425 mils												
SMD150F	2.30	2.04	1.80	1.50	1.45	1.23	1.10	0.99	0.83	0.70	0.63	-
SMD150F/33	2.30	2.04	1.80	1.50	1.45	1.23	1.10	0.99	0.83	0.70	0.63	-
SMDH160	2.14	1.96	1.78	1.60	1.56	1.42	1.33	1.24	1.15	1.06	1.02	0.44
SMD185F	2.54	2.29	2.20	1.85	1.80	1.55	1.43	1.31	1.19	1.06	1.00	-
SMD200F	3.01	2.67	2.30	2.00	1.90	1.66	1.50	1.30	1.16	0.99	0.91	-
SMD250F	3.72	3.31	2.80	2.50	2.35	2.09	1.89	1.60	1.48	1.28	1.18	-

\* Data is preliminary

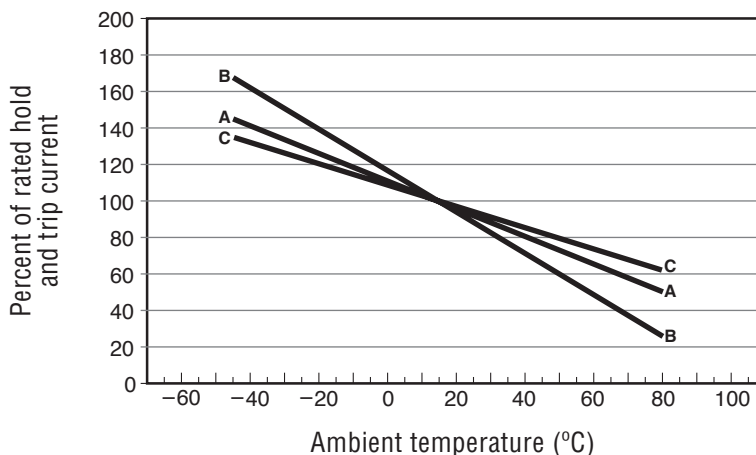
## Thermal Derating Curve for Surface-mount Devices

A = nanoSMD / microSMD /  
miniSMD / decaSMD & SMD

B = miniSMDE190F

C = SMDH120 and SMDH160

Figure S1 Thermal Derating Curve



### Table S3 - Electrical Characteristics for Surface-mount Devices at Room Temperature

Part Number	$I_H$ (A)	$I_T$ (A)	$V_{MAX}$ ( $V_{DC}$ )	$I_{MAX}$ (A)	$P_{D MAX}$ (W)	Max. Time-to-Trip (A) (s)		$R_{MIN}$ $\Omega$	$R_{1 MAX}$ $\Omega$	Figure for Dimensions
<b>nanoSMDC Series</b> Size 3216 mm/1206 mils										
New nanoSMDC012F	0.12	0.39	48	10	0.50	1.00	0.20	1.40	6.50	S2
New nanoSMDC016F	0.16	0.45	48	10	0.50	1.00	0.30	1.10	5.00	S2
nanoSMDC020F	0.20	0.42	24	100	0.60	8.00	0.10	0.65	3.30	S2
nanoSMDC035F	0.35	0.75	16	20	0.60	3.50	0.10	0.45	1.40	S2
nanoSMDC050F/13.2	0.50	1.10	13.2	100	0.80	8.00	0.10	0.20	0.80	S2
nanoSMDC075F	0.75	1.50	6	100	0.80	8.00	0.10	0.12	0.40	S2
nanoSMDC110F	1.10	2.20	6	100	0.80	8.00	0.10	0.07	0.20	S2
nanoSMDC150F	1.50	3.00	6	100	0.80	8.00	0.30	0.04	0.11	S2
coming soon nanoSMDC200F*	2.00	4.00	6	100	1.00	8.00	TBD	0.02	0.07	S2
<b>microSMD Series</b> Size 3225 mm/1210 mils										
microSMD005F	0.05	0.15	30	10	1.00	0.25	1.50	3.60	50.00	S3
microSMD010F	0.10	0.25	30	10	0.80	0.50	1.00	2.10	15.00	S2
microSMD035F	0.35	0.75	6	40	0.80	8.00	0.20	0.32	1.30	S2
microSMD050F	0.50	1.00	13.2	40	0.80	8.00	0.05	0.25	0.90	S2
microSMD075F	0.75	1.50	6	40	0.80	8.00	0.10	0.11	0.40	S2
microSMD110F	1.10	2.20	6	40	0.80	8.00	0.20	0.07	0.21	S2
microSMD150F	1.50	3.00	6	40	0.80	8.00	1.00	0.04	0.11	S2
New microSMD175F	1.75	3.50	6	40	0.80	8.00	0.80	0.02	0.08	S2
<b>miniSMDC Series</b> Size 4532 mm/1812 mils										
miniSMDC014F	0.14	0.28	60	10	0.75	8.00	0.008	1.50	6.00	S2
miniSMDC020F	0.20	0.40	30	10	0.80	8.00	0.02	0.60	3.30	S2
miniSMDC050F	0.50	1.00	24	100	0.80	8.00	0.15	0.15	1.00	S2
miniSMDC075F	0.75	1.50	13.2	100	1.00	8.00	0.20	0.11	0.45	S2
New miniSMDC075F/24	0.75	1.50	24	40	0.80	8.00	0.30	0.09	0.29	S2
miniSMDC110F	1.10	2.20	8	100	1.20	8.00	0.30	0.04	0.21	S2
miniSMDC110F/16	1.10	2.20	16	100	0.80	8.00	0.30	0.06	0.18	S2
New miniSMDC110F/24	1.10	2.20	24	20	0.80	8.00	0.50	0.06	0.18	S2
miniSMDC125F	1.25	2.50	6	100	0.80	8.00	0.40	0.05	0.14	S2
miniSMDC125F/16	1.25	2.50	16	100	0.80	8.00	0.40	0.05	0.14	S2
miniSMDC150F	1.50	3.00	6	100	0.80	8.00	0.50	0.04	0.11	S2
New miniSMDC150F/12	1.50	2.80	12	100	0.80	8.00	0.50	0.04	0.11	S2
New miniSMDC150F/24	1.50	3.00	24	20	1.00	8.00	1.50	0.04	0.12	S2
miniSMDC160F	1.60	3.20	9	100	0.80	8.00	1.00	0.03	0.10	S2
miniSMDC200F	2.00	4.00	8	100	1.00	8.00	5.00	0.02	0.07	S2
miniSMDC260F	2.60	5.00	6	100	1.00	8.00	7.00	0.01	0.04	S2
miniSMDC260F/12	2.60	5.00	12	100	1.00	8.00	5.00	0.01	0.04	S2
New miniSMDC260F/13.2	2.60	5.00	13.2	100	1.00	8.00	5.00	0.01	0.04	S2
coming soon miniSMDC260F/16*	2.60	5.00	16	100	1.00	8.00	5.00	0.01	0.04	S2

\* Data is preliminary

## Table S3 - Electrical Characteristics for Surface-mount Devices at Room Temperature ... Cont'd

Part Number	$I_H$ (A)	$I_T$ (A)	$V_{MAX}$ (V <sub>DC</sub> )	$I_{MAX}$ (A)	$P_{D MAX}$ (W)	Max. Time-to-Trip (A) (s)		$R_{MIN}$ Ω	$R_{1 MAX}$ Ω	Figure for Dimensions
<b>miniSMDE Series</b>										
Size 11550 mm/4420 mils										
miniSMDE190F	1.90	3.80	16	100	1.5	10.00	2.00	0.02	0.08	S2
<b>midSMD Series</b>										
Size 5050 mm/2018 mils										
SMD030F-2018	0.30	0.80	60	20	0.90	1.50	1.50	0.50	2.30	S4
New decaSMDC050F/60	0.55	1.10	60	10	1.00	8.00	0.10	0.40	1.10	S2
SMD100F-2018	1.10	2.20	15	40	1.40	8.00	0.50	0.10	0.40	S4
SMD150F-2018	1.50	3.00	15	40	1.80	8.00	1.00	0.07	0.18	S4
SMD200F-2018	2.00	4.20	6	40	1.50	8.00	3.00	0.04	0.10	S4
<b>SMD Series</b>										
Size 7555 mm/2920 mils										
SMD030F	0.30	0.60	60	10	1.70	1.50	3.00	1.20	4.80	S5
SMD050F	0.50	1.00	60	10	1.70	2.50	4.00	0.35	1.40	S5
SMD075F	0.75	1.50	30	40	1.70	8.00	0.30	0.35	1.00	S5
SMD075F/60	0.75	1.50	60	10	1.70	8.00	0.30	0.35	1.00	S5
SMD100F	1.10	2.20	30	40	1.70	8.00	0.50	0.12	0.48	S5
SMD100F/33	1.10	2.20	33	40	1.70	8.00	0.50	0.12	0.41	S5
New SMDH120	1.20	2.30	16	50	2.00	8.00	2.00	0.15	0.34	S5
SMD125F	1.25	2.50	15	40	1.70	8.00	2.00	0.07	0.25	S5
SMD260F	2.60	5.20	6	40	1.70	8.00	20.00	0.02	0.07	S5
SMD300F	3.00	6.00	6	40	1.50	8.00	35.00	0.01	0.04	S5
<b>SMD2 Devices</b>										
Size 8763 mm/3425 mils										
SMD150F	1.50	3.00	15	40	1.90	8.00	5.00	0.06	0.25	S5
SMD150F/33	1.50	3.00	33	40	1.90	8.00	5.00	0.08	0.23	S5
SMDH160	1.60	3.20	16	70	2.20	8.00	15.00	0.05	0.15	S5
SMD185F	1.85	3.60	33	40	1.50	8.00	5.00	0.06	0.16	S5
SMD200F	2.00	4.00	15	40	1.90	8.00	12.00	0.05	0.12	S5
SMD250F	2.50	5.00	15	40	1.90	8.00	25.00	0.03	0.08	S5

## Figures S2-S5 - Dimension Figures for Surface-mount Devices

Figure S2

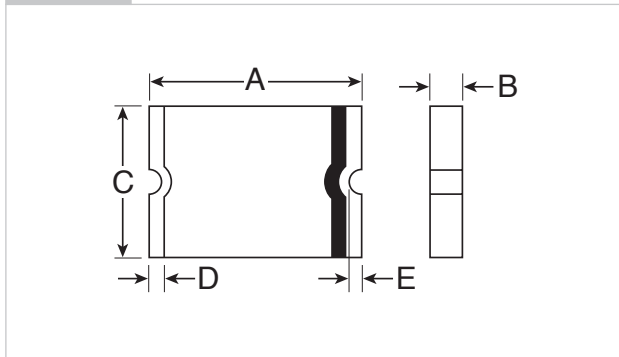


Figure S3

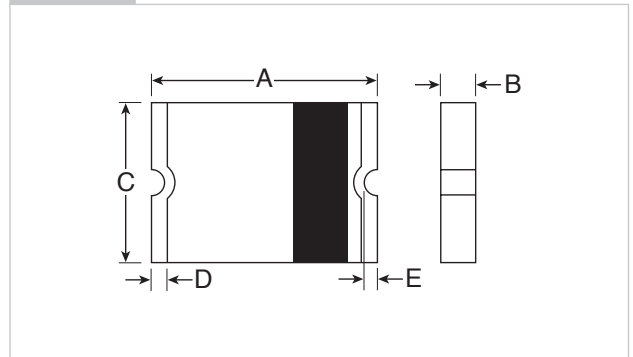


Figure S4

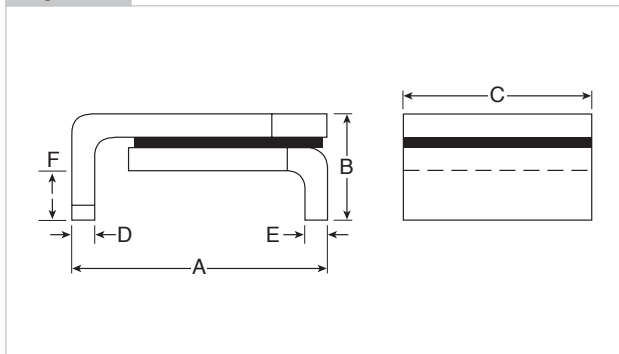
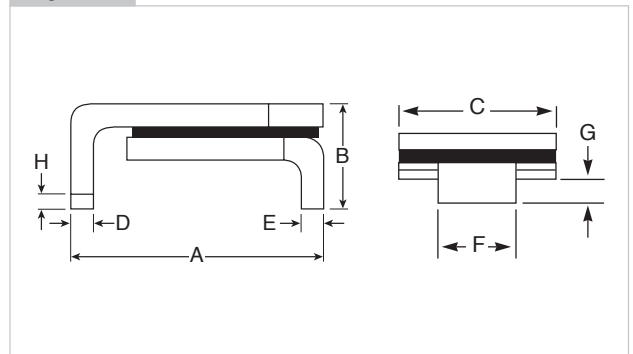


Figure S5





**Table S4 - Dimensions for Surface-mount Devices in Millimeters (Inches)**

Part Number	A		B		C		D		E		F		G		H		Figure
	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	
<b>nanoSMDC Series</b> Size 3216 mm/1206 mils																	
<b>New</b> nanoSMDC012F	3.00 (0.118)	3.40 (0.134)	0.62 (0.024)	1.00 (0.039)	1.37 (0.054)	1.80 (0.071)	0.25 (0.010)	0.75 (0.030)	0.076 (0.003)	-	-	-	-	-	-	-	S2
<b>New</b> nanoSMDC016F	3.00 (0.118)	3.40 (0.134)	0.62 (0.024)	1.00 (0.039)	1.37 (0.054)	1.80 (0.071)	0.25 (0.010)	0.75 (0.030)	0.076 (0.003)	-	-	-	-	-	-	-	S2
nanoSMDC020F	3.00 (0.118)	3.40 (0.134)	0.38 (0.015)	0.64 (0.025)	1.37 (0.054)	1.80 (0.071)	0.25 (0.010)	0.75 (0.030)	0.076 (0.003)	-	-	-	-	-	-	-	S2
nanoSMDC035F	3.00 (0.118)	3.40 (0.134)	0.38 (0.015)	0.64 (0.025)	1.37 (0.054)	1.80 (0.071)	0.25 (0.010)	0.75 (0.030)	0.076 (0.003)	-	-	-	-	-	-	-	S2
nanoSMDC050F/13.2	3.00 (0.118)	3.40 (0.134)	0.38 (0.015)	0.64 (0.025)	1.37 (0.054)	1.80 (0.071)	0.25 (0.010)	0.75 (0.030)	0.076 (0.003)	-	-	-	-	-	-	-	S2
nanoSMDC075F	3.00 (0.118)	3.40 (0.134)	0.28 (0.011)	0.48 (0.019)	1.37 (0.054)	1.80 (0.071)	0.25 (0.010)	0.75 (0.030)	0.076 (0.003)	-	-	-	-	-	-	-	S2
nanoSMDC110F	3.00 (0.118)	3.40 (0.134)	0.67 (0.026)	1.00 (0.039)	1.37 (0.054)	1.80 (0.071)	0.25 (0.010)	0.75 (0.030)	0.076 (0.003)	-	-	-	-	-	-	-	S2
nanoSMDC150F	3.00 (0.118)	3.40 (0.134)	0.55 (0.022)	0.89 (0.035)	1.37 (0.054)	1.80 (0.071)	0.25 (0.010)	0.75 (0.030)	0.076 (0.003)	-	-	-	-	-	-	-	S2
<b>coming soon</b> nanoSMDC200F*	3.00 (0.118)	3.40 (0.134)	0.68 (0.027)	1.25 (0.049)	1.37 (0.054)	1.80 (0.071)	0.25 (0.010)	0.75 (0.030)	0.076 (0.003)	-	-	-	-	-	-	-	S2
<b>microSMD Series</b> Size 3225 mm/1210 mils																	
microSMD005F	3.0 (0.118)	3.43 (0.135)	0.50 (0.019)	0.85 (0.034)	2.35 (0.092)	2.80 (0.110)	0.25 (0.010)	0.75 (0.030)	0.20 (0.008)	-	-	-	-	-	-	-	S3
microSMD010F	3.0 (0.118)	3.43 (0.135)	0.50 (0.019)	0.85 (0.034)	2.35 (0.092)	2.80 (0.110)	0.25 (0.010)	0.75 (0.030)	0.20 (0.008)	-	-	-	-	-	-	-	S2
microSMD035F	3.0 (0.118)	3.43 (0.135)	0.38 (0.015)	0.62 (0.025)	2.35 (0.092)	2.80 (0.110)	0.25 (0.010)	0.75 (0.030)	0.20 (0.008)	-	-	-	-	-	-	-	S2
microSMD050F	3.0 (0.118)	3.43 (0.135)	0.38 (0.015)	0.62 (0.025)	2.35 (0.092)	2.80 (0.110)	0.25 (0.010)	0.75 (0.030)	0.20 (0.008)	-	-	-	-	-	-	-	S2
microSMD075F	3.0 (0.118)	3.43 (0.135)	0.38 (0.015)	0.62 (0.025)	2.35 (0.092)	2.80 (0.110)	0.25 (0.010)	0.75 (0.030)	0.20 (0.008)	-	-	-	-	-	-	-	S2
microSMD110F	3.0 (0.118)	3.43 (0.135)	0.28 (0.011)	0.48 (0.019)	2.35 (0.092)	2.80 (0.110)	0.25 (0.010)	0.75 (0.030)	0.20 (0.008)	-	-	-	-	-	-	-	S2
microSMD150F	3.0 (0.118)	3.43 (0.135)	0.51 (0.020)	1.22 (0.048)	2.35 (0.092)	2.80 (0.110)	0.25 (0.010)	0.75 (0.030)	0.20 (0.008)	-	-	-	-	-	-	-	S2
<b>New</b> microSMD175F	3.0 (0.118)	3.43 (0.135)	0.40 (0.016)	0.76 (0.030)	2.35 (0.092)	2.80 (0.110)	0.25 (0.010)	0.75 (0.030)	0.20 (0.008)	-	-	-	-	-	-	-	S2
<b>miniSMDC Series</b> Size 4532 mm/1812 mils																	
miniSMDC014F	4.37 (0.172)	4.73 (0.186)	0.635 (0.025)	0.89 (0.035)	3.07 (0.121)	3.41 (0.134)	0.25 (0.010)	0.95 (0.040)	0.20 (0.008)	-	-	-	-	-	-	-	S2
miniSMDC020F	4.37 (0.172)	4.73 (0.186)	0.635 (0.025)	0.89 (0.035)	3.07 (0.121)	3.41 (0.134)	0.25 (0.010)	0.95 (0.040)	0.20 (0.008)	-	-	-	-	-	-	-	S2
miniSMDC050F	4.37 (0.172)	4.73 (0.186)	0.38 (0.015)	0.62 (0.025)	3.07 (0.121)	3.41 (0.134)	0.25 (0.010)	0.95 (0.040)	0.20 (0.008)	-	-	-	-	-	-	-	S2
miniSMDC075F	4.37 (0.172)	4.73 (0.186)	0.38 (0.015)	0.62 (0.025)	3.07 (0.121)	3.41 (0.134)	0.25 (0.010)	0.95 (0.040)	0.20 (0.008)	-	-	-	-	-	-	-	S2
<b>New</b> miniSMDC075F/24	4.37 (0.172)	4.83 (0.190)	0.81 (0.032)	1.30 (0.051)	3.07 (0.121)	3.41 (0.134)	0.25 (0.010)	0.95 (0.040)	0.20 (0.008)	-	-	-	-	-	-	-	S2
miniSMDC110F	4.37 (0.172)	4.73 (0.186)	0.38 (0.015)	0.62 (0.025)	3.07 (0.121)	3.41 (0.134)	0.25 (0.010)	0.95 (0.040)	0.20 (0.008)	-	-	-	-	-	-	-	S2
miniSMDC110F/16	4.37 (0.172)	4.73 (0.186)	0.28 (0.011)	0.48 (0.019)	3.07 (0.121)	3.41 (0.134)	0.25 (0.010)	0.95 (0.040)	0.20 (0.008)	-	-	-	-	-	-	-	S2
<b>New</b> miniSMDC110F/24	4.37 (0.172)	4.83 (0.190)	0.81 (0.032)	1.30 (0.051)	3.07 (0.121)	3.41 (0.134)	0.25 (0.010)	0.95 (0.040)	0.20 (0.008)	-	-	-	-	-	-	-	S2
miniSMDC125F	4.37 (0.172)	4.73 (0.186)	0.28 (0.011)	0.48 (0.019)	3.07 (0.121)	3.41 (0.134)	0.25 (0.010)	0.95 (0.040)	0.20 (0.008)	-	-	-	-	-	-	-	S2
miniSMDC125F/16	4.37 (0.172)	4.83 (0.190)	0.28 (0.011)	0.48 (0.019)	3.07 (0.121)	3.41 (0.134)	0.25 (0.010)	0.95 (0.040)	0.20 (0.008)	-	-	-	-	-	-	-	S2
miniSMDC150F	4.37 (0.172)	4.73 (0.186)	0.28 (0.011)	0.48 (0.019)	3.07 (0.121)	3.41 (0.134)	0.25 (0.010)	0.95 (0.040)	0.20 (0.008)	-	-	-	-	-	-	-	S2
<b>New</b> miniSMDC150F/12	4.37 (0.172)	4.73 (0.186)	0.28 (0.011)	0.48 (0.019)	3.07 (0.121)	3.41 (0.134)	0.25 (0.010)	0.95 (0.040)	0.20 (0.008)	-	-	-	-	-	-	-	S2
<b>New</b> miniSMDC150F/24	4.37 (0.172)	4.83 (0.190)	1.00 (0.040)	1.68 (0.066)	3.07 (0.121)	3.41 (0.134)	0.25 (0.010)	0.95 (0.040)	0.20 (0.008)	-	-	-	-	-	-	-	S2
miniSMDC160F	4.37 (0.172)	4.73 (0.186)	0.28 (0.011)	0.48 (0.019)	3.07 (0.121)	3.41 (0.134)	0.25 (0.010)	0.95 (0.040)	0.20 (0.008)	-	-	-	-	-	-	-	S2
miniSMDC200F	4.37 (0.172)	4.73 (0.186)	0.51 (0.020)	1.22 (0.048)	3.07 (0.121)	3.41 (0.134)	0.25 (0.010)	0.95 (0.040)	0.20 (0.008)	-	-	-	-	-	-	-	S2
miniSMDC260F	4.37 (0.172)	4.73 (0.186)	0.48 (0.019)	0.74 (0.029)	3.07 (0.121)	3.41 (0.134)	0.25 (0.010)	0.95 (0.040)	0.20 (0.008)	-	-	-	-	-	-	-	S2
miniSMDC260F/12	4.37 (0.172)	4.73 (0.186)	0.76 (0.030)	1.25 (0.050)	3.07 (0.121)	3.41 (0.134)	0.25 (0.010)	0.95 (0.040)	0.20 (0.008)	-	-	-	-	-	-	-	S2
<b>New</b> miniSMDC260F/13.2	4.37 (0.172)	4.73 (0.186)	0.76 (0.030)	1.25 (0.050)	3.07 (0.121)	3.41 (0.134)	0.25 (0.010)	0.95 (0.040)	0.20 (0.008)	-	-	-	-	-	-	-	S2
<b>coming soon</b> miniSMDC260F/16*	4.37 (0.172)	4.73 (0.186)	0.76 (0.030)	1.25 (0.050)	3.07 (0.121)	3.41 (0.134)	0.25 (0.010)	0.95 (0.040)	0.20 (0.008)	-	-	-	-	-	-	-	S2

\* Data is preliminary

**Table S4 - Dimensions for Surface-mount Devices in Millimeters (Inches)**

... **Cont'd**

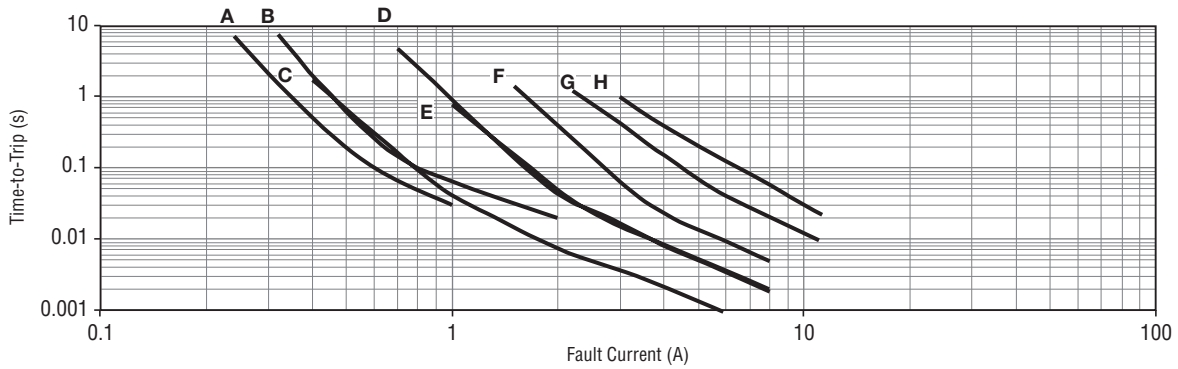
Part Number	A		B		C		D		E		F		G		H	Figure
	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	
<b>miniSMDE Series</b>																
<b>Size 11550 mm/4420 mils</b>																
miniSMDE190F	11.15 (0.439)	11.51 (0.453)	0.33 (0.013)	0.53 (0.021)	4.83 (0.190)	5.33 (0.210)	0.51 (0.020)	1.02 (0.040)	0.381 (0.015)	-	-	-	-	-	-	S2
<b>midSMD Series</b>																
<b>Size 5050 mm/2018 mils</b>																
SMD030F-2018	4.72 (0.186)	5.44 (0.214)	-	1.78 (0.070)	4.22 (0.166)	4.93 (0.194)	0.25 (0.010)	0.36 (0.014)	0.25 (0.010)	0.36 (0.014)	0.30 (0.012)	0.46 (0.018)	-	-	-	S4
<b>New</b> decaSMDC050F/60	4.70 (0.185)	5.31 (0.209)	0.63 (0.025)	0.89 (0.035)	4.19 (0.165)	4.80 (0.189)	0.25 (0.010)	0.95 (0.040)	0.25 (0.010)	-	-	-	-	-	-	S2
SMD100F-2018	4.72 (0.186)	5.44 (0.214)	-	1.52 (0.060)	4.22 (0.166)	4.93 (0.194)	0.25 (0.010)	0.36 (0.014)	0.25 (0.010)	0.36 (0.014)	0.30 (0.012)	0.46 (0.018)	-	-	-	S4
SMD150F-2018	4.72 (0.186)	5.44 (0.214)	-	1.52 (0.060)	4.22 (0.166)	4.93 (0.194)	0.25 (0.010)	0.36 (0.014)	0.25 (0.010)	0.36 (0.014)	0.30 (0.012)	0.46 (0.018)	-	-	-	S4
SMD200F-2018	4.72 (0.186)	5.44 (0.214)	-	1.52 (0.060)	4.22 (0.166)	4.93 (0.194)	0.25 (0.010)	0.36 (0.014)	0.25 (0.010)	0.36 (0.014)	0.30 (0.012)	0.46 (0.018)	-	-	-	S4
<b>SMD Series</b>																
<b>Size 7555 mm/2920 mils</b>																
SMD030F	6.73 (0.265)	7.98 (0.314)	-	3.18 (0.125)	4.80 (0.19)	5.44 (0.214)	0.56 (0.022)	0.71 (0.028)	0.56 (0.022)	0.71 (0.028)	2.16 (0.085)	2.41 (0.095)	0.66 (0.026)	1.37 (0.054)	0.43 (0.017)	S5
SMD050F	6.73 (0.265)	7.98 (0.314)	-	3.18 (0.125)	4.80 (0.19)	5.44 (0.214)	0.56 (0.022)	0.71 (0.028)	0.20 (0.008)	0.30 (0.012)	2.16 (0.085)	2.41 (0.095)	0.66 (0.026)	1.37 (0.054)	0.43 (0.017)	S5
SMD075F	6.73 (0.265)	7.98 (0.314)	-	3.18 (0.125)	4.80 (0.19)	5.44 (0.214)	0.56 (0.022)	0.71 (0.028)	0.56 (0.022)	0.71 (0.028)	2.16 (0.085)	2.41 (0.095)	0.66 (0.026)	1.37 (0.054)	0.43 (0.017)	S5
SMD075F/60	6.73 (0.265)	7.98 (0.314)	-	3.18 (0.125)	4.80 (0.19)	5.44 (0.214)	0.56 (0.022)	0.71 (0.028)	0.56 (0.022)	0.71 (0.028)	2.16 (0.085)	2.41 (0.095)	0.66 (0.026)	1.37 (0.054)	0.43 (0.017)	S5
SMD100F	6.73 (0.265)	7.98 (0.314)	-	3.00 (0.118)	4.80 (0.19)	5.44 (0.214)	0.56 (0.022)	0.71 (0.028)	0.56 (0.022)	0.71 (0.028)	2.16 (0.085)	2.41 (0.095)	0.66 (0.026)	1.37 (0.054)	0.43 (0.017)	S5
SMD100F/33	6.73 (0.265)	7.98 (0.314)	-	3.00 (0.118)	4.80 (0.19)	5.44 (0.214)	0.56 (0.022)	0.71 (0.028)	0.56 (0.022)	0.71 (0.028)	2.16 (0.085)	2.41 (0.095)	0.66 (0.026)	1.37 (0.054)	0.43 (0.017)	S5
<b>New</b> SMDH120	6.73 (0.265)	7.98 (0.314)	-	3.00 (0.118)	4.80 (0.19)	5.44 (0.214)	0.56 (0.022)	0.71 (0.028)	0.56 (0.022)	0.71 (0.028)	2.16 (0.085)	2.41 (0.095)	0.66 (0.026)	1.37 (0.054)	0.43 (0.017)	S5
SMD125F	6.73 (0.265)	7.98 (0.314)	-	3.00 (0.118)	4.80 (0.19)	5.44 (0.214)	0.56 (0.022)	0.71 (0.028)	0.56 (0.022)	0.71 (0.028)	2.16 (0.085)	2.41 (0.095)	0.66 (0.026)	1.37 (0.054)	0.43 (0.017)	S5
SMD260F	6.73 (0.265)	7.98 (0.314)	-	3.00 (0.118)	4.80 (0.19)	5.44 (0.214)	0.56 (0.022)	0.71 (0.028)	0.56 (0.022)	0.71 (0.028)	2.16 (0.085)	2.41 (0.095)	0.66 (0.026)	1.37 (0.054)	0.43 (0.017)	S5
SMD300F	6.73 (0.265)	7.98 (0.314)	-	3.00 (0.118)	4.80 (0.19)	5.44 (0.214)	0.56 (0.022)	0.71 (0.028)	0.56 (0.022)	0.71 (0.028)	2.16 (0.085)	2.41 (0.095)	0.66 (0.026)	1.37 (0.054)	0.43 (0.017)	S5
<b>SMD2 Devices</b>																
<b>Size 8763 mm/3425 mils</b>																
SMD150F	8.00 (0.315)	9.40 (0.370)	-	3.00 (0.118)	6.00 (0.236)	6.71 (0.264)	0.56 (0.022)	0.71 (0.028)	0.56 (0.022)	0.71 (0.028)	3.68 (0.145)	3.94 (0.155)	0.66 (0.026)	1.37 (0.054)	0.43 (0.017)	S5
SMD150F/33	8.00 (0.315)	9.40 (0.370)	-	3.00 (0.118)	6.00 (0.236)	6.71 (0.264)	0.56 (0.022)	0.71 (0.028)	0.56 (0.022)	0.71 (0.028)	3.68 (0.145)	3.94 (0.155)	0.66 (0.026)	1.37 (0.054)	0.43 (0.017)	S5
SMDH160	8.00 (0.315)	9.40 (0.370)	-	3.00 (0.118)	6.00 (0.236)	6.71 (0.264)	0.56 (0.022)	0.71 (0.028)	0.56 (0.022)	0.71 (0.028)	3.68 (0.145)	3.94 (0.155)	0.66 (0.026)	1.37 (0.054)	0.43 (0.017)	S5
SMD185F	8.00 (0.315)	9.40 (0.370)	-	3.00 (0.118)	6.00 (0.236)	6.71 (0.264)	0.56 (0.022)	0.71 (0.028)	0.56 (0.022)	0.71 (0.028)	3.68 (0.145)	3.94 (0.155)	0.66 (0.026)	1.37 (0.054)	0.43 (0.017)	S5
SMD200F	8.00 (0.315)	9.40 (0.370)	-	3.00 (0.118)	6.00 (0.236)	6.71 (0.264)	0.56 (0.022)	0.71 (0.028)	0.56 (0.022)	0.71 (0.028)	3.68 (0.145)	3.94 (0.155)	0.66 (0.026)	1.37 (0.054)	0.43 (0.017)	S5
SMD250F	8.00 (0.315)	9.40 (0.370)	-	3.00 (0.118)	6.00 (0.236)	6.71 (0.264)	0.56 (0.022)	0.71 (0.028)	0.56 (0.022)	0.71 (0.028)	3.68 (0.145)	3.94 (0.155)	0.66 (0.026)	1.37 (0.054)	0.43 (0.017)	S5

Surface-mount Devices



Figures S6-S11 - Typical Time-to-trip Curves at 20°C for Surface-mount Devices

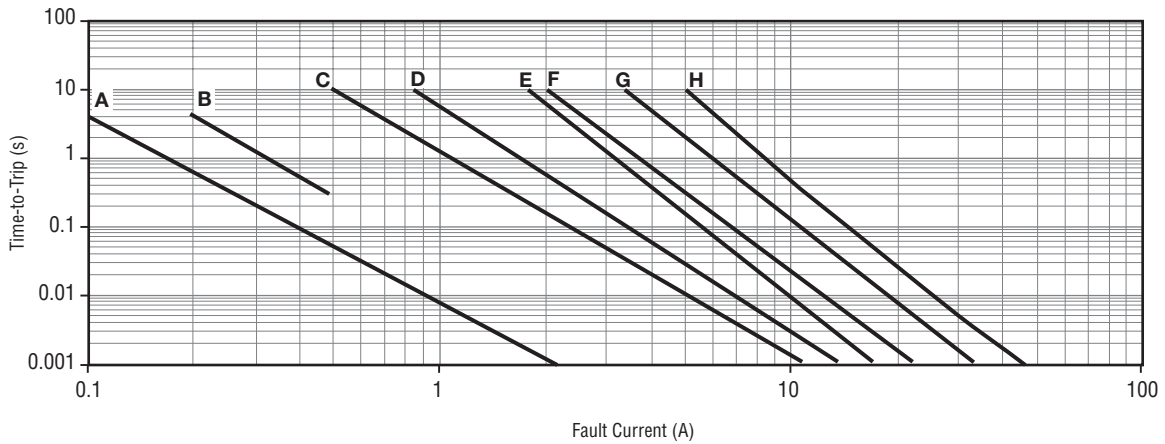
Figure S6



**nanoSMDCxxxF**

- |                  |                       |
|------------------|-----------------------|
| A = nanoSMDC012F | E = nanoSMDC050F/13.2 |
| B = nanoSMDC016F | F = nanoSMDC075F      |
| C = nanoSMDC020F | G = nanoSMDC110F      |
| D = nanoSMDC035F | H = nanoSMDC150F      |

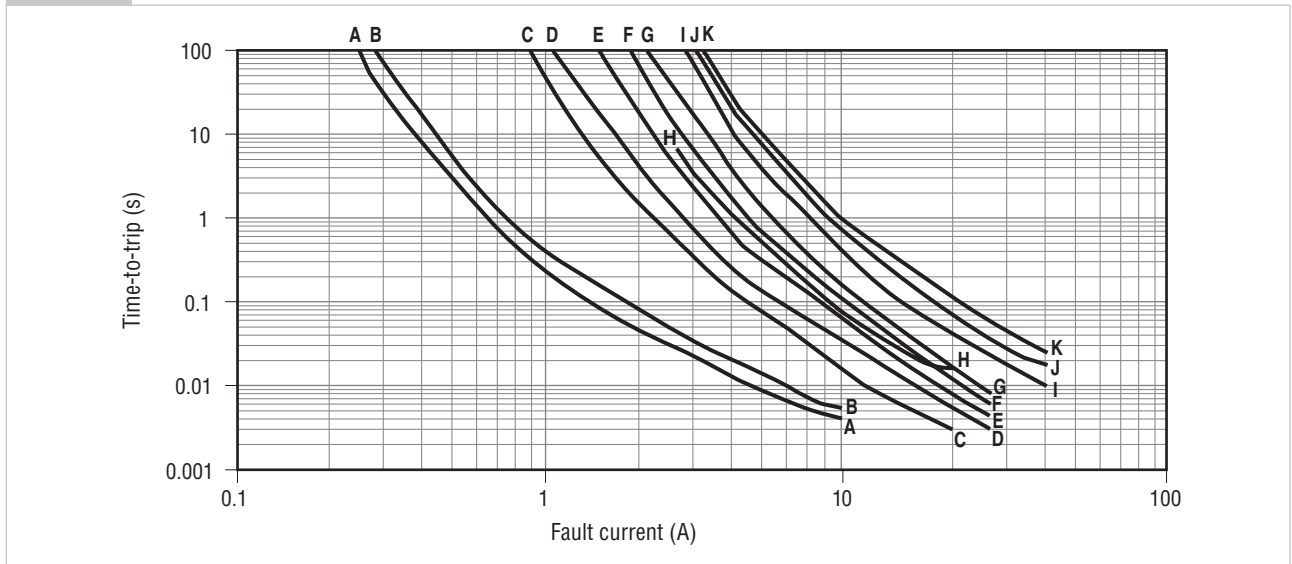
Figure S7



**microSMDxxxF**

- |                  |                  |
|------------------|------------------|
| A = microSMD005F | E = microSMD075F |
| B = microSMD010F | F = microSMD110F |
| C = microSMD035F | G = microSMD150F |
| D = microSMD050F | H = microSMD175F |

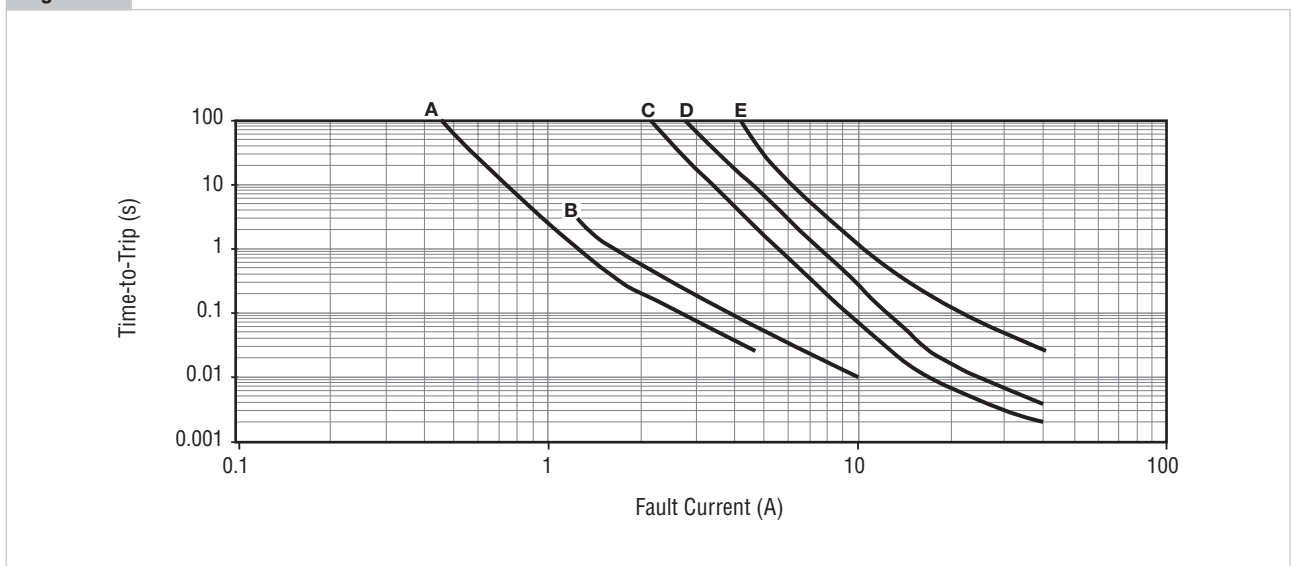
Figure S8



**miniSMDCxxxF and miniSMDExxxF**

- A = miniSMDC014F
- B = miniSMDC020F
- C = miniSMDC050F
- D = miniSMDC075F, miniSMDC075F/24
- E = miniSMDC110F, miniSMDC110F/16, miniSMDC110F/24
- F = miniSMDC125F, miniSMDC125F/16
- G = miniSMDC150F, miniSMDC150F/12, miniSMDC150F/24
- H = miniSMDC160F
- I = miniSMDC200F
- J = miniSMDE190F
- K = miniSMDC260F, miniSMDC260F/12, miniSMDC260F/13.2, miniSMDC260F/16

Figure S9



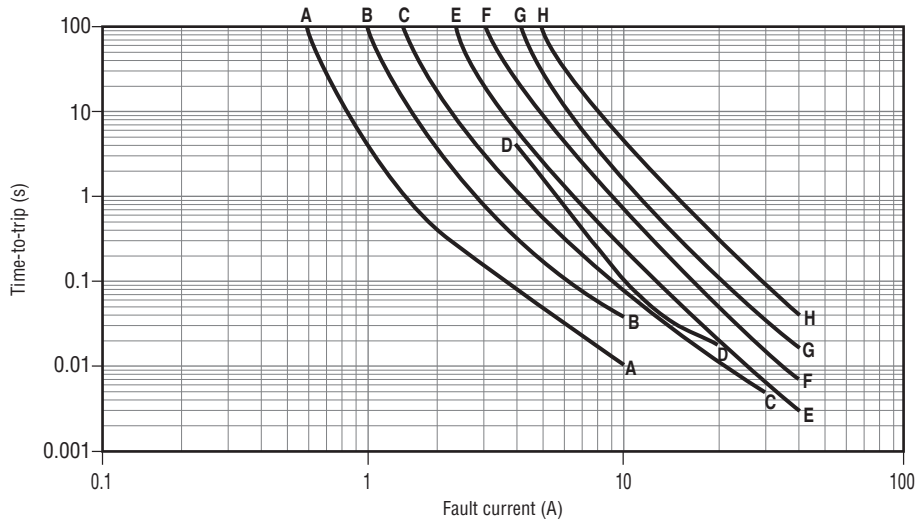
**midSMD**

- A = SMD030F-2018
- B = decaSMDC050F/60
- C = SMD100F-2018
- D = SMD150F-2018
- E = SMD200F-2018

Figures S6-S11 - Typical Time-to-trip Curves at 20°C for Surface-mount Devices

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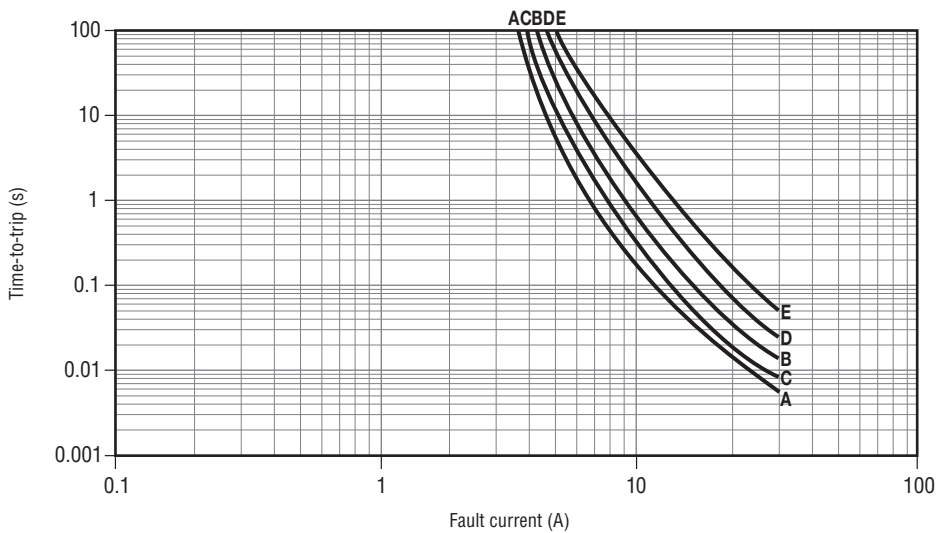
Figure S10



SMDxxxF

- A = SMD030F
- B = SMD050F
- C = SMD075F, SMD075F/60
- D = SMDH120
- E = SMD100F, SMD100F/33
- F = SMD125F
- G = SMD260F
- H = SMD300F

Figure S11



SMDxxxF

- A = SMD150F, SMD150F/33
- B = SMDH160
- C = SMD185F
- D = SMD200F
- E = SMD250F

## Table S5 - Physical Characteristics and Environmental Specifications for Surface-mount Devices

Operating temperature range -40°C to 85°C, -40°C to 125°C for SMDH120 and SMDH160

### Physical Characteristics

Terminal pad material	100% matte tin with nickel underplate
Soldering characteristics	ANSI/J-STD-002 Category 3 for nanoSMD, microSMD and miniSMD series ANSI/J-STD-002 Category 1 for SMD series
Solder heat withstand	per IEC-STD 68-2-20, Test Tb, Section 5, Method 1A
Flammability resistance	per IEC 695-2-2 Needle Flame Test for 20 sec.
Recommended storage conditions	40°C max, 70% R.H. max; devices may not meet specified ratings if storage conditions are exceeded.
Mositure sensitivity	Level 2a, per IPC/JEDEC J-STD 020C

### Environmental Specifications

Test	Test Method	Conditions	Resistance Change
Storage Life	Raychem PS300, Section 5.3.2	60°C, 1000 hours	±3% typical
		85°C, 1000 hours	±5% typical
Humidity aging	Raychem PS300, Section 5.3.1	85°C, 85% RH, 100 hours	±1.2% typical
Thermal shock	MIL-STD-202, Method 107G	85°C, -40°C (20 times)	-33% typical
		125°C, -55°C (10 times)	-33% typical
Vibration	MIL-STD-883C	per MIL-STD-883C	No change
Solvent resistance	Raychem PS300, Section 5.2.2	Freon	No change
		Trichloroethane	No change
		Hydrocarbons	No change

## Table S6 - Packaging and Marking Information for Surface-mount Devices

Part Number	Tape & Reel Quantity	Standard Package	Part Marking	Recommended Pad Layout Figures [mm (In.)]			Agency Recognition	
				Dimension A (Nom.)	Dimension B (Nom.)	Dimension C (Nom.)		
<b>nanoSMDC Series</b>								
<b>Size 3216 mm/1206 mils</b>								
<b>New</b>	nanoSMDC012F	3,000	15,000	P	1.60 (0.063)	1.00 (0.039)	2.00 (0.079)	UL, CSA
<b>New</b>	nanoSMDC016F	3,000	15,000	N	1.60 (0.063)	1.00 (0.039)	2.00 (0.079)	UL, CSA
	nanoSMDC020F	3,000	15,000	02	1.60 (0.063)	1.00 (0.039)	2.00 (0.079)	UL, CSA, TÜV
	nanoSMDC035F	3,000	15,000	03	1.60 (0.063)	1.00 (0.039)	2.00 (0.079)	UL, CSA, TÜV
	nanoSMDC050F/13.2	3,000	15,000	M	1.60 (0.063)	1.00 (0.039)	2.00 (0.079)	UL, CSA, TÜV
	nanoSMDC075F	3,000	15,000	L	1.60 (0.063)	1.00 (0.039)	2.00 (0.079)	UL, CSA, TÜV
	nanoSMDC110F	3,000	15,000	K	1.60 (0.063)	1.00 (0.039)	2.00 (0.079)	UL, CSA, TÜV
	nanoSMDC150F	3,000	15,000	15	1.60 (0.063)	1.00 (0.039)	2.00 (0.079)	UL, CSA, TÜV
<b>Coming Soon</b>	nanoSMDC200F*	TBD	TBD	TBD	1.60 (0.063)	1.00 (0.039)	2.00 (0.079)	Pending
<b>microSMD Series</b>								
<b>Size 3225 mm/1210 mils</b>								
	microSMD005F	4,000	20,000	05	2.50 (0.098)	1.00 (0.039)	2.00 (0.079)	UL, CSA, TÜV
	microSMD010F	4,000	20,000	10	2.50 (0.098)	1.00 (0.039)	2.00 (0.079)	UL, CSA, TÜV
	microSMD035F	4,000	20,000	3	2.50 (0.098)	1.00 (0.039)	2.00 (0.079)	UL, CSA, TÜV
	microSMD050F	4,000	20,000	50	2.50 (0.098)	1.00 (0.039)	2.00 (0.079)	UL, CSA, TÜV
	microSMD075F	4,000	20,000	75	2.50 (0.098)	1.00 (0.039)	2.00 (0.079)	UL, CSA, TÜV
	microSMD110F	4,000	20,000	11	2.50 (0.098)	1.00 (0.039)	2.00 (0.079)	UL, CSA, TÜV
	microSMD150F	4,000	20,000	15	2.50 (0.098)	1.00 (0.039)	2.00 (0.079)	UL, CSA, TÜV
<b>New</b>	microSMD175F	4,000	20,000	17	2.50 (0.098)	1.00 (0.039)	2.00 (0.079)	UL, CSA, TÜV
<b>miniSMDC Series</b>								
<b>Size 4532 mm/1812 mils</b>								
	miniSMDC014F	2,000	10,000	14	2.95 (0.114)	1.68 (0.066)	3.10 (0.122)	UL, CSA, TÜV
	miniSMDC020F	2,000	10,000	2	2.95 (0.114)	1.68 (0.066)	3.10 (0.122)	UL, CSA, TÜV
	miniSMDC050F	2,000	10,000	5	2.95 (0.114)	1.68 (0.066)	3.10 (0.122)	UL, CSA, TÜV
	miniSMDC075F	2,000	10,000	7	2.95 (0.114)	1.68 (0.066)	3.10 (0.122)	UL, CSA, TÜV
<b>New</b>	miniSMDC075F/24	1,500	7,500	075F 24V	2.95 (0.114)	1.68 (0.066)	3.10 (0.122)	UL, CSA, TÜV

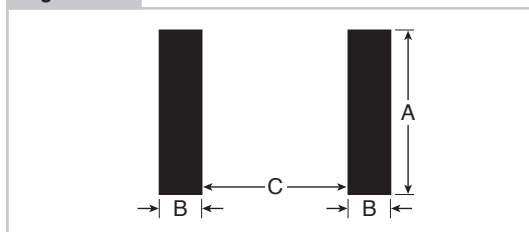
**Table S6 - Packaging and Marking Information for Surface-mount Devices**

... **Cont'd**

Part Number	Tape & Reel Quantity	Standard Package	Part Marking	Recommended Pad Layout Figures [mm (In.)]			Agency Recognition
				Dimension A (Nom.)	Dimension B (Nom.)	Dimension C (Nom.)	
<b>miniSMDC Series</b>							
<b>Size 4532 mm/1812 mils</b>							
miniSMDC110F	2,000	10,000	1	2.95 (0.114)	1.68 (0.066)	3.10 (0.122)	UL, CSA, TÜV
miniSMDC110F/16	2,000	10,000	110F 16V	2.95 (0.114)	1.68 (0.066)	3.10 (0.122)	UL, CSA, TÜV
<b>New</b> miniSMDC110F/24	1,500	7,500	110F 24V	2.95 (0.114)	1.68 (0.066)	3.10 (0.122)	UL, CSA, TÜV
miniSMDC125F	2,000	10,000	12	2.95 (0.114)	1.68 (0.066)	3.10 (0.122)	UL, CSA, TÜV
miniSMDC125F/16	2,000	10,000	125F 16V	2.95 (0.114)	1.68 (0.066)	3.10 (0.122)	UL, CSA, TÜV
miniSMDC150F	2,000	10,000	15	2.95 (0.114)	1.68 (0.066)	3.10 (0.122)	UL, CSA, TÜV
<b>New</b> miniSMDC150F/12	2,000	10,000	150F 12V	2.95 (0.114)	1.68 (0.066)	3.10 (0.122)	UL, CSA, TÜV
<b>New</b> miniSMDC150F/24	1,000	5,000	150F 24V	2.95 (0.114)	1.68 (0.066)	3.10 (0.122)	UL, CSA, TÜV
miniSMDC160F	2,000	10,000	16	2.95 (0.114)	1.68 (0.066)	3.10 (0.122)	UL, CSA, TÜV
miniSMDC200F	2,000	10,000	20	2.95 (0.114)	1.68 (0.066)	3.10 (0.122)	UL, CSA, TÜV
miniSMDC260F	2,000	10,000	260F	2.95 (0.114)	1.68 (0.066)	3.10 (0.122)	UL, CSA, TÜV
miniSMDC260F/12	1,500	7,500	260F 12V	2.95 (0.114)	1.68 (0.066)	3.10 (0.122)	UL, CSA, TÜV
<b>New</b> miniSMDC260F/13.2	1,500	7,500	260F 13V	2.95 (0.114)	1.68 (0.066)	3.10 (0.122)	Pending
<b>coming soon</b> miniSMDC260F/16*	1,500	7,500	260F 16V	2.95 (0.114)	1.68 (0.066)	3.10 (0.122)	Pending
<b>miniSMDE Series</b>							
<b>Size 11550 mm/4420 mils</b>							
miniSMDE190F	5,000	20,000	19	4.75 (0.187)	1.45 (0.057)	9.57 (0.377)	UL, CSA, TÜV
<b>midSMD Series</b>							
<b>Size 5050 mm/2018 mils</b>							
SMD030F-2018	4,000	20,000	A03F	4.6 (0.18)	1.50 (0.059)	3.4 (0.134)	UL, CSA, TÜV
<b>New</b> decaSMD050F/60	1,000	5,000	050F 60V	4.32 (0.017)	1.40 (0.055)	3.61 (0.142)	UL, CSA, TÜV
SMD100F-2018	4,000	20,000	A10F	4.6 (0.18)	1.50 (0.059)	3.4 (0.134)	UL, CSA, TÜV
SMD150F-2018	4,000	20,000	A15F	4.6 (0.18)	1.50 (0.059)	3.4 (0.134)	UL, CSA, TÜV
SMD200F-2018	4,000	20,000	A20F	4.6 (0.18)	1.50 (0.059)	3.4 (0.134)	UL, CSA, TÜV
<b>SMD Series</b>							
<b>Size 7555 mm/2920 mils</b>							
SMD030F	2,000	10,000	030F	3.1 (0.12)	2.3 (0.09)	5.1 (0.201)	UL, CSA, TÜV
SMD050F	2,000	10,000	050F	3.1 (0.12)	2.3 (0.09)	5.1 (0.201)	UL, CSA, TÜV
SMD075F	2,000	10,000	075F	3.1 (0.12)	2.3 (0.09)	5.1 (0.201)	UL, CSA, TÜV
SMD075F/60	2,000	10,000	756F	3.1 (0.12)	2.3 (0.09)	5.1 (0.201)	UL, TUV
SMD100F	2,000	10,000	100F	3.1 (0.12)	2.3 (0.09)	5.1 (0.201)	UL, CSA, TÜV
SMD100F/33	2,000	10,000	103F	3.1 (0.12)	2.3 (0.09)	5.1 (0.201)	UL, CSA, TÜV
<b>New</b> SMDH120	2,000	10,000	H12	3.1 (0.12)	2.3 (0.09)	5.1 (0.201)	Pending
SMD125F	2,000	10,000	125F	3.1 (0.12)	2.3 (0.09)	5.1 (0.201)	UL, CSA, TÜV
SMD260F	2,000	10,000	260F	3.1 (0.12)	2.3 (0.09)	5.1 (0.201)	UL, CSA, TÜV
SMD300F	2,000	10,000	300F	3.1 (0.12)	2.3 (0.09)	5.1 (0.201)	UL, CSA, TÜV
<b>SMD2 Devices</b>							
<b>Size 8763 mm/3425 mils</b>							
SMD150F	1,500	7,500	150F	4.6 (0.18)	2.3 (0.09)	6.1 (0.240)	UL, CSA, TÜV
SMD150F/33	1,500	7,500	153F	4.6 (0.18)	2.3 (0.09)	6.1 (0.240)	UL, CSA, TÜV
SMDH160	1,500	7,500	160F	4.6 (0.18)	2.3 (0.09)	6.1 (0.240)	Pending
SMD185F	1,500	7,500	185F	4.6 (0.18)	2.3 (0.09)	6.1 (0.240)	UL, CSA, TÜV
SMD200F	1,500	7,500	200F	4.6 (0.18)	2.3 (0.09)	6.1 (0.240)	UL, CSA, TÜV
SMD250F	1,500	7,500	250F	4.6 (0.18)	2.3 (0.09)	6.1 (0.240)	UL, CSA, TÜV

\* Data is preliminary

**Figure S12**



## Agency Recognition for Surface-mount Devices

UL	File # E74889 for all surface-mount devices
CSA	File # CA78165 for all surface-mount devices
TÜV	Certificate # R9872048 for microSMD and miniSMD series Certificate # R2172061 for nanoSMD series Certificate # R9872049 for SMD series

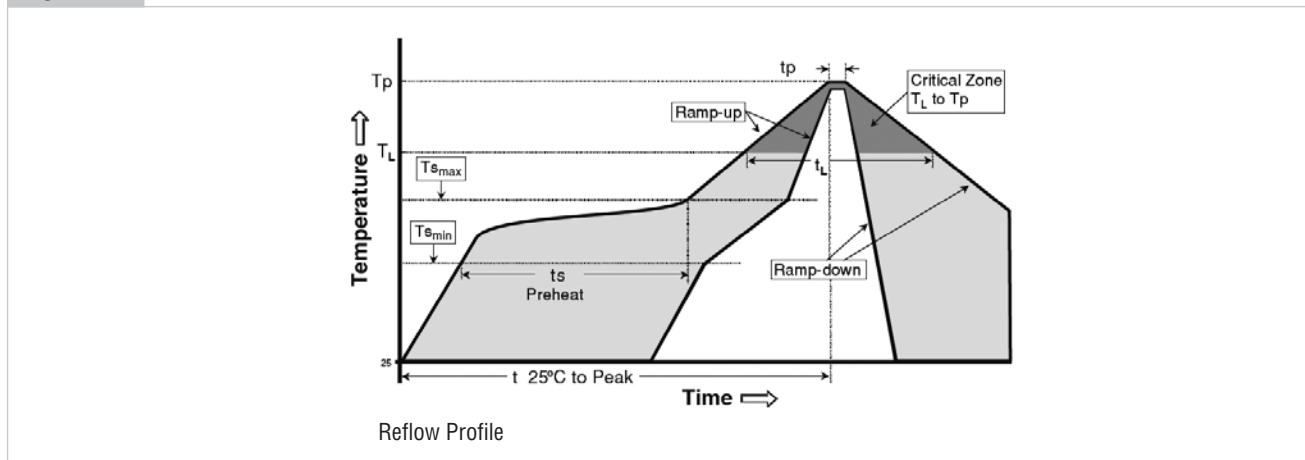
## Solder Reflow and Rework Recommendation for Surface-mount Devices

### Classification Reflow Profiles

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average Ramp-Up Rate ( $T_{s_{max}}$ to $T_p$ )	3 °C/second max.	3° C/second max.
<b>Preheat</b>		
• Temperature Min ( $T_{s_{min}}$ )	100 °C	150 °C
• Temperature Max ( $T_{s_{max}}$ )	150 °C	200 °C
• Time ( $t_{s_{min}}$ to $t_{s_{max}}$ )	60-120 seconds	60-180 seconds
<b>Time maintained above:</b>		
• Temperature ( $T_L$ )	183 °C	217 °C
• Time ( $t_L$ )	60-150 seconds	60-150 seconds
<b>Peak/Classification Temperature (<math>T_p</math>)</b>	260 °C	260 °C
<b>Time within 5 °C of actual Peak</b>		
Temperature ( $t_p$ )	10-30 seconds	20-40 seconds
<b>Ramp-Down Rate</b>	6 °C/second max.	6 °C/second max.
<b>Time 25 °C to Peak Temperature</b>	6 minutes max.	8 minutes max.

**Note:** All temperatures refer to topside of the package, measured on the package body surface.

Figure S13



### Solder Reflow

- Recommended reflow methods:
  - IR
  - Hot air
  - Nitrogen
- Recommended maximum paste thickness:
  - nanoSMD, microSMD and miniSMD series: 0.25mm (0.010 inch)
  - SMD series: 0.38mm (0.015 inch)
- Devices can be cleaned using standard methods and aqueous solvents.
- Raychem circuit protection believes that the optimum conditions for forming acceptable solder fillets occur when a reasonable amount of solder paste is placed underneath each device's via. As such, Raychem circuit protection requests that customers comply with our recommended solder pad layouts.
- Raychem circuit protection requests that customer board layouts refrain from placing raised features (e.g. vias, nomenclature, traces, etc.) underneath PolySwitch devices. It is possible that raised features could negatively impact solderability performance of our devices.

### Rework

- nanoSMD, microSMD and miniSMD series: standard industry practices. Please also avoid direct contact to the device.
- SMD series: rework should be confined to removal of the installed product and replacement with a fresh device.



**Table S7 - Tape and Reel Specifications for Surface-mount Devices (in Millimeters)**

	nanoSMDC EIA 481-1	microSMD EIA 481-1	miniSMDC EIA 481-1	miniSMDE190 EIA 481-2	midSMD EIA 481-2	SMD EIA 481-2	SMD2 EIA 481-2
W	8.0 ± 0.30	8.0 ± 0.30	12.0 ± 0.30	24.0 ± 0.30	16.0 ± 0.30	16.0 ± 0.30	16.0 ± 0.30
Po	4.0 ± 0.10	4.0 ± 0.10	4.0 ± 0.10	4.0 ± 0.10	4.0 ± 0.10	4.0 ± 0.10	4.0 ± 0.10
P1	4.0 ± 0.10	4.0 ± 0.10	8.0 ± 0.10	8.0 ± 0.10	8.0 ± 0.10	8.0 ± 0.10	12.0 ± 0.10
P2	2.0 ± 0.05	2.0 ± 0.05	2.0 ± 0.05	2.0 ± 0.10	2.0 ± 0.10	2.0 ± 0.10	2.0 ± 0.10
Ao	1.95 ± 0.10	2.9 ± 0.10	Table S8	5.70 ± 0.10	5.11 ± 0.15	5.6 ± 0.23	6.9 ± 0.23
Bo	3.50 ± 0.10	3.50 ± 0.10	Table S8	11.90 ± 0.10	5.6 ± 0.23	8.1 ± 0.15	9.6 ± 0.15
B1 max.	4.35	4.35	8.2	20.1	12.1	12.1	12.1
Do	1.55 ± .05	1.55 ± .05	1.5 + 0.10/ -.00	1.55 ± .05	1.5 + 0.10/ -.00	1.5 + 0.10/ -.00	1.5 + 0.10/ -.00
F	3.50 ± 0.05	3.50 ± 0.05	5.50 ± 0.05	11.50 ± 0.10	7.50 ± 0.10	7.50 ± 0.10	7.50 ± 0.10
E1	1.75 ± 0.10	1.75 ± 0.10	1.75 ± 0.10	1.75 ± 0.10	1.75 ± 0.10	1.75 ± 0.10	1.75 ± 0.10
E2 min.	6.25	6.25	10.25	22.25	14.25	14.25	14.25
T max.	0.6	0.6	0.6	0.6	0.6	0.6	0.6
T1 max.	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Ko	0.89 ± 0.10	0.90 ± 0.10	Table S8	0.95 ± 0.10	1.8 ± 0.15	3.2 ± 0.15	3.4 ± 0.15
Leader min.	390	390	390	400	400	400	400
Trailer min.	160	160	160	160	160	160	160

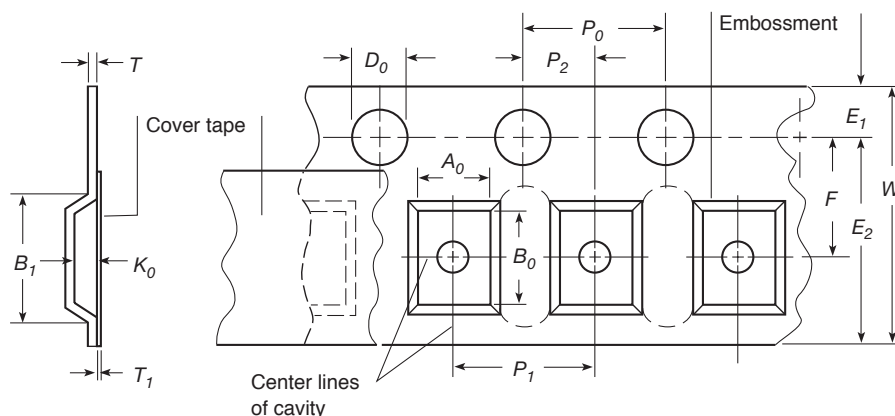
**Table S8 - Tape and Reel Specifications for Surface-mount Devices (in Millimeters)**

	All miniSMD series and miniSMDC200F miniSMDC200F miniSMDC260F	miniSMDC075F/24 miniSMDC110F/24 miniSMDC260F/12 miniSMDC260F/13.2 miniSMDC260F/16	miniSMDC150F/24	decaSMDC050F/60
Ao	3.5 ± 0.1	3.7 ± 0.1	3.7 ± 0.1	5.0 ± 0.1
Bo	5.1 ± 0.1	4.9 ± 0.1	4.9 ± 0.1	5.4 ± 0.1
Ko	0.9 ± 0.1	1.4 ± 0.1	1.78 ± 0.1	1.7 ± 0.1

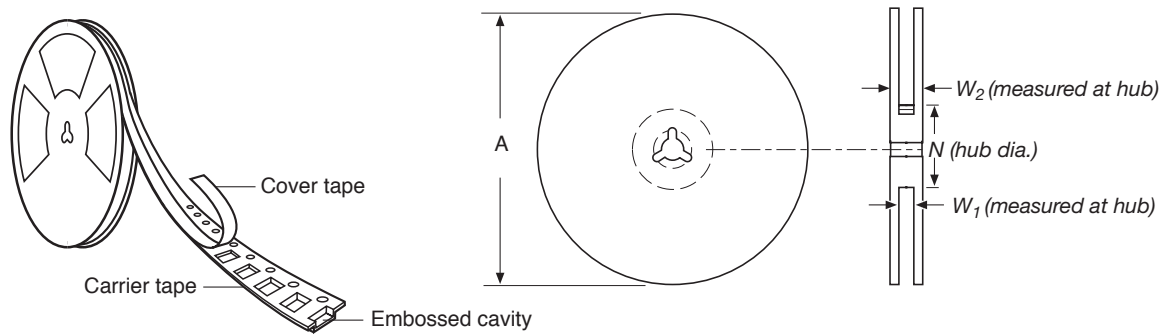
**Table S9 - Reel Dimensions for Surface-mount Devices (in Millimeters)**

	nano/microSMD	miniSMDC	miniSMDE190	midSMD	SMD	SMD2
A max.	185	185	330	330	330	330
N min.	50	50	60	50	50	50
W1	8.4 + 1.5/-.00	12.4 + 2.0/-.00	24.4 + 2.0/-.00	16.4 + 2.0/-.00	16.4 + 2.0/-.00	16.4 + 2.0/-.00
W2 max.	14.4	18.4	30.4	22.4	22.4	22.4

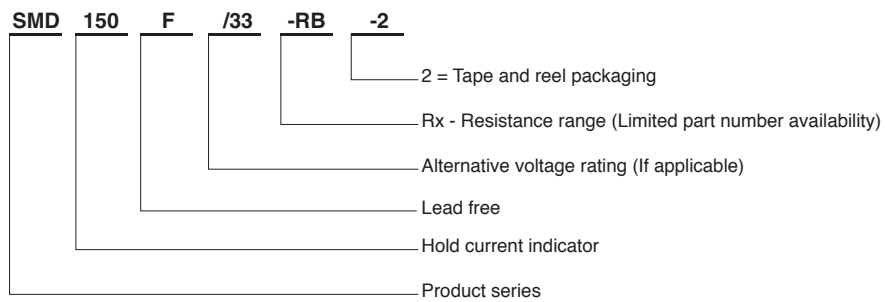
**Figure S14 - EIA Taped Component Dimensions for Surface-mount Devices**



**Figure S15 - EIA Reel Dimensions for Surface-mount Devices**



**Part Numbering System for Surface-mount Devices**



**WARNING:**

- Operation beyond the maximum ratings or improper use may result in device damage and possible electrical arcing and flame.
- The devices are intended for protection against occasional overcurrent or overtemperature fault conditions and should not be used when repeated fault conditions or prolonged trip events are anticipated.
- Contamination of the PPTC material with certain silicon based oils or some aggressive solvents can adversely impact the performance of the devices.
- Device performance can be impacted negatively if devices are handled in a manner inconsistent with recommended electronic, thermal, and mechanical procedures for electronic components.
- Operation in circuit with a large inductance can generate a circuit voltage ( $L \frac{di}{dt}$ ) above the rated voltage of the PolySwitch resettable device.