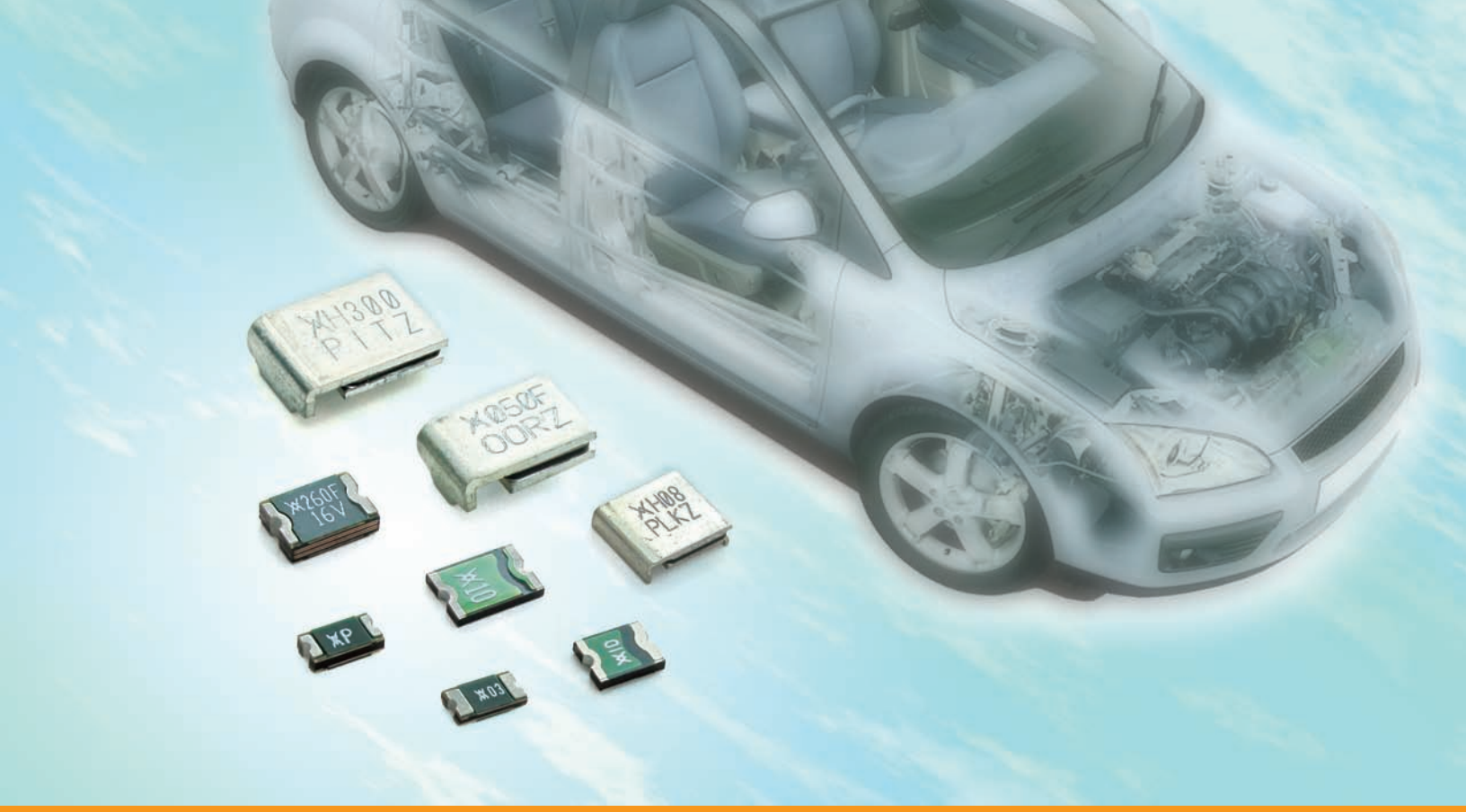


Product Overview

Automotive Surface-Mount Devices
miniASMDC/microASMD/nanoASMDC/AHS/ASMD Series

Since the 1980's we have provided PPTC resettable devices for the automotive industry. In vehicle electronic equipment, our PolySwitch PTC surface-mount devices are rapidly becoming the preferred circuit protection solution.

TE connectivity

Our automotive surface-mount device offering is constantly increasing with smaller size, higher current and higher temperature devices. We are proud to offer the specific automotive surface-mount device families: nanoASMDC, microASMD, miniASMDC, ASMD, AHS.

These specific devices are qualified and sold under our PS400 specification which is derived from the AEC-Q200 standard for electronic components used in the automotive industry. The key difference between these automotive devices and other surface-mount devices from the circuit protection product portfolio is their qualification according to a series of rigorous tests related to the automotive environment. As a result, they are characterized by some specific additional values determined after stringent testing.

KEY FEATURES

- Qualified per AEC-Q200 specification
- RoHS compliant and halogen free
- Footprints from 1206 to 3425
- Current ratings from 0.05 to 3.0A
- Voltage ratings from 16 to 60V
- Fast time-to-trip
- Low resistance

APPLICATIONS

- Electronic Control Unit (ECU) I/O and trace protection
- Telematics, infotainment and navigations systems
- USB port protection
- Motor and motor control circuit protection:
  power door-locks, mirrors, lumbar pumps, headlight position adjustment, seat, sunroofs and windows
- Heating Ventilation and Cooling (HVAC) control circuit and I/O protection
- Liquid Crystal Display backlight heaters

BENEFITS

- Products meet applicable automotive industry standards
- Compatible with high-volume electronics assembly
- Small sizes help save board space and cost
- Many product choices give design engineers more design flexibility
- Low resistance allows for low voltage drop

ELECTRICAL CHARACTERISTICS

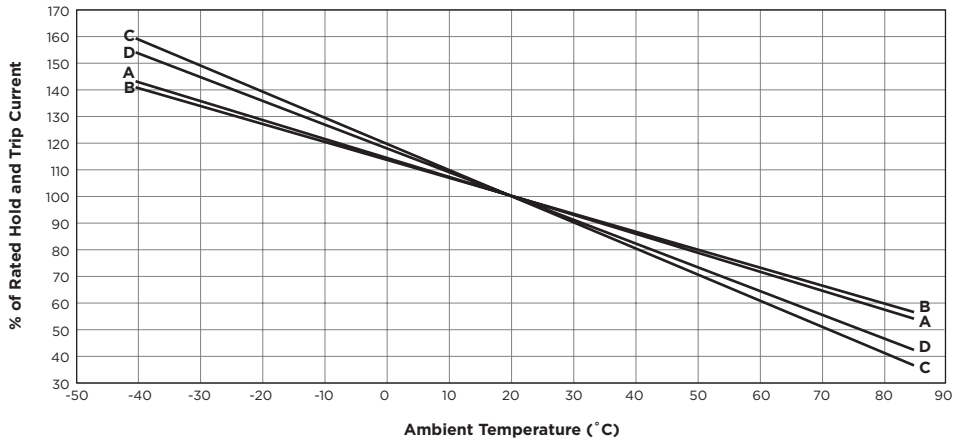
Part Number	Marking	I_{HOLD} (A)	I_{Trip} (A)	V_{MAX} (V_{DC})	I_{MAX} (A)	P_D max (W)	Maximum Time-to-Trip Current (A)	Maximum Time-to-Trip Time (s)	R_{MIN} (Ω)	R_{1MAX} (Ω)
nanoASMDC012F	P	0.12	0.39	48	10	0.50	1.00	0.20	1.40	6.50
nanoASMDC016F	N	0.16	0.45	48	10	0.50	1.00	0.30	1.10	5.00
nanoASMDC020F	02	0.20	0.42	24	100	0.60	8.00	0.10	0.65	3.10
nanoASMDC035F	03	0.35	0.75	16	20	0.60	3.50	0.10	0.45	1.35
microASMD005F	05	0.05	0.15	30	10	1.00	0.25	1.50	3.60	50.00
microASMD010F	10	0.10	0.25	30	10	0.80	0.50	1.00	2.10	15.00
miniASMDC010F	10	0.10	0.30	60	40	0.75	0.50	5.00	0.70	12.70
miniASMDC014F	14	0.14	0.28	60	10	0.75	8.00	0.008	1.50	6.00
miniASMDC020F	2	0.20	0.40	30	10	0.80	8.00	0.02	0.60	3.30
miniASMDC030F	3	0.30	0.60	30	40	0.80	8.00	0.10	0.20	1.75
miniASMDC050F	5	0.50	1.00	24	100	0.80	8.00	0.15	0.15	1.00
miniASMDC075F/24	075F24V	0.75	1.50	24	40	0.80	8.00	0.30	0.09	0.29
miniASMDC110F/16	110F16V	1.10	2.20	16	100	0.80	8.00	0.30	0.06	0.18
miniASMDC110F/24	110F24V	1.10	2.20	24	20	0.80	8.00	0.50	0.06	0.18
miniASMDC125F/16	125F16V	1.25	2.50	16	100	0.80	8.00	0.40	0.05	0.14
miniASMDC150F/16	15016V	1.50	2.80	16	100	0.80	8.00	0.50	0.04	0.11
miniASMDC150F/24	150F24V	1.50	3.00	24	20	1.00	8.00	1.50	0.04	0.12
miniASMDC260F/16	260F16V	2.60	5.00	16	100	1.20	8.00	5.00	0.015	0.05
AHS080-2018	H08	0.80	2.00	16	70	1.50	8.00	9.00	0.13	0.55
AHS160	160	1.60	3.20	16	70	2.20	8.00	15.00	0.05	0.15
AHS200	H200	2.00	4.00	16	70	2.30	8.00	13.40	0.05	0.14
AHS300	H300	3.00	6.00	16	70	3.00	15.00	8.00	0.024	0.083
ASMD030F	030F	0.23	0.59	60	10	1.10	1.15	12.00	0.98	4.80
ASMD050F	050F	0.37	0.94	60	10	1.70	1.95	20.00	0.29	1.40
ASMD075F	075F	0.60	1.48	30	40	1.10	3.00	20.00	0.29	1.00
ASMD100F	100F	0.90	2.16	30	40	1.10	4.50	20.00	0.098	0.48
ASMD125F	125F	1.04	2.46	16	40	1.10	5.20	20.00	0.057	0.25
ASMD150F	150F	1.27	2.95	16	40	1.20	6.35	25.00	0.049	0.25
ASMD185F	185A	1.85	3.70	16	40	1.50	9.25	11.30	0.032	0.126
ASMD200F	200F	1.73	3.93	16	40	1.20	8.65	30.00	0.05	0.12
ASMD250F	250F	1.97	5.00	16	40	1.20	9.85	30.00	0.035	0.085

Note : Operation Temperature for nanoASMDC, microASMD, miniASMDC and ASMD devices is -40-85°C.
Operation Temperature for AHS devices is -40-125°C.

TYPICAL THERMAL DERATING CURVE

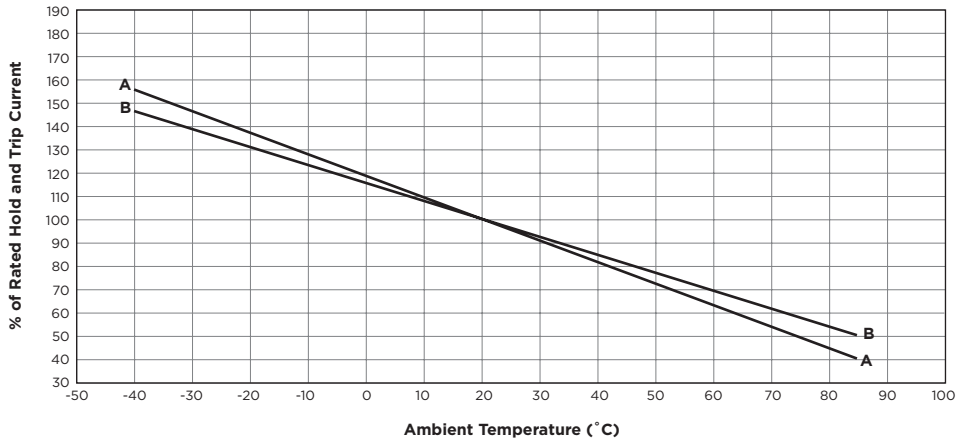
nanoASMDC Devices

A = nanoASMDC012F
B = nanoASMDC016F
C = nanoASMDC020F
D = nanoASMDC035F



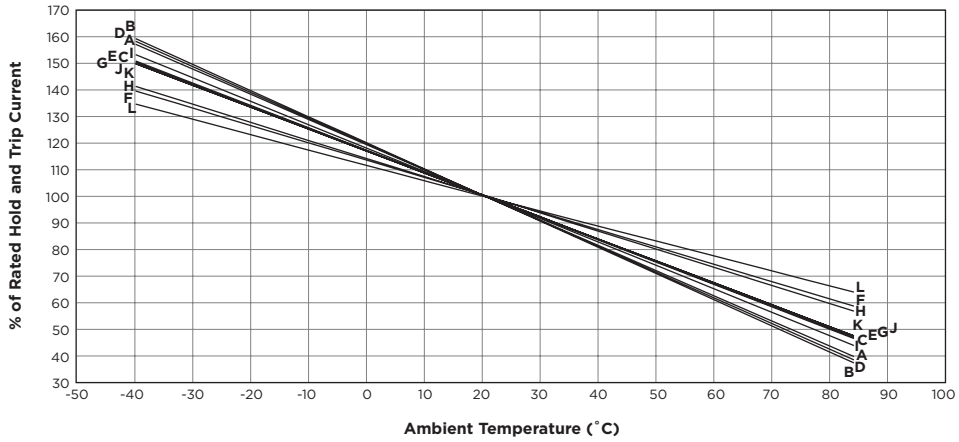
microASMD Devices

A = microASMD005F
B = microASMD010F



miniASMDC Devices

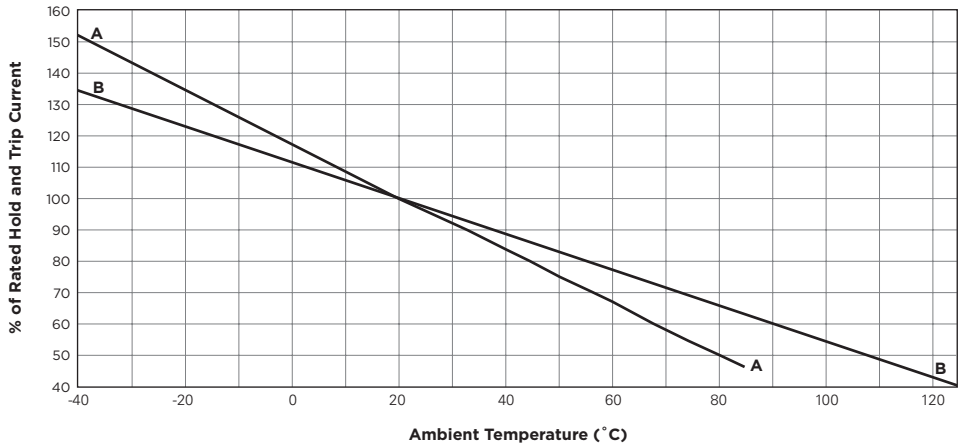
A = miniASMDC010F
B = miniASMDC014F
C = miniASMDC020F
D = miniASMDC030F
E = miniASMDC050F
F = miniASMDC075F/24
G = miniASMDC110F/16
H = miniASMDC110F/24
I = miniASMDC125F/16
J = miniASMDC150F/24
K = miniASMDC150F/24
L = miniASMDC260F/16



TYPICAL THERMAL DERATING CURVE CONT'D

ASMD and AHS Devices

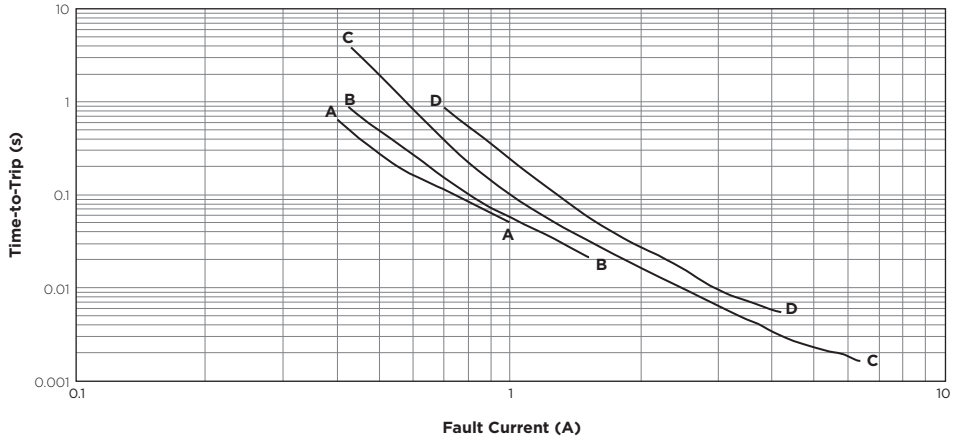
A = ASMD
B = AHS



TYPICAL TIME-TO-TRIP CURVE AT 20°C

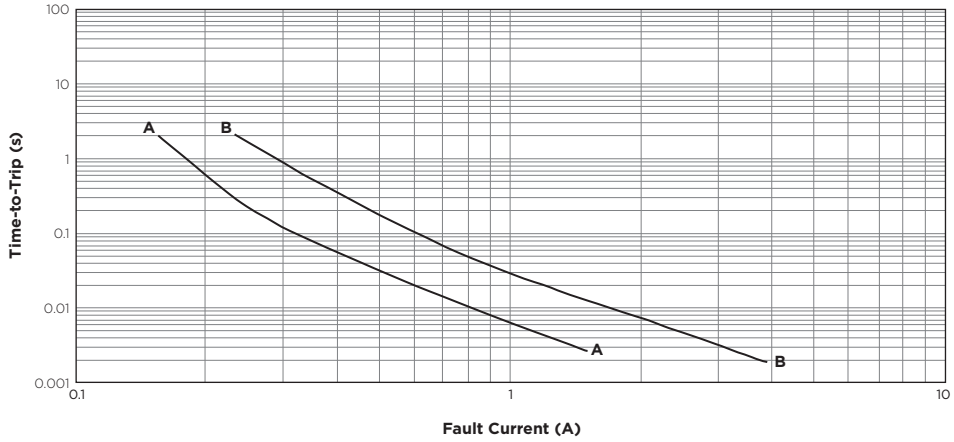
nanoASMDC Devices

A = nanoASMDC012F
B = nanoASMDC016F
C = nanoASMDC020F
D = nanoASMDC035F



microASMD Devices

A = microASMD005F
B = microASMD010F

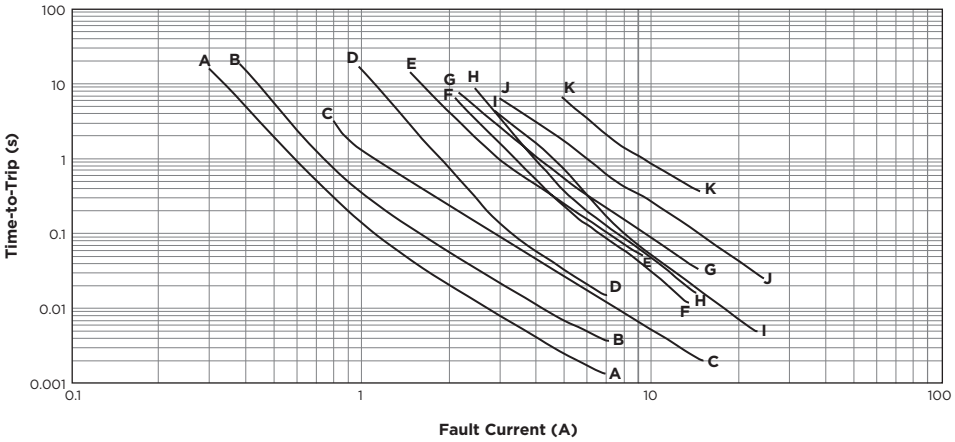


TYPICAL TIME-TO-TRIP CURVE AT 20°C

CONT'D

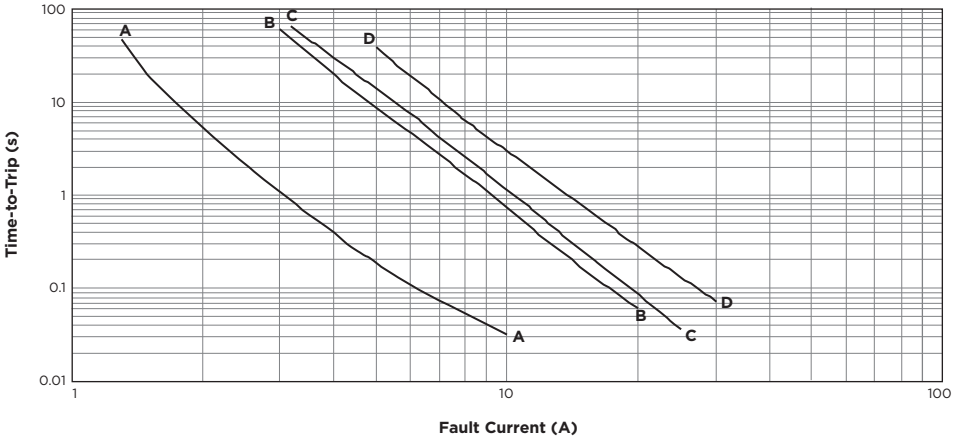
miniASMDC Devices

A = miniASMDC010F, miniASMDC014F
B = miniASMDC020F
C = miniASMDC030F
D = miniASMDC050F
E = miniASMDC075F/24
F = miniASMDC110F/16
G = miniASMDC110F/24
H = miniASMDC125F/16
I = miniASMDC150F/16
J = miniASMDC150F/24
K = miniASMDC260F/16



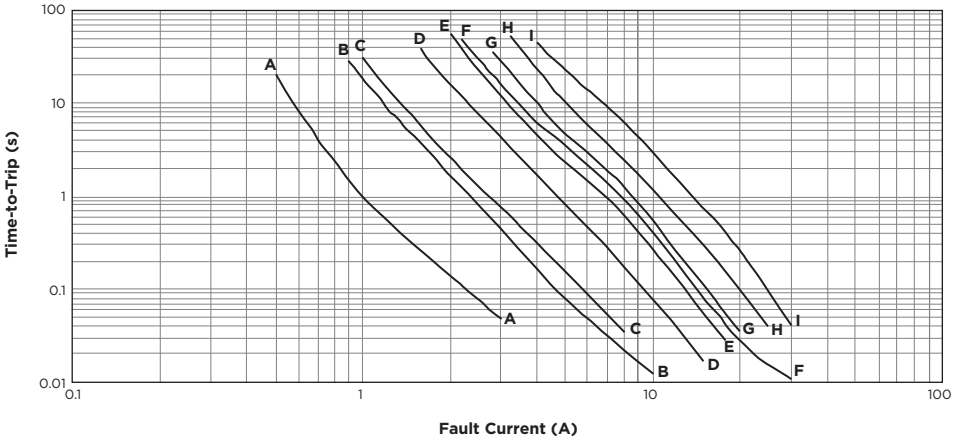
AHS Devices

A = AHS080-2018
B = AHS160
C = AHS200
D = AHS300



ASMD Devices

A = ASMD030F
B = ASMD050F
C = ASMD075F
D = ASMD100F
E = ASMD125F
F = ASMD150F
G = ASMD185F
H = ASMD200F
I = ASMD250F



DIMENSIONS IN MILLIMETERS (INCHES)

Unit: mm (inch)	A		B		C		D		E		F		G		H	
Part Number	**Min.**	**Max.**	**Min.**	**Max.**	**Min.**	**Max.**	**Min.**	**Max.**	**Min.**	**Max.**	**Min.**	**Max.**	**Min.**	**Max.**	**Min.**	**Figure**
nanoASMDC012F (1206 mils)	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)	- -	- -	- -	- -	- -	- -	S1
nanoASMDC016F (1206 mils)	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)	- -	- -	- -	- -	- -	- -	S1
nanoASMDC020F (1206 mils)	3.00 (0.118)	3.40 (0.134)	0.58 (0.023)	0.82 (0.032)	1.37 (0.054)	1.80 (0.071)	0.25 (0.010)	0.75 (0.030)	0.076 (0.003)	- -	- -	- -	- -	- -	- -	S1
nanoASMDC035F (1206 mils)	3.00 (0.118)	3.40 (0.134)	0.58 (0.023)	0.82 (0.032)	1.37 (0.054)	1.80 (0.071)	0.25 (0.010)	0.75 (0.030)	0.076 (0.003)	- -	- -	- -	- -	- -	- -	S1
microASMD005F (1210 mils)	3.00 (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)	0.076 (0.003)	- -	- -	- -	- -	- -	- -	S1
microASMD010F (1210 mils)	3.00 (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)	0.076 (0.003)	- -	- -	- -	- -	- -	- -	S1
miniASMDC010F (1812 mils)	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)	- -	- -	- -	- -	- -	- -	S1
miniASMDC014F (1812 mils)	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)	- -	- -	- -	- -	- -	- -	S1
miniASMDC020F (1812 mils)	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)	- -	- -	- -	- -	- -	- -	S1
miniASMDC030F (1812 mils)	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)	- -	- -	- -	- -	- -	- -	S1
miniASMDC050F (1812 mils)	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)	- -	- -	- -	- -	- -	- -	S1
miniASMDC075F/24 (1812 mils)	4.37 (0.172)	4.83 (0.190)	0.81 (0.032)	1.46 (0.057)	3.07 (0.121)	3.41 (0.134)	0.25 (0.010)	0.95 (0.040)	0.20 (0.008)	- -	- -	- -	- -	- -	- -	S1
miniASMDC110F/16 (1812 mils)	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)	- -	- -	- -	- -	- -	- -	S1
miniASMDC110F/24 (1812 mils)	4.37 (0.172)	4.83 (0.190)	0.81 (0.032)	1.46 (0.057)	3.07 (0.121)	3.41 (0.134)	0.25 (0.010)	0.95 (0.040)	0.20 (0.008)	- -	- -	- -	- -	- -	- -	S1
miniASMDC125F/16 (1812 mils)	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)	- -	- -	- -	- -	- -	- -	S1
miniASMDC150F/16 (1812 mils)	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)	- -	- -	- -	- -	- -	- -	S1
miniASMDC150F/24 (1812 mils)	4.37 (0.172)	4.83 (0.190)	1.00 (0.040)	1.94 (0.077)	3.07 (0.121)	3.41 (0.134)	0.25 (0.010)	0.95 (0.040)	0.20 (0.008)	- -	- -	- -	- -	- -	- -	S1
miniASMDC260F/16 (1812 mils)	4.37 (0.172)	4.83 (0.190)	1.02 (0.042)	1.52 (0.060)	3.07 (0.121)	3.41 (0.134)	0.25 (0.010)	0.95 (0.040)	0.20 (0.008)	- -	- -	- -	- -	- -	- -	S1

DIMENSIONS IN MILLIMETERS (INCHES)

Unit: mm (inch)	A		B		C		D		E		F		G		H	
Part Number	**Min.**	**Max.**	**Min.**	**Max.**	**Min.**	**Max.**	**Min.**	**Max.**	**Min.**	**Max.**	**Min.**	**Max.**	**Min.**	**Max.**	**Min.**	**Figure**
AHS080-2018 (2018 mils)	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)	- -	- -	- -	S2
AHS160 (3425 mils)	8.00 (0.315)	9.40 (0.370)	- -	3.00 (0.118)	6.00 (0.24)	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)	S3
AHS200 (3425 mils)	8.00 (0.315)	9.40 (0.370)	- -	3.00 (0.118)	6.00 (0.24)	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)	S3
AHS300 (3425 mils)	8.00 (0.315)	9.40 (0.370)	- -	3.00 (0.118)	6.00 (0.24)	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)	S3
ASMD030F (2920 mils)	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)	S3
ASMD050F (2920 mils)	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)	S3
ASMD075F (2920 mils)	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)	S3
ASMD100F (2920 mils)	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)	S3
ASMD125F (2920 mils)	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)	S3
ASMD150F (3425 mils)	8.00 (0.315)	9.40 (0.370)	- -	3.00 (0.118)	6.00 (0.24)	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)	S3
ASMD185F (3425 mils)	8.00 (0.315)	9.40 (0.370)	- -	3.00 (0.118)	6.00 (0.24)	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)	S3
ASMD200F (3425 mils)	8.00 (0.315)	9.40 (0.370)	- -	3.00 (0.118)	6.00 (0.24)	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)	S3
ASMD250F (3425 mils)	8.00 (0.315)	9.40 (0.370)	- -	3.00 (0.118)	6.00 (0.24)	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)	S3

Note : Terminal Material is 100% matte tin with nickel underplate.

DIMENSION FIGURES

Figure S1

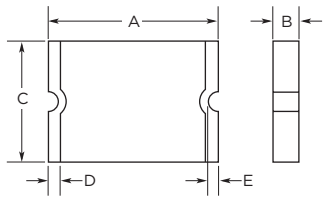


Figure S2

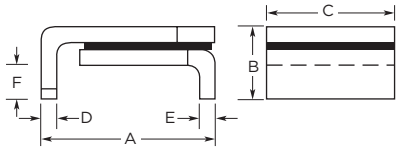
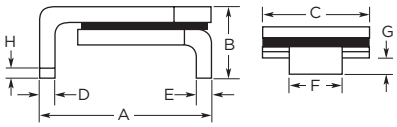
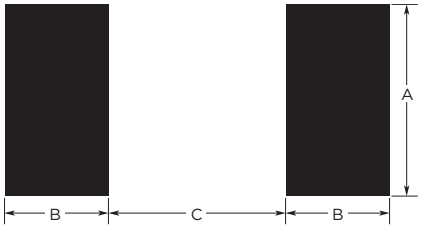


Figure S3



RECOMMENDED PAD LAYOUT

Part Number	Recommended Pad Layout Figures [mm (In.)]		
	Dimension A (Nom.)	Dimension B (Nom.)	Dimension C (Nom.)
nanoASMD device	1.60 (0.063)	1.00 (0.039)	2.00 (0.079)
microASMD device	2.50 (0.098)	1.00 (0.039)	2.00 (0.079)
miniASMD device	2.95 (0.114)	1.68 (0.066)	3.10 (0.122)
AHS080-2018 device	4.60 (0.180)	1.50 (0.059)	3.40 (0.134)
AHS160-AHS300 devices	4.60 (0.180)	2.30 (0.090)	6.10 (0.240)
ASMD030F-ASMD125F devices	3.10 (0.120)	2.30 (0.090)	5.10 (0.201)
ASMD150F-ASMD250F devices	4.60 (0.180)	2.30 (0.090)	6.10 (0.240)

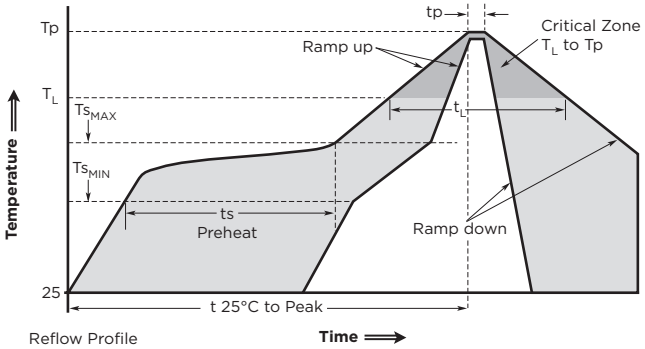


SOLDERING REFLOW AND REWORK RECOMMENDATIONS

Classification Reflow Profiles

Profile Feature	Pb-Free Assembly
Average Ramp-Up Rate (Ts_{MAX} to Tp)	3°C/s max
Preheat • Temperature Min (Ts_{MIN}) • Temperature Max (Ts_{MAX}) • Time (ts_{MIN} to ts_{MAX})	 150°C 200°C 60-120 s
Time maintained above: • Temperature (T_L) • Time (t_L)	 217°C 60-150 s
Peak/Classification Temperature (Tp)	260°C
Time within 5°C of actual Peak Temperature Time (tp)	 30 s max
Ramp-Down Rate	3°C/s max

Reflow Profile



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

Solder Reflow

- Recommended reflow methods: IR, hot air and Nitrogen
- Recommended maximum paste thickness : 0.25mm (0.010 inch)
- Devices can be cleaned using standard methods and aqueous solvents.
- TE Circuit Protection believes the optimum conditions for forming acceptable solder fillets occur when a reasonable amount of solder paste is placed underneath each device's termination. As such, we request that customers comply with our recommended solder pad layouts.
- TE 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

- Standard industry practices. Please also avoid direct contact to the device.

PS400 TEST ITEMS AND RESULTS (BASED ON AEC-Q200 SPECIFICATION)

Item	Test	Test condition	Details	Test Results
1	Pre & post stress electrical test	Passive resistance, TtT, I_{HOLD}, Pd		Pass
4	Temperature cycling	-40°C to 85°C 1000 cycles	Ramp rate 10°C/min Soak time 5 minutes	Pass
6	Moisture resistance	t = 24 hours/cycle; 10 continuous cycles Un-powered		Pass
7	Biased humidity	1000 hours 85°C ± 5°C/85%RH±5% Test current: 10% of I_{HOLD}	In-test measurement: None	Pass
8	Operational life	1000 hours Rated Temp. and tol: 85°C ±2°C Still air requirement: None Dist of temp measurement: 4"min	Operation condition: Rated Voltage/I_{HOLD} ON-OFF frequency: 15 sec ON 15 sec OFF	Pass
12	Resistance to solvents	Three solvents. Immersion → brush, 3 cycles, inspection for marking and part damage	Per MIL-STD-202G METHOD 215K	Pass
13	Mechanical shock	Condition: F Mounting cfg.: per general spec.	Peak value 1500g's half-sine 0.5msec for each duration Repeat 3 times per direction	Pass
14	Vibration	5 g's for 20 min. 12 cycles each of 3 orientations Test from 10-2000 Hz	Frequency 1: 10 - 40 Hz Amplitude: ± 0.75 mm Frequency 2: 40 – 2KHz Amplitude: 5 g's peak	Pass
15	Resistance to soldering heat	Per MIL-STD-202G Test conditions I, J, K	Repeat 3 times 24hrs cooling time prior to final measurement	Pass
16	Thermal shock	-40°C to 85°C Transfer time: 20 sec; Dwell time: 15 minutes Medium: Air - Air	No. of cycles: 300	Pass
17	ESD	15KV air discharge level		Pass
18	Solderability	260(+0/-5)°C 10 seconds max (Pb free solder paste) 220(+0/-5)°C 10 seconds max (Pb contained solder paste)	Test with devices after 8 hours steam aging	Pass
21	Board flex		Total deflection: 2.0mm minimum Deflection time: 60 (-0/+5) sec.	Pass
22	Terminal strength		17.7 N (1.8 Kg) force to the side of a device being tested for 60sec	Pass
31	Short circuit fault current durability	Room temperature V_{DC}/200A, (16V for miniASMDC014F)	5 sec ON, 2 minutes OFF 25 cycles	Pass
32	Fault current durability	Room temperature 16V/6 x I_{HOLD}	Min. 5 minutes ON Min. 10 minutes OFF	Pass
33	End-of-life-mode verification	Room temperature 16V/6 x I_{HOLD}	5 sec ON, 1 minute OFF 1000 cycles	Pass
34	Jump start endurance	Test voltage: 26V Duty cycle: 1min ±3sec ON, 2 min OFF 3 pulses		Pass
35	Load dump endurance	Test per ISO7637-2, pulse 5a, 10 times	Test voltage: Us=86.5V/66.5V/46.5V (the two lower Us values correspond to truncated surge profiles)* Devices tested under un-tripped status, Ua=13.5V	Pass*

* Most tested devices meet the load dump test with a peak voltage of 86.5V. However some only meet a reduced peak voltage surge. Contact us if you need more details.

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