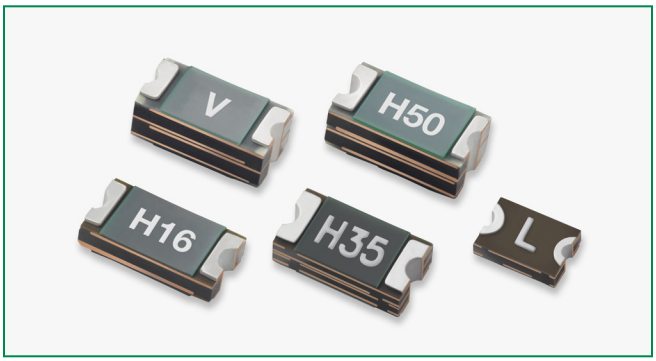
Automotive High Temperature SMD Series



Applications

- Automotive and Industrial Transportation
- Infotainment/Telematics
- Climate Control Systems
- Body Electronics
- Sensor Protection
- ADAS (Advanced Driver Assistance)
- Auto Lighting
- Security and Communication Systems

Additional Information

Datasheet | Resources | Samples

Description

This Automotive High Temperature SMD is the first miniature high temperature PPTC series from Littelfuse with AEC-Q200 qualification for automotive applications and it provides surface mount overcurrent protection for applications where space is a prime concern and resettable protection is desired.

Features

- Meets applicable automotive industry standards
- Compatible with high volume electronics assembly
- Smaller footprint
- High operating temperature -40°C~125°C
- Resettable solution against overcurrent and short circuit
- AEC-Q200 qualified
- RoHS compliant, halogen-free, and lead-free
- Surface-mount form factor

Benefits

- Expertise from the world's leading resettable overcurrent protection manufacturer
- Provides wider range of form factors to enhance design flexibility
- Meets ever-increasing demand for compact and space saving designs due to more electronics content in vehicle
- Restores system operation after reset when fault condition is removed, thus provides safety and protection
- Able to meet most stringent requirements for the extreme harsh automotive environment
- Suitable for standard PCB assembly to enable automated mass production

Electrical Characteristics

Part Number	I_H	I_T	V_{MAX}	I_{MAX}	$P_{D\ Typ}$	Max Time-to-trip		R_{MIN}	R_{1MAX}
	(A)	(A)	(V_{DC})	(A)	(W)	(A)	(s)	(Ω)	(Ω)
Automotive High Temperature SMD – 16V									
picoASMDCH010F	0.10	0.60	16	40	1.00	2.50	1.50	1.00	10.00
nanoASMDCH016F	0.16	0.80	30	20	0.90	8.00	0.10	0.70	6.00
nanoASMDCH035F	0.35	0.95	16	50	1.00	3.50	0.20	0.20	1.60
nanoASMDCH35F/30	0.35	1.75	30	20	1.20	8.00	0.10	0.40	2.20
nanoASMDCH50F/24	0.50	2.50	24	20	1.70	8.00	0.10	0.20	1.60

Notes:

I_H : Hold current: maximum current device will pass without interruption in 25°C, unless otherwise specified.
I_T : Trip current: minimum current that will switch the device from low-resistance to high-resistance in 25°C still air, unless otherwise specified.
V_{MAX} : Maximum voltage device can withstand without damage at rated current.
I_{MAX} : Maximum fault current device can withstand without damage at rated voltage.
P_D : Power dissipated from device when in the tripped state in 25°C still air, unless otherwise specified.
R_{MIN} : Minimum resistance of device as supplied at 25°C, unless otherwise specified.
R_{1MAX}: Maximum resistance of device when measured one hour post reflow at 25°C unless otherwise specified.
* Electrical characteristics determined at 25°C.

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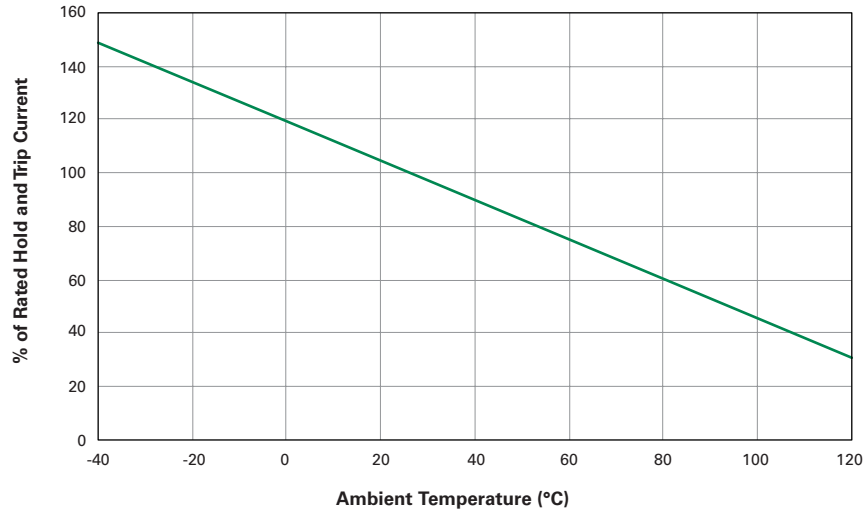
Temperature Rerating

Maximum Ambient Temperature											
Part Number	-40°C	-20°C	0°C	20°C	25°C	40°C	50°C	60°C	70°C	85°C	125°C
Hold Current (A)											
Automotive High Temperature SMD – 16V											
picoASMDCH010F	0.150	0.130	0.115	0.103	0.100	0.090	0.084	0.078	0.072	0.063	0.040
nanoASMDCH016F	0.250	0.210	0.190	0.170	0.160	0.140	0.130	0.120	0.110	0.090	0.050
nanoASMDCH035F	0.540	0.480	0.430	0.370	0.350	0.320	0.290	0.260	0.240	0.200	0.100
nanoASMDCH35F/30	0.510	0.460	0.410	0.360	0.350	0.310	0.290	0.260	0.240	0.200	0.100
nanoASMDCH50F/24	0.730	0.660	0.580	0.500	0.500	0.450	0.420	0.390	0.350	0.310	0.170

Temperature Rerating Curve



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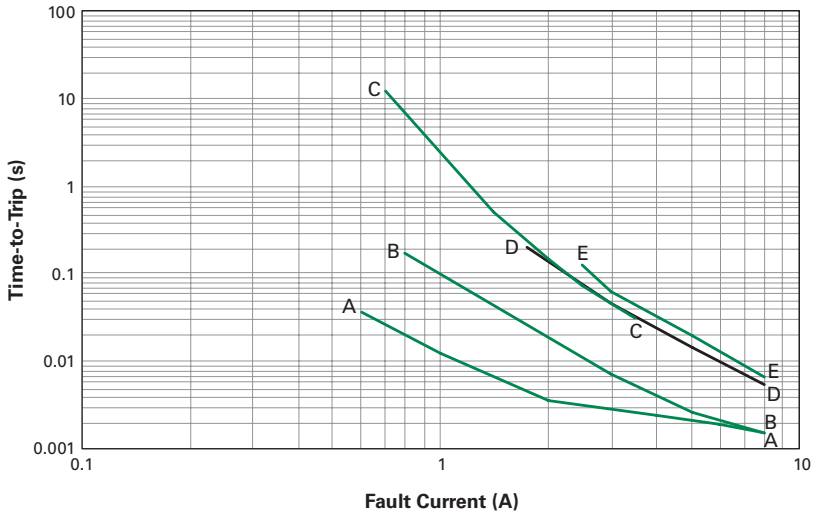
Typical Time-to-Trip Curves at 25°C

A = picoASMDCH010F
B = nanoASMDCH016F
C = nanoASMDCH035F
D = nanoASMDCH035F/30
E = nanoASMDCH050F/24



Physical Specifications

Terminal Pad Material	100% Matte Tin with Nickel Underplate
Soldering Characteristics	Solderability per ANSI-J-STD-002 Category 3
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 seconds
Recommended Storage Conditions	40°C max, 70% RH max; Devices May Not Meet Specified Ratings if Storage Conditions are Exceeded
Operation Temperature	-40°C~125°C

Note: See PS400 for other physical specifications.

Environmental Specifications

Test	Conditions	Resistance Change
Passive Aging	60°C, 1000 hrs 85°C, 1000 hrs	±3% Typical ±5% Typical
Humidity Aging	85°C, 85% R.H., 100 hrs	±1.2% Typical
Thermal Shock	125°C, -40°C 10 times	-33% Typical
Solvent Resistance	Freon Trichloroethane Hydrocarbons	No change No change No change

Note: See PS400 for other environmental specifications.

Moisture Resistance Level	Level 2a, J-STD-020
Storage Conditions	40°C max, 70% RH max; devices should remain in original sealed bags prior to use. Devices may not meet specified values if these storage conditions are exceeded.

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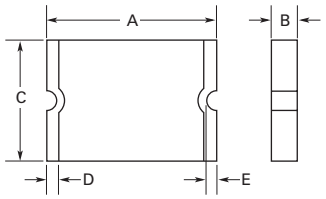
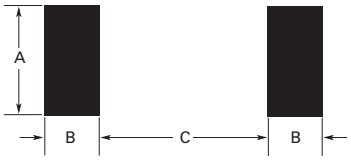
Dimensions



Dimensions

Part Number	Dimensions in Millimeters (Inches)									
	A		B		C		D		E	
	Min	Max	Min	Max	Min	Max	Mzzzzin	Max	Min	Max
Automotive High Temperature SMD – 16V										
picoASMDCH010F	2.00 (0.079)	2.20 (0.087)	0.40 (0.016)	0.80 (0.310)	1.30 (0.051)	1.50 (0.059)	0.25 (0.010)	0.75 (0.030)	0.076 (0.003)	—
nanoASMDCH016F	3.00 (0.118)	3.40 (0.134)	0.61 (0.024)	0.89 (0.035)	1.37 (0.054)	1.80 (0.071)	0.25 (0.010)	0.75 (0.030)	0.076 (0.003)	—
nanoASMDCH035F	3.00 (0.118)	3.40 (0.134)	0.91 (0.036)	1.14 (0.045)	1.37 (0.054)	1.80 (0.071)	0.25 (0.010)	0.75 (0.030)	0.076 (0.003)	—
nanoASMDCH35F/30	3.00 (0.118)	3.40 (0.134)	1.16 (0.046)	1.46 (0.057)	1.37 (0.054)	1.80 (0.071)	0.25 (0.010)	0.75 (0.030)	0.076 (0.003)	—
nanoASMDCH50F/24	3.00 (0.118)	3.40 (0.134)	1.16 (0.046)	1.46 (0.057)	1.37 (0.054)	1.80 (0.071)	0.25 (0.010)	0.75 (0.030)	0.076 (0.003)	—

Recommended Pad Layout



Packaging and Marking Information

Part Number	Tape and Reel Quantity	Standard Package	Part Marking	Recommended Pad Layout Figures [mm (in)]			Agency Recognition
				Dimension A (Nom)	Dimension B (Nom)	Dimension C (Nom)	
Automotive High Temperature SMD – 16V							
picoASMDCH010F	4,000	20,000	L	1.50 (0.060)	1.00 (0.039)	1.20 (0.047)	—
nanoASMDCH016F	3,000	15,000	H16	1.60 (0.063)	1.00 (0.039)	2.00 (0.079)	—
nanoASMDCH035F	3,000	15,000	H35	1.60 (0.063)	1.00 (0.039)	2.00 (0.079)	—
nanoASMDCH35F/30	3,000	15,000	V	1.60 (0.063)	1.00 (0.039)	2.00 (0.079)	—
nanoASMDCH50F/24	3,000	15,000	H50	1.60 (0.063)	1.00 (0.039)	2.00 (0.079)	—

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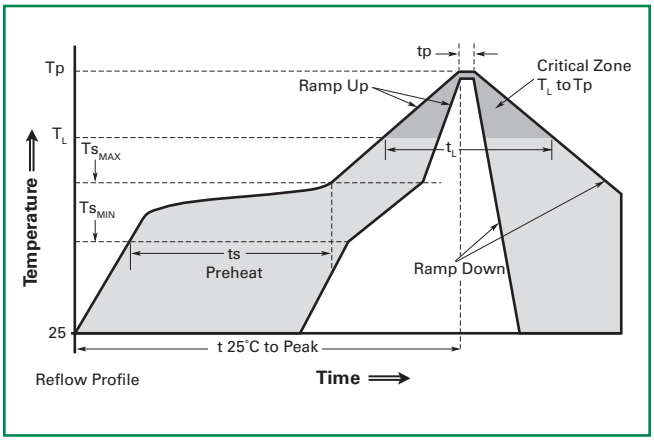
Solder Reflow Recommendations

Profile Feature	Pb-Free Assembly
Average ramp up rate (Ts_{MAX} to Tp)	3°C/s max
Preheat	
• Temperature min (Ts_{MIN})	150°C
• Temperature max (Ts_{MAX})	200°C
• Time (ts_{MIN} to ts_{MAX})	60-120 s
Time maintained above:	
• Temperature (T_L)	217°C
• Time (t_L)	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
Time 25°C to peak temperature	8 min max

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



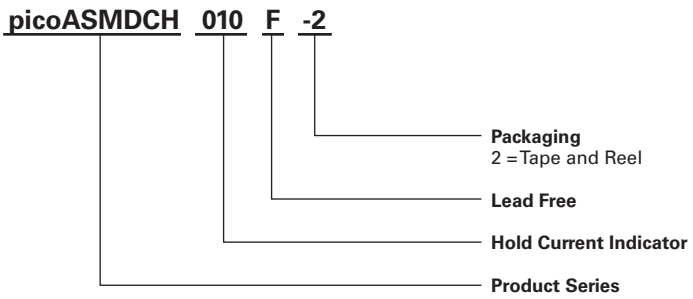
Solder Reflow

- Recommended reflow method: IR, hot air, nitrogen.
- Recommended maximum paste thickness: 0.25mm (0.010in)
- Devices can be cleaned using standard methods and aqueous solvents.
- Experience has shown 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.
- Customer should validate that the solder paste amount and reflow recommendations meet its application.
- We request 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.)

Part Ordering Number System



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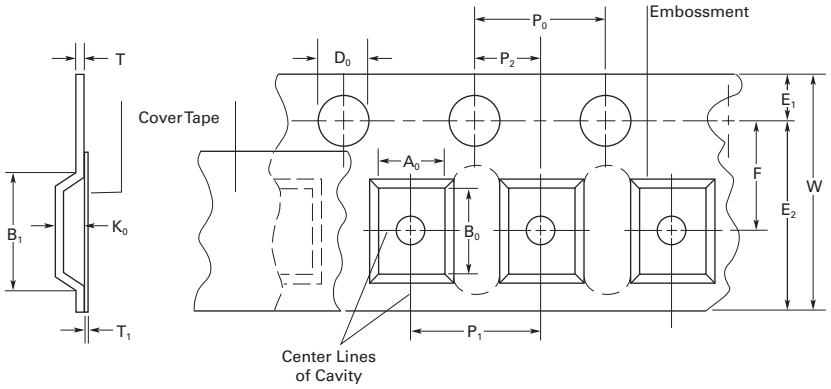
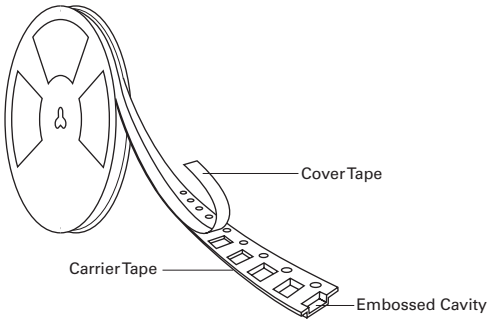
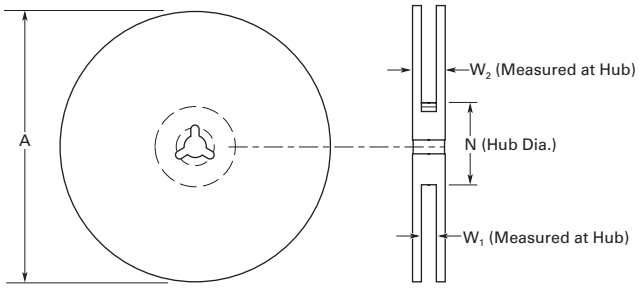
Tape and Reel Diagrams







WARNING

- Users should independently evaluate the suitability of and test each product selected for their own application.
- Operation beyond the maximum ratings or improper use may result in device damage and possible electrical arcing and flame.
- These devices are intended for protection against damage caused by 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 silicone-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.
- PPTC devices are not recommended for installation in applications where the device is constrained such that its PTC properties are inhibited, for example in rigid potting materials or in rigid housings, which lack adequate clearance to accommodate device expansion.
- Operation in circuits with a large inductance can generate a circuit voltage (Ldi/dt) above the rated voltage of the device.

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Tape and Reel Specifications

Description	EIA 481-1		
	picoASMDCH010F	nanoASMDCH016F nanoASMDCH035F	nanoASMDCH035F/30 nanoASMDCH050F/24
W	8.0 ± 0.30	8.0 ± 0.30	8.0 ± 0.30
P_0	4.0 ± 0.10	4.0 ± 0.10	4.0 ± 0.10
P_1	4.0 ± 0.10	4.0 ± 0.10	4.0 ± 0.10
P_2	2.0 ± 0.10	2.0 ± 0.05	2.0 ± 0.05
A_0	1.70 ± 0.1	1.95 ± 0.1	1.95 ± 0.1
B_0	2.45 ± 0.1	3.5 ± 0.1	3.5 ± 0.1
B_1 max	4.35	4.35	4.35
D_0	1.55 ± .05	1.55 ± .05	1.55 ± .05
F	3.50 ± 0.05	3.50 ± 0.05	3.50 ± 0.05
E_1	1.75 ± 0.10	1.75 ± 0.10	1.75 ± 0.10
E_2 min	6.25	6.25	6.25
T max	0.3	0.6	0.6
T_1 max	0.1	0.1	0.1
K_0	0.86 ± 0.1	1.27 ± 0.1	1.50 ± 0.1
A max	185	185	185
N min	50	50	50
W_1	8.4 + 1.5/-.00	8.4 + 1.5/-.00	8.4 + 1.5/-.00
W_2 max	14.4	14.4	14.4