

# Automotive picoASMDC Series

## PolySwitch® Resettable PPTCs



### Additional Information



Resources



Accessories



Samples

### Description

The picoASMD is the first small-sized 0805 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 & Benefits

- Products meet applicable automotive industry standards
- Compatible with high-volume electronics assembly
- Small footprint – 0805 size
- Resettable solution against overcurrent and short-circuit
- AEC-Q200 qualified, RoHS compliant, and ISO/TS16949 certified
- Surface-mount form factor
- 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

### Applications

- Automotive and industrial transportation
- Actuators and medium motors
- Trace protection
- Harness/junction box protection
- Powered outputs
- Electronic control modules
- Telematics/Infotainment

### Electrical Characteristics

Part Number	Ordering Part Number	I <sub>H</sub> (A)@	I <sub>H</sub> (A)@	I <sub>T</sub>	V <sub>MAX</sub>	I <sub>MAX</sub>	P <sub>D Typ</sub>	Max Time-to-trip		R <sub>MIN</sub>	R <sub>1MAX</sub>	R <sub>aMAX</sub>
		(R <sub>1MAX</sub> )	(R <sub>aMAX</sub> )	(A)	(V <sub>DC</sub> )	(A)	(W)	(A)	(s)	(Ω)	(Ω)	(Ω)
picoASMDC – 6-15V												
picoASMDC010S	RF4561-000	0.10	0.10	0.30	15	20	0.50	0.50	0.60	1.50	11.00	11.00
picoASMDC012S	RF4562-000	0.12	0.12	0.30	15	20	0.50	1.00	0.10	1.50	9.00	9.00
picoASMDC020S	RF5051-000	0.20	0.20	0.47	9	100	0.50	2.00	0.10	0.75	3.20	3.2
picoASMDC035S	RF5052-000	0.35	0.35	0.75	6	100	0.50	1.75	0.20	0.35	1.40	1.4
picoASMDC050S	RF5053-000	0.50	0.50	1.00	6	100	0.50	8.00	0.10	0.15	0.80	0.8
picoASMDC075S	RF5054-000	0.75	0.75	1.50	6	40	0.70	8.00	0.20	0.10	0.35	0.35
picoASMDC110S	RF5055-000	1.10	1.10	2.20	6	40	0.80	8.00	0.20	0.05	0.17	0.17

#### 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, unless otherwise specified.
- $R_{2MAX}$  : Maximum functional resistance of device after being subjected to the stresses described in PS400 at 25°C, unless otherwise specified.

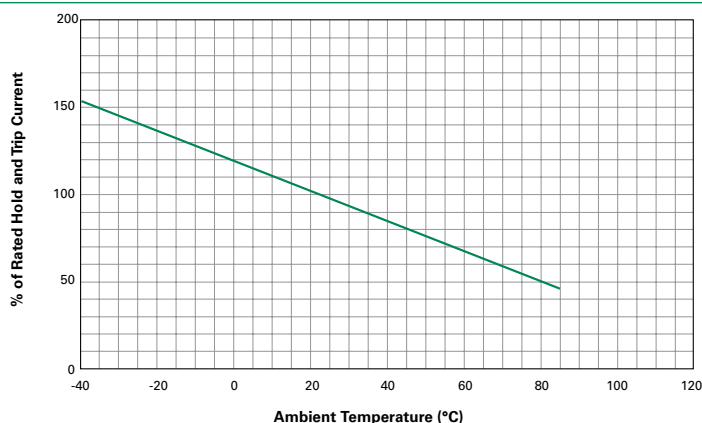
# Automotive picoASMDC Series

## PolySwitch® Resettable PPTCs

### Temperature Derating

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
Hold Current (A)										
picoASMDC – 6-15V										
picoASMDC010S	0.17	0.15	0.13	0.11	0.10	0.09	0.08	0.07	0.06	0.05
picoASMDC012S	0.20	0.17	0.15	0.13	0.12	0.10	0.09	0.08	0.07	0.05
picoASMDC020S	0.30	0.27	0.24	0.21	0.20	0.18	0.16	0.15	0.13	0.11
picoASMDC035S	0.55	0.49	0.44	0.37	0.35	0.31	0.28	0.26	0.23	0.18
picoASMDC050S	0.70	0.62	0.55	0.55	0.50	0.43	0.38	0.33	0.30	0.26
picoASMDC075S	1.13	1.01	0.90	0.78	0.75	0.67	0.61	0.55	0.49	0.40
picoASMDC110S	1.64	1.47	1.30	1.14	1.10	0.97	0.89	0.80	0.72	0.59

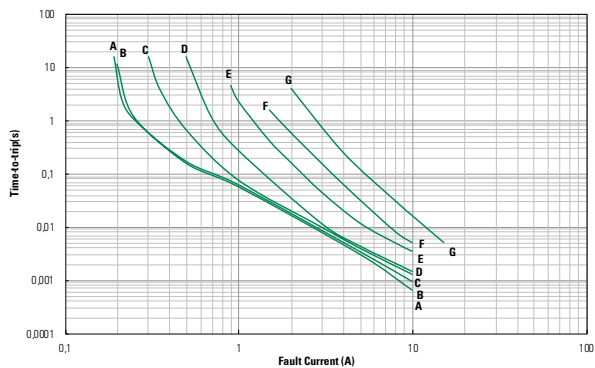
### Temperature Derating Curve



### Typical Time-to-Trip Curves at 25°C

#### picoASMDC

- A = picoASMDC010S
- B = picoASMDC012S
- C = picoASMDC020S
- D = picoASMDC035S
- E = picoASMDC050S
- F = picoASMDC075S
- G = picoASMDC110S



# Automotive picoASMDC Series

## PolySwitch® Resettable PPTCs

### Physical Specifications

<b>Terminal Pad Material</b>	100% Matte Tin with Nickel Underplate
<b>Soldering Characteristics</b>	Solderability per ANSI-J-STD-002 Category 3
<b>Solder Heat Withstand</b>	per IEC 60068-2-20, Test Tb, Section 5, Method 1a
<b>Flammability</b>	per IEC 60695-11-5 Needle Flame Test for 20 seconds
<b>Recommended Storage Conditions</b>	40°C max, 70% RH max; Devices May Not Meet Specified Ratings if Storage Conditions are Exceeded
<b>Operation Temperature</b>	-40°C~85°C

**Note:** See PS400 for other physical specifications.

### Environmental Specifications

Test	Conditions	Resistance Change
<b>Passive Aging</b>	60°C, 1000 hrs	±3% Typical
	85°C, 1000 hrs	±5% Typical
<b>Humidity Aging</b>	85°C, 85% R.H., 100 hrs	±1.2% Typical
<b>Thermal Shock</b>	85°C, -40°C 20 times	-33% Typical
<b>Solvent Resistance</b>	Freon	No change
	Trichloroethane	No change
	Hydrocarbons	No change

**Note:** See PS400 for other environmental specifications.

<b>Moisture Resistance Level</b>	Level 1, J-STD-020
<b>Storage Conditions</b>	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.

# Automotive picoASMDC Series

## PolySwitch® Resettable PPTCs

### Dimension Figures

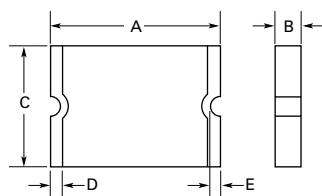
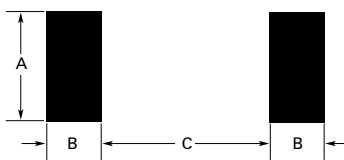


Figure 1

### Dimensions

Part Number	Dimensions in Millimeters (Inches)										Figure
	A		B		C		D		E		
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	
picoASMDC – 6-15V											
picoASMDC010S	2.00	2.20	0.60	1.00	1.30	1.50	0.25	0.75	0.076	-	1
	(0.079)	(0.087)	(0.023)	(0.040)	(0.051)	(0.059)	(0.010)	(0.030)	(0.003)		
picoASMDC012S	2.00	2.20	0.44	0.68	1.30	1.50	0.25	0.75	0.076	-	1
	(0.079)	(0.087)	(0.017)	(0.027)	(0.051)	(0.059)	(0.010)	(0.030)	(0.003)		
picoASMDC020S	2.00	2.20	0.44	0.68	1.30	1.50	0.25	0.75	0.076	-	1
	(0.079)	(0.087)	(0.017)	(0.027)	(0.051)	(0.059)	(0.010)	(0.030)	(0.003)		
picoASMDC035S	2.00	2.20	0.44	0.68	1.30	1.50	0.25	0.75	0.076	-	1
	(0.079)	(0.087)	(0.017)	(0.027)	(0.051)	(0.059)	(0.010)	(0.030)	(0.003)		
picoASMDC050S	2.00	2.20	0.63	0.93	1.30	1.50	0.25	0.75	0.076	-	1
	(0.079)	(0.087)	(0.025)	(0.036)	(0.051)	(0.059)	(0.010)	(0.030)	(0.003)		
picoASMDC075S	2.00	2.20	0.63	0.93	1.30	1.50	0.25	0.75	0.076	-	1
	(0.079)	(0.087)	(0.025)	(0.036)	(0.051)	(0.059)	(0.010)	(0.030)	(0.003)		
picoASMDC110S	2.00	2.20	0.80	1.20	1.30	1.50	0.25	0.75	0.076	-	1
	(0.079)	(0.087)	(0.031)	(0.047)	(0.051)	(0.059)	(0.010)	(0.030)	(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)]		
				Dimension A (Min*/Nom)	Dimension B (Nom)	Dimension C (Nom)
picoASMDC – 6-15V						
picoASMDC010S	3,000	15,000	C	1.50 (0.060)	1.00 (0.039)	1.20 (0.047)
picoASMDC012S	4,000	20,000	F	1.50 (0.060)	1.00 (0.039)	1.20 (0.047)
picoASMDC020S	4,000	20,000	H	1.50 (0.060)	1.00 (0.039)	1.20 (0.047)
picoASMDC035S	4,000	20,000	I	1.50 (0.060)	1.00 (0.039)	1.20 (0.047)
picoASMDC050S	3,000	20,000	K	1.50 (0.060)	1.00 (0.039)	1.20 (0.047)
picoASMDC075S	3,000	15,000	M	1.50 (0.060)	1.00 (0.039)	1.20 (0.047)
picoASMDC110S	3,000	15,000	S	1.50 (0.060)	1.00 (0.039)	1.20 (0.047)

\* These devices are intended for use in automotive applications.

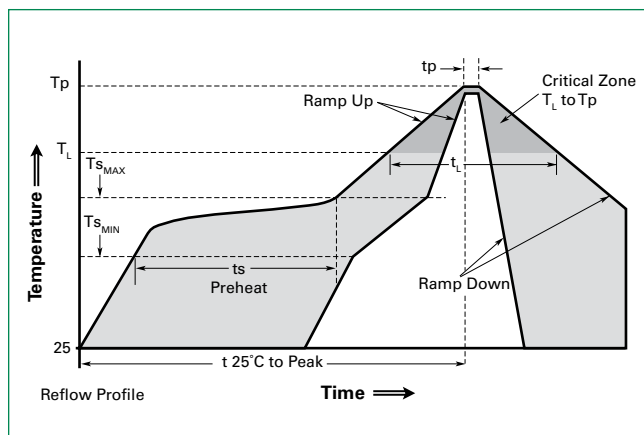
# Automotive picoASMD Series

## PolySwitch® Resettable PPTCs

### Solder Reflow Recommendations

Profile Feature	Pb-Free Assembly
<b>Average ramp up rate (<math>T_{s\_MAX}</math> to <math>T_p</math>)</b>	3°C/s max
<b>Preheat</b>	
• Temperature min ( $T_{s\_MIN}$ )	150°C
• Temperature max ( $T_{s\_MAX}$ )	200°C
• Time ( $t_{s\_MIN}$ to $t_{s\_MAX}$ )	60-120 s
<b>Time maintained above:</b>	
• Temperature ( $T_L$ )	217°C
• Time ( $t_L$ )	60-150 s
<b>Peak/Classification temperature (<math>T_p</math>)</b>	260°C
<b>Time within 5°C of actual peak temperature</b>	
Time ( $t_p$ )	30 s max
<b>Ramp down rate</b>	3°C/s max
<b>Time 25°C to peak temperature</b>	8 min max

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



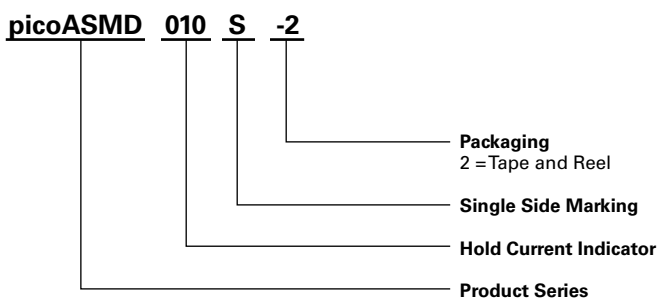
#### Solder Reflow

- 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



# Automotive picoASMDC Series

## PolySwitch® Resettable PPTCs

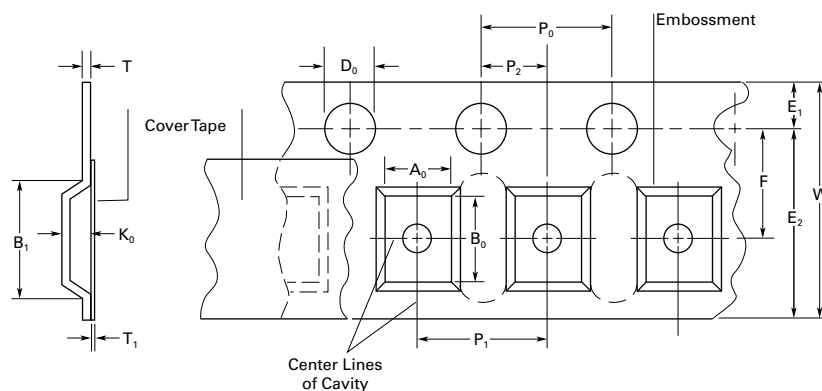
### Tape and Reel Specifications

Description	picoASMDC EIA 481-1 (mm)		
	picoASMDC012S picoASMDC020S picoASMDC035S	picoASMDC010S picoASMDC050S picoASMDC075S	picoASMDC110S
<b>W</b>	8.0 ± 0.30	8.0 ± 0.30	8.0 ± 0.30
<b>P<sub>0</sub></b>	4.0 ± 0.10	4.0 ± 0.10	4.0 ± 0.10
<b>P<sub>1</sub></b>	4.0 ± 0.10	4.0 ± 0.10	4.0 ± 0.10
<b>P<sub>2</sub></b>	2.0 ± 0.10	2.0 ± 0.005	2.0 ± 0.005
<b>A<sub>0</sub></b>	1.70 ± 0.10	1.70 ± 0.10	1.70 ± 0.10
<b>B<sub>0</sub></b>	2.45 ± 0.10	2.45 ± 0.10	2.45 ± 0.10
<b>B<sub>1</sub> max</b>	4.35	4.35	4.35
<b>D<sub>0</sub></b>	1.55 ± 0.05	1.55 ± 0.05	1.55 ± 0.05
<b>F</b>	3.50 ± 0.05	3.50 ± 0.05	3.50 ± 0.05
<b>E<sub>1</sub></b>	1.75 ± 0.10	1.75 ± 0.10	1.75 ± 0.10
<b>E<sub>2</sub> min</b>	6.25	6.25	6.25
<b>T max</b>	0.3	0.3	0.3
<b>T<sub>1</sub> max</b>	0.1	0.1	0.1
<b>K<sub>0</sub></b>	0.86 ± 0.1	1.20 ± 0.1	1.35 ± 0.1
<b>A max</b>	185	185	185
<b>N min</b>	50	50	50
<b>W<sub>1</sub></b>	8.4 + 1.5/-0.00	8.4 + 1.5/-0.00	8.4 + 1.5/-0.00
<b>W<sub>2</sub> max</b>	14.4	14.4	14.4

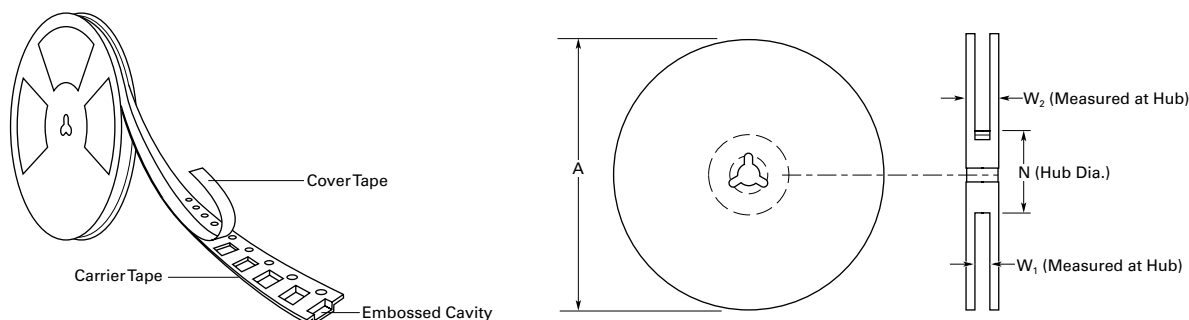
# Automotive picoASMDC Series

## PolySwitch® Resettable PPTCs

### Tape and Reel Diagrams



**Figure 1**



**Figure 2**

#### 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 ( $L di/dt$ ) above the rated voltage of the device.

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