

Surface Mount Polymer PTC

Automotive Grade, PAS Series, 1812 Size



Features:

- AEC-Q200 Rev-D stress test qualification
- Resettable over-current protection
- Small size of 1812
- Fast time-to-trip
- RoHS compliant
- Halogen free
- IEC 60730-1:2010 standard compliance
- Compatible with Pb and Pb-free solder reflow profiles

Applications:

- Electronic control unit (ECU) I/O and trace protection
- Heating ventilation and cooling (HVAC) control circuit and I/O protection
- Battery management system
- Telematics, infotainment, and navigations systems
- Overcurrent and overtemperature protection of automotive electronics

Ordering Code:

PAS 1812-110-24 F

(1) (2) (3) (4) (5)

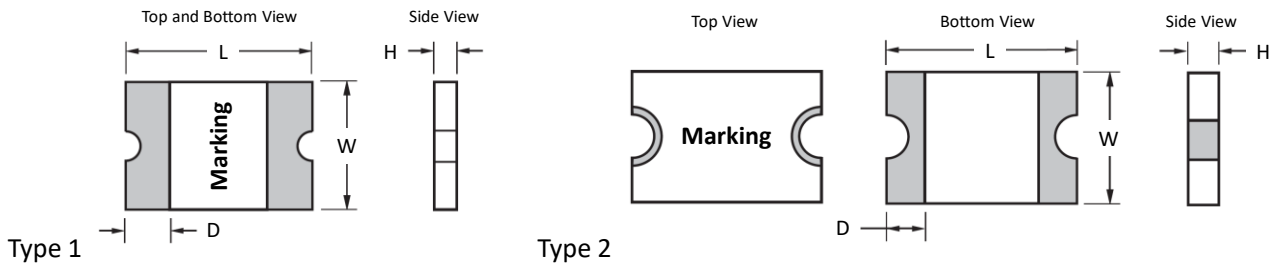
- (1) Series code
- (2) Size code
- (3) Current rating code
110: 1.1A
- (4) Voltage rating code
24: 24V
- (5) Identification code

Agency Approval:

UL file number: E355716

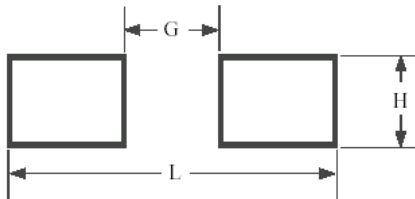
TÜV certification number: R50371797, R50371842, R50371875 and R50385152. Tested for EN60738-1: 2006+A1; EN60738-1:2008; EN60730-1: 2011 clause 15, 17 and Annex J

Product Dimensions:



Part Number	Type	L mm (inches)		W mm (inches)		H mm (inches)		D mm (inches)
		Min.	Max.	Min.	Max.	Min.	Max.	Min.
PAS1812-010 PAS1812-014 PAS1812-020 PAS1812-020-60 PAS1812-030	1	4.37 (0.172)	4.73 (0.186)	3.07 (0.121)	3.41 (0.134)	0.70 (0.028)	1.10 (0.043)	0.30 (0.012)
PAS1812-050 PAS1812-075 PAS1812-075-24	1	4.37 (0.172)	4.73 (0.186)	3.07 (0.121)	3.41 (0.134)	0.55 (0.022)	0.85 (0.033)	0.30 (0.012)
PAS1812-050-30F	2	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	0.40 (0.016)	0.85 (0.033)	0.30 (0.012)
PAS1812-110-16	1	4.37 (0.172)	4.73 (0.186)	3.07 (0.121)	3.41 (0.134)	0.55 (0.022)	0.85 (0.033)	0.30 (0.012)
PAS1812-075-33F PAS1812-110-24F	2	4.37 (0.172)	4.73 (0.186)	3.07 (0.121)	3.41 (0.134)	0.70 (0.028)	1.60 (0.063)	0.30 (0.012)
PAS1812-150-12	1	4.37 (0.172)	4.73 (0.186)	3.07 (0.121)	3.41 (0.134)	0.55 (0.022)	0.85 (0.033)	0.30 (0.012)
PAS1812-150-24F	2	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	0.70 (0.028)	1.60 (0.063)	0.30 (0.012)
PAS1812-250-16F PAS1812-260-16F	2	4.37 (0.172)	4.73 (0.186)	3.07 (0.121)	3.41 (0.134)	0.70 (0.028)	1.60 (0.063)	0.30 (0.012)

Recommended Foot Print Dimensions:



Type	G (mm)	H (mm)	L (mm)
1	2.7±0.1	3.2±0.1	5.7±0.1
2	2.9±0.1	2.95±0.1	6.1±0.1

Typical Ratings and Characteristics (@ 23°C):

✧ Operating temperature: -40 to +85°C

Part Number	Current (A)		V _{Max} (Vdc)	I _{Max} (A)	Max. Time to Trip (sec)		Typical Power (Pd, W)	Resistance Min. (Ω)	One Hours Post Reflow Resistance R ₁ Max. (Ω) ¹	Agency Approval	
	Hold (I _H)	Trip (I _T)			Current (A)	Time (sec)				UL	TÜV
PAS1812-010	0.10	0.30	60	40	0.5	1.50	0.8	0.70	15.00	√	√
PAS1812-014	0.14	0.30	60	40	1.5	0.2	0.8	0.40	6.50	√	√
PAS1812-020	0.20	0.40	30	80	6.0	0.1	0.8	0.40	6.00	√	√
PAS1812-020-60	0.20	0.40	60	40	1.5	0.2	0.8	0.40	6.00	√	√
PAS1812-030	0.30	0.60	30	10	8.0	0.10	0.8	0.30	3.00	√	√
PAS1812-050	0.50	1.00	15	100	8.0	0.2	0.8	0.15	1.00	√	√
PAS1812-050-30F	0.50	1.00	30	40	8.0	0.20	0.8	0.150	1.30	√	√
PAS1812-075	0.75	1.50	13.2	100	8.0	0.20	0.8	0.11	0.45	√	√
PAS1812-075-24	0.75	1.50	24	40	8.0	0.20	0.8	0.11	0.45	√	√
PAS1812-075-33F	0.80	1.50	33	20	8.0	0.20	1.4	0.110	0.400		
PAS1812-110-16	1.10	2.20	16	100	8.0	0.30	0.8	0.04	0.21	√	√
PAS1812-110-24F	1.10	2.20	24	20	8.0	0.50	0.8	0.06	0.18	√	√
PAS1812-150-12	1.50	3.00	12	100	8.0	0.50	0.8	0.030	0.120	√	√
PAS1812-150-24F	1.50	3.00	24	20	8.0	1.50	1.0	0.035	0.12	√	√
PAS1812-250-16F	2.50	5.00	16	100	8.0	5.0	1.2	0.015	0.10	√	√
PAS1812-260-16F	2.60	5.00	16	100	8.0	5.0	1.2	0.015	0.050	√	√

¹ The max resistance of one-hour post reflow is a reference value. The value may change a little according to reflow conditions and soldering state.

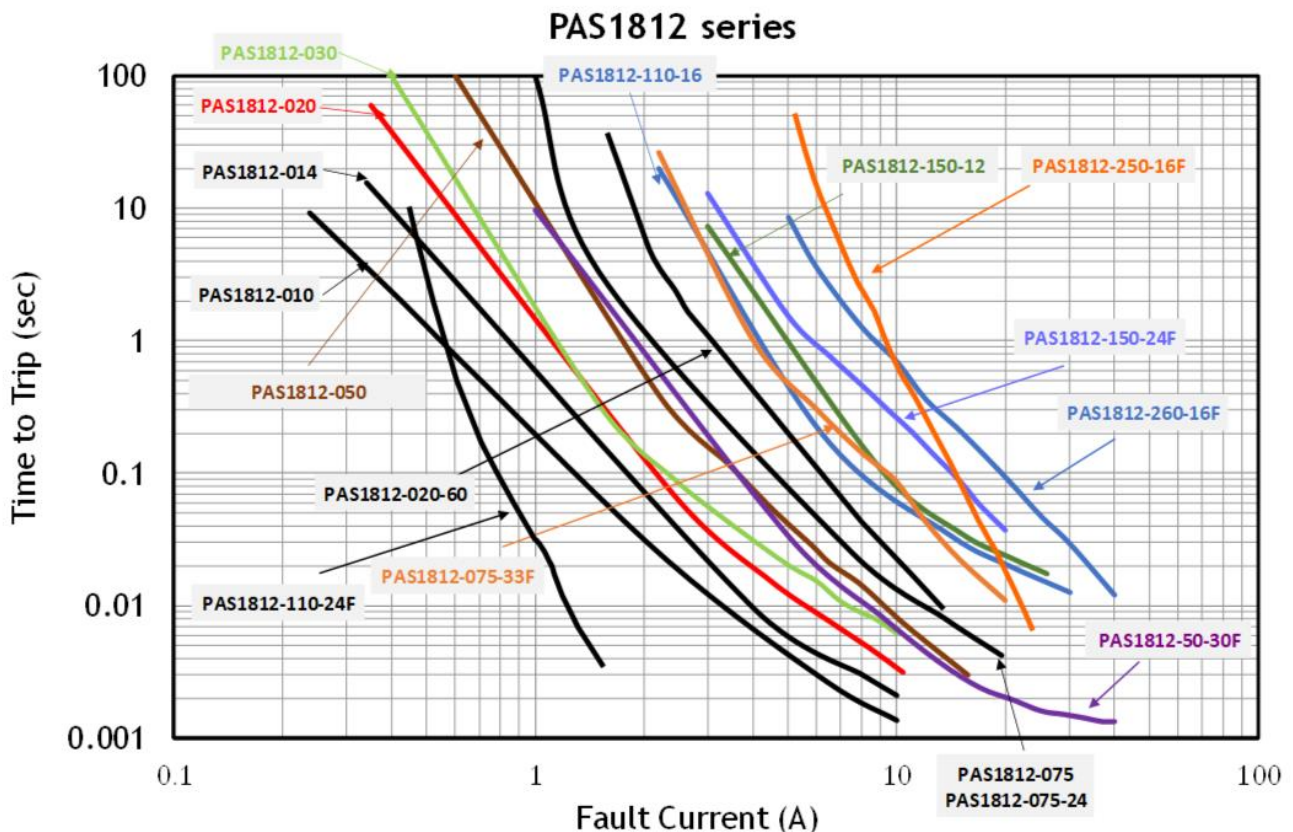
Packaging Information:

Part Number	Tape & Reel Quantity (piece)
PAS1812-010	1,500
PAS1812-014	
PAS1812-020	
PAS1812-020-60	
PAS1812-030	
PAS1812-050/-30F	2,000
PAS1812-075	
PAS1812-075-24/-33F	
PAS1812-110-16	
PAS1812-110-24F	1,500
PAS1812-150-12	1,500
PAS1812-150-24F	1,500
PAS1812-250-16F	1,500
PAS1812-260-16F	2,000

Thermal De-rating Hold Current (A) at Ambient Temperature (23°C):

Part Number	Ambient temperature								
	-40°C	-20°C	0°C	23°C	40°C	50°C	60°C	70°C	85°C
PAS1812-010	0.16	0.14	0.12	0.10	0.08	0.07	0.06	0.05	0.03
PAS1812-014	0.23	0.20	0.17	0.14	0.12	0.10	0.09	0.08	0.06
PAS1812-020	0.30	0.27	0.23	0.20	0.17	0.15	0.13	0.12	0.09
PAS1812-020-60	0.29	0.26	0.23	0.20	0.17	0.15	0.13	0.11	0.08
PAS1812-030	0.46	0.40	0.36	0.30	0.26	0.22	0.20	0.18	0.14
PAS1812-050	0.77	0.68	0.59	0.50	0.44	0.40	0.37	0.33	0.29
PAS1812-050-30F	0.77	0.68	0.59	0.50	0.44	0.40	0.37	0.33	0.25
PAS1812-075	1.15	1.01	0.88	0.75	0.65	0.60	0.55	0.49	0.43
PAS1812-075-24	1.15	1.01	0.88	0.75	0.65	0.60	0.55	0.49	0.43
PAS1812-075-33F	1.16	1.03	0.90	0.75	0.63	0.56	0.49	0.42	0.32
PAS1812-110-16	1.59	1.43	1.26	1.10	0.95	0.87	0.80	0.71	0.60
PAS1812-110-24F	2.00	1.70	1.40	1.10	0.95	0.88	0.80	0.73	0.61
PAS1812-150-12	2.17	1.95	1.72	1.50	1.30	1.18	1.09	0.97	0.82
PAS1812-150-24F	2.10	1.90	1.70	1.50	1.25	1.13	1.00	0.88	0.69
PAS1812-250-16F	3.90	3.42	2.96	2.50	2.24	1.98	1.85	1.29	0.94
PAS1812-260-16F	3.50	3.20	3.00	2.60	2.30	2.15	2.00	1.85	1.63

Typical Time to Trip (@ 23°C):

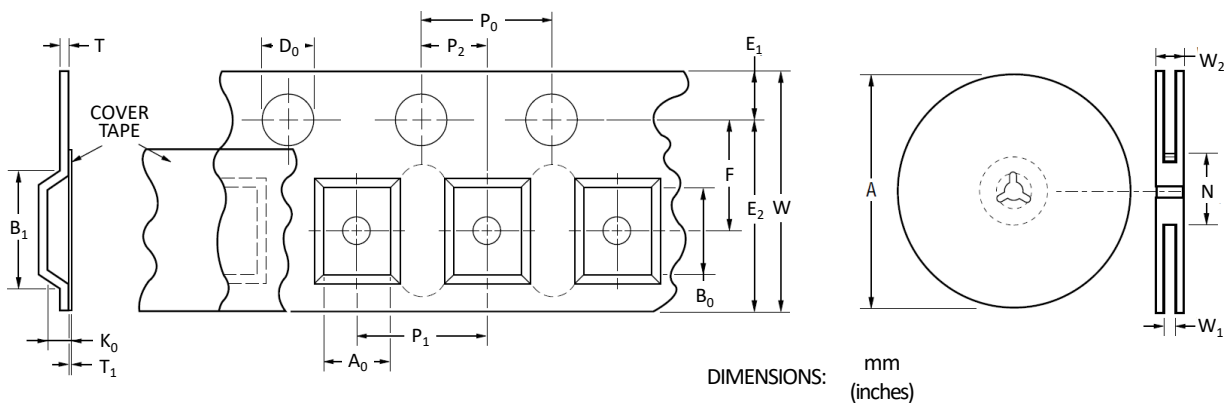


Environmental Test:

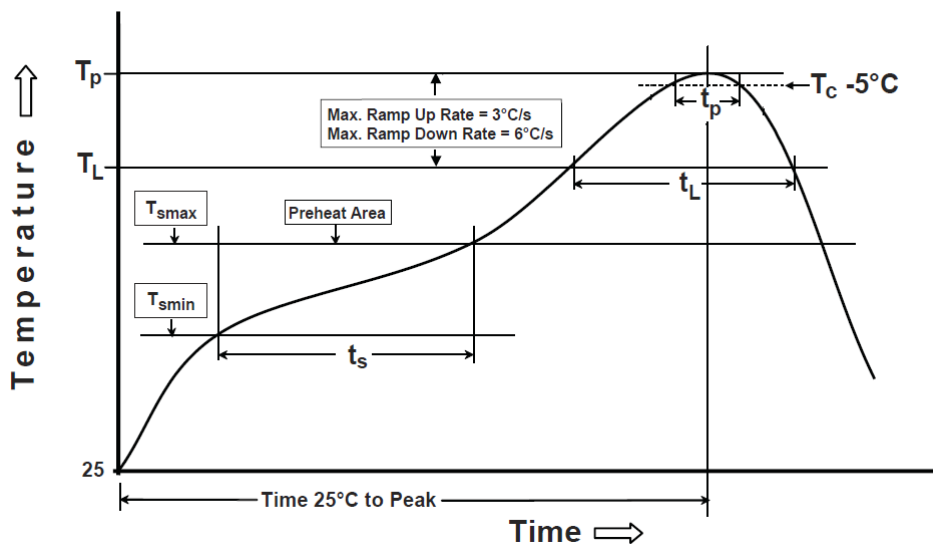
Item No.	Test Item	Test Condition
1	Pre-and-Post stress electrical test	-40 °C, 25 °C and 85 °C
4	Temperature cycling	-40 and 85 °C, 1000 cycles
6	Moisture resistance	Cycled 25 °C to 65 °C, 80-100% RH, 24 hrs./cycle. 10 cycles
7	Biased humidity	1000 hrs., 85 °C, 85% RH, biased
8	Operational life	1000 hrs., 85 °C with rated power on and off repeatedly
9	External visual	Per individual specification sheets
10	Physical dimension	Per individual specification sheets
12	Resistance to solvents	MIL STD 202 and aqueous wash chemical
13	Mechanical shock	1/2 sine shock pulse, 1500g peak
14	Vibration	5g, 20 mins, 36 cycles, 10-2K Hz
15	Resistance to solder heat	MIL STD 202, 215 °C for 3 heating cycles
16	Thermal shock	-40 to 85 °C, 300 cycles
17	ESD	Air discharge mode 25KV
18	Solderability	J-STD-002B 215, 235 and 260 °C
19	Electrical characterization	Per spec
20	Flammability	UL-94 V0
21	Board flex	2 mm deflection min
22	Terminal strength (SMD)	1.8Kg, 60 sec
31	Short circuit fault current durability	30V 80A, power on and off for 25 cycles
32	Fault current durability	30V 1.2A, power on and off for 350 cycles
33	End-of-life mode verification	30V 1.2A, power on and off for 1750 cycles
34	Jump start endurance	26V (fixed), power on and off for 3cycles
35	Load dump endurance	Per ISO-7637-2 pulse 5a, Vs=87V, Ri = 4 ohm, Td = 400 ms, 10 pulse

Tape and Reel Specifications:

Dimensions (Tape)	PAS1812-010 PAS1812-030 PAS1812-014 PAS1812-020 PAS1812-020-60	PAS1812-050 PAS1812-050-30F PAS1812-075 PAS1812-075-24 PAS1812-110-16 PAS1812-150-12	PAS1812-110-24F PAS1812-150-24F PAS1812-250-16F PAS1812-260-16F PAS1812-075-33F	Dimensions (Reel)	PAS1812 Series
W	12.0±0.3 (0.472±0.012)	12.0±0.3 (0.472±0.012)	12.0±0.3 (0.472±0.012)	A max.	185 (7.28)
P ₀	4.0±0.1 (0.157±0.004)	4.0±0.1 (0.157±0.004)	4.0±0.1 (0.157±0.004)	N min.	50 (1.97)
P ₁	8.0±0.1 (0.315±0.004)	8.0±0.1 (0.315±0.004)	8.0±0.1 (0.315±0.004)	W ₁	12.4+2.0/-0.0 (0.488+0.079/-0.0)
P ₂	2.0±0.05 (0.079±0.002)	2.0±0.05 (0.079±0.002)	2.0±0.05 (0.079±0.002)	W ₂ max.	18.4 (0.724)
A ₀	3.58±0.1 (0.141±0.004)	3.66±0.15 (0.144±0.006)	3.70±0.1 (0.146±0.004)		
B ₀	4.93±0.1 (0.194±0.004)	4.98±0.1 (0.196±0.004)	5.10±0.1 (0.200±0.004)		
B ₁ max.	5.9 (0.232)	5.9 (0.232)	5.9 (0.232)		
D ₀	1.5+0.1/-0.0 (0.059+0.004/-0.0)	1.5+0.1/-0.0 (0.059+0.004/-0.0)	1.5+0.1/-0.0 (0.059+0.004/-0.0)		
F	5.5±0.05 (0.217±0.002)	5.5±0.05 (0.217±0.002)	5.5±0.05 (0.217±0.002)		
E ₁	1.75±0.1 (0.069±0.004)	1.75±0.1 (0.069±0.004)	1.75±0.1 (0.069±0.004)		
E ₂ max.	10.25 (0.404)	10.25 (0.404)	10.25 (0.404)		
T max.	0.6 (0.024)	0.6 (0.024)	0.6 (0.024)		
T ₁ max.	0.1 (0.004)	0.1 (0.004)	0.1 (0.004)		
K ₀	1.30±0.1 (0.051±0.004)	1.30±0.1 (0.051±0.004)	1.30±0.1 (0.051±0.004)		



Recommended Reflow Soldering Profile:



Profile Feature	Pb-Free Assembly
Preheat/Soak	
Temperature Min (T_{smin})	150°C
Temperature Max(T_{smax})	200°C
Time(t_s) from (T_{smin} to T_{smax})	60~180 seconds
Ramp-uprate (T_L to T_p)	3°C/second max.
Liquidous temperature(T_L)	217°C
Time(t_L) maintained above T_L	60~150 seconds
Peak package body temperature (T_p)	260°C
Time (t_p)*within 5°C of the specified classification temperature (T_c)	20~40seconds *
Ramp-down rate (T_p to T_L)	6°C/second max.
Time 25°C to peak temperature	8 minutes max.
* Tolerance for peak profile temperature (T_p) is defined as a supplier minimum and a user maximum	

Note:

- PAS1812 series cannot be wave soldered. Please contact AEM for hand soldering recommendations.
- If reflow temperatures exceed the recommended profile, devices may not meet the performance requirements.
- Compatible with Pb and Pb-free solder reflow profiles.
- Excess solder may cause a short circuit, especially during hand soldering.

Caution: Operation beyond the rated voltage or current may result in rupture electrical arcing or flame.



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 over-current or over-temperature 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 ($L di/dt$) above the rated voltage of the PPTC device.