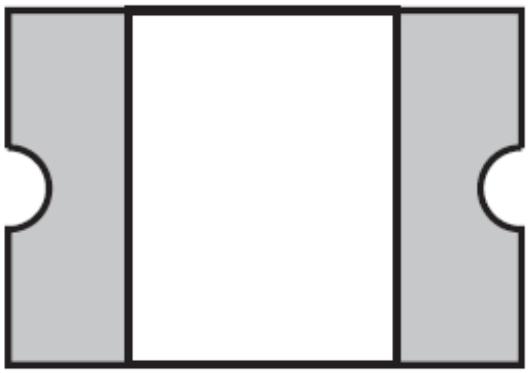
1. Scope

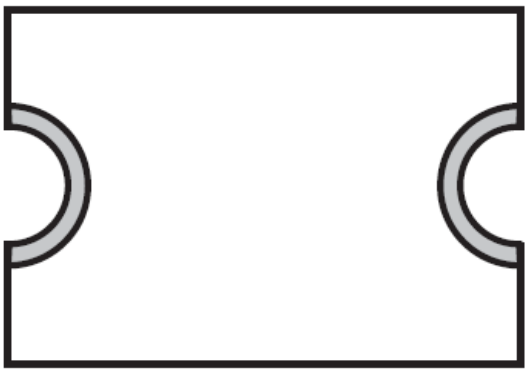
This specification applies for the Lead-Free SMD Resettable fuse series .

2. Construction

Style 1



Style 2



Terminal material:
Electroless Ni under immersion Au

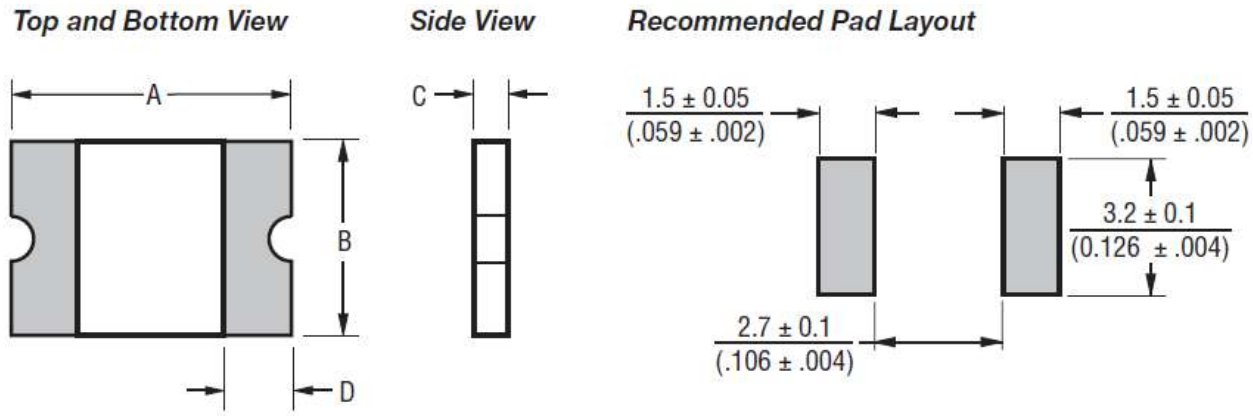
Termination pad solderability:
Standard Au finish:
Meets ANSI/J-STD-002 Category 2.

3. Type Designation

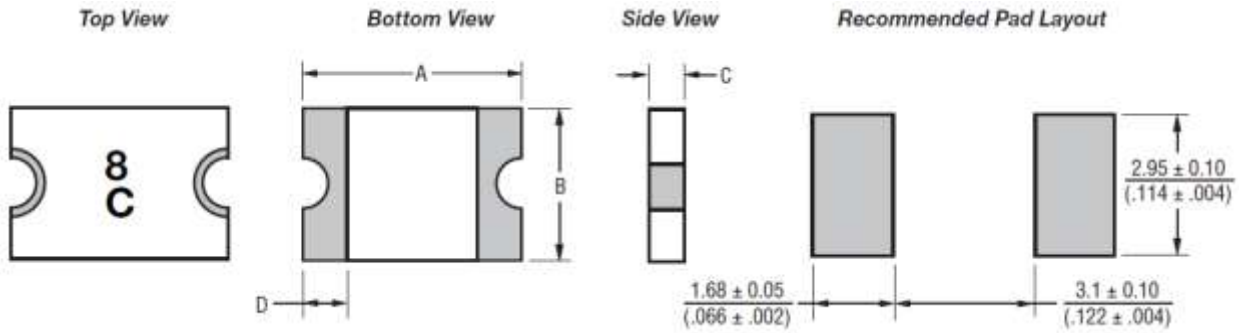
TRF	18	—	035	V16	—	E	F
SMD Resettable fuse	Size		I-hold	Vmax(Vdc)		Packaging	Lead Free
	18:1812(4532)		035:0.35A	V06: 6V V08: 8V V12: 12V V13: 13.2V V15: 15V V16: 16V V30: 30V V60: 60V		E:Embossed Tape T:Paper Tape	

4. Dimensions

Style 1



Style 2



Dimensions

Unit: mm

Part Designation	A		B		C		D	Style
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	
TRF18-010V60-EF	4.37	4.73	3.07	3.41	0.70	1.10	0.30	1
TRF18-014V60-EF	4.37	4.73	3.07	3.41	0.70	1.10	0.30	1
TRF18-020V30-EF	4.37	4.73	3.07	3.41	0.70	1.10	0.30	1
TRF18-020V60-EF	4.37	4.73	3.07	3.41	0.70	1.10	0.30	1
TRF18-030V30-EF	4.37	4.73	3.07	3.41	0.70	1.10	0.30	1
TRF18-050V15-EF	4.37	4.73	3.07	3.41	0.55	0.85	0.30	1
TRF18-075V13-EF	4.37	4.73	3.07	3.41	0.55	0.85	0.30	1
TRF18-075V24-EF	4.37	4.73	3.07	3.41	0.55	0.85	0.30	1
TRF18-110V06-EF	4.37	4.73	3.07	3.41	0.45	0.85	0.30	1
TRF18-110V16-EF	4.37	4.73	3.07	3.41	0.45	0.85	0.30	1
TRF18-110V24-EF	4.37	4.83	3.07	3.41	0.70	1.60	0.30	2
TRF18-125V06-EF	4.37	4.73	3.07	3.41	0.55	0.85	0.30	1
TRF18-150V06-EF	4.37	4.73	3.07	3.41	0.55	0.85	0.30	1
TRF18-150V24-EF	4.37	4.83	3.07	3.41	0.70	1.60	0.30	2
TRF18-160V08-EF	4.37	4.73	3.07	3.41	0.55	0.85	0.30	1
TRF18-200V08-EF	4.37	4.73	3.07	3.41	0.55	0.85	0.30	1
TRF18-250V16-EF	4.37	4.83	3.07	3.41	0.70	1.60	0.30	2
TRF18-260V06-EF	4.37	4.73	3.07	3.41	0.48	0.85	0.30	1

Packaging:

TRF18-010V60-EF through TRF18-030V30-EF = 1500 pcs. per reel.

TRF18-050V15-EF through TRF18-200V08-EF & TRF18-260V06-EF = 2000 pcs. per reel.

TRF18-110V24-EF = 1000 pcs. per reel.

TRF18-150V24-EF & TRF18-250V16-EF = 1500 pcs. per reel.

5. Applications and ratings

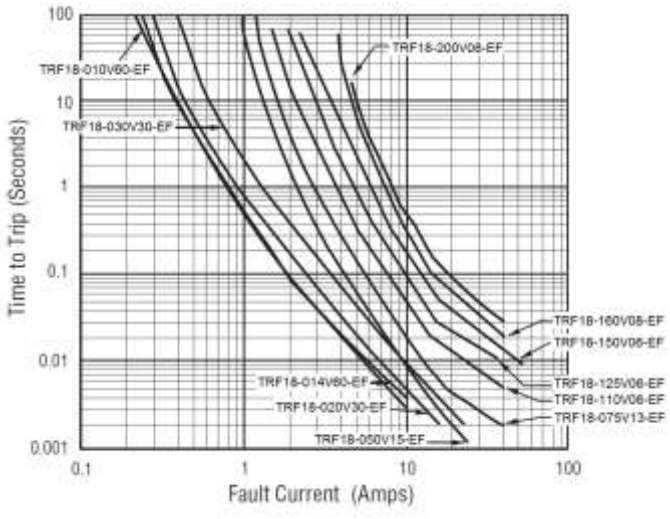
Part Designation	V_{max} (Vdc)	I_{max} (A)	I_{hold} at 23℃ (A)	I_{trip} at 23℃ (A)	P_d Typ. (W)	Maximum time to trip at 23℃		Resistance at 23℃	
						Current (A)	Time (Sec)	Ri_{min} (Ω)	$R1_{max}$ (Ω)
TRF18-010V60-EF	60.0	40	0.10	0.30	0.8	0.5	1.50	0.70	15.00
TRF18-014V60-EF	60.0	40	0.14	0.34	0.8	1.5	0.15	0.40	6.5
TRF18-020V30-EF	30.0	80	0.20	0.40	0.8	6.0	0.06	0.40	6.00
TRF18-020V60-EF	60.0	40	0.20	0.40	0.8	1.5	0.15	0.40	6
TRF18-030V30-EF	30.0	10	0.30	0.60	0.8	8.0	0.10	0.30	3
TRF18-050V15-EF	15.0	100	0.50	1.00	0.8	8.0	0.15	0.15	1
TRF18-075V13-EF	13.2	100	0.75	1.50	0.8	8.0	0.20	0.11	0.45
TRF18-075V24-EF	24.0	40	0.75	1.5	0.8	8.0	0.20	0.11	0.45
TRF18-110V06-EF	6.0	100	1.10	2.2	0.8	8.0	0.30	0.04	0.21
TRF18-110V16-EF	16.0	100	1.10	2.2	0.8	8.0	0.30	0.04	0.21
TRF18-110V24-EF	24.0	20	1.10	2.2	0.8	8.0	0.50	0.06	0.18
TRF18-125V06-EF	6.0	100	1.25	2.5	0.8	8.0	0.40	0.035	0.14
TRF18-150V06-EF	6.0	100	1.50	3	0.8	8.0	0.5	0.03	0.12
TRF18-150V24-EF	24.0	20	1.50	3	1.0	8.0	1.5	0.03	0.12
TRF18-160V08-EF	8.0	100	1.60	2.8	0.8	8.0	2.0	0.035	0.099
TRF18-200V08-EF	8.0	40	2.00	4	0.8	8.0	3.0	0.020	0.08
TRF18-250V16-EF	16.0	100	2.50	5	1.2	8.0	5.0	0.015	0.1
TRF18-260V06-EF	6.0	100	2.60	5.2	0.8	8.0	5.0	0.015	0.08

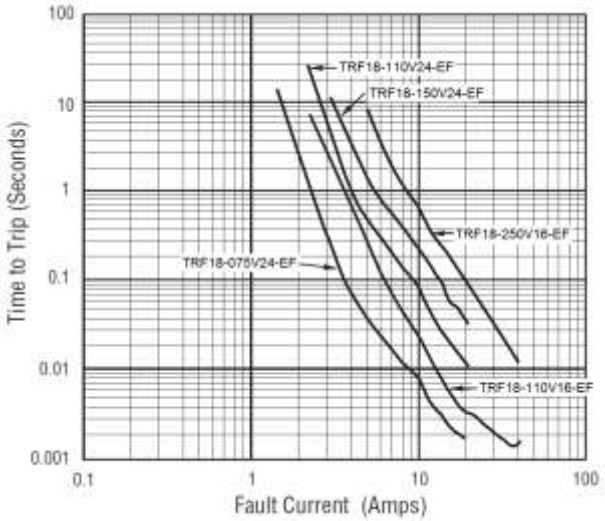
I_{hold} = Hold Current. Maximum current device will sustain for 30min without tripping in 23°C still air.
I_{trip} = Trip Current. Minimum current at which the device will trip in 23°C still air.
V_{max} = Maximum voltage device can withstand without damage at rated current.
I_{max} = Maximum fault current device can withstand without damage at rated voltage.
P_d = Power dissipated from device when in the tripped state at 23°C still air.
Ri_{min} = Typical resistance of device in initial (un-soldered) state.
$R1_{max}$ = Maximum resistance of device at 23°C measured one hour post reflow.
CAUTION:Operation beyond the specified ratings may result in damge and possibile arcing and flame.

6. Thermal Derating Chart

Part	Maximum ambient operating temperature(T_{mao}) vs. hold current (I_{hold}) (Amps)								
Designation	-40℃	-20℃	0℃	23℃	40℃	50℃	60℃	70℃	85℃
TRF18-010V60-EF	0.16	0.14	0.12	0.10	0.08	0.07	0.06	0.05	0.03
TRF18-014V60-EF	0.23	0.19	0.17	0.14	0.12	0.10	0.09	0.08	0.06
TRF18-020V30-EF	0.29	0.26	0.23	0.20	0.17	0.15	0.14	0.12	0.10
TRF18-020V60-EF	0.29	0.26	0.23	0.20	0.17	0.15	0.14	0.12	0.10
TRF18-030V30-EF	0.44	0.39	0.35	0.30	0.26	0.23	0.21	0.18	0.15
TRF18-050V15-EF	0.77	0.68	0.59	0.50	0.44	0.40	0.37	0.33	0.29
TRF18-075V13-EF	1.15	1.01	0.88	0.75	0.65	0.60	0.55	0.49	0.43
TRF18-075V24-EF	1.15	1.01	0.88	0.75	0.65	0.60	0.55	0.49	0.43
TRF18-110V06-EF	1.59	1.43	1.26	1.10	0.95	0.87	0.80	0.71	0.60
TRF18-110V16-EF	1.59	1.43	1.26	1.10	0.95	0.87	0.80	0.71	0.60
TRF18-110V24-EF	2.00	1.70	1.40	1.10	0.95	0.88	0.80	0.73	0.61
TRF18-125V06-EF	1.80	1.63	1.43	1.25	1.08	0.99	0.91	0.81	0.68
TRF18-150V06-EF	2.17	1.95	1.72	1.50	1.30	1.18	1.09	0.97	0.82
TRF18-150V24-EF	2.10	1.90	1.70	1.50	1.25	1.13	1.00	0.88	0.69
TRF18-160V08-EF	2.30	2.20	1.90	1.60	1.45	1.30	1.15	1.03	0.91
TRF18-200V08-EF	3.08	2.71	2.35	2.00	1.80	1.60	1.50	1.40	1.25
TRF18-250V16-EF	3.85	3.45	3.00	2.50	2.05	1.85	1.75	1.30	1.10
TRF18-260V06-EF	4.00	3.52	3.06	2.60	2.34	2.08	1.95	1.39	1.04

7. Typical Time to Trip at 23 °C





The Time to Trip curves represent typical performance of a device in a simulated application environment. Actual performance in specific customer applications may differ from these values due to the influence of other variables.

8. Environment

8.1 Operating Conditions

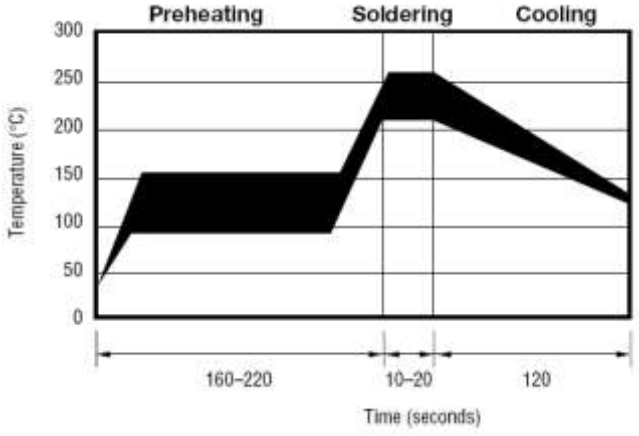
Operating Temperature: -40℃ to 85℃

Device Surface Temperature in Tripped State: 125℃ max

8.2 Environmental Specifications

TEST ITEM	Condition	Resistance Change
Passive aging	85℃,1000hr	±5% typical
Humidity aging	85℃,85%R.H,1000hr	±5% typical
Thermal shock	85℃ to -40℃,20times	±10% typical
Resistance to solvent	MIL-STD-202,Method215	No change
Vibration	MIL-STD-883C,Method2007.1 Condition A	No change

8.3 Solder Reflow Recommendations

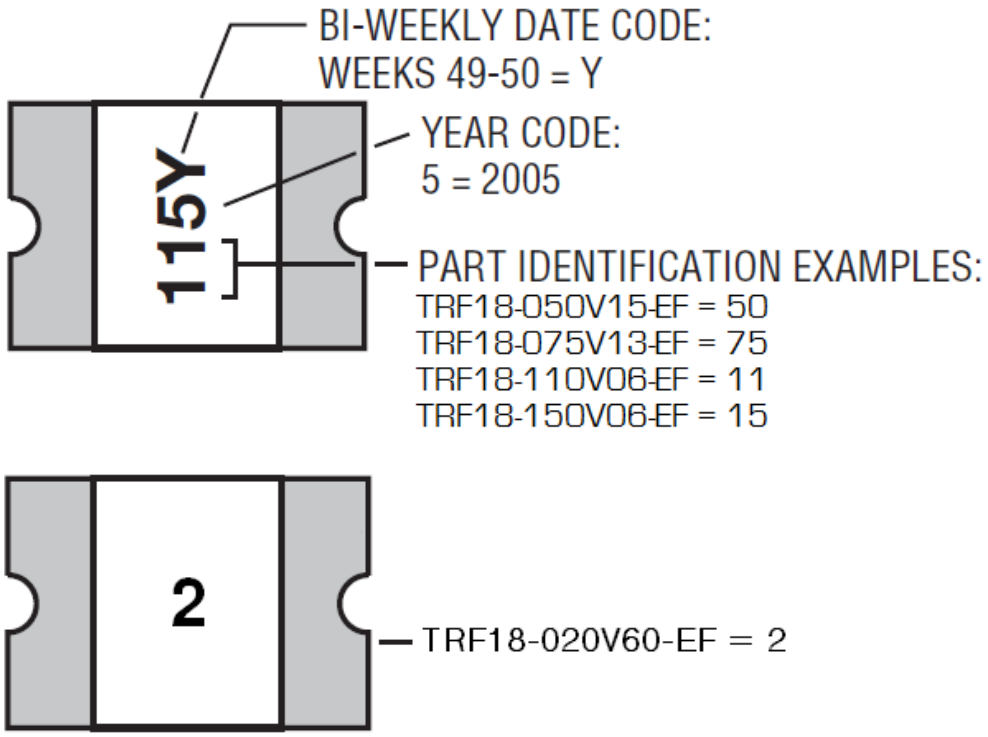


- Recommend reflow methods : IR, vapor phase oven, hot air oven.
- Devices are not designed to be wave soldered to the bottom side of the board.
- Recommended maximum paste thickness is 0.25 mm(0.010 inch).
- Devices can be cleaned using standard method and solvents.

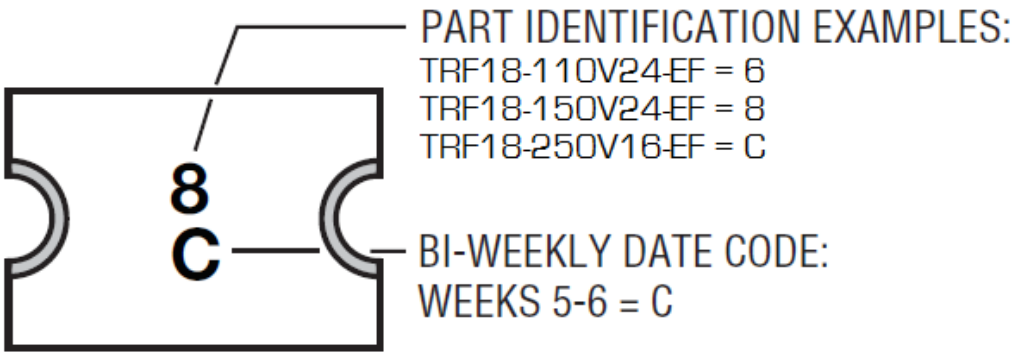
Note : If reflow temperatures exceed the recommended profile, devices may not meet the performance requirements.

9. Typical Part Marking

Style 1 :



Style 2 :



10. Taping & Reel

Tape Dimensions	TRF18-010 ~ TRF18-030 per EIA-481-1	TRF18-050 ~ TRF18-260 per EIA 481-1	TRF18-110V24 TRF18-150V24 TRF18-250V16 per EIA 481-1
W	12.0 ± 0.30 (0.472 ± 0.012)	12.0 ± 0.30 (0.472 ± 0.012)	12.0 ± 0.30 (0.472 ± 0.012)
P_0	4.0 ± 0.10 (0.157 ± 0.004)	4.0 ± 0.10 (0.157 ± 0.004)	4.0 ± 0.10 (0.157 ± 0.004)
P_1	8.0 ± 0.10 (0.315 ± 0.004)	8.0 ± 0.10 (0.315 ± 0.004)	8.0 ± 0.10 (0.315 ± 0.004)
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)
A_0	3.58 ± 0.10 (0.141 ± 0.004)	3.66 ± 0.15 (0.144 ± 0.006)	3.70 ± 0.10 (0.146 ± 0.004)
B_0	4.93 ± 0.10 (0.194 ± 0.004)	4.98 ± 0.10 (0.196 ± 0.004)	5.10 ± 0.10 (0.200 ± 0.004)
B_1 max.	5.9 (0.232)	5.9 (0.232)	5.9 (0.232)
D_0	1.5 + 0.10/-0.0 (0.059 + 0.004/-0)	1.5 + 0.10/-0.0 (0.059 + 0.004/-0)	1.5 + 0.10/-0.0 (0.059 + 0.004/-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 ± 0.10 (0.069 ± 0.004)	1.75 ± 0.10 (0.069 ± 0.004)	1.75 ± 0.10 (0.069 ± 0.004)
E_2 min.	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 ± 0.10 (0.051 ± 0.004)	0.95 ± 0.10 (0.037 ± 0.004)	1.50 ± 0.10 (0.059 ± 0.004)
Leader min.	390 (15.35)	390 (15.35)	390 (15.35)
Trailer min.	160 (6.30)	160 (6.30)	160 (6.30)
Reel Dimensions			
A max.	185 (7.28)	185 (7.28)	185 (7.28)
N min.	50 (1.97)	50 (1.97)	50 (1.97)
W_1	12.4 + 2.0/-0.0 (0.488 + 0.079/-0.0)	12.4 + 2.0/-0.0 (0.488 + 0.079/-0.0)	12.4 + 2.0/-0.0 (0.488 + 0.079/-0.0)
W_2 max.	18.4 (0.724)	18.4 (0.724)	18.4 (0.724)

11. Storage Conditions:

Temperature : 40℃max, Humidity : 40%~70%

12. Shelf Life:

2 years from manufacturing date