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FUZETEC TECHNOLOGY

Founded in 1997, as a world leading device manufacturer and designer, Fuzetec Technology Co., Ltd. (FUZETEC) is committed to provide continuous circuit protection solutions to today's and tomorrow's electronic and electrical industries.

With the most advanced Positive Temperature Coefficient (PTC) conductive polymer technologies, FUZETEC offers a wide variety of Polymeric PTC resettable fuses to fulfill the needs of modern demanding high-tech applications. They include, but not limited to: Telecommunications, Networks, Computers & Peripherals, Notebook PC's, Primary & Secondary Batteries, Automotives, Instrumentations & Industrial Controls, Power Supplies, and Consumer Electronics etc.

FUZETEC $\hat{\circ}$ PRODUCT FAMILY

FUZETEC™ product families are designed for today's demanding electronic and electrical industries. Its resettable feature, compact size, flexible construction, low thermal output and competitive cost outperformed the traditional fuse, Ceramic PTC, Bimetal fuse and Current control IC. They are ideal for all low voltage DC and AC application. FUZETEC™ resettable fuse are offered in a variety constructions, which include: Radial Leaded (16V, 30V, 60V, 90V, 120Vac, 240 VAC/DC, 250V & 600V), Surface Mount (1206, 1210, 1812 & 2920 sizes) & Axial Leaded for all battery packs applications. In addition to our standard products we offer a flexible range of custom design devices (i.e. Disc Type).



SAFETY, QUALITY AND CUSTOMER SATISFACTORY

With third party approvals (UL, C-UL and TÜV), FUZETEC™ products are ensured to provide long lasting safety and performance. From product design and development, through manufacturing and quality control to delivery and shipment. Fuzetec Technology strictly implements ISO 9001-2000 quality standards to assure its products quality and consistency. With continuous improvement, we are committed to provide top products and services to better satisfy our customer's needs. We strongly believe that excellent partnership between customers and us are the best and the only route to achieve success in tomorrow's competing business world.

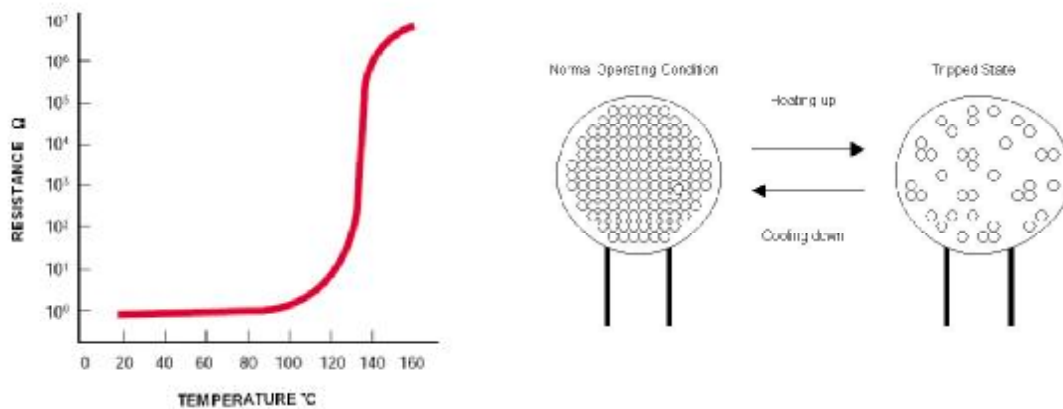
TECHNOLOGY NICHE

Polymeric PTC material and devices technology synergistically integrate the advance polymer material technologies, conductive material science, novel processing engineering, and fundamental electronic and electrical theory. Electrical resistance of such material and devices increases with temperature increases and vice versa. When experiencing "overcurrent and/or over voltage", the device generates thermal energy ($\text{Energy} = I \cdot V$) and heats up itself. This makes polymer matrix's morphology change from crystalline to amorphous phase, and results in a resistance increase of thousand orders of magnitude such that "trip" the electricity. The device will remain hot and stay "tripped" until the fault is cleared and power is removed.

OVERVIEW

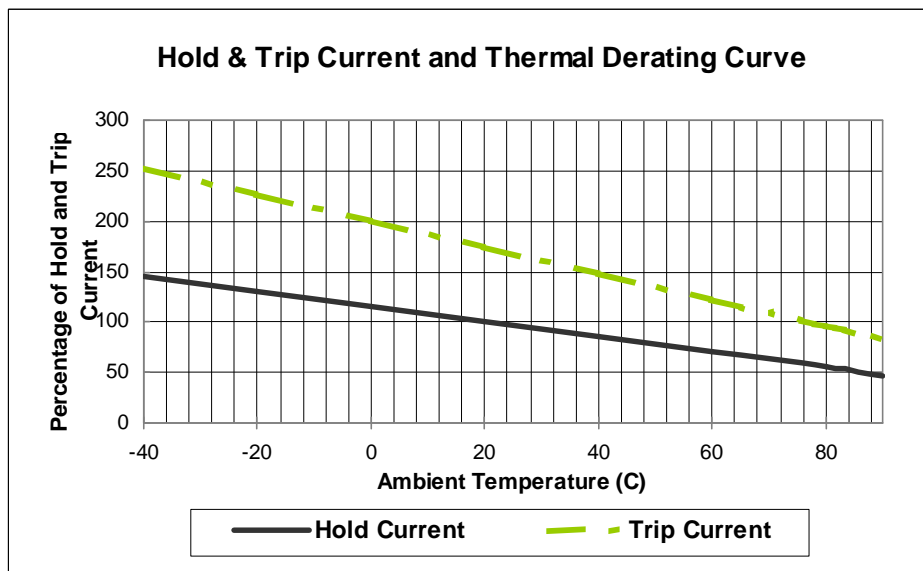
HOW DOES THE RESETTABLE FUSE WORK

FUZETEC™ resettable fuses are designed and made of patented novel polymeric PTC material in thin chip form, developed solely by FUZETEC. With electrodes and leads attached on both sides, it is placed in series to protect a circuit. At “normal operating condition” the device remains at an extremely low resistance (mini-ohms) and allows the electrical current to flow through it without any restriction. When overcurrent conditions occur, the polymeric PTC material heats up and its resistance increases sharply. Such a sharp resistance increase (to an insulated status) cuts off the current in the circuit, and consequently protects the element and device in the circuit. Upon fault current being removed, the resettable fuse cools and its resistance drops to the original extremely low value. The resettable fuse is “resetted” and allows the current through the circuit again.



TRIP CURRENT, HOLD CURRENT AND THERMAL DERATING

Trip Current (IT) and Hold Current (IH) of FUZETEC™ resettable fuse are rated at 23°C. Typically its Trip Current is twice as much as its Hold Current. FUZETEC™ device does not trip at or below its rated Hold Current, and will trip at or above its Trip Current value. However, due to PTC effect both IT and IH reduce with ambient temperature increase and vice versa. As shown below, the currents are reduced nearly 50% at 85°C and increased to 150% at -40°C.



NOTE : All Specification subject to change without notice. 2

Radial Leaded PTC FRX Series



✧ **RoHS Compliant**
(Lead Free) Available

Application:

Wide variety of electronic equipment

Product Features:

Low hold current, Solid state

Radial-leaded product ideal for up to 60V

Operation Current: 50mA ~ 3.75A

Maximum Voltage: 60V

Temperature Range: -40°C to 85°C

Agency Recognition: UL(E211981)

C-UL(E211981)

TÜV (R3-50004084)

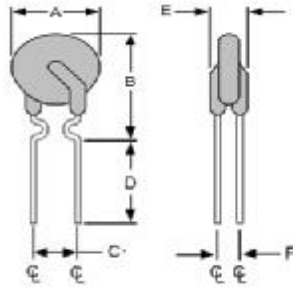
Electrical Characteristics(23°C)

Part Number	Hold Current I _H , A	Trip Current I _T , A	Max.Time to Trip at 5xI _H , S	Maximum Current I _{MAX} , A	Rated Voltage V _{MAX} , Vdc	Typical Power Pd, W	Resistance Tolerance	
							R _{MIN} Ohms	R _{1MAX} Ohms
FRX005-60	0.05	0.10	5.0	40	60	0.26	7.30	20.0
FRX010-60	0.10	0.20	4.0	40	60	0.38	2.50	7.50
FRX017-60	0.17	0.34	3.0	40	60	0.48	2.00	7.00
FRX020-60	0.20	0.40	2.2	40	60	0.41	1.83	4.40
FRX025-60	0.25	0.50	2.5	40	60	0.45	1.25	3.00
FRX030-60	0.30	0.60	3.0	40	60	0.49	0.88	2.10
FRX040-60	0.40	0.80	3.8	40	60	0.56	0.55	1.29
FRX050-60	0.50	1.00	4.0	40	60	0.77	0.50	1.17
FRX065-60	0.65	1.30	5.3	40	60	0.88	0.31	0.72
FRX075-60	0.75	1.50	6.3	40	60	0.92	0.25	0.60
FRX090-60	0.90	1.80	7.2	40	60	0.99	0.20	0.47
FRX110-60	1.10	2.20	8.2	40	60	1.50	0.15	0.38
FRX135-60	1.35	2.70	9.6	40	60	1.70	0.12	0.30
FRX160-60	1.60	3.20	11.4	40	60	1.90	0.09	0.22
FRX185-60	1.85	3.70	12.6	40	60	2.10	0.08	0.19
FRX250-60	2.50	5.00	15.6	40	60	2.50	0.05	0.13
FRX300-60	3.00	6.00	19.8	40	60	2.80	0.04	0.10
FRX375-60	3.75	7.50	24.0	40	60	3.20	0.03	0.08

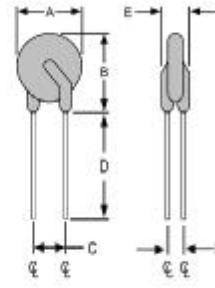
I_H=Hold current-maximum current at which the device will not trip at 23°C still air.
 I_T=Trip current-minimum current at which the device will always trip at 23°C still air.
 V_{MAX}=Maximum voltage device can withstand without damage at its rated current.
 I_{MAX}= Maximum fault current device can withstand without damage at rated voltage (V max).
 Pd=Typical power dissipated from device when in the tripped state in 23°C still air environment.
 R_{MIN}=Minimum device resistance at 23°C.
 R_{1MAX}=Maximum device resistance at 23°C, 1 hour after tripping .
 Physical specifications:
 Lead material: FRX005-FRX090 Tin plated copper, 24 AWG.
 FRX110-FRX375 Tin plated copper, 20 AWG.
 Soldering characteristics: MIL-STD-202, Method 208E.
 Insulating coating:Flame retardant epoxy, meet UL-94V-0 requirement.

NOTE : All Specification subject to change without notice. 3

FRX Product Dimensions (Millimeters)



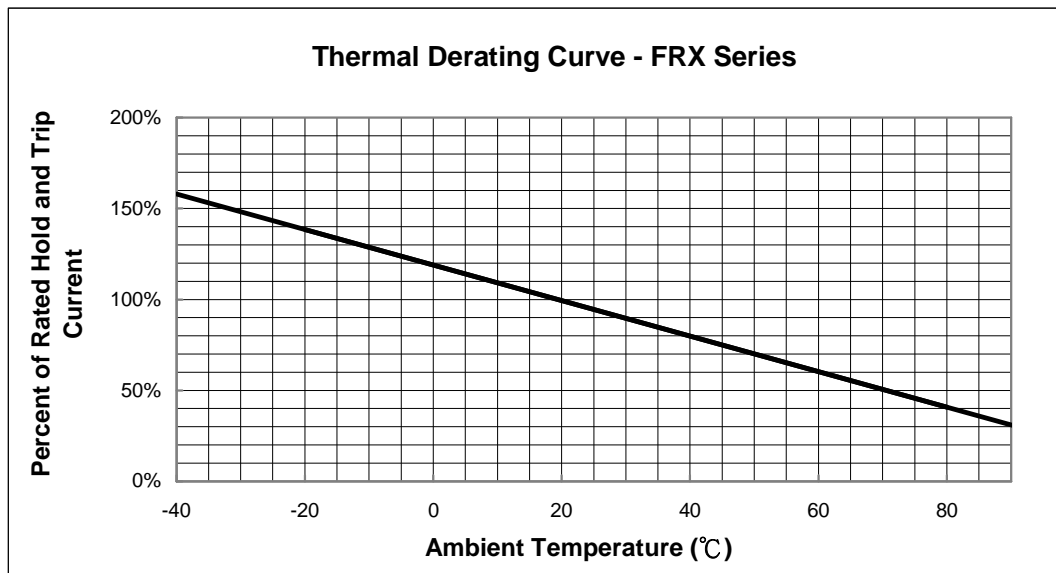
FRX 005-60 ~ FRX 090-60
Lead Size: 24AWG,
Φ 0.51 mm Diameter



FRX FRX 110-60 ~ FRX 375-60
Lead Size: 20AWG,
Φ 0.81 mm Diameter

Part Number	A	B	C	D	E	F
	Maximum	Maximum	Typical	Minimum	Maximum	Typical
FRX005-60	7.4	12.7	5.1	7.6	3.1	1.1
FRX010-60	7.4	12.7	5.1	7.6	3.1	1.1
FRX017-60	7.4	12.7	5.1	7.6	3.1	1.1
FRX020-60	7.4	12.7	5.1	7.6	3.1	1.1
FRX025-60	7.4	12.7	5.1	7.6	3.1	1.1
FRX030-60	7.4	13.0	5.1	7.6	3.1	1.1
FRX040-60	7.6	13.5	5.1	7.6	3.1	1.1
FRX050-60	7.9	13.7	5.1	7.6	3.1	1.1
FRX065-60	9.7	14.5	5.1	7.6	3.1	1.1
FRX075-60	10.4	15.2	5.1	7.6	3.1	1.1
FRX090-60	11.7	15.8	5.1	7.6	3.1	1.1
FRX110-60	13.0	18.0	5.1	7.6	3.1	1.4
FRX135-60	14.5	19.6	5.1	7.6	3.1	1.4
FRX160-60	16.3	21.3	5.1	7.6	3.1	1.4
FRX185-60	17.8	22.9	5.1	7.6	3.1	1.4
FRX250-60	21.3	26.4	10.2	7.6	3.1	1.4
FRX300-60	24.9	30.0	10.2	7.6	3.1	1.4
FRX375-60	28.5	33.5	10.2	7.6	3.1	1.4

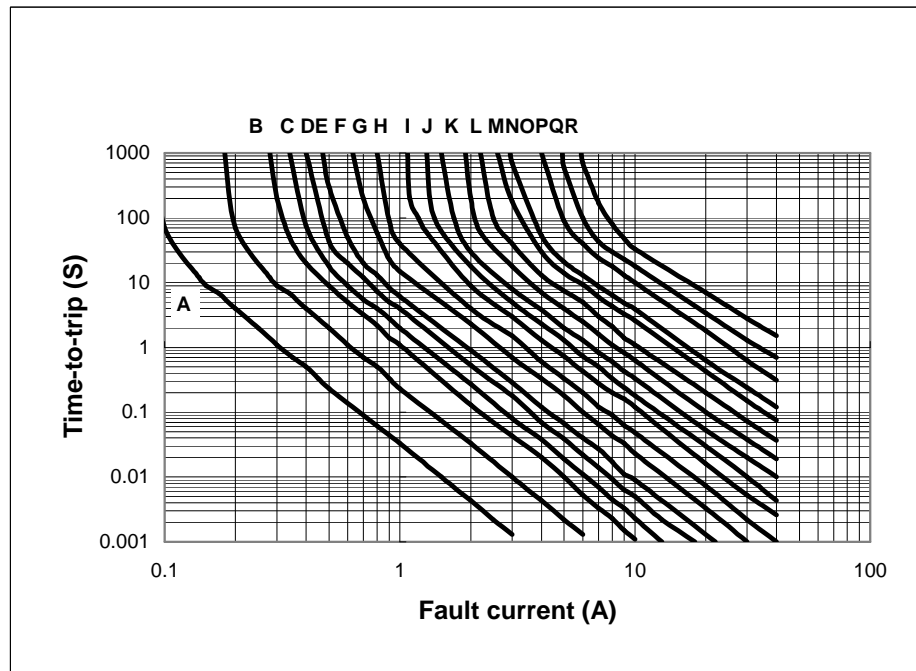
Thermal Derating Curve



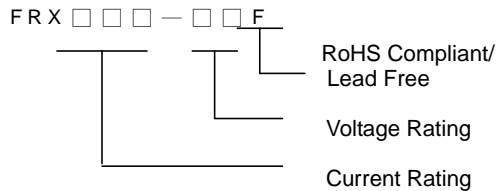
NOTE : All Specification subject to change without notice. 4

Typical Time-To-Trip at 23°C

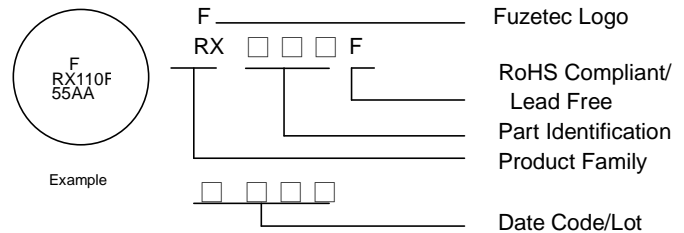
- A= FRX005-60
- B = FRX010-60
- C = FRX017-60
- D = FRX020-60
- E = FRX025-60
- F = FRX030-60
- G = FRX040-60
- H = FRX050-60
- I = FRX065-60
- J = FRX075-60
- K= FRX090-60
- L = FRX110-60
- M = FRX135-60
- N = FRX160-60
- O = FRX185-60
- P = FRX250-60
- Q = FRX300-60
- R = FRX375-60



Part Numbering System



Part Marking System



Standard Package

P/N	Pcs /Bag	Reel/Tape
FRX005-60	500	3K
FRX010-60	500	3K
FRX017-60	500	3K
FRX020-60	500	3K
FRX025-60	500	3K
FRX030-60	500	3K
FRX040-60	500	3K
FRX050-60	500	3K
FRX065-60	300	3K

P/N	Pcs /Bag	Reel/Tape
FRX075-60	300	3K
FRX090-60	300	3K
FRX110-60	300	1.5K
FRX135-60	200	1.5K
FRX160-60	200	1.5K
FRX185-60	200	1.5K
FRX250-60	100	-----
FRX300-60	100	-----
FRX375-60	100	-----

Warning:

- Operation beyond the specified maximum ratings or improper use may result in damage and possible electrical arcing and/or flame.
- PPTC device are intended for occasional overcurrent protection. Application for repeated overcurrent condition and/or prolonged trip are not anticipated.
- Avoid contact of PPTC device with chemical solvent. Prolonged contact will damage the device performance.

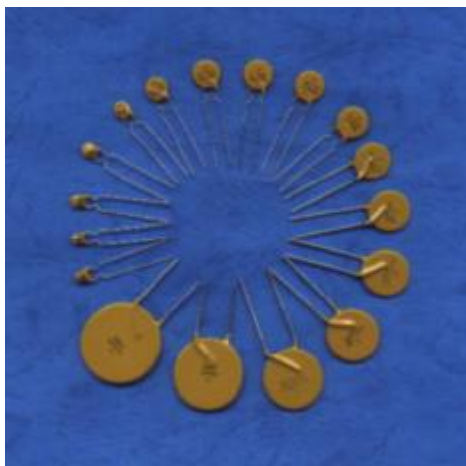


Radial Leaded PTC FRX 90V Series



Electrical Characteristics (23°C)

✳ **RoHS Compliant
(Lead Free) Available**



Application:

Telecom & wide variety of electronic equipment

Product Features:

Low hold current, Solid state, Radial leaded product ideal for up to 90V

Operation Current: 100mA~3.75A

Maximum Voltage: Up to 90V

Temperature Range: -40°C to 85°C

Agency Recognition: UL (E211981)

C-UL (E211981)

TÜV (R50004084)

Part Number	Hold Current	Trip Current	Max.Time to Trip	Maximum Current	Rated Voltage	Typical Power	Resistance Tolerance	
	I _H , A	I _T , A	at 5xI _H , S	I _{MAX} , A	V _{MAX} ,Vdc	P _d , W	R _{MIN} Ohms	R _{1MAX} Ohms
FRX010-90	0.10	0.20	4.0	40	72/90	0.38	2.50	7.50
FRX015-90	0.15	0.35	10.0	40	72/90	0.70	2.40	7.00
FRX017-90	0.17	0.34	3.0	40	72/90	0.48	2.00	5.00
FRX020-90	0.20	0.40	2.2	40	72/90	0.41	1.83	4.40
FRX025-90	0.25	0.50	2.5	40	72/90	0.45	1.25	3.00
FRX030-90	0.30	0.60	3.0	40	72/90	0.49	0.88	2.10
FRX035-90	0.35	0.75	10.0	40	72/90	1.30	0.70	2.50
FRX040-90	0.40	0.80	3.8	40	72/90	0.56	0.55	1.29
FRX050-90	0.50	1.00	4.0	40	72/90	0.77	0.50	1.17
FRX055-90	0.55	1.20	10.0	40	72/90	1.50	0.40	1.50
FRX065-90	0.65	1.30	5.3	40	72/90	0.88	0.31	0.72
FRX075-90	0.75	1.50	6.3	40	72/90	0.92	0.25	0.60
FRX090-90	0.90	1.80	7.2	40	72/90	0.99	0.20	0.47
FRX110-90	1.10	2.20	8.2	40	72/90	1.50	0.15	0.38
FRX135-90	1.35	2.70	9.6	40	72/90	1.70	0.12	0.30
FRX160-90	1.60	3.20	11.4	40	72/90	1.90	0.09	0.22
FRX185-90	1.85	3.70	12.6	40	72/90	2.10	0.08	0.19
FRX250-90	2.50	5.00	15.6	40	72/90	2.50	0.05	0.13
FRX300-90	3.00	6.00	19.8	40	72/90	2.80	0.04	0.10
FRX375-90	3.75	7.50	24.0	40	72/90	3.20	0.03	0.08

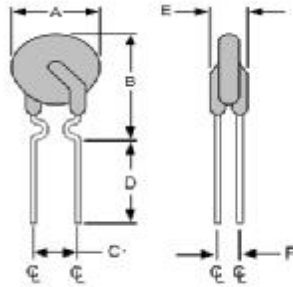
I_H=Hold current-maximum current at which the device will not trip at 23 °C still air.
I_T=Trip current-minimum current at which the device will always trip at 23 °C still air.
V_{MAX}=Maximum voltage device can withstand without damage at its rated current.
I_{MAX}= Maximum fault current device can withstand without damage at rated voltage (V_{MAX}).
P_d=Typical power dissipated from device when in tripped state in 23 °C still air environment.
R_{MIN}=Minimum device resistance at 23 °C.
R_{1MAX}=Maximum device resistance at 23 °C, 1 hour after tripping .
Physical specifications:
Lead material: FRX010~FRX090 Tin plated copper, 24 AWG.
FRX110~FRX375 Tin plated copper, 20 AWG.
Soldering characteristics: MIL-STD-202, Method 208E.
Insulating coating:Flame retardant epoxy, meets UL-94V-0 requirement.

NOTE : All Specification subject to change without notice. 6

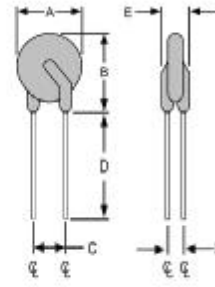
Radial Leaded PTC FRX 90V Series



FRX90V Production Dimensions (millimeter)



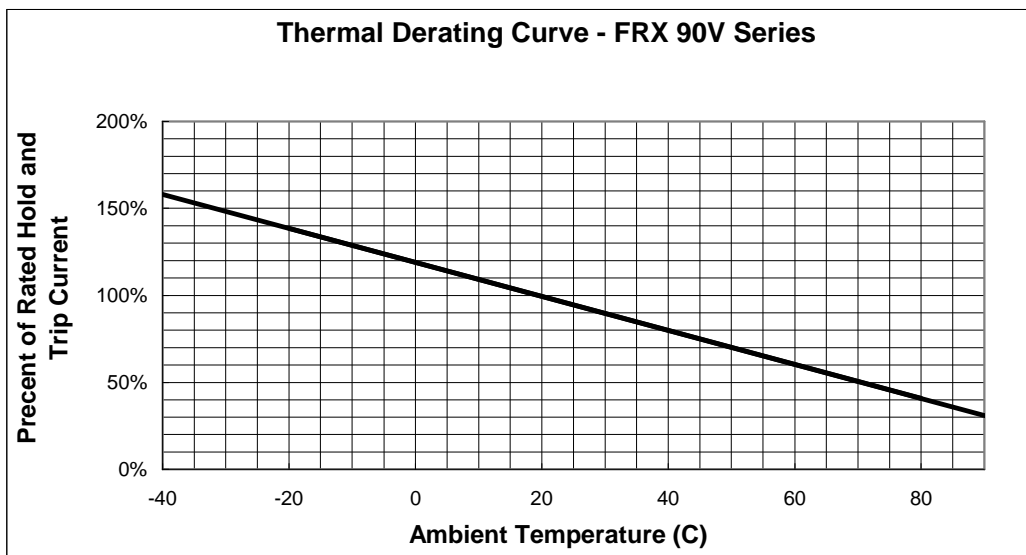
FRX 010-90 ~ FRX 090-90
Lead Size : 24AWG
Φ 0.51 mm Diameter



FRX 110-90 ~ FRX 375-90
Lead Size : 20AWG
Φ 0.81 mm Diameter

Part Number	A	B	C	D	E	F
	Maximum	Maximum	Typical	Minimum	Maximum	Typical
FRX010-90	7.4	12.7	5.1	7.6	3.1	1.1
FRX015-90	7.4	12.7	5.1	7.6	3.1	1.1
FRX017-90	7.4	12.7	5.1	7.6	3.1	1.1
FRX020-90	7.4	12.7	5.1	7.6	3.1	1.1
FRX025-90	7.4	12.7	5.1	7.6	3.1	1.1
FRX030-90	7.4	13.0	5.1	7.6	3.1	1.1
FRX035-90	7.4	12.7	5.1	7.6	3.1	1.1
FRX040-90	7.6	13.5	5.1	7.6	3.1	1.1
FRX050-90	7.9	13.7	5.1	7.6	3.1	1.1
FRX055-90	9.7	14.0	5.1	7.6	3.1	1.1
FRX065-90	9.7	14.5	5.1	7.6	3.1	1.1
FRX075-90	10.4	15.2	5.1	7.6	3.1	1.1
FRX090-90	11.7	15.8	5.1	7.6	3.1	1.1
FRX110-90	13.0	18.0	5.1	7.6	3.1	1.4
FRX135-90	14.5	19.6	5.1	7.6	3.1	1.4
FRX160-90	16.3	21.3	5.1	7.6	3.1	1.4
FRX185-90	17.8	22.9	5.1	7.6	3.1	1.4
FRX250-90	21.3	26.4	10.2	7.6	3.1	1.4
FRX300-90	24.9	30.0	10.2	7.6	3.1	1.4
FRX375-90	28.5	33.5	10.2	7.6	3.1	1.4

Thermal Derating Curve



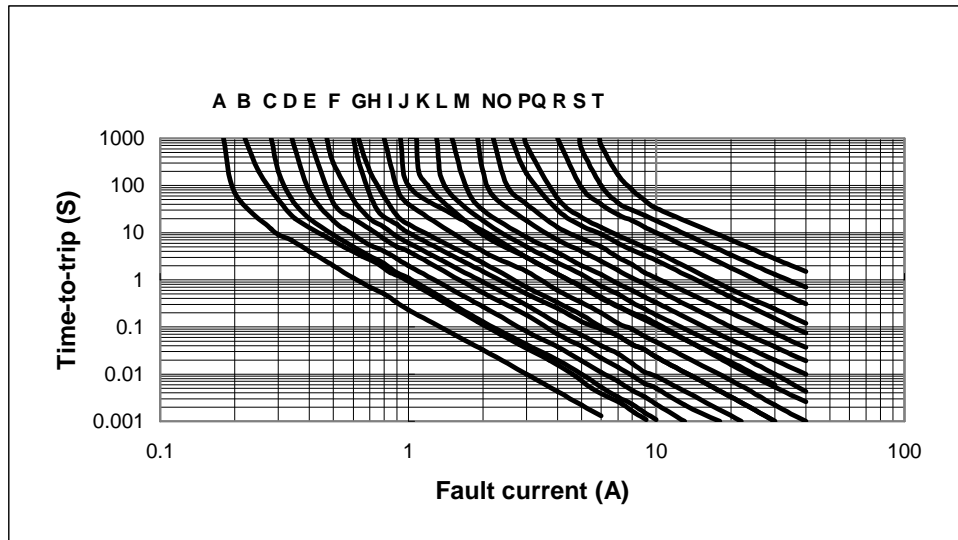
NOTE : All Specification subject to change without notice. 7

Radial Leaded PTC FRX 90V Series

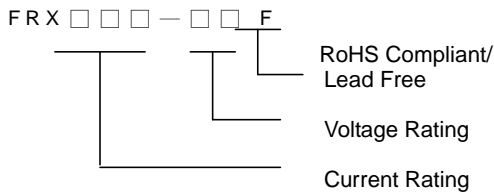


Typical Time-To-Trip at 23°C

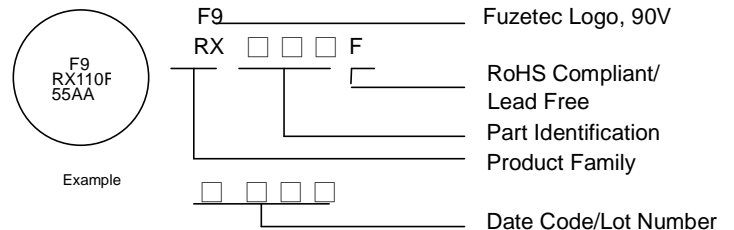
- A = FRX010-90
- B = FRX015-90
- C = FRX017-90
- D = FRX020-90
- E = FRX025-90
- F = FRX030-90
- G = FRX035-90
- H = FRX040-90
- I = FRX050-90
- J = FRX055-90
- K = FRX065-90
- L = FRX070-90
- M = FRX090-90
- N = FRX110-90
- O = FRX135-90
- P = FRX160-90
- Q = FRX185-90
- R = FRX250-90
- S = FRX300-90
- T = FRX375-90



Part Numbering System



Part Marking System



Standard Package

P/N	Pcs /Bag	Reel/Tape
FRX010-90	500	3K
FRX015-90	500	3K
FRX017-90	500	3K
FRX020-90	500	3K
FRX025-90	500	3K
FRX030-90	500	3K
FRX035-90	500	3K
FRX040-90	500	3K
FRX050-90	500	3K
FRX055-90	500	3K

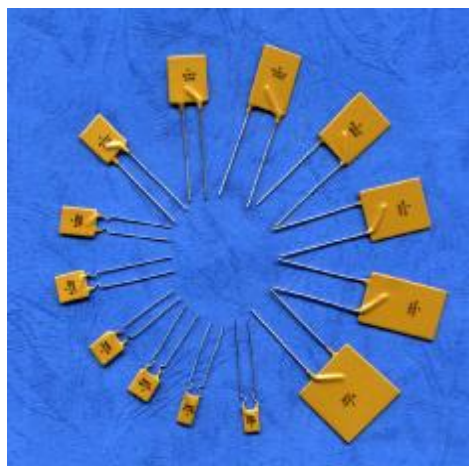
P/N	Pcs /Bag	Reel/Tape
FRX065-90	300	3K
FRX075-90	300	3K
FRX090-90	300	3K
FRX110-90	200	1.5K
FRX135-90	200	1.5K
FRX160-90	200	1.5K
FRX185-90	200	1.5K
FRX250-90	100	-----
FRX300-90	100	-----
FRX375-90	100	-----

Warning:

- Operation beyond the specified maximum ratings or improper use may result in damage and possible electrical arcing and/or flame.
- PPTC device are intended for occasional overcurrent protection. Application for repeated overcurrent condition and/or prolonged trip are not anticipated.
- Avoid contact of PPTC device with chemical solvent. Prolonged contact will damage the device performance.



Radial Leaded PTC FRU Series



※ **RoHS Compliant
(Lead Free) Available**

Application:

Wide variety of electronic equipment

Product Features:

Low resistance, High hold current, Solid state
Radial-leaded product ideal for up to 30V

Operation Current: 900mA~9A

Maximum Voltage: 30V

Temperature Range: -40°C to 85°C

Agency Recognition: UL(E211981)

C-UL(E211981)

TÜV (R3-50004084)

Electrical Characteristics(23°C)

Part Number	Hold Current	Trip Current	Max.Time To Trip	Maximum Current	Rated Voltage	Typical Power	Resistance Tolerance	
							R _{MIN}	R _{1MAX}
	I _H , A	I _T , A	at 5xI _H , S	I _{MAX} , A	V _{MAX} , Vdc	P _d , W	Ohms	Ohms
FRU090-30	0.90	1.80	5.9	40	30	0.6	0.070	0.22
FRU110-30	1.10	2.20	6.6	40	30	0.7	0.050	0.17
FRU135-30	1.35	2.70	7.3	40	30	0.8	0.040	0.13
FRU160-30	1.60	3.20	8.0	40	30	0.9	0.030	0.11
FRU185-30	1.85	3.70	8.7	40	30	1.0	0.030	0.09
FRU250-30	2.50	5.00	10.3	40	30	1.2	0.020	0.07
FRU300-30	3.00	6.00	10.8	40	30	2.0	0.020	0.08
FRU400-30	4.00	8.00	12.7	40	30	2.5	0.010	0.05
FRU500-30	5.00	10.00	14.5	40	30	3.0	0.010	0.05
FRU600-30	6.00	12.00	16.0	40	30	3.5	0.005	0.04
FRU700-30	7.00	14.00	17.5	40	30	3.8	0.005	0.03
FRU800-30	8.00	16.00	18.8	40	30	4.0	0.005	0.02
FRU900-30	9.00	18.00	20.0	40	30	4.2	0.005	0.02

I_H=Hold current-maximum current at which the device will not trip at 23°C still air.

I_T=Trip current-minimum current at which the device will always trip at 23°C still air.

V_{MAX}=Maximum voltage device can withstand without damage at its rated current.

I_{MAX}= Maximum fault current device can withstand without damage at rated voltage (V max).

P_d=Maximum power dissipated from device when in the tripped state in 23°C still air environment.

R_{MIN}=Minimum device resistance at 23°C.

R_{1MAX}=Maximum device resistance at 23°C, 1 hour after tripping.

Physical specifications:

Lead material: FRU090~FRU250 Tin plated copper, 24 AWG.

FRU300~FRU900 Tin plated copper, 20 AWG.

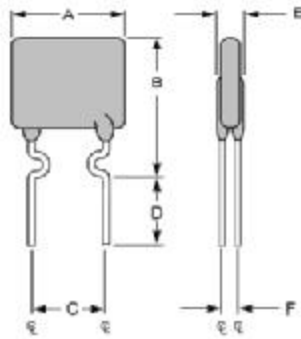
Soldering characteristics: MIL-STD-202, Method 208E.

Insulating coating:Flame retardant epoxy, meet UL-94V-0 requirement.

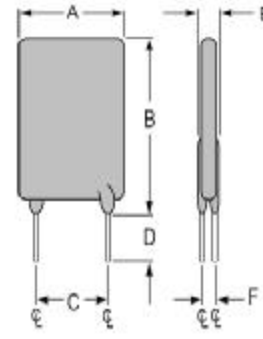
Radial Leaded PTC FRU Series



FRU Product Dimensions (millimeters)



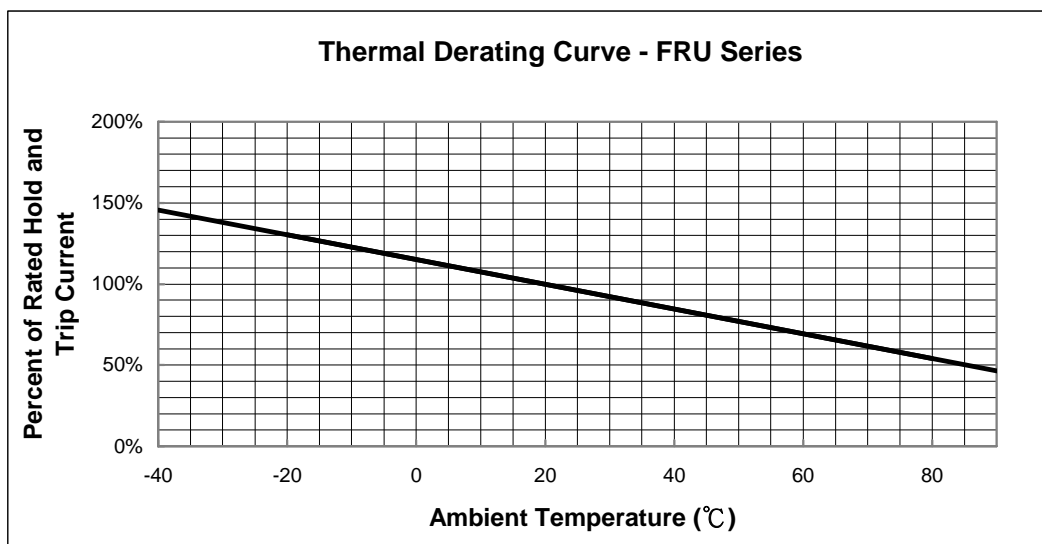
FRU 090-30 ~ FRU 250-30
Lead Size: 24AWG,
Φ 0.51 mm Diameter



FRU 300-30 ~ FRU 900-30
Lead Size: 20AWG
Φ 0.81 mm Diameter

Part Number	A	B	C	D	E	F
	Maximum	Maximum	Typical	Minimum	Maximum	Typical
FRU090-30	7.4	12.2	5.1	7.6	3.0	0.9
FRU110-30	7.4	14.2	5.1	7.6	3.0	0.9
FRU135-30	8.9	13.5	5.1	7.6	3.0	0.9
FRU160-30	8.9	15.2	5.1	7.6	3.0	0.9
FRU185-30	10.2	15.7	5.1	7.6	3.0	0.9
FRU250-30	11.4	18.3	5.1	7.6	3.0	0.9
FRU300-30	11.4	17.3	5.1	7.6	3.0	1.2
FRU400-30	14.0	20.1	5.1	7.6	3.0	1.2
FRU500-30	14.0	24.9	10.2	7.6	3.0	1.2
FRU600-30	16.5	24.9	10.2	7.6	3.0	1.2
FRU700-30	19.1	26.7	10.2	7.6	3.0	1.2
FRU800-30	21.6	29.2	10.2	7.6	3.0	1.2
FRU900-30	24.1	29.7	10.2	7.6	3.0	1.2

Thermal Derating Curve



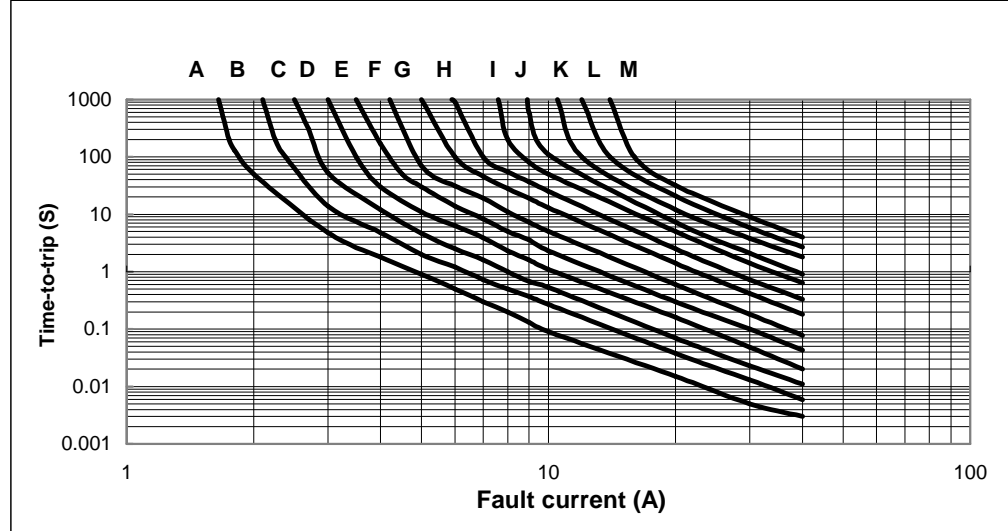
NOTE : All Specification subject to change without notice. 10

Radial Leaded PTC FRU Series

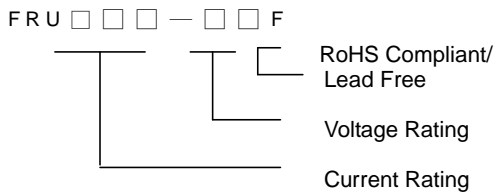


Typical Time-To-Trip at 23°C

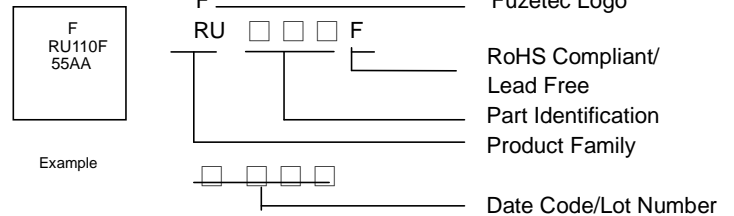
- A = FRU090-30
- B = FRU110-30
- C = FRU135-30
- D = FRU160-30
- E = FRU185-30
- F = FRU250-30
- G = FRU300-30
- H = FRU400-30
- I = FRU500-30
- J = FRU600-30
- K = FRU700-30
- L = FRU800-30
- M = FRU900-30



Part Numbering System



Part Marking System



Standard Package

P/N	Pcs /Bag	Reel/Tape
FRU090-30	500	3k
FRU110-30	500	3k
FRU135-30	300	3k
FRU160-30	300	3k
FRU185-30	300	3k
FRU250-30	300	3k
FRU300-30	200	1.5k

P/N	Pcs /Bag	Reel/Tape
FRU400-30	200	1.5k
FRU500-30	200	-----
FRU600-30	100	-----
FRU700-30	100	-----
FRU800-30	100	-----
FRU900-30	100	-----

Warning:



- Operation beyond the specified maximum ratings or improper use may result in damage and possible electrical arcing and/or flame.
- PPTC device are intended for occasional overcurrent protection. Application for repeated overcurrent condition and/or prolonged trip are not anticipated.
- Avoid contact of PPTC device with chemical solvent. Prolonged contact will damage the device performance.

NOTE : All Specification subject to change without notice. 11

Radial Leaded PTC FRT Series



✧ **RoHS Compliant
(Lead Free) Available**

Application:

IEEE 1394 FireWire, Computers & Consumer electronics

Product Features:

Fast trip time, Lower Trip-to-hold Ratio,
Radial-leaded product ideal for up to 36V

Operation Current: 500mA~2.50A

Maximum Voltage: 36V

Temperature Range: -40°C to 85°C

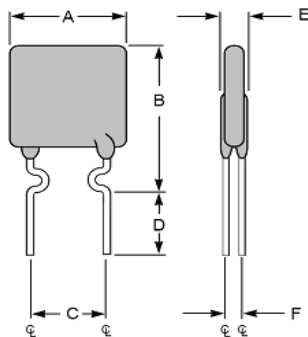
Agency Recognition: UL, C-UL & TÜV pending

Electrical Characteristics (23°C)

Part Number	Hold Current	Trip Current	Maximum Current	Rated Voltage	Typical Power	Resistance Tolerance	
	I _H , A	I _T , A	I _{MAX} , A	V _{MAX} , Vdc	P _d , W	R _{MIN}	R _{1MAX}
						Ohms	Ohms
FRT050-33	0.50	1.00	40	36	0.67	0.140	0.448
FRT075-33	0.75	1.50	40	36	0.71	0.115	0.368
FRT090-33	0.90	1.80	40	36	0.74	0.090	0.288
FRT120-33	1.20	2.30	40	36	0.78	0.074	0.180
FRT135-33	1.35	2.50	40	36	0.84	0.059	0.143
FRT160-33	1.60	2.75	40	36	0.86	0.041	0.131
FRT190-33	1.90	3.00	40	36	0.90	0.045	0.092
FRT220-33	2.20	3.50	40	36	0.95	0.025	0.080
FRT250-33	2.50	4.00	40	36	0.99	0.020	0.064

I_H=Hold current-maximum current at which the device will not trip at 23 °C still air.
 I_T=Trip current-minimum current at which the device will always trip at 23 °C still air.
 V_{MAX}=Maximum voltage device can withstand without damage at its rated current.
 I_{MAX}= Maximum fault current device can withstand without damage at rated voltage (V_{MAX}).
 P_d=Typical power dissipated from device when in tripped state in 23 °C still air environment.
 R_{MIN}=Minimum device resistance at 23°C.
 R_{1MAX}=Maximum device resistance at 23°C, 1 hour after tripping .
 Physical specifications:
 Lead material: Tin plated copper, 24 AWG.
 Soldering characteristics:MIL-STD-202, Method 208E.
 Insulating coating:Flame retardant epoxy, meets UL-94V-0 requirement.

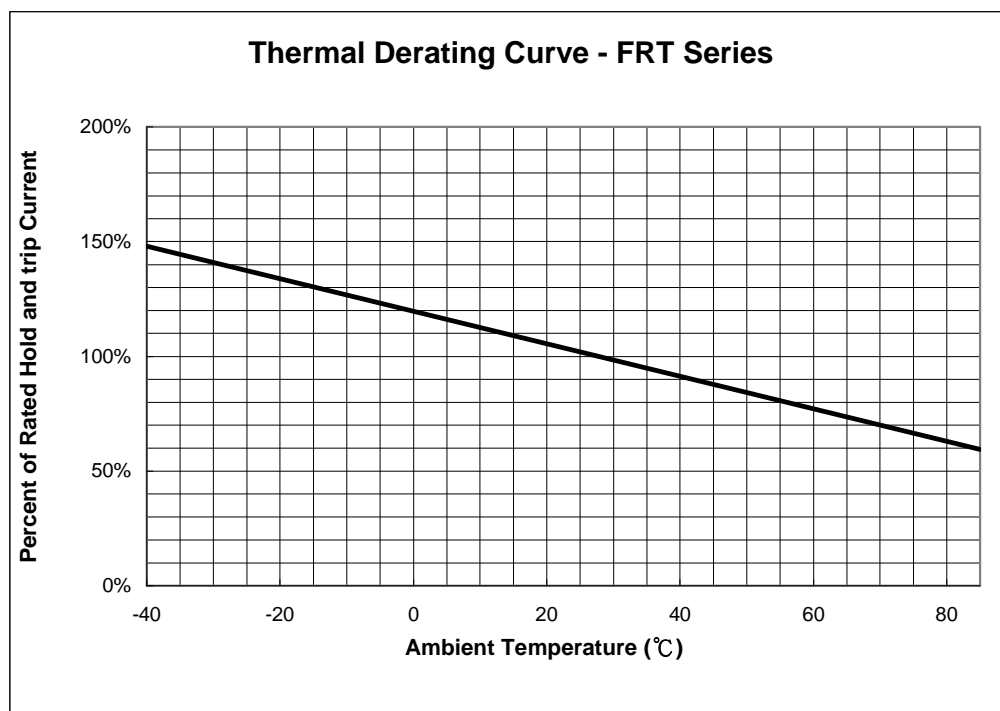
Production Dimensions (millimeter)



Lead Size: 24AWG,
Φ 0.51 mm Diameter

Part Number	A	B	C	D	E	F
	Maximum	Maximum	Typical	Minimum	Maximum	Typical
FRT050-33	7.4	12.2	5.1	7.6	3.0	1.1
FRT075-33	7.4	12.2	5.1	7.6	3.0	1.1
FRT090-33	7.4	12.2	5.1	7.6	3.0	1.1
FRT120-33	7.4	12.2	5.1	7.6	3.0	1.1
FRT135-33	7.4	14.2	5.1	7.6	3.0	1.1
FRT160-33	7.4	14.0	5.1	7.6	3.0	1.1
FRT190-33	9.0	13.5	5.1	7.6	3.0	1.1
FRT220-33	10.0	17.0	5.1	7.6	3.0	1.1
FRT250-33	10.0	19.5	5.1	7.6	3.0	1.1

Thermal Derating Curve



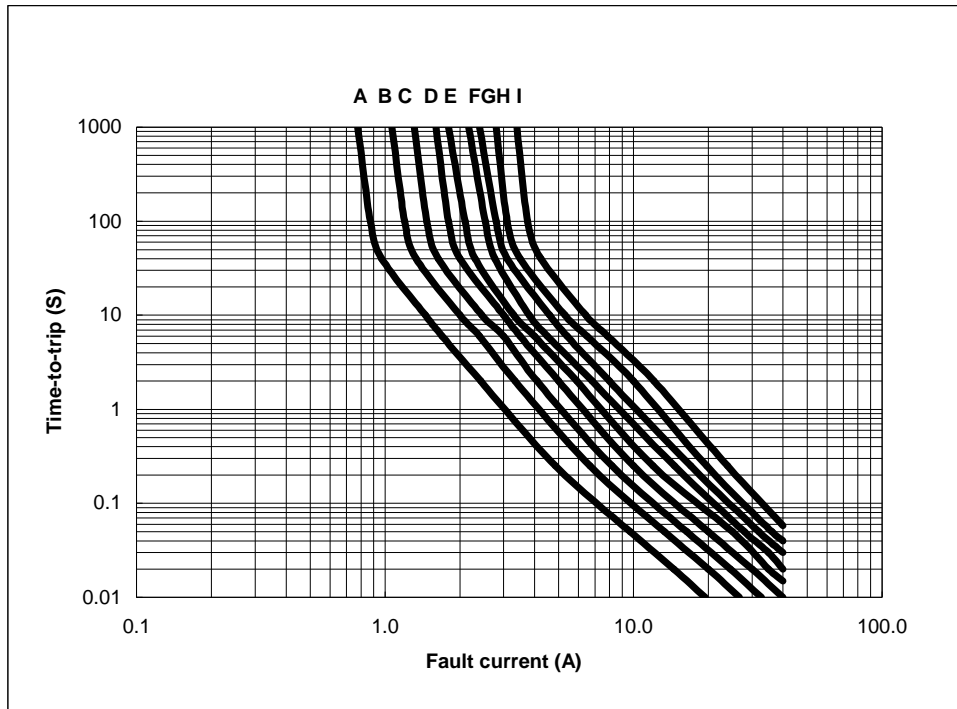
NOTE : All Specification subject to change without notice. 13

Radial Leaded PTC FRT Series

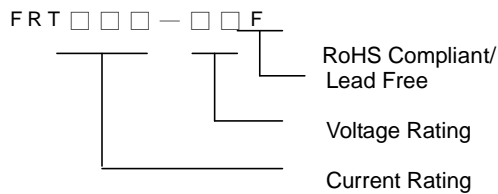


Typical Time-To-Trip at 23°C

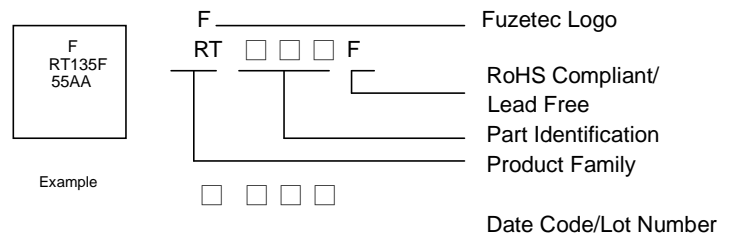
- A= FRT 050-33
- B= FRT 075-33
- C= FRT 090-33
- D= FRT 120-33
- E= FRT 135-33
- F= FRT 160-33
- G= FRT 190-33
- H= FRT 220-33
- I = FRT 250-33



Part Numbering System



Part Marking System



Standard Package

P/N	Pcs /Bag	Reel/Tape
FRT050-33	500	3K
FRT075-33	500	3K
FRT090-33	500	3K
FRT120-33	500	3K
FRT135-33	500	3K

P/N	Pcs /Bag	Reel/Tape
FRT160-33	500	3K
FRT190-33	500	3K
FRT220-33	500	3K
FRT250-33	500	3K

Radial Leaded PTC FUSB Series



✧ **RoHS Compliant
(Lead Free) Available**

Application:

Low voltage USB equipment

Product Features:

Low resistance, Fast trip time , Lower Trip-to-hold Ratio

Operation Current: 750mA ~2.5A

Maximum Voltage: 16V/30V

Temperature Range: -40°C to 85°C

Agency Recognition: UL(E211981)

C-UL(E211981)

TÜV (R3-50004084)

Electrical characteristics(23°C)

Part Number	Hold Current	Trip Current	Max.Time to Trip		Maximum Current	Rated Voltage	Typical Power	Resistance Tolerance	
								R _{MIN}	R _{1MAX}
								Ohms	Ohms
	I _H , A	I _T , A	at 8A, S	at 5xI _H , S	I _{MAX} , A	V _{MAX} ,Vdc	P _d , W		
FUSB075	0.75	1.30	0.4	--	40	16	0.3	0.08	0.23
FUSB090	0.90	1.80	1.2	5.9	40	16/30	0.6	0.07	0.18
FUSB110	1.10	2.20	2.3	6.6	40	16/30	0.7	0.05	0.14
FUSB120	1.20	2.00	0.5	--	40	16	0.6	0.04	0.14
FUSB135	1.35	2.70	4.5	7.3	40	16/30	0.8	0.04	0.12
FUSB155	1.55	2.70	0.6	--	40	16	0.7	0.03	0.12
FUSB160	1.60	3.20	9.0	8.0	40	16/30	0.9	0.03	0.11
FUSB185	1.85	3.70	10.0	8.7	40	16/30	1.0	0.03	0.09
FUSB250	2.50	5.00	40.0	10.3	40	16/30	1.2	0.02	0.07

I_H=Hold current-maximum current at which the device will not trip at 23°C still air.
 I_T=Trip current-minimum current at which the device will always trip at 23°C still air.
 V_{MAX}=Maximum voltage device can withstand without damage at its rated current.
 I_{MAX}= Maximum fault current device can withstand without damage at rated voltage (V max).
 P_d=Typical power dissipated from device when in the tripped state in 23°C still air environment.
 R_{MIN}=Minimum device resistance at 23°C.
 R_{1MAX}=Maximum device resistance at 23°C, 1 hour after tripping .
 Physical specifications:
 Lead material: Tin plated copper, 24 AWG.
 Soldering characteristics: Soldering ability per ANSI/J-STD 002
 Solder heat withstand per IEC 68-2-20

Insulating coating:Flame retardant epoxy polymer,meets UL 94V-0 requirement.

Radial Leaded PTC FUSB Series



FUSB Product Dimensions (millimeters)

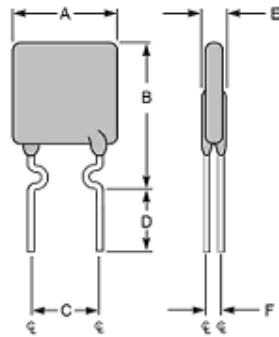


Figure 1
Lead Size: 24AWG,
Φ 0.51 mm Diameter

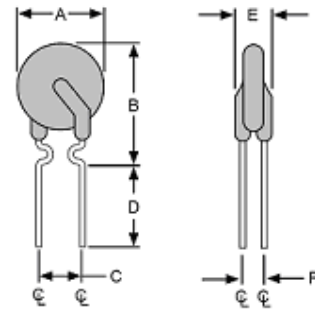
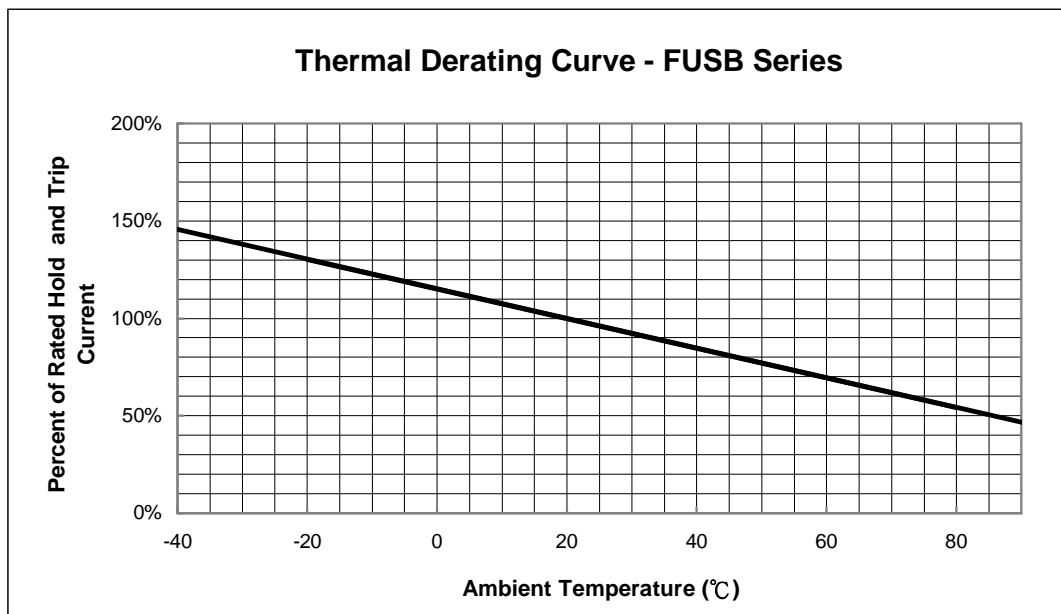


Figure 2
Lead Size : 24AWG
Φ 0.51 mm Diameter

Part Number	Fig	A	B	C	D	E	F
		Maximum	Maximum	Typical	Minimum	Maximum	Typical
FUSB075	2	6.9	11.4	5.1	7.6	3.0	0.8
FUSB090	1	7.4	12.2	5.1	7.6	3.0	0.8
FUSB110	1	7.4	14.2	5.1	7.6	3.0	0.8
FUSB120	2	6.9	11.7	5.1	7.6	3.0	0.8
FUSB135	1	8.9	13.5	5.1	7.6	3.0	0.8
FUSB155	2	6.9	11.7	5.1	7.6	3.0	0.8
FUSB160	1	8.9	15.2	5.1	7.6	3.0	0.8
FUSB185	1	10.2	15.7	5.1	7.6	3.0	0.8
FUSB250	1	11.4	18.3	5.1	7.6	3.0	0.8

Thermal Derating Curve



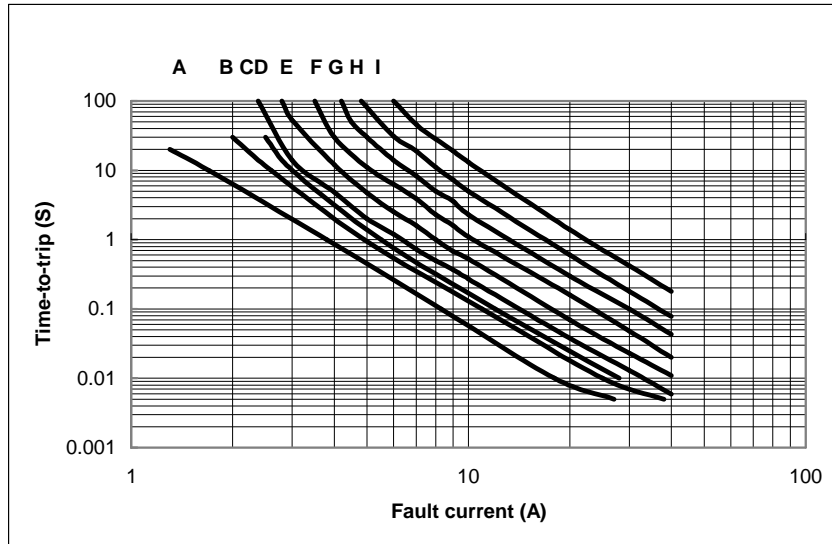
NOTE : All Specification subject to change without notice. 16

Radial Leaded PTC FUSB Series

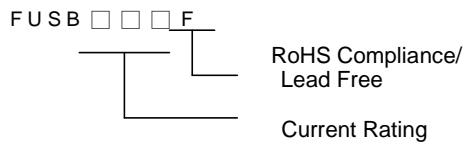


Typical Time-To-Trip at 23°C

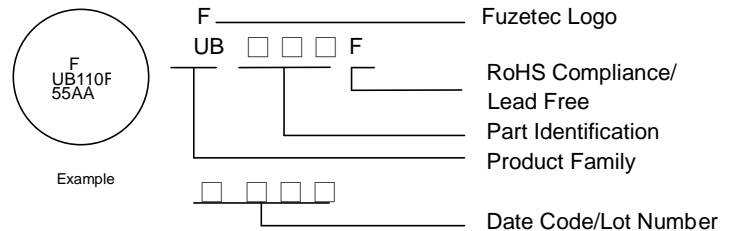
- A = FUSB075
- B = FUSB120
- C = FUSB155
- D = FUSB090
- E = FUSB110
- F = FUSB135
- G = FUSB160
- H = FUSB185
- I = FUSB250



Part Numbering System



Part Marking System



Standard Package

P/N	Pcs /Bag	Reel/Tape
FUSB075	500	3K
FUSB090	500	3K
FUSB110	500	3K
FUSB120	500	3K
FUSB135	500	3K

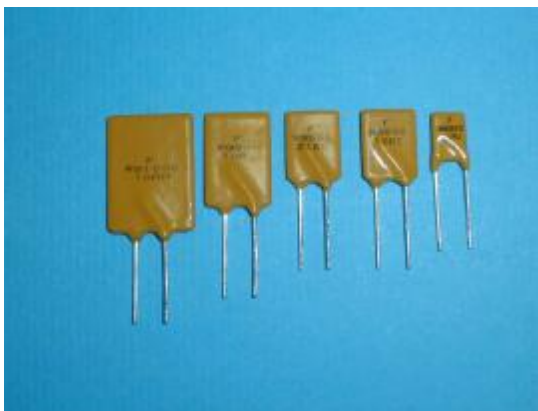
P/N	Pcs /Bag	Reel/Tape
FUSB155	500	3K
FUSB160	500	3K
FUSB185	500	3K
FUSB250	500	3K

Warning:



- Operation beyond the specified maximum ratings or improper use may result in damage and possible electrical arcing and/or flame.
- PPTC device are intended for occasional overcurrent protection. Application for repeated overcurrent condition and/or prolonged trip are not anticipated.
- Avoid contact of PPTC device with chemical solvent. Prolonged contact will damage the device performance.

Radial Leaded PTC FRG Series



※ **RoHS Compliant
(Lead Free) Available**

Application:

Wide variety of electronic equipment

Product Features:

Very high hold current, Solid state

Radial-leaded product ideal for up to 16Vdc

Operation Current: 3 A~14A

Maximum Voltage: 16V

Temperature Range: -40°C to 85°C

Agency Recognition: UL(E211981)

C-UL(E211981)

TÜV (R50004084)

Electrical Characteristics(23°C)

Part Number	Hold Current	Trip Current	Max.time to trip	Maximum Current	Rated Voltage	Typical Power	Resistance Tolerance	
							R _{MIN}	R _{1MAX}
	I _H , A	I _T , A	at 5xI _H , S	I _{MAX} , A	V _{MAX} , Vdc	P _d , W	Ohms	Ohms
FRG300-16	3.0	5.1	2.0	100	16	2.3	0.034	0.105
FRG400-16	4.0	6.8	3.5	100	16	2.4	0.020	0.063
FRG500-16	5.0	8.5	3.6	100	16	2.6	0.014	0.044
FRG600-16	6.0	10.2	5.8	100	16	2.8	0.009	0.033
FRG700-16	7.0	11.9	8.0	100	16	3.0	0.006	0.021
FRG800-16	8.0	13.6	9.0	100	16	3.0	0.005	0.018
FRG900-16	9.0	15.3	12.0	100	16	3.3	0.004	0.015
FRG1000-16	10.0	17.0	12.5	100	16	3.3	0.003	0.012
FRG1100-16	11.0	18.7	13.5	100	16	3.7	0.003	0.010
FRG1200-16	12.0	20.4	16.0	100	16	4.2	0.002	0.009
FRG1400-16	14.0	23.8	20.0	100	16	4.6	0.002	0.008

I_H=Hold current-maximum current at which the device will not trip at 23 °C still air.

I_T=Trip current-minimum current at which the device will always trip at 23 °C still air.

V_{MAX}=Maximum voltage device can withstand without damage at its rated current.

I_{MAX}= Maximum fault current device can withstand without damage at rated voltage (V max).

P_d=Typical power dissipated from device when in the tripped state in 23 °C still air environment.

R_{MIN}=Minimum device resistance at 23 °C.

R_{1MAX}=Maximum device resistance at 23 °C, 1 hour after tripping .

Physical specifications:

Lead material: FRG300~FRG1100 Tin plated copper, 20 AWG.

FRG1200~FRG1400 Tin plated copper, 18 AWG.

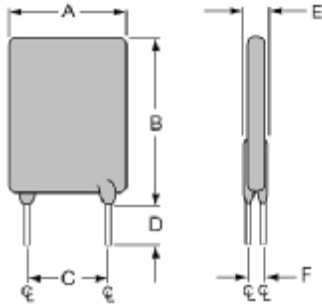
Soldering characteristics: MIL-STD-202, Method 208E.

Insulating coating:Flame retardant epoxy, meet UL-94V-0 requirement.

Radial Leaded PTC FRG Series



FRG Product Dimensions (millimeters)

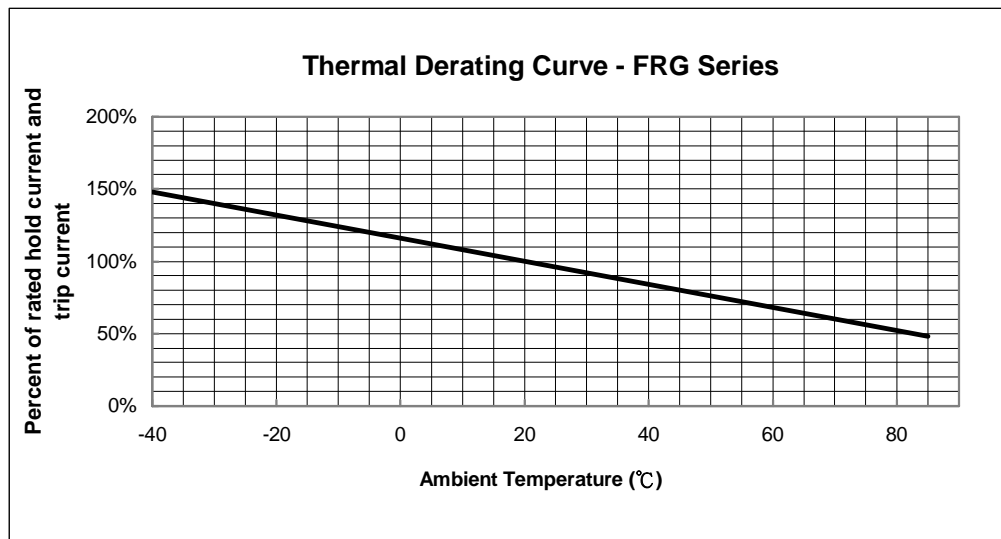


Lead Size
FRG300-16~FRG1100-16
20AWG
Φ0.81 mm Diameter

Lead Size
FRG1200-16~FRG1400-16
18AWG
Φ1.0 mm Diameter

Part Number	A	B	C	D	E	F
	Maximum	Maximum	Typical	Minimum	Maximum	Typical
FRG300-16	7.1	11.0	5.1	7.6	3.0	1.2
FRG400-16	8.9	12.8	5.1	7.6	3.0	1.2
FRG500-16	10.4	14.3	5.1	7.6	3.0	1.2
FRG600-16	10.7	17.1	5.1	7.6	3.0	1.2
FRG700-16	11.2	19.7	5.1	7.6	3.0	1.2
FRG800-16	12.7	20.9	5.1	7.6	3.0	1.2
FRG900-16	14.0	21.7	5.1	7.6	3.0	1.2
FRG1000-16	16.5	24.1	5.1	7.6	3.0	1.2
FRG1100-16	17.5	26.0	5.1	7.6	3.0	1.2
FRG1200-16	17.5	28.0	10.2	7.6	3.6	1.4
FRG1400-16	27.9	27.9	10.2	7.6	3.6	1.4

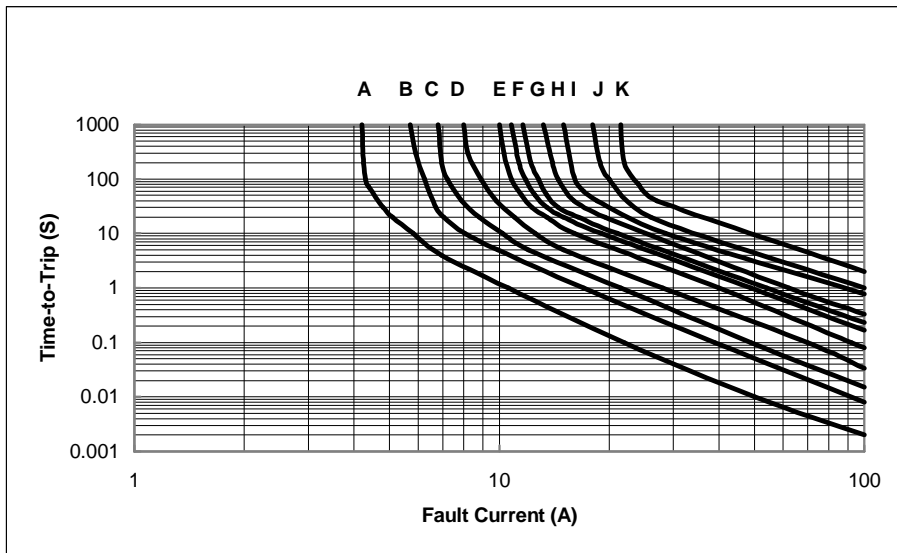
Thermal Derating Curve



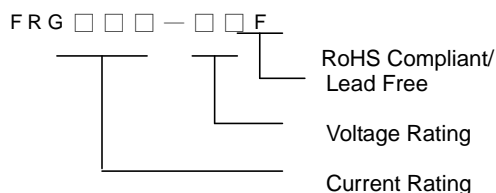
NOTE : All Specification subject to change without notice. 19

Typical Time-To-Trip at 23°C

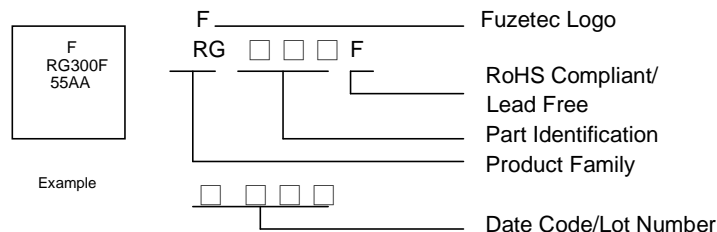
- A=FRG300-16
- B=FRG400-16
- C=FRG500-16
- D=FRG600-16
- E=FRG700-16
- F=FRG800-16
- G=FRG900-16
- H=FRG1000-16
- I =FRG1100-16
- J=FRG1200-16
- K=FRG1400-16



Part Numbering System



Part Marking System



Standard Package

P/N	Pcs /Bag	Reel/Tape
FRG300-16	500	2.5k
FRG400-16	300	2.5k
FRG500-16	300	2.5k
FRG600-16	300	2.5k
FRG700-16	200	1.2k
FRG800-16	200	-----

P/N	Pcs /Bag	Reel/Tape
FRG900 -16	200	-----
FRG1000-16	100	-----
FRG1100-16	100	-----
FRG1200-16	100	-----
FRG1400-16	100	-----

Warning:

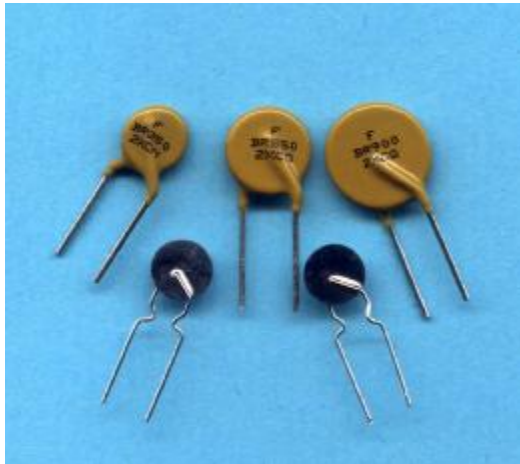


- Operation beyond the specified maximum ratings or improper use may result in damage and possible electrical arcing and/or flame.
- PPTC device are intended for occasional overcurrent protection. Application for repeated overcurrent condition and/or prolonged trip are not anticipated.
- Avoid contact of PPTC device with chemical solvent. Prolonged contact will damage the device performance.

Radial Leaded PTC FBR Series



✧ **RoHS Compliant
(Lead Free) Available**



Application:

Cable /Telephone Electronics: Cable Power
Passing Tap.

Product Features:

Low hold current, Solid state, Radial-leaded product
ideal for up to 90V

Operation Current: 100mA~900mA

Maximum Voltage: 90V

Temperature Range: -40°C to 85°C

Agency Recognition: UL (E211981)

C-UL(E211981)

TÜV (R50004084)

Electrical Characteristics (23°C)

Part Number	Hold Current	Trip Current	Max.Time to Trip	Maximum Current	Rated Voltage	Typical Power	Resistance Tolerance	
	I _H , A	I _T , A	at 5xI _H , S	I _{MAX} , A	V _{MAX} ,Vdc	P _d , W	R _{MIN}	R _{1MAX}
							Ohms	Ohms
FBR100(U)	0.10	0.20	10	40	90	0.38	2.50	7.50
FBR150(U)	0.15	0.35	10	40	90	0.70	2.40	7.00
FBR200(U)	0.20	0.45	10	40	90	0.80	1.50	4.50
FBR250(U)	0.25	0.55	10	40	90	0.90	1.25	3.70
FBR350(U)	0.35	0.75	10	40	90	1.30	0.90	2.50
FBR550(U)	0.55	1.20	12	40	90	1.50	0.45	1.50
FBR750(U)	0.75	1.60	13	40	90	1.70	0.30	1.20
FBR900(U)	0.90	2.00	20	40	90	2.30	0.15	0.70

I_H=Hold current-maximum current at which the device will not trip at 23 °C still air.

I_T=Trip current-minimum current at which the device will always trip at 23 °C still air.

V_{MAX}=Maximum voltage device can withstand without damage at its rated current.

I_{MAX}= Maximum fault current device can withstand without damage at rated voltage (V_{MAX}).

P_d=Typical power dissipated from device when in tripped state in 23 °C still air environment.

R_{MIN}=Minimum device resistance at 23 °C .

R_{1MAX}=Maximum device resistance at 23 °C, 1 hour after tripping .

Physical specifications:

Lead material: FBR100~FBR900 Tin plated copper, 20 AWG.

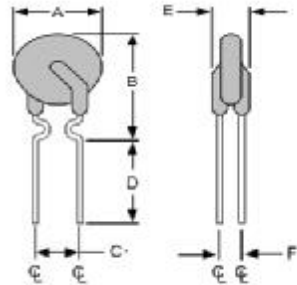
Soldering characteristics: MIL-STD-202, Method 208E.

Insulating coating:Flame retardant epoxy, meets UL-94V-0 requirement.

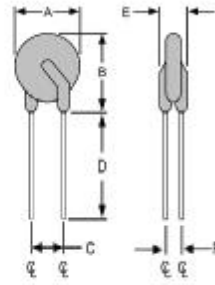
Radial Leaded PTC FBR Series



Production Dimensions (millimeter)



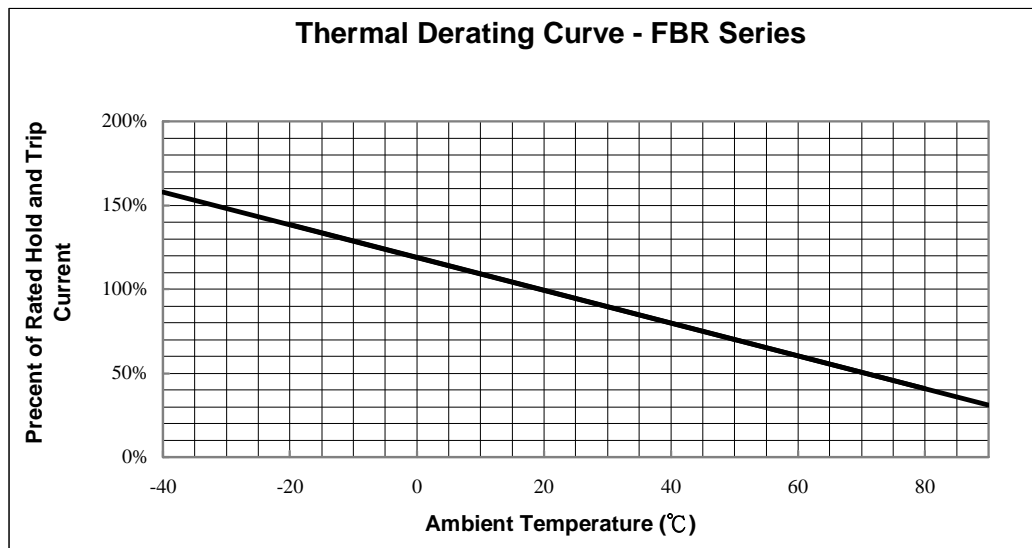
FBR 100-90 ~ FBR 350-90
Lead Size: 24AWG
Φ 0.51 mm Diameter



FBR 550-90 ~ FBR 900-90
Lead Size: 20AWG
Φ 0.81 mm Diameter

Part Number	A	B	C	D	E	F
	Maximum	Maximum	Typical	Minimum	Maximum	Typical
FBR100 (U)	7.4	12.7	5.1	7.6	3.6	1.4
FBR150 (U)	9.0	12.7	5.1	7.6	3.6	1.4
FBR200 (U)	9.0	12.7	5.1	7.6	3.6	1.4
FBR250 (U)	9.0	12.7	5.1	7.6	3.6	1.4
FBR350 (U)	9.0	12.7	5.1	7.6	3.6	1.4
FBR550 (U)	10.9	14.0	5.1	7.6	3.6	1.4
FBR750 (U)	11.9	15.5	5.1	7.6	3.6	1.4
FBR900 (U)	13.0	16.0	5.1	7.6	3.6	1.4

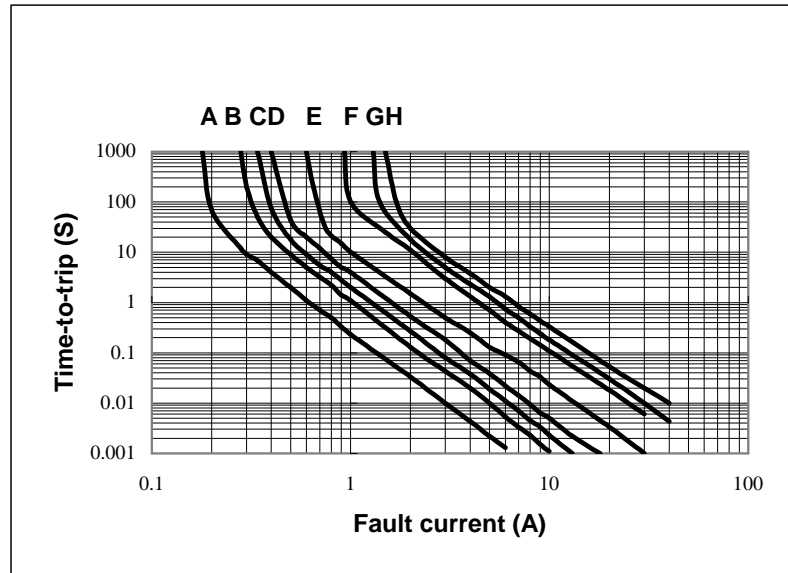
Thermal Derating Curve



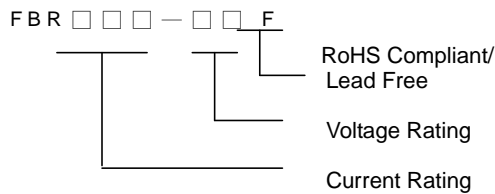
NOTE : All Specification subject to change without notice. 22

Typical Time-To-Trip at 23°C

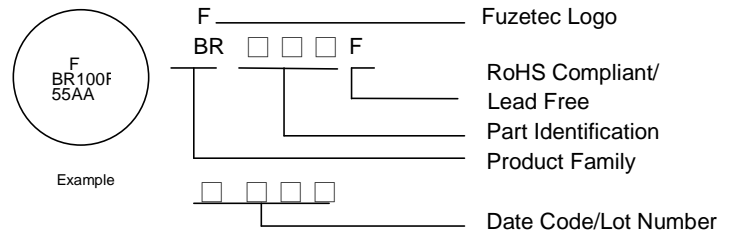
- A = FBR100 (U)
- B = FBR150 (U)
- C = FBR200 (U)
- D = FBR250 (U)
- E = FBR350 (U)
- F = FBR550 (U)
- G = FBR750 (U)
- H = FBR900 (U)



Part Numbering System



Part Marking System



Standard Package

P/N	Pcs /Bag	Reel/Tape
FBR100 (U)	500	2.5K
FBR150 (U)	500	2.5K
FBR200 (U)	500	2.5K
FBR250 (U)	500	2.5K

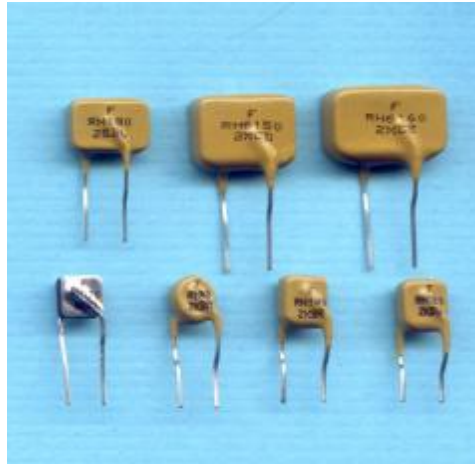
P/N	Pcs /Bag	Reel/Tape
FBR350 (U)	500	2.5K
FBR550 (U)	500	2K
FBR750 (U)	500	2K
FBR900 (U)	500	2K

Warning:



- Operation beyond the specified maximum ratings or improper use may result in damage and possible electrical arcing and/or flame.
- PPTC device are intended for occasional overcurrent protection. Application for repeated overcurrent condition and/or prolonged trip are not anticipated.
- Avoid contact of PPTC device with chemical solvent. Prolonged contact will damage the device performance.

Radial Leaded PTC FRH Series



✧ **RoHS Compliant
(Lead Free) Available**

Application:

Telecommunication and Data transmitting

Product Features:

Low hold current, Solid state

Radial-leaded product ideal for up to
60V/250V/600V

Operation Current: 0.08 A~0.18A

Maximum Voltage: 60V/250V/600V

Temperature Range: -40°C to 85°C

Agency Recognition: UL(E211981)

C-UL(E211981)

TÜV(R50021651)

Electrical Characteristics(23°C)

Part Number	Hold Current	Maximum Current	Max Oper. Voltage	Max Int. Voltage	Resistance Tolerance	
					R MIN	R1MAX
	I _H , A	I _{MAX} , A	V _{MAX} ,V	V _{IMAX} ,V	Ohms	Ohms
FRH080-250U	0.08	3.0	60	250	14.0	33.0
FRH080-250	0.08	3.0	60	250	14.0	33.0
FRH110-250U	0.11	3.0	60	250	5.0	16.0
FRH110-250	0.11	3.0	60	250	5.0	16.0
FRH120-250U	0.12	3.0	60	250	6.0	16.0
FRH120-250	0.12	3.0	60	250	4.0	16.0
FRH145-250U	0.15	3.0	60	250	3.5	12.0
FRH145-250	0.15	3.0	60	250	3.0	12.0
FRH180-250U	0.18	10.0	60	250	0.8	4.0
FRH180-250	0.18	10.0	60	250	0.8	4.0
FRH150-600	0.15	3.0	60	600	6.0	22.0
FRH160-600	0.16	3.0	60	600	4.0	18.0

I_H=Hold current-maximum current at which the device will not trip at 23 °C still air.

I_T=Trip current-minimum current at which the device will always trip at 23 °C still air.

V_{MAX}=Maximum voltage device can withstand without damage at its rated current.

V_{I-MAX} = Maximum interrupt voltage device can withstand for short period of time. (Not for long term.)

I_{MAX}= Maximum fault current device can withstand without damage at rated voltage (V max).

P_d=Typical power dissipated from device when in the tripped state in 23 °C still air environment.

R_{MIN}=Minimum device resistance at 23°C .

R_{1MAX}=Maximum device resistance at 23°C , 1 hour after tripping .

Physical specifications:

Lead material: FRH080-250 ~ FRH180-250 Tin plated copper, 22 AWG.

FRH150-600 ~ FRH160-600 Tin plated copper, 22 AWG.

Soldering characteristics:MIL-STD-202, Method 208E.

Insulating coating:Flame retardant epoxy, meet UL-94V-0 requirement.

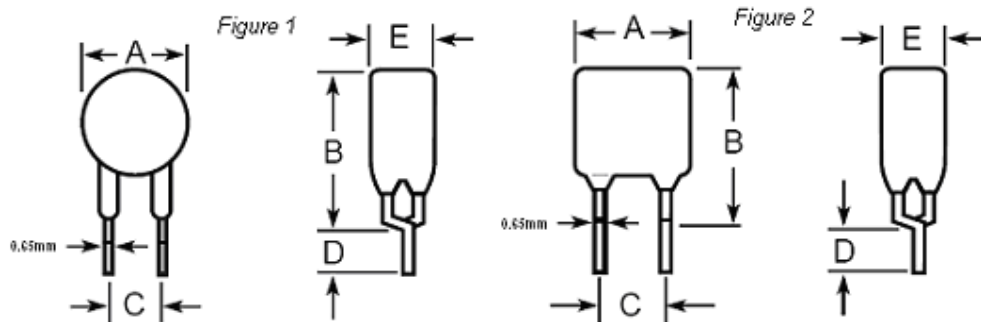
NOTE : All FRH products are designed to assist equipment to pass ITU, UL1950 or GR1089 specification.

CAUTION : FRH devices are not intended for continuous use of Line Voltage such as 120 VAC~ 600VAC and above.

Radial Leaded PTC FRH Series



FRH Product Dimensions (millimeters)

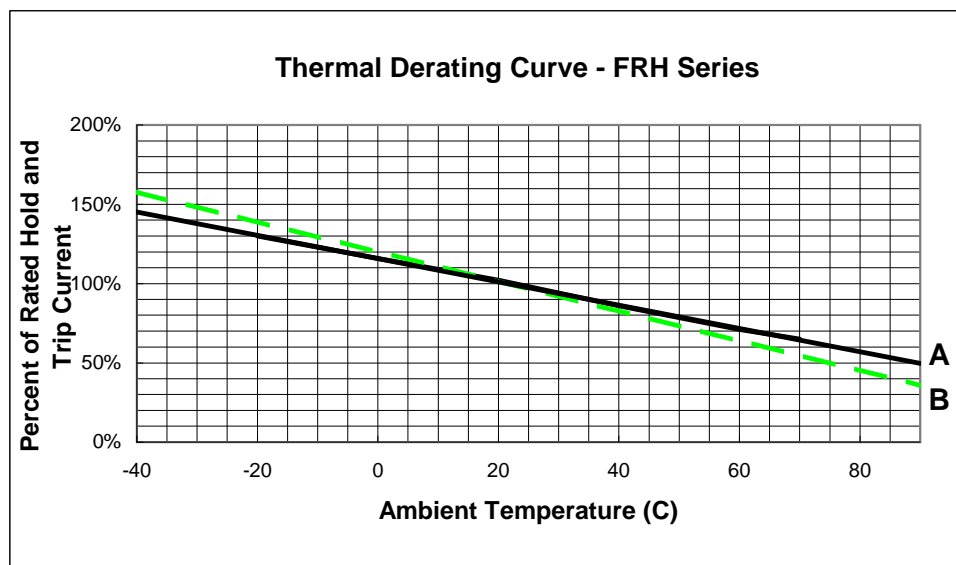


Lead Size: 22AWG
Φ 0.65 mm Diameter

Lead Size: 22AWG
Φ 0.65 mm Diameter

Part Number	Fig	A	B	C	D	E
		Maximum	Maximum	Typical	Minimum	Maximum
FRH080-250U	1	5.1	9.1	5.0	4.7	3.8
FRH080-250	1	5.8	9.6	5.0	4.7	4.6
FRH110-250U	1	5.9	9.4	5.0	4.7	3.8
FRH110-250	1	6.8	9.9	5.0	4.7	4.6
FRH120-250U	2	6.0	10.0	5.0	4.7	3.8
FRH120-250	2	6.5	11.0	5.0	4.7	4.6
FRH145-250U	2	6.0	10.0	5.0	4.7	3.8
FRH145-250	2	6.5	11.0	5.0	4.7	4.6
FRH180-250U	2	10.4	12.6	5.0	4.7	3.8
FRH180-250	2	10.9	12.6	5.0	4.7	4.6
FRH150-600	2	13.5	12.6	5.0	4.7	6.0
FRH160-600	2	16.0	12.6	5.0	4.7	6.0

Thermal Derating Curve



A= FRH180-250U; FRH180-250
B= All other FRH devices

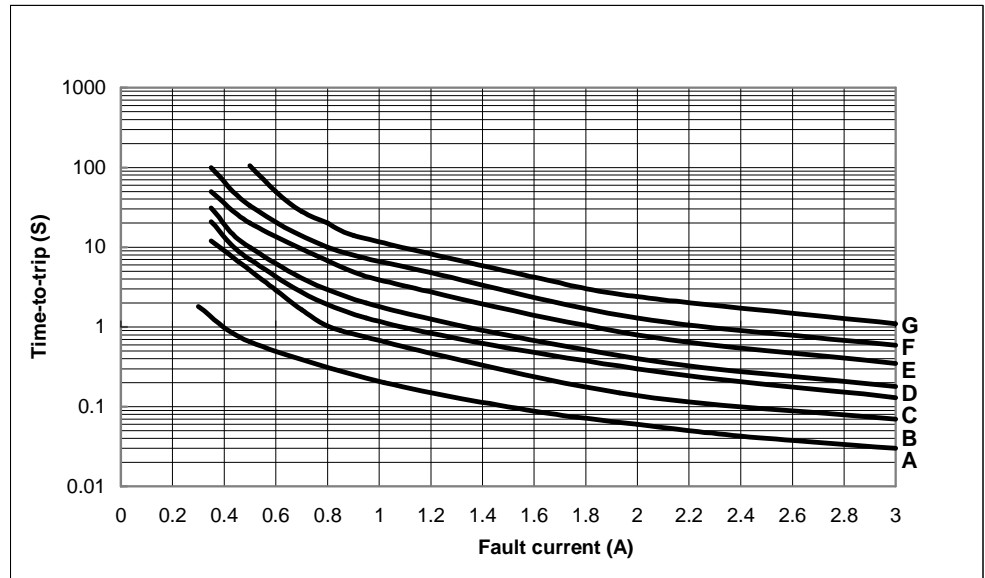
NOTE : All Specification subject to change without notice. 25

Radial Leaded PTC FRH Series

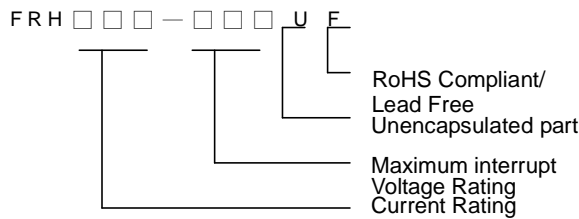


Typical Time-To-Trip at 23°C

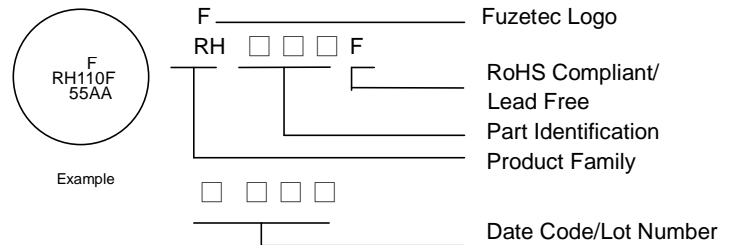
- A= FRH080-250(U)
- B= FRH110-250(U)
- C= FRH120-250(U)
- D= FRH145-250(U)
- E= FRH180-250(U)
- F= FRH150-600
- G= FRH160-600



Part Numbering System



Part Marking System



- * FRH150-600 Marking: RH6150
- * FRH160-600 Marking: RH6160

Standard Package

P/N	Pcs /Bag	Reel/Tape
FRH080-250U	300	1.5K
FRH080-250	300	1.5K
FRH110-250U	300	1.5K
FRH110-250	300	1.5K
FRH120-250U	300	1.5K
FRH120-250	300	1.5K

P/N	Pcs /Bag	Reel/Tape
FRH145-250U	300	1.5K
FRH145-250	300	1.5K
FRH180-250U	200	1.2K
FRH180-250	200	1.2K
FRH150-600	100	600
FRH160-600	100	600

Warning: -Operation beyond the specified maximum ratings or improper use may result in damage and possible electrical arcing and/or flame.
 -PPTC device are intended for occasional overcurrent protection. Application for repeated overcurrent condition and/or prolonged trip are not anticipated.
 -Avoid contact of PPTC device with chemical solvent. Prolonged contact will damage the device performance.

NOTE : All Specification subject to change without notice. 26

Radial Leaded PTC FRV Series



✳️ **RoHS Compliant
(Lead Free) Available**

Application:

Line Voltage Power Supply, Transformer and Appliances

Product Features:

Low hold current, Solid state, Radial leaded product ideal for up to 265V_{AC/DC}

Operation Current: 50mA~550mA

Maximum Operating Voltage: 240V_{AC/DC}

Maximum Interrupt Voltage: 265V_{AC/DC}

Temperature Range: -40°C to 85°C

Agency Recognition: UL, C-UL & TÜV pending

Electrical Characteristics (23°C)

Part Number	Hold Current	Trip Current	Max.Time to Trip	Maximum Current	Rated Voltage	Typical Power	Resistance Tolerance	
							R _{MIN}	R _{1MAX}
							Ohms	Ohms
FRV005-240	0.05	0.12	15.0	1.0	240	0.70	18.50	65.00
FRV008-240	0.08	0.19	15.0	1.2	240	0.80	7.40	26.00
FRV012-240	0.12	0.30	15.0	1.2	240	1.00	3.00	12.00
FRV016-240	0.16	0.37	15.0	2.0	240	1.40	2.50	7.80
FRV025-240	0.25	0.56	18.5	3.5	240	1.50	1.30	3.80
FRV033-240	0.33	0.74	18.5	4.5	240	1.70	0.83	2.60
FRV040-240	0.40	0.90	24.0	5.5	240	2.00	0.60	1.90
FRV055-240	0.55	1.25	26.0	7.0	240	3.40	0.45	1.45

I_H=Hold current-maximum current at which the device will not trip at 23 °C still air.

I_T=Trip current-minimum current at which the device will always trip at 23 °C still air.

V_{MAX}=Maximum voltage device can withstand without damage at its rated current.

I_{MAX}= Maximum fault current device can withstand without damage at rated voltage (V_{MAX}).

P_d=Typical power dissipated from device when in tripped state in 23 °C still air environment.

R_{MIN}=Minimum device resistance at 23 °C.

R_{1MAX}=Maximum device resistance at 23 °C, 1 hour after tripping.

Physical specifications:

Lead material: FRV005-240F~FRV016-240F Tin plated copper, 24AWG.

FRV025-240F~FRV040-240F Tin plated copper, 22AWG.

FRV055-240F Tin plated copper, 20AWG.

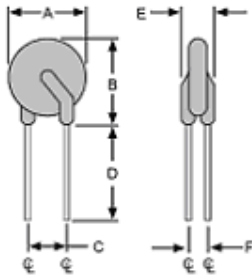
Soldering characteristics: MIL-STD-202, Method 208E.

Insulating coating:Flame retardant epoxy, meets UL-94V-0 requirement.

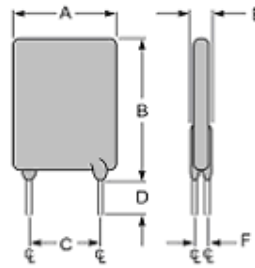
Radial Leaded PTC FRV Series



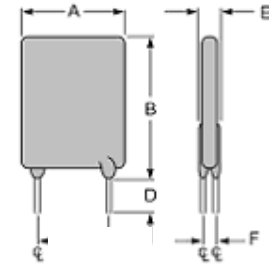
Production Dimensions (millimeter)



FRV 005-240F~FRV016-240F
Lead Size: 24AWG
Φ 0.51 mm Diameter



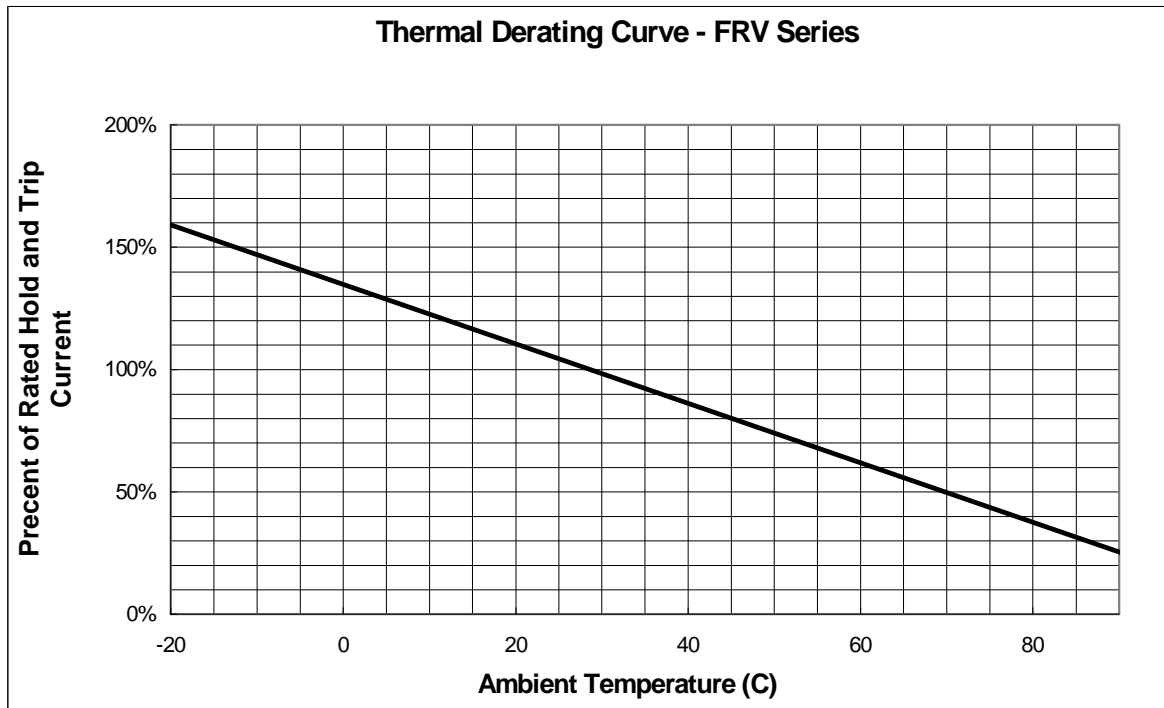
FRV025-240F~FRV040-240F
Lead Size: 22AWG
Φ 0.65 mm Diameter



FRV055-240F
Lead Size: 20AWG
Φ 0.81 mm Diameter

Part Number	A	B	C	D	E
	Maximum	Maximum	Typical	Minimum	Maximum
FRV005-240	8.3	10.7	5.1	7.6	3.8
FRV008-240	8.3	10.7	5.1	7.6	3.8
FRV012-240	8.3	10.7	5.1	7.6	3.8
FRV016-240	9.9	12.5	5.1	7.6	3.8
FRV025-240	9.6	17.4	5.1	7.6	3.8
FRV033-240	11.4	16.5	5.1	7.6	3.8
FRV040-240	11.5	19.5	5.1	7.6	3.8
FRV055-240	14.0	21.7	5.1	7.6	4.1

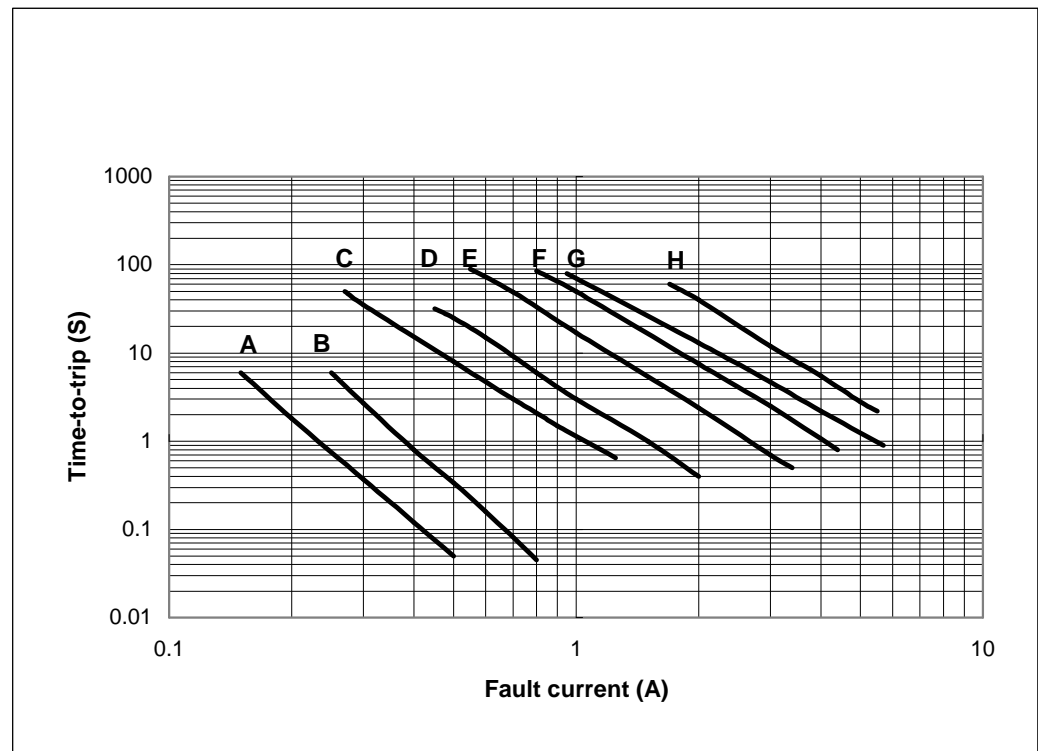
Thermal Derating Curve



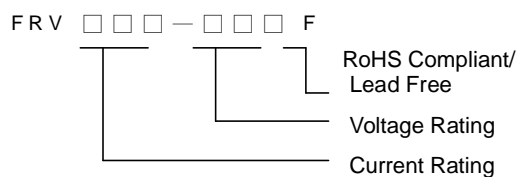
NOTE : All Specification subject to change without notice. 28

Typical Time-To-Trip at 23°C

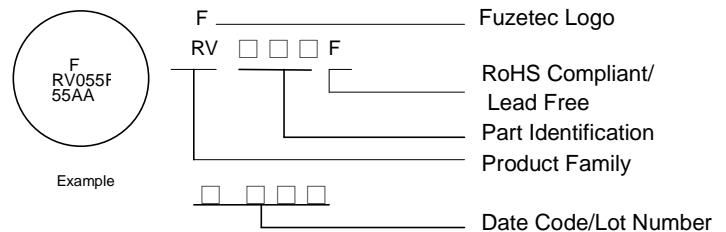
- A= FRV005-240
- B= FRV008-240
- C= FRV012-240
- D= FRV016-240
- E= FRV025-240
- F= FRV033-240
- G= FRV040-240
- H= FRV055-240



Part Numbering System



Part Marking System



Standard Package

P/N	Pcs /Bag	Reel/Tape
FRV005-240	500	2.5K
FRV008-240	500	2.5K
FRV012-240	500	2.5K
FRV016-240	500	2.5K

P/N	Pcs /Bag	Reel/Tape
FRV025-240	500	2K
FRV033-240	500	2K
FRV040-240	500	2K
FRV055-240	500	1K

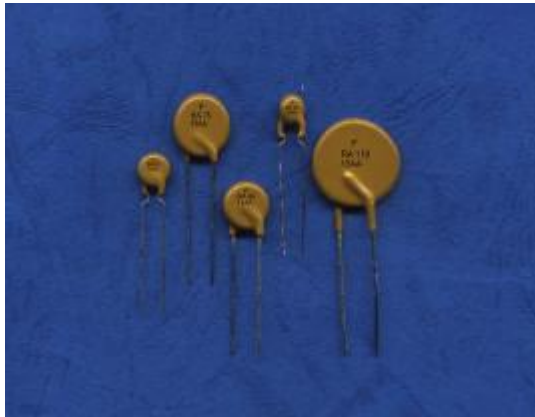
Warning: - Each product should be carefully evaluated and tested for their suitability of application.



- Operation beyond the specified maximum rating or improper use may result in damage and possible electrical arcing and/or flame.
- PPTC device are intended for occasional overcurrent protection. Application for repeated overcurrent condition and/or prolonged trip are not anticipated.- Avoid contact of PPTC device with chemical solvent, including some inert material such as silicone based oil, lubricant and etc. Prolonged contact will damage the device performance.- Additional protection mechanism are strongly recommended to be used in conjunction with the PPTC device for protection against abnormal or failure conditions.- Avoid use of PPTC device in a constrained space such as potting material, housing and containers where have limited space to accommodate device thermal expansion and/or contraction.

NOTE : All Specification subject to change without notice. 29

Radial Leaded PTC FRA Series



✧ **RoHS Compliant
(Lead Free) Available**

Application:

Wide variety of electronic equipment

Product Features:

Low hold current, Solid state
Radial-leaded product ideal for up to
120VDC/120VAC

Operation Current: 100mA~3.75A

Maximum Voltage: 120VDC/120VAC

Temperature Range: -40°C to 85°C

Agency Recognition: UL, C-UL & TÜV pending

Electrical Characteristics(23°C)

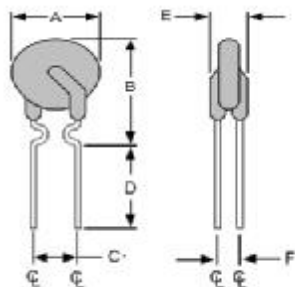
Part Number	Hold Current	Trip Current	Max.Time to Trip	Maximum Current	Rated Voltage	Typical Power	Resistance Tolerance	
	I _H , A	I _T , A	at 5xI _H , S	I _{MAX} , A	V _{MAX} , Vac		R _{MIN}	R _{1MAX}
							Ohms	Ohms
FRA010-120	0.10	0.20	4.0	2.0	120	0.57	2.50	7.50
FRA017-120	0.17	0.34	3.0	2.0	120	0.59	2.00	7.00
FRA020-120	0.20	0.40	2.2	2.0	120	0.62	1.83	4.40
FRA025-120	0.25	0.50	2.5	3.0	120	0.68	1.25	3.00
FRA030-120	0.30	0.60	3.0	3.0	120	0.74	0.88	2.10
FRA040-120	0.40	0.80	3.8	3.0	120	0.84	0.55	1.29
FRA050-120	0.50	1.00	4.0	3.0	120	1.16	0.50	1.17
FRA065-120	0.65	1.30	5.3	3.0	120	1.32	0.31	0.72
FRA075-120	0.75	1.50	6.3	5.0	120	1.38	0.25	0.60
FRA090-120	0.90	1.80	7.2	5.0	120	1.49	0.20	0.47
FRA110-120	1.10	2.20	8.2	5.0	120	2.25	0.15	0.38
FRA135-120	1.35	2.70	9.6	8.0	120	2.55	0.12	0.30
FRA160-120	1.60	3.20	11.4	8.0	120	2.85	0.09	0.22
FRA185-120	1.85	3.70	12.6	8.0	120	3.15	0.08	0.19
FRA250-120	2.50	5.00	15.6	12.0	120	3.75	0.05	0.13
FRA300-120	3.00	6.00	19.8	15.0	120	4.20	0.04	0.10
FRA375-120	3.75	7.50	24.0	15.0	120	4.80	0.03	0.08

I_H=Hold current-maximum current at which the device will not trip at 23 °C still air.
I_T=Trip current-minimum current at which the device will always trip at 23 °C still air.
V_{MAX}=Maximum voltage device can withstand without damage at its rated current.
I_{MAX}= Maximum fault current device can withstand without damage at rated voltage (V max).
Pd=Typical power dissipated from device when in the tripped state in 23 °C still air environment.
R_{MIN}=Minimum device resistance at 23°C.
R_{1MAX}=Maximum device resistance at 23°C, 1 hour after tripping .
Physical specifications:
Lead material: FRA010~FRA090 Tin plated copper, 22 AWG.
FRA110~FRA375 Tin plated copper, 20 AWG.
Soldering characteristics:MIL-STD-202, Method 208E.
Insulating coating:Flame retardant epoxy, meet UL-94V-0 requirement.

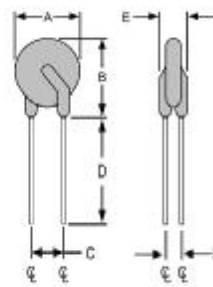
Axial Leaded PTC FRA Series



FRA Product Dimensions (millimeters)



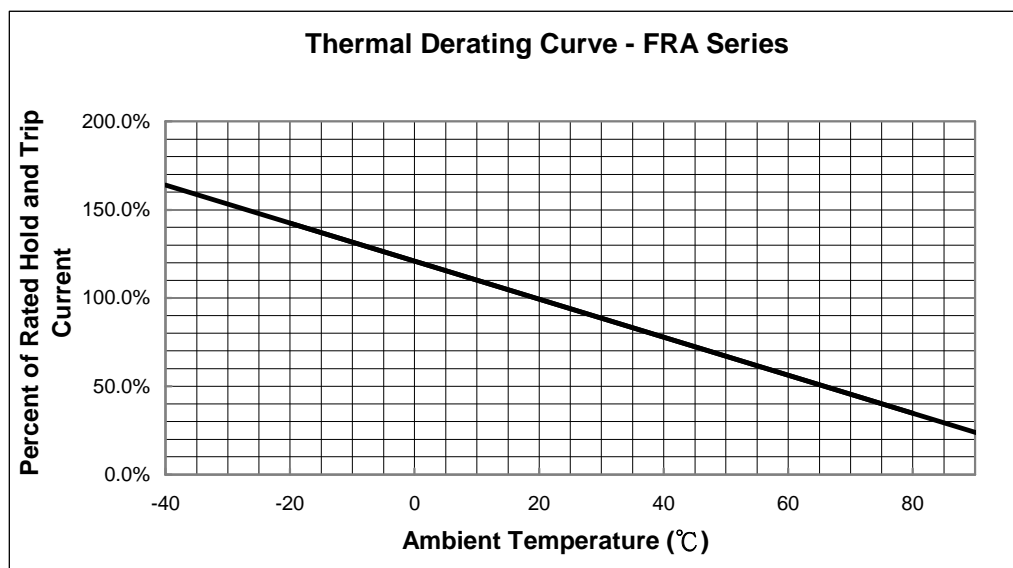
FRA 010-120 ~ FRA 090-120
Lead Size: 22AWG,
Φ 0.65 mm Diameter



FRA 110-120 ~ FRA 375-120
Lead Size : 20AWG,
Φ 0.81 mm Diameter

Part Number	A	B	C	D	E	F
	Maximum	Maximum	Typical	Minimum	Maximum	Typical
FRA010-120	7.9	12.7	5.1	7.6	5.0	3.0
FRA017-120	7.9	12.7	5.1	7.6	5.0	3.0
FRA020-120	7.9	12.2	5.1	7.6	5.0	3.0
FRA025-120	7.9	12.7	5.1	7.6	5.0	3.0
FRA030-120	7.9	13.0	5.1	7.6	5.0	3.0
FRA040-120	8.2	14.2	5.1	7.6	5.0	3.0
FRA050-120	9.2	14.9	5.1	7.6	5.0	3.0
FRA065-120	9.7	14.9	5.1	7.6	5.0	3.0
FRA075-120	10.6	15.5	5.1	7.6	5.0	3.0
FRA090-120	11.9	15.9	5.1	7.6	5.0	3.0
FRA110-120	13.3	18.3	5.1	7.6	5.0	3.0
FRA135-120	15.5	20.6	5.1	7.6	5.0	3.0
FRA160-120	17.5	22.5	5.1	7.6	5.0	3.0
FRA185-120	19.9	24.9	5.1	7.6	5.0	3.0
FRA250-120	22.5	27.5	10.2	7.6	5.0	3.0
FRA300-120	25.5	30.0	10.2	7.6	5.0	3.0
FRA375-120	29.5	34.0	10.2	7.6	5.0	3.0

Thermal Derating Curve



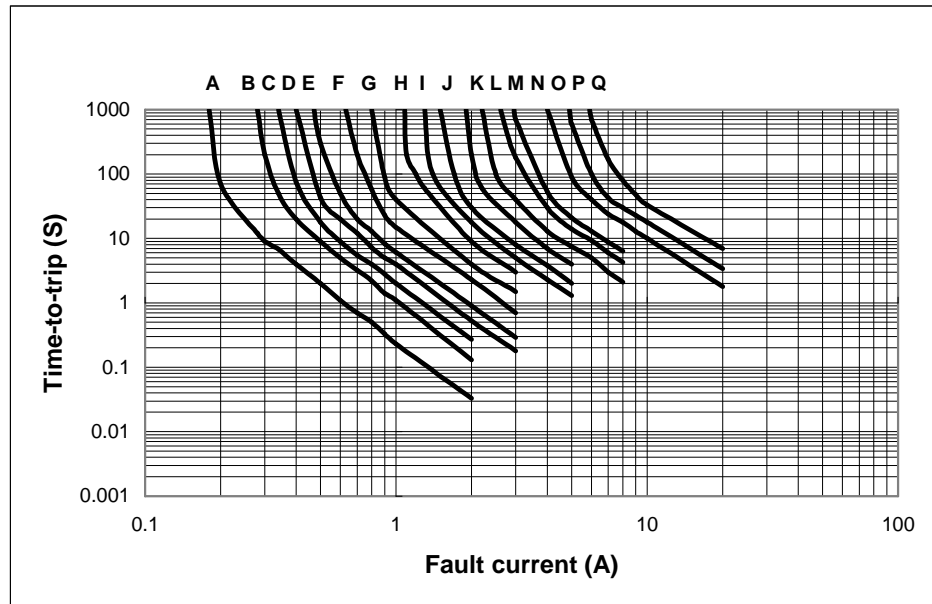
NOTE : All Specification subject to change without notice. 31

Radial Leaded PTC FRA Series

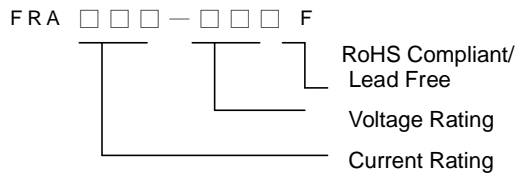


Typical Time-To-Trip at 23°C

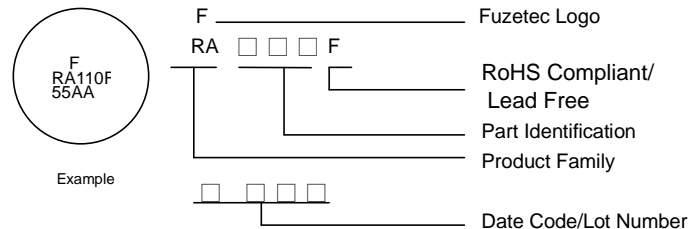
- A = FRA010-120
- B = FRA017-120
- C = FRA020-120
- D = FRA025-120
- E = FRA030-120
- F = FRA040-120
- G = FRA050-120
- H = FRA065-120
- I = FRA075-120
- J = FRA090-120
- K = FRA110-120
- L = FRA135-120
- M = FRA160-120
- N = FRA185-120
- O = FRA250-120
- P = FRA300-120
- Q = FRA375-120



Part Numbering System



Part Marking System



Standard Package

P/N	Pcs /Bag	Reel/Tape
FRA010-120	300	1.5K
FRA017-120	300	1.5K
FRA020-120	300	1.5K
FRA025-120	300	1.5K
FRA030-120	300	1.5K
FRA040-120	300	1.5K
FRA050-120	300	1.5K
FRA065-120	300	1.5K
FRA075-120	300	1.5K

P/N	Pcs /Bag	Reel/Tape
FRA090-120	300	1.5K
FRA110-120	300	600
FRA135-120	200	600
FRA160-120	200	-----
FRA185-120	200	-----
FRA250-120	100	-----
FRA300-120	100	-----
FRA375-120	100	-----

Warning: -Operation beyond the specified maximum ratings or improper use may result in damage and possible electrical arcing and/or flame.
 -PPTC device are intended for occasional overcurrent protection. Application for repeated overcurrent condition and/or prolonged trip are not anticipated.
 -Avoid contact of PPTC device with chemical solvent. Prolonged contact will damage the device performance.

Axial Leaded PTC FSR Series



✘ **RoHS Compliant
(Lead Free) Available**

Application:

- Rechargeable battery packs
- Lithium cell and battery packs

Product Features:

Low profile, Solid state

Operation Current: 1.2A~4.2 A

Maximum Voltage: 15V& 30V

Temperature Range: -40°C to 85°C

Agency Recognition: UL (E211981)

TÜV (R3-50004084)

Electrical Characteristics(23°C)

Part Number	Hold Current	Trip Current	Rated Voltage	Maximum Current	Typical Power	Resistance Tolerance		
						R _{MIN}	R _{MAX}	R _{1MAX}
	I _H , A	I _T , A	V _{MAX} , Vdc	I _{MAX} , A	P _d , W	Ohms	Ohms	Ohms
FSR120	1.20	2.70	15	100	1.2	0.085	0.160	0.220
FSR175	1.75	3.80	15	100	1.5	0.050	0.090	0.120
FSR200	2.00	4.40	30	100	1.9	0.030	0.060	0.100
FSR350	3.50	6.30	30	100	2.5	0.017	0.031	0.050
FSR420	4.20	7.60	30	100	2.9	0.012	0.024	0.040

I_H=Hold current-maximum current at which the device will not trip at 23 °C still air.

I_T=Trip current-minimum current at which the device will always trip at 23 °C still air.

V_{MAX}=Maximum voltage device can withstand without damage at its rated current.

I_{MAX}= Maximum fault current device can withstand without damage at rated voltage (V max).

P_d=Maximum power dissipated from device when in the tripped state in 23 °C still air environment.

R_{MIN}=Minimum device resistance at 23 °C .

R_{1MAX}=Maximum device resistance at 23 °C , 1 hour after tripping.

Physical specifications:

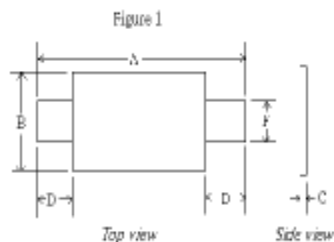
Lead material:0.13mm nominal thickness, quarter-hard nickel.

Insulating material: Polyester tape.

Axial Leaded PTC FSR Series

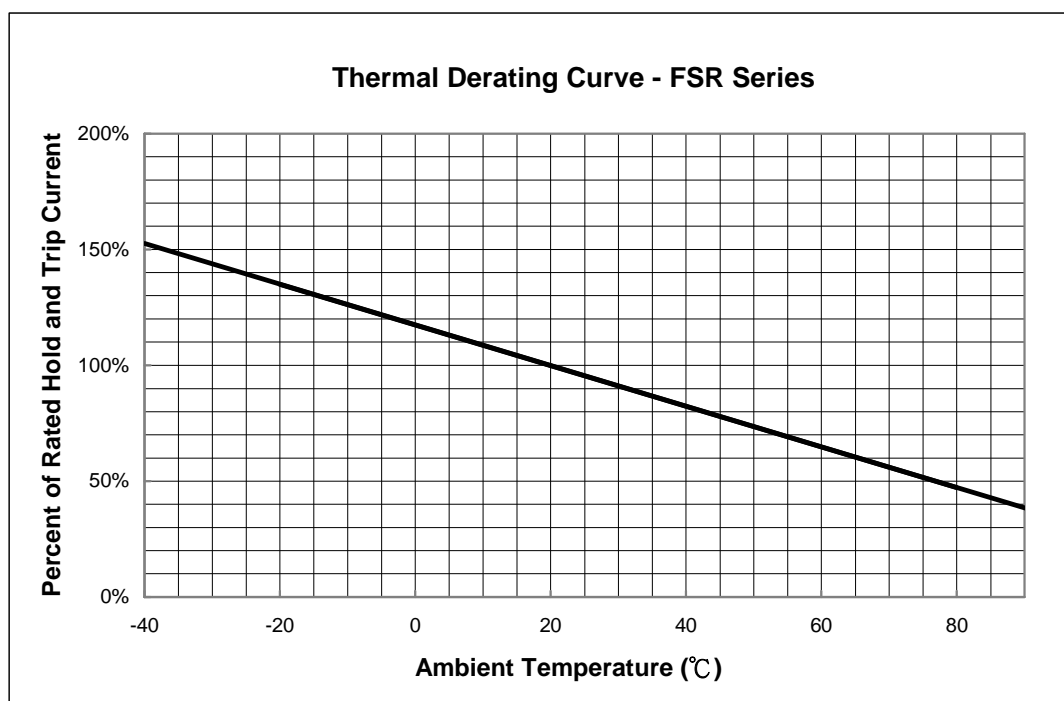


FSR Product Dimensions (Millimeters)



Part Number	A		B		C		D		F	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
FSR120	19.9	22.1	4.9	5.2	0.6	1.0	5.5	7.5	3.9	4.1
FSR175	20.9	23.1	4.9	5.2	0.6	1.0	4.1	5.5	3.9	4.1
FSR200	21.3	23.4	10.2	11.0	0.5	1.1	5.0	7.6	4.8	5.4
FSR350	28.4	31.8	13.0	13.5	0.5	1.1	6.3	8.9	6.0	6.6
FSR420	30.6	32.4	12.9	13.6	0.5	1.1	5.0	7.5	6.0	6.7

Thermal Derating Curve



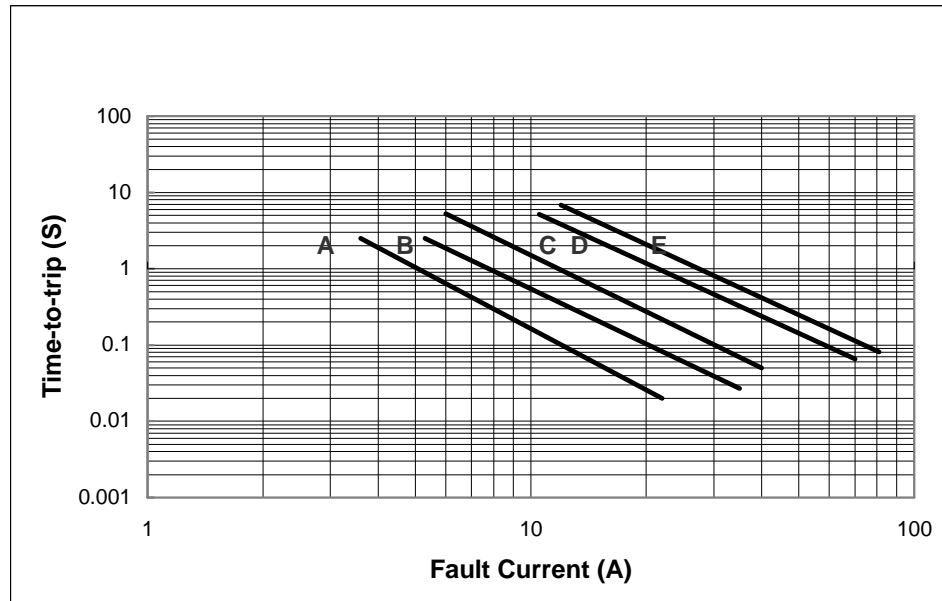
NOTE : All Specification subject to change without notice. 34

Axial Leaded PTC FSR Series

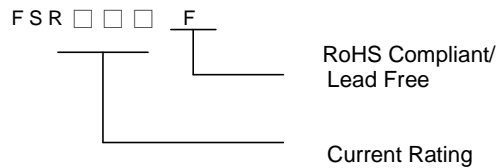


Typical Time-To-Trip at 23°C

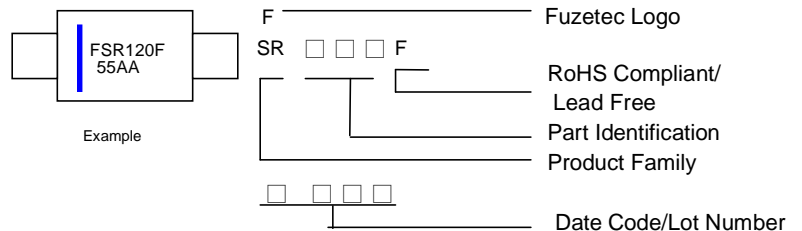
- A = FSR120
- B = FSR175
- C = FSR200
- D = FSR350
- E = FSR420



Part Numbering System



Part Marking System



Standard Package

P/N	Pcs /Bag
FSR120	1K
FSR175	1K
FSR200	500

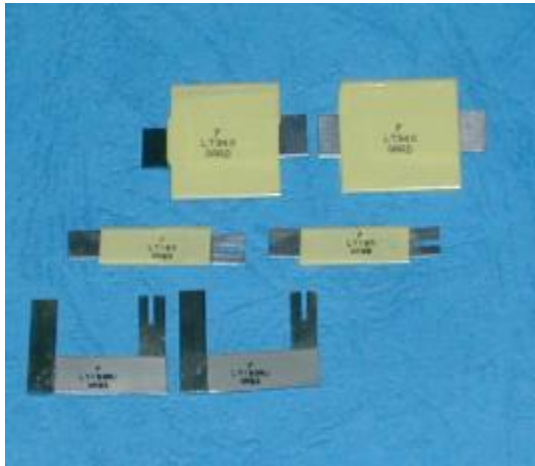
P/N	Pcs /Bag
FSR350	500
FSR420	500

Warning:



- Operation beyond the specified maximum ratings or improper use may result in damage and possible electrical arcing and/or flame.
- PPTC device are intended for occasional overcurrent protection. Application for repeated overcurrent condition and/or prolonged trip are not anticipated.
- Avoid contact of PPTC device with chemical solvent. Prolonged contact will damage the device performance.

Axial Leaded PTC FLT Series



※ **RoHS Compliant
(Lead Free) Available**

Application:

Rechargeable battery packs
Lithium cell and battery packs

Product Features:

Low profile, Solid state

Operation Current: 0.7A~3.4 A

Maximum Voltage: 24V

Temperature Range: -40°C to 85°C

Agency Recognition:UL(E211981)

C-UL(E211981)

TÜV (R3-50004084)

Electrical Characteristics(23°C)

Part Number	Hold Current	Trip Current	Rated Voltage	Maximum Current	Typical Power	Resistance Tolerance		
						R _{MIN}	R _{MAX}	R _{1MAX}
	I _H , A	I _T , A	V _{MAX} , Vdc	I _{MAX} , A	P _d , W	Ohms	Ohms	Ohms
FLT070	0.7	1.5	24	100	1.1	0.100	0.200	0.340
FLT100	1.0	2.5	24	100	1.5	0.070	0.130	0.260
FLT180	1.8	3.8	24	100	2.0	0.040	0.068	0.120
FLT190	1.9	4.2	24	100	1.9	0.030	0.057	0.100
FLT260	2.6	5.2	24	100	2.3	0.025	0.042	0.076
FLT300	3.0	6.3	24	100	2.0	0.015	0.031	0.055
FLT310	3.1	6.0	24	100	2.5	0.018	0.030	0.055
FLT340	3.4	6.8	24	100	2.7	0.016	0.027	0.050

I_H=Hold current-maximum current at which the device will not trip at 23 °C still air.

I_T=Trip current-minimum current at which the device will always trip at 23 °C still air.

V_{MAX}=Maximum voltage device can withstand without damage at its rated current.

I_{MAX}= Maximum fault current device can withstand without damage at rated voltage (V max).

P_d=Maximum power dissipated from device when in the tripped state in 23 °C still air environment.

R_{MIN}=Minimum device resistance at 23 °C.

R_{1MAX}=Maximum device resistance at 23 °C, 1 hour after tripping.

Physical specifications:

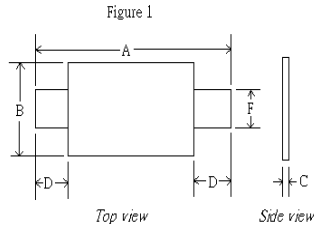
Lead material:0.13mm.nominal thickness ,quarter-hard nickel.

Insulating material: Polyester tape.

Axial Leaded PTC FLT Series

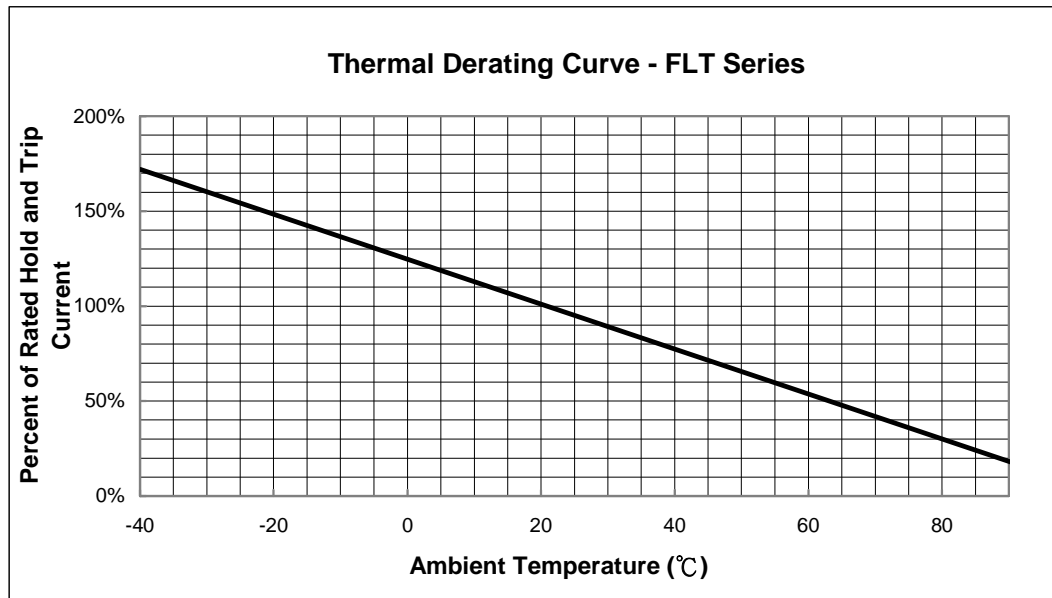


FLT Product Dimensions (Millimeters)



Part Number	A		B		C		D		F	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
FLT070	19.9	22.1	4.9	5.2	0.7	1.2	5.5	7.5	3.9	4.1
FLT100	20.9	23.1	4.9	5.2	0.6	1.0	4.1	5.5	3.9	4.1
FLT180	24.0	26.0	4.9	5.2	0.6	1.0	4.1	5.5	3.9	4.1
FLT190	21.3	23.4	10.2	11.0	0.5	1.1	5.0	7.6	4.8	5.4
FLT260	24.0	26.0	10.8	11.9	0.6	1.0	5.0	7.0	5.9	6.1
FLT300	28.4	31.8	13.0	13.5	0.5	1.1	6.3	8.9	6.0	6.6
FLT310	24.0	26.0	14.8	15.9	0.6	1.0	5.0	7.0	5.9	6.1
FLT340	24.0	26.0	14.8	15.9	0.6	1.0	4.0	5.0	5.9	6.1

Thermal Derating Curve

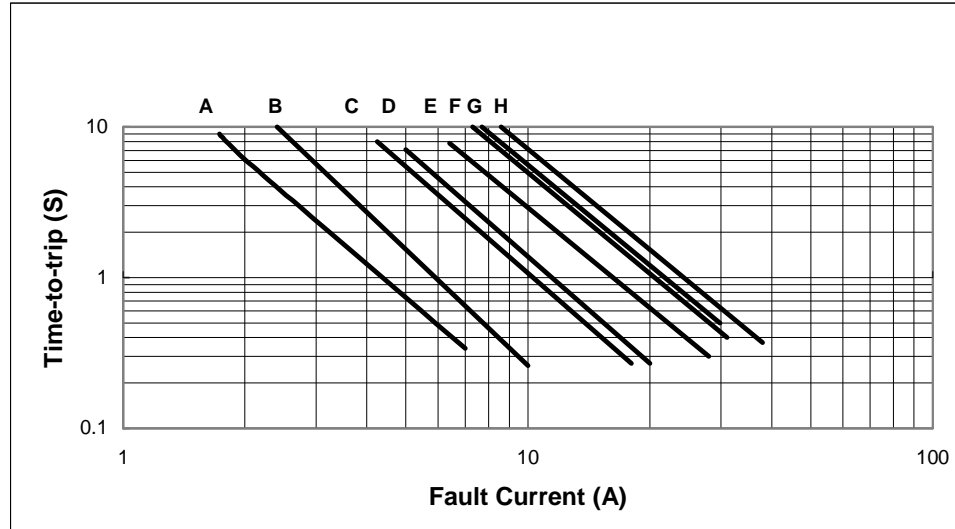


Axial Leaded PTC FLT Series

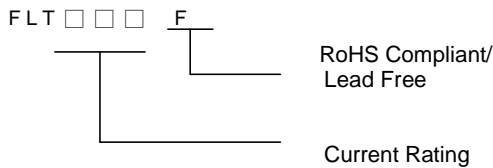


Typical Time-To-Trip at 23°C

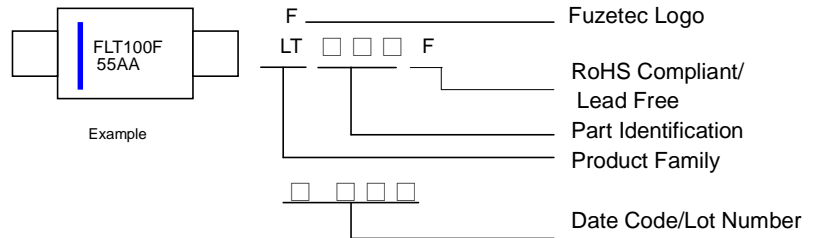
- A=FLT070
- B=FLT100
- C=FLT180
- D=FLT190
- E=FLT260
- F=FLT300
- G=FLT310
- H=FLT340



Part Numbering System



Part Marking System



Standard Package

P/N	Pcs /Bag
FLT070	1K
FLT100	1K
FLT180	1K
FLT190	500

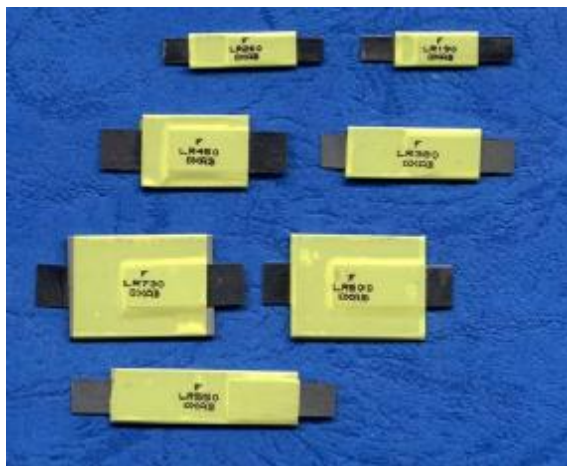
P/N	Pcs /Bag
FLT260	500
FLT300	500
FLT310	500
FLT340	500

Warning:



- Operation beyond the specified maximum ratings or improper use may result in damage and possible electrical arcing and/or flame.
- PPTC device are intended for occasional overcurrent protection. Application for repeated overcurrent condition and/or prolonged trip are not anticipated.
- Avoid contact of PPTC device with chemical solvent. Prolonged contact will damage the device performance.

Axial Leaded PTC FLR Series



✳ **RoHS Compliant
(Lead Free) Available**

Application:

Rechargeable battery packs
Lithium cell and battery packs

Product Features:

Low profile, Solid state

Operation Current: 1.9A~7.3 A

Maximum Voltage: 15V& 20V

Temperature Range: -40°C to 85°C

Agency Recognition: UL (E211981)

C-UL (E211981)

TÜV (R50004084)

Electrical Characteristics(23°C)

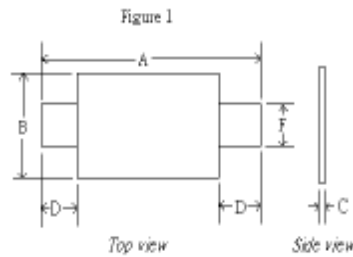
Part Number	Hold Current	Trip Current	Rated Voltage	Maximum Current	Typical Power	Resistance Tolerance		
						R _{MIN}	R _{MAX}	R _{1MAX}
						I _H , A	I _T , A	V _{MAX} , Vdc
FLR190	1.9	3.9	15	100	1.2	0.039	0.072	0.102
FLR260	2.6	5.8	15	100	2.5	0.020	0.042	0.063
FLR380	3.8	8.3	15	100	2.5	0.013	0.026	0.037
FLR450	4.5	8.9	20	100	2.5	0.011	0.020	0.028
FLR550	5.5	10.5	20	100	2.8	0.009	0.016	0.022
FLR600	6.0	11.7	20	100	2.8	0.007	0.014	0.019
FLR730	7.3	14.1	20	100	3.3	0.006	0.012	0.015

I_H=Hold current-maximum current at which the device will not trip at 23 °C still air.
 I_T=Trip current-minimum current at which the device will always trip at 23 °C still air.
 V_{MAX}=Maximum voltage device can withstand without damage at its rated current.
 I_{MAX}= Maximum fault current device can withstand without damage at rated voltage (V max).
 P_d=Maximum power dissipated from device when in the tripped state in 23 °C still air environment.
 R_{MIN}=Minimum device resistance at 23 °C .
 R_{1MAX}=Maximum device resistance at 23 °C , 1 hour after tripping.
 Physical specifications:
 Lead material:0.13mm nominal thickness, quarter-hard nickel.
 Insulating material: Polyester tape.

Axial Leaded PTC FLR Series

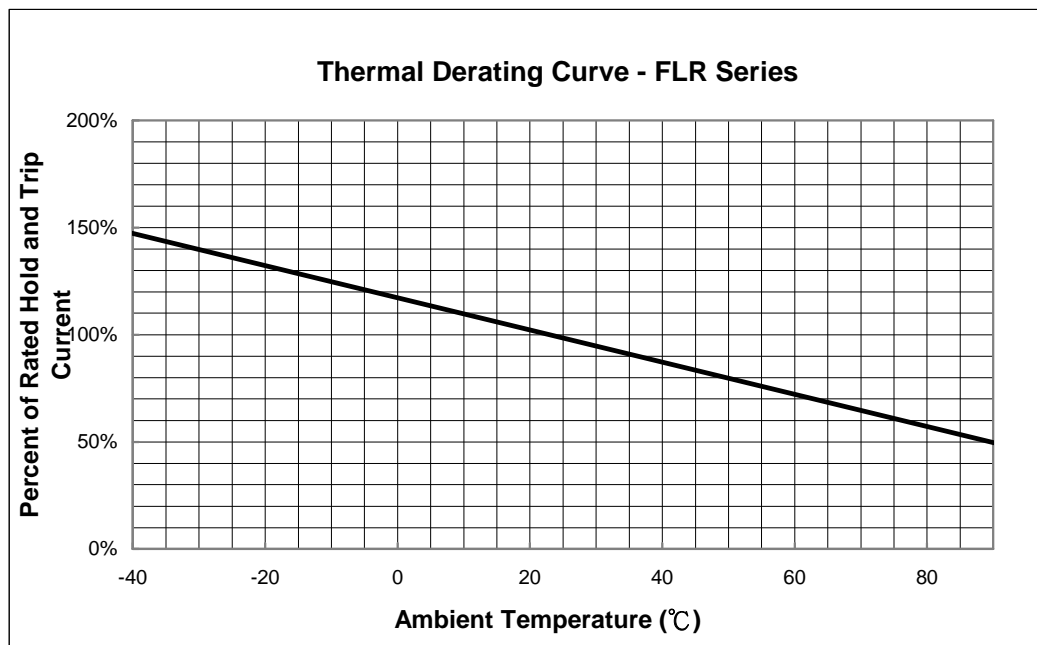


FLR Product Dimensions (Millimeters)



Part Number	A		B		C		D		F	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
FLR190	19.9	22.1	4.9	5.5	0.6	1.0	5.5	7.5	3.9	4.1
FLR260	20.9	23.1	4.9	5.5	0.6	1.0	4.1	5.5	3.9	4.1
FLR380	24.0	26.0	6.9	7.5	0.6	1.0	4.1	5.5	4.9	5.1
FLR450	24.0	26.0	9.9	10.5	0.6	1.0	5.3	6.7	5.9	6.1
FLR550	35.0	37.0	6.9	7.5	0.6	1.0	5.3	6.7	4.9	5.1
FLR600	24.0	26.0	13.9	14.5	0.6	1.0	4.1	5.5	5.9	6.1
FLR730	27.1	29.1	13.9	14.5	0.6	1.0	4.1	5.5	5.9	6.1

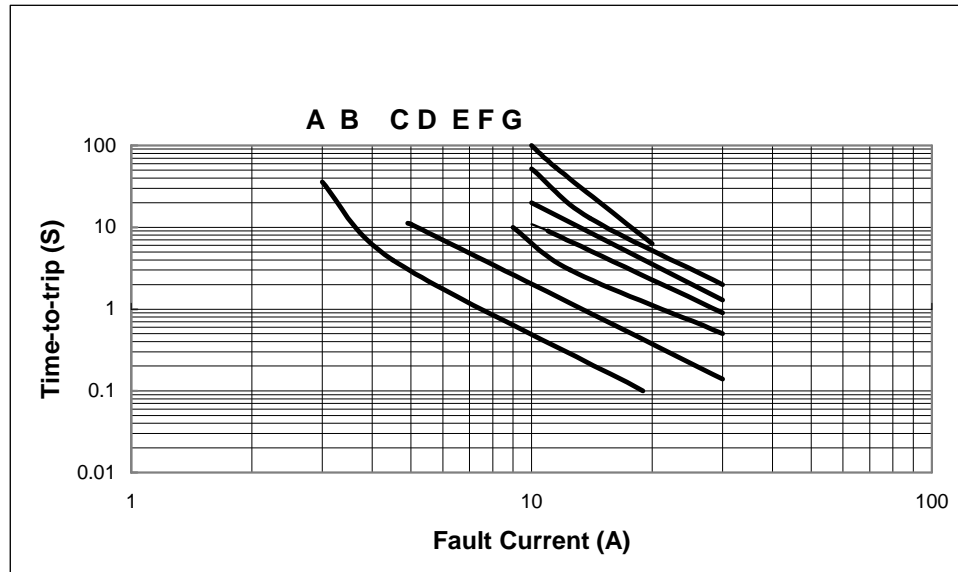
Thermal Derating Curve



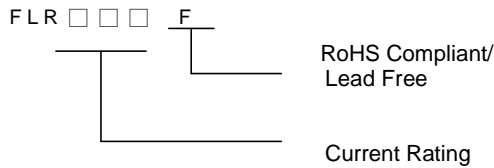
NOTE : All Specification subject to change without notice. 40

Typical Time-To-Trip at 23°C

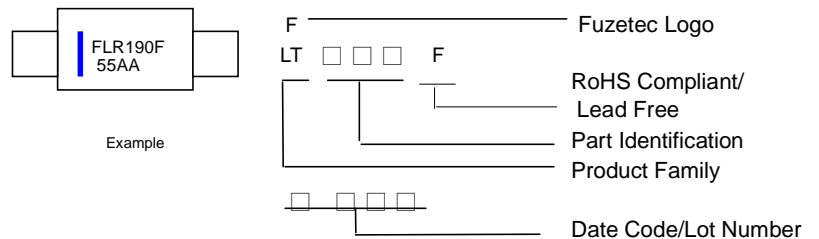
- A=FLR190
- B=FLR260
- C=FLR380
- D=FLR450
- E=FLR550
- F=FLR600
- G=FLR730



Part Numbering System



Part Marking System



Standard Package

P/N	Pcs /Bag
FLR190	1K
FLR260	1K
FLR380	1K
FLR450	500

P/N	Pcs /Bag
FLR550	500
FLR600	500
FLR730	500

Warning:



- Operation beyond the specified maximum ratings or improper use may result in damage and possible electrical arcing and/or flame.
- PPTC device are intended for occasional overcurrent protection. Application for repeated overcurrent condition and/or prolonged trip are not anticipated.
- Avoid contact of PPTC device with chemical solvent. Prolonged contact will damage the device performance.

Surface Mount PTC FSMD1812 Series



✧ **RoHS Compliant**

(Lead Free) Product

Application:

All high-density boards

Product Features:

Small surface mount, Solid state

Faster time to trip than standard SMD devices

Lower resistance than standard SMD devices

Operation Current: 140mA~2.0A

Maximum Voltage: 6V~60V

Temperature Range: -40°C to 85°C

Agency Recognition: UL (E211981)

C-UL (E211981)

TÜV (R50004084)

Electrical Characteristics(23°C)

Part Number	Hold Current	Trip Current	Rated Voltage	Max Current	Typical Power	Max Time to Trip		Resistance Tolerance	
	I _H , A	I _T , A	V _{MAX} , Vdc	I _{MAX} , A	P _d , W	Current	Time	R _{MIN}	R _{1MAX}
	I _H , A	I _T , A	V _{MAX} , Vdc	I _{MAX} , A	P _d , W	Amp	Sec	Ohms	Ohms
FSMD014	0.14	0.30	60	10	0.8	8.0	< 0.02	1.50	6.50
FSMD020	0.20	0.40	30	10	0.8	8.0	0.02	0.80	5.00
FSMD035	0.35	0.70	16	40	0.8	8.0	0.10	0.32	1.50
FSMD050	0.50	1.00	16	40	0.8	8.0	0.15	0.15	1.00
FSMD075	0.75	1.50	16	40	0.8	8.0	0.02	0.11	0.45
FSMD110	1.10	2.20	6	40	0.8	8.0	0.30	0.04	0.21
FSMD110-16	1.10	1.95	16	40	0.8	8.0	0.50	0.04	0.18
FSMD125	1.25	2.50	6	40	0.8	8.0	0.40	0.05	0.14
FSMD150	1.50	3.00	6	40	0.8	8.0	0.50	0.04	0.11
FSMD160	1.60	3.20	6	40	0.8	8.0	< 0.5	0.03	0.10
FSMD200	2.00	3.50	8	40	0.8	8.0	2	0.02	0.07

I_H=Hold current-maximum current at which the device will not trip at 23 °C still air.

I_T=Trip current-minimum current at which the device will always trip at 23 °C still air.

V_{MAX}=Maximum voltage device can withstand without damage at it rated current.(I_{max})

I_{MAX}= Maximum fault current device can withstand without damage at rated voltage (V_{max}).

P_d=Typical power dissipated-type amount of power dissipated by the device when in the tripped state in 23°C still air environment.

R_{MIN}=Minimum device resistance at 23°C prior to tripping.

R_{1MAX}=Maximum device resistance at 23°C measured 1 hour post trip.

Termination pad characteristics

Termination pad materials: Tin-plated copper

FSMD Product Dimensions (Millimeters)

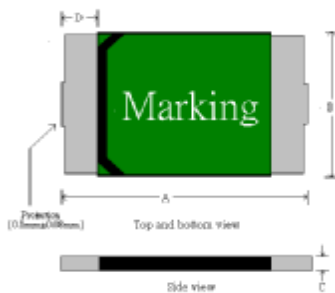


Figure 1

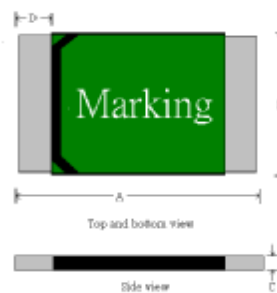
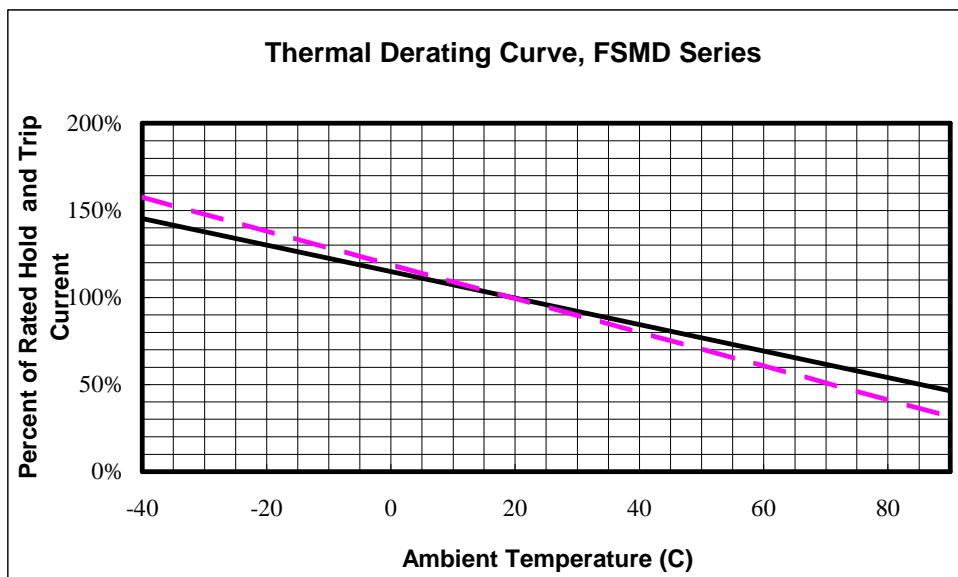


Figure 2

PART NUMBER	Figure	A		B		C		D
		Min	Max	Min	Max	Min	Max	Min
FSMD014	1 or 2	4.37	4.73	3.07	3.41	0.60	0.90	0.3
FSMD020	1 or 2	4.37	4.73	3.07	3.41	0.60	0.90	0.3
FSMD035	1 or 2	4.37	4.73	3.07	3.41	0.40	0.70	0.3
FSMD050	1 or 2	4.37	4.73	3.07	3.41	0.35	0.65	0.3
FSMD075	1 or 2	4.37	4.73	3.07	3.41	0.35	0.65	0.3
FSMD110	1 or 2	4.37	4.73	3.07	3.41	0.25	0.55	0.3
FSMD110-16	2	4.37	4.73	3.07	3.41	0.25	0.55	0.3
FSMD125	2	4.37	4.73	3.07	3.41	0.25	0.55	0.3
FSMD150	2	4.37	4.73	3.07	3.41	0.25	0.55	0.3
FSMD160	2	4.37	4.73	3.07	3.41	0.25	0.90	0.3
FSMD200	2	4.37	4.73	3.07	3.41	0.50	0.90	0.3

Thermal Derating Curve



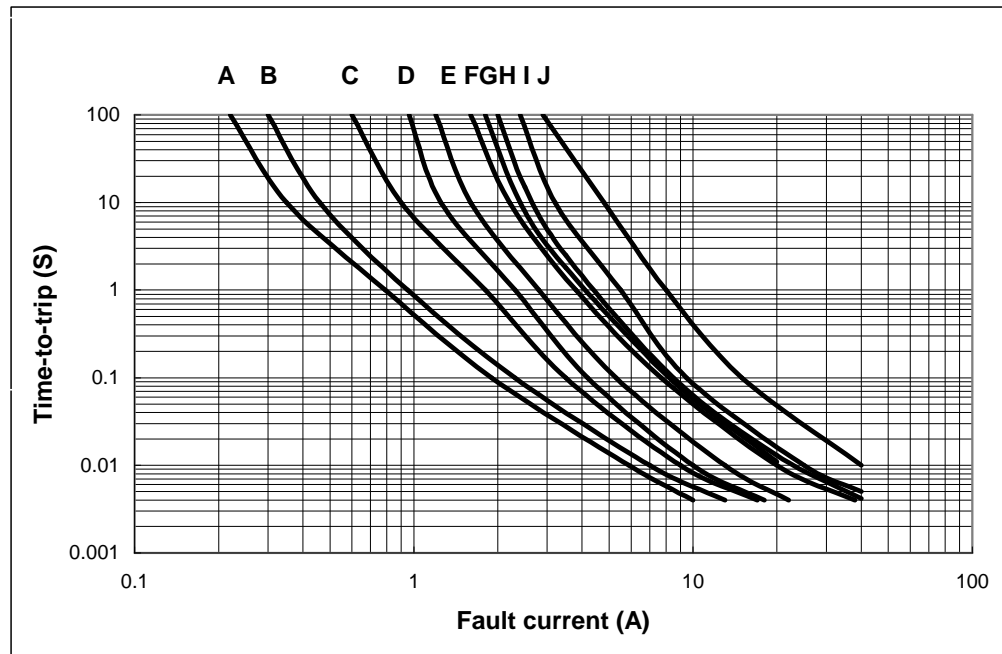
A= FSMD 075, 110, 110-16, 125,
150, 160, 200
B= FSMD 014, 020, 035, 050

Surface Mount PTC FSMD1812 Series

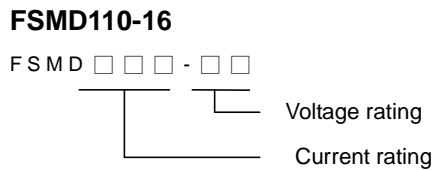
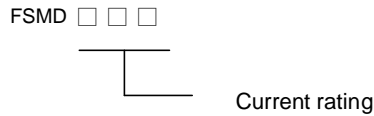


Typical Time-To-Trip at 23°C

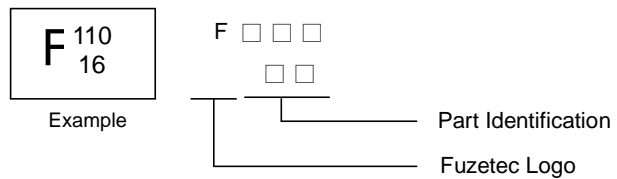
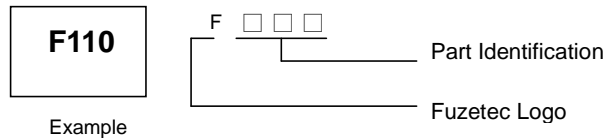
- A = FSMD014
- B = FSMD020
- C = FSMD035
- D = FSMD050
- E = FSMD075
- F = FSMD110/
FSMD110-16
- G = FSMD125
- H = FSMD150
- I = FSMD160
- J = FSMD200



Part Numbering System



Part Marking System



Standard Package

P/N	Pcs /Bag	Reel/Tape
FSMD014	-----	2K
FSMD020	-----	2K
FSMD035	-----	2K
FSMD050	-----	2K
FSMD075	-----	2K
FSMD110	-----	2K

P/N	Pcs /Bag	Reel/Tape
FSMD110-16	-----	2K
FSMD125	-----	2K
FSMD150	-----	2K
FSMD160	-----	2K
FSMD200	-----	2K

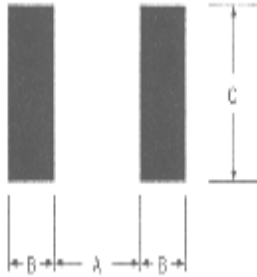
Warning:

- Operation beyond the specified maximum ratings or improper use may result in damage and possible electrical arcing and/or flame.
- PPTC device are intended for occasional overcurrent protection. Application for repeated overcurrent condition and/or prolonged trip are not anticipated.
- Avoid contact of PPTC device with chemical solvent. Prolonged contact will damage the device performance. .

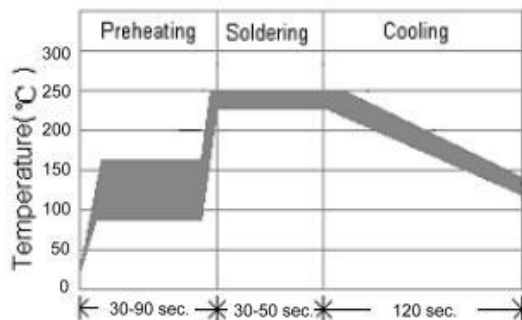
NOTE : All Specification subject to change without notice. 44

Pad Layouts 、 Solder Reflow and Rework Recommendations

The dimension in the table below provide the recommended pad layout for each FSMD1812 device



Pad dimensions (millimeters)			
Device	A Nominal	B Nominal	C Nominal
FSMD014	3.45	1.78	3.50
FSMD020	3.45	1.78	3.50
FSMD035	3.45	1.78	3.50
FSMD050	3.45	1.78	3.50
FSMD075	3.45	1.78	3.50
FSMD110	3.45	1.78	3.50
FSMD110-16	3.45	1.78	3.50
FSMD125	3.45	1.78	3.50
FSMD150	3.45	1.78	3.50
FSMD160	3.45	1.78	3.50
FSMD200	3.45	1.78	3.50



Solder reflow

※ Due to “Lead Free” nature, Temperature and Dwelling time for the soldering zone is higher than those for Regular. This may cause damage to other components.

1. Recommended reflow methods; IR , vapor phase oven, hot air oven.
2. The FSMD1812 Series are suitable for use with wave-solder application methods.
3. Recommended maximum paste thickness is 0.25mm.
4. Devices can be cleaned using standard industry methods and solvents.

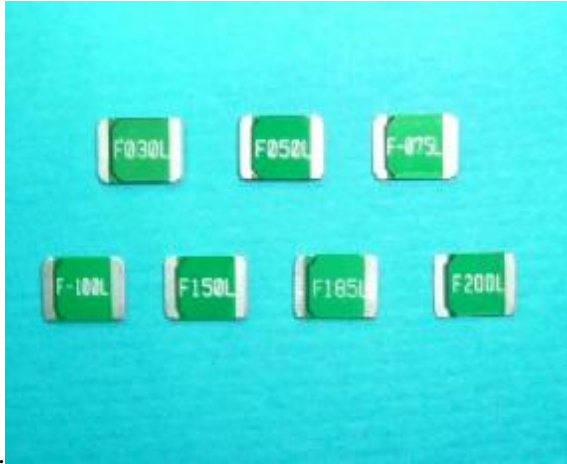
CAUTION:

If reflow temperatures exceed the recommended Profile, devices may not meet the performance requirements.

Rework:

Use standard industry practices.

Surface Mount PTC FSMD2920 Series



✧ **RoHS Compliant**
(Lead Free) Product

Application:

All high-density boards

Product Features: 2920 Dimension, Surface mountable, Solid state, Faster time to trip than standard SMD devices.

Operation Current: 300mA~2.5A

Maximum Voltage: 6V~60V

Temperature Range: -40°C to 85°C

Agency Recognition: UL (E211981)

C-UL (E211981)

Electrical Characteristics (23°C)

Part Number	Hold Current	Trip Current	Rated Voltage	Max Current	Typical Power	Max Time to Trip		Resistance Tolerance	
						Current	Time	R _{MIN}	R _{1MAX}
						I _H , A	I _T , A	V _{MAX} , Vdc	I _{MAX} , A
FSMD030-2920	0.30	0.60	60	10	1.5	1.5	3.0	1.00	4.80
FSMD050-2920	0.50	1.00	60	10	1.5	2.5	4.0	0.30	1.40
FSMD075-2920	0.75	1.50	33	40	1.5	8.0	0.3	0.18	1.00
FSMD100-2920	1.10	2.20	33	40	1.5	8.0	0.5	0.09	0.41
FSMD125-2920	1.25	2.50	33	40	1.5	8.0	2.0	0.05	0.25
FSMD150-2920	1.50	3.00	33	40	1.5	8.0	2.0	0.05	0.23
FSMD185-2920	1.85	3.70	33	40	1.5	8.0	2.5	0.04	0.15
FSMD200-2920	2.00	4.00	16	40	1.5	8.0	4.5	0.035	0.120
FSMD250-2920	2.50	5.00	16	40	1.5	8.0	16	0.025	0.085

I_H=Hold current-maximum current at which the device will not trip at 23°C still air.

I_T=Trip current-minimum current at which the device will always trip at 23°C still air.

V_{MAX}=Maximum voltage device can withstand without damage at it rated current.(I_{MAX})

I_{MAX}= Maximum fault current device can withstand without damage at rated voltage (V_{MAX}).

Pd=Typical power dissipated-type amount of power dissipated by the device when in the tripped state in 23°C still air environment

R_{MIN}=Minimum device resistance at 23°C prior to tripping.

R_{1MAX}=Maximum device resistance at 23°C measured 1 hour post trip.

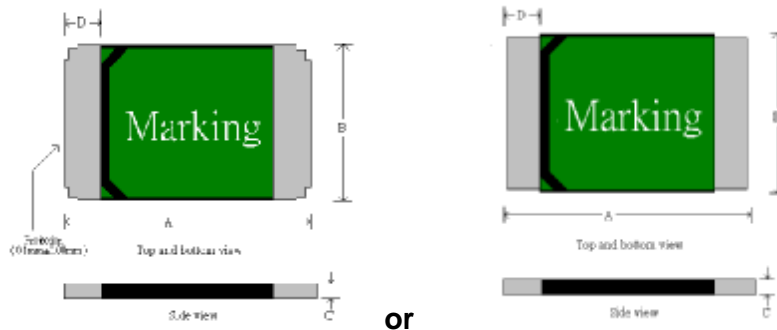
Termination pad characteristics

Termination pad materials: Tin-plated copper

Surface Mount PTC FSMD2920 Series



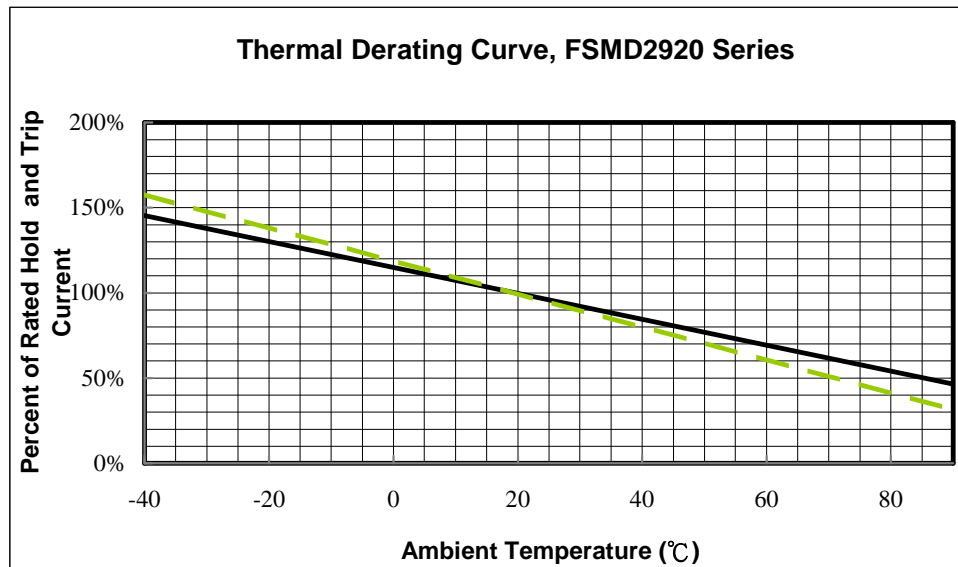
FSMD2920 Product Dimensions (Millimeters)



or

PART NUMBER	A		B		C		D
	Min	Max	Min	Max	Min	Max	Min
FSMD030-2920	6.73	7.98	4.80	5.44	0.60	1.15	0.35
FSMD050-2920	6.73	7.98	4.80	5.44	0.60	1.15	0.35
FSMD075-2920	6.73	7.98	4.80	5.44	0.60	1.15	0.35
FSMD100-2920	6.73	7.98	4.80	5.44	0.40	1.00	0.35
FSMD125-2920	6.73	7.98	4.80	5.44	0.40	0.90	0.35
FSMD150-2920	6.73	7.98	4.80	5.44	0.40	0.90	0.35
FSMD185-2920	6.73	7.98	4.80	5.44	0.30	0.90	0.35
FSMD200-2920	6.73	7.98	4.80	5.44	0.30	0.90	0.35
FSMD250-2920	6.73	7.98	4.80	5.44	0.30	0.90	0.35

Thermal Derating Curve



A=FSMD125~FSMD250

B=FSMD030~FSMD100

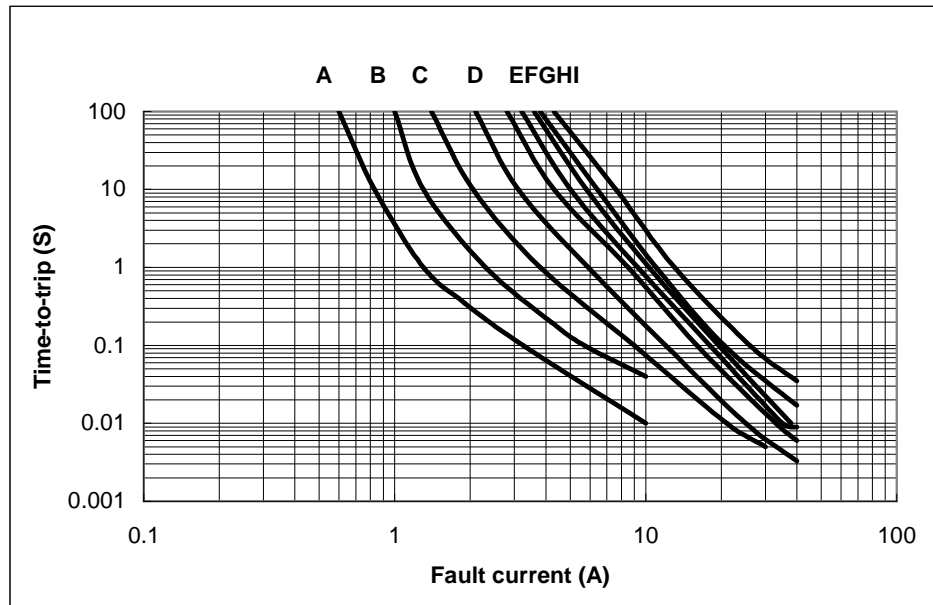
NOTE : All Specification subject to change without notice. 47

Surface Mount PTC FSMD2920 Series

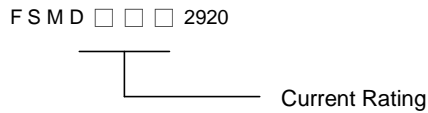


Typical Time-To-Trip at 23°C

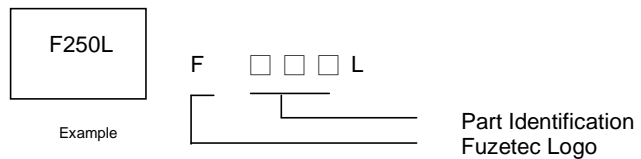
- A = FSMD030-2920
- B = FSMD050-2920
- C = FSMD075-2920
- D = FSMD100-2920
- E = FSMD125-2920
- F = FSMD150-2920
- G = FSMD185-2920
- H = FSMD200-2920
- I = FSMD250-2920



Part Numbering System



Part Marking System



Standard Package

P/N	Pcs /Bag	Reel/Tape
FSMD030-2920	-----	2K
FSMD050-2920	-----	2K
FSMD075-2920	-----	2K
FSMD100-2920	-----	2K
FSMD125-2920	-----	2K

P/N	Pcs /Bag	Reel/Tape
FSMD150-2920	-----	2K
FSMD185-2920	-----	2K
FSMD200-2920	-----	2K
FSMD250-2920	-----	2K

Warning:



- Operation beyond the specified maximum ratings or improper use may result in damage and possible electrical arcing and/or flame.
- PPTC device are intended for occasional overcurrent protection. Application for repeated overcurrent condition and/or prolonged trip are not anticipated.
- Avoid contact of PPTC device with chemical solvent. Prolonged contact will damage the device performance. .

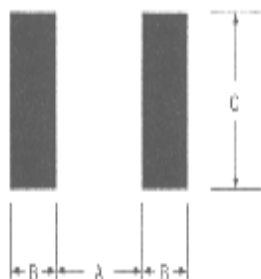
NOTE : All Specification subject to change without notice. 48

Surface Mount PTC FSMD2920 Series

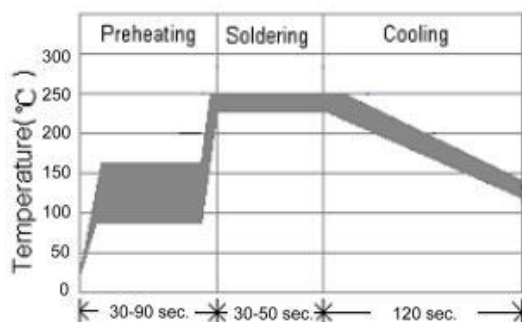


Pad Layouts 、 Solder Reflow and Rework Recommendations

The dimension in the table below provide the recommended pad layout for each FSMD2920 device



Pad dimensions (millimeters)			
Device	A Nominal	B Nominal	C Nominal
FSMD030-2920	5.1	2.3	5.6
FSMD050-2920	5.1	2.3	5.6
FSMD075-2920	5.1	2.3	5.6
FSMD100-2920	5.1	2.3	5.6
FSMD125-2920	5.1	2.3	5.6
FSMD150-2920	5.1	2.3	5.6
FSMD185-2920	5.1	2.3	5.6
FSMD200-2920	5.1	2.3	5.6
FSMD250-2920	5.1	2.3	5.6



Solder reflow

※ Due to “Lead Free” nature, Temperature and Dwelling time for the soldering zone is higher than those for Regular. This may cause damage to other components.

1. Recommended reflow methods; IR , vapor phase oven, hot air oven.
2. The FSMD2920 Series are suitable for use with wave-solder application methods.
3. Recommended maximum paste thickness is 0.25mm.
4. Devices can be cleaned using standard industry methods and solvents.

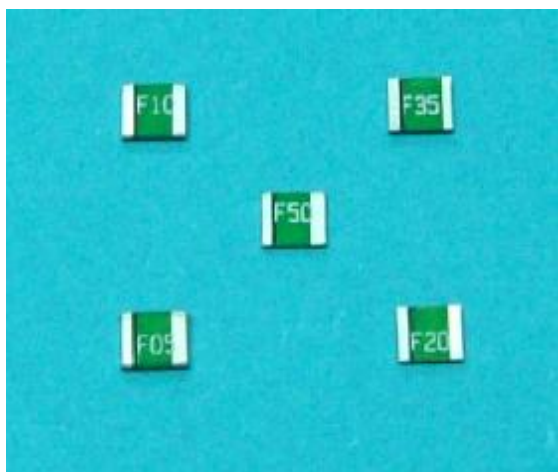
CAUTION:

If reflow temperatures exceed the recommended Profile, devices may not meet the performance requirements.

Rework:

Use standard industry practices.

Surface Mount PTC FSMD1210 Series



※ RoHS Compliant (Lead Free) Product

Application:

All high-density boards

Product Features:

Small surface mount, Solid state

Faster time to trip than standard SMD devices

Lower resistance than standard SMD devices

Operation Current: 50mA~0.75A

Maximum Voltage: 6V~60V

Temperature Range: -40°C to 85°C

Agency Recognition: UL (E211981)

C-UL (E211981)

Electrical Characteristics(23°C)

Part Number	Hold Current	Trip Current	Rated Voltage	Max Current	Typical Power	Max Time to Trip		Resistance Tolerance	
						Current	Time	R MIN	R1 MAX
						I _H , A	I _T , A	V _{MAX} , Vdc	I _{MAX} , A
FSMD005-1210	0.05	0.15	60	10	0.60	0.25	1.50	3.60	50.00
FSMD010-1210	0.10	0.25	60	10	0.60	0.50	1.50	1.60	15.00
FSMD020-1210	0.20	0.40	30	10	0.60	8.00	0.02	0.80	5.00
FSMD035-1210	0.35	0.70	16	40	0.60	8.00	0.20	0.32	1.30
FSMD050-1210	0.50	1.00	16	40	0.60	8.00	0.10	0.25	0.90
FSMD075-1210	0.75	1.50	8	40	0.60	8.00	0.10	0.13	0.40

I_H=Hold current-maximum current at which the device will not trip at 23°C still air.

I_T=Trip current-minimum current at which the device will always trip at 23°C still air.

V_{MAX}=Maximum voltage device can withstand without damage at it rated current.(I_{max})

I_{MAX}= Maximum fault current device can withstand without damage at rated voltage (V_{max}).

P_d=Typical power dissipated-type amount of power dissipated by the device when in the tripped state in 23°C still air environment.

R_{MIN}=Minimum device resistance at 23°C prior to tripping.

R_{1MAX}=Maximum device resistance at 23°C measured 1 hour post trip.

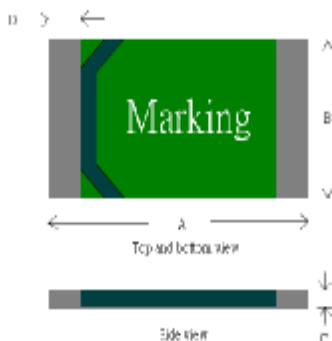
Termination pad characteristics

Termination pad materials : Tin-plated copper

Surface Mount PTC FSMD1210 Series

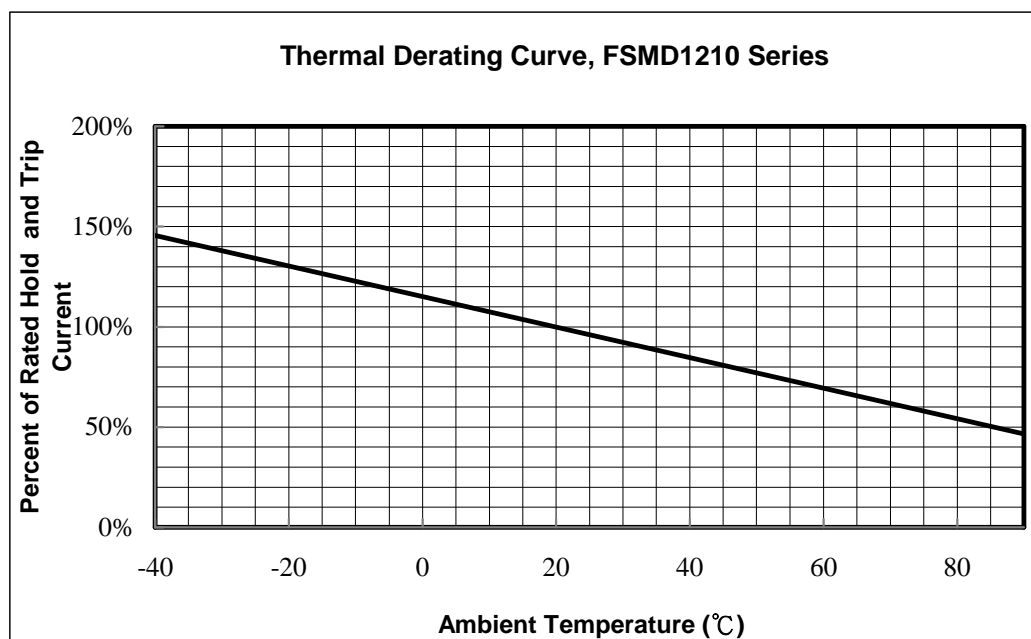


FSMD Product Dimensions (Millimeters)



Part Number	A		B		C		D
	Min	Max	Min	Max	Min	Max	Min
FSMD005-1210	3.00	3.43	2.35	2.80	0.60	1.15	0.25
FSMD010-1210	3.00	3.43	2.35	2.80	0.60	1.15	0.25
FSMD020-1210	3.00	3.43	2.35	2.80	0.40	0.85	0.25
FSMD035-1210	3.00	3.43	2.35	2.80	0.40	0.80	0.25
FSMD050-1210	3.00	3.43	2.35	2.80	0.30	0.75	0.25
FSMD075-1210	3.00	3.43	2.35	2.80	0.30	0.70	0.25

Thermal Derating Curve



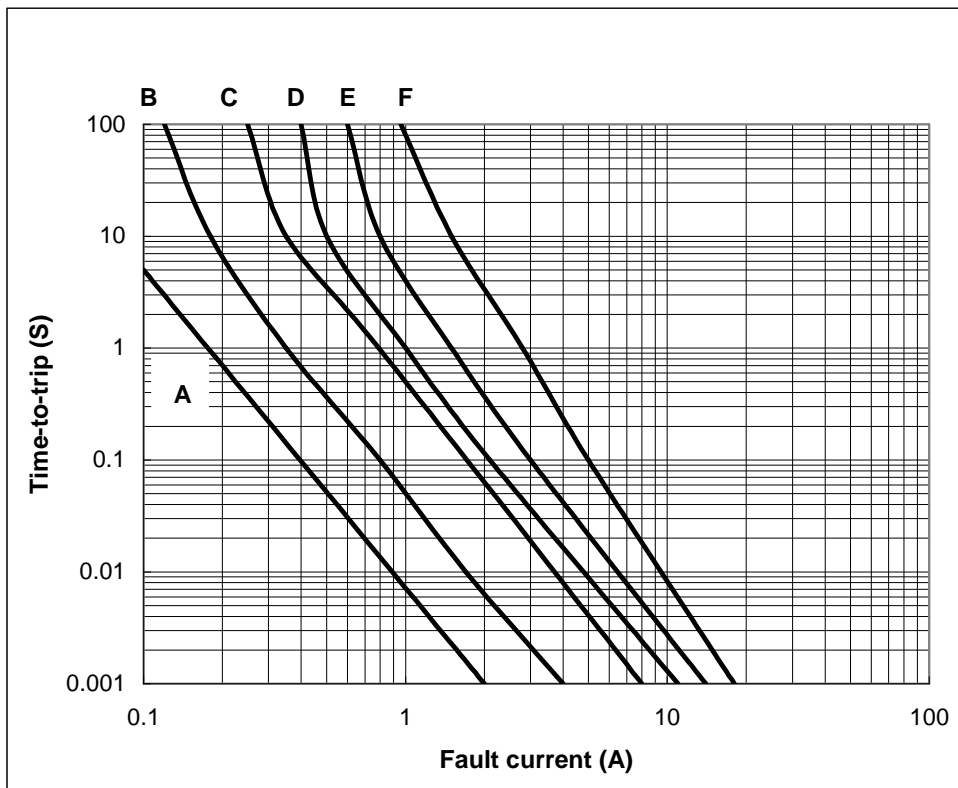
NOTE : All Specification subject to change without notice. 51

Surface Mount PTC FSMD1210 Series

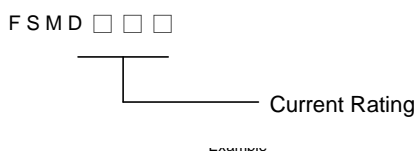


Typical Time-To-Trip at 23°C

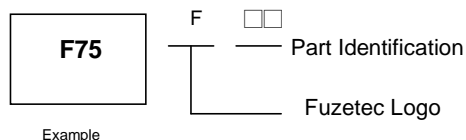
- A =FSMD005-1210
- B =FSMD010-1210
- C =FSMD020-1210
- D =FSMD035-1210
- E =FSMD050-1210
- F =FSMD075-1210



Part Numbering System



Part Marking System



- F05 =FSMD005-1210
- F10 =FSMD010-1210
- F20 =FSMD020-1210
- F35 =FSMD035-1210
- F50 =FSMD050-1210
- F75 =FSMD075-1210

Standard Package

P/N	Pcs /Bag	Reel/Tape
FSMD005-1210	-----	4K
FSMD010-1210	-----	4K
FSMD020-1210	-----	4K

P/N	Pcs /Bag	Reel/Tape
FSMD035-1210	-----	4K
FSMD050-1210	-----	4K
FSMD075-1210	-----	4K

Warning:

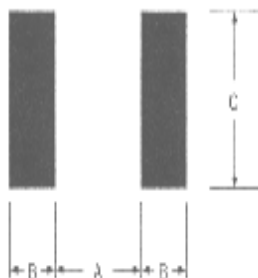


- Operation beyond the specified maximum ratings or improper use may result in damage and possible electrical arcing and/or flame.
- PPTC device are intended for occasional overcurrent protection. Application for repeated overcurrent condition and/or prolonged trip are not anticipated.
- Avoid contact of PPTC device with chemical solvent. Prolonged contact will damage the device performance.

NOTE : All Specification subject to change without notice. 52

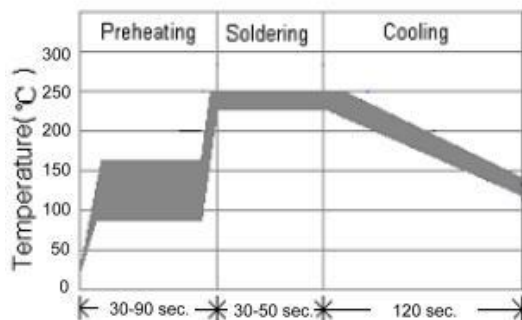
Pad Layouts 、 Solder Reflow and Rework Recommendations

The dimension in the table below provide the recommended pad layout for each FSMD1210 device



Pad dimensions(millimeters)

Device	A Nominal	B Nominal	C Nominal
FSMD005-1210	2.00	1.00	2.80
FSMD010-1210	2.00	1.00	2.80
FSMD020-1210	2.00	1.00	2.80
FSMD035-1210	2.00	1.00	2.80
FSMD050-1210	2.00	1.00	2.80
FSMD075-1210	2.00	1.00	2.80



Solder reflow

※ Due to “Lead Free” nature, Temperature and Dwelling time for the soldering zone is higher than those for Regular. This may cause damage to other components.

1. Recommended reflow methods; IR , vapor phase oven, hot air oven.
2. The FSMD1210 Series are suitable for use with wave-solder application methods.
3. Recommended maximum paste thickness is 0.25mm.
4. Devices can be cleaned using standard industry methods and solvents.

CAUTION:

If reflow temperatures exceed the recommended Profile, devices may not meet the performance requirements.

Rework:

Use standard industry practices.

Surface Mount PTC FSMD1206 Series



✘ **RoHS Compliant
(Lead Free) Product**

Application:

All high-density boards

Product Features:

Small surface mount, Solid state
Faster time to trip than standard SMD devices
Lower resistance than standard SMD devices

Operation Current: 50mA~500mA

Maximum Voltage: 6V~60V

Temperature Range: -40°C to 85°C

Agency Recognition: UL (E211981)

C-UL (E211981)

Electrical Characteristics(23°C)

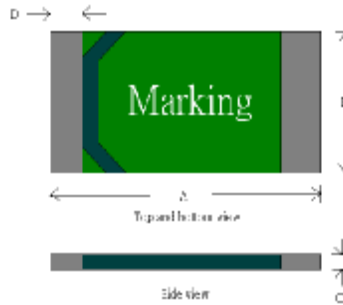
Part Number	Hold Current	Trip Current	Rated Voltage	Max Current	Typical Power	Max Time to Trip		Resistance Tolerance	
						Current	Time	R MIN	R1 MAX
						I _H , A	I _T , A	V _{MAX} , Vdc	I _{MAX} , A
FSMD005-1206	0.05	0.15	60	10	0.4	0.25	1.50	3.60	50.00
FSMD010-1206	0.10	0.25	60	10	0.4	0.50	1.00	1.60	15.00
FSMD020-1206	0.20	0.40	30	10	0.4	8.00	0.05	0.60	2.50
FSMD035-1206	0.35	0.75	16	40	0.4	8.00	0.10	0.30	1.20
FSMD050-1206	0.50	1.00	8	40	0.4	8.00	0.10	0.15	0.70

I_H=Hold current-maximum current at which the device will not trip at 23°C still air.
I_T=Trip current-minimum current at which the device will always trip at 23°C still air.
V_{MAX}=Maximum voltage device can withstand without damage at it rated current.(I max)
I_{MAX}= Maximum fault current device can withstand without damage at rated voltage (V max).
P_d=Typical power dissipated-type amount of power dissipated by the device when in the tripped state in 23°C still air environment.
R_{MIN}=Minimum device resistance at 23°C prior to tripping.
R_{1MAX}=Maximum device resistance at 23°C measured 1 hour post trip.
Termination pad characteristics
Termination pad materials : Tin-plated copper

Surface Mount PTC FSMD1206 Series

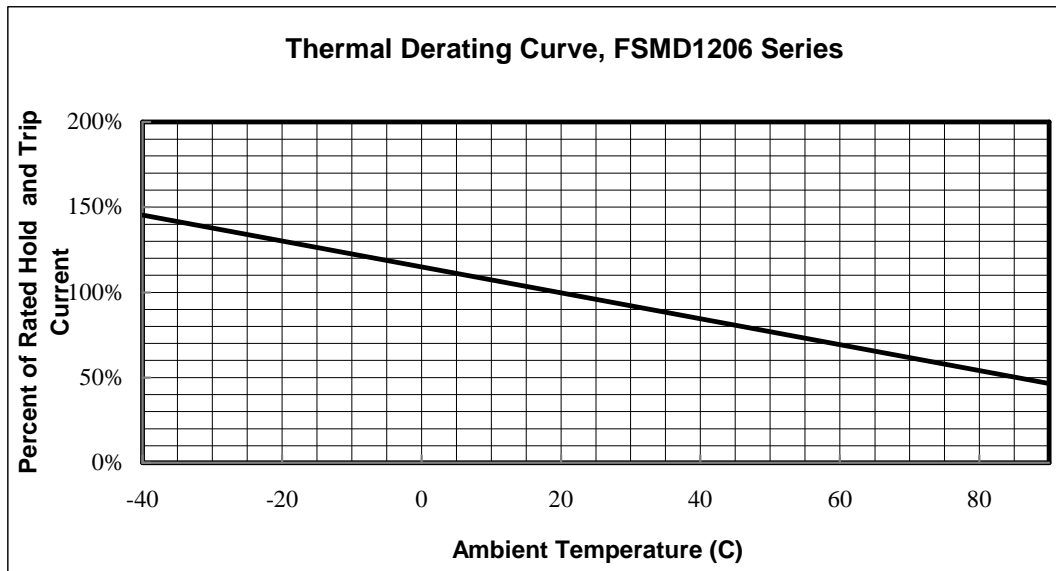


FSMD Product Dimensions (Millimeters)



Part Number	A		B		C		D
	Min	Max	Min	Max	Min	Max	Min
FSMD005-1206	3.0	3.5	1.50	1.80	0.45	0.75	0.10
FSMD010-1206	3.0	3.5	1.50	1.80	0.45	0.75	0.10
FSMD020-1206	3.0	3.5	1.50	1.80	0.45	0.75	0.10
FSMD035-1206	3.0	3.5	1.50	1.80	0.45	0.75	0.10
FSMD050-1206	3.0	3.5	1.50	1.80	0.25	0.55	0.10

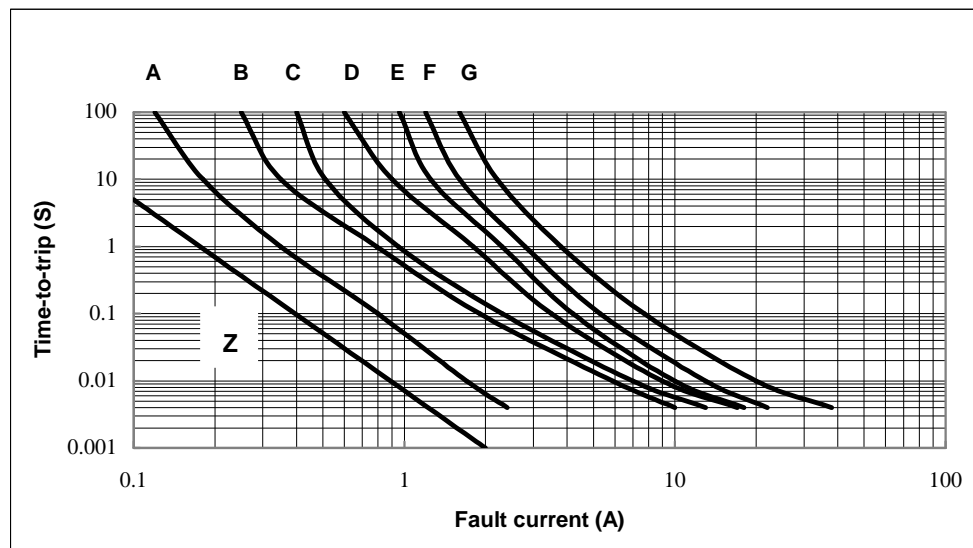
Thermal Derating Curve



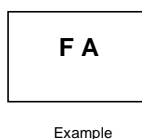
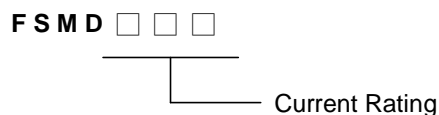
NOTE : All Specification subject to change without notice. 55

Typical Time-To-Trip at 23°C

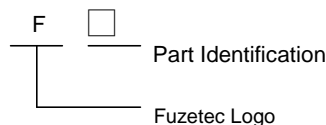
Z =FSMD005-1206
 A =FSMD010-1206
 B =FSMD020-1206
 C =FSMD035-1206
 D =FSMD050-1206



Part Numbering System



Part Marking System



FZ =FSMD005-1206
 FA =FSMD010-1206
 FB =FSMD020-1206
 FC =FSMD035-1206
 FD =FSMD050-1206

Standard Package

P/N	Pcs /Bag	Reel/Tape
FSMD005-1206	-----	4K
FSMD010-1206	-----	4K
FSMD020-1206	-----	4K

P/N	Pcs /Bag	Reel/Tape
FSMD035-1206	-----	4K
FSMD050-1206	-----	4K

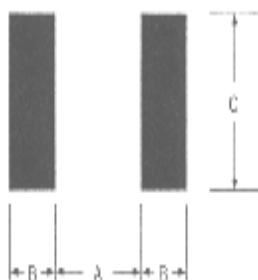
Warning:



- Operation beyond the specified maximum ratings or improper use may result in damage and possible electrical arcing and/or flame.
- PPTC device are intended for occasional overcurrent protection. Application for repeated overcurrent condition and/or prolonged trip are not anticipated.
- Avoid contact of PPTC device with chemical solvent. Prolonged contact will damage the device performance.

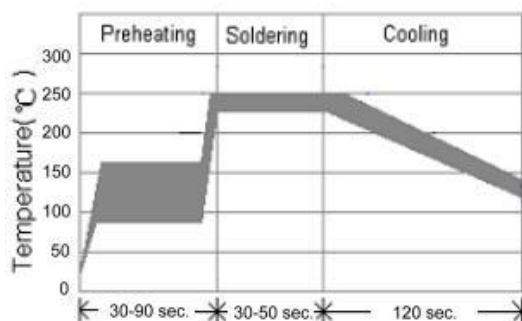
Pad Layouts 、 Solder Reflow and Rework Recommendations

The dimension in the table below provide the recommended pad layout for each FSMD1206 device



Pad dimensions(millimeters)

Device	A Nominal	B Nominal	C Nominal
FSMD005-1206	2.00	1.00	1.90
FSMD010-1206	2.00	1.00	1.90
FSMD020-1206	2.00	1.00	1.90
FSMD035-1206	2.00	1.00	1.90
FSMD050-1206	2.00	1.00	1.90



Solder reflow

※ Due to “Lead Free” nature, Temperature and Dwelling time for the soldering zone is higher than those for Regular. This may cause damage to other components.

1. Recommended reflow methods; IR , vapor phase oven, hot air oven.
2. The FSMD1206 Series are suitable for use with wave-solder application methods.
3. Recommended maximum paste thickness is 0.25mm.
4. Devices can be cleaned using standard industry methods and solvents.

CAUTION:

If reflow temperatures exceed the recommended Profile, devices may not meet the performance requirements.

Rework:

Use standard industry practices.

Quick Selection Guide

Fill in the following **BLANKS** to help us out in suggesting the **“Right”** product for your applications.

1. Determine the followings to define your circuit operation parameter,

Normal operating current : _____ . Typical fault current: _____ .

Normal operating voltage : _____ . Required opening time at fault: _____

Maximum interrupt current: _____ . Form factor: _____ .

Maximum operating voltage: _____ .

Maximum Ambient Temperature/ Derating : Between _____ °C and _____ °C

Typical resistance (in circuit): _____ Agency approvals: _____

2. Select the appropriate Fuzetec series from the table listed below: _____

Fuzetec Family	Voltage	Hold Current	Form factor	Application
FRX	60V	50mA~3.75A	Radial Leaded	Computer & Electronic Equipment
FRX90V	90V	100mA~3.75A	Radial Leaded	Telecom and electronic Equipment
FRU	30 V	900mA~9A	Radial Leaded	Computer & Electronic Equipment
FRT	36V	500mA~2.50A	Radial Leaded	IEEE 1394 FireWire, Computers & Consumer electronics
FUSB	16V/30V	750mA~2.5A	Radial Leaded	Computer & Electronic Equipment
FRG	16V	3A~14A	Radial Leaded	Electronics, Automotive & Appliance
FBR	90V	100mA~900mA	Radial Leaded	Cable Telephone Electronics/Cable Power Passing Tap
FRH	60V/250V/600V	0.08A~0.18A	Radial Leaded	Telecom Equipment
FRV	240V _{AC/DC}	50mA~550mA	Radial Leaded	Line Voltage Power Supply, Transformer and Appliances
FRA	120V _{AC}	100mA~3.75A	Radial Leaded	Electrical & Electronic Appliance
FSR	15V&30V	1.2A~4.2A	Axial Leaded	Rechargeable Battery & Packs
FLT	24V	0.7A ~3.4A	Axial Leaded	Rechargeable Battery & Packs
FLR	15V&20V	1.9A~7.3A	Axial Leaded	Rechargeable Battery & Packs
FSMD 1812	6V~60V	140mA~2.0A	Surface Mount	High-density PCB
FSMD 1206	6V~60V	0.05A ~0.50A	Surface Mount	High-density PCB
FSMD 1210	6V~60V	0.05A ~0.75A	Surface Mount	High-density PCB
FSMD 2920	6V~60V	300mA~2.5A	Surface Mount	High-density PCB

3. Fill in the followings:

a) Quantity of samples requested: _____

b) Application Type: _____

c) Company name: _____

d) Address: _____

Contact Person: _____ Position : _____

Tel: _____ Fax: _____

E-mail: _____ Website: _____

e) Type of Business: _____

Cross Reference



<u>Fuzetec</u>		<u>Raychem</u>		<u>Bourns</u>		<u>Littelfuse</u>	
FRX	005-60	RXE	005	MF-R	005	--	--
FRX	010-60	RXE	010	MF-R	010	60R	010
FRX	017-60	RXE	017	MF-R	017	60R	017
FRX	020-60	RXE	020	MF-R	020	60R	020
FRX	025-60	RXE	025	MF-R	025	60R	025
FRX	030-60	RXE	030	MF-R	030	60R	030
FRX	040-60	RXE	040	MF-R	040	60R	040
FRX	050-60	RXE	050	MF-R	050	60R	050
FRX	065-60	RXE	065	MF-R	065	60R	065
FRX	075-60	RXE	075	MF-R	075	60R	075
FRX	090-60	RXE	090	MF-R	090	60R	090
FRX	110-60	RXE	110	MF-RX	110	60R	110
FRX	135-60	RXE	135	MF-RX	135	60R	135
FRX	160-60	RXE	160	MF-RX	160	60R	160
FRX	185-60	RXE	185	MF-RX	185	60R	185
FRX	250-60	RXE	250	MF-RX	250	60R	250
FRX	300-60	RXE	300	MF-RX	300	60R	300
FRX	375-60	RXE	375	MF-RX	375	60R	375

FRX	010-90	--	--	--	--	--	--
FRX	015-90	--	--	--	--	--	--
FRX	017-90	--	--	--	--	--	--
FRX	020-90	RXE	020 (72V)	--	--	--	--
FRX	025-90	RXE	025 (72V)	--	--	--	--
FRX	030-90	RXE	030 (72V)	--	--	--	--
FRX	035-90	--	--	--	--	--	--
FRX	040-90	RXE	040 (72V)	--	--	--	--
FRX	050-90	RXE	050 (72V)	--	--	--	--
FRX	055-90	--	--	--	--	--	--
FRX	065-90	RXE	065 (72V)	--	--	--	--
FRX	075-90	RXE	075 (72V)	--	--	--	--
FRX	090-90	RXE	090 (72V)	--	--	--	--
FRX	110-90	RXE	110 (72V)	--	--	--	--
FRX	135-90	RXE	135 (72V)	--	--	--	--
FRX	160-90	RXE	160 (72V)	--	--	--	--
FRX	185-90	RXE	185 (72V)	--	--	--	--
FRX	250-90	RXE	250 (72V)	--	--	--	--
FRX	300-90	RXE	300 (72V)	--	--	--	--
FRX	375-90	RXE	375 (72V)	--	--	--	--

FBR	100(U)	--	--	--	--	--	--
FBR	150(U)	--	--	--	--	--	--
FBR	200(U)	--	--	--	--	--	--
FBR	250(U)	--	--	--	--	--	--
FBR	350(U)	--	--	--	--	--	--
FBR	550(U)	BBR	550	MF-R	055/90(U)	--	--
FBR	750(U)	BBR	750	MF-R	075/90	--	--
FBR	900(U)	--	--	--	--	--	--

FRU	090-30	RUE	090	MF-R	090-09	30R	090
FRU	110-30	RUE	110	MF-R	110	30R	110
FRU	135-30	RUE	135	MF-R	135	30R	135
FRU	160-30	RUE	160	MF-R	160	30R	160
FRU	185-30	RUE	185	MF-R	185	30R	185
FRU	250-30	RUE	250	MF-R	250(10)	30R	250
FRU	300-30	RUE	300	MF-R	300	30R	300
FRU	400-30	RUE	400	MF-R	400	30R	400
FRU	500-30	RUE	500	MF-R	500	30R	500
FRU	600-30	RUE	600	MF-R	600	30R	600
FRU	700-30	RUE	700	MF-R	700	30R	700
FRU	800-30	RUE	800	MF-R	800	30R	800
FRU	900-30	RUE	900	MF-R	900	30R	900

NOTE : All Specification subject to change without notice. 59

Cross Reference



<u>Fuzetec</u>		<u>Raychem</u>		<u>Bourns</u>		<u>Littelfuse</u>	
FRT	050-33	-	-	-	-	-	-
FRT	075-33	-	-	-	-	-	-
FRT	090-33	-	-	-	-	-	-
FRT	120-33	RTE	120	-	-	-	-
FRT	135-33	RTE	135	-	-	-	-
FRT	160-33	-	-	-	-	-	-
FRT	190-33	RTE	190	-	-	-	-
FRT	220-33	-	-	-	-	-	-
FRT	250-33	-	-	-	-	-	-

FUSB	075	RUSB	075	--	--	--	--
FUSB	090	RUSB	090	--	--	--	--
FUSB	110	RUSB	110	--	--	--	--
FUSB	120	RUSB	120	--	--	--	--
FUSB	135	RUSB	135	--	--	--	--
FUSB	155	RUSB	155	--	--	--	--
FUSB	160	RUSB	160	--	--	--	--
FUSB	185	RUSB	185	--	--	--	--
FUSB	250	RUSB	250	--	--	--	--

FRG	300-16	RGE	300	MF-RG	300	--	--
FRG	400-16	RGE	400	--	--	--	--
FRG	500-16	RGE	500	MF-RG	500	--	--
FRG	600-16	RGE	600	--	--	--	--
FRG	700-16	RGE	700	MF-RG	700	--	--
FRG	800-16	RGE	800	--	--	--	--
FRG	900-16	RGE	900	MF-RG	900	--	--
FRG	1000-16	RGE	1000	--	--	--	--
FRG	1100-16	RGE	1100	MF-RG	1100	--	--
FRG	1200-16	RGE	1200	--	--	--	--
FRG	1400-16	RGE	1400	--	--	--	--

FRH	080-250U	TR250	080U	MF-R008	250U	--	--
FRH	080-250	TR250	080	MF-R008	250-B10	--	--
FRH	110-250U	TR250	110U	MF-R011	250U	--	--
FRH	110-250	TR250	---	---	---	--	--
FRH	120-250U	TR250	120U	MF-R012	250U	--	--
FRH	120-250	TR250	120	MF-R012	250	--	--
FRH	145-250U	TR250	145U	MF-R014	250U	--	--
FRH	145-250	TR250	145	MF-R014	250	--	--
FRH	180-250U	TR250	180U	MF-R018	250U	--	--
FRH	180-250	TRW250	---	--	--	--	--
FRH	150-600	TR600	150	--	--	--	--
FRH	160-600	TR600	160	--	--	--	--

FRV	005-240F	LVR	005	--	--	--	--
FRV	008-240F	LVR	008	--	--	--	--
FRV	012-240F	LVR	012	--	--	--	--
FRV	016-240F	LVR	016	--	--	--	--
FRV	025-240F	LVR	025	--	--	--	--
FRV	033-240F	LVR	033	--	--	--	--
FRV	040-240F	LVR	040	--	--	--	--
FRV	055-240F	LVR	055K	--	--	--	--

NOTE : All Specification subject to change without notice. 60

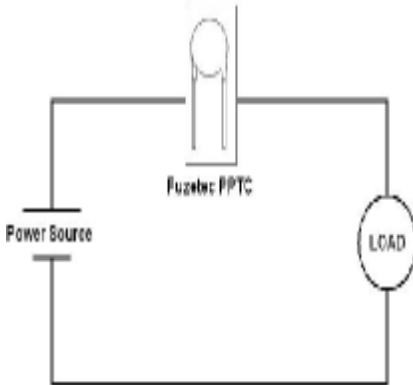
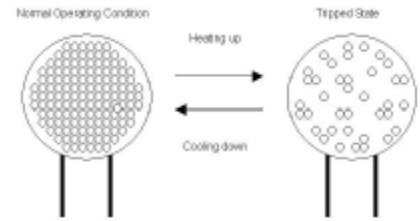
<u>Fuzetec</u>		<u>Raychem</u>		<u>Bourns</u>		<u>Littelfuse</u>	
FSR	120	SRP	120	MF-S	120	--	--
FSR	175	SRP	175	MF-S	175	--	--
FSR	200	SRP	200	MF-S	200	--	--
FSR	350	SRP	350	MF-S	350	--	--
FSR	420	SRP	420	MF-S	420	--	--
FLT	070	LTP	070	MF-LS	070	--	--
FLT	100	LTP	100	--	--	--	--
FLT	180	LTP	180	MF-LS	180	--	--
FLT	190	LTP	190	MF-LS	190	--	--
FLT	260	LTP	260	MF-LS	260	--	--
FLT	300	LTP	300	MF-LS	300	--	--
FLT	310	LTP	310	--	--	--	--
FLT	340	LTP	340	MF-LS	340	--	--
FLR	190	LR4	190	MF-LR	190	--	--
FLR	260	LR4	260	MF-LR	260	--	--
FLR	380	LR4	380	MF-LR	380	--	--
FLR	450	LR4	450	MF-LR	450	--	--
FLR	550	LR4	550	MF-LR	550	--	--
FLR	600	LR4	600	MF-LR	600	--	--
FLR	730	LR4	730	MF-LR	730	--	--
FSMD	014	mSMD	C014	MF-MSMD	014	--	--
FSMD	020	mSMD	020	MF-MSMD	020	--	--
FSMD	035	mSMD	C035	MF-MSMD	030	--	--
FSMD	050	mSMD	C050	MF-MSMD	050	1812L	050
FSMD	075	mSMD	C075	MF-MSMD	075	1812L	075
FSMD	110	mSMD	C110	MF-MSMD	110	1812L	110
FSMD	110-16	mSMD	M110/16	MF-MSMD	M110/16	--	--
FSMD	125	mSMD	C125	--	--	1812L	125
FSMD	150	mSMD	150	MF-MSMD	150	1812L	150
FSMD	160	mSMD	160	MF-MSMD	160	1812L	160
FSMD	200	mSMD	200	MF-MSMD	200	1812L	200
FSMD*	030-2920	SMD	030-2	MF-SM	030	2029L	030
FSMD*	050-2920	SMD	050-2	MF-SM	050	2029L	050
FSMD*	075-2920	SMD	075-2	MF-SM	075	2029L	075
FSMD*	100-2920	SMD	100-2	MF-SM	100	2029L	100
FSMD*	125-2920	SMD	125-2	MF-SM	125	2029L	125
FSMD*	150-2920	SMD	150	MF-SM	150		
FSMD*	185-2920	SMD	185	MF-SM	185		
FSMD*	200-2920	SMD	200	MF-SM	200		
FSMD*	250-2920	SMD	250	MF-SM	250		
FSMD	005-1210	microSMD	005	MF-USMD	005	--	--
FSMD	010-1210	--	--	MF-USMD	010	--	--
FSMD	020-1210	--	--	MF-USMD	020	--	--
FSMD	035-1210	microSMD	035	MFUSMD	035	--	--
FSMD	050-1210	microSMD	050	MFUSMD	050	--	--
FSMD	075-1210	microSMD	075	MFUSMD	075	--	--
FSMD	005-1206	--	--	--	--		
FSMD	010-1206	--	--	MF-NSMF	012		
FSMD	020-1206	--	--	--	--	1206L	020
FSMD	035-1206	--	--	--	--	1206L	035
FSMD	050-1206	nanoSMD	M050	MF-NSMF	050	1206L	050

* : Dimensional equivalent. Functional identical.

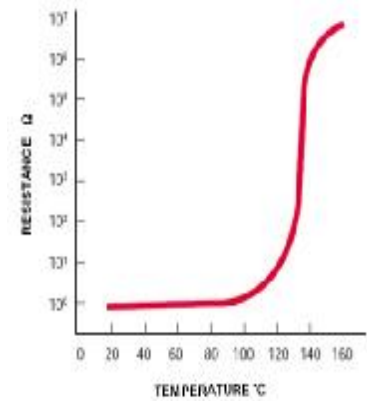
Fuzetec PPTC Resettable Fuses Technology



The conductive carbon black particles in Fuzetec's PPTC resettable fuses are dispersed in a polymer that has a crystalline structure. At normal operating conditions there are numerous carbon chains forming conductive paths through the material. Under fault conditions (Tripped State), excessive current flows through the PPTC device and the PTC material heats up making the conductive particles move apart from each other, most of them no longer conduct current and the resistance of the device increases sharply. Upon fault current being removed, the resettable fuse is reset and allows the current through the circuit again.



When connected in series to a circuit, Fuzetec's PPTC resettable fuses remain at extremely low resistance and allow the electrical current to flow through it without any restriction. When overcurrent situations occur, Fuzetec PPTC resettable fuses limit the current to a very small value and therefore protect the circuit from being damaged by the high current.



PPTC Applications by Industry

Telecom & Communications	ADSL, VDSL Cable modems, Set top Box	Customer Premise Equipment/UL-1495
	MDF Module	Telecom Network Equipment
Computer Industry	Mother board	Printer, Scanner, Modem
	Universal Serial Bus (USB) & IEEE1394	I/O Card
Industrial, Power Supply & Other Electronics	Power Supply Devices	Test & Measurement Equipment
	Ballast	Industrial Process Controls
	Motors, Fans & Blowers	Speakers
	Security & Fire Alarm Systems	Consumer Electronics
Automotive Industry	Automobile cigar-lighter adapters (CLAs)	
	Wire Harness	
	Automotive Security Alarm & other Automotive Electronics	
	Automotive actuators & motors (i.e. Power Windows)	
Battery & Portable Electronics	Battery Cell & Battery Packs	
	Battery Chargers	
	Notebook, PDA & Cellphone Batteries	

NOTE : All Specification subject to change without notice. 62

Radial Leaded (For Telecom & Electronic Equipment)



FRX
 Operation Current:0.05A ~3.75A
 VMAX:60V, IMAX: 40A.
 Wide Variety of Electronic Equipment



FRX90V
 Operation Current:0.1A ~3.75A
 VMAX:72V/90V, IMAX: 40A.
 Wide Variety of Electronic Equipment



FRU
 Operation Current:0.9A ~9A
 VMAX:30V, IMAX: 40A.
 Wide Variety of Electronic Equipment



FRT
 Operation Current:0.9A ~9A
 VMAX:36V, IMAX: 40A.
 Wide Variety of Electronic Equipment



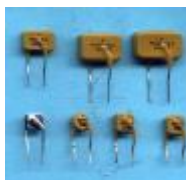
FRG
 Operation Current:3A~14A
 VMAX:16V, IMAX: 100A.
 Wide Variety of Electronic Equipment



FUSB
 Operation Current:0.75A~2.5A
 VMAX:16/30V, IMAX: 40A.
 Low Voltage USB Equipment



FBR
 Operation Current:0.10A ~0.9A
 VMAX:90V, IMAX: 40A.
 Cable/Telephone Electronic



FRH
 Operation Current:0.08A~0.18A
 Max Operation Voltage:60V
 Interrupt Voltage: 250V or 600V
 Telecommunication and Net Work



FRV
 Operation Current: 50mA~550mA
 Max Operation Voltage: 240V_{AC/DC}
 Interrupt Voltage: 265V
 Line Voltage application

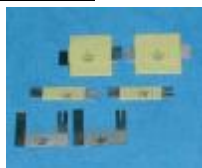


FRA
 Operation Current:0.1A ~3.75A
 VMAX:120V, IMAX: 2A~15A.
 Wide Variety of Electronic Equipment

Axial Leaded (For Rechargeable Battery Packs)



FSR
 Operation Current: 1.2A~4.2 A
 VMAX:15V/30V, IMAX: 100A.
 Rechargeable Battery Packs



FLT
 Operation Current: 0.7A~3.4A
 VMAX:24V, IMAX: 100A.
 Rechargeable Battery Packs



FLR
 Operation Current: 1.9A~7.3 A
 VMAX:15V/20V, IMAX: 100A.
 Rechargeable Battery Packs



Disc (Donut type)
Custom Design
 Battery Cell and Charger

Surface Mount (For High Density Board)



FSMD1812
 Operation Current:0.14A ~2.0A
 VMAX:6V~60V, IMAX: 10A~40A.
 All High-Density Board



FSMD2920
 Operation Current:0.3A ~2.5A
 VMAX:6V~60V, IMAX: 10A~40A.
 All High-Density Board



FSMD1210
 Operation Current:0.05A ~0.75A
 VMAX:6V~60V, IMAX: 10A~40A.
 All High-Density Board



FSMD1206
 Operation Current:0.05A ~0.5A
 VMAX:6V~60V, IMAX: 10A~40A.
 All High-Density Board