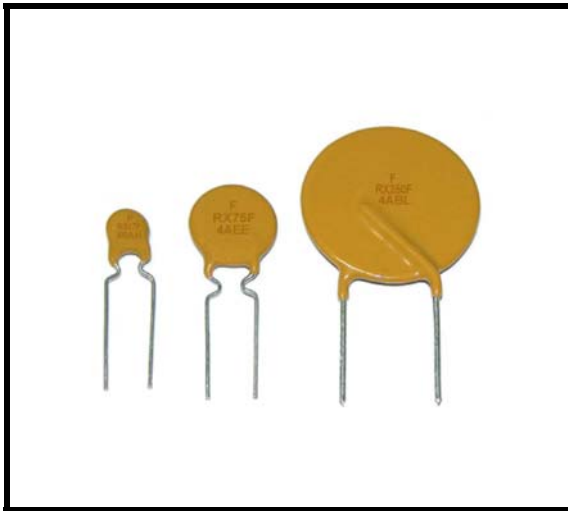


Radial Leaded PTC FRX Series



**RoHS Compliant &
Lead Free**



Application:

Wide variety of electronic equipment

Product Features:

Low hold current, Solid state

Radial-leaded product ideal for up to 60V

Operation Current: 0.05A ~ 3.75A

Maximum Voltage: 60V

Temperature Range: -40°C to 85°C

Agency Recognition: UL(E211981)

C-UL(E211981)

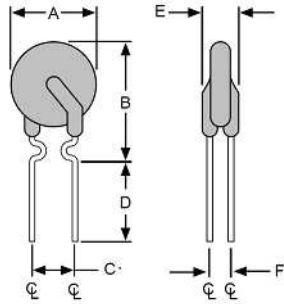
TÜV (R3-50004084)

Electrical Characteristics(23°C)

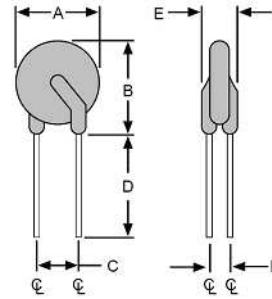
Part Number	Hold Current	Trip Current	Max.Time to Trip	Maximum Current	Rated Voltage	Typical Power	Resistance Tolerance	
							R _{MIN}	R _{1MAX}
	I _H , A	I _T , A	at 5xI _H , S	I _{MAX} , A	V _{MAX} , V _{DC}	P _d , W	Ohms	Ohms
FRX005-60F	0.05	0.10	5.0	40	60	0.26	7.30	20.0
FRX010-60F	0.10	0.20	4.0	40	60	0.38	2.50	7.50
FRX017-60F	0.17	0.34	3.0	40	60	0.48	2.00	8.00
FRX020-60F	0.20	0.40	2.2	40	60	0.41	1.83	4.40
FRX025-60F	0.25	0.50	2.5	40	60	0.45	1.25	3.00
FRX030-60F	0.30	0.60	3.0	40	60	0.49	0.88	2.10
FRX040-60F	0.40	0.80	3.8	40	60	0.56	0.55	1.29
FRX050-60F	0.50	1.00	4.0	40	60	0.77	0.50	1.17
FRX065-60F	0.65	1.30	5.3	40	60	0.88	0.31	0.72
FRX075-60F	0.75	1.50	6.3	40	60	0.92	0.25	0.60
FRX090-60F	0.90	1.80	7.2	40	60	0.99	0.20	0.47
FRX110-60F	1.10	2.20	8.2	40	60	1.50	0.15	0.38
FRX135-60F	1.35	2.70	9.6	40	60	1.70	0.12	0.30
FRX160-60F	1.60	3.20	11.4	40	60	1.90	0.09	0.22
FRX185-60F	1.85	3.70	12.6	40	60	2.10	0.08	0.19
FRX250-60F	2.50	5.00	15.6	40	60	2.50	0.05	0.13
FRX300-60F	3.00	6.00	19.8	40	60	2.80	0.04	0.10
FRX375-60F	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).
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: FRX005F~FRX090F Tin plated copper, 24 AWG.
FRX110F~FRX375F Tin plated copper, 20 AWG.
Soldering characteristics: MIL-STD-202, Method 208E.
Insulating coating:Flame retardant epoxy, meets UL-94V-0 requirement.

FRX Product Dimensions (Millimeters)



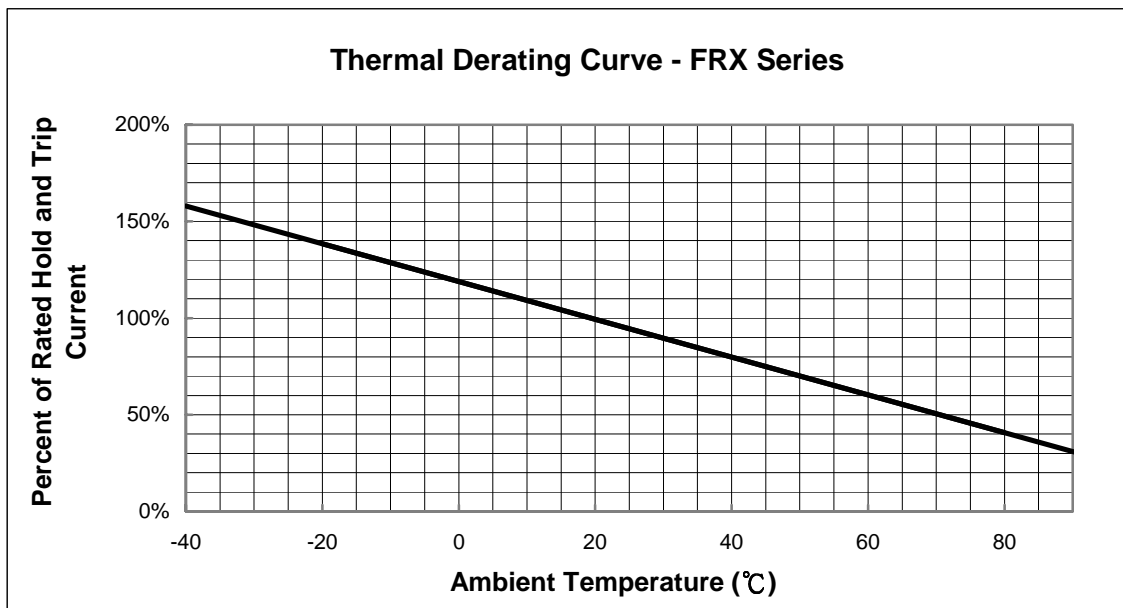
FRX 005-60F ~ FRX 090-60F
Lead Size: 24AWG,
Φ 0.51 mm Diameter



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

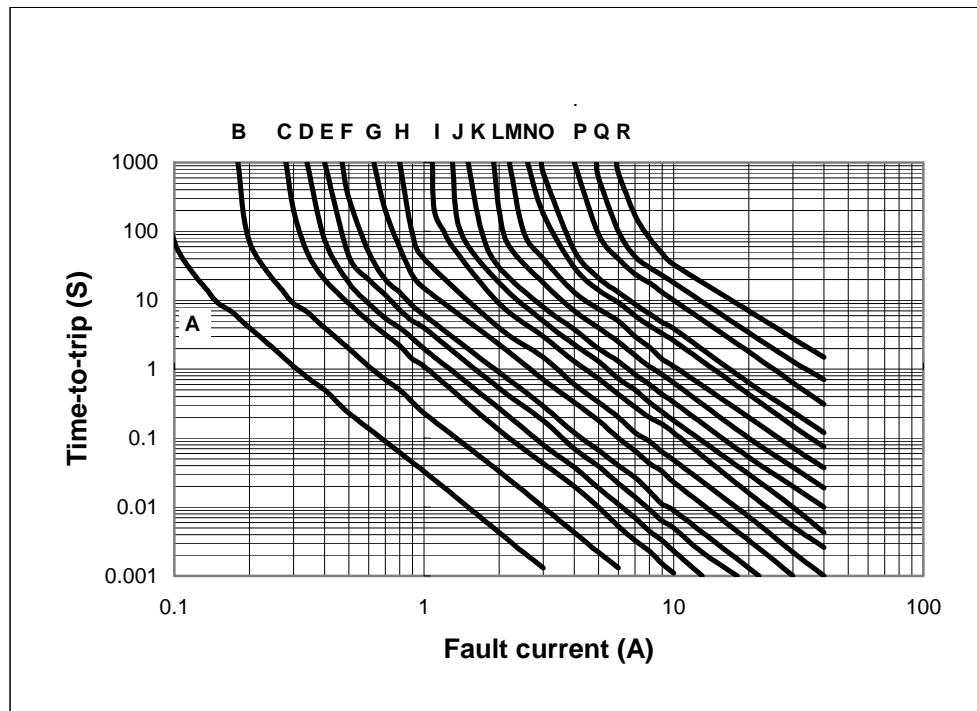
Part Number	A	B	C	D	E	F
	Maximum	Maximum	Typical	Minimum	Maximum	Typical
FRX005-60F	7.4	12.7	5.1	7.6	3.1	1.1
FRX010-60F	7.4	12.7	5.1	7.6	3.1	1.1
FRX017-60F	7.4	12.7	5.1	7.6	3.1	1.1
FRX020-60F	7.4	12.7	5.1	7.6	3.1	1.1
FRX025-60F	7.4	12.7	5.1	7.6	3.1	1.1
FRX030-60F	7.4	13.0	5.1	7.6	3.1	1.1
FRX040-60F	7.6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

Thermal Derating Curve

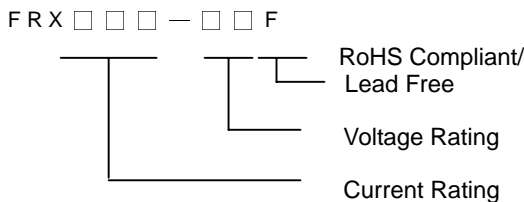


Typical Time-To-Trip at 23°C

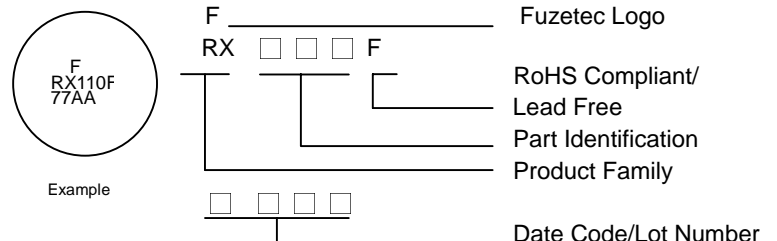
- A= FRX005-60F
- B = FRX010-60F
- C = FRX017-60F
- D = FRX020-60F
- E = FRX025-60F
- F = FRX030-60F
- G = FRX040-60F
- H = FRX050-60F
- I = FRX065-60F
- J = FRX075-60F
- K= FRX090-60F
- L = FRX110-60F
- M = FRX135-60F
- N = FRX160-60F
- O = FRX185-60F
- P = FRX250-60F
- Q = FRX300-60F
- R = FRX375-60F



Part Numbering System



Part Marking System



Standard Package

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

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



RoHS Compliant & Lead Free)



Application:

Telecom & wide variety of electronic equipment

Product Features:

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

Operation Current: 0.10A~3.75A

Maximum Voltage: Up to 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 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} , V _{DC}	Typical Power Pd, W	Resistance Tolerance	
							R _{MIN} Ohms	R _{1MAX} Ohms
FRX010-90F	0.10	0.20	4.0	40	72/90	0.38	2.50	7.50
FRX015-90F	0.15	0.35	10.0	40	72/90	0.70	2.40	7.00
FRX017-90F	0.17	0.34	3.0	40	72/90	0.48	2.00	8.00
FRX020-90F	0.20	0.40	2.2	40	72/90	0.41	1.83	4.40
FRX025-90F	0.25	0.50	2.5	40	72/90	0.45	1.25	3.00
FRX030-90F	0.30	0.60	3.0	40	72/90	0.49	0.88	2.10
FRX035-90F	0.35	0.75	10.0	40	72/90	1.30	0.70	2.50
FRX040-90F	0.40	0.80	3.8	40	72/90	0.56	0.55	1.29
FRX050-90F	0.50	1.00	4.0	40	72/90	0.77	0.50	1.17
FRX055-90F	0.55	1.20	10.0	40	72/90	1.50	0.40	1.50
FRX065-90F	0.65	1.30	5.3	40	72/90	0.88	0.31	0.72
FRX075-90F	0.75	1.50	6.3	40	72/90	0.92	0.25	0.60
FRX090-90F	0.90	1.80	7.2	40	72/90	0.99	0.20	0.47
FRX110-90F	1.10	2.20	8.2	40	72/90	1.50	0.15	0.38
FRX135-90F	1.35	2.70	9.6	40	72/90	1.70	0.12	0.30
FRX160-90F	1.60	3.20	11.4	40	72/90	1.90	0.09	0.22
FRX185-90F	1.85	3.70	12.6	40	72/90	2.10	0.08	0.19
FRX250-90F	2.50	5.00	15.6	40	72/90	2.50	0.05	0.13
FRX300-90F	3.00	6.00	19.8	40	72/90	2.80	0.04	0.10
FRX375-90F	3.75	7.50	24.0	40	72/90	3.20	0.03	0.08

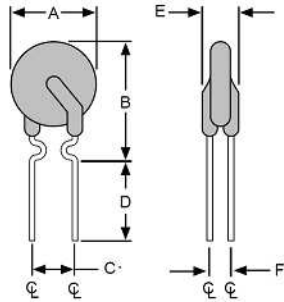
I_H=Hold current-maximum current at which the device will not trip at 23°C still air.
 I_T=Trip current-minimum current at which the device will always trip at 23°C still air.
 V_{MAX}=Maximum voltage device can withstand without damage at its rated current.
 I_{MAX}= Maximum fault current device can withstand without damage at rated voltage (V_{MAX}).
 Pd=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: FRX010F~FRX090F Tin plated copper, 24 AWG.
 FRX110F~FRX375F 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

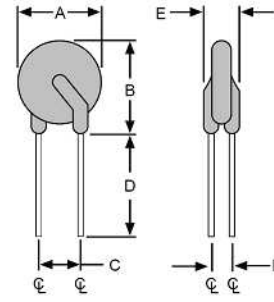
FRX 90V Series



FRX90V Production Dimensions (Millimeter)



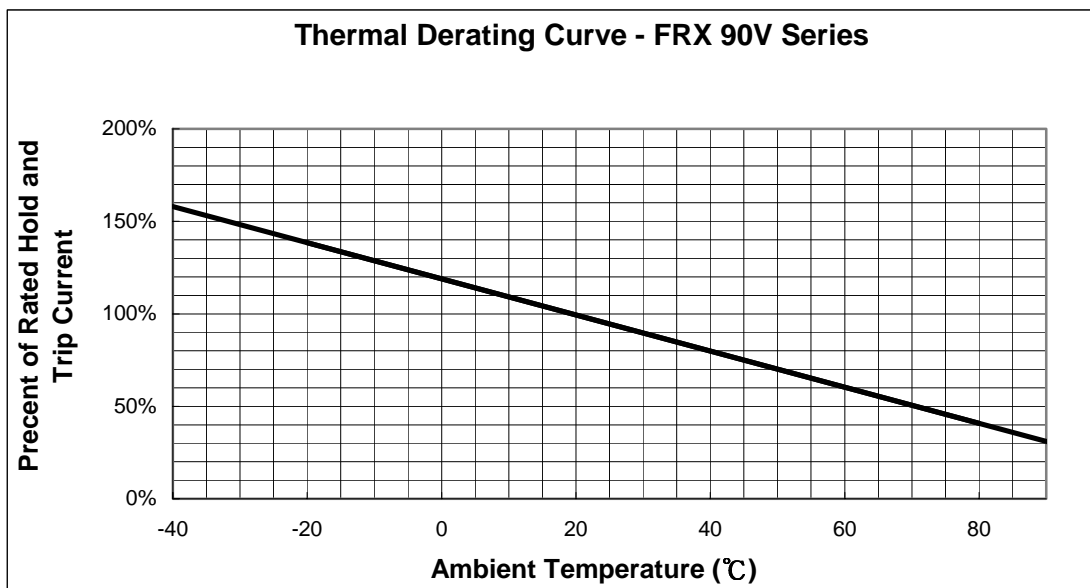
FRX 010-90F ~ FRX 090-90F
Lead Size : 24AWG
Φ 0.51 mm Diameter



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

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

Thermal Derating Curve

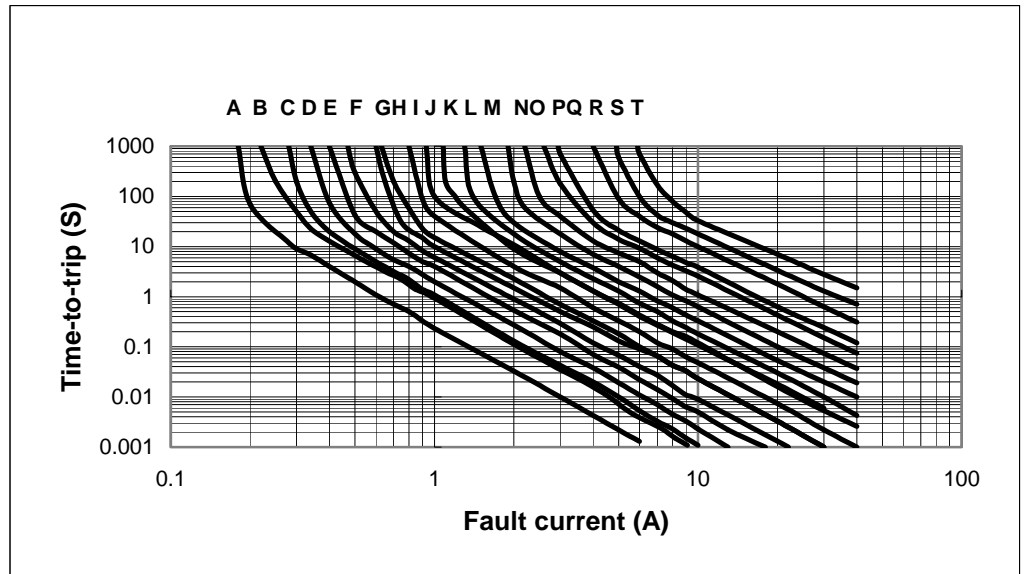


Radial Leaded PTC FRX 90V Series

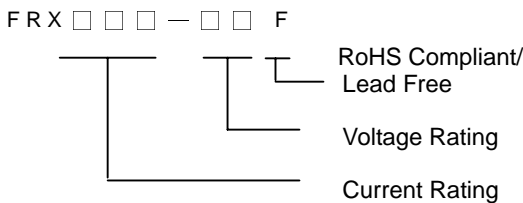


Typical Time-To-Trip at 23°C

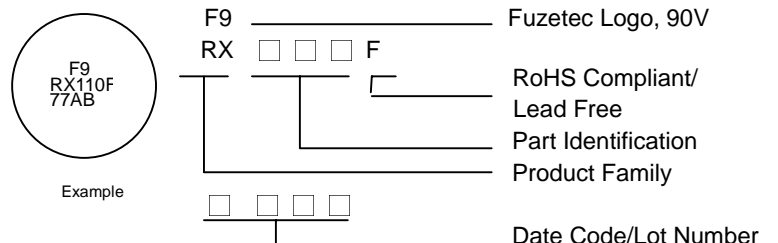
- A = FRX010-90F
- B = FRX015-90F
- C = FRX017-90F
- D = FRX020-90F
- E = FRX025-90F
- F = FRX030-90F
- G = FRX035-90F
- H = FRX040-90F
- I = FRX050-90F
- J = FRX055-90F
- K = FRX065-90F
- L = FRX070-90F
- M = FRX090-90F
- N = FRX110-90F
- O = FRX135-90F
- P = FRX160-90F
- Q = FRX185-90F
- R = FRX250-90F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



Part Numbering System



Part Marking System



Standard Package

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

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



Cross Reference



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

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

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

FRU	090-30F	RUEF	090	MF-R	090-0-9	30R	090
FRU	110-30F	RUEF	110	MF-R	110	30R	110
FRU	135-30F	RUEF	135	MF-R	135	30R	135
FRU	160-30F	RUEF	160	MF-R	160	30R	160
FRU	185-30F	RUEF	185	MF-R	185	30R	185
FRU	250-30F	RUEF	250	MF-R	250	30R	250
FRU	300-30F	RUEF	300	MF-R	300	30R	300
FRU	400-30F	RUEF	400	MF-R	400	30R	400
FRU	500-30F	RUEF	500	MF-R	500	30R	500
FRU	600-30F	RUEF	600	MF-R	600	30R	600
FRU	700-30F	RUEF	700	MF-R	700	30R	700
FRU	800-30F	RUEF	800	MF-R	800	30R	800
FRU	900-30F	RUEF	900	MF-R	900	30R	900

Thermal Derating for PPTC Device at Various Ambient Temperature.

FUZETEC PPTC Family	-20°C	0°C	23°C	30°C	40°C	50°C	60°C	70°C	85°C
FRX-60/90	136%	119%	100%	90%	81%	72%	63%	54%	40%
FRU	130%	115%	100%	91%	83%	76%	67%	61%	52%
FRT	135%	120%	100%	98%	90%	85%	78%	70%	64%
FUSB	130%	115%	100%	91%	83%	76%	67%	61%	52%
FRG	132%	120%	100%	95%	88%	80%	71%	61%	47%
FBR	136%	118%	100%	90%	81%	72%	63%	54%	40%
FRH	138%	119%	100%	92%	83%	73%	64%	55%	42%
FRV	133%	114%	100%	92%	86%	73%	64%	52%	40%
FRVL	138%	119%	100%	90%	80%	70%	60%	50%	38%
FRA	137%	122%	100%	95%	88%	79%	70%	65%	50%
FSR	135%	118%	100%	92%	85%	77%	69%	62%	50%
FLT	143%	122%	100%	90%	80%	69%	59%	46%	26%
FLR	130%	115%	100%	93%	86%	78%	71%	64%	56%
FSMD-1812	135%	118%	100%	93%	87%	79%	72%	65%	56%
FSMD-2920	134%	117%	100%	92%	83%	75%	66%	58%	45%
FSMD-1210	132%	115%	100%	92%	83%	75%	64%	59%	46%
FSMD-1206	135%	117%	100%	94%	88%	81%	71%	66%	52%