

## Positive Temperature Coefficient (PTC) Data Sheet

### Description

The 60V series provides radial resettable overcurrent protection with holding current from 0.05A to 5.0A. This series is suitable for applications with higher working voltage up to 60V.

### Features

- Radial leaded devices.
- High voltage surge capabilities
- Flame retardant epoxy polymer insulating material meets UL94 V-0 requirement.
- Over-current protection
- Available in lead-free version.
- Operating Temperature: -40°C~+85°C
- Meets MSL level 1, per J-STD-020

### Applications

- Powered supplies
- Security systems
- Automotive applications
- Industrial controls
- General electronics
- Motor protection

### Electrical Characteristics

Part Number	Marking	I <sub>hold</sub> (A)	I <sub>trip</sub> (A)	V <sub>max</sub> (V <sub>DC</sub> )	I <sub>max</sub> (A)	Pd typ. (W)	Maximum time to trip		Resistance	
							Current(A)	Times ( S )	R <sub>min</sub> (Ω )	R <sub>max</sub> (Ω )
FTR60-005	JK60 005	0.05	0.10	60	40	0.30	0.25	5.00	7.50	25.00
FTR60-010	JK60 010	0.10	0.20	60	40	0.38	0.50	4.00	2.50	7.50
FTR60-017	JK60 017	0.17	0.34	60	40	0.48	0.85	3.00	1.80	5.80
FTR60-020	JK60 020	0.20	0.40	60	40	0.41	1.00	2.20	1.50	3.30
FTR60-025	JK60 025	0.25	0.50	60	40	0.45	1.25	2.50	1.00	2.20
FTR60-030	JK60 030	0.30	0.60	60	40	0.49	1.50	3.00	0.70	1.55
FTR60-040	JK60 040	0.40	0.80	60	40	0.56	2.00	3.80	0.50	1.10
FTR60-050	JK60 050	0.50	1.00	60	40	0.77	2.50	4.00	0.35	0.85
FTR60-065	JK60 065	0.65	1.30	60	40	0.88	3.25	5.30	0.30	0.65
FTR60-075	JK60 075	0.75	1.50	60	40	0.92	3.75	6.30	0.25	0.55
FTR60-090	JK60 090	0.90	1.80	60	40	0.99	4.50	7.20	0.20	0.45
FTR60-110	JK60 110	1.10	2.20	60	40	1.50	5.50	8.20	0.15	0.33
FTR60-135	JK60 135	1.35	2.70	60	40	1.70	6.75	9.60	0.12	0.27
FTR60-160	JK60 160	1.60	3.20	60	40	1.90	8.00	11.40	0.09	0.22
FTR60-185	JK60 185	1.85	3.70	60	40	2.10	9.25	12.60	0.08	0.18
FTR60-250	JK60 250	2.50	5.00	60	40	2.50	12.50	15.60	0.05	0.11
FTR60-300	JK60 300	3.00	6.00	60	40	2.80	15.00	19.80	0.04	0.09
FTR60-375	JK60 375	3.75	7.50	60	40	3.20	18.50	24.00	0.03	0.08
FTR60-500	JK60 500	5.00	10.00	60	40	3.20	25.00	35.00	0.025	0.05

·I<sub>hold</sub>= Hold current: maximum current device will pass without tripping in 25°C still air.  
 ·I<sub>trip</sub>= Trip current: minimum current at which the device will trip in 25°C still air.  
 ·V<sub>max</sub>= Maximum voltage device can withstand without damage at rated current (I<sub>max</sub>)  
 ·I<sub>max</sub>= Maximum fault current device can withstand without damage at rated voltage

·Pd typ.= Typical power dissipated from device when in the tripped state at 23°C still air.  
 ·R<sub>min</sub>= Minimum resistance of device in initial (un-soldered) state.  
 ·R<sub>max</sub>= Maximum resistance of device in initial (un-soldered) state.

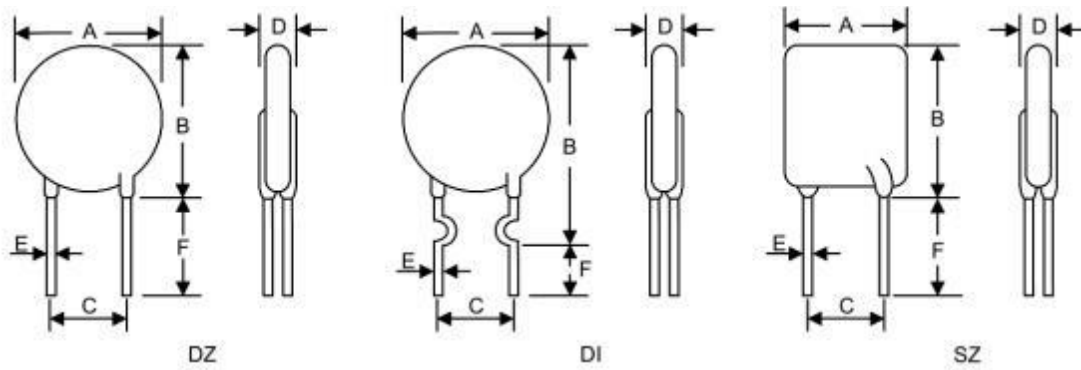
## Test Procedures and Requirement

Items	Test Conditions	Accept/Reject Criteria
Resistance	In still air @25°C	$R_{min} \leq R \leq R_{max}$
Time to Trip	Specified current, V max , 25°C	$T \leq \text{max. Time to trip (T trip)}$
Hold Current	30 min, at $I_{hold}$	No trip
Trip Cycle Life	V max , I max , 100 cycle	No arcing or burning
Trip Endurance	V max , 24hours	No arcing or burning

## Thermal Derating Chart - $I_{hold}$

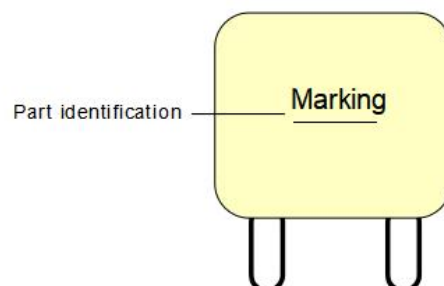
Part Number	Ambient Operation Temperature									
	-40°C	-20°C	0°C	25°C	30°C	40°C	50°C	60°C	70°C	85°C
FTR60-005	0.078	0.07	0.06	0.05	0.05	0.04	0.04	0.03	0.03	0.02
FTR60-010	0.16	0.14	0.12	0.10	0.09	0.08	0.07	0.06	0.05	0.04
FTR60-017	0.25	0.23	0.20	0.17	0.15	0.14	0.12	0.11	0.09	0.07
FTR60-020	0.30	0.27	0.24	0.20	0.18	0.16	0.14	0.13	0.11	0.08
FTR60-025	0.38	0.34	0.30	0.25	0.23	0.20	0.18	0.16	0.14	0.10
FTR60-030	0.46	0.41	0.36	0.30	0.27	0.24	0.22	0.19	0.16	0.12
FTR60-040	0.60	0.54	0.48	0.40	0.36	0.32	0.29	0.25	0.22	0.16
FTR60-050	0.75	0.68	0.60	0.50	0.45	0.41	0.36	0.32	0.27	0.20
FTR60-065	1.00	0.88	0.77	0.65	0.59	0.53	0.47	0.41	0.35	0.26
FTR60-075	1.15	1.02	0.89	0.75	0.68	0.61	0.54	0.47	0.41	0.30
FTR60-090	1.40	1.22	1.07	0.90	0.81	0.73	0.65	0.57	0.49	0.36
FTR60-110	1.70	1.50	1.31	1.10	0.99	0.89	0.79	0.69	0.59	0.44
FTR60-135	2.05	1.84	1.61	1.35	1.22	1.09	0.97	0.85	0.73	0.54
FTR60-160	2.45	2.18	1.90	1.60	1.44	1.30	1.15	1.01	0.86	0.64
FTR60-185	2.85	2.52	2.20	1.85	1.67	1.50	1.33	1.17	1.00	0.74
FTR60-250	3.85	3.40	2.98	2.50	2.25	2.03	1.80	1.58	1.35	1.00
FTR60-300	4.65	4.08	3.57	3.00	2.70	2.43	2.18	1.89	1.62	1.20
FTR60-375	5.80	5.10	4.46	3.75	3.38	3.04	2.70	2.36	2.03	1.50
FTR60-500	7.75	6.80	5.95	5.00	4.50	4.05	3.60	3.15	2.70	2.00

## Dimensions



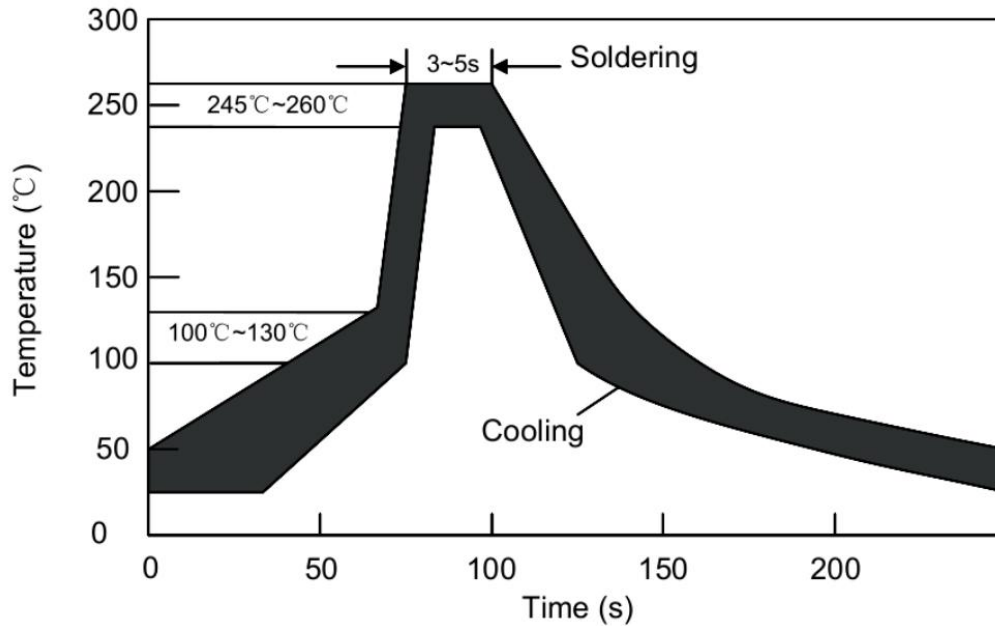
Part Number	Dimensions ( mm )						Style.
	A	B	C	D	E	F	
	Max.	Max.	±0.6	Max.	Typ.	Min.	
FTR60-005	6.0	8.5	5.1	3.1	0.5	7.6	DZ
FTR60-010	6.0	9.5	5.1	3.1	0.5	7.6	DZ
FTR60-017	7.4	12.7	5.1	3.1	0.5	7.6	DZ
FTR60-020	7.4	12.7	5.1	3.1	0.5	7.6	DZ
FTR60-025	7.4	12.7	5.1	3.1	0.5	7.6	DZ
FTR60-030	7.4	13.0	5.1	3.1	0.5	7.6	DZ
FTR60-040	7.4	14.2	5.1	3.1	0.5	4.6	DI
FTR60-050	7.5	14.5	5.1	3.1	0.5	4.6	DI
FTR60-065	9.4	16.1	5.1	3.1	0.5	4.6	DI
FTR60-075	10.2	16.8	5.1	3.1	0.5	4.6	DI
FTR60-090	11.2	18.0	5.1	3.1	0.5	4.6	DI
FTR60-110	11.0 / 13.0	16.0 / 18.0	5.1	3.1	0.8	7.6	SZ / DZ
FTR60-135	14.5	19.6	5.1	3.1	0.8	7.6	DZ
FTR60-160	16.3	21.3	5.1	3.1	0.8	7.6	DZ
FTR60-185	17.5	22.9	5.1	3.1	0.8	7.6	DZ
FTR60-250	21.6	26.6	10.5	3.1	0.8	7.6	DZ
FTR60-300	24.8	30.0	10.5	3.1	0.8	7.6	DZ
FTR60-375	27.2	32.0	10.5	3.1	0.8	7.6	DZ
FTR60-500	26.0	29.5	10.2	3.1	0.8	7.6	DZ

## Marking Code



## Recommended Soldering Conditions

Wave Soldering Recommendation Parameters

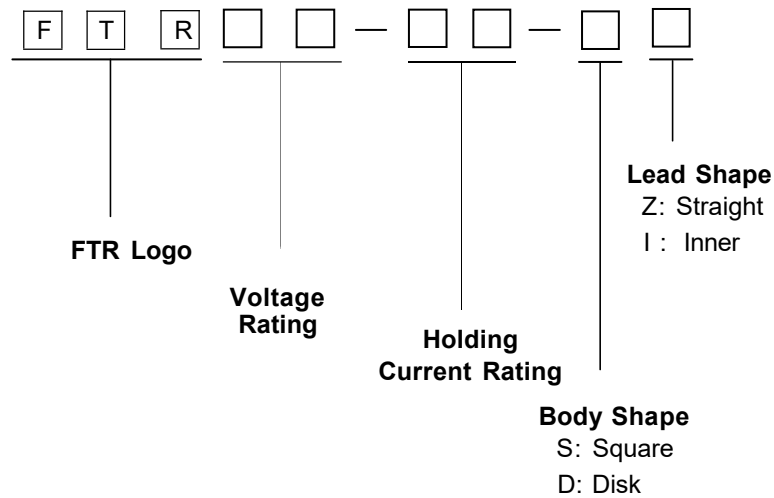


Items	Conditions
Pre-Heating Zone	Refer to the condition recommended by the flux manufacturer. Max. ramping rate should not exceed 4°C/Sec.
Soldering Zone	Max. solder temperature should not exceed 260°C Time within 5°C of actual Max. solder temperature within 3 - 5 seconds Total time from 25°C room to Max. solder temperature within 5 minutes including Pre-Heating time
Cooling Zone	Cooling by natural convection in air. Max. ramping down rate should not exceed 6°C/Sec.

Manual Soldering Recommendation Parameters

Items	Conditions
Soldering condition	The highest power of the manual soldering iron should be 30W or less, soldering temperature should not be higher than 280°C.
Soldering time	The soldering time should be kept within 3 seconds, otherwise it might cause insulation layer cracking, and increased part resistance.
Soldering position	The distance on the leads between the soldering point and bottom of the PPTC body should be equal or greater than 4mm.
Other	The soldering iron should not contact the PPTC body except the leads. If the soldering conditions are kept to lower temperature, less time and larger distance, the outcome of the soldering will be better.

## Partnumber code



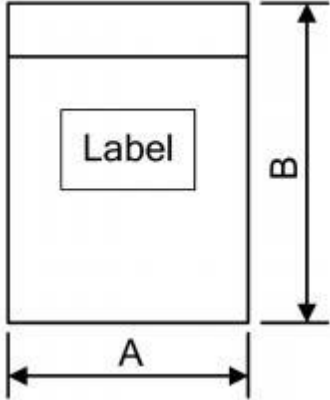
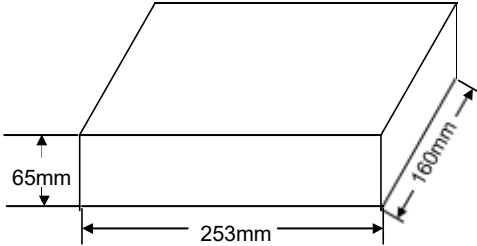
## Environmental Specifications

Operating / Storage temperature	-40°C to +85°C
Maximum Device Surface Temperature in Tripped State	125°C
Passive Aging	+85°C, 1000 hours ±5% typical resistance change
Humidity Aging	+85°C, 85%RH, 1000 hours ±5% typical resistance change
Thermal Shock	+85°C to -40°C 10 times 30% typical resistance change
Solvent Resistance	MIL-STD-202, Method 215 No change
Moisture Level Sensitivity	Level 1, J-STD-020

## Mechanical Specifications

Tensile strength	1.0Kgf, 10 seconds, No visible damage
Bending strength	0.5Kgf, 90°, 3 times, No visible damage
Vibration	Freq: 10-55Hz, Amp: 0.75mm, 1min; No visible damage

## Packaging

Bag	Part Number	Dimension A×B (mm)	Quantity
	FTR60-005	120×150	1000pcs/bag 6000pcs/box
	FTR60-010		
	FTR60-017		
	FTR60-020		
	FTR60-025		
	FTR60-030		
	FTR60-040		
	FTR60-050		
	FTR60-065		
	FTR60-075	120×150	500pcs/bag 3000pcs/box
	FTR60-090		
	FTR60-110		
	FTR60-135	150×200	500pcs/bag 2000pcs/box
	FTR60-160		
	FTR60-185		
	FTR60-250	150×200	200pcs/bag 800pcs/box
	FTR60-300		
	FTR60-375		
FTR60-500			