

Positive Temperature Coefficient (PTC) Data Sheet

Description

The 2016 series provides miniature surface mount resettable overcurrent protection with holding current from 0.3A to 2.0A. This series is suitable for applications where space is at a premium and the device current is low.

Features

- ROHS compliant and lead-free
- Fast response to fault current
- Low profile
- Low resistance
- Compatible with high temperature solders
- Compact design saves board space

Applications

- USB peripherals and Type C
- Disk drives
- General electronics
- PDAs/digital cameras
- Game console port protection
- HDMI and Set-top-box

Electrical Characteristics

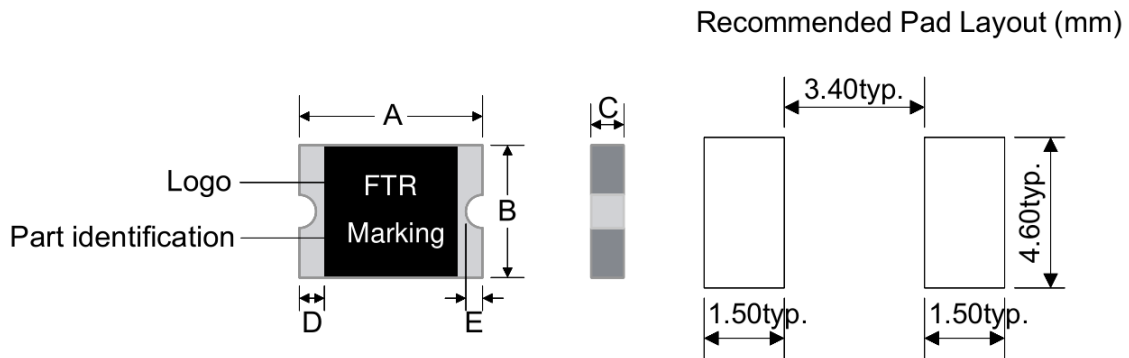
Part Number	Marking	I _{hold} (A)	I _{trip} (A)	V _{max} (V)	I _{max} (A)	Pd typ. (W)	Maximum time to trip		Resistance	
							Time(s)	Current(A)	R _{min} (Ω)	R _{1max} (Ω)
FTR2016-030		0.30	0.60	60	20	1.40	3.00	1.50	0.50	2.30
FTR2016-050		0.55	1.10	60	20	1.40	5.00	2.50	0.20	1.00
FTR2016-075		0.75	1.55	60	20	1.40	0.50	8.00	0.13	0.90
FTR2016-100		1.10	2.20	15	40	1.40	0.50	8.00	0.06	0.40
FTR2016-100/33		1.10	2.20	33	40	1.40	0.50	8.00	0.06	0.40
FTR2016-150		1.50	3.00	15	40	1.40	1.00	8.00	0.05	0.18
FTR2016-200		2.00	4.20	6	40	1.40	3.00	8.00	0.03	0.10

·I_{hold}= Hold current: maximum current device will pass without tripping in 23°C still air.
 ·I_{trip}= Trip current: minimum current at which the device will trip in 23°C still air.
 ·V_{max}= Maximum voltage device can withstand without damage at rated current (I_{max})
 ·I_{max}= Maximum fault current device can withstand without damage at rated voltage (V_{max})
 ·Pd typ.= Typical power dissipated from device when in the tripped state at 23°C still air.
 ·R_{min}= Minimum resistance of device in initial (un-soldered) state.
 ·R_{1max}= Maximum resistance of device at 23°C measured one hour after tripping or reflow soldering of 260°C for 20 sec.
 ■Caution: Operation beyond the specified rating may result in damage and possible arcing and flame.

Thermal Derating Chart

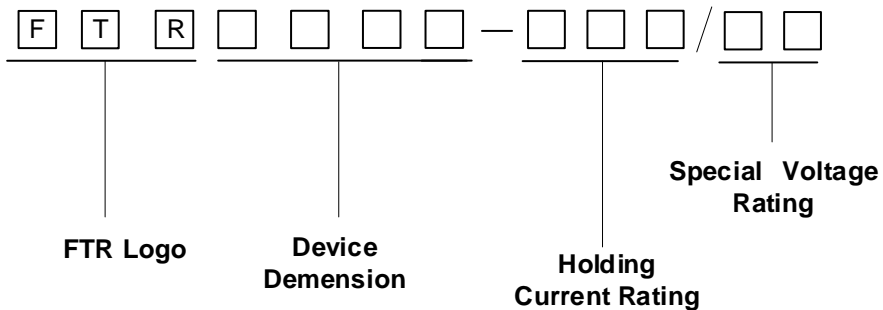
Part Number	Ambient Operation Temperature								
	-40°C	-20°C	0°C	23°C	40°C	50°C	60°C	70°C	85°C
FTR2016-030	0.45	0.40	0.35	0.30	0.25	0.23	0.20	0.18	0.14
FTR2016-050	0.93	0.80	0.65	0.50	0.42	0.38	0.33	0.30	0.23
FTR2016-075	1.05	0.95	0.85	0.75	0.60	0.55	0.45	0.40	0.30
FTR2016-100	1.66	1.47	1.29	1.10	0.91	0.83	0.73	0.64	0.50
FTR2016-100/33	1.66	1.47	1.29	1.10	0.91	0.83	0.73	0.64	0.50
FTR2016-150	2.26	2.00	1.76	1.50	1.24	1.13	1.00	0.87	0.68
FTR2016-200	2.80	2.50	2.19	2.00	1.84	1.74	1.50	1.34	1.14

Dimensions and PAD Size



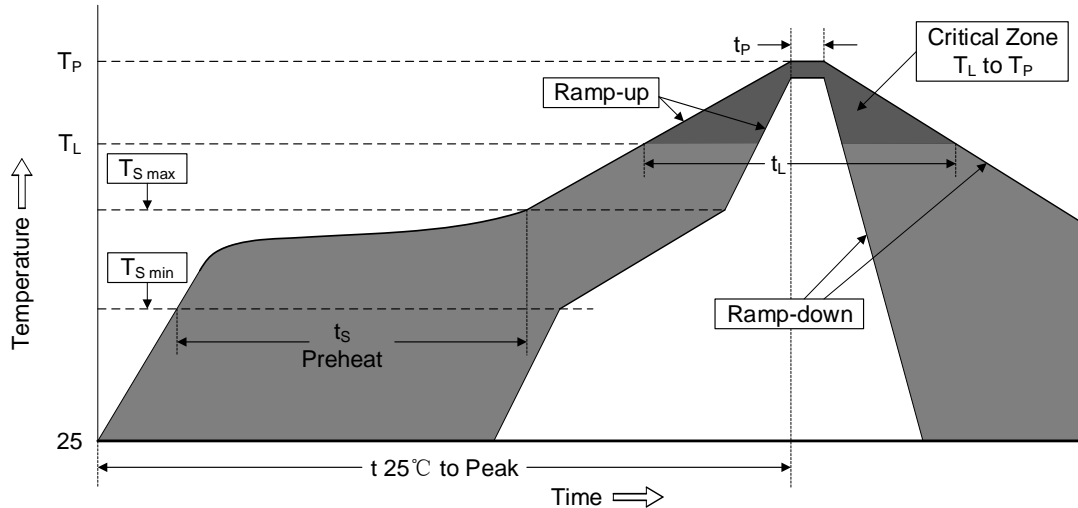
Part Number	Dimensions(mm)									
	A		B		C		D		E	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
FTR2016-030	4.72	5.44	3.70	4.43	0.55	1.05	0.30	1.50	0.25	0.65
FTR2016-050	4.72	5.44	3.70	4.43	0.75	2.00	0.30	1.50	0.25	0.65
FTR2016-075	4.72	5.44	3.70	4.43	1.45	2.25	0.30	1.50	0.25	0.65
FTR2016-100	4.72	5.44	3.70	4.43	0.50	1.20	0.30	1.50	0.25	0.65
FTR2016-100/33	4.72	5.44	3.70	4.43	0.75	1.25	0.30	1.50	0.25	0.65
FTR2016-150	4.72	5.44	3.70	4.43	0.50	1.55	0.30	1.50	0.25	0.65
FTR2016-200	4.72	5.44	3.70	4.43	0.50	1.20	0.30	1.50	0.25	0.65

Partnumber code



Recommended Soldering Conditions

Reflow Soldering



Recommended Conditions

Profile Feature	Pb-Free Assembly
Average ramp-up rate (T_L to T_P)	3°C/second max.
Preheat	
-Temperature Min ($T_{S\ min}$)	150°C
-Temperature Max ($T_{S\ max}$)	200°C
-Time (min to max) (t_s)	60-180 seconds
$T_{S\ max}$ to T_L	
-Ramp-up Rate	3°C/second max.
Time maintained above:	
-Temperature (T_L)	217°C
-Time (t_L)	60-150 seconds
Peak Temperature (T_P)	260°C
Time within 5°C of actual Peak Temperature (t_p)	20-40 seconds
Ramp-down Rate	6°C/second max.
Time 25°C to Peak Temperature	8 minutes max.
Storage Condition	0°C ~ 35°C, ≤70%RH

·Recommended reflow methods: IR, vapor phase oven, hot air oven, N 2 environment for lead-free

·Recommended maximum paste thickness is 0.25mm (0.010 inch)

·Device can be cleaned using standard industry methods and solvents.

Note 1: All temperature refer to topside of the package, measured on the package body surface.

Note 2: If reflow temperatures exceed the recommended profile, devices may not meet the performance requirements.

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 ±50% typical resistance change
Humidity Aging	+85°C, 85%RH, 1000 hours ±50% typical resistance change
Thermal Shock	MIL-STD-202, Method 107G +85°C/-40°C 20 times -50% typical resistance change
Solvent Resistance	MIL-STD-202, Method 215 No change
Vibration	MIL-STD-883C, Method 2007.1, Condition A No change
Moisture Level Sensitivity	Level 1, J-STD-020C

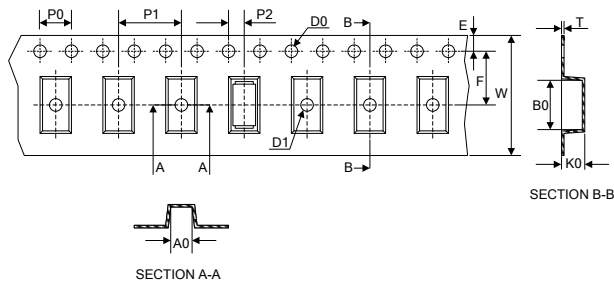
Physical Specifications

Terminal Material	Solder-Plated Copper (Solder Material: Matte Tin (Sn))
Terminal Solderability	Meets EIA Specification RS186-9E, ANSI/J-STD-002 Category 3.

Packaging

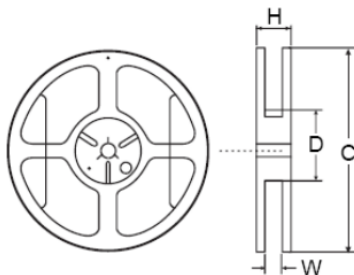
Part Number	Quantity	Part Number	Quantity
FTR2016-030	1500	FTR2016-100/33	1500
FTR2016-050	1000	FTR2016-150	1500
FTR2016-075	800	FTR2016-200	2000
FTR2016-100	2000		

Tape



Symbol	Dimension (mm)			
	100 200	030,150 100/33	050	075
W	12.00±0.30	12.00±0.30	12.00±0.30	12.00±0.30
P0	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10
P1	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10
P2	2.00±0.10	2.00±0.10	2.00±0.10	2.00±0.10
D0	Φ1.55±0.10	Φ1.55±0.10	Φ1.55±0.10	Φ1.50±0.10
D1	1.50min	1.50±0.10	1.50±0.10	1.50±0.10
E	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10
F	5.50±0.05	5.50±0.05	5.50±0.05	5.50±0.05
A0	4.40±0.1	4.48±0.1	4.45±0.1	4.51±0.1
B0	5.50±0.1	5.40±0.1	5.48±0.1	5.50±0.1
K0	0.75±0.1	1.36±0.1	1.86±0.1	2.40±0.1
T	0.25±0.1	0.25±0.1	0.25±0.1	0.30±0.1

Reel



C	Φ178.0±1.0
D	Φ60.2±0.5
H	16.0±0.5
W	13.2±1.5