



#### **Additional Information**







Resources

Accessories

Samples

#### **Agency Approvals**

Agency	Agency File/Certificatge Number							
<b>71</b> 2	E74889							
<b>®</b> :	78165C							
$\triangle$	72161786							

### **Description**

Littelfuse PolySwitch, a pioneer of polymeric positive temperature coefficient (PPTC) resettable devices, offers several material platforms to help protect battery applications. The low trip temperaure and broad range of hold current ratings combined with a broad range of form-factors and high current interrupt capability are a unique combination for the VTP series.

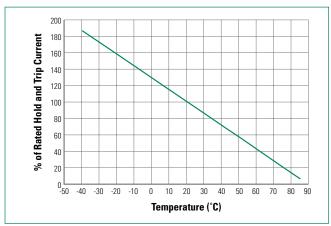
#### **Features & Benefits**

- Low trip temperature
- Current ratings from 1.1A to 2.1A
- Voltage ratings from 16V
- Safely interrupt high fault current
- Low-resistance devices increase battery operating time
- RoHS compliant and Halogen free
- Compatible with high-volume electronics assembly
- UL Recognized to UL 1434 CSA Certified to CSATIL No. CA-3ATUV Certified to EN 60730-1

### **Applications**

- Rechargeable batteries for mobile devices
- Video game controller
- Electronic tooth brush
- Battery-powerd shaver
- Portable medical devices

#### **Thermal Derating Curve**



#### Thermal Derating [Hold Current (A) at Ambient Temperature (°C)]

		Maximum Ambient Temperature											
Part Description	Ordering Part Number	-40°C	-20°C	0°C	20°C	25°C	40°C	50°C	60°C	70°C	80°C	85°C	
		Hold Current (A)											
VTP*	VTP*												
VTP110F	RF3498-000	2.0	1.7	1.4	1.12	1.10	0.85	0.75	0.7	0.4	0.2	0.1	
VTP170F	E04213-000	3.2	2.7	2.2	1.80	1.70	1.3	1.0	0.8	0.5	0.3	0.1	
VTP170XSF	RF0222-000	3.2	2.7	2.2	1.80	1.70	1.3	1.0	0.8	0.5	0.3	0.1	
VTP175F	A57199-000	3.2	2.7	2.2	1.84	1.75	1.3	1.0	0.8	0.5	0.3	0.1	
VTP175LF	RF3519-000	3.2	2.7	2.2	1.84	1.75	1.3	1.0	0.8	0.5	0.3	0.1	
VTP210GF	RF3122-000	4.1	3.5	2.9	2.26	2.10	1.6	1.3	1.0	0.7	0.4	0.1	
VTP210SF	RF3506-000	4.1	3.5	2.9	2.26	2.10	1.6	1.3	1.0	0.7	0.4	0.1	

<sup>\*</sup> Product electrical characteristics determined at 25°C.



#### **Electrical Characteristics**

Part Description	Ordering Part Number	I <sub>H</sub>	I <sub>T</sub>	V <sub>MAX</sub>	I <sub>MAX</sub>	P <sub>D MAX</sub>	MaxTim	e-to-trip	R <sub>MIN</sub>	R <sub>MAX</sub>	R <sub>1MAX</sub>	Typical	Typical
		(A)	(A)	(V <sub>DC</sub> )	(A)	(W)	(A)	(s)	(Ω)	(Ω)	(Ω)	Activation temperature	resistance
VTP*													
VTP110F	RF3498-000	1.10	2.7	16	100	1.3	5.50	5.0	0.038	0.070	0.140	90 °C	0.054
VTP170F	E04213-000	1.70	3.4	16	100	1.4	8.50	5.0	0.030	0.052	0.105	90 °C	0.041
VTP170XSF	RF0222-000	1.70	3.4	16	100	1.4	8.50	5.0	0.030	0.052	0.105	90 °C	0.041
VTP175F	A57199-000	1.75	3.6	16	100	1.4	8.75	5.0	0.029	0.051	0.102	90 °C	0.040
VTP175LF	RF3519-000	1.75	3.6	16	100	1.4	8.75	5.0	0.029	0.051	0.102	90 °C	0.040
VTP210GF	RF3122-000	2.10	4.7	16	100	1.5	10.00	5.0	0.018	0.030	0.060	90 °C	0.024
VTP210SF	RF3506-000	2.10	4.7	16	100	1.5	10.00	5.0	0.018	0.030	0.060	90 °C	0.024

<sup>\*</sup> Product electrical characteristics determined at 25°C.

#### Notes

. : Hold current: maximum current device will pass without interruption in 20°C still air unless otherwise specified.  $I_{\rm H}$  : Hold current: maximum current device will pass without interruption in 20°  $I_{\rm T}$  : Trip current: minimum current that will switch the device from low-resistar  $V_{\rm MAX}$  : Maximum voltage device can withstand without damage at rated current.

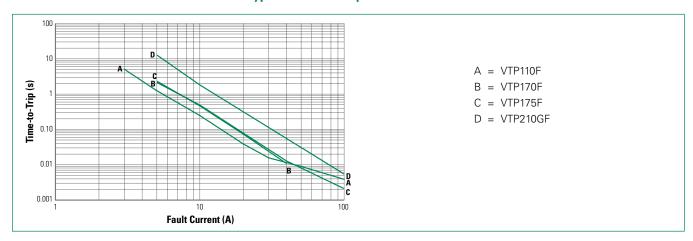
Trip current: minimum current that will switch the device from low-resistance to high-resistance in 20°C still air unless otherwise specified.

: Maximum fault current device can withstand without damage at rated voltage. : Power dissipated from device when in the tripped state in 20°C still air unless otherwise specified.

R<sub>MIN</sub>: Minimum resistance of device as supplied at 20°C unless otherwise specified.

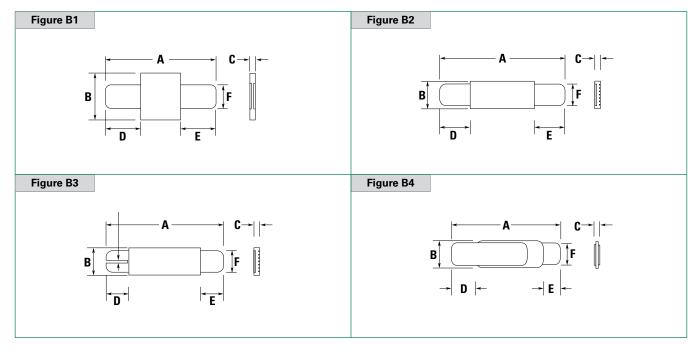
 $R_{MAX}$ : Maximum resistance of device a supplied at 20°C unless otherwise specified.  $R_{IMAX}$ : Maximum resistance, measured at 20°C unless otherwise specified, of device one hour after being tripped the first time.

#### Typical Time-to-Trip Curve at 25°C





#### **Dimension Figures**



#### **Dimensions in Millimeters (Inches)**

Part	Ordering Part	-	4		3	(	C		)	E		ı	Figure	
Description	Number	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	rigure
VTP110F	RF3498-000	23.6 (0.944)	25.6 (1.024)	2.7 (0.108)	2.9 (0.116)	_	0.7 (0.028)	7.0 (0.280)	8.0 (0.320)	7.0 (0.280)	8.0 (0.320)	2.3 (0.092)	2.5 (0.100)	B4
VTP170F	E04213-000	15.4 (0.616)	17.5 (0.700)	7.0 (0.280)	7.4 (0.296)	0.5 (0.020)	0.8 (0.032)	4.0 (0.160)	6.2 (0.248)	4.0 (0.160)	6.2 (0.248)	3.9 (0.156)	4.1 (0.164)	B1
VTP170XSF	RF0222-000	20.9 (0.836)	22.9 (0.916)	4.9 (0.196)	5.3 (0.212)	0.5 (0.020)	0.8 (0.032)	6.0 (0.240)	8.6 (0.344)	6.0 (0.240)	8.6 (0.344)	3.9 (0.156)	4.1 (0.164)	В3
VTP175F	A57199-000	21.2 (0.848)	23.2 (0.928)	3.5 (0.140)	3.9 (0.156)	_	0.8 (0.032)	4.6 (0.184)	6.6 (0.264)	4.6 (0.184)	6.6 (0.264)	2.9 (0.116)	3.1 (0.124)	B2
VTP175LF	RF3519-000	25.8 (1.032)	28.2 (1.128)	3.5 (0.140)	3.9 (0.156)	_	0.8 (0.032)	5.7 (0.228)	7.3 (0.292)	8.7 (0.348)	10.3 (0.412)	2.4 (0.096)	2.6 (0.104)	B2
VTP210GF	RF3122-000	20.9 (0.836)	23.1 (0.924)	4.9 (0.196)	5.3 (0.212)	_	0.8 (0.032)	4.1 (0.164)	5.8 (0.232)	4.1 (0.164)	5.8 (0.232)	3.9 (0.156)	4.1 (0.164)	B2
VTP210SF	RF3506-000	20.9 (0.836)	23.1 (0.924)	4.9 (0.196)	5.3 (0.212)	0.6 (0.024)	0.8 (0.032)	4.1 (0.164)	5.8 (0.232)	4.1 (0.164)	5.8 (0.232)	3.9 (0.156)	4.1 (0.164)	В3



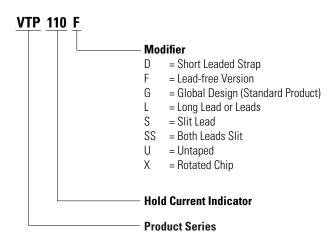
#### Physical Characteristics and Environmental Specifications

Physical Characteristics	Lead Material	0.125mm Nominal Thickness, Quarter-hard Nickel					
Citatacteristics	Tape Material	Polyester					
	Test	Conditions	Resistance Change				
	Passive Aging	-40°C, 1000 hrs	±5% typ				
		60°C, 1000 hrs	±10% typ				
Environmental Specifications	Humidity Aging	60°C/95% RH, 1000 hrs	±10% typ				
	Thermal Shock	85°C, -40°C (10 Times)	±5% typ				
	Vibration	MIL-STD-883D, Method 2026	No Change				

#### Notes

Storage conditions: 40°C max., 70% RH max.; devices should remain in original sealed bags prior to use Devices may not meet specified values if these storage conditions are exceeded.

#### **Part Naming System**



#### Packaging and Marking Information/Agency Recognition

Part Description	Ordering Part Number	Bag Quantity	Standard Package Quantity	Part Marking	Agency Recognition
VTP110F	RF3498-000	1,000	10,000	_	UL, CSA, TÜV
VTP170F	E04213-000	1,000	10,000	V17	UL, CSA, TÜV
VTP170XSF	RF0222-000	1,000	10,000	V17	UL, CSA, TÜV
VTP175F	A57199-000	1,000	10,000	V1X	UL, CSA, TÜV
VTP175LF	RF3519-000	1,000	10,000	V1X	UL, CSA, TÜV
VTP210GF	RF3122-000	1,000	10,000	V21	UL, CSA, TÜV
VTP210SF	RF3506-000	1,000	10,000	V21	UL, CSA, TÜV

#### **Installation Guidelines for the Strap Family**

- PPTC devices operate by thermal expansion of the conductive polymer. If devices are placed under pressure or installed in spaces that would prevent thermal expansion, they may not properly protect against damage caused by fault conditions. Designs must be selected in such a manner that adequate space is maintained over the life of the product.
- Twisting, bending, or placing the PPTC device in tension will decrease the ability of the device to protect against damage caused by electrical faults. No residual force should remain on device after installation. Mechanical damage to the PPTC device may affect device performance and should be avoided.
- Chemical contamination of PPTC devices should be avoided.
  Certain greases, solvents, hydraulic fluids, fuels, industrial cleaning agents, volatile components of adhesives, silicones, and electrolytes can have an adverse effect on device performance.
- PPTC strap devices are intended to be resistance welded to battery cells or to pack interconnect straps, yet some precautions must be taken when doing so. In order for the PPTC device to exhibit its specified performance, weld placement should be a minimum of 2mm from the edge of the PPTC device, weld splatter must not touch the PPTC device, and welding conditions must not heat the PPTC device above its maximum operating temperature.
- PPTC strap devices are not intended for applications where reflow onto flex circuits or rigid circuit boards is required.
- The polyester tape on PPTC strap devices is intended for marking and identification purposes only, not for electrical insulation.

**Disclaimer Notice** - Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at <a href="https://www.littelfuse.com/legal/disclaimers/polyswitch-products.aspx">https://www.littelfuse.com/legal/disclaimers/polyswitch-products.aspx</a>.

