PTC

PRODUCTS

Littelfuse®

Circuit Protection Specialists

PTC PRODUCTS

What Are PTCs?

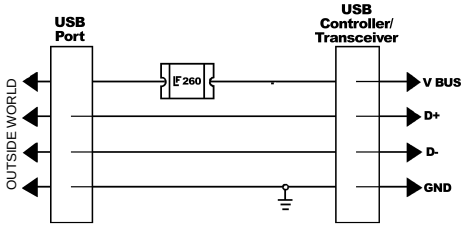
PTCs are components that utilize a unique polymer-based positive temperature coefficient material that protects electrical equipment from over-current conditions. Numerous carbon paths within the polymer allow the device to conduct electricity. As current through the device reaches its rated threshold, the polymer material begins to heat causing the polymer to expand. The resulting expansion breaks the carbon chains to reduce the current through the circuit to a small leakage current. When the fault is removed from the circuit, the device will reset itself thereby allowing current to flow through the circuit again.

Where are they used?

PTCs are used as circuit protection in applications where sensitive components are at risk of damage from overcurrent conditions. The ability of PTCs to reset themselves after exposure to a fault current makes them ideal for use in circuits that are not easily accessible to a user or technician. Typical applications include port protection on personal computers (USB, Firewire, keyboard/mouse, serial ports), peripherals (hard drives, video cards, hubs), cell phone, battery packs, industrial controls, lighting ballast and motor controls.

USB PORT PROTECTION

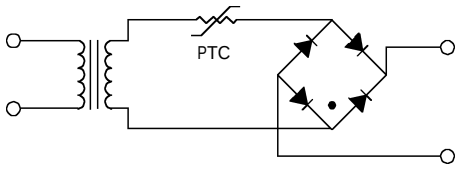
USB is one of the most common"Plug and Play" interfaces. Designed as a "hot-plug" device, USB ports are susceptible to overcurrent conditions caused by potential differences and temporary short circuits. An 1812L or 1206L series PTC should be placed across the bus voltage of a USB



port to protect against over-current conditions on the line. This allows the user to use plug & play devices without having to service the computer every time a fault condition occurs.

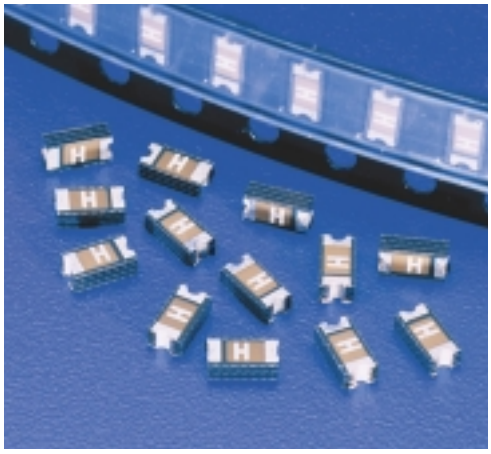
INDUSTRIAL CONTROLS

Industrial Controls typically use higher voltages than computer applications. Littelfuse offers the 30R and 60R series of radial-leaded PTCs for use in these higher voltage applications. The figure below illustrates overcurrent protection on a typical transformer. Overcurrent conditions typically



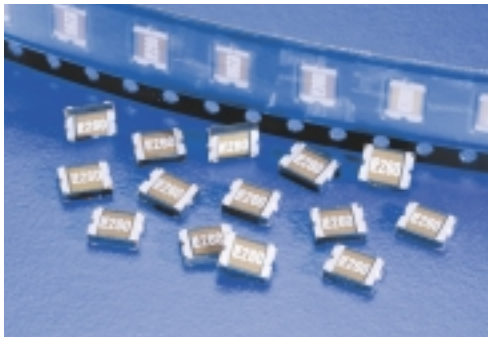
result from a substantial decrease in the circuit load or a short on the transformer output. Typically this will result in arcing, burnt wiring or fire unless over-current protection in used.

1206L Series



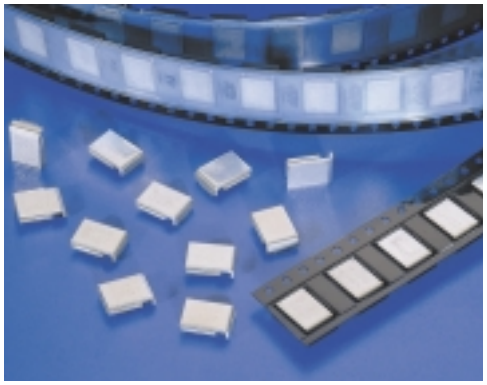
Part Number	Marking Code	I_{Hold} (A)	I_{Trip} (A)	V_{Max} (V_{DC})	I_{Max} (A)	P_dMax (W)	Maximum Time to Trip Current (A)	Maximum Time to Trip Time (Sec)	R_{IL} (Ω)	R_{AT} (Ω)
1206L020	C	0.20	0.40	15.0	40	0.8	8.0	0.05	0.600	2.500
1206L025	D	0.25	0.50	15.0	40	0.8	8.0	0.08	0.550	2.300
1206L035	E	0.35	0.70	6.0	40	0.8	8.0	0.10	0.250	0.800
1206L050	F	0.50	1.00	6.0	40	0.8	8.0	0.10	0.090	0.600
1206L075	G	0.75	1.50	6.0	40	0.8	8.0	0.20	0.070	0.300
1206L110	H	1.10	2.20	6.0	40	0.8	8.0	0.30	0.040	0.180
1206L150	K	1.50	3.00	6.0	40	0.8	8.0	0.30	0.030	0.120

1812L Series



Part Number	I_{Hold} (A)	I_{Trip} (A)	V_{Max} (V_{DC})	I_{Max} (A)	P_dMax (W)	Maximum Time to Trip Current (A)	Maximum Time to Trip Time (Sec)	R_{IL} (Ω)	R_{AT} (Ω)
1812L050	0.50	1.00	15.0	40	0.8	8.0	0.15	0.100	1.000
1812L075	0.75	1.50	13.2	40	0.8	8.0	0.30	0.075	0.420
1812L110	1.10	2.20	6.0	40	0.8	8.0	0.30	0.040	0.226
1812L125	1.25	2.50	6.0	40	0.8	8.0	0.30	0.045	0.184
1812L150	1.50	3.00	6.0	40	0.8	8.0	0.30	0.030	0.099
1812L160	1.60	3.20	6.0	40	0.8	8.0	0.30	0.040	0.137
1812L200	2.00	4.00	6.0	40	0.8	8.0	2.50	0.018	0.070
1812L260	2.60	5.20	6.0	40	0.8	8.0	2.50	0.010	0.050

3425L Series



Part Number	I_{Hold} (A)	I_{Trip} (A)	V_{Max} (V_{DC})	I_{Max} (A)	$P_d$max (W)	Maximum Time to Trip Current (A)	Maximum Time to Trip Time (Sec)	R_{IL} (Ω)	R_{AT} (Ω)
3425L150	1.50	3.00	15.0	40	1.9	8.0	5.00	0.060	0.250
3425L200	2.00	4.00	15.0	40	1.9	8.0	12.0	0.050	0.150
3425L250	2.50	5.00	15.0	40	1.9	8.0	25.0	0.035	0.100
3425L300	3.00	6.00	6.0	40	1.9	8.0	32.0	0.020	0.060

30R Radial Leaded

Part Number	I_{Hold} (A)	I_{Trip} (A)	V_{Max} (V_{DC})	I_{Max} (A)	P_dMax (W)	Maximum Time to Trip Current (A)	Maximum Time to Trip Time (Sec)	R_{IL} (Ω)	R_{AT} (Ω)
30R090	0.90	1.80	30.0	40	0.6	4.5	5.90	0.07	0.22
30R110	1.1	2.2	30.0	40	0.7	5.5	6.6	0.05	0.17
30R135	1.35	2.7	30.0	40	0.8	6.75	7.3	0.04	0.13
30R160	1.6	3.2	30.0	40	0.9	8	8	0.03	0.11
30R185	1.85	3.7	30.0	40	1	9.25	8.7	0.03	0.09
30R250	2.5	5	30.0	40	1.2	12.5	10.3	0.02	0.07
30R300	3	6	30.0	40	2	15	10.8	0.02	0.08
30R400	4	8	30.0	40	2.5	20	12.7	0.01	0.05
30R500	5	10	30.0	40	3	25	14.5	0.01	0.05
30R600	6	12	30.0	40	3.5	30	16	0.005	0.04
30R700	7	14	30.0	40	3.8	35	17.5	0.005	0.03
30R800	8	16	30.0	40	4	40	18.8	0.005	0.02
30R900	9	18	30.0	40	4.2	45	20	0.005	0.02

60R Radial Leaded

Part Number	I_{Hold} (A)	I_{Trip} (A)	V_{Max} (V_{DC})	I_{Max} (A)	P_d Max (W)	Maximum Time to Trip Current (A)	Maximum Time to Trip Time (Sec)	R_{IL} (Ω)	R_{AT} (Ω)
60R010	0.10	0.20	60	40	0.38	0.50	4.0	2.5	7.5
60R017	0.17	0.34	60	40	0.48	0.85	3.0	3.3	8
60R020	0.20	0.40	60	40	0.41	1.00	2.2	1.83	4.4
60R025	0.25	0.50	60	40	0.45	1.25	2.5	1.25	3
60R030	0.30	0.60	60	40	0.49	1.50	3.0	0.88	2.1
60R040	0.40	0.80	60	40	0.56	2.00	3.8	0.55	1.29
60R050	0.50	1.00	60	40	0.77	2.50	4.0	0.5	1.17
60R065	0.65	1.30	60	40	0.88	3.25	5.3	0.31	0.72
60R075	0.75	1.50	60	40	0.92	3.75	6.3	0.25	0.6
60R090	0.90	1.80	60	40	0.99	4.50	7.2	0.2	0.47
60R110	1.10	2.20	60	40	1.50	5.50	8.2	0.15	0.38
60R135	1.35	2.17	60	40	1.70	6.75	9.6	0.12	0.3
60R160	1.60	3.20	60	40	1.90	8.00	11.4	0.09	0.22
60R185	1.85	3.70	60	40	2.10	9.25	12.6	0.08	0.19
60R250	2.50	5.00	60	40	2.50	12.50	15.6	0.04	0.13
60R300	3.00	6.00	60	40	2.80	15.00	19.8	0.03	0.1
60R375	3.75	7.50	60	40	3.20	18.75	24.0	0.02	0.08

Electronic Definitions

I_{Hold} (A) = Hold Current - The maximum current the device will sustain for 4 hours without tripping in 20°C still air.

I_{Trip} (A) = Trip Current -The minimum current at which the device will trip in 20°C still air.

V_{Max} (V_{DC}) = Maximum Voltage - The maximum voltage the device can withstand without damage at rated current (I_{Max}).

I_{Max} (A) = Maximum Fault Current - The maximum fault current the device can withstand without damage at rated voltage (V_{Max}).

P_dMax (W) = Power Dissipated from the device when in the tripped state in 20°C still air.

R_{IL} (Ω) = The minimum resistance of the device in an initial (un-soldered) state.

R_{AT} (Ω) = The maximum measured resistance in the non-tripped state one hour after reflow with reflow conditions of 260°C for 20 seconds.

Cross Reference

Littelfuse	Raychem®	Bourns®	Polytronics
1206L020			
1206L025			
1206L035			SMD1206P035TS
1206L050	nanoSMDM050		SMD1206P050TS
1206L075	nanoSMDM075		SMD1206P075TS
1206L110	nanoSMDM110		SMD1206P110TS
1206L150	nanoSMDC150		SMD1206P150TS
1812L050	miniSMDC050	MF-MSMD050	SMD1812P050TS
1812L075	miniSMDC075	MF-MSMD075	SMD1812P075TS
1812L110	miniSMDC110	MF-MSMD110	SMD1812P110TS
1812L150	miniSMDC150	MF-MSMD150	SMD1812P150TS
1812L160	miniSMDM160	MF-MSMD160	SMD1812P160TS
1812L200	miniSMDC200	MF-MSMD200	SMD1812P200TS
1812L260	miniSMDC260	MF-MSMD260	SMD1812P260TS
3425L150	SMD150	MF-SM150	
3425L200	SMD200	MF-SM200	
3425L250	SMD250	MF-SM-250	
3425L300	SMD300	MF-SM-300	
30R090	RUE090	MF-R090-0-9	RLD30P090U
30R110	RUE110	MF-R110	RLD30P110U
30R135	RUE135	MF-R135	RLD30P135U
30R160	RUE160	MF-R160	RLD30P160U
30R185	RUE185	MF-R185	RLD30P185U
30R250	RUE250	MF-R250	RLD30P250U

Littelfuse	Raychem®	Bourns®	Polytronics
30R300	RUE300	MF-R300	RLD30P300U
30R400	RUE400	MF-R400	RLD30P400U
30R500	RUE500	MF-R500	RLD30P500U
30R600	RUE600	MF-R600	RLD30P600U
30R700	RUE700	MF-R700	RLD30P700U
30R800	RUE800	MF-R800	RLD30P800U
30R900	RUE900	MF-R900	RLD30P900U
60R010	RXE010	MF-R010	RLD60P010X
60R017	RXE017	MF-R017	RLD60P017X
60R020	RXE020	MF-R020	RLD60P020X
60R025	RXE025	MF-R025	RLD60P025X
60R030	RXE030	MF-R030	RLD60P030X
60R040	RXE040	MF-R040	RLD60P040X
60R050	RXE050	MF-R050	RLD60P050X
60R065	RXE065	MF-R065	RLD60P065X
60R075	RXE075	MF-R075	RLD60P075X
60R090	RXE090	MF-R090	RLD60P090X
60R110	RXE110	MF-R110	RLD60P110X
60R135	RXE135	MF-R135	RLD60P135X
60R160	RXE160	MF-R160	RLD60P160X
60R185	RXE185	MF-R185	RLD60P185X
60R250	RXE250	MF-R250	RLD60P250X
60R300	RXE300	MF-R300	RLD60P300X
60R375	RXE375	MF-R375	RLD60P375X

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