PolySwitch LVR/LVRL Line Voltage Rated Devices

PolySwitch LVR devices help protect electric motors and transformers used in commercial and home appliances from damage caused by mechanical overloads, overheating, stall, lost neutral and other potentially harmful conditions.

The PolySwitch LVR product line of polymeric positive thermal coefficient (PPTC) line voltage devices includes components that are rated for line voltages of 120 VAC and 240 VAC, for up to 2A of operating current at 20°C. They help protect against damage caused by both overcurrent surges and overtemperature faults, offer low resistance, and are compatibly sized with fuse solutions.

Unlike traditional fuses, PolySwitch devices do not require replacement after a fault event. After power has been removed and the overcurrent condition eliminated, the circuit is restored to normal operating condition. Compared to bimetal breakers, they offer greater flexibility, longer lifespan, and lower electromagnetic interference (EMI).

The PolySwitch LVR devices' resettable functionality and latching attributes make them a reliable, cost-effective circuit protection solution for both intermittent- and continuous-operation motor applications. Their low resistance, fast time-to-trip, and low profile help circuit designers provide a safe and dependable product, comply with regulatory agency requirements, and reduce warranty repair costs.

Benefits:

- Reduced board space and assembly
- Reduced repair and replacement cost
- Fast time-to-trip helps reduce current-generated heat to motor windings and sensitive electronic components
- Reduced nuisance tripping

Features:

- Overcurrent and overtemperature protection in a single component
- Resettable functionality
- Latching device
- Compliant with UL 1434 safety standards

Applications:

- Continuous-operation motors
- Intermittent-operation motors
- Transformers
- Power supplies
- Fans and blowers
- Electronic controllers

Electrical Characteristics—LVR/LVRL 240V AC/120V AC

	Part Number	I_{HOLD} (A)	I_{TRIP} (A)	V_{MAX} (V)	V_{MAX} Interrupt (VAC)	I_{MAX} Interrupt (A)	Power Dissipation Typ (W)	Max. Time-to-trip (A)	Max. Time-to-trip (s)	R_{MIN} (Ω)	R_{MAX} (Ω)	$R_{1\ MAX}$ (Ω)	Lead Size [mm (AWG)]
	LVR005K	0.05	0.12	240	265	1.0	0.7	0.25	15.0	18.50	31.00	65.00	[0.51mm (24)]
	LVR005S	0.05	0.12	240	265	1.0	0.7	0.25	15.0	18.50	31.00	65.00	[0.51mm (24)]
	LVR008K	0.08	0.19	240	265	1.2	0.8	0.40	15.0	7.40	12.00	26.00	[0.51mm (24)]
	LVR008S	0.08	0.19	240	265	1.2	0.8	0.40	15.0	7.40	12.00	26.00	[0.51mm (24)]
	LVR012K	0.12	0.30	240	265	1.2	1.0	0.60	15.0	3.00	6.50	12.00	[0.51mm (24)]
	LVR012S	0.12	0.30	240	265	1.2	1.0	0.60	15.0	3.00	6.50	12.00	[0.51mm (24)]
	LVR016K	0.16	0.37	240	265	2.0	1.4	0.80	15.0	2.50	4.10	7.80	[0.51mm (24)]
	LVR016S	0.16	0.37	240	265	2.0	1.4	0.80	15.0	2.50	4.10	7.80	[0.51mm (24)]
	LVR025K	0.25	0.56	240	265	3.5	1.5	1.25	18.5	1.30	2.10	3.80	[0.64mm (22)]
	LVR025S	0.25	0.56	240	265	3.5	1.5	1.25	18.5	1.30	2.10	3.80	[0.64mm (22)]
	LVR033K	0.33	0.74	240	265	4.5	1.7	1.65	21.0	0.77	1.24	2.60	[0.64mm (22)]
	LVR033S	0.33	0.74	240	265	4.5	1.7	1.65	21.0	0.77	1.24	2.60	[0.64mm (22)]
	LVR040K	0.40	0.90	240	265	5.5	2.0	2.00	24.0	0.60	0.97	1.90	[0.64mm (22)]
	LVR040S	0.40	0.90	240	265	5.5	2.0	2.00	24.0	0.60	0.97	1.90	[0.64mm (22)]
	LVR055K	0.55	1.25	240	265	7.0	3.4	2.75	26.0	0.45	0.73	1.45	[0.81mm (20)]
	LVR055S	0.55	1.25	240	265	7.0	3.4	2.75	26.0	0.45	0.73	1.45	[0.81mm (20)]
NEW	LVR075S	0.75	1.5	240	265	7.5	2.6	3.75	18.0	0.32	0.48	0.84	[0.81mm (20)]
NEW	LVR100S	1.00	2.00	240	265	10.0	2.9	5.00	21.0	0.22	0.33	0.58	[0.81mm (20)]
NEW	LVR125S	1.25	2.50	240	265	12.5	3.3	6.25	23.0	0.17	0.18	0.44	[0.81mm (20)]
NEW	LVR200S	2.00	4.00	240	265	20.0	4.5	10.00	28.0	0.09	0.13	0.22	[0.81mm (20)]
	LVRL075S	0.75	1.52	120	135	7.5	1.8	3.75	14.0	0.25	0.40	0.69	[0.81mm (20)]
	LVRL100S	1.00	2.00	120	135	10.0	2.2	5.00	13.6	0.18	0.27	0.47	[0.81mm (20)]
	LVRL125S	1.25	2.50	120	135	12.5	2.0	6.25	18.0	0.12	0.18	0.32	[0.81mm (20)]
	LVRL135S	1.35	2.70	120	135	13.5	2.8	6.75	20.0	0.11	0.17	0.30	[0.81mm (20)]
	LVRL200S	2.00	4.00	120	135	20.0	3.9	10.00	36.0	0.08	0.12	0.21	[0.81mm (20)]

Dimensions in Millimeters (Inches)

Part Number	A Min.	A Max.	B Min.	B Max.	C Min.	C Max.	D Min.	D Max.	E Min.	E Max.	Figure
LVR005K	— —	8.3 (0.33)	— —	12.9 (0.51)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	— —	— —	3.8 (0.15)	1
LVR005S	— —	8.3 (0.33)	— —	10.7 (0.43)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	— —	— —	3.8 (0.15)	2
LVR008K	— —	8.3 (0.33)	— —	12.9 (0.51)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	— —	— —	3.8 (0.15)	1
LVR008S	— —	8.3 (0.33)	— —	10.7 (0.43)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	— —	— —	3.8 (0.15)	2
LVR012K	— —	8.3 (0.33)	— —	12.9 (0.51)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	— —	— —	3.8 (0.15)	1
LVR012S	— —	8.3 (0.33)	— —	10.7 (0.43)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	— —	— —	3.8 (0.15)	2
LVR016K	— —	9.9 (0.39)	— —	13.8 (0.54)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	— —	— —	3.8 (0.15)	1
LVR016S	— —	9.9 (0.39)	— —	12.5 (0.50)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	— —	— —	3.8 (0.15)	2
LVR025K	— —	9.6 (0.38)	— —	18.8 (0.74)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	— —	— —	3.8 (0.15)	3
LVR025S	— —	9.6 (0.38)	— —	17.4 (0.69)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	— —	— —	3.8 (0.15)	4
LVR033K	— —	11.4 (0.45)	— —	19.0 (0.75)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	— —	— —	3.8 (0.15)	3
LVR033S	— —	11.4 (0.45)	— —	16.5 (0.65)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	— —	— —	3.8 (0.15)	4
LVR040K	— —	11.5 (0.46)	— —	20.9 (0.82)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	— —	— —	3.8 (0.15)	3
LVR040S	— —	11.5 (0.46)	— —	19.5 (0.77)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	— —	— —	3.8 (0.15)	4
LVR055K	— —	14.0 (0.55)	— —	22.4 (0.88)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	— —	— —	4.1 (0.16)	3
LVR055S	— —	14.0 (0.55)	— —	21.7 (0.85)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	— —	— —	4.1 (0.16)	4
NEW LVR075S	— —	11.5 (0.45)	-- --	23.4 (0.92)	4.3 (0.17)	5.8 (0.23)	5.1 (0.20)	-- --	— —	4.8 (0.19)	4
NEW LVR100S	— —	18.7 (0.74)	— —	24.40 (0.96)	8.9 (0.35)	11.4 (0.45)	5.1 (0.20)	— —	— —	5.10 (0.20)	2
NEW LVR125S	— —	21.20 (0.84)	— —	27.40 (1.08)	8.9 (0.35)	11.4 (0.45)	5.1 (0.20)	— —	— —	5.30 (0.21)	2
NEW LVR200S	— —	24.9 (0.98)	— —	33.8 (1.33)	8.9 (0.35)	11.4 (0.45)	5.1 (0.20)	— —	— —	6.1 (0.24)	4
LVRL075S	— —	10.9 (0.43)	— —	17.0 (0.67)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	— —	— —	4.1 (0.16)	4
LVRL100S	— —	11.5 (0.45)	— —	20.1 (0.79)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	— —	— —	4.1 (0.16)	4
LVRL125S	— —	14.0 (0.55)	— —	21.7 (0.85)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	— —	— —	4.1 (0.16)	4
LVRL135S	— —	16.3 (0.64)	— —	21.7 (0.85)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	— —	— —	4.1 (0.16)	4
LVRL200S	— —	23.5 (0.93)	— —	31.8 (1.25)	9.4 (0.37)	10.9 (0.43)	7.6 (0.30)	— —	— —	4.1 (0.16)	4

Fig. 1

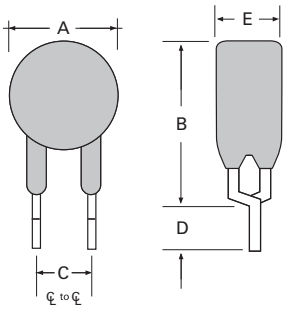


Fig. 2

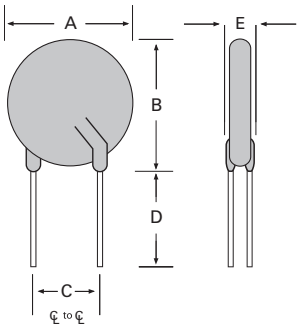


Fig. 3

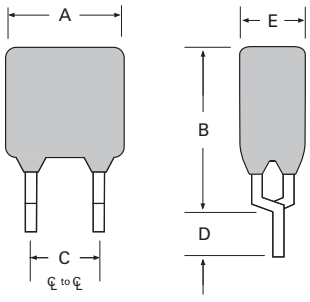
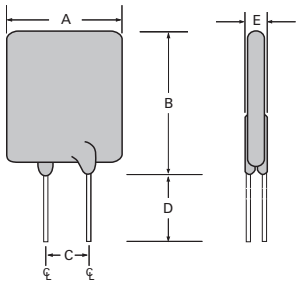
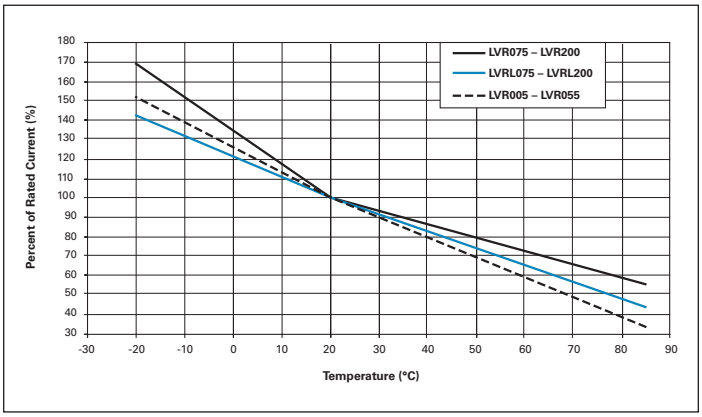


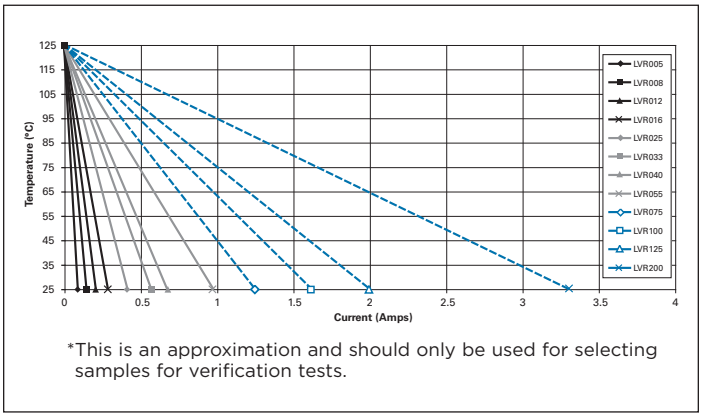
Fig. 4



Typical Thermal Derating

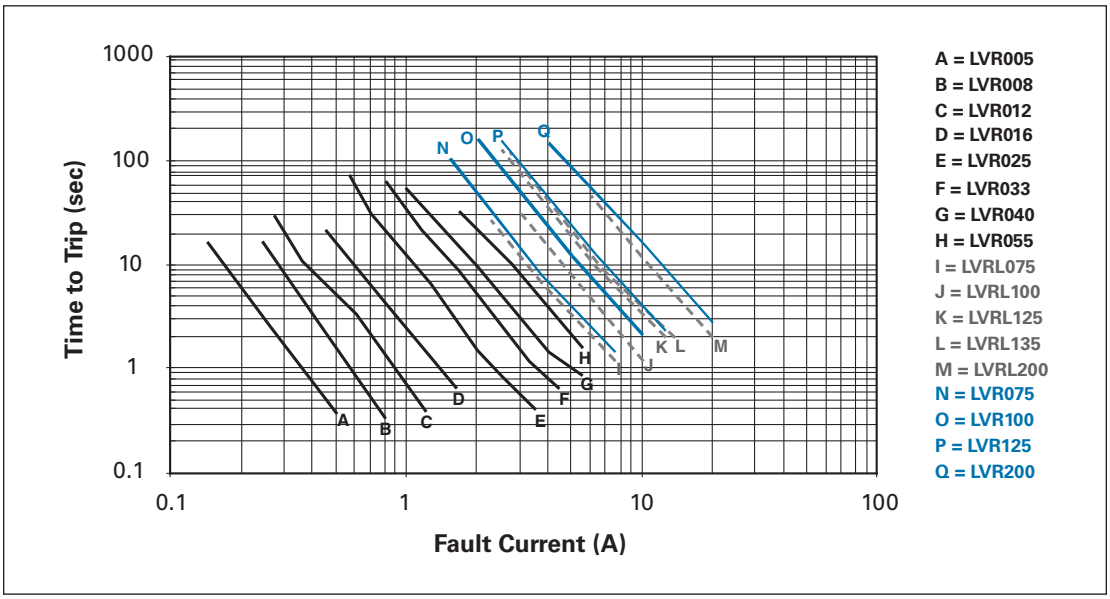


Typical Trip Current vs. Temperature*



*This is an approximation and should only be used for selecting samples for verification tests.

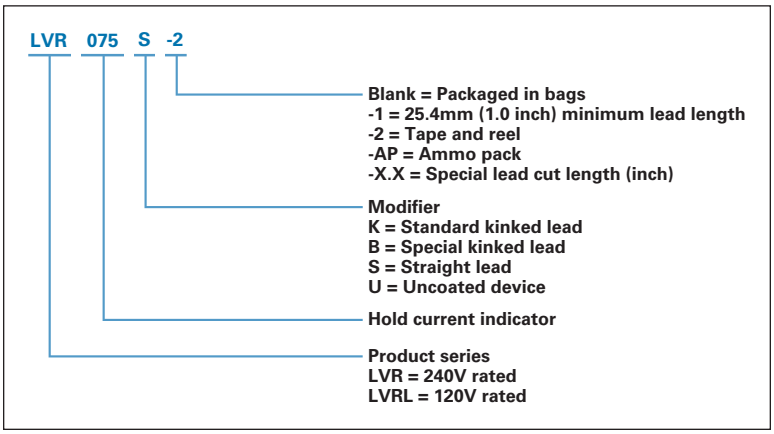
Typical Time-to-Trip at 20°C



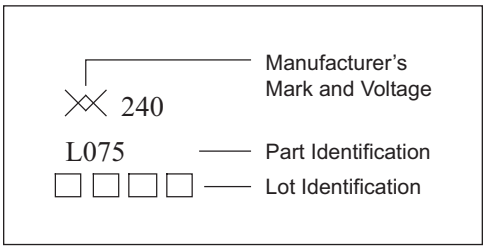
Agency Recognitions

For LVR Devices	
UL	1434 - Thermistor type devices, File # E74889
CSA	class 9073-32 Thermistor PTC type, File # CA78165C
TÜV	Certificate number available on request (per IEC 60730-1).

Part Numbering System



Marking



Physical Characteristics

Lead material	LVR005-016: Tin-plated copper, 0.205mm^2 (24AWG), ø0.51mm (0.020in.) LVR025-040: Tin-plated copper, 0.32mm^2 (22AWG), ø0.64mm (0.025in.) LVR055-200: Tin-plated copper, 0.52mm^2 (20AWG), ø0.81mm (0.032in.) LVRL: Tin-plated copper, 0.52mm^2 (20AWG), ø0.81mm (0.032in.)
Insulating material	LVR005-055: Cured flame retardant epoxy polymer, meets UL94V-0 LVR075-200: Cured flame retardant modified silicone meets UL94V-0 LVRL: Cured flame retardant epoxy polymer, meets UL94V-0
Soldering characteristics	Solderability pre ANSI/J-STD-002 Category 3
Solder heat withstand	Per IEC-STD 68-2-20, Test Tb, Method 1A, Condition B, can withstand 10 seconds at 260°C ±5°C

Devices are not designed to be placed through a reflow process.

Environmental Characteristics

Test	Conditions	Resistance Change
Passive aging	70°C, 1000 hours	±5%
	85°C, 1000 hours	±5%
Humidity aging	85°C, 85%RH, 1000 hours	±5%
Thermal Shock	85°C, -40°C (10 times)	±5%
Solvent resistance	MIL-STD-202, Method 215F	No change

WARNING: Application Limitations for the LVR Product Line

1) Users should independently evaluate the suitability of and test each product selected for their own application.
2) This product should not be used in an application where the maximum interrupt voltage or maximum interrupt current can be exceeded in a fault condition. Operation beyond the maximum ratings or improper use may result in device damage and possible electrical arcing and flame.
3) A PPTC device is not a fuse—it is a nonlinear thermistor that limits current. Because under a fault condition all PPTC devices go into a high resistance state but not open circuit, hazardous voltage may be present at PPTC locations.
4) The devices are intended for protection against occasional overcurrent or overtemperature fault conditions and should not be used when repeated fault conditions or prolonged trip events are anticipated.
5) In most applications, power must be removed and the fault condition cleared in order to reset a PPTC device. However, under certain unusual conditions, a PPTC device may automatically reset. Accordingly, in applications where an automatic reset could create a safety hazard, such as garbage disposals and blenders, appropriate qualification testing should be performed.
6) It is the responsibility of the user to determine the need for back-up or fail safe protection to prevent damage that may occur in the event of abnormal function or failure of the PPTC device.
7) Operation in circuits with a large inductance can generate a circuit voltage (Ldi/dt) above the rated voltage of a PPTC device.
8) Devices are not recommended for reflow soldering.
9) Device performance can be negatively impacted if devices are handled in a manner inconsistent with recommended electronic, thermal, or mechanical procedures for electronic components.
10) PPTC devices are not recommended to be installed in applications where the device is constrained such that its PPTC properties are inhibited, for example in rigid potting materials or in rigid housings, which lack adequate clearance to accommodate device expansion.
11) Contamination of the PPTC material with certain silicone-based oils or some aggressive solvents can adversely impact the performance of the devices.

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