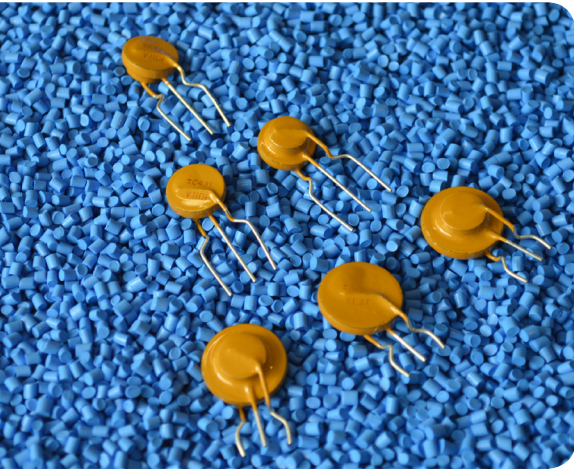


Product Overview

2Pro AC Devices Provide Overcurrent/Overvoltage/
Overtemperature Protection for AC Industrial and
Appliance Applications

The 2Pro AC family of devices provide integrated overcurrent/
overvoltage/overtemperature circuit protection that helps
protect a wide variety of low-power systems against damage
caused by overvoltage faults, including lightning strikes,
ESD surges, loss of neutral, incorrect input voltage and power
induction.



KEY FEATURES

- Single overcurrent, overvoltage, and overtemperature protection
- Resettable overcurrent protection
- Helps protect varistor and other components from damage caused by loss of neutral or abnormal AC input voltage
- Normal operating mode: Universal Input voltage range: $85V_{AC}$ to $265V_{AC}$
- RoHS-compliant
- Power range: up to 30VA for $230V_{AC}$ input voltage at $20^{\circ}C$
- High safe interrupt power up to: $415V_{ACRMS}/40A_{RMS}$

INTEGRATION PROVIDES ENHANCED PERFORMANCE

The 2Pro AC family of devices provide integrated overcurrent/overvoltage/overtemperature circuit protection that helps protect a wide variety of low-power systems against damage caused by overvoltage faults, including lightning strikes, ESD surges, loss of neutral, incorrect input voltage and power induction.

The RoHS-compliant 2Pro AC devices combine a PolySwitch polymeric positive temperature coefficient (PPTC) overcurrent device with a metal oxide varistor (MOV) component into one innovative, thermally protected device to help provide resettable current limiting for overcurrent protection and voltage clamping during overvoltage events. This single-device approach helps manufacturers meet industry test requirements, reduce component count, and improve equipment reliability.

The 2Pro AC family of devices help provide protection for AC input LED lighting systems, PLC network adapters, cell phone chargers, AC/DC power supplies*, modem power supplies, ACpanel protection modules, AC power meters, white goods and home and professional appliances.

APPLICATIONS

- Main LED lighting systems
- PLC network adapters (fast Ethernet, xDSL over the main)
- Cell phone chargers
- AC/DC power supplies up to:
 - 150VA as input power for $240V_{AC}$ input voltage
 - 75VA as input power for $120V_{AC}$ input voltage
- Modem power supply
- AC panel protection modules
- AC Line power supplies
- AC power meters
- White goods, appliances, industrial controls

BENEFITS

Single, small form factor device helps to reduce component count and footprint.

- Helps provide a safe failure mode in case of varistor overstress
- Helps reduce warranty returns
- Helps equipment comply with UL/IEC 60950/IEC60335
- Helps equipment comply with:
 - IEC61000-4-5 - Surge immunity test
 - IEC61000-4-4 - Electrical fast transient/burst immunity test
 - IEC61000-4-2 - Electrostatic discharge immunity test
- Reduces cost by eliminating need for additional fuse or power resistor in the power line

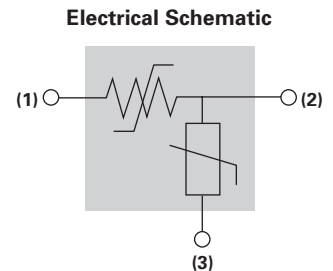
* AC/DC power supplies up to 30VA as input power for $230V_{AC}$ input voltage

2Pro AC Devices

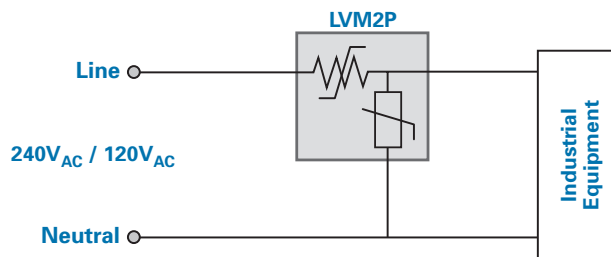
HOW IT WORKS

Under normal operating conditions, the AC line voltage applied to an MOV is not expected to exceed the device's maximum continuous operating voltage rating, V_{ACRMS} . However, occasionally overvoltage transients may occur that exceed these limits. By integrating PPTC technology with the MOV, the 2Pro device helps provide increased overcurrent and thermal protection under conditions where the MOV is exposed to prolonged continuous overvoltage events that exceed its rated specifications. In the event of an overvoltage transient, the PPTC element of the 2Pro device heats up and goes into a high resistance state, helping to reduce the risk of MOV device failure.

2Pro AC devices are radial-leaded devices that utilize three leads. In the following electrical schematic, the lead (1) is connected to the PPTC element, lead (2) is connected to the MOV/ PPTC series connection (providing a path to ground), and lead (3) is connected to the MOV.



TYPICAL CIRCUIT DIAGRAM UTILIZING THE 2PRO LVM2P-015R10431 DEVICE



PROTECTING AGAINST THERMAL RUNAWAY

In AC line applications, loss of neutral may occur so that the MOV is exposed to a higher level of sustained overvoltage than it is rated for. One loss of neutral condition would be a voltage of $400V_{AC}$ instead of $230V_{AC}$, derived from a loss of neutral. In an unlimited current condition the unprotected MOV will first fall to low impedance of a few Ohms, but due to the high amount of energy it is likely to rupture rather than protect. If there are devices used on the AC line return path that limit current flow these may also overheat due to the failure of the MOV.

Standard unprotected MOVs are typically rated to $275V_{ACRMS}$ for a universal input voltage range. In a loss of neutral condition they may overheat with disastrous consequences (see figure on next page), even if a fuse or power resistor is used upstream. The 2Pro AC device's PPTC element helps prevent thermal runaway, maintaining varistor surface temperature at less than $150^{\circ}C$, and preventing the device from reaching combustible temperatures caused by overvoltage transients.

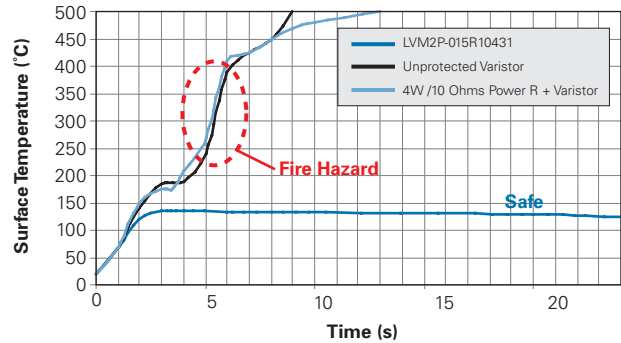
The 2Pro AC devices help manufacturers comply with IEC60950 and IEC60335, and help equipment remain operational after specified lightning tests according to IEC61000-4-5. Also, because the PPTC element is in series with the MOV no additional overcurrent protection is required, which helps reduce component count and optimize board space.

2Pro AC Devices

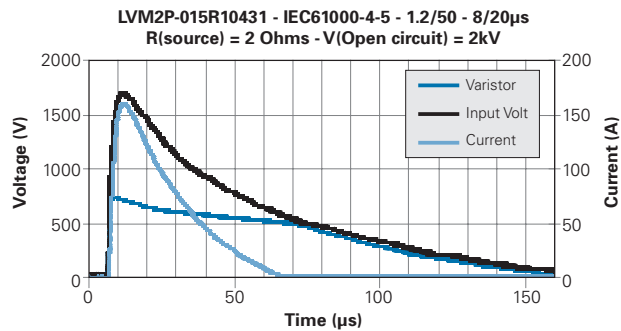
TYPICAL SURFACE TEMPERATURE VS. TIME FOR VARIOUS PROTECTION SCHEMES

The figure illustrates the effects of abnormal overvoltage conditions ($400V_{RMS}$, $4A_{SC}$) on three devices or a combination of devices:

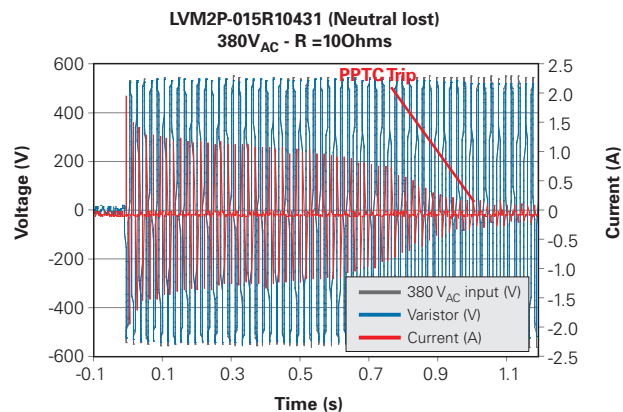
- 1) LVM2P-015R10431 combination (PPTC, MOV)
- 2) Single MOV (10mm, $275V_{RMS}$ - ROV10-431K)
- 3) MOV/4W Power Resistor (10 Ohms)



TYPICAL 2PRO LVM2P-015R10431 DEVICE RESPONSE UNDER IEC61000-4-5 SURGE IMMUNITY TEST



TYPICAL 2PRO LVM2P-015R10431 DEVICE RESPONSE TO LOSS OF NEUTRAL EVENT



2Pro AC Devices

ELECTRICAL CHARACTERISTICS

Overcurrent (terminals 1 - 2) — Performance ratings @ 20°C

Part Number	I _{HOLD}	I _{TRIP}	Resistance (Ω)			Time to Trip (s)
	(A)	(A)	R _{MIN}	R _{MAX}	R _{1MAX} *	Typ.
LVM2P-015R10431	0.15	0.30	6.50	14.00	16.00	0.9 (@1A)
LVM2P-035R14431	0.35	0.75	1.40	2.20	2.80	0.5 (@3A)
LVM2P-075R14431	0.75	1.50	0.37	0.75	1.03	0.9 (@7A)

* Maximum device resistance @ 20°C measured 1 hour post trip

Overvoltage (terminals 2 - 3) Performance ratings @ 20°C

Part Number	Varistor Voltage V @ 1mA		DC Resistance @ 100V	Maximum Clamping Voltage	Rated Wattage
	DC (V)	Tolerance	(MΩ)	(V)	(W)
LVM2P-015R10431	430	+10% -10%	>10	710 (@ 25A)	0.25
LVM2P-035R14431	430	+10% -10%	>10	710 (@ 50A)	0.60
LVM2P-075R14431	430	+10% -10%	>10	711 (@ 50A)	1.00

Surge Immunity for the Assembly (terminal 2-3) @ 20°C

Part Number	Parameter	Voltage - Open Circuit Voltage (waveform 1.2x50 μs)	Current - Short Circuit Current (waveform 8x20 μs)	Repetitions
		(V)	(A)	
LVM2P-015R10431	IEC / EN 61000-4-5	2000	1000	5 ea. Polarity
LVM2P-035R14431	IEC / EN 61000-4-5	2000	1000	5 ea. Polarity
LVM2P-075R14431	IEC / EN 61000-4-5	2000	1000	5 ea. Polarity

Notice:

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