



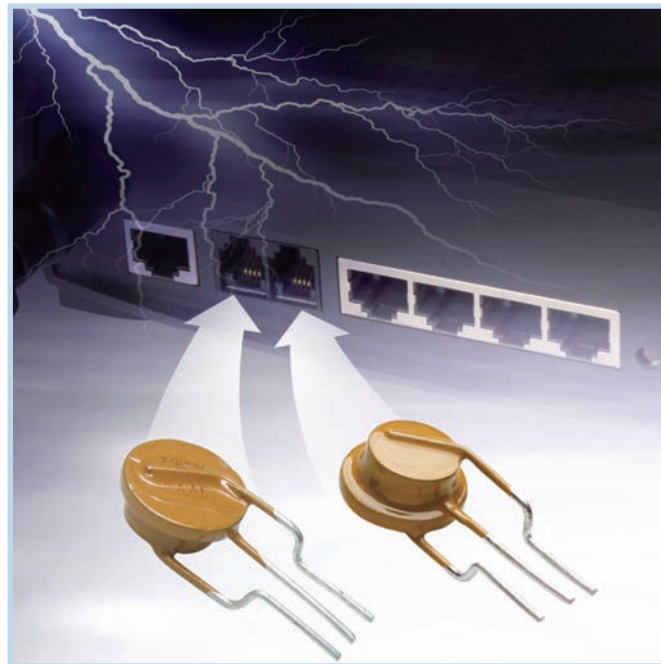
## 2Pro Devices

The 2Pro product is an integrated overcurrent/over-voltage protection device. The RoHS-compliant component incorporates PolySwitch PPTC (Polymeric Positive Temperature Coefficient) and metal oxide varistor technology in a single device to help reduce board space requirements and component count.

Damage to telephony communications equipment can be caused by various sources including lightning, electrostatic discharge (ESD), power contact and induction with AC lines. The 2Pro TM2P-10271 devices help provide current limiting during overcurrent events, and voltage clamping during overvoltage events. After a fault condition is removed and power is cycled, 2Pro devices will reset so that the equipment remains operational.

The 2Pro device helps address the need for resettable circuit protection devices for use in cost-sensitive PSTN

(Public Switched Telephone Network) and VoIP (Voice over Internet Protocol) telephony equipment. The widespread use of VoIP gateways in homes and enterprise environments as the primary means of voice delivery requires the utmost safety and reliability in equipment. 2Pro circuit protection devices help manufacturers comply with global safety standards, including UL 60950, TIA-968-A, IEC 60950, and ITU-T K.20/K.21. The UL 497A listed protector also helps provide ESD protection.



6

### Benefits

- Single device helps reduce component count and footprint
- Helps reduce warranty returns
- Helps equipment comply with surge tests per: TIA-968-A, IEC 60950, ITU-T K.20/K.21
- Helps simplify UL 60950 testing
- Helps equipment comply with UL 60950

### Features

- RoHS compliant
- Halogen free (refers to: Br≤900ppm, Cl≤900ppm, Br+Cl≤1500ppm)
- Single overcurrent, overvoltage and ESD protection device
- Resettable overcurrent protection
- UL 497A listed protector (#E258475)

### Applications

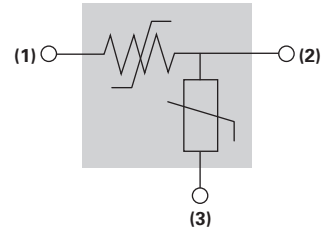
- Cordless telephones
- VoIP gateways
- Fax machines
- Data modems
- Set-top boxes
- Security systems
- MDF modules
- Analog and ISDN linecards

## Table 2P1 Electrical Characteristics for 2Pro Devices

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

Part Number	I <sub>HOLD</sub> (A)	I <sub>TRIP</sub> (A)	Resistance <sup>†</sup> (Ω)			Time to Trip (s) <sup>†</sup> @ 1A	
			R <sub>MIN</sub>	R <sub>MAX</sub>	R <sub>1MAX</sub> *	Typ.	Max.
TM2P-10271	0.15	0.30	6.5	14.0	16.0	0.9	3
<b>NEW</b> LVM2P-015R10431	0.15	0.30	6.5	14.0	16.0	0.9	3

### Electrical Schematic



### Overvoltage (terminals 2 - 3)

Part Number	Varistor Voltage V @ 1mA		DC Resistance @ 100V (MΩ)	Maximum Clamping Voltage @ 25A (V)	Rated Wattage (W)
	DC(V)	Tolerance			
TM2P-10271	260	+14% -7%	>10	455	0.25
<b>NEW</b> LVM2P-015R10431	430	+10% -10%	>10	710	0.25

\* Maximum device resistance at 20°C measured 1 hour post trip.

† Corresponds to operation below varistor voltages.

## Table 2P2 Dimensions for 2Pro Devices in Millimeters (Inches\*)

	A		B		C		D		E	Figure
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Nom.	
TM2P-10271	—	12.0	—	15.0	—	6.6	6.0	—	2.5	2P1
	—	(0.47)	—	(0.59)	—	(0.26)	(0.24)	—	(0.10)	
<b>NEW</b> LVM2P-015R10431	—	12.0	—	17.0	—	7.4	8.5	11.50	5.1	2P2
	—	(0.47)	—	(0.67)	—	(0.29)	(0.34)	(0.45)	(0.20)	

\* The dimensions in inches are rounded approximations.

## Figure 2P1-2P2 Dimension Figures for 2Pro Devices

Figure 2P1

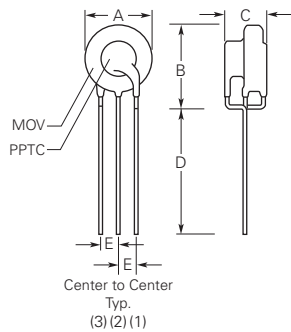
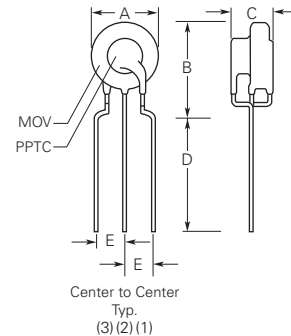


Figure 2P2



## Figure 2P3-2P4 Typical Time-to-Trip at 25°C for 2Pro Devices

Figure 2P3

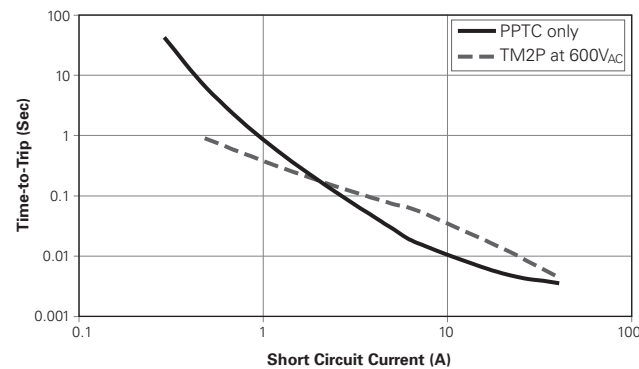
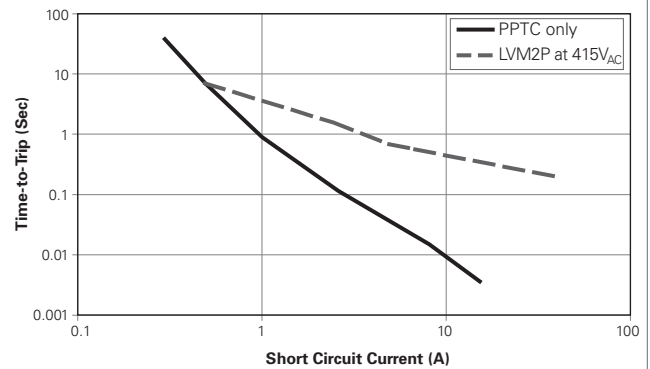


Figure 2P4



**Table 2P3 Physical Characteristics and Environmental Specifications for 2Pro Devices**
**Physical Characteristics**

Lead material	Tin-plated copper, 0.33mm <sup>2</sup> (22AWG), ø0.64mm (0.025in.)
Flammability	IEC 695-2-2 needle flame test for 20s
Soldering characteristics	ANSI approved IPC/EIA/JEDEC J-STD-002, Category 3
Solder heat withstand	per IEC-STD 68-2-20, Test Tb, Method1A, Condition B, can withstand 10 seconds at 260°C ± 5°C

**Environmental Specifications**

Test	Conditions
Passive aging	60°C, 1000 hours / 85°C, 1000 hours
Humidity aging	85°C, 85% RH, 500 hours
Active aging	60°C, 90% RH, 60V <sub>DC</sub> bias, 1000 hours
Thermal shock	125°C, -55°C (10 times)
Solvent resistance	MIL-STD-202, Method 215K

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

**Table 2P4 Packaging and Marking Information for 2Pro Devices**

Part Number	Bag Quantity	Tape & Reel Quantity	Standard Package	Part Marking	Agency Recognition
TM2P-10271	500	-	10,000	1027 & Batch #	UL 497A/File No. E258475
TM2P-10271-2	-	1,000	5,000	1027 & Batch #	UL 497A/File No. E258475
<b>NEW</b> LVM2P-015R10431	500	-	10,000	C431 & Batch #	

**Table 2P5 Ordering Information for 2Pro Devices**

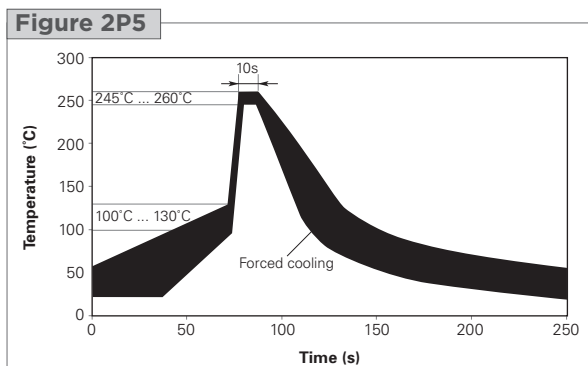
Bulk	500 pieces/bag
	10,000 pieces/box
Tape & Reel	1,000 pieces/reel
	5,000 pieces/box

**Wave Soldering and Rework Recommendations for 2Pro Devices**
**Recommended Wave Soldering for Radial-leaded Devices**

- Soldering temperature profile  
Temperature characteristic at component terminal with dual wave soldering

**Rework**

- If a device is removed from the board, it should be discarded and replaced with a new device.

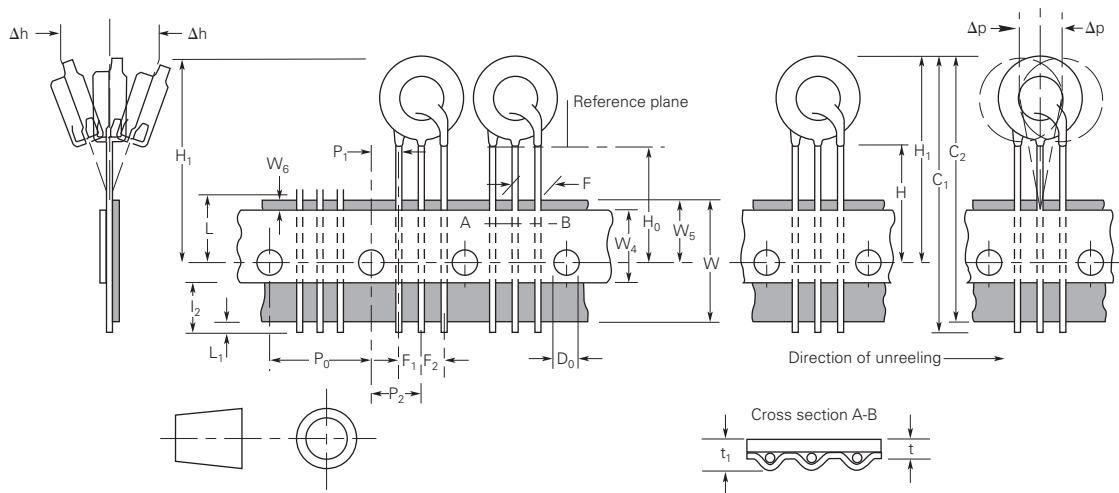


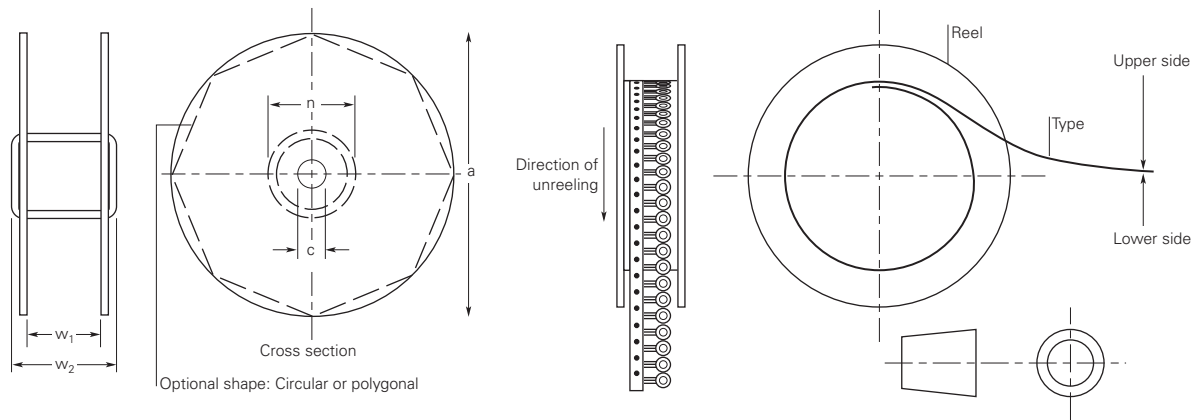
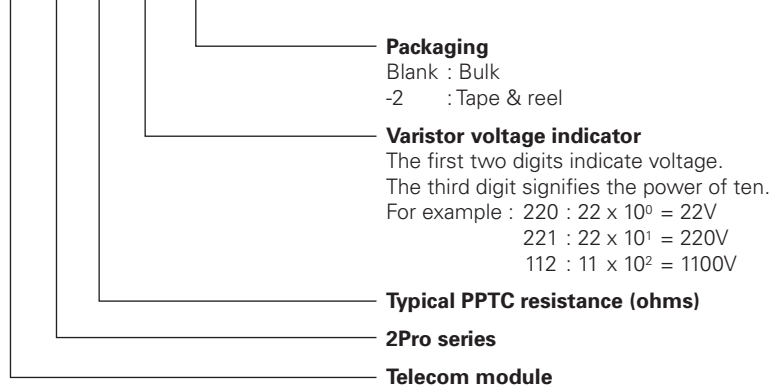
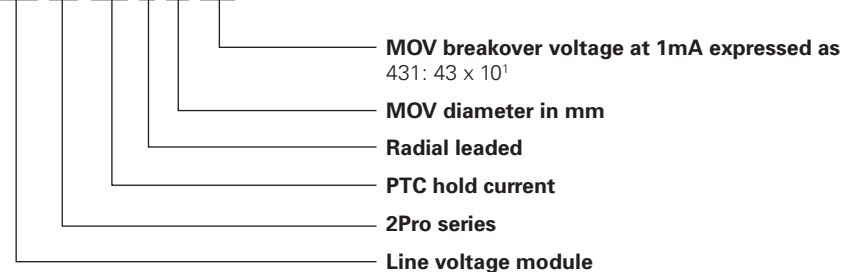
**Table 2P6 Tape and Reel Specifications for 2Pro Devices (in Millimeters)**

2Pro devices are available in tape and reel packaging per EIA 468-B standard. See Figures 2P6 and 2P7 for details.

Description	EIA Mark	IEC Mark	Dimension (mm)	Tolerance
Carrier tape width	W	W	18	-0.5/ +1.0
Hold down tape width	W <sub>4</sub>	W <sub>0</sub>	5	Minimum
Top distance between tape edges	W <sub>6</sub>	W <sub>2</sub>	3	Maximum
Sprocket hole position	W <sub>5</sub>	W <sub>1</sub>	9	-0.5/ +0.75
Sprocket hole diameter	D <sub>0</sub>	D <sub>0</sub>	4	±0.2
Abcissa to plane (kinked lead)*	H <sub>0</sub>	H <sub>0</sub>	16	-0.5/0.6
Abcissa to top	H <sub>1</sub>	H <sub>1</sub>	32.2	Maximum
Overall width with lead protrusion	-	C <sub>1</sub>	43.2	Maximum
Overall width without lead protrusion	-	C <sub>2</sub>	42.5	Maximum
Lead protrusion	L <sub>1</sub>	I <sub>1</sub>	1.0	Maximum
Protrusion of cut-out	L	L	11	Maximum
Protrusion beyond hold down tape	I <sub>2</sub>	I <sub>2</sub>	Not specified	-
Sprocket hole pitch	P <sub>0</sub>	P <sub>0</sub>	12.7	±0.3
Pitch tolerance	-	-	20 consecutive	±1
Tape thickness	t	t	0.9	Maximum
Tape thickness with splice*	t <sub>1</sub>	-	2.0	Maximum
Splice sprocket hole alignment	-	-	0	±0.3
Body lateral deviation	Δh	Δh	0	±0.1
Body tape plane deviation	Δp	Δp	0	±1.3
Ordnate to component center lead	P <sub>2</sub>	P <sub>2</sub>	6.35	±0.7
Lead spacing*	F <sub>1</sub> , F <sub>2</sub>	F <sub>1</sub> , F <sub>2</sub>	2.54	-0.1/+0.4
Reel width	w <sub>2</sub>	w	56	Maximum
Reel diameter	a	d	370	Maximum
Space between flanges	w <sub>1</sub>	-	51.2	Maximum
Arbor hole diameter	c	f	26	±12.0
Core diameter	n	h	80	Maximum
Box	-	-	56/372/372	Maximum
Consecutive missing pieces*	-	-	3 maximum	-
Empty places per reel*	-	-	Not specified	-

**Note:** \*Differs from EIA specification.

**Figure 2P6 EIA Referenced Taped Component Dimensions for 2Pro Devices**


**Figure 2P7 EIA Referenced Reel Dimensions for 2Pro Devices**

**Part Numbering System for 2Pro Devices**
**TM 2P - 10 271 -2**

**LVM 2P - 015 R 10 431**

**Warning :**

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