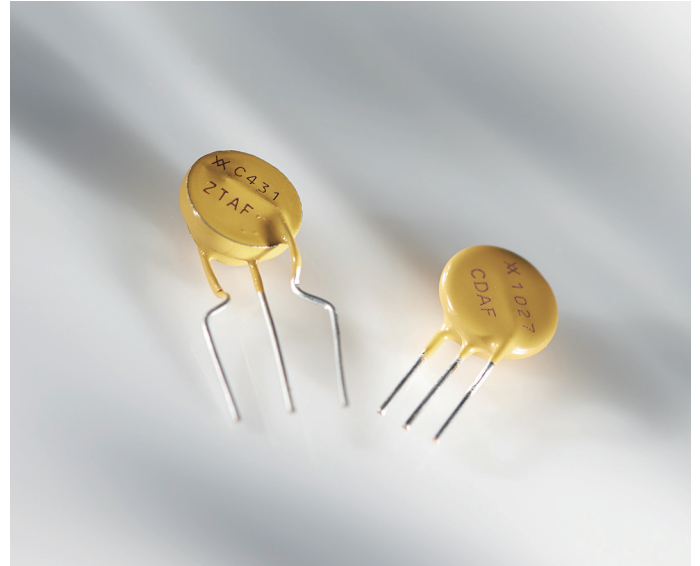


# 2PRO DEVICES

The 2Pro product is an integrated overcurrent/over-voltage protection device. The RoHS-compliant component incorporates PolySwitch PPTC (Polymeric Positive Temperature Coefficient) technology and MOV (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.

## 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 $\geq$ 900ppm, Cl $\geq$ 900ppm, Br+Cl $\geq$ 1500ppm)
- Single overcurrent, overvoltage and ESD protection device
- Resettable overcurrent protection

## APPLICATIONS

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

# PolySwitch Resettable Devices

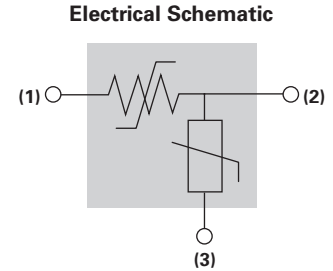
## Radial-Leaded Devices

### Table 2P1 – Electrical Characteristics

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>		
			R <sub>MIN</sub>	R <sub>MAX</sub>	R <sub>1 MAX*</sub>	Typ	Max	
TM2P-10271	0.15	0.30	6.50	14.00	16.00	0.90	3.00	(@1A)
LVM2P-015R10431	0.15	0.30	6.50	14.00	16.00	0.90	3.00	(@1A)
LVM2P-035R14431	0.35	0.75	1.40	2.20	2.80	0.50	2.00	(@3A)
LVM2P-075R14431	0.75	1.50	0.37	0.80	1.00	0.90	1.20	(@7A)

Overvoltage (Terminals 2 – 3)					
Part Number	Varistor Voltage V @ 1mA		DC Resistance @ 100V (MΩ)	Maximum Clamping (V)	Rated Wattage (W)
	DC (V)	Tolerance			
TM2P-10271	260	+14% -7%	>10	455 (@25A)	0.25
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	710 (@ 50A)	1.00

\* Maximum device resistance at 20°C measured 1 hour post trip.  
 † Corresponds to operation below varistor voltages.

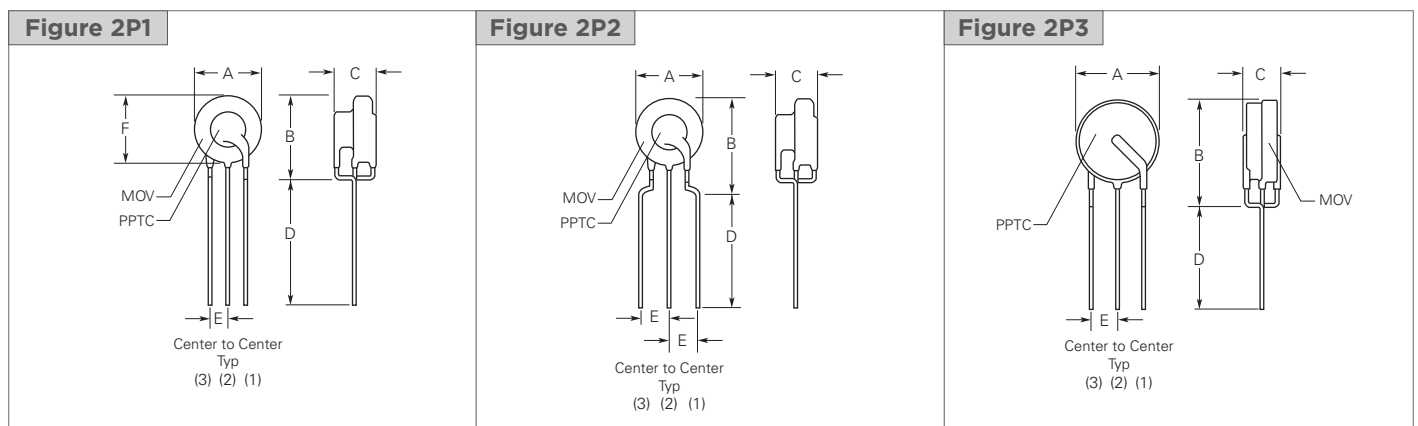


### Table 2P2 – Dimensions in Millimeters and (Inches\*)

Part Number	A		B		C		D		E	F		Figure
	Min	Max	Min	Max	Min	Max	Min	Max	Nom	Min	Max	
<b>TM2P-10271</b>												
mm	—	12.0	—	15.0	—	6.6	6.0	—	2.5	—	12.0	2P1
in*	—	(0.47)	—	(0.59)	—	(0.26)	(0.24)	—	(0.10)	—	(0.47)	
<b>LVM2P-015R10431</b>												
mm	—	12.0	—	17.0	—	7.4	8.5	11.5	5.1	—	—	2P2
in*	—	(0.47)	—	(0.67)	—	(0.29)	(0.34)	(0.45)	(0.20)	—	—	
<b>LVM2P-035R14431</b>												
mm	—	16.0	—	21.0	—	7.4	3.0	5.0	5.1	—	—	2P2
in*	—	(0.63)	—	(0.83)	—	(0.29)	(0.12)	(0.20)	(0.20)	—	—	
<b>LVM2P-075R14431</b>												
mm	—	16.0	—	21.0	—	7.4	3.0	5.0	2.5	—	—	2P3
in*	—	(0.63)	—	(0.83)	—	(0.29)	(0.12)	(0.20)	(0.10)	—	—	

\* The dimensions in inches are rounded approximations.

### Figures 2P1-2P3 – Dimension Figures



## PolySwitch Resettable Devices Radial-Leaded Devices

Figure 2P4 – Typical Time-to-Trip at 25°C

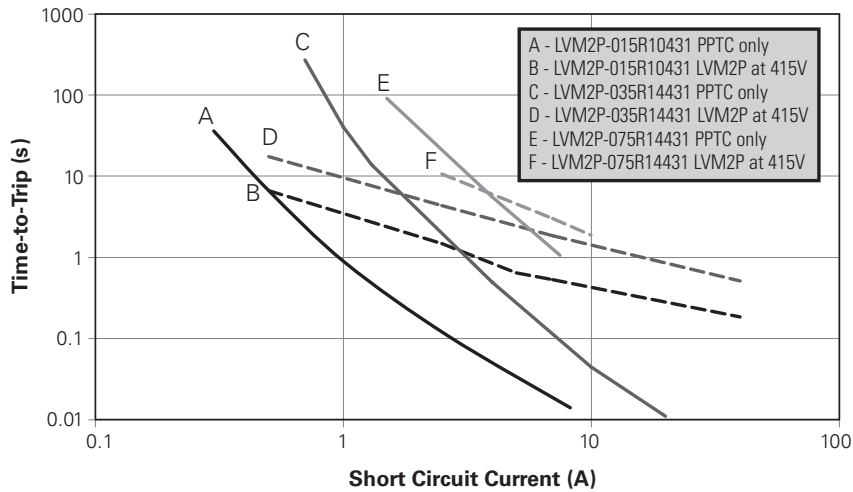


Table 2P3 – Physical Characteristics and Environmental Specifications

Physical Characteristics	
Lead Material	Tin-plated Copper, 0.33mm <sup>2</sup> (22AWG), 0.64mm (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, 60VDC 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.

# PolySwitch Resettable Devices

## Radial-Leaded Devices

Table 2P4 – Packaging and Marking Information

Part Number	Bag Quantity	Tape and Reel Quantity	Standard Package	Part Marking
TM2P-10271	250	—	3,000	1027 & Batch #
TM2P-10271-2	—	1,000	5,000	1027 & Batch #
LVM2P-015R10431	250	—	3,000	C431 & Batch #
LVM2P-035R14431	250	—	3,000	A431 & Batch #
LVM2P-075R14431	250	—	3,000	B431 & Batch #

Table 2P5 – Ordering Information

Bulk	250	pieces/bag
	3,000	pieces/box
Tape & Reel	1,000	pieces/reel
	5,000	pieces/box

## Wave Soldering and Rework Recommendations

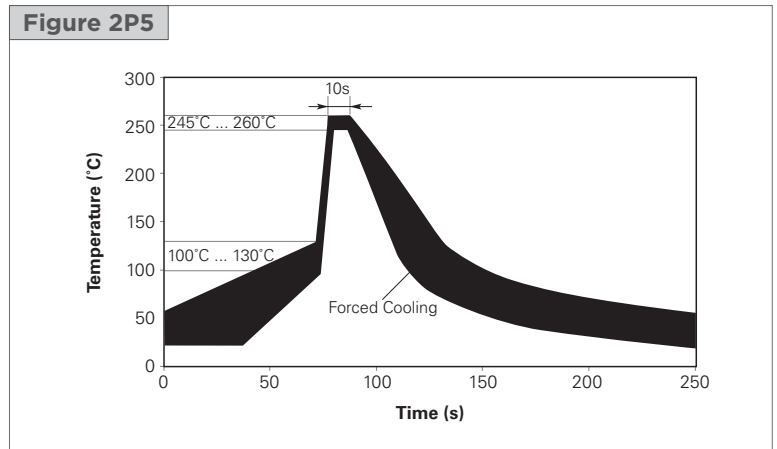
### Recommended Wave Soldering for Radial-leaded Devices

- 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

Figure 2P5



# PolySwitch Resettable Devices

## Radial-Leaded Devices

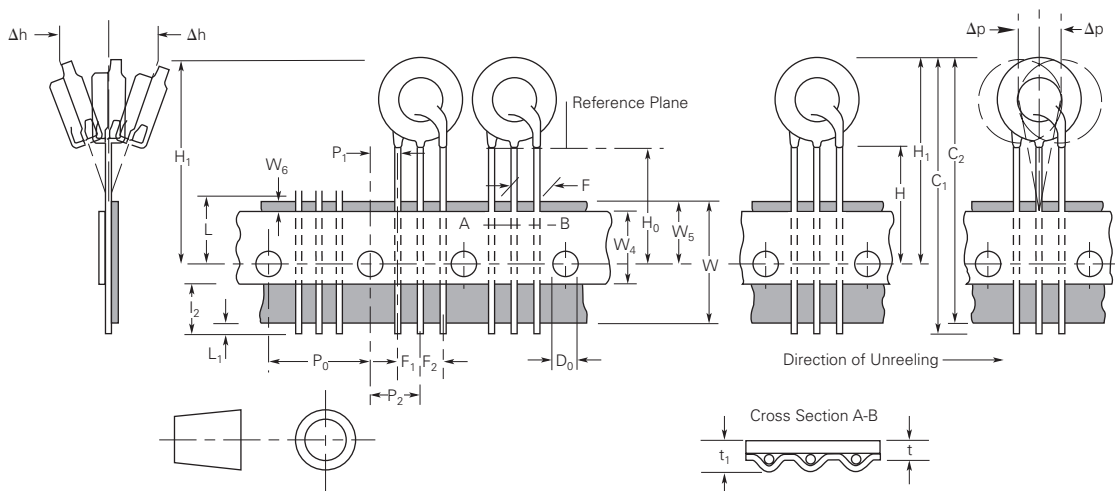
### Table 2P6 — Tape and Reel Specifications in Millimeters (mm)

2Pro devices are available in tape and reel packaging per EIA 468-B standard.

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	Min
Top Distance Between Tape Edges	W <sub>6</sub>	W <sub>2</sub>	3	Max
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	Max
Overall Width with Lead Protrusion	—	C <sub>1</sub>	43.2	Max
Overall Width Without Lead Protrusion	—	C <sub>2</sub>	42.5	Max
Lead Protrusion	L <sub>1</sub>	I <sub>1</sub>	1.0	Max
Protrusion of Cut-out	L	L	11	Max
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	Max
Tape Thickness with Splice*	t <sub>1</sub>	—	2.0	Max
Splice Sprocket Hole Alignment	—	—	0	±0.3
Body Lateral Deviation	Dh	Dh	0	±0.1
Body Tape Plane Deviation	Dp	Dp	0	±1.3
Ordinate 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	Max
Reel Diameter	a	d	370	Max
Space Between Flanges	w <sub>1</sub>	—	51.2	Max
Arbor Hole Diameter	c	f	26	±12.0
Core Diameter	n	h	80	Max
Box	—	—	56/372/372	Max
Consecutive Missing Pieces*	—	—	3 Max	—
Empty Places Per Reel*	—	—	Not Specified	—

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

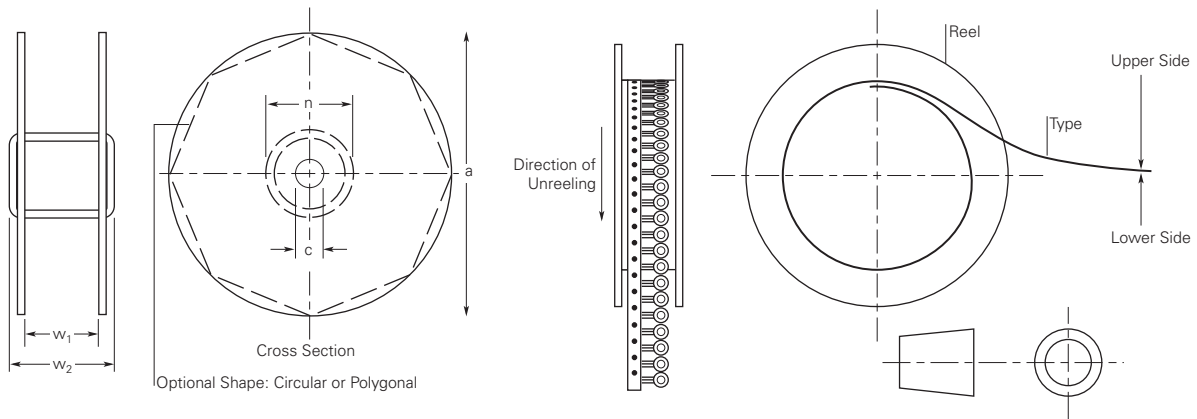
### Figure 2P6 — EIA Referenced Taped Component Dimensions



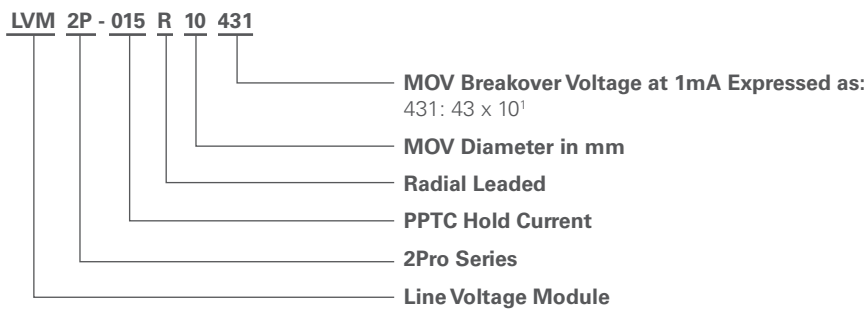
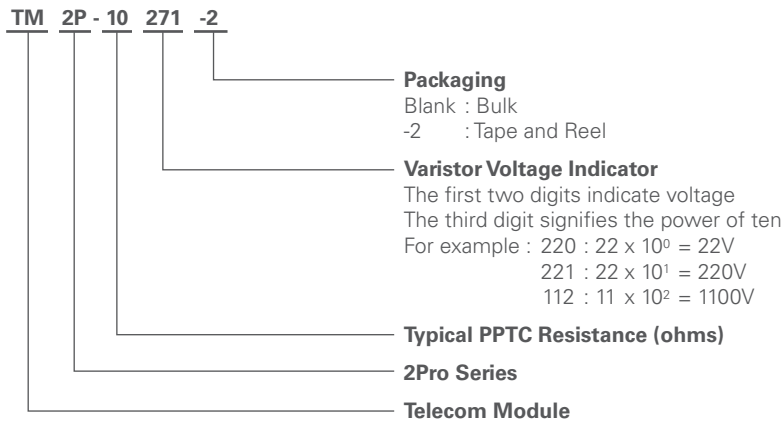
# PolySwitch Resettable Devices

## Radial-Leaded Devices

Figure 2P7 – EIA Referenced Reel Dimensions



## Part Numbering System



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