

**ULTRA LOW CAPACITANCE ESD PROTECTION COMPONENT****DESCRIPTION**

The P0402V Series is an ultra low capacitance ESD component designed to protect very high-speed data interfaces. These devices have a typical capacitance of only 0.05pF (I/O to GND) and is compatible with the ESD immunity requirements of IEC61000-4-2.

**FEATURES**

- Compatible with IEC 61000-4-2 (ESD): Air 15kV (Typical), 25kV(Max)
- Compatible with IEC 61000-4-2 (ESD): Contact 8kV (Typical), 15kV(Max)
- Low Leakage Current: 0.10 $\mu$ A
- Fast Response Time
- Protects One Bidirectional Line
- Ultra Low Capacitance: 0.15 pF (Typical)
- RoHS Compliant
- REACH Compliant

**APPLICATIONS**

- HDMI
- DVI
- Display Port
- Unified Display Interface (UDI)
- Mobile Display Digital Interface (MDDI)
- Gigabit Ethernet
- USB2.0 & USB3.0
- IEEE 1394 Interface

**MECHANICAL CHARACTERISTICS**

- Molded Ceramic 0402 Package
- Approximate Weight: 0.44 milligrams
- Lead-Free Plating
- Solder Reflow Temperature:
  - Lead-Free - Sn/Ag/Cu, 96/3.5/0.5: 260-270°C
- 8mm Tape and Reel Per EIA Standard 481
- Flammability Rating UL 94V-0

**PIN CONFIGURATION**

## TYPICAL DEVICE CHARACTERISTICS

### MAXIMUM RATINGS @ 25°C Unless Otherwise Specified

PARAMETER	SYMBOL	VALUE	UNITS
Operating Temperature	$T_A$	-40 to 90	°C
Storage Temperature	$T_{STG}$	-55 to 125	°C
Solder Temperature - 10s	$T_L$	260	°C

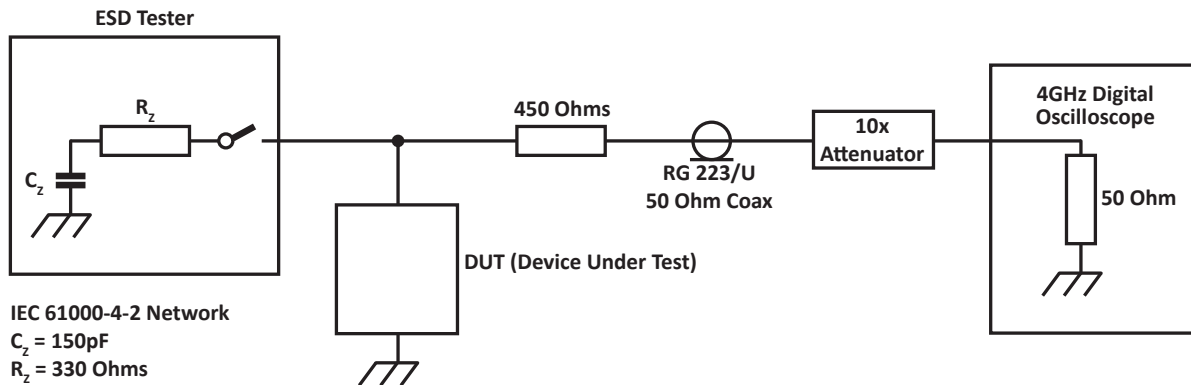
### ELECTRICAL CHARACTERISTICS PER LINE @ 25°C Unless Otherwise Specified

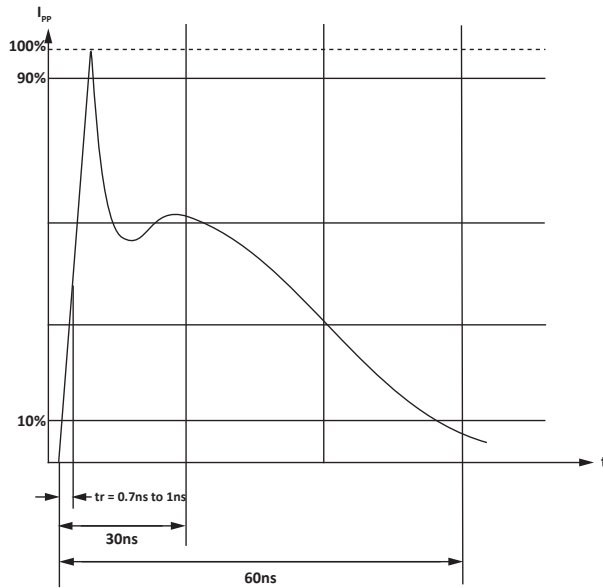
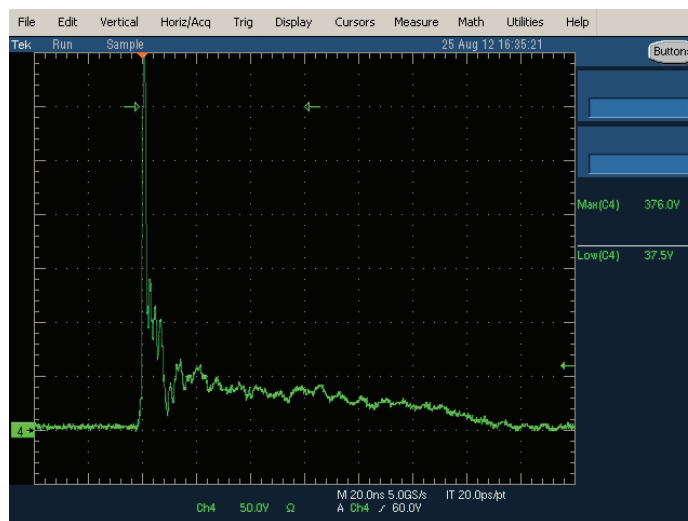
PART NUMBER	RATED STAND-OFF VOLTAGE $V_{WM}$ VOLTS	TYPICAL TRIGGER VOLTAGE (Note 1) $V_T$ VOLTS	TYPICAL CLAMPING VOLTAGE (Note 1) $V_C$ VOLTS	MAXIMUM LEAKAGE CURRENT (Note 2) @ $V_{WM}$ $I_D$ $\mu A$	TYPICAL CAPACITANCE @ 0V, 1MHz $C_J$ pF
P0402V05	5.0	350	35.0	0.10	0.15
P0402V15	15.0	350	35.0	0.10	0.05

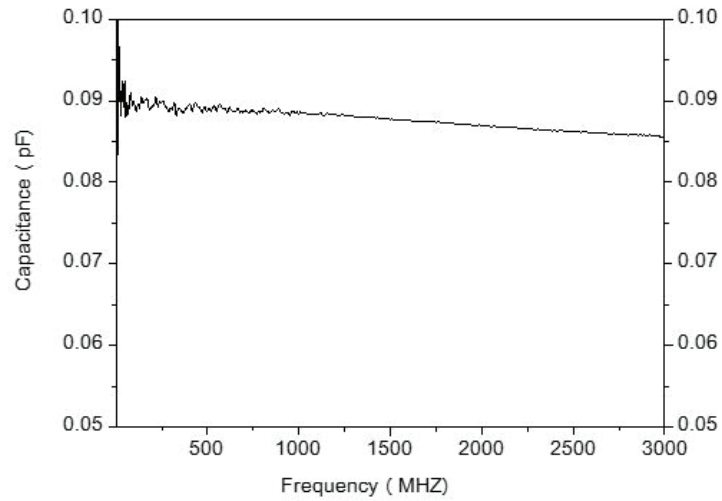
#### NOTES

1. Trigger and Clamping Voltage are measured per IEC 61000-4-2, 8kV contact discharge method.
2. After reliability tests such as high temperature storage, temp cycle, continuous ESD strikes, the maximum leakage current is less than 10 $\mu A$ .

**FIGURE 1**  
ESD CLAMPING TEST



**TYPICAL DEVICE CHARACTERISTICS**
**FIGURE 2**  
**TYPICAL ESD WAVEFORM**

**FIGURE 3**  
**ESD WAVE AFTER CLAMPING**


**TYPICAL DEVICE CHARACTERISTICS****FIGURE 4**  
**CAPACITANCE VS FREQUENCY**

## SOLDER REFLOW INFORMATION

PRINTED CIRCUIT BOARD RECOMMENDATIONS	
PARAMETER	VALUE
Pad Size on PCB	0.275mm
Pad Shape	Round
Pad Definition	Non-Solder Mask Defined Pads
Solder Mask Opening	0.325mm Round
Solder Stencil Thickness	0.150mm
Solder Stencil Aperture Opening (Laser cut, 5% tapered walls)	0.330mm Round
Solder Paste Type	No Clean
Pad Protective Finish	OSP (Entek Cu Plus 106A)
Tolerance - Edge To Corner Ball	±50µm
Solder Ball Side Coplanarity	±20µm
Maximum Dwell Time Above Liquidous (183°C)	60 seconds
Soldering Maximum Temperature	270°C

### REQUIREMENTS

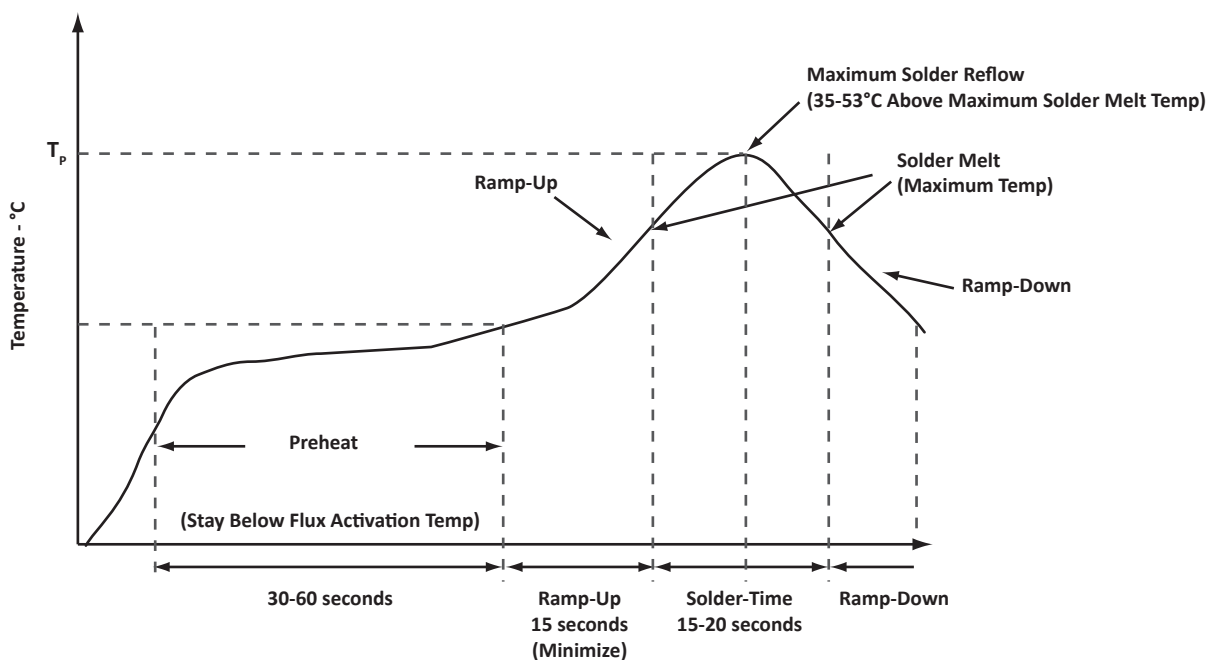
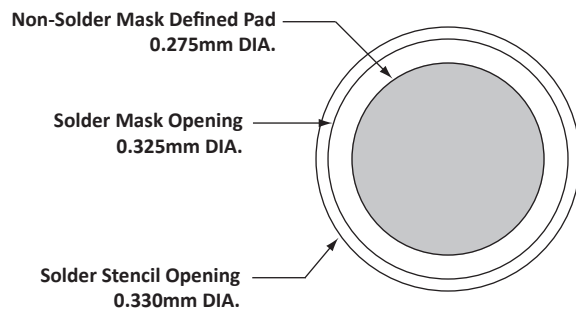
Temperature:

$T_p$  for Lead-Free (Sn/Ag/Cu): 260-270°C

$T_p$  for Tin-Lead: 240-245°C

Preheat time and temperature depends on solder paste and flux activation temperature, component size, weight, surface area and plating.

### RECOMMENDED NON-SOLDER MASK DEFINED PAD ILLUSTRATION

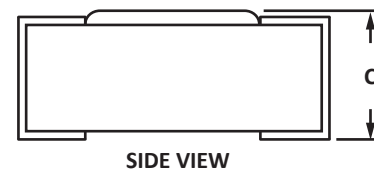
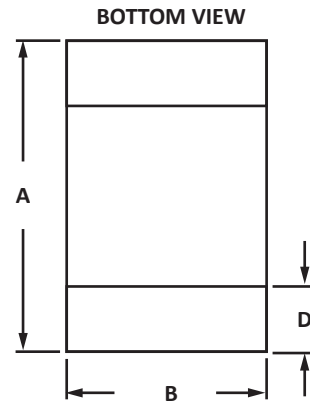


**C0402 PACKAGE INFORMATION**
**OUTLINE DIMENSIONS**

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.90	1.20	0.035	0.047
B	0.45	0.65	0.018	0.026
C	0.26	0.46	0.010	0.018
D	0.15	0.35	0.006	0.014

**NOTES**

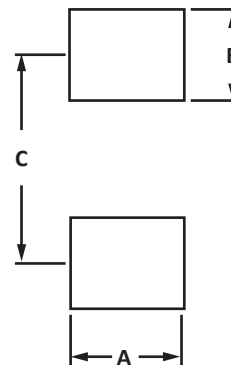
1. Controlling dimension: millimeters.


**PAD LAYOUT DIMENSIONS**

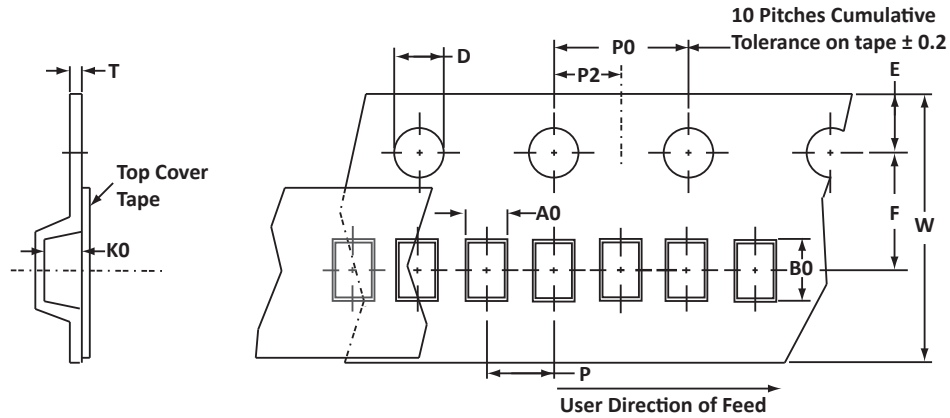
DIM	MILLIMETERS	INCHES
	NOM	NOM
A	0.6	0.024
B	0.50	0.020
C	0.90	0.035

**NOTES**

1. Controlling dimension: millimeters



## TAPE AND REEL



## SPECIFICATIONS

REEL DIA.	TAPE WIDTH	A0	B0	K0	D	E	F	W	P0	P2	P	tmax
178mm (7")	8mm	$0.75 \pm 0.05$	$1.22 \pm 0.10$	$0.56 \pm 0.05$	$1.55 \pm 0.10$	$1.75 \pm 0.10$	$3.50 \pm 0.05$	$8.00 \pm 0.30$	$4.00 \pm 0.10$	$2.00 \pm 0.05$	$2.00 \pm 0.05$	0.25

## NOTES

1. Dimensions are in millimeters.
2. Surface mount product is taped and reeled in accordance with EIA-481.
3. Suffix - T710 = 7" Reel - 10,000 pieces per 8mm tape.

## ORDERING INFORMATION

BASE PART NUMBER	LEADFREE SUFFIX	TAPE SUFFIX	QTY/REEL	REEL SIZE	TUBE QTY
P0402Vxx	N/A	-T710	10,000	7"	N/A

This device is only available in a Lead-Free configuration.

## COMPANY INFORMATION

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### COMPANY PROFILE

In business more than 20 years, ProTek Devices™ is a privately held semiconductor company. The company offers a product line of overvoltage protection and overcurrent protection components. These include transient voltage suppressor array (TVS arrays) avalanche breakdown diode, steering diode TVS array and electronics SMD chip fuses. These components deliver circuit protection in electronic systems from numerous overvoltage and overcurrent events. They include lightning; electrostatic discharge (ESD); nuclear electromagnetic pulses (NEMP); inductive switching; and electromagnetic interference (EMI) / radio frequency interference (RFI). ProTek Devices also offers high performance interface and linear products. They include analog switches; multiplexers; LED drivers; LED wafer die for ESD protection; audio control ICs; RF and related high frequency products.

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