

## APPLICATIONS

- ✓ Cellular Phones
- ✓ MCM Boards
- ✓ Wireless Communication Circuits
- ✓ IR LEDs
- ✓ SMART & PCMCIA Cards

## IEC COMPATIBILITY (EN61000-4)

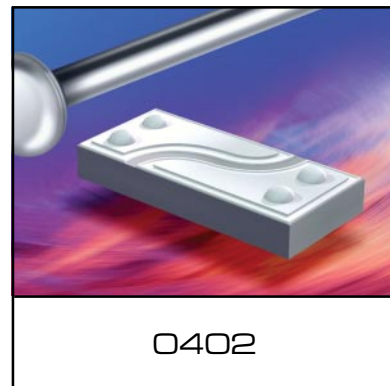
- ✓ 61000-4-2 (ESD): Air - 15kV, Contact - 8kV
- ✓ 61000-4-4 (EFT): 40A - 5/50ns

## FEATURES

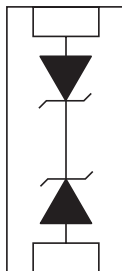
- ✓ ESD Protection > 25 kilovolts
- ✓ Available in Multiple Voltage Types Ranging From 3.3V to 36V
- ✓ 250 Watts Peak Pulse Power per Line ( $t_p = 8/20\mu s$ )
- ✓ Bidirectional Configuration & Monolithic Structure
- ✓ Protects 1 Line
- ✓ RoHS Compliant in Lead-Free Versions

## MECHANICAL CHARACTERISTICS

- ✓ Standard EIA Chip Size: 0402
- ✓ Weight 0.73 milligrams (Approximate)
- ✓ Available in Tin-Lead or Lead-Free Plating
- ✓ Solder Reflow Temperature:
  - Tin-Lead - Sn/Pb, 85/15: 240-245°C
  - Lead-Free - Sn/Ag/Cu, 96/3.5/0.5: 260-270°C
- ✓ Flammability Rating UL 94V-0
- ✓ 8mm Plastic & Paper Tape and Reel Per EIA Standard 481
- ✓ Device Marking On Reel
- ✓ Top Contacts: Solder Bump 0.004" in Height (Nominal)



## PIN CONFIGURATION



## DEVICE CHARACTERISTICS

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

| PARAMETER                                             | SYMBOL    | VALUE          | UNITS |
|-------------------------------------------------------|-----------|----------------|-------|
| Peak Pulse Power ( $t_p = 8/20\mu s$ ) - See Figure 1 | $P_{PP}$  | 250            | Watts |
| Operating Temperature                                 | $T_J$     | -55°C to 150°C | °C    |
| Storage Temperature                                   | $T_{STG}$ | -55°C to 150°C | °C    |

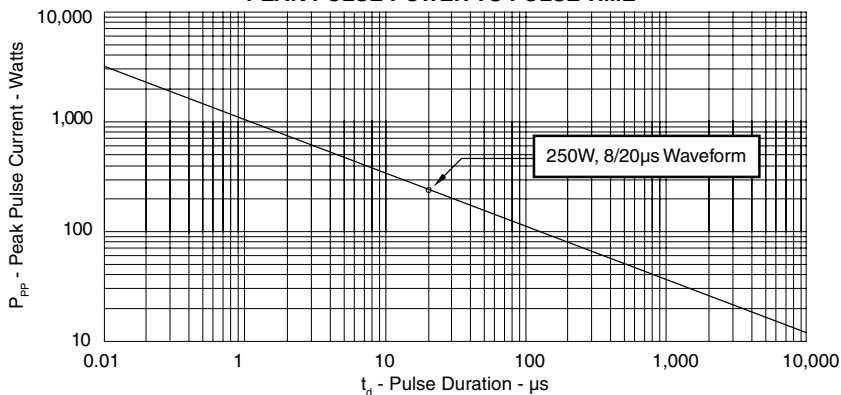
### ELECTRICAL CHARACTERISTICS PER LINE @ 25°C Unless Otherwise Specified

| PART NUMBER<br>(See Note 1) | RATED STAND-OFF VOLTAGE<br><br>$V_{WM}$<br>VOLTS | MINIMUM BREAKDOWN VOLTAGE<br><br>@ 1mA<br>$V_{(BR)}$<br>VOLTS | MAXIMUM CLAMPING VOLTAGE<br>(See Fig. 2)<br><br>@ $I_p = 1A$<br>$V_C$<br>VOLTS | MAXIMUM CLAMPING VOLTAGE<br>(See Fig. 2)<br><br>@ 8/20 $\mu s$<br>$V_C$ @ $I_{PP}$ | MAXIMUM LEAKAGE CURRENT<br>(See Note 2)<br><br>@ $V_{WM}$<br>$I_D$<br>$\mu A$ | TYPICAL CAPACITANCE<br><br>@ 0V, 1 MHz<br>C<br>pF |
|-----------------------------|--------------------------------------------------|---------------------------------------------------------------|--------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|---------------------------------------------------|
| P0402FC3.3C                 | 3.3                                              | 4.0                                                           | 7.0                                                                            | 12.5V @ 20A                                                                        | 75*                                                                           | 150                                               |
| P0402FC05C                  | 5.0                                              | 6.0                                                           | 9.8                                                                            | 14.7V @ 17A                                                                        | 10**                                                                          | 100                                               |
| P0402FC08C                  | 8.0                                              | 8.5                                                           | 13.4                                                                           | 19.2V @ 13A                                                                        | 10***                                                                         | 75                                                |
| P0402FC12C                  | 12.0                                             | 13.3                                                          | 19.0                                                                           | 29.7V @ 9.0A                                                                       | 1                                                                             | 50                                                |
| P0402FC15C                  | 15.0                                             | 16.7                                                          | 24.0                                                                           | 35.7V @ 7.0A                                                                       | 1                                                                             | 40                                                |
| P0402FC24C                  | 24.0                                             | 26.7                                                          | 43.0                                                                           | 55.0V @ 5.0A                                                                       | 1                                                                             | 30                                                |
| P0402FC36C                  | 36.0                                             | 40.0                                                          | 64.0                                                                           | 84.0V @ 3.0A                                                                       | 1                                                                             | 25                                                |

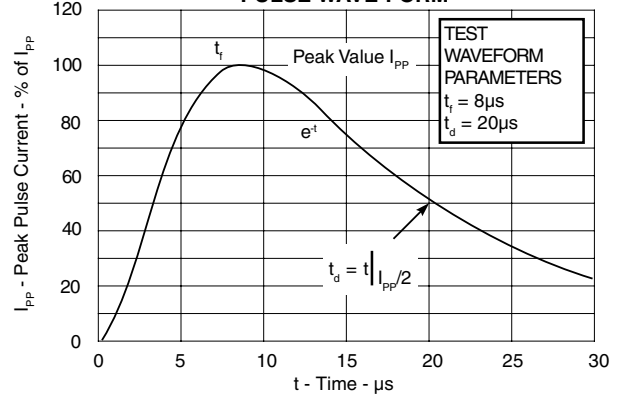
**Note 1:** All devices are bidirectional. Electrical characteristics apply in both directions.

**Note 2:** \*Maximum leakage current < 5 $\mu A$  @ 2.8V. \*\*Maximum leakage current < 500nA @ 3.3V. \*\*\*Maximum leakage current < 200nA @ 5V.

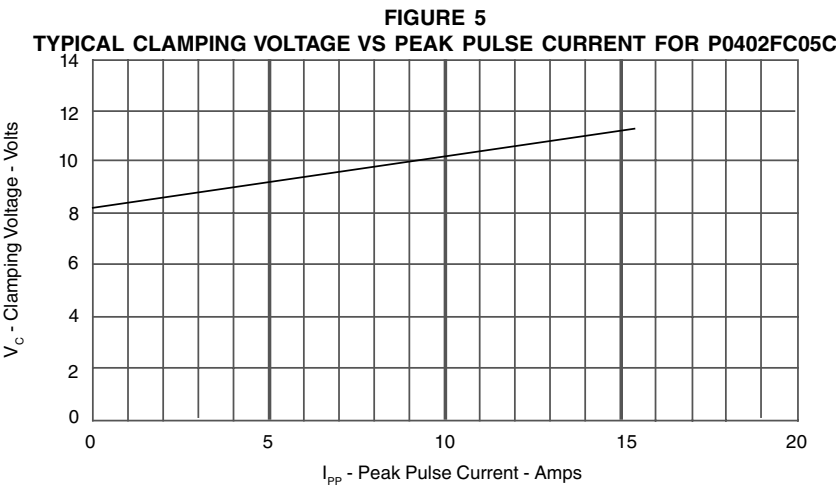
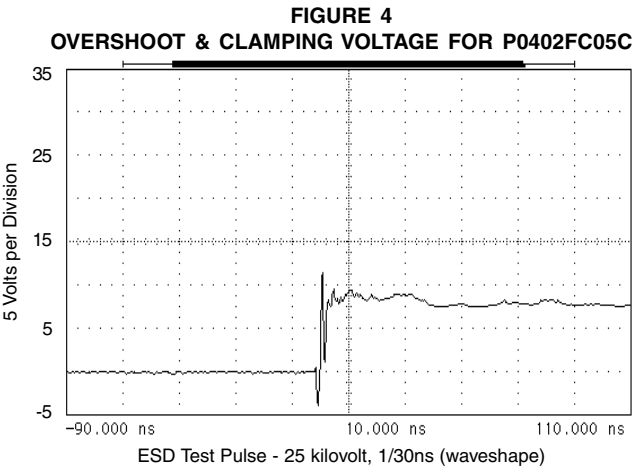
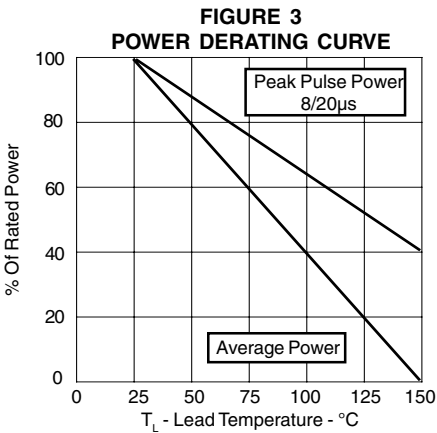
**FIGURE 1**  
**PEAK PULSE POWER VS PULSE TIME**



**FIGURE 2**  
**PULSE WAVE FORM**



GRAPHS

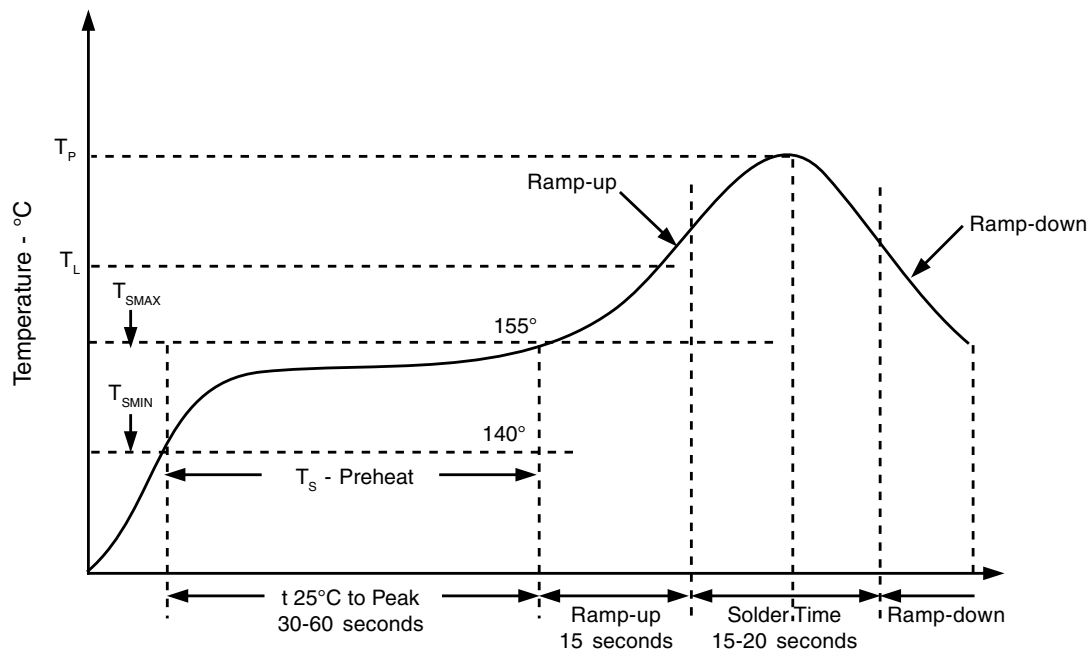
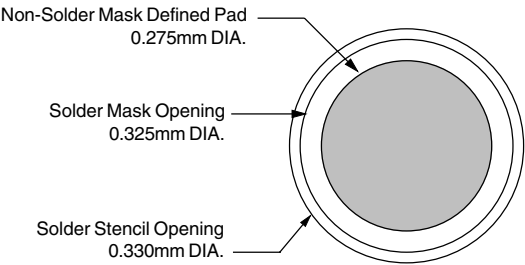


APPLICATION INFORMATION

| 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                                                                                                                                                                                                                                                                          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Temperature:</b></p> <p><math>T_p</math> for Lead-Free (SnAgCu): 260-265°C</p> <p><math>T_p</math> for Tin-Lead: 240-245°C</p> <p>Preheat time and temperature depends on solder paste and flux activation temperature, component size, weight, surface area &amp; plating.</p> |

RECOMMENDED NON-SOLDER MASK DEFINED PAD ILLUSTRATION



PO402FC3.3C\*

thru

PO402FC24C\*

PACKAGE OUTLINE & DIMENSIONS

PACKAGE OUTLINE

TOP

SIDE

END

A, B, C, D, E, F, G, H, I

O402

PACKAGE DIMENSIONS

| DIM | MILLIMETERS    | INCHES        |
|-----|----------------|---------------|
| A   | 0.46 NOM       | 0.018 NOM     |
| B   | 0.86 NOM       | 0.034 NOM     |
| C   | 0.99 ± 0.0254  | 0.039 ± 0.001 |
| D   | 0.10 NOM       | 0.004 NOM     |
| E   | 0.35 NOM       | 0.014 NOM     |
| F   | 0.483 ± 0.0254 | 0.019 ± 0.001 |
| G   | 0.20 NOM       | 0.008 NOM     |
| H   | 0.127 MAX      | 0.005 MAX     |
| I   | 0.076 MIN      | 0.003 MIN     |
| I   | 0.406 NOM      | 0.016 NOM     |

NOTES:

1. Controlling dimensions in inches.

2. Decimal tolerances for mounting pad and outline:  
.xxx ± 0.05mm (± 0.002").

3. Maximum chip size: 1.02 (0.040") by 0.51(0.020").

MOUNTING PAD

DIE

SOLDER PAD

SOLDER BUMP

A, B, C, D, E, F, G, H, I

PAD DIMENSIONS

| DIM | MILLIMETERS | INCHES |
|-----|-------------|--------|
| A   | 0.23        | 0.009  |
| B   | 0.48        | 0.019  |
| C   | 0.69        | 0.027  |
| D   | 0.46        | 0.018  |
| E   | 0.99        | 0.039  |
| F   | 0.20        | 0.008  |
| G   | 0.20        | 0.008  |
| H   | 0.66        | 0.026  |
| I   | 0.13        | 0.005  |

NOTE:

1. Top view of tape. Metal contacts are face down in tape package.

TAPE & REEL ORIENTATION

Single Die - 0402

NOTE:

1. Preferred: Using 0.1mm (0.004") stencil.

Outline & Dimensions: Rev 3 - 11/02, 06001

TAPE & REEL ORDERING NOMENCLATURE

1. Surface mount product is taped and reeled in accordance with EIA 481.

2. 8mm Plastic Tape: 7 Inch Reels - 5,000 pieces per reel. Ordering Suffix: -T75-1 (i.e., P0402FC05C-T75-1).

3. 8mm Paper Tape: 7 Inch Reels - 10,000 pieces per reel. Ordering Suffix: -T710-2 (i.e., P0402FC05C-T710-2).

4. Suffix - LF = Lead-Free, i.e., P0402FC05C-LF-T75-1.

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"U.S. Patent No. Des. "D456,367S"

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