

## 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

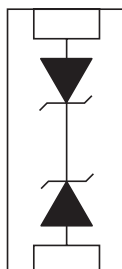
- ✓ ESD Protection > 25 kilovolts
- ✓ Available in Voltages Ranging From 3.3V to 36V
- ✓ 250 Watts Peak Pulse Power per Line ( $t_p = 8/20\mu s$ )
- ✓ Bidirectional Configuration & Monolithic Structure
- ✓ Protects 1 Line
- ✓ RoHS Compliant

## MECHANICAL CHARACTERISTICS

- ✓ Standard EIA Chip Size: 0402
- ✓ Weight 0.73 milligrams (Approximate)
- ✓ Available in Lead-Free Plating
- ✓ Solder Reflow Temperature:  
Lead-Free - Sn/Ag/Cu, 96/3.5/0.5: 260-270°C
- ✓ Consult Factory for Leaded Device Availability
- ✓ 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



# P0402FC3.3C\*

## thru

# P0402FC36C\*

### 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                                 | $T_A$     | -55 to 150 | °C    |
| Storage Temperature                                   | $T_{STG}$ | -55 to 150 | °C    |

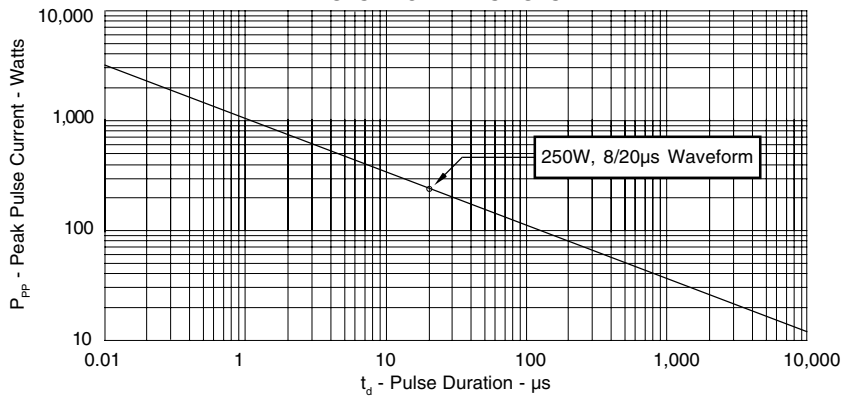
#### ELECTRICAL CHARACTERISTICS PER LINE @ 25°C Unless Otherwise Specified

| PART NUMBER<br>(See Note 1) | RATED STAND-OFF VOLTAGE<br>$V_{WM}$<br>VOLTS | MINIMUM BREAKDOWN VOLTAGE<br>@ 1mA<br>$V_{(BR)}$<br>VOLTS | MAXIMUM CLAMPING VOLTAGE<br>(See Fig. 2)<br>@ $I_P = 1A$<br>$V_C$<br>VOLTS | MAXIMUM CLAMPING VOLTAGE<br>(See Fig. 2)<br>@ $8/20\mu s$<br>$V_C @ I_{PP}$ | MAXIMUM LEAKAGE CURRENT<br>(See Note 2)<br>@ $V_{WM}$<br>$I_D$<br>$\mu A$ | TYPICAL CAPACITANCE<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                                                       | 11.0                                                                       | 14.7V @ 17A                                                                 | 10**                                                                      | 100                                           |
| P0402FC08C                  | 8.0                                          | 8.5                                                       | 13.2                                                                       | 19.2V @ 13A                                                                 | 10***                                                                     | 75                                            |
| P0402FC12C                  | 12.0                                         | 13.3                                                      | 19.8                                                                       | 29.7V @ 9.0A                                                                | 1                                                                         | 50                                            |
| P0402FC15C                  | 15.0                                         | 16.7                                                      | 25.4                                                                       | 35.7V @ 7.0A                                                                | 1                                                                         | 40                                            |
| P0402FC24C                  | 24.0                                         | 26.7                                                      | 37.2                                                                       | 55.0V @ 5.0A                                                                | 1                                                                         | 30                                            |
| P0402FC36C                  | 36.0                                         | 40.0                                                      | 70.0                                                                       | 84.0V @ 3.0A                                                                | 1                                                                         | 25                                            |

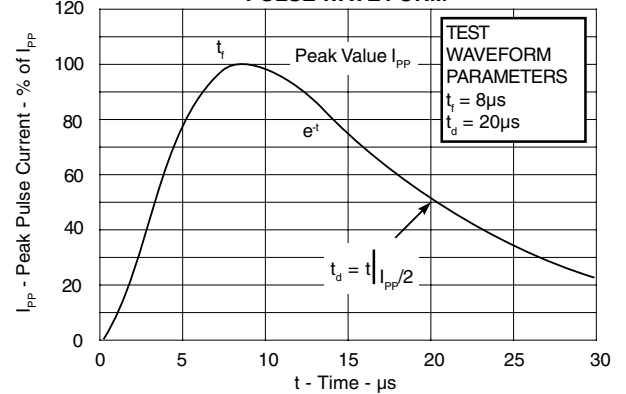
**Note 1:** All devices are bidirectional. Electrical characteristics apply in both directions.

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

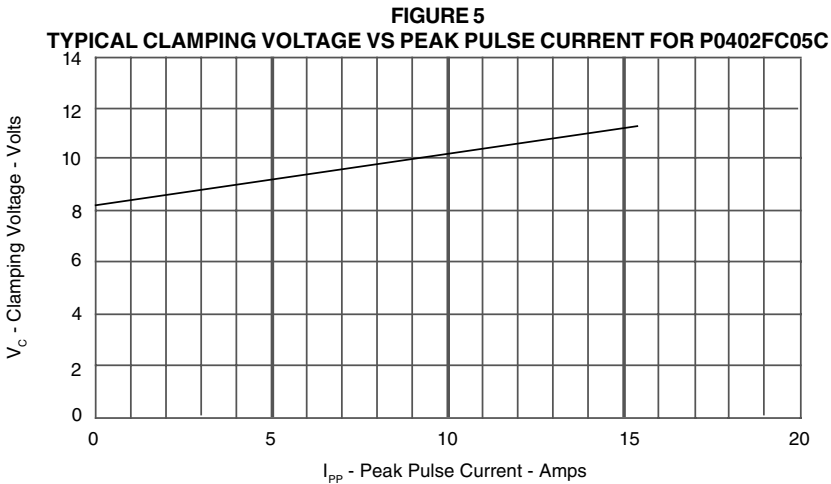
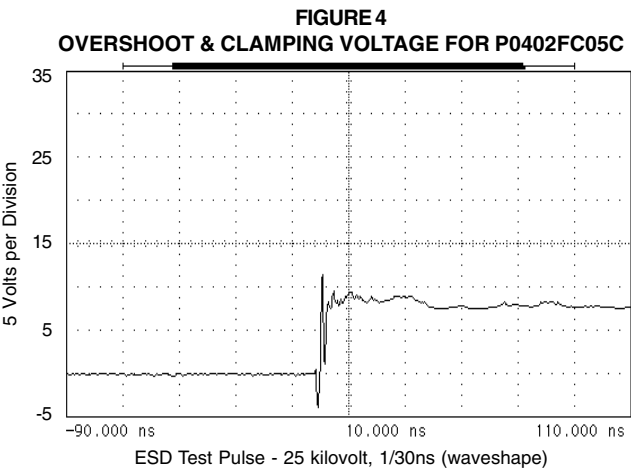
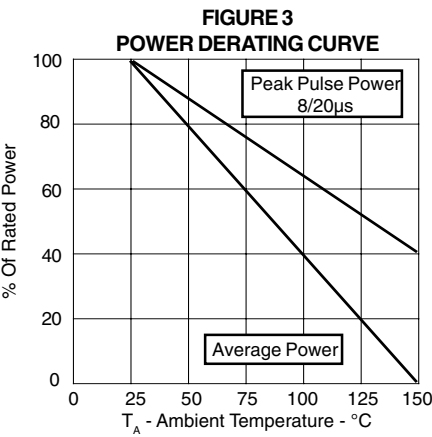
**FIGURE 1**  
**PEAK PULSE POWER VS PULSE TIME**



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



GRAPHS

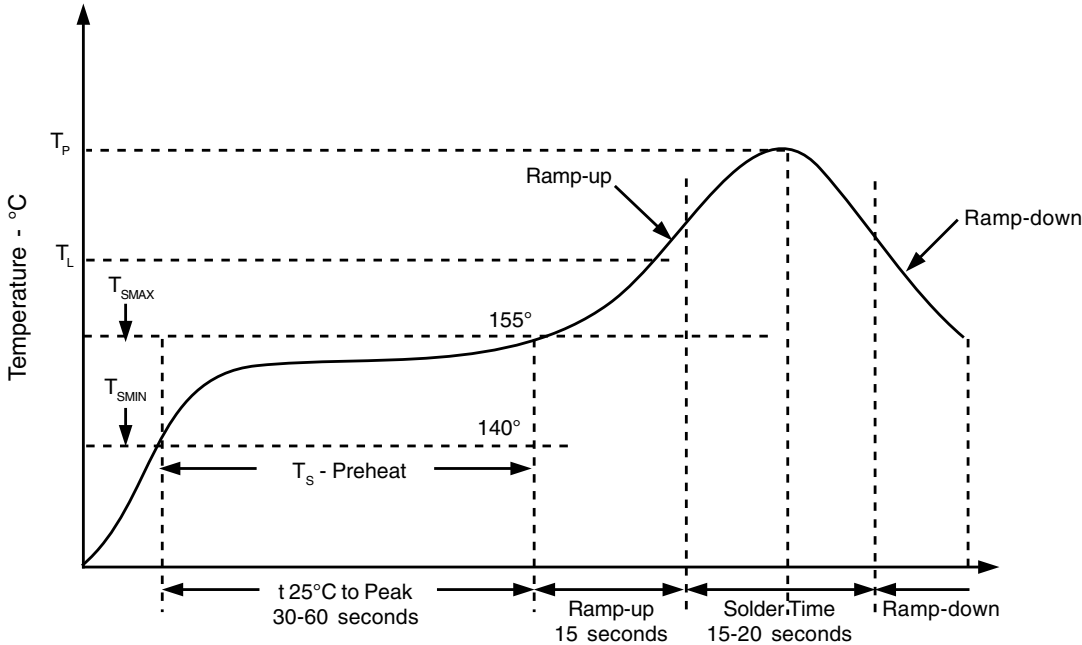
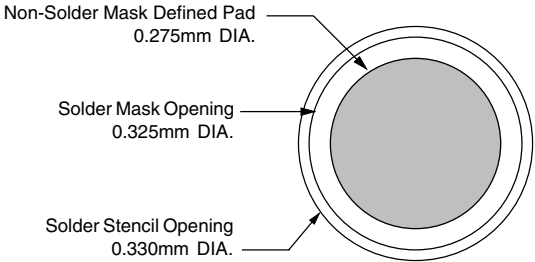


APPLICATION INFORMATION

| 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                                                                                                                                                                                                                                        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Temperature:<br>T <sub>P</sub> for Lead-Free (SnAgCu): 260-270°C<br>T <sub>P</sub> for Tin-Lead: 240-245°C<br>Preheat time and temperature depends on solder paste and flux activation temperature, component size, weight, surface area & plating. |

RECOMMENDED NON-SOLDER MASK  
DEFINED PAD ILLUSTRATION



# P0402FC3.3C\*

## thru

# P0402FC36C\*

## 0402 PACKAGE OUTLINE & DIMENSIONS

| PACKAGE OUTLINE                                                                                                                                                                                          | PACKAGE DIMENSIONS |                    |                   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|--------------------|-------------------|
|                                                                                                                                                                                                          | DIM                | MILLIMETERS        | INCHES            |
|                                                                                                                                                                                                          | A                  | 0.46 NOM           | 0.018 NOM         |
|                                                                                                                                                                                                          | B                  | 0.86 NOM           | 0.034 NOM         |
|                                                                                                                                                                                                          | C                  | $0.99 \pm 0.0254$  | $0.039 \pm 0.001$ |
|                                                                                                                                                                                                          | D                  | 0.10 NOM           | 0.004 NOM         |
|                                                                                                                                                                                                          | E                  | 0.35 NOM           | 0.014 NOM         |
|                                                                                                                                                                                                          | F                  | $0.483 \pm 0.0254$ | $0.019 \pm 0.001$ |
|                                                                                                                                                                                                          | G                  | 0.20 NOM           | 0.008 NOM         |
|                                                                                                                                                                                                          | H                  | 0.127 MAX          | 0.005 MAX         |
|                                                                                                                                                                                                          | I                  | 0.076 MIN          | 0.003 MIN         |
| <b>NOTES:</b><br>1. Controlling dimensions in inches.<br>2. Decimal tolerances for mounting pad and outline: .xxx $\pm$ 0.05mm ( $\pm$ 0.002").<br>3. Maximum chip size: 1.02 (0.040") by 0.51 (0.020"). |                    |                    |                   |
| MOUNTING PAD                                                                                                                                                                                             | 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             |
| <b>NOTE:</b><br>1. Top view of tape. Metal contacts are face down in tape package.                                                                                                                       |                    |                    |                   |
| TAPE & REEL ORIENTATION                                                                                                                                                                                  |                    |                    |                   |
|                                                                                                                                                                                                          |                    |                    |                   |
| <b>NOTE:</b><br>1. Preferred: Using 0.1mm (0.004") stencil.                                                                                                                                              |                    |                    |                   |

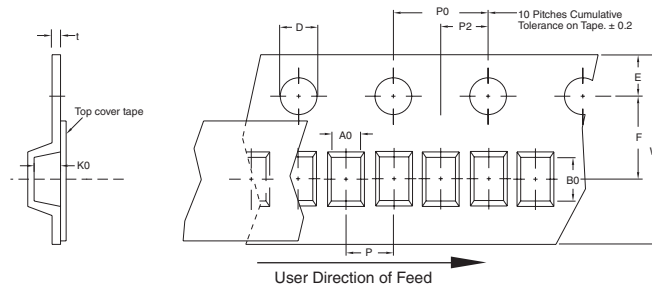
### TAPE & REEL ORDERING NOMENCLATURE

- Surface mount product is taped and reeled in accordance with EIA 481.
- 8mm Plastic Tape: 7 Inch Reels - 5,000 pieces per reel. Ordering Suffix: -T75-1 (i.e., P0402FC05C-T75-1).
- 8mm Paper Tape: 7 Inch Reels - 10,000 pieces per reel. Ordering Suffix: -T710-2 (i.e., P0402FC05C-T710-2).
- Suffix - LF = Lead-Free, i.e., P0402FC05C-LF-T75-1.

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

### Tape & Reel Specifications (Dimensions in millimeters)

| Reel Dia.             | Tape Width | A0              | B0              | K0              | D               | E               | F               | W               | P0              | P2              | P               | tmax |
|-----------------------|------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|------|
| 178mm (7")/330mm(13") | 8mm        | $0.80 \pm 0.10$ | $1.20 \pm 0.10$ | $0.70 \pm 0.10$ | $1.50 \pm 0.10$ | $1.75 \pm 0.10$ | $3.50 \pm 0.05$ | $8.00 \pm 0.30$ | $4.00 \pm 0.10$ | $2.00 \pm 0.05$ | $2.00 \pm 0.10$ | 0.25 |



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ProTek Devices

2929 South Fair Lane, Tempe, AZ 85282

Tel: 602-431-8101 Fax: 602-431-2288

E-Mail: [sales@protekdevices.com](mailto:sales@protekdevices.com)

Web Site: [www.protekdevices.com](http://www.protekdevices.com)