

200W LOW CAPACITANCE UNBUMPED FLIP CHIP TVS ARRAY

DESCRIPTION

The ULC0402FCxxC Series Flip Chips employ advanced silicon P/N junction technology for unmatched board-level transient voltage protection against Electrostatic Discharge (ESD) and Electrical Fast Transients (EFT). Developed specifically for high-density circuit protection, this series meets the IEC 61000-4-2 and 61000-4-4 requirements. These devices are ideally suited for handheld devices, PCMCIA and SMART cards.

This low capacitance series provides ESD protection greater than 25 kilovolts with a peak pulse power dissipation of 200 Watts per line for an 8/20 μ s waveform. In addition, the ULC0402FCxxC series features superior clamping performance, low leakage current characteristics and a response time of less than a nanosecond. Their low inductance virtually eliminates overshoot voltage due to package inductance.

FEATURES

- Compatible with IEC 61000-4-2 (ESD): Air 15kV, Contact 8kV
- Compatible with IEC 61000-4-4 (EFT): 40A, 5/50ns
- ESD Protection > 25 kilovolts
- Available in Voltages Ranging from 3.3V to 36V
- 200 Watts Peak Pulse Power per Line (tp = 8/20 μ s)
- Bidirectional and Monolithic Structure
- Low Clamping Voltage
- Low Capacitance
- Protection for 1 Line
- RoHS Compliant
- REACH Compliant

APPLICATIONS

- SMART Phones
- Portable Electronics
- SMART Cards

MECHANICAL CHARACTERISTICS

- Standard EIA Chip Size: 0402
- Approximate Weight: 0.73 milligrams
- Lead-Free Plating
- Flammability Rating UL 94V-0
- 8mm Plastic Tape per EIA Standard 481

PIN CONFIGURATION



TYPICAL DEVICE CHARACTERISTICS
MAXIMUM RATINGS @ 25°C Unless Otherwise Specified

| PARAMETER | SYMBOL | VALUE | UNITS |
|---|------------------|------------|-------|
| Peak Pulse Power (tp = 8/20μs) - See Figure 1 | P _{PP} | 200 | 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 (Note 1) | RATED STAND-OFF VOLTAGE V _{WM} VOLTS | MINIMUM BREAKDOWN VOLTAGE @ 1mA V _(BR) VOLTS | MAXIMUM CLAMPING VOLTAGE (Fig. 2) @ I _p = 1A V _c VOLTS | MAXIMUM CLAMPING VOLTAGE (Fig. 2) @ 8/20μS V _c @ I _{PP} | MAXIMUM LEAKAGE CURRENT (Note 2) @ V _{WM} I _D μA | TYPICAL CAPACITANCE @ 0V, 1MHz C pF |
|-------------------------|---|--|---|---|---|--|
| ULC0402FC3.3C | 3.3 | 4.0 | 7.0 | 12.5V @ 16A | 75* | 70 |
| ULC0402FC05C | 5.9 | 6.0 | 11.0 | 13.0V @ 15A | 10** | 35 |
| ULC0402FC08C | 8.0 | 8.5 | 13.2 | 18.0V @ 11A | 1 | 32 |
| ULC0402FC12C | 12.0 | 13.3 | 19.8 | 26.9V @ 7.4A | 1 | 30 |
| ULC0402FC15C | 15.0 | 16.7 | 25.4 | 34.5V @ 5.8A | 1 | 25 |
| ULC0402FC24C | 24.0 | 26.7 | 37.2 | 50.6V @ 4A | 1 | 20 |
| ULC0402FC36C | 36.0 | 40.0 | 70.0 | 80.0V @ 2.5A | 1 | 18 |

NOTES

- All devices are bidirectional. Electrical characteristics apply in both directions.
- *Maximum leakage current < 5μA @ 2.8V. **Maximum leakage current < 500nA @ 3.3V.

TYPICAL DEVICE CHARACTERISTICS

FIGURE 1
PEAK PULSE POWER VS PULSE TIME

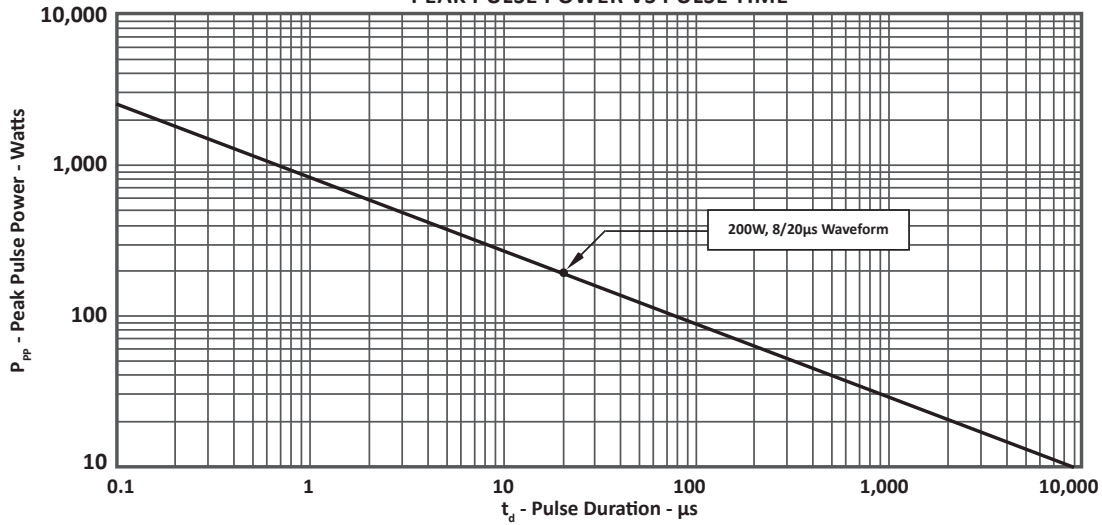


FIGURE 2
PULSE WAVE FORM

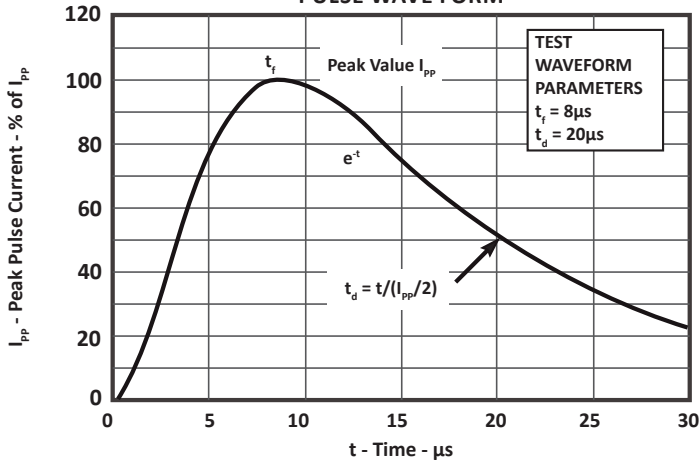
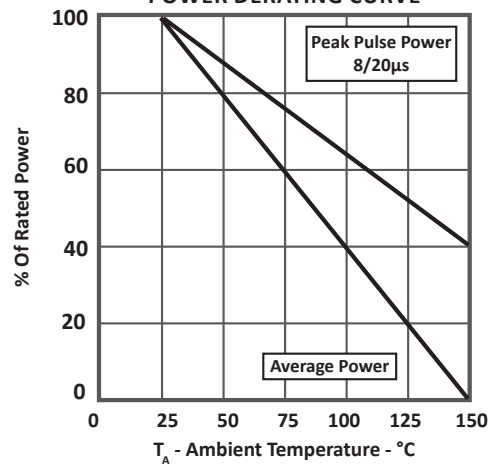
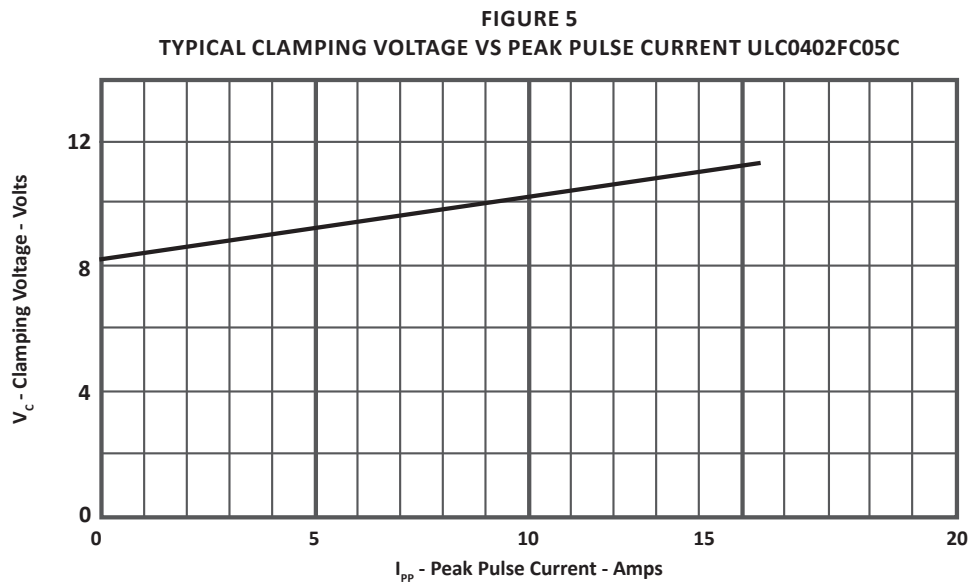
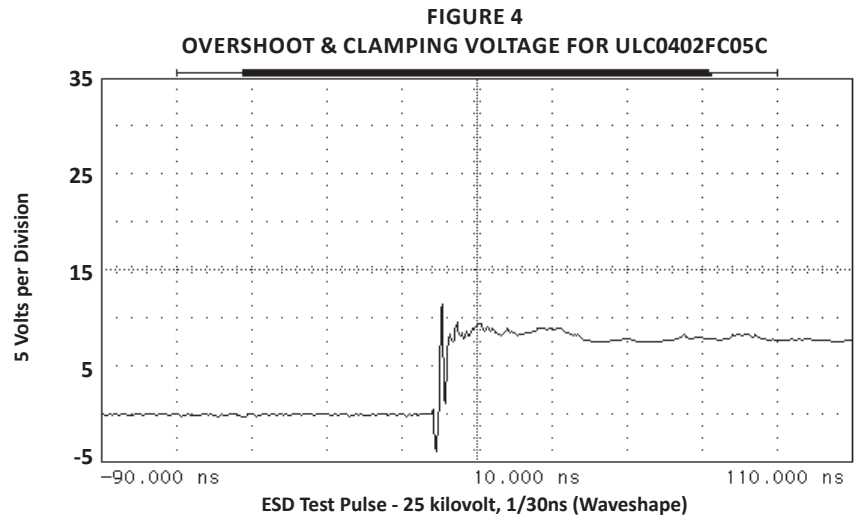


FIGURE 3
POWER DERATING CURVE



TYPICAL DEVICE CHARACTERISTICS



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 (Only applies to bumped devices) | ±20µm |
| Maximum Dwell Time Above Liquidous (183°C) | 60 seconds |
| Soldering Maximum Temperature | 270°C |

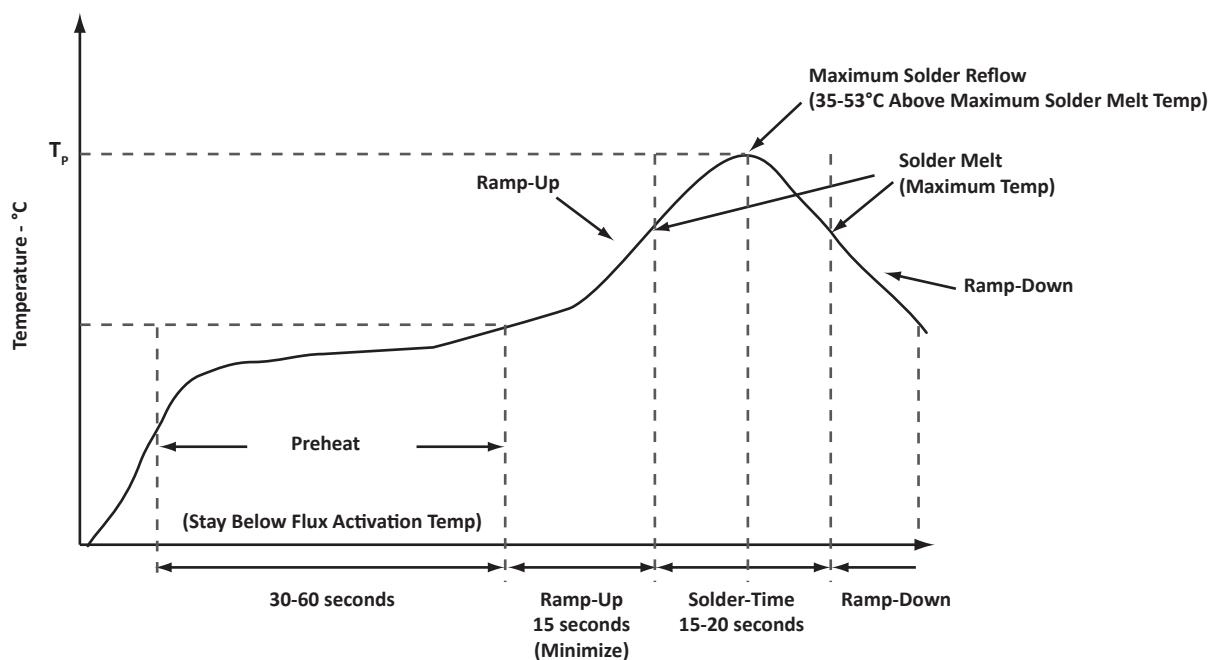
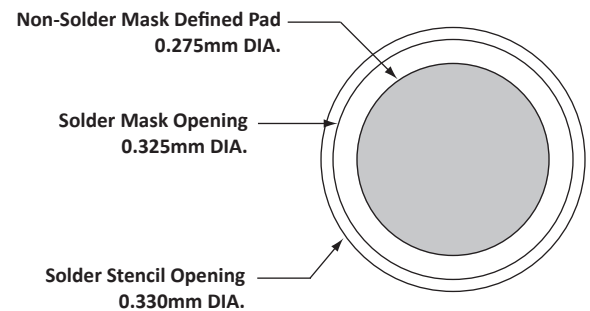
REQUIREMENTS

Temperature:

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

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



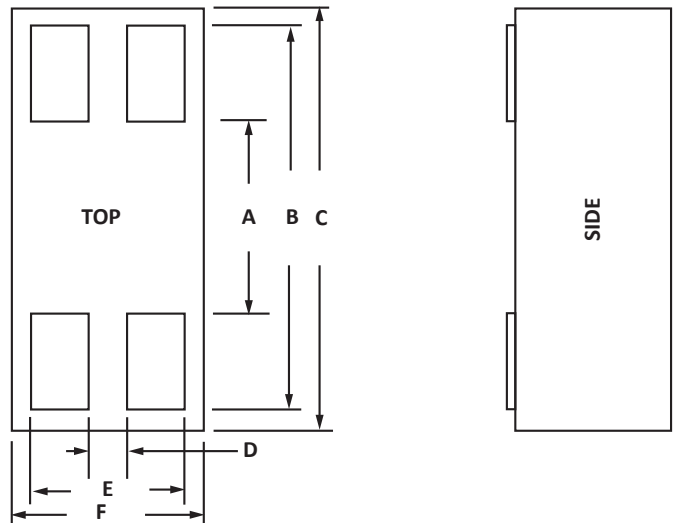
U0402 PACKAGE INFORMATION

OUTLINE DIMENSIONS

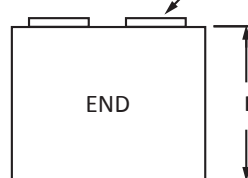
| DIM | MILLIMETERS | | INCHES | |
|-----|-------------|-------|--------|-------|
| | MIN | MAX | MIN | MAX |
| A | 0.61 | | 0.024 | |
| B | 0.86 | | 0.034 | |
| C | 0.98 | 1.02 | 0.038 | 0.040 |
| D | 0.10 | | 0.004 | |
| E | 0.35 | | 0.014 | |
| F | 0.458 | 0.508 | 0.018 | 0.020 |
| I | 0.406 | | 0.016 | |

NOTES

- Controlling dimensions in inches.
- Decimal tolerance: .xxx ± 0.05mm (0.002").
- Maximum chip size: 1.02mm (0.040") by 0.51mm (0.020").



Metalized Die Contacts

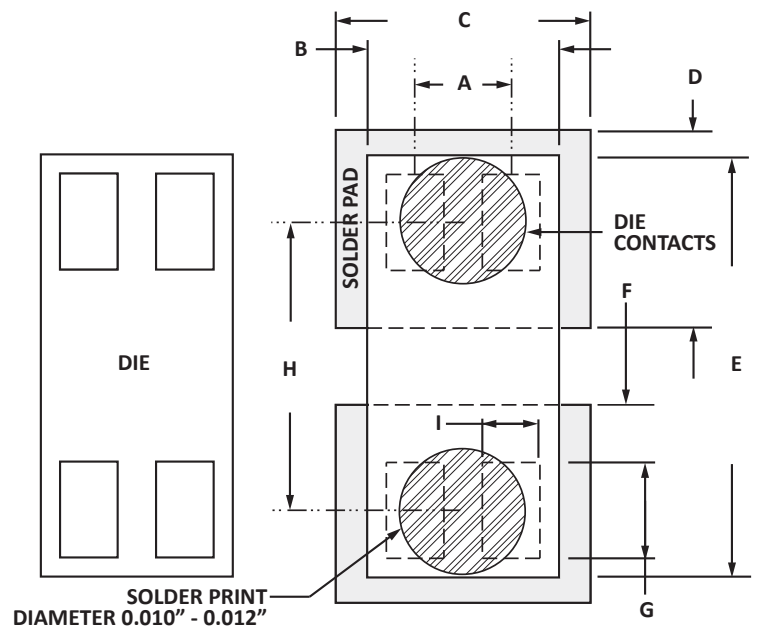


LAYOUT DIMENSIONS

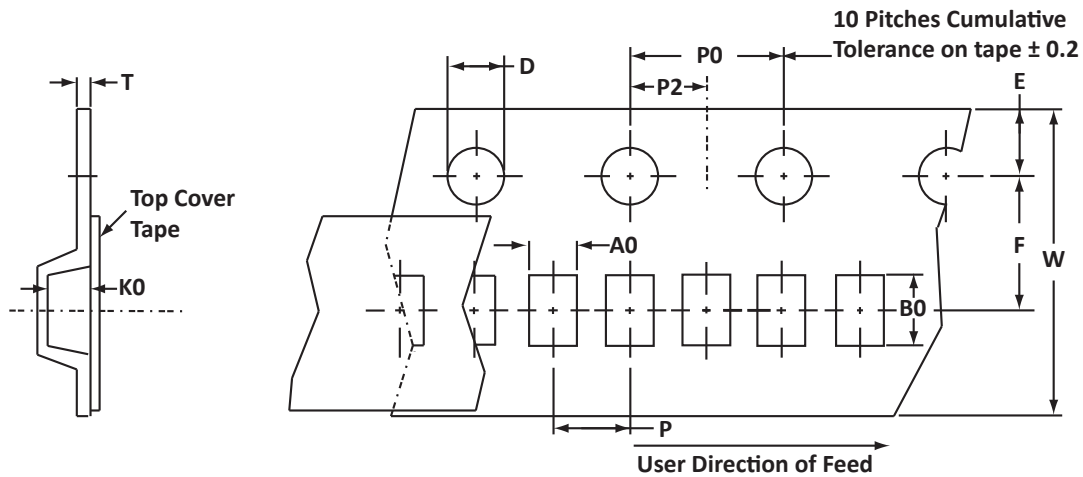
| DIM | MILLIMETERS | | INCHES | |
|-----|-------------|---------|---------|---------|
| | NOMINAL | NOMINAL | NOMINAL | NOMINAL |
| A | 0.23 | | 0.009 | |
| B | 0.48 | | 0.019 | |
| C | 0.69 | | 0.027 | |
| D | 0.46 | | 0.018 | |
| E | 0.99 | | 0.039 | |
| F | 0.20 | | 0.008 | |
| G | 0.20 | | 0.008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

NOTES

- Controlling dimensions in inches.
- Decimal tolerance: .xxx ± 0.05mm (0.002").



TAPE AND REEL INFORMATION



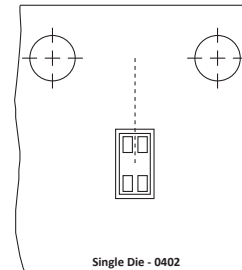
SPECIFICATIONS

| REEL DIA. | TAPE WIDTH | A0 | B0 | K0 | D | E | F | W | P0 | P2 | P | Tmax |
|-----------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|------|
| 178(7") | 8 | 0.70 ± 0.05 | 1.15 ± 0.10 | 0.56 ± 0.05 | 1.55 ± 0.05 | 1.75 ± 0.10 | 3.50 ± 0.05 | 8.00 ± 0.20 | 4.00 ± 0.05 | 2.00 ± 0.05 | 2.00 ± 0.05 | 0.25 |

NOTES

- Dimensions in millimeters.
- Top view of tape. Metal contacts are face down in tape package.
- Orientation: preferred stencil - 0.1mm (0.004").
- Surface mount product is taped and reeled in accordance with EIA 481.
- 8mm plastic tape: 7" Reels - 5,000 (pocket under hole skipped) pieces per reel.
- Marking on Reel - part number, date code and lot number.

TAPE & REEL ORIENTATION



Package outline, pad layout and tape specifications per document number 06020.R6 8/12.

ORDERING INFORMATION

| BASE PART NUMBER (xx = Voltage) | LEADFREE SUFFIX | TAPE SUFFIX | QTY/REEL | REEL SIZE | TUBE QTY |
|------------------------------------|-----------------|-------------|----------|-----------|----------|
| ULC0402FCxxC | -LF | -T75-1 | 5,000 | 7" | n/a |

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

COMPANY INFORMATION

COMPANY PROFILE

In business more than 20 years, ProTek Devices™ is a privately-held company located in Tempe, Arizona, that offers a product line of transient voltage suppressors (TVS); avalanche breakdown diodes; steering diode TVS arrays and other surge suppressor component products. These TVS devices protect electronic systems from the effects of lightning, electrostatic discharge (ESD), nuclear electromagnetic pulses (NEMP), inductive switching and EMI / RFI. ProTek Devices also offers high performance interface and linear products that include analog switches; multiplexers; LED drivers; audio control ICs; RF and related high frequency products. The analog devices work in a host of consumer; industrial; automotive and other applications.

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