# 200W CHIP SCALE TVS ARRAY

## DESCRIPTION

The CSP040605C is a chip scale TVS array that 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 such as SMART phones, PCMCIA and SMART cards.

This device provides ESD protection greater than 25 kilovolts with a peak pulse power dissipation of 200 Watts per line for an 8/20µs waveform. In addition, the CSP040605C 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 5 Volts
- 200 Watts Peak Pulse Power per Line (tp = 8/20µs)
- Low Clamping Voltage
- Bidirectional Configuration & Monolithic Structure
- Low Leakage Current
- Low Capacitance
- Protection for 3 to 5 Lines
- Package Design Prevents Solder Leakage & Solder Shorts
- RoHS Compliant
- REACH Compliant

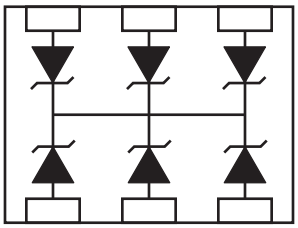
## APPLICATIONS

- SMART Phones
- Portable Electronics
- SMART Cards

## MECHANICAL CHARACTERISTICS

- Molded Chip Scale 0406 Package
- Low Profile - 0.254mm Maximum Height
- Approximate Weight: 0.73 milligrams
- Lead-Free Plating
- Solder Reflow Temperature:
- Lead-Free - Sn/Ag/Cu, 96/3.5/0.5: 260-270°C
- Flammability Rating UL 94V-0
- No Under-Fill Required
- 8mm 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 |
| CSP040605C | 5.9 | 6.0 | 11.0 | 13.0V @ 15.0A | 10 | 35 |

**NOTES**
1. Device is bidirectional. Electrical characteristics apply in both directions.
2. Maximum leakage current < 500nA @ 3.3V.

## TYPICAL DEVICE CHARACTERISTICS

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

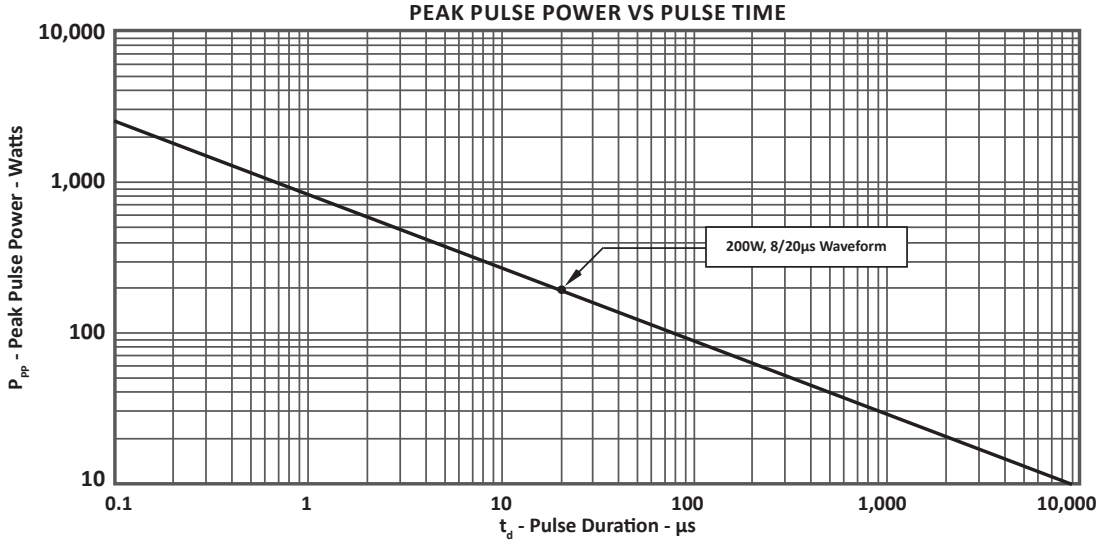



**FIGURE 2**
**PULSE WAVE FORM**

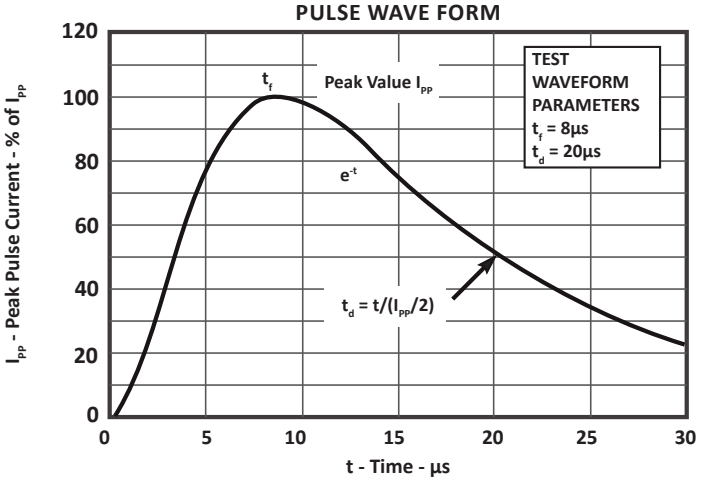
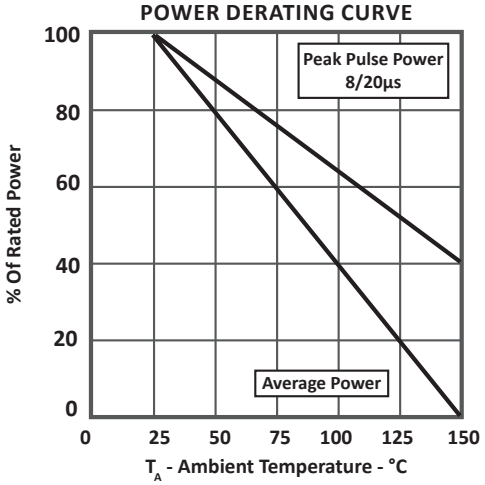
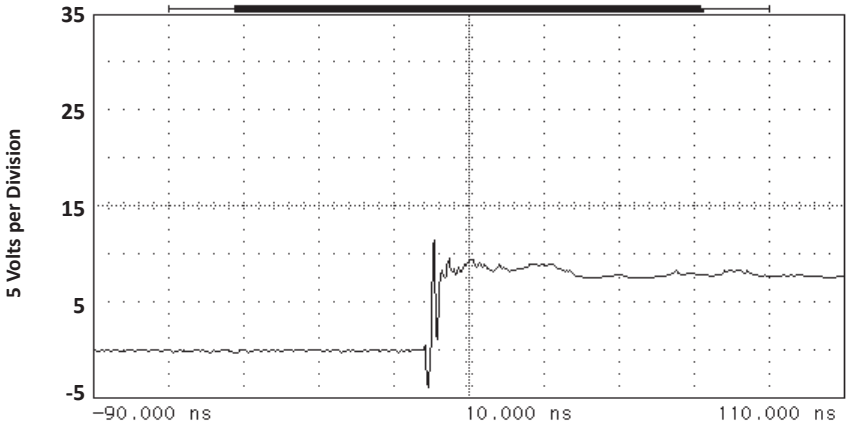



**FIGURE 3**
**POWER DERATING CURVE**



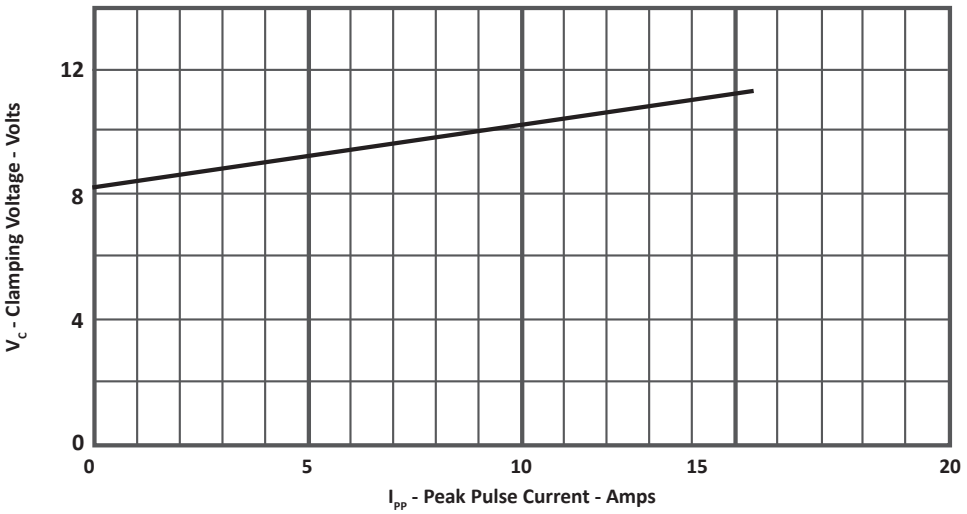
## TYPICAL DEVICE CHARACTERISTICS

**FIGURE 4**
**OVERSHOOT & CLAMPING VOLTAGE**




**ESD Test Pulse - 25 kilovolt, 1/30ns (Waveshape)**

**FIGURE 5**
**TYPICAL CLAMPING VOLTAGE VS PEAK PULSE CURRENT**



## 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

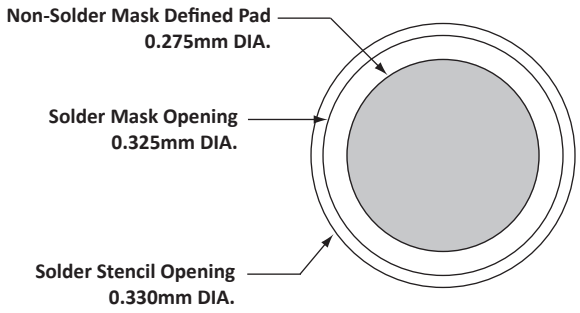
Temperature:

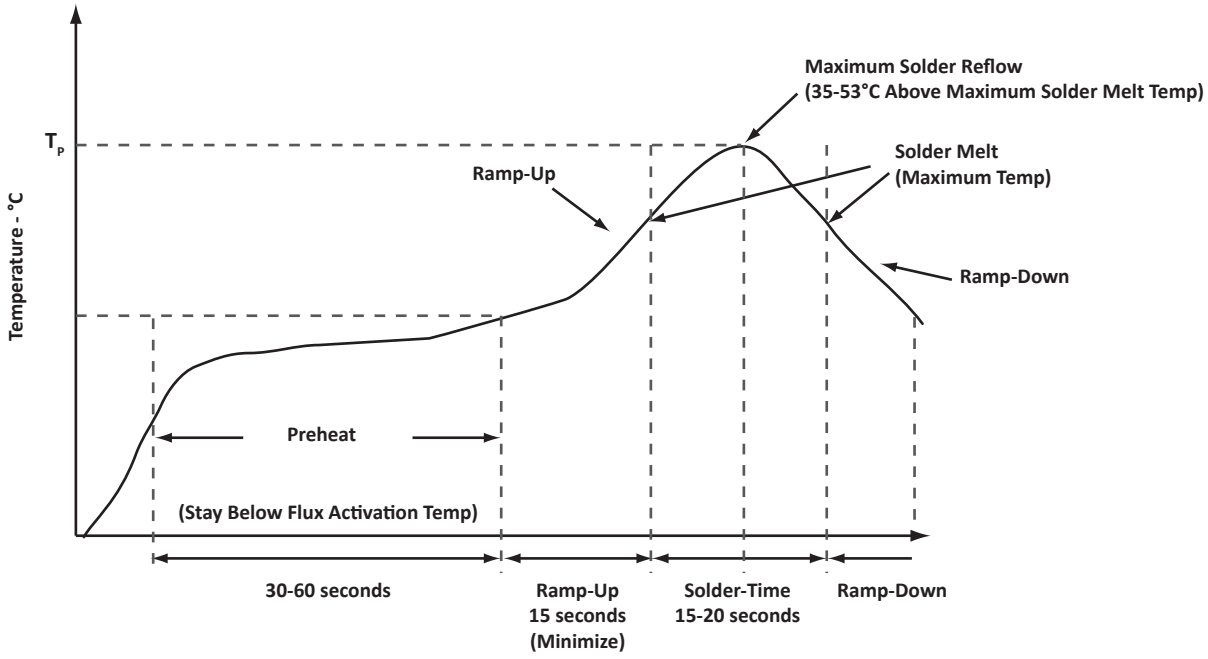
$T_P$ for Lead-Free (Sn/Ag/Cu): 260-270°C

$T_P$ 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

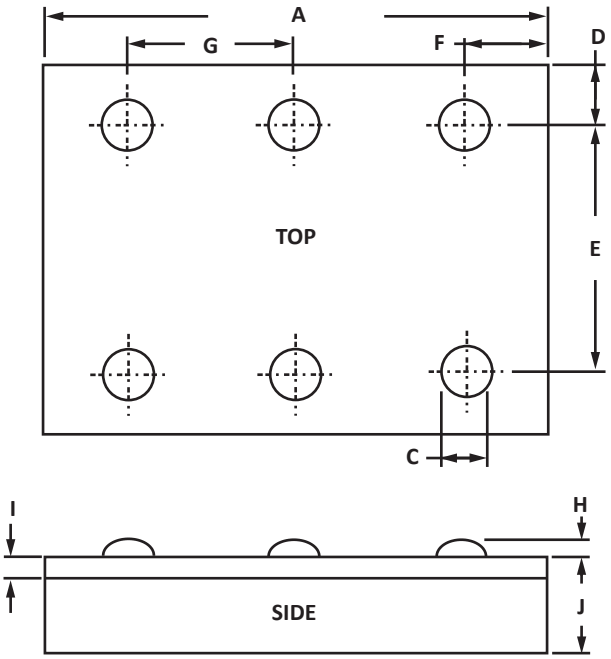


## MOLDED CHIP SCALE 0406 PACKAGE INFORMATION

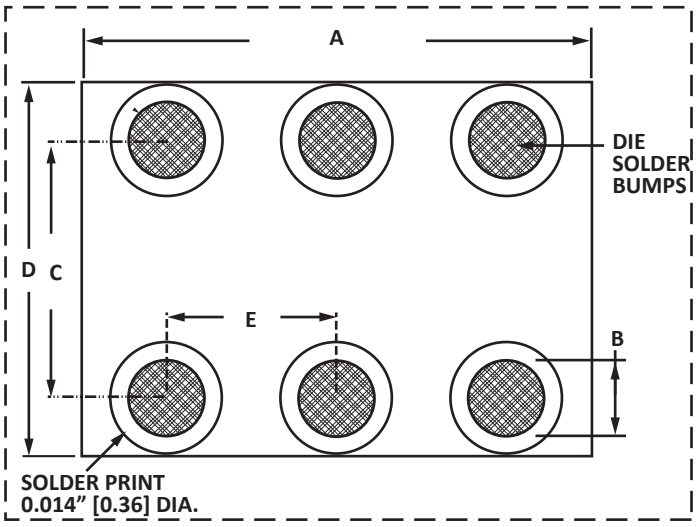
| OUTLINE DIMENSIONS | | | | |
|---|---|---|---|---|
| DIM | MILLIMETERS | | INCHES | |
| | MIN | MAX | MIN | MAX |
| A | 1.47 | 1.57 | 0.058 | 0.062 |
| B | 0.97 | 1.07 | 0.038 | 0.042 |
| C | 0.102 | 0.152 | 0.004 | 0.006 |
| D | 0.230 | 0.279 | 0.009 | 0.011 |
| E | 0.457 | 0.558 | 0.018 | 0.022 |
| F | 0.230 | 0.279 | 0.009 | 0.011 |
| G | 0.457 | 0.558 | 0.018 | 0.022 |
| H | 0.051 | | 0.002 | |
| I | 0.076 | 0.101 | 0.003 | .004 |
| J | 0.177 | 0.203 | 0.007 | 0.008 |

**NOTES**
1. Controlling dimensions in inches.

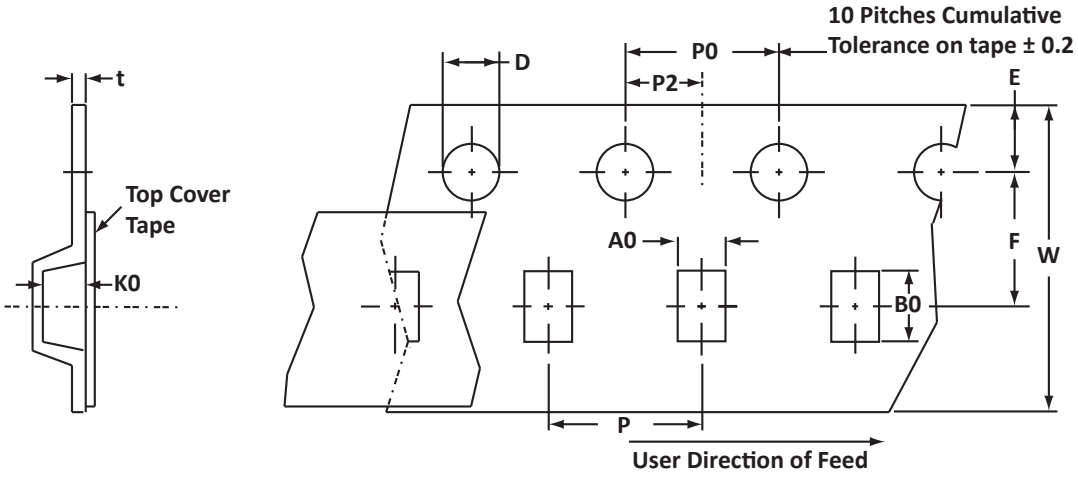



| PAD LAYOUT DIMENSIONS | | | | |
|---|---|---|---|---|
| DIM | MILLIMETERS | | INCHES | |
| | MIN | MAX | MIN | MAX |
| A | 1.63 | 1.73 | 0.064 | 0.068 |
| B | 0.20 | 0.30 | 0.008 | 0.012 |
| C | 0.46 | 0.56 | 0.018 | 0.022 |
| D | 1.16 | 1.22 | 0.046 | 0.048 |
| E | 0.46 | 0.56 | 0.018 | 0.022 |
| G | 0.25 | 0.35 | 0.010 | 0.014 |

**NOTES**
1. Controlling dimension: inches.



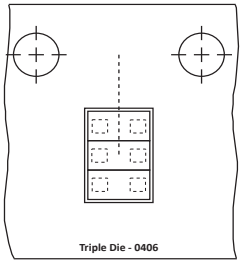
## TAPE AND REEL INFORMATION




| SPECIFICATIONS | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| REEL DIA. | TAPE WIDTH | A0 | B0 | K0 | D | E | F | W | P0 | P2 | P | Tmax |
| 178(7") | 8mm | 1.40 ± 0.10 | 1.80 ± 0.10 | 0.32 ± 0.05 | 1.50 ± 0.10 | 1.75 ± 0.10 | 3.50 ± 0.05 | 8.00 ± 0.20 | 4.00 ± 0.12 | 2.00 ± 0.05 | 2.00 ± 0.10 | 0.25 |

**NOTES**
1. Dimensions in millimeters.
2. Top view of tape. Solder bumps are face down in tape package.
3. Orientation: preferred stencil - 0.1mm (0.004").
4. Surface mount product is taped and reeled in accordance with EIA 481.
5. 8mm plastic tape: 7" Reels - 5,000.
6. Marking on reel: part number, date code, quanity and lot number.

**TAPE & REEL ORIENTATION**




Package outline, pad layout and tape specifications per document number 06097.R0 3/11.

| ORDERING INFORMATION | | | | | |
|---|---|---|---|---|---|
| BASE PART NUMBER | LEADFREE SUFFIX | TAPE SUFFIX | QTY/REEL | REEL SIZE | TUBE QTY |
| CSP040605C | n/a | -T75 | 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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