PROTEK DEVICES
. . . engineered solutions for the transient environment™

P0402FC3.3C thru P0402FC36C

BIDIRECTIONAL FLIP CHIP

0402

APPLICATIONS

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

IEC COMPATIBILITY (EN61000-4)

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

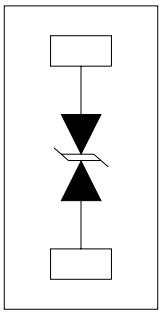
FEATURES

✔ ESD Protection > 25 kilovolts
✔ Available in Multiple Voltage Types Ranging From 3.3V to 36V
✔ 250 Watts Peak Pulse Power Dissipation per Line (8/20µs)
✔ Monolithic Structure

MECHANICAL CHARACTERISTICS

✔ Standard EIA Chip Size: 0402
✔ Weight 0.73 milligrams (Approximate)
✔ Flammability Rating UL 94V-0
✔ 8mm Plastic & Paper Tape and Reel Per EIA Standard 481-1-A
✔ Device Marking On Reel
✔ Top Contacts: Solder Bump 0.004” in Height (Nominal)

CIRCUIT DIAGRAM



DEVICE CHARACTERISTICS

MAXIMUM RATINGS @ 25°C Unless Otherwise Specified			
PARAMETER	SYMBOL	VALUE	UNITS
Peak Pulse Power (t_p = 8/20µs) - 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 (See Note 1 & Note 2)	RATED STAND-OFF VOLTAGE V_{WM} VOLTS	MINIMUM BREAKDOWN VOLTAGE @ 1mA $V_{(BR)}$ VOLTS	MAXIMUM CLAMPING VOLTAGE (See Fig. 2) @ I_P = 1A V_C VOLTS	MAXIMUM CLAMPING VOLTAGE (See Fig. 2) @8/20µs V_C @ I_{PP}	MAXIMUM LEAKAGE CURRENT @V_{WM} I_D µA	TYPICAL CAPACITANCE 0V @ 1 MHz C pF
P0402FC3.3C	3.3	4.0	7.0	12.5V @ 20A	75	150
P0402FC05C	5.9	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: SPICE model and parameters are available for the P0402FC05C on the ProTek Devices website: http://www.protekdevices.com/spice.

FIGURE 1
PEAK PULSE POWER VS PULSE TIME

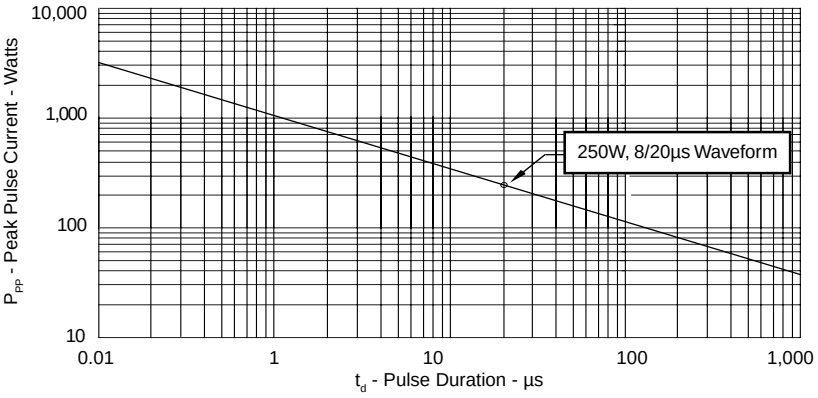
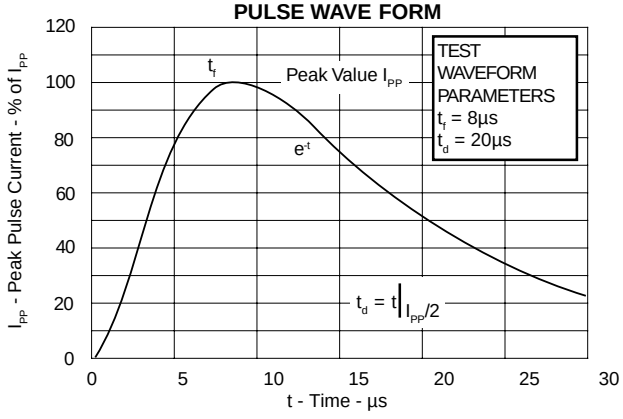


FIGURE 2
PULSE WAVE FORM



GRAPHS

FIGURE 3
POWER DERATING CURVE

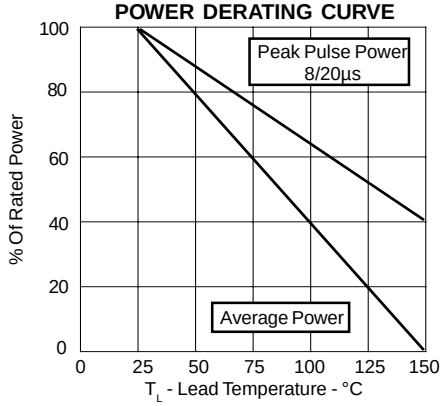
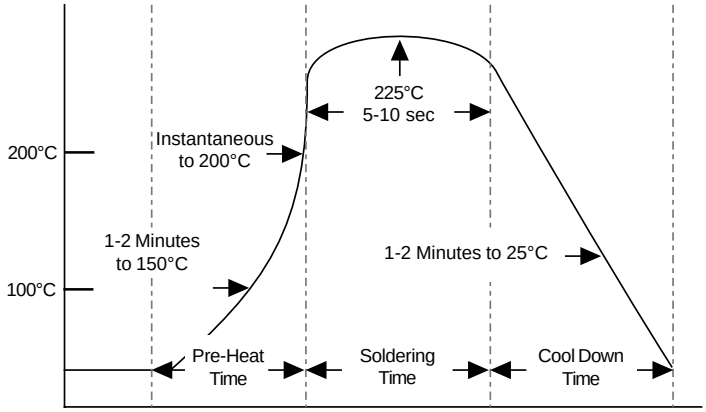
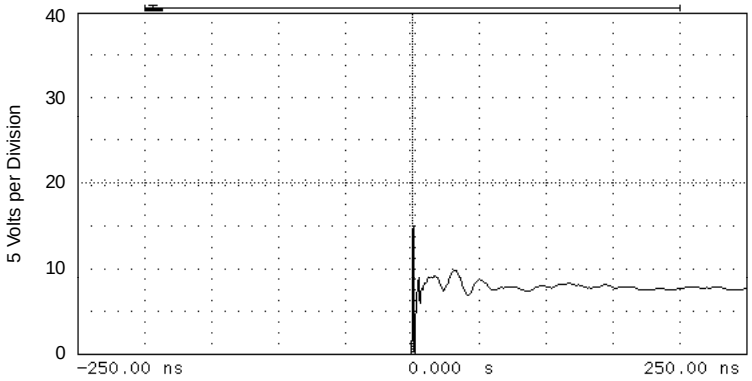


FIGURE 4
REFLOW SOLDER PROFILE



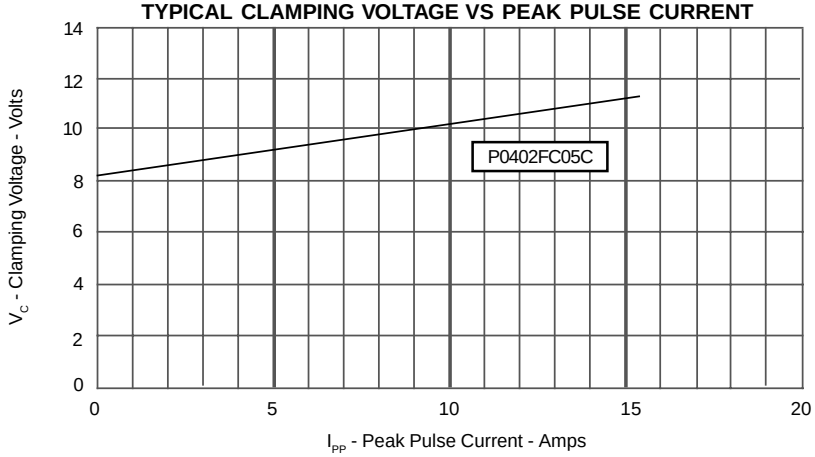
Note: This reflow profile does not take into account the printed circuit board (PCB) material heating time. Additional time may be required for the preheat time and cool down time upon the PCB or board material.

FIGURE 5
OVERSHOOT & CLAMPING VOLTAGE FOR P0402FC05C



ESD Test Pulse - 12 kilovolt, 1/30ns (waveshape)

FIGURE 6
TYPICAL CLAMPING VOLTAGE VS PEAK PULSE CURRENT



APPLICATION NOTE

The P0402FC Series are flip-chip components that provide board level EFT and ESD protection > 25 kilovolts with an additional surge capability of 250 Watts P_{PP} per line for an 8/20µs waveform.

BIDIRECTIONAL COMMON MODE CONFIGURATION (Figure 1)

The 0402FC Series provides single line, bidirectional protection in a common mode configuration as depicted in Figure 1.

CIRCUIT BOARD LAYOUT RECOMMENDATIONS

Circuit board layout is critical for Electromagnetic Compatibility (EMC) protection. The following guidelines are recommended:

- The protection device should be placed near the input terminals or connectors, the device will divert the transient current immediately before it can be coupled into the nearby traces.
- The path length between the TVS device and the protected line should be minimized.
- All conductive loops including power and ground loops should be minimized.
- The transient current return path to ground should be kept as short as possible to reduce parasitic inductance.
- Ground planes should be used whenever possible. For multilayer PCBs, use ground vias.

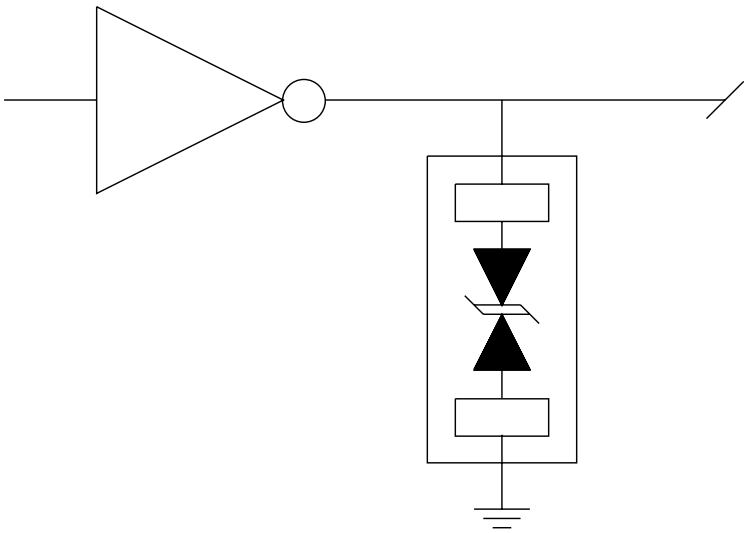
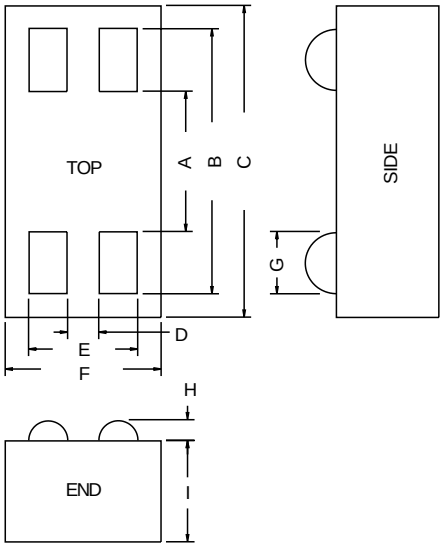


Figure 1 - Bidirectional Configuration Common-Mode I/O Port Protection

PACKAGE OUTLINE & DIMENSIONS

PACKAGE OUTLINE



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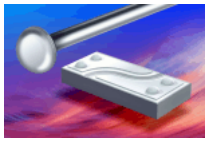
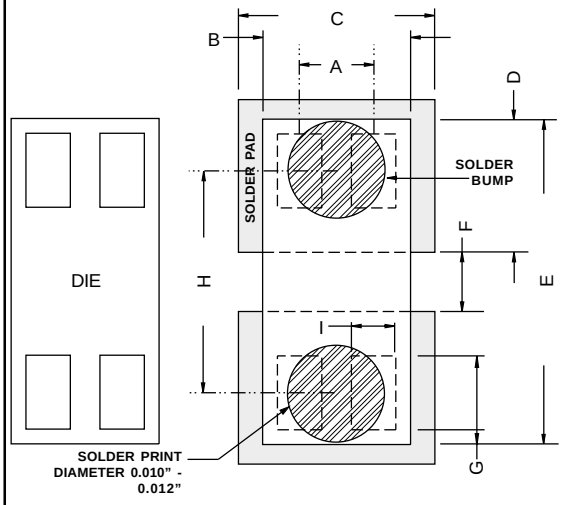


PACKAGE DIMENSIONS

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
	0.076 MIN	0.003 MIN
I	0.406 NOM	0.016 NOM

MOUNTING PAD

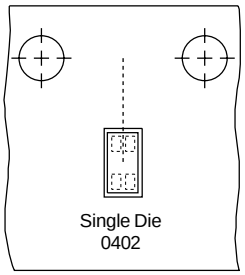


PAD DIMENSIONS		
DIM	Millimeters	Inches
A	0.23	0.009
B	0.48	0.019
C	0.69	0.027
D	0.46	0.018
E	0.99	0.039
F	0.20	0.008
G	0.20	0.008
H	0.66	0.026
I	0.13	0.005

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

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").

TAPE & REEL ORIENTATION



NOTE:
1. Top view of tape. Solder bumps are face down in tape package.

06001 Rev 2 - 2/02

TAPE & REEL PACKAGING:
Surface mount product is taped and reeled in accordance with EIA-481, reel quantites and sizes are as follows:
Paper Tape: 7 Inch Reel - 10,000 pieces per reel. Plastic Tape: 7 Inch Reel - 3,000 or 5,000 per reel.

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