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 8/20µs 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 = 8/20µs)
- 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
1. All devices are bidirectional. Electrical characteristics apply in both directions.
2. *Maximum leakage current < 5µA @ 2.8V. **Maximum leakage current < 500nA @ 3.3V.

TYPICAL DEVICE CHARACTERISTICS

FIGURE 1
PEAK PULSE POWER VS PULSE TIME

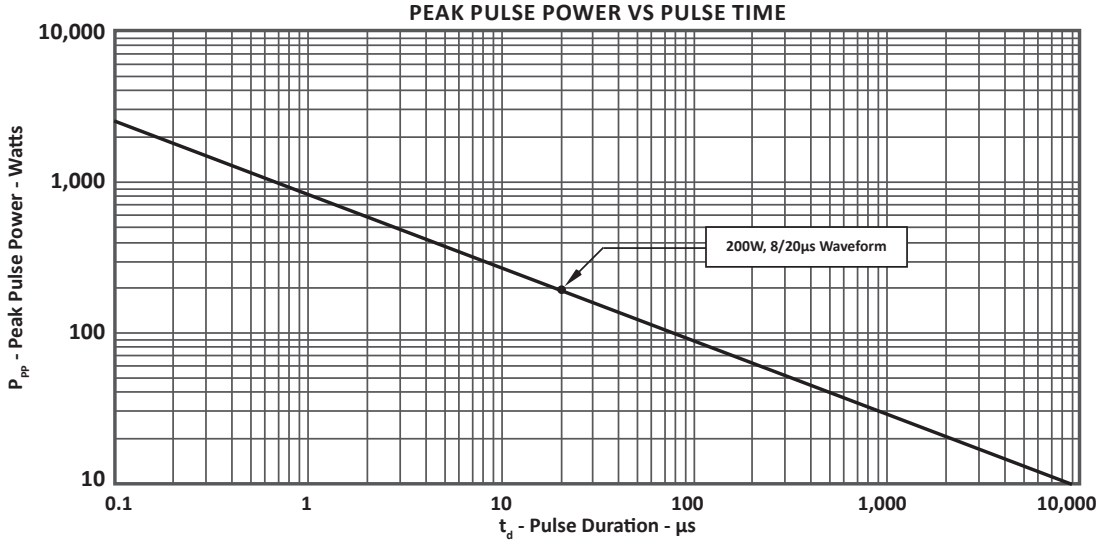


FIGURE 2
PULSE WAVE FORM

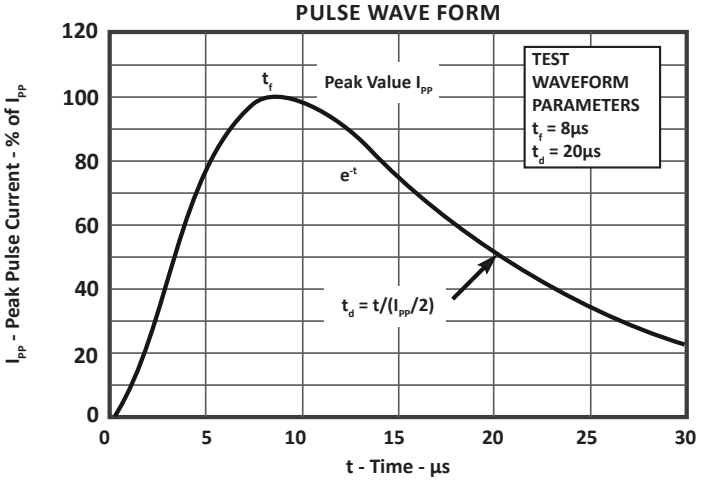
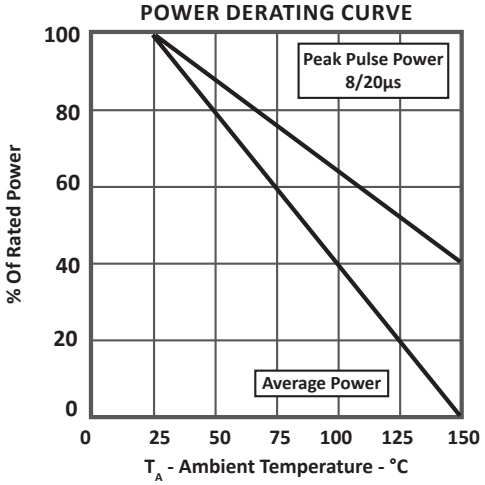
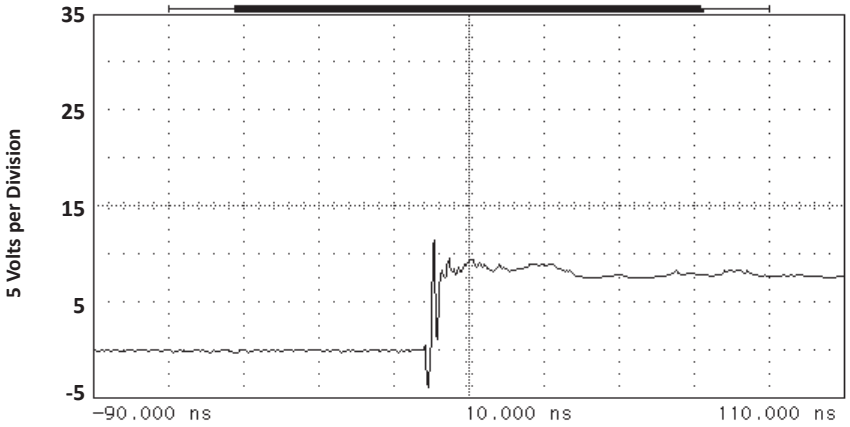


FIGURE 3
POWER DERATING CURVE



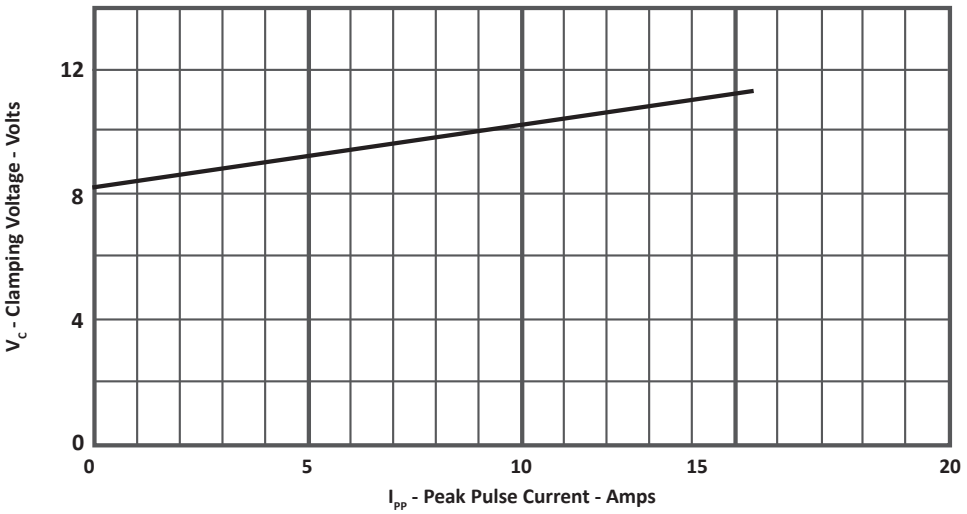
TYPICAL DEVICE CHARACTERISTICS

FIGURE 4
OVERSHOOT & CLAMPING VOLTAGE FOR ULC0402FC05C



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

FIGURE 5
TYPICAL CLAMPING VOLTAGE VS PEAK PULSE CURRENT ULC0402FC05C



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

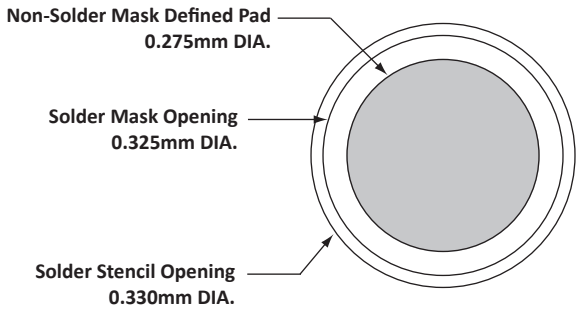
REQUIREMENTS

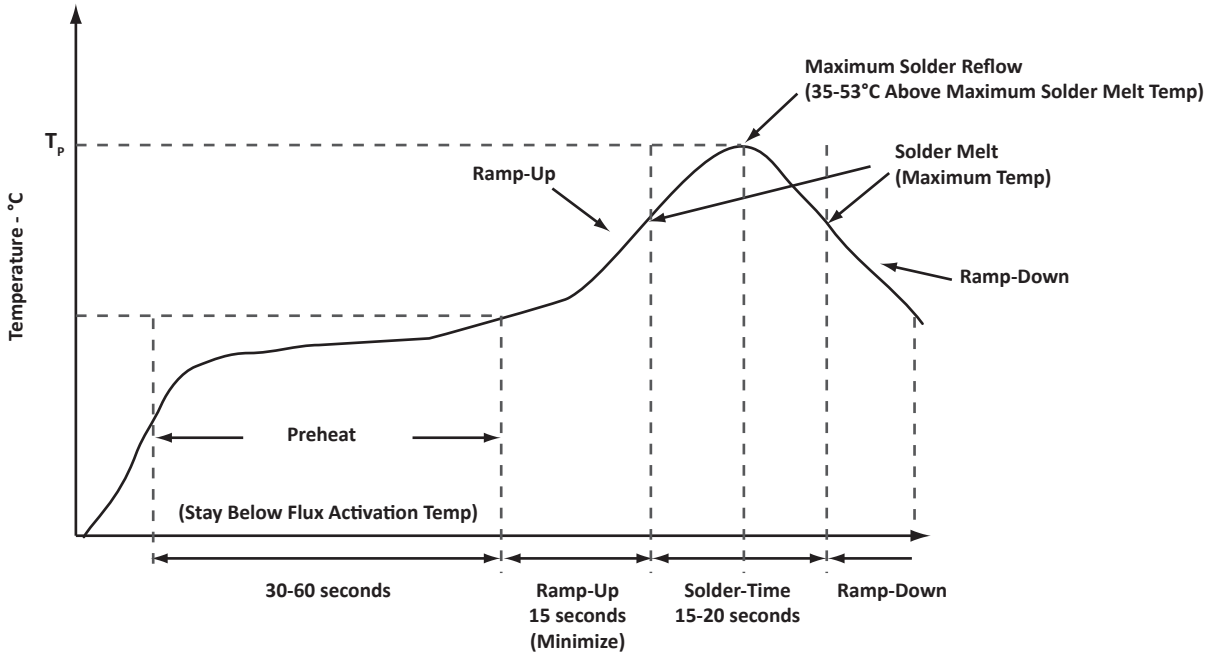
Temperature:

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

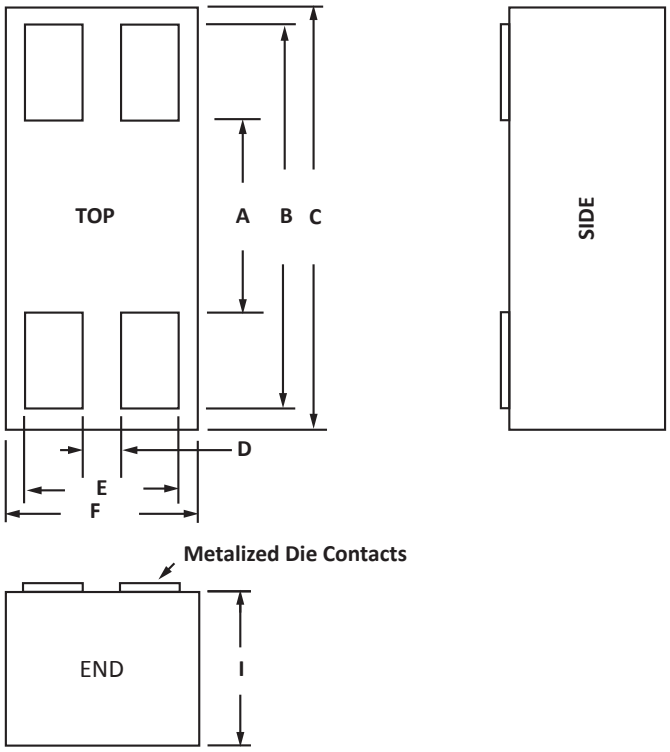




U0402 PACKAGE INFORMATION

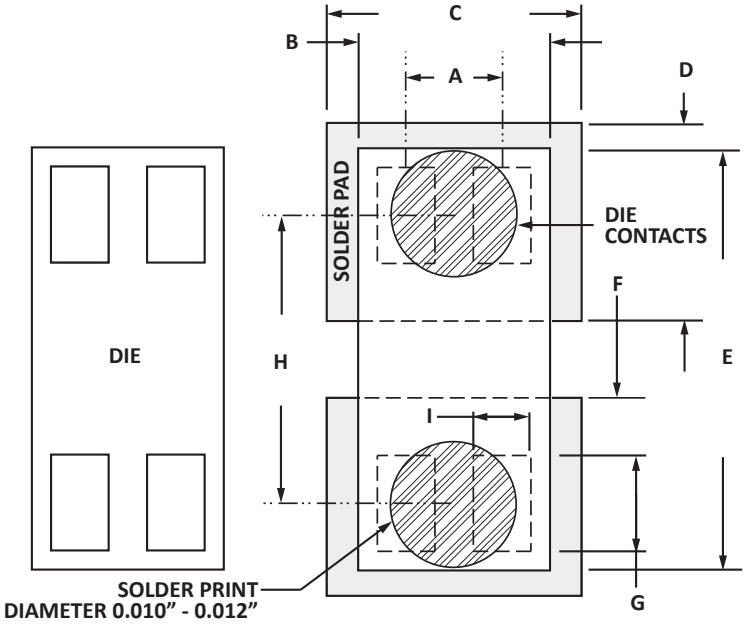
OUTLINE DIMENSIONS				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.61		0.024	
B	0.86		0.034	
C	0.98	1.02	0.038	0.040
D	0.10		0.004	
E	0.35		0.014	
F	0.458	0.508	0.018	0.020
I	0.406		0.016	

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

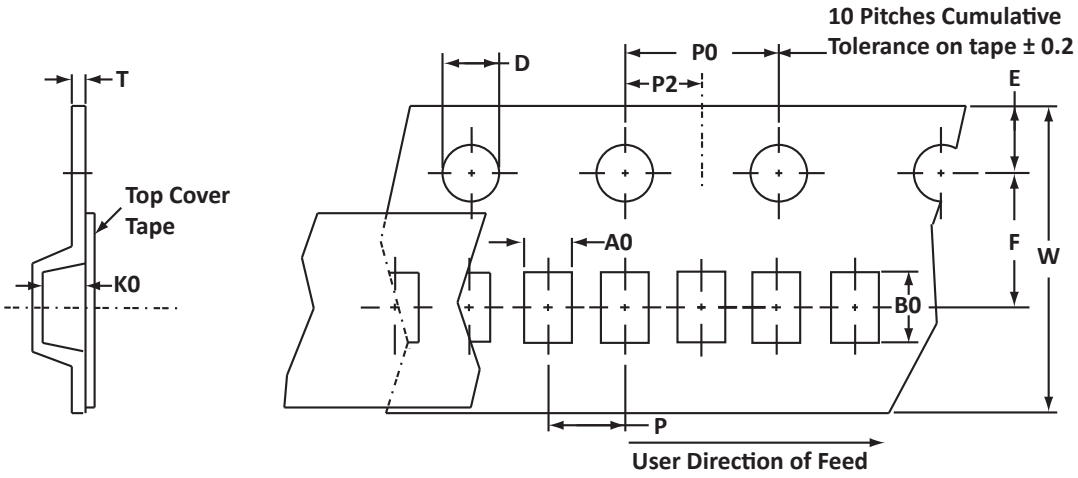


LAYOUT DIMENSIONS		
DIM	MILLIMETERS	INCHES
	NOMINAL	NOMINAL
A	0.23	0.009
B	0.48	0.019
C	0.69	0.027
D	0.46	0.018
E	0.99	0.039
F	0.20	0.008
G	0.20	0.008
H	0.66	0.026
I	0.13	0.005

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



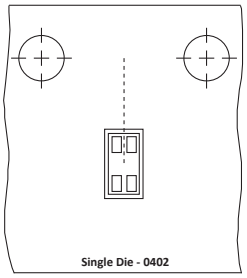
TAPE AND REEL INFORMATION



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
1. Dimensions in millimeters.
2. Top view of tape. Metal contacts 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 (pocket under hole skipped) pieces per reel.
6. 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	n/a	-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 25 years, ProTek Devices™ is a privately held semiconductor company. The company offers a product line of overvoltage protection and overcurrent protection components. These include transient voltage suppressor array (TVS arrays) avalanche breakdown diode, steering diode TVS array and electronics SMD chip fuses. These components deliver circuit protection in electronic systems from numerous overvoltage and overcurrent events. They include lightning; electrostatic discharge (ESD); nuclear electromagnetic pulses (NEMP); inductive switching; and electromagnetic interference (EMI) / radio frequency interference (RFI). ProTek Devices also offers LED wafer die for ESD protection and related high frequency products. ProTek Devices is ISO 9001:2015 certified.

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