

## APPLICATIONS

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

## IEC COMPATIBILITY (EN61000-4)

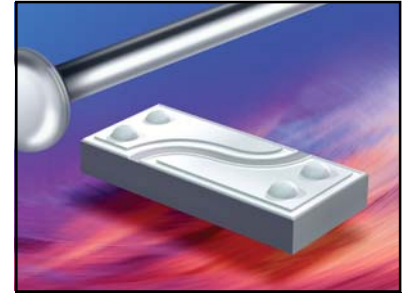
- ✓ 61000-4-2 (ESD): Air - 15kV, Contact - 8kV
- ✓ 61000-4-4 (EFT): 40A - 5/50ns

## 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 3 to 5 Lines
- ✓ RoHS Compliant

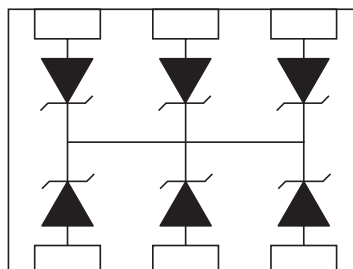
## MECHANICAL CHARACTERISTICS

- ✓ Standard EIA Chip Size: 0406
- ✓ 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)



**0402 CHIP SHOWN**

## PIN CONFIGURATION



# P0406FC3.3C\* thru P0406FC36C\*

## DEVICE CHARACTERISTICS

### MAXIMUM RATINGS @ 25°C Unless Otherwise Specified

PARAMETER	SYMBOL	VALUE	UNITS
Peak Pulse Power (tp = 8/20µs) - See Figure 1	P <sub>PP</sub>	250	Watts
Operating Temperature	T <sub>A</sub>	-55 to 150	°C
Storage Temperature	T <sub>STG</sub>	-55 to 150	°C

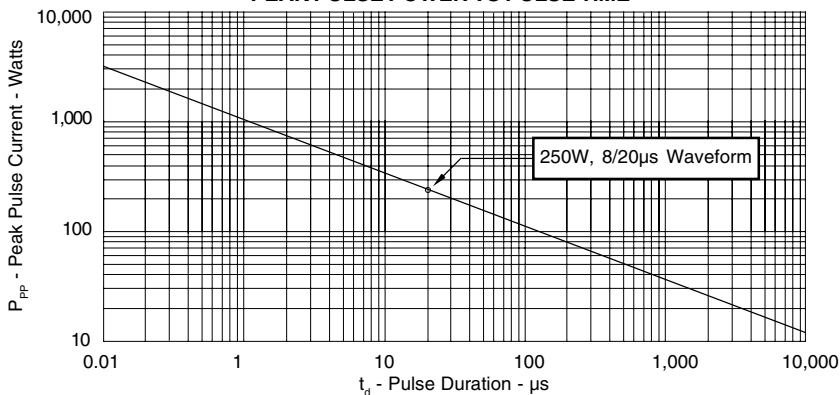
### ELECTRICAL CHARACTERISTICS PER LINE @ 25°C Unless Otherwise Specified

PART NUMBER (See Note 1)	RATED STAND-OFF VOLTAGE  V <sub>WM</sub> VOLTS	MINIMUM BREAKDOWN VOLTAGE  @ 1mA V <sub>(BR)</sub> VOLTS	MAXIMUM CLAMPING VOLTAGE (See Fig. 2)  @ I <sub>p</sub> = 1A V <sub>C</sub> VOLTS	MAXIMUM CLAMPING VOLTAGE (See Fig. 2)  @ 8/20µs V <sub>C</sub> @ I <sub>PP</sub>	MAXIMUM LEAKAGE CURRENT (See Note 2)  @ V <sub>WM</sub> I <sub>D</sub> µA	TYPICAL CAPACITANCE  @ 0V, 1 MHz C pF
P0406FC3.3C	3.3	4.0	7.0	12.5V @ 20A	75*	150
P0406FC05C	5.0	6.0	11.0	14.7V @ 17A	10**	100
P0406FC08C	8.0	8.5	13.2	19.2V @ 13A	10***	75
P0406FC12C	12.0	13.3	19.8	29.7V @ 9.0A	1	50
P0406FC15C	15.0	16.7	25.4	35.7V @ 7.0A	1	40
P0406FC24C	24.0	26.7	37.2	55.0V @ 5.0A	1	30
P0406FC36C	36.0	40.0	70.0	84.0V @ 3.0A	1	25

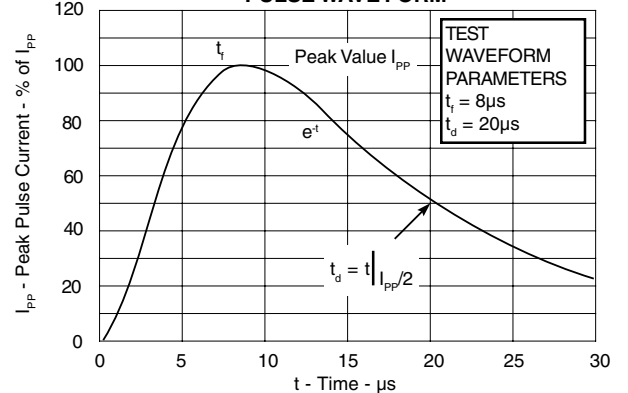
**Note 1:** All devices are bidirectional. Electrical characteristics apply in both directions.

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

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

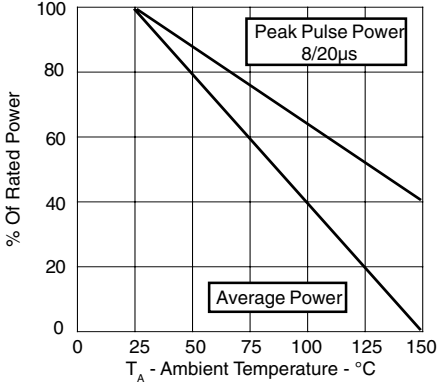


**FIGURE 2  
PULSE WAVE FORM**

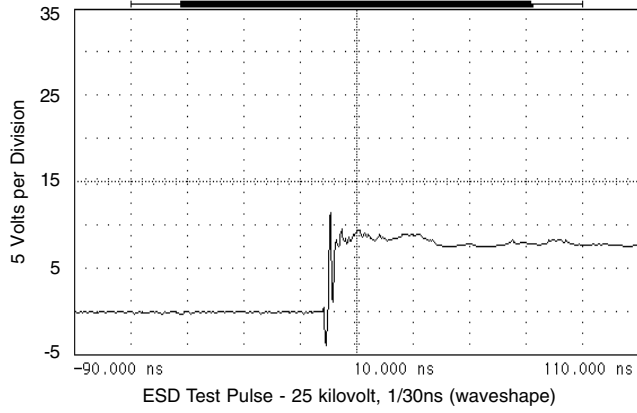


**GRAPHS**

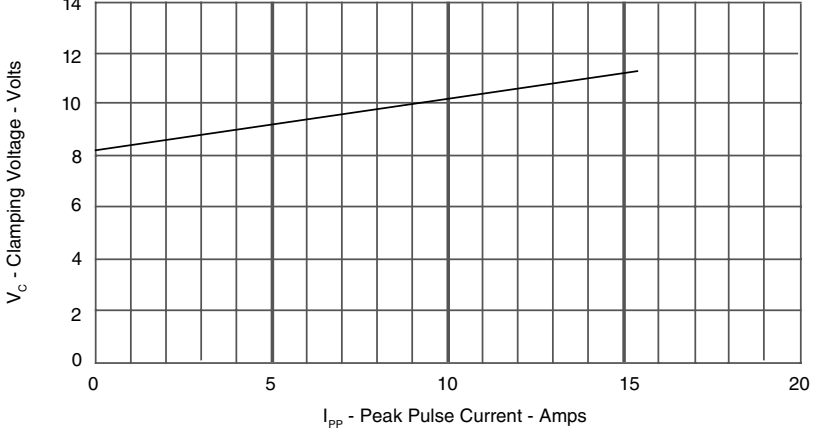
**FIGURE 3  
 POWER DERATING CURVE**



**FIGURE 4  
 OVERSHOOT & CLAMPING VOLTAGE FOR P0406FC05C**



**FIGURE 5  
 TYPICAL CLAMPING VOLTAGE VS PEAK PULSE CURRENT FOR P0406FC05C**

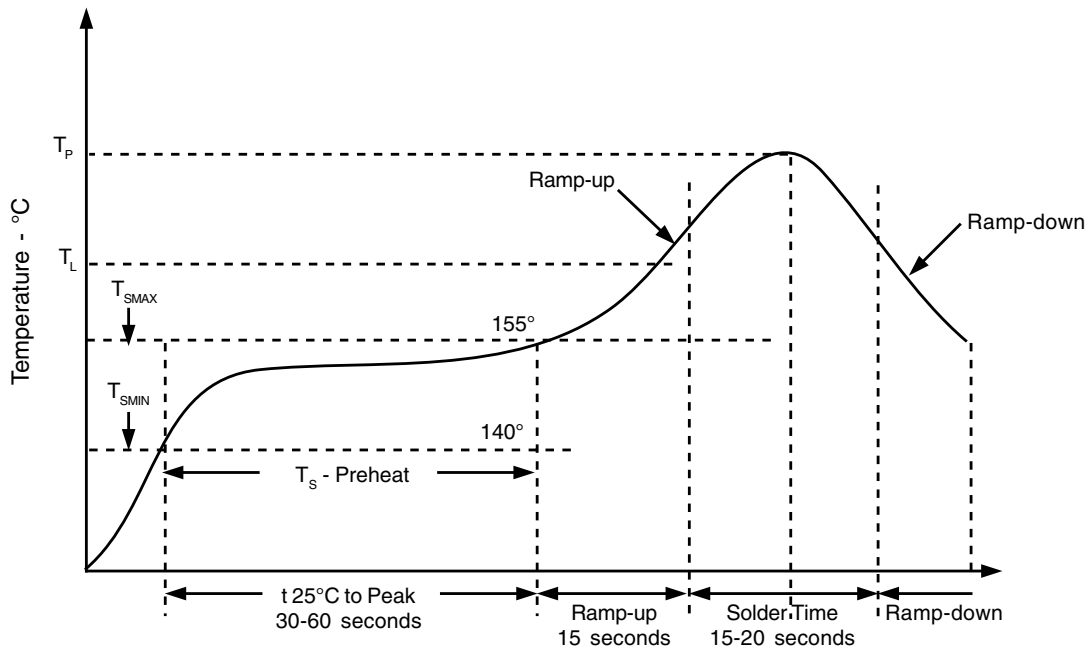
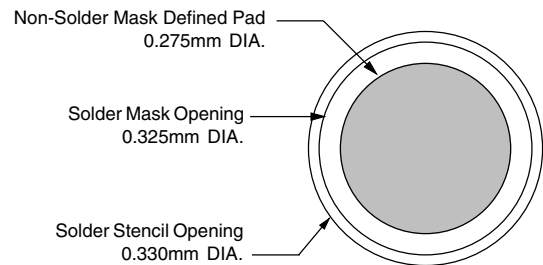


**APPLICATION INFORMATION**

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

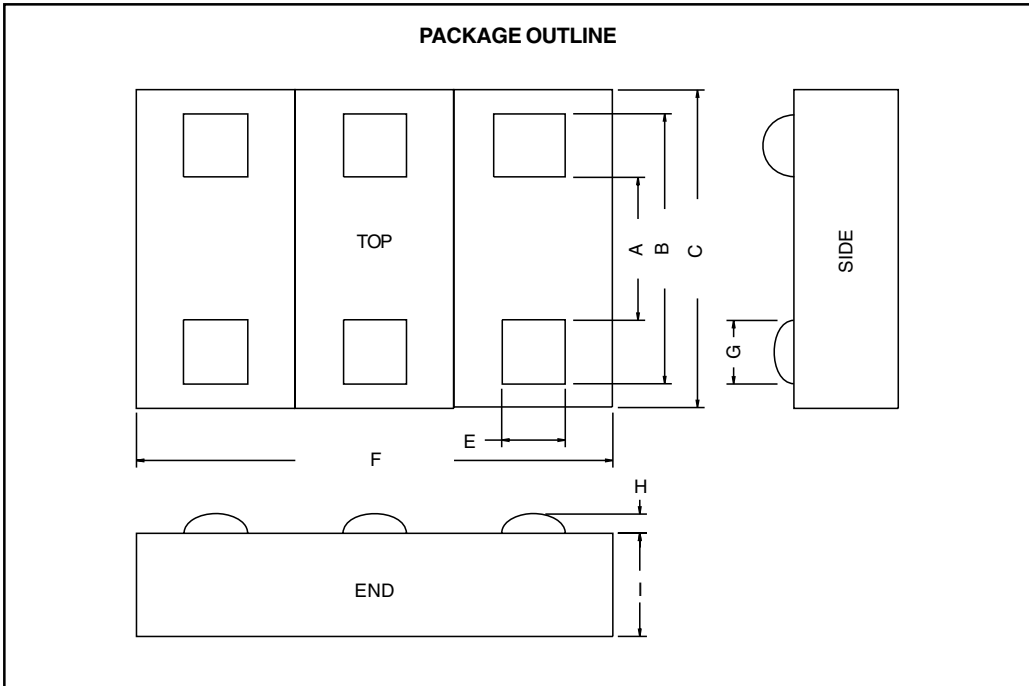
REQUIREMENTS
Temperature: $T_p$ for Lead-Free (SnAgCu): 260-270°C $T_p$ for Tin-Lead: 240-245°C Preheat time and temperature depends on solder paste and flux activation temperature, component size, weight, surface area & plating.

**RECOMMENDED NON-SOLDER MASK DEFINED PAD ILLUSTRATION**



# P0406FC3.3C\* thru P0406FC36C\*

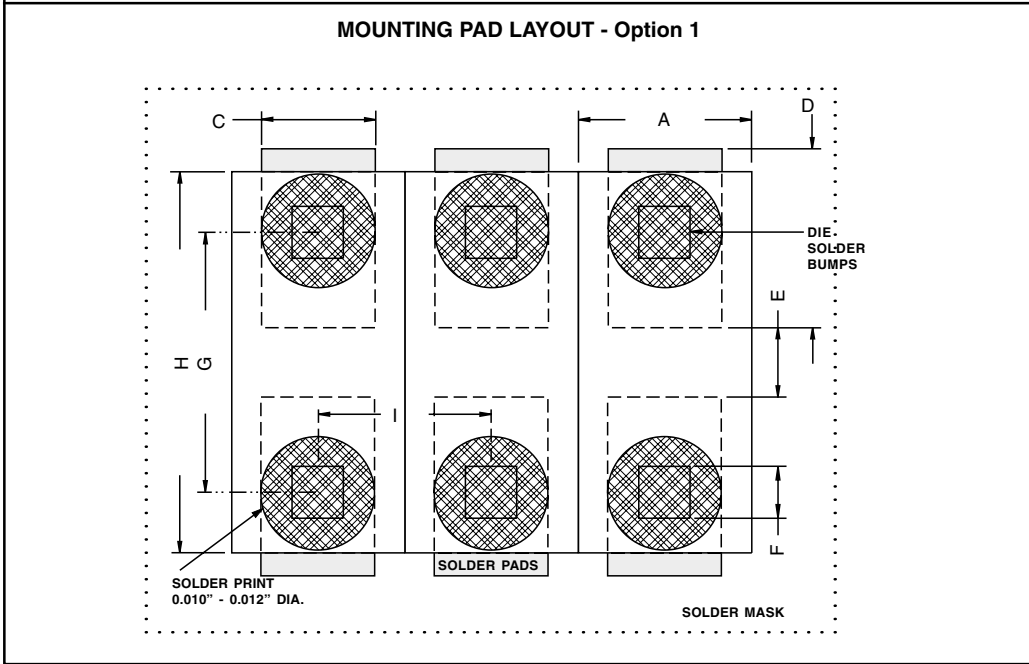
## 0406 PACKAGE OUTLINE & DIMENSIONS



PACKAGE DIMENSIONS		
DIM	MILLIMETERS	INCHES
A	0.56 NOM	0.022 NOM
B	0.86 NOM	0.034 NOM
C	$0.99 \pm 0.0254$	$0.039 \pm 0.001$
E	0.15 SQ	0.006 SQ
F	$1.5 \pm 0.0254$	$0.059 \pm 0.001$
G	0.15 NOM	0.006 NOM
H	0.127 MAX	0.005 MAX
	0.076 MIN	0.003 MIN
I	0.406 NOM	0.016 NOM

**NOTES:**

- Controlling dimensions in inches.
- Decimal tolerances for mounting pad and outline: .xxx ± 0.05mm (± 0.002").



PAD DIMENSIONS		
DIM	MILLIMETERS	INCHES
A	0.51	0.020
C	0.30	0.012
D	0.46	0.018
E	0.20	0.008
F	0.15 SQ	0.006 SQ
G	0.71	0.028
H	0.99	0.039
I	0.51	0.020

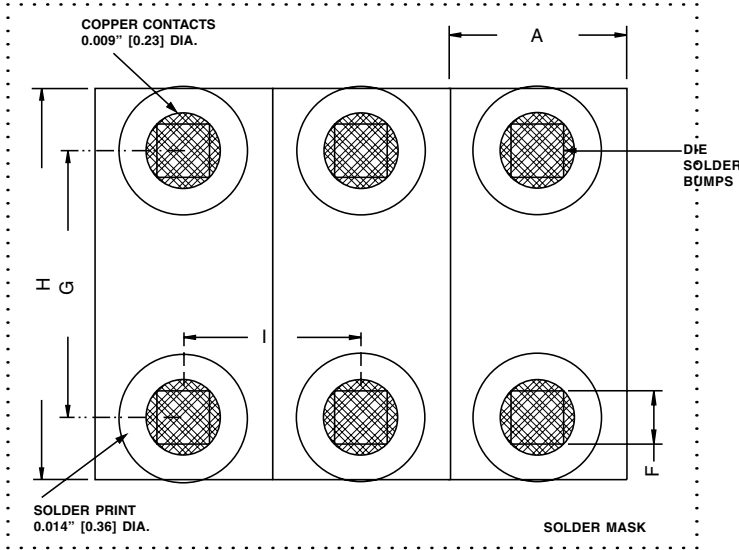
**NOTE:**

- Preferred:* Using 0.1mm (0.004") stencil.

# P0406FC3.3C\* thru P0406FC36C\*

## 0406 PACKAGE OUTLINE & DIMENSIONS

### MOUNTING PAD LAYOUT - Option 2



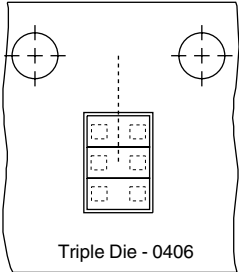
### PACKAGE DIMENSIONS

DIM	MILLIMETERS	INCHES
A	0.51	0.020
F	0.15 SQ	0.006 SQ
G	0.71	0.028
H	0.99	0.039
I	0.51	0.020

### NOTES:

1. Controlling dimensions in inches.
2. Decimal tolerances for mounting pad and outline: .xxx ± 0.05mm (± 0.002").
3. Preferred: Using 0.1mm (0.004") stencil.

### TAPE & REEL ORIENTATION



### NOTE:

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

### TAPE & REEL ORDERING NOMENCLATURE

1. Surface mount product is taped and reeled in accordance with EIA 481.
2. 8mm Plastic Tape: 7 Inch Reels - 5,000 pieces per reel. Ordering Suffix: -T75-1, i.e., P0406FC05C-T75-1.
3. 8mm Paper Tape: 7 Inch Reels - 5,000 pieces per reel. Ordering Suffix: -T75-2, i.e., P0406FC05C-T75-2.
4. Suffix - LF = Lead-Free, i.e., P0406FC05C-LF-T75-1.

Outline & Dimensions: Rev 3 - 11/02, 06023

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