05153

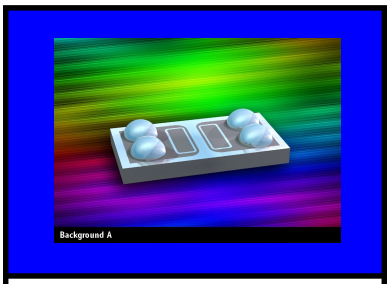
PROTEK DEVICES
. . . engineered solutions for the transient environment™

# LC0408FC3.3C thru LC0408FC24C

## BIDIRECTIONAL LOW CAPACITANCE FLIP CHIP

## APPLICATIONS

✔ Cellular Phones
✔ Handheld Electronics
✔ Personal Digital Assistants (PDAs)
✔ Notebook Computers
✔ SMART Cards




0408
(Single Chip Shown)

## IEC COMPATIBILITY (EN61000-4)

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

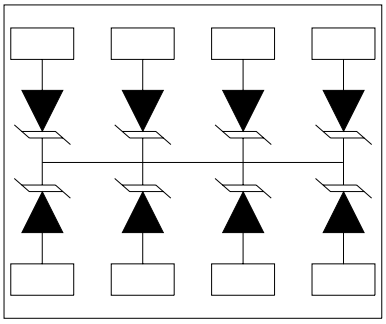
## FEATURES

✔ ESD Protection > 25 kilovolts
✔ Available in Six Voltage Types Ranging From 3.3V to 24V
✔ 200 Watts Peak Pulse Power Dissipation per Line (8/20µs)
✔ Low Clamping Voltage
✔ ***LOW CAPACITANCE***
✔ ***LOW STANDBY CURRENT***

## MECHANICAL CHARACTERISTICS

✔ Standard EIA Chip Size: 0408
✔ 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

| MAXIMUN RATINGS @ 25°C Unless Otherwise Specified | | | |
|---|---|---|---|
| PARAMETER | SYMBOL | VALUE | UNITS |
| Peak Pulse Power ($t_p$ = 8/20µs) - See Figure 1 | $P_{PP}$ | 200 | 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) | 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 |
| LC0408FC3.3C | 3.3 | 4.0 | 7.0 | 12.5V @ 16A | 75 | 70 |
| LC0408FC05C | 5.9 | 6.0 | 11.0 | 13V @ 15A | 10 | 35 |
| LC0408FC08C | 8.0 | 8.0 | 13.2 | 18V @ 11A | 1 | 32 |
| LC0408FC12C | 12.0 | 13.3 | 19.8 | 26.9V @ 7.4A | 1 | 30 |
| LC0408FC15C | 15.0 | 16.7 | 25.4 | 34.5V @ 5.8A | 1 | 25 |
| LC0408FC24C | 24.0 | 26.7 | 37.2 | 50.6V @ 4A | 1 | 20 |

**Note 1:** All devices are bidirectional. Electrical characteristics apply in both directions. Electrical characteristics for the 3V, 8V, 12V, 15V and 24V devices are preliminary.

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

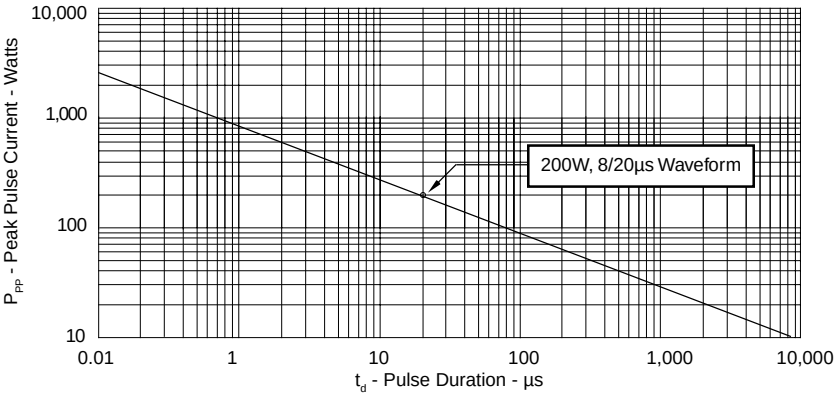
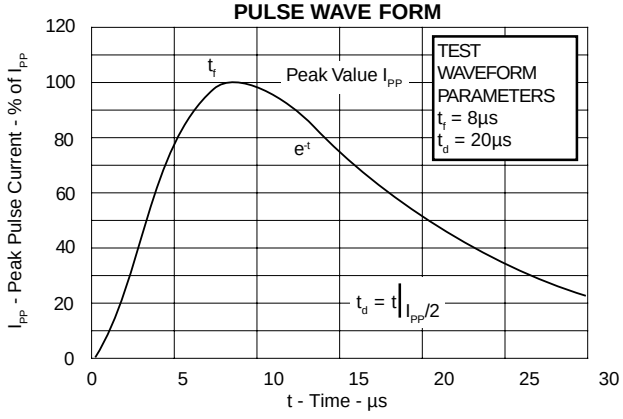



**FIGURE 2**
**PULSE WAVE FORM**



## GRAPHS

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

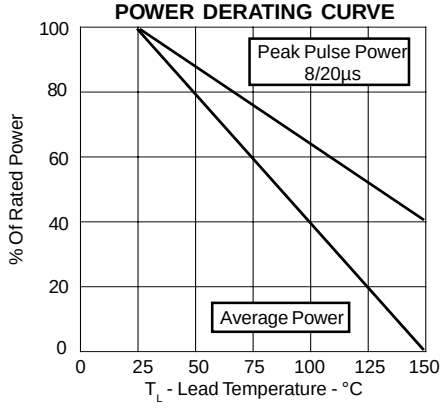
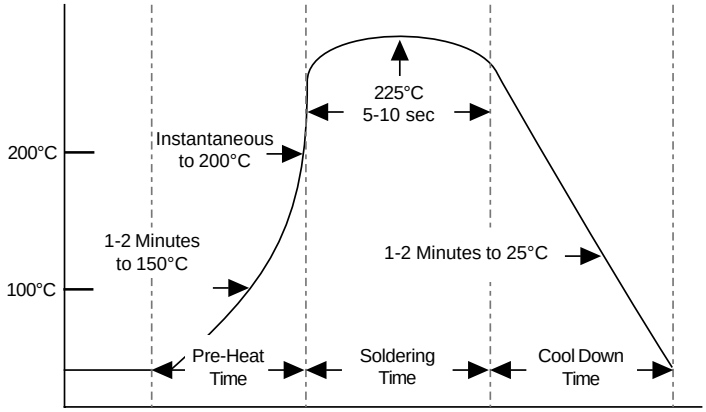
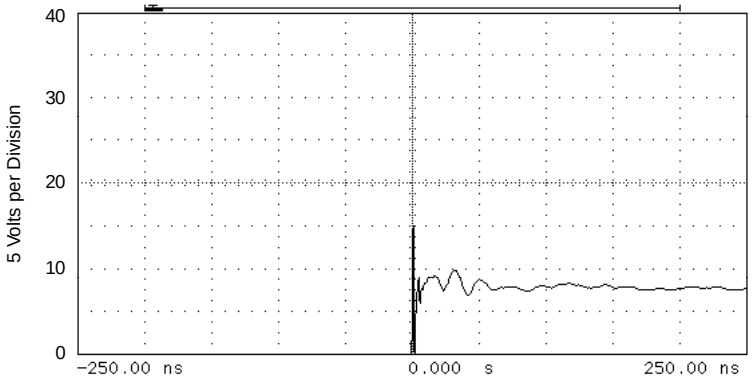



**FIGURE 4**
**REFLOW SOLDER PROFILE**



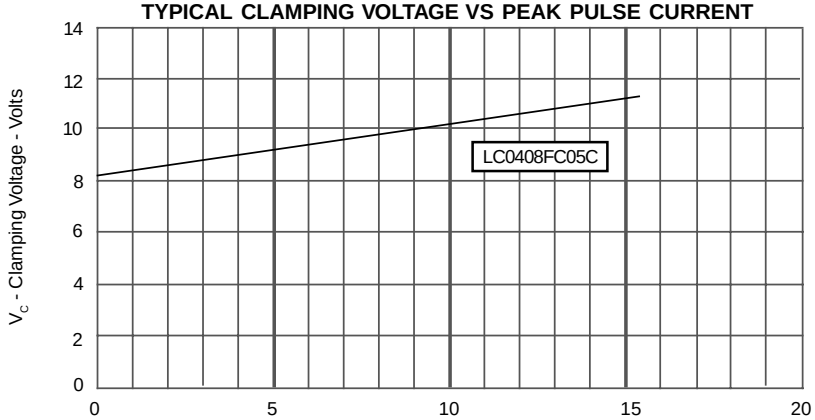

**Note:** This reflow profile does not take into account the printed circuit board (PCB) material heating time. Additional time may be required for the preheat time and cool down time upon the PCB or board material.

**FIGURE 5**
**OVERSHOOT & CLAMPING VOLTAGE FOR LC0408FC05C**



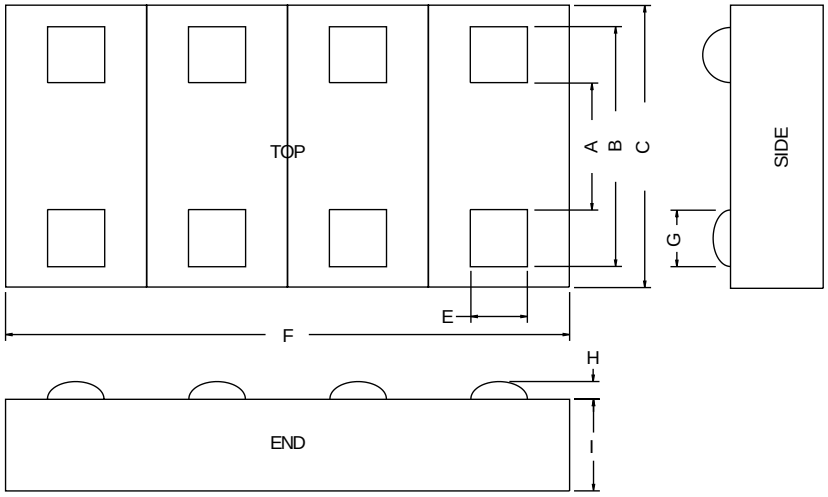

ESD Test Pulse - 12 kilovolt, 1/30ns (waveshape)

**FIGURE 6**
**TYPICAL CLAMPING VOLTAGE VS PEAK PULSE CURRENT**



# PACKAGE OUTLINE & DIMENSIONS

## PACKAGE OUTLINE



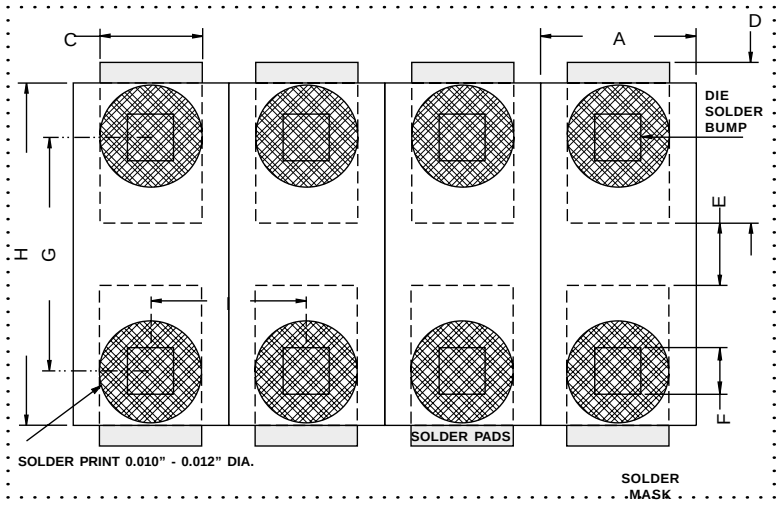

## 0408

Picture Not Available

## PACKAGE DIMENSIONS

| DIM | MILLIMETERS | INCHES |
|---|---|---|
| A | 0.56 NOM | 0.022 NOM |
| B | 0.86 NOM | 0.034 NOM |
| C | 0.99 ± 0.0254 | 0.039 ± 0.001 |
| E | 0.15 SQ | 0.006 SQ |
| F | 2.0 ± 0.0254 | 0.079 ± 0.001 |
| G | 0.15 NOM | 0.006 NOM |
| H | 0.127 MAX | 0.005 MAX |
| | 0.076 MIN | 0.003 MIN |
| I | 0.42 NOM | 0.0165 NOM |

## MOUNTING PAD - Option 1

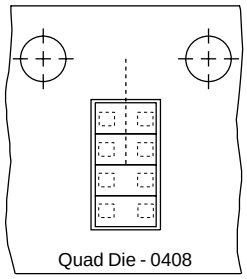



| PAD DIMENSIONS | | |
|---|---|---|
| DIM | Millimeters | Inches |
| A | 0.51 | 0.020 |
| C | 0.30 | 0.012 |
| D | 0.46 | 0.018 |
| E | 0.20 | 0.008 |
| F | 0.15 SQ | 0.006 SQ |
| G | 0.71 | 0.028 |
| H | 0.99 | 0.039 |
| I | 0.5 | 0.02 |

**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").

## TAPE & REEL ORIENTATION



Quad Die - 0408

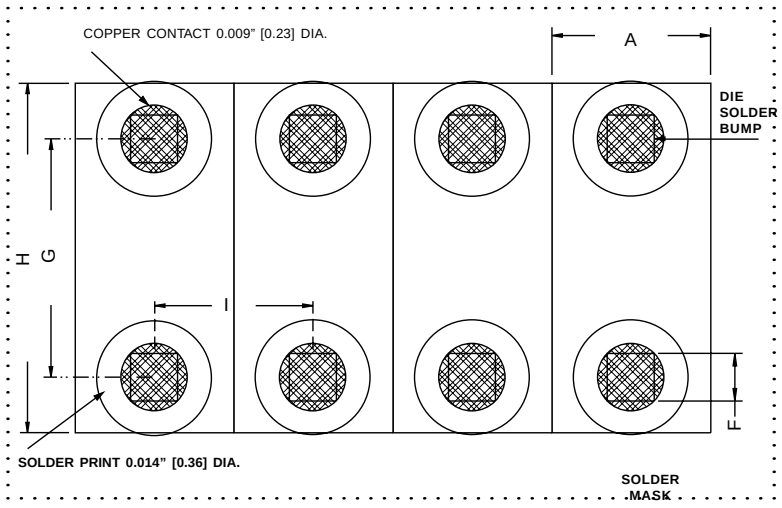
**NOTE:**
1. Top view of tape. Solder bumps are face down in tape package.

**06021 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 - 3,000 or 10,000 pieces per reel. Plastic Tape: 7 Inch Reel - 3,000 or 5,000 per reel.*

# PACKAGE OUTLINE & DIMENSIONS

## MOUNTING PAD LAYOUT - Option 2




**PAD 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").
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