PROTEK DEVICES
Only One Name Means ProTek'Tion™

# PKFC3.3C* thru PKFC36C*

## PACKAGED FLIP CHIP ARRAY

## 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

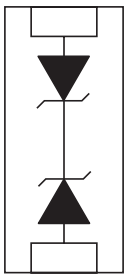
## FEATURES

✔ ***CHIP SCALE PACKAGE 0.050" (1.270mm) x 0.030" (0.762mm)***
✔ ESD Protection > 25 kilovolts
✔ Available in Multiple Voltage Types Ranging From 3.3V to 36V
✔ 250 Watts Peak Pulse Power per Line (tp = 8/20µs)
✔ Bidirectional Configuration & Monolithic Structure
✔ Protects 1 Line
✔ RoHS Compliant in Lead-Free Versions

## MECHANICAL CHARACTERISTICS

✔ Encapsulated 0502 Chip
✔ Weight 0.73 milligrams (Approximate)
✔ Available in Tin-Lead or Lead-Free Pure-Tin Plating(Annealed)
✔ Solder Reflow Temperature:
  Tin-Lead - Sn/Pb, 85/15: 240-245°C
  Pure-Tin - Sn, 100: 260-270°C
✔ Flammability Rating UL 94V-0
✔ 8mm Plastic & Paper Tape and Reel Per EIA Standard 481
✔ Device Marking On Reel

## PIN CONFIGURATION



## 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) | 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 (See Note 2) @$V_{WM}$ $I_D$ µA | TYPICAL CAPACITANCE @0V, 1 MHz C pF |
|---|---|---|---|---|---|---|
| PKFC3.3C | 3.3 | 4.0 | 7.0 | 12.5V @ 20A | 75* | 150 |
| PKFC05C | 5.0 | 6.0 | 9.8 | 14.7V @ 17A | 10** | 100 |
| PKFC08C | 8.0 | 8.5 | 13.4 | 19.2V @ 13A | 10*** | 75 |
| PKFC12C | 12.0 | 13.3 | 19.0 | 29.7V @ 9.0A | 1 | 50 |
| PKFC15C | 15.0 | 16.7 | 24.0 | 35.7V @ 7.0A | 1 | 40 |
| PKFC24C | 24.0 | 26.7 | 43.0 | 55.0V @ 5.0A | 1 | 30 |
| PKFC36C | 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:** *Typical leakage current < 5µA @ 2.8V. **Typical leakage current <500nA @ 3.3V. ***Typical leakage current <200nA @ 5V.

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

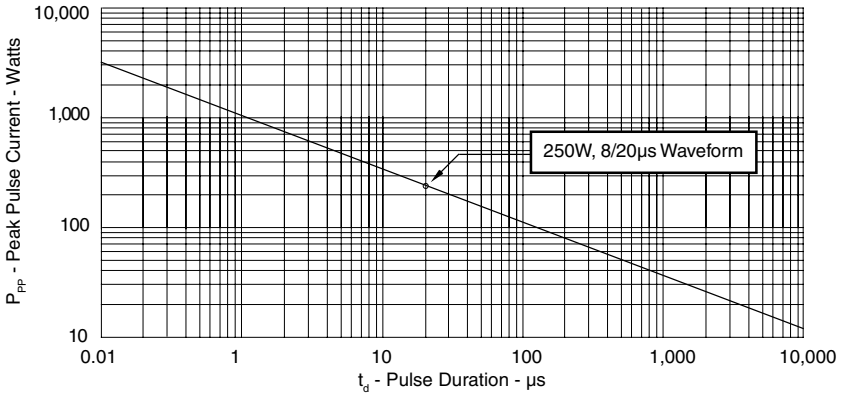
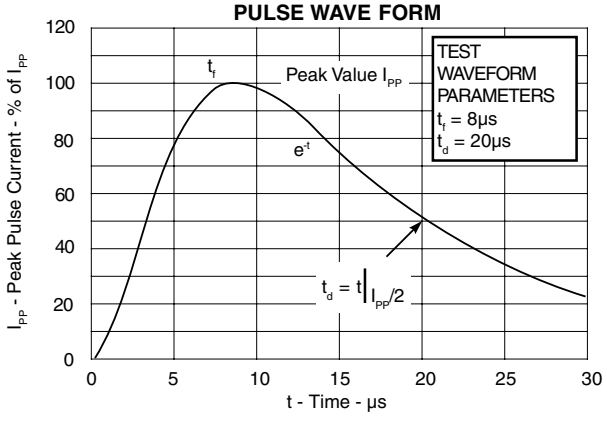



**FIGURE 2**
**PULSE WAVE FORM**





*PATENT PENDING

## GRAPHS

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

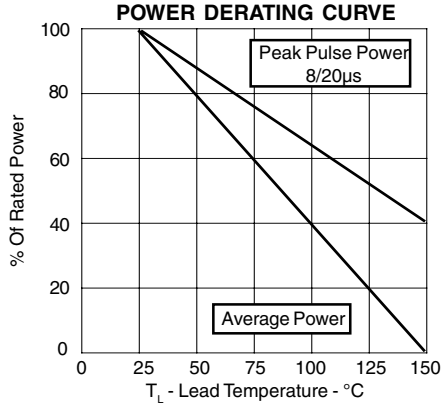



**FIGURE 4**
**OVERSHOOT & CLAMPING VOLTAGE FOR PKFC05C**

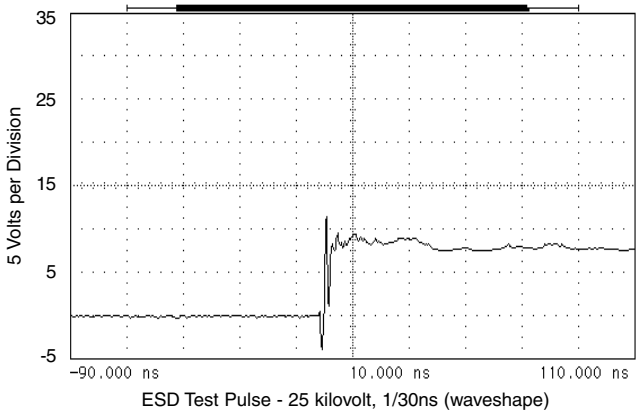
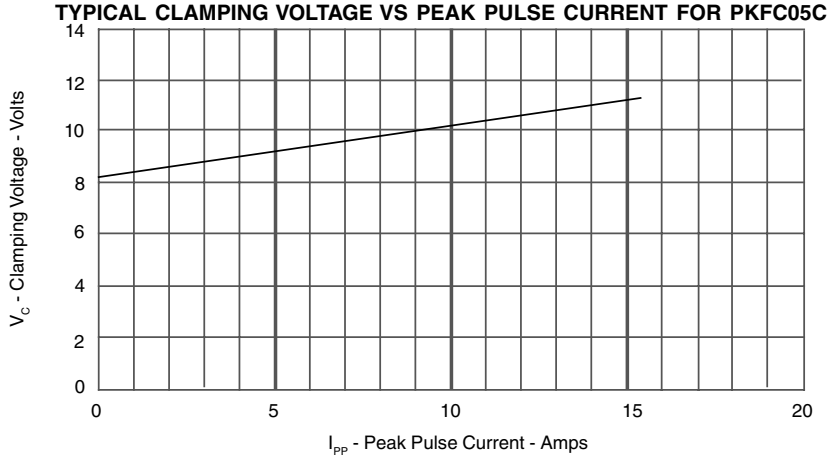



**FIGURE 5**
**TYPICAL CLAMPING VOLTAGE VS PEAK PULSE CURRENT FOR PKFC05C**



# 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

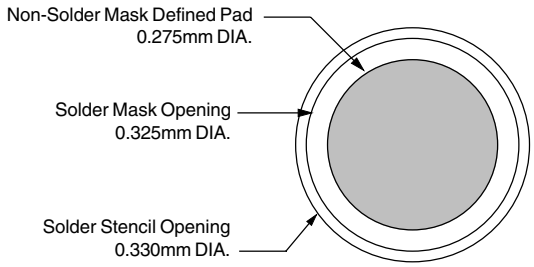
**Temperature:**

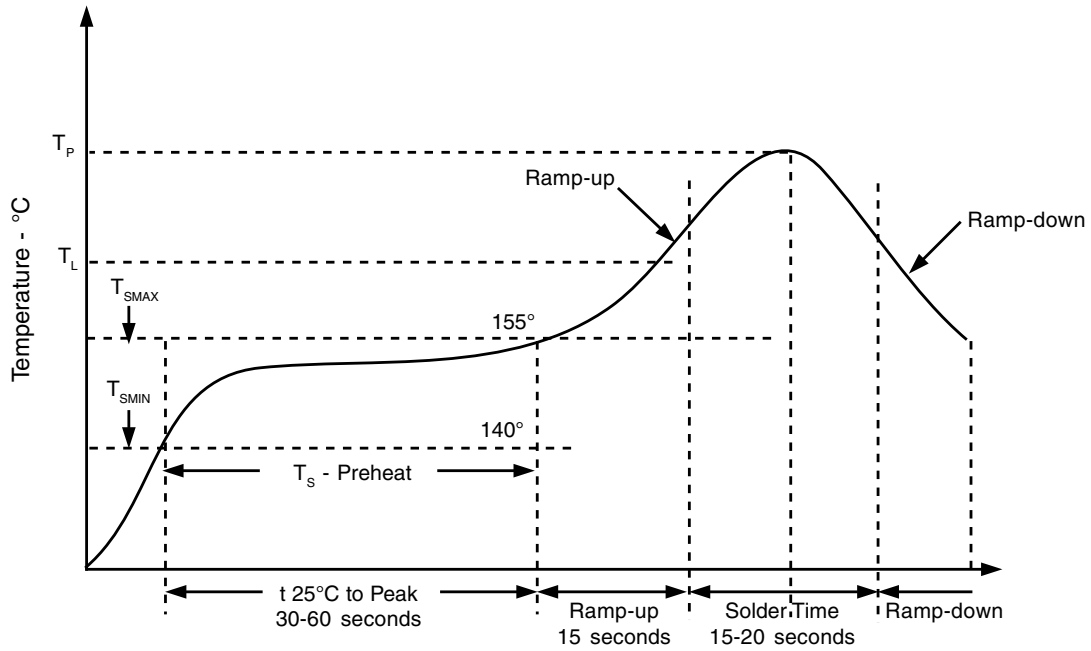
$T_P$ for Lead-Free (SnAgCu): 260-265°C

$T_P$ for Tin-Lead: 240-245°C

Preheat time and temperature depends on solder paste and flux activation temperature, component size, weight, surface area & plating.

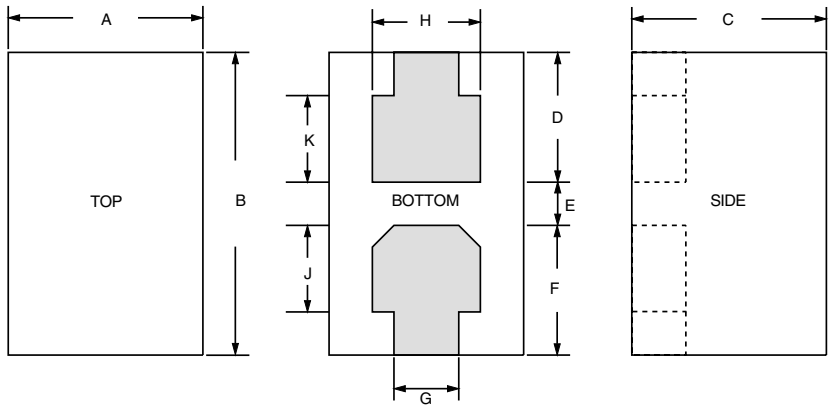
**RECOMMENDED NON-SOLDER MASK DEFINED PAD ILLUSTRATION**



# PACKAGE OUTLINE & DIMENSIONS

## PACKAGE OUTLINE



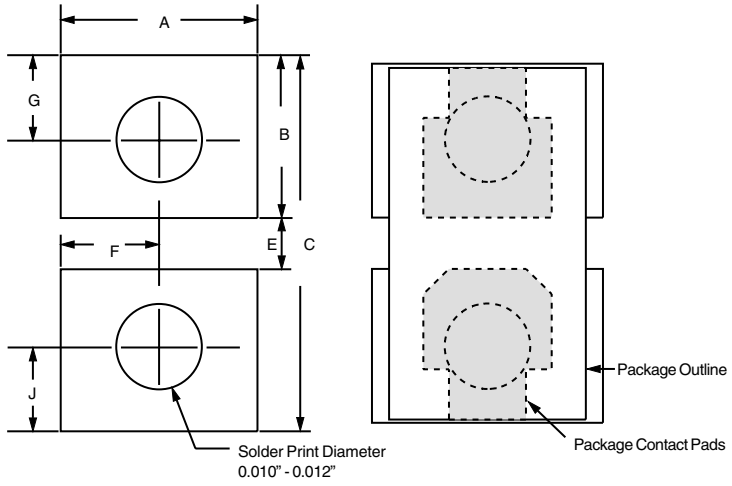

## PACKAGE DIMENSIONS

| DIM | MILLIMETERS | INCHES |
|---|---|---|
| A | 0.838 | 0.033 |
| B | 1.245 | 0.049 |
| C | 0.762 | 0.030 |
| D | 0.533 | 0.021 |
| E | 0.228 | 0.009 |
| F | 0.533 | 0.021 |
| G | 0.305 | 0.012 |
| H | 0.432 | 0.017 |
| J | 0.432 | 0.017 |
| K | 0.355 | 0.014 |

**NOTES**

1. Controlling dimensions in inches.
2. Decimal tolerances for mounting pad : ± 0.003" (± 0.08mm).
3. Maximum size: 0.052" (1.321mm) by 0.036" (0.914mm).
4. All dimensions ±0.003" on package outline.

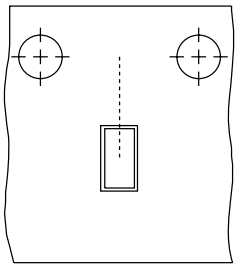
## MOUNTING PAD




## PAD DIMENSIONS

| DIM | MILLIMETERS | INCHES |
|---|---|---|
| A | 1.016 | 0.040 |
| B | 0.635 | 0.025 |
| C | 1.473 | 0.058 |
| E | 0.203 | 0.008 |
| F | 0.508 | 0.020 |
| G | 0.343 | 0.0135 |
| J | 0.343 | 0.0135 |

## TAPE & REEL ORIENTATION



**NOTE**

1. Top view of tape. Solder PADS 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., PKFC05C-T75-1).
3. *8mm Paper Tape:* 7 Inch Reels - 5,000 pieces per reel. Ordering Suffix: -T75-2 (i.e., PKFC05C-T75-2).
4. Suffix - LF = Lead-Free, Pure-Tin Plating, i.e., *PKFC05C-LF-T75-2.*

**Outline & Dimensions: Rev 1 - 8/03, 06040**

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