



THE DATASHEET OF MPLAD15KP120CA





Surface Mount 15,000 Watt Transient Voltage Suppressor

High-Reliability
screening available in
reference to
MIL-PRF-19500

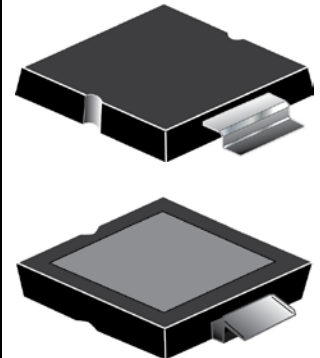
DESCRIPTION

These high power 15 kW rated transient voltage suppressors in a surface mount package are provided with design features to minimize thermal resistance and cumulative heating. Typical applications include lightning and automotive load dump protection. They are particularly effective at meeting the multi-stroke lightning standard RTCA DO-160, section 22 for aircraft design. This efficient low profile package design is offered in standoff voltage selections (V_{WM}) of 7 volts to 200 volts in either unidirectional or bidirectional construction.

Important: For the latest information, visit our website <http://www.microsemi.com>.

FEATURES

- Available in both unidirectional and bidirectional construction (bidirectional with CA suffix)
- High reliability with wafer fabrication and assembly lot traceability
- All parts surge tested
- Low profile surface mount package
- Optional upscreening is available with various screening and conformance inspection options based on MIL-PRF-19500. Refer to [Hirel Non-Hermetic Product Portfolio](#) for more details on the screening options.
- Suppresses transients up to 15,000 W @ 10/1000 μ s (see [Figure 1](#))
- Moisture classification is Level 1 with no dry pack required per IPC/JEDEC J-STD-020B
- RoHS compliant versions are available
- 3 σ lot norm screening performed on standby current (I_D)




PLAD
(The cathode is the metal base under the body of this device.)

Also available:

PLAD30KP

(30,000 watts)

 [MPLAD30KP14A thru MPLAD30KP400CA](#)

APPLICATIONS / BENEFITS

- Protection from switching transients and induced RFI
- Protection from ESD, and EFT per IEC 61000-4-2 and IEC 61000-4-4
- Secondary lightning protection per IEC 61000-4-5 with 42 ohms source impedance:
Class 1,2,3,4,5: MPLAD15KP7.0A to 200CA
- Secondary lightning protection per IEC 61000-4-5 with 12 ohms source impedance:
Class 1,2,3,4: MPLAD15KP7.0A to 200CA
- Secondary lightning protection per IEC 61000-4-5 with 2 ohms source impedance:
Class 2,3: MPLAD15KP7.0A to 200CA
Class 4: MPLAD15KP5.0 to 54CA
- Pin injection protection per RTCA/DO-160F for Waveform 4 (6.4/69 μ s at 25 °C)*:
Level 4: MPLAD15KP7.0A to 200CA
Level 5: MPLAD15KP7.0A to 100CA
- Pin injection protection per RTCA/DO-160F for Waveform 5A (40/120 μ s at 25 °C)*:
Level 4: MPLAD15KP7.0A to 28CA

*See [MicroNote 132](#) for further temperature derating selection.

MSC – Lawrence

6 Lake Street,
Lawrence, MA 01841
Tel: 1-800-446-1158 or
(978) 620-2600
Fax: (978) 689-0803

MSC – Ireland

Gort Road Business Park,
Ennis, Co. Clare, Ireland
Tel: +353 (0) 65 6840044
Fax: +353 (0) 65 6822298

Website:

www.microsemi.com

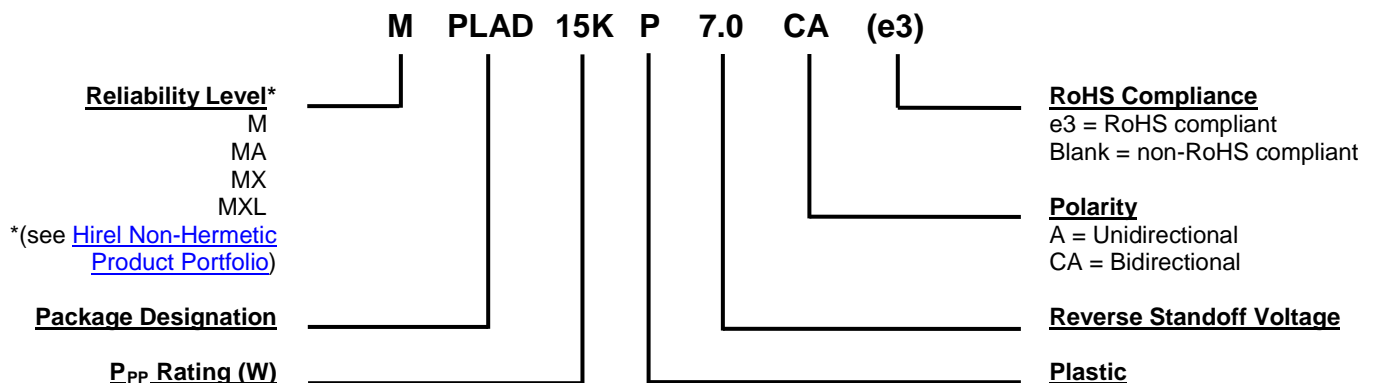
MAXIMUM RATINGS @ 25 °C unless otherwise specified

| Parameters/Test Conditions | Symbol | Value | Unit | |
|--|-------------------------------------|----------------|--------------------|---|
| Junction and Storage Temperature | T _J and T _{STG} | -55 to +150 | °C/W | |
| Thermal Resistance Junction-to-Ambient ⁽¹⁾ | R _{θJA} | 50 | °C/W | |
| Thermal Resistance Junction-to-Case | R _{θJC} | 0.7 | °C/W | |
| Peak Pulse Power @ 10/1000 μs ⁽²⁾ | P _{PP} | 15,000 | W | |
| t _{clamping} (0 volts to V _(BR) min) | Unidirectional | <100 | ps | |
| | Bidirectional | <5 | ns | |
| Forward Clamping Voltage @ 500 Amps ⁽³⁾ | V _{FS} | 2.0 | V | |
| Forward Surge Current ⁽³⁾ | I _{FSM} | 1500 | A | |
| Solder Temperature @ 10 s | T _{SP} | 260 | °C | |
| Steady-State Power dissipation ⁽⁵⁾ | T _A = 25 °C | P _D | 2.5 ⁽¹⁾ | W |
| | T _C = 100 °C | | 71 ⁽⁴⁾ | W |

- Notes:**
- When mounted on FR4 PC board with recommended mounting pad (see [pad layout](#)).
 - Also see [Figures 1 and 2](#). With impulse repetition rate (duty factor) of 0.05% or less.
 - At 8.3 ms half-sine wave (unidirectional devices only).
 - Case temperature controlled on heat sink as specified.
 - See [MicroNote 134](#) for derating P_{PP} when also applying steady-state power.

MECHANICAL and PACKAGING

- CASE: Void-free transfer molded thermosetting epoxy body meeting UL94V-0
- TERMINALS: Tin-lead or RoHS compliant annealed matte-tin plating readily solderable per MIL-STD-750, method 2026.
- MARKING: Body marked with part number
- POLARITY: For unidirectional devices, the cathode is on the metal backside (package bottom)
- Available in bulk or custom tape-and-reel packaging
- TAPE-AND-REEL: Standard per EIA-481-B (add "TR" suffix to part number). Consult factory for quantities.
- WEIGHT: Approximately 1 gram
- See [Package Dimensions](#) on last page.

PART NOMENCLATURE


SYMBOLS & DEFINITIONS

| Symbol | Definition |
|------------------|---|
| $I_{(BR)}$ | Breakdown Current: The current used for measuring breakdown voltage $V_{(BR)}$. |
| I_D | Standby Current: The current at the rated standoff voltage V_{WM} . |
| I_{PP} | Peak Impulse Current: The peak current during the impulse. |
| $V_{(BR)}$ | Breakdown Voltage: The minimum voltage the device will exhibit at a specified current. |
| V_C | Clamping Voltage: Clamping voltage at I_{PP} (peak pulse current) at the specified pulse conditions (typically shown as maximum value). |
| V_{WM} | Rated Working Standoff Voltage: The maximum peak voltage that can be applied over the operating temperature range. |
| $\alpha_{V(BR)}$ | Temperature Coefficient of Breakdown Voltage: The change in breakdown voltage divided by change in temperature. |

ELECTRICAL CHARACTERISTICS @ 25 °C unless otherwise stated

| MICROSEMI PART NUMBER | | REVERSE STANDOFF VOLTAGE V_{WM} (Note 1) | BREAKDOWN VOLTAGE $V_{(BR)}$ @ | | MAXIMUM CLAMPING VOLTAGE V_C @ I_{PP} | MAXIMUM STANDBY CURRENT I_D @ V_{WM} | MAXIMUM PEAK PULSE CURRENT I_{PP} (FIG. 3) | MAXIMUM TEMPERATURE COEFFICIENT $\alpha_{V(BR)}$ |
|-----------------------|-----------------------|--|--|-----|--|---|---|---|
| Unidirectional | Bidirectional | Volts | Volts | mA | Volts | μA | A | mV/ °C |
| MPLAD15KP7.0A | MPLAD15KP7.0CA | 7.0 | 7.78 – 8.60 | 150 | 12.0 | 3000 | 1251* | 5.0 |
| MPLAD15KP7.5A | MPLAD15KP7.5CA | 7.5 | 8.33 – 9.21 | 5 | 12.9 | 750 | 1164* | 6.0 |
| MPLAD15KP8.0A | MPLAD15KP8.0CA | 8.0 | 8.89 – 9.83 | 5 | 13.6 | 450 | 1101* | 6.0 |
| MPLAD15KP8.5A | MPLAD15KP8.5CA | 8.5 | 9.44 – 10.4 | 5 | 14.4 | 150 | 1041* | 7.0 |
| MPLAD15KP9.0A | MPLAD15KP9.0CA | 9.0 | 10.0 – 11.1 | 5 | 15.4 | 60 | 975 | 8.0 |
| MPLAD15KP10A | MPLAD15KP10CA | 10 | 11.1 – 12.3 | 5 | 17.0 | 45 | 882 | 9.0 |
| MPLAD15KP11A | MPLAD15KP11CA | 11 | 12.2 – 13.5 | 5 | 18.2 | 10 | 822 | 10 |
| MPLAD15KP12A | MPLAD15KP12CA | 12 | 13.3 – 14.7 | 5 | 19.9 | 10 | 753 | 11 |
| MPLAD15KP13A | MPLAD15KP13CA | 13 | 14.4 – 15.9 | 5 | 21.5 | 10 | 696 | 12 |
| MPLAD15KP14A | MPLAD15KP14CA | 14 | 15.6 – 17.2 | 5 | 23.2 | 10 | 645 | 13 |
| MPLAD15KP15A | MPLAD15KP15CA | 15 | 16.7 – 18.5 | 5 | 24.4 | 10 | 618 | 15 |
| MPLAD15KP16A | MPLAD15KP16CA | 16 | 17.8 – 19.7 | 5 | 26.0 | 10 | 576 | 16 |
| MPLAD15KP17A | MPLAD15KP17CA | 17 | 18.9 – 20.9 | 5 | 27.6 | 10 | 543 | 18 |
| MPLAD15KP18A | MPLAD15KP18CA | 18 | 20.0 – 22.1 | 5 | 29.2 | 10 | 516 | 19 |
| MPLAD15KP20A | MPLAD15KP20CA | 20 | 22.2 – 24.5 | 5 | 32.4 | 10 | 462 | 22 |
| MPLAD15KP22A | MPLAD15KP22CA | 22 | 24.4 – 26.9 | 5 | 35.5 | 10 | 423 | 24 |
| MPLAD15KP24A | MPLAD15KP24CA | 24 | 26.7 – 29.5 | 5 | 38.9 | 10 | 384 | 27 |
| MPLAD15KP26A | MPLAD15KP26CA | 26 | 28.9 – 31.9 | 5 | 42.1 | 10 | 357 | 29 |
| MPLAD15KP28A | MPLAD15KP28CA | 28 | 31.1 – 34.4 | 5 | 45.5 | 10 | 330 | 30 |
| MPLAD15KP30A | MPLAD15KP30CA | 30 | 33.3 – 36.8 | 5 | 48.4 | 10 | 309 | 35 |
| MPLAD15KP33A | MPLAD15KP33CA | 33 | 36.7 – 40.6 | 5 | 53.3 | 10 | 282 | 38 |
| MPLAD15KP36A | MPLAD15KP36CA | 36 | 40.0 – 44.2 | 5 | 58.1 | 10 | 258 | 40 |
| MPLAD15KP40A | MPLAD15KP40CA | 40 | 44.4 – 49.1 | 5 | 64.5 | 10 | 234 | 45 |
| MPLAD15KP43A | MPLAD15KP43CA | 43 | 47.8 – 52.8 | 5 | 69.4 | 10 | 216 | 49 |
| MPLAD15KP45A | MPLAD15KP45CA | 45 | 50.0 – 55.3 | 5 | 72.7 | 10 | 207 | 51 |
| MPLAD15KP48A | MPLAD15KP48CA | 48 | 53.3 – 58.9 | 5 | 77.4 | 10 | 195 | 55 |
| MPLAD15KP51A | MPLAD15KP51CA | 51 | 56.7 – 62.7 | 5 | 82.4 | 10 | 183 | 60 |
| MPLAD15KP54A | MPLAD15KP54CA | 54 | 60.0 – 66.3 | 5 | 87.1 | 10 | 171 | 64 |
| MPLAD15KP58A | MPLAD15KP58CA | 58 | 64.4 – 71.2 | 5 | 93.6 | 10 | 159 | 69 |
| MPLAD15KP60A | MPLAD15KP60CA | 60 | 66.7 – 73.7 | 5 | 96.8 | 10 | 156 | 70 |
| MPLAD15KP64A | MPLAD15KP64CA | 64 | 71.1 – 78.6 | 5 | 103 | 10 | 147 | 75 |
| MPLAD15KP70A | MPLAD15KP70CA | 70 | 77.8 – 86.0 | 5 | 113 | 10 | 132 | 84 |
| MPLAD15KP75A | MPLAD15KP75CA | 75 | 83.3 – 92.1 | 5 | 121 | 10 | 123 | 90 |
| MPLAD15KP78A | MPLAD15KP78CA | 78 | 86.7 – 95.8 | 5 | 126 | 10 | 120 | 94 |
| MPLAD15KP85A | MPLAD15KP85CA | 85 | 94.4 – 104.0 | 5 | 137 | 10 | 108 | 102 |
| MPLAD15KP90A | MPLAD15KP90CA | 90 | 100 – 111 | 5 | 146 | 10 | 102 | 109 |
| MPLAD15KP100A | MPLAD15KP100CA | 100 | 111 – 123 | 5 | 162 | 10 | 93 | 122 |
| MPLAD15KP110A | MPLAD15KP110CA | 110 | 122 – 135 | 5 | 177 | 10 | 84 | 132 |
| MPLAD15KP120A | MPLAD15KP120CA | 120 | 133 – 147 | 5 | 193 | 10 | 78 | 145 |
| MPLAD15KP130A | MPLAD15KP130CA | 130 | 144 – 159 | 5 | 209 | 10 | 71 | 157 |
| MPLAD15KP150A | MPLAD15KP150CA | 150 | 167 – 185 | 5 | 243 | 10 | 62 | 183 |
| MPLAD15KP160A | MPLAD15KP160CA | 160 | 178 – 197 | 5 | 259 | 10 | 58 | 195 |
| MPLAD15KP170A | MPLAD15KP170CA | 170 | 189 – 209 | 5 | 275 | 10 | 55 | 207 |
| MPLAD15KP180A | MPLAD15KP180CA | 180 | 200 – 221 | 5 | 291 | 10 | 52 | 219 |
| MPLAD15KP200A | MPLAD15KP200CA | 200 | 222 – 245 | 5 | 322 | 10 | 47 | 243 |

NOTE 1: Transient Voltage Suppressors are normally selected with reverse standoff voltage V_{WM} , which should be equal to or greater than the peak operating voltage.

NOTE 2: Items listed in bold above are available ex-stock or with a short lead-time.

* Surge Testing is performed to 1000Amps due to Equipment limitations

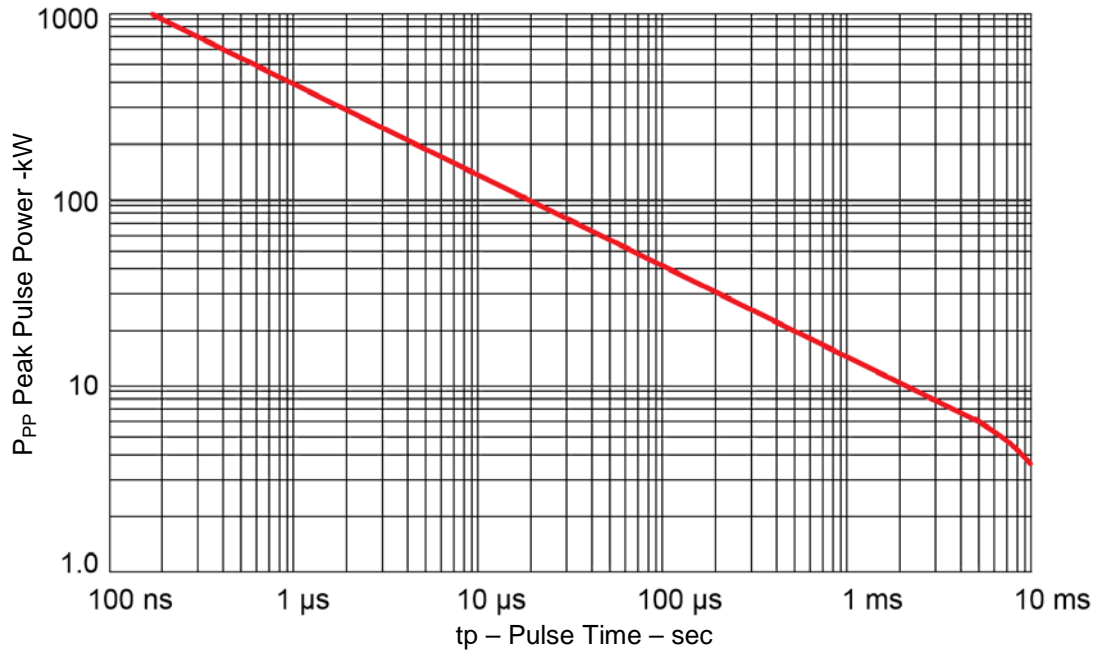
GRAPHS


FIGURE 1
Peak Pulse Power vs. Pulse Time
(to 50% of exponentially decaying pulse)

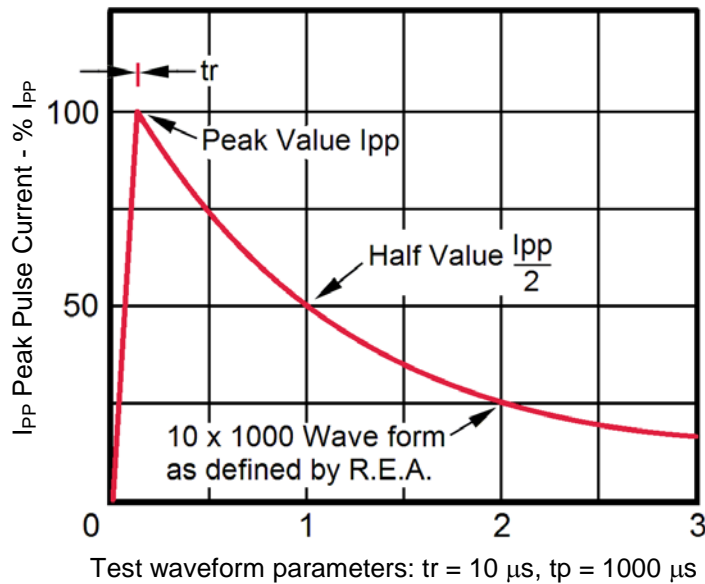


Figure 2
Pulse Waveform

GRAPHS (continued)

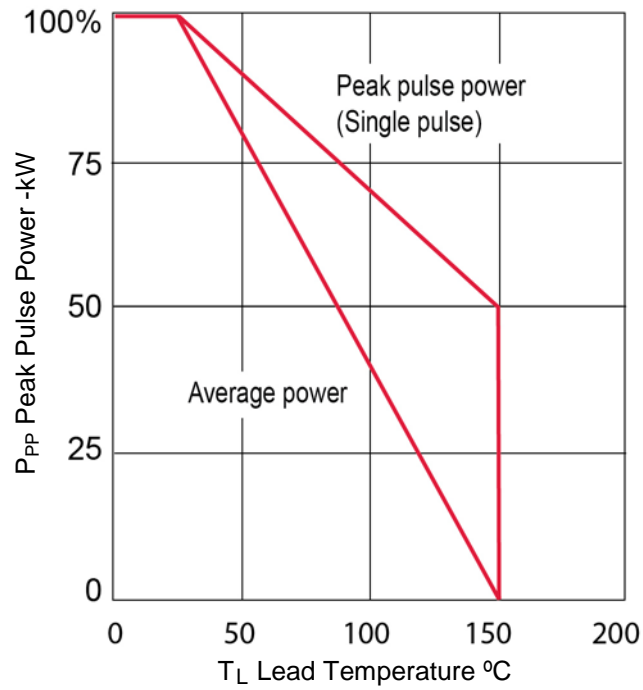
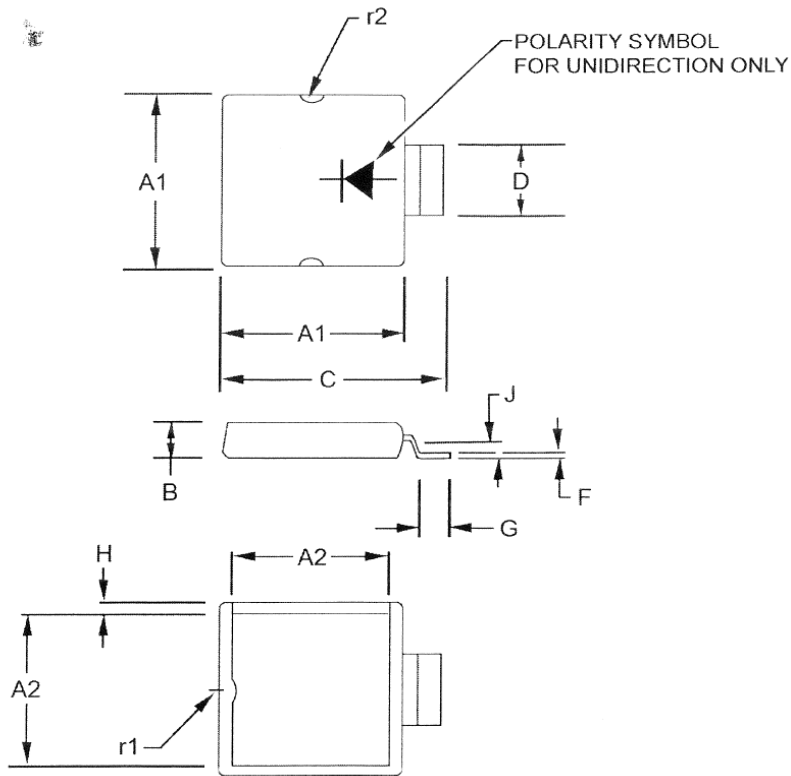
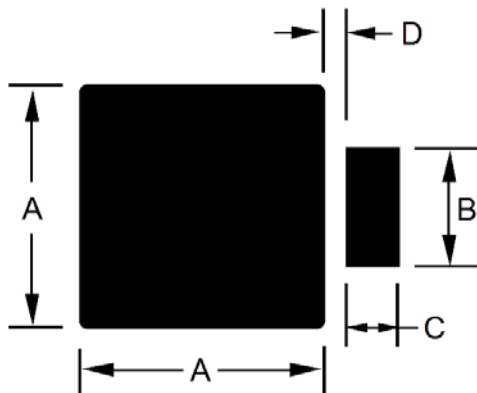


FIGURE 3
Derating Curve

PACKAGE DIMENSIONS


| Ref. | Dimensions | | | |
|------|------------|-------|-------------|-------|
| | Inch | | Millimeters | |
| | Min | Max | Min | Max |
| A1 | 0.485 | 0.495 | 12.32 | 12.57 |
| A2 | 0.445 | 0.455 | 11.30 | 11.56 |
| B | 0.145 | 0.155 | 3.68 | 3.94 |
| C | 0.585 | 0.595 | 14.86 | 15.11 |
| D | 0.200 | 0.210 | 5.08 | 5.33 |
| F | 0.008 | 0.013 | 0.20 | 0.33 |
| G | 0.055 | 0.065 | 1.40 | 1.65 |
| H | 0.015 | 0.025 | 0.38 | 0.64 |
| J | 0.062 TYP. | | 1.57 TYP. | |
| r1 | 0.030 TYP. | | 0.76 TYP. | |
| r2 | 0.045 TYP. | | 1.14 TYP. | |

PAD LAYOUT


| Ref. | Dimensions | | | |
|------|------------|-------|-------------|-------|
| | Inch | | Millimeters | |
| | Min | Max | Min | Max |
| A | 0.465 | 0.475 | 11.81 | 12.07 |
| B | 0.225 | 0.235 | 5.72 | 5.97 |
| C | 0.095 | 0.105 | 2.41 | 2.67 |
| D | 0.04 | 0.05 | 1.02 | 1.27 |

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