

DUAL P-CHANNEL 60V ENHANCEMENT MODE MOSFET

Product Summary

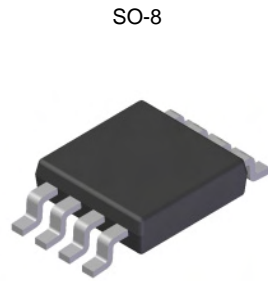
| $V_{(BR)DSS}$ | $R_{DS(on)}$ Max | I_D $T_A = 25^\circ C$ (Notes 7 & 9) |
|---------------|----------------------------------|--|
| -60V | 125m Ω @ $V_{GS} = -10V$ | -3.4A |
| | 190m Ω @ $V_{GS} = -4.5V$ | -2.8A |

Description

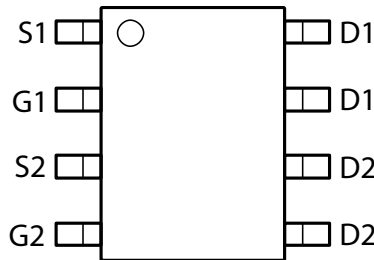
This MOSFET has been designed to minimize the on-state resistance and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

Applications

- DC-DC Converters
- Power Management functions
- Disconnect Switches
- Motor control



Top View



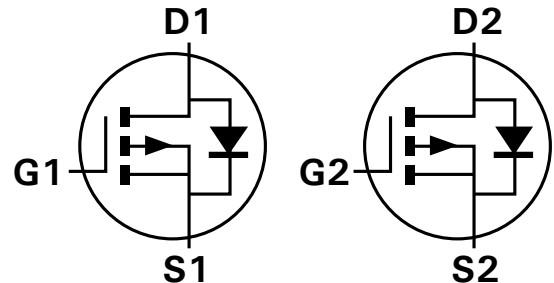
Top View

Features

- Low on-resistance
- Fast switching speed
- Low threshold
- Low gate drive
- Low profile SOIC package
- **Totally Lead-Free & Fully RoHS compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP capable (Note 4)**

Mechanical Data

- Case: SO-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0 (Note 1)
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish; Solderable per MIL-STD-202, Method 208
- Weight: 0.074 grams (approximate)



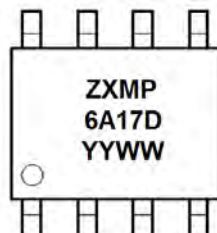
Equivalent Circuit

Ordering Information (Notes 4 & 5)

| Product | Grade | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|----------------|------------|-----------|--------------------|-----------------|-------------------|
| ZXMP6A17DN8TA | AEC-Q101 | ZXMP6A17D | 7 | 12 | 500 |
| ZXMP6A17DN8QTA | Automotive | ZXMP6A17D | 7 | 12 | 500 |

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
 2. See <http://www.diodes.com> for more information about Diodes Incorporated's definitions of Halogen and Antimony free, "Green" and Lead-Free.
 3. Halogen and Antimony free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
 4. Automotive products are AEC-Q101 qualified and are PPAP capable. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified.
 5. For packaging details, go to our website at <http://www.diodes.com>

Marking Information



ZXMP6A17D = Product Type Marking Code
YYWW = Date Code Marking
YY = Year (ex: 11 = 2011)
WW = Week (01 - 53)

Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

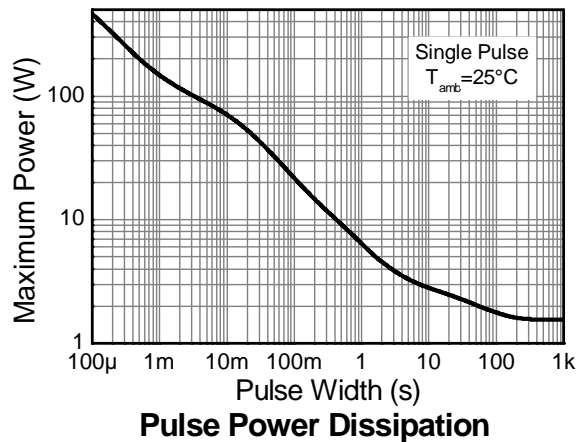
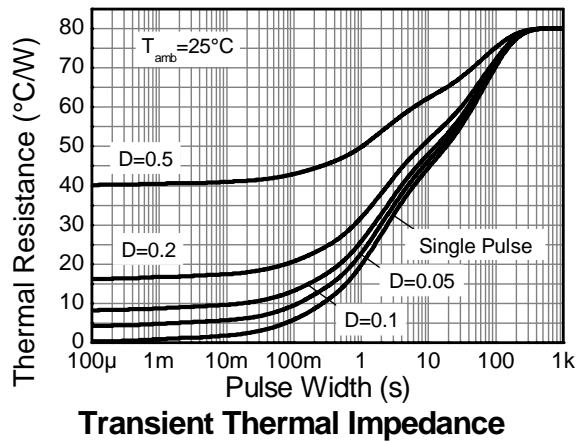
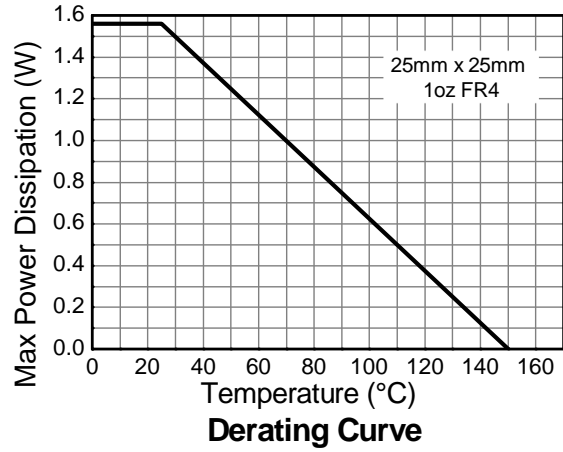
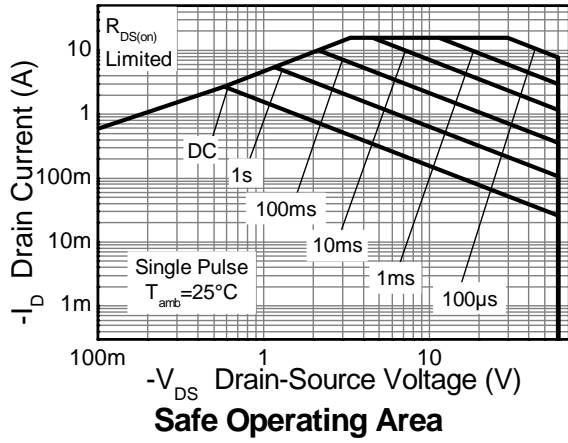
| Characteristic | | Symbol | Value | Unit |
|--|-----------------------|-------------------------------------|-------|------|
| Drain-Source voltage | | V _{DSS} | -60 | V |
| Gate-Source voltage | | V _{GS} | ±20 | V |
| Continuous Drain current | V _{GS} = 10V | (Notes 7 & 9) | -3.42 | A |
| | | T _A = 70°C (Notes 7 & 9) | -2.73 | |
| | | (Notes 6 & 9) | -2.7 | |
| Pulsed Drain current | | I _{DM} | -15.6 | A |
| Continuous Source current (Body diode) | | I _S | -3.4 | A |
| Pulsed Source current (Body diode) | | I _{SM} | -15.6 | A |

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

| Characteristic | | Symbol | Value | Unit |
|---|----------------|-----------------------------------|------------|------------|
| Power dissipation Linear derating factor | (Notes 6 & 9) | P _D | 1.25 | W mW/°C |
| | (Notes 6 & 10) | | 10.0 | |
| | (Notes 7 & 9) | | 1.81 | |
| | (Notes 7 & 9) | | 14.5 | |
| Thermal Resistance, Junction to Ambient | (Notes 6 & 9) | R _{θJA} | 2.15 | °C/W |
| | (Notes 6 & 10) | | 17 | |
| | (Notes 7 & 9) | | 100 | |
| Thermal Resistance, Junction to Lead | (Notes 6 & 10) | R _{θJL} | 70 | °C/W |
| | (Notes 7 & 9) | | 60 | |
| Operating and storage temperature range | | T _J , T _{STG} | -55 to 150 | °C |

- Notes:
6. For a device surface mounted on 25mm x 25mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
 7. Same as note (6), except the device is measured at t ≤ 10 sec.
 8. Same as note (6), except the device is pulsed with D = 0.02 and pulse width 300µs. The pulse current is limited by the maximum junction temperature.
 9. For a dual device with one active die.
 10. For a device with two active die running at equal power.
 11. Thermal resistance from junction to solder-point.

Thermal Characteristics

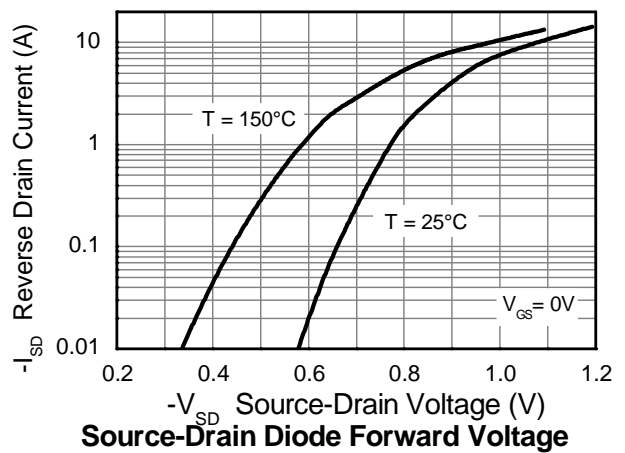
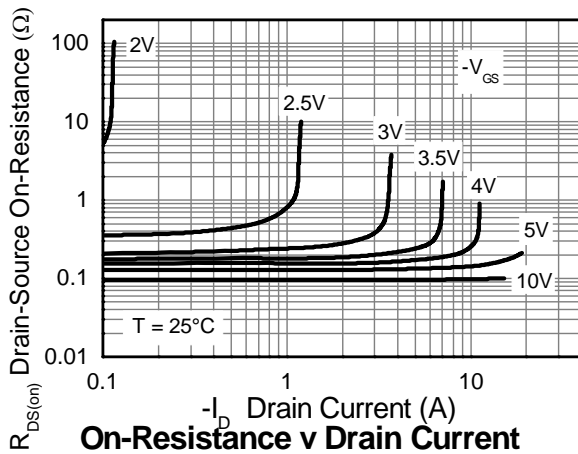
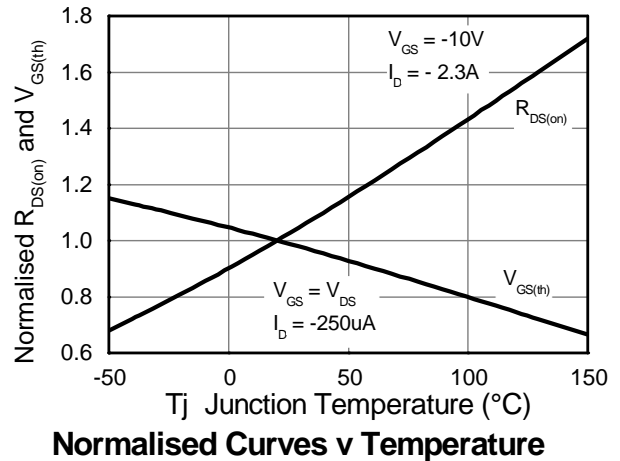
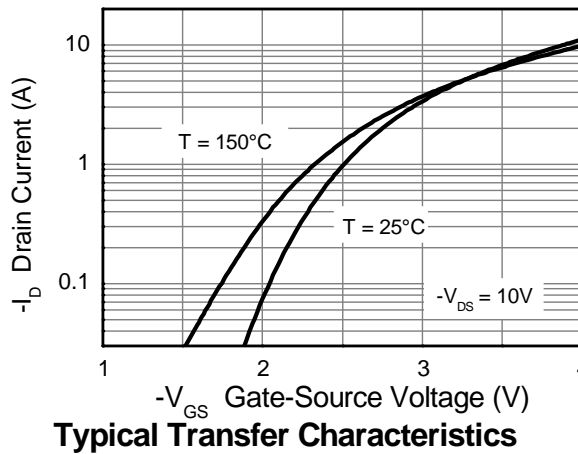
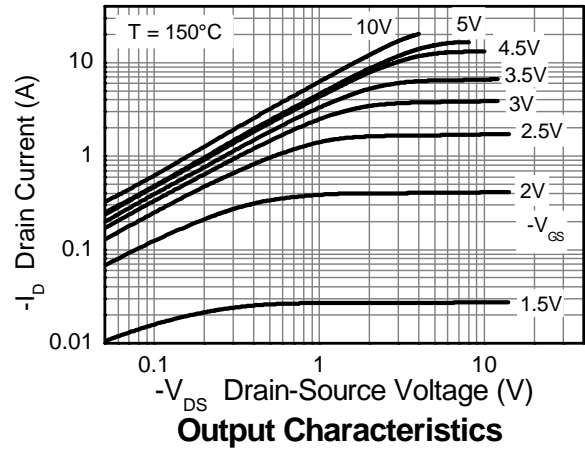
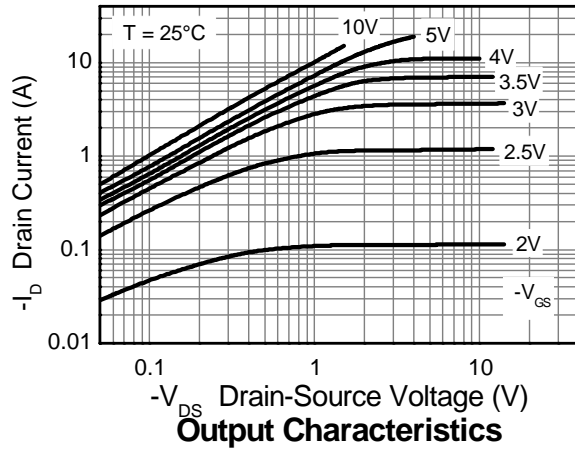


Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

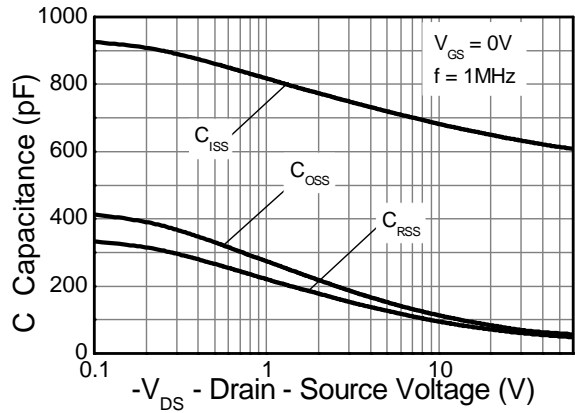
| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|--------------|------|-------|-----------|---------------|---|
| OFF CHARACTERISTICS | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | -60 | — | — | V | $I_D = -250\mu\text{A}$, $V_{GS} = 0\text{V}$ |
| Zero Gate Voltage Drain Current | I_{DSS} | — | — | -0.5 | μA | $V_{DS} = -60\text{V}$, $V_{GS} = 0\text{V}$ |
| Gate-Source Leakage | I_{GSS} | — | — | ± 100 | nA | $V_{GS} = \pm 20\text{V}$, $V_{DS} = 0\text{V}$ |
| ON CHARACTERISTICS | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | -1.0 | — | — | V | $I_D = -250\mu\text{A}$, $V_{DS} = V_{GS}$ |
| Static Drain-Source On-Resistance (Note 12) | $R_{DS(on)}$ | — | — | 0.125 | Ω | $V_{GS} = -10\text{V}$, $I_D = -2.3\text{A}$ $V_{GS} = -4.5\text{V}$, $I_D = -1.9\text{A}$ |
| | | | | 0.190 | | |
| Forward Transconductance (Notes 12 & 13) | g_{fs} | — | 4.7 | — | S | $V_{DS} = -15\text{V}$, $I_D = -2.3\text{A}$ |
| Diode Forward Voltage (Note 12) | V_{SD} | — | -0.85 | -0.95 | V | $I_S = -2.0\text{A}$, $V_{GS} = 0\text{V}$ |
| Reverse recovery time (Note 13) | t_{rr} | — | 25.1 | — | ns | $I_S = -1.7\text{A}$, $di/dt = 100\text{A}/\mu\text{s}$ |
| Reverse recovery charge (Note 13) | Q_{rr} | — | 27.2 | — | nC | |
| DYNAMIC CHARACTERISTICS (Note 13) | | | | | | |
| Input Capacitance | C_{iss} | — | 637 | — | pF | $V_{DS} = -30\text{V}$, $V_{GS} = 0\text{V}$ $f = 1\text{MHz}$ |
| Output Capacitance | C_{oss} | — | 70 | — | pF | |
| Reverse Transfer Capacitance | C_{rss} | — | 53 | — | pF | |
| Total Gate Charge (Note 14) | Q_g | — | 9.0 | — | nC | $V_{GS} = -4.5\text{V}$ |
| Total Gate Charge (Note 14) | Q_g | — | 17.7 | — | nC | |
| Gate-Source Charge (Note 14) | Q_{gs} | — | 1.6 | — | nC | $V_{GS} = -10\text{V}$ |
| Gate-Drain Charge (Note 14) | Q_{gd} | — | 4.4 | — | nC | |
| Turn-On Delay Time (Note 14) | $t_{D(on)}$ | — | 2.6 | — | ns | $V_{DD} = -30\text{V}$, $V_{GS} = -10\text{V}$ $I_D = -1\text{A}$, $R_G \cong 6.0\Omega$ |
| Turn-On Rise Time (Note 14) | t_r | — | 3.4 | — | ns | |
| Turn-Off Delay Time (Note 14) | $t_{D(off)}$ | — | 26.2 | — | ns | |
| Turn-Off Fall Time (Note 14) | t_f | — | 11.3 | — | ns | |

- Notes:
12. Measured under pulsed conditions. Pulse width $\leq 300\mu\text{s}$; duty cycle $\leq 2\%$
 13. For design aid only, not subject to production testing.
 14. Switching characteristics are independent of operating junction temperatures.

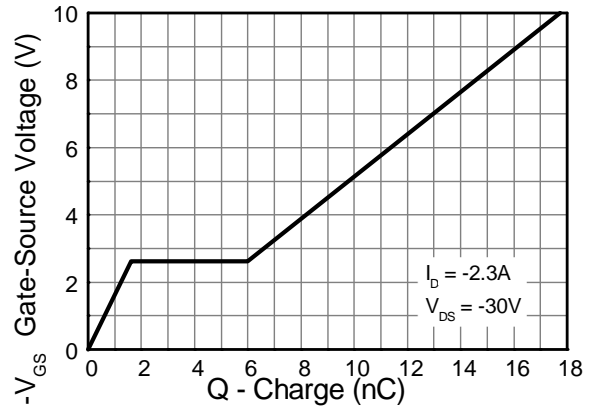
Typical Characteristics



Typical Characteristics - continued

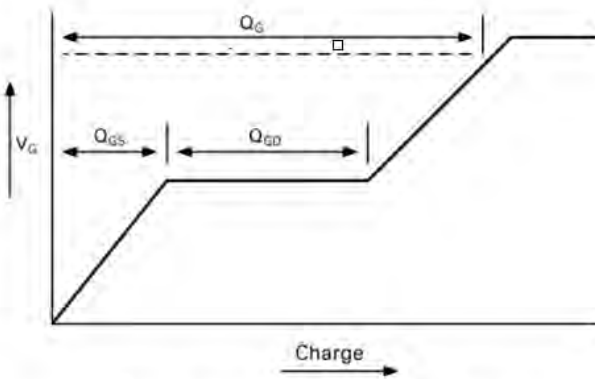


Capacitance v Drain-Source Voltage

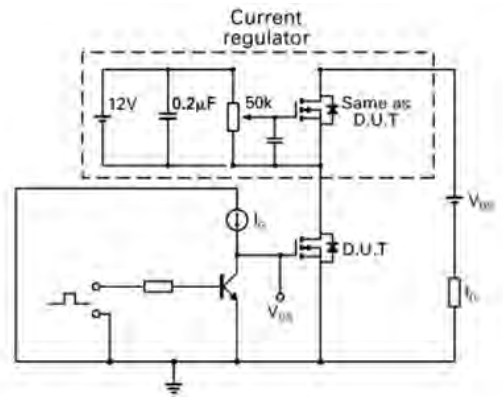


Gate-Source Voltage v Gate Charge

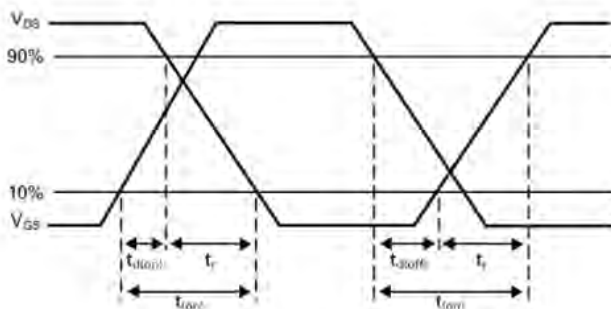
Test Circuits



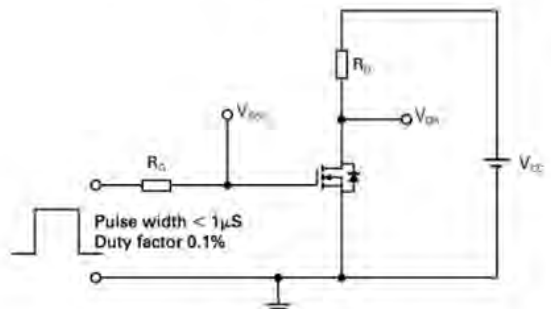
Basic gate charge waveform



Gate charge test circuit



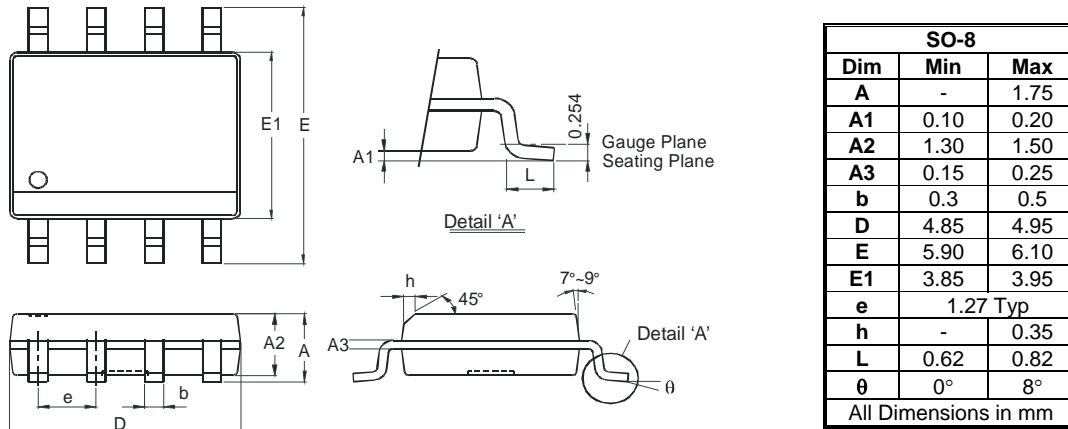
Switching time waveforms



Switching time test circuit

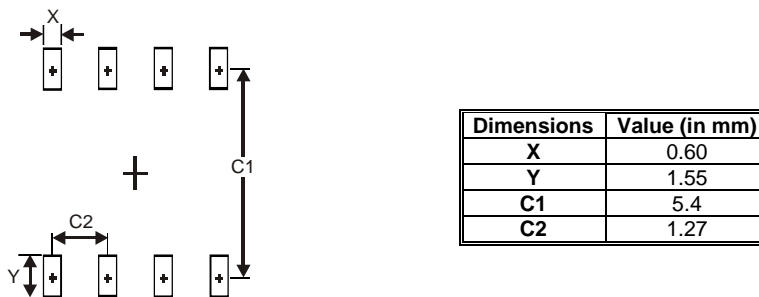
Package Outline Dimensions

Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



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