

Product Summary

| $V_{(BR)DSS}$ | $R_{DS(ON)}$ | I_D $T_C = +25^\circ C$ |
|---------------|-------------------------|------------------------------|
| -30V | 9mΩ @ $V_{GS} = -10V$ | -45A |
| | 12mΩ @ $V_{GS} = -4.5V$ | -35A |

Description and Applications

This new generation 30V P-Channel Enhancement Mode MOSFET has been designed to minimize $R_{DS(ON)}$ and yet maintain superior switching performance. This device is ideal for use in Notebook battery power management and loadswitch.

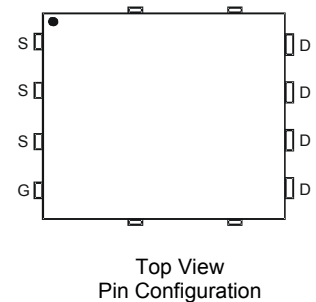
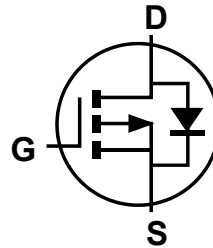
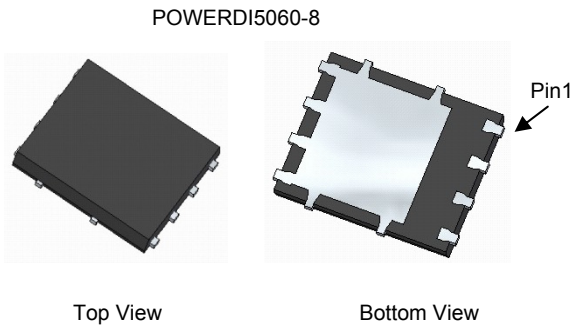
- Notebook Battery Power Management
- DC-DC Converters
- Loadswitch

Features and Benefits

- Thermally Efficient Package-Cooler Running Applications
- High Conversion Efficiency
- Low $R_{DS(ON)}$ – Minimizes On State Losses
- Low Input Capacitance
- Fast Switching Speed
- <1.1mm Package Profile – Ideal for Thin Applications
- ESD HBM Protected up to 1kV
- **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**

Mechanical Data

- Case: POWERDI5060-8
- Case Material: Molded Plastic, “Green” Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram Below
- Weight: 0.097 grams (approximate)

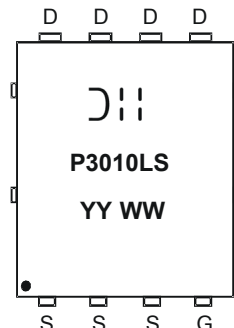


Ordering Information (Note 4)

| Part Number | Case | Packaging |
|---------------|---------------|--------------------|
| DMP3012LPS-13 | POWERDI5060-8 | 2500 / Tape & Reel |

- 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/quality/lead_free.html 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. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

Marking Information



⌋⌋ = Manufacturer's Marking
 P3012LS = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Year (ex: 13 = 2013)
 WW = Week (01 - 53)

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

| Characteristic | | | Symbol | Value | Unit |
|---|--------------|------------------------|------------------|-------|------|
| Drain-Source Voltage | | | V _{DSS} | -30 | V |
| Gate-Source Voltage | | | V _{GSS} | ±20 | V |
| Continuous Drain Current (Note 6) V _{GS} = -10V | Steady State | T _A = +25°C | I _D | 13.2 | A |
| | | T _A = +70°C | | 10.5 | |
| Continuous Drain Current (Note 6) V _{GS} = -4.5V | Steady State | T _A = +25°C | I _D | 11.4 | A |
| | | T _A = +70°C | | 9.1 | |
| Pulsed Drain Current (Notes 6) | | | I _{DM} | -100 | A |
| Avalanche Current (Notes 7) L = 1mH | | | I _{AR} | -24 | A |
| Avalanche Energy (Notes 7) L = 1mH | | | E _{AR} | 292 | mJ |

Thermal Characteristics

| Characteristic | Symbol | Value | Unit |
|---|-----------------------------------|-------------|------|
| Power Dissipation (Note 5) | P _D | 1.29 | W |
| Thermal Resistance, Junction to Ambient @ T _A = +25°C (Note 5) | R _{θJA} | 97 | °C/W |
| Power Dissipation (Note 6) | P _D | 2.36 | W |
| Thermal Resistance, Junction to Ambient @ T _A = +25°C (Note 6) | R _{θJA} | 53 | °C/W |
| Thermal Resistance, Junction to Case @ T _C = +25°C (Notes 6) | R _{θJC} | 4.0 | °C/W |
| Operating and Storage Temperature Range | T _J , T _{STG} | -55 to +150 | °C |

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

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---------------------|------|-------|------|------|---|
| OFF CHARACTERISTICS (Note 8) | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | -30 | — | — | V | V _{GS} = 0V, I _D = -250μA |
| Zero Gate Voltage Drain Current | I _{DSS} | — | — | -1.0 | μA | V _{DS} = -30V, V _{GS} = 0V |
| Gate-Source Leakage | I _{GSS} | — | — | ±100 | nA | V _{GS} = ±20V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 8) | | | | | | |
| Gate Threshold Voltage | V _{GS(th)} | -1.1 | -1.6 | -2.1 | V | V _{DS} = V _{GS} , I _D = -250μA |
| Static Drain-Source On-Resistance | R _{DS(on)} | — | 7.5 | 9.0 | mΩ | V _{GS} = -10V, I _D = -10A |
| | | — | 8.5 | 12.0 | | V _{GS} = -4.5V, I _D = -10A |
| Forward Transfer Admittance | Y _{fs} | — | 30 | — | S | V _{DS} = -15V, I _D = -10A |
| Diode Forward Voltage | V _{SD} | — | -0.65 | -1.0 | V | V _{GS} = 0V, I _S = -1A |
| DYNAMIC CHARACTERISTICS (Note 9) | | | | | | |
| Input Capacitance | C _{iSS} | — | 6807 | — | pF | V _{DS} = 15V, V _{GS} = 0V, f = 1.0MHz |
| Output Capacitance | C _{oss} | — | 988 | — | pF | |
| Reverse Transfer Capacitance | C _{rss} | — | 647 | — | pF | |
| Gate Resistance | R _g | — | 6.2 | — | Ω | V _{DS} = 0V, V _{GS} = 0V, f = 1MHz |
| Total Gate Charge (V _{GS} = -10V) | Q _g | — | 139 | — | nC | V _{DS} = -15V, I _D = -10A |
| Total Gate Charge (V _{GS} = -4.5V) | Q _g | — | 66 | — | nC | |
| Gate-Source Charge | Q _{gs} | — | 19 | — | nC | |
| Gate-Drain Charge | Q _{gd} | — | 21 | — | nC | |
| Turn-On Delay Time | t _{D(on)} | — | 8.9 | — | ns | V _{DS} = -15V, V _{GEN} = -10V, R _G = 6Ω, I _D = -1A |
| Turn-On Rise Time | t _r | — | 10.5 | — | ns | |
| Turn-Off Delay Time | t _{D(off)} | — | 254 | — | ns | |
| Turn-Off Fall Time | t _f | — | 95 | — | ns | |

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
 - Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
 - I_{AS} and E_{AS} rating are based on low frequency and duty cycles to keep T_J = 25°C
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to product testing.

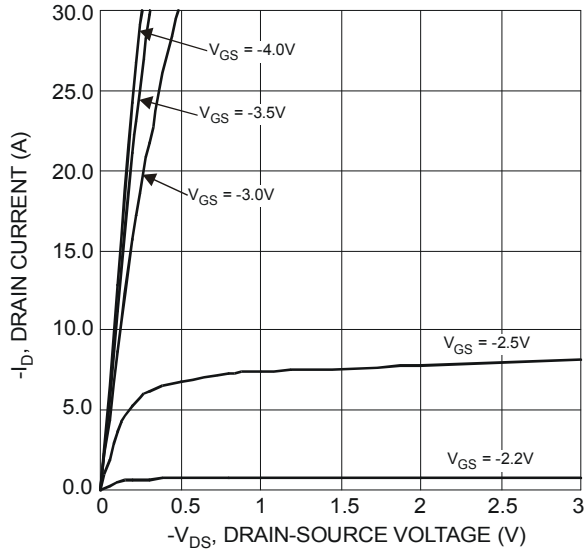


Figure 1 Typical Output Characteristics

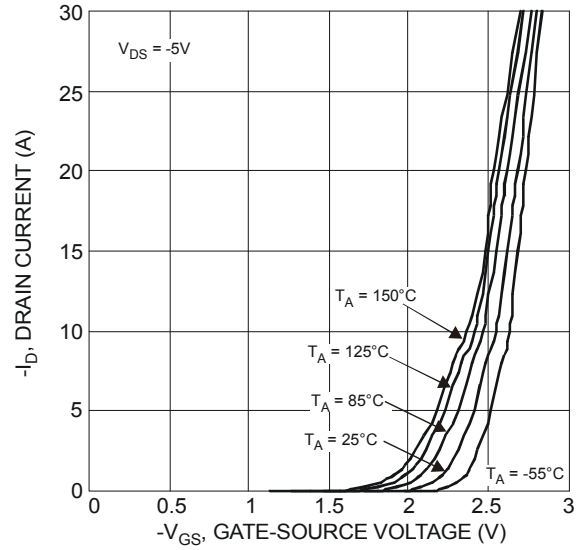


Figure 2 Typical Transfer Characteristics

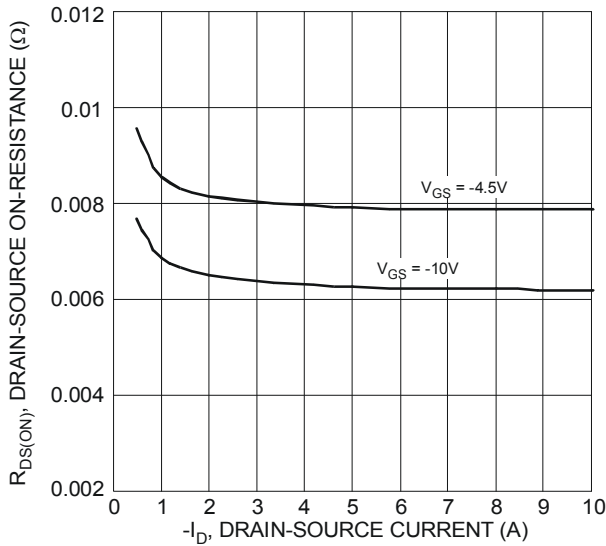


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

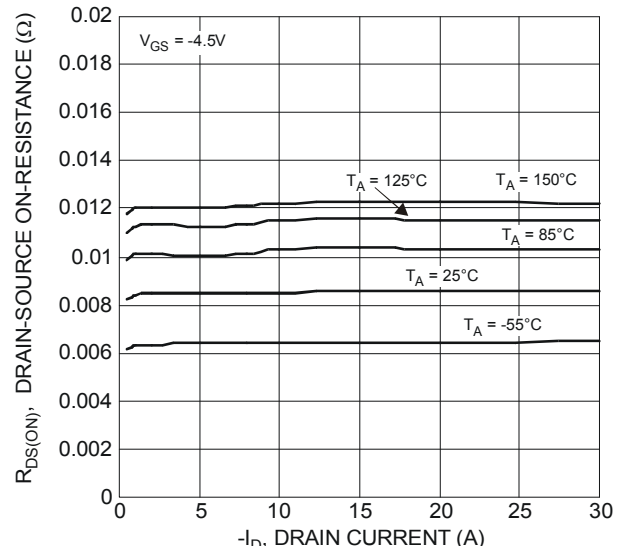


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

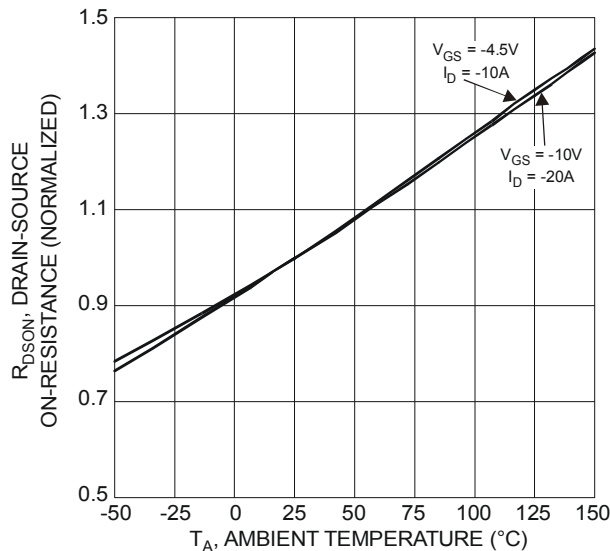


Figure 5 On-Resistance Variation with Temperature

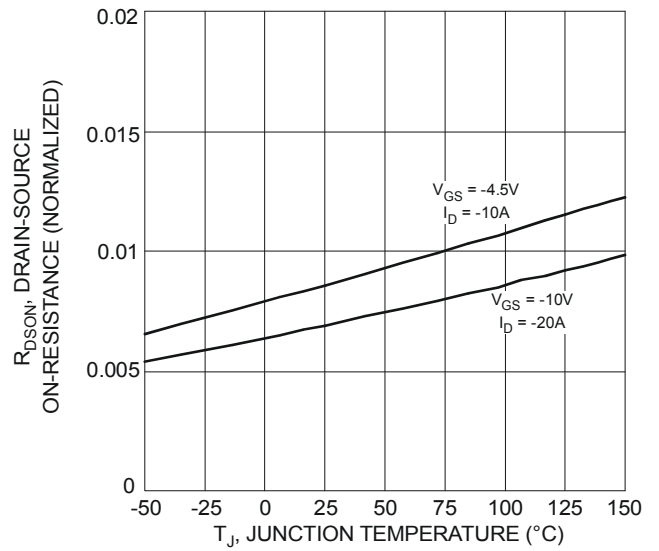


Figure 6 On-Resistance Variation with Temperature

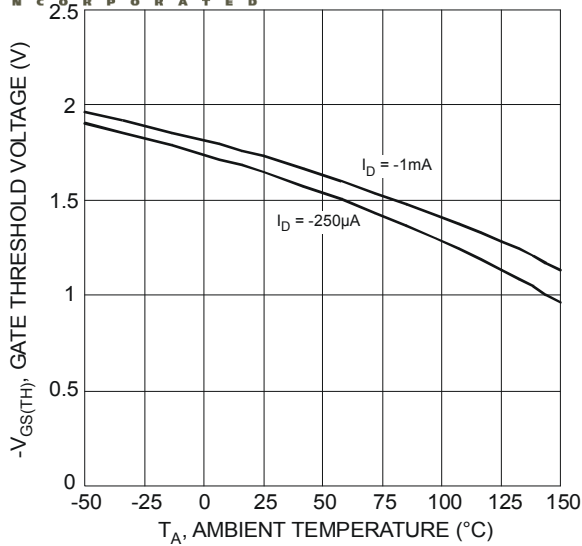


Figure 7 Gate Threshold Variation vs. Ambient Temperature

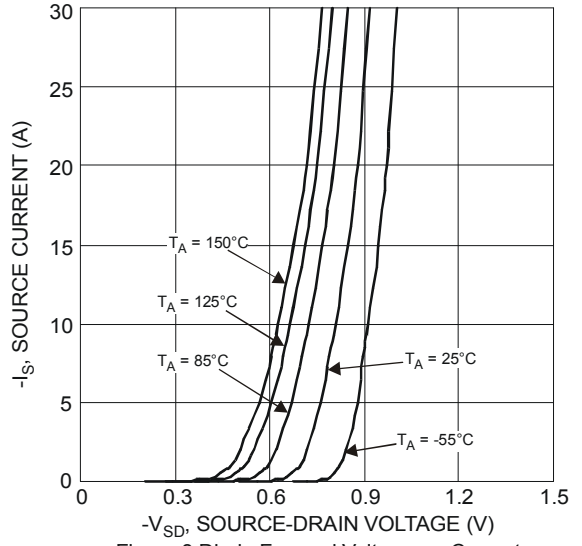


Figure 8 Diode Forward Voltage vs. Current

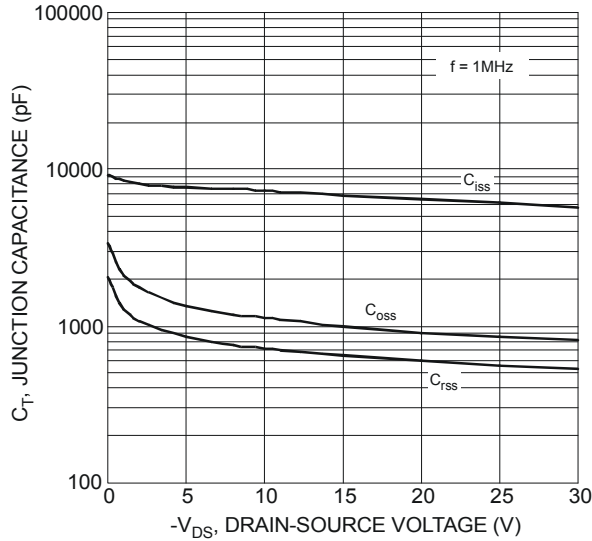


Figure 9 Typical Total Capacitance

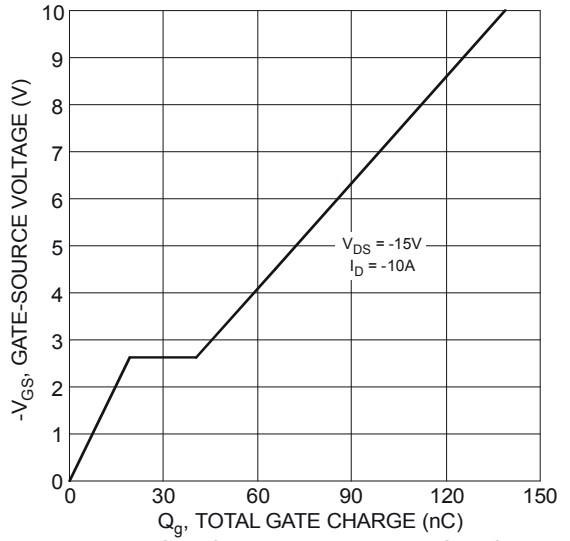


Figure 10 Gate-Source Voltage vs. Total Gate Charge

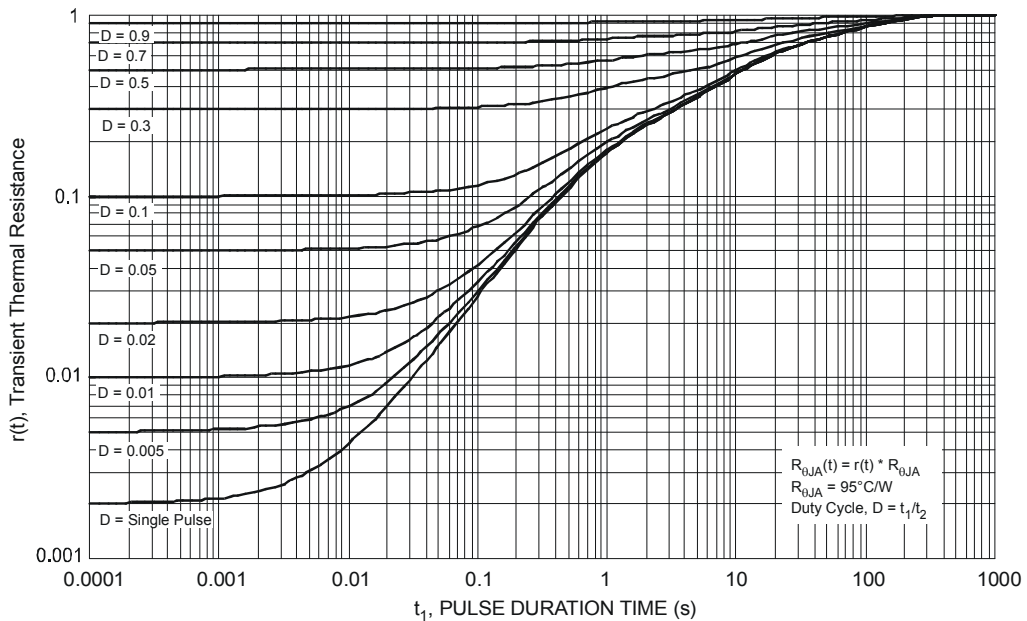
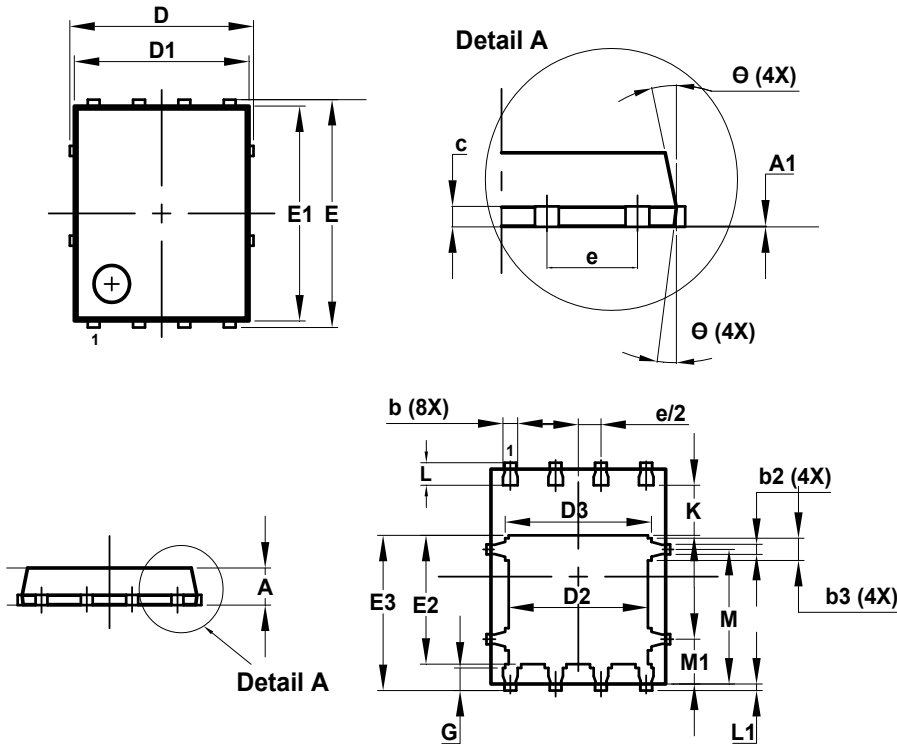


Figure 11 Transient Thermal Response

$R_{\theta JA}(t) = r(t) * R_{\theta JA}$
 $R_{\theta JA} = 95^{\circ}\text{C/W}$
 Duty Cycle, $D = t_1/t_2$

Package Outline Dimensions

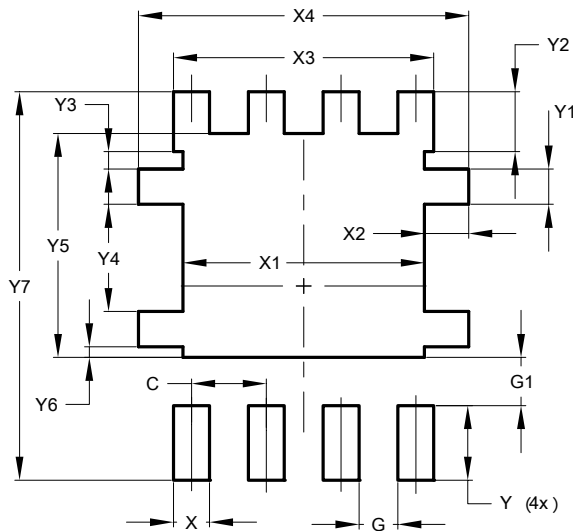
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



| POWERDI5060-8 | | | |
|----------------------|----------|-------|-------|
| Dim | Min | Max | Typ |
| A | 0.90 | 1.10 | 1.00 |
| A1 | 0.00 | 0.05 | - |
| b | 0.33 | 0.51 | 0.41 |
| b2 | 0.200 | 0.350 | 0.273 |
| b3 | 0.40 | 0.80 | 0.60 |
| c | 0.230 | 0.330 | 0.277 |
| D | 5.15 BSC | | |
| D1 | 4.70 | 5.10 | 4.90 |
| D2 | 3.70 | 4.10 | 3.90 |
| D3 | 3.90 | 4.30 | 4.10 |
| E | 6.15 BSC | | |
| E1 | 5.60 | 6.00 | 5.80 |
| E2 | 3.28 | 3.68 | 3.48 |
| E3 | 3.99 | 4.39 | 4.19 |
| e | 1.27 BSC | | |
| G | 0.51 | 0.71 | 0.61 |
| K | 0.51 | - | - |
| L | 0.51 | 0.71 | 0.61 |
| L1 | 0.10 | 0.20 | 0.175 |
| M | 3.235 | 4.035 | 3.635 |
| M1 | 1.00 | 1.40 | 1.21 |
| Θ | 10° | 12° | 11° |
| Θ1 | 6° | 8° | 7° |
| All Dimensions in mm | | | |

Suggested Pad Layout

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



| Dimensions | Value (in mm) |
|------------|---------------|
| C | 1.270 |
| G | 0.660 |
| G1 | 0.820 |
| X | 0.610 |
| X1 | 4.100 |
| X2 | 0.755 |
| X3 | 4.420 |
| X4 | 5.610 |
| Y | 1.270 |
| Y1 | 0.600 |
| Y2 | 1.020 |
| Y3 | 0.295 |
| Y4 | 1.825 |
| Y5 | 3.810 |
| Y6 | 0.180 |
| Y7 | 6.610 |

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