

Product Summary (Typ. @ $V_{GS} = -4.5V$, $T_A = +25^\circ C$)

| V_{DSS} | $R_{DS(on)}$ | Q_g | Q_{gd} | I_D |
|-----------|--------------|-------|----------|-------|
| -20V | 28m Ω | 5.4nC | 1.5nC | -5.8A |

Description and Applications

This new generation MOSFET is designed to minimize the on-state resistance ($R_{DS(on)}$) and yet maintain superior switching performance, making it ideal for high-efficiency power management applications.

Applications

- Battery Management
- Load Switch
- Battery Protection

Features and Benefits

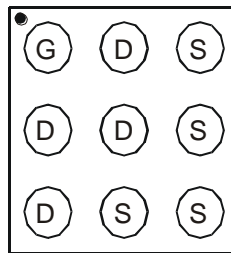
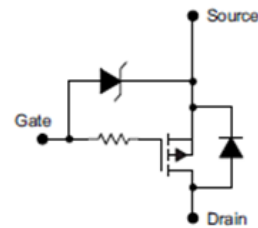
- LD-MOS Technology with the Lowest Figure of Merit:
 $R_{DS(on)} = 28m\Omega$ to Minimize On-State Losses
 $Q_g = 5.4nC$ for Ultra-Fast Switching
- $V_{gs(th)} = -0.6V$ typ. for a Low Turn-On Potential
- CSP with Footprint 1.5mm x 1.5mm
- Height = 0.62mm for Low Profile
- ESD = 3kV HBM Protection of Gate
- 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: U-WLB1515-9
- Terminal Connections: See Diagram Below
- Weight: 0.0018 grams (Approximate)



ESD PROTECTED TO 3kV

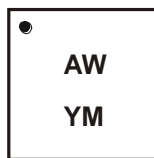

 Top-View
Pin Configuration


Equivalent Circuit

Ordering Information (Note 4)

| Part Number | Case | Packaging |
|---------------|-------------|-------------------|
| DMP2033UCB9-7 | U-WLB1515-9 | 3,000/Tape & Reel |

- Notes:
- No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
 - See <http://www.diodes.com> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
 - Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
 - For packaging details, go to our website at <http://www.diodes.com>.

Marking Information


AW = Product Type Marking Code
 YM = Date Code Marking
 Y = Year (ex: Y = 2011)
 M = Month (ex: 9 = September)

Date Code Key

| Year | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|------|------|------|------|------|------|------|------|
| Code | Y | Z | A | B | C | D | E |

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Code | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | O | N | D |

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

| Characteristic | | | Symbol | Value | Units |
|---|--------------|------------------------|------------------|-------|-------|
| Drain-Source Voltage | | | V _{DSS} | -20 | V |
| Gate-Source Voltage | | | V _{GSS} | -6 | V |
| Continuous Drain Current (Note 5) V _{GS} = -4.5V | Steady State | T _A = +25°C | I _D | -4.2A | A |
| | | T _A = +70°C | | -3.3A | |
| Continuous Drain Current (Note 6) V _{GS} = -4.5V | Steady State | T _A = +25°C | I _D | -5.8A | A |
| | | T _A = +70°C | | -4.5A | |
| Pulsed Drain Current | | | I _{DM} | -30 | A |

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

| Characteristic | Symbol | Value | Units |
|--|-----------------------------------|-------------|-------|
| Total Power Dissipation (Note 5) | P _D | 1.0 | W |
| Total Power Dissipation (Note 6) | P _D | 1.8 | W |
| Thermal Resistance, Junction to Ambient (Note 5) | R _{θJA} | 126.8 | °C/W |
| Thermal Resistance, Junction to Ambient (Note 6) | R _{θJA} | 69 | °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 7) | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | -20 | - | - | V | V _{GS} = 0V, I _D = -250μA |
| Gate-Source Breakdown Voltage | BV _{GSS} | -6.1 | - | - | V | I _{GS} = -250μA, V _{DS} = 0V |
| Zero Gate Voltage Drain Current | I _{DSS} | - | - | -1 | μA | @T _C = +25°C V _{DS} = -16V, V _{GS} = 0V |
| Gate-Source Leakage | I _{GSS} | - | - | -100 | nA | V _{GS} = -6V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 7) | | | | | | |
| Gate Threshold Voltage | V _{GS(th)} | -0.4 | -0.6 | -1.1 | V | V _{DS} = V _{GS} , I _D = -250μA |
| Static Drain-Source On-Resistance | R _{DS(on)} | - | 28 | 33 | mΩ | V _{GS} = -4.5V, I _D = -2A |
| | | | 35 | 45 | | V _{GS} = -2.5V, I _D = -2A |
| | | | 45 | 65 | | V _{GS} = -1.8V, I _D = -2A |
| Forward Transfer Admittance | Y _{fs} | - | 10.8 | - | S | V _{DS} = -10V, I _D = -2A |
| Diode Forward Voltage (Note 6) | V _{SD} | - | -0.7 | -1 | V | V _{GS} = 0V, I _S = -2A |
| Reverse Recovery Charge | Q _{rr} | - | 15 | - | nC | V _{dd} = -9.5V, I _F = -2A, di/dt = 200A/μs |
| Reverse Recovery Time | t _{rr} | - | 25 | - | ns | |
| DYNAMIC CHARACTERISTICS (Note 8) | | | | | | |
| Input Capacitance | C _{iss} | - | 382 | 500 | pF | V _{DS} = -10V, V _{GS} = 0V, f = 1.0MHz |
| Output Capacitance | C _{oss} | - | 204 | 270 | pF | |
| Reverse Transfer Capacitance | C _{rss} | - | 86 | 115 | pF | |
| Series Gate Resistance | R _G | - | 26.1 | 35 | Ω | V _{DS} = 0V, V _{GS} = 0V, f = 1.0MHz |
| Total Gate Charge (4.5V) | Q _g | - | 5.4 | 7.0 | nC | V _{GS} = -4.5V, V _{DS} = -10V, I _D = -2A |
| Gate-Source Charge | Q _{gs} | - | 0.7 | - | nC | |
| Gate-Drain Charge | Q _{gd} | - | 1.5 | - | nC | |
| Turn-On Delay Time | t _{D(on)} | - | 8.5 | - | ns | V _{DD} = -10V, V _{GS} = -4.5V, I _{DS} = -2A, R _G = 2Ω, |
| Turn-On Rise Time | t _r | - | 11.8 | - | ns | |
| Turn-Off Delay Time | t _{D(off)} | - | 47 | - | ns | |
| Turn-Off Fall Time | t _f | - | 56 | - | ns | |

- Notes:
- Device mounted on FR-4 PCB with minimum recommended pad layout.
 - Device mounted on FR4 material with 1-inch² (6.45-cm²), 2-oz. (0.071-mm thick) Cu.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to production testing.

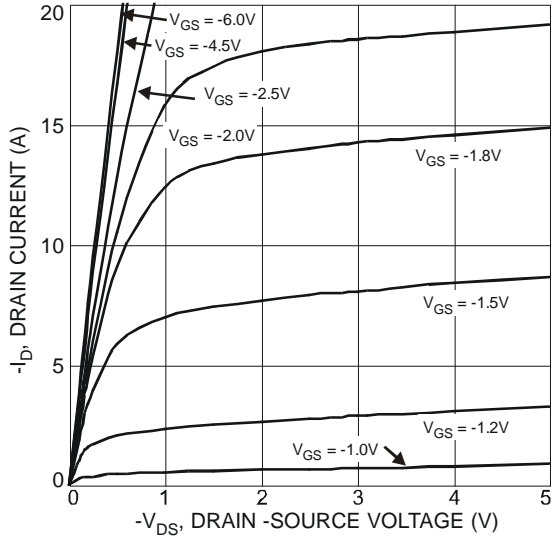


Fig. 1 Typical Output Characteristics

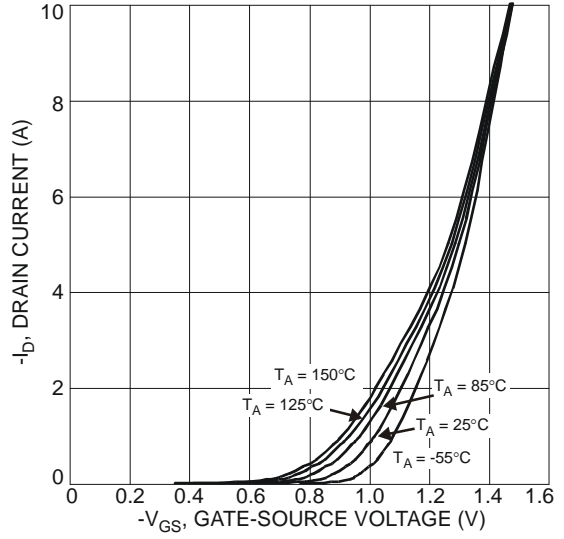


Fig. 2 Typical Transfer Characteristics

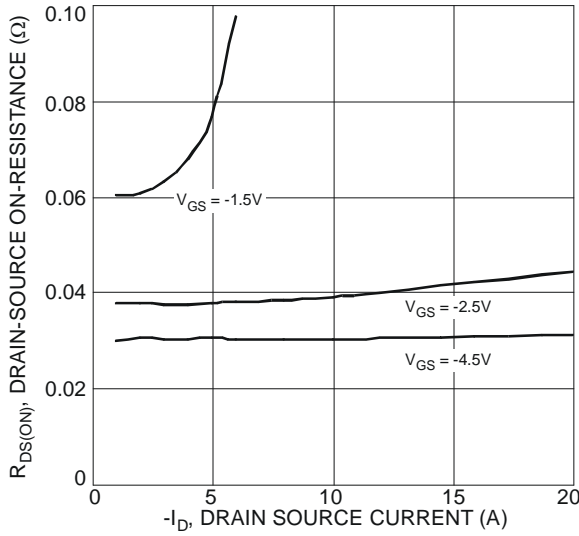


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

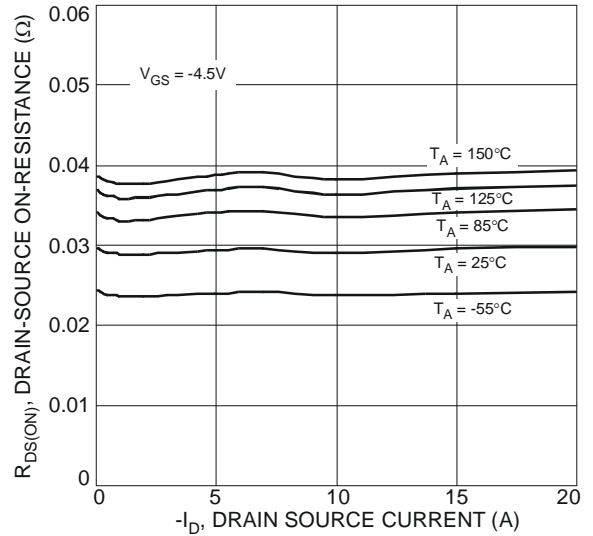


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

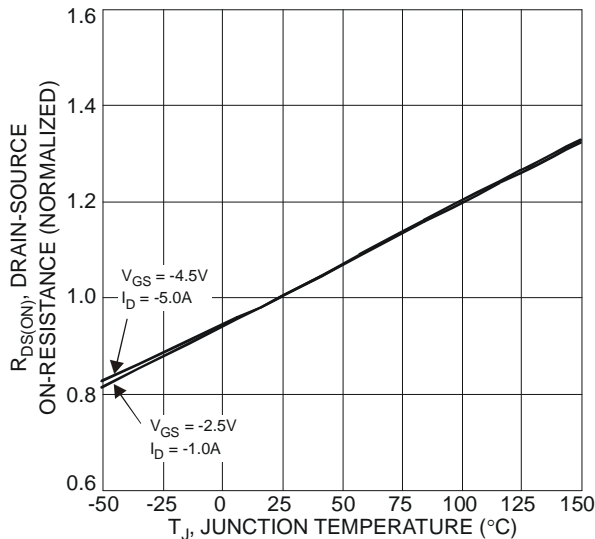


Fig. 5 On-Resistance Variation with Temperature

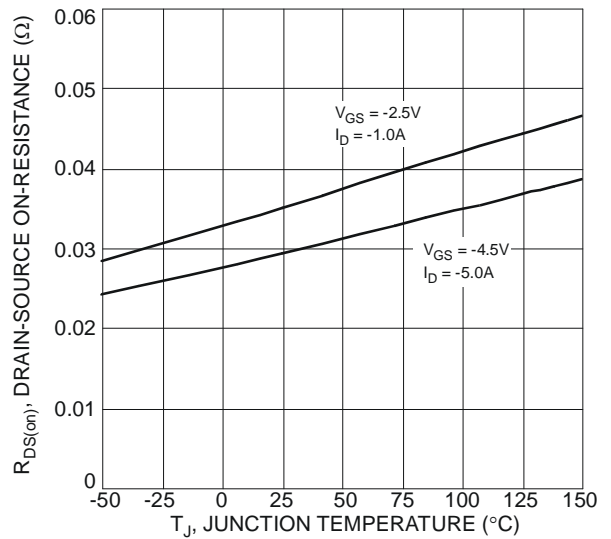


Fig. 6 On-Resistance Variation with Temperature

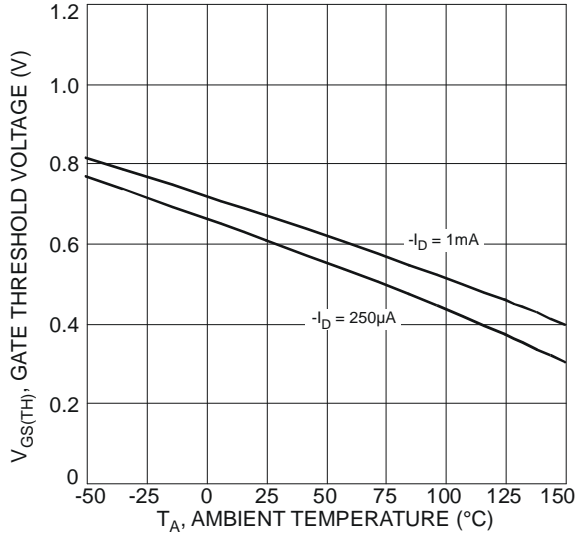


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

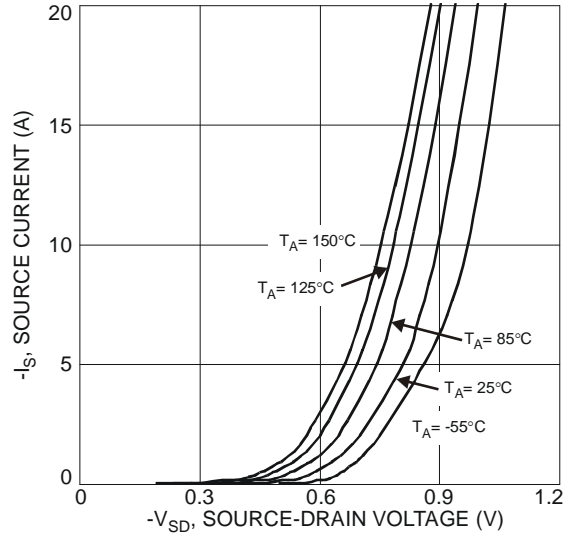


Fig. 8 Diode Forward Voltage vs. Current

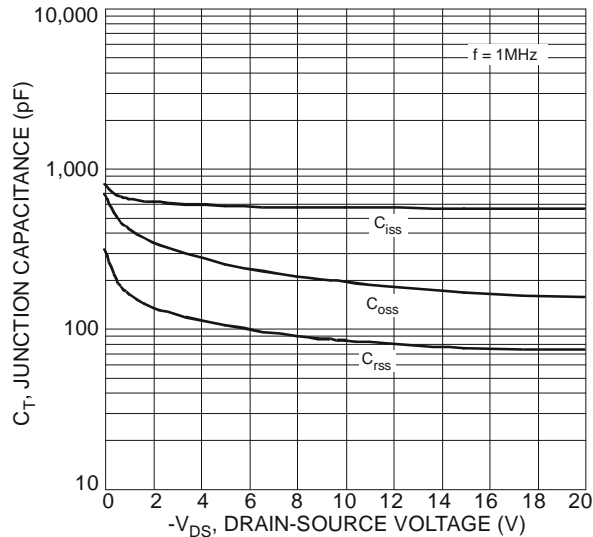


Fig. 9 Typical Junction Capacitance

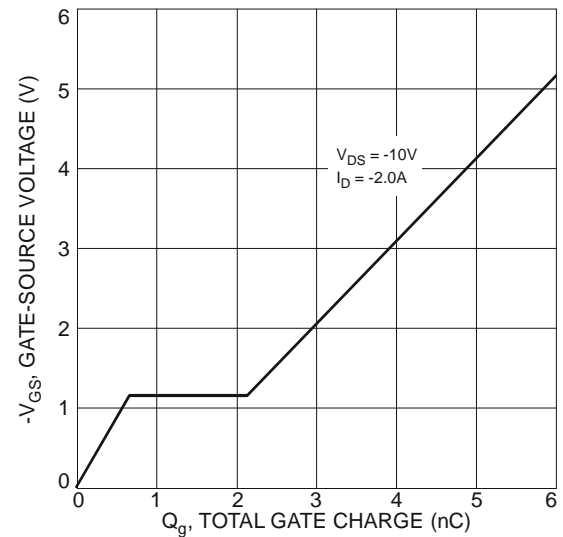


Fig. 10 Gate-Charge Characteristics

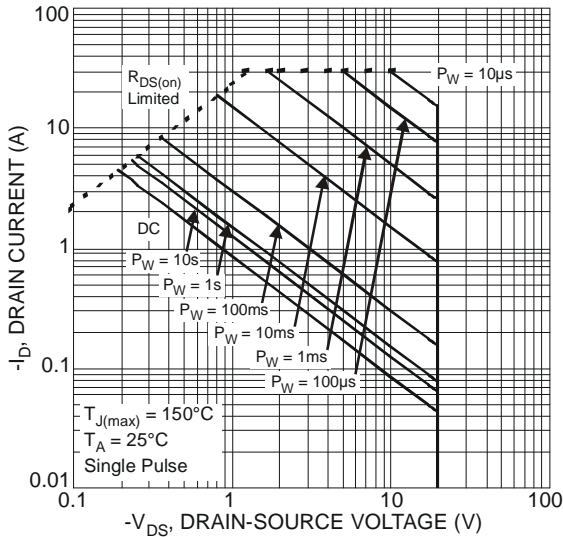
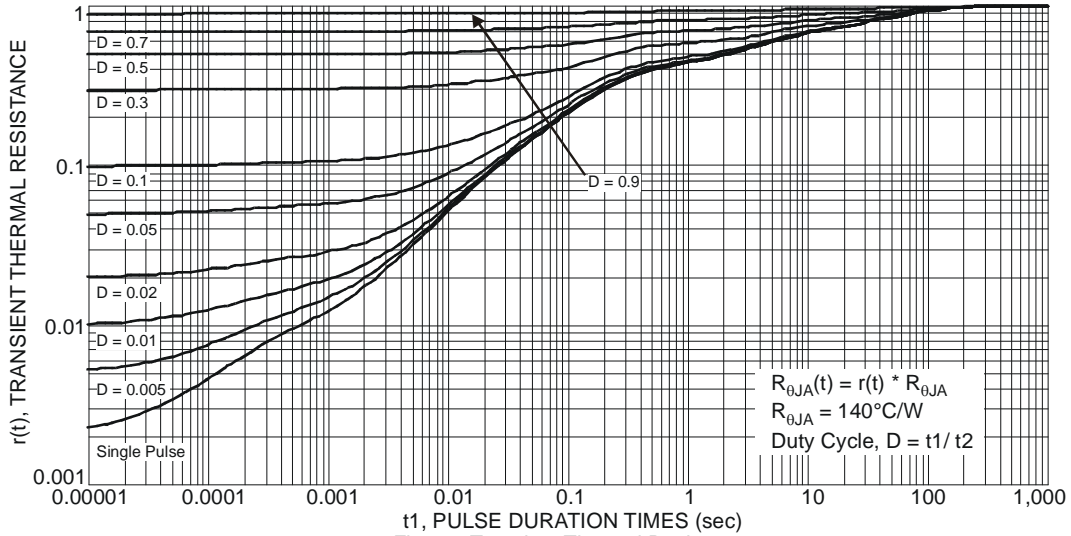
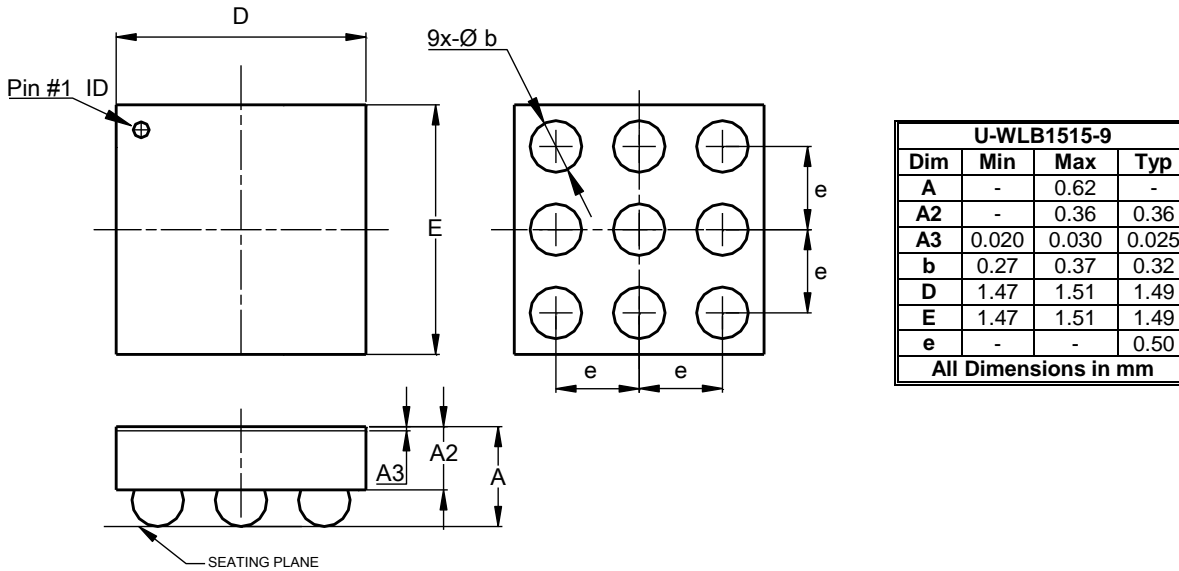


Fig. 11 SOA, Safe Operation Area



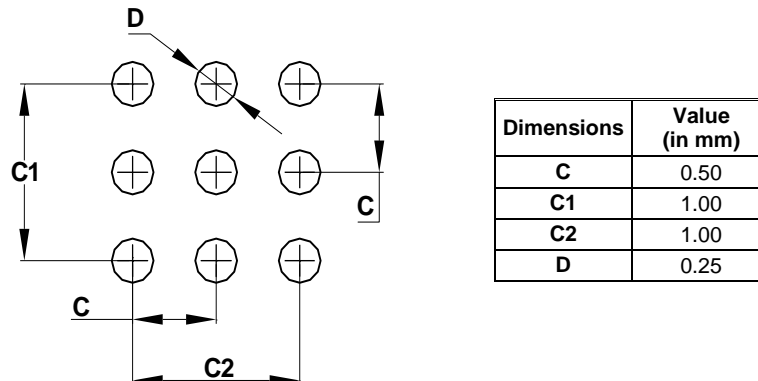
Package Outline Dimensions

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



Suggested Pad Layout

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