

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

| V_{DSS} | $R_{DS(on)}$ | Q_g | Q_{gd} | I_D |
|-----------|---------------|-------|----------|-------|
| -8V | 8.2m Ω | 8.1nC | 1.8nC | -10A |

Description

This 3rd generation Lateral MOSFET (LD-MOS) is engineered to minimize on-state losses and switch ultra-fast, making it ideal for high-efficiency power transfer. It uses Chip-Scale Package (CSP) to increase power density by combining low thermal impedance with minimal $R_{DS(on)}$ per footprint area.

Applications

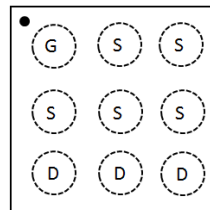
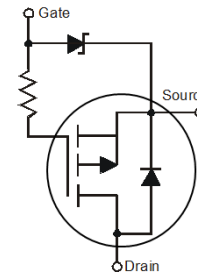
- DC-DC Converters
- Battery Management
- Load Switch

Features

- LD-MOS Technology with the Lowest Figure of Merit:
 - $R_{DS(on)}$ = 8.2m Ω to Minimize On-State Losses
 - Q_g = 8.1nC for Ultra-Fast Switching
- $V_{GS(th)}$ = -0.8V typ. for a Low Turn-On Potential
- CSP with Footprint 1.5mm x 1.5mm
- Height = 0.60mm for Low Profile
- ESD = 6kV 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

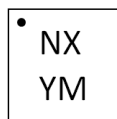
U-WLB1515-9

 Top-View
Pin Configuration


Equivalent Circuit

Ordering Information (Note 4)

| Part Number | Case | Packaging |
|---------------|-------------|-------------------|
| DMP1011UCB9-7 | U-WLB1515-9 | 3,000/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
U-WLB1515-9


NX = Product Type Marking Code
 YM = Date Code Marking
 Y or \bar{Y} = Year (ex: B = 2014)
 M or \bar{M} = Month (ex: 9 = September)

Date Code Key

| Year | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
|------|------|------|------|------|------|------|------|
| Code | Z | A | B | C | D | E | F |

| 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} | -8 | 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 | -10 | A |
| | | T _A = +70°C | | -8 | |
| Continuous Drain Current (Note 6) V _{GS} = -4.5V | Steady State | T _A = +25°C | I _D | -7.4 | A |
| | | T _A = +70°C | | -6.0 | |
| Pulsed Drain Current (Pulse duration 10μs, duty cycle ≤1%) | | | I _{DM} | -50 | A |
| Continuous Source Pin Current (Note 6) | | | I _S | -2 | — |
| Pulsed Source Pin Current (Pulse duration 10μs, duty cycle ≤1%) | | | I _{SM} | -15 | — |
| Continuous Gate Current | | | I _G | -0.5 | A |

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

| Characteristic | Symbol | Value | Units |
|--|-----------------------------------|-------------|-------|
| Total Power Dissipation (Note 5) | P _D | 0.89 | W |
| Total Power Dissipation (Note 6) | P _D | 1.57 | W |
| Thermal Resistance, Junction to Ambient (Note 5) | R _{θJA} | +142.1 | °C/W |
| Thermal Resistance, Junction to Ambient (Note 6) | R _{θJA} | +80.5 | °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} | -8 | — | — | V | V _{GS} = 0V, I _D = -250μA |
| Gate to Source Voltage | BV _{GSS} | -6 | — | — | V | V _{DS} = 0V, I _D = -250μA |
| Zero Gate Voltage Drain Current | I _{DSS} | — | — | -1 | μA | V _{DS} = -4.0V, V _{GS} = 0V |
| Gate-Source Leakage | I _{GSS} | — | — | -100 | nA | V _{GS} = -4.0V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 7) | | | | | | |
| Gate Threshold Voltage | V _{GS(th)} | -0.4 | -0.8 | -1.1 | V | V _{DS} = V _{GS} , I _D = -250μA |
| Static Drain-Source On-Resistance | R _{DS(on)} | — | 8.2 | 10 | mΩ | V _{GS} = -4.5V, I _D = -2A |
| | | | 10 | 13 | | V _{GS} = -3.0V, I _D = -2A |
| | | | 11 | 14 | | V _{GS} = -2.5V, I _D = -2A |
| Forward Transfer Admittance | Y _{fs} | — | 16.8 | — | S | V _{DS} = -4V, 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} | — | 6.3 | — | nC | V _{dd} = -5V, I _F = -2A, |
| Reverse Recovery Time | t _{rr} | — | 18.5 | — | ns | di/dt = 200A/μs |
| DYNAMIC CHARACTERISTICS (Note 8) | | | | | | |
| Input Capacitance | C _{iss} | — | 817 | 1,060 | pF | V _{DS} = -4V, V _{GS} = 0V, f = 1.0MHz |
| Output Capacitance | C _{oss} | — | 595 | 770 | pF | |
| Reverse Transfer Capacitance | C _{rss} | — | 269 | 350 | pF | |
| Series Gate Resistance | R _G | — | 1.9 | — | Ω | V _{DS} = 0V, V _{GS} = 0V, f = 1.0MHz |
| Total Gate Charge (4.5V) | Q _g | — | 8.1 | 10.5 | nC | V _{GS} = -4.5V, V _{DS} = -4V, I _D = -2A |
| Gate-Source Charge | Q _{gs} | — | 0.9 | — | nC | |
| Gate-Drain Charge | Q _{gd} | — | 1.8 | — | nC | |
| Turn-On Delay Time | t _{D(on)} | — | 6.2 | 10 | ns | V _{DD} = -4V, V _{GS} = -4.5V, I _{DS} = -2A, R _G = 10Ω, |
| Turn-On Rise Time | t _r | — | 22.6 | — | ns | |
| Turn-Off Delay Time | t _{D(off)} | — | 30.1 | 48 | ns | |
| Turn-Off Fall Time | t _f | — | 22.7 | — | ns | |

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

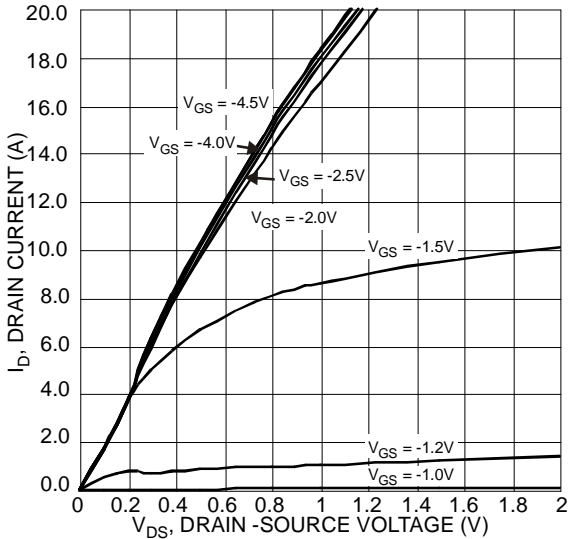


Figure 1 Typical Output Characteristics

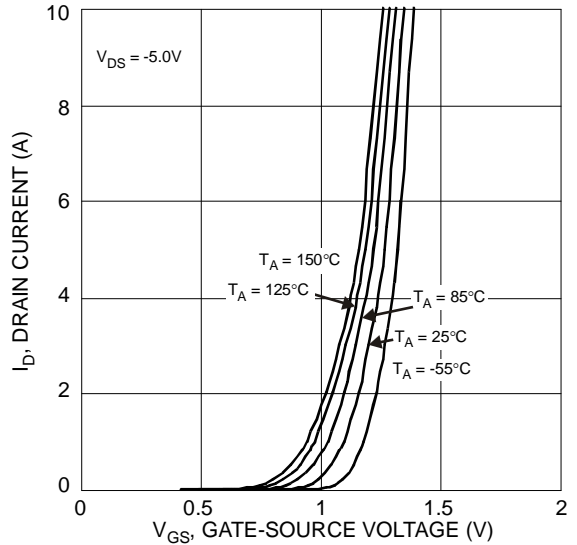


Figure 2 Typical Transfer Characteristics

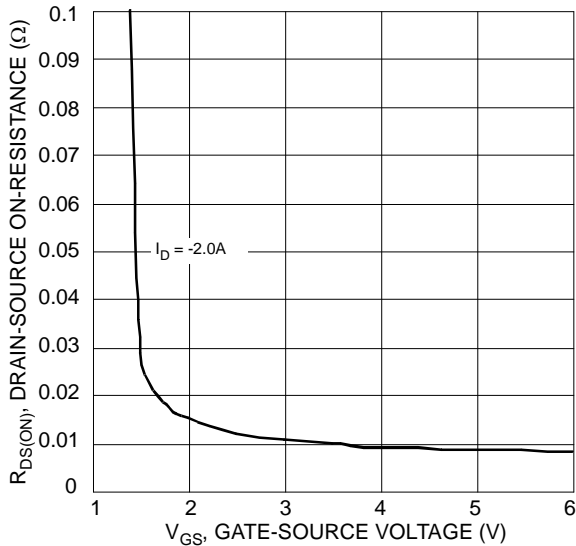


Figure 3 Typical Transfer Characteristic

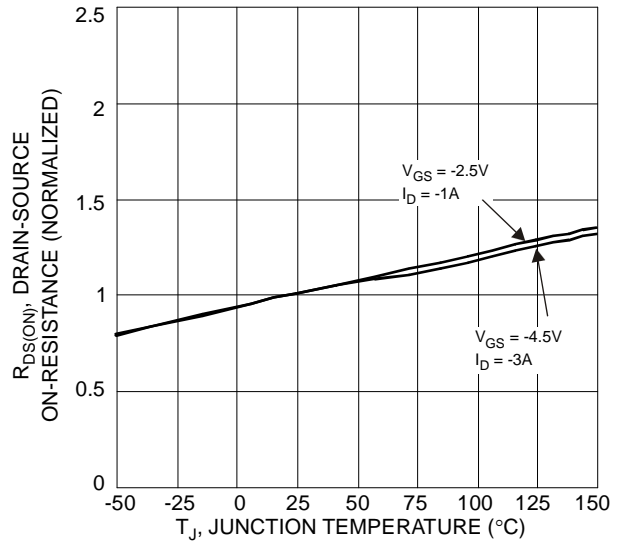


Figure 4 On-Resistance Variation with Temperature

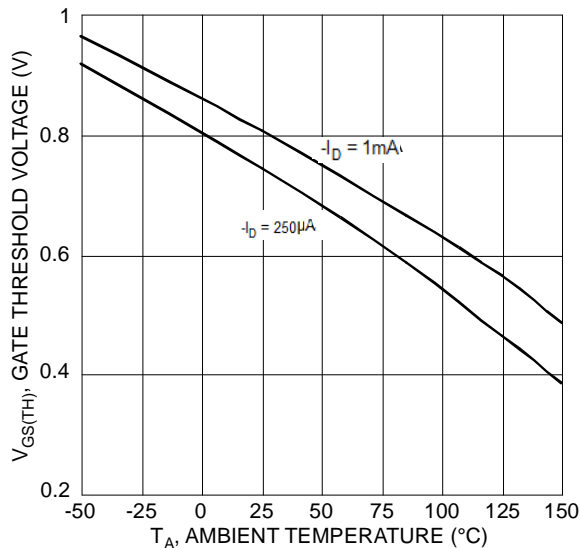


Figure 5 Gate Threshold Variation vs. Ambient Temperature

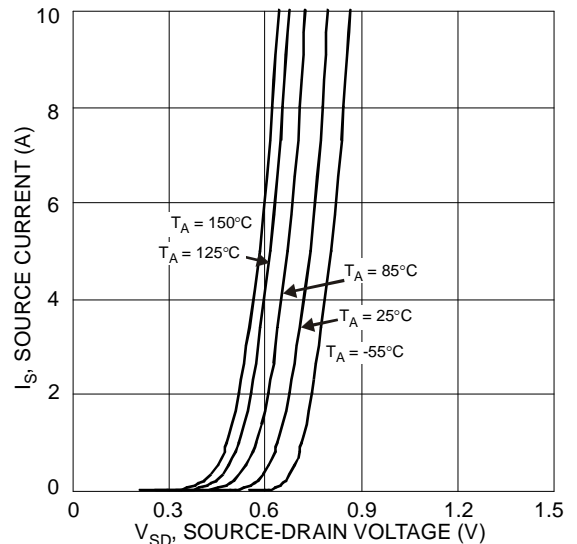
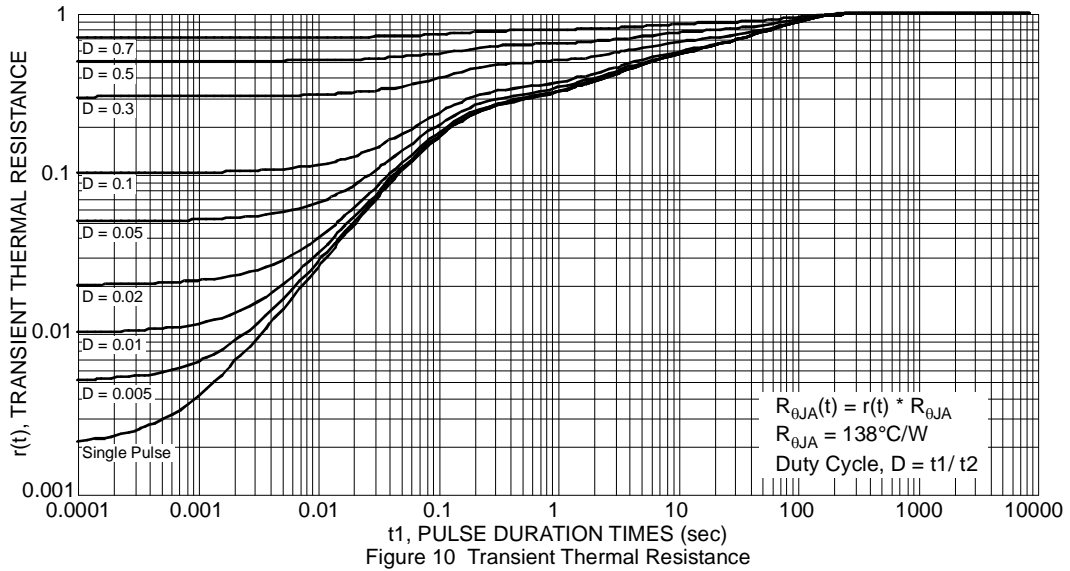
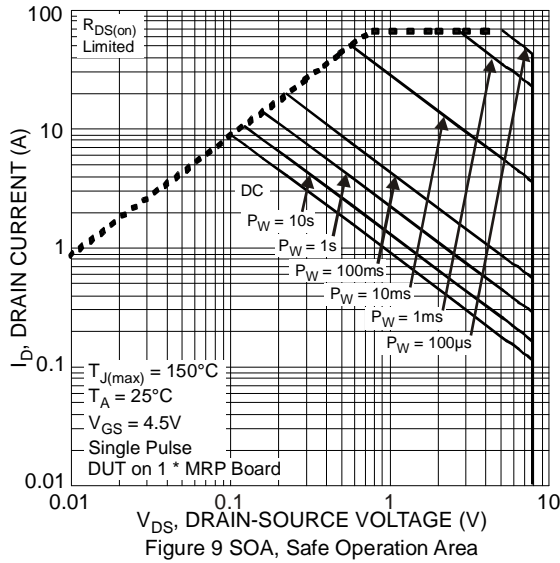
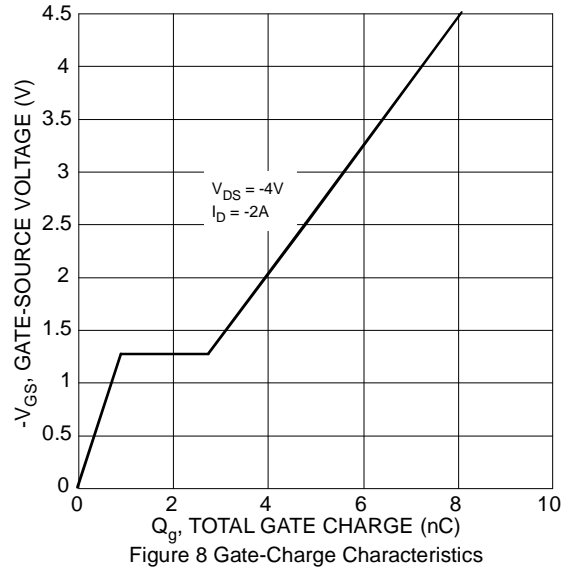
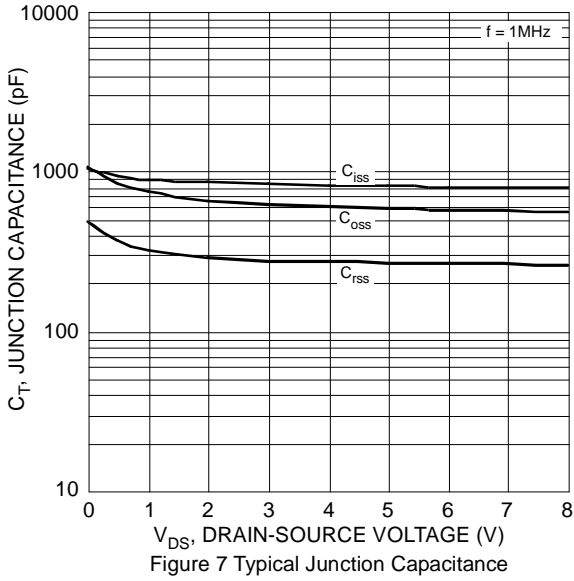
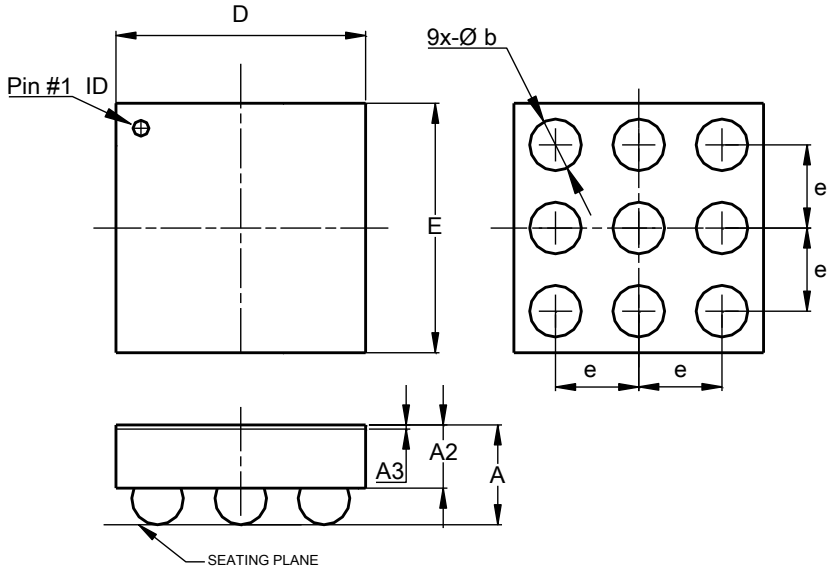


Figure 6 Diode Forward Voltage vs. Current



Package Outline Dimensions

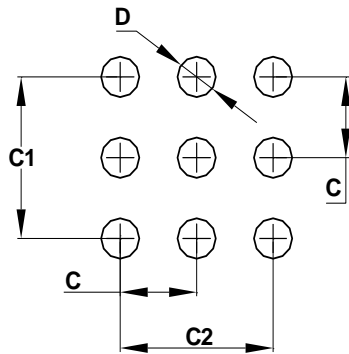
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



| U-WLB1515-9 | | | |
|----------------------|-------|-------|-------|
| Dim | Min | Max | Typ |
| A | - | 0.60 | - |
| A2 | - | 0.36 | 0.36 |
| A3 | 0.020 | 0.030 | 0.025 |
| b | 0.22 | 0.32 | 0.27 |
| D | 1.47 | 1.50 | 1.49 |
| E | 1.47 | 1.50 | 1.49 |
| e | - | - | 0.50 |
| 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 | 0.50 |
| C1 | 1.00 |
| C2 | 1.00 |
| D | 0.25 |

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