

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

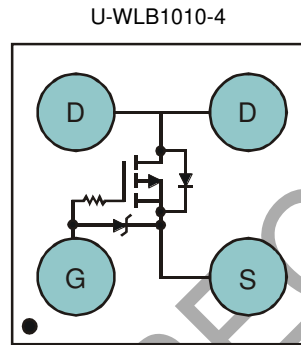
| V_{DS} | $R_{DS(ON)}$ | Q_g | Q_{gd} | I_D |
|----------|--------------|-------|----------|-------|
| -12V | 65m Ω | 2.5nC | 0.6nC | -3.3A |

Description

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

Applications

- Battery managements
- Load switches
- Battery protections



Top View
Equivalent Circuit



Features

- LD-MOS Technology with the Lowest Figure of Merit:
 $R_{DS(ON)} = 65m\Omega$ to Minimize On-State Losses
 $Q_g = 2.5nC$ for Ultra-Fast Switching
- $V_{GS(TH)} = -0.6V$ typ. for a Low Turn-On Potential
- CSP with Footprint 1.0mm \times 1.0mm
- 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)**
- For automotive applications requiring specific change control (i.e.: parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please refer to the related automotive grade (Q-suffix) part. A listing can be found at**
<https://www.diodes.com/products/automotive/automotive-products/>.
- This part is qualified to JEDEC standards (as references in AEC-Q) for High Reliability.**
<https://www.diodes.com/quality/product-definitions/>

Mechanical Data

- Package: U-WLB1010-4
- Terminal Connections: See Diagram Below
- Weight: 0.0018 grams (Approximate)

Ordering Information (Note 4)

| Part Number | Package | Packaging | |
|---------------|-------------|-----------|-------------|
| | | Qty. | Carrier |
| DMP1080UCB4-7 | U-WLB1010-4 | 3,000 | Tape & Reel |

- Notes:
- No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
 - See <https://www.diodes.com/quality/lead-free/> 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 <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information

U-WLB1010-4



BW = Product Type Marking Code
YM = Date Code Marking
Y = Year (ex: J = 2022)
M = Month (ex: 9 = September)

Date Code Key

| Year | 2011 | ... | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|------|------|-----|------|------|------|------|------|------|------|------|------|------|
| Code | Y | ... | J | K | L | M | N | O | P | R | S | T |

| 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 | Unit |
|---|--------------|------------------------|------------------|-------|------|
| Drain-Source Voltage | | | V _{DSS} | -12 | 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 | -3.3 | A |
| | | T _A = +70°C | | -2.7 | |
| Continuous Drain Current (Note 5) V _{GS} = -2.5V | Steady State | T _A = +25°C | I _D | -3.0 | A |
| | | T _A = +70°C | | -2.4 | |
| Pulsed Drain Current (Note 6) | | | I _{DM} | -20 | A |

Thermal Characteristics

| Characteristic | Symbol | Value | Unit |
|--|-----------------------------------|-------------|------|
| Power Dissipation (Note 7) | P _D | 0.82 | W |
| Thermal Resistance, Junction to Ambient @T _A = +25°C (Note 7) | R _{θJA} | 150 | °C/W |
| Thermal Resistance, Junction to Case @T _C = +25°C (Note 7) | R _{θJC} | 42.66 | °C/W |
| Power Dissipation (Note 5) | P _D | 1.59 | W |
| Thermal Resistance, Junction to Ambient @T _A = +25°C (Note 5) | R _{θJA} | 80.29 | °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} | -12 | — | — | V | V _{GS} = 0V, I _D = -250μA |
| Gate-Source Breakdown Voltage | BV _{GSS} | -6.0 | — | — | V | V _{DS} = 0V, I _G = -250μA |
| Zero Gate Voltage Drain Current T _J = +25°C | I _{DSS} | — | — | -1 | μA | V _{DS} = -9.6V, V _{GS} = 0V |
| Gate-Source Leakage | I _{GSS} | — | — | -100 | nA | V _{GS} = -6V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 8) | | | | | | |
| Gate Threshold Voltage | V _{GS(TH)} | -0.4 | -0.6 | -1.0 | V | V _{DS} = V _{GS} , I _D = -250μA |
| Static Drain-Source On-Resistance | R _{DS(ON)} | — | 65 | 80 | mΩ | V _{GS} = -4.5V, I _D = -500mA |
| | | — | 77 | 93 | | V _{GS} = -2.5V, I _D = -500mA |
| | | — | 108 | 130 | | V _{GS} = -1.5V, I _D = -500mA |
| Forward Transfer Admittance | Y _{fs} | — | 4 | — | S | V _{DS} = -6V, I _D = -500mA |
| Diode Forward Voltage | V _{SD} | — | -0.6 | -1.0 | V | V _{GS} = 0V, I _S = -500mA |
| Reverse Recovery Charge | Q _{RR} | — | 2.0 | — | nC | V _{dd} = -4.0V, I _F = -0.5A, di/dt = 100A/μs |
| Reverse Recovery Time | t _{RR} | — | 9.5 | — | ns | |
| DYNAMIC CHARACTERISTICS (Note 9) | | | | | | |
| Input Capacitance | C _{iss} | — | 213 | 350 | pF | V _{DS} = -6V, V _{GS} = 0V, f = 1.0MHz |
| Output Capacitance | C _{oss} | — | 119 | 250 | | |
| Reverse Transfer Capacitance | C _{rss} | — | 54.4 | 90 | | |
| Total Gate Charge | Q _g | — | 2.5 | 5 | nC | V _{GS} = -4.5V, V _{DS} = -6V, I _D = -500mA |
| Gate-Source Charge | Q _{gs} | — | 0.3 | — | | |
| Gate-Drain Charge | Q _{gd} | — | 0.6 | — | | |
| Gate Charge at V _{th} | Q _{g(th)} | — | 0.15 | — | | |
| Turn-On Delay Time | t _{D(ON)} | — | 16.7 | — | ns | V _{DS} = -6V, V _{GS} = -2.5V, R _G = 20Ω, I _D = -500mA |
| Turn-On Rise Time | t _r | — | 20.6 | — | | |
| Turn-Off Delay Time | t _{D(OFF)} | — | 38.4 | — | | |
| Turn-Off Fall Time | t _f | — | 28.4 | — | | |

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

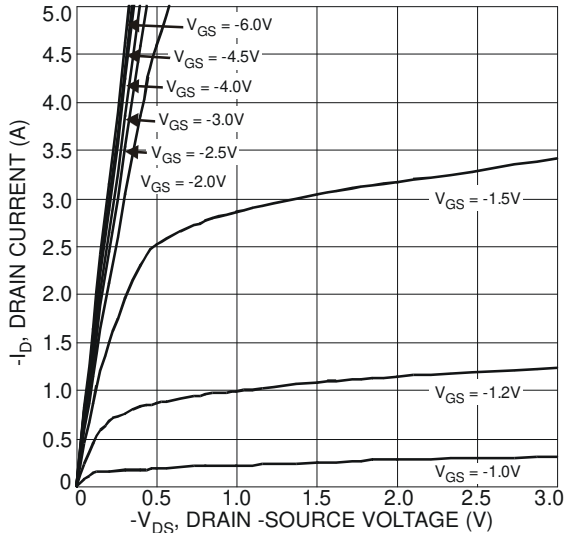


Fig. 1 Typical Output Characteristics

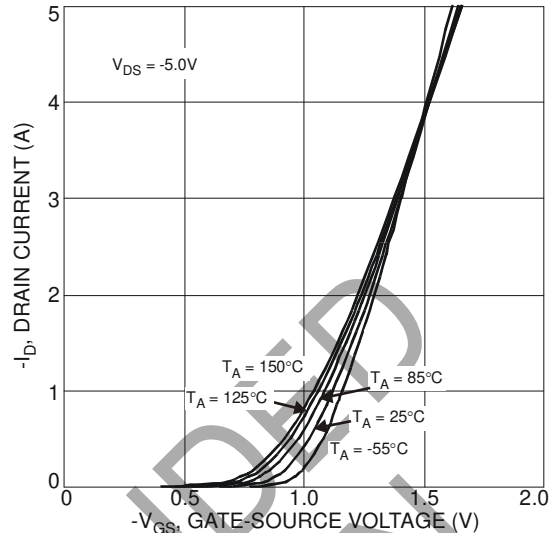


Fig. 2 Typical Transfer Characteristics

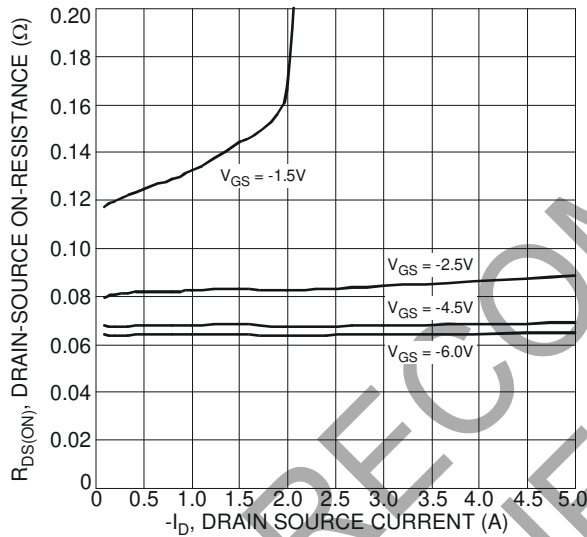


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

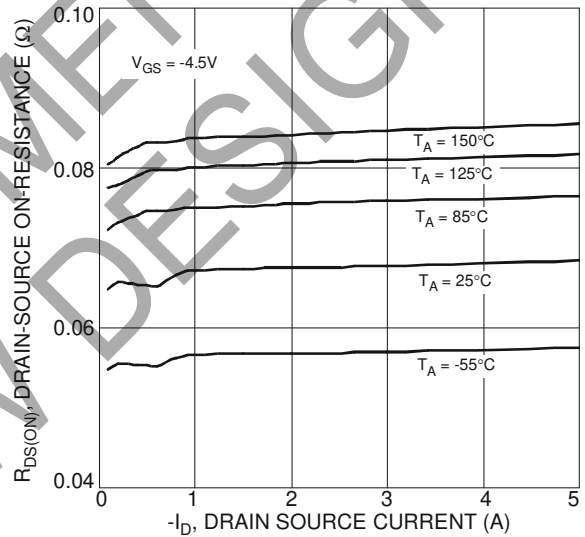


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

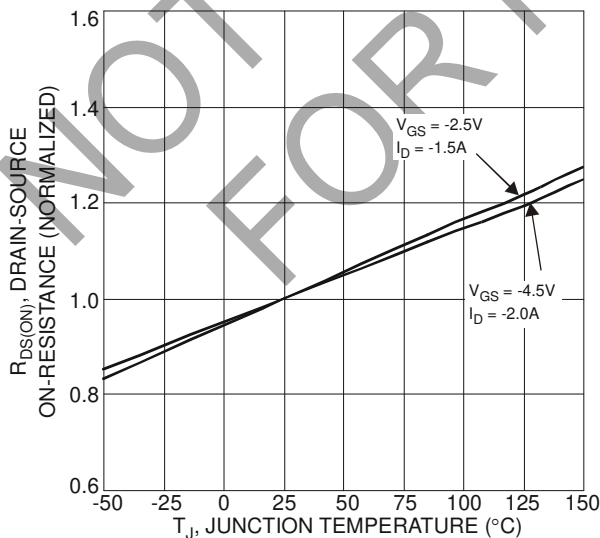


Fig. 5 On-Resistance Variation with Temperature

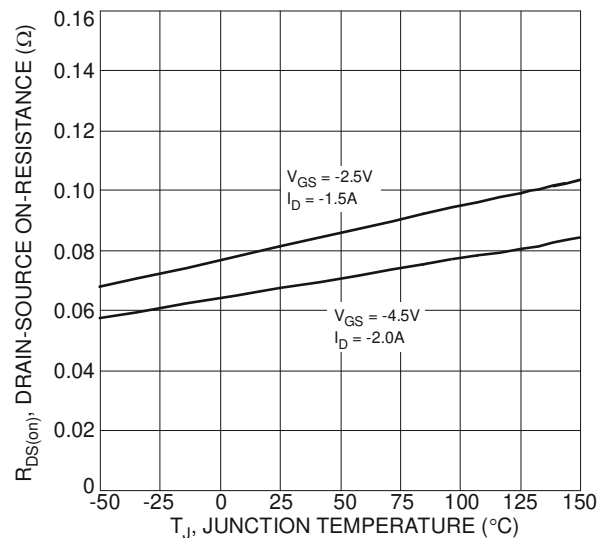


Fig. 6 On-Resistance Variation with Temperature

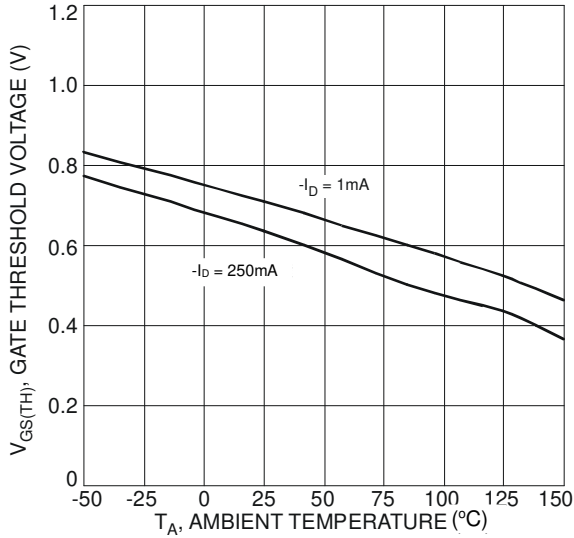


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

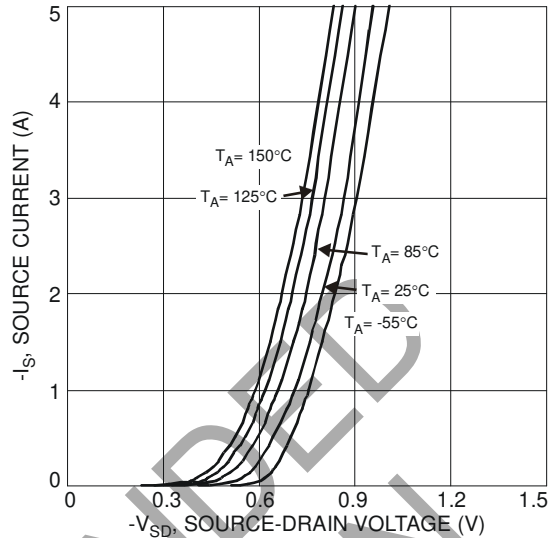


Fig. 8 Diode Forward Voltage vs. Current

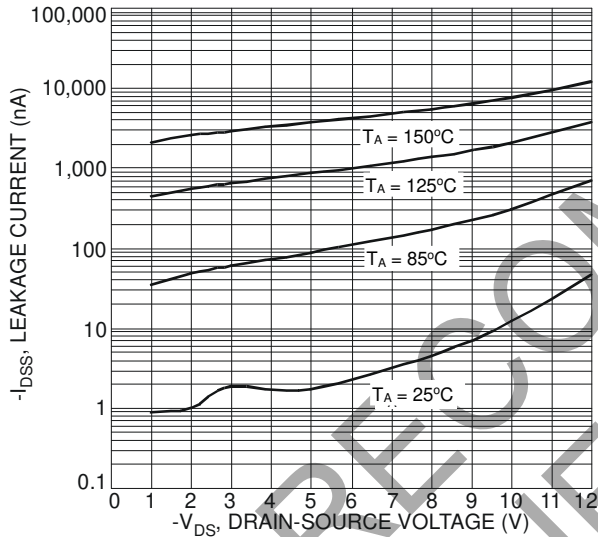


Fig. 9 Typical Drain-Source Leakage Current vs. Voltage

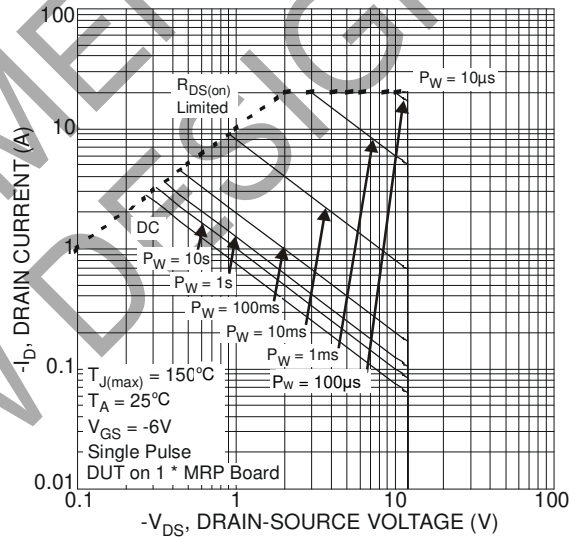


Fig. 10 SOA, Safe Operation Area

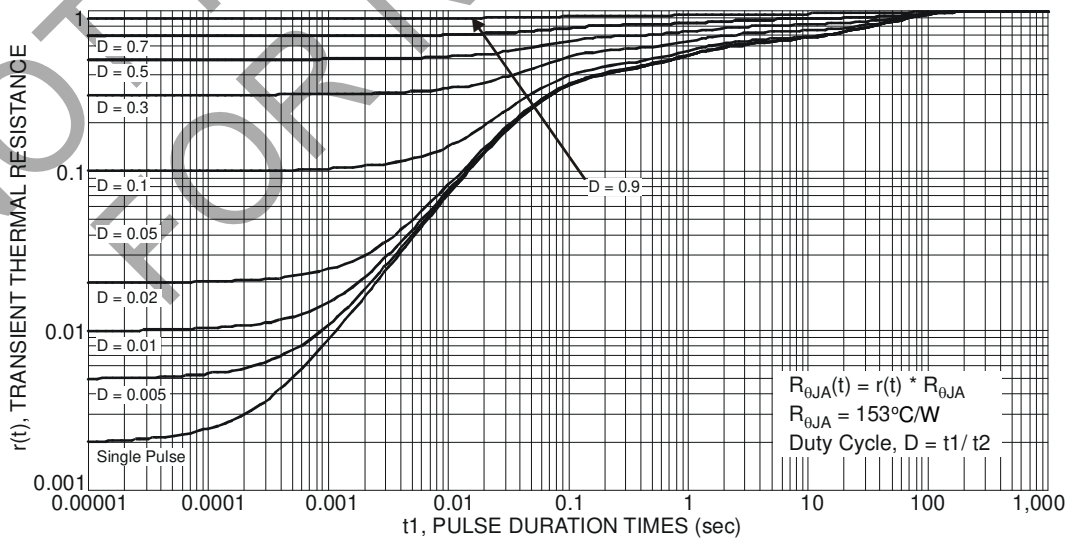
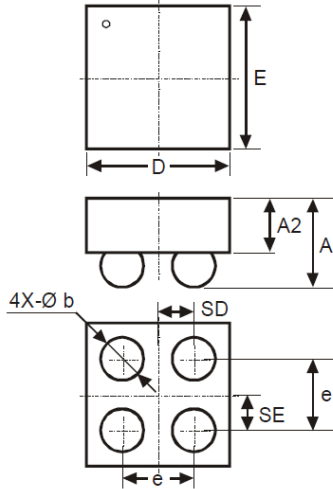


Fig. 11 Transient Thermal Resistance

Package Outline Dimensions

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

U-WLB1010-4

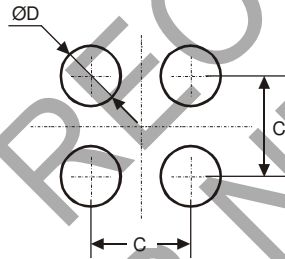


| U-WLB1010-4 | | | |
|----------------------|------|------|------|
| Dim | Min | Max | Typ |
| D | 0.95 | 1.05 | 1.00 |
| E | 0.95 | 1.05 | 1.00 |
| A | — | 0.62 | — |
| A2 | — | — | 0.38 |
| b | 0.25 | 0.35 | 0.30 |
| e | — | — | 0.50 |
| SD | — | — | 0.25 |
| SE | — | — | 0.25 |
| All Dimensions in mm | | | |

Suggested Pad Layout

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

U-WLB1010-4



| Dimensions | Value (in mm) |
|------------|---------------|
| C | 0.50 |
| D | 0.25 |

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