

Product Summary

| $V_{(BR)DSS}$ | $R_{DS(ON)}$ | I_D $T_A = 25^\circ C$ |
|---------------|---------------------------------|-----------------------------|
| -20V | 70m Ω @ $V_{GS} = -4.5V$ | 3.5 A |
| | 90m Ω @ $V_{GS} = -2.5V$ | 3.0 A |

Description and Applications

This new generation MOSFET has been 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.

- Battery Management
- Load Switch
- Battery Protection

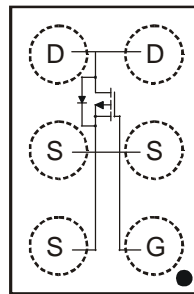
Features and Benefits

- Low Q_g & Q_{gd}
- Small Footprint
- Low Profile 0.62mm height
- **Lead Free By Design/RoHS Compliant (Note 1)**
- **"Green" Device Halogen and Antimony Free (Note 2)**
- **Qualified to AEC-Q101 Standards for High Reliability**

Mechanical Data

- Case: U-WLB1510-6
- Terminal Connections: See Diagram Below
- Weight: 0.0018 grams (approximate)

U-WLB1510-6



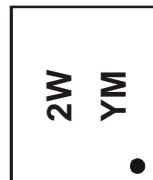
Top View

Ordering Information (Note 3)

| Part Number | Case | Packaging |
|---------------|-------------|------------------|
| DMP2070UCB6-7 | U-WLB1510-6 | 3000/Tape & Reel |

- Notes:
1. No purposefully added lead.
 2. Diodes Inc.'s "Green" policy can be found on our website at <http://www.diodes.com>.
 3. For packaging details, go to our website at <http://www.diodes.com>

Marking Information



2W = 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} | ±8 | V |
| Continuous Drain Current (Note 4) V _{GS} = -4.5V | I _D | T _A = 25°C Steady State | -2.5 |
| | | T _A = 70°C | -2.0 |
| Continuous Drain Current (Note 5) V _{GS} = -4.5V | I _D | T _A = 25°C Steady State | -3.5 |
| | | T _A = 70°C | -2.8 |
| Pulsed Drain Current (Note 6) | I _{DM} | -12 | A |
| Maximum Continuous Body Diode Forward Current (Note 5) | I _S | -1.8 | A |

Thermal Characteristics @T_A = 25°C unless otherwise specified

| Characteristic | Symbol | Value | Units |
|--|-----------------------------------|-------------|-------|
| Total Power Dissipation (Note 4) | P _D | 0.92 | W |
| Total Power Dissipation (Note 5) | P _D | 1.47 | W |
| Thermal Resistance, Junction to Ambient (Note 4) | R _{θJA} | 136 | °C/W |
| Thermal Resistance, Junction to Ambient (Note 5) | R _{θJA} | 84 | °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 |
| 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} = ±8V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 7) | | | | | | |
| 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)} | - | 55 | 70 | mΩ | V _{GS} = -4.5V, I _D = -1A |
| | | | 70 | 90 | | V _{GS} = -2.5V, I _D = -1A |
| | | | 90 | 110 | | V _{GS} = -1.8V, I _D = -1A |
| | | | 110 | 150 | | V _{GS} = -1.5V, I _D = -1A |
| Forward Transfer Admittance | Y _{fs} | - | 12 | - | S | V _{DS} = -10V, I _D = -1A |
| Diode Forward Voltage (Note 5) | V _{SD} | - | -0.7 | -1 | V | V _{GS} = 0V, I _S = -1A |
| DYNAMIC CHARACTERISTICS (Note 8) | | | | | | |
| Input Capacitance | C _{iss} | - | 210 | - | pF | V _{DS} = -10V, V _{GS} = 0V, f = 1.0MHz |
| Output Capacitance | C _{oss} | - | 92 | - | pF | |
| Reverse Transfer Capacitance | C _{rss} | - | 38 | - | pF | |
| Series Gate Resistance | R _G | - | 5.3 | - | Ω | V _{DS} = 0V, V _{GS} = 0V, f = 1MHz |
| Total Gate Charge (4.5V) | Q _g | - | 2.9 | - | nC | V _{GS} = -4.5V, V _{DS} = -10V, I _D = -1A, |
| Gate-Source Charge | Q _{gs} | - | 0.3 | - | nC | |
| Gate-Drain Charge | Q _{gd} | - | 0.5 | - | nC | |
| Turn-On Delay Time | t _{D(on)} | - | 7.3 | - | ns | V _{DD} = -10V, V _{GS} = -4.5V, I _{DS} = -1A, R _G = 20Ω, |
| Turn-On Rise Time | t _r | - | 14.0 | - | ns | |
| Turn-Off Delay Time | t _{D(off)} | - | 42.6 | - | ns | |
| Turn-Off Fall Time | t _f | - | 32 | - | 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
 - 300ms pulse, pulse duty cycle ≤ 2%
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to production testing.

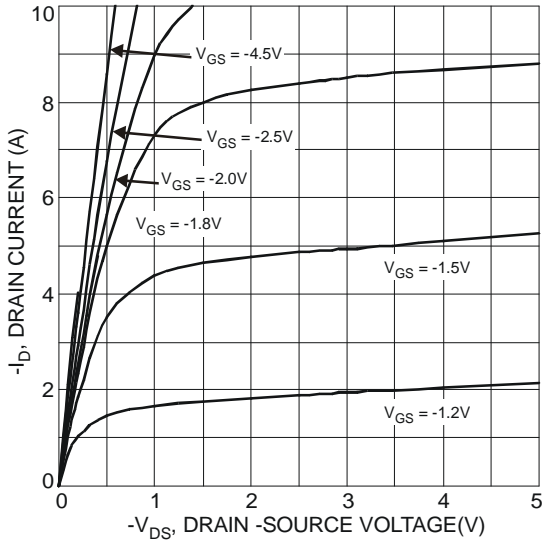


Fig. 1 Typical Output Characteristics

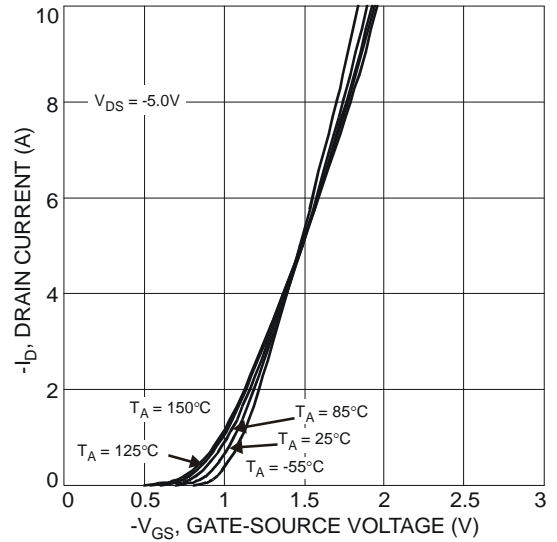


Fig. 2 Typical Transfer Characteristics

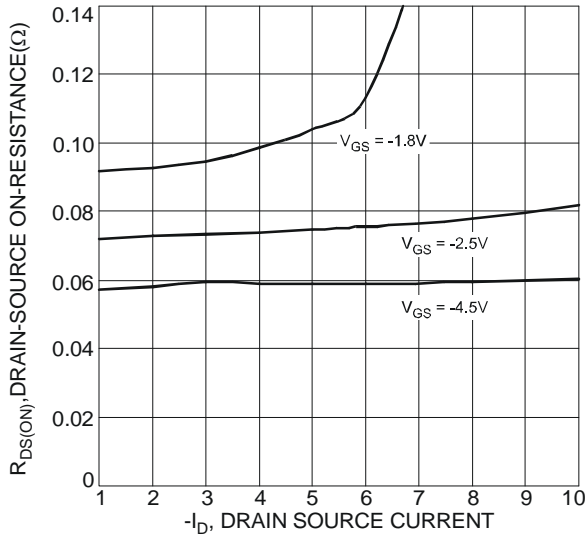


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

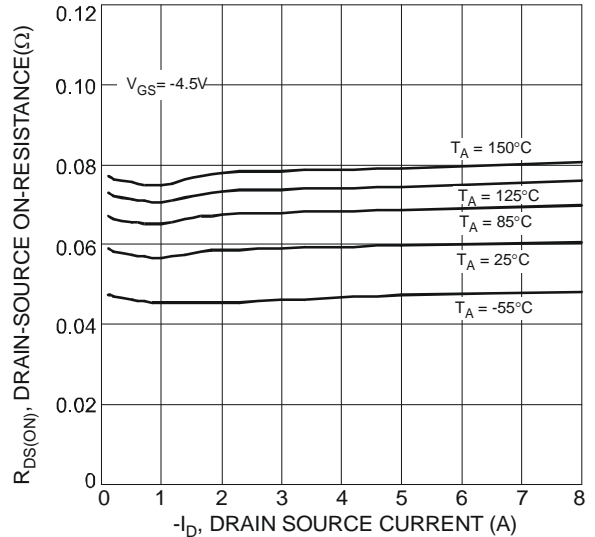


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

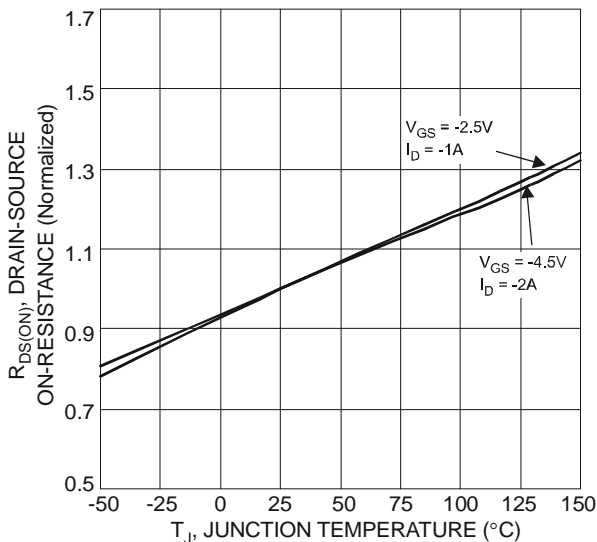


Fig. 5 On-Resistance Variation with Temperature

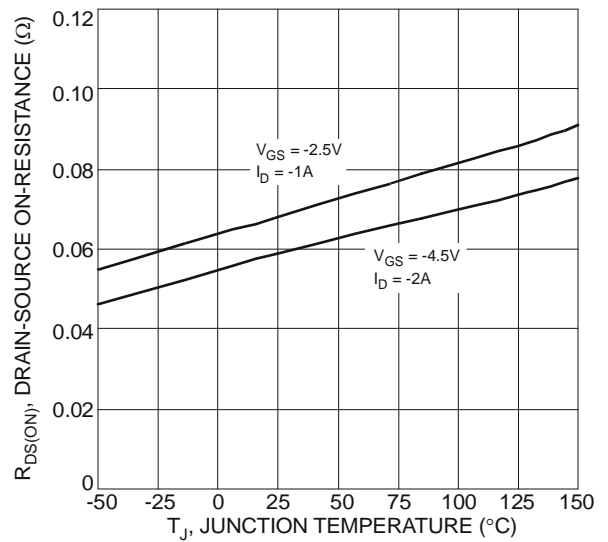


Fig. 6 On-Resistance Variation with Temperature

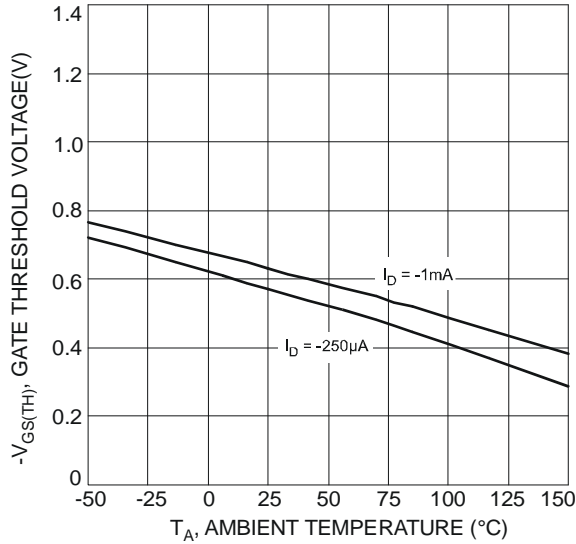


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

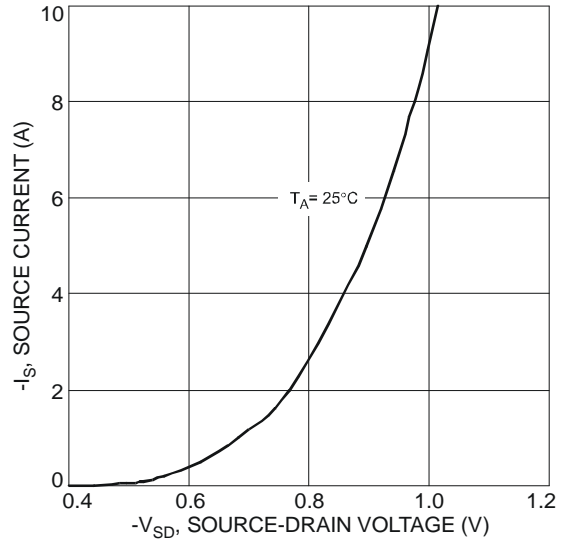


Fig. 8 Diode Forward Voltage vs. Current

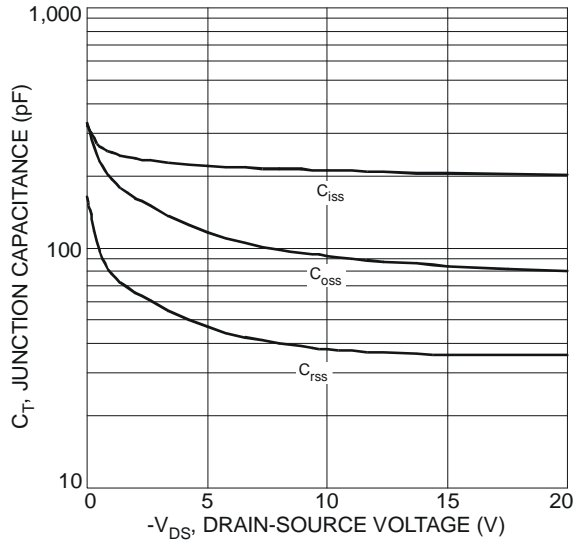


Fig. 9 Typical Junction Capacitance

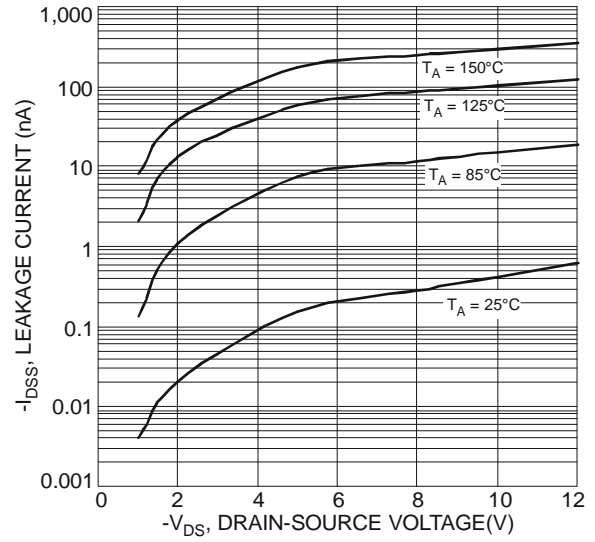


Fig. 10 Typical Drain-Source Leakage Current vs. Voltage

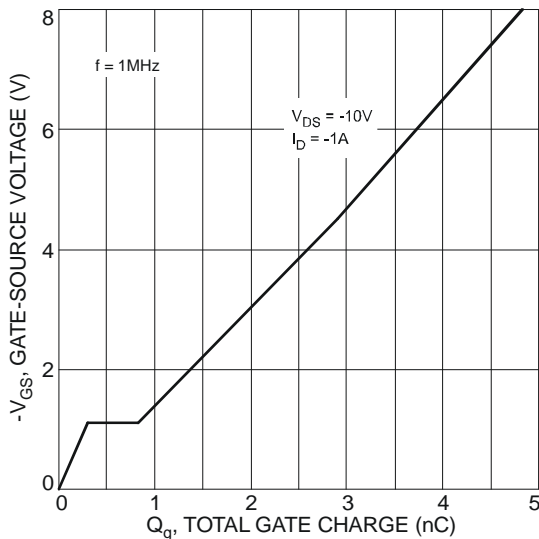


Fig. 11 Gate-Charge Characteristics

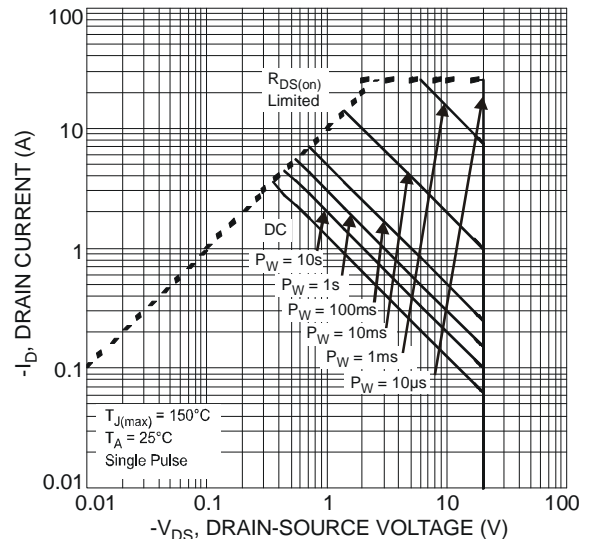


Fig. 12 SOA, Safe Operation Area

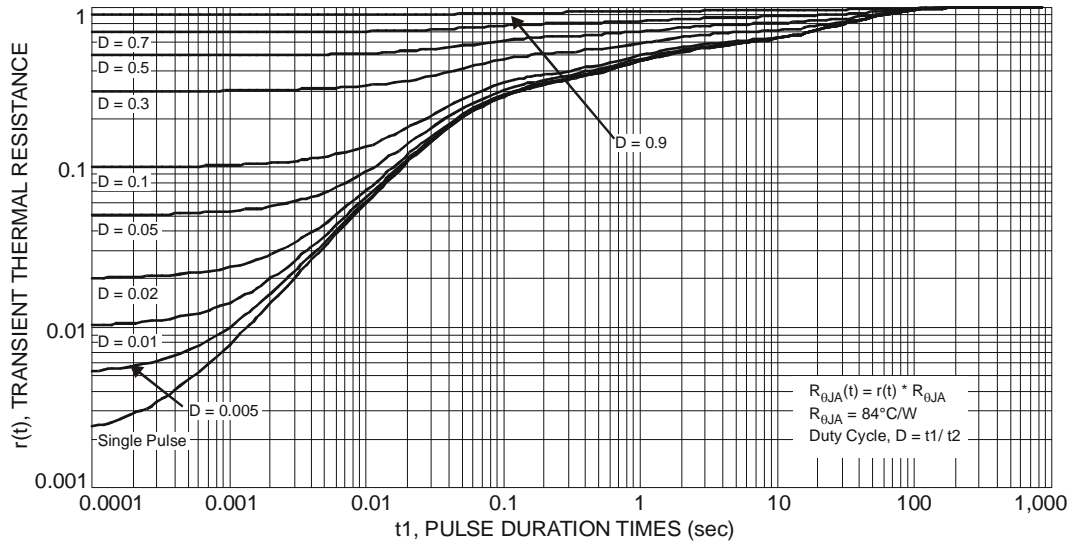
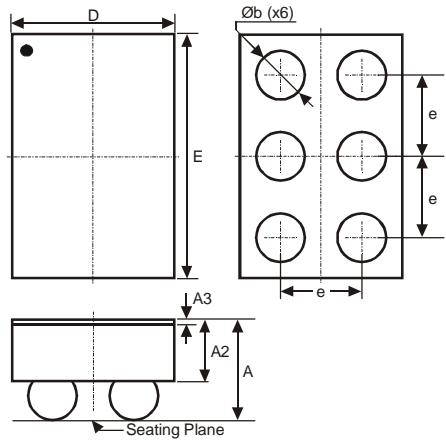


Fig. 13 Transient Thermal Resistance

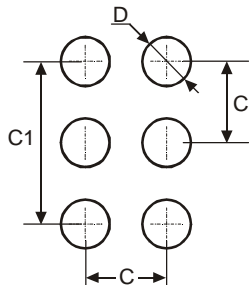
Package Outline Dimensions



| U-WLB1510-6 | | | |
|-------------|-------|-------|-------|
| Dim | Min | Max | Typ |
| D | 0.90 | 1.00 | 1.00 |
| E | 1.40 | 1.50 | 1.50 |
| A | — | 0.62 | — |
| A2 | — | — | 0.38 |
| A3 | 0.020 | 0.030 | 0.025 |
| b | 0.27 | 0.37 | 0.32 |
| e | — | — | 0.50 |

All Dimensions in mm

Suggested Pad Layout



| Dimensions | Value (in mm) |
|------------|---------------|
| C | 0.50 |
| C1 | 1.00 |
| D | 0.25 |

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