

## Product Summary

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

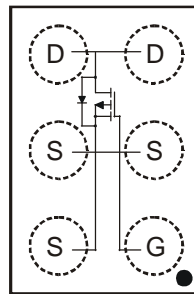
## Features and Benefits

- 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



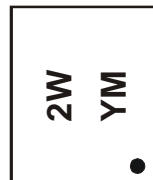
Top View

## 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<sub>A</sub> = 25°C unless otherwise specified

Characteristic	Symbol	Value	Units
Drain-Source Voltage	V <sub>DSS</sub>	-20	V
Gate-Source Voltage	V <sub>GSS</sub>	±8	V
Continuous Drain Current (Note 4) V <sub>GS</sub> = -4.5V	I <sub>D</sub>	T <sub>A</sub> = 25°C Steady State	-2.5
		T <sub>A</sub> = 70°C	-2.0
Continuous Drain Current (Note 5) V <sub>GS</sub> = -4.5V	I <sub>D</sub>	T <sub>A</sub> = 25°C Steady State	-3.5
		T <sub>A</sub> = 70°C	-2.8
Pulsed Drain Current (Note 6)	I <sub>DM</sub>	-12	A
Maximum Continuous Body Diode Forward Current (Note 5)	I <sub>S</sub>	-1.8	A

**Thermal Characteristics** @T<sub>A</sub> = 25°C unless otherwise specified

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 4)	P <sub>D</sub>	0.92	W
Total Power Dissipation (Note 5)	P <sub>D</sub>	1.47	W
Thermal Resistance, Junction to Ambient (Note 4)	R <sub>θJA</sub>	136	°C/W
Thermal Resistance, Junction to Ambient (Note 5)	R <sub>θJA</sub>	84	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

**Electrical Characteristics** @T<sub>A</sub> = 25°C unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 7)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	-20	-	-	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	-	-	-1	μA	@T <sub>C</sub> = 25°C V <sub>DS</sub> = -16V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	-	-	±100	nA	V <sub>GS</sub> = ±8V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 7)</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	-0.4	-0.6	-1.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA
Static Drain-Source On-Resistance	R <sub>DS(on)</sub>	-	55	70	mΩ	V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -1A
			70	90		V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -1A
			90	110		V <sub>GS</sub> = -1.8V, I <sub>D</sub> = -1A
			110	150		V <sub>GS</sub> = -1.5V, I <sub>D</sub> = -1A
Forward Transfer Admittance	Y <sub>fs</sub>	-	12	-	S	V <sub>DS</sub> = -10V, I <sub>D</sub> = -1A
Diode Forward Voltage (Note 5)	V <sub>SD</sub>	-	-0.7	-1	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = -1A
<b>DYNAMIC CHARACTERISTICS (Note 8)</b>						
Input Capacitance	C <sub>iss</sub>	-	210	-	pF	V <sub>DS</sub> = -10V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	-	92	-	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	-	38	-	pF	
Series Gate Resistance	R <sub>G</sub>	-	5.3	-	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz
Total Gate Charge (4.5V)	Q <sub>g</sub>	-	2.9	-	nC	V <sub>GS</sub> = -4.5V, V <sub>DS</sub> = -10V, I <sub>D</sub> = -1A,
Gate-Source Charge	Q <sub>gs</sub>	-	0.3	-	nC	
Gate-Drain Charge	Q <sub>gd</sub>	-	0.5	-	nC	
Turn-On Delay Time	t <sub>D(on)</sub>	-	7.3	-	ns	V <sub>DD</sub> = -10V, V <sub>GS</sub> = -4.5V, I <sub>DS</sub> = -1A, R <sub>G</sub> = 20Ω,
Turn-On Rise Time	t <sub>r</sub>	-	14.0	-	ns	
Turn-Off Delay Time	t <sub>D(off)</sub>	-	42.6	-	ns	
Turn-Off Fall Time	t <sub>f</sub>	-	32	-	ns	

- Notes:
- Device mounted on FR-4 PCB with minimum recommended pad layout.
  - Device mounted on FR4 material with 1-inch<sup>2</sup> (6.45-cm<sup>2</sup>), 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.

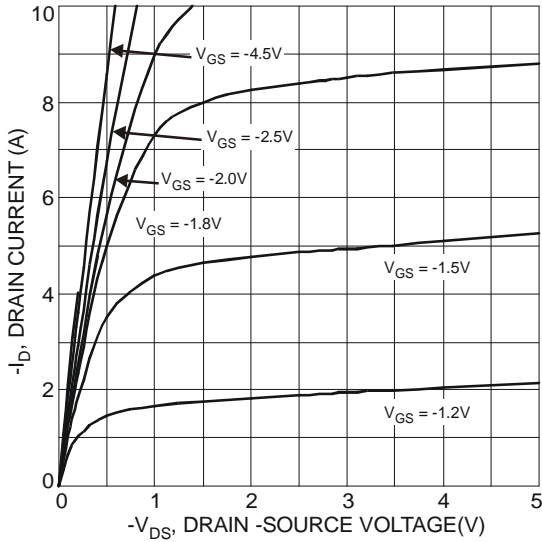


Fig. 1 Typical Output Characteristics

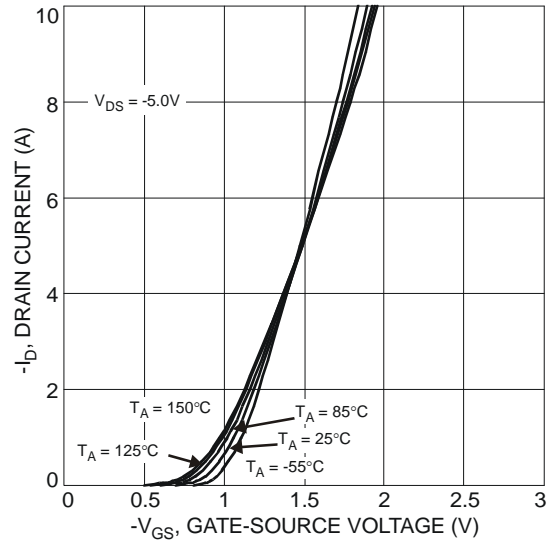


Fig. 2 Typical Transfer Characteristics

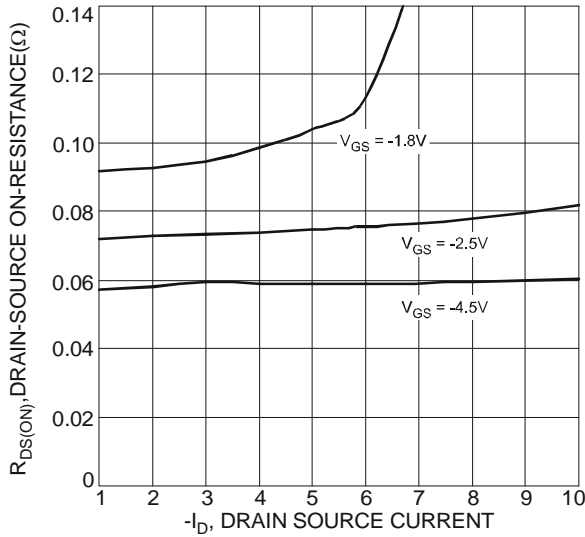


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

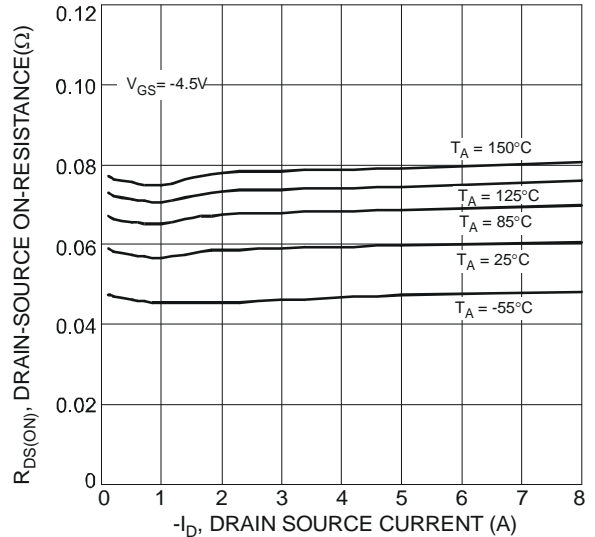


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

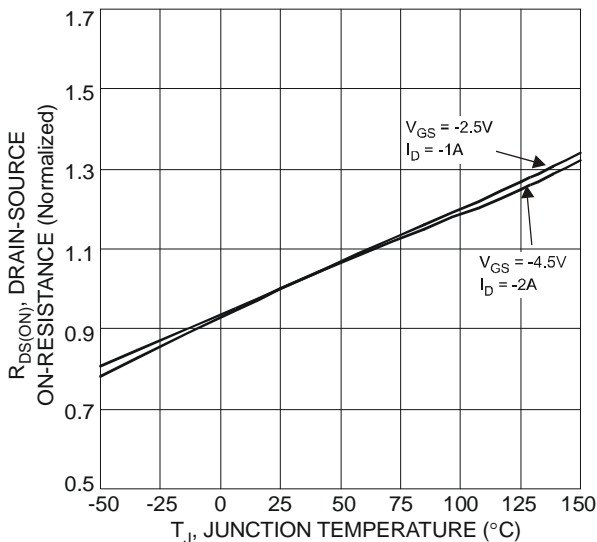


Fig. 5 On-Resistance Variation with Temperature

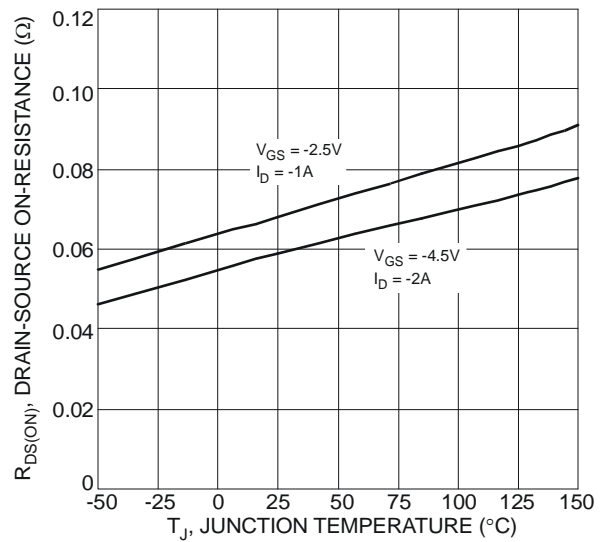


Fig. 6 On-Resistance Variation with Temperature

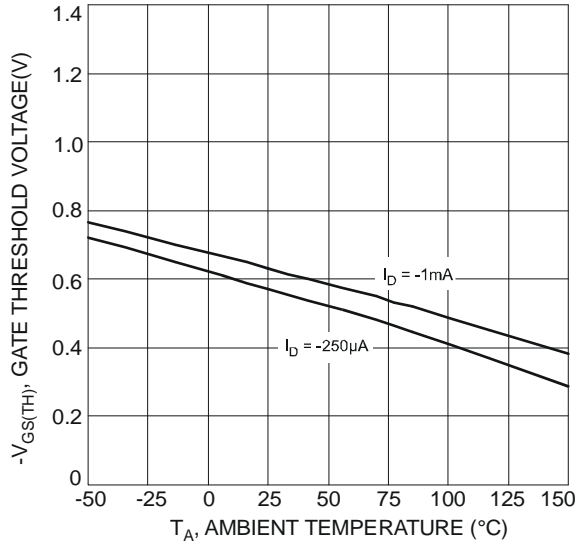


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

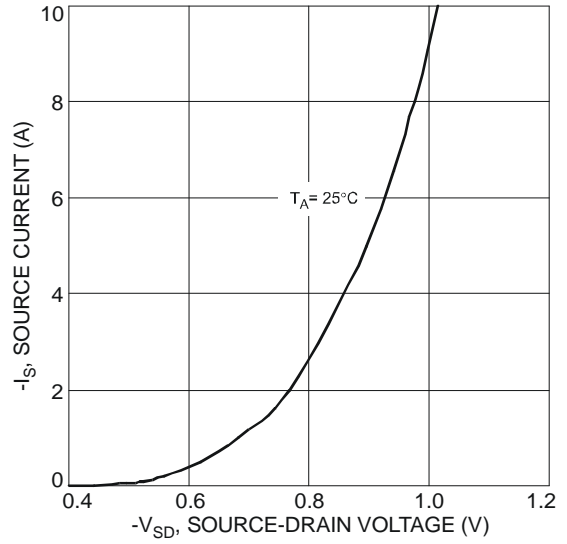


Fig. 8 Diode Forward Voltage vs. Current

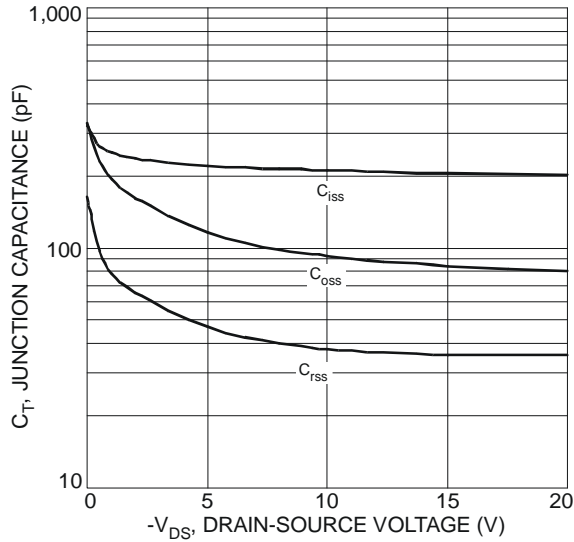


Fig. 9 Typical Junction Capacitance

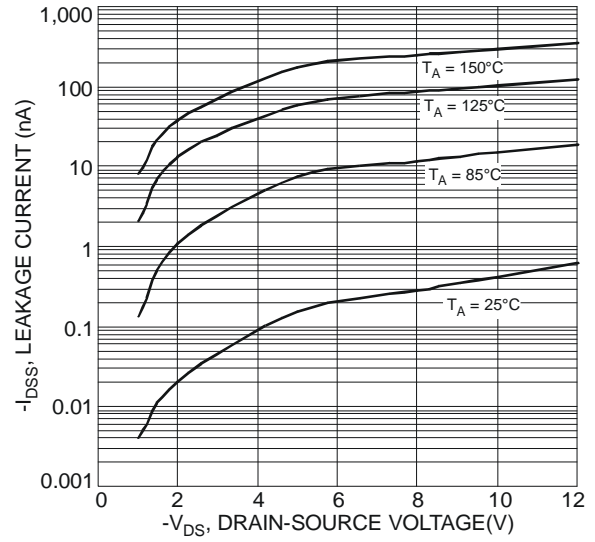


Fig. 10 Typical Drain-Source Leakage Current vs. Voltage

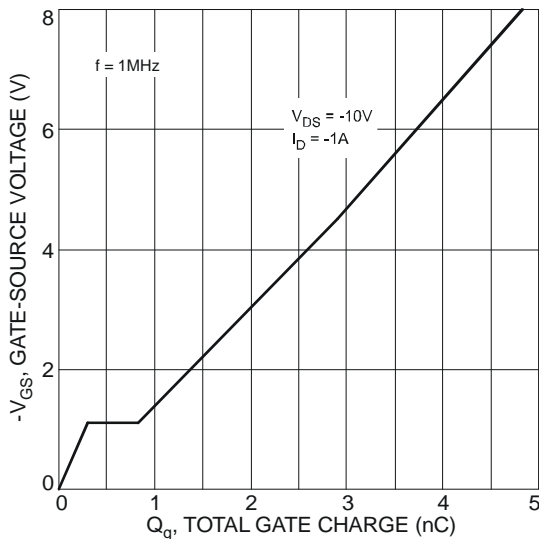


Fig. 11 Gate-Charge Characteristics

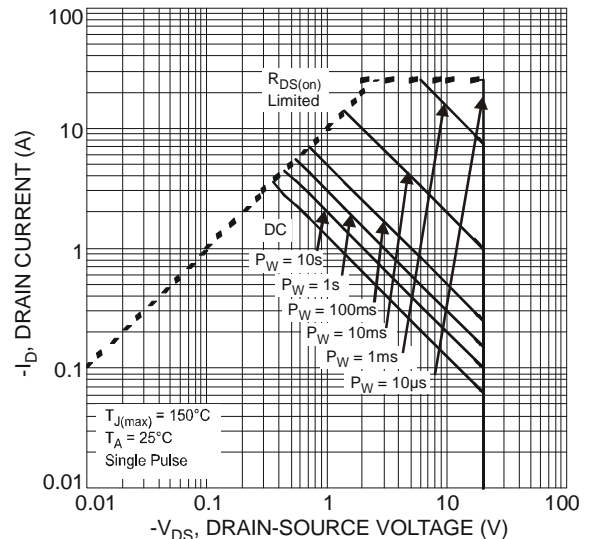


Fig. 12 SOA, Safe Operation Area

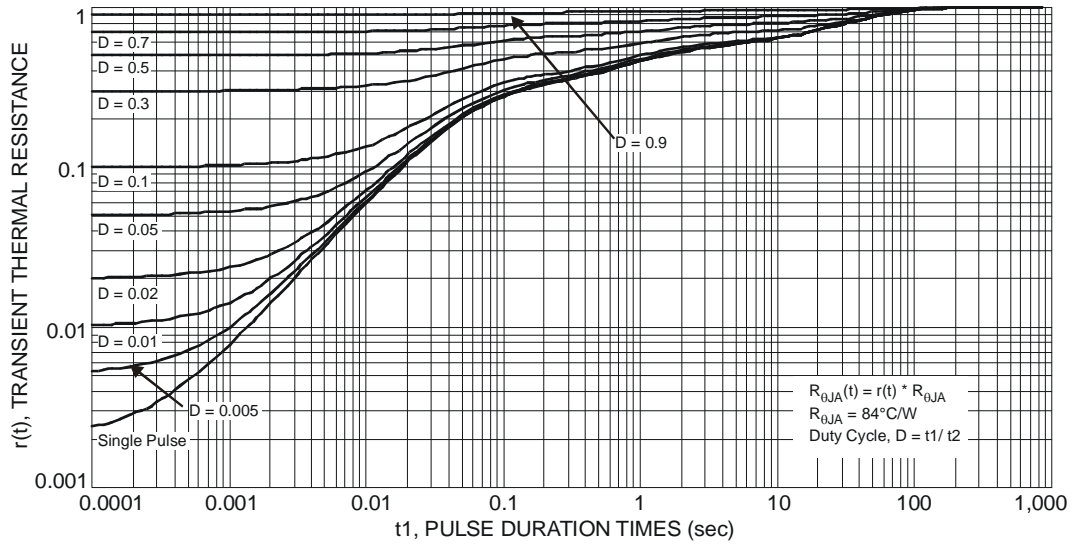
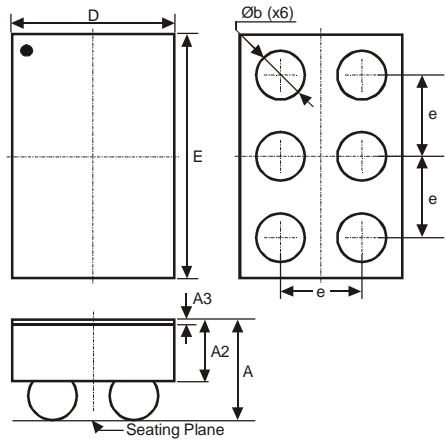


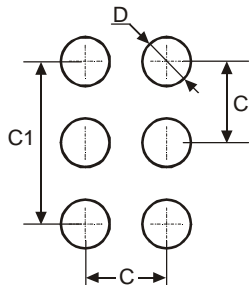
Fig. 13 Transient Thermal Resistance

**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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