

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

V_{DSS}	$R_{DS(on)}$	Q_g	Q_{gd}	I_D
-20V	55m Ω	2.9nC	0.5nC	-3.5A

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

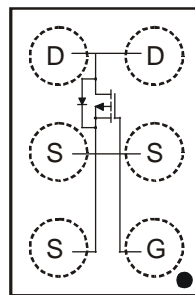
Features and Benefits

- LD-MOS Technology with the Lowest Figure of Merit:
 $R_{DS(on)} = 55m\Omega$ to Minimize On-State Losses
 $Q_g = 2.9nC$ for Ultra-Fast Switching
- $V_{gs(th)} = -0.6V$ typ. for a Low Turn-On Potential
- CSP with Footprint 1.5mm x 1.0mm
- Height = 0.62mm for Low Profile
- **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-WLB1510-6
- Terminal Connections: See Diagram Below
- Weight: 0.0018 grams (Approximate)

U-WLB1510-6



Top View

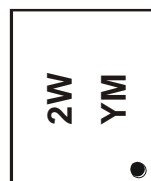
Ordering Information (Note 4)

Part Number	Case	Packaging
DMP2070UCB6-7	U-WLB1510-6	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-WLB1510-6



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 (@ $T_A = +25^\circ\text{C}$ 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) $V_{GS} = -4.5\text{V}$	Steady State	$T_A = +25^\circ\text{C}$	-2.5	A
		$T_A = +70^\circ\text{C}$	-2.0	A
Continuous Drain Current (Note 5) $V_{GS} = -4.5\text{V}$	Steady State	$T_A = +25^\circ\text{C}$	-3.5	A
		$T_A = +70^\circ\text{C}$	-2.8	A
Pulsed Drain Current (Note 6)	I_{DM}	-12	A	
Maximum Continuous Body Diode Forward Current (Note 5)	I_S	-1.8	A	

Thermal Characteristics (@ $T_A = +25^\circ\text{C}$ 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)	$R_{\theta JA}$	136	$^\circ\text{C/W}$
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	84	$^\circ\text{C/W}$
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

Electrical Characteristics (@ $T_A = +25^\circ\text{C}$ unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
Drain-Source Breakdown Voltage	BV_{DSS}	-20	-	-	V	$V_{GS} = 0\text{V}, I_D = -250\mu\text{A}$
Zero Gate Voltage Drain Current	I_{DSS}	-	-	-1	μA	$V_{DS} = -16\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	I_{GSS}	-	-	± 100	nA	$V_{GS} = \pm 8\text{V}, V_{DS} = 0\text{V}$
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(th)}$	-0.4	-0.6	-1.0	V	$V_{DS} = V_{GS}, I_D = -250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	-	55	70	m Ω	$V_{GS} = -4.5\text{V}, I_D = -1\text{A}$
			70	90		$V_{GS} = -2.5\text{V}, I_D = -1\text{A}$
			90	110		$V_{GS} = -1.8\text{V}, I_D = -1\text{A}$
			110	150		$V_{GS} = -1.5\text{V}, I_D = -1\text{A}$
Forward Transfer Admittance	$ Y_{fs} $	-	12	-	S	$V_{DS} = -10\text{V}, I_D = -1\text{A}$
Diode Forward Voltage (Note 5)	V_{SD}	-	-0.7	-1	V	$V_{GS} = 0\text{V}, I_S = -1\text{A}$
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	-	210	-	pF	$V_{DS} = -10\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
Output Capacitance	C_{oss}	-	92	-	pF	
Reverse Transfer Capacitance	C_{rss}	-	38	-	pF	
Series Gate Resistance	R_G	-	5.3	-	Ω	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$
Total Gate Charge (4.5V)	Q_g	-	2.9	-	nC	$V_{GS} = -4.5\text{V}, V_{DS} = -10\text{V}, I_D = -1\text{A}$
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	$V_{DD} = -10\text{V}, V_{GS} = -4.5\text{V}, I_{DS} = -1\text{A}, R_G = 20\Omega$
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 $\leq 2\%$.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to production testing.

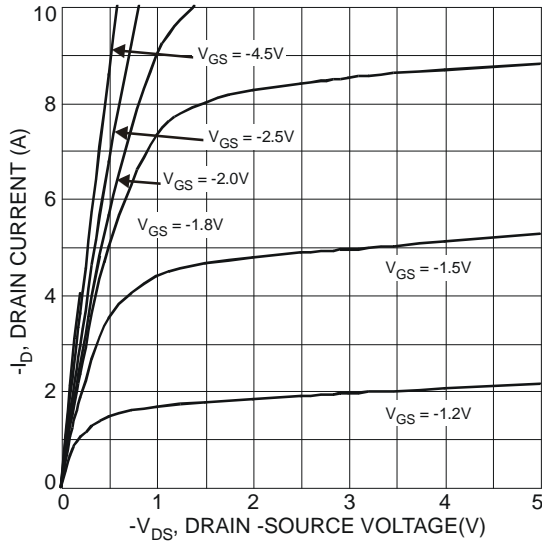


Fig. 1 Typical Output Characteristics

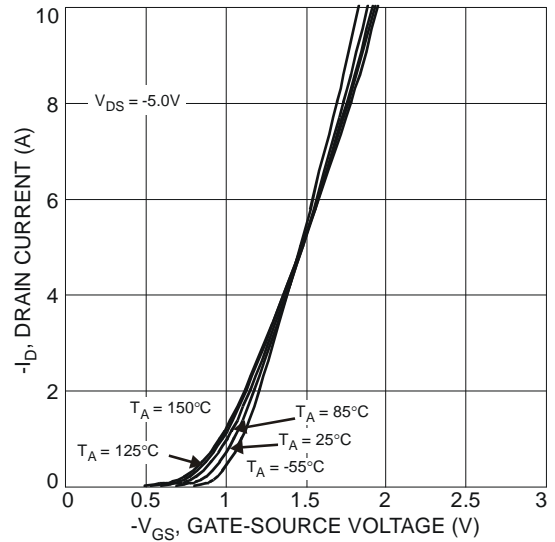


Fig. 2 Typical Transfer Characteristics

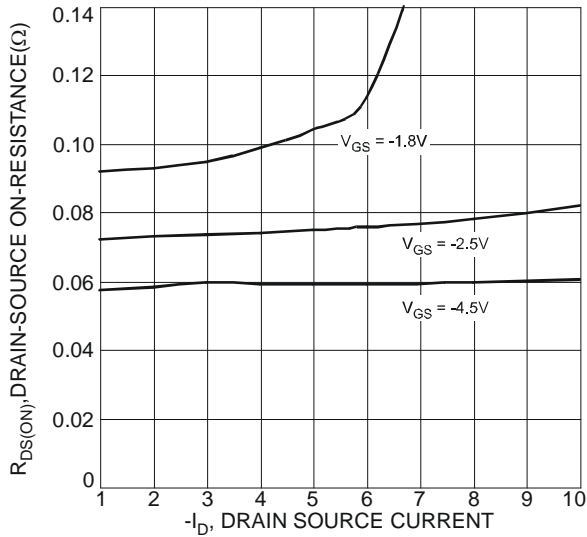


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

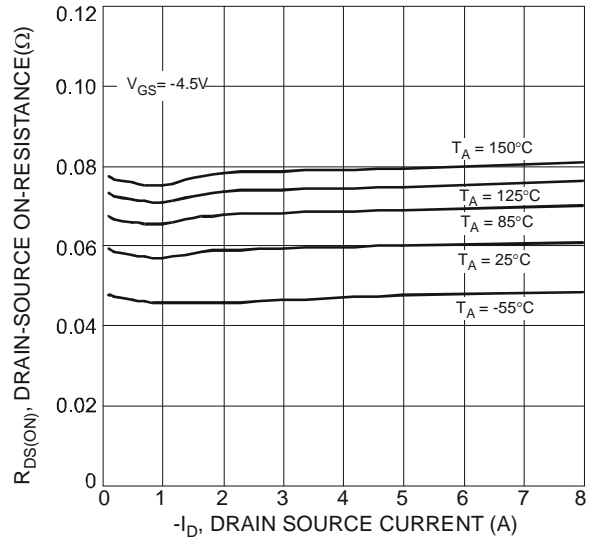


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

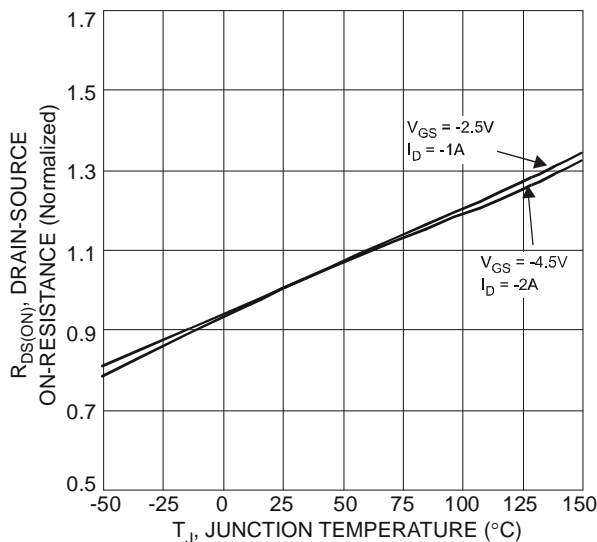


Fig. 5 On-Resistance Variation with Temperature

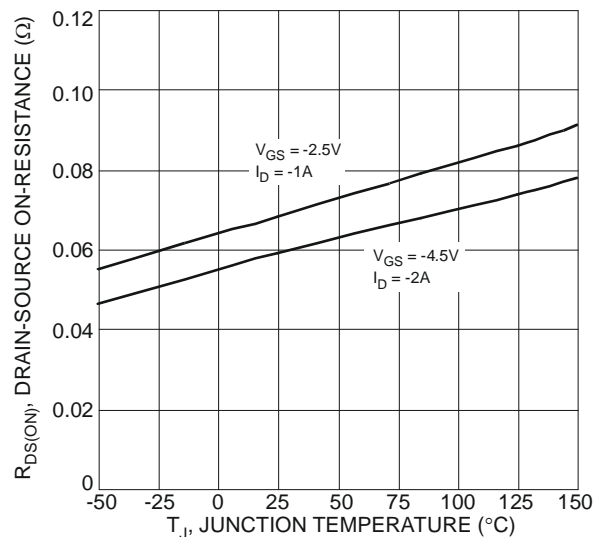


Fig. 6 On-Resistance Variation with Temperature

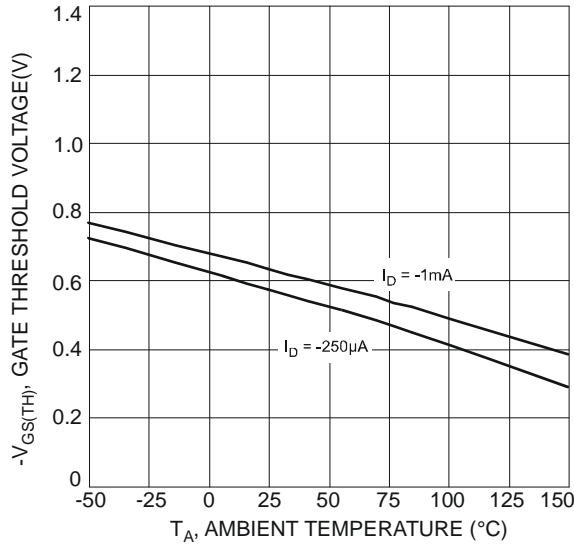


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

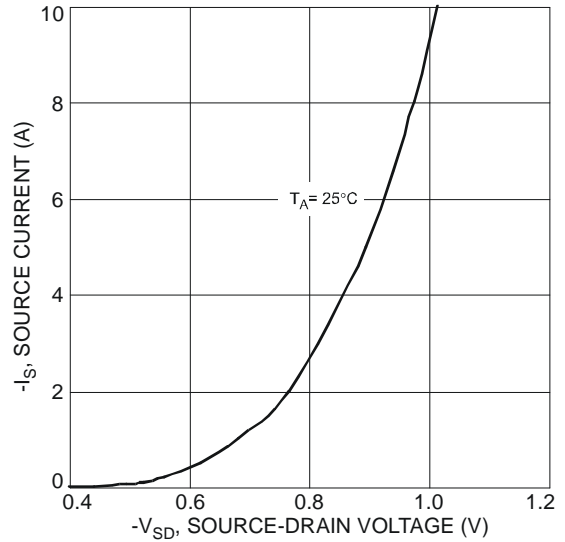


Fig. 8 Diode Forward Voltage vs. Current

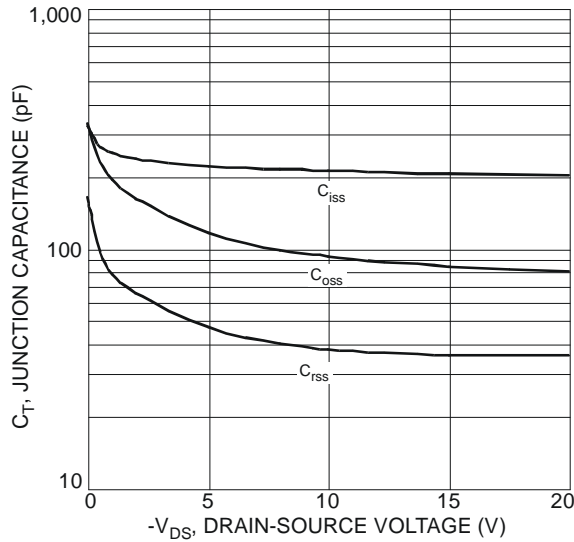


Fig. 9 Typical Junction Capacitance

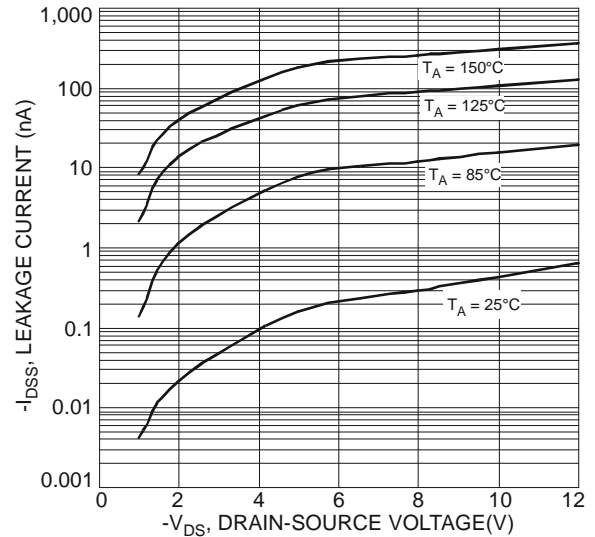


Fig. 10 Typical Drain-Source Leakage Current vs. Voltage

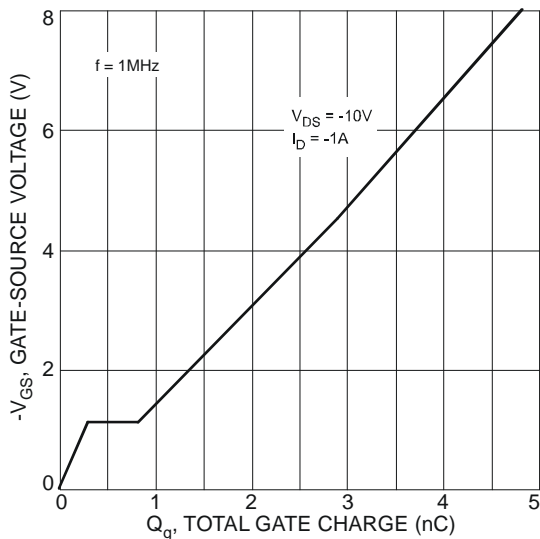


Fig. 11 Gate-Charge Characteristics

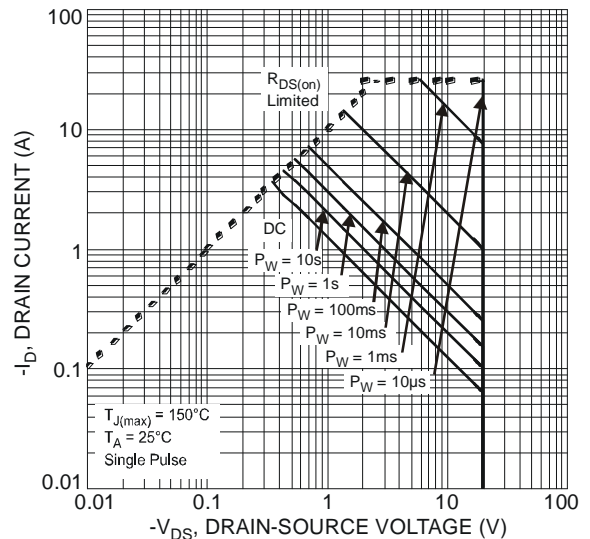


Fig. 12 SOA, Safe Operation Area

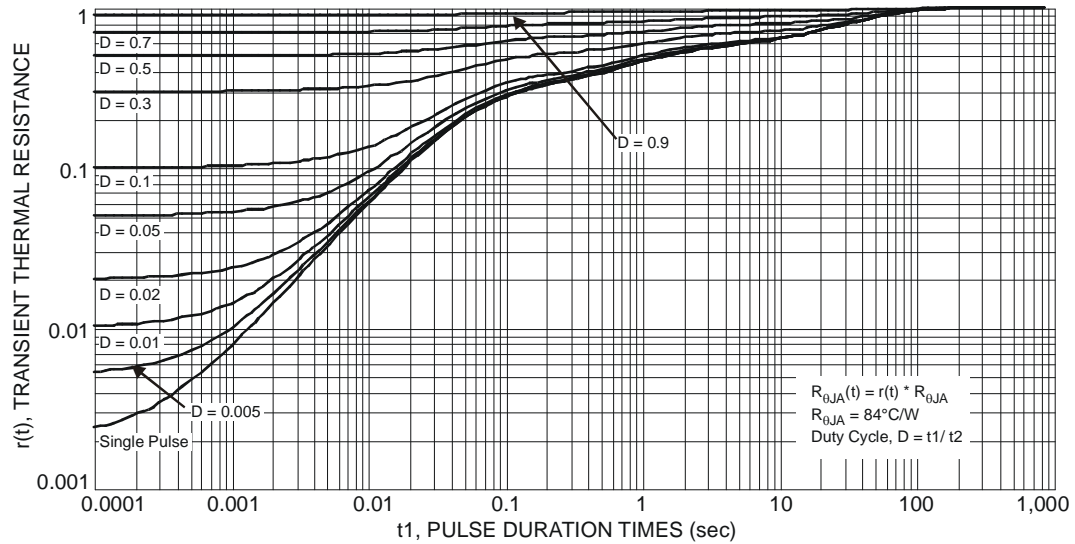
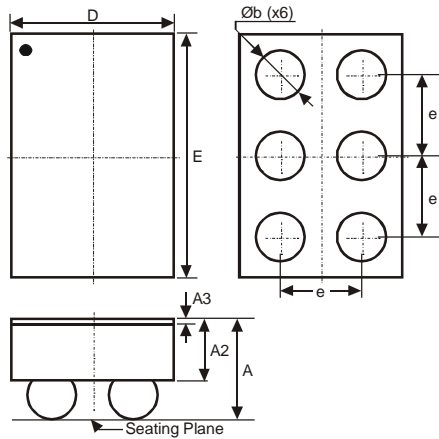


Fig. 13 Transient Thermal Resistance

Package Outline Dimensions

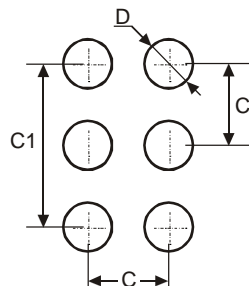
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



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

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
D	0.25

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