P-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$	I_D T_A = 25°C
-20V	70mΩ @ V_{GS} = -4.5V	3.5 A
	90mΩ @ V_{GS} = -2.5V	3.0 A

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**

Description and Applications

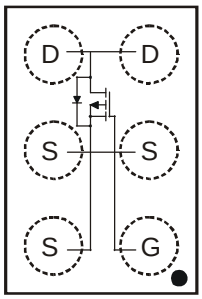
This new generation MOSFET has been designed to minimize the on-state resistance ($R_{DS(on)}$) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

- Battery Management
- Load Switch
- Battery Protection

Mechanical Data

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

U-WLB1510-6



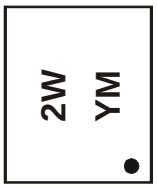
Top View

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	Steady State	T_A = 25°C T_A = 70°C	I_D	-2.5 -2.0	A
Continuous Drain Current (Note 5) V_{GS} = -4.5V	Steady State	T_A = 25°C T_A = 70°C	I_D	-3.5 -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°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	°C/W
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	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 @T_C = 25°C	I_{DSS}	-	-	-1	µA	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:
4. Device mounted on FR-4 PCB with minimum recommended pad layout.
5. Device mounted on FR4 material with 1-inch^2 (6.45-cm^2), 2-oz. (0.071-mm thick) Cu
6 300ms pulse, pulse duty cycle ≤ 2%
7. Short duration pulse test used to minimize self-heating effect.
8. Guaranteed by design. Not subject to production testing.

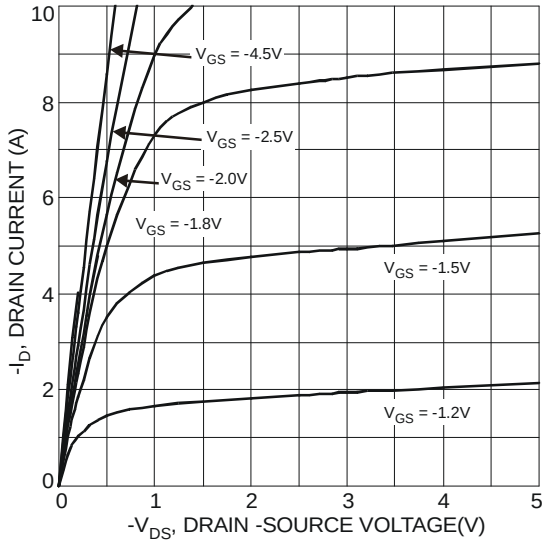


Fig. 1 Typical Output Characteristics

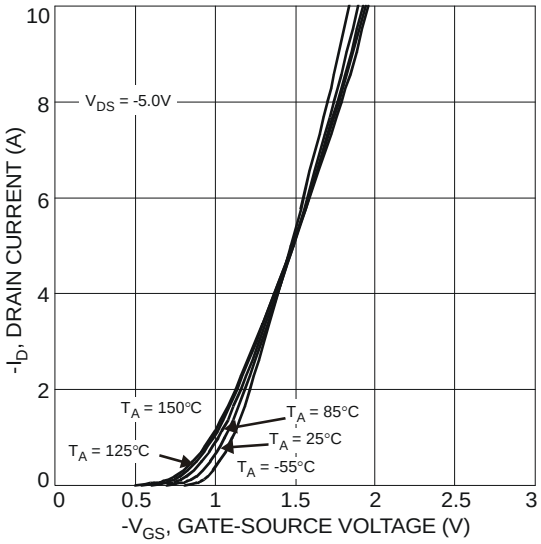


Fig. 2 Typical Transfer Characteristics

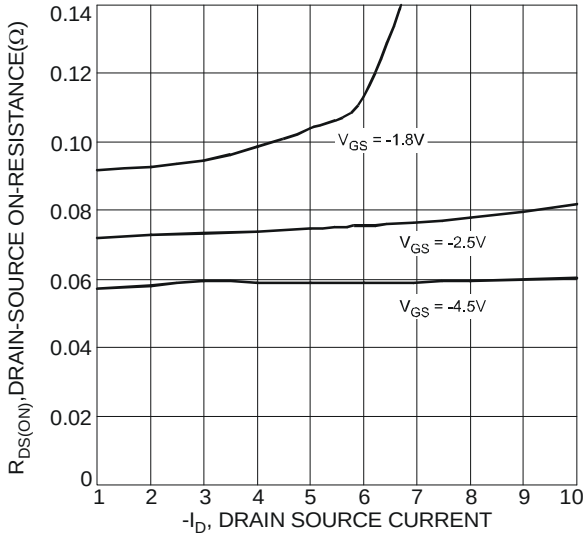


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

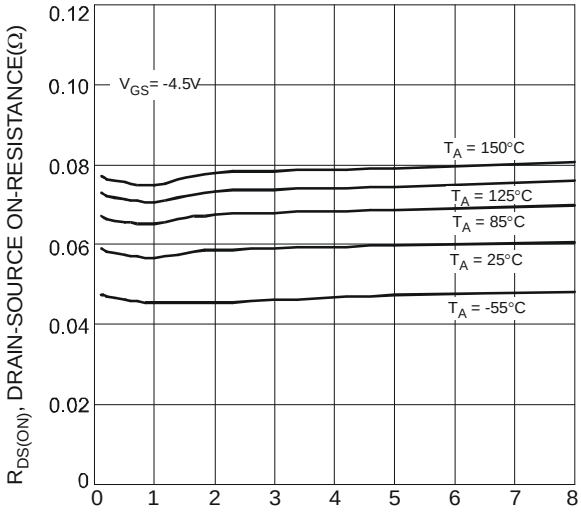


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

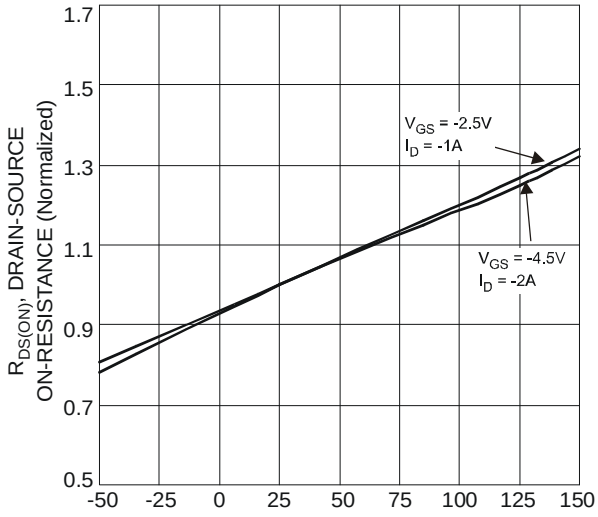


Fig. 5 On-Resistance Variation with Temperature

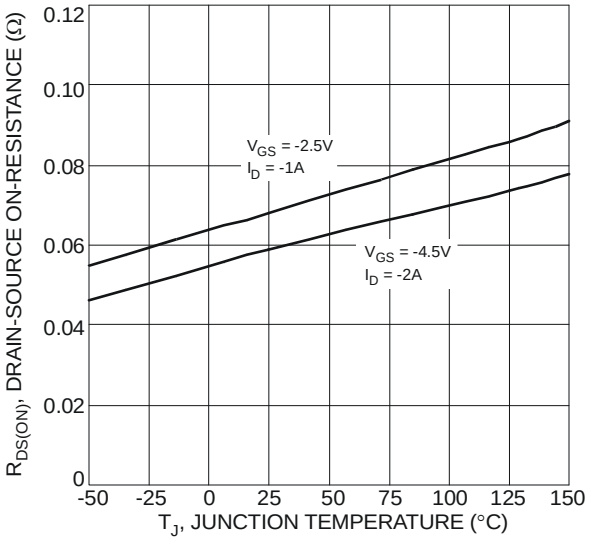


Fig. 6 On-Resistance Variation with Temperature

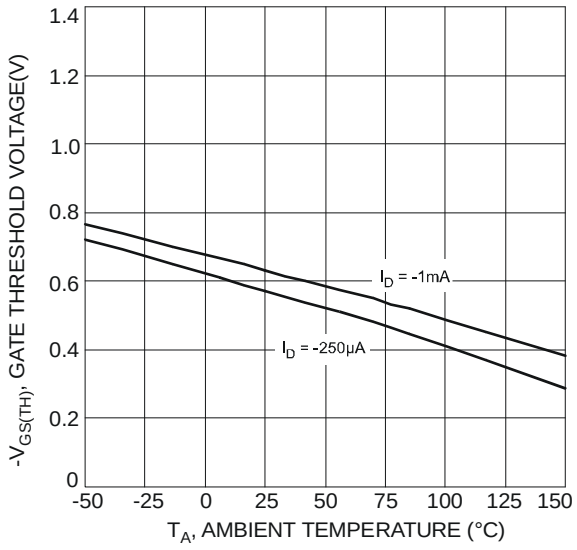


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

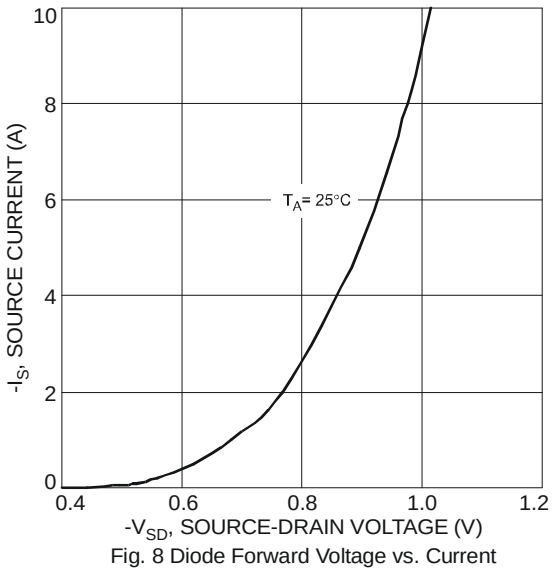


Fig. 8 Diode Forward Voltage vs. Current

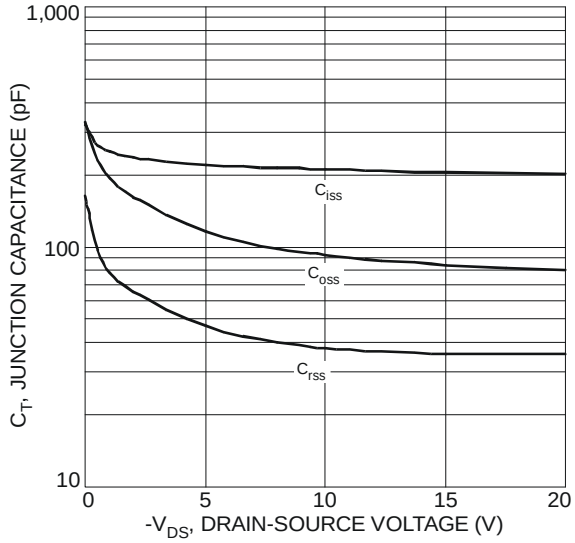


Fig. 9 Typical Junction Capacitance

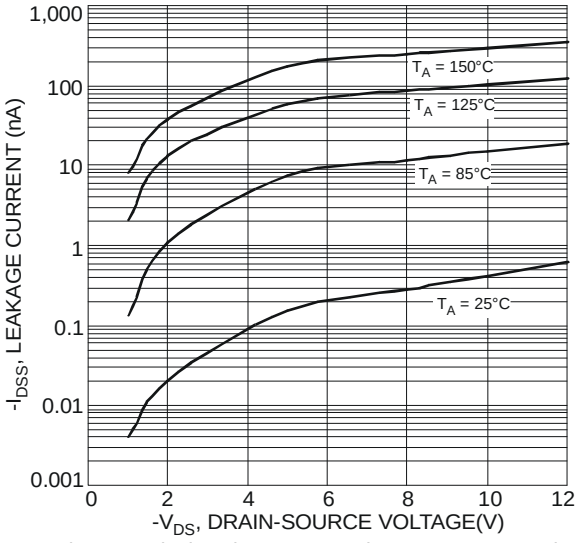


Fig. 10 Typical Drain-Source Leakage Current vs. Voltage

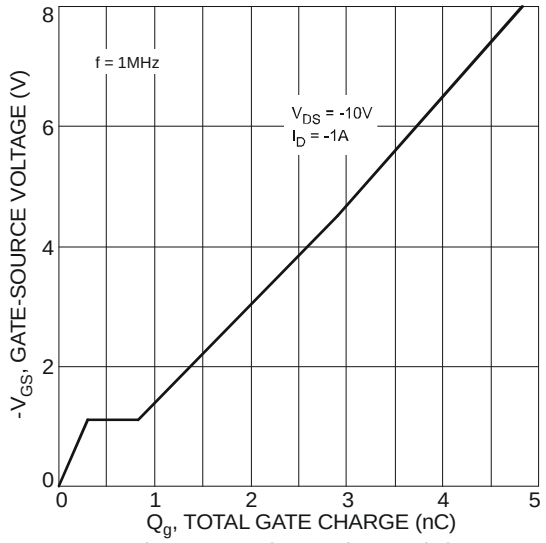


Fig. 11 Gate-Charge Characteristics

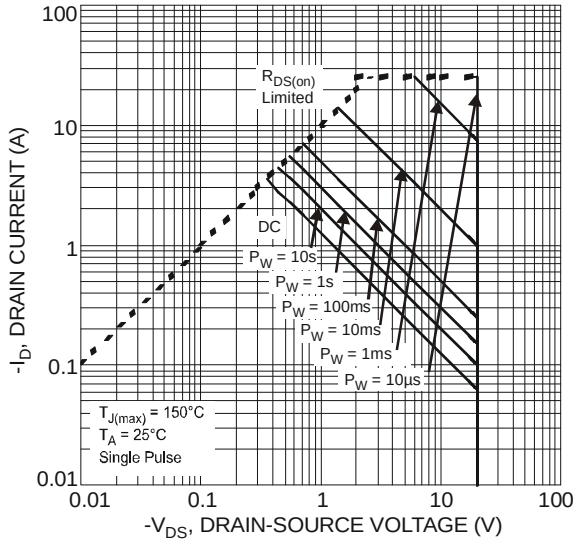


Fig. 12 SOA, Safe Operation Area

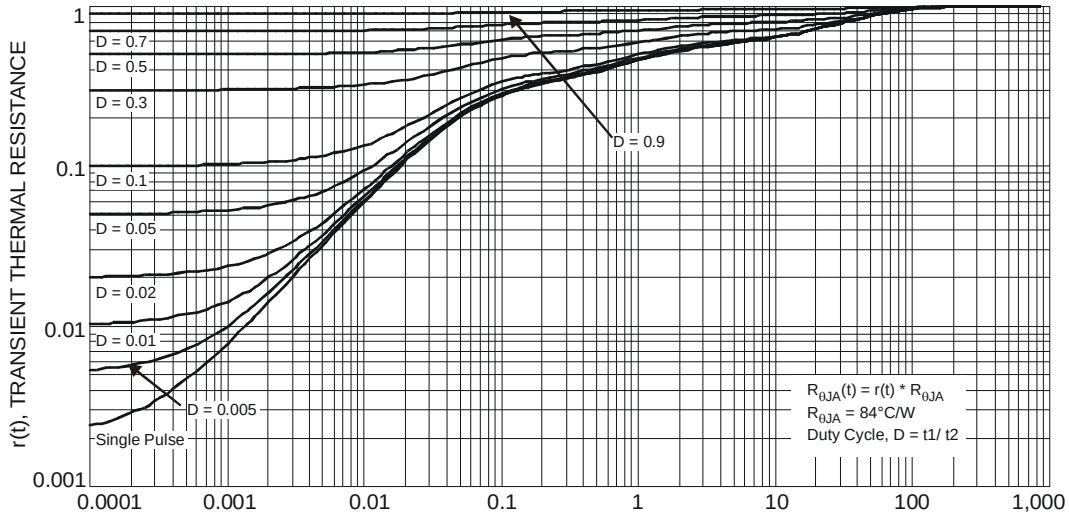
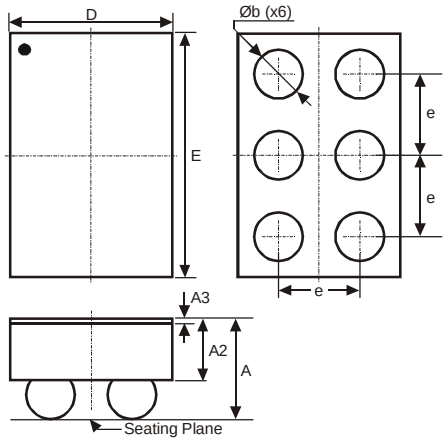


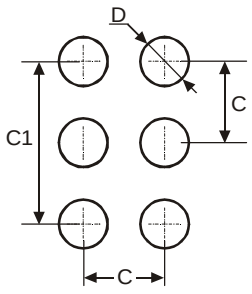
Fig. 13 Transient Thermal Resistance

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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