

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

V_{DSS}	$R_{DS(on)}$	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 ($R_{DS(on)}$) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

Applications

- Battery Management
- Load Switch
- Battery Protection

Features

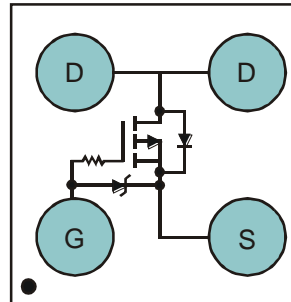
- LD-MOS Technology with the Lowest Figure of Merit:
 $R_{DS(on)} = 65m\Omega$ to Minimize On-State Losses
 $Q_g = 2.5nC$ for Ultra-Fast Switching
- $V_{GS(th)} = -0.6V$ typ. for a Low Turn-On Potential
- CSP with Footprint 1.0mm x 1.0mm
- Height = 0.62mm for Low Profile
- ESD = 3kV HBM Protection of Gate
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- Halogen and Antimony Free. "Green" Device (Note 3)**
- Qualified to AEC-Q101 Standards for High Reliability**

Mechanical Data

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



U-WLB1010-4


 Top View
Equivalent Circuit

Ordering Information (Note 4)

Part Number	Case	Packaging
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) compliant.
 - 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.
 - 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 <http://www.diodes.com/products/packages.html>.

Marking Information

U-WLB1010-4



BW = Product Type Marking Code
 YM = Date Code Marking
 Y = Year (ex: X = 2010)
 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	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
		-	-	-		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.

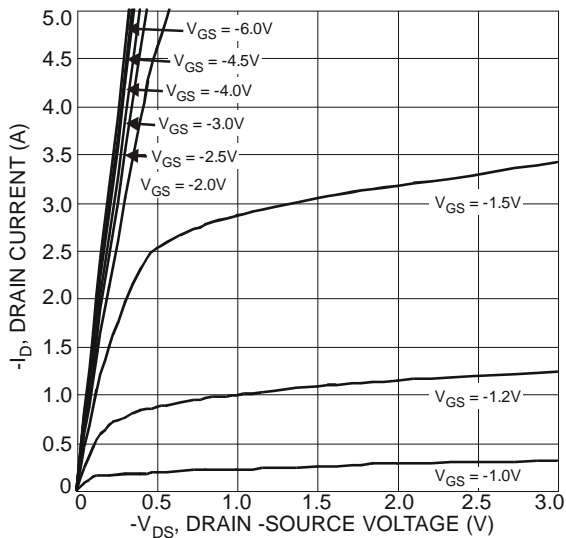


Fig. 1 Typical Output Characteristics

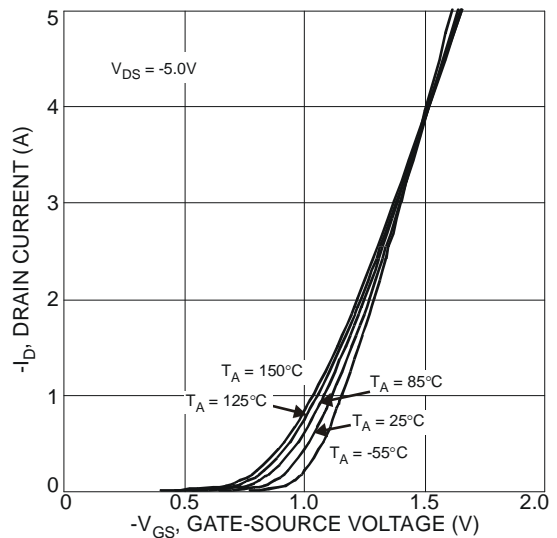


Fig. 2 Typical Transfer Characteristics

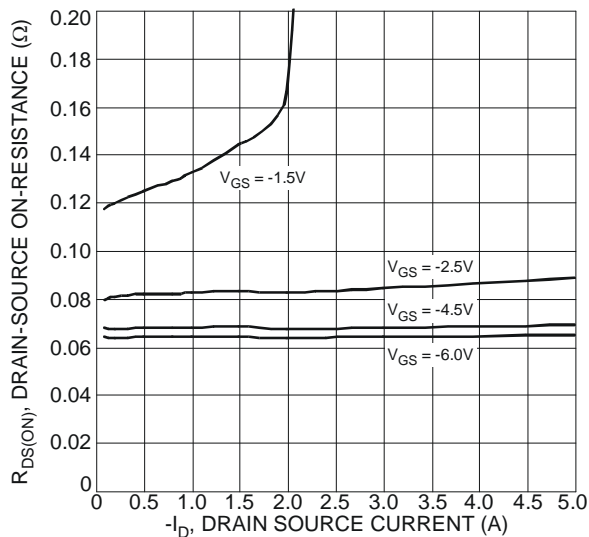


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

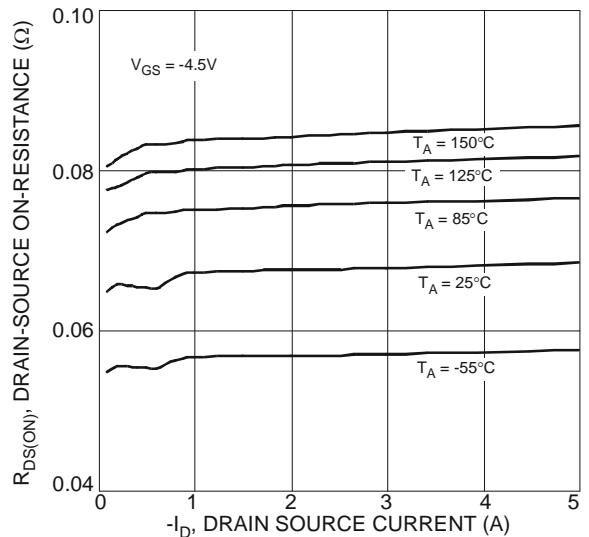


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

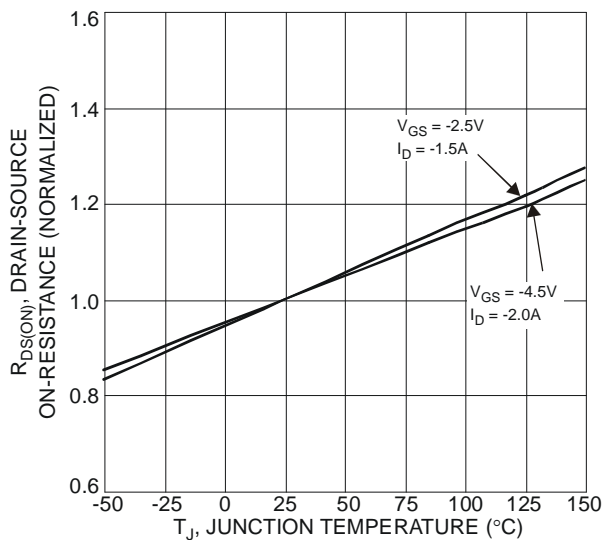


Fig. 5 On-Resistance Variation with Temperature

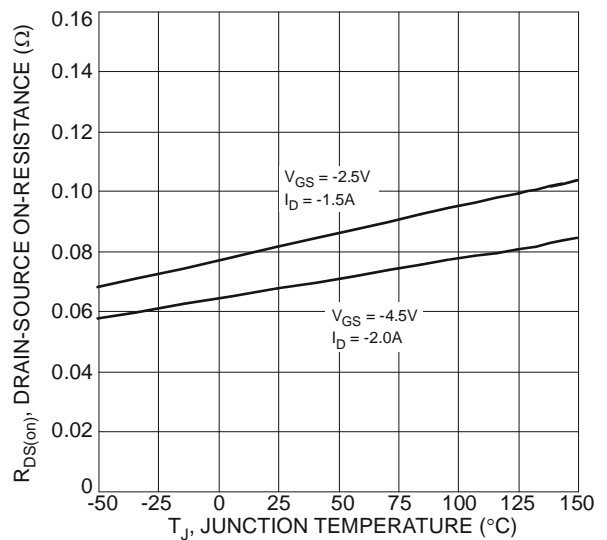


Fig. 6 On-Resistance Variation with Temperature

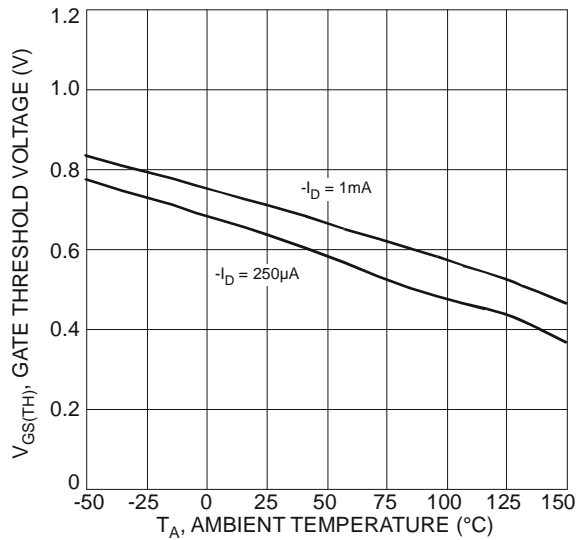


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

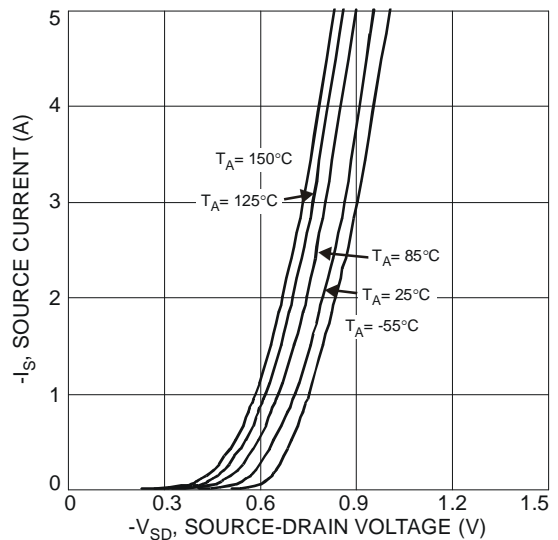


Fig. 8 Diode Forward Voltage vs. Current

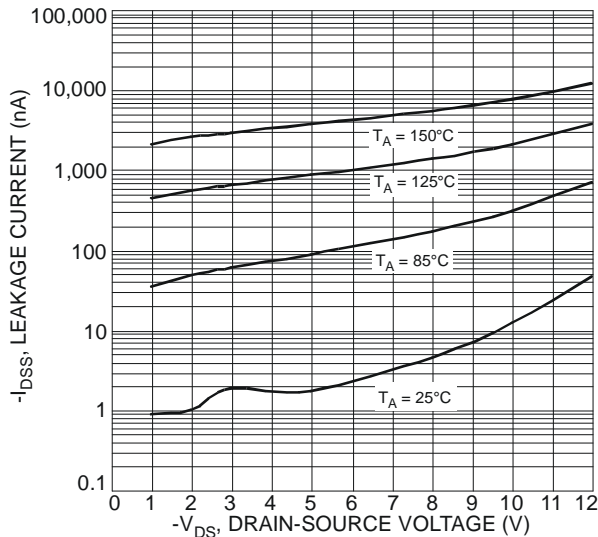


Fig. 9 Typical Drain-Source Leakage Current vs. Voltage

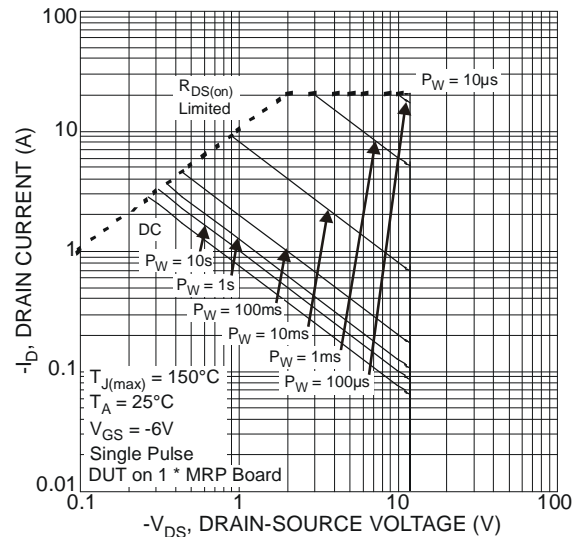


Fig. 10 SOA, Safe Operation Area

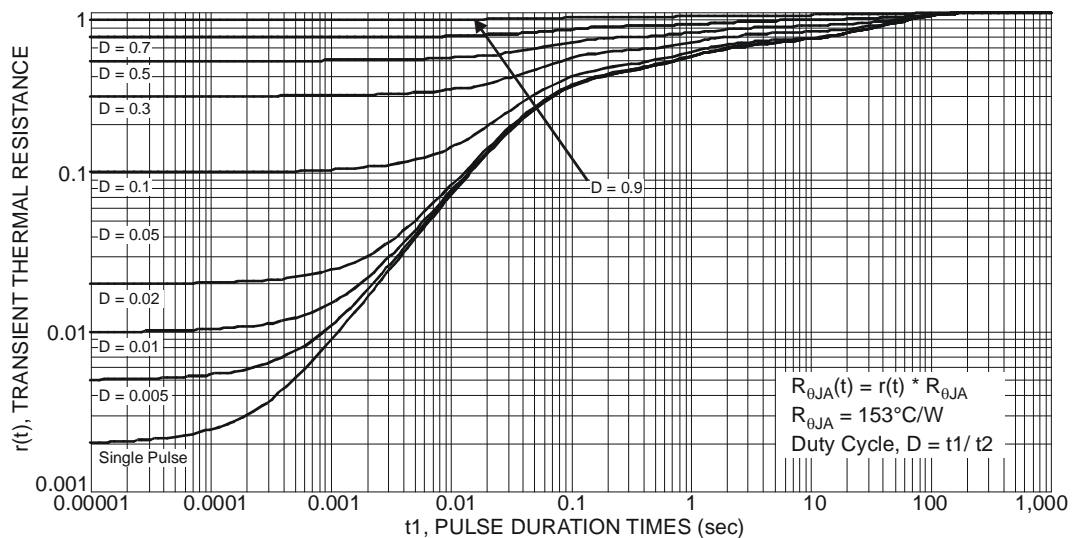


Fig. 11 Transient Thermal Resistance

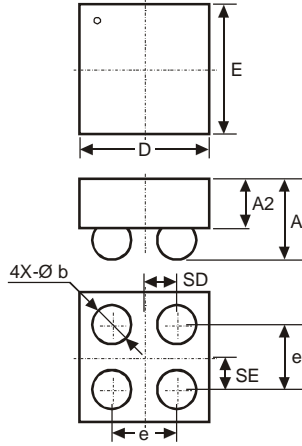
$$R_{\theta JA}(t) = r(t) * R_{\theta JA}$$

$$R_{\theta JA} = 153^{\circ}\text{C/W}$$

$$\text{Duty Cycle, } D = t1 / t2$$

Package Outline Dimension

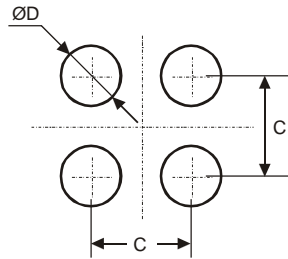
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



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 AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



Dimensions	Value (in mm)
C	0.50
D	0.25

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