P-CHANNEL ENHANCEMENT MODE MOSFET

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

V_{DSS}	$R_{DS(on)}$	Q_g	Q_{gd}	I_D
-8V	8.2mΩ	8.1nC	1.8nC	-10A

Description

This 3rd generation Lateral MOSFET (LD-MOS) is engineered to minimize on-state losses and switch ultra-fast, making it ideal for high efficiency power transfer. It uses Chip-Scale Package (CSP) to increase power density by combining low thermal impedance with minimal $R_{DS(on)}$ per footprint area.

Applications

- DC-DC Converters
- Battery Management
- Load Switch

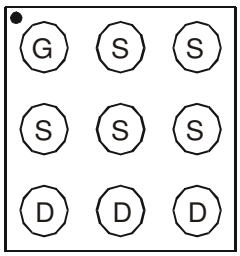
Features

- LD-MOS Technology with the Lowest Figure of Merit:
  $R_{DS(on)}$ = 8.2mΩ to Minimize On-State Losses
  Q_g = 8.1nC for Ultra-Fast Switching
- $V_{gs(th)}$ = -0.8V typ. for a Low Turn-On Potential
- CSP with Footprint 1.5mm × 1.5mm
- Height = 0.62mm for Low Profile
- ESD = 6kV 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**

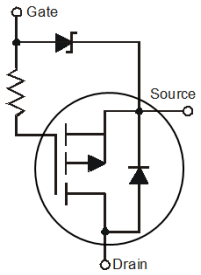
Mechanical Data

- Case: U-WLB1515-9
- Terminal Connections: See Diagram Below

U-WLB1515-9



Top-View
Pin Configuration



Equivalent Circuit

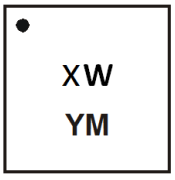
Ordering Information (Note 4)

Part Number	Case	Packaging
DMP1012UCB9-7	U-WLB1515-9	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-WLB1515-9



XW = Product Type Marking Code
YM = Date Code Marking
Y or $\overline{Y}$ = Year (ex: B = 2014)
M or $\overline{M}$ = Month (ex: 9 = September)

Date Code Key

Year	2012	2013	2014	2015	2016	2017	2018
Code	Z	A	B	C	D	E	F

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

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Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V_{DSS}	-8	V
Gate-Source Voltage			V_{GSS}	-6	V
Continuous Drain Current (Note 5) V_{GS} = -4.5V	Steady State	T_A = +25°C T_A = +70°C	I_D	-10 -8	A
Continuous Drain Current (Note 6) V_{GS} = -4.5V	Steady State	T_A = +25°C T_A = +70°C	I_D	-7.4 -6.0	A
Pulsed Drain Current (Pulse duration 10µs, duty cycle ≤1%)			I_{DM}	-50	A
Continuous Source Pin Current (Note 6)			I_S	-2	—
Pulsed Source Pin Current (Pulse duration 10µs, duty cycle ≤1%)			I_{SM}	-15	—
Continuous Gate Current			I_G	-0.5	A

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 5)	P_D	0.89	W
Total Power Dissipation (Note 6)	P_D	1.57	W
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	+142.1	°C/W
Thermal Resistance, Junction to Ambient (Note 6)	$R_{\theta JA}$	+80.5	°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}	-8	—	—	V	V_{GS} = 0V, I_D = -250µA
Gate to Source Voltage	BV_{SGS}	-6	—	—	V	V_{DS} = 0V, I_G = -250µA
Zero Gate Voltage Drain Current @T_C = +25°C	I_{DSS}	—	—	-1	µA	V_{DS} = -4.0V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	-100	nA	V_{GS} = -4.0V, V_{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(th)}$	-0.4	-0.8	-1.1	V	V_{DS} = V_{GS}, I_D = -250µA
Static Drain-Source On-Resistance	$R_{DS\ (ON)}$	—	8.2	10	mΩ	V_{GS} = -4.5V, I_D = -2A
			10	13		V_{GS} = -3.0V, I_D = -2A
			11	14		V_{GS} = -2.5V, I_D = -2A
Forward Transfer Admittance	$\|Y_{fs}\|$	—	16.8	—	S	V_{DS} = -4V, I_D = -2A
Diode Forward Voltage (Note 6)	V_{SD}	—	-0.7	-1	V	V_{GS} = 0V, I_S = -2A
Reverse Recovery Charge	Q_{rr}	—	6.3	—	nC	V_{dd} = -5V, I_F = -2A, di/dt = 200A/µs
Reverse Recovery Time	t_{rr}	—	18.5	—	ns	
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	—	817	1060	pF	V_{DS} = -4V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	595	770	pF	
Reverse Transfer Capacitance	C_{rss}	—	269	350	pF	
Series Gate Resistance	R_G	—	1.9	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz
Total Gate Charge (4.5V)	Q_g	—	8.1	10.5	nC	V_{GS} = -4.5V, V_{DS} = -4V, I_D = -2A
Gate-Source Charge	Q_{gs}	—	0.9	—	nC	
Gate-Drain Charge	Q_{gd}	—	1.8	—	nC	
Turn-On Delay Time	$t_{D(on)}$	—	6.2	10	ns	V_{DD} = -4V, V_{GS} = -4.5V, I_{DS} = -2A, R_G = 10Ω,
Turn-On Rise Time	t_r	—	22.6	—	ns	
Turn-Off Delay Time	$t_{D(off)}$	—	30.1	48	ns	
Turn-Off Fall Time	t_f	—	22.7	—	ns	

Notes:
5. Device mounted on FR-4 PCB with minimum recommended pad layout.
6. Device mounted on FR4 material with 1-inch^2 (6.45cm^2), 2oz (0.071mm thick) Cu.
7. Short duration pulse test used to minimize self-heating effect.
8. Guaranteed by design. Not subject to production testing.

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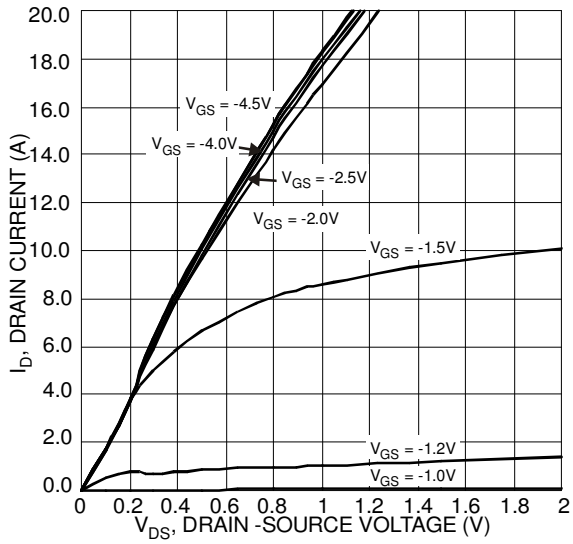

Figure 1 Typical Output Characteristics

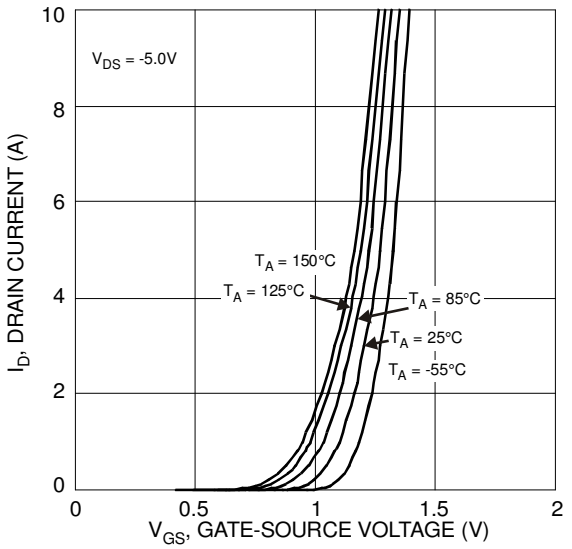

Figure 2 Typical Transfer Characteristics

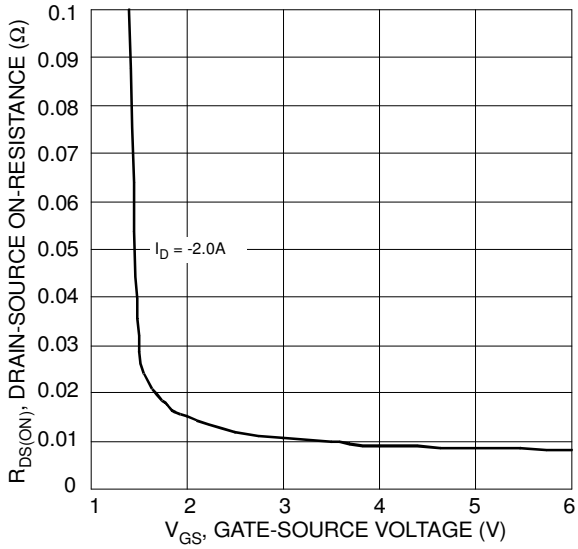

Figure 3 Typical Transfer Characteristic

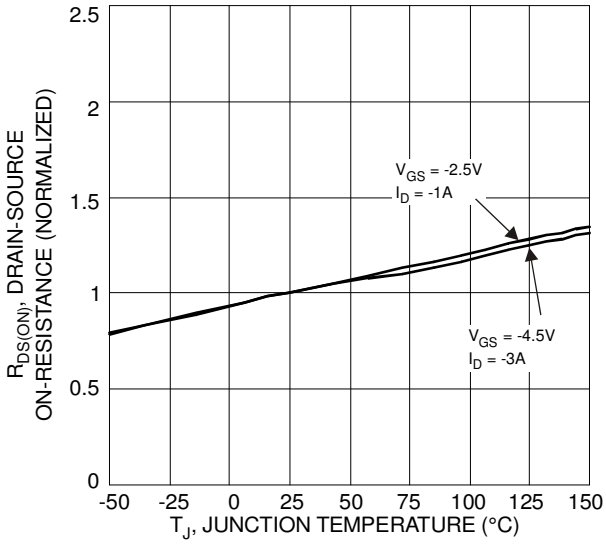

Figure 4 On-Resistance Variation with Temperature

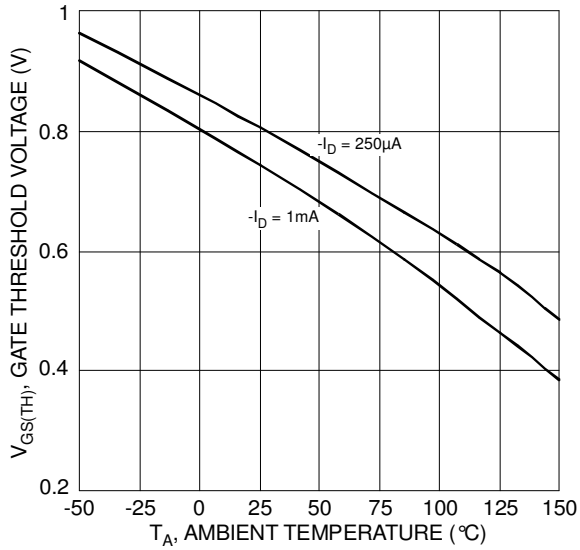

Figure 5 Gate Threshold Variation vs. Ambient Temperature

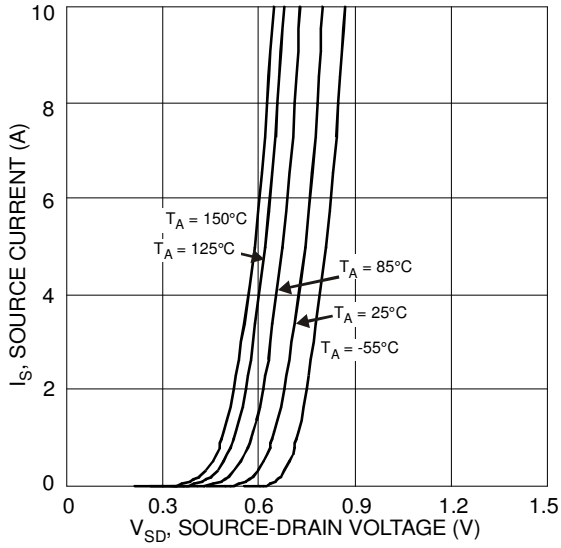

Figure 6 Diode Forward Voltage vs. Current

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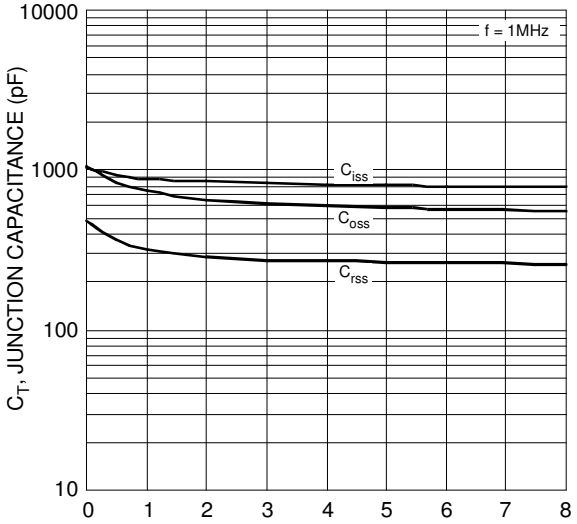

Figure 7 Typical Junction Capacitance

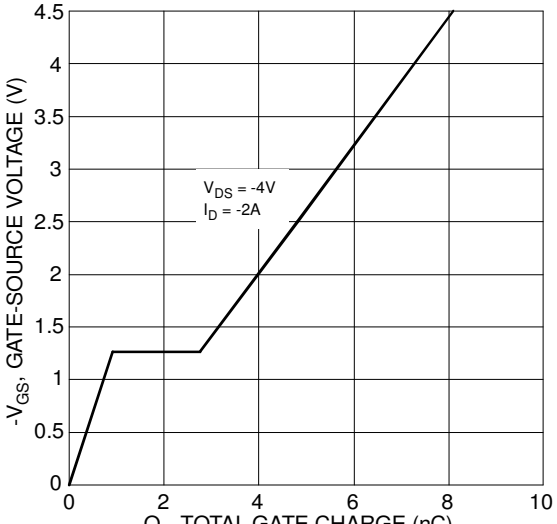

Figure 8 Gate-Charge Characteristics

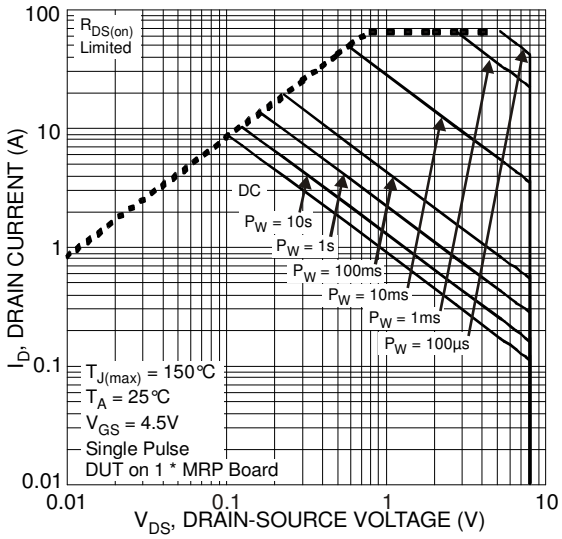

Figure 9 SOA, Safe Operation Area

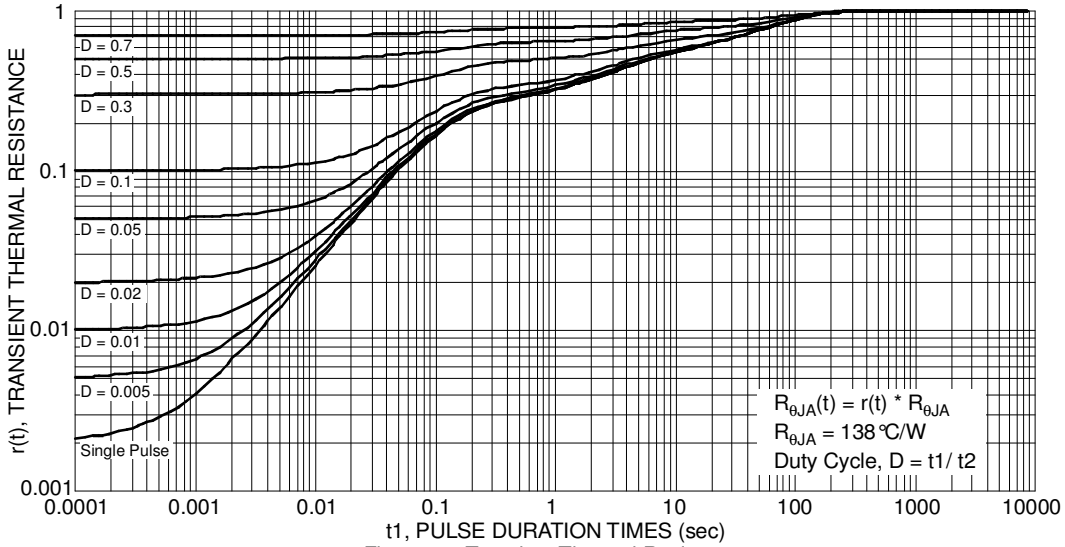

Figure 10 Transient Thermal Resistance

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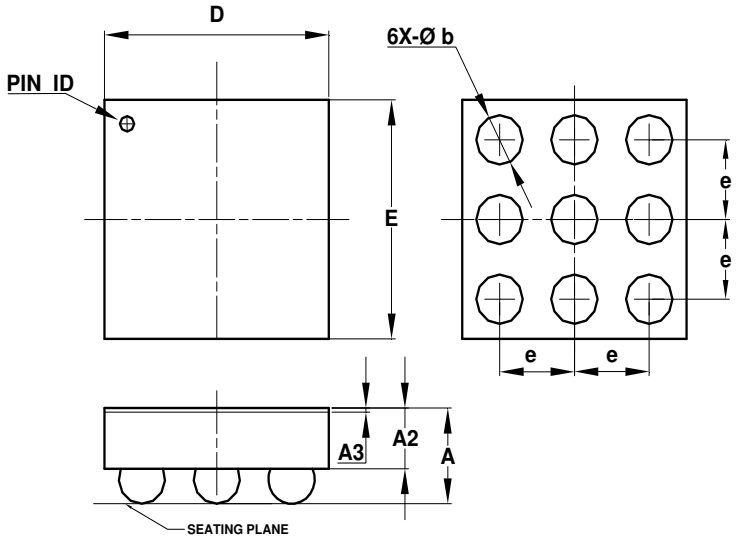
Package Outline Dimensions

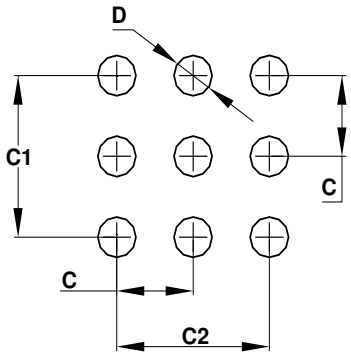
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for the latest version.



U-WLB1515-9			
Dim	**Min**	**Max**	**Typ**
A	-	0.62	-
A2	-	0.36	0.36
A3	0.020	0.030	0.025
b	0.27	0.37	0.32
D	1.47		1.49
E	1.47		1.49
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
C2	1.00
D	0.25

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