

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

V_{DSS}	$R_{DS(on)}$	Q_g	Q_{gd}	I_D
-20V	28m Ω	5.4nC	1.5nC	-5.8A

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

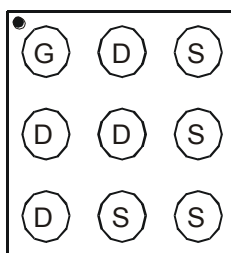
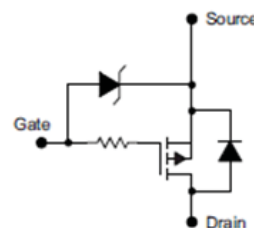
- Battery Management
- Load Switch
- Battery Protection

Features and Benefits

- LD-MOS Technology with the Lowest Figure of Merit:
 $R_{DS(on)} = 28m\Omega$ to Minimize On-State Losses
 $Q_g = 5.4nC$ for Ultra-Fast Switching
- $V_{gs(th)} = -0.6V$ typ. for a Low Turn-On Potential
- CSP with Footprint 1.5mm \times 1.5mm
- 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-WLB1515-9
- Terminal Connections: See Diagram Below
- Weight: 0.0018 grams (Approximate)

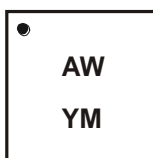

 Top-View
Pin Configuration


Equivalent Circuit

Ordering Information (Note 4)

Part Number	Case	Packaging
DMP2033UCB9-7	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> 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>.

Marking Information


AW = 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}	-6	V
Continuous Drain Current (Note 5) V _{GS} = -4.5V	Steady State	T _A = +25°C	I _D	-4.2A	A
		T _A = +70°C		-3.3A	
Continuous Drain Current (Note 6) V _{GS} = -4.5V	Steady State	T _A = +25°C	I _D	-5.8A	A
		T _A = +70°C		-4.5A	
Pulsed Drain Current			I _{DM}	-30	A

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

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 5)	P _D	1.0	W
Total Power Dissipation (Note 6)	P _D	1.8	W
Thermal Resistance, Junction to Ambient (Note 5)	R _{θJA}	126.8	°C/W
Thermal Resistance, Junction to Ambient (Note 6)	R _{θJA}	69	°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
Gate-Source Breakdown Voltage	BV _{GSS}	-6.1	-	-	V	I _{GS} = -250μA, V _{DS} = 0V
Zero Gate Voltage Drain Current	I _{DSS}	-	-	-1	μA	@T _C = +25°C V _{DS} = -16V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	-	-	-100	nA	V _{GS} = -6V, V _{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	V _{GS(th)}	-0.4	-0.6	-1.1	V	V _{DS} = V _{GS} , I _D = -250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	-	28	33	mΩ	V _{GS} = -4.5V, I _D = -2A
			35	45		V _{GS} = -2.5V, I _D = -2A
			45	65		V _{GS} = -1.8V, I _D = -2A
Forward Transfer Admittance	Y _{fs}	-	10.8	-	S	V _{DS} = -10V, 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}	-	15	-	nC	V _{dd} = -9.5V, I _F = -2A, di/dt = 200A/μs
Reverse Recovery Time	t _{rr}	-	25	-	ns	
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C _{iss}	-	382	500	pF	V _{DS} = -10V, V _{GS} = 0V, f = 1.0MHz
Output Capacitance	C _{oss}	-	204	270	pF	
Reverse Transfer Capacitance	C _{rss}	-	86	115	pF	
Series Gate Resistance	R _G	-	26.1	35	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1.0MHz
Total Gate Charge (4.5V)	Q _g	-	5.4	7.0	nC	V _{GS} = -4.5V, V _{DS} = -10V, I _D = -2A
Gate-Source Charge	Q _{gs}	-	0.7	-	nC	
Gate-Drain Charge	Q _{gd}	-	1.5	-	nC	
Turn-On Delay Time	t _{D(on)}	-	8.5	-	ns	V _{DD} = -10V, V _{GS} = -4.5V, I _{DS} = -2A, R _G = 2Ω,
Turn-On Rise Time	t _r	-	11.8	-	ns	
Turn-Off Delay Time	t _{D(off)}	-	47	-	ns	
Turn-Off Fall Time	t _f	-	56	-	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.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to production testing.

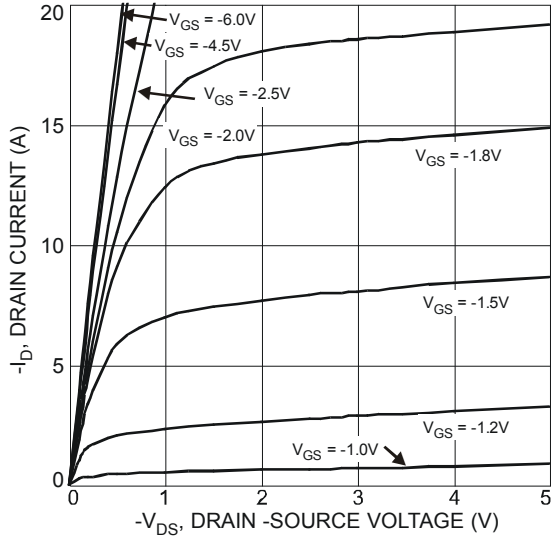


Fig. 1 Typical Output Characteristics

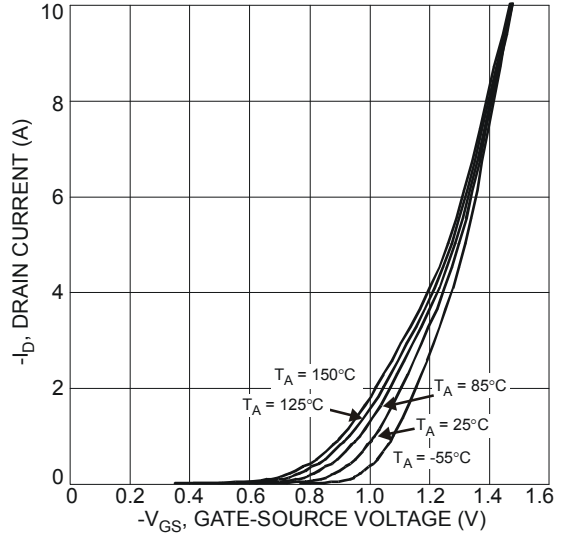


Fig. 2 Typical Transfer Characteristics

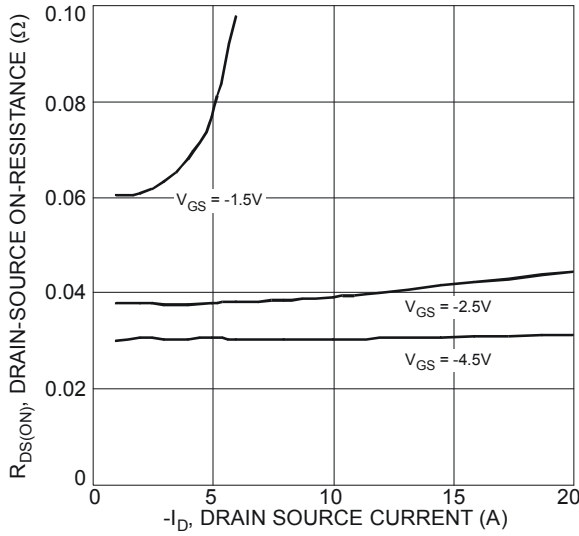


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

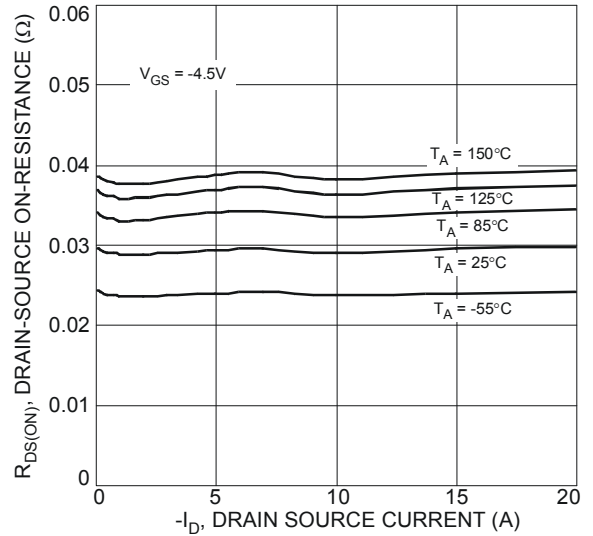


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

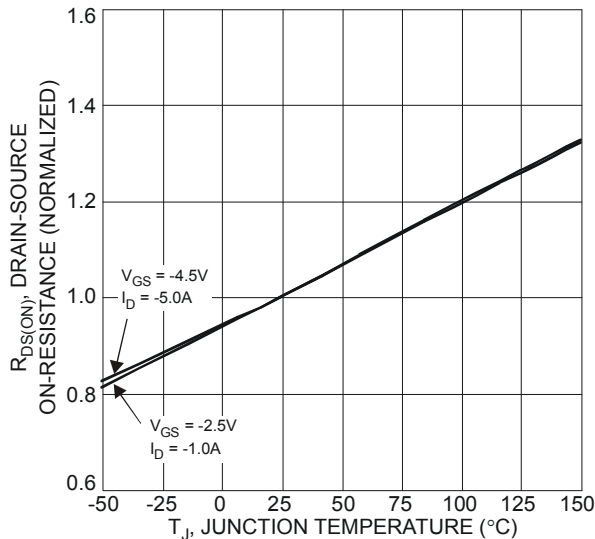


Fig. 5 On-Resistance Variation with Temperature

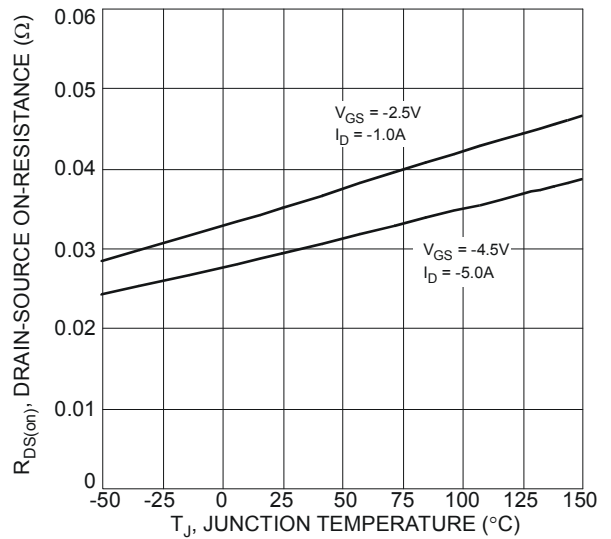


Fig. 6 On-Resistance Variation with Temperature

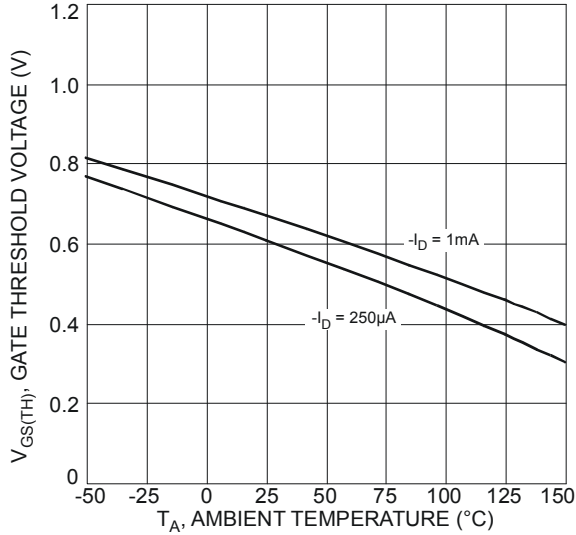


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

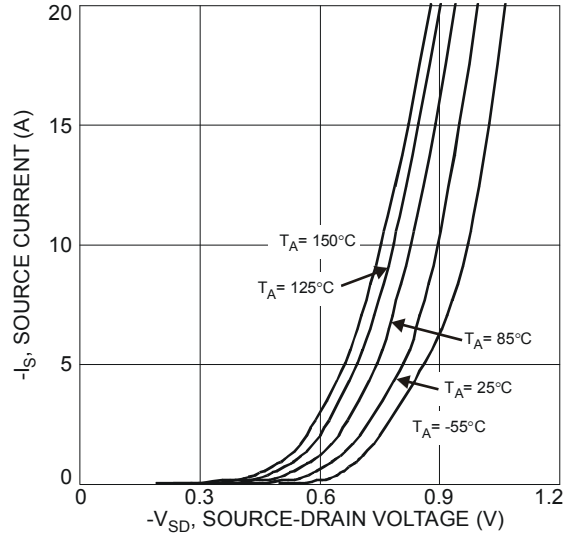


Fig. 8 Diode Forward Voltage vs. Current

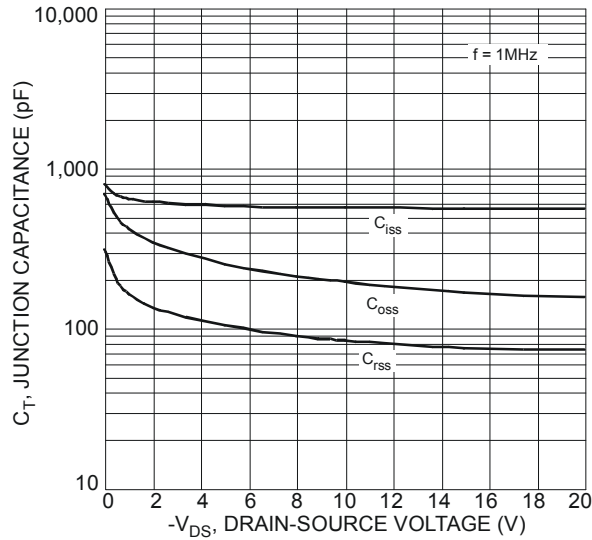


Fig. 9 Typical Junction Capacitance

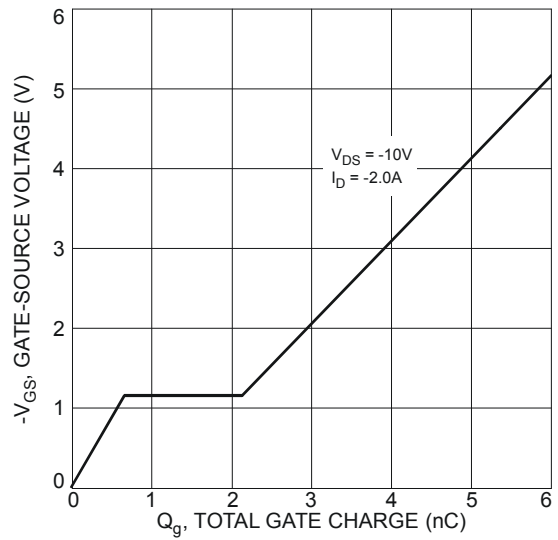


Fig. 10 Gate-Charge Characteristics

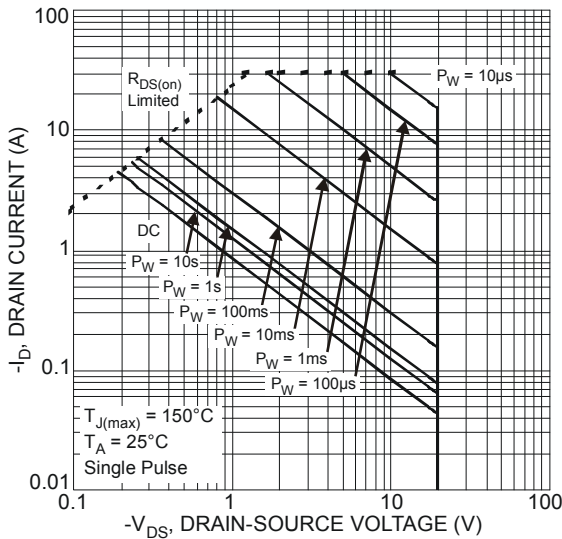
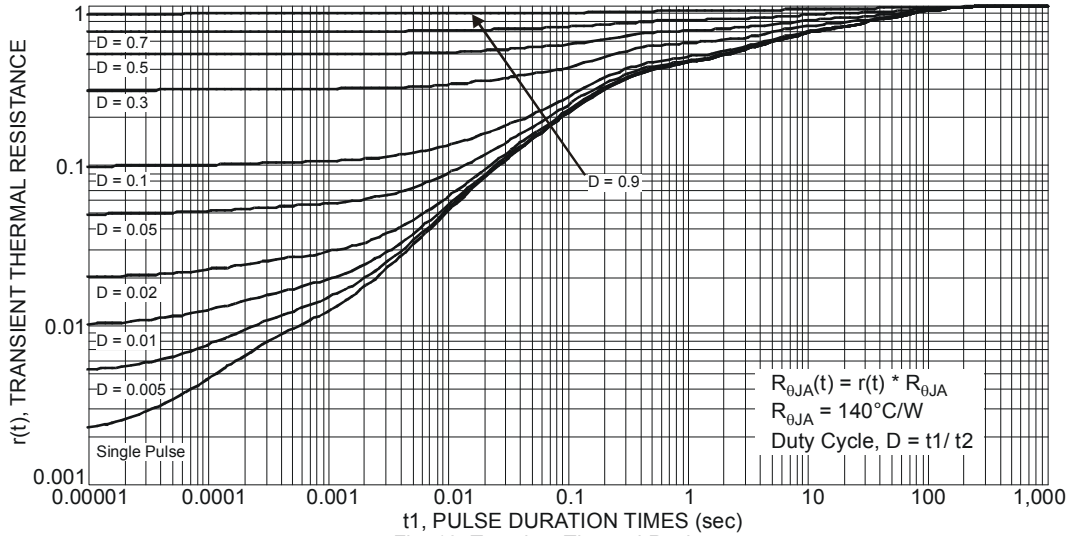
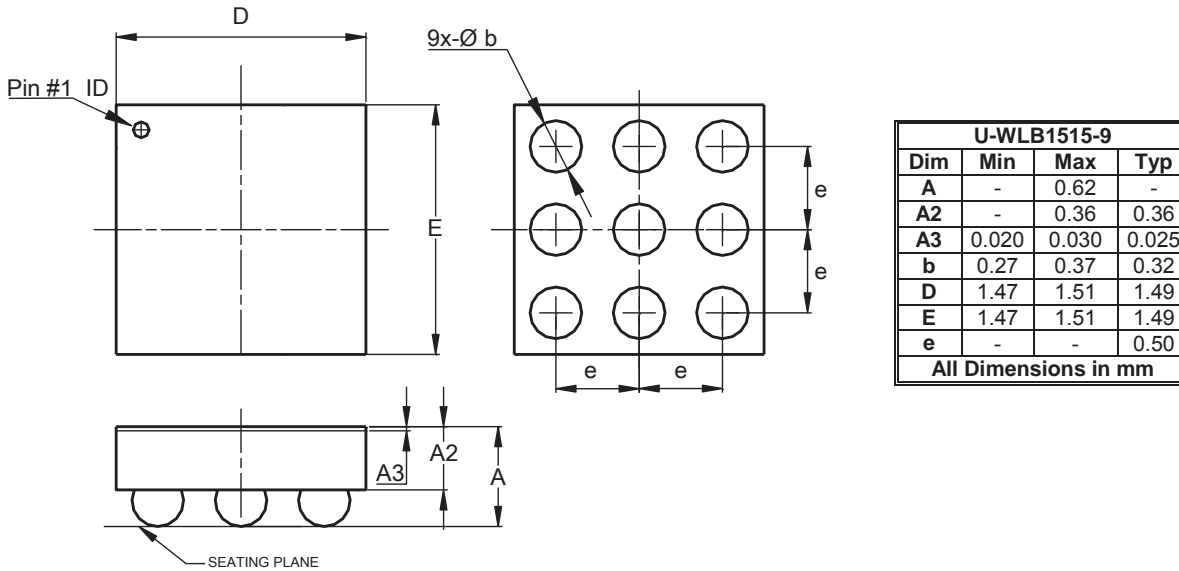


Fig. 11 SOA, Safe Operation Area



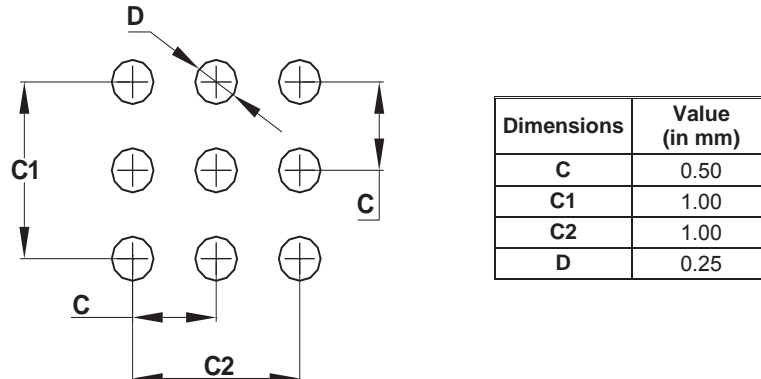
Package Outline Dimensions

Please see AP02001 at http://www.diodes.com/_files/datasheets/ap02001.pdf for the latest version.



Suggested Pad Layout

Please see AP02001 at http://www.diodes.com/_files/datasheets/ap02001.pdf for the latest version.



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