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

BV_{DSS}	$R_{DS(ON)}$	Q_g	Q_{gd}	I_D
-12V	0.065Ω	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.

Features

- LD-MOS Technology with the Lowest Figure of Merit:
  $R_{DS(ON)}$ = 0.065Ω to Minimize On-State Losses
  Q_g = 2.5nC for Ultra-Fast Switching
- $V_{gs(TH)}$ = -0.5V Typ. for a Low Turn-On Potential
- CSP with Footprint 1.0mm × 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**

Applications

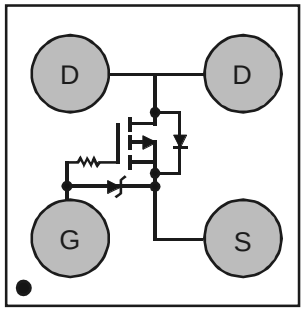
- Battery Management
- Load Switch
- Battery Protection

Mechanical Data

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

ESD PROTECTED TO 3kV

U-WLB1010-4



Top View
Equivalent Circuit

Ordering Information (Note 4)

Part Number	Case	Packaging
DMP1081UCB4-7	U-WLB1010-4	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 https://www.diodes.com/design/support/packaging/diodes-packaging/.

Marking Information

U-WLB1010-4

7A = Product Type Marking Code
YM = Date Code Marking
Y = Year (ex: E = 2017)
M = Month (ex: 9 = September)

Date Code Key

Year	2016	2017	2018	2019	2020	2021	2022
Code	D	E	F	G	H	I	J

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	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 T_A = +70°C	I_D	-3.3 -2.7	A
Continuous Drain Current (Note 5) V_{GS} = -2.5V	Steady State	T_A = +25°C T_A = +70°C	I_D	-3.0 -2.4	A
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)	$R_{\theta JA}$	150	°C/W
Thermal Resistance, Junction to Case @T_C = +25°C (Note 7)	$R_{\theta JC}$	42.66	°C/W
Power Dissipation (Note 5)	P_D	1.59	W
Thermal Resistance, Junction to Ambient @T_A = +25°C (Note 5)	$R_{\theta JA}$	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	$V_{GS(TH)}$	-0.35	-0.5	-0.65	V	V_{DS} = V_{GS}, I_D = -250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	-	0.065	0.08	Ω	V_{GS} = -4.5V, I_D = -500mA
		-	0.077	0.1		V_{GS} = -2.5V, I_D = -500mA
		-	0.108	0.13		V_{GS} = -1.5V, I_D = -500mA
		-	0.4	10		V_{GS} = -0.9V, I_D = -100mA
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
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	-		
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	

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

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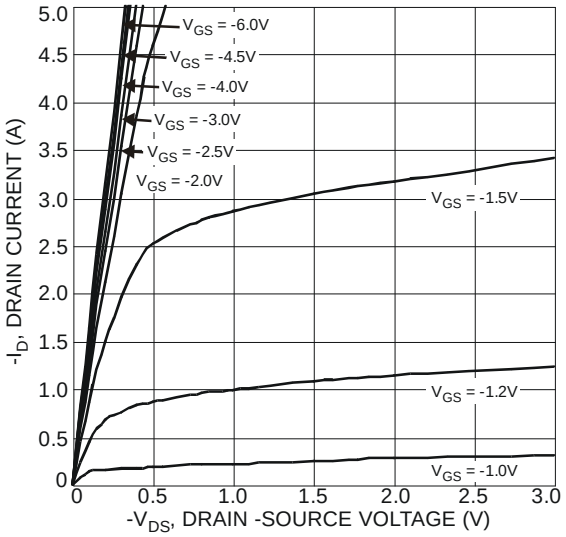

Fig. 1 Typical Output Characteristics

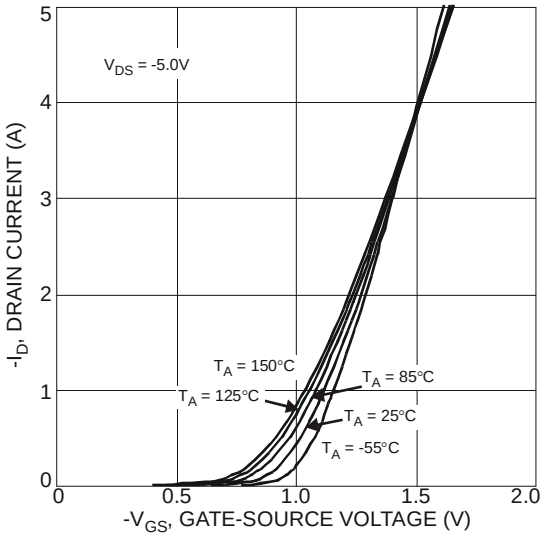

Fig. 2 Typical Transfer Characteristics

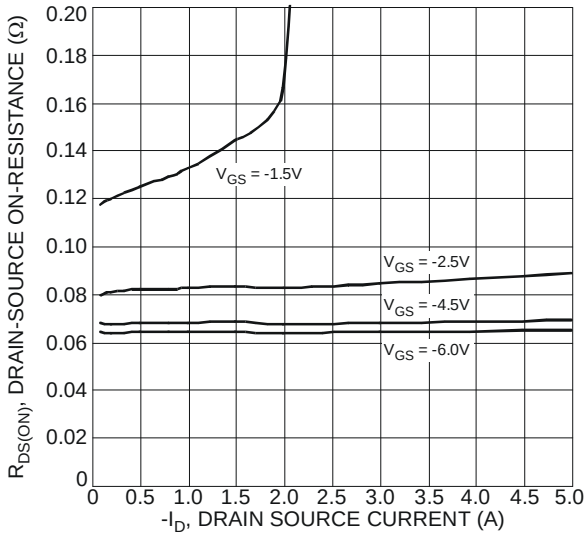

Fig. 3 Typical On-Resistance vs.
Drain Current and Gate Voltage

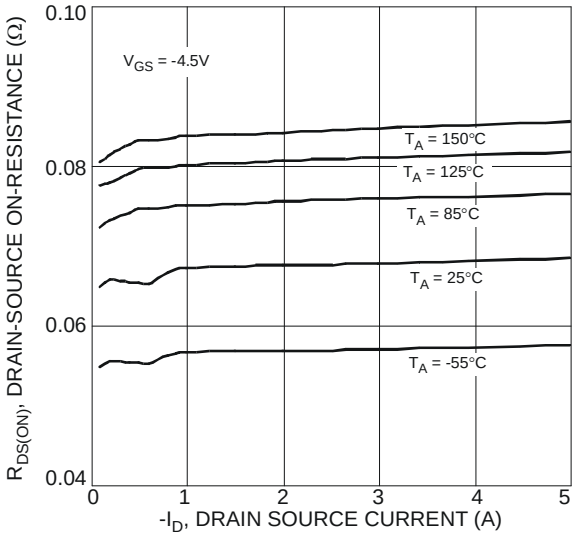

Fig. 4 Typical On-Resistance vs.
Drain Current and Temperature

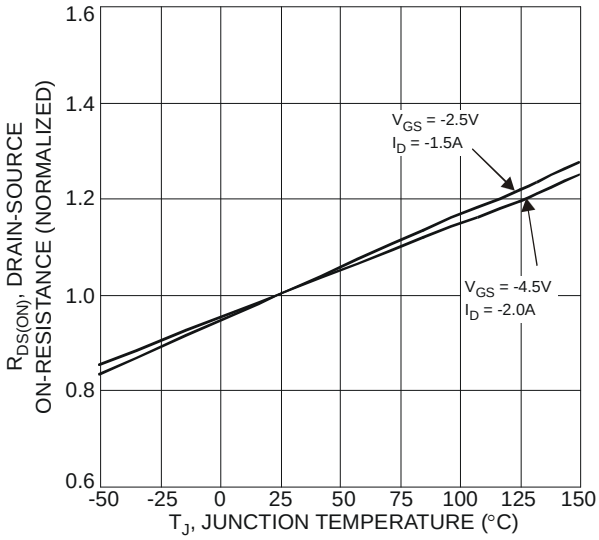

Fig. 5 On-Resistance Variation with Temperature

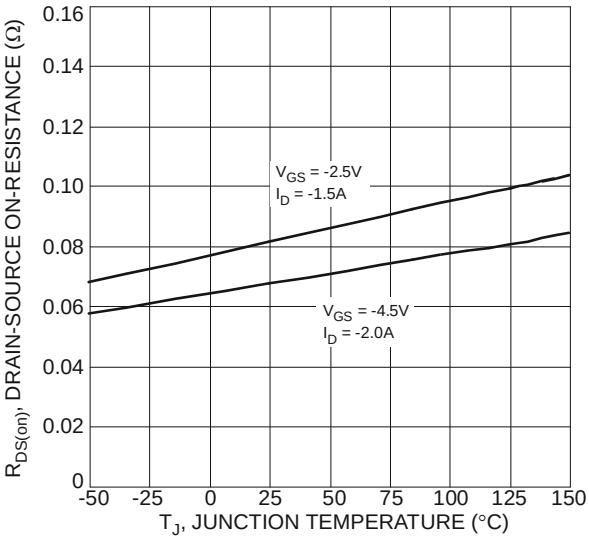

Fig. 6 On-Resistance Variation with Temperature

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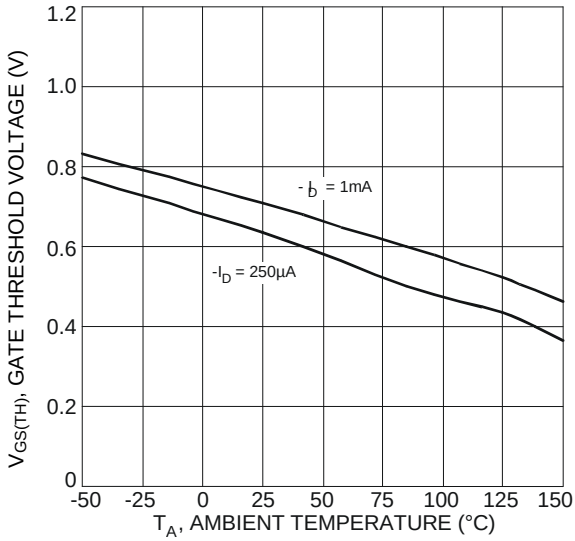

Fig. 7 Gate Threshold Variation vs. Ambient Temperature

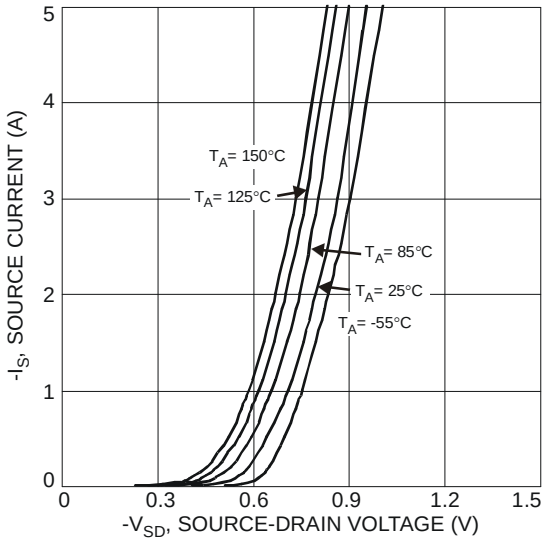

Fig. 8 Diode Forward Voltage vs. Current

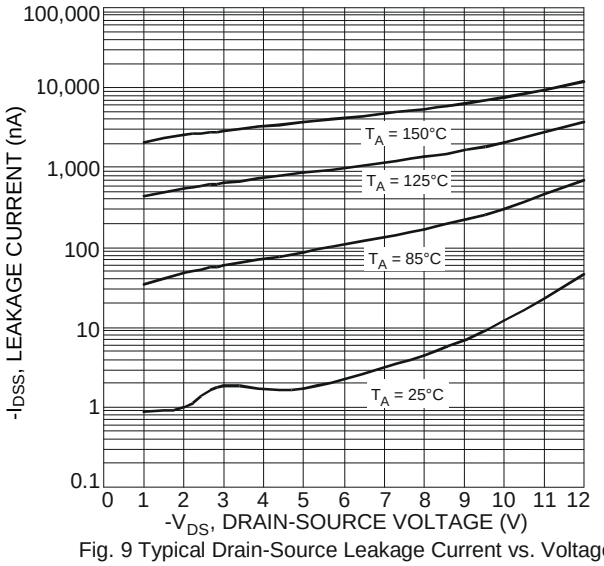

Fig. 9 Typical Drain-Source Leakage Current vs. Voltage

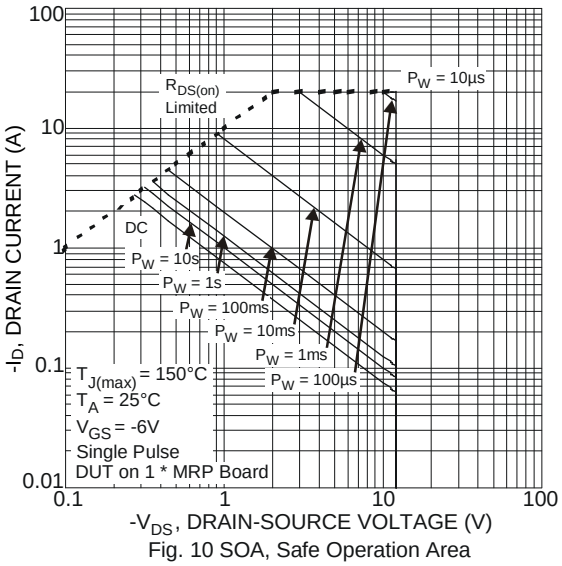

Fig. 10 SOA, Safe Operation Area

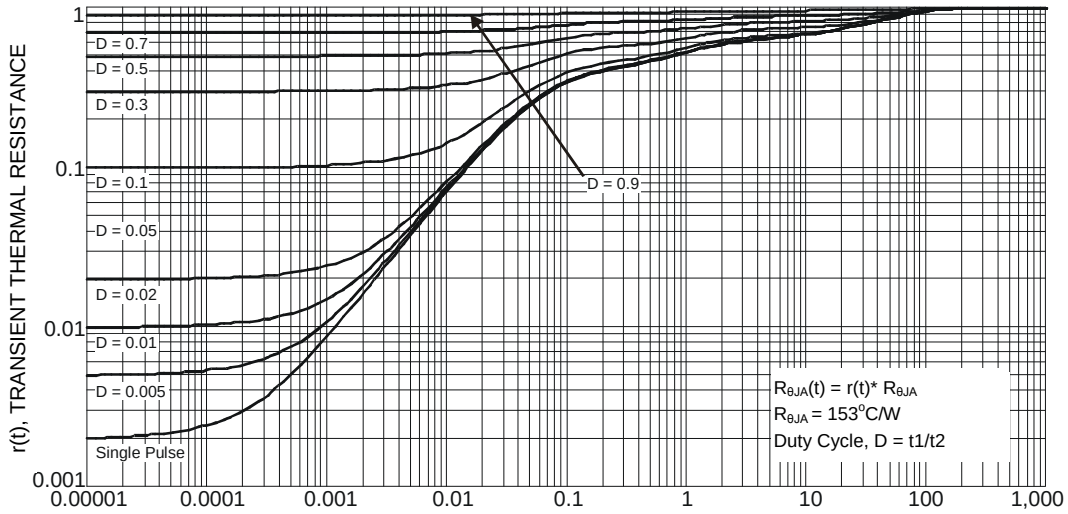

Fig. 11 Transient Thermal Resistance

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Package Outline Dimension

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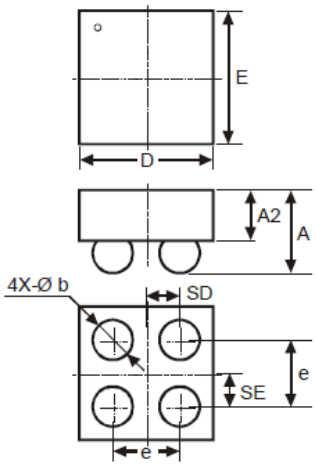

U-WLB1010-4			
Dim	**Min**	**Max**	**Typ**
D	0.95	1.05	1.00
E	0.95	1.05	1.00
A	–	0.62	–
A2	–	–	0.38
b	0.25	0.35	0.30
e	–	–	0.50
SD	–	–	0.25
SE	–	–	0.25
All Dimensions in mm			

Suggested Pad Layout

Please see http://www.diodes.com/package-outlines.html for the latest version.

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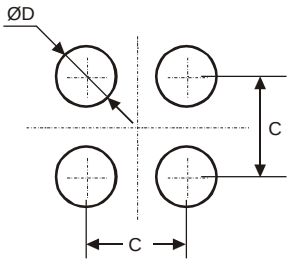

Dimensions	Value (in mm)
C	0.50
D	0.25

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