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

BV_{DSS}	$R_{DS(ON)}$	Q_g	Q_{gd}	I_D
-20V	40mΩ	2.3nC	0.4nC	-4.1A

Description

This new generation MOSFET is designed to minimize the on-state resistance ($R_{DS(ON)}$) 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:
  $R_{DS(ON)}$ = 40mΩ to Minimize On-State Losses
  Q_g = 2.3nC for Ultra-Fast Switching
- $V_{GS(th)}$ = -0.8V 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)**
- **For automotive applications requiring specific change control (i.e.: parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please refer to the related automotive grade (Q-suffix) part. A listing can be found at https://www.diodes.com/products/automotive/automotive-products/.**
- **This part is qualified to JEDEC standards (as references in AEC-Q) for High Reliability. https://www.diodes.com/quality/product-definitions/**

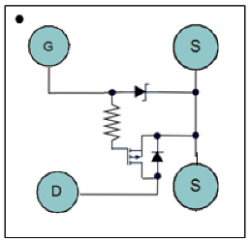
Mechanical Data

- Case: U-WLB1010-4
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram Below
- Terminal: Finish - SnAgCu. Solderable per MIL-STD-202 Method 208 e1
- Weight: 0.0018 grams (Approximate)

U-WLB1010-4



ESD PROTECTED TO 3kV



Top View
Equivalent Circuit

Ordering Information (Note 4)

Part Number	Case	Packaging
DMP2047UCB4-7	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) & 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ 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/.

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Marking Information

U-WLB1010-4



DW = Product Type Marking Code
YM = Date Code Marking
Y = Year (ex: H = 2020)
M = Month (ex: 9 = September)
c = Assembly Code

Date Code Key

Year	2012	…	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Code	Z	…	H	I	J	K	L	M	N	O	P	R

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}	-20	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	-4.1 -3.2	A
Continuous Drain Current (Note 5) V_{GS} = -2.5V	Steady State	T_A = +25°C T_A = +70°C	I_D	-3.6 -2.8	A
Pulsed Drain Current (Note 6)			I_{DM}	-16	A

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 7)	P_D	1.0	W
Thermal Resistance, Junction to Ambient @ T_A = +25°C (Note 7)	$R_{\theta JA}$	127	°C/W
Thermal Resistance, Junction to Case @ T_C = +25°C (Note 7)	$R_{\theta JC}$	25.8	°C/W
Power Dissipation (Note 5)	P_D	1.66	W
Thermal Resistance, Junction to Ambient @ T_A = +25°C (Note 5)	$R_{\theta JA}$	77	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

Notes: 5. Device mounted on FR4 material with 1-inch^2 (6.45-cm^2), 2-oz. (0.071-mm 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.

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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}	-20	—	—	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} = -16V, 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	-0.8	-1.2	V	V_{DS} = V_{GS}, I_D = -250μA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	40	47	mΩ	V_{GS} = -4.5V, I_D =-1A
		—	53	60		V_{GS} = -2.5V, I_D = -1A
Forward Transfer Admittance	$\|Y_{fs}\|$	—	3.7	—	S	V_{DS} = -10V, I_D = -1A
Diode Forward Voltage	V_{SD}	—	-0.7	-1.0	V	V_{GS} = 0V, I_S = -1A
Reverse Recovery Charge	Q_{RR}	—	3.07	—	nC	V_{DD}= -10V, I_F = -1A, di/dt =100A/μs
Reverse Recovery Time	t_{RR}	—	13.14	—	ns	
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	218	—	pF	V_{DS} = -10V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	116	—		
Reverse Transfer Capacitance	C_{rss}	—	11	—		
Total Gate Charge	Q_g	—	2.3	—	nC	V_{GS} = -4.5V, V_{DS} = -10V, I_D = -1A
Gate-Source Charge	Q_{gs}	—	0.2	—		
Gate-Drain Charge	Q_{gd}	—	0.4	—		
Gate Charge at Vth	$Q_{g(th)}$	—	0.2	—		
Turn-On Delay Time	$t_{D(ON)}$	—	7.9	—	ns	V_{DS} = -10V, V_{GS} = -2.5V, R_G = 20Ω, I_D = -1A
Turn-On Rise Time	t_R	—	10.7	—		
Turn-Off Delay Time	$t_{D(OFF)}$	—	48	—		
Turn-Off Fall Time	t_F	—	38	—		

Notes: 8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to production testing.

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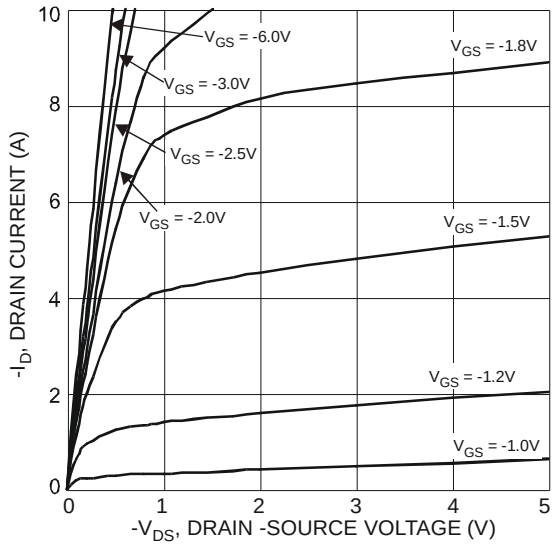


Figure 1 Typical Output Characteristics

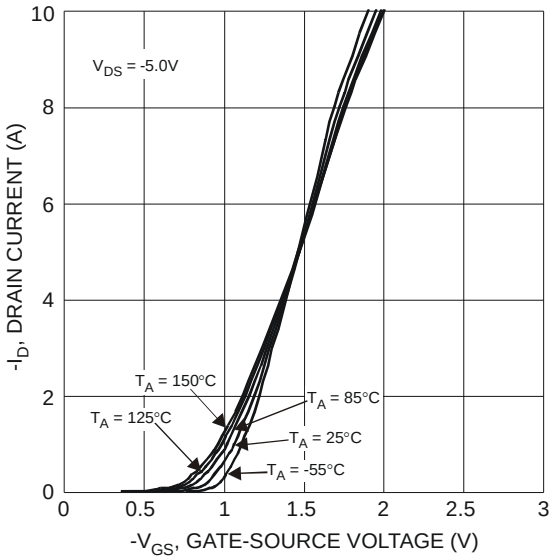


Figure 2 Typical Transfer Characteristics

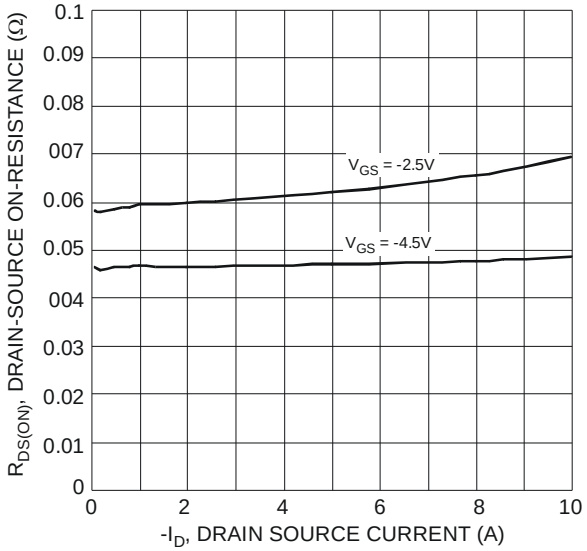


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

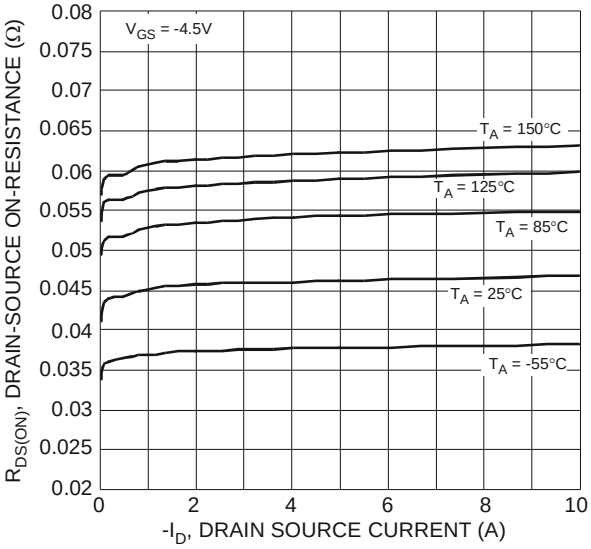


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

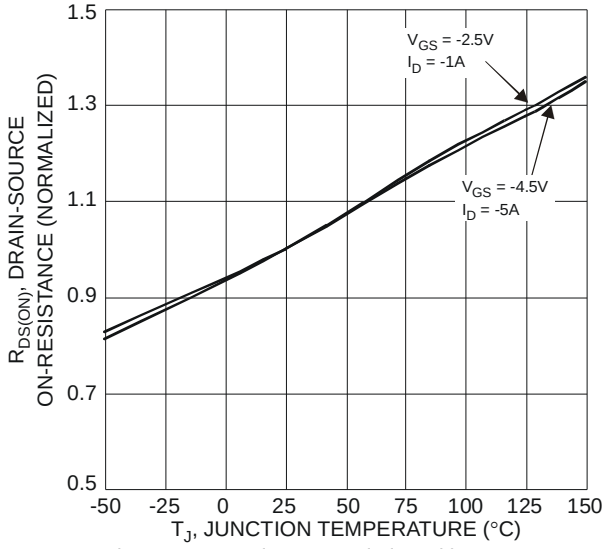


Figure 5 On-Resistance Variation with Temperature

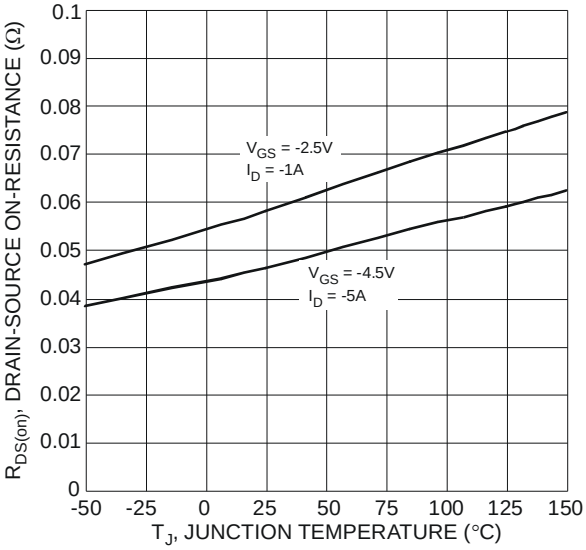


Figure 6 On-Resistance Variation with Temperature

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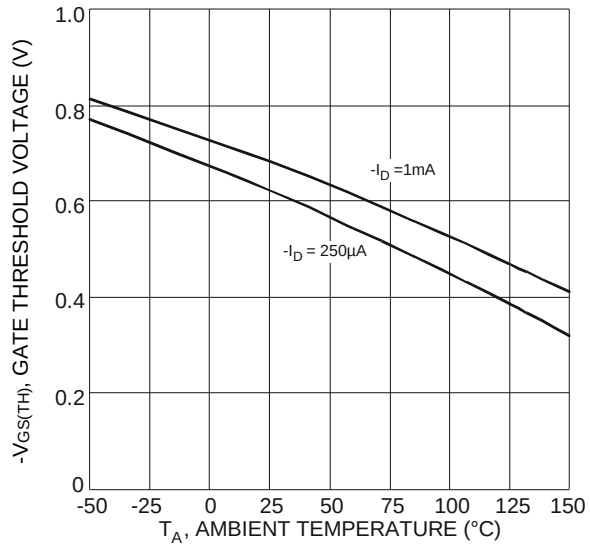


Figure 7 Gate Threshold Variation vs. Ambient Temperature

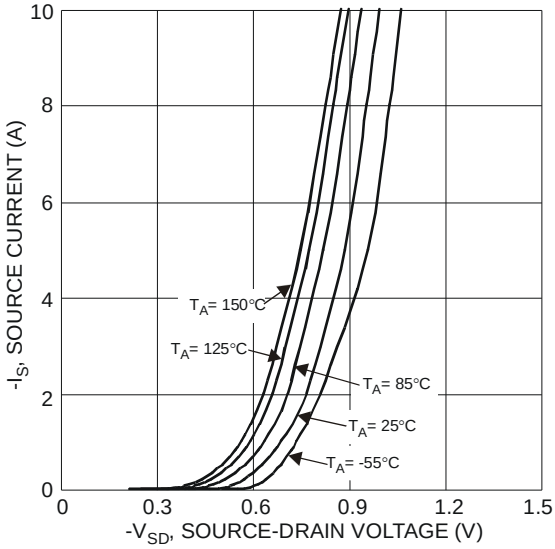


Figure 8 Diode Forward Voltage vs. Current

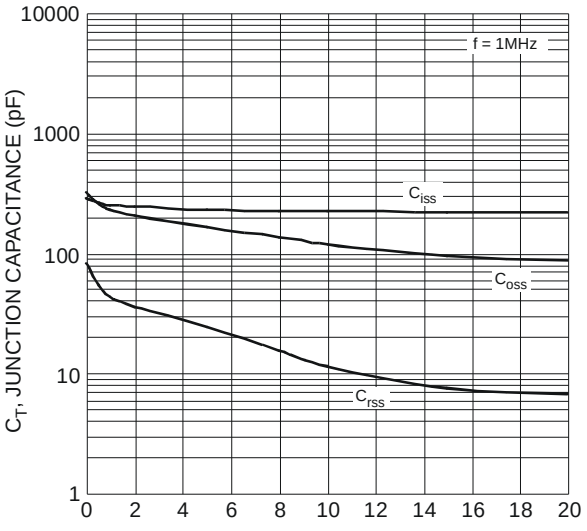


Figure 9 Typical Junction Capacitance

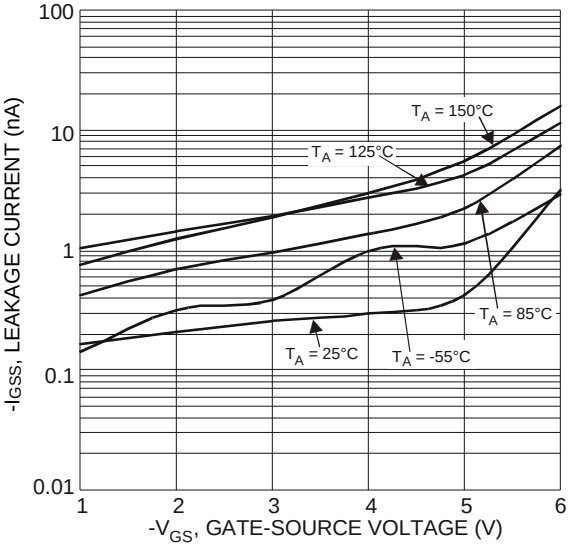


Figure 10 Typical Gate-Source Leakage Current vs. Voltage

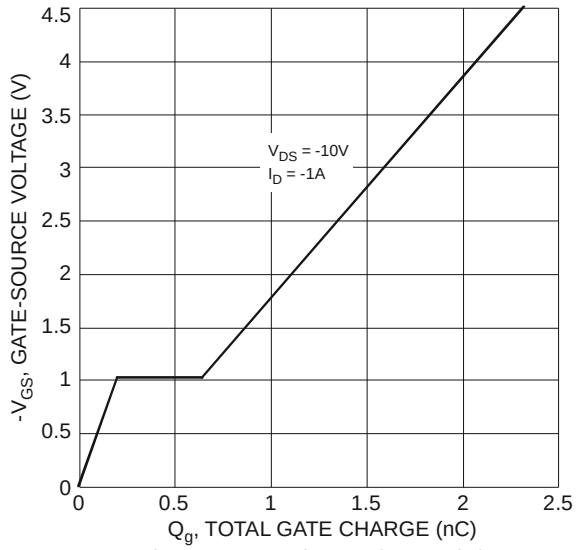


Figure 11 Gate-Charge Characteristics

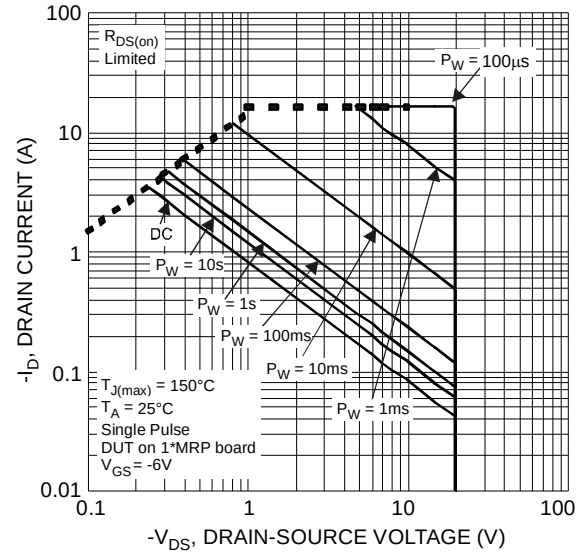


Figure 12 SOA, Safe Operation Area

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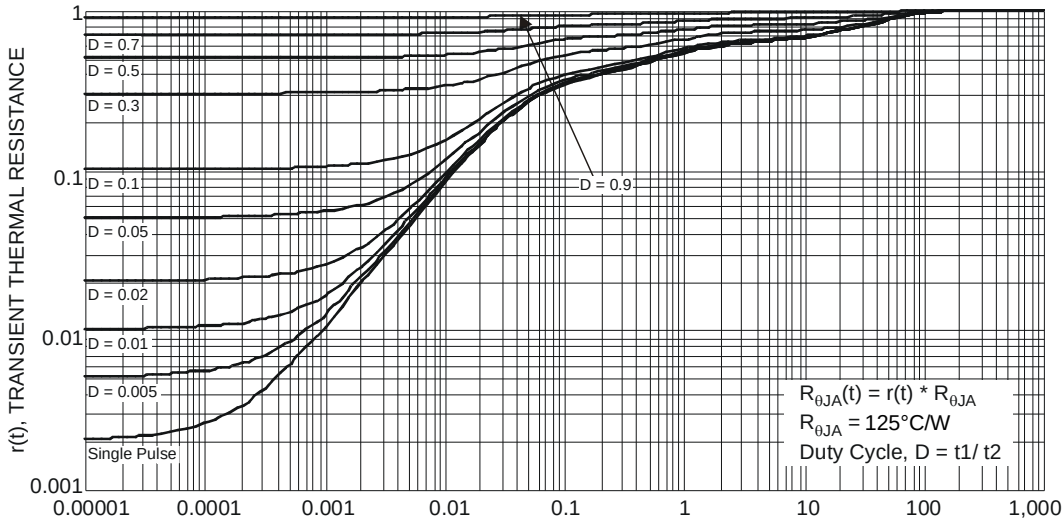


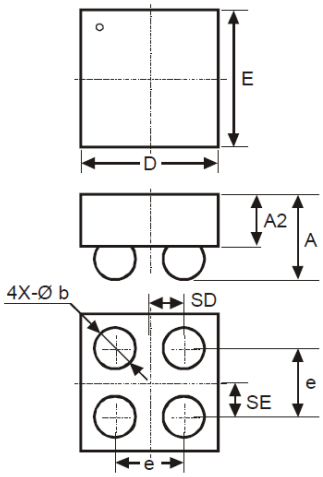
Figure 13 Transient Thermal Resistance

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Package Outline Dimensions

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

U-WLB1010-4

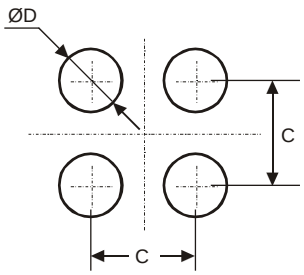


U-WLB1010-4			
Dim	**Min**	**Max**	**Typ**
D	0.95	1.05	1.00
E	0.95	1.05	1.00
A	–	0.62	–
A2	–	–	0.38
b	0.25	0.35	0.30
e	–	–	0.50
SD	–	–	0.25
SE	–	–	0.25
All Dimensions in mm			

Suggested Pad Layout

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

U-WLB1010-4



Dimensions	Value (in mm)
C	0.50
D	0.25

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