

N-CHANNEL ENHANCEMENT MODE MOSFET
Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$	I_D $T_A = +25^\circ\text{C}$
12V	20m Ω @ $V_{GS} = 4.5\text{V}$	6.6A
	23m Ω @ $V_{GS} = 2.5\text{V}$	6.1A

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

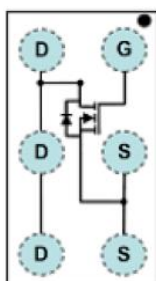
- Battery Management
- Load Switch
- Battery Protection

Features and Benefits

- Low Q_G & Q_{GD}
- Small Footprint
- Low Profile 0.62mm Height
- Totally Lead-Free & Full 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-WLB1510-6
- Terminal Connections: See Diagram Below
- Terminals: Finished – SnAgCu Ball (e)
- Weight: 0.0018 grams (Approximate)

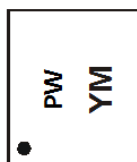
U-WLB1510-6


Top View

Ordering Information (Note 4)

Part Number	Case	Packaging
DMN1016UCB6-7	U-WLB1510-6	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-WLB1510-6


PW = Product Type Marking Code
 YM = Date Code Marking
 Y = Year (ex: D = 2016)
 M = Month (ex: 9 = September)

Date Code Key

Year	2015	2016	2017	2018	2019	2020	2021
Code	C	D	E	F	G	H	I

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}	12	V
Gate-Source Voltage			V _{GSS}	±8	V
Continuous Drain Current (Note 5) V _{GS} =4.5V	Steady State	T _A = +25°C	I _D	5.5	A
		T _A = +70°C		4.2	
Continuous Drain Current (Note 6) V _{GS} =4.5V	Steady State	T _A = +25°C	I _D	6.6	A
		T _A = +70°C		5.3	
Pulsed Drain Current (Note 7)			I _{DM}	30	A

Thermal Characteristics

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 5)	P _D	0.92	W
Total Power Dissipation (Note 6)	P _D	1.47	W
Thermal Resistance, Junction to Ambient (Note 5)	R _{θJA}	136	°C/W
Thermal Resistance, Junction to Ambient (Note 6)	R _{θJA}	94	°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
Zero Gate Voltage Drain Current (@T _C = +25°C)	I _{DSS}	—	—	1.0	μA	V _{DS} = 9.6V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±8V, 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)}	—	16	20	mΩ	V _{GS} = 4.5V, I _D = 1.5A
		—	20	23		V _{GS} = 2.5V, I _D = 1.5A
Forward Transfer Admittance	Y _{FS}	—	14	—	S	V _{DS} = 6V, I _D = 1.5A
Diode Forward Voltage (Note 6)	V _{SD}	—	0.7	1.0	V	V _{GS} = 0V, I _S = 1.5A
Reverse Recovery Charge	Q _{RR}	—	8	—	nC	V _{DD} = 6V, I _F = 1.5A, di/dt =200A/μs
Reverse Recovery Time	t _{RR}	—	43.6	—	ns	
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C _{ISS}	—	423	550	pF	V _{DS} = 6V, V _{GS} = 0V, f = 1.0MHz
Output Capacitance	C _{OSS}	—	238	310	pF	
Reverse Transfer Capacitance	C _{RSS}	—	41	55	pF	
Series Gate Resistance	R _G	—	3	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (4.5V)	Q _G	—	4.2	5.5	nC	V _{GS} = 4.5V, V _{DS} = 6V, I _D =1.5A
Gate-Source Charge	Q _{GS}	—	0.6	—	nC	
Gate-Drain Charge	Q _{GD}	—	0.4	—	nC	
Turn-On Delay Time	t _{D(ON)}	—	5	8	ns	V _{DS} = 6V, V _{GS} = 4.5V, R _G = 4Ω, I _D = 1.5A
Turn-On Rise Time	t _R	—	10	—	ns	
Turn-Off Delay Time	t _{D(OFF)}	—	25	40	ns	
Turn-Off Fall Time	t _F	—	10	—	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.
 - 300ms pulse, pulse duty cycle ≤ 2%.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to production testing.

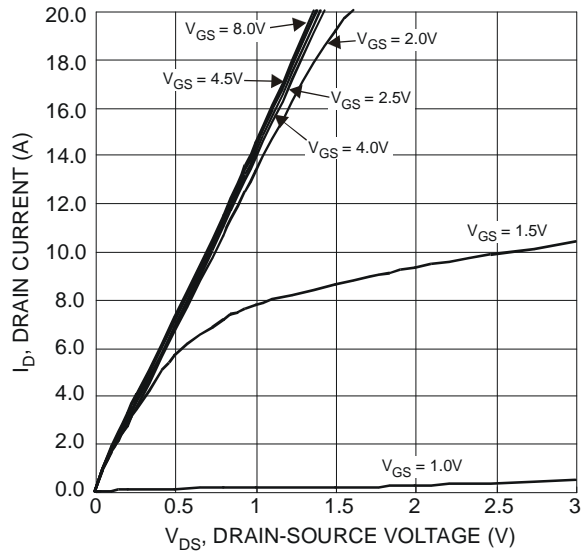


Figure 1 Typical Output Characteristics

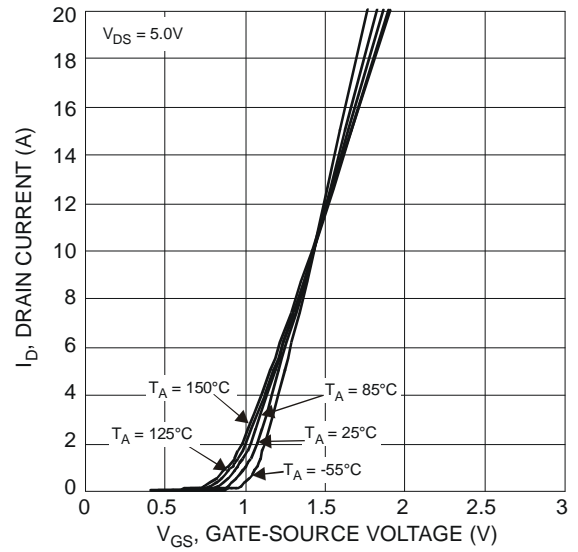


Figure 2 Typical Transfer Characteristics

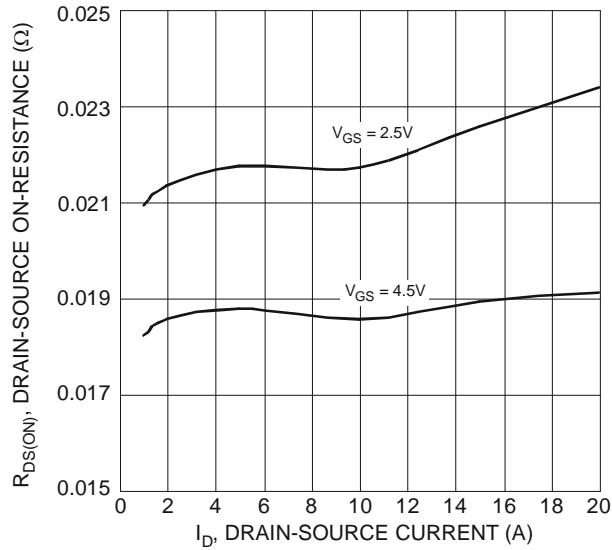


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

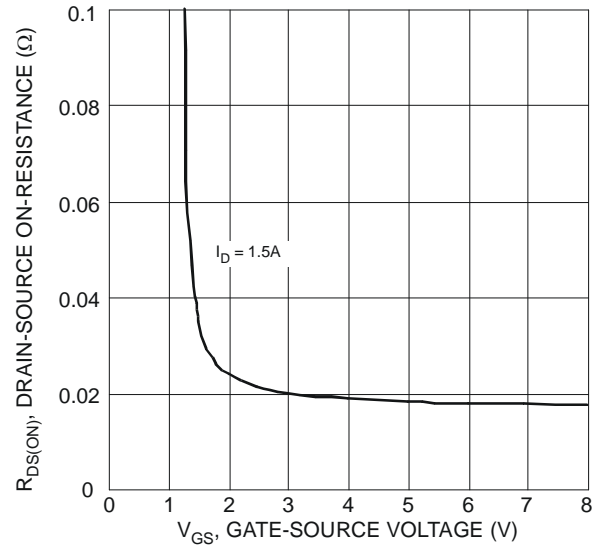


Figure 4 Typical Transfer Characteristics

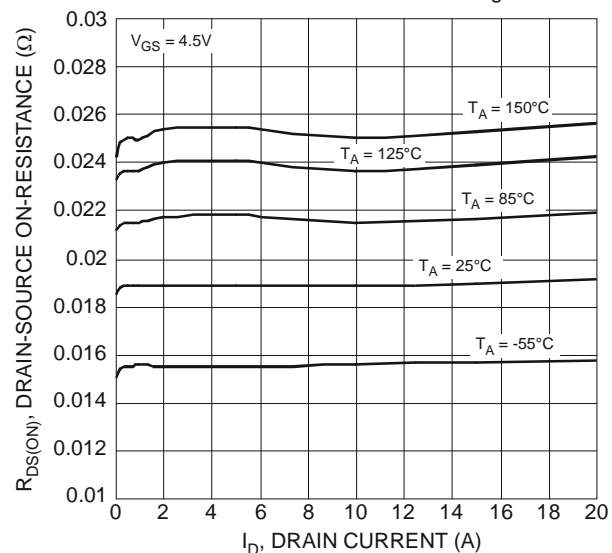


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

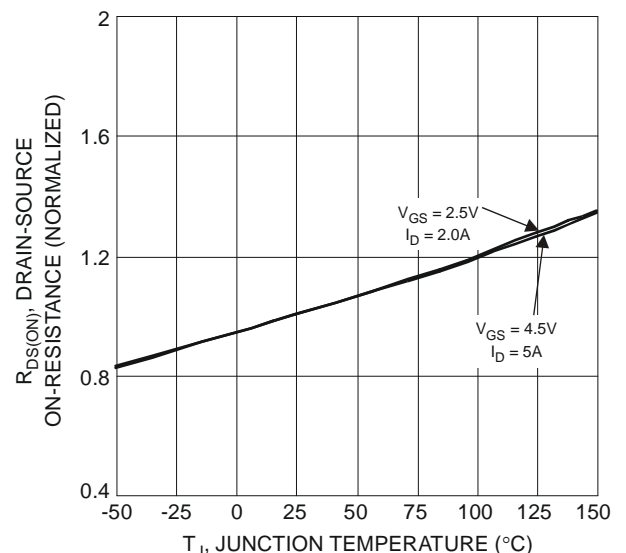
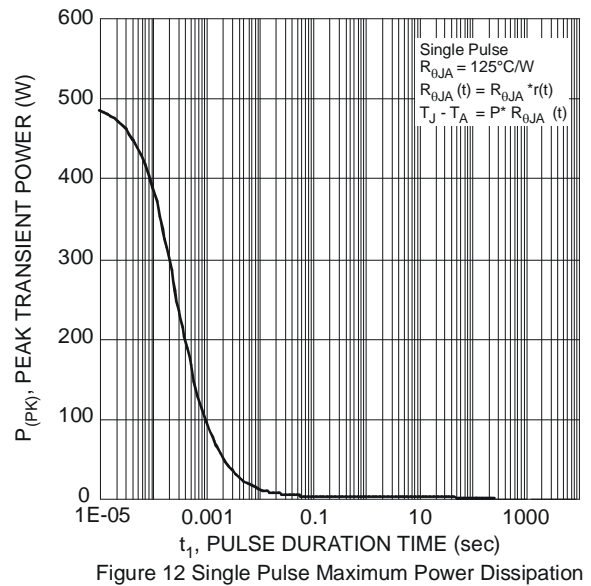
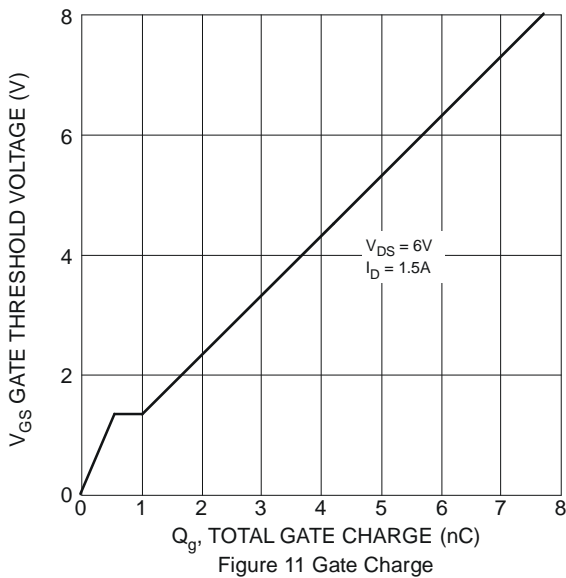
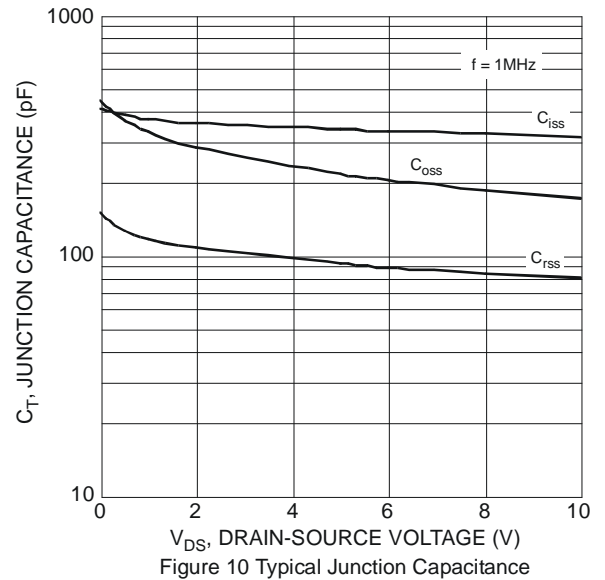
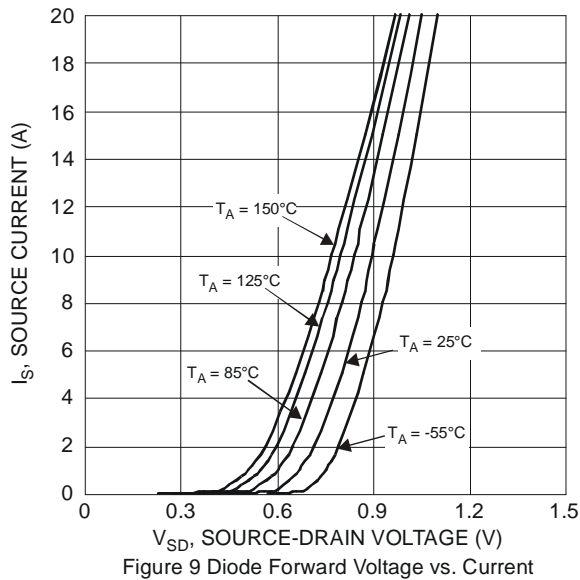
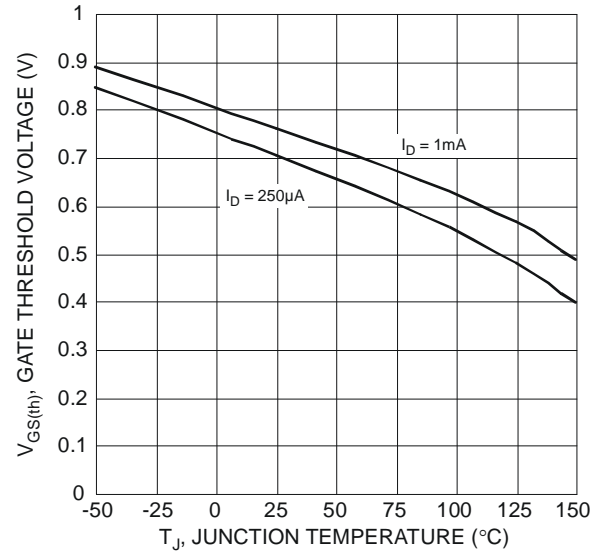
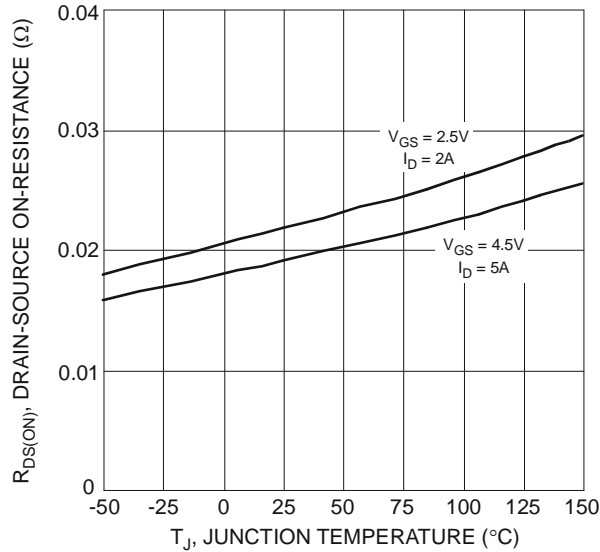


Figure 6 On-Resistance Variation with Temperature



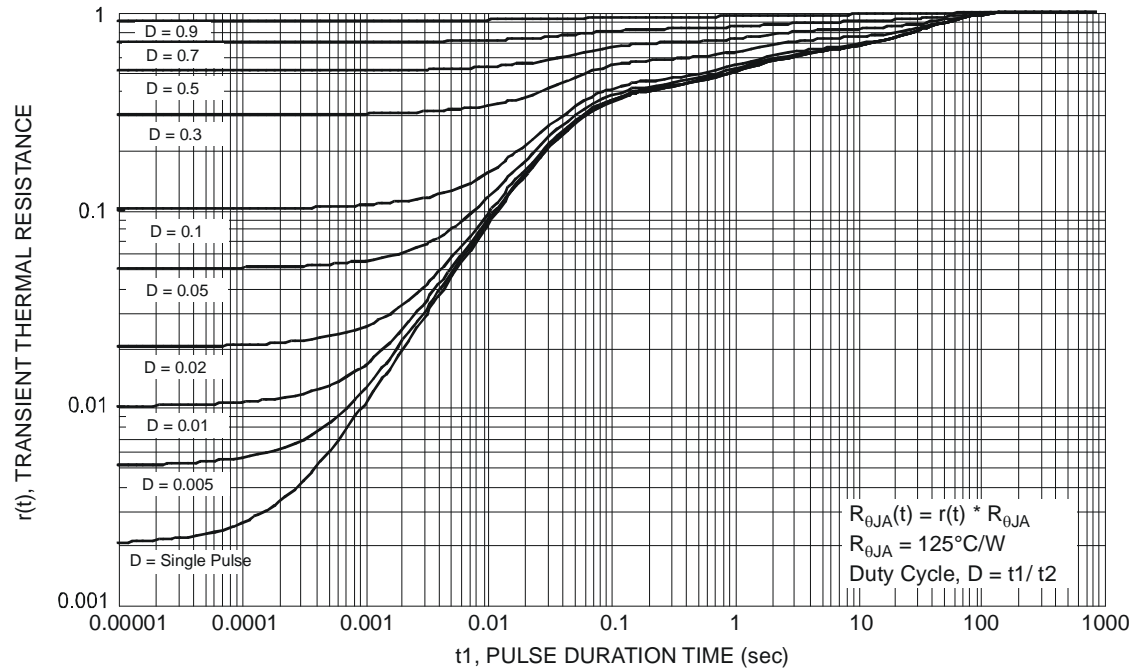
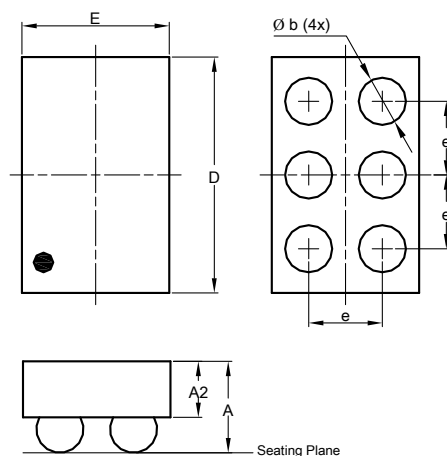


Figure 13 Transient Thermal Resistance

Package Outline Dimensions

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

U-WLB1510-6

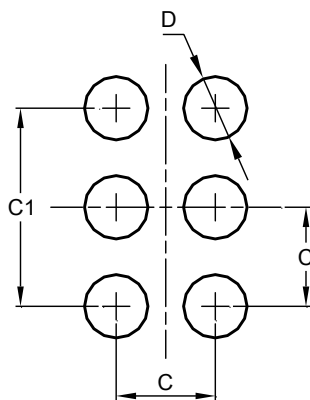


U-WLB1510-6			
Dim	Min	Max	Typ
A	—	0.62	—
A2	—	—	0.038
b	0.27	0.37	0.32
D	1.40	1.50	1.50
E	0.90	1.00	1.00
e	—	—	0.50
All Dimensions in mm			

Suggested Pad Layout

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

U-WLB1510-6



Dimensions	Value (in mm)
C	0.50
C1	1.00
D	0.25

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