



#### **DUAL N-CHANNEL ENHANCEMENT MODE MOSFET**

## **Product Summary**

V <sub>(BR)DSS</sub>	R <sub>DS(ON)</sub> Max	I <sub>D</sub> T <sub>A</sub> = +25°C
24V	$7m\Omega @ V_{GS} = 4.5V$	11.0A
	$7.8 m\Omega @ V_{GS} = 4.0 V$	10.8A
	$8.2m\Omega @ V_{GS} = 3.7V$	10.6A
	$9.5 m\Omega @ V_{GS} = 3.1 V$	10.5A
	$10.5 m\Omega @ V_{GS} = 2.5 V$	10.0A

#### **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.

## **Applications**

- Power Management Functions
- Battery Pack
- Load Switch

#### **Features**

- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- ESD Protected Gate > 2KV
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. "Green" Device (Note 3)

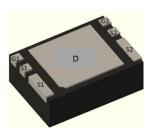
#### **Mechanical Data**

- Case: U-DFN2535-6
- Case Material: Molded Plastic, "Green" Molding Compound.
   UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram Below
- Weight: 0.012 grams (Approximate)

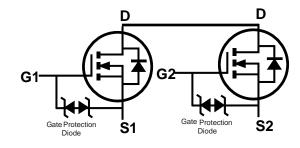


**ESD PROTECTED** 





Bottom View



**Equivalent Circuit** 

#### **Ordering Information** (Note 4)

Part Number	Case	Packaging
DMN2010UDZ-7	U-DFN2535-6	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-DFN2535-6



R11 = Product Type Marking Code YYWW = Date Code Marking YY = Last Digit of Year (ex: 15 for 2015) WW = Week Code (01 to 53)



# **Maximum Ratings** (@ $T_A = +25^{\circ}C$ , unless otherwise specified.)

Characte	Symbol	Value	Unit		
Drain-Source Voltage	$V_{DSS}$	24	V		
Gate-Source Voltage			$V_{GSS}$	±8	V
Continuous Drain Current (Note 6) V <sub>GS</sub> = 4.5V	Steady State	$T_A = +25^{\circ}C$ $T_A = +70^{\circ}C$	I <sub>D</sub>	11 9	А
Maximum Continuous Body Diode Forward Curr	I <sub>S</sub>	2	Α		
Pulsed Drain Current (380μs Pulse, Duty Cycle = 1%)			I <sub>DM</sub>	65	Α
Avalanche Current (Note 7) L = 0.1mH			I <sub>AS</sub>	34	Α
Avalanche Energy (Note 7) L = 0.1mH			E <sub>AS</sub>	57	mJ

## **Thermal Characteristics**

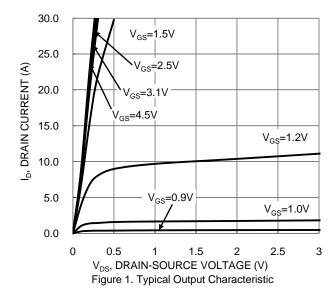
Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	T <sub>A</sub> = +25°C	$P_{D}$	0.7	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{ heta JA}$	184	°C/W
Total Power Dissipation (Note 6)	T <sub>A</sub> = +25°C	P <sub>D</sub>	1.6	W
Thermal Resistance, Junction to Ambient (Note 6)  Steady State		$R_{\theta JA}$	78	°C/W
Thermal Resistance, Junction to Case	$R_{\theta JC}$	16.4	C/VV	
Operating and Storage Temperature Range		$T_{J_{I}}T_{STG}$	-55 to +150	°C

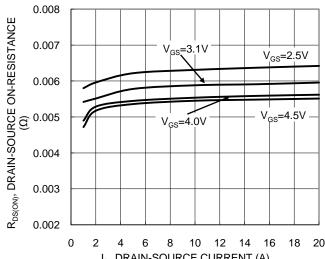
# Electrical Characteristics (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Тур	Max	Unit	Test Condition	
OFF CHARACTERISTICS (Note 8)							
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	24	1	-	V	$V_{GS} = 0V$ , $I_D = 250\mu A$	
Zero Gate Voltage Drain Current T <sub>J</sub> = +25°C	I <sub>DSS</sub>		-	1.0	μΑ	$V_{DS} = 24V, V_{GS} = 0V$	
Gate-Source Leakage	I <sub>GSS</sub>	-	-	±10	μΑ	$V_{GS} = \pm 8V, V_{DS} = 0V$	
ON CHARACTERISTICS (Note 8)							
Gate Threshold Voltage	V <sub>GS(TH)</sub>	0.3	-	1.5	V	$V_{DS} = V_{GS}, I_{D} = 250 \mu A$	
			-	7		$V_{GS} = 4.5V, I_D = 5.5A$	
			ı	7.8	mΩ	$V_{GS} = 4.0V, I_D = 5.5A$	
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	-	-	8.2		$V_{GS} = 3.7V, I_D = 5.5A$	
			-	9.5		$V_{GS} = 3.1V, I_D = 5.5A$	
			-	10.5		$V_{GS} = 2.5V, I_D = 5.5A$	
Diode Forward Voltage	V <sub>SD</sub>	-	0.7	1.2	V	$V_{GS} = 0V, I_{S} = 1A$	
DYNAMIC CHARACTERISTICS (Note 9)							
Input Capacitance	C <sub>iss</sub>	-	2,665	-	pF	101/1/	
Output Capacitance	Coss	-	323	-	рF	$V_{DS} = 10V, V_{GS} = 0V,$ - f = 1.0MHz	
Reverse Transfer Capacitance	C <sub>rss</sub>	-	311	-	рF	1 = 1.000112	
Gate Resistance	$R_g$	-	1.1	-	Ω	$V_{DS} = 0V$ , $V_{GS} = 0V$ , $f = 1MHz$	
Total Gate Charge (V <sub>GS</sub> = 4.5V)	$Q_g$	-	33.2	-	nC		
Gate-Source Charge	Q <sub>gs</sub>	-	3.6	-	nC	$V_{DS} = 10V, I_D = 5.5A$	
Gate-Drain Charge	$Q_{gd}$	-	5.6	-	nC		
Turn-On Delay Time	t <sub>D(ON)</sub>	-	7.5	-	ns		
Turn-On Rise Time	t <sub>R</sub>	-	20	-	ns	$V_{DD} = 16V, I_D = 5.5A,$ $V_{GS} = 4.5V, R_G = 6\Omega$	
Turn-Off Delay Time	t <sub>D(OFF)</sub>	-	93	-	ns		
Turn-Off Fall Time	t <sub>F</sub>	-	49	-	ns		

5. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
6. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
7. I<sub>AS</sub> and E<sub>AS</sub> ratings are based on low frequency and duty cycles to keep T<sub>J</sub> = +25°C.
8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to product testing. Notes:







I<sub>D</sub>, DRAIN-SOURCE CURRENT (A) Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

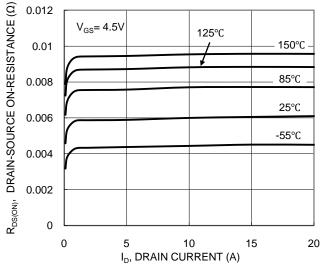
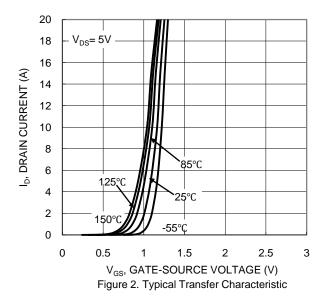
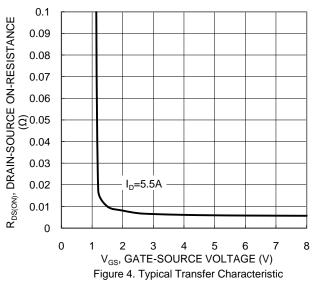


Figure 5. Typical On-Resistance vs. Drain Current and Temperature





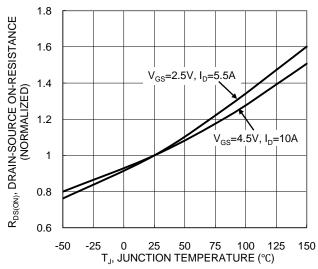
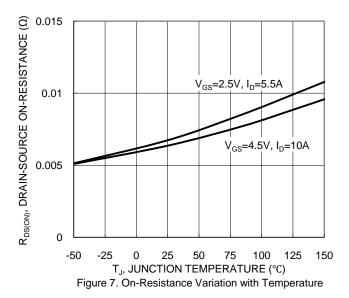
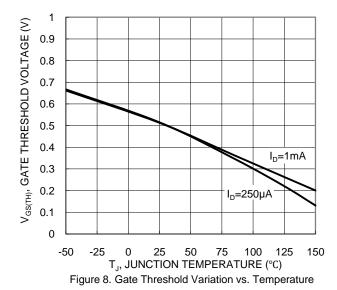
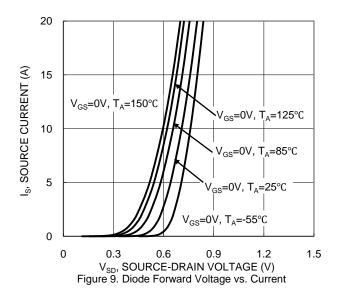


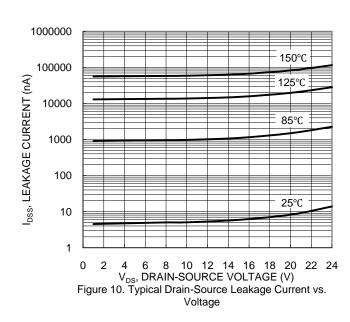
Figure 6. On-Resistance Variation with Temperature

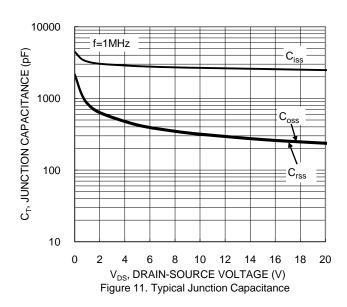


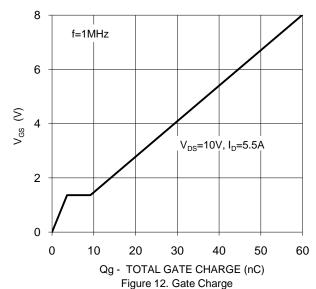




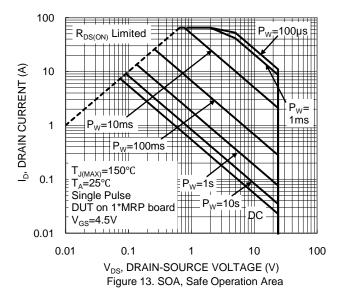












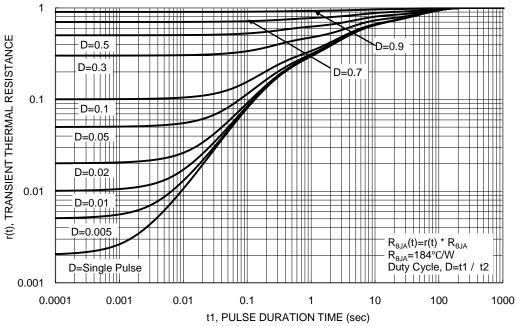
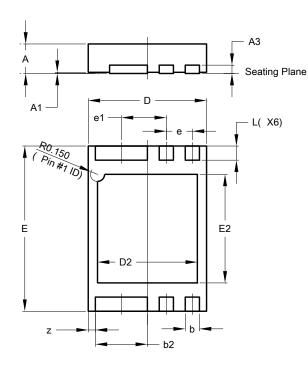


Figure 14. Transient Thermal Resistance



## **Package Outline Dimensions**

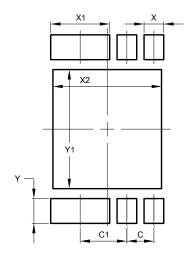
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for the latest version.



U-DFN2535-6 (Type B)					
Dim	Min	Max	Тур		
Α	0.50	0.60	-		
A1	0.00	0.05	0.02		
A3	-	-	0.127		
b	0.25	0.35	0.30		
b2	1.05	1.15	1.10		
D	2.45	2.55	2.50		
D2	2.01	2.21	2.11		
E	3.45	3.55	3.50		
E2	2.20	2.40	2.30		
е	-	-	0.55		
e1	-	-	0.95		
٦	0.25	0.35	0.30		
Z	-	-	0.15		
All Dimensions in mm					

# **Suggested Pad Layout**

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



Dimensions	Value			
Difficusions	(in mm)			
С	0.550			
C1	0.950			
Х	0.400			
X1	1.200			
X2	2.210			
Y	0.500			
Y1	2.400			



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