

20V DUAL N-CANNEL ENHANCEMENT MODE MOSFET

Product Summary

$V_{(BR)DSS}$	Max $R_{DS(on)}$	I_D max $T_A = 25^\circ\text{C}$ (Notes 6)
20V	195m Ω @ $V_{GS} = 4.5\text{V}$	2.11A
	260m Ω @ $V_{GS} = 2.5\text{V}$	1.83A
	380m Ω @ $V_{GS} = 1.8\text{V}$	1.51A
	520m Ω @ $V_{GS} = 1.5\text{V}$	1.29A

Description and Applications

This MOSFET has been 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.

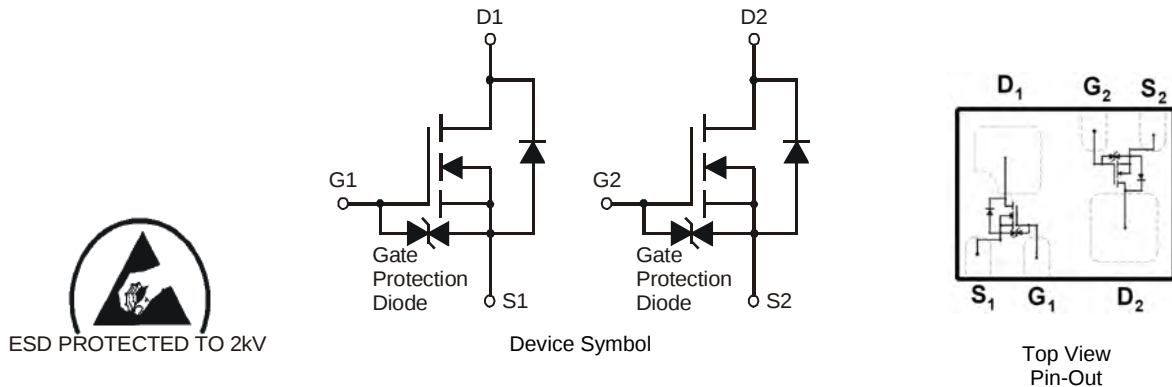
- Load switch

Features and Benefits

- Footprint of just 1.3 mm²
- Ultra Low Profile Package - 0.4mm profile
- On resistance <200m Ω
- Low Gate Threshold Voltage
- Fast Switching Speed
- Ultra-Small Surface Mount Package
- ESD Protected Gate 2KV**
- 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: X2-DFN1310-6
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – NiPdAu annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208 



Ordering Information (Note 4)

Part Number	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
DMN2300UFL4-7	23N	7	8	3000

- Notes:
- No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
 - See <http://www.diodes.com> 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>.

Marking Information



23N = Product Type Marking Code

Maximum Ratings @ $T_A = 25^\circ\text{C}$ unless otherwise specified

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	20	V
Gate-Source Voltage			V_{GSS}	±8	V
Continuous Drain Current (Note 6)	Steady State	$T_A = 25^{\circ}\text{C}$	I_D	2.11	A
		$T_A = 85^{\circ}\text{C}$		1.19	
Pulsed Drain Current (Note 7)			I_{DM}	6.0	A

Thermal Characteristics @ $T_A = 25^\circ\text{C}$ unless otherwise specified

Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 5)	P_D	0.53	W
	(Note 6)		1.39	
Thermal Resistance, Junction to Ambient	(Note 5)	$R_{\theta JA}$	238	$^\circ\text{C/W}$
	(Note 6)		90	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

Notes: 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. Device mounted on minimum recommended pad layout test board, 10 μs pulse duty cycle = 1%.

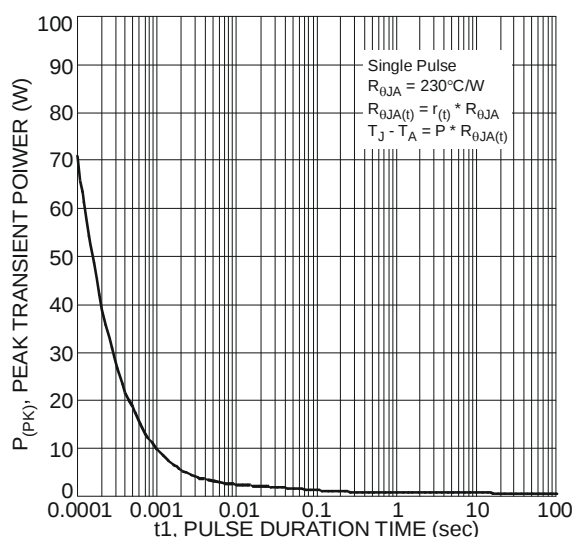


Fig. 1 Single Pulse Maximum Power Dissipation

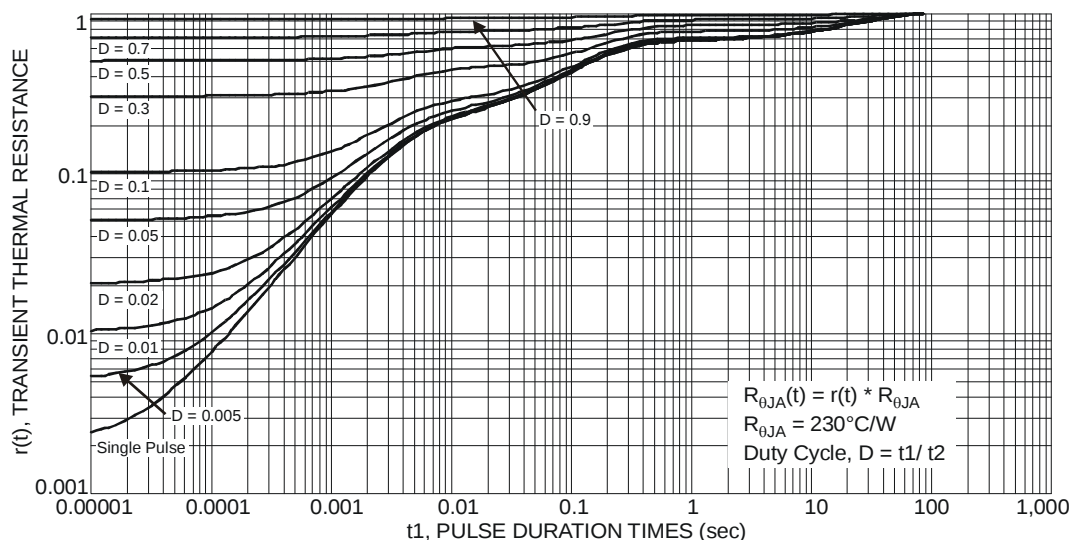


Fig. 2 Transient Thermal Resistance

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 = 10μA
Zero Gate Voltage Drain Current T _J = 25°C	I _{DSS}	-	-	1	μA	V _{DS} = 20V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	-	-	10	μA	V _{GS} = ±8V, V _{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	V _{GS(th)}	0.45	-	0.95	V	V _{DS} = V _{GS} , I _D = 250μA
Static Drain-Source On-Resistance	R _{DS(on)}	-	-	195	mΩ	V _{GS} = 4.5V, I _D = 300mA
		-	-	260		V _{GS} = 2.5V, I _D = 250mA
		-	-	380		V _{GS} = 1.8V, I _D = 100mA
		-	-	520		V _{GS} = 1.5V, I _D = 50mA
		-	-	-		V _{GS} = 1.2V, I _D = 25mA
Forward Transfer Admittance	Y _{fs}	40	-	-	mS	V _{DS} = 3V, I _D = 30mA
Diode Forward Voltage	V _{SD}	-	0.7	1.2	V	V _{GS} = 0V, I _S = 300mA
DYNAMIC CHARACTERISTICS						
Input Capacitance	C _{iss}	-	64.3	-	pF	V _{DS} = 25V, V _{GS} = 0V, f = 1.0MHz
Output Capacitance	C _{oss}	-	6.1	-	pF	
Reverse Transfer Capacitance	C _{rss}	-	4.5	-	pF	
Gate Resistance	R _g	-	70	-	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge	Q _g	-	1.6	-	nC	V _{GS} = 4.5V, V _{DS} = 15V, I _D = 1A
Gate-Source Charge	Q _{gs}	-	0.2	-	nC	
Gate-Drain Charge	Q _{gd}	-	0.2	-	nC	
Turn-On Delay Time	t _{D(on)}	-	3.5	-	ns	V _{DS} = 10V, I _D = 1A V _{GS} = 10V, R _G = 6Ω
Turn-On Rise Time	t _r	-	2.8	-	ns	
Turn-Off Delay Time	t _{D(off)}	-	38	-	ns	
Turn-Off Fall Time	t _f	-	13	-	ns	

Notes: 8. Short duration pulse test used to minimize self-heating effect.

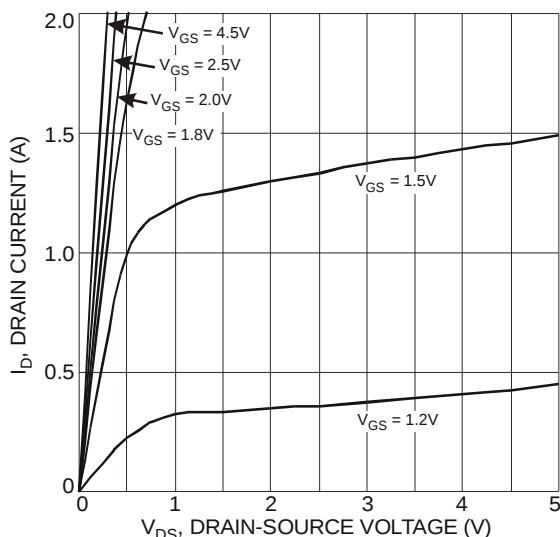


Fig. 3 Typical Output Characteristic

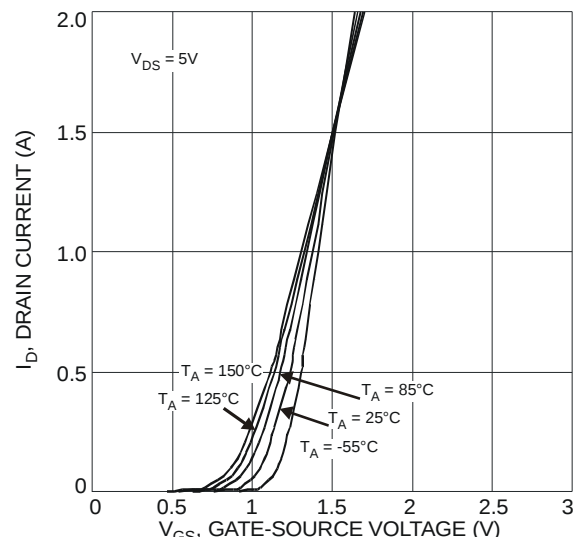


Fig. 4 Typical Transfer Characteristic

DMN2300UFL4

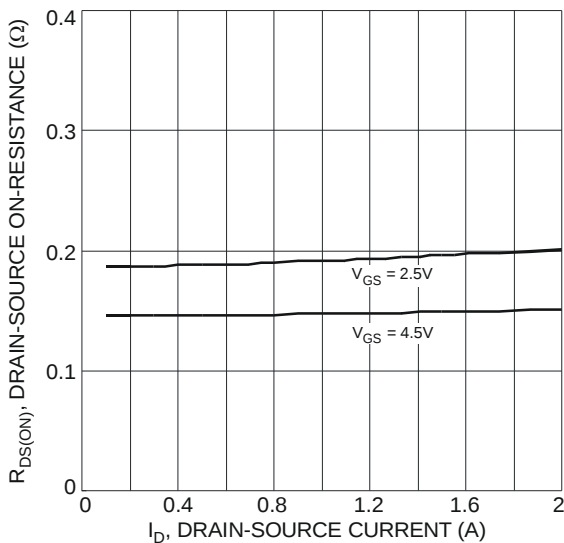


Fig. 5 Typical On-Resistance
vs. Drain Current and Gate Voltage

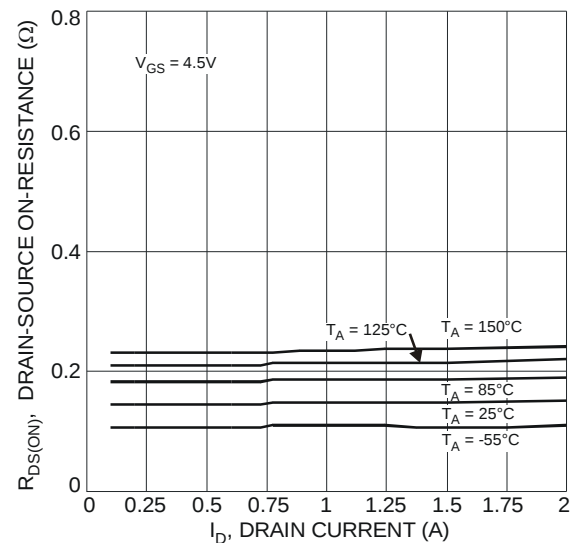


Fig. 6 Typical On-Resistance
vs. Drain Current and Temperature

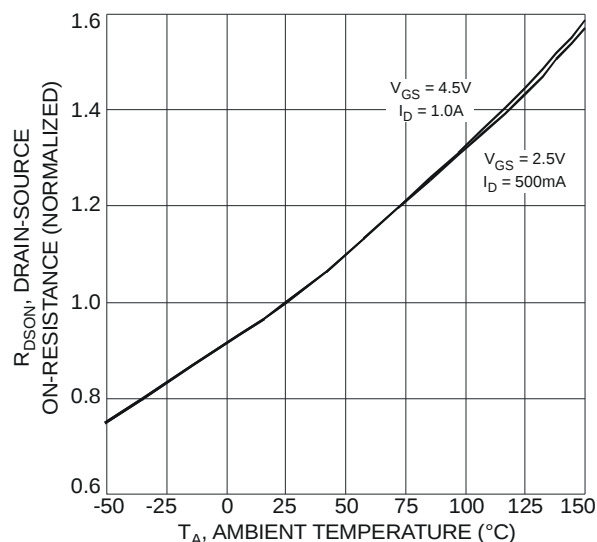


Fig. 7 On-Resistance Variation with Temperature

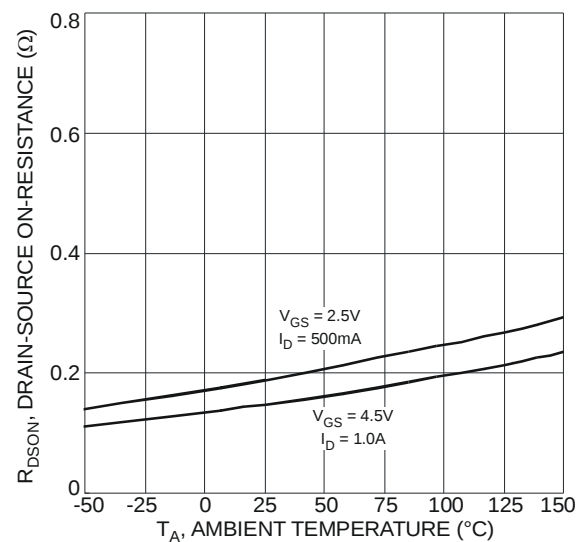


Fig. 8 On-Resistance Variation with Temperature

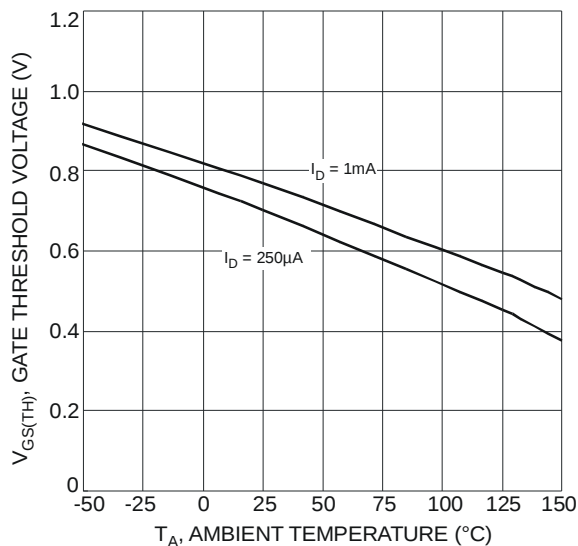


Fig. 9 Gate Threshold Variation vs. Ambient Temperature

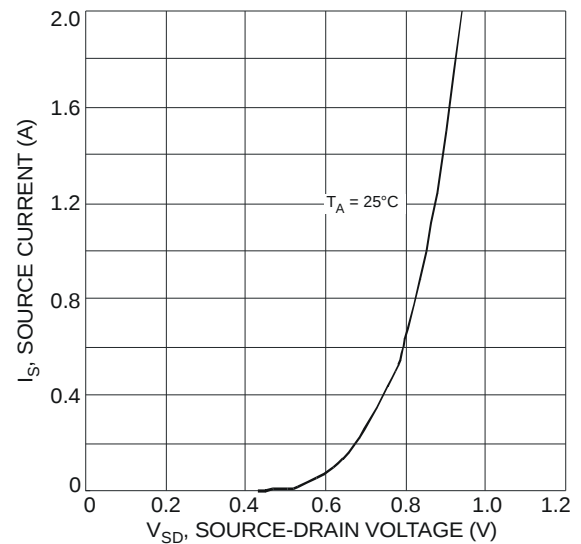
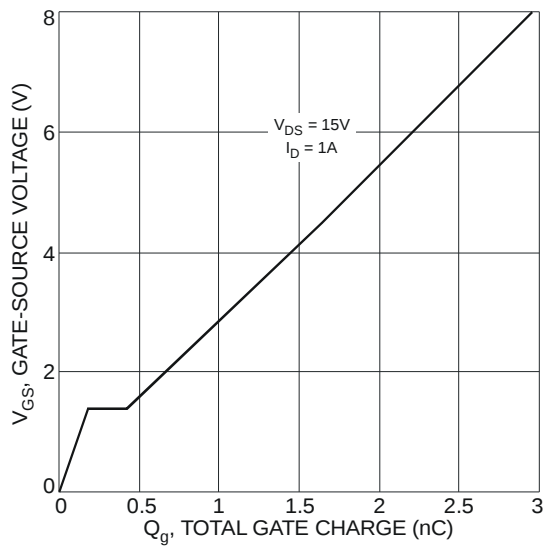
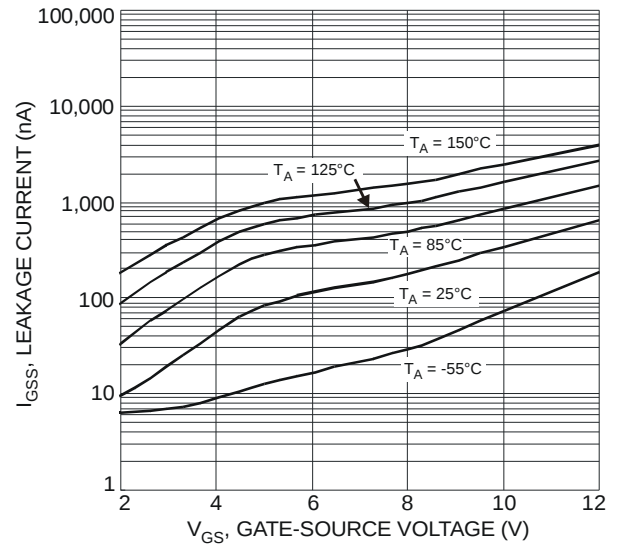
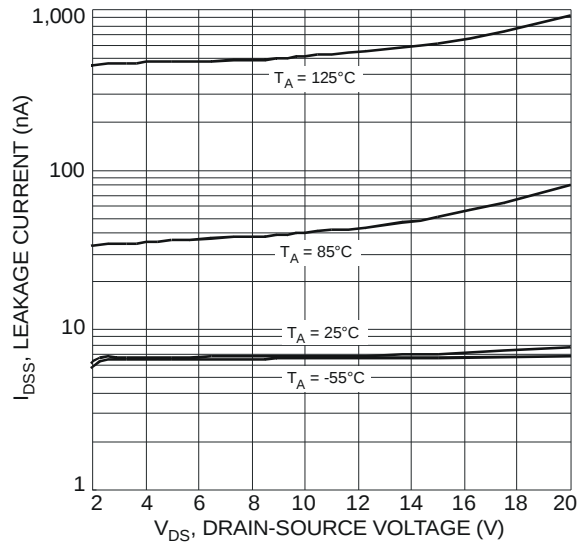
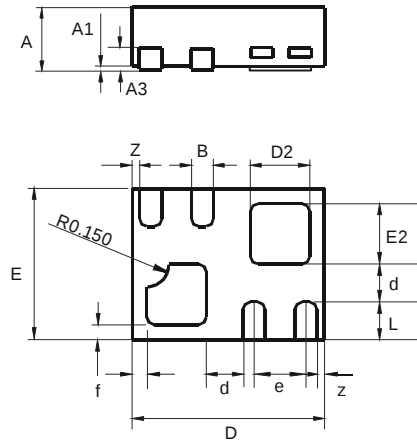


Fig. 10 Diode Forward Voltage vs. Current

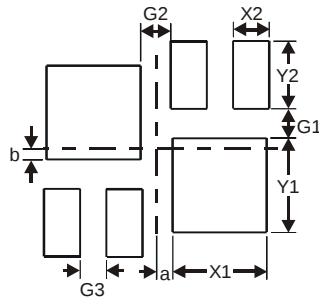


Package Outline Dimensions



X2-DFN1310-6			
Dim	Min	Max	Typ
A	—	0.40	—
A1	0	0.05	0.02
A3	—	—	0.13
b	0.10	0.20	0.15
D	1.25	1.38	1.30
d	—	—	0.25
D2	0.30	0.50	0.40
E	0.95	1.075	1.00
e	—	—	0.35
E2	0.30	0.50	0.40
f	—	—	0.10
L	0.20	0.30	0.25
Z	—	—	0.05
All Dimensions in mm			

Suggested Pad Layout



Dimensions	Value (in mm)
G1	0.16
G2	0.17
G3	0.15
X1	0.52
X2	0.20
Y1	0.52
Y2	0.375
a	0.09
b	0.06

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