20V DUAL N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

$V_{(BR)DSS}$	Max $R_{DS(on)}$	I_D max T_A = +25°C (Note 6)
20V	195mΩ @ V_{GS} = 4.5V	2.11A
	260mΩ @ V_{GS} = 2.5V	1.83A
	380mΩ @ V_{GS} = 1.8V	1.51A
	520mΩ @ V_{GS} = 1.5V	1.29A

Features and Benefits

- Footprint of Just 1.3 mm^2
- Ultra Low Profile Package - 0.4mm Profile
- On Resistance <200mΩ
- 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**

Description and Applications

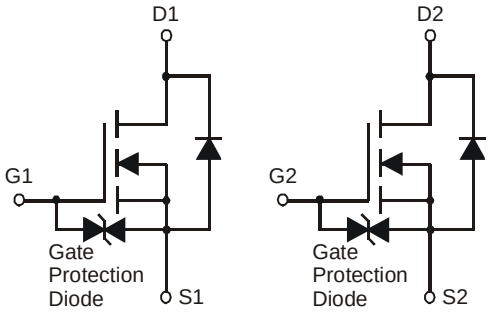
This MOSFET is designed to minimize the on-state resistance ($R_{DS(on)}$) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

- Load switch

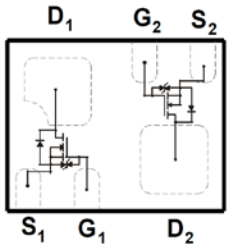
Mechanical Data

- 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 208e4

ESD PROTECTED TO 2kV



Device Symbol



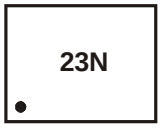
Top View
Pin-Out

Ordering Information (Note 4)

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

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



23N = Product Type Marking Code

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}	±8	V
Continuous Drain Current (Note 6)	Steady State	T_A = +25°C T_A = +85°C	I_D	2.11 1.19	A
Pulsed Drain Current (Note 7)			I_{DM}	6.0	A

Thermal Characteristics @T_A = 25°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	°C/W
	(Note 6)		90	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°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, 10μs pulse duty cycle = 1%.

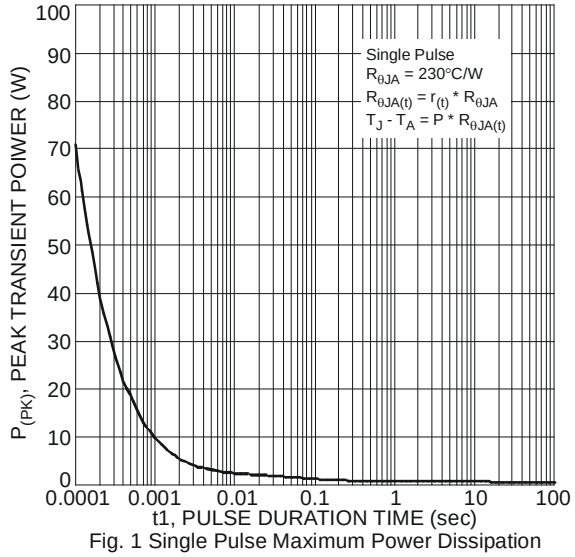


Fig. 1 Single Pulse Maximum Power Dissipation

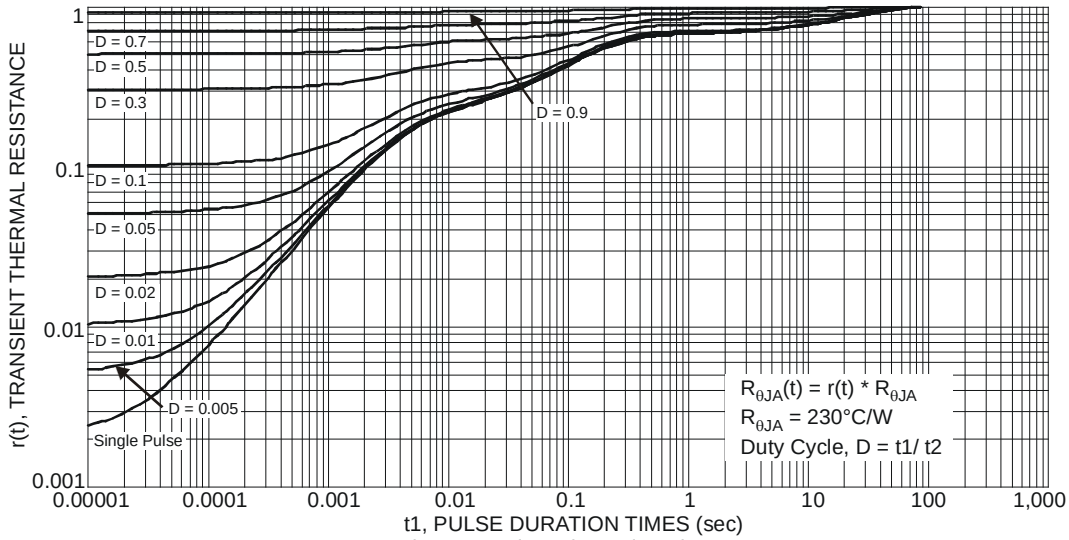


Fig. 2 Transient Thermal Resistance

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
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	128.6	pF	V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	-	6.1	12.2	pF	
Reverse Transfer Capacitance	C_{rss}	-	4.5	9.0	pF	
Gate Resistance	R_g	-	70	140	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge	Q_g	-	1.6	3.2	nC	V_{GS} = 4.5V, V_{DS} = 15V, I_D = 1A
Gate-Source Charge	Q_{gs}	-	0.2	0.4	nC	
Gate-Drain Charge	Q_{gd}	-	0.2	0.4	nC	
Turn-On Delay Time	$t_{D(on)}$	-	3.5	10	ns	V_{DS} = 10V, I_D = 1A, V_{GS} = 10V, R_G = 6Ω
Turn-On Rise Time	t_r	-	2.8	10	ns	
Turn-Off Delay Time	$t_{D(off)}$	-	38	60	ns	
Turn-Off Fall Time	t_f	-	13	25	ns	

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

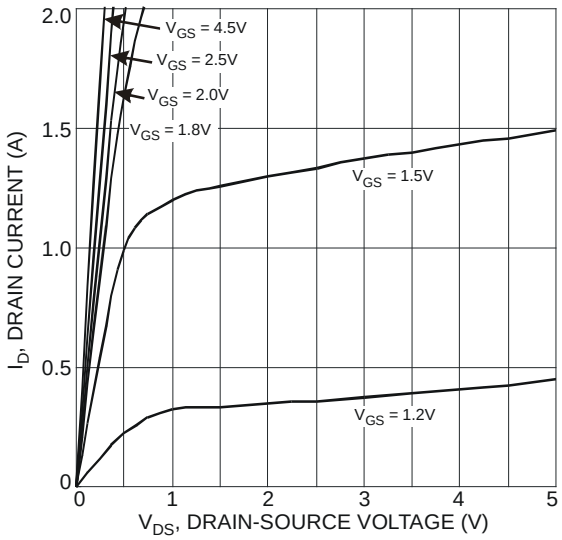


Fig. 3 Typical Output Characteristic

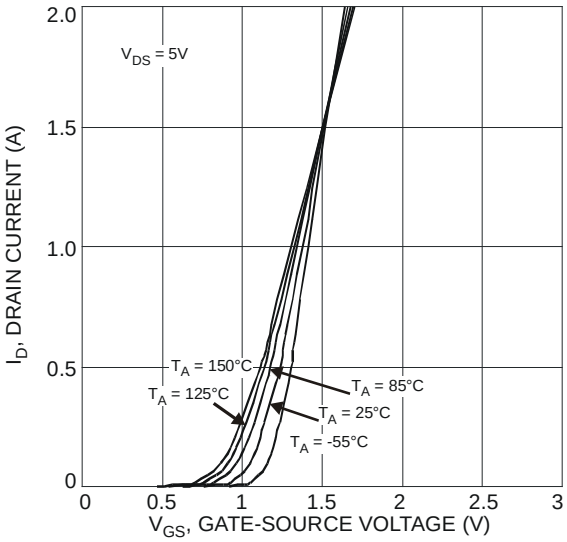


Fig. 4 Typical Transfer Characteristic

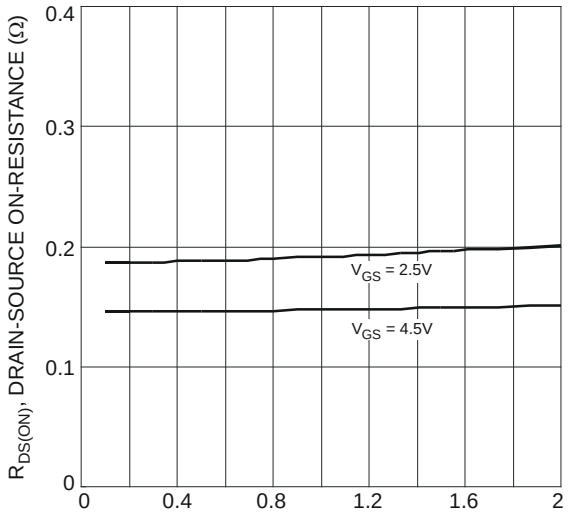


Fig. 5 Typical On-Resistance
vs. Drain Current and Gate Voltage

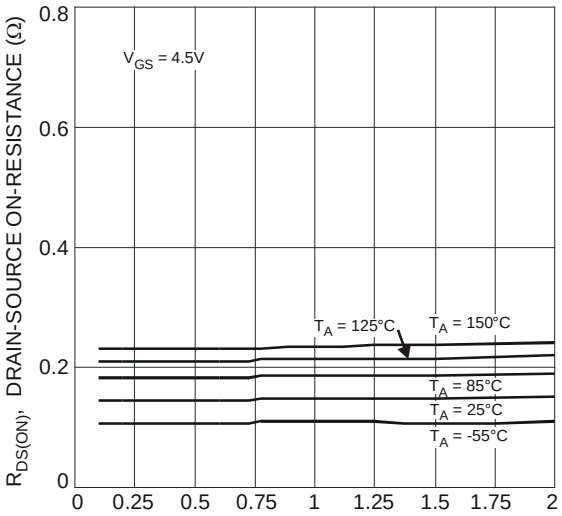


Fig. 6 Typical On-Resistance
vs. Drain Current and Temperature

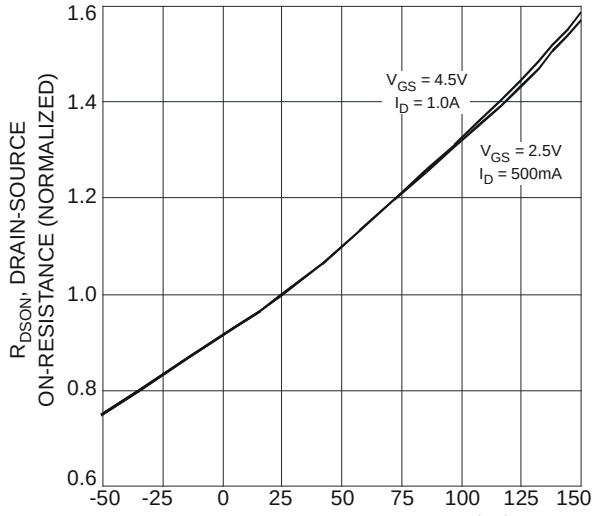


Fig. 7 On-Resistance Variation with Temperature

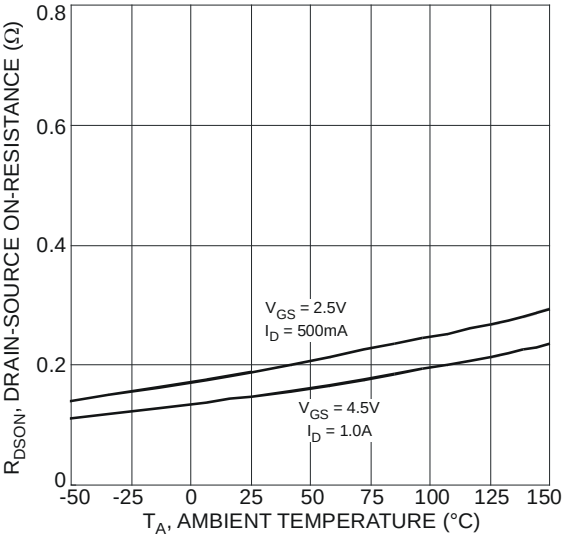


Fig. 8 On-Resistance Variation with Temperature

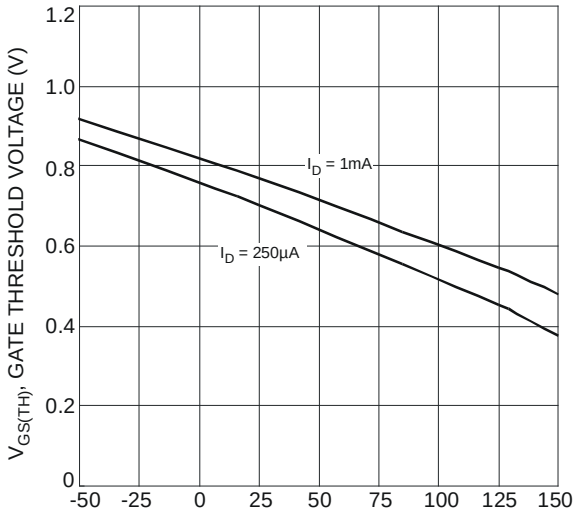


Fig. 9 Gate Threshold Variation vs. Ambient Temperature

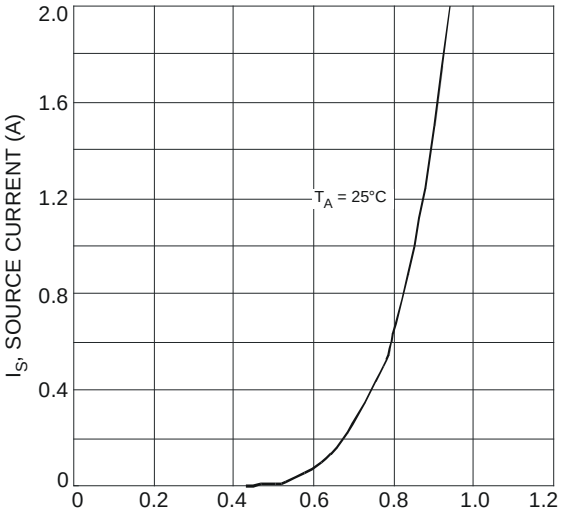


Fig. 10 Diode Forward Voltage vs. Current

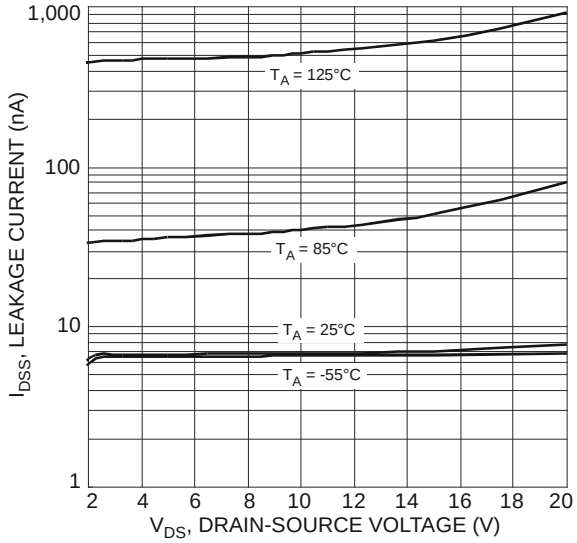


Fig. 11 Typical Leakage Current vs. Drain-Source Voltage

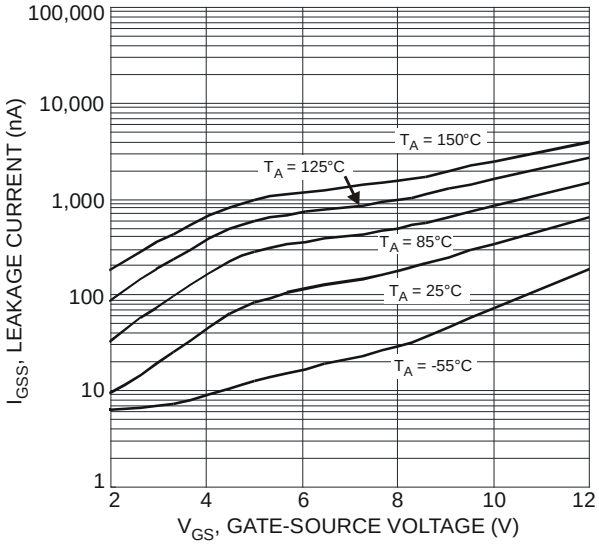


Fig.12 Leakage Current vs. Gate-Source Voltage

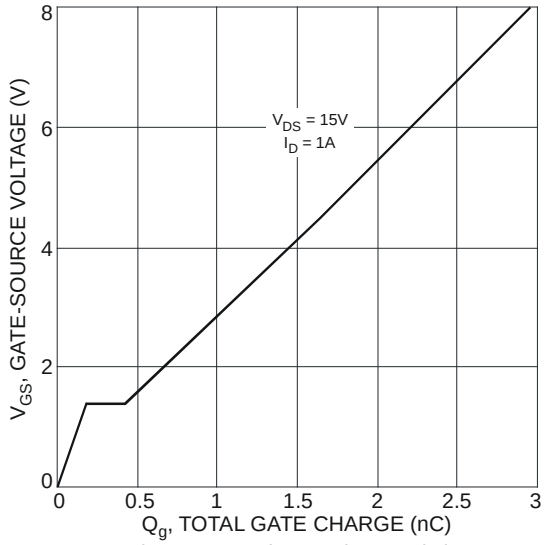
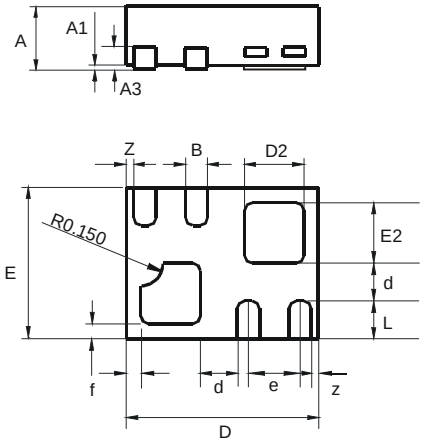


Fig. 13 Gate-Charge Characteristics

Package Outline Dimensions

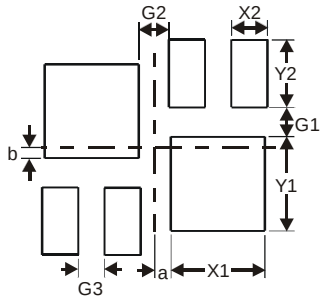
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.



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

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



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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