

Product Summary

$V_{(BR)DSS}$	Max $R_{DS(on)}$	I_D max $T_A = +25^\circ\text{C}$ (Note 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

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**

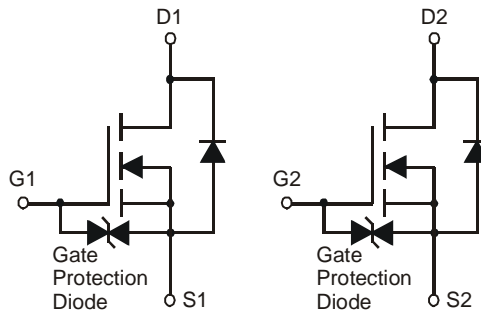
Description and Applications

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.

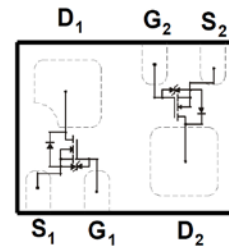
- Load switch

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 208④



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	I _D	2.11	A
		T _A = +85°C		1.19	
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 _{θJA}		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%.

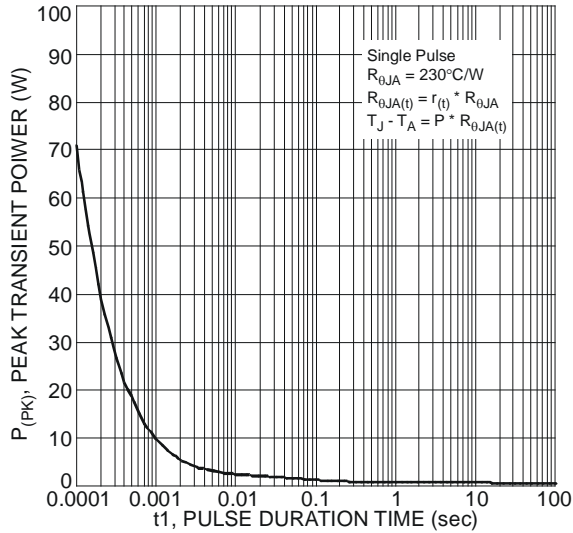


Fig. 1 Single Pulse Maximum Power Dissipation

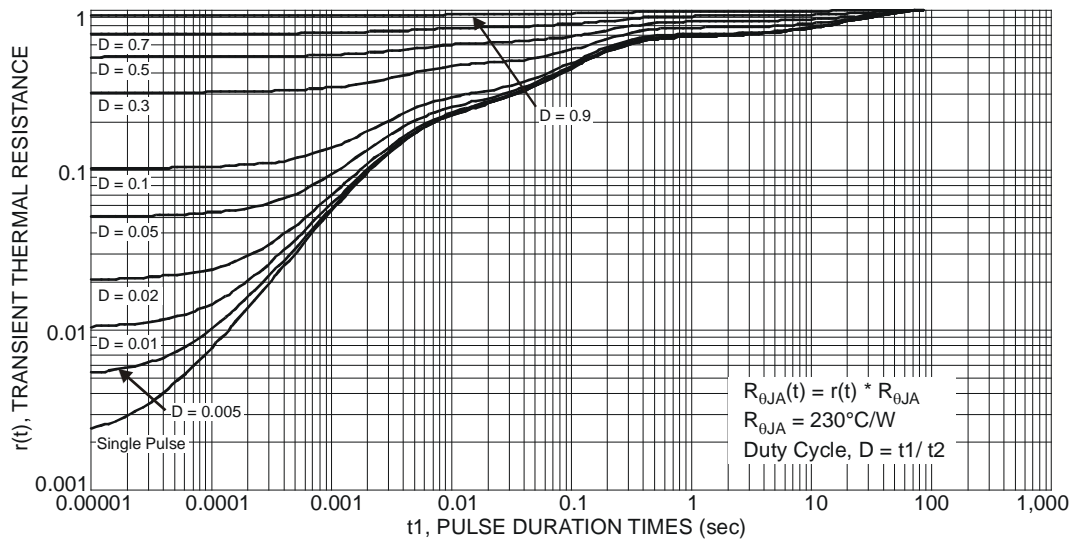
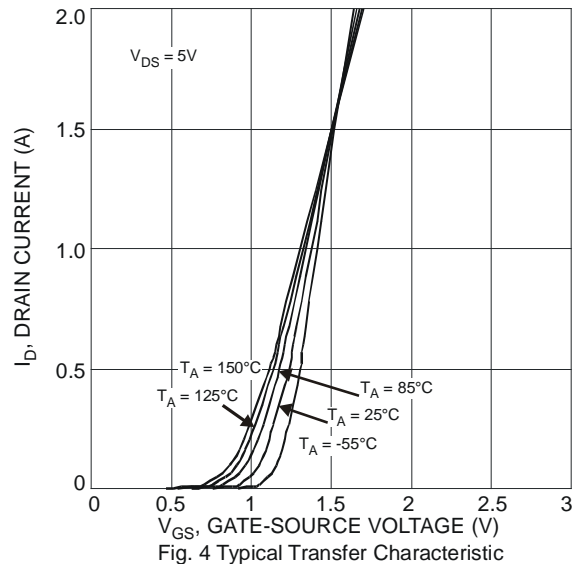
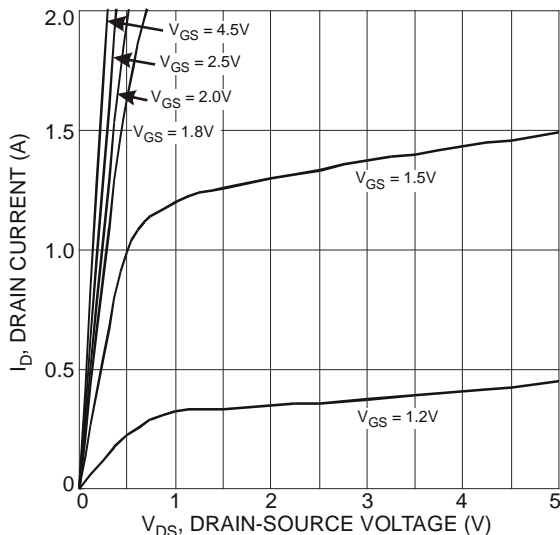


Fig. 2 Transient Thermal Resistance

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 _{riss}	-	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.



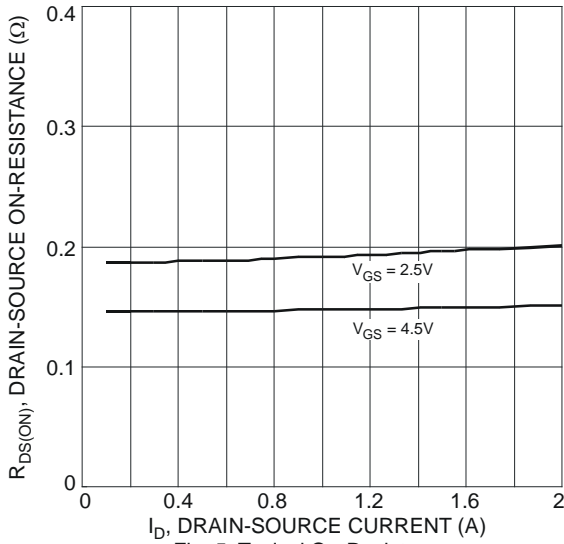


Fig. 5 Typical On-Resistance vs. Drain Current and Gate Voltage

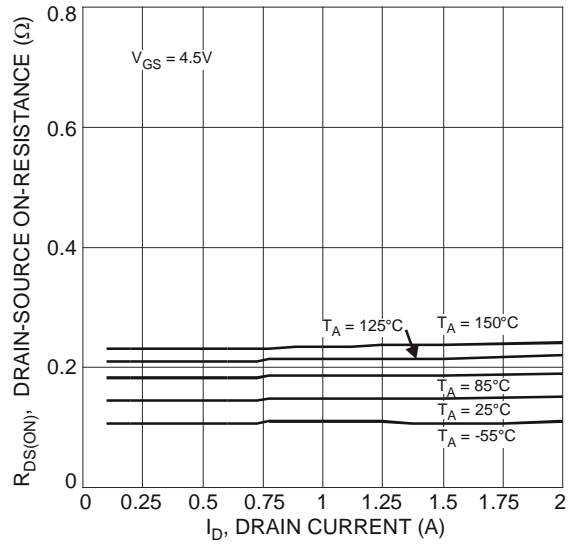


Fig. 6 Typical On-Resistance vs. Drain Current and Temperature

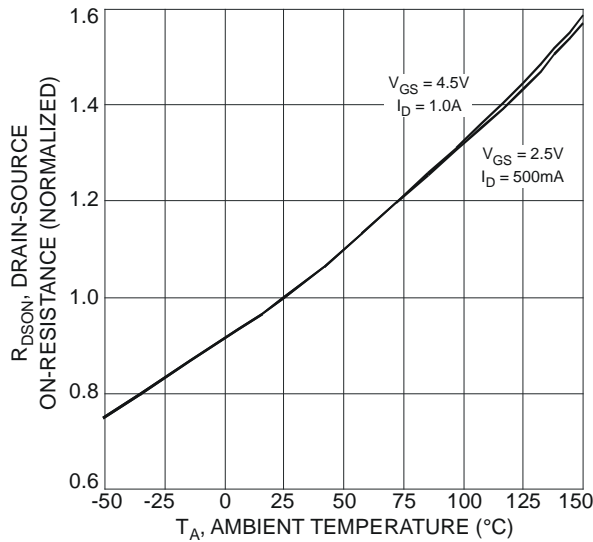


Fig. 7 On-Resistance Variation with Temperature

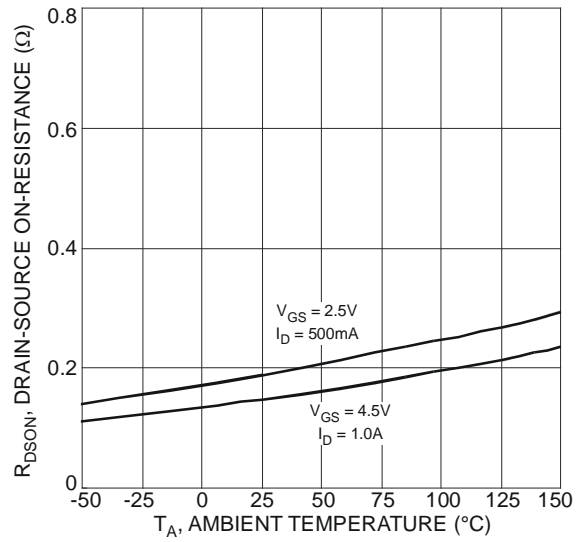


Fig. 8 On-Resistance Variation with Temperature

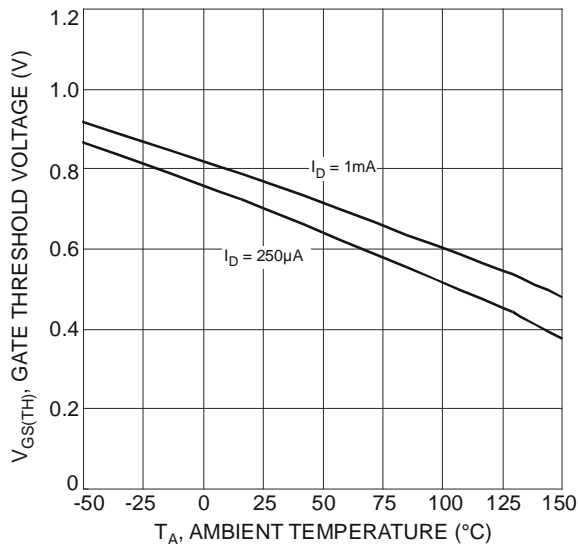


Fig. 9 Gate Threshold Variation vs. Ambient Temperature

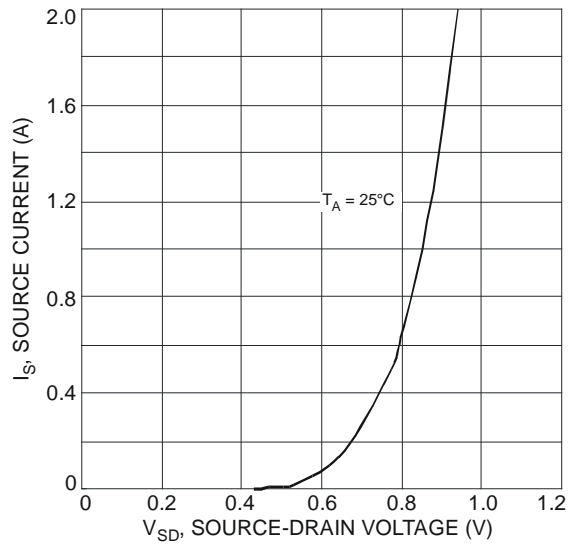


Fig. 10 Diode Forward Voltage vs. Current

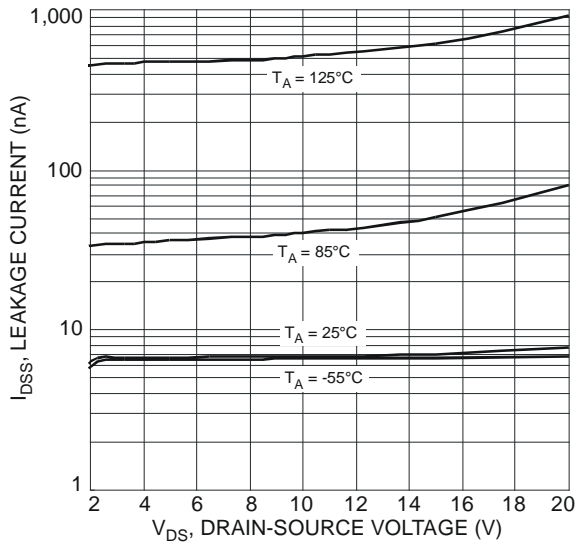


Fig. 11 Typical Leakage Current vs. Drain-Source Voltage

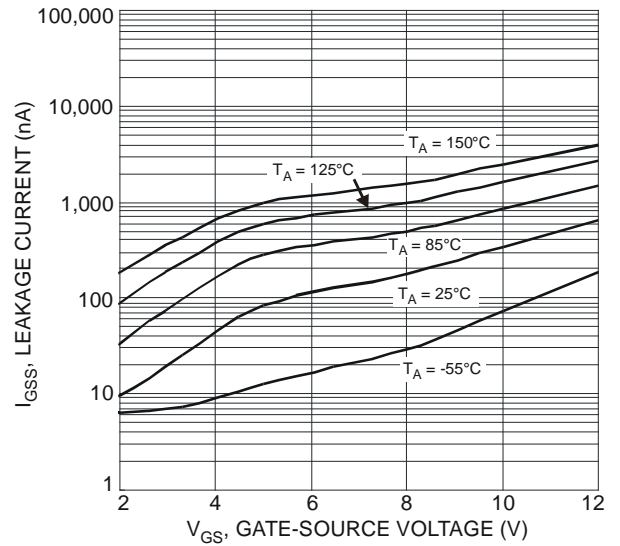


Fig. 12 Leakage Current vs. Gate-Source Voltage

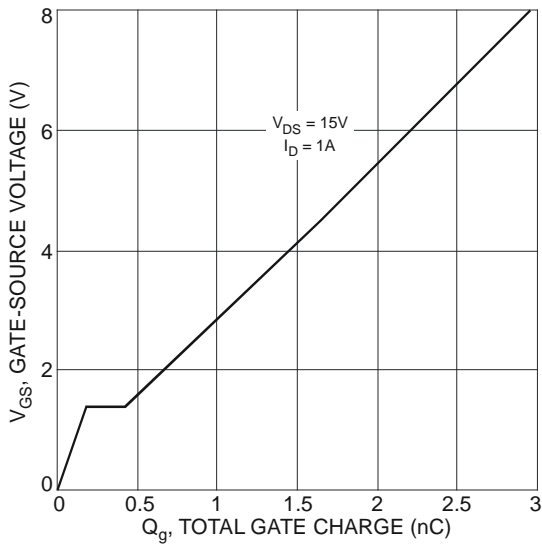
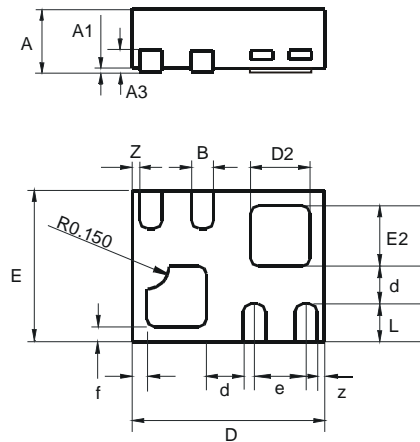


Fig. 13 Gate-Charge Characteristics

Package Outline Dimensions

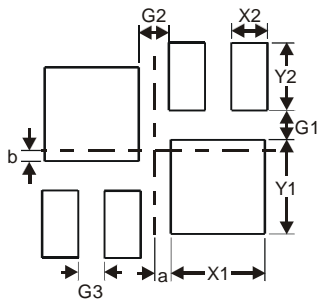
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



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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