DUAL N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$ max	I_D max T_A = 25°C (Note 5)
40V	31mΩ @ V_{GS} = 10V	7.0A
	50mΩ @ V_{GS} = 4.5V	5.6A

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.

- Motor control
- Backlighting
- Power Management Functions
- DC-DC Converters

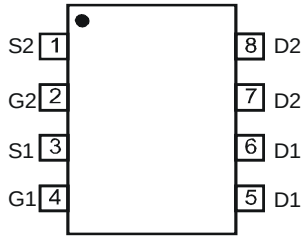
Features and Benefits

- Low On-Resistance
- Low Input/Output Leakage
- **Lead Free By Design/RoHS Compliant (Note 1)**
- **"Green" Device (Note 2)**
- **Qualified to AEC-Q101 standards for High Reliability**

Mechanical Data

- Case: SO-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections Indicator: See diagram
- Terminals: Finish — Matte Tin annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.072 grams (approximate)

SO-8



TOP VIEW

TOP VIEW
Internal Schematic

Ordering Information (Note 3)

Part Number	Case	Packaging
DMN4031SSD-13	SO-8	2500/Tape & Reel

Notes: 1. No purposefully added lead.
2. Diodes Inc.'s "Green" policy can be found on our website at http://www.diodes.com.
3. For packaging details, go to our website at http://www.diodes.com.

Marking Information

Maximum Ratings @T_A = 25℃ unless otherwise specified

Characteristic				Symbol	Value	Units
Drain-Source Voltage				V_{DSS}	40	V
Gate-Source Voltage				V_{GSS}	±20	V
Continuous Drain Current (Note 4)	V_{GS} = 10V	Steady State	T_A = 25°C T_A = 70°C	I_D	5.2 4.1	A
Continuous Drain Current (Note 4)	V_{GS} = 4.5V	Steady State	T_A = 25°C T_A = 70°C	I_D	4.3 3.4	A
Continuous Drain Current (Note 5)	V_{GS} = 10V	Steady State	T_A = 25°C T_A = 70°C	I_D	7.0 5.6	A
Continuous Drain Current (Note 5)	V_{GS} = 4.5V	Steady State	T_A = 25°C T_A = 70°C	I_D	5.8 4.7	A
Pulsed Drain Current (Note 6)				I_{DM}	20	A

Thermal Characteristics @T_A = 25℃ unless otherwise specified

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 4)	P_D	1.42	W
Thermal Resistance, Junction to Ambient @T_A = 25℃ (Note 4)	$R_{\theta JA}$	88	℃/W
Total Power Dissipation (Note 5)	P_D	2.6	W
Thermal Resistance, Junction to Ambient @T_A = 25℃ (Note 5)	$R_{\theta JA}$	48	℃/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	℃

Electrical Characteristics T_A = 25℃ unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
Drain-Source Breakdown Voltage	BV_{DSS}	40	-	-	V	V_{GS} = 0V, I_D = 10mA
Zero Gate Voltage Drain Current	I_{DSS}	-	-	1	μA	V_{DS} = 40V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	-	-	±100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(th)}$	1.6	2.4	3.0	V	V_{DS} = V_{GS}, I_D = 250μA
On-state drain current	$I_{D(ON)}$	20	-	-	A	V_{GS} = 10V, V_{DS} = 5A
Static Drain-Source On-Resistance	$R_{DS\ (ON)}$	-	19	31	mΩ	V_{GS} = 10V, I_D = 6A
		-	44	50		V_{GS} = 4.5V, I_D = 5A
Forward Transfer Admittance	$\|Y_{fs}\|$	-	11	-	S	V_{DS} = 5V, I_D = 6A
Diode Forward Voltage	V_{SD}	-	0.74	1.0	V	V_{GS} = 0V, I_S = 1A
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	-	945	-	pF	V_{DS} = 20V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	-	69	-	pF	
Reverse Transfer Capacitance	C_{rss}	-	58	-	pF	
Gate resistance	R_g	-	1.45	-	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz
Total Gate Charge (V_{GS} = 4.5V)	Q_g	-	8.4	-	nC	V_{GS} = 10V, V_{DS} = 20V, I_D = 12A
Total Gate Charge (V_{GS} = 10V)	Q_g	-	18.6	-	nC	
Gate-Source Charge	Q_{gs}	-	3.3	-	nC	
Gate-Drain Charge	Q_{gd}	-	2.2	-	nC	
Turn-On Delay Time	$T_{D(on)}$	-	6.4	-	ns	V_{GS} = 10V, V_{DS} = 20V, R_L = 1.6Ω, R_G = 3Ω
Turn-On Rise Time	T_r	-	9.7	-	ns	
Turn-Off Delay Time	$T_{D(off)}$	-	19.8	-	ns	
Turn-Off Fall Time	T_f	-	3.1	-	ns	

Notes:
4. Device mounted on FR-4 PCB, with minimum recommended pad layout. The value in any given application depends on user's specific board design
5. Device mounted on 1" x 1" FR-4PCB with high coverage 1 oz. Copper, single sided.
6. Repetitive rating, pulse width limited by junction temperature.
7. Short duration pulse test used to minimize self-heating effect
8. Guaranteed by design. No subject to production testing.

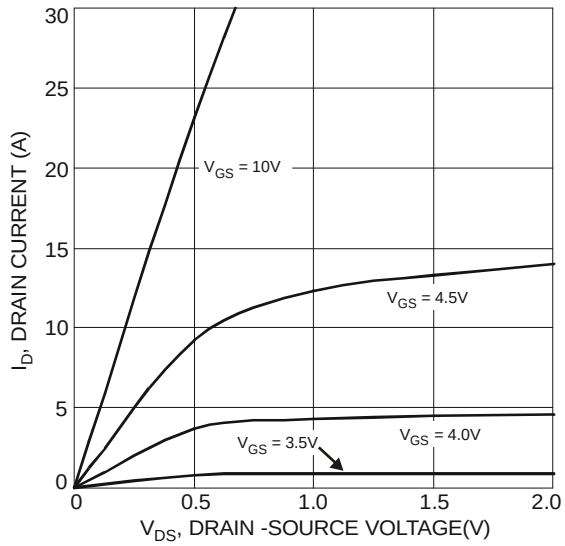


Fig. 1 Typical Output Characteristics

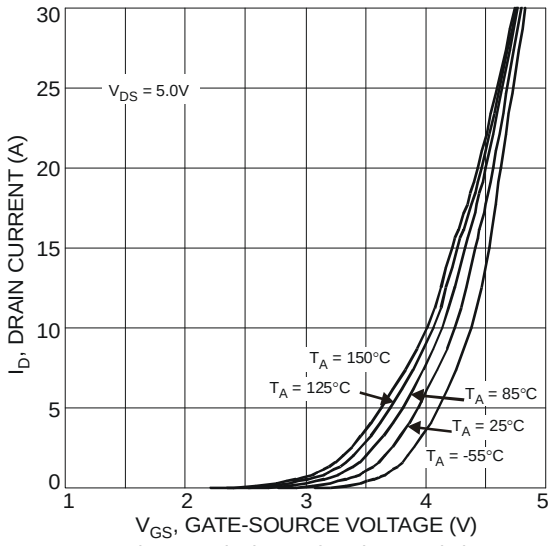


Fig. 2 Typical Transfer Characteristics

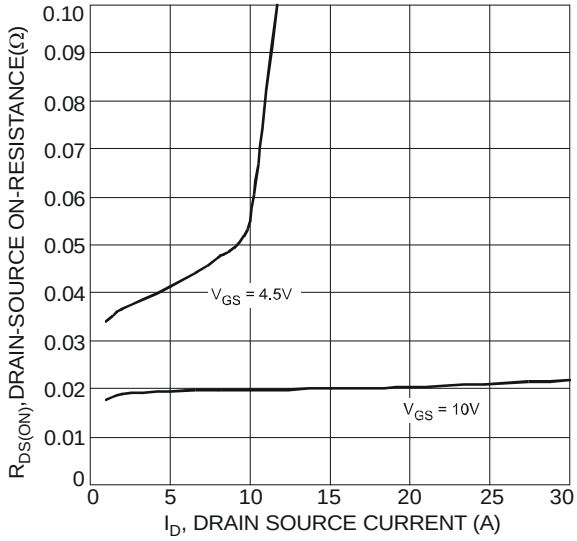


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

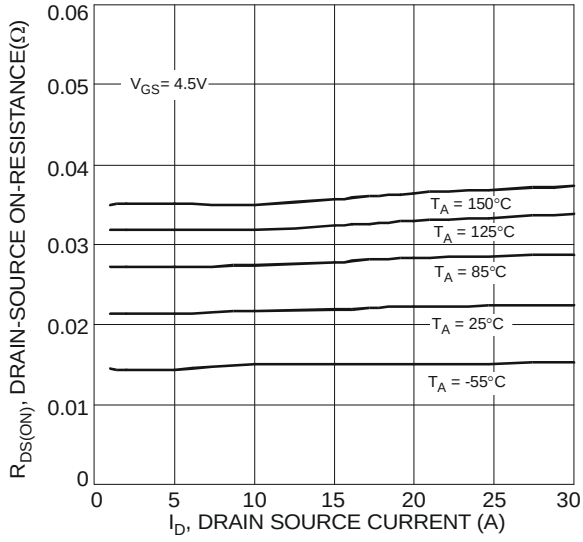


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

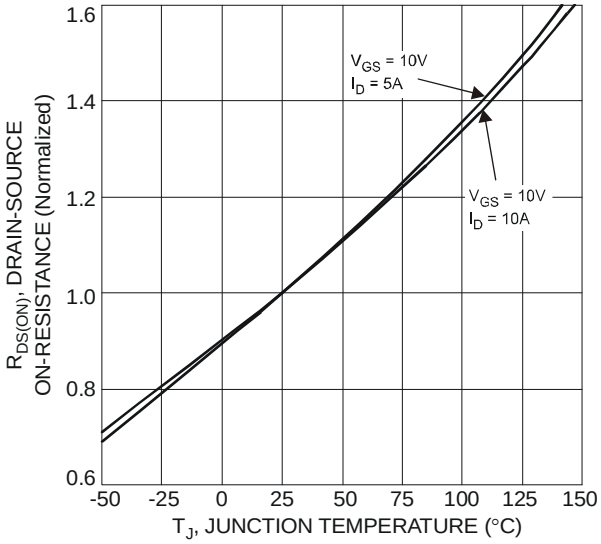


Fig. 5 On-Resistance Variation with Temperature

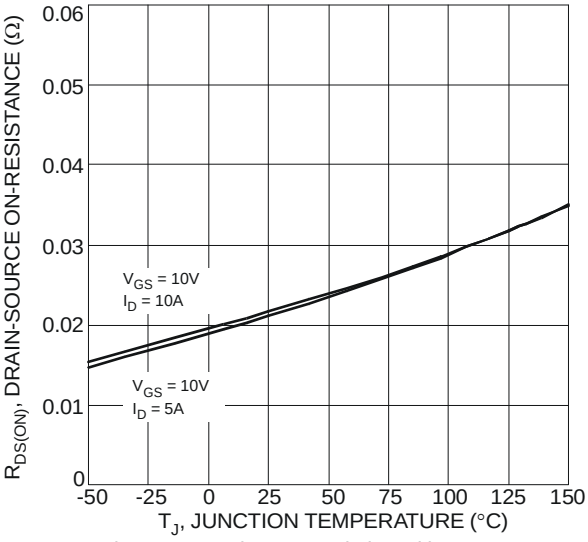


Fig. 6 On-Resistance Variation with Temperature

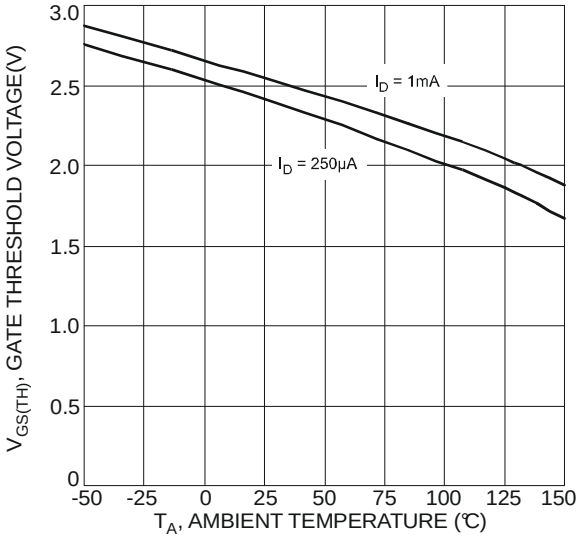


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

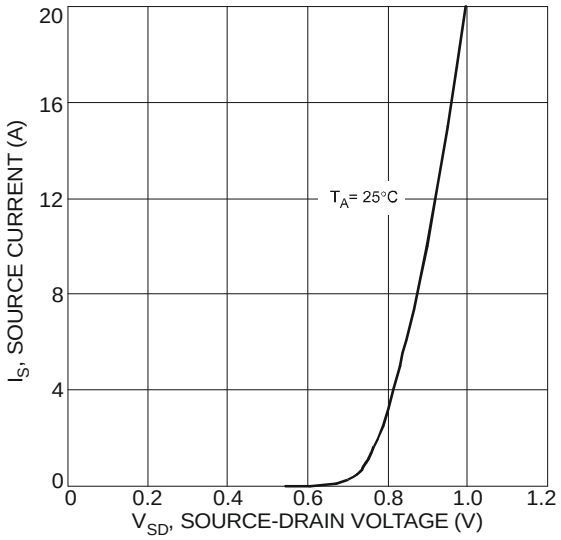


Fig. 8 Diode Forward Voltage vs. Current

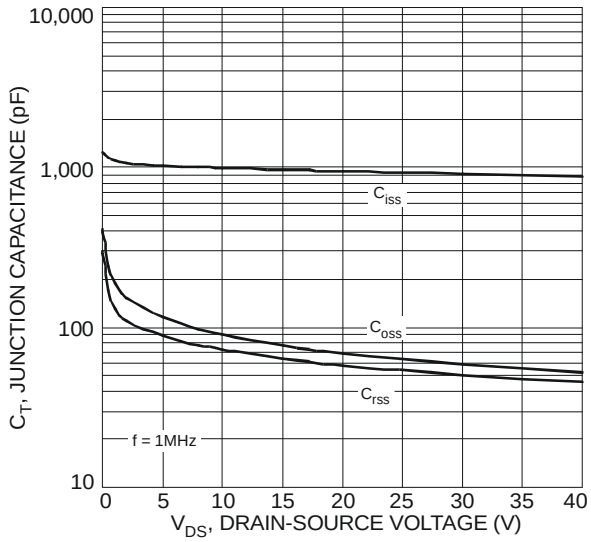


Fig. 9 Typical Junction Capacitance

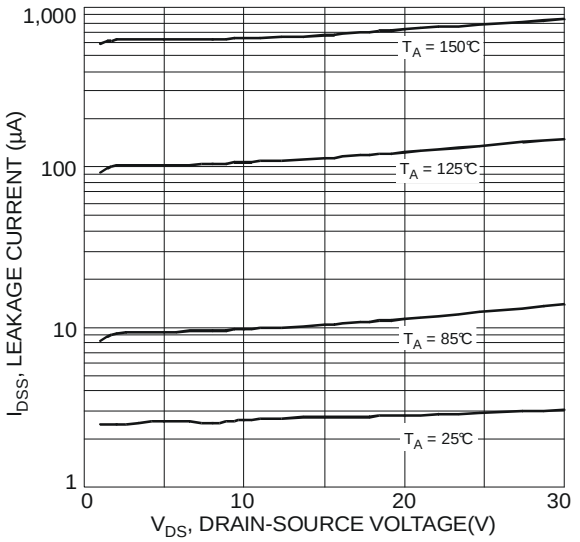


Fig. 10 Typical Drain-Source Leakage Current vs. Voltage

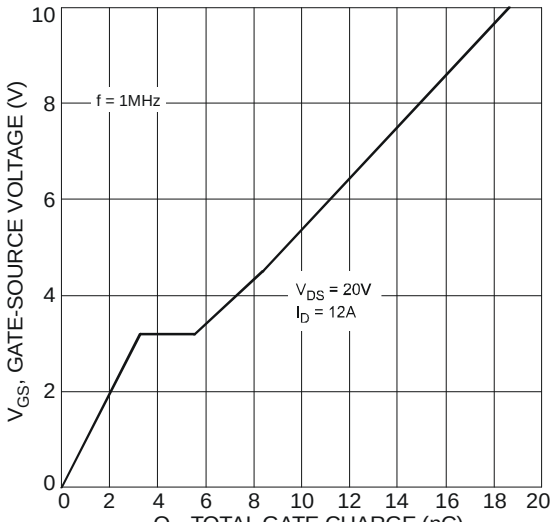


Fig. 11 Gate-Charge Characteristics

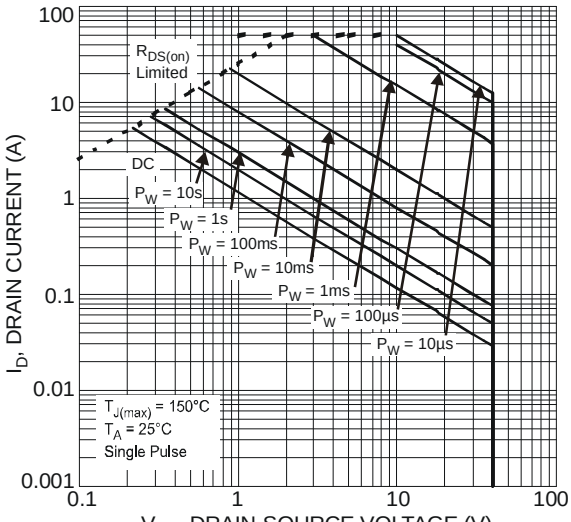
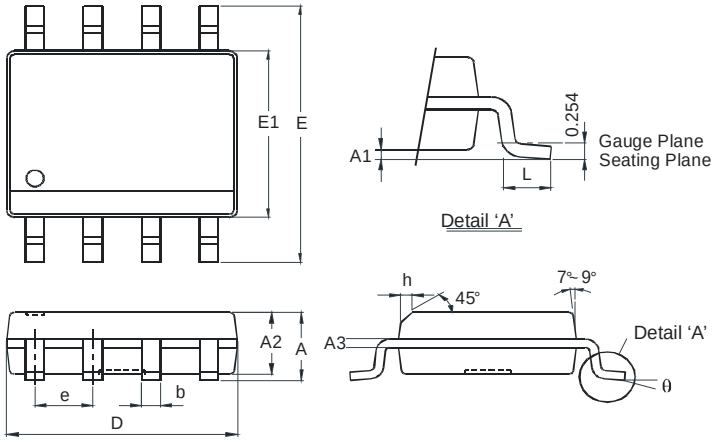


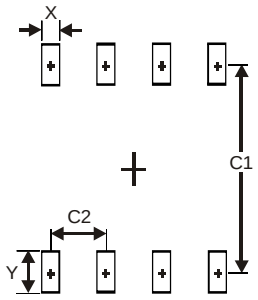
Fig. 12 SOA, Safe Operation Area

Package Outline Dimensions



SO-8		
Dim	**Min**	**Max**
A	-	1.75
A1	0.10	0.20
A2	1.30	1.50
A3	0.15	0.25
b	0.3	0.5
D	4.85	4.95
E	5.90	6.10
E1	3.85	3.95
e	1.27 Typ	
h	-	0.35
L	0.62	0.82
θ	0°	8°
All Dimensions in mm		

Suggested Pad Layout



Dimensions	Value (in mm)
X	0.60
Y	1.55
C1	5.4
C2	1.27

IMPORTANT NOTICE

DIODES INCORPORATED MAKES NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARDS TO THIS DOCUMENT, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION).

Diodes Incorporated and its subsidiaries reserve the right to make modifications, enhancements, improvements, corrections or other changes without further notice to this document and any product described herein. Diodes Incorporated does not assume any liability arising out of the application or use of this document or any product described herein; neither does Diodes Incorporated convey any license under its patent or trademark rights, nor the rights of others. Any Customer or user of this document or products described herein in such applications shall assume all risks of such use and will agree to hold Diodes Incorporated and all the companies whose products are represented on Diodes Incorporated website, harmless against all damages.

Diodes Incorporated does not warrant or accept any liability whatsoever in respect of any products purchased through unauthorized sales channel. Should Customers purchase or use Diodes Incorporated products for any unintended or unauthorized application, Customers shall indemnify and hold Diodes Incorporated and its representatives harmless against all claims, damages, expenses, and attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized application.

Products described herein may be covered by one or more United States, international or foreign patents pending. Product names and markings noted herein may also be covered by one or more United States, international or foreign trademarks.

LIFE SUPPORT

Diodes Incorporated products are specifically not authorized for use as critical components in life support devices or systems without the express written approval of the Chief Executive Officer of Diodes Incorporated. As used herein:

A. Life support devices or systems are devices or systems which:

1. are intended to implant into the body, or
2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.

B. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or to affect its safety or effectiveness.

Customers represent that they have all necessary expertise in the safety and regulatory ramifications of their life support devices or systems, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of Diodes Incorporated products in such safety-critical, life support devices or systems, notwithstanding any devices- or systems-related information or support that may be provided by Diodes Incorporated. Further, Customers must fully indemnify Diodes Incorporated and its representatives against any damages arising out of the use of Diodes Incorporated products in such safety-critical, life support devices or systems.

www.diodes.com