

Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)} \text{ max}$	$I_D \text{ max}$ $T_A = +25^\circ\text{C}$ (Note 6)
40V	31mΩ @ $V_{GS} = 10\text{V}$	7.0A
	50mΩ @ $V_{GS} = 4.5\text{V}$	5.6A

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.

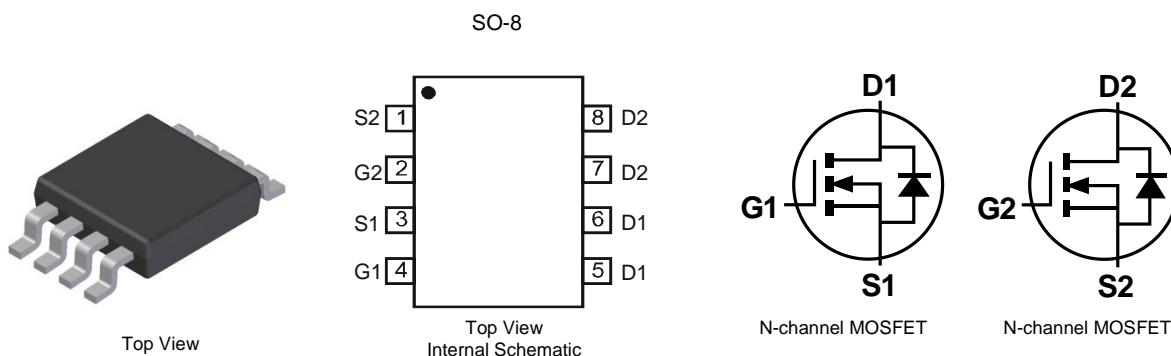
- Motor Control
- Backlighting
- Power Management Functions
- DC-DC Converters

Features and Benefits

- Low On-Resistance
- Low Input/Output Leakage
- **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**
- **PPAP Capable (Note 4)**

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. ⁽⁶³⁾ Solderable per MIL-STD-202, Method 208
- Weight: 0.072 grams (Approximate)



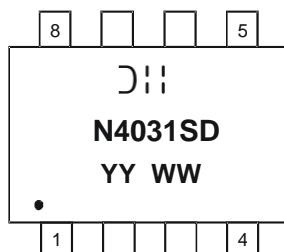
Ordering Information (Note 4)

Part Number	Case	Packaging
DMN4031SSDQ-13	SO-8	2,500/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. Automotive products are AEC-Q101 qualified and are PPAP capable. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified. For more information, please refer to http://www.diodes.com/quality/product_grade_definitions/.
5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

Marking Information



DII = Manufacturer's Marking
 N4031SD = Product Type Marking Code
 YYWW = Date Code Marking
 YY or YY = Year (ex: 13 = 2013)
 WW = Week (01 - 53)
 YY = Date Code Marking

Maximum Ratings (@ $T_A = +25^\circ\text{C}$, 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 6)	$V_{GS} = 10\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D	5.2 4.1	A
Continuous Drain Current (Note 6)	$V_{GS} = 4.5\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D	4.3 3.4	A
Continuous Drain Current (Note 7)	$V_{GS} = 10\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D	7.0 5.6	A
Continuous Drain Current (Note 7)	$V_{GS} = 4.5\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D	5.8 4.7	A
Pulsed Drain Current (Note 8)				I_{DM}	20	A

Thermal Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

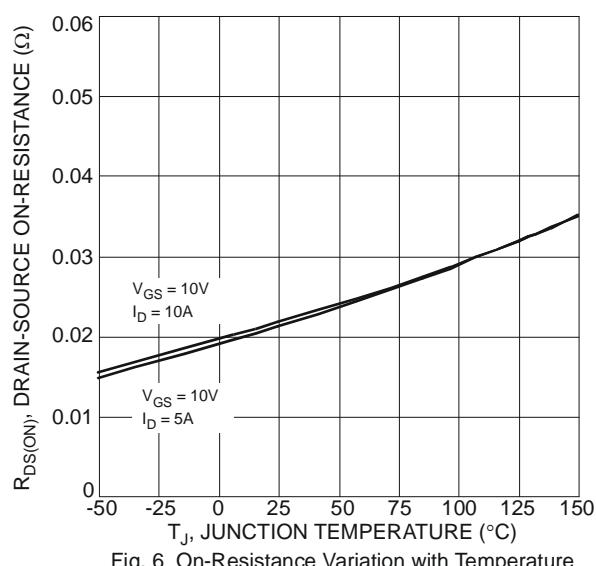
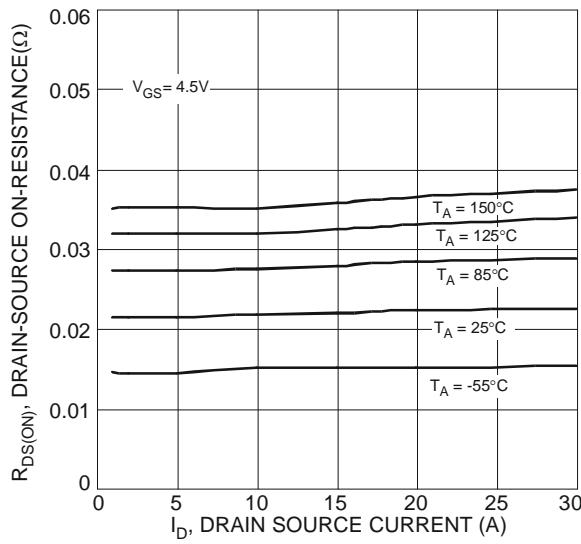
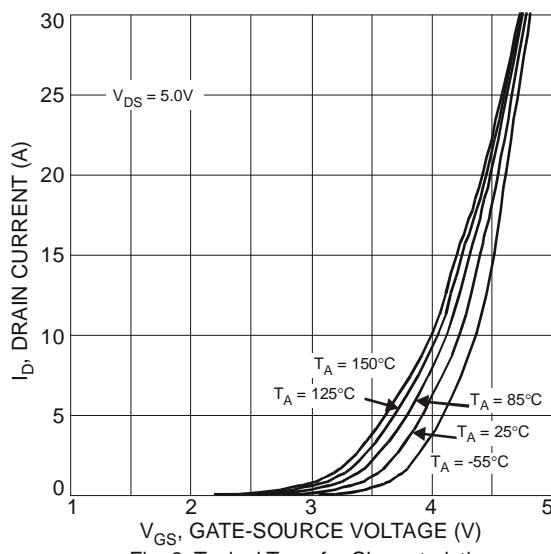
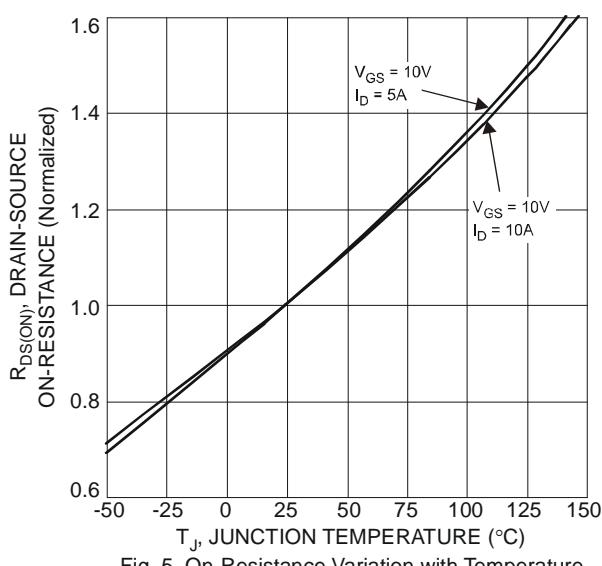
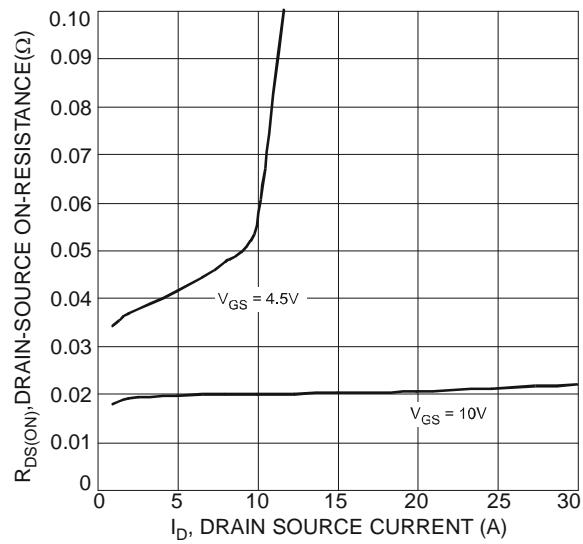
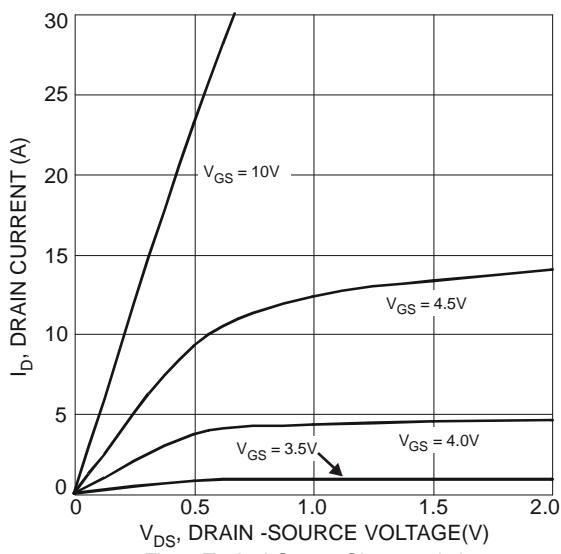
Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 6)	P_D	1.42	W
Thermal Resistance, Junction to Ambient @ $T_A = +25^\circ\text{C}$ (Note 5)	$R_{\theta JA}$	88	°C/W
Total Power Dissipation (Note 7)	P_D	2.6	W
Thermal Resistance, Junction to Ambient @ $T_A = +25^\circ\text{C}$ (Note 6)	$R_{\theta JA}$	48	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 9)						
Drain-Source Breakdown Voltage	BV_{DSS}	40	—	—	V	$V_{GS} = 0\text{V}, I_D = 10\text{mA}$
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	μA	$V_{DS} = 40\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	I_{GSS}	—	—	± 100	nA	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$
ON CHARACTERISTICS (Note 9)						
Gate Threshold Voltage	$V_{GS(th)}$	1.6	2.4	3.0	V	$V_{DS} = V_{GS}, I_D = 250\text{μA}$
On-state drain current	$I_{D(ON)}$	20	—	—	A	$V_{GS} = 10\text{V}, V_{DS} = 5\text{A}$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	19	31	mΩ	$V_{GS} = 10\text{V}, I_D = 6\text{A}$
		—	44	50		$V_{GS} = 4.5\text{V}, I_D = 5\text{A}$
Forward Transfer Admittance	$ Y_{fs} $	—	11	—	S	$V_{DS} = 5\text{V}, I_D = 6\text{A}$
Diode Forward Voltage	V_{SD}	—	0.74	1.0	V	$V_{GS} = 0\text{V}, I_S = 1\text{A}$
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C_{iss}	—	945	—	pF	$V_{DS} = 20\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
Output Capacitance	C_{oss}	—	69	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	58	—	pF	
Gate Resistance	R_g	—	1.45	—	Ω	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
Total Gate Charge ($V_{GS} = 4.5\text{V}$)	Q_g	—	8.4	—	nC	$V_{GS} = 10\text{V}, V_{DS} = 20\text{V}, I_D = 12\text{A}$
Total Gate Charge ($V_{GS} = 10\text{V}$)	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	$V_{GS} = 10\text{V}, V_{DS} = 20\text{V}, R_L = 1.6\Omega, R_G = 3\Omega$
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:

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



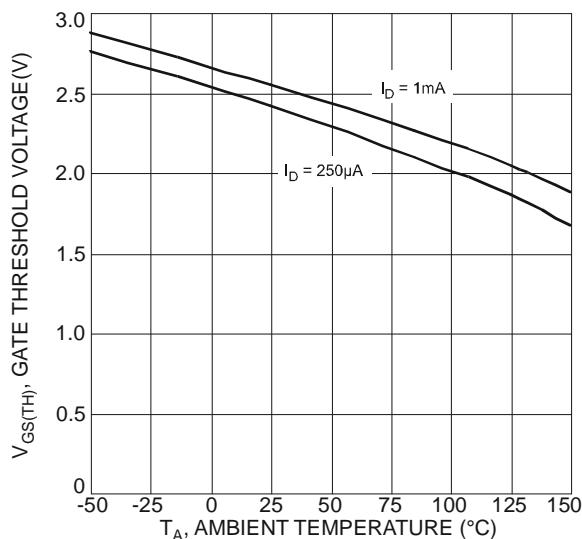


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

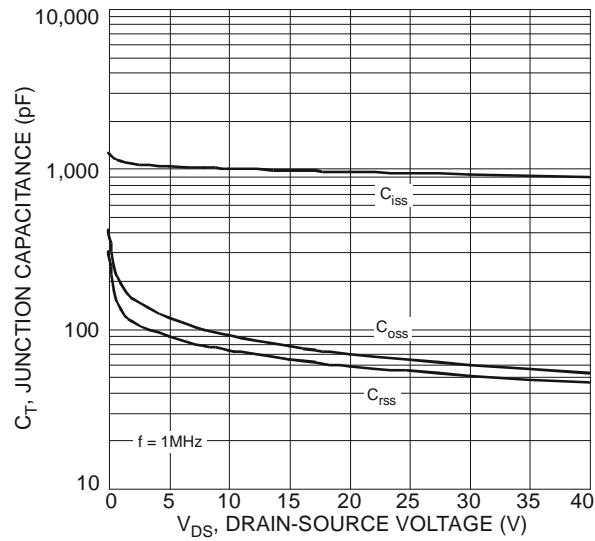


Fig. 9 Typical Junction Capacitance

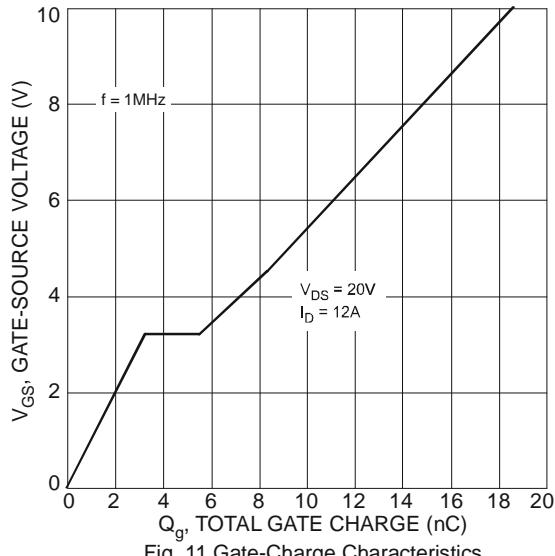


Fig. 11 Gate-Charge Characteristics

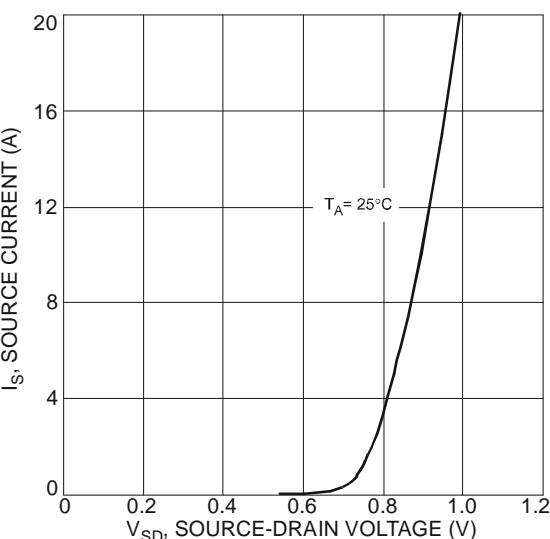


Fig. 8 Diode Forward Voltage vs. Current

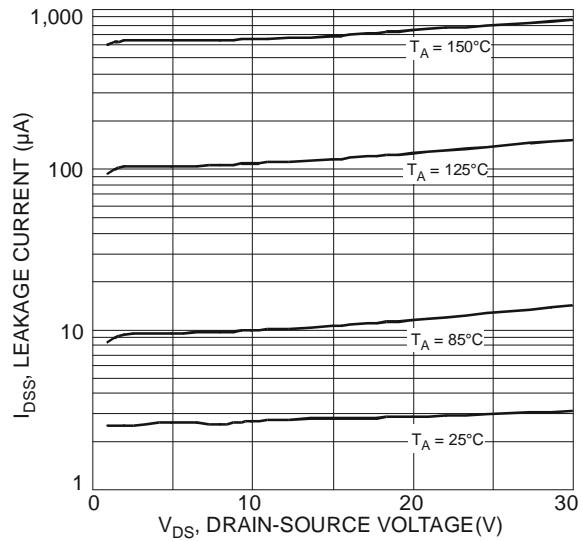


Fig. 10 Typical Drain-Source Leakage Current vs. Voltage

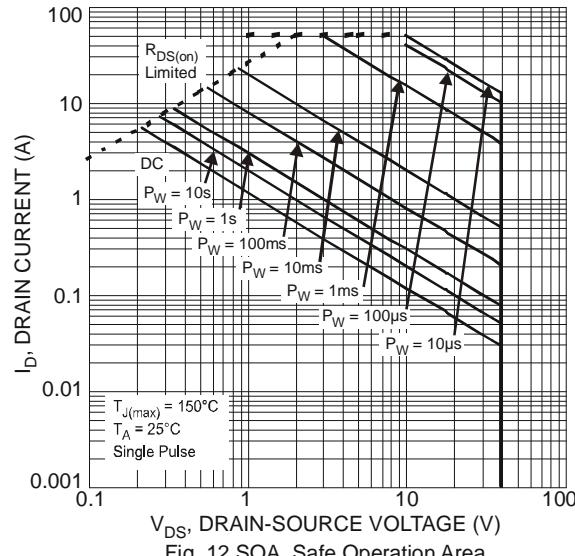
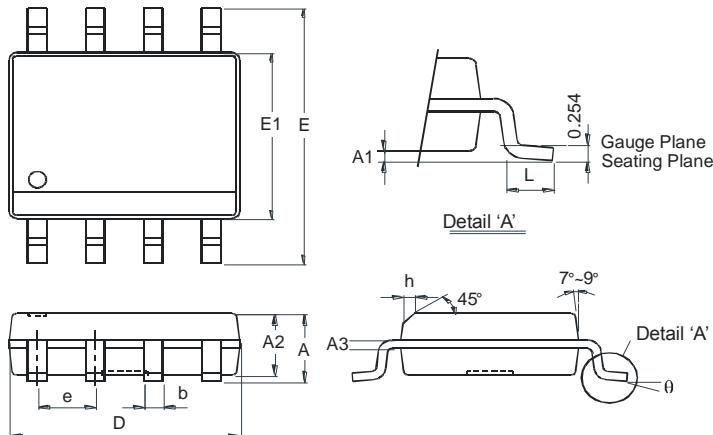


Fig. 12 SOA, Safe Operation Area

Package Outline Dimensions

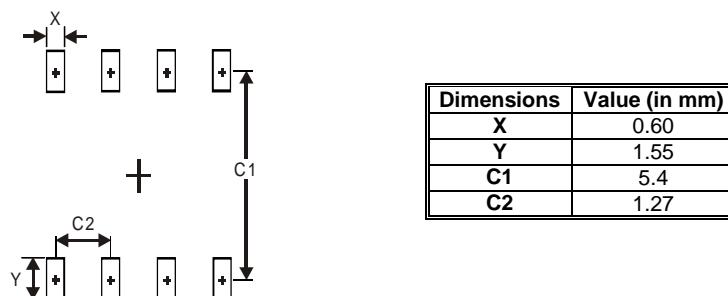
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



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

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



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