SINGLE N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$ max	I_D max T_A = +25°C
20V	8mΩ @ V_{GS} = 10V	12A
	9mΩ @ V_{GS} = 4.5V	10A
	12mΩ @ V_{GS} = 2.5V	8A

Features

- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- 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**

Description and Applications

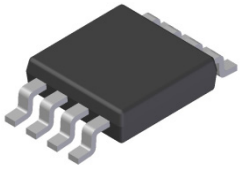
This MOSFET has been designed to minimize the on-state resistance ($R_{DS(on)}$) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

- Backlighting
- Power Management Functions
- DC-DC Converters

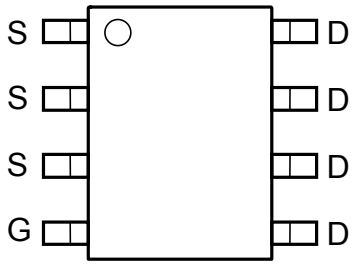
Mechanical Data

- 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: 0.074 grams (approximate)

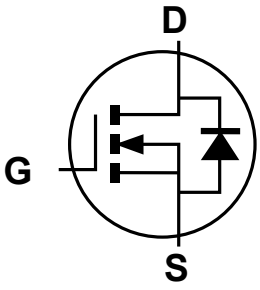
SO-8



TOP VIEW



Top View
Internal Schematic



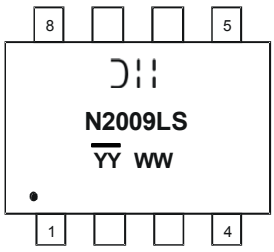
Equivalent circuit

Ordering Information (Note 4)

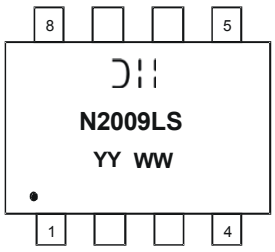
Part Number	Case	Packaging
DMN2009LSS-13	SO-8	2500/Tape & Reel

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. For packaging details, go to our website at http://www.diodes.com/products/packages.html.

Marking Information



Chengdu A/T Site



Shanghai A/T Site

YWW = Manufacturer's Marking
N2009LS = Product Type Marking Code
YYWW = Date Code Marking
YY or YY = Year (ex: 13 = 2013)
WW = Week (01 - 53)
YY = Date Code Marking for SAT (Shanghai Assembly/ Test site)
YY = Date Code Marking for CAT (Chengdu Assembly/ Test site)

Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V_{DSS}	20	V
Gate-Source Voltage			V_{GSS}	±12	V
Drain Current (Note 5)	Steady State	T_A = +25°C T_A = +70°C	I_D	12 9.6	A
Pulsed Drain Current (Note 6)			I_{DM}	42	A

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 5)	P_D	2	W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	62.5	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
Drain-Source Breakdown Voltage	BV_{DSS}	20	—	—	V	V_{GS} = 0V, I_D = 250µA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	µA	V_{DS} = 20V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±12V, V_{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(th)}$	0.5	—	1.2	V	V_{DS} = V_{GS}, I_D = 250µA
Static Drain-Source On-Resistance	$R_{DS\ (ON)}$	—	— — —	8 9 12	mΩ	V_{GS} = 10V, I_D = 12A V_{GS} = 4.5V, I_D = 10A V_{GS} = 2.5V, I_D = 8A
Forward Transconductance	g_{fs}	—	27	—	S	V_{DS} = 5V, I_D = 6.5A
Diode Forward Voltage	V_{SD}	0.5	0.7	1.2	V	V_{GS} = 0V, I_S = 3A
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	—	2555	—	pF	V_{DS} = 10V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	523	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	496	—	pF	
Gate Resistance	R_G	—	1.1	—	Ω	V_{GS} = 0V V_{DS} = 0V, f = 1MHz
SWITCHING CHARACTERISTICS (Note 8)						
Total Gate Charge	Q_g	—	28.9 58.3	—	nC	V_{DS} = 10V, V_{GS} = 4.5V, I_D = 12A V_{DS} = 10V, V_{GS} = 10V, I_D = 12A
Gate-Source Charge	Q_{gs}	—	3.7	—		V_{DS} = 10V, V_{GS} = 10V, I_D = 12A
Gate-Drain Charge	Q_{gd}	—	11.4	—		V_{DS} = 10V, V_{GS} = 10V, I_D = 12A

Notes: 5. Device mounted on 2 oz, FR-4 PCB, with $R_{\theta JA}$ = 62.5°C/W
6. Pulse width ≤10µS, Duty Cycle ≤1%.
7. Short duration pulse test used to minimize self-heating effect.
8. Guaranteed by design. Not subject to product testing.

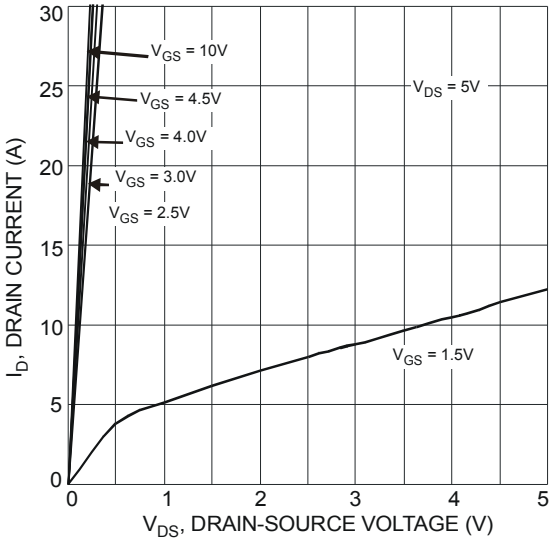


Fig. 1 Typical Output Characteristics

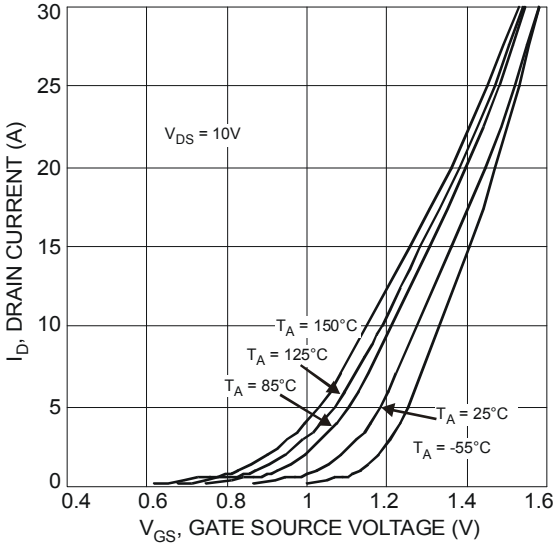


Fig. 2 Typical Transfer Characteristics

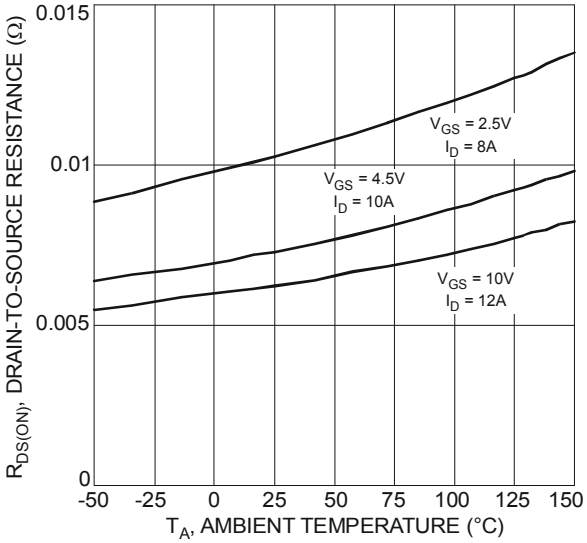


Fig. 3 On-Resistance Variation with Temperature

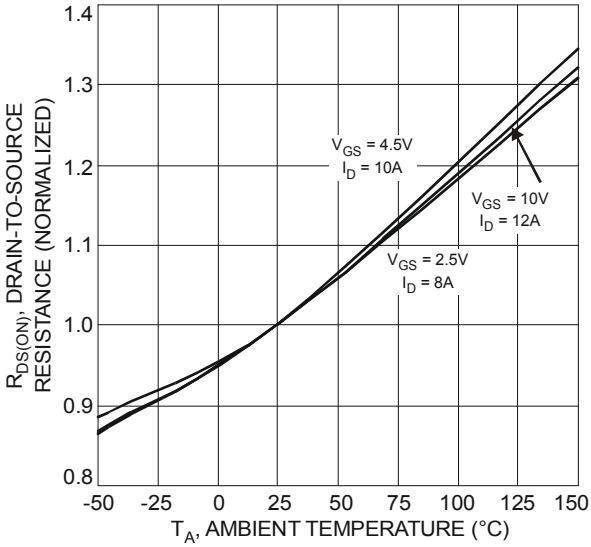


Fig. 4 On-Resistance Variation with Temperature

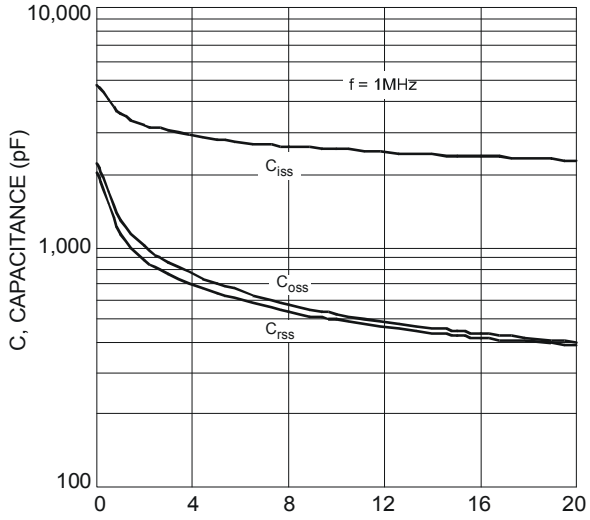


Fig. 5 Typical Capacitance

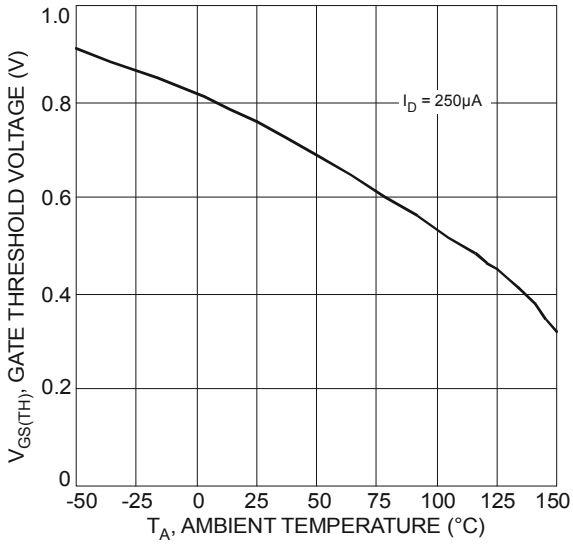


Fig. 6 Gate Threshold Variation vs. Ambient Temperature

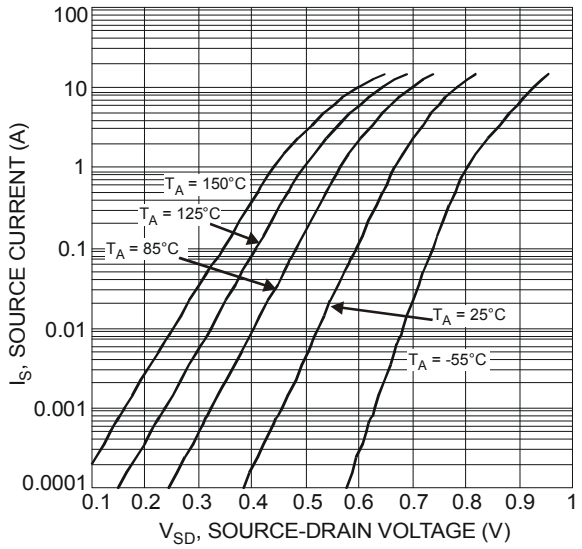


Fig. 7 Diode Forward Voltage vs. Current

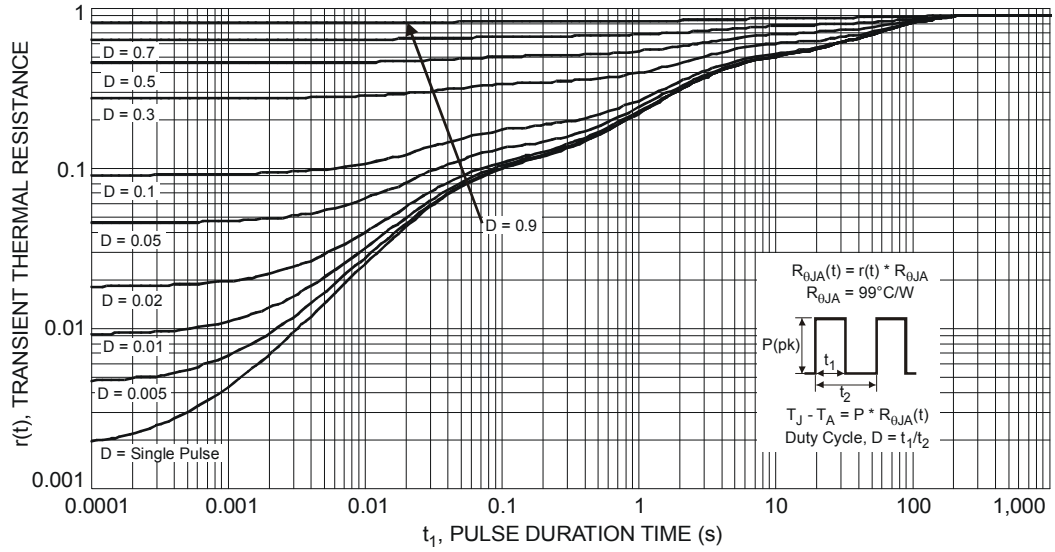
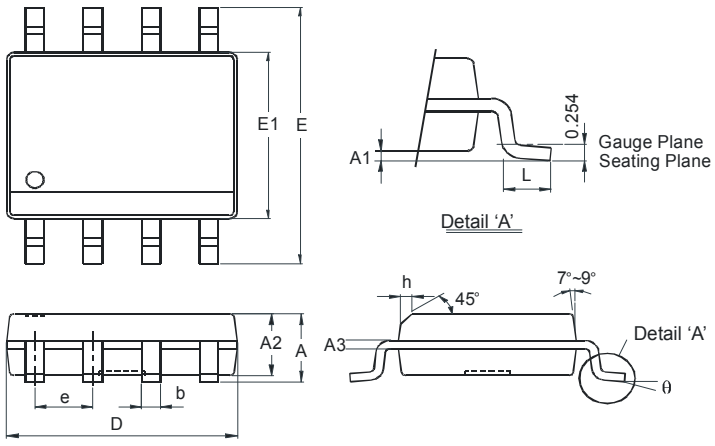


Fig. 8 Transient Thermal Response

Package Outline Dimensions

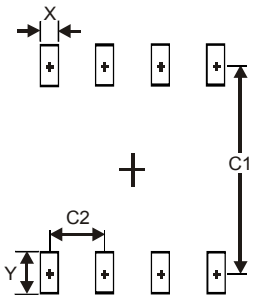
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.



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 the latest version.



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