

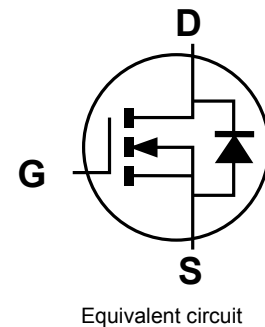
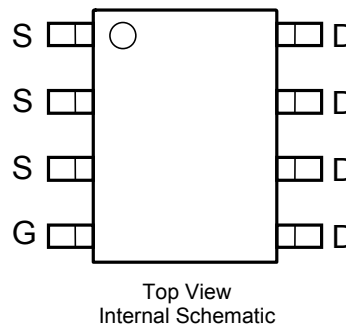
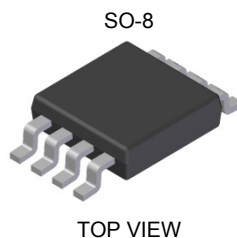
## Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$ max	$I_D$ max $T_A = +25^\circ\text{C}$
20V	8m $\Omega$ @ $V_{GS} = 10\text{V}$	12A
	9m $\Omega$ @ $V_{GS} = 4.5\text{V}$	10A
	12m $\Omega$ @ $V_{GS} = 2.5\text{V}$	8A

## 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



## 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**

## Mechanical Data

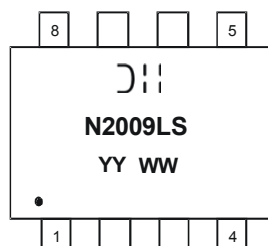
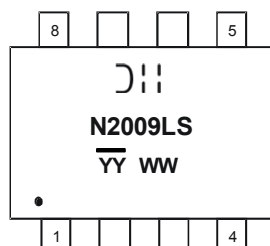
- Case: SO-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections Indicator: See diagram
- Terminals: Finish — Matte Tin annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.074 grams (approximate)

## 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](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



- $\text{D}|||$  = 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<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V <sub>DSS</sub>	20	V
Gate-Source Voltage			V <sub>GSS</sub>	±12	V
Drain Current (Note 5)	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	12	A
		T <sub>A</sub> = +70°C		9.6	
Pulsed Drain Current (Note 6)			I <sub>DM</sub>	42	A

**Thermal Characteristics**

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 5)	P <sub>D</sub>	2	W
Thermal Resistance, Junction to Ambient	R <sub>θJA</sub>	62.5	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 7)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	20	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	1	μA	V <sub>DS</sub> = 20V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±12V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 7)</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	0.5	—	1.2	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
Static Drain-Source On-Resistance	R <sub>DS(on)</sub>	—	—	8	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 12A
			—	9		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 10A
			—	12		V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 8A
Forward Transconductance	g <sub>fs</sub>	—	27	—	S	V <sub>DS</sub> = 5V, I <sub>D</sub> = 6.5A
Diode Forward Voltage	V <sub>SD</sub>	0.5	0.7	1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 3A
<b>DYNAMIC CHARACTERISTICS (Note 8)</b>						
Input Capacitance	C <sub>iss</sub>	—	2555	—	pF	V <sub>DS</sub> = 10V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	523	—	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	—	496	—	pF	
Gate Resistance	R <sub>G</sub>	—	1.1	—	Ω	V <sub>GS</sub> = 0V, V <sub>DS</sub> = 0V, f = 1MHz
<b>SWITCHING CHARACTERISTICS (Note 8)</b>						
Total Gate Charge	Q <sub>g</sub>	—	28.9 58.3	—	nC	V <sub>DS</sub> = 10V, V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 12A
Gate-Source Charge	Q <sub>gs</sub>	—	3.7	—		V <sub>DS</sub> = 10V, V <sub>GS</sub> = 10V, I <sub>D</sub> = 12A
Gate-Drain Charge	Q <sub>gd</sub>	—	11.4	—		V <sub>DS</sub> = 10V, V <sub>GS</sub> = 10V, I <sub>D</sub> = 12A

- Notes:
5. Device mounted on 2 oz, FR-4 PCB, with R<sub>θJA</sub> = 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.

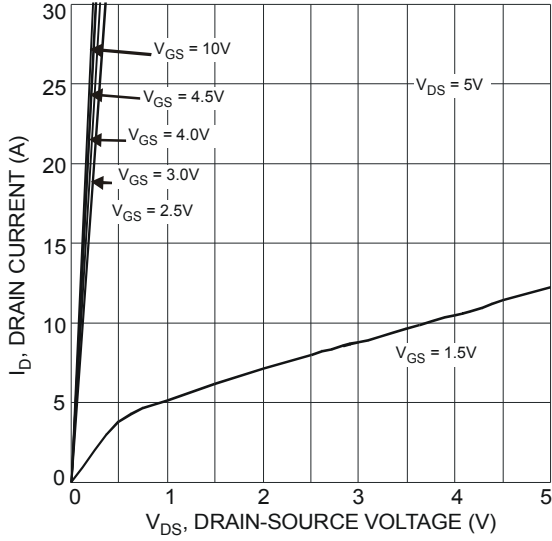


Fig. 1 Typical Output Characteristics

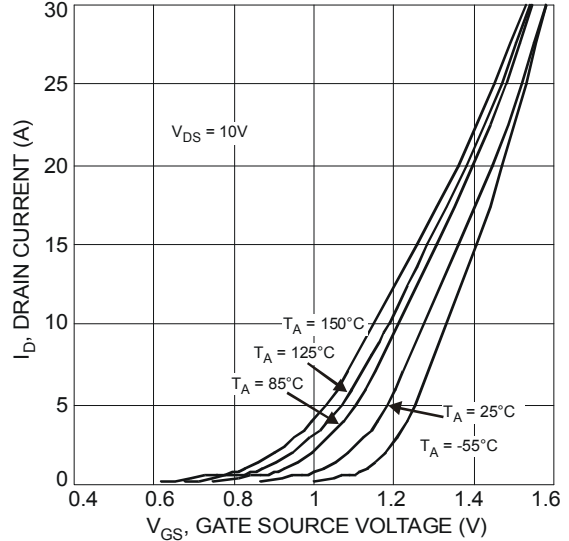


Fig. 2 Typical Transfer Characteristics

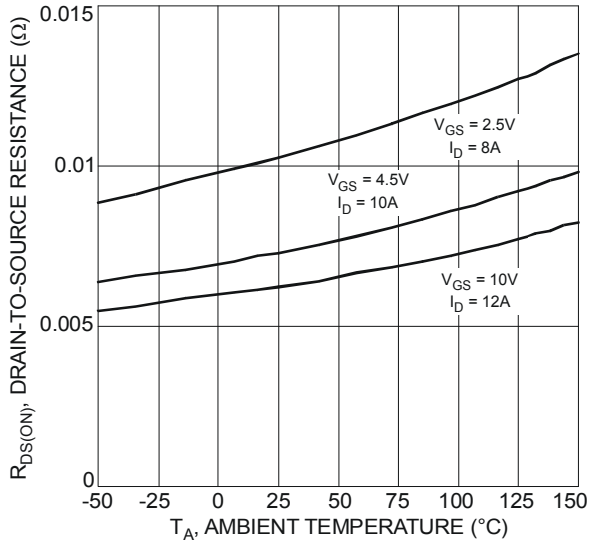


Fig. 3 On-Resistance Variation with Temperature

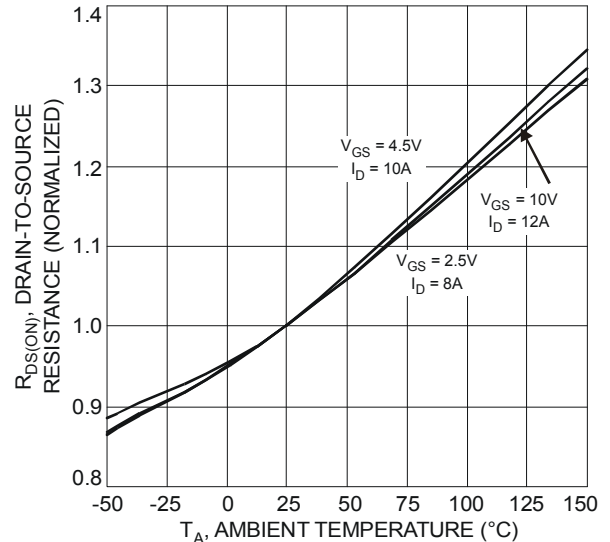


Fig. 4 On-Resistance Variation with Temperature

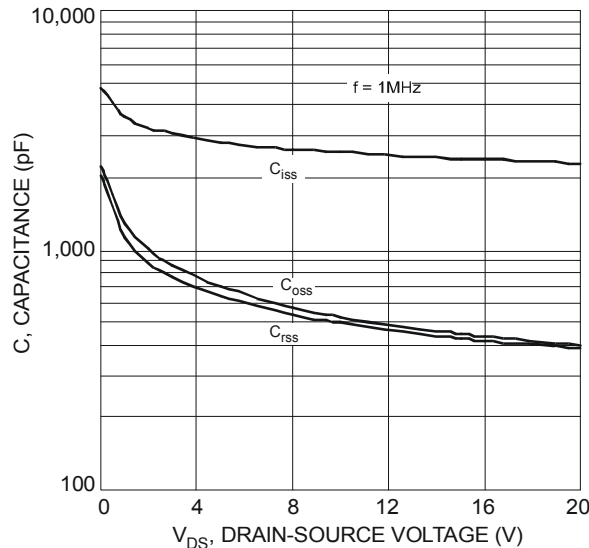


Fig. 5 Typical Capacitance

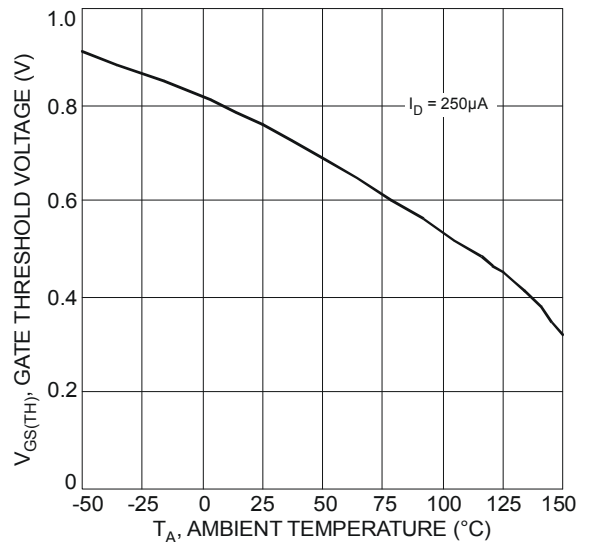


Fig. 6 Gate Threshold Variation vs. Ambient Temperature

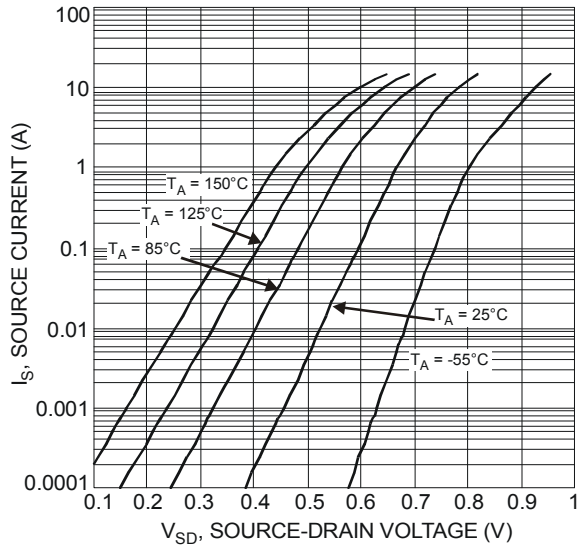


Fig. 7 Diode Forward Voltage vs. Current

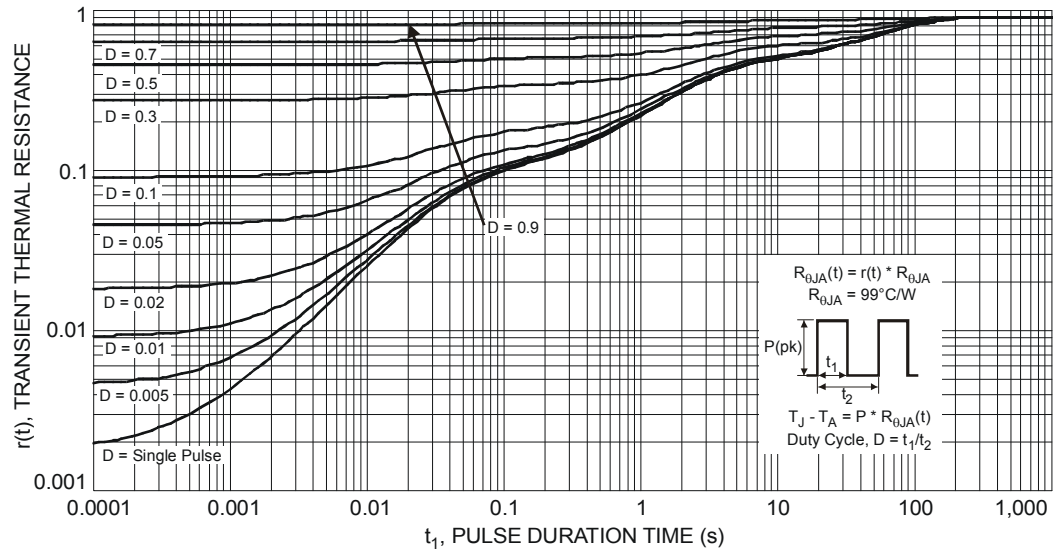
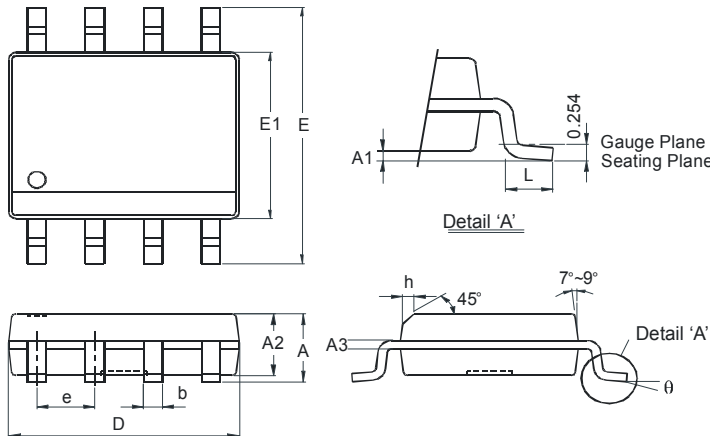


Fig. 8 Transient Thermal Response

**Package Outline Dimensions**

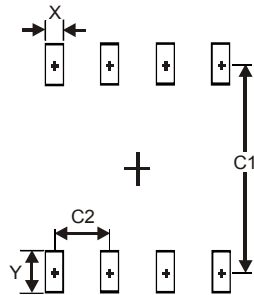
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



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

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