

## Product Summary

$V_{(BR)DSS}$	$R_{DS(on)}$	$I_D$ $T_A = 25^\circ C$
30V	24m $\Omega$ @ $V_{GS} = 10V$	8.5A
	36m $\Omega$ @ $V_{GS} = 4.5V$	6.9A

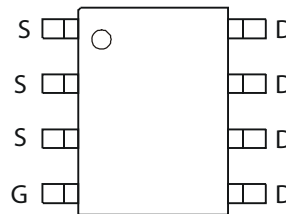
## Description and Applications

This new generation 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.

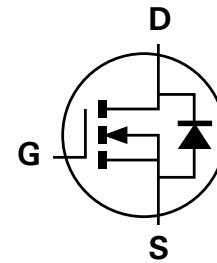
- Motor control
- Backlighting
- DC-DC Converters
- Power management functions



TOP VIEW



TOP VIEW



Equivalent Circuit

## Features and Benefits

- Low on-resistance
- Fast switching speed
- "Green" component and RoHS compliant (Note 1)

## Mechanical Data

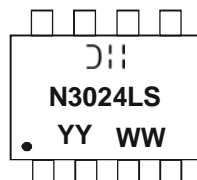
- Case: SO-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0 (Note 1)
- Moisture Sensitivity: Level 1 per J-STD-020D
- Terminals Connections: See Diagram
- Terminals: Finish - Matte Tin annealed over Copper lead frame. Solderable per MIL-STD-202,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

## Ordering Information (Note 1)

Product	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
DMN3024LSS-13	N3024LS	13	12	2,500

Note: 1. Diodes, Inc. defines "Green" products as those which are Eu RoHS compliant and contain no halogens or antimony compounds; further information about Diodes Inc.'s "Green" Policy can be found on our website. For packaging details, go to our website.

## Marking Information



N3024LS = Product Type Marking Code  
 ⤵⤵ = Manufacturer's Marking  
 YY WW = Date Code Marking  
 YY = Year (ex: 09 = 2009)  
 WW = Week (01-52)

**Maximum Ratings** @ $T_A = 25^\circ\text{C}$  unless otherwise specified

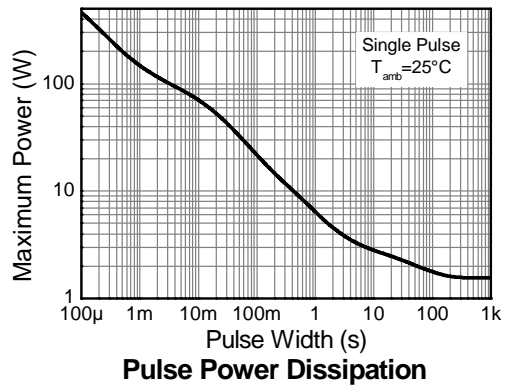
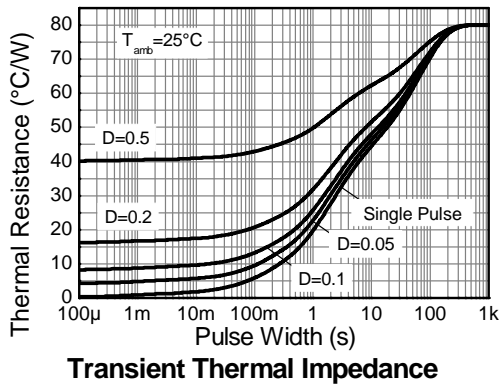
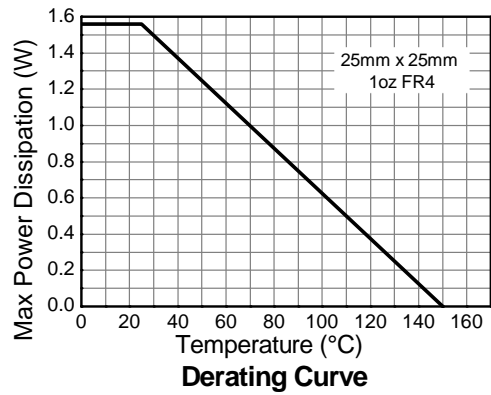
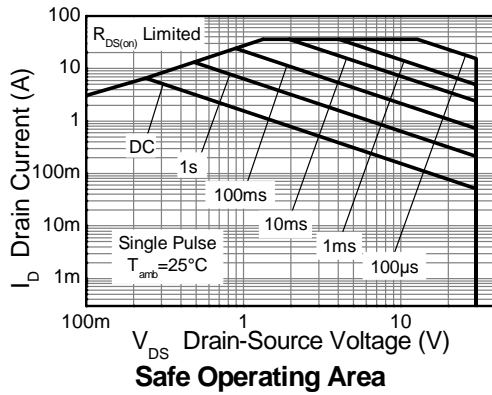
Characteristic			Symbol	Value	Unit	
Drain-Source voltage			$V_{DSS}$	30	V	
Gate-Source voltage			$V_{GS}$	$\pm 20$	V	
Continuous Drain current	$V_{GS} = 10\text{V}$	(Note 3)	$I_D$	8.5	A	
		$T_A = 70^\circ\text{C}$ (Note 3)		6.8		
		(Note 2)		6.4		
Pulsed Drain current	$V_{GS} = 10\text{V}$	(Note 4)	$I_{DM}$	36	A	
Continuous Source current (Body diode)			(Note 3)	$I_S$	4.5	A
Pulsed Source current (Body diode)			(Note 4)	$I_{SM}$	36	A

**Thermal Characteristics** @ $T_A = 25^\circ\text{C}$  unless otherwise specified

Characteristic		Symbol	Value	Unit
Power dissipation	(Note 2)	$P_D$	1.6	W
	(Note 3)		12.5	
Linear derating factor	(Note 3)		2.8	
Thermal Resistance, Junction to Ambient	(Note 2)	$R_{\theta JA}$	80	$^\circ\text{C/W}$
	(Note 3)		45	
Thermal Resistance, Junction to Lead	(Note 5)	$R_{\theta JL}$	35	$^\circ\text{C/W}$
Operating and storage temperature range		$T_J, T_{STG}$	-55 to 150	$^\circ\text{C}$

- Notes:
- For a device surface mounted on 25mm x 25mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
  - Same as note (2), except the device is measured at  $t \leq 10$  sec.
  - Same as note (2), except the device is pulsed with  $D = 0.02$  and pulse width 300  $\mu\text{s}$ . The pulse current is limited by the maximum junction temperature.
  - Thermal resistance from junction to solder-point (at the end of the drain lead): the device is operating in a steady-state condition.

**Thermal Characteristics**

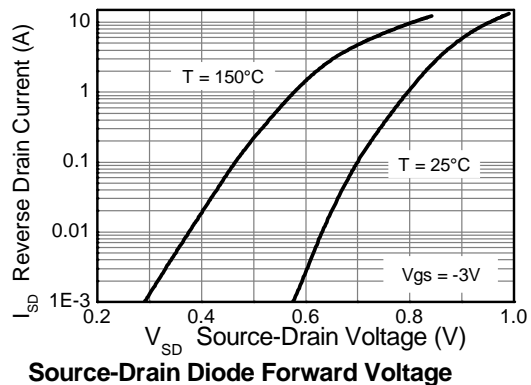
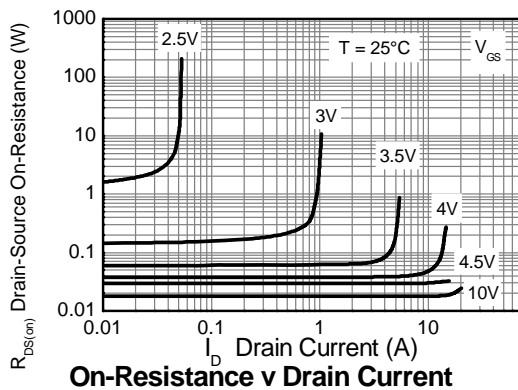
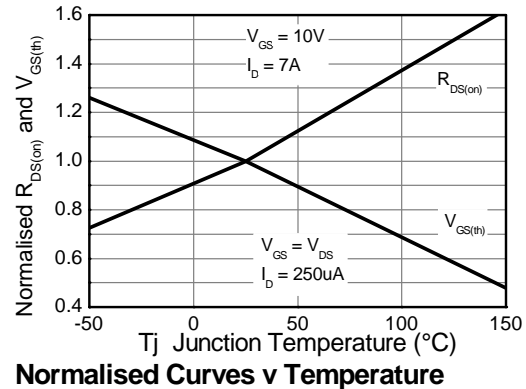
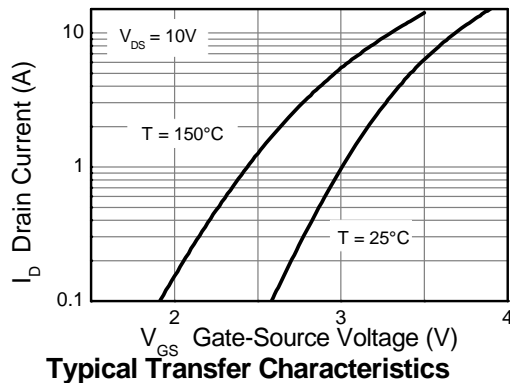
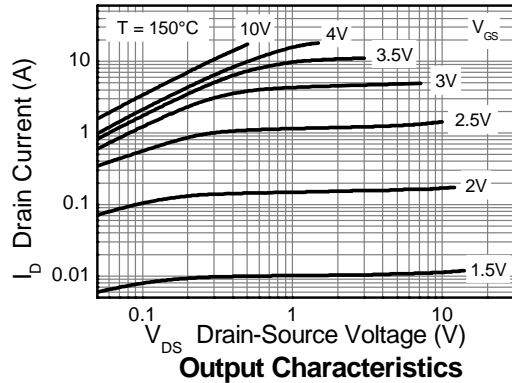
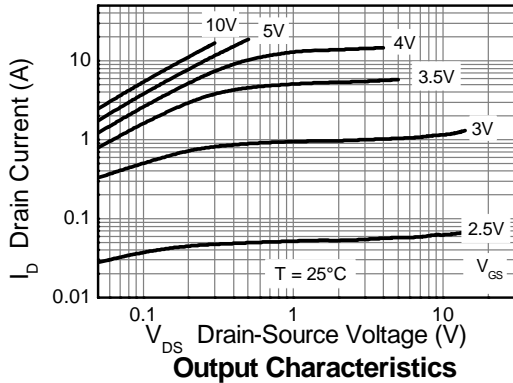


**Electrical Characteristics** @ $T_A = 25^\circ\text{C}$  unless otherwise specified

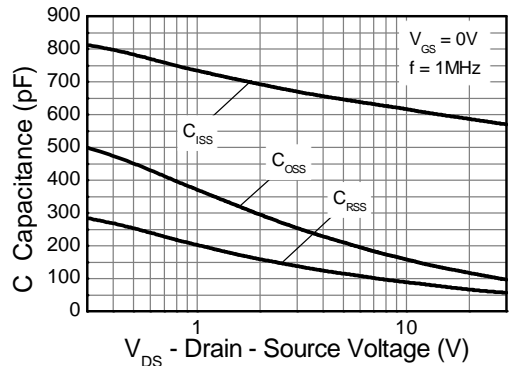
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	30	—	—	V	$I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$
Zero Gate Voltage Drain Current	$I_{DSS}$	—	—	0.5	$\mu\text{A}$	$V_{DS} = 30\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	$I_{GSS}$	—	—	$\pm 100$	nA	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	$V_{GS(th)}$	1.0	—	3.0	V	$I_D = 250\mu\text{A}, V_{DS} = V_{GS}$
Static Drain-Source On-Resistance (Note 6)	$R_{DS(on)}$	—	—	0.024	$\Omega$	$V_{GS} = 10\text{V}, I_D = 7.0\text{A}$
				0.036		$V_{GS} = 4.5\text{V}, I_D = 6.0\text{A}$
Forward Transconductance (Notes 6 & 7)	$g_{fs}$	—	16.5	—	S	$V_{DS} = 15\text{V}, I_D = 7.1\text{A}$
Diode Forward Voltage (Note 6)	$V_{SD}$	—	0.82	1.2	V	$I_S = 1.7\text{A}, V_{GS} = 0\text{V}$
Reverse recovery time (Note 7)	$t_{rr}$	—	12	—	ns	$I_S = 2.2\text{A}, di/dt = 100\text{A}/\mu\text{s}$
Reverse recovery charge (Note 7)	$Q_{rr}$	—	4.8	—	nC	
<b>DYNAMIC CHARACTERISTICS (Note 7)</b>						
Input Capacitance	$C_{iss}$	—	608	—	pF	$V_{DS} = 15\text{V}, V_{GS} = 0\text{V}$ $f = 1\text{MHz}$
Output Capacitance	$C_{oss}$	—	132	—	pF	
Reverse Transfer Capacitance	$C_{rss}$	—	71	—	pF	
Total Gate Charge	$Q_g$	—	6.3	—	nC	$V_{DS} = 15\text{V}, V_{GS} = 4.5\text{V}$ $I_D = 7\text{A}$
Total Gate Charge	$Q_g$	—	12.9	—	nC	$V_{DS} = 15\text{V}, V_{GS} = 10\text{V}$ $I_D = 7\text{A}$
Gate-Source Charge	$Q_{gs}$	—	2.5	—	nC	
Gate-Drain Charge	$Q_{gd}$	—	2.5	—	nC	
Turn-On Delay Time (Note 8)	$t_{D(on)}$	—	2.9	—	ns	$V_{DD} = 15\text{V}, V_{GS} = 10\text{V}$ $I_D = 1\text{A}, R_G = 6.0\Omega$
Turn-On Rise Time (Note 8)	$t_r$	—	3.3	—	ns	
Turn-Off Delay Time (Note 8)	$t_{D(off)}$	—	16	—	ns	
Turn-Off Fall Time (Note 8)	$t_f$	—	8	—	ns	

- Notes:
6. Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ ; duty cycle  $\leq 2\%$
  7. For design aid only, not subject to production testing.
  8. Switching characteristics are independent of operating junction temperatures.

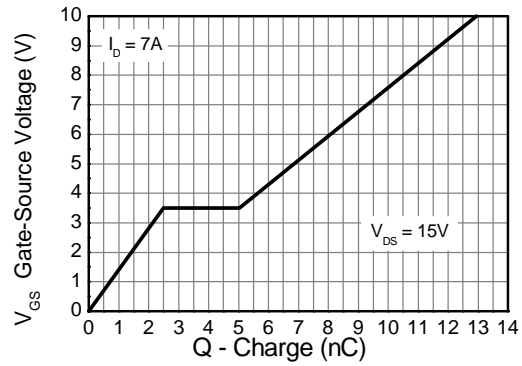
**Typical Characteristics**



**Typical Characteristics - continued**

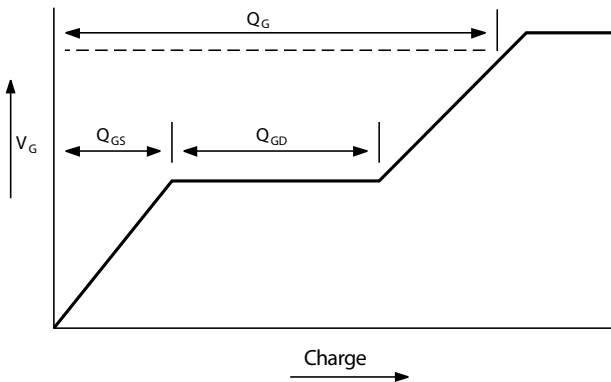


**Capacitance v Drain-Source Voltage**

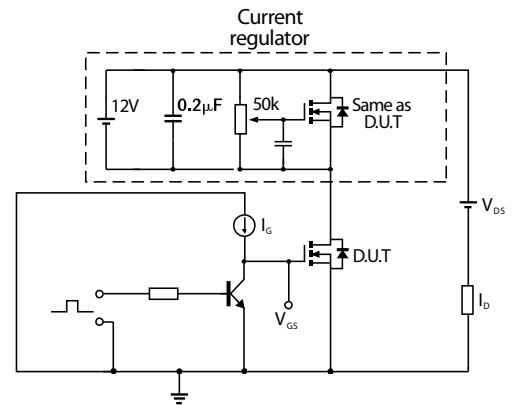


**Gate-Source Voltage v Gate Charge**

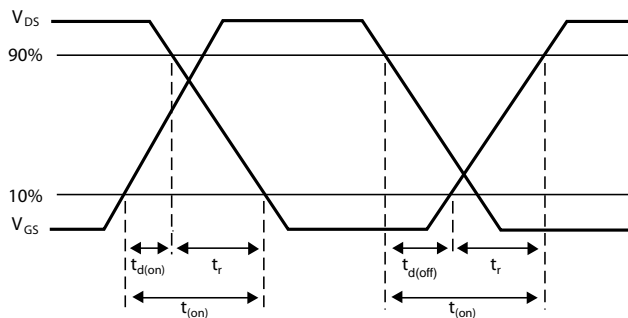
**Test Circuits**



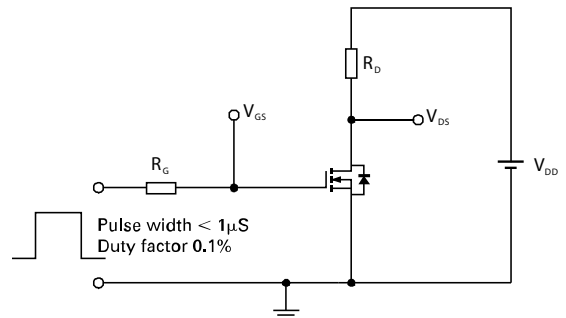
**Basic gate charge waveform**



**Gate charge test circuit**

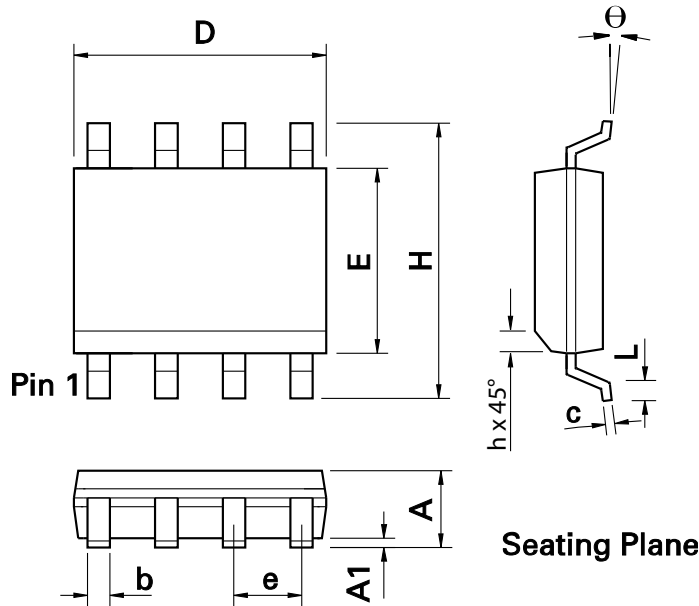


**Switching time waveforms**



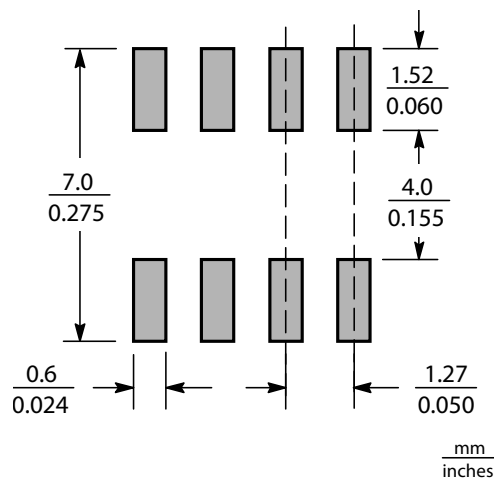
**Switching time test circuit**

**Package Outline Dimensions**



DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.053	0.069	1.35	1.75	e	0.050 BSC		1.27 BSC	
A1	0.004	0.010	0.10	0.25	b	0.013	0.020	0.33	0.51
D	0.189	0.197	4.80	5.00	c	0.008	0.010	0.19	0.25
H	0.228	0.244	5.80	6.20	theta	0°	8°	0°	8°
E	0.150	0.157	3.80	4.00	h	0.010	0.020	0.25	0.50
L	0.016	0.050	0.40	1.27	-	-	-	-	-

**Suggested Pad Layout**



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