

## Product Summary

$V_{(BR)DSS}$	$R_{DS(on)}$	$I_D$ $T_A = 25^\circ\text{C}$
40V	36mΩ @ $V_{GS} = 10\text{V}$	12.2A
	61mΩ @ $V_{GS} = 4.5\text{V}$	9.4A

## 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.

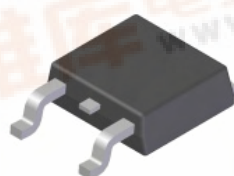
- Backlighting
- DC-DC Converters
- Power management functions

## Features and Benefits

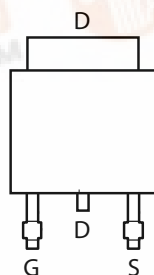
- Low on-resistance
- Fast switching speed
- "Green" component and RoHS compliant (Note 1)

## Mechanical Data

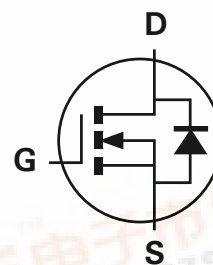
- Case: TO252-3L
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0 (Note 1)
- Moisture Sensitivity: Level 1 per J-STD-020D
- Terminals Connections: See Diagram
- Terminals: Matte Tin Finish annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208
- Marking Information: See Below
- Ordering Information: See Below
- Weight: 0.33 grams (approximate)



TOP VIEW



PIN OUT -TOP VIEW



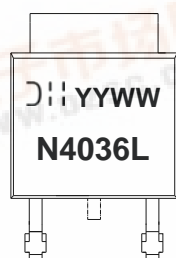
Equivalent Circuit

## Ordering Information (Note 1)

Product	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
DMN4036LK3-13	N4036L	13	16	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



311 = Manufacturer's Marking  
N4036L = Product Type Marking Code  
YYWW = Date Code Marking  
YY = Year (ex: 09 = 2009)  
WW = Week (01-52)

## Maximum Ratings @T<sub>A</sub> = 25°C unless otherwise specified

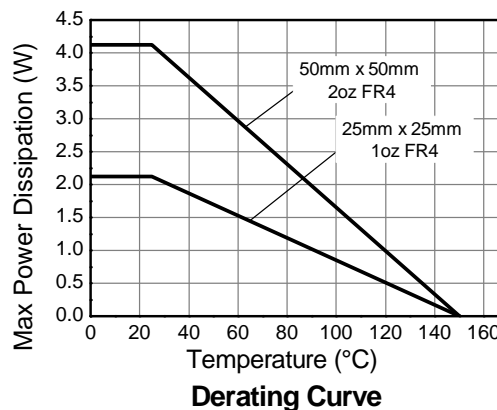
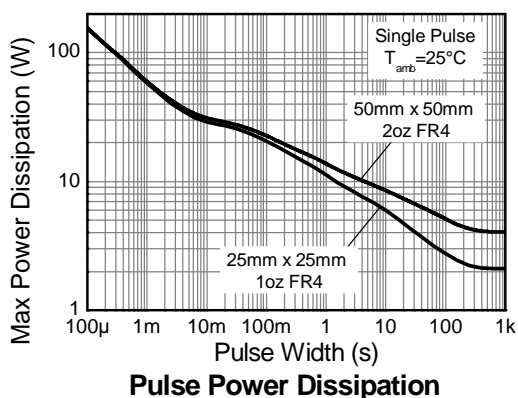
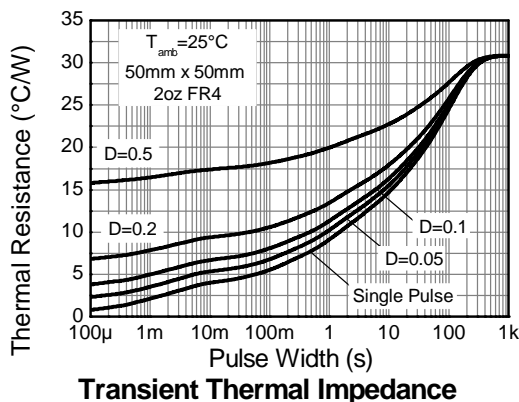
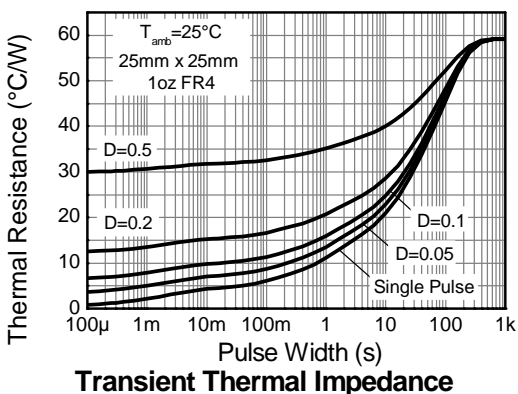
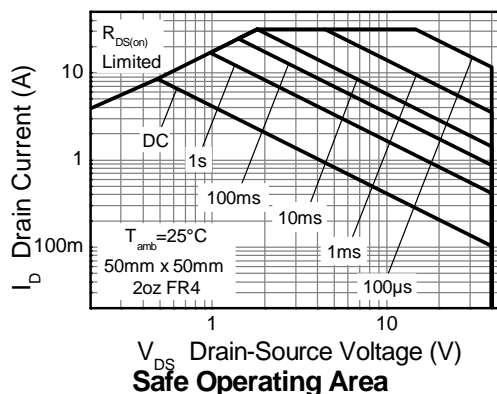
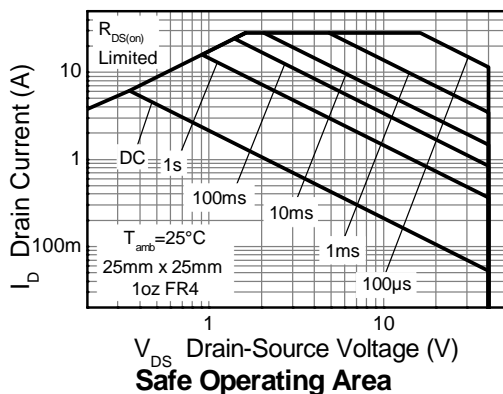
Characteristic			Symbol	Value	Unit
Drain-Source voltage			V <sub>DSS</sub>	40	V
Gate-Source voltage			V <sub>GS</sub>	±20	V
Continuous Drain current	V <sub>GS</sub> = 10V	(Note 3)	I <sub>D</sub>	12.2	A
		T <sub>A</sub> =70°C (Note 3)		9.7	
		(Note 2)		8.5	
Pulsed Drain current	V <sub>GS</sub> = 10V	(Note 4)	I <sub>DM</sub>	31.7	A
Continuous Source current (Body diode)		(Note 3)	I <sub>S</sub>	10.4	A
Pulsed Source current (Body diode)		(Note 4)	I <sub>SM</sub>	31.7	A

## Thermal Characteristics @T<sub>A</sub> = 25°C unless otherwise specified

Characteristic		Symbol	Value	Unit
Power dissipation Linear derating factor	(Note 2)	P <sub>D</sub>	4.12	W mW/°C
			33	
	(Note 3)		8.49	
			67.9	
Thermal Resistance, Junction to Ambient	(Note 5)	R <sub>θJA</sub>	2.12	°C/W
			16.9	
	(Note 2)		30.3	
	(Note 3)		14.7	
Thermal Resistance, Junction to Lead	(Note 5)	R <sub>θJL</sub>	59.0	°C/W
	(Note 6)		3.1	
Operating and storage temperature range		T <sub>J</sub> , T <sub>STG</sub>	-55 to 150	°C

- Notes:
2. For a device surface mounted on 50mm x 50mm x 1.6mm FR4 PCB with high coverage of single sided 2oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
  3. Same as note 2, except the device is measured at t ≤ 10 sec.
  4. Same as note 2, except the device is pulsed with D = 0.02 and pulse width 300 μs. The pulse current is limited by the maximum junction temperature.
  5. 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.
  6. Thermal resistance from junction to solder-point (at the end of the drain lead).

## Thermal Characteristics

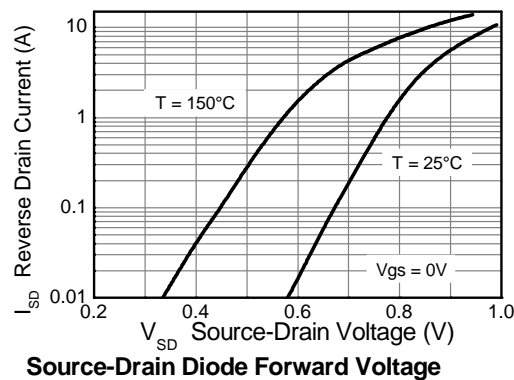
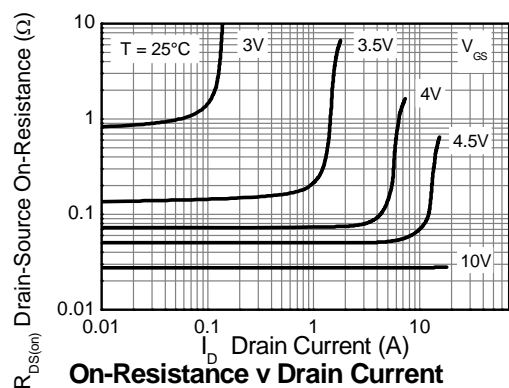
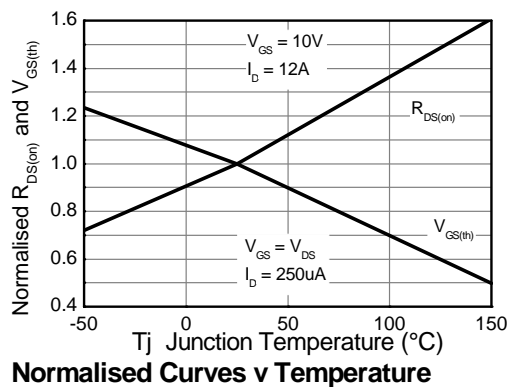
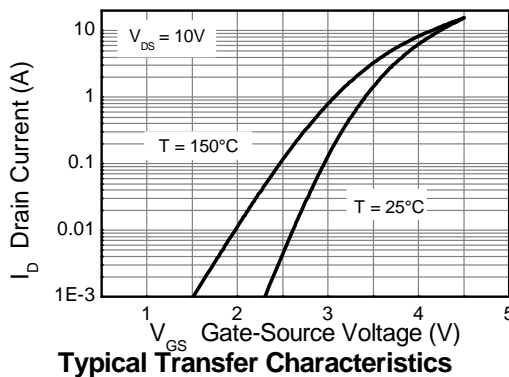
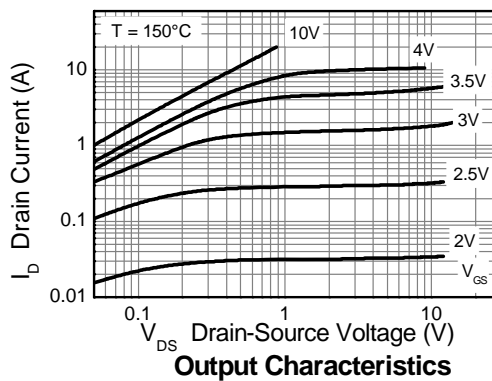
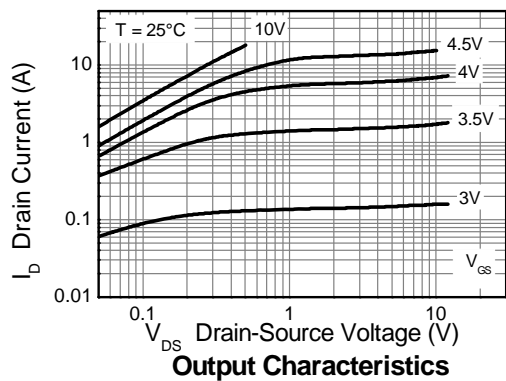


**Electrical Characteristics** @T<sub>A</sub> = 25°C unless otherwise specified

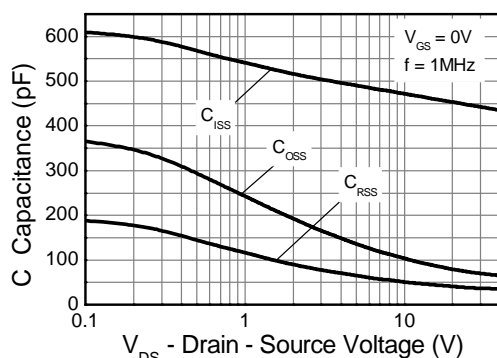
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition	
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	40	—	—	V	I <sub>D</sub> = 250μA, V <sub>GS</sub> = 0V	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	0.5	μA	V <sub>DS</sub> = 40V, V <sub>GS</sub> = 0V	
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V	
ON CHARACTERISTICS							
Gate Threshold Voltage	V <sub>GS(th)</sub>	1.0	—	3.0	V	I <sub>D</sub> = 250μA, V <sub>DS</sub> = V <sub>GS</sub>	
Static Drain-Source On-Resistance (Note 7)	R <sub>DS (ON)</sub>	—	—	0.036	Ω	V <sub>GS</sub> = 10V, I <sub>D</sub> = 12A	
				0.061		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 6A	
Forward Transconductance (Notes 7 & 8)	g <sub>fs</sub>	—	19.6	—	S	V <sub>DS</sub> = 15V, I <sub>D</sub> = 12A	
Diode Forward Voltage (Note 7)	V <sub>SD</sub>	—	0.96	1.1	V	I <sub>S</sub> = 12A, V <sub>GS</sub> = 0V	
Reverse recovery time (Note 8)	t <sub>rr</sub>		112	—	ns	I <sub>S</sub> = 12A, di/dt= 100A/μs	
Reverse recovery charge (Note 8)	Q <sub>rr</sub>	—	926	—	nC		
DYNAMIC CHARACTERISTICS (Note 8)							
Input Capacitance	C <sub>iss</sub>	—	453	—	pF	V <sub>DS</sub> = 20V, V <sub>GS</sub> = 0V f= 1MHz	
Output Capacitance	C <sub>oss</sub>	—	79.1	—	pF		
Reverse Transfer Capacitance	C <sub>rss</sub>	—	40.5	—	pF		
Total Gate Charge	Q <sub>g</sub>	—	4.9	—	nC	V <sub>GS</sub> = 4.5V	V <sub>DS</sub> = 20V I <sub>D</sub> = 12A
Total Gate Charge	Q <sub>g</sub>	—	9.2	—	nC	V <sub>GS</sub> = 10V	
Gate-Source Charge	Q <sub>gs</sub>	—	1.7	—	nC		
Gate-Drain Charge	Q <sub>gd</sub>	—	2.7	—	nC		
Turn-On Delay Time (Note 9)	t <sub>D(on)</sub>	—	3.2	—	ns	V <sub>DD</sub> = 20V, V <sub>GS</sub> = 10V I <sub>D</sub> = 12A, R <sub>G</sub> ≅ 6.0Ω	
Turn-On Rise Time (Note 9)	t <sub>r</sub>	—	11.7	—	ns		
Turn-Off Delay Time (Note 9)	t <sub>D(off)</sub>	—	11.6	—	ns		
Turn-Off Fall Time (Note 9)	t <sub>f</sub>	—	9.5	—	ns		

- Notes:
7. Measured under pulsed conditions. Pulse width ≤ 300μs; duty cycle ≤ 2%
  8. For design aid only, not subject to production testing.
  9. Switching characteristics are independent of operating junction temperatures.

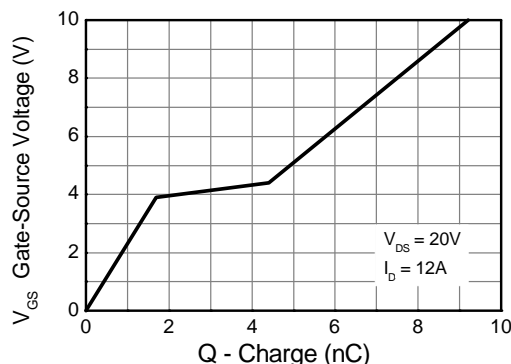
## Typical Characteristics



## Typical Characteristics - continued

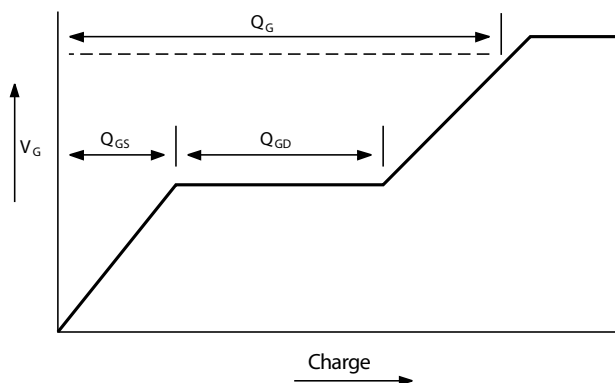


Capacitance v Drain-Source Voltage

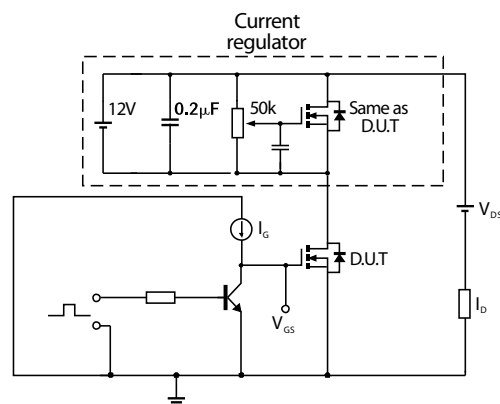


Gate-Source Voltage v Gate Charge

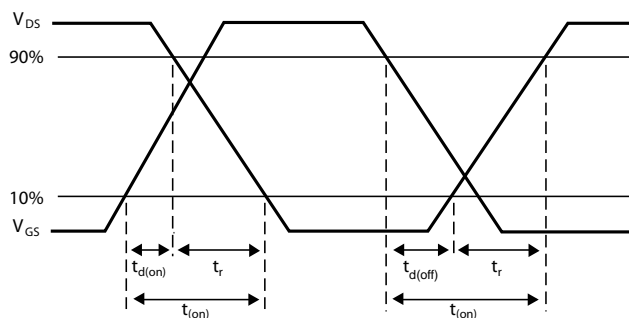
## Test Circuits



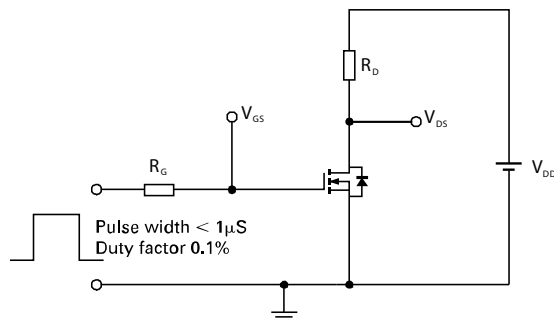
Basic gate charge waveform



Gate charge test circuit

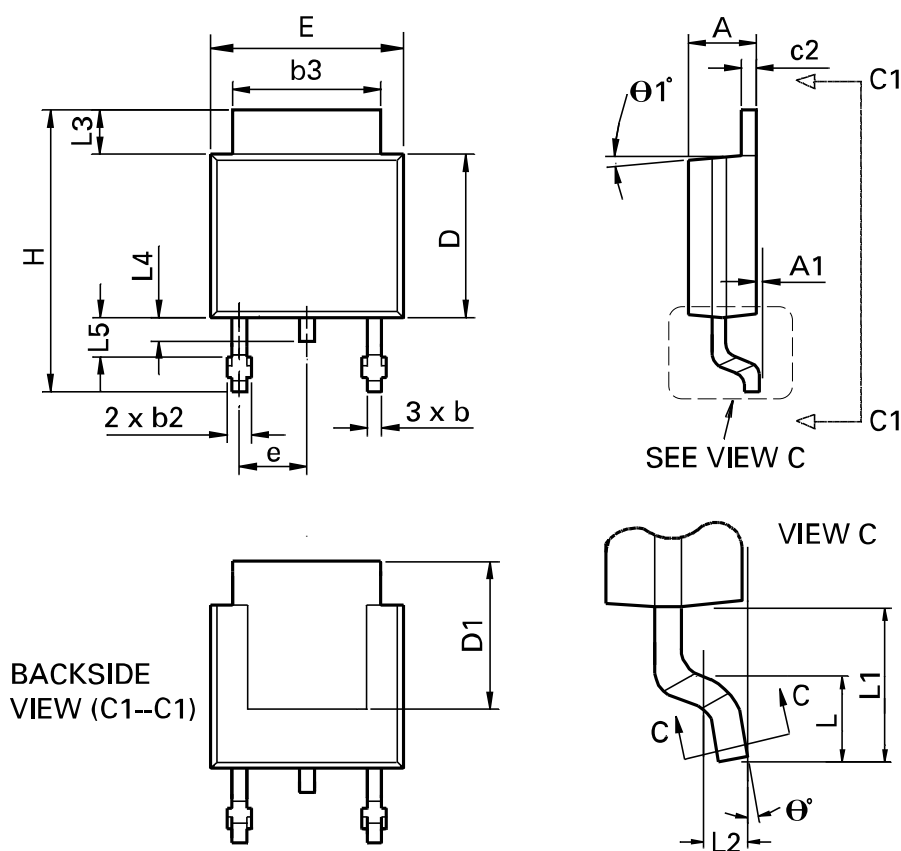


Switching time waveforms



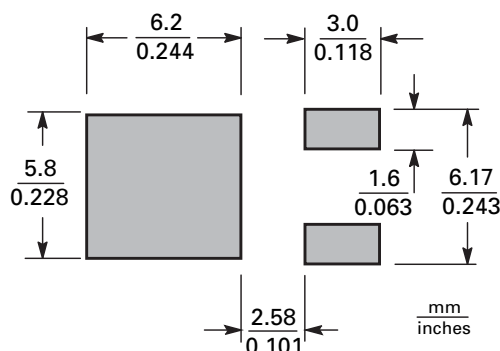
Switching time test circuit

## Package Outline Dimensions



DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min	Max	Min	Max		Min	Max	Min	Max
A	0.086	0.094	2.18	2.39	e	0.090 BSC		2.29 BSC	
A1	-	0.005	-	0.127	H	0.370	0.410	9.40	10.41
b	0.020	0.035	0.508	0.89	L	0.055	0.070	1.40	1.78
b2	0.030	0.045	0.762	1.14	L1	0.108 REF		2.74 REF	
b3	0.205	0.215	5.21	5.46	L2	0.020 BSC		0.508 BSC	
c	0.018	0.024	0.457	0.61	L3	0.035	0.065	0.89	1.65
c2	0.018	0.023	0.457	0.584	L4	0.025	0.040	0.635	1.016
D	0.213	0.245	5.41	6.22	L5	0.045	0.060	1.14	1.52
D1	0.205	-	5.21	-	$\theta_1^\circ$	0°	10°	0°	10°
E	0.250	0.265	6.35	6.73	$\theta^\circ$	0°	15°	0°	15°
E1	0.170	-	4.32	-	-	-	-	-	-

## Suggested Pad Layout



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