

## Product Summary

$V_{(BR)DSS}$	$R_{DS(on)}$	$I_D$ $T_A = 25^\circ C$
60V	68m $\Omega$ @ $V_{GS} = 10V$	8.5A
	100m $\Omega$ @ $V_{GS} = 4.5V$	7.0A

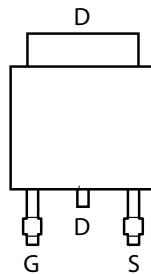
## Description and Applications

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.

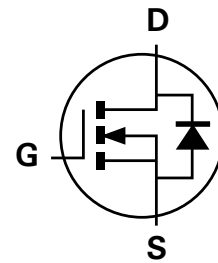
- Motor Control
- Transformer Driving Switch
- DC-DC Converters
- Power Management Functions
- Uninterrupted Power Supply



TOP VIEW



PIN OUT -TOP VIEW



Equivalent Circuit

## Features and Benefits

- 100% Unclamped Inductive Switch (UIS) test in production
- Low on-resistance
- Fast switching speed
- “Green” component and RoHS compliant (Note 1)
- Qualified to AEC-Q101 Standards for High Reliability

## Mechanical Data

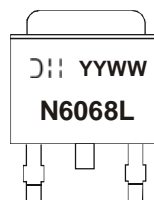
- Case: TO252-3L
- Case Material: Molded Plastic, “Green” Molding Compound. UL Flammability Classification Rating 94V-0 (Note 1)
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals Connections: See Diagram
- Terminals: Matte Tin Finish annealed over Copper leadframe. Solderable per MIL-STD-202,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

## Ordering Information (Note 1)

Product	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
DMN6068LK3-13	N6068L	13	16	2,500

Note: 1. Diodes, Inc. defines “Green” products as those which are 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



$\text{D} \parallel \text{YYWW}$  = Manufacturer's Marking  
 N6068L = 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

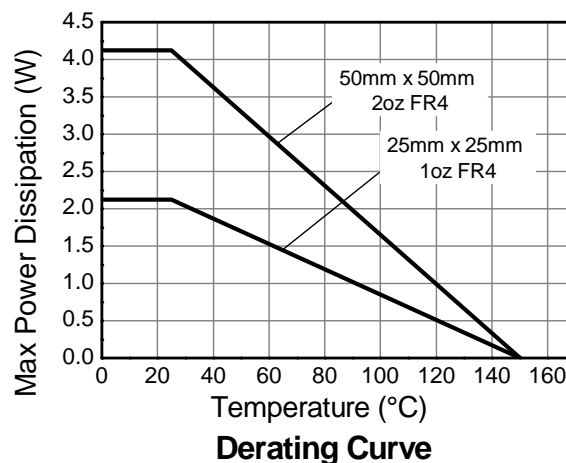
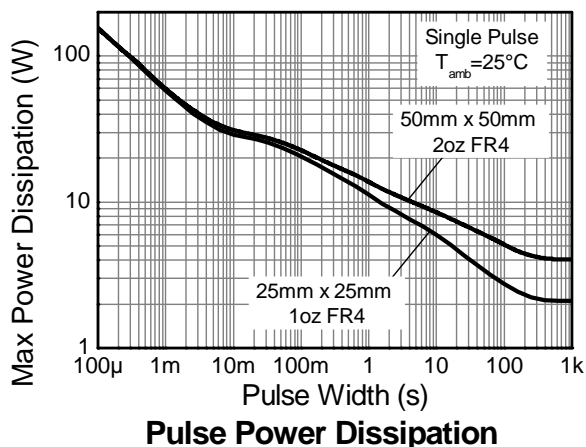
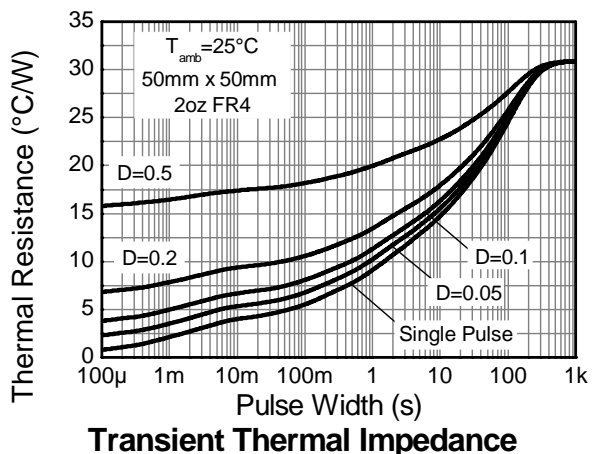
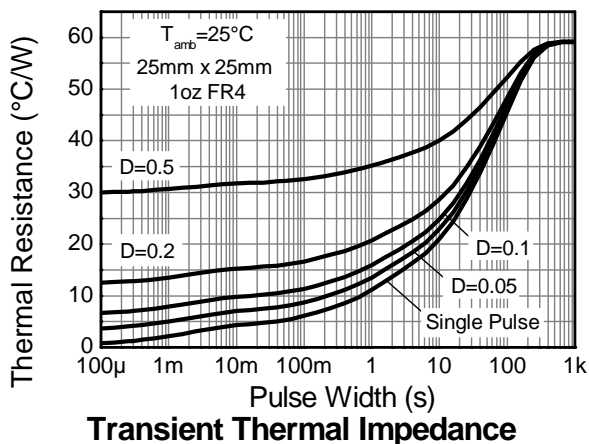
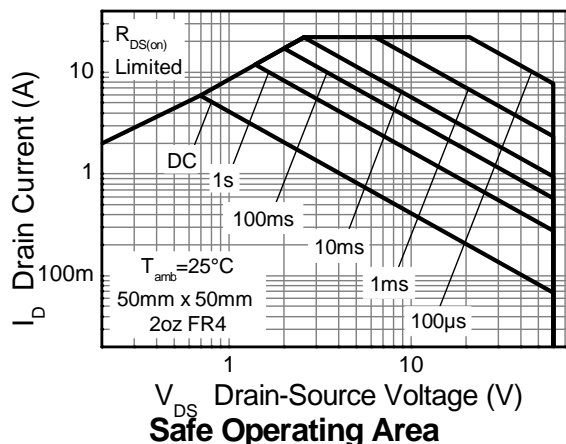
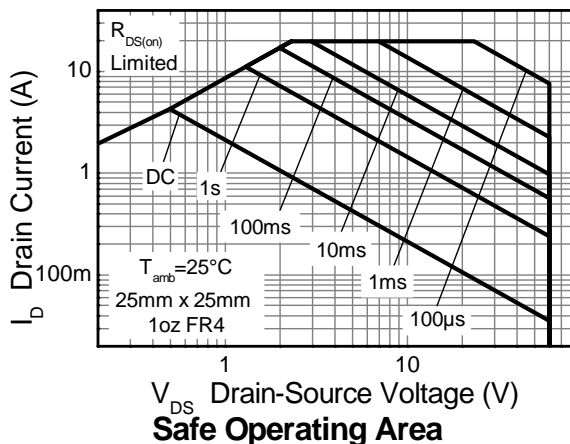
Characteristic		Symbol	Value	Unit
Drain-Source voltage		V <sub>DSS</sub>	60	V
Gate-Source voltage	(Note 2)	V <sub>GS</sub>	±20	V
Single Pulsed Avalanche Energy	(Note 8)	E <sub>AS</sub>	37.5	mJ
Single Pulsed Avalanche Current	(Note 8)	I <sub>AS</sub>	5.0	A
Continuous Drain current	V <sub>GS</sub> = 10V	I <sub>D</sub>	(Note 4) 8.5	A
			T <sub>A</sub> = 70°C (Note 4) 6.8	
			(Note 3) 6.0	
Pulsed Drain current	V <sub>GS</sub> = 10V	I <sub>DM</sub>	22.2	A
Continuous Source current (Body diode)	(Note 4)	I <sub>S</sub>	10.2	A
Pulsed Source current (Body diode)	(Note 5)	I <sub>SM</sub>	22.2	A

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

Characteristic		Symbol	Value	Unit
Power dissipation Linear derating factor	(Note 3)	P <sub>D</sub>	4.12	W mW/°C
			33	
	(Note 4)		8.49	
			67.9	
Thermal Resistance, Junction to Ambient	(Note 6)	R <sub>θJA</sub>	2.12	°C/W
			16.9	
	(Note 3)		30.3	
	(Note 4)		14.7	
Thermal Resistance, Junction to Lead	(Note 6)	R <sub>θJL</sub>	59.0	
	(Note 7)		3.09	
Operating and storage temperature range		T <sub>J</sub> , T <sub>STG</sub>	-55 to 150	°C

- Notes:
- AEC-Q101 V<sub>GS</sub> maximum is ±16V.
  - 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.
  - Same as note 2, except the device is measured at t ≤ 10 sec.
  - 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.
  - 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.
  - Thermal resistance from junction to solder-point (at the end of the drain lead).
  - UIS in production with L = 3.0mH, I<sub>AS</sub> = 5.0A, R<sub>G</sub> = 25Ω, V<sub>DD</sub> = 50V, starting T<sub>J</sub> = 25°C

## Thermal Characteristics

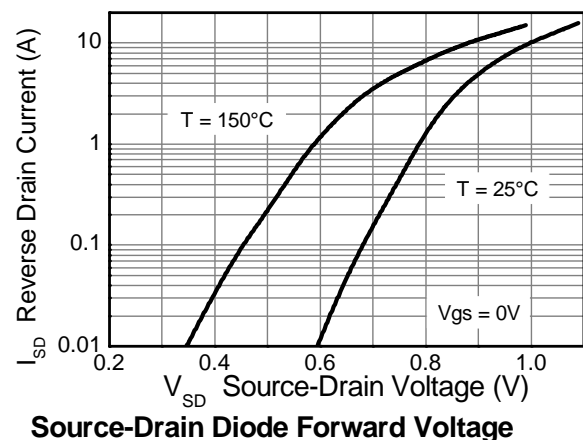
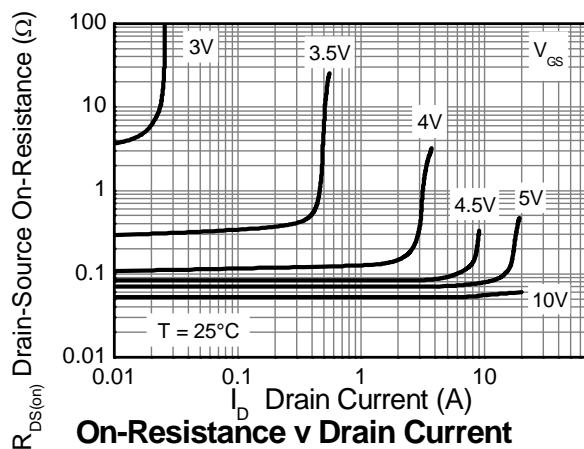
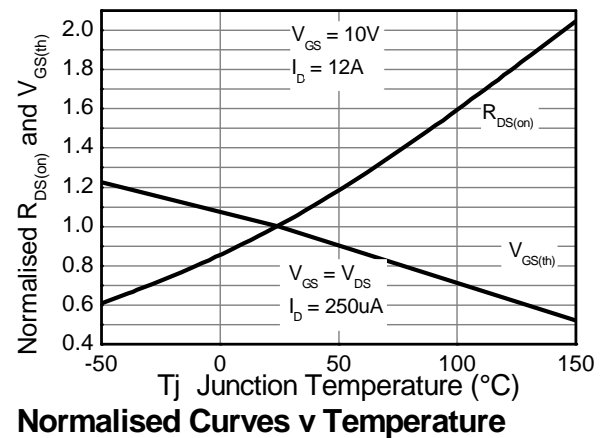
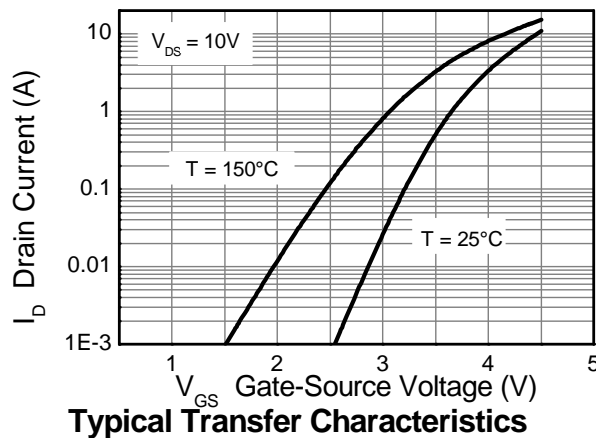
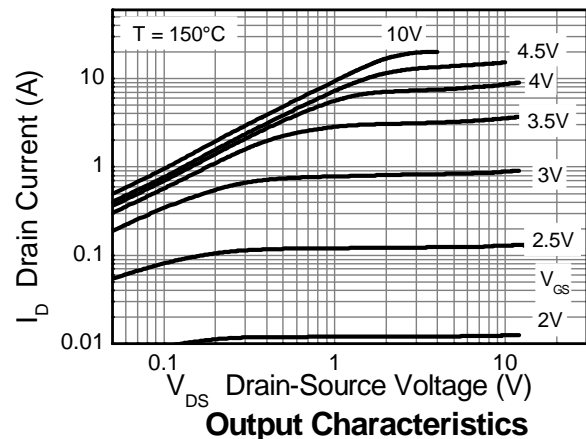
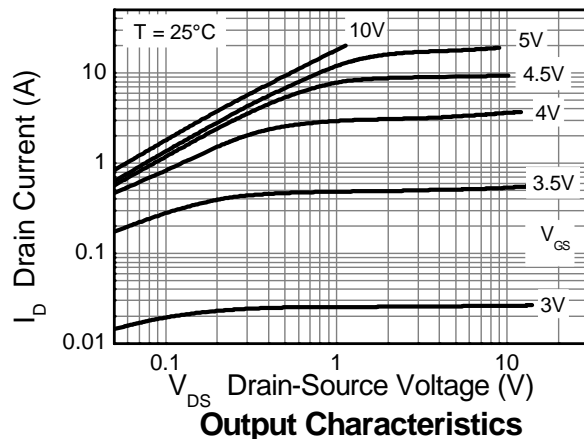


## Electrical Characteristics @T<sub>A</sub> = 25°C unless otherwise specified

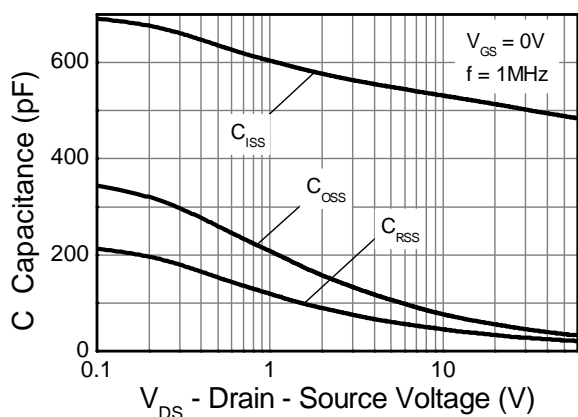
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition	
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	60	—	—	V	I <sub>D</sub> = 250μA, V <sub>GS</sub> = 0V	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	0.5	μA	V <sub>DS</sub> = 60V, V <sub>GS</sub> = 0V	
Gate-Source 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 9)	R <sub>DS (ON)</sub>	—	—	0.068	Ω	V <sub>GS</sub> = 10V, I <sub>D</sub> = 12A	
				0.100		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 6A	
Forward Transconductance (Notes 9 & 10)	g <sub>fs</sub>	—	19.7	—	S	V <sub>DS</sub> = 15V, I <sub>D</sub> = 12A	
Diode Forward Voltage (Note 9)	V <sub>SD</sub>	—	0.98	1.15	V	I <sub>S</sub> = 12A, V <sub>GS</sub> = 0V	
Reverse recovery time (Note 10)	t <sub>rr</sub>		145	—	ns	I <sub>S</sub> = 12A, di/dt= 100A/μs	
Reverse recovery charge (Note 10)	Q <sub>rr</sub>	—	929	—	nC		
DYNAMIC CHARACTERISTICS (Note 10)							
Input Capacitance	C <sub>iss</sub>	—	502	—	pF	V <sub>DS</sub> = 30V, V <sub>GS</sub> = 0V f= 1MHz	
Output Capacitance	C <sub>oss</sub>	—	45.7	—	pF		
Reverse Transfer Capacitance	C <sub>rss</sub>	—	27.1	—	pF		
Total Gate Charge	Q <sub>g</sub>	—	5.55	—	nC	V <sub>GS</sub> = 4.5V	V <sub>DS</sub> = 30V I <sub>D</sub> = 12A
Total Gate Charge	Q <sub>g</sub>	—	10.3	—	nC	V <sub>GS</sub> = 10V	
Gate-Source Charge	Q <sub>gs</sub>	—	1.6	—	nC		
Gate-Drain Charge	Q <sub>gd</sub>	—	3.5	—	nC		
Turn-On Delay Time (Note 11)	t <sub>D(on)</sub>	—	3.6	—	ns	V <sub>DD</sub> = 30V, V <sub>GS</sub> = 10V I <sub>D</sub> = 12A, R <sub>G</sub> ≅ 6.0Ω	
Turn-On Rise Time (Note 11)	t <sub>r</sub>	—	10.8	—	ns		
Turn-Off Delay Time (Note 11)	t <sub>D(off)</sub>	—	11.9	—	ns		
Turn-Off Fall Time (Note 11)	t <sub>f</sub>	—	8.7	—	ns		

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

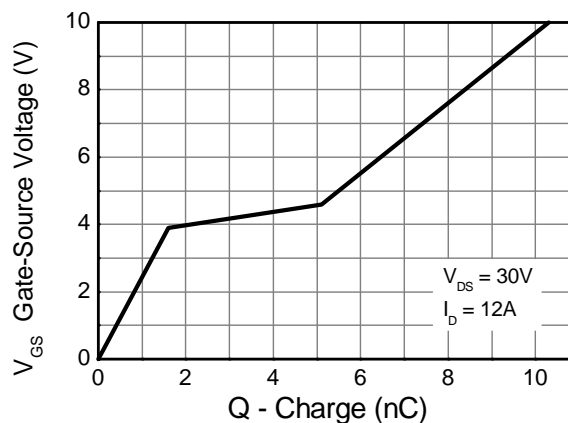
## Typical Characteristics



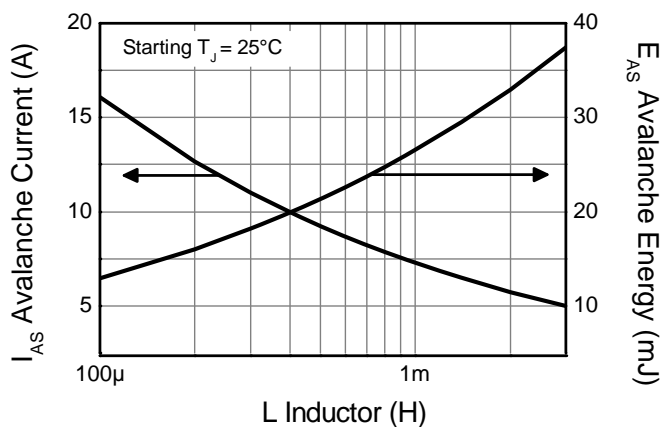
## Typical Characteristics - continued



Capacitance v Drain-Source Voltage

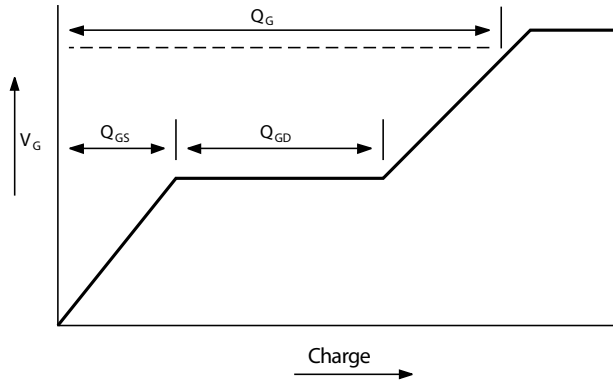


Gate-Source Voltage v Gate Charge

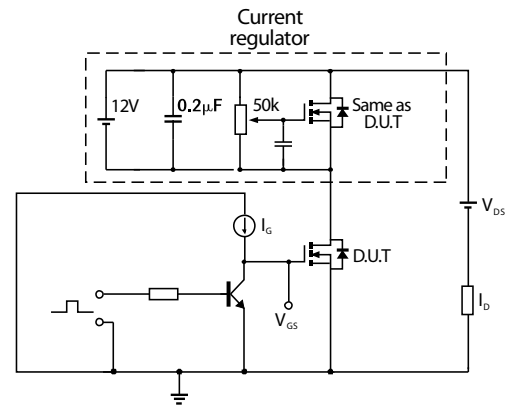


Single-Pulsed Avalanche Rating

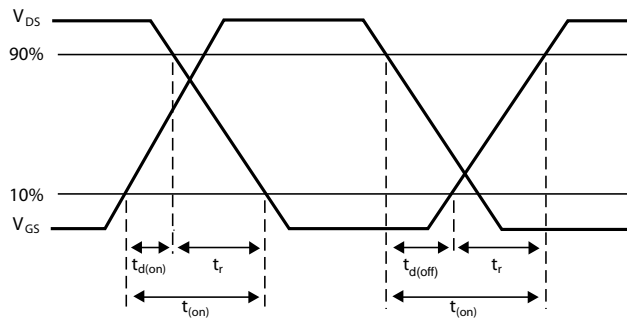
## Test Circuits



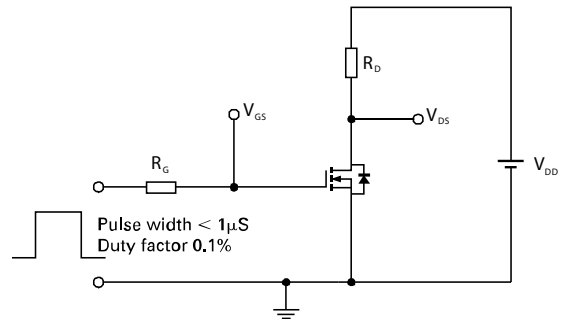
**Basic gate charge waveform**



**Gate charge test circuit**

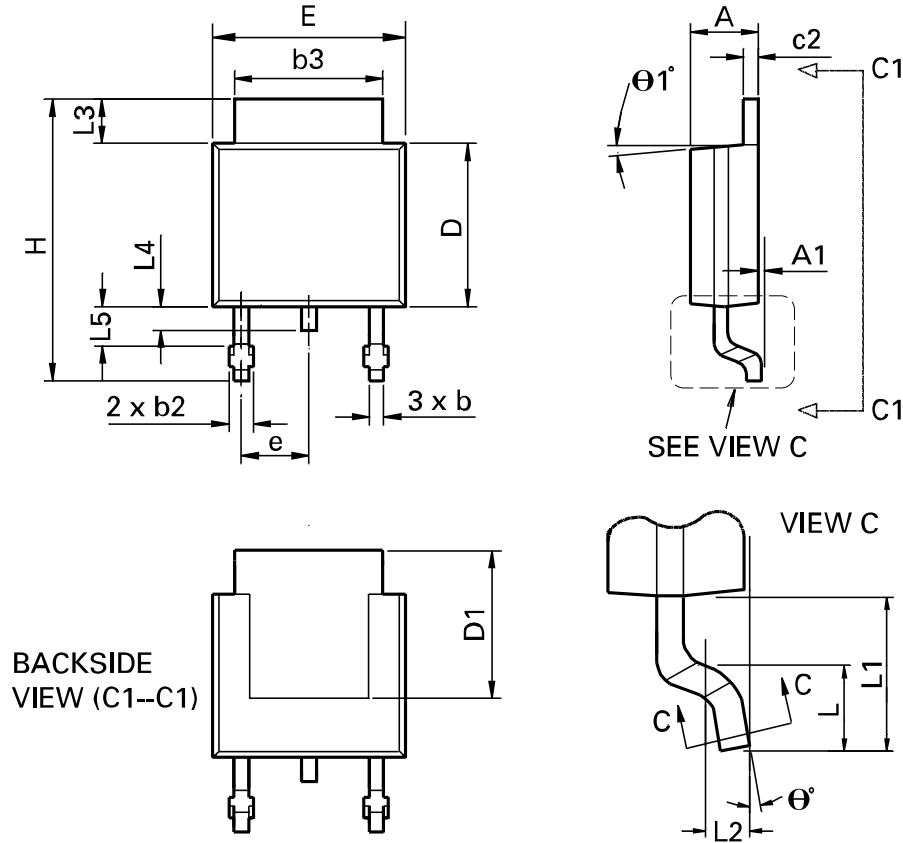


**Switching time waveforms**



**Switching time test circuit**

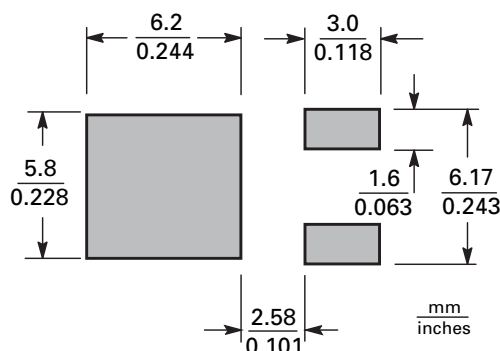
## Package Outline Dimensions



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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