

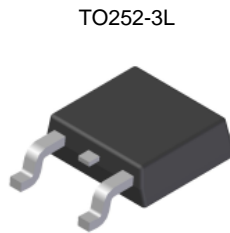
Product Summary

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

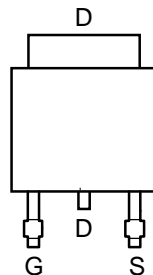
Description and Applications

This MOSFET is designed to meet the stringent requirements of automotive applications. It is qualified to AEC-Q101, supported by a PPAP, and is ideal for use in:

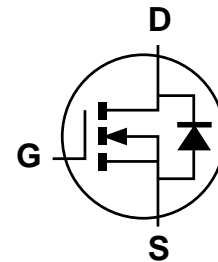
- Motor Control
- Transformer Driving Switch
- DC-DC Converters
- Power Management Functions
- Uninterrupted Power Supply



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
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Capable (Note 4)**

Mechanical Data

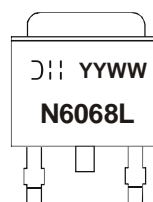
- Case: TO252
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0 (Note 1)
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals Connections: See Diagram
- Terminals: Matte Tin Finish Annealed over Copper Leadframe Solderable per MIL-STD-202, Method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

Ordering Information (Note 5)

Product	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
DMN6068LK3Q-13	N6068L	13	16	2500

- Note:
1. EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant. All applicable RoHS exemptions applied.
 2. See <https://www.diodes.com/quality/lead-free/> 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. Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to <https://www.diodes.com/quality/>.
 5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

Marking Information



Ⓜ: = Manufacturer's Marking
 N6068L = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Year (ex: 18 = 2018)
 WW = Week (01-52)

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

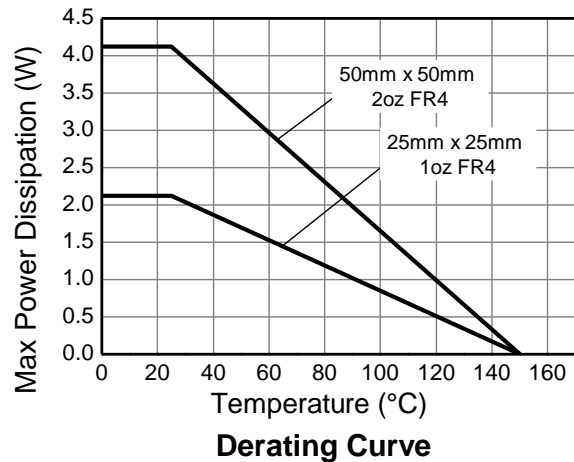
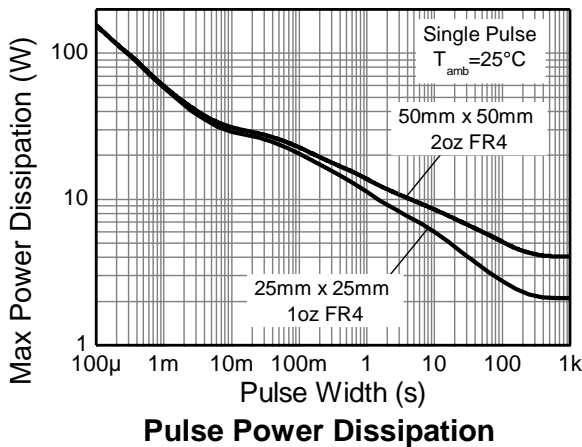
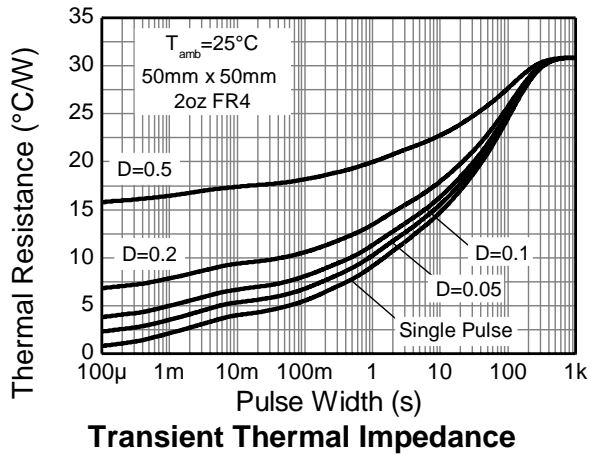
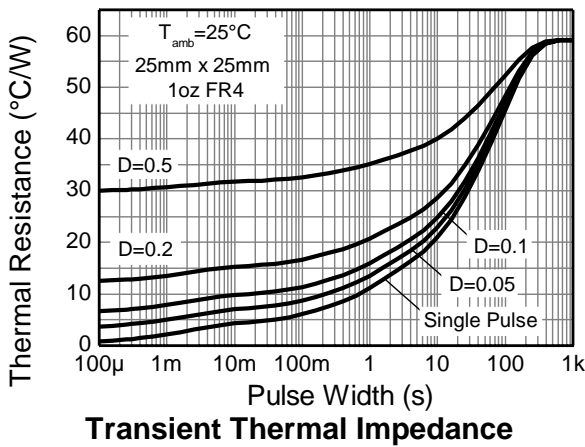
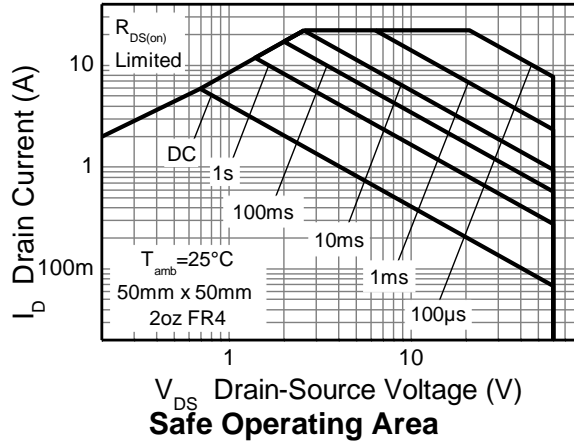
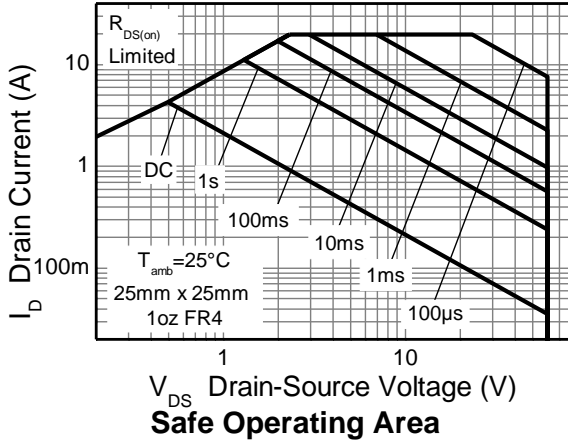
Characteristic		Symbol	Value	Unit
Drain-Source Voltage		V _{DSS}	60	V
Gate-Source Voltage	(Note 6)	V _{GS}	±20	V
Single Pulsed Avalanche Energy		E _{AS}	37.5	mJ
Single Pulsed Avalanche Current		I _{AS}	5.0	A
Continuous Drain Current	V _{GS} = 10V	(Note 8)	8.5	A
		T _A = 70°C (Note 8)	6.8	
		(Note 7)	6.0	
Pulsed Drain Current	V _{GS} = 10V (Note 9)	I _{DM}	22.2	A
Continuous Source Current (Body Diode)		I _S	10.2	A
Pulsed Source Current (Body Diode)		I _{SM}	22.2	A

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

Characteristic		Symbol	Value	Unit
Power Dissipation Linear Derating Factor	(Note 7)	P _D	4.12	W mW/°C
			33	
	(Note 8)		8.49	
	(Note 10)		67.9	
Thermal Resistance, Junction to Ambient	(Note 7)	R _{θJA}	2.12	°C/W
	(Note 8)		16.9	
	(Note 10)		30.3	
Thermal Resistance, Junction to Lead	(Note 8)	R _{θJL}	14.7	°C/W
	(Note 11)		59.0	
Operating and Storage Temperature Range		T _J , T _{STG}	-55 to +150	°C

- Notes:
6. AEC-Q101 V_{GS} maximum is ±16V.
 7. For a device surface mounted on 50mm × 50mm × 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.
 8. Same as note 2 except the device is measured at t ≤ 10 sec.
 9. Same as note 2 except the device is pulsed with D = 0.02 and pulse width 300μs. The pulse current is limited by the maximum junction temperature.
 10. For a device surface mounted on 25mm × 25mm × 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.
 11. Thermal resistance from junction to solder-point (at the end of the drain lead).
 12. UIS in production with L = 3.0mH, I_{AS} = 5.0A, R_G = 25Ω, V_{DD} = 50V, starting T_J = 25°C

Thermal Characteristics

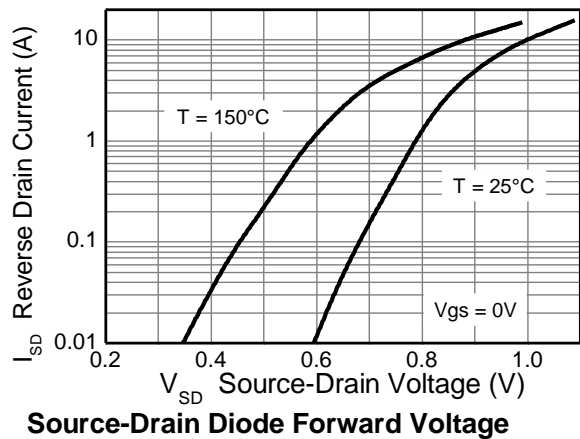
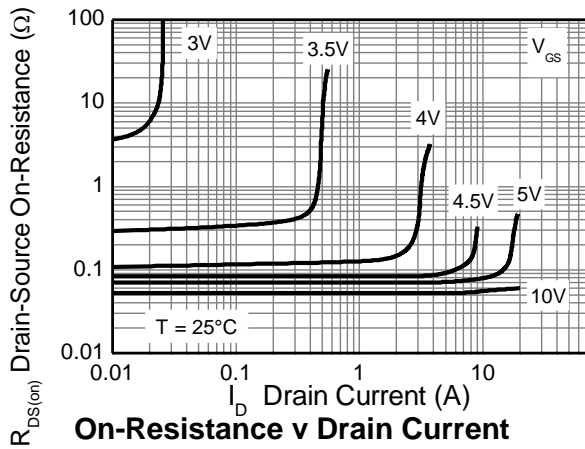
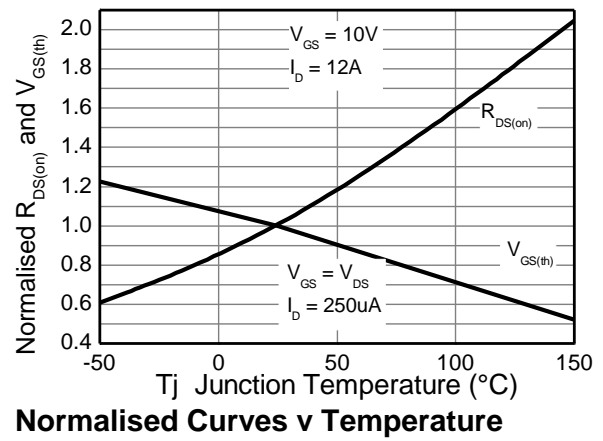
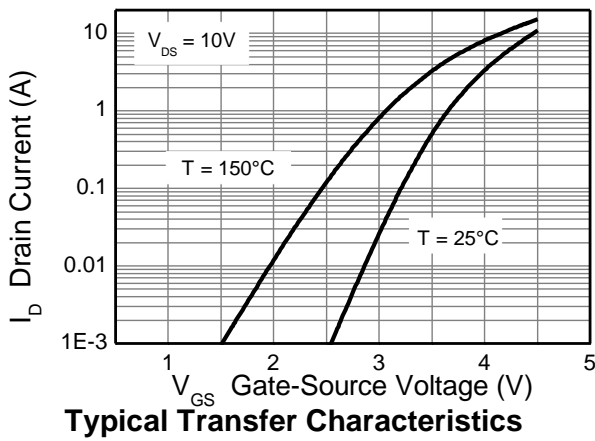
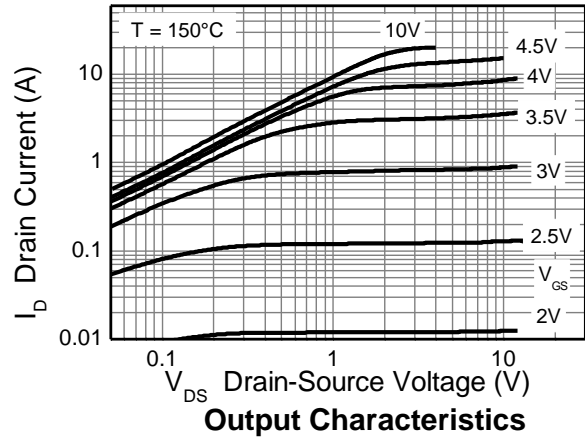
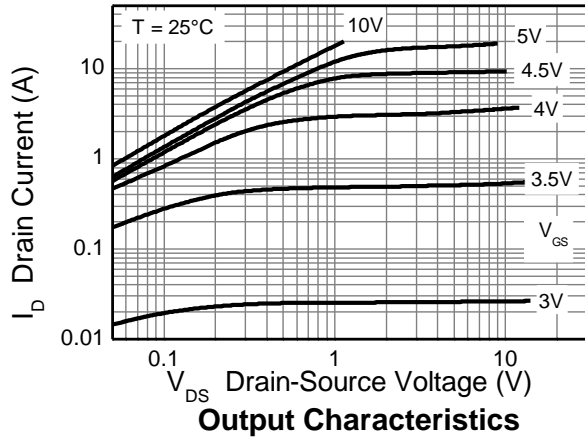


Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

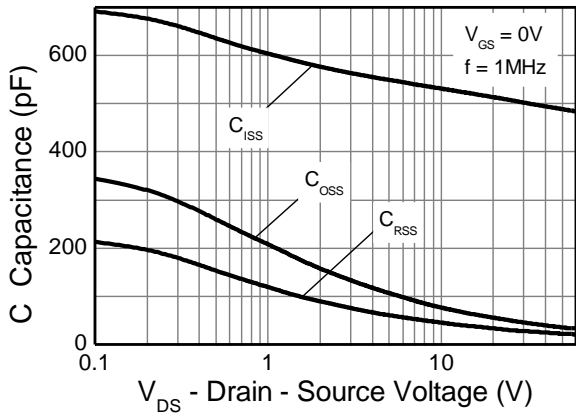
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	60	—	—	V	$I_D = 250\mu\text{A}$, $V_{GS} = 0\text{V}$
Zero Gate Voltage Drain Current	I_{DSS}	—	—	0.5	μA	$V_{DS} = 60\text{V}$, $V_{GS} = 0\text{V}$
Gate-Source Leakage	I_{GSS}	—	—	± 100	nA	$V_{GS} = \pm 20\text{V}$, $V_{DS} = 0\text{V}$
ON CHARACTERISTICS						
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 13)	$R_{DS(on)}$	—	—	0.068	Ω	$V_{GS} = 10\text{V}$, $I_D = 12\text{A}$
				0.100		$V_{GS} = 4.5\text{V}$, $I_D = 6\text{A}$
Forward Transconductance (Notes 13 & 14)	g_{fs}	—	19.7	—	S	$V_{DS} = 15\text{V}$, $I_D = 12\text{A}$
Diode Forward Voltage (Note 13)	V_{SD}	—	0.98	1.15	V	$I_S = 12\text{A}$, $V_{GS} = 0\text{V}$
Reverse recovery time (Note 14)	t_{rr}	—	145	—	ns	$I_S = 12\text{A}$, $di/dt = 100\text{A}/\mu\text{s}$
Reverse recovery charge (Note 14)	Q_{rr}	—	929	—	nC	
DYNAMIC CHARACTERISTICS (Note 14)						
Input Capacitance	C_{iss}	—	502	—	pF	$V_{DS} = 30\text{V}$, $V_{GS} = 0\text{V}$ $f = 1\text{MHz}$
Output Capacitance	C_{oss}	—	45.7	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	27.1	—	pF	
Total Gate Charge	Q_g	—	5.55	—	nC	$V_{GS} = 4.5\text{V}$
Total Gate Charge	Q_g	—	10.3	—	nC	$V_{GS} = 10\text{V}$
Gate-Source Charge	Q_{gs}	—	1.6	—	nC	
Gate-Drain Charge	Q_{gd}	—	3.5	—	nC	
Turn-On Delay Time (Note 15)	$t_{D(on)}$	—	3.6	—	ns	$V_{DD} = 30\text{V}$, $V_{GS} = 10\text{V}$ $I_D = 12\text{A}$, $R_G = 6.0\Omega$
Turn-On Rise Time (Note 15)	t_r	—	10.8	—	ns	
Turn-Off Delay Time (Note 15)	$t_{D(off)}$	—	11.9	—	ns	
Turn-Off Fall Time (Note 15)	t_f	—	8.7	—	ns	

Notes: 13. Measured under pulsed conditions. Pulse width $\leq 300\mu\text{s}$; duty cycle $\leq 2\%$
14. For design aid only, not subject to production testing.
15. Switching characteristics are independent of operating junction temperatures.

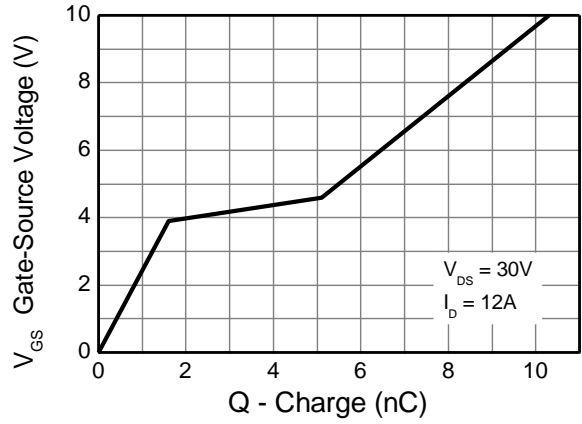
Typical Characteristics



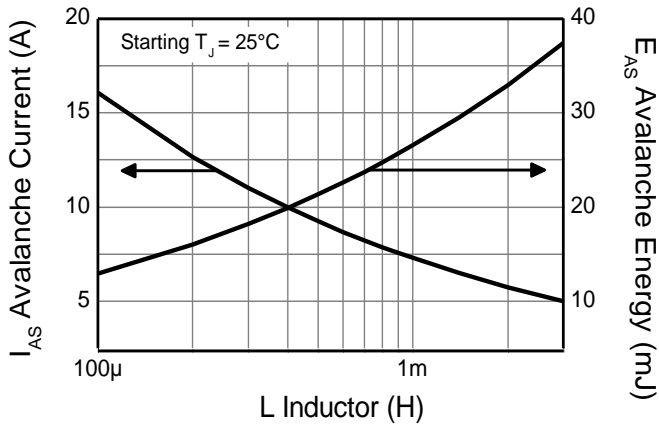
Typical Characteristics (Continued)



Capacitance v Drain-Source Voltage

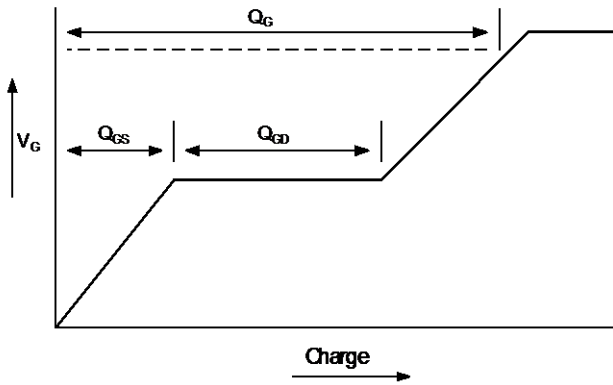


Gate-Source Voltage v Gate Charge

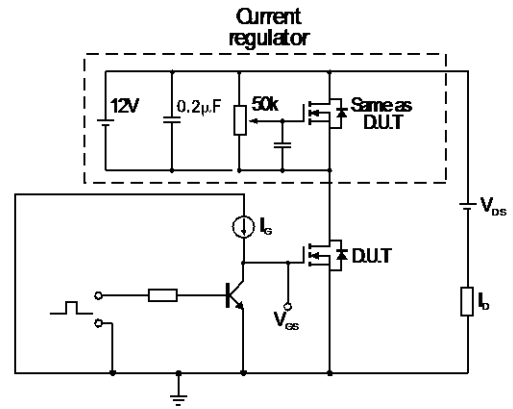


Single-Pulsed Avalanche Rating

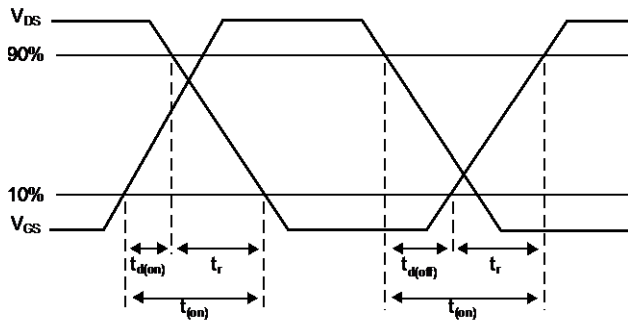
Test Circuits



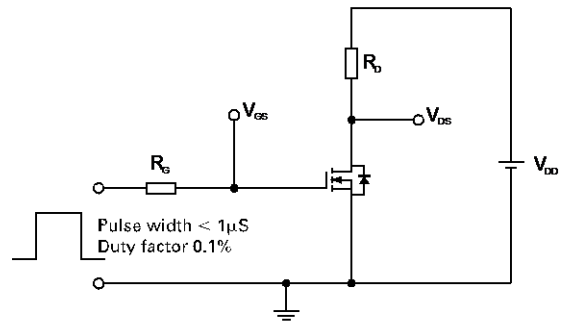
Basic gate charge waveform



Gate charge test circuit



Switching time waveforms

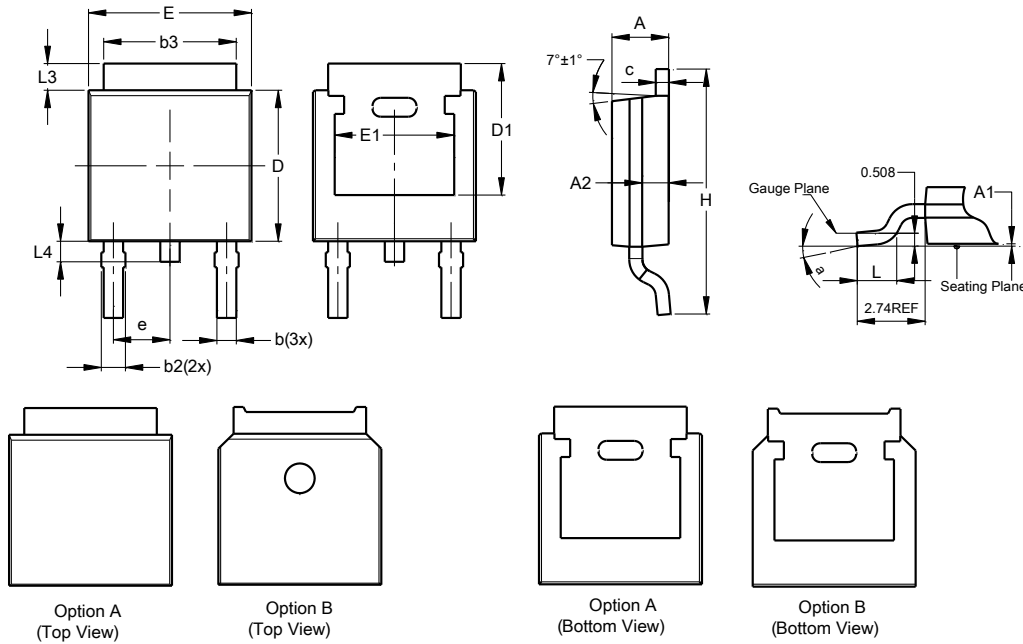


Switching time test circuit

Package Outline Dimensions

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

TO252 (Standard)

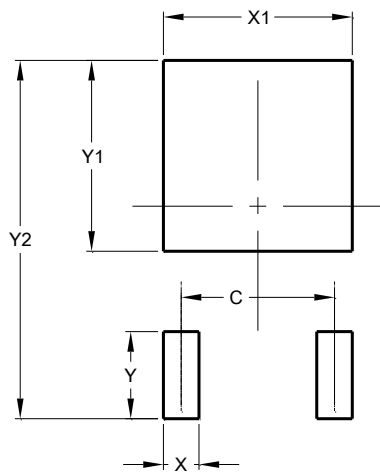


TO252 (Standard)			
Dim	Min	Max	Typ
A	2.19	2.39	2.29
A1	0.00	0.13	0.08
A2	0.97	1.17	1.07
b	0.64	0.88	0.783
b2	0.76	1.14	0.95
b3	5.21	5.46	5.33
c	0.45	0.58	0.531
D	6.00	6.20	6.10
D1	5.21	-	-
e	-	-	2.286
E	6.45	6.70	6.58
E1	4.32	-	-
H	9.40	10.41	9.91
L	1.40	1.78	1.59
L3	0.88	1.27	1.08
L4	0.60	1.02	0.83
a	0°	10°	-
All Dimensions in mm			

Suggested Pad Layout

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

TO252 (Standard)



Dimensions	Value (in mm)
C	4.572
X	1.060
X1	5.632
Y	2.600
Y1	5.700
Y2	10.700

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