

Product Summary

BV _{DSS}	R _{DS(ON)} Max	I _D Max T _C = +25°C
30V	5.5mΩ @ V _{GS} = 10V	89A
	9.0mΩ @ V _{GS} = 4.5V	69A

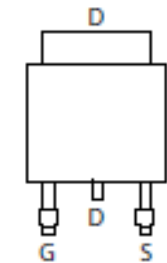
Description and Applications

This new generation MOSFET is designed to minimize the on-state resistance (R_{DS(ON)}) yet maintain superior switching performance, making it ideal for high efficiency power management applications.

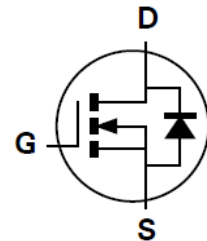
- Power management functions
- DC-DC converters
- Industrials



Top View



Pin Out Top View



Equivalent Circuit

Features

- Low On-Resistance
- Low Input Capacitance
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/104/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please [contact us](mailto:contact@diodes.com) or your local Diodes representative. <https://www.diodes.com/quality/product-definitions/>**

Mechanical Data

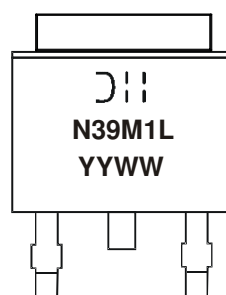
- Package: TO252
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 3 per J-STD-020
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 ^(e3)
- Terminal Connections: See Diagram
- Weight: 0.33 grams (Approximate)

Ordering Information (Note 4)

Part Number	Package	Packing	
		Qty.	Carrier
DMN39M1LK3-13	TO252 (DPAK)	2,500	Tape & Reel

- Notes:
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. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information



= Manufacturer's Marking
 N39M1L = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Last Two Digits of Year (ex: 22 = 2022)
 WW = Week Code (01 to 53)

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

Characteristic	Symbol	Value	Unit
Drain-Source Voltage	V _{DSS}	30	V
Gate-Source Voltage	V _{GSS}	±20	V
Continuous Drain Current, V _{GS} = 10V (Note 5)	I _D	T _C = +25°C	89.3
		T _C = +70°C	71.4
Continuous Drain Current, V _{GS} = 10V (Note 6)	I _D	T _A = +25°C	17.9
		T _A = +70°C	14.3
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)	I _{DM}	357	A
Maximum Continuous Body Diode Forward Current (Note 6)	I _S	3.6	A
Pulsed Continuous Body Diode Forward Current (10µs Pulse, Duty Cycle = 1%)	I _{SM}	357	A
Avalanche Current, L = 0.1mH (Note 7)	I _{AS}	41	A
Avalanche Energy, L = 0.1mH (Note 7)	E _{AS}	84	mJ

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

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 8)	P _D	1.4	W
Thermal Resistance, Junction to Ambient (Note 8)	R _{θJA}	85.4	°C/W
Total Power Dissipation (Note 6)	P _D	2.6	W
Thermal Resistance, Junction to Ambient (Note 6)	R _{θJA}	47.1	°C/W
Total Power Dissipation (Note 5)	P _D	65.7	W
Thermal Resistance, Junction to Case (Note 5)	R _{θJC}	1.9	°C/W
Operating and Storage Temperature Range	T _J , T _{STG}	-55 to +150	°C

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 9)						
Drain-Source Breakdown Voltage	BV _{DSS}	30	—	—	V	V _{GS} = 0V, I _D = 250µA
Zero Gate Voltage Drain Current	I _{DSS}	—	—	1	µA	V _{DS} = 24V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±20V, V _{DS} = 0V
ON CHARACTERISTICS (Note 9)						
Gate Threshold Voltage	V _{GS(TH)}	1	—	2.5	V	V _{DS} = V _{GS} , I _D = 250µA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	3.1	5.5	mΩ	V _{GS} = 10V, I _D = 30A
		—	4.6	9.0		V _{GS} = 4.5V, I _D = 15A
Diode Forward Voltage	V _{SD}	—	0.7	1	V	V _{GS} = 0V, I _S = 1A
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C _{iss}	—	2253	—	pF	V _{DS} = 15V, V _{GS} = 0V f = 1MHz
Output Capacitance	C _{oss}	—	304	—	pF	
Reverse Transfer Capacitance	C _{rss}	—	230	—	pF	
Gate Resistance	R _g	—	2.4	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = 4.5V)	Q _g	—	19.3	—	nC	V _{DS} = 15V, I _D = 15A
Total Gate Charge (V _{GS} = 10V)	Q _g	—	38.6	—	nC	
Gate-Source Charge	Q _{gs}	—	5.7	—	nC	
Gate-Drain Charge	Q _{gd}	—	7.7	—	nC	
Turn-On Delay Time	t _{D(ON)}	—	4.6	—	ns	V _{DD} = 15V, V _{GS} = 10V R _G = 3.3Ω, I _D = 15A
Turn-On Rise Time	t _R	—	5.4	—	ns	
Turn-Off Delay Time	t _{D(OFF)}	—	35.5	—	ns	
Turn-Off Fall Time	t _F	—	15.7	—	ns	
Reverse Recovery Time	t _{RR}	—	16.6	—	ns	
Reverse Recovery Charge	Q _{rr}	—	7.1	—	nC	I _F = 15A, dI/dt = 100A/µs

- Notes:
5. Thermal resistance from junction to soldering point (on the exposed drain pad).
 6. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.
 7. I_{AS} and E_{AS} ratings are based on low frequency and duty cycles to keep T_J = +25°C.
 8. Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
 9. Short duration pulse test used to minimize self-heating effect.
 10. Guaranteed by design. Not subject to product testing.

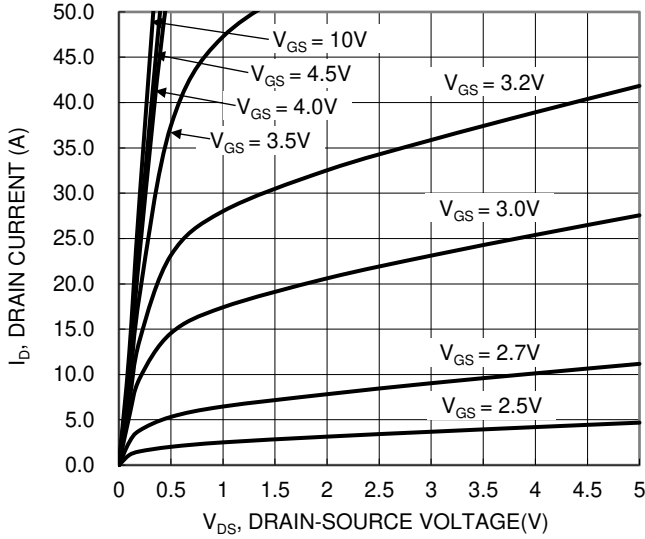


Figure 1. Typical Output Characteristic

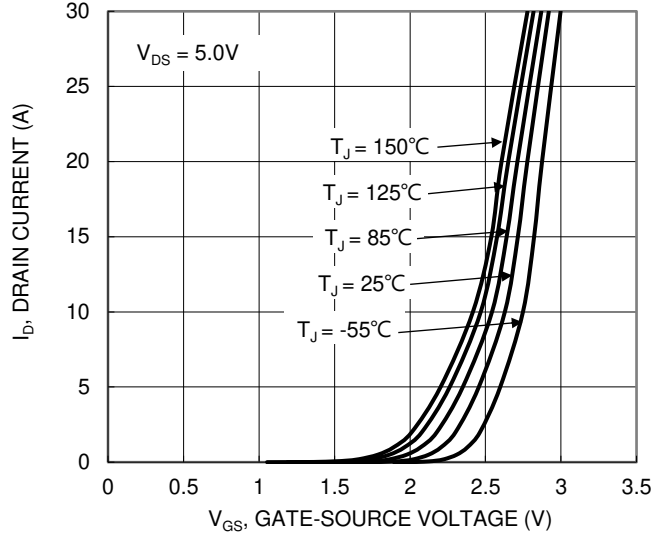


Figure 2. Typical Transfer Characteristic

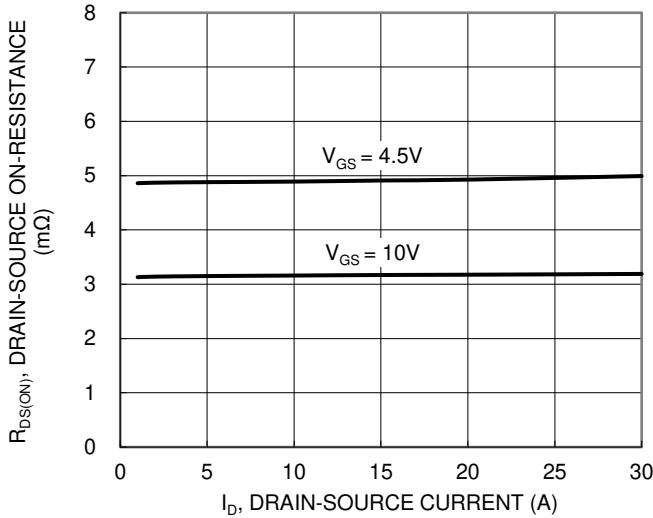


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

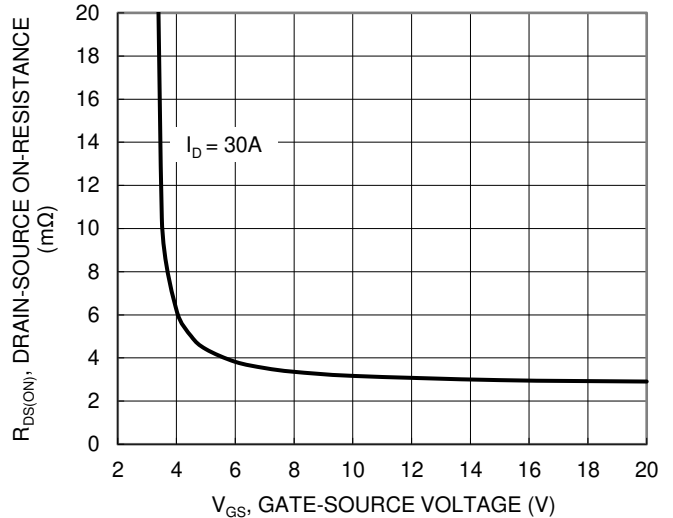


Figure 4. Typical Transfer Characteristic

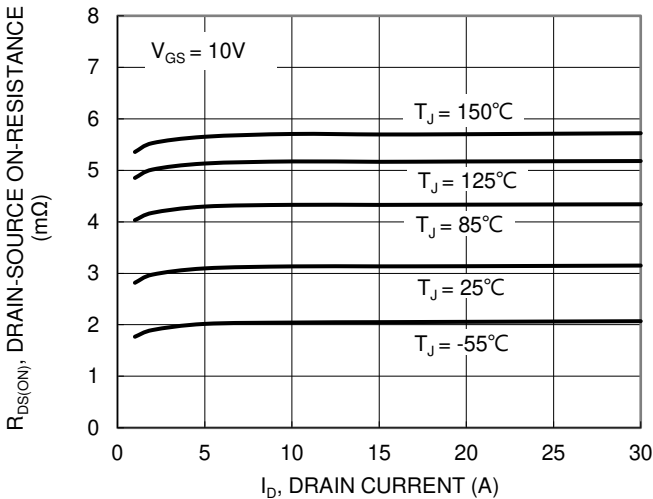


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

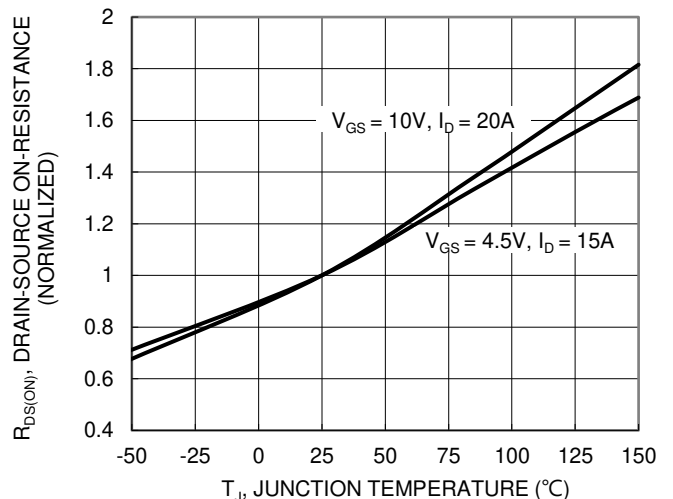


Figure 6. On-Resistance Variation with Temperature

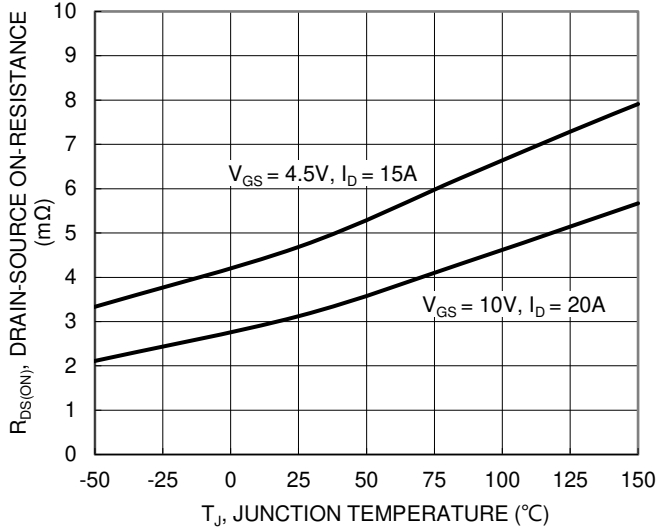


Figure 7. On-Resistance Variation with Temperature

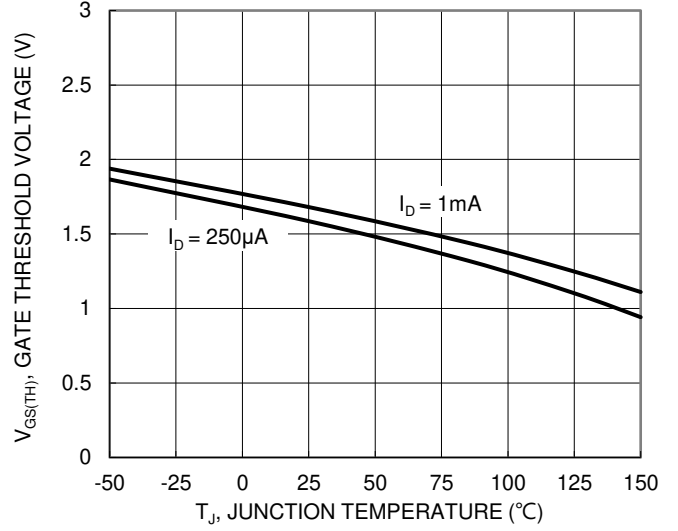


Figure 8. Gate Threshold Variation vs. Junction Temperature

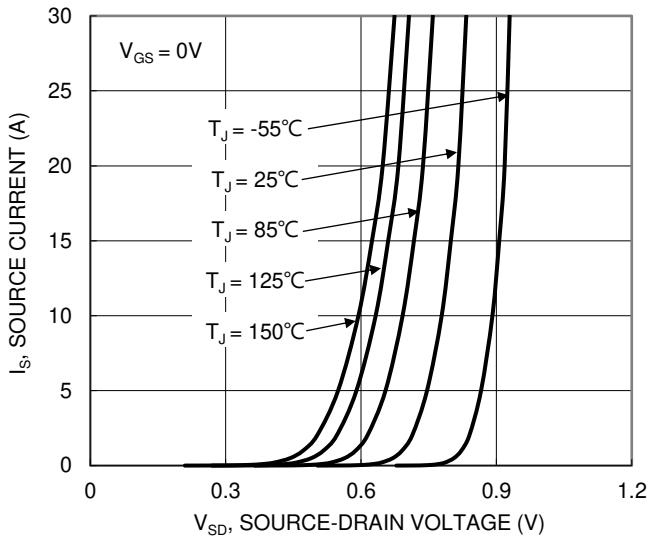


Figure 9. Diode Forward Voltage vs. Current

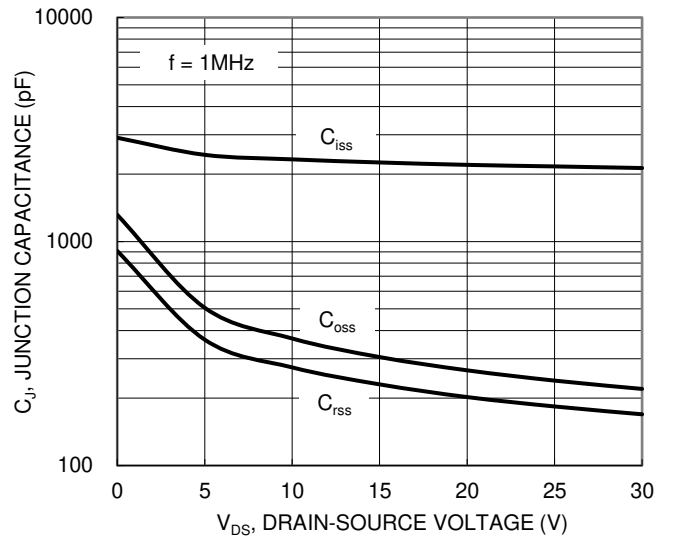


Figure 10. Typical Junction Capacitance

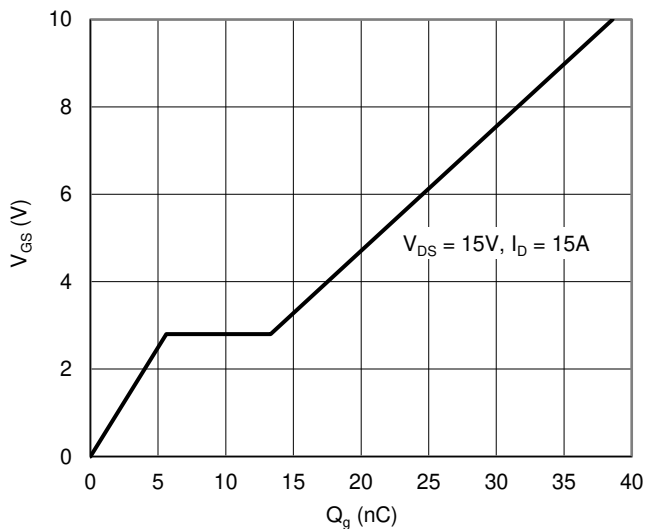


Figure 11. Gate Charge

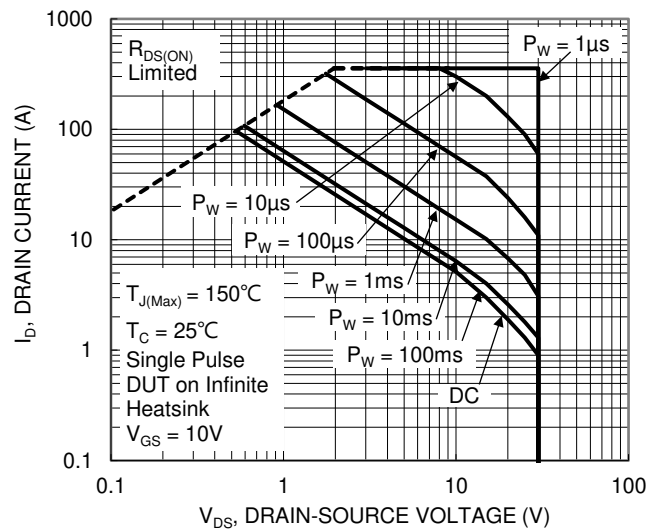


Figure 12. SOA, Safe Operation Area

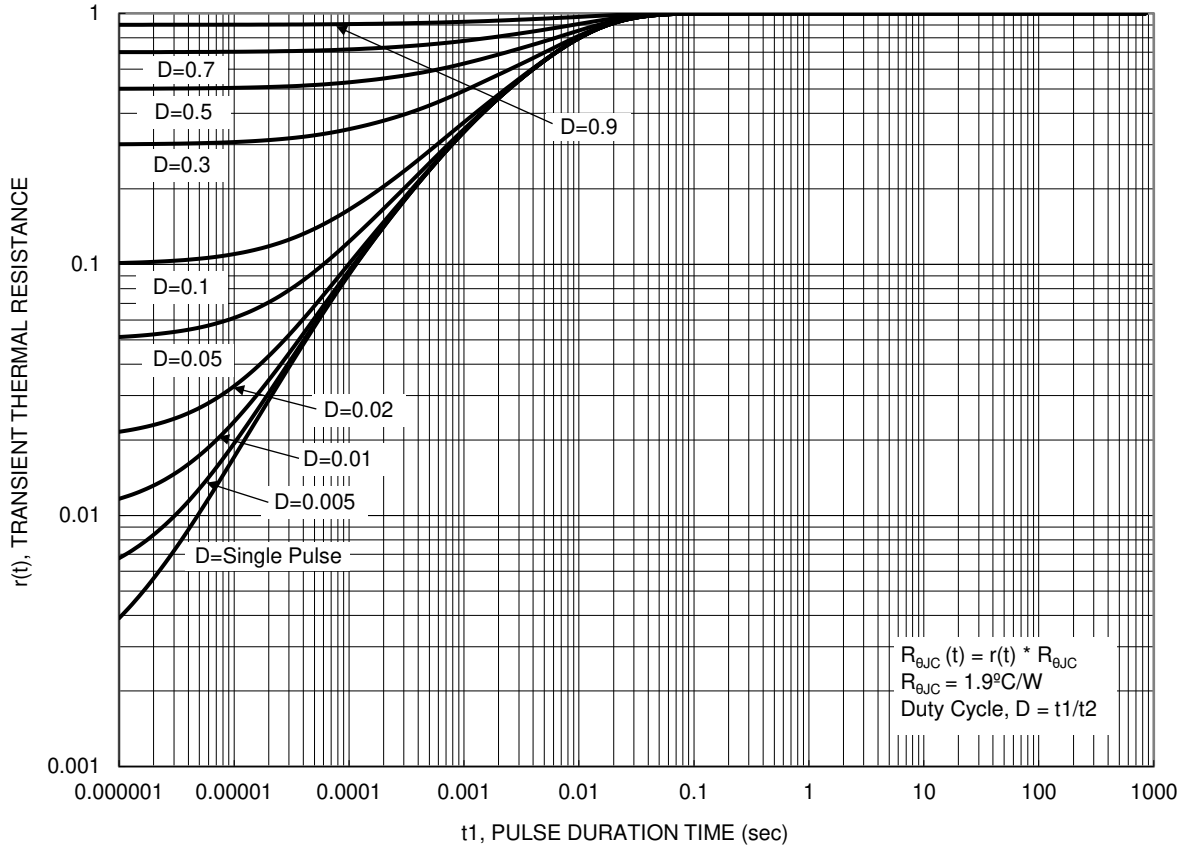
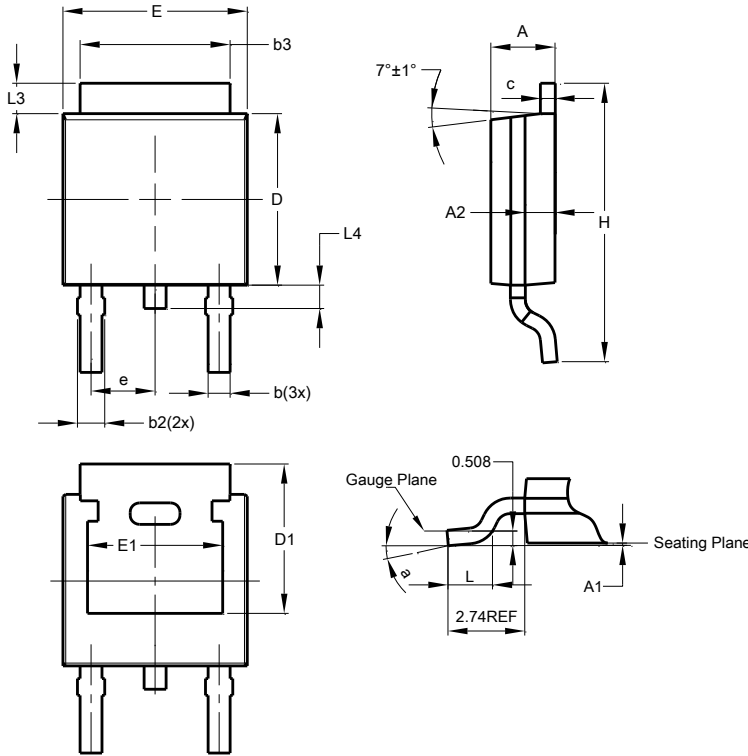


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

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

TO252 (DPAK)

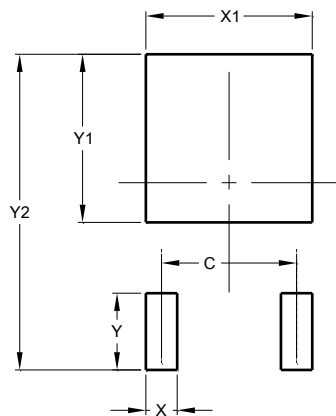


TO252 (DPAK)			
Dim	Min	Max	Typ
A	2.19	2.39	2.29
A1	0.00	0.13	0.08
A2	0.97	1.17	1.07
b	0.64	0.88	0.783
b2	0.76	1.14	0.95
b3	5.21	5.50	5.33
c	0.45	0.58	0.531
D	6.00	6.20	6.10
D1	5.21	--	--
e	2.286 BSC		
E	6.45	6.70	6.58
E1	4.32	--	--
H	9.40	10.41	9.91
L	1.40	1.78	1.59
L3	0.88	1.27	1.08
L4	0.64	1.02	0.83
a	0°	10°	--
All Dimensions in mm			

Suggested Pad Layout

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

TO252 (DPAK)



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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