



**THE DATASHEET OF  
DMG4N60SK3-13**



## Product Summary

$V_{(BR)DSS}$ (@ $T_J$ Max)	$R_{DS(ON)}$ Max	$I_D$ $T_C = +25^\circ C$
650V	2.3Ω @ $V_{GS} = 10V$	3.7A

## Description

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.

## Applications

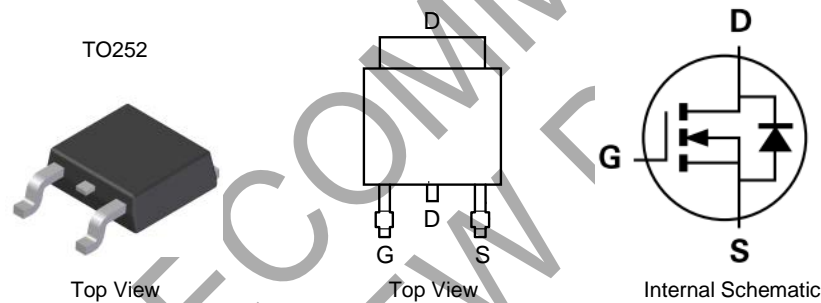
- Motor Control
- Backlighting
- DC-DC Converters
- Power Management Functions

## Features

- 100% Unclamped Inductive Switch (UIS) Test in Production
- Low Gate Input Resistance
- Low Input Capacitance
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

## Mechanical Data

- Case: TO252
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish—Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 (E3)
- Weight: 0.33 grams (Approximate)

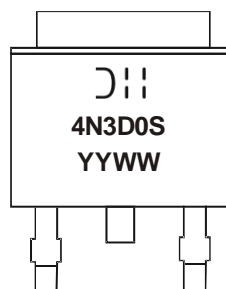


## Ordering Information (Note 4)

Part Number	Compliance	Case	Packaging
DMG4N60SK3-13	Standard	TO252	2500/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, see <http://www.diodes.com/products/packages.html>.

## Marking Information



☺||=Manufacturer's Marking  
 4N3D0S=Product Type Marking Code  
 YYWW = Date Code Marking  
 YY or YY= Last Digit of Year (ex: 14 = 2014)  
 WW or WW= Week Code (01 to 53)

**Maximum Ratings** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V <sub>DSS</sub>	600	V
Gate-Source Voltage			V <sub>GSS</sub>	±30	V
Continuous Drain Current, V <sub>GS</sub> = 10V	Steady State	T <sub>C</sub> = +25°C	I <sub>D</sub>	3.7	A
		T <sub>C</sub> = +100°C		2.4	
Maximum Body Diode Forward Current			I <sub>S</sub>	3.7	A
Pulsed Drain Current (10µs pulse, Duty Cycle = 1%)			I <sub>DM</sub>	5	A
Avalanche Current, L = 60mH (Note 6)			I <sub>AS</sub>	1.7	A
Avalanche Energy, L = 60mH (Note 6)			E <sub>AS</sub>	90	mJ

**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Total Power Dissipation	T <sub>C</sub> = +25°C	P <sub>D</sub>	48	W
	T <sub>C</sub> = +100°C		19	
Thermal Resistance, Junction to Ambient (Note 5)		R <sub>θJA</sub>	47	°C/W
Thermal Resistance, Junction to Case		R <sub>θJC</sub>	2.6	
Operating and Storage Temperature Range		T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 7)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	600	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250µA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	1	µA	V <sub>DS</sub> = 600V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	100	nA	V <sub>GS</sub> = ±30V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 7)</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	2.5	3.5	4.5	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250µA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	2.0	2.3	Ω	V <sub>GS</sub> = 10V, I <sub>D</sub> = 2A
Diode Forward Voltage	V <sub>SD</sub>	—	0.8	1.4	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 1A
<b>DYNAMIC CHARACTERISTICS (Note 6)</b>						
Input Capacitance	C <sub>ISS</sub>	—	532	—	pF	V <sub>DS</sub> = 25V, f = 1.0MHz, V <sub>GS</sub> = 0
Output Capacitance	C <sub>OSS</sub>	—	47	—		
Reverse Transfer Capacitance	C <sub>RSS</sub>	—	4	—		
Gate Resistance	R <sub>G</sub>	—	3.3	—	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1.0MHz
Total Gate Charge (V <sub>GS</sub> = 10V)	Q <sub>g</sub>	—	14.3	—	nC	V <sub>DD</sub> = 480V, I <sub>D</sub> = 4A, V <sub>GS</sub> = 10V
Gate-Source Charge	Q <sub>gs</sub>	—	3.3	—		
Gate-Drain Charge	Q <sub>gd</sub>	—	6.9	—		
Turn-On Delay Time	t <sub>D(ON)</sub>	—	14	—	ns	V <sub>DD</sub> = 300V, R <sub>G</sub> = 25Ω, I <sub>D</sub> = 4A, V <sub>GS</sub> = 10V
Turn-On Rise Time	t <sub>R</sub>	—	34	—		
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	32	—		
Turn-Off Fall Time	t <sub>F</sub>	—	25	—		
Body Diode Reverse Recovery Time	t <sub>RR</sub>	—	229	—	ns	di/dt = 100A/µs, V <sub>DS</sub> = 100V, I <sub>F</sub> = 4A
Body Diode Reverse Recovery Charge	Q <sub>RR</sub>	—	1564	—	nC	

- Notes:
- Device mounted on FR-4 substrate PCB, 2oz copper, with 1inch square copper pad layout.
  - Guaranteed by design. Not subject to production testing.
  - Short duration pulse test used to minimize self-heating effect.

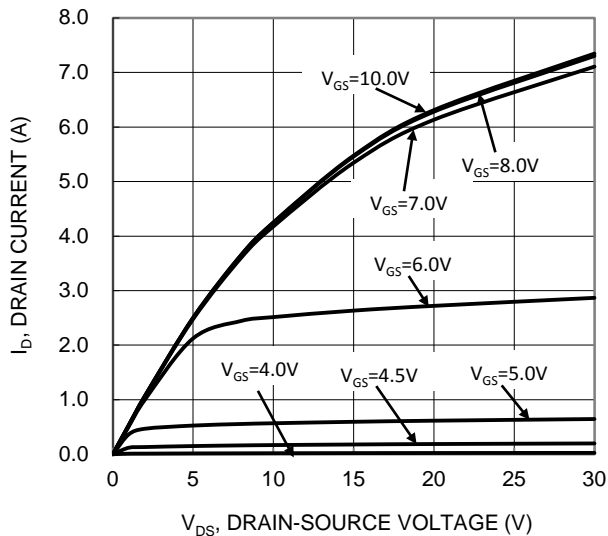


Figure 1. Typical Output Characteristic

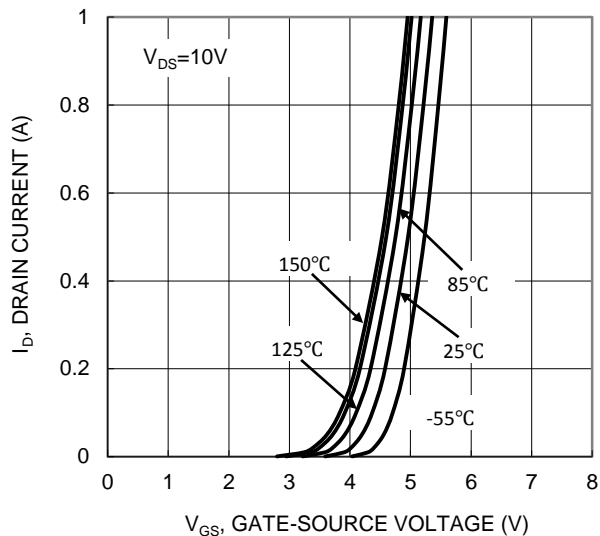


Figure 2. Typical Transfer Characteristic

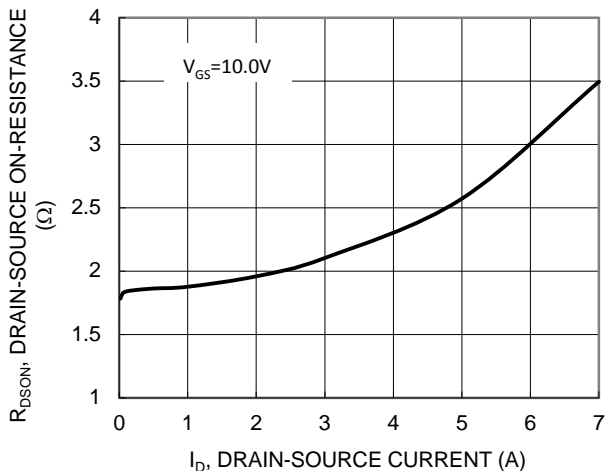


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

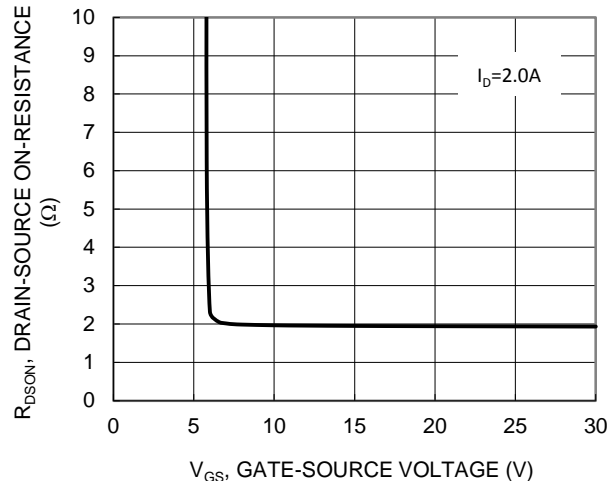


Figure 4. Typical Transfer Characteristic

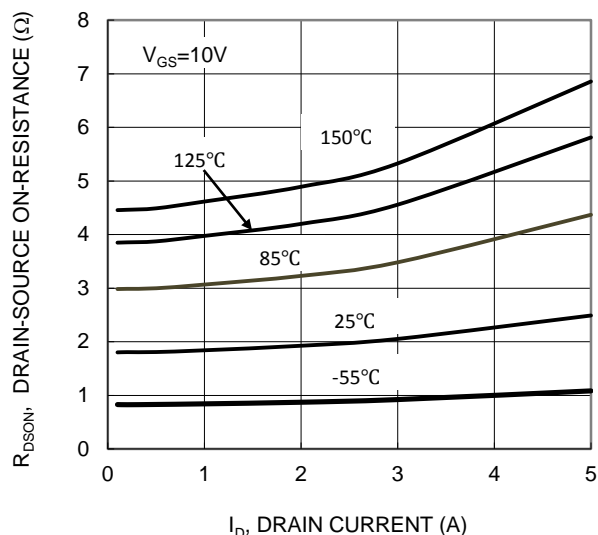


Figure 5. Typical On-Resistance vs Drain Current and Temperature

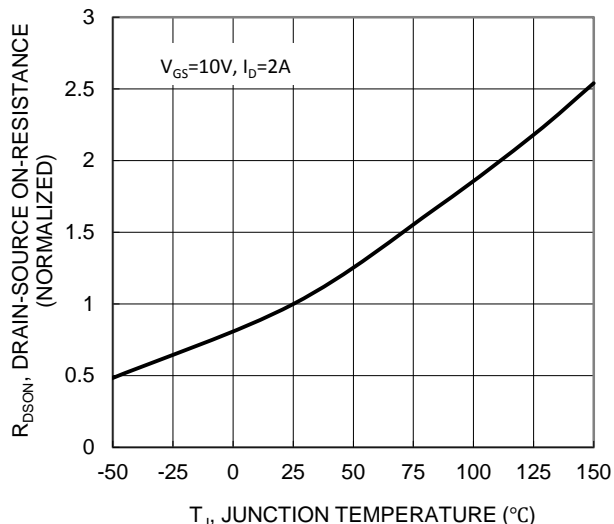


Figure 6. On-Resistance Variation with Temperature

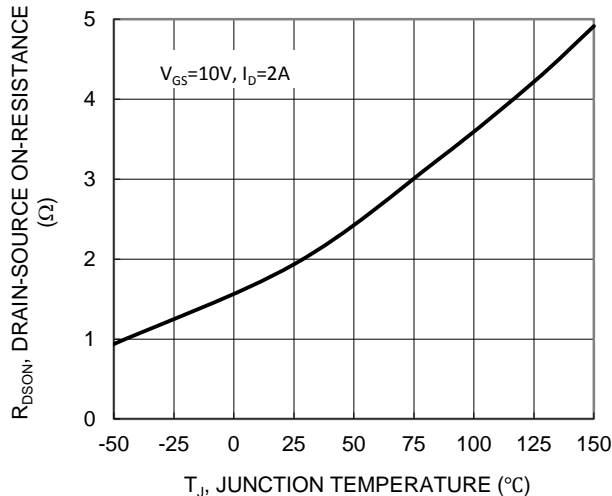


Figure 7. On-Resistance Variation with Temperature

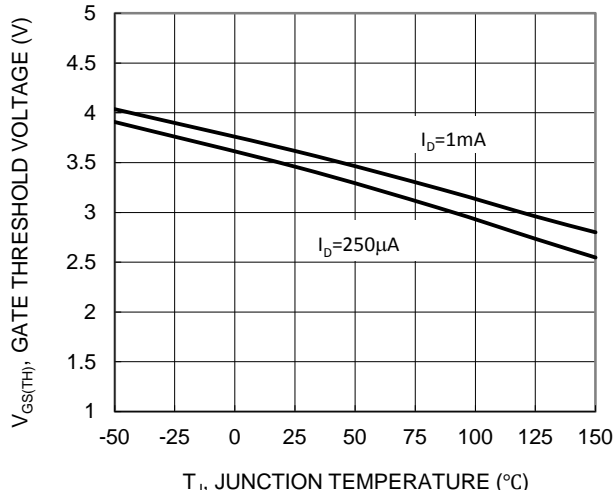


Figure 8. Gate Threshold Variation vs. Junction Temperature

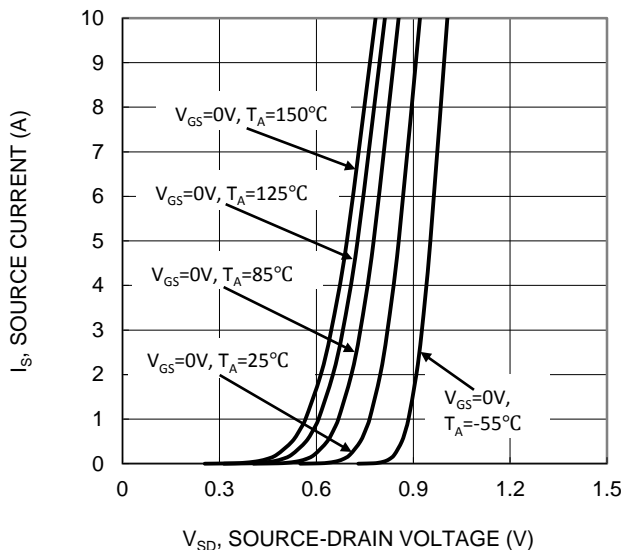


Figure 9. Diode Forward Voltage vs. Current

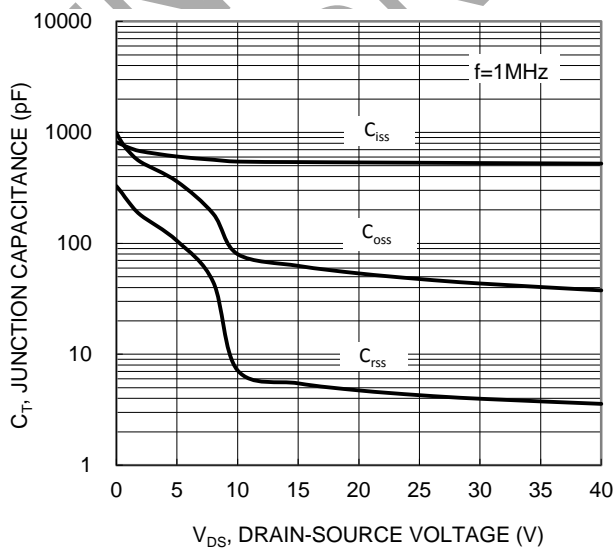


Figure 10. Typical Junction Capacitance

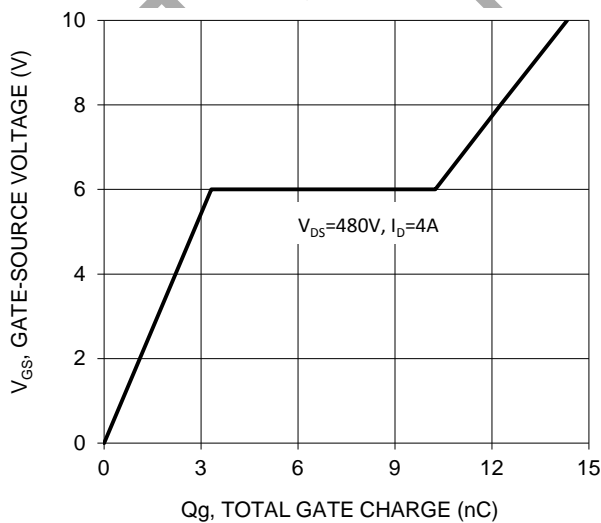


Figure 11. Gate Charge

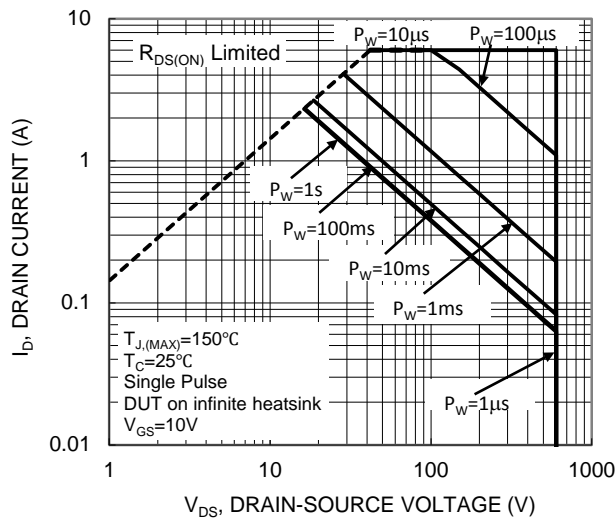


Figure 12. SOA, Safe Operation Area

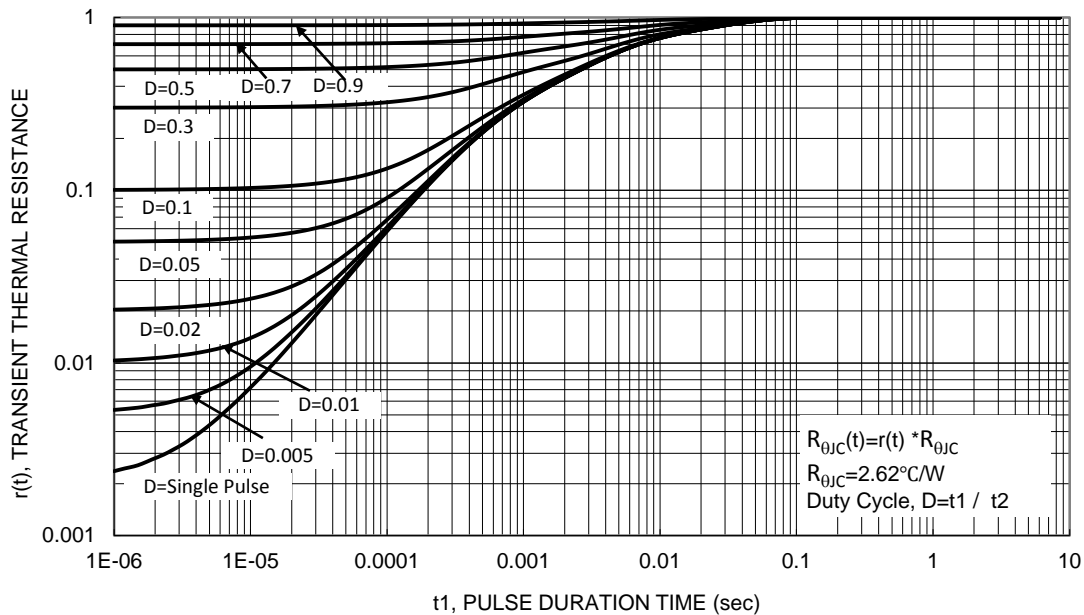
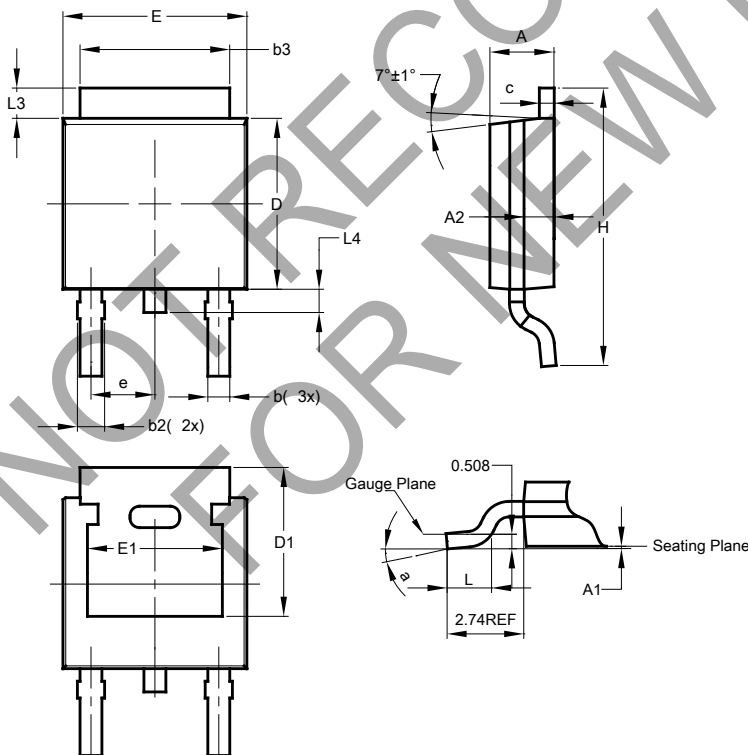


Figure 13. Transient Thermal Resistance

**Package Outline Dimensions**

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

(1) Package Type: TO252 (DPAK)

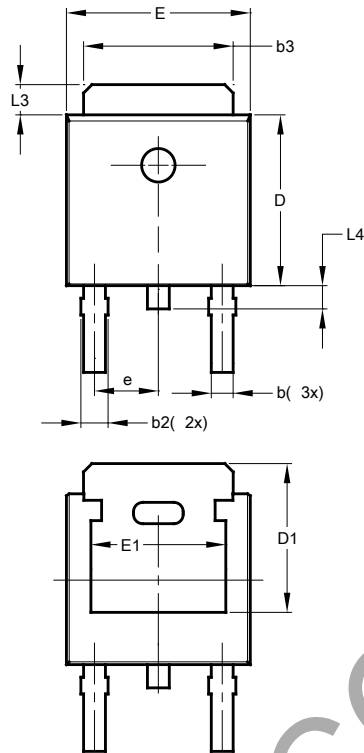


TO252 (DPAK)			
Dim	Min	Max	Typ
A	2.19	2.39	2.29
A1	0.00	0.13	0.08
A2	0.97	1.17	1.07
b	0.64	0.88	0.783
b1	0.76	1.14	0.95
b2	5.21	5.46	5.33
b3	0.45	0.58	0.531
D	6.00	6.20	6.10
D1	5.21	—	—
e	—	—	2.286
E	6.45	6.70	6.58
E1	4.32	—	—
H	9.40	10.41	9.91
L	1.40	1.78	1.59
L3	0.88	1.27	1.08
L4	0.64	1.02	0.83
a	0°	10°	—
<b>All Dimensions in mm</b>			

**Package Outline Dimensions** (continued)

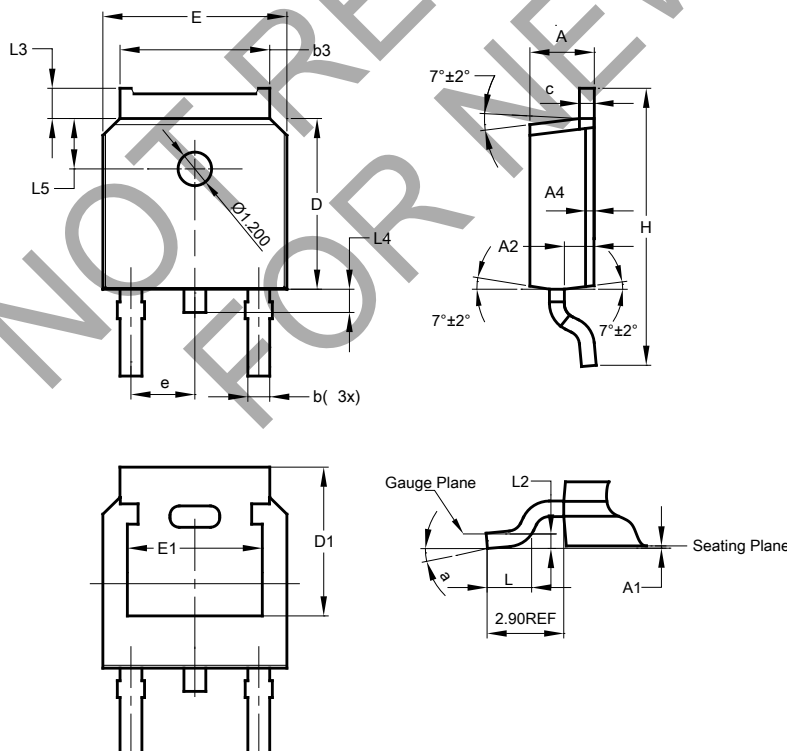
Please see <http://www.diodes.com/package-outlines.html> for the latest version.

(2) Package Type: TO252 (DPAK) (Type BR)



TO252 (DPAK) (Type BR)			
Dim	Min	Max	Typ
A	2.20	2.40	—
A1	0.00	0.10	—
b	0.50	0.70	—
b3	5.20	5.40	—
c	0.45	0.55	—
D	5.95	6.25	—
D1	5.10	5.50	—
E	6.45	6.70	—
E1	4.71	4.91	—
e	2.24	2.34	—
H	9.45	9.95	—
L	1.25	1.75	—
L3	0.95	1.25	—
L4	0.60	0.90	—
All Dimensions in mm			

(3) Package Type: TO252 (DPAK) (Type TH)

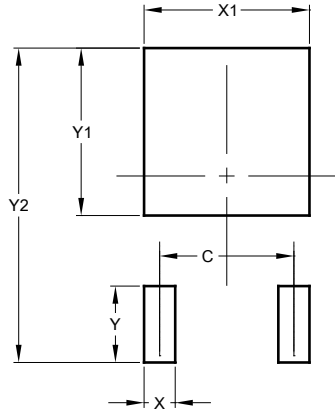


TO252 (DPAK) (Type TH)			
Dim	Min	Max	Typ
A	2.20	2.38	2.30
A1	0.00	0.10	—
A2	0.97	1.17	1.07
A4	0.10 REF		
b	0.72	0.85	0.78
b3	5.23	5.45	5.33
c	0.47	0.58	0.53
D	6.00	6.20	6.10
D1	5.30 REF		
e	2.286 BSC		
E	6.50	6.70	6.60
E1	4.70	4.92	4.83
H	9.90	10.10	10.30
L	1.40	1.70	1.60
L2	0.51 BSC		
L3	0.90	1.25	—
L4	0.60	1.00	0.80
L5	1.70	1.90	1.80
a	0°	8°	—
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

NOT RECOMMENDED FOR NEW DESIGN

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