



YOUSHANG SEMICONDUCTOR

**设计研发新型功率器件**

**各类小信号开关**

**中低压及高压大电流等场效应管**

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## Product Summary

$BV_{DSS}$	$R_{DS(ON) MAX}$	$I_D$ $T_c = +25^\circ C$
-40V	11m $\Omega$ @ $V_{GS} = -10V$	-75A
	15m $\Omega$ @ $V_{GS} = -4.5V$	-65A

## Features and Benefits

- 100% Unclamped Inductive Switch (UIS) Test in Production
- Low On-Resistance
- Fast Switching Speed

## Description and Applications

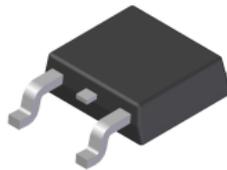
This MOSFET is designed to meet the stringent requirements of automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

- DC-DC converters
- Power-management functions
- Analog switches

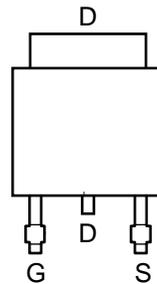
## Mechanical Data

- Package: TO252
- Package 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 Finish Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 ③
- Weight: 0.33 grams (Approximate)

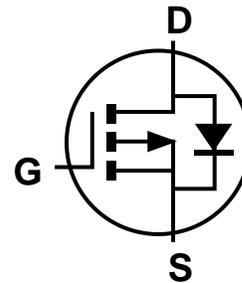
TO252 (DPAK)



Top View



Top View  
Pin-Out



Equivalent Circuit

**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>GSS</sub>	±20	V
Continuous Drain Current (Note 6) V <sub>GS</sub> = -10V	Steady State	T <sub>C</sub> = +25°C	I <sub>D</sub>	-75	A
		T <sub>C</sub> = +70°C		-60	
Pulsed Drain Current (10μs Pulse, Duty Cycle = 1%)			I <sub>DM</sub>	-300	A
Maximum Body Diode Continuous Current (Note 6)			I <sub>S</sub>	-75	A
Pulsed Source Current (10μs Pulse, Duty Cycle = 1%)			I <sub>SM</sub>	-300	A
Avalanche Current, L = 1mH			I <sub>AS</sub>	-28	A
Avalanche Energy, L = 1mH			E <sub>AS</sub>	392	mJ

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

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	T <sub>A</sub> = +25°C	P <sub>D</sub>	4	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	R <sub>θJA</sub>	31	°C/W
Total Power Dissipation (Note 6)	T <sub>C</sub> = +25°C	P <sub>D</sub>	113	W
Thermal Resistance, Junction to Case (Note 6)		R <sub>θJC</sub>	1.1	°C/W
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>	-40	—	—	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> = -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
<b>ON CHARACTERISTICS (Note 7)</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	-1.5	—	-2.5	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	6.8	11	mΩ	V <sub>GS</sub> = -10V, I <sub>D</sub> = -9.8A
		—	9.8	15		V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -9.8A
Diode Forward Voltage	V <sub>SD</sub>	—	-0.7	-1	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = -1A
<b>DYNAMIC CHARACTERISTICS (Note 8)</b>						
Input Capacitance	C <sub>iss</sub>	—	5697	—	pF	V <sub>DS</sub> = -20V, V <sub>GS</sub> = 0V f = 1MHz
Output Capacitance	C <sub>oss</sub>	—	534	—		
Reverse Transfer Capacitance	C <sub>rss</sub>	—	408	—		
Gate Resistance	R <sub>g</sub>	—	7	—	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz
Total Gate Charge (V <sub>GS</sub> = -4.5V)	Q <sub>g</sub>	—	53	—	nC	V <sub>DS</sub> = -20V, I <sub>D</sub> = -9.8A
Total Gate Charge (V <sub>GS</sub> = -10V)	Q <sub>g</sub>	—	112	—		
Gate-Source Charge	Q <sub>gs</sub>	—	20	—		
Gate-Drain Charge	Q <sub>gd</sub>	—	18	—		
Turn-On Delay Time	t <sub>D(ON)</sub>	—	11.5	—	ns	V <sub>GS</sub> = -10V, V <sub>DD</sub> = -20V, R <sub>G</sub> = 2Ω, I <sub>D</sub> = -9.8A
Turn-On Rise Time	t <sub>R</sub>	—	41	—		
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	146	—		
Turn-Off Fall Time	t <sub>F</sub>	—	165	—		
Reverse Recovery Time	t <sub>RR</sub>	—	27	—	ns	I <sub>F</sub> = -9.8A, di/dt = -100A/μs
Reverse Recovery Charge	Q <sub>RR</sub>	—	22	—	nC	I <sub>F</sub> = -9.8A, di/dt = -100A/μs

- Notes:
5. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.
  6. Device mounted on infinite heatsink.
  7. Short duration pulse test used to minimize self-heating effect.
  8. Guaranteed by design. Not subject to product testing.

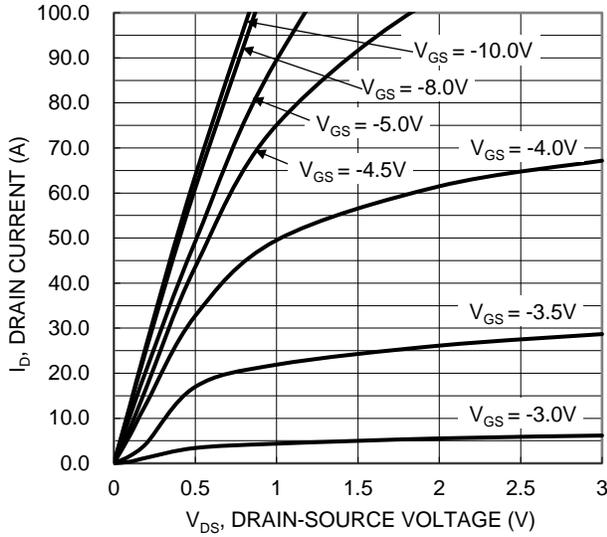


Figure 1. Typical Output Characteristic

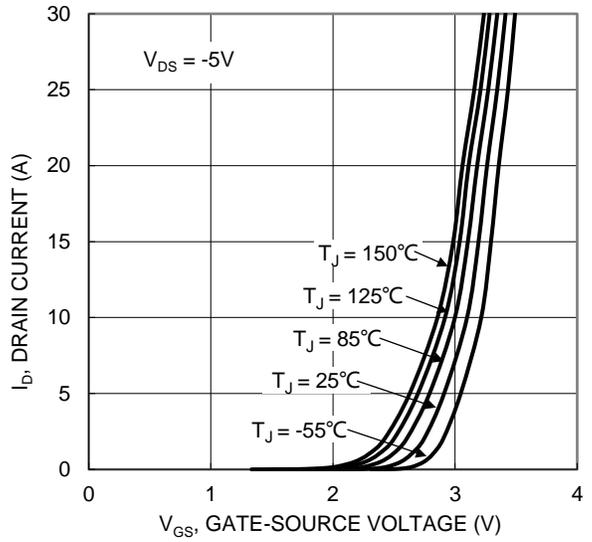


Figure 2. Typical Transfer Characteristic

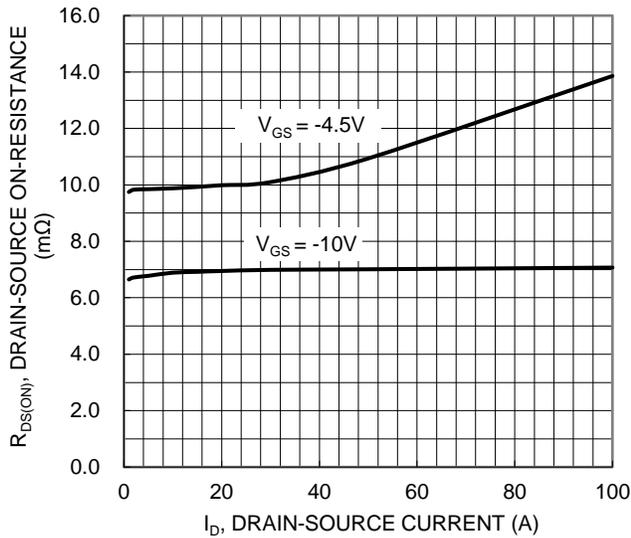


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

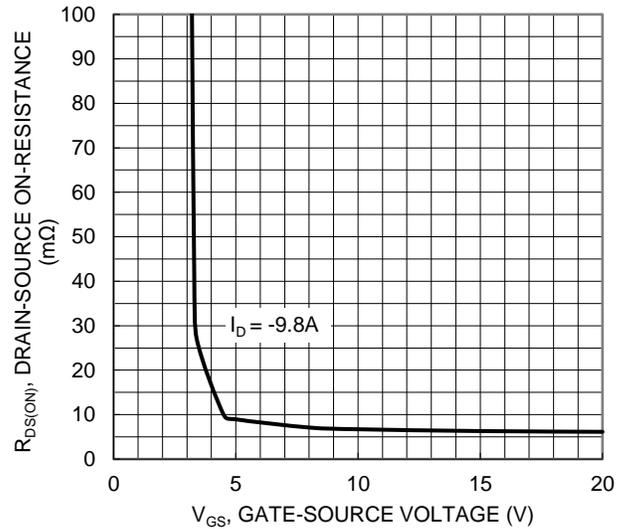


Figure 4. Typical Transfer Characteristic

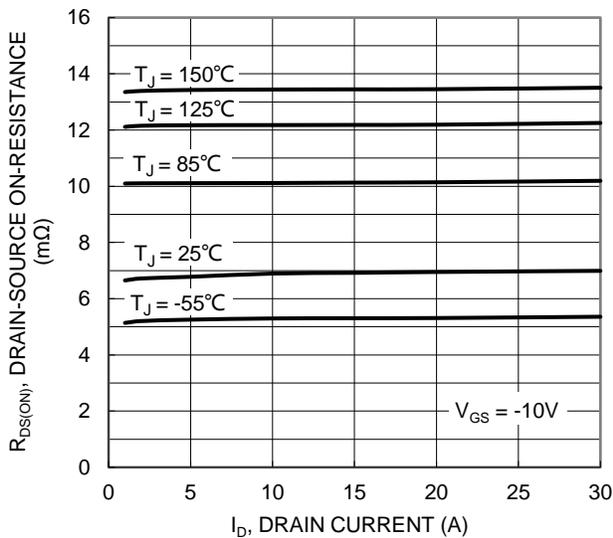


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

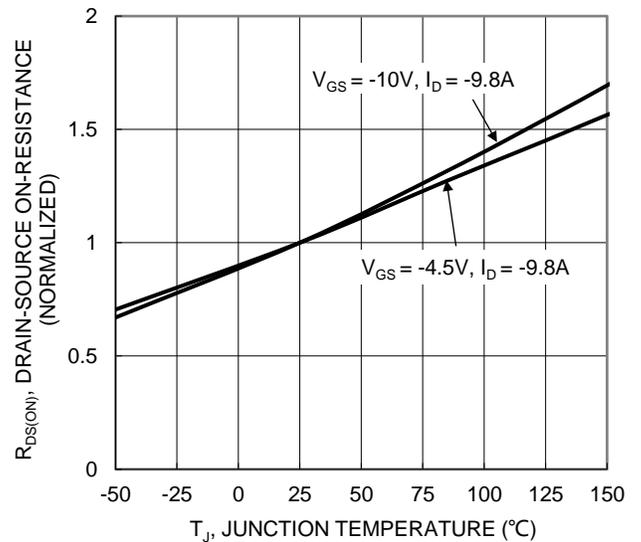


Figure 6. On-Resistance Variation with Temperature

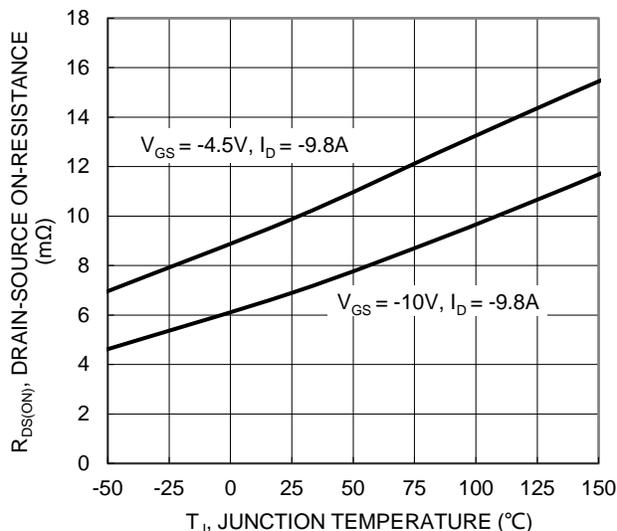


Figure 7. On-Resistance Variation with Temperature

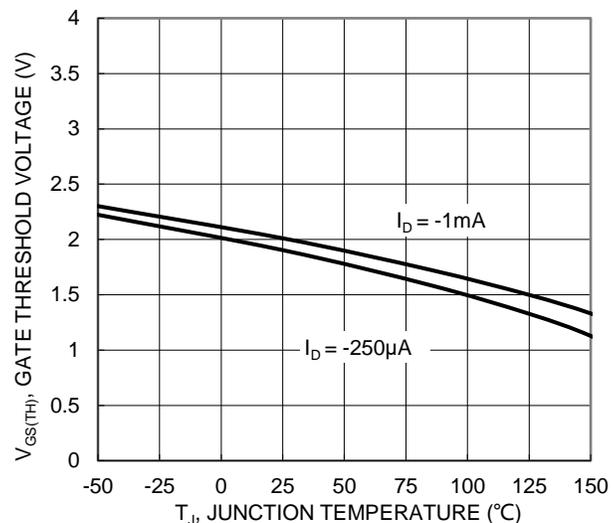


Figure 8. Gate Threshold Variation vs. Junction Temperature

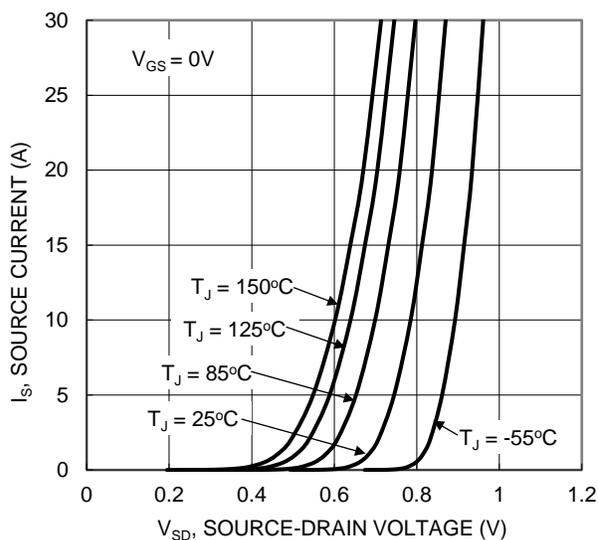


Figure 9. Diode Forward Voltage vs. Current

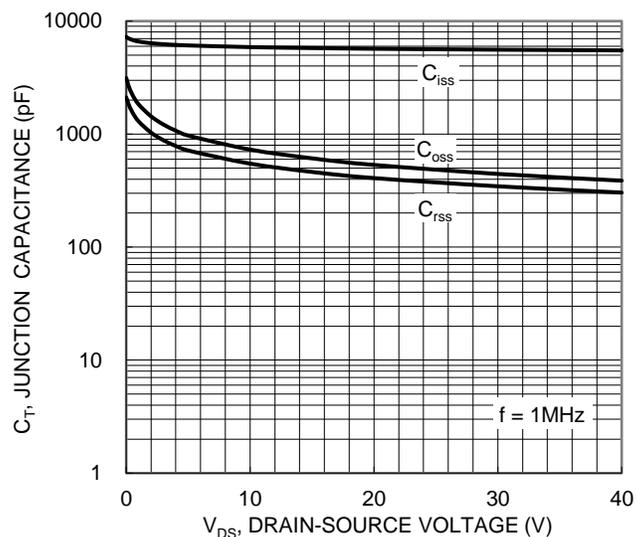


Figure 10. Typical Junction Capacitance

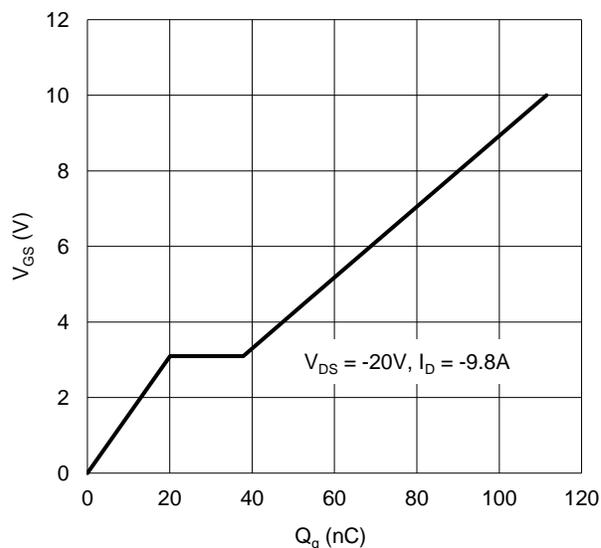


Figure 11. Gate Charge

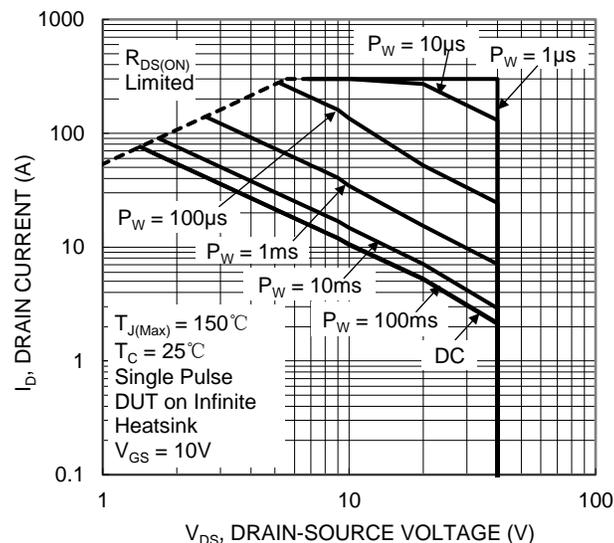


Figure 12. SOA, Safe Operation Area

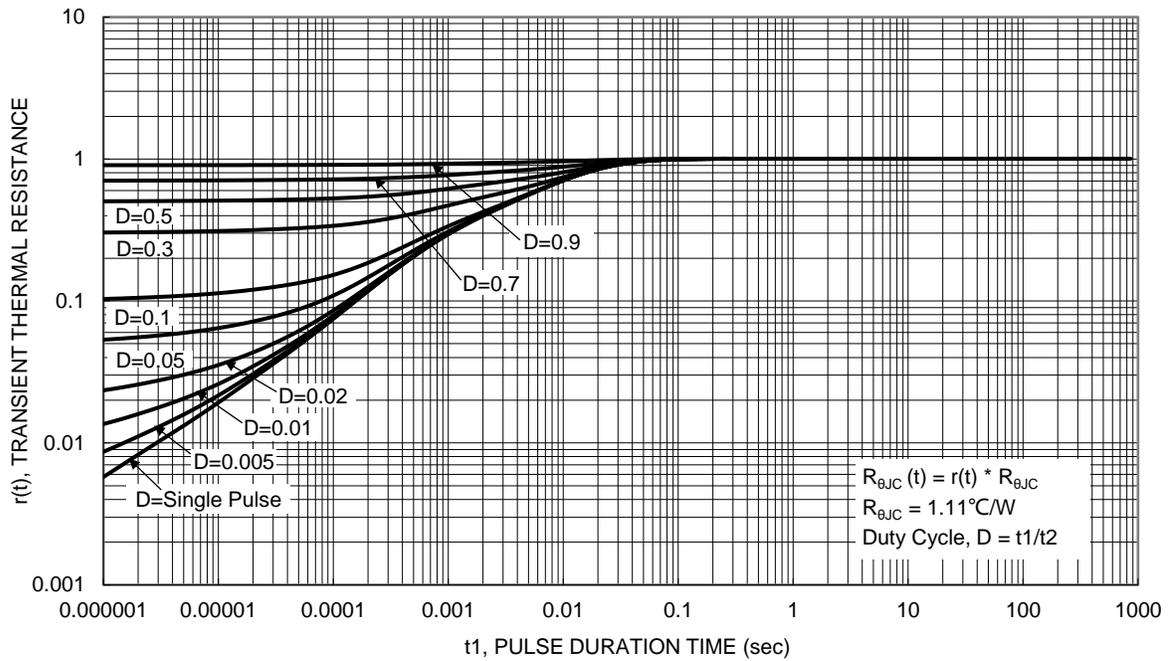
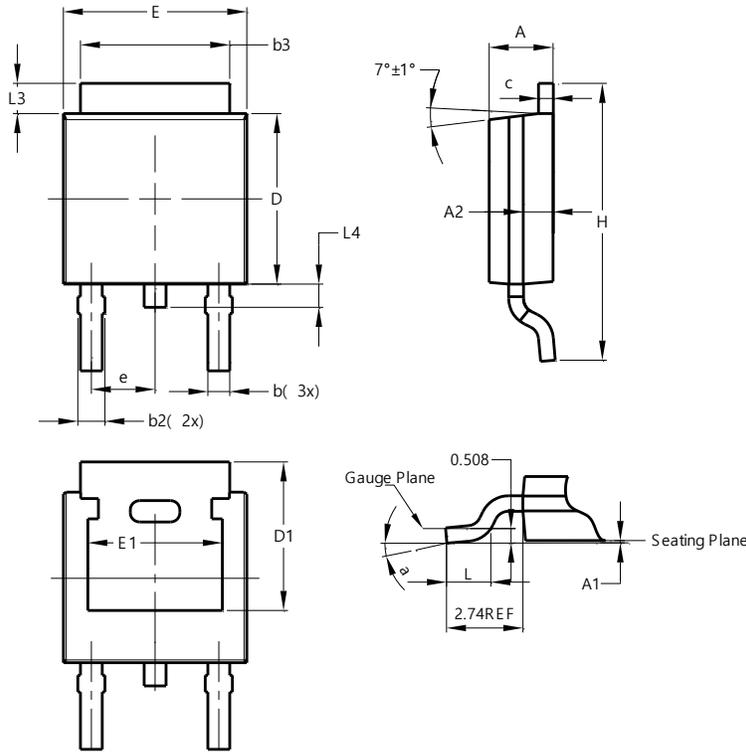


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

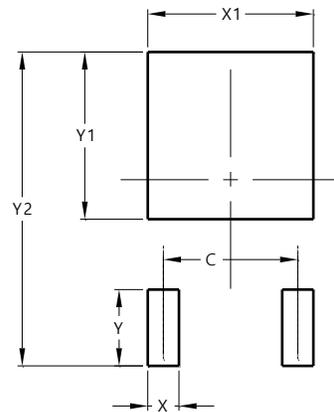
TO252 (DPAK)



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°	--
<b>All Dimensions in mm</b>			

Suggested Pad Layout

TO252 (DPAK)



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