优尚

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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企业微信二维码

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Product Summary

BV_{DSS}	$R_{DS(ON)\ MAX}$	$I_{D\ MAX}$ T_A = +25°C
-60V	55mΩ @ V_{GS} = -10V	-10.4A
	80mΩ @ V_{GS} = -4.5V	-9.2A

Features and Benefits

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

Description and Applications

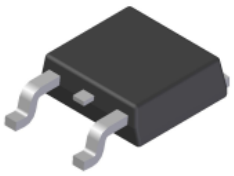
This MOSFET is designed to meet the stringent requirements of automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

- Disconnect Switches
  Motor Control

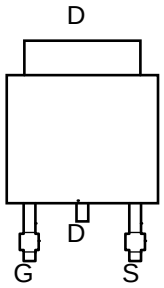
Mechanical Data

- 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 Finish Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.33 grams (Approximate)

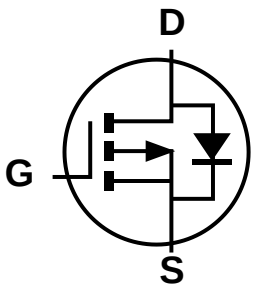
TO252 (DPAK)



Top View



Top View
Pin-Out



Equivalent Circuit

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

Characteristic		Symbol	Value	Unit
Drain-Source Voltage		V_{DSS}	-60	V
Gate-Source Voltage		V_{GSS}	±20	V
Continuous Drain Current, V_{GS} = -10V	T_A = +25°C (Note 6)	I_D	-10.4	A
	T_A = +70°C (Note 6)		-8.3	
	T_A = +25°C (Note 5)		-6.8	
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%) (Note 7)		I_{DM}	-37.5	A
Maximum Body Diode Forward Current (Note 6)		I_S	-10.4	A
Pulsed Source Current (10µs Pulse, Duty Cycle = 1%) (Note 7)		I_{SM}	-37.5	A
Avalanche Current, L = 0.1mH		I_{AS}	-36	A
Avalanche Energy, L = 0.1mH		E_{AS}	65	mJ

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

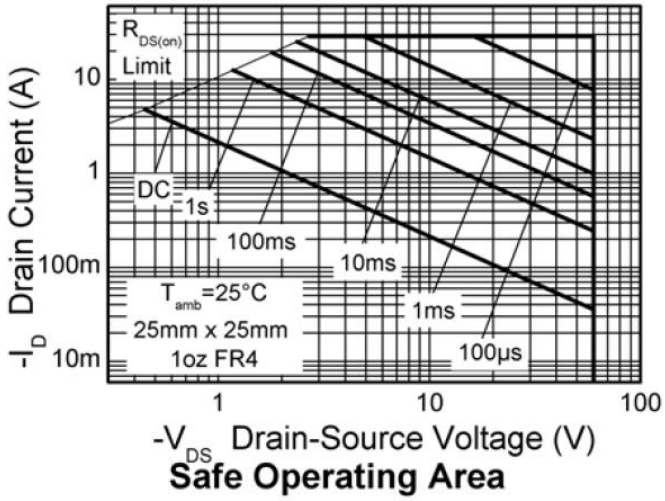
Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)		P_D	4.3	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	29	°C/W
Total Power Dissipation (Note 6)		P_D	10.1	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	12.3	°C/W
Total Power Dissipation (Note 8)		P_D	2.15	W
Thermal Resistance, Junction to Case (Note 8)	Steady State	$R_{\theta JA}$	58	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

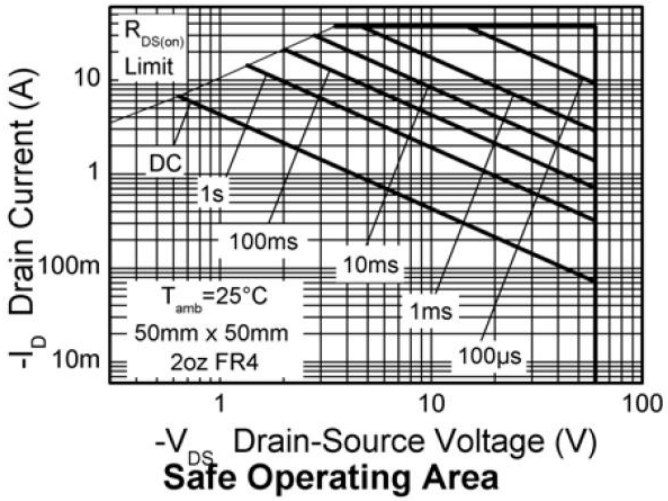
Notes:
5. For a device surface mounted on 50mm x 50mm x 1.6mm FR-4 PCB with high coverage of single sided 2oz copper, in still air conditions.
6. For a device surface mounted on FR-4 PCB measured at t <=10s.
7. Repetitive rating 50mm x 50mm x 1.6mm FR-4 PCB, D=0.02 pulse width=300s - pulse width limited by maximum junction temperature.
8. For a device surface mounted on 25mm x 25mm x 1.6mm FR-4 PCB with high coverage of single sided 1oz copper, in still air conditions.

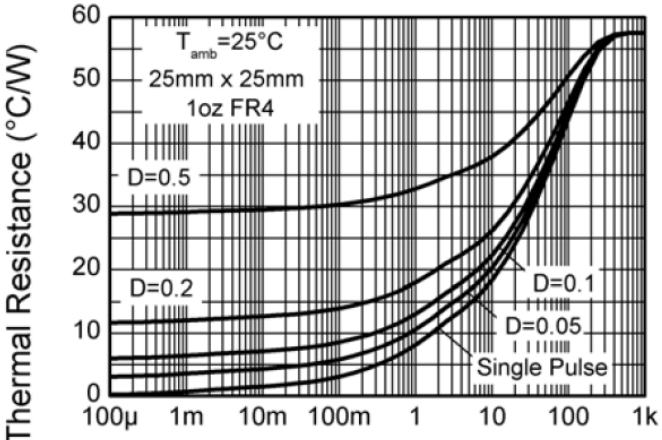
Electrical Characteristics (@ T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 9)						
Drain-Source Breakdown Voltage	BV_{DSS}	-60	—	—	V	V_{GS} = 0V, I_D = -250μA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	-1	μA	V_{DS} = -60V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS (Note 9)						
Gate Threshold Voltage	$V_{GS(TH)}$	-1.0	—	—	V	V_{DS} = V_{GS}, I_D = -250μA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	44	55	mΩ	V_{GS} = -10V, I_D = -3.5A
		—	59	80		V_{GS} = -4.5V, I_D = -2.9A
Forward Transconductance	g_{fs}	—	8.7	—	s	V_{DS} = -15V, I_D = -3.5A
Diode Forward Voltage	V_{SD}	—	-0.85	-0.95	V	V_{GS} = 0V, I_S = -4.2A
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C_{iss}	—	1580	—	pF	V_{DS} = -30V, V_{GS} = 0V f = 1MHz
Output Capacitance	C_{oss}	—	160	—		
Reverse Transfer Capacitance	C_{rss}	—	140	—		
Total Gate Charge (V_{GS} = -5V)	Q_G	—	23	—	nC	V_{DS} = -30V, I_D = -3.5A
Total Gate Charge (V_{GS} = -10V)	Q_G	—	44	—		
Gate-Source Charge	Q_{GS}	—	3.9	—		
Gate-Drain Charge	Q_{GD}	—	9.8	—		
Turn-On Delay Time	$t_{D(ON)}$	—	4.6	—	ns	V_{GS} = -10V, V_{DD} = -30V, R_g = 6Ω, I_D = -1A
Turn-On Rise Time	t_R	—	5.8	—		
Turn-Off Delay Time	$t_{D(OFF)}$	—	55	—		
Turn-Off Fall Time	t_F	—	23	—		
Reverse Recovery Time	t_{RR}	—	37	—	ns	I_S = -2.1A, di/dt = -100A/μs
Reverse Recovery Charge	Q_{RR}	—	56	—	nC	I_S = -2.1A, di/dt = -100A/μs

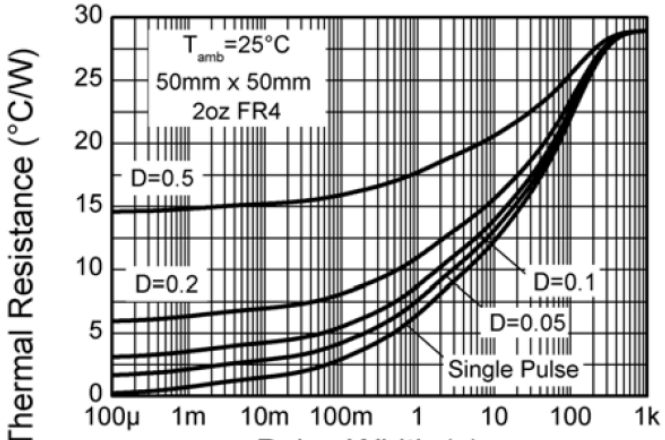
Notes: 9. Short duration pulse test used to minimize self-heating effect.
10. Guaranteed by design. Not subject to product testing.



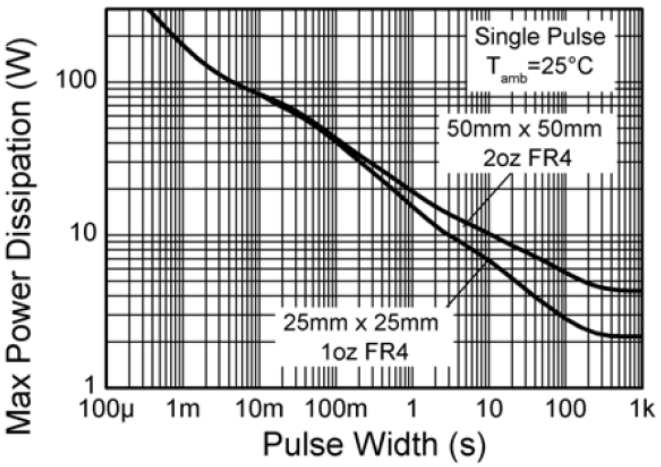




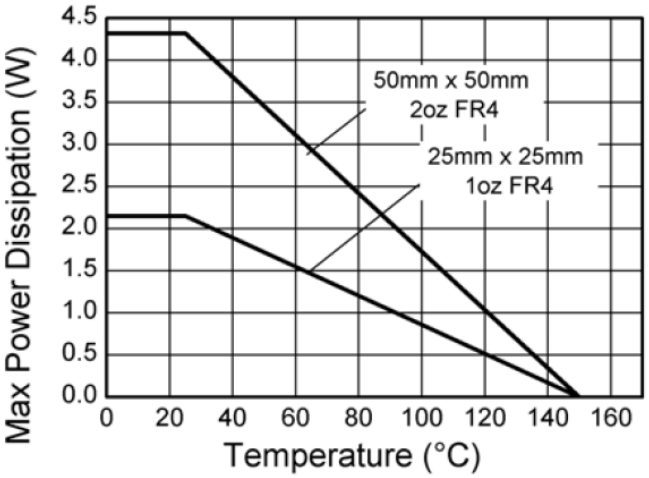
Transient Thermal Impedance



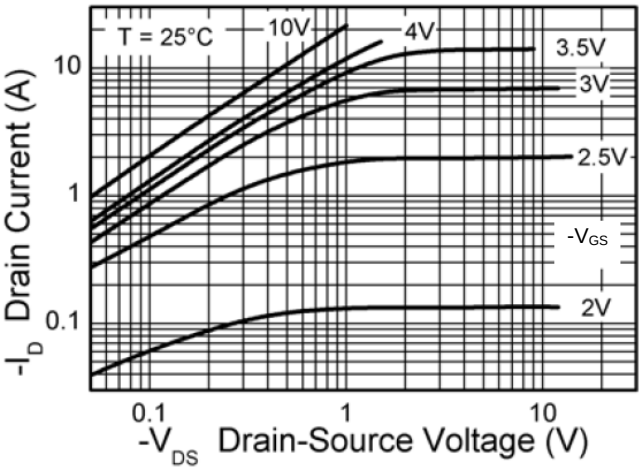
Transient Thermal Impedance



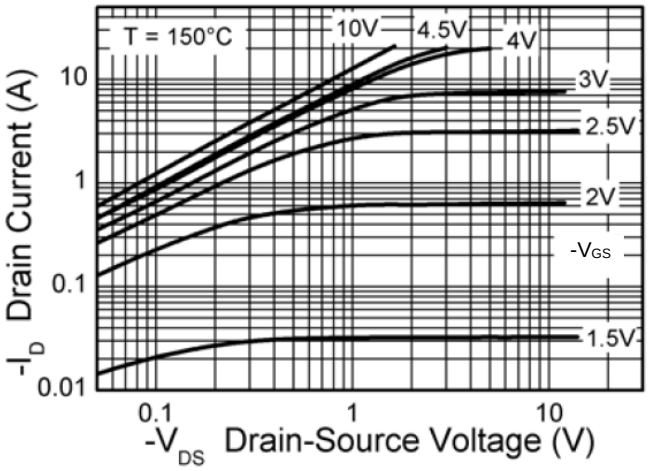
Pulse Power Dissipation



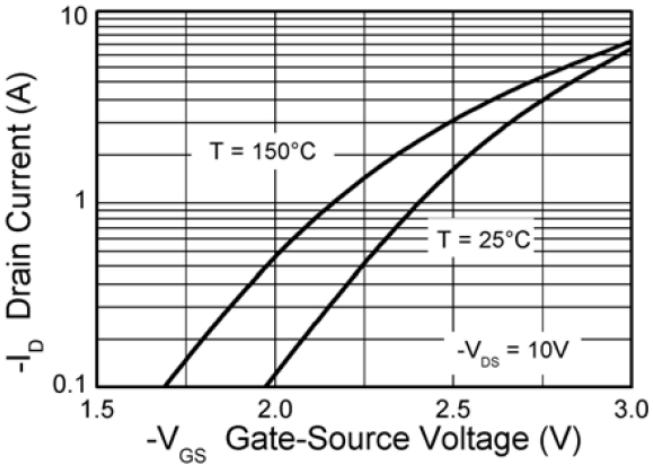
Derating Curve



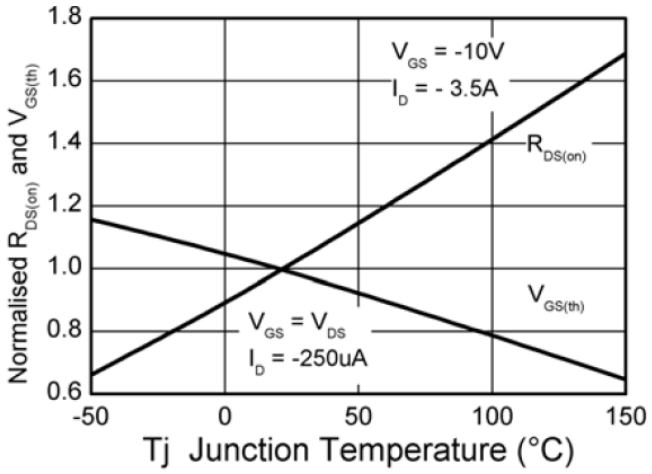
Output Characteristics



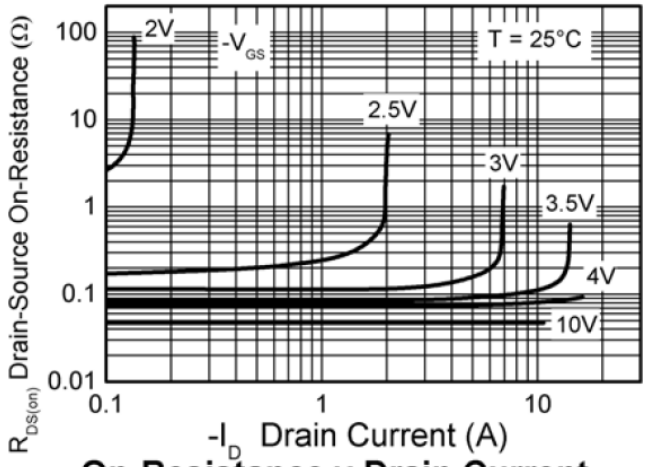
Output Characteristics



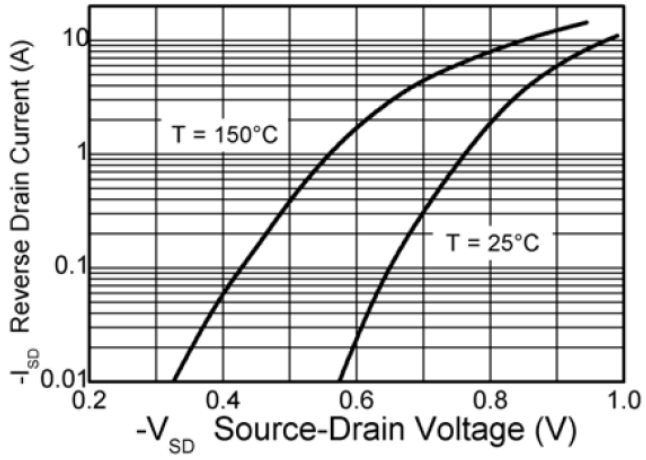
Typical Transfer Characteristics



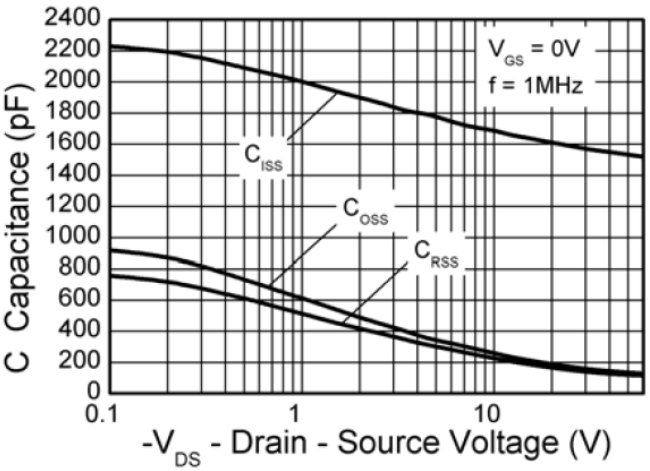
Normalised Curves v Temperature



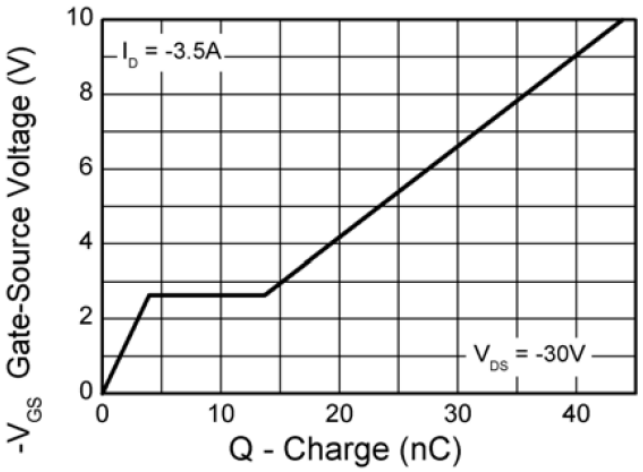
On-Resistance v Drain Current



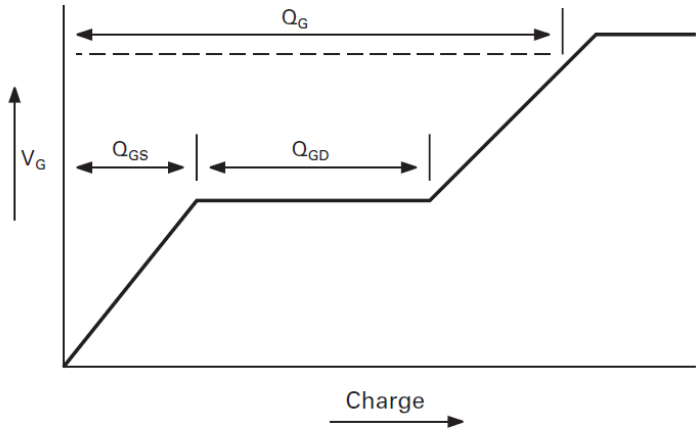
Source-Drain Diode Forward Voltage



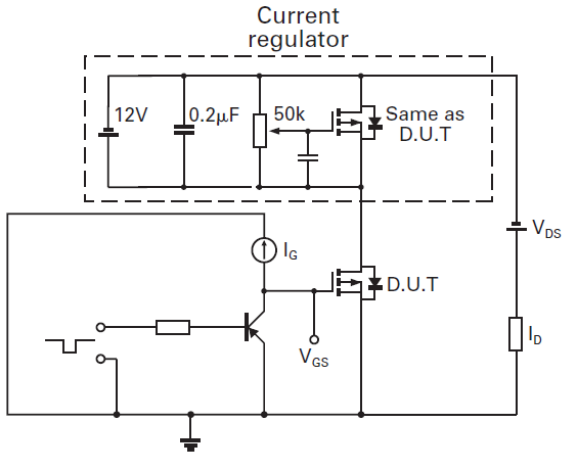
Capacitance v Drain-Source Voltage



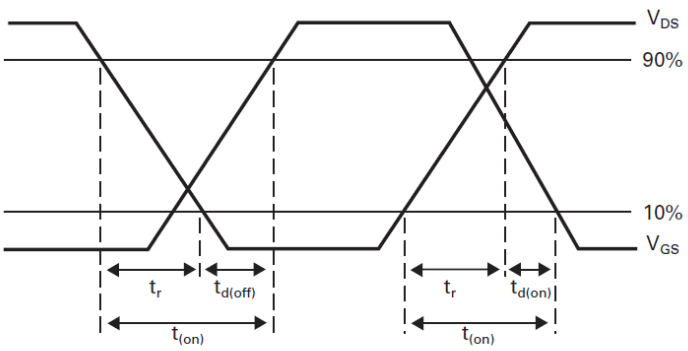
Gate-Source Voltage v Gate Charge



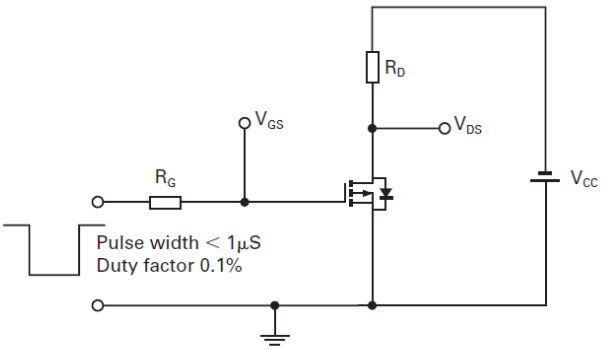
Basic gate charge waveform



Gate charge test circuit



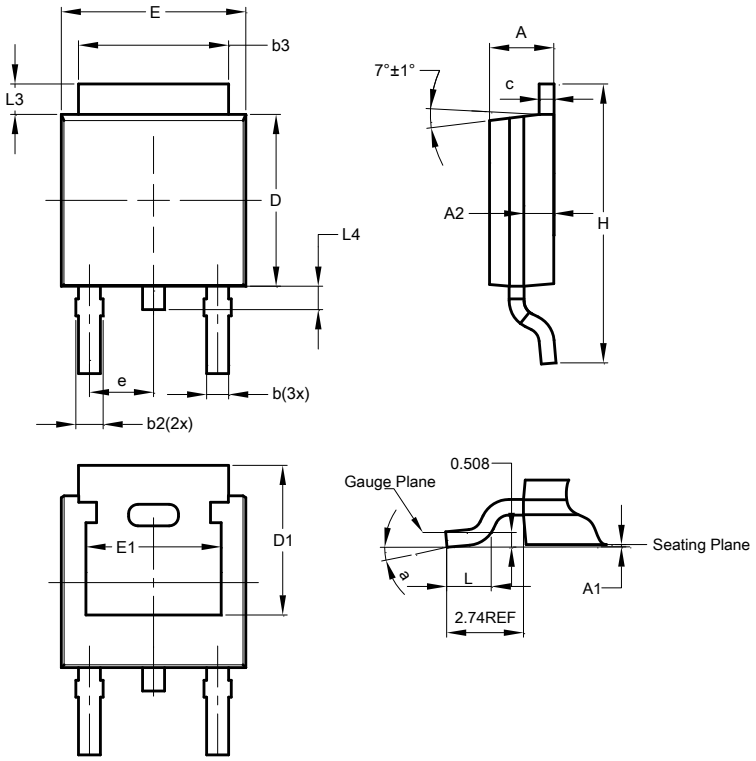
Switching time waveforms



Switching time test circuit

Package Outline Dimensions

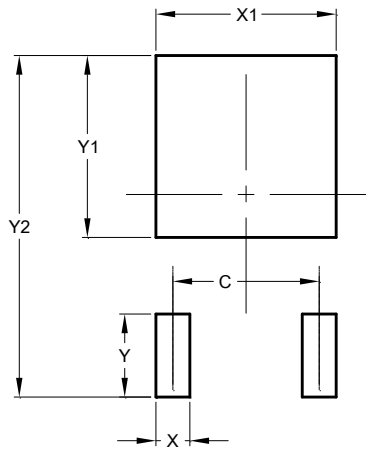
TO252 (DPAK)



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	5.46	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	0.64	1.02	0.83
a	0°	10°	-
All Dimensions in mm			

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