UNIVERSAL PARTS SEMICONDUCTOR

UP10N04

N-Channel Enhancement Mode MOSFET

Features

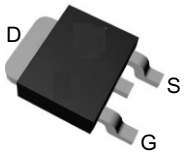
. 40V/100A,
  $R_{DS(ON)}$= 3.5mΩ (Max.) @ V_{GS}=10V
  $R_{DS(ON)}$= 5.1mΩ (Max.) @ V_{GS}=4.5V
. Reliable and Rugged
. Lower Q_g and Q_{gd} for high-speed switching
. Lower $R_{DS(ON)}$ to Minimize Conduction Losses
. Lead Free and Green Devices Available
  (RoHS Compliant)

Applications

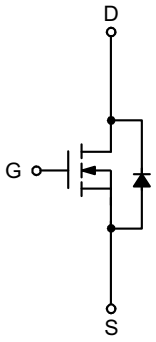
. SMPS Synchronous Rectification.
. Load Switch.
. DC-DC Conversion.

"

Pin Description



Top View of TO-252-3



N-Channel MOSFET

Absolute Maximum Ratings (T_A = 25?C Unless Otherwise Noted)

Symbol	Parameter		Rating	Unit
Common Ratings				
V_{DSS}	Drain-Source Voltage		40	V
V_{GSS}	Gate-Source Voltage		±20	
T_J	Maximum Junction Temperature		175	°C
T_{STG}	Storage Temperature Range		-55 to 175	
I_S	Diode Continuous Forward Current	T_C=25°C	20	A
I_D [a]	Continuous Drain Current	T_C=25°C	100 *	
		T_C=100°C	78	
I_{DM} [b]	Pulsed Drain Current	T_C=25°C	300	
P_D	Maximum Power Dissipation	T_C=25°C	100	W
		T_C=100°C	50	
R_{qJC}	Thermal Resistance-Junction to Case	Steady State	1.5	°C/W
I_D [c]	Continuous Drain Current	T_A=25°C	23	A
		T_A=70°C	20	
P_D [c]	Maximum Power Dissipation	T_A=25°C	3	W
		T_A=70°C	2.1	
R_{qJA} [c]	Thermal Resistance-Junction to Ambient	t ? 10s	18	°C/W
		Steady State	50	
I_{AS} [d]	Avalanche Current, Single pulse	L=0.1mH	50	A
E_{AS} [d]	Avalanche Energy, Single pulse	L=0.1mH	125	mJ

Note a：* Pulse width is limited by max. junction temperature.

Note b：Max. continue current is limited by bonding wire

Note c：R_{qJA} steady state t=100s

Note d：UIS tested and pulse width limited by maximum junction temperature 175°C (initial temperature T_j=25°C).

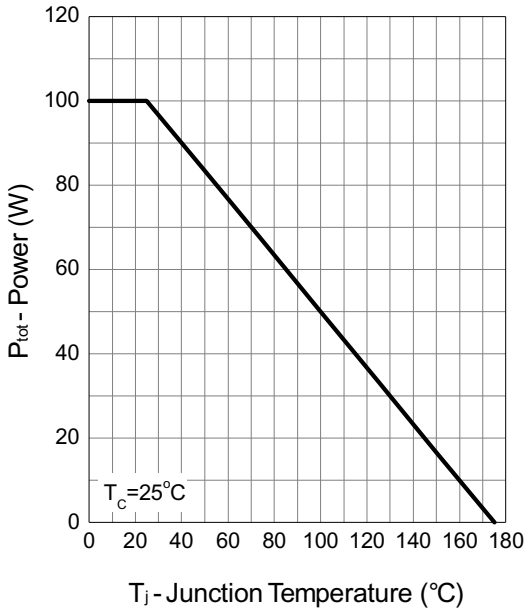
Electrical Characteristics (T_A = 25?C Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_{DS}=250mA	40	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=32V, V_{GS}=0V	-	-	1	mA
		T_J=85°C	-	-	30	
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_{DS}=250mA	1.5	1.8	2.5	V
I_{GSS}	Gate Leakage Current	V_{GS}=±20V, V_{DS}=0V	-	-	±100	nA
$R_{DS(ON)}$ [e]	Drain-Source On-state Resistance	V_{GS}=10V, I_{DS}=25A	-	2.8	3.5	mΩ
		T_J=100°C	-	3.98	-	
		V_{GS}=4.5V, I_{DS}=20A	-	3.8	5.1	
Gfs	Forward Transconductance	V_{DS}=5V, I_{DS}=20A	-	40	-	S
Diode Characteristics						
V_{SD} [e]	Diode Forward Voltage	I_{SD}=20A, V_{GS}=0V	-	0.8	1.1	V
t_{rr}	Reverse Recovery Time	I_{SD}=5A, dI_{SD}/dt=100A/ms V_{dd}=20V	-	36.7	-	ns
t_a	Charge Time		-	22.4	-	
t_b	Discharge Time		-	14.3	-	
Q_{rr}	Reverse Recovery Charge		-	38.7	-	nC
Dynamic Characteristics						
R_G	Gate Resistance	V_{GS}=0V,V_{DS}=0V,F=1MHz	-	1.1	-	W
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=20V, Frequency=1.0MHz	-	2885	-	pF
C_{oss}	Output Capacitance		-	645	-	
C_{rss}	Reverse Transfer Capacitance		-	65	-	
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}=20V, R_L=20W, I_{DS}=1A, V_{GEN}=10V, R_G=6W	-	17.9	-	ns
t_r	Turn-on Rise Time		-	10.3	-	
$t_{d(OFF)}$	Turn-off Delay Time		-	40.4	-	
t_f	Turn-off Fall Time		-	39	-	
Gate Charge Characteristics						
Q_g	Total Gate Charge	V_{DS}=20V, V_{GS}=10V, I_{DS}=25A	-	44	62	nC
Q_g	Total Gate Charge	V_{DS}=20V, V_{GS}=4.5V, I_{DS}=25A	-	19.7		
Q_{gth}	Threshold Gate Charge		-	5.7	-	
Q_{gs}	Gate-Source Charge		-	12.1	-	
Q_{gd}	Gate-Drain Charge		-	4.5	-	

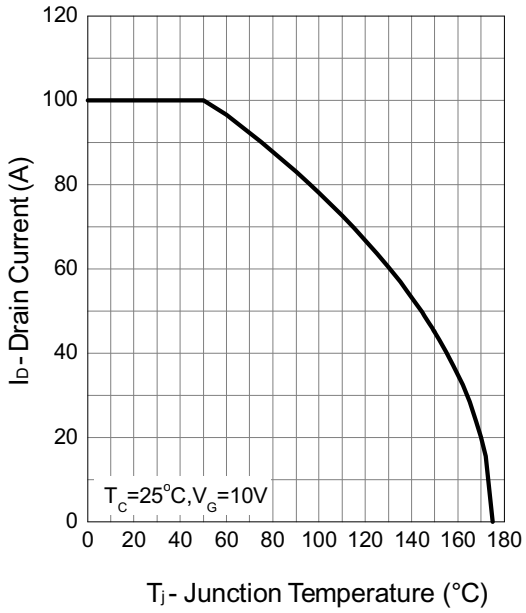
Note e：Pulse test ; pulse width?300ms, duty cycle?2%.

Typical Operating Characteristics

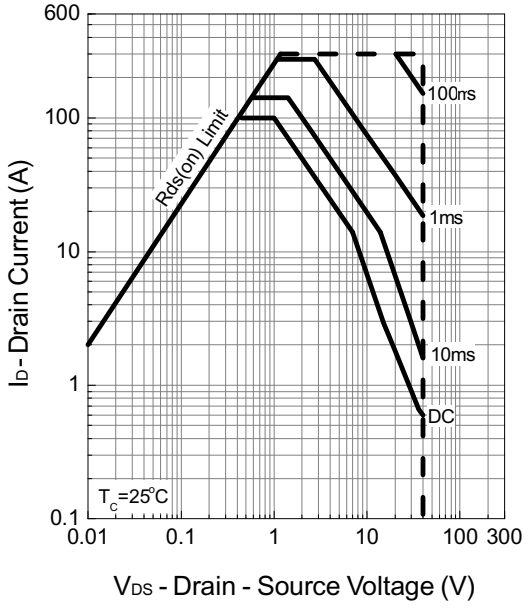
Power Dissipation



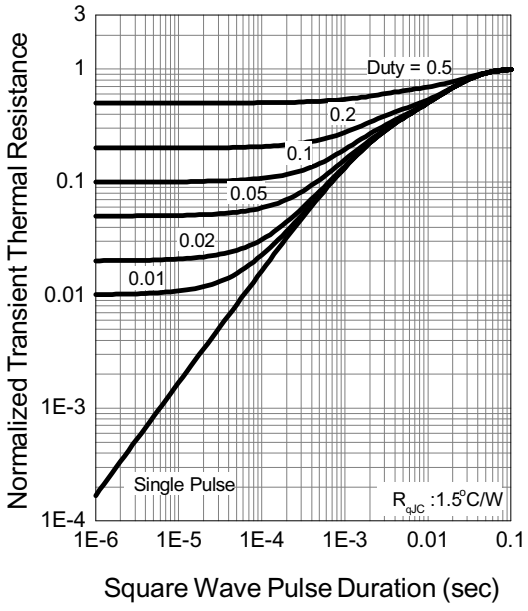
Drain Current



Safe Operation Area

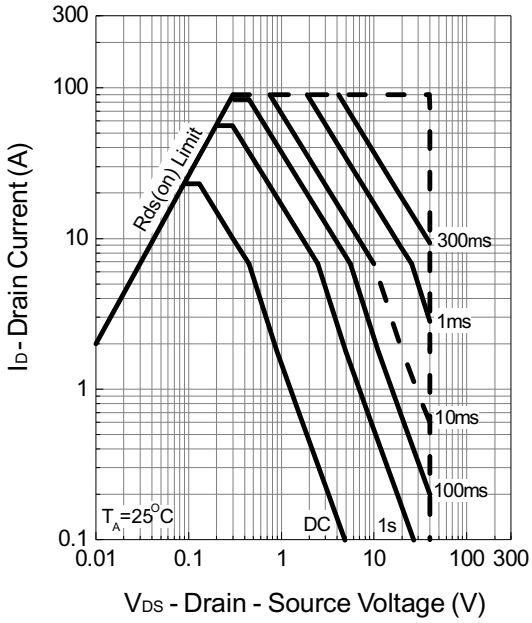


Thermal Transient Impedance

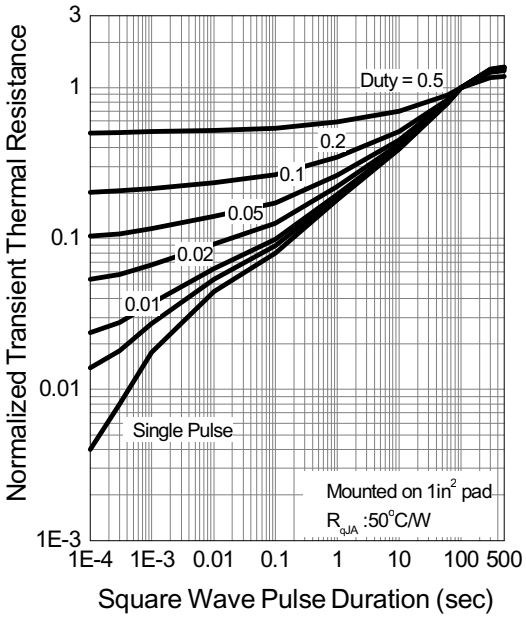


Typical Operating Characteristics (Cont.)

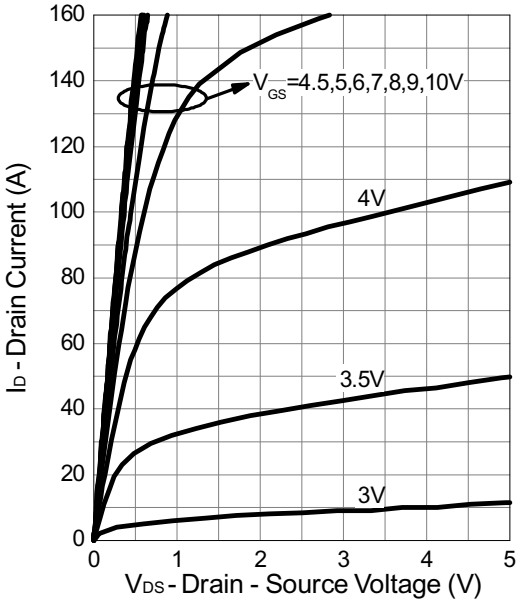
Safe Operation Area



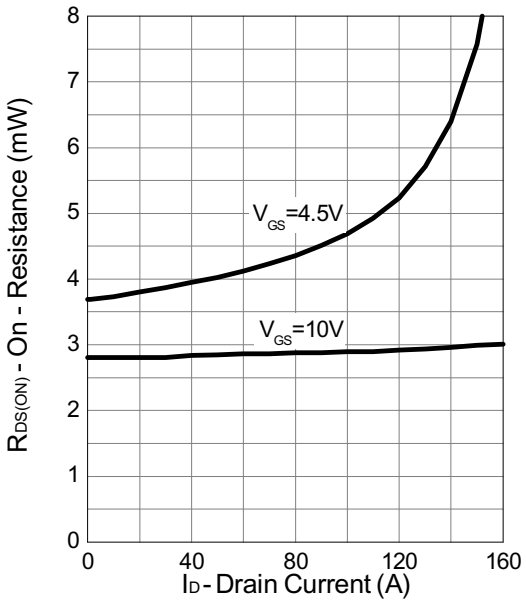
Thermal Transient Impedance



Output Characteristics

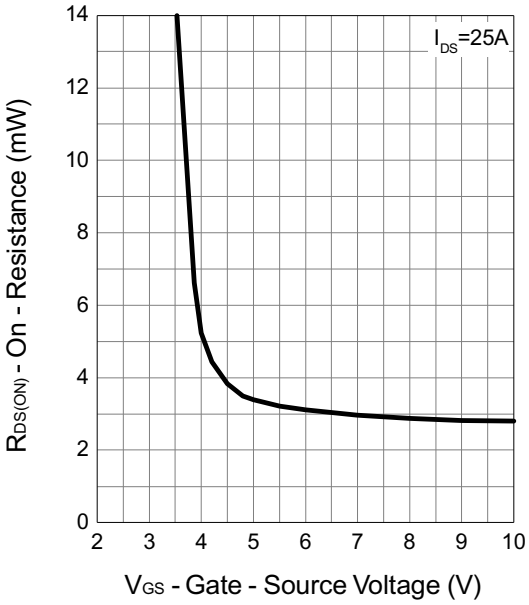


Drain-Source On Resistance

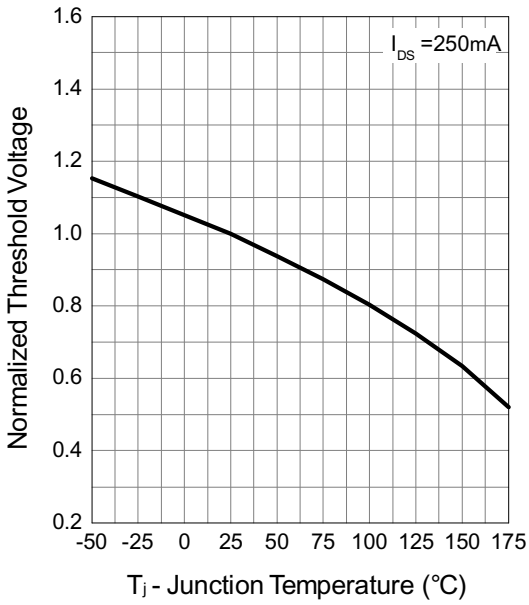


Typical Operating Characteristics (Cont.)

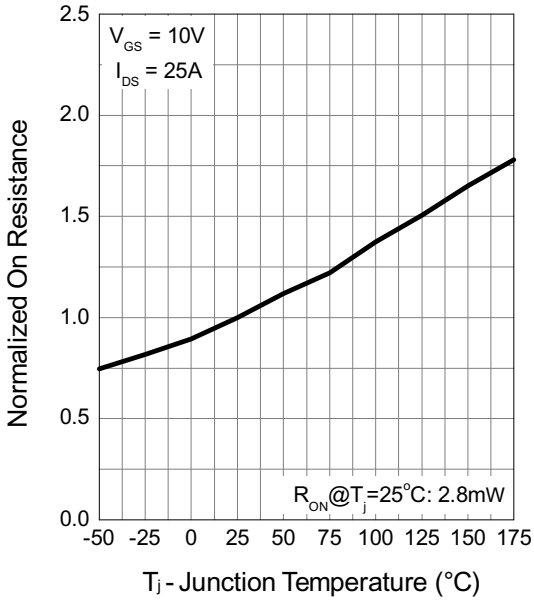
Gate-Source On Resistance



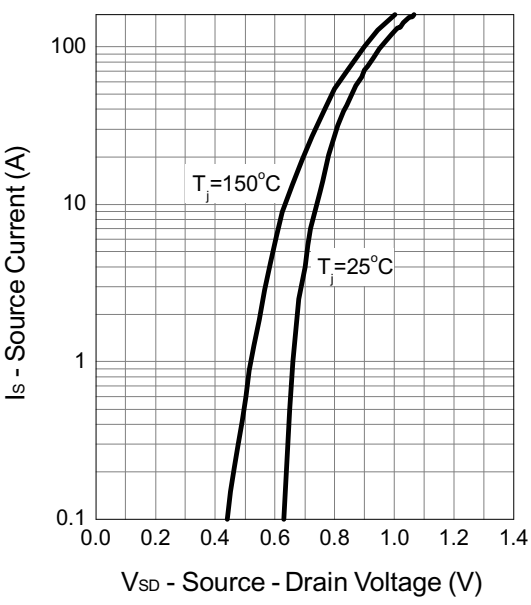
Gate Threshold Voltage



Drain-Source On Resistance

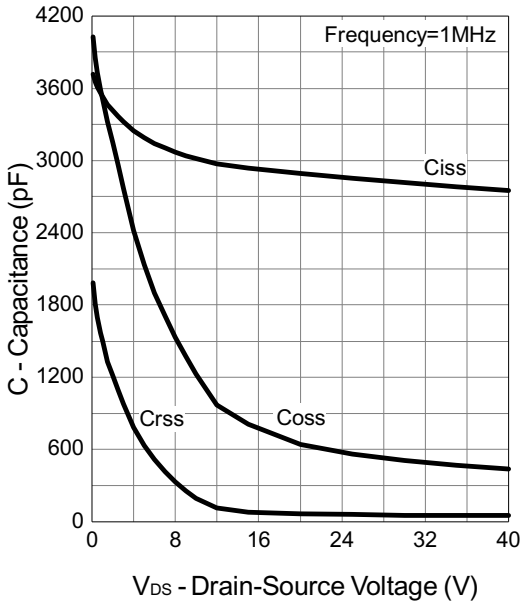


Source-Drain Diode Forward

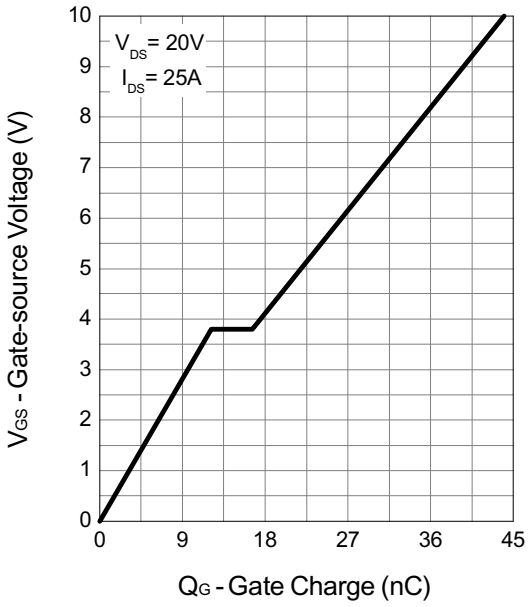


Typical Operating Characteristics (Cont.)

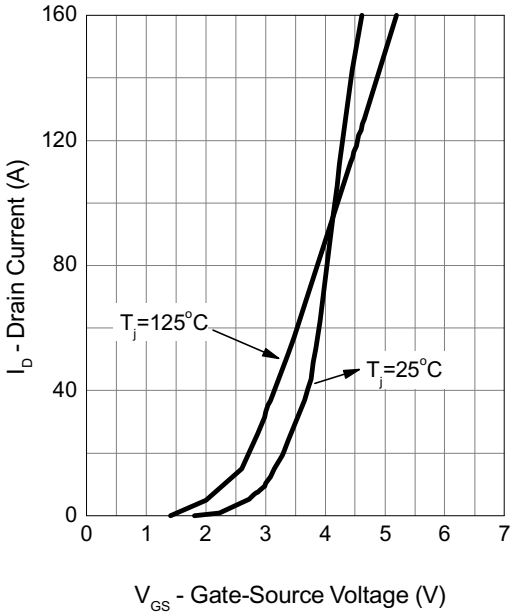
Capacitance



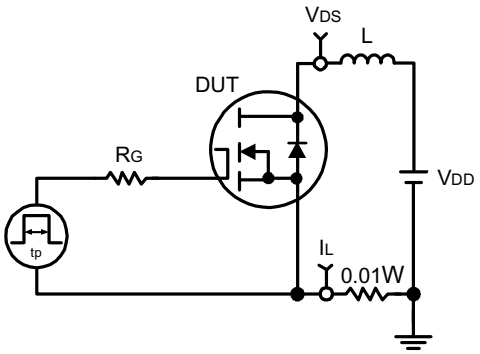
Gate Charge

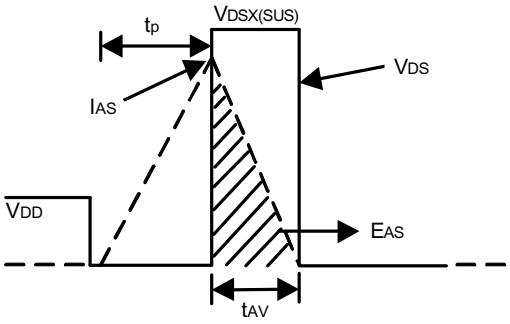


Transfer Characteristics

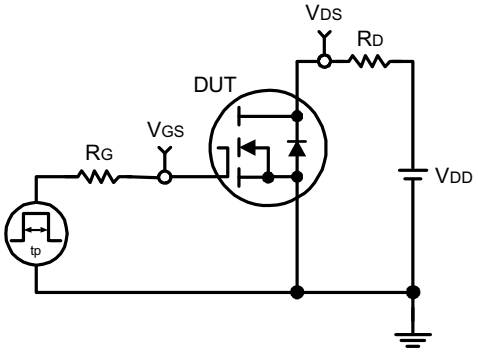


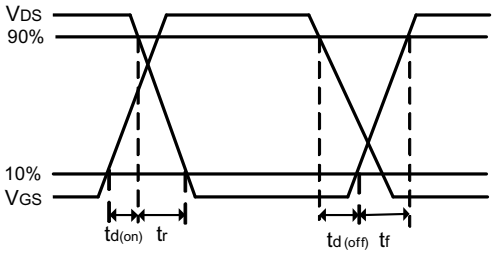
Avalanche Test Circuit and Waveforms





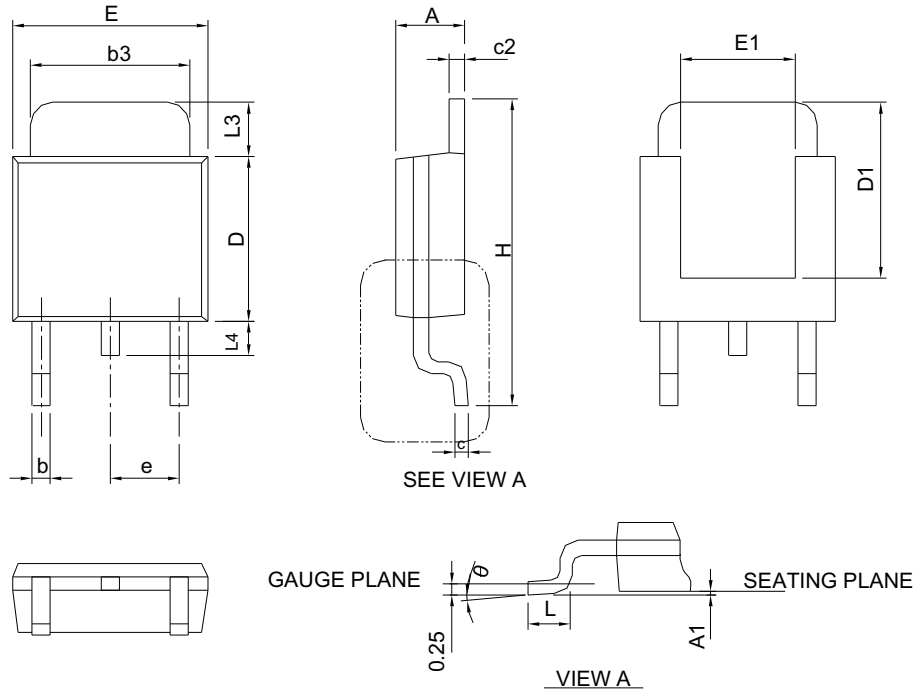
Switching Time Test Circuit and Waveforms





Package Information

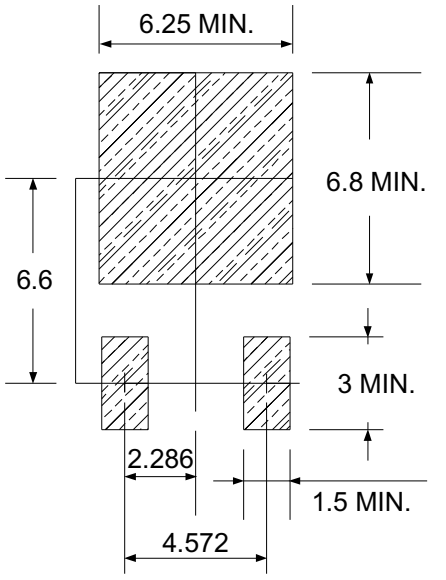
TO-252-3



SYMBOL	TO-252-3			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	2.18	2.39	0.086	0.094
A1	-	0.13	-	0.005
b	0.50	0.89	0.020	0.035
b3	4.95	5.46	0.195	0.215
c	0.46	0.61	0.018	0.024
c2	0.46	0.89	0.018	0.035
D	5.33	6.22	0.210	0.245
D1	4.57	6.00	0.180	0.236
E	6.35	6.73	0.250	0.265
E1	3.81	6.00	0.150	0.236
e	2.29 BSC		0.090 BSC	
H	9.40	10.41	0.370	0.410
L	0.90	1.78	0.035	0.070
L3	0.89	2.03	0.035	0.080
L4	-	1.02	-	0.040
θ	0°	8°	0°	8°

Note : Follow JEDEC TO-252 .

RECOMMENDED LAND PATTERN



UNIT: mm