



## N-Channel Enhancement Mode MOSFET

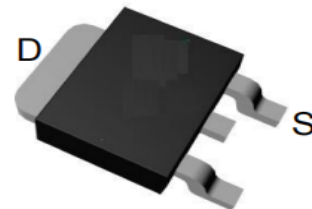
### Features

- 30V/150A,  
 $R_{DS(ON)}=2.2m\Omega$  (Typ.) @  $V_{GS}=10V$   
 $R_{DS(ON)}=3m\Omega$  (Typ.) @  $V_{GS}=4.5V$
- Reliable and Rugged
- Lower  $Q_g$  and  $Q_{gd}$  for high-speed switching
- Lower  $R_{DS(ON)}$  to Minimize Conduction Losses
- 100% UIS +  $R_g$  Tested
- ESD protection
- Lead Free and Green Devices Available  
(RoHS Compliant)

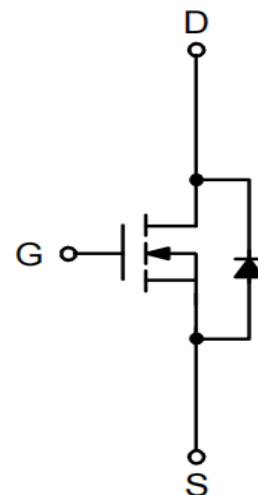
### Applications

- Power Management in Desktop Computer or DC/DC Converters.
- Power Load Switch.
- Notebook Battery Management.

### Pin Description



Top View of TO-252-2



N-Channel MOSFET

**Absolute Maximum Ratings** ( $T_A = 25^\circ\text{C}$  Unless Otherwise Noted)

Symbol	Parameter	Rating	Unit	
<b>Common Ratings</b>				
$V_{DSS}$	Drain-Source Voltage	30	V	
$V_{GSS}$	Gate-Source Voltage	$\pm 20$		
$T_J$	Maximum Junction Temperature	150	$^\circ\text{C}$	
$T_{STG}$	Storage Temperature Range	-55 to 150		
$I_S$	Diode Continuous Forward Current	$T_C=25^\circ\text{C}$ 31	A	
$I_D$	Continuous Drain Current	$T_C=25^\circ\text{C}$ 150		
		$T_C=100^\circ\text{C}$ 74		
$P_D$	Maximum Power Dissipation	$T_C=25^\circ\text{C}$ 56	W	
		$T_C=100^\circ\text{C}$ 22		
$R_{\theta JC}$	Thermal Resistance-Junction to Case	Steady State	2.2	$^\circ\text{C/W}$
$I_S$	Diode Continuous Forward Current	$T_A=25^\circ\text{C}$ 1.9	A	
$I_D^a$	Continuous Drain Current	$T_A=25^\circ\text{C}$ 22.8		
		$T_A=70^\circ\text{C}$ 18.2		
$I_{DM}^b$	Pulsed Drain Current	$T_A=25^\circ\text{C}$ 92		
$P_D^a$	Maximum Power Dissipation	$T_A=25^\circ\text{C}$ 2.08	W	
		$T_A=70^\circ\text{C}$ 1.33		
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient	$t \leq 10\text{s}$ 20	$^\circ\text{C/W}$	
		Steady State 60 <sup>a</sup>		
$I_{AS}^c$	Avalanche Current, Single pulse	$L=0.1\text{mH}$ 80	A	
$E_{AS}^c$	Avalanche Energy, Single pulse	$L=0.1\text{mH}$ 320	mJ	

Note a : Surface Mounted on 1in<sup>2</sup> pad area,  $t \leq 10\text{sec}$ .  $R_{\theta JA}$  steady state  $t=999\text{s}$ .

Note b : Pulse width is limited by max. junction temperature.

Note c : UIS tested and pulse width limited by maximum junction temperature  $150^\circ\text{C}$  (initial temperature  $T_J=25^\circ\text{C}$ ).



**Electrical Characteristics** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

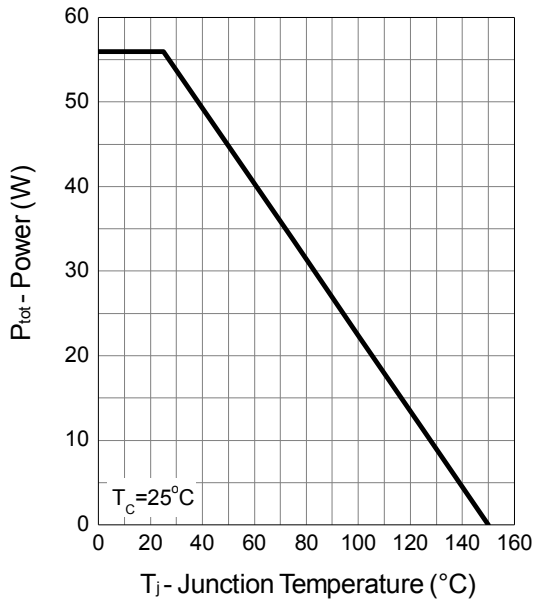
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_{DS}=250\mu A$	30	-	-	V
$BV_{DSS(t)}$	Drain-Source Breakdown Voltage (transient)	$V_{GS}=0V, I_{D(aval)}=36A$ $T_{case}=25^\circ\text{C}, t_{transient}=100ns$	34	-	-	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=24V, V_{GS}=0V$	-	-	1	$\mu A$
		$T_J=85^\circ\text{C}$	-	-	30	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_{DS}=250\mu A$	1.0	1.2	2.5	V
$I_{GSS}$	Gate Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 12$	$\mu A$
$R_{DS(ON)}^d$	Drain-Source On-state Resistance	$V_{GS}=10V, I_{DS}=20A$	-	2.2	3	m $\Omega$
		$T_J=125^\circ\text{C}$	-	2.2	-	
		$V_{GS}=4.5V, I_{DS}=15A$	-	3	4	
Gfs	Forward Transconductance	$V_{DS}=5V, I_{DS}=15A$	-	30	-	S
<b>Diode Characteristics</b>						
$V_{SD}^d$	Diode Forward Voltage	$I_{SD}=20A, V_{GS}=0V$	-	0.8	1.1	V
$t_{rr}$	Reverse Recovery Time	$I_{SD}=5A, dI_{SD}/dt=100A/\mu s$	-	39	-	ns
$t_a$	Charge Time		-	23	-	
$t_b$	Discharge Time		-	16	-	
$Q_{rr}$	Reverse Recovery Charge		-	33	-	
<b>Dynamic Characteristics</b>						
$R_G$	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$	-	0.9	2.1	$\Omega$
$C_{iss}$	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=15V,$ Frequency=1.0MHz	-	1860	2400	pF
$C_{oss}$	Output Capacitance		-	1220	1586	
$C_{rss}$	Reverse Transfer Capacitance		-	92	120	
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD}=15V, R_L=15\Omega,$ $I_{DS}=1A, V_{GEN}=10V,$ $R_G=6\Omega$	-	15	-	ns
$t_r$	Turn-on Rise Time		-	8	-	
$t_{d(OFF)}$	Turn-off Delay Time		-	38	-	
$t_f$	Turn-off Fall Time		-	54	-	
<b>Gate Charge Characteristics</b>						
$Q_g$	Total Gate Charge	$V_{DS}=15V, V_{GS}=10V,$ $I_{DS}=20A$	-	30	45	nC
$Q_g$	Total Gate Charge	$V_{DS}=15V, V_{GS}=4.5V,$ $I_{DS}=20A$	-	14	-	
$Q_{gth}$	Threshold Gate Charge		-	3	-	
$Q_{gs}$	Gate-Source Charge		-	5.3	-	
$Q_{gd}$	Gate-Drain Charge		-	3.6	-	

Note d : Pulse test ; pulse width $\leq 300\mu s$ , duty cycle $\leq 2\%$ .

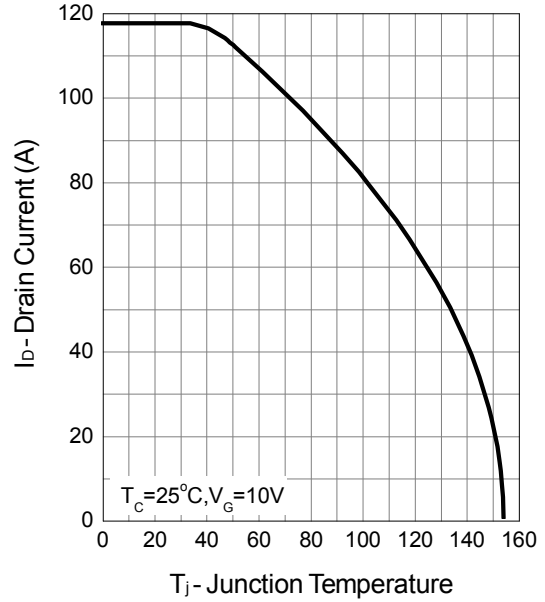


### Typical Operating Characteristics

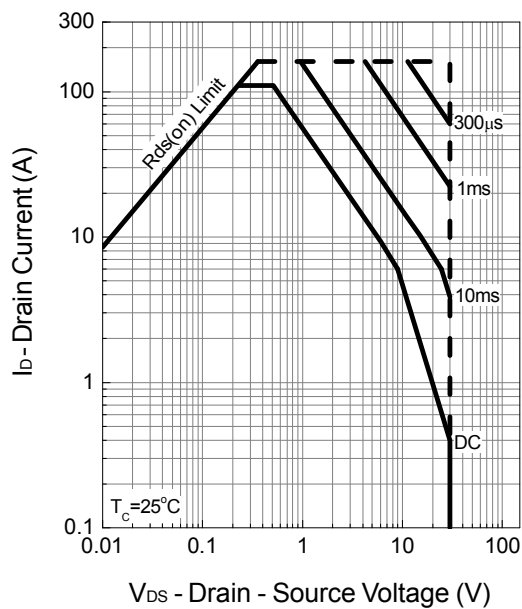
Power Dissipation



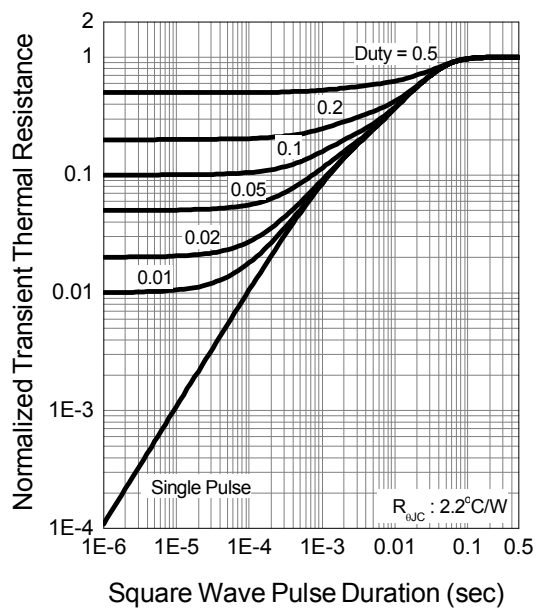
Drain Current



Safe Operation Area



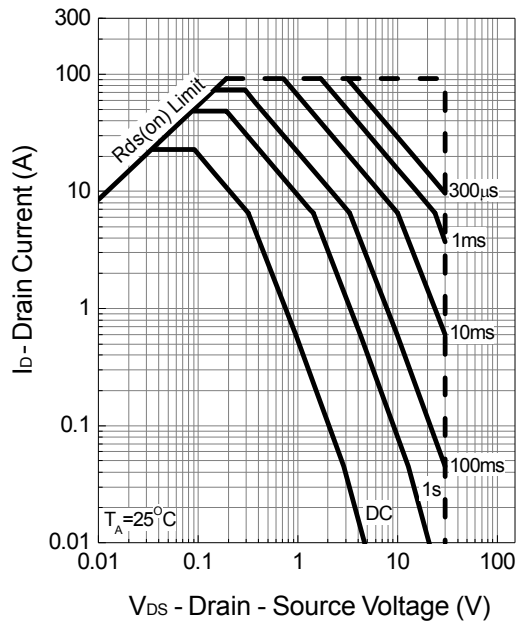
Thermal Transient Impedance



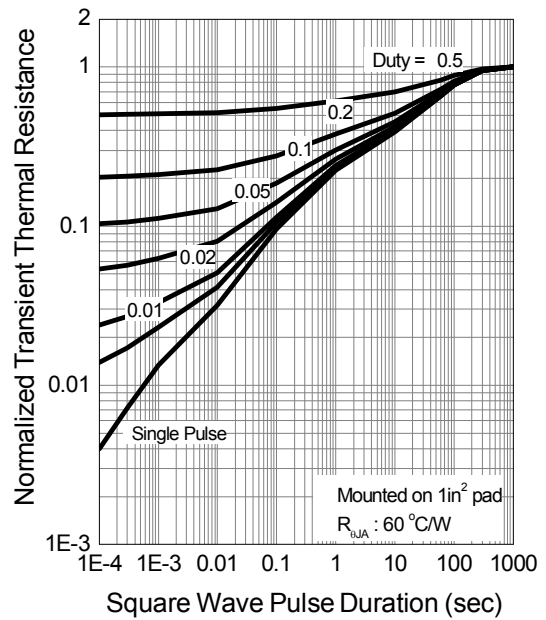


### Typical Operating Characteristics (Cont.)

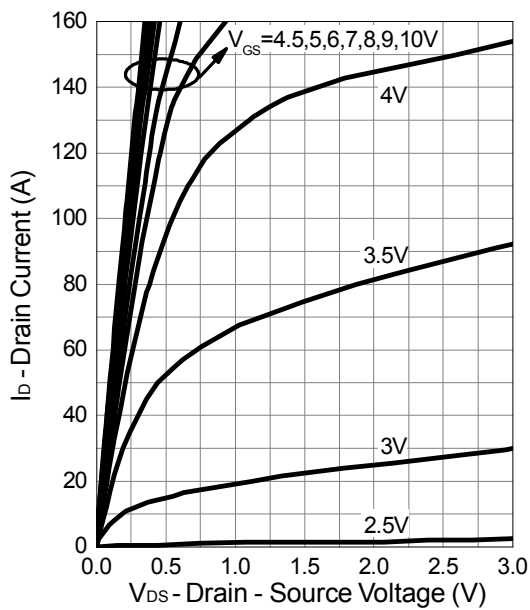
Safe Operation Area



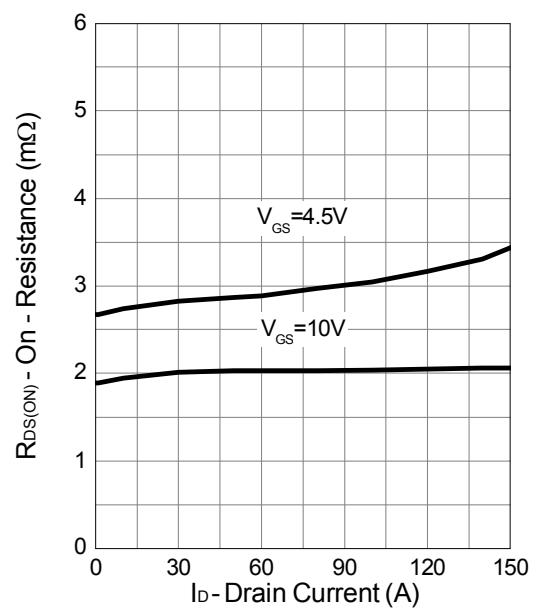
Thermal Transient Impedance



Output Characteristics

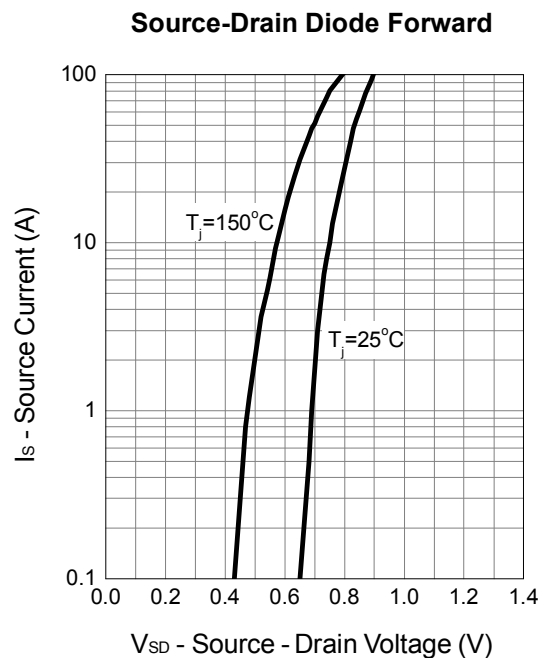
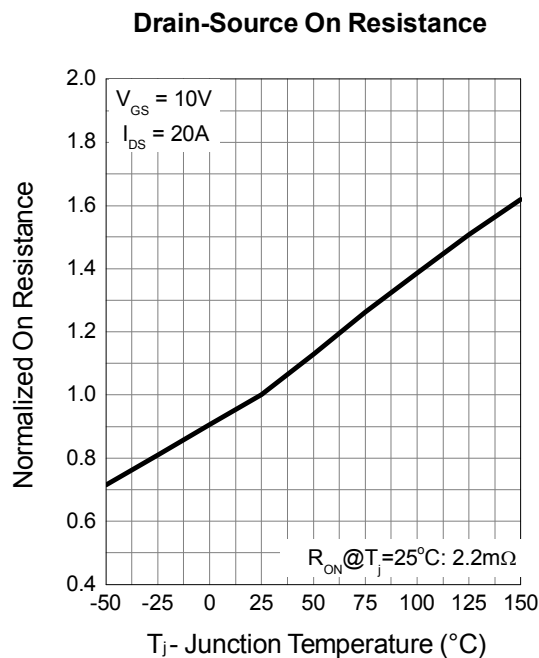
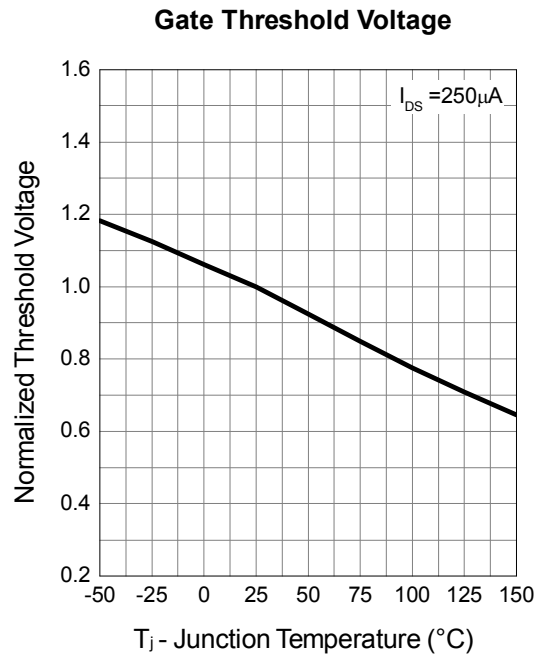
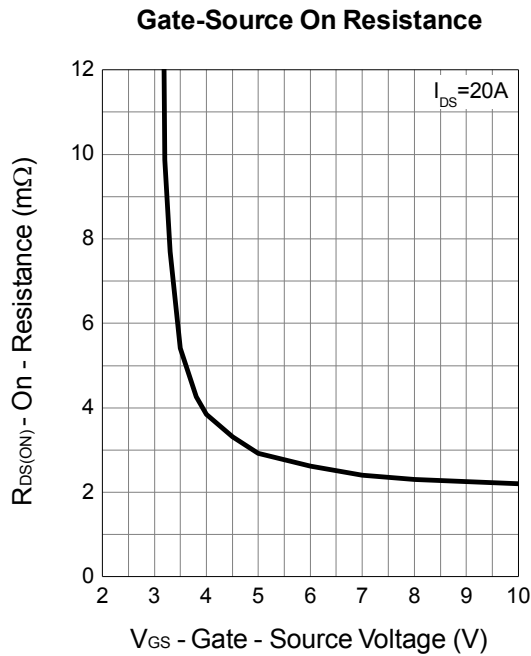


Drain-Source On Resistance





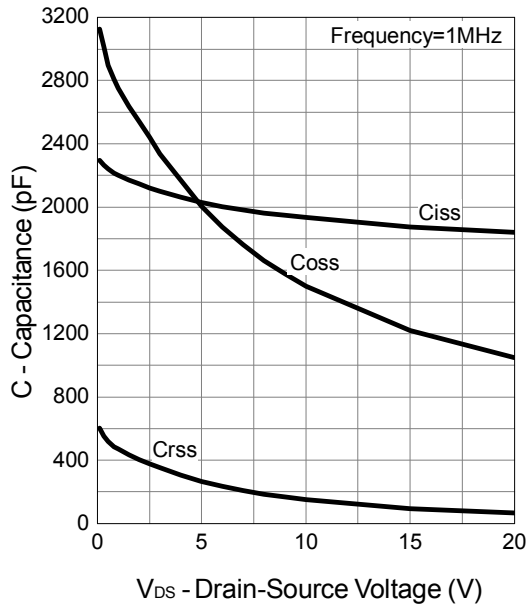
### Typical Operating Characteristics (Cont.)



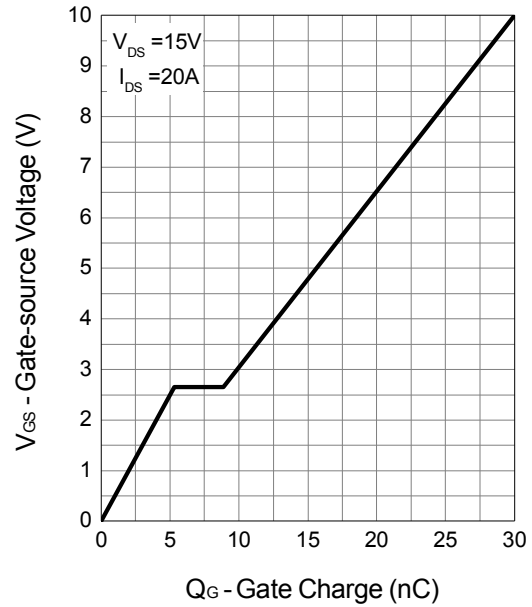


### Typical Operating Characteristics (Cont.)

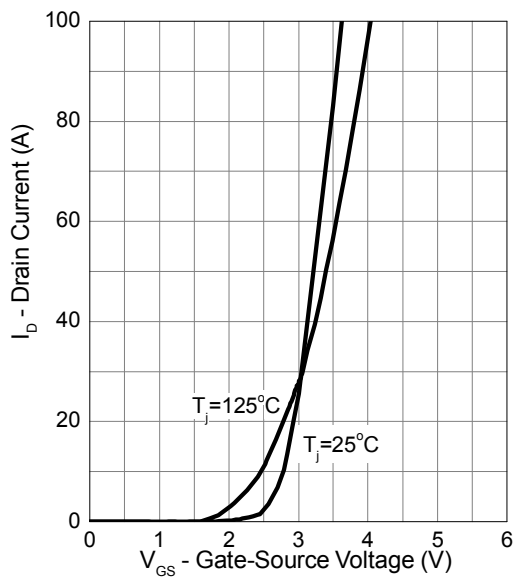
Capacitance



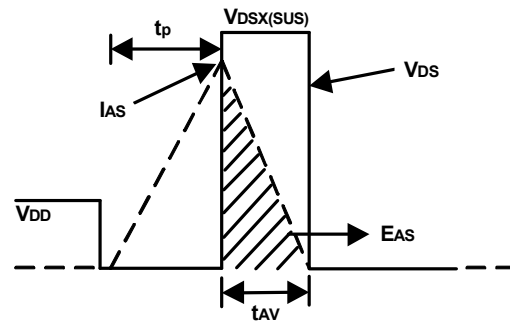
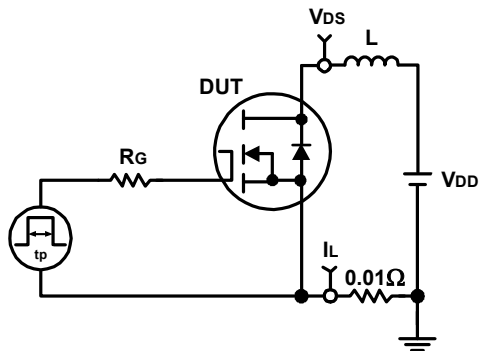
Gate Charge



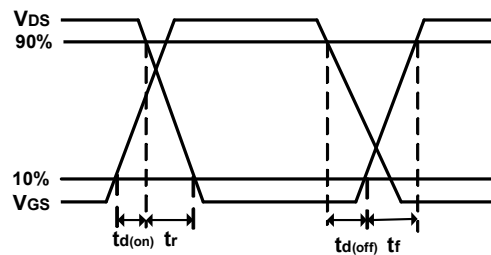
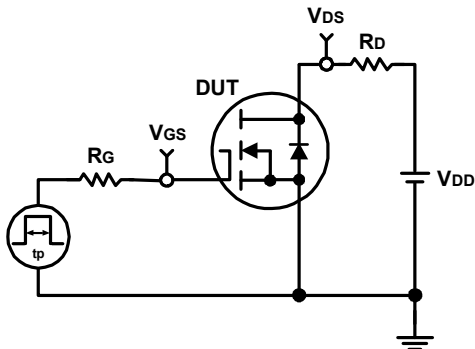
Transfer Characteristics



## Avalanche Test Circuit and Waveforms



## Switching Time Test Circuit and Waveforms

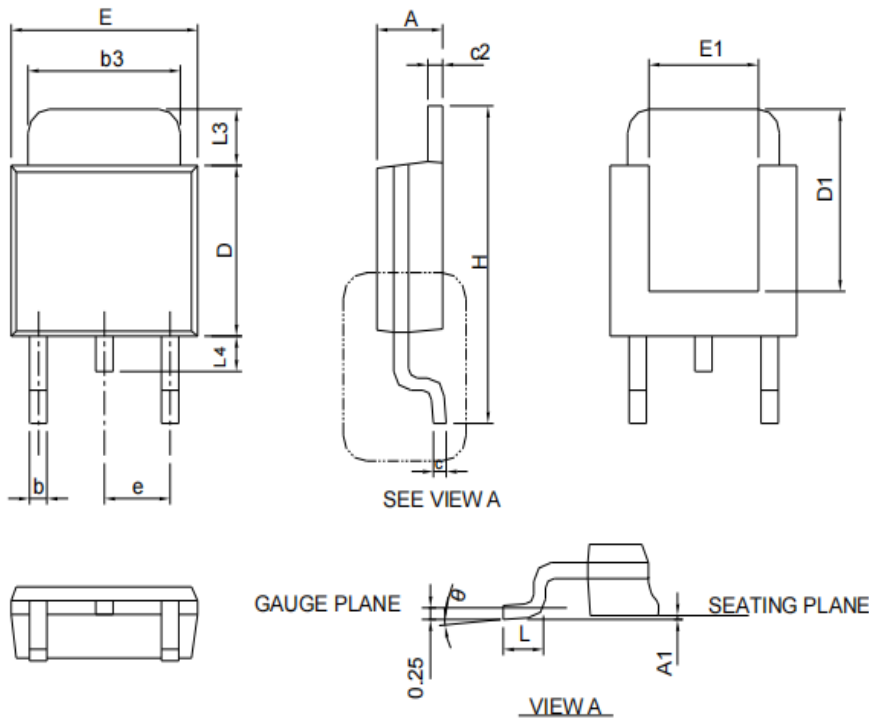






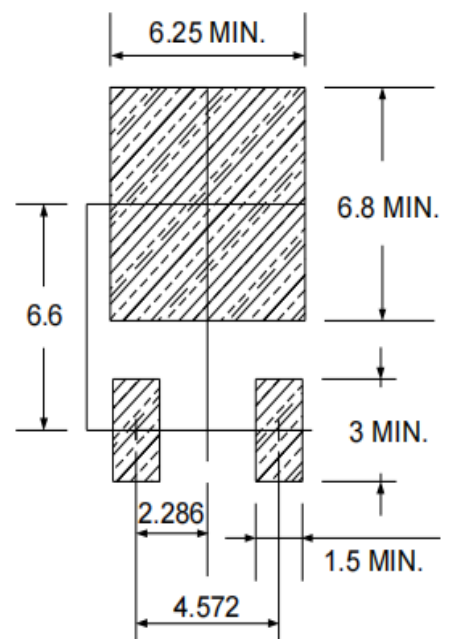
# Package Information

TO-252-2



DIMENSIONS	TO-252-2			
	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
$\theta$	0°	8°	0°	8°

## RECOMMENDED LAND PATTERN



UNIT: mm

Note : Follow JEDEC TO-252 .