

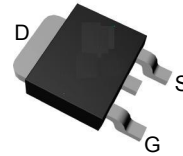
## Features

- 30V/60A,  
 $R_{DS(ON)} = 6.5\text{m}\Omega$  (Typ.) @  $V_{GS} = 10\text{V}$   
 $R_{DS(ON)} = 8.5\text{m}\Omega$  (Typ.) @  $V_{GS} = 4.5\text{V}$
- Reliable and Rugged
- Lead Free and Green Devices Available (RoHS Compliant)

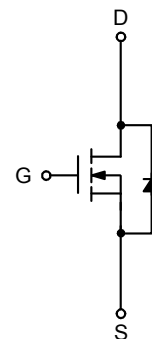
## Applications

- Power Management in Desktop Computer or DC/DC Converters.

## Pin Description



Top View of TO-252



N-Channel MOSFET

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

Symbol	Parameter	Rating	Unit	
<b>Common Ratings</b> ( $T_A=25^\circ\text{C}$ Unless Otherwise Noted)				
$V_{\text{DSS}}$	Drain-Source Voltage	30	V	
$V_{\text{GSS}}$	Gate-Source Voltage	$\pm 20$		
$T_J$	Maximum Junction Temperature	150	$^\circ\text{C}$	
$T_{\text{STG}}$	Storage Temperature Range	-55 to 150		
$I_S$	Diode Continuous Forward Current	$T_C=25^\circ\text{C}$ 60	A	
$I_D$	Continuous Drain Current	$T_C=25^\circ\text{C}$ 60		
		$T_C=100^\circ\text{C}$ 45		
$I_{\text{DM}}^{\text{a}}$	Pulsed Drain Current	$T_C=25^\circ\text{C}$ 180		
$P_D$	Maximum Power Dissipation	$T_C=25^\circ\text{C}$ 35.7	W	
		$T_C=100^\circ\text{C}$ 14.3		
$R_{\theta\text{JC}}$	Thermal Resistance-Junction to Case	Steady State	$3.5$	$^\circ\text{C/W}$
$R_{\theta\text{JA}}$	Thermal Resistance-Junction to Ambient	$t \leq 10\text{s}$	17	$^\circ\text{C/W}$
		Steady State	40	
$I_{\text{AS}}^{\text{b}}$	Avalanche Current, Single pulse ( $L=0.1\text{mH}$ )	19	A	
$E_{\text{AS}}^{\text{b}}$	Avalanche Energy, Single pulse ( $L=0.1\text{mH}$ )	18	mJ	

Note a: Pulse width limited by maximum junction temperature.

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

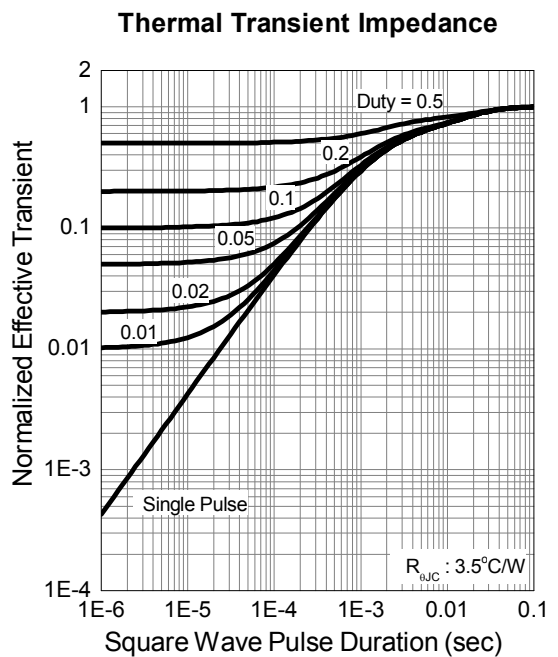
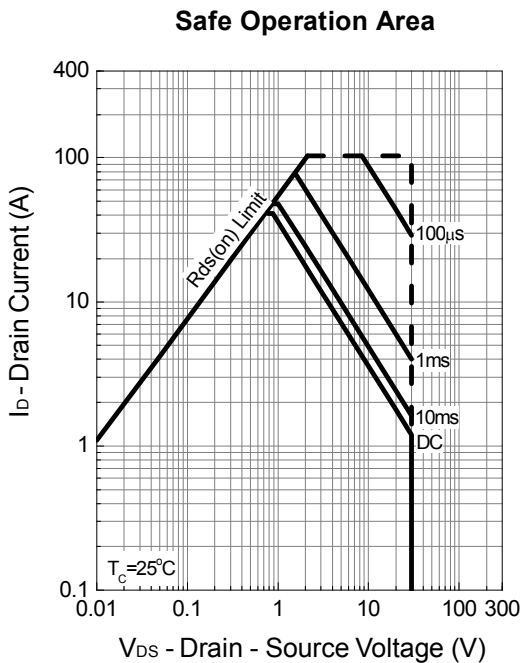
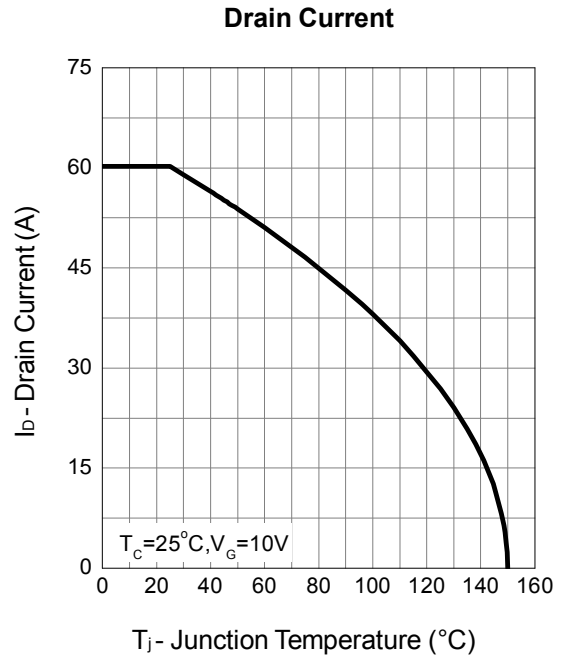
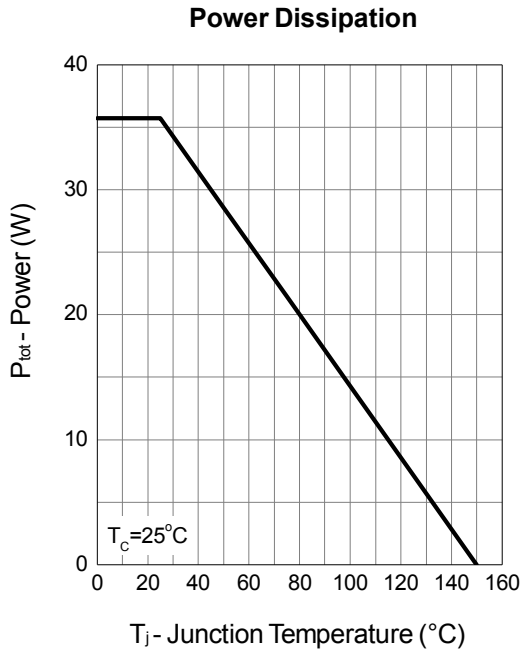
**Electrical Characteristics** ( $T_A = 25^\circ\text{C}$  Unless Otherwise Noted)

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
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=24V, V_{GS}=0V$	-	-	1	$\mu A$
		$T_J=85^\circ C$	-	-	30	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_{DS}=250\mu A$	1	1.65	2	V
$I_{GSS}$	Gate Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
$R_{DS(ON)}^c$	Drain-Source On-state Resistance	$V_{GS}=10V, I_{DS}=20A$	-	6.5	10	m $\Omega$
		$T_J=125^\circ C$	-	11.4	-	
		$V_{GS}=4.5V, I_{DS}=10A$	-	8.5	12	
Gfs	Forward Transconductance	$V_{DS}=5V, I_D=15A$	-	24	-	S
<b>Diode Characteristics</b>						
$V_{SD}^c$	Diode Forward Voltage	$I_{SD}=5A, V_{GS}=0V$	-	0.79	1.1	V
$t_{rr}$	Reverse Recovery Time	$I_F=20A, di_{SD}/dt=100A/\mu s$	-	6	-	ns
$t_a$	Charge Time		-	5	-	
$t_b$	Discharge Time		-	11	-	
$Q_{rr}$	Reverse Recovery Charge		-	4.8	-	
<b>Dynamic Characteristics<sup>d</sup></b>						
$R_G$	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1MHz$	1.5	2.3	3.5	$\Omega$
$C_{iss}$	Input Capacitance	$V_{GS}=0V, V_{DS}=15V, \text{Frequency}=1.0MHz$	700	780	1045	pF
$C_{oss}$	Output Capacitance		96	120	145	
$C_{rss}$	Reverse Transfer Capacitance		60	76	91	
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD}=15V, R_L=15\Omega, I_{DS}=1A, V_{GEN}=10V, R_G=1\Omega$	-	12	-	ns
$t_r$	Turn-on Rise Time		-	11.8	-	
$t_{d(OFF)}$	Turn-off Delay Time		-	23.2	-	
$t_f$	Turn-off Fall Time		-	4.4	-	
<b>Gate Charge Characteristics<sup>d</sup></b>						
$Q_g$	Total Gate Charge	$V_{DS}=15V, V_{GS}=10V, I_{DS}=20A$	-	16	20	nC
$Q_g$	Total Gate Charge	$V_{DS}=15V, V_{GS}=4.5V, I_{DS}=20A$	-	7.2	-	
$Q_{gth}$	Threshold Gate Charge		-	1.48	-	
$Q_{gs}$	Gate-Source Charge		-	3	-	
$Q_{gd}$	Gate-Drain Charge		-	2.7	-	

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

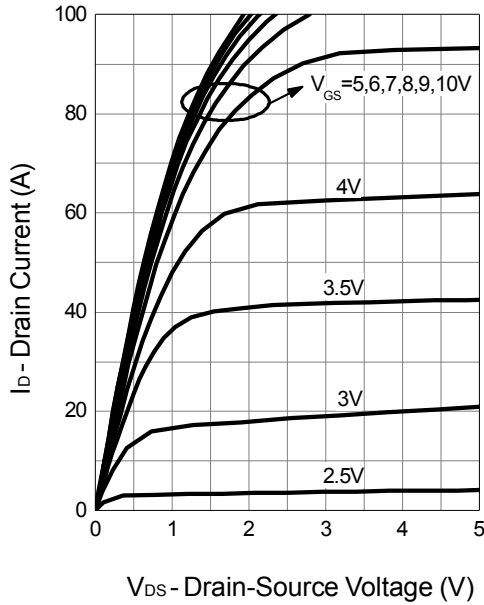
Note d: Guaranteed by design, not subject to production testing.

### Typical Operating Characteristics

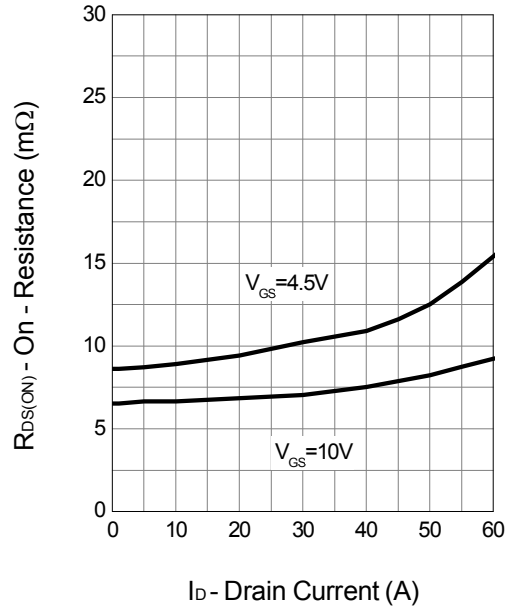


### Typical Operating Characteristics (Cont.)

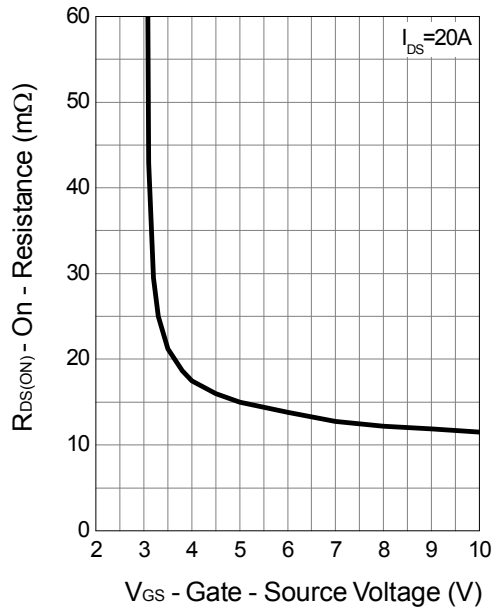
Output Characteristics



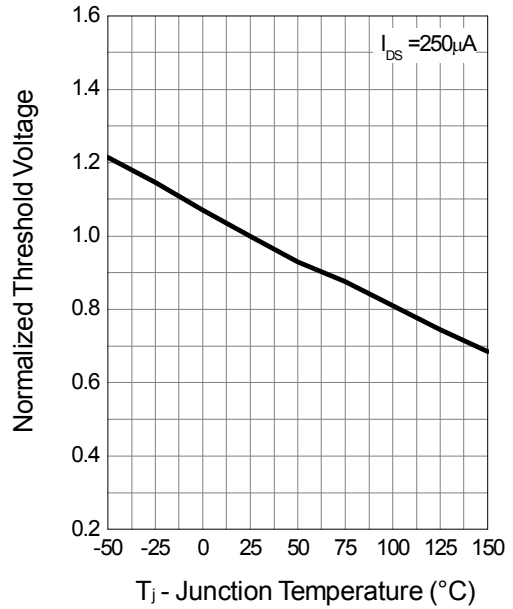
Drain-Source On Resistance



Gate-Source On Resistance

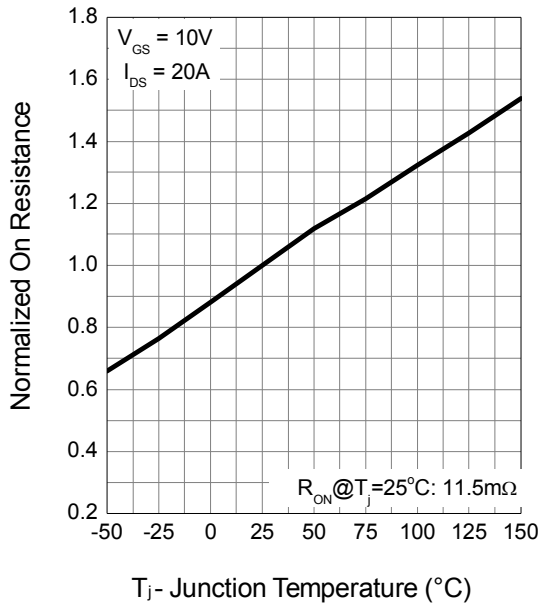


Gate Threshold Voltage

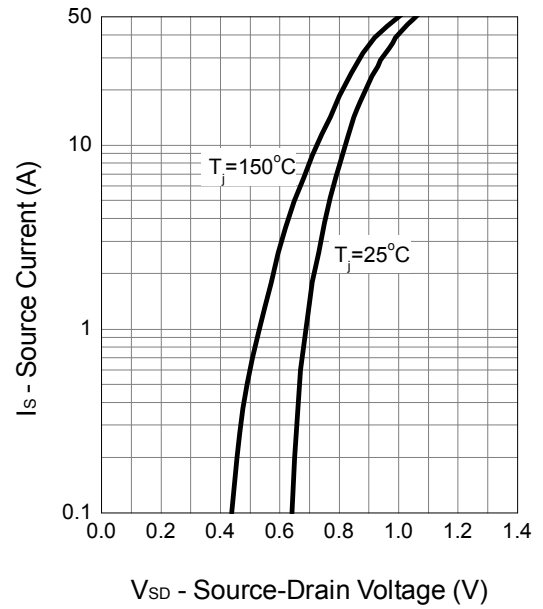


### Typical Operating Characteristics (Cont.)

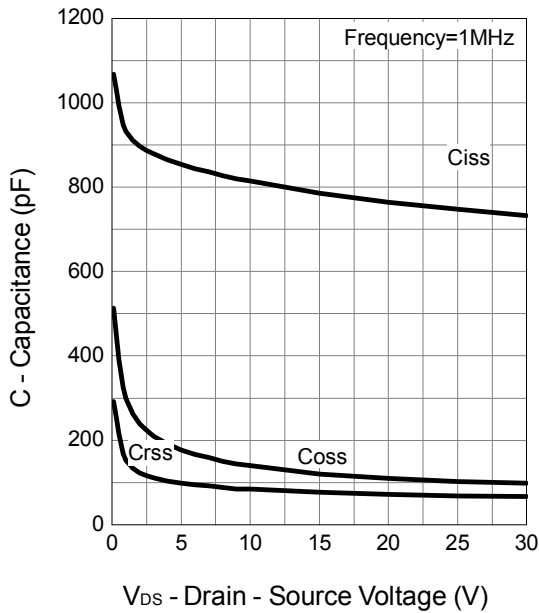
**Drain-Source On Resistance**



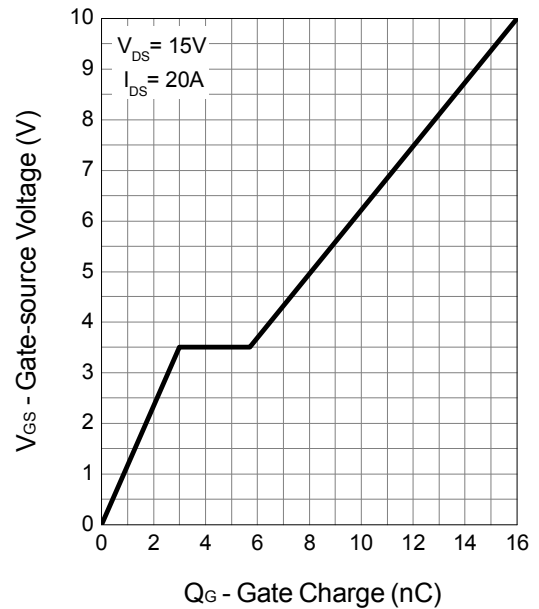
**Source-Drain Diode Forward**



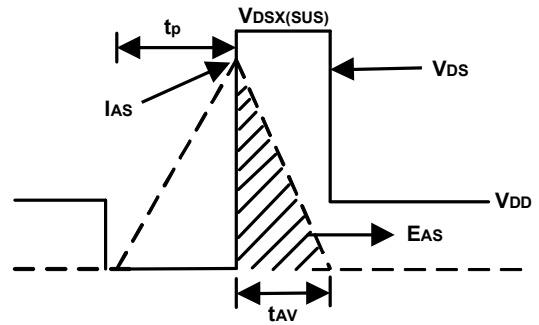
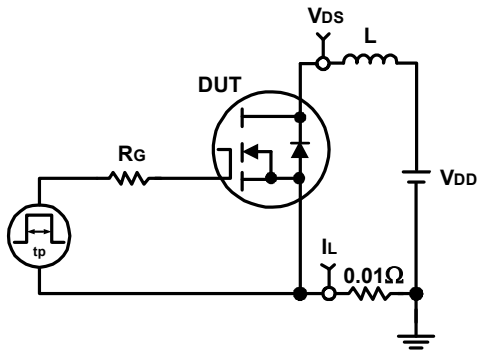
**Capacitance**



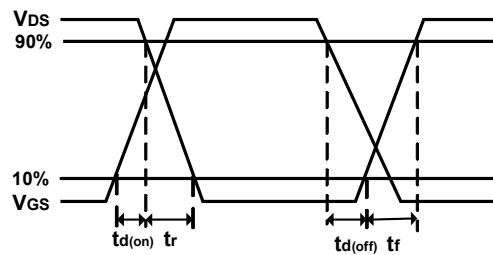
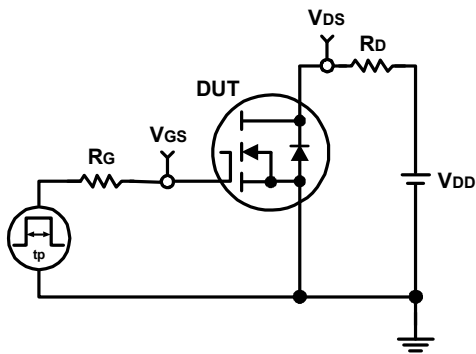
**Gate Charge**



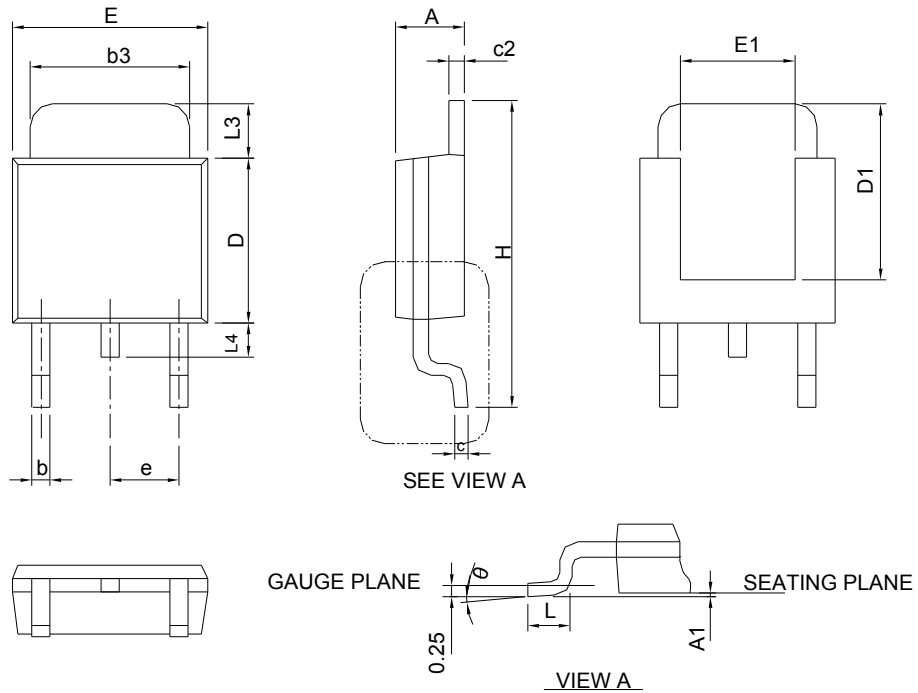
### Avalanche Test Circuit and Waveforms



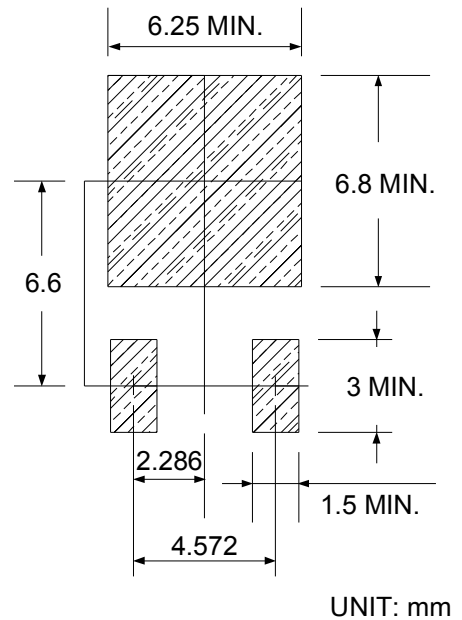
### Switching Time Test Circuit and Waveforms



## Package Information

**TO-252**


SYMBOL	TO-252			
	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 .