

Description

The 80N03B TO-251/TO-252 uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

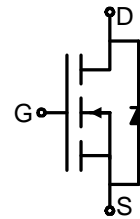
General Features

VDSS	RDS(on) typ	ID
30V	3.6 mΩ @10V	80A
	4.8 mΩ @4.5V	

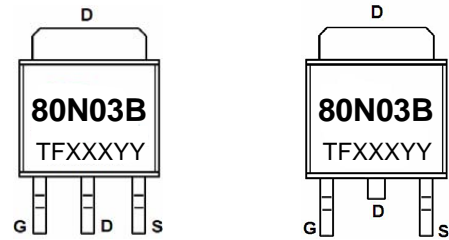
- High density cell design for ultra low Rdson
- Fully characterized avalanche voltage and current
- Excellent package for good heat dissipation

Application

- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply



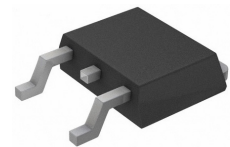
Schematic diagram



Marking and pin Assignment



TO-251



TO-252

Absolute Maximum Ratings ($T_A=25^{\circ}C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	80	A
Drain Current-Pulsed ^(Note 1)	I_{DM}	200	A
Maximum Power Dissipation	P_D	55	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	$^{\circ}C$

Thermal Characteristic

Thermal Resistance, Junction-to-Ambient ^(Note 2)	$R_{\theta JA}$	1.5	$^{\circ}C/W$
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Electrical Characteristics ($T_A=25^{\circ}C$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	30	32	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=28V, V_{GS}=0V$	-	-	500	nA



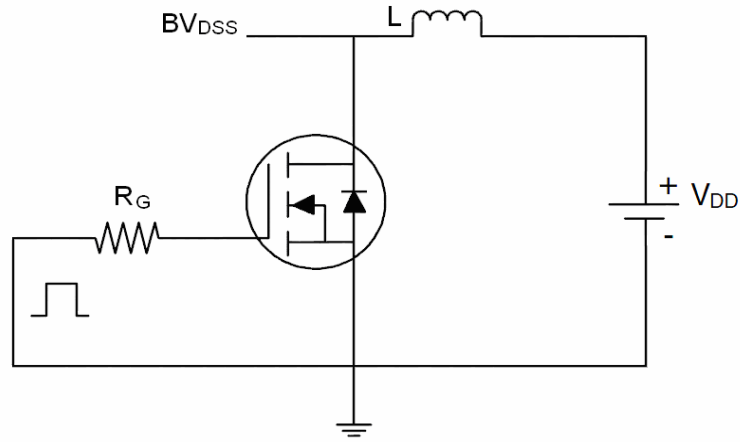
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1	1.3	2.0	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=30A$		3.6	5.5	m Ω
		$V_{GS}=4.5V, I_D=20A$		4.8	6.5	
Forward Transconductance	g_{FS}	$V_{DS}=5V, I_D=20A$	15			S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{iss}	$V_{DS}=15V, V_{GS}=0V,$ $F=1.0MHz$	-	2016	-	PF
Output Capacitance	C_{oss}		-	251	-	PF
Reverse Transfer Capacitance	C_{rss}		-	230	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=10V, I_D=30A$ $V_{GS}=10V, R_G=2.7\Omega$	-	20	-	nS
Turn-on Rise Time	t_r		-	15	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	60	-	nS
Turn-Off Fall Time	t_f		-	10	-	nS
Total Gate Charge	Q_g	$V_{DS}=10V, I_D=30A,$ $V_{GS}=10V$	-	60.5	-	nC
Gate-Source Charge	Q_{gs}		-	8.1	-	nC
Gate-Drain Charge	Q_{gd}		-	7.8	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	$V_{GS}=0V, I_S=30A$	-	0.90	12	V
Diode Forward Current (Note 2)	I_S		-	-	80	A

Notes:

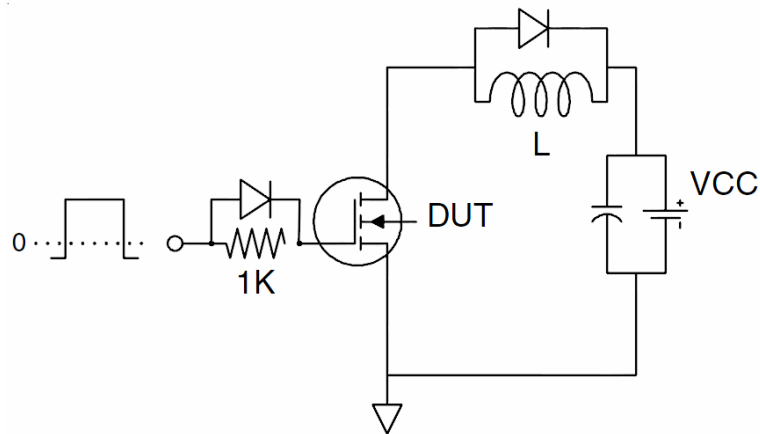
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production

Test Circuit

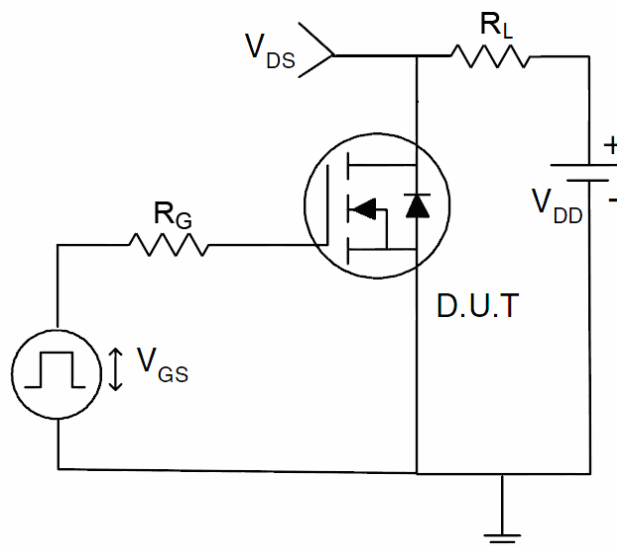
1) E_{AS} Test Circuits



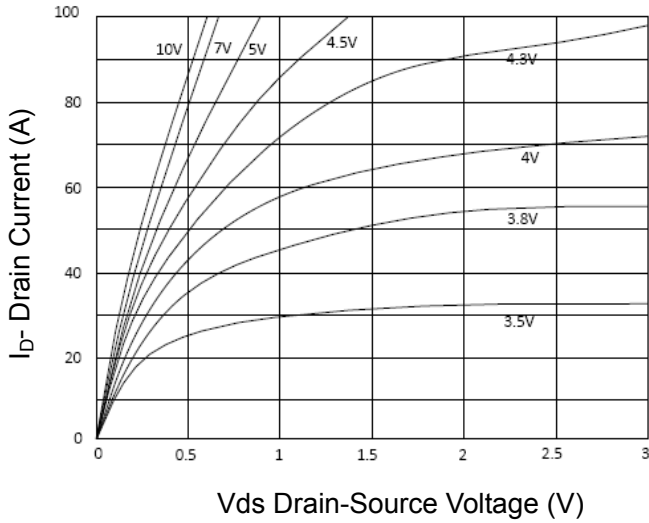
2) Gate Charge Test Circuit:



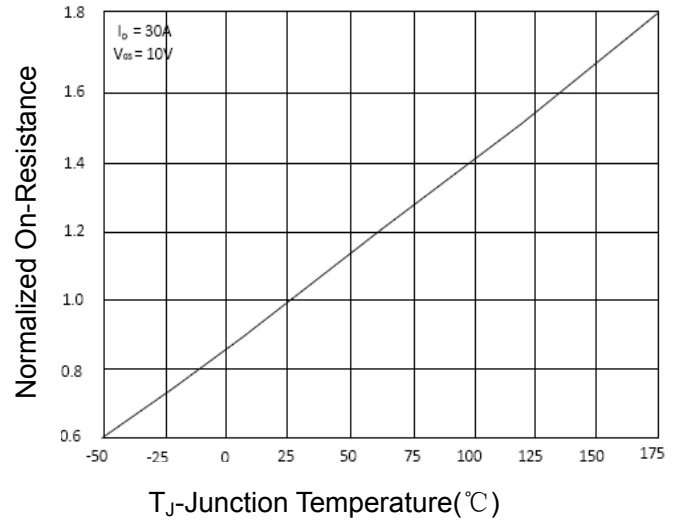
3) Switch Time Test Circuit:



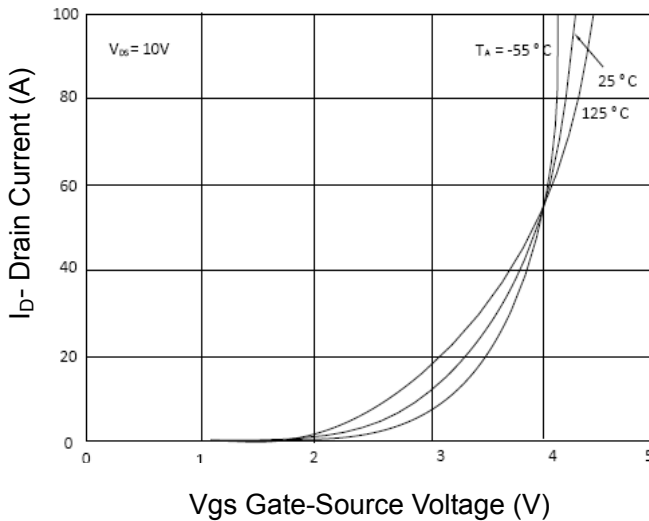
Typical Electrical and Thermal Characteristics (Curves)



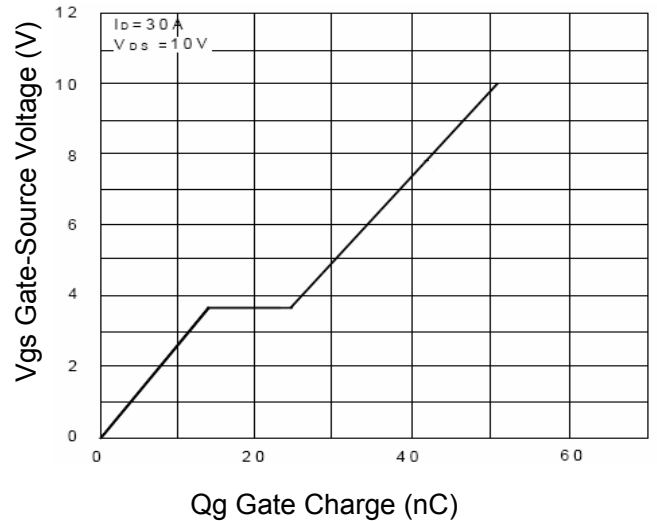
Vds Drain-Source Voltage (V)
Figure 1 Output Characteristics



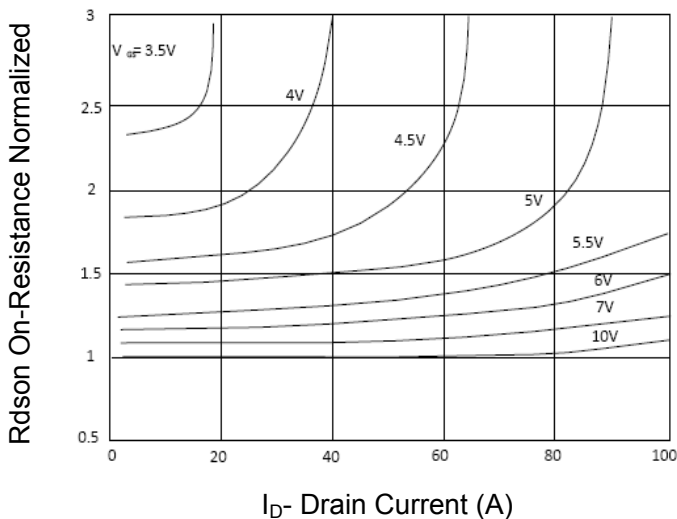
Tj-Junction Temperature(°C)
Figure 4 Rdson-Junction Temperature



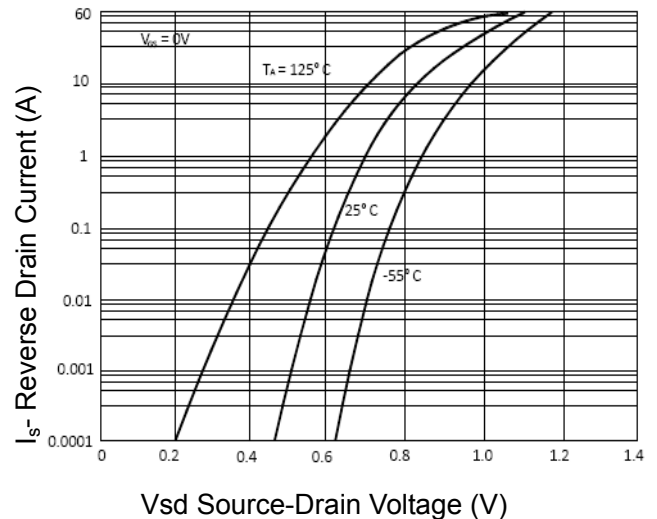
Vgs Gate-Source Voltage (V)
Figure 2 Transfer Characteristics



Qg Gate Charge (nC)
Figure 5 Gate Charge



Id- Drain Current (A)
Figure 3 Rdson- Drain Current



Vsd Source-Drain Voltage (V)
Figure 6 Source- Drain Diode Forward

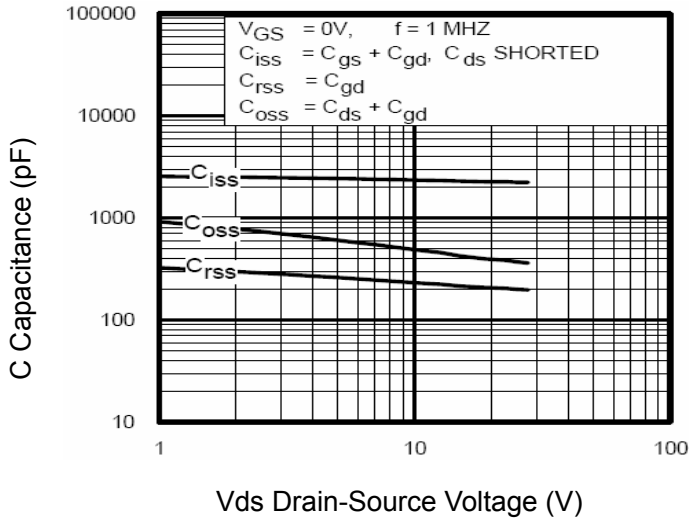


Figure 7 Capacitance vs Vds

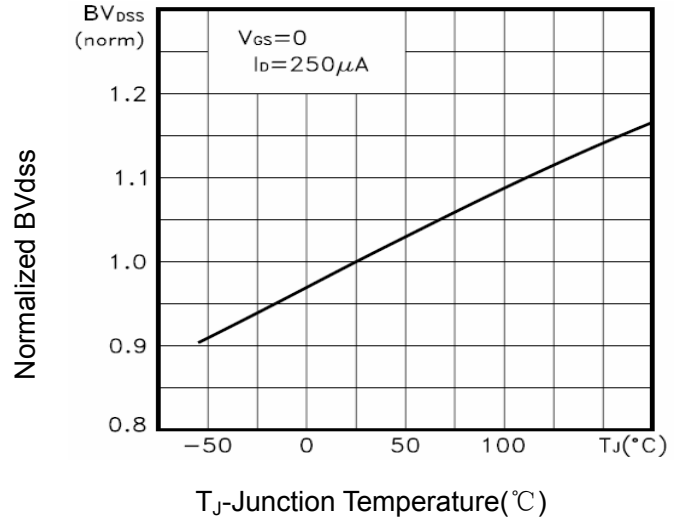


Figure 9 BV_{DSS} vs Junction Temperature

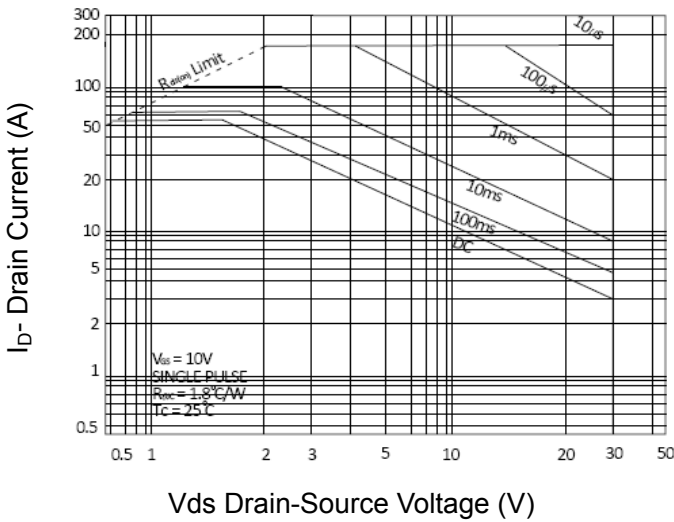


Figure 8 Safe Operation Area

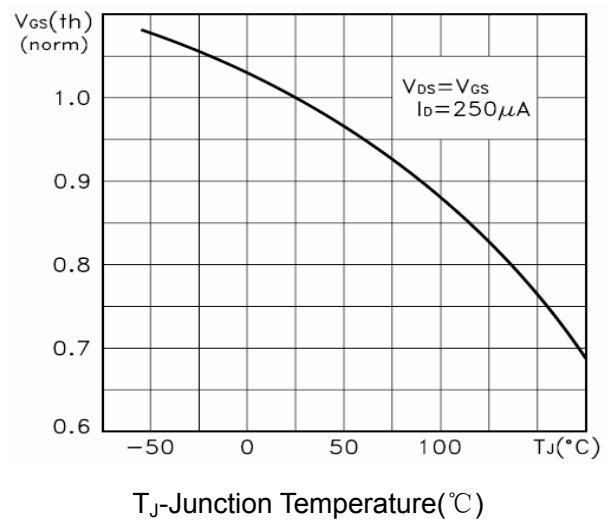


Figure 10 $V_{GS(th)}$ vs Junction Temperature

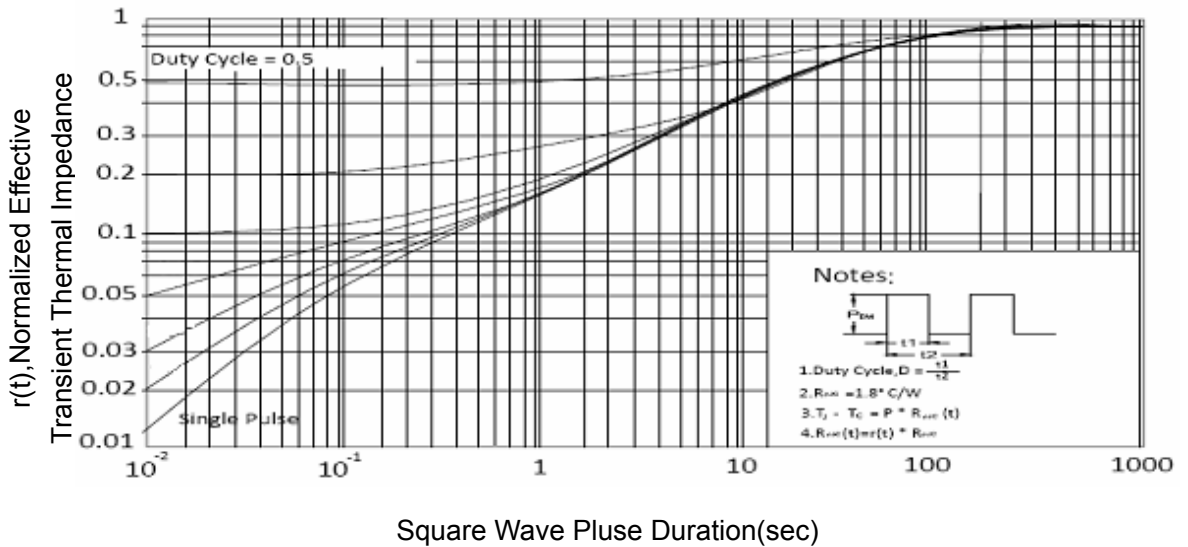
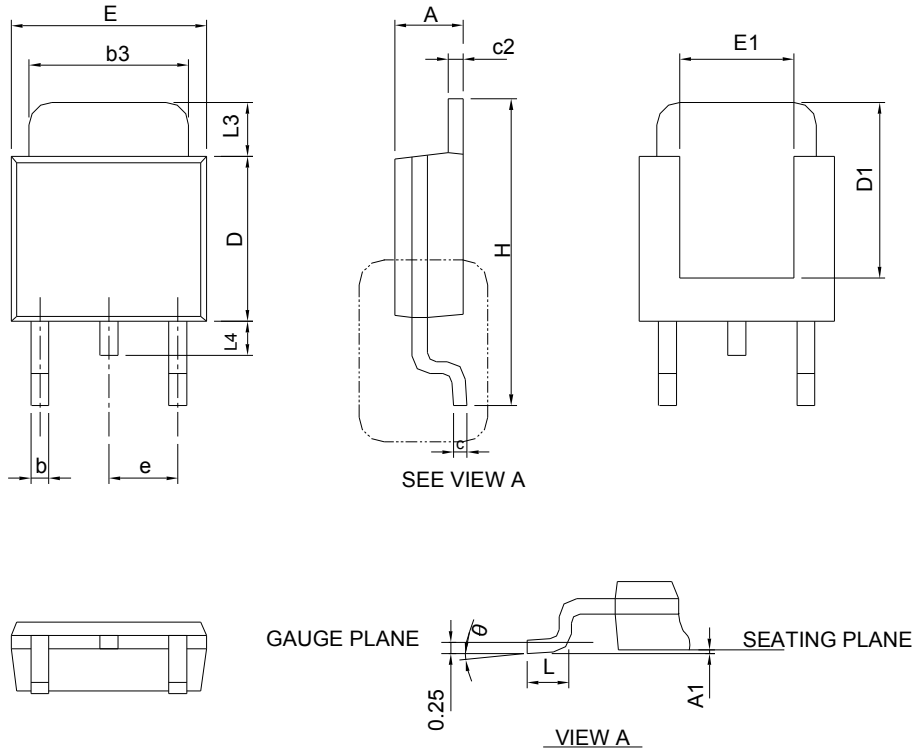


Figure 11 Normalized Maximum Transient Thermal Impedance

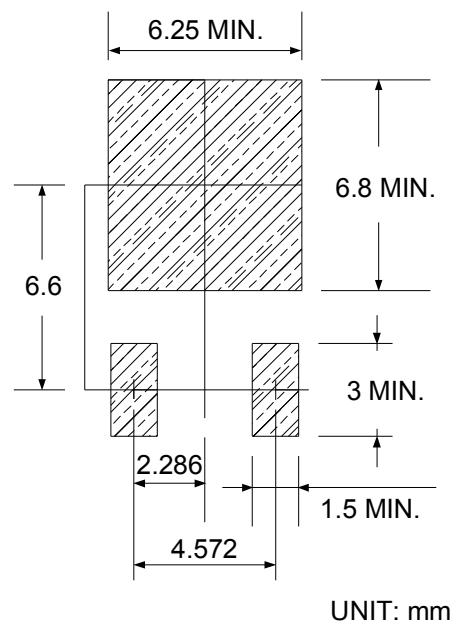
Package Information

TO-252-2L

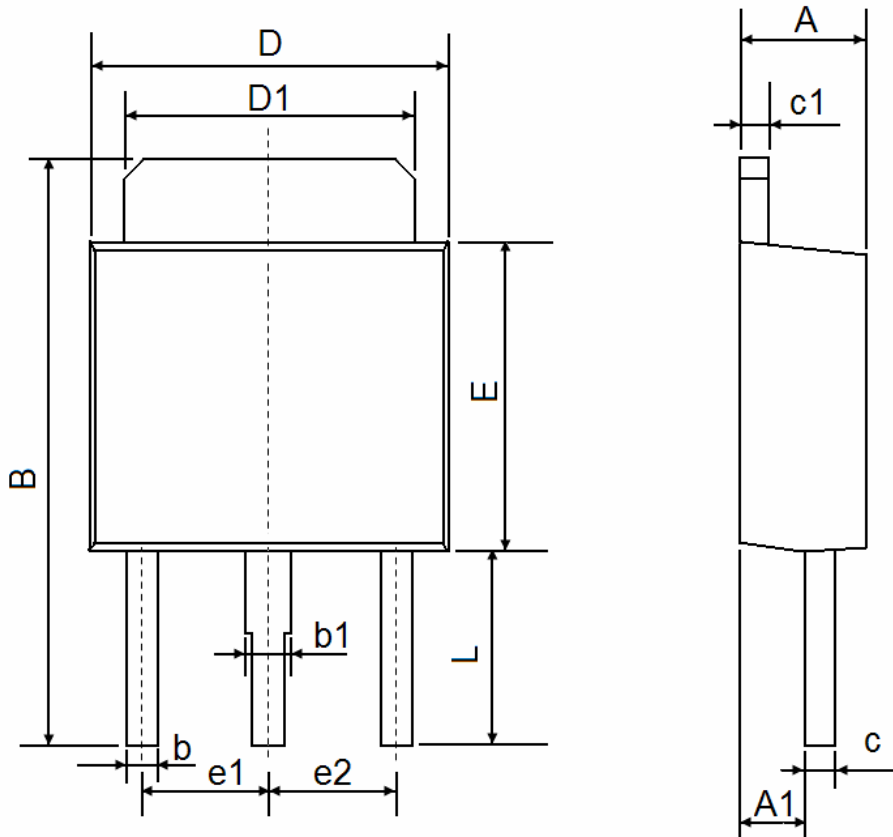


SYMBOL	TO-252-3			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	2.18	2.39	0.086	0.094
A1		0.13		0.005
b	0.50	0.89	0.020	0.035
b3	4.95	5.46	0.195	0.215
c	0.46	0.61	0.018	0.024
c2	0.46	0.89	0.018	0.035
D	5.33	6.22	0.210	0.245
D1	4.57	6.00	0.180	0.236
E	6.35	6.73	0.250	0.265
E1	3.81	6.00	0.150	0.236
e	2.29 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°

RECOMMENDED LAND PATTERN



TO-251S Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.250	2.350	0.089	0.093
A1	1.150	1.250	0.045	0.049
B	10.200	10.800	0.402	0.425
b	0.550	0.650	0.022	0.026
b1	0.750	0.850	0.030	0.033
c	0.480	0.540	0.019	0.021
c1	0.480	0.540	0.019	0.021
D	6.400	6.600	0.252	0.260
D1	5.250	5.350	0.207	0.211
E	5.400	5.600	0.213	0.220
e1	2.300 TYP		0.091 TYP	
e2	2.300 TYP		0.091 TYP	
L	3.300	3.700	0.130	0.146