N-Channel Enhancement Mode MOSFET

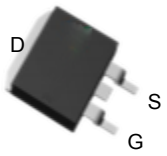
Features

- 40V/280A
  $R_{DS(ON)}$=1.8mΩ(typ.)@V_{GS}=10V
- 100% UIS + R_g Tested
- Reliable and Rugged
- Lead Free and Green Devices Available
  (RoHS Compliant)

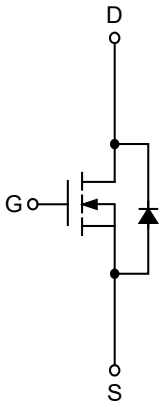
Applications

- SMPS Synchronous Rectification.
- BLDC Motor drive applications.
- Load Switch.
- DC-DC Conversion.
- Or-ing.

Pin Description



Top View of TO-263



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	280	A
I_D	Continuous Drain Current	T_C=25°C	280	
	Continuous Drain Current	T_C=100°C	112	
I_{DM} [b]	Pulsed Drain Current	T_C=25°C	840	
P_D	Maximum Power Dissipation	T_C=25°C	136	W
		T_C=100°C	68	
$R_{\theta JC}$	Thermal Resistance-Junction to Case	Steady State	1.1	°C/W
I_D	Continuous Drain Current	T_A=25°C	25.5	A
		T_A=70°C	21.3	
I_{DM} [b]	Pulsed Drain Current	T_A=25°C	102	
P_D	Maximum Power Dissipation	T_A=25°C	2.4	W
		T_A=70°C	1.68	
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient	Steady State	62.5	°C/W
I_{AS} [c]	Avalanche Current, Single pulse	L=0.1mH	139	A
E_{AS} [c]	Avalanche Energy, Single pulse	L=0.1mH	968	mJ

Note a : Maximum continuous current is limited by bonding wire.
Note b : Pulse width limited by maximum junction temperature.
Note c : UIS tested and pulse width limited by maximum junction temperature (initial temperature T_j=25°C).

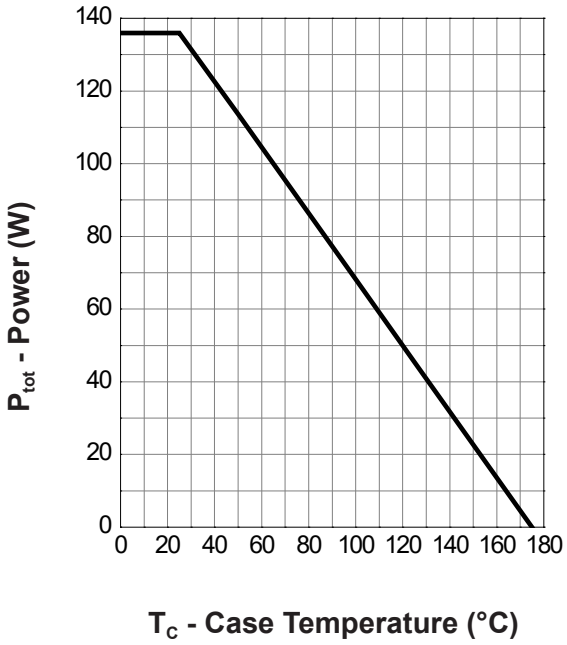
Electrical Characteristics (T_A = 25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_{DS}=250μA	40	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=24V, V_{GS}=0V	-	-	1	μA
		T_J=85°C	-	-	30	
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_{DS}=250μA	2	3	4	V
I_{GSS}	Gate Leakage Current	V_{GS}=±20V, V_{DS}=0V	-	-	±100	nA
$R_{DS(ON)}$ [d]	Drain-Source On-state Resistance	V_{GS}=10V, I_{DS}=20A	-	1.8	2.2	mΩ
Gfs	Forward Transconductance	V_{DS}=5V, I_{DS}=15A	-	41.5	-	S
Diode Characteristics						
V_{SD} [d]	Diode Forward Voltage	I_{SD}=20A, V_{GS}=0V	-	0.8	1.1	V
t_{rr}	Reverse Recovery Time	I_{SD}=20A, dI_{SD}/dt=100A/μs	-	44.2	-	ns
t_a	Charge Time		-	22.6	-	
t_b	Discharge Time		-	21.6	-	
Q_{rr}	Reverse Recovery Charge		-	42.7	-	nC
Dynamic Characteristics [e]						
R_G	Gate Resistance	V_{GS}=0V,V_{DS}=0V,F=1MHz	-	2	4	Ω
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=20V, Frequency=1.0MHz	-	4690	6097	pF
C_{oss}	Output Capacitance		-	1235	-	
C_{rss}	Reverse Transfer Capacitance		-	190	-	
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}=20V, R_L=20Ω, I_{DS}=1A, V_{GEN}=10V, R_G=6Ω	-	18.4	34	ns
t_r	Turn-on Rise Time		-	13.6	25	
$t_{d(OFF)}$	Turn-off Delay Time		-	60.9	110	
t_f	Turn-off Fall Time		-	107.6	194	
Gate Charge Characteristics [e]						
Q_g	Total Gate Charge	V_{DS}=20V, V_{GS}=10V, I_{DS}=20A	-	60.6	84.8	nC
Q_{gth}	Threshold Gate Charge		-	13.3	-	
Q_{gs}	Gate-Source Charge		-	18.4	-	
Q_{gd}	Gate-Drain Charge		-	9	-	

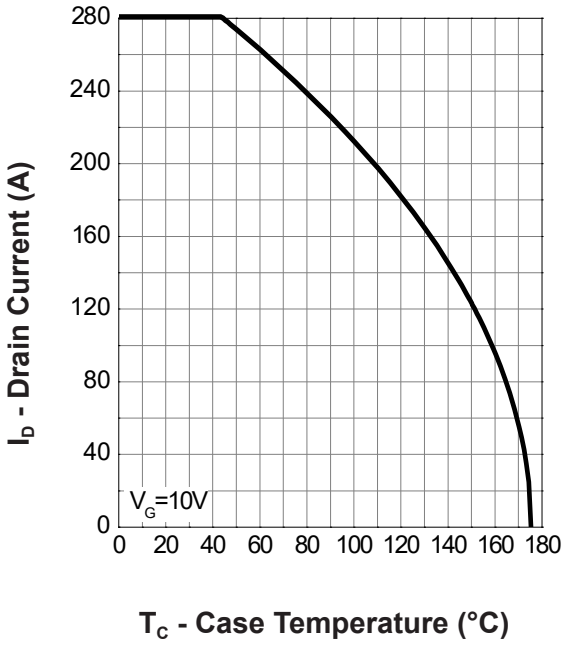
Note d：Pulse test ; pulse width≤300μs, duty cycle≤2%.
Note e：Guaranteed by design, not subject to production testing.

Typical Operating Characteristics

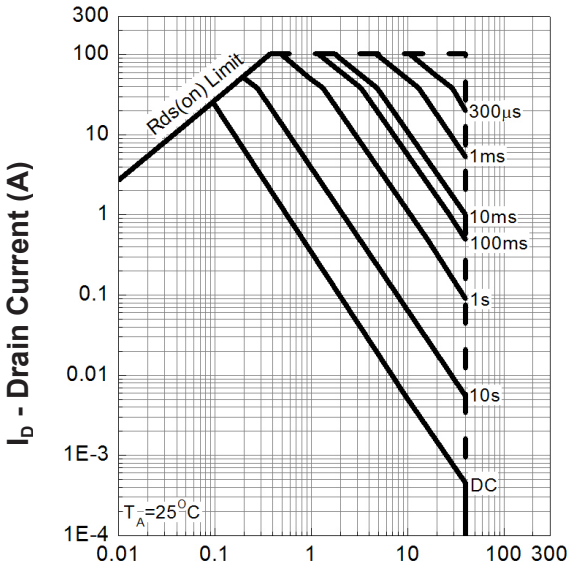
Power Dissipation



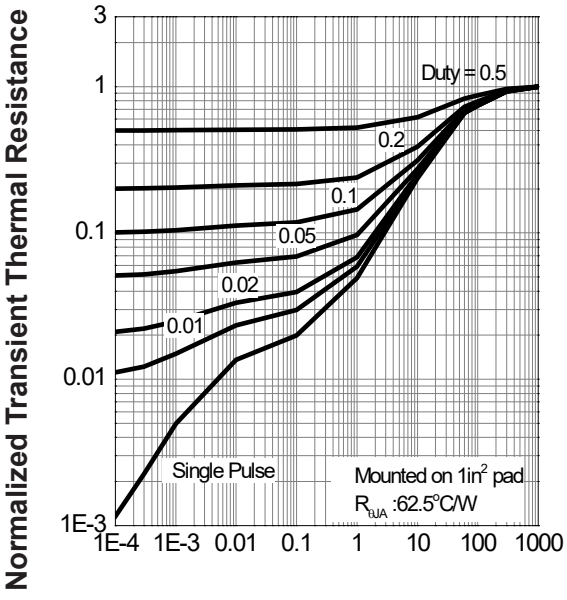
Drain Current



Safe Operation Area

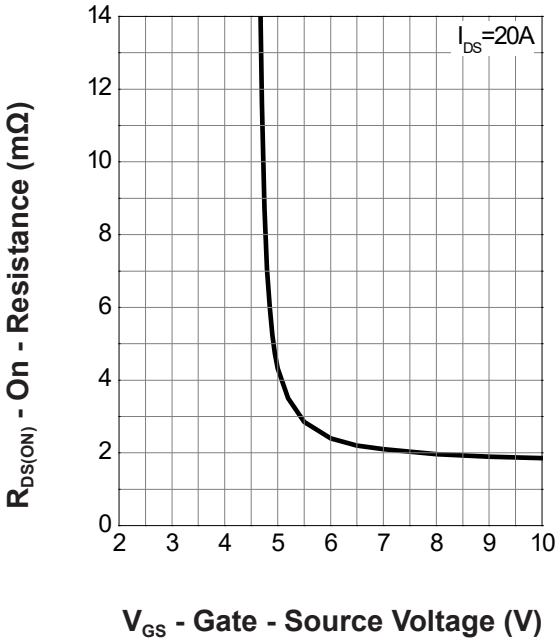


Thermal Transient Impedance

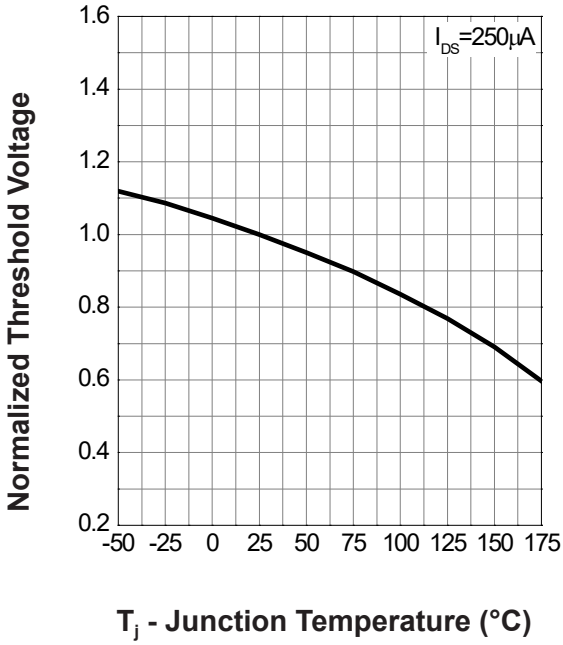


Typical Operating Characteristics(Cont.)

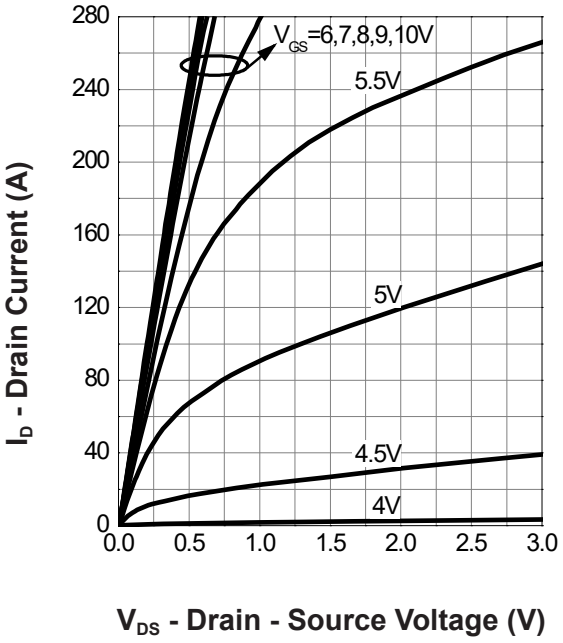
Gate-Source On Resistance



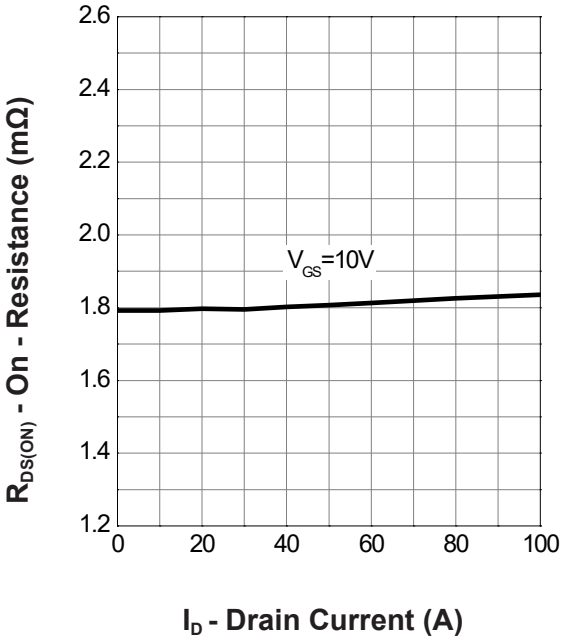
Gate Threshold Voltage



Output Characteristics

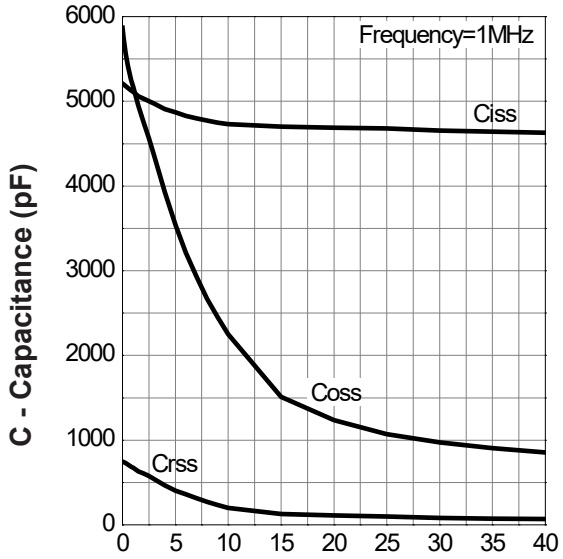


Drain-Source On Resistance

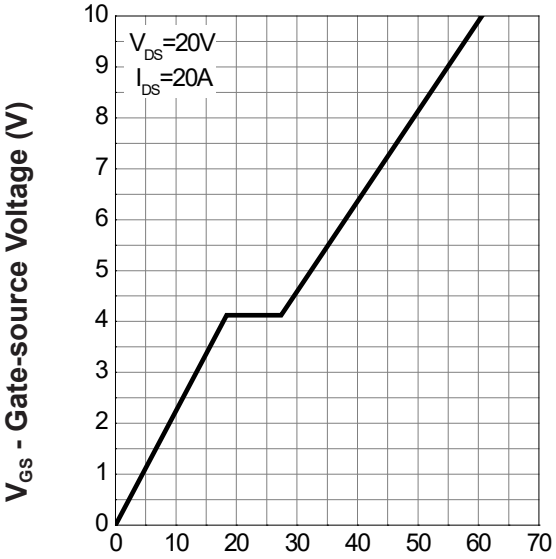


Typical Operating Characteristics(Cont.)

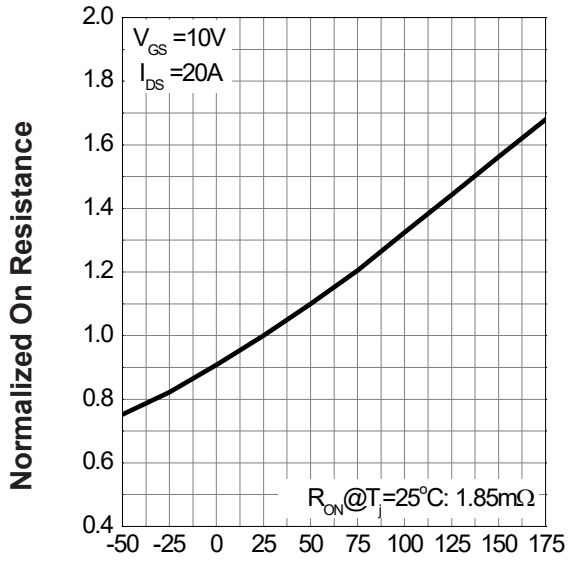
Capacitance



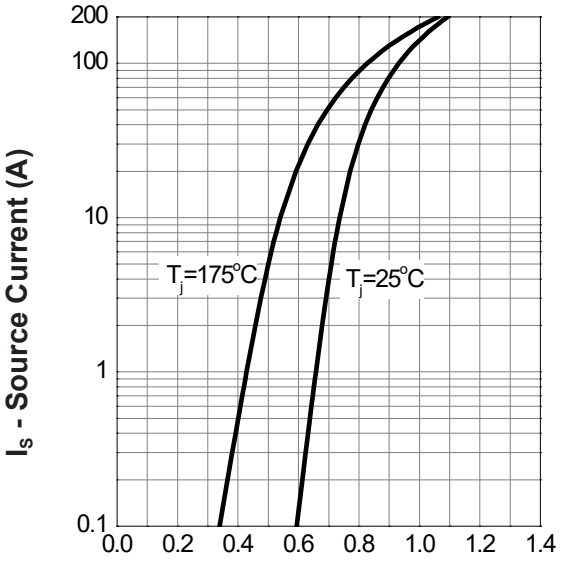
Gate Charge



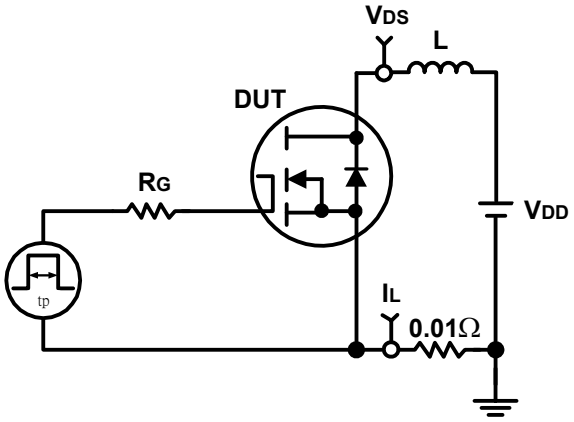
Drain-Source On Resistance

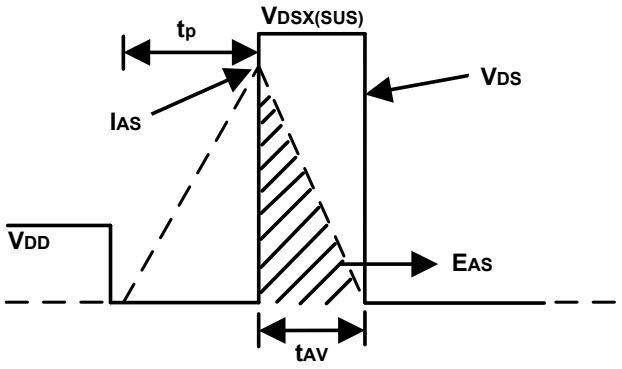


Source-Drain Diode Forward

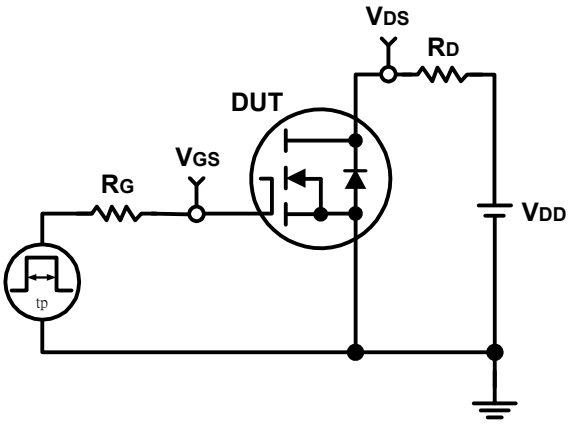


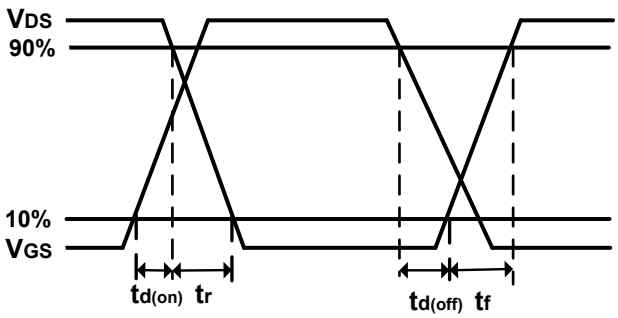
Avalanche Test Circuit and Waveforms





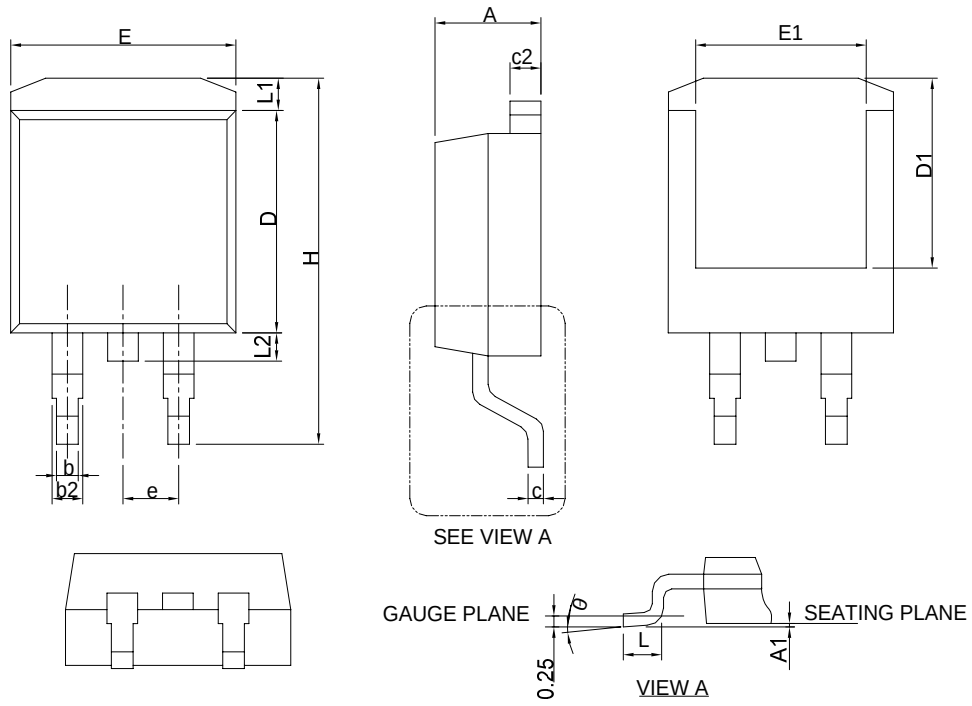
Switching Time Test Circuit and Waveforms





Package Information

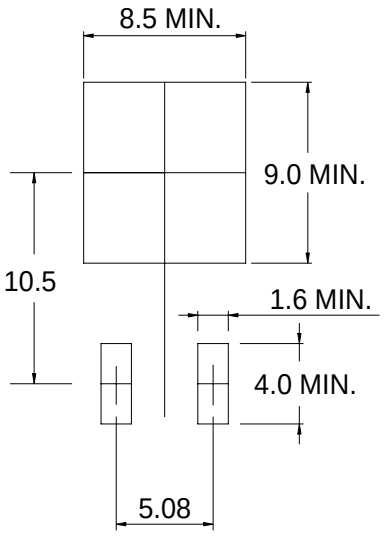
TO-263



SYMBOL	TO-263			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.06	4.83	0.160	0.190
A1	0.00	0.25	0.000	0.010
b	0.51	0.99	0.020	0.039
b2	1.14	1.78	0.045	0.070
c	0.38	0.74	0.015	0.029
c2	1.14	1.65	0.045	0.065
D	8.38	9.65	0.330	0.380
D1	6.00	9.00	0.236	0.354
E	9.65	11.43	0.380	0.450
E1	6.22	9.00	0.245	0.354
e	2.54 BSC		0.100 BSC	
H	14.61	15.88	0.575	0.625
L	1.78	2.79	0.070	0.110
L1	-	1.68	-	0.066
L2	-	1.78	-	0.070
θ	0°	8°	0°	8°

Note : Follow JEDEC TO-263 AB.

RECOMMENDED LAND PATTERN



UNIT: mm