FH3210BS

N-Channel SGT Power MOSFET

◆ General Description

This N channel SGT MOSFET has been designed to very low on-state resistance and superior E_{AS} performance, especially for BMS and Motor driving applications.

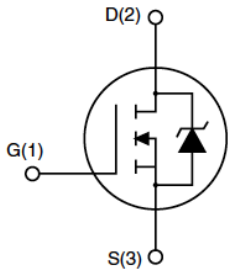
◆ Features

- $R_{DS(ON)}$ ≦5.4mΩ@V_{GS}=10V
- Super high density cell design for extremely low $R_{DS(ON)}$
- Exceptional on-resistance and maximum DC current capability

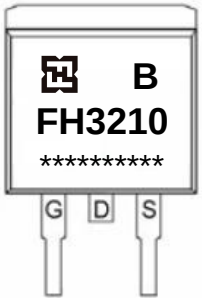
◆ Applications

- Power Management
- DC/DC Converter
- Load Switch

TO-263



Schematic diagram



Marking and pin assignment

TO-263 top view

Maximum Ratings (T_A = 25°C unless otherwise noted)

Symbol	Parameter	Value	Units
V_{DS}	Drain-Source Voltage	100	V
I_D	Drain Current - Continuous (T_C = 25°C) (Note 1)	120	A
	Drain Current - Continuous (T_C = 100°C)	84	A
I_{DM}	Drain Current - Pulsed (Note 2)	440	A
V_{GS}	Gate-Source Voltage	± 20	V
E_{AS}	Single Pulsed Avalanche Energy (Note 3)	225	mJ
P_D	Power Dissipation (T_C = 25°C)	192	W
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	°C
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case, Steady-State	0.65	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient, Steady State (Note 4)	55	°C/W

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 μA	100			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 100 V, V_{GS} = 0 V,			1	μA
I_{GSS}	Gate Leakage Current	V_{GS} = ± 20 V, V_{DS} = 0 V			±100	nA
$V_{GS(TH)}$	Gate Threshold voltage	V_{DS} = V_{GS}, I_D = 250 μA	2	3	4	V
$R_{DS(ON)}$	Drain-Source on-state resistance	V_{GS} = 10 V, I_D = 20 A		4.5	5.4	mΩ
Dynamic Characteristics						
C_{ISS}	Input Capacitance	V_{DS} = 50 V, V_{GS} = 0 V, F = 1 MHz		3244		pF
C_{OSS}	Output Capacitance			1077		pF
C_{RSS}	Reverse Transfer Capacitance			52		pF
R_G	Gate Resistance	F = 1 MHz		3.5		Ω
Switching Characteristics						
$T_{D(ON)}$	Turn On Delay Time	V_{DD} = 50 V , R_L = 2.5 Ω, V_{GS} = 10 V, R_G = 6 Ω		22		nS
T_R	Rise Time			36		nS
$T_{D(OFF)}$	Turn Off Delay Time			49		nS
T_F	Fall Time			31.5		nS
Q_G	Total Gate Charge	V_{DD} = 50 V , I_D = 20 A, V_{GS} = 10 V		51.3		nC
Q_{GS}	Gate-Source Charge			15.2		nC
Q_{GD}	Gate-Drain Charge			13.1		nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Body-Diode Forward Current				120	A
I_{SM}	Maximum Pulsed Body-Diode Forward Current (NOTE 1)				440	A
V_{SD}	Diode Forward Voltage	V_{GS} = 0 V, I_S = 1 A		0.7	1	V
T_{RR}	Reverse recovery time	V_{DD} = 50 V, I_D = 15 A, di/dt = 100 A/μS		58		ns
Q_{RR}	Reverse recovery charge			90.0		nC
I_{RRM}	Peak Reverse Recovery Current			2.6		A

Notes:

1. The max drain current rating is package limited
2. Repetitive Rating: Pulse width limited by maximum junction temperature
3. L = 0.5 mH, V_{DD} = 50V, I_{AS} = 30 A, R_G = 25 Ω, Starting T_J = 25 °C
4. Mount on minimum PCB layout

Electrical Characteristics Diagrams

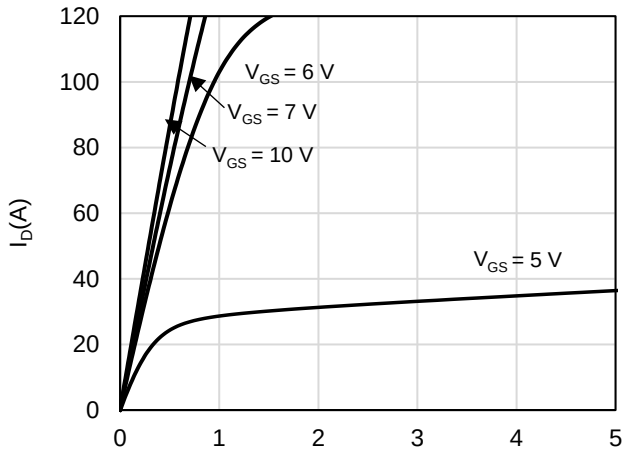


Figure 1: On-Region Characteristics

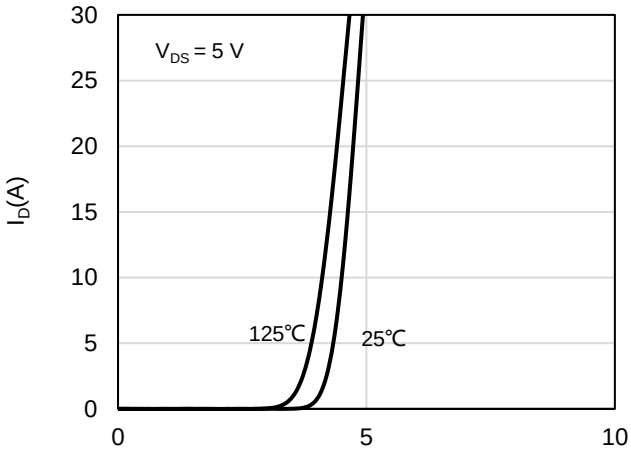


Figure 2: Transfer Characteristics

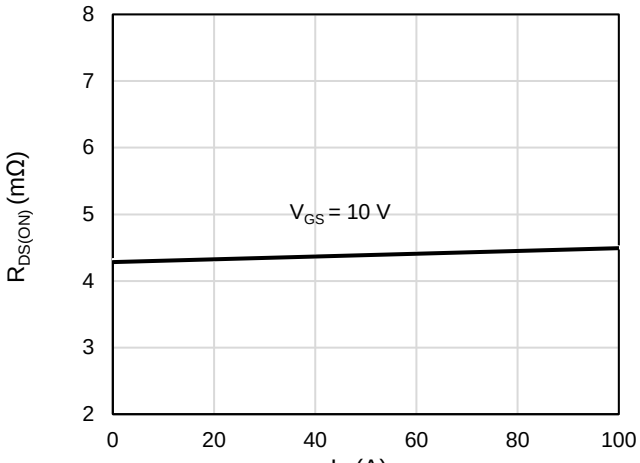


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

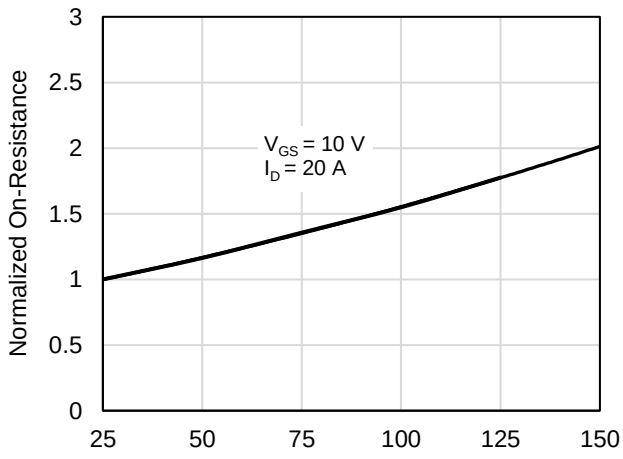


Figure 4: On-Resistance vs. Junction Temperature

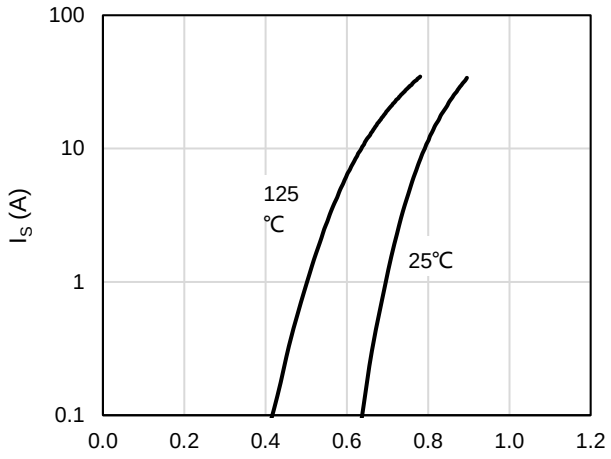


Figure 7: Body-Diode Characteristics

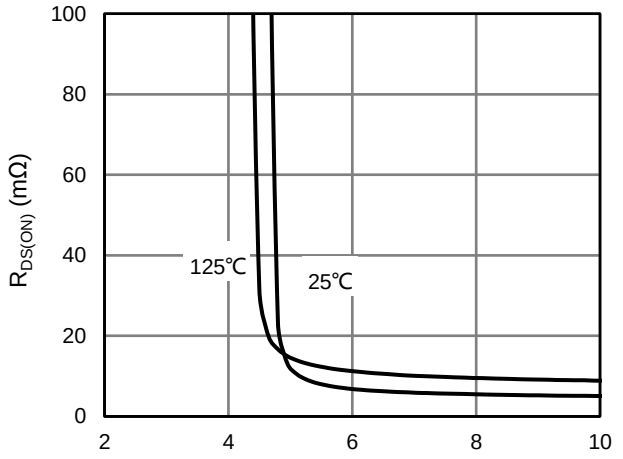


Figure 8: On-Resistance vs. Gate-Source Voltage

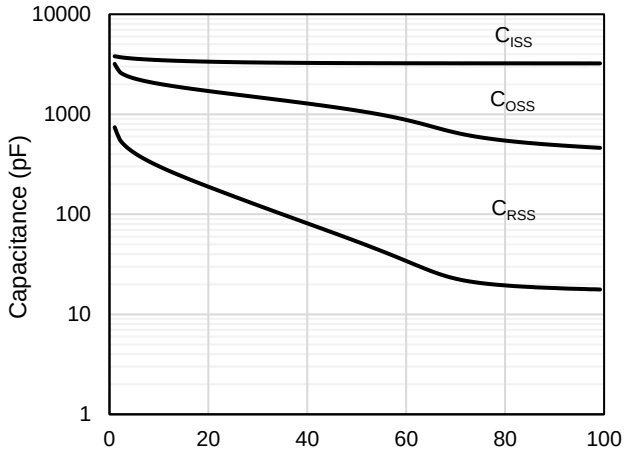


Figure 9: Capacitance Characteristics

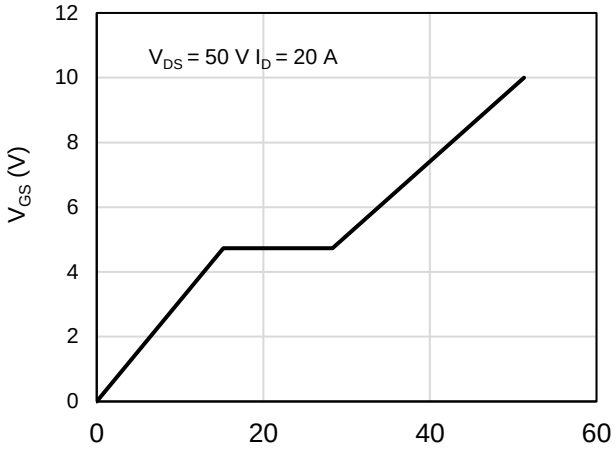


Figure 10: Gate-Charge Characteristics

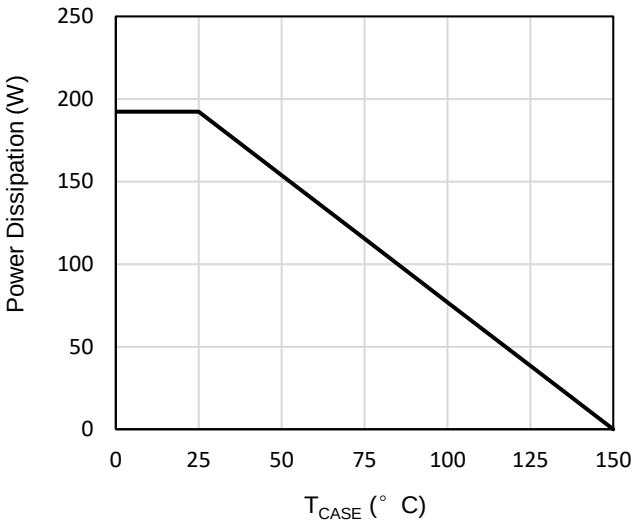


Figure 11: Power De-rating

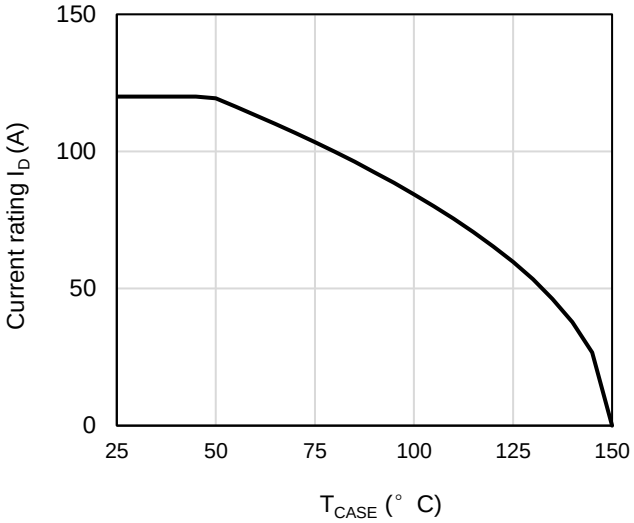


Figure 12: Current De-rating

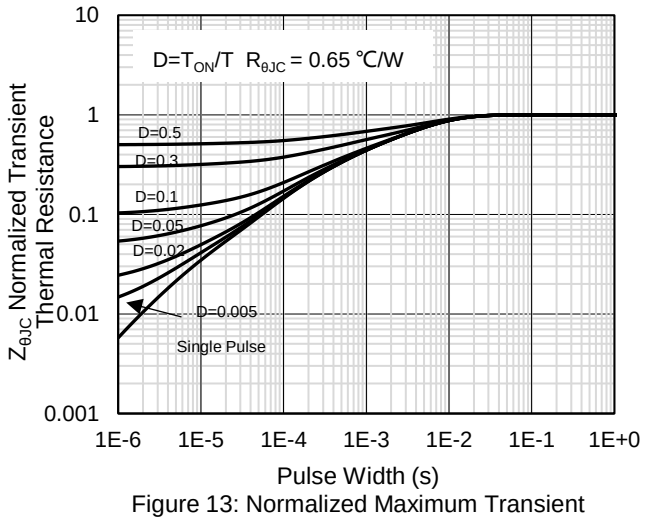


Figure 13: Normalized Maximum Transient Thermal Impedance

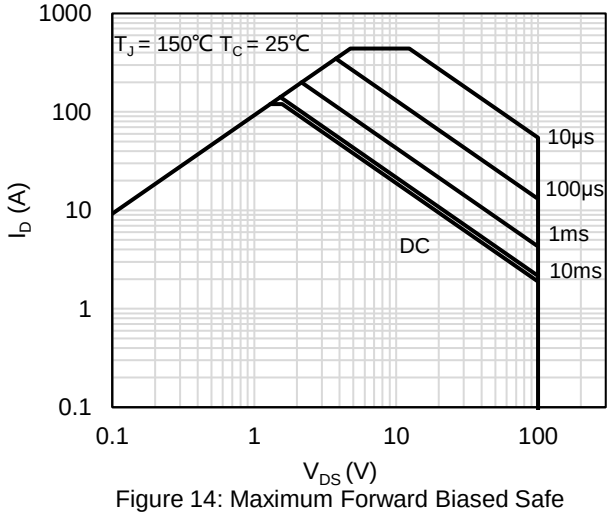
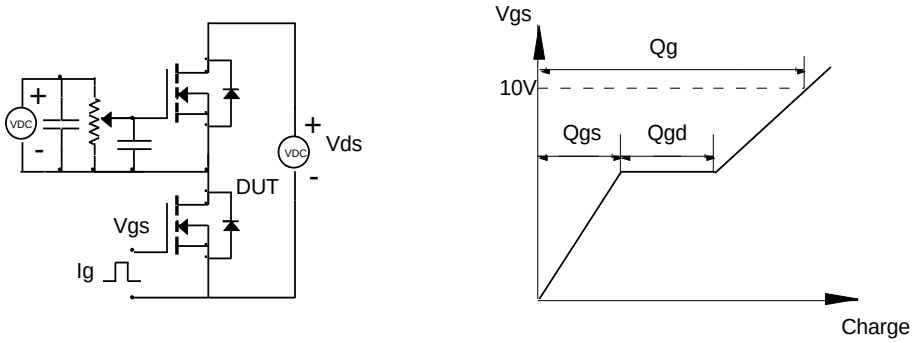


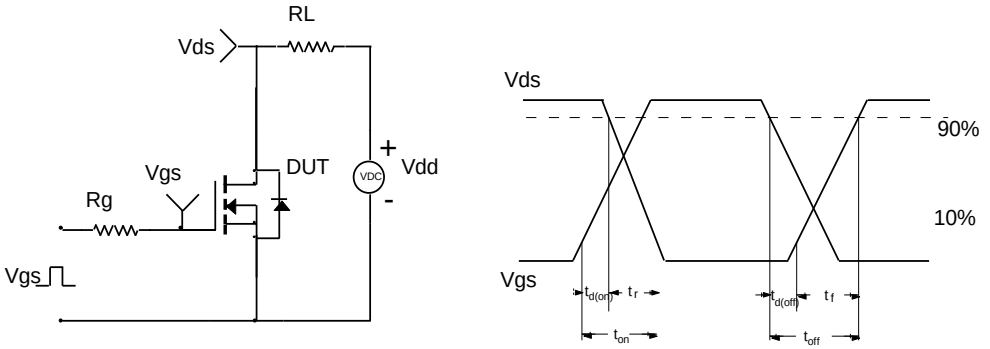
Figure 14: Maximum Forward Biased Safe Operating Area

Test Circuit and Waveform

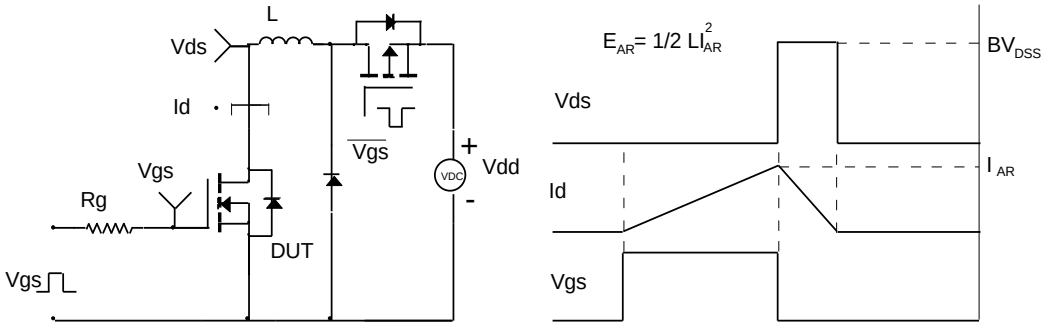
Gate Charge Test Circuit & Waveform



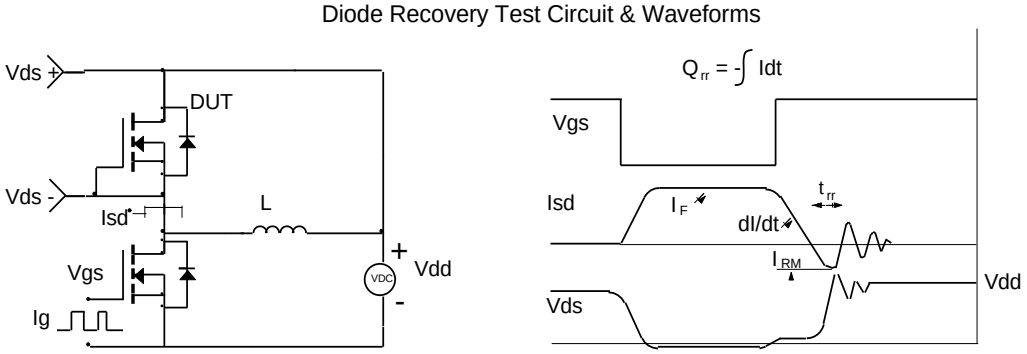
Resistive Switching Test Circuit & Waveforms



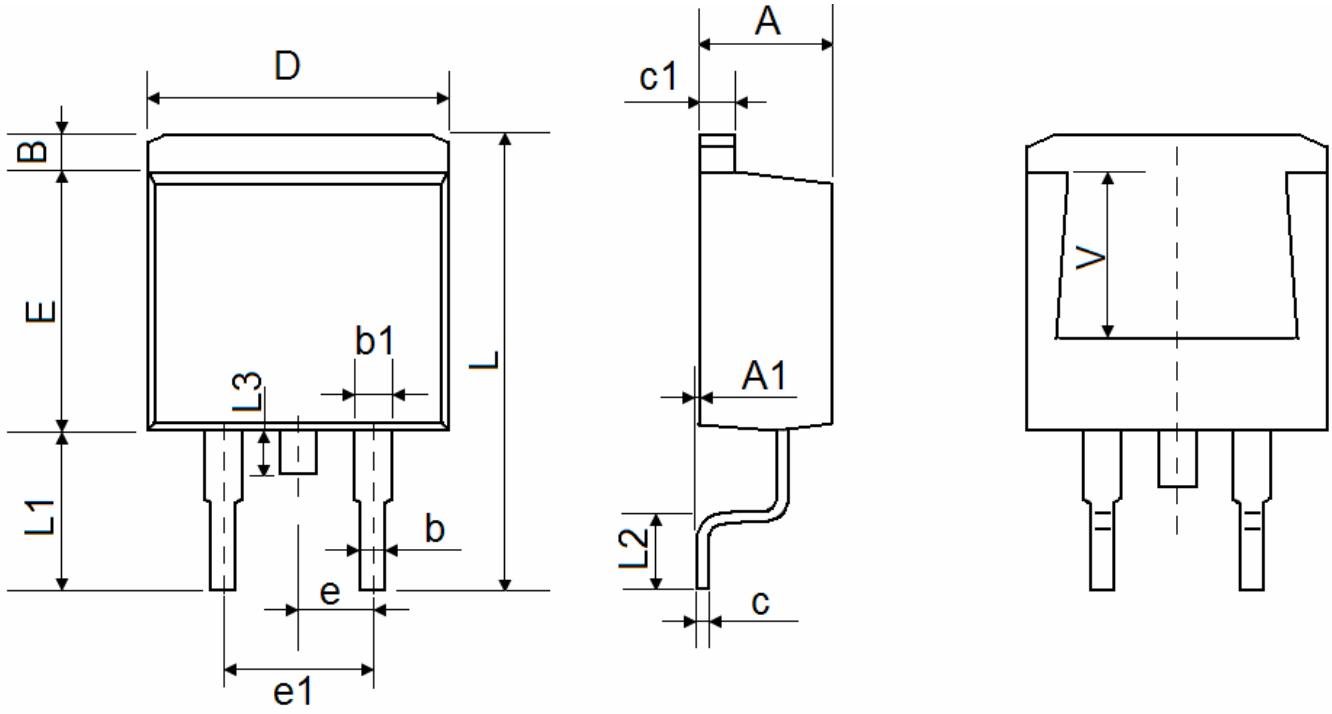
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Information ：TO-263



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.470	4.670	0.176	0.184
A1	0.000	0.150	0.000	0.006
B	1.170	1.370	0.046	0.054
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.310	0.530	0.012	0.021
c1	1.170	1.370	0.046	0.054
D	10.010	10.310	0.394	0.406
E	8.500	8.900	0.335	0.350
e	2.540 TYP.		0.100 TYP.	
e1	4.980	5.180	0.196	0.204
L	15.050	15.450	0.593	0.608
L1	5.080	5.480	0.200	0.216
L2	2.340	2.740	0.092	0.108
L3	1.300	1.700	0.051	0.067
V	5.600 REF		0.220 REF	