ACE16015B

N-Channel Enhancement Mode Power MOSFET

General Description

- DC Motor Driver
- Synchronous Rectification in DC/DC
- AC/DC Converters

Features

- V_{DS}=60V
- I_D=153A
- $R_{DS(ON)}$@V_{GS}=10V, TYP 2.5mΩ (TO-220)
- $R_{DS(ON)}$@V_{GS}=4.5V, TYP 3.5mΩ (TO-220)
- $R_{DS(ON)}$@V_{GS}=10V, TYP 2.4mΩ (TO-263-3)
- $R_{DS(ON)}$@V_{GS}=4.5V, TYP 3.5mΩ (TO-263-3)

Absolute Maximum Ratings

Parameter		Symbol	Ratings	Units
Drain-Source Voltage		V_{DSS}	60	V
Gate-Source Voltage		V_{GSS}	±20	V
Drain Current (Continuous) *AC	T_C=25℃	I_D	153	A
	T_C=100℃		96.7	
Drain Current (Pulsed) *B		I_{DM}	540	A
Power Dissipation	T_C=25℃	P_D	139	W
Operating temperature / storage temperature		T_J/T_{STG}	-55~150	℃

Note:

A. The value of $R_{\theta JA}$ is measured with the device mounted on 1in2 FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C. The value in any given application depends on the user's specific board design.

B. Repetitive rating, pulse width limited by junction temperature.

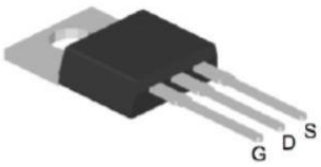
C. The current rating is based on the t≤ 10s junction to ambient thermal resistance rating

Thermal Resistance Ratings

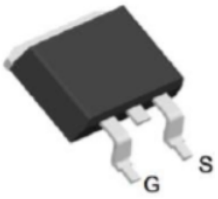
Parameter		Symbol	Maximum	Units
Maximum Junction-to-Case (Drain)	Steady State	R_{thJC}	0.9	℃/W

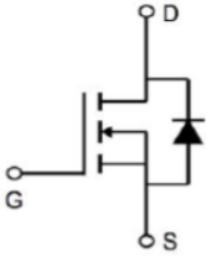
Packaging Type

TO-220



TO-263-3





Ordering information

ACE16015B XX + H

- H: Halogen - free
- Pb: Pb - free
- XX: ZM: TO-220, 1WN: TO-263-3

Electrical Characteristics T_A=25℃, unless otherwise specified.

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D= 250μA	60			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 48V, V_{GS} = 0V			1	μA
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_{DS}= 250μA	1	2	3	V
Gate Leakage Current	I_{GSS}	V_{GS}=±20V, V_{DS}=0V			±100	nA
Drain-Source On-state Resistance	$R_{DS(on)}$	V_{GS} = 10V, I_D = 30A (TO-220)		2.5	3.3	mΩ
		V_{GS} = 4.5V, I_D = 20A (TO-220)		3.5	4.6	
		V_{GS} = 10V, I_D = 30A (TO-263-3)		2.4	3.1	
		V_{GS} = 4.5V, I_D = 20A (TO-263-3)		3.5	4.6	
Diode Forward Voltage	V_{SD}	I_{SD}= 1A, V_{GS}=0V		0.68	1.2	V
Diode Forward Current	I_S	T_C =25°C			153	A
Switching						
Total Gate Charge	Q_g	V_{GS}=10V, V_{DS}=48V, I_D=30A		138		nC
Gate-Source Charge	Q_{gs}			34		
Gate-Drain Charge	Q_{gd}			46		
Turn-on Delay Time	$t_{d(on)}$	V_{GS}=10V, V_{DD}=30V, R_{GEN}=3.6Ω, I_D=30A		34		ns
Turn-on Rise Time	t_r			23		
Turn-off Delay Time	$t_{d(off)}$			82		
Turn-Off Fall Time	t_f			25		
Dynamic						
Input Capacitance	C_{iss}	V_{DS}=30V, V_{GS}=0V, f=1.0MHz		6010		pF
Output Capacitance	C_{oss}			1150		
Reverse Transfer Capacitance	C_{rss}			60		

Typical Performance Characteristics (TJ = 25 ℃, unless otherwise noted)

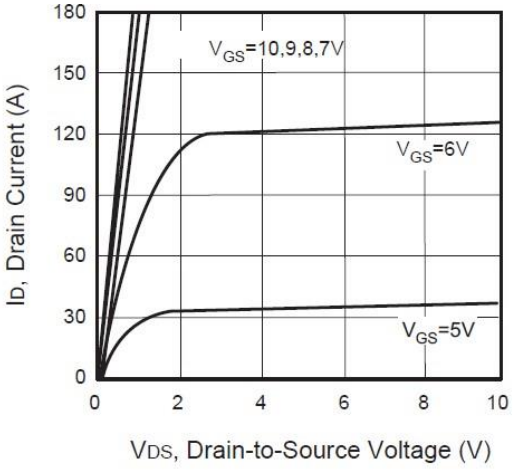


Figure 1. Output Characteristics

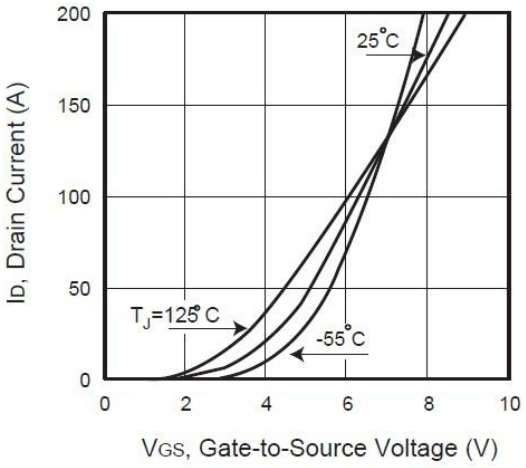


Figure 2. Transfer Characteristics

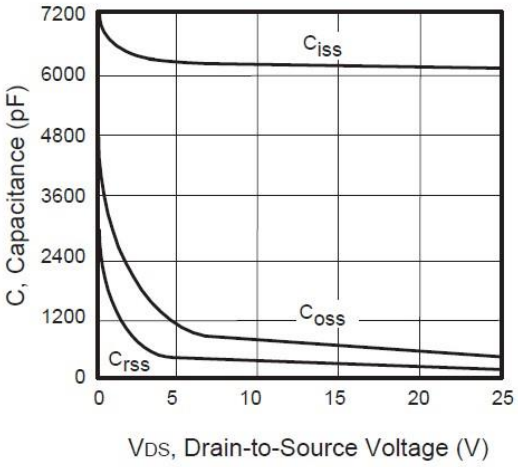


Figure 3. Capacitance

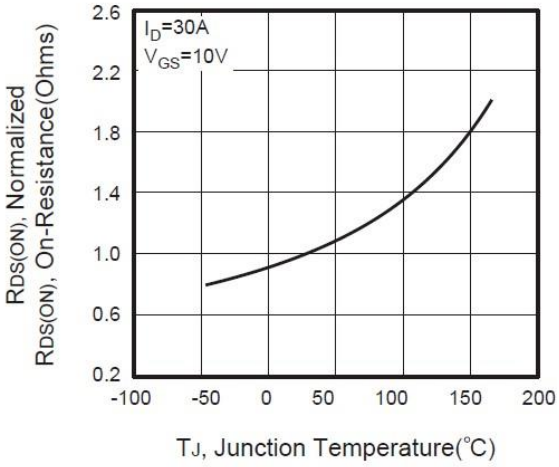


Figure 4. On-Resistance Variation with Temperature

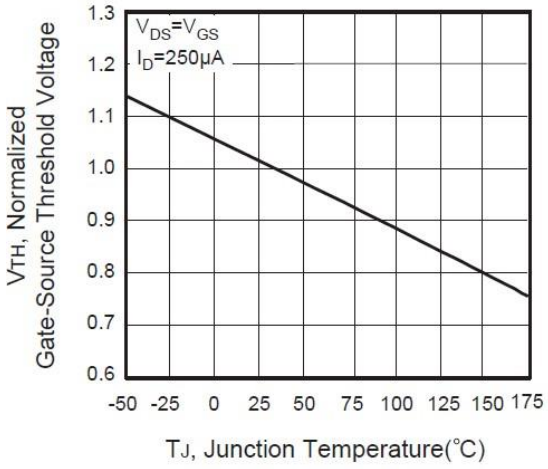


Figure 5. Gate Threshold Variation with Temperature

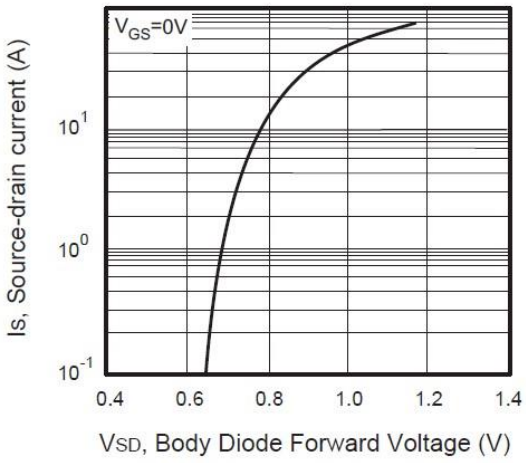


Figure 6. Body Diode Forward Voltage Variation with Source Current

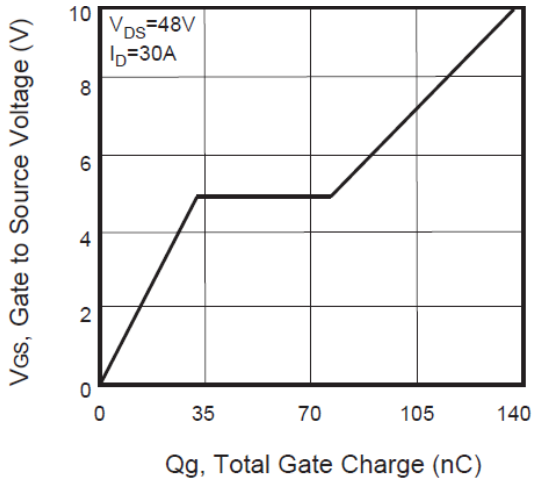


Figure 7. Gate Charge

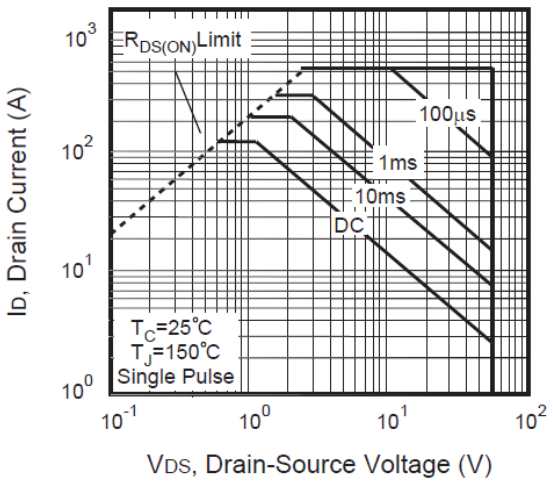


Figure 8. Maximum Safe Operating Area

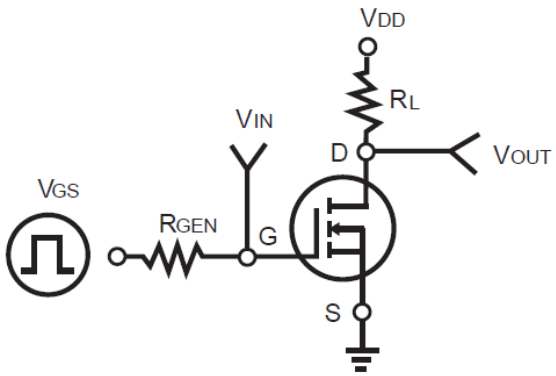


Figure 9. Switching Test Circuit

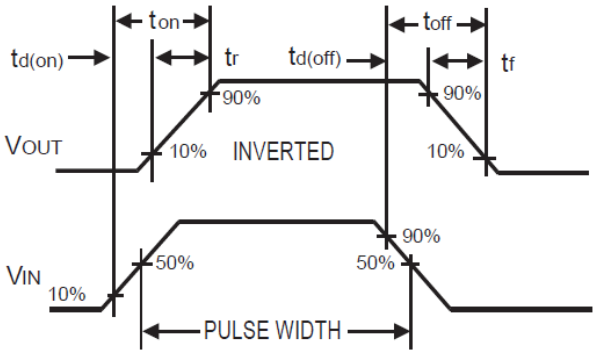


Figure 10. Switching Waveforms

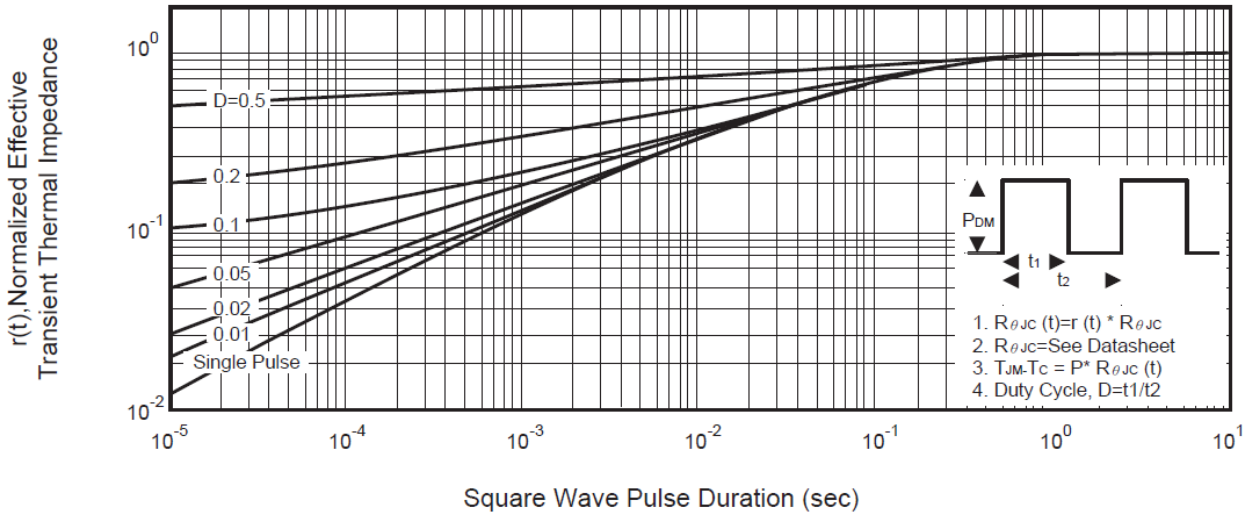
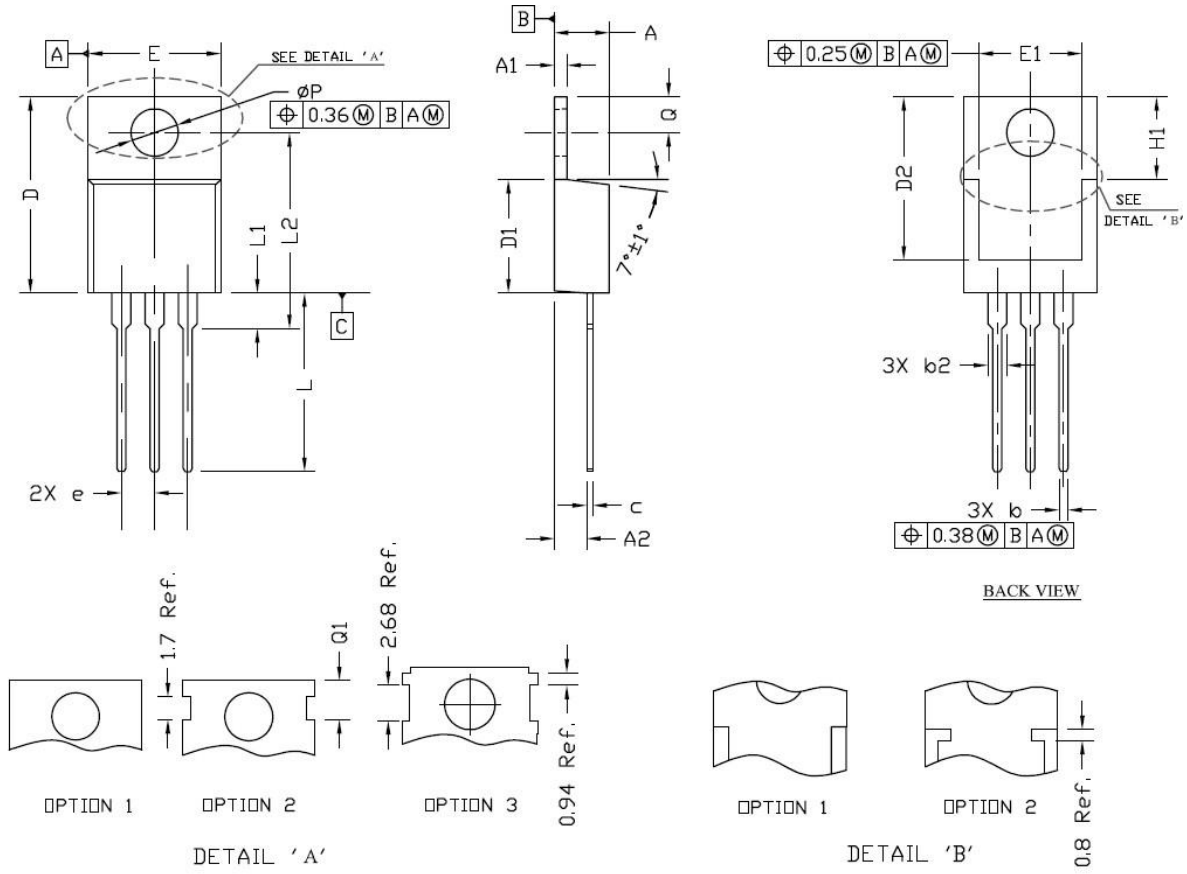


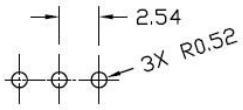
Figure 11. Normalized Thermal Transient Impedance Curve

Packing Information

TO-220



RECOMMENDATION OF HOLE PATTERN



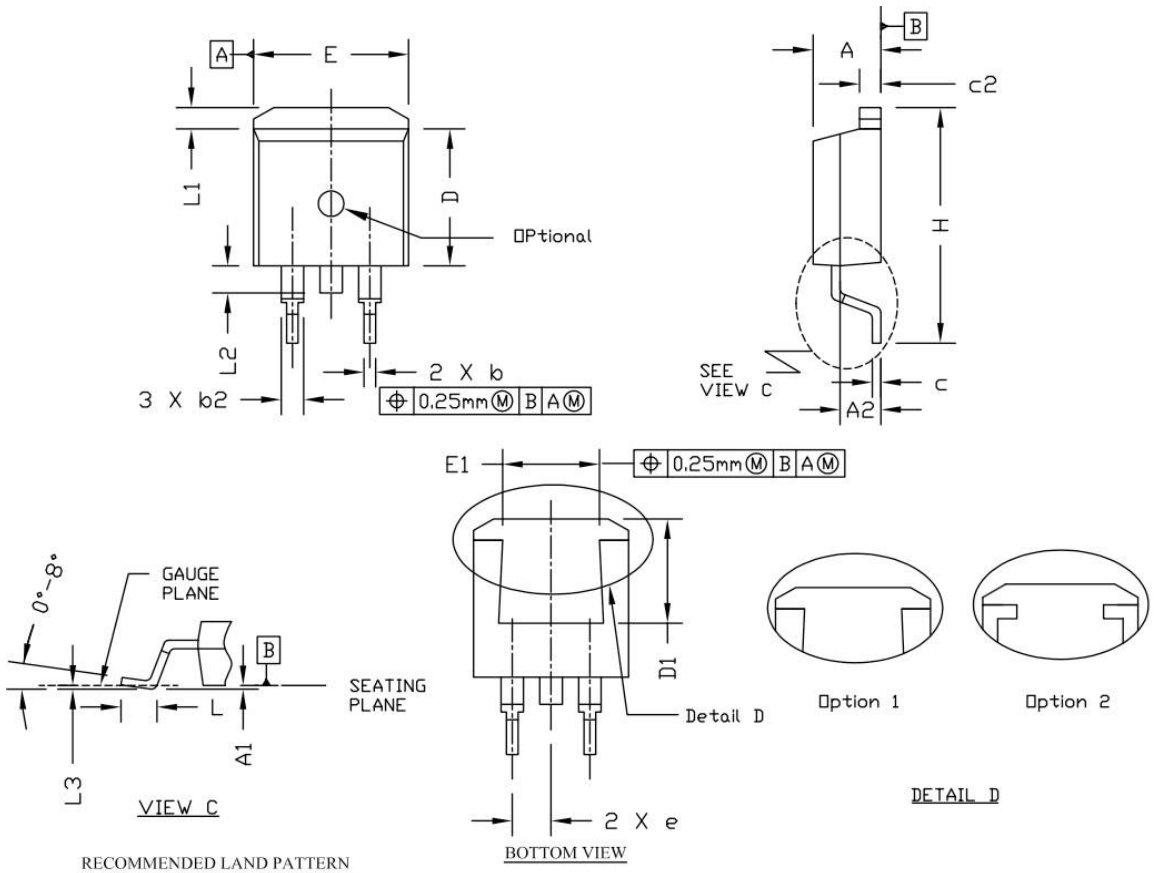
UNIT: mm

NOTE
1. PACKAGE BODY SIZES EXCLUDE MOLD FLASH AND GATE BURRS. MOLD FLASH SHOULD BE LESS THAN 6 MIL.
2. TOLERANCE 0.100 MILLIMETERS UNLESS OTHERWISE SPECIFIED.
3. CONTROLLING DIMENSION IS MILLIMETER. CONVERTED INCH DIMENSIONS ARE NOT NECESSARILY EXACT.

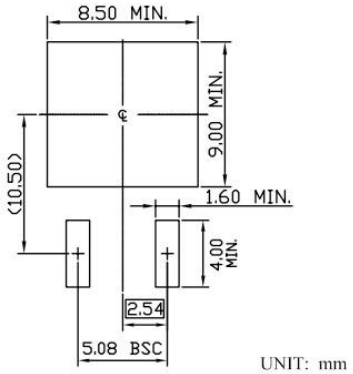
SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	4.30	4.45	4.72	0.169	0.175	0.186
A1	1.15	1.27	1.40	0.045	0.050	0.055
A2	2.20	2.67	2.90	0.087	0.105	0.114
b	0.69	0.81	0.95	0.027	0.032	0.037
b2	1.17	1.37	1.45	0.046	0.050	0.068
c	0.36	0.38	0.60	0.014	0.015	0.024
D	14.50	15.44	15.80	0.571	0.608	0.622
D1	8.59	9.14	9.65	0.338	0.360	0.380
D2	11.43	11.73	12.48	0.450	0.462	0.491
e	2.54 BSC			0.100 BSC.		
E	9.66	10.03	10.54	0.380	0.395	0.415
E1	6.22	---	---	0.245	---	---
H1	6.10	6.30	6.50	0.240	0.248	0.256
L	12.27	12.82	14.27	0.483	0.505	0.562
L1	2.47	---	3.90	0.097	---	0.154
L2	---	---	16.70	---	---	0.657
Q	2.59	2.74	2.89	0.102	0.108	0.114
ØP	3.50	3.84	3.89	0.138	0.151	0.153
Q1	2.70	---	2.90	0.106	---	0.114

Packing Information

TO-263-3



RECOMMENDED LAND PATTERN



UNIT: mm

SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	4.064	4.45	4.826	0.160	0.175	0.190
A1	0.00	---	0.254	0.000	---	0.010
A2	2.20	2.67	2.90	0.087	0.105	0.114
b	0.508	0.81	0.991	0.020	0.032	0.039
b2	1.143	1.27	1.778	0.045	0.050	0.070
c	0.381	0.50	0.737	0.015	0.020	0.029
c2	1.143	1.27	1.651	0.045	0.050	0.065
D	8.382	9.14	9.652	0.330	0.360	0.380
D1	6.858	8.00	8.37	0.270	0.315	0.330
e	2.54 BSC			0.100 BSC.		
E	9.652	10.03	10.668	0.380	0.395	0.420
E1	6.223	8.00	8.37	0.245	0.315	0.330
H	14.605	15.24	15.875	0.575	0.600	0.625
L	1.778	2.54	2.794	0.070	0.100	0.110
L1	1.02	1.27	1.676	0.040	0.050	0.066
L2	1.27	1.52	1.778	0.50	0.60	0.070
L3	0.25 BSC			0.010 BSC.		

NOTE:
1. PACKAGE BODY SIDES EXCLUDE MOLD FLASH AND GATE BURRS.
   MOLD FLASH SHOULD BE LESS THAN 6 MILS.
2. TOLERANCE 0.10 MILLIMETERS UNLESS OTHERWISE SPECIFIED.
3. DIMENSION L IS MEASURED IN GAUGE LINE.
4. CONTROLLING DIMENSION IS MILLIMETER.
   CONVERTED INCH DIMENSIONS ARE NOT NECESSARILY EXACT.
5. REFER TO JEDEC TO-263 AB.

Notes

ACE does not assume any responsibility for use as critical components in life support devices or systems without the express written approval of the president and general counsel of ACE Technology Co., LTD. As sued herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and shoes failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.