SGS-THOMSON MICROELECTRONICS

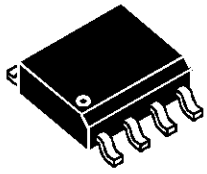
THBT15011D
THBT15012D

Application Specific Discretes
A.S.D.™

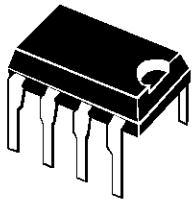
DUAL TRANSIENT VOLTAGE SUPPRESSOR FOR SLIC PROTECTION

FEATURES

- BIDIRECTIONAL CROWBAR PROTECTION BETWEEN TIP AND GND, RING AND GND, AND BETWEEN TIP AND RING.
- PEAK PULSE CURRENT : I_{PP} = 30A for 10/1000µs surge.
- HOLDING CURRENT : I_H = 150mA.



SO8
(Plastic)



DIL8
(Plastic)

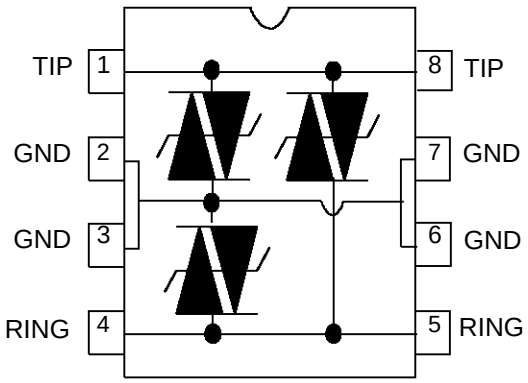
DESCRIPTION

Dedicated to telecommunication equipment protection, these devices provide a triple bidirectional protection function.
They ensure the same protection capability with the same breakdown voltage both in longitudinal mode and transversal mode.

A particular attention has been given to the internal wire bonding. A "4-point" configuration ensures a reliable protection, eliminating the overvoltage introduced by the parasitic inductances of the wiring (Ldi/dt), especially for very fast transients.

Dynamic characteristics have been defined for several types of surges, in order to meet the SLIC maximum ratings.

FUNCTIONAL DIAGRAM



COMPLIES WITH FOLLOWING STANDARDS :

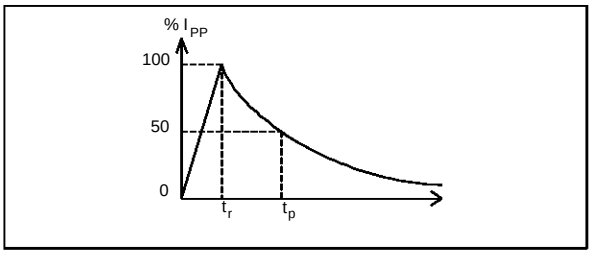
CCITT K20 :	10/700µs 5/310µs	1.5kV
VDE 0433 :	10/700µs 5/310µs	2kV
VDE 0878 :	1.2/50µs 1/20µs	1.5kV
FCC part 68 :	2/10µs	2.5kV
BELLCORE TR-NWT-001089 :	2/10µs	

ABSOLUTE MAXIMUM RATINGS ($0°C \leq T_{amb} \leq 70°C$)

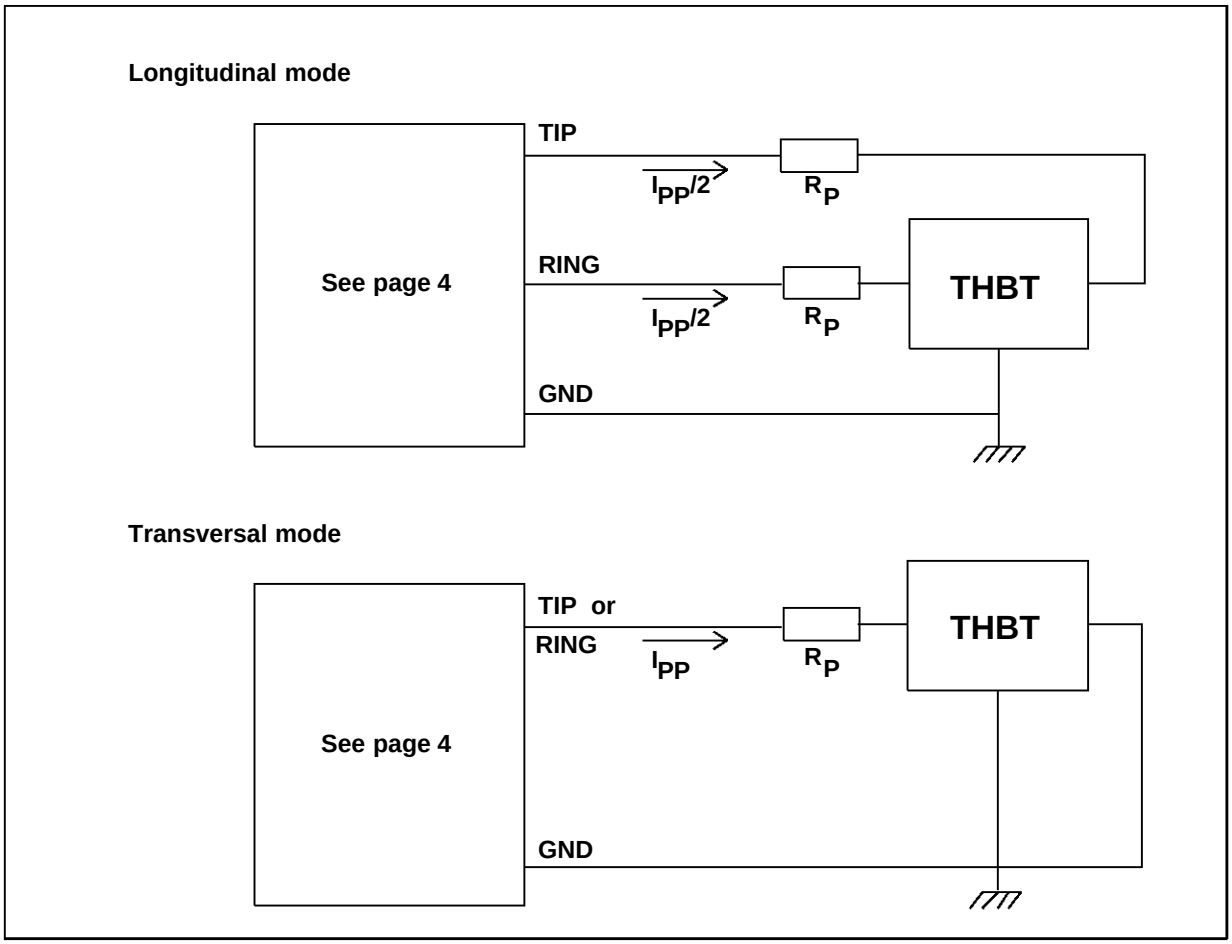
Symbol	Parameter		Value	Unit
I_{PP}	Peak pulse current (see note 1 and test circuits below)	10/1000µs 5/310µs 2/10µs	30 50 90	A
I_{TSM}	Non repetitive surge peak on-state current (F = 50Hz)	t_p = 10ms t_p = 1s	5 3.5	A
di/dt	Critical rate of rise of on-state current	Non repetitive	100	A/µs
T_{stg} T_j	Storage temperature range Maximum junction temperature		- 55 to + 150 150	°C

Note 1 : Pulse waveform :

10/1000µs	t_r=10µs	t_p=1000µs
5/310µs	t_r=5µs	t_p=310µs
2/10µs	t_r=2µs	t_p=10µs



TEST CIRCUITS FOR I_{PP}



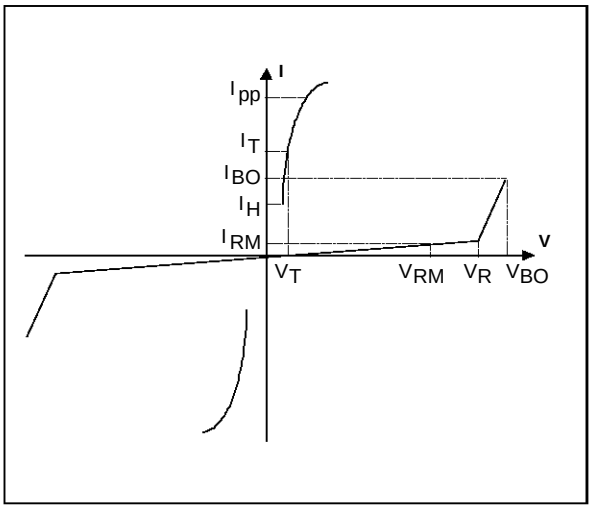
THERMAL RESISTANCE

Symbol	Parameter	Package	Value	Unit
$R_{th\ (j-a)}$	Junction to ambient	SO8 DIL8	170 125	°C/W °C/W

ELECTRICAL CHARACTERISTICS

(T_{amb} = 25°C, unless otherwise specified)

Symbol	Parameter
V_{RM}	Stand-off voltage
V_R	Reverse voltage
V_{BO}	Breakover voltage
I_H	Holding current
V_T	On-state voltage
I_{BO}	Breakover current
I_{RM}	Leakage current at VRM
I_{PP}	Peak pulse current



STATIC PARAMETERS

Types	I_{RM} @ V_{RM} max		I_R @ V_R max		V_{BO} @ I_{BO} max	min	max	I_H min note1	V_T max note2	C max note3
	µA	V	µA	V	V	mA	mA	mA	V	pF
THBT150xxD	5	135	50	150	210	50	400	150	5	80

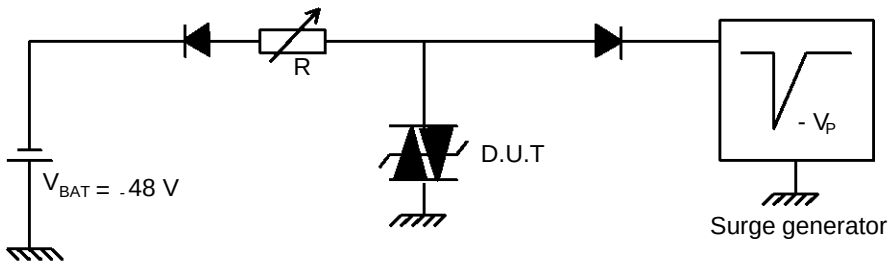
Note 1 : See the functional holding current (I_H) test circuit.
Note 2 : Square pulse t_p = 500µs, I_T = 5A.
Note 3 : V_R = 1V, F = 1MHz.

DYNAMIC PARAMETERS (Transversal mode)

Symbol	Test conditions (see note 1)				Maximum	Unit
V_{BO}	10/700µs 1.2/50µs 2/10µs	1.5kV 1.5kV 2.5kV	R_p=10Ω R_p=10Ω R_p=62Ω	I_{PP}=30A I_{PP}=30A I_{PP}=38A	240 250 260	V

Note 1 : See test circuit for V_{BO}; R_p is the protection resistor located on the line card.

FUNCTIONAL HOLDING CURRENT (I_H) TEST CIRCUIT : GO-NO GO TEST

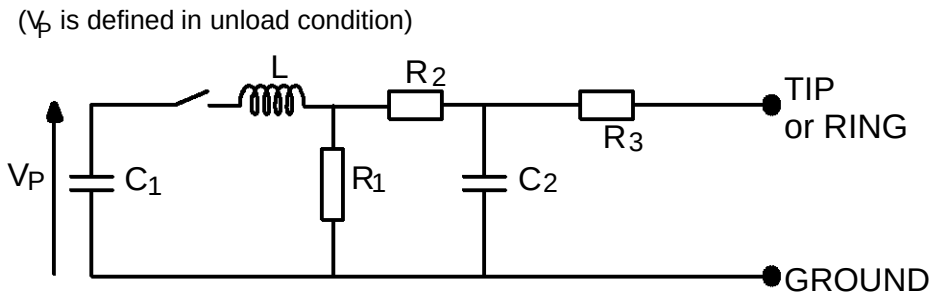


This is a GO-NO GO test which allows to confirm the holding current (I_H) level in a functional test circuit.

TEST PROCEDURE :

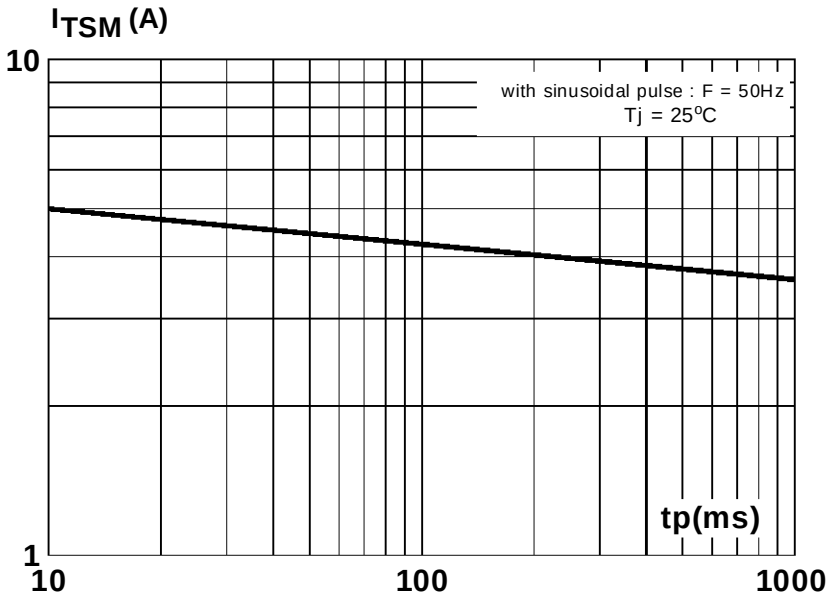
- Adjust the current level at the I_H value by short circuiting the D.U.T.
- Fire the D.U.T. with a surge current : I_{PP} = 10A, 10/1000µs.
- The D.U.T. will come back to the OFF-state within a duration of 50ms max.

TEST CIRCUIT FOR V_{BO} DYNAMIC PARAMETERS



Pulse (µs)		V_p	C_1	C_2	L	R_1	R_2	R_3	I_{PP}	R_p
t_r	t_p	(V)	(µF)	(nF)	(µH)	(Ω)	(Ω)	(Ω)	(A)	(Ω)
10	700	1500	20	200	0	50	15	25	30	10
1.2	50	1500	1	33	0	76	13	25	30	10
2	10	2500	10	0	1.1	1.3	0	3	38	62

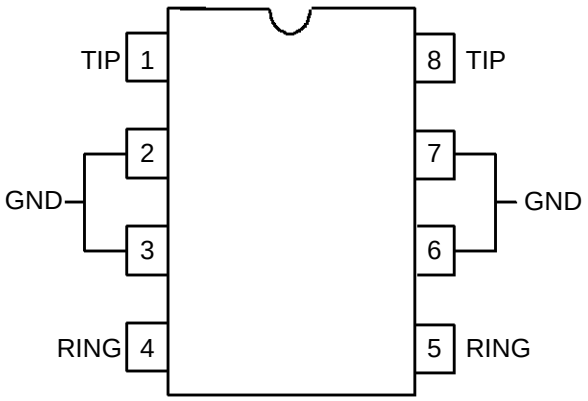
MAXIMUM NON REPETITIVE SURGE PEAK ON-STATE CURRENT



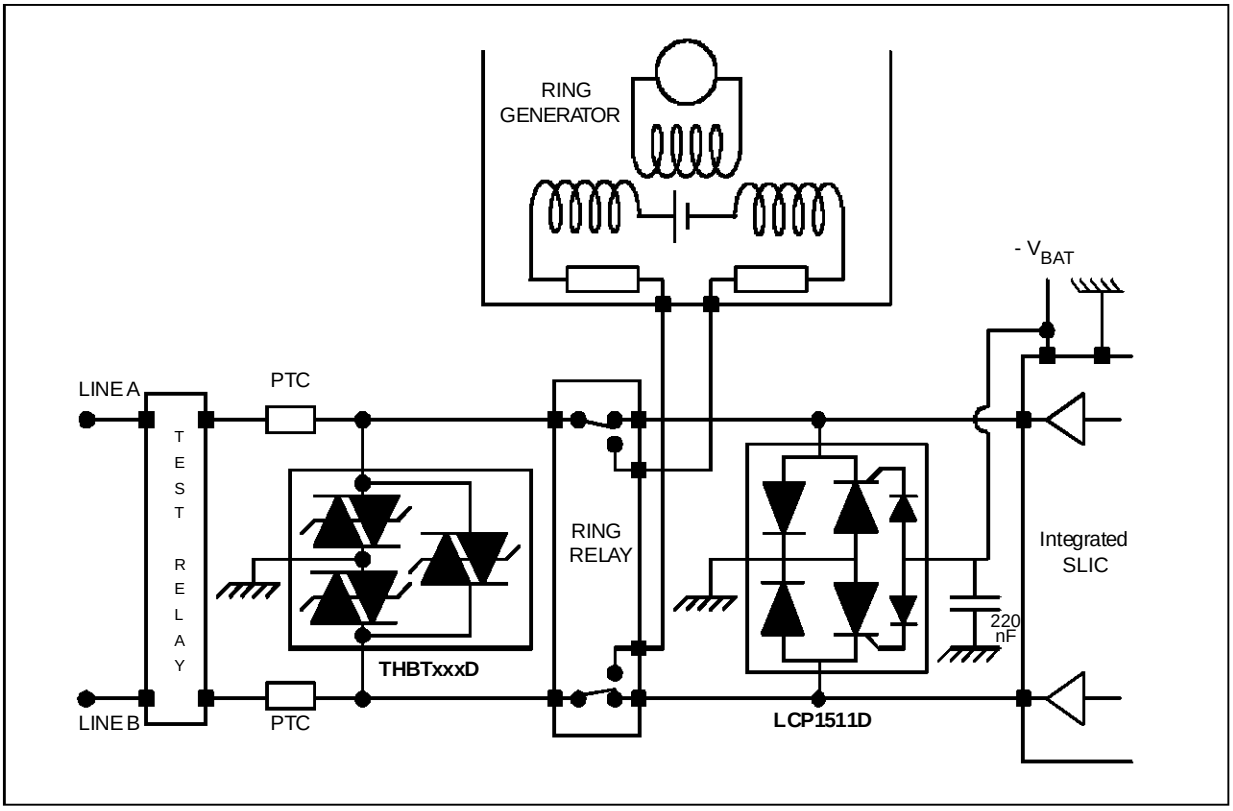
APPLICATION NOTE

1 Connect pins 2, 3, 6 and 7 to Ground in order to guarantee a good surge current capability for long duration disturbances.

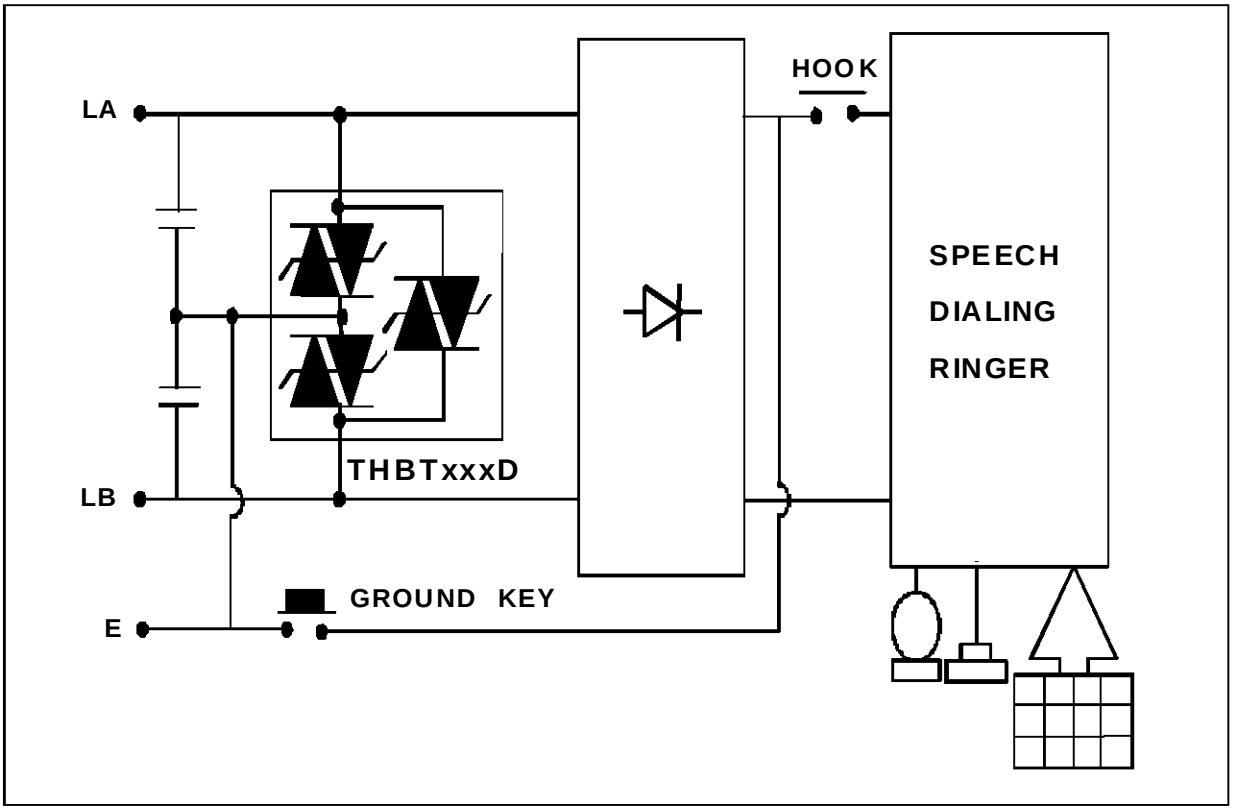
2 In order to take advantage of the" 4 point " structure of the THBT, the TIP and RING lines have to cross through the device. In such case, the device will eliminate the overvoltages generated by the parasitic inductances of the wiring (Ldi/dt), especially for very fast transients.



APPLICATION CIRCUIT : typical SLIC protection concept



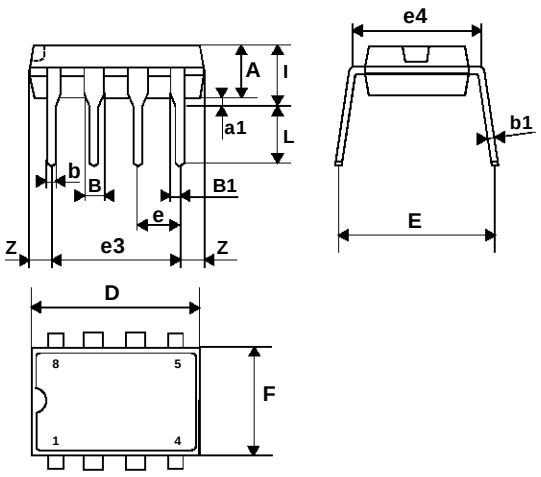
PROTECTION FOR TELEPHONE SET WITH GROUND KEY



MARKING

Package	Types	Marking
SO8	THBT15011D	BT151D
DIL8	THBT15012D	BT152D

PACKAGE MECHANICAL DATA
DIL8 Plastic

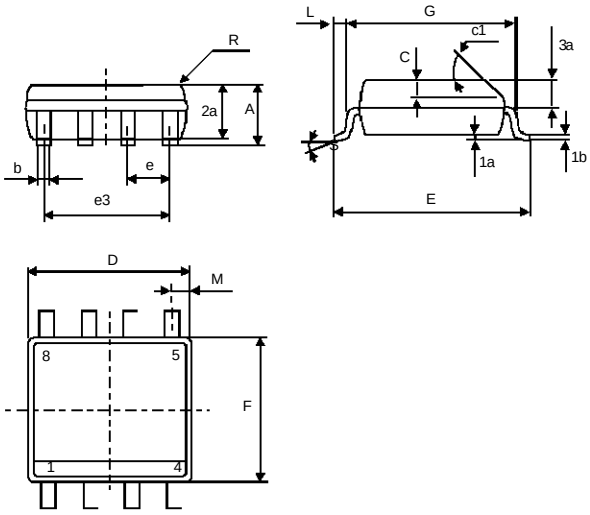


REF.	DIMENSIONS					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A		3.3			0.130	
a1	0.7			0.028		
B	1.39		1.65	0.055		0.065
B1	0.91		1.04	0.036		0.041
b		0.5			0.020	
b1	0.38		0.5	0.015		0.020
D			9.8			0.386
E		8.8			0.346	
e		2.54			0.100	
e3		7.62			0.300	
e4		7.62			0.300	
F			7.1			0.280
I			4.8			0.189
L		3.3			0.130	
Z	0.44		1.6	0.017		0.063

Weight = 0.58 g.

PACKAGE MECHANICAL DATA

SO8 Plastic



REF.	DIMENSIONS					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.75			0.069
a1	0.1		0.25	0.004		0.010
a2			1.65			0.065
a3	0.65		0.85	0.026		0.033
b	0.35		0.48	0.014		0.019
b1	0.19		0.25	0.007		0.010
C	0.25		0.5	0.010		0.020
c1	45° (typ)					
D	4.8		5.0	0.189		0.197
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		3.81			0.150	
F	3.8		4.0	0.15		0.157
L	0.4		1.27	0.016		0.050
M			0.6			0.024
S	8° (max)					