



# THBT7011D

Application Specific Discretes  
A.S.D.<sup>TM</sup>

DUAL OVERVOLTAGE  
PROTECTION FOR TELECOM LINE

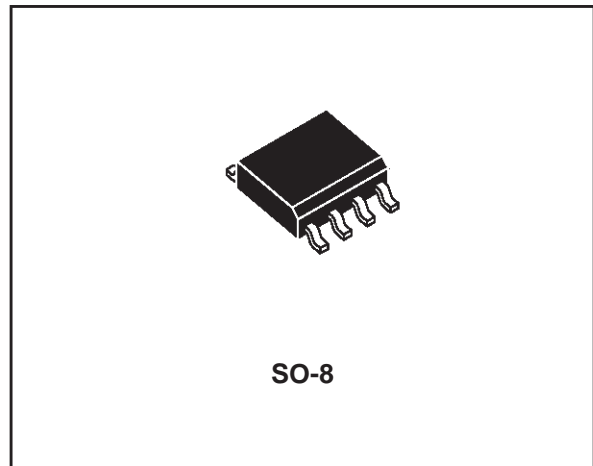
## FEATURES

- BIDIRECTIONAL CROWBAR PROTECTION.
- PEAK PULSE CURRENT :  
 $I_{PP} = 30A$  for 10/1000 $\mu s$  surge.
- HOLDING CURRENT :  
 $I_H = 150mA$ .
- BREAKDOWN VOLTAGE: 70V Min.
- LOW DYNAMIC BREAKOVER VOLTAGE.

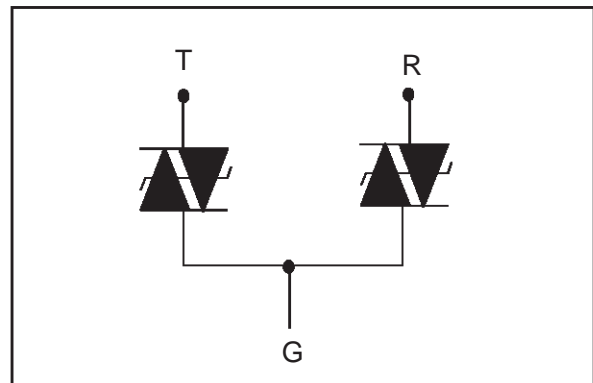
## DESCRIPTION

Dedicated to telecommunication equipment protection, this device provides a dual bidirectional protection function.

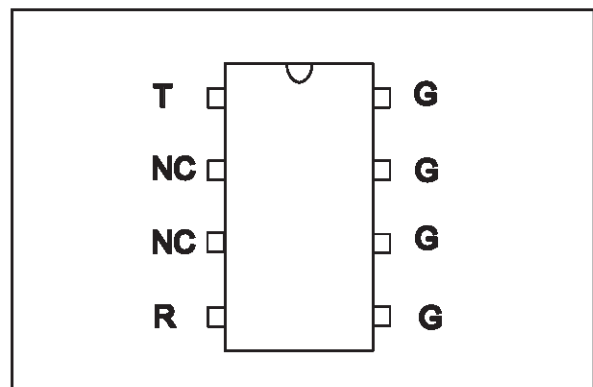
Dynamic characteristics have been defined for several types of surges, in order to meet the SLIC maximum ratings.



## FUNCTIONAL DIAGRAM



## PINOUT CONFIGURATION



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# THBT7011D

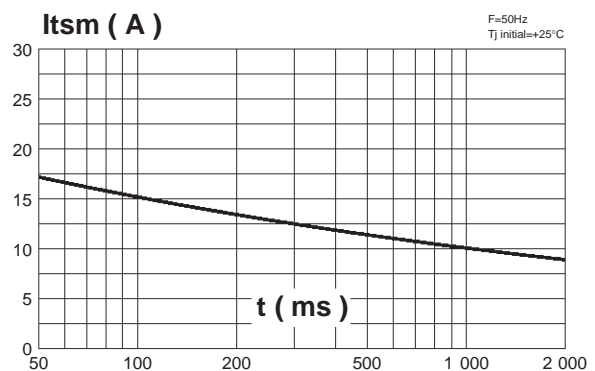
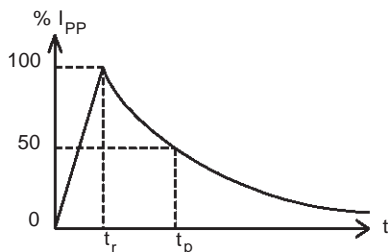
COMPLIES WITH THE FOLLOWING STANDARDS:	Peak Surge Voltage (V)	Voltage Waveform ( $\mu$ s)	Current Waveform ( $\mu$ s)	Admissible Ipp (A)	Necessary Resistor ( $\Omega$ )
CCITT K20	4000	10/700	5/310	25	-
VDE0433	4000	10/700	5/310	40	10
VDE0878	4000	1.2/50	1/20	50	-
IEC-1000-4-5	level 4 level 4	10/700 1.2/50	5/310 8/20	25 50	- -
FCC Part 68, lightning surge type A	1500 800	10/160 10/560	10/160 10/560	47 35	25 15.5
FCC Part 68, lightning surge type B	100	9/720	5/320	25	-
BELLCORE TR-NWT-001089 First level	2500 1000	2/10 10/1000	2/10 10/1000	90 30	23 24
BELLCORE TR-NWT-001089 Second level	5000	2/10	2/10	90	50
CNET I31-24	4000	0.5/700	0.8/310	25	-

## ABSOLUTE MAXIMUM RATINGS ( $T_{amb} = 25^{\circ}\text{C}$ )

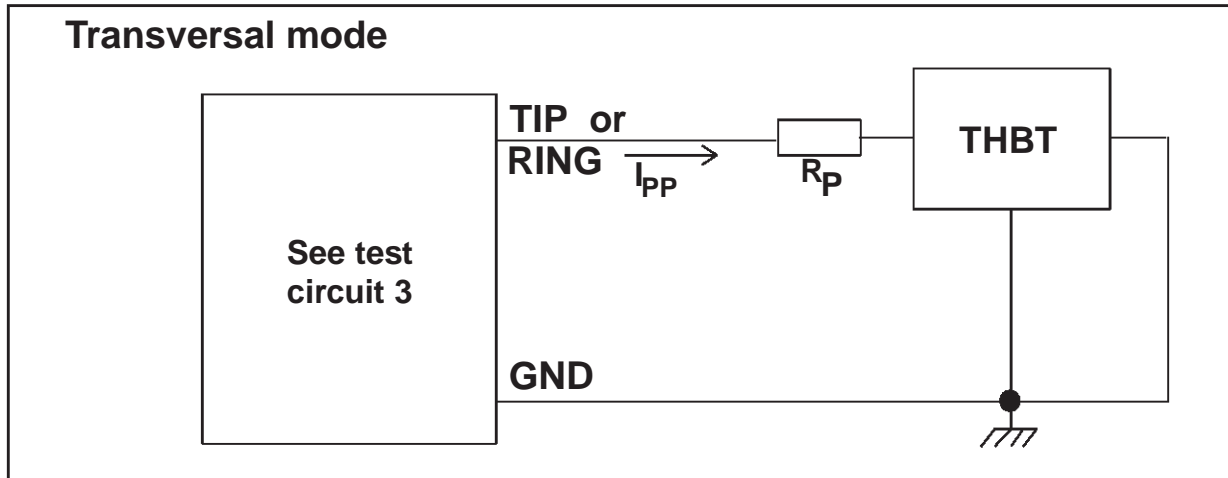
Symbol	Parameter	Value	Unit
$I_{PP}$	Peak pulse current (see note 1)	10/1000 $\mu$ s	A
$I_{TSM}$	Non repetitive surge peak on-state current (F=50Hz)	$t_p = 100$ ms $t = 1$ s	15.5 9 A
$T_{stg}$ $T_j$	Storage temperature range Maximum operating junction temperature	- 40 to + 150 + 150	$^{\circ}\text{C}$ $^{\circ}\text{C}$
$T_L$	Maximum lead temperature for soldering during 10s	260	$^{\circ}\text{C}$

Note 1 : Pulse waveform :

10/1000 $\mu$ s  $t_r=10\mu$ s  $t_p=1000\mu$ s



TEST CIRCUITS FOR  $I_{PP}$

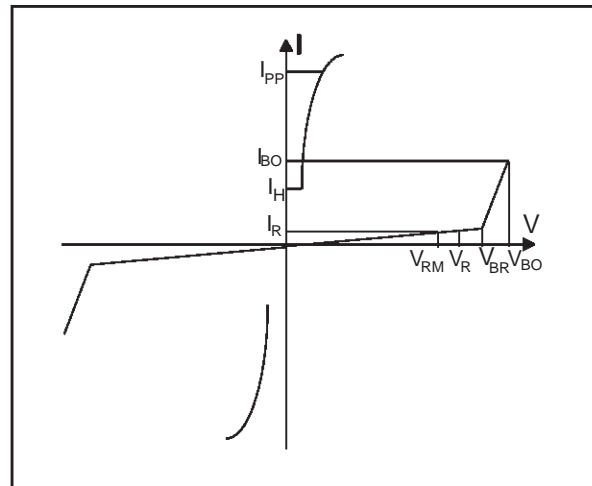


THERMAL RESISTANCES

Symbol	Parameter	Value	Unit
$R_{th(j-a)}$	Junction to ambient	170	$^{\circ}C/W$

ELECTRICAL CHARACTERISTICS ( $T_{amb} = 25^{\circ}C$ )

Symbol	Parameter
$V_{RM}$	Stand-off voltage
$I_{RM}$	Leakage current at stand-off voltage
$V_R$	Continuous Reverse voltage
$V_{BR}$	Breakdown voltage
$V_{BO}$	Breakover voltage
$I_H$	Holding current
$I_{BO}$	Breakover current
$I_{PP}$	Peak pulse current
C	Capacitance



STATIC PARAMETERS BETWEEN TIP AND GND, RING AND GND

Type	$I_{RM} @ V_{RM}$		$I_R @ V_R$		$V_{BO} @ I_{BO}$			$I_H$	C
	max. $\mu A$	V	max. note 1 $\mu A$	V	max. note 2 V	min. mA	max. mA	min note 3 mA	max note 4 pF
THBT7011D	5	66	50	70	89	50	400	150	80

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## STATIC PARAMETERS BETWEEN TIP AND RING

Type	$I_{RM}$ @ $V_{RM}$		$I_R$ @ $V_R$		C max note 4 pF
	max. $\mu A$	note 6 V	max. $\mu A$	note 6 V	
THBT7011D	5	132	50	140	40

Note 1:  $I_R$  measured at  $V_R$  guarantees  $V_{BR} > V_R$

Note 2: Measured at 50 Hz (1 cycle) test circuit 1.

Note 3: See the reference test circuit 2.

Note 4:  $V_R = 1V, F = 1MHz$ .

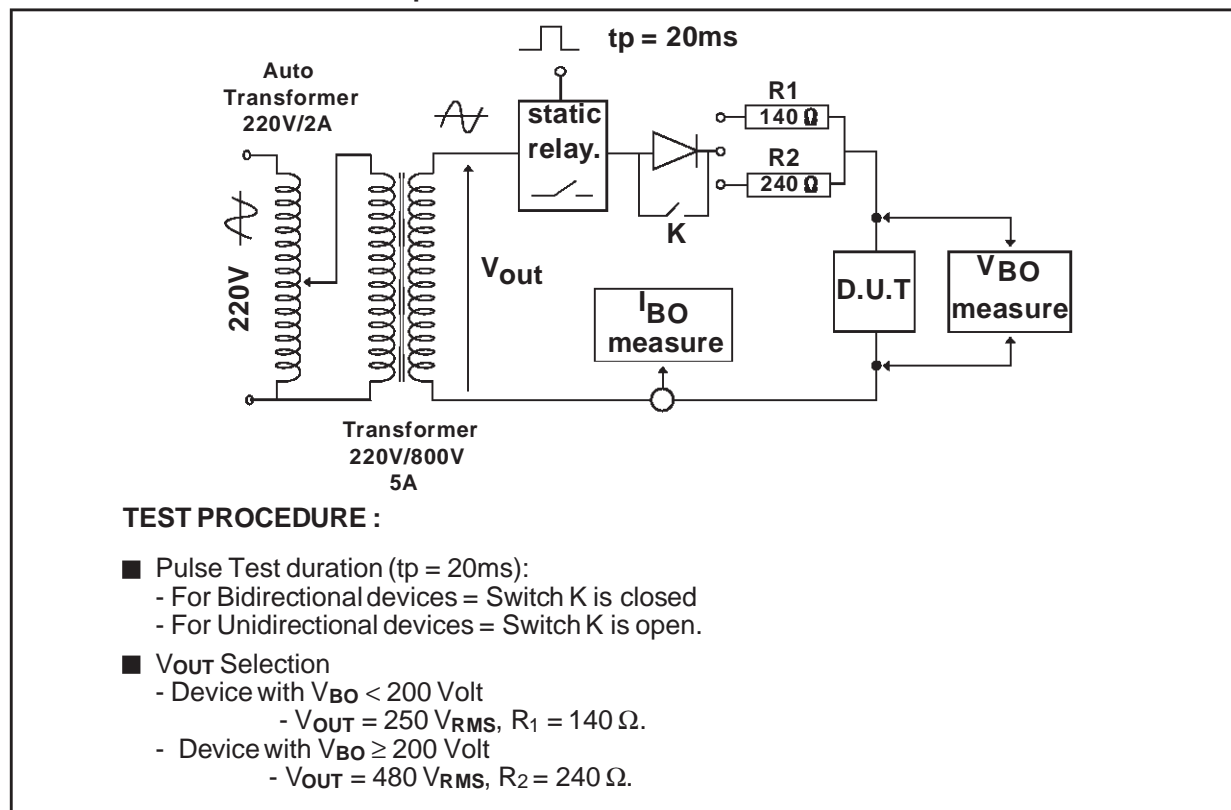
Note 5: See test circuit 3 for  $V_{BO}$  dynamic parameters;  $R_p$  is the protection resistor located on the line card.

Note 6: Ground not connected or  $|V_{TIP}| = |V_{RING}|$  versus Ground

## DYNAMIC BREAKOVER VOLTAGES (Transversal mode)

Type	Symbol	Test conditions (see note 5)				Maximum	Unit
THBT7011D	$V_{BO}$	10/700 $\mu s$	1.5kV	$R_p=10\Omega$	$I_{PP}=30A$	90	V
		1.2/50 $\mu s$	1.5kV	$R_p=10\Omega$	$I_{PP}=30A$	95	
		2/10 $\mu s$	2.5kV	$R_p=62\Omega$	$I_{PP}=38A$	150	

## TEST CIRCUIT 1 for $I_{BO}$ and $V_{BO}$ parameters:



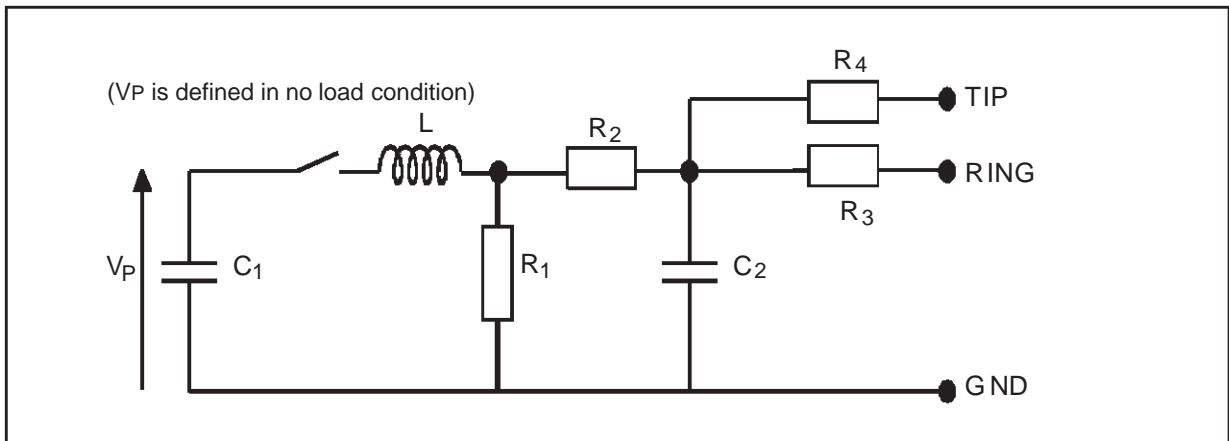
**TEST CIRCUIT 2 for  $I_H$  parameter.**

This is a GO-NOGO test which allows to confirm the holding current ( $I_H$ ) level in a functional test circuit.

**TEST PROCEDURE :**

- 1) Adjust the current level at the  $I_H$  value by short circuiting the AK of the D.U.T.
- 2) Fire the D.U.T with a surge Current :  $I_{pp} = 10A$  ,  $10/1000 \mu s$ .
- 3) The D.U.T will come back off-state within 50 ms max.

**TEST CIRCUIT 3 for  $I_{PP}$  and  $V_{BO}$  parameters :**

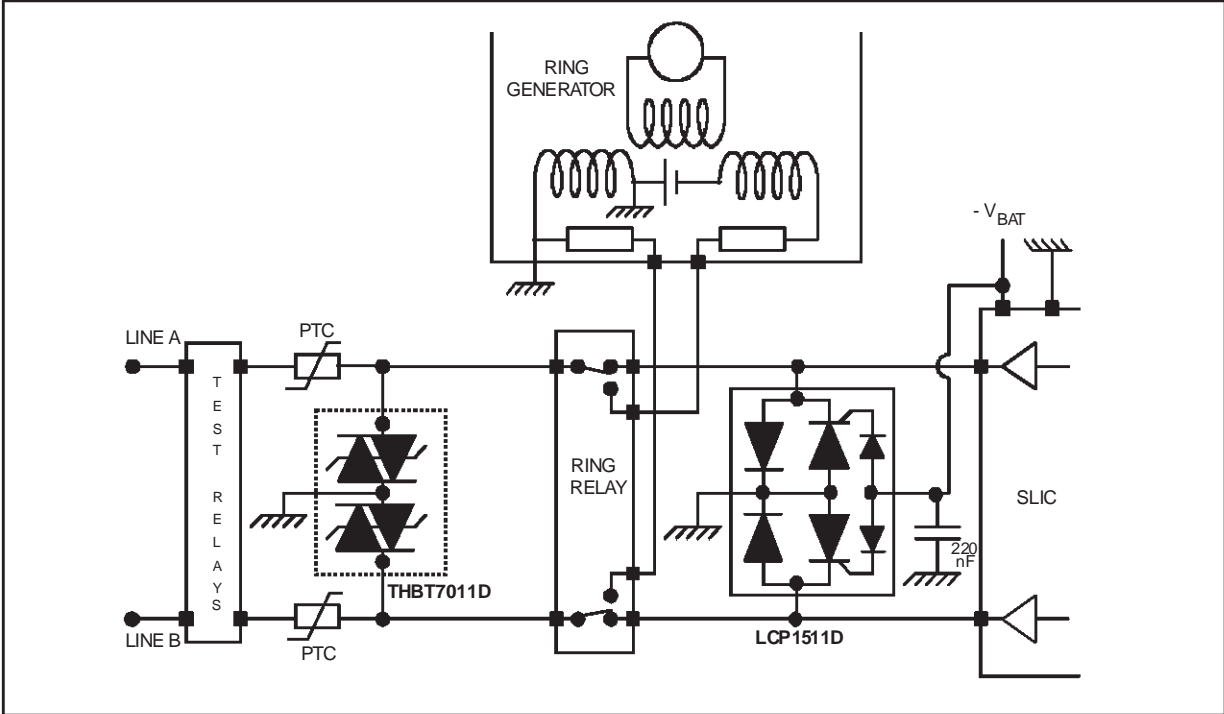


Pulse ( $\mu s$ )		$V_p$ (V)	$C_1$ ( $\mu F$ )	$C_2$ (nF)	$L$ ( $\mu H$ )	$R_1$ ( $\Omega$ )	$R_2$ ( $\Omega$ )	$R_3$ ( $\Omega$ )	$R_4$ ( $\Omega$ )	$I_{PP}$ (A)	$R_p$ ( $\Omega$ )
$t_r$	$t_p$										
10	700	1500	20	200	0	50	15	25	25	30	10
1.2	50	1500	1	33	0	76	13	25	25	30	10
2	10	2500	10	0	1.1	1.3	0	3	3	38	62

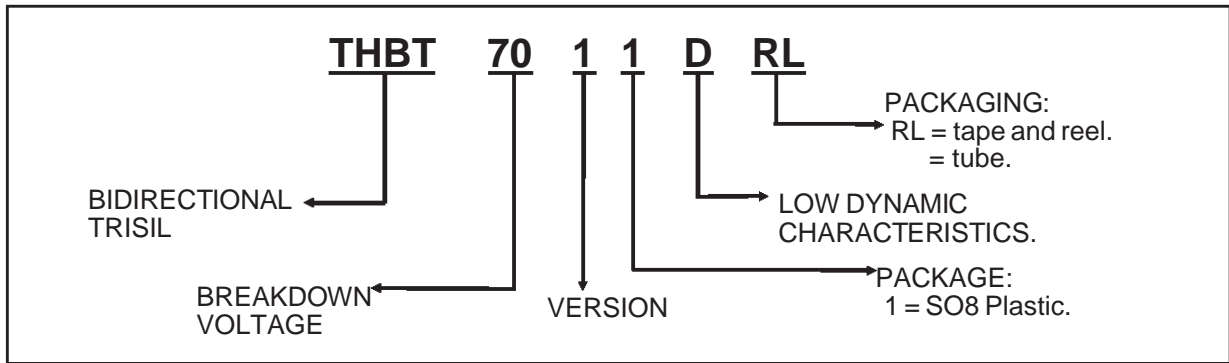
**THBT7011D**

**APPLICATION CIRCUIT :**

**1 - Line card protection**



ORDER CODE

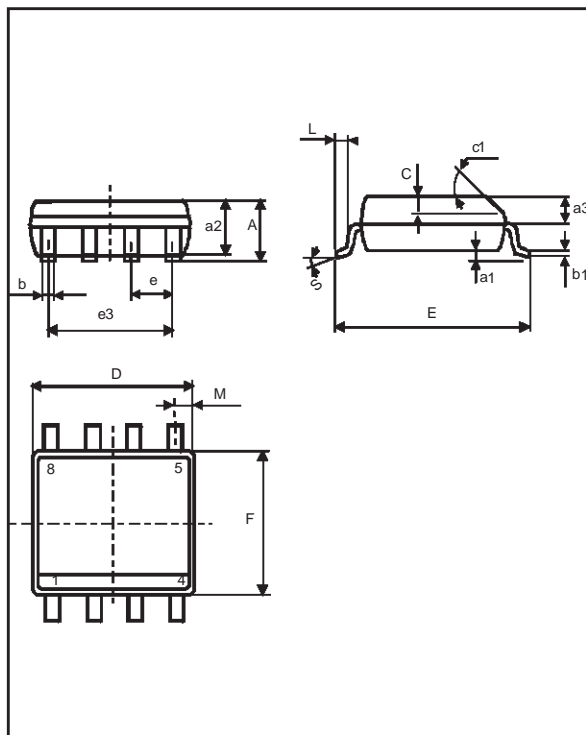


MARKING

Types	Package	Marking
THBT7011D	SO-8	BT701D

PACKAGE MECHANICAL DATA.  
SO-8 Plastic

MARKING : Logo, Date Code, Part Number.



**Packaging :** Products supplied in antistatic tubes or tape and reel.

**Weight :** 0.08g



REF.	DIMENSIONS					
	Millimetres			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	0.025		0.033
b	0.35		0.48	0.014		0.019
b1	0.19		0.25	0.007		0.010
C	0.25	0.50	0.50	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)					

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