



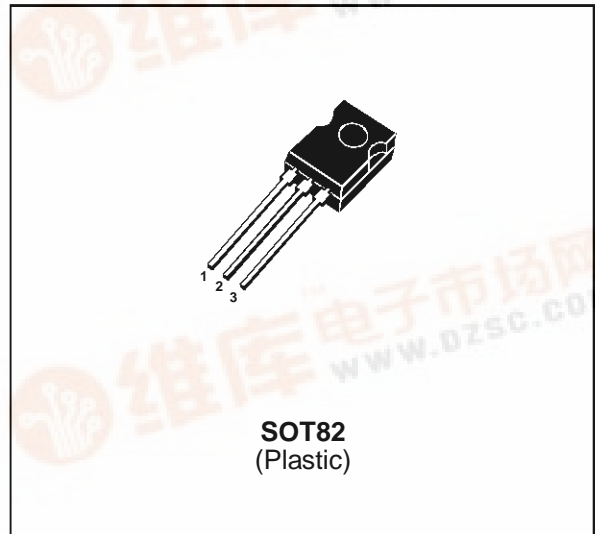
FLC02-200D

Application Specific Discretets
A.S.D.™

FIRE LIGHTER CIRCUIT

FEATURES

- SPACE SAVING : MONOLITHIC FIRE LIGHTER FUNCTION INTEGRATION
- DEDICATED THYRISTOR STRUCTURE FOR CAPACITANCE DISCHARGE IGNITION OPERATION
- HIGH PULSE CURRENT CAPABILITY
150A @ $t_p = 10\mu s$



DESCRIPTION

- The FLC02 is a high performance planar diffused technology adapted to high temperature and rugged environmental conditions.
- It has been developed especially for capacitance discharge operation. The main applications are ignitor circuits such as : fuel ignitioris / gas boilers...

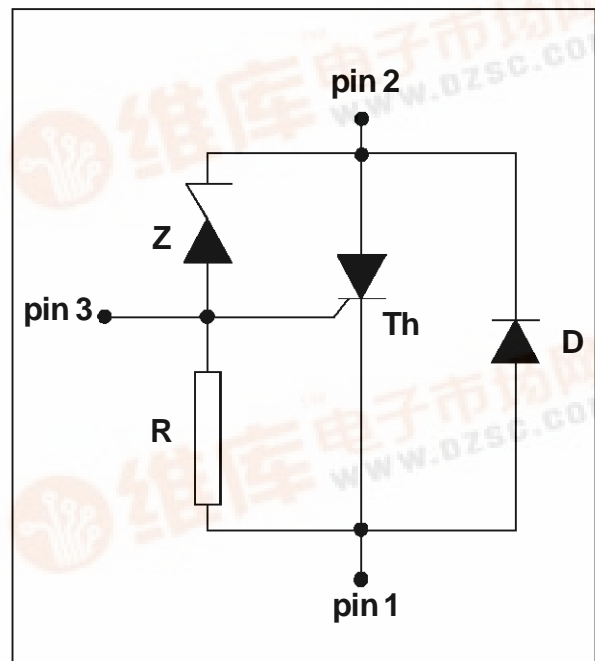
Th : Thyristor for switching operation.

Z : Zener diode to set the threshold voltage.

D : Diode for reverse conduction.

R : 2 kOhm resistor.

FUNCTIONAL DIAGRAM

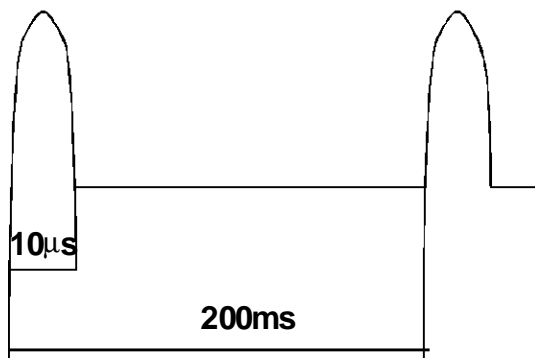


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ABSOLUTE RATINGS (limiting values) : $0^{\circ}\text{C} < T_{\text{amb}} < 90^{\circ}\text{C}$

Symbol	Parameter	Value	Unit
I_{TRM}	Repetitive surge peak on state current for thyristor	150	A
I_{FRM}	Repetitive surge peak on state current for diode		
I_{TSM}	Non repetitive surge peak on state current	5	A
di/dt	Critical rate of rise time on state current	120	A/ μs
T_{stg} T_{j}	Storage junction temperature range Maximum junction temperature	- 40 to + 150 + 125	$^{\circ}\text{C}$
T_{oper}	Operating temperature range	0 + 90	$^{\circ}\text{C}$
T_{L}	Maximum lead temperature for soldering during 10s	260	$^{\circ}\text{C}$

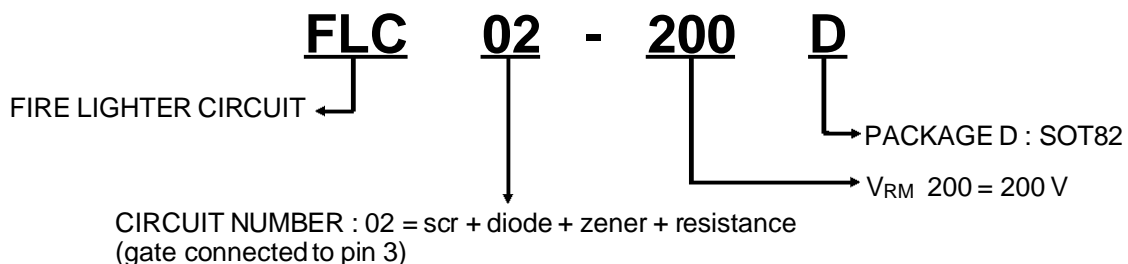
Note 1 : Test current waveform



THERMAL RESISTANCE

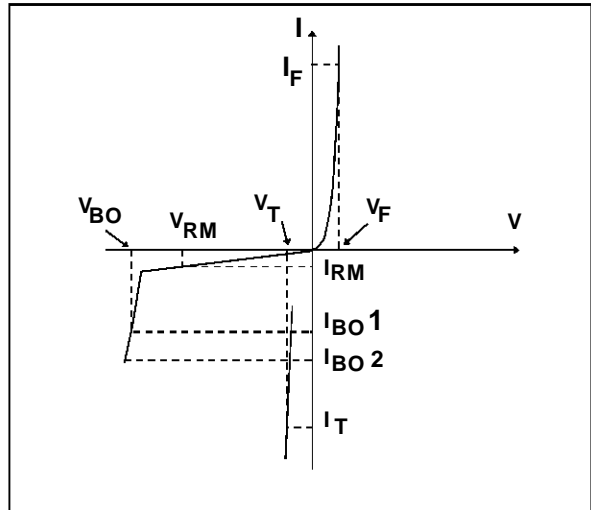
Symbol	Parameter	Value	Unit
$R_{\text{th(j-a)}}$	Thermal resistance junction to ambient	100	$^{\circ}\text{C}/\text{W}$

ORDERING INFORMATION



ELECTRICAL CHARACTERISTICS

Symbol	Parameters
V_{RM}	Stand-off voltage
V_{BO}	Breakover voltage
V_T	On-state voltage drop
V_F	Diode voltage drop
I_{RM}	Leakage current
I_{BO}	Breakover current



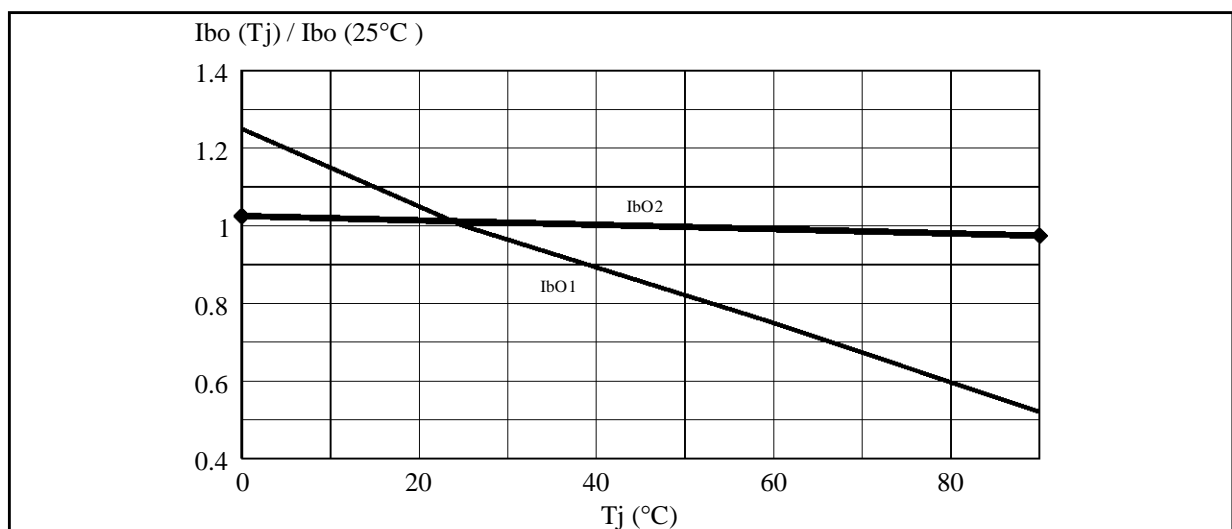
DIODE (D) PARAMETER

Symbol	Test Conditions			Value	Unit	
V_F	$I_F = 2A$	$tp \leq 1 ms$	$T_j = 25^\circ C$	MAX	1.7	V

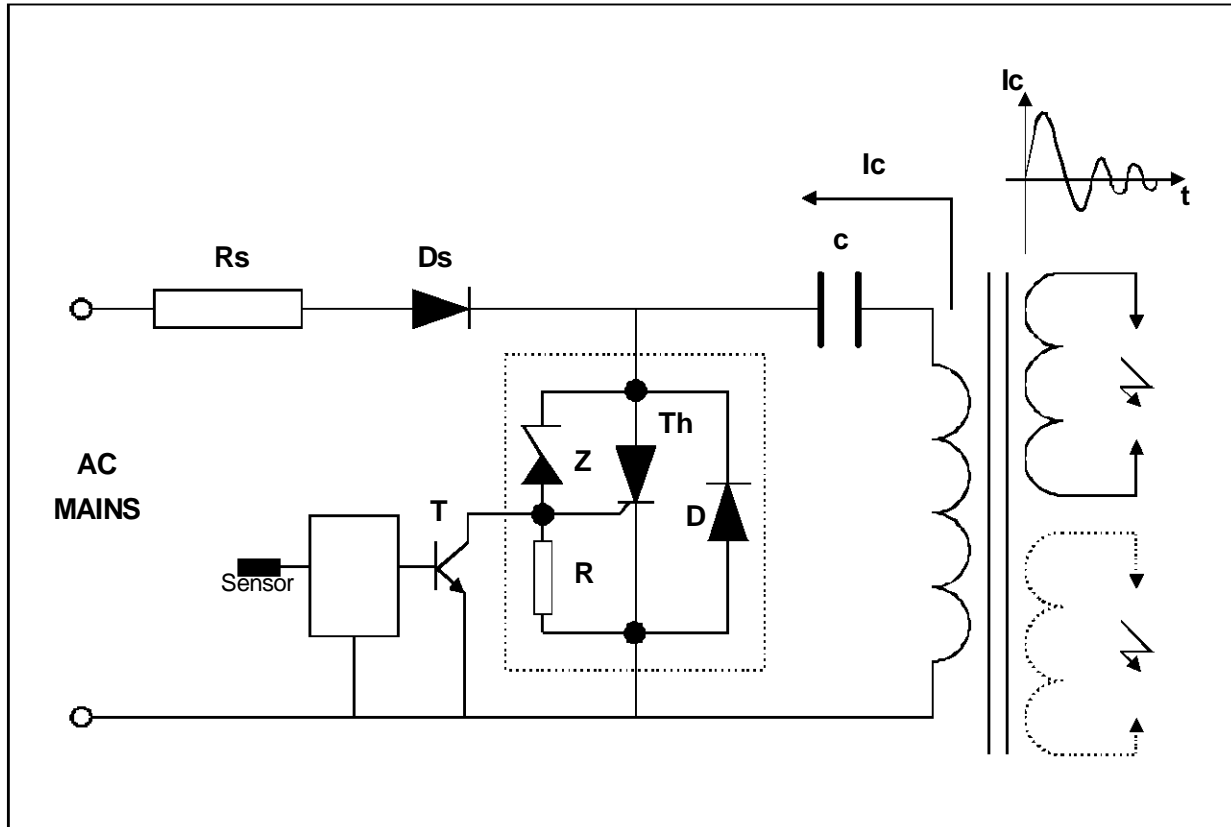
THYRISTOR (Th) and ZENER (Z) PARAMETERS

Symbol	Test conditions			Value	Unit	
I_{RM}	$V_{RM} = 200 V$	$T_j = 25^\circ C$	MAX	10	μA	
		$T_j = 120^\circ C$	MAX	100	μA	
V_{BO}	at I_{BO1}	Pin 3 (gate) open	$T_j = 25^\circ C$	MAX	250	V
$I_{BO 1}$	at V_{BO}	Pin 3 (gate) open	$T_j = 25^\circ C$	MAX	0.5	mA
$I_{BO 2}$	at V_{BO}	Pin 1 (cathode) and pin 3 (gate) in c/c	$T_j = 25^\circ C$	MIN	40	mA
V_T	$I_T = 2A$	$tp \leq 1ms$	$T_j = 25^\circ C$	MAX	1.7	V

Fig.1 : Relative variation of breakover current (I_{BO}) versus junction temperature



BASIC APPLICATION



The applications of the FLC02 using the capacitance discharge topology operate in 2 modes :

- Ignition mode : Transistor T is OFF
- Blanking mode : Transistor T is ON

1) **IGNITION MODE (Transistor T_{OFF})**

PHASE 1 :

The energy coming from the mains is stored into the capacitor C. For that, the AC voltage is rectified by the diode D_s .

PHASE 2 :

At the end of the phase 1, the voltage across the capacitor C reaches the avalanche threshold of the zener. Then a current flows through the gate of the thyristor Th which fires.

The firing of the thyristor causes an alternating current to flow through the capacitor C.

The positive parts of this current flow through C, Th and the primary of the HV transformer.

The negative parts of the current flow through C, D and the primary of the HV transformer.

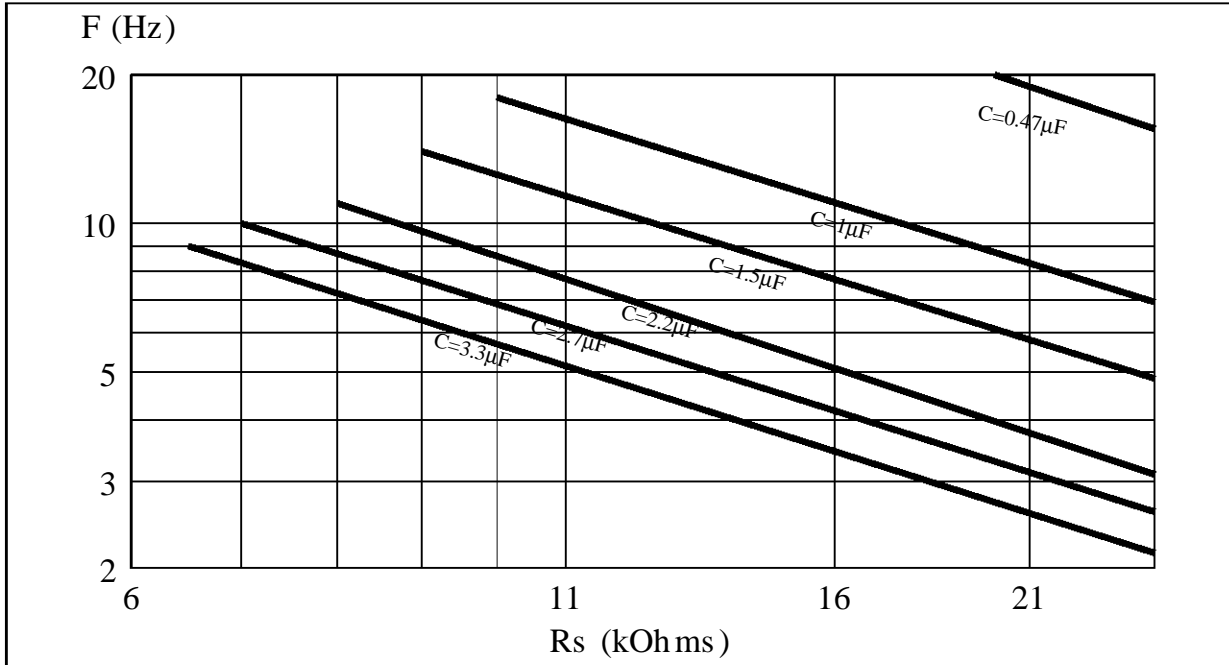
RS RESISTOR CALCULATION

The R_s resistor allows, in addition with the capacitor C, to adjust the spark frequency and to limit the current from the mains. Its value shall allow the thyristor Th to fire even in the worst case. In this borderline case the system must fire with the lower RMS mains voltage value while the breakdown voltage and current of the FLC are at the maximum.

The maximum R_s value is equal to :

$$R_{smax} = \frac{(V_{AC \min} \times \sqrt{2}) - V_{BO \max}}{I_{BO1 \max}}$$

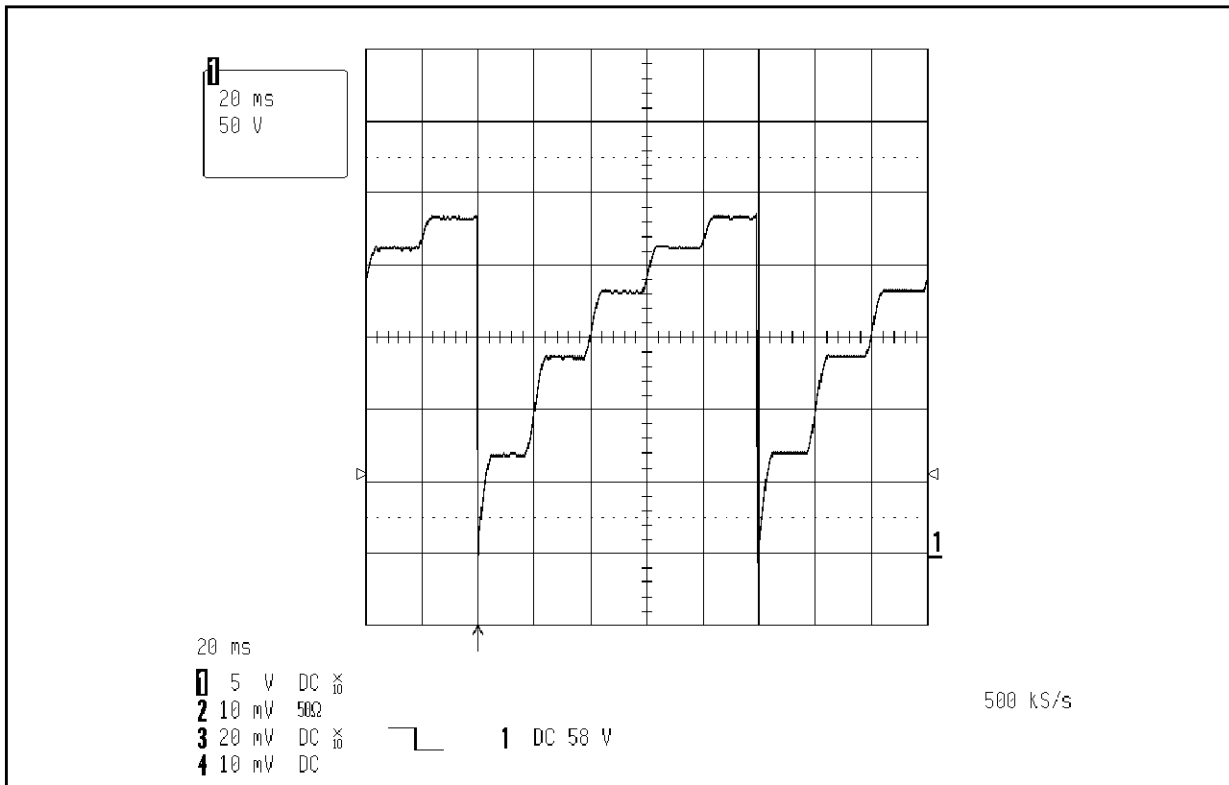
Fig 2. : Spark frequency versus Rs and C



The couple Rs/C can be chosen with the previous curve. Keep in mind the Rs maximum limit for which the system would not work when the AC

mains is minimum. The next curve shows the behavior with Rs=15kOhms and C=1µF.

Fig. 3 : Voltage across the capacitance with Rs = 15 kOhms and C = 1µF



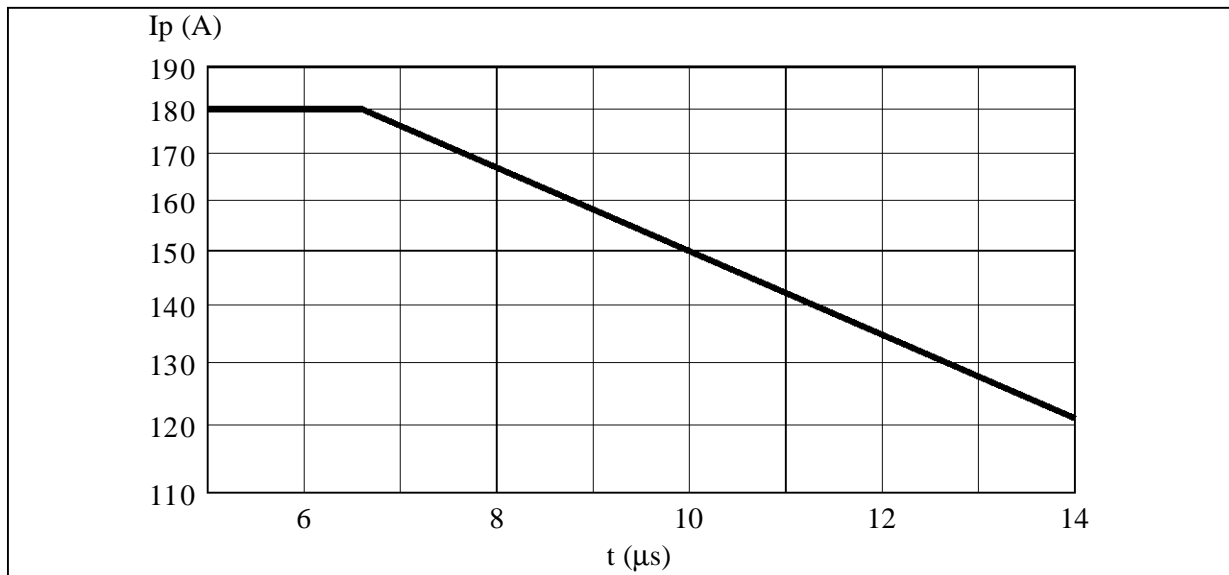
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PEAK CURRENT LIMIT

This component is designed to withstand $I_p = 150A$ for a pulse duration of $10\mu s$ for an ambient temperature of $90^\circ C$.

The curve of peak current versus the pulse duration allows us to verify if the application is within the FLC operating limit.

Fig. 4 : Peak current limit



POWER LOSSES (For $10\mu s$, see note 1)

To evaluate the power losses, please use the following equations :

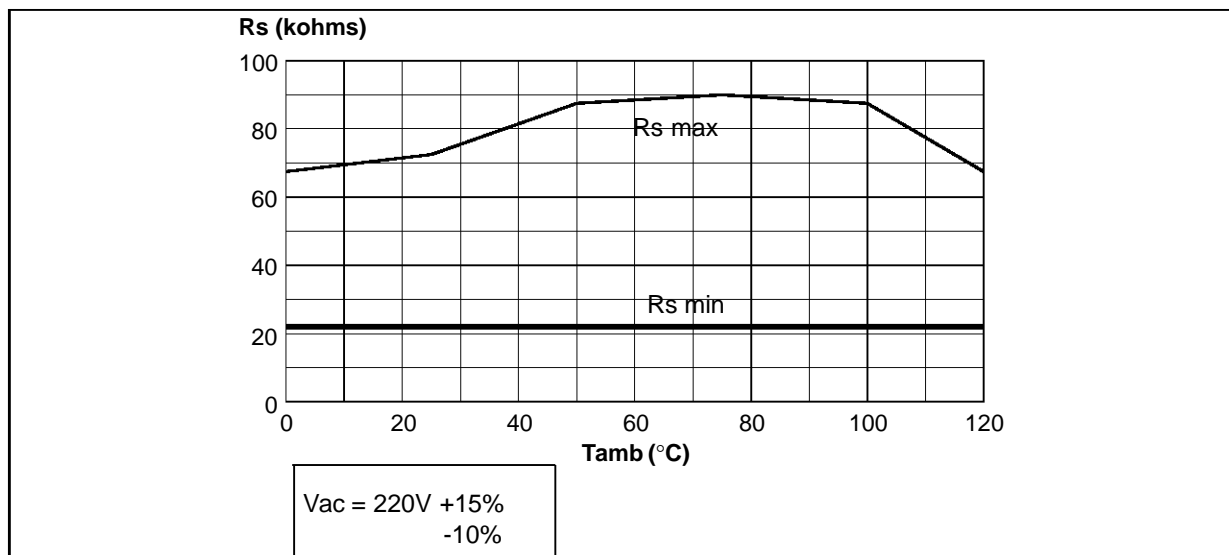
$$\text{For the thyristor : } P = 1.18 \times I_{T(AV)} + 0.035 I_{T(RMS)}^2$$

$$\text{For the diode : } P = 0.67 \times I_{F(AV)} + 0.106 I_{F(RMS)}^2$$

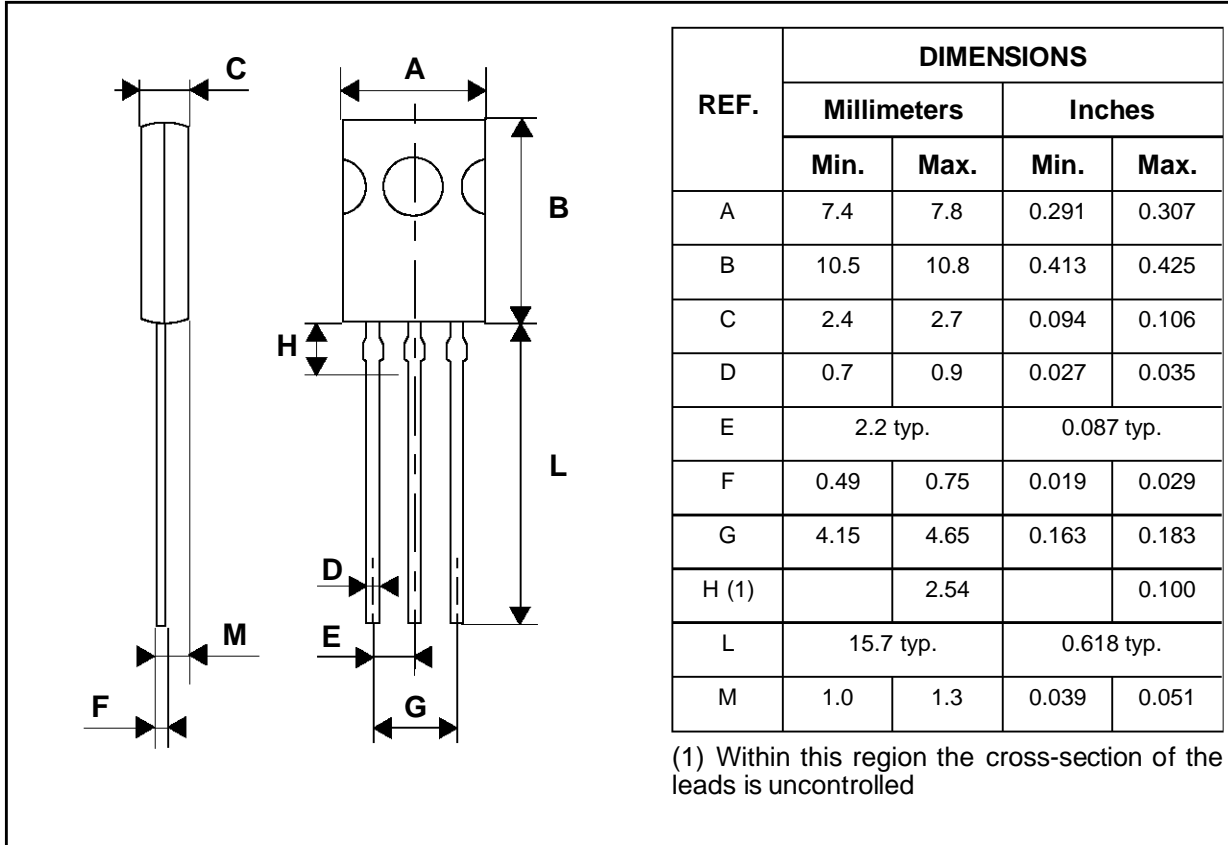
2/ BLANKING MODE (Transistor T_{ON})

In this mode and transistor T is saturated and stops the spark generation.

In order to keep the thyristor Th in blanking mode and because of the power dissipation, the Resistor (R_s) has to keep a minimum value of $22 k\Omega$ (see next curve) :



PACKAGE MECHANICAL DATA
SOT82 (Plastic)



Marking type number

Weight : 0.72 g.

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