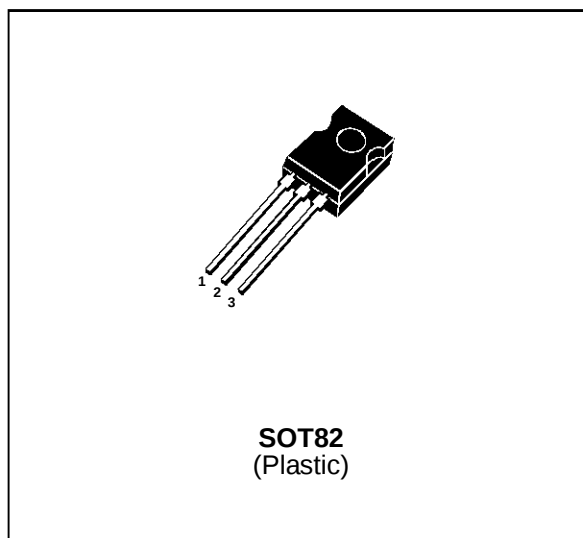


FEATURES

- 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 ignitors / gas boilers...

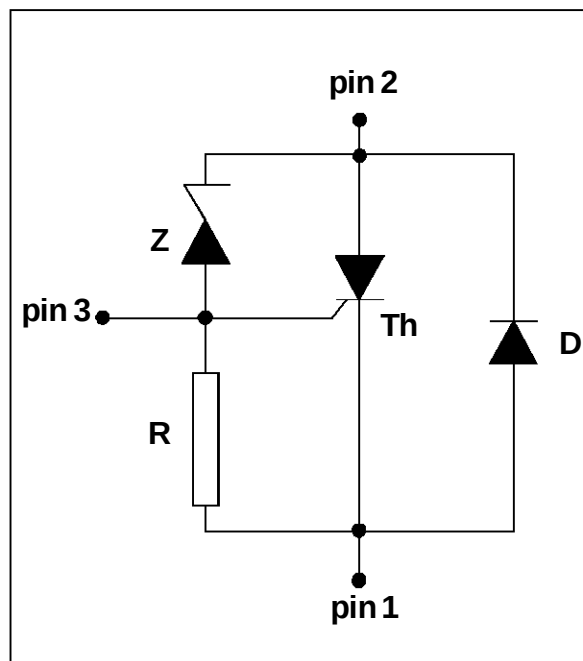
Th : Thyristor for switching operation.

Z : Zener diode to set the threshold voltage.

D : Diode for reverse conduction.

R : 2 kOhm resistor.

FUNCTIONAL DIAGRAM

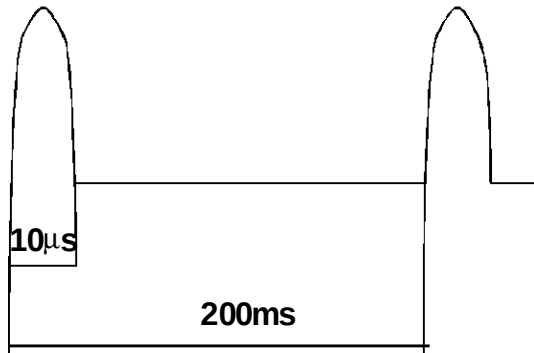


FLC02-200D

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	$t_p = 10\mu\text{s}$ (note 1)	150	A
I_{FRM}	Repetitive surge peak on state current for diode			
I_{TSM}	Non repetitive surge peak on state current	$t_p = 10\text{ms}$	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	$^{\circ}\text{C}$

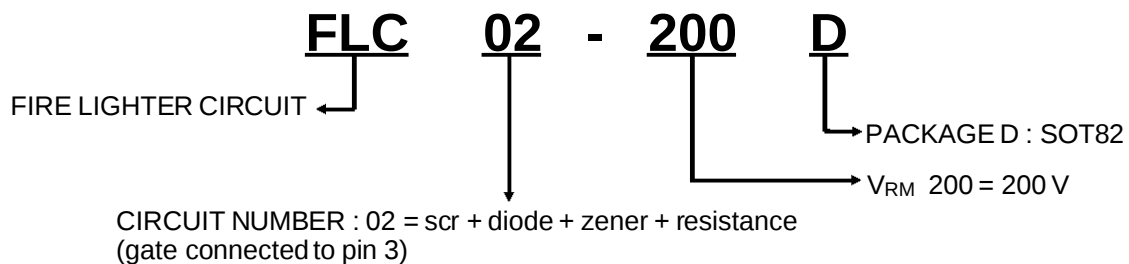
Note 1 : Test current waveform



THERMAL RESISTANCE

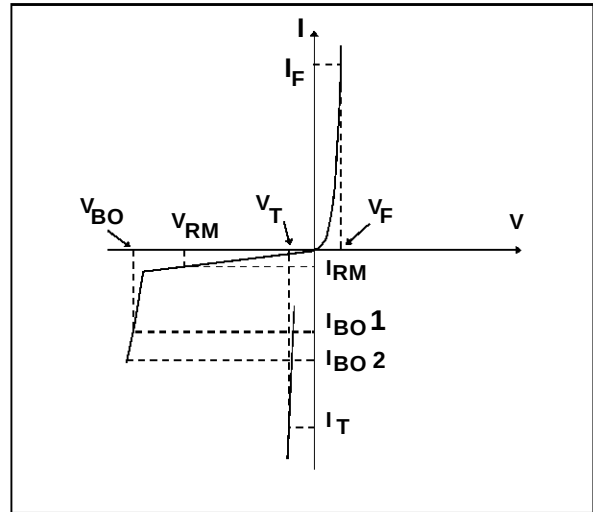
Symbol	Parameter	Value	Unit
$R_{\text{th(j-a)}}$	Thermal resistance junction to ambient	100	$^{\circ}\text{C/W}$

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



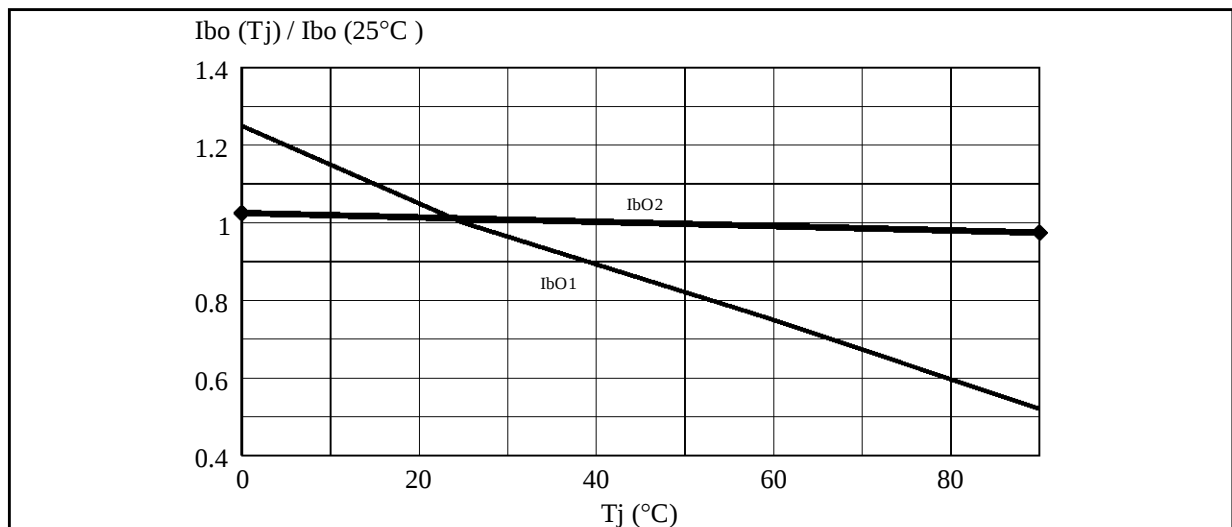
DIODE (D) PARAMETER

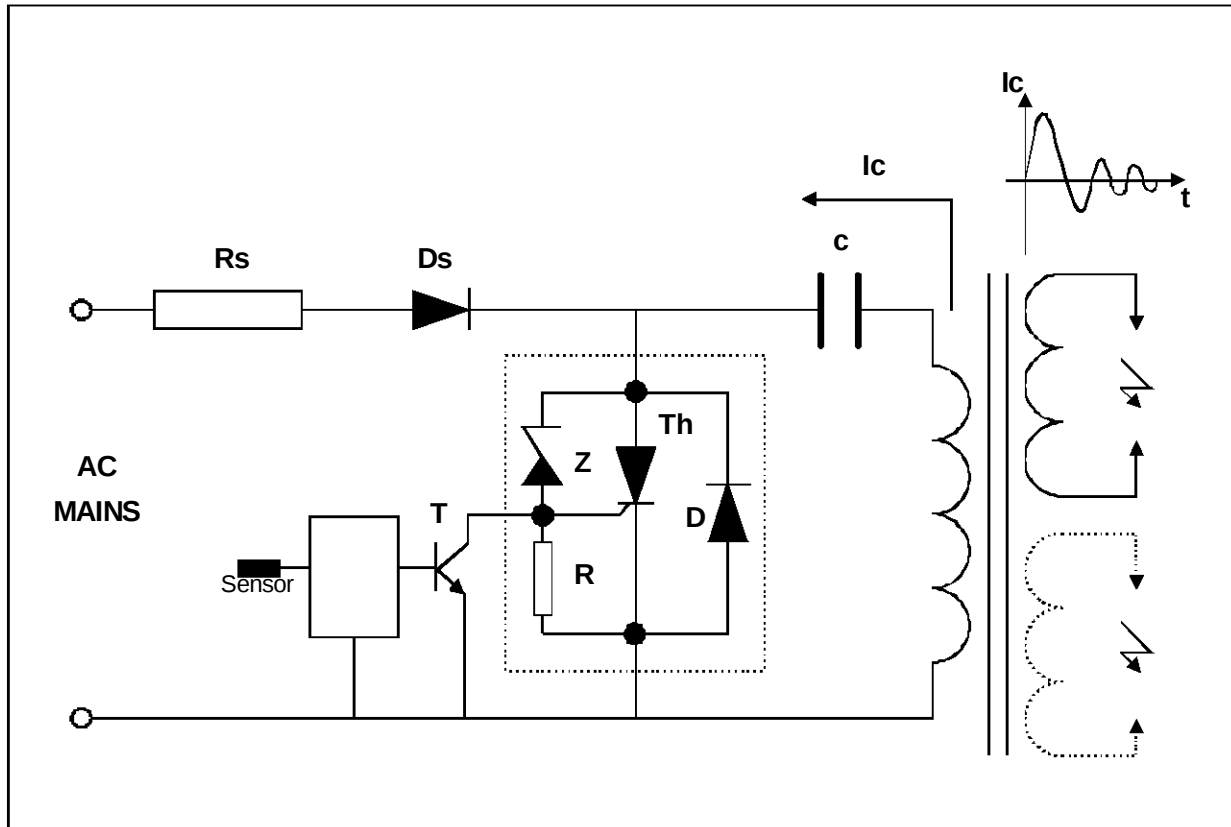
Symbol	Test Conditions				Value	Unit
V_F	$I_F = 2A$	$tp \leq 1ms$	$T_j = 25^{\circ}C$	MAX	1.7	V

THYRISTOR (Th) and ZENER (Z) PARAMETERS

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

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





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 Ds.

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.

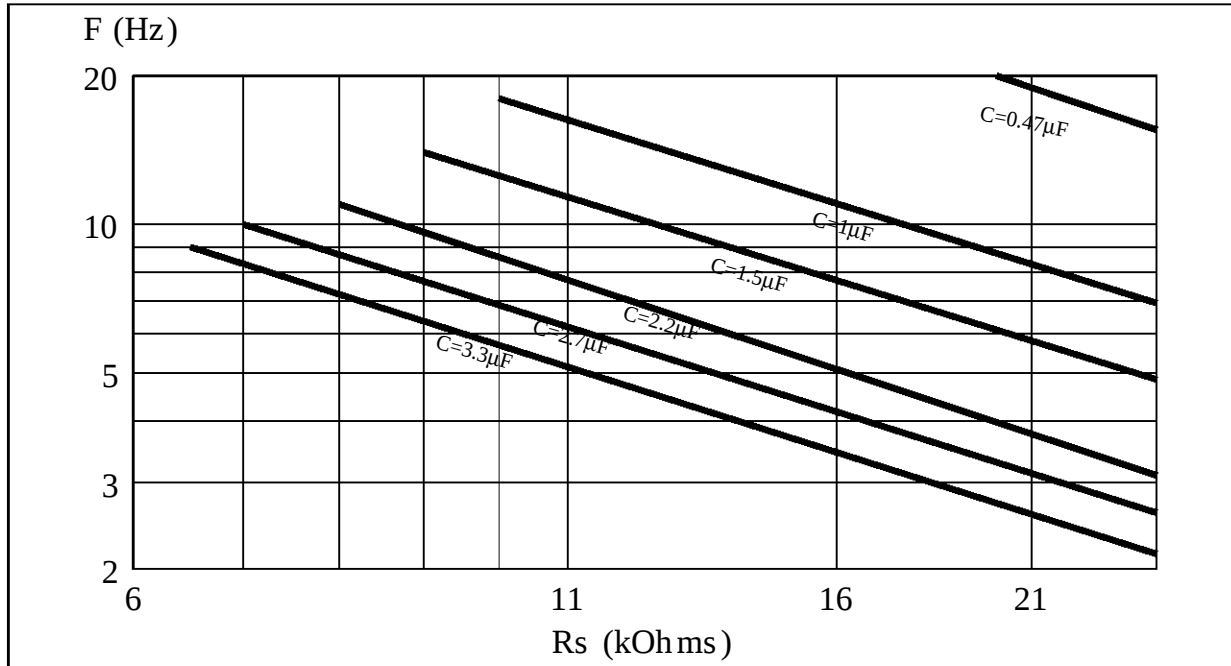
RS RESISTOR CALCULATION

The Rs 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 Rs value is equal to :

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

Fig 2. : Spark frequency versus R_s and C

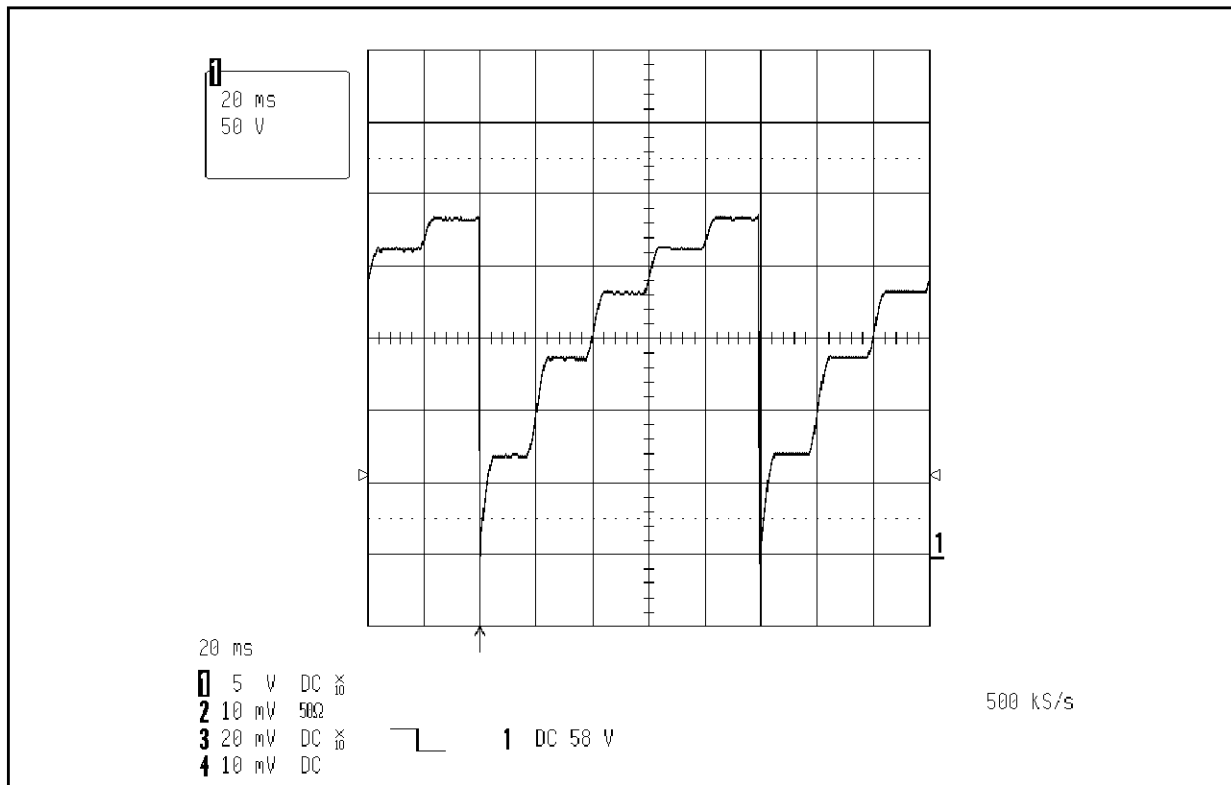


The couple R_s/C can be chosen with the previous curve. Keep in mind the R_s maximum limit for which the system would not work when the AC

mains is minimum.

The next curve shows the behavior with $R_s = 15$ kOhms and $C = 1 \mu F$.

Fig. 3 : Voltage across the capacitance with $R_s = 15$ kOhms and $C = 1 \mu F$

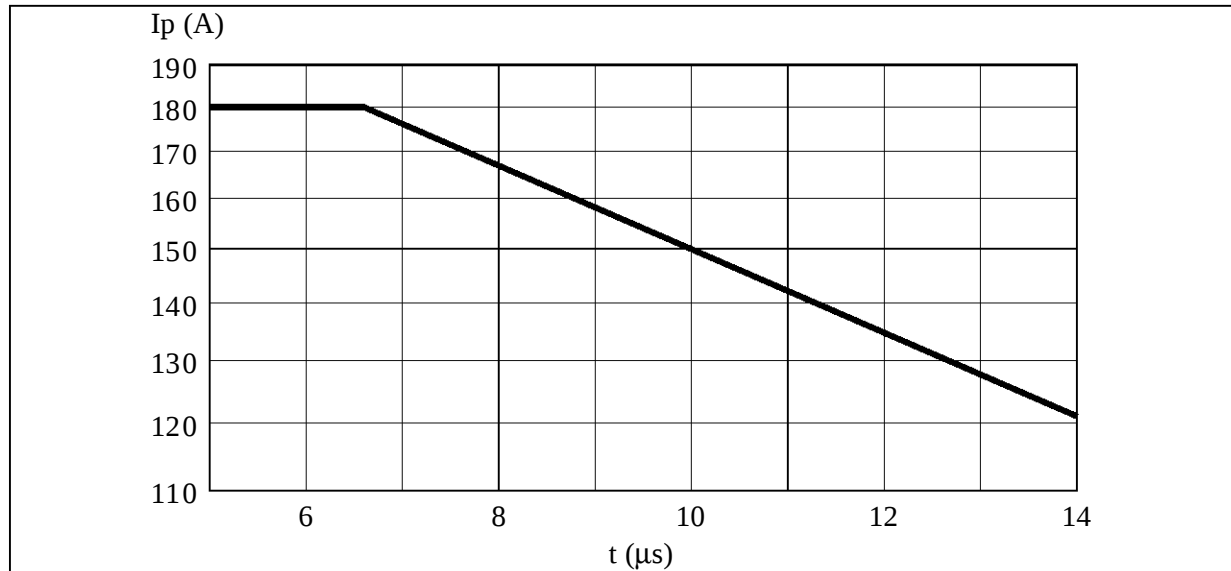


PEAK CURRENT LIMIT

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 :

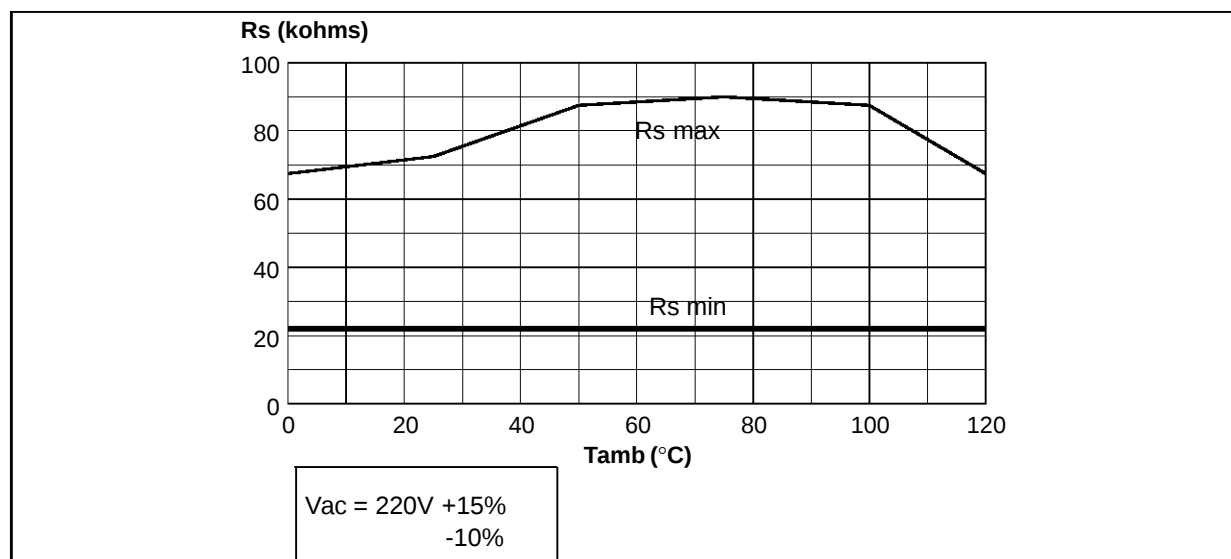
For the thyristor : $P = 1.18 \times I_{T(AV)} + 0.035 I_{T(RMS)}^2$

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

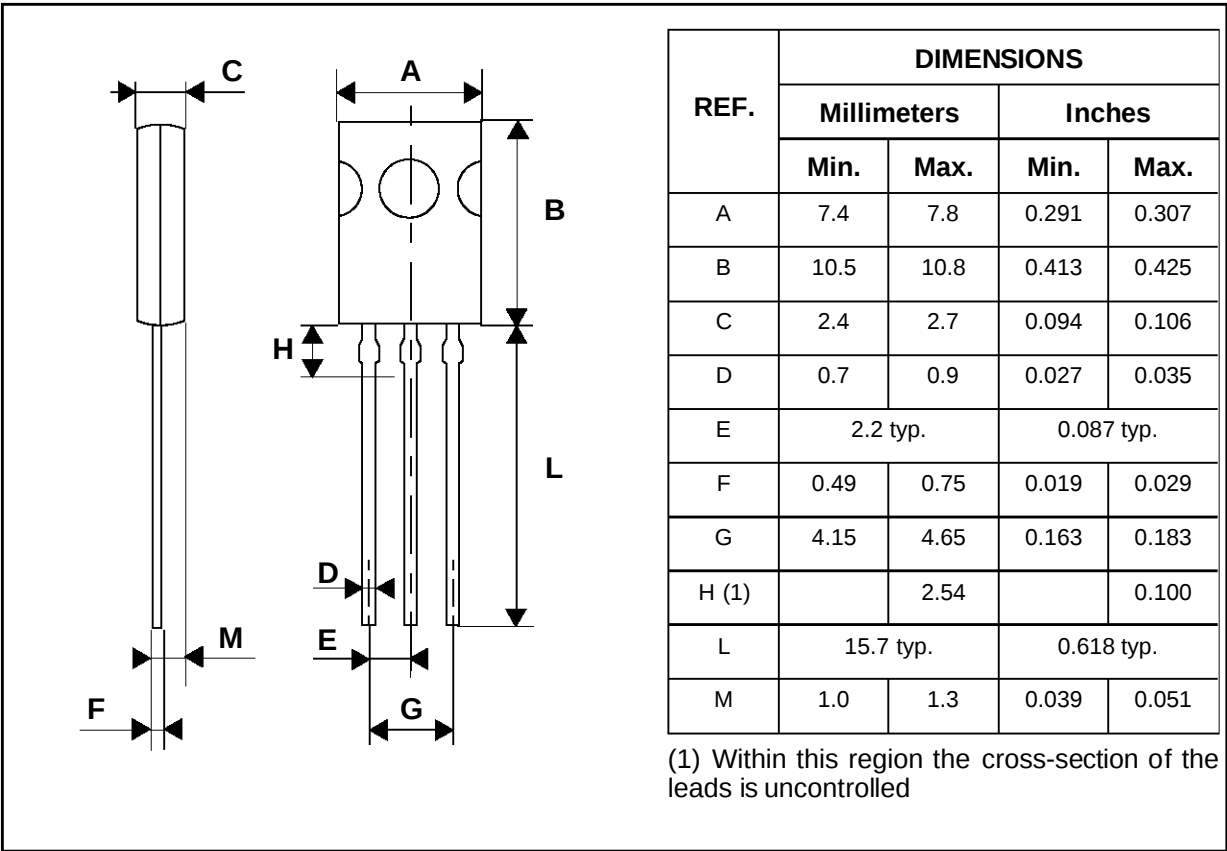
2/ BLANKING MODE (Transistor T_{ON})

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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