



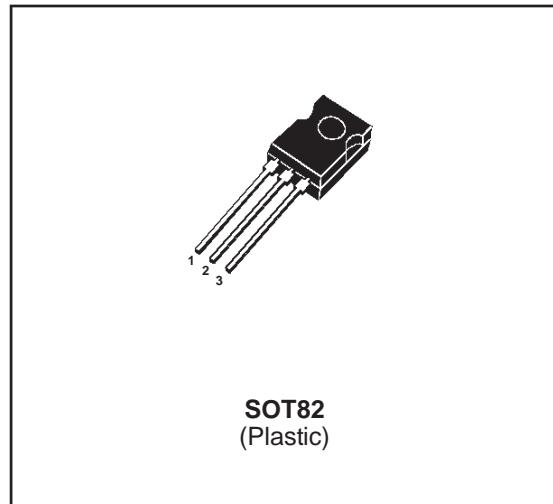
FLC01-200D

Application Specific Discretes
A.S.D.TM

FIRE LIGHTER CIRCUIT

FEATURES

- SPACE SAVING : MONOLITHIC FIRE LIGHTER FUNCTION INTEGRATION
- DEDICATED THYRISTOR STRUCTURE FOR CAPACITANCE DISCHARGE IGNITION OPERATION
- HIGH PULSE CURRENT CAPABILITY
190A @ $t_p = 10\mu s$



DESCRIPTION

- The FLC01 is a high performance planar difused technology adapted to high temperature and rugged environmental conditions.
- It has been developed especially for capacitance discharge operation. The main applications are gas lighter or ignitor such as :
cookers / gas boilers / gas hobs...

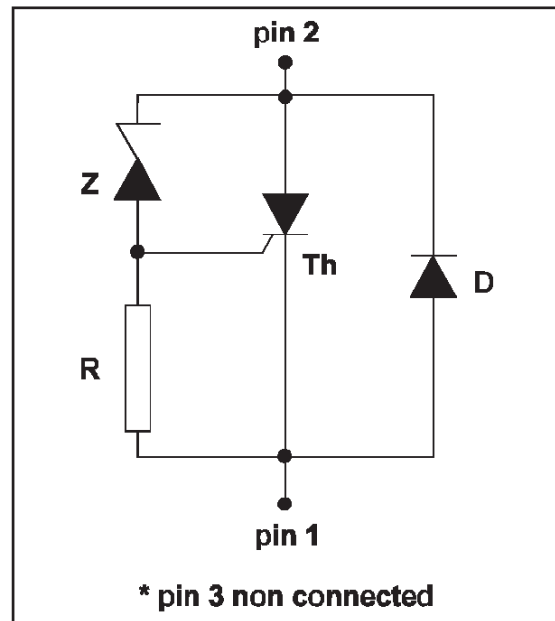
Th : Thyristor for switching operation.

Z : Zener diode to set the threshold voltage.

D : Diode for reverse conduction.

R : 2 k Ω resistor.

FUNCTIONAL DIAGRAM

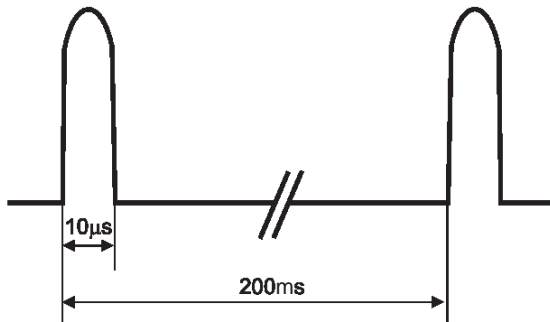


FLC01-200D

ABSOLUTE RATINGS (limiting values) : $-30^{\circ}\text{C} < T_{\text{amb}} < 120^{\circ}\text{C}$

Symbol	Parameter	Value	Unit
I_{TRM}	Repetitive surge peak on state current for thyristor	190	A
I_{FRM}	Repetitive surge peak on state current for diode		
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	-30 + 120	$^{\circ}\text{C}$
T_{L}	Maximum lead temperature for soldering during 10s	260	$^{\circ}\text{C}$

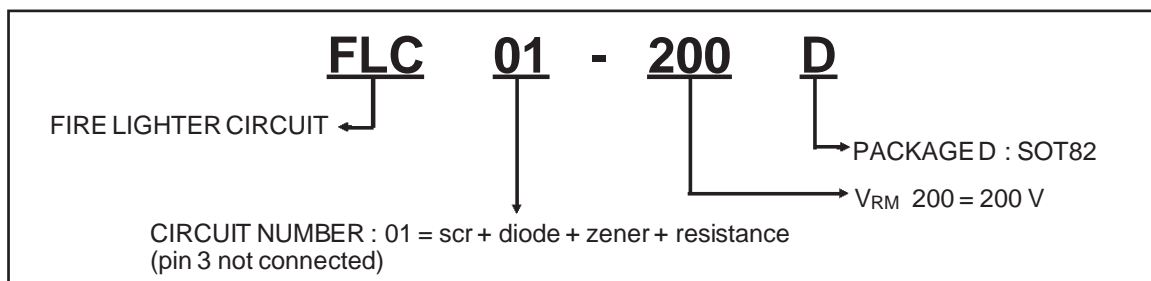
Note 1 : Test current waveform



THERMAL RESISTANCE

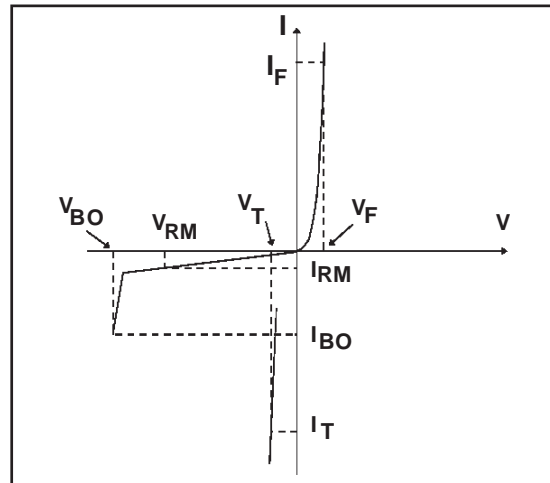
Symbol	Parameter	Value	Unit
$R_{\text{th(j-a)}}$	Thermal resistance junction to ambient	100	$^{\circ}\text{C}/\text{W}$

ORDERING INFORMATION



ELECTRICAL CHARACTERISTICS

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



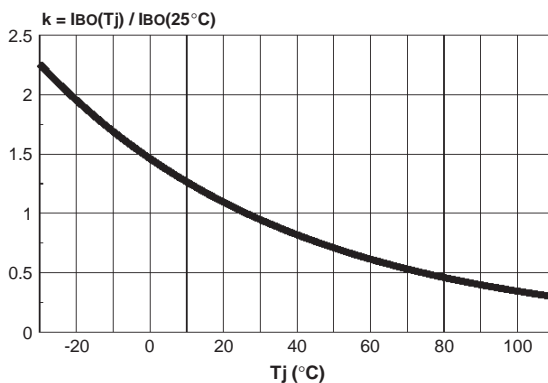
DIODE (D) PARAMETER

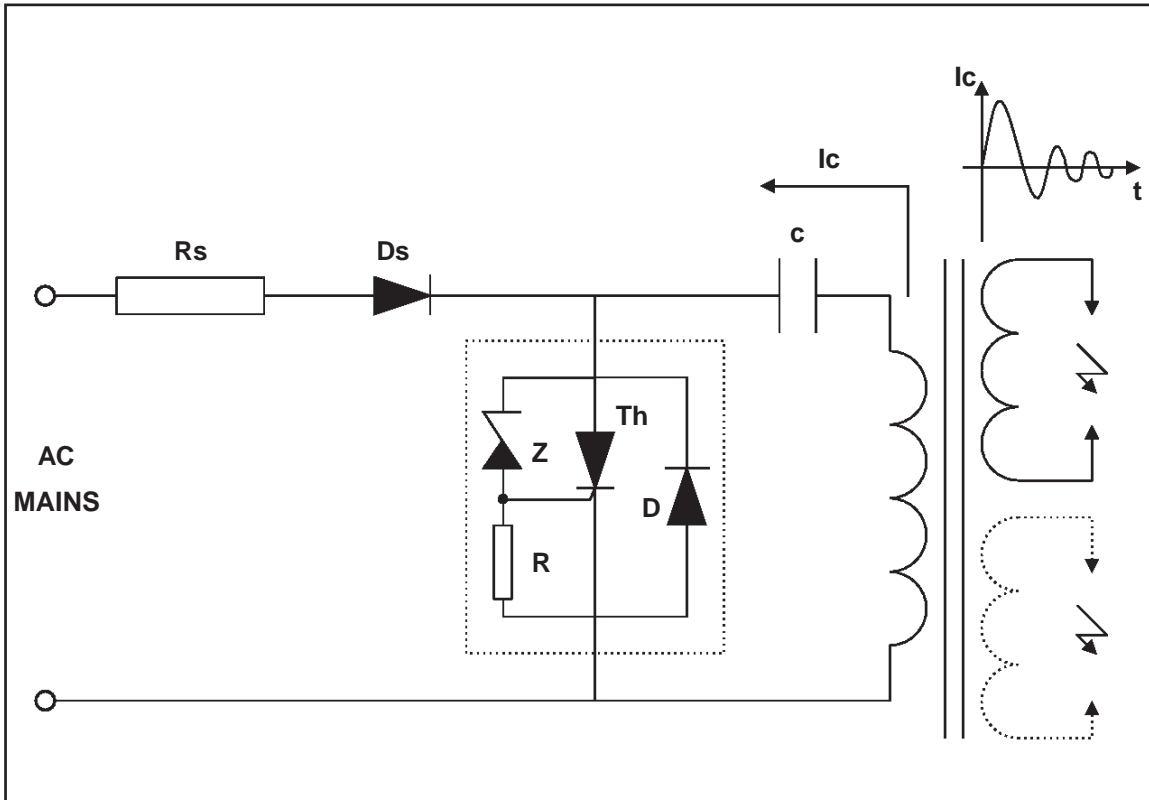
Symbol	Test Conditions				Value	Unit
V_F	$I_F = 2A$	$t_p \leq 1\text{ ms}$	$T_j = 25^\circ C$	MAX	1.7	V

THYRISTOR (Th) and ZENER (Z) PARAMETERS

Symbol	Test conditions	Min	Typ	Max	Unit	
I_{RM}	$V_{RM} = 200\text{ V}$	$T_j = 25^\circ C$		1	μA	
		$T_j = 125^\circ C$		10	μA	
V_{BO}	at I_{BO}	$T_j = 25^\circ C$	206	220	233	V
I_{BO}	at V_{BO}	$T_j = 25^\circ C$			0.5	mA
V_T	$I_T = 2A$ $t_p \leq 1\text{ ms}$	$T_j = 25^\circ C$			1.7	V
αT			0.27		$V/^\circ C$	

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





The applications of the lighter using the capacitance discharge topology operate in 2 phases :

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

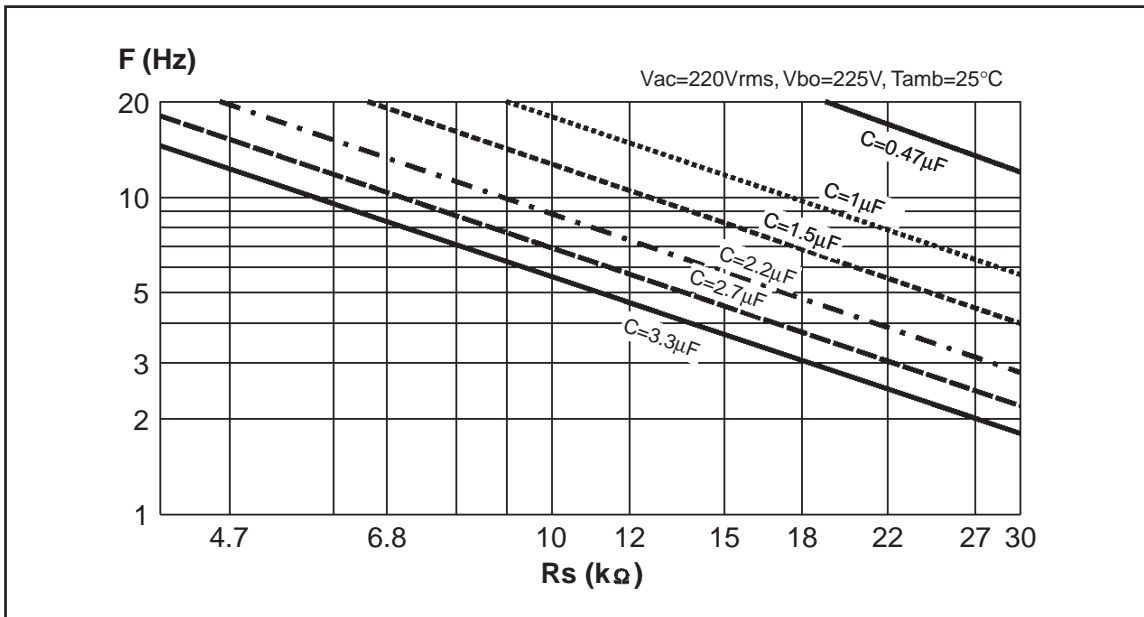
The Rs resistor allows, in addition with the capacitor C, to adjust the spark frequency and to limit the current from the mains. Its value shall allow the thyristor Th to fire even in the worst case. In this borderline case the system must fire with the lower RMS mains voltage value while the breakdown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

The maximum Rs value is equal to :

$$R_{smax} = \frac{(V_{AC \text{ min.}} \cdot \sqrt{2}) - [V_{BO \text{ max.}} \cdot (1 + \alpha \cdot T \cdot (T_{amb} - 25))] }{k \cdot I_{BO}^*}$$

* : see fig 1

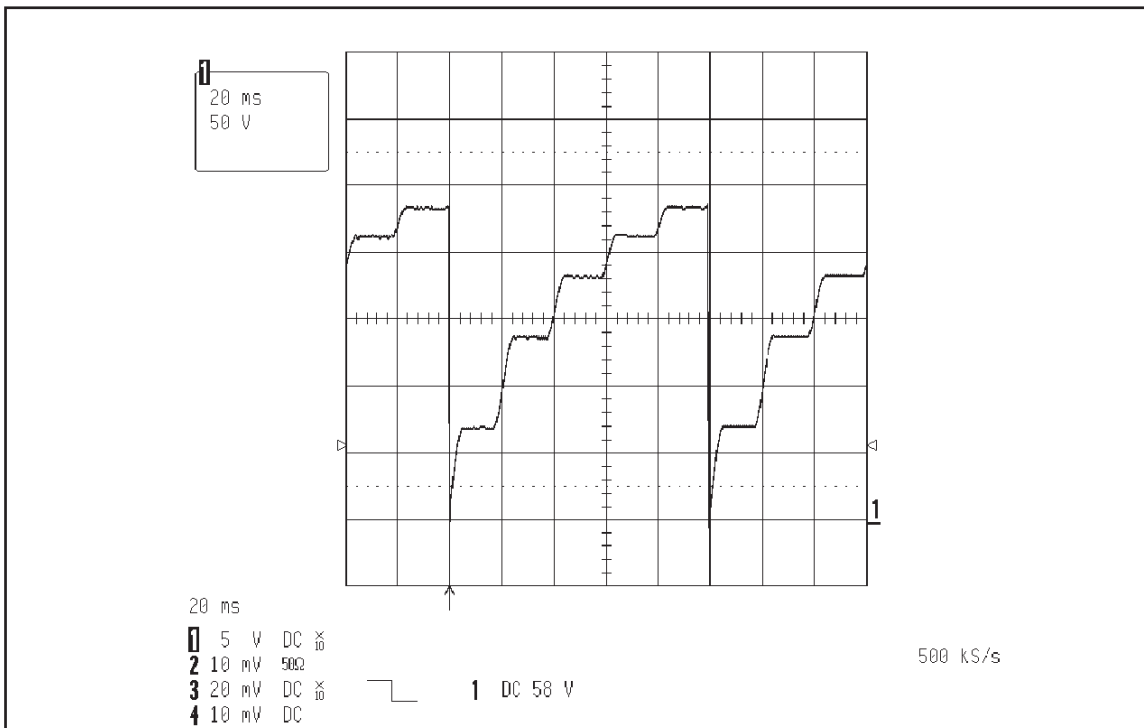
Fig. 2 : Spark frequency versus R_s and C



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 $R_s=15k\Omega$ and $C=1\mu F$.

Fig. 3 : Voltage across the capacitance with $R_s = 15k\Omega$, $C = 1\mu F$ and $V_{BO} = 225V$.

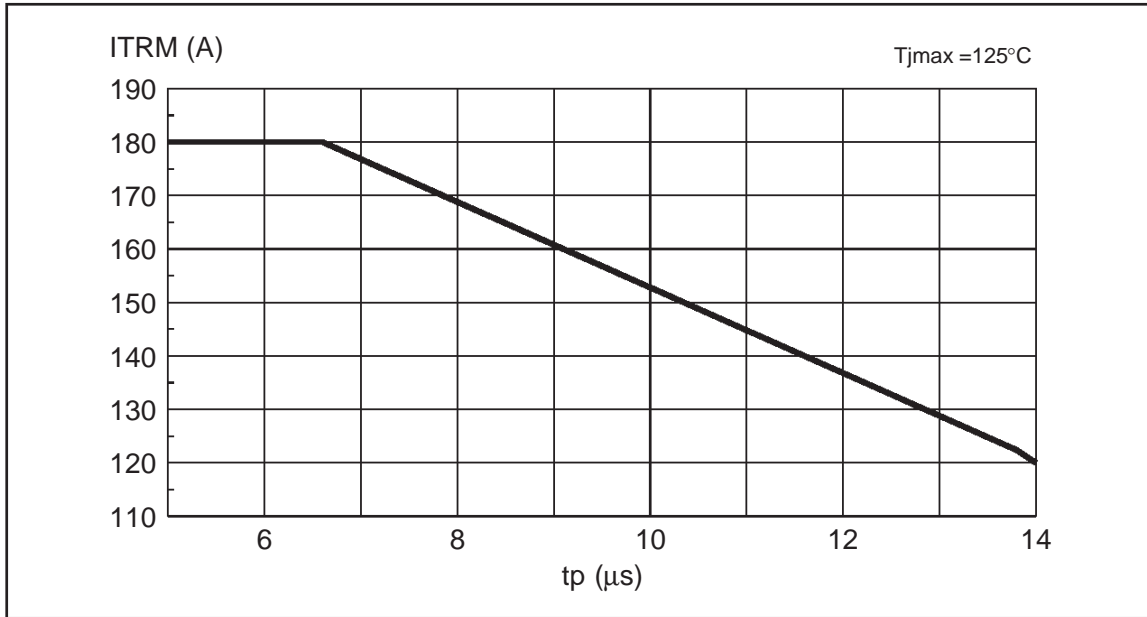


PEAK CURRENT LIMIT

This component is designed to withstand $I_{TRM} = 150A$ for a pulse duration of $10\mu s$ for an

ambient temperature of $120^{\circ}C$ in repetitive surge. 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



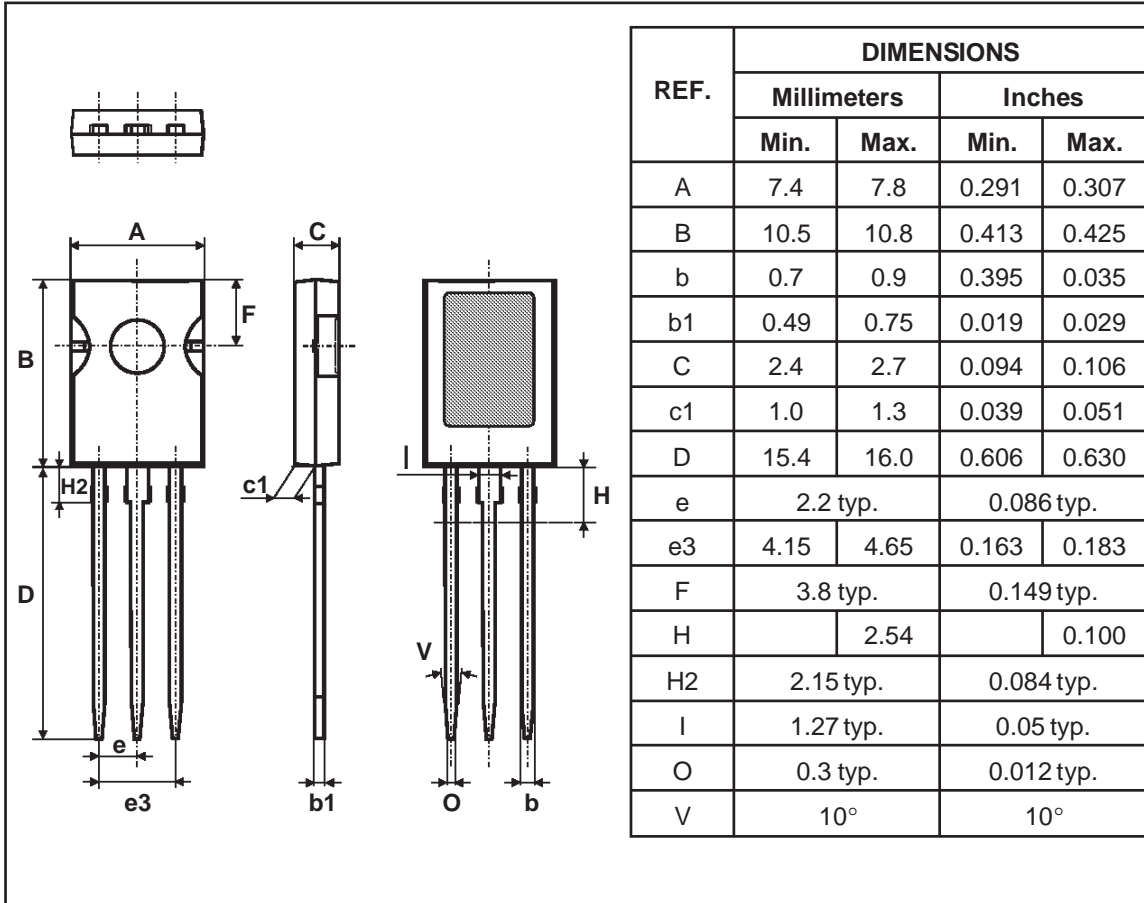
POWER LOSSES (For $10\mu s$, see note 1)

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

PACKAGE MECHANICAL DATA
SOT82 (Plastic)



- **Marking** : type number
- **Weight** : 0.72 g.

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