



FLC21-135A

Application Specific Discretes
A.S.D.™

LOW POWER
FIRE LIGHTER CIRCUIT

FEATURES

- DEDICATED THYRISTOR STRUCTURE FOR CAPACITIVE DISCHARGE IGNITION OPERATION
- HIGH PULSE CURRENT CAPABILITY
 $I_{FRM} = 90A @ t_p = 10\mu S$
- AC OR DC OPERATION CAPABILITY WITH SUPPLY FROM THE AC MAINS OR A DC BATTERY
- FAST TURN-ON OPERATION
- DESIGNED FOR HIGH AMBIENT TEMPERATURE (up to 120°C)

BENEFITS

- SPACE SAVING THANKS TO MONOLITHIC FUNCTION INTEGRATION
- HIGH RELIABILITY WITH PLANAR TECHNOLOGY

DESCRIPTION

The FLC21-135A has been especially developed for capacitance discharge operation. The main applications are: fuel ignitors, fuel or gas heaters, gas ranges, cooker tops, barbecues, water heaters, HVACs, portable ignitors, insect killers.

Based on ST's ASD™ technology, it provides a fully integrated function, with high performance and reliability levels, adapted to severe and hot temperature environment.

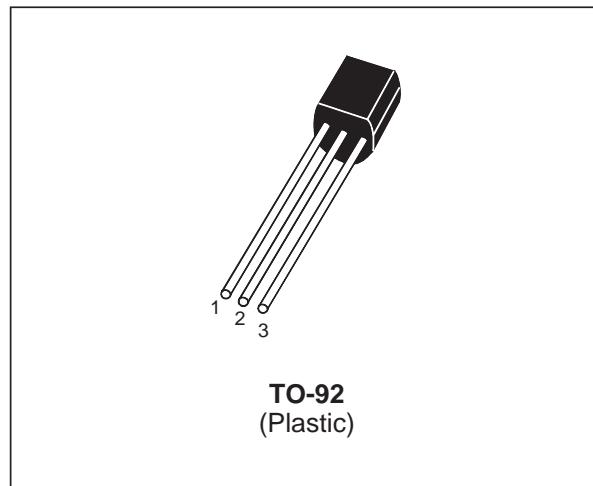
The typical supply of the FLC21-135A fire lighter circuit is a DC battery or the AC mains.

Th: Thyristor for the switching operation.

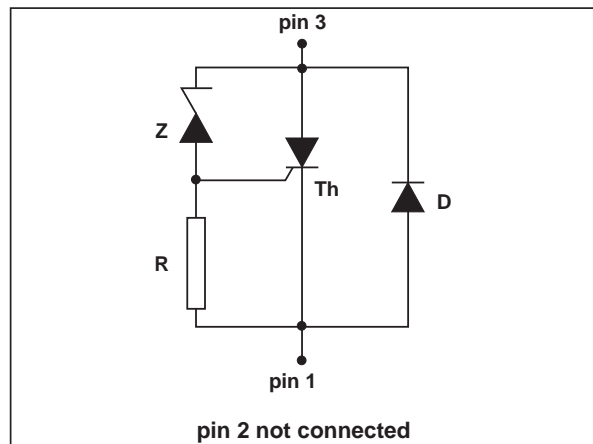
Z: Zener diode to set the igniting threshold voltage.

D: Diode for the reverse conduction.

R: 2 kΩ resistor.



FUNCTIONAL DIAGRAM



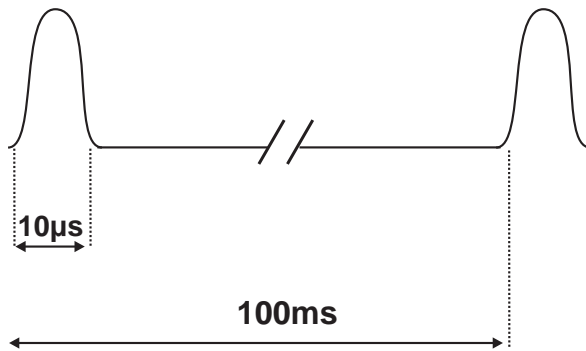
| DEVICE TYPE | APPLICATION | MODE |
|-------------|-------------------|----------|
| FLC21-135A | BATTERY OPERATION | Ignition |

FLC21-135A

ABSOLUTE RATINGS (limiting values)

| Symbol | Parameter | Value | Unit |
|--------------------|---|---|--------------------|
| I_{TRM} | Repetitive surge peak on state current for thyristor $-30^{\circ}\text{C} \leq T_{amb} \leq 120^{\circ}\text{C}$ | 90 $t_p = 10\mu\text{s}$ (note 1) | A |
| I_{FRM} | Repetitive surge peak on state current for diode $-30^{\circ}\text{C} \leq T_{amb} \leq 120^{\circ}\text{C}$ | | |
| di/dt | Critical rate of rise on state current $-30^{\circ}\text{C} \leq T_{amb} \leq 120^{\circ}\text{C}$ | 50 | A/ μs |
| T_{stg} T_j | Storage junction temperature range Maximum junction temperature | - 40 to + 150 125 | $^{\circ}\text{C}$ |
| T_{amb} | Operating temperature range | - 30 to + 120 | $^{\circ}\text{C}$ |
| T_L | Maximum lead temperature for soldering during 10s | 260 | $^{\circ}\text{C}$ |

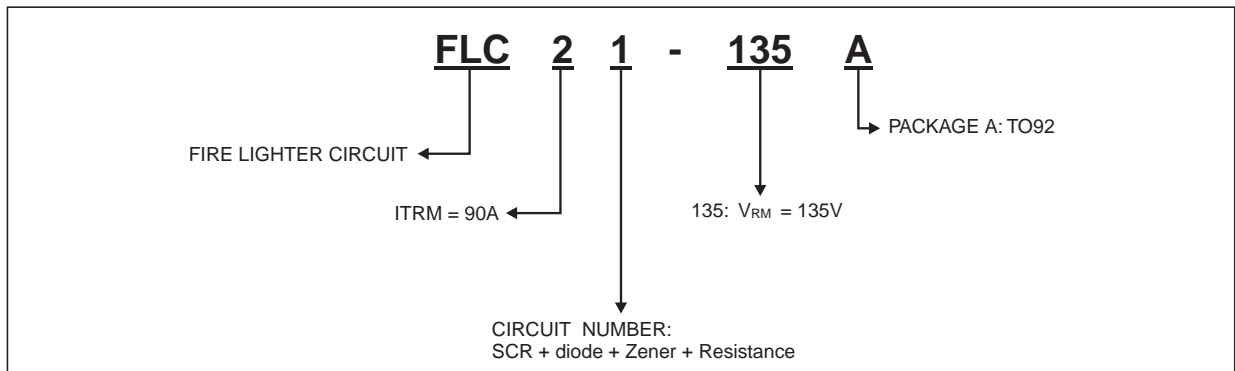
Note 1 : Test current waveform



THERMAL RESISTANCE

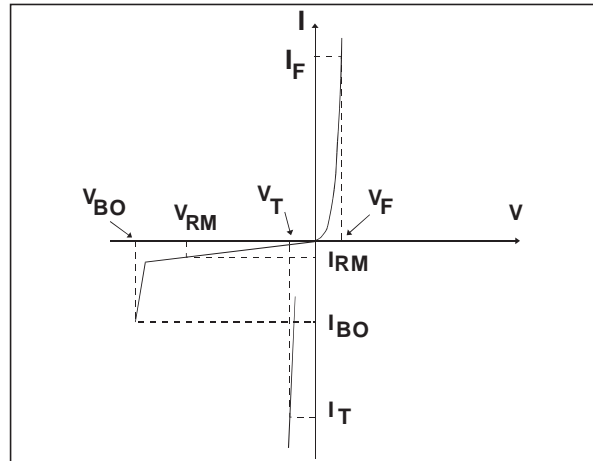
| Symbol | Parameter | Value | Unit |
|---------------|---------------------|-------|-----------------------------|
| $R_{th(j-a)}$ | Junction to ambient | 150 | $^{\circ}\text{C}/\text{W}$ |

ORDERING INFORMATION



ELECTRICAL CHARACTERISTICS

| Symbol | Parameters |
|------------|--------------------------------------|
| V_{RM} | Stand-off voltage |
| V_{BO} | Breakover voltage |
| V_T | On-state voltage |
| V_F | Diode forward voltage drop |
| I_{BO} | Breakover current |
| I_{RM} | Leakage current |
| α_T | Temperature coefficient for V_{BO} |



DIODE (D) PARAMETER

| Symbol | Test Conditions | | | Value | Unit | |
|--------|-----------------|---------------------|--------------------|-------|------|---|
| V_F | $I_F = 1A$ | $t_p \leq 500\mu s$ | $T_j = 25^\circ C$ | Max. | 1.7 | V |

THYRISTOR (Th) and ZENER (Z) PARAMETERS

| Symbol | Test conditions | | Value | | | Unit |
|------------|-----------------|---------------------|------------|------|------|--------------|
| | | | FLC21-135A | | | |
| | | | Min. | Typ. | Max. | |
| I_{RM} | $V_{RM} = 135V$ | $T_j = 25^\circ C$ | | | 1 | μA |
| | | $T_j = 125^\circ C$ | | | 10 | μA |
| V_{BO} | at I_{BO} | $T_j = 25^\circ C$ | 140 | | 160 | V |
| I_{BO} | at V_{BO} | $T_j = 25^\circ C$ | | | 500 | μA |
| V_T | $I_T = 2A$ | $t_p \leq 500\mu s$ | | | 1.7 | V |
| α_T | | | | 0.16 | | $V/^\circ C$ |

Fig. 1: Relative variation of breakover current versus junction temperature.

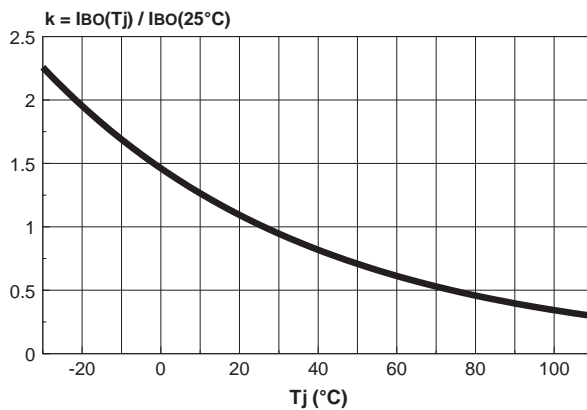


Fig. 2: BASIC AC MAINS APPLICATION.

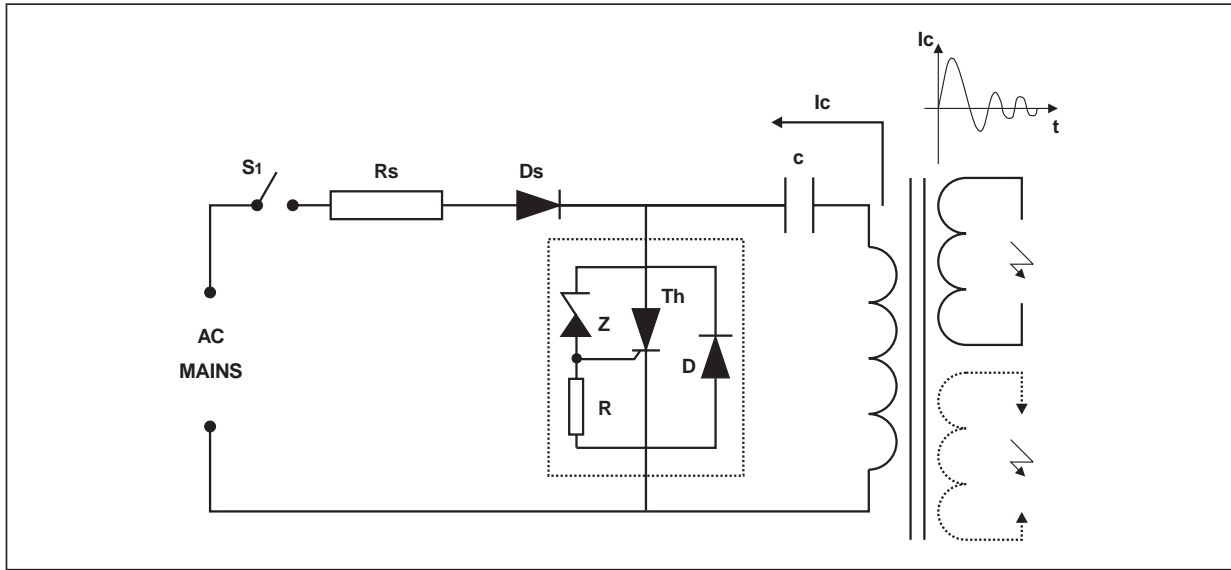
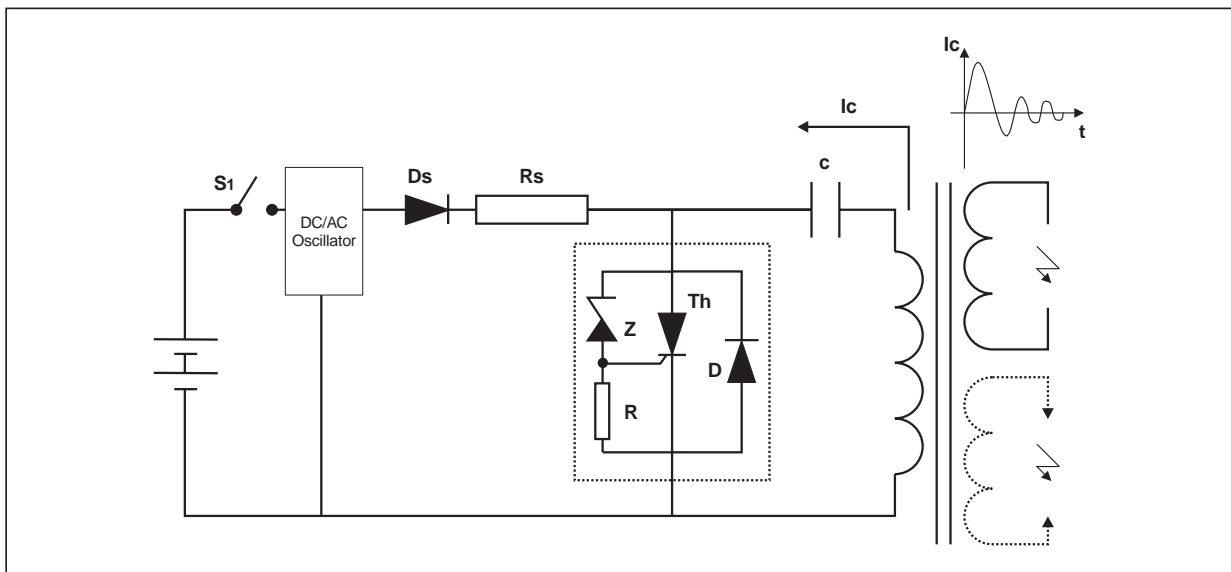


Fig. 3: BASIC DC APPLICATION.



1/ IGNITION MODE

PHASE 1

The AC voltage is rectified by the diode Ds. The ignition energy is supplied by the mains and stored into the capacitor C.

PHASE 2

At the end of the phase 1, the voltage across the capacitor C reaches the avalanche threshold of the Zener diode Z. Then, a current flows through this Zener diode into the gate of the thyristor Th which is triggered.

The thyristor turn-on generates an alternating current through the capacitor C. Its positive parts flow through the capacitor C, the primary of the HV transformer and the thyristor Th. Its negative parts of the current flow through C, D and the primary of the H.V transformer.

RS RESISTANCE CALCULATION

The Rs resistance allows, in addition with the capacitance C, the spark frequency to be adjusted and the current supplied by the mains to be limited. This resistance allows the thyristor triggering in

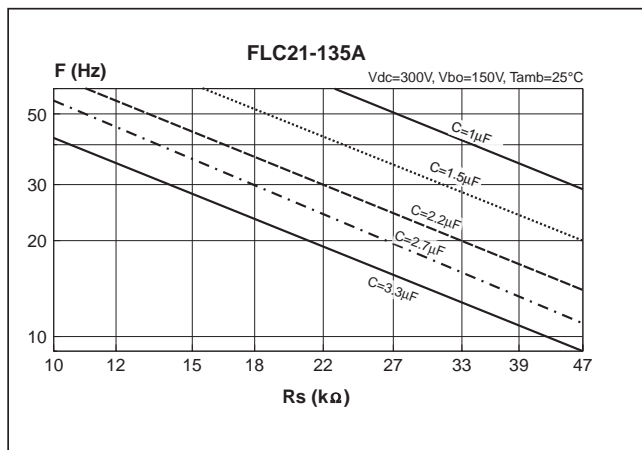
any requested cases. In the worst case scenario, the system must fire when the a.c. line voltage is minimum while the breakdown voltage V_{BO} and the current I_{BO} of the FLC are maximum.

The maximum Rs value is equal to:

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

* : see fig 1

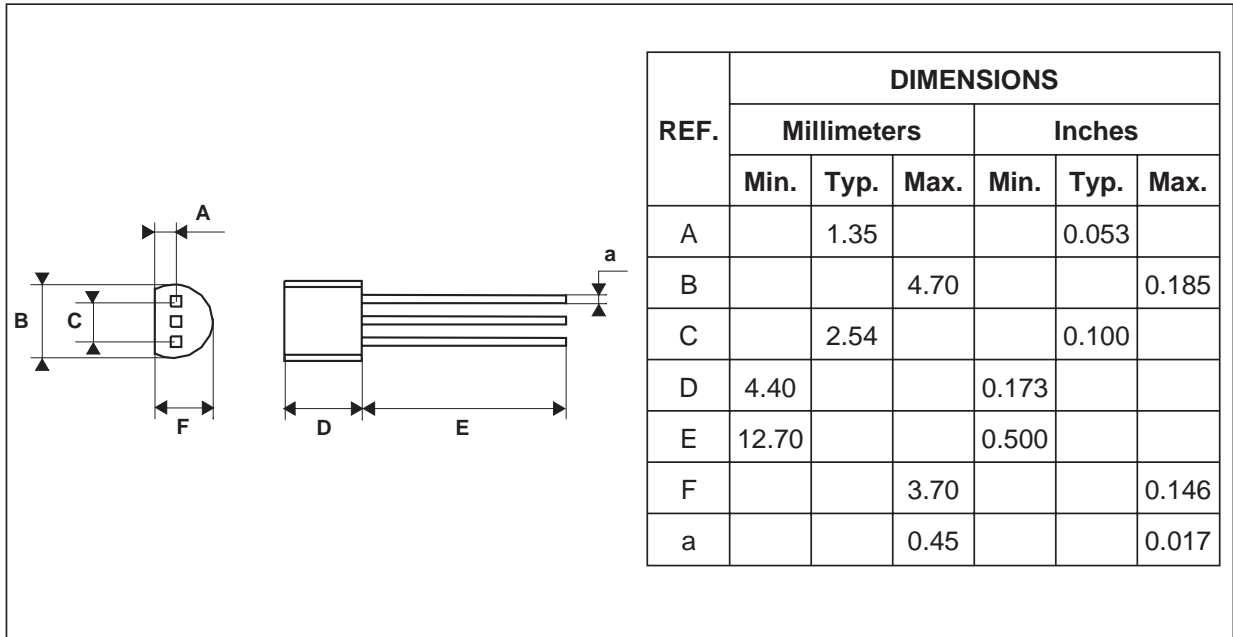
Fig. 4: Spark frequency versus Rs and C.



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.

FLC21-135A

PACKAGE MECHANICAL DATA TO-92 (Plastic)



OTHER INFORMATION

| Type | Marking | Package | Weight | Base qty | Delivery mode |
|------------|------------|---------|--------|----------|---------------|
| FLC21-135A | FLC21-135A | TO-92 | 0.20 g | 2500 | Bulk |

- Epoxy meets UL94, VO at 1/8"

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