FLC10-200H/B

Application Specific Discretes
A.S.D.™

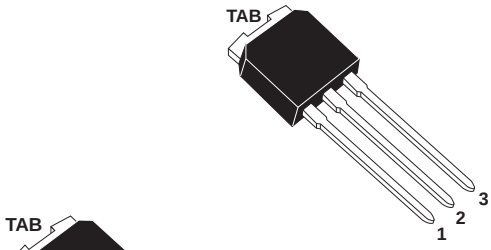
FIRE LIGHTER CIRCUIT

FEATURES

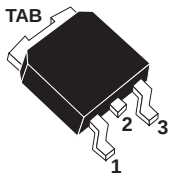
- Dedicated thyristor structure for capacitance discharge ignition operation
- High pulse current capability
  240A @ tp= 10µs
- Fast turn-on operation
- Designed for high ambient temperature (up to 120°C)

BENEFITS

- Space saving thanks to monolithic function integration
- High reliability with planar technology



IPAK
FLC10-200H



DPAK
FLC10-200B

DESCRIPTION

The FLC10 series has been especially developed for high power capacitance discharge operation. The main applications are gas lighters or ignitors such as :
cookers / gas boilers / gas hobs...

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.

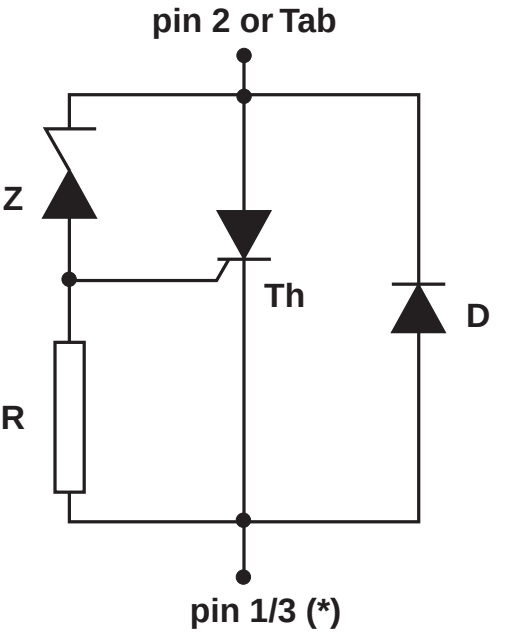
Th: Thyristor for switching operation.

Z: Zener diode to set the threshold voltage.

D: Diode for reverse conduction.

R: 2 kΩ resistor.

FUNCTIONAL DIAGRAM

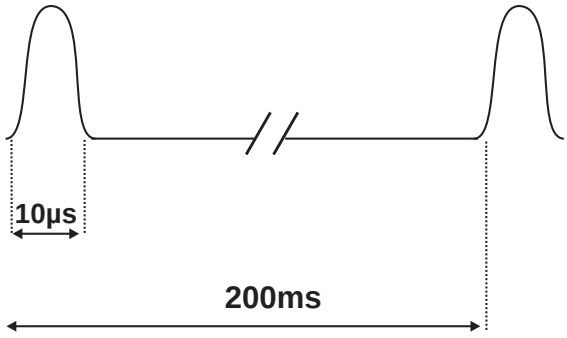


(*) Pin1 and Pin3 must be shorted together in the application circuit layout.

ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
I_{TRM}	Repetitive surge peak on state current for thyristor -30°C ≤ T_{amb} ≤ 120°C	tp = 10µs (note 1)	240	A
I_{FRM}	Repetitive surge peak on state current for diode -30°C ≤ T_{amb} ≤ 120°C			
dI/dt	Critical rate of rise time on state current -30°C ≤ T_{amb} ≤ 120°C		200	A/µs
Tstg Tj	Storage junction temperature range Maximum junction temperature		- 40 to + 150 + 125	°C
Toper	Operating temperature range		-30 + 120	°C
T_L	Maximum lead temperature for soldering during 10s		260	°C

Note 1 : Test current waveform

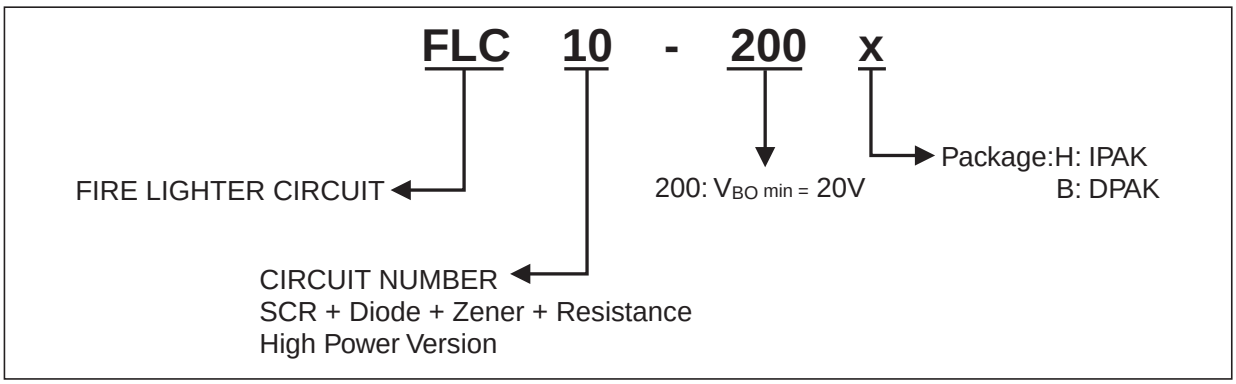


THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
Rth(j-a)	IPAK thermal resistance junction to ambient	100	°C/W
Rth(j-a)	DPAK thermal resistance junction to ambient S = 0.5cm^2	70	°C/W

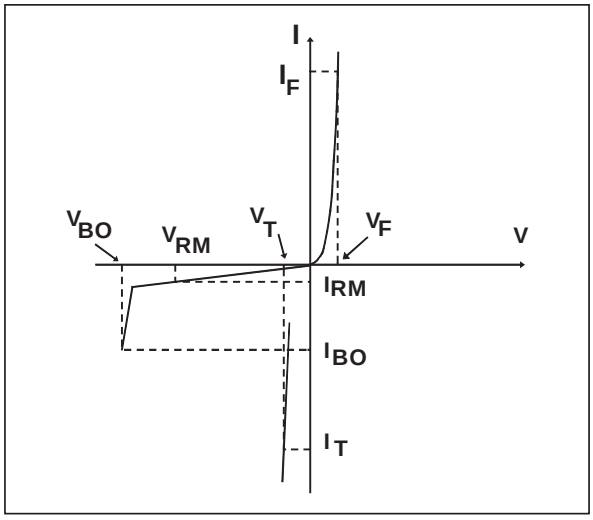
S = Copper Surface under Tab

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
αT	Temperature coefficient for V_{BO}



DIODE (D) PARAMETER

Symbol	Test Conditions			Value	Unit
V_F	I_F = 2A tp ≤ 500µs	Tj = 25°C	Max.	1.7	V

THYRISTOR (Th) and ZENER (Z) PARAMETERS

Symbol	Test conditions		Min	Typ	Max	Unit
I_{RM}	V_{RM} = 200 V	Tj = 25°C			10	µA
		Tj = 125°C			100	µA
V_{BO}	at I_{BO}	Tj = 25°C	200	225	250	V
I_{BO}	at V_{BO}	Tj = 25°C			0.5	mA
V_T	I_T = 2A tp ≤ 500µs	Tj = 25°C			1.7	V
αT				13		10^{-4}/°C

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

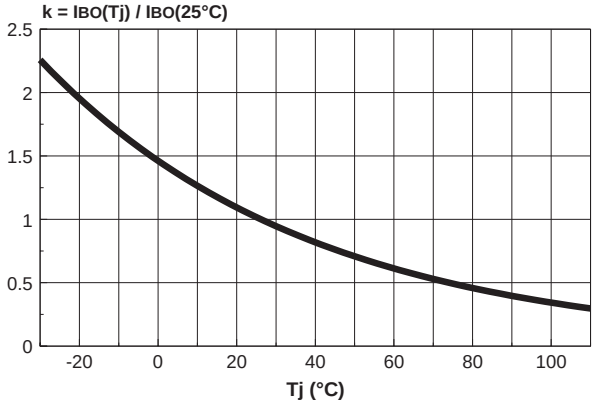
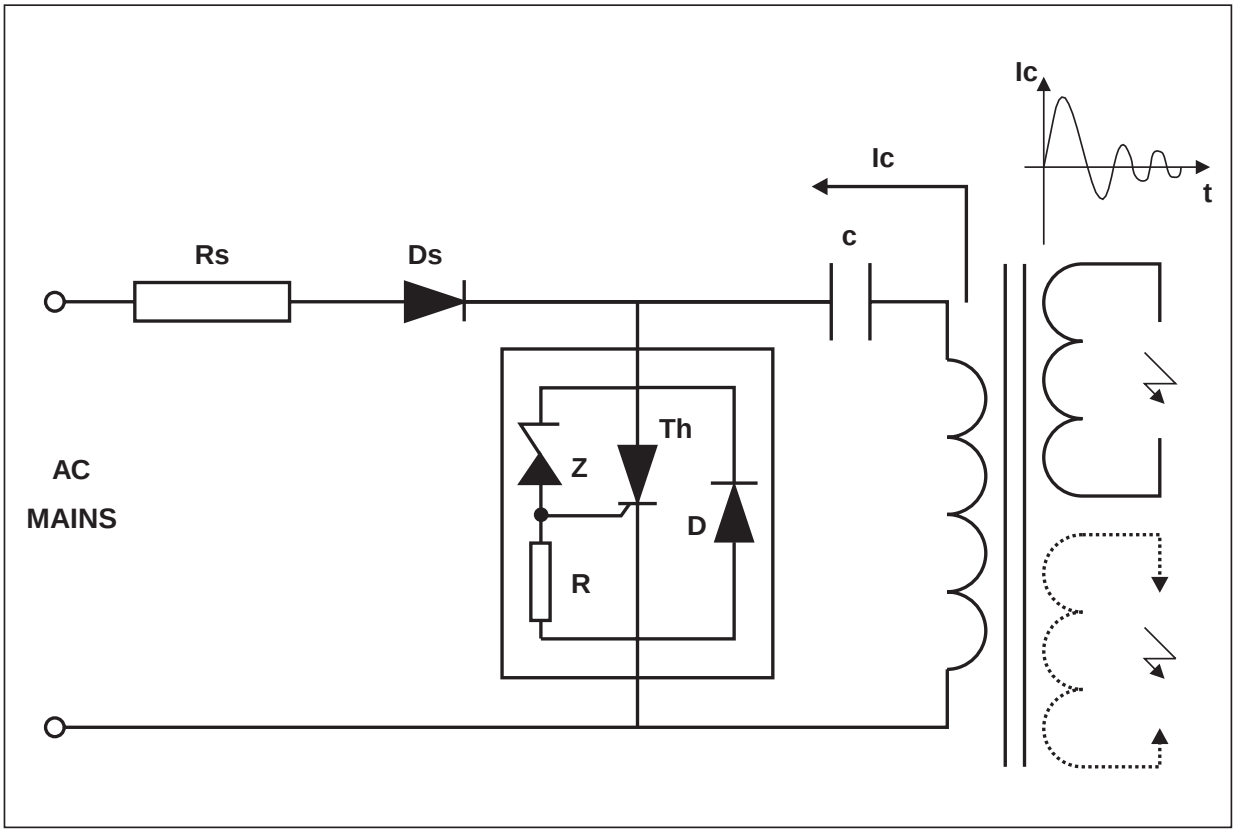


Fig. 2: BASIC APPLICATION



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 primaty of the HV transformer.

COMPONENT CHOICE

RS RESISTOR CALCULATION

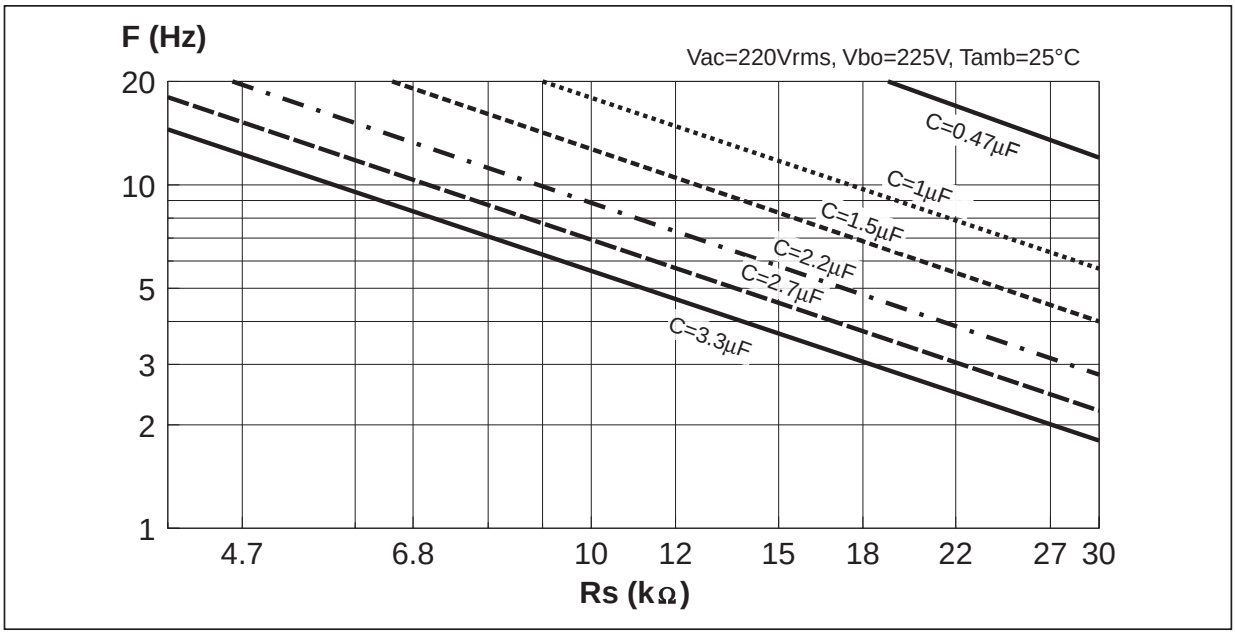
The Rs resistor allows, in addition with the capacitor C, the spark frequency to be adjusted and the current from the mains to be limited. Its value shall allow the thyristor Th to fire even in worst case conditions. In this borderline case, the system must fire with the lowest value of RMS mains voltage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

The maximum Rs value is equal to :

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

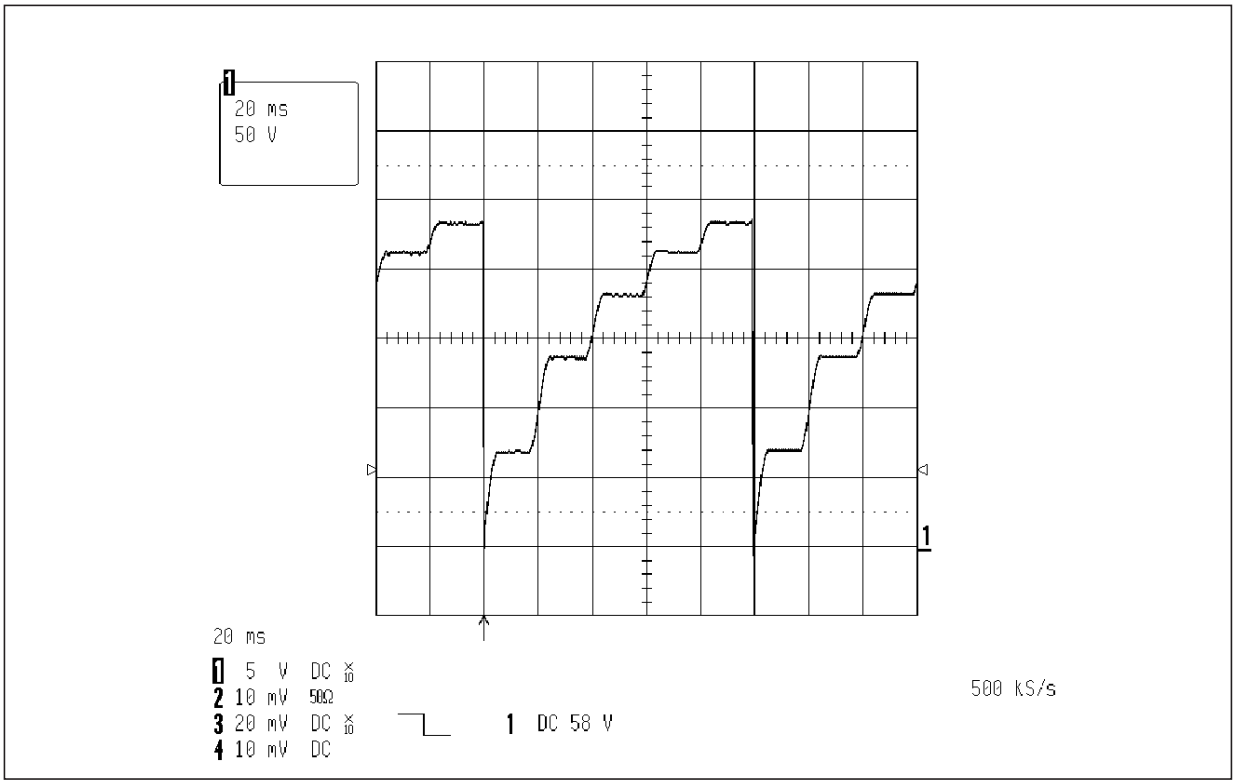
* : see fig 1

Fig. 3: 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=15kΩ and C=1µF.

Fig. 4: Voltage across the capacitance with Rs = 15kΩ, C = 1µF and V_{BO} = 225V.

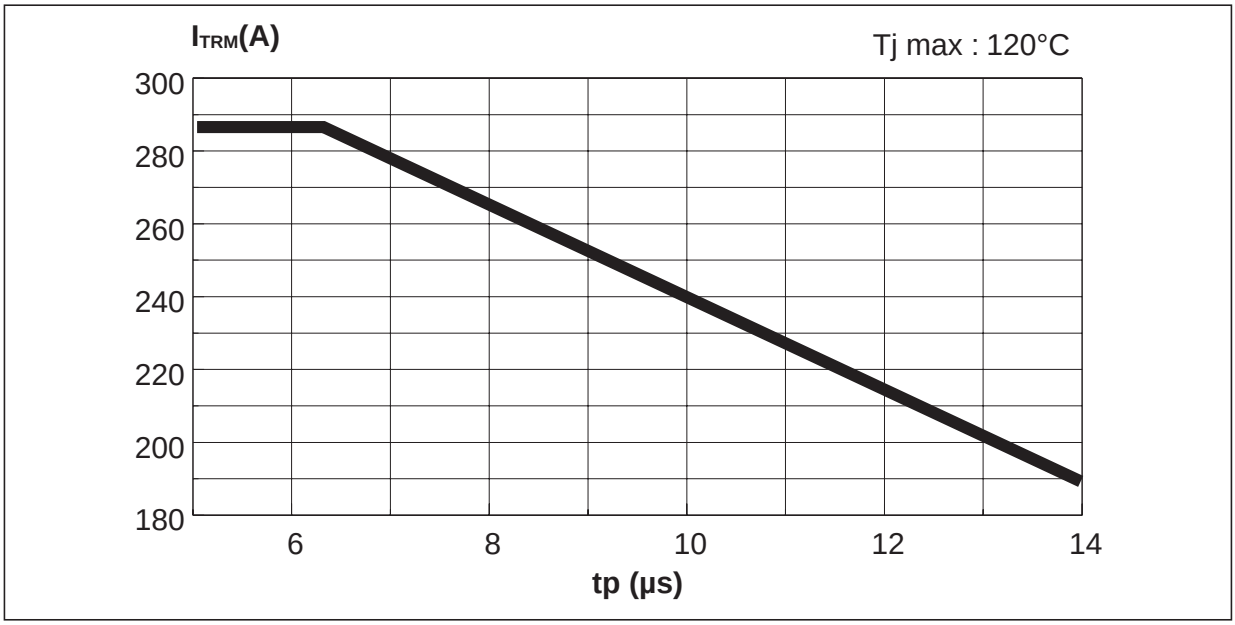


PEAK CURRENT LIMIT

This component is designed to withstand I_{TRM} = 240A for a pulse duration of 10µs for an ambient temperature of 120°C in repetitive surge (see note 1, page 2).

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

Fig. 5: Peak current limit versus pulse duration.



POWER LOSSES (For 10µs, see note 1)

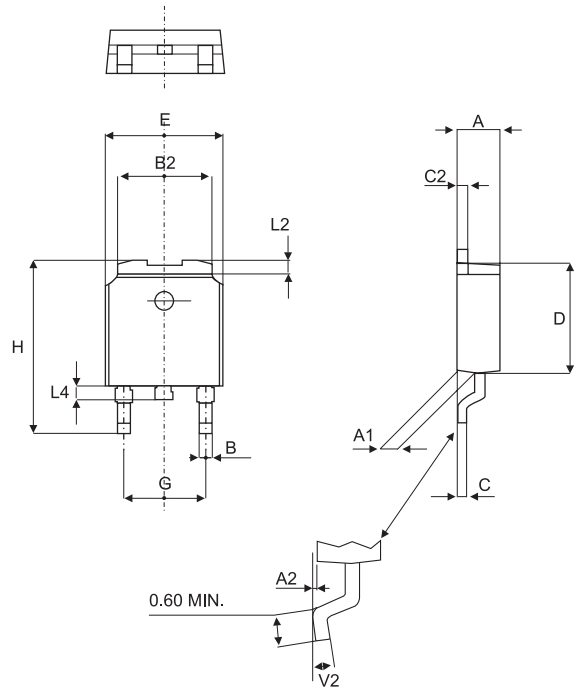
To evaluate the power losses, please use the following equations :

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

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

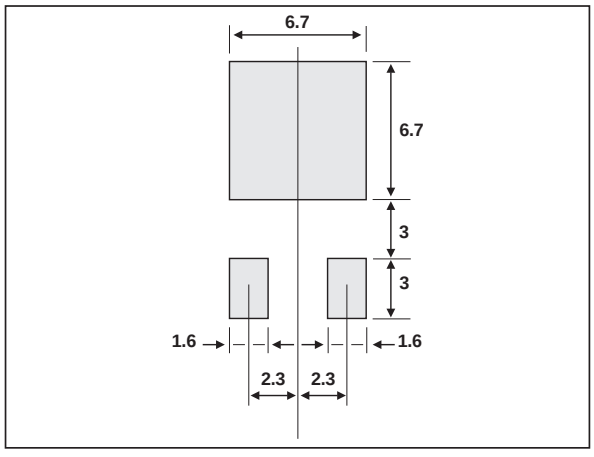
PACKAGE MECHANICAL DATA

DPAK



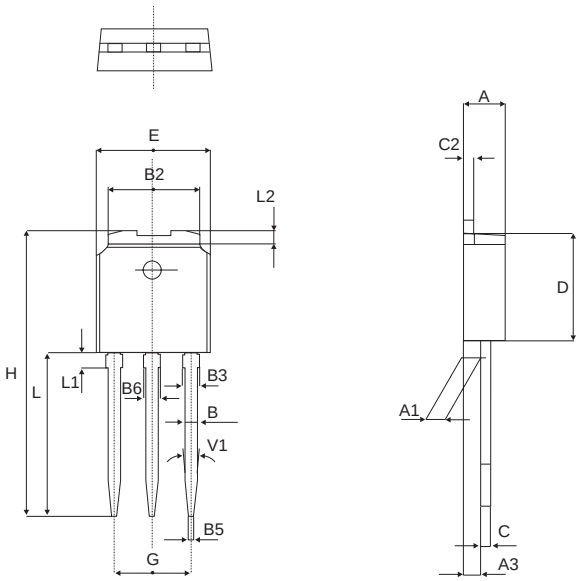
REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max	Min.	Max.
A	2.20	2.40	0.086	0.094
A1	0.90	1.10	0.035	0.043
A2	0.03	0.23	0.001	0.009
B	0.64	0.90	0.025	0.035
B2	5.20	5.40	0.204	0.212
C	0.45	0.60	0.017	0.023
C2	0.48	0.60	0.018	0.023
D	6.00	6.20	0.236	0.244
E	6.40	6.60	0.251	0.259
G	4.40	4.60	0.173	0.181
H	9.35	10.10	0.368	0.397
L2	0.80 typ.		0.031 typ.	
L4	0.60	1.00	0.023	0.039
V2	0°	8°	0°	8°

FOOTPRINT



PACKAGE MECHANICAL DATA

IPAK



REF.	DIMENSIONS					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.2		2.4	0.086		0.094
A1	0.9		1.1	0.035		0.043
A3	0.7		1.3	0.027		0.051
B	0.64		0.9	0.025		0.035
B2	5.2		5.4	0.204		0.212
B3			0.85			0.033
B5		0.3			0.035	
B6			0.95			0.037
C	0.45		0.6	0.017		0.023
C2	0.48		0.6	0.019		0.023
D	6		6.2	0.236		0.244
E	6.4		6.6	0.252		0.260
G	4.4		4.6	0.173		0.181
H	15.9		16.3	0.626		0.641
L	9		9.4	0.354		0.370
L1	0.8		1.2	0.031		0.047
L2		0.8	1		0.031	0.039
V1		10°			10°	

OTHER INFORMATION

Type	Marking	Package	Weight	Base qty	Delivery mode
FLC10-200H	FLC10-200H	IPAK	0.40 g	75	Tube
FLC10-200B	FLC10-200B	DPAK	0.3 g	75	Tube

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