

**P61089B**

硬件可编程过电压保护集成电路

版本号  
201603-A**产品概述**

P61089B 主要用于保护 SLIC 免遭瞬态过电压冲击。正向过载由两个二极管来控制，负向浪涌由两个晶闸管抑制，晶闸管的动作电压与门极电压 $-V_{BAT}$ 有关。该器件有非常低的门极触发电流 ( $I_{GT}$ ) 以减少电路工作时的损耗。器件结构如图 1 所示。“四点”结构保证了高可靠的保护，特别是针对非常快速的瞬间线感应过压 ( $L \cdot di/dt$ ) 图 1 和图 2 分别为器件的等效结构图和外型图。

**产品特点**

- 双编程瞬态抑制；
- 负压范围宽： $V_{MGL} = -167V_{MAX}$
- 动态开关电压低： $V_{FP}$  和  $V_{DGL}$
- 门极触发电流低： $I_{GT} = 5mA_{Max}$
- 峰值脉冲电流： $I_{PP} = 50A$  (10/700 $\mu s$ )
- 维持电流： $I_H \geq 150mA$

**应用领域**

P61089B 主要应用于程控交换机等通讯设备的二级过电压防护。

**特征参数**

符号	额定值	单位
$V_{MGL}$	-167	V
$I_{PP}(10/700)$	50	A
$I_H$	150	mA

封装：SOP-8

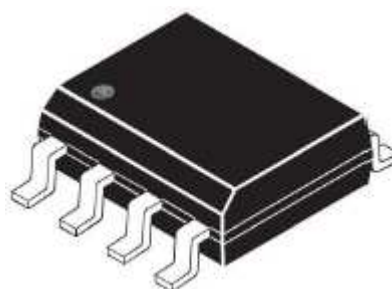
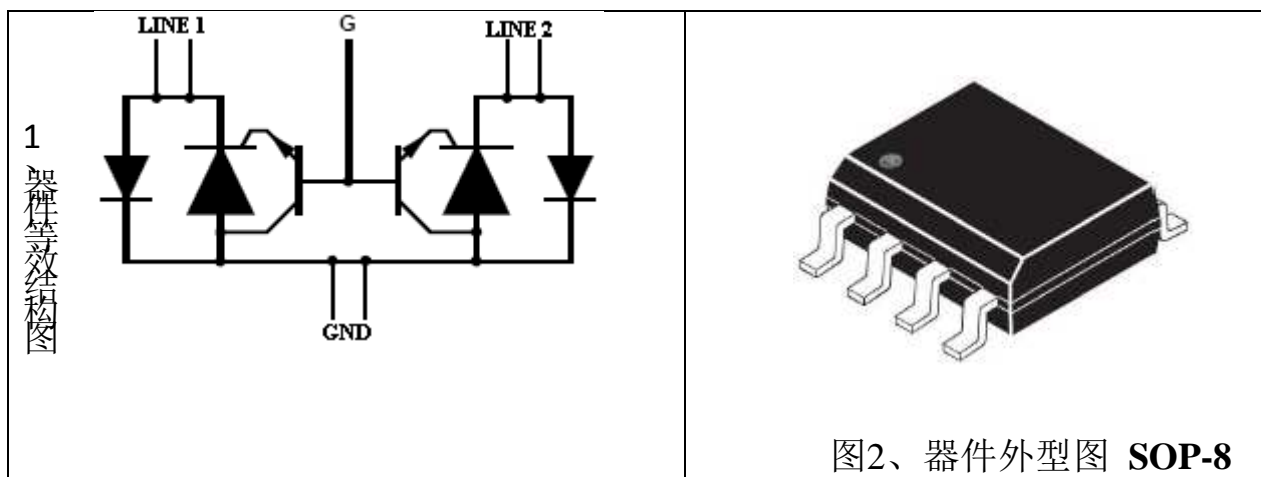


图2、器件外型图 SOP-8

## ■ 满足标准

标准类型	波形		ITSP
ITU-T K.20/21 和 K.45	电压	10/700 $\mu$ s	50A
	电流	5/310 $\mu$ s	

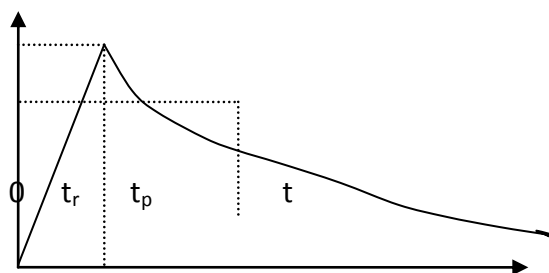
## ■ 电特性

### ● 极限值 除非另有规定 $T_a = 25^\circ\text{C}$

符号	参数	数值	单位
$V_{PP}/I_{PP}$	峰值脉冲电压/电流 (注 1)	10/700 $\mu$ s	2000 V
		5/310 $\mu$ s	50 A
$I_{TSM}$	非重复性浪涌峰值电流 (F=60Hz)	$t_p=500\text{ms}$	6.5 A
		$t=1\text{s}$	4.6 A
$I_{GSM}$	最大门极电流 (半正弦波 $t_p=10\text{ms}$ )	2	A
$V_{MLG}$	线—地间最大电压	-170	V
$V_{MGL}$	门极—线间最大电压	-167	V
$T_{stg}$	存储温度范围	-55~150	$^\circ\text{C}$
$T_j$	最高温度	150	$^\circ\text{C}$
$T_L$	10 秒内可承受的最高焊锡温度	260	$^\circ\text{C}$

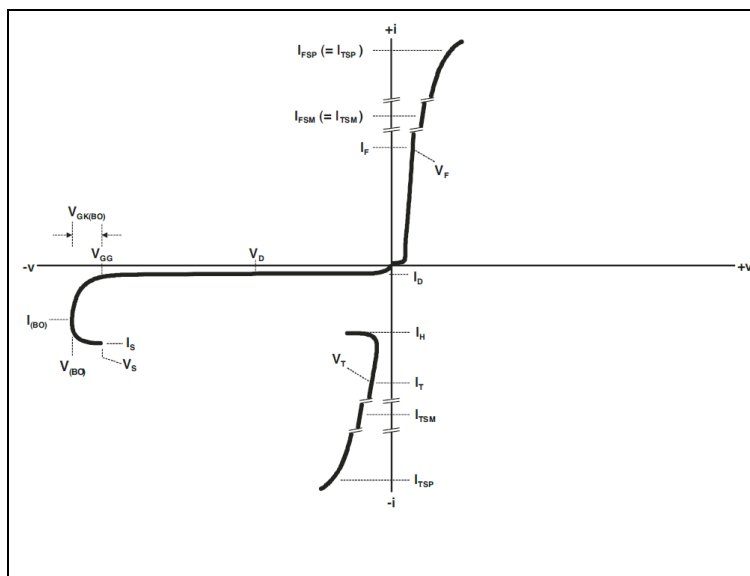
注 1: 脉冲波形:

5/310 $\mu$ s  $t_r=5\mu$ s  $t_p=310\mu$ s 100% $I_{PP}$



### ● 伏安特性曲线 ( $T_a = 25^\circ\text{C}$ )

符号	参数
$I_{GT}$	门极触发电流
$I_H$	维持电流
$I_{RM}$	线-地间反向漏电流
$I_{RG}$	门极-线间反向漏电流
$V_{RM}$	线-地间反向电压
$V_F$	线-地间正向电压
$V_{GT}$	门极触发电压
$V_{FP}$	线-地间正向峰值电压
$V_{DGL}$	门极-线间动态开关电压
$V_{GATE}$	门极-地间电压
$V_{LG}$	线-地间电压
C	线-地间断态电容
$I_H$	维持电流



■ 电参数 除非另有规定,  $T_a=25^{\circ}\text{C}$

● 线地间二极管相关参数

符号	测试条件	最大值	单位
$V_F$	$I_F=5\text{A}, t_p=500\mu\text{s}$	3	V
$V_{FP}$	10/700 $\mu\text{s}$ 1.5kV $R_p=10\Omega$ (见注释 1)	5	V

注释 1:  $V_{FP}$  见测试电路 2,  $R_p$  是装在线卡上的保护电阻

● 保护晶闸管相关参数 ( $T_a=25^{\circ}\text{C}$ )

符号	测试条件	最小值	最大值	单位
$I_{GT}$	$V_{GND}/LINE=-100\text{V}$	0.1	5	mA
$I_H$	$V_{GATE}=-100\text{V}$	150		mA
$V_{GT}$	同 $I_{GT}$		2.5	V
$I_{RG}$	$T_C=25^{\circ}\text{C}$ $V_{RG}=-170\text{V}$		5	$\mu\text{A}$
	$T_C=70^{\circ}\text{C}$ $V_{RG}=-170\text{V}$		50	
$V_{DGL}$	$V_{GATE}=-100\text{V}$ (见注释 3) 10/700 $\mu\text{s}$ 1.5kV $R_p=10\Omega$		10	V

注释 2: 见测试电路 2 功能维持电流 ( $I_H$ );

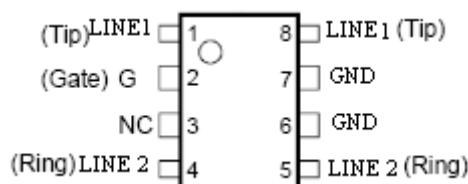
注释 3: 见测试电路 1 关于  $V_{DGL}$ , 波动时间小于 50ns 不作记录。

● 保护晶闸管和二极管相关参数

符号	测试条件	最大值	单位
$I_{RM}$	$T_C=25^{\circ}\text{C}$ $V_{GATE}/LINE=-1\text{V}$ $V_{RM}=-75$	5	$\mu\text{A}$
	$T_C=70^{\circ}\text{C}$ $V_{GATE}/LINE=-1\text{V}$ $V_{RM}=-75$	50	$\mu\text{A}$
C	$V_R=-3\text{V}$ $F=150\text{KHz}$	100	pF
	$V_R=-48\text{V}$ $F=150\text{KHz}$	50	pF

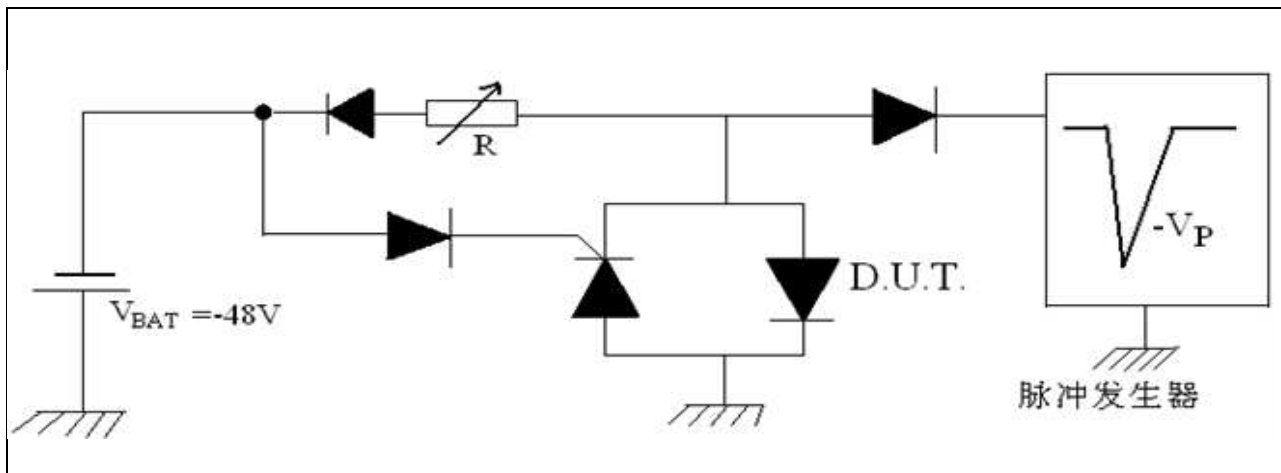
● 应用注意

为了更好地发挥“四点”结构的优势, TIP 和 RING 横向穿过器件, 这样器件将消除线寄生感应的过压, 特别是高速短瞬态。



## ■ 测试方法及电路

### ● 维持电流测试电路（测试电路 1）

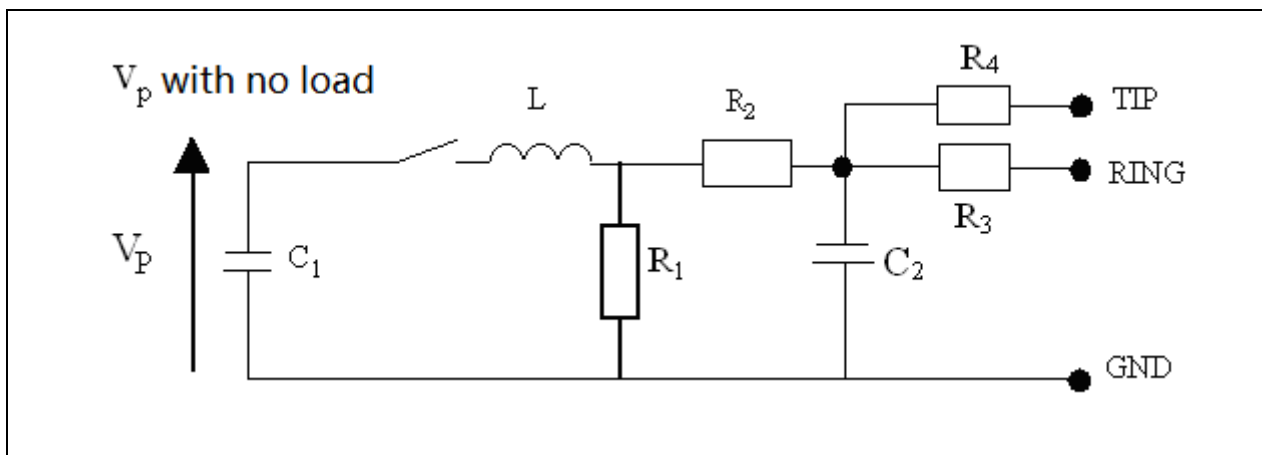


这是一个“导通-截止”测试，该测试电路可以确定维持电流的大小。

测试方法：

- ① 短路 DUT，调节电流在  $I_H$  值范围；
- ② 用  $I_{PP}=10A$ ， $10/1000\mu s$  的浪涌电流触发 DUT；
- ③ DUT 最多在 50ms 内必须返回到断态。

### ● $V_{FP}$ 和 $V_{DGL}$ 参数测试电路 2

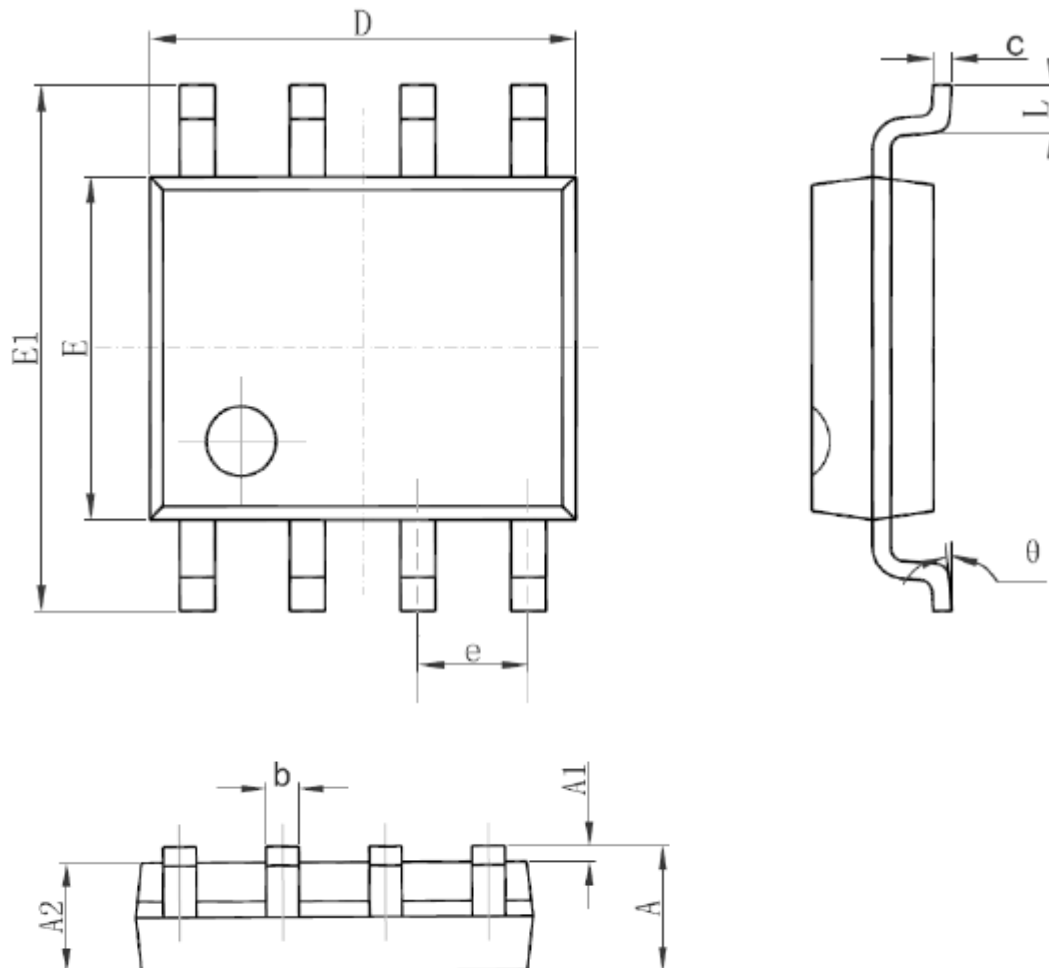


Pluse( $\mu s$ )		$V_P$ (V)	$C_1$ ( $\mu F$ )	$C_2$ (nF)	L ( $\mu H$ )	$R_1$ ( $\Omega$ )	$R_2$ ( $\Omega$ )	$R_3$ ( $\Omega$ )	$R_4$ ( $\Omega$ )	$I_{PP}$ (A)	$R_P$ ( $\Omega$ )
$t_r$	$t_p$										
10	700	1500	20	200	0	50	15	25	25	30	10
1.2	50	1500	1	33	0	76	13	25	25	30	10
2	10	2500	10	0	1.1	1.3	0	3	3	38	62



## 封装尺寸

## ■ 外观尺寸图 SOP-8



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
theta	0°	8°	0°	8°

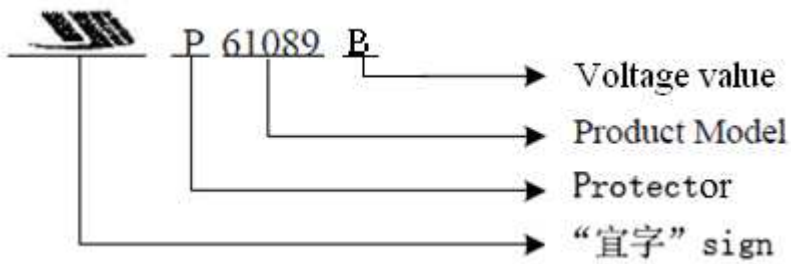


## 外观标识

### ■ 打印标示



### ■ 命名规则



**XXYY:**XX表示年份，YY表示星期。

Package Type	Quantity
SOP-8	2500



## P61089B

Dual Programmable Thyristor Transient Voltage Suppressor

版本号  
201603-A

### Description

This device has been especially designed to protect 2 new high voltage,as well as classical SLICs,against transient overvoltages.Positive overvoltages are clamped by 2 diodes.Negative surges are suppressed by 2 thyristors,their breakdown voltage being referenced to  $-V_{BAT}$  through the gate.This component presents a very low gate triggering current in order to reduce the current consumption on printed circuit board the firing phase.This devices are not subject to aging and provide a fail safe mode in short circuit for a better protection.Pic 1 and pic 2 are the device symbol and the package.

### Features and Benefits

- Dual Voltage-Tracking Protectors ;
- wide negative pressure range:  $V_{MGL}=-167V_{MAX}$
- low dynamic switching voltage:  $V_{FP}$  and  $V_{DGL}$
- low gate triggering current :  $I_{GT}=5mA_{Max}$
- Peak Pulse Current:  $I_{PP}=50A$  (10/700 $\mu s$ )
- high Holding current :  $I_H \geq 150mA$

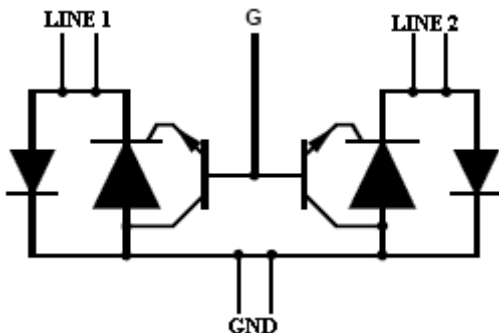
### Application field

P61089B are designed to protect communication equipment such as SPC exchanger from damaging overvoltage transients in the second level。

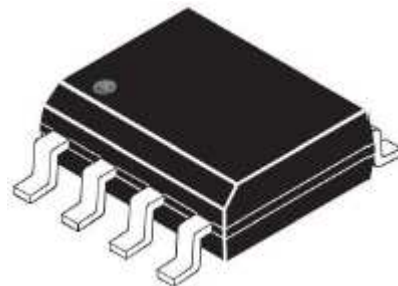
### Characteristic parameters

symbol	Rated value	unit
$V_{MGL}$	-167	V
$I_{PP}(10/700\mu s)$	50	A
$I_H$	150	mA

### Package : SOP-8



Pic.1 Device equivalent structure



Pic.2 Device type SOP-8



## Electrical Parameters

### Standard

type	Wave shape		ITSP
	ITU-T K.20/21and K.45	voltage	
current		5/310μs	

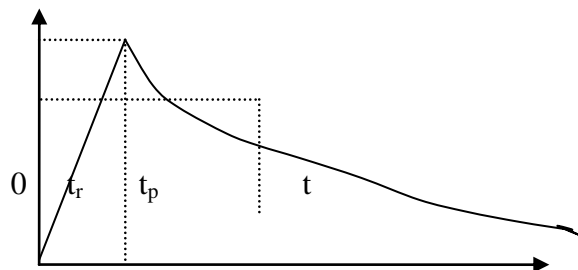
### Electrical characteristics

- Absolute maximum ratings  $T_a = 25^\circ\text{C}$  unless otherwise noted

symbol	parameters	value	unit
$V_{PP}/I_{PP}$	Peak pulse voltage /current (tip.1)	10/700μs	2000
		5/310μs	50
$I_{TSM}$	Non repetitive peak pulse current (F=60Hz)	$t_p=500\text{ms}$	6.5
		$t=1\text{s}$	4.6
$I_{GSM}$	Maximum gate current (half sinusoid $t_p=10\text{ms}$ )	2	A
$V_{MLG}$	Line-ground maximum voltage	-170	V
$V_{MGL}$	Gate-line maximum voltage	-167	V
$T_{stg}$	Storage Temperature Range	-55~150	$^\circ\text{C}$
$T_j$	maximum temperature	150	$^\circ\text{C}$
$T_L$	maximum sustainable temperature of solder in 10 seconds	260	$^\circ\text{C}$

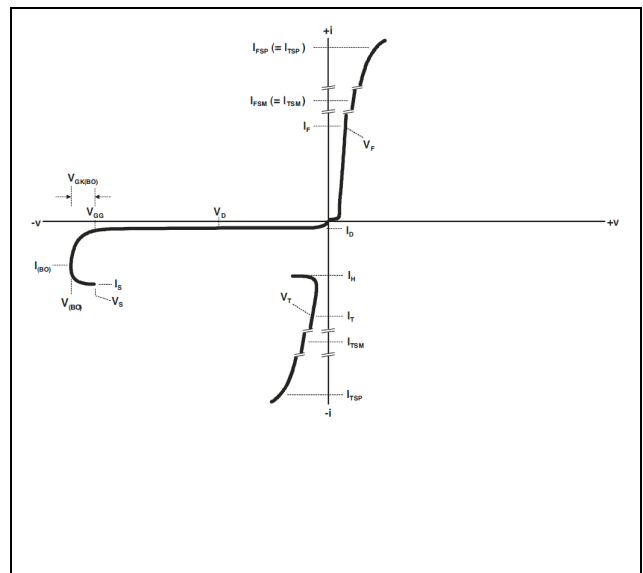
tip.1: pulse form:

5/310μs  $t_r=5\mu\text{s}$   $t_p=310\mu\text{s}$  100%  $I_{PP}$



- V-I characteristic curve ( $T_a = 25^\circ\text{C}$ )

symbol	parameters
$I_{GT}$	Gate trigger current
$I_H$	Holding current
$I_{RM}$	Line-ground reverse leakage current
$I_{RG}$	Gate-line reverse leakage current
$V_{RM}$	Line-ground reverse voltage
$V_F$	Line-ground voltage
$V_{GT}$	gate trigger voltage
$V_{FP}$	Line-ground peak voltage
$V_{DGL}$	Gate-line dynamic switching voltage
$V_{GATE}$	Gate-ground voltage
$V_{LG}$	Line-ground voltage





C	Line-ground off state capacitance	
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### Electrical Parameters

Absolute maximum ratings  $T_a = 25^\circ\text{C}$  unless otherwise noted

#### ● Line-ground diode parameters

symbol	Test conditions	Max.	unit
$V_F$	$I_F=5\text{A}$ , $t_p=500\mu\text{s}$	3	V
$V_{FP}$	$10/700\mu\text{s}$ $1.5\text{kV}$ $R_p=10\Omega$ (tip. 1)	5	V

tip.1:  $V_{FP}$  refers to test circuit 2,  $R_p$  is the protective resistance mounted on the card

#### ● thyristor parameters ( $T_a=25^\circ\text{C}$ )

symbol	Test conditions	Min.	Max.	unit
$I_{GT}$	$V_{GND}/LINE=-100\text{V}$	0.1	5	mA
$I_H$	$V_{GATE}=-100\text{V}$	150		mA
$V_{GT}$	Same to $I_{GT}$		2.5	V
$I_{RG}$	$T_C=25^\circ\text{C}$ $V_{RG}=-170\text{V}$		5	$\mu\text{A}$
	$T_C=70^\circ\text{C}$ $V_{RG}=-170\text{V}$		50	
$V_{DGL}$	$V_{GATE}=-100\text{V}$ (TIP.3) $10/700\mu\text{s}$ $1.5\text{kV}$ $R_p=10\Omega$		10	V

Tip.2: see holding current ( $I_H$ ) at test circuit 2;

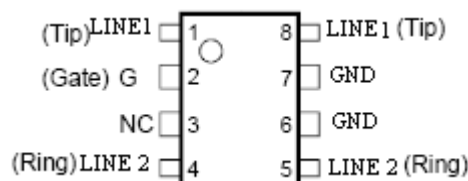
Tip.3: see  $V_{DGL}$  at test circuit 1, Don't make records if fluctuation time is less than 50ns.

#### ● thyristor and diode parameters

Symbol	Test conditions	Max.	unit
$I_{RM}$	$T_C=25^\circ\text{C}$ $V_{GATE}/LINE=-1\text{V}$ $V_{RM}=-167$	5	$\mu\text{A}$
	$T_C=70^\circ\text{C}$ $V_{GATE}/LINE=-1\text{V}$ $V_{RM}=-167$	50	$\mu\text{A}$
C	$V_R=-3\text{V}$ $F=150\text{KHz}$	100	$\text{pF}$
	$V_R=-48\text{V}$ $F=150\text{KHz}$	50	$\text{pF}$

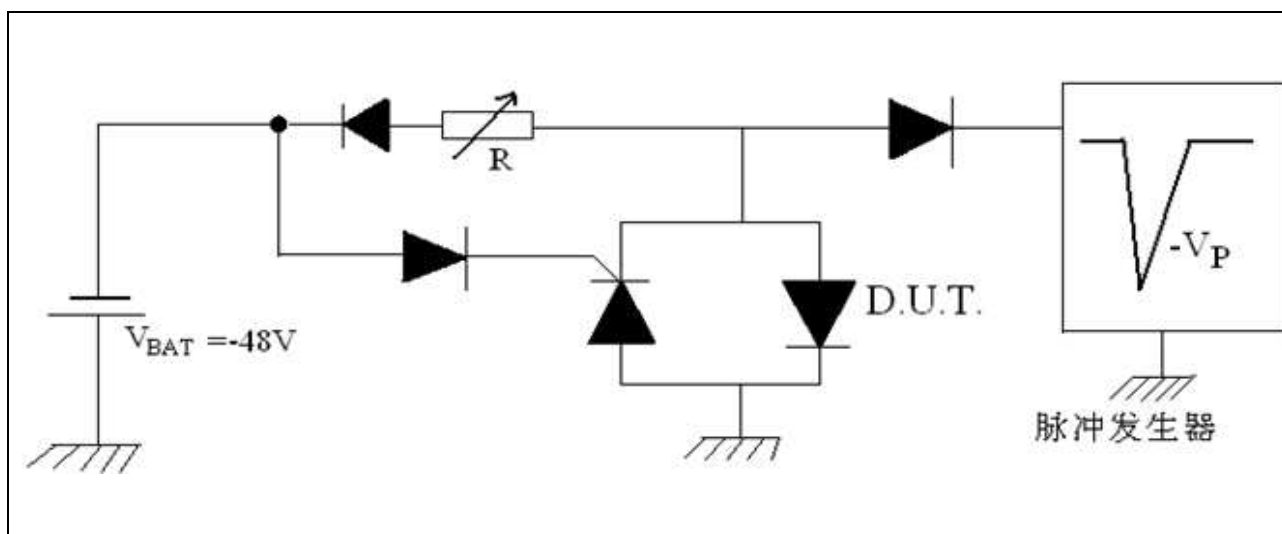
#### ● Attention

For eliminate the overvoltage from the line Parasitic induction, especially at the high speed and short moment signal, we make TIP and RING across the device.



## Test method and circuit

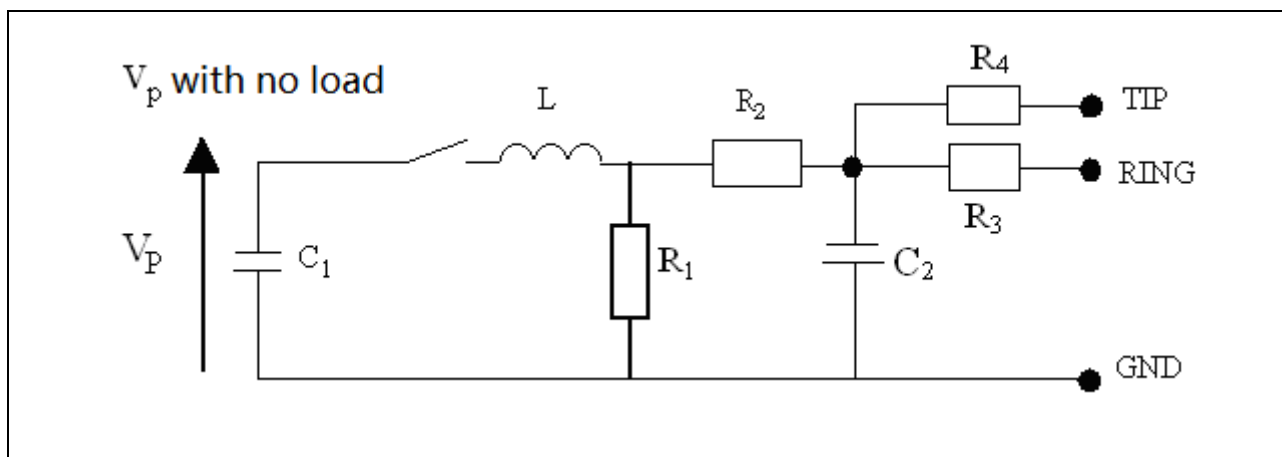
- Holding current test circuit (test circuit1)



This is a “Conducting-cutoff” test. The test circuit can ascertain the size of holding current.

Test method :

- ① short out DUT, regulating current in  $I_H$  range;
  - ② let  $I_{PP}=10A$ , 10/1000 $\mu s$  surge current triggers DUT;
  - ③ DUT must return to the off-state in 50ms.and
- $V_{FP}$  and  $V_{DGL}$  test circuit2

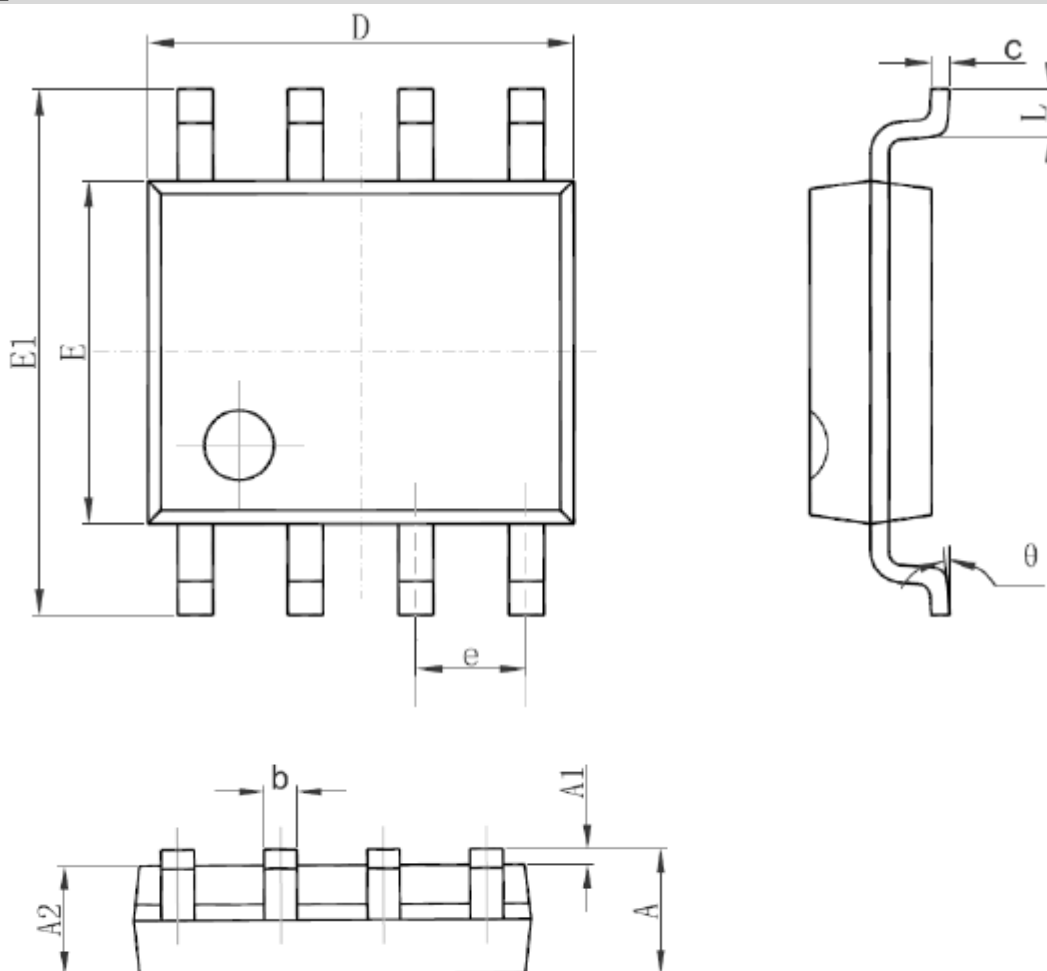


Pluse( $\mu s$ )		$V_P$ (V)	$C_1$ ( $\mu F$ )	$C_2$ (nF)	$L$ ( $\mu H$ )	$R_1$ ( $\Omega$ )	$R_2$ ( $\Omega$ )	$R_3$ ( $\Omega$ )	$R_4$ ( $\Omega$ )	$I_{PP}$ (A)	$R_P$ ( $\Omega$ )
$t_r$	$t_p$										
10	700	1500	20	200	0	50	15	25	25	30	10
1.2	50	1500	1	33	0	76	13	25	25	30	10
2	10	2500	10	0	1.1	1.3	0	3	3	38	62



## Package size

## ■ Appearance size SOP-8



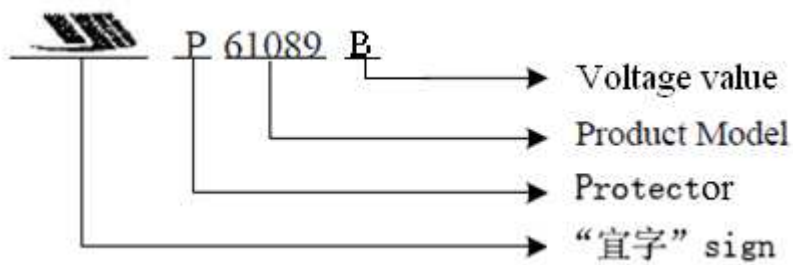
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°



## Marking



## Naming Rule



XXYY:XX means year, YY means week。