

**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 μs)
- 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

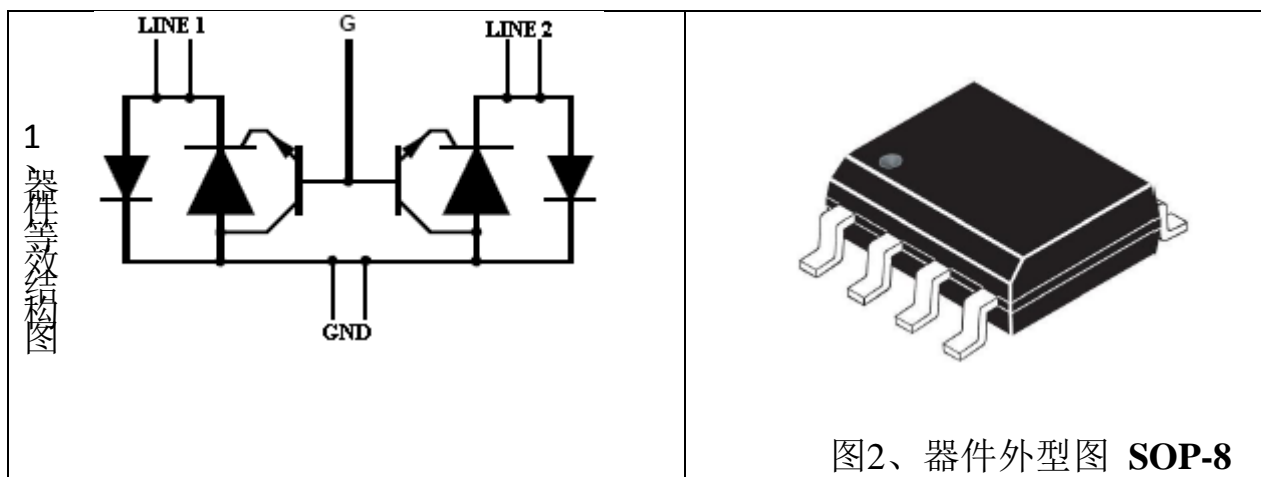


图2、器件外型图 SOP-8



■ 满足标准

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

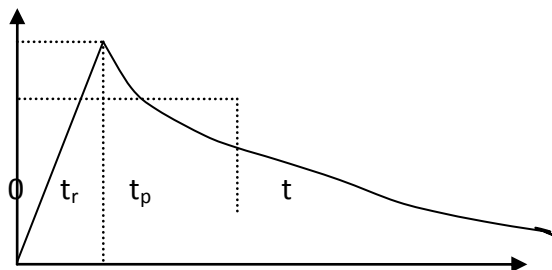
■ 电特性

● 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 μ s	2000
		5/310 μ s	50
I_{TSM}	非重复性浪涌峰值电流 ($F=60\text{Hz}$)	$t_p=500\text{ms}$	6.5
		$t=1\text{s}$	4.6
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	$^\circ\text{C}$

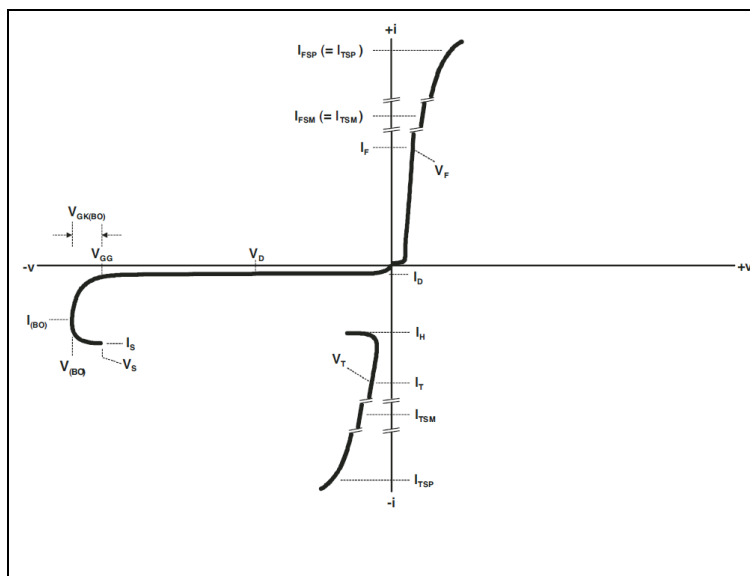
注1: 脉冲波形:

5/310 μ 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 μs 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	μA
	$T_C=70^{\circ}\text{C}$ $V_{RG}=-170\text{V}$		50	
V_{DGL}	$V_{GATE}=-100\text{V}$ (见注释 3) 10/700 μs 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);

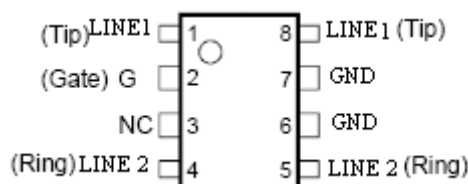
注释 3: 见测试电路 1 关于 V_{DGL} , 波动时间小于 50ns 不作记录。

● 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	μA
	$T_C=70^{\circ}\text{C}$ $V_{GATE}/LINE=-1\text{V}$ $V_{RM}=-75$	50	μA
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

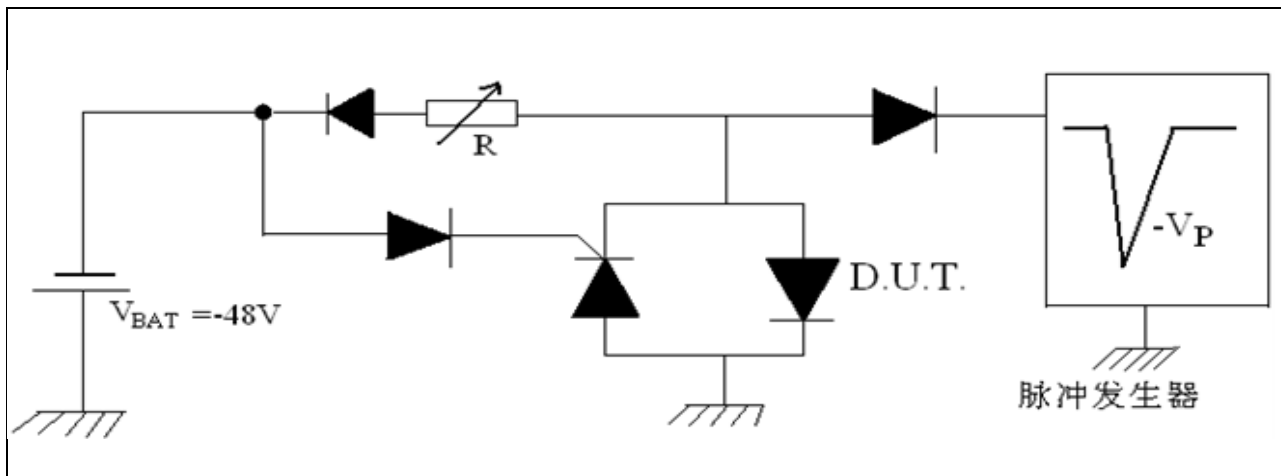
为了更好地发挥“四点”结构的优势, TIP 和 RING 横向穿过器件, 这样器件将消除线寄生感应的过压, 特别是高速短瞬态。





■ 测试方法及电路

● 维持电流测试电路（测试电路 1）

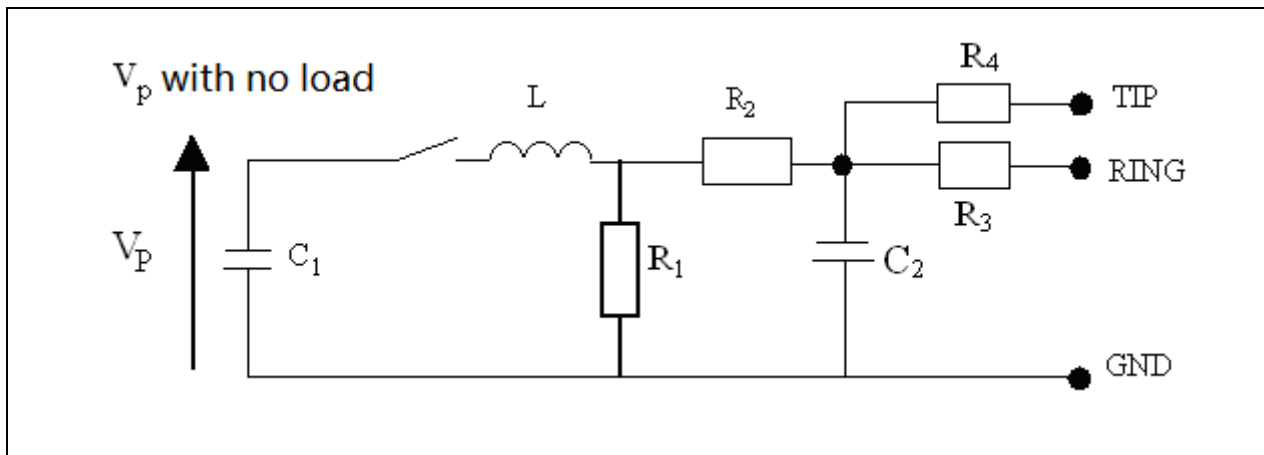


这是一个“导通-截止”测试，该测试电路可以确定维持电流的大小。

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

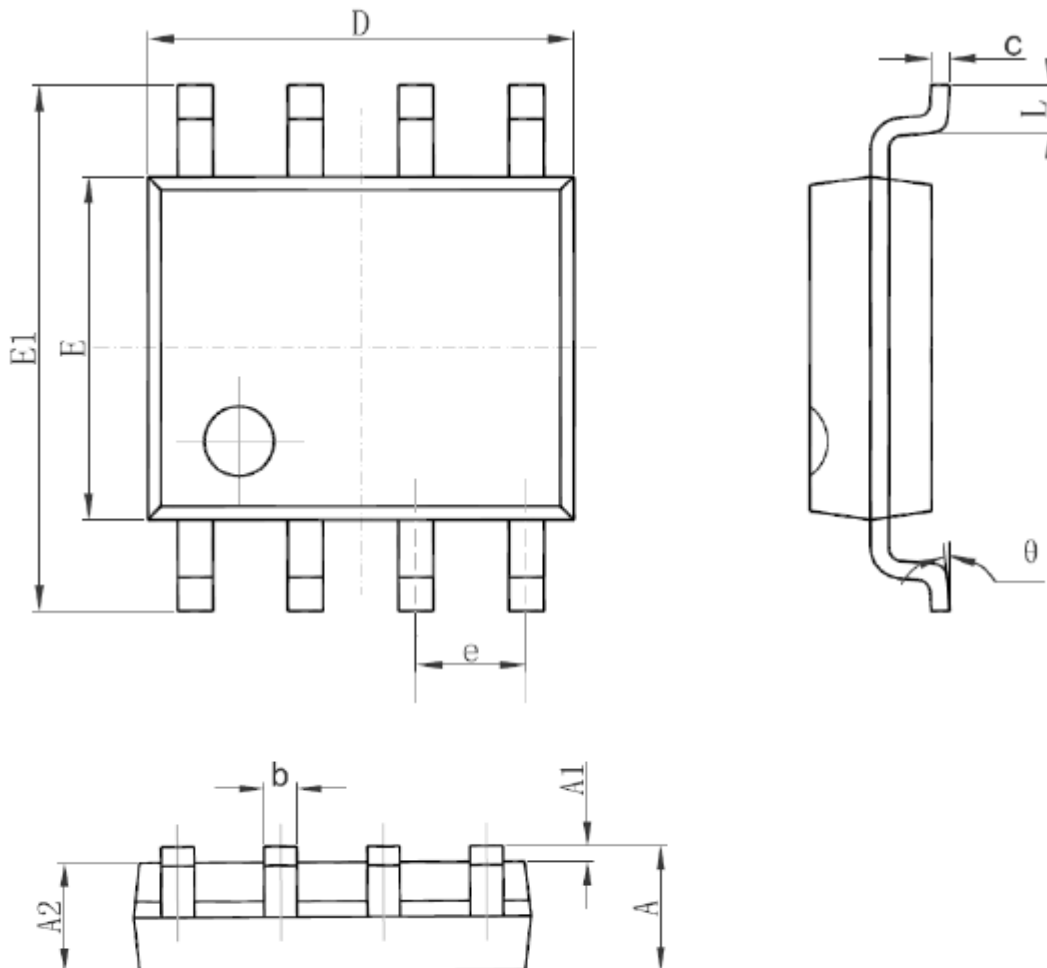


Pluse(μs)		V_P (V)	C_1 (μF)	C_2 (nF)	L (μH)	R_1 (Ω)	R_2 (Ω)	R_3 (Ω)	R_4 (Ω)	I_{PP} (A)	R_P (Ω)
t_r	t_p										
10	700	1500	20	200	0	50	15	25	25	30	10
1.2	50	1500	1	33	0	76	13	25	25	30	10
2	10	2500	10	0	1.1	1.3	0	3	3	38	62



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°

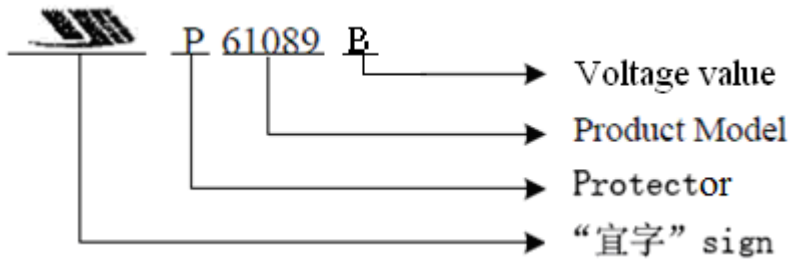


外观标识

■ 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

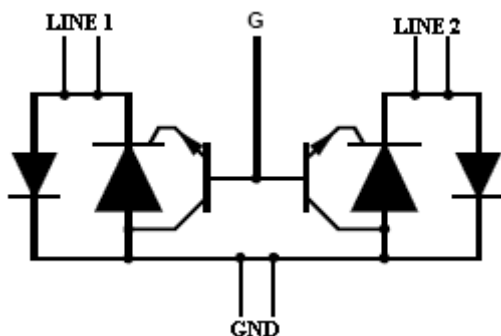
- Dual Voltage-Tracking Protectors ;
- wide negative pressure range: $V_{MGL} = -167V_{MAX}$
- low dynamic switching voltage: V_{FP} and V_{DGL}
- low gate triggering current : $I_{GT} = 5mA_{Max}$
- Peak Pulse Current: $I_{PP} = 50A$ (10/700 μs)
- high Holding current : $I_H \geq 150mA$

Application field

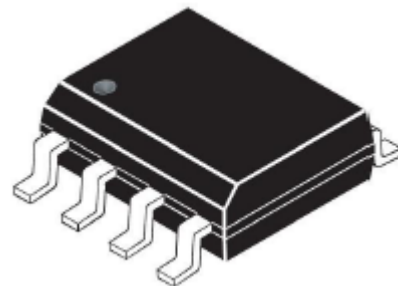
P61089B are designed to protect communication equipment such as SPC exchanger from damaging overvoltage transients in the second level.

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		5/310 μ s	

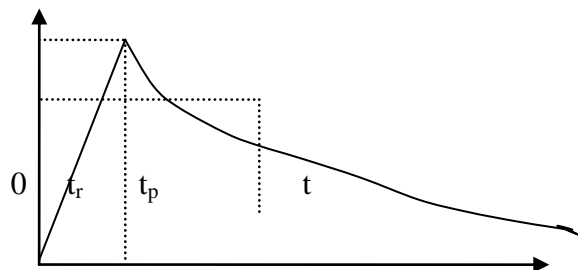
Electrical characteristics

- 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)	10/700 μ s	2000
		5/310 μ s	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	$^\circ\text{C}$

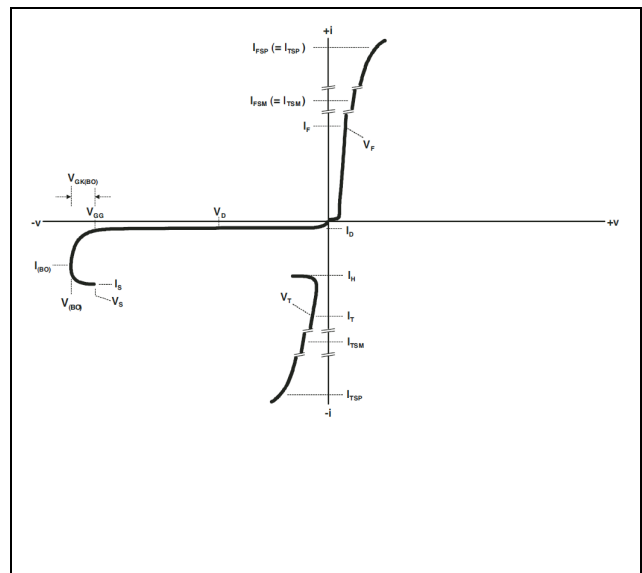
tip.1: pulse form:

5/310 μ s $t_r=5 \mu$ s $t_p=310 \mu$ 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	
---	-----------------------------------	--

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	$I_F=5A, t_p=500\mu s$	3	V
V_{FP}	$10/700\mu s, 1.5kV, R_p=10\Omega$ (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}	$V_{GND}/LINE=-100V$	0.1	5	mA
I_H	$V_{GATE}=-100V$	150		mA
V_{GT}	Same to I_{GT}		2.5	V
I_{RG}	$T_C=25^\circ\text{C}, V_{RG}=-170V$		5	μA
	$T_C=70^\circ\text{C}, V_{RG}=-170V$		50	
V_{DGL}	$V_{GATE}=-100V$ (TIP.3) $10/700\mu s, 1.5kV, R_p=10\Omega$		10	V

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

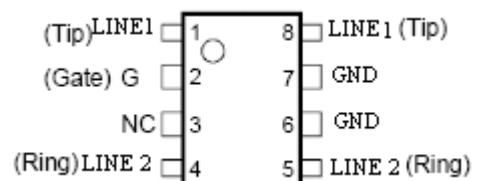
Tip.3: see V_{DGL} at test circuit 1, Don't make records if fluctuation time is less than 50ns.

● **thyristor and diode parameters**

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

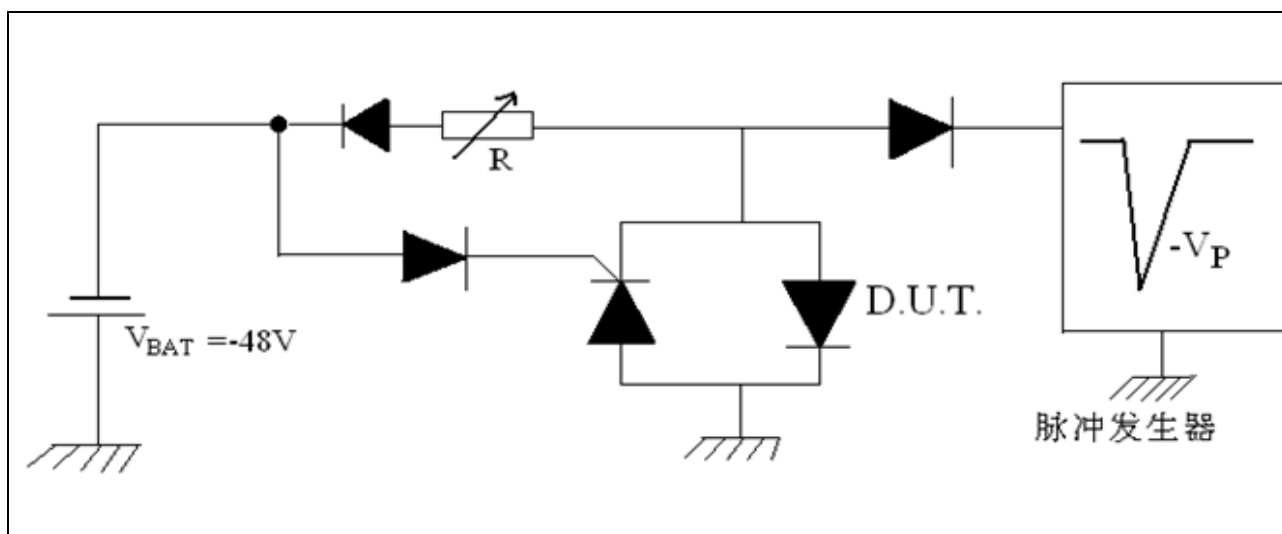
● **Attention**

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

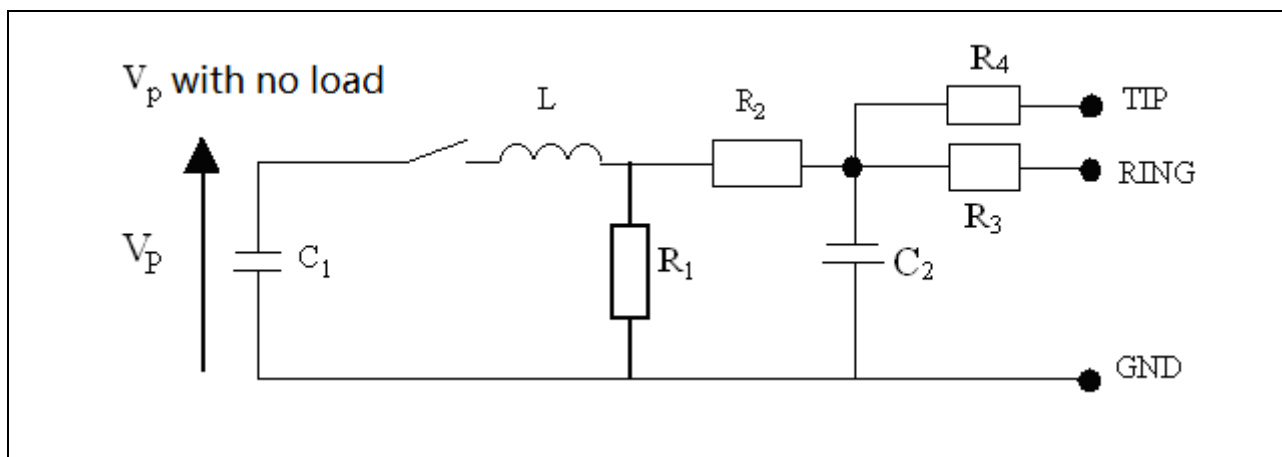
- Holding current test circuit (test circuit1)



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

Test method :

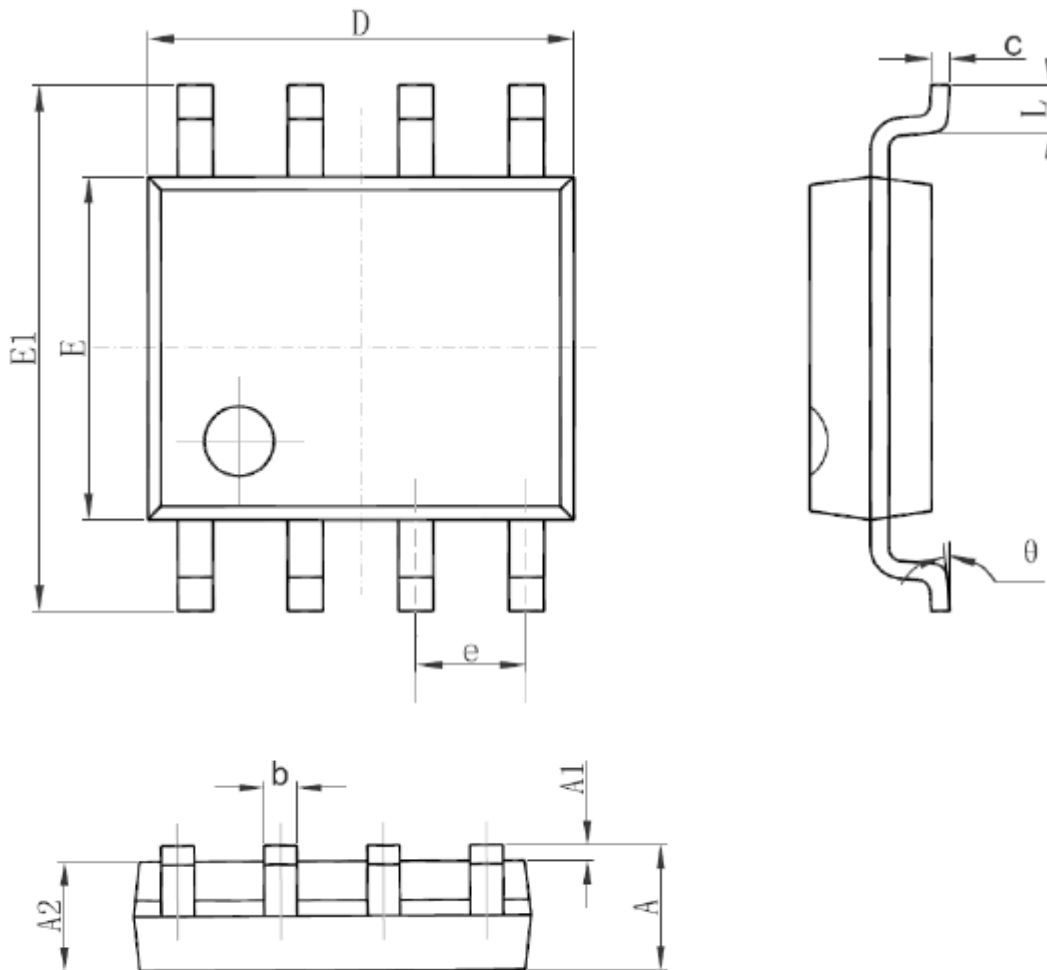
- ① short out DUT, regulating current in I_H range;
 - ② let $I_{PP}=10A$, 10/1000 μs surge current triggers DUT;
 - ③ DUT must return to the off-state in 50ms.and
- V_{FP} and V_{DGL} test circuit2



Pluse(μs)		V_P (V)	C_1 (μF)	C_2 (nF)	L (μH)	R_1 (Ω)	R_2 (Ω)	R_3 (Ω)	R_4 (Ω)	I_{PP} (A)	R_P (Ω)
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



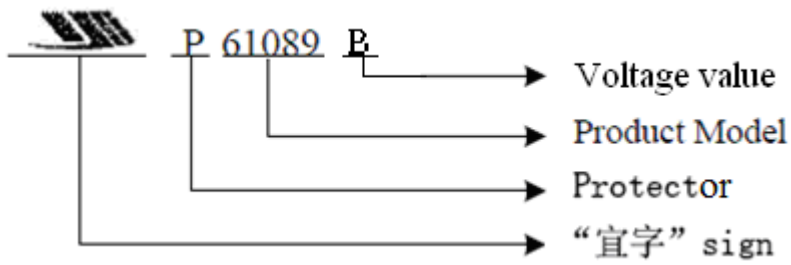
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)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



Marking



Naming Rule



XXYY:XX means year, YY means week。