



P61089Q

硬件可编程过电压保护集成电路

版本号
201603-A

产品概述

P61089Q 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

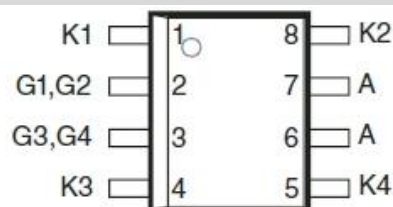
- 双编程瞬态抑制；
- 负压范围宽： $V_{MGL} = -170V_{MAX}$
- 动态开关电压低： V_{FP} 和 V_{DGL}
- 门极触发电流低： $I_{GT} = 5mA_{Max}$
- 峰值脉冲电流： $I_{PP} = 40A$ (10/700 μs)
- 维持电流： $I_H \geq 150mA$

应用领域

P61089Q 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} | -170 | V |
| $I_{PP}(10/700)$ | 40 | A |
| I_H | 150 | mA |



封装：SOP-8

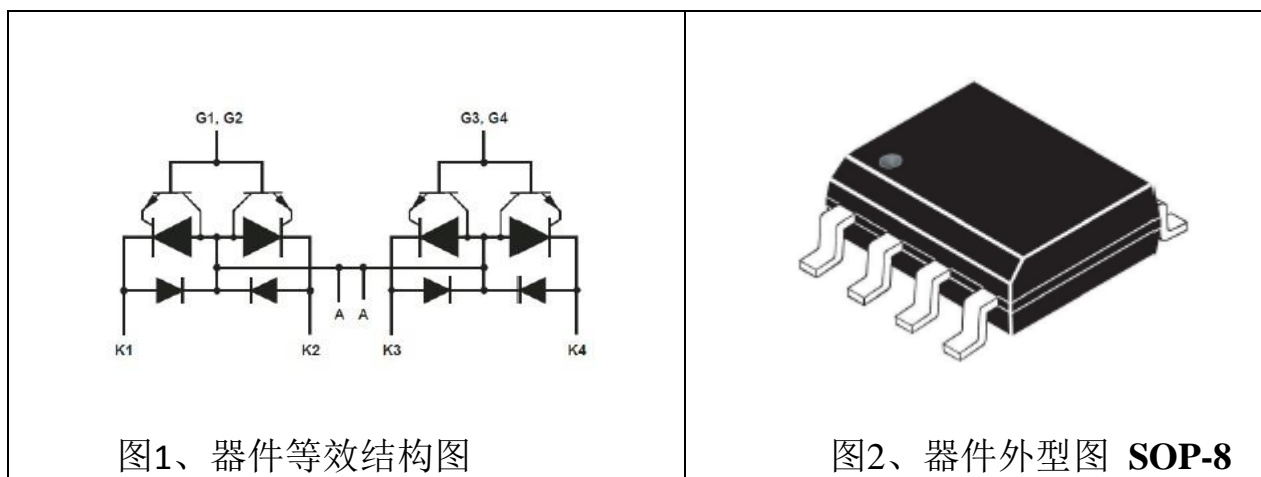


图1、器件等效结构图

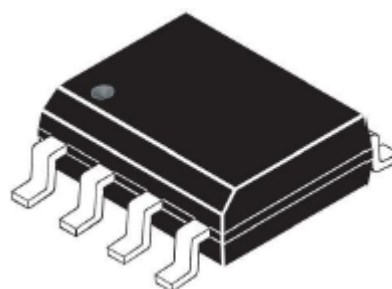


图2、器件外型图 SOP-8



■ 满足标准

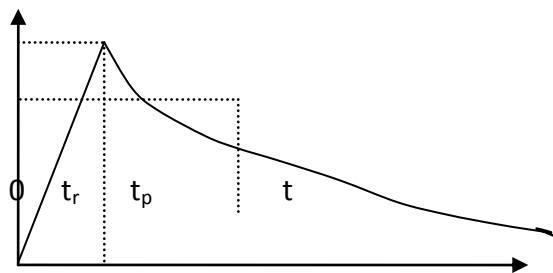
| 标准类型 | 波形 | | ITSP |
|----------------------|----|----------------|------|
| ITU-T K.20/21 和 K.45 | 电压 | 10/700 μ s | 40A |
| | 电流 | 5/310 μ s | |

■ 电特性

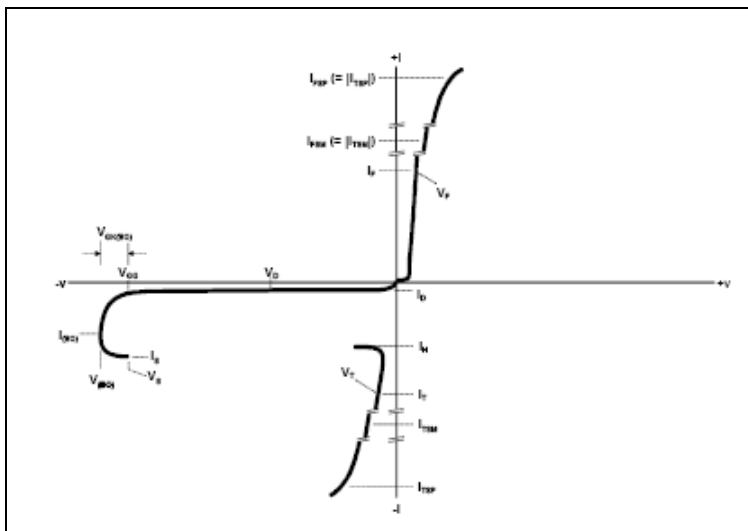
● 极限值 除非另有规定 $T_a = 25^\circ\text{C}$

| 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 V |
| | | 5/310 μ s | 40 A |
| I_{TSM} | 非重复性浪涌峰值电流 (F=50Hz) | $t_p=10\text{ms}$ | 8 A |
| | | t=1s | 3.5 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 | -170 | 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} | $T_C=25^\circ\text{C}$ $V_{RG}=-75\text{V}$ | | 5 | μA |
| | $T_C=70^\circ\text{C}$ $V_{RG}=-75\text{V}$ | | 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。

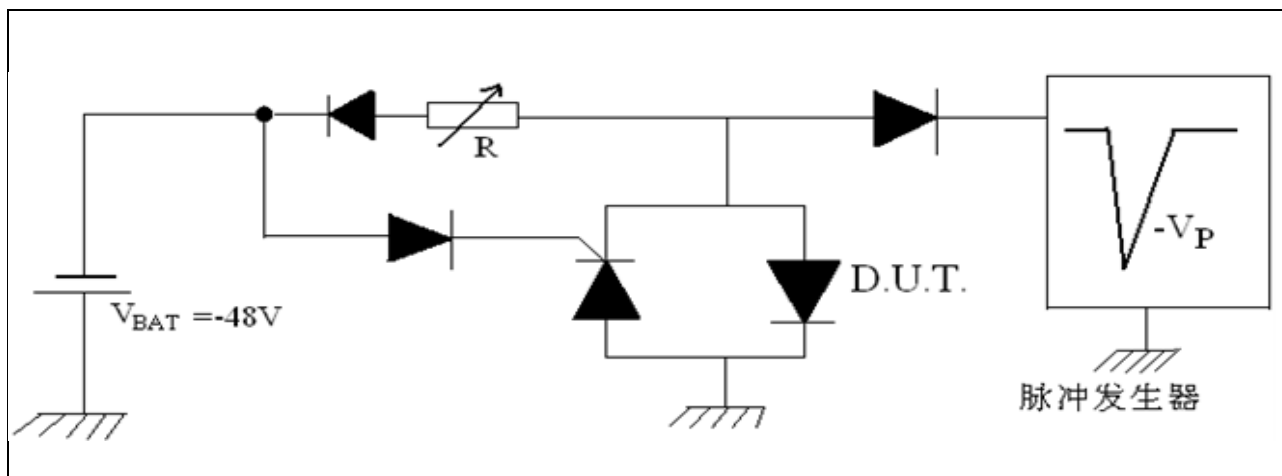
● 保护晶闸管和二极管相关参数

| 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 | p^F |
| | $V_R=-48\text{V}$ $F=150\text{KHz}$ | 50 | p^F |



■ 测试方法及电路

● 维持电流测试电路（测试电路 1）

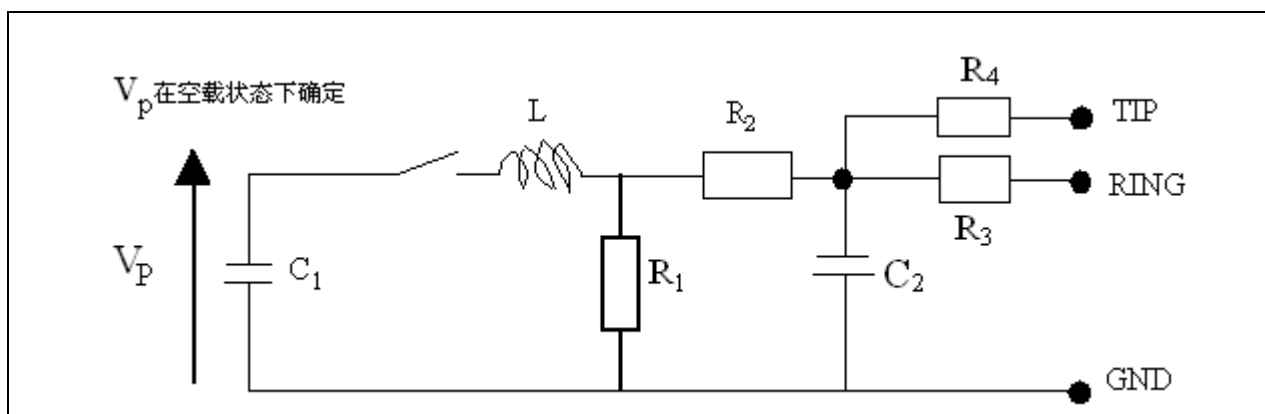


这是一个“导通-截止”测试，该测试电路可以确定维持电流的大小。

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



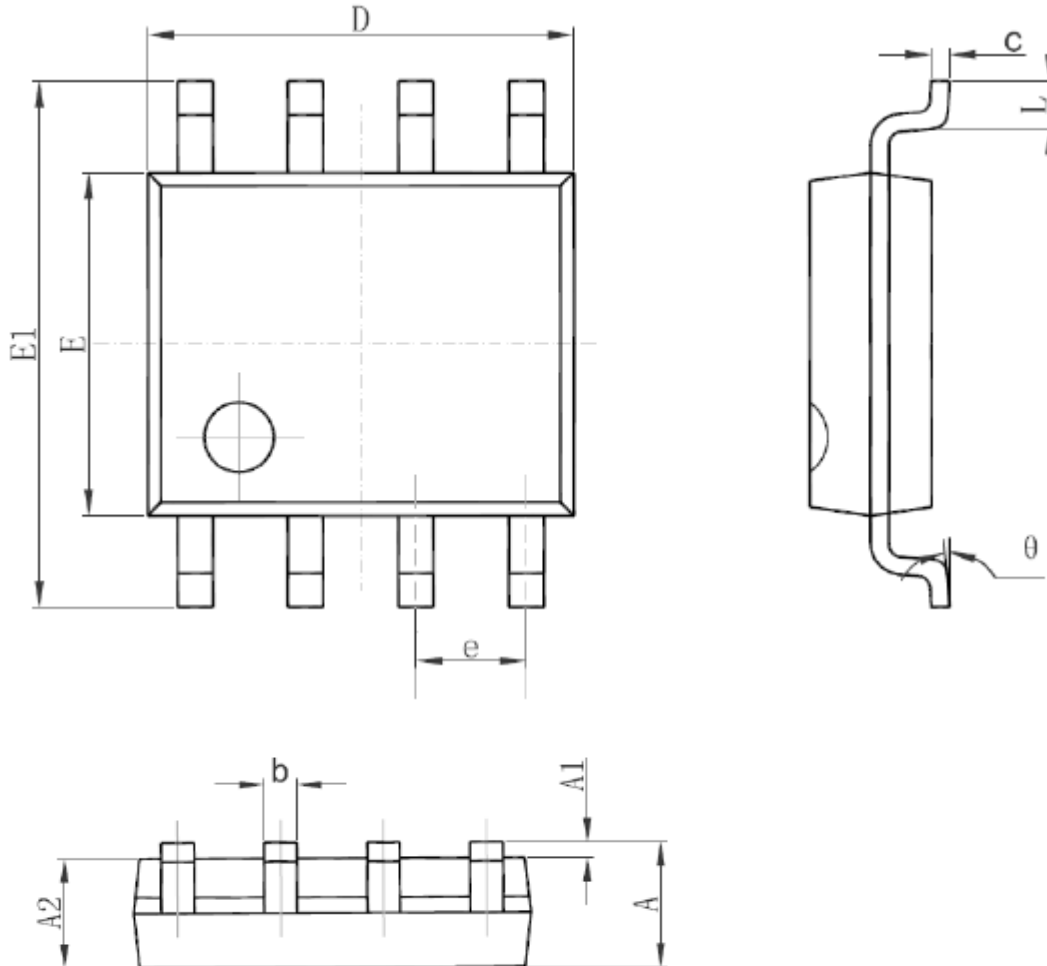


| Pluse(μ s) | | V_p (V) | C_1 (μ F) | C_2 (nF) | L (μ H) | R_1 (Ω) | R_2 (Ω) | R_3 (Ω) | R_4 (Ω) | I_{pp} (A) | R_p (Ω) |
|-----------------|-------|--------------|---------------------|---------------|-----------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------|-----------------------|
| 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 |
| θ | 0° | 8° | 0° | 8° |



■ 打印标示

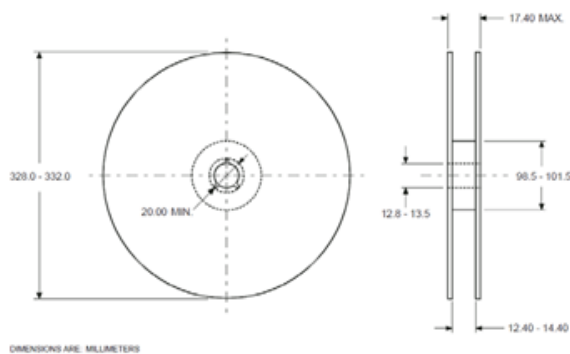
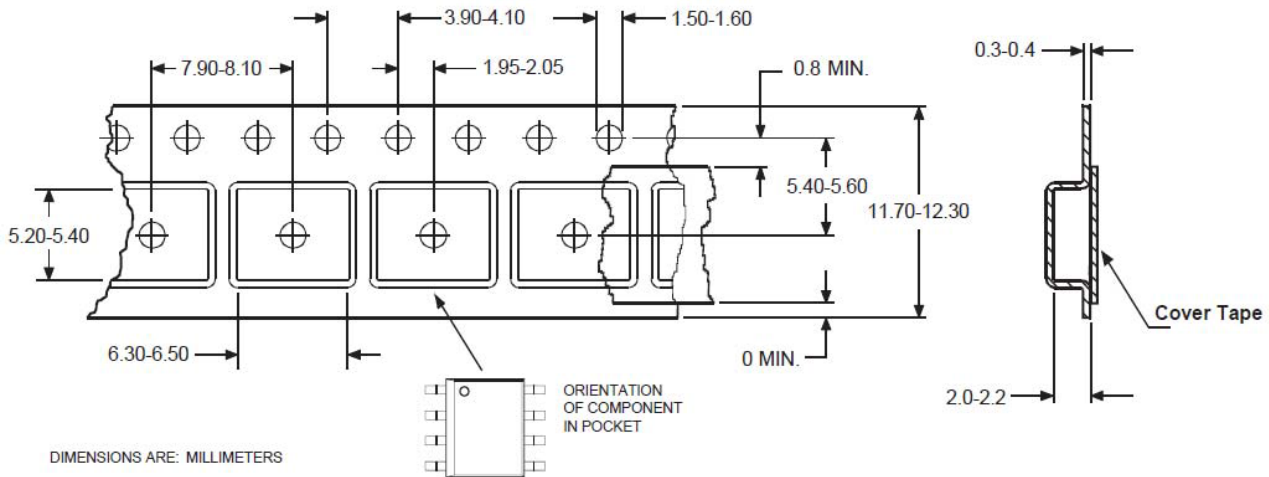


■ 命名规则



XXYY:XX表示年份，YY表示星期。

■ 编带规范



| Package Type | Quantity |
|--------------|----------|
| SOP-8 | 2500 |

P61089Q

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. These 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

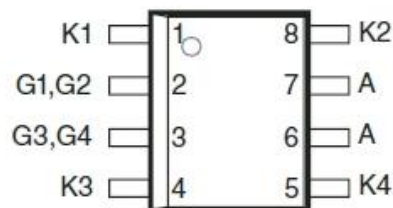
- Dual Voltage-Tracking Protectors ;
- wide negative pressure range: $V_{MGL} = -170V_{MAX}$
- low dynamic switching voltage: V_{FP} and V_{DGL}
- low gate triggering current : $I_{GT} = 5mA_{MAX}$
- Peak Pulse Current: $I_{PP} = 40A$ (10/700 μs)
- high Holding current : $I_H \geq 150mA$

Application field

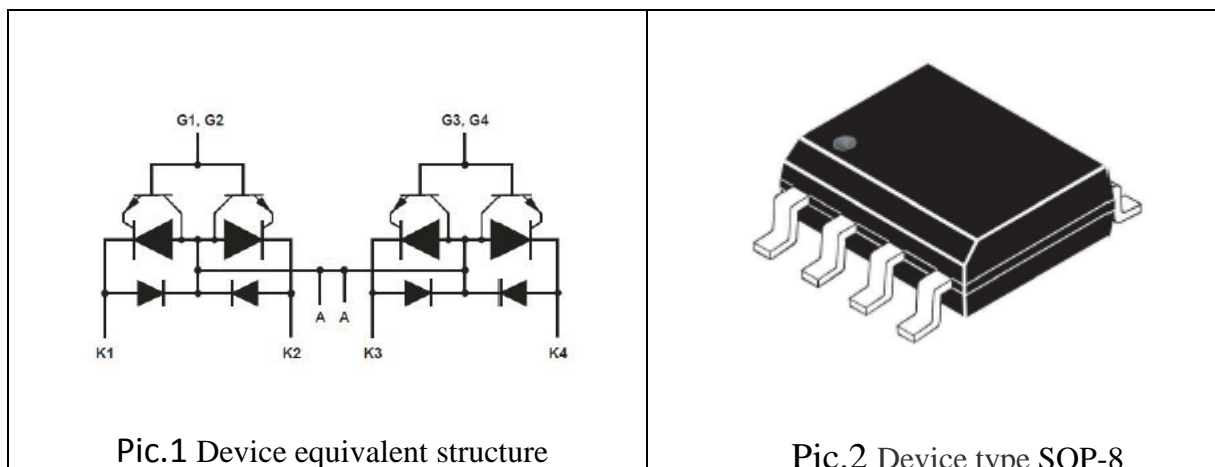
P61089Q are designed to protect communication equipment such as SPC exchanger from damaging overvoltage transients in the second level.

Characteristic parameters

| symbol | Rated value | unit |
|-----------------------|-------------|------|
| V_{MGL} | -170 | V |
| $I_{PP}(10/700\mu s)$ | 40 | A |
| I_H | 150 | mA |



Package : SOP-8



Electrical Parameters

Standard

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

Electrical characteristics

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

| symbol | parameters | value | unit | |
|-----------------|---|----------------|------------|---|
| V_{PP}/I_{PP} | Peak pulse voltage /current (tip.1) | 10/700 μs | 2000 | V |
| | | 5/310 μs | 40 | A |
| I_{TSM} | Non repetitive peak pulse current (F=50Hz) | $t_p=10ms$ | 8 | A |
| | | $t=1s$ | 3.5 | |
| I_{GSM} | Maximum gate current (half sinusoid $t_p=10ms$) | 2 | A | |
| V_{MLG} | Line-ground maximum voltage | -170 | V | |
| V_{MGL} | Gate-line maximum voltage | -170 | V | |
| T_{stg} | Storage Temperature Range | -55~150 | $^\circ C$ | |
| T_j | maximum temperature | 150 | $^\circ C$ | |
| T_L | maximum sustainable temperature of solder in 10 seconds | 260 | $^\circ C$ | |

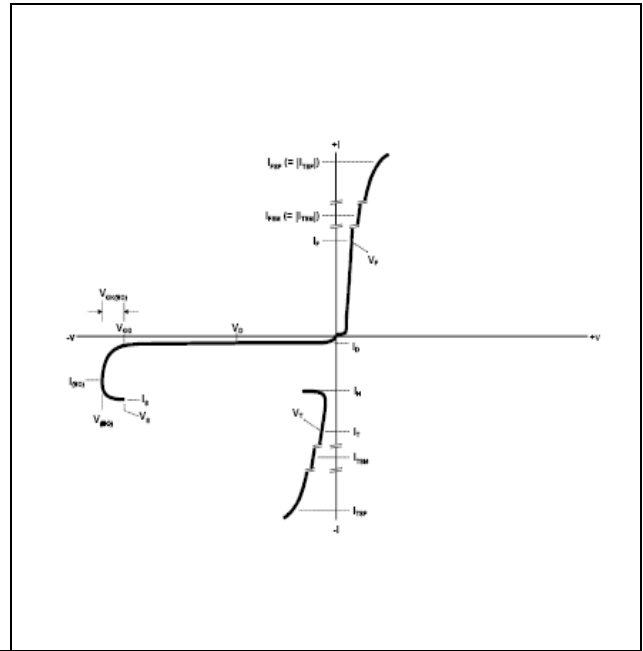
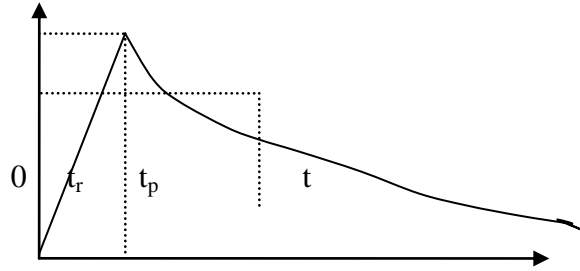


tip.1: pulse form:

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

● V-I characteristic curve ($T_a = 25^\circ C$)

| 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 $T_a = 25^\circ C$ 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 μs 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 ($T_a=25^\circ C$)



| symbol | Test conditions | Min. | Max. | unit |
|-----------|--|------|------|---------|
| I_{GT} | $V_{GND}/L_{INE}=-100V$ | 0.1 | 5 | mA |
| I_H | $V_{GATE}=-100V$ | 150 | | mA |
| V_{GT} | Same to I_{GT} | | 2.5 | V |
| I_{RG} | $T_C=25^{\circ}C$ $V_{RG}=-75V$ | | 5 | μA |
| | $T_C=70^{\circ}C$ $V_{RG}=-75V$ | | 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.

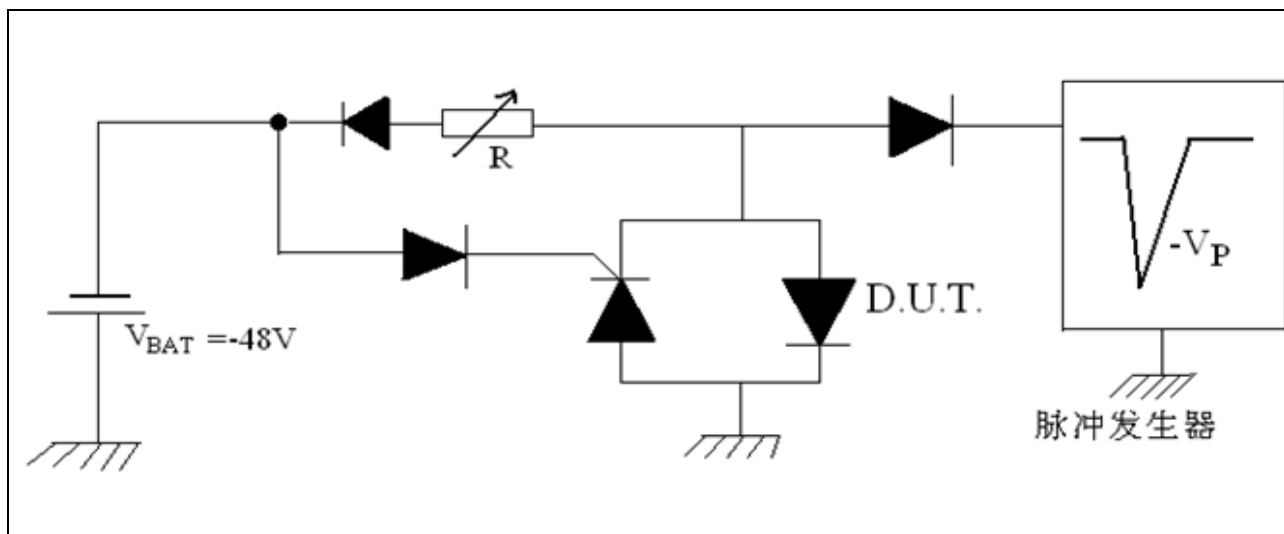
● thyristor and diode parameters

| Symbol | Test conditions | Max. | unit |
|----------|--|------|---------|
| I_{RM} | $T_C=25^{\circ}C$ $V_{GATE}/LINE=-1V$ $V_{RM}=-75$ | 5 | μA |
| | $T_C=70^{\circ}C$ $V_{GATE}/LINE=-1V$ $V_{RM}=-75$ | 50 | μA |
| C | $V_R=-3V$ $F=150KHZ$ | 100 | P^F |
| | $V_R=-48V$ $F=150KHZ$ | 50 | P^F |



Test method and circuit

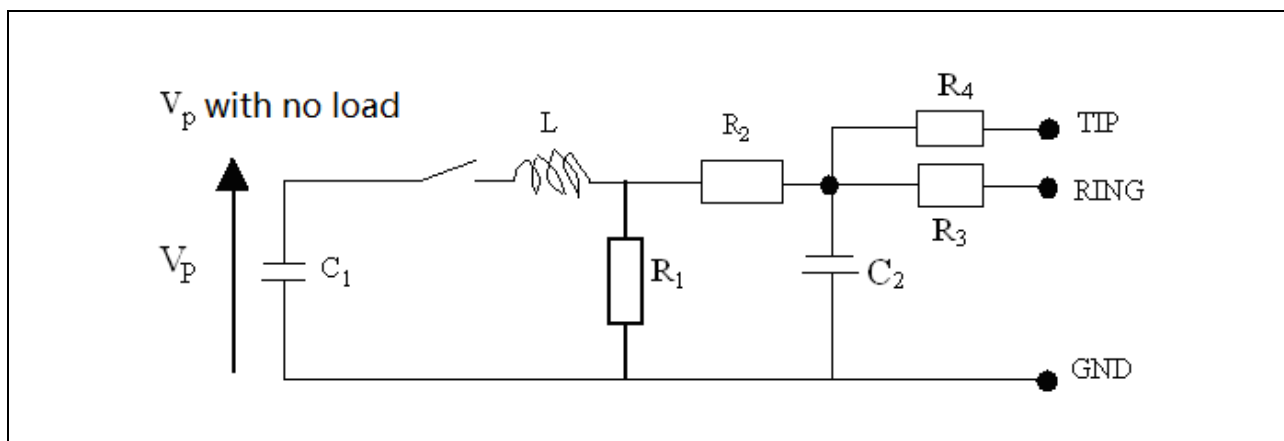
- Holding current test circuit (test circuit1)



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

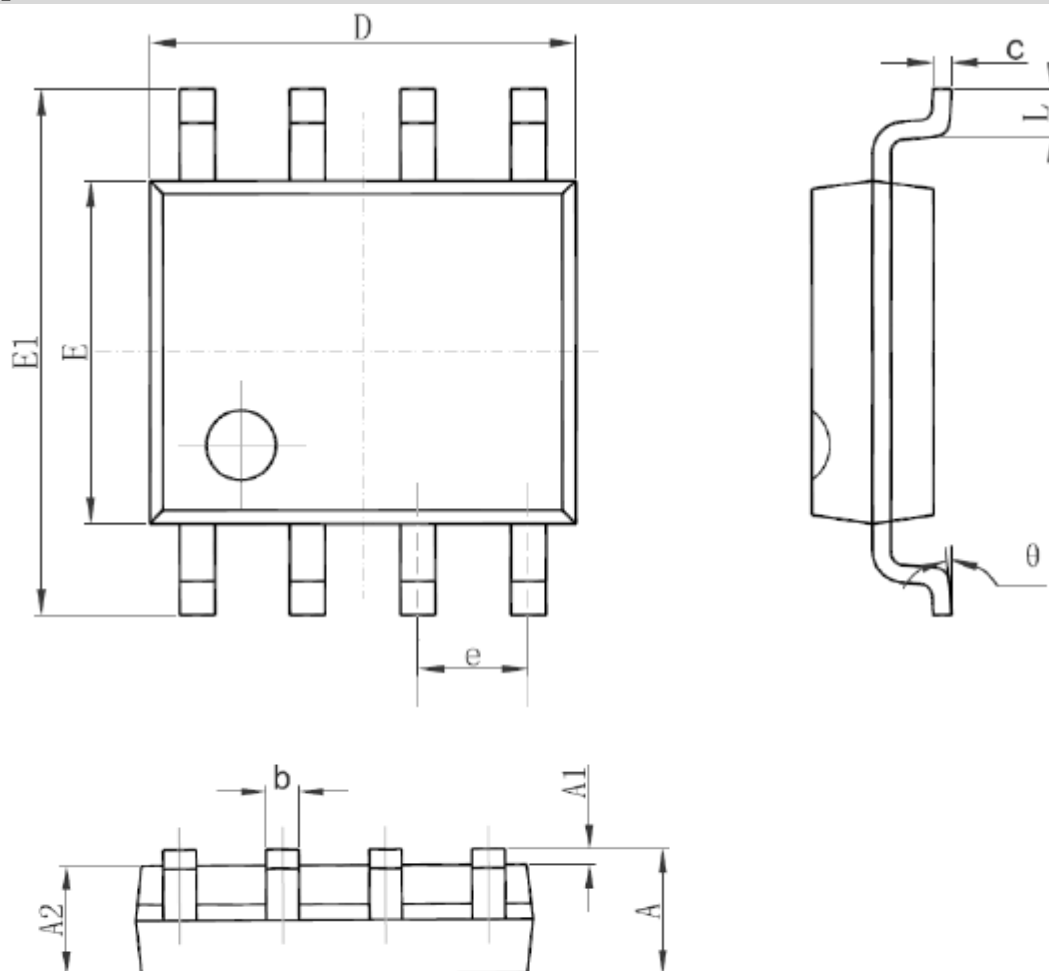


| Pluse(μs) | | V_p (V) | C_1 (μF) | C_2 (nF) | L (μH) | R_1 (Ω) | R_2 (Ω) | R_3 (Ω) | R_4 (Ω) | I_{PP} (A) | R_p (Ω) |
|------------------|-------|--------------|----------------------|---------------|--------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------|-----------------------|
| 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

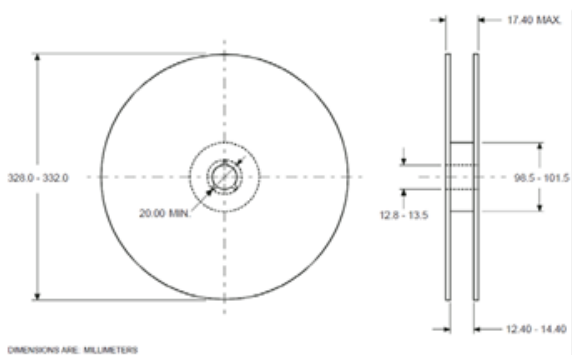
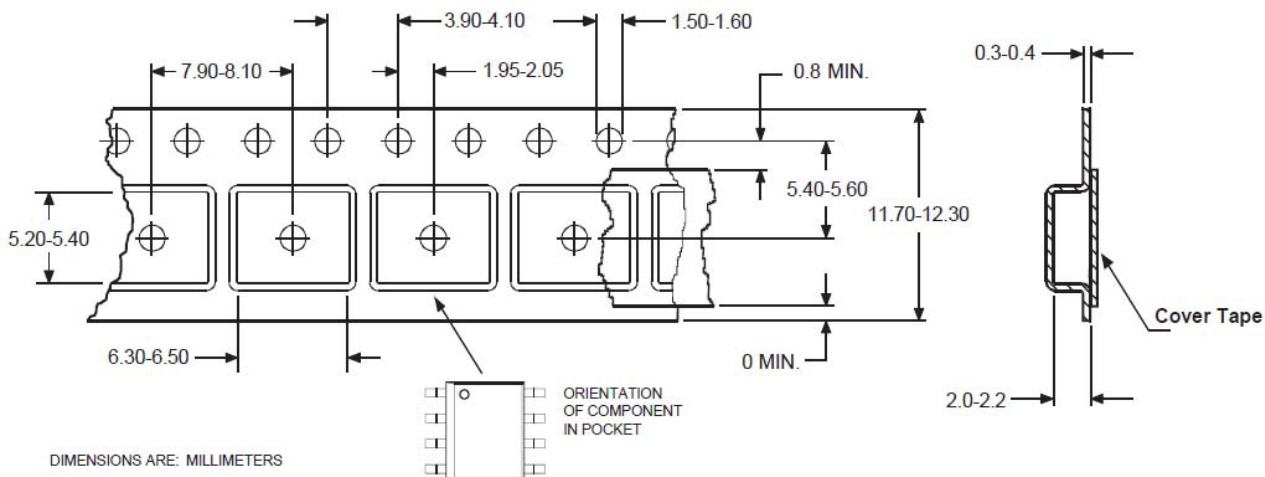


Naming Rule



XXYY:XX means year, YY means week。

■ Package Information



| Package Type | Quantity |
|--------------|----------|
| SOP-8 | 2500 |

