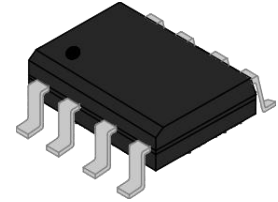


Description

LM61089Q is a quad forward-conducting buffered p-gate overvoltage protector.

This device is especially designed to protect monolithic subscriber line card interfaces (SLIC) against transient overvoltages on the telephone line caused by lightning. The LM61089Q has an array of four buffered thyristors with commoned gates and a common anode connection. Each thyristor cathode has a separate terminal connection. An antiparallel anode-cathode diode is

connected across each thyristor. The buffer transistors reduce the gate supply current. Positive overloads are clipped to common by forward of the antiparallel diodes. Negative surges are suppressed by the four thyristors, their breakdown voltage being referenced to -VBAT through the gate. This component presents a very low gate triggering current (IGT) in order to reduce the current consumption on printed circuit board during the firing phase. If sufficient clipping current flows, the LM61089Q thyristor will regenerate and switch into a low voltage on-state condition. As the overvoltage subsides, the high holding current of the device prevents d.c latch up.



Device package type SOP-8

Features

- Quad programmable transient suppressor.
- Wide negative firing voltage range: $V_{GKRM} = -167V$ max.
- Low dynamic switching voltage: V_{FRM} and $V_{GK(BD)}$.
- Low gate triggering current: $I_{GT} = 5mA$ max.
- Peak pulse current: $I_{PP} = 30A$ for 10/1000 μs surge.
- Holding current: $I_H = 150mA$ min.

APPLICATION:

LM61089Q is designed to protect communication equipment such as SPC exchanger from being damaged by transient overvoltages at the second level.

TESTING STANDARD

| Type | Wave Sharp | | V_{PP}/I_{PP} |
|------------------------|------------|----------------|-----------------|
| ITU-T K.20/21 and K.45 | Voltage | 10/700 μs | 2000V |
| | Current | 5/310 μs | 40A |

ABSOLUTE MAXIMUM RATINGS (TA=25°C, RH=45%-75%, unless otherwise noted)

| Parameter | | Symbol | Value | Unit |
|---|--|-------------------|-------------|------|
| Storage temperature range | | T _{STG} | -40 to +150 | °C |
| Operating junction temperature | | T _J | -40 to +150 | °C |
| Non-repetitive peak on-state pulse current | | | | |
| 10/1000μs | (Telcordia (Bellcore) GR-1089-CORE, Issue 2, February) | I _{TSP} | 30 | A |
| 5/310μs | (ITU-T K.20/21& K.45/44 open-circuit voltage 10/700μs) | | 40 | |
| 1.2/50μs | (Telcordia (Bellcore) GR-1089-CORE, Issue 2, February) | | 100 | |
| Non-repetitive peak pulse voltage (10/700μs) | | V _{PP} | 2000 | V |
| Non repetitive surge peak on-state current (sinusoidal) 60Hz (Note 2)900s | | I _{TSM} | 0.5 | A |
| Maximum voltage LINE/GROUND | | V _{DRM} | -170 | V |
| Maximum voltage GATE/LINE | | V _{GKRM} | -167 | V |

Note1: 5/310μs means current wave, and its rise time is 5μs, fall time is 310μs.
10/700μs means voltage wave, and its rise time is 10μs, fall time is 700μs.

Note2: Initially the protector must be in thermal equilibrium with T_J = 25 ° C.
EIA/JESD51-2 environment and EIA/JESD51-7 high effective thermal conductivity test board (multi-layer) connected with 0.6 mm printed wiring track widths

ELECTRICAL CHARACTERISTICS (TA=25°C)

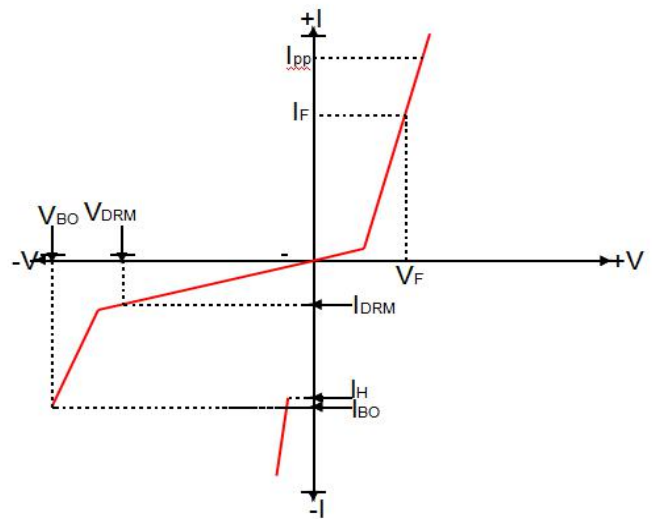
| Symbol | Parameter | Test conditions | Value | | | Unit |
|--|-------------------------------|---|-------|------|------|------|
| | | | Min. | Typ. | Max. | |
| Parameters related to the diode | | | | | | |
| V _F | Forward voltage | I _F =5A, t _w =200μs | - | - | 3 | V |
| V _{FRM} | Peak forward recovery voltage | 10/700us, I _F =40A, R _s =55Ω V _{GG} =-48V, C _G =100nF | - | 12 | - | V |
| Parameters related to the protection thyristor | | | | | | |
| I _{DRM} | Off-state current | V _{DRM} =-170V, V _{GK} =0V | - | - | -5 | μA |
| V _{BO} | Breakover voltage | 10/700us, I _F =-40A, R _s =55Ω, V _{GG} =-48V, C _G =100nF | - | - | -64 | V |
| I _H | Holding current | I _T =-1A, di/dt=1A/ms, V _{GG} =-100V | -150 | - | - | mA |

ELECTRICAL CHARACTERISTICS (TA=25°C, continued)

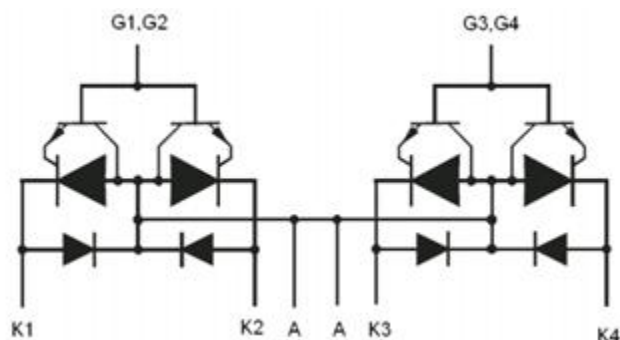
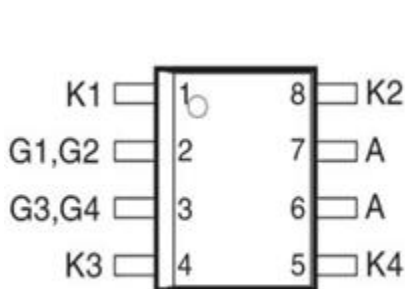
| | | | | | | |
|-----------|-------------------------------------|---|---|---|-----|---------|
| I_{GKS} | Gate reverse current | $V_{GG}=V_{GK}=-167V$, $V_{KA}=0, T_J=25^\circ C$ | - | - | -5 | μA |
| I_{GT} | Gate trigger current | $I_T=3A, t_p(g)\geq 20\mu s$, $V_{GG}=-100V$ | - | - | 5 | mA |
| V_{GT} | Gate trigger voltage | $I_T=3A, t_p(g)\geq 20\mu s$, $V_{GG}=-100V$ | - | - | 2.5 | V |
| C_{AK} | Anode-cathode off-state capacitance | $f=1MHz, V_d=1V, I_G=0A$, $V_D=-3V$ | - | - | 70 | pF |

ELECTRICAL CHARACTERISTIC

| Symbol | Parameters |
|--------------|---|
| I_{DRM} | Off-state current |
| I_H | Holding current |
| V_{BO} | Break-over voltage |
| V_F | Forward voltage |
| V_{FRM} | Peak forward recovery voltage |
| $V_{GK(BD)}$ | Gate-cathode impulse break-over voltage |
| I_{GKS} | Gate reverse current |
| I_{GT} | Gate trigger current |
| V_{GT} | Gate-cathode trigger voltage |
| C_{KA} | Cathode-anode off-state capacitance |

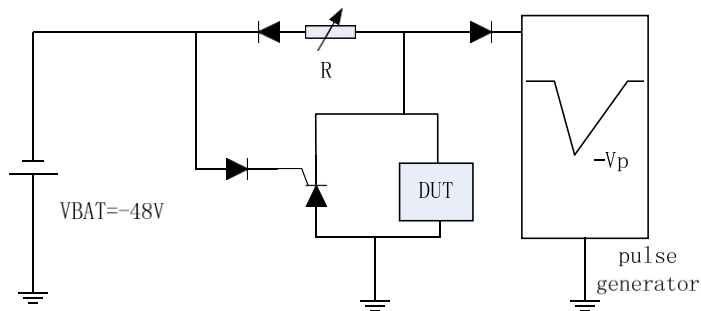


SOP PACKAGE TOP VIEW AND DEVICE SYMBOL



TEST METHOD AND CIRCUIT

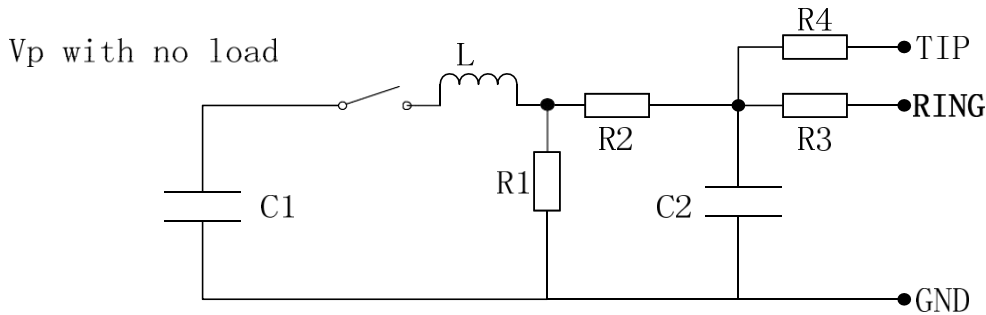
Holding current test circuit(test circuit 1)



This is a conduction-cutoff test. The test circuit can ascertain the size of holding current. Test method :

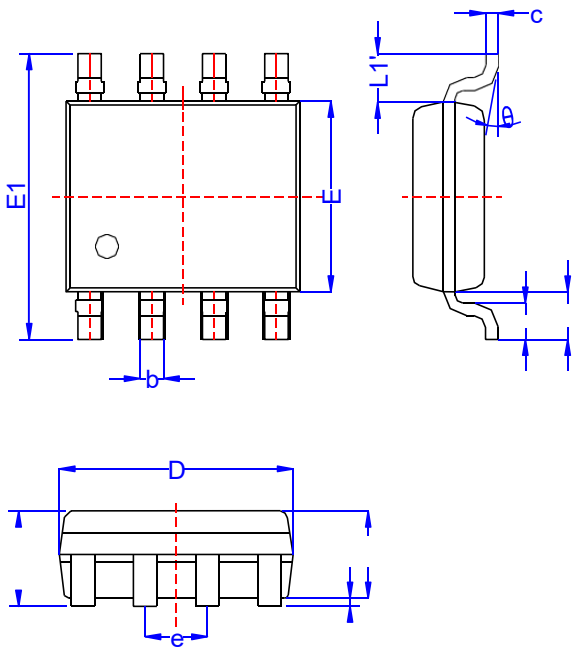
- 1.Short out DUT, regulating current in IH range;
- 2.Triggering DUT with $I_{PP}=10A$, $10/1000\mu s$ surge current;
DUT needs to return to the off-state in the maximum 50ms

Typical Characteristics



| Pulse(μs) | | V _P (V) | C1 (μF) | C2 (nF) | L (μH) | R1 (Ω) | R2 (Ω) | R3 (Ω) | R4 (Ω) | I _{PP} (A) | R _P (Ω) |
|-------------------|-------------------|-----------------------|------------|------------|-----------|-----------|-----------|-----------|-----------|------------------------|-----------------------|
| T _{rise} | T _{fall} | | | | | | | | | | |
| 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 MECHANICAL DATA

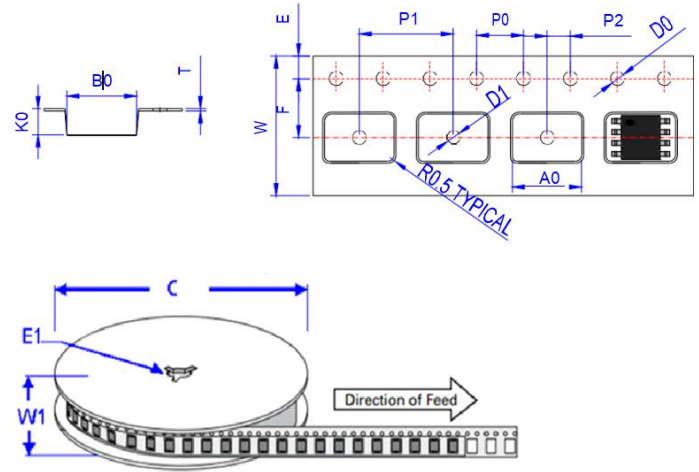


SOP-8

| Ref. | Dimensions | | | | | |
|--------|-------------|------|------|--------|-------|-------|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 1.40 | | 1.70 | 0.055 | | 0.067 |
| A1 | 0.05 | | 0.15 | 0.002 | | 0.006 |
| A2 | 1.35 | | 1.55 | 0.053 | | 0.061 |
| b | 0.31 | | 0.51 | 0.015 | | 0.017 |
| c | 0.17 | | 0.25 | 0.007 | | 0.010 |
| D | 4.70 | | 5.10 | 0.185 | | 0.200 |
| E | 3.88 | | 3.93 | 0.153 | | 0.155 |
| E1 | 5.80 | | 6.20 | 0.228 | | 0.244 |
| e | 1.14 | 1.27 | 1.40 | 0.045 | 0.050 | 0.055 |
| L | 0.62 | | 0.77 | 0.024 | | 0.030 |
| L1 | 1.00 | 1.02 | 1.04 | 0.039 | 0.04 | 0.048 |
| L1-L1' | | | 0.12 | | | 0.005 |
| θ | 0° | | 8° | 0° | | 8° |

TAPE AND REEL SPECIFICATION - SOP - 8

| Ref. | Dimensions | |
|------|-------------|---------------|
| | Millimeters | Inches |
| A0 | 6.6±0.10 | 0.260 ± 0.004 |
| B0 | 5.3±0.10 | 0.209 ± 0.004 |
| C | 330 | 13.0 |
| D0 | 1.50±0.10 | 0.059 + 0.004 |
| D1 | 1.50±0.10 | 0.059 + 0.004 |
| E | 13.3±0.3 | 0.524± 0.012 |
| E1 | 1.75±0.1 | 0.069± 0.004 |
| F | 5.5±0.05 | 0.217 ± 0.002 |
| K0 | 2.1±0.1 | 0.083 ± 0.004 |
| P0 | 4.0±0.1 | 0.157± 0.004 |
| P1 | 8.0±0.1 | 0.315± 0.004 |
| P2 | 2.0±0.05 | 0.079 ± 0.002 |
| T | 0.24±0.1 | 0.009 ± 0.002 |
| W | 12.0±0.3 | 0.472 ± 0.012 |
| W1 | 15.7±2.0 | 0.618 ± 0.079 |



| OUTLINE | UNIT WEIGHT (g/PCS) typ. | REEL (PCS) | PER CARTON (PCS) | REEL DIAMETERS (mm) |
|---------|-----------------------------|---------------|---------------------|---------------------------|
| TAPING | 0.077 | 2,500 | 40,000 | 330 |

NOTICE

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