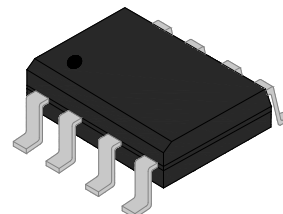


**JIP61089B Dual Programmable Thyristor Transient Voltage Suppressor Rev.4.1**

**DESCRIPTION:**

This device is especially designed to protect subscriber line card interfaces (SLIC) against transient overvoltages. Positive overloads are clipped with 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 ( $I_{GT}$ ) in order to reduce the current consumption on printed circuit board during the firing phase. A particular attention has been given to the internal wire bonding. The “4-point” configuration ensures reliable protection, eliminating the overvoltage introduced by the parasitic inductances of the wiring ( $Ldi/dt$ ), especially for very fast transients.



Device package type SOP-8

**FEATURES:**

- ✧ Dual 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 $\mu s$  surge.
- ✧ Holding current:  $I_H = 150mA$  min.
- ✧ Moisture sensitivity level: Level 3.
- ✧ UL 497B item recognized. (File No.: E480698).
- ✧ IEC61000-4-2 (ESD)  $\pm 30kV$  (air),  $\pm 30kV$  (contact).

**APPLICATION:**

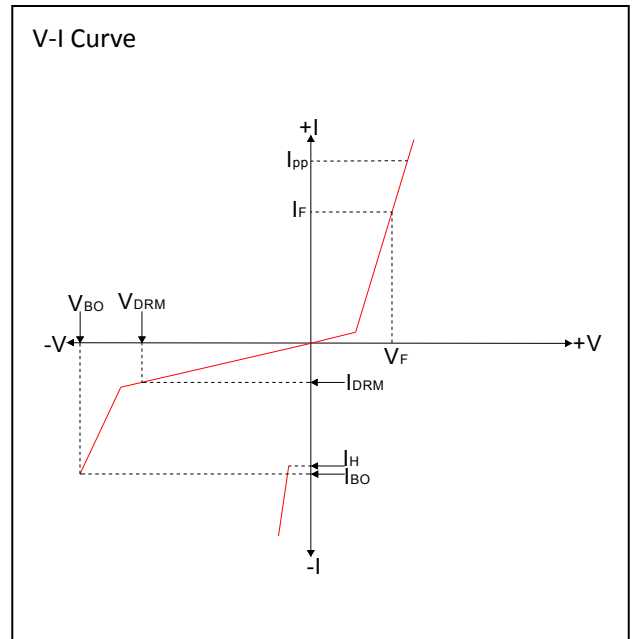
JIP61089B is designed to protect communication equipment such as SPC exchanger from being damaged by transient overvoltages at the second level.

**TESTING STANDARDS**

| Type                   | Wave Sharp |                | $V_{PP}/I_{PP}$ |
|------------------------|------------|----------------|-----------------|
| ITU-T K.20/21 and K.45 | Voltage    | 10/700 $\mu s$ | 3000V           |
|                        | Current    | 5/310 $\mu s$  | 70A             |

**ELECTERICAL CAHRACTERISTIC**

| 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     |



**ABSOLUTE MAXIMUM RATINGS** ( $T_A=25^{\circ}C$ , RH=45%-75%, unless otherwise noted)

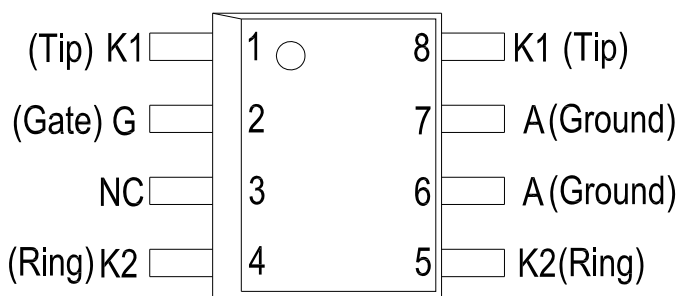
| Parameter  |  | Symbol     | Value       | Unit        |
|--|--|------------|-------------|-------------|
| Storage temperature range                                    |  | $T_{STG}$  | -40 to +150 | $^{\circ}C$ |
| Junction temperature   |  | $T_J$      | -40 to +150 | $^{\circ}C$ |
| Operating free-air temperature range                         |  | $T_A$      | -40 to +85  | $^{\circ}C$ |
| Non-repetitive peak on-state pulse current                   |  |            |             |             |
| 10/1000 $\mu s$  | (Telcordia (Bellcore) GR-1089-CORE, Issue 2, February)         | $I_{TSP}$  | 30          | A           |
| 5/310 $\mu s$  | (ITU-T K.20/21 & K.45/44 open-circuit voltage 10/700 $\mu s$ ) |            | 70          |             |
| 1.2/50 $\mu s$   | (Telcordia (Bellcore) GR-1089-CORE, Issue 2, February)         |            | 120         |             |
| Non-repetitive peak pulse voltage(10/700 $\mu s$ )           |  | $V_{PP}$   | 3000        | V           |
| Non repetitive surge peak on-state current (sinusoidal) 60Hz | 0.1s   | $I_{TSM}$  | 11          | A           |
|  | 1s   |            | 4.5         |             |
|  | 5s   |            | 2.4         |             |
|  | 300s   |            | 0.95        |             |
|  | 900s   |            | 0.93        |             |
| Maximum voltage LINE/GROUND                                  |  | $V_{DRM}$  | -170        | V           |
| Maximum voltage GATE/LINE                                    |  | $V_{GKRM}$ | -167        | V           |

Note1: 5/310 $\mu s$  means current wave, and its rise time is 5 $\mu s$ , fall time is 310 $\mu s$ .  
 10/700 $\mu s$  means voltage wave, and its rise time is 10 $\mu s$ , fall time is 700 $\mu s$ .

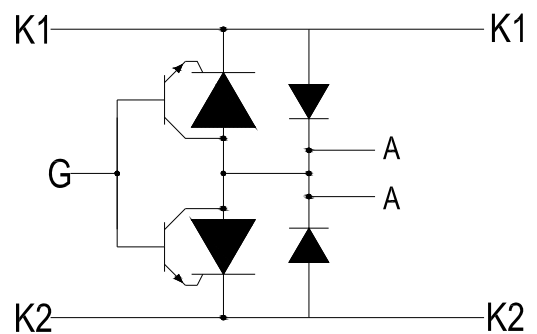
**ELECTRICAL CHARACTERISTICS** (T<sub>A</sub>=25°C)

| Symbol   | Parameter                           | Test conditions  | Value |      |      | Unit |
|--|-------------------------------------|--|-------|------|------|------|
|  |                                     |  | Min.  | Typ. | Max. |      |
| Parameters related to the diode                |                                     |  |       |      |      |      |
| V <sub>F</sub>                                 | Forward voltage                     | I <sub>F</sub> =5A, t <sub>w</sub> =200μs  | -     | -    | 3    | V    |
| V <sub>FRM</sub>                               | Peak forward recovery voltage       | 2/10μs, I <sub>F</sub> =100A, R <sub>s</sub> =50Ω, di/dt=80A/μs                            | -     | -    | 10   | V    |
| Parameters related to the protection thyristor |                                     |  |       |      |      |      |
| I <sub>DRM</sub>                               | Off-state current                   | V <sub>DRM</sub> =-170V, V <sub>GK</sub> =0V   | -     | -    | -5   | μA   |
| V <sub>BO</sub>                                | Break-over voltage                  | 2/10μs, I <sub>TM</sub> =-100A, R <sub>s</sub> =50Ω, di/dt=-80A/μs, V <sub>GG</sub> =-100V | -     | -    | -112 | V    |
| I <sub>H</sub>                                 | Holding current                     | I <sub>T</sub> =-1A, di/dt=1A/ms, V <sub>GG</sub> =-100V                                   | -150  | -    | -    | mA   |
| I <sub>GKS</sub>                               | Gate reverse current                | V <sub>GG</sub> =V <sub>GK</sub> =-167V, V <sub>KA</sub> =0, T <sub>J</sub> =25°C          | -     | -    | -5   | μA   |
| I <sub>GT</sub>                                | Gate trigger current                | I <sub>T</sub> =-3A, t <sub>P(g)</sub> ≥20μs, V <sub>GG</sub> =-48V                        | -     | -    | 5    | mA   |
| V <sub>GT</sub>                                | Gate trigger voltage                | I <sub>T</sub> =3A, t <sub>P(g)</sub> ≥20μs, V <sub>GG</sub> =-48V                         | -     | -    | 2.5  | V    |
| C <sub>AK</sub>                                | Anode-cathode off-state capacitance | f=1MHz, V <sub>D</sub> =1V, I <sub>G</sub> =0A, V <sub>D</sub> =-3V                        | -     | -    | 100  | pF   |

**SOP PACKAGE TOP VIEW AND DEVICE SYMBOL**

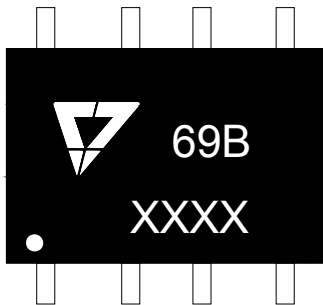


Package (Top view)



Device symbol

**MARKING**



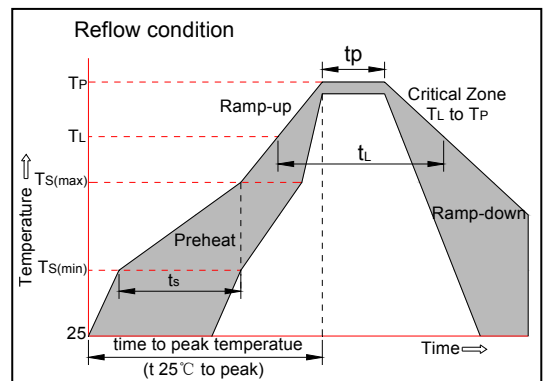
69B: Device marking code  
XXXX: Date of manufacture

**ORDERING INFORMATION**

|                                   |                              |                |                            |
|-----------------------------------|------------------------------|----------------|----------------------------|
| <b>J</b>                          | <b>IP</b>                    | <b>61089</b>   | <b>B</b>                   |
| JieJie Microelectronics CO. , Ltd | Integrated protection device | Product number | Surge ratings:10/700µs 3KV |

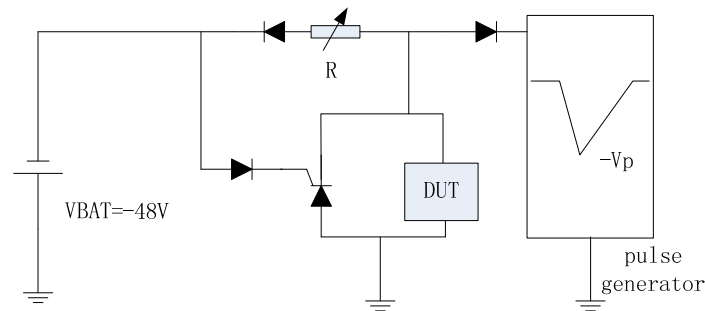
**SOLDERING PARAMETERS**

|  |                                   |   |
|--|-----------------------------------|---|
| Reflow Condition                                       |                                   | Pb-Free assembly<br>(see figure at right) |
| Pre Heat   | -Temperature Min ( $T_{s(min)}$ ) | +150°C                                    |
|  | -Temperature Max( $T_{s(max)}$ )  | +200°C                                    |
|  | -Time (Min to Max) (ts)           | 60-180 secs.                              |
| Average ramp up rate (Liquidus Temp ( $T_L$ ) to peak) |                                   | 3°C/sec. Max                              |
| $T_{s(max)}$ to $T_L$ - Ramp-up Rate                   |                                   | 3°C/sec. Max                              |
| Reflow   | -Temperature( $T_L$ )(Liquidus)   | +217°C                                    |
|  | -Temperature( $t_L$ )             | 60-150 secs.                              |
| Peak Temp ( $T_P$ )                                    |                                   | +260(+0/-5)°C                             |
| Time within 5°C of actual Peak Temp ( $t_p$ )          |                                   | 30secs.Max                                |
| Ramp-down Rate   |                                   | 6°C/sec. Max                              |
| Time 25°C to Peak Temp ( $T_P$ )                       |                                   | 8 min. Max                                |
| Do not exceed  |                                   | +260°C                                    |



**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 :

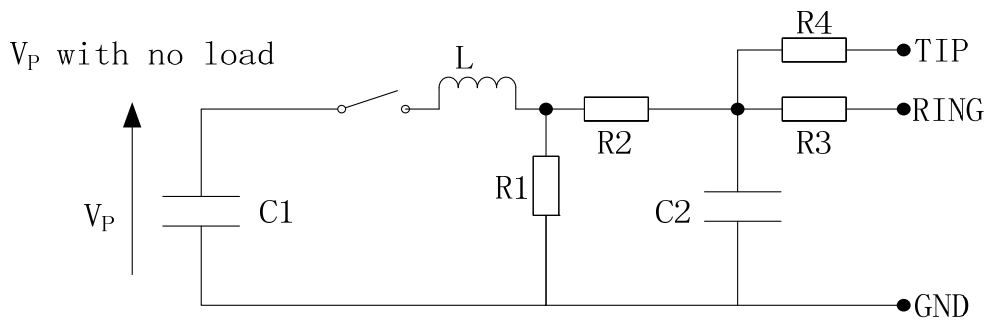
1. Short out DUT, regulating current in  $I_H$  range;
2. Triggering DUT with  $I_{PP}=10A$ , 10/1000 $\mu s$  surge current;
3. DUT needs to return to the off-state in the maximum 50ms.

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

Test method :

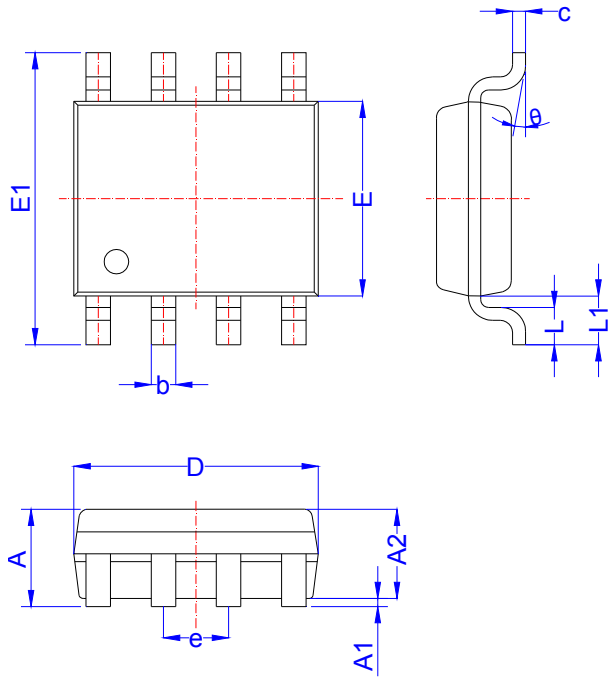
4. Shortout DUT, regulating current in  $I_H$  range;
5. Triggering DUT with  $I_{PP}=10A$ , 10/1000 $\mu s$  surge current;
6. DUT needs to return to the off-state in the maximum 50ms.

**$V_{FP}$  and  $V_{DGL}$  test circuit(test circuit 2)**



| Pulse( $\mu s$ ) |            | $V_P$<br>(V) | C1<br>( $\mu F$ ) | C2<br>(nF) | L<br>( $\mu H$ ) | R1<br>( $\Omega$ ) | R2<br>( $\Omega$ ) | R3<br>( $\Omega$ ) | R4<br>( $\Omega$ ) | $I_{PP}$<br>(A) | $R_P$<br>( $\Omega$ ) |
|------------------|------------|--------------|-------------------|------------|------------------|--------------------|--------------------|--------------------|--------------------|-----------------|-----------------------|
| $T_{rise}$       | $T_{fall}$ |              |                   |            |                  |                    |                    |                    |                    |                 |                       |
| 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                    |

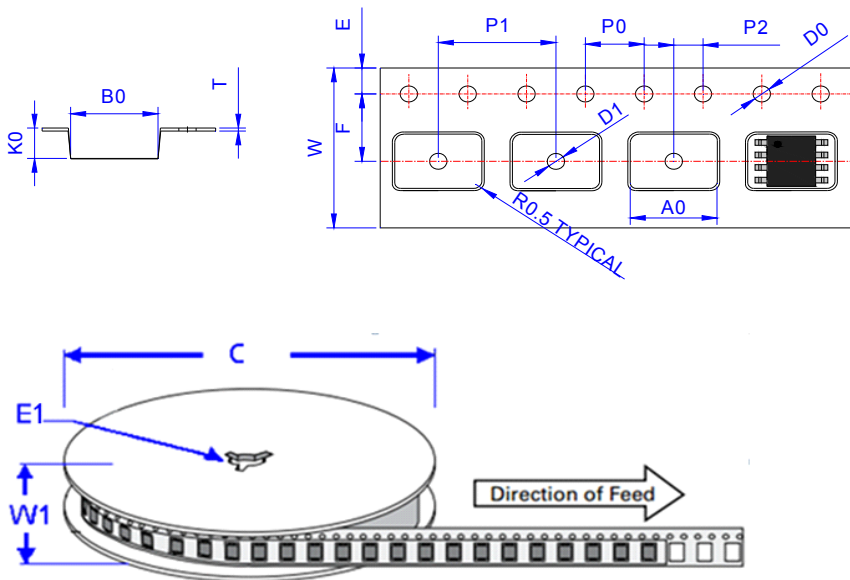
**PACKAGE MECHANICAL DATA**



SOP-8

| Ref.  | Dimensions  |      |       |        |       |       |
|-------|-------------|------|-------|--------|-------|-------|
|       | Millimeters |      |       | Inches |       |       |
|       | Min.        | Typ. | Max.  | Min.   | Typ.  | Max.  |
| A     | 1.35        |      | 1.70  | 0.053  |       | 0.067 |
| A1    | 0.04        |      | 0.18  | 0.002  |       | 0.007 |
| A2    | 1.30        |      | 1.55  | 0.051  |       | 0.061 |
| b     | 0.31        |      | 0.51  | 0.012  |       | 0.020 |
| c     | 0.17        |      | 0.25  | 0.007  |       | 0.010 |
| D     | 4.65        |      | 5.10  | 0.183  |       | 0.201 |
| E     | 3.70        |      | 4.10  | 0.146  |       | 0.161 |
| E1    | 5.80        |      | 6.20  | 0.228  |       | 0.244 |
| e     | 1.14        | 1.27 | 1.40  | 0.045  | 0.050 | 0.055 |
| L     | 0.40        |      | 0.77  | 0.016  |       | 0.030 |
| L1    | 0.825       |      | 1.225 | 0.032  |       | 0.048 |
| theta | 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 |
| E1   | 13.3±0.3    | 0.524± 0.012  |
| E    | 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 |

| PART No.  | UNIT WEIGHT (g/PCS) typ. | REEL (PCS) | PER CARTON (PCS) | DESCRIPTION       |
|-----------|--------------------------|------------|------------------|-------------------|
| JIP61089B | 0.077                    | 4,000      | 64,000           | 13 inch reel pack |

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