

# UT169Q

## SCR



**VOLTAGE:** 600 Volts

**CURRENT:** 0.8 Amperes

**Package:** TO-126

### FEATURES

- Highly dv/dt For High Reliability
- Low Thermal Resistance Increases Carrying Capacity
- Strong resistance To Electromagnetic Interference.
- With High Ability To Withstand The Shock Loading Of Large Current

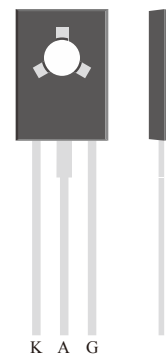
### TYPICAL APPLICATIONS

- Phase Control Operation Of Light Dimmers And Motor Speed Controllers
- ON/OFF Control Operation Of Heating Regulation And Induction Motor

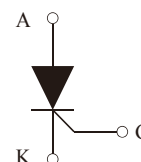
### PRODUCT SUMMARY

| Gear                           | Value | Unit |
|--------------------------------|-------|------|
| $I_{GT} \text{ Max.}$          | 200   | mA   |
| $V_{DRM}/V_{RRM} \text{ Min.}$ | 600   | V    |
| $I_{T(RMS)}$                   | 0.8   | A    |

### Diagram:



### Polarity:



### Absolute Maximum Ratings (Ta=25°C Unless otherwise specified)

| Parameter                                  | Test Conditions                                    | Symbol       | Ratings | Unit             |
|--------------------------------------------|----------------------------------------------------|--------------|---------|------------------|
| Repetitive Peak Off-State Voltage          |                                                    | $V_{DRM}$    | 600     | V                |
| Repetitive Peak Reverse Voltage            |                                                    | $V_{RRM}$    | 600     | V                |
| RMS On-State Current                       | $T_c \leq 91^\circ\text{C}$                        | $I_{T(RMS)}$ | 0.8     | A                |
| Average On-State Current                   | $T_c \leq 91^\circ\text{C}$                        | $I_{T(AV)}$  | 0.5     | A                |
| Non Repetitive Surge Peak On-State Current | F= 50 Hz, $T_p = 10 \text{ ms}$                    | $I_{TSM}$    | 9       | A                |
|                                            | F= 60 Hz, $T_p = 8.3 \text{ ms}$                   |              | 10      |                  |
| $I^2T$ Value For Fusing                    | $T_p = 5 \text{ ms}$                               | $I^2t$       | 0.2     | A                |
| Critical Rate Of Rise Of On-State Current  | $IG = 2 * I_{GT}$ , $tr \leq 100 \text{ ns}$       | $di/dt$      | 50      | A/ $\mu\text{s}$ |
|                                            | F= 100 Hz, $T_j = 125^\circ\text{C}$               |              |         |                  |
| Peak Gate Current                          | $T_p = 20 \mu\text{s}$ , $T_j = 125^\circ\text{C}$ | $I_{GM}$     | 0.5     | A                |
| Average Gate Power Dissipation             | $T_j = 125^\circ\text{C}$                          | $P_{G(AV)}$  | 0.1     | W                |
| Peak Gate Power Dissipation                |                                                    | $P_{GM}$     | 2.0     | W                |
| Maximum Mounting Torque                    | M3 screw                                           | $T_{MM}$     | 1.1     | N.m              |

### Thermal Characteristics (Ta=25°C Unless otherwise specified )

| Parameter                                                   | Test Conditions                                        | Symbol          | Typ.       | Unit               |
|-------------------------------------------------------------|--------------------------------------------------------|-----------------|------------|--------------------|
| Operating Junction Temperature Range                        |                                                        | $T_J$           | -40 to 125 | $^\circ\text{C}$   |
| Storage Temperature Range                                   |                                                        | $T_{STD}$       | -40 to 150 |                    |
| Thermal Resistance Junction To Ambient<br>With Steady-State | Still Air Environment<br>With $T_a = 25^\circ\text{C}$ | $R_{\theta JA}$ | 100.0      | $^\circ\text{C/W}$ |
| Thermal Resistance Junction-Case<br>With Steady-State       | Device Mounted On<br>75mm x 45mm x 2.5mm Alu. Heat.    | $R_{\theta JC}$ | 45.00      |                    |

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### Electrical Characteristics (Ta=25°C Unless otherwise specified )

| Parameter                  | Test Conditions                                  | Symbol   | Value |      |       | Unit |
|----------------------------|--------------------------------------------------|----------|-------|------|-------|------|
|                            |                                                  |          | Min.  | Typ. | Max.  |      |
| Gate Trigger Current       | $V_D=12V, R_L=33\Omega$                          | $I_{GT}$ | 10.0  | 40.0 | 200.0 | mA   |
| Max. Gate Trigger Voltage  | $V_D=12V, R_L=33\Omega$                          | $V_{GT}$ | -     | -    | 1.0   | V    |
| Min. Gate Trigger Voltage  | $V_D=V_{DRM}, T_j=125^\circ C, R_L=3.3K\Omega$   | $V_{GD}$ | 0.2   | -    | -     | V    |
| Holding Current            | $I_T=50\text{ mA}$                               | $I_H$    | -     | -    | 5.0   | mA   |
| Latching Current           | $I_G=1.2*I_{GT}$                                 | $I_L$    | -     | -    | 6.0   | mA   |
| Rise Of Off- State Voltage | $V_D=V_{DRM}, T_j=125^\circ C, \text{Gate Open}$ | $dv/dt$  | 50.0  | -    | -     | V/us |

### Static Characteristics (Ta=25°C Unless otherwise specified )

| Parameter                                | Test Conditions                                | Symbol            | Value | Unit |
|------------------------------------------|------------------------------------------------|-------------------|-------|------|
| Peak On-State Voltage                    | $I_T=2\text{ A}, T_p=380\mu S, T_j=25^\circ C$ | $V_{TM} M_{AX.}$  | 1.6   | V    |
| Threshold Voltage                        | $T_j=125^\circ C$                              | $V_{TO} M_{AX.}$  | 0.9   | V    |
| Dynamic resistance                       | $T_j=125^\circ C$                              | $R_D M_{AX.}$     | 344   | mΩ   |
| Peak Repetitive Forward Blocking Current | $V_D=V_{DRM} T_j=25^\circ C$                   | $I_{DRM} M_{AX.}$ | 5.0   | uA   |
|                                          | $V_R=V_{RRM} T_j=125^\circ C$                  | $I_{RRM} M_{AX.}$ | 0.5   | mA   |

### Model and identification instructions

|                | UT | 169 | Q |
|----------------|----|-----|---|
| Product Type   |    |     |   |
| UT=SCR         |    |     |   |
| IT(RMS) Spec.: |    |     |   |
| 169=8A         |    |     |   |
| Package Spec.: |    |     |   |
| Q=TO-126       |    |     |   |

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Typical Characteristics Curves

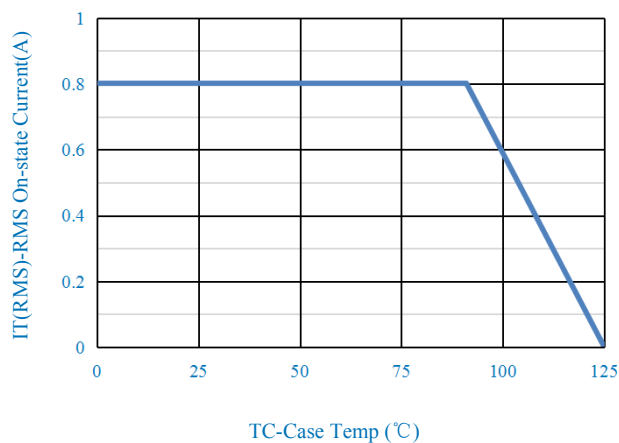


Fig.1-RMS on-state current vs. case temperature

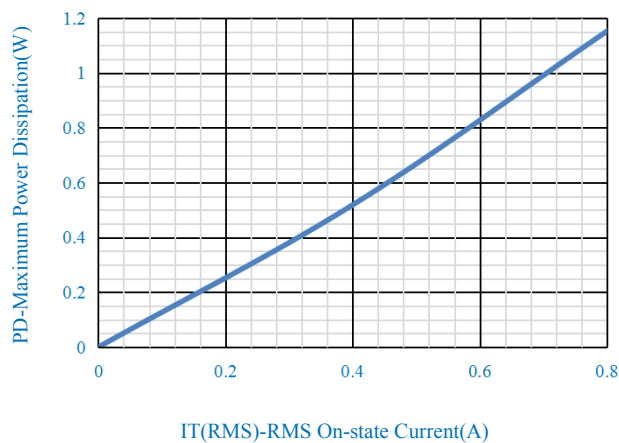


Fig.2- Maximum Power Dissipation Vs. on-state current

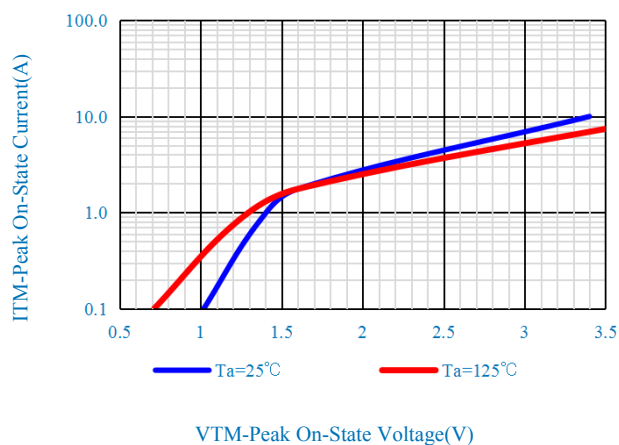


Fig.3-On-State Characteristics

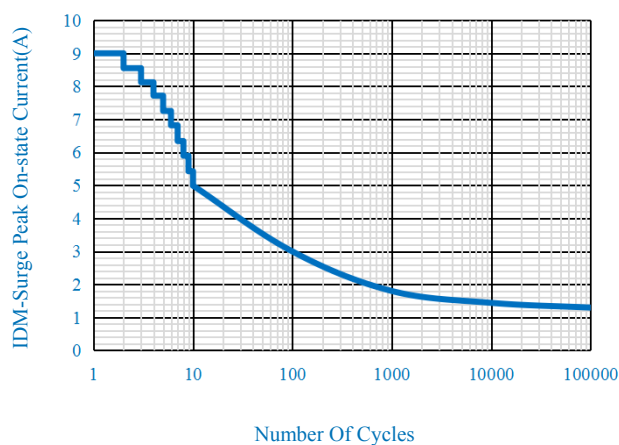


Fig.4- Surge Peak On-state Current Vs. Number Cycles

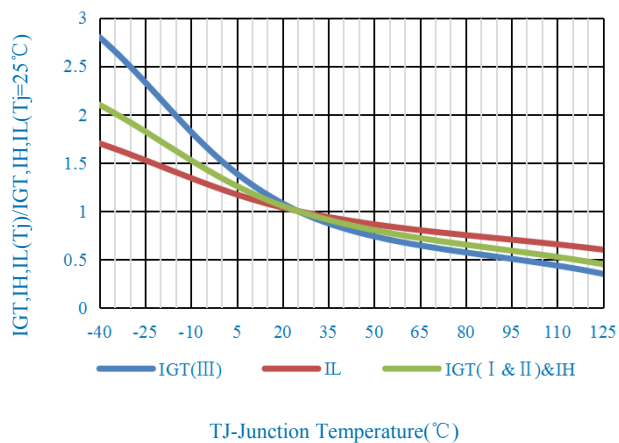


Fig.5- Relative Variation Of Gate Trigger Current , Holding Current And Latching Current Versus Junction Temperature (Typical Value)

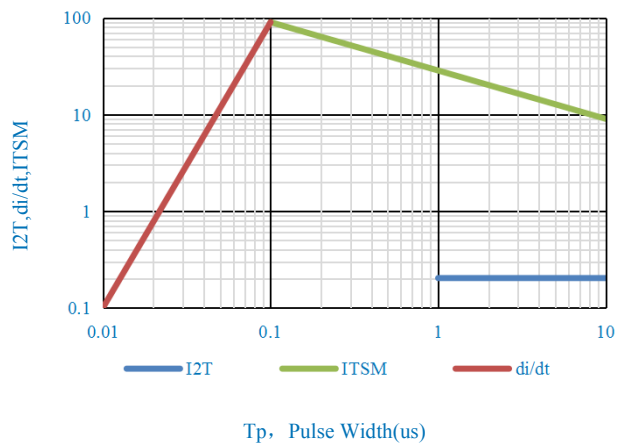
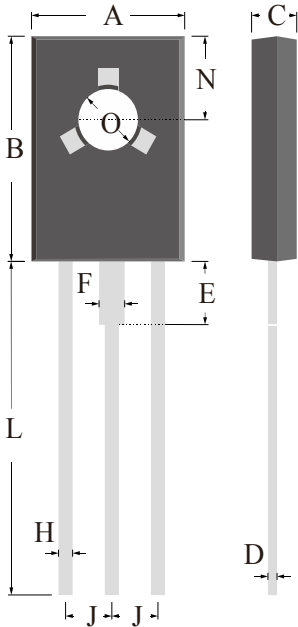


Fig.6- Non-repetitive surge peak on-state current for a sinusoidal pulse with width  $t_p < 20\text{ms}$ , and corresponding value of  $I_2t$  ( $di/dt < 50\text{A}/\mu\text{s}$ )

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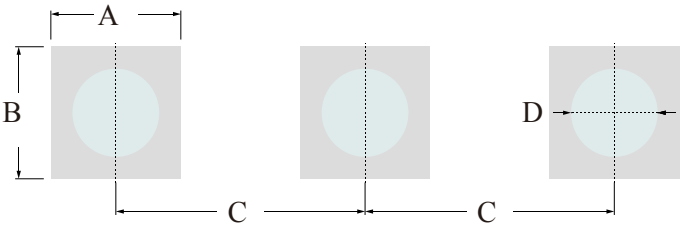
OUTLINE DRAWINGS



TO-126

| OUTLINE DIMENSIONS |            |      |       |        |      |        |
|--------------------|------------|------|-------|--------|------|--------|
| Dim.               | Milimeters |      |       | Inches |      |        |
|                    | Min.       | Typ. | Max.  | Min.   | Typ. | Max.   |
| A                  | 7.30       | -    | 7.90  | 0.2874 | -    | 0.3110 |
| B                  | 10.40      | -    | 11.20 | 0.4094 | -    | 0.4409 |
| C                  | 2.50       | -    | 2.90  | 0.0984 | -    | 0.1142 |
| D                  | 0.30       | -    | 0.60  | 0.0118 | -    | 0.0236 |
| E                  | 2.00       | -    | 2.40  | 0.0787 | -    | 0.0945 |
| F                  | 1.17       | -    | 1.37  | 0.0461 | -    | 0.0539 |
| H                  | 0.60       | -    | 0.80  | 0.0236 | -    | 0.0315 |
| J                  | 2.09       | -    | 2.49  | 0.0823 | -    | 0.0980 |
| L                  | 15.00      | -    | 17.00 | 0.5906 | -    | 0.6693 |
| N                  | 3.80       | -    | 4.20  | 0.1496 | -    | 0.1654 |
| O                  | 2.75       | -    | 3.15  | 0.1083 | -    | 0.1240 |

RECOMMEDND LAYOUT DRAWINGS



TO-126

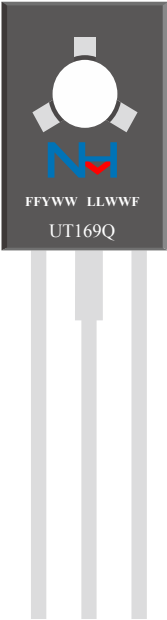
| OUTLINE DIMENSIONS |            |      |      |        |        |      |
|--------------------|------------|------|------|--------|--------|------|
| Dim.               | Milimeters |      |      | Inches |        |      |
|                    | Min.       | Typ. | Max. | Min.   | Typ.   | Max. |
| A                  | -          | 1.20 | -    | -      | 0.0472 | -    |
| B                  | -          | 1.20 | -    | -      | 0.0472 | -    |
| C                  | -          | 2.30 | -    | -      | 0.0906 | -    |
| D                  | -          | 0.80 | -    | -      | 0.0315 | -    |

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MARKING INFORMATION



MARKING INSTRUCTIONS

NH=Niuhang Trademark  
FF=Product Line Code,According To Actual Changes  
YWW=Date Code,According To Actual Changes  
LLWWF=Inernal Code,According To Actual Changes  
UT169Q=Model

PACKING INFORMATION

| Package Type | Package Code | Product Weight<br>Approx(g/Pcs) | Package Method | Quantity<br>(Pcs/Min. Pack.) | Quantity<br>(Pcs/Inner Box) | Quantity<br>(Pcs/Carton) |
|--------------|--------------|---------------------------------|----------------|------------------------------|-----------------------------|--------------------------|
| TO-126       | P1           | 0.628                           | Tube           | 400                          | 4000                        | 20000                    |

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**Recommended wave soldering condition**

| Product         | Peak Temperature | Soldering Time  |
|-----------------|------------------|-----------------|
| Pb-free devices | 260 +0/-5 °C     | 5 +1/-1 seconds |

**Recommended temperature profile for IR reflow**

|  | Profile feature                                                                                                  | Sn-Pb eutectic Assembly          | Pb-free Assembly                 |
|--|------------------------------------------------------------------------------------------------------------------|----------------------------------|----------------------------------|
|  | Average ramp-up rate (T <sub>smax</sub> to T <sub>p</sub> )                                                      | 3°C/second max.                  | 3°C/second max.                  |
|  | Preheat-Temperature Min (T <sub>S</sub> min)<br>-Temperature Max (T <sub>S</sub> max)<br>-Time(ts min to ts max) | 100°C<br>150°C<br>60-120 seconds | 150°C<br>200°C<br>60-180 seconds |
|  | Time maintained above:<br>-Temperature (T <sub>L</sub> )<br>- Time (t <sub>L</sub> )                             | 183°C<br>60-150 seconds          | 217°C<br>60-150 seconds          |
|  | Peak Temperature(T <sub>P</sub> )                                                                                | 240 +0/-5 °C                     | 260 +0/-5 °C                     |
|  | Time within 5°C of actual peak temperature (t <sub>p</sub> )                                                     | 10-30 seconds                    | 20-40 seconds                    |
|  | Ramp down rate                                                                                                   | 6°C/second max.                  | 6°C/second max.                  |
|  | Time 25 °C to peak temperature                                                                                   | 6 minutes max.                   | 8 minutes max.                   |

Note : All temperatures refer to topside of the package, measured on the package body surface.

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Specification Revision History

| Rev.        | Date       | Changed Items | Pre-Changed Content | Changed Content |
|-------------|------------|---------------|---------------------|-----------------|
| A/1         | 2014-10-20 | First Issue   |                     |                 |
| Blank Below |            |               |                     |                 |