

UT30-35F16

SCR



**VOLTAGE:** 1600 Volts

**CURRENT:** 30 Amperes

**Package:** TO-220F

#### 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

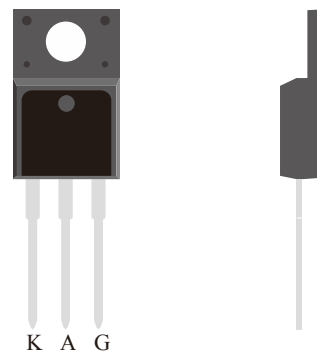
#### TYPICAL APPLICATIONS

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

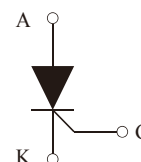
#### PRODUCT SUMMARY

| Gear                                        | Value | Unit |
|---------------------------------------------|-------|------|
| <b>I<sub>GT</sub>Max.</b>                   | 35    | mA   |
| <b>V<sub>DRM</sub>/V<sub>RRM</sub> Min.</b> | 1600  | V    |
| <b>I<sub>T(RMS)</sub></b>                   | 30    | A    |

#### Diagram:



#### Polarity:



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

| Parameter                                  | Test Conditions       | Symbol                    | Ratings | Unit |
|--------------------------------------------|-----------------------|---------------------------|---------|------|
| Repetitive Peak Off-State Voltage          |                       | <b>V<sub>DRM</sub></b>    | 1600    | V    |
| Repetitive Peak Reverse Voltage            |                       | <b>V<sub>RRM</sub></b>    | 1600    | V    |
| RMS On-State Current                       | Tc≤ 40 °C             | <b>I<sub>T(RMS)</sub></b> | 30      | A    |
| Average On-State Current                   | Tc≤ 40 °C             | <b>I<sub>T(AV)</sub></b>  | 20      |      |
| Non Repetitive Surge Peak On-State Current | F= 50 Hz, Tp= 10 ms   | <b>I<sub>TSM</sub></b>    | 300     | A    |
|                                            | F= 60 Hz, Tp= 8.3 ms  |                           | 329     |      |
| I <sup>2</sup> T Value For Fusing          | Tp= 10 ms             | <b>I<sup>2</sup>t</b>     | 450     | A    |
| Critical Rate Of Rise Of On-State Current  | IG=2*IGT, tr≤100ns    | <b>di/dt</b>              | 50      | A/μs |
|                                            | F= 100 Hz, Tj= 125 °C |                           |         |      |
| Peak Gate Current                          | Tp= 20 μs, Tj= 125 °C | <b>I<sub>GM</sub></b>     | 4       | A    |
| Average Gate Power Dissipation             | Tj= 125 °C            | <b>P<sub>G(AV)</sub></b>  | 1.0     | W    |
| Peak Gate Power Dissipation                |                       | <b>P<sub>GM</sub></b>     | 20      | W    |
| Maximum Mounting Torque                    | M3 screw              | <b>T<sub>MM</sub></b>     | 1.1     | N.m  |

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

| Parameter                                                   | Test Conditions                                     | Symbol                 | Typ.       | Unit |
|-------------------------------------------------------------|-----------------------------------------------------|------------------------|------------|------|
| Operating Junction Temperature Range                        |                                                     | <b>T<sub>J</sub></b>   | -40 to 125 | °C   |
| Storage Temperature Range                                   |                                                     | <b>T<sub>STD</sub></b> | -40 to 150 |      |
| Thermal Resistance Junction To Ambient<br>With Steady-State | Still Air Environment<br>With Ta=25°C               | <b>R<sub>θJA</sub></b> | 60         | °C/W |
| Thermal Resistance Junction-Case<br>With Steady-State       | Device Mounted On<br>75mm x 45mm x 2.5mm Alu. Heat. | <b>R<sub>θJC</sub></b> | 1.8        |      |

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

| Parameter                  | Test Conditions                                      | Symbol   | Value |      |       | Unit |
|----------------------------|------------------------------------------------------|----------|-------|------|-------|------|
|                            |                                                      |          | Min.  | Typ. | Max.  |      |
| Gate Trigger Current       | $V_D=12V, R_L=140\Omega$                             | $I_{GT}$ | -     | -    | 35.0  | mA   |
| Max. Gate Trigger Voltage  | $V_D=12V, R_L=140\Omega$                             | $V_{GT}$ | -     | -    | 1.3   | 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            | $I_T=500\text{ mA}$                                  | $I_H$    | -     | -    | 120.0 | mA   |
| Latching Current           | $I_G=1.2 \cdot I_{GT}$                               | $I_L$    | -     | -    | 180.0 | mA   |
| Rise Of Off- State Voltage | $V_D=2/3 V_{DRM}, T_j=125^\circ C, \text{Gate Open}$ | $dv/dt$  | 500.0 | -    | -     | V/us |

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

| Parameter                                | Test Conditions                                 | Symbol            | Value | Unit |
|------------------------------------------|-------------------------------------------------|-------------------|-------|------|
| Peak On-State Voltage                    | $I_T=55\text{ A}, T_p=380\mu S, T_j=25^\circ C$ | $V_{TM} M_{AX.}$  | 1.65  | V    |
| Threshold Voltage                        | $T_j=125^\circ C$                               | $V_{TO} M_{AX.}$  | 0.70  | V    |
| Peak Repetitive Forward Blocking Current | $V_D=V_{DRM}, T_j=25^\circ C$                   | $I_{DRM} M_{AX.}$ | 20    | uA   |
| Peak Repetitive Reverse Blocking Current | $V_R=V_{RRM}, T_j=125^\circ C$                  | $I_{RRM} M_{AX.}$ | 4     | mA   |

**Model and identification instructions**

|                                                                        |    |    |   |     |   |    |
|------------------------------------------------------------------------|----|----|---|-----|---|----|
| Product Type                                                           | UT | 30 | - | 35. | F | 16 |
| UT=SCR                                                                 |    |    |   |     |   |    |
| Insulation Spec.:<br>A=Ins.=Insulation<br>Empty=No Ins.=No Insulation  |    |    |   |     |   |    |
| $I_{T(RMS)}$ Spec.:<br>30=30A                                          |    |    |   |     |   |    |
| "- "=Connection Symbol<br>Constant And Unchanging                      |    |    |   |     |   |    |
| IGT Spec.<br>35.=35mA                                                  |    |    |   |     |   |    |
| Package Spec.:<br>F=TO-220F                                            |    |    |   |     |   |    |
| $V_{DRM}/V_{RRM}$ Spec.:<br>16=1600V                                   |    |    |   |     |   |    |
| Temperature Spec.:<br>Empty=Standard Temperature<br>H=high temperature |    |    |   |     |   |    |

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### Typical Characteristics Curves

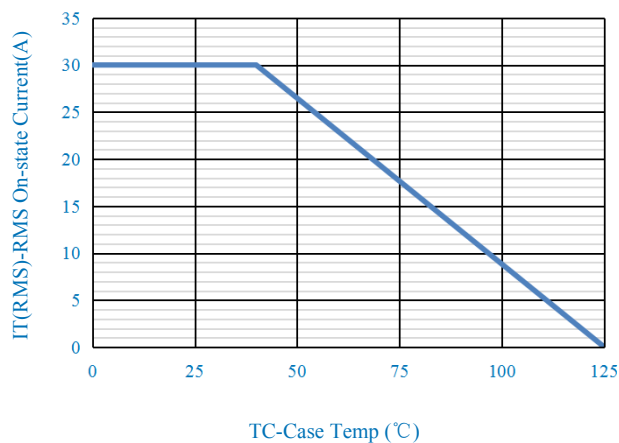


Fig.1-RMS on-state current vs. case temperature

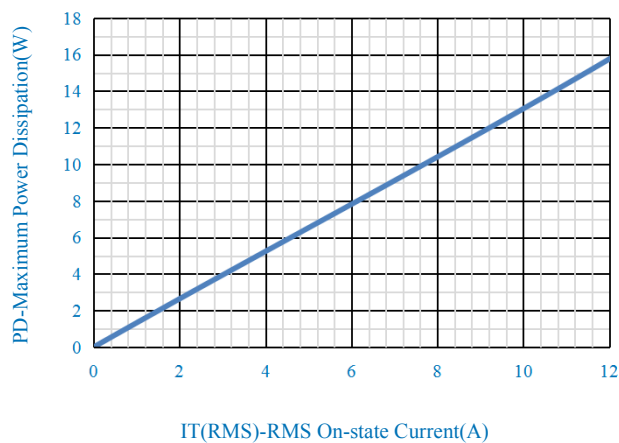


Fig.2- Maximum Power Dissipation Vs. on-state current

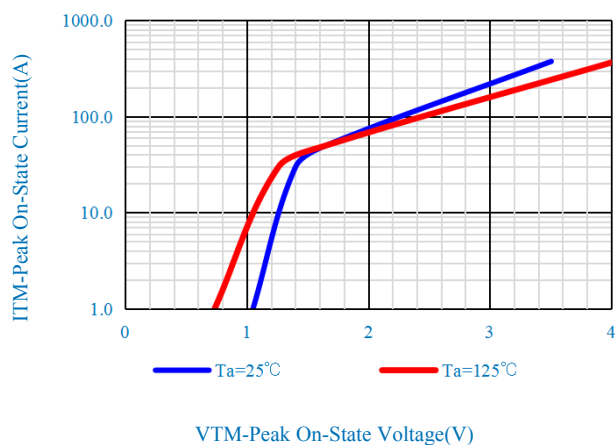


Fig.3-On-State Characteristics

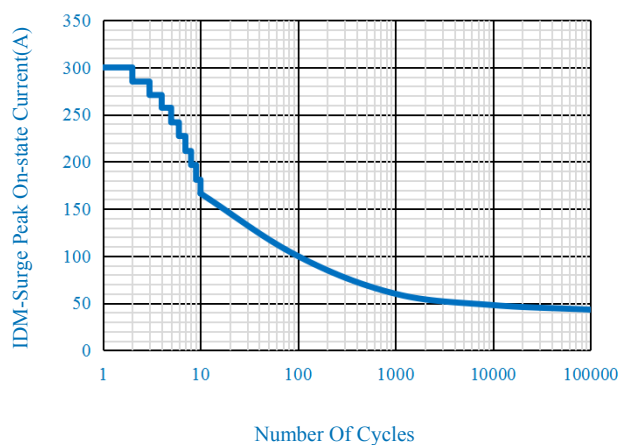


Fig.4- Surge Peak On-state Current Vs. Number Cycles

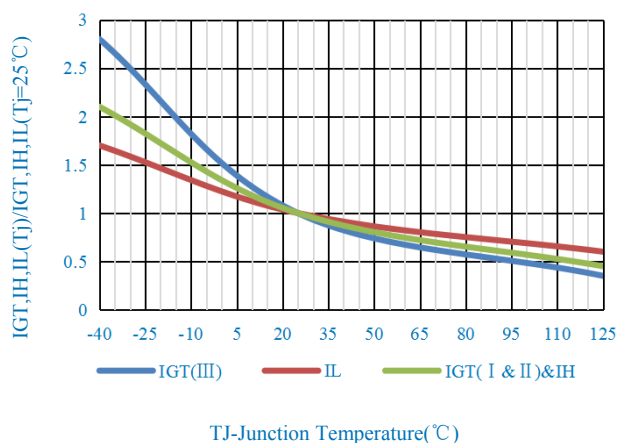


Fig.5- Relative Variation Of Gate Trigger Current , Holding Current And Latching Current Versus Junction Temperature (Typical Value)

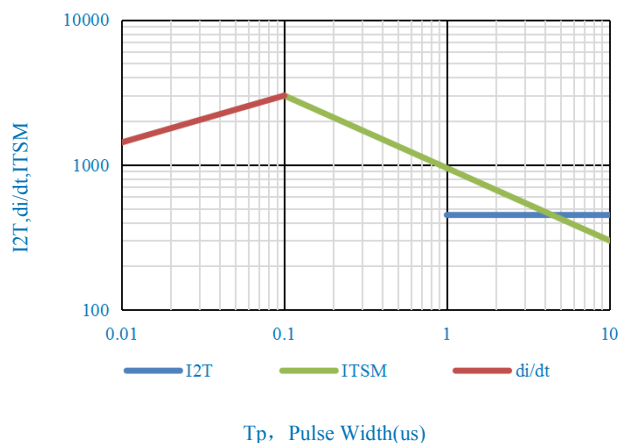
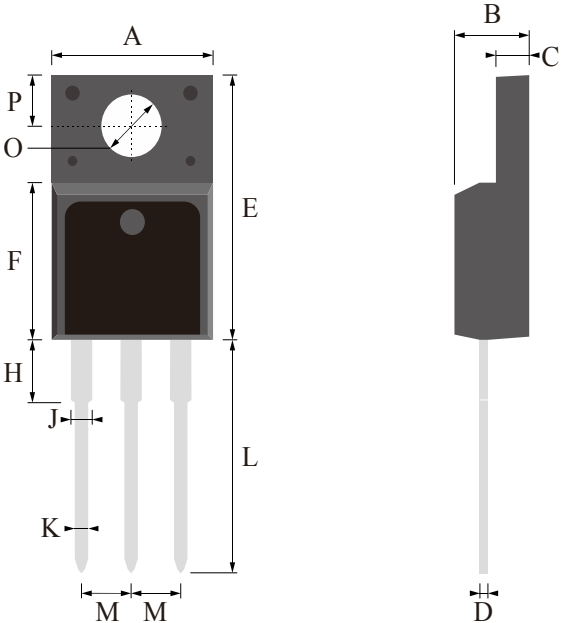


Fig.6- Non-repetitive surge peak on-state current for a sinusoidal pulse with width  $t_p < 20\text{ms}$ , and corresponding value of  $I_2t$  ( $dI/dt < 50\text{A}/\mu\text{s}$ )

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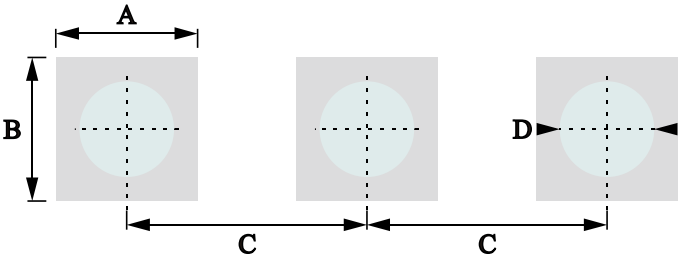
OUTLINE DRAWINGS



TO-220F

| OUTLINE DIMENSIONS |            |      |       |        |      |        |
|--------------------|------------|------|-------|--------|------|--------|
| Dim.               | Milimeters |      |       | Inches |      |        |
|                    | Min.       | Typ. | Max.  | Min.   | Typ. | Max.   |
| A                  | 9.25       | -    | 10.75 | 0.3642 | -    | 0.4232 |
| B                  | 4.20       | -    | 5.20  | 0.1654 | -    | 0.2047 |
| C                  | 2.30       | -    | 2.90  | 0.0906 | -    | 0.1142 |
| D                  | 0.35       | -    | 0.75  | 0.0138 | -    | 0.0295 |
| E                  | 14.80      | -    | 16.80 | 0.5827 | -    | 0.6614 |
| F                  | 8.25       | -    | 9.75  | 0.3248 | -    | 0.3839 |
| L                  | 12.15      | -    | 14.15 | 0.4783 | -    | 0.5571 |
| H                  | 2.60       | -    | 3.80  | 0.1024 | -    | 0.1496 |
| J                  | 1.10       | -    | 1.60  | 0.0433 | -    | 0.0630 |
| K                  | 0.60       | -    | 1.00  | 0.0236 | -    | 0.0394 |
| M                  | 2.20       | -    | 3.00  | 0.0866 | -    | 0.1181 |
| O                  | 2.70       | -    | 3.50  | 0.1063 | -    | 0.1378 |
| P                  | 3.10       | -    | 3.80  | 0.1220 | -    | 0.1496 |

RECOMMEDND LAYOUT DRAWINGS



TO-220F

| OUTLINE DIMENSIONS |            |      |      |        |        |      |
|--------------------|------------|------|------|--------|--------|------|
| Dim.               | Milimeters |      |      | Inches |        |      |
|                    | Min.       | Typ. | Max. | Min.   | Typ.   | Max. |
| A                  | -          | 1.60 | -    | -      | 0.0630 | -    |
| B                  | -          | 1.60 | -    | -      | 0.0630 | -    |
| C                  | -          | 2.54 | -    | -      | 0.1000 | -    |
| D                  | -          | 1.00 | -    | -      | 0.0394 | -    |

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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  
UT30-35F16=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-220F      | P1           | 2.048                           | Tube           | 50                           | 1000                        | 5000                     |

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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(t <sub>s</sub> min to t <sub>s</sub> 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 |            |               |                     |                 |