

## Standard SCRs, 40A

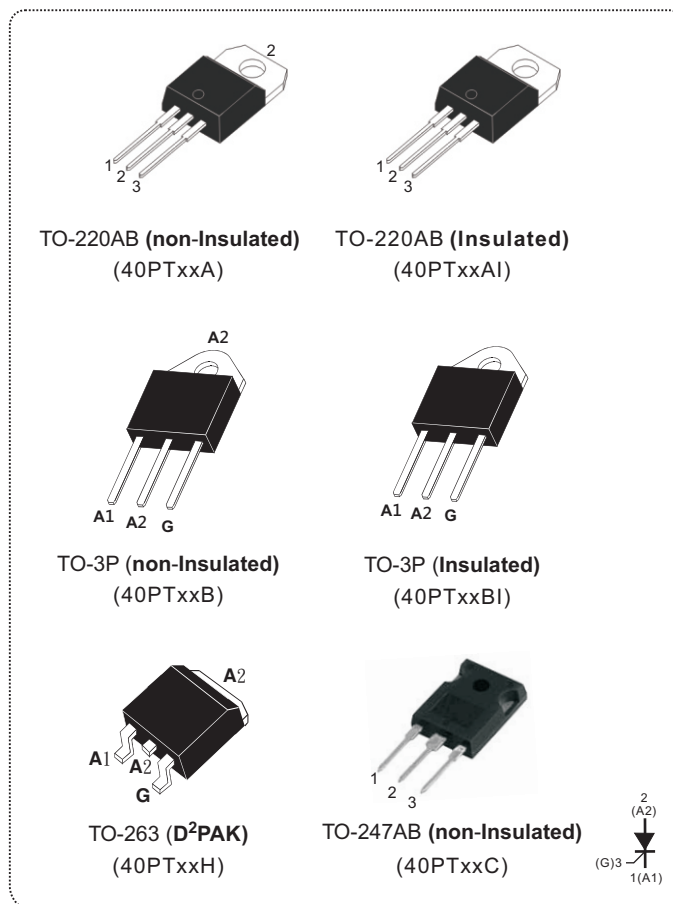
### Main Features

| Symbol            | Value       | Unit |
|-------------------|-------------|------|
| $I_{T(RMS)}$      | 40          | A    |
| $V_{DRM}/V_{RRM}$ | 600 to 1600 | V    |
| $I_{GT}$          | 4 to 35     | mA   |

### DESCRIPTION

The 40PT series of silicon controlled rectifiers are high performance glass passivated technology, and are suitable for general purpose applications, where in-rush current conditions are critical such as overvoltage crowbar protection circuits in power supplies, in-rush current limiting circuits, solid state relay in back to back configuration, welding equipment and high power motor control.

Base on a clip assembly technology, they offer a superior performance in surge current capabilities.



### ABSOLUTE MAXIMUM RATINGS

| PARAMETER                                                                                         | SYMBOL       | TEST CONDITIONS                    |                             | VALUE         | UNIT                   |
|---------------------------------------------------------------------------------------------------|--------------|------------------------------------|-----------------------------|---------------|------------------------|
| RMS on-state current full sine wave<br>(180° conduction angle)                                    | $I_{T(RMS)}$ | TO-3P/TO-247AB                     | $T_c=95^{\circ}\text{C}$    | 40            | A                      |
|                                                                                                   |              | TO-220AB/TO-263                    | $T_c=90^{\circ}\text{C}$    |               |                        |
|                                                                                                   |              | TO-220AB insulated/TO-3P insulated | $T_c=80^{\circ}\text{C}$    |               |                        |
| Average on-state current<br>(180° conduction angle)                                               | $I_{T(AV)}$  | TO-3P/TO-247AB                     | $T_c=95^{\circ}\text{C}$    | 25            | A                      |
|                                                                                                   |              | TO-220AB/TO-263                    | $T_c=90^{\circ}\text{C}$    |               |                        |
|                                                                                                   |              | TO-220AB insulated/TO-3P insulated | $T_c=80^{\circ}\text{C}$    |               |                        |
| Non repetitive surge peak on-state<br>current (full cycle, $T_j$ initial = $25^{\circ}\text{C}$ ) | $I_{TSM}$    | F = 50 Hz                          | t = 20 ms                   | 460           | A                      |
|                                                                                                   |              | F = 60 Hz                          | t = 16.7 ms                 | 480           |                        |
| $I^2t$ Value for fusing                                                                           | $I^2t$       | $t_p = 10 \text{ ms}$              |                             | 1058          | $\text{A}^2\text{s}$   |
| Critical rate of rise of on-state current<br>$I_G = 2 \times I_{GT}$ , $t_r \leq 100\text{ns}$    | $di/dt$      | F = 60 Hz                          | $T_j = 125^{\circ}\text{C}$ | 50            | $\text{A}/\mu\text{s}$ |
| Peak gate current                                                                                 | $I_{GM}$     | $T_p = 20 \mu\text{s}$             | $T_j = 125^{\circ}\text{C}$ | 4             | A                      |
| Maximum gate power                                                                                | $P_{GM}$     | $T_p = 20 \mu\text{s}$             | $T_j = 125^{\circ}\text{C}$ | 10            | W                      |
| Average gate power dissipation                                                                    | $P_{G(AV)}$  | $T_j = 125^{\circ}\text{C}$        |                             | 1             | W                      |
| Repetitive peak off-state voltage                                                                 | $V_{DRM}$    | $T_j = 125^{\circ}\text{C}$        |                             | 600 to 1600   | V                      |
| Repetitive peak reverse voltage                                                                   | $V_{RRM}$    |                                    |                             |               |                        |
| Storage temperature range                                                                         | $T_{stg}$    |                                    |                             | - 40 to + 150 | $^{\circ}\text{C}$     |
| Operating junction temperature range                                                              | $T_j$        |                                    |                             | - 40 to + 125 |                        |
| Maximum peak reverse gate voltage                                                                 | $V_{RGM}$    |                                    |                             | 5             | V                      |

| ELECTRICAL SPECIFICATIONS (T <sub>J</sub> = 25 °C unless otherwise specified) |                                                                                               |                         |      |          |      |
|-------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-------------------------|------|----------|------|
| SYMBOL                                                                        | TEST CONDITIONS                                                                               |                         |      | 40PTxxxx | Unit |
| I <sub>GT</sub>                                                               | V <sub>D</sub> = 12V, R <sub>L</sub> = 33Ω                                                    |                         | Min. | 4        | mA   |
|                                                                               |                                                                                               |                         | Max. | 35       |      |
| V <sub>GT</sub>                                                               |                                                                                               |                         | Max. | 1.3      | V    |
| V <sub>GD</sub>                                                               | V <sub>D</sub> = V <sub>DRM</sub> , R <sub>L</sub> = 3.3KΩ, R <sub>GK</sub> = 220Ω            | T <sub>J</sub> = 125 °C | Min. | 0.2      | V    |
| I <sub>H</sub>                                                                | I <sub>T</sub> = 500mA, Gate open                                                             |                         | Max. | 75       | mA   |
| I <sub>L</sub>                                                                | I <sub>G</sub> = 1.2×I <sub>GT</sub>                                                          |                         | Max. | 150      | mA   |
| dV/dt                                                                         | V <sub>D</sub> = 67% V <sub>DRM</sub> , Gate open                                             | T <sub>J</sub> = 125 °C | Min. | 1000     | V/μs |
| V <sub>TM</sub>                                                               | I <sub>T</sub> = 80A, t <sub>p</sub> = 380μs                                                  | T <sub>J</sub> = 25 °C  | Max. | 1.6      | V    |
| I <sub>DRM</sub><br>I <sub>RRM</sub>                                          | V <sub>D</sub> =V <sub>DRM</sub> , V <sub>R</sub> =V <sub>RRM</sub><br>R <sub>GK</sub> = 220Ω | T <sub>J</sub> = 25 °C  | Max. | 10       | μA   |
|                                                                               |                                                                                               | T <sub>J</sub> = 125 °C | Max. | 4        | mA   |
| V <sub>to</sub>                                                               | Threshold Voltage                                                                             | T <sub>J</sub> = 125 °C | Max. | 0.85     | V    |
| R <sub>d</sub>                                                                | Dynamic Resistance                                                                            | T <sub>J</sub> = 125 °C | Max. | 10       | mΩ   |

| THERMAL RESISTANCE   |                       |                                            |                                |            |
|----------------------|-----------------------|--------------------------------------------|--------------------------------|------------|
| SYMBOL               | Parameter             |                                            |                                | VALUE UNIT |
| R <sub>th(j-c)</sub> | Junction to case (DC) | D <sup>2</sup> PAK/TO-220AB/TO-3P/TO-247AB |                                | 0.8 °C/W   |
|                      |                       | TO-220AB insulated/TO-3P insulated         |                                | 0.9 °C/W   |
| R <sub>th(j-a)</sub> | Junction to ambient   | S = 1 cm <sup>2</sup>                      | TO-263(D <sup>2</sup> PAK)     | 45 °C/W    |
|                      |                       |                                            | TO-220AB/TO-220AB insulated    | 60 °C/W    |
|                      |                       |                                            | TO-3P/TO-247AB/TO-3P insulated | 50 °C/W    |

S=Copper surface under tab

| PRODUCT SELECTOR |              |       |        |        |        |             |                    |
|------------------|--------------|-------|--------|--------|--------|-------------|--------------------|
| PART NUMBER      | VOLTAGE (xx) |       |        |        |        | SENSITIVITY | PACKAGE            |
|                  | 600 V        | 800 V | 1000 V | 1200 V | 1600 V |             |                    |
| 40PTxxA/40PTxxAI | V            | V     | V      | V      | V      | 35 mA       | TO-220AB           |
| 40PTxxH          | V            | V     | V      | V      | V      | 35 mA       | D <sup>2</sup> PAK |
| 40PTxxB/40PTxxBI | V            | V     | V      | V      | V      | 35 mA       | TO-3P              |
| 40PTxxC          | V            | V     | V      | V      | V      | 35 mA       | TO-247AB           |

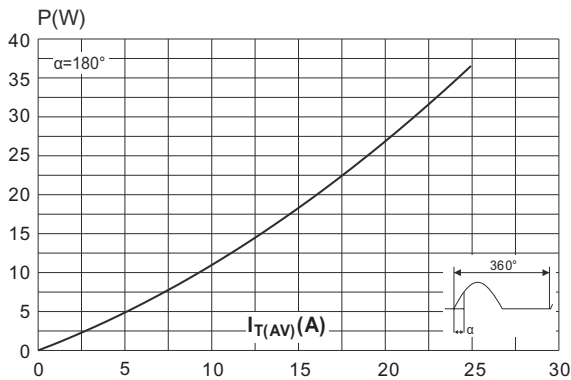
| ORDERING INFORMATION |          |                            |        |           |               |
|----------------------|----------|----------------------------|--------|-----------|---------------|
| ORDERING TYPE        | MARKING  | PACKAGE                    | WEIGHT | BASE Q'TY | DELIVERY MODE |
| 40PTxxA              | 40PTxxA  | TO-220AB                   | 2.0g   | 50        | Tube          |
| 40PTxxAI             | 40PTxxAI | TO-220AB (insulated)       | 2.3g   | 50        | Tube          |
| 40PTxxH              | 40PTxxH  | TO-263(D <sup>2</sup> PAK) | 2.0g   | 50        | Tube          |
| 40PTxxB              | 40PTxxB  | TO-3P                      | 4.3g   | 30        | Tube          |
| 40PTxxBI             | 40PTxxBI | TO-3P insulated            | 4.8g   | 30        | Tube          |
| 40PTxxC              | 40PTxxC  | TO-247AB                   | 5g     | 30        | Tube          |

Note: xx = voltage

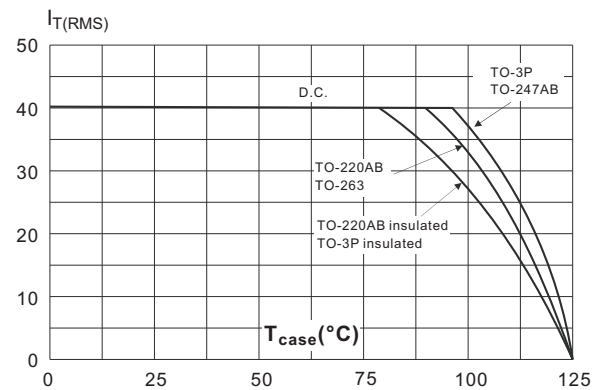
## ORDERING INFORMATION SCHEME

|                                 |    |    |    |    |
|---------------------------------|----|----|----|----|
|                                 | 40 | PT | 06 | AI |
| <b>Current</b>                  |    |    |    |    |
| 40 = 40A, $I_{T(RMS)}$          |    |    |    |    |
| <b>SCR series</b>               |    |    |    |    |
| <b>Voltage Code</b>             |    |    |    |    |
| 06 = 600V                       |    |    |    |    |
| 08 = 800V                       |    |    |    |    |
| 10 = 1000V                      |    |    |    |    |
| 12 = 1200V                      |    |    |    |    |
| 16 = 1600V                      |    |    |    |    |
| <b>Package type</b>             |    |    |    |    |
| A = TO-220AB (non-insulated)    |    |    |    |    |
| AI = TO-220AB ( insulated)      |    |    |    |    |
| B = TO-3P (non-insulated)       |    |    |    |    |
| BI = TO-3P ( insulated)         |    |    |    |    |
| C = TO-247AB                    |    |    |    |    |
| H = TO-263 (D <sup>2</sup> PAK) |    |    |    |    |

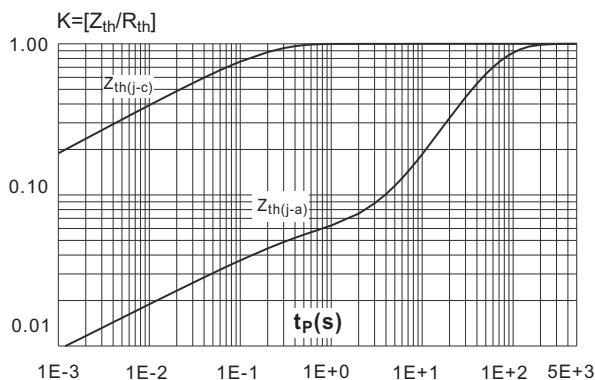
**Fig.1 Maximum average power dissipation versus average on-state current.**



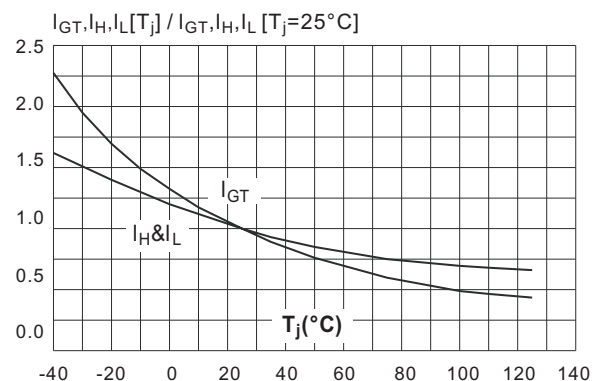
**Fig.2 RMS on-state current versus case temperature.**



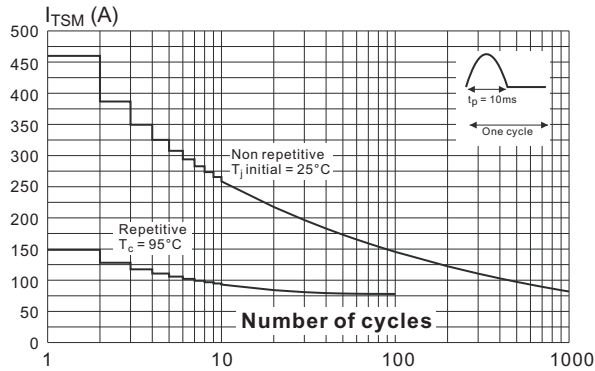
**Fig.3 Relative variation of thermal impedance versus pulse duration.**



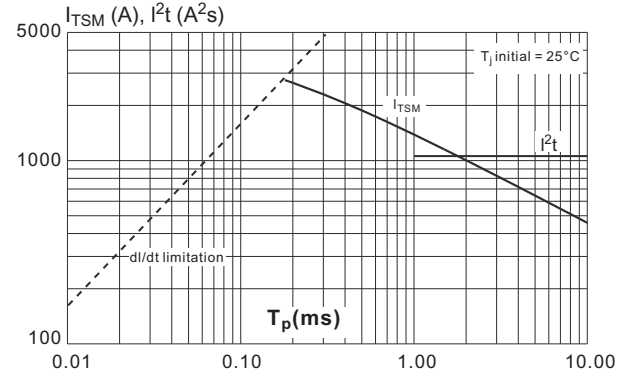
**Fig.4 Relative variation of gate trigger current, holding current and latching current versus junction temperature.**



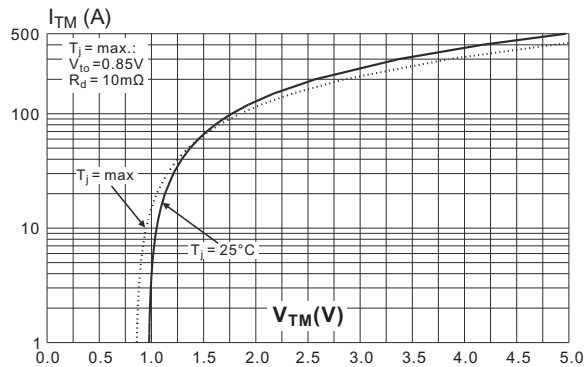
**Fig.5 Surge peak on-state current versus number of cycles.**



**Fig.6 Non-repetitive surge peak on-state current for a sinusoidal pulse with width  $t_p < 10$  ms, and corresponding values of  $I^2t$ .**

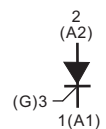
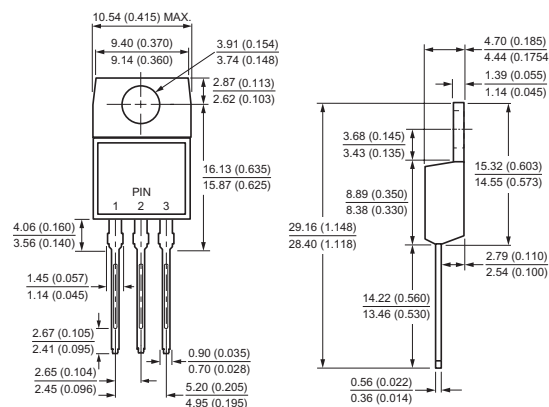


**Fig.7 On-state characteristics (maximum values)**



## Case Style

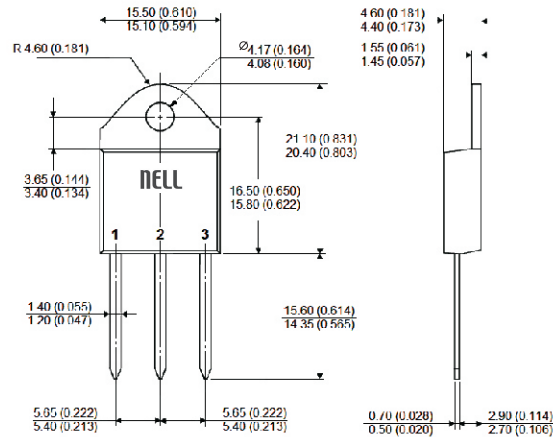
### TO-220AB



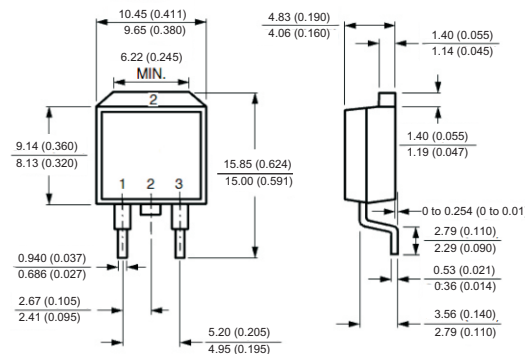
All dimensions in millimeters(inches)

## Case Style

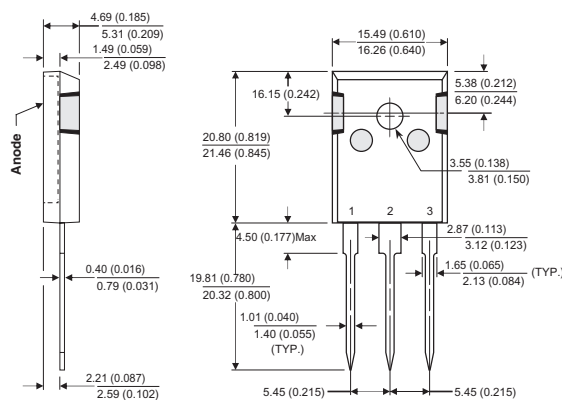
**TO-3P**



**TO-263(D<sup>2</sup>PAK)**



**TO-247AB**



All dimensions in millimeters(inches)

