

**T805 700-06-14**

**Key Parameters**

|                    |          |    |
|--------------------|----------|----|
| $V_{\text{DRM}}$   | 600~1400 | V  |
| $I_{\text{T(AV)}}$ | 700      | A  |
| $I_{\text{TSM}}$   | 9.1      | kA |
| $V_{\text{TO}}$    | 0.95     | V  |
| $r_{\text{T}}$     | 0.53     | mΩ |

**Applications**

- Traction drive
- Motor drive
- Industry converter

**Features**

- Double-side cooling
- High power capability
- Low loss

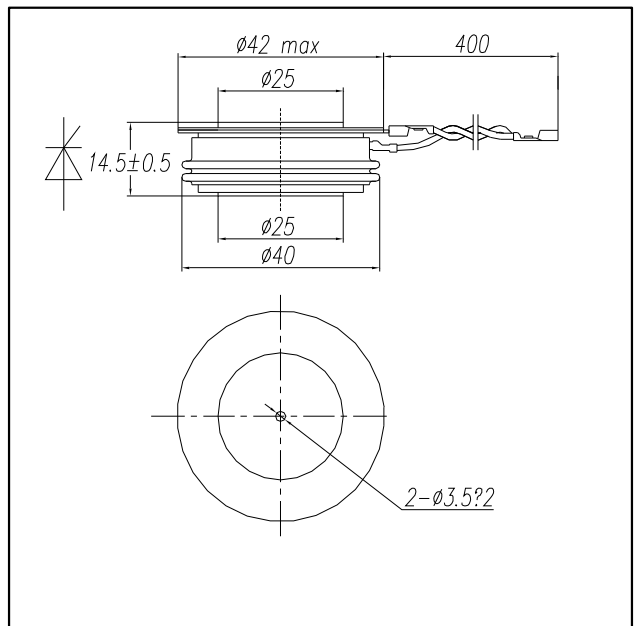
**Thermal & Mechanical Data**

| Symb.             | Parameter                              | Min | Type | Max   | Unit  |
|-------------------|----------------------------------------|-----|------|-------|-------|
| $R_{\text{thjc}}$ | Thermal Resistance<br>Junction to Case | -   | -    | 0.041 | K / W |
| $R_{\text{thcs}}$ | Thermal Resistance<br>Case to Heatsink | -   | -    | 0.01  | K / W |
| $T_{\text{vj}}$   | Junction Temperature                   | -40 | -    | 125   | °C    |
| $T_{\text{stg}}$  | Storage Temperature                    | -40 | -    | 140   | °C    |
| $F$               | Mounting Force                         | -   | 5    | -     | kN    |
| $m$               | Weight                                 | -   | 0.1  | -     | kg    |

**Voltage Ratings**

| Device Type | $V_{\text{DRM}}/V_{\text{RRM}}(\text{V})$ | Test Conditions                                                                                   |
|-------------|-------------------------------------------|---------------------------------------------------------------------------------------------------|
| T805 700-06 | 600                                       | $T_{\text{vj}} = 125\text{ °C}$                                                                   |
| T805 700-08 | 800                                       | $I_{\text{DRM}} = 30\text{ mA}$                                                                   |
| T805 700-10 | 1000                                      | $I_{\text{RRM}} = 30\text{ mA}$                                                                   |
| T805 700-12 | 1200                                      |                                                                                                   |
| T805 700-14 | 1400                                      | $V_{\text{DM}} = V_{\text{DRM}}, V_{\text{RM}} = V_{\text{RRM}}$<br>$t_{\text{p}} = 10\text{ ms}$ |
|             |                                           | $V_{\text{DSM}} = V_{\text{DRM}}$<br>$V_{\text{RSM}} = V_{\text{RRM}} + 100$                      |

**Outline**



**Current Ratings**

| Symb.               | Parameter                               | Test Conditions                                                        | Min | Type | Max  | Unit                      |
|---------------------|-----------------------------------------|------------------------------------------------------------------------|-----|------|------|---------------------------|
| $I_{\text{T(AV)}}$  | Mean On-State Current                   | Half Sine Wave, $T_{\text{C}} = 70\text{ °C}$                          | -   | -    | 700  | A                         |
| $I_{\text{T(RMS)}}$ | RMS On-State Current                    | $T_{\text{C}} = 70\text{ °C}$                                          | -   | -    | 1099 | A                         |
| $I_{\text{TSM}}$    | Surge (non-repetitive) On-State Current | 10ms, Half Sine Wave, $T_{\text{C}} = 125\text{ °C}, V_{\text{R}} = 0$ | -   | -    | 9.1  | kA                        |
| $I^2t$              | Limiting load integral                  | Sine Wave, 10ms                                                        | -   | -    | 41.4 | $10^4\text{ A}^2\text{s}$ |

**T805 700-06-14**
**Characteristics**

| Symb.     | Parameter               | Test Conditions                                                   | Min | Type | Max  | Unit       |
|-----------|-------------------------|-------------------------------------------------------------------|-----|------|------|------------|
| $V_{TM}$  | Peak on-state voltage   | $T_{vj} = 125\text{ }^{\circ}\text{C}$ , $I_{TM} = 1500\text{ A}$ | -   | -    | 1.75 | V          |
| $I_{DRM}$ | Forward leakage current | $T_{vj} = 125\text{ }^{\circ}\text{C}$ , $V_{DRM}$                | -   | -    | 30   | mA         |
| $I_{RRM}$ | Reverse leakage current | $T_{vj} = 125\text{ }^{\circ}\text{C}$ , $V_{RRM}$                | -   | -    | 30   | mA         |
| $V_{TO}$  | Threshold voltage       | $T_{vj} = 125\text{ }^{\circ}\text{C}$                            | -   | -    | 0.95 | V          |
| $r_T$     | Slope resistance        | $T_{vj} = 125\text{ }^{\circ}\text{C}$                            | -   | -    | 0.53 | m $\Omega$ |
| $I_H$     | Holding current         | $T_{vj} = 25\text{ }^{\circ}\text{C}$                             | -   | -    | 200  | mA         |
| $I_L$     | Latching current        | $T_{vj} = 25\text{ }^{\circ}\text{C}$                             | -   | -    | 1000 | mA         |

**Dynamic Parameters**

| Symb.    | Parameter                                  | Test Conditions                                                                                                                                                                              | Min  | Type | Max  | Unit       |
|----------|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|------|------------|
| $dv/dt$  | Critical rate of rise of off-state voltage | $T_{vj} = 125\text{ }^{\circ}\text{C}$ , $0.67V_{DRM}$                                                                                                                                       | 1000 | -    | -    | V/ $\mu$ s |
| $di/dt$  | Critical rate of rise of on-state current  | $T_{vj} = 125\text{ }^{\circ}\text{C}$ , $V_{DM} = 0.67V_{DRM}$ , $I_{TM} = 1000\text{ A}$<br>$I_{FG} = 2\text{ A}$ , $tr = 0.5\text{ }\mu\text{ s}$ , $f = 50\text{ Hz}$                    | -    | -    | 200  | A/ $\mu$ s |
| $t_d$    | Delay time                                 | $T_{vj} = 25\text{ }^{\circ}\text{C}$ , $V_{DM} = 0.5V_{DRM}$ , $I_{TM} = 1000\text{ A}$<br>$I_{FG} = 2\text{ A}$ , $tr = 0.5\text{ }\mu\text{ s}$                                           | -    | -    | 3.0  | $\mu$ s    |
| $t_q$    | Turn-off time                              | $T_{vj} = 125\text{ }^{\circ}\text{C}$ , $V_{DM} = 0.67V_{DRM}$ , $dv/dt = 20\text{ V}/\mu\text{ s}$ , $V_R = 200\text{ V}$<br>$di_T/dt = -10\text{ A}/\mu\text{ s}$ , $I_T = 1000\text{ A}$ | -    | -    | 150  | $\mu$ s    |
| $Q_{rr}$ | Recovery Charge                            | $T_{vj} = 125\text{ }^{\circ}\text{C}$ , $di_T/dt = -10\text{ A}/\mu\text{ s}$ , $V_R = 200\text{ V}$ ,<br>$I_T = 1000\text{ A}$                                                             | -    | -    | 1000 | $\mu$ C    |
| $I_{rr}$ | Reverse recovery current                   |                                                                                                                                                                                              | -    | -    | 95   | A          |

**Gate Parameters**

| Symb.       | Parameter                 | Test Conditions                                             | Min | Type | Max | Unit |
|-------------|---------------------------|-------------------------------------------------------------|-----|------|-----|------|
| $I_{GT}$    | Gate trigger current      | $T_{vj} = 25\text{ }^{\circ}\text{C}$                       | -   | -    | 300 | mA   |
| $V_{GT}$    | Gate trigger voltage      | $T_{vj} = 25\text{ }^{\circ}\text{C}$                       | -   | -    | 3.0 | V    |
| $I_{GD}$    | Gate non-trigger current  | $T_{vj} = 125\text{ }^{\circ}\text{C}$ , $V_D = 0.4V_{DRM}$ | 10  | -    | -   | mA   |
| $V_{GD}$    | Gate non-trigger voltage  | $T_{vj} = 125\text{ }^{\circ}\text{C}$ , $V_D = 0.4V_{DRM}$ | 0.3 | -    | -   | V    |
| $V_{FGM}$   | Peak forward gate voltage |                                                             | -   | -    | 12  | V    |
| $V_{RGM}$   | Peak reverse gate voltage |                                                             | -   | -    | 5   | V    |
| $I_{FGM}$   | Peak forward gate current |                                                             | -   | -    | 4   | A    |
| $P_{GM}$    | Gate power losses         |                                                             | -   | -    | 20  | W    |
| $P_{G(AV)}$ | Gate power losses (mean)  |                                                             | -   | -    | 4   | W    |

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Max. on-state characteristic model

$$V_T = A + B \cdot \ln(I_T) + C \cdot I_T + D \cdot \sqrt{I_T}$$

|   | 25 °C       | 125 °C      |
|---|-------------|-------------|
| A | 0.951705    | -0.206432   |
| B | -0.0182818  | 0.251078    |
| C | 0.000305714 | 0.000621248 |
| D | 0.0134125   | -0.0211045  |

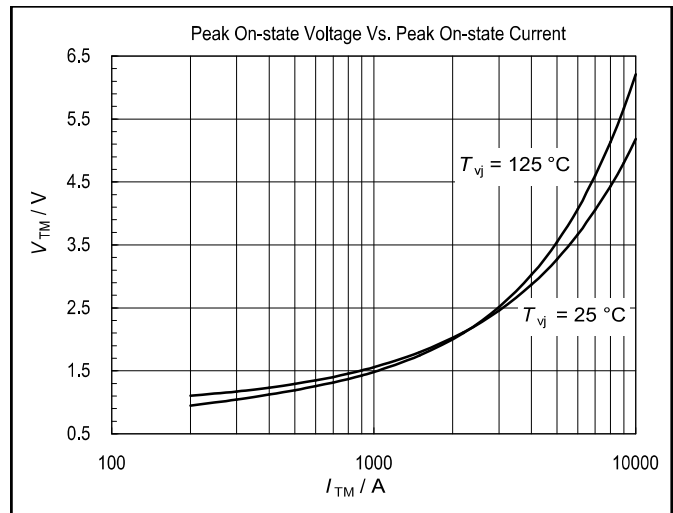


Fig1. Peak On-state Voltage Vs. Peak On-state Current

Transient thermal impedance function  
(double side cooled)

$$R_{thjc}(t) = \sum_{i=1}^n R_{thi} \cdot \left( 1 - e^{-\frac{t}{\tau_i}} \right)$$

| i                       | 1      | 2      | 3      | 4      |
|-------------------------|--------|--------|--------|--------|
| R <sub>thi</sub> (K/kW) | 16.5   | 14.192 | 7.4127 | 2.7598 |
| τ <sub>i</sub> (s)      | 0.5392 | 0.1941 | 0.022  | 0.0022 |

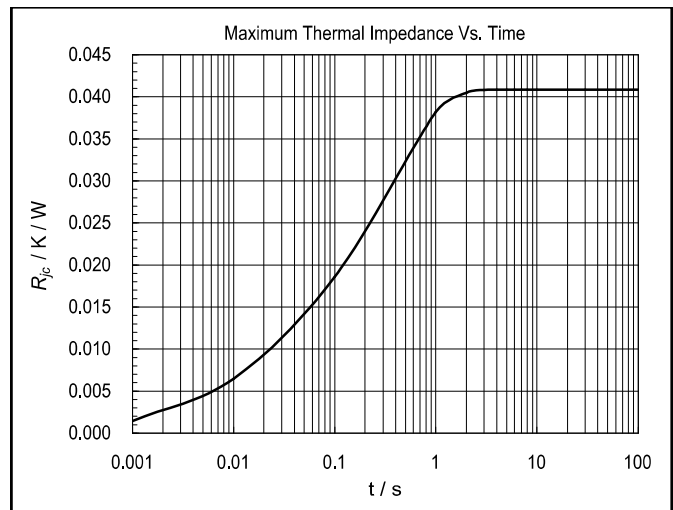


Fig2. Maximum Thermal Impedance Vs. Time

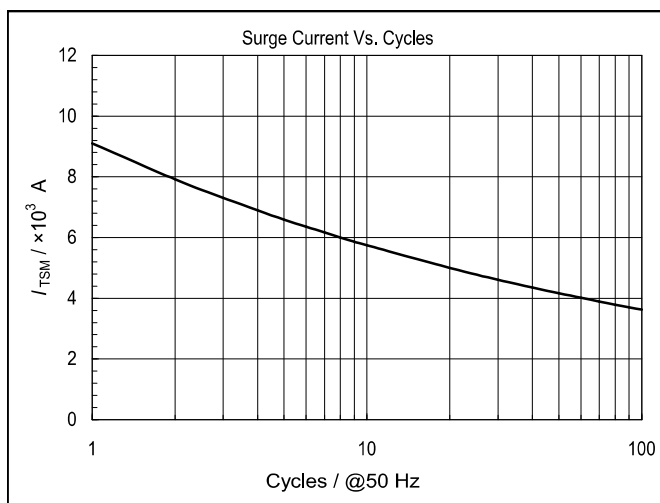


Fig3. Surge Current Vs. Cycles

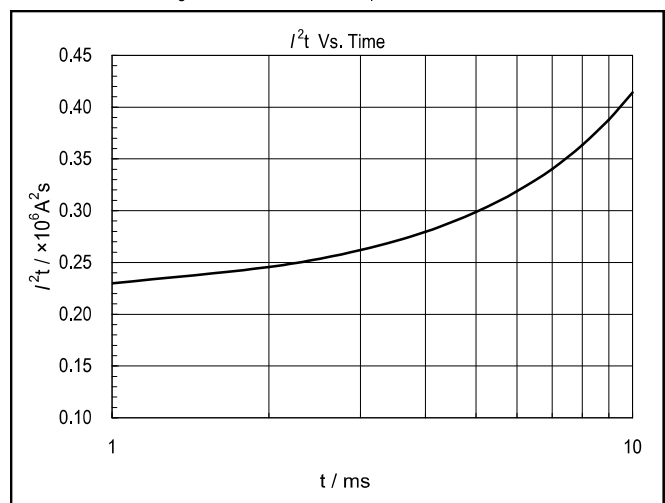


Fig4. I<sup>2</sup> t Vs. Time

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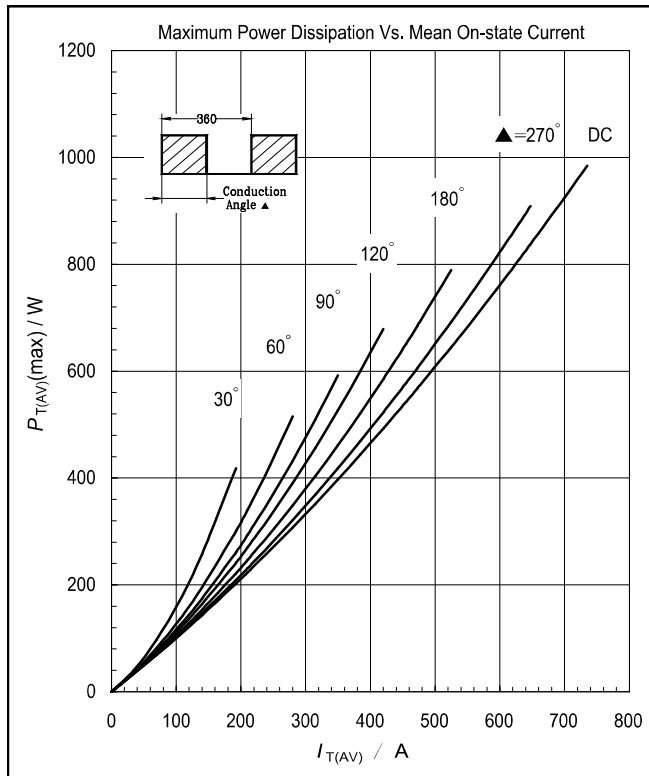


Fig5. Maximum Power Dissipation Vs. Mean On-state Current

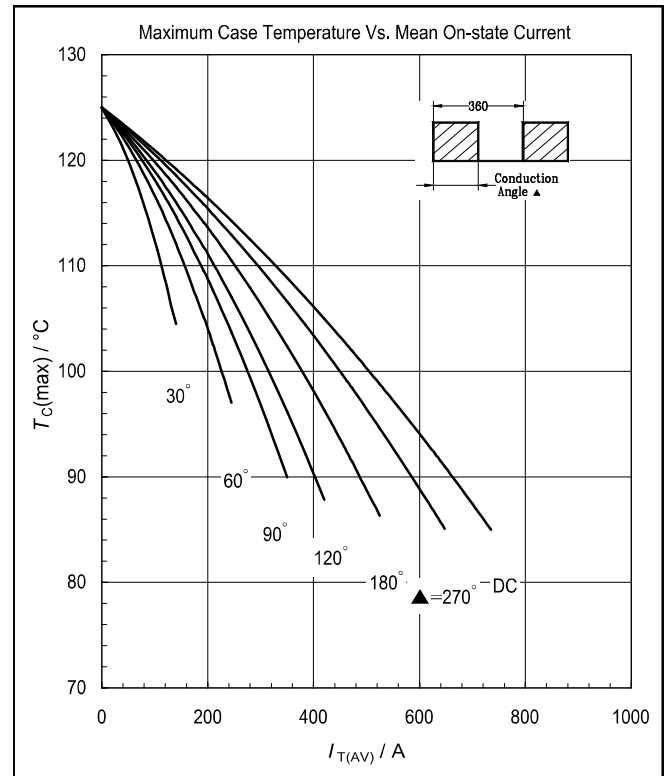


Fig6. Maximum Case Temperature Vs. Mean On-state Current

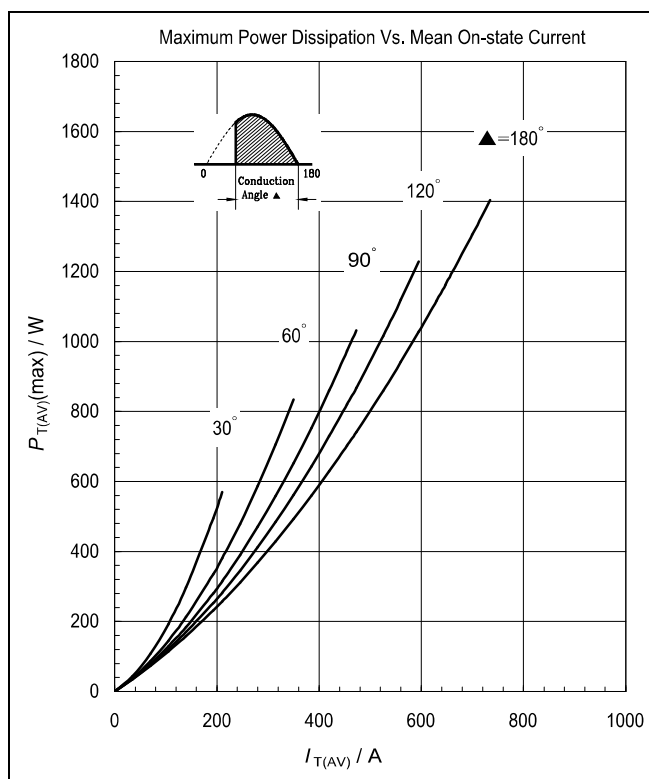


Fig7. Maximum Power Dissipation Vs. Mean On-state Current

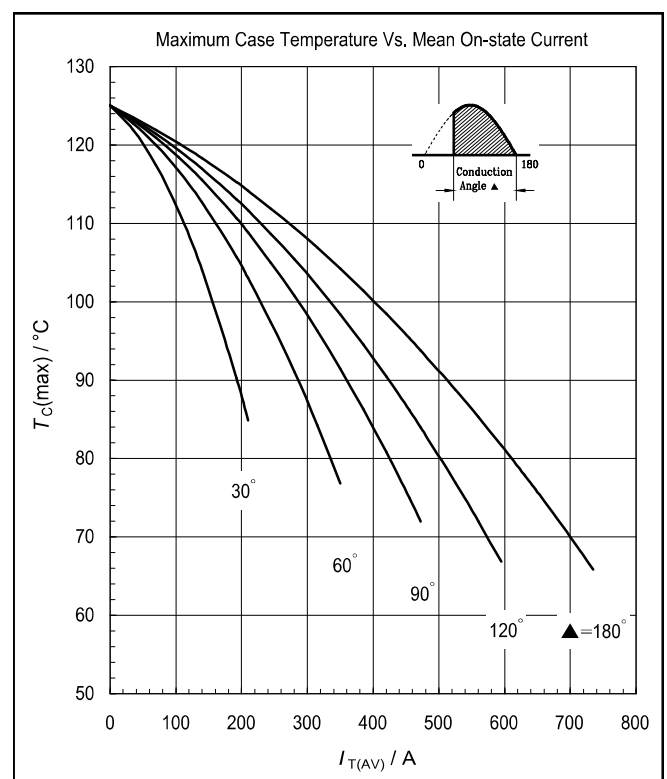


Fig8. Maximum Case Temperature Vs. Mean On-state Current

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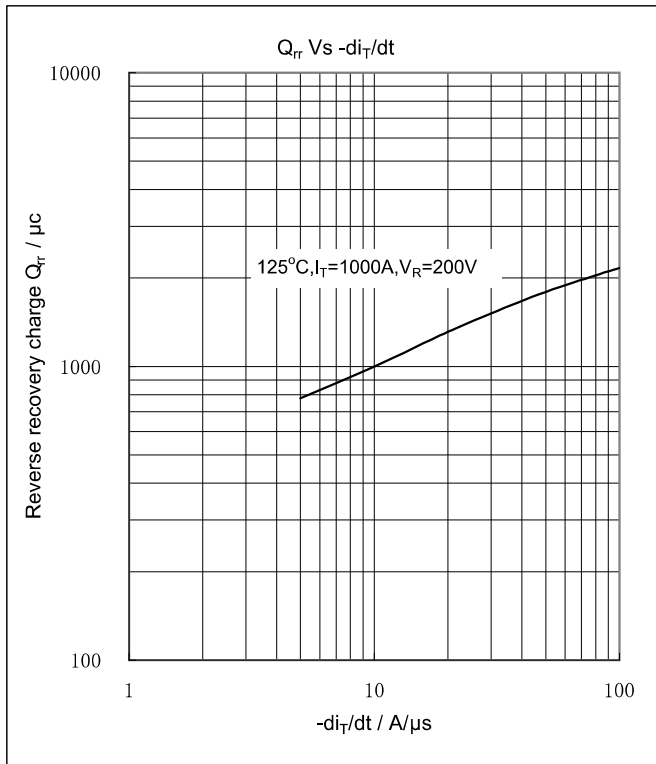


Fig9. Reverse recovery charge Vs.  $-di_T/dt$

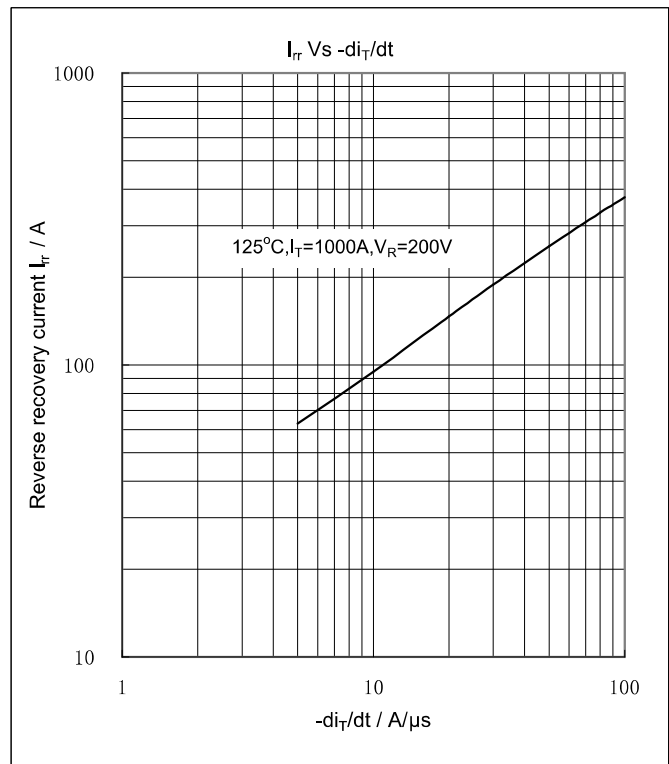


Fig10. Reverse recovery current Vs.  $-di_T/dt$

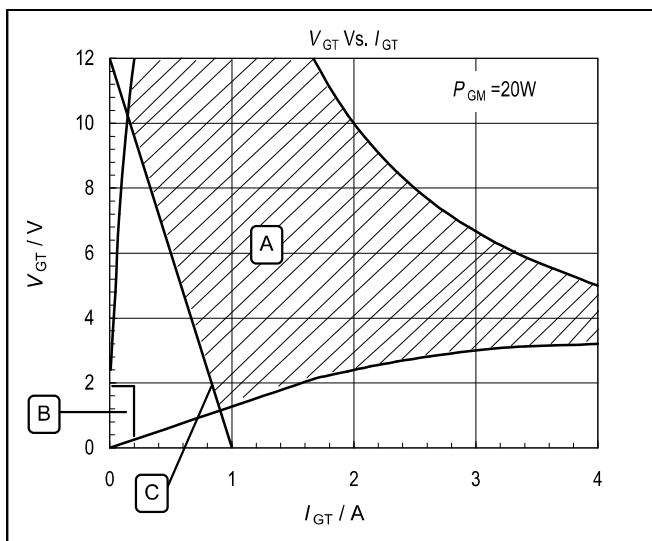


Fig11.  $V_{GT}$  Vs.  $I_{GT}$

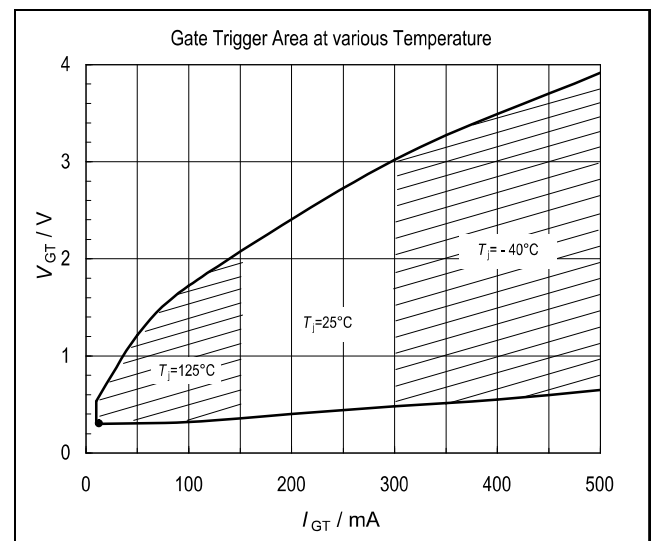


Fig12. Gate Trigger Area at various Temperature

A is Recommended Triggering Area.

B is Unreliable Triggering Area.

C is Recommended Gate Load Line.