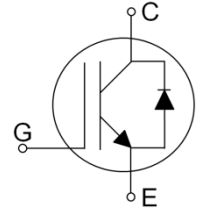


**Features:**

- 1200V NPT Trench Technology
- High Speed Switching
- Low Conduction Loss
- Positive Temperature Coefficient
- Easy parallel Operation
- RoHS compliant
- JEDEC Qualification

**Applications :**

Induction Heating, Soft switching application



| Device      | Package | Marking     | Remark |
|-------------|---------|-------------|--------|
| TGA25N120ND | TO-3P   | TGA25N120ND | RoHS   |

**Absolute Maximum Ratings**

| Parameter                                                                        |                                     | Symbol    | Value     | Unit               |
|----------------------------------------------------------------------------------|-------------------------------------|-----------|-----------|--------------------|
| Collector-Emitter Voltage                                                        |                                     | $V_{CES}$ | 1200      | V                  |
| Gate-Emitter Voltage                                                             |                                     | $V_{GES}$ | $\pm 20$  | V                  |
| Continuous Current                                                               | $T_C = 25\text{ }^{\circ}\text{C}$  | $I_C$     | 50        | A                  |
|                                                                                  | $T_C = 100\text{ }^{\circ}\text{C}$ |           | 25        | A                  |
| Pulsed Collector Current (Note 1)                                                |                                     | $I_{CM}$  | 75        | A                  |
| Diode Continuous Forward Current                                                 | $T_C = 100\text{ }^{\circ}\text{C}$ | $I_F$     | 25        | A                  |
| Diode Maximum Forward Current                                                    |                                     | $I_{FM}$  | 75        | A                  |
| Power Dissipation                                                                | $T_C = 25\text{ }^{\circ}\text{C}$  | $P_D$     | 312       | W                  |
|                                                                                  | $T_C = 100\text{ }^{\circ}\text{C}$ |           | 125       | W                  |
| Operating Junction Temperature                                                   |                                     | $T_J$     | -55 ~ 150 | $^{\circ}\text{C}$ |
| Storage Temperature Range                                                        |                                     | $T_{STG}$ | -55 ~ 150 | $^{\circ}\text{C}$ |
| Maximum lead temperature for soldering purposes,<br>1/8" from case for 5 seconds |                                     | $T_L$     | 300       | $^{\circ}\text{C}$ |

Notes :

(1) Repetitive rating : Pulse width limited by max junction temperature

**Thermal Characteristics**

| Parameter                                       | Symbol                  | Value | Unit                 |
|-------------------------------------------------|-------------------------|-------|----------------------|
| Maximum Thermal resistance, Junction-to-Case    | $R_{\theta JC}$ (IGBT)  | 0.4   | $^{\circ}\text{C/W}$ |
| Maximum Thermal resistance, Junction-to-Case    | $R_{\theta JC}$ (DIODE) | 2.2   | $^{\circ}\text{C/W}$ |
| Maximum Thermal resistance, Junction-to-Ambient | $R_{\theta JA}$         | 40    | $^{\circ}\text{C/W}$ |

**Electrical Characteristics of the IGBT  $T_C=25^{\circ}\text{C}$ , unless otherwise noted**

| Parameter                              | Symbol               | Test condition                                                                                                                       | Min  | Typ  | Max   | Units |
|----------------------------------------|----------------------|--------------------------------------------------------------------------------------------------------------------------------------|------|------|-------|-------|
| OFF                                    |                      |                                                                                                                                      |      |      |       |       |
| Collector – Emitter Breakdown Voltage  | BV <sub>CES</sub>    | V <sub>GE</sub> = 0V, I <sub>C</sub> =1mA                                                                                            | 1200 | --   | --    | V     |
| Zero Gate Voltage Collector Current    | I <sub>CES</sub>     | V <sub>CE</sub> = 1200V, V <sub>GE</sub> = 0V                                                                                        | --   | --   | 1     | mA    |
| Gate – Emitter Leakage Current         | I <sub>GES</sub>     | V <sub>CE</sub> = 0V, V <sub>GE</sub> =20V                                                                                           | --   | --   | ± 250 | nA    |
| ON                                     |                      |                                                                                                                                      |      |      |       |       |
| Gate – Emitter Threshold Voltage       | V <sub>GE(TH)</sub>  | V <sub>GE</sub> = V <sub>CE</sub> , I <sub>C</sub> =25mA                                                                             | 3.0  | 5.0  | 7.0   | V     |
| Collector – Emitter Saturation Voltage | V <sub>CE(SAT)</sub> | V <sub>GE</sub> = 15V, I <sub>C</sub> =25A, T <sub>J</sub> =25 °C                                                                    | --   | 1.9  | 2.5   | V     |
|                                        |                      | V <sub>GE</sub> = 15V, I <sub>C</sub> =25A, T <sub>J</sub> =125 °C                                                                   | --   | 2.2  | --    | V     |
| DYNAMIC                                |                      |                                                                                                                                      |      |      |       |       |
| Input Capacitance                      | C <sub>IES</sub>     | V <sub>CE</sub> = 30V,<br>V <sub>GE</sub> = 0V<br>f =1MHz                                                                            | --   | 4000 | --    | pF    |
| Output Capacitance                     | C <sub>OES</sub>     |                                                                                                                                      | --   | 105  | --    | pF    |
| Reverse Transfer Capacitance           | C <sub>RES</sub>     |                                                                                                                                      | --   | 72   | --    | pF    |
| SWITCHING                              |                      |                                                                                                                                      |      |      |       |       |
| Turn-On Delay Time                     | t <sub>d(on)</sub>   | V <sub>CC</sub> = 600V, I <sub>C</sub> =25A<br>R <sub>G</sub> = 10Ω, V <sub>GE</sub> = 15V<br>Inductive Load, T <sub>J</sub> =25 °C  | --   | 57   | --    | ns    |
| Rise Time                              | t <sub>r</sub>       |                                                                                                                                      | --   | 65   | --    | ns    |
| Turn-Off Delay Time                    | t <sub>d(off)</sub>  |                                                                                                                                      | --   | 240  | --    | ns    |
| Fall Time                              | t <sub>f</sub>       |                                                                                                                                      | --   | 86   | 160   | ns    |
| Turn-On Switching Loss                 | E <sub>ON</sub>      |                                                                                                                                      | --   | 4.15 | 6.22  | mJ    |
| Turn-Off Switching Loss                | E <sub>OFF</sub>     |                                                                                                                                      | --   | 0.87 | 1.31  | mJ    |
| Total Switching Loss                   | E <sub>TS</sub>      |                                                                                                                                      | --   | 5.02 | 7.53  | mJ    |
| Turn-On Delay Time                     | t <sub>d(on)</sub>   | V <sub>CC</sub> = 600V, I <sub>C</sub> =25A<br>R <sub>G</sub> = 10Ω, V <sub>GE</sub> = 15V<br>Inductive Load, T <sub>J</sub> =125 °C | --   | 41   | --    | ns    |
| Rise Time                              | t <sub>r</sub>       |                                                                                                                                      | --   | 57   | --    | ns    |
| Turn-Off Delay Time                    | t <sub>d(off)</sub>  |                                                                                                                                      | --   | 265  | --    | ns    |
| Fall Time                              | t <sub>f</sub>       |                                                                                                                                      | --   | 168  | --    | ns    |
| Turn-On Switching Loss                 | E <sub>ON</sub>      |                                                                                                                                      | --   | 4.46 | 6.69  | mJ    |
| Turn-Off Switching Loss                | E <sub>OFF</sub>     |                                                                                                                                      | --   | 1.74 | 2.61  | mJ    |
| Total Switching Loss                   | E <sub>TS</sub>      |                                                                                                                                      | --   | 6.2  | 9.30  | mJ    |
| Total Gate Charge                      | Q <sub>g</sub>       | V <sub>CC</sub> = 600V, I <sub>C</sub> =25A<br>V <sub>GE</sub> = 15V                                                                 | --   | 170  | 255   | nC    |
| Gate-Emitter Charge                    | Q <sub>ge</sub>      |                                                                                                                                      | --   | 27   | 41    | nC    |
| Gate-Collector Charge                  | Q <sub>gc</sub>      |                                                                                                                                      | --   | 60   | 90    | nC    |

**Electrical Characteristics of the DIODE**  $T_c=25^{\circ}\text{C}$ , unless otherwise noted

| Parameter                | Symbol   | Test condition                                 |                                   | Min | Typ  | Max  | Units |
|--------------------------|----------|------------------------------------------------|-----------------------------------|-----|------|------|-------|
| Diode Forward Voltage    | $V_{FM}$ | $I_F = 25\text{ A}$                            | $T_J=25\text{ }^{\circ}\text{C}$  | --  | 2.0  | 2.5  | V     |
|                          |          |                                                | $T_J=125\text{ }^{\circ}\text{C}$ | --  | 2.18 | --   |       |
| Reverse Recovery Time    | $t_{rr}$ | $I_F = 25\text{ A,}$<br>$dI/dt=200\text{A/us}$ | $T_J=25\text{ }^{\circ}\text{C}$  | --  | 300  | 480  | ns    |
|                          |          |                                                | $T_J=125\text{ }^{\circ}\text{C}$ | --  | 360  | --   |       |
| Reverse Recovery Current | $I_{rr}$ |                                                | $T_J=25\text{ }^{\circ}\text{C}$  | --  | 27   | 41   | A     |
|                          |          |                                                | $T_J=125\text{ }^{\circ}\text{C}$ | --  | 31   | --   |       |
| Reverse Recovery Charge  | $Q_{rr}$ |                                                | $T_J=25\text{ }^{\circ}\text{C}$  | --  | 4000 | 6000 | nC    |
|                          |          |                                                | $T_J=125\text{ }^{\circ}\text{C}$ | --  | 5580 | --   |       |

# IGBT Performance Characteristics

Fig. 1 Output characteristics

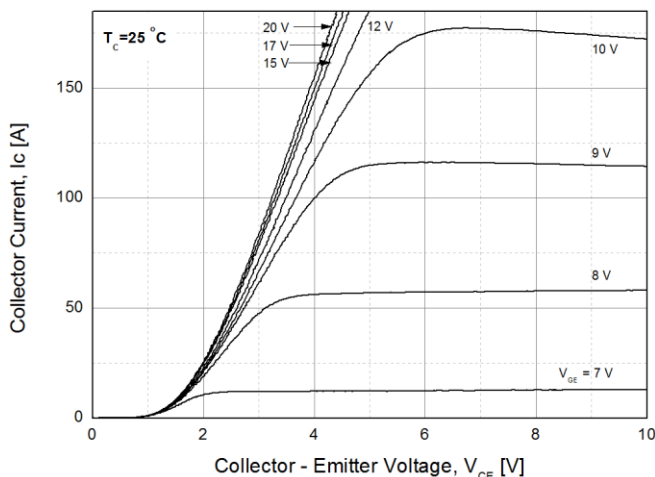


Fig. 2 Saturation voltage characteristics

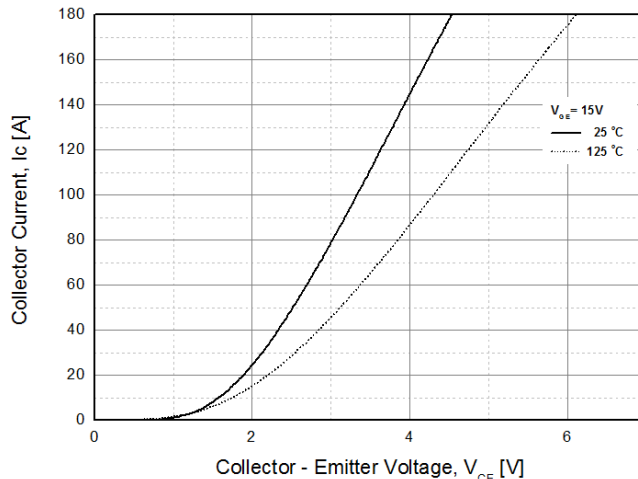


Fig. 3 Saturation voltage vs. collector current

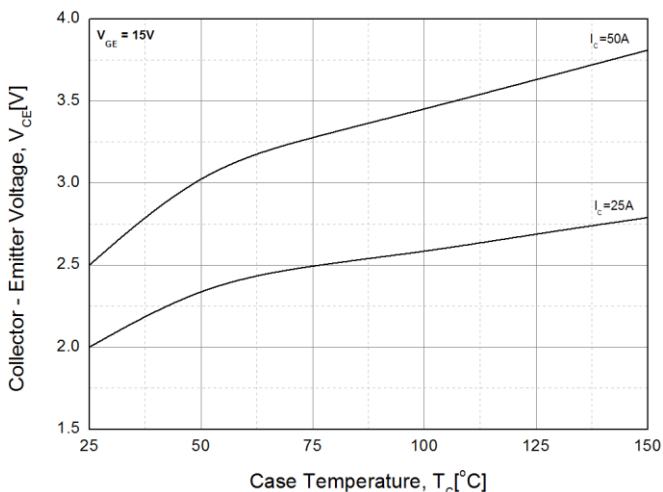


Fig. 4 Saturation voltage vs. gate bias

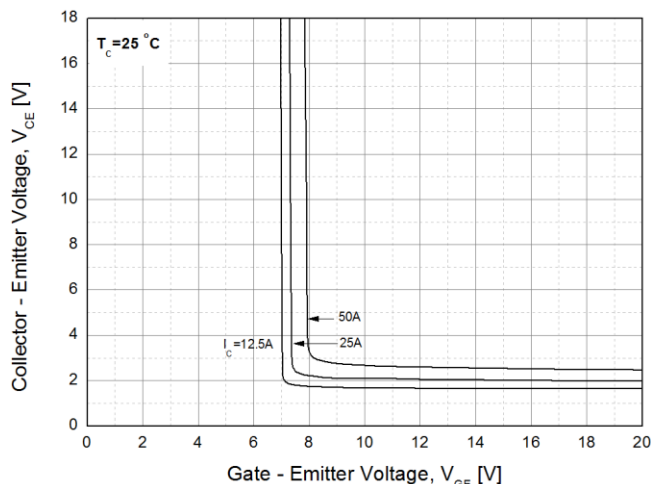


Fig. 5 Saturation voltage vs. gate bias

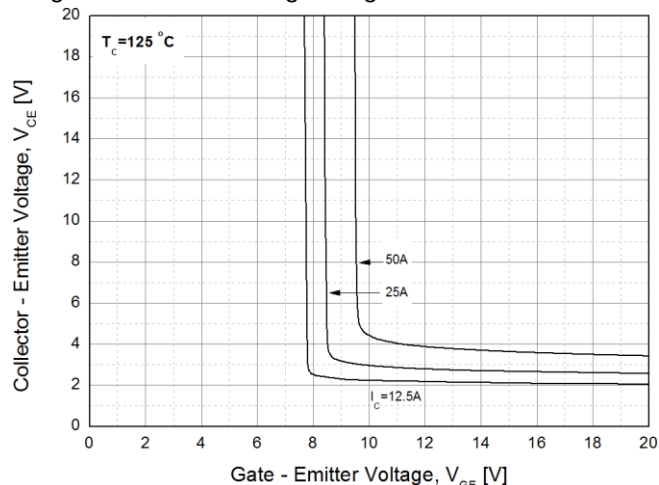
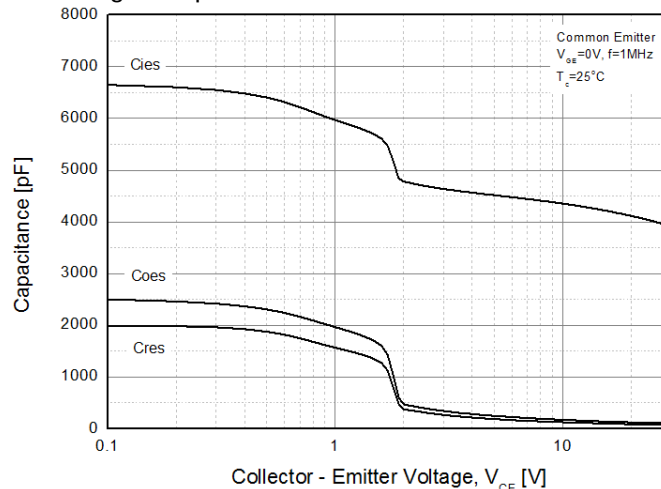


Fig. 6 Capacitance characteristics



# IGBT Performance Characteristics

Fig. 7 Turn on time vs. gate resistance

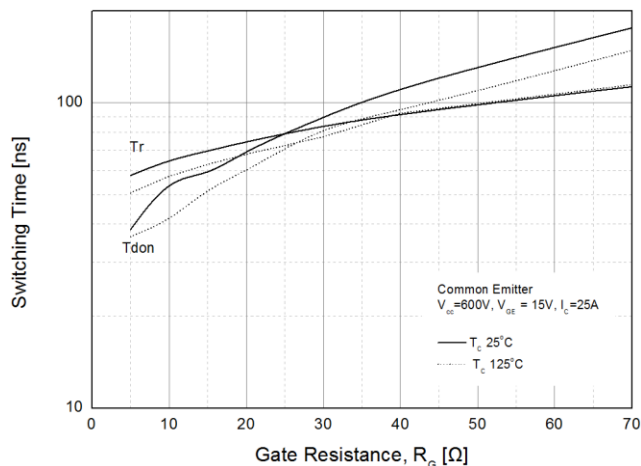


Fig. 8 Turn off time vs. gate resistance

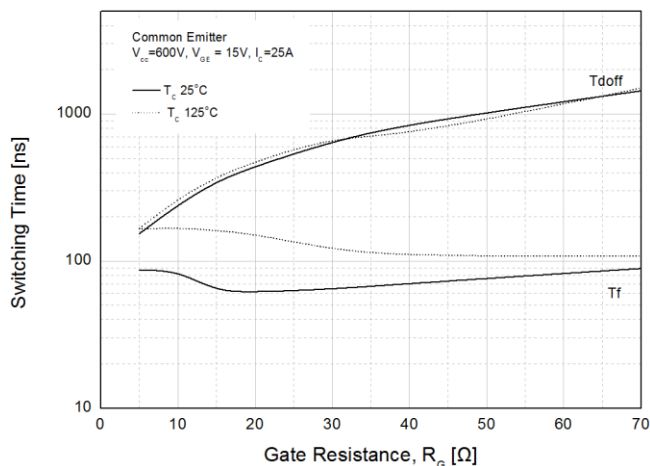


Fig. 9 Switching loss vs. gate resistance

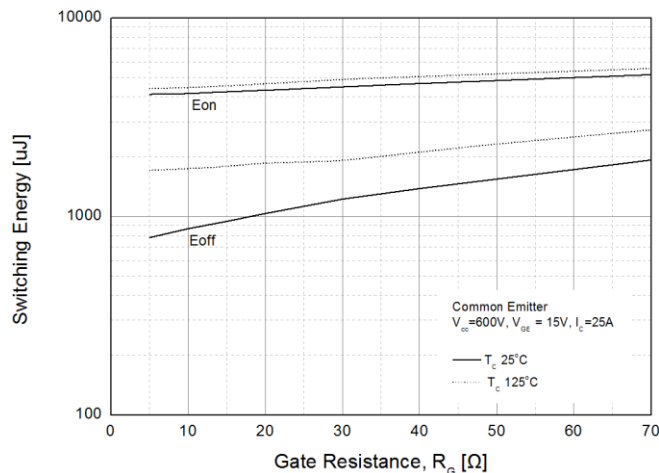


Fig. 10 Turn on time vs. collector current

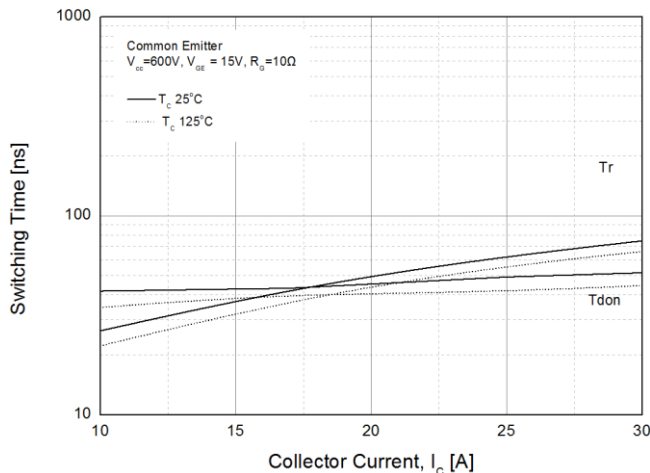


Fig. 11 Turn off time vs. collector current

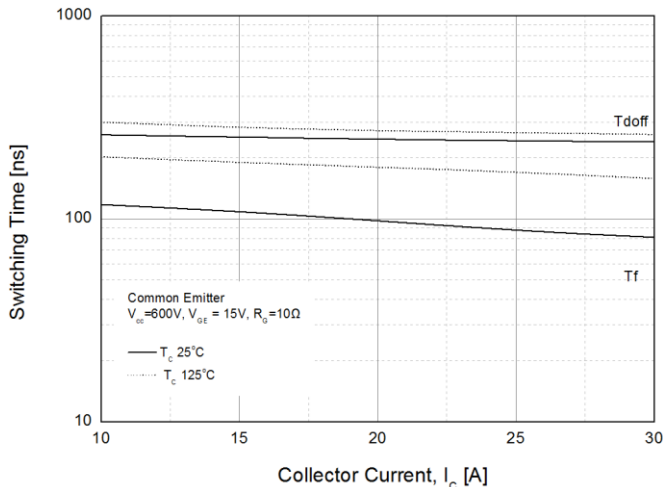
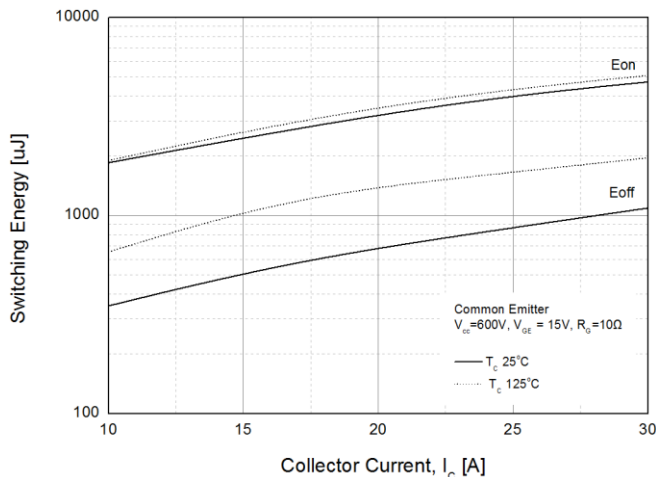


Fig. 12 Switching loss vs. collector current



# IGBT Performance Characteristics

Fig. 13 Gate charge characteristics

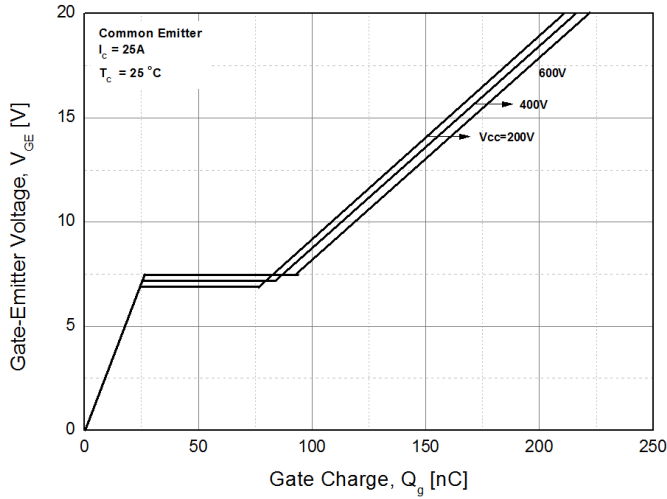


Fig. 14 SOA

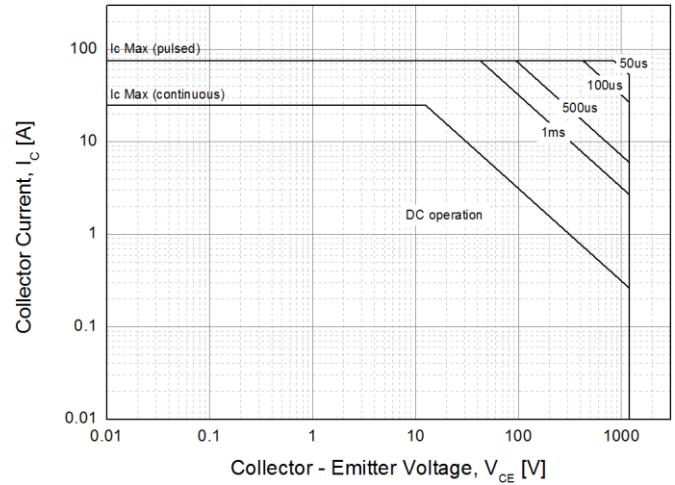


Fig. 15 RBSOA

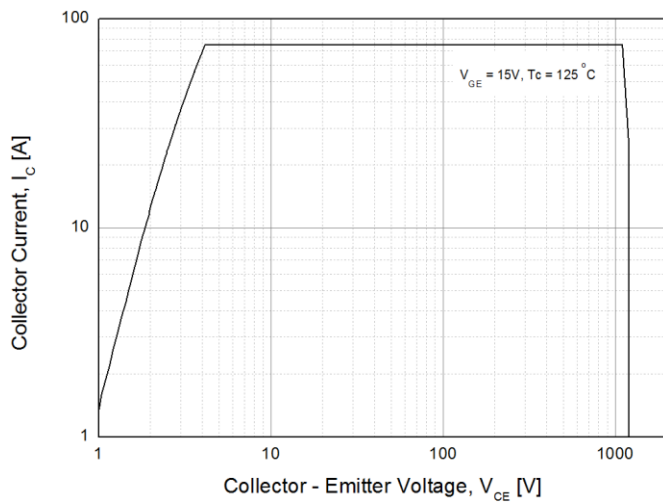
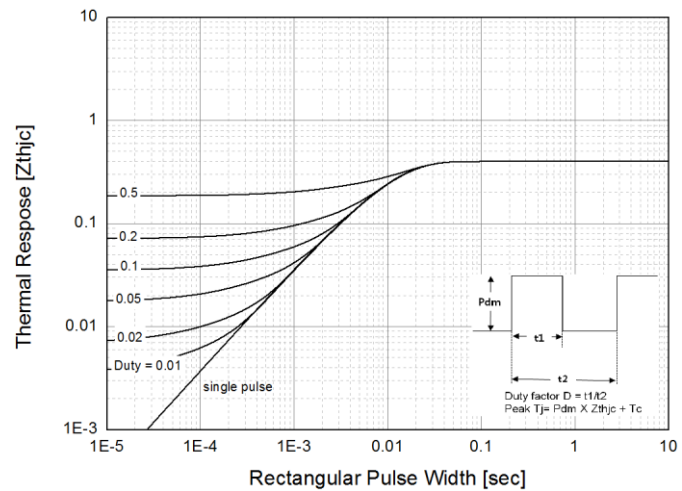


Fig. 16 Transient thermal impedance



# DIODE Performance Characteristics

Fig. 17 Conduction characteristics

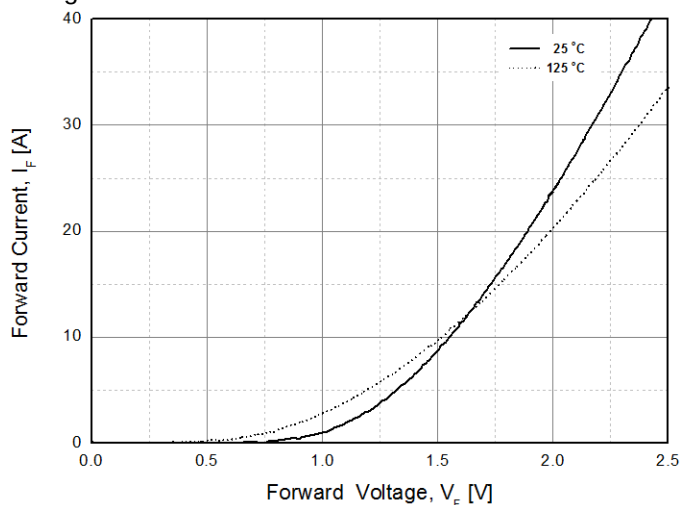


Fig. 18 Reverse recovery current vs. forward current

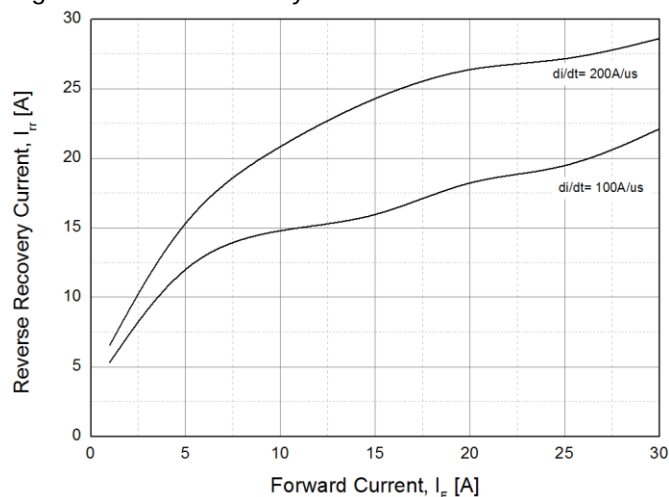


Fig. 19 Stored recovery charge vs. forward current

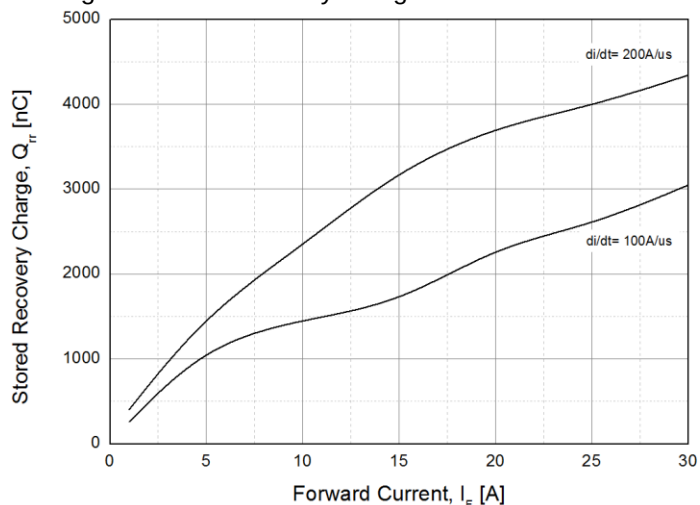


Fig. 20 Reverse recovery time vs. forward current

