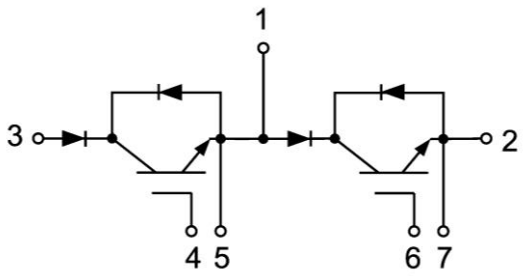
# GT100TD120T1VH

## IGBT Module

Preliminary Data

### Features：

- Field Stop Trench Gate IGBT
- Short Circuit Rated>10μs
- Low Saturation Voltage
- Low Switching Loss
- 100% RBSOA Tested（2×Ic）
- Low Stray Inductance
- Lead Free, Compliant with RoHS Requirement




### Applications：

- Welding Machine、Cutting Machine
- Plating Power Supply、Induction Heating
- SMPS、UPS

### Maximum Rated Values of IGBT($T_C$=25℃ unless otherwise specified)

| | | | | |
|---|---|---|---|---|
| $V_{CES}$ | Collector-Emitter Blocking Voltage | | 1200 | V |
| $V_{GES}$ | Gate-Emitter Voltage | | ±20 | V |
| $I_C$ | Continuous Collector Current | $T_C$ = 100℃ | 100 | A |
| | | $T_C$ = 25℃ | 200 | A |
| $I_{CM}$ | Repetitive Peak Collector Current | $T_J$ = 175℃ | 200 | A |
| $t_{SC}$ | Short Circuit Withstand Time | | >10 | μs |
| $P_D$ | Maximum Power Dissipation per IGBT | $T_C$ = 25℃<br>$T_{Jmax}$=175℃ | 714 | W |

## **Electrical Characteristics of IGBT** ($T_C$=25℃ unless otherwise specified)

Static Characteristics

| Symbol | Description | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $V_{GE(th)}$ | Gate-Emitter Threshold Voltage | $I_C$=1mA, $V_{CE}$=$V_{GE}$ | | 5.0 | 5.5 | 6.6 | V |
| $V_{CE(sat)}$ | Collector-Emitter Saturation Voltage | $I_C$=100A, $V_{GE}$ =15V | $T_J$=25℃ | | 1.70 | 2.00 | V |
| | | | $T_J$=125℃ | | 1.90 | | V |
| | | | $T_J$=150℃ | | 1.90 | | V |
| $I_{CES}$ | Collector-Emitter Leakage Current | $V_{GE}$=0V, $V_{CE}$=$V_{CES}$, $T_J$=25℃ | | | | 1 | mA |
| $I_{GES}$ | Gate-Emitter Leakage Current | $V_{GE}$= ±20V, $V_{CE}$=0V, $T_J$=25℃ | | | | 200 | nA |
| $C_{ies}$ | Input Capacitance | $V_{CE}$=25V, $V_{GE}$=0V , f=1MHz | | | 8.03 | | nF |
| $C_{oes}$ | Output Capacitance | | | | 1.22 | | nF |
| $C_{res}$ | Reveres Transfer Capacitance | | | | 0.59 | | nF |

Switching Characteristics

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $t_{d(on)}$ | Turn-on Delay Time | $V_{CC}$=600V,$I_C$=100A, $R_{Gon}$=1Ω,$V_{GE}$=±15V, Inductive Load | $T_J$=25℃ | | 228 | | ns |
| | | | $T_J$=125℃ | | 250 | | |
| | | | $T_J$=150℃ | | 254 | | |
| $t_r$ | Rise Time | | $T_J$=25℃ | | 63 | | ns |
| | | | $T_J$=125℃ | | 67 | | |
| | | | $T_J$=150℃ | | 69 | | |
| $t_{d(off)}$ | Turn-off Delay Time | $V_{CC}$=600V,$I_C$=100A, $R_{Goff}$=1Ω,$V_{GE}$=±15V, Inductive Load | $T_J$=25℃ | | 269 | | ns |
| | | | $T_J$=125℃ | | 279 | | |
| | | | $T_J$=150℃ | | 284 | | |
| $t_f$ | Fall Time | | $T_J$=25℃ | | 184 | | ns |
| | | | $T_J$=125℃ | | 291 | | |
| | | | $T_J$=150℃ | | 317 | | |
| $E_{on}$ | Turn-on Switching Loss | $V_{CC}$=600V,$I_C$=100A, $R_{Gon}$=1Ω,$V_{GE}$=±15V, di/dt=1387A/μs($T_J$=150℃), Inductive Load | $T_J$=25℃ | | 3.1 | | mJ |
| | | | $T_J$=125℃ | | 4.3 | | |
| | | | $T_J$=150℃ | | 4.8 | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $E_{off}$ | Turn-off Switching Loss | $V_{CC}$=600V,$I_C$=100A, $R_{Goff}$=1Ω,$V_{GE}$=±15V, du/dt=4448V/μs($T_J$=150℃), Inductive Load | $T_J$=25℃ | | 5.28 | | mJ |
| | | | $T_J$=125℃ | | 8.33 | | |
| | | | $T_J$=150℃ | | 9.30 | | |
| $Q_g$ | Total Gate Charge | $V_{GE}$=+15V…-15V | $T_J$=25℃ | | 745 | | nC |
| $R_{g\ internal}$ | Internal Gate Resistance | | $T_J$=25℃ | | 7.50 | | Ω |
| RBSOA | $I_C$=200A,$V_{CC}$=1050V,Vp=1200V, $R_{Goff}$=1Ω, $V_{GE}$=+15V to 0V, $T_J$=150°C | | | Trapezoid | | | |
| SC data | Vcc=600V, tp=10us, Vge=+/-15V, $R_{Gon}$ =1ohm, $R_{Goff}$ =1ohm,Tj=25℃ | | | | 575 | | A |
| $R_{\theta JC}$ | IGBT Thermal Resistance: Junction-To-Case | | | | | 0.21 | ℃/W |

## Diode, Clamp

**Maximum Rated Values** ($T_C$ = 25℃ unless otherwise specified)

| | | | |
|---|---|---|---|
| $V_{RRM}$ | Repetitive Peak Reverse Voltage | 1200 | V |
| $I_F$ | Diode Continuous Forward Current | 100 | A |
| $I_{FM}$ | Peak FWD Current Repetitive | 200 | A |

**Electrical Characteristics of FWD** ($T_C$=25℃ unless otherwise specified)

| Symbol | Description | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $V_{FM}$ | Forward Voltage | $I_F$=100A | $T_J$=25℃ | | 1.70 | | V |
| | | | $T_J$=125℃ | | 1.80 | | |
| | | | $T_J$=150℃ | | 1.80 | | |
| $t_{rr}$ | Reverse Recovery Time | $I_F$=100A, -diF/dt =1911A/μs($T_J$=150℃), $V_R$=600V, $V_{GE}$=-15V | $T_J$=25℃ | | 260 | | ns |
| | | | $T_J$=125℃ | | 396 | | |
| | | | $T_J$=150℃ | | 454 | | |
| $I_{rr}$ | Peak Reverse Recovery Current | | $T_J$=25℃ | | 92 | | A |
| | | | $T_J$=125℃ | | 104 | | |
| | | | $T_J$=150℃ | | 105 | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $Q_{rr}$ | Reverse Recovery Charge | $I_F$=100A, -diF/dt =1911A/μs($T_J$=150℃), $V_R$=600V, $V_{GE}$=-15V | $T_J$=25℃ | | 10.2 | | μC |
| | | | $T_J$=125℃ | | 16.8 | | |
| | | | $T_J$=150℃ | | 19.2 | | |
| $E_{rec}$ | Reverse Recovery Energy | $I_F$=100A, -diF/dt =1911A/μs($T_J$=150℃), $V_R$=600V, $V_{GE}$=-15V | $T_J$=25℃ | | 4.83 | | mJ |
| | | | $T_J$=125℃ | | 7.92 | | |
| | | | $T_J$=150℃ | | 9.13 | | |
| $R_{\theta JC}$ | Diode Thermal Resistance: Junction-To-Case | | | | | 0.34 | ℃/W |

## Diode, Inverter

**Maximum Rated Values** ($T_C$ = 25℃ unless otherwise specified)

| | | | |
|---|---|---|---|
| $V_{RRM}$ | Repetitive Peak Reverse Voltage | 1200 | V |
| $I_F$ | Diode Continuous Forward Current | 75 | A |
| $I_{FM}$ | Diode Maximum Forward Current | 150 | A |

**Electrical Characteristics of Diode** ($T_C$=25℃ unless otherwise specified)

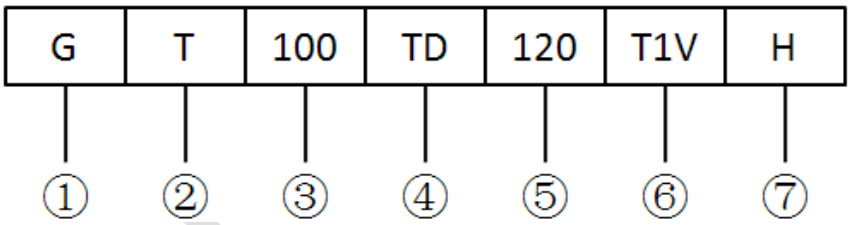
| Symbol | Description | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $V_{FM}$ | Forward Voltage | $I_F$ =75A | $T_J$=25℃ | | 2.10 | | V |
| | | | $T_J$=125℃ | | 2.20 | | |
| $t_{rr}$ | Reverse Recovery Time | $I_F$=75A, -diF/dt =1738A/μs($T_J$=125℃), $V_R$ = 600V, $V_{GE}$ = -15V | $T_J$=25℃ | | 204 | | ns |
| | | | $T_J$=125℃ | | 388 | | |
| $I_{rr}$ | Peak Reverse Recovery Current | | $T_J$=25℃ | | 47 | | A |
| | | | $T_J$=125℃ | | 64 | | |
| $Q_{rr}$ | Reverse Recovery Charge | | $T_J$=25℃ | | 4.56 | | μC |
| | | | $T_J$=125℃ | | 9.42 | | |
| $E_{rec}$ | Reverse Recovery Energy | | $T_J$=25℃ | | 1.67 | | mJ |
| | | | $T_J$=125℃ | | 3.60 | | |
| $R_{\theta JC}$ | Diode Thermal Resistance: Junction-To-Case | | | | | 0.425 | ℃/W |

## Module

| Symbol | Description | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $V_{iso}$ | Isolation Voltage (All Terminals Shorted) | f = 50Hz, 1minute | 2500 | | | V |
| $T_J$ | Maximum Junction Temperature | | | | 175 | ℃ |
| $T_{JOP}$ | Maximum Operating Junction Temperature Range | | -40 | | +150 | ℃ |
| $T_{stg}$ | Storage Temperature | | -40 | | +125 | ℃ |
| CTI | Comparative Tracking Index | | 200 | | | |
| $R_{\theta CS}$ | Case-To-Sink Thermally (Conductive Grease Applied) | | | | 0.07 | ℃/W |
| T | Power Terminals Screw:M5 | | 3.0 | | 5.0 | N·m |
| T | Mounting Screw:M6 | | 4.0 | | 6.0 | N·m |
| G | Weight | | | 165 | | g |

## Ordering Information Table

Device code




① - IGBT Module
② - Field Stop Trench Gate IGBT
③ - Rated Current (100=100A)
④ - Circuit Configuration (Half Bridge、Clamp Diode on Collector)
⑤ - Rated Voltage (120=1200V)
⑥ - Package Type
⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)

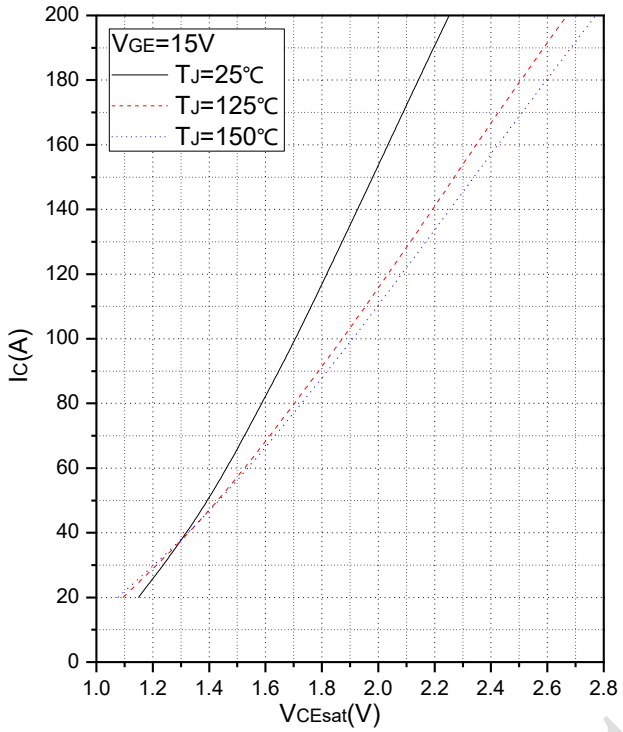



Fig.1 Typical Saturation Voltage Characteristics

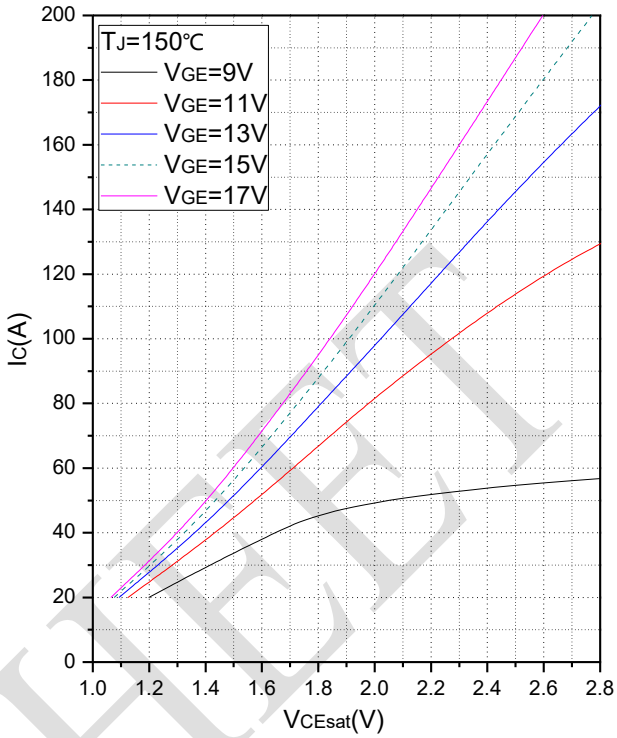



Fig.2 Typical Output Characteristics

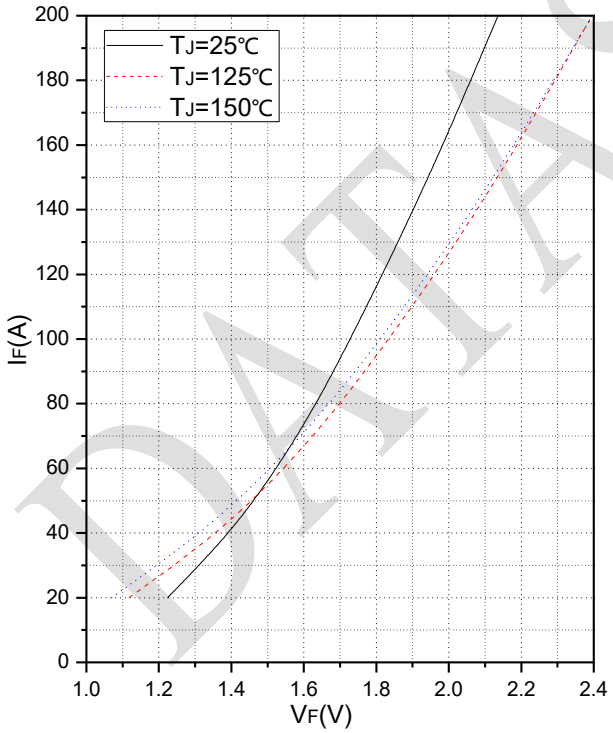



Fig.3 Forward Characteristics of FWD-Inverter

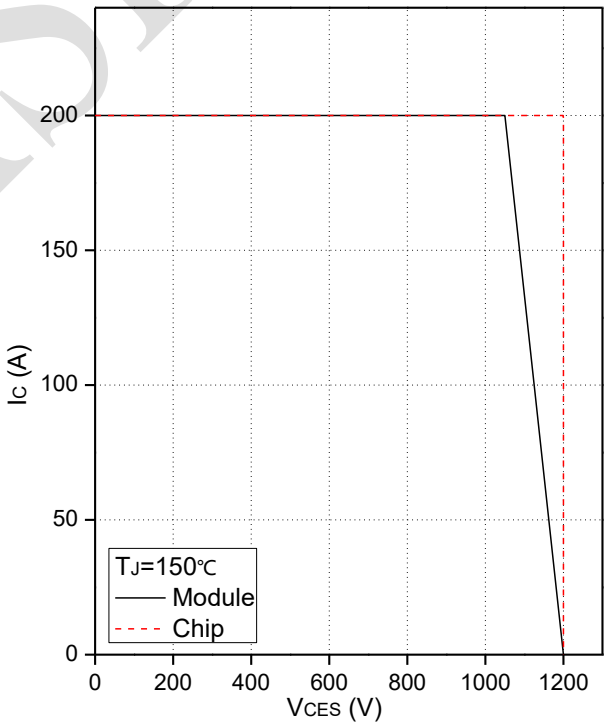



Fig.4 Reverse Bias Safe Operation Area (RBSOA)

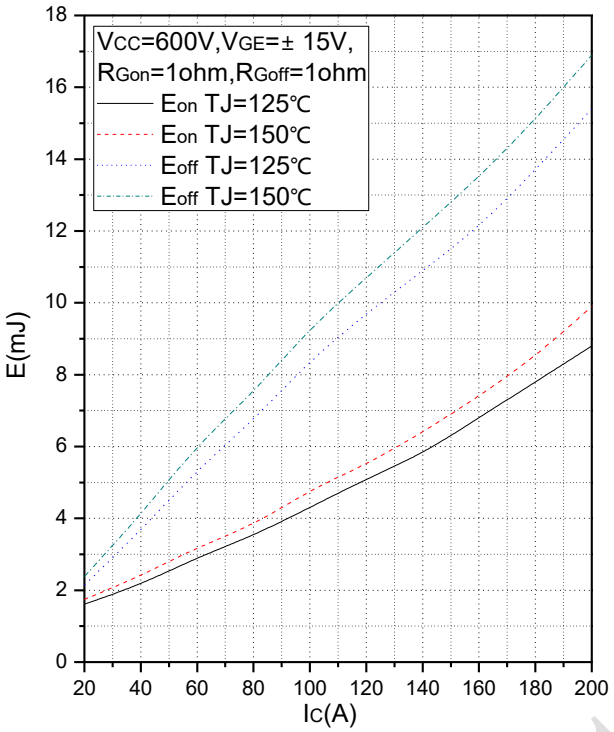



Fig.5 Typical Switching Loss vs. Collector Current

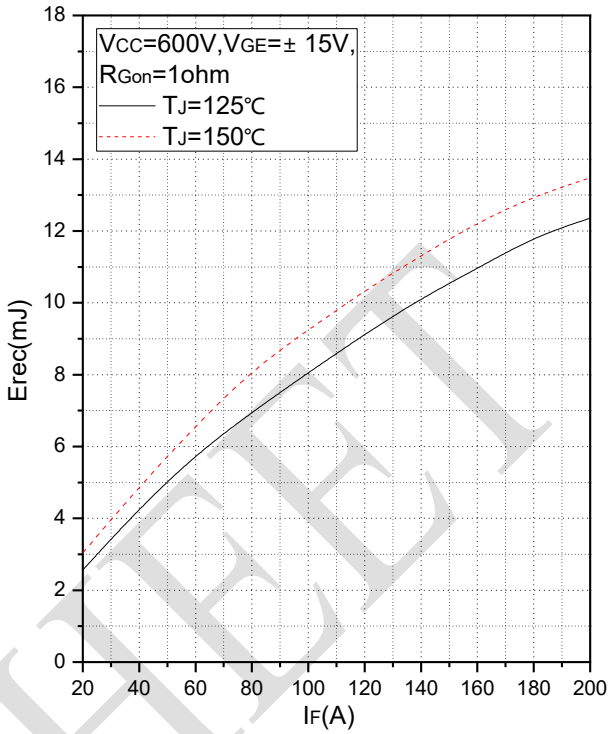



Fig.6 Typical Switching Loss vs. Forward Current

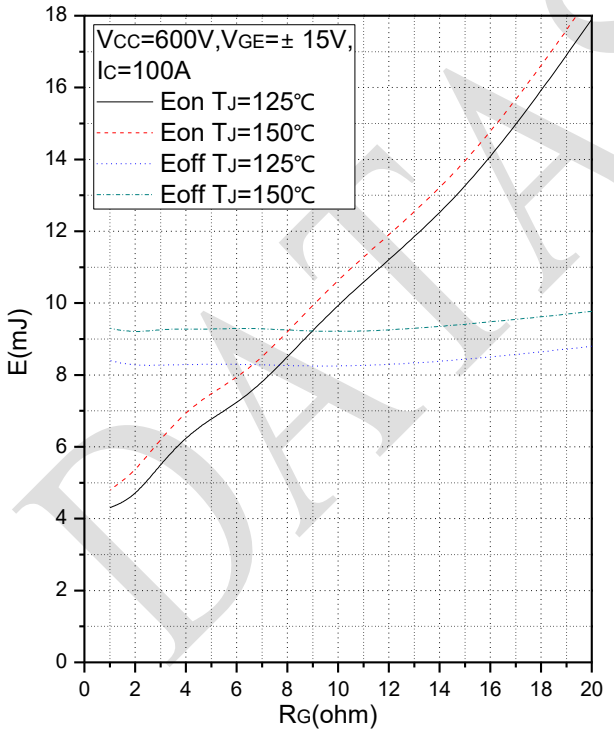



Fig.7 Typical Switching Loss vs. Gate Resistance

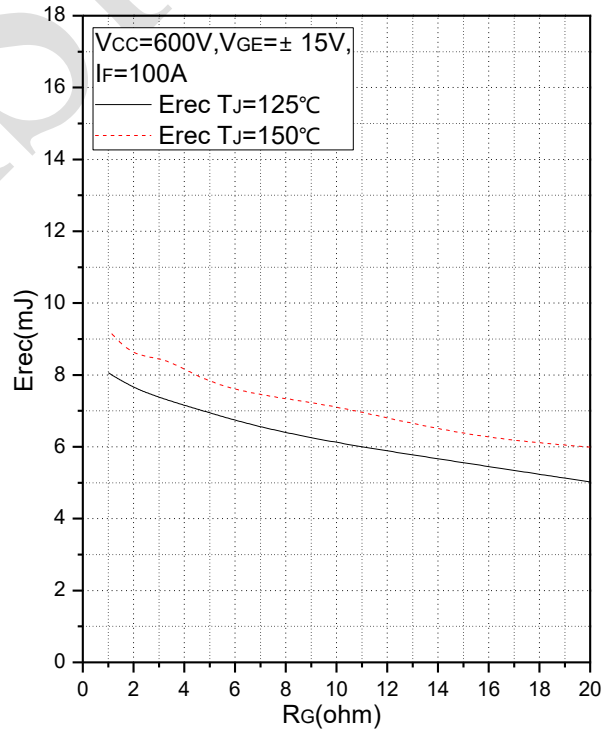



Fig.8 Typical Switching Loss vs. Gate Resistance

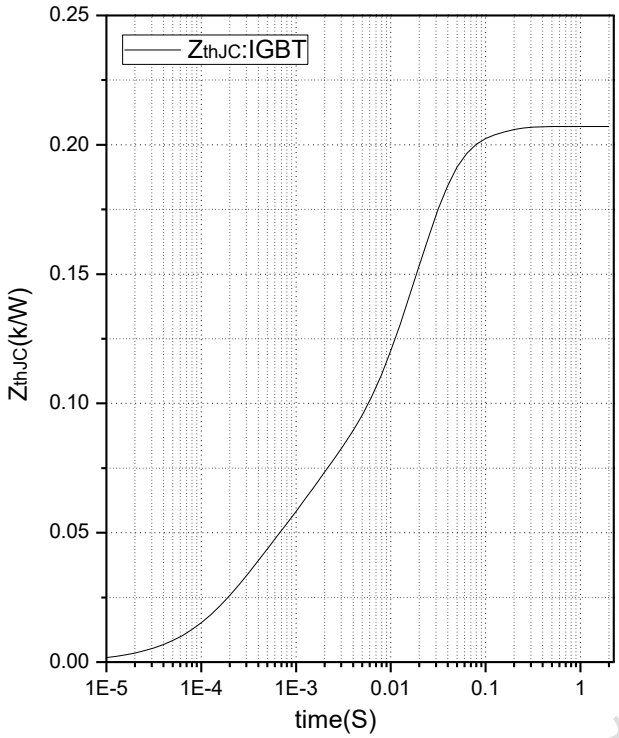



Fig.9 Transient Thermal Impedance

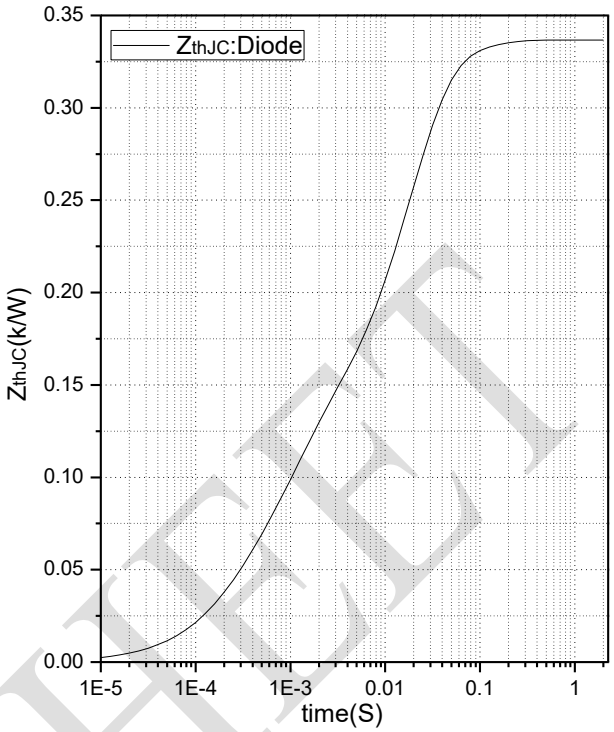



Fig.10 Transient Thermal Impedance-Inverter Diode

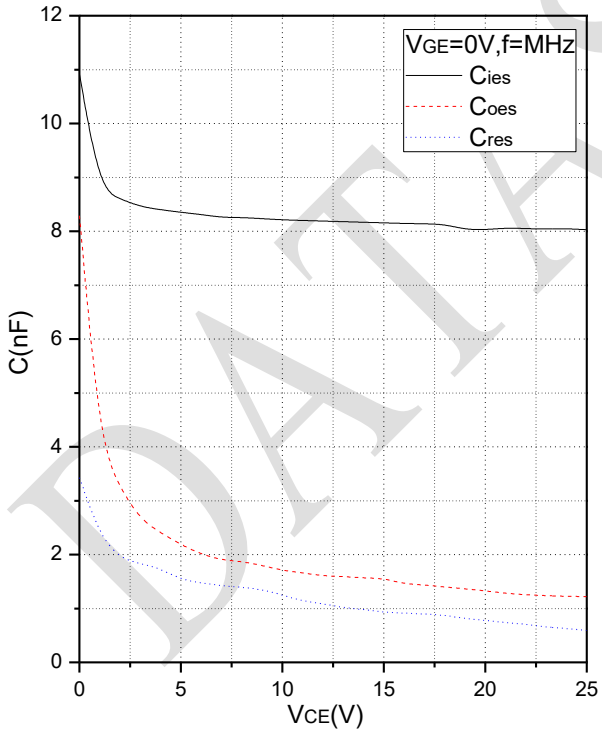



Fig.11 Capacitance Characteristics

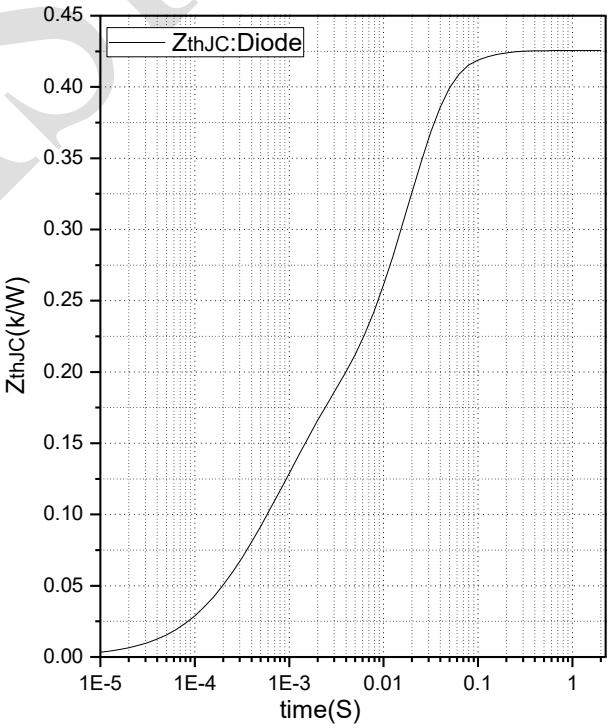
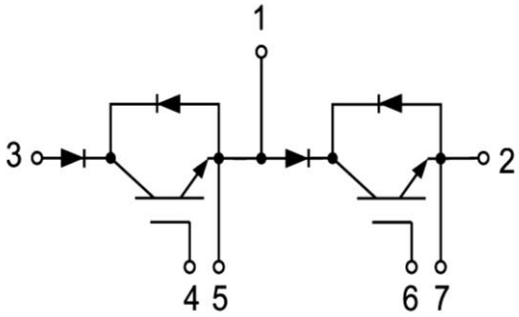
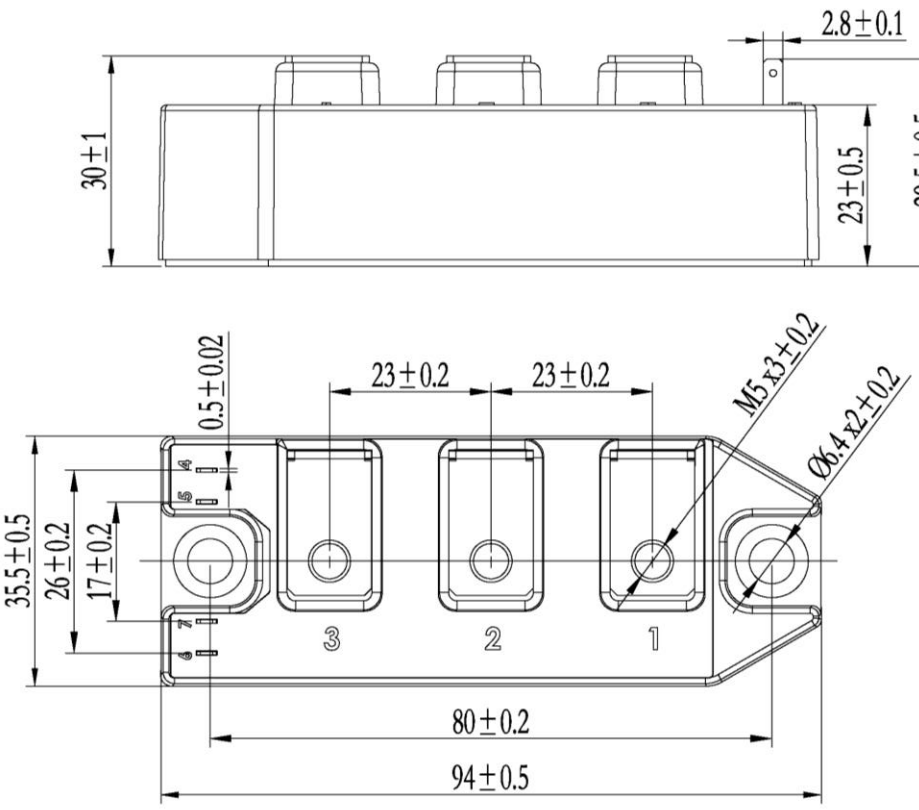



Fig.12 Transient Thermal Impedance-Clamp Diode

**Internal Circuit**




**Package Outline (Unit: mm):**



| Date | Revision | Notes |
|---|---|---|
| 12/23/2021 | 01 | Initial Release |
| | | |

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