



GF300HF120T2VH GF300CC120T2VH GF300CE120T2VH IGBT Module

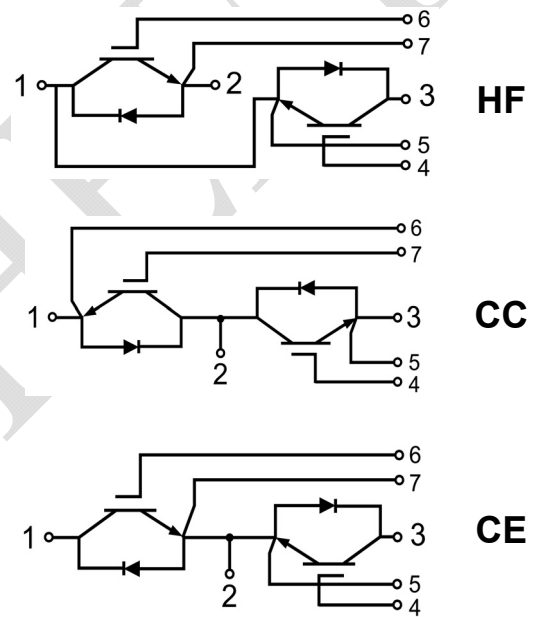
Features:

- Non Punch Through (NPT) Technology
- Short Circuit Rated >10 μ s
- Low Saturation Voltage
- Low Switching Loss
- 100% RBSOA Tested (2 \times I_c)
- Low Stray Inductance
- Lead Free, Compliant with RoHS Requirement

Applications:

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

Circuit Diagram



IGBT, Inverter

Maximum Rated Values of IGBT ($T_C=25^\circ\text{C}$ unless otherwise specified)

| | | | | |
|-----------|------------------------------------|--|----------|---------------|
| V_{CES} | Collector-Emitter Blocking Voltage | | 1200 | V |
| V_{GES} | Gate-Emitter Voltage | | ± 20 | V |
| I_C | Continuous Collector Current | $T_C=80^\circ\text{C}$ | 300 | A |
| | | $T_C=25^\circ\text{C}$ | 600 | A |
| I_{CM} | Repetitive Peak Collector Current | $T_J=150^\circ\text{C}$ | 600 | A |
| t_{SC} | Short Circuit Withstand Time | | >10 | μs |
| P_D | Maximum Power Dissipation per leg | $T_C=25^\circ\text{C}$ $T_{Jmax}=150^\circ\text{C}$ | 2600 | W |



Electrical Characteristics of IGBT ($T_C=25^\circ\text{C}$ unless otherwise specified)

Static Characteristics

| Symbol | Description | Conditions | Min. | Typ. | Max. | Units |
|---------------|--------------------------------------|--|-------------------------|------|------|-------|
| $V_{GE(th)}$ | Gate-Emitter Threshold Voltage | $I_C=12\text{mA}$, $V_{CE}=V_{GE}$ | 5.0 | 5.8 | 6.5 | V |
| $V_{CE(sat)}$ | Collector-Emitter Saturation Voltage | $I_C=300\text{A}$, $V_{GE}=15\text{V}$ | $T_J=25^\circ\text{C}$ | 3.30 | 3.65 | V |
| | | | $T_J=125^\circ\text{C}$ | 4.15 | | V |
| I_{CES} | Collector-Emitter Leakage Current | $V_{GE}=0\text{V}$, $V_{CE}=V_{CES}$, $T_J=25^\circ\text{C}$ | | | 1 | mA |
| I_{GES} | Gate-Emitter Leakage Current | $V_{GE}=\pm 20\text{V}$, $V_{CE}=0\text{V}$, $T_J=25^\circ\text{C}$ | | | 300 | nA |
| C_{ies} | Input Capacitance | $V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$, $f=100\text{kHz}$ | | 23.5 | | nF |
| C_{oes} | Output Capacitance | | | 1.96 | | nF |
| C_{res} | Reverse Transfer Capacitance | | | 1.04 | | nF |

Switching Characteristics

| Symbol | Description | Conditions | Min. | Typ. | Max. | Units |
|-------------------|--|--|-------------------------|-----------|-------|---------------------------|
| $t_{d(on)}$ | Turn-on Delay Time | $V_{CC}=600\text{V}$, $I_C=300\text{A}$, $R_{Gon}=4.7\Omega$, $V_{GE}=\pm 15\text{V}$, Inductive Load | $T_J=25^\circ\text{C}$ | | 896 | ns |
| | | | $T_J=125^\circ\text{C}$ | | 910 | |
| t_r | Rise Time | | $T_J=25^\circ\text{C}$ | | 182 | ns |
| | | | $T_J=125^\circ\text{C}$ | | 177 | |
| $t_{d(off)}$ | Turn-off Delay Time | $V_{CC}=600\text{V}$, $I_C=300\text{A}$, $R_{Goff}=4.7\Omega$, $V_{GE}=\pm 15\text{V}$, Inductive Load | $T_J=25^\circ\text{C}$ | | 835 | ns |
| | | | $T_J=125^\circ\text{C}$ | | 871 | |
| t_f | Fall Time | | $T_J=25^\circ\text{C}$ | | 92 | ns |
| | | | $T_J=125^\circ\text{C}$ | | 118 | |
| E_{on} | Turn-on Switching Loss | $V_{CC}=600\text{V}$, $I_C=300\text{A}$, $R_{Gon}=4.7\Omega$, $V_{GE}=\pm 15\text{V}$, $di/dt=1450\text{A}/\mu\text{s}$ ($T_J=125^\circ\text{C}$), Inductive Load | $T_J=25^\circ\text{C}$ | | 23.4 | mJ |
| | | | $T_J=125^\circ\text{C}$ | | 30.9 | |
| E_{off} | Turn-off Switching Loss | | $T_J=25^\circ\text{C}$ | | 23.0 | mJ |
| | | | $T_J=125^\circ\text{C}$ | | 26.8 | |
| Q_g | Total Gate Charge | $V_{GE}=+15\text{V} \dots -15\text{V}$ | $T_J=25^\circ\text{C}$ | | 2.96 | μC |
| $R_{g\ internal}$ | Internal Gate Resistor | | $T_J=25^\circ\text{C}$ | | 2.3 | Ω |
| RBSOA | $I_C=600\text{A}$, $V_{CC}=1050\text{V}$, $V_p=1200\text{V}$, $R_G=4.7\Omega$, $V_{GE}=+15\text{V}$ to 0V , $T_J=125^\circ\text{C}$ | | | Trapezoid | | |
| I_{SC} | $V_{CC}=600\text{V}$, $t_p=10\mu\text{s}$, $V_{GE}=\pm 15\text{V}$, $R_G=6.8\Omega$, $T_J=125^\circ\text{C}$ | | | | 2660 | A |
| $R_{\theta JC}$ | IGBT Thermal Resistance: Junction-to-Case | | | | 0.048 | $^\circ\text{C}/\text{W}$ |



Diode, Inverter
Maximum Rated Values ($T_C=25^{\circ}\text{C}$ unless otherwise specified)

| | | | |
|-----------|----------------------------------|------|---|
| V_{RRM} | Repetitive Peak Reverse Voltage | 1200 | V |
| I_F | Diode Continuous Forward Current | 300 | A |
| I_{FM} | Diode Maximum Forward Current | 600 | A |

Electrical Characteristics of Diode ($T_C=25^{\circ}\text{C}$ unless otherwise specified)

| Symbol | Description | Conditions | | Min. | Typ. | Max. | Units | |
|-----------------|--|---|---------------------------|------|------|------|---------------|-----------------------------|
| V_{FM} | Forward Voltage | $I_F=300\text{A}$, $V_{GE}=15\text{V}$ | $T_J=25^{\circ}\text{C}$ | | 2.85 | 3.15 | V | |
| | | | $T_J=125^{\circ}\text{C}$ | | 3.05 | | | |
| t_{rr} | Reverse Recovery Time | $I_F=300\text{A}$, $di/dt=1850\text{A}/\mu\text{s}$ ($T_J=125^{\circ}\text{C}$), $V_{rr}=600\text{V}$, $V_{GE}=-15\text{V}$ | $T_J=25^{\circ}\text{C}$ | | 156 | | ns | |
| | | | $T_J=125^{\circ}\text{C}$ | | 288 | | | |
| I_{rr} | Peak Reverse Recovery Current | | $T_J=25^{\circ}\text{C}$ | | 106 | | A | |
| | | | $T_J=125^{\circ}\text{C}$ | | 150 | | | |
| Q_{rr} | Reverse Recovery Charge | | $T_J=25^{\circ}\text{C}$ | | 10.0 | | μC | |
| | | | $T_J=125^{\circ}\text{C}$ | | 21.7 | | | |
| E_{rec} | Reverse Recovery Energy | | $T_J=25^{\circ}\text{C}$ | | 3.9 | | mJ | |
| | | | $T_J=125^{\circ}\text{C}$ | | 8.0 | | | |
| $R_{\theta JC}$ | Diode Thermal Resistance: Junction-to-Case | | | | | | 0.129 | $^{\circ}\text{C}/\text{W}$ |



Module

| Symbol | Description | Min. | Typ. | Max. | Units |
|------------------|--|------------------|------|------|-------|
| V _{iso} | Isolation Voltage (All Terminals Shorted) | f =50Hz, 1minute | 2500 | | V |
| L _{sCE} | Stray Inductance Module | | 20 | | nH |
| T _J | Maximum Junction Temperature | | | 150 | °C |
| T _{JOP} | Maximum Operating Junction Temperature Range | -40 | | +125 | °C |
| T _{stg} | Storage Temperature | -40 | | +125 | °C |
| CTI | Comparative Tracking Index | 200 | | | |
| R _{θCS} | Case-to-Sink Thermally (Conductive Grease Applied) | | | 0.03 | °C/W |
| T | Power Terminals Screw:M6 | 3.0 | | 5.0 | N·m |
| T | Mounting Screw:M6 | 4.0 | | 6.0 | N·m |
| G | Weight | | 300 | | g |

Ordering Information Table

| | | | | | | | |
|-------------|---|---|-----|----|-----|-----|---|
| Device code | G | F | 300 | HF | 120 | T2V | H |
| | ① | ② | ③ | ④ | ⑤ | ⑥ | ⑦ |

- ① - IGBT Module
- ② - NPT, Fast IGBT
- ③ - Rated Current (300=300A)
- ④ - Circuit Configuration: HF(Half Bridge)
CC(Common Collector)
CE(Common Emitter)
- ⑤ - Rated Voltage (120=1200V)
- ⑥ - Package Type
- ⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)

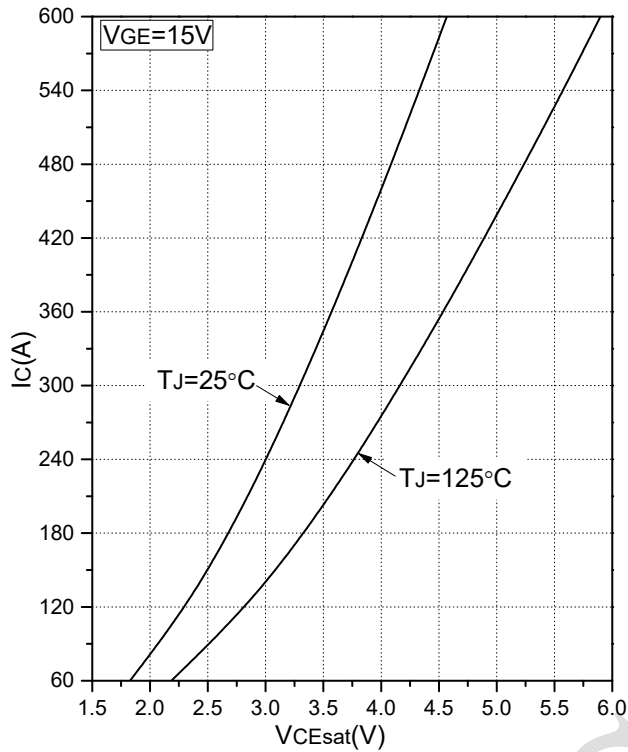


Fig.1 Typical Saturation Voltage Characteristics

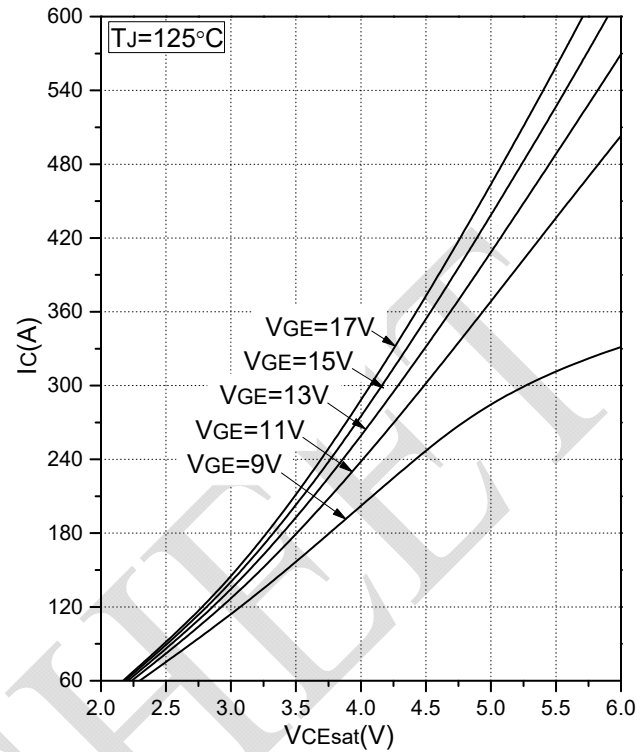


Fig.2 Typical Output Characteristics

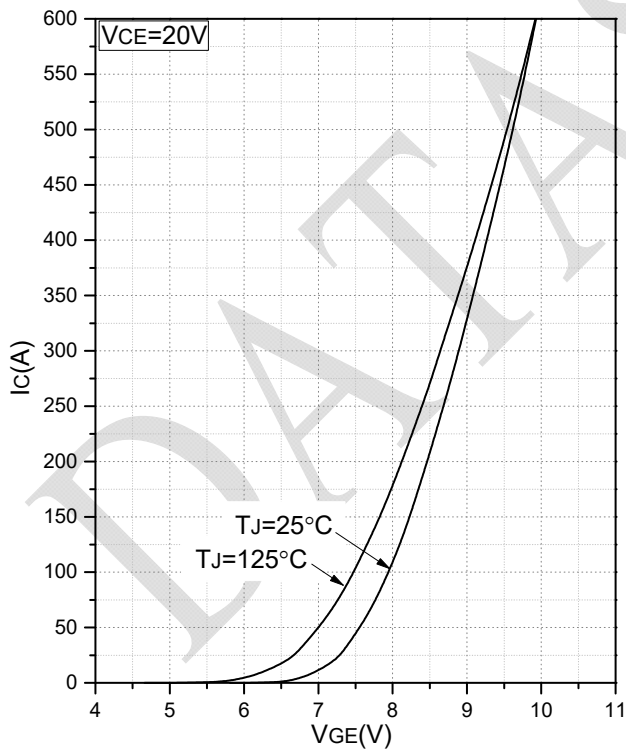


Fig.3 Transfer Characteristic

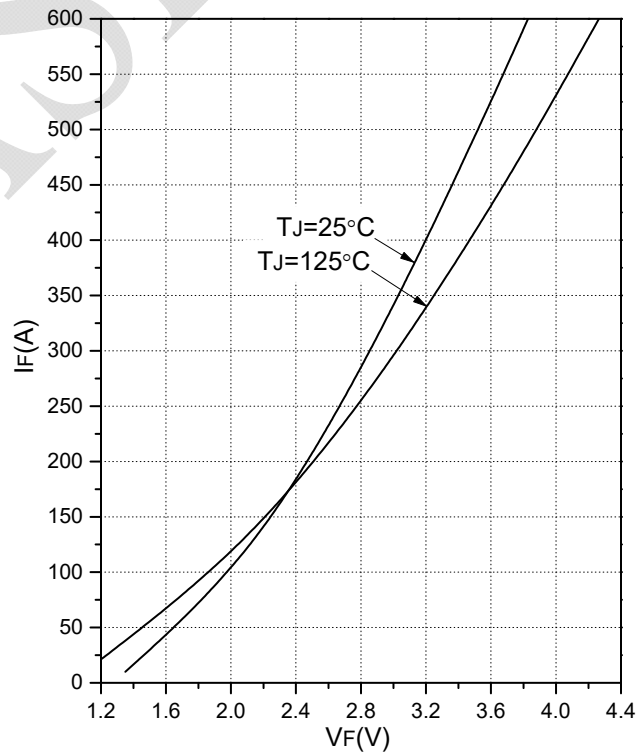


Fig.4 Forward Characteristics of Diode

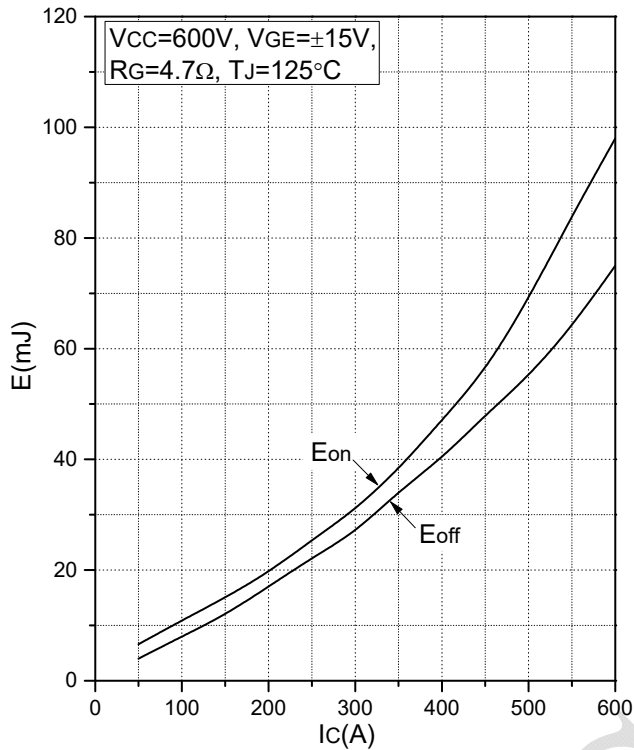


Fig.5 Typical Switching Loss vs. Collector Current

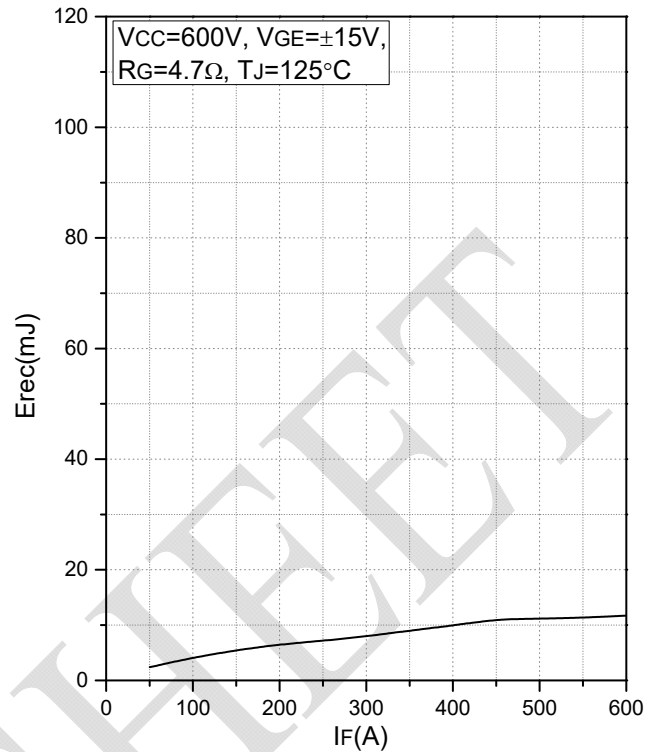


Fig.6 Typical Switching Loss vs. Forward Current

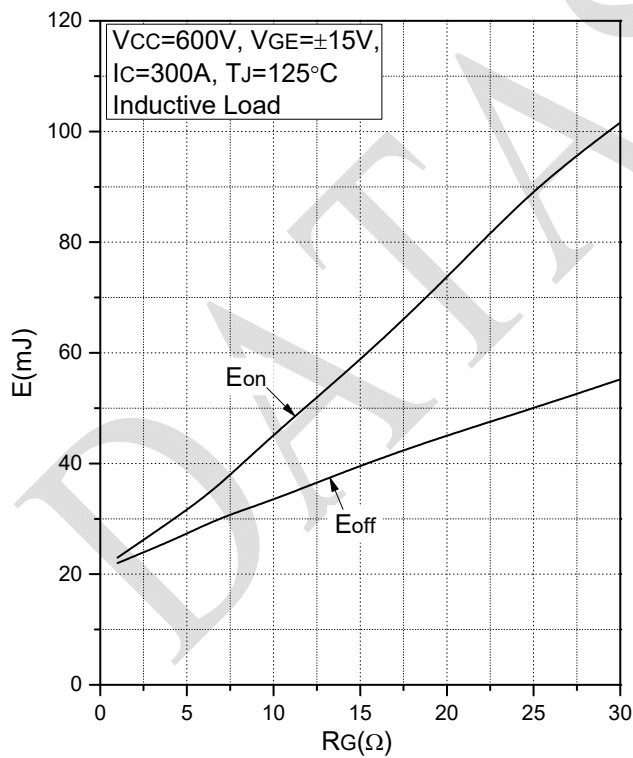


Fig.7 Typical Switching Loss vs. Gate Resistance

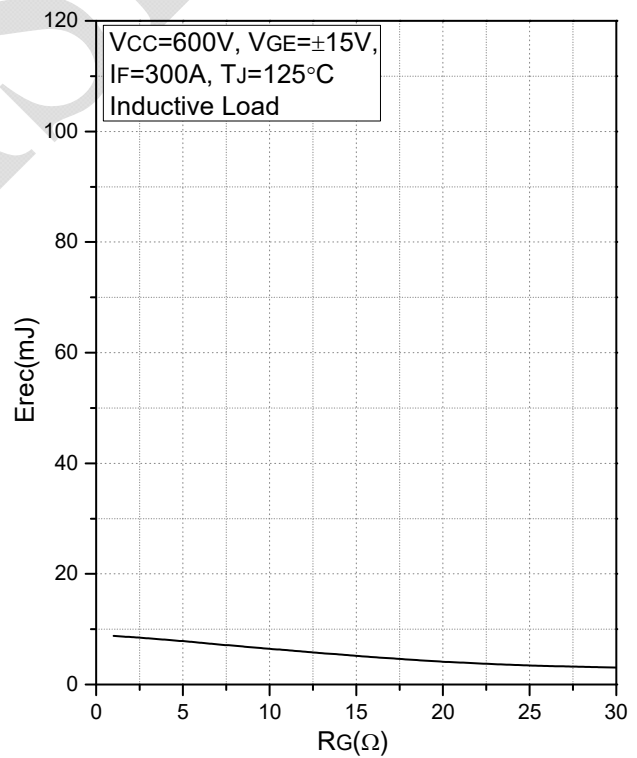


Fig.8 Typical Switching Loss vs. Gate Resistance

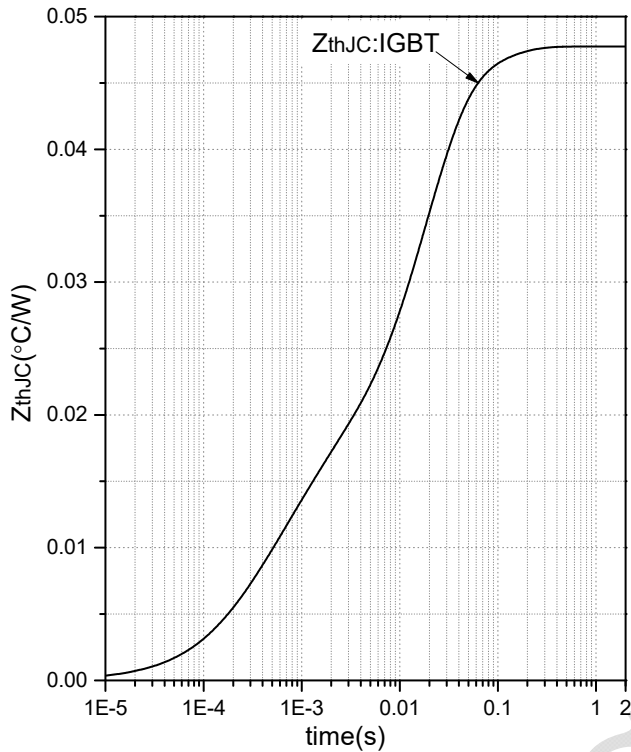


Fig.9 Transient Thermal Impedance (IGBT)

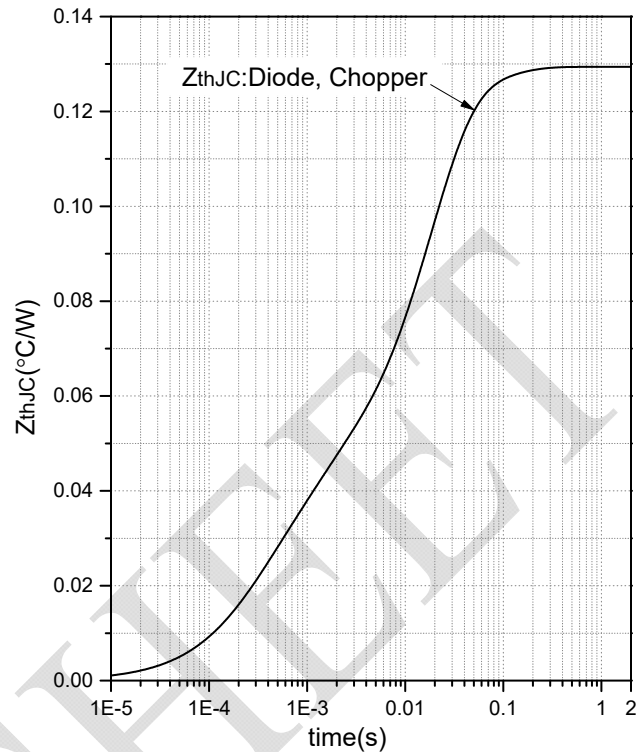


Fig.10 Transient Thermal Impedance (Diode)

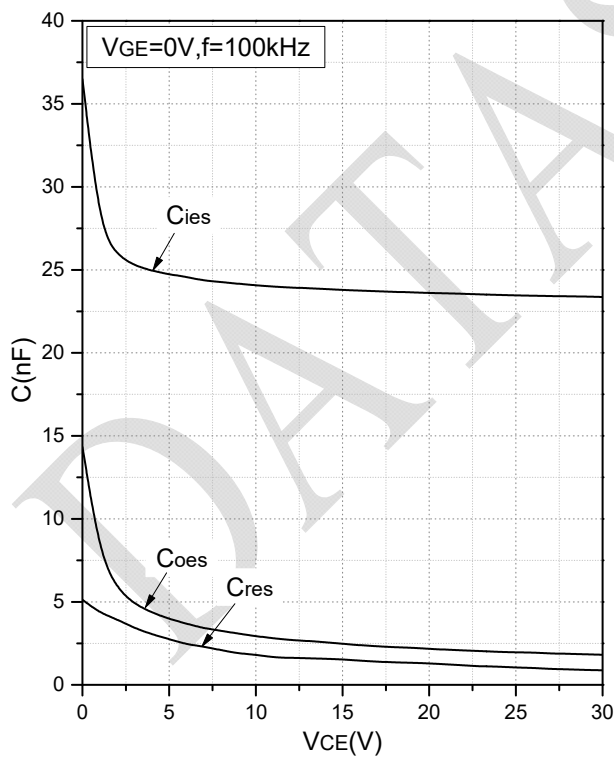


Fig.11 Capacitance Characteristics

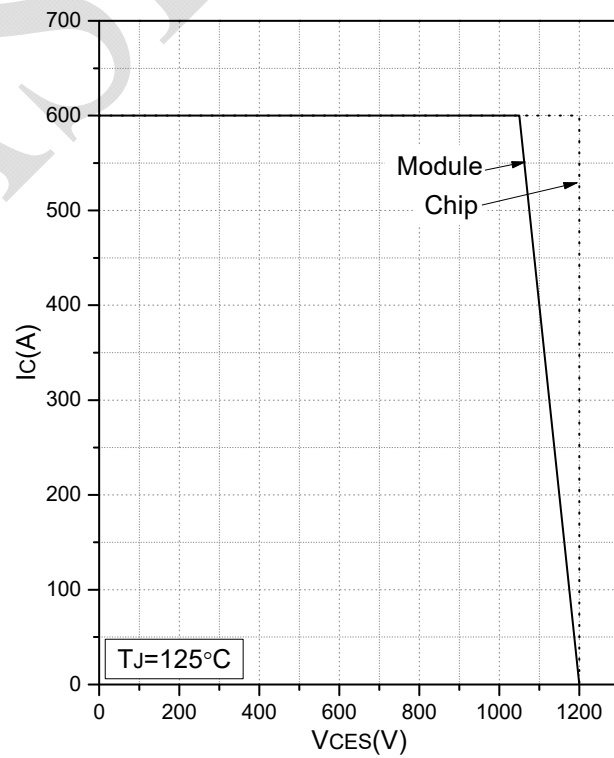
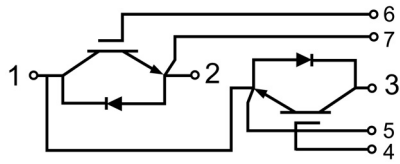


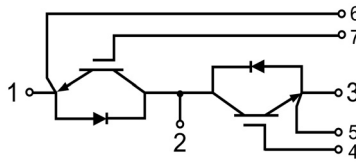
Fig.12 Reverse Bias Safe Operation Area (RBSOA)



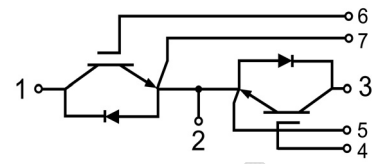
Internal Circuit



HF

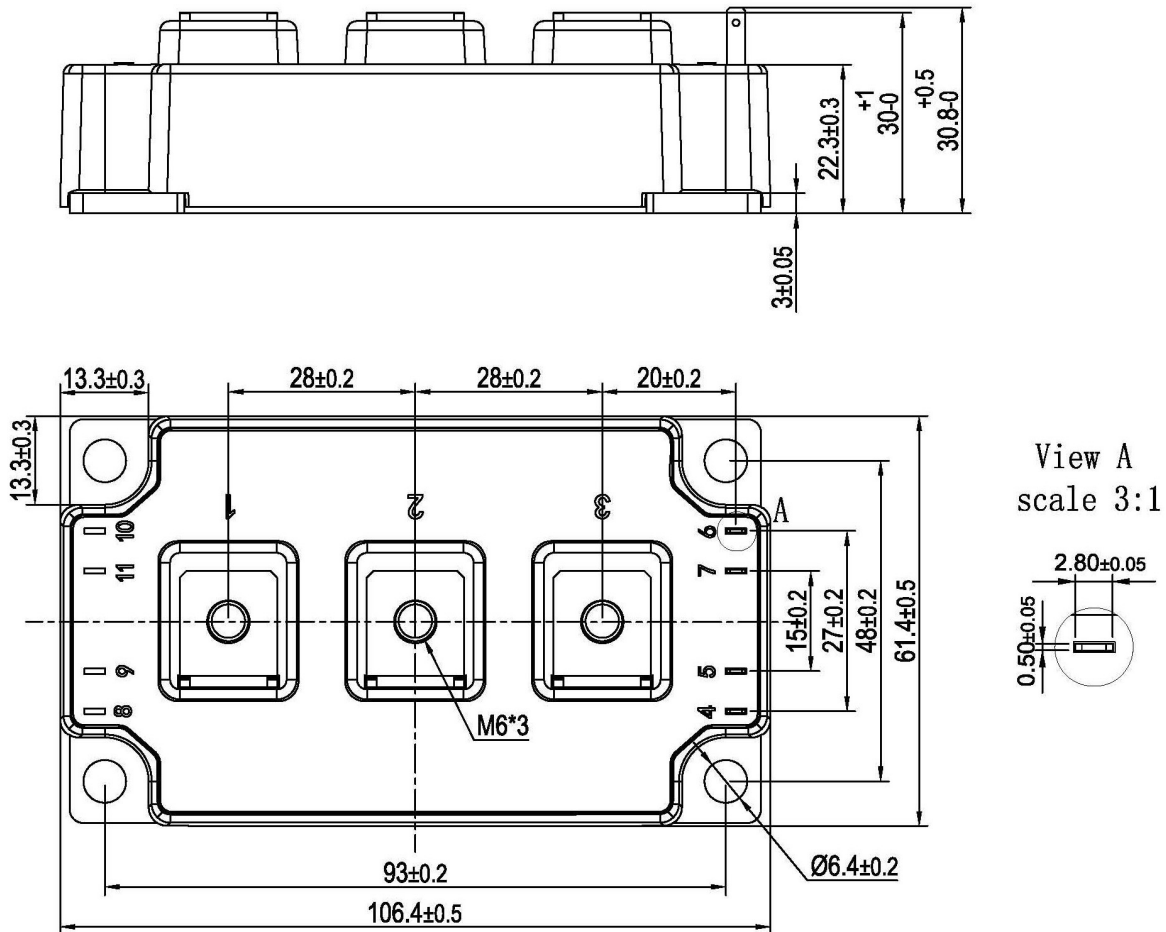


CC



CE

Package Outline (Unit: mm):





| Date | Revision | Notes |
|------------|----------|---------------|
| 02/23/2022 | A | Final Version |
| | | |

Announcements

Information in this document is believed to be accurate and reliable. However, NJSME does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information.

Right to Make Changes

NJSME reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

The datasheet with “REV.” + “Arabic numerals” is based on engineering data for initial reference purpose only.

The released datasheet would be issued with “REV.” + “alphabet characters”.

DATA SHEET