Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!


## Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832
Email & Skype: info@chipsmall.com Web: www.chipsmall.com
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

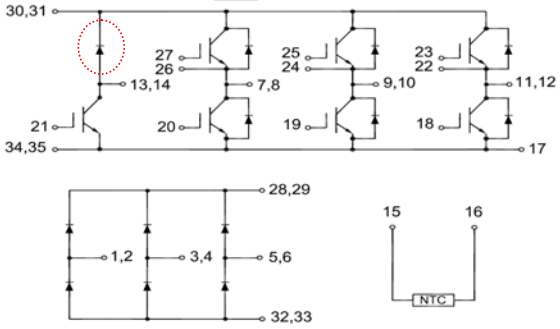
# GHIS075A120T2P2

## Si IGBT/ SiC SBD PIM Module

RoHS

### Features:

- Short Circuit Rated 10μs
- Low Saturation Voltage: $V_{CE\ (sat)}$ = 1.90V @ $I_C$ =75A , $T_C$=25℃
- Low Switching Loss
- SiC SBD for boost diode: $V_F$= 1.70V @ $I_F$ = 50A , $T_C$=25℃
- 100% RBSOA Tested（2×Ic）
- Low Stray Inductance
- Lead Free, Compliant with RoHS Requirement




### Applications:

- Industrial Inverters
- Servo Applications

### IGBT, Inverter

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

| | | | | |
|---|---|---|---|---|
| $V_{CES}$ | Collector-Emitter Blocking Voltage | | 1200 | V |
| $V_{GES}$ | Gate-Emitter Voltage | | ±20 | V |
| $I_C$ | Continuous Collector Current | $T_C$ = 80℃ | 75 | A |
| | | $T_C$ = 25℃ | 150 | A |
| $I_{CM(1)}$ | Peak Collector Current Repetitive | $T_J$ = 175℃ | 150 | A |
| $t_{SC}$ | Short Circuit Withstand Time | | >10 | μs |
| $P_D$ | Maximum Power Dissipation per IGBT | $T_C$ = 25℃<br>$T_{Jmax}$=175℃ | 520 | 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 | $I_C$ = 1 mA, $V_{CE}$ = $V_{GE}$ | | 5.0 | 5.5 | 6.0 | V |
| $V_{CE(sat)}$ | Collector-Emitter Saturation Voltage | $I_C$ =75A, $V_{GE}$ = 15V | $T_J$ = 25℃ | | 1.90 | 2.10 | V |
| | | | $T_J$ = 125℃ | | 2.20 | | 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 | | | 10.4 | | nF |
| $C_{res}$ | Output capacitance | | | | 0.56 | | nF |

Switching Characteristics

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $t_{d(on)}$ | Turn-on Delay Time | $V_{CC}$ = 600V,$I_C$ = 75A, $R_G$ = 15Ω,$V_{GE}$ = ±15V, Inductive Load | $T_J$ = 25℃ | | 190 | | ns |
| | | | $T_J$ = 125℃ | | 170 | | |
| $t_r$ | Rise Time | | $T_J$ = 25℃ | | 100 | | ns |
| | | | $T_J$ = 125℃ | | 110 | | |
| $t_{d(off)}$ | Turn-off Delay Time | | $T_J$ = 25℃ | | 270 | | ns |
| | | | $T_J$ = 125℃ | | 280 | | |
| $t_f$ | Fall Time | | $T_J$ = 25℃ | | 160 | | ns |
| | | | $T_J$ = 125℃ | | 240 | | |
| $E_{on}$ | Turn-on Switching Loss | | $T_J$ = 25℃ | | 5.77 | | mJ |
| | | | $T_J$ = 125℃ | | 6.90 | | |
| $E_{off}$ | Turn-off Switching Loss | | $T_J$ = 25℃ | | 3.54 | | mJ |
| | | | $T_J$ = 125℃ | | 5.60 | | |
| $Q_g$ | Total Gate Charge | | $T_J$ = 25℃ | | 190 | | nC |
| RBSOA | Reverse Bias Safe Operation Area | $I_C$=150A,$V_{CC}$=960V,Vp=1200V, Rg = 15Ω, $V_{GE}$=+15V to 0V, $T_J$ =150°C | | Trapezoid | | | |
| SCSOA | Short Circuit Safe Operation Area | $V_{CC}$ = 600V, $V_{GE}$ = 15V, $T_J$ = 150℃ | | 10 | | | μs |
| $R_{\theta JC}$ | IGBT Thermal Resistance: Junction-To-Case | | | | 0.29 | | ℃/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 |
| $I_{FM}$ | Repetitive Peak Forward Current | 150 | A |

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

| Symbol | Description | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $V_{FM}$ | Forward Voltage | $I_F$ = 75A , $V_{GE}$ = 0V | $T_J$ = 25℃ | | 1.90 | | V |
| | | | $T_J$ = 125℃ | | 2.10 | | |
| $I_{rr}$ | Peak Reverse Recovery Current | $I_F$ = 75A, di/dt =700A/μs, $V_{rr}$ = 600V, $V_{GE}$ = -15V | $T_J$ = 25℃ | | 35 | | A |
| | | | $T_J$ = 125℃ | | 40 | | |
| $Q_{rr}$ | Reverse Recovery Charge | | $T_J$ = 25℃ | | 5.7 | | μC |
| | | | $T_J$ = 125℃ | | 9.52 | | |
| $E_{rec}$ | Reverse Recovery Energy | | $T_J$ = 25℃ | | 1.92 | | mJ |
| | | | $T_J$ = 125℃ | | 3.80 | | |
| $R_{\theta JC}$ | Diode Thermal Resistance: Junction-To-Case | | | | 0.45 | | ℃/W |

## IGBT, Brake-Chopper

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

| | | | | |
|---|---|---|---|---|
| $V_{CES}$ | Collector-Emitter Blocking Voltage | | 1200 | V |
| $V_{GES}$ | Gate-Emitter Voltage | | ±20 | V |
| $I_C$ | Continuous Collector Current | $T_C$ = 80℃ | 50 | A |
| | | $T_C$ = 25℃ | 100 | A |
| $I_{CM}$ | Peak Collector Current Repetitive | $T_J$ = 175℃ | 100 | A |
| $t_{SC}$ | Short Circuit Withstand Time | | >10 | μs |
| $P_D$ | Maximum Power Dissipation (IGBT) | $T_C$ = 25℃, $T_{Jmax}$=175℃ | 390 | 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 | $I_C$ = 1 mA, $V_{CE}$ = $V_{GE}$ | | 5.0 | 5.5 | 6.0 | V |
| $V_{CE(sat)}$ | Collector-Emitter Saturation Voltage | $I_C$ = 50 A, $V_{GE}$ = 15V | $T_J$ = 25℃ | | 1.90 | 2.20 | V |
| | | | $T_J$ = 125℃ | | 2.20 | | 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 | | | 6.7 | | nF |
| $C_{oes}$ | Output Capacitance | | | | 0.38 | | nF |

Switching Characteristics

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $t_{d(on)}$ | Turn-on Delay Time | $V_{CC}$ = 600V,$I_C$ = 50A, $R_G$ = 15 Ω,$V_{GE}$ = ±15V, Inductive Load | $T_J$ = 25℃ | | 240 | | ns |
| | | | $T_J$ = 125℃ | | 235 | | |
| $t_r$ | Rise Time | | $T_J$ = 25℃ | | 75 | | ns |
| | | | $T_J$ = 125℃ | | 75 | | |
| $t_{d(off)}$ | Turn-off Delay Time | | $T_J$ = 25℃ | | 235 | | ns |
| | | | $T_J$ = 125℃ | | 250 | | |
| $t_f$ | Fall Time | | $T_J$ = 25℃ | | 165 | | ns |
| | | | $T_J$ = 125℃ | | 280 | | |
| $E_{on}$ | Turn-on Switching Loss | | $T_J$ = 25℃ | | 3.72 | | mJ |
| | | | $T_J$ = 125℃ | | 4.48 | | |
| $E_{off}$ | Turn-off Switching Loss | | $T_J$ = 25℃ | | 2.25 | | mJ |
| | | | $T_J$ = 125℃ | | 3.54 | | |
| $Q_g$ | Total Gate Charge | | $T_J$ = 25℃ | | 390 | | nC |
| RBSOA | Reverse Bias Safe Operation Area | $I_C$=100A,$V_{CC}$=960V,Vp=1200V, Rg = 15Ω, $V_{GE}$=+15V to 0V, $T_J$ =150°C | | Trapezoid | | | |
| SCSOA | Short Circuit Safe Operation Area | $V_{CC}$ = 600V, $V_{GE}$ = 15V, $T_J$ = 150℃ | | 10 | | | μs |
| $R_{\theta JC}$ | IGBT Thermal Resistance: Junction-To-Case | | | | 0.39 | | ℃/W |

## Maximum Rated Values of SiC SBD Brake-Chopper ($T_C$=25℃ unless otherwise specified)

| Symbol | Description | Conditions | Value | Unit |
|---|---|---|---|---|
| $V_{RRM}$ | Repetitive Peak Reverse Voltage | $T_j$=25 °C | 1200 | V |
| $I_F$ | Diode Continuous Forward Current | $T_C$=125 °C, $T_j$=175 °C | 51 | A |
| $I_{F,SM}$ | Surge Non-repetitive Forward Current | $T_C$=125 °C, $t_p$=8.3 ms sine half wave | 225 | A |
| dv/dt | Diode dv/dt Ruggedness | Turn-on slew rate, repetitive | 50 | V/ns |

## Electrical Characteristics of SiC SBD ($T_C$=25℃ unless otherwise specified)

| Symbol | Description | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $V_R$ | DC Blocking Voltage | $I_R$=100 uA | | 1200 | | | V |
| $V_F$ | Forward Voltage | $I_F$ = 50A, $V_{GE}$ = 0V | $T_J$ = 25℃ | | 1.7 | 1.9 | V |
| | | | $T_J$ = 175℃ | | 2.3 | 2.7 | |
| $I_R$ | Reverse leakage Current | $V_R$=1200V | $T_J$ = 25℃ | | 7 | 500 | μA |
| | | $V_R$=1200V | $T_J$ = 175℃ | | 260 | 1000 | |
| $Q_C$ | Total Capacitive Charge | $V_R$=1200V | $T_J$ = 25℃ | | 194 | | nC |
| C | Total Capacitance | $V_R$=1V, f=1 MHz | | | 2857 | | pF |
| | | $V_R$=600V, f=1 MHz | | | 167 | | |
| | | $V_R$=1200V, f=1 MHz | | | 162 | | |
| $R_{\theta JC}$ | Diode Thermal Resistance: Junction-To-Case | | | | TBD | | ℃/W |

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

| Symbol | Description | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $V_{FM}$ | Forward Voltage | $I_F$ = 25 A , $V_{GE}$ = 0V | $T_J$ = 25℃ | | 1.80 | 2.20 | V |
| | | | $T_J$ = 125℃ | | 2.00 | | |
| $I_{rr}$ | Peak Reverse Recovery Current | $I_F$=25A, di/dt =580A/μs, $V_{rr}$ = 600V, $V_{GE}$ = -15V | $T_J$ = 25℃ | | 15 | | A |
| | | | $T_J$ = 125℃ | | 20 | | |
| $Q_{rr}$ | Reverse Recovery Charge | | $T_J$ = 25℃ | | 1.05 | | μC |
| | | | $T_J$ = 125℃ | | 2.19 | | |
| $E_{rec}$ | Reverse Recovery Energy | | $T_J$ = 25℃ | | 0.39 | | mJ |
| | | | $T_J$ = 125℃ | | 0.95 | | |
| $R_{\theta JC}$ | Diode Thermal Resistance: Junction-To-Case | | | | 0.80 | | ℃/W |

## Diode, Rectifier

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

| | | | | |
|---|---|---|---|---|
| $V_{RRM}$ | Repetitive Peak Reverse Voltage | $T_J$ =25℃ | 1800 | V |
| $I_{FRMSM}$ | Maximum RMS Forward Current per Chip | $T_J$ =80℃ | 80 | A |
| $I_{RMSM}$ | Maximum RMS Current at Rectifier Output | $T_J$ =80℃ | 120 | A |
| $I_{FSM}$ | Surge Current @$t_p$=10 ms | $T_J$ =25℃ | 550 | A |
| | | $T_J$ =150℃ | 450 | |
| $I^2t$ | I²t - value | $T_J$ =25℃ | 1700 | $A^2s$ |
| | | $T_J$ =150℃ | 1000 | |

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

| Symbol | Description | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $V_F$ | Forward voltage | $I_F$ = 75 A | $T_J$ =25℃ | | 1.15 | | V |
| | | | $T_J$ =150℃ | | 1.10 | | |
| $I_R$ | Reverse current | $V_R$=1200V | $T_J$ =25℃ | | | 1 | mA |
| $R_{\theta JC}$ | Junction-To-Case Diode | | | | 0.39 | | ℃/W |

**Internal NTC-Thermistor Characteristics**

| Symbol | Description | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| $R_{25}$ | $T_C$ =25℃ | | 5 | | kΩ |
| △R/R | $T_C$ =100℃，$R_{100}$ =481Ω | | | ±5 | % |
| $P_{25}$ | $T_C$ =25℃ | | 50 | | mW |
| $B_{25/50}$ | $R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15K))]$ | | 3380 | | K |
| $B_{25/80}$ | $R_2=R_{25}\exp[B_{25/80}(1/T_2-1/(298.15K))]$ | | 3440 | | K |

## 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 | ℃ |
| $R_{\theta CS}$ | Case-To-Sink (Conductive Grease Applied) | | | 0.1 | | ℃/W |
| M | Mounting Screw:M5 | | 3.0 | | 5.0 | N·m |
| G | Weight | | | 300 | | g |

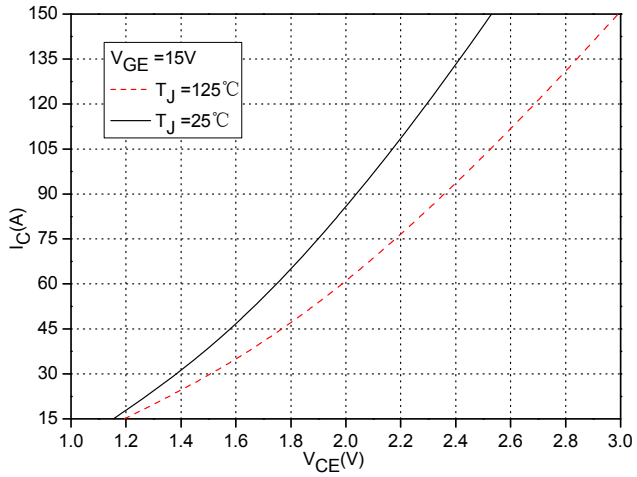



Fig.1 Typical Saturation Voltage Characteristics

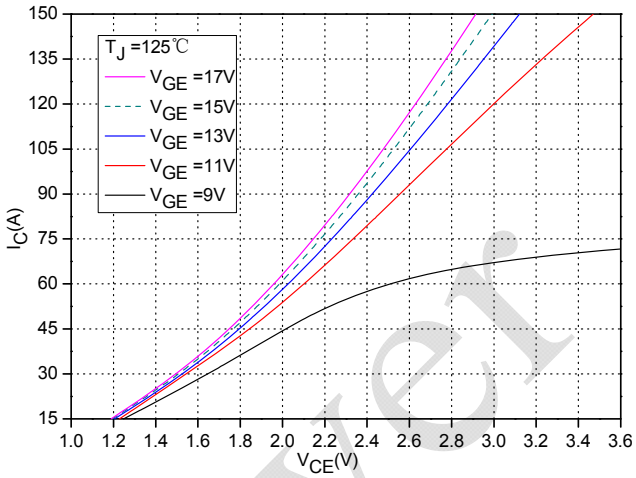



Fig.2 Typical Output Characteristics

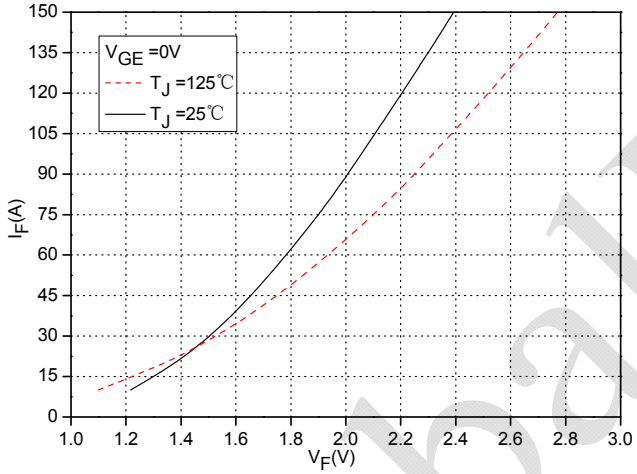



Fig.3 Forward Characteristics of FWD

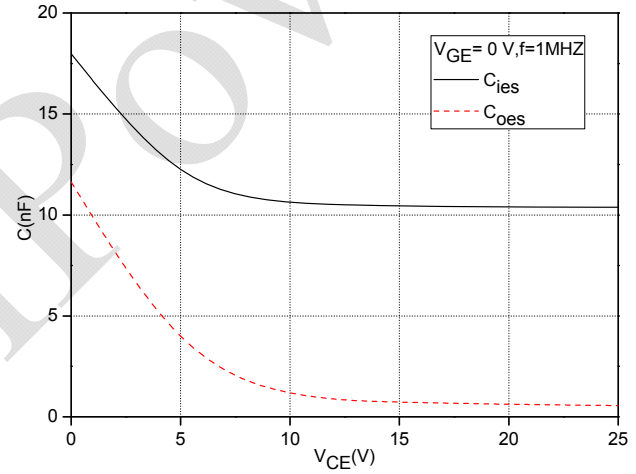



Fig.4 Capacitance Characteristics

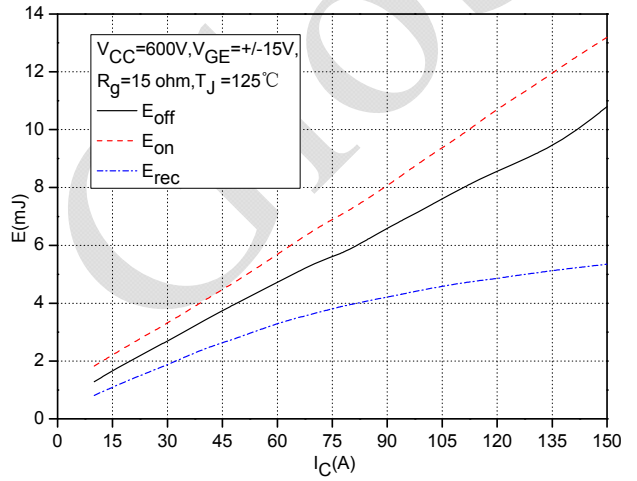



Fig.5 Typical Switching Loss vs. Collector Current

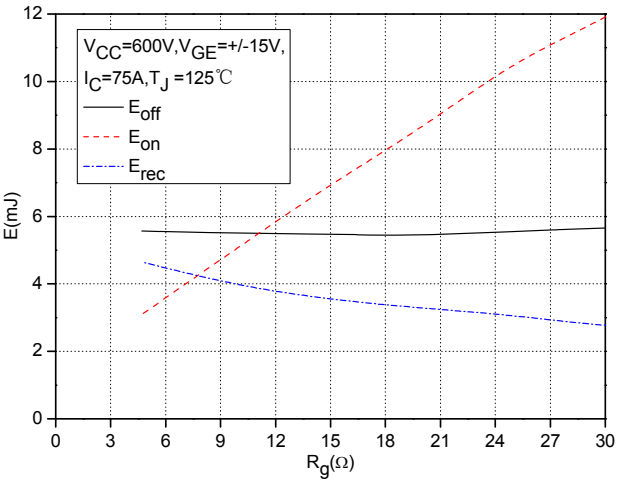



Fig.6 Typical Switching Loss vs. Gate Resistance

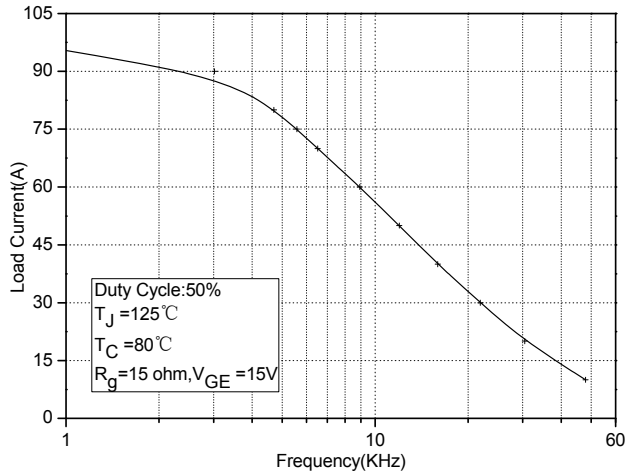



Fig.7 Typical Load Current vs. Frequency

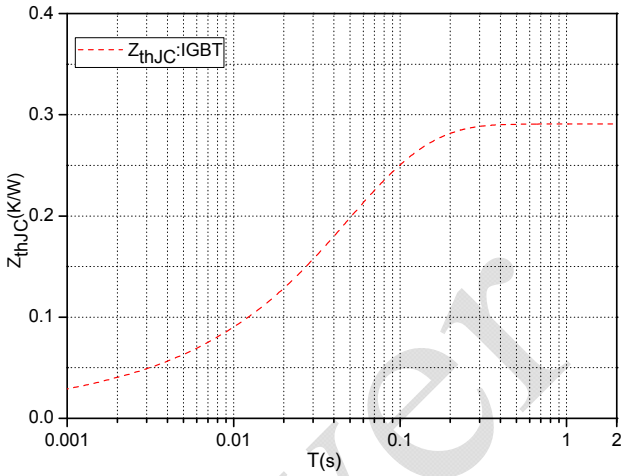



Fig.8 Transient thermal impedance (IGBT)

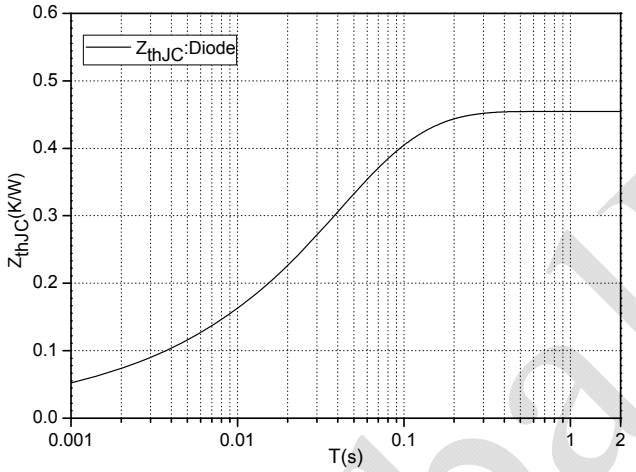



Fig.9 Transient thermal impedance Diode

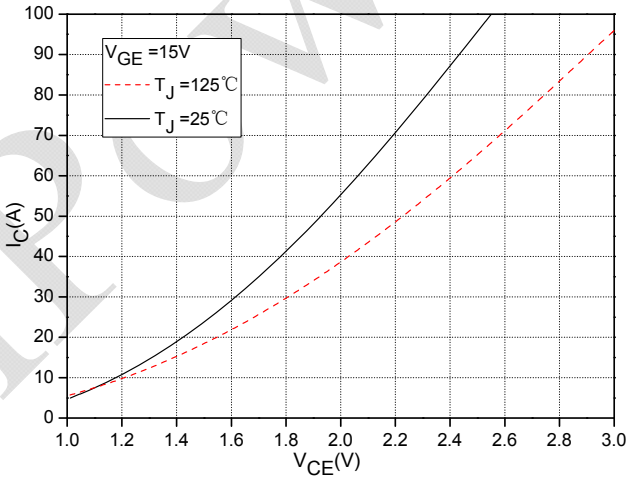



Fig.10 Typical Saturation Voltage Characteristics (Brake-Chopper)

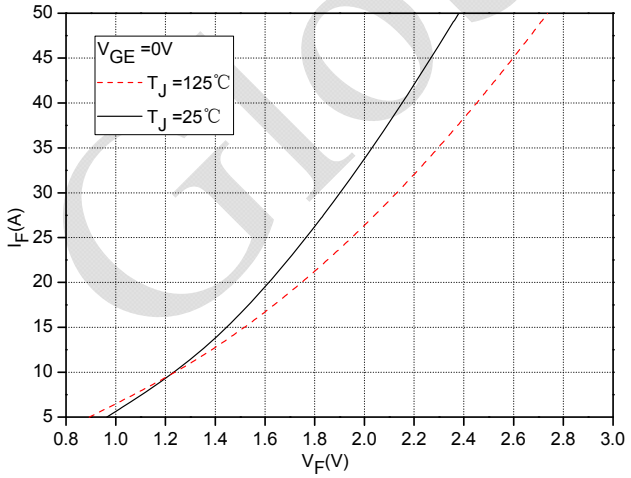



Fig.11 Forward Characteristics of FWD (Brake-Chopper)

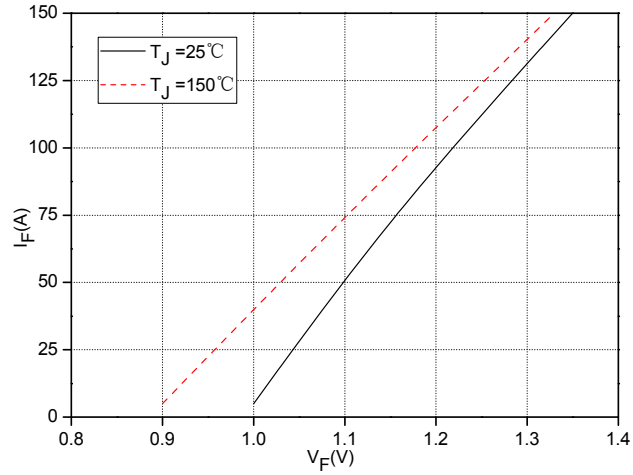



Fig.12 Forward Characteristics of Diode (Rectifier)

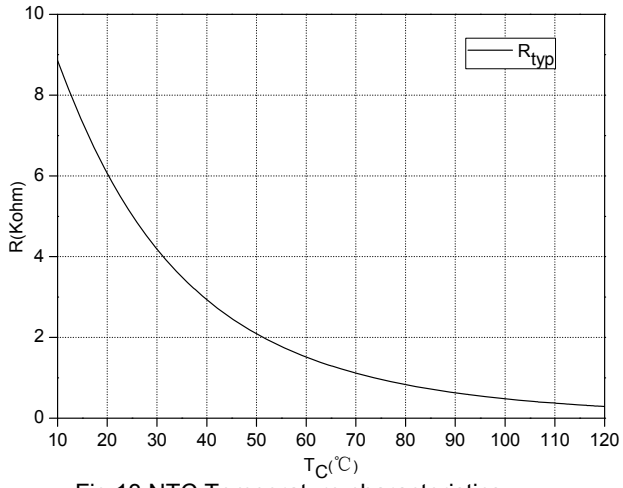



Fig.13 NTC Temperature characteristics

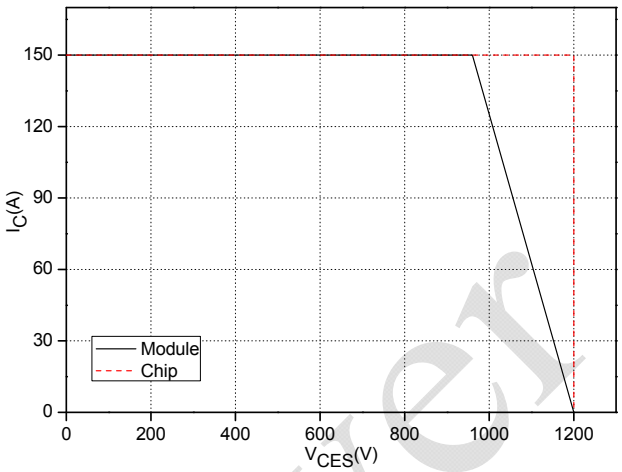



Fig.14 Reverse Bias Safe Operation Area (RBSOA)

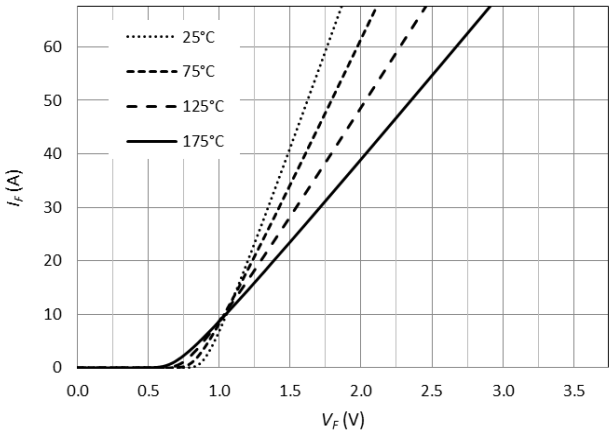



Fig. 15 Forward Characteristics of SiC Diode (Boost)

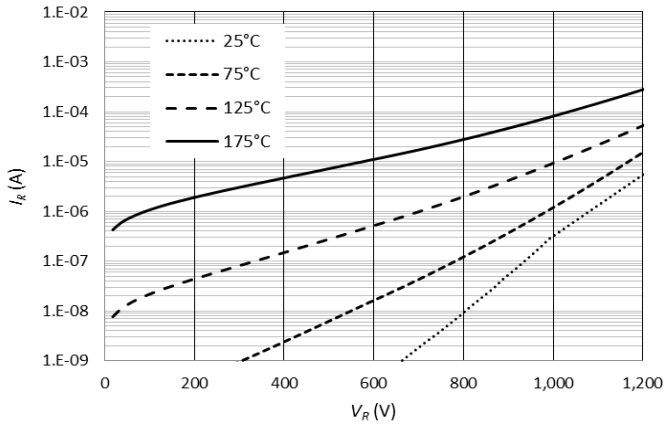



Fig. 16 Leakage Current of SiC Diode (Boost)

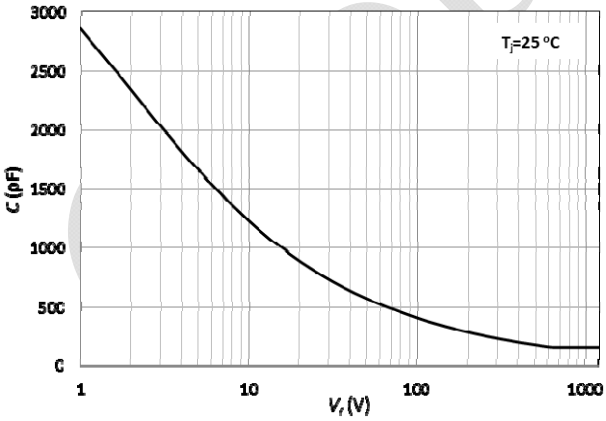



Fig. 17 Capacitance Characteristics of SiC Diode (Boost)

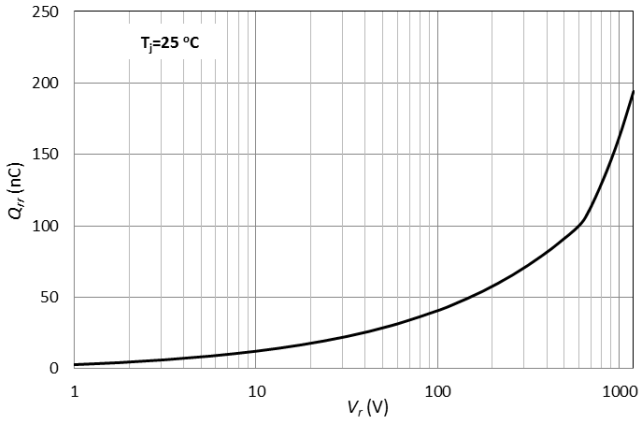
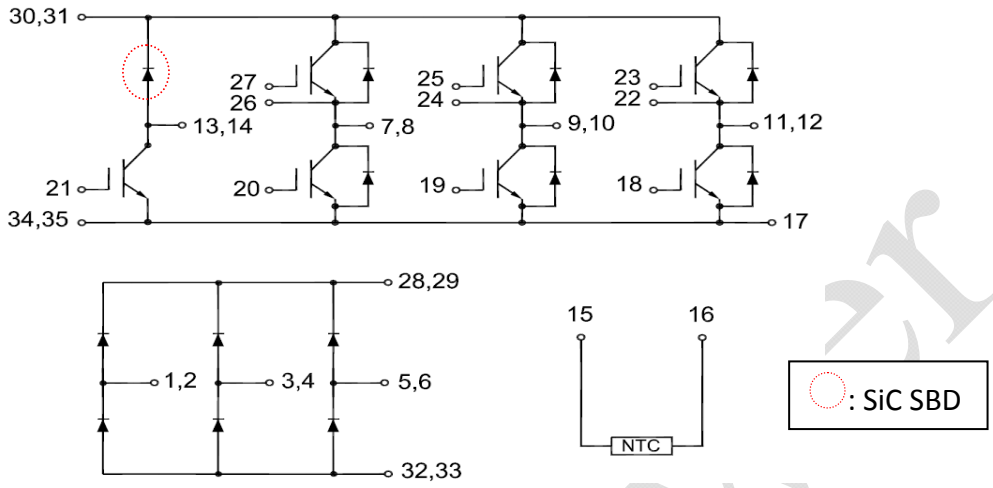
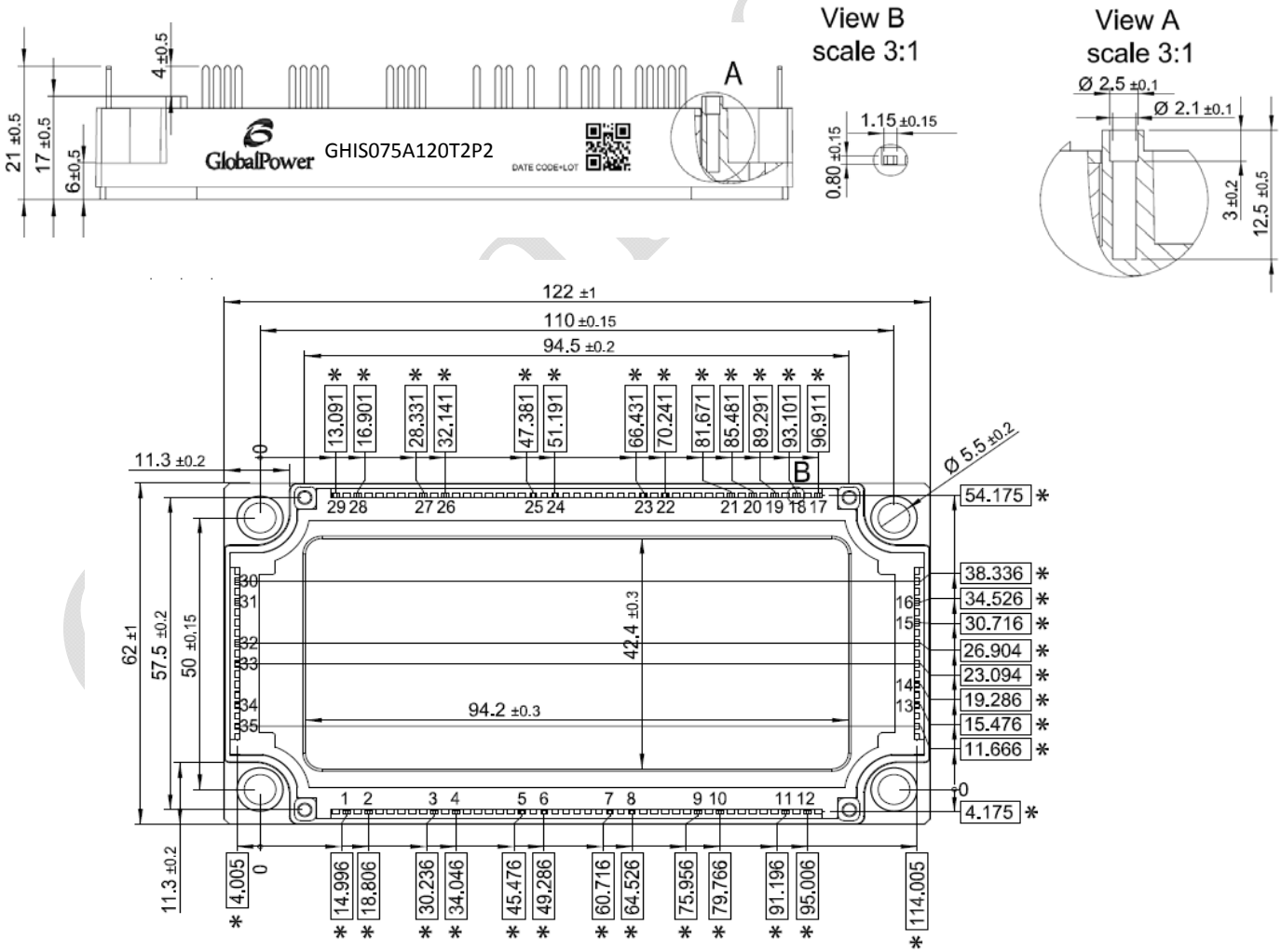



Fig. 18 Recovery Charge of Boost SiC Diode (Boost)

## Internal Circuit:




## Package Outline (Unit: mm):



## Revision History

| Date | Revision | Notes |
|---|---|---|
| 4/22/2015 | 0.1 | Initial release of preliminary datasheet |
| | | |
| | | |

**Global Power Technologies Group**
20692 Prism Place
Lake Forest, CA 92630
TEL (949) 207-7500
FAX (949) 613-7600
E-mail: info@gptechgroup.com
Web site: www.gptechgroup.com


## Notes

- **RoHS Compliance**
  The levels of RoHS restricted materials in this product are below the maximum concentration values (also referred to as the threshold limits) permitted for such substances, or are used in an exempted application, in accordance with EU Directive 2011/65/EC (RoHS2), as implemented March, 2013. RoHS Declarations for this product can be obtained from the Product Documentation sections of www.gptechgroup.com.

- **REACh Compliance**
  REACh substances of high concern (SVHCs) information is available for this product. Since the European Chemical Agency (ECHA) has published notice of their intent to frequently revise the SVHC listing for the foreseeable future, please contact our office at GPTG Headquarters in Lake Forest, California to insure you get the most up-to-date REACh SVHC Declaration.
  REACh banned substance information (REACh Article 67) is also available upon request.

- This product has not been designed or tested for use in, and is not intended for use in, applications implanted into the human body nor in applications in which failure of the product could lead to death, personal injury or property damage, including but not limited to equipment used in the operation of nuclear facilities, life-support machines, cardiac defibrillators or similar emergency medical equipment, aircraft navigation or communication or control systems, or air traffic control.

- To obtain additional technical information or to place an order for this product, please contact us. The information in this datasheet is provided by Global Power Technologies Group. GPTG reserves the right to make changes, corrections, modifications, and improvements of datasheet without notice.