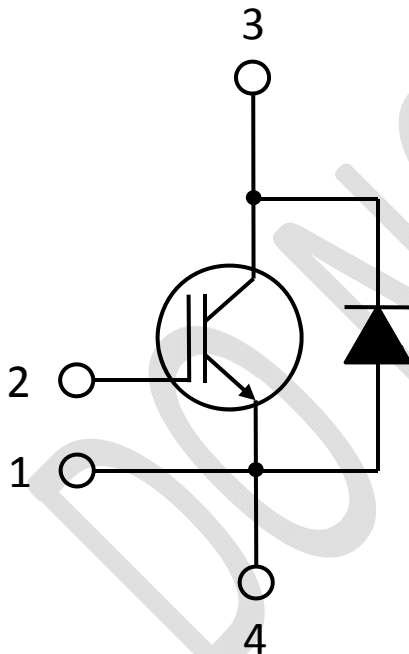


COPACK (Si IGBT/SiC SBD) SOT-227 Power Module

$V_{CES} = 1250V$
 $I_C = 100A @ T_C = 100^{\circ}C$
 $V_{CE(SAT)} = 1.8V$



Features

- High speed switching IGBT
- Freewheeling diode with zero reverse recovery SiC SBDs
- Low collector to emitter saturation voltage
- Short circuit withstanding time (10 μs min.)
- Kelvin reference for stable gate driving
- High junction temperature operation
- Positive temperature coefficient for easy to parallel mounting

Applications

- Photo Voltaic Inverter
- Aerospace actuators
- Server Power supplies
- High voltage AC/DC Converter
- Inductive heating and welding machine



Benefits

- Outstanding power conversion efficiency at high switching frequency operation
- Low switching losses and Low EMI noises
- Very rugged and easy mount
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Easy paralleling due to positive T_C of V_F
- RoHS Compliant

Absolute Maximum Ratings ($T_j=25^{\circ}\text{C}$ unless otherwise specified)

| Parameters | Symbol | Conditions | Specifications | Units |
|--|-----------|---|----------------|--------------------|
| Si IGBT | | | | |
| Maximum Collector-Emitter Voltage | V_{CES} | $T_j = 25^{\circ}\text{C} \sim 150^{\circ}\text{C}$ | 1250 | V |
| Continuous Collector Current | I_C | $T_j = 25^{\circ}\text{C}, V_{GE}=20\text{V}$ | 200 | A |
| | | $T_j = 150^{\circ}\text{C}, V_{GE}=20\text{V}$ | 100 | A |
| Peak Collector Current | I_{CM} | Limited by T_{jmax} | TBD | A |
| Gate-Emitter Peak Voltage | V_{GE} | | ± 30 | V |
| SiC SBDs | | | | |
| Maximum Reverse Voltage | V_{RRM} | | 1200 | V |
| Average Forward Current | I_{DAV} | $T_j = 25^{\circ}\text{C}$ | 200 | A |
| | | $T_j = 150^{\circ}\text{C}$ | 100 | A |
| Non-repetitive Forward Surge Current | I_{FSM} | $t=10\text{ ms}$ | TBD | A |
| | | $T=10\ \mu\text{s}$ | TBD | A |
| COPACK Modules Thermal Properties | | | | |
| Maximum Power Dissipation | P_D | $T_C = 25^{\circ}\text{C}$ | TBD | W |
| | | $T_C = 100^{\circ}\text{C}$ | TBD | W |
| Operating Junction Temperature | T_j | | $-40 \sim 175$ | $^{\circ}\text{C}$ |
| Storage Temperature | T_{STG} | | $-40 \sim 150$ | $^{\circ}\text{C}$ |

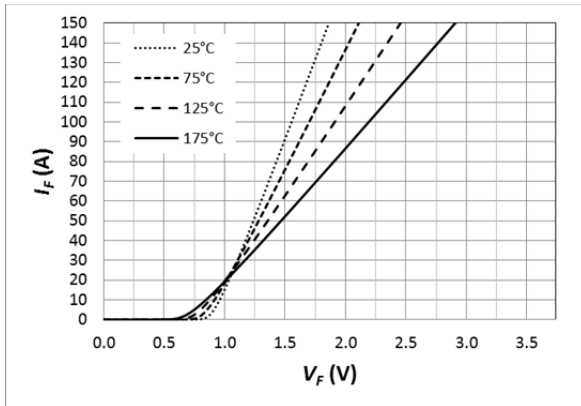
Electrical Characteristics ($T_j=25^{\circ}\text{C}$ unless otherwise specified)

| Parameters | Symbol | Conditions | Min | Typ | Max | Units |
|--------------------------------------|---------------|--|------|------|---------|---------------|
| Si IGBT | | | | | | |
| Collector-Emitter Breakdown Voltage | V_{CES} | $V_{GE}=0\text{ V}, I_C=100\ \mu\text{A}$ | 1250 | -- | -- | V |
| Gate Threshold Voltage | $V_{GE(TH)}$ | $V_{CE}=10\text{ V}, I_C=3.3\text{ mA}$ | 5.0 | -- | 6.8 | V |
| Collector-Emitter Saturation Voltage | $V_{CE(SAT)}$ | $V_{GE}=15\text{ V}, I_C=100\text{ A}$ | -- | 1.8 | 2.25 | V |
| Zero Gate Voltage Collector Current | I_{CSS} | $V_{CE}=1200\text{V}, V_{GE}=0\text{V}, T_j = 25^{\circ}\text{C}$ | -- | -- | 1 | μA |
| | | $V_{CE}=1200\text{V}, V_{GE}=0\text{V}, T_j = 150^{\circ}\text{C}$ | -- | TBD | -- | μA |
| Gate Emitter Leakage Current | I_{GES} | $V_{GE}=\pm 30\text{ V}, V_{CE}=0\text{V}$ | -- | -- | ± 1 | μA |
| Input Capacitance | C_{ISS} | $V_{GE} = 0\text{V}, V_{CE} = 25\text{ V}, \text{freq.} = 1\text{MHz}$ | -- | 10 | -- | nF |
| Output Capacitance | C_{OSS} | | -- | 0.28 | -- | nF |
| Reverse transfer Capacitance | C_{RES} | | -- | 0.23 | -- | nF |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{CE} = 600\text{V}, V_{GE} = \pm 15\text{V}$ $I_C = 100\text{A}, R_{G(ext)} = 10\Omega,$ Inductive Load | -- | 70 | -- | ns |
| Rise Time | t_r | | -- | 60 | -- | ns |
| Turn-off Delay Time | $t_{d(off)}$ | | -- | 420 | -- | ns |

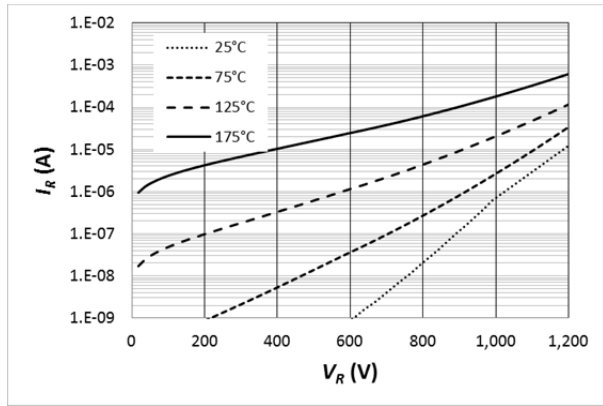
| | | | | | | |
|---|-----------|--|------|------|-----|---------------|
| Fall Time | t_f | | -- | 160 | -- | ns |
| Turn-on Switching Loss | E_{ON} | | | TBD | | mJ |
| Turn-off Switching Loss | E_{OFF} | | | TBD | | mJ |
| Total Gate Charge | Q_g | $V_{CE}=600\text{ V}, V_{GE} = -5/20\text{V}$ $I_C = 100\text{A}$ | -- | 900 | -- | nC |
| SiC SBDs | | | | | | |
| Maximum peak repetitive reverse voltage | V_{RRM} | | 1200 | -- | -- | V |
| Maximum Reverse Leakage Current | I_{RM} | $V_R = 1200\text{V}, T_j = 25\text{ }^\circ\text{C}$ | -- | 16 | 500 | μA |
| | | $V_R = 1200\text{V}, T_j = 175\text{ }^\circ\text{C}$ | -- | 580 | -- | μA |
| Diode Forward Voltage | V_F | $I_F = 100\text{A}, T_j = 25\text{ }^\circ\text{C}$ | -- | 1.6 | 1.8 | V |
| | | $I_F = 100\text{A}, T_j = 175\text{ }^\circ\text{C}$ | -- | 2.2 | 2.7 | V |
| Total Capacitive Charge | Q_C | $V_R=1200\text{ V}, I_F<I_{F,max}, di_F/dt = 500\text{ A}/\mu\text{s}, T_j = 25\text{ }^\circ\text{C}$ | -- | 431 | -- | nC |
| Switching Time | t_C | $di_F/dt = 500\text{ A}/\mu\text{s}, T_j = 25\text{ }^\circ\text{C}$ | -- | -- | 10 | ns |
| Total Capacitance | C | $V_R = 1\text{V}, f = 1\text{ MHz}$ | -- | 6349 | -- | pF |
| | | $V_R = 600\text{V}, f = 1\text{ MHz}$ | -- | 370 | -- | pF |
| | | $V_R = 1200\text{V}, f = 1\text{ MHz}$ | -- | 359 | -- | pF |

Thermal and Package Characteristics ($T_j=25\text{ }^\circ\text{C}$ unless otherwise specified)

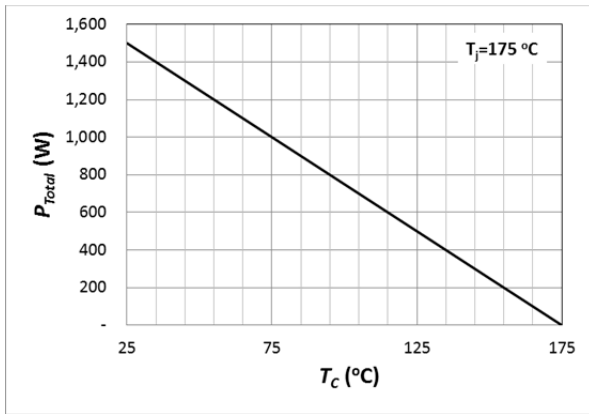
| Parameters | Symbol | Conditions | Min | Typ | Max | Units |
|--|------------|---|------|-----|-----|---------------------------|
| Junction to Case Thermal Resistance | R_{THJC} | IGBT | -- | -- | 0.2 | $^\circ\text{C}/\text{W}$ |
| | | SBD | -- | -- | 0.3 | $^\circ\text{C}/\text{W}$ |
| | | Per Module | -- | -- | TBD | $^\circ\text{C}/\text{W}$ |
| Junction to Ambient Thermal Resistance | R_{THJA} | Per MOSFET | -- | -- | TBD | $^\circ\text{C}/\text{W}$ |
| | | Per SBD | -- | -- | TBD | $^\circ\text{C}/\text{W}$ |
| | | Per Module | -- | -- | TBD | $^\circ\text{C}/\text{W}$ |
| Mounting Torque | M_d | | | | 1.5 | N-m |
| Terminal Connection Torque | M_{dt} | | 1.3 | -- | 1.5 | N-m |
| Package Weight | W_t | | | 32 | | g |
| Isolation Voltage | V_{ISOL} | $I_{ISOL} < 1\text{mA}, 50/60\text{Hz}, t=1\text{ min}$ | 2500 | | | V |



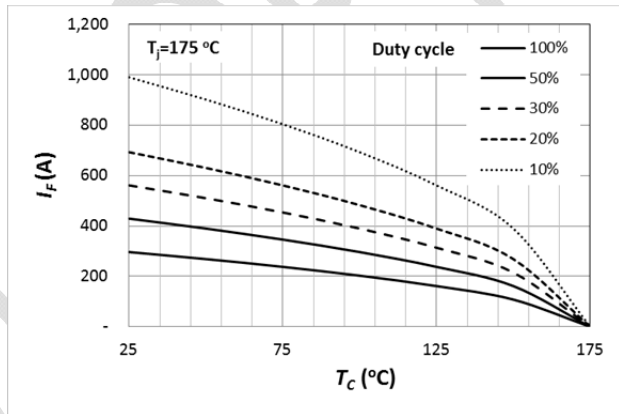
Forward Characteristics (parameterized on T_j)



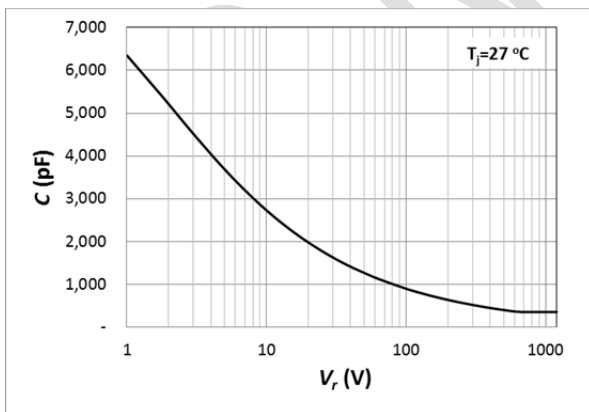
Reverse Characteristics (parameterized on T_j)



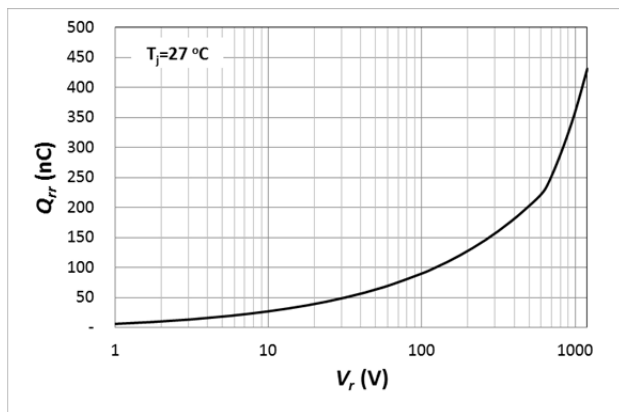
Power Derating



Current Derating



Capacitance Curve



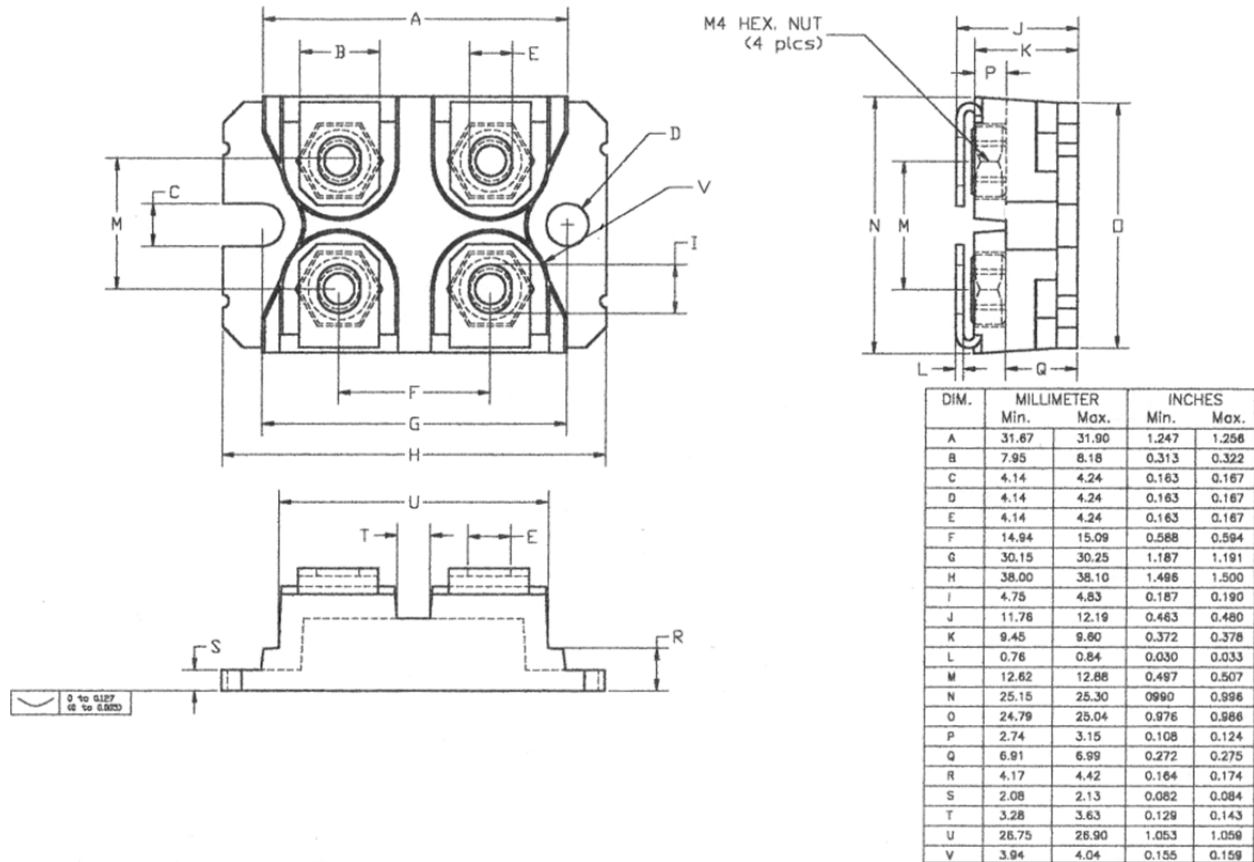
Recovery Charge

Part Number and Pin assignment

| Part Number | Rating | Pin 1* | Pin 2 | Pin 3 | Pin 4* |
|-----------------|-------------|--------|-------|-------|--------|
| GHS100A120S1-E1 | 1200V, 100A | Source | Gate | Drain | Source |
| | | | | | |
| | | | | | |

* pin 1 could be used as a kelvin reference terminal, and pin 4 is assigned for main source power terminal.

SOT-227 Package Outline and Dimension



Revision History

| Date | Revision | Notes |
|------------|----------|-----------------|
| 11/24/2014 | 1.0 | Initial release |
| | | |

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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.
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