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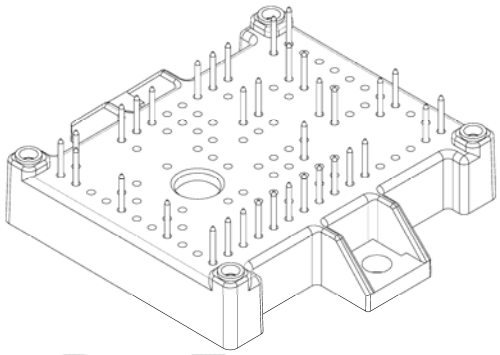
# GCMS080A120B3C1

## 1.2kV 80 mohm SiC MOSFET 6-Pack Module

RoHS

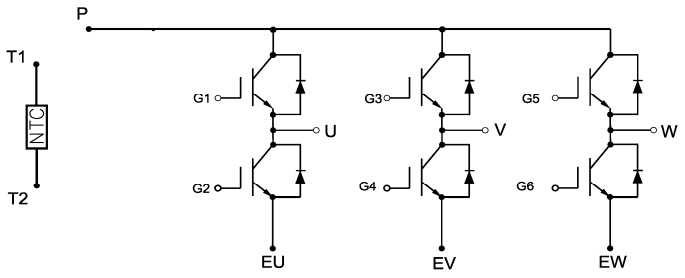
### Features:



- Ultra Low Loss
- High-Frequency Operation
- Zero Reverse Recovery Current from SiC SBDs
- Small Turn-off Tail Current from SiC MOSFETs
- Normally-off Device Operation
- Low Stray Inductance
- Lead Free, Compliant with RoHS Requirement

### Applications:

- Industrial Motor Drivers
- Solar Inverters
- UPS and SMPS
- Three-Phase PFC




### Maximum Rated Values ($T_C$=25℃Unless otherwise specified)

| Parameters | Symbol | Conditions | Specifications | Units |
|---|---|---|---|---|
| Drain - Source Voltage | $V_{DS}$ | | 1200 | V |
| Continuous Drain Current (Q1-Q4) | $I_D$ | $V_{GS}$=20V, $T_C$ = 25 $^0$C | 40 | A |
| | | $V_{GS}$=20V, $T_C$ = 80 $^0$C | 20 | A |
| Gate - Source Voltage | $V_{GS}$ | | +25/-10 | V |
| Pulsed Drain Current | $I_{DS}$ | Limited by Tj_max | 60 | A |
| Maximum Power Dissipation | $P_D$ | $T_C$ = 25 $^0$C | 220 | W |
| | | $T_C$ = 100 $^0$C | TBD | W |
| Operating Junction Temperature | $T_j$ | | -40 ~ +150 | $^0$C |
| Storage Temperature | $T_{STG}$ | | -40 ~ +125 | $^0$C |
| Solder Temperature | $T_L$ | Max for 10 sec | 260 | $^0$C |

## Electrical Characteristics of MOSFETs ($T_j$=25°C unless otherwise specified)

| Parameters | Symbol | Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| **OFF** | | | | | | |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = 1200V, $V_{GS}$ = 0V | -- | 1 | 100 | uA |
| Gate-Source Leakage Current | $I_{GSS}$ | $V_{DS}$ = 0V, $V_{GS}$ = 20V | -- | -- | ±250 | nA |
| **ON** | | | | | | |
| Gate-Source Threshold Voltage | $V_{GS(TH)}$ | $V_{DS}$ = 10V, $I_D$ = 1mA | 1.7 | 2.2 | -- | V |
| On State Resistance | $R_{DS(ON)}$ | $V_{GS}$ = 20V, $I_D$ = 20A, $T_j$ = 25 °C | -- | 80 | -- | mΩ |
| | | $V_{GS}$ = 20V, $I_D$ = 20A, $T_j$ = 150 °C | -- | 150 | -- | mΩ |
| **DYNAMIC** | | | | | | |
| Input Capacitance | $C_{ISS}$ | $V_{DS}$ = 800V, $V_{GE}$ = 0V, f = 1 MHz | -- | 950 | -- | pF |
| Output Capacitance | $C_{OSS}$ | | -- | 80 | -- | pF |
| Reverse Transfer Capacitance | $C_{RSS}$ | | -- | 6.5 | -- | pF |
| Module Stray Inductance | $L_{}$ | | -- | TBD | -- | nH |
| Module Lead Resistance | $R_{mod}$ | | -- | TBD | -- | mΩ |
| **SWITCHING** | | | | | | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DD}$= 800V, $I_D$ =20A<br>$R_G$= 2.5Ω, $V_{GS}$= -5/20V<br>Inductive Load, $T_J$=25 °C | -- | 15 | -- | ns |
| Rise Time | $t_r$ | | -- | 35 | -- | ns |
| Turn-Off Delay Time | $t_{d(off)}$ | | -- | 32 | -- | ns |
| Fall Time | $t_f$ | | -- | 26 | -- | ns |
| Turn-On Switching Energy Loss | $E_{ON}$ | | -- | 0.4 | -- | mJ |
| Turn-Off Switching Energy Loss | $E_{OFF}$ | | -- | 0.25 | -- | mJ |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DD}$= 800V, $I_D$ =20A<br>$R_G$= 2.5Ω, $V_{GS}$=-5/20V<br>Inductive Load, $T_J$=125 °C | -- | TBD | -- | ns |
| Rise Time | $t_r$ | | -- | TBD | -- | ns |
| Turn-Off Delay Time | $t_{d(off)}$ | | -- | TBD | -- | ns |
| Fall Time | $t_f$ | | -- | TBD | -- | ns |
| Turn-On Switching Energy Loss | $E_{ON}$ | | -- | TBD | -- | mJ |
| Turn-Off Switching Energy Loss | $E_{OFF}$ | | -- | TBD | -- | mJ |
| Total Gate Charge | $Q_G$ | $V_{DD}$= 800V, $I_D$ =20A<br>$V_{GS}$= -5/20V | -- | 49.2 | -- | nC |
| Gate-Source Charge | $Q_{GS}$ | | -- | 10.8 | -- | nC |
| Gate-Drain Charge | $Q_{GD}$ | | -- | 18 | -- | nC |
| Short Circuit Withstanding Time | $t_{sc}$ | $V_{CC}$= 800V, $V_{GS}$= 20V<br>$T_J$=125 °C | TBD | -- | -- | µs |

## SiC Freewheeling Diode Characteristics

| Parameters | Symbol | Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| Max continuous drain-source diode forward current | $I_S$ | | | 20 | | A |
| Max pulsed drain-source diode forward current | $I_{SM}$ | | | 60 | | A |
| Diode forward voltage | $V_{SD}$ | $V_{GS}$=-5V, $I_{SD}$=20A | | 1.7 | | V |
| Reverse recovery charge | $Q_C$ | $V_{GS}$=-5V, $I_{SD}$=20A, $T_j$=25°C | | 102 | | nC |

## Thermal Characteristics

| Parameters | Symbol | Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| Thermal Resistance Junction to Case: MOSFET | $R_{thJCM}$ | $T_C$=80 °C | | 0.59 | | ℃/W |
| Thermal Resistance Junction to Case: SBD | $R_{thJCD}$ | $T_C$=80 °C | | 1.13 | | ℃/W |

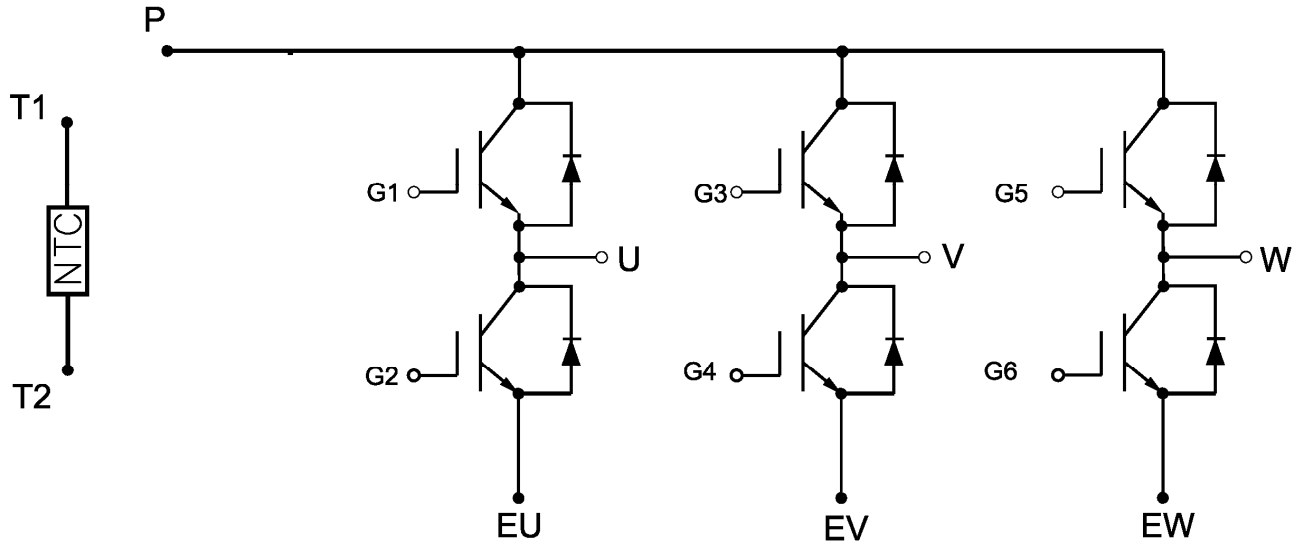
## Internal NTC-Thermistor Characteristic

| 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 |

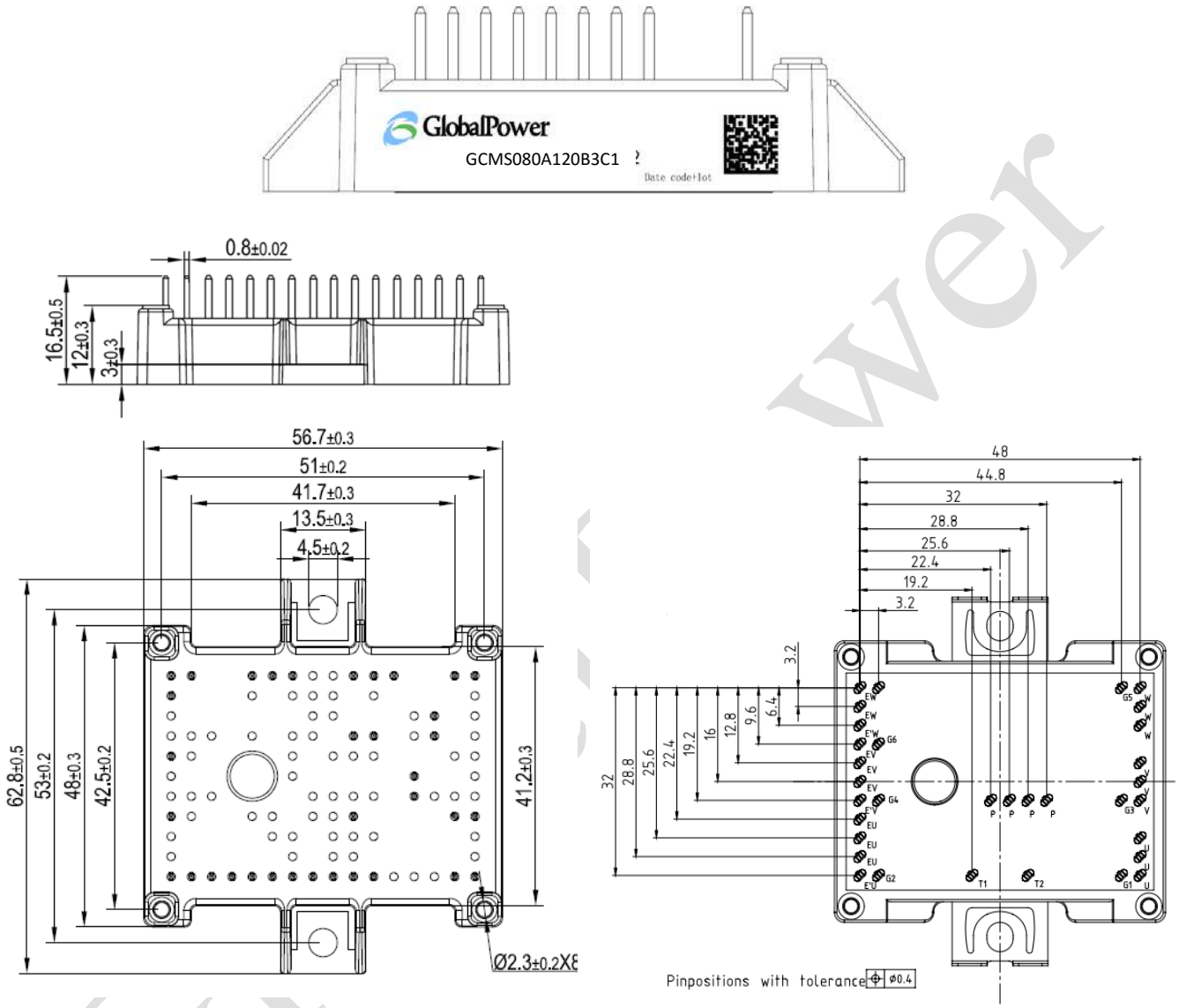
## Module

| Symbol | Description | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $V_{iso}$ | Isolation Voltage(All Terminals Shorted) | f = 50Hz, 1minute | | | 2500 | V |
| $T_{JOP}$ | Maximum Operating Junction Temperature Range | | -40 | | +150 | ℃ |
| $T_{stg}$ | Storage Temperature | | -40 | | +125 | ℃ |
| $R_{\theta CS}$ | Case-To-Sink (Conductive Grease Applied) | | | 0.05 | | ℃/W |
| T | Mounting Screw:M4 | | 1.0 | | 1.5 | N·m |
| G | Weight | | | 40 | | g |

**Internal Circuit:**



## Package Outline (Unit: mm):



## Revision History

| Date | Revision | Notes |
|---|---|---|
| 9/30/2016 | 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.

- 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.