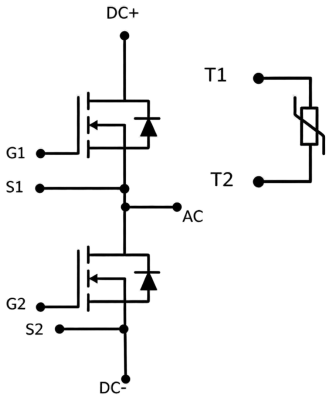
# Easy2B Half Bridge SiC Module

| Parameter | Value | Unit |
|---|---|---|
| $V_{DS}$ | 1200 | V |
| $I_D$ | 240 | A |
| $R_{DS(ON)}$ | 5 | mΩ |
| $Q_G$ | 730 | nC |




## Features:

- High Current Density
- Low Inductive Design
- Low Switching Losses
- High-Frequency Operation

## Applications:

- DC/DC Converter
- Motor Drives
- Servo Drives
- UPS Systems
- High Frequency Switching

## Absolute Maximum Ratings ($T_C$=25°C unless otherwise specified)

| Symbol | Parameter | Values | Unit |
|---|---|---|---|
| $V_{DS}$ | Drain-source Voltage | 1200 | V |
| $V_{GS}$ | Gate-source Voltage (dynamic) | -10/+22 | V |
| $I_D$ | Drain Current (continuous) ($V_{GS}$=18V, $T_H$=65°C, $T_{vjmax}$=175°C) | 240 | A |
| $I_{DM}$ | Drain Current (pulsed) | 480 | A |
| $T_{op}$;$T_{stg}$ | Operating and Storage Temperature Range | -40 to +175 | °C |
| $R_{th(j-c)}$ | Thermal Resistance, Junction-to-heatsink | 0.223 | °C/W |

## MOSFET Characteristics

| Symbol | Parameter | Min. | Typ. | Max. | Unit | Test Conditions |
|---|---|---|---|---|---|---|
| **Static characteristics (at TC=25°C unless otherwise specified)** | | | | | | |
| $B_{VDS}$ | Drain-source Breakdown Voltage | 1200 | - | - | V | $V_{GS}$=0V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | - | - | 50 | μA | $V_{DS}$=1200V; $V_{GS}$=0V |
| $I_{GSS}$ | Gate-body Leakage Current | - | - | 200 | nA | $V_{GS}$=-10/22V; $V_{DS}$=0V |
| $V_{GS(th)}$ | Gate Threshold Voltage | 2.2 | 3.2 | 4.2 | V | $V_{DS}$=$V_{GS}$ ; $I_D$=80mA |
| $R_{DS(on)}$ | Static Drain-source on Resistance | - | 5 | 7 | mΩ | $V_{GS}$=18V; $I_D$=240A |
| | | - | 7.5 | - | mΩ | $V_{GS}$=18V; $I_D$=240A;$T_i$=175°C |
| $V_{GS(on)}$ | Recommended Turn-on Voltage | - | 18 | - | V | Static |
| $V_{GS(off)}$ | Recommended Turn-off Voltage | - | -5 | - | V | |
| $R_G$ | Gate Resistance | - | 1.0 | - | Ω | $V_{GS}$=0V; f=1MHz |
| **Dynamic characteristics (at TC=25°C unless otherwise specified)** | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| $C_{iss}$ | Input Capacitance | - | 17200 | - | pF | $V_{DS}$=1000V; f=100kHz; $V_{AC}$=25mV |
| $C_{oss}$ | Output Capacitance | - | 930 | - | | |
| $C_{rss}$ | Reverse Transfer Capacitance | - | 48 | - | | |
| $E_{on}$ | Turn-on Energy | - | 5.06 | - | mJ | $V_{DS}$=800V; $V_{GS}$=-5/+18V; $I_D$=240A; $R_{G(ext)}$=2Ω; di/dt=30kA/μs (Tvj=175℃) |
| $E_{off}$ | Turn-off Energy | - | 3.95 | - | | $V_{DS}$=800V; $V_{GS}$=-5/+18V; $I_D$=240A; $R_{G(ext)}$=2Ω; di/dt=38kA/μs (Tvj=175℃) |
| $Q_G$ | Total Gate Charge | - | 730 | - | | $V_{DD}$=800V; $V_{GS}$=-5/+18V; $I_D$=240A |
| $t_{d(on)}$ | Turn-on Delay Time | - | 50.88 | - | ns | $V_{DS}$=600V; $V_{GS}$=-5/+18V; $I_D$=250A; $R_{G(ext)}$=5Ω; Load=100μH |
| $t_r$ | Rise Time | - | 57.92 | - | | |
| $t_{d(off)}$ | Turn-off Delay Time | - | 73.28 | - | | |
| $t_f$ | Fall Time | - | 41.28 | - | | |

## Body Diode Characteristics ($T_J$ =25°C unless otherwise specified)

| Symbol | Parameter | Min. | Typ. | Max. | Unit | Test Conditions |
|---|---|---|---|---|---|---|
| $V_{FSD}$ | Forward Voltage | - | 3.6 | - | V | $V_{GS}$=-5V; $I_F$=120A |
| $I_S$ | Continuous Diode Forward Current | - | 120 | - | A | $V_{GS}$=-5V; $T_C$=25°C |

## NTC Thermistor Characteristics

| Symbol | Parameter | Min. | Typ. | Max. | Unit | Test Conditions |
|---|---|---|---|---|---|---|
| $R_{25}$ | Rated Resistance | - | 5.00 | - | kΩ | $T_{NTC}$=25°C |
| ΔR/R | Deviation of $R_{100}$ | -5 | - | 5 | % | $T_{NTC}$=100°C; $R_{100}$=493.3Ω |
| $B_{25/50}$ | Beta Value for 25°C to 50°C | - | 3375 | - | K | $R_2=R_{25}\ \exp[B_{25/50}(1/T2-1/(298.15K))]$ |
| $B_{25/100}$ | Beta Value for 25°C to 100°C | - | 3433 | - | K | $R_2=R_{25}\ \exp[B_{25/100}(1/T2-1/(298.15K))]$ |

## Module

| Parameter | Conditions | Symbol | Value | | | Unit |
|---|---|---|---|---|---|---|
| Isolation test voltage | RMS, f = 50Hz, t = 1min | $V_{ISOL}$ | 2.5 | | | KV |
| Internal isolation | | | Al2O3 | | | |
| Creepage distance | Terminal to heatsink | | 11.5 | | | mm |
| | Terminal to terminal | | 6.3 | | | |
| Clearance | Terminal to heatsink | | 10.0 | | | mm |
| | Terminal to terminal | | 5.0 | | | |
| Comperative tracking index | | CTI | > 200 | | | |
| RTI Elec. | | RTI | 140 | | | |
| Storage temperature | | $T_{stg}$ | -40 | | 125 | ℃ |
| Mounting Force Per Clamp | | F | 40 | | 80 | N |
| Weight | | W | | 41.4 | | g |

## Typical Characteristics

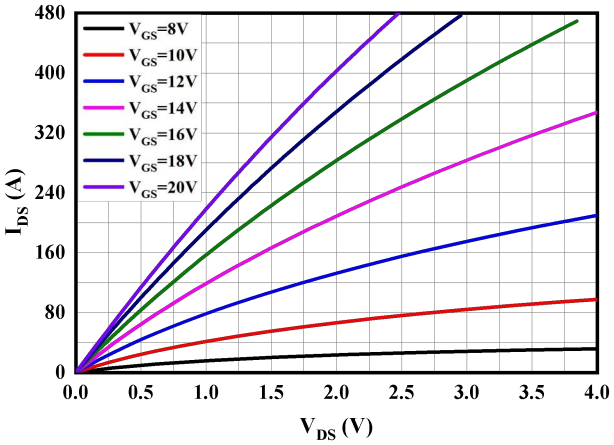



Figure 1. Typical output characteristics ($T_{vj}$ = 25°C)

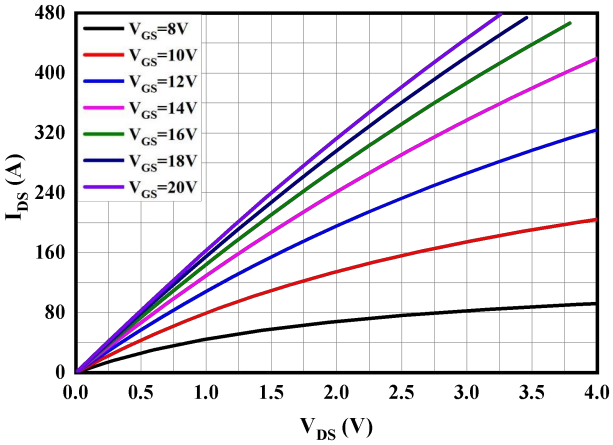



Figure 2. Typical output characteristics ($T_{vj}$ =125°C)

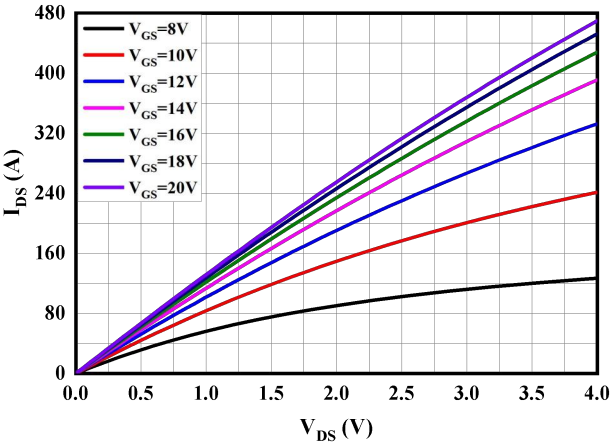



Figure 3. Typical output characteristics ($T_{vj}$ =175°C)

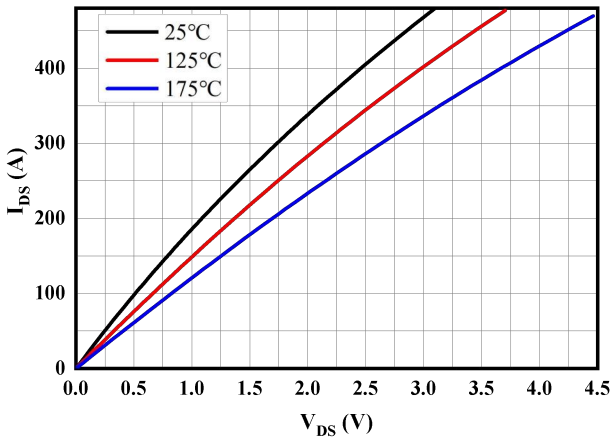



Figure 4. Output curves ($V_{GS}$=18V)

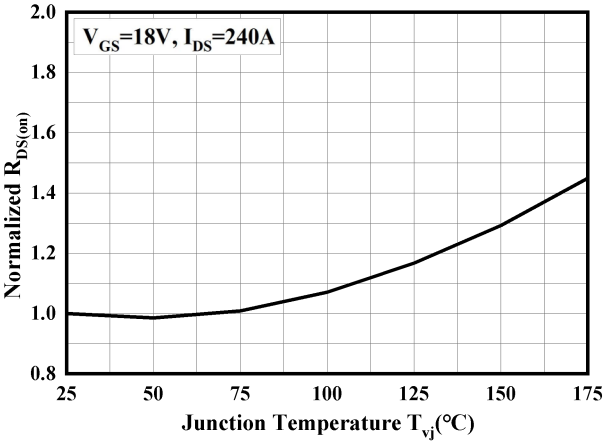



Figure 5. Normalized $R_{DS(on)}$ on vs. Temperature

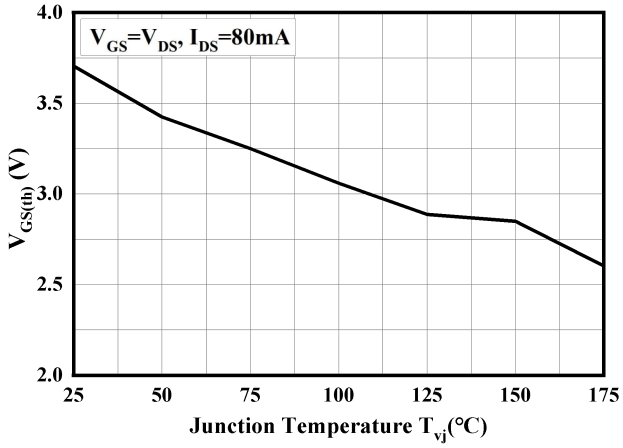



Figure 6.$V_{GS(th)}$ vs. Temperature

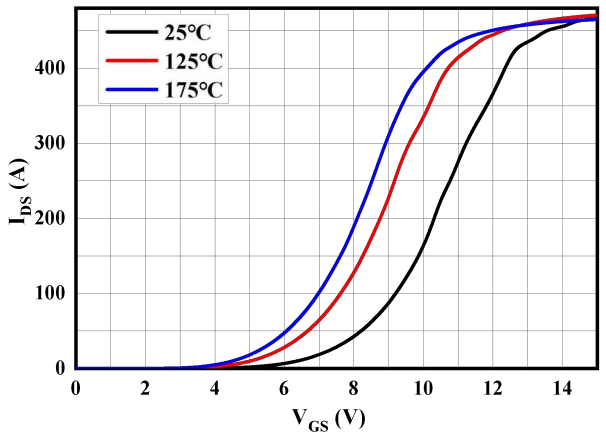



Figure 7. Transfer curves ($V_{DS}$=20V)

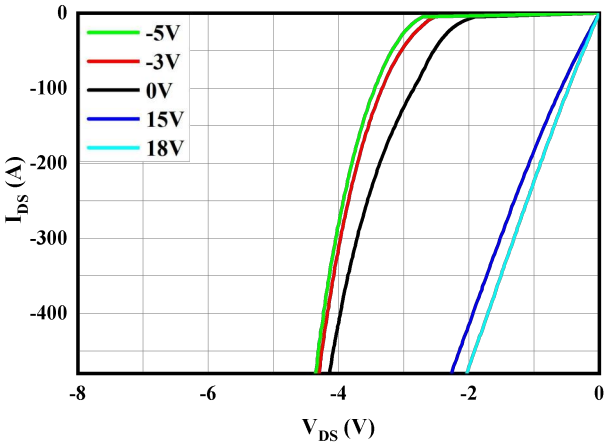



Figure 8. 3rd Quadrant curves($T_{vj}$=25℃)

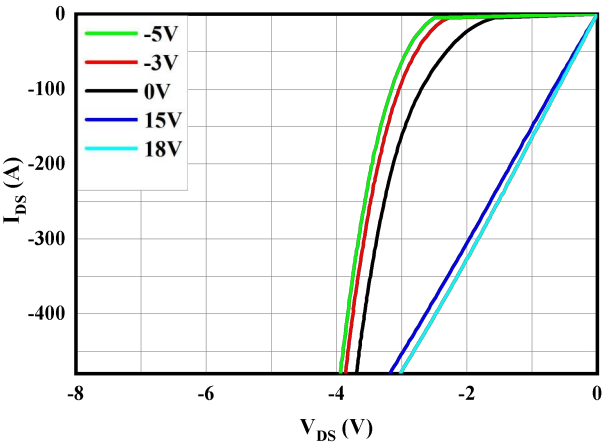



Figure 9. 3rd Quadrant curves($T_{vj}$=125℃)

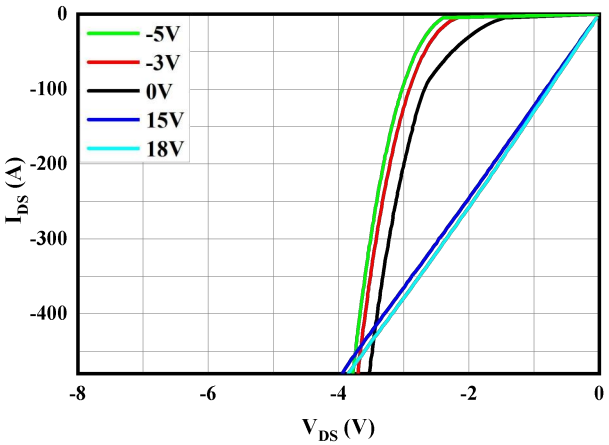



Figure 10. 3rd Quadrant curves($T_{vj}$=175℃)

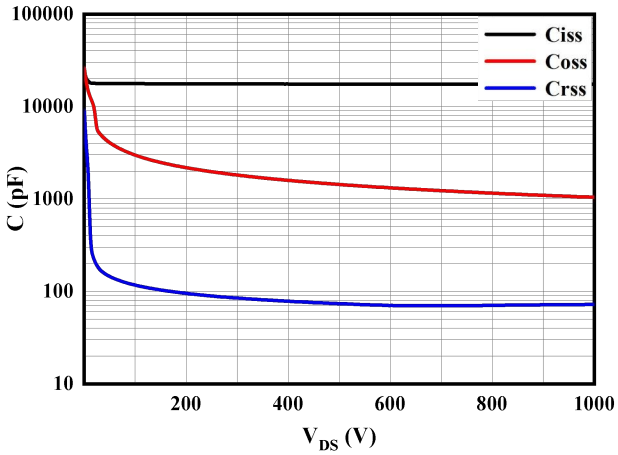



Figure 11. Capacitance vs. $V_{DS}$

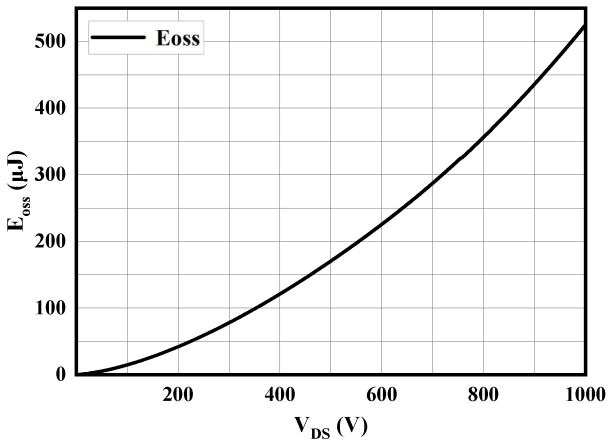



Figure 12. Output capacitor stored energy

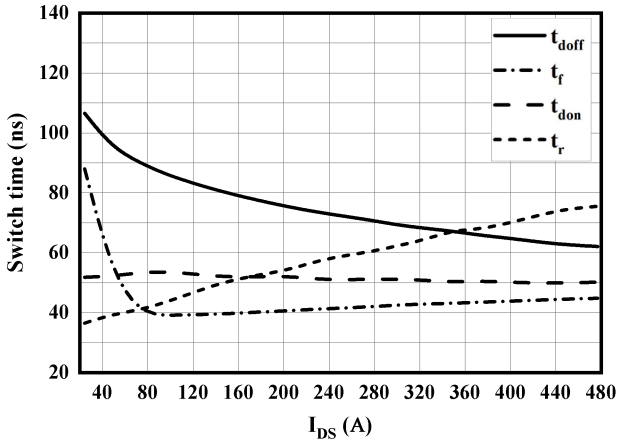



Figure 13. Switch time vs $I_{DS}$
$R_{Goff}$=$R_{Gon}$=2Ω, $V_{DD}$=800V, $V_{GS}$=-5/+18V

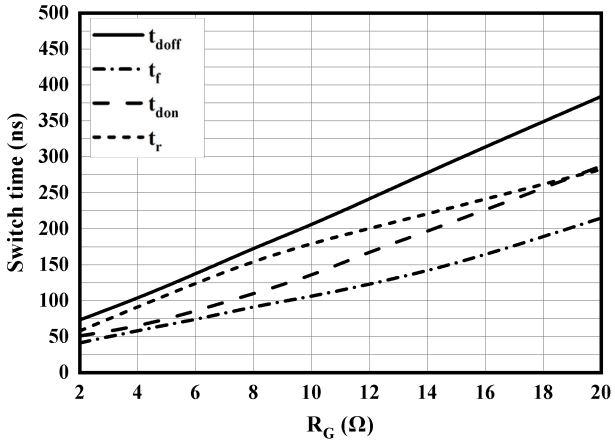



Figure 14. Switch time vs $R_G$
$R_{Goff}$=$R_{Gon}$,$V_{DD}$=800V, $I_{DS}$=240A, $V_{GS}$=-5/+18V

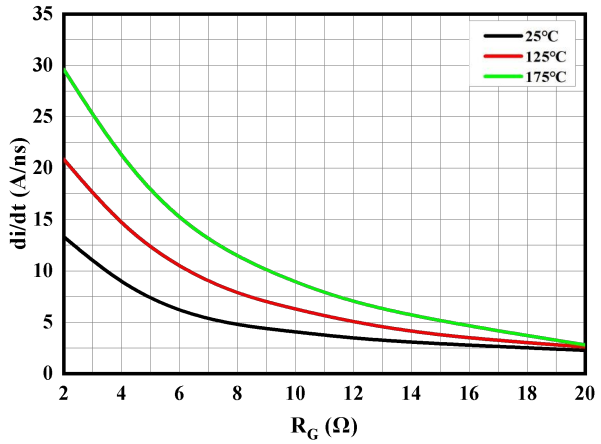



Figure 15. di/dt-on vs $R_G$
$R_{Goff}$=$R_{Gon}$, $V_{DD}$=800V, $I_{DS}$=240A, $V_{GS}$=-5/+18V

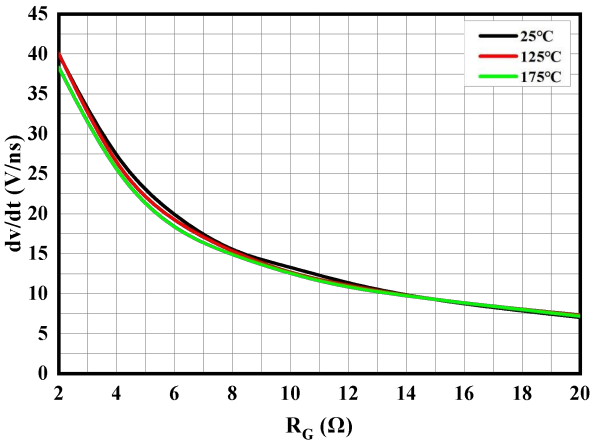



Figure 16. dv/dt-off vs $R_G$
$R_{Goff}$=$R_{Gon}$, $V_{DD}$=800V, $I_{DS}$=240A, $V_{GS}$=-5/+18V

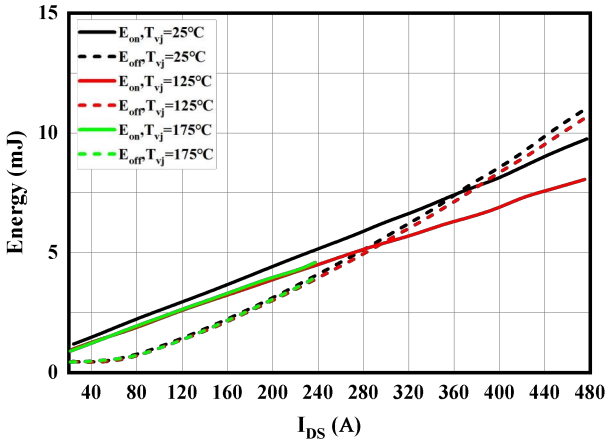



Figure 17. Switch loss vs $I_D$
$R_{Goff}$=$R_{Gon}$=2Ω, $V_{DD}$=800V, $V_{GS}$=-5/+18V

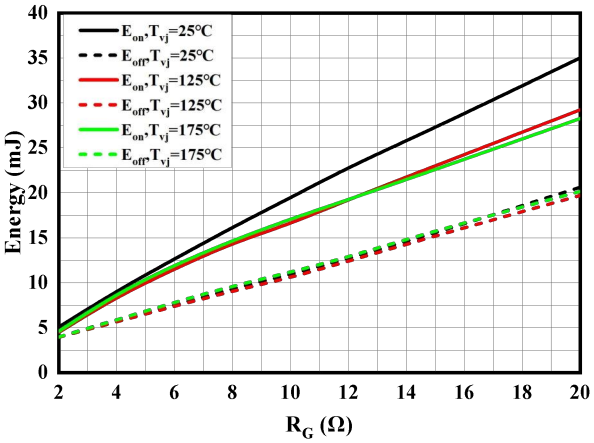



Figure 18. Switch loss vs $R_G$
$R_{Goff}$=$R_{Gon}$, $V_{DD}$=800V, $I_{DS}$=240A, $V_{GS}$=-5/+18V

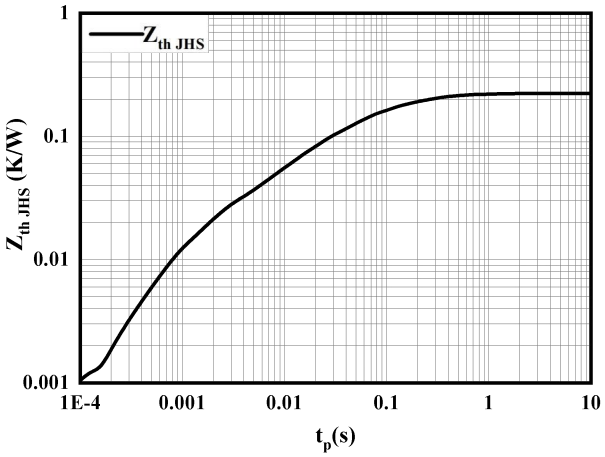



Figure 19. Transient thermal impedance

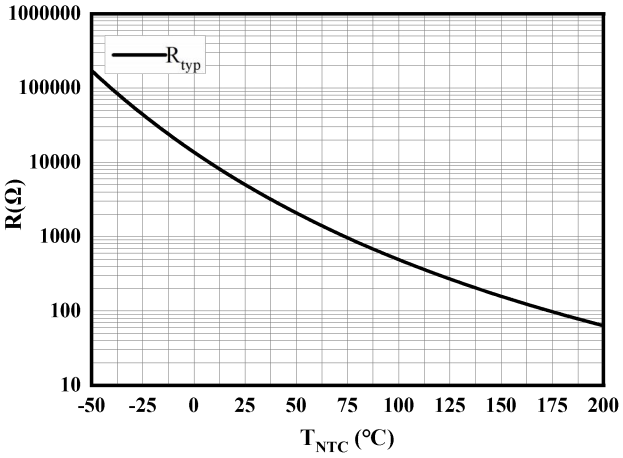
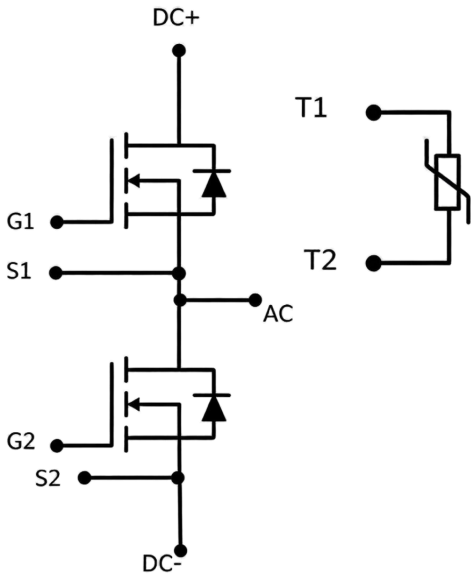
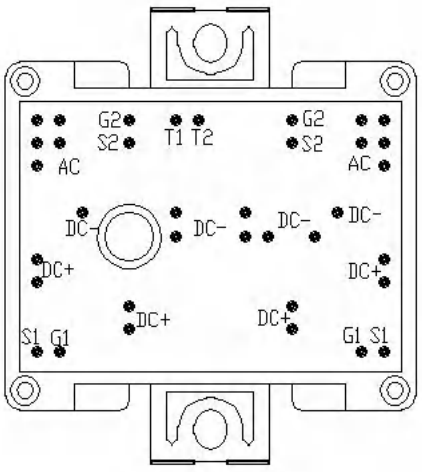


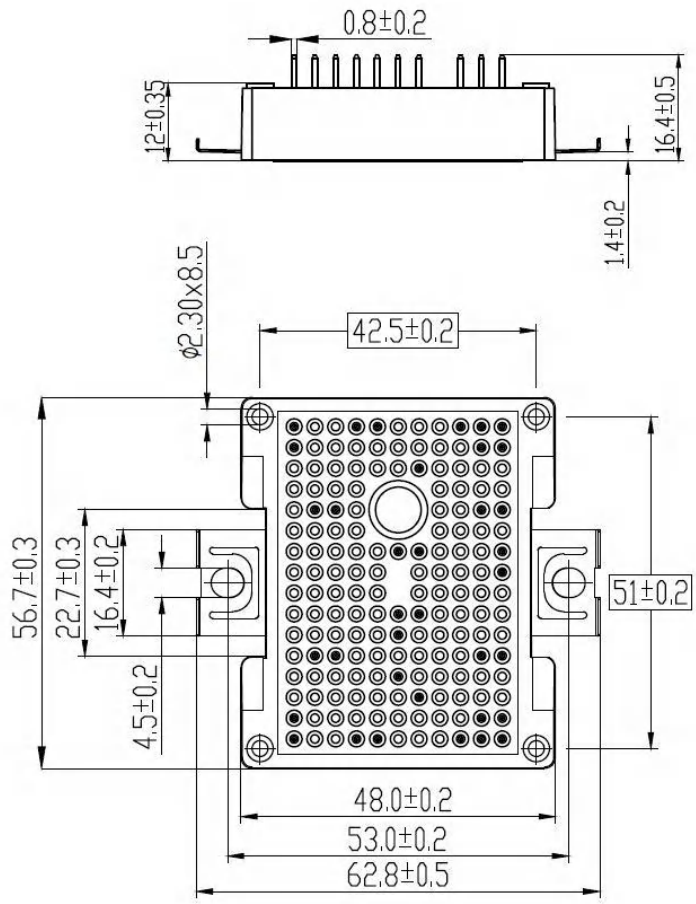

Figure 20. NTC-Thermistor-temperature characteristic

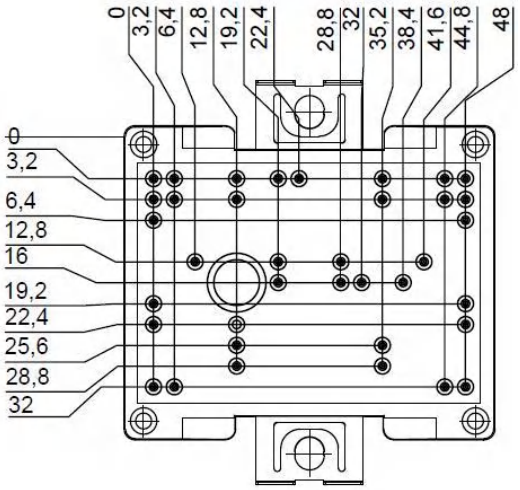
## Circuit Diagram



## Package Outlines(Unit: mm):

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