

MBB600TV6A

Silicon N-channel IGBT

1. FEATURES

- * High speed, low loss IGBT module.
- * Low thermal impedance due to direct liquid cooling.
- * High reliability, high durability module.

2. ABSOLUTE MAXIMUM RATINGS (T_c=25°C)

| Item | Symbol | Unit | Specification |
|--|-------------------|------------------|---------------------|
| Collector Emitter Voltage | V _{CES} | V | 650 |
| Gate Emitter Voltage | V _{GES} | V | ±20 |
| Collector Current | DC | I _c | 600 |
| | 1ms | I _{cp} | 1200 |
| Forward Current | DC | I _F | 600 |
| | 1ms | I _{FM} | 1200 |
| Maximum Junction Temperature | T _{jmax} | °C | 175 |
| Temperature under switching conditions | T _{jop} | °C | -40 ~ +150 |
| Storage Temperature | T _{stg} | °C | -40 ~ +125 |
| Isolation Voltage | V _{ISO} | V _{RMS} | 2,500 (AC 1 minute) |
| Screw Torque | Terminals (M6) | - | 6.0 (1) |
| | Mounting (M5) | - | 4.0 (2) |

Notes: Recommended Value (1)5.5±0.5N·m (2)3.5±0.5N·m

3. ELECTRICAL CHARACTERISTICS

| Item | Symbol | Unit | Min. | Typ. | Max. | Test Conditions | |
|--|------------------------|----------------------|------|------|------|---|--|
| Collector Emitter Cut-Off Current | I _{CES} | mA | - | - | 1.0 | V _{ce} =650V, V _{ge} =0V, T _j =25°C | |
| Gate Emitter Leakage Current | I _{GES} | nA | - | - | ±500 | V _{ge} =±20V, V _{ce} =0V, T _j =25°C | |
| Collector Emitter Saturation Voltage | V _{CE(sat)} | V | 1.3 | 1.65 | 2.1 | I _c =600A, V _{ge} =15V, T _j =25°C | |
| | | | - | 1.9 | - | I _c =600A, V _{ge} =15V, T _j =150°C | |
| Gate Emitter Threshold Voltage | V _{GE(TO)} | V | 6.0 | 6.7 | 7.5 | V _{ce} =5V, I _c =600mA, T _j =25°C | |
| Input Capacitance | C _{ies} | nF | - | 53 | - | V _{ce} =10V, V _{ge} =0V, f=100kHz, T _j =25°C | |
| Switching Times | Rise Time | t _r | - | 0.15 | 0.4 | V _{cc} =300V, I _c =600A | |
| | Turn On Time | t _{on} | - | 0.50 | 0.9 | L _s =30nH, R _{g(ext)} =4.7Ω, C _{ge} =56nF | |
| | Fall Time | t _f | - | 0.35 | 0.8 | V _{ge} =+15V/0V, T _j =150°C | |
| | Turn Off Time | t _{off} | - | 1.20 | 2.0 | Inductive load | |
| Peak Forward Voltage Drop | V _F | V | 1.1 | 1.45 | 1.8 | I _f =600A, V _{GE} =0V, T _j =25°C | |
| | | | - | 1.5 | - | I _f =600A, V _{GE} =0V, T _j =150°C | |
| Reverse Recovery Time | t _{rr} | μs | - | 0.35 | 0.8 | V _{cc} =300V, I _c =600A, | |
| Turn On Loss | E _{on(full)} | mJ/P | - | 20 | 30 | L _s =30nH, R _{g(ext)} =4.7Ω, C _{ge} =56nF | |
| Turn Off Loss | E _{off(full)} | mJ/P | - | 45 | 65 | V _{ge} =+15V/0V, T _j =150°C | |
| Reverse Recovery Loss | E _{rr(full)} | mJ/P | - | 15 | 23 | Inductive load | |
| Thermistor Resistance | R | kΩ | - | 5 | - | T _c =25°C | |
| | | | - | 0.16 | - | T _c =150°C | |
| Leakage Current between Thermistor and Other Terminals | | mA | - | - | 0.1 | V=600Vp | |
| Thermal Resistance | IGBT | R _{th(j-w)} | K/W | - | - | 0.145 | Junction to water/fin, 10l/min, 50%LLC |
| | FWD | R _{th(j-w)} | K/W | - | - | 0.21 | (per 1 arm) |

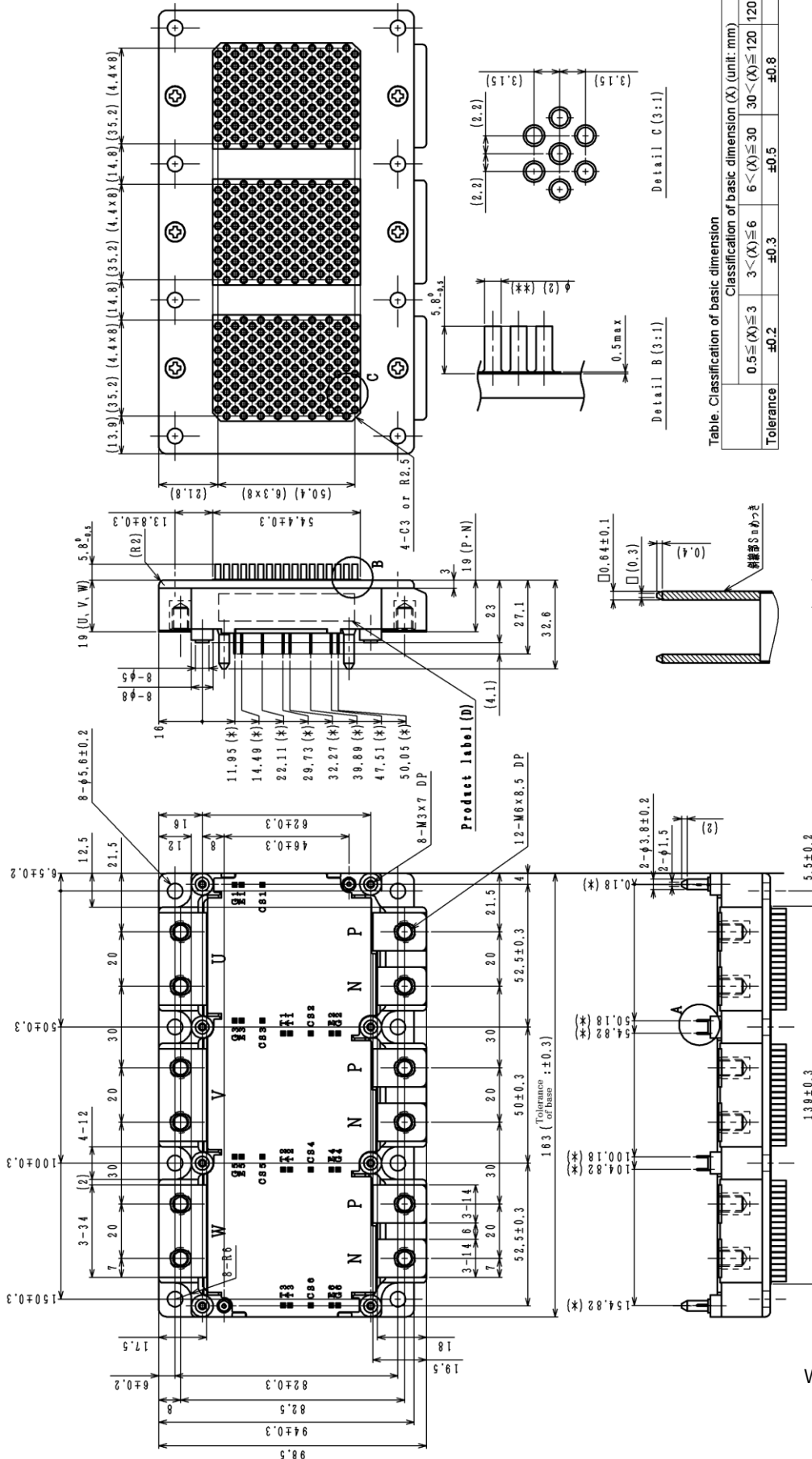
* Please contact our representatives at order.

* For improvement, specifications are subject to change without notice.

* For actual application, please confirm this spec sheet is the newest revision.

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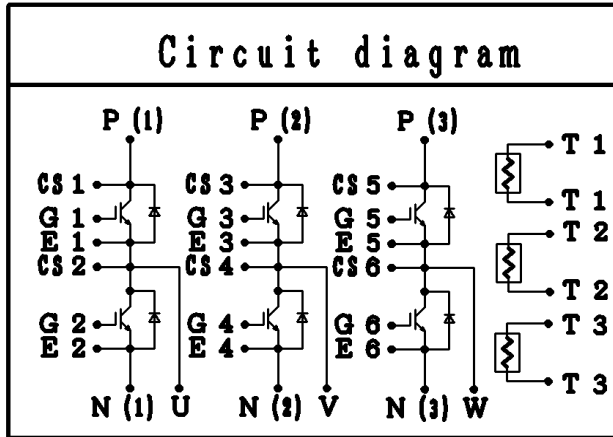
4. PACKAGE OUTLINE DRAWING



Weight : 900g

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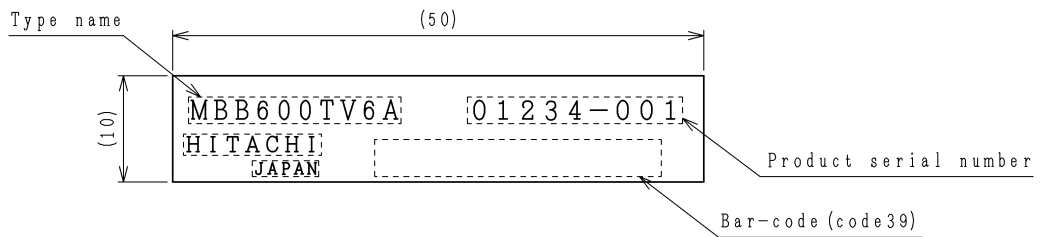
5. CIRCUIT DIAGRAM



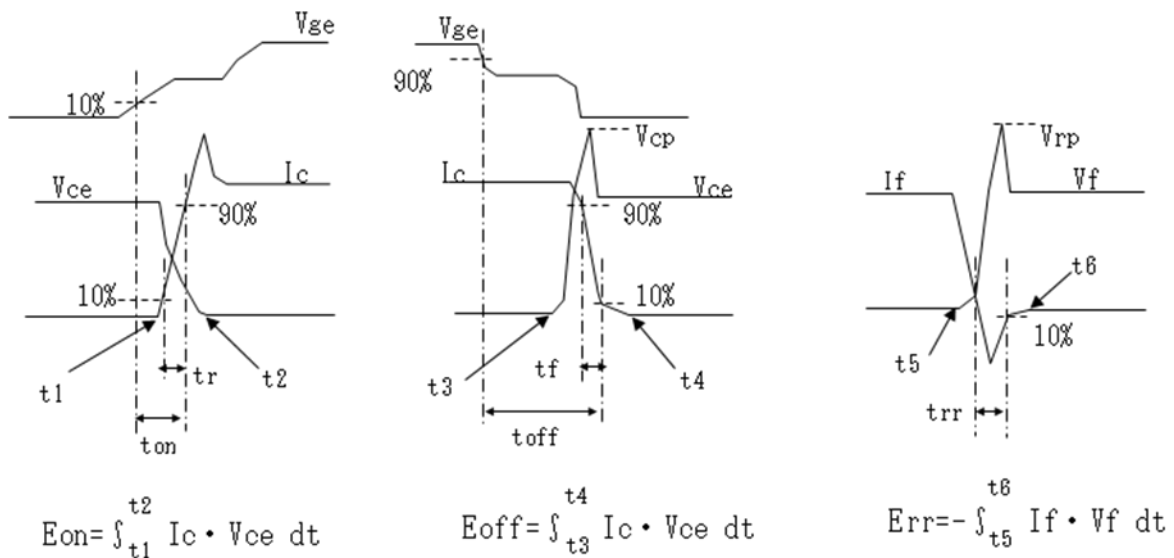
Thermistor T1, T2 and T3 are located on the same ceramic substrate with the IGBT and diode chips of phase U, V and W, respectively.

Note: This temperature measurement is not suitable for the short circuit or short term overload detection and should be used only for the module protection against long term overload or malfunction of the cooling system.

6. PRODUCT LABEL

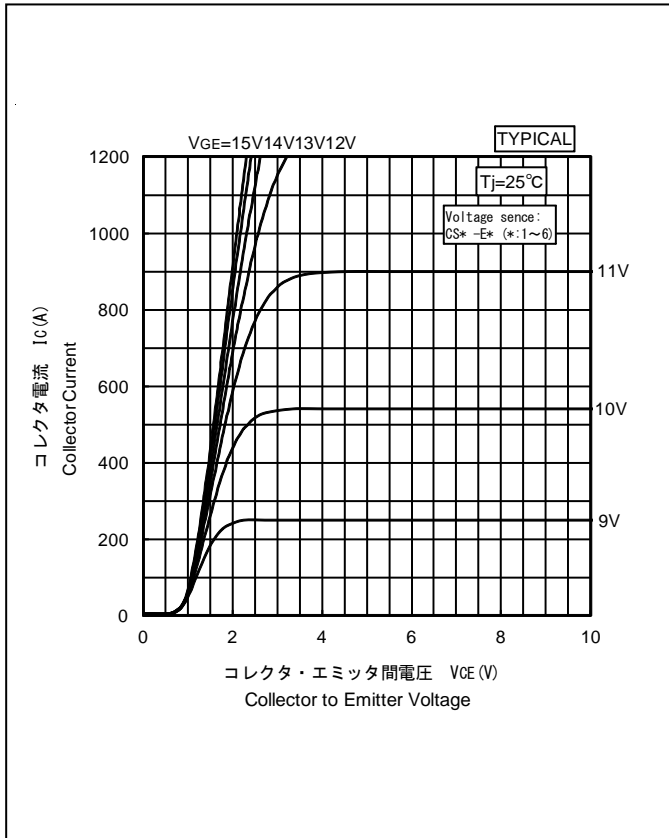


7. DEFINITION OF THE SYMBOLS

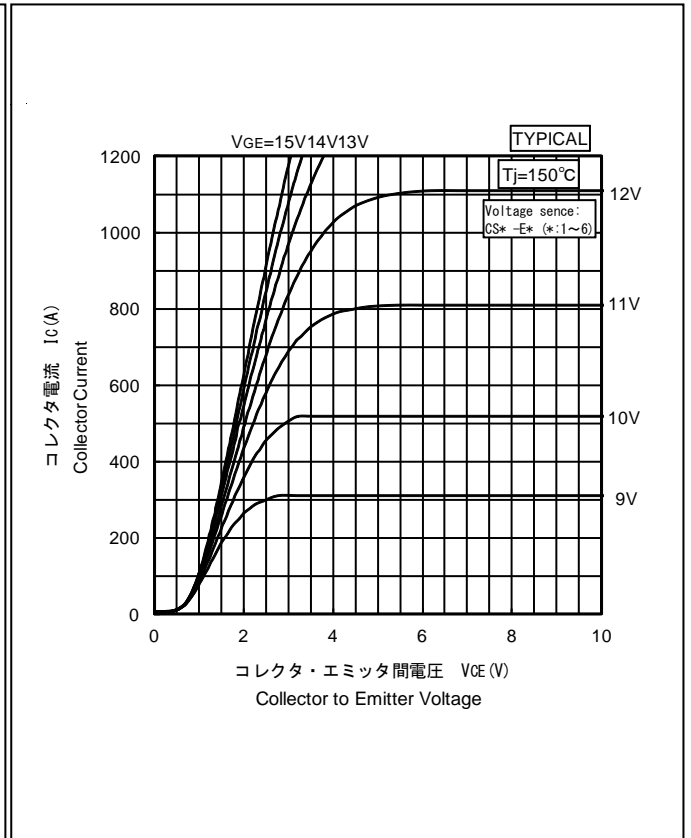


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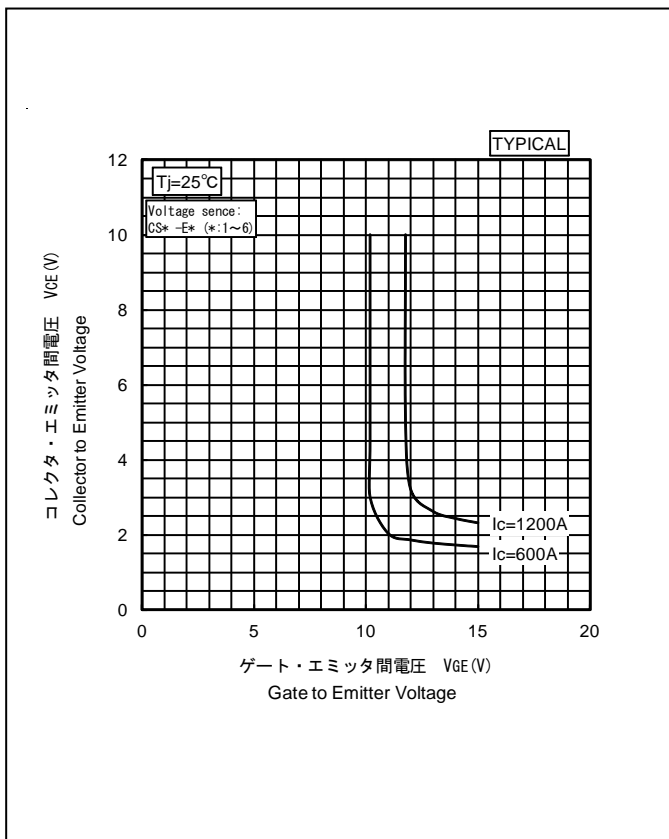
8. STATIC CHARACTERISTICS



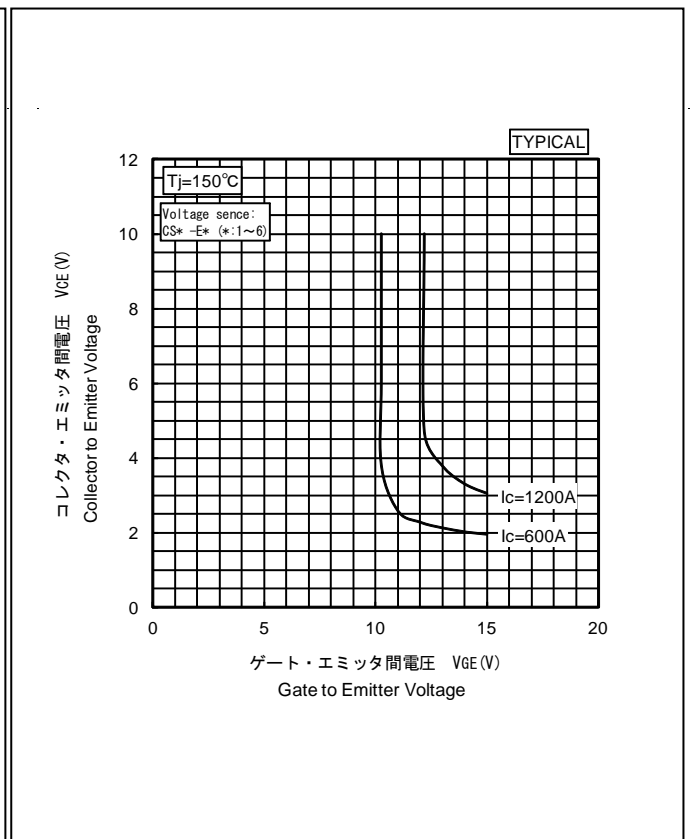
Collector Current vs. Collector to Emitter Voltage



Collector Current vs. Collector to Emitter Voltage

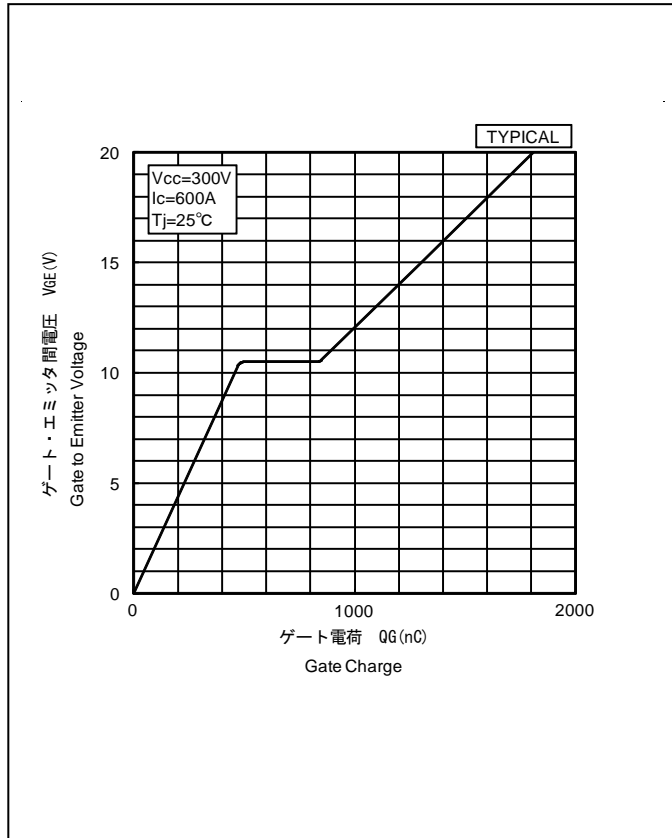


Collector to Emitter Voltage vs. Gate to Emitter Voltage

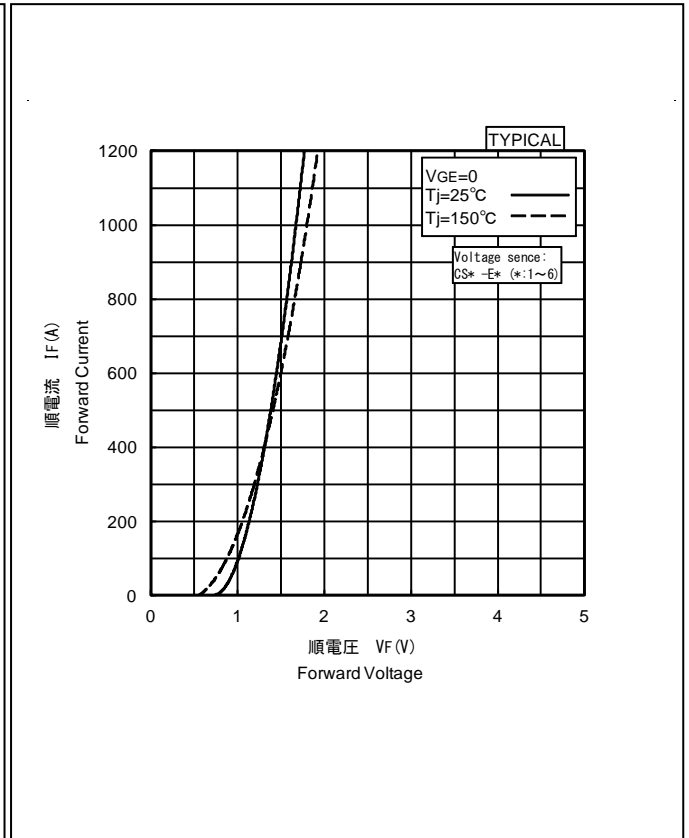


Collector to Emitter Voltage vs. Gate to Emitter Voltage

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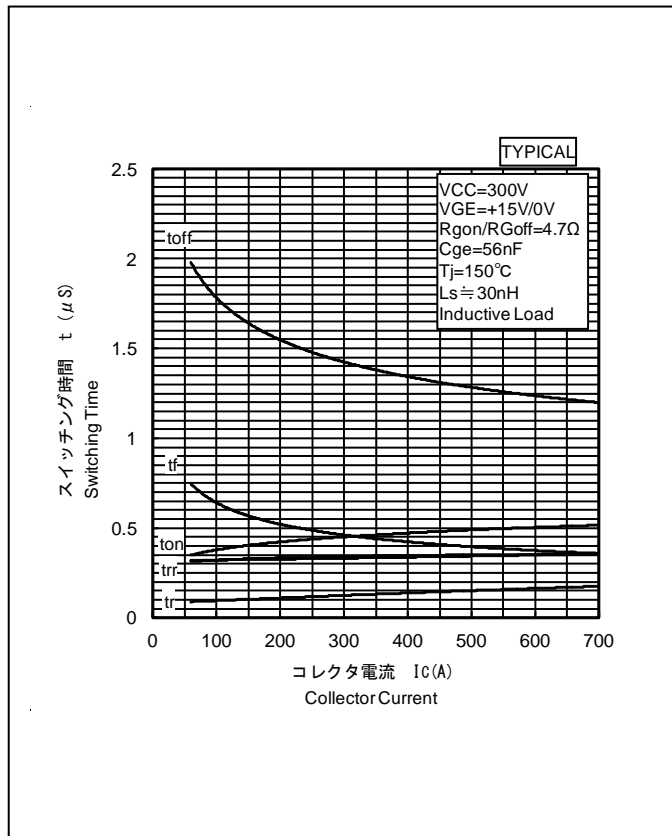


Gate Charge Characteristics

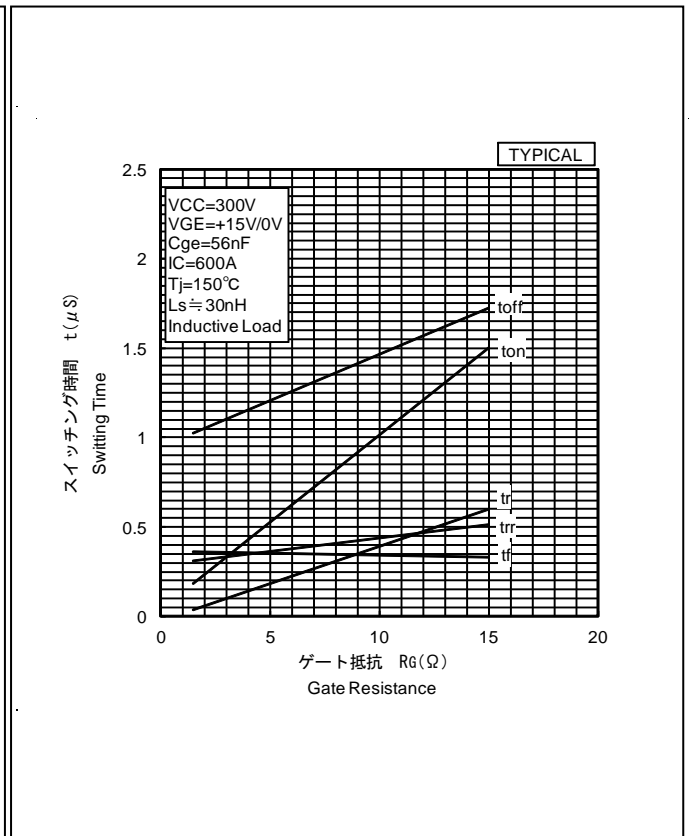


Forward Voltage of Free-Wheeling Diode

9. DYNAMIC CHARACTERISTICS

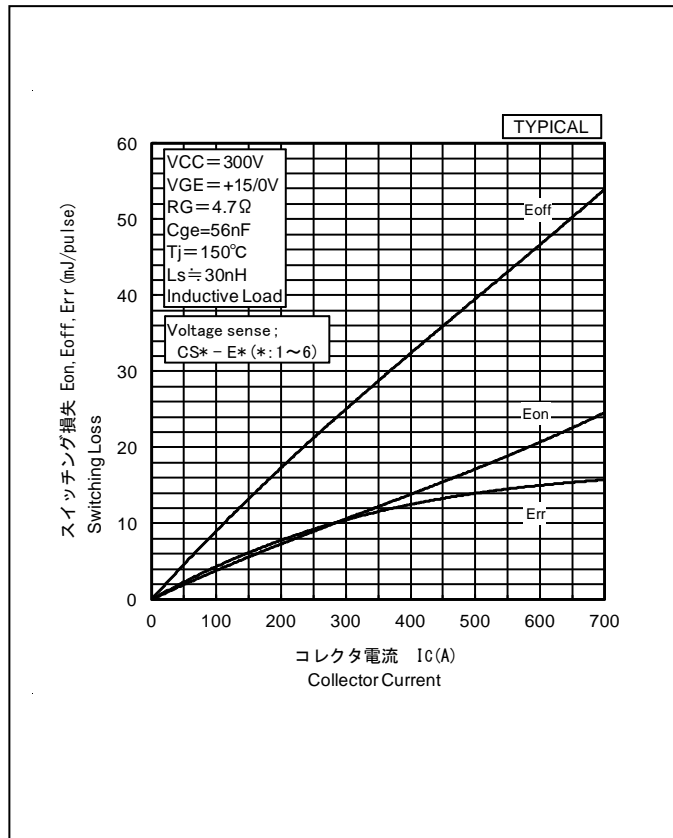


Switching Time vs. Collector Current

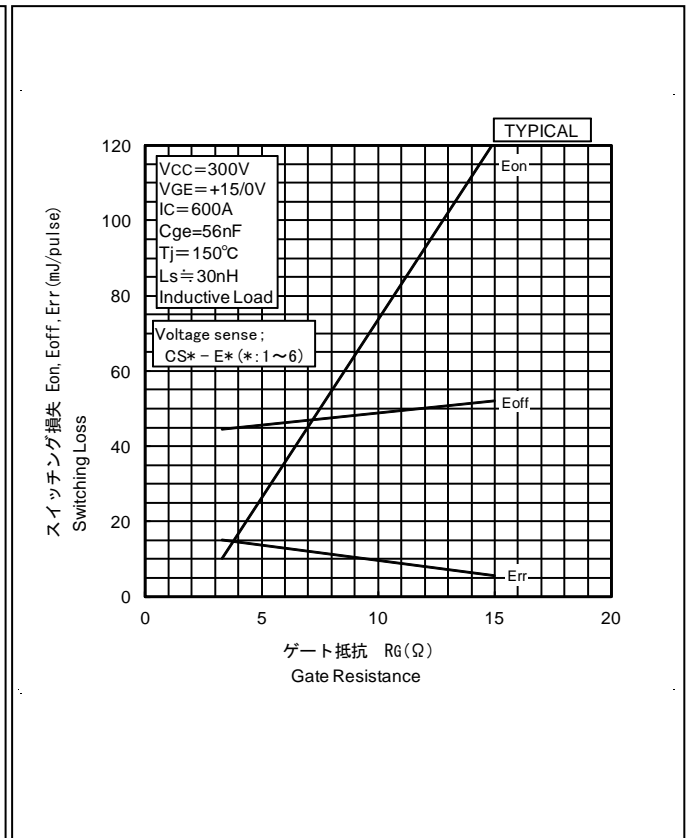


Switching Time vs. Gate Resistance

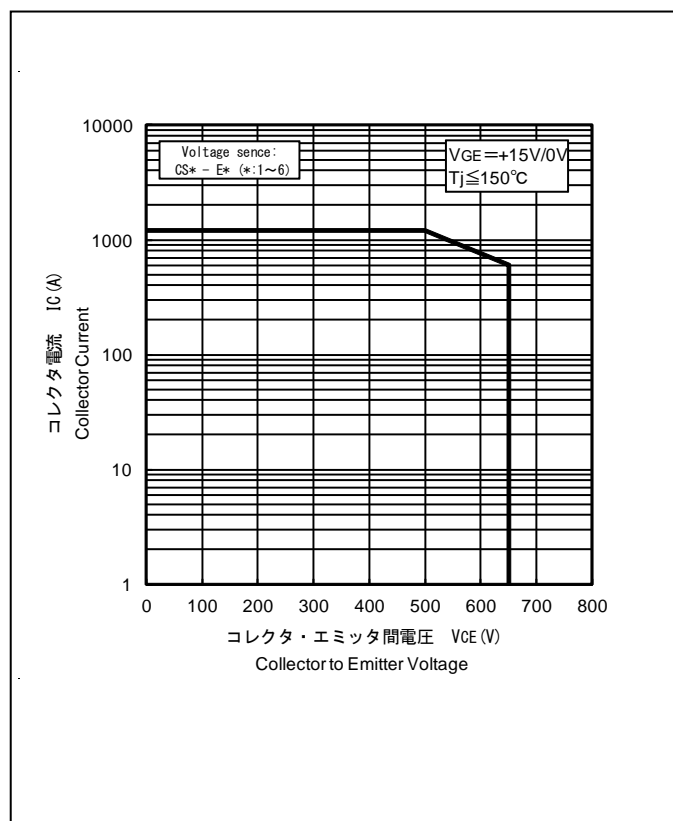
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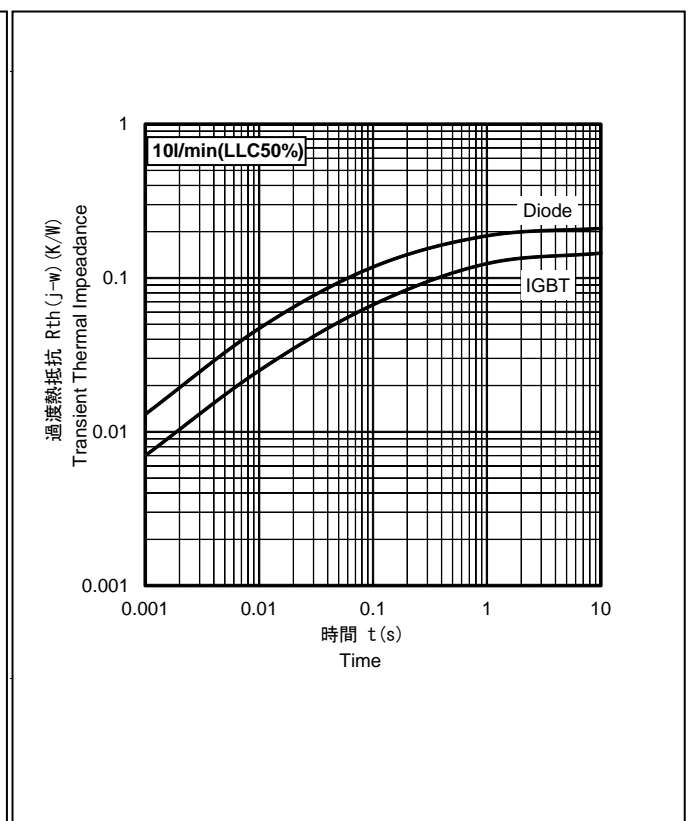
Switching Loss vs. Collector Current



Switching Loss vs. Gate Resistance

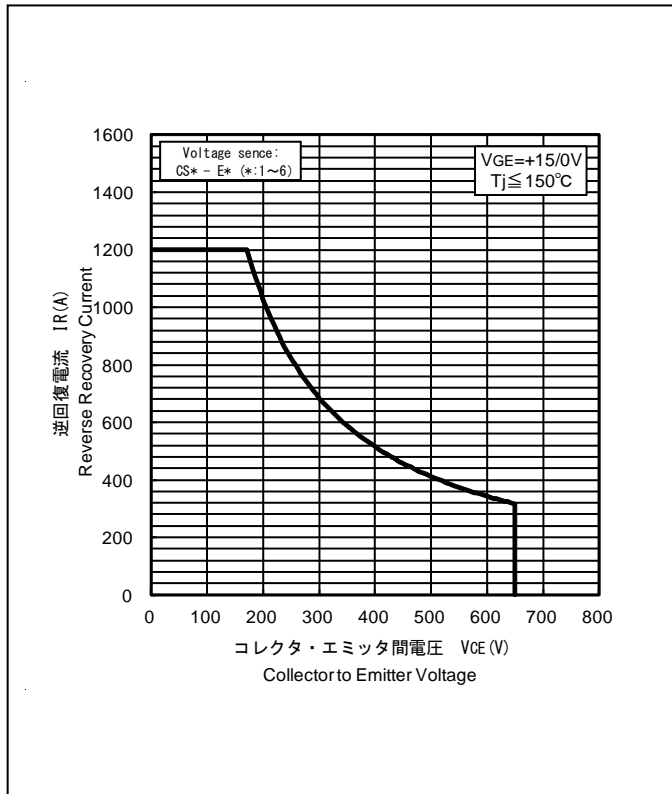


Reverse Bias Safe Operation Area (RBSOA)



Transient Thermal Impedance Characteristics

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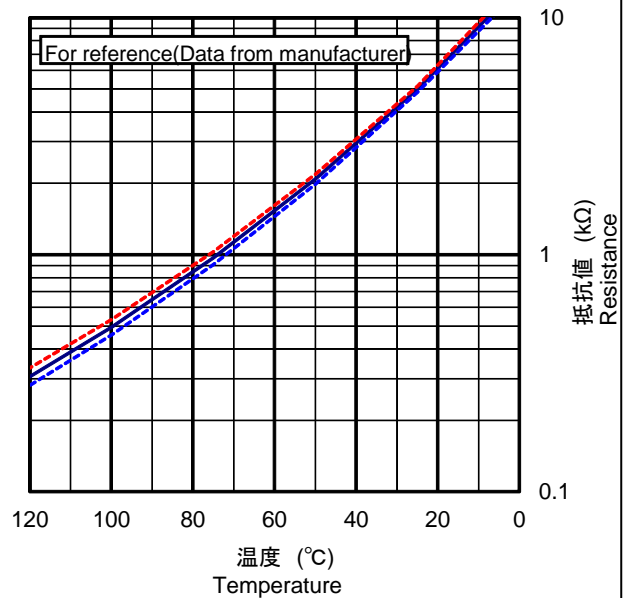


Reverse Recovery Safe Operation Area (RRSOA)

10. THERMISTOR

Table1 Specifications of Thermistor(For reference)

| | |
|-------------------------------------|----------------------|
| Nominal zero-power resistance | 5kΩ ± 3% (25°C) |
| B value | 3375K ± 2% (25~50°C) |
| Operating temperature range | -50~150°C |
| Thermal time constant(in still air) | Approx. 10 sec. |



Resistance vs. Temperature

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HITACHI POWER SEMICONDUCTORS

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