

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.

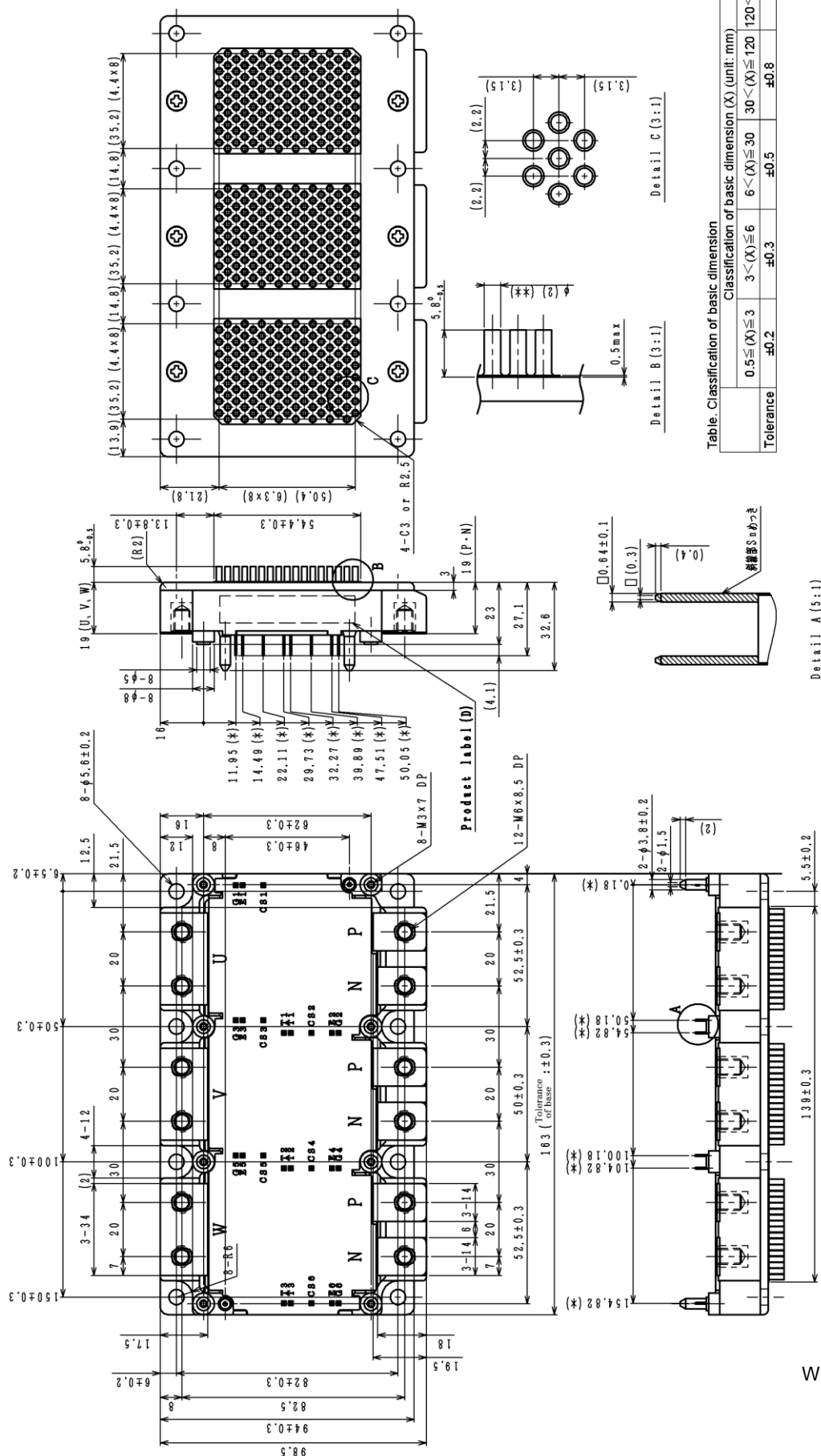
* For improvement, specifications are subject to change without notice.

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

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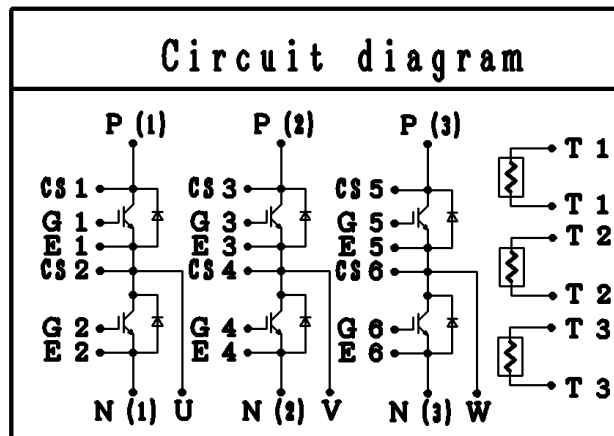
4. PACKAGE OUTLINE DRAWING

Unit in mm



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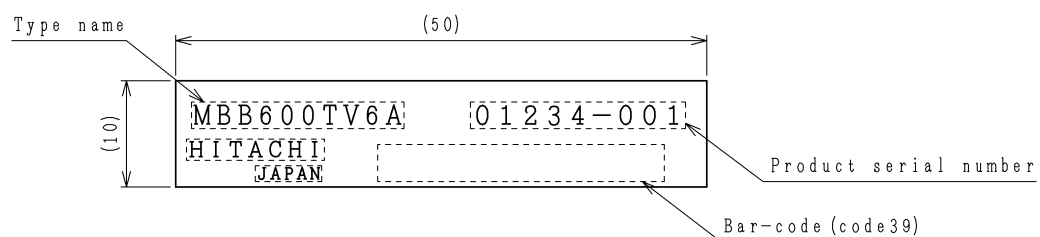
5. CIRCUIT DIAGRAM



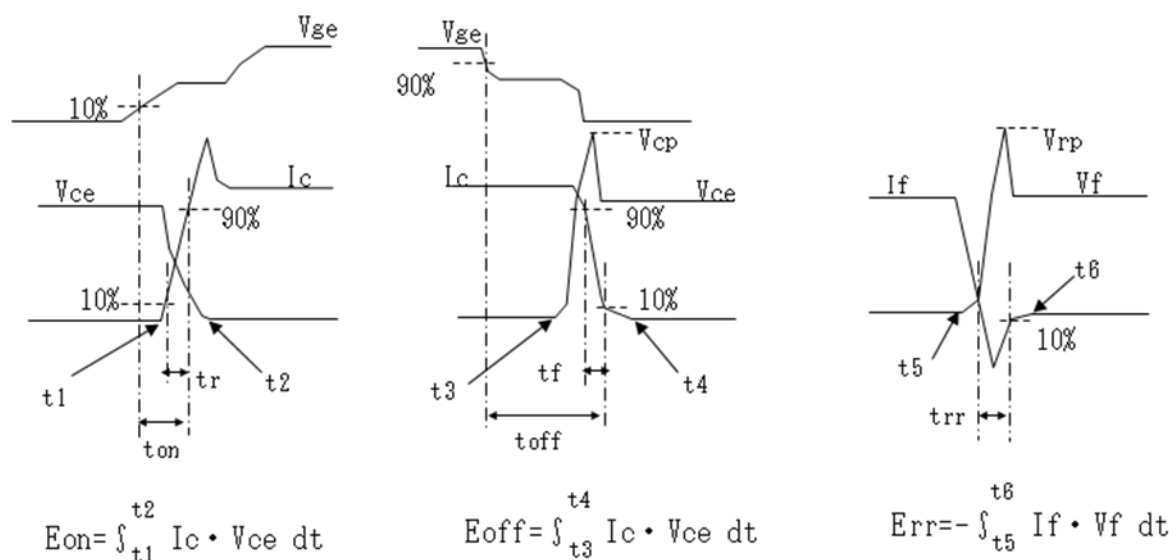
Thermistor T1, T2 and T3 are located on the same ceramic substrate with the IGBT and diode chips of phase U, V and W, respectively.

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

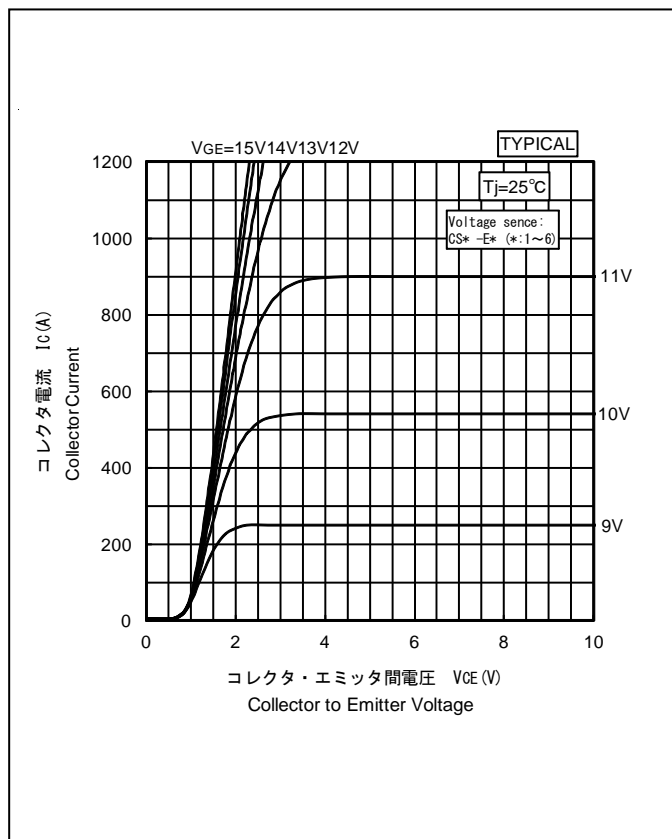


7. DEFINITION OF THE SYMBOLS

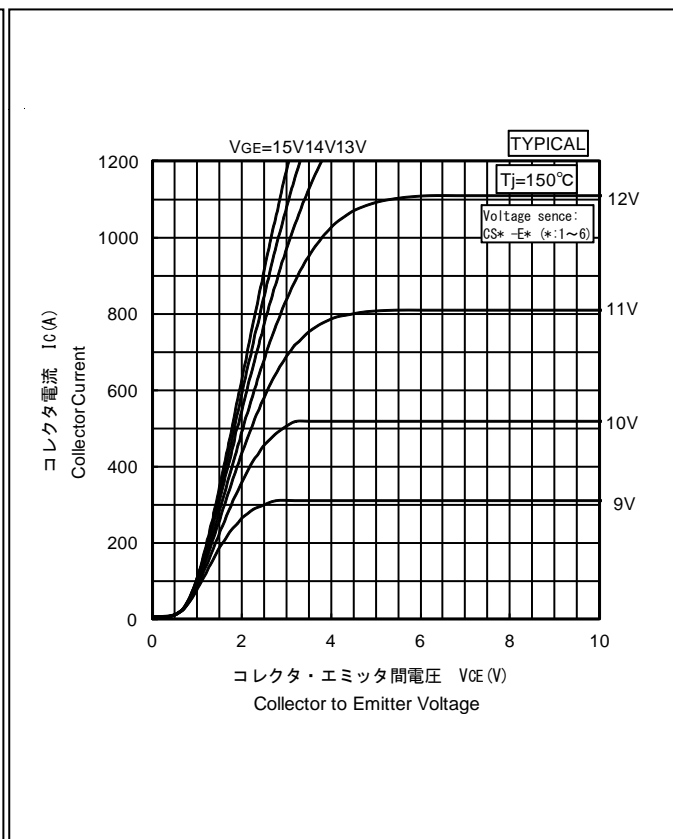


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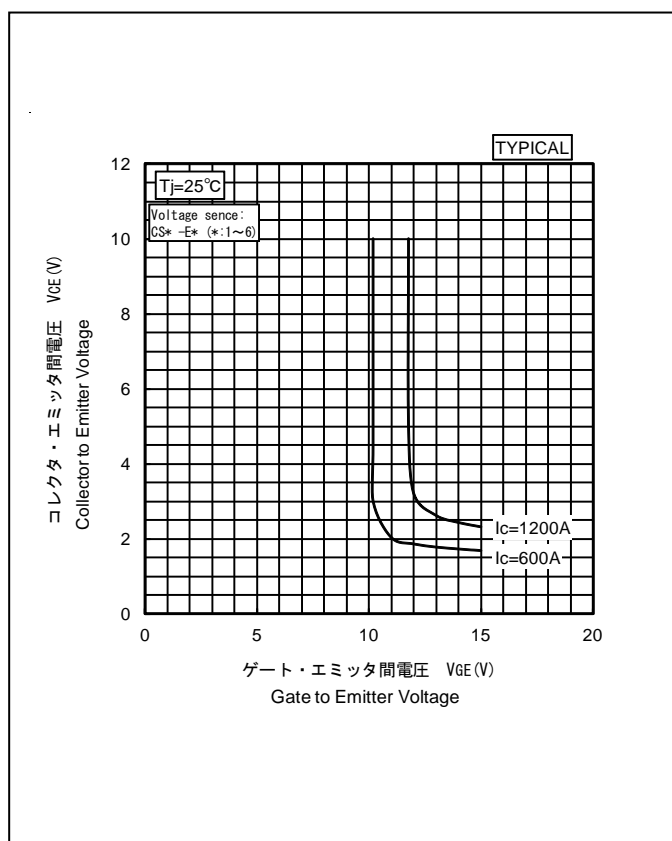
8. STATIC CHARACTERISTICS



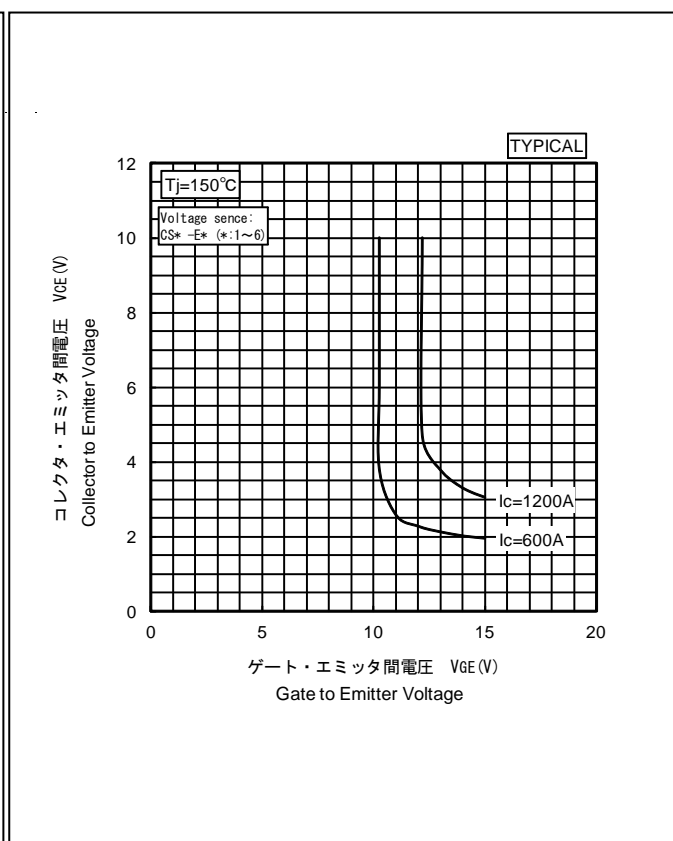
Collector Current vs. Collector to Emitter Voltage



Collector Current vs. Collector to Emitter Voltage

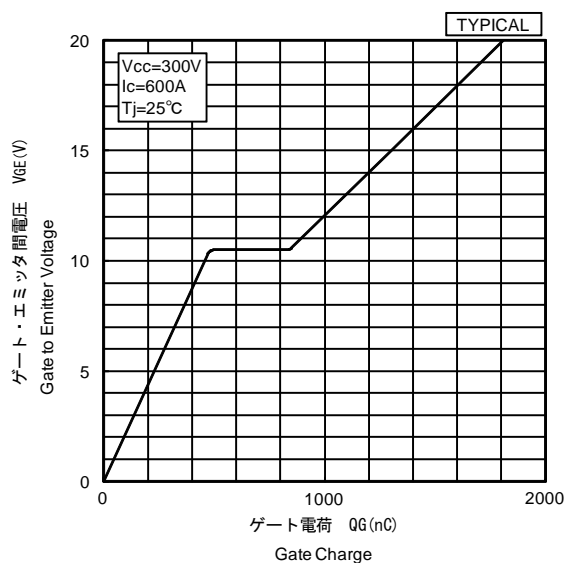


Collector to Emitter Voltage vs. Gate to Emitter Voltage

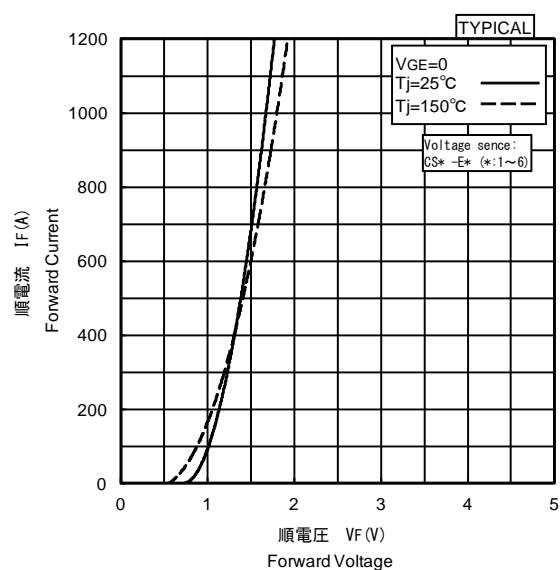


Collector to Emitter Voltage vs. Gate to Emitter Voltage

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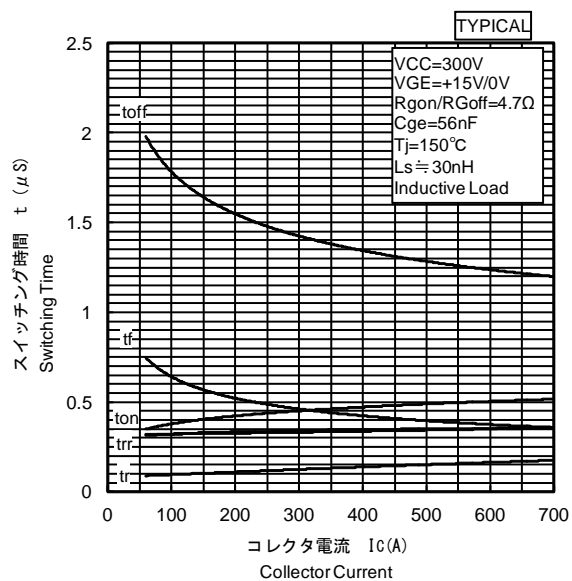


Gate Charge Characteristics

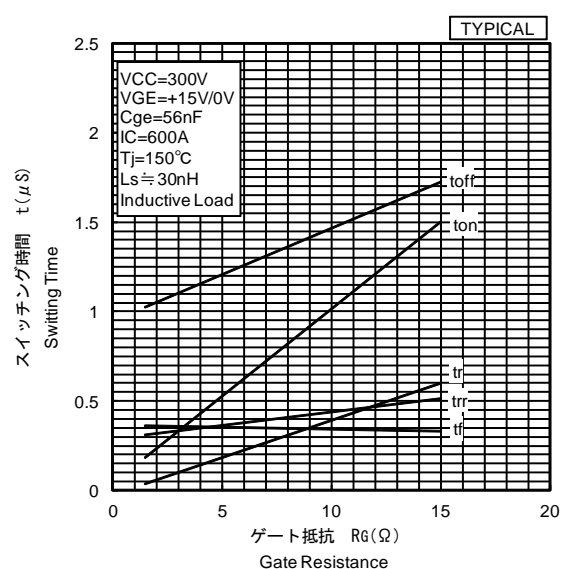


Forward Voltage of Free-Wheeling Diode

9. DYNAMIC CHARACTERISTICS

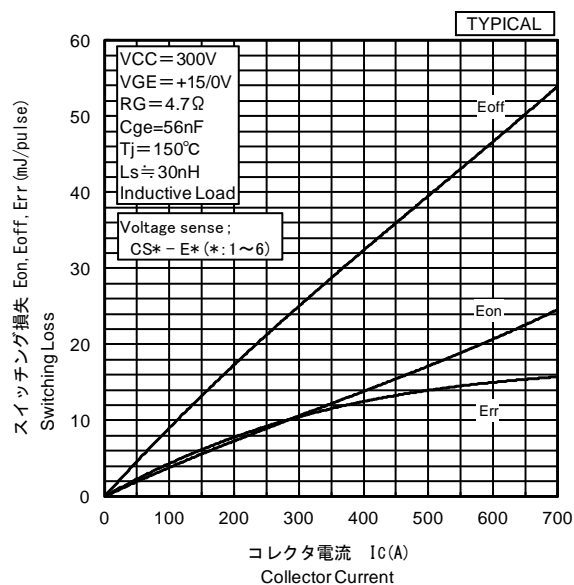


Switching Time vs. Collector Current

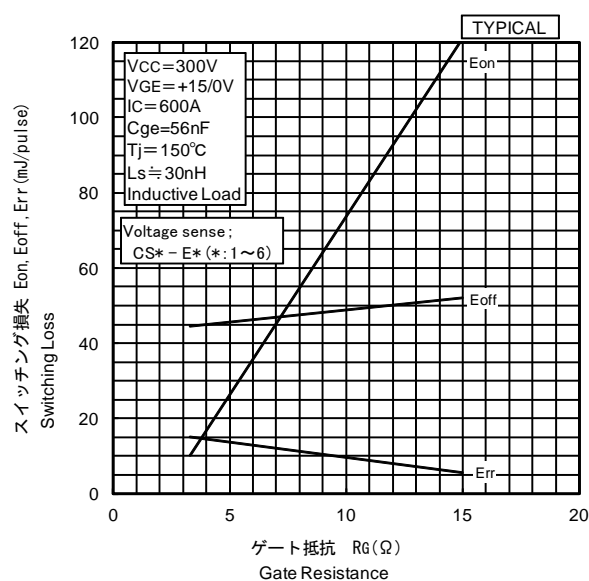


Switching Time vs. Gate Resistance

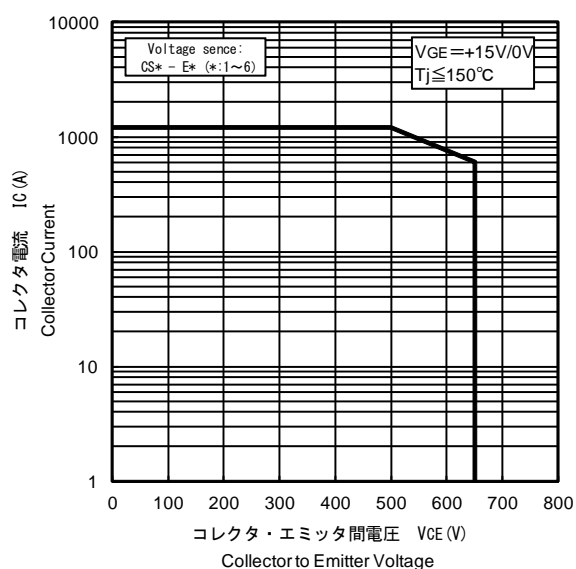
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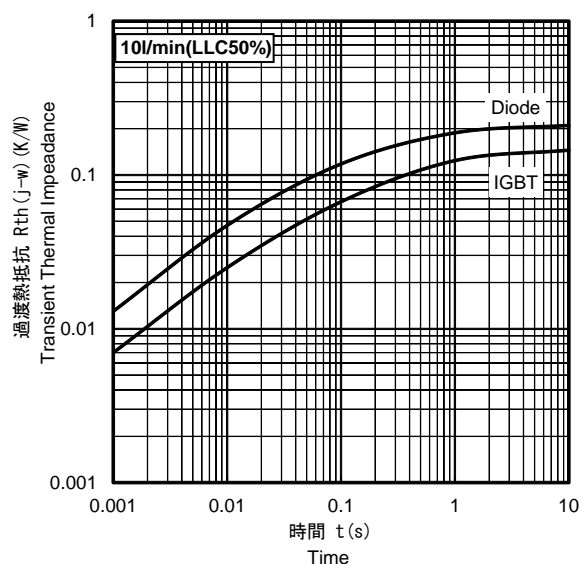
Switching Loss vs. Collector Current



Switching Loss vs. Gate Resistance

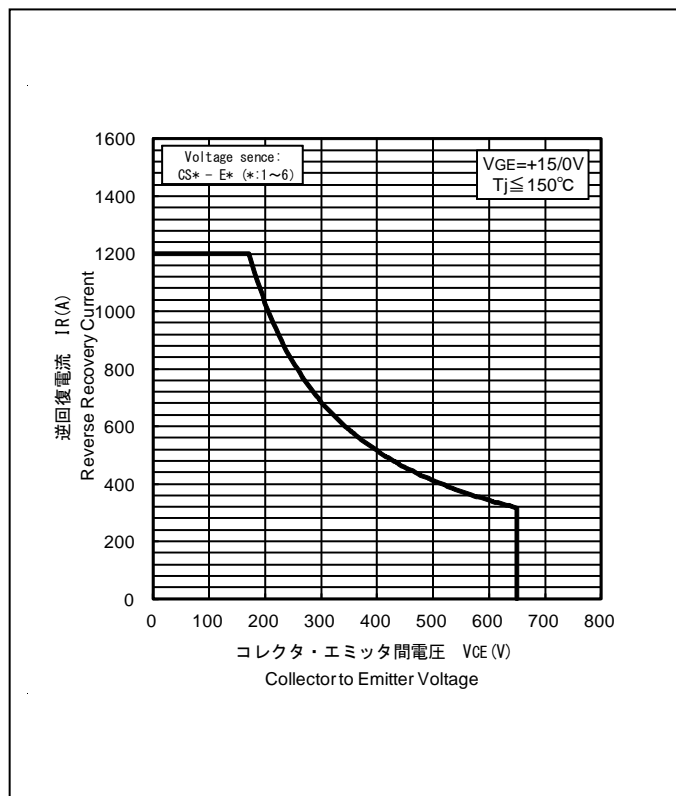


Reverse Bias Safe Operation Area (RBSOA)



Transient Thermal Impedance Characteristics

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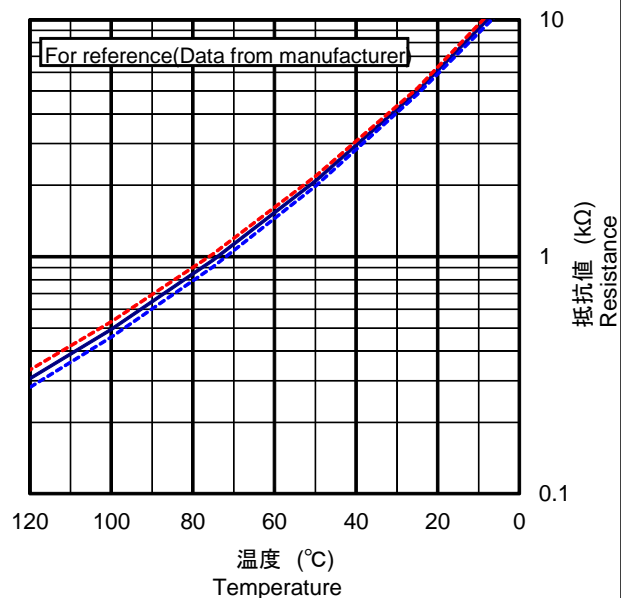


Reverse Recovery Safe Operation Area (RRSOA)

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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