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 (Tc=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	A	600	
	1ms	I_{Cp}		1200	
Forward Current	DC	I_F	A	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)	-	N·m	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	Vce=650V, Vge=0V, Tj=25°C
Gate Emitter Leakage Current		I_{GES}	nA	-	-	±500	Vge=±20V, Vce=0V, Tj=25°C
Collector Emitter Saturation Voltage		$V_{CE(sat)}$	V	1.3	1.65	2.1	Ic=600A, Vge=15V, Tj=25°C
				-	1.9	-	Ic=600A, Vge=15V, Tj=150°C
Gate Emitter Threshold Voltage		$V_{GE(TO)}$	V	6.0	6.7	7.5	Vce=5V, Ic=600mA, Tj=25°C
Input Capacitance		C_{ies}	nF	-	53	-	Vce=10V, Vge=0V, f=100kHz, Tj=25°C
Switching Times	Rise Time	t_r	μs	-	0.15	0.4	Vcc=300V, Ic=600A
	Turn On Time	t_{on}		-	0.50	0.9	Ls=30nH , R(ext)=4.7Ω , Cge=56nF
	Fall Time	t_f		-	0.35	0.8	Vge=+15V/0V, Tj=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	If=600A, V_{GE}=0V, Tj=25°C
				-	1.5	-	If=600A, V_{GE}=0V, Tj=150°C
Reverse Recovery Time		t_{rr}	μs	-	0.35	0.8	V_{CC}=300V, Ic=600A,
Turn On Loss		$E_{on(full)}$	mJ/P	-	20	30	Ls=30nH, Rg(ext)=4.7Ω , Cge=56nF
Turn Off Loss		$E_{off(full)}$	mJ/P	-	45	65	Vge=+15V/0V, Tj=150°C
Reverse Recovery Loss		$E_{rr(full)}$	mJ/P	-	15	23	Inductive load
Thermistor Resistance		R	kΩ	-	5	-	Tc=25 °C
				-	0.16	-	Tc=150 °C
Leakage Current between Thermistor and Other Terminals			mA	-	-	0.1	V=600Vp
Thermal Resistance	IGBT	Rth(j-w)	K /W	-	-	0.145	Junction to water/fin, 10l/min, 50%LLC
	FWD	Rth(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

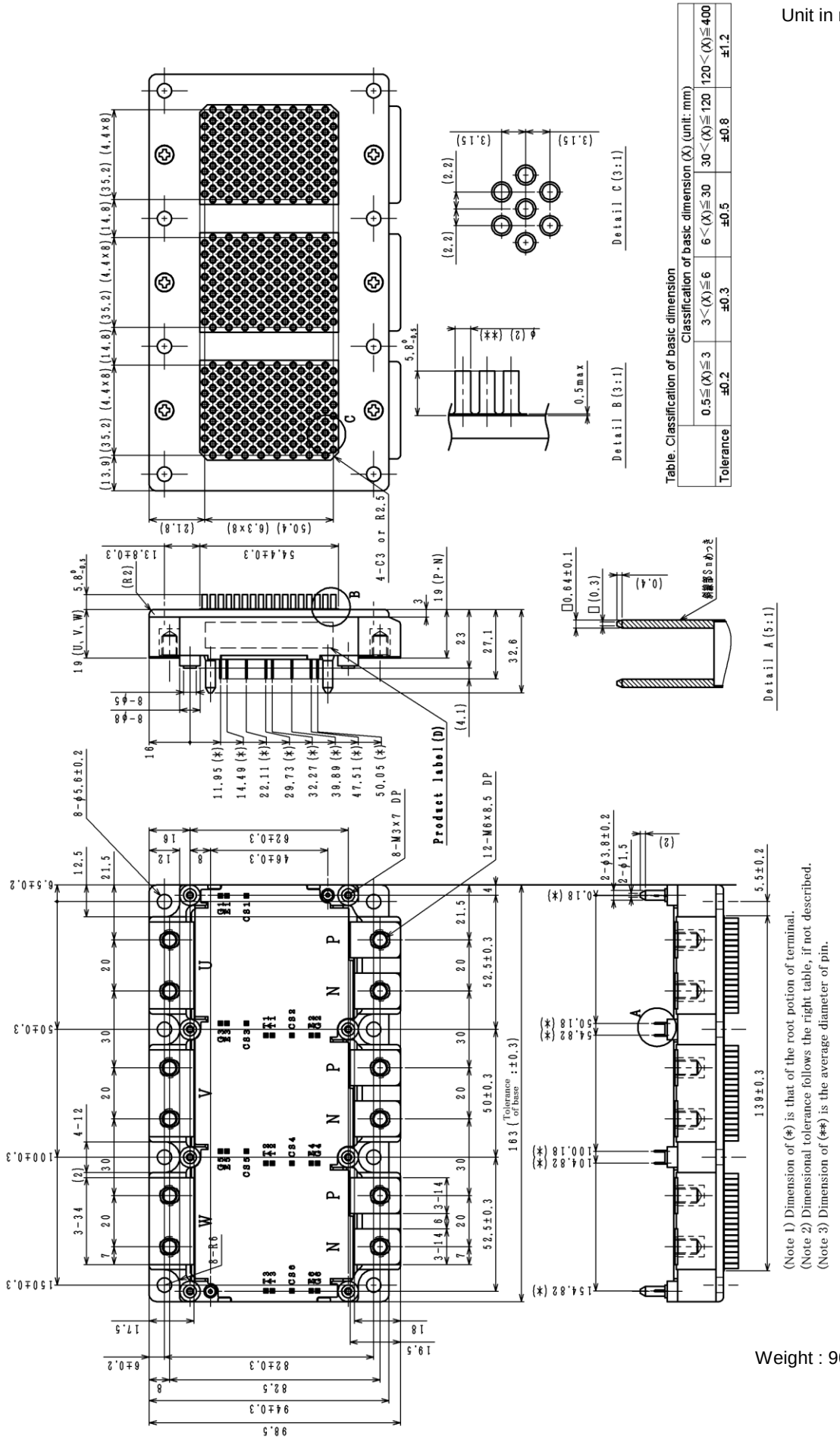

Table. Classification of basic dimension

	Classification of basic dimension (X) (unit: mm)				
	0.5≦(X)≦3	3<(X)≦6	6<(X)≦30	30<(X)≦120	120<(X)≦400
Tolerance	±0.2	±0.3	±0.5	±0.8	±1.2

Weight : 900g

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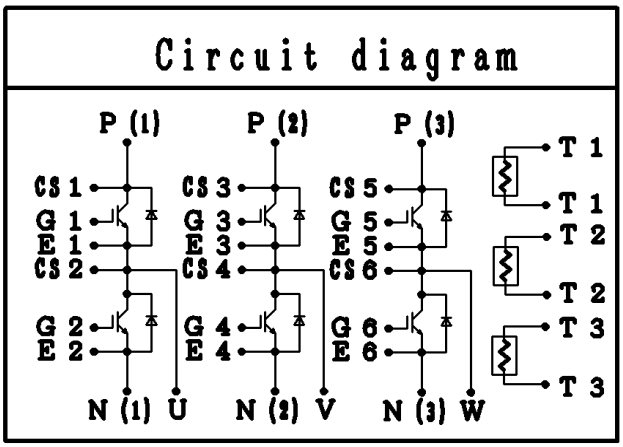
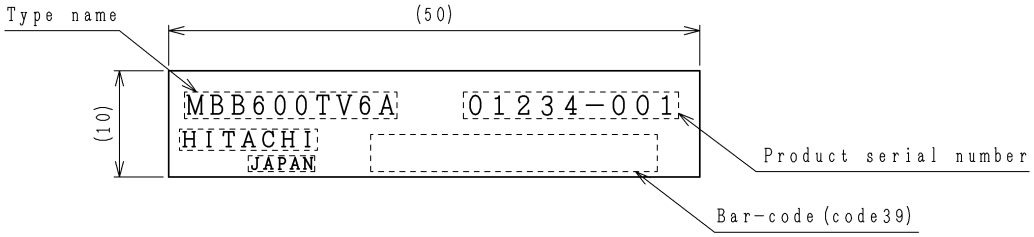
5. CIRCUIT DIAGRAM



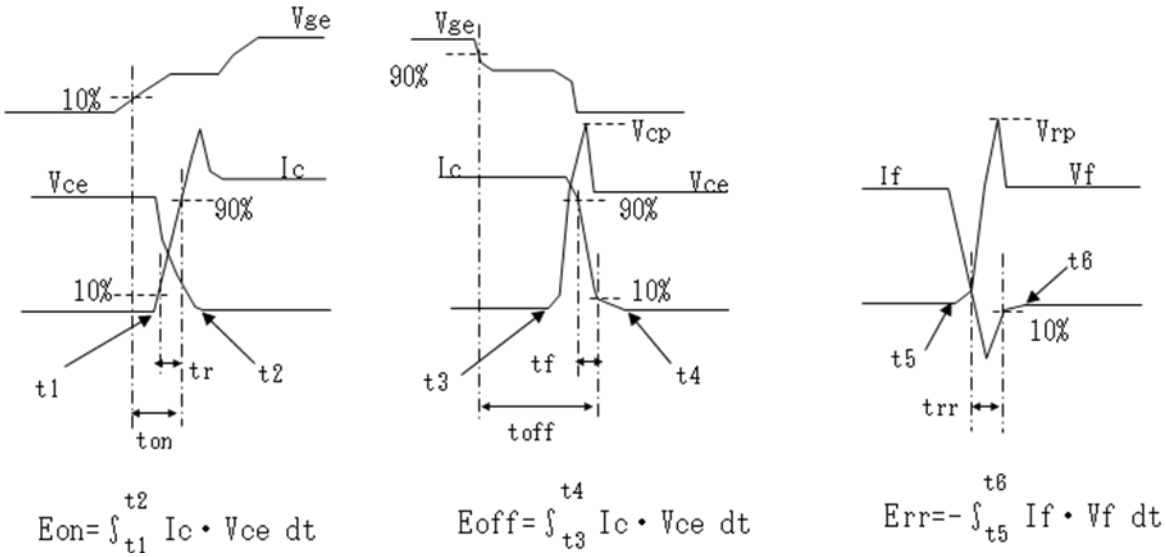
Thermistor T1, T2 and T3 are located on the same ceramic substrate with the IGBT and diode chips of phase U, V and W, respectively.

Note: This temperature measurement is not suitable for the short circuit or short term over-load 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



$$Eon = \int_{t1}^{t2} Ic \cdot Vce \, dt$$

$$Eoff = \int_{t3}^{t4} Ic \cdot Vce \, dt$$

$$Err = -\int_{t5}^{t6} If \cdot Vf \, dt$$

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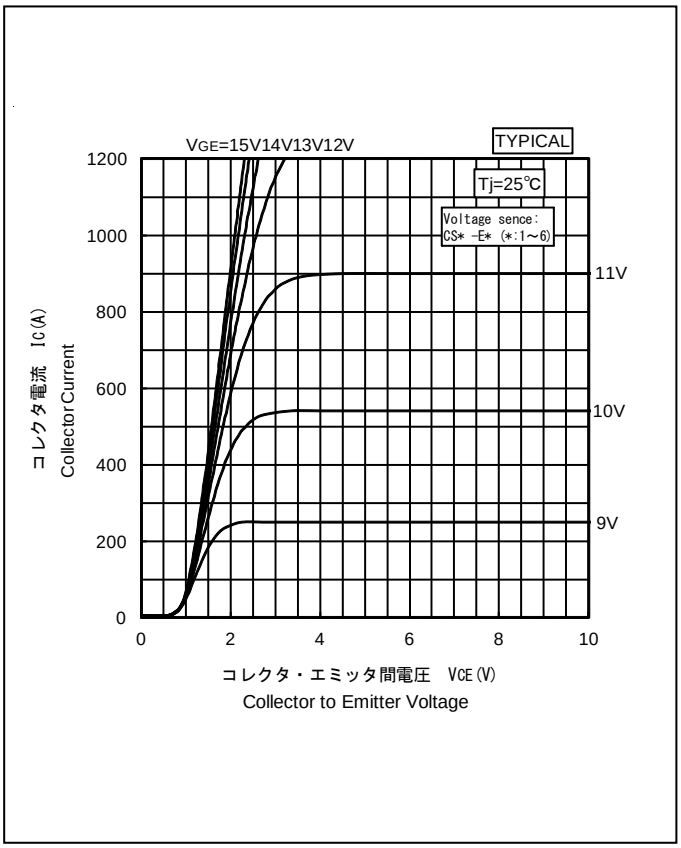
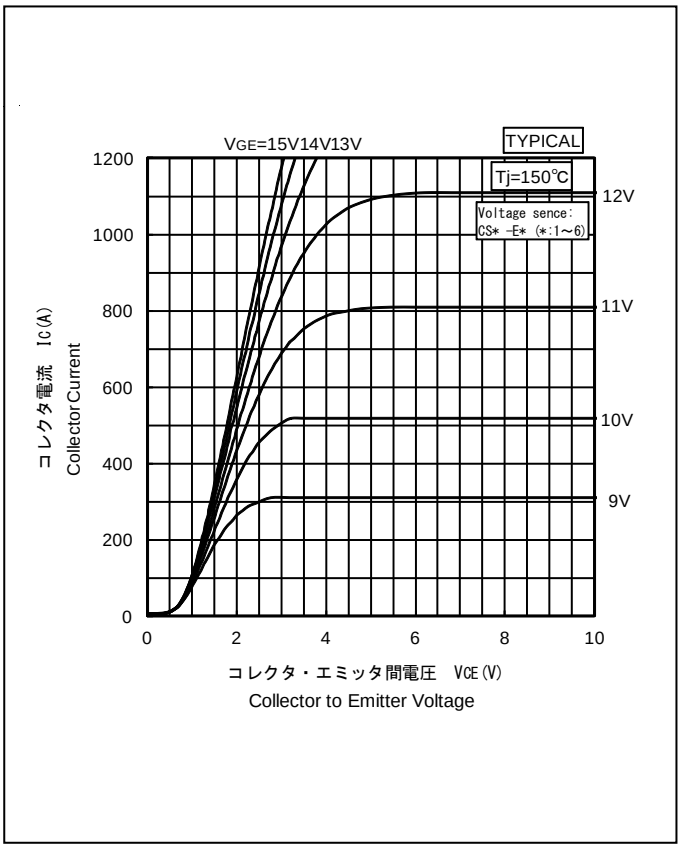
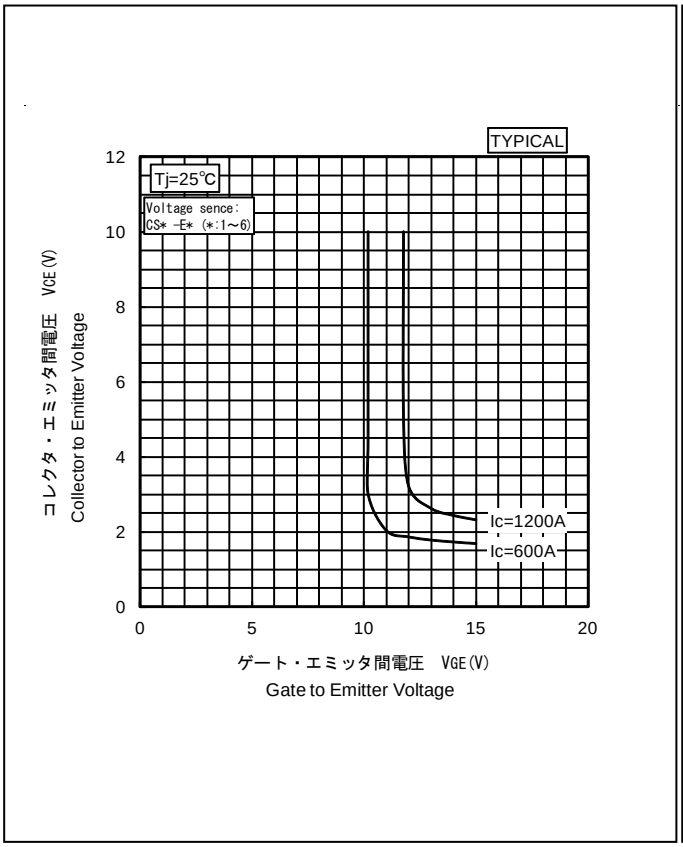
8. STATIC CHARACTERISTICS



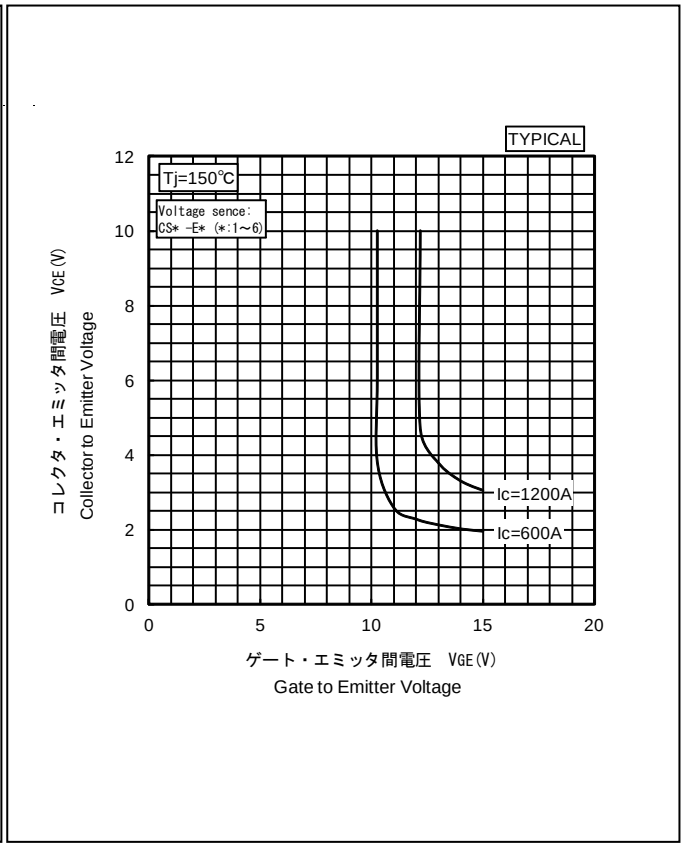
Collector Current vs. Collector to Emitter Voltage



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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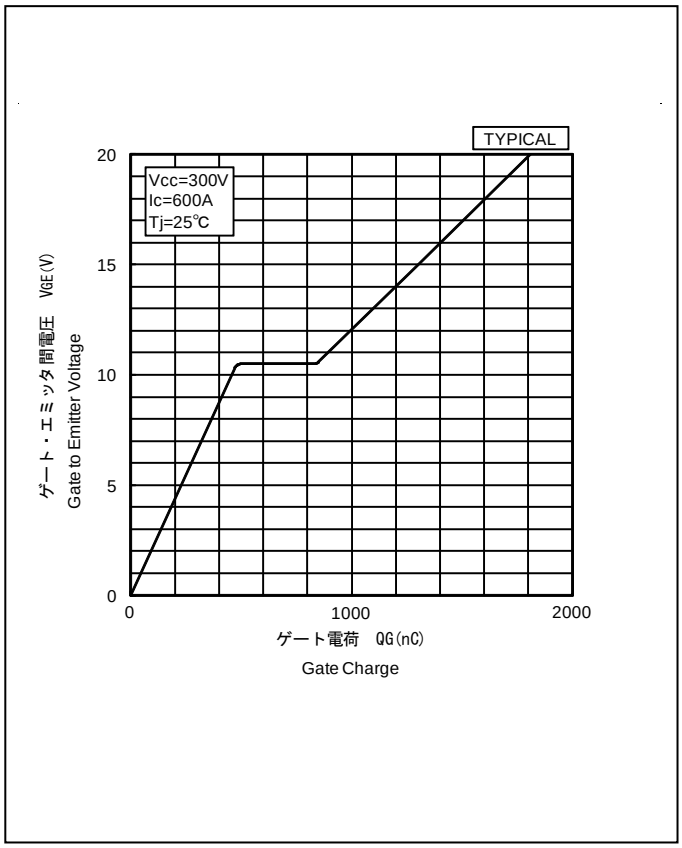
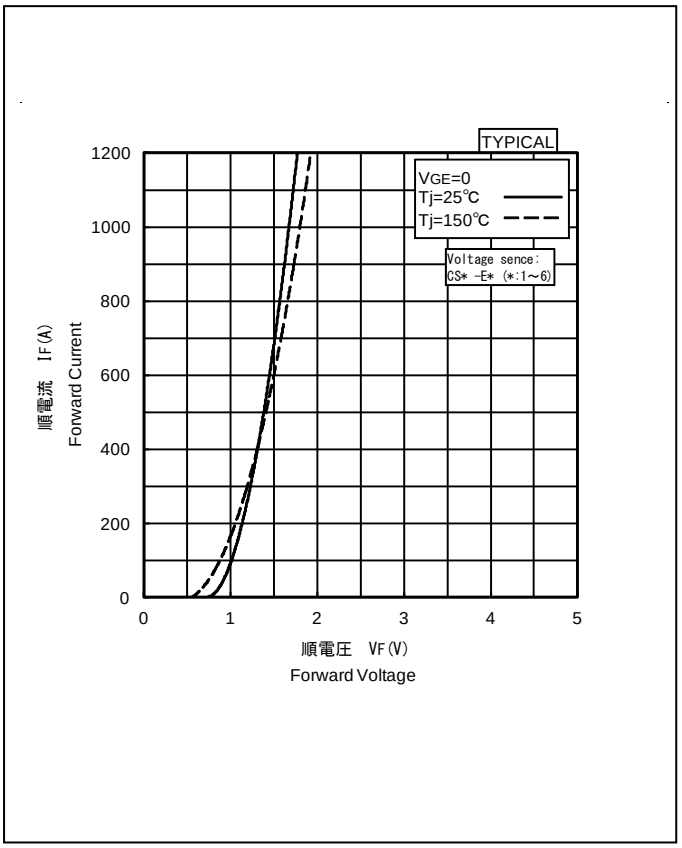
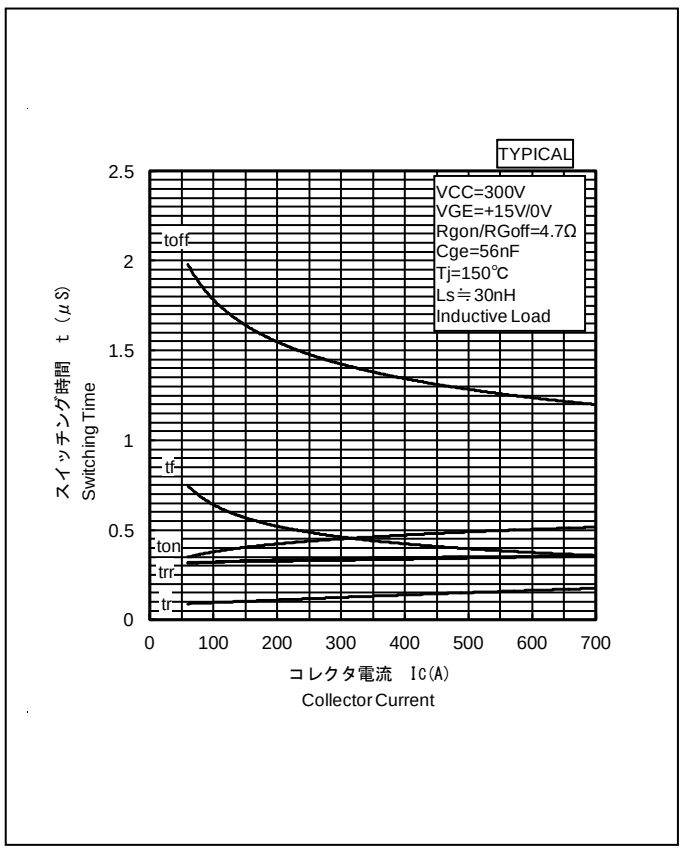


Gate Charge Characteristics

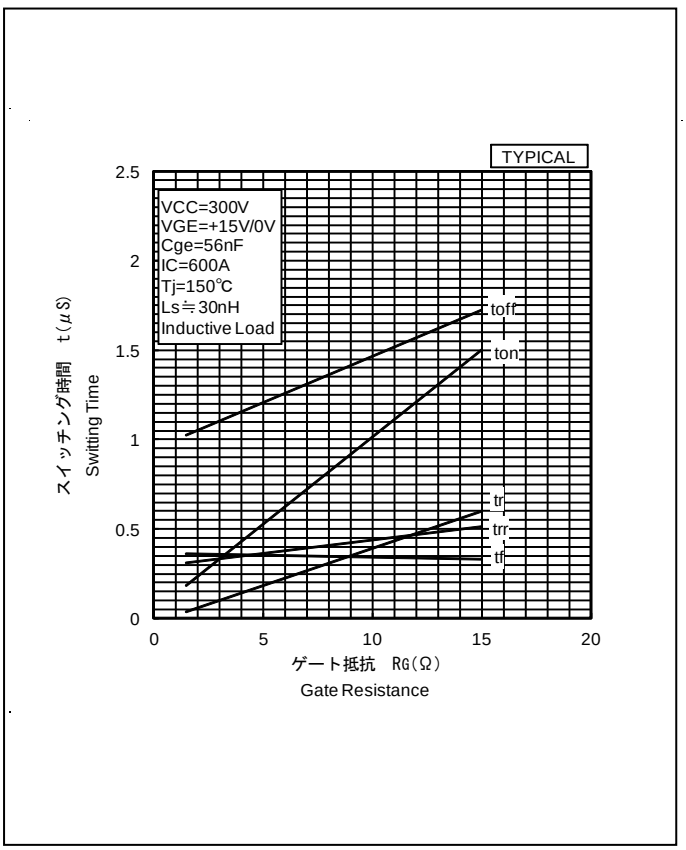


Forward Voltage of Free-Wheeling Diode

9. DYNAMIC CHARACTERISTICS



Switching Time vs. Collector Current



Switching Time vs. Gate Resistance

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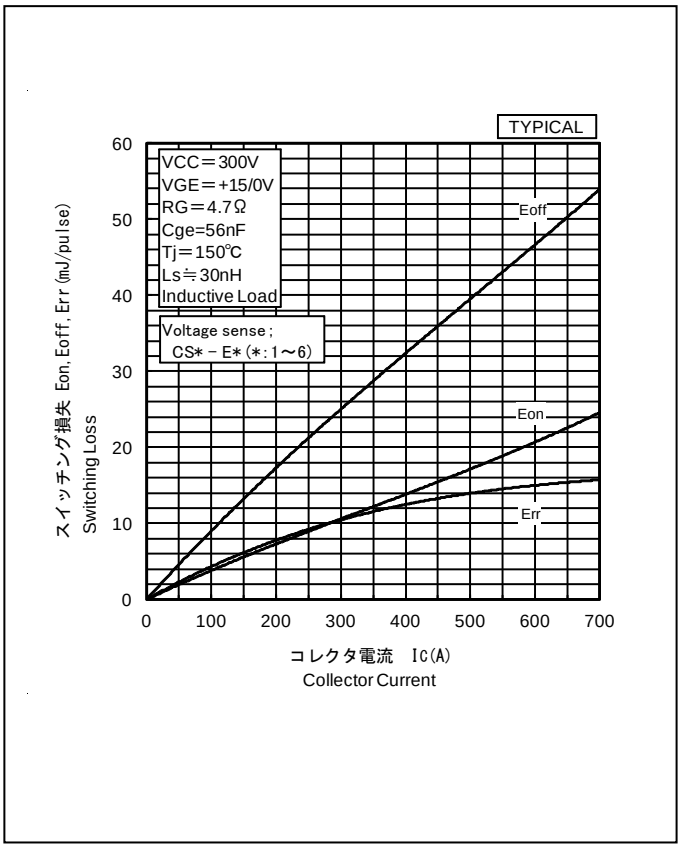
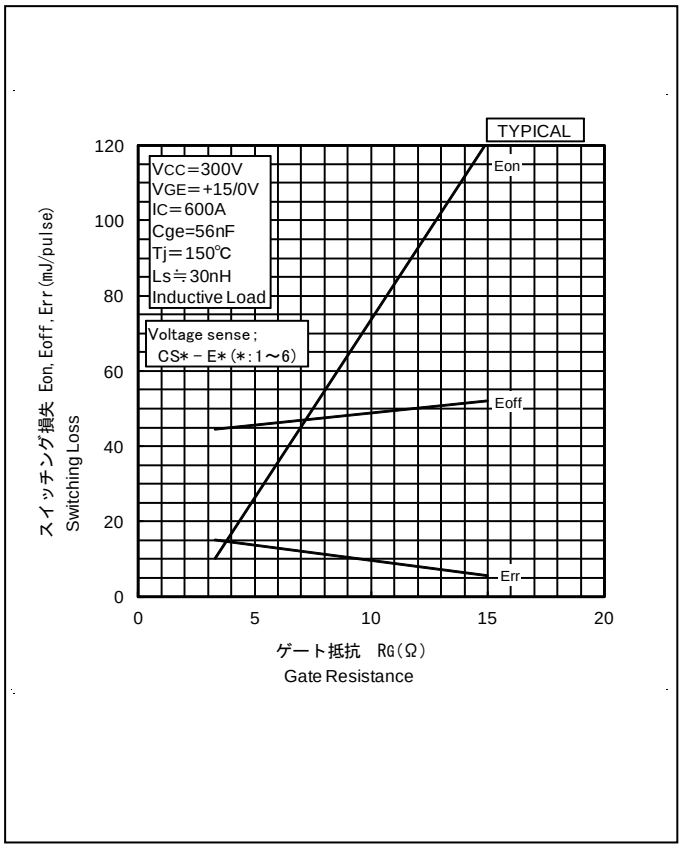
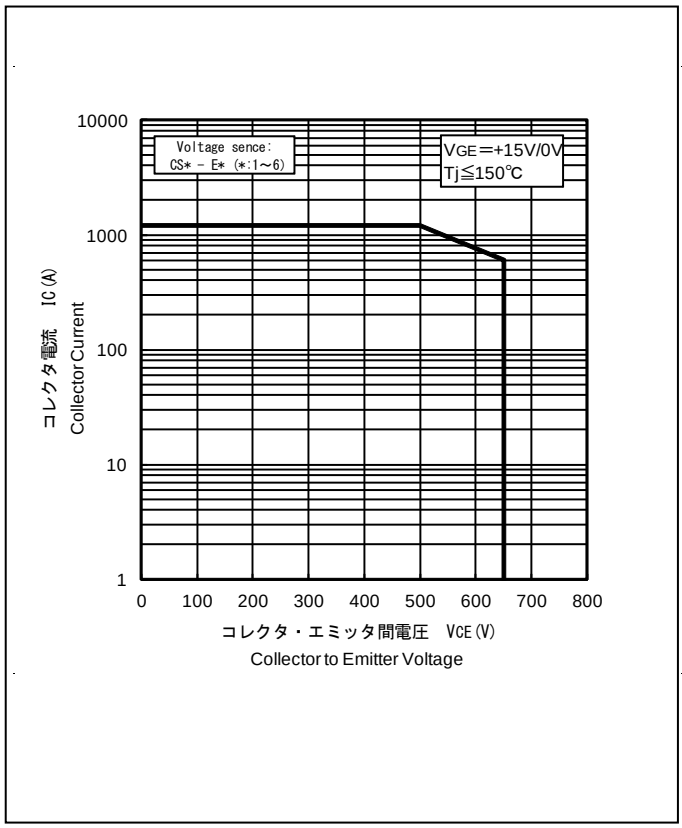


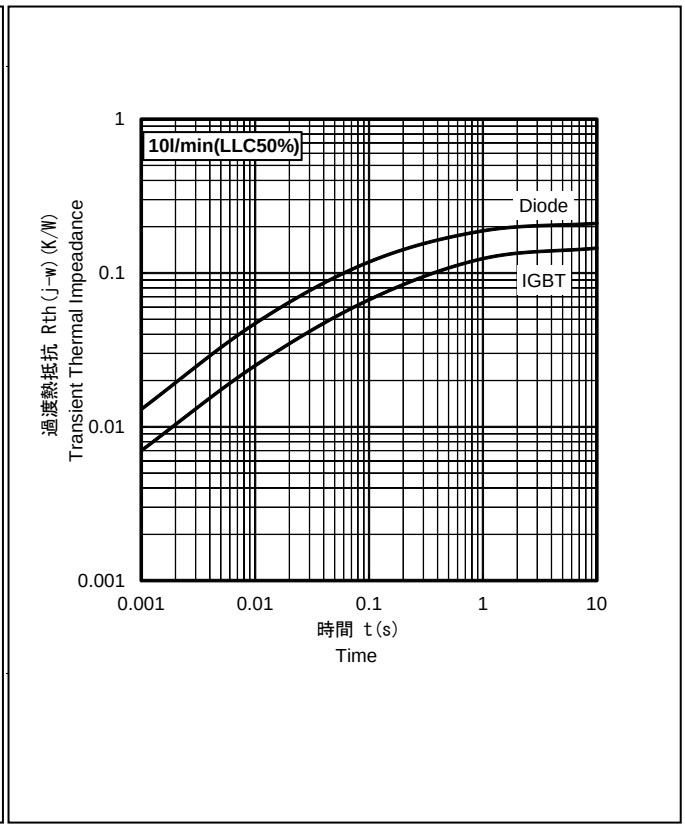
Switching Loss vs. Collector Current



Switching Loss vs. Gate Resistance



Reverse Bias Safe Operation Area (RBSOA)



Transient Thermal Impedance Characteristics

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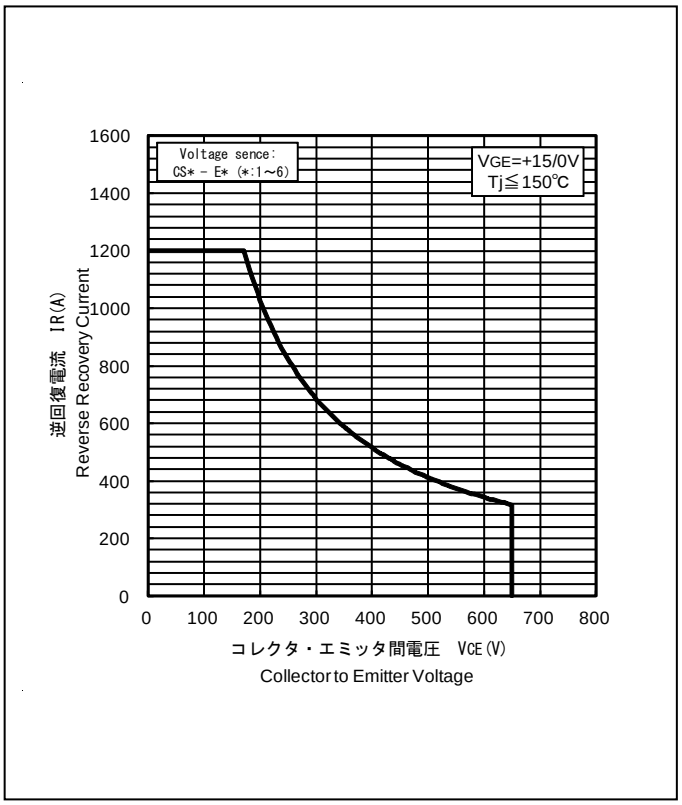
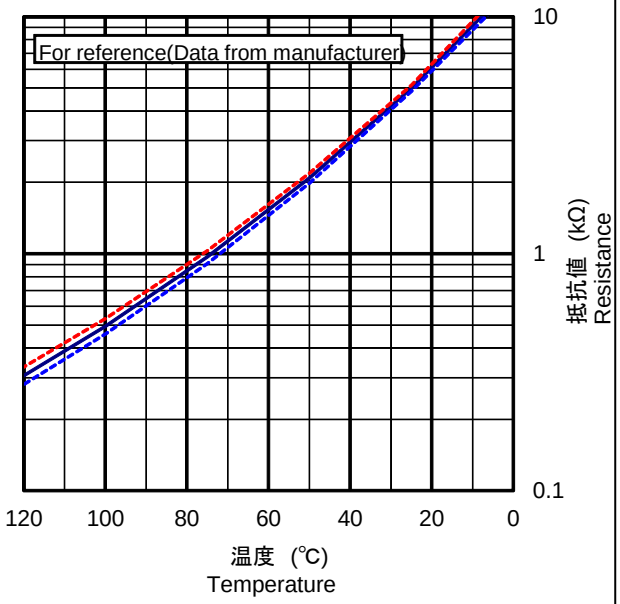


Reverse Recovery Safe Operation Area (RRSOA)

10. THERMISTOR

Table1 Specifications of Thermistor(For reference)

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



Resistance vs. Temperature

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HITACHI POWER SEMICONDUCTORS

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