MBB800TV7A

Target Specification

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=25ºC)

Item		Symbol	Unit	Specification	
Collector Emitter Voltage		V_{CES}	V	700	(4)
Gate Emitter Voltage		V_{GES}	V	±20	
Collector Current	DC	I_C	A	800	
	1ms	I_{Cp}		1600	
Forward Current	DC	I_F	A	800	
	1ms	I_{FM}		1600	
Maximum Junction Temperature		T_{jmax}	ºC	175	
Temperature under switching conditions		T_{jop}	ºC	-40 ~ +150	
Storage Temperature		T_{stg}	ºC	-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)
	PCB Mounting (M3)	-		0.8	(3)

Notes: Recommended Value (1)5.5±0.5N·m, (2)3.5±0.5N·m, (3)0.65±0.15N·m.
(4)Please refer to figure of V_{CES} vs. Tc on the page of 6.

3. ELECTRICAL CHARACTERISTICS

Item		Symbol	Unit	Min.	Typ.	Max.	Test Conditions
Collector Emitter Cut-Off Current		I_{CES}	mA	-	-	1.0	Vce=700V, Vge=0V, Tj=25ºC
Gate Emitter Leakage Current		I_{GES}	nA	-	-	±500	Vge=±20V, Vce=0V, Tj=25ºC
Collector Emitter Saturation Voltage		$V_{CE(sat)}$	V	-	1.55	2.0	Ic=800A, Vge=15V, Tj=25ºC
				-	1.80	-	Ic=800A, Vge=15V, Tj=150ºC
Gate Emitter Threshold Voltage		$V_{GE(TO)}$	V	6.0	6.7	7.5	Vce=5V, Ic=800mA, Tj=25ºC
Input Capacitance		C_{ies}	nF	-	70	-	Vce=10V, Vge=0V, f=100kHz, Tj=25ºC
Switching Times	Rise Time	t_r	μs	-	0.2	0.5	Vcc=300V, Ic=800A
	Turn On Time	t_{on}		-	0.6	1.1	Ls=30nH , Rg(ext)=4.7Ω , Cge=56nF
	Fall Time	t_f		-	0.3	1.15	Vge=+15V/0V, Tj=150ºC
	Turn Off Time	t_{off}		-	1.3	2.2	Inductive load
Peak Forward Voltage Drop		V_F	V	-	1.35	1.7	If=800A, V_{GE}=0V, Tj=25ºC
				-	1.35	-	If=800A, V_{GE}=0V, Tj=150ºC
Reverse Recovery Time		t_{rr}	μs	-	0.4	0.85	V_{CC}=300V, Ic=800A,
Turn On Loss		$E_{on(full)}$	mJ/P	-	20	33	Ls=30nH , Rg(ext)=4.7Ω , Cge=56nF
Turn Off Loss		$E_{off(full)}$	mJ/P	-	66	95	Vge=+15V/0V, Tj=150ºC
Reverse Recovery Loss		$E_{rr(full)}$	mJ/P	-	22	42	Inductive load
Thermistor Resistance		R	kΩ	-	5	-	Tc=25ºC
				-	0.16	-	Tc=150ºC
Leakage Current between Thermistor and Other Terminals			mA	-	-	0.1	V=600Vp
Thermal Resistance	IGBT	Rth(j-w)	K/W	-	-	0.135	Junction to water/fin, 10l/min, 50%LLC
	FWD	Rth(j-w)	K/W	-	-	0.165	(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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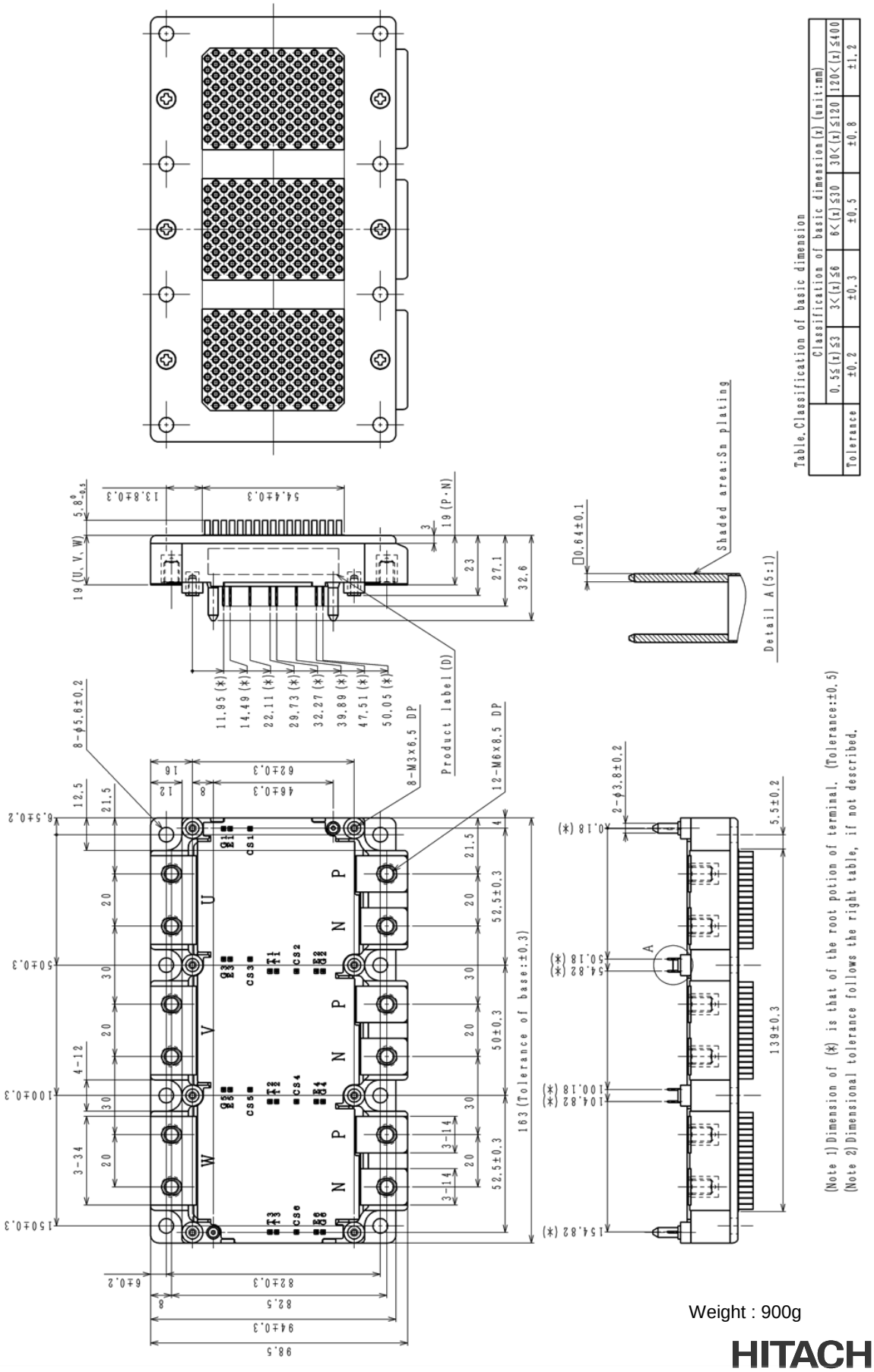
4. PACKAGE OUTLINE DRAWING

Unit in mm



Weight : 900g

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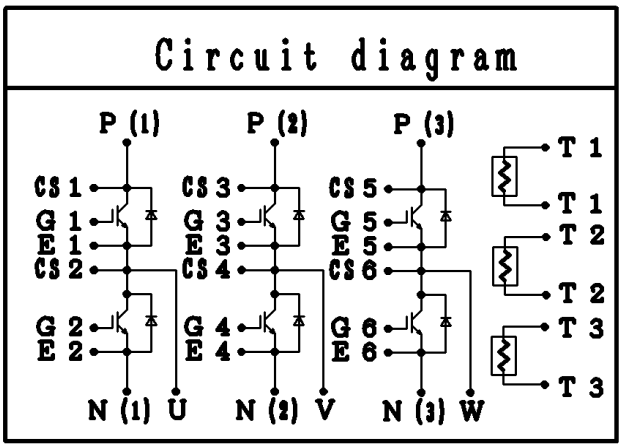
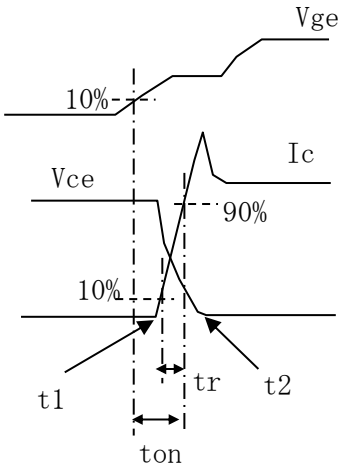
5. CIRCUIT DIAGRAM



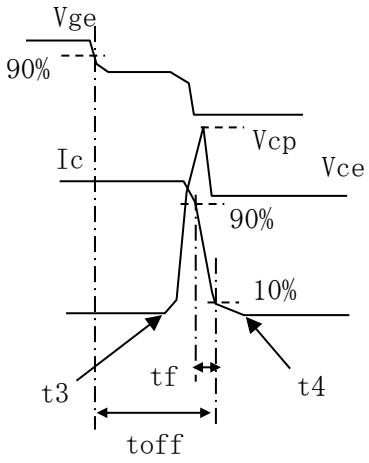
Thermistor T1, T2 and T3 are located on the same ceramic substrate with the IGBT and diode chips of phase U, V and W, respectively.

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.

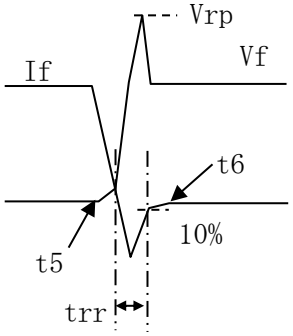
6. DEFINITION OF THE SYMBOLS



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



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



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

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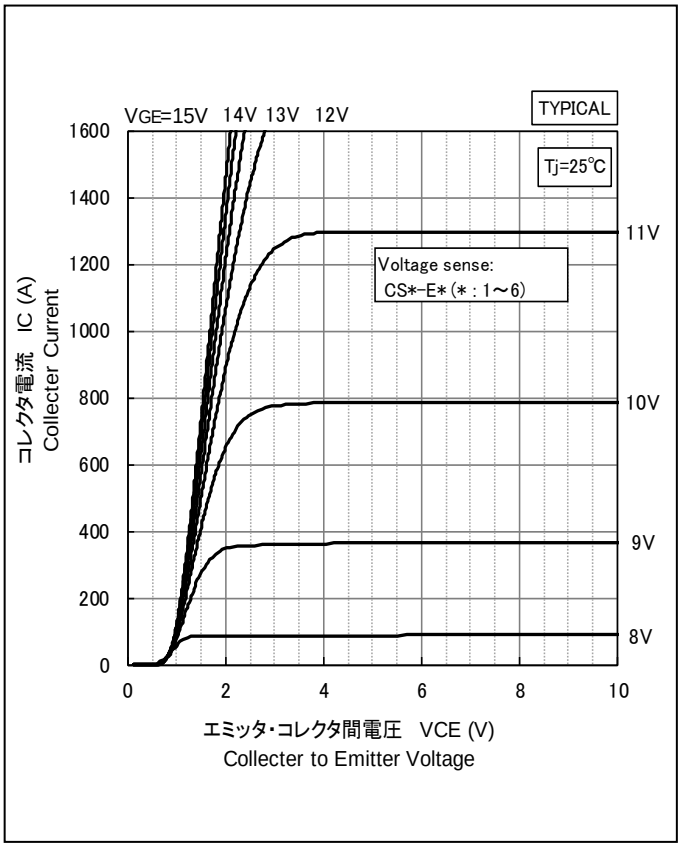
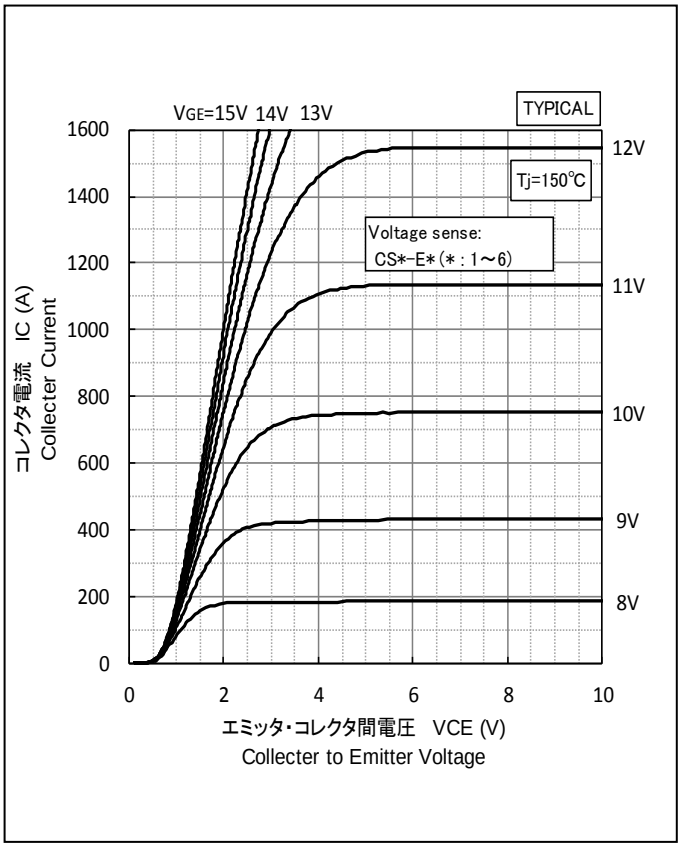
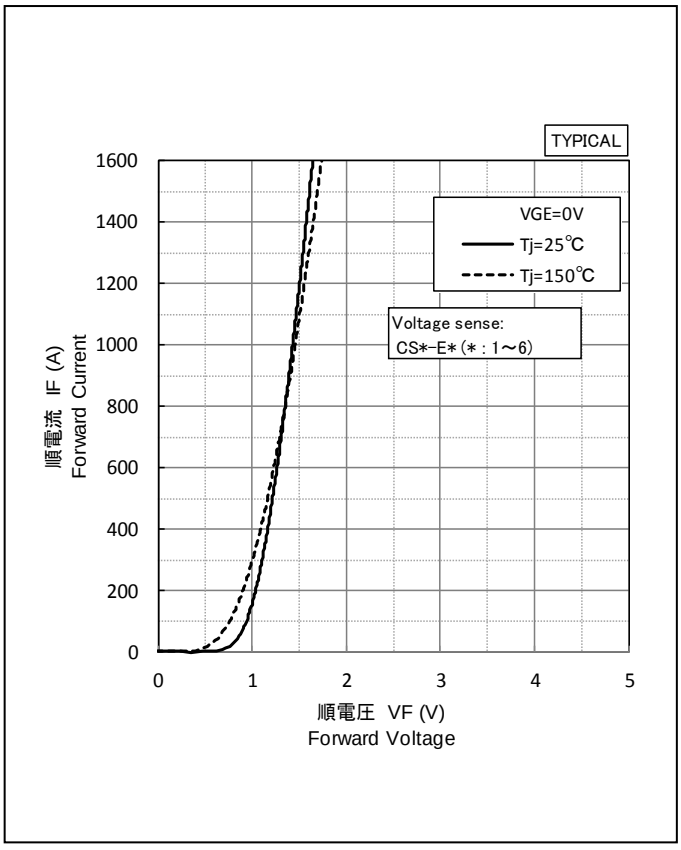
7. STATIC CHARACTERISTICS



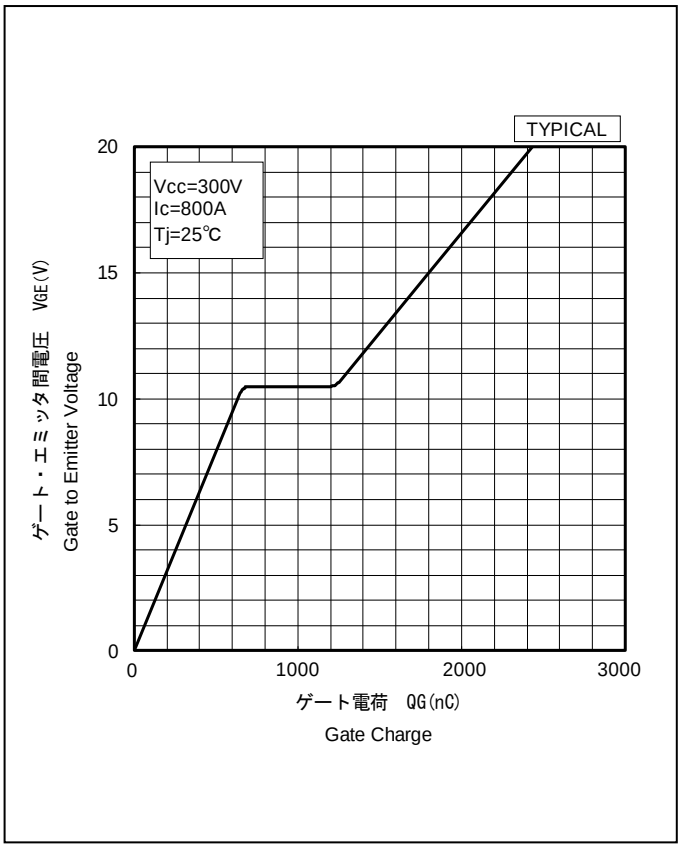
Collector Current vs. Collector to Emitter Voltage



Collector Current vs. Collector to Emitter Voltage



Forward Current vs. Forward Voltage



Gate to Emitter Voltage vs. Gate Charge

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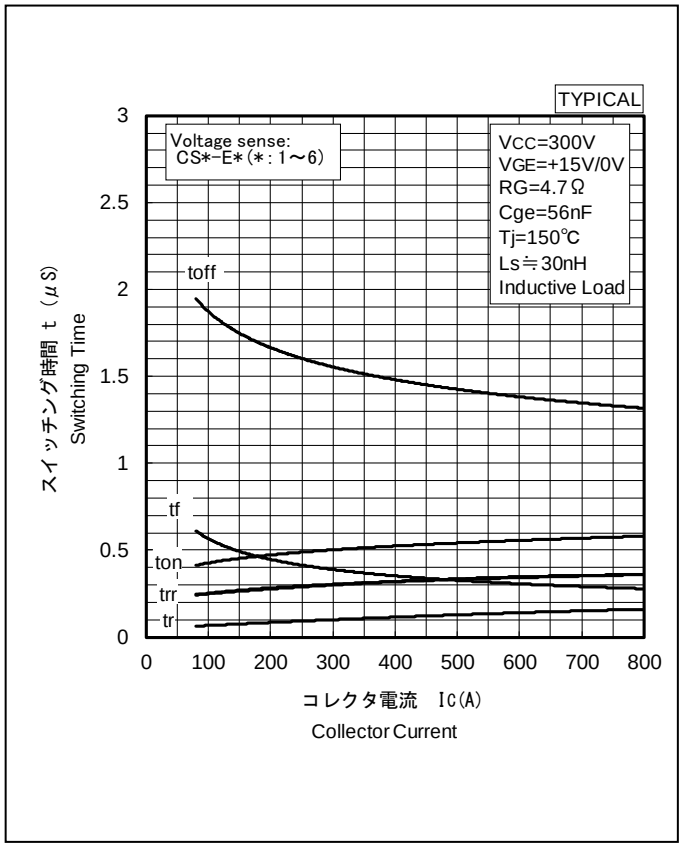
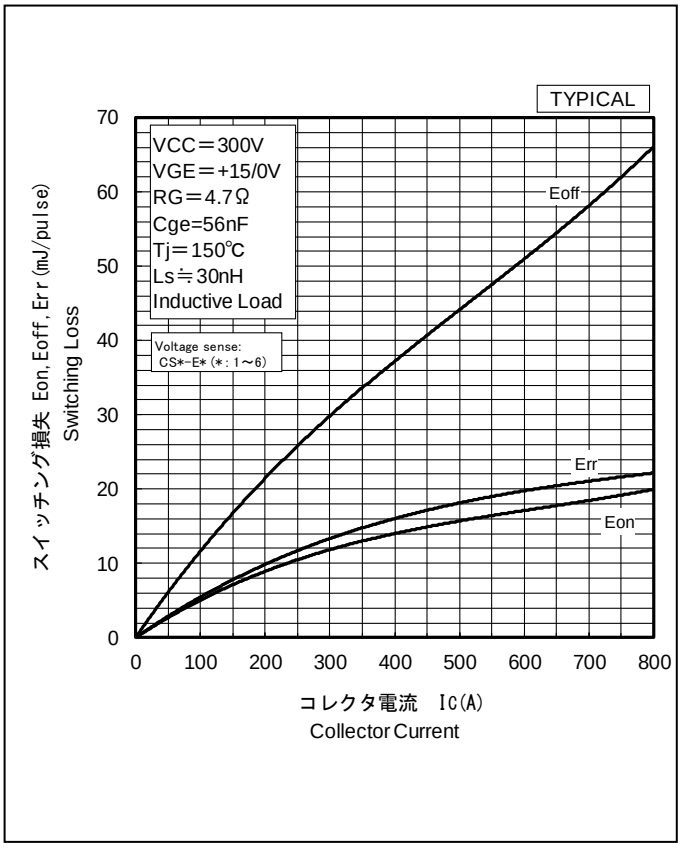
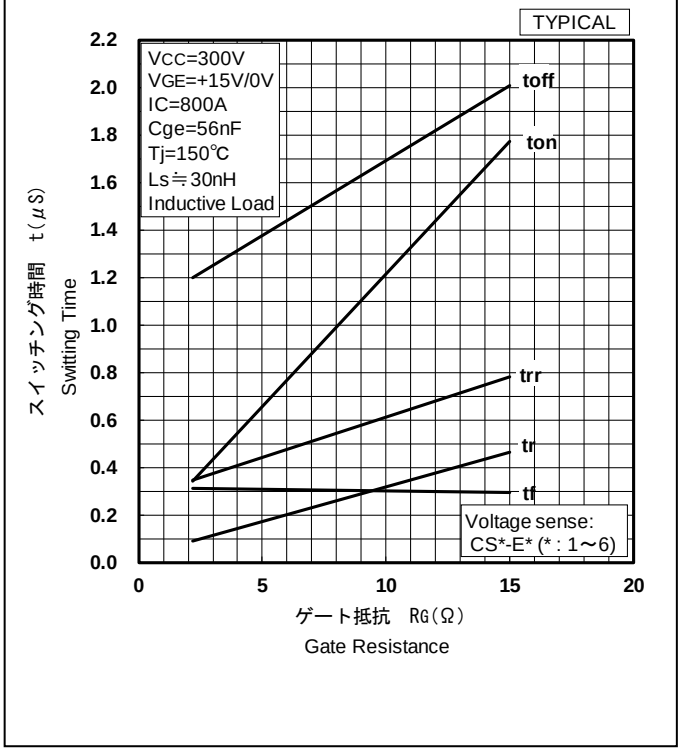
8. DYNAMIC CHARACTERISTICS



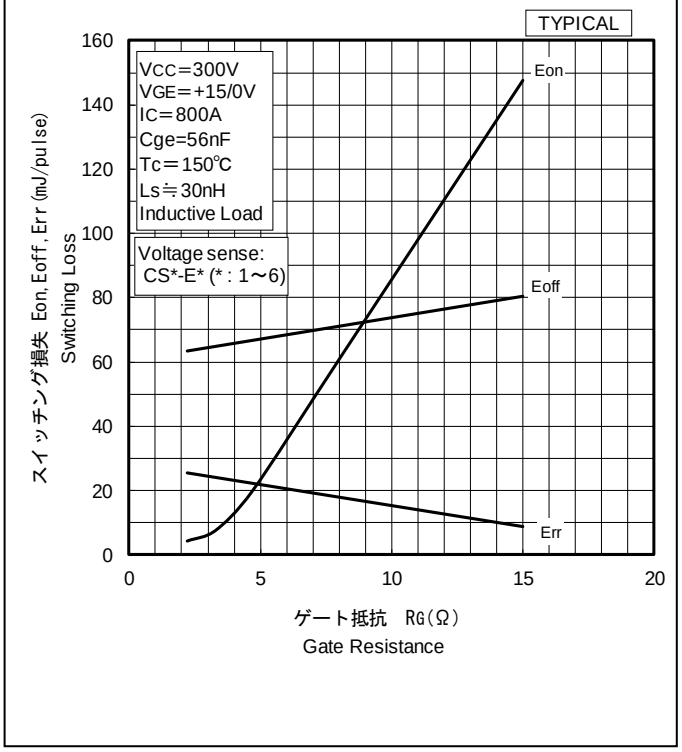
Switching Time vs. Collector Current



Switching Loss vs. Collector Current



Switching Time vs. Gate Resistance



Switching Loss vs. Gate Resistance

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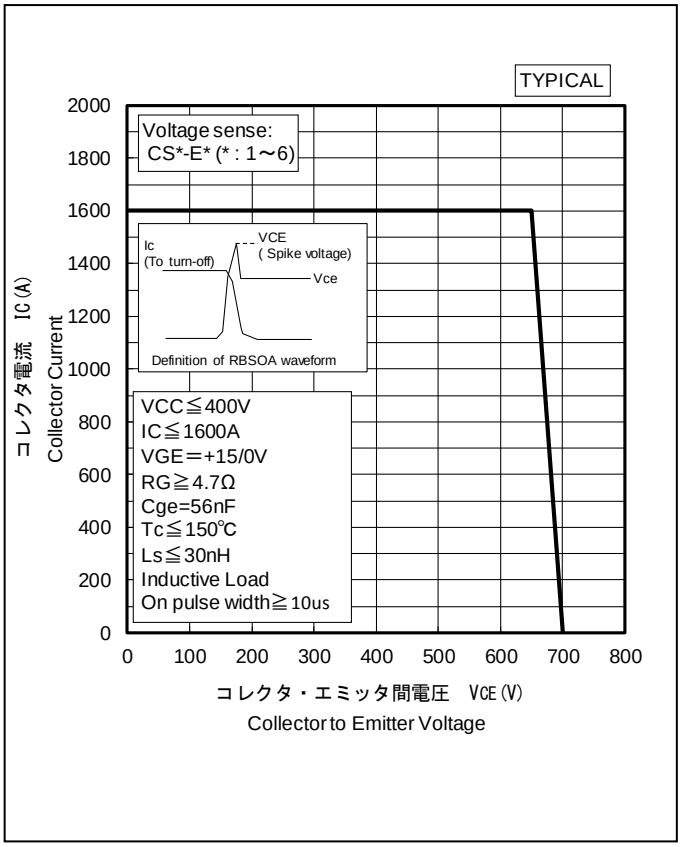
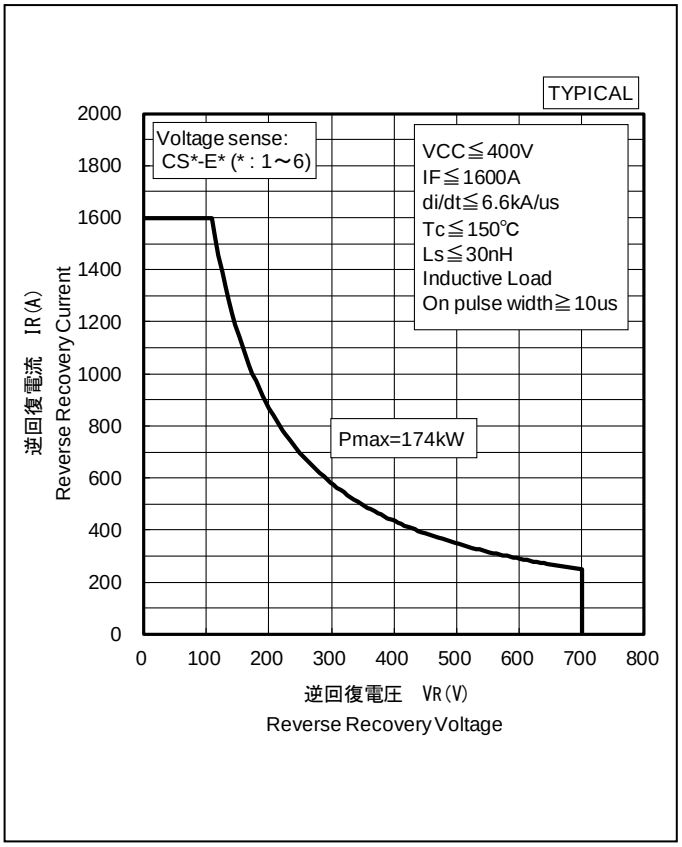
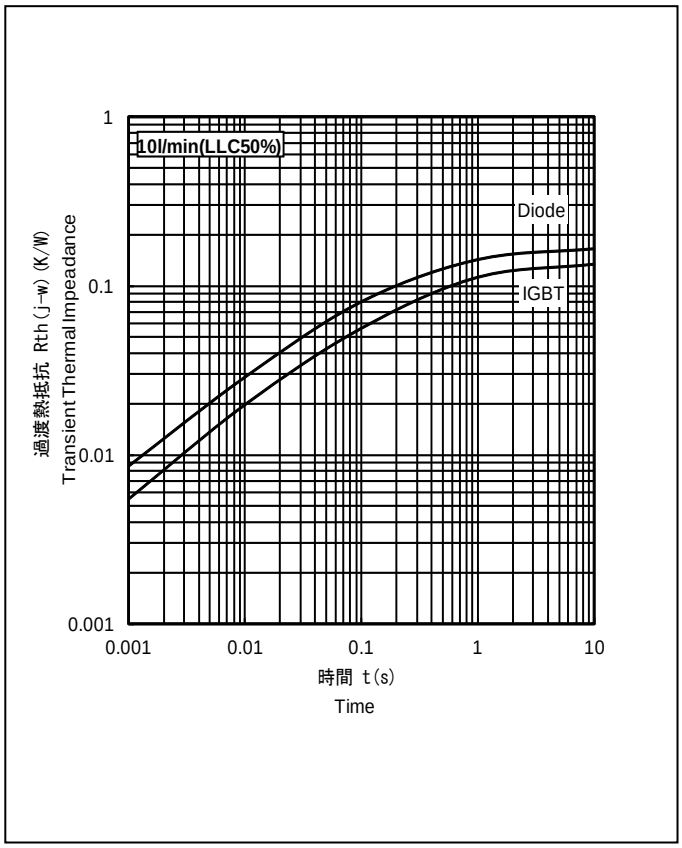


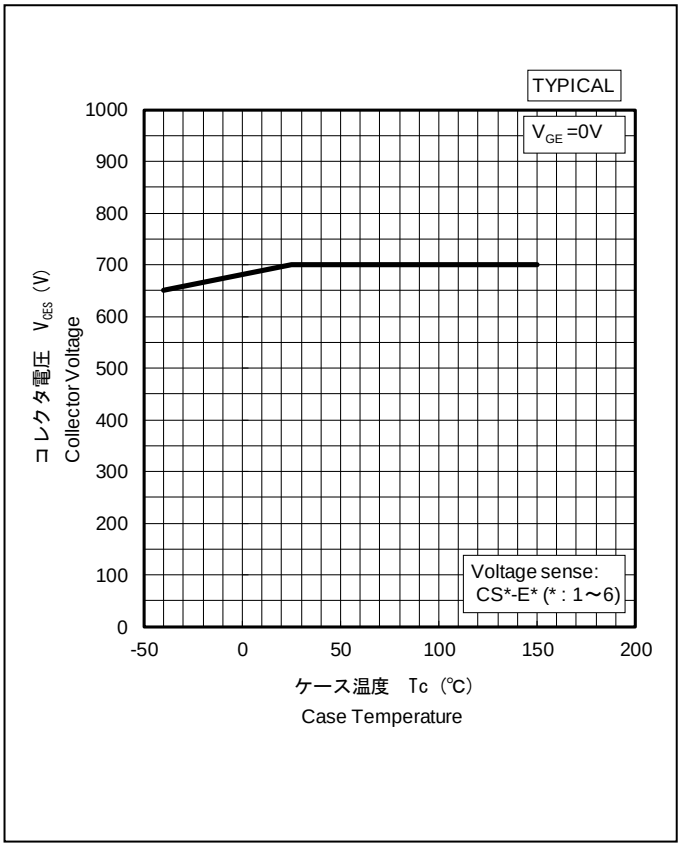
RBSOA



RRSOA



Transient Thermal Impedance Characteristics



V_{CES} vs. Tc

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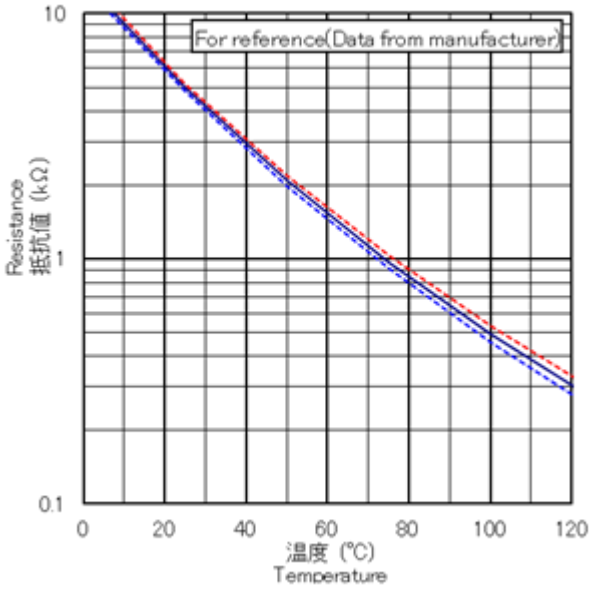
9. THERMISTOR

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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10. PRECAUTIONS

10-1. Storage and Shipping Precautions

Important Notices

(1) IGBT modules should always be stored under the following conditions.
- ●Temperature：40 degrees Celsius, maximum.
- ●Humidity：60％ Relative Humidity, maximum.
- ●Dust：Avoid storing the module in locations subject to dust.
- ●Harmful substances：The installation location should be free of corrosive gases such as sulfur dioxide and chlorine gas.
- ●Other：Do not remove the conductive sponges or tapes attached to the signal gate and emitter gate.

(2) Shipping Method
- ●To prevent the case cracking and/or the electrode bending, appropriate consideration should be given to properly insulate the shipping container from mechanical shock or sever vibration situation.
- ●Do not throw or drop the case while shipping. Treat them with care. The devices may break if they are not handled with care. Please do not use the IGBT modules that were dropped or damaged.
- ●Appropriate labeling on the outside of the shipping container should always be present.
- ●The shipping container itself should always be properly protected from both rain and water.

10-2. Precautions against Electrostatic Failure

Important Notices

Because the IGBT has a MOS gate structure and temperature sensing diode, you should always take the following precautions as measures to avoid generating static electricity.
- ●Before starting operation, do not remove the conductive sponge mounted between terminals of gate, emitter, collector, temperature sensing anode and cathode.
- ●When handling the IGBT module, ground our body via a high-value resistor (between 100kΩ and 1MΩ), hold the package body, and do not touch the terminals of gate, temperature sensing anode and cathode.
- ●Be sure to ground any parts which the IGBT module may touch, such as the work table or soldering iron.
- ●Before testing or inspection, be sure to check that any residual electric charge in measuring instruments has been removed. Apply voltage to each terminal starting at 0V and return to 0V when finishing.

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HITACHI POWER SEMICONDUCTORS

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