MBN1200H33D

Silicon N-channel IGBT

FEATURES

* High speed, low loss IGBT module.
* Low driving power due to low input capacitance MOS gate.
* Low noise due to ultra soft fast recovery diode.
* High reliability, high durability module.
* High thermal fatigue durability. (delta Tc=70K, N>30,000cycles)
* High isolation package

ABSOLUTE MAXIMUM RATINGS (Tc=25°C)

Item		Symbol	Unit	MBN1200H33D
Collector Emitter Voltage		V_{CES}	V	3,300
Gate Emitter Voltage		V_{GES}	V	±20
Collector Current	DC	I_C	A	1,200
	1ms	I_{Cp}		2,400
Forward Current	DC	I_F	A	1,200
	1ms	I_{FM}		2,400
Junction Temperature		T_j	°C	-40 ~ +125
Storage Temperature		T_{stg}	°C	-40 ~ +125
Isolation Voltage		V_{ISO}	V_{RMS}	10,200(AC 1 minute)
Screw Torque	Terminals (M4/M8)	-	N·m	2/10 (1)
	Mounting (M6)	-		6 (2)

Notes: (1) Recommended Value 1.8±0.2/9±1N·m (2) Recommended Value 5.5±0.5N·m

ELECTRICAL CHARACTERISTICS

Item		Symbol	Unit	Min.	Typ.	Max.	Test Conditions
Collector Emitter Cut-Off Current		I_{CES}	mA	-	-	12	V_{CE}=3,300V, V_{GE}=0V, Tj=25°C
				-	20	60	V_{CE}=3,300V, V_{GE}=0V, Tj=125°C
Gate Emitter Leakage Current		I_{GES}	nA	-500	-	+500	V_{GE}=±20V, V_{CE}=0V, Tj=25°C
Collector Emitter Saturation Voltage		$V_{CE(sat)}$	V	3.4	4.2	5.2	I_C=1,200A, V_{GE}=15V, Tj=125°C
Gate Emitter Threshold Voltage		$V_{GE(TO)}$	V	4.5	6.0	7.0	V_{CE}=10V, I_C=1,200mA, Tj=25°C
Input Capacitance		C_{ies}	nF	-	110	-	V_{CE}=10V, V_{GE}=0V, f=100kHz, Tj=25°C
Internal Gate Resistance		Rge	Ω	-	1.2	-	V_{CE}=10V, V_{GE}=0V, f=100kHz, Tj=25°C
Switching Times	Rise Time	t_r	µs	0.6	1.9	3.1	V_{CC}=1,650V, Ic=1,200A
	Turn On Time	t_{on}		1.1	2.4	3.3	L=100nH
	Fall Time	t_f		0.1	1.0	2.5	R_G=3.3/3.3Ω (3)
	Turn Off Time	t_{off}		0.9	3.0	5.1	V_{GE}=±15V, Tj=125°C
Peak Forward Voltage Drop		V_{FM}	V	1.9	2.5	3.0	IF=1,200A, V_{GE}=0V, Tj=125°C
Reverse Recovery Time		t_{rr}	µs	0.1	0.6	1.1	V_{CC}=1,650V, Ic=1,200A, L=100nH
Turn On Loss		$E_{on(10\%)}$	J/P	-	1.6	2.1	R_G= 3.3/3.3Ω (3)
Turn Off Loss		$E_{off(10\%)}$	J/P	-	1.3	1.7	V_{GE}=±15V, Tj=125°C
Reverse Recovery Loss		$E_{rr(10\%)}$	J/P	-	1.2	1.9	
Stray inductance module		L_{SCE}	nH	-	14	-	
Thermal Impedance	IGBT	Rth(j-c)	K/W	-	-	0.009	Junction to case
	FWD	Rth(j-c)		-	-	0.018	
Contact Thermal Impedance		Rth(c-f)	K/W	-	0.006	-	Case to fin

Notes:(3) R_G value is the test condition's value for evaluation of the switching times, not recommended value. Please, determine the suitable R_G value after the measurement of switching waveforms (overshoot voltage, etc.) with appliance mounted.

* 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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DEFINITION OF TEST CIRCUIT

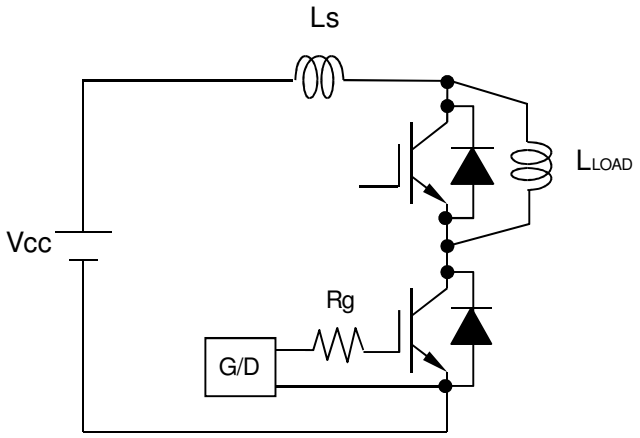
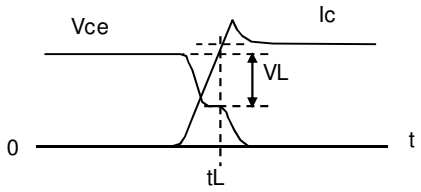
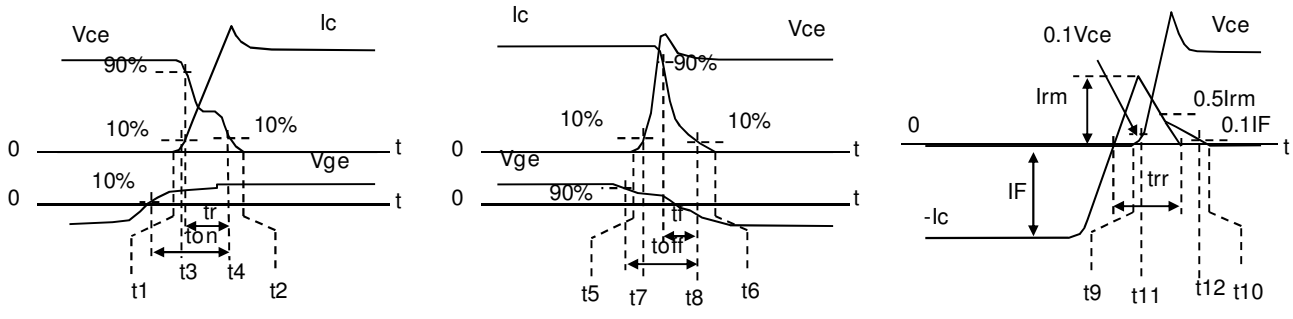


Fig.1 Switching test circuit



$$Ls = \frac{VL}{\left(\frac{dIc}{dt}\right)_{t=tL}}$$

Fig.2 Definition of Ls



$$Eon(10\%) = \int_{t3}^{t4} Ic \cdot Vce\, dt \qquad Eoff(10\%) = \int_{t7}^{t8} Ic \cdot Vce\, dt \qquad Err(10\%) = \int_{t11}^{t12} IF \cdot Vce\, dt$$

$$Eon(Full) = \int_{t1}^{t2} Ic \cdot Vce\, dt \qquad Eoff(Full) = \int_{t5}^{t6} Ic \cdot Vce\, dt \qquad Err(Full) = \int_{t9}^{t10} IF \cdot Vce\, dt$$

Fig.3 Definition of switching loss

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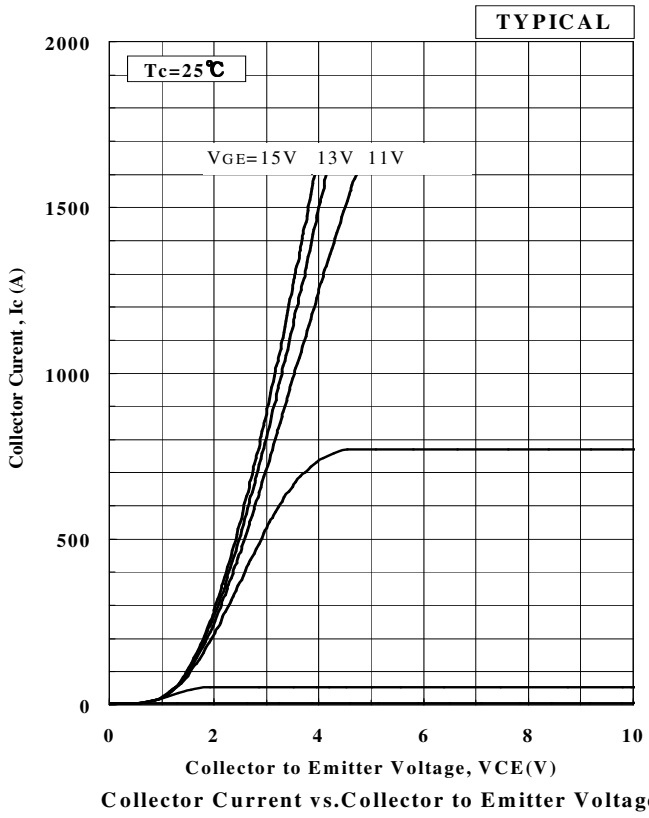
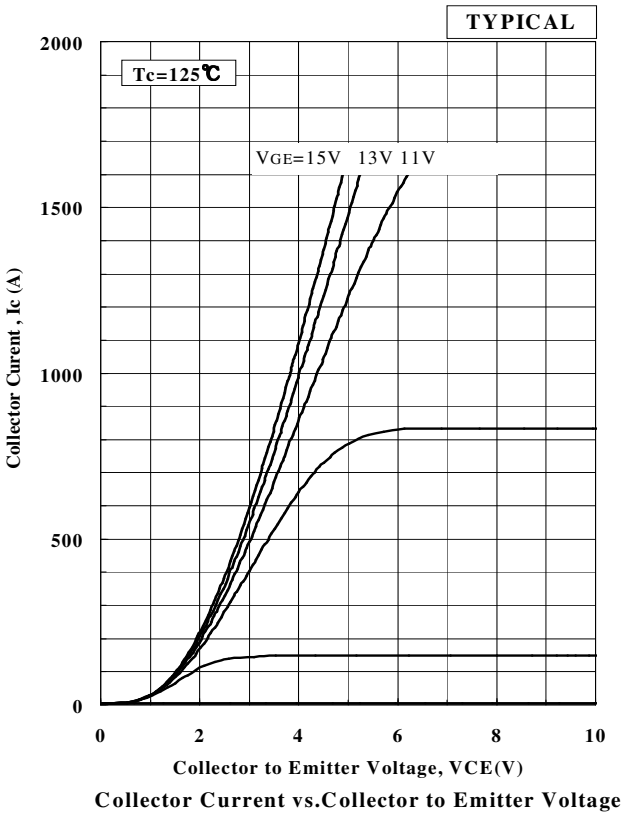
CHARACTERISTICS CURVE

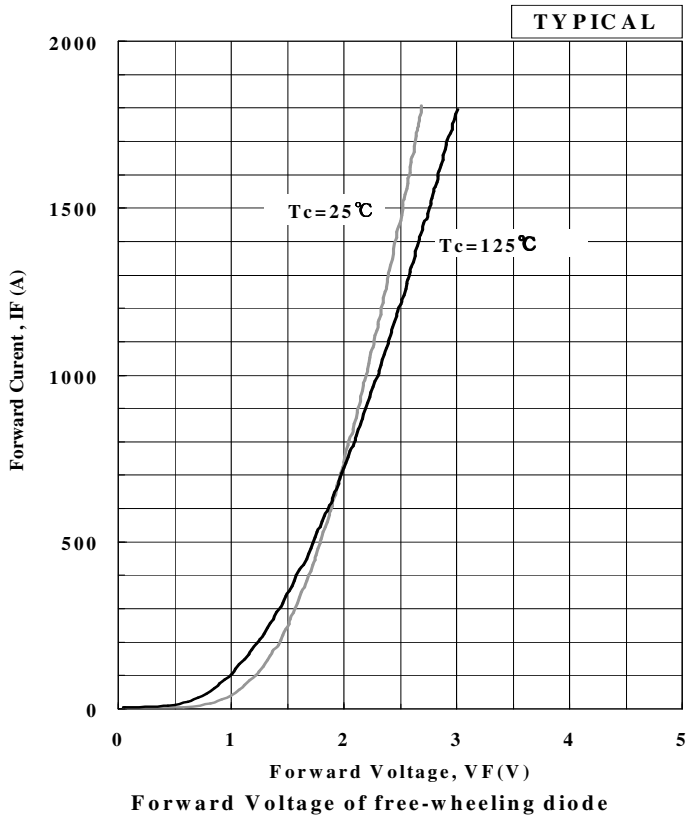
STATIC CHARACTERISTICS



Collector Current vs.Collector to Emitter Voltage



Collector Current vs.Collector to Emitter Voltage



Forward Voltage of free-wheeling diode

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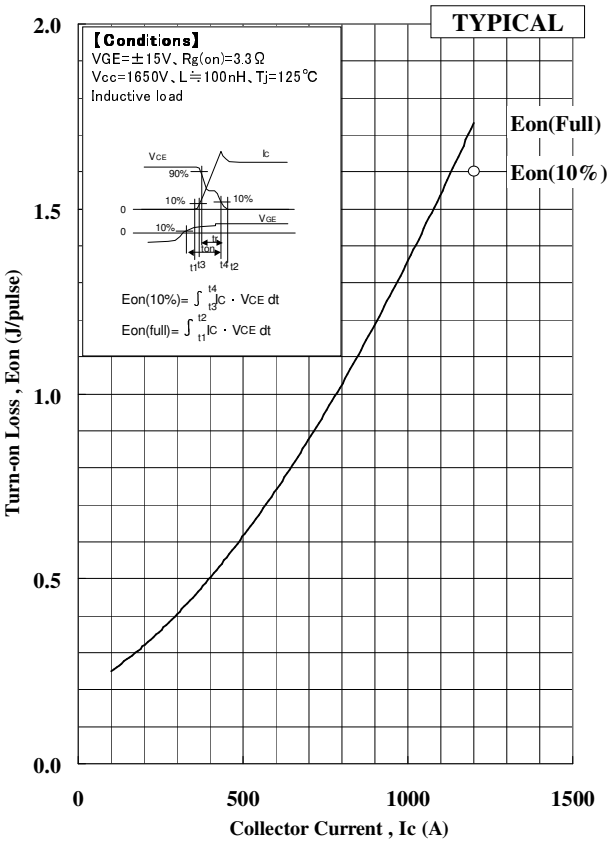
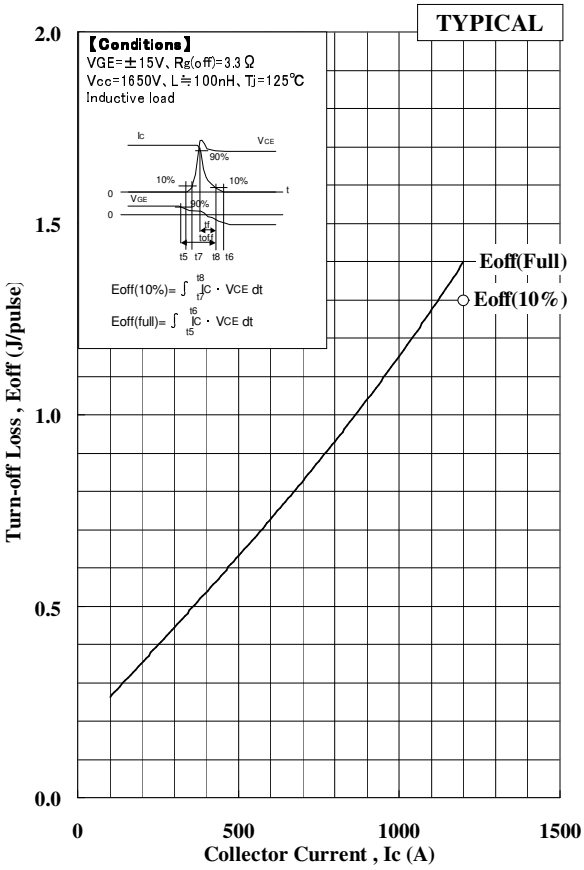
DYNAMIC CHARACTERISTICS

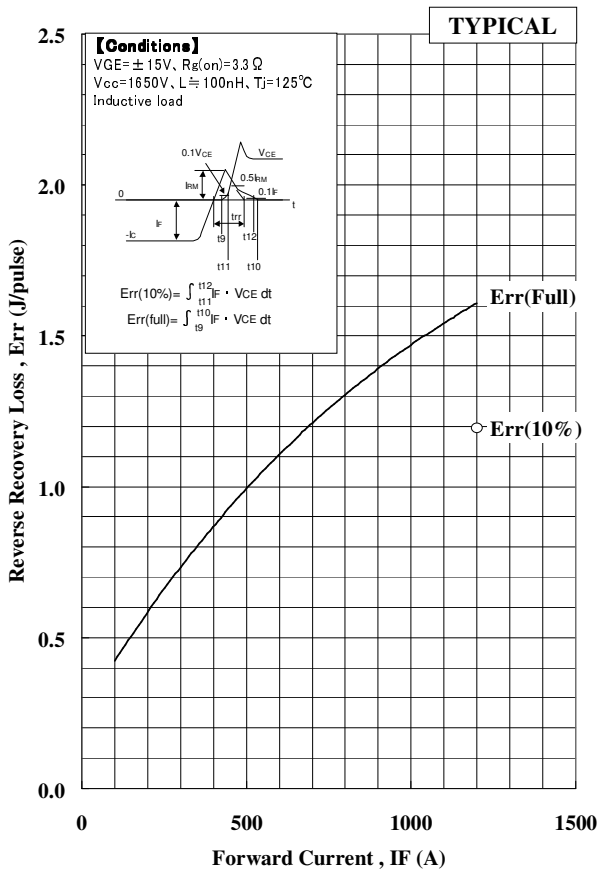
DEPENDENCE OF CURRENT



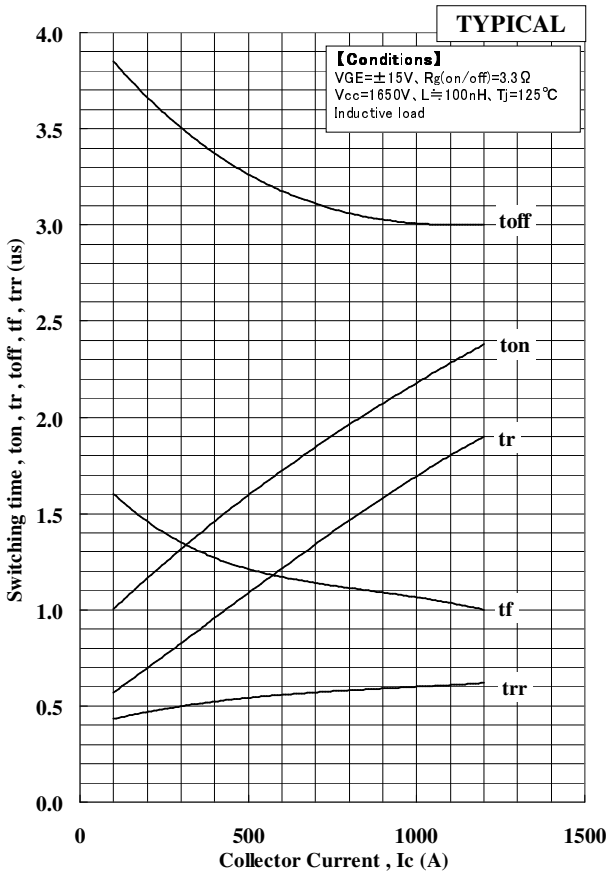
Turn-on Loss vs. Collector Current



Turn-off Loss vs. Collector Current



Recovery Loss vs. Forward Current



Switching time vs. Collector current

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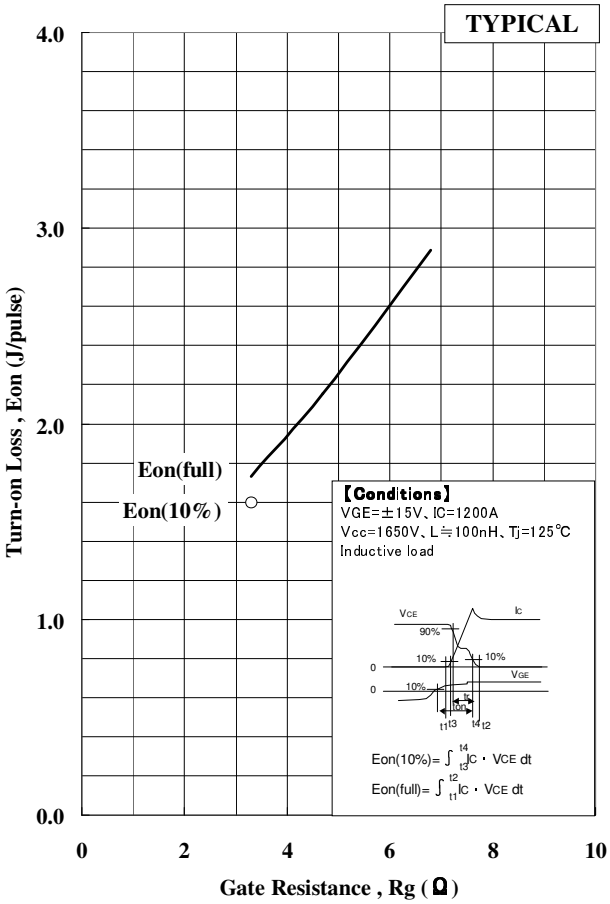
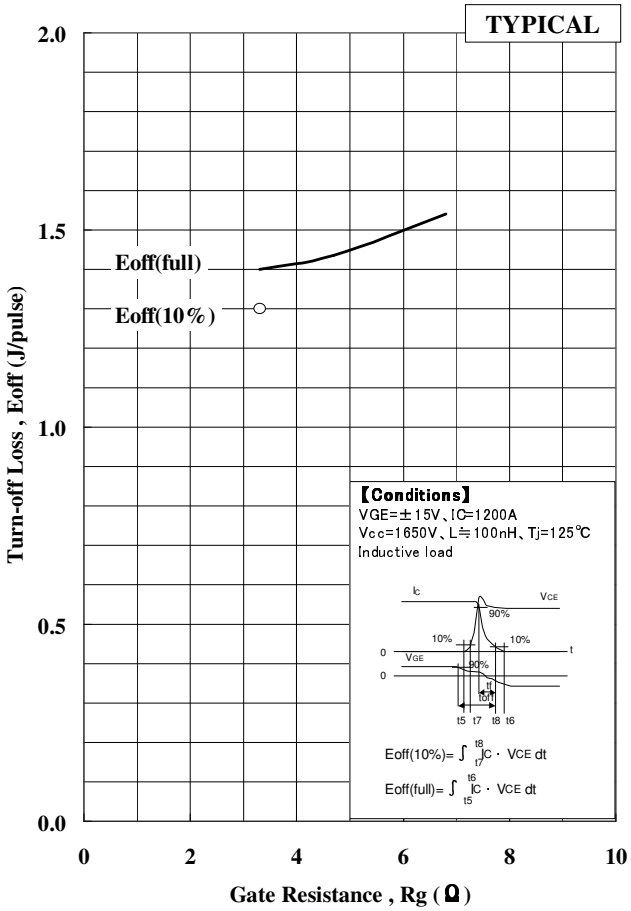
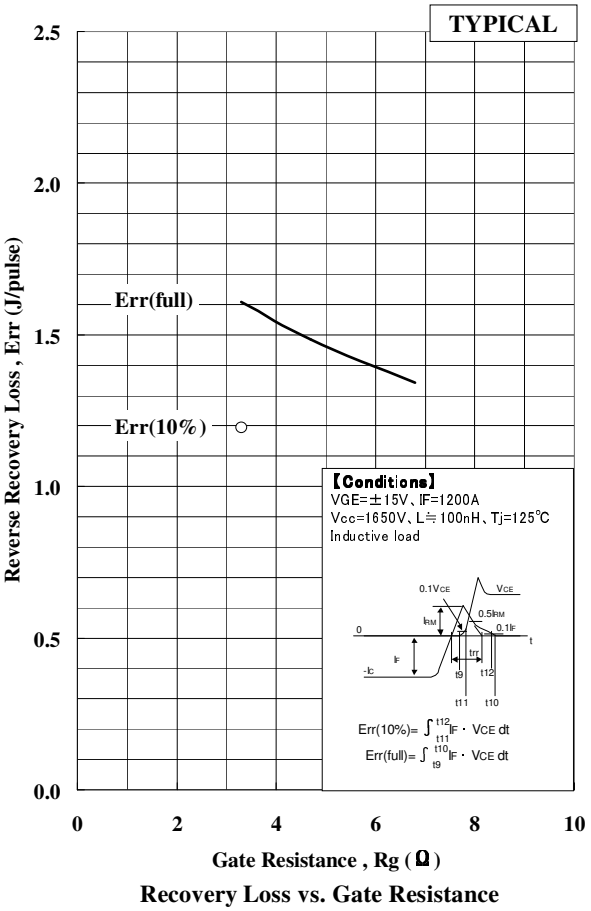
DEPENDENCE OF RG



Turn-on Loss vs. Gate Resistance



Turn-off Loss vs. Gate Resistance



Recovery Loss vs. Gate Resistance

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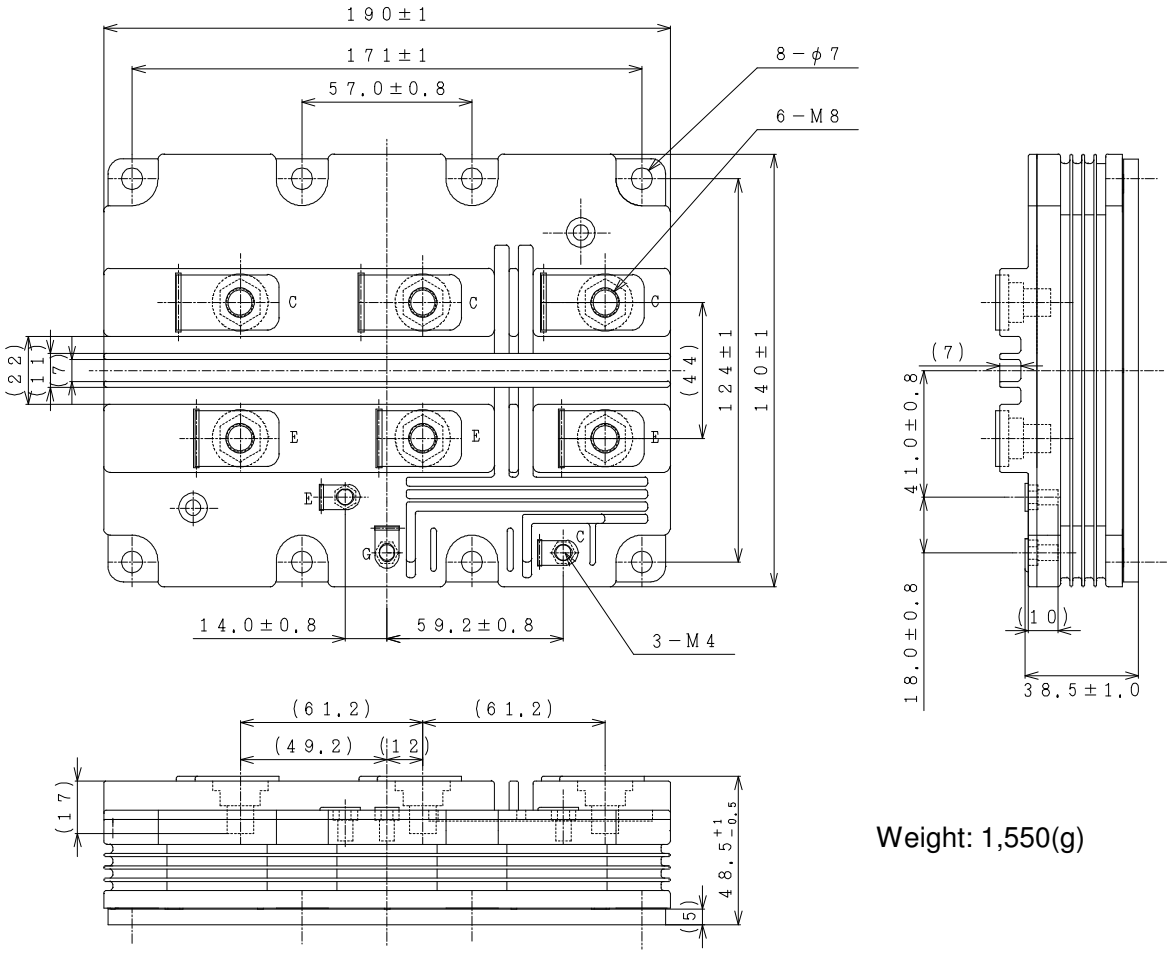
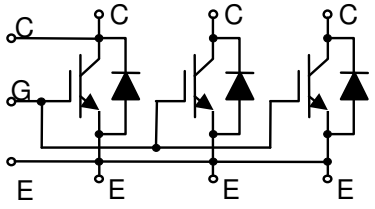
PACKAGE OUTLINE DRAWING

Unit in mm



Weight: 1,550(g)



Circuit diagram

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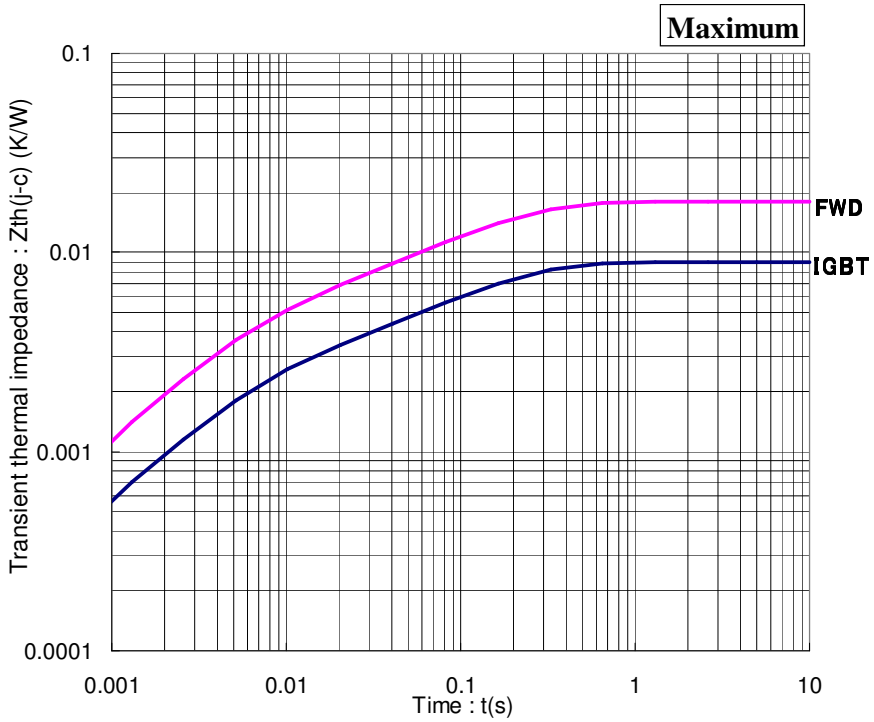
TRANSIENT THERMAL IMPEDANCE



Transient Thermal Impedance Curve

n	1	2	3	4	5	6	7	Unit
τth[n]	0.30	0.1	0.03	0.01	0.003	0.001	0.0003	sec
Zth[n,IGBT]	1.79E-03	4.55E-03	1.59E-05	1.44E-03	1.15E-03	3.47E-06	4.25E-05	K/W
Zth[n,Diode]	3.58E-03	9.13E-03	1.01E-05	2.89E-03	2.31E-03	1.16E-06	8.63E-05	K/W

Material declaration

Please note the following materials are contained in the product, in order to keep characteristic and reliability level.

Material	Contained part
Lead (Pb) and its compounds	Solder

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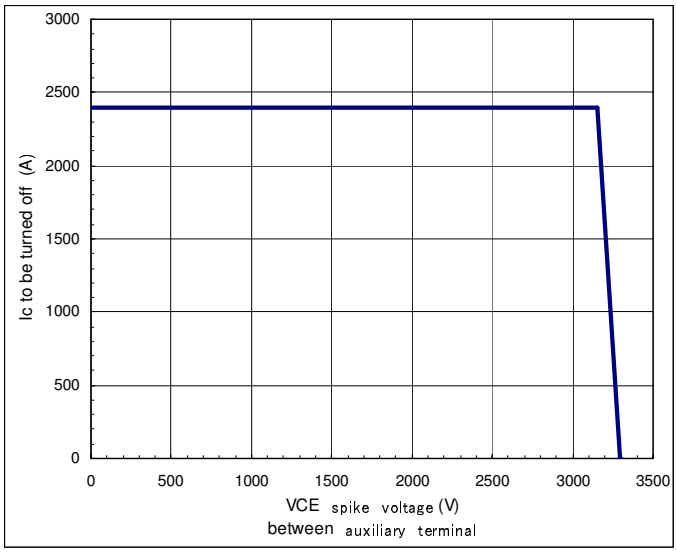
RBSOA / Recovery SOA

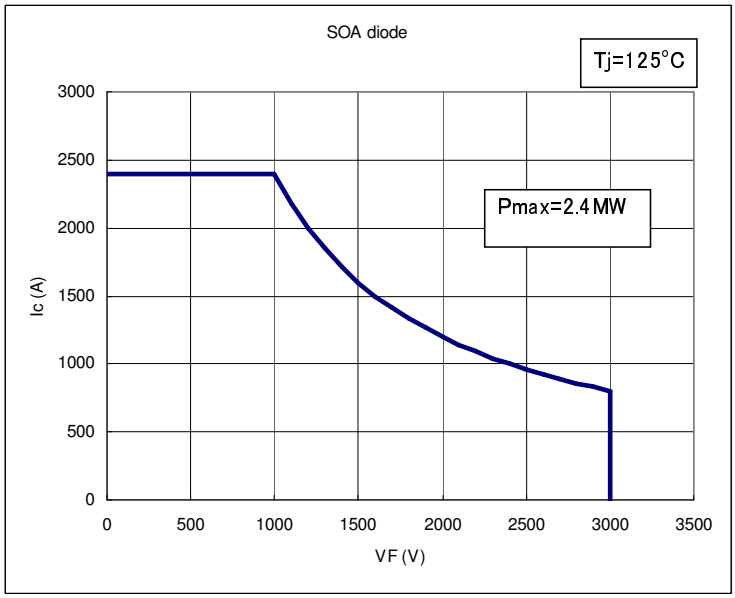
RBSOA

Vcc=2300V, Ic=2400A, Rg(on/off)=3.3/3.3Ω
, VGE=±15V, Ls=100nH, Tc=125°C
(Measured at auxiliary terminal)



Recovery SOA

Vcc=2000V, Ic=-IF=2400A, Rg(on/off)=3.3/3.3Ω
, VGE=±15V, Ls=100nH, Tc=125°C
(Measured at auxiliary terminal)



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HITACHI POWER SEMICONDUCTORS

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