MBN1200E33D

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=70°C, N>30,000cycles)
- Isolated head sink (terminal to base).

ABSOLUTE MAXIMUM RATINGS (Tc=25°C)

Item		Symbol	Unit	MBN1200E33D
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}	6,000(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	-	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	-	1.9	3.1	V_{CC}=1,650V, Ic=1,200A
	Turn On Time	t_{on}		-	2.4	3.3	L=100nH
	Fall Time	t_f		-	1.0	2.5	R_G=3.3Ω (3)
	Turn Off Time	t_{off}		-	3.0	5.1	V_{GE}=±15V, Tj=125°C
Peak Forward Voltage Drop		V_{FM}	V	-	2.5	3.0	IF=1,200A, V_{GE}=0V, Tj=125°C
Reverse Recovery Time		t_{rr}	μs	-	0.6	1.1	Vcc=1,650V, IF=1,200A, L=100nH Tj=125°C
Turn On Loss		$E_{on(10\%)}$	J/P	-	1.6	2.1	V_{CC}=1,650V, Ic=1,200A, L=100nH
Turn Off Loss		$E_{off(10\%)}$	J/P	-	1.3	1.7	R_G=3.3Ω (3)
Reverse Recovery Loss		$E_{rr(10\%)}$	J/P	-	1.2	1.9	V_{GE}=±15V, Tj=125°C
Stray inductance module		LSCE	nH	-	12	-	
Thermal Impedance	IGBT	Rth(j-c)	K/W	-	-	0.0085	Junction to case
	FWD	Rth(j-c)		-	-	0.017	
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

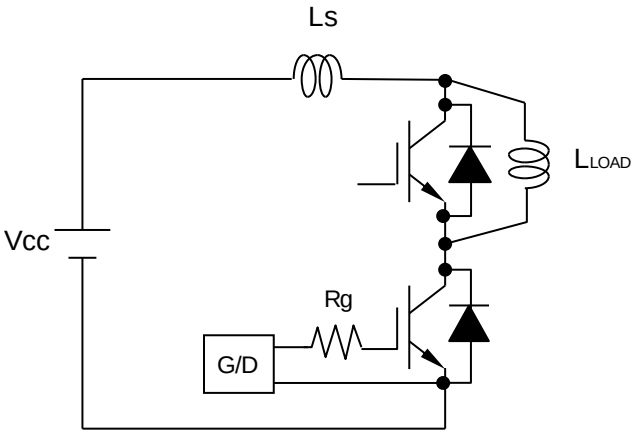
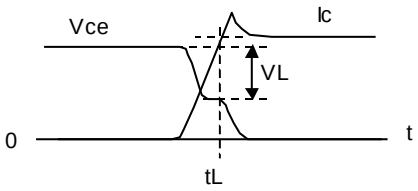
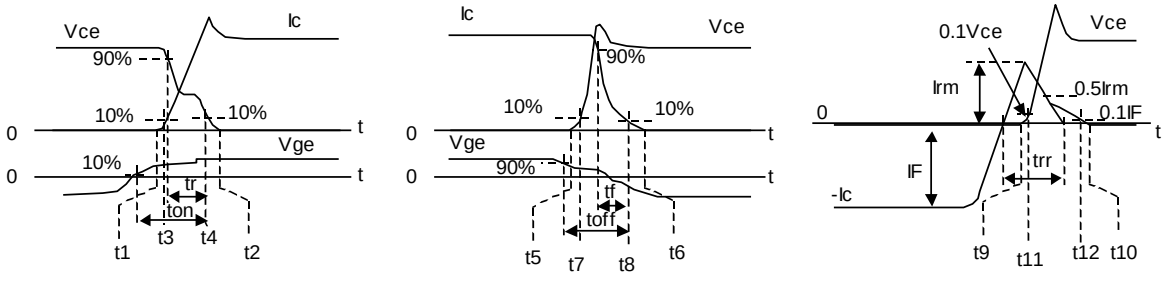


Fig.1 Switching test circuit



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

Fig.2 Definition of stray inductance



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

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

Fig.3 Definition of switching loss

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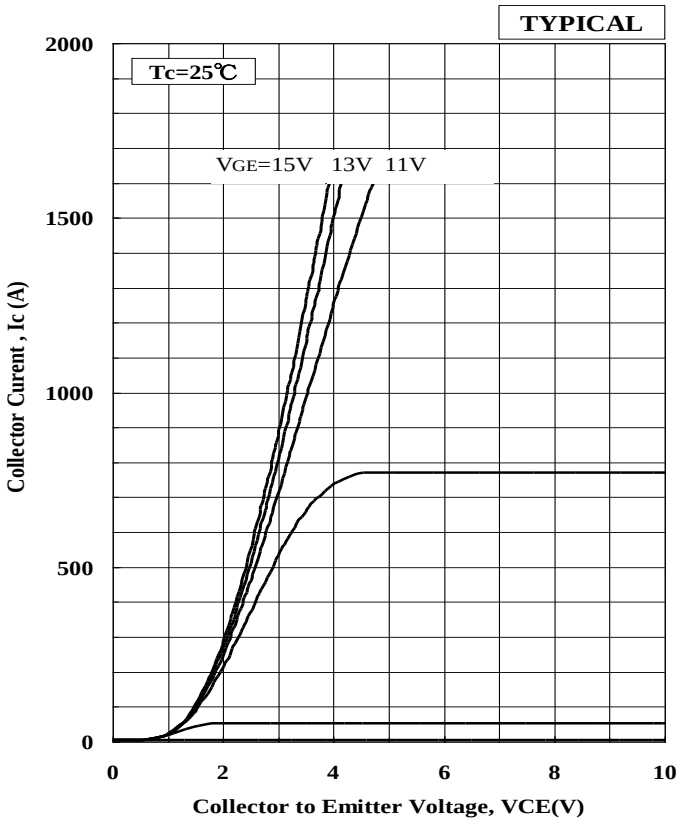
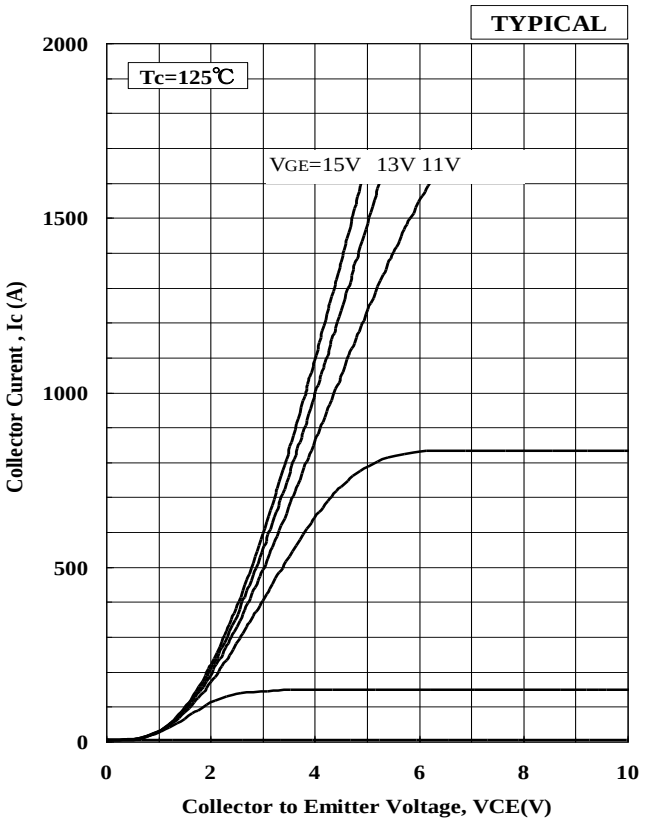
CHARACTERISTICS CURVE

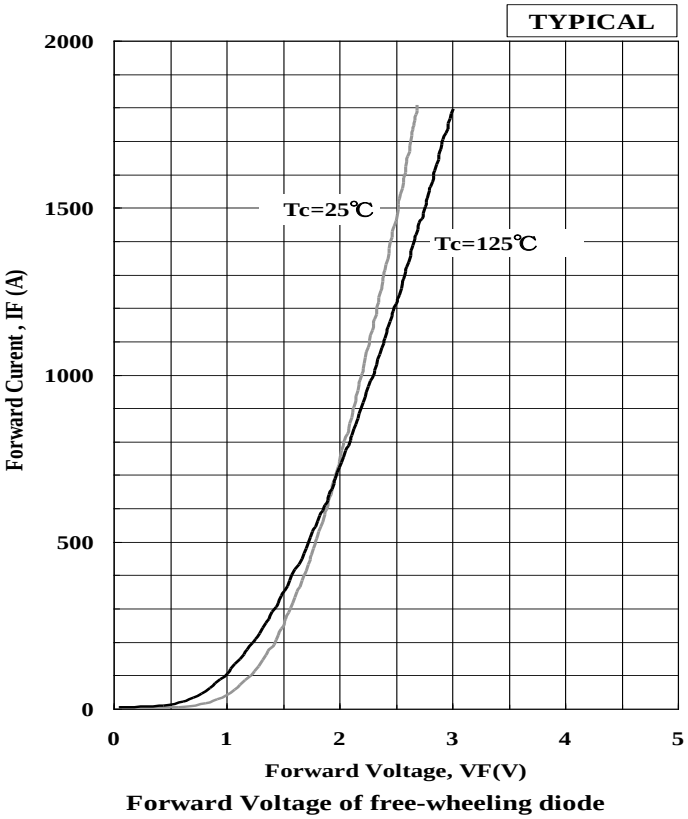
STATIC CHARACTERISTICS



Collector Current vs.Collector to Emitter Voltage



Collector Current vs.Collector to Emitter Voltage



Forward Voltage of free-wheeling diode

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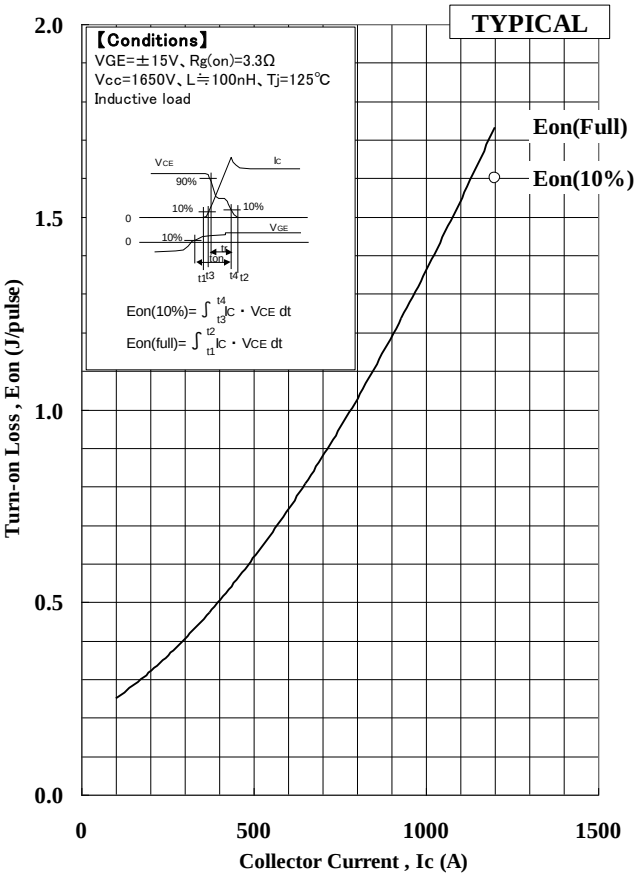
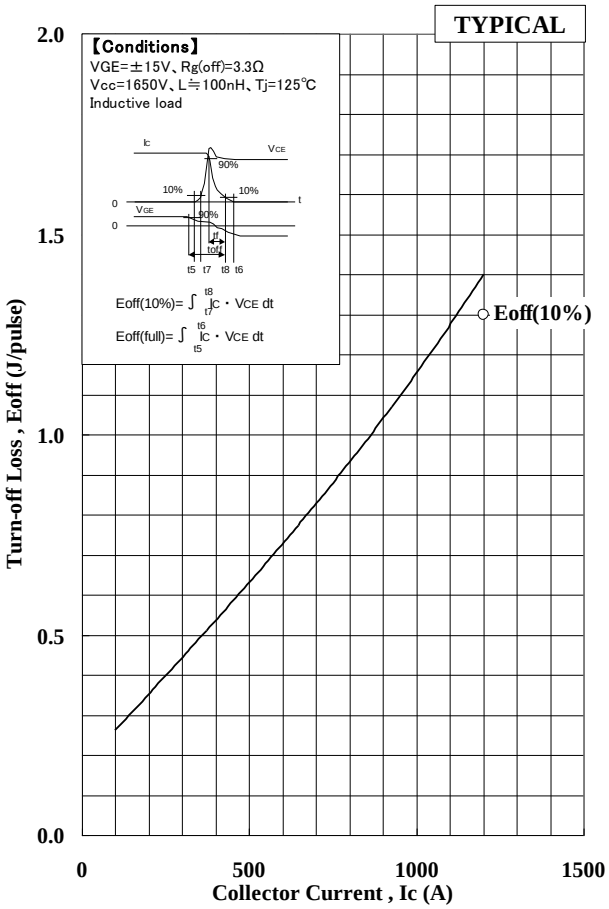
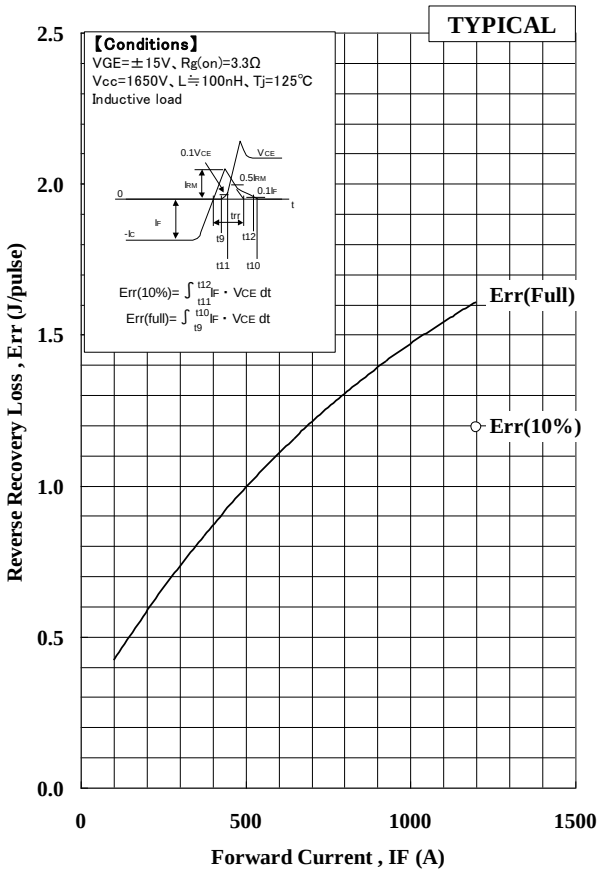
DEPENDENCE OF CURRENT



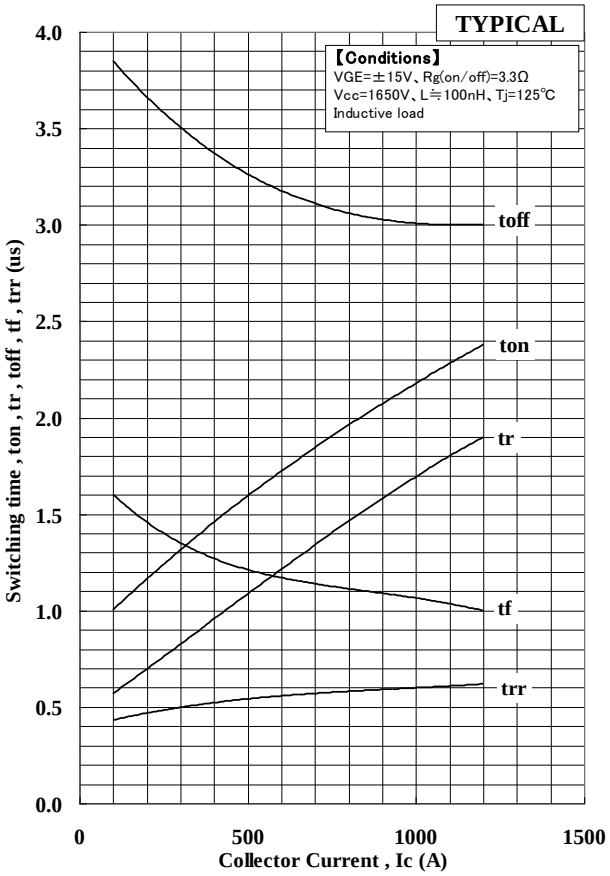
Turn-on Loss vs. Collector Current



Turn-off Loss vs. Collector Current



Recovery Loss vs. Forward Current



Switching time vs. Collector current

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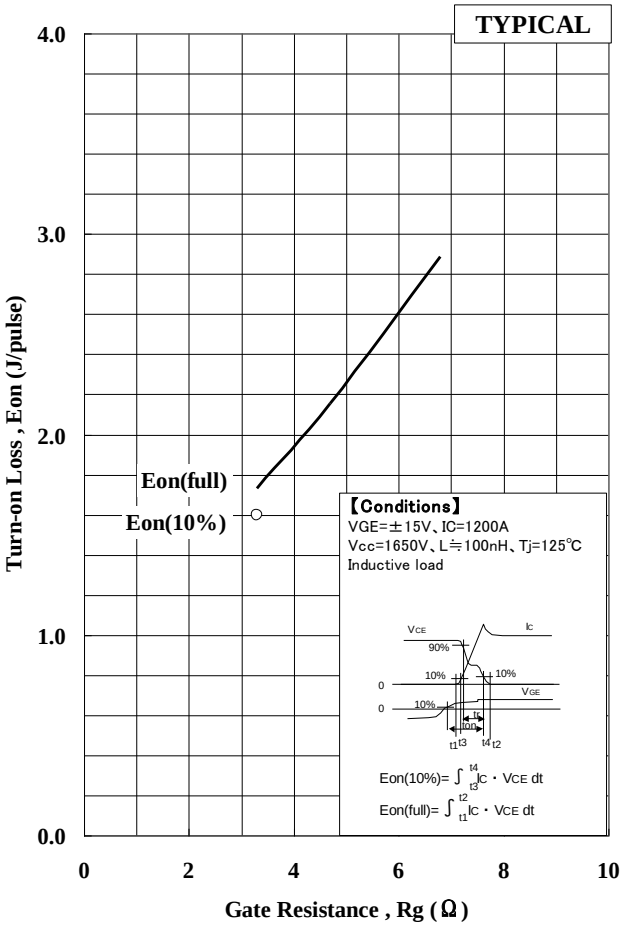
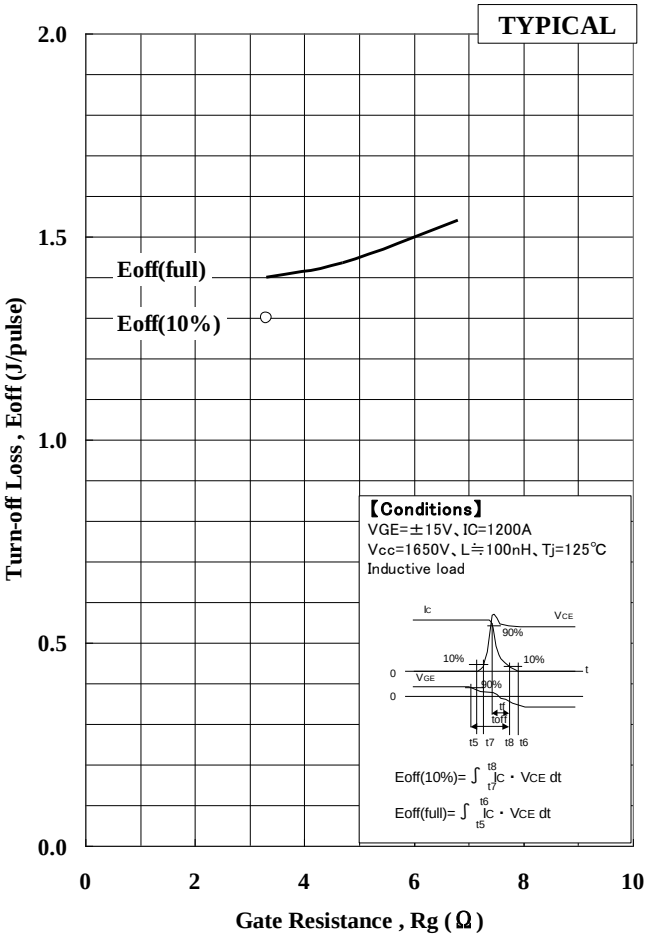
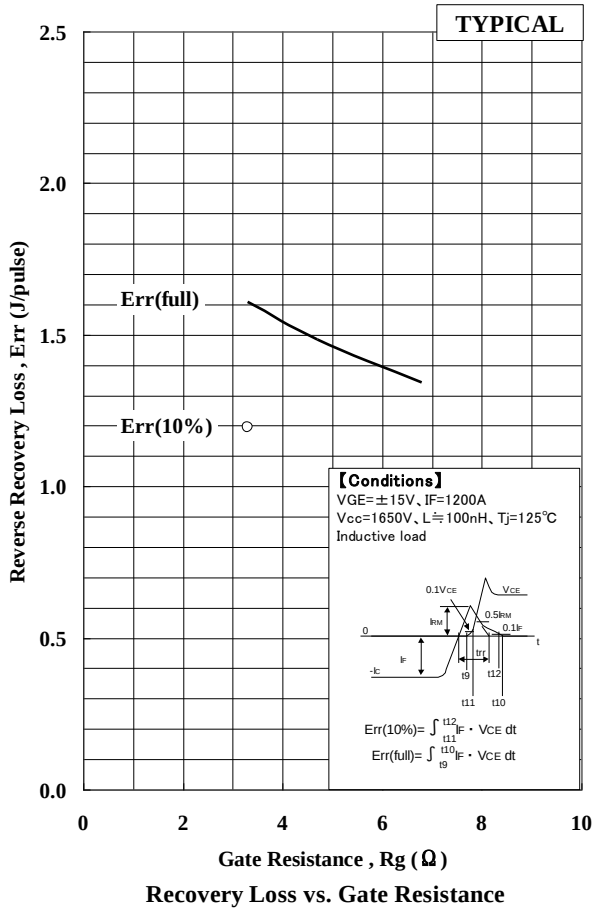
DEPENDENCE OF RG



Turn-on Loss vs. Gate Resistance



Turn-off Loss vs. Gate Resistance



Recovery Loss vs. Gate Resistance

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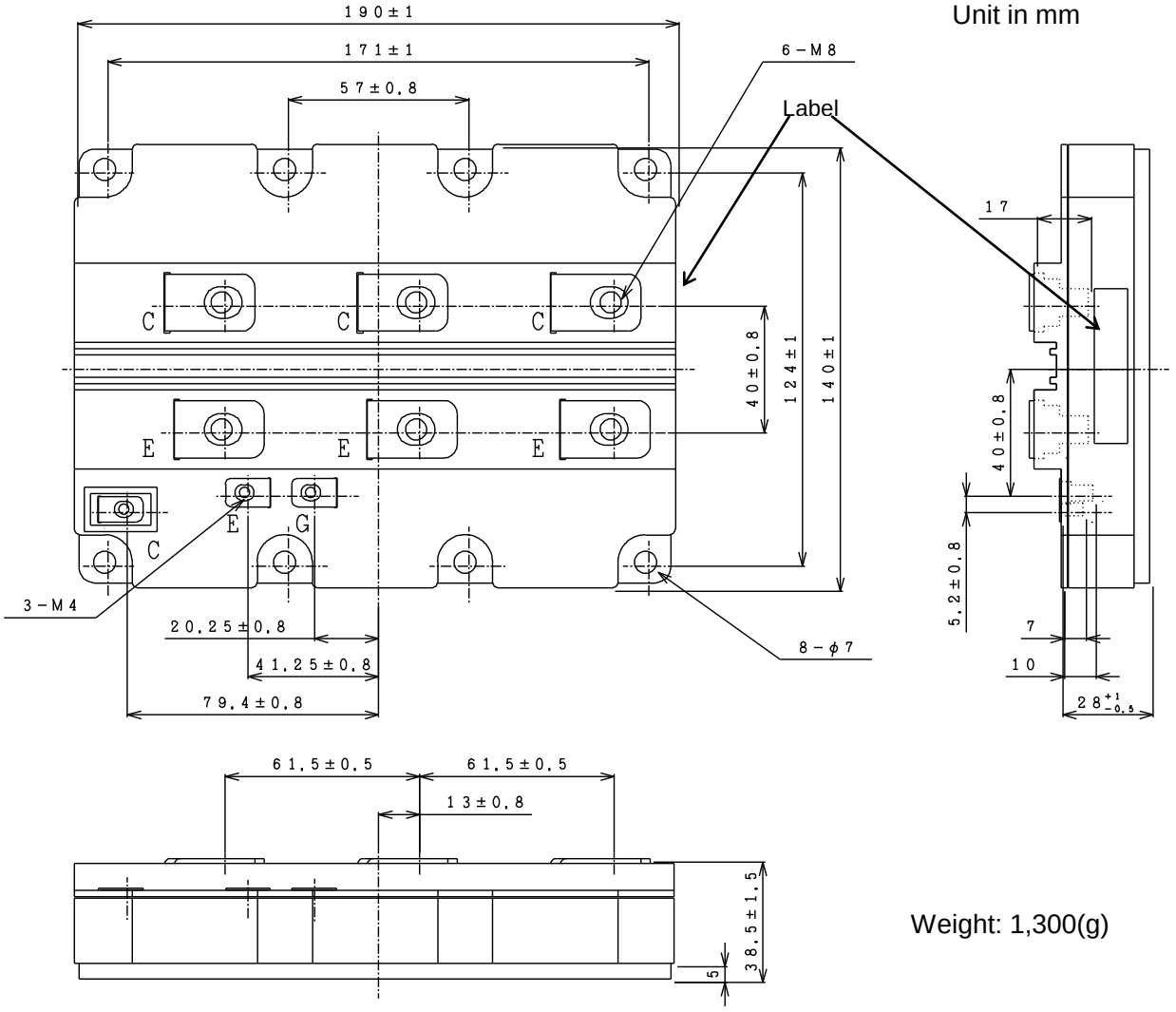
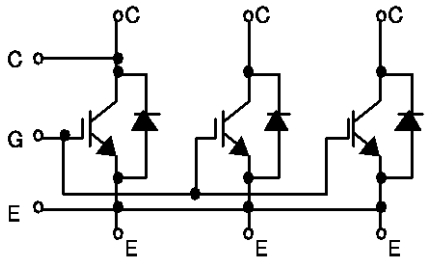
PACKAGE OUTLINE DRAWING

Unit in mm



Weight: 1,300(g)



Circuit diagram

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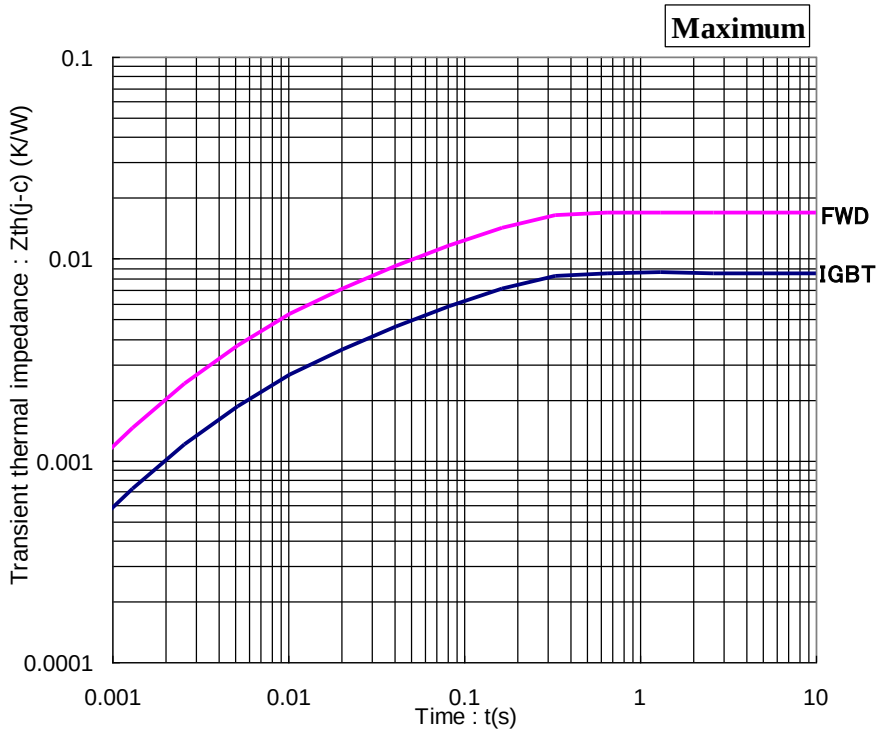
TRANSIENT THERMAL IMPEDANCE



Transient Thermal Impedance Curve

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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HITACHI POWER SEMICONDUCTORS

Notices

1. The information given herein, including the specifications and dimensions, is subject to change without prior notice to improve product characteristics. Before ordering, purchasers are advised to contact Hitachi sales department for the latest version of this data sheets.
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