

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.
($\Delta T_c=70^\circ\text{C}$, $N>30,000$ cycles)
- * Isolated head sink (terminal to base).

ABSOLUTE MAXIMUM RATINGS ($T_c=25^\circ\text{C}$)

Item	Symbol	Unit	MBN1200E33D	
Collector Emitter Voltage	V_{CES}	V	3,300	
Gate Emitter Voltage	V_{GES}	V	± 20	
Collector Current	DC	I_C	1,200	
	1ms	I_{Cp}	2,400	
Forward Current	DC	I_F	1,200	
	1ms	I_{FM}	2,400	
Junction Temperature	T_j	$^\circ\text{C}$	-40 ~ +125	
Storage Temperature	T_{stg}	$^\circ\text{C}$	-40 ~ +125	
Isolation Voltage	V_{ISO}	V_{RMS}	6,000(AC 1 minute)	
Screw Torque	Terminals (M4/M8)	-	2/10	(1)
	Mounting (M6)	-	6	(2)

Notes: (1) Recommended Value $1.8\pm 0.2/9\pm 1\text{N}\cdot\text{m}$ (2) Recommended Value $5.5\pm 0.5\text{N}\cdot\text{m}$

ELECTRICAL CHARACTERISTICS

Item	Symbol	Unit	Min.	Typ.	Max.	Test Conditions
Collector Emitter Cut-Off Current	I_{CES}	mA	-	-	12	$V_{CE}=3,300\text{V}$, $V_{GE}=0\text{V}$, $T_j=25^\circ\text{C}$
			-	20	60	$V_{CE}=3,300\text{V}$, $V_{GE}=0\text{V}$, $T_j=125^\circ\text{C}$
Gate Emitter Leakage Current	I_{GES}	nA	-500	-	+500	$V_{GE}=\pm 20\text{V}$, $V_{CE}=0\text{V}$, $T_j=25^\circ\text{C}$
Collector Emitter Saturation Voltage	$V_{CE(sat)}$	V	-	4.2	5.2	$I_C=1,200\text{A}$, $V_{GE}=15\text{V}$, $T_j=125^\circ\text{C}$
Gate Emitter Threshold Voltage	$V_{GE(TO)}$	V	4.5	6.0	7.0	$V_{CE}=10\text{V}$, $I_C=1,200\text{mA}$, $T_j=25^\circ\text{C}$
Input Capacitance	C_{ies}	nF	-	110	-	$V_{CE}=10\text{V}$, $V_{GE}=0\text{V}$, $f=100\text{kHz}$, $T_j=25^\circ\text{C}$
Internal Gate Resistance	R_{ge}	Ω	-	1.2	-	$V_{CE}=10\text{V}$, $V_{GE}=0\text{V}$, $f=100\text{kHz}$, $T_j=25^\circ\text{C}$
Switching Times	Rise Time	t_r	-	1.9	3.1	$V_{CC}=1,650\text{V}$, $I_C=1,200\text{A}$
	Turn On Time	t_{on}	-	2.4	3.3	$L=100\text{nH}$
	Fall Time	t_f	-	1.0	2.5	$R_G=3.3\Omega$ (3)
	Turn Off Time	t_{off}	-	3.0	5.1	$V_{GE}=\pm 15\text{V}$, $T_j=125^\circ\text{C}$
Peak Forward Voltage Drop	V_{FM}	V	-	2.5	3.0	$I_F=1,200\text{A}$, $V_{GE}=0\text{V}$, $T_j=125^\circ\text{C}$
Reverse Recovery Time	t_{rr}	μs	-	0.6	1.1	$V_{CC}=1,650\text{V}$, $I_F=1,200\text{A}$, $L=100\text{nH}$ $T_j=125^\circ\text{C}$
Turn On Loss	$E_{on(10\%)}$	J/P	-	1.6	2.1	$V_{CC}=1,650\text{V}$, $I_C=1,200\text{A}$, $L=100\text{nH}$
Turn Off Loss	$E_{off(10\%)}$	J/P	-	1.3	1.7	$R_G=3.3\Omega$ (3)
Reverse Recovery Loss	$E_{rr(10\%)}$	J/P	-	1.2	1.9	$V_{GE}=\pm 15\text{V}$, $T_j=125^\circ\text{C}$
Stray inductance module	LSCE	nH	-	12	-	
Thermal Impedance	IGBT	$R_{th(j-c)}$	-	-	0.0085	Junction to case
	FWD	$R_{th(j-c)}$	-	-	0.017	
Contact Thermal Impedance	$R_{th(c-f)}$	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

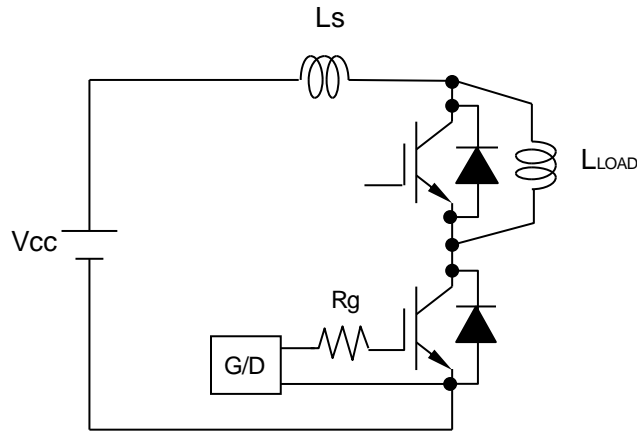


Fig.1 Switching test circuit

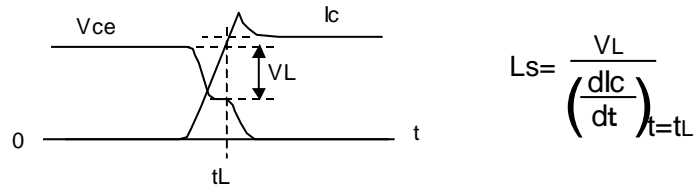


Fig.2 Definition of stray inductance

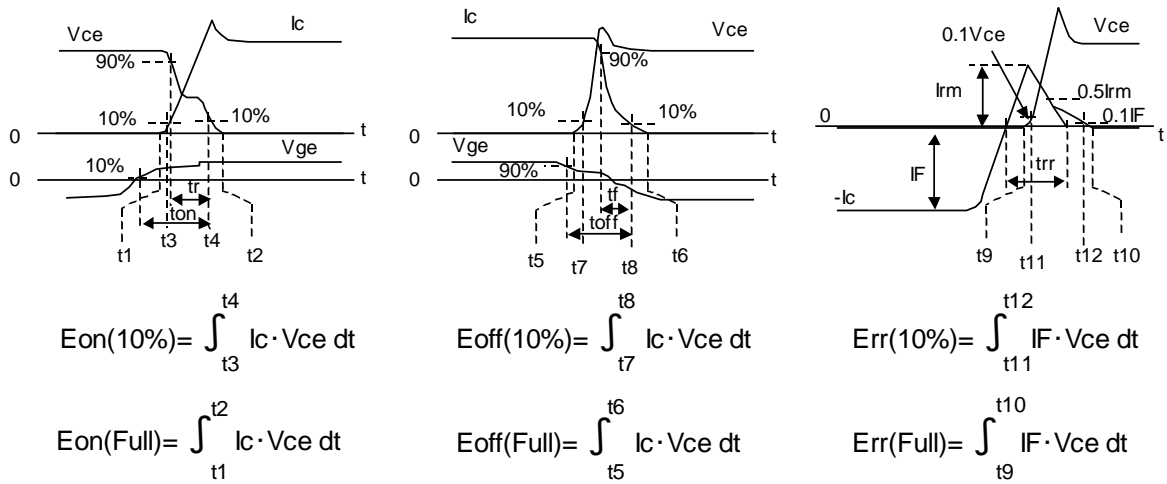
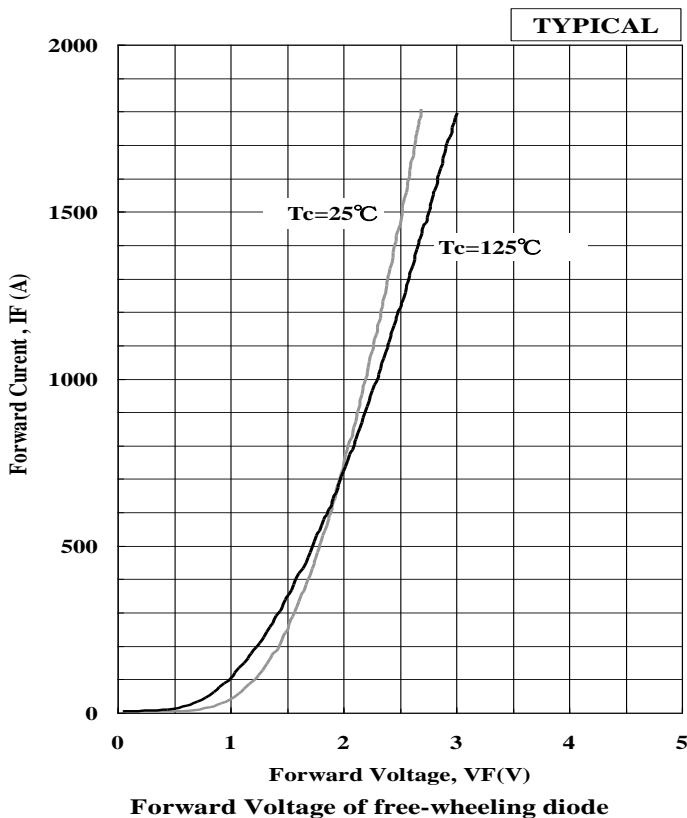
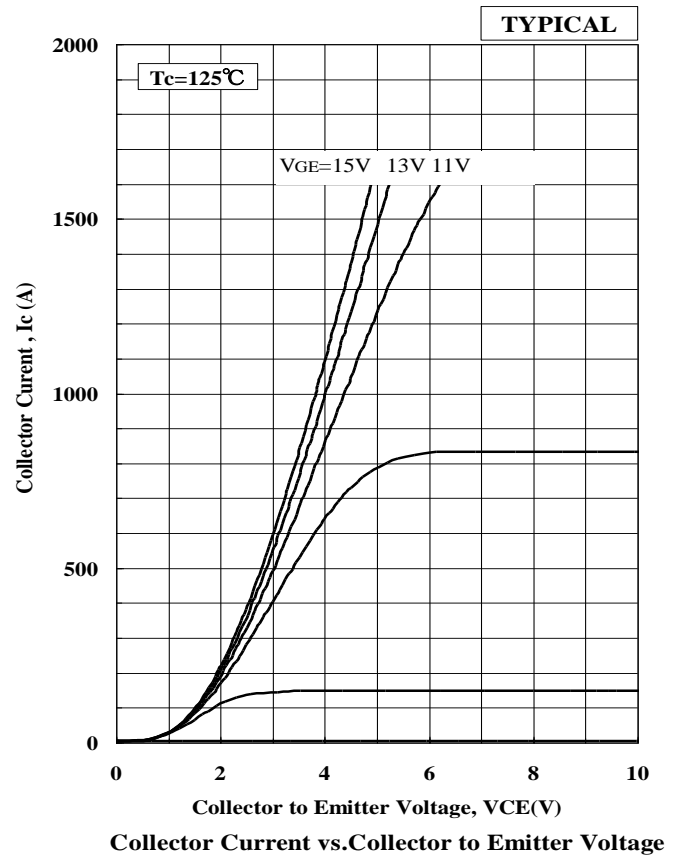
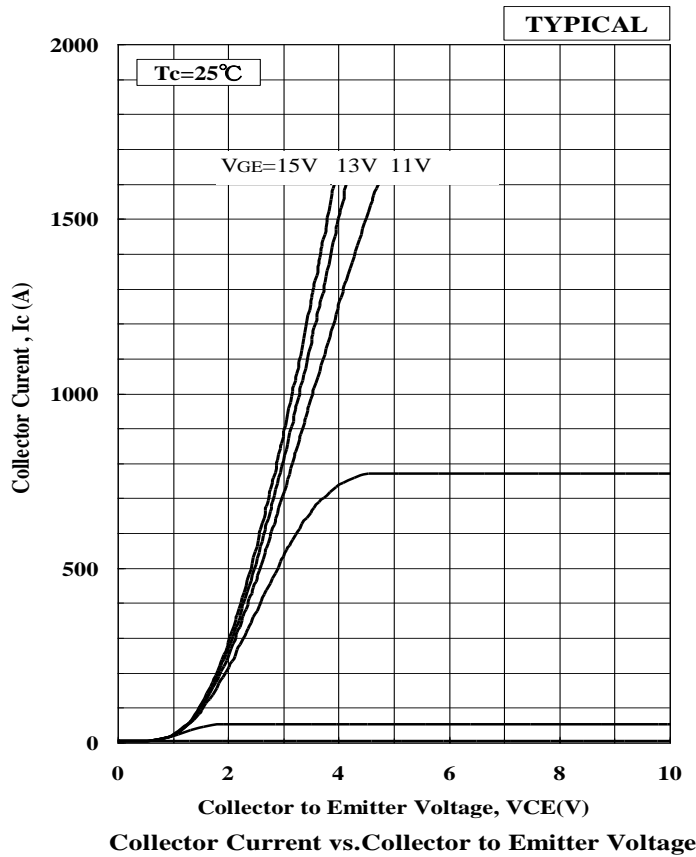


Fig.3 Definition of switching loss

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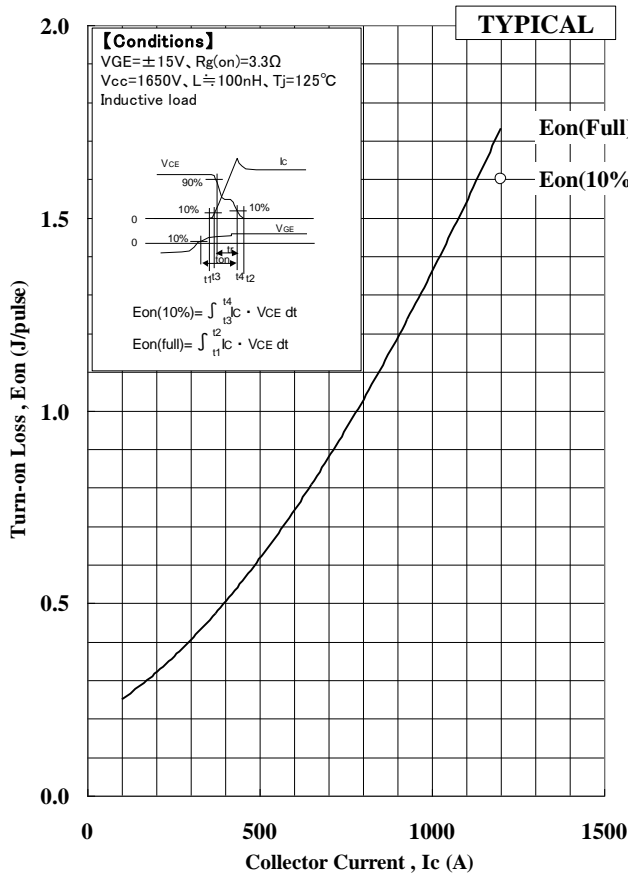
CHARACTERISTICS CURVE

STATIC CHARACTERISTICS

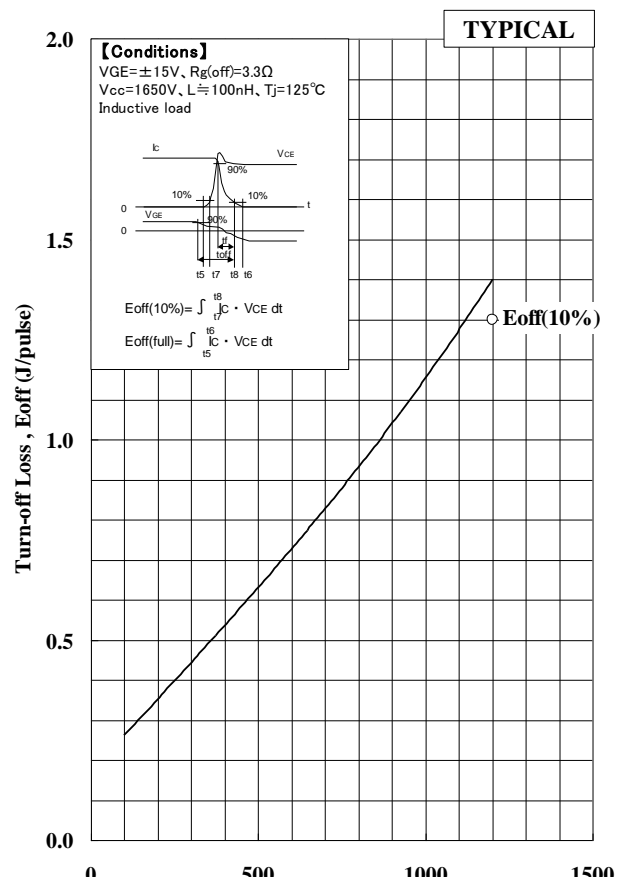


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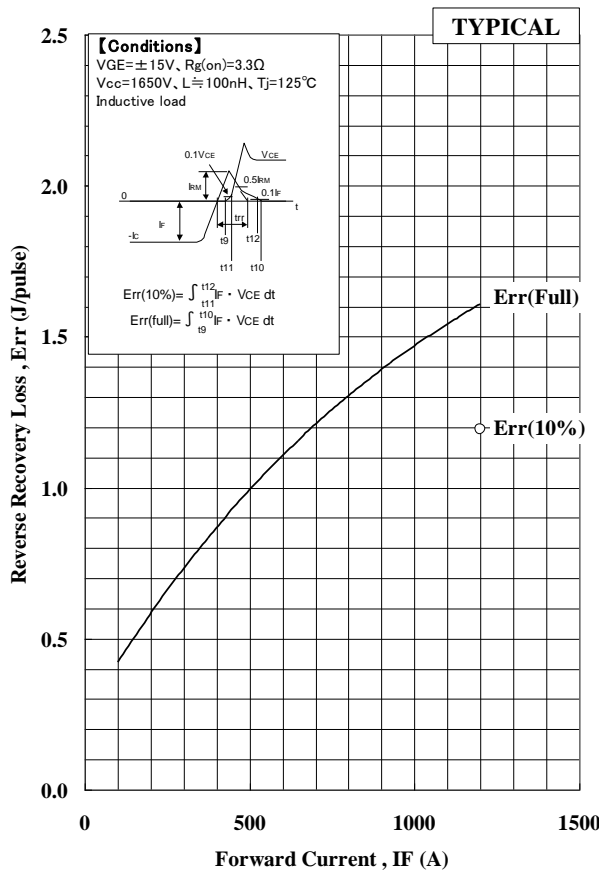
DEPENDENCE OF CURRENT



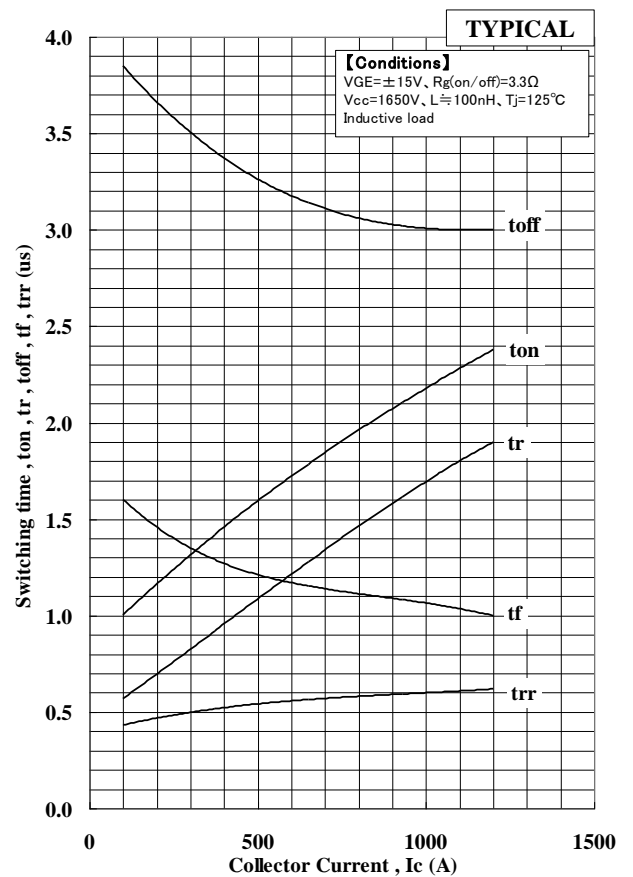
Turn-on Loss vs. Collector Current



Turn-off Loss vs. Collector Current



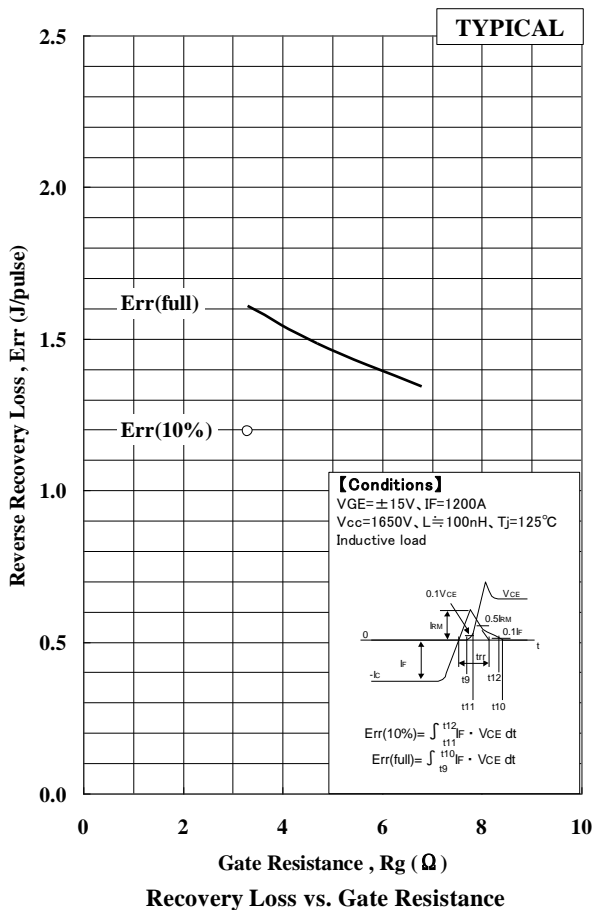
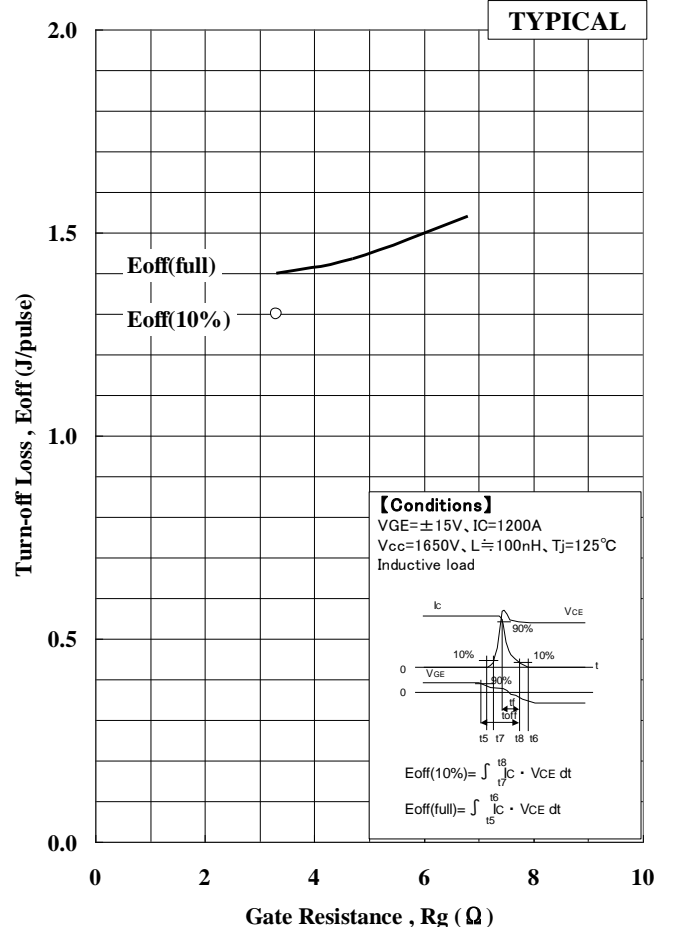
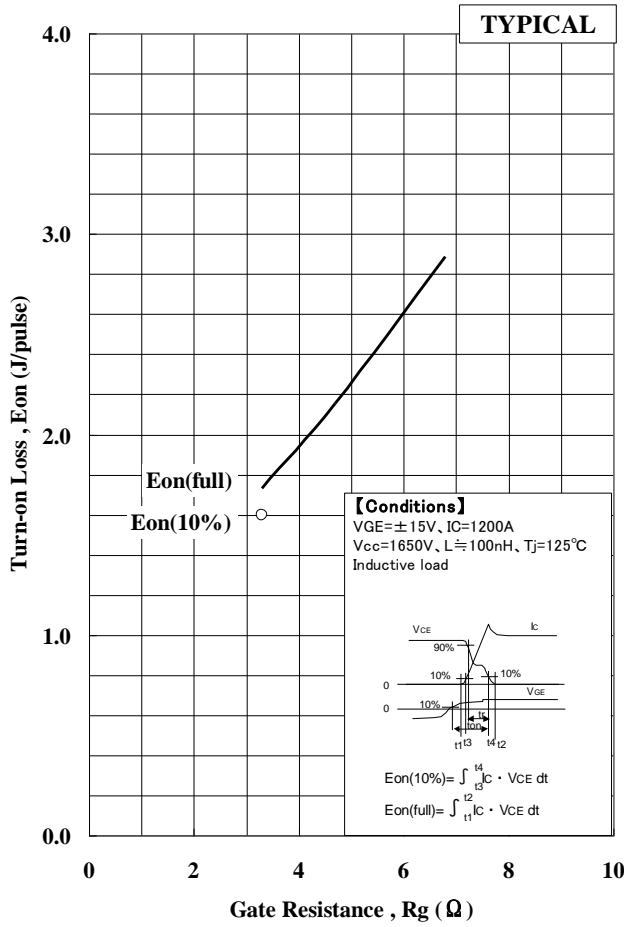
Recovery Loss vs. Forward Current



Switching time vs. Collector current

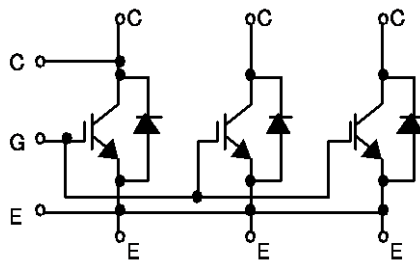
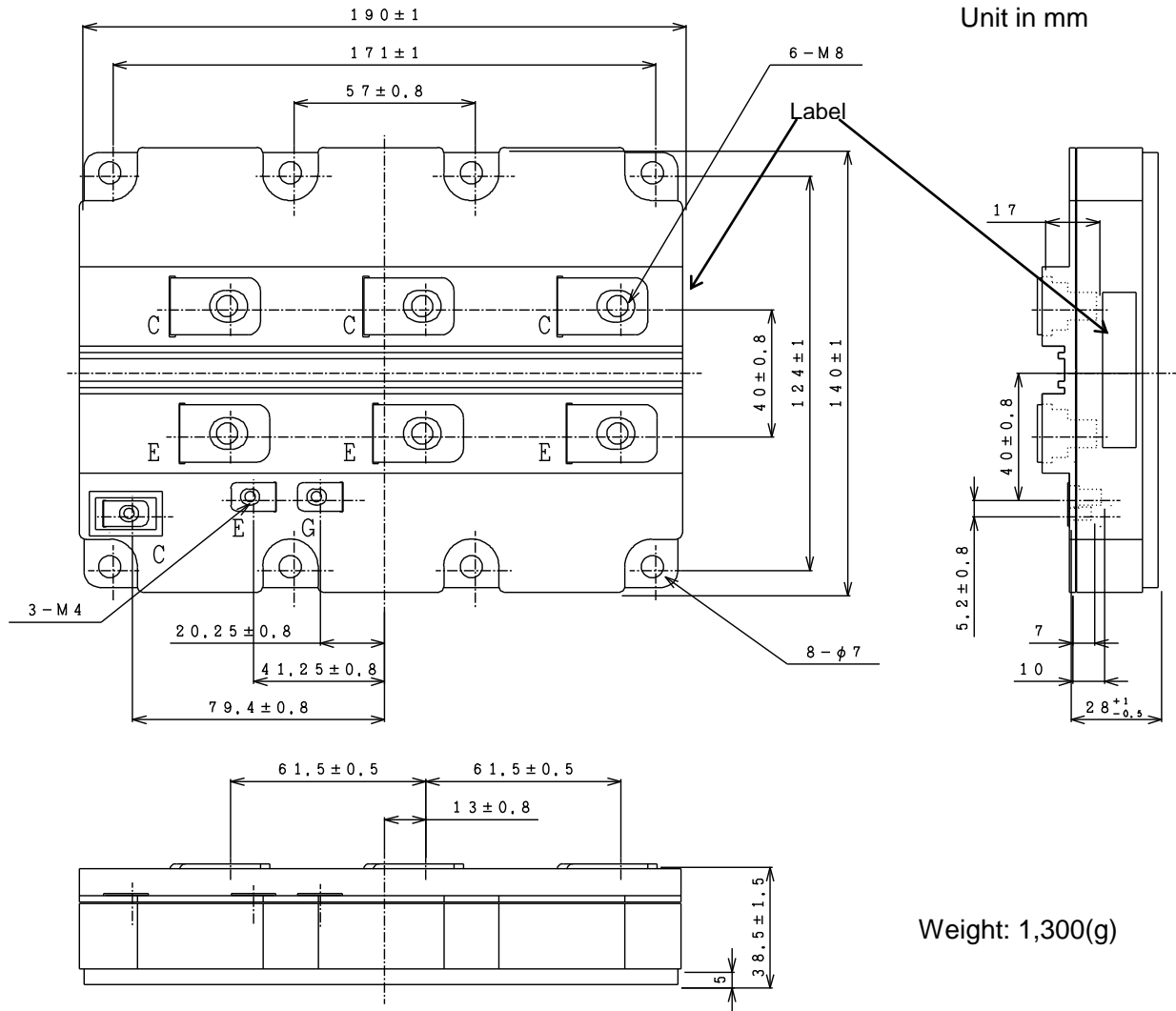
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DEPENDENCE OF R_G



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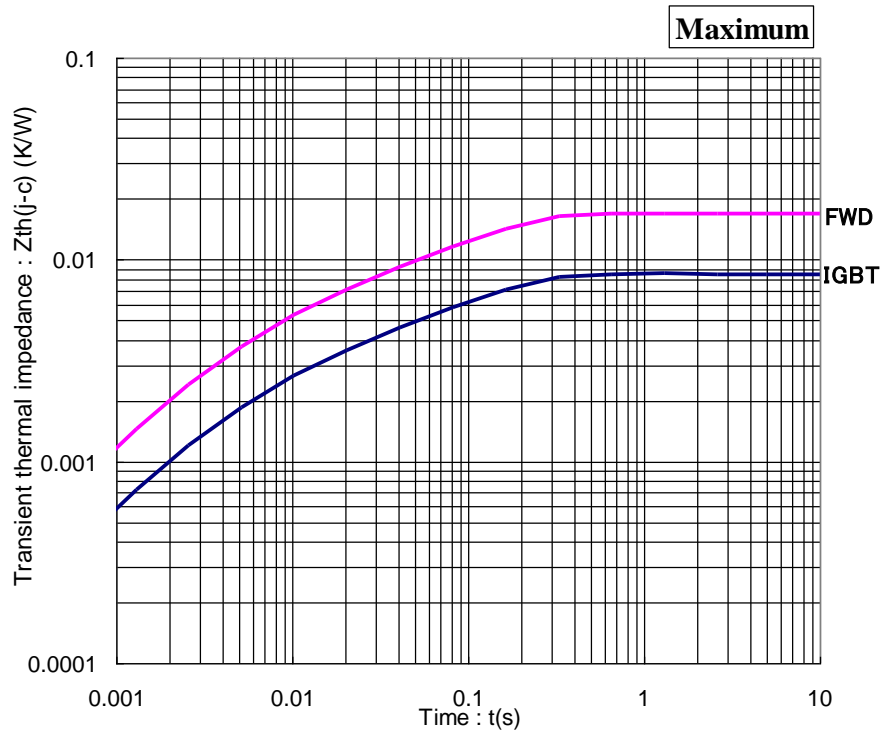
PACKAGE OUTLINE DRAWING



Circuit diagram

MBN1200E33D

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

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