

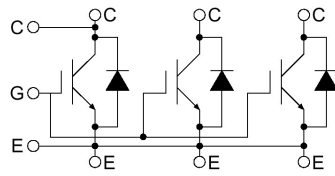
MBN1200E33C

Silicon N-channel IGBT

FEATURES

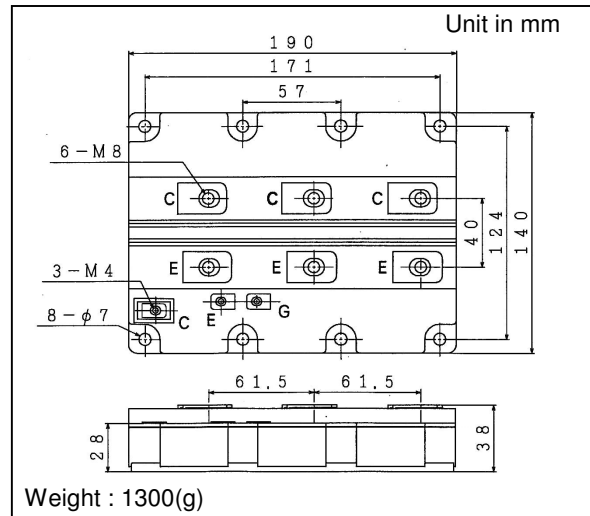
- * High thermal fatigue durability.
($\Delta T_c=70^{\circ}\text{C}$, $N>30,000$ cycles)
- * Low noise due to ultra soft fast recovery diode.
- * High speed, low loss IGBT module.
- * Low driving power due to low input capacitance MOS gate.
- * High reliability, high durability module.
- * Isolated head sink (terminal to base).

CIRCUIT DIAGRAM



TERMINALS

OUTLINE DRAWING



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

Item	Symbol	Unit	MBN1200E33C
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	$^{\circ}\text{C}$	$-40 \sim +125$
Storage Temperature	T_{stg}	$^{\circ}\text{C}$	$-40 \sim +125$
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 ($T_c=25^{\circ}\text{C}$)

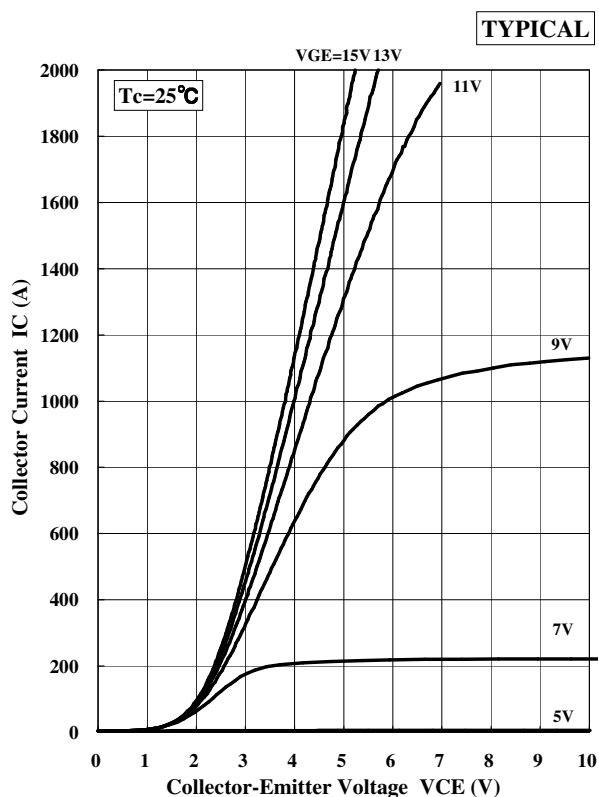
Item	Symbol	Unit	Min.	Typ.	Max.	Test Conditions
Collector Emitter Cut-Off Current	I_{CES}	mA	-	-	12	$V_{CE}=3,300\text{V}$, $V_{GE}=0\text{V}$, $T_j=25^{\circ}\text{C}$
			-	20	60	$V_{CE}=3,300\text{V}$, $V_{GE}=0\text{V}$, $T_j=125^{\circ}\text{C}$
Gate Emitter Leakage Current	I_{GES}	nA	-	-	± 500	$V_{GE}=\pm 20\text{V}$, $V_{CE}=0\text{V}$, $T_j=25^{\circ}\text{C}$
Collector Emitter Saturation Voltage	$V_{CE(sat)}$	V	-	4.1	4.7	$I_C=1,200\text{A}$, $V_{GE}=15\text{V}$, $T_j=25^{\circ}\text{C}$
			-	4.8	5.3	$I_C=1,200\text{A}$, $V_{GE}=15\text{V}$, $T_j=125^{\circ}\text{C}$
Gate Emitter Threshold Voltage	$V_{GE(TH)}$	V	4.5	5.5	6.5	$V_{CE}=10\text{V}$, $I_C=1200\text{mA}$, $T_j=25^{\circ}\text{C}$
Input Capacitance	C_{ies}	nF	-	140	-	$V_{CE}=10\text{V}$, $V_{GE}=0\text{V}$, $f=100\text{kHz}$, $T_j=25^{\circ}\text{C}$
Switching Times	Rise Time	t_r	-	2.0	3.2	$V_{CC}=1,650\text{V}$, $I_C=1,200\text{A}$ $L=100\text{nH}$ $R_G=3.3\Omega$ (3) $V_{GE}=\pm 15\text{V}$, $T_j=125^{\circ}\text{C}$
	Turn On Time	t_{on}	-	2.9	3.8	
	Fall Time	t_f	-	1.7	3.2	
	Turn Off Time	t_{off}	-	3.5	5.6	
Peak Forward Voltage Drop	V_{FM}	V	-	2.2	2.8	$I_C=1,200\text{A}$, $V_{GE}=0\text{V}$, $T_j=25^{\circ}\text{C}$
			-	2.3	2.75	$I_C=1,200\text{A}$, $V_{GE}=0\text{V}$, $T_j=125^{\circ}\text{C}$
Reverse Recovery Time	t_{rr}	μs	-	0.8	1.4	$V_{CC}=1,650\text{V}$, $I_C=1,200\text{A}$, $L=100\text{nH}$ $T_j=125^{\circ}\text{C}$
Turn On Loss	$E_{on(10\%)}$	J/P	-	2.3	2.6	$V_{CC}=1,650\text{V}$, $I_C=1,200\text{A}$, $L=100\text{nH}$ $R_G=3.3\Omega$ (3) $V_{GE}=\pm 15\text{V}$, $T_j=125^{\circ}\text{C}$
Turn Off Loss	$E_{off(10\%)}$	J/P	-	1.4	2.1	
Reverse Recovery Loss	$E_{rr(10\%)}$	J/P	-	1.5	2.1	
Thermal Impedance	IGBT	$R_{th(j-c)}$	-	-	0.0085	Junction to case
	FWD	$R_{th(j-c)}$	-	-	0.017	

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.Counter arm IGBT $V_{GE}=-15\text{V}$

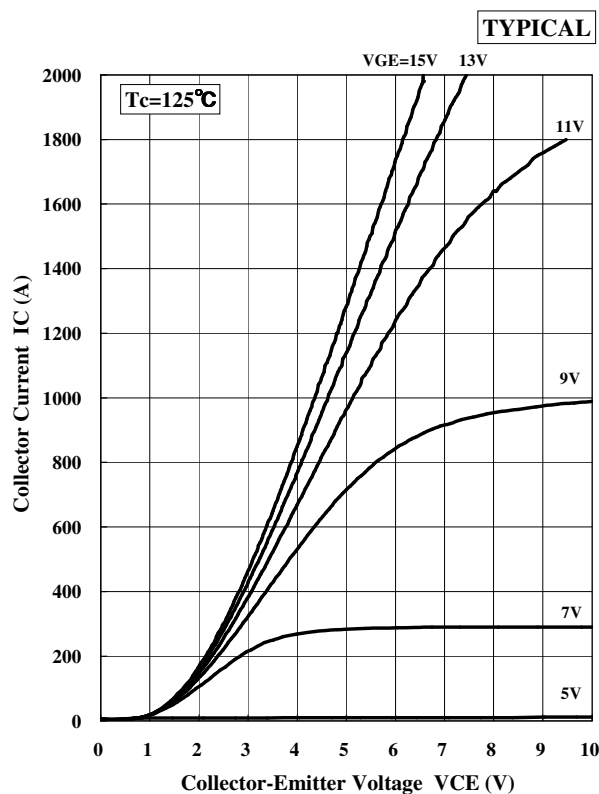
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CHARACTERISTICS CURVE

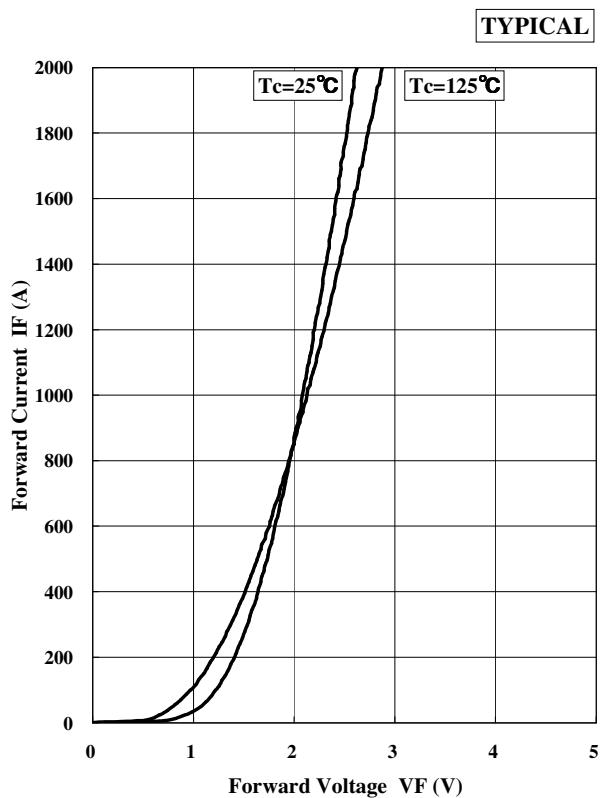
STATIC CHARACTERISTICS



Collector Current vs. Collector to Emitter Voltage



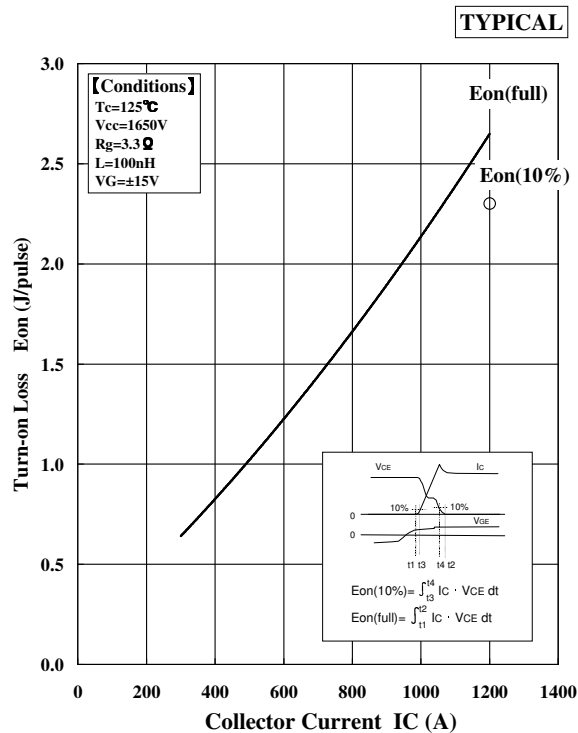
Collector Current vs. Collector to Emitter Voltage



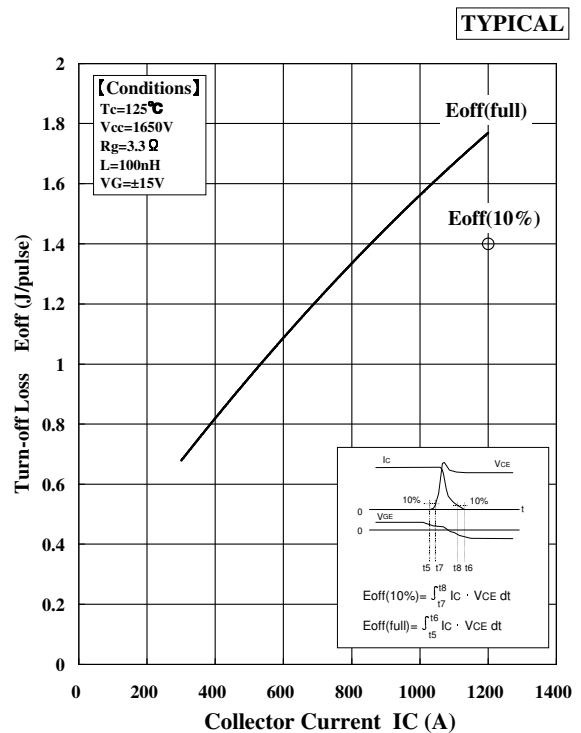
Forward Voltage of free-wheeling diode

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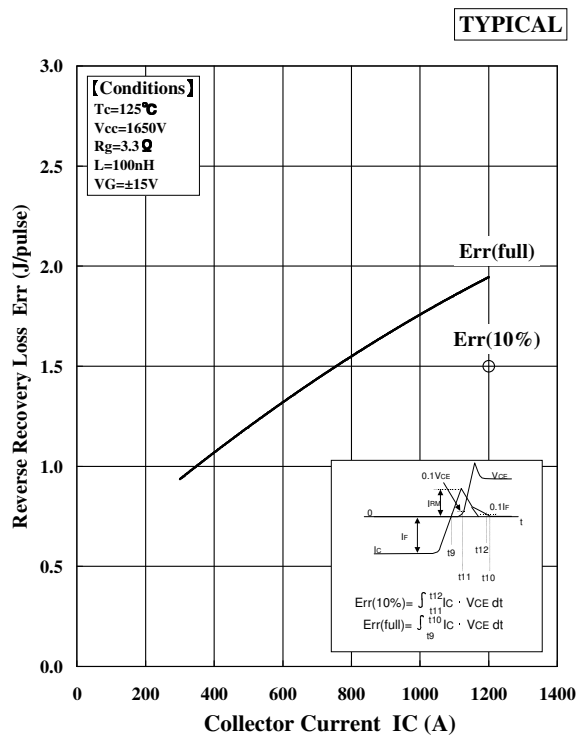
DEPENDENCE OF CURRENT



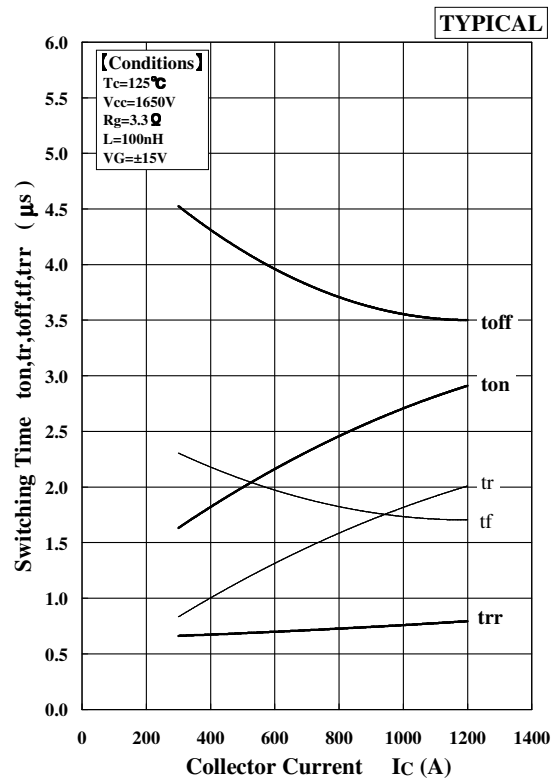
Turn-on Loss vs. Collector Current



Turn-off Loss vs. Collector Current



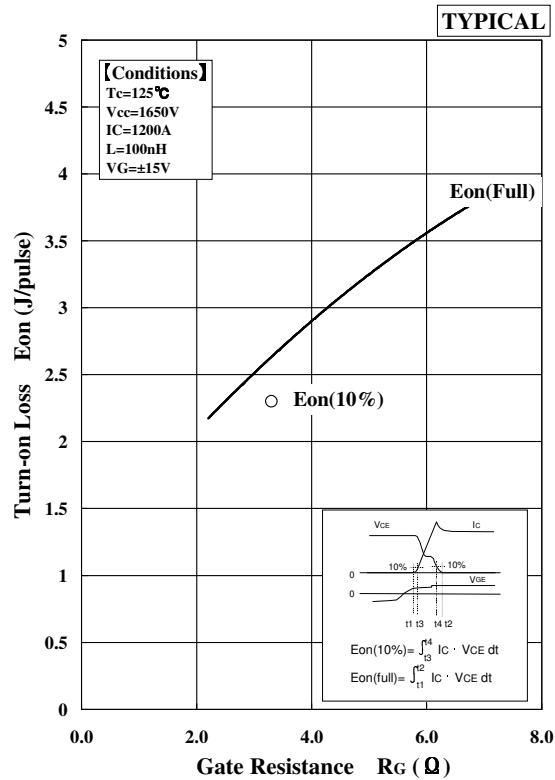
Turn-on Loss vs. Collector Current



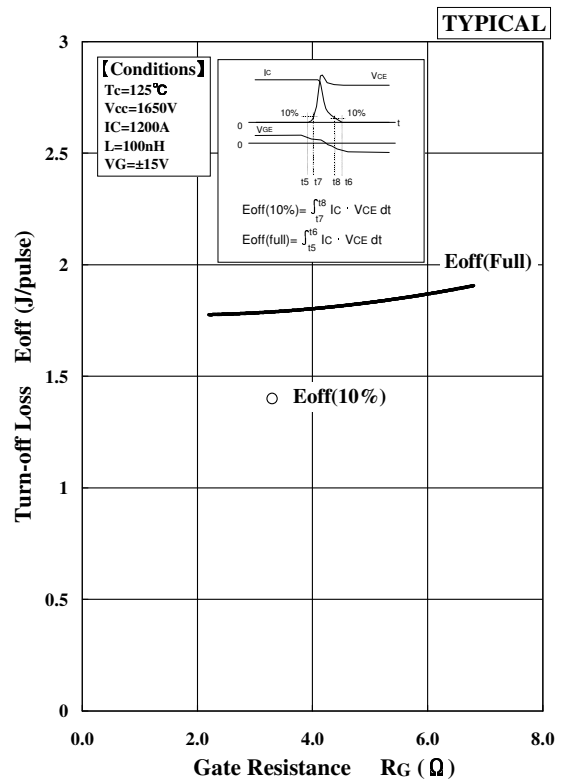
Switching Time vs. Collector Current

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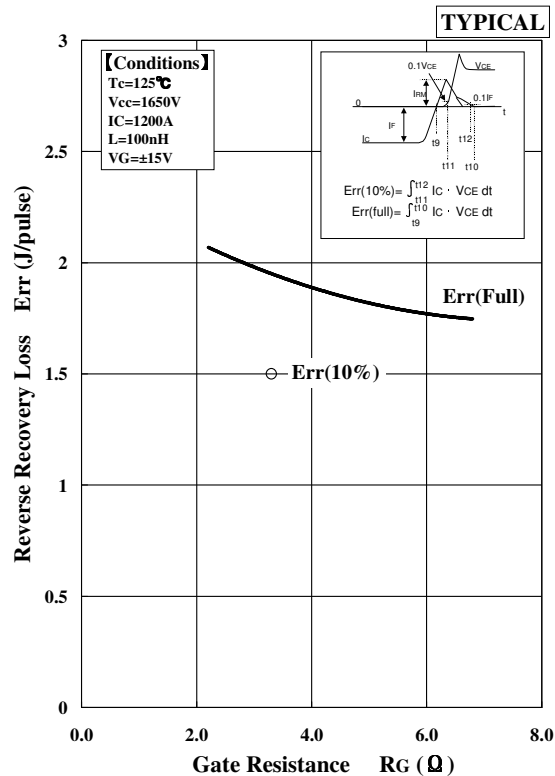
DEPENDENCE OF R_G



Turn-on Loss vs. Gate Resistance



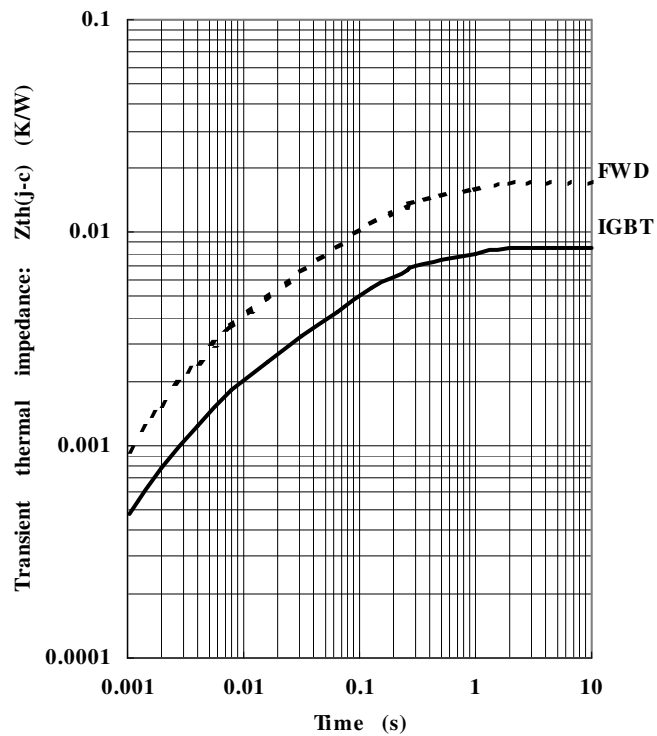
Turn-off Loss vs. Gate Resistance



Recovery Loss vs. Gate Resistance

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TRANSIENT THERMAL IMPEDANCE



Transient Thermal Impedance Curve

HITACHI POWER SEMICONDUCTORS

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