

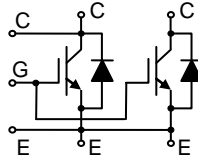
MBN600E45A

Silicon N-channel IGBT

FEATURES

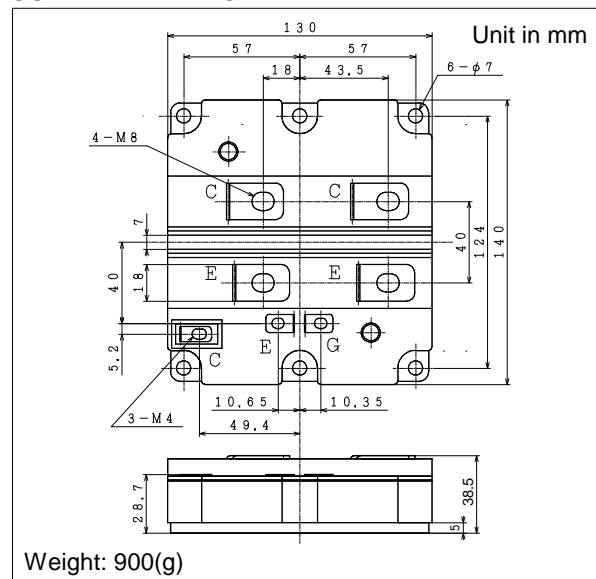
- * High speed, low loss IGBT module.
- * Low driving power due to low input capacitance MOS gate.
- * Low noise due to ultra soft fast recovery diode.
- * High reliability, high durability module.
- * High thermal fatigue durability.
($\Delta T_c=70^\circ\text{C}$, $N>30,000$ cycles)
- * Isolated heat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

CIRCUIT DIAGRAM



TERMINALS

OUTLINE DRAWING



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

Item	Symbol	Unit	MBN600E45A
Collector Emitter Voltage	V_{CES}	V	4,500
Gate Emitter Voltage	V_{GES}	V	± 20
Collector Current	DC	I_C	600
	1ms	I_{Cp}	1,200
Forward Current	DC	I_F	600
	1ms	I_{FM}	1,200
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	$V_{CE}=4,500\text{V}$, $V_{GE}=0\text{V}$, $T_j=25^\circ\text{C}$	
			-	34	67	$V_{CE}=4,500\text{V}$, $V_{GE}=0\text{V}$, $T_j=125^\circ\text{C}$	
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	4.5	5.5	6.3	$I_C=600\text{A}$, $V_{GE}=15\text{V}$, $T_j=125^\circ\text{C}$	
Gate Emitter Threshold Voltage	$V_{GE(TO)}$	V	4.5	6.0	7.5	$V_{CE}=10\text{V}$, $I_C=600\text{mA}$, $T_j=25^\circ\text{C}$	
Input Capacitance	C_{ies}	nF	-	87	-	$V_{CE}=10\text{V}$, $V_{GE}=0\text{V}$, $f=100\text{kHz}$, $T_j=25^\circ\text{C}$	
Internal Gate Resistance	R_{ge}	Ω	-	2.3	-	$V_{CE}=10\text{V}$, $V_{GE}=0\text{V}$, $f=100\text{kHz}$, $T_j=25^\circ\text{C}$	
Switching Times	Rise Time	t_r	1.1	1.6	2.5	$V_{CC}=2,600\text{V}$, $I_C=600\text{A}$	
	Turn On Time	t_{on}	1.5	2.2	3.0	$L=130\text{nH}$	
	Fall Time	t_f	1.6	1.9	3.0	$R_G=3.3\Omega$ (3)	
	Turn Off Time	t_{off}	3.1	3.6	5.5	$V_{GE}=\pm 15\text{V}$, $T_j=125^\circ\text{C}$	
Peak Forward Voltage Drop	V_{FM}	V	3.7	4.2	5.0	$I_F=600\text{A}$, $V_{GE}=0\text{V}$, $T_j=125^\circ\text{C}$	
Reverse Recovery Time	t_{rr}	μs	0.3	0.6	1.0	$V_{CC}=2,600\text{V}$, $I_F=600\text{A}$, $L=130\text{nH}$, $T_j=125^\circ\text{C}$	
Turn On Loss	$E_{on(10\%)}$	J/P	-	1.5	2.0	$V_{CC}=2,600\text{V}$, $I_C=600\text{A}$, $L=130\text{nH}$	
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	-	0.7	1.0	$V_{GE}=\pm 15\text{V}$, $T_j=125^\circ\text{C}$	
Thermal Impedance	IGBT	$R_{th(j-c)}$	K/W	-	-	0.013	Junction to case
	FWD	$R_{th(j-c)}$	K/W	-	-	0.026	
Contact Thermal Impedance		$R_{th(c-f)}$	K/W	-	0.008	-	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

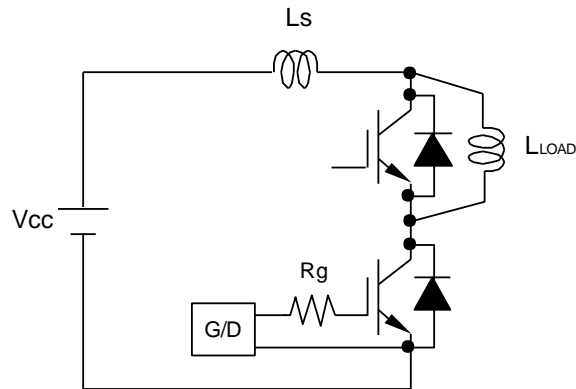


Fig.1 Switching test circuit

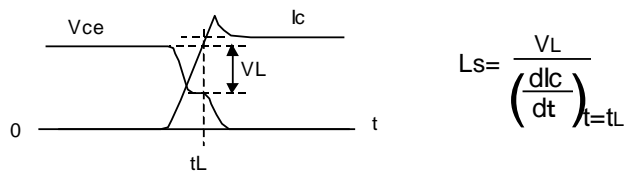


Fig.2 Definition of Ls

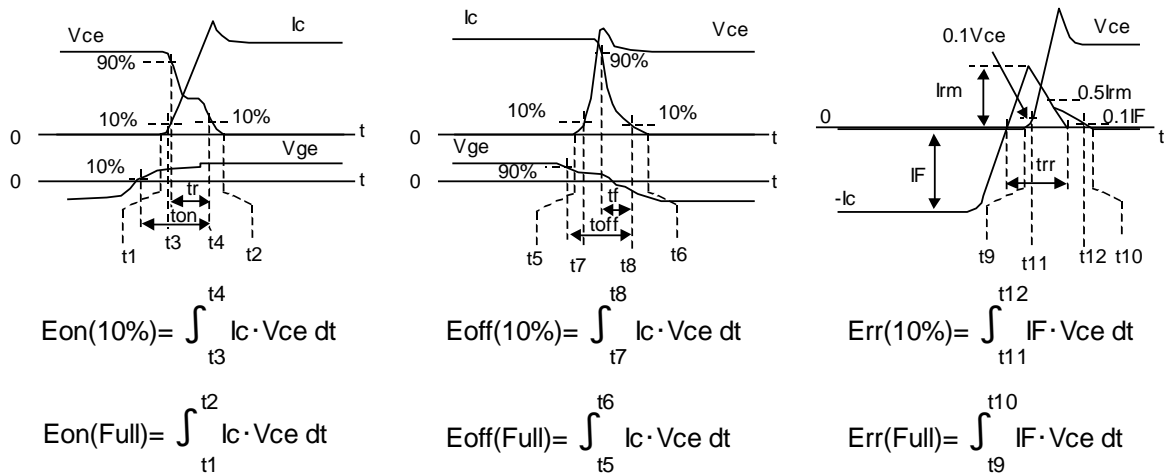
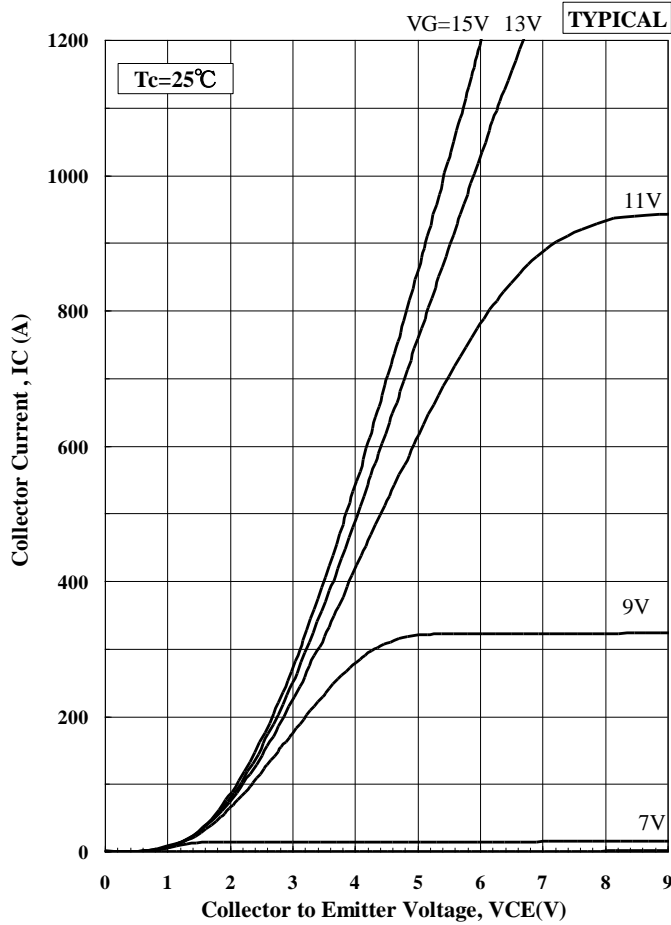


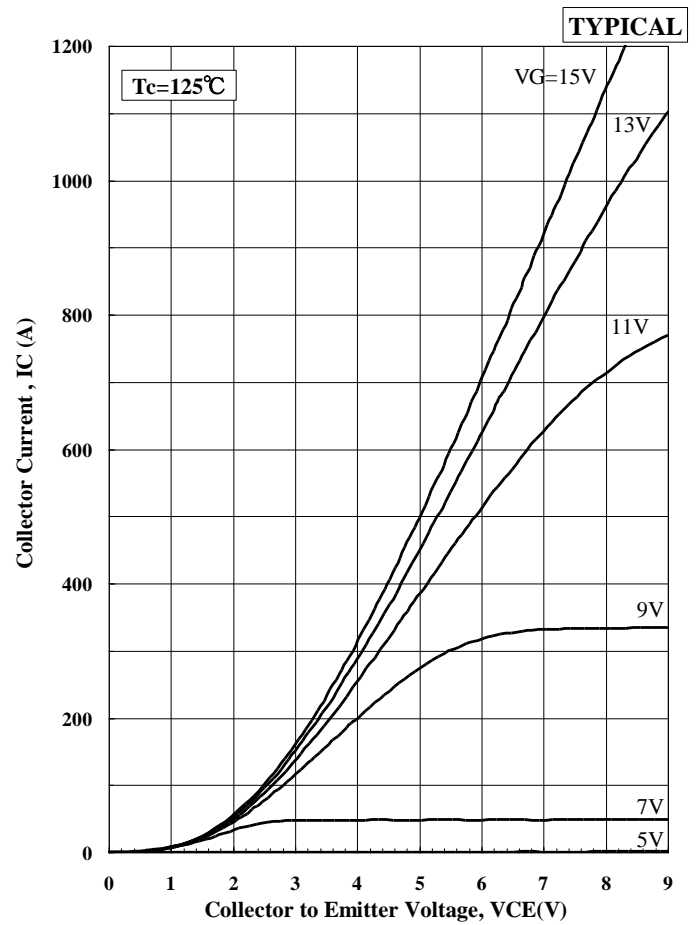
Fig.3 Definition of switching loss

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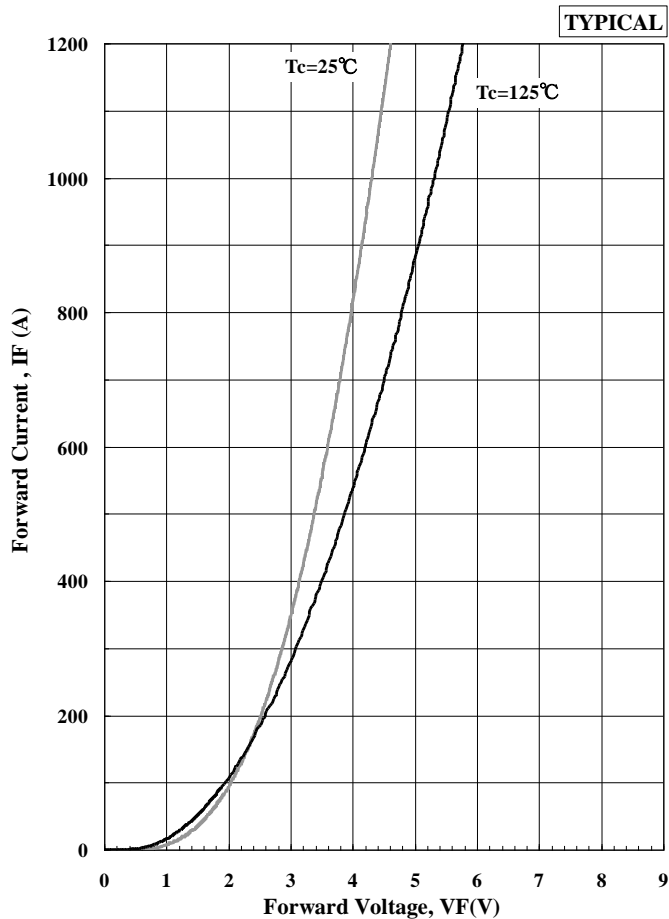
CHARACTERISTICS CURVE



Collector Current vs. Collector to Emitter Voltage



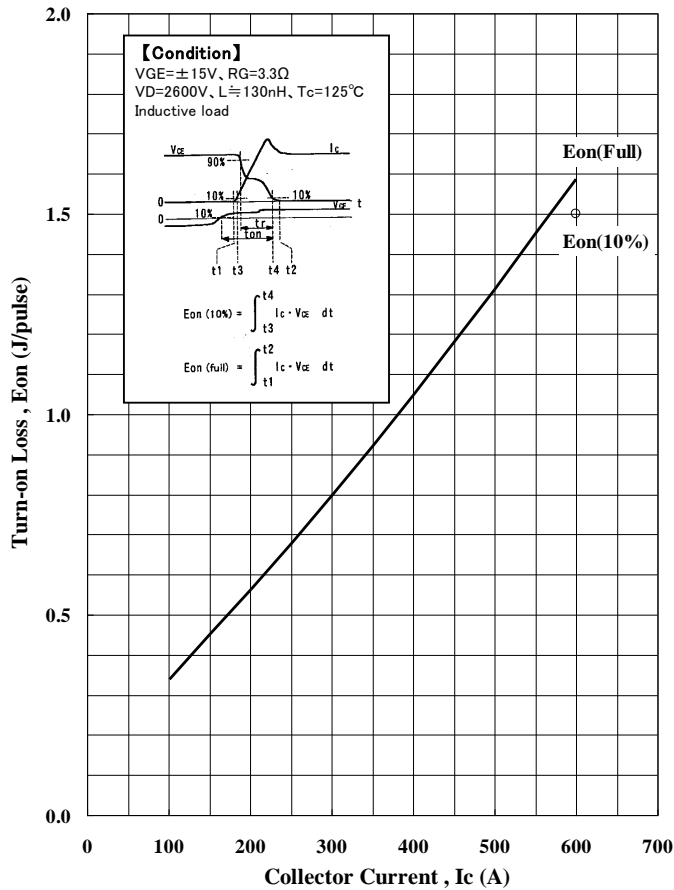
Collector Current vs. Collector to Emitter Voltage



Forward Voltage of free-wheeling diode

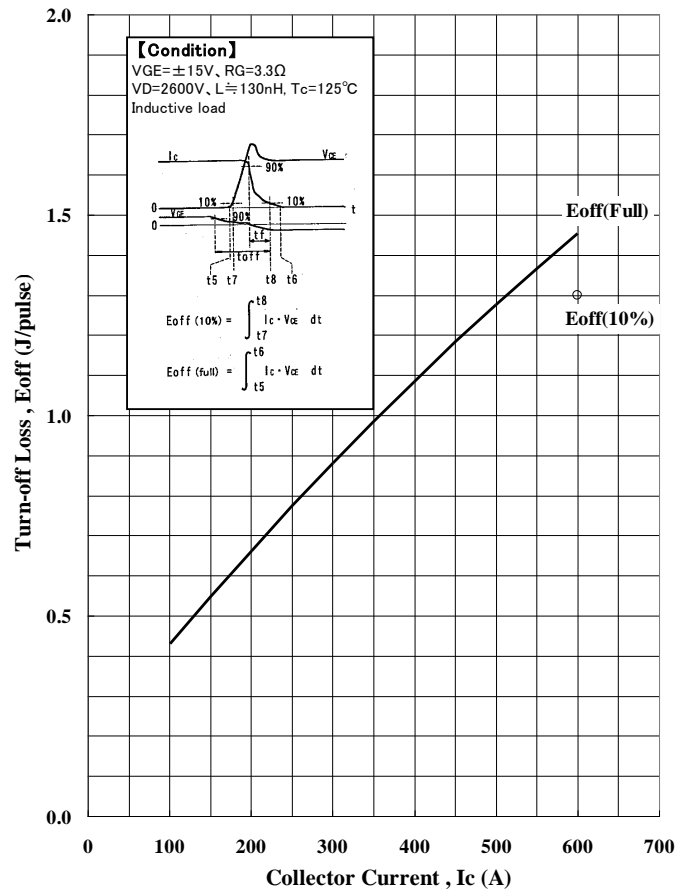
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TYPICAL



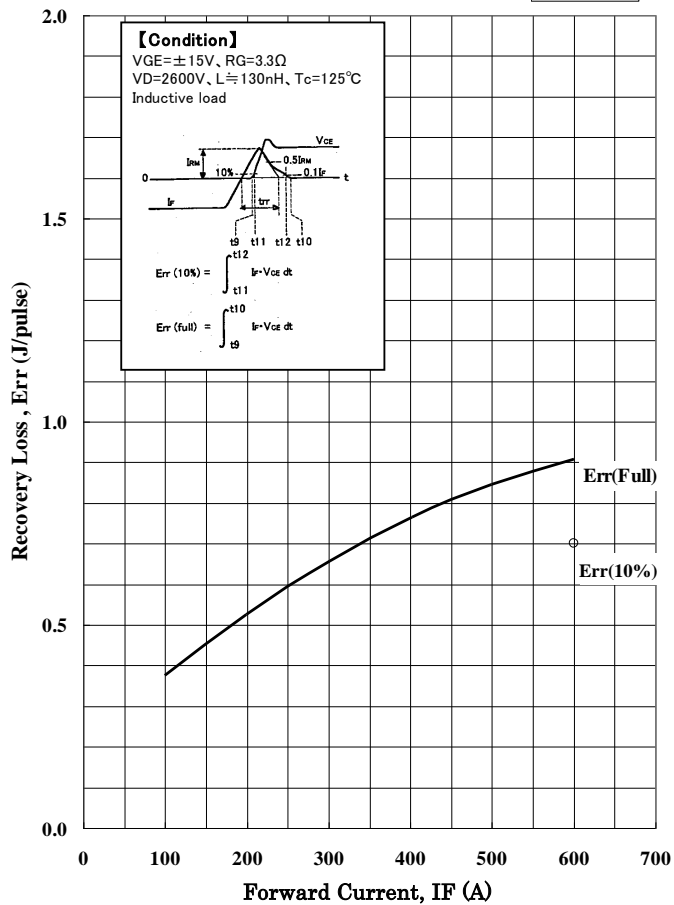
Turn-on Loss vs. Collector Current

TYPICAL



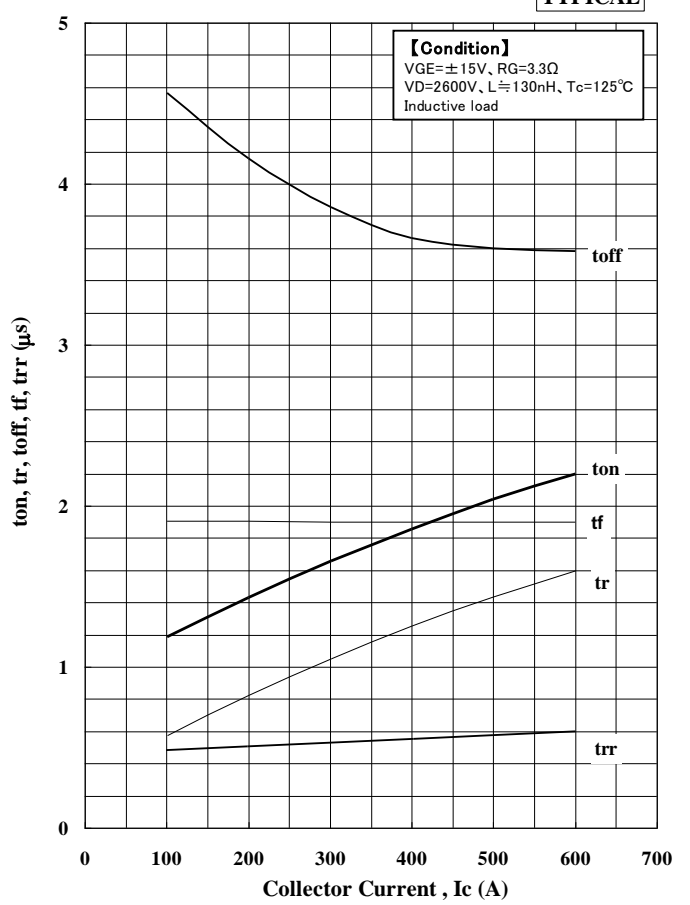
Turn-off Loss vs. Collector Current

TYPICAL



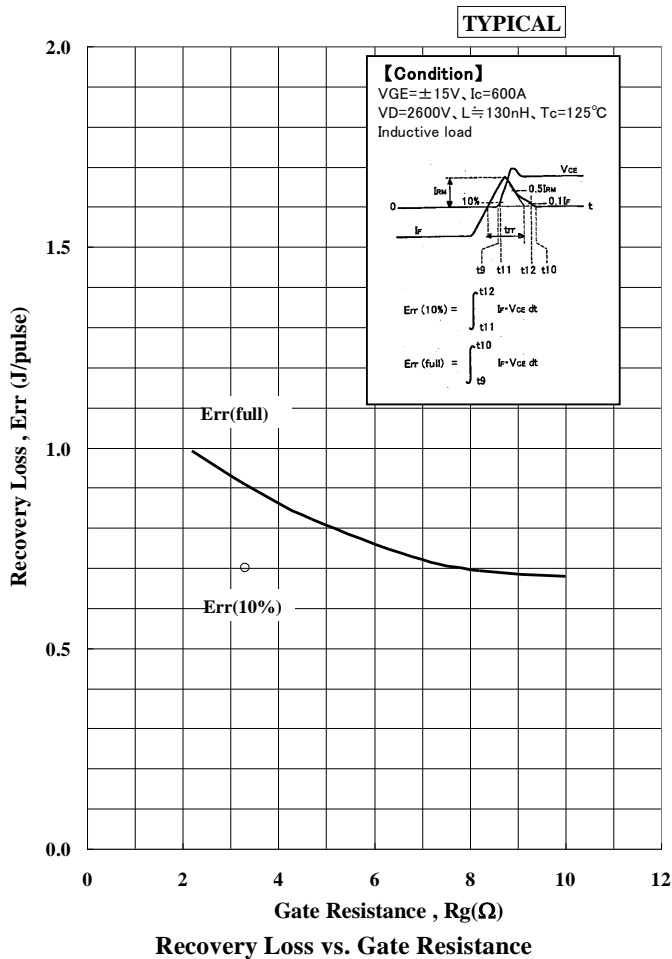
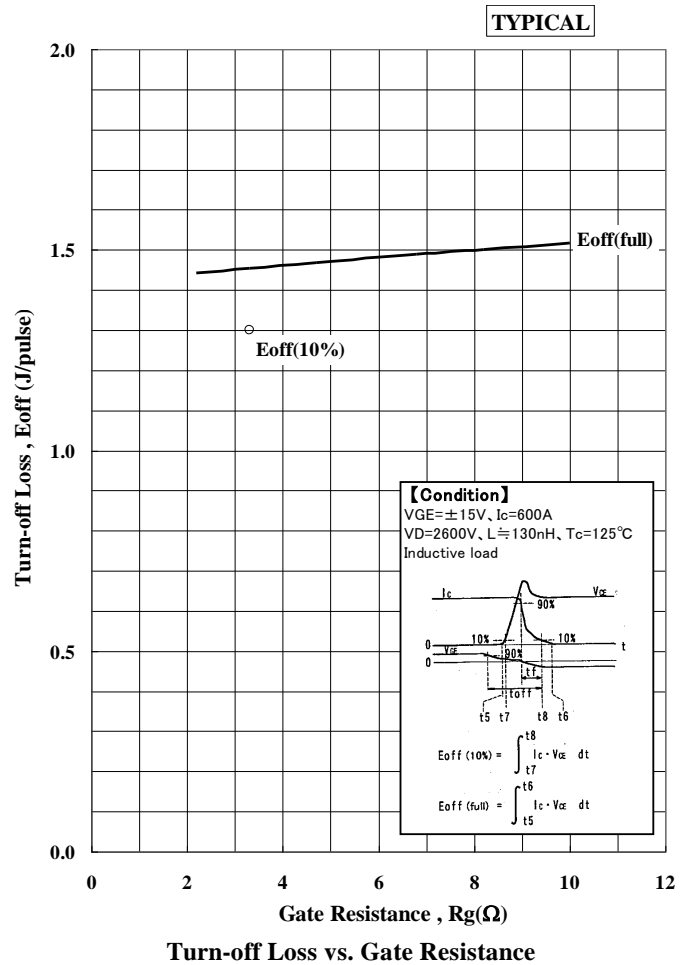
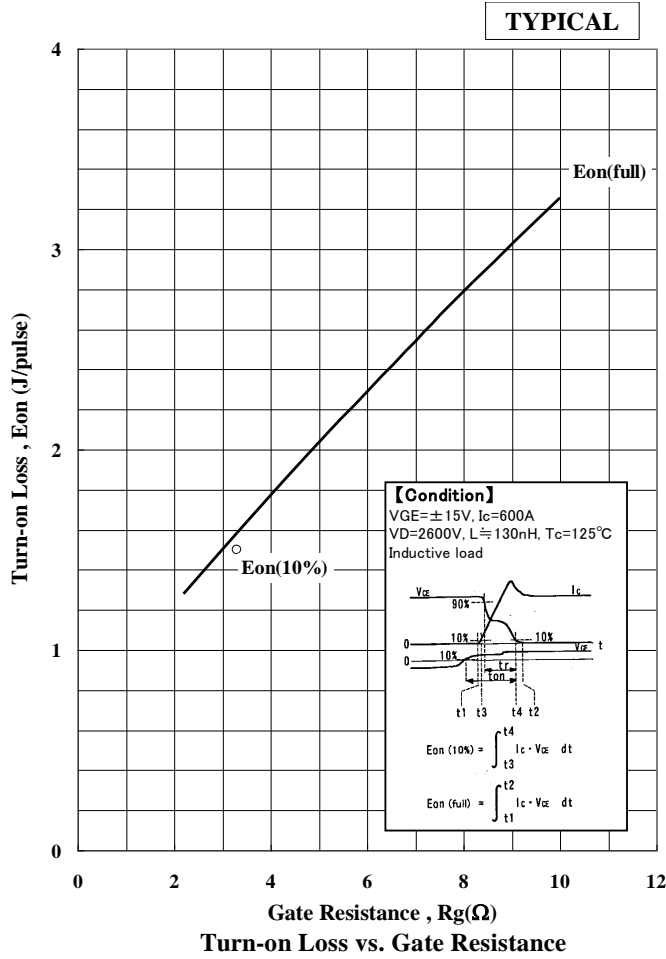
Recovery Loss vs. Collector Current

TYPICAL



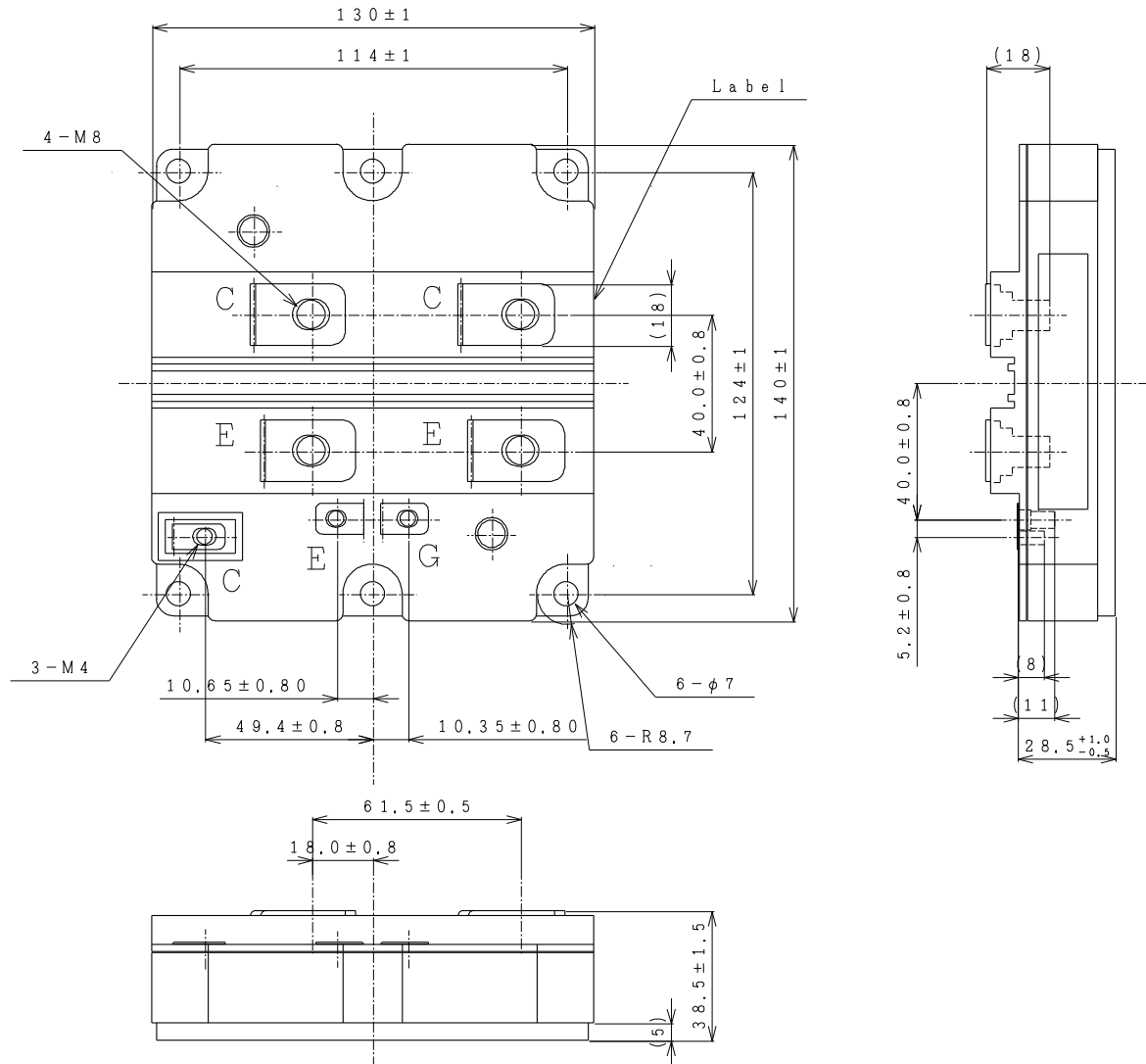
Switching time vs. Collector current

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OUTLINE DRAWINGS



Unit in mm

Fig.4 Outline drawings

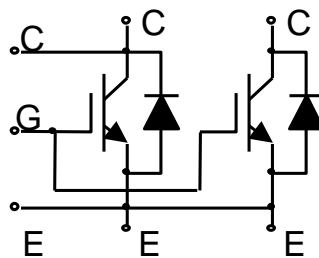
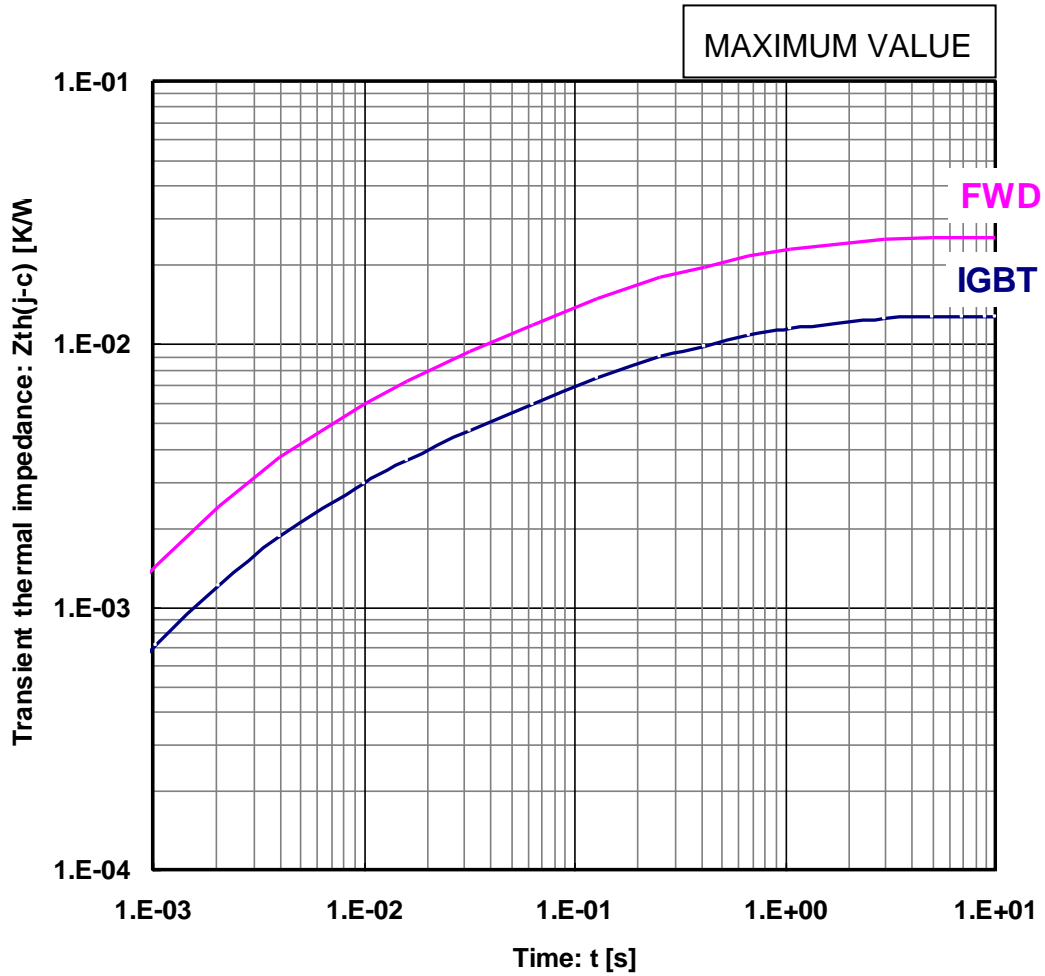


Fig.5 Circuit diagram

MBN600E45A

TRANSIENT THERMAL IMPEDANCE



Material Declaration

Please note that following materials are contained in the product In order to keep characteristics and reliability level.

Material	Contained part
Lead (Pb) and its compounds	Solder

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HITACHI POWER SEMICONDUCTORS

Notices

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