

MBM1200E17D

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 (Al-SiC base plate.)
($\Delta T_c=70^\circ\text{C}$, $N>30,000$ cycles)

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

Item	Symbol	Unit	MBM1200E17D
Collector Emitter Voltage	V_{CES}	V	1,700
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}	4,000 (AC 50Hz, 1 minute)
Screw Torque	Terminals (M4)	-	2 (1)
	Terminals (M8)	-	15 (2)
	Mounting (M6)	-	6 (3)

Notes: Recommended Value (1) 1.8 ± 0.2 N·m, (2) 15^{+0}_{-3} N·m, (3) 5.5 ± 0.5 N·m

ELECTRICAL CHARACTERISTICS

Item	Symbol	Unit	Min.	Typ.	Max.	Test Conditions
Collector Emitter Cut-Off Current	I_{CES}	mA	-	-	5.0	$V_{CE}=1,700\text{V}$, $V_{GE}=0\text{V}$, $T_j=25^\circ\text{C}$
			-	5	17	$V_{CE}=1,700\text{V}$, $V_{GE}=0\text{V}$, $T_j=125^\circ\text{C}$
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	2.4	2.7	3.3	$I_C=1,200\text{A}$, $V_{GE}=15\text{V}$, $T_j=125^\circ\text{C}$
Gate Emitter Threshold Voltage	$V_{GE(TO)}$	V	5.0	6.5	8.0	$V_{CE}=10\text{V}$, $I_C=120\text{mA}$, $T_j=25^\circ\text{C}$
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	$R_{g(int)}$	Ω	-	1.3	-	
Switching Times	Rise Time	t_r	0.2	0.5	1.0	$V_{CC}=900\text{V}$, $I_C=1,200\text{A}$ $L=100\text{nH}$, $C_{GE}=120\text{nF}$ (4) $R_G=1.5\Omega$ (4) $V_{GE}=\pm 15\text{V}$, $T_j=125^\circ\text{C}$
	Turn On Time	t_{on}	0.4	0.9	1.8	
	Fall Time	t_f	0.1	0.3	0.6	
	Turn Off Time	t_{off}	0.7	1.6	3.2	
Peak Forward Voltage Drop	V_{FM}	V	1.5	1.9	2.3	$I_F=1,200\text{A}$, $V_{GE}=0\text{V}$, $T_j=125^\circ\text{C}$
Reverse Recovery Time	t_{rr}	μs	0.2	0.5	1.0	$V_{CC}=900\text{V}$, $I_C=I_F=1,200\text{A}$, $L=100\text{nH}$, $C_{GE}=120\text{nF}$ (4)
Turn On Loss	$E_{on(10\%)}$	J/P	-	0.17	0.24	$R_G=1.5\Omega$ (4)
Turn Off Loss	$E_{off(10\%)}$	J/P	-	0.43	0.56	$V_{GE}=\pm 15\text{V}$, $T_j=125^\circ\text{C}$
Reverse Recovery Loss	$E_{rr(10\%)}$	J/P	-	0.40	0.60	

Notes:(4) R_G and C_{GE} value is a test condition value for evaluation, not recommended value.Please, determine the suitable R_G value by measuring switching behaviors.

- * 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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THERMAL CHARACTERISTICS

Item	Symbol	Unit	Min.	Typ.	Max.	Test Conditions	
Thermal Resistance	IGBT	Rth(j-c)	K/W	-	-	0.022	Junction to case
	FWD	Rth(j-c)	K/W	-	-	0.033	
Contact Thermal Impedance	Rth(c-f)	K/W	-	0.016	-	Case to fin. (par 1 arm) Thermal grease applied. Thickness 100μm, Thermal conductivity of grease: 1W/mK	

DEFINITION OF TEST CIRCUIT

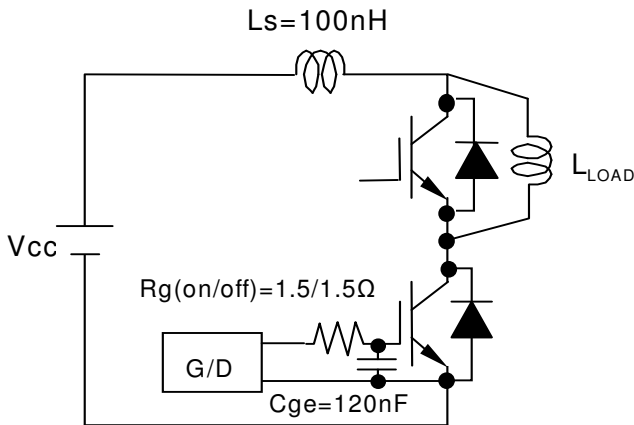


Fig.1 Switching test circuit

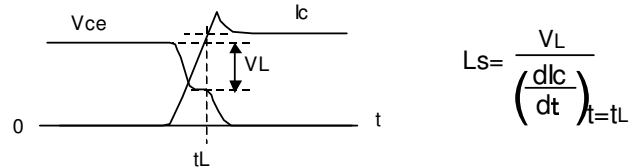


Fig.2 Definition of stray inductance

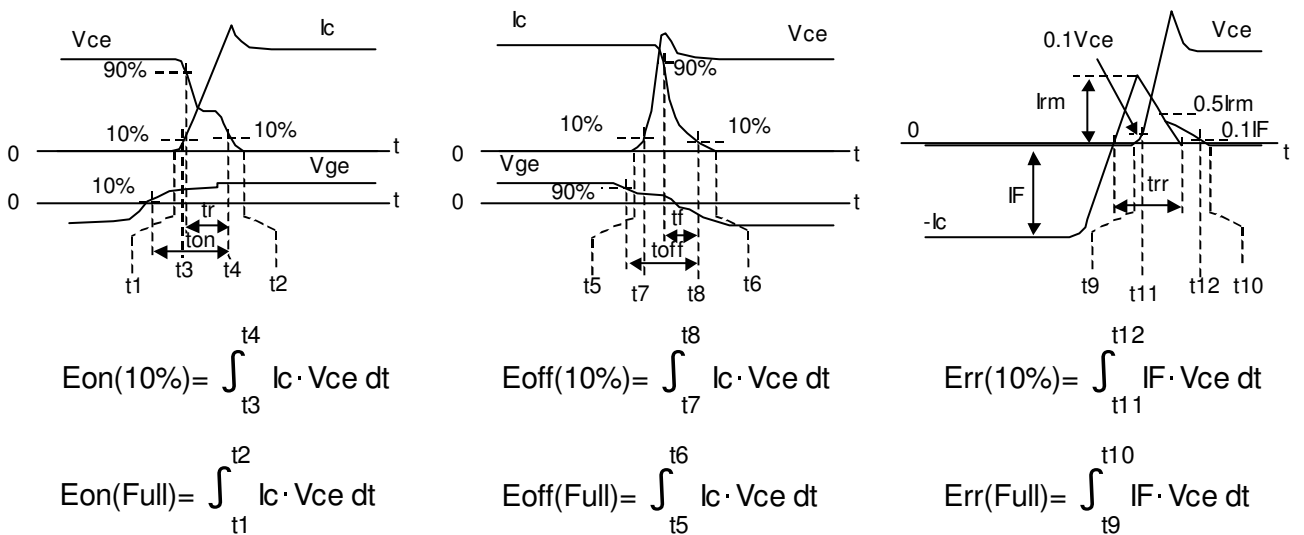
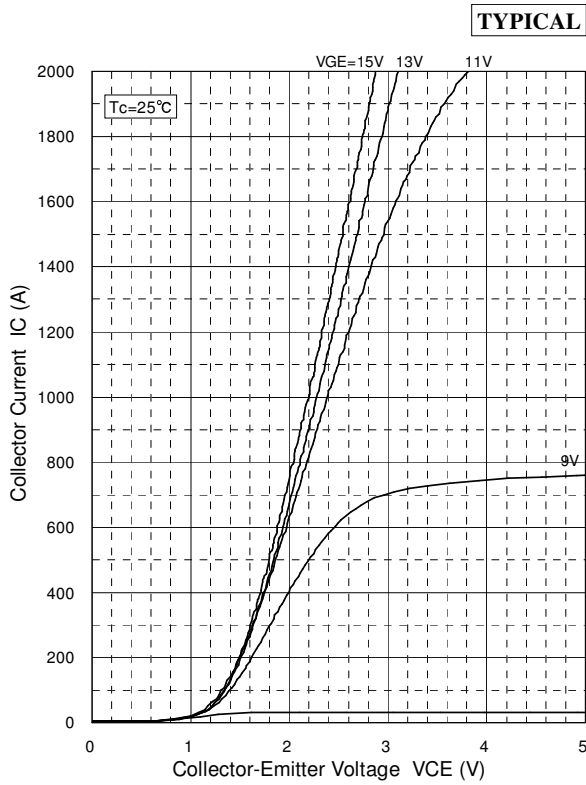


Fig.3 Definition of switching loss

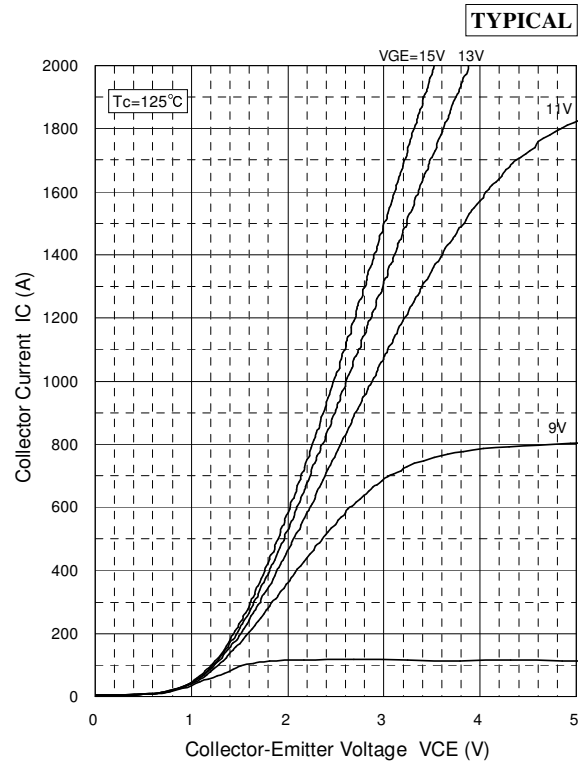
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CHARACTERISTICS CURVE

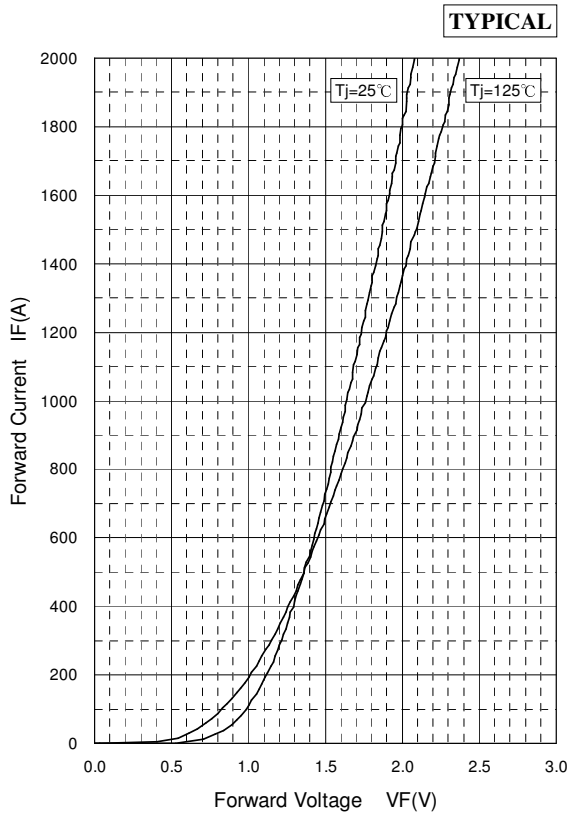
STATIC CHARACTERISTICS



Collector Current vs. Collector to Emitter Voltage



Collector Current vs. Collector to Emitter Voltage

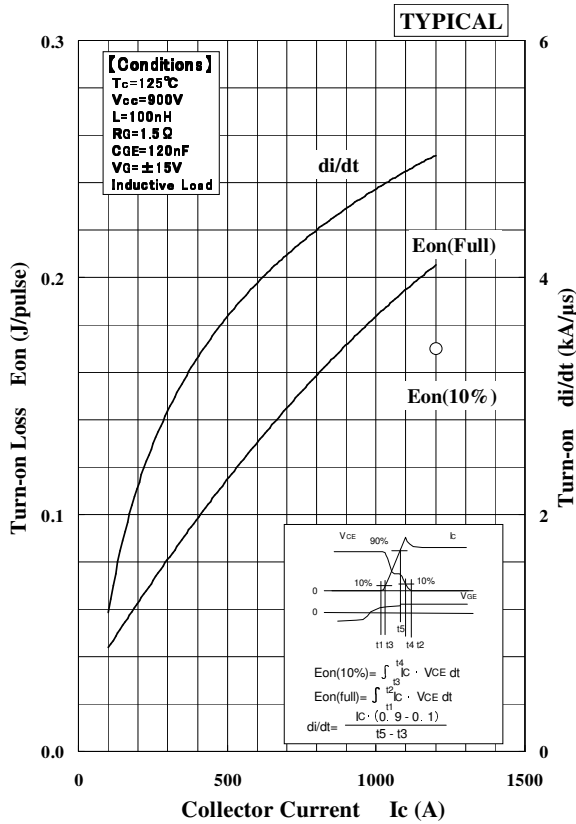


Forward Voltage of free-wheeling diode

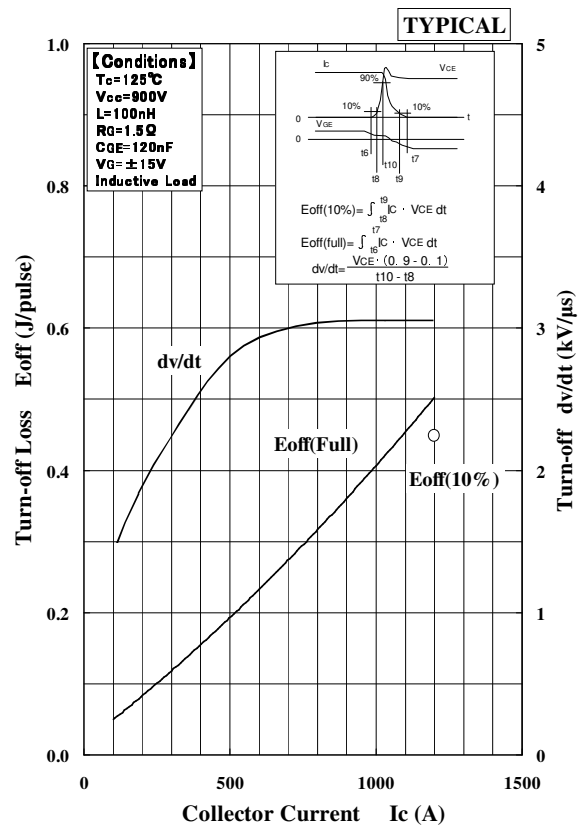
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DYNAMIC CHARACTERISTICS

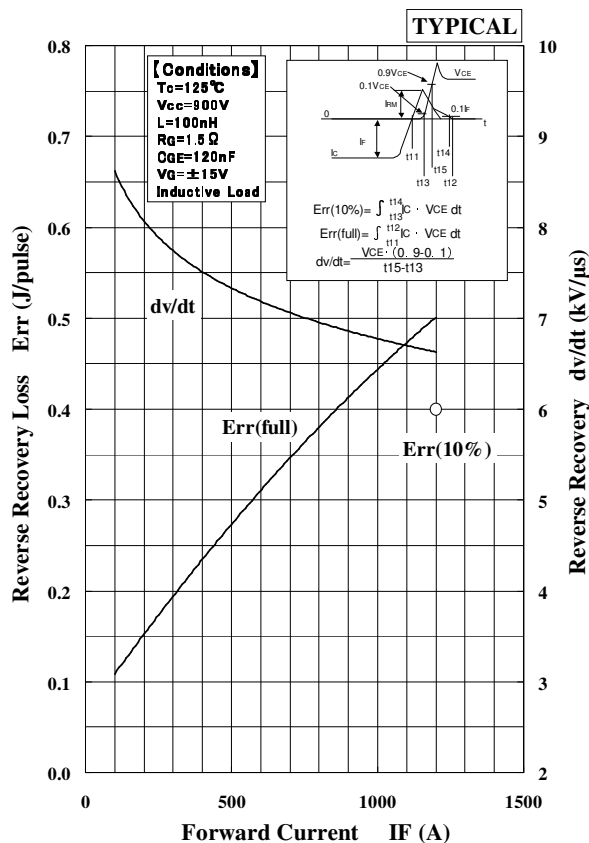
DEPENDENCE OF CURRENT



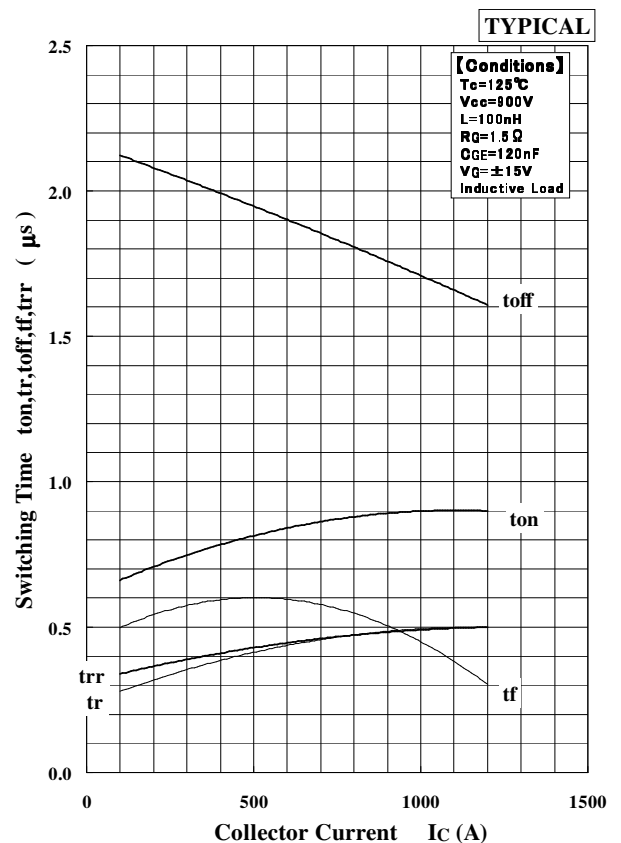
Turn-on Loss, di/dt vs. Collector Current



Turn-off Loss, dv/dt vs. Collector Current



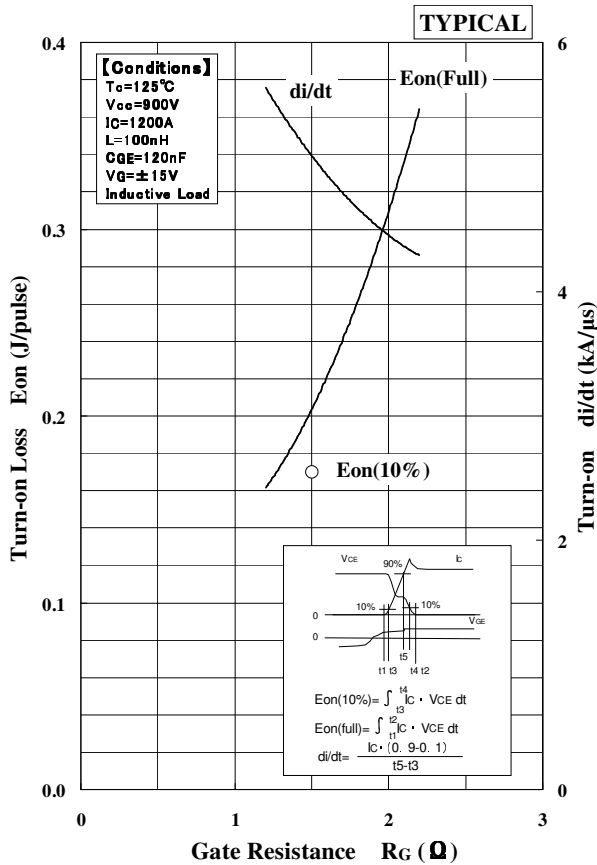
Recovery Loss, dv/dt vs. Forward Current



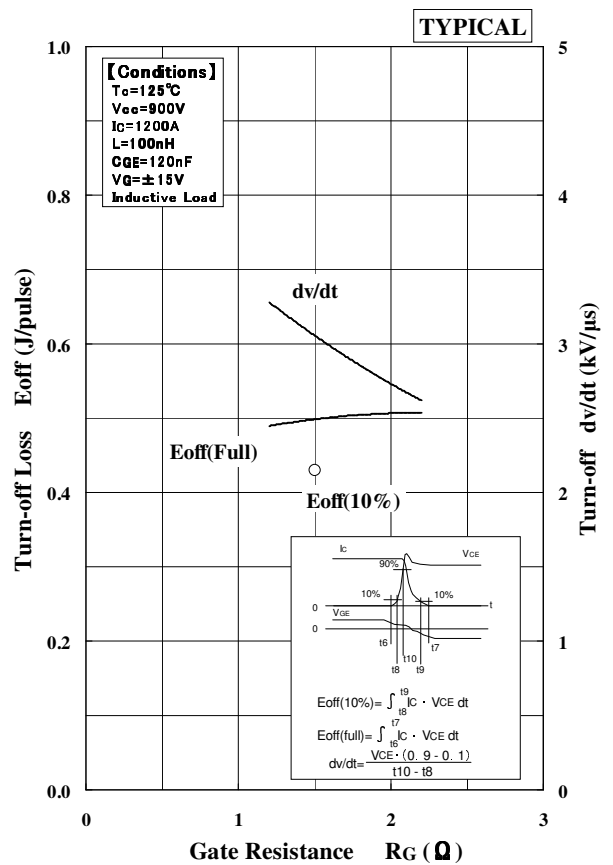
Switching Time vs. Collector Current

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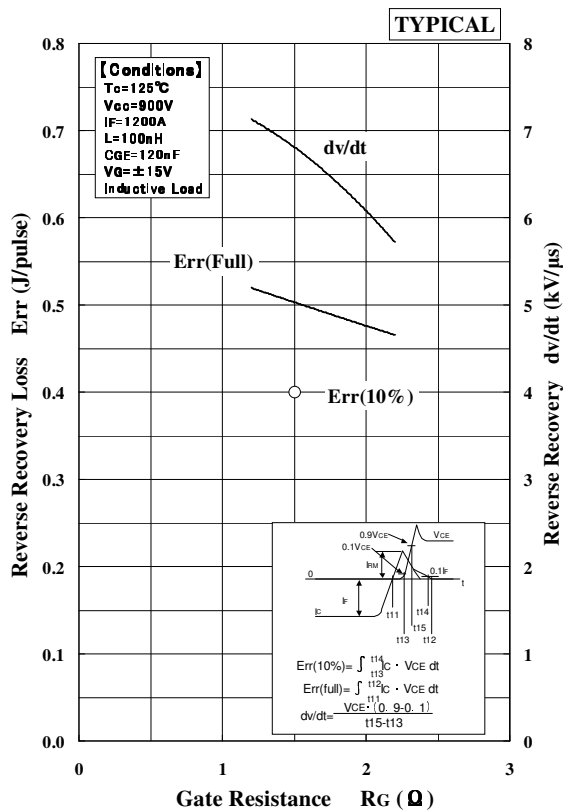
DEPENDENCE OF RG



Turn-on Loss, di/dt vs. Gate Resistance



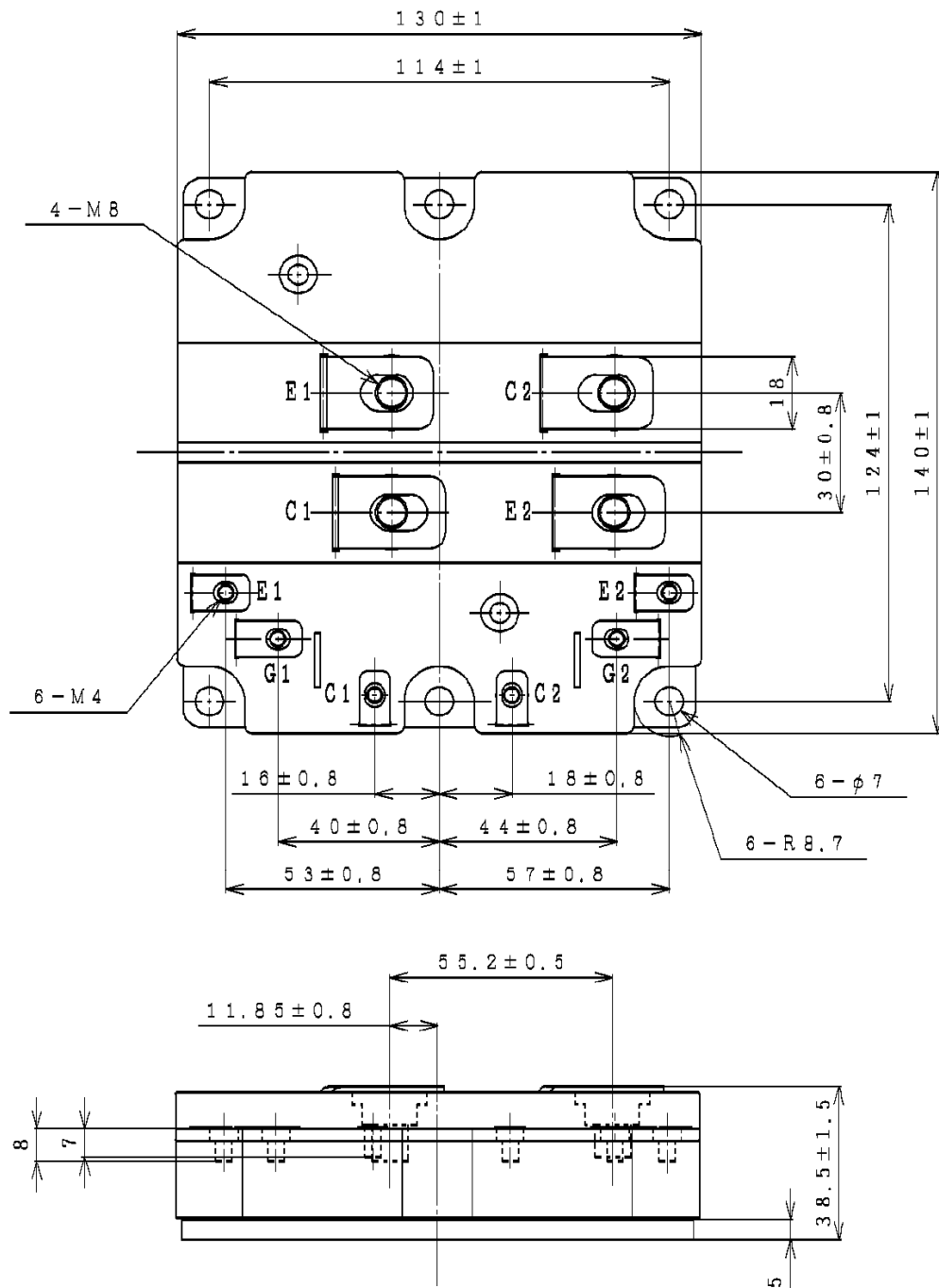
Turn-off Loss, dv/dt vs. Gate Resistance



Recovery Loss, dv/dt vs. Gate Resistance

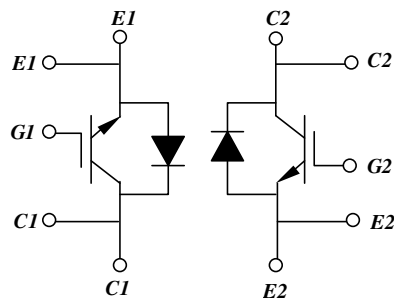
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PACKAGE OUTLINE DRAWING



Unit in mm

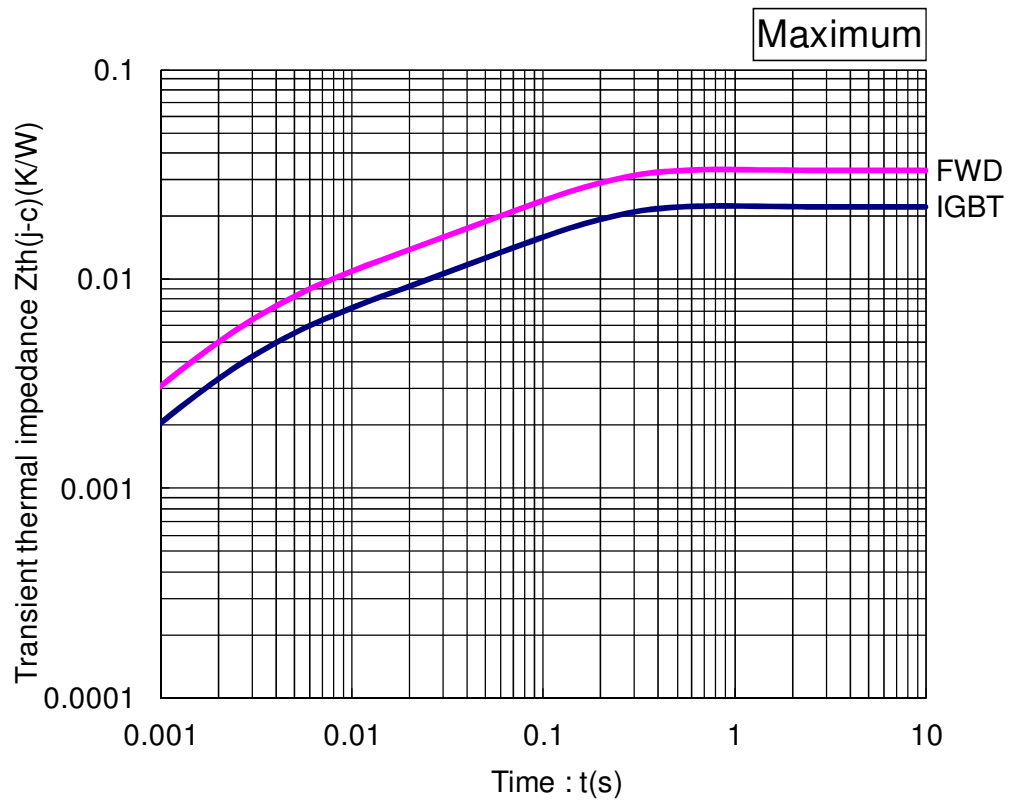
Weight: 900(g)



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.
2. Please be sure to read "Precautions for Safe Use and Notices" in the individual brochure before use.
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