

MBN1200H33D

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.
($\Delta T_c=70K$, $N>30,000$ cycles)
- * High isolation package

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

Item	Symbol	Unit	MBN1200H33D
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	$^\circ C$	-40 ~ +125
Storage Temperature	T_{stg}	$^\circ C$	-40 ~ +125
Isolation Voltage	V_{ISO}	V_{RMS}	10,200(AC 1 minute)
Screw Torque	Terminals (M4/M8)	-	2/10 (1)
	Mounting (M6)	-	6 (2)

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

ELECTRICAL CHARACTERISTICS

Item	Symbol	Unit	Min.	Typ.	Max.	Test Conditions	
Collector Emitter Cut-Off Current	I_{CES}	mA	-	-	12	$V_{CE}=3,300V, V_{GE}=0V, T_j=25^\circ C$	
			-	20	60	$V_{CE}=3,300V, V_{GE}=0V, T_j=125^\circ C$	
Gate Emitter Leakage Current	I_{GES}	nA	-500	-	+500	$V_{GE}=\pm 20V, V_{CE}=0V, T_j=25^\circ C$	
Collector Emitter Saturation Voltage	$V_{CE(sat)}$	V	3.4	4.2	5.2	$I_C=1,200A, V_{GE}=15V, T_j=125^\circ C$	
Gate Emitter Threshold Voltage	$V_{GE(TO)}$	V	4.5	6.0	7.0	$V_{CE}=10V, I_C=1,200mA, T_j=25^\circ C$	
Input Capacitance	C_{ies}	nF	-	110	-	$V_{CE}=10V, V_{GE}=0V, f=100kHz, T_j=25^\circ C$	
Internal Gate Resistance	R_{ge}	Ω	-	1.2	-	$V_{CE}=10V, V_{GE}=0V, f=100kHz, T_j=25^\circ C$	
Switching Times	Rise Time	t_r	0.6	1.9	3.1	$V_{CC}=1,650V, I_C=1,200A$	
	Turn On Time	t_{on}	1.1	2.4	3.3	$L=100nH$	
	Fall Time	t_f	0.1	1.0	2.5	$R_G=3.3/3.3\Omega$ (3)	
	Turn Off Time	t_{off}	0.9	3.0	5.1	$V_{GE}=\pm 15V, T_j=125^\circ C$	
Peak Forward Voltage Drop	V_{FM}	V	1.9	2.5	3.0	$I_F=1,200A, V_{GE}=0V, T_j=125^\circ C$	
Reverse Recovery Time	t_{rr}	μs	0.1	0.6	1.1	$V_{CC}=1,650V, I_C=1,200A, L=100nH$	
Turn On Loss	$E_{on(10\%)}$	J/P	-	1.6	2.1	$R_G=3.3/3.3\Omega$ (3)	
Turn Off Loss	$E_{off(10\%)}$	J/P	-	1.3	1.7	$V_{GE}=\pm 15V, T_j=125^\circ C$	
Reverse Recovery Loss	$E_{rr(10\%)}$	J/P	-	1.2	1.9		
Stray inductance module	L_{SCE}	nH	-	14	-		
Thermal Impedance	IGBT	$R_{th(j-c)}$	K/W	-	-	0.009	Junction to case
	FWD	$R_{th(j-c)}$	K/W	-	-	0.018	
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

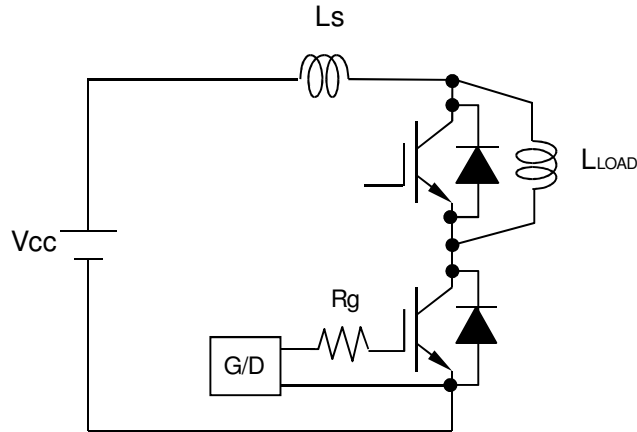


Fig.1 Switching test circuit

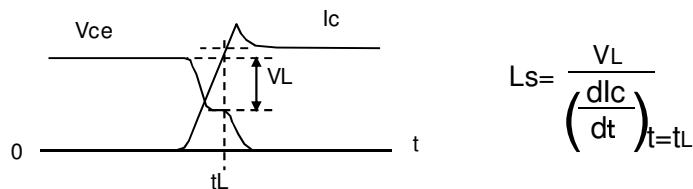


Fig.2 Definition of Ls

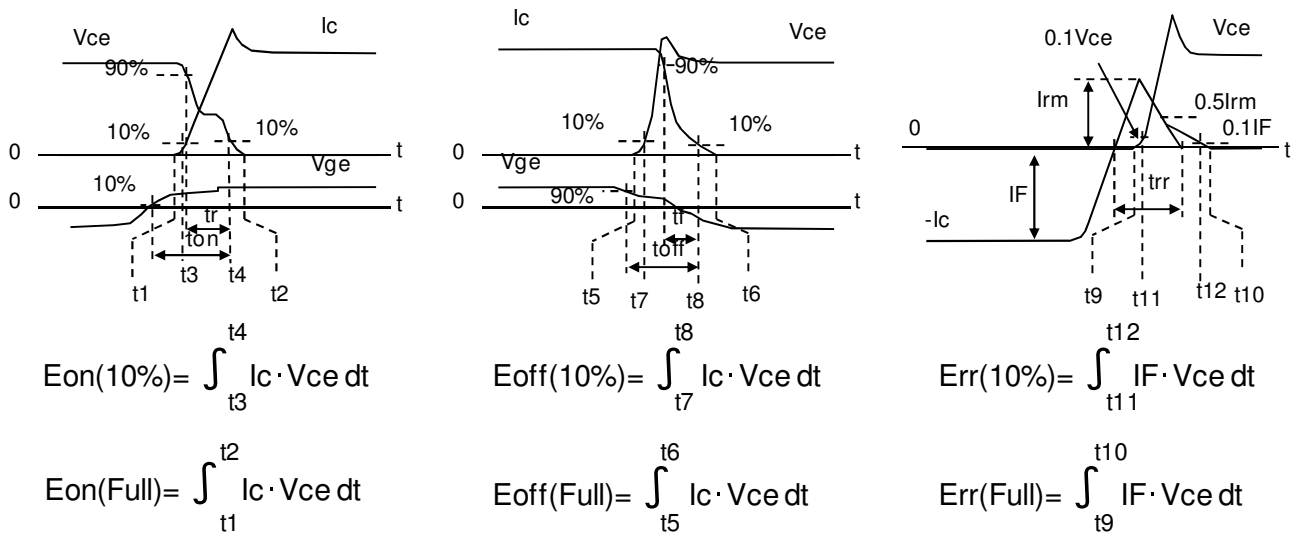
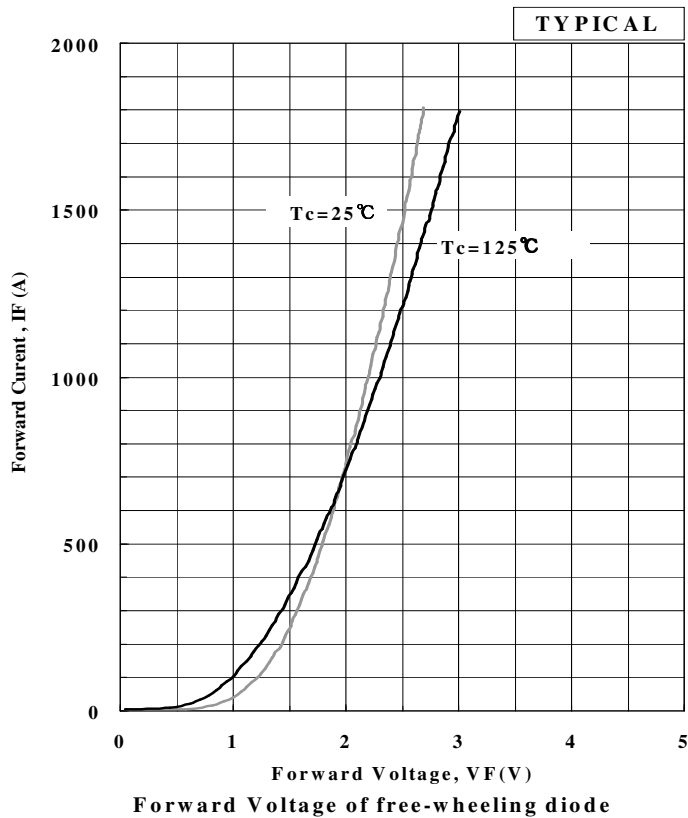
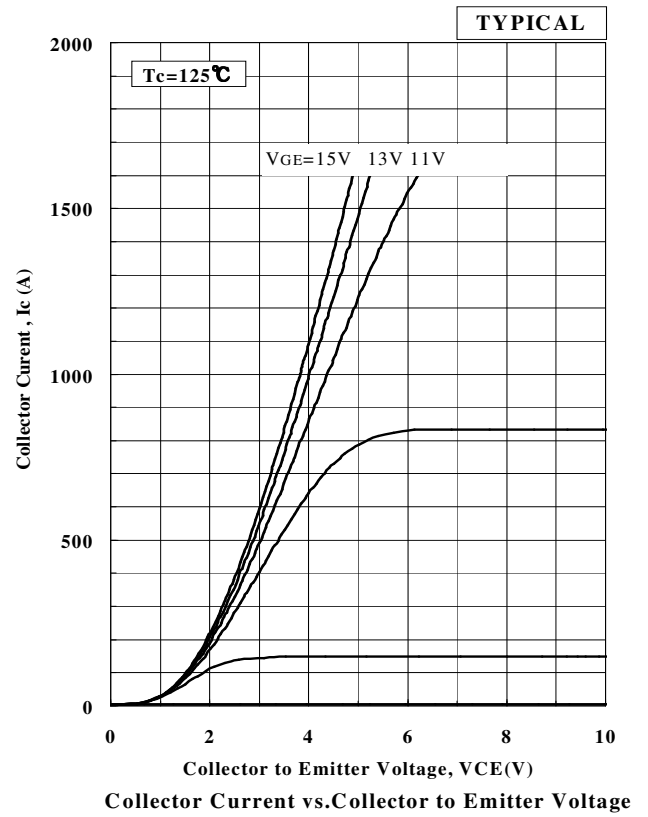
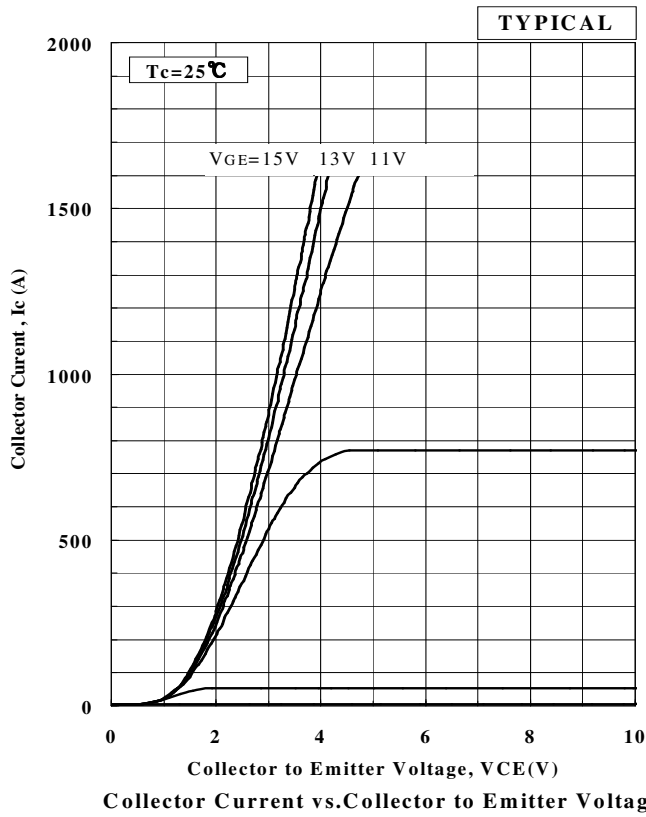


Fig.3 Definition of switching loss

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CHARACTERISTICS CURVE

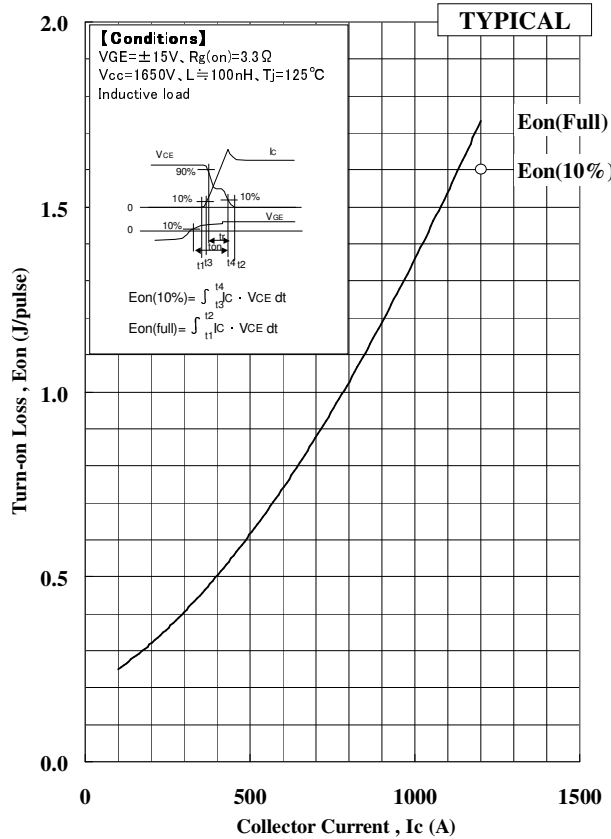
STATIC CHARACTERISTICS



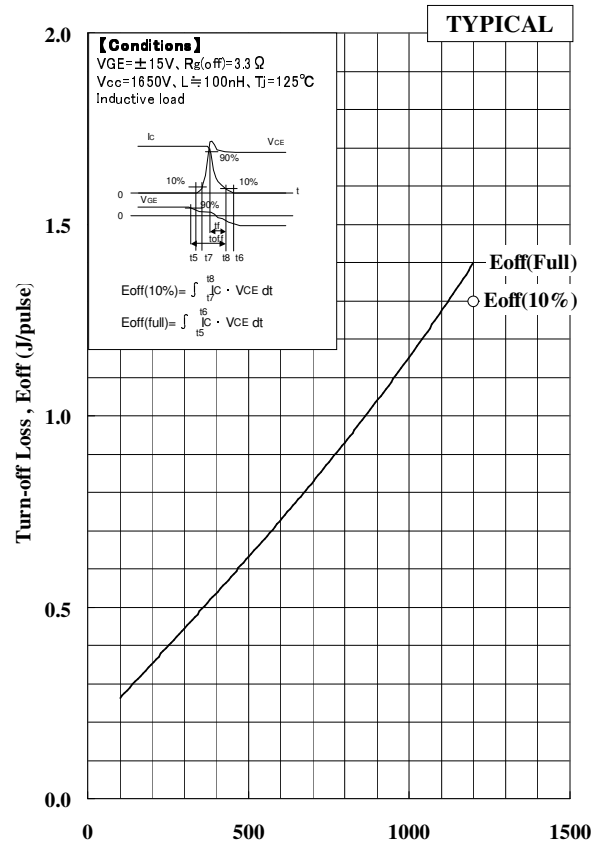
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DYNAMIC CHARACTERISTICS

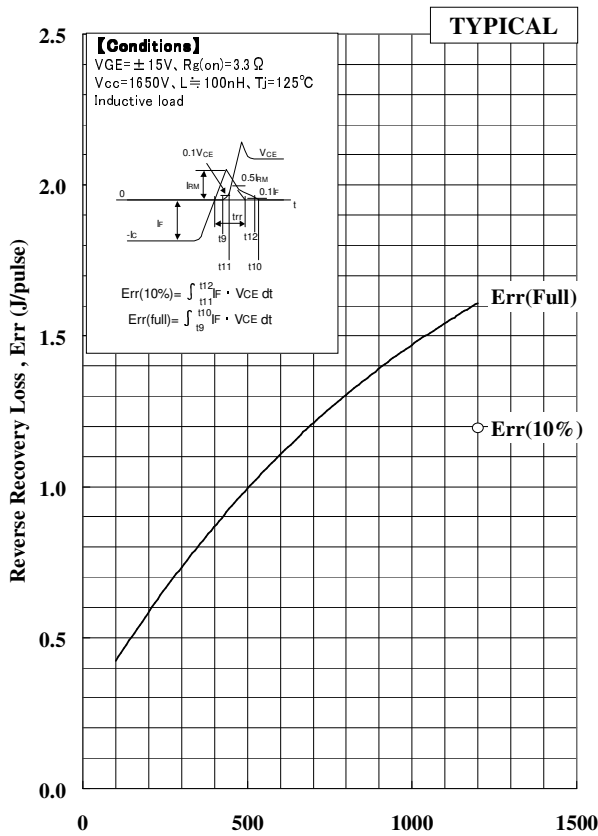
DEPENDENCE OF CURRENT



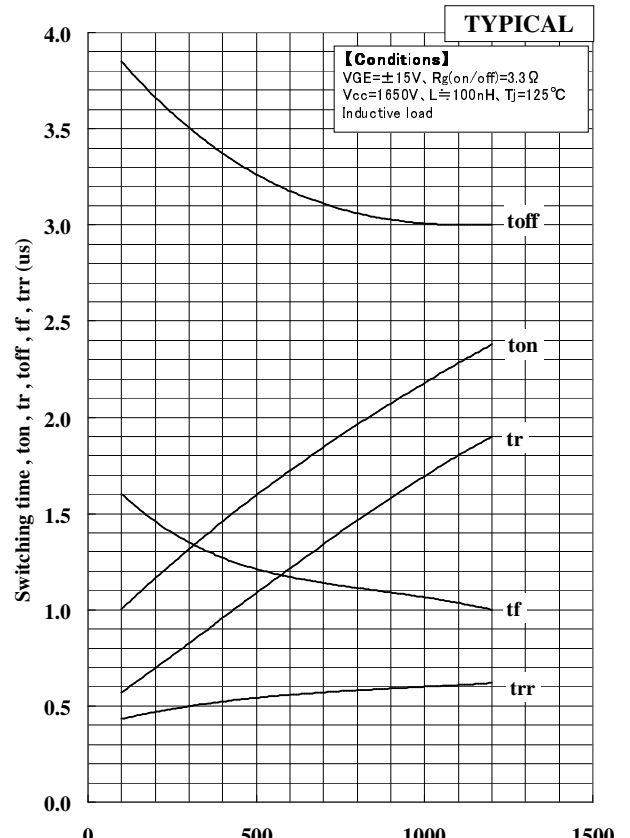
Turn-on Loss vs. Collector Current



Turn-off Loss vs. Collector Current



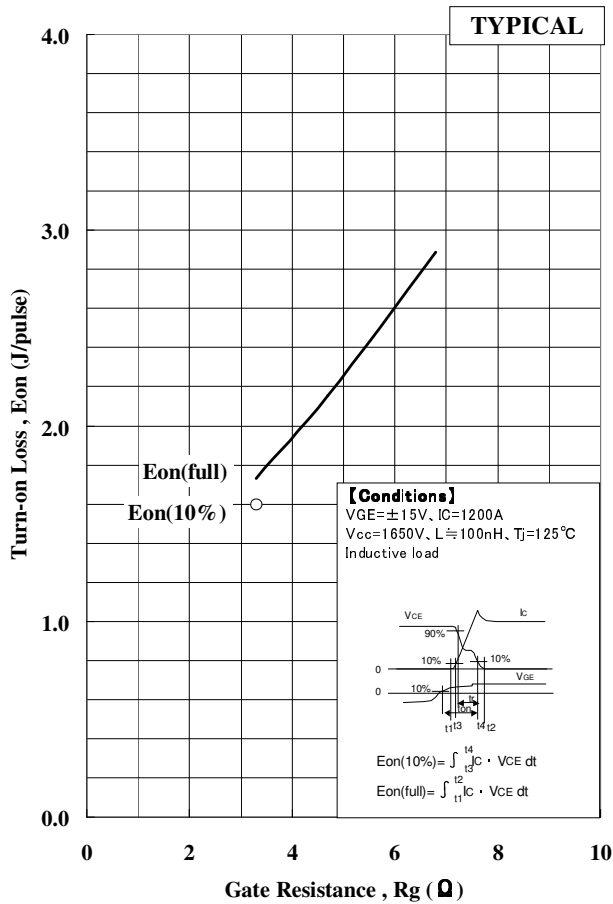
Recovery Loss vs. Forward Current



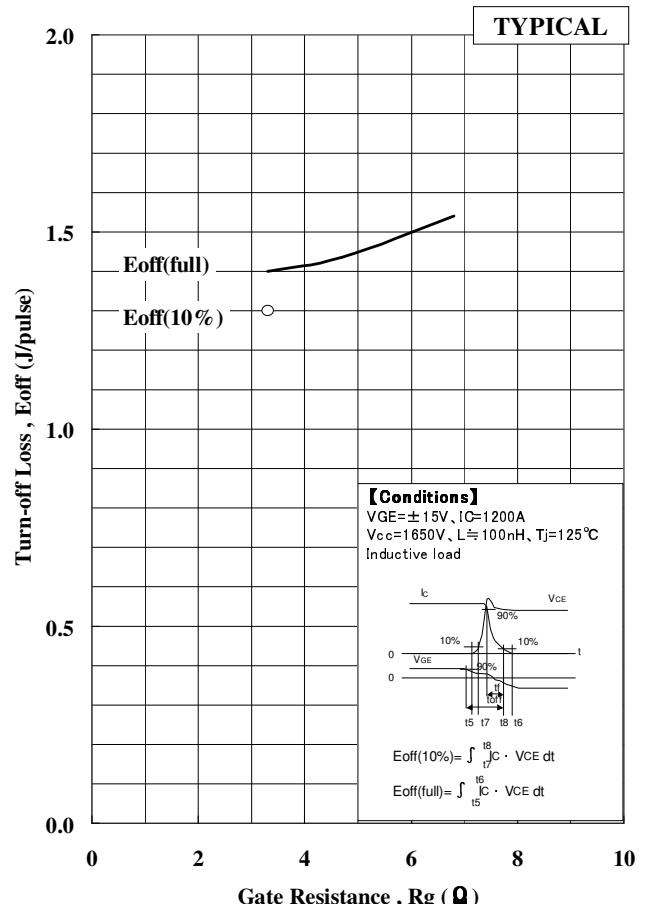
Switching time vs. Collector current

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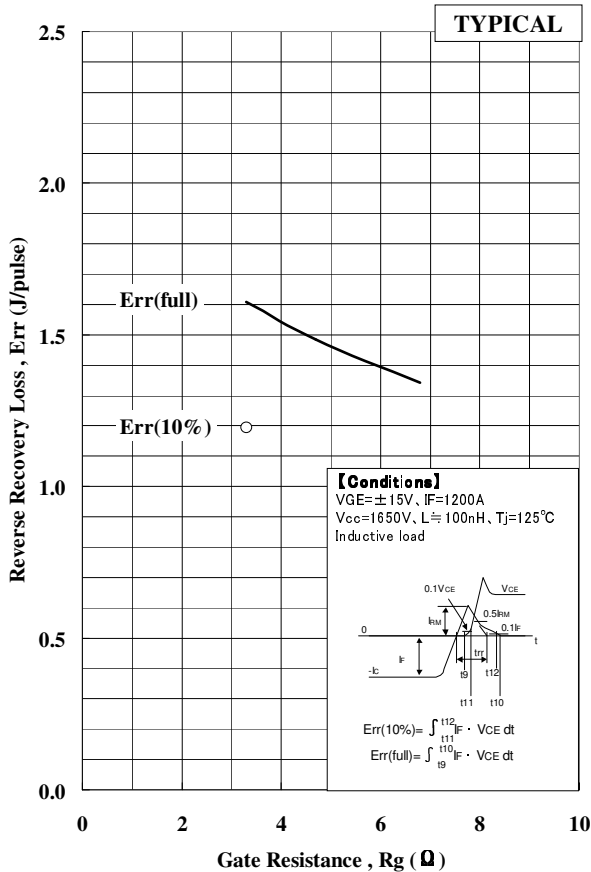
DEPENDENCE OF RG



Turn-on Loss vs. Gate Resistance



Turn-off Loss vs. Gate Resistance

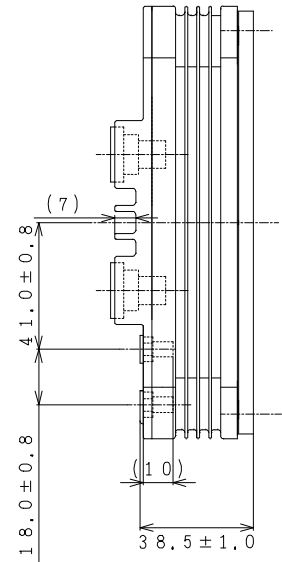
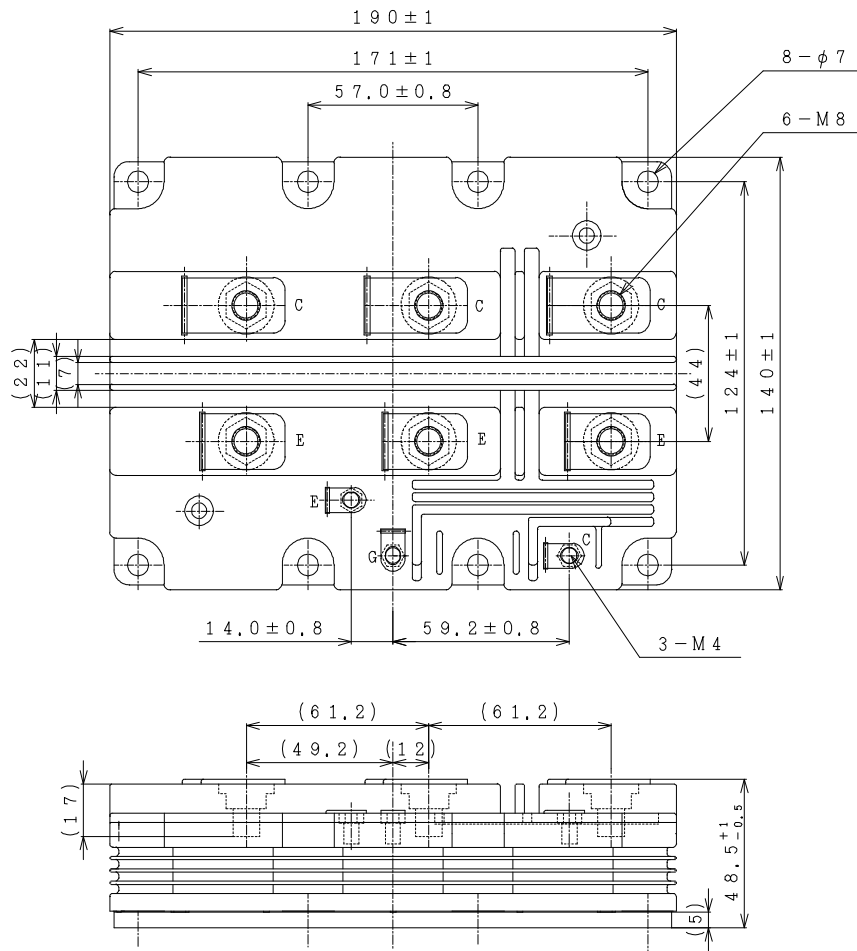


Recovery Loss vs. Gate Resistance

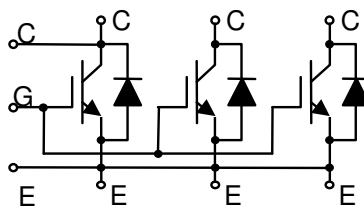
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PACKAGE OUTLINE DRAWING

Unit in mm



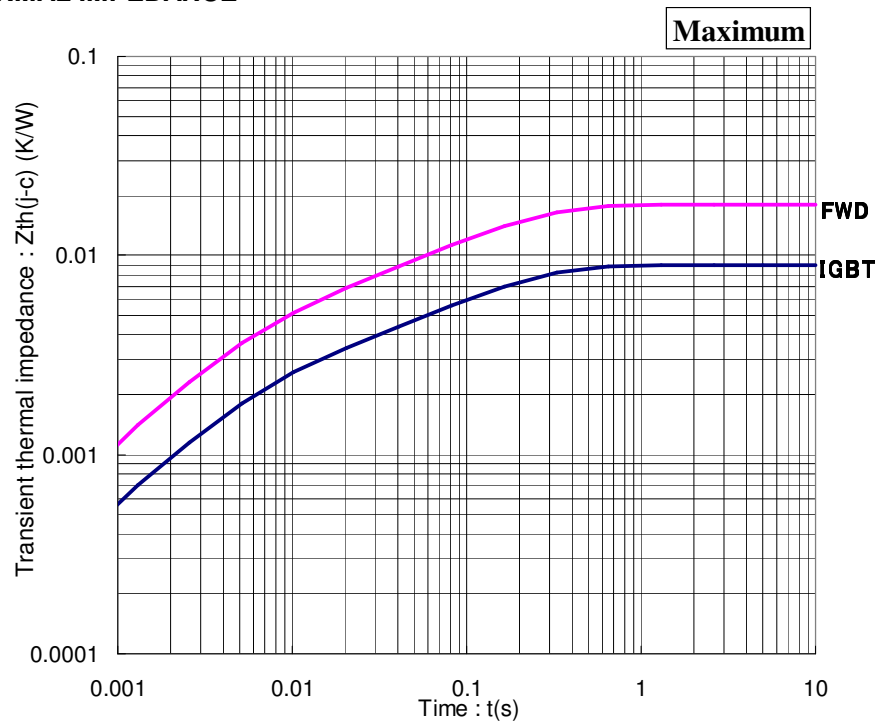
Weight: 1,550(g)



Circuit diagram

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TRANSIENT THERMAL IMPEDANCE



Transient Thermal Impedance Curve

n	1	2	3	4	5	6	7	Unit
$\tau_{th}[n]$	0.30	0.1	0.03	0.01	0.003	0.001	0.0003	sec
$Z_{th}[n,IGBT]$	1.79E-03	4.55E-03	1.59E-05	1.44E-03	1.15E-03	3.47E-06	4.25E-05	K/W
$Z_{th}[n,Diode]$	3.58E-03	9.13E-03	1.01E-05	2.89E-03	2.31E-03	1.16E-06	8.63E-05	K/W

Material declaration

Please note the following materials are contained in the product, in order to keep characteristic and reliability level.

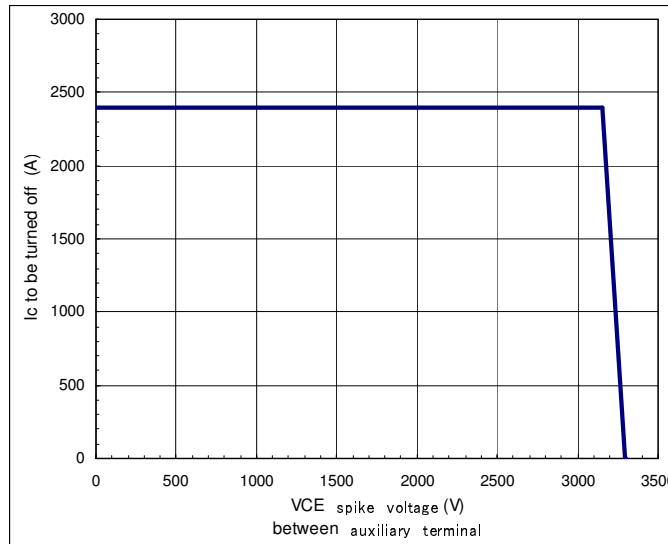
Material	Contained part
Lead (Pb) and its compounds	Solder

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RBSOA / Recovery SOA

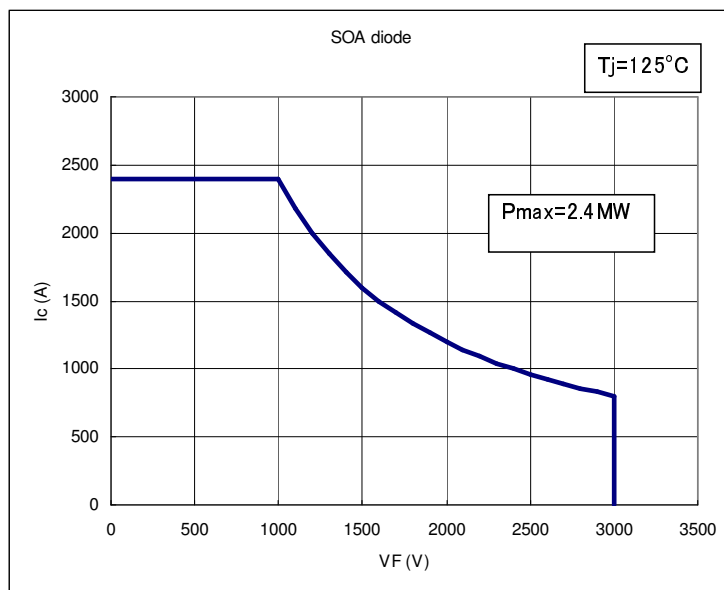
RBSOA

$V_{cc}=2300V$, $I_c=2400A$, $R_{g(on/off)}=3.3/3.3\Omega$
 , $V_{GE}=\pm 15V$, $L_s=100nH$, $T_c=125^\circ C$
 (Measured at auxiliary terminal)



Recovery SOA

$V_{cc}=2000V$, $I_c=-I_F=2400A$, $R_{g(on/off)}=3.3/3.3\Omega$
 , $V_{GE}=\pm 15V$, $L_s=100nH$, $T_c=125^\circ C$
 (Measured at auxiliary terminal)



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HITACHI POWER SEMICONDUCTORS

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