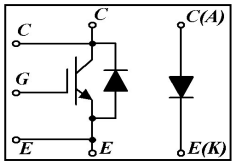
MBL1200E17D

Silicon N-channel IGBT

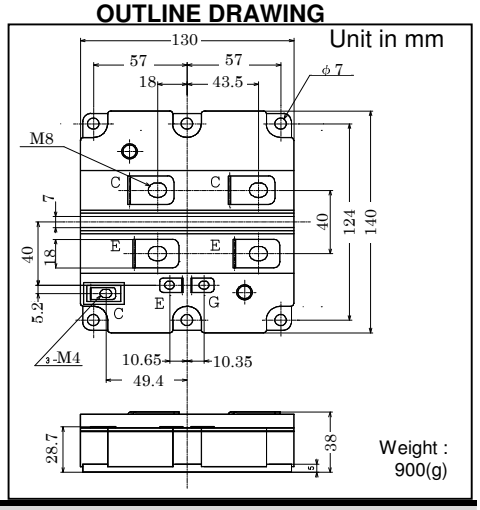
FEATURES

- High thermal fatigue durability.(delta Tc=70℃,N>30,000cycles)
- High speed, low loss IGBT module.
- Low noise due to built-in free-wheeling diode
  – ultra soft fast recovery diode(USFD).
- Low driving power due to low input capacitance MOS gate.
- High reliability, high durability module.
- Isolated heat sink(terminal to base).

CIRCUIT DIAGRAM



OUTLINE DRAWING



ABSOLUTE MAXIMUM RATINGS (TC=25℃)

Item		Symbol	Unit	MBL1200E17D	
Collector Emitter Voltage		V_{CES}	V	1,700	
Gate Emitter Voltage		V_{GES}	V	±20	
Collector Current	DC	I_C	A	1,200	
	1ms	I_{Cp}		2,400	
Forward Current (Free wheel Diode)	DC	$I_{F(FWD)}$	A	600	
	1ms	$I_{FM(FWD)}$		1,200	
Forward Current (Chopper Diode)	DC	$I_{F(chopper)}$	A	1,200	
	1ms	$I_{FM(chopper)}$		2,400	
Junction Temperature		T_j	℃	-40 ～ +125	
Strage Temperature		Tstg	℃	-40 ～ +125	(1)
Isolation Test Voltage		V_{ISO}	V_{RMS}	4,000(AC 1 minute)	
Screw Torque	Terminals (M4/M8)	-	N·m	2/15	(2)
	Mounting (M6)	-		6	(3)

Notes: (1) Terminal temperature shall not exceed the spepecified temperture in any operation.
(2) Recommended Value 1.8±0.2 / 15^{+0}_{-3}N·m (3) Recommended Value 5.5±0.5N·m

ELECTRICAL CHARACTERISTICS

1) IGBT + FWD

Item		Symbol	Unit	Min.	Typ.	Max.	Test Conditions
Collector Emitter Cut-Off Current		I_{CES}	mA	-	-	10	V_{CE}=1,700V, V_{GE}=0V, Tj=25℃
Gate Emitter Leakage Current		I_{GES}	nA	-	-	±500	V_{GE}=±20V, V_{CE}=0V, Tj=25℃
Collector Emitter Saturation Voltage		$V_{CE(sat)}$	V	2.1	2.7	3.3	I_C=1,200A, V_{GE}=15V, Tj=125℃
Gate Emitter Threshold Voltage		$V_{GE(TO)}$	V	5.5	7.0	8.5	V_{CE}=10V, I_C=120mA, Tj=25℃
Input Capacitance		Cies	nF	-	100	-	V_{CE}=10V, V_{GE}=0V,f=100kHz, Tj=25℃
Switching Times	Rise Time	tr	μs	0.4	0.9	1.5	V_{CC}=900V, Ic=1,200A L=90nH(TBD), C_{GE}=120nF(TBD) (4) R_G=1.5Ω(TBD) (4) V_{GE}=±15V, Tj=125℃
	Turn On Time	ton		0.7	1.6	2.4	
	Fall Time	tf		0.08	0.2	0.4	
	Turn Off Time	toff		0.7	1.7	3.4	
Turn On Loss		$E_{on(10\%)}$	J/P	-	0.37	0.55	
Turn Off Loss		$E_{off(10\%)}$	J/P	-	0.45	0.65	
Peak Forward Voltage Drop		V_{FM}	V	-	1.9	-	IF=600A, V_{GE}=0V, Tj=125℃
Thermal Impedance	IGBT	Rth(j-c)	K/W	-	-	0.020	Junction to case
	FWD	Rth(j-c)		-	-	0.060	
Contact Thermal Impedance		Rth(c-f)	K/W	-	0.016	-	Case to fin (at IGBT+FWD part)

2) Chopper DIODE

Item	Symbol	Unit	Min.	Typ.	Max.	Test Conditions
Collector Emitter Cut-Off Current	I_{AKS}	mA	-	-	10.0	V_{AK}=1,700V, Tj=25℃
Peak Forward Voltage Drop (Between main terminals)	V_F	V	1.9	2.4	2.8	I_F=1,200A, Tj=125℃ Terminal Resistance Typ. 0.4mΩ
Reverse Recovery Time	trr	μs	0.3	0.7	1.0	V_{CC}=900V, I_F=1,200A, L=90nH(TBD), C_{GE}=120nF(TBD), R_G=1.5Ω(TBD) (4) V_{GE}=±15V, Tj=125℃
Reverse Recovery Loss	$E_{rr(10\%)}$	J/P	-	0.32	0.5	
Thermal Impedance	Rth(j-c)	K/W			0.030	Junction to case
Contact Thermal Impedance	Rth(c-f)	K/W	-	0.016	-	Case to fin (at Chopper Diode part)

Notes: (4) R_G value is the test condition's value for decision 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.

HITACHI
Inspire the Next

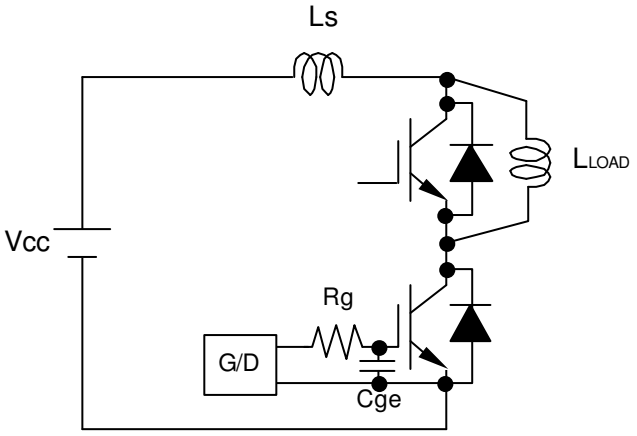
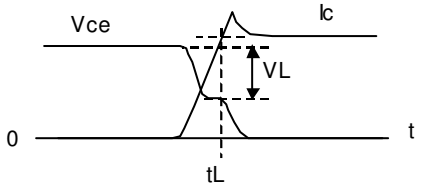
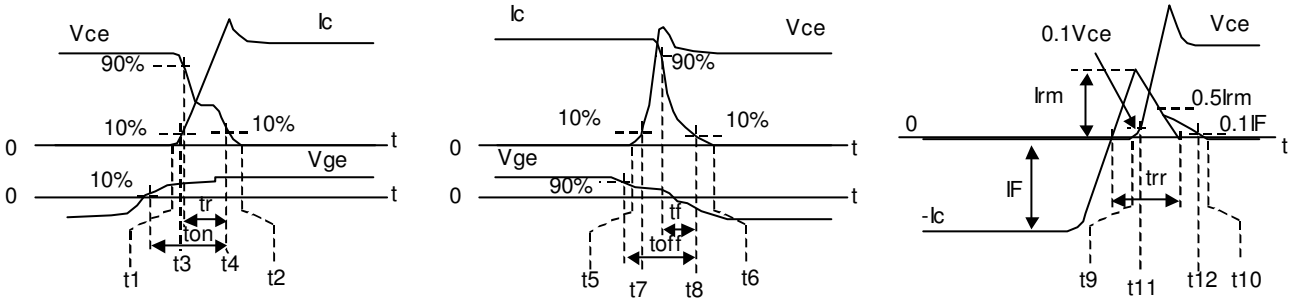


Fig.1 Switching test circuit



$$Ls = \frac{VL}{\left(\frac{dIc}{dt}\right)_{t=tL}}$$

Fig.2 Definition of Ls



$$Eon(10\%) = \int_{t3}^{t4} Ic \cdot Vce\, dt \qquad Eoff(10\%) = \int_{t7}^{t8} Ic \cdot Vce\, dt \qquad Err(10\%) = \int_{t11}^{t12} IF \cdot Vce\, dt$$

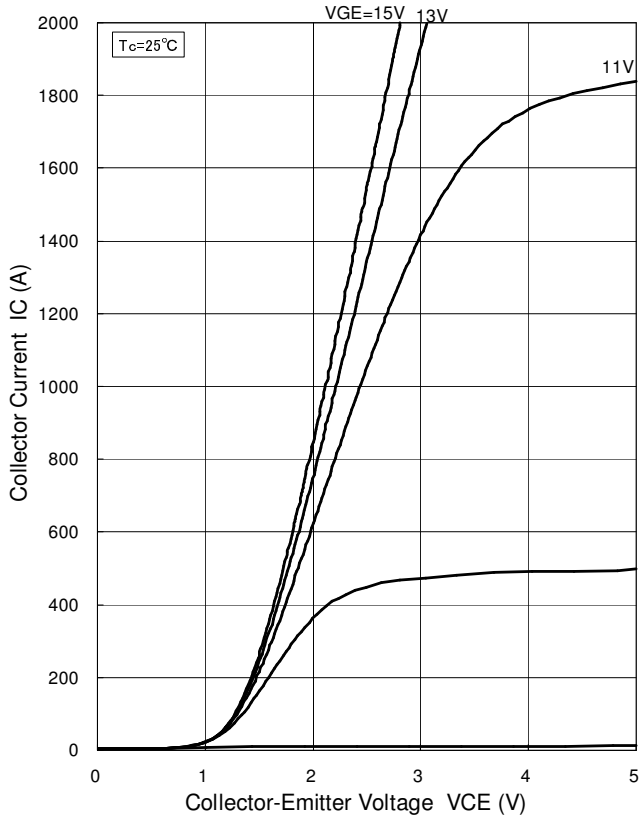
$$Eon(Full) = \int_{t1}^{t2} Ic \cdot Vce\, dt \qquad Eoff(Full) = \int_{t5}^{t6} Ic \cdot Vce\, dt \qquad Err(Full) = \int_{t9}^{t10} IF \cdot Vce\, dt$$

Fig.3 Definition of switching loss

1. CHARACTERISTICS CURVE

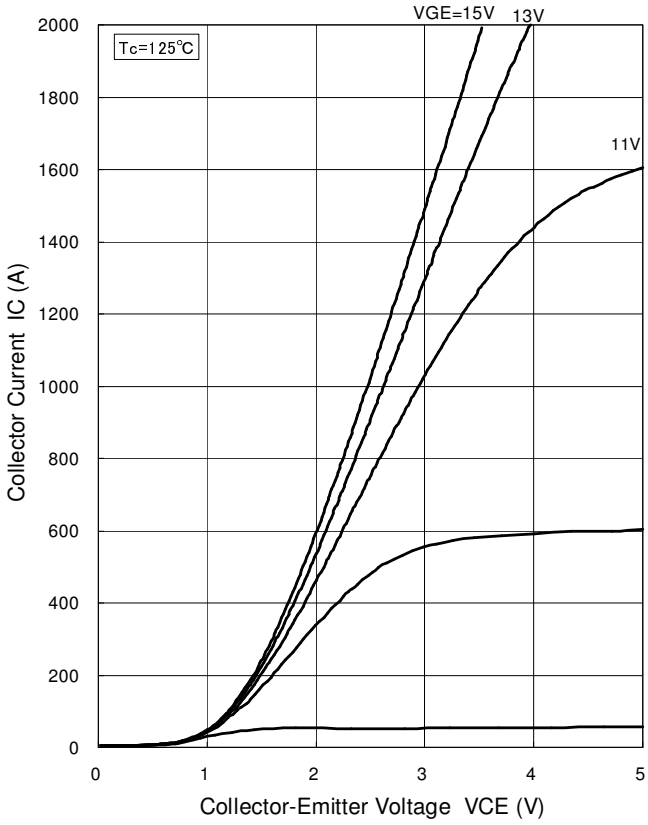
1.1 STATIC CHARACTERISTICS

TYPICAL



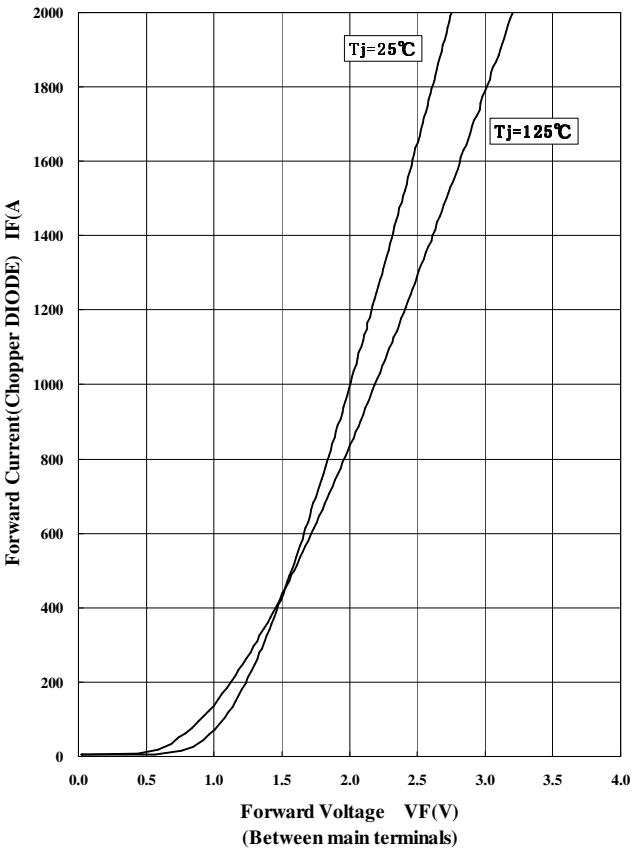
Collector Current vs.Collector to Emitter Voltage

TYPICAL



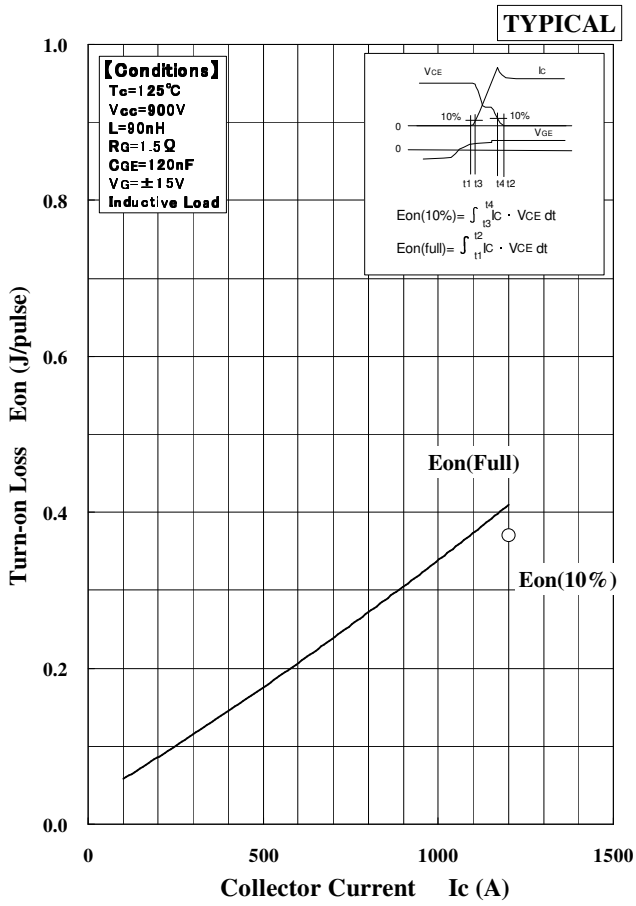
Collector Current vs.Collector to Emitter Voltage

TYPICAL

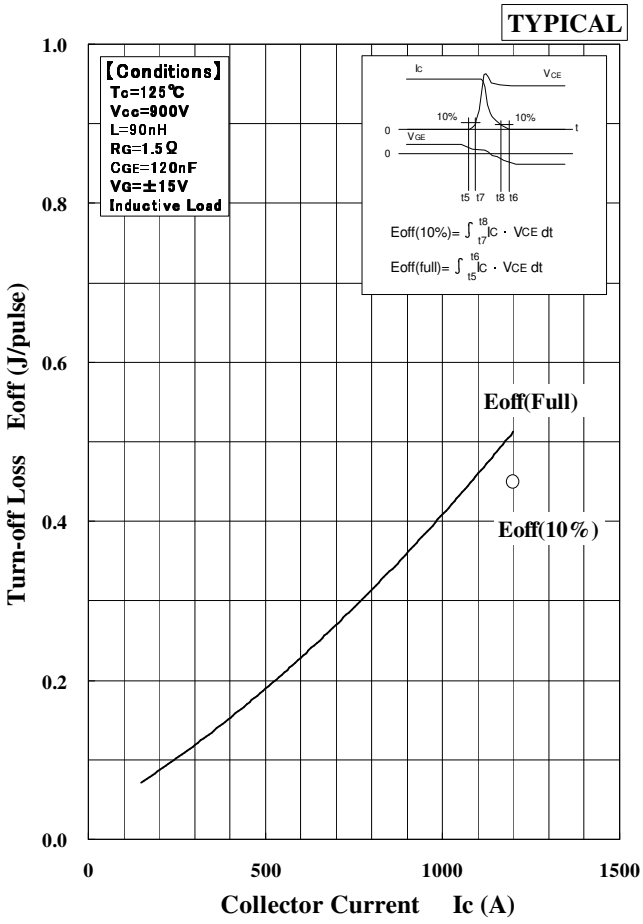


Forward Voltage of Chopper diode

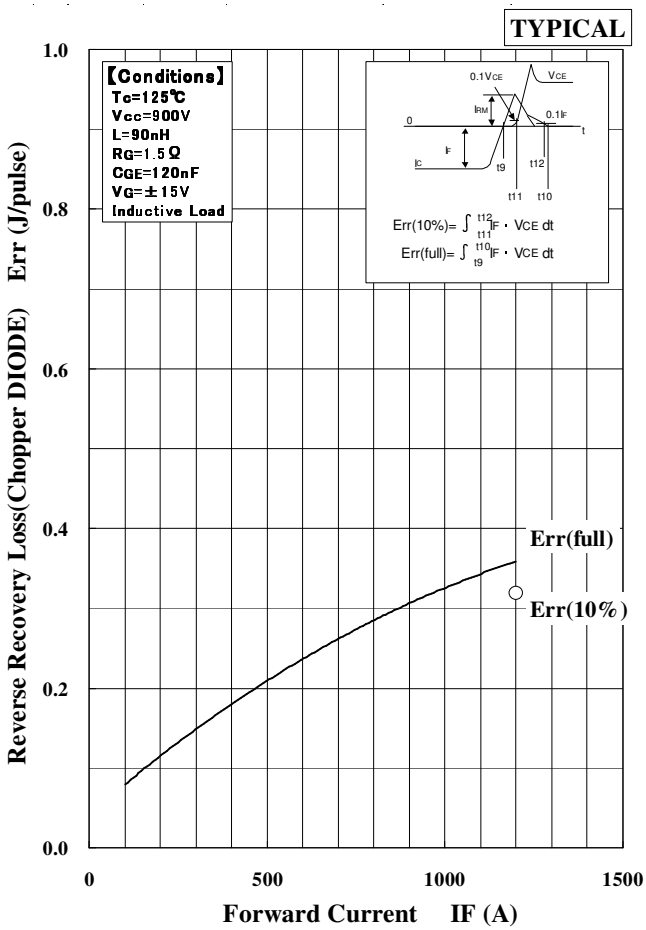
1.2. DYNAMIC CHARACTERISTICS
1.2.1 DEPENDENCE OF VURRENT



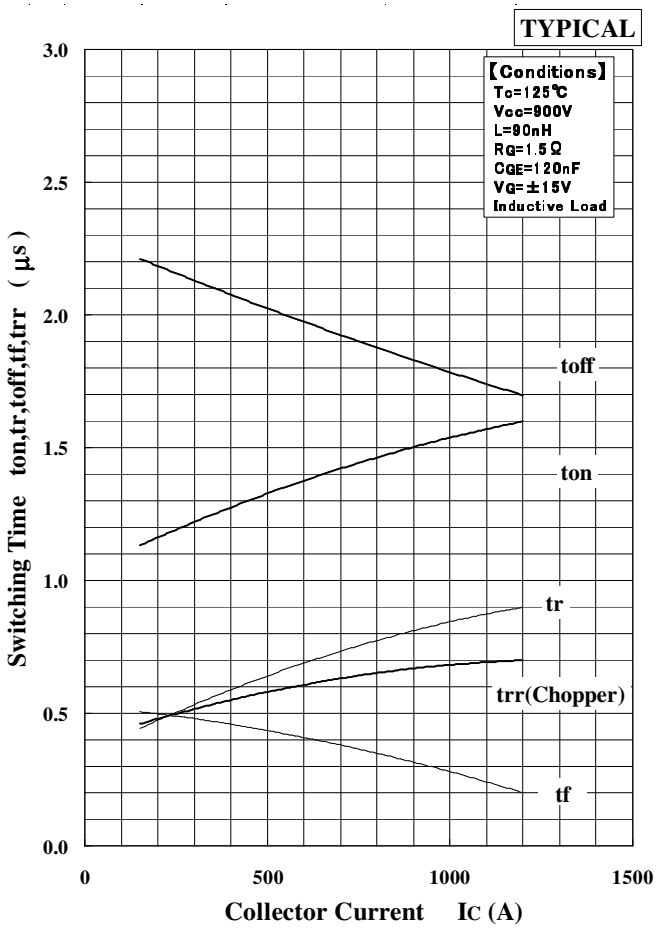
Turn-on Loss vs. Collector Current



Turn-off Loss vs. Collector Current

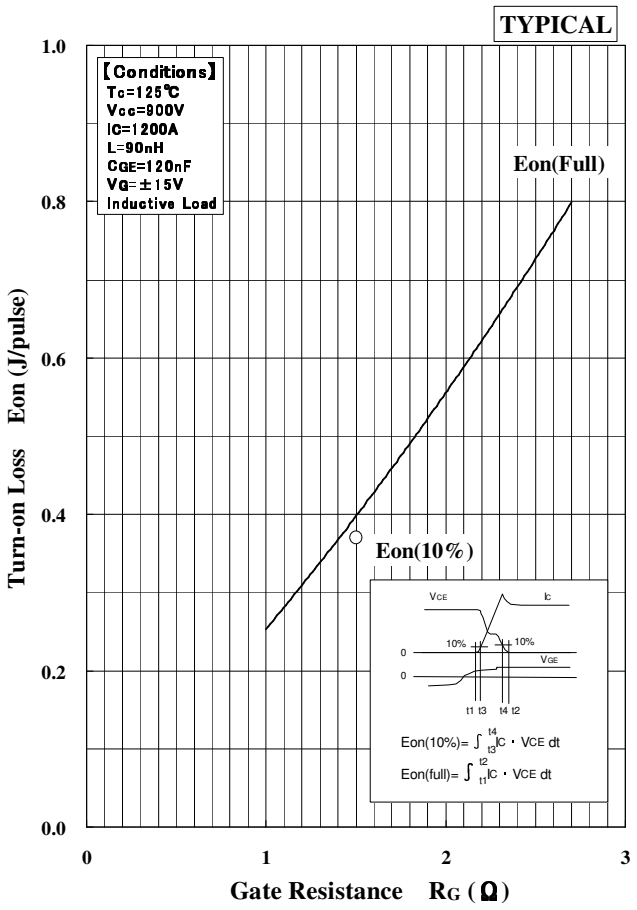


Recovery Loss vs. Collector Current

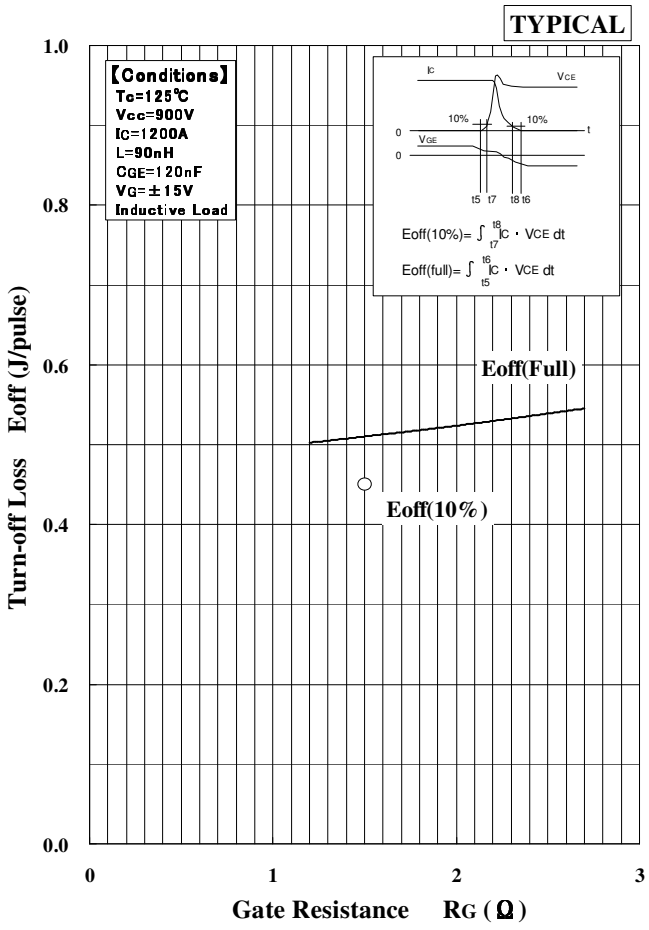


Switching Time vs. Collector Current

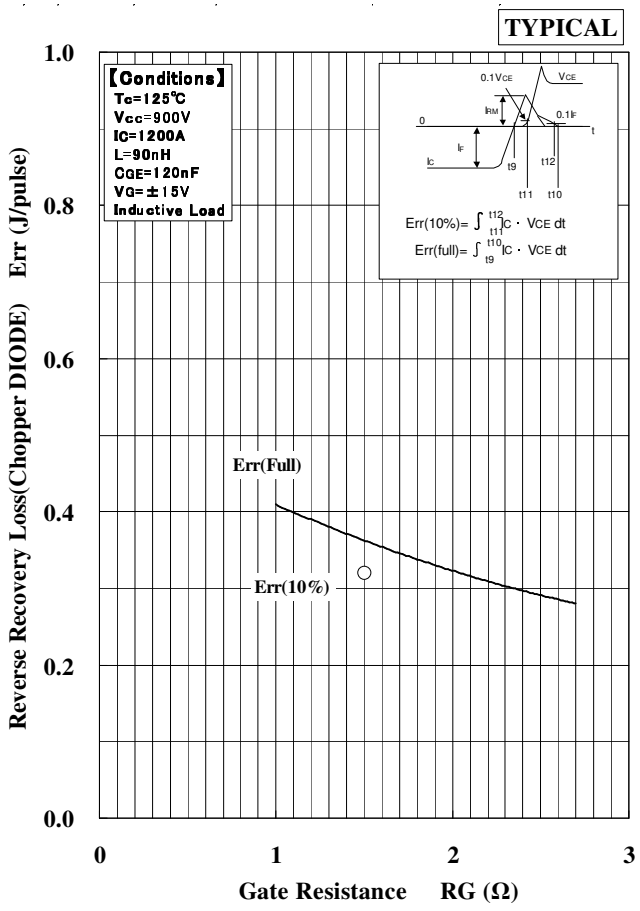
1.2.2 DEPENDENCE OF RG



Turn-on Loss vs. Gate Resistance

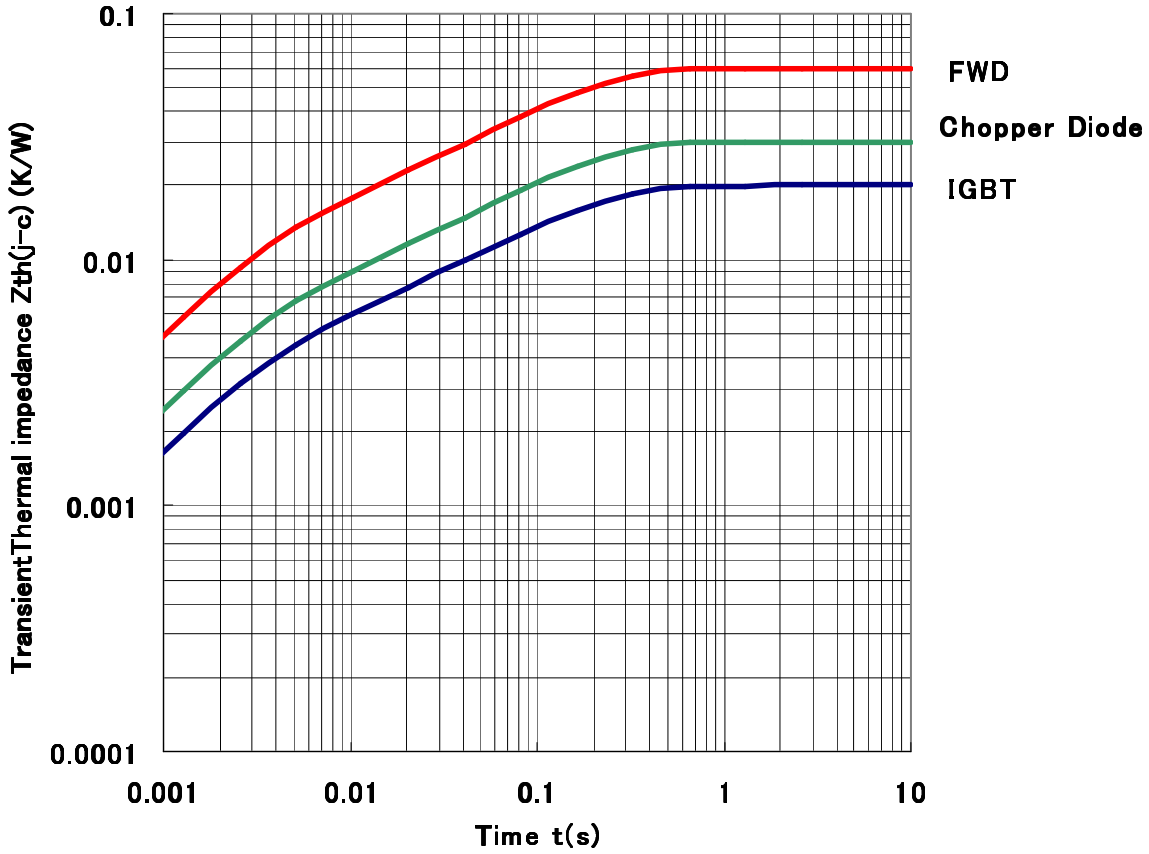


Turn-off Loss vs. Gate Resistance



Recovery Loss vs. Gate Resistance

2. THERMAL IMPEDANCE
2.1 TRNSIENT THERMAL IMPEDANCE



Transient Thermal Impedance Curve ***(Maximum Value)***

Negative environmental impact material

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

Material	Contained part
Lead (Pb) and its compounds	Solder
Arsenic and its compounds	Si chip

HITACHI POWER SEMICONDUCTORS

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