MBL1200E17D

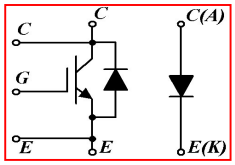
PRELIMINARY SPEC.

Silicon N-channel IGBT

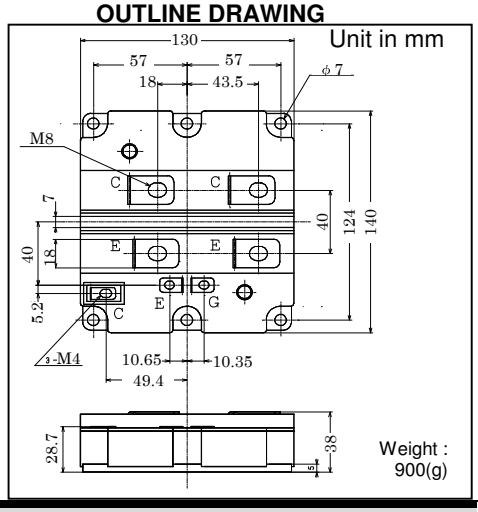
FEATURES

* 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	°C	-40 ～ +125	
Strage Temperature		T_{stg}	°C	-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	-	2.7	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	-	0.9	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°C
	Turn On Time	ton		-	1.6	2.4	
	Fall Time	tf		-	0.2	0.4	
	Turn Off Time	toff		-	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	-	Ic=600A, V_{GE}=0V, Tj=125°C
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	-	2.4	2.8	I_F=1,200A, Tj=125℃ Terminal Resistance Typ. 0.4mΩ
Reverse Recovery Time	trr	μs	-	0.7	1.0	V_{CC}=900V, Ic=1,200A, L=90nH(TBD), C_{GE}=120nF(TBD), R_G=1.5Ω(TBD) (4) V_{GE}=±15V, Tj=125°C
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.

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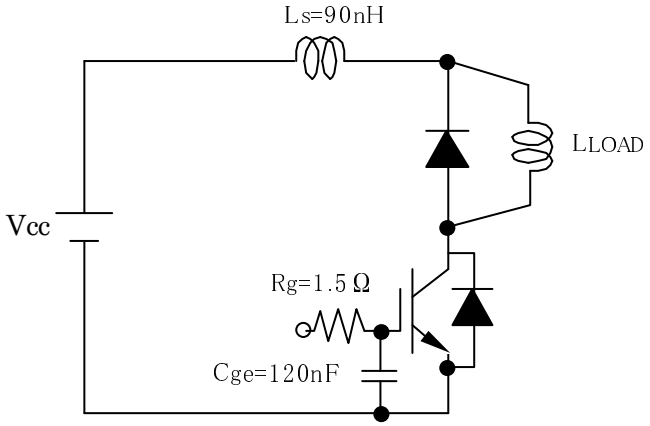
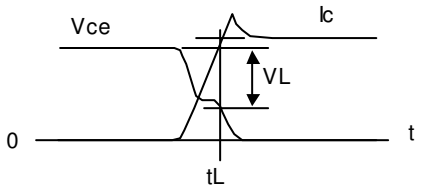
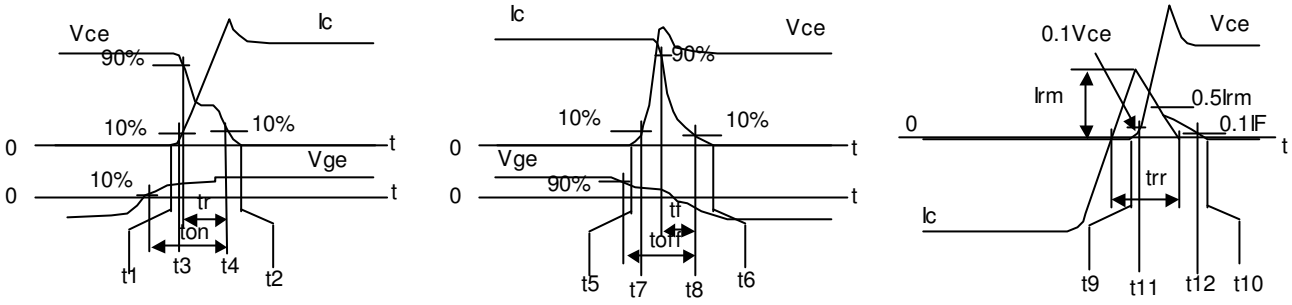


Fig.1 Switching test circuit



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

Fig.2 Definition of Ls

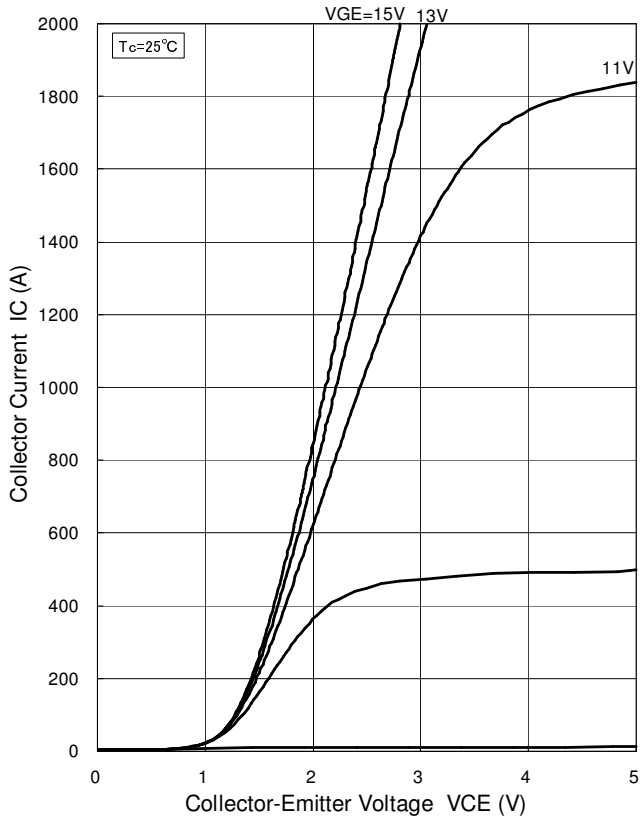


$$Eon(10\%) = \int_{t3}^{t4} Ic \cdot Vce \, dt \qquad Eoff(10\%) = \int_{t7}^{t8} Ic \cdot Vce \, dt \qquad Err(10\%) = \int_{t11}^{t12} Ic \cdot Vce \, dt$$

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

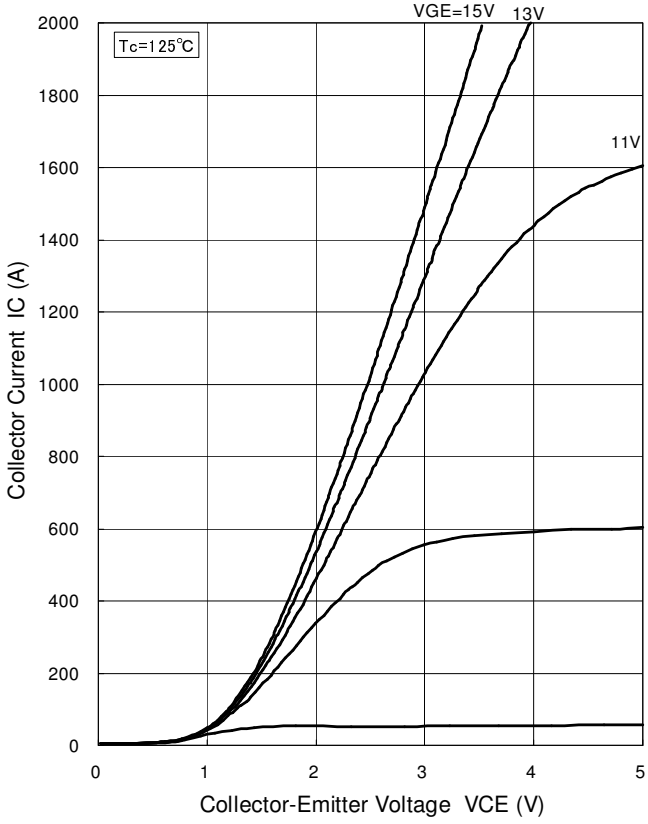
Fig.3 Definition of switching loss

TYPICAL



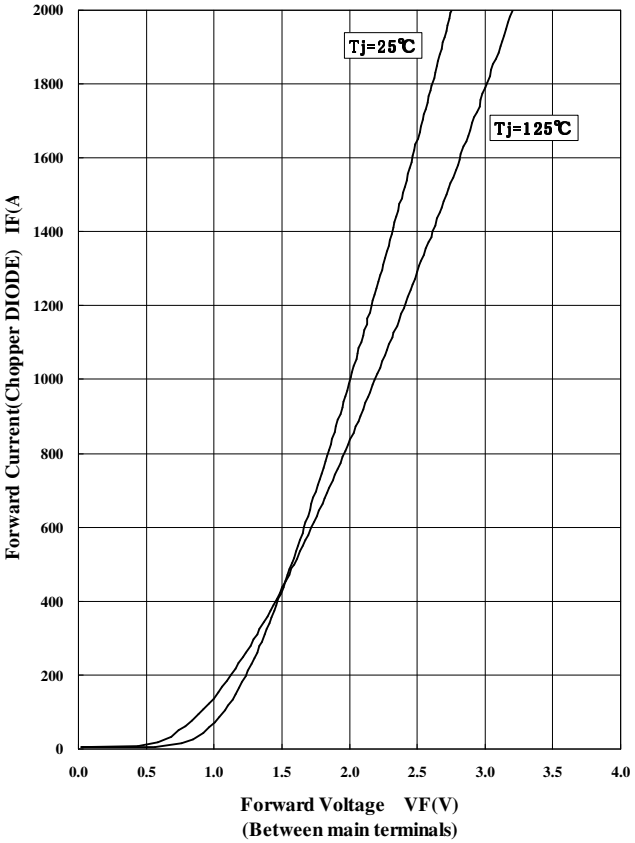
Collector Current vs.Collector to Emitter Voltage

TYPICAL



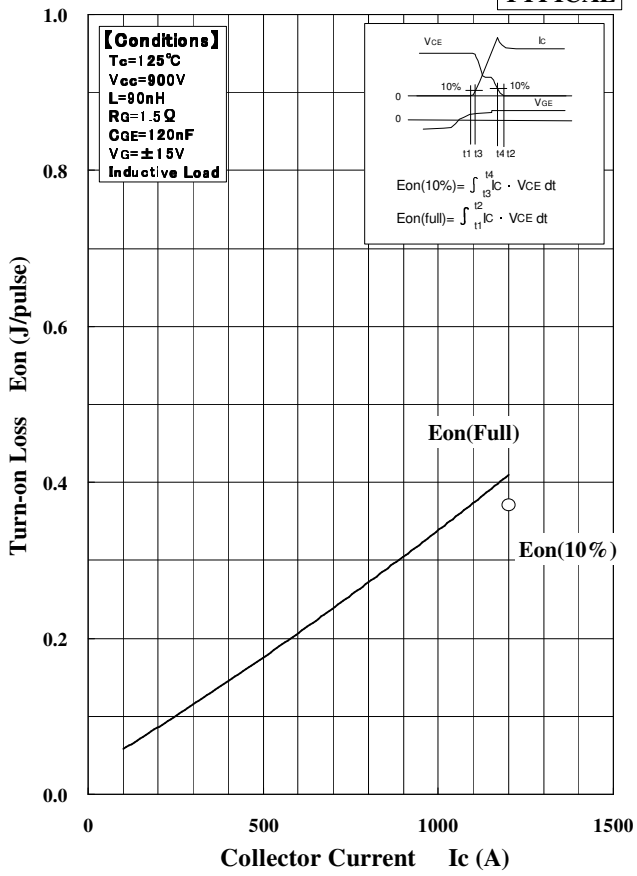
Collector Current vs.Collector to Emitter Voltage

TYPICAL



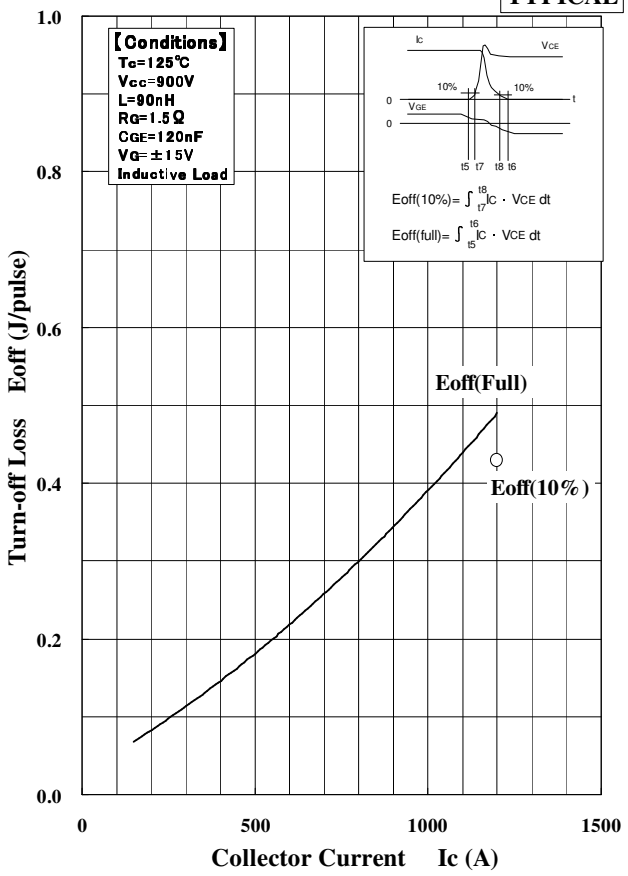
Forward Voltage of Chopper diode

TYPICAL



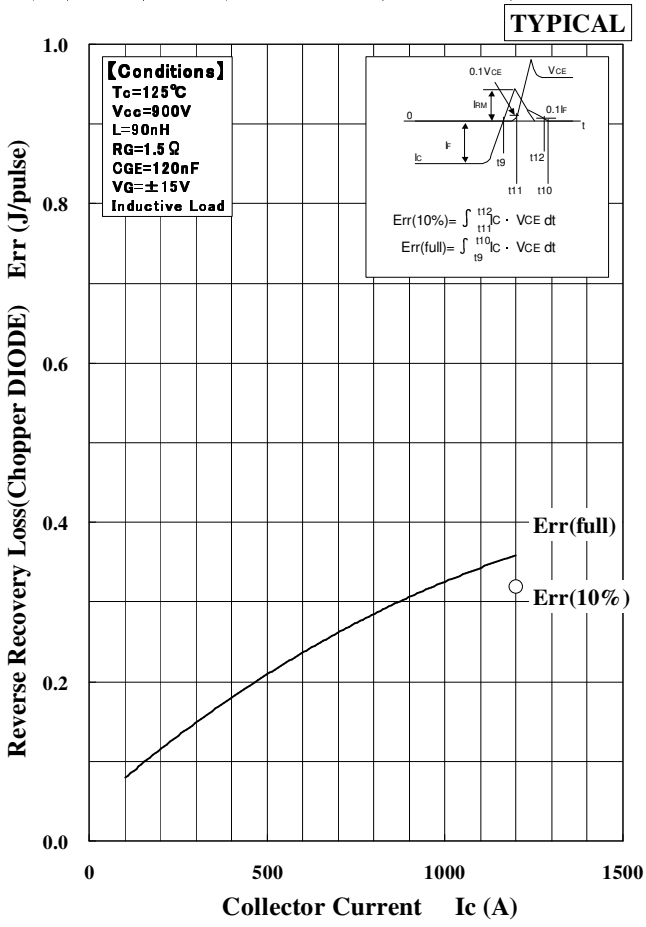
Turn-on Loss vs. Collector Current

TYPICAL



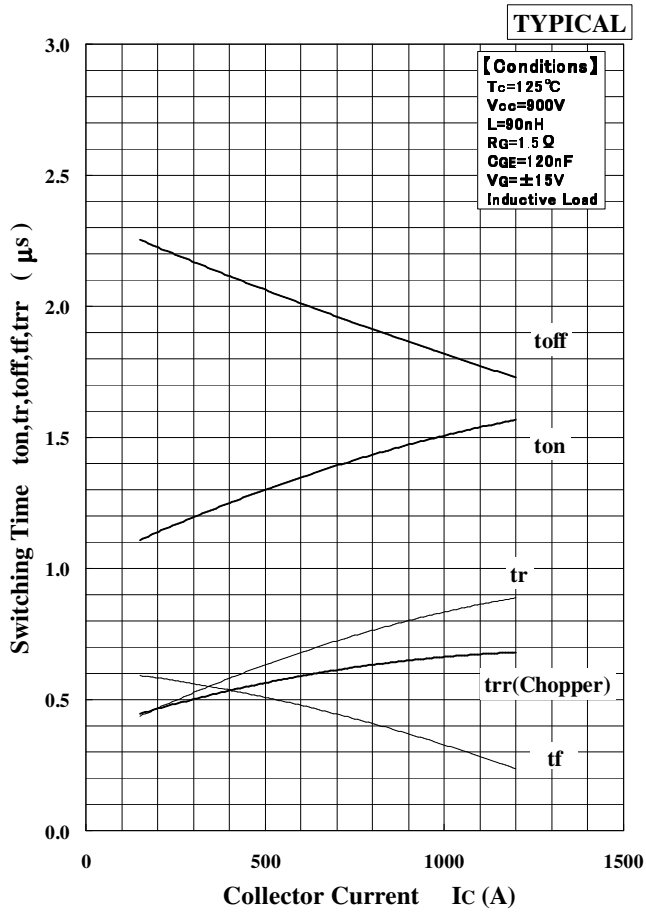
Turn-off Loss vs. Collector Current

TYPICAL

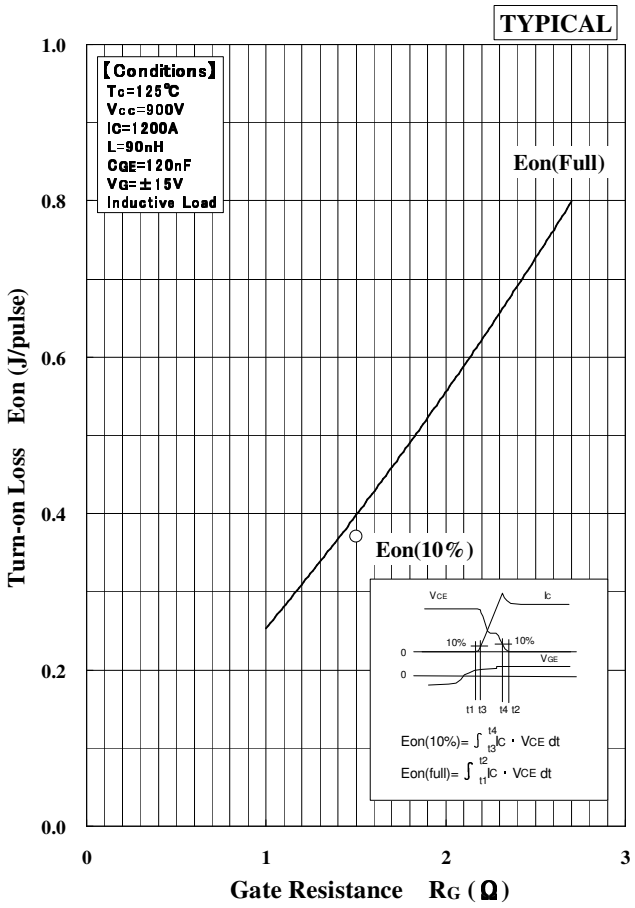


Recovery Loss vs. Collector Current

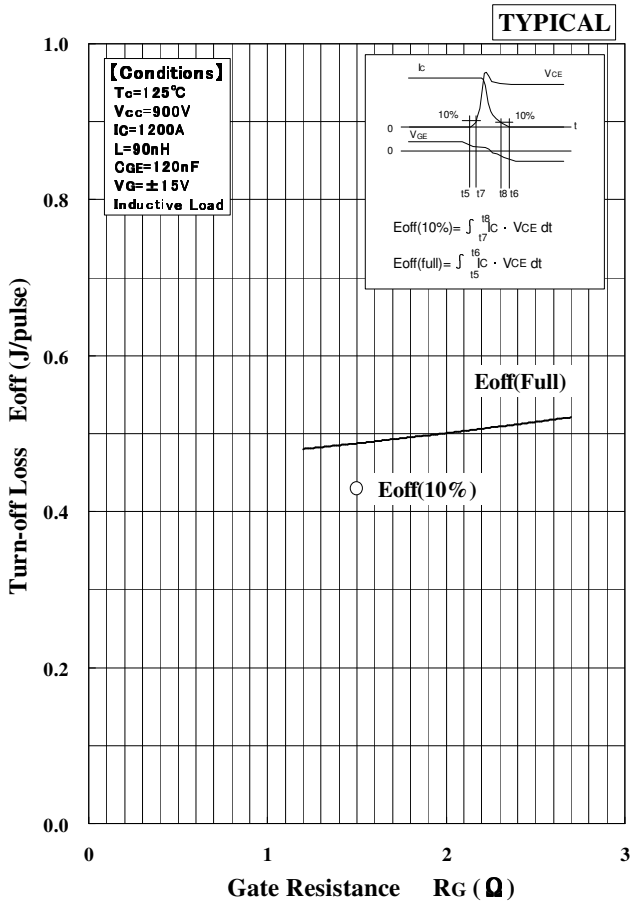
TYPICAL



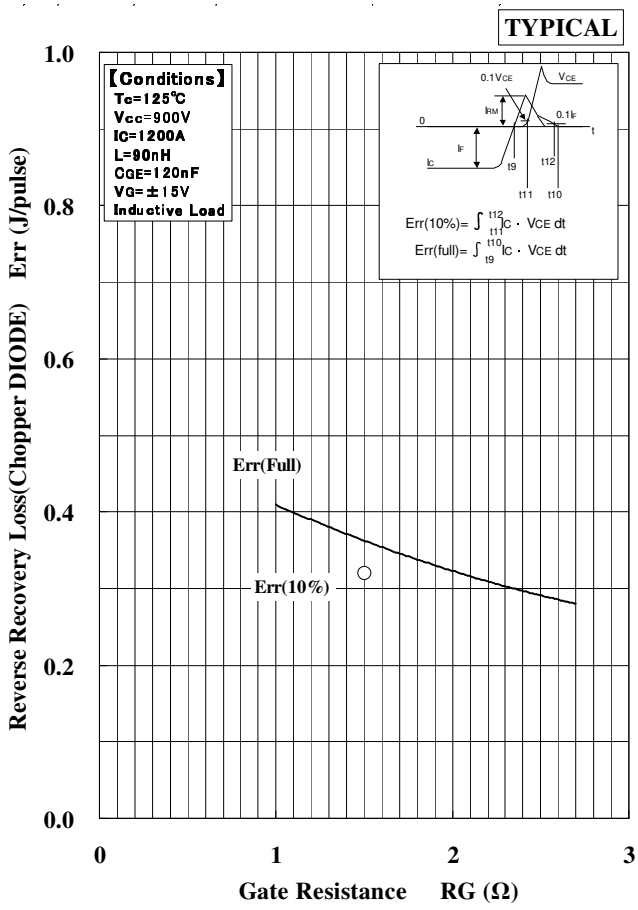
Switching Time vs. Collector Current



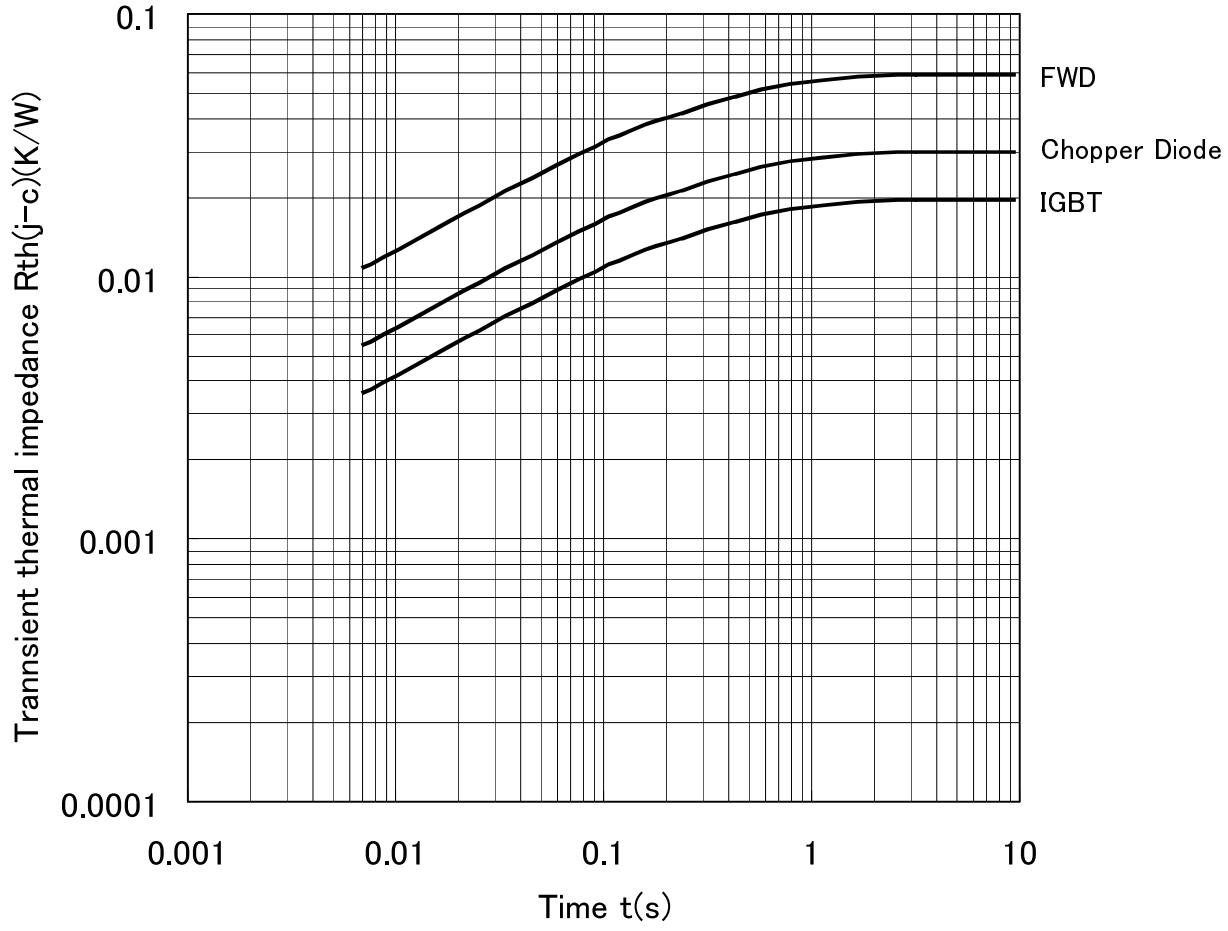
Turn-on Loss vs. Gate Resistance



Turn-off Loss vs. Gate Resistance



Recovery Loss vs. Gate Resistance



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

HITACHI POWER SEMICONDUCTORS

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