MBN1000E33E2

Preliminary Specification

Silicon N-channel IGBT 3300V E2 version

FEATURES

∗ Soft switching behavior & low conduction loss:
Soft low-injection punch-through High conductivity IGBT.
∗ Low driving power due to low input capacitance MOS gate.
∗ Low noise recovery: Ultra soft fast recovery diode.
∗ High thermal fatigue durability:
(delta Tc=70K, N>30,000cycles)
AlSiC base-plate/AlN substrate

ABSOLUTE MAXIMUM RATINGS (Tc=25°C)

Item		Symbol	Unit	MBN1000E33E2
Collector Emitter Voltage		V_{CES}	V	3,300
Gate Emitter Voltage		V_{GES}	V	±20
Collector Current	DC	I_C	A	1,000 (Tc=95 °C)
	1ms	I_{Cp}		2,000
Forward Current	DC	I_F	A	1,000
	1ms	I_{FM}		2,000
Junction Temperature		T_j	°C	-40 ~ +150
Storage Temperature		T_{stg}	°C	-50 ~ +125
Isolation Voltage		V_{ISO}	V_{RMS}	6,000(AC 1 minute)
Screw Torque	Terminals (M4/M8)	-	N·m	2/15 (1)
	Mounting (M6)	-		6 (2)

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

ELECTRICAL CHARACTERISTICS

Item		Symbol	Unit	Min.	Typ.	Max.	Test Conditions	
Collector Emitter Cut-Off Current		I_{CES}	mA	-	-	8	V_{CE}=3,300V, V_{GE}=0V, Tj=25°C	
				-	14	40	V_{CE}=3,300V, V_{GE}=0V, Tj=125°C	
Gate Emitter Leakage Current		I_{GES}	nA	-500	-	+500	V_{GE}=±20V, V_{CE}=0V, Tj=25°C	
Collector Emitter Saturation Voltage		$V_{CE(sat)}$	V	tbd	2.95	tbd	I_C=1,000A, V_{GE}=15V, Tj=125°C	
				-	3.10	-	I_C=1,000A, V_{GE}=15V, Tj=150°C	
Gate Emitter Threshold Voltage		$V_{GE(TO)}$	V	5.5	6.5	7.5	V_{CE}=10V, I_C=1,000mA, Tj=25°C	
Input Capacitance		C_{ies}	nF	-	130	-	V_{CE}=10V, V_{GE}=0V, f=100kHz, Tj=25°C	
Internal Gate Resistance		Rge	Ω	-	1.9	-	V_{CE}=10V, V_{GE}=0V, f=100kHz, Tj=25°C	
Switching Times	Rise Time	t_r	µs	tbd	2.5	tbd	V_{CC}=1,650V, Ic=1,000A L=120nH R_G=3.9Ω/3.9Ω, CGE=220nF (3) V_{GE}=±15V, Tj=125°C	
	Turn On Time	t_{on}		tbd	3.6	tbd		
	Fall Time	t_f		tbd	1.8	tbd		
	Turn Off Time	t_{off}		tbd	4.1	tbd		
Peak Forward Voltage Drop		V_{FM}	V	tbd	2.5	tbd	IF=1,000A, V_{GE}=0V, Tj=125°C	
				-	2.5	-	IF=1,000A, V_{GE}=0V, Tj=150°C	
Reverse Recovery Time		t_{rr}	µs	-	0.9	tbd	Vcc=1,650V, IF=1,000A, L=120nH Tj=125°C	
Turn On Loss		$E_{on(10\%)}$	J/P	-	2.5	tbd	Tj=125°C	V_{CC}=1,650V, Ic= IF=1,000A, L=120nH, R_G=3.9Ω/3.9Ω, CGE=220nF (3) V_{GE}=±15V
		$E_{on(full)}$		-	2.7	-		
				-	tbd	-	Tj=150°C	
Turn Off Loss		$E_{off(10\%)}$	J/P	-	1.5	tbd	Tj=125°C	
		$E_{off(full)}$		-	1.6	-		
				-	tbd	-	Tj=150°C	
Reverse Recovery Loss		$E_{rr(10\%)}$	J/P	-	1.1	tbd	Tj=125°C	
		$E_{rr(full)}$		-	1.3	-		
				-	tbd	-	Tj=150°C	

Notes:(3) R_G and C_{GE} value are 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.

Stray inductance module		L_{SCE}	nH	-	18	-	
Thermal Impedance	IGBT	Rth(j-c)	K/W	-	-	0.012	Junction to case
	FWD	Rth(j-c)		-	-	0.024	
Contact Thermal Impedance		Rth(c-f)	K/W	-	0.008	-	Case to fin

* 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.

DEFINITION OF TEST CIRCUIT

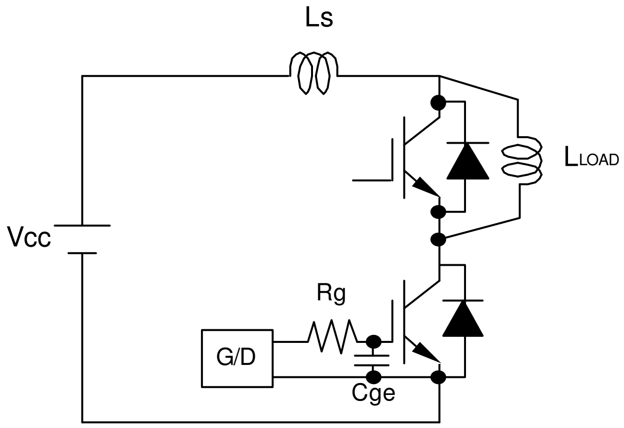
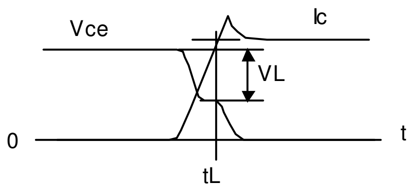
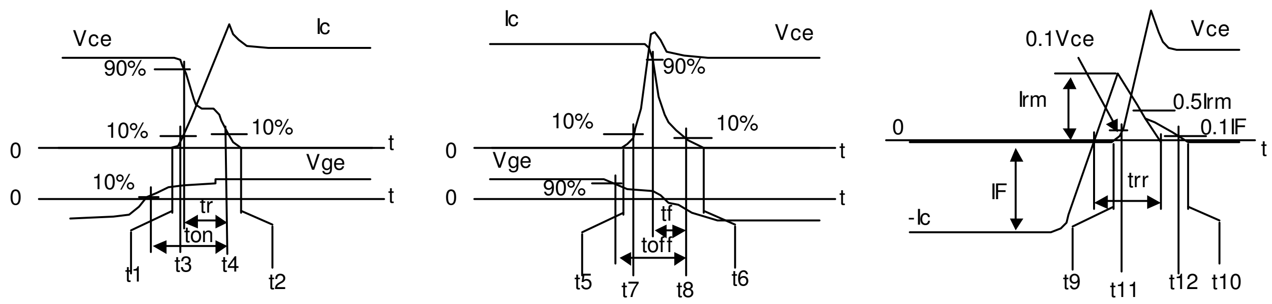


Fig.1 Switching test circuit



$$L_s = \frac{V_L}{\left(\frac{dI_c}{dt}\right)_{t=t_L}}$$

Fig.2 Definition of Ls

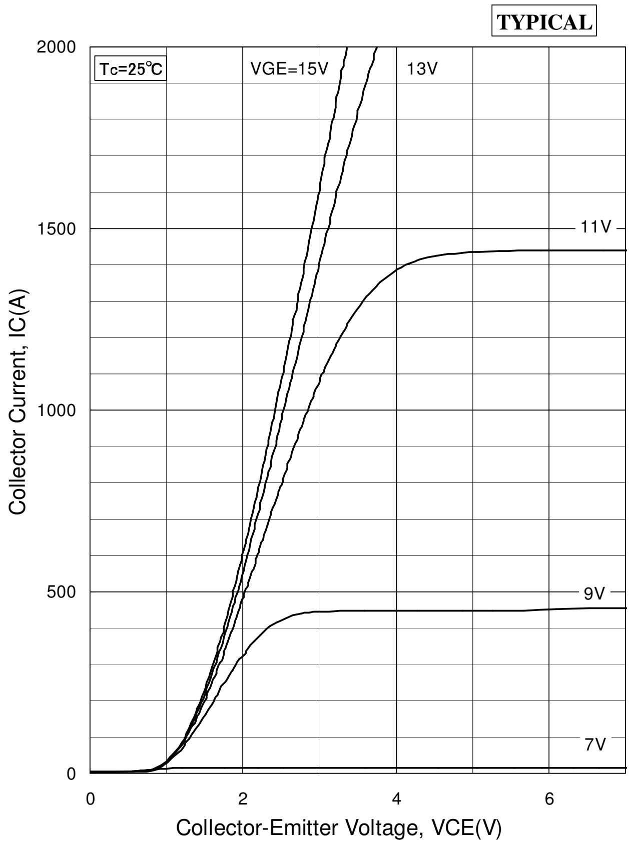


$$Eon(10\%) = \int_{t3}^{t4} Ic \cdot Vce\, dt \qquad Eoff(10\%) = \int_{t7}^{t8} Ic \cdot Vce\, dt \qquad Err(10\%) = \int_{t11}^{t12} IF \cdot Vce\, dt$$

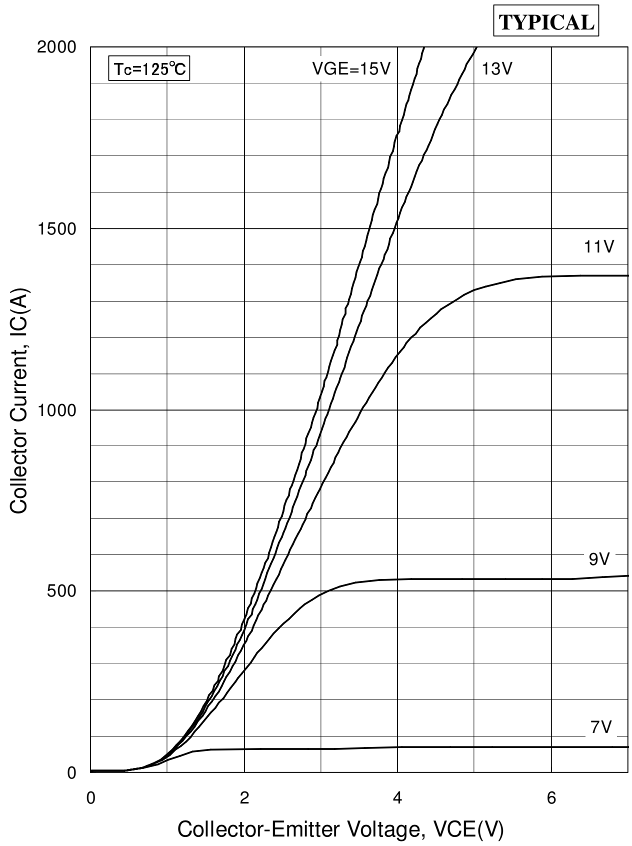
$$Eon(Full) = \int_{t1}^{t2} Ic \cdot Vce\, dt \qquad Eoff(Full) = \int_{t5}^{t6} Ic \cdot Vce\, dt \qquad Err(Full) = \int_{t9}^{t10} IF \cdot Vce\, dt$$

Fig.3 Definition of switching loss

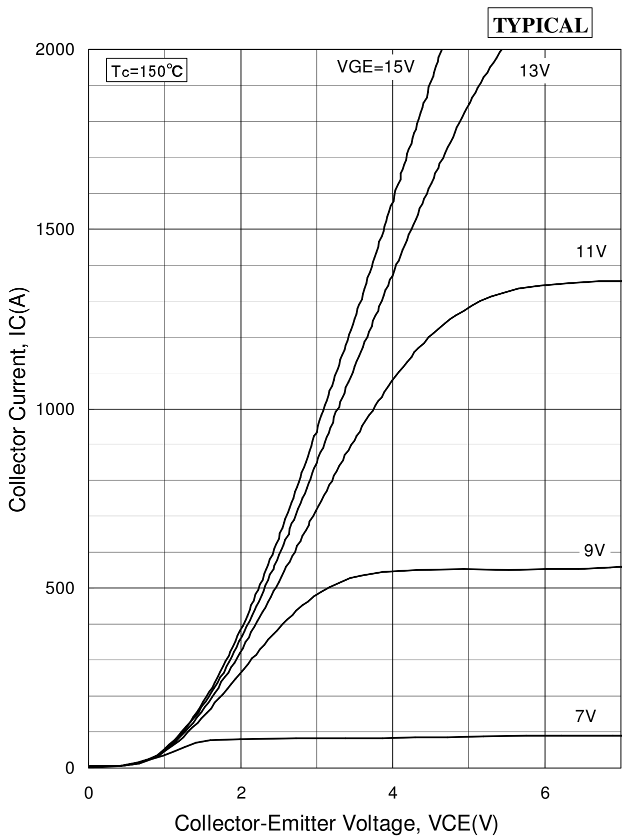
1. STATIC CHARACTERISTICS



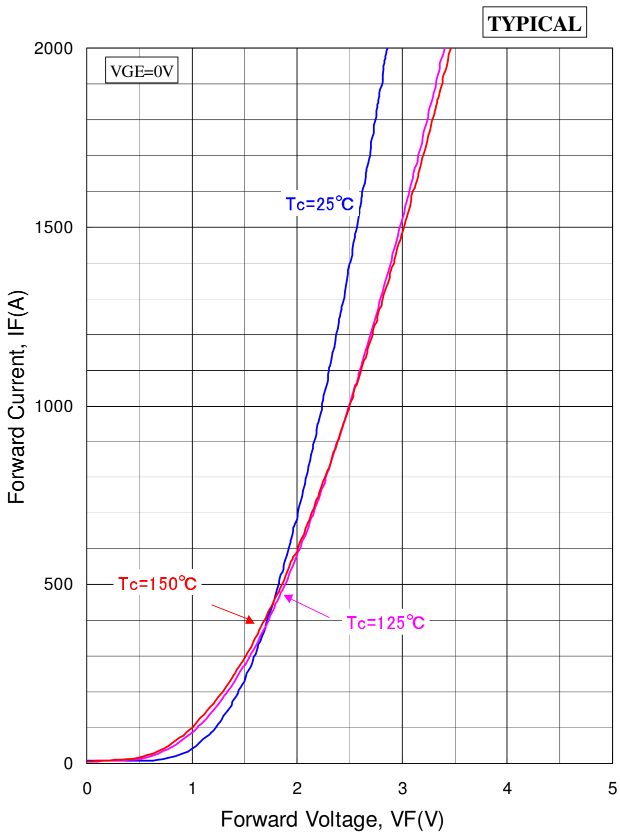
Collecter Current vs. Collector to Emitter Voltage



Collecter Current vs. Collector to Emitter Voltage

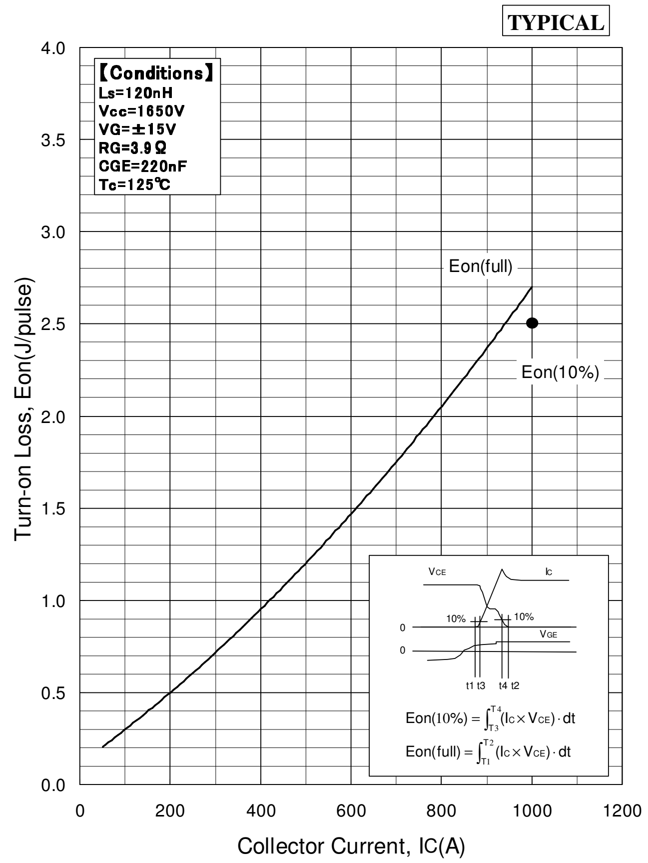


Collecter Current vs. Collector to Emitter Voltage

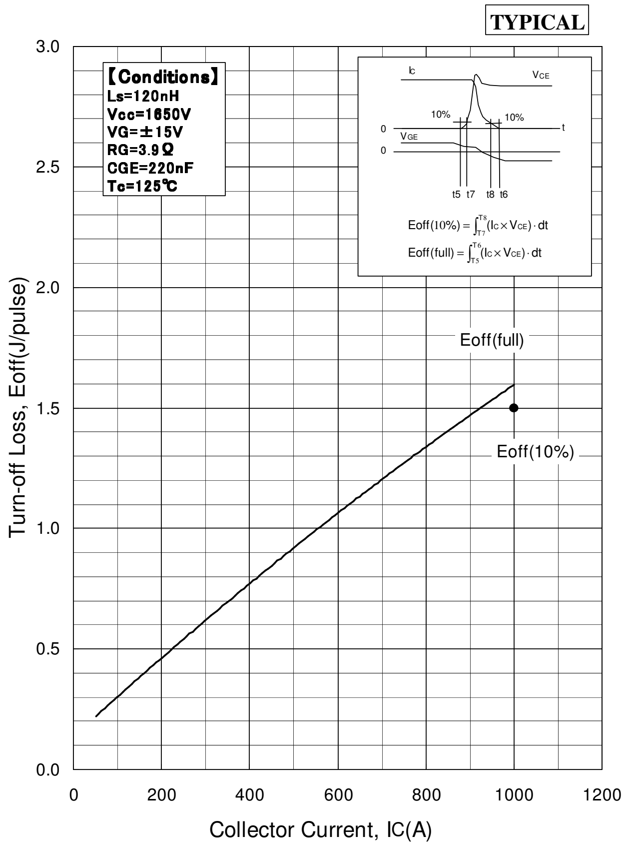


Forward Voltage of free-wheeling diode

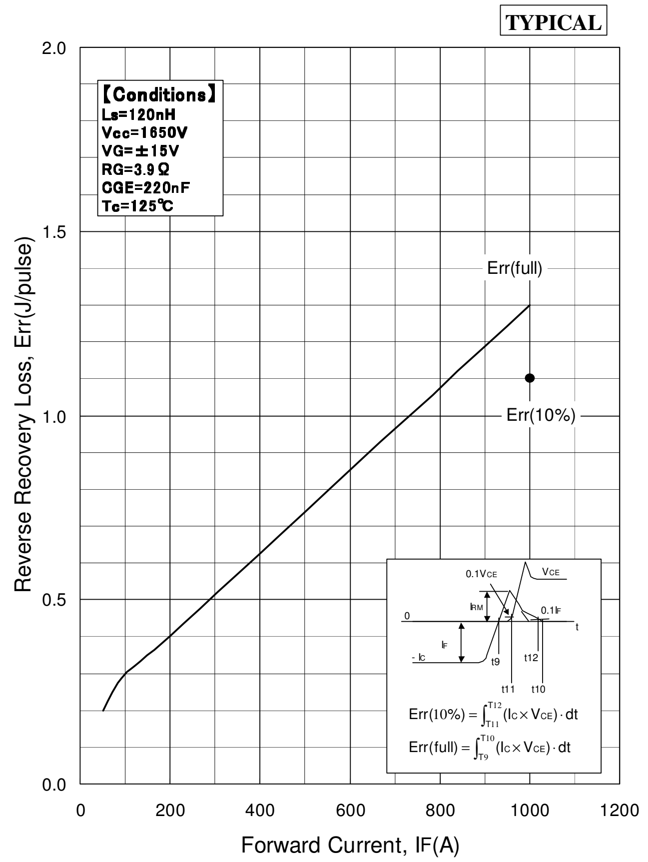
2. DYNAMIC CHARACTERISTICS



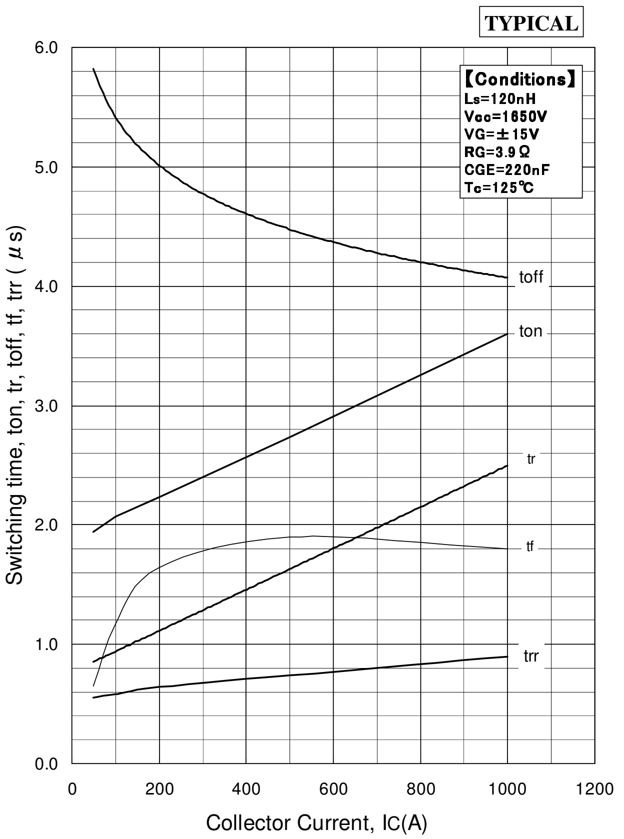
Turn-on Loss vs. Collector Current



Turn-off Loss vs. Collector Current

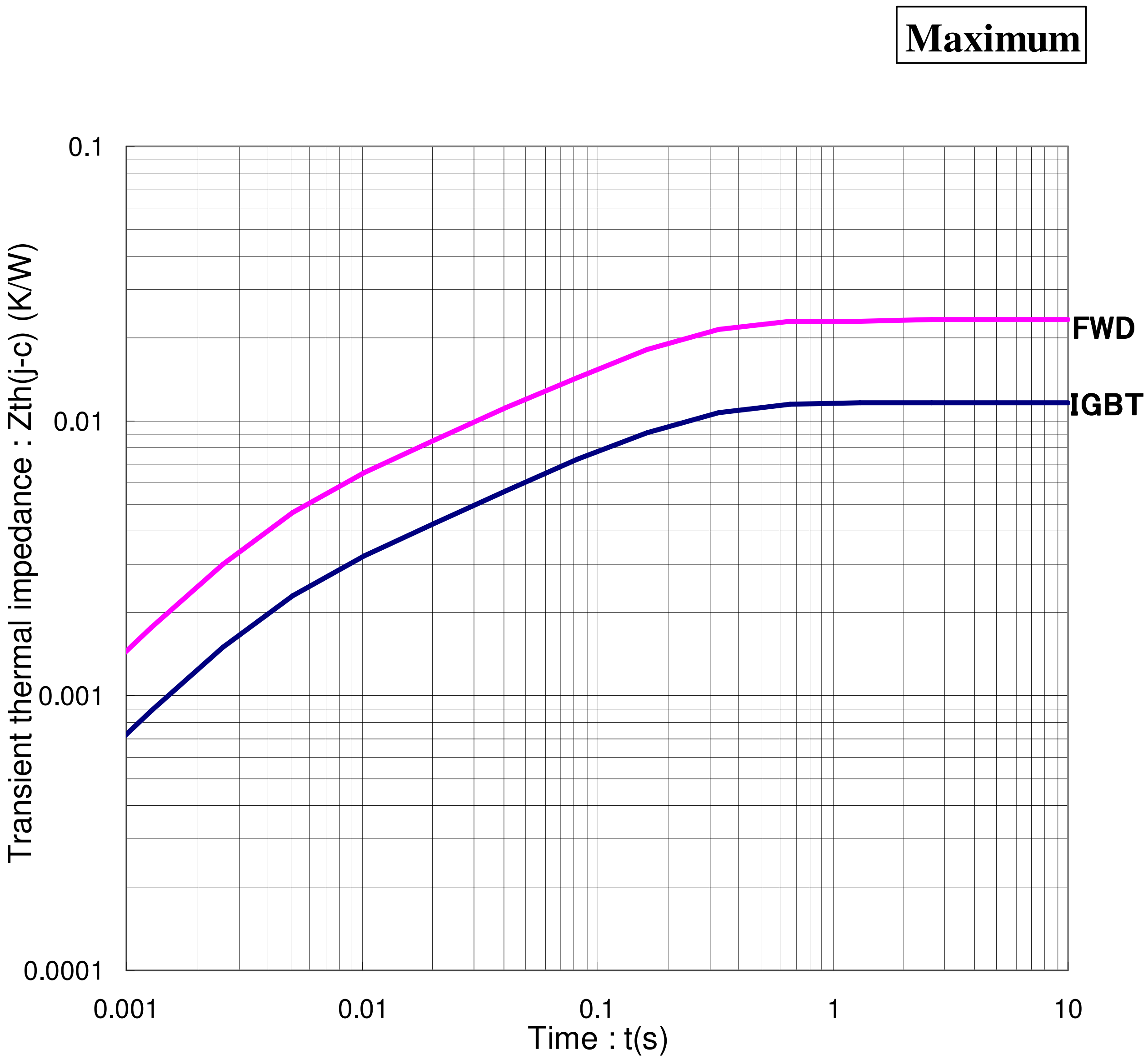


Recovery Loss vs. Forward Current



Switching time vs. Collector current

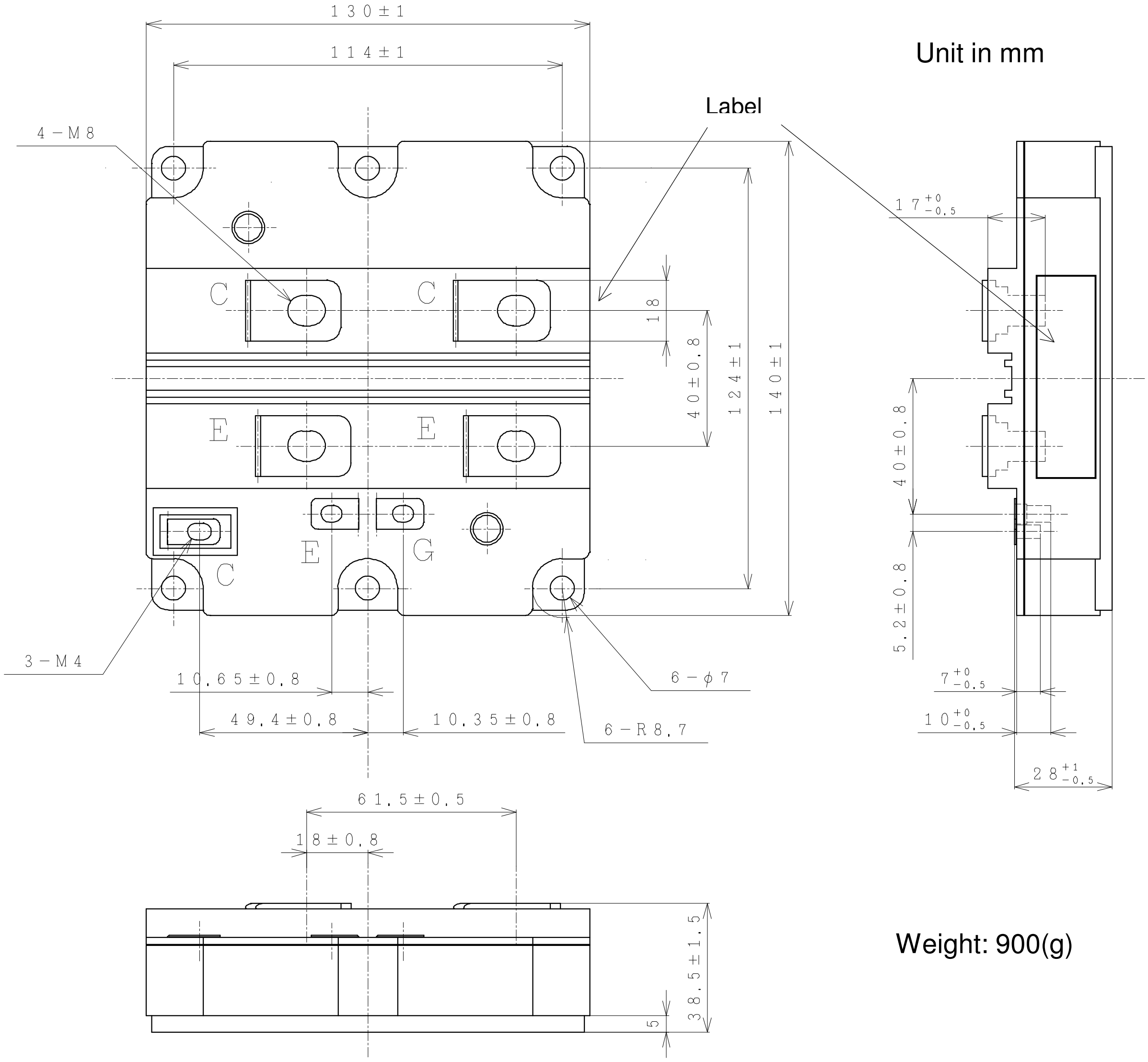
3. TRANSIENT THERMAL IMPEDANCE



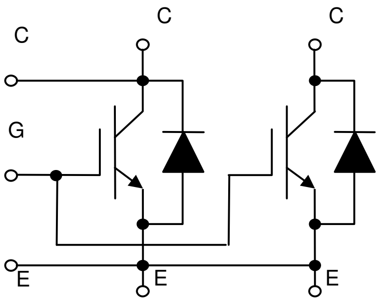
Transient Thermal Impedance Curve

4. OUTLINE DRAWINGS

Unit in mm



Weight: 900(g)



Circuit diagram

5. 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

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