MBN800E33D-AX

Silicon N-channel IGBT 3300V D version

FEATURES

- High speed low loss IGBT. Low-injection punch-through IGBT.
- Low driving power due to low input capacitance MOS gate.
- High speed low recovery loss 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	MBN800E33D-AX
Collector Emitter Voltage		V_{CES}	V	3,300
Gate Emitter Voltage		V_{GES}	V	±20
Collector Current	DC	I_C	A	800 (Tc=80°C)
	1ms	I_{Cp}		1,600
Forward Current	DC	I_F	A	800
	1ms	I_{FM}		1,600
Junction Temperature		T_j	°C	-40 ~ +125
Storage Temperature		T_{stg}	°C	-40 ~ +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 $1.8\pm0.2/15^{+0}_{-3}$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	-	-	0.5	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	-	3.40	-	I_C=800A, V_{GE}=15V, Tj=25°C
				-	4.20	5.00	I_C=800A, V_{GE}=15V, Tj=125°C
Gate Emitter Threshold Voltage		$V_{GE(TO)}$	V	4.5	6.0	7.5	V_{CE}=10V, I_C=800mA, Tj=25°C
Input Capacitance		C_{ies}	nF	-	75	-	V_{CE}=10V, V_{GE}=0V, f=100kHz, Tj=25°C
Internal Gate Resistance		Rge	Ω	-	1.8	-	V_{CE}=10V, V_{GE}=0V, f=100kHz, Tj=25°C
Switching Times	Rise Time	t_r	μs	1.1	2.1	3.3	V_{CC}=1,650V, Ic=800A
	Turn On Time	t_{on}		1.7	2.6	3.5	Ls=120nH
	Fall Time	t_f		0.6	1.1	2.6	R_G=6.8Ω/6. 8Ω (3)
	Turn Off Time	t_{off}		2.2	3.2	5.3	V_{GE}=±15V, Tj=125°C
Peak Forward Voltage Drop		V_{FM}	V	2.6	2.9	3.4	IF=800A, V_{GE}=0V, Tj=25°C
				-	3.0	-	IF=800A, V_{GE}=0V, Tj=125°C
Reverse Recovery Time		t_{rr}	μs	0.1	0.5	1.0	Vcc=1,650V, IF=800A, Ls=120nH Tj=125°C
Turn On Loss		$E_{on(10\%)}$	J/P	-	1.27	1.57	Tj=125°C V_{CC}=1,650V, Ic=800A,
Turn Off Loss		$E_{off(10\%)}$	J/P	-	0.87	1.27	Tj=125°C Ls=120nH, R_G=6.8Ω/6.8Ω (3)
Reverse Recovery Loss		$E_{rr(10\%)}$	J/P	-	0.52	0.76	Tj=125°C V_{GE}=±15V

Notes:(3) R_G 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 switchingwaveforms(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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THERMAL CHARACTERISTICS

Item		Symbol	Unit	Min.	Typ.	Max.	Conditions
Thermal Impedance	IGBT	Rth(j-c)	K/W	-	-	0.013	Junction to case
	FWD	Rth(j-c)		-	-	0.026	
Contact Thermal Impedance		Rth(c-f)	K/W	-	0.008	-	Case to fin (λgrease=1W/(m･K), heat-sink flatness ≤50um)

MODULE MECHANICAL CHARACTERISTICS

Item		Unit	Characteristics	Conditions
Weight		g	900	
Creepage Distance	Between terminal	mm	35	
	Terminal-Base	mm	35	
Clearance Distance	Between terminal	mm	22	
	Terminal-Base	mm	19.5	
Stray inductance in module	LS(CM-EM)	nH	18	Collector-main to Emitter-main
	LS(ES-EM)		3.8	Emitter-sense to Emitter-main
	LS(CM-CS)		6.4	Collector-main to Collector sense
Terminal Resistance	$R_{Terminal}$	mΩ	0.135	Collector-main to Emitter-main
Comparative Tracking Index	(CTI)		600	
Module base plate Material			Al-SiC	
Baseplate Thickness		mm	5	
Insulation plate Material			AlN	
Terminal Surface treatment			Ni plating	
Case Material			Poly-Phenilene Sulfide	
Fire and Smoke Category			I2 / F3	NFF 16-102

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DEFINITION OF TEST CIRCUIT

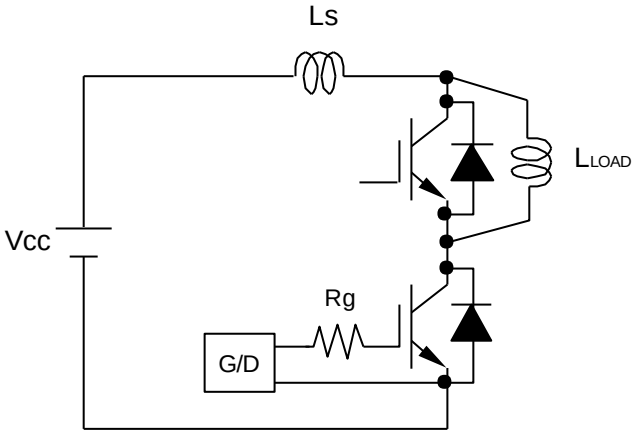
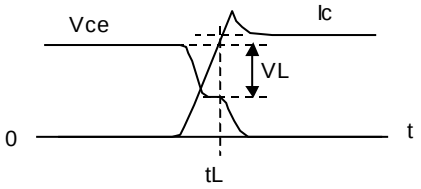
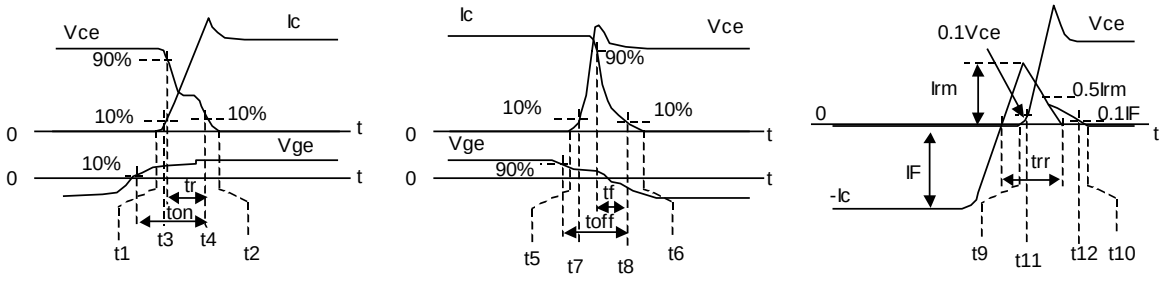


Fig.1 Switching test circuit



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

Fig.2 Definition of stray inductance



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

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

Fig.3 Definition of switching loss

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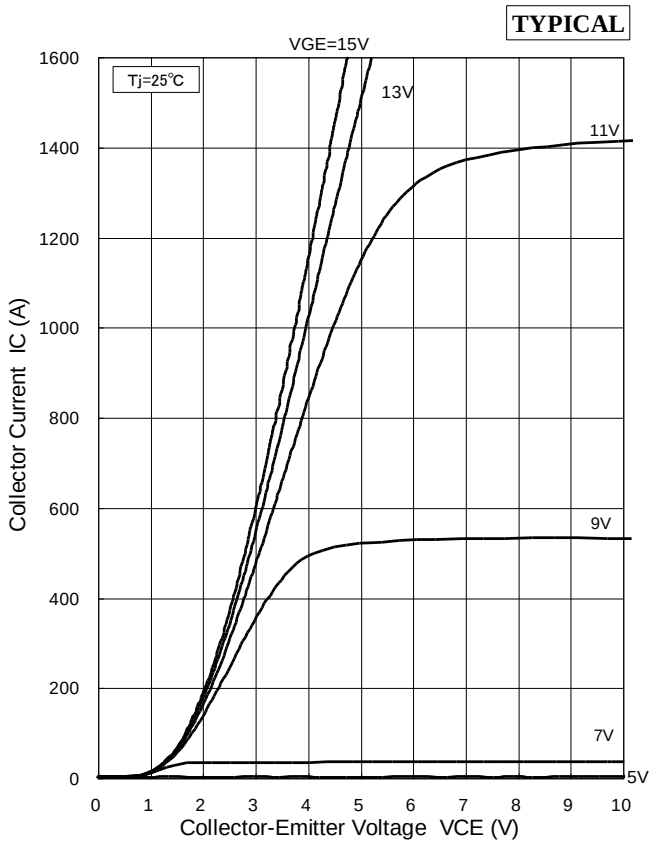
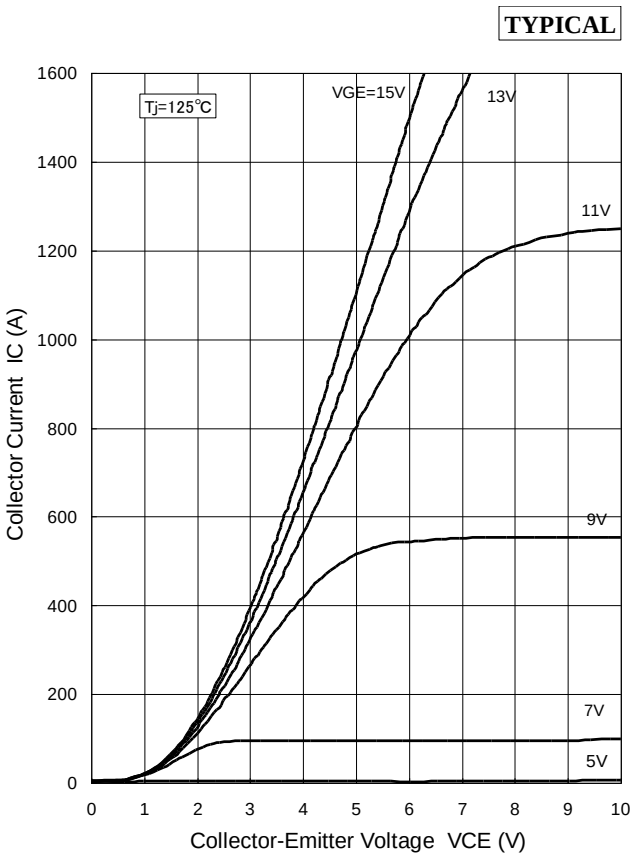
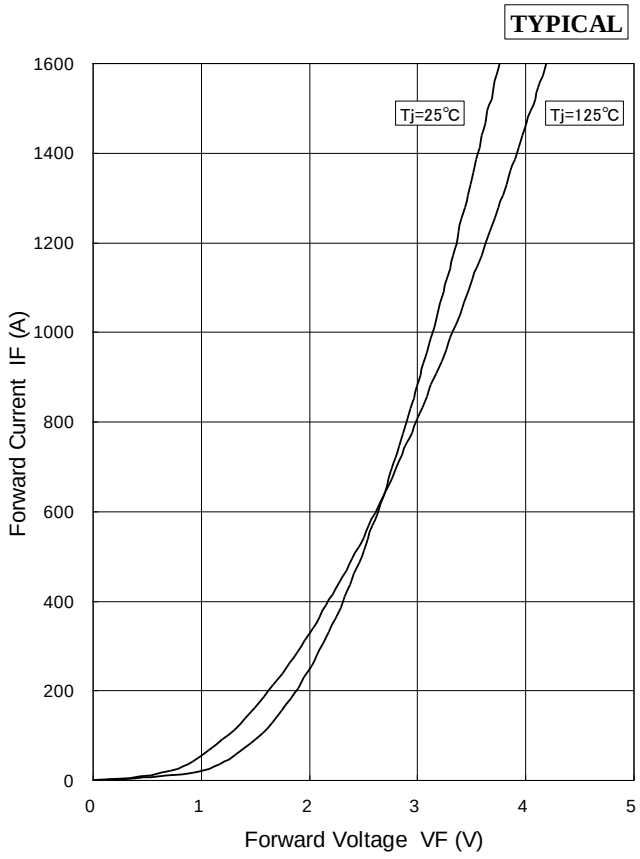
STATIC CHARACTERISTICS



Collector Current vs.Collector to Emitter Voltage



Collector Current vs.Collector to Emitter Voltage



Forward Voltage of free-wheeling diode

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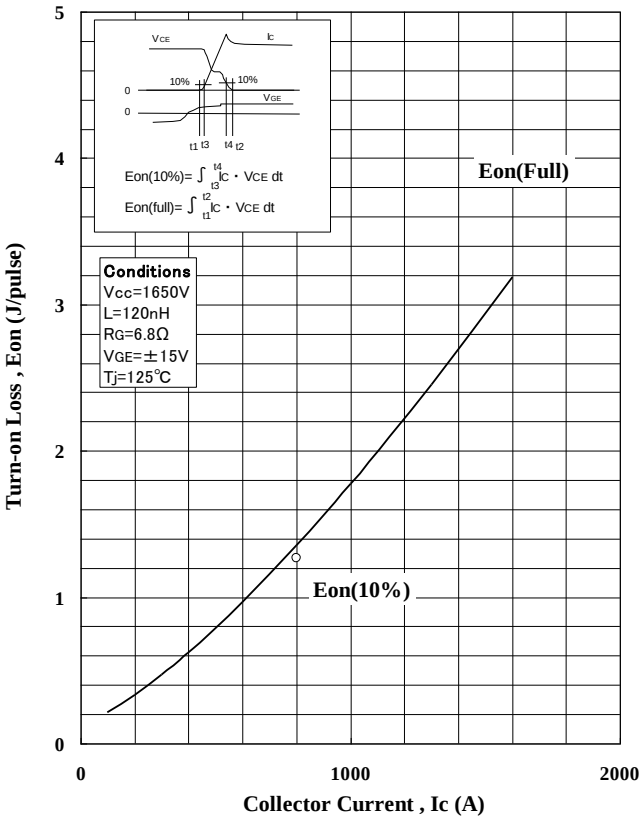
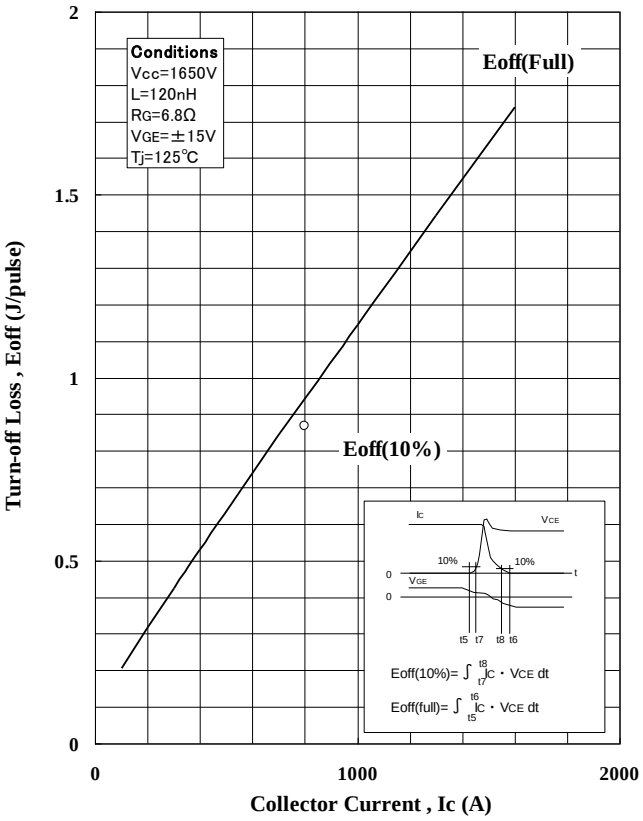
DYNAMIC CHARACTERISTICS

TYPICAL



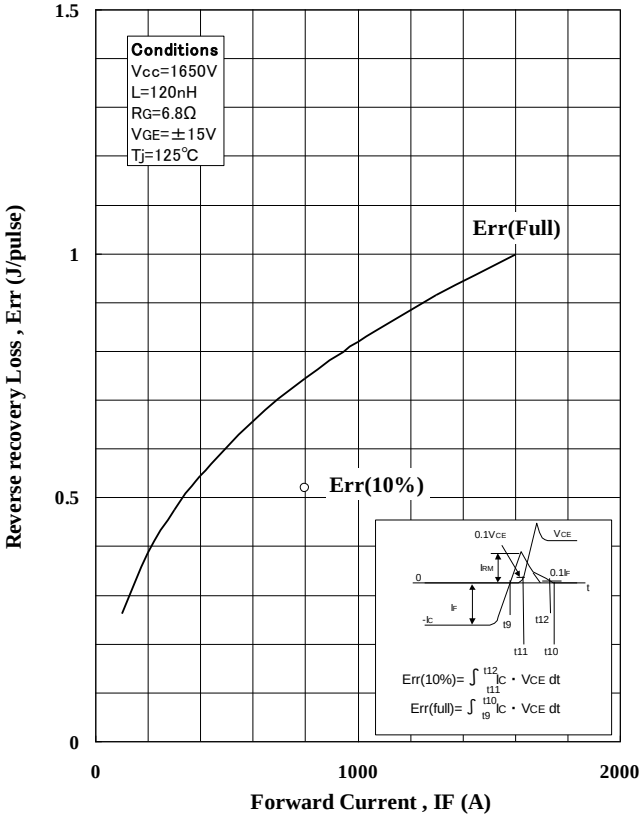
Turn-on Loss vs.Collector Current

TYPICAL



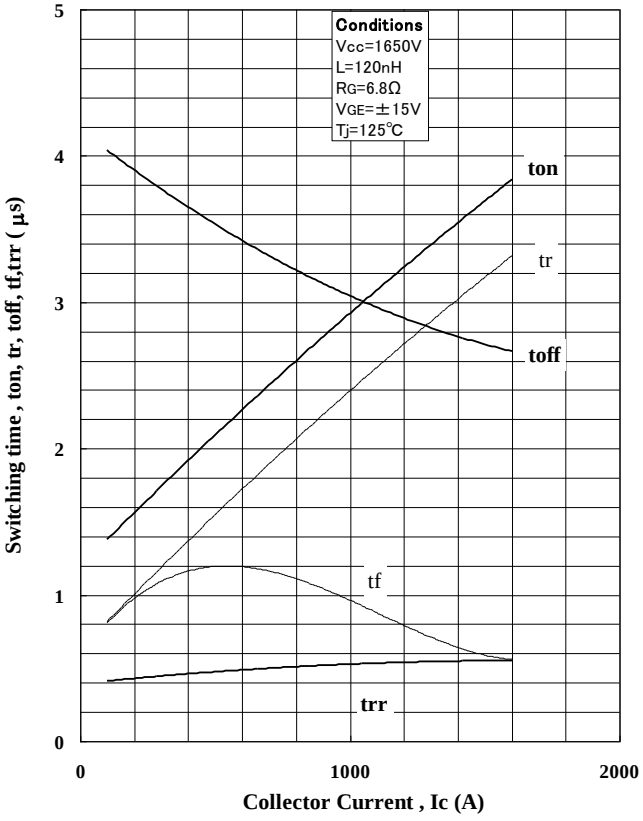
Turn-off Loss vs.Collector Current

TYPICAL



Reverse recovery Loss vs. Forward Current

TYPICAL



Switching time vs.Collector Current

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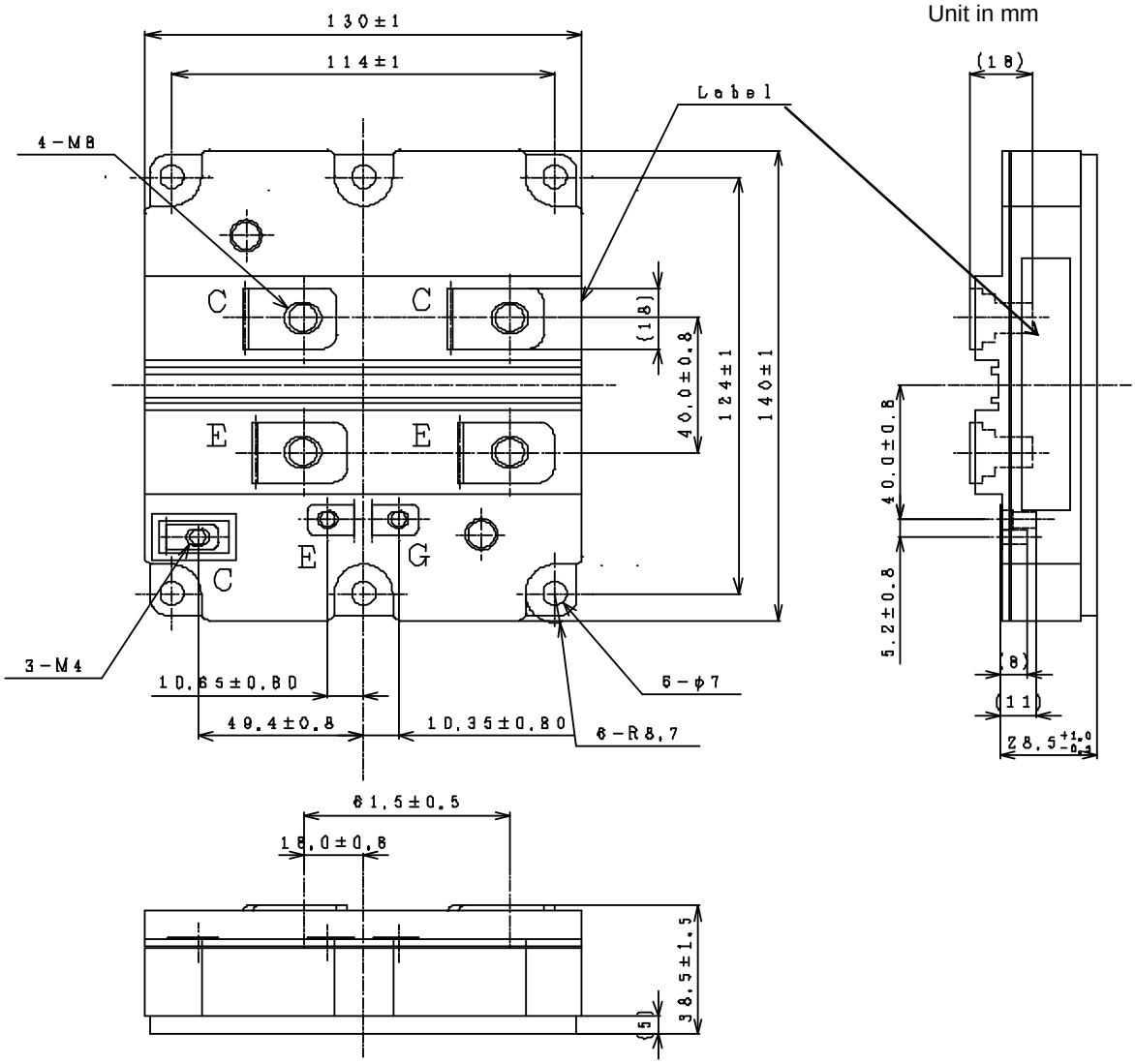
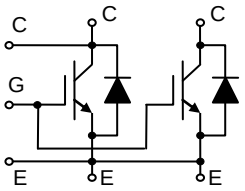
OUTLINE DRAWINGS

Unit in mm





Circuit diagram

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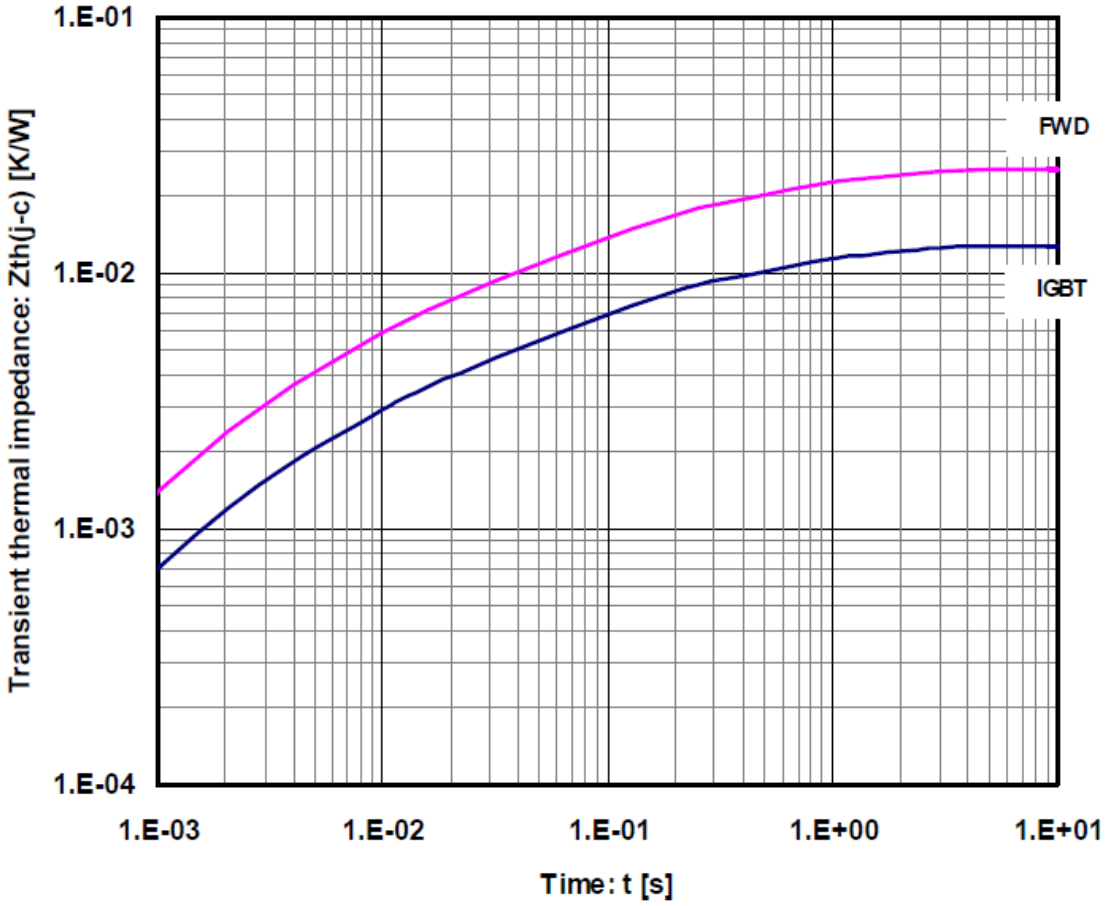
TRANSIENT THERMAL IMPEDANCE



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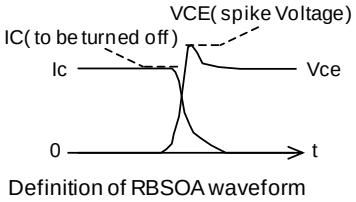
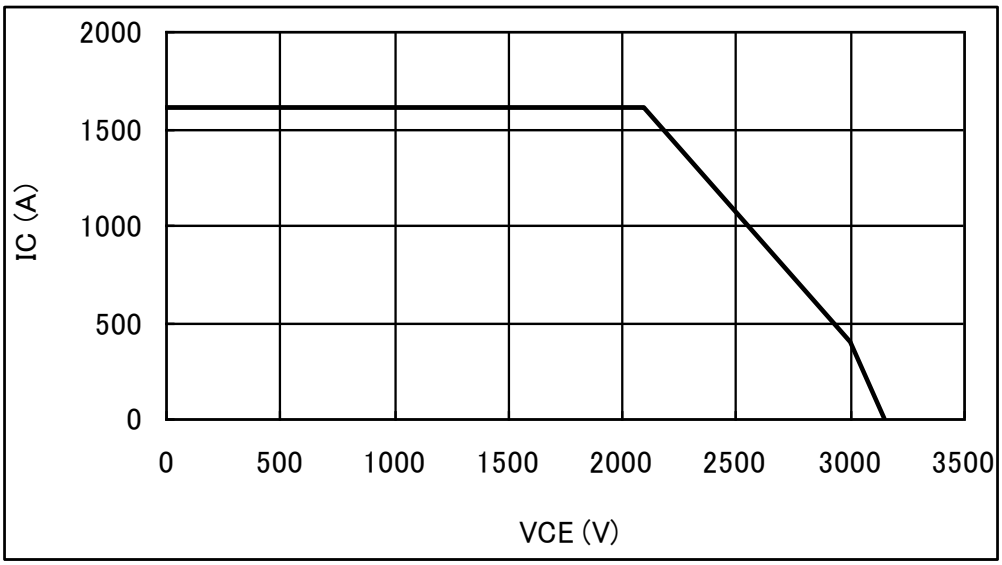
RBSOA

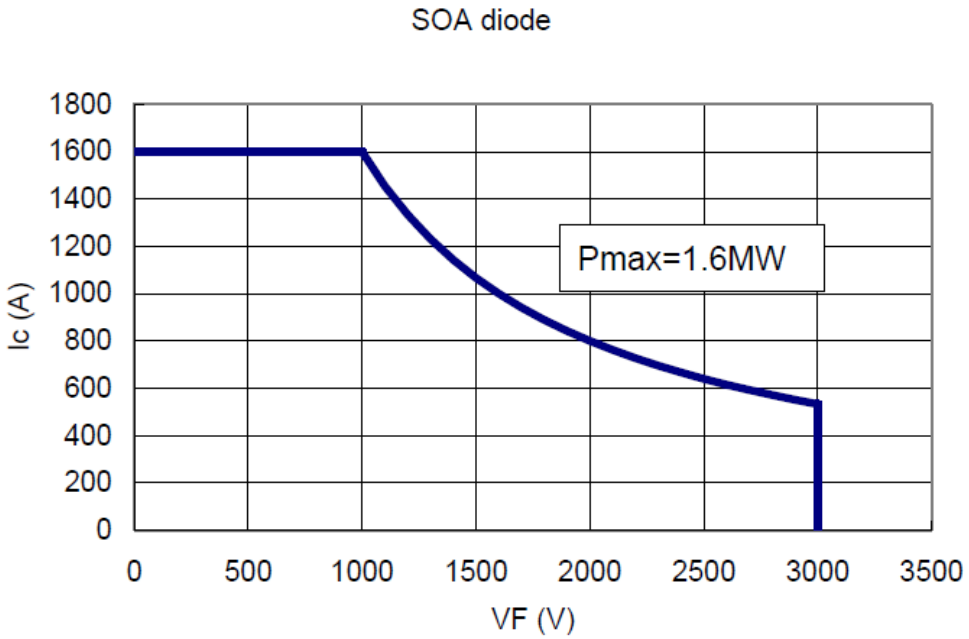
Test conditions: Tj=125°C, Vcc=2000V, Ic=1600A,
Rg≥6.8Ω,
VGE=±15V, Ls≤120nH
(Vce spike voltage and Ls are defined at auxiliary terminal)



Definition of RBSOA waveform



Recovery SOA



Test conditions : Tj=125°C,VCC=2000V, IF=1600A, Ls=120nH, VGE=+15V/-15V
RG=6.8Ω Measured at auxiliary terminal

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Material declaration

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

Material	Contained part
Lead (Pb) and its compounds	Solder

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HITACHI POWER SEMICONDUCTORS

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