MBN750H65E2

Tentative Datasheet

Silicon N-channel IGBT 6500V 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

This datasheet is not final version. Changes of this datasheet are reserved.

ABSOLUTE MAXIMUM RATINGS (Tc=25°C)

Item		Symbol	Unit	MBN750H65E2
Collector Emitter Voltage		V_{CES}	V	6,500
Gate Emitter Voltage		V_{GES}	V	±20
Collector Current	DC	I_C	A	750 (Tc=80 °C)
	1ms	I_{Cp}		1,500
Forward Current	DC	I_F	A	750
	1ms	I_{FM}		1,500
Junction Temperature		T_j	°C	-40 ~ +125
Storage Temperature		T_{stg}	°C	-40 ~ +125
Isolation Voltage		V_{ISO}	V_{RMS}	10,200 (AC 1 minute)
Screw Torque	Terminals (M4/M8)	-	N·m	2/10 (1)
	Mounting (M6)	-		6 (2)

Notes: (1) Recommended Value 1.8±0.2/9±1N·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	-	-	25	V_{CE}=6,500V, V_{GE}=0V, Tj=25°C
				-	25	100	V_{CE}=6,500V, 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	-	3.2	-	I_C=750A, V_{GE}=15V, Tj=25°C
				tbd	4.2	tbd	I_C=750A, V_{GE}=15V, Tj=125°C
Gate Emitter Threshold Voltage		$V_{GE(TO)}$	V	4.5	6.5	7.5	V_{CE}=10V, I_C=750mA, 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	-	0.7	-	V_{CE}=10V,V_{GE}=0V, f=100kHz, Tj=25°C
Switching Times	Rise Time	t_r	µs	tbd	3.3	tbd	V_{CC}=3,600V, Ic=750A
	Turn On Time	t_{on}		tbd	4.0	tbd	Ls=200nH
	Fall Time	t_f		tbd	3.3	tbd	R_G=8.2Ω (3)
	Turn Off Time	t_{off}		tbd	6.7	tbd	V_{GE}=+/-15V, Tj=125°C
Peak Forward Voltage Drop		V_{FM}	V	-	3.6	-	IF=750A, V_{GE}=0V, Tj=25°C
				tbd	3.9	tbd	IF=750A, V_{GE}=0V, Tj=125°C
Reverse Recovery Time		t_{rr}	µs	-	0.8	-	Vcc=3600V, IF=750A, Ls=200nH Tj=125°C
Turn On Loss		$E_{on(10\%)}$	J/p	-	4.9	tbd	V_{CC}=3600V, Ic= IF=750A, Ls=200nH R_G= 8.2Ω (3) V_{GE}=+/-15V, Tj=125°C
		$E_{on(full)}$		-	5.5	-	
Turn Off Loss		$E_{off(10\%)}$	J/ p	-	4.2	tbd	
		$E_{off(full)}$		-	4.5	-	
Reverse Recovery Loss		$E_{rr(10\%)}$	J/ p	-	2.2	tbd	
		$E_{rr(full)}$		-	2.4	-	
Module internal Inductance		Lint	nH	-	14	-	Per 1 module
Thermal Impedance	IGBT	Rth(j-c)	K/W	-	-	0.009	Junction to case
	FWD	Rth(j-c)		-	-	0.017	
Contact Thermal Impedance		Rth(c-f)	K/W	-	0.005	-	Case to fin (λgrease=1W/(m · K), heat-sink flatness ≤50um)

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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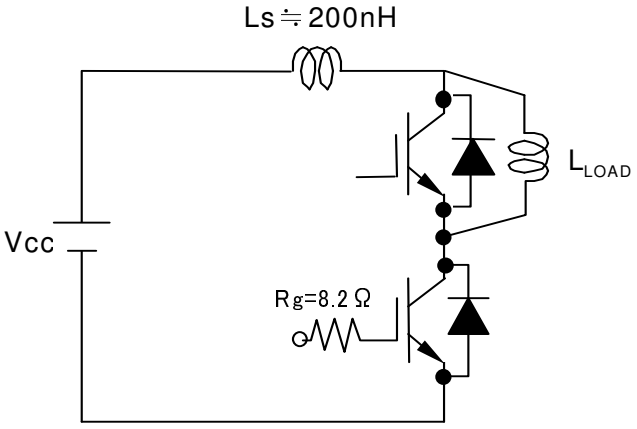
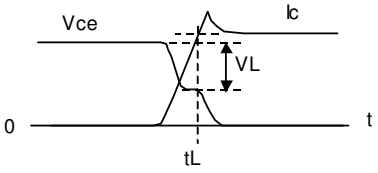
DEFINITION OF TEST CIRCUIT

CIRCUIT

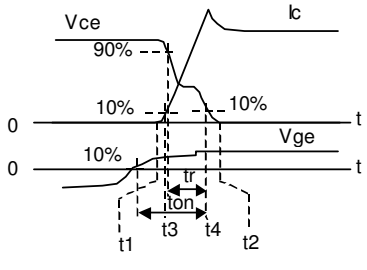




$$Ls = \frac{V_L}{\left(\frac{dIc}{dt}\right)_{t=tL}}$$

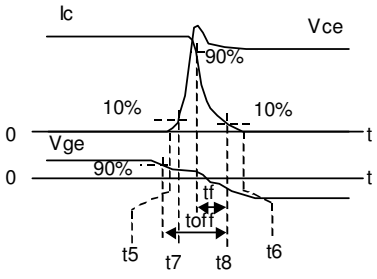
Definition of Ls

WAVEFORM DEFINITION



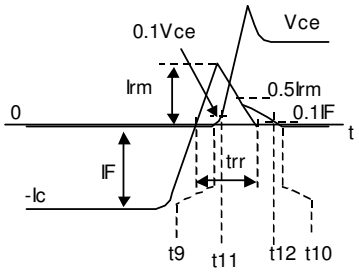
$$Eon(10\%) = \int_{t3}^{t4} Ic \cdot Vce\, dt$$

$$Eon(Full) = \int_{t1}^{t2} Ic \cdot Vce$$



$$Eoff(10\%) = \int_{t7}^{t8} Ic \cdot Vce\, dt$$

$$Eoff(Full) = \int_{t5}^{t6} Ic \cdot Vce\, dt$$



$$Err(10\%) = \int_{t11}^{t12} IF \cdot Vce\, dt$$

$$Err(Full) = \int_{t9}^{t10} IF \cdot Vce\, dt$$

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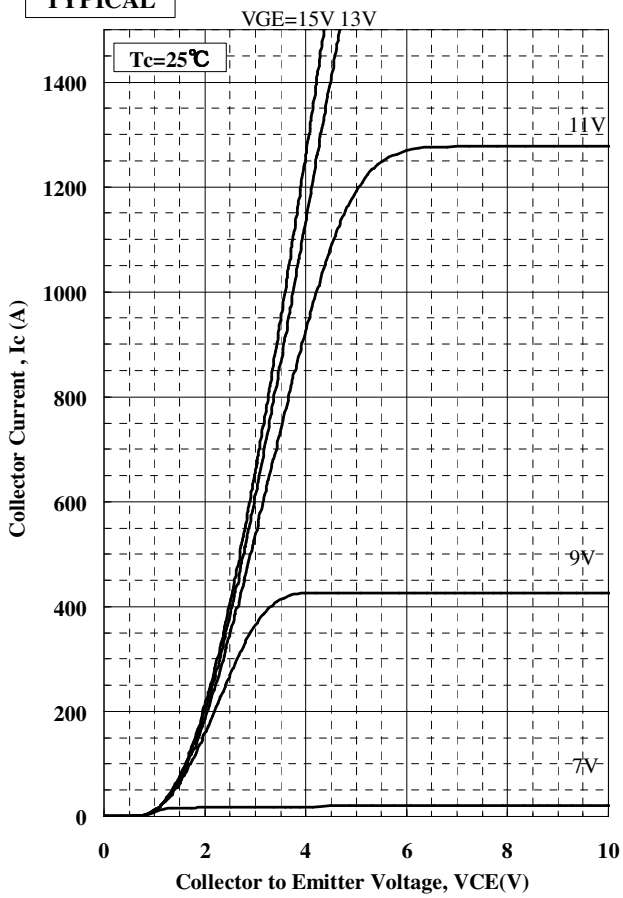
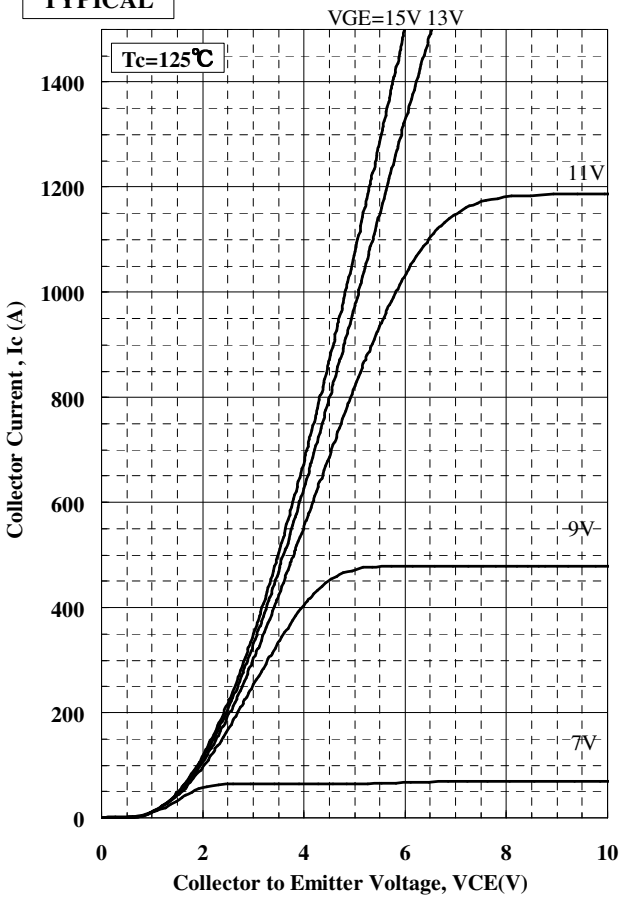
STATIC CHARACTERISTICS

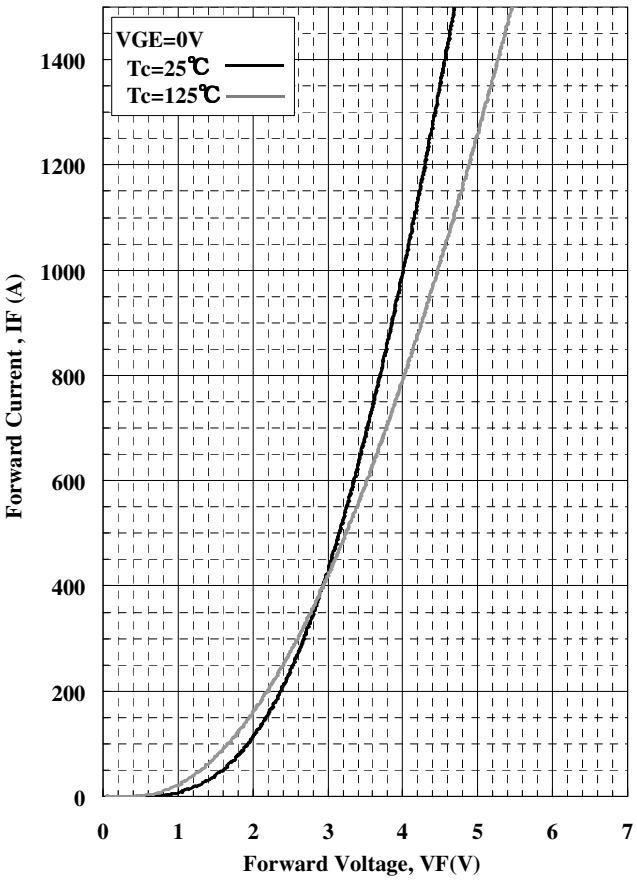
TYPICAL



TYPICAL



TYPICAL



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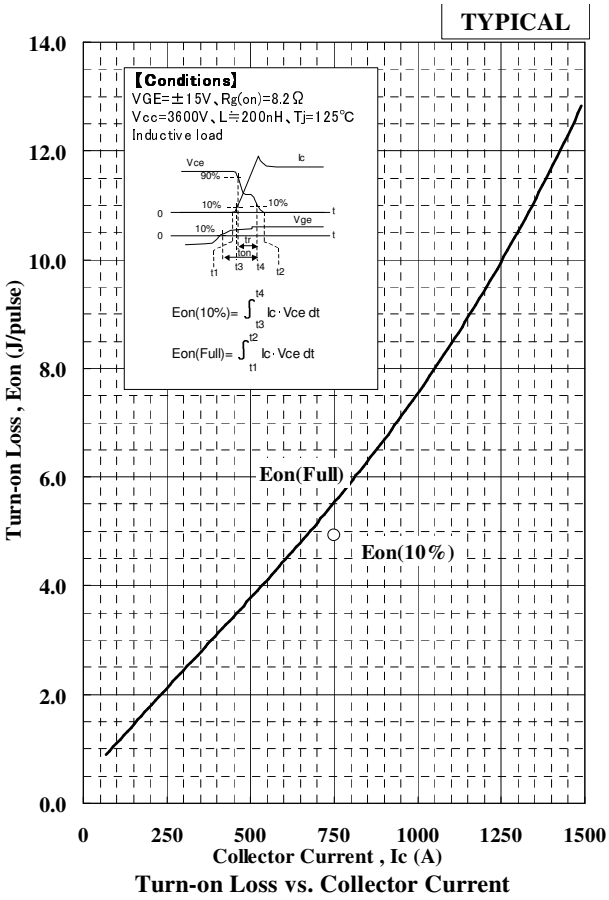
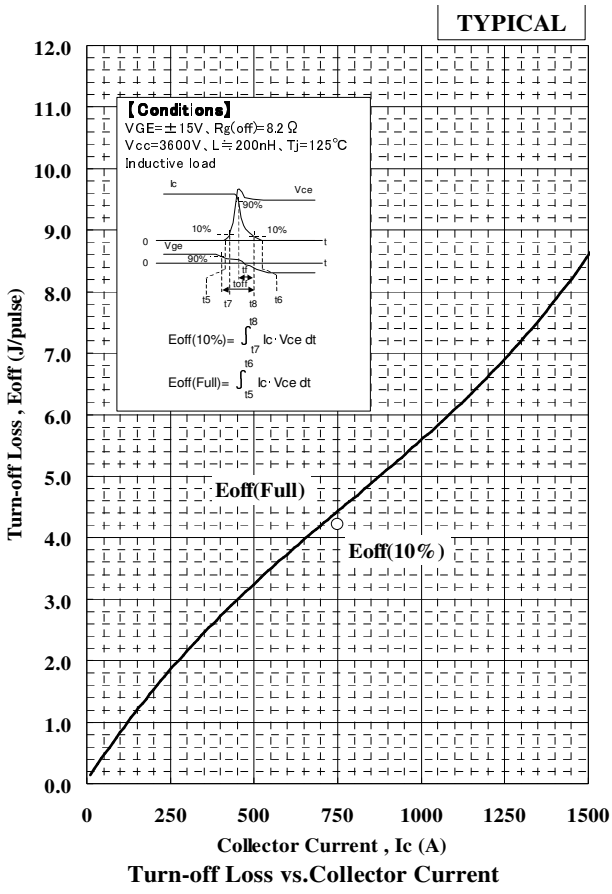
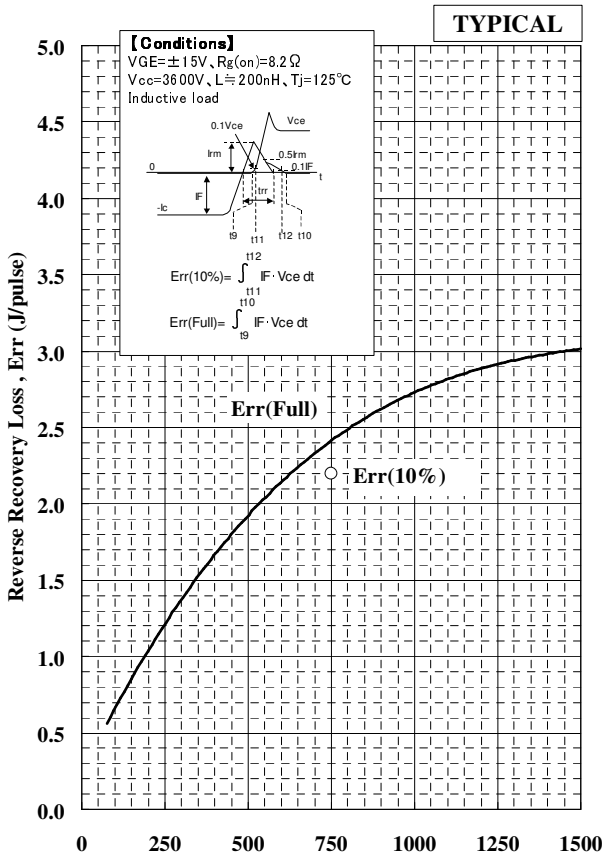
DYNAMIC CHARACTERISTICS



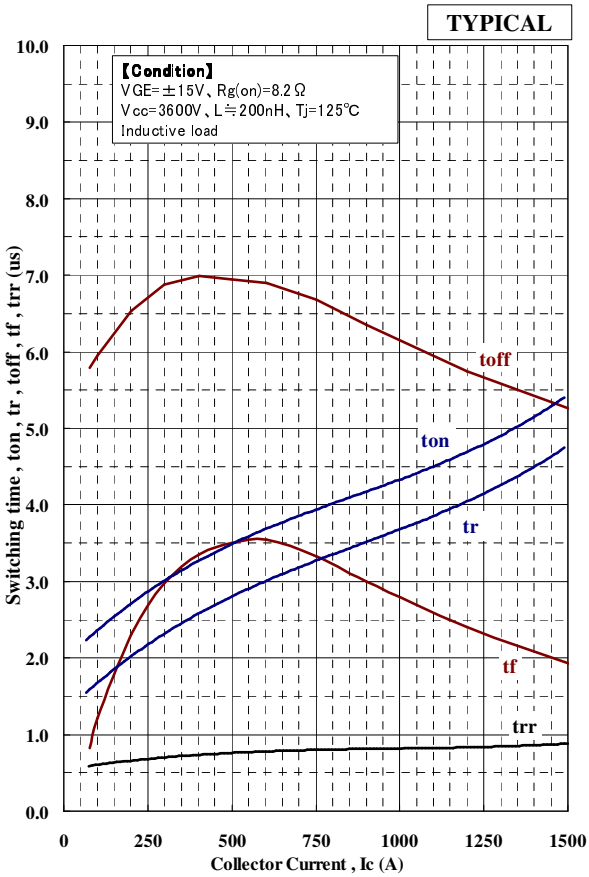
Turn-on Loss vs. Collector Current



Turn-off Loss vs.Collector Current



Recovery Loss vs. Forward Current



Switching time vs. Collector current

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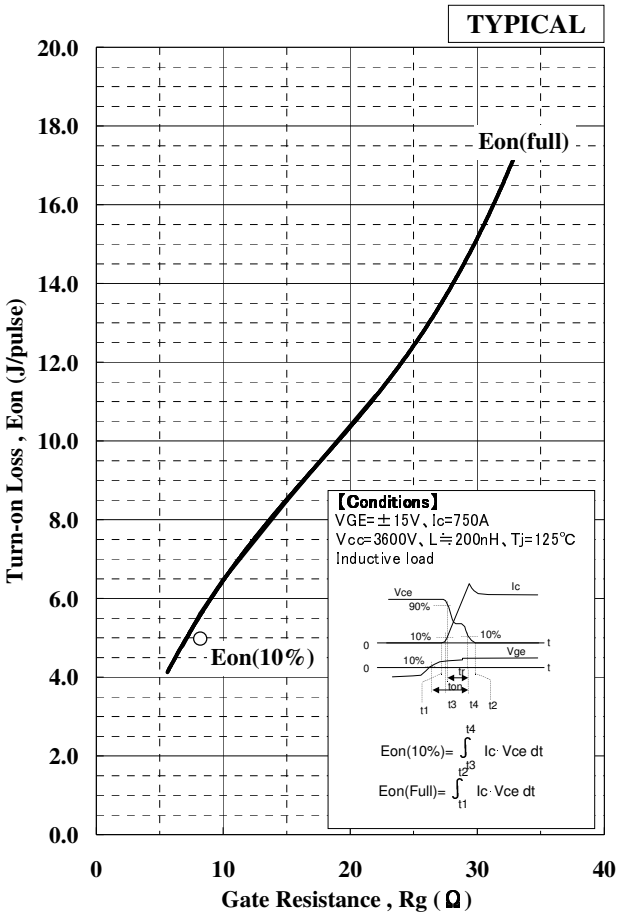
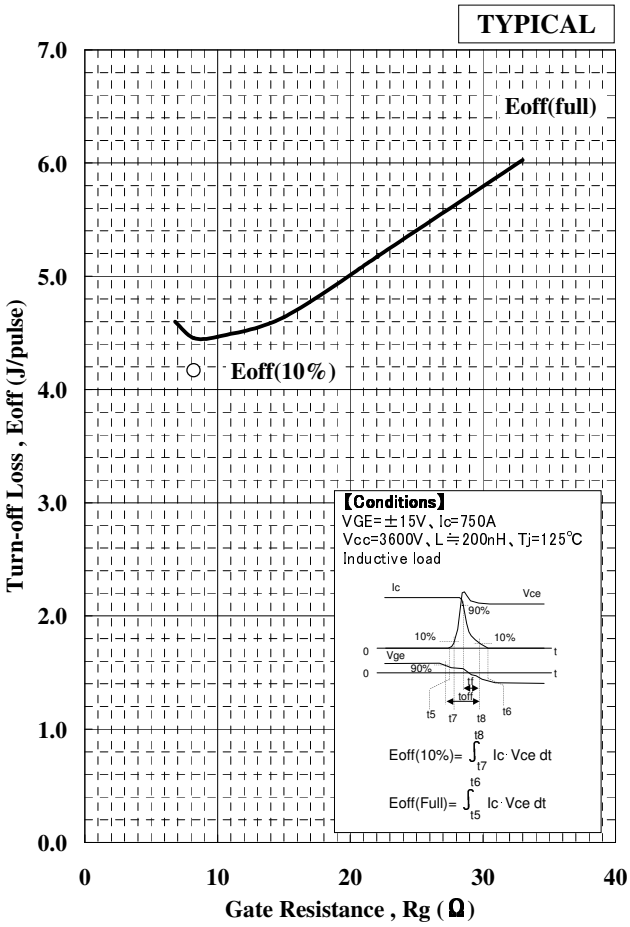
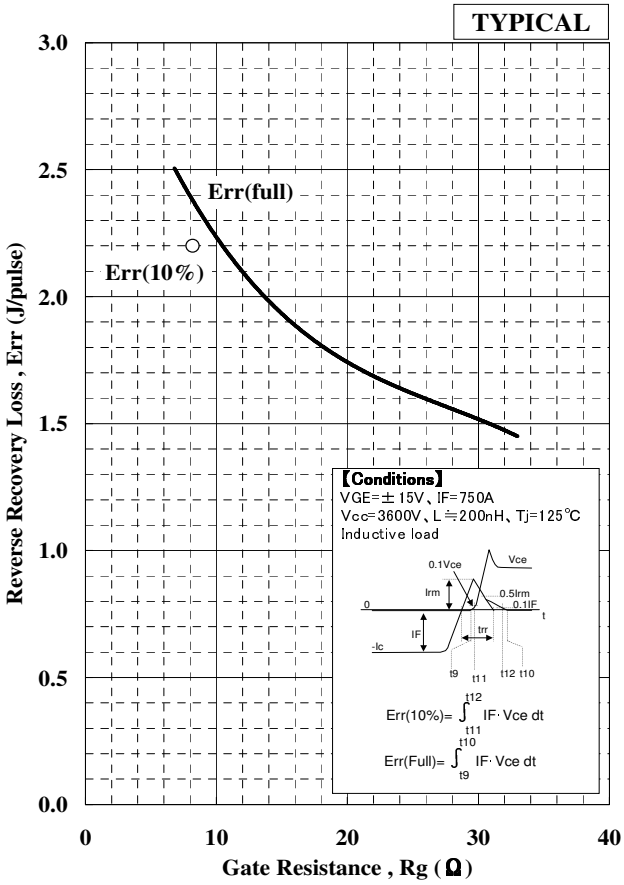
DYNAMIC CHARACTERISTICS



Turn-on Loss vs. Gate Resistance



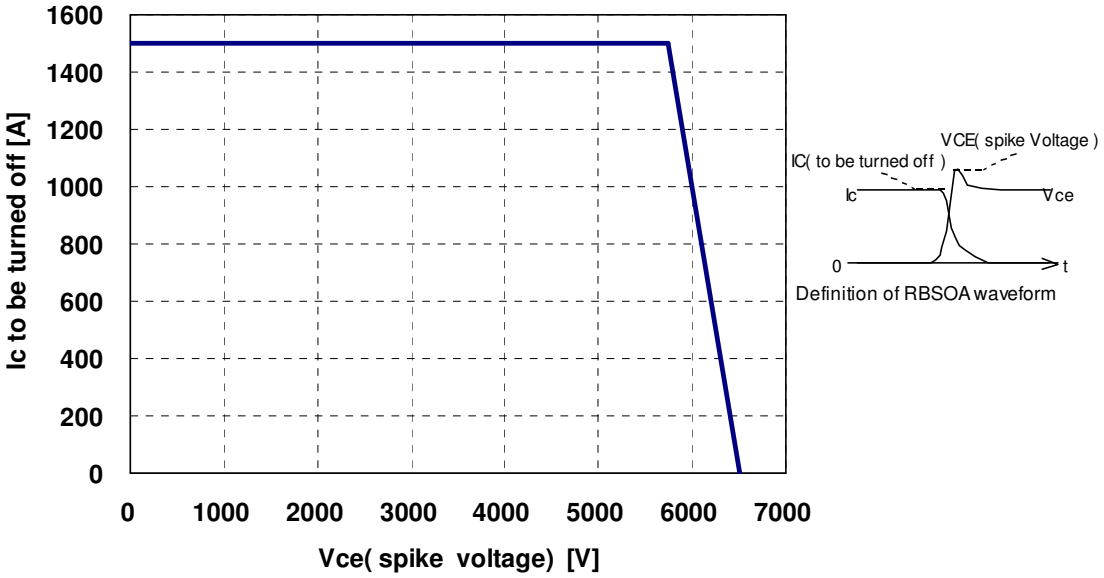
Turn-off Loss vs. Gate Resistance



Recovery Loss vs. Gate Resistance

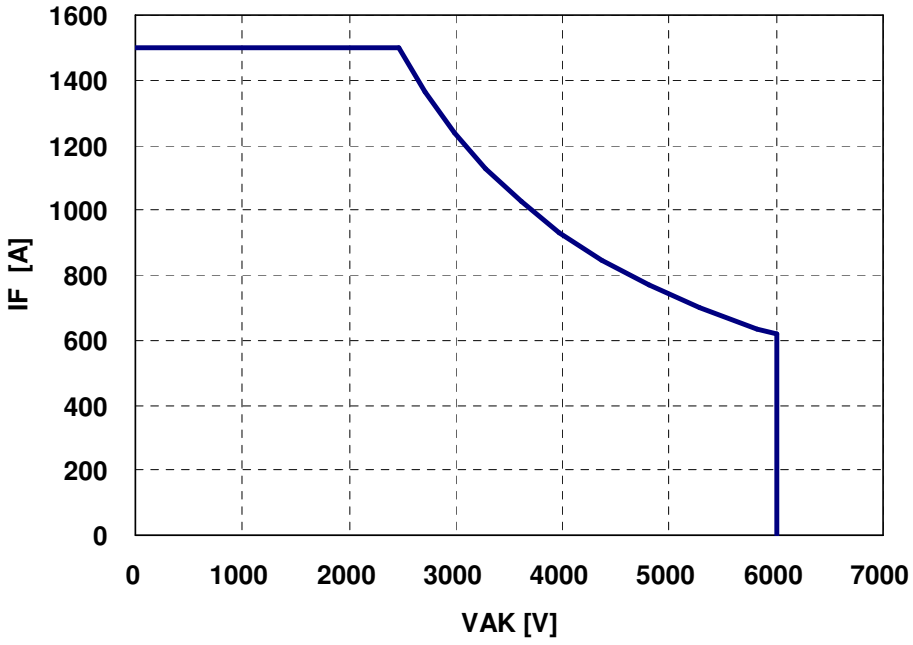
RBSOA / Recovery SOA

Conditions: Ls≤200nH, Vcc≤4400V,
Ic≤1500A, VGE=±15V,
Rg(on/off)≥8.2/8.2Ω, -40°C≤Tc≤125°C
on pulse width ≥ 20us
(Vce spike voltage and Ls are defined at auxiliary terminal)



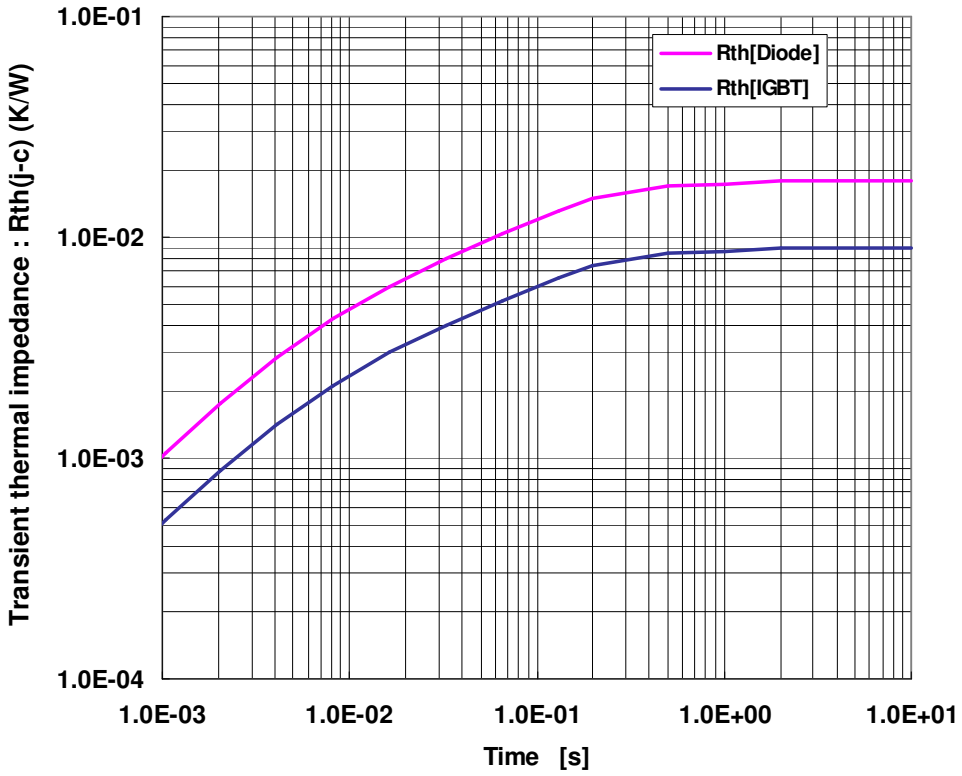
Reverse bias safe operation area (RBSOA)

Conditions:
Ls≤200nH, Vcc≤4400V, - Ic≤1500A, VGE=-15V,
Rg(on) of across IGBT ≥8.2Ω, VGE of across IGBT =±15V,
-40°C≤Tc≤125°C, VAK defined at auxiliary terminal
Conduction pulse width of diode ≥30μs



RecSOA

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

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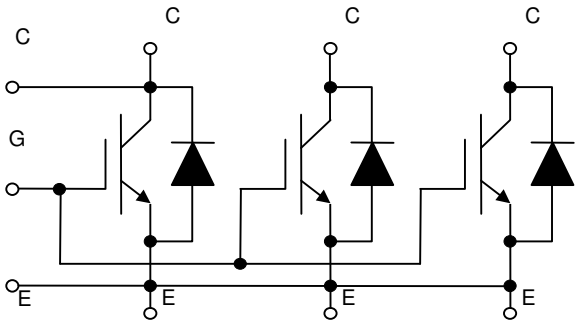
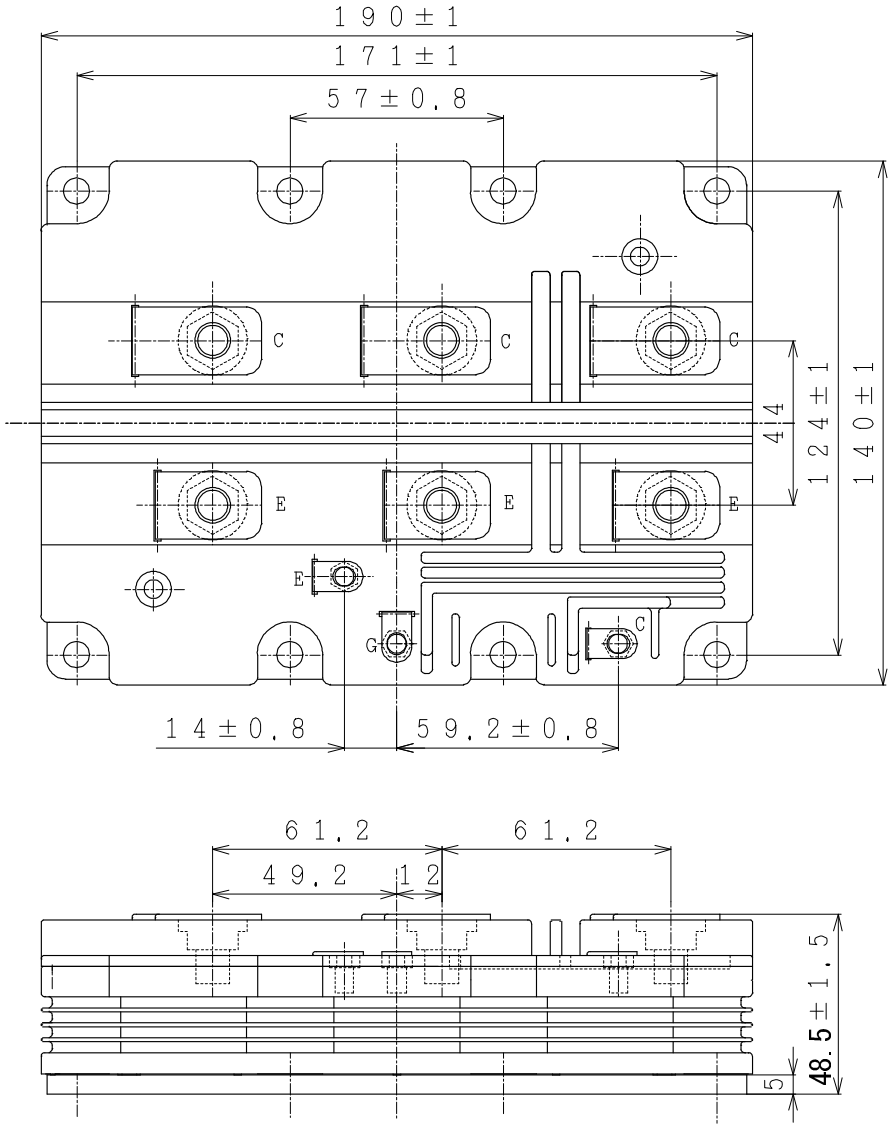
CIRCUIT DIAGRAM / PACKAGE OUTLINE DRAWING

CIRCUIT DIAGRAM



PACKAGE OUTLINE DRAWING



Mass : 1550g

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HITACHI POWER SEMICONDUCTORS

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