

MBN750H65E2

Preliminary Specification

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:
($\Delta T_c=70K$, $N>30,000$ cycles)
AlSiC base-plate/AlN substrate

This datasheet is not final version. Changes of this datasheet are reserved.
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ABSOLUTE MAXIMUM RATINGS ($T_c=25^\circ\text{C}$)

Item	Symbol	Unit	MBN750H65E2
Collector Emitter Voltage	V_{CES}	V	6,500
Gate Emitter Voltage	V_{GES}	V	± 20
Collector Current	DC	I_c	750 ($T_c=80^\circ\text{C}$)
	1ms	I_{cp}	1,500
Forward Current	DC	I_F	750
	1ms	I_{FM}	1,500
Junction Temperature	T_j	$^\circ\text{C}$	-40 ~ +125
Storage Temperature	T_{stg}	$^\circ\text{C}$	-40 ~ +125
Isolation Voltage	V_{ISO}	V_{RMS}	10,200 (AC 1 minute)
Screw Torque	Terminals (M4/M8)	-	2/10 (1)
	Mounting (M6)	-	6 (2)

Notes: (1) Recommended Value $1.8\pm 0.2/9\pm 1\text{N}\cdot\text{m}$ (2) Recommended Value $5.5\pm 0.5\text{N}\cdot\text{m}$

ELECTRICAL CHARACTERISTICS

Item	Symbol	Unit	Min.	Typ.	Max.	Test Conditions
Collector Emitter Cut-Off Current	I_{CES}	mA	-	-	25	$V_{CE}=6,500\text{V}$, $V_{GE}=0\text{V}$, $T_j=25^\circ\text{C}$
Gate Emitter Leakage Current	I_{GES}	nA	-500	-	+500	$V_{GE}=\pm 20\text{V}$, $V_{CE}=0\text{V}$, $T_j=25^\circ\text{C}$
Collector Emitter Saturation Voltage	$V_{CE(sat)}$	V	-	3.2	-	$I_c=750\text{A}$, $V_{GE}=15\text{V}$, $T_j=25^\circ\text{C}$
Gate Emitter Threshold Voltage	$V_{GE(To)}$	V	5.8	6.3	6.8	$V_{CE}=10\text{V}$, $I_c=750\text{mA}$, $T_j=25^\circ\text{C}$
Input Capacitance	C_{ies}	nF	-	130	-	$V_{CE}=10\text{V}$, $V_{GE}=0\text{V}$, $f=100\text{kHz}$, $T_j=25^\circ\text{C}$
Internal Gate Resistance	R_{ge}	Ω	-	0.7	-	$V_{CE}=10\text{V}$, $V_{GE}=0\text{V}$, $f=100\text{kHz}$, $T_j=25^\circ\text{C}$
Switching Times	Rise Time	t_r	tbd	3.3	tbd	$V_{CC}=3,600\text{V}$, $I_c=750\text{A}$
	Turn On Time	t_{on}	tbd	4.0	tbd	$L_s=200\text{nH}$
	Fall Time	t_f	tbd	3.3	tbd	$R_G=8.2\ \Omega$ (3)
	Turn Off Time	t_{off}	tbd	6.7	tbd	$V_{GE}=\pm 15\text{V}$, $T_j=125^\circ\text{C}$
Peak Forward Voltage Drop	V_{FM}	V	-	3.6	-	$I_F=750\text{A}$, $V_{GE}=0\text{V}$, $T_j=25^\circ\text{C}$
			tbd	3.9	tbd	$I_F=750\text{A}$, $V_{GE}=0\text{V}$, $T_j=125^\circ\text{C}$
Reverse Recovery Time	t_{rr}	μs	-	0.8	-	$V_{CC}=3600\text{V}$, $I_F=750\text{A}$, $L_s=200\text{nH}$ $T_j=125^\circ\text{C}$
Turn On Loss	$E_{on(10\%)}$	J/p	-	4.9	tbd	$V_{CC}=3600\text{V}$, $I_c= I_F=750\text{A}$, $L_s=200\text{nH}$ $R_G= 8.2\ \Omega$ (3) $V_{GE}=\pm 15\text{V}$, $T_j=125^\circ\text{C}$
	$E_{on(full)}$	J/p	-	5.5	-	
Turn Off Loss	$E_{off(10\%)}$	J/p	-	4.2	tbd	
	$E_{off(full)}$	J/p	-	4.5	-	
Reverse Recovery Loss	$E_{rr(10\%)}$	J/p	-	2.2	tbd	
	$E_{rr(full)}$	J/p	-	2.4	-	

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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THERMAL CHARACTERISTICS

Item	Symbol	Unit	Min.	Typ.	Max.	Test Conditions	
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 ($\lambda_{grease}=1W/(m \cdot K)$, heat-sink flatness $\leq 50\mu m$)	

MODULE MECHANICAL CHARACTERISTICS

Item	Unit	Characteristics	Conditions
Weight	g	1,550	
Stray inductance in module	LS(CM-EM)	nH	14
Comparative Tracking Index (CTI)			600
Module base plate Material			Al-SiC
Baseplate Thickness	mm		5
Insulation plate Material			Al N
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

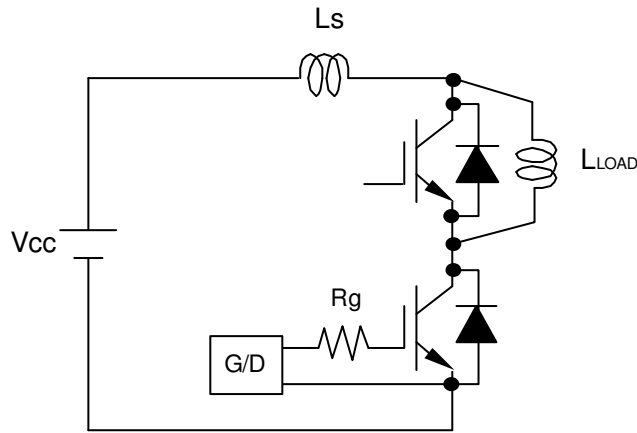


Fig.1 Switching test circuit

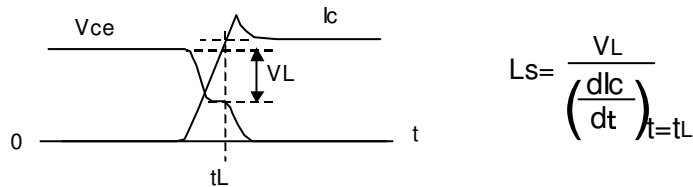


Fig.2 Definition of Ls

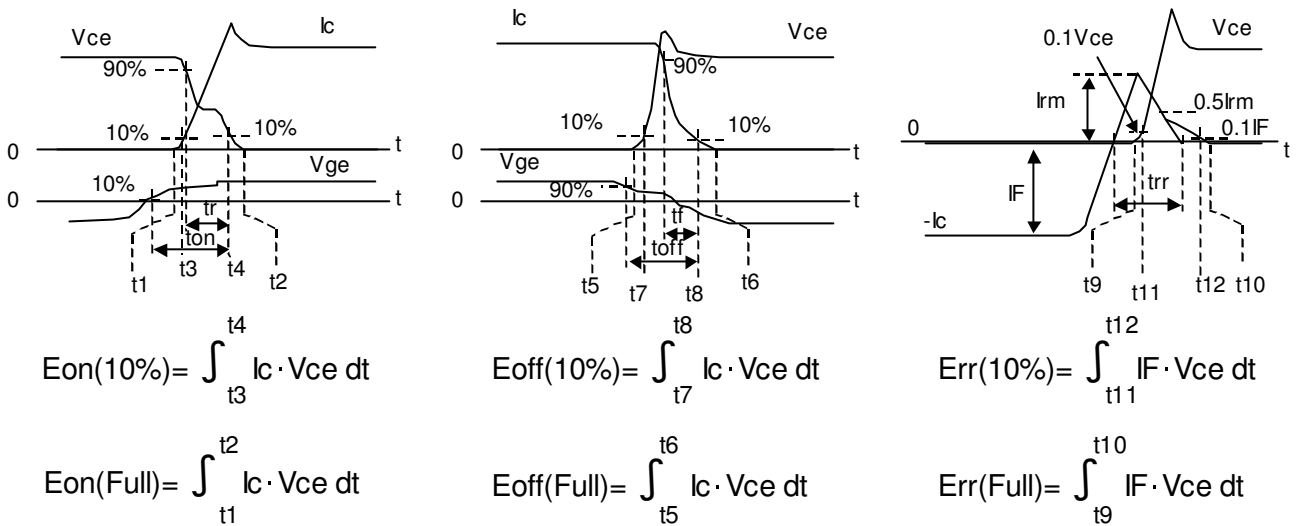
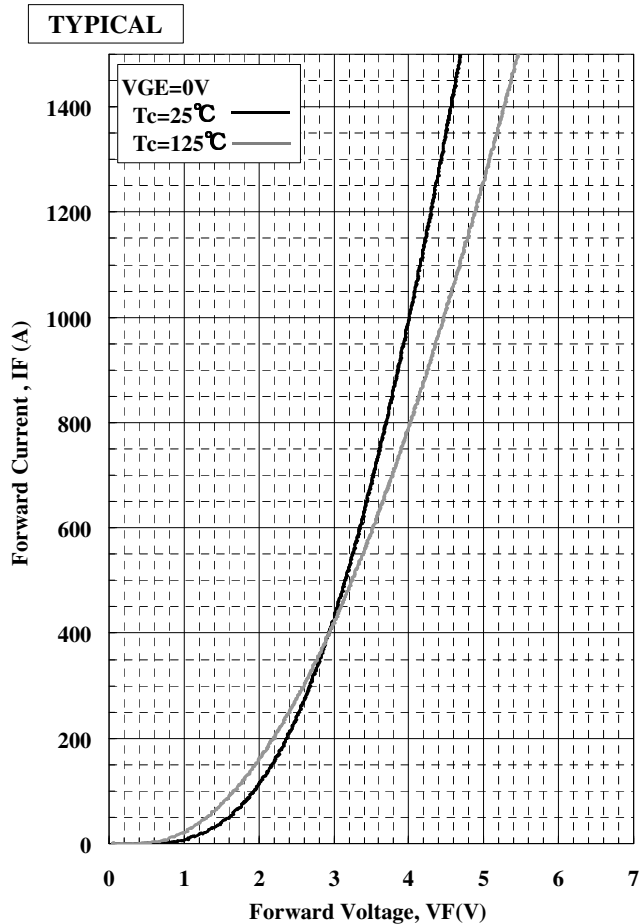
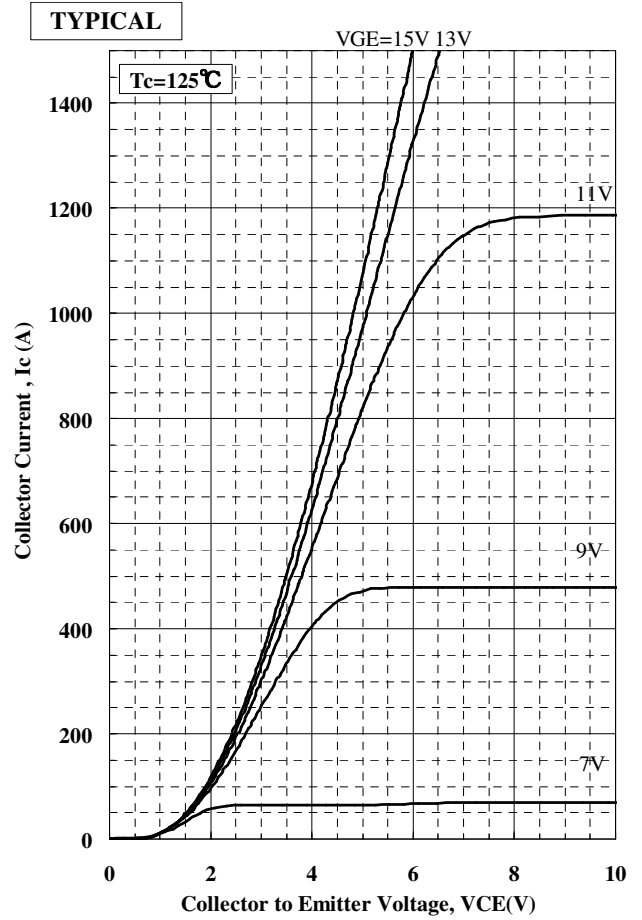
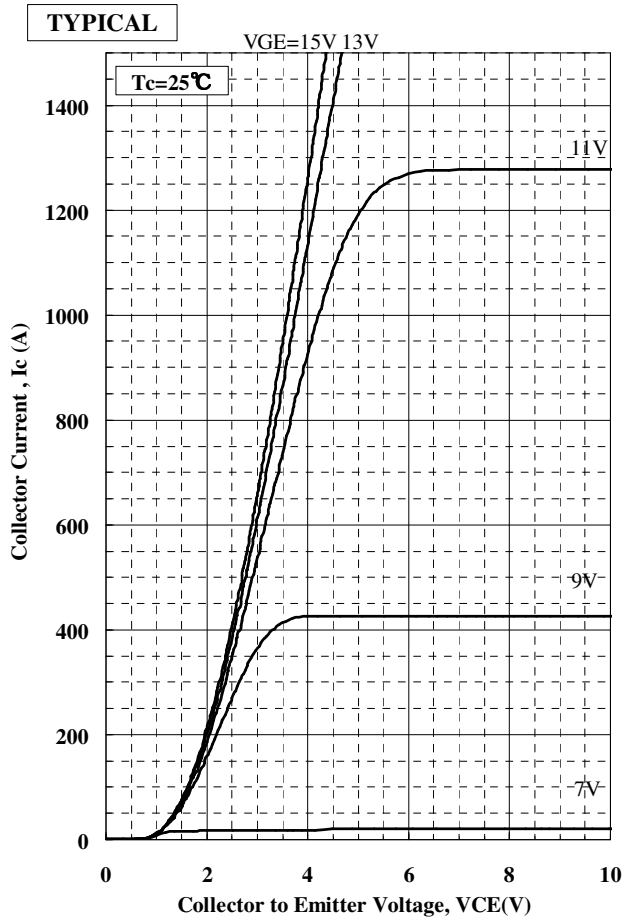


Fig.3 Definition of switching loss

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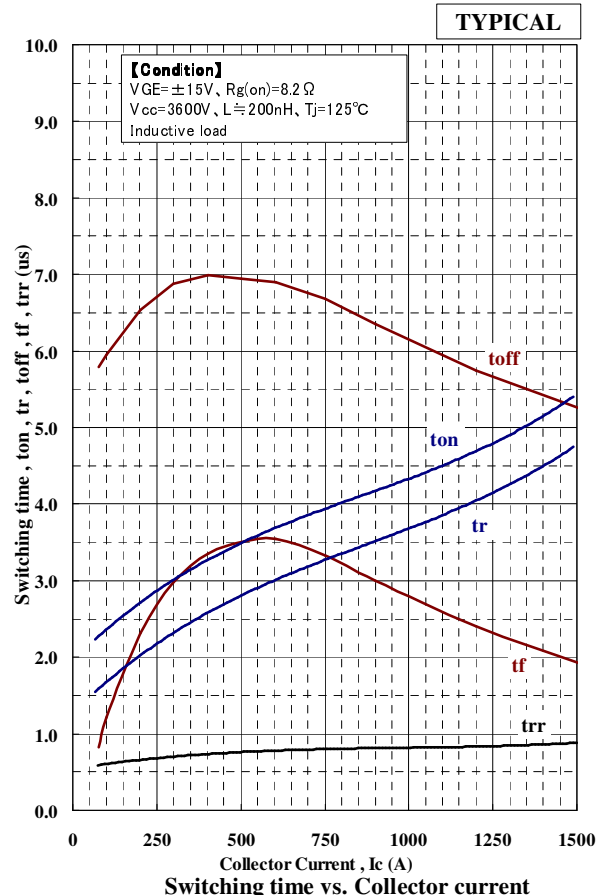
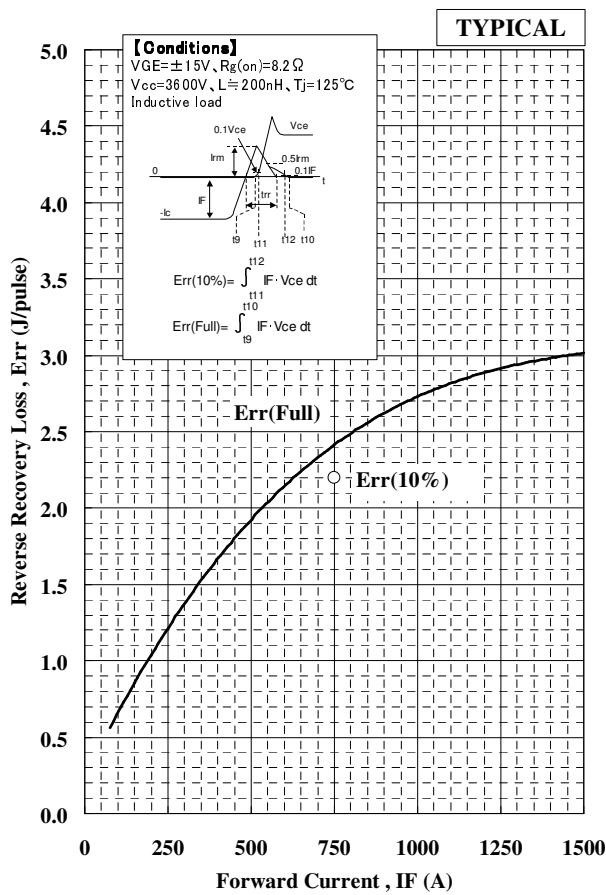
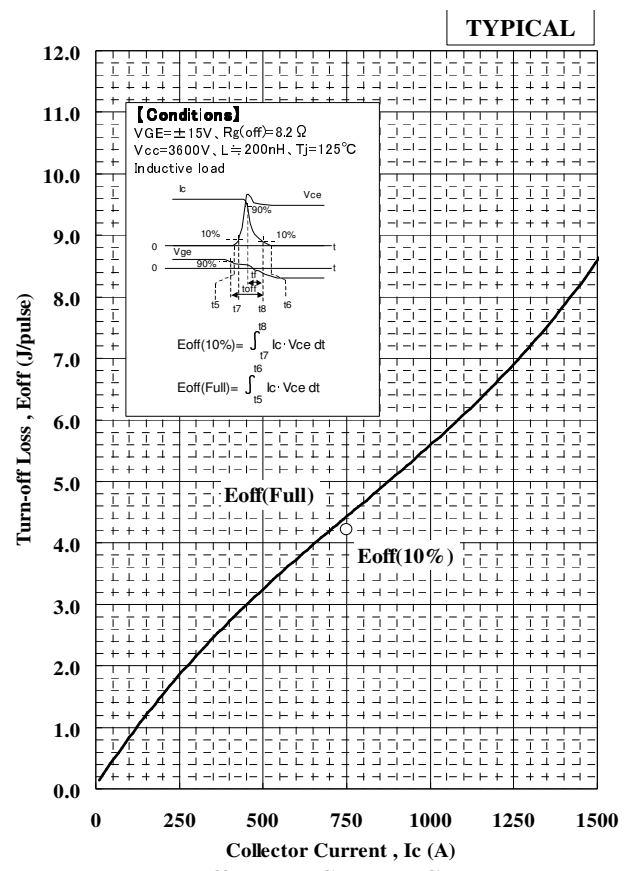
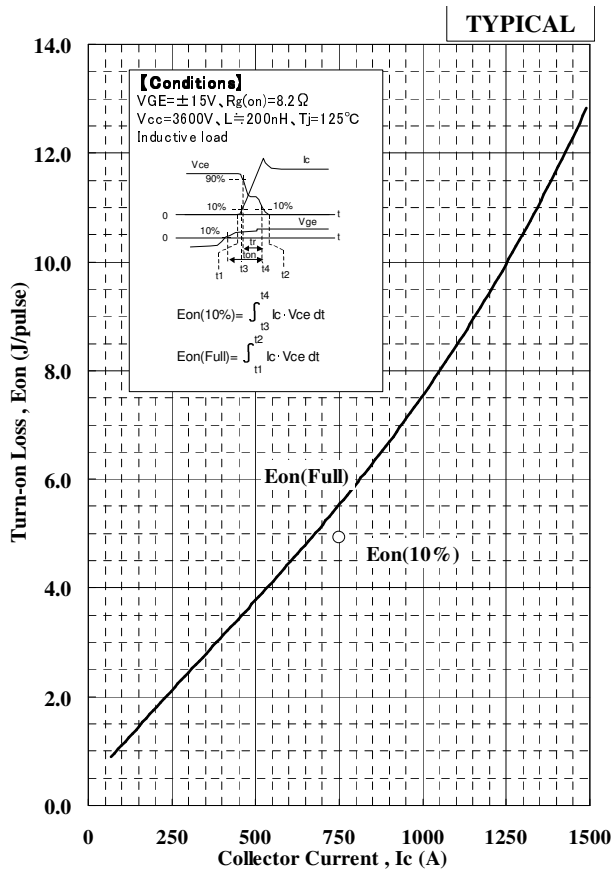
STATIC CHARACTERISTICS



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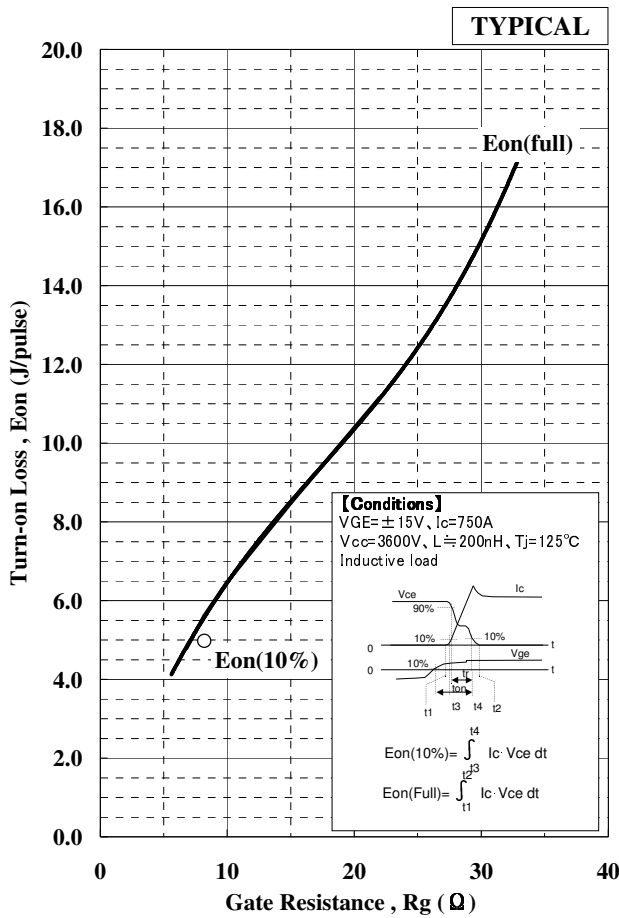
DYNAMIC CHARACTERISTICS



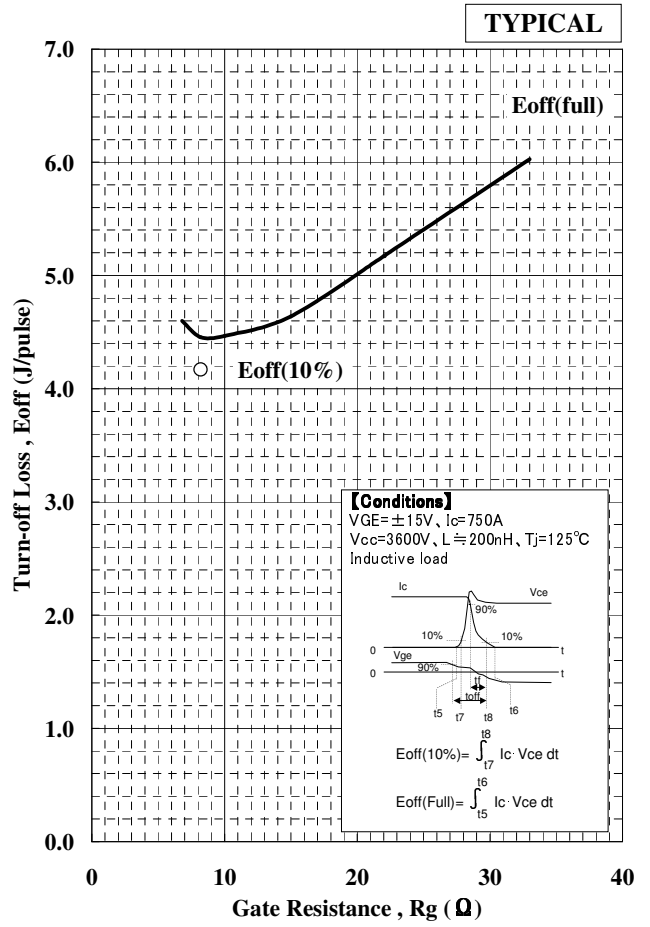
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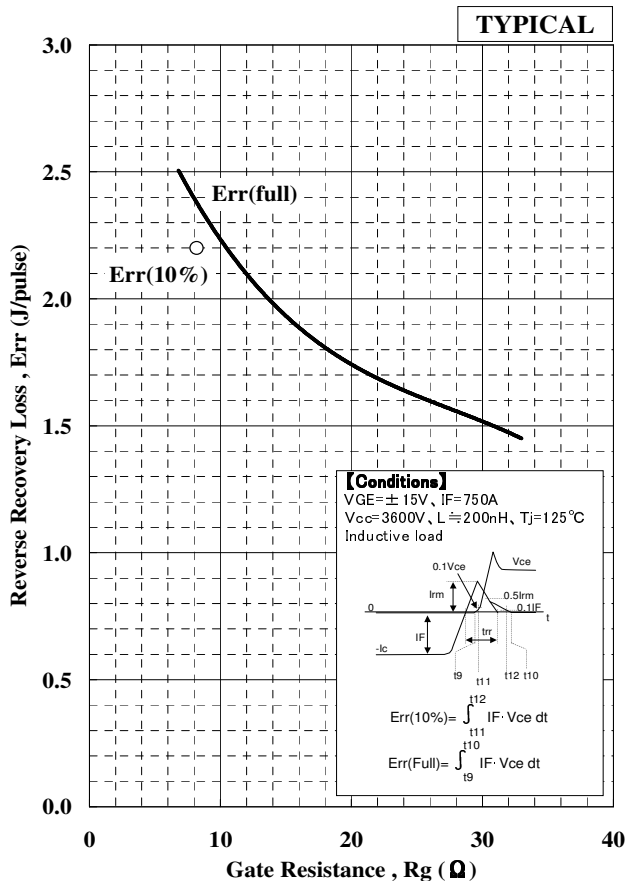
DYNAMIC CHARACTERISTICS



Turn-on Loss vs. Gate Resistance



Turn-off Loss vs. Gate Resistance

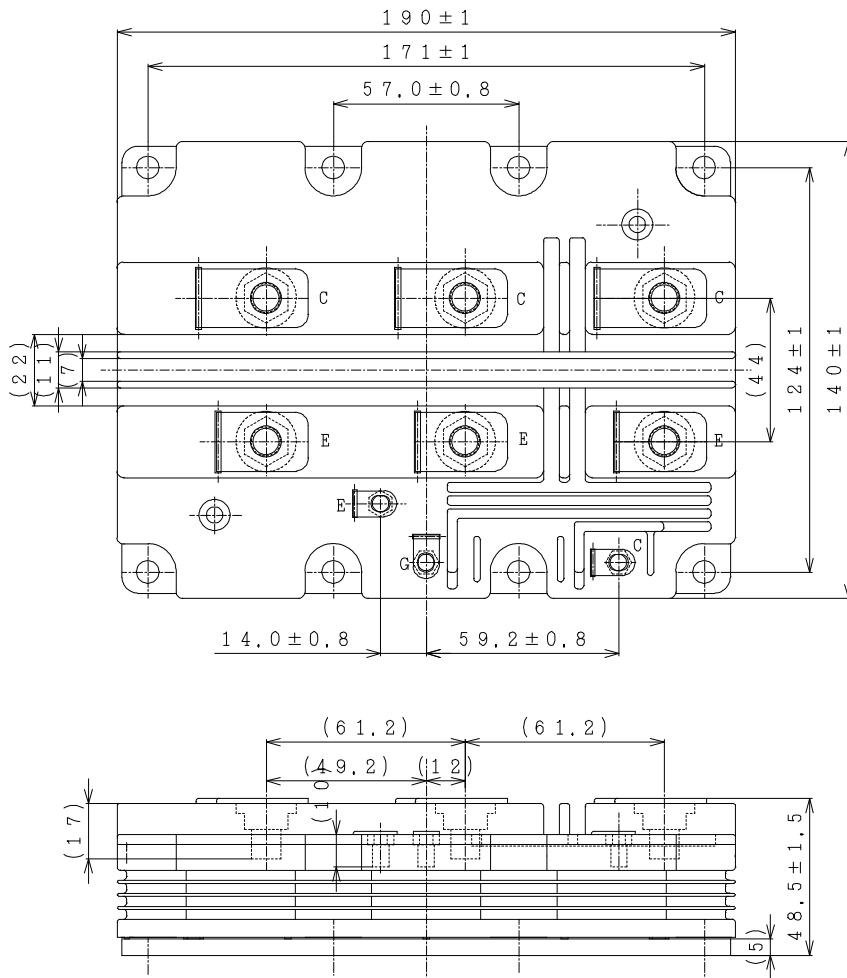


Recovery Loss vs. Gate Resistance

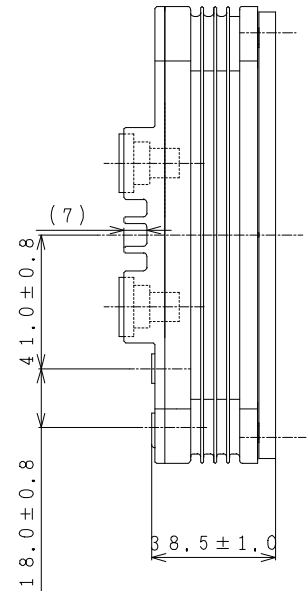
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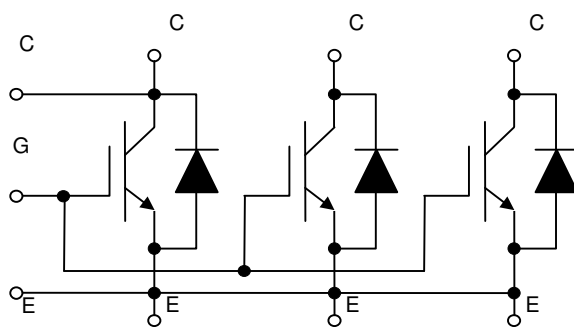
PACKAGE OUTLINE DRAWING



Unit in mm



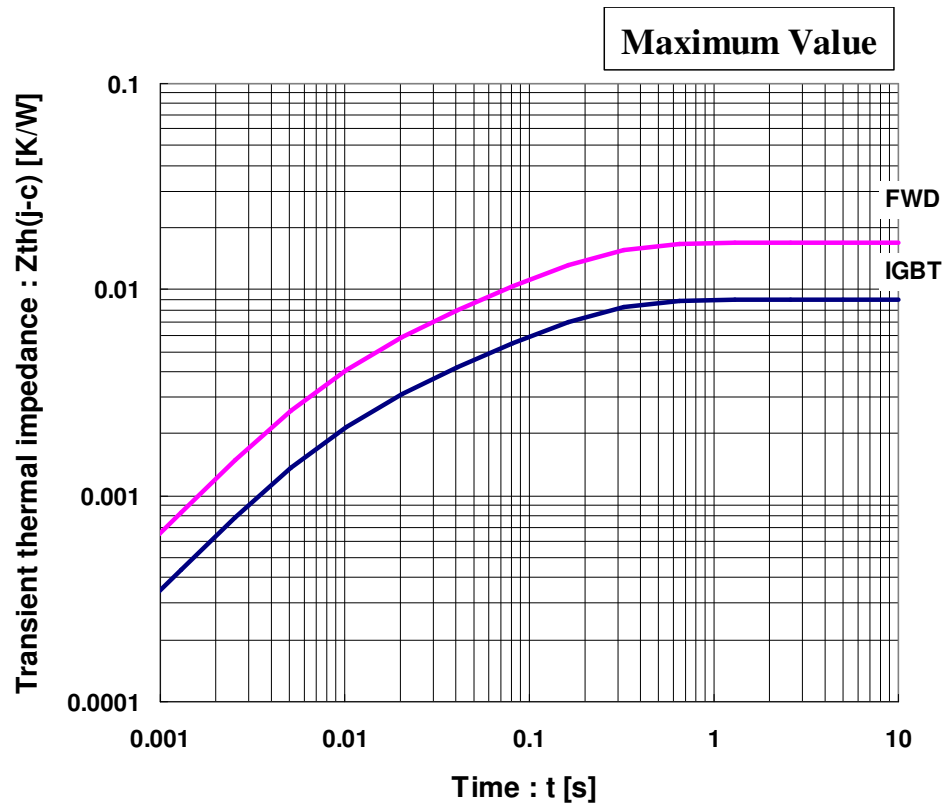
CIRCUIT DIAGRAM



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THERMAL IMPEDANCE



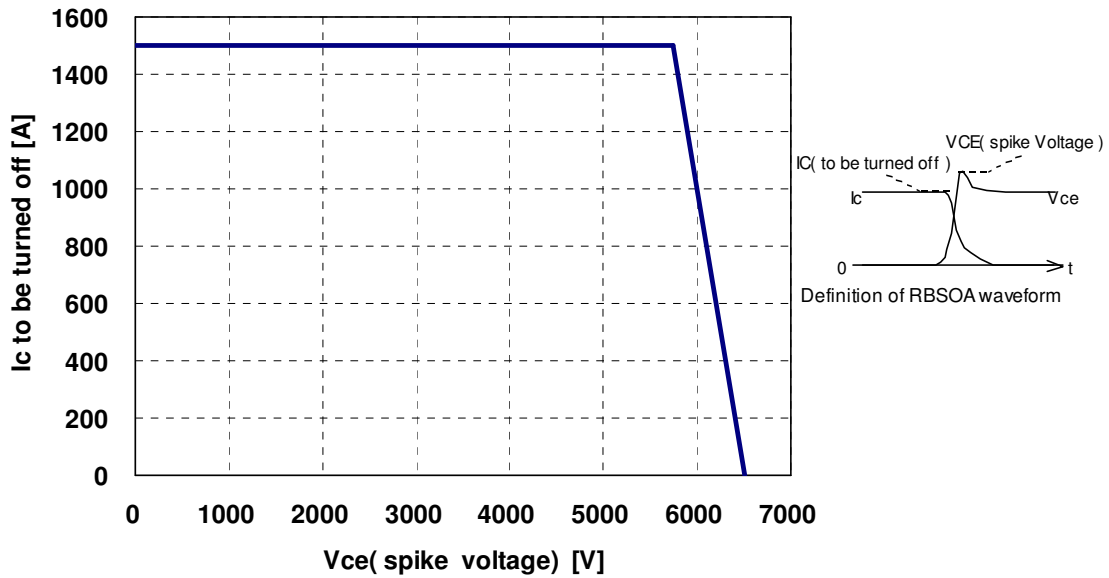
Transient Thermal Impedance Curve

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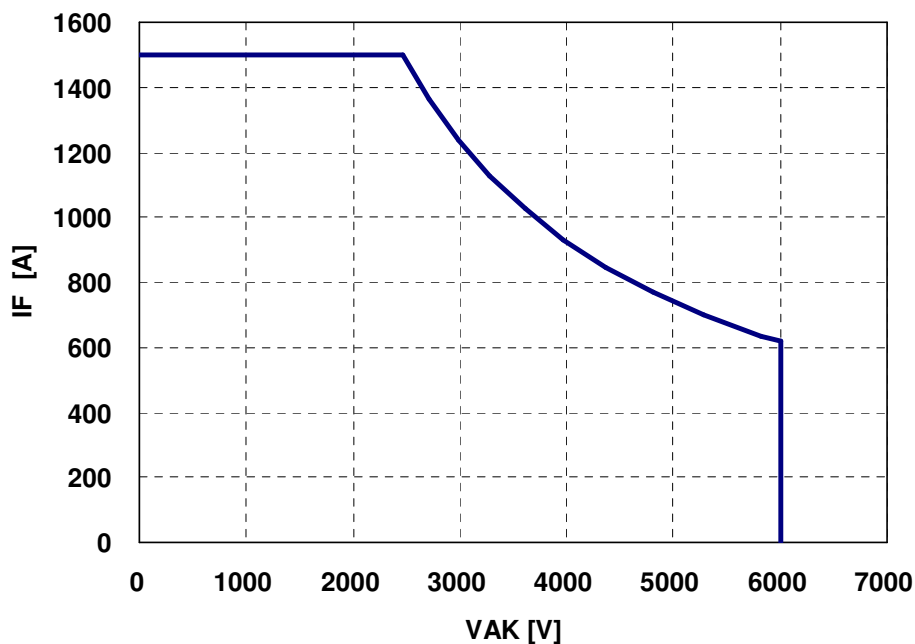
RBSOA / Recovery SOA

Conditions: $L_s \leq 200\text{nH}$, $V_{cc} \leq 4400\text{V}$,
 $I_c \leq 1500\text{A}$, $V_{GE} = \pm 15\text{V}$,
 $R_{g(\text{on/off})} \geq 8.2/8.2\Omega$, $-40^\circ\text{C} \leq T_c \leq 125^\circ\text{C}$
 on pulse width $\geq 20\mu\text{s}$
 (V_{ce} spike voltage and L_s are defined
 at auxiliary terminal)



Reverse bias safe operation area (RBSOA)

Conditions:
 $L_s \leq 200\text{nH}$, $V_{cc} \leq 4400\text{V}$, $-I_c \leq 1500\text{A}$, $V_{GE} = -15\text{V}$,
 $R_{g(\text{on})}$ of across IGBT $\geq 8.2\Omega$, V_{GE} of across IGBT $= \pm 15\text{V}$,
 $-40^\circ\text{C} \leq T_c \leq 125^\circ\text{C}$, V_{AK} defined at auxiliary terminal
 Conduction pulse width of diode $\geq 30\mu\text{s}$



RecSOA

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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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HITACHI POWER SEMICONDUCTORS

Notices

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