

MBN1600E17D

Silicon N-channel IGBT

FEATURES

- * High speed, low loss IGBT module.
- * Low driving power due to low input capacitance MOS gate.
- * Low noise due to ultra soft fast recovery diode.
- * High reliability, high durability module.
- * High thermal fatigue durability.
($\Delta T_c=70^\circ\text{C}$, $N>30,000$ cycles)
- * Isolated heat sink (terminal to base).

ABSOLUTE MAXIMUM RATINGS ($T_c=25^\circ\text{C}$)

Item	Symbol	Unit	MBN1600E17D
Collector Emitter Voltage	V_{CES}	V	1,700
Gate Emitter Voltage	V_{GES}	V	± 20
Collector Current	DC	I_C	1,600
	1ms	I_{Cp}	3,200
Forward Current	DC	I_F	1,600
	1ms	I_{FM}	3,200
Junction Temperature	T_j	$^\circ\text{C}$	-40 ~ +125
Storage Temperature	T_{stg}	$^\circ\text{C}$	-40 ~ +125
Isolation Voltage	V_{ISO}	V_{RMS}	4,000(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	-	-	10	$V_{CE}=1,700\text{V}$, $V_{GE}=0\text{V}$, $T_j=25^\circ\text{C}$
			-	10	35	$V_{CE}=1,700\text{V}$, $V_{GE}=0\text{V}$, $T_j=125^\circ\text{C}$
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	-	2.7	3.3	$I_C=1,600\text{A}$, $V_{GE}=15\text{V}$, $T_j=125^\circ\text{C}$
Gate Emitter Threshold Voltage	$V_{GE(TO)}$	V	5.5	7.0	8.5	$V_{CE}=10\text{V}$, $I_C=160\text{mA}$, $T_j=25^\circ\text{C}$
Input Capacitance	C_{ies}	nF	-	140	-	$V_{CE}=10\text{V}$, $V_{GE}=0\text{V}$, $f=100\text{kHz}$, $T_j=25^\circ\text{C}$
Internal Gate Resistance	R_{ge}	Ω	-	0.8	-	$V_{CE}=10\text{V}$, $V_{GE}=0\text{V}$, $f=100\text{kHz}$, $T_j=25^\circ\text{C}$
Switching Times	Rise Time	t_r	-	0.7	1.4	$V_{CC}=900\text{V}$, $I_C=1,600\text{A}$
	Turn On Time	t_{on}	-	1.2	2.4	$L=65\text{nH}$, $C_{GE}=150\text{nF}$ (3)
	Fall Time	t_f	-	0.2	0.4	$R_G=1.5\Omega$ (3)
	Turn Off Time	t_{off}	-	1.9	3.8	$V_{GE}=\pm 15\text{V}$, $T_j=125^\circ\text{C}$
Peak Forward Voltage Drop	V_{FM}	V	-	1.9	2.5	$I_F=1,600\text{A}$, $V_{GE}=0\text{V}$, $T_j=125^\circ\text{C}$
Reverse Recovery Time	t_{rr}	μs	-	0.7	1.1	$V_{CC}=900\text{V}$, $I_C=1,600\text{A}$
Turn On Loss	$E_{on(10\%)}$	J/P	-	0.5	0.8	$L=65\text{nH}$, $C_{GE}=150\text{nF}$ (3)
Turn Off Loss	$E_{off(10\%)}$	J/P	-	0.5	0.8	$R_G=1.5\Omega$ (3)
Reverse Recovery Loss	$E_{rr(10\%)}$	J/P	-	0.5	0.8	$V_{GE}=\pm 15\text{V}$, $T_j=125^\circ\text{C}$

Notes:(3) R_G and C_{GE} value is the test condition's value for evaluation of the switching times, not recommended value.Please, determine the suitable R_G and C_{GE} 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	$R_{th(j-c)}$	K/W	-	-	0.015	Junction to case
	FWD	$R_{th(j-c)}$		-	-	0.023	
Contact Thermal Impedance		$R_{th(c-f)}$	K/W	-	0.008	-	Case to fin

MODULE MECHANICAL CHARACTERISTICS

Item		Unit	Characteristics	Conditions
Weight		g	900	
Stray inductance in module	LS(CM-EM)	nH	18	Collector-main to Emitter-main
Terminal Resistance	$R_{Terminal}$	m Ω	0.14	Collector-main to Emitter-main
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

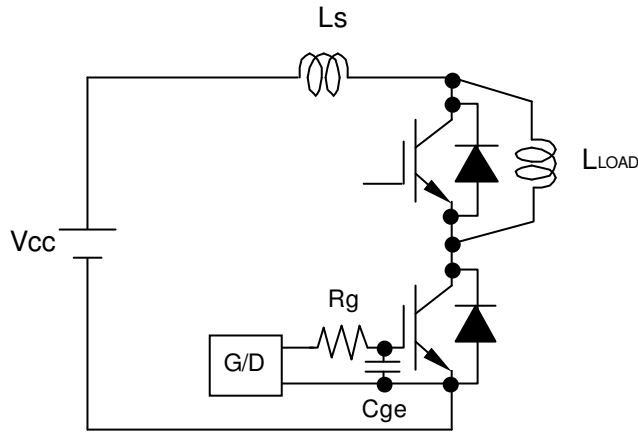


Fig.1 Switching test circuit

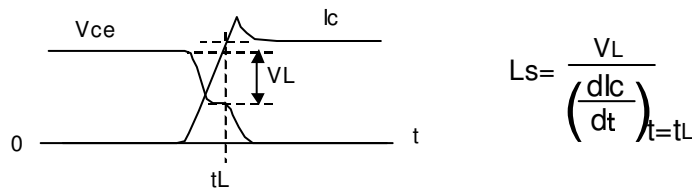


Fig.2 Definition of stray inductance

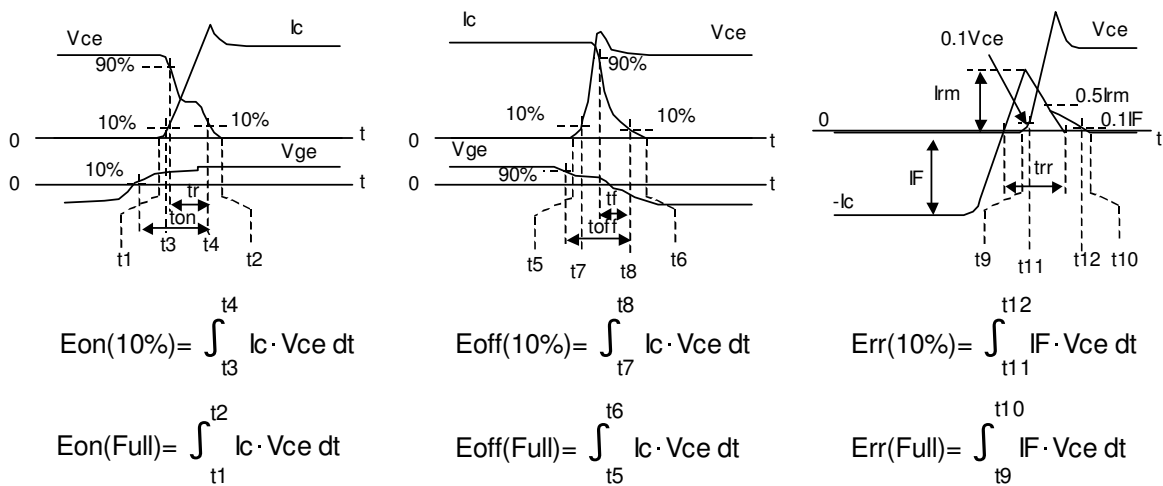
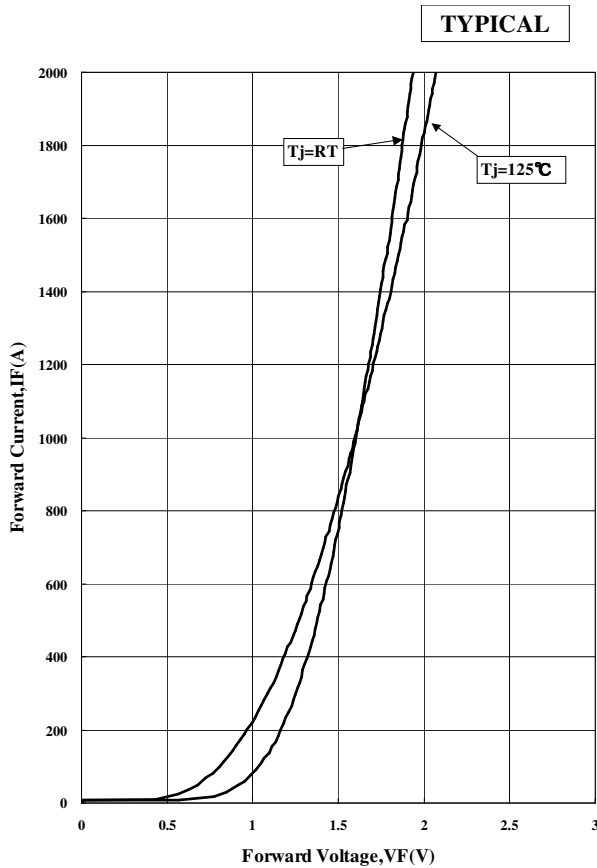
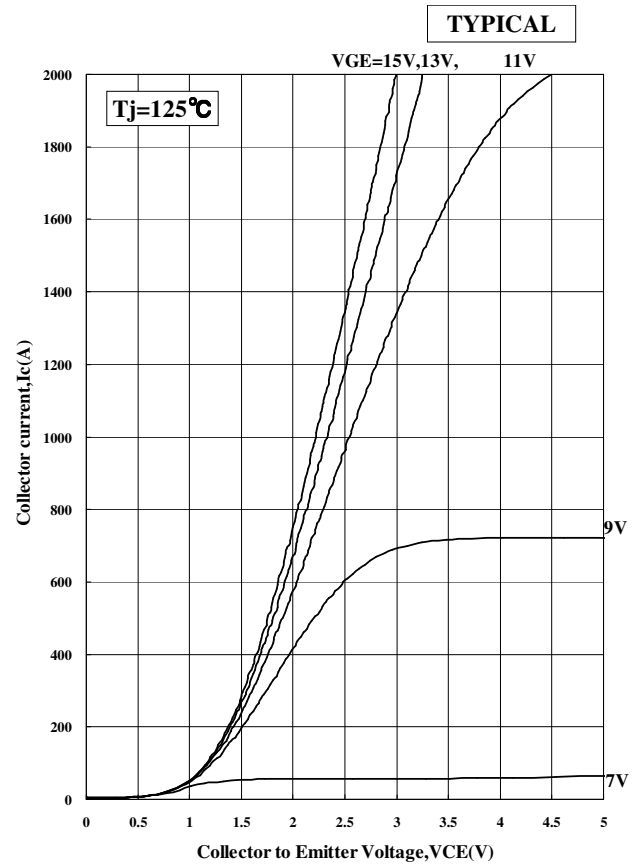
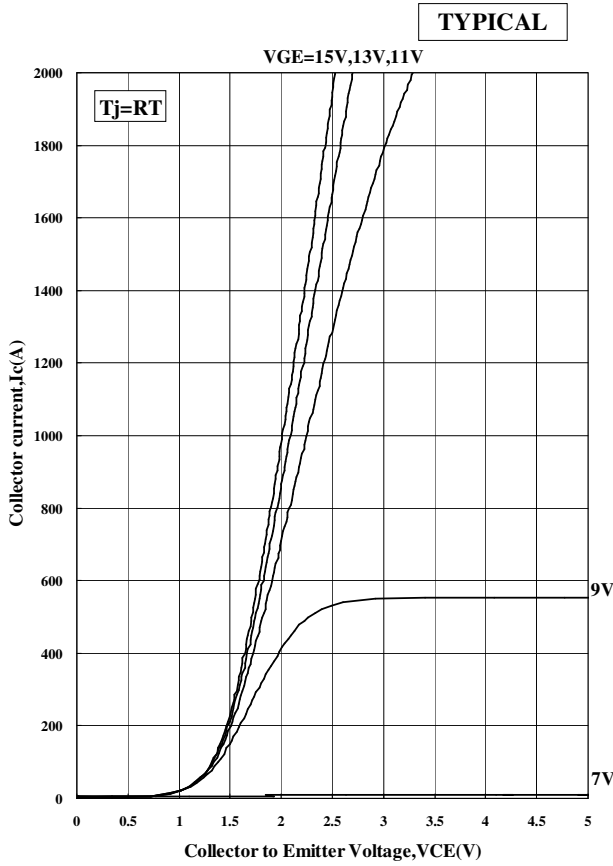


Fig.3 Definition of switching loss

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CHARACTERISTICS CURVE

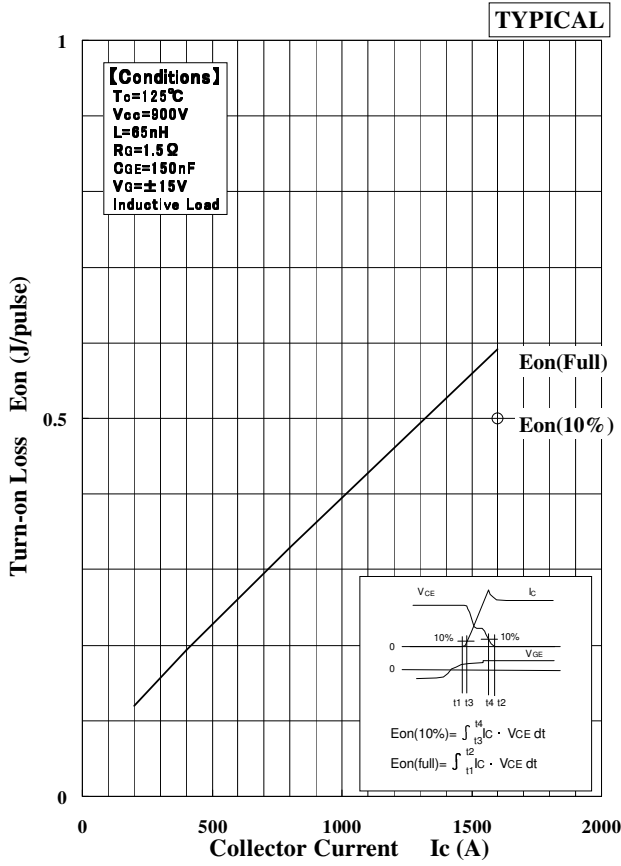
STATIC CHARACTERISTICS



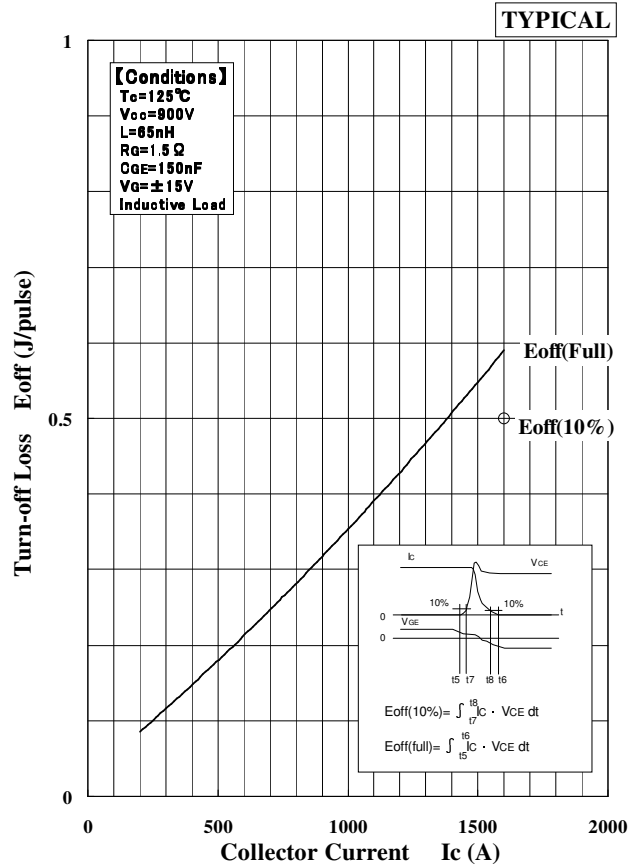
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DYNAMIC CHARACTERISTICS

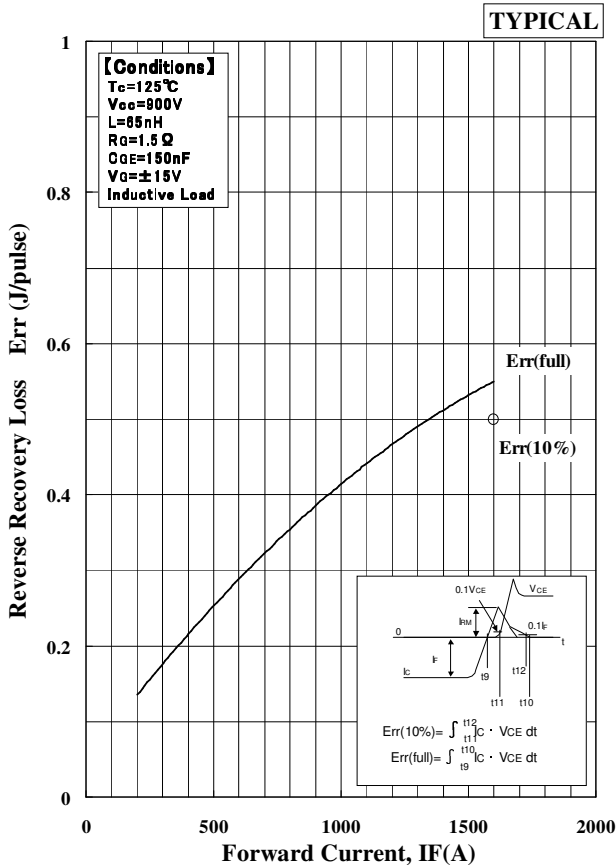
DEPENDENCE OF CURRENT



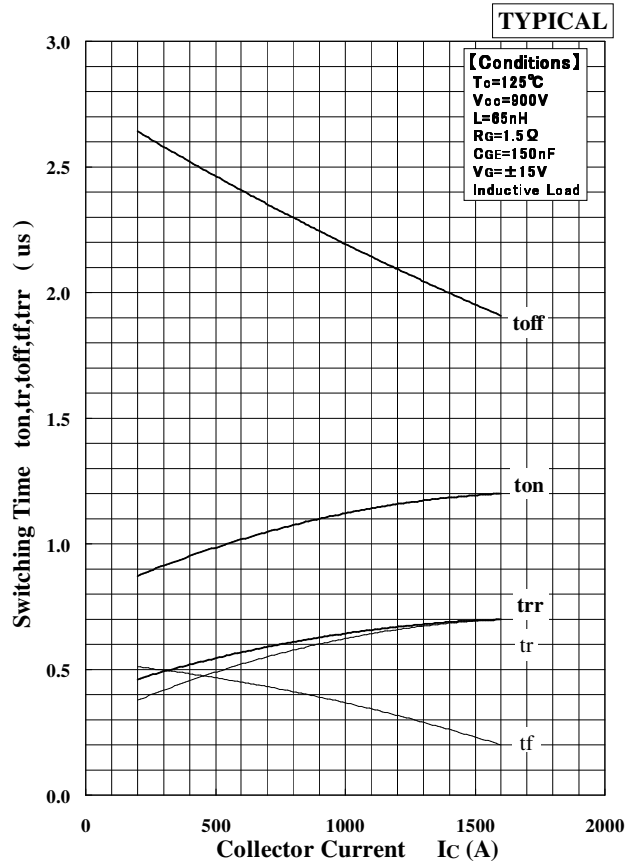
Turn-on Loss vs. Collector Current



Turn-off Loss vs. Collector Current



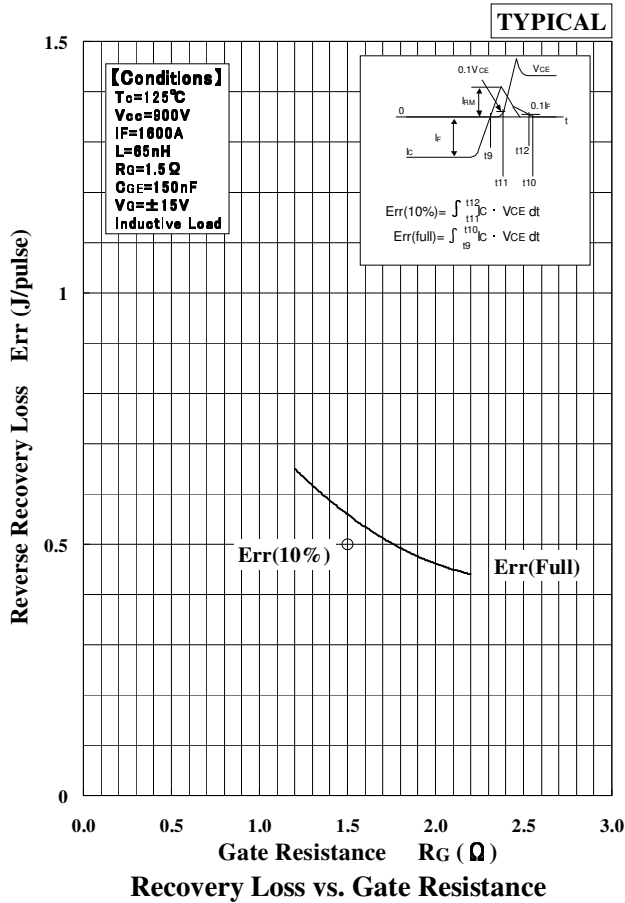
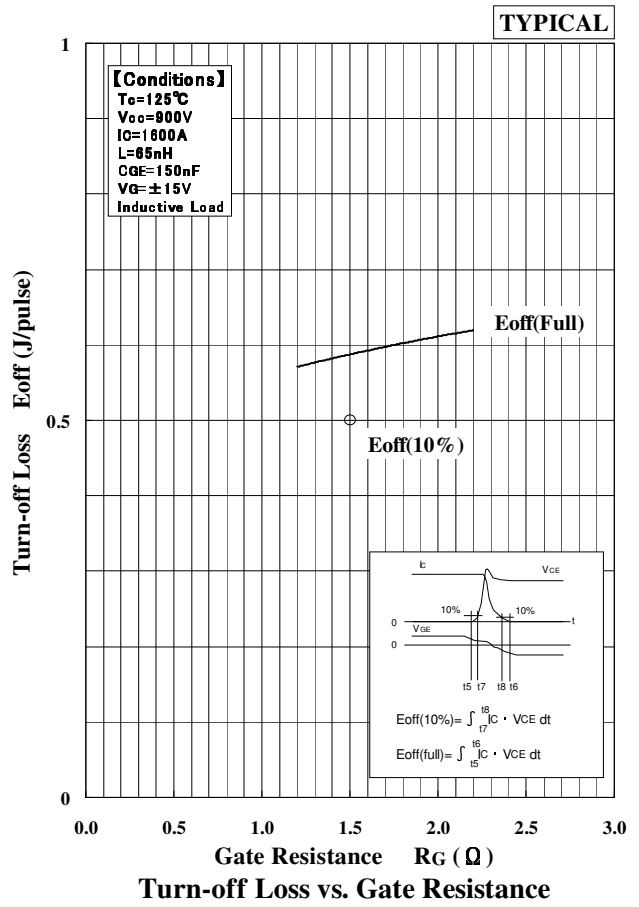
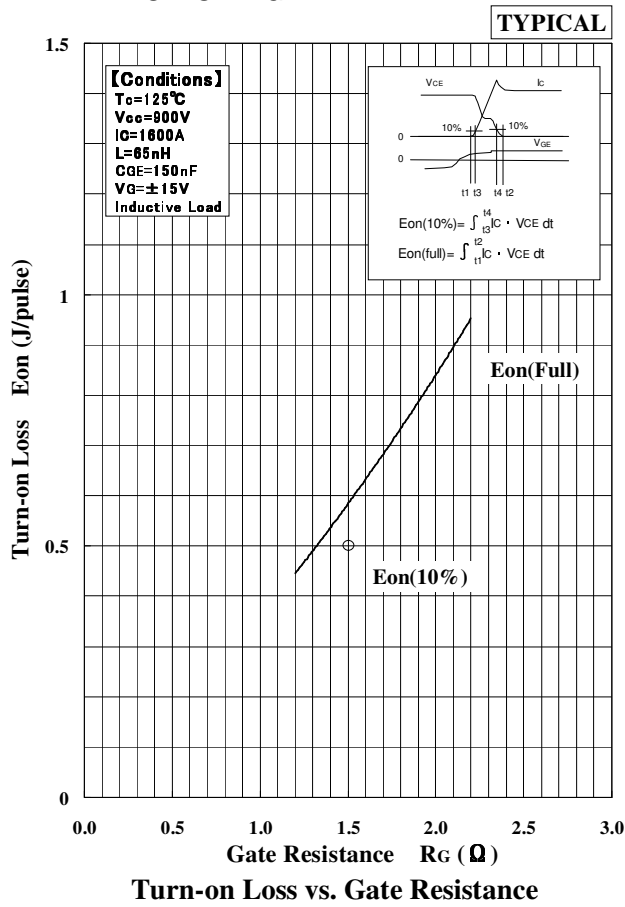
Recovery Loss vs. Forward Current



Switching Time vs. Collector Current

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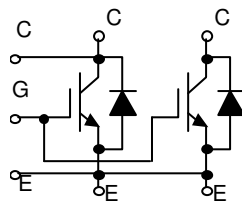
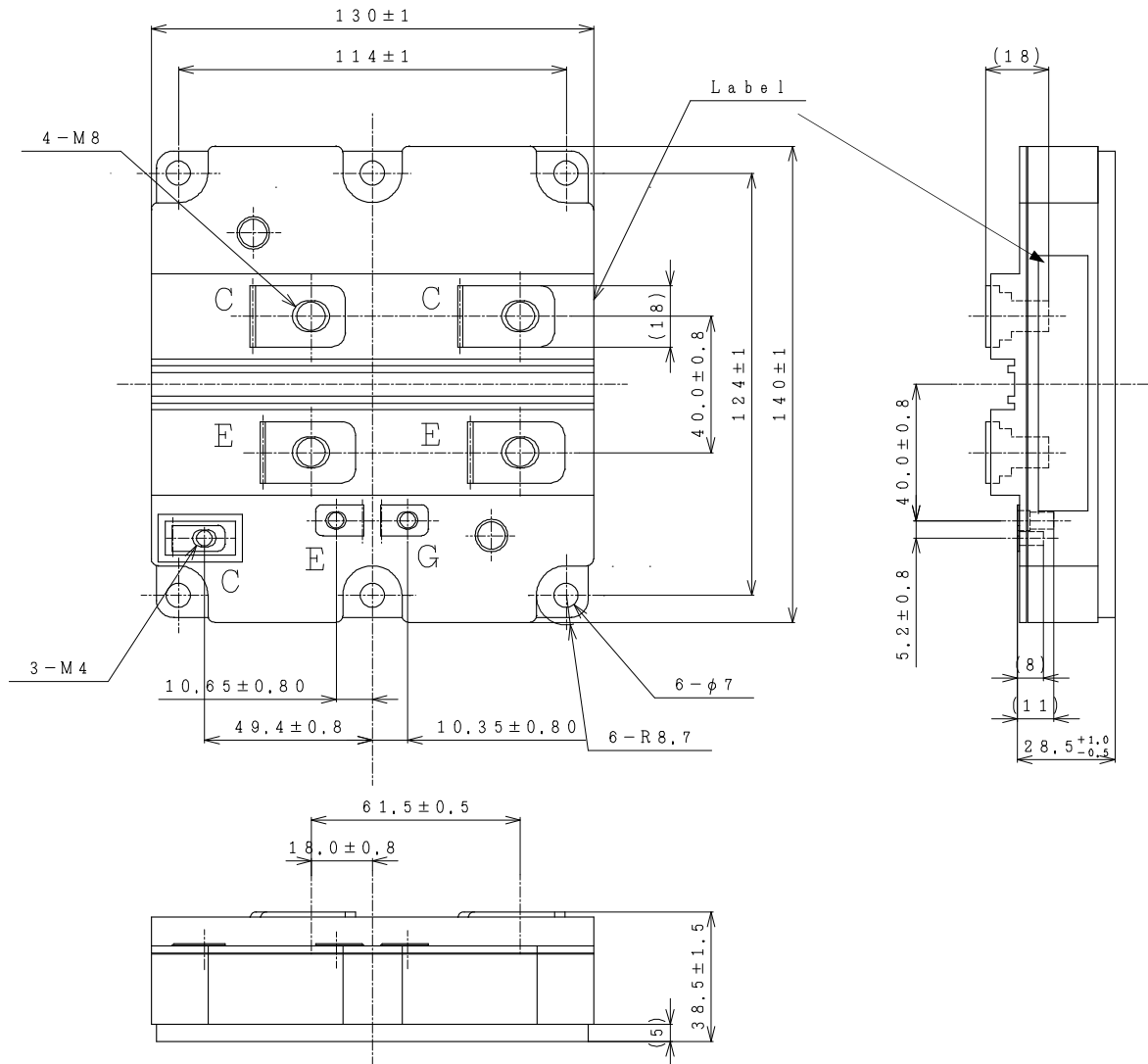
DEPENDENCE OF RG



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OUTLINE DRAWINGS

Unit in mm

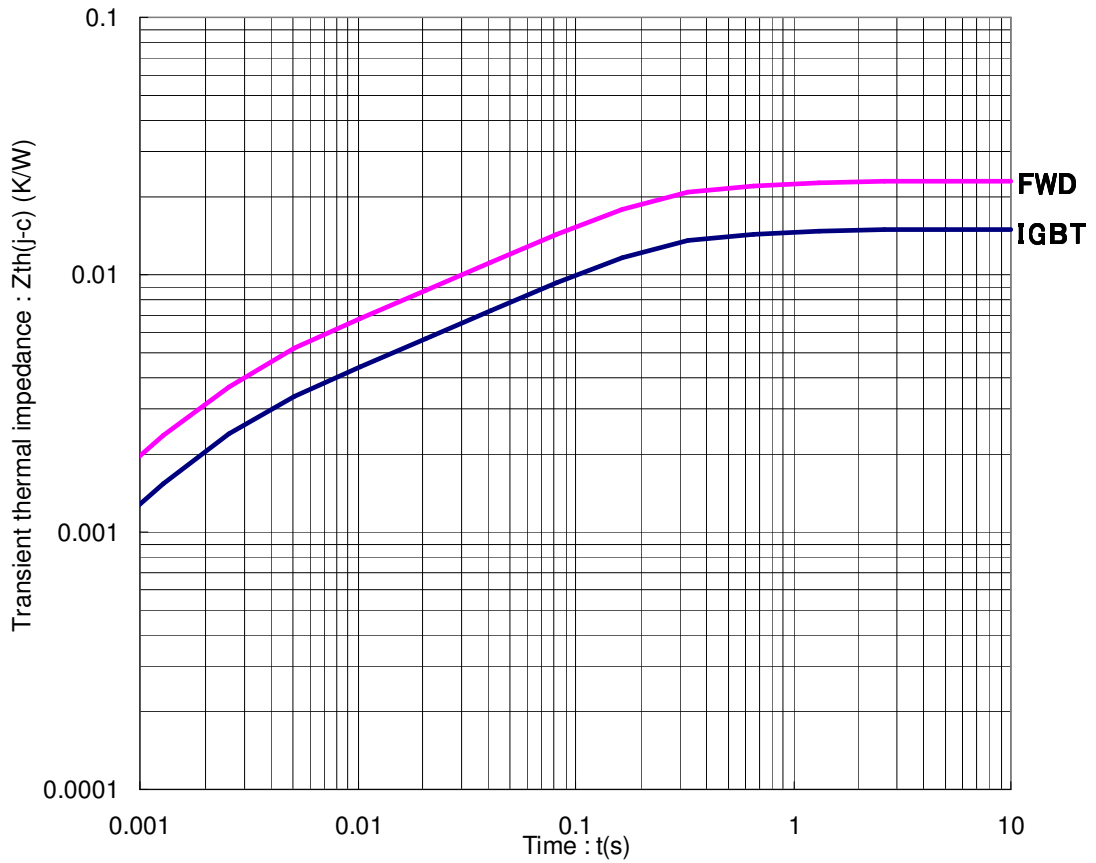


Circuit diagram

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TRANSIENT THERMAL IMPEDANCE

Maximum



Transient Thermal Impedance Curve

Material declaration

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

Material	Contained part
Lead (Pb) and its compounds	Solder

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HITACHI POWER SEMICONDUCTORS

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