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 Tc=70°C, N>30,000cycles)
* Isolated heat sink (terminal to base).

ABSOLUTE MAXIMUM RATINGS (Tc=25°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	A	1,600
	1ms	I_{Cp}		3,200
Forward Current	DC	I_F	A	1,600
	1ms	I_{FM}		3,200
Junction Temperature		T_j	°C	-40 ~ +125
Storage Temperature		T_{stg}	°C	-40 ~ +125
Isolation Voltage		V_{ISO}	V_{RMS}	4,000(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	-	-	10	V_{CE}=1,700V, V_{GE}=0V, Tj=25°C
				-	10	35	V_{CE}=1,700V, 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	-	2.7	3.3	I_C=1,600A, V_{GE}=15V, Tj=125°C
Gate Emitter Threshold Voltage		$V_{GE(TO)}$	V	5.5	7.0	8.5	V_{CE}=10V, I_C=160mA, Tj=25°C
Input Capacitance		C_{ies}	nF	-	140	-	V_{CE}=10V, V_{GE}=0V, f=100kHz, Tj=25°C
Internal Gate Resistance		Rge	Ω	-	0.8	-	V_{CE}=10V, V_{GE}=0V, f=100kHz, Tj=25°C
Switching Times	Rise Time	t_r	µs	-	0.7	1.4	V_{CC}=900V, Ic=1,600A
	Turn On Time	t_{on}		-	1.2	2.4	L=65nH,C_{GE}=150nF (3)
	Fall Time	t_f		-	0.2	0.4	R_G=1.5Ω (3)
	Turn Off Time	t_{off}		-	1.9	3.8	V_{GE}=±15V, Tj=125°C
Peak Forward Voltage Drop		V_{FM}	V	-	1.9	2.5	IF=1,600A, V_{GE}=0V, Tj=125°C
Reverse Recovery Time		t_{rr}	µs	-	0.7	1.1	V_{CC}=900V, Ic=1,600A
Turn On Loss		$E_{on(10\%)}$	J/P	-	0.5	0.8	L=65nH,C_{GE}=150nF (3)
Turn Off Loss		$E_{off(10\%)}$	J/P	-	0.5	0.8	R_G=1.5Ω (3)
Reverse Recovery Loss		$E_{rr(10\%)}$	J/P	-	0.5	0.8	V_{GE}=±15V, Tj=125°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	Rth(j-c)	K/W	-	-	0.015	Junction to case
	FWD	Rth(j-c)		-	-	0.023	
Contact Thermal Impedance		Rth(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	$R_{Terminal}$	mΩ	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

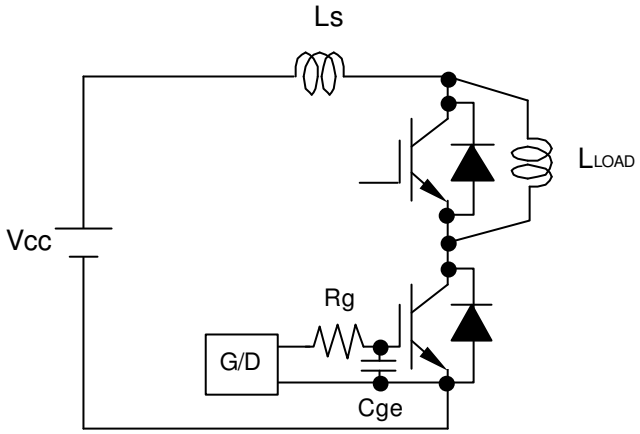
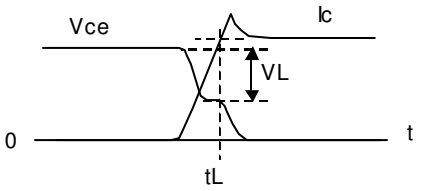
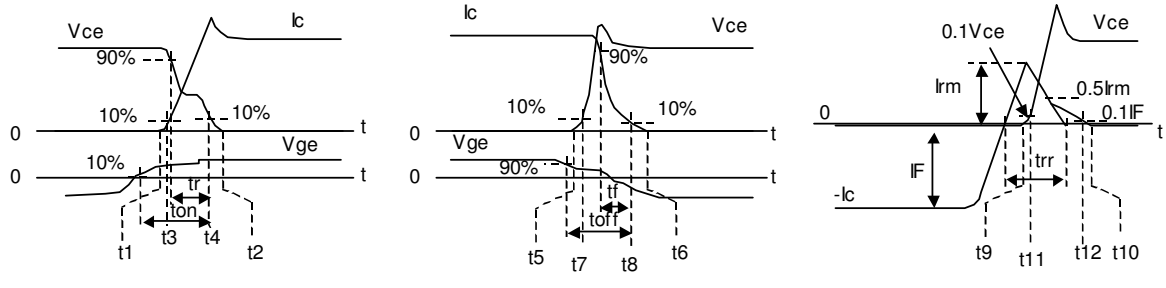


Fig.1 Switching test circuit



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

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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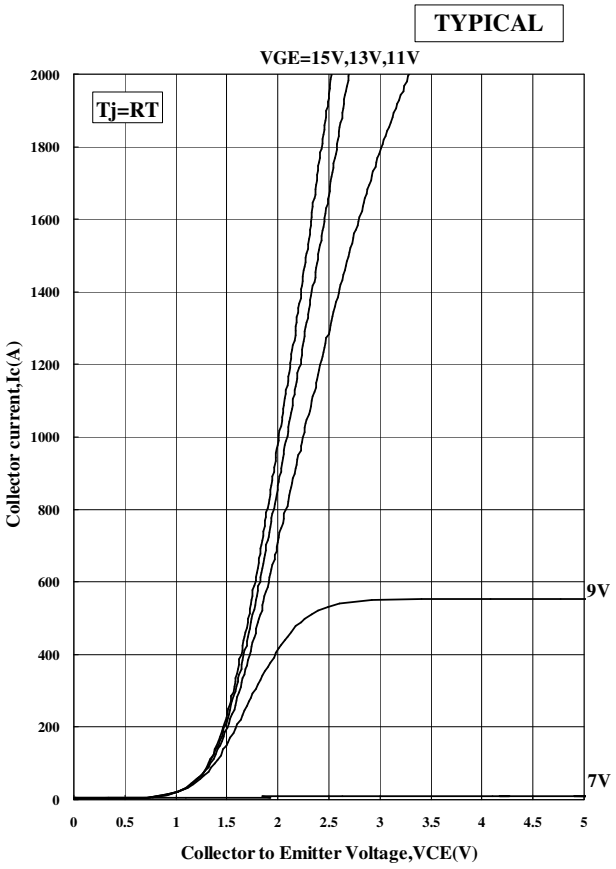
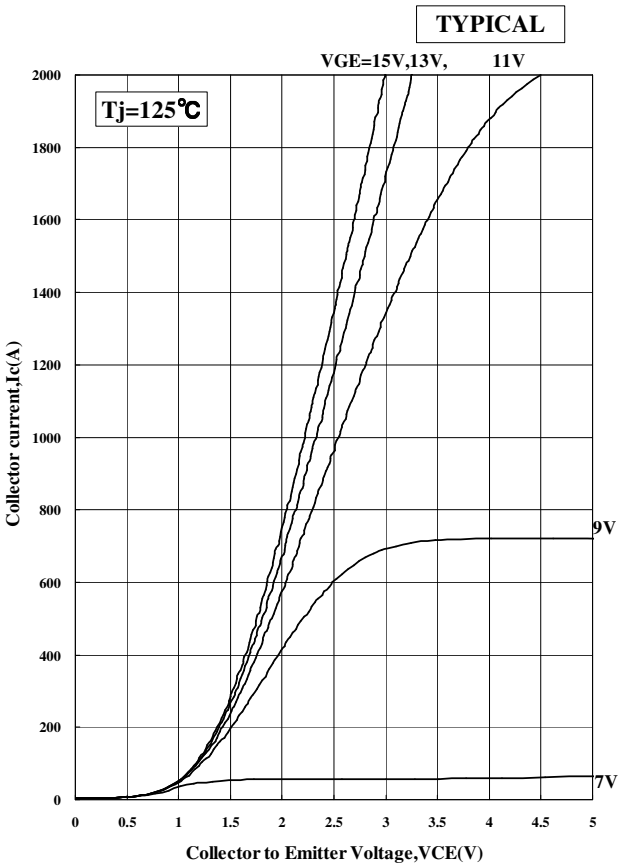
CHARACTERISTICS CURVE

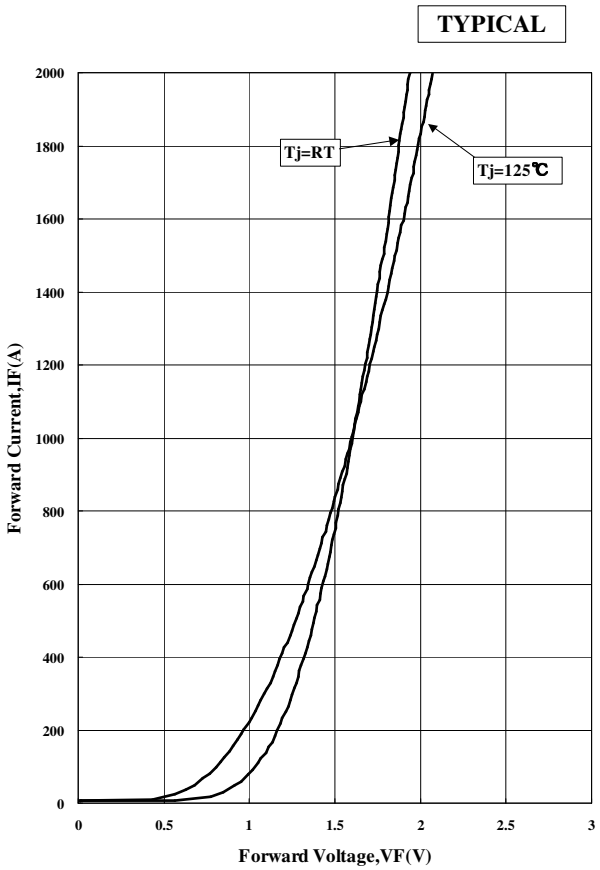
STATIC CHARACTERISTICS



Collector Current vs.Collector to Emitter Voltage



Collector Current vs.Collector to Emitter Voltage



Forward Voltage of free-wheeling diode

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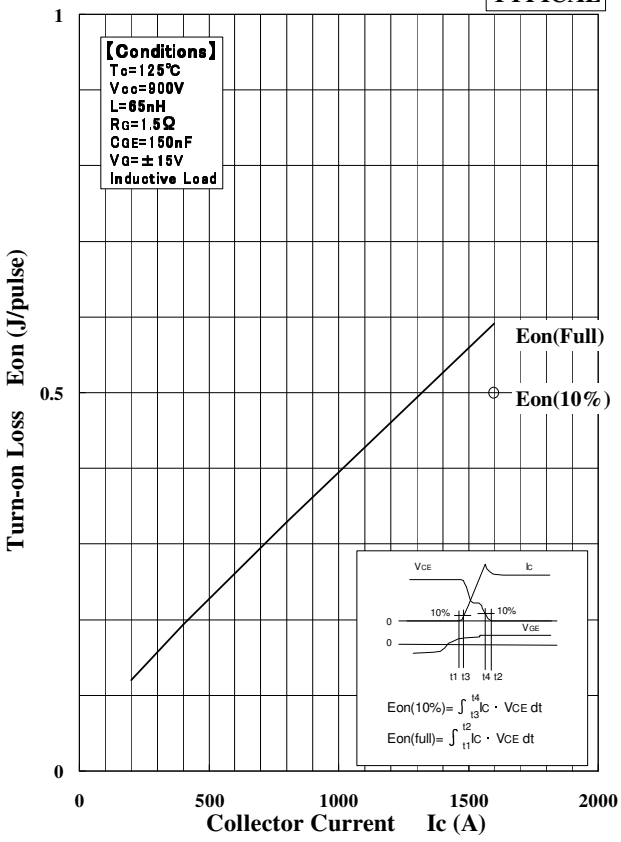
DYNAMIC CHARACTERISTICS

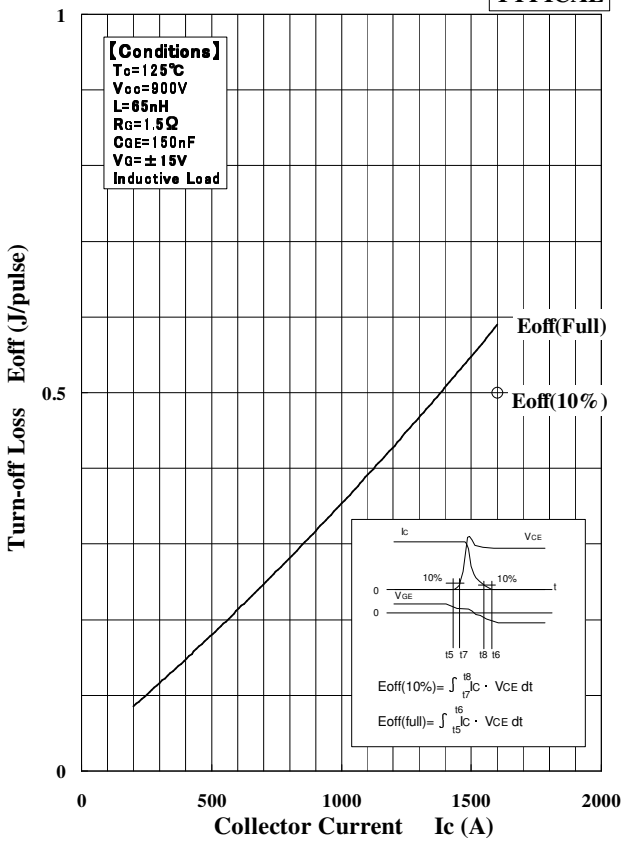
DEPENDENCE OF CURRENT

TYPICAL



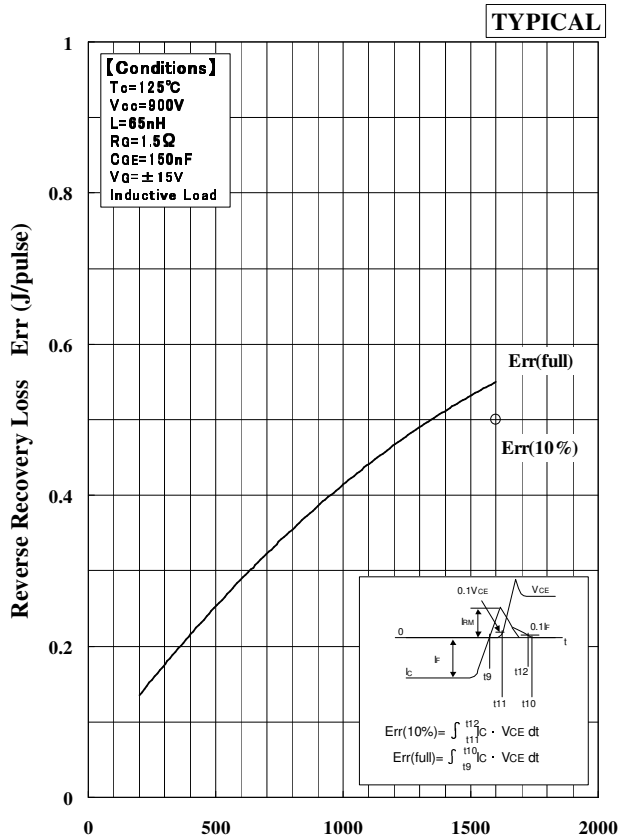
Turn-on Loss vs. Collector Current

TYPICAL



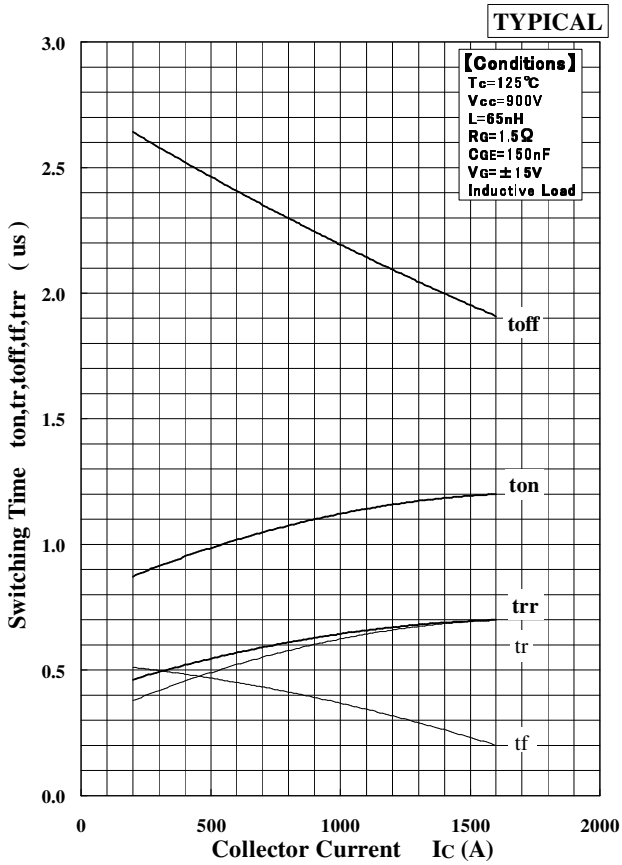
Turn-off Loss vs. Collector Current

TYPICAL



Recovery Loss vs. Forward Current

TYPICAL



Switching Time vs. Collector Current

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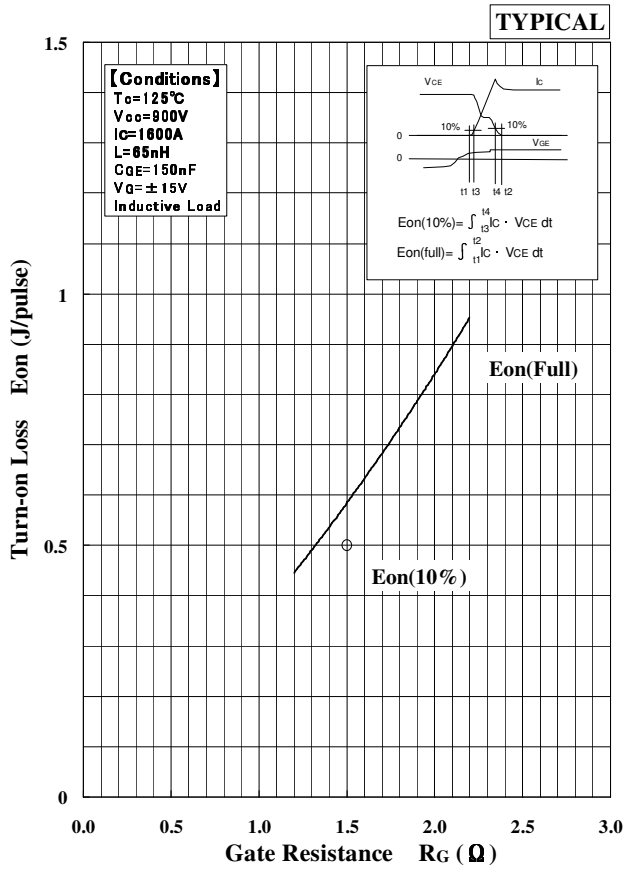
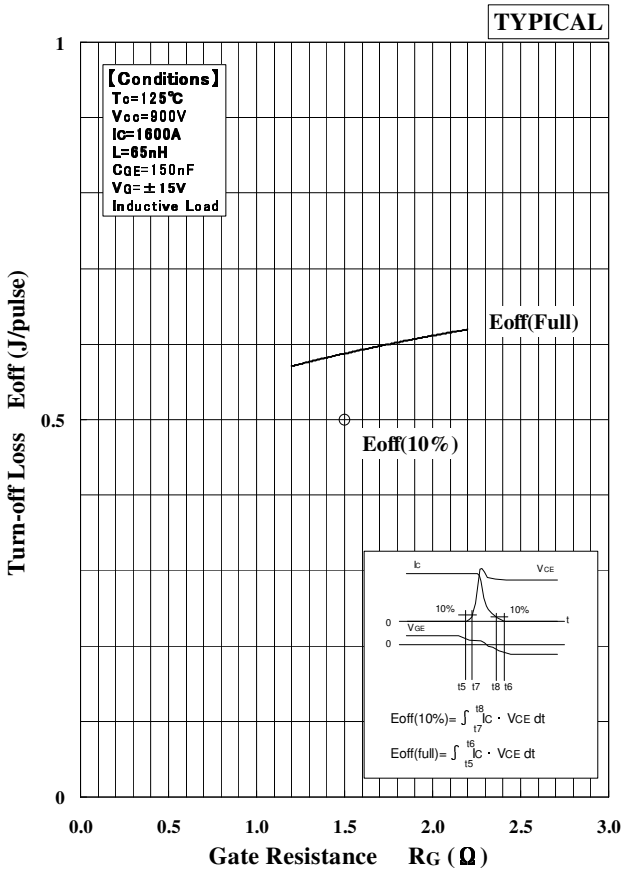
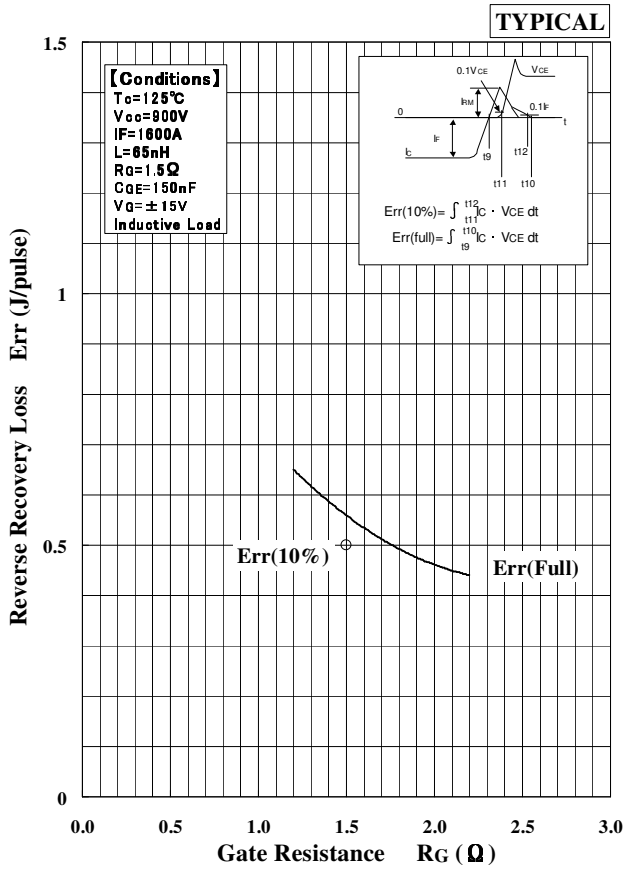
DEPENDENCE OF RG



Turn-on Loss vs. Gate Resistance



Turn-off Loss vs. Gate Resistance



Recovery Loss vs. Gate Resistance

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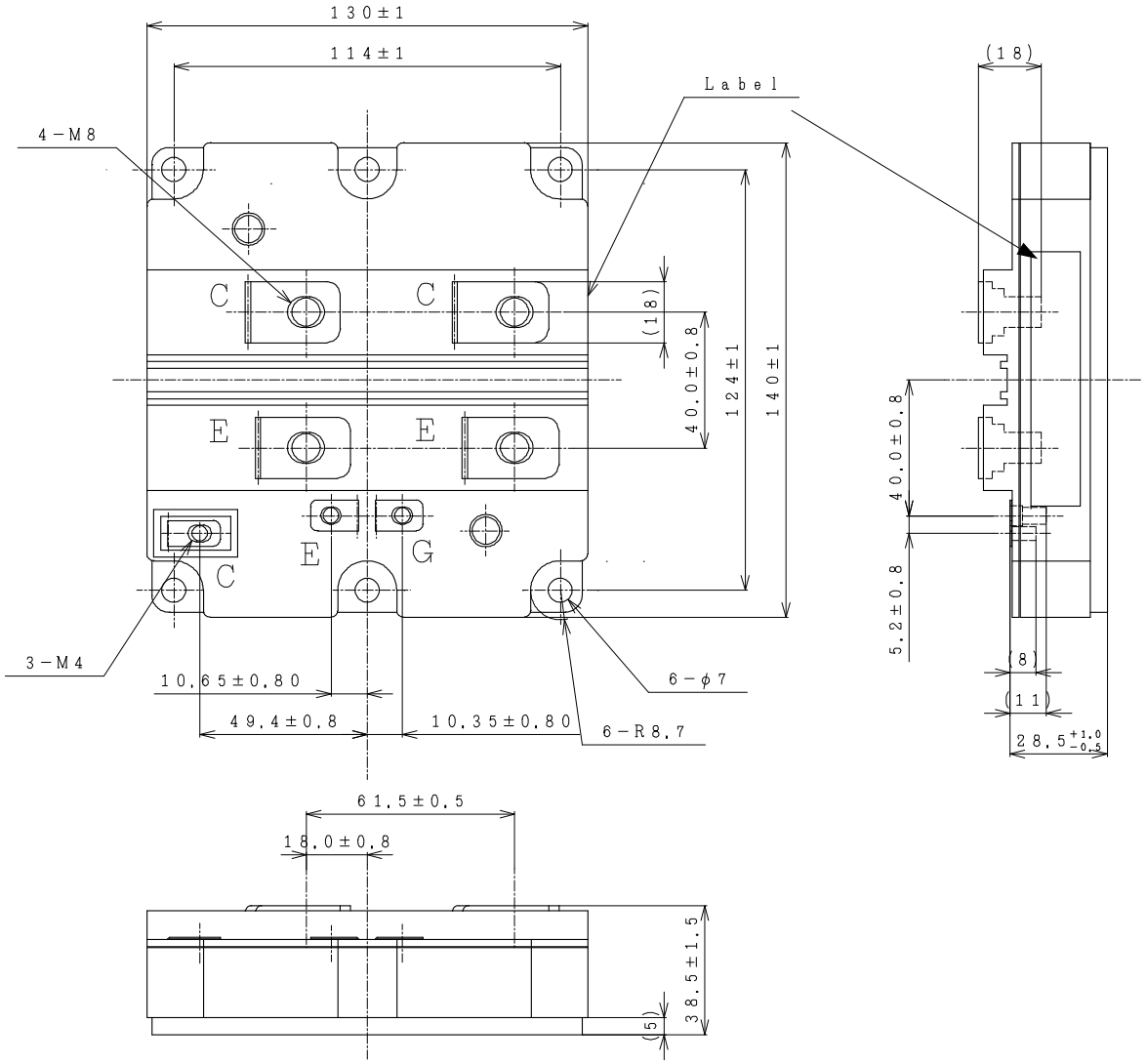
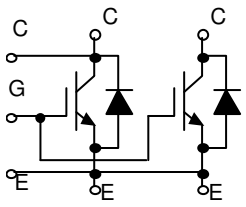
OUTLINE DRAWINGS

Unit in mm





Circuit diagram

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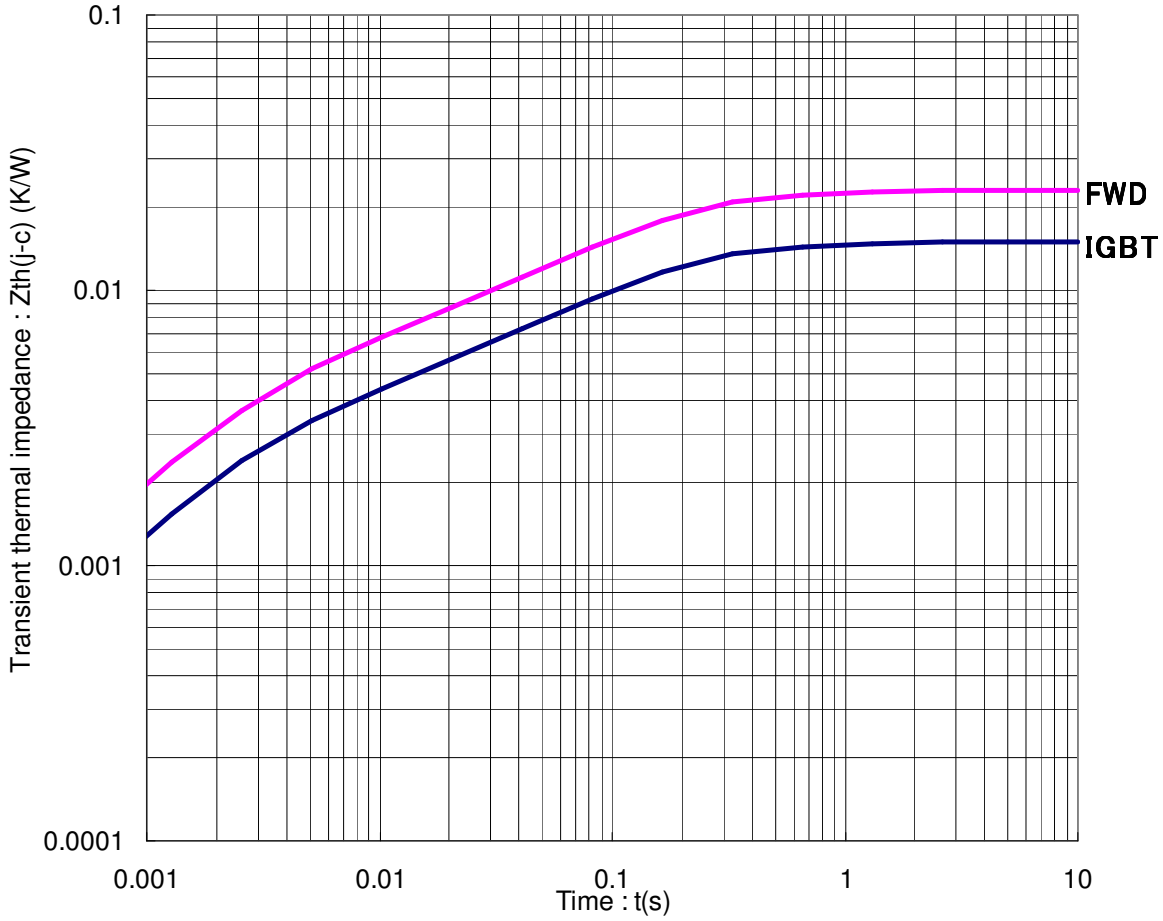
TRANSIENT THERMAL IMPEDANCE

Maximum



Transient Thermal Impedance Curve

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Negative environmental impact material

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
Arsenic and its compounds	Si chip

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HITACHI POWER SEMICONDUCTORS

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