MBN3600E17E

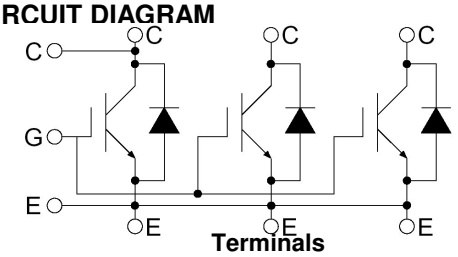
Preliminary SPECIFICATION

Silicon N-channel IGBT 1700V E version

FEATURES

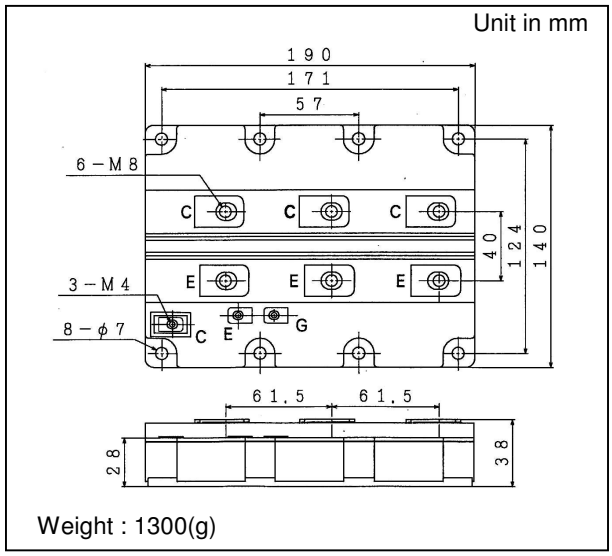
* Soft switching behavior & low conduction loss:
  Soft low-injection punch-through with trench gate IGBT.
* Low driving power:
  Low input capacitance advanced trench gate.
* Low noise recovery: Ultra soft fast recovery diode.
* High thermal fatigue durability:
  (delta Tc=70K, N>30,000cycles)
  AlSiC base-plate/AlN substrate.

CIRCUIT DIAGRAM



Terminals

OUTLINE DRAWING



Weight : 1300(g)

ABSOLUTE MAXIMUM RATINGS (Tc=25°C)

Item		Symbol	Unit	MBN3600E17E
Collector Emitter Voltage		V_{CES}	V	1,700
Gate Emitter Voltage		V_{GES}	V	±20
Collector Current	DC	I_C	A	3,600
	1ms	I_{Cp}		7,200
Forward Current	DC	I_F	A	3,600
	1ms	I_{FM}		7,200
Junction Temperature		$T_{j\,op}$	°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	2/15 (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	-	-	10	V_{CE}=1,700V, V_{GE}=0V, Tj=25°C
				-	15	50	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	1.6	2.2	2.8	I_C=3,600A, V_{GE}=15V, Tj=125°C
Gate Emitter Threshold Voltage		$V_{GE(TO)}$	V	5.0	6.5	8.0	V_{CE}=10V, I_C=360mA, Tj=25°C
Input Capacitance		C_{ies}	nF	-	320	-	V_{CE}=10V, V_{GE}=0V, f=100kHz, Tj=25°C
Internal Gate Resistance		Rge	Ω	-	0.5	-	V_{CE}=10V, V_{GE}=0V, f=100kHz, Tj=25°C
Switching Times	Rise Time	t_r	µs	0.4	0.9	1.8	V_{CC}=900V, Ic=3,600A
	Turn On Time	t_{on}		0.9	1.8	3.6	Ls=55nH (3)
	Fall Time	t_f		0.4	0.8	1.6	R_G(on/off)=3.3/1.5Ω (3)
	Turn Off Time	t_{off}		1.4	2.8	5.6	V_{GE}=±15V, Tj=125°C
Peak Forward Voltage Drop		V_{FM}	V	1.5	2.1	2.7	IF=3,600A, V_{GE}=0V, Tj=125°C
Reverse Recovery Time		t_{rr}	µs	0.3	0.7	1.4	V_{CC}=900V, Ic=3,600A
Turn On Loss		$E_{on(10\%)}$	J/P	-	0.5	1.0	Ls=55nH (3)
Turn Off Loss		$E_{off(10\%)}$	J/P	-	2.3	3.5	R_G(on/off)=3.3/1.5Ω (3)
Reverse Recovery Loss		$E_{rr(10\%)}$	J/P	-	0.7	1.1	V_{GE}=±15V, Tj=125°C
Stray inductance in module		L_{SCE}	nH	-	8	-	
Thermal Impedance Junction to Case	IGBT	Rth(j-c)	K/W	-	-	0.0075	Junction to case
	FWD	Rth(j-c)		-	-	0.012	
Contact Thermal Impedance		Rth(c-f)	K/W	-	0.006	-	Case to fin

Notes:(3) Ls and R_G are the test condition's values 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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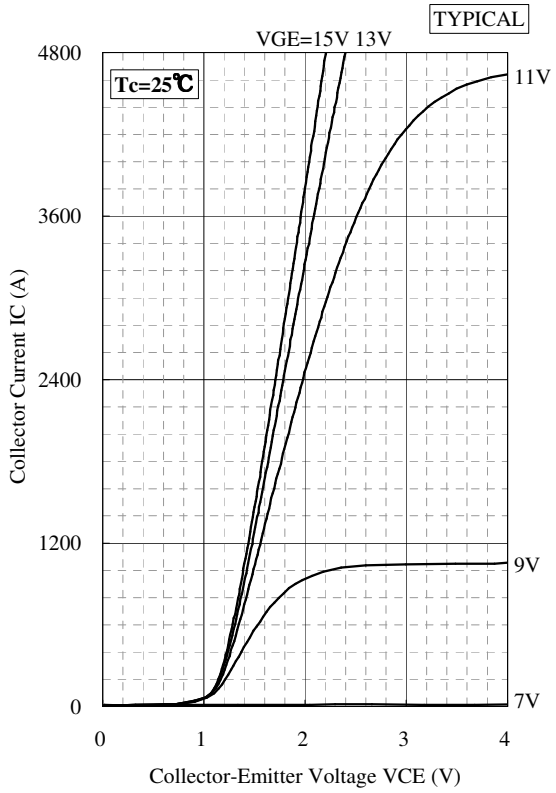
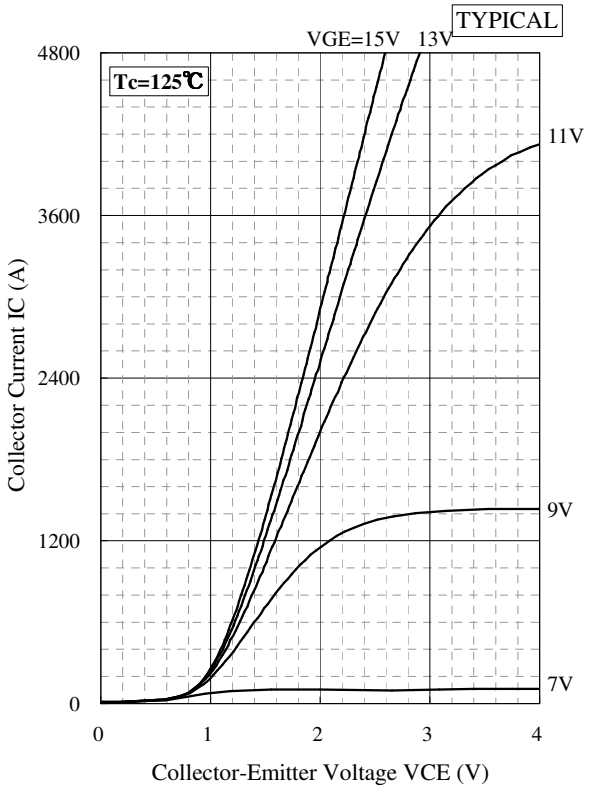
Preliminary SPECIFICATION

1. CHARACTERISTICS CURVE

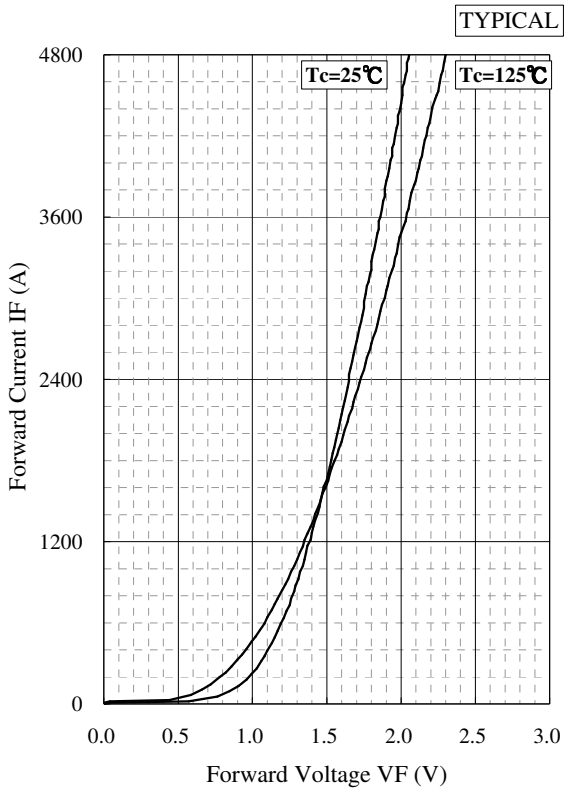
1.1 STATIC CHARACTERISTICS



Collector Current vs. Collector to Emitter Voltage



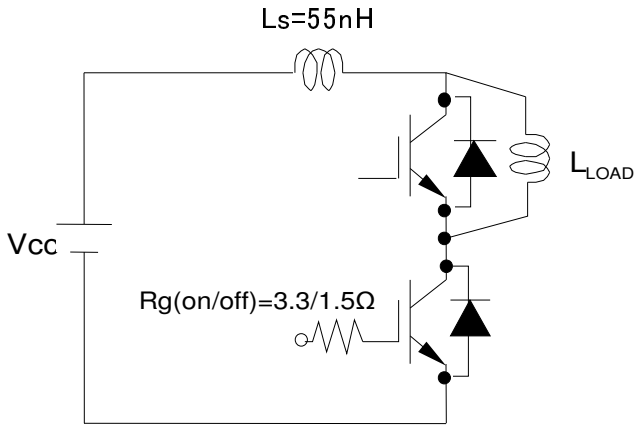
Collector Current vs. Collector to Emitter Voltage

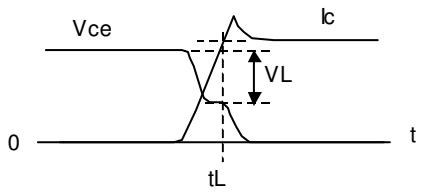


Forward Voltage of free-wheeling diode

1.2 DYNAMIC CHARACTERISTICS

1.2.1 CIRCUIT

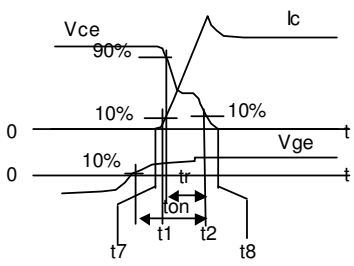


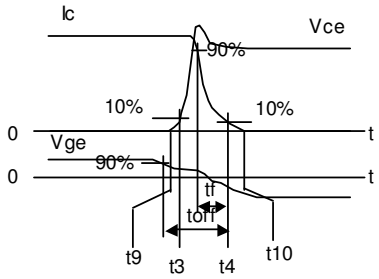


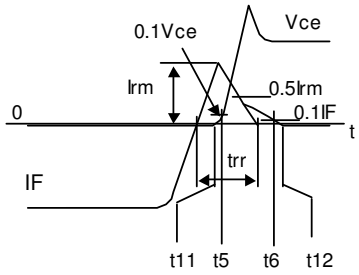
$$Ls = \frac{VL}{\left(\frac{dIc}{dt}\right)_{t=tL}}$$

Definition of Ls

1.2.2 WAVEFORM DEFINITION







$$Eon(10\%) = \int_{t1}^{t2} Ic \cdot Vce \, dt \qquad Eoff(10\%) = \int_{t3}^{t4} Ic \cdot Vce \, dt \qquad Err(10\%) = \int_{t5}^{t6} IF \cdot Vce \, dt$$

$$Eon(Full) = \int_{t7}^{t8} Ic \cdot Vce \, dt \qquad Eoff(Full) = \int_{t9}^{t10} Ic \cdot Vce \, dt \qquad Err(Full) = \int_{t11}^{t12} IF \cdot Vce \, dt$$

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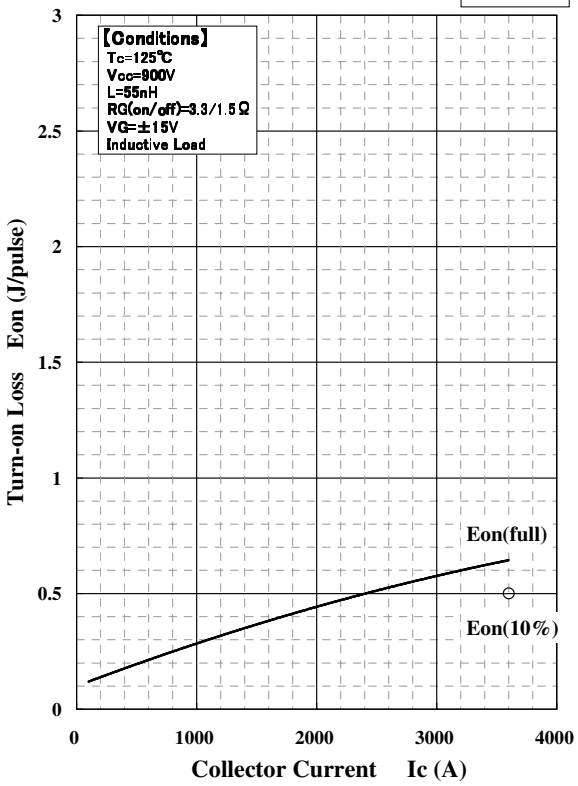
Preliminary SPECIFICATION

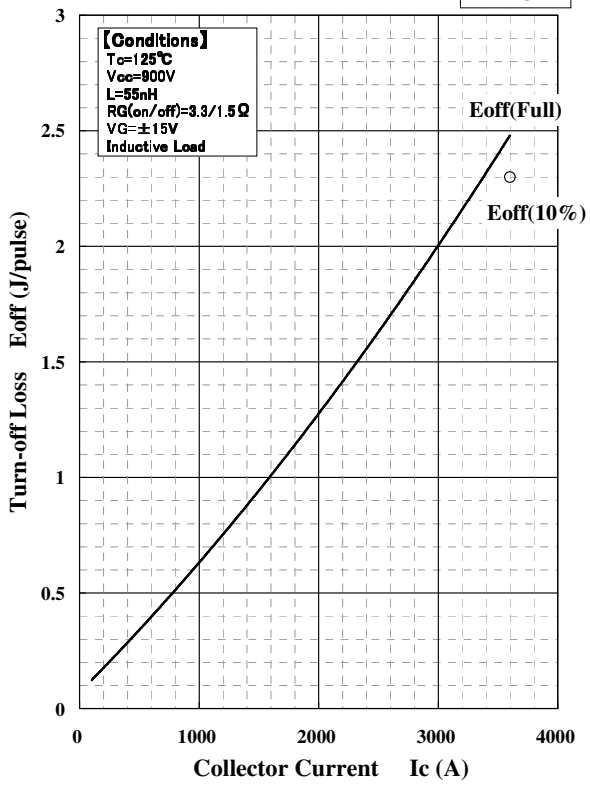
1.2.3 DEPENDENCE OF CURRENT

TYPICAL



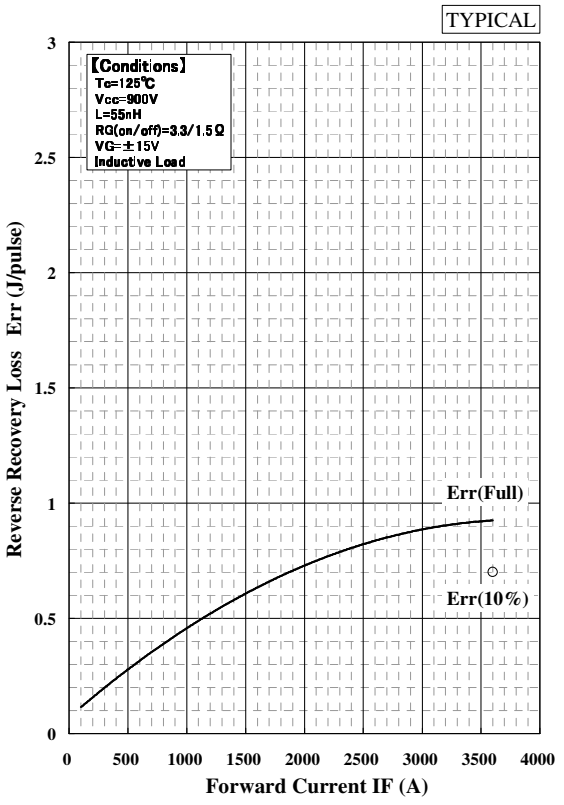
Turn-on Loss vs. Collector Current

TYPICAL

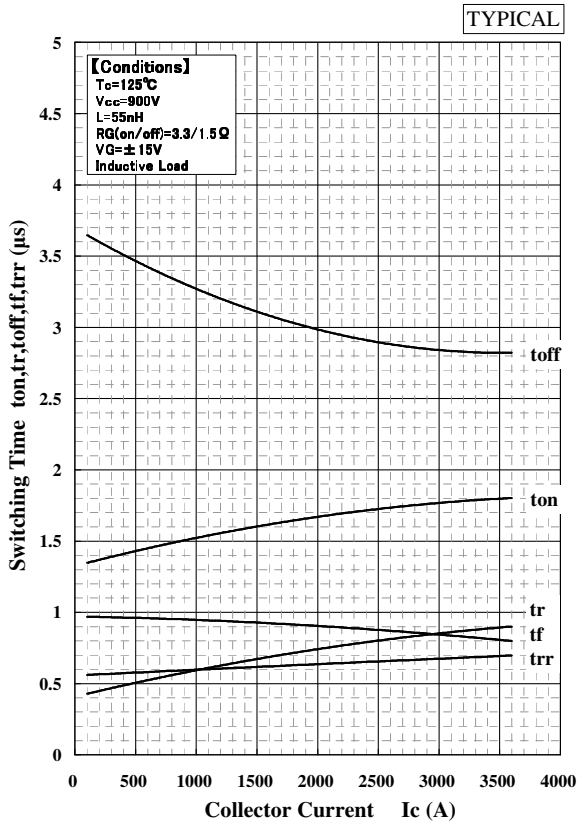


Turn-off Loss vs. Collector Current

TYPICAL



TYPICAL



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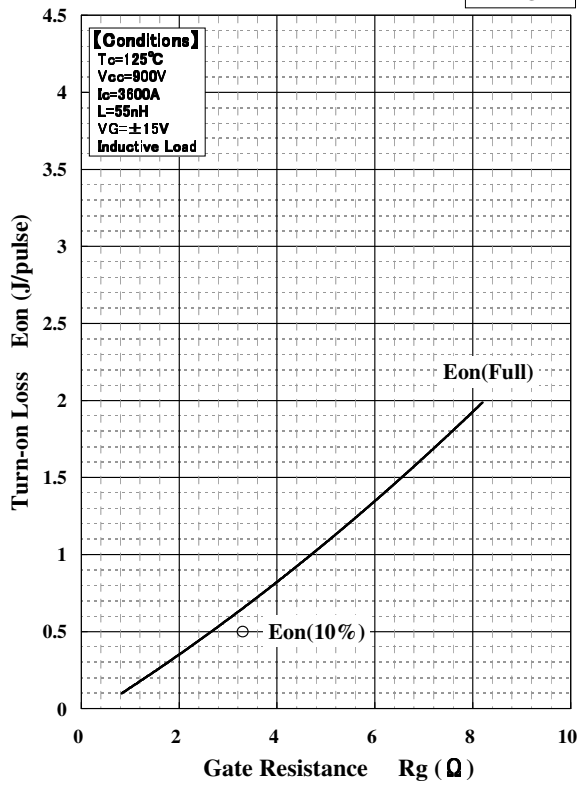
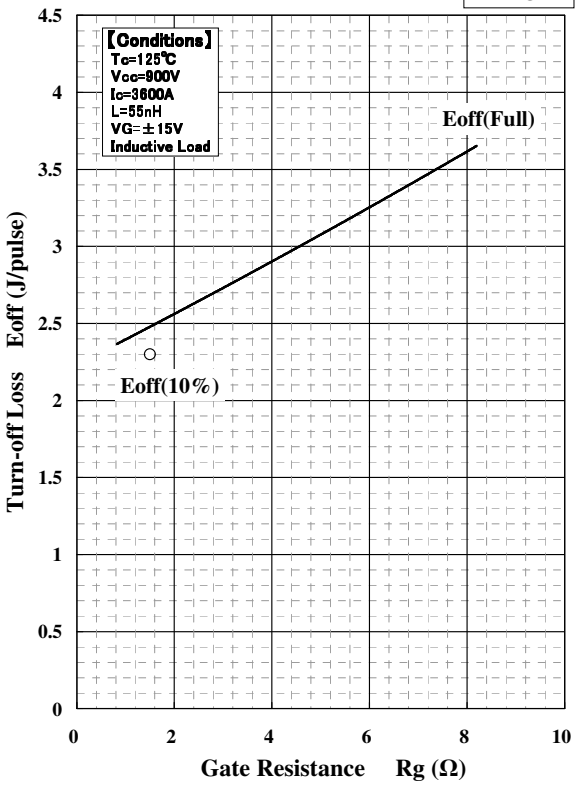
1.2.4 DEPENDENCE OF RG

TYPICAL



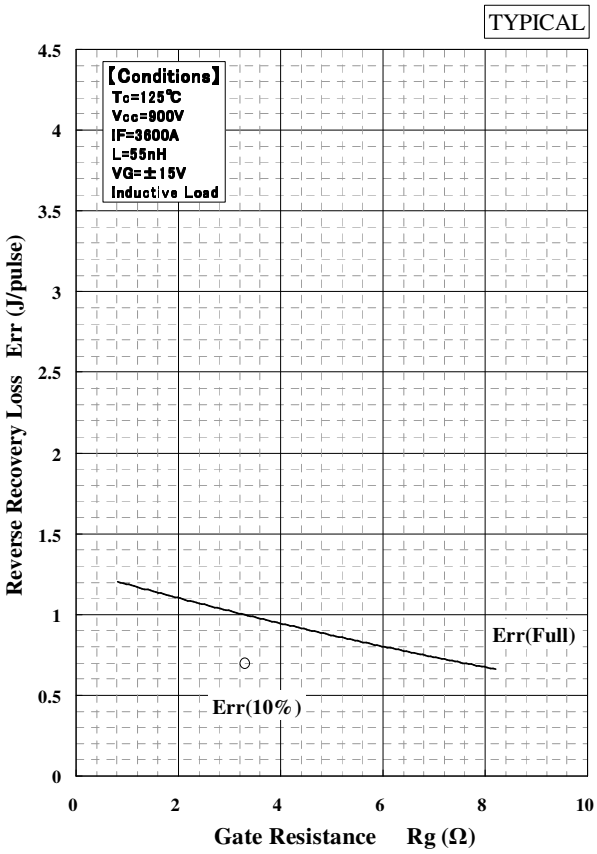
Turn-on Loss vs. Gate Resistance

TYPICAL



Turn-off Loss vs. Gate Resistance

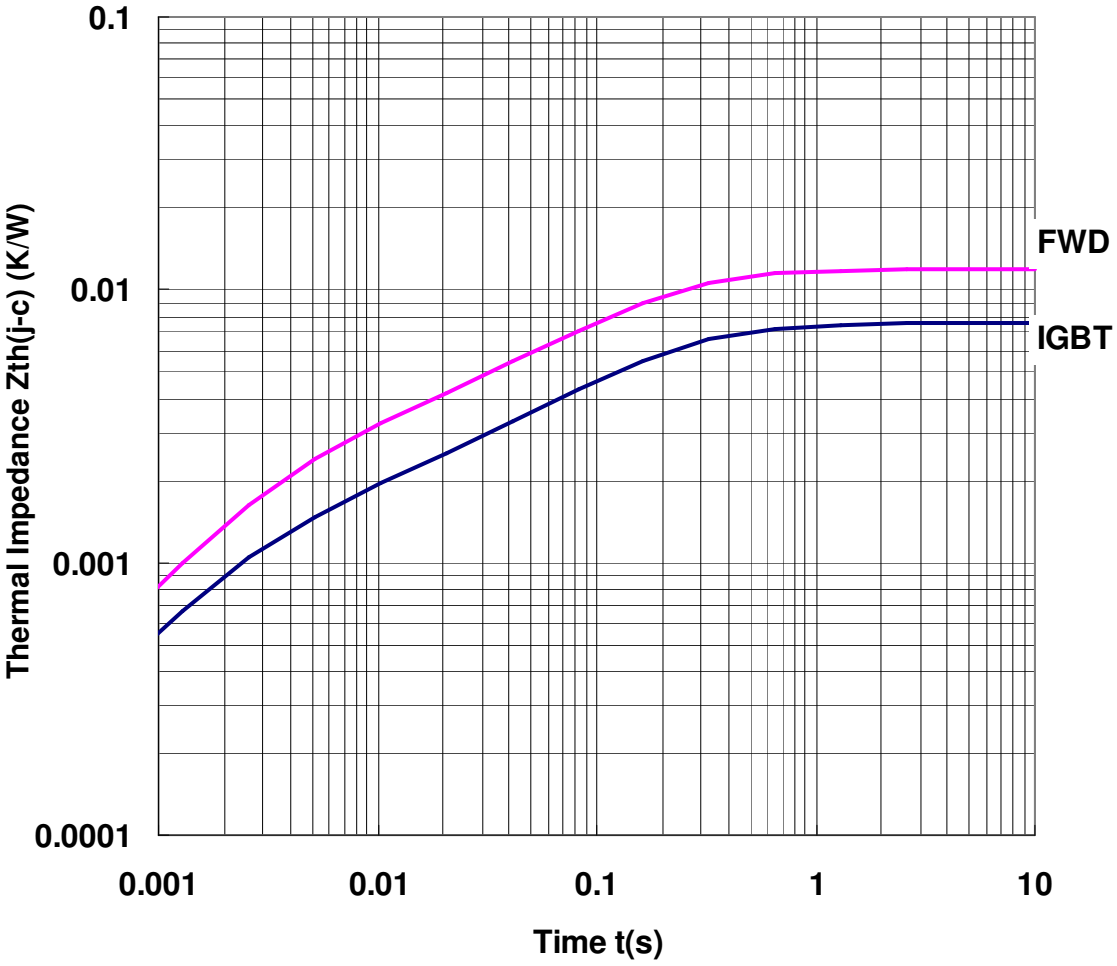
TYPICAL



Reverse Recovery Loss vs. Gate Resistance

2. Thermal Impedance

2.1 TRANSIENT 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

HITACHI POWER SEMICONDUCTORS

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