

MBN1800FH33F

Silicon N-channel IGBT 3300V F version

FEATURES

- * Soft switching behavior, low switching loss & low conduction loss :
Soft low-injection punch-through
Advanced Trench High conductivity IGBT.
- * Low driving power due to low input capacitance with trench MOS gate.
- * Low noise recovery: Ultra soft fast recovery diode.
- * High Current rate Package.
- * Low Rth(j-c) & low stray inductance.
- * RoHS

ABSOLUTE MAXIMUM RATINGS (T_C=25°C)

Item	Symbol	Unit	MBN1800FH33F
Collector Emitter Voltage	V _{CES}	V	3,300
Gate Emitter Voltage	V _{GES}	V	±20
Collector Current	DC	I _C	1,800
	1ms	I _{CRM}	3,600
Forward Current	DC	I _F	1,800
	1ms	I _{FRM}	3,600
Junction Temperature	T _j	°C	-50 ~ +150
Storage Temperature	T _{stg}	°C	-50 ~ +150
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±0.2/9±1N·m (2) Recommended Value 5.5±0.5N·m

ELECTRICAL CHARACTERISTICS

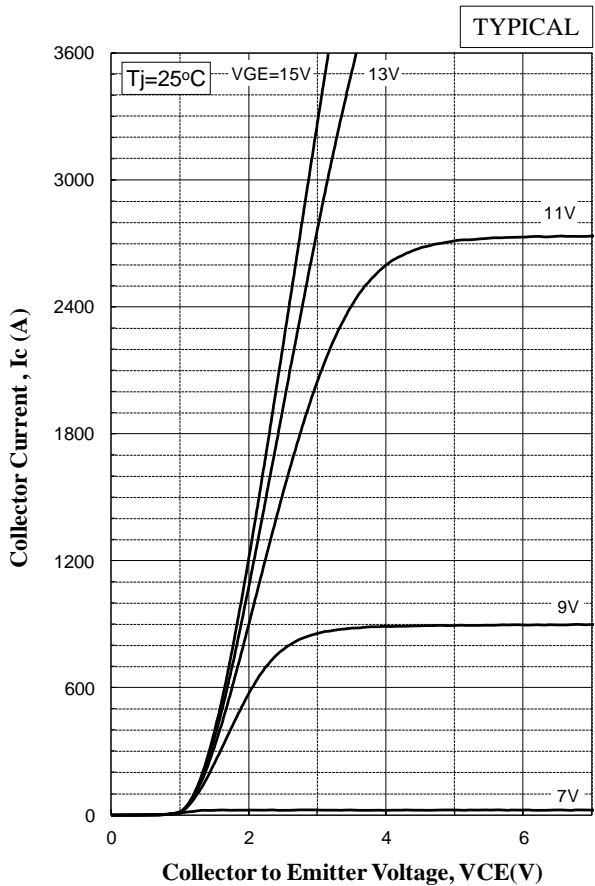
Item	Symbol	Unit	Min.	Typ.	Max.	Test Conditions
Collector Emitter Cut-Off Current	I _{CES}	mA	-	-	0.6	V _{CE} =3,300V, V _{GE} =0V, T _j =25°C
			-	40	100	V _{CE} =3,300V, V _{GE} =0V, T _j =150°C
Gate Emitter Leakage Current	I _{GES}	nA	-500	-	+500	V _{GE} =±20V, V _{CE} =0V, T _j =25°C
Collector Emitter Saturation Voltage	V _{CESat}	V	2.5	2.85	3.5	I _C =1800A, V _{GE} =15V, T _j =150°C
Gate Emitter Threshold Voltage	V _{GE(th)}	V	5.5	6.5	7.5	V _{CE} =10V, I _C =1800mA, T _j =25°C
Input Capacitance	C _{ies}	nF	-	132	-	V _{CE} =10V, V _{GE} =0V, f=100kHz, T _j =25°C
Internal Gate Resistance	r _g	Ω	-	1.3	-	V _{CE} =10V, V _{GE} =0V, f=100kHz, T _j =25°C
Switching Times	Rise Time	t _r	-	0.3	-	V _{CC} =1,800V, I _C =1800A
	Turn On Time	t _{on}	-	1.1	-	L _S =100nH
	Fall Time	t _f	-	1.8	-	R _G (on/off)=4.7Ω/5.6Ω (3)
	Turn Off Time	t _{off}	-	4.0	-	V _{GE} =±15V, T _j =150°C
Peak Forward Voltage Drop	V _F	V	2.2	2.6	2.9	I _F =1800A, V _{GE} =0V, T _j =150°C
Reverse Recovery Time	t _{rr}	μs	-	0.7	-	V _{CC} =1,800V, I _F =1800A, L _S =100nH T _j =150°C
Turn On Loss	E _{on}	J/P	-	3.7	-	V _{CC} =1,800V, I _C =1800A, L _S =100nH
Turn Off Loss	E _{off}	J/P	-	3.3	-	R _G (on/off)=4.7Ω/5.6Ω (3)
Reverse Recovery Loss	E _{rr}	J/P	-	2.4	-	V _{GE} =±15V, T _j =150°C
Stray inductance module	L _{SCE}	nH	-	12	-	
Thermal Impedance	IGBT	Rth(j-c)	-	-	0.0075	Junction to case
	FWD	Rth(j-c)	-	-	0.0125	
Contact Thermal Impedance	Rth(c-f)	K/W	-	0.005	-	Case to fin
I ² t value	I ² t	kA ² s	1000	-	-	T _{j,start} =150°C, 10ms, V _R =0V, half-sinewave

Notes: (3) R_G value is a test condition value for evaluation, not recommended value.
Please, determine the suitable R_G value by measuring switching behaviors.

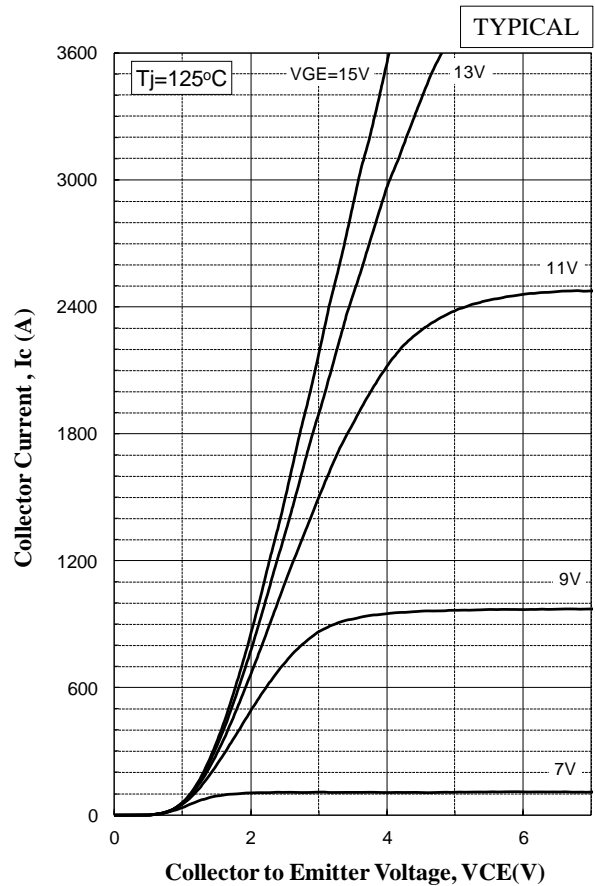
- * Please contact our representatives at order.
- * For improvement, specifications are subject to change without notice.
- * For actual application, please confirm this spec sheet is the newest revision.
- * ELECTRICAL CHARACTERISTIC values according to IEC 60747-2 IEC 60747-9

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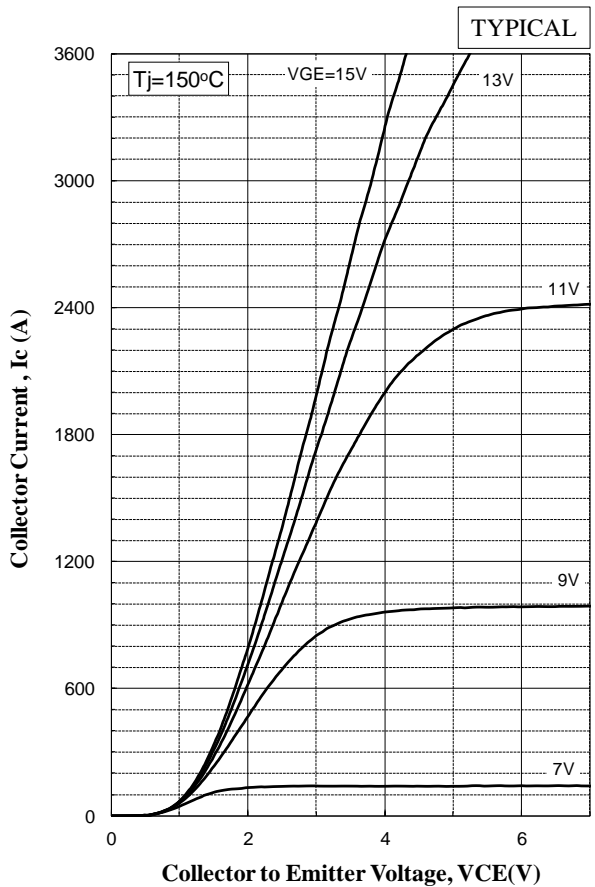
STATIC CHARACTERISTICS



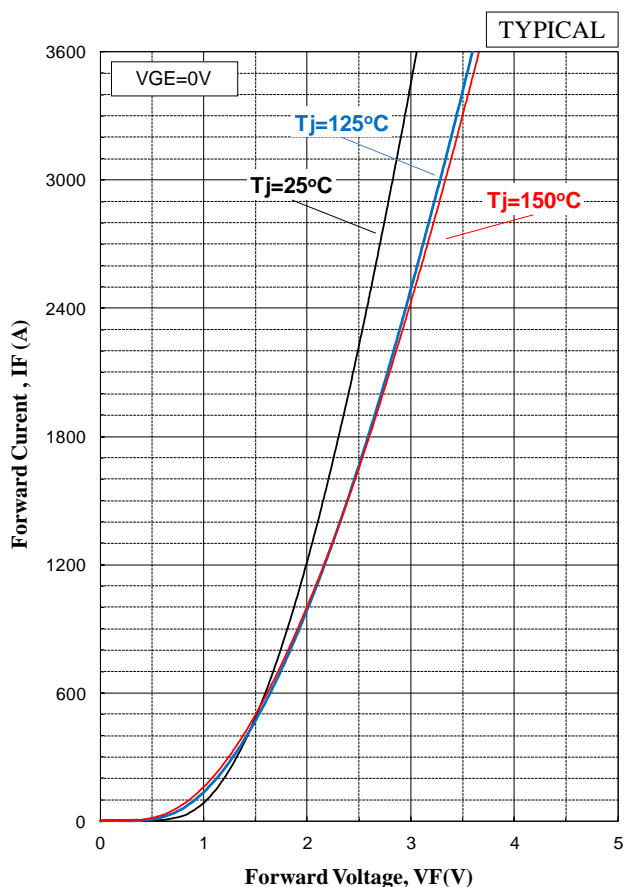
Collector Current vs. Collector to Emitter Voltage



Collector Current vs. Collector to Emitter Voltage



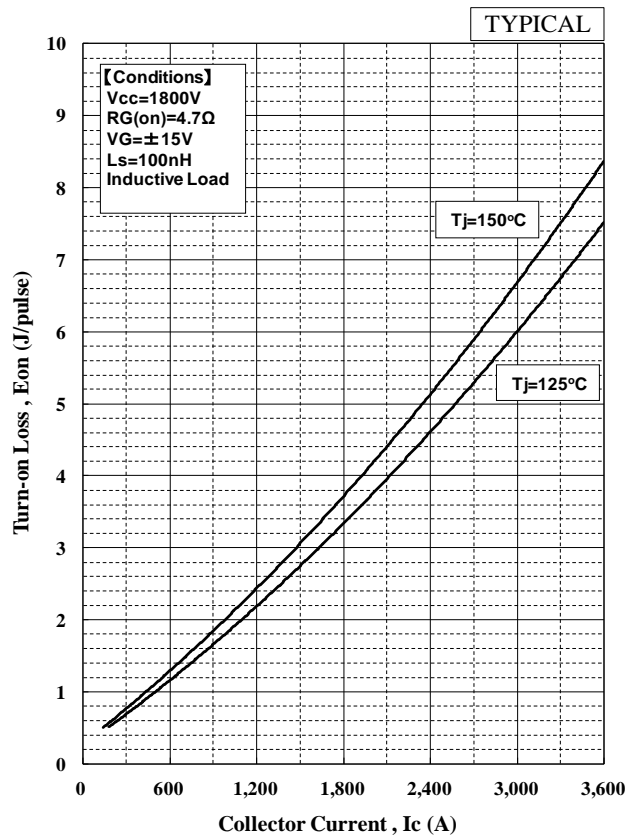
Collector Current vs. Collector to Emitter Voltage



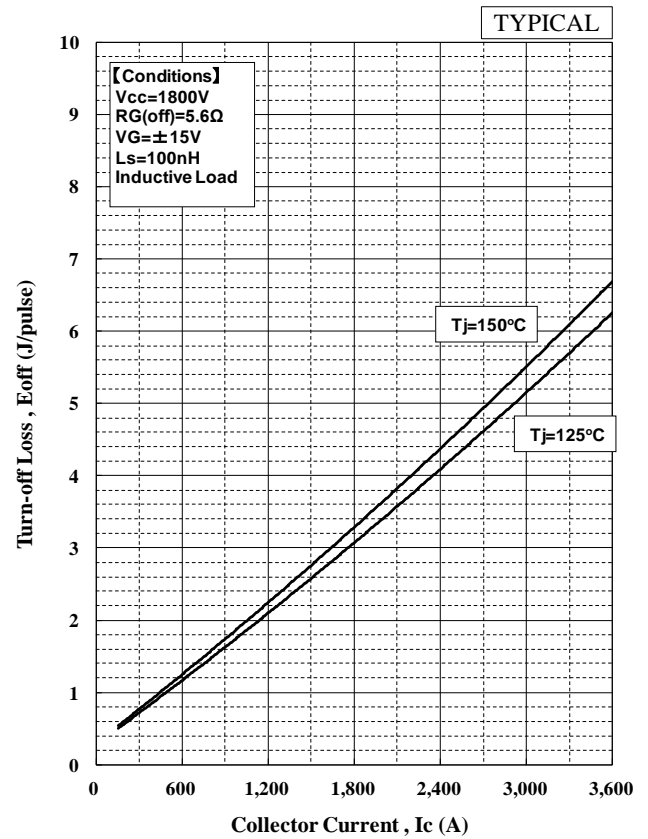
Forward Voltage of free-wheeling diode

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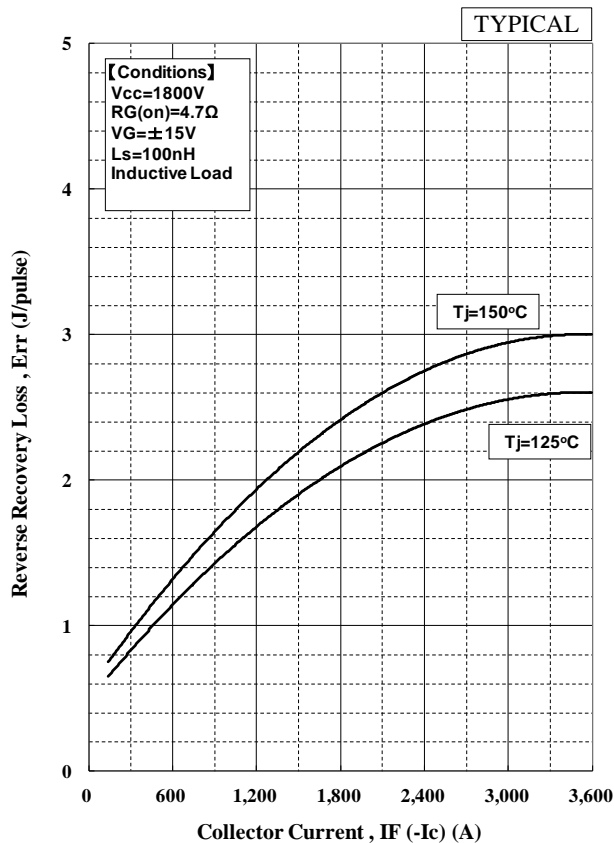
DYNAMIC CHARACTERISTICS



Turn-on Loss vs. Collector Current



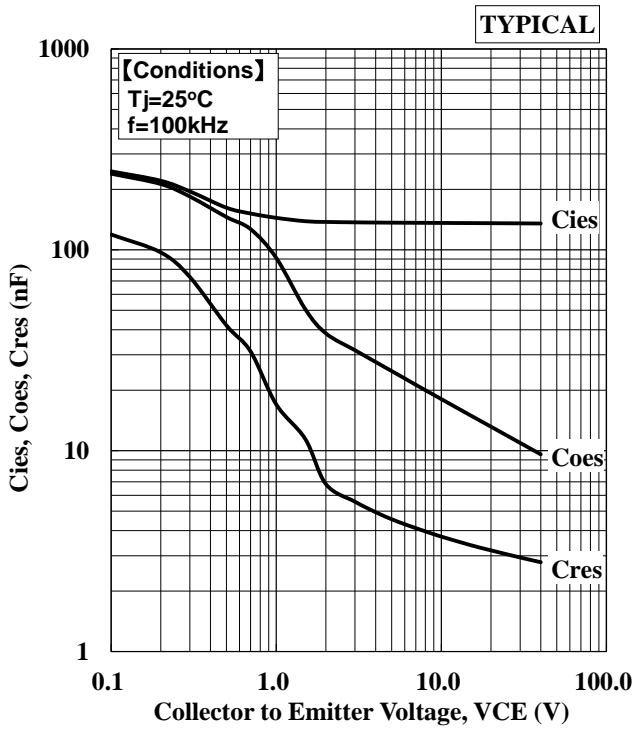
Turn-off Loss vs. Collector Current



Recovery Loss vs. Collector Current

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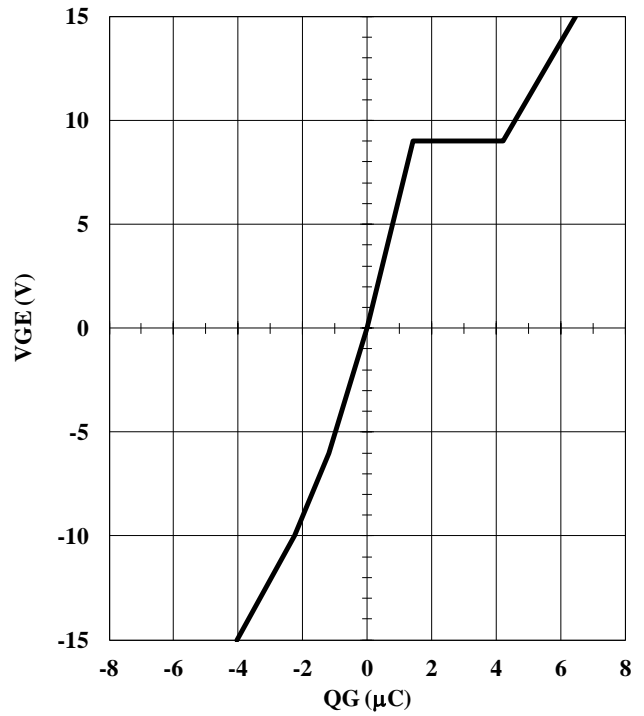
Capacitance vs. Collector to Emitter Voltage



Capacitance vs. Collector to Emitter Voltage

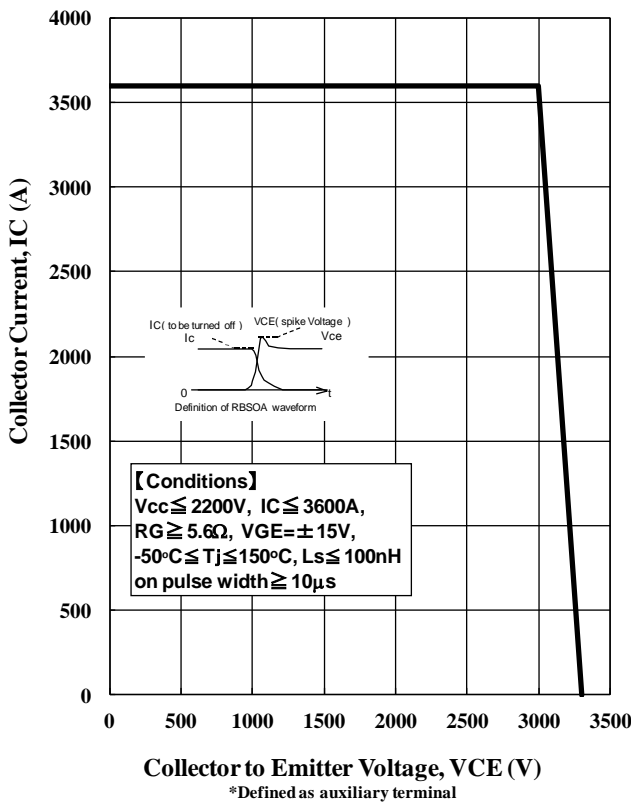
QG-VGE CURVE

Conditions: $L_s=100\text{nH}$, $V_{CC}=1800\text{V}$, $I_C=1800\text{A}$, $V_{GE}=\pm 15\text{V}$, $T_j=25^\circ\text{C}$ **TYPICAL**

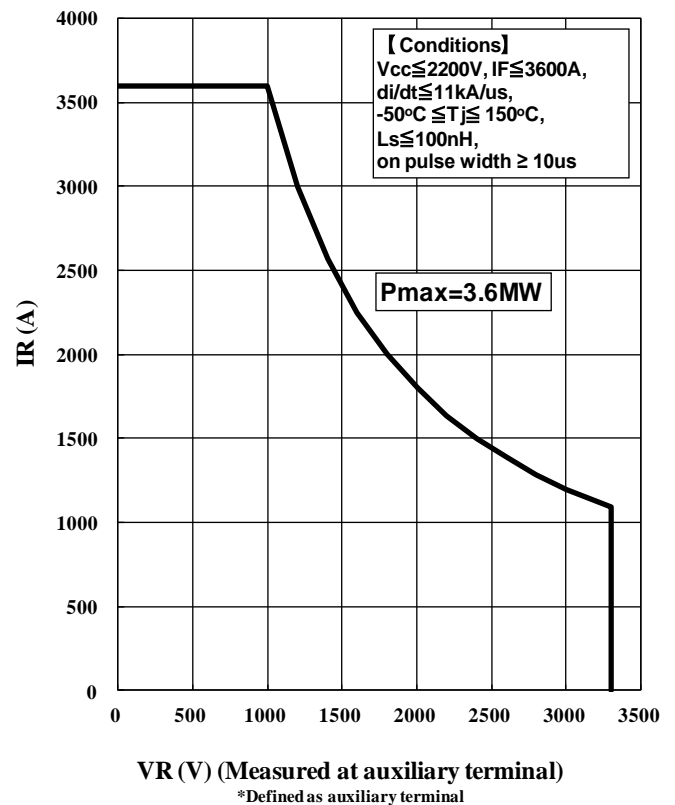


QG-VGE curve

Safe Operating Area



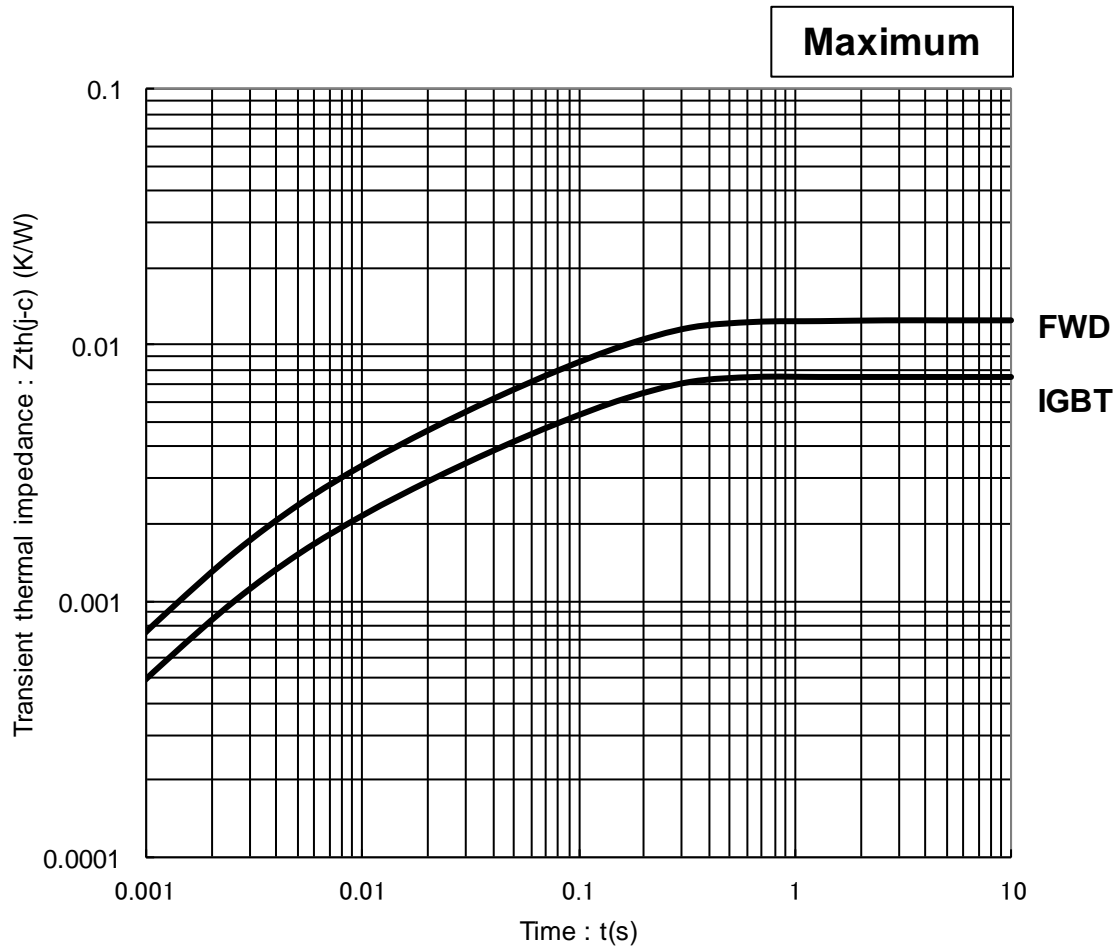
Reverse bias safe operation area(RBSOA)



Reverse recovery safe operation area(RRSOA)

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TRANSIENT THERMAL IMPEDANCE



Transient Thermal Impedance Curve

Curve approximation model

$$(\sum Z_{th}[n] * (1 - \exp(-t/\tau_{th}[n])))$$

n	1	2	3	4	Unit
$\tau_{th}[n]$	0.003	0.03	0.1	0.3	sec
$Z_{th}[n,IGBT]$	1.52E-03	8.82E-04	4.60E-03	5.03E-04	K/W
$Z_{th}[n,Diode]$	2.36E-03	1.69E-03	6.99E-03	1.47E-03	K/W

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OUTLINE DRAWINGS

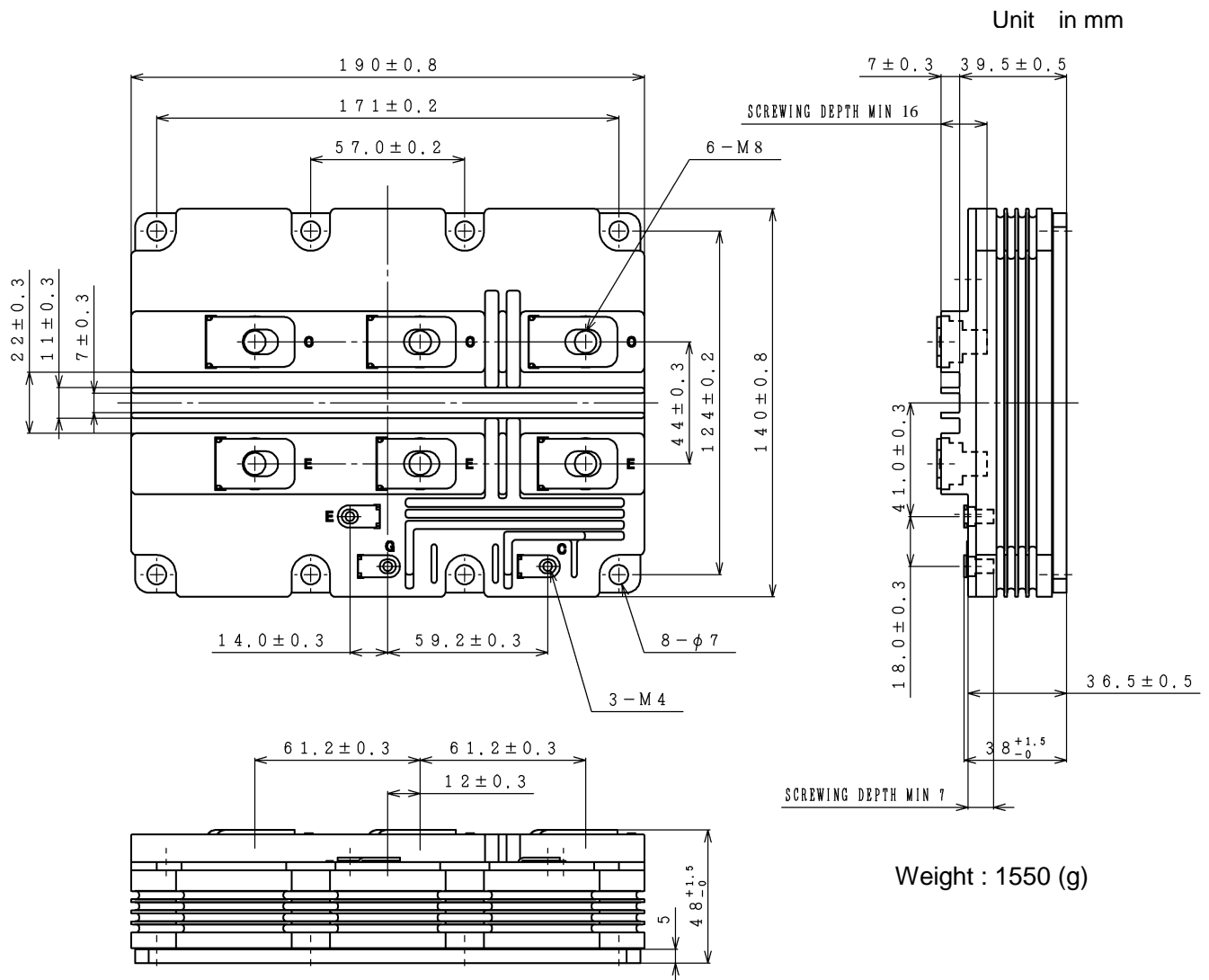


Fig.1 Outline Drawings

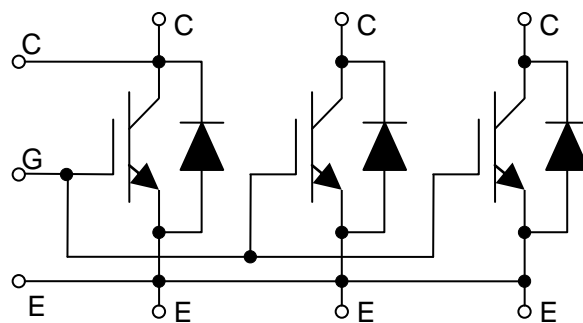


Fig.2 Circuit diagram

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HITACHI POWER SEMICONDUCTORS

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