

MBN1200F33F-C3

3300V Silicon N-channel IGBT F version with SiC Diode

FEATURES

- * Soft switching & low conduction loss IGBT :
 - Soft low-injection punch-through
 - High conductivity IGBT with advanced trench MOS gate.
- * Low driving power due to low input capacitance.
- * Ultra low recovery loss with SiC diode.
- * High Current rate Package.
- * Low stray inductance.
- * RoHS

ABSOLUTE MAXIMUM RATINGS (T_C=25°C)

Item	Symbol	Unit	MBN1200F33F-C3
Collector Emitter Voltage	V _{CES}	V	3,300
Gate Emitter Voltage	V _{GES}	V	±20
Collector Current	DC	I _C	1,200
	1ms	I _{CRM}	2,400
Forward Current	DC	I _F	1,200
	1ms	I _{FRM}	2,400
Junction Temperature	T _{vj op}	°C	-40 ~ +150
Storage Temperature	T _{stg}	°C	-40 ~ +150
Isolation Voltage	V _{ISO}	V _{RMS}	6,000(AC 1 minute)
Screw Torque	Terminals (M4/M8)	-	2/15 (1)
	Mounting (M6)	-	6 (2)

Notes: (1) Recommended Value 1.8±0.2/15⁺⁰₋₃N·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	-	-	12	V _{CE} =3,300V, V _{GE} =0V, T _{vj} =25°C	
Gate Emitter Leakage Current	I _{GES}	nA	-500	-	+500	V _{CE} =3,300V, V _{GE} =0V, T _{vj} =150°C	
Collector Emitter Saturation Voltage	V _{CESat}	V	-	2.85	-	I _C =1,200A, V _{GE} =15V, T _{vj} =150°C	
Gate Emitter Threshold Voltage	V _{GE(th)}	V	-	6.5	-	V _{CE} =10V, I _C =1,200mA, T _{vj} =25°C	
Input Capacitance	C _{ies}	nF	-	88	-	V _{CE} =10V, V _{GE} =0V, f=100kHz, T _{vj} =25°C	
Internal Gate Resistance	R _{G(int)}	Ω	-	1.9	-	V _{CE} =10V, V _{GE} =0V, f=100kHz, T _{vj} =25°C	
Turn On Delay Time	t _{d(on)}	μs	-	0.9	-	V _{CC} =1,800V, I _C =1,200A	
Rise Time	t _r		-	0.2	-	L _S =100nH	
Turn Off Delay Time	t _{d(off)}		-	2.2	-	R _{G(on/off)} =6.8Ω/8.2Ω (3)	
Fall Time	t _f		-	2.0	-	V _{GE} =±15V, T _{vj} =150°C	
Peak Forward Voltage Drop	V _F	V	-	4.6	-	I _F =1,200A, V _{GE} =0V, T _{vj} =150°C	
Reverse Recovery Time	t _{rr}	μs	-	0.1	-	V _{CC} =1,800V, I _F =1,200A, L _S =100nH T _{vj} =150°C	
Turn On Loss	E _{on}	J/P	-	1.4	-	V _{CC} =1,800V, I _C =1,200A, L _S =100nH	
Turn Off Loss	E _{off}	J/P	-	2.2	-	R _{G(on/off)} =6.8Ω/8.2Ω (3)	
Reverse Recovery Loss	E _{rr}	J/P	-	(0.1)	-	V _{GE} =±15V, T _{vj} =150°C	
Stray inductance module	L _{SCE}	nH	-	10	-		
Short Circuit Pulse Width	t _{sc}	μs	10	-	-	V _{CC} =2,200V, L _S =100nH R _{G(on/off)} =6.8/8.2Ω, V _{GE} =±15V, T _{vj} =150°C	
Thermal Impedance	IGBT	R _{th(j-c)}	K/W	-	-	0.010	Junction to case
	FWD	R _{th(j-c)}		-	-	0.017	
Contact Thermal Impedance		R _{th(c-f)}	K/W	-	0.008	-	Case to fin

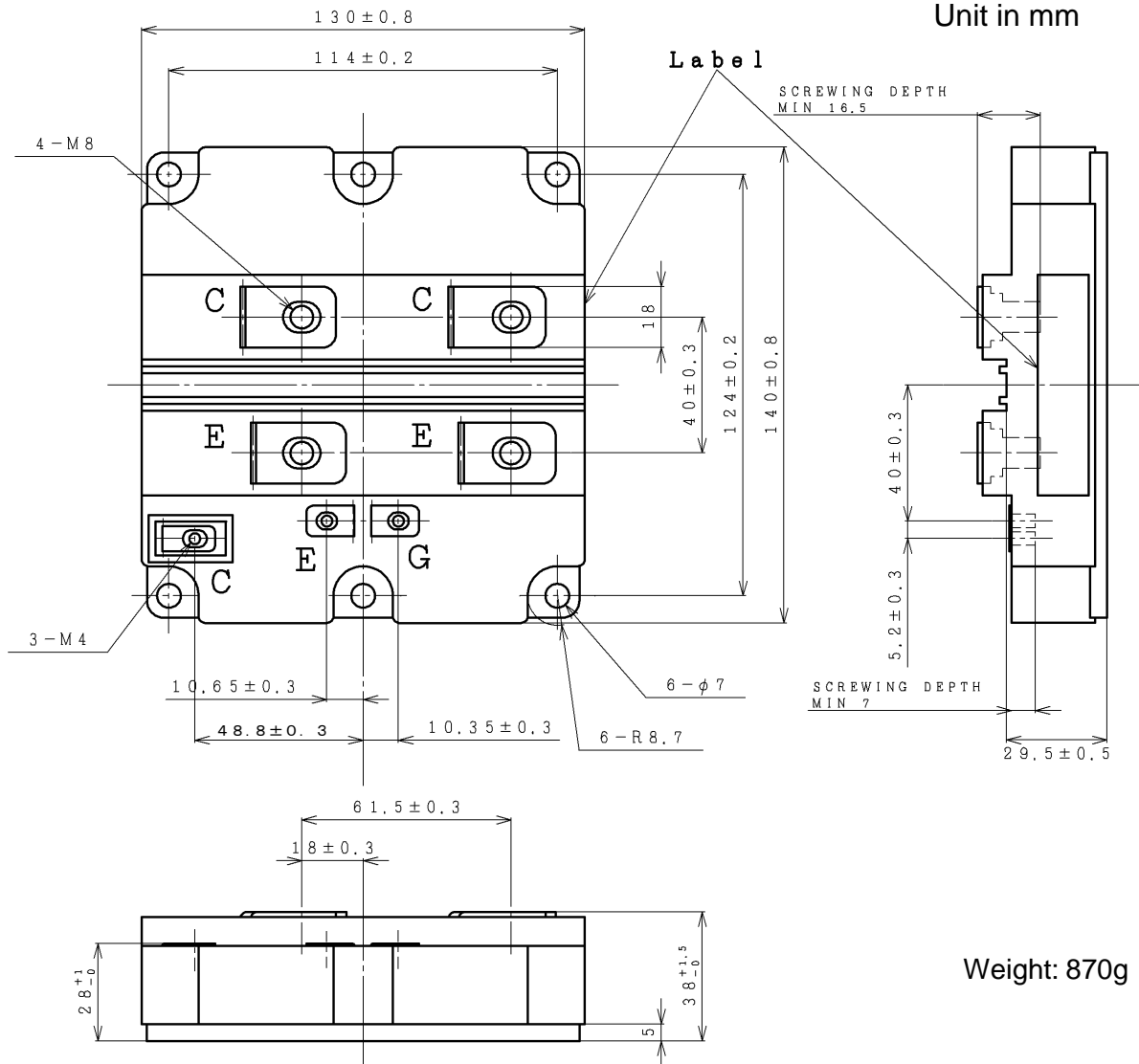
Notes: (3) R_G value is a test condition value for evaluation, not recommended value.

Please, determine the suitable R_G value by measuring switching behaviors.

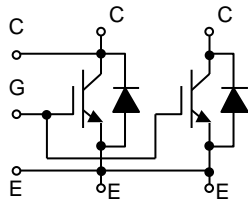
- * Please contact our representatives at order.
- * For improvement, specifications are subject to change without notice.
- * For actual application, please confirm this spec sheet is the newest revision.
- * ELECTRICAL CHARACTERISTIC items shown in above table are according to IEC 60747-2 and IEC 60747-9.

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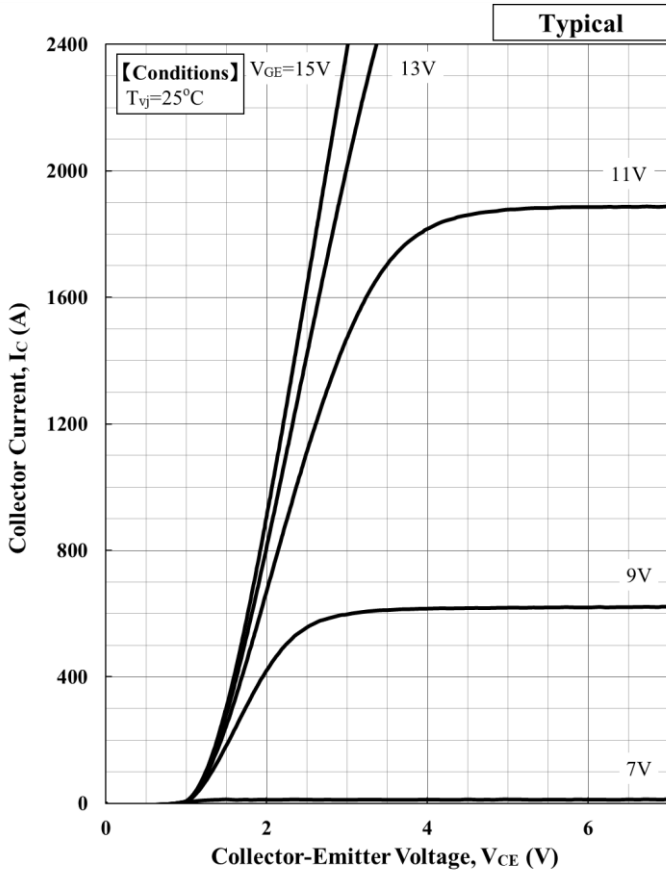
OUTLINE DRAWING



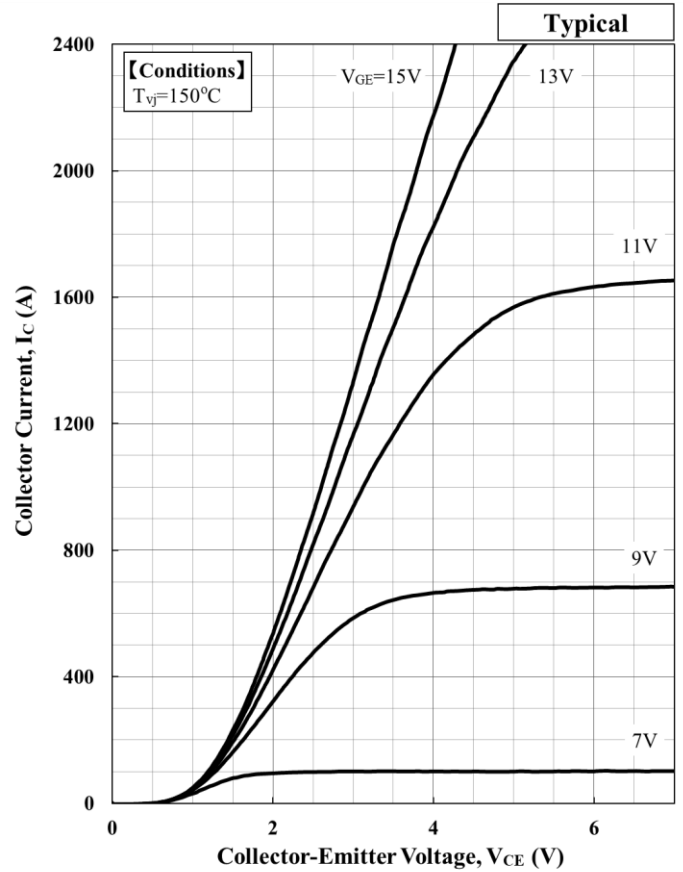
CIRCUIT DIAGRAM



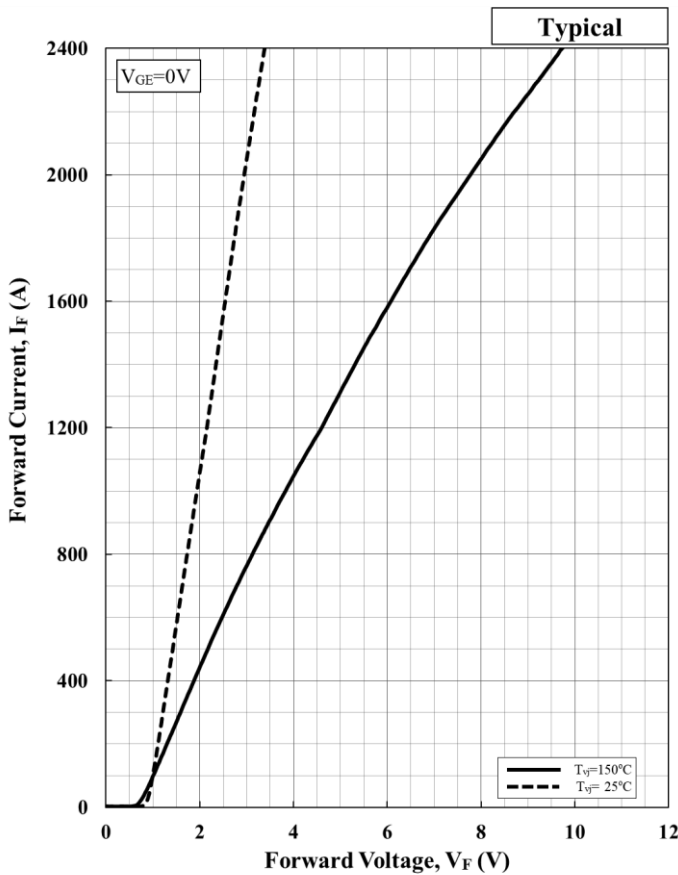
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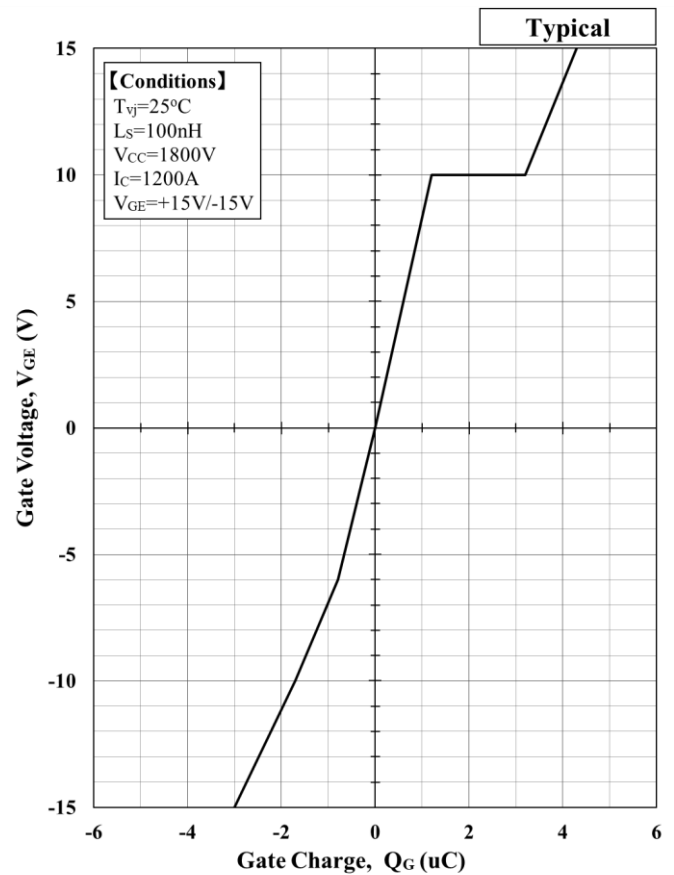
Collector Current vs. Collector Emitter Voltage



Collector Current vs. Collector Emitter Voltage

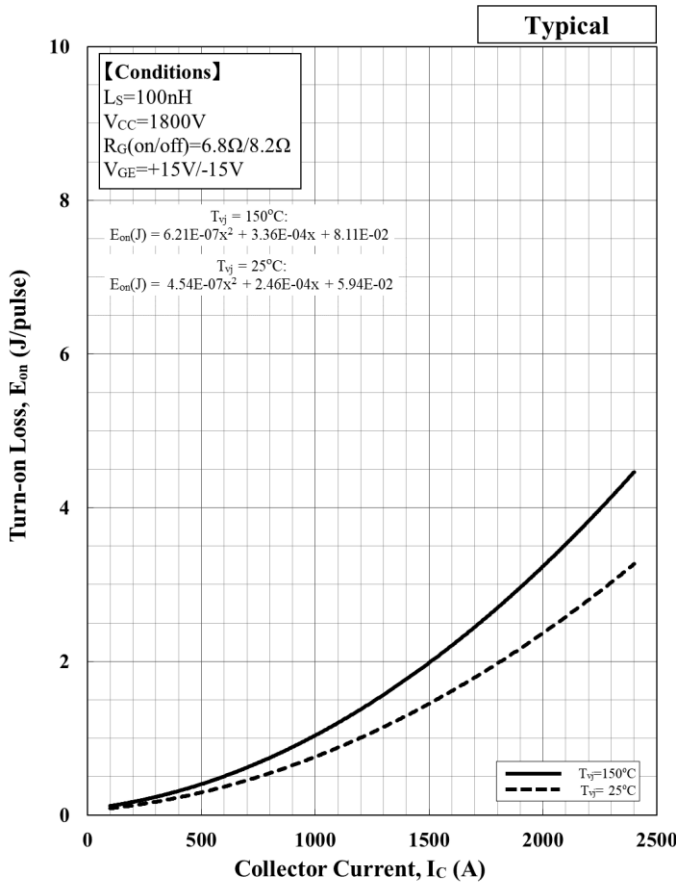


Forward Voltage of free-wheeling diode

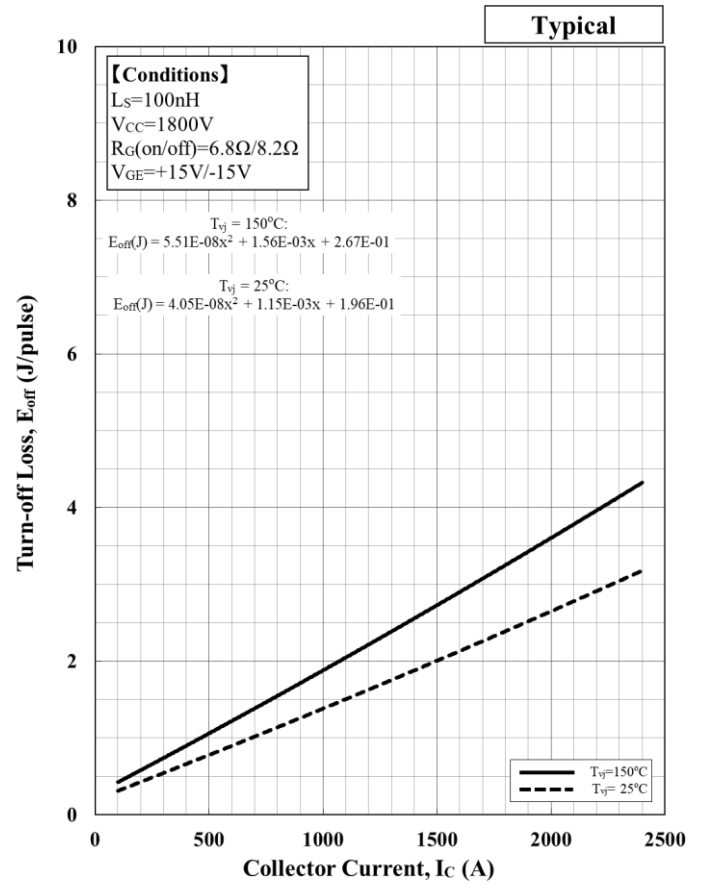


$V_{GE}-Q_G$ curve

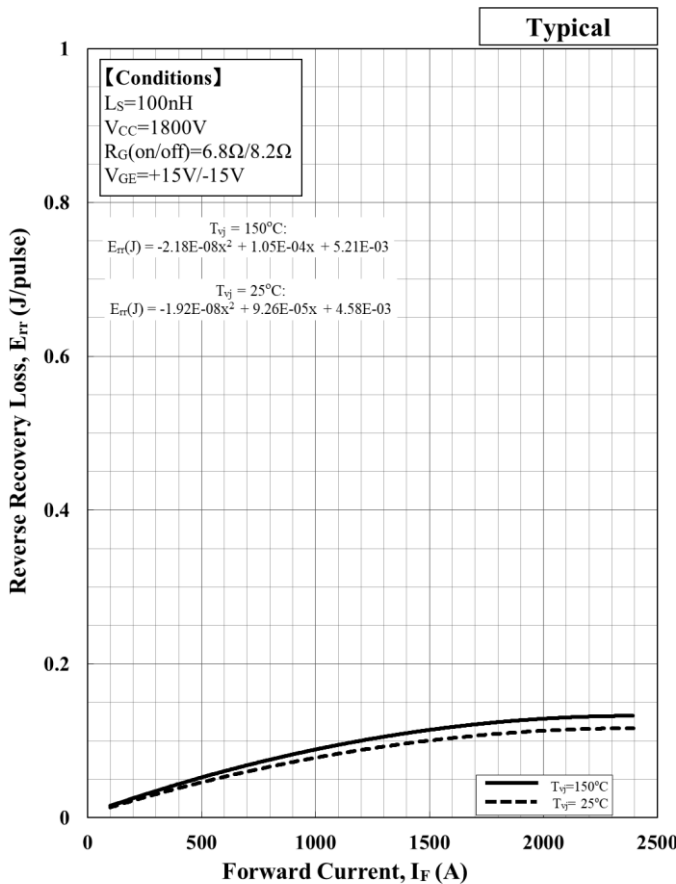
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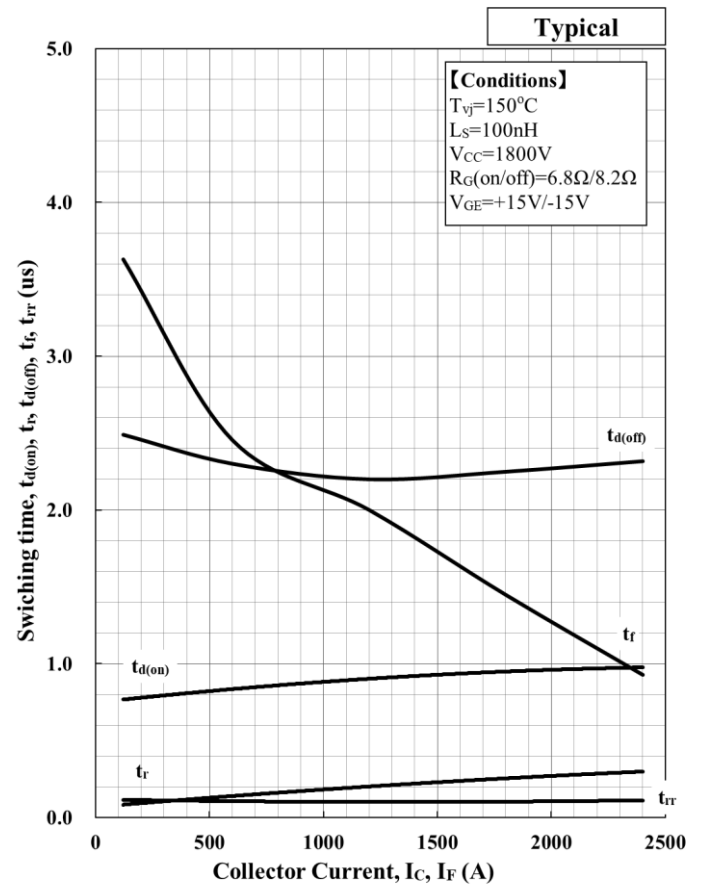
Turn-on loss vs. Collector current



Turn-off loss vs. Collector current

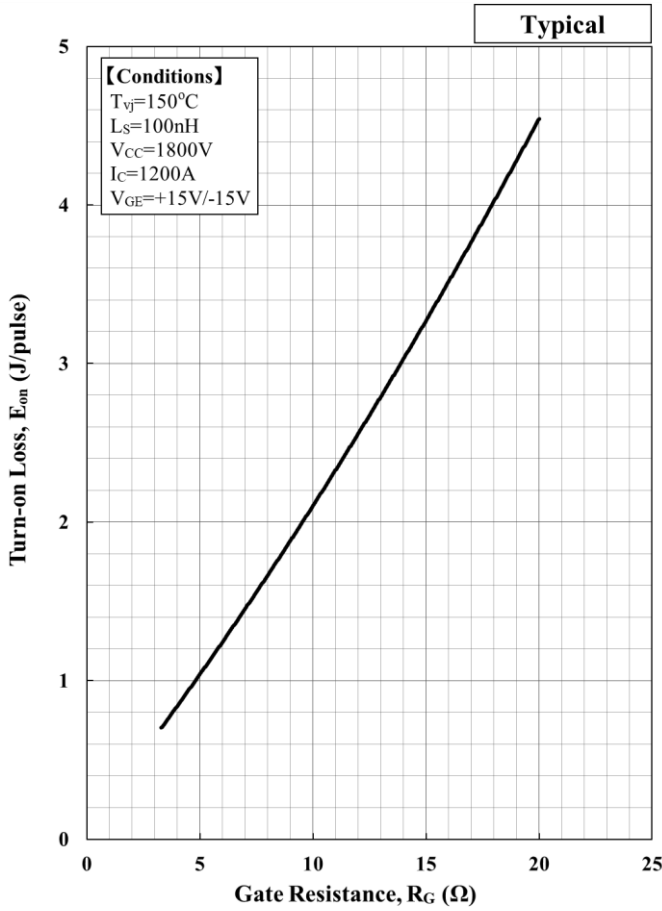


Recovery loss vs. Forward current

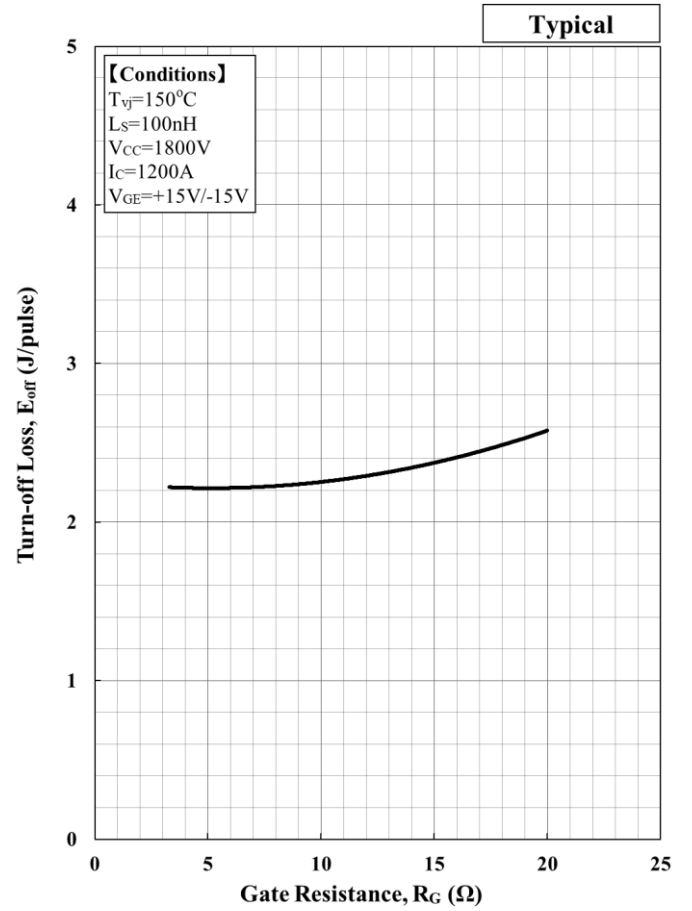


Switching time vs. Collector Current

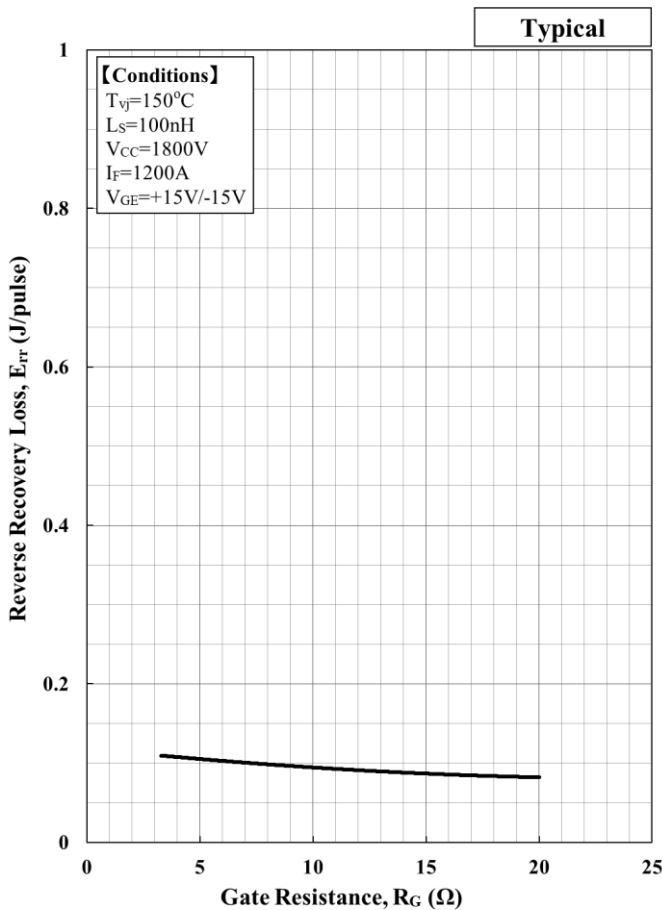
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Turn-on loss vs. Gate Resistance

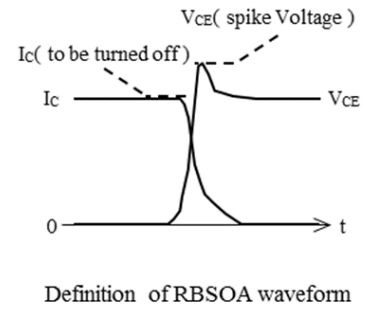
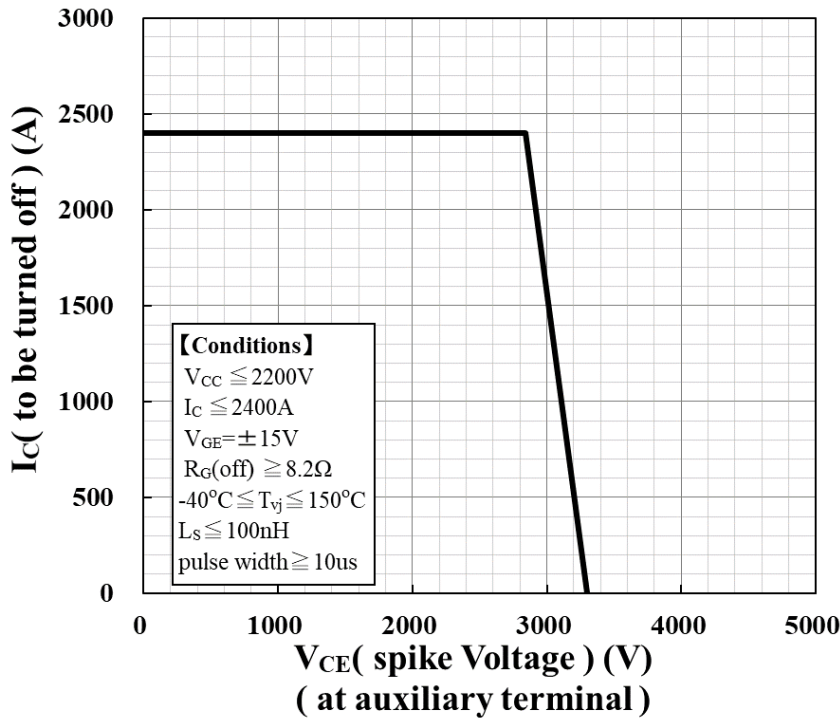


Turn-off loss vs. Gate Resistance

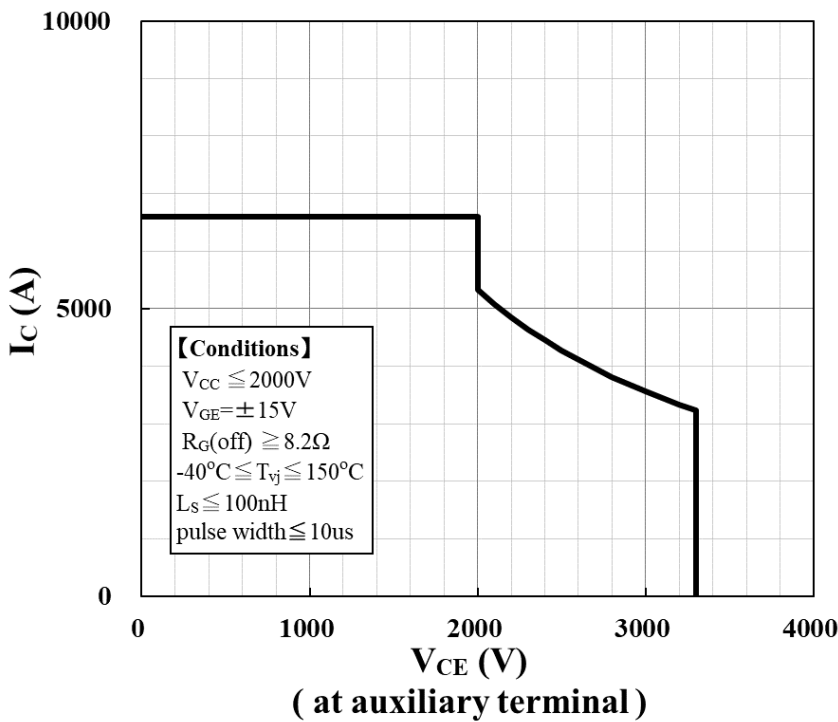


Recovery loss vs. Gate Resistance

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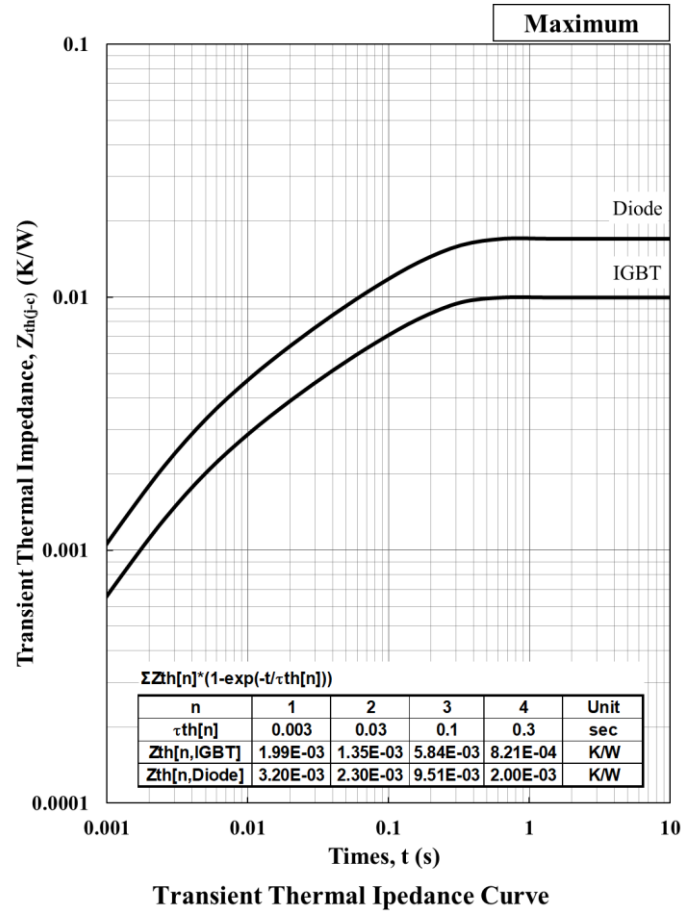
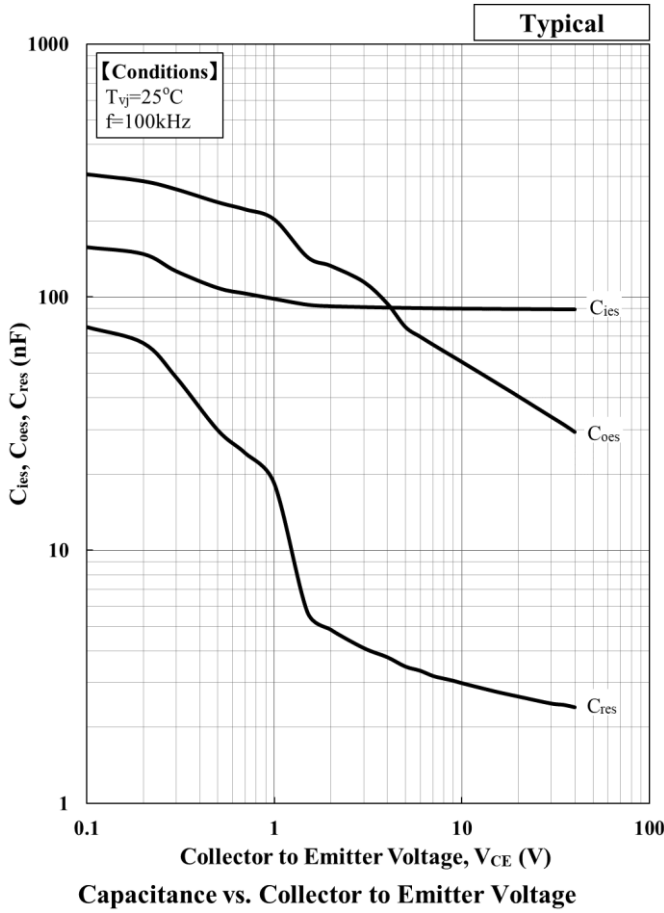


Reverse Bias Safe Operation Area (RBSOA)



Short circuit Safe Operation Area (SCSOA)

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HITACHI POWER SEMICONDUCTORS

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