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	A	1,200
	1ms	I_{CRM}		2,400
Forward Current	DC	I_F	A	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)	-	N·m	2/15 (1)
	Mounting (M6)	-		6 (2)

Notes: (1) Recommended Value 1.8±0.2/15$^{+0}_{-3}$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	-	-	12	V_{CE}=3,300V, V_{GE}=0V, T_{vj}=25°C
				-	25	-	V_{CE}=3,300V, V_{GE}=0V, T_{vj}=150°C
Gate Emitter Leakage Current		I_{GES}	nA	-500	-	+500	V_{GE}=±20V, V_{CE}=0V, T_{vj}=25°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,Ls=100nH R_G(on/off)=6.8/82Ω,V_{GF}=±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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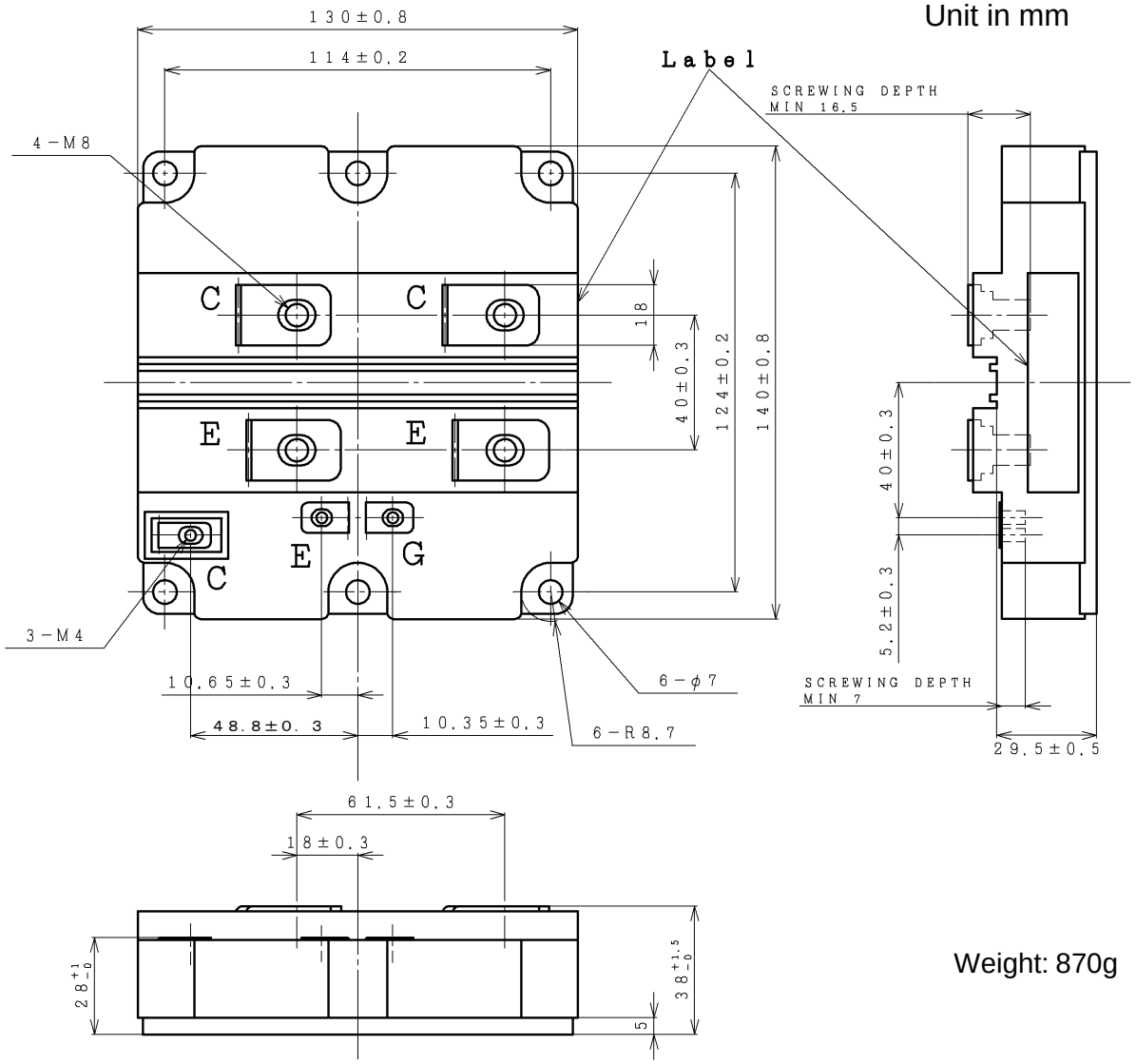
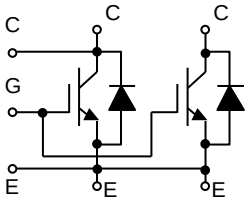
OUTLINE DRAWING

Unit in mm



Weight: 870g

CIRCUIT DIAGRAM



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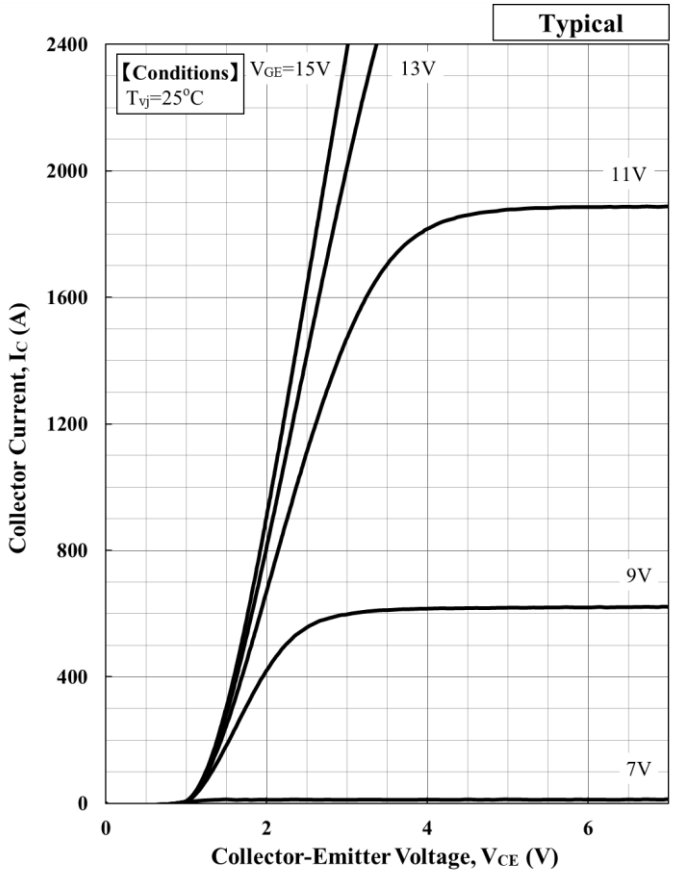
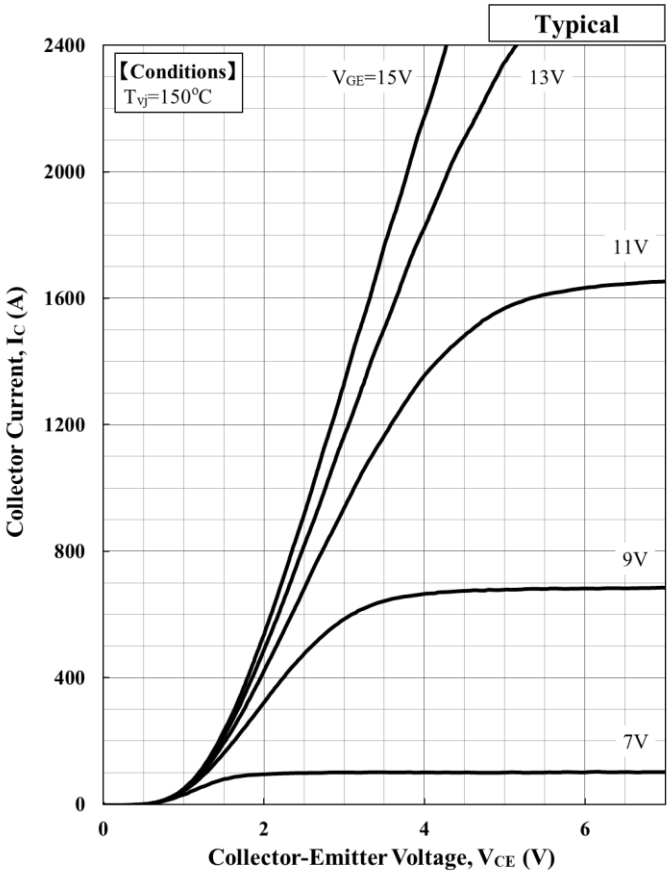
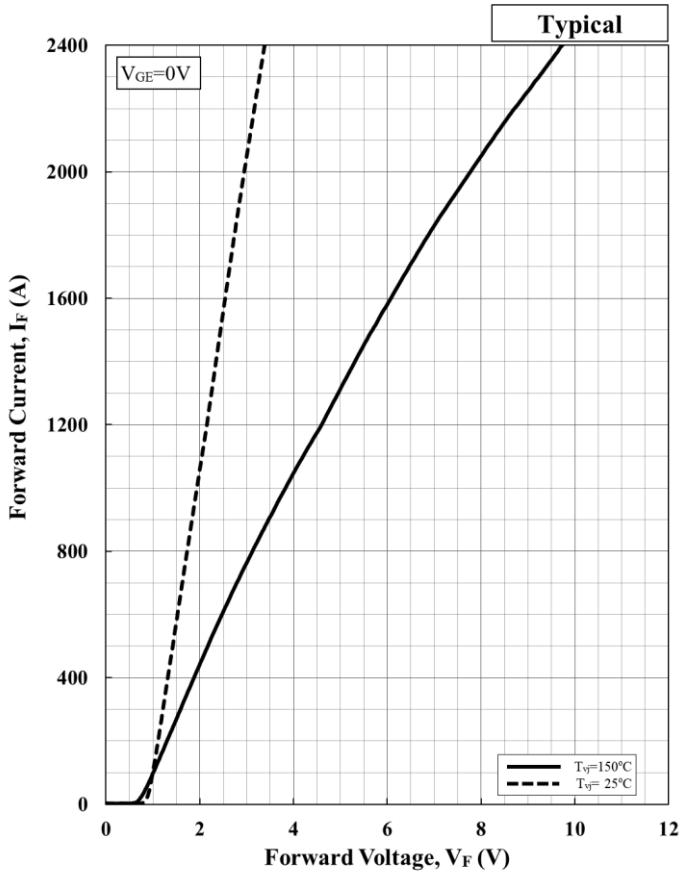


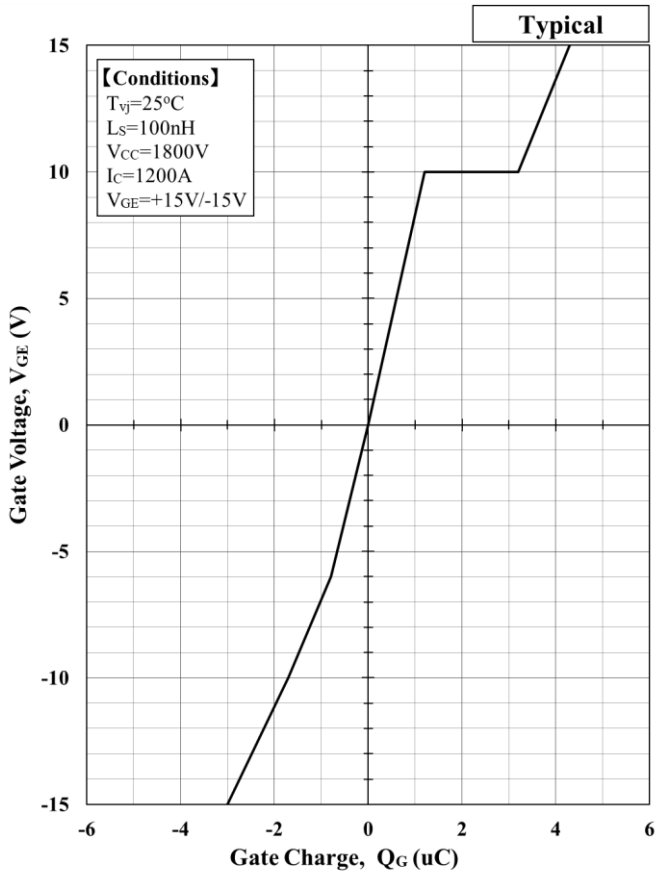
Collector Current vs. Collector Emitter Voltage



Collector Current vs. Collector Emitter Voltage



Forward Voltage of free-wheeling diode



V_{GE}-Q_G curve

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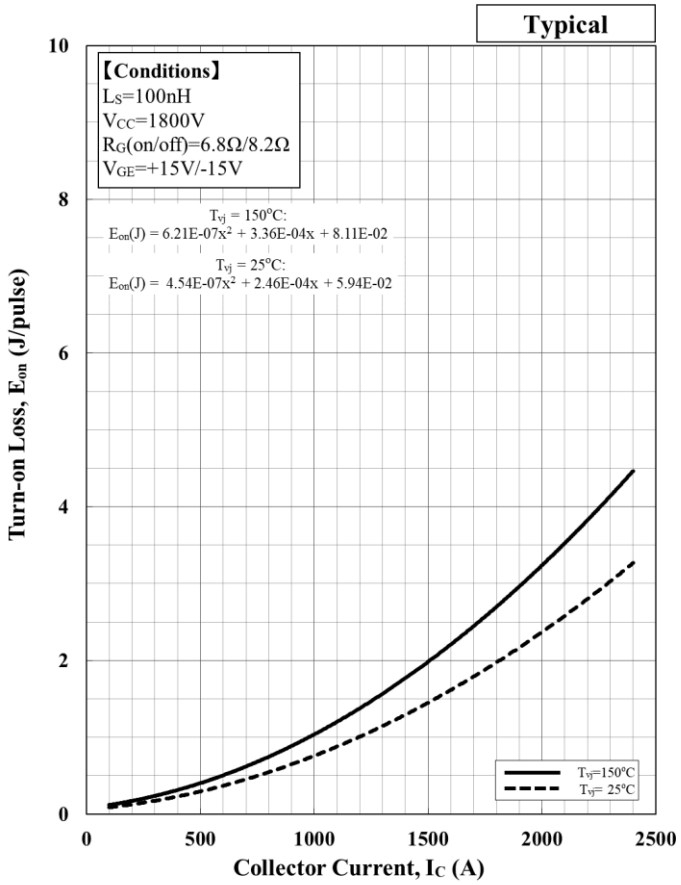
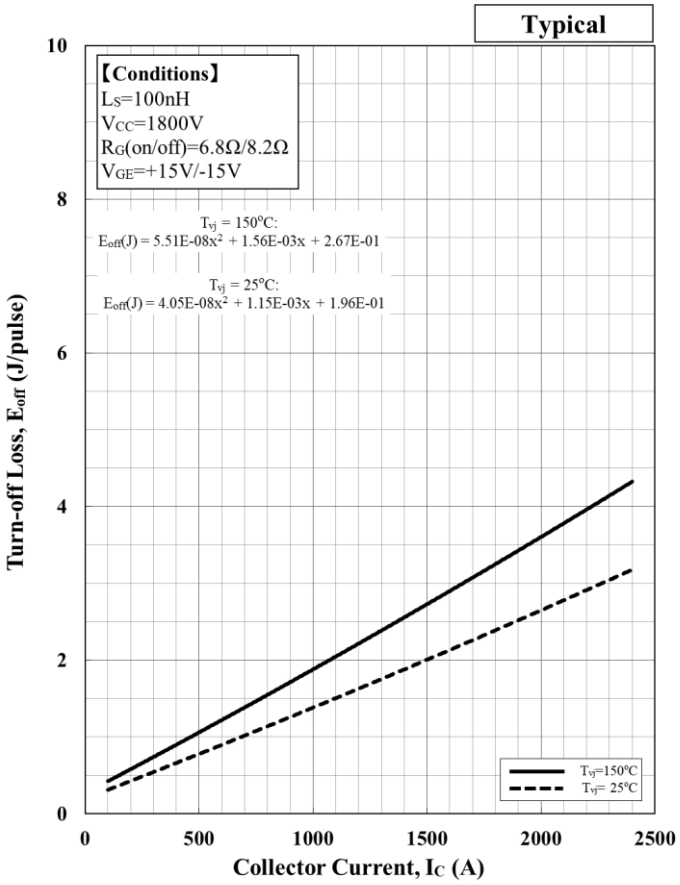
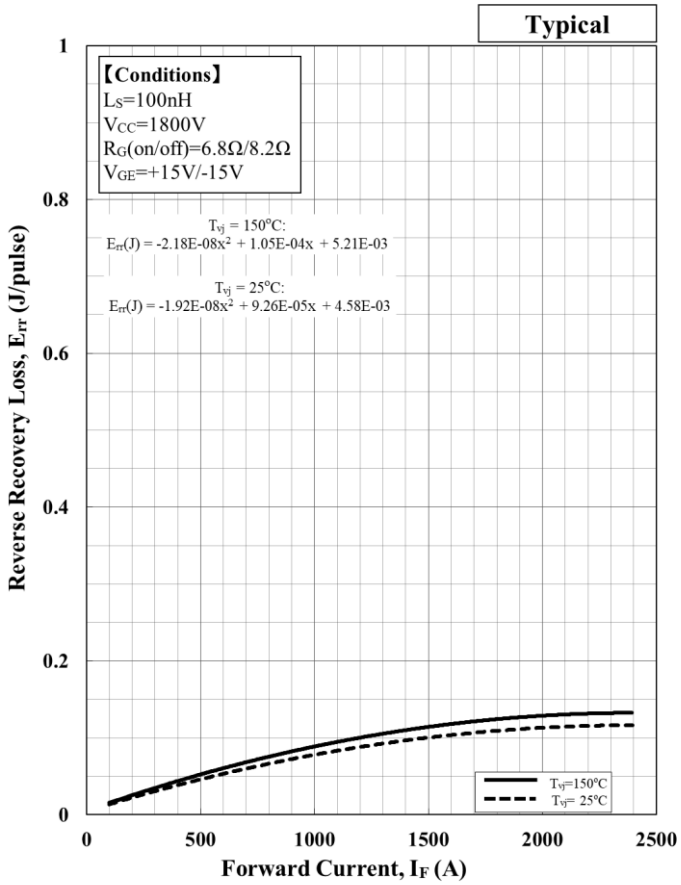


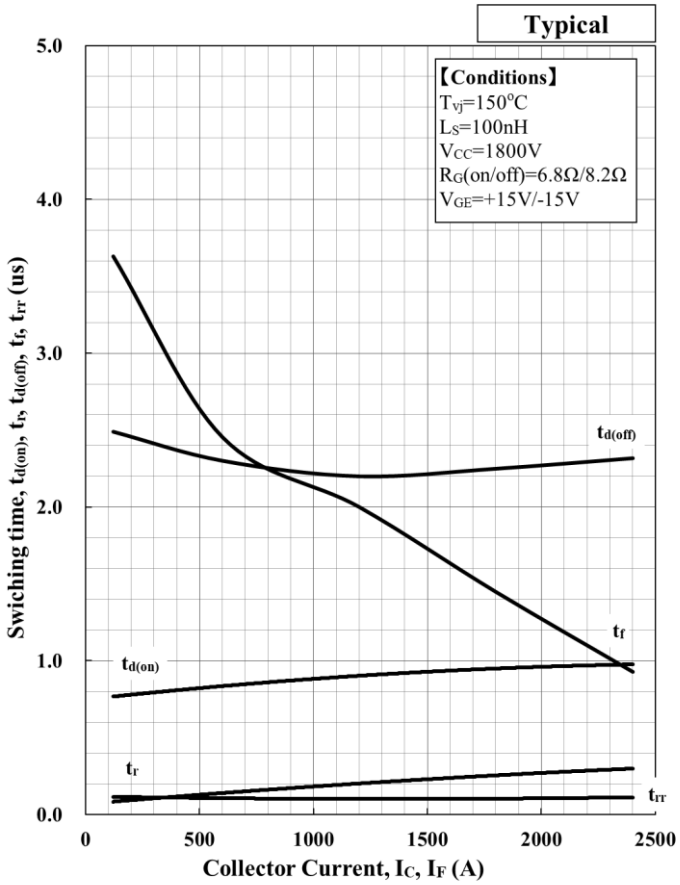
Turn-on loss vs. Collector current



Turn-off loss vs. Collector current



Recovery loss vs. Forward current



Switching time vs. Collector Current

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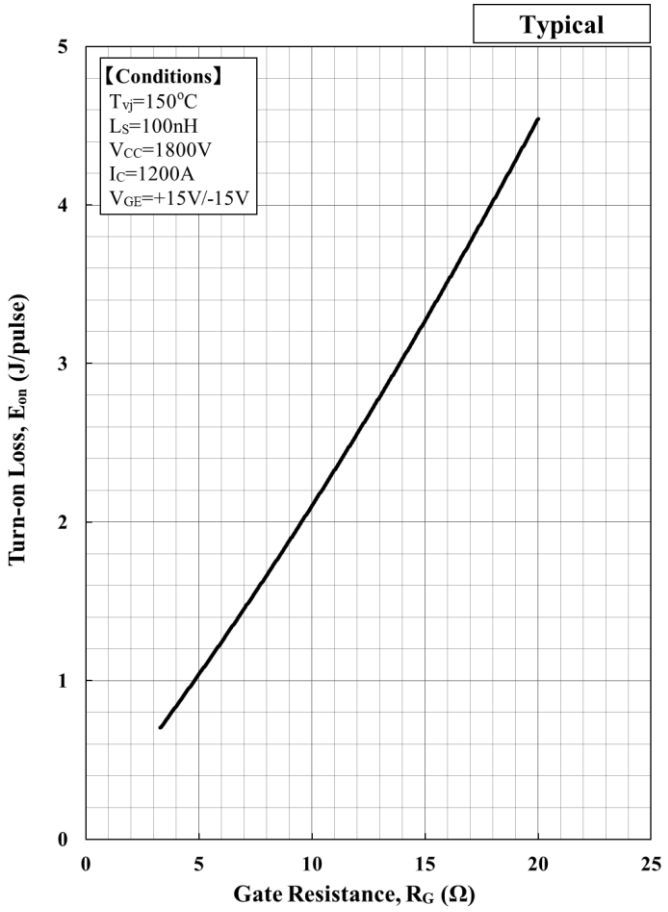
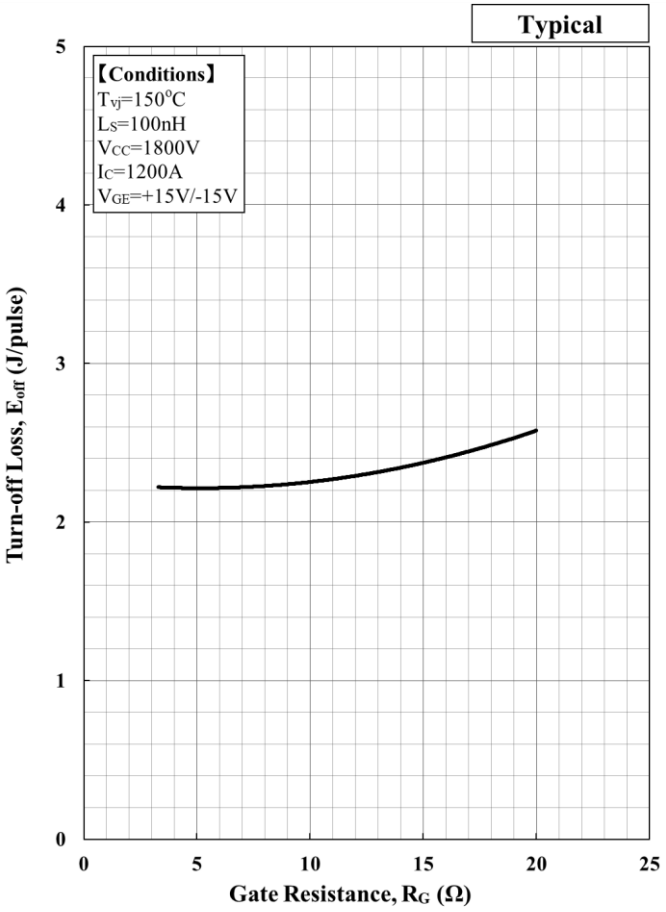
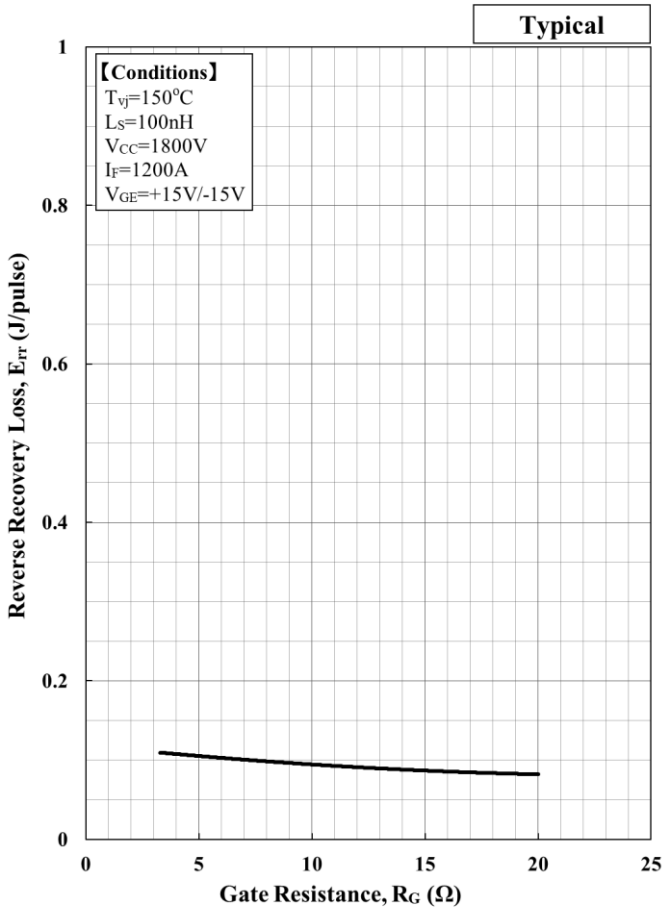


Turn-on loss vs. Gate Resistance



Turn-off loss vs. Gate Resistance



Recovery loss vs. Gate Resistance

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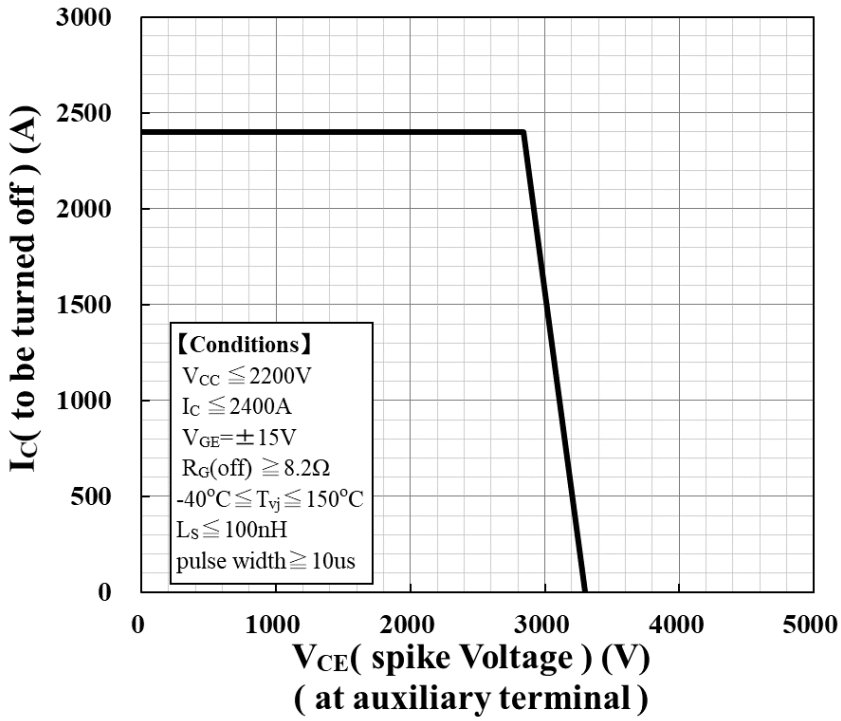
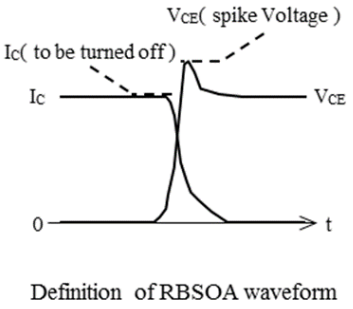
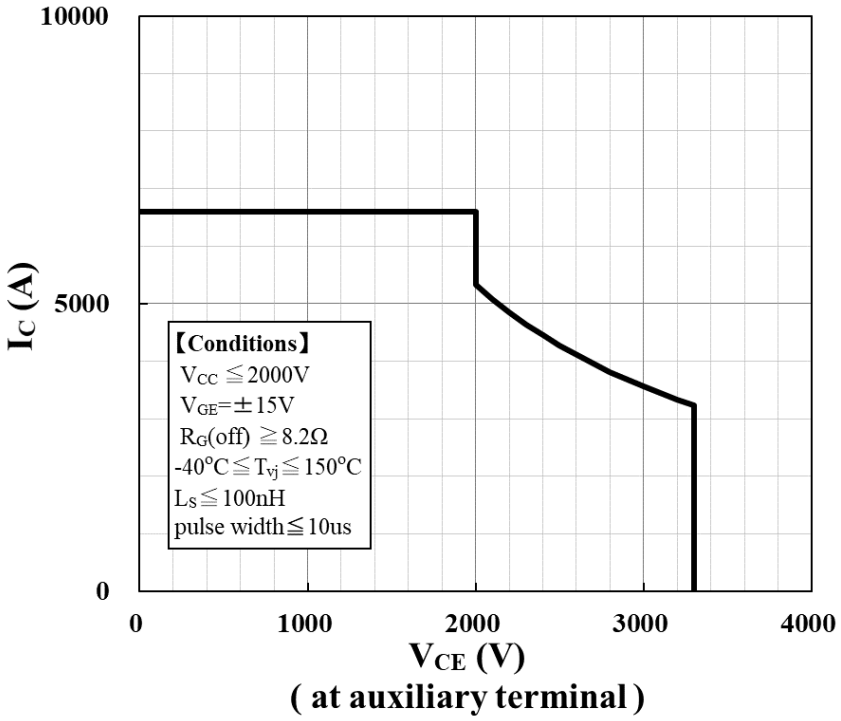




Definition of RBSOA waveform

Reverse Bias Safe Operation Area (RBSOA)



Short cuicuit Safe Operation Area (SCSOA)

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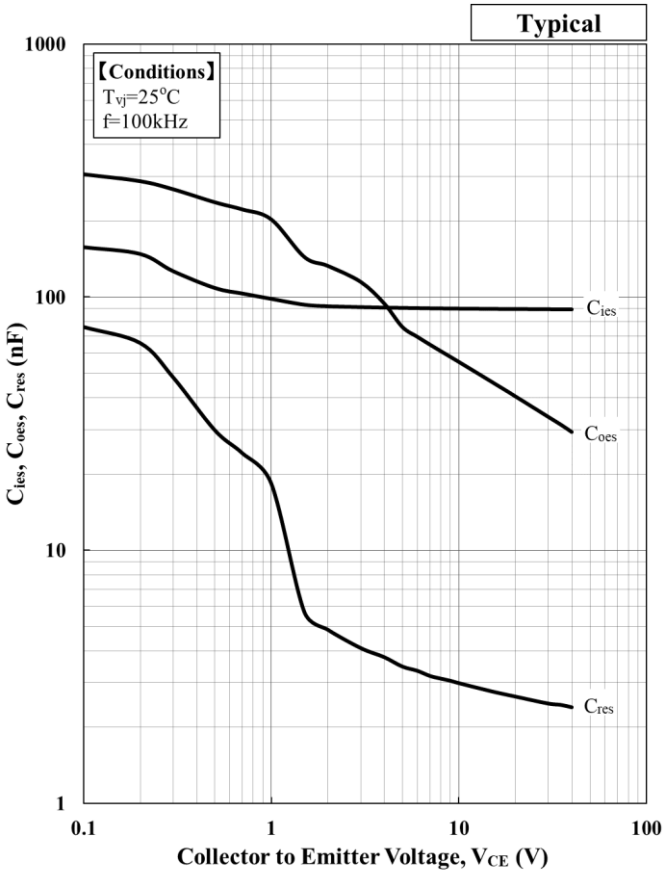
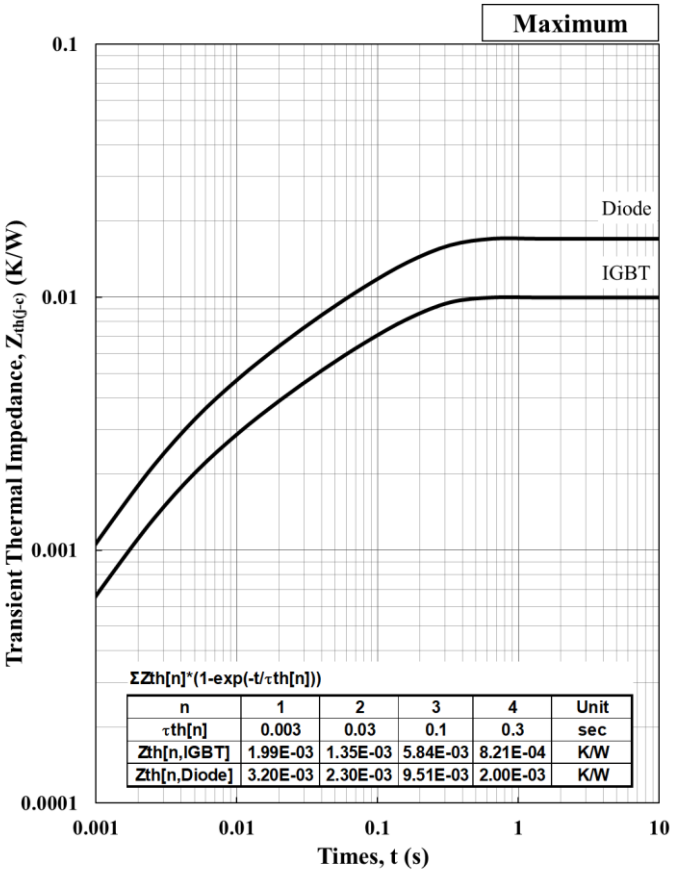


Capacitance vs. Collector to Emitter Voltage



ΣZth[n]*(1-exp(-t/τth[n]))

n	1	2	3	4	Unit
τth[n]	0.003	0.03	0.1	0.3	sec
Zth[n,IGBT]	1.99E-03	1.35E-03	5.84E-03	8.21E-04	K/W
Zth[n,Diode]	3.20E-03	2.30E-03	9.51E-03	2.00E-03	K/W

Transient Thermal Ipedance Curve

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HITACHI POWER SEMICONDUCTORS

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