MBN1800F33F-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	MBN1800F33F-C3
Collector Emitter Voltage		V_{CES}	V	3,300
Gate Emitter Voltage		V_{GES}	V	±20
Collector Current	DC	I_C	A	1,800
	1ms	I_{CRM}		3,600
Forward Current	DC	I_F	A	1,800
	1ms	I_{FRM}		3,600
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	-	-	18	V_{CE}=3,300V, V_{GE}=0V, T_{vj}=25°C
			-	38	-	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=1,800A, V_{GE}=15V, T_{vj}=150°C
Gate Emitter Threshold Voltage	$V_{GE(th)}$	V	5.5	6.5	7.5	V_{CE}=10V, I_C=1,800mA, T_{vj}=25°C
Input Capacitance	C_{ies}	nF	-	132	-	V_{CE}=10V, V_{GE}=0V, f=100kHz, T_{vj}=25°C
Internal Gate Resistance	$R_{G(int)}$	Ω	-	1.3	-	V_{CE}=10V, V_{GE}=0V, f=100kHz, T_{vj}=25°C
Turn On Delay Time	$t_{d(on)}$	μs	-	0.8	-	V_{CC}=1,800V, I_C=1,800A
Rise Time	t_r		-	0.3	-	L_S=80nH
Turn Off Delay Time	$t_{d(off)}$		-	2.5	-	R_G(on/off)=4.7Ω/5.6Ω (3)
Fall Time	t_f		-	1.7	-	V_{GE}=±15V, T_{vj}=150°C
Peak Forward Voltage Drop	V_F	V	-	4.6	-	I_F=1,800A, V_{GE}=0V, T_{vj}=150°C
Reverse Recovery Time	t_{rr}	μs	-	0.1	-	V_{CC}=1,800V, I_F=1,800A, L_S=80nH T_{vj}=150°C
Turn On Loss	E_{on}	J/P	-	2.1	-	V_{CC}=1,800V, I_C=1,800A, L_S=80nH
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	-	(0.15)	-	V_{GE}=±15V, T_{vj}=150°C
Short Circuit Pulse Width	t_{sc}	μs	10	-	-	V_{CC}=2,200V,Ls=80nH R_G(on/off)=4.7/56Ω,V_{GE}=±15V, T_{vj}=150°C
Stray inductance module	L_{SCE}	nH	-	7	-	
Thermal Impedance IGBT	$R_{th(j-c)}$	K/W	-	-	0.0067	Junction to case
Thermal Impedance FWD	$R_{th(j-c)}$		-	-	0.012	Junction to case
Contact Thermal Impedance	$R_{th(c-f)}$	K/W	-	0.005	-	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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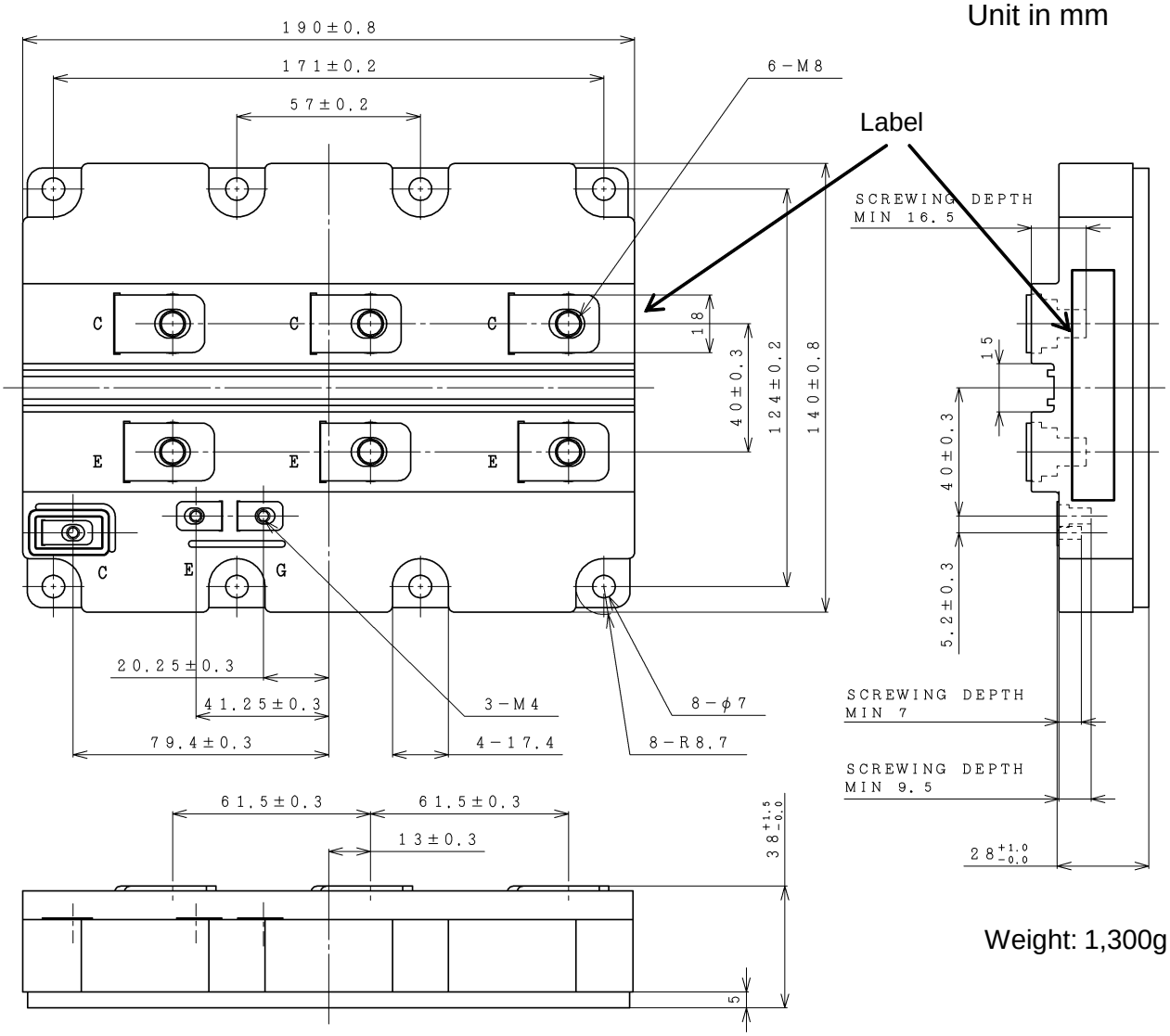
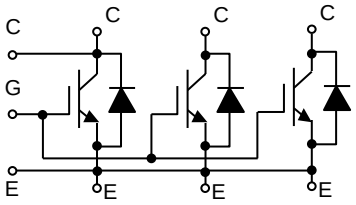
OUTLINE DRAWING

Unit in mm



Weight: 1,300g

CIRCUIT DIAGRAM



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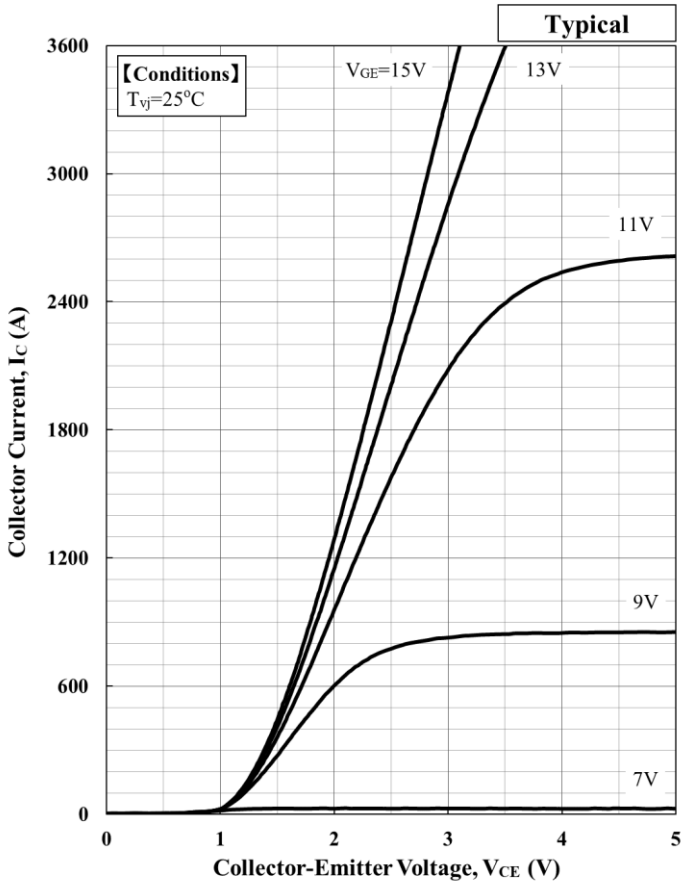
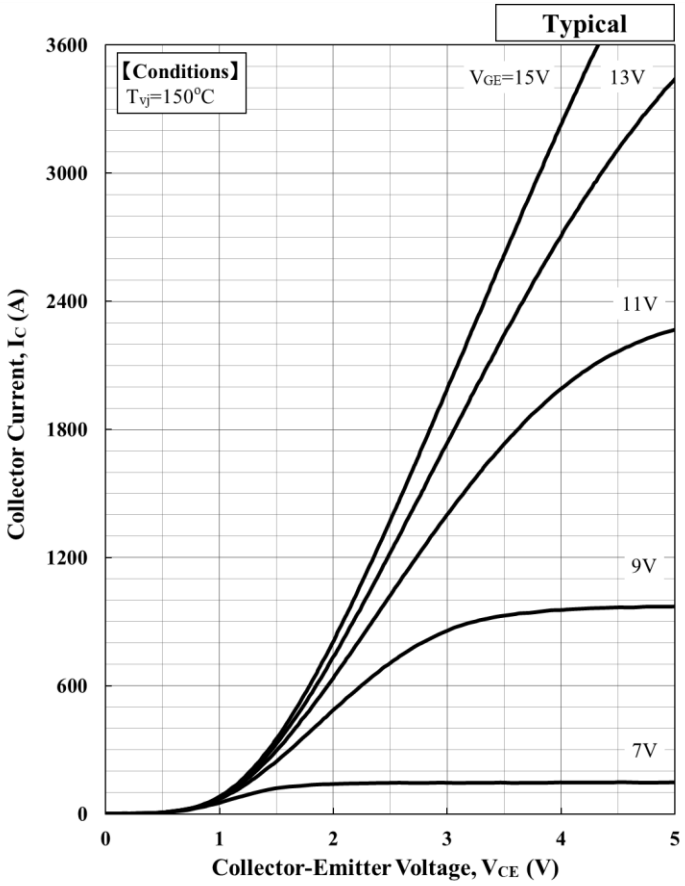
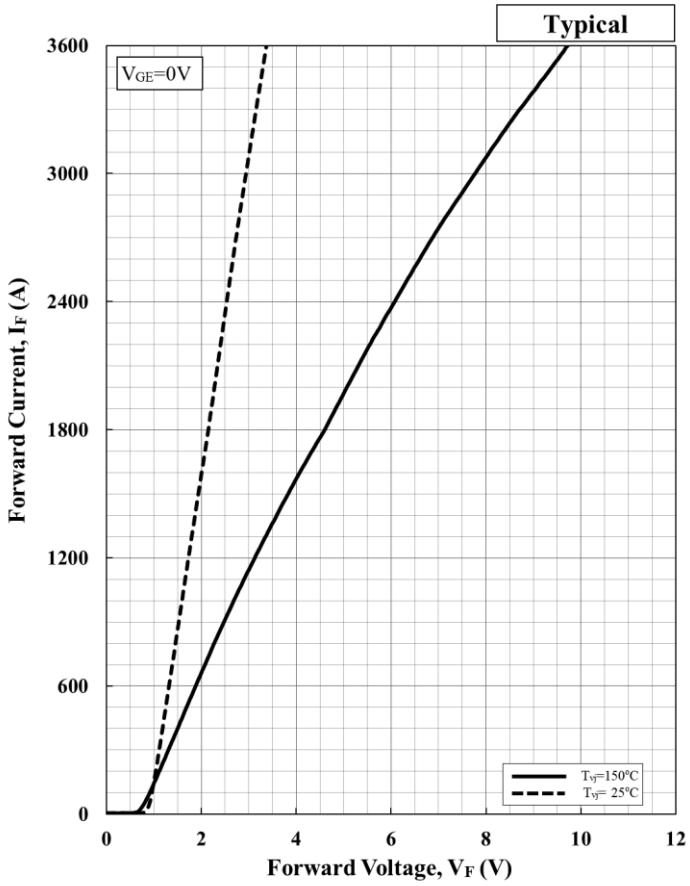


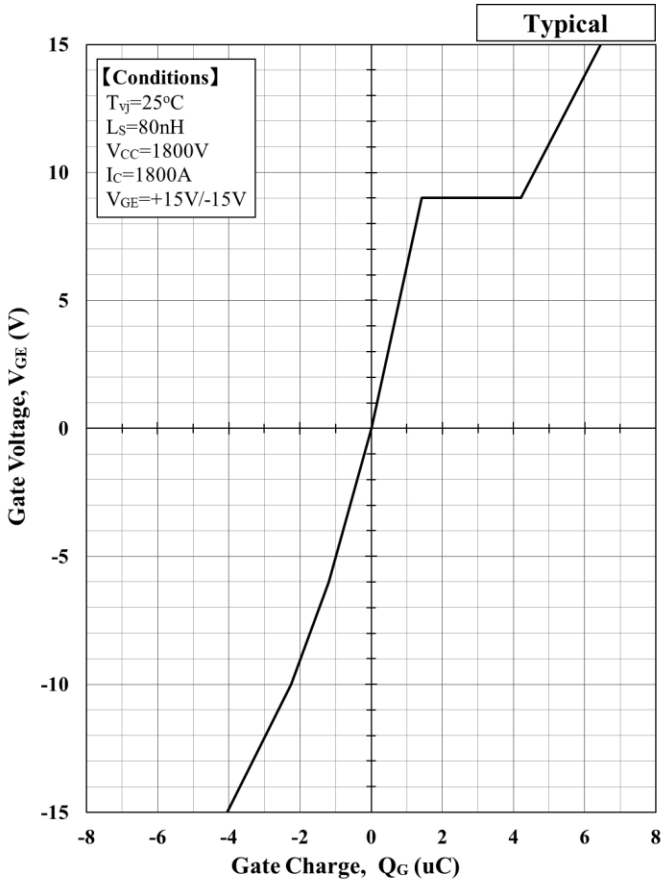
Collector Current vs. Collector Emitter Voltage



Collector Current vs. Collector Emitter Voltage



Forward Voltage of free-wheeling diode



V_{GE}-Q_G curve

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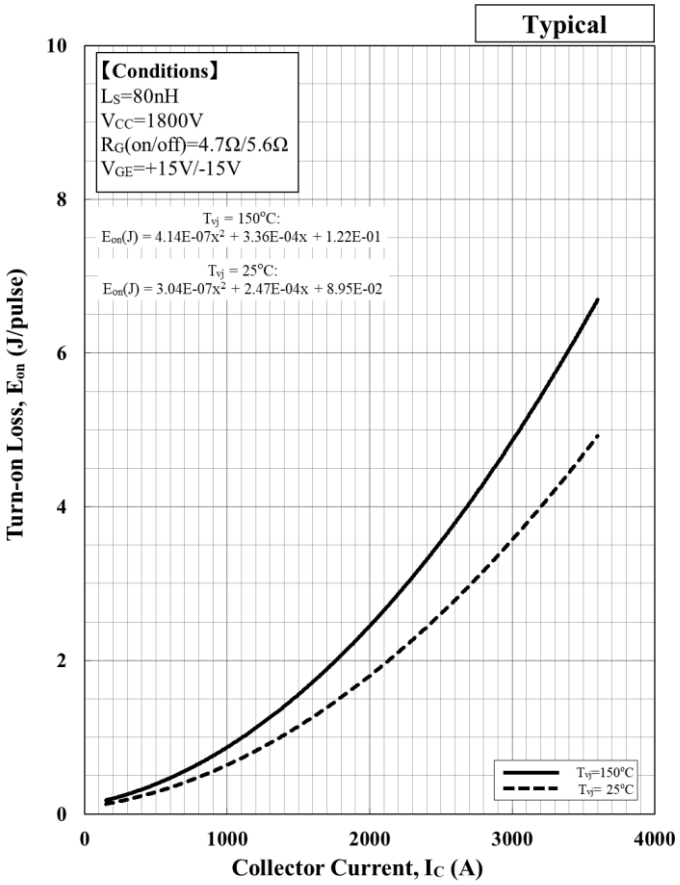
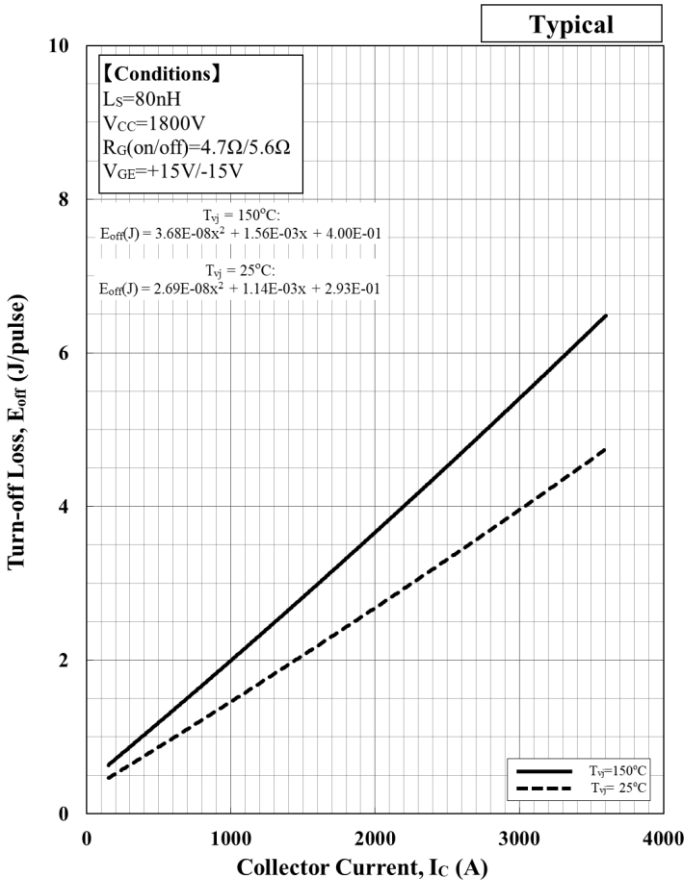
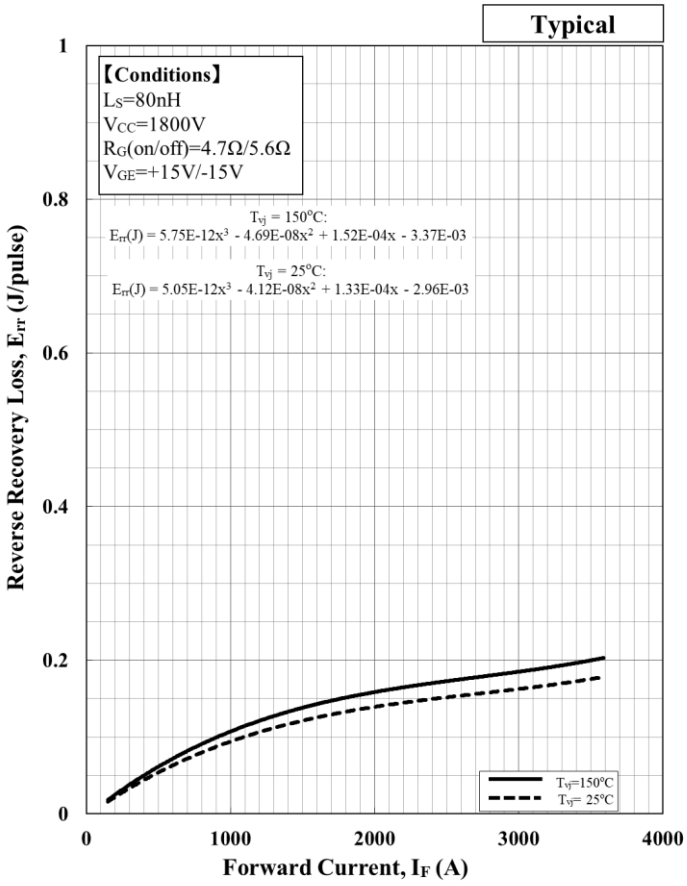


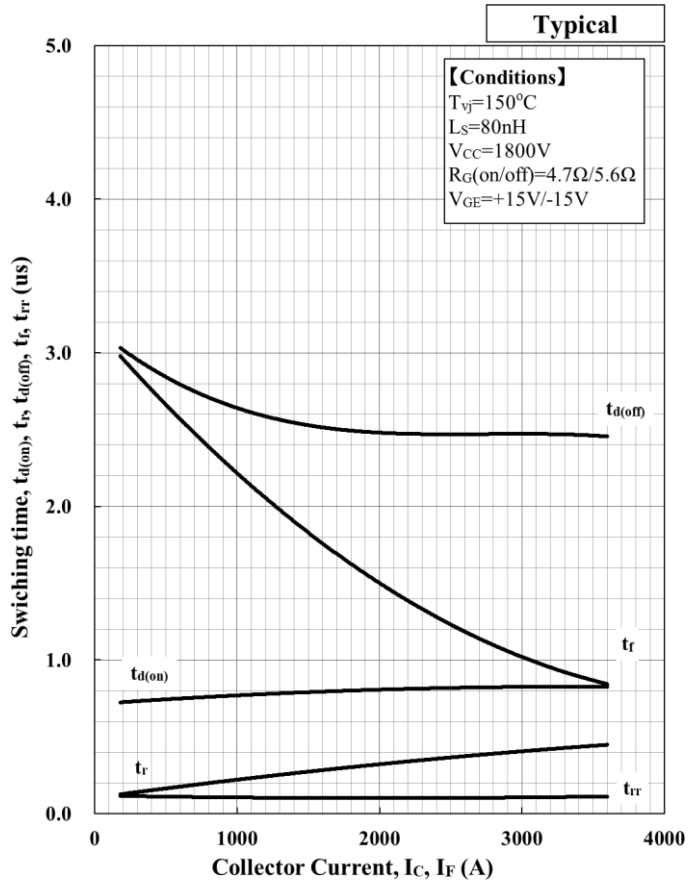
Turn-on loss vs. Collector current



Turn-off loss vs. Collector current



Recovery loss vs. Forward current



Switching time vs. Collector Current

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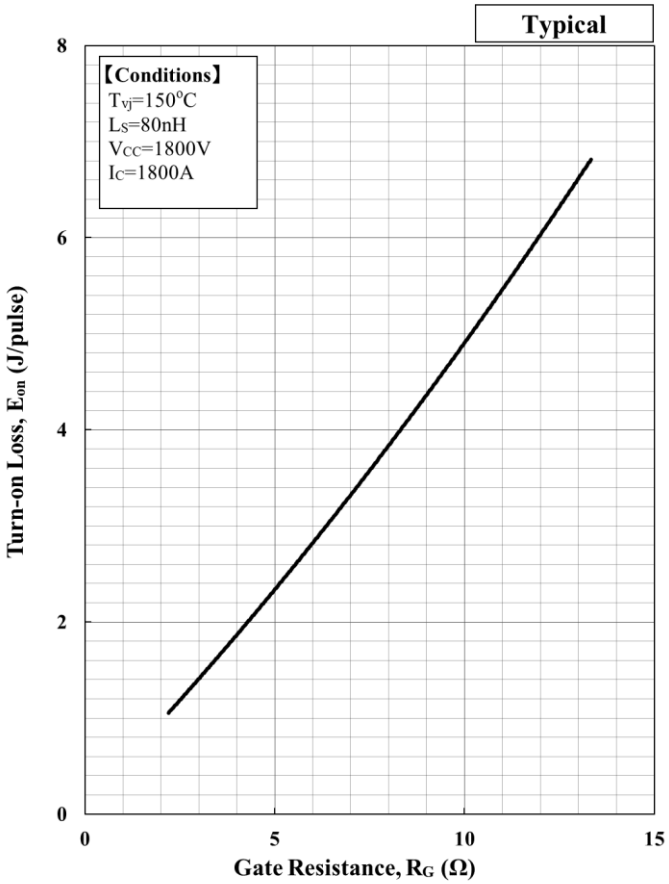
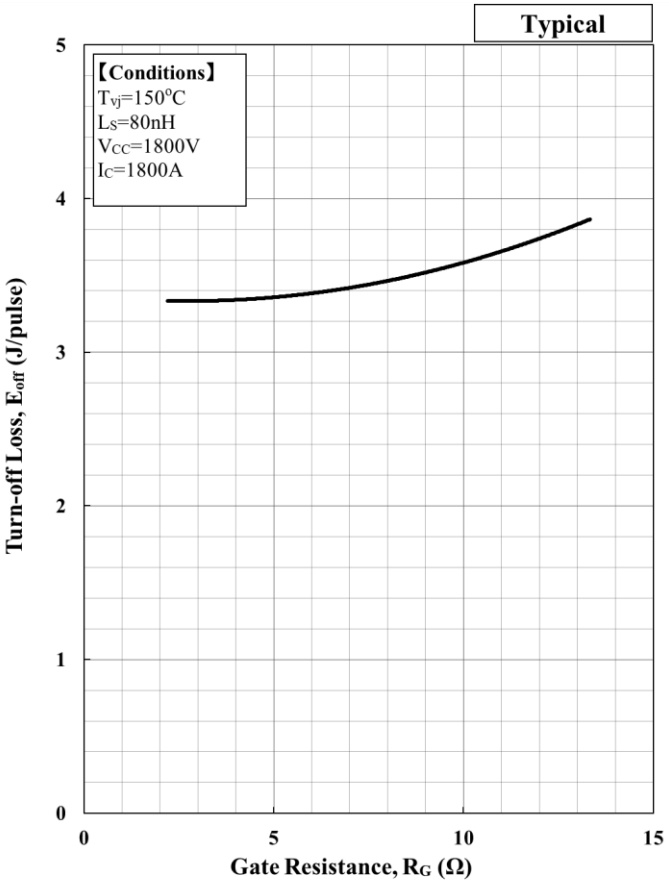
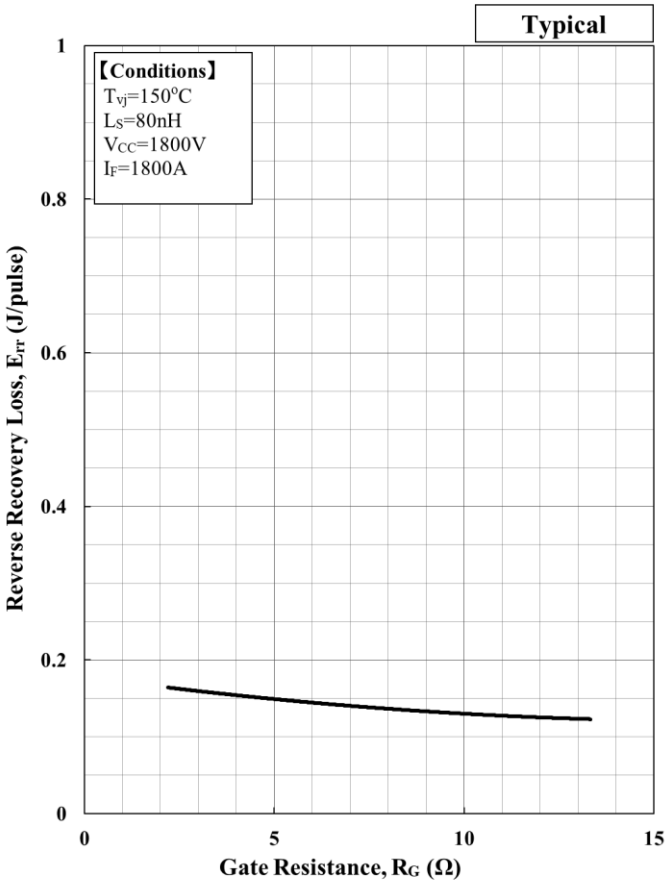


Turn-on loss vs. Gate Resistance



Turn-off loss vs. Gate Resistance



Recovery loss vs. Gate Resistance

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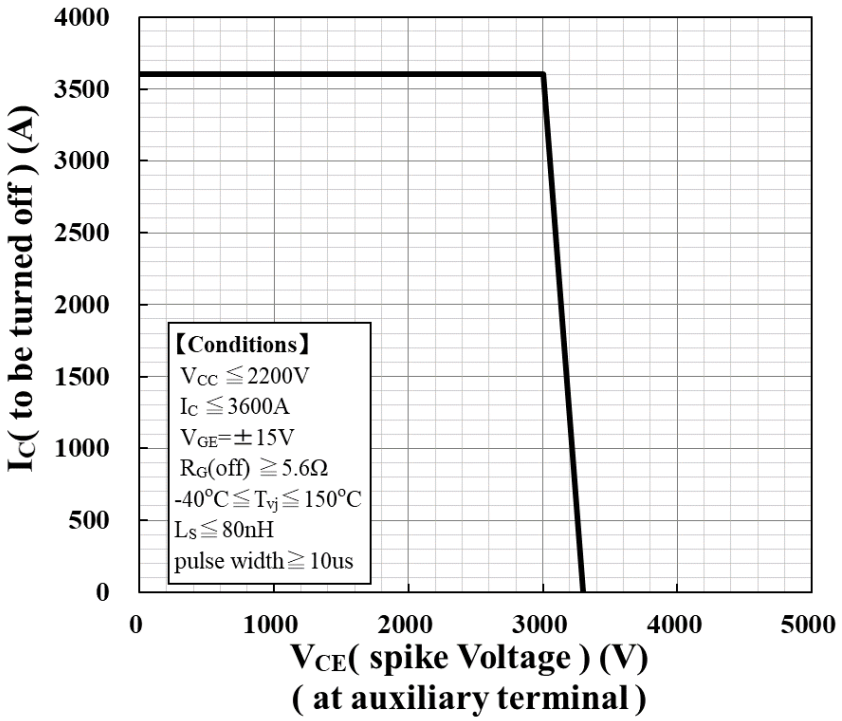
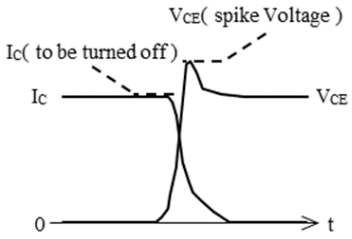
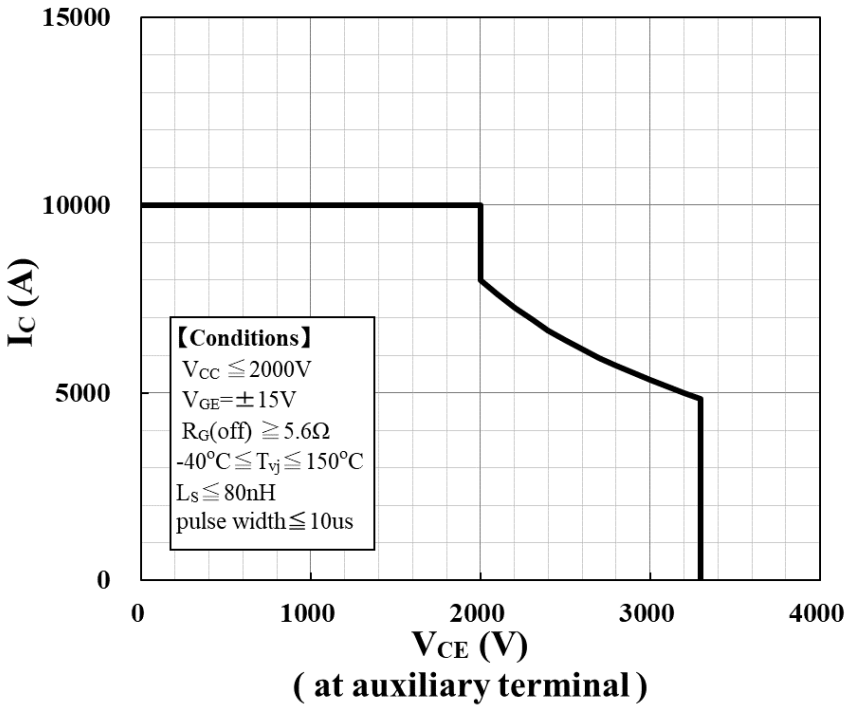




Definition of RBSOA waveform

Reverse Bias Safe Operation Area (RBSOA)



Short cuicuit Safe Operation Area (SCSOA)

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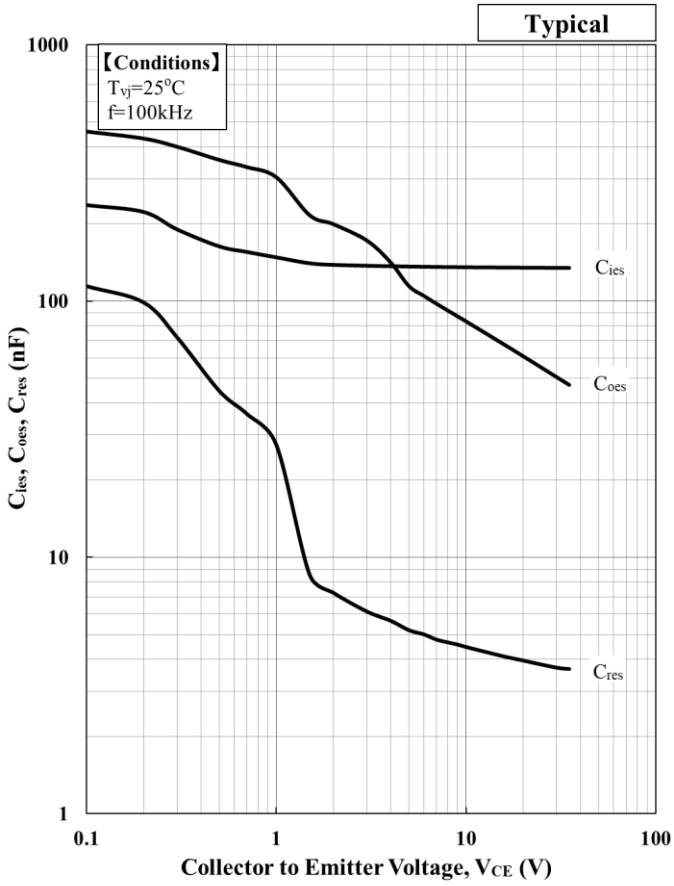
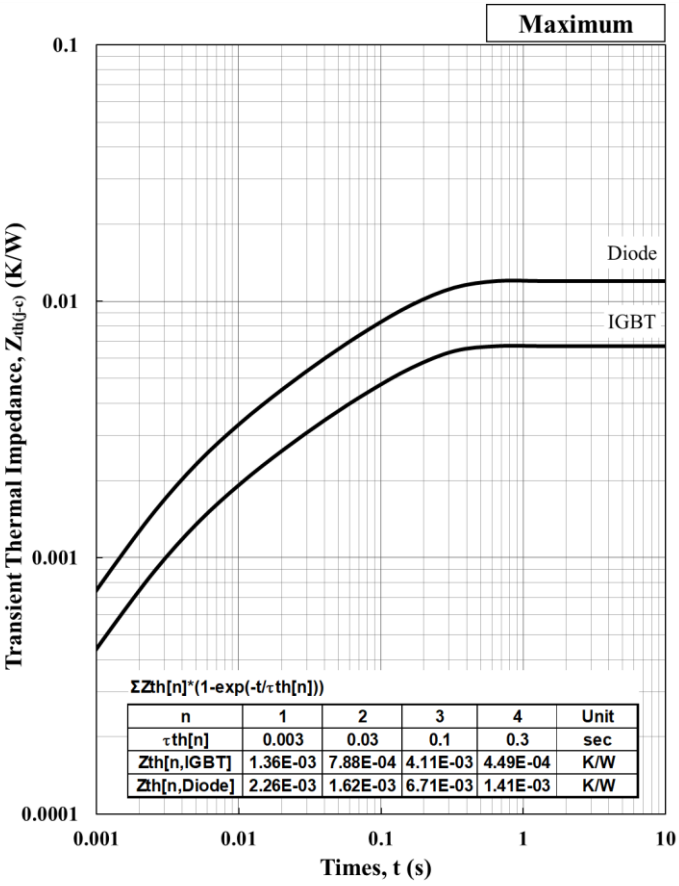


Capacitance vs. Collector to Emitter Voltage



n	1	2	3	4	Unit
τth[n]	0.003	0.03	0.1	0.3	sec
Zth[n,IGBT]	1.36E-03	7.88E-04	4.11E-03	4.49E-04	K/W
Zth[n,Diode]	2.26E-03	1.62E-03	6.71E-03	1.41E-03	K/W

Transient Thermal Ipedance Curve

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HITACHI POWER SEMICONDUCTORS

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