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 $R_{th(j-c)}$ & 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	A	1,800
	1ms	I_{CRM}		3,600
Forward Current	DC	I_F	A	1,800
	1ms	I_{FRM}		3,600
Operating Junction Temperature		$T_{vj\ op}$	°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)	-	N·m	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_{vj}=25°C
				-	40	100	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	2.5	2.85	3.5	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=100nH
Turn Off Delay Time		$t_{d(off)}$		-	2.2	-	R_G(on/off)=4.7Ω/5.6Ω (3)
Fall Time		t_f		-	1.8	-	V_{GE}=±15V, T_{vj}=150°C
Forward Voltage Drop		V_F	V	2.2	2.6	2.9	I_F=1,800A, V_{GE}=0V, T_{vj}=150°C
Reverse Recovery Time		t_{rr}	μs	-	0.7	-	V_{CC}=1,800V, I_F=1,800A, L_S=100nH T_{vj}=150°C
Turn On Loss		E_{on}	J/P	-	3.7	-	V_{CC}=1,800V, I_C=1,800A, 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_{vj}=150°C
Short Circuit Pulse Width		t_{sc}	μs	10	-	-	V_{CC}=2,000V, Ls=100nH R_G(on/off)=4.7/56Ω, V_{GE}=±15V, T_{vj}=150°C
Partial discharge extinction voltage		V_e	V_{RMS}	5,000	-	-	f=50Hz, Q_{PD}≤10pC(acc. to IEC 61287)
Stray inductance module		L_{SCE}	nH	-	12	-	
Thermal Impedance	IGBT	$R_{th(j-c)}$	K/W	-	-	0.0075	Junction to case
	FWD	$R_{th(j-c)}$		-	-	0.0125	
Contact Thermal Impedance		$R_{th(c-f)}$	K/W	-	0.005	-	Case to fin

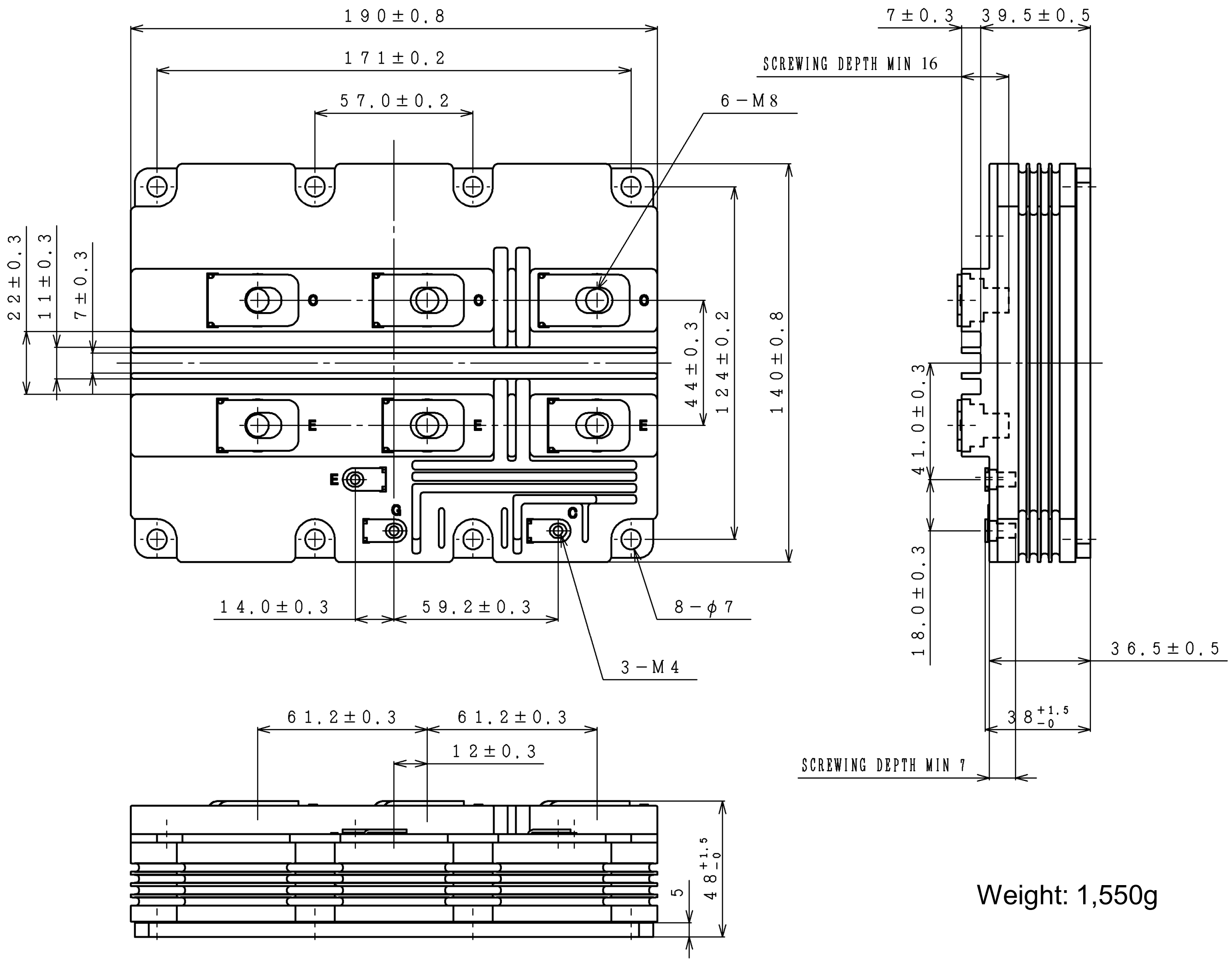
Notes: (3) R_G value is a test condition value for evaluation, not recommended value.
Please, determine the suitable R_G value by measuring switching behaviors.

* 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.

MBN1800FH33F

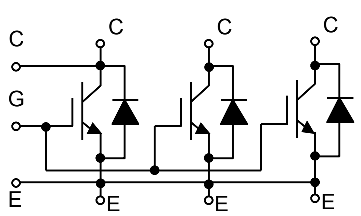
OUTLINE DRAWING

Unit in mm



Weight: 1,550g

CIRCUIT DIAGRAM



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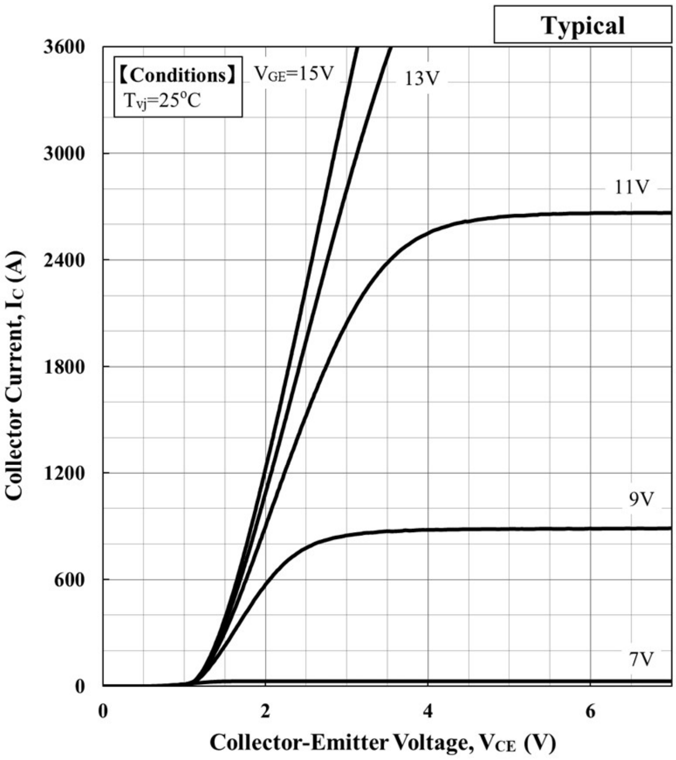
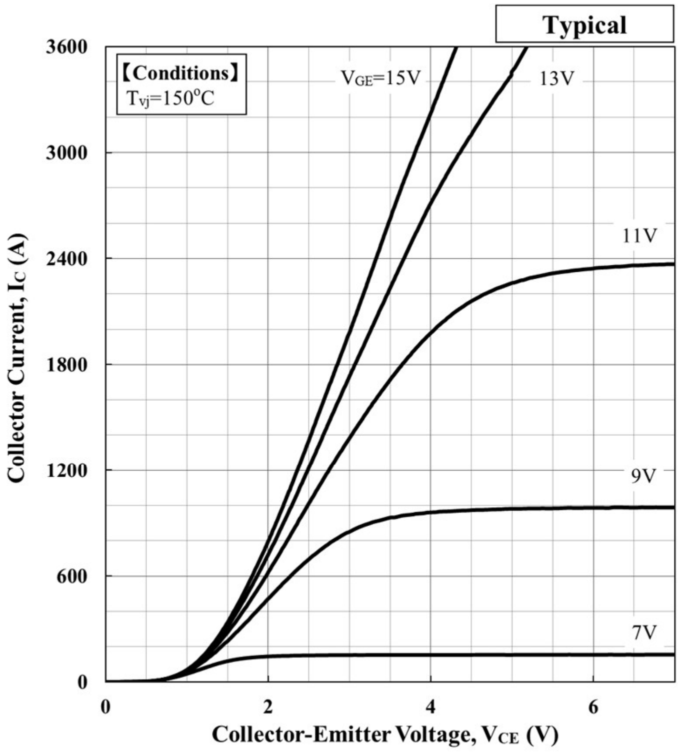


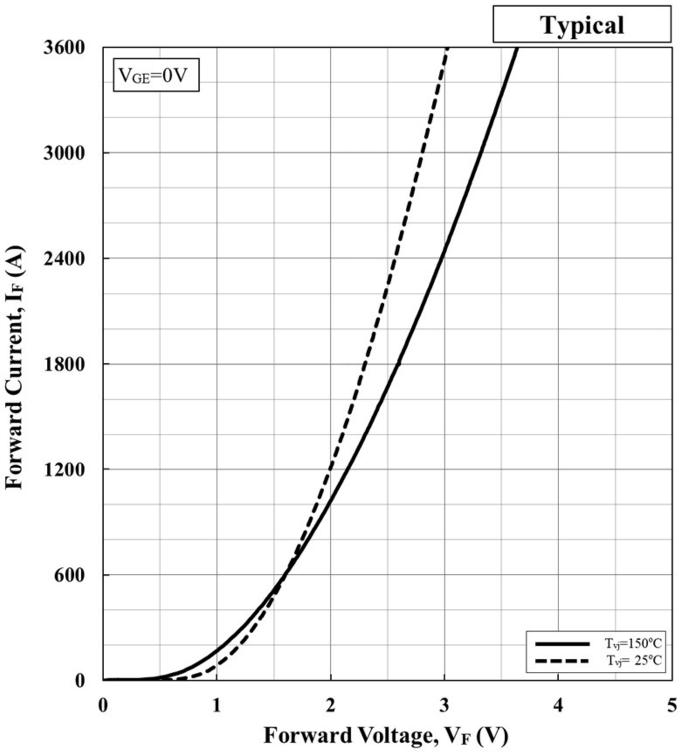
$V_{CE}(sat)[V] = a_3 \cdot \lvert I_c \rvert^3 + a_2 \cdot \lvert I_c \rvert^2 + a_1 \cdot \lvert I_c \rvert + a_0$					
Temp.[°C]	V_{GE}[V]	a_3	a_2	a_1	a_0
25	15	1.96.E-11	-1.45.E-07	8.06.E-04	1.20.E+00

Collector Current vs. Collector Emitter Voltage



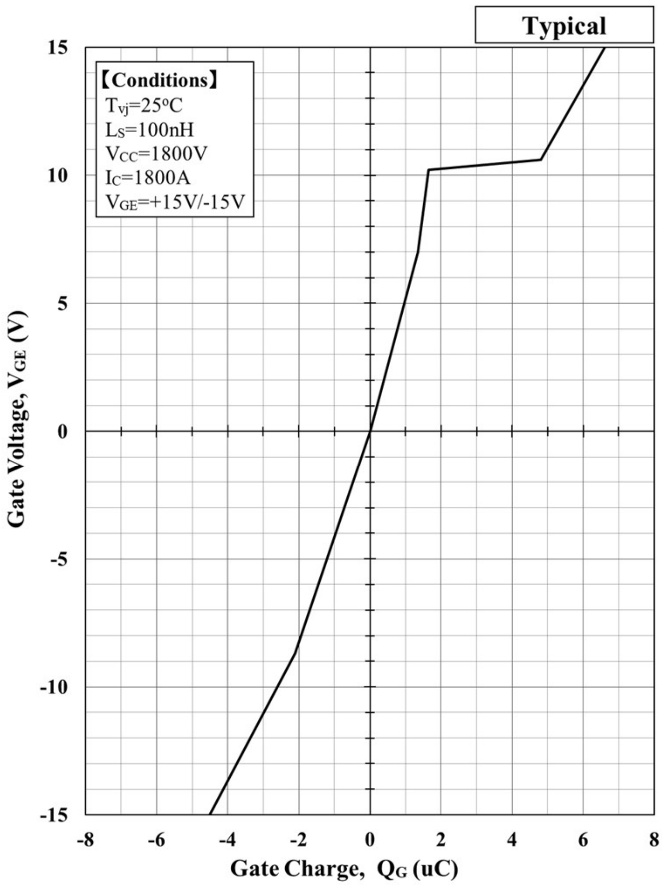
$V_{CE}(sat)[V] = a_3 \cdot \lvert I_c \rvert^3 + a_2 \cdot \lvert I_c \rvert^2 + a_1 \cdot \lvert I_c \rvert + a_0$					
Temp.[°C]	V_{GE}[V]	a_3	a_2	a_1	a_0
150	15	4.23.E-11	-2.84.E-07	1.39.E-03	1.03.E+00

Collector Current vs. Collector Emitter Voltage



$V_F[V] = a_3 \cdot \lvert I_F \rvert^3 + a_2 \cdot \lvert I_F \rvert^2 + a_1 \cdot \lvert I_F \rvert + a_0$				
Temp.[°C]	a_3	a_2	a_1	a_0
25	3.65.E-11	-2.90.E-07	1.14.E-03	9.84.E-01
150	4.43.E-11	-3.60.E-07	1.52.E-03	7.71.E-01

Forward Voltage of free-wheeling diode



V_{GE}-Q_G curve

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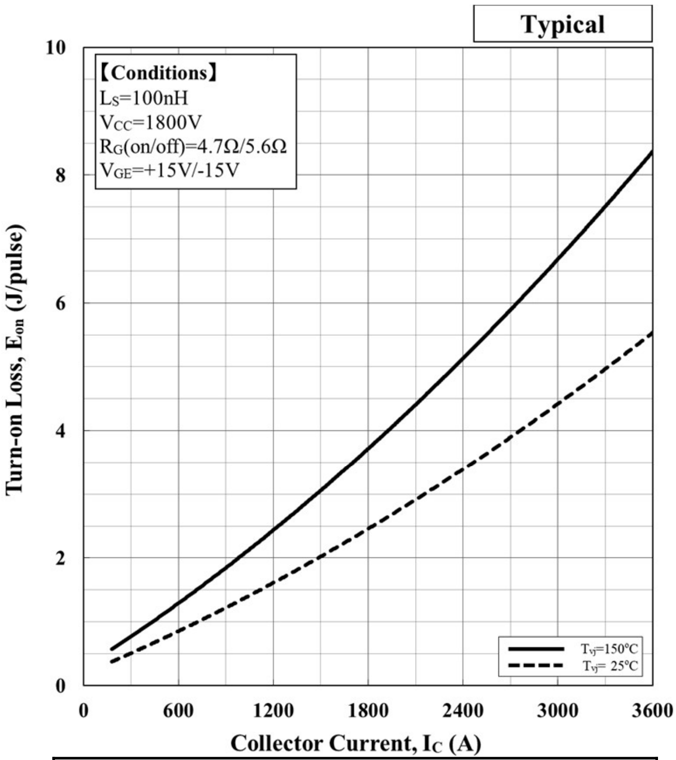
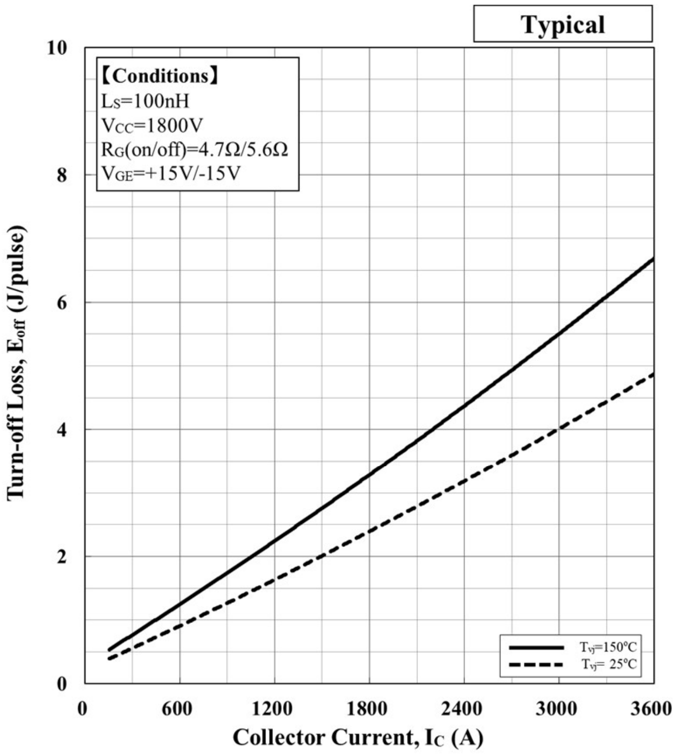


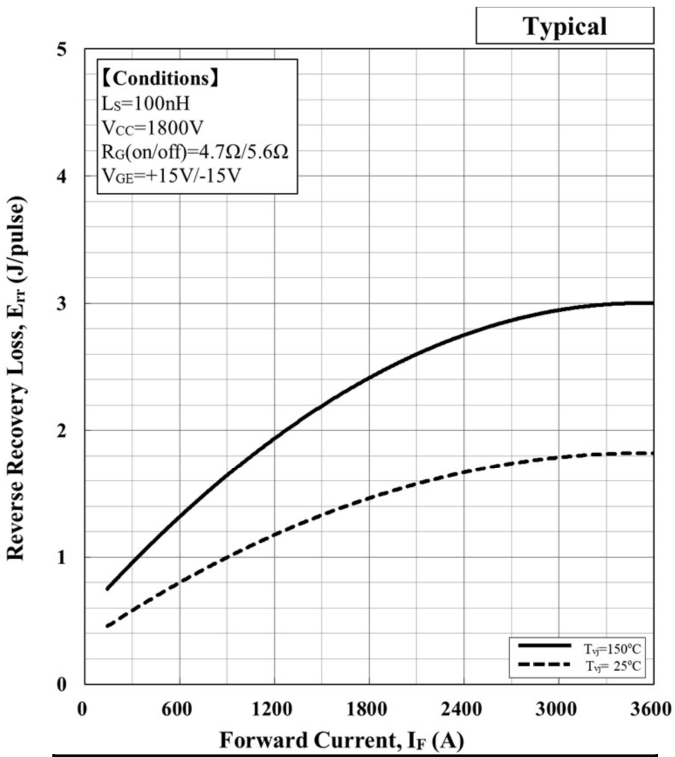
$E\,[J] = a_3 \cdot \lvert I_c\rvert^3 + a_2 \cdot \lvert I_c\rvert^2 + a_1 \cdot \lvert I_c\rvert + a_0$				
Temp.[°C]	a_3	a_2	a_1	a_0
25	-	1.24E-07	1.04E-03	1.87E-01
150	-	1.88E-07	1.57E-03	2.82E-01

Turn-on loss vs. Collector current



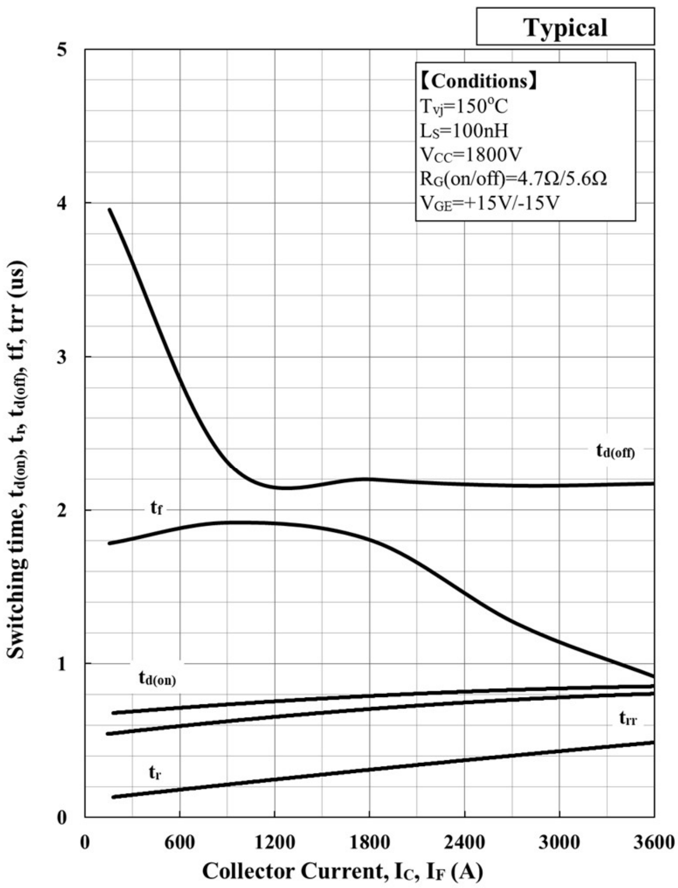
$E\,[J] = a_3 \cdot \lvert I_c\rvert^3 + a_2 \cdot \lvert I_c\rvert^2 + a_1 \cdot \lvert I_c\rvert + a_0$				
Temp.[°C]	a_3	a_2	a_1	a_0
25	-	4.68E-08	1.13E-03	2.18E-01
150	-	6.42E-08	1.54E-03	2.99E-01

Turn-off loss vs. Collector current



$E\,[J] = a_3 \cdot \lvert I_F\rvert^3 + a_2 \cdot \lvert I_F\rvert^2 + a_1 \cdot \lvert I_F\rvert + a_0$				
Temp.[°C]	a_3	a_2	a_1	a_0
25	-	-1.19E-07	8.40E-04	3.39E-01
150	-	-1.96E-07	1.38E-03	5.58E-01

Recovery loss vs. Forward current



Switching time vs. Collector Current

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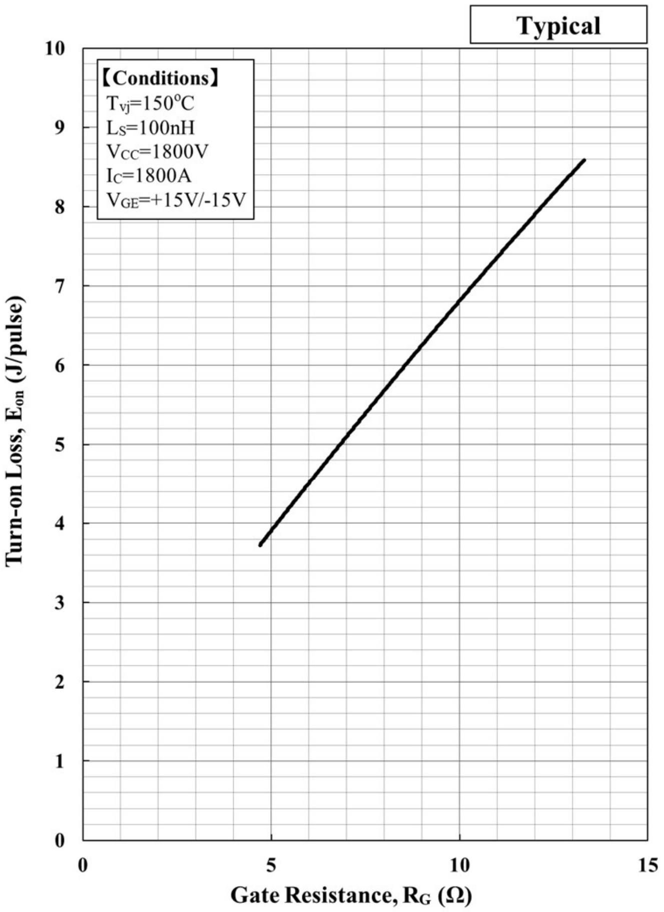
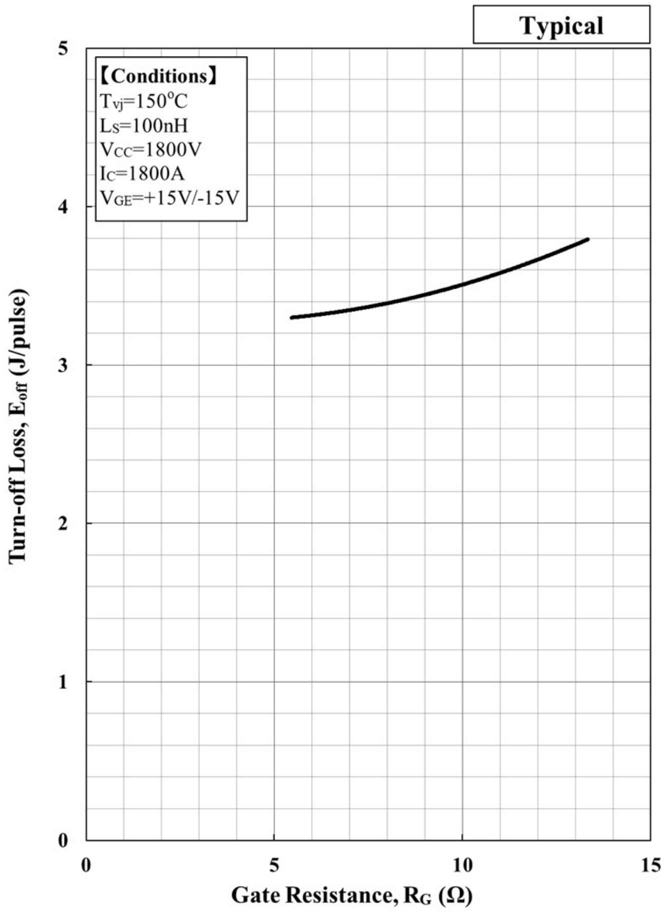
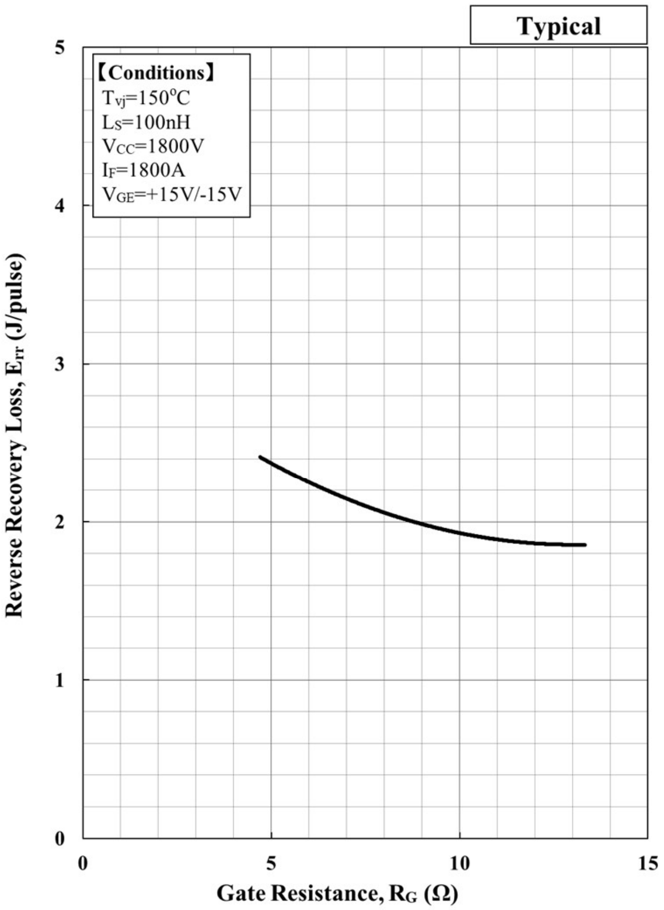


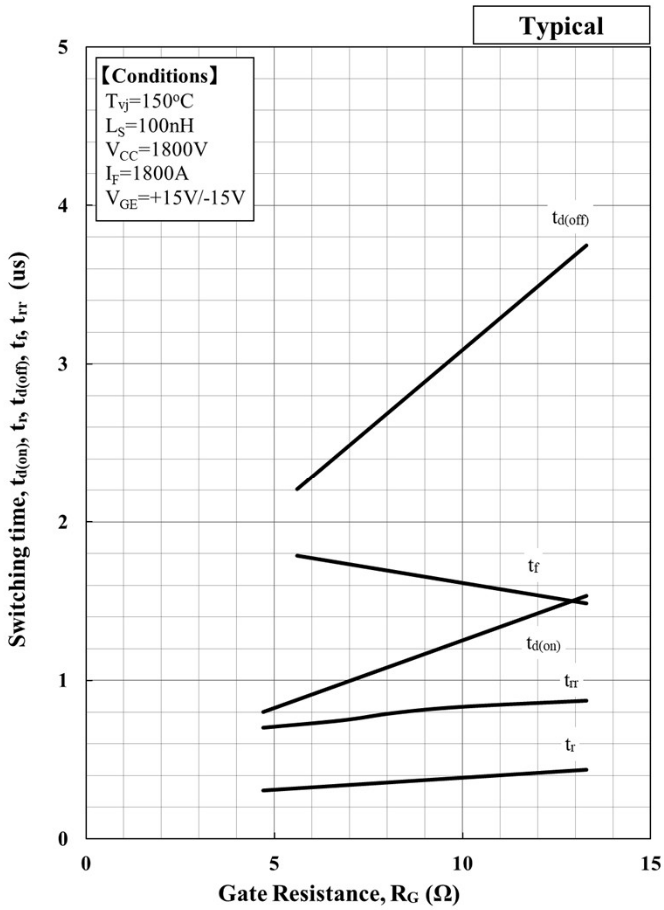
Turn-on loss vs. Gate Resistance



Turn-off loss vs. Gate Resistance



Recovery loss vs. Gate Resistance



Switching time vs. Gate Resistance

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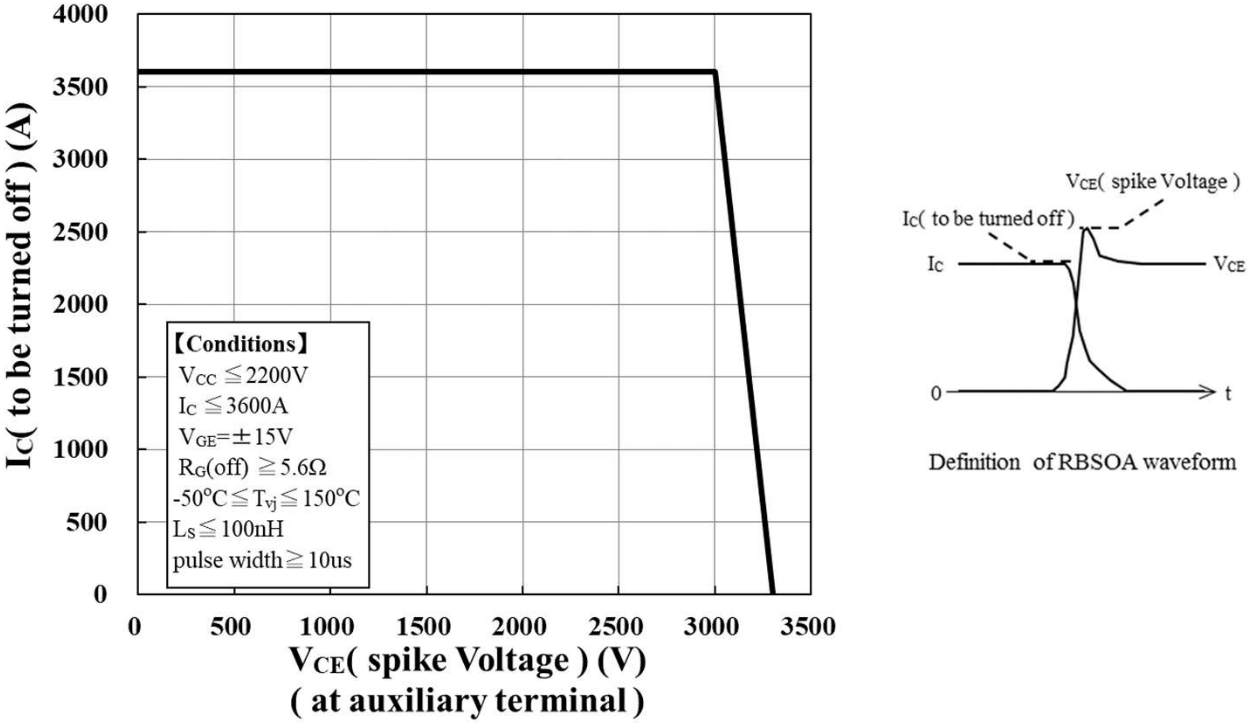
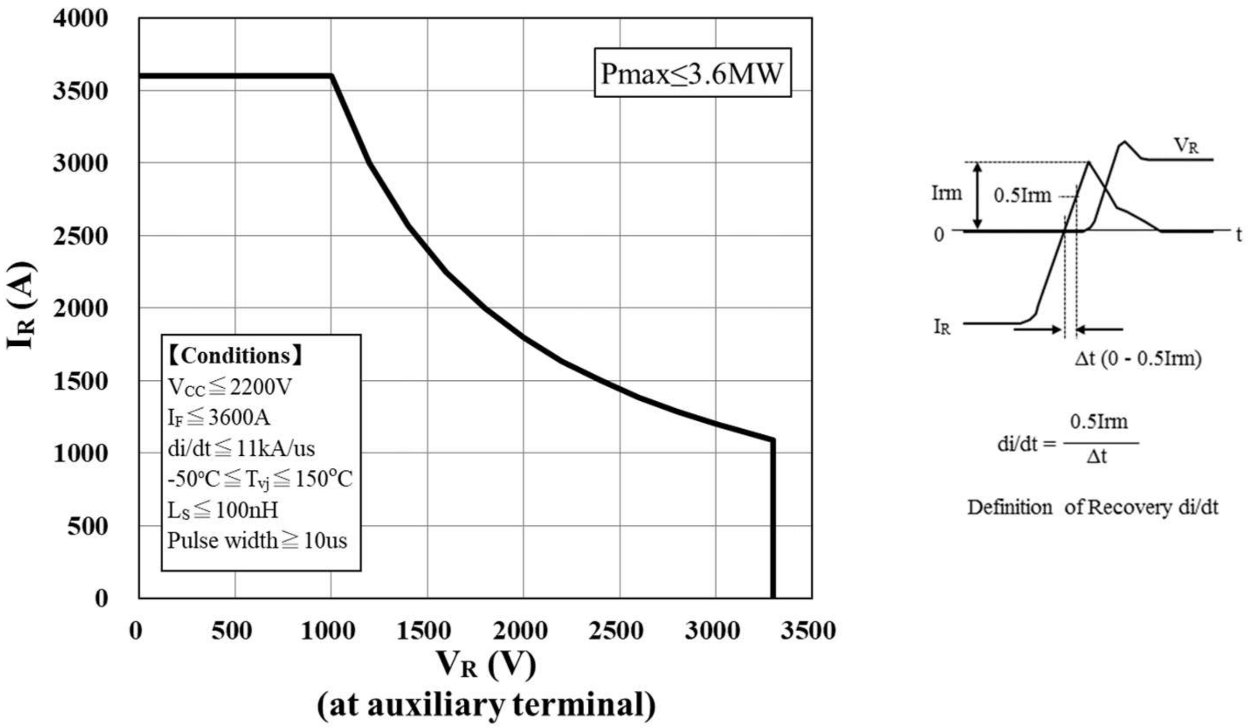


Reverse Bias Safe Operation Area (RBSOA)



Reverse Recovery Safe Operation Area (RRSOA)

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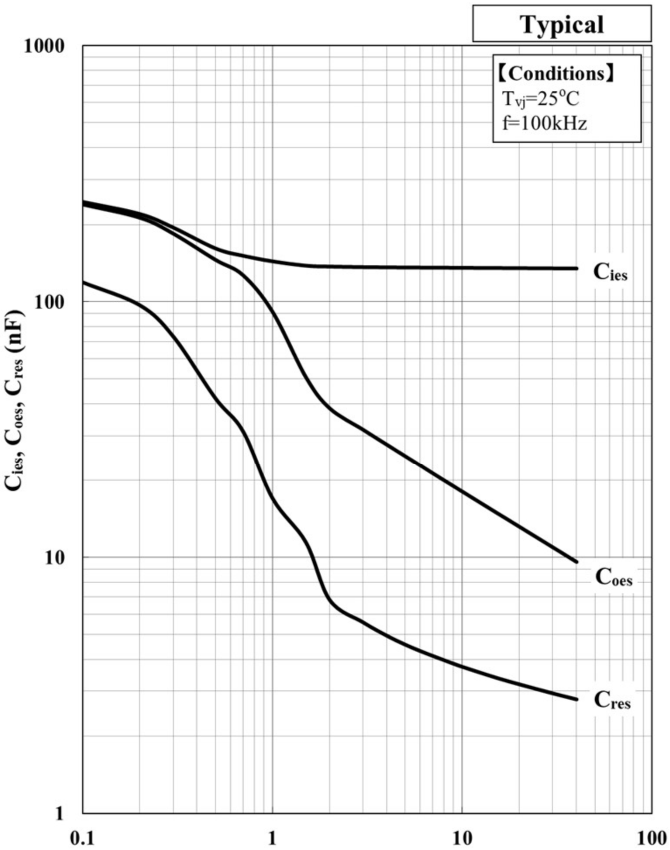
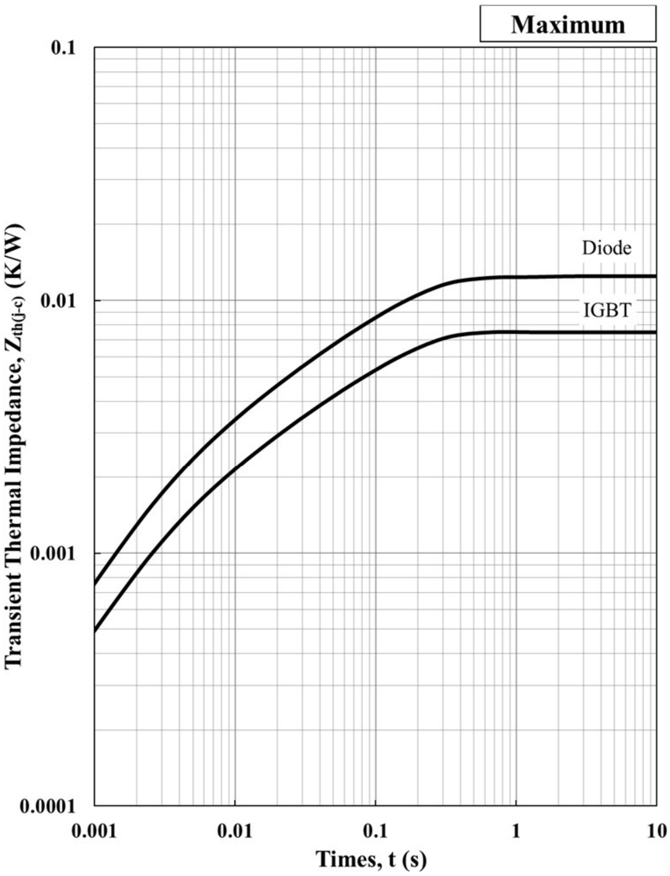


Capacitance vs. Collector to Emitter Voltage



Transient Thermal Impedance Curve

Foster model lumped circuit constant

n	1	2	3	4	Unit
R th, IGBT [n]	1.52E-03	8.82E-04	4.60E-03	5.03E-04	[K/W]
C th, IGBT [n]	1.98E+00	3.40E+01	2.17E+01	5.96E+02	[J/K]
R th, Diode [n]	2.36E-03	1.69E-03	6.99E-03	1.47E-03	[K/W]
C th, Diode [n]	1.27E+00	1.78E+01	1.43E+01	2.04E+02	[J/K]

Cauer model lumped circuit constant

n	1	2	3	4	Unit
R th, IGBT [n]	2.00E-03	3.81E-03	1.53E-03	1.74E-04	[K/W]
C th, IGBT [n]	1.72E+00	1.28E+01	3.68E+01	1.65E+03	[J/K]
R th, Diode [n]	3.18E-03	6.10E-03	2.74E-03	4.98E-04	[K/W]
C th, Diode [n]	1.09E+00	7.52E+00	2.25E+01	5.55E+02	[J/K]

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