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
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
Peak 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
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.

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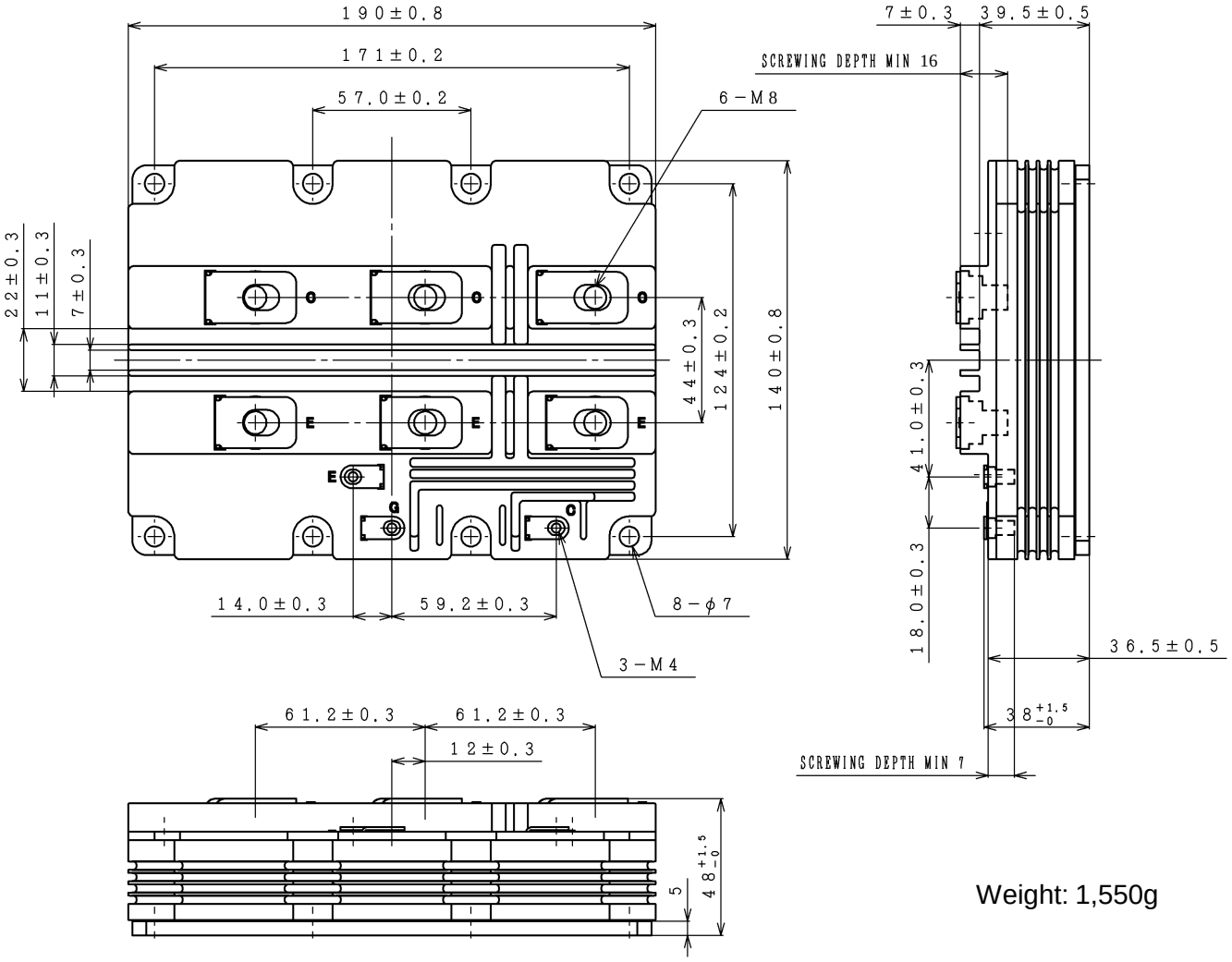
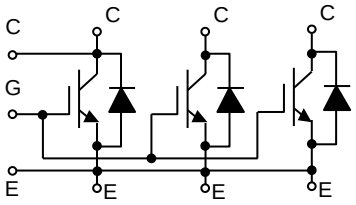
OUTLINE DRAWING

Unit in mm



Weight: 1,550g

CIRCUIT DIAGRAM



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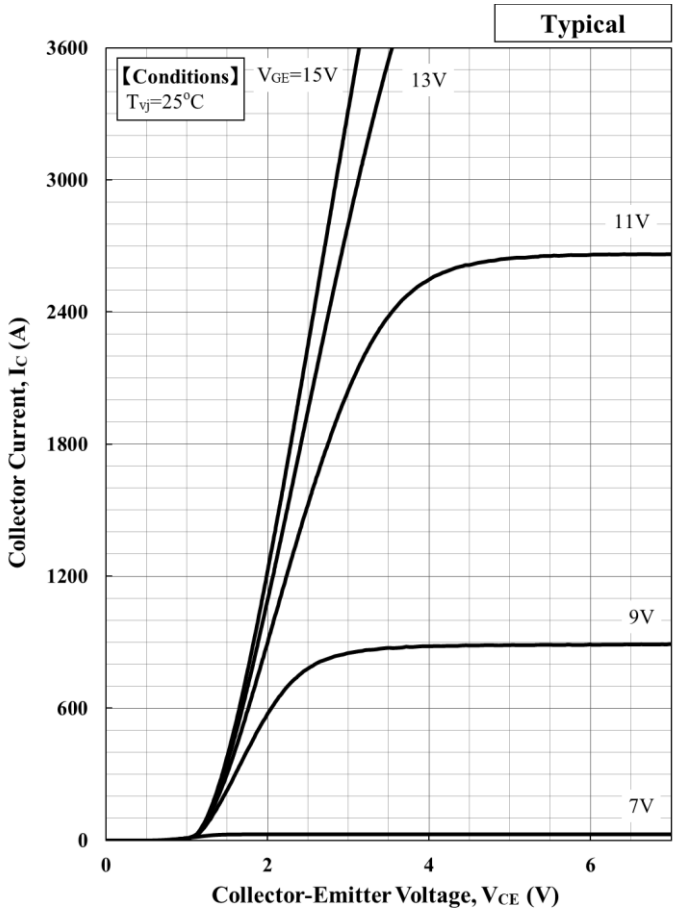
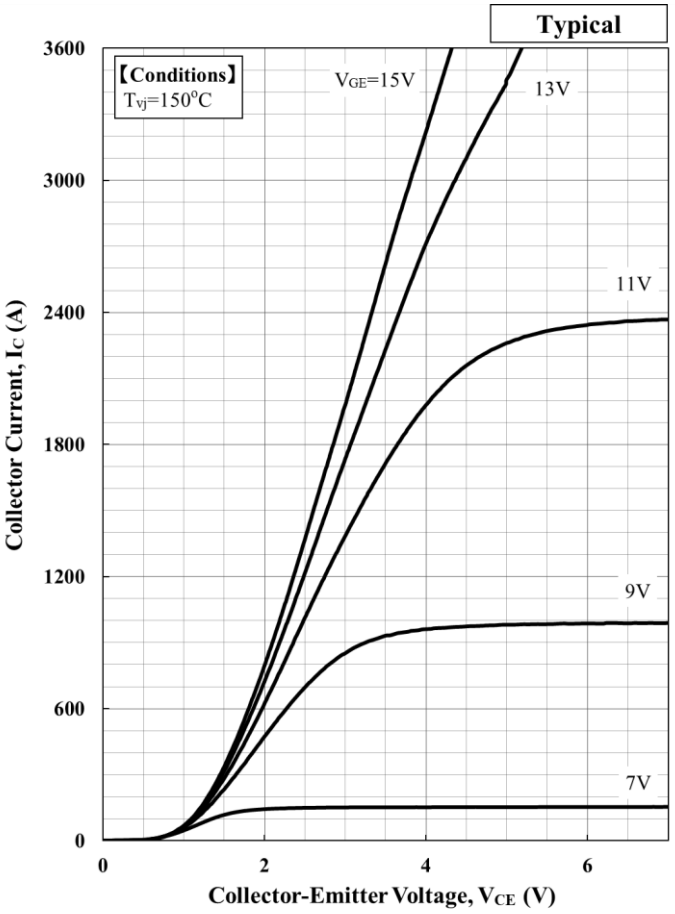
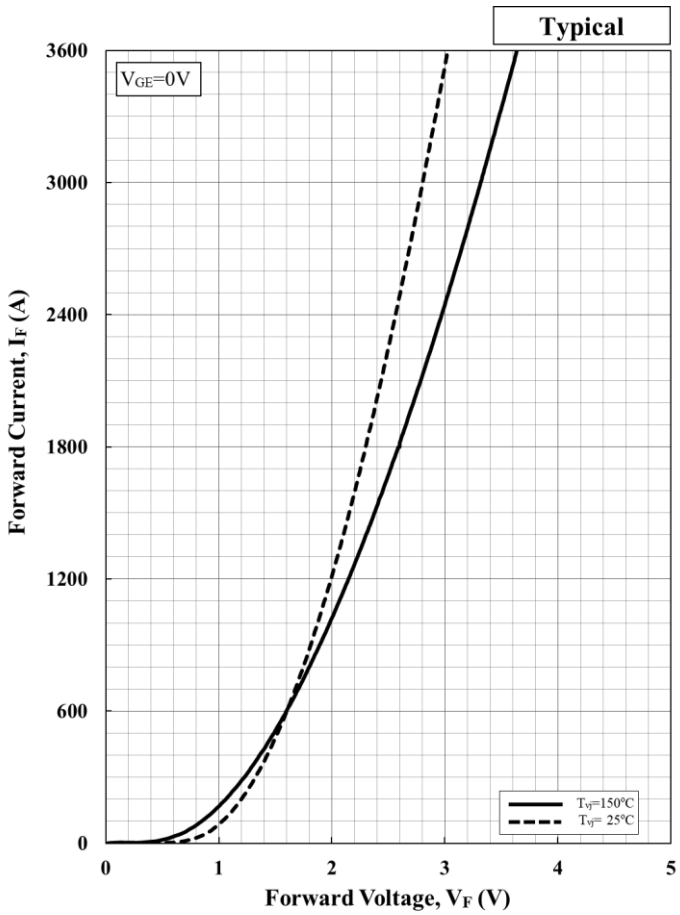


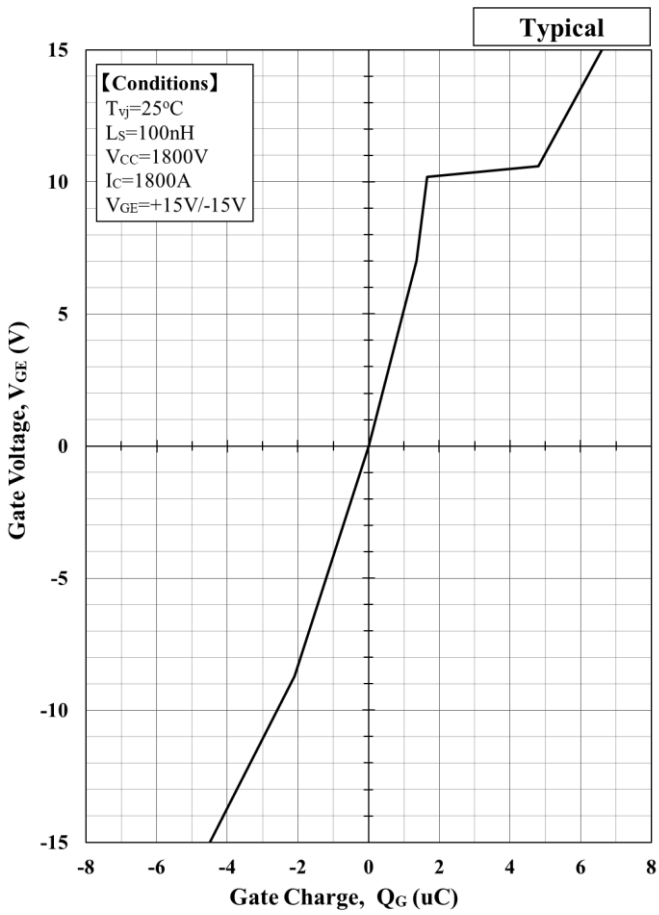
Collector Current vs. Collector Emitter Voltage



Collector Current vs. Collector Emitter Voltage



Forward Voltage of free-wheeling diode



VGE-QG curve

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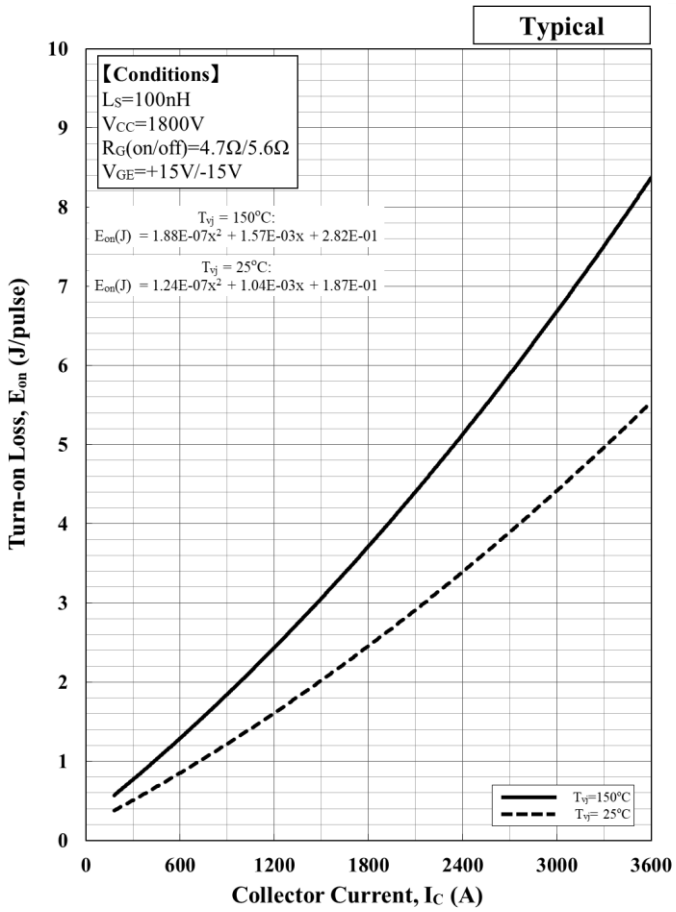
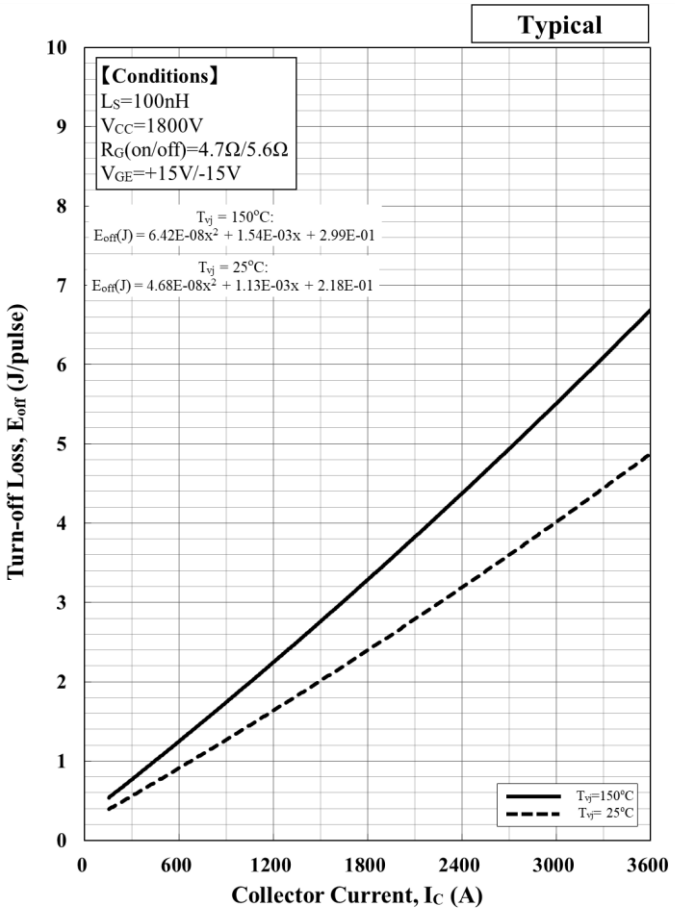
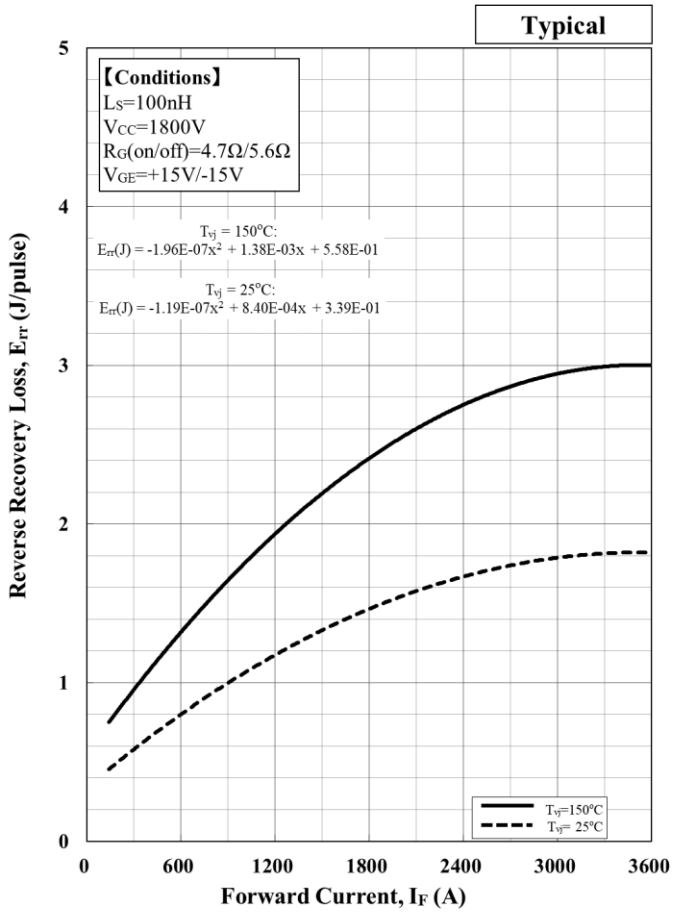


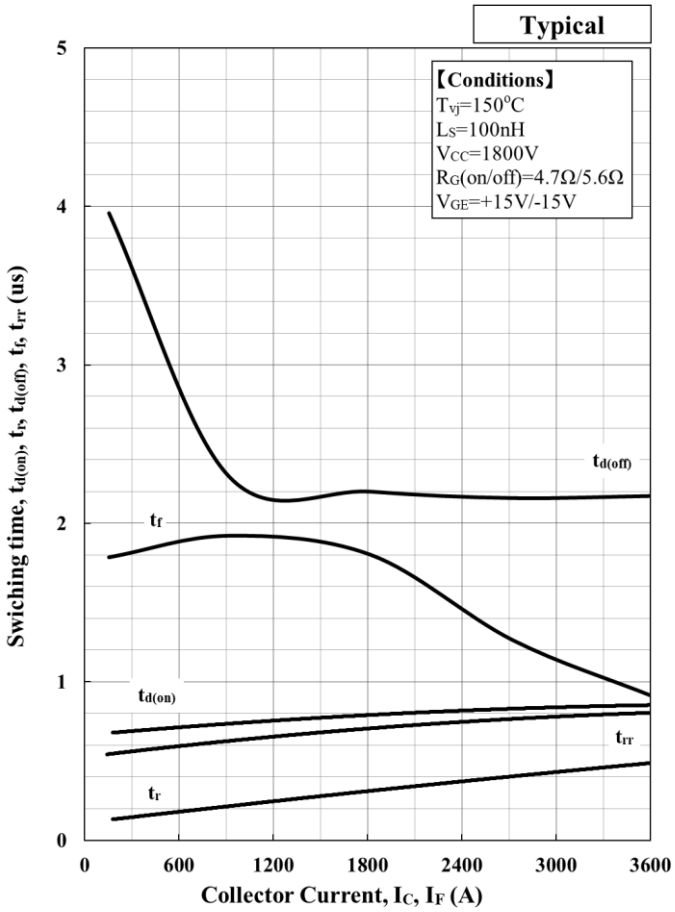
Turn-on loss vs. Collector current



Turn-off loss vs. Collector current



Recovery loss vs. Forward current



Switching time vs. Collector Current

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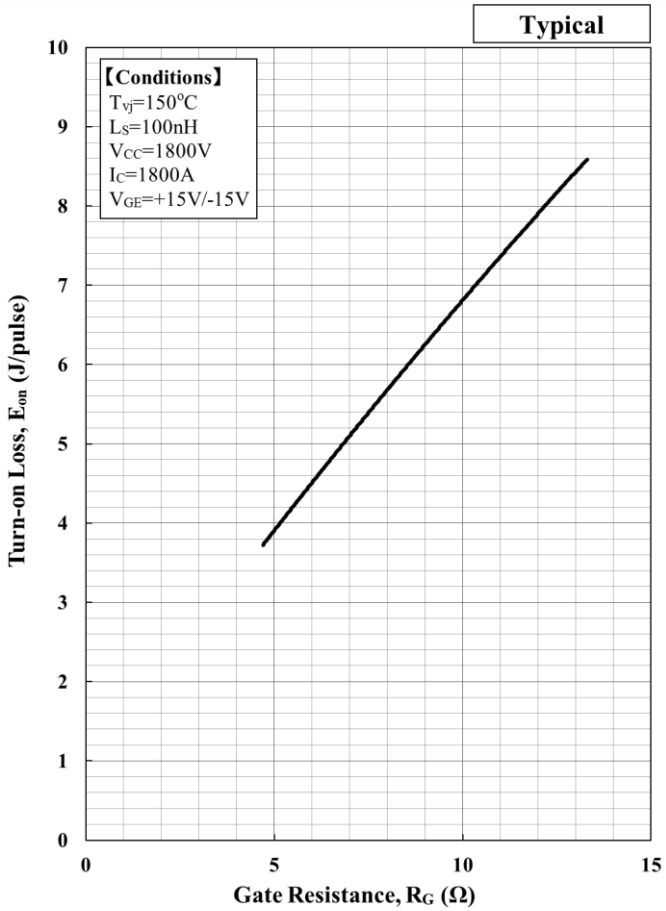
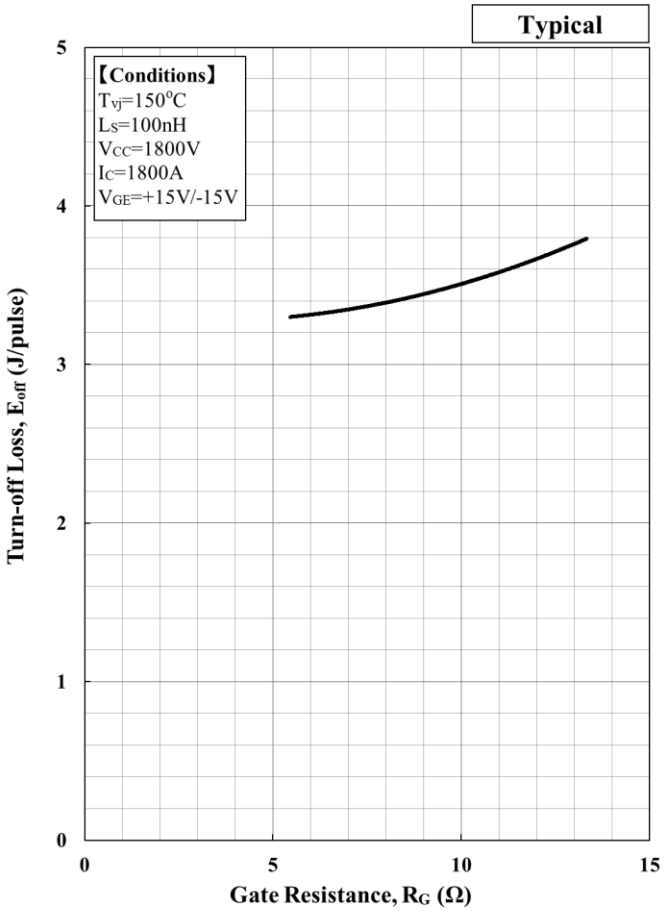
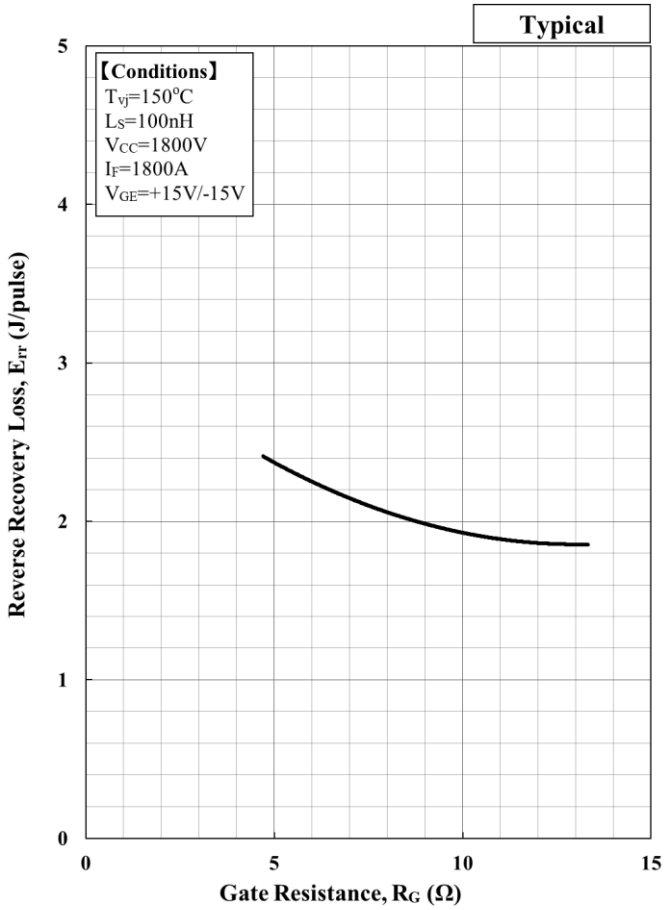


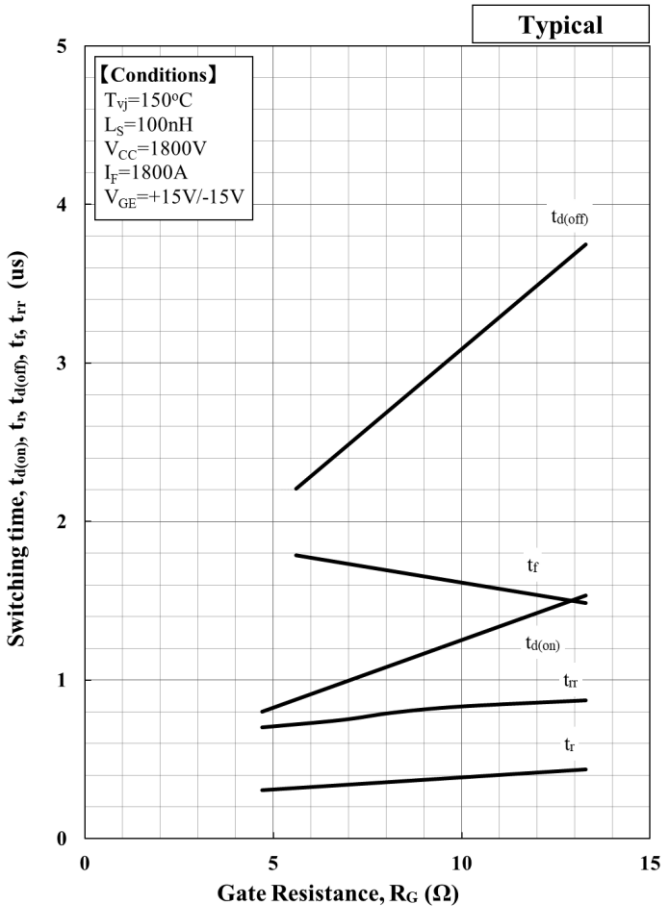
Turn-on loss vs. Gate Resistance



Turn-off loss vs. Gate Resistance



Recovery loss vs. Gate Resistance



Switching time vs. Gate Resistance

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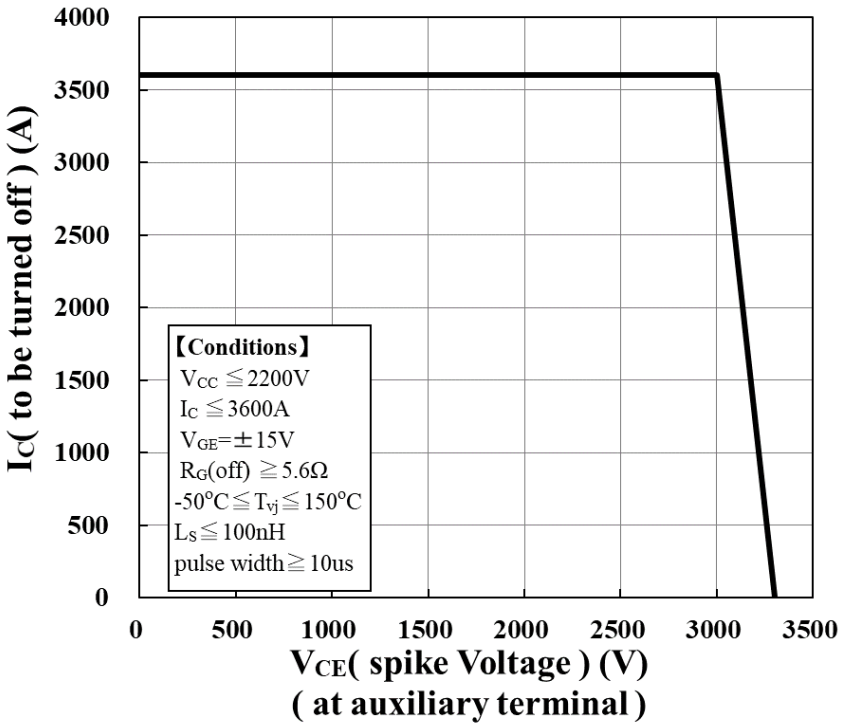
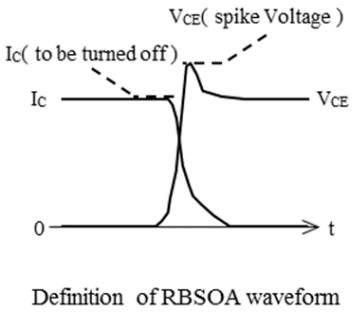
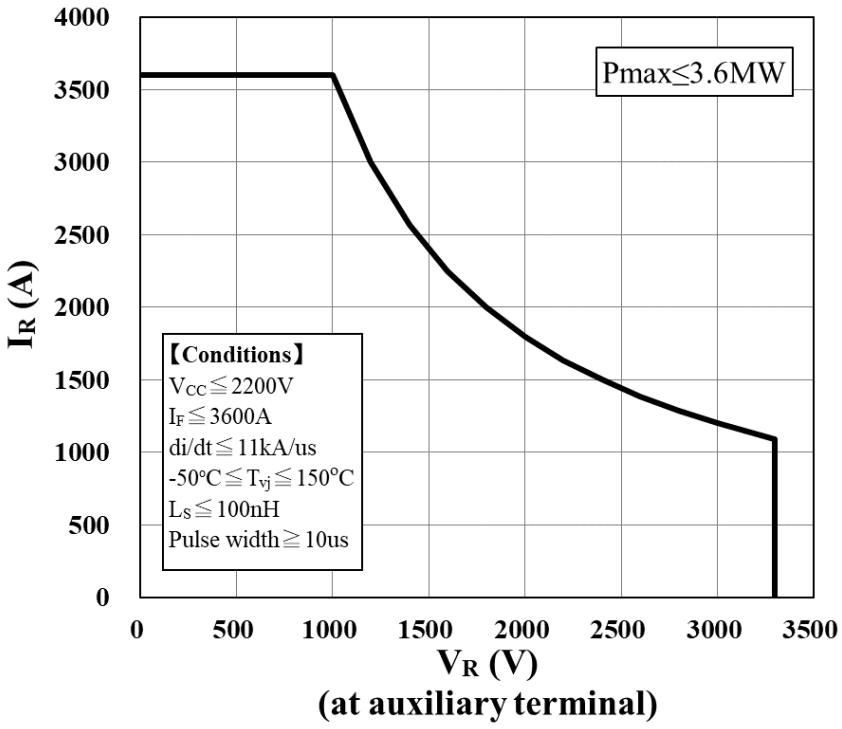
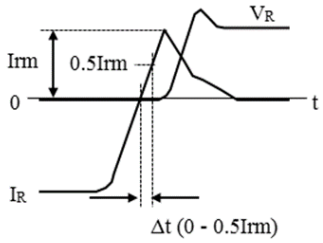




Definition of RBSOA waveform

Reverse Bias Safe Operation Area (RBSOA)





$$di/dt = \frac{0.5Irm}{\Delta t}$$

Definition of Recovery di/dt

Reverse Recovery Safe Operation Area (RRSOA)

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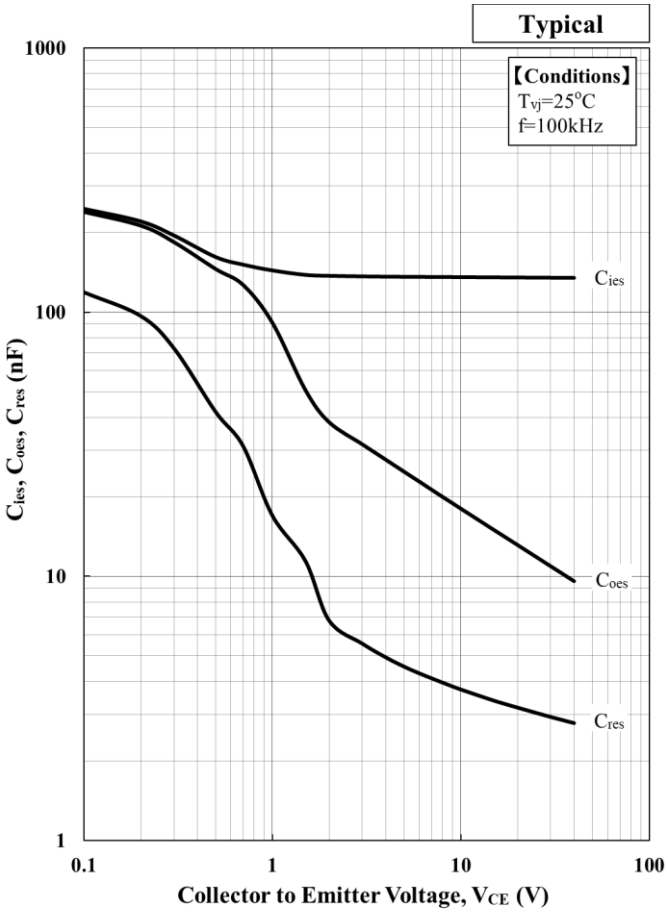
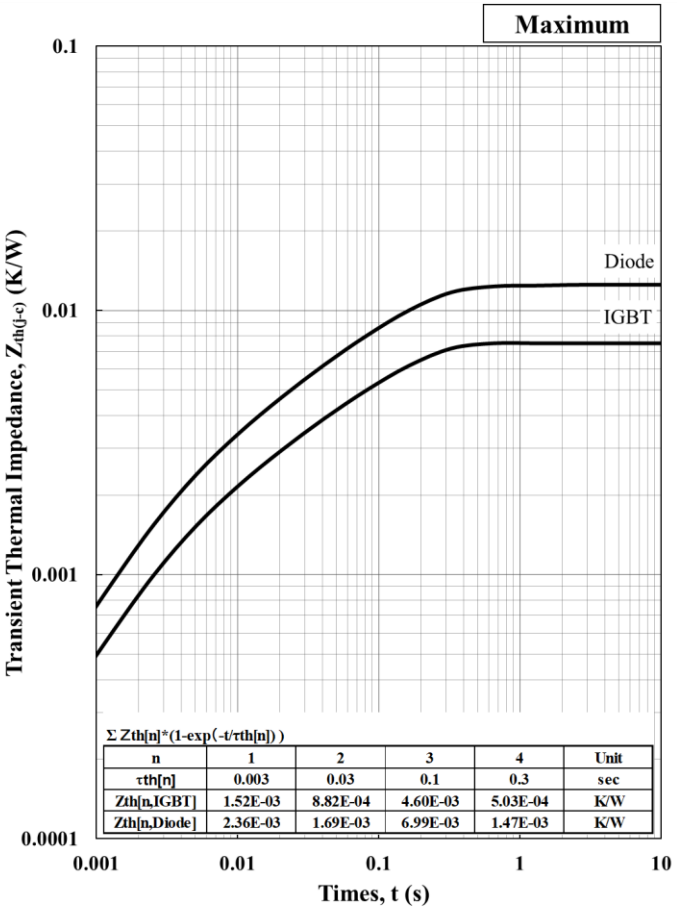


Capacitance vs. Collector to Emitter Voltage



Σ Zth[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]	1.52E-03	8.82E-04	4.60E-03	5.03E-04	K/W
Zth[n,Diode]	2.36E-03	1.69E-03	6.99E-03	1.47E-03	K/W

Transient Thermal Ipedance Curve

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5. A semi-processed article is done now using solder which contains lead inside the semiconductor devices. There is possibility of the regulation substance depend on the applied models, so please check before using.
6. This specification is a material for component selection, which describes specifications of power semiconductor devices (hereinafter referred to as products), characteristic charts, and external dimension drawings.
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