MBN1600F17F

Silicon N-channel IGBT 1700V F version

FEATURES

- Soft switching behavior, low switching loss & low conduction loss :
  Soft low-injection punch-through with trench gate IGBT
- Low driving power due to low input capacitance advanced trench MOS gate.
- Ultra soft fast recovery diode.
- High current rate package.
- Low $R_{th(j-c)}$ & low stray inductance.
- RoHS
- High thermal fatigue durability

ABSOLUTE MAXIMUM RATINGS (T_C=25°C)

Item		Symbol	Unit	MBN1600F17F
Collector Emitter Voltage		V_{CES}	V	1,700
Gate Emitter Voltage		V_{GES}	V	±20
Collector Current	DC	I_C	A	1,600
	1ms	I_{CRM}		3,200
Forward Current	DC	I_F	A	1,600
	1ms	I_{FRM}		3,200
Junction Temperature		$T_{vj\ op}$	°C	-50 ~ +150
Storage Temperature		T_{stg}	°C	-50 ~ +150
Isolation Voltage		V_{ISO}	V_{RMS}	4,000(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	-	-	5	V_{CE}=1,700V, V_{GE}=0V, T_{vj}=25°C
				-	20	70	V_{CE}=1,700V, 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		$V_{CE(sat)}$	V	-	2.0	-	I_C=1,600A, V_{GE}=15V, T_{vj}=25°C
				-	2.3	-	I_C=1,600A, V_{GE}=15V, T_{vj}=125°C
				-	2.4	2.6	I_C=1,600A, V_{GE}=15V, T_{vj}=150°C
Gate Emitter Threshold Voltage		$V_{GE(th)}$	V	4.1	5.5	7.1	V_{CE}=10V, I_C=160mA, T_{vj}=25°C
Input Capacitance		C_{ies}	nF	-	87	-	V_{CE}=10V, V_{GE}=0V, f=100kHz, T_{vj}=25°C
Internal Gate Resistance		$R_{G(int)}$	Ω	-	2.25	-	V_{CE}=10V, V_{GE}=0V, f=100kHz, T_{vj}=25°C
Turn On Delay Time		$t_{d(on)}$	μs	-	0.7	-	V_{CC}=900V, I_C=1,600A
Rise Time		t_r		-	0.2	-	L_S=65nH (3)
Turn Off Delay Time		$t_{d(off)}$		-	1.5	-	R_G(on/off)=4.7/4.7Ω (3)
Fall Time		t_f		-	1.5	-	V_{GE}=±15V, T_{vj}=150°C
Peak Forward Voltage Drop		V_F	V	-	2.0	-	I_F=1,600A, V_{GE}=0V, T_{vj}=25°C
				-	2.2	-	I_F=1,600A, V_{GE}=0V, T_{vj}=125°C
				-	2.25	2.7	I_F=1,600A, V_{GE}=0V, T_{vj}=150°C
Reverse Recovery Time		t_{rr}	μs	-	0.75	-	V_{CC}=900V, I_C=1,600A
Turn On Loss		E_{on}	J/P	-	0.47	-	L_S=65nH (3)
Turn Off Loss		E_{off}	J/P	-	1.25	-	R_G(on/off)=4.7/4.7Ω (3)
Reverse Recovery Loss		E_{rr}	J/P	-	0.55	-	V_{GE}=±15V, T_{vj}=150°C
Stray inductance module		L_{SCE}	nH	-	10	-	Collector Main to Emitter Main
Thermal Impedance	IGBT	$R_{th(j-c)}$	K/W	-	-	0.0165	Junction to case
	FWD	$R_{th(j-c)}$		-	-	0.0255	
Contact Thermal Impedance		$R_{th(c-f)}$	K/W	-	0.008	-	Case to fin

Notes:(3) Ls and R_G are the test condition's values for evaluation of the switching times, not recommended value.
Please, determine the suitable R_G value after the measurement of switching waveforms (overshoot voltage, etc.) with appliance mounted.

* 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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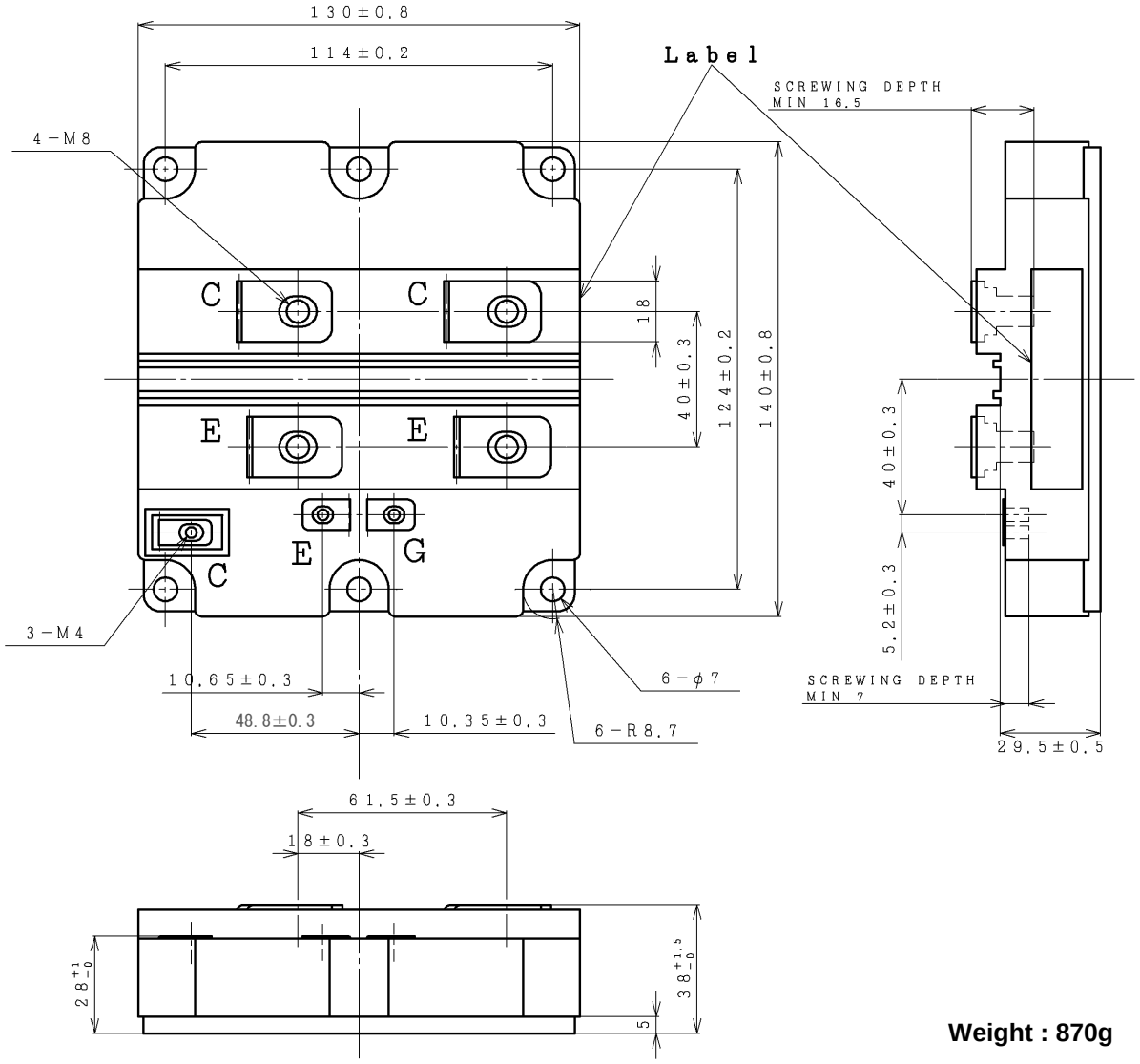
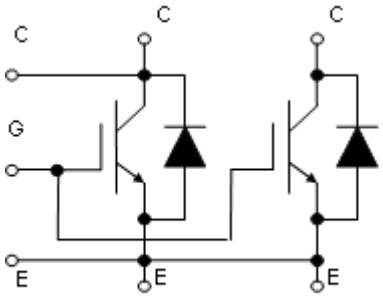
OUTLINE DRAWING

Unit in mm



Weight : 870g

CIRCUIT DIAGRAM



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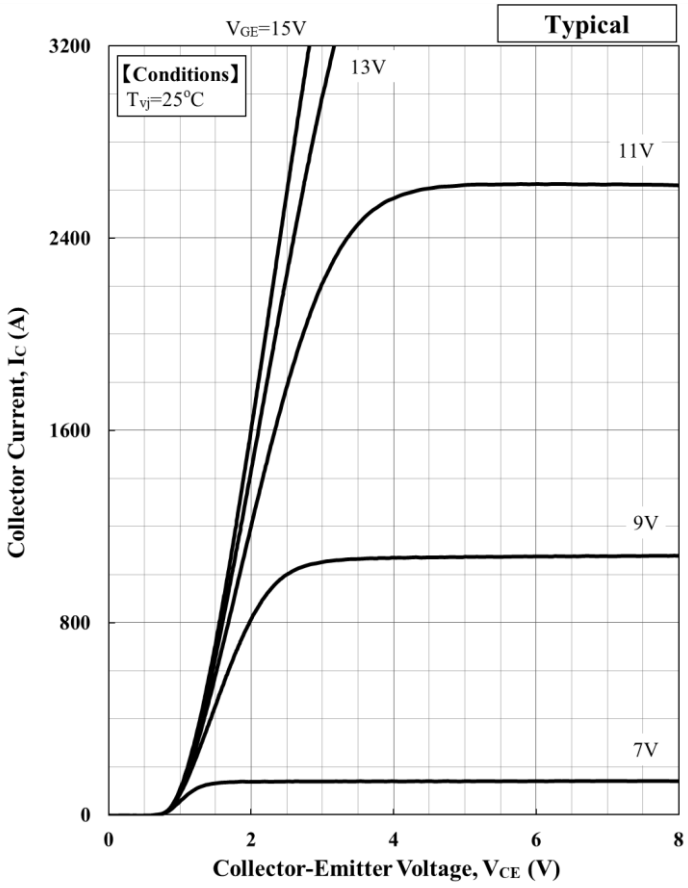
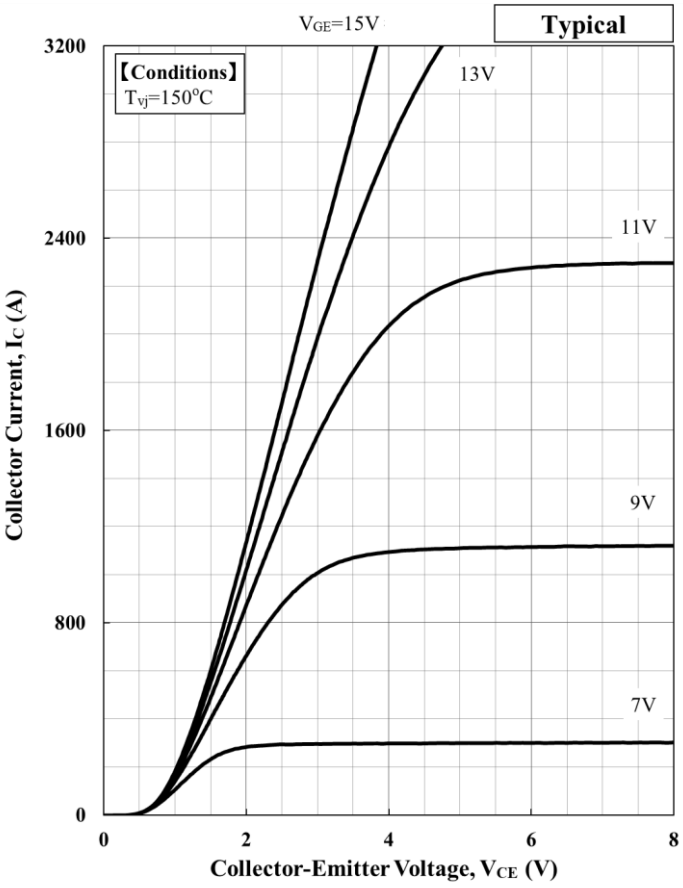
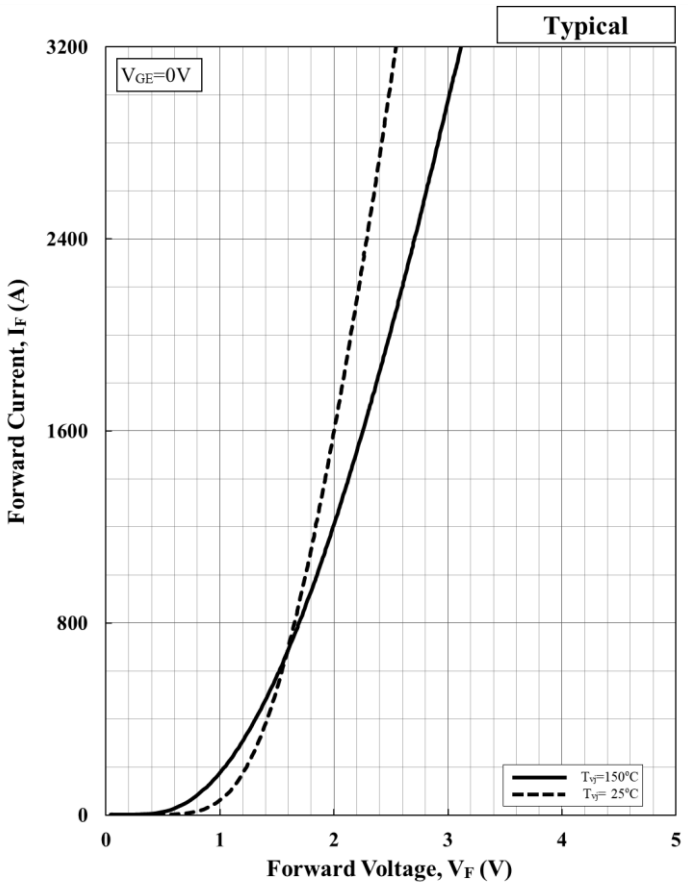


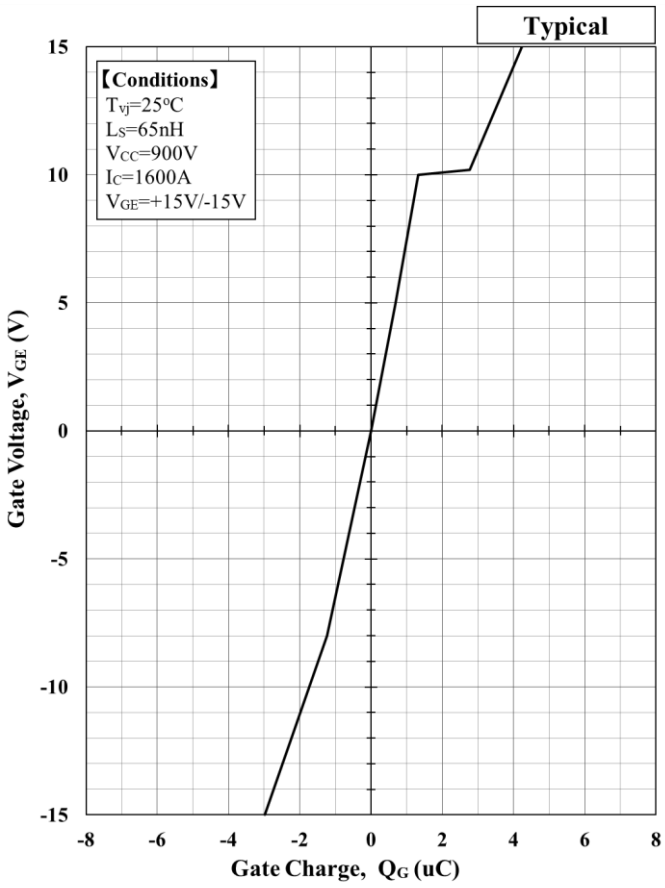
Collector Current vs. Collector Emitter Voltage



Collector Current vs. Collector Emitter Voltage



Forward Voltage of free-wheeling diode



V_{GE}-Q_G curve

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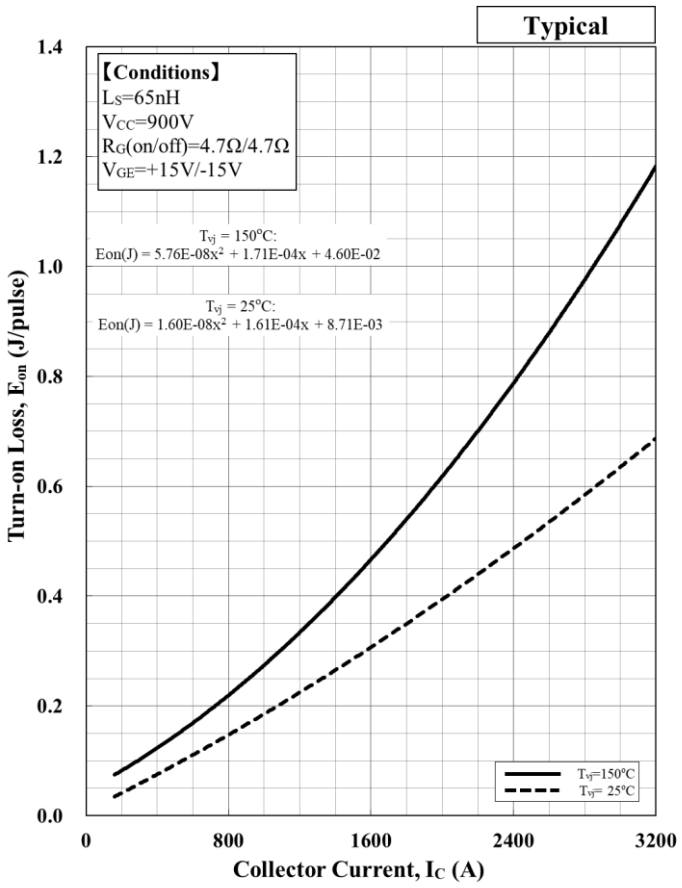
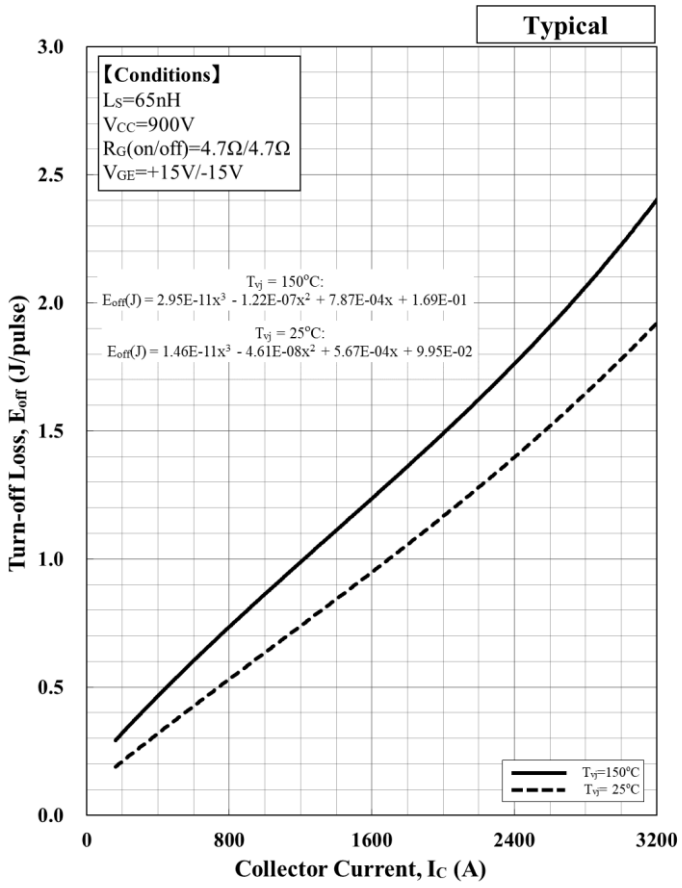
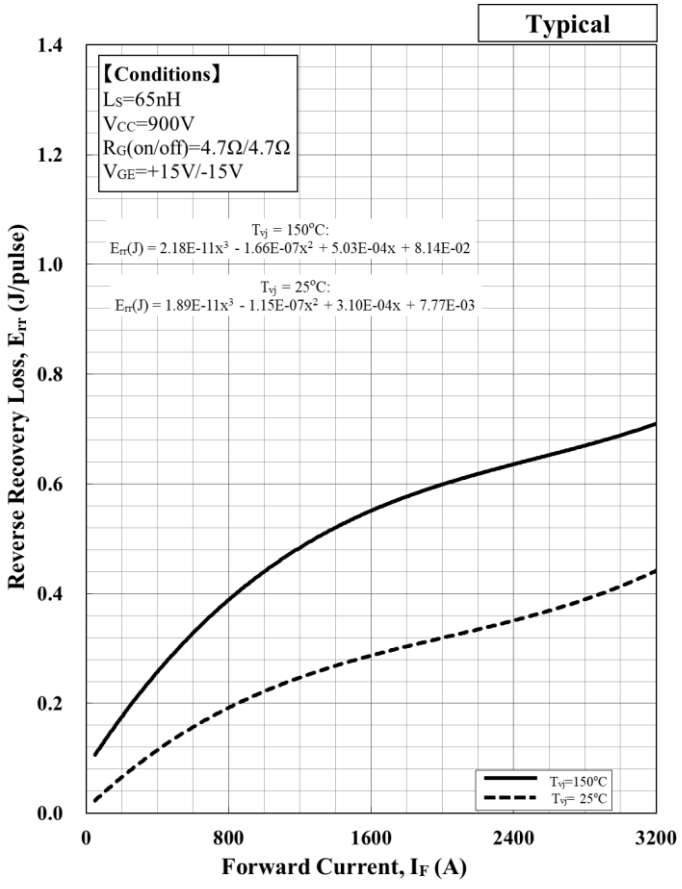


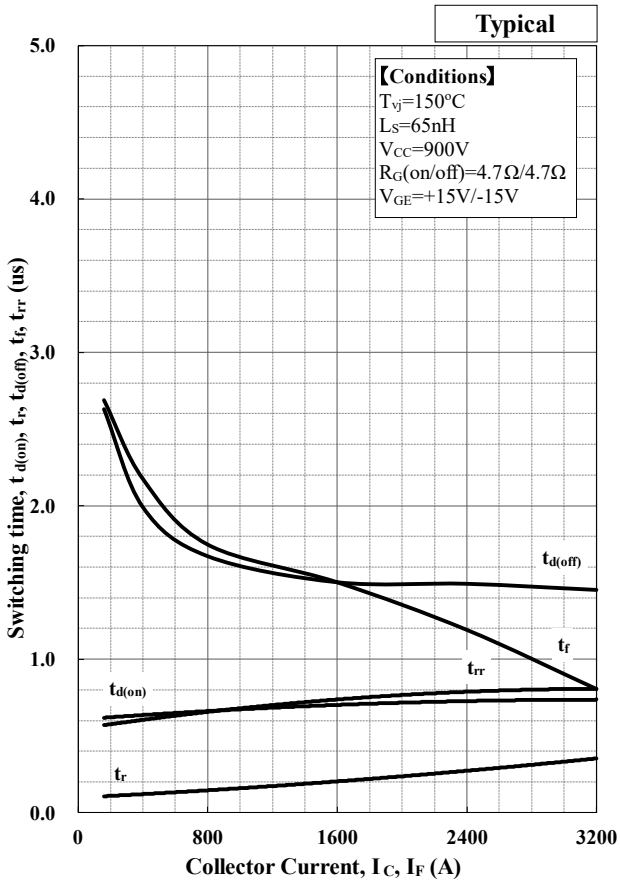
Turn-on loss vs. Collector current



Turn-off loss vs. Collector current



Recovery loss vs. Forward current



Switching time vs. Collector Current

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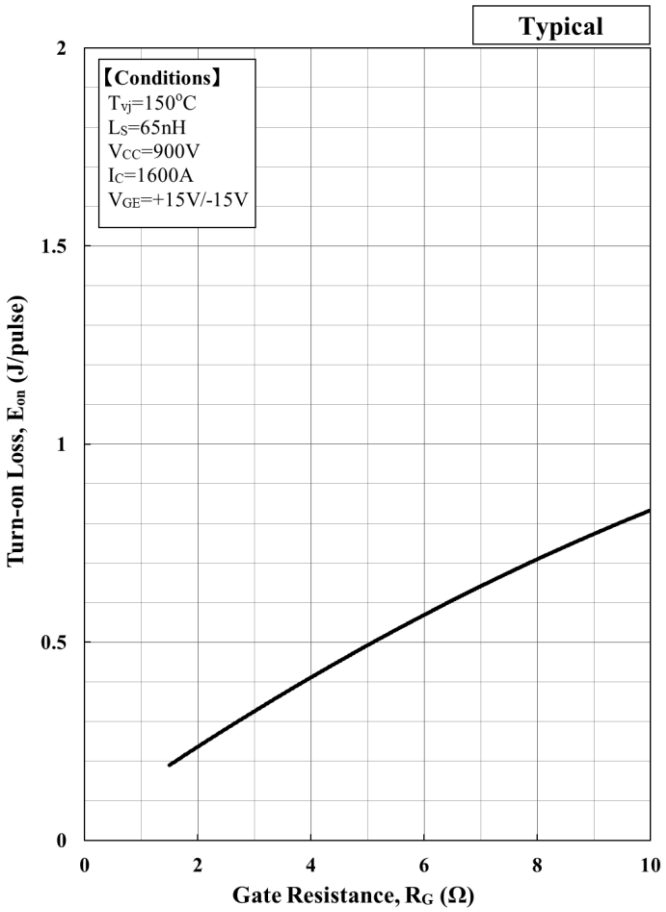
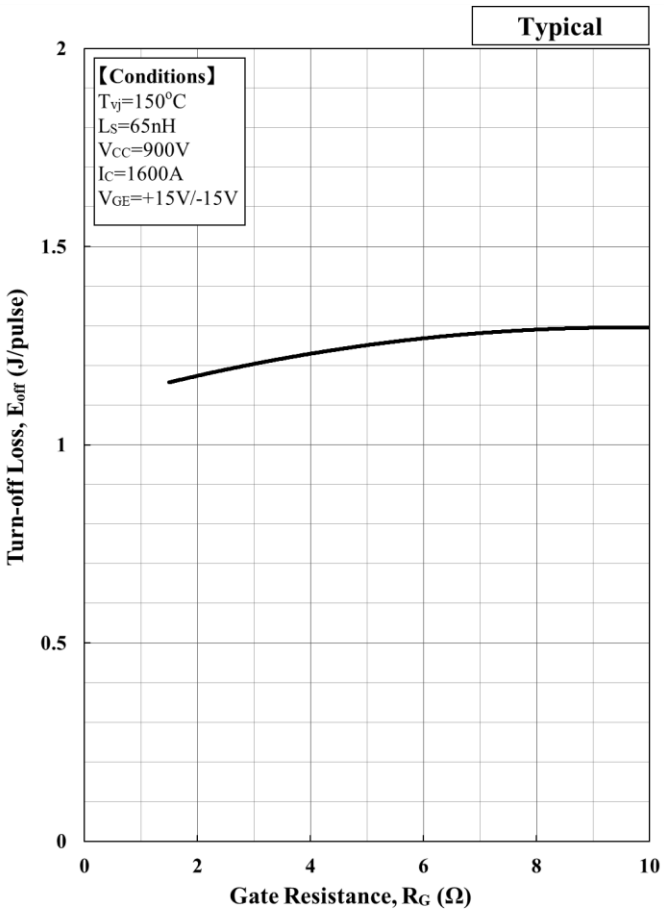
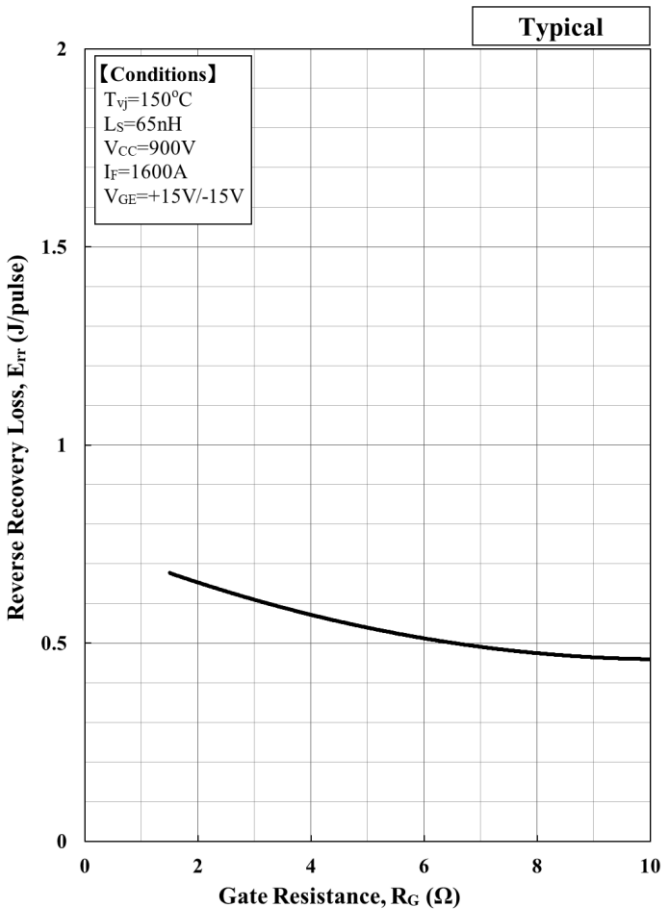


Turn-on loss vs. Gate Resistance



Turn-off loss vs. Gate Resistance



Recovery loss vs. Gate Resistance

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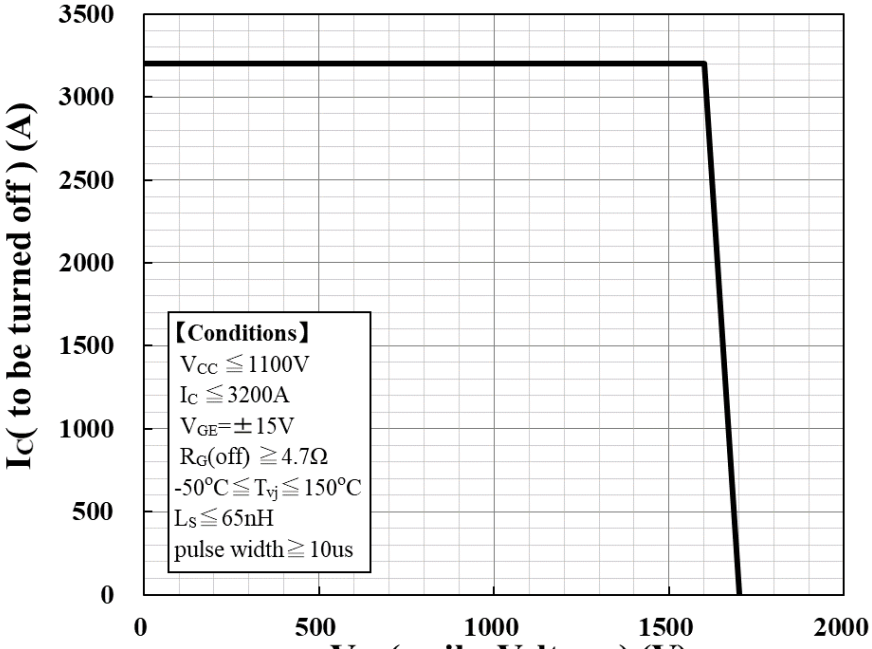
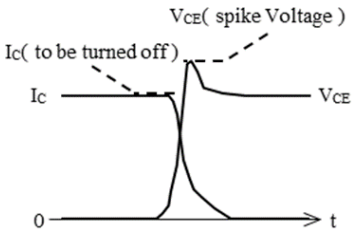


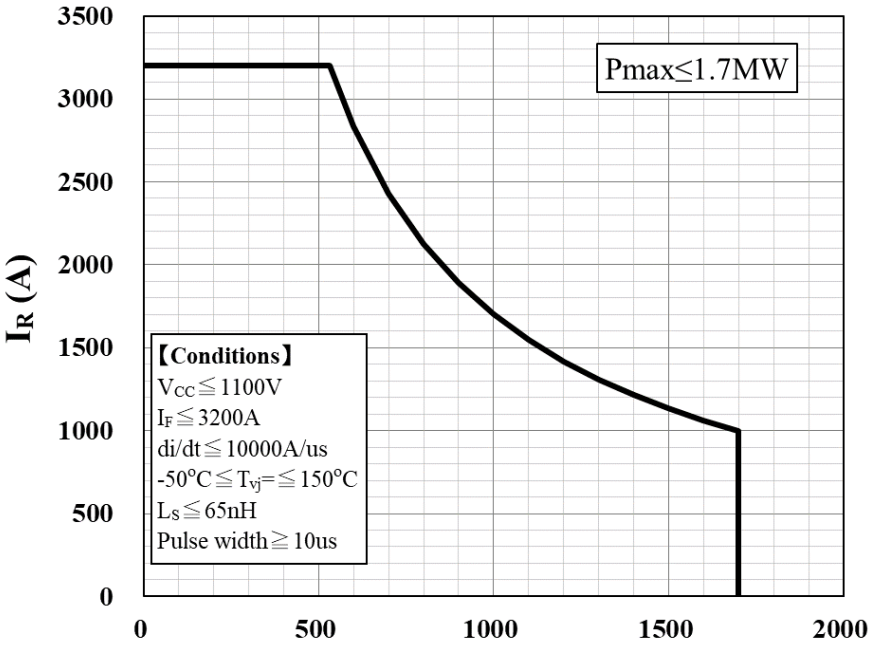
IC(to be turned off) (A)

VCE(spike Voltage) (V)
(at auxiliary terminal)

Reverse Bias Safe Operation Area (RBSOA)



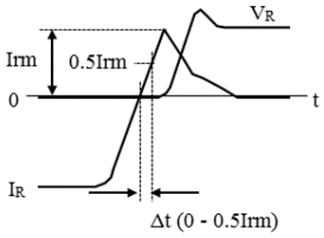
Definition of RBSOA waveform



IR (A)

VR (V)
(at auxiliary terminal)

Reverse Recovery Safe Operation Area (RRSOA)



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

Definition of Recovery di/dt

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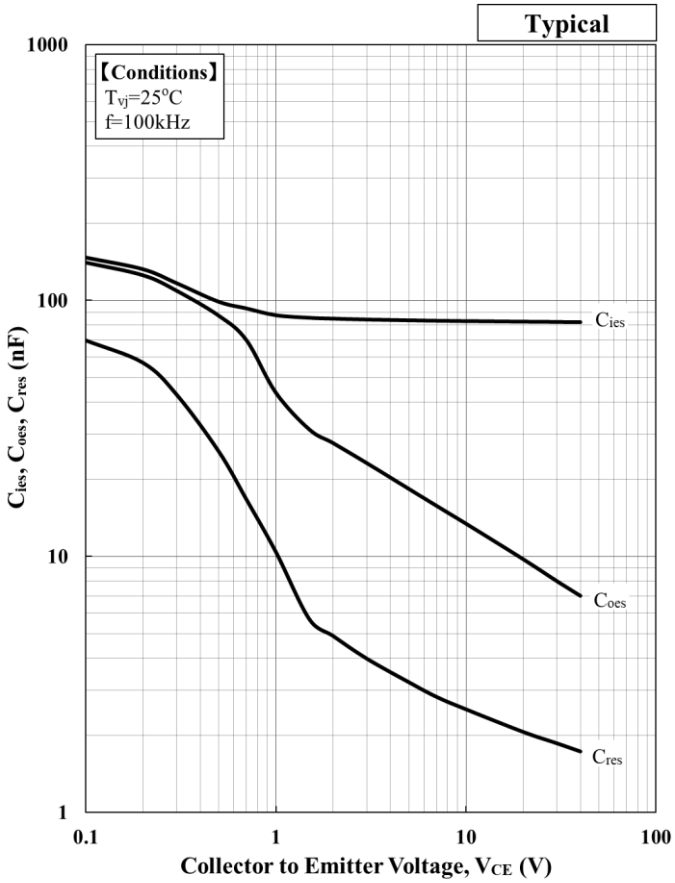
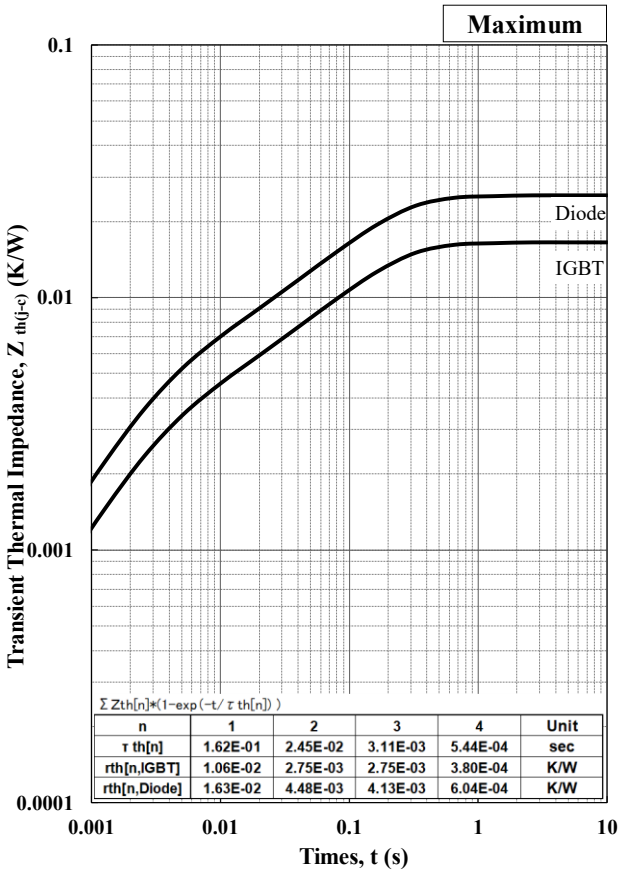


Capacitance vs. Collector to Emitter Voltage



n	1	2	3	4	Unit
τ th[n]	1.62E-01	2.45E-02	3.11E-03	5.44E-04	sec
rth[n,IGBT]	1.06E-02	2.75E-03	2.75E-03	3.80E-04	K/W
rth[n,Diode]	1.63E-02	4.48E-03	4.13E-03	6.04E-04	K/W

Transient Thermal Impedance Curve

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Minebea POWER SEMICONDUCTORS

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