MBL1200F17F

Silicon N-channel IGBT 1700V F version

FEATURES

- Soft switching behavior & low conduction loss :
  Soft low-injection punch-through with trench gate IGBT
- Low driving power due to low input capacitance advanced trench gate.
- Low noise due to 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	MBL1200F17F
Collector Emitter Voltage		V_{CES}	V	1,700
Gate Emitter Voltage		V_{GES}	V	±20
Collector Current	DC	I_C	A	1,200
	1ms	I_{CRM}		2,400
Forward Current (Free wheel Diode) (1)	DC	$I_{F(FWD)}$	A	150
	1ms	$I_{FRM(FWD)}$		300
Forward Current (Chopper Diode)	DC	$I_{F(chopper)}$	A	1,200
	1ms	$I_{FRM(chopper)}$		2,400
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 (2)
	Mounting (M6)	-		6 (3)

Notes: (1) For reverse voltage protection (2) Recommended Value 1.8±0.2/ 15^{+0}_{-3}N·m (3) Recommended Value 5.5±0.5N·m

ELECTRICAL CHARACTERISTICS

1)IGBT+FWD

Item		Symbol	Unit	Min.	Typ.	Max.	Test Conditions
Collector Emitter Cut-Off Current		I_{CES}	mA	-	-	4	V_{CE}=1,700V, V_{GE}=0V, T_{vj}=25°C
				-	15	50	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	-	1.9	-	I_C=1,200A, V_{GE}=15V, T_{vj}=25°C
				-	2.3	2.6	I_C=1,200A, 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=120mA, T_{vj}=25°C
Input Capacitance		C_{ies}	nF	-	63	-	V_{CE}=10V, V_{GE}=0V, f=100kHz, T_{vj}=25°C
Internal Gate Resistance		$R_{G(int)}$	Ω	-	2.9	-	V_{CE}=10V, V_{GE}=0V, f=100kHz, T_{vj}=25°C
Turn On Delay Time		$t_{d(on)}$	μs	-	0.78	-	V_{CC}=900V, I_C=1,200A
Rise Time		t_r		-	0.25	-	L_S=115nH (4)
Turn Off Delay Time		$t_{d(off)}$		-	1.7	-	R_G(on/off)=6.8/6.8Ω (4)
Fall Time		t_f		-	1.3	-	V_{GE}=±15V, T_{vj}=150°C
Peak Forward Voltage Drop		V_F	V	-	1.5	-	I_F=150A, V_{GE}=0V, T_{vj}=25°C
				-	1.6	-	I_F=150A, V_{GE}=0V, T_{vj}=150°C
Turn On Loss		E_{on}	J/P	-	0.58	-	V_{CC}=900V, I_C=1,200A L_S=115nH (4)
Turn Off Loss		E_{off}	J/P	-	0.9	-	R_G(on/off)=6.8/6.8Ω (4) V_{GE}=±15V, T_{vj}=150°C
Stray inductance module		L_{SCE}	nH	-	20	-	Collector Main to Emitter Main
Thermal Impedance	IGBT	$R_{th(j-c)}$	K/W	-	-	0.02	Junction to case
	FWD	$R_{th(j-c)}$		-	-	0.13	
Contact Thermal Impedance		$R_{th(c-f)}$	K/W	-	0.016	-	Case to fin (grease=1W/(m·K), (at IGBT+FWD part)

MBL1200F17F

2) Chopper Diode

Item	Symbol	Unit	Min.	Typ.	Max.	Test Conditions
Repetitive Reverse Current	I_{RRM}	mA	-	-	2	V_{CE}=1,700V, T_{vj}=25°C
			-	8	-	V_{CE}=1,700V, T_{vj}=150°C
Peak Forward Voltage Drop (Between main terminals)	V_F	V	-	2.1	-	I_F=1,200A,T_{vj}=25°C Measured at main terminals
			-	2.3	-	I_F=1,200A,T_{vj}=150°C Measured at main terminals
Reverse Recovery Time	t_{rr}	μs	-	1.6	-	V_{CC}=900V, I_C=1,200A L_S=115nH (4) R_G(on/off)=6.8/6.8Ω (4) V_{GE}=±15V, T_{vj}=150°C
Reverse Recovery Loss	E_{rr}	J/P	-	0.35	-	
Thermal Impedance	$R_{th(j-c)}$	K/W	-	-	0.03	Junction to case
Contact Thermal Impedance	$R_{th(c-f)}$	K/W	-	0.016	-	Case to fin(at Chopper Diode part)

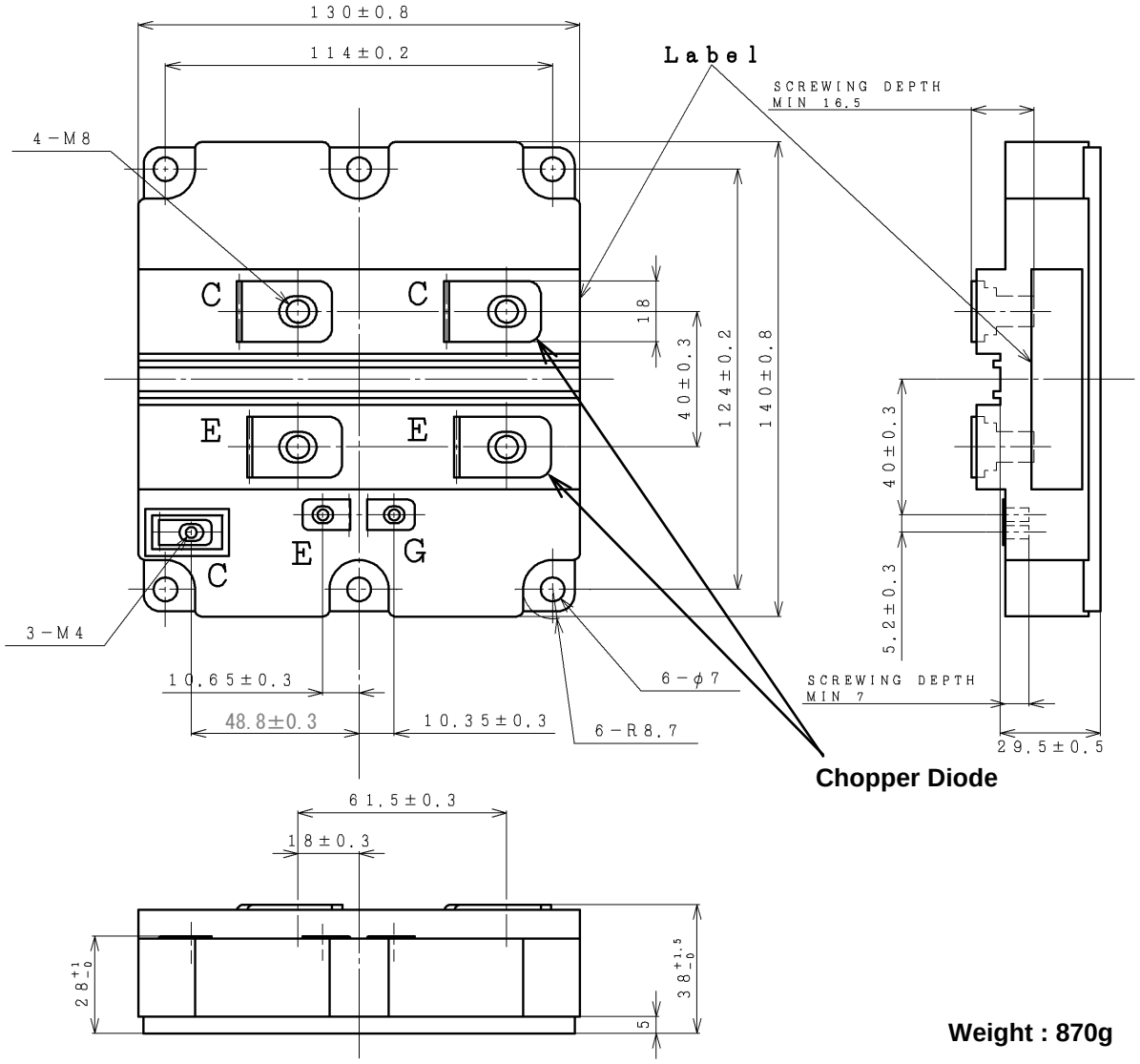
Notes:(4) Ls and R_G are the test condition's values for evaluation of the switching times, not recommended value.
Please, determine the suitable R_G value after the measurement of switching waveforms (overshoot voltage, etc.) with appliance mounted.

* 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.

MBL1200F17F

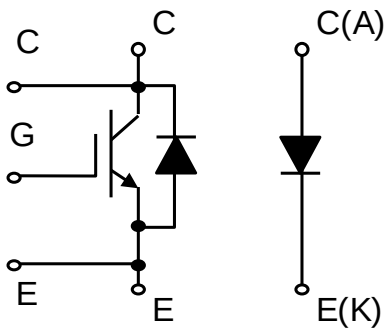
OUTLINE DRAWING

Unit in mm



Weight : 870g

CIRCUIT DIAGRAM



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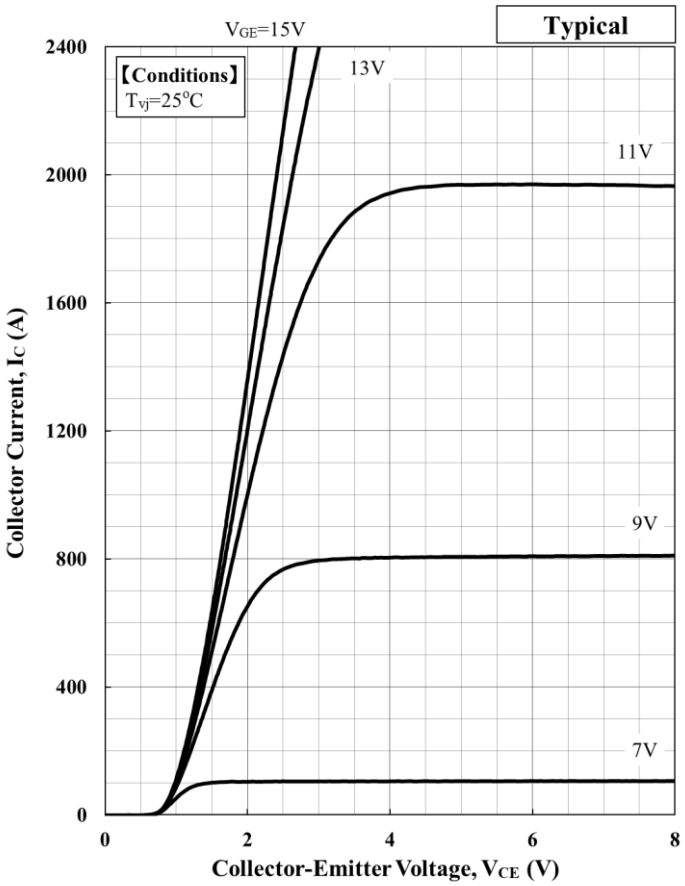
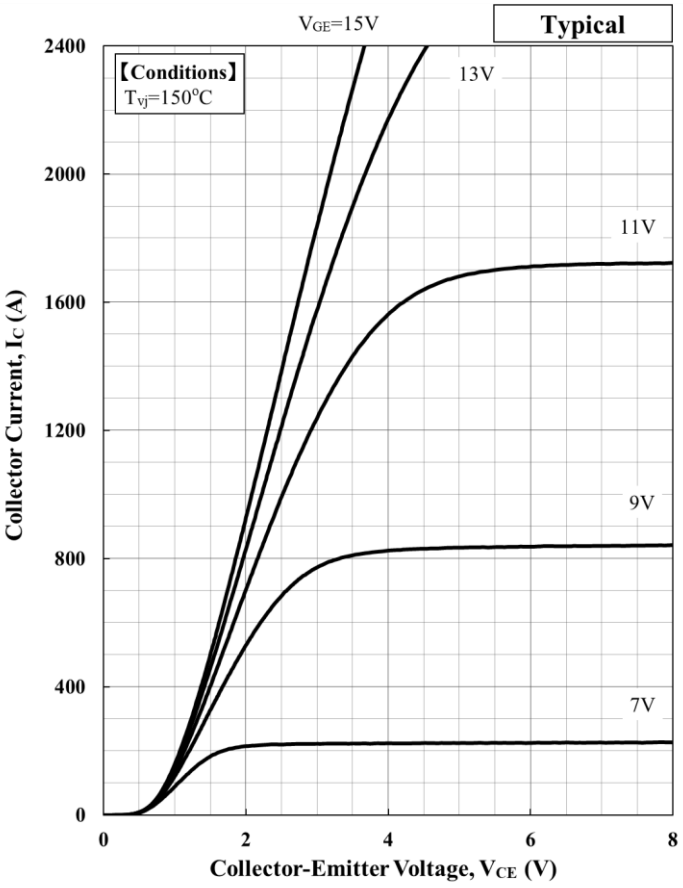
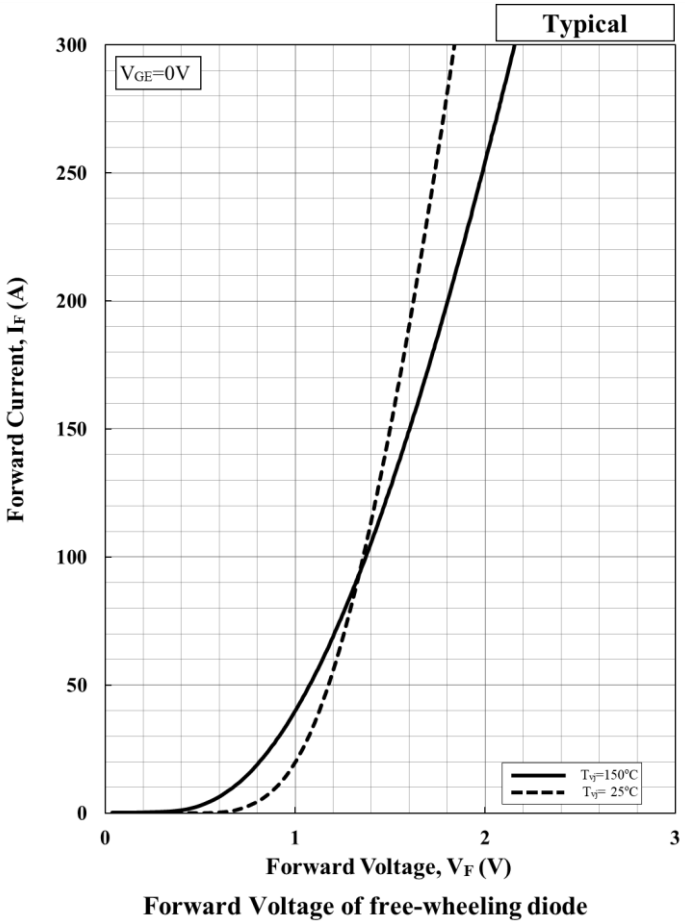


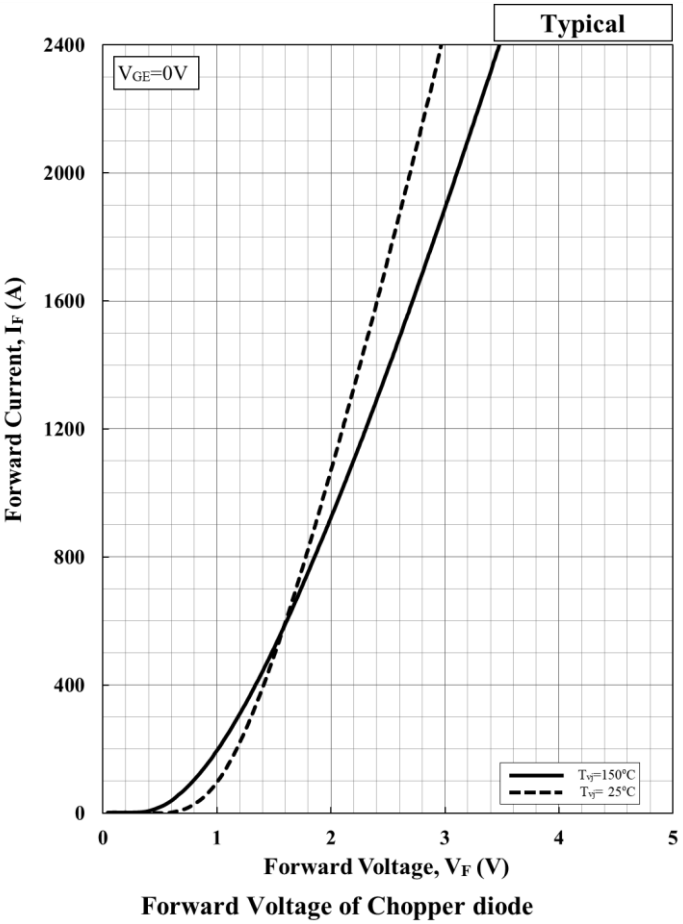
Collector Current vs. Collector Emitter Voltage



Collector Current vs. Collector Emitter Voltage

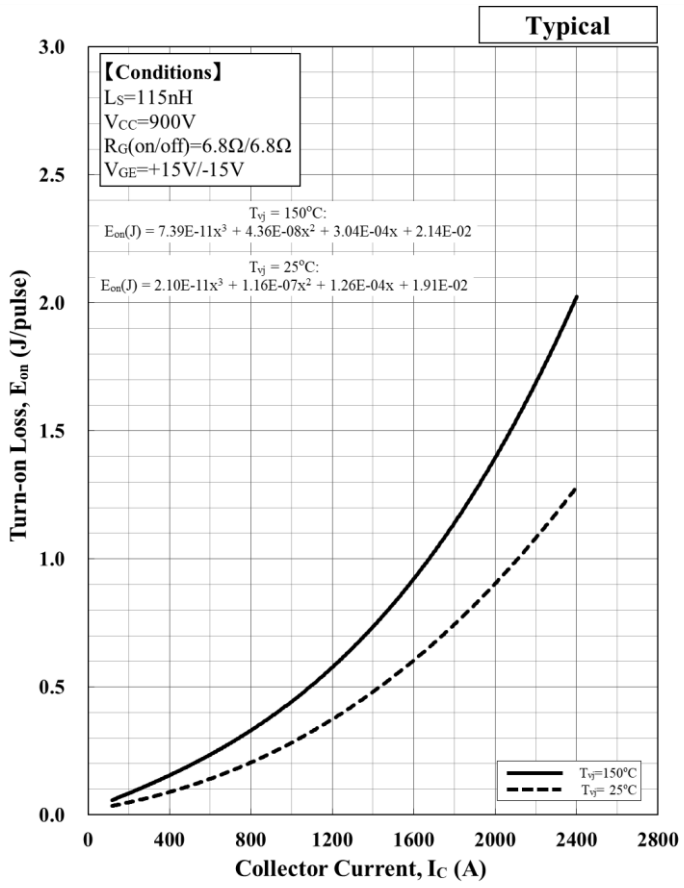


Forward Voltage of free-wheeling diode

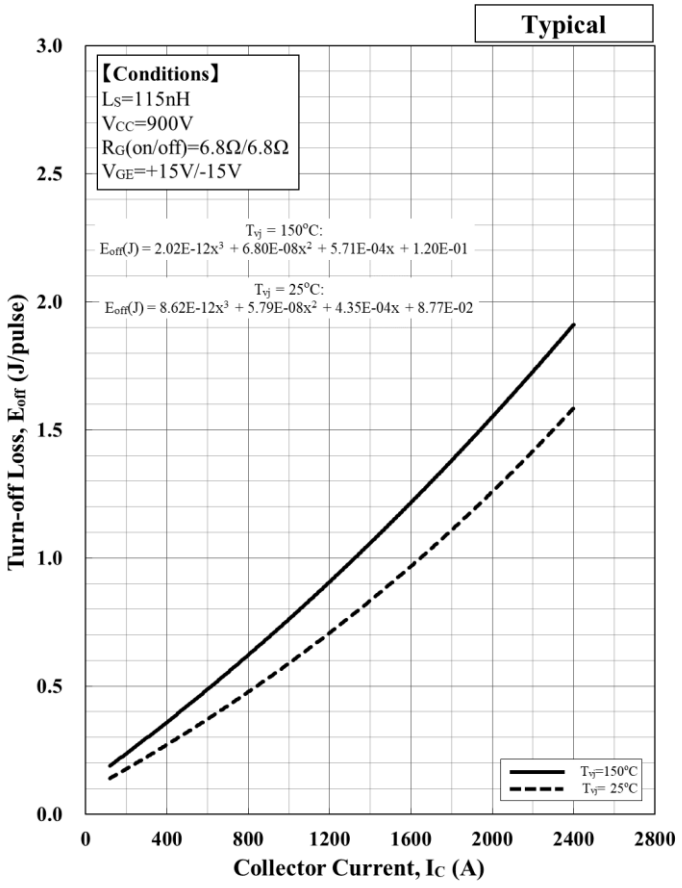


Forward Voltage of Chopper diode

MBL1200F17F



Turn-on loss vs. Collector current



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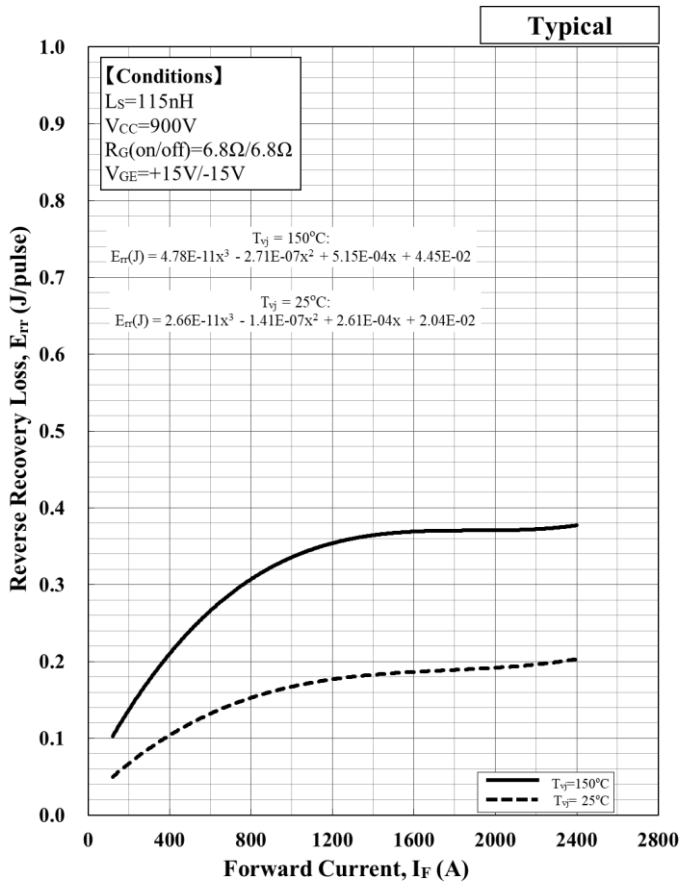
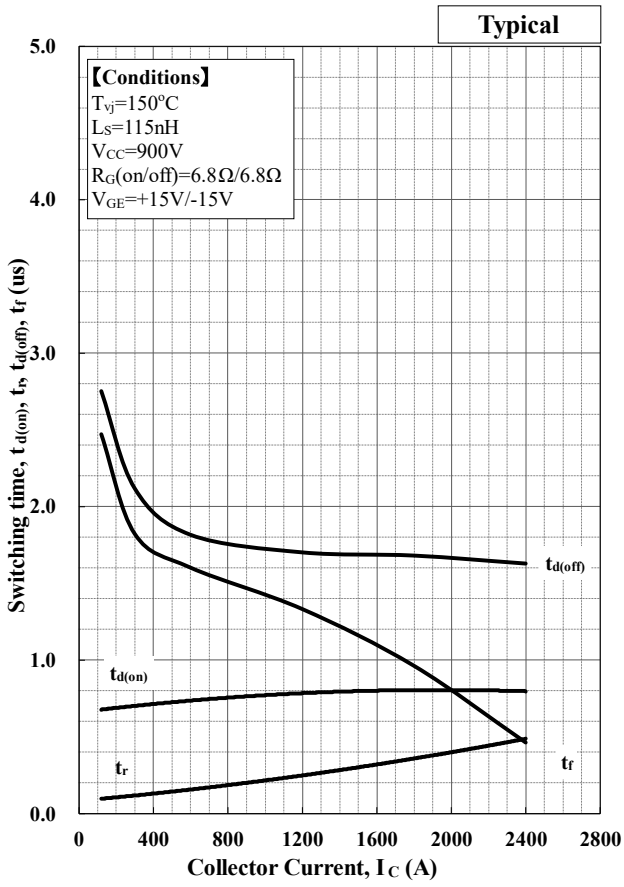


Recovery loss vs. Forward current



Switching time vs. Collector Current

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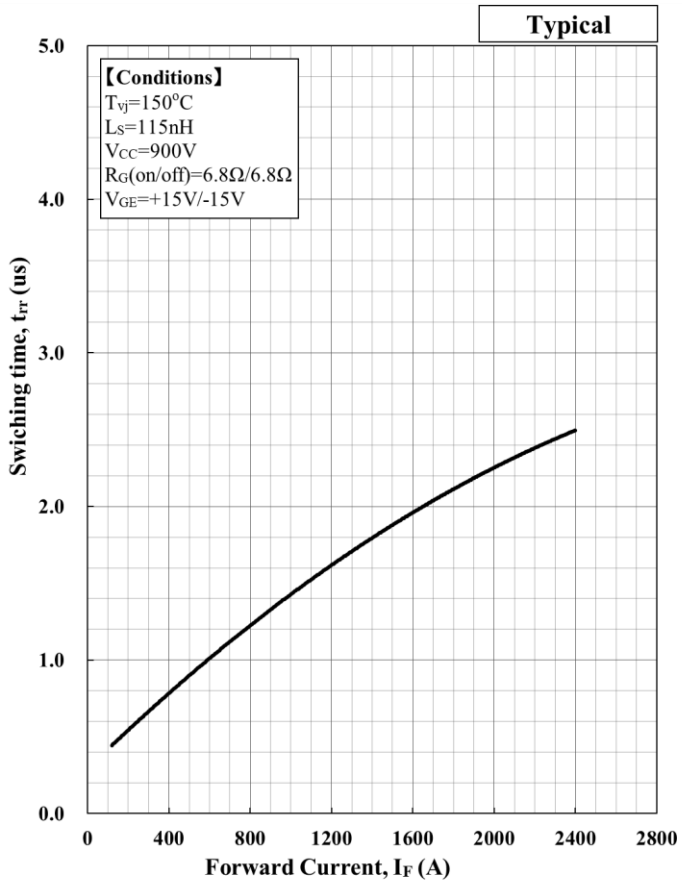

Switching time vs. Forward Current of chopper diode

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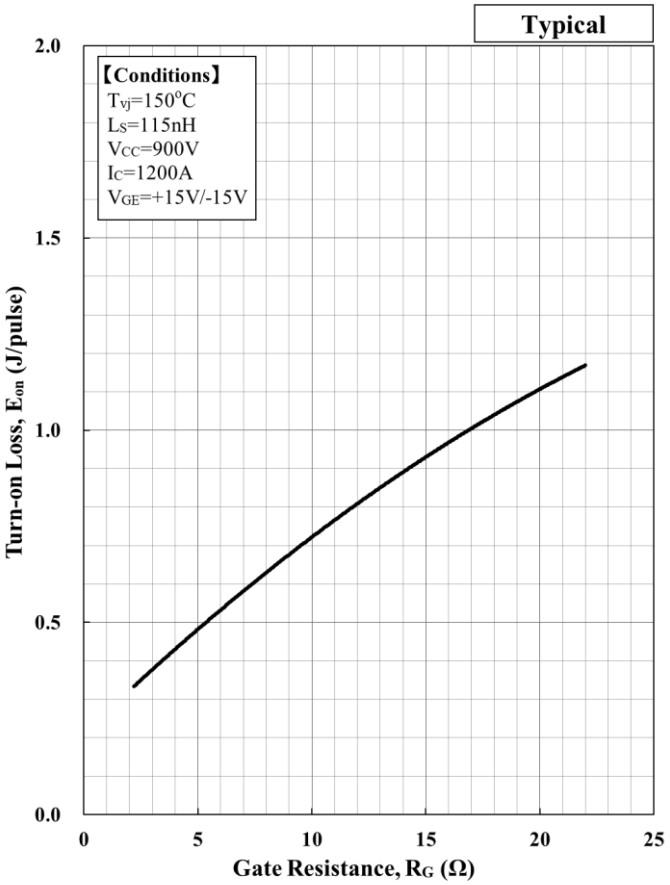
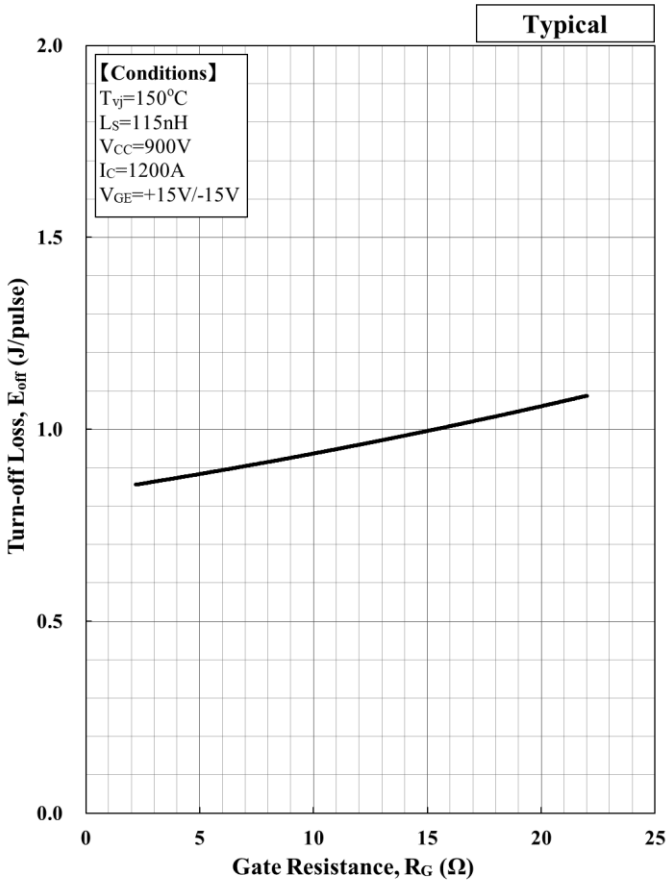
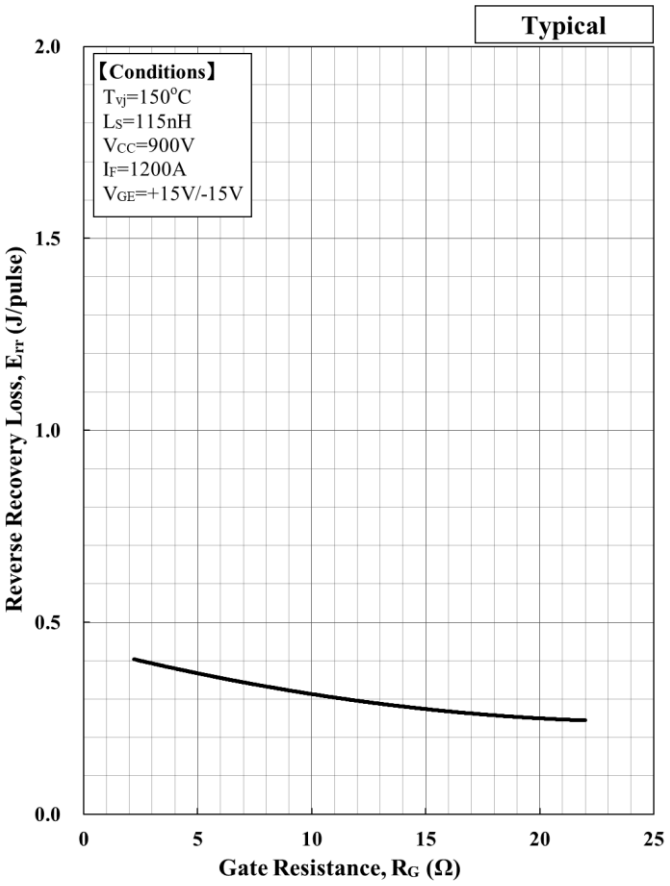


Turn-on loss vs. Gate Resistance



Turn-off loss vs. Gate Resistance



Recovery loss vs. Gate Resistance

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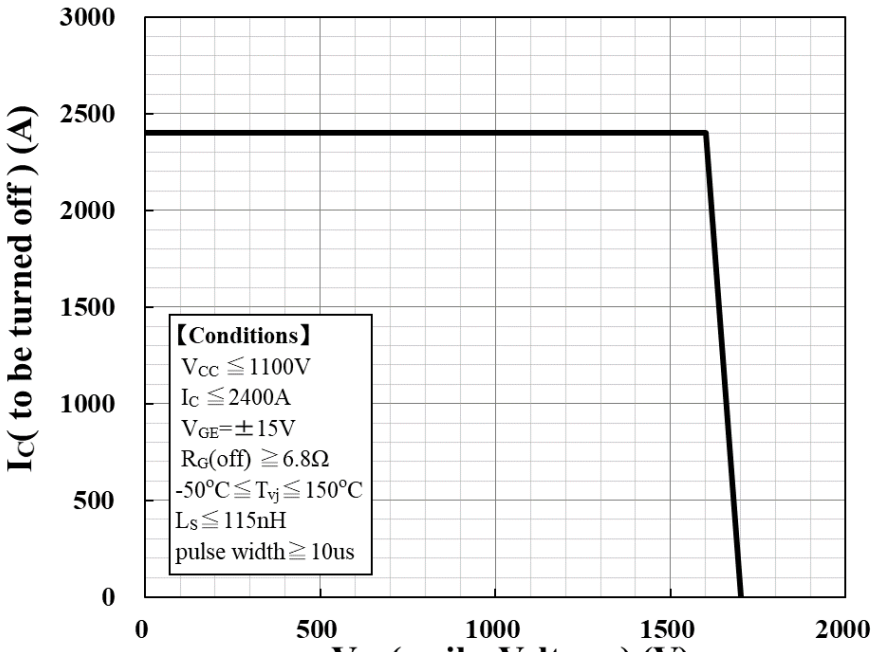
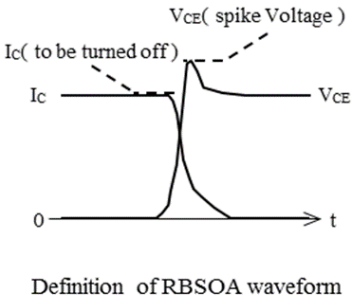
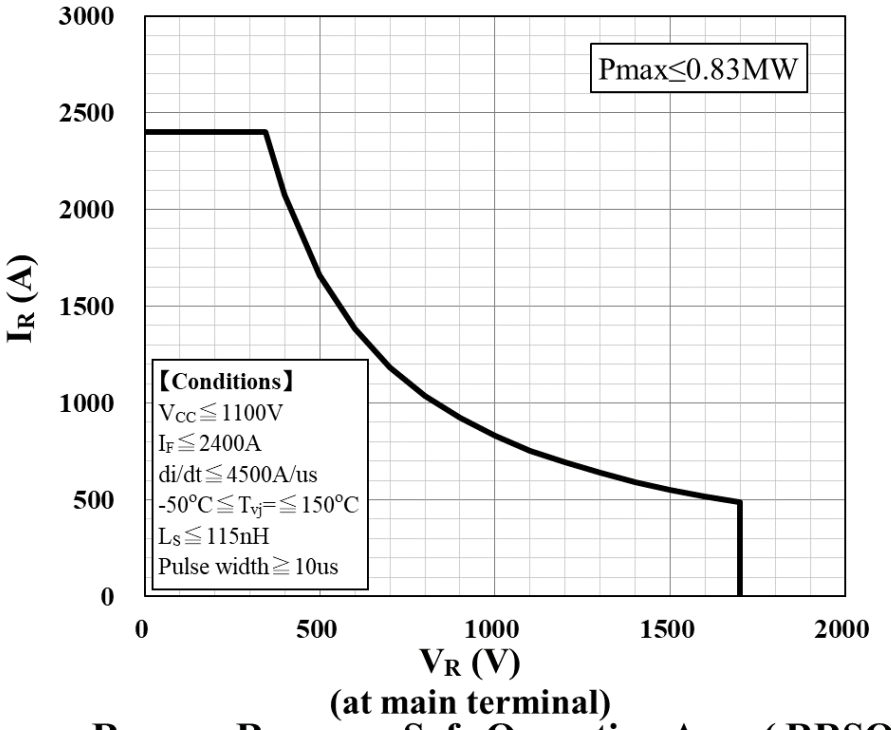


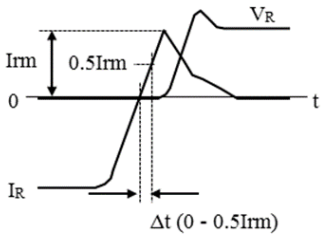
Reverse Bias Safe Operation Area (RBSOA)



Definition of RBSOA waveform



Reverse Recovery Safe Operation Area (RRSOA) of Chopper diode



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

Definition of Recovery di/dt

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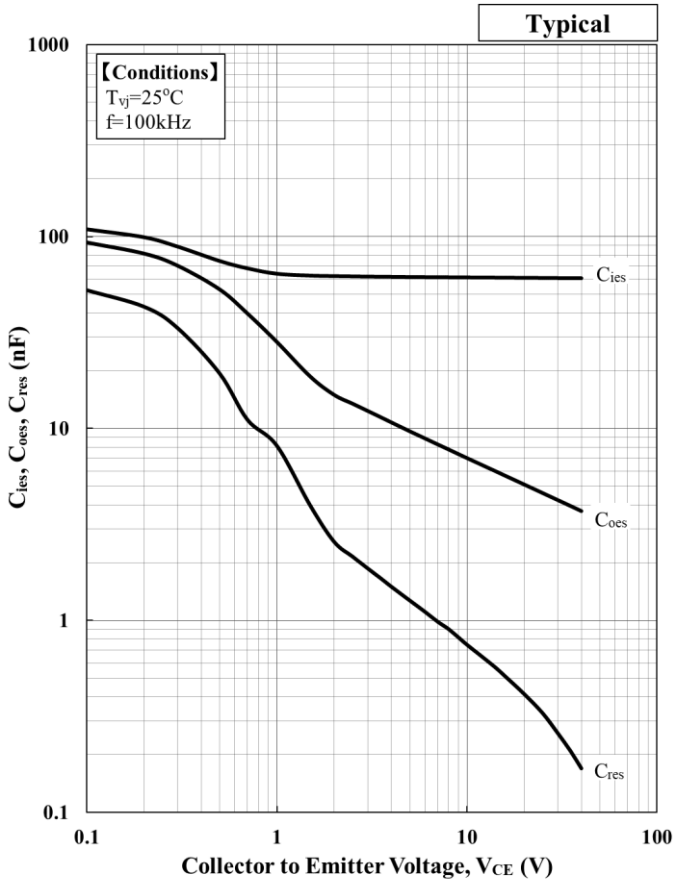
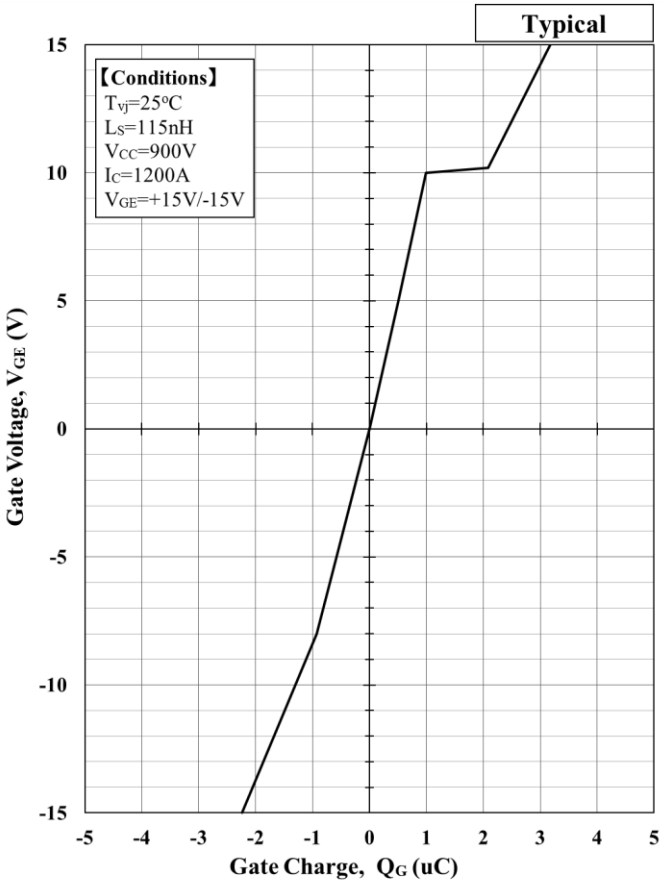
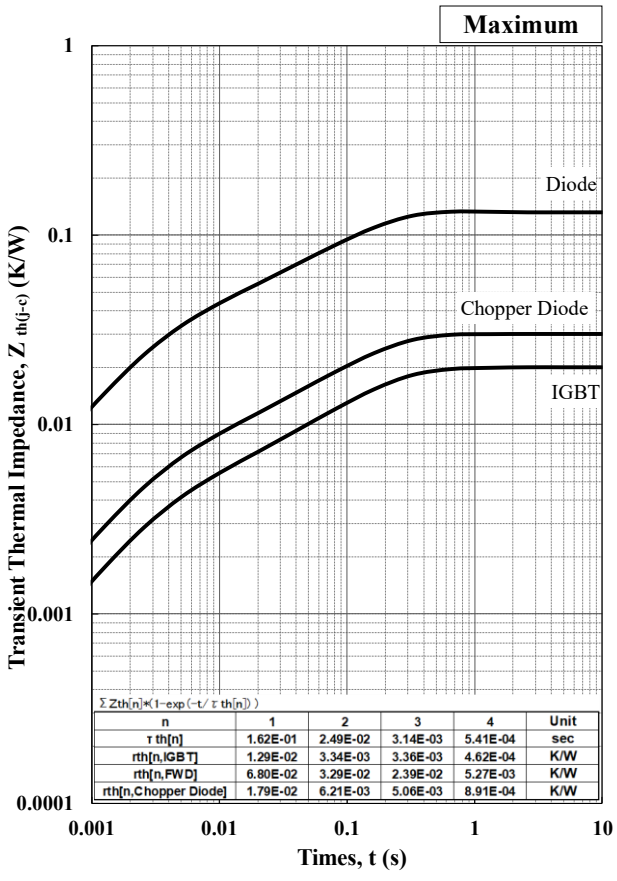


Capacitance vs. Collector to Emitter Voltage



V_{GE}-Q_G curve



n	1	2	3	4	Unit
τ th[n]	1.62E-01	2.49E-02	3.14E-03	5.41E-04	sec
rth[n,IGBT]	1.29E-02	3.34E-03	3.36E-03	4.62E-04	K/W
rth[n,FWD]	6.80E-02	3.29E-02	2.39E-02	5.27E-03	K/W
rth[n,Chopper Diode]	1.79E-02	6.21E-03	5.06E-03	8.91E-04	K/W

Transient Thermal Impedance Curve

MBL1200F17F

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