MBL1200E17F

Silicon N-channel IGBT 1700V F version

1.FEATURES

* Soft switching behavior & low conduction loss:
  Soft low-injection punch-through with trench gate IGBT.
* Low driving power:
  Low input capacitance with advanced trench gate.
* Low noise recovery: Ultra soft fast recovery diode.

2.ABSOLUTE MAXIMUM RATINGS (T_C=25ºC)

Item		Symbol	Unit	MBL1200E17F	
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_{Cp}		2,400	
Forward Current (Free wheel Diode)	DC	$I_{F(FWD)}$	A	1,200	
	1ms	$I_{FM(FWD)}$		2,400	
Forward Current (Chopper Diode)	DC	$I_{F(chopper)}$	A	1,200	
	1ms	$I_{FM(chopper)}$		2,400	
Junction Temperature		T_j	ºC	-50 ~ +150	
Storage Temperature		Tstg	ºC	-55 ~ +125	
Isolation Test 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

3.ELECTRICAL CHARACTERISTICS

1) IGBT + FWD

Item		Symbol	Unit	Min.	Typ.	Max.	Test Conditions
Collector Emitter Cut-Off Current		I_{CES}	mA	-	-	10	V_{CE}=1,700V, V_{GE}=0V, Tj=25ºC
				-	23	-	V_{CE}=1,700V, V_{GE}=0V, Tj=150ºC
Gate Emitter Leakage Current		I_{GES}	nA	-500	-	+500	V_{GE}=±20V, V_{CE}=0V, Tj=25ºC
Collector Emitter Saturation Voltage		$V_{CE(sat)}$	V	-	2.0	-	I_C=1,200A, V_{GE}=15V, Tj=25ºC
				-	2.4	-	I_C=1,200A, V_{GE}=15V, Tj=150ºC
Gate Emitter Threshold Voltage		$V_{GE(TO)}$	V	4.1	5.5	7.1	V_{CE}=10V, I_C=120mA, Tj=25ºC
Input Capacitance		Cies	nF	-	63	-	V_{CE}=10V, V_{GE}=0V, f=100kHz, Tj=25ºC
Internal Gate Resistance		Rge	Ω	-	4	-	V_{CE}=10V, V_{GE}=0V, f=100kHz, Tj=25ºC
Turn On Delay Time		$t_{d(on)}$	µs	-	0.74	1.70	V_{CC}=900V, Ic=1,200A, L=100nH, R_G(on/off)=2.7/4.7Ω (3) V_{GE}=±15V, Tj=150ºC
Rise Time		t_r		-	0.26	0.80	
Turn Off Delay Time		$t_{d(off)}$		-	1.9	3.0	
Fall Time		t_f		-	1.6	3.0	
Turn On Loss		E_{on}	J/P	-	0.40	0.90	
Turn Off Loss		E_{off}	J/P	-	0.93	1.5	
Peak Forward Voltage Drop		V_{FM}	V	-	2.0	-	IF=1,200A, V_{GE}=0V, Tj=25ºC Measured at auxiliary terminals
				-	2.3	-	IF=1,200A, V_{GE}=0V, Tj=150ºC Measured at auxiliary terminals
Reverse Recovery Time		t_{rr}	µs	-	0.65	1.5	V_{CC}=900V, IF=1,200A, L=100nH, R_G(on/off)=2.7/4.7Ω (3) V_{GE}=±15V, Tj=150ºC
Reverse Recovery Loss		E_{rr}	J/P	-	0.48	1.0	
Thermal Impedance	IGBT	Rth(j-c)	K/W	-	-	0.022	Junction to case
	FWD	Rth(j-c)		-	-	0.033	
Contact Thermal Impedance		Rth(c-f)	K/W	-	0.016	-	Case to fin (at IGBT+FWD part)

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2) Chopper DIODE

Item	Symbol	Unit	Min.	Typ.	Max.	Test Conditions
Repetitive Reverse Current	I_{RRM}	mA	-	-	10.0	V_R=1,700V, Tj=25ºC
			-	23	-	V_R=1,700V, Tj=150ºC
Forward Voltage Drop (Between main terminals)	V_F	V	-	2.1	-	I_F=1,200A, Tj=25ºC Measured at main terminal
				2.4		I_F=1,200A, Tj=150ºC Measured at main terminal
Reverse Recovery Time	t_{rr}	μs	-	0.65	1.5	V_{CC}=900V, I_F=1,200A, L=100nH, R_G(on)=2.7Ω (3) V_{GE}=±15V, Tj=150ºC
Reverse Recovery Loss	E_{rr}	J/P	-	0.48	1.0	
Thermal Impedance	Rth(j-c)	K/W			0.033	Junction to case
Contact Thermal Impedance	Rth(c-f)	K/W	-	0.016	-	Case to fin (at Chopper Diode part)

Notes: (3) R_G value is the test condition's value for decision 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.

4.Material declaration

Please note the following materials are contained in the product, in order to keep characteristic and reliability level.

Material	Contained part
Lead (Pb) and its compounds	Solder

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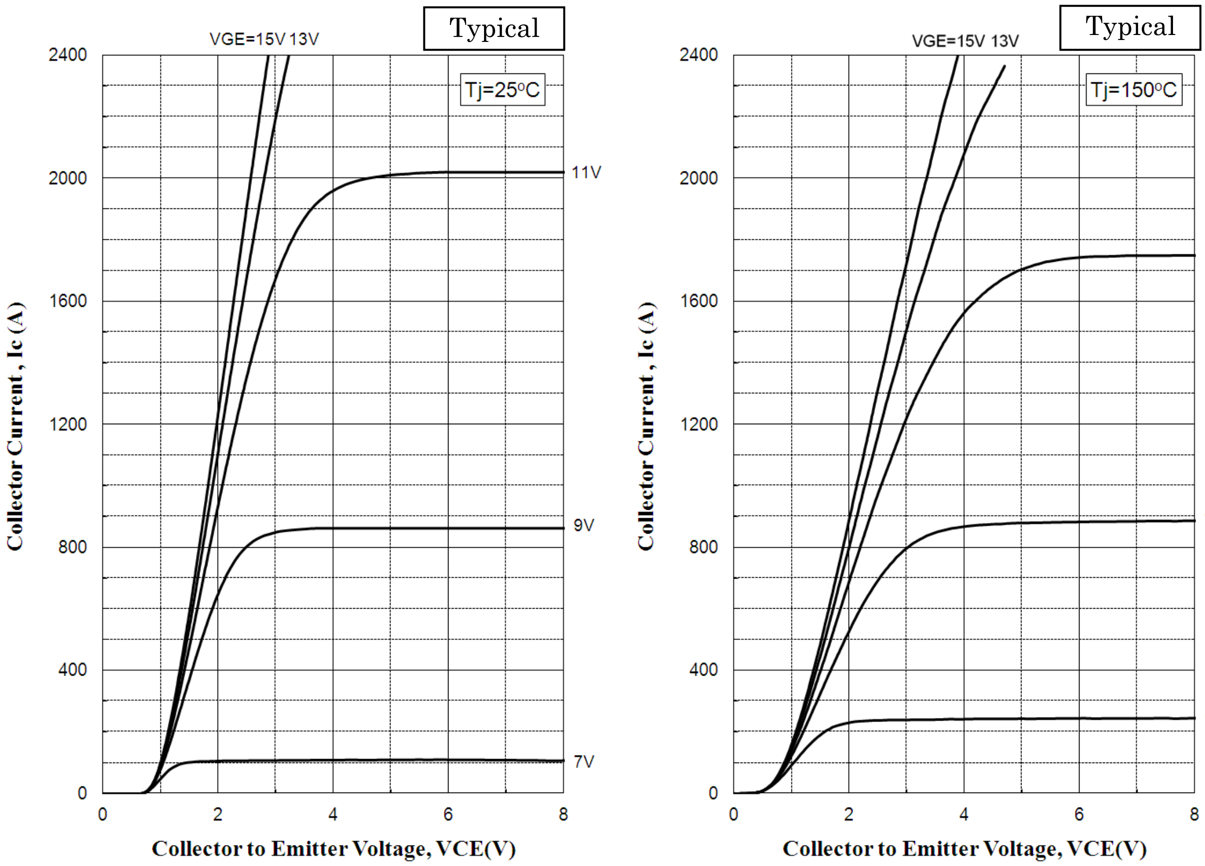
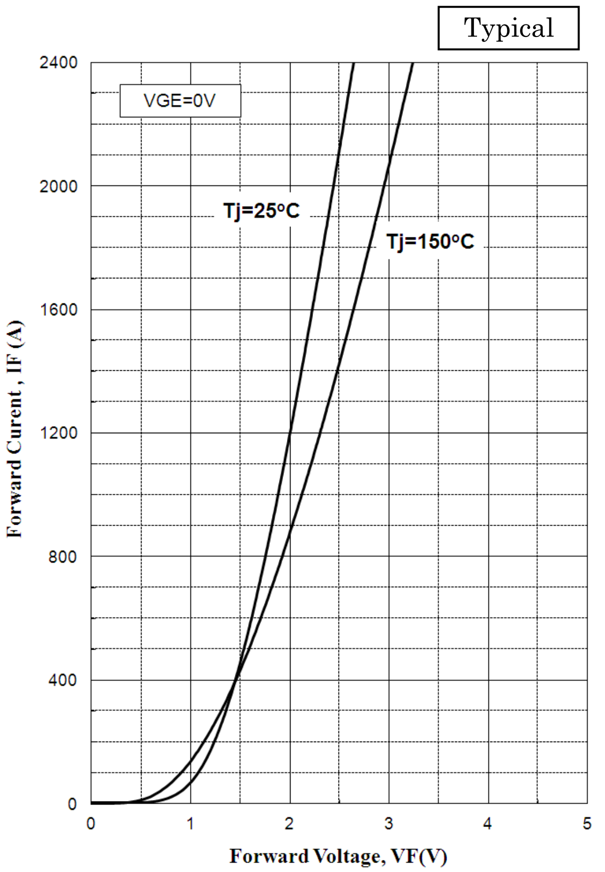
5.CHARACTERISTICS CURVE

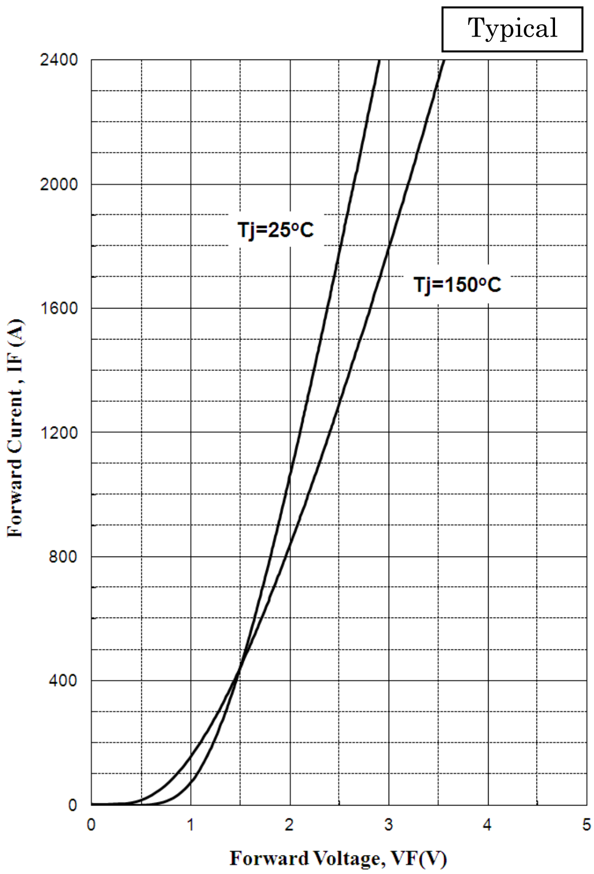
5.1 STATIC CHARACTERISTICS



Collector Current vs.Collector to Emitter Voltage



Forward Voltage of free-wheeling diode



Forward Voltage of Chopper diode

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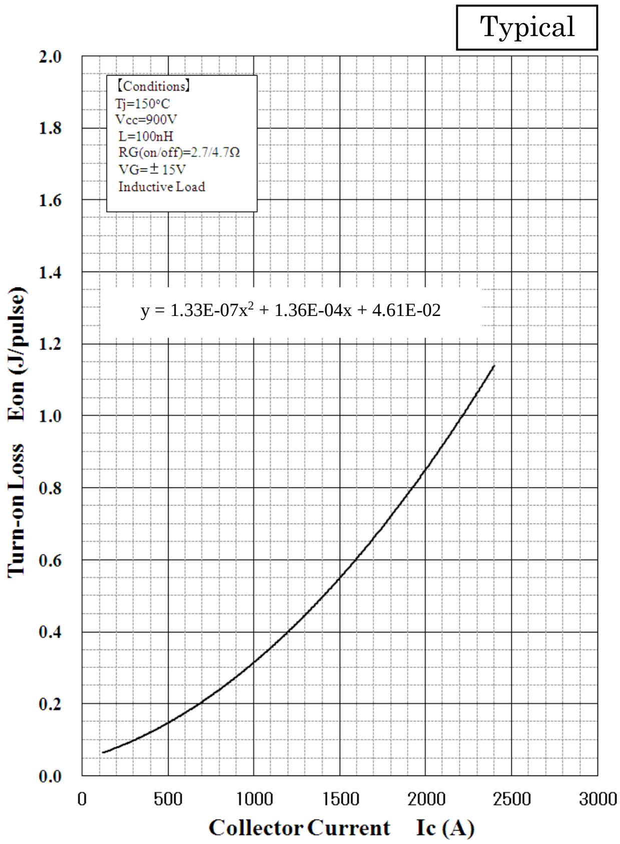
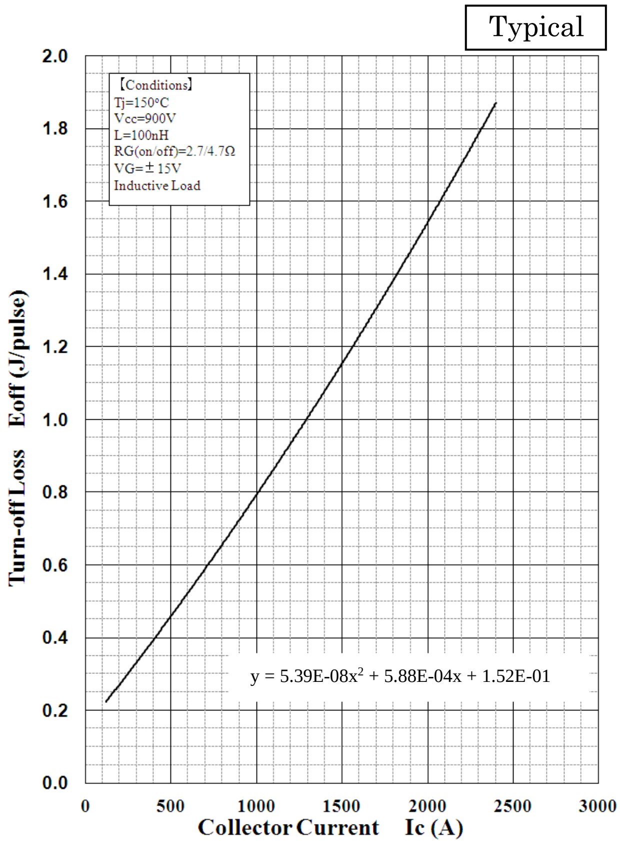
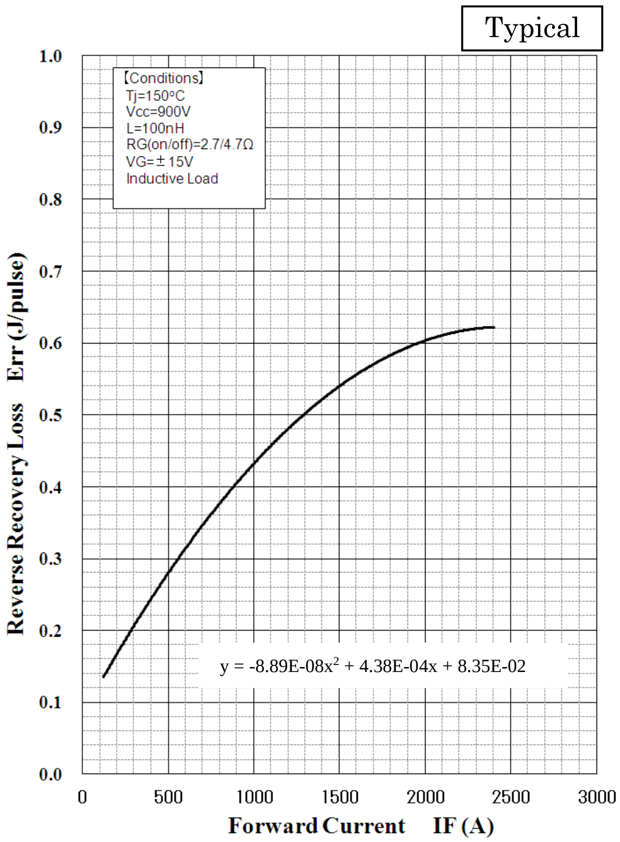
5.2 DYNAMIC CHARACTERISTICS



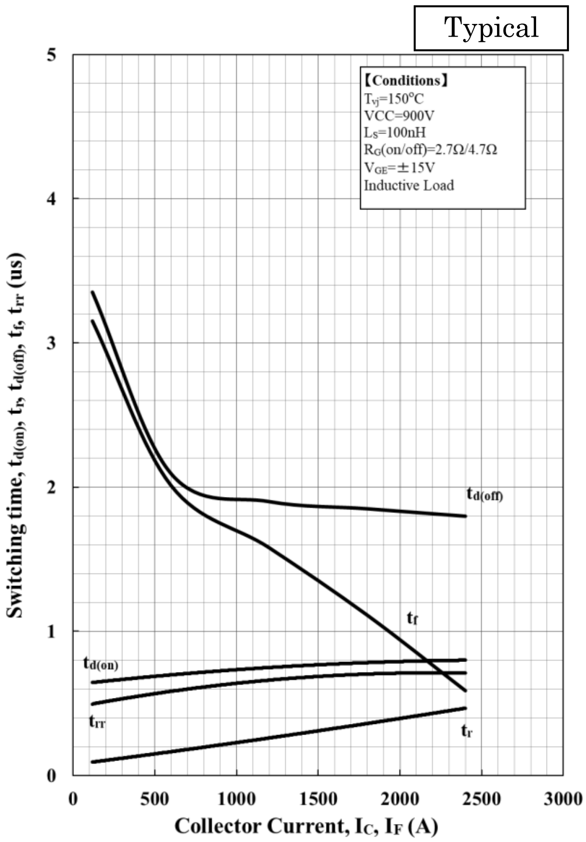
Turn-on Loss vs. Collector Current



Turn-off Loss vs. Collector Current



Reverse Recovery Loss vs. Forward Current



Switching time vs. Collector Current

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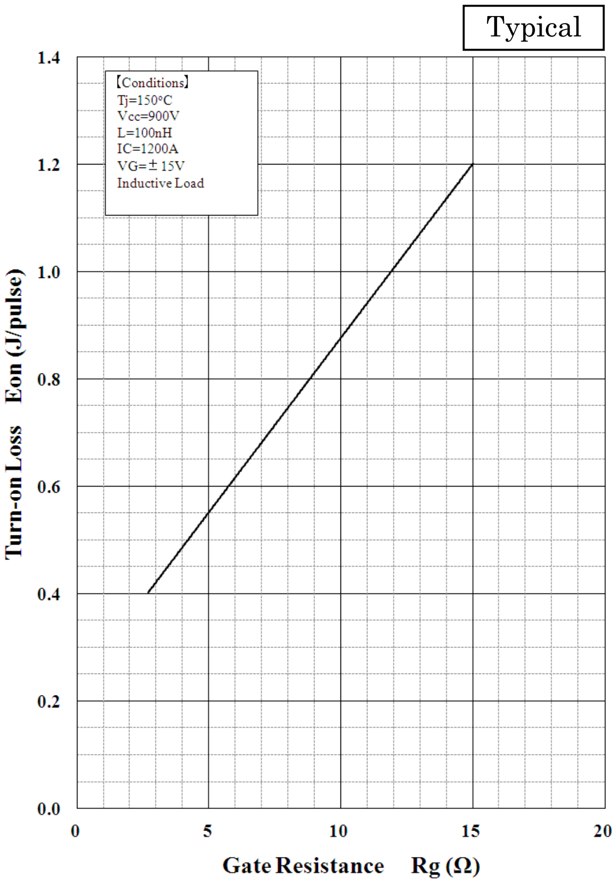
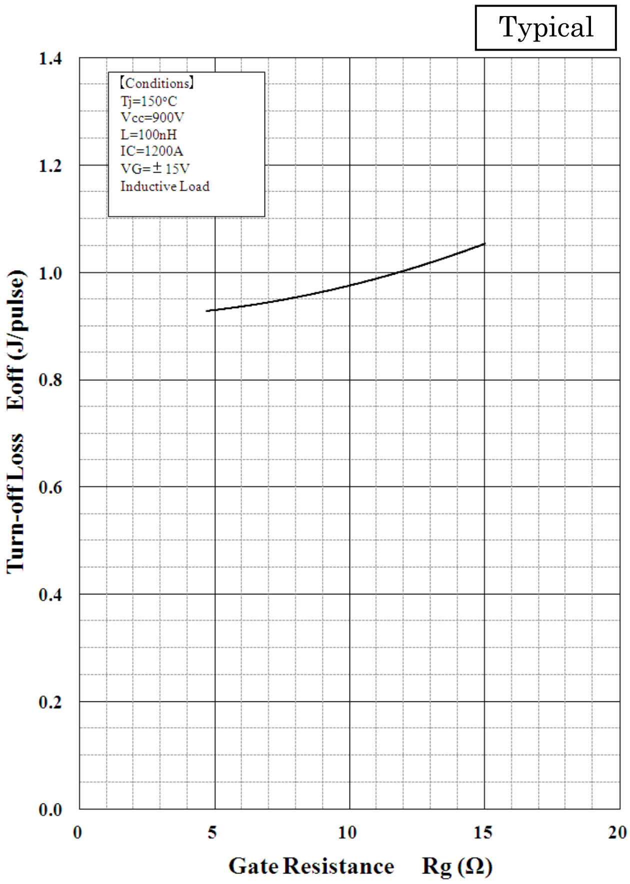
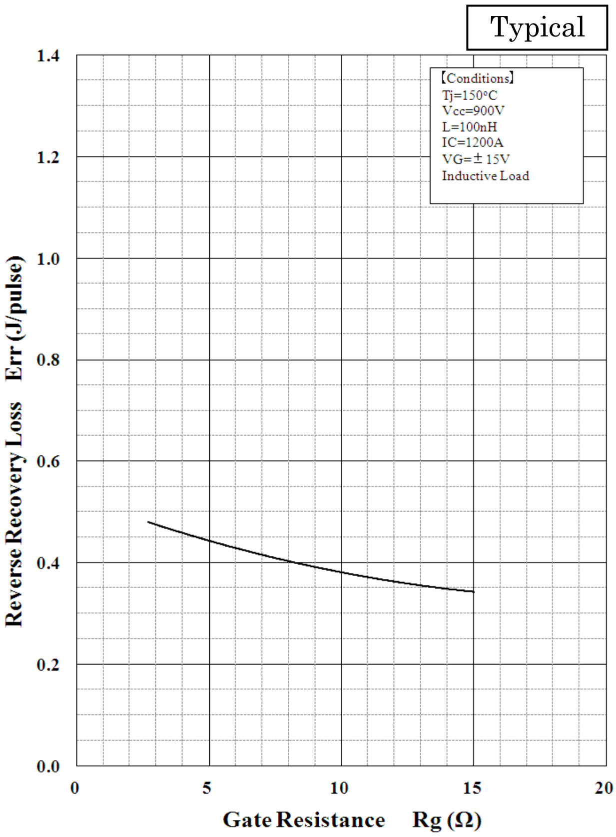


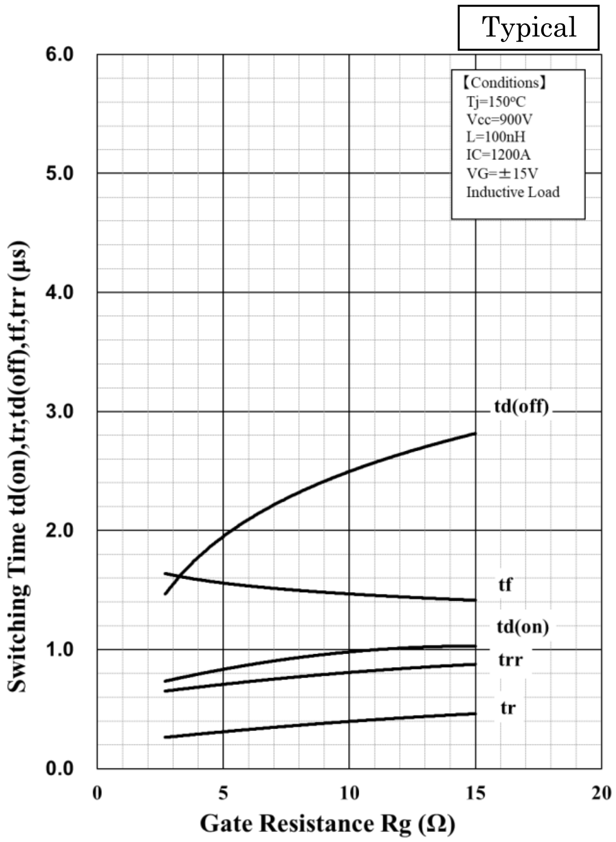
Turn-on Loss vs. Gate Resistance



Turn-off Loss vs. Gate Resistance



Reverse Recovery Loss vs. Gate Resistance



Switching Time vs. Gate Resistance

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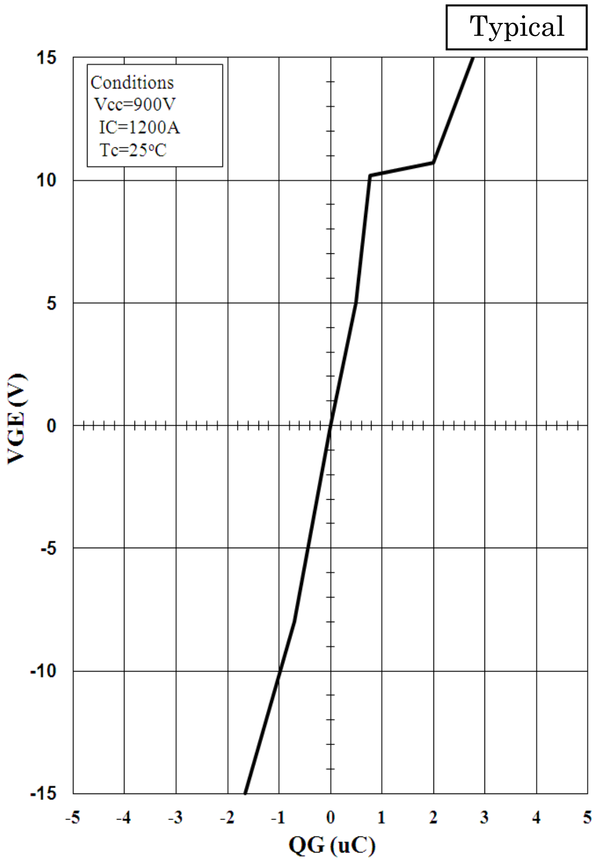
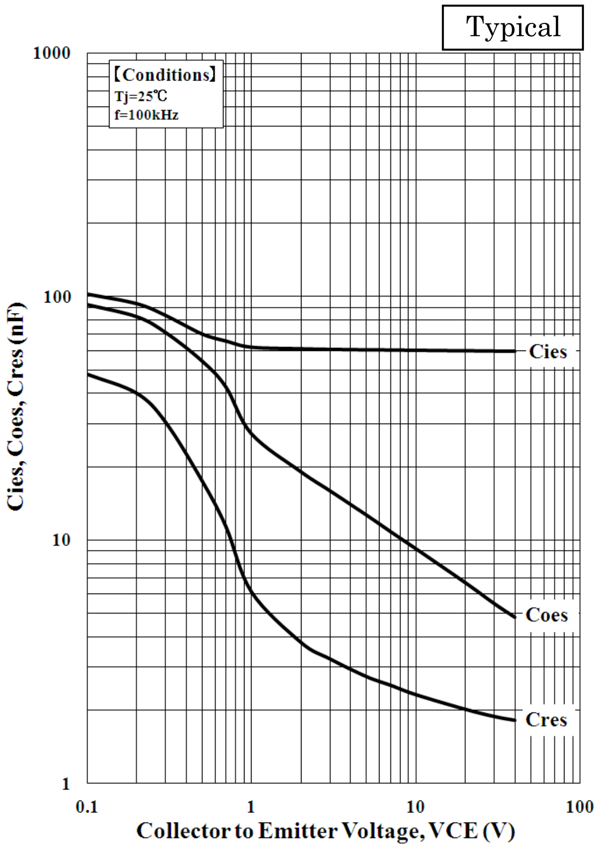
5.3 QG-VG CURVE



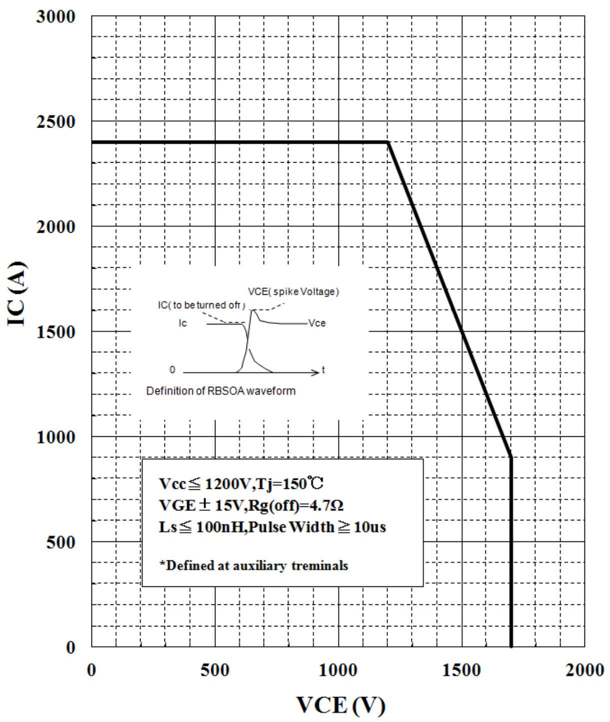
QG-VGE curve

5.4 Cies,Coes,Cres CURVE

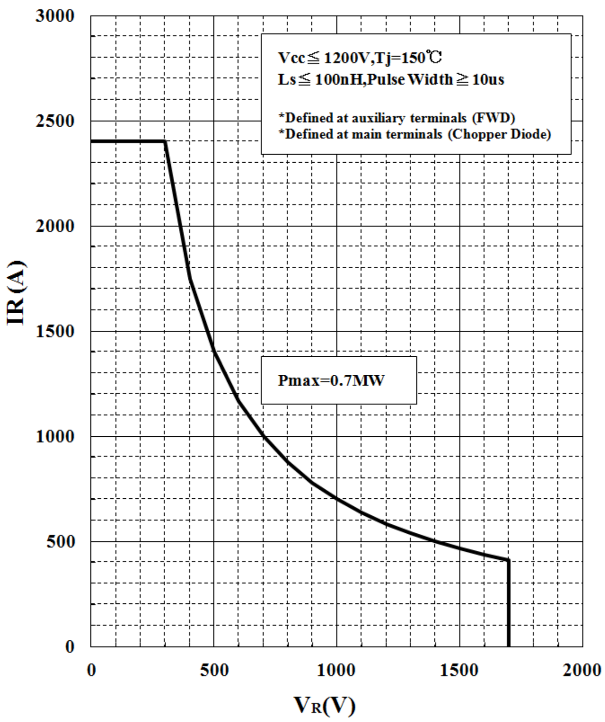


Capacitance vs. Collector to Emitter Voltage

5.5 RBSOA



5.6 RecSOA



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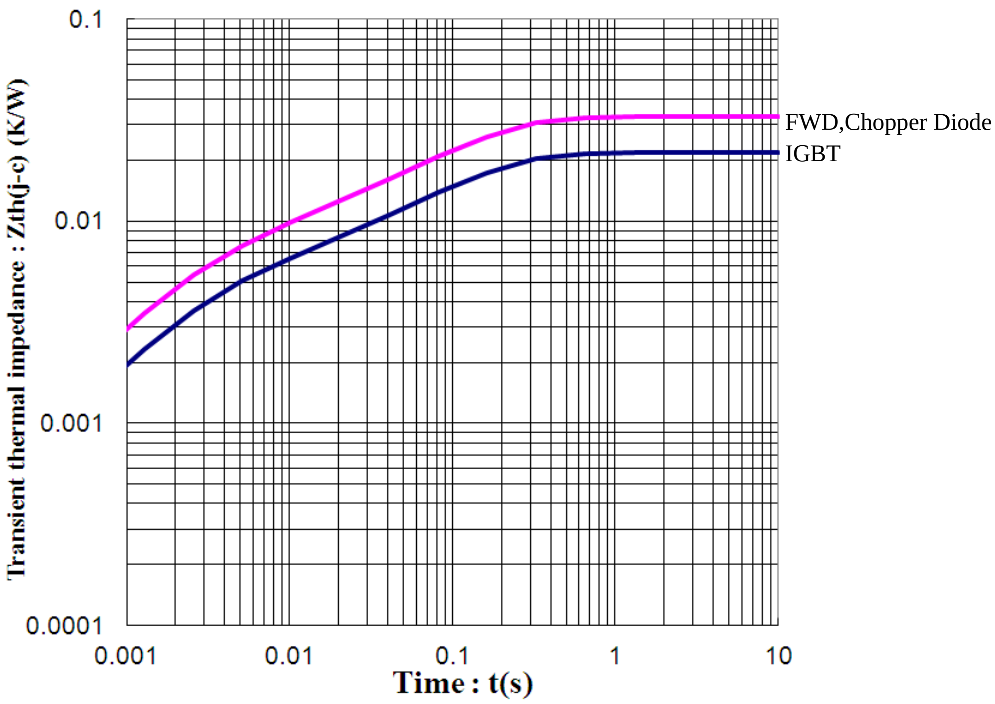
6. TRANSIENT THERMAL IMPEDANCE



Transient Thermal Impedance Curve

Curve approximation model
Zth = Σ rth[n]*(1-exp(-t/τth[n]))

n	1	2	3	4	Unit
τ th[n]	1.45E-01	2.03E-02	2.33E-03	3.16E-04	sec
rth[n,IGBT]	1.41E-02	3.76E-03	3.74E-03	4.21E-04	K/W
rth[n,Diode]	2.10E-02	5.93E-03	5.45E-03	6.50E-04	K/W

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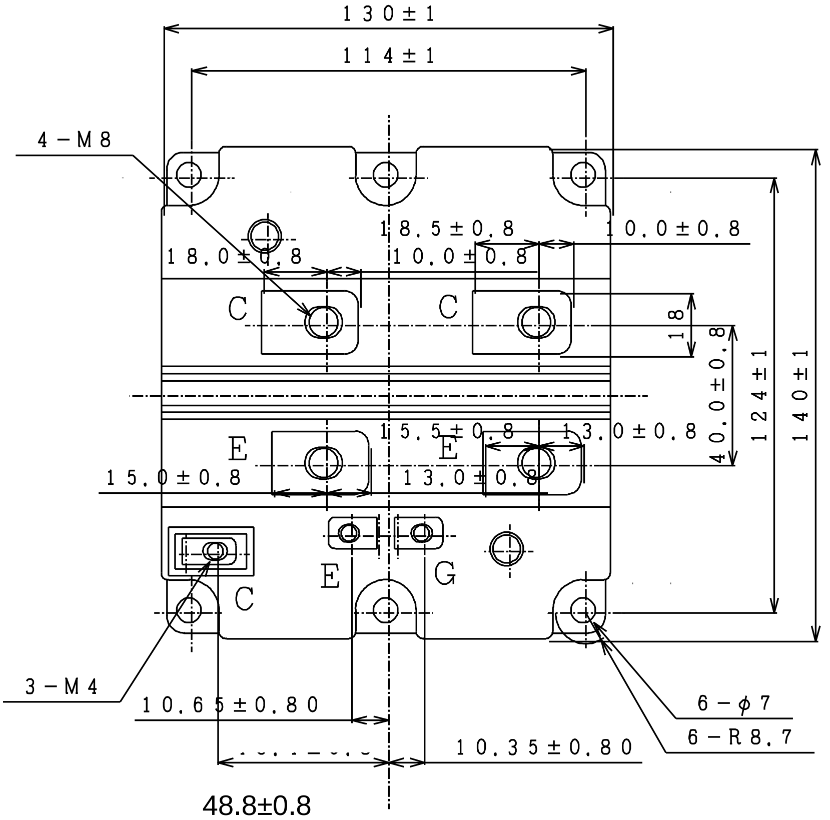
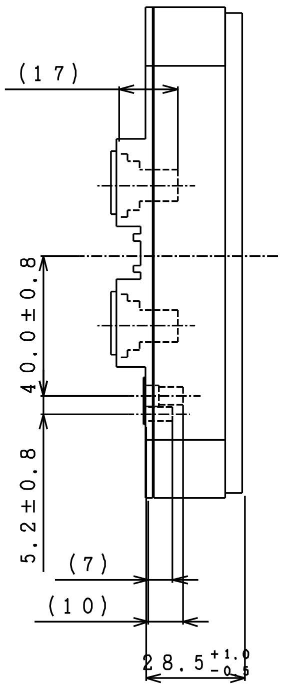
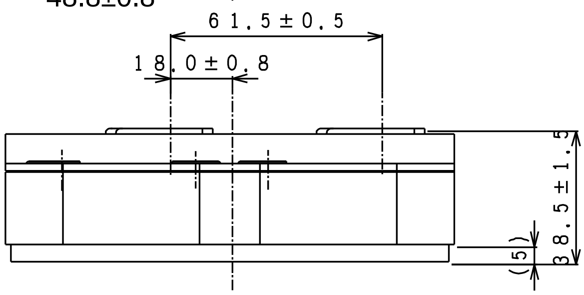
7. PACKAGE OUTLINE DRAWING

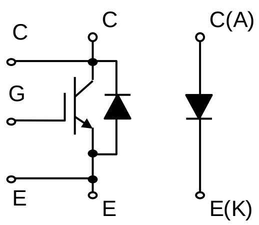
Unit in mm







Weight: 900(g)



Circuit diagram

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Minebea POWER SEMICONDUCTORS

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■ For inquiries relating to the products, please contact nearest representatives which is located "Inquiry" portion on the top page of a home page.

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Minebea POWER SEMICONDUCTORS

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