

MBL1000E33E2-B

Silicon N-channel IGBT 3300V E2 version

FEATURES

- * Soft switching behavior & low conduction loss:
Soft low-injection punch-through High conductivity IGBT.
- * Low driving power due to low input capacitance MOS gate.
- * Low noise recovery: Ultra soft fast recovery diode.

ABSOLUTE MAXIMUM RATINGS (T_C=25°C)

Item	Symbol	Unit	MBL1000E33E2-B
Collector Emitter Voltage	V _{CES}	V	3,300
Gate Emitter Voltage	V _{GES}	V	±20
Collector Current	DC	I _C	1,000
	1ms	I _{CRM}	2,000
Forward Current (Free wheel Diode)	DC	I _{F(FWD)}	1,000
	1ms	I _{FRM(FWD)}	2,000
Forward Current (Chopper Diode)	DC	I _{F(Chopper)}	800
	1ms	I _{FRM(Chopper)}	1,600
Junction Temperature	T _{vi op}	°C	-40 ~ +125
Storage Temperature	T _{stg}	°C	-50 ~ +125
Isolation Voltage	V _{ISO}	V _{RMS}	6,000(AC 1 minute)
Screw Torque	Terminals (M4/M8)	-	2/15 (1)
	Mounting (M6)	-	6 (2)

Notes: (1) Recommended Value 1.8±0.2/ 15⁺⁰₋₃N·m (2) 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	-	-	12	V _{CE} =3,300V, V _{GE} =0V, T _{vi} =25°C	
Gate Emitter Leakage Current	I _{GES}	nA	-500	-	+500	V _{GE} =±20V, V _{CE} =0V, T _{vi} =25°C	
Collector Emitter Saturation Voltage	V _{CE(sat)}	V	2.5	2.95	3.5	I _C =1,000A, V _{GE} =15V, T _{vi} =125°C	
Gate Emitter Threshold Voltage	V _{GE(th)}	V	5.5	6.3	7.7	V _{CE} =10V, I _C =1,000mA, T _{vi} =25°C	
Input Capacitance	C _{ies}	nF	-	130	-	V _{CE} =10V, V _{GE} =0V, f=100kHz, T _{vi} =25°C	
Internal Gate Resistance	R _{G(int)}	Ω	-	1.3	-	V _{CE} =10V, V _{GE} =0V, f=100kHz, T _{vi} =25°C	
Turn On Delay Time	t _{d(on)}	μs	-	0.7	-	V _{CC} =1,650V, I _C =1,000A L _S =200nH R _{G(on/off)} =3.9/3.9Ω, C _{GE} =100nF (3)	
Rise Time	t _r		1.0	1.6	2.2		
Turn Off Delay Time	t _{d(off)}		-	2.1	-		
Fall Time	t _f		1.0	1.8	2.7		
Turn On Loss	E _{on(10%)}	J/P	-	1.30	-	V _{GE} =±15V, T _{vi} =125°C	
Turn Off Loss	E _{off(10%)}	J/P	-	1.60	-		
Forward Voltage Drop	V _F	V	-	2.5	-	I _F =1000A, V _{GE} =0V, T _{vi} =125°C	
Reverse Recovery Time	t _{rr}	μs	-	0.8	-	V _{CC} =1,650V, I _F =1,000A L _S =200nH	
Reverse Recovery Loss	E _{rr(10%)}	J/P	-	1.08	-	R _{G(on/off)} =3.9/3.9Ω, C _{GE} =100nF (3) V _{GE} =±15V, T _{vi} =125°C	
Thermal Impedance	IGBT	R _{th(j-c)}	K/W	-	-	0.012	Junction to case
	FWD	R _{th(j-c)}		-	-		
Contact Thermal Impedance		R _{th(c-f)}	K/W	-	0.010	-	Case to fin (at IGBT+FWD part)

Notes:(3) L_S 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.

MBL1000E33E2-B

2) Chopper Diode

Item	Symbol	Unit	Min.	Typ.	Max.	Test Conditions
Collector Emitter Cut-Off Current	I_{AKS}	mA	-	-	12	$V_{KA}=3,300V, T_{vj}=25^{\circ}C$
Forward Voltage Drop	V_F	V	2.4	2.9	3.4	$I_F=800A, T_{vj}=125^{\circ}C$ at main terminals (Terminal resistance:0.5mΩ typical)
Reverse Recovery Time	t_{rr}	μs	0.4	1.0	1.7	$V_{CC}=1,650V, I_F=800A$ $L_S=200nH$
Reverse Recovery Loss	$E_{rr(10\%)}$	J/P	-	1.03	-	$R_G(\text{on/off})=3.9/3.9\Omega, C_{GE}=100nF$ (4) $V_{GE}=\pm 15V, T_{vj}=125^{\circ}C$
Thermal Impedance	$R_{th(j-c)}$	K/W	-	-	0.026	Junction to case
Contact Thermal Impedance	$R_{th(c-f)}$	K/W	-	0.015	-	Case to fin(at Chopper Diode part)

Notes:(4) L_S 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.

MBL1000E33E2-B

DEFINITION OF TEST CIRCUIT

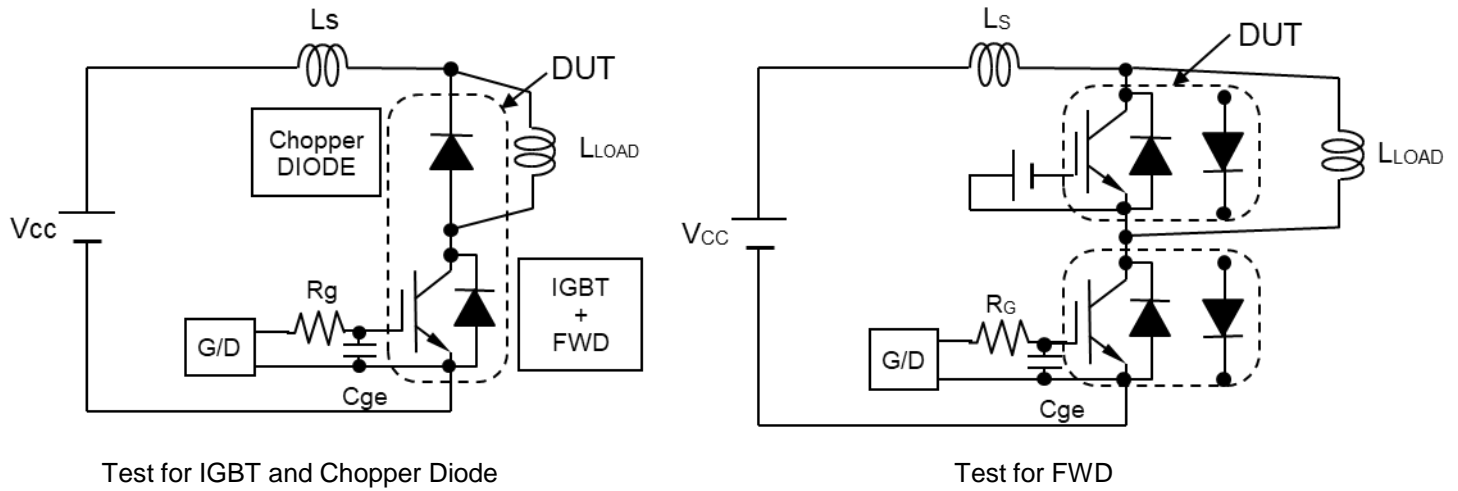


Fig.1 Switching test circuit

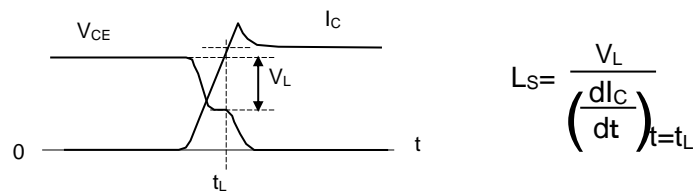


Fig.2 Definition of stray inductance

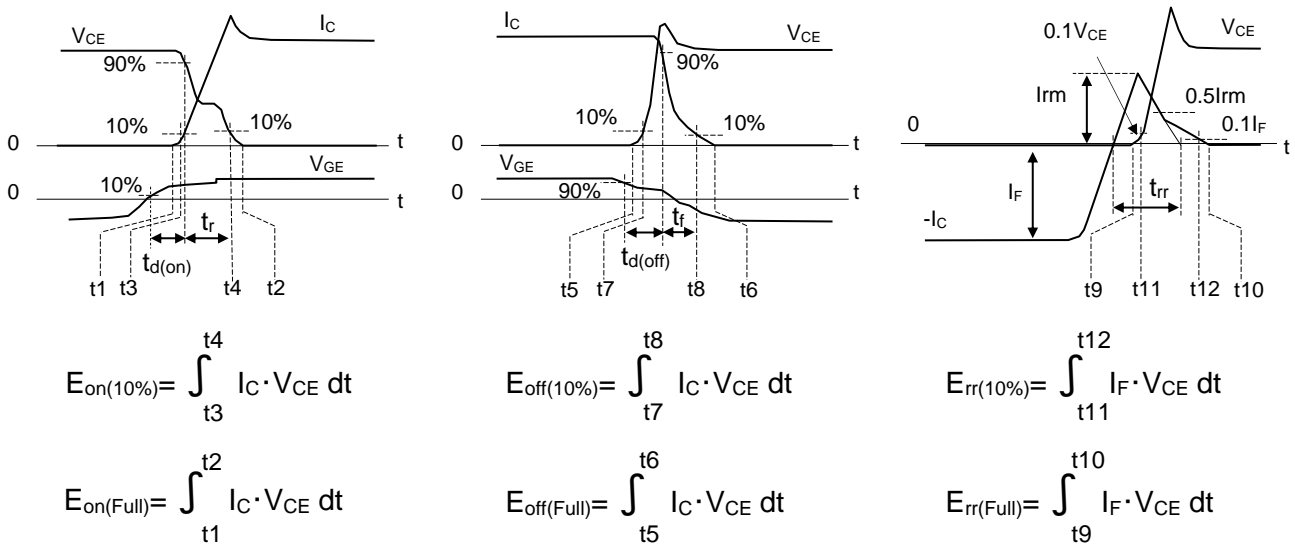
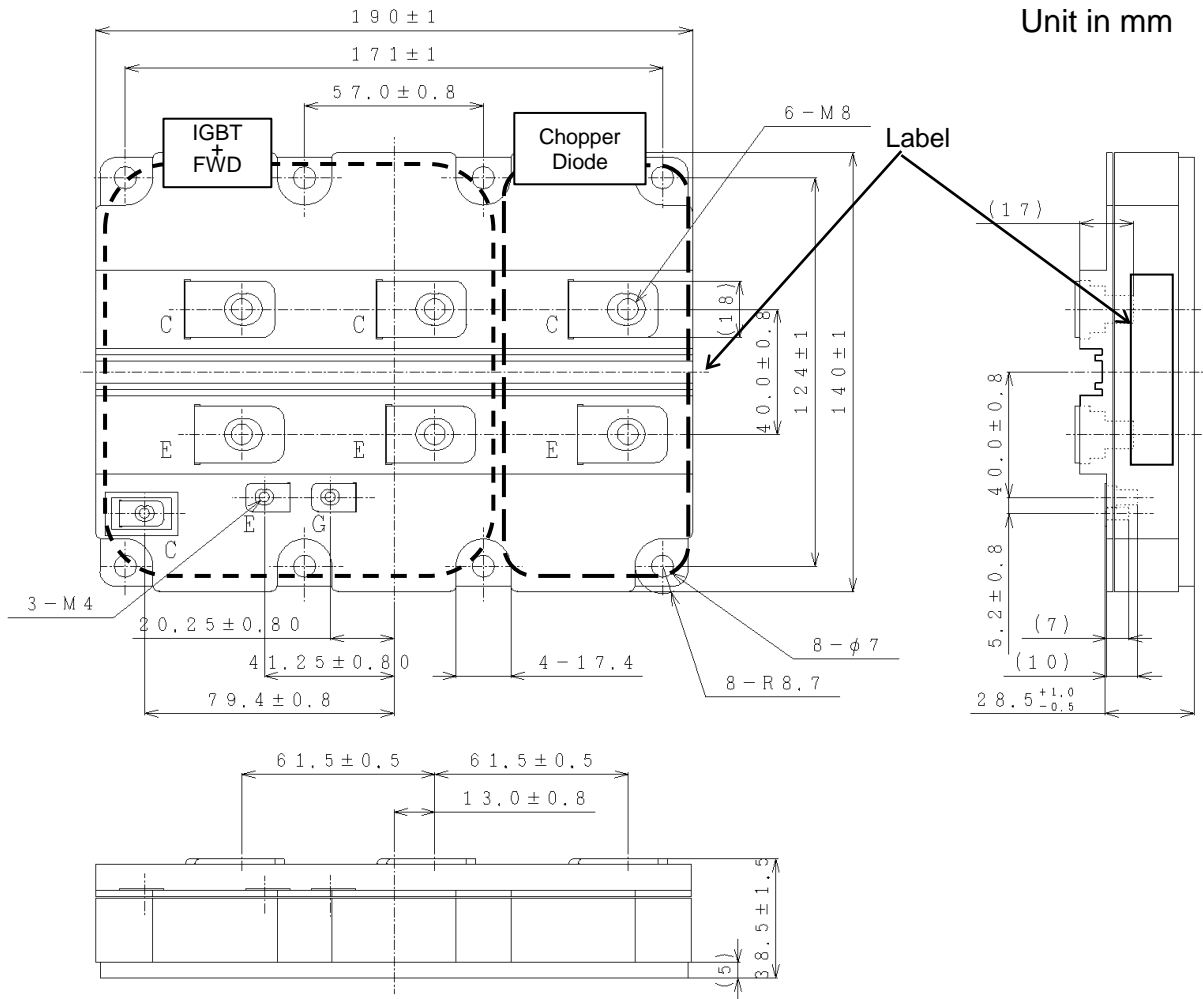


Fig.3 Definition of switching loss

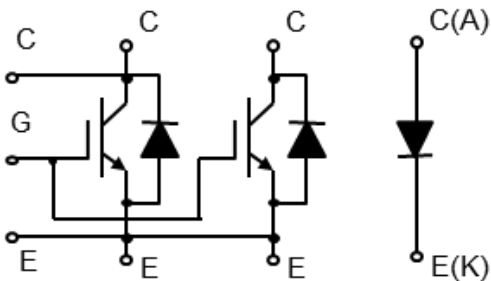
MBL1000E33E2-B

OUTLINE DRAWING

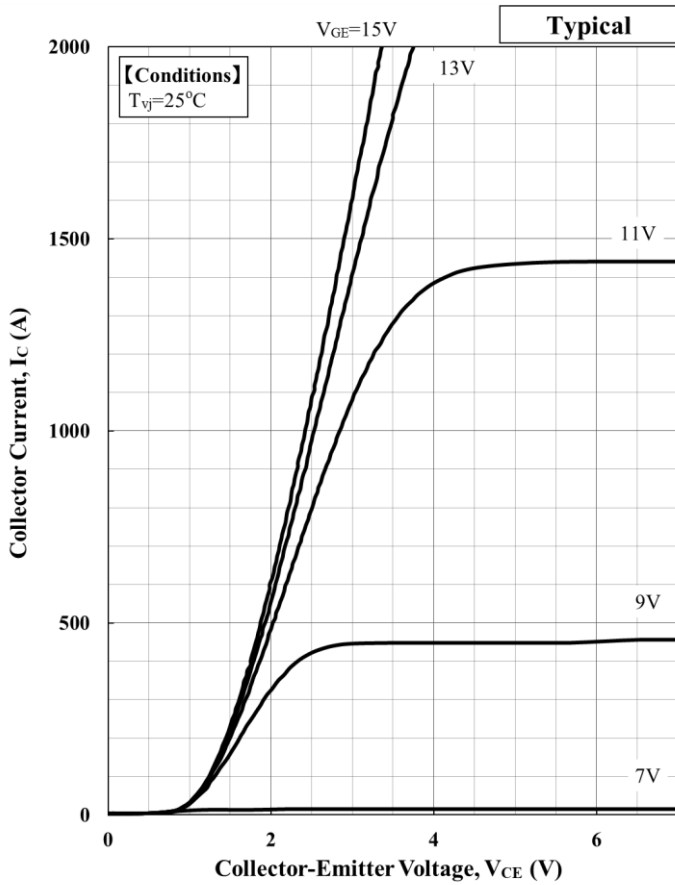


Weight : 1300g

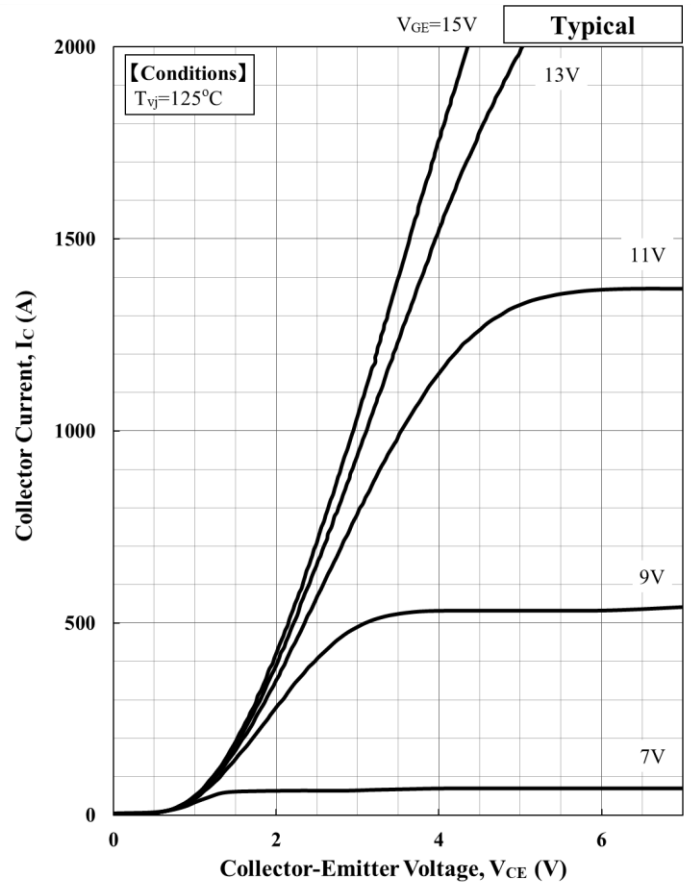
CIRCUIT DIAGRAM



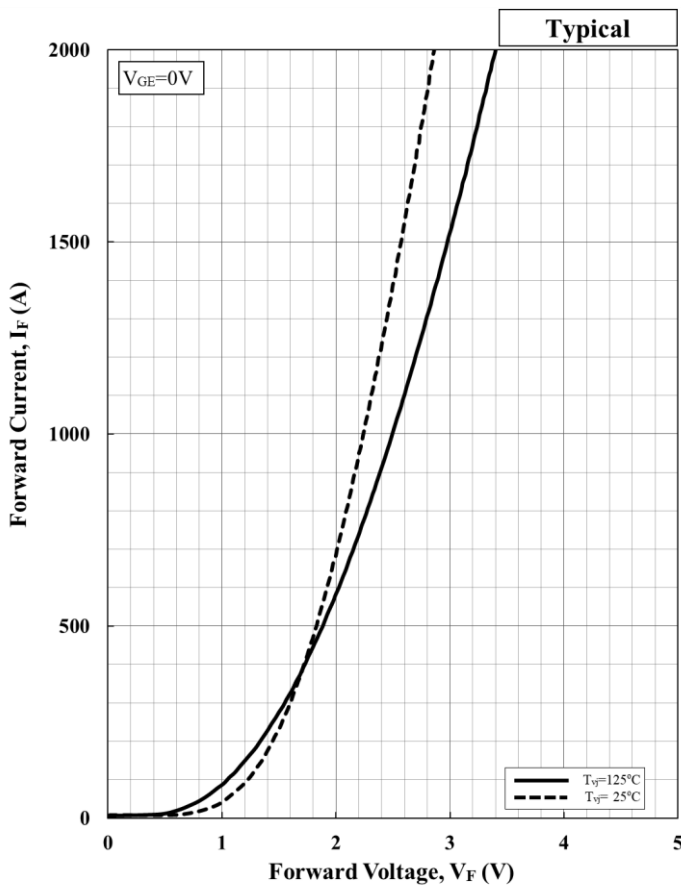
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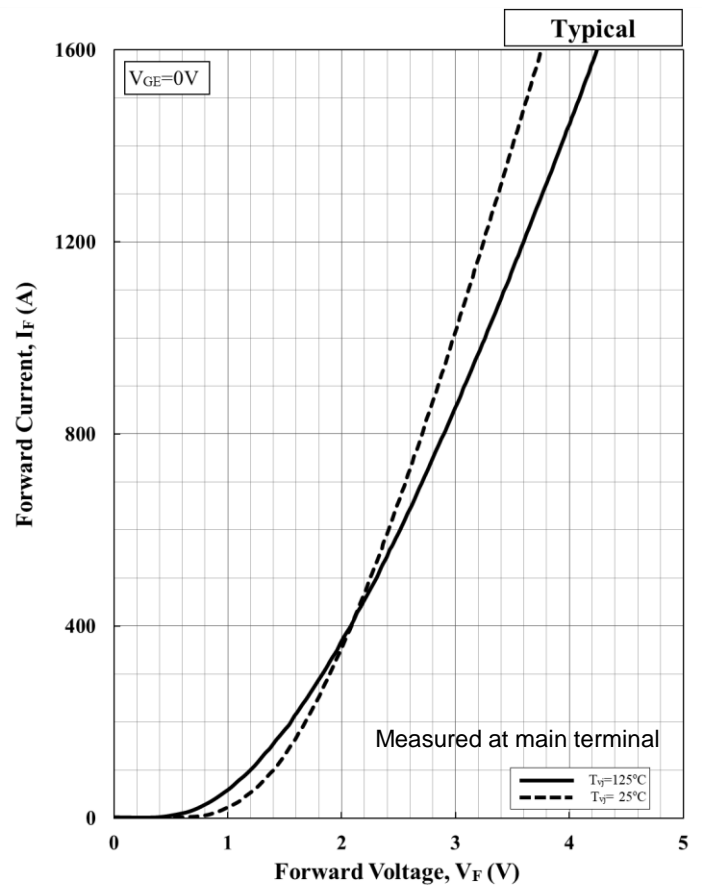
Collector Current vs. Collector Emitter Voltage



Collector Current vs. Collector Emitter Voltage

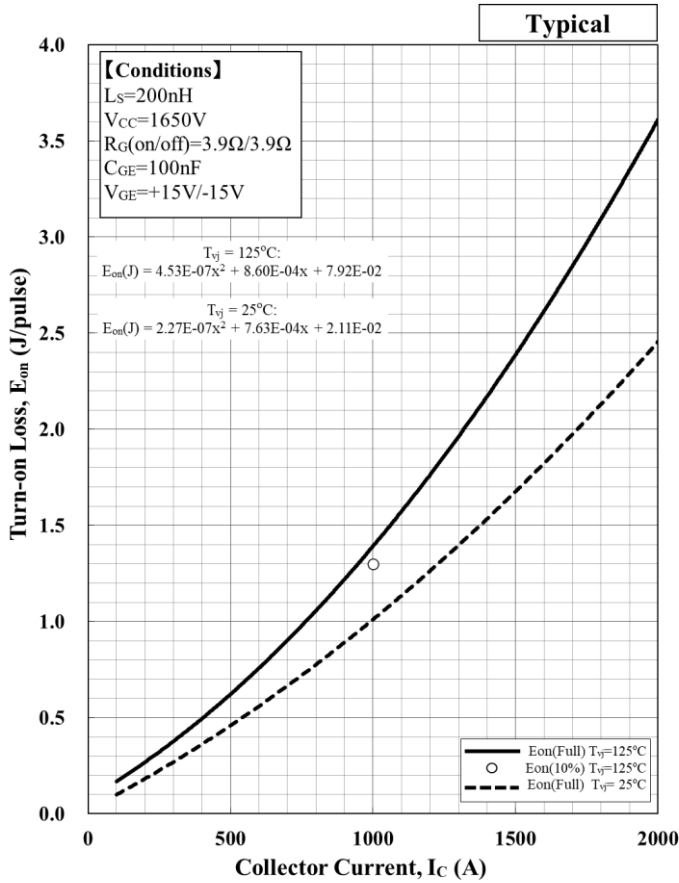


Forward Voltage of free-wheeling diode

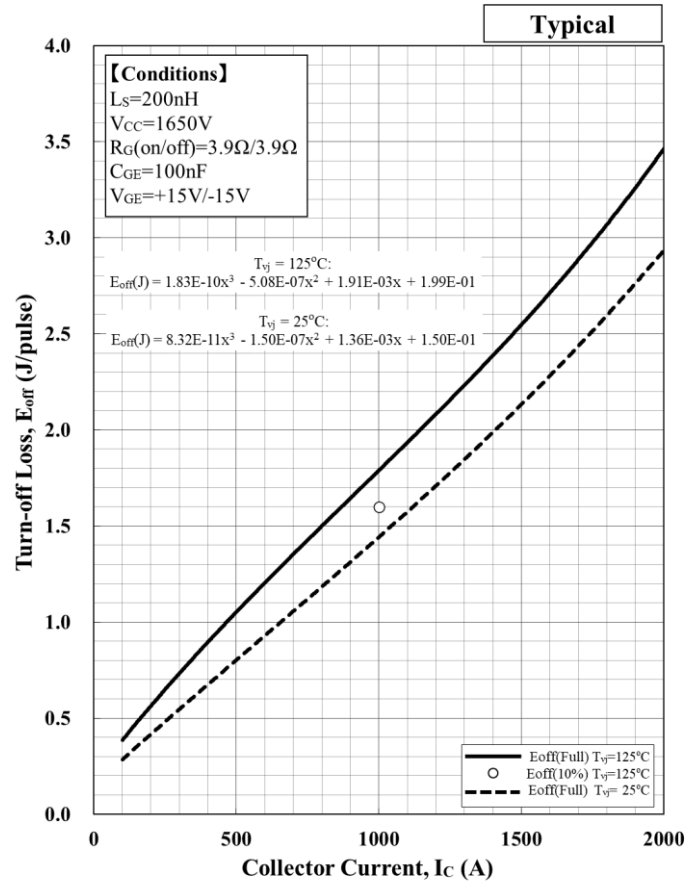


Forward Voltage of Chopper diode

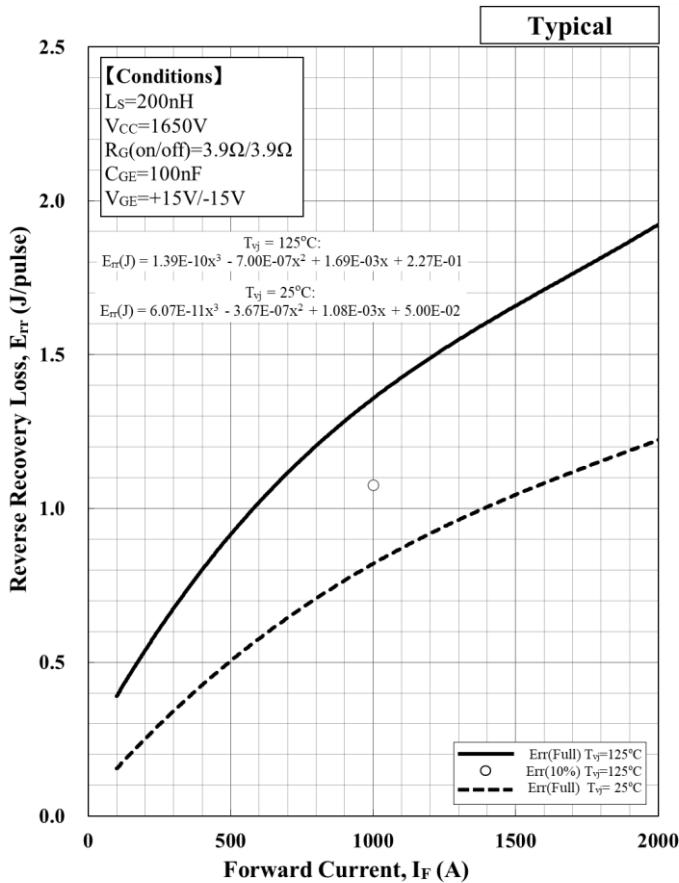
MBL1000E33E2-B



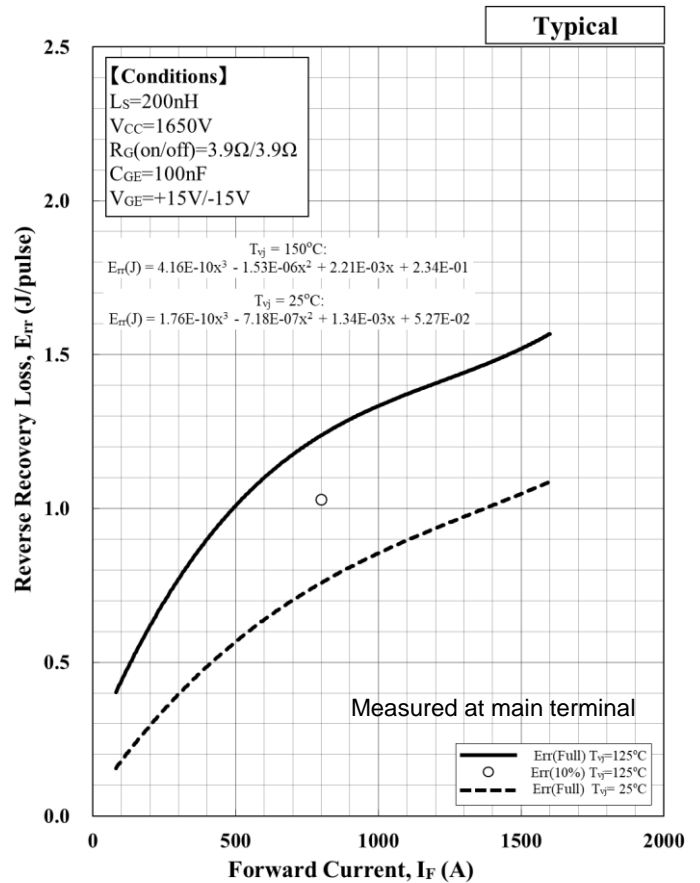
Turn-on loss vs. Collector current



Turn-off loss vs. Collector current

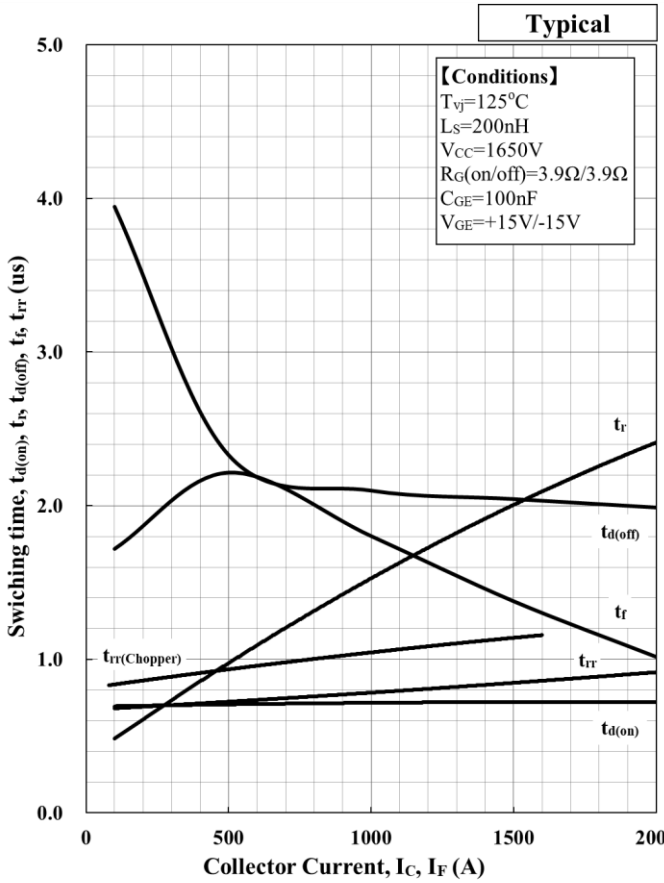


Recovery loss (FWD) vs. Forward current

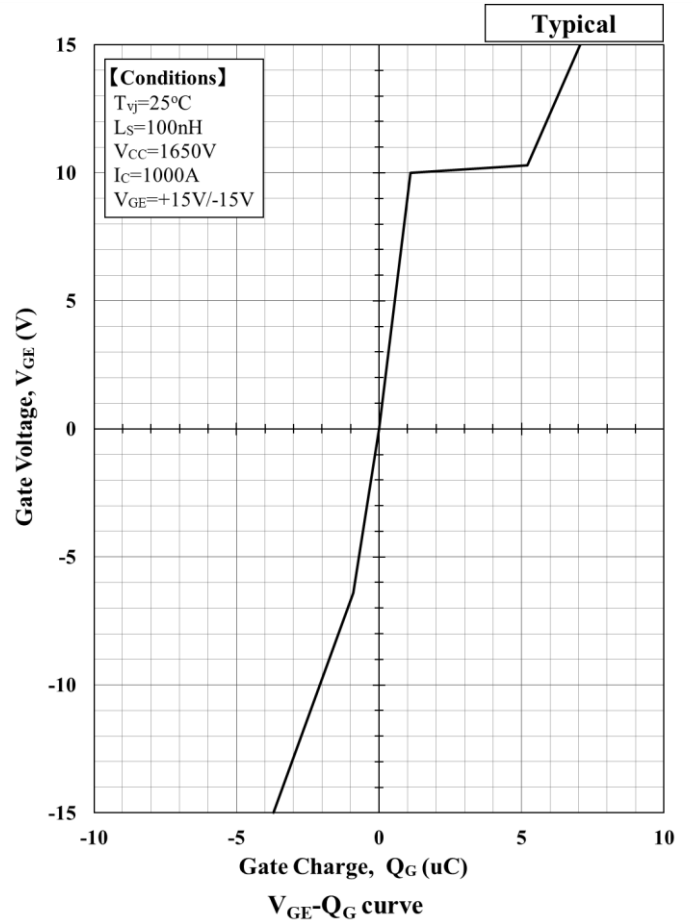


Recovery loss (Chopper Diode) vs. Forward current

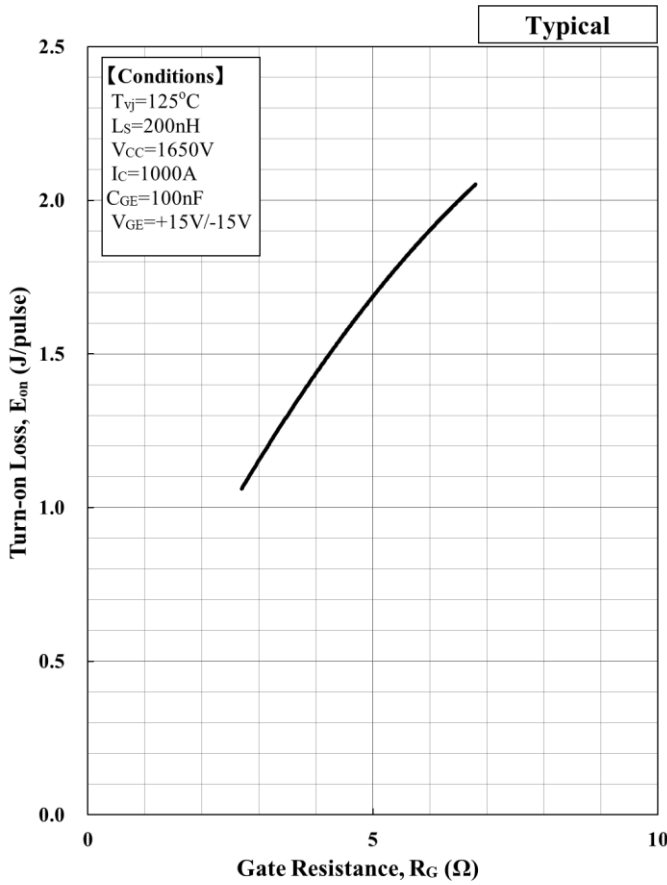
MBL1000E33E2-B



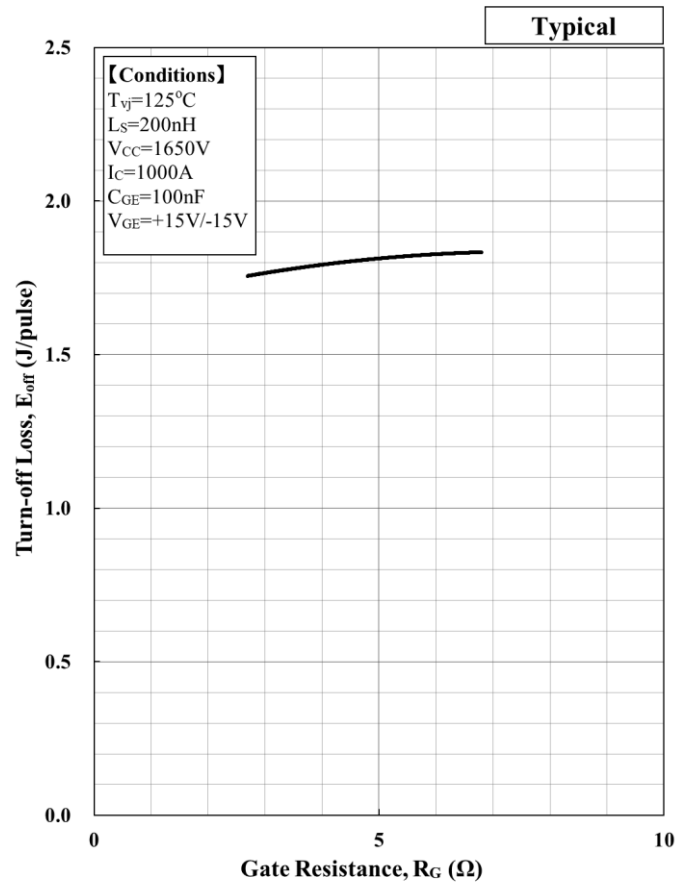
Switching time vs. Collector Current



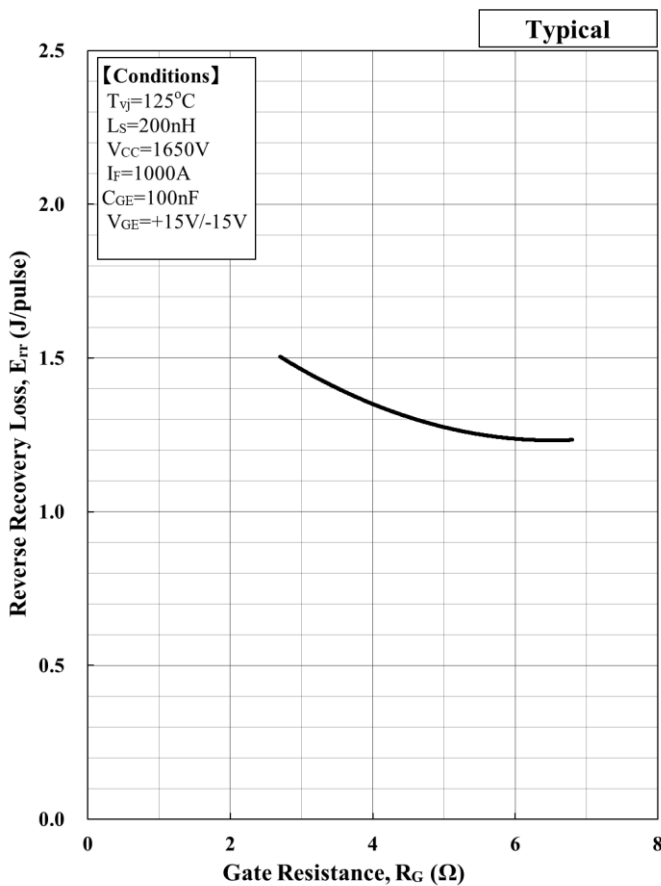
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Turn-on loss vs. Gate Resistance

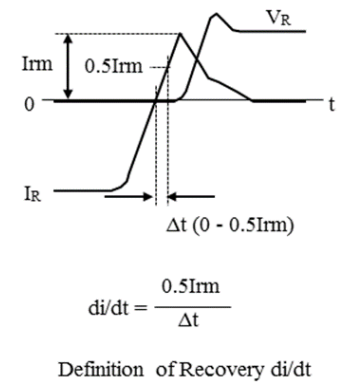
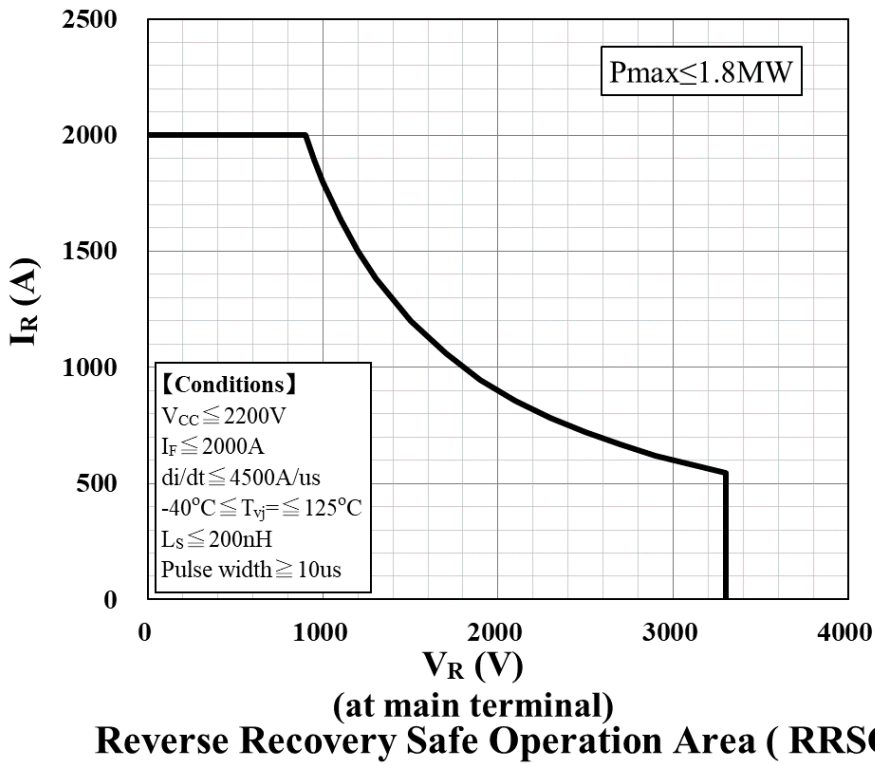
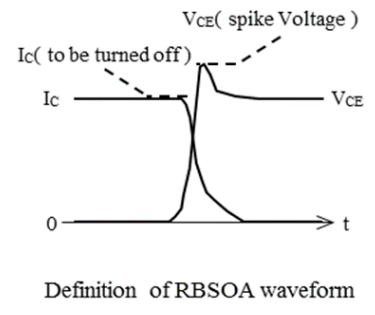
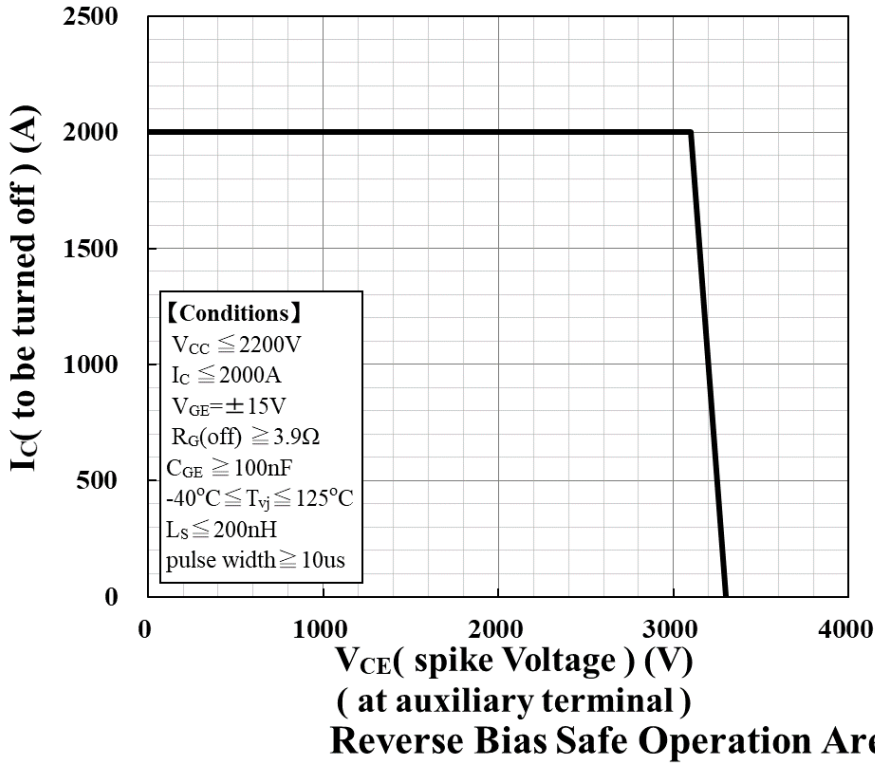


Turn-off loss vs. Gate Resistance

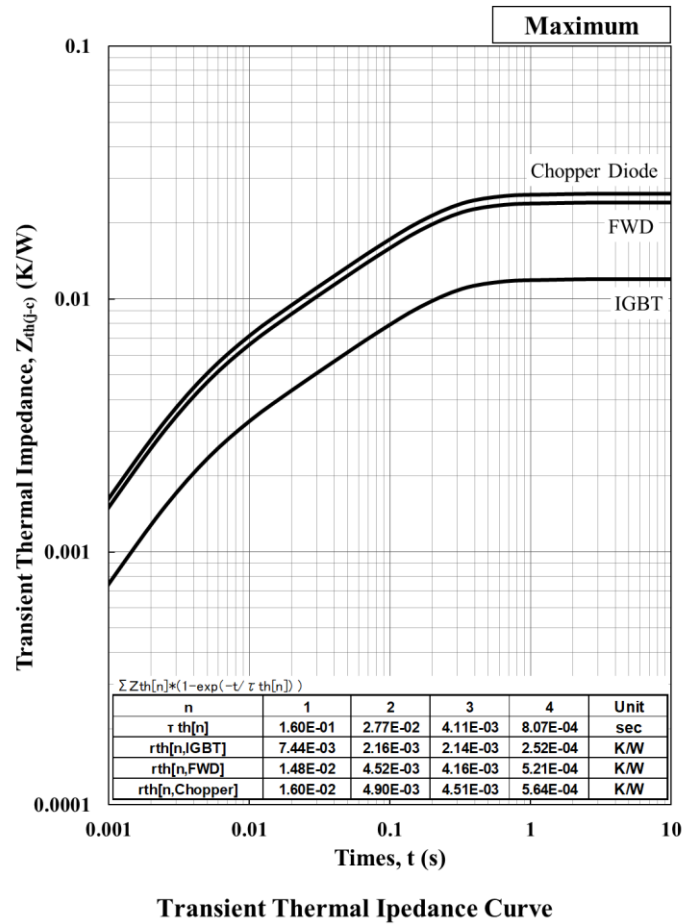
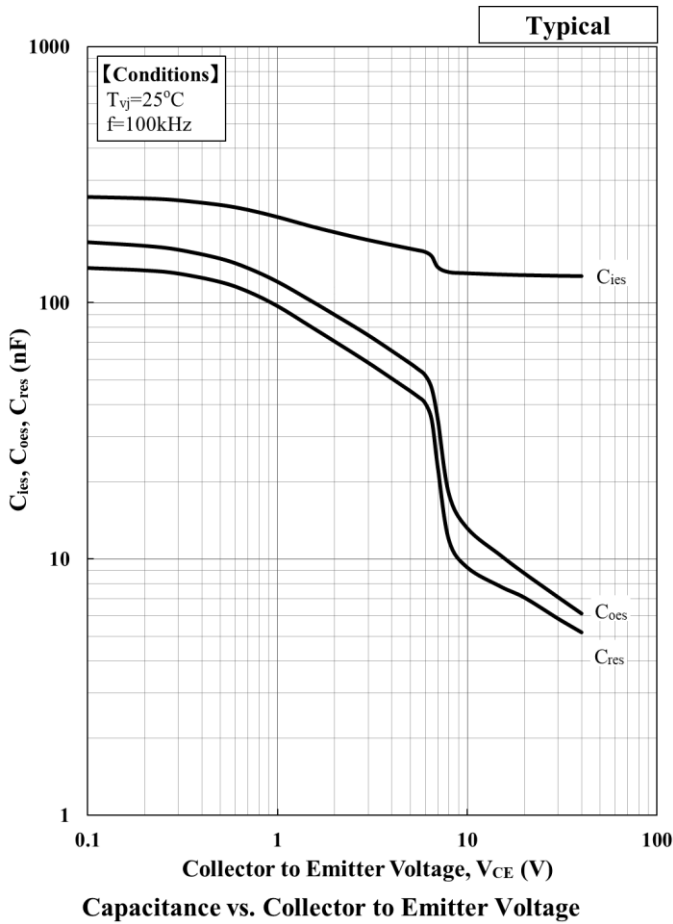


Recovery loss (FWD) vs. Gate Resistance

MBL1000E33E2-B



MBL1000E33E2-B



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

MBL1000E33E2-B

HITACHI POWER SEMICONDUCTORS

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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.
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MBL1000E33E2-B

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