

MBN1200E33E

Silicon N-channel IGBT 3300V E 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	MBN1200E33E
Collector Emitter Voltage	V _{CEs}	V	3,300
Gate Emitter Voltage	V _{GES}	V	±20
Collector Current	DC	I _C	1,200
	1ms	I _{CRM}	2,400
Forward Current	DC	I _F	1,200
	1ms	I _{FRM}	2,400
Junction Temperature	T _{vj,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

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 _{vj} =25°C
			-	20	60	V _{CE} =3,300V, V _{GE} =0V, T _{vj} =125°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	3.0	3.5	4.2	I _C =1,200A, V _{GE} =15V, T _{vj} =125°C
Gate Emitter Threshold Voltage	V _{GE(th)}	V	4.5	6.0	7.0	V _{CE} =10V, I _C =1,200mA, T _{vj} =25°C
Input Capacitance	C _{ies}	nF	-	110	-	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	-	0.4	-	V _{CC} =1,650V, I _C =1,200A
Rise Time	t _r		1.1	2.1	3.1	L _S =100nH
Turn Off Delay Time	t _{d(off)}		-	2.0	-	R _G =3.9/3.9Ω (3)
Fall Time	t _f		1.3	2.2	3.1	V _{GE} =±15V, T _{vj} =125°C
Peak Forward Voltage Drop	V _F	V	2.0	2.5	3.0	I _F =1,200A, V _{GE} =0V, T _{vj} =125°C
Reverse Recovery Time	t _{rr}	μs	0.2	0.7	1.2	V _{CC} =1,650V, I _F =1,200A, L _S =100nH T _{vj} =125°C
Turn On Loss	E _{on(10%)}	J/P	-	1.7	2.2	V _{CC} =1,650V, I _C =1,200A, L _S =100nH
Turn Off Loss	E _{off(10%)}	J/P	-	1.9	2.4	R _G =3.9/3.9Ω (3)
Reverse Recovery Loss	E _{rr(10%)}	J/P	-	1.6	2.1	V _{GE} =±15V, T _{vj} =125°C
Short Circuit Pulse Width	t _{sc}	μs	10	-	-	V _{CC} =2,000V, L _S =100nH R _{G(on/off)} =3.9/39Ω, V _{GE} =±15V, T _{vj} =125°C
Stray inductance module	L _{SCE}	nH	-	12	-	
Thermal Impedance	IGBT	R _{th(f-c)}	-	-	0.0085	Junction to case
	FWD	R _{th(f-c)}	-	-	0.017	
Contact Thermal Impedance	R _{th(c-f)}	K/W	-	0.006	-	Case to fin

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

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DEFINITION OF TEST CIRCUIT

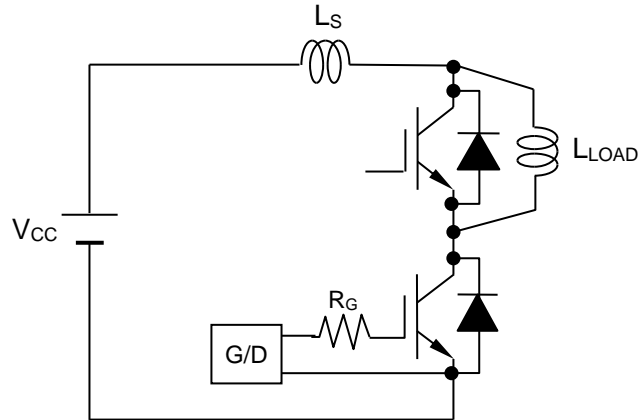


Fig.1 Switching test circuit

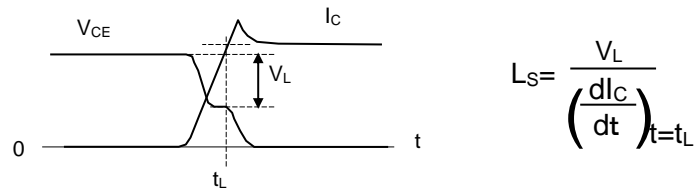


Fig.2 Definition of stray inductance

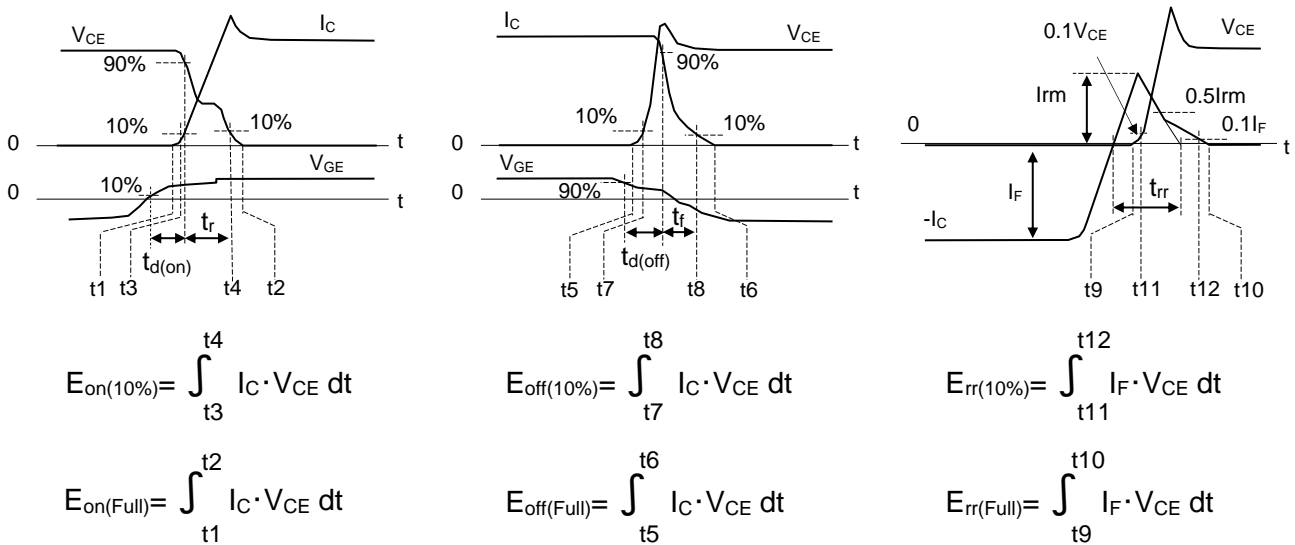
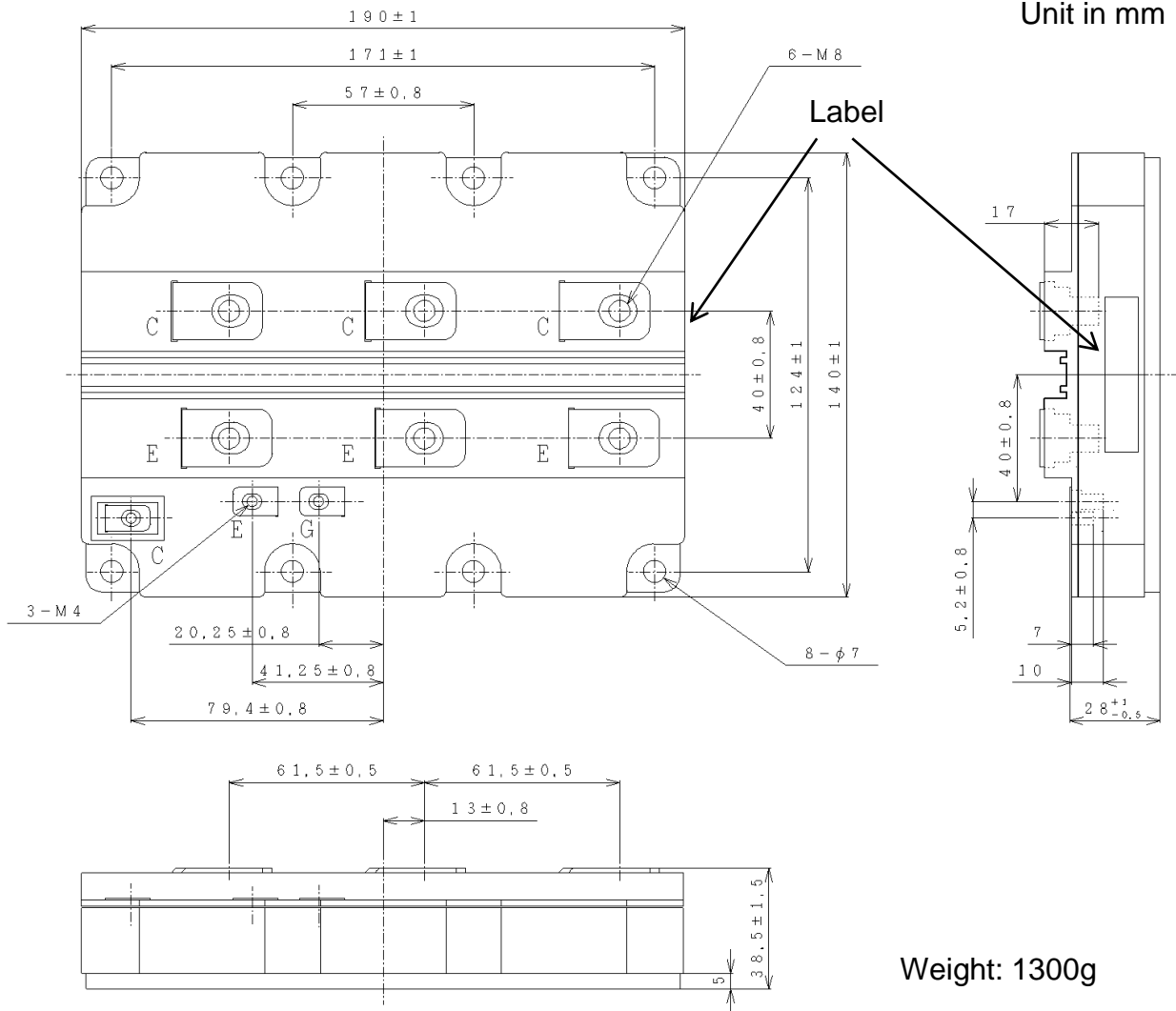


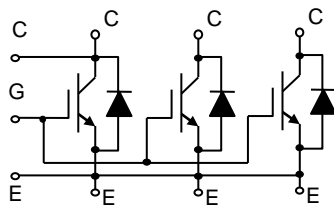
Fig.3 Definition of switching loss

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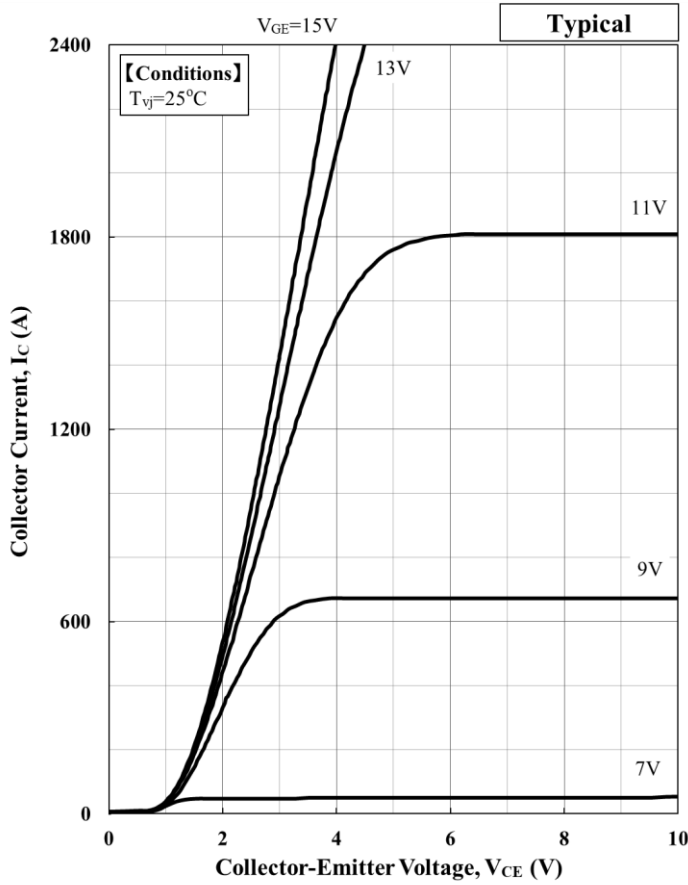
OUTLINE DRAWING



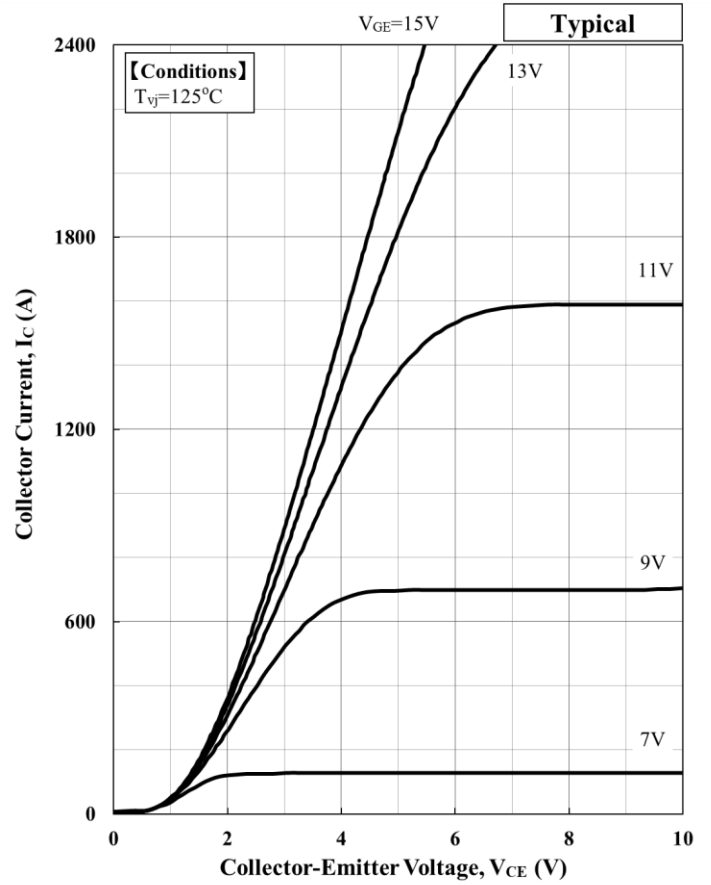
CIRCUIT DIAGRAM



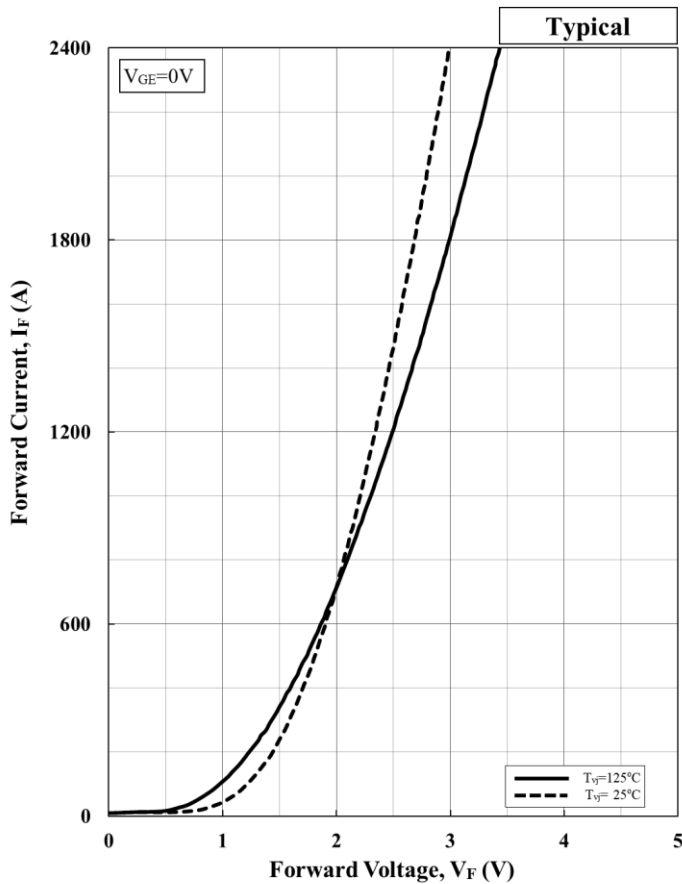
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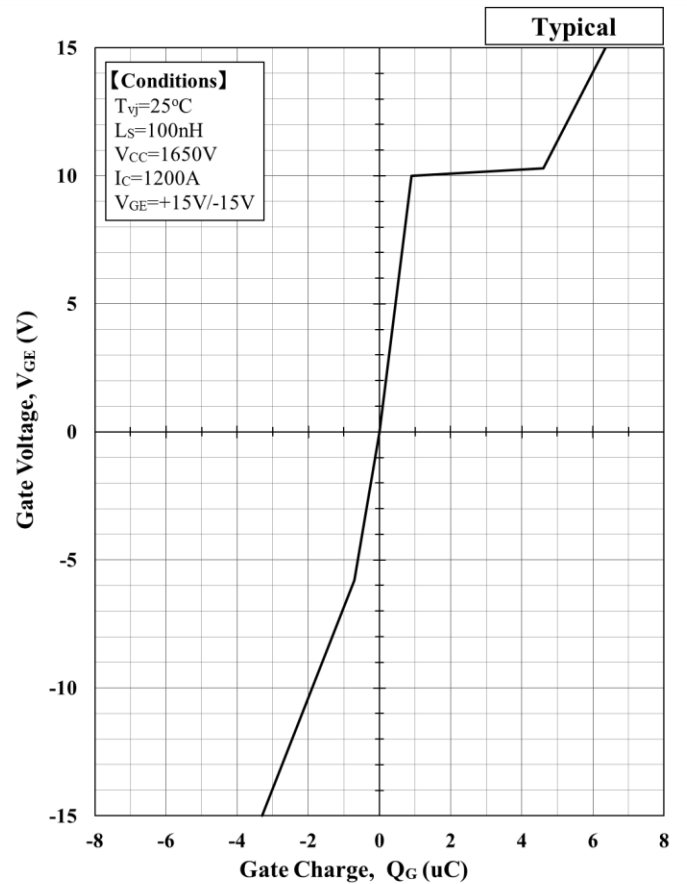
Collector Current vs. Collector Emitter Voltage



Collector Current vs. Collector Emitter Voltage

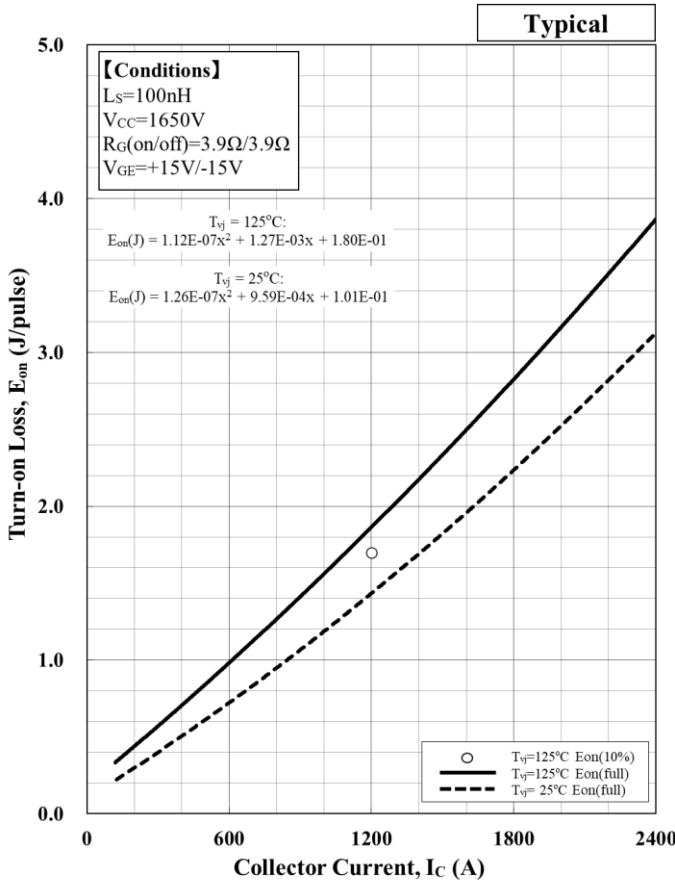


Forward Voltage of free-wheeling diode

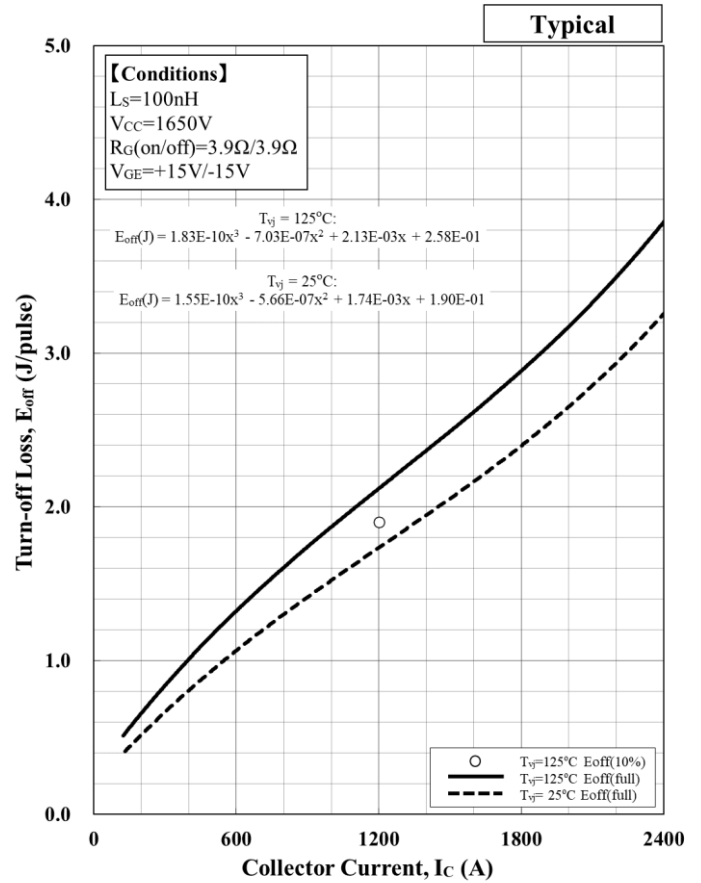


V_{GE} - Q_G curve

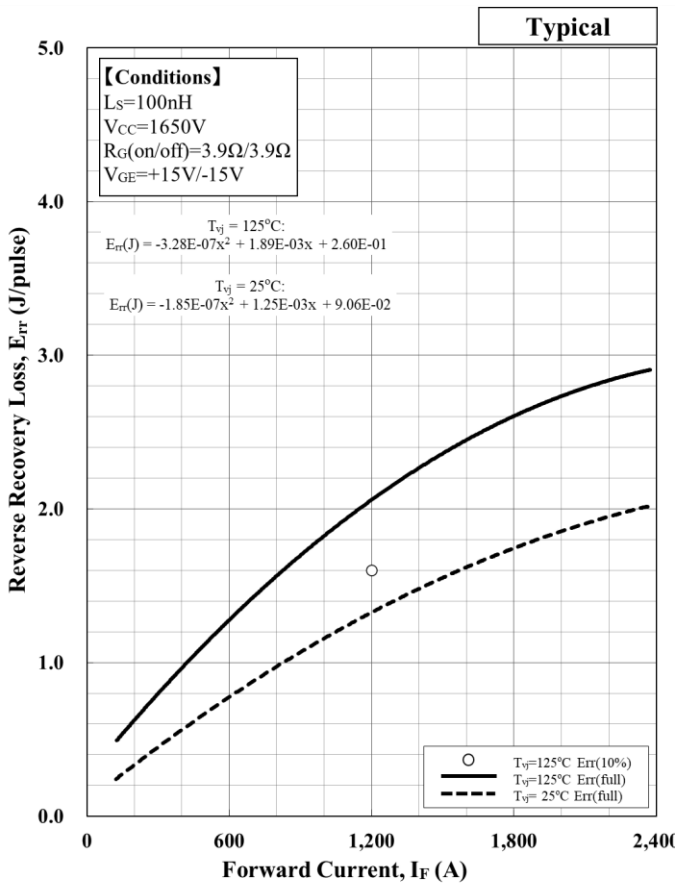
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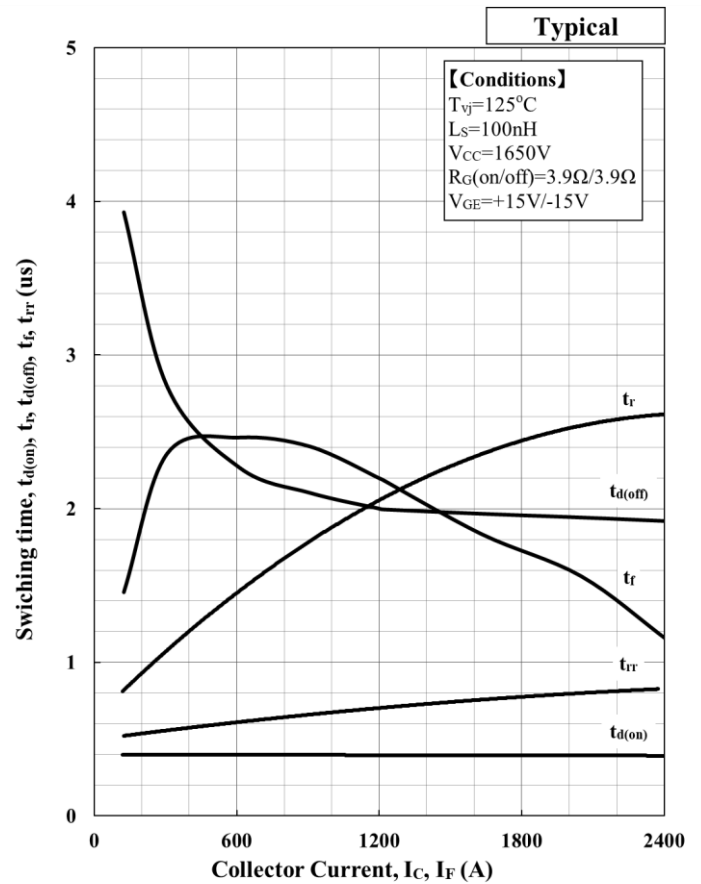
Turn-on loss vs. Collector current



Turn-off loss vs. Collector current

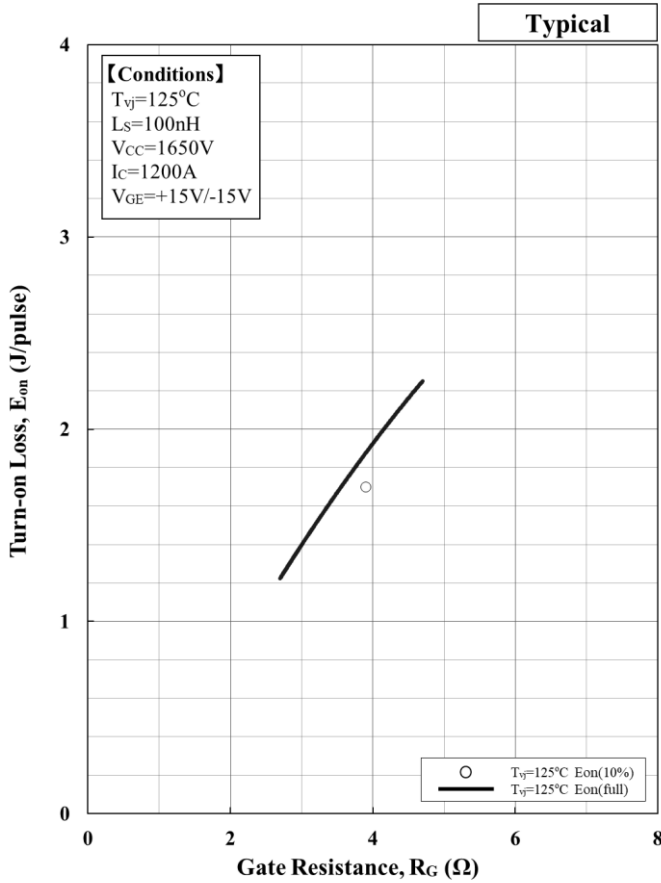


Reverse Recovery loss vs. Forward current

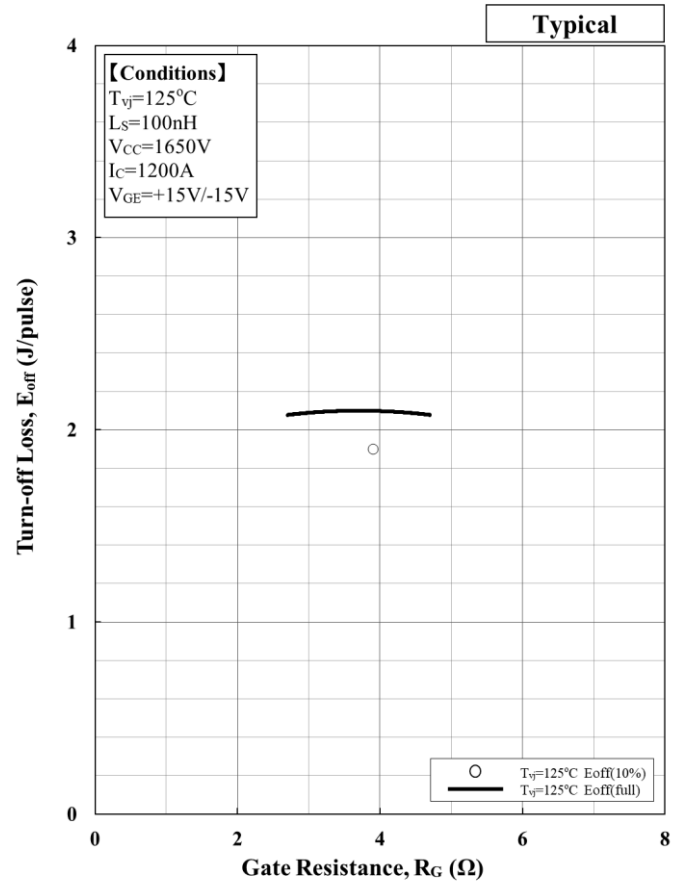


Switching time vs. Collector Current

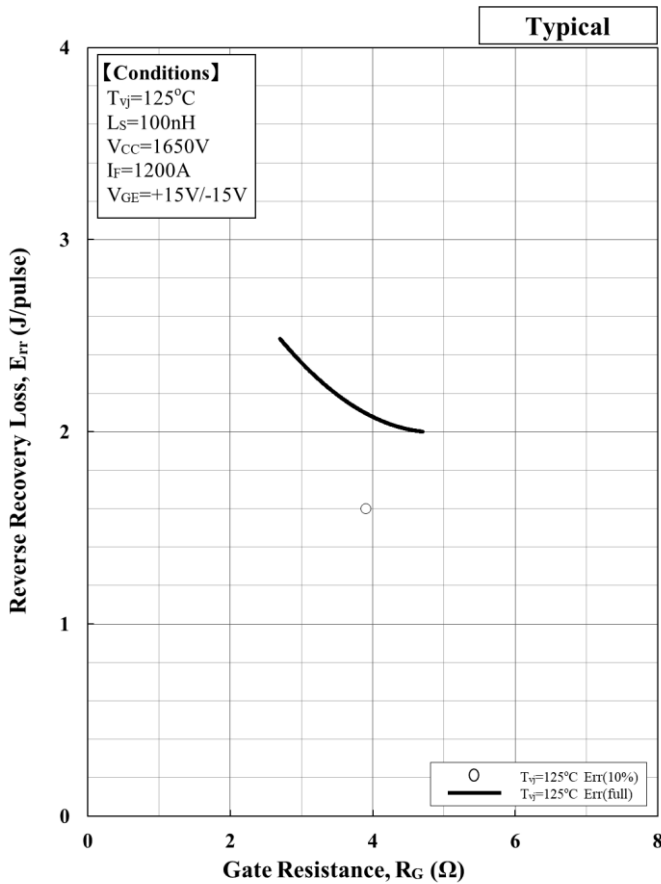
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Turn-on loss vs. Gate Resistance

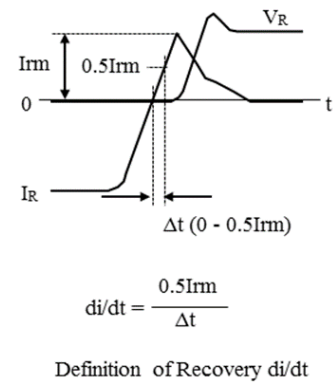
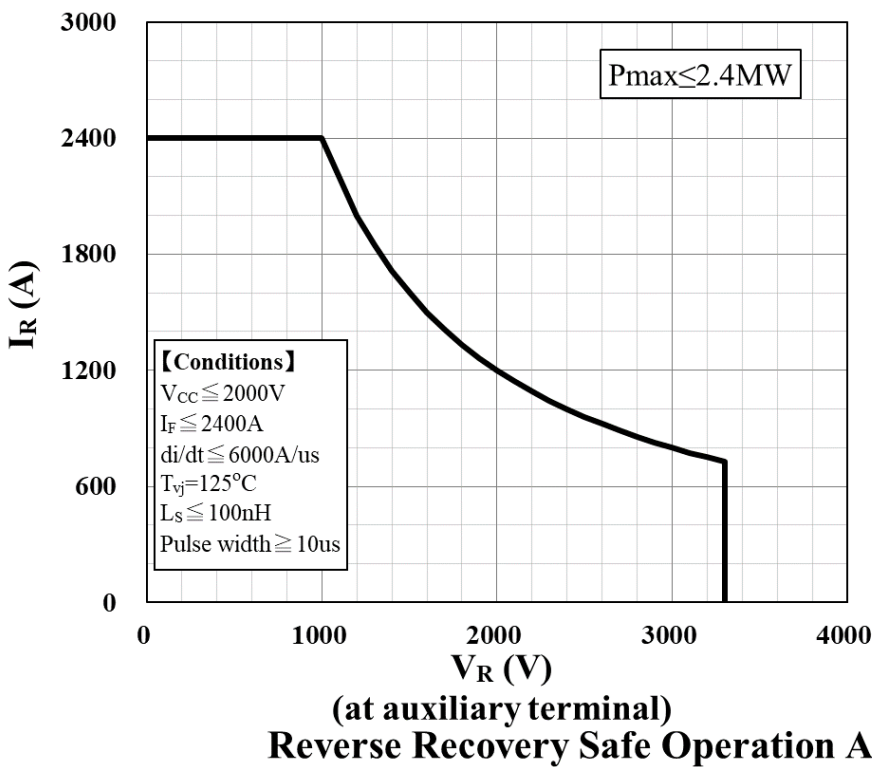
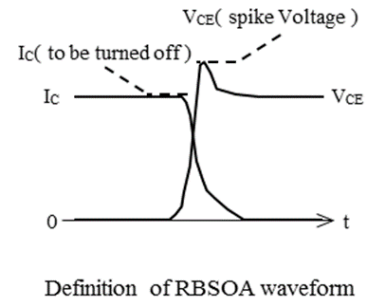
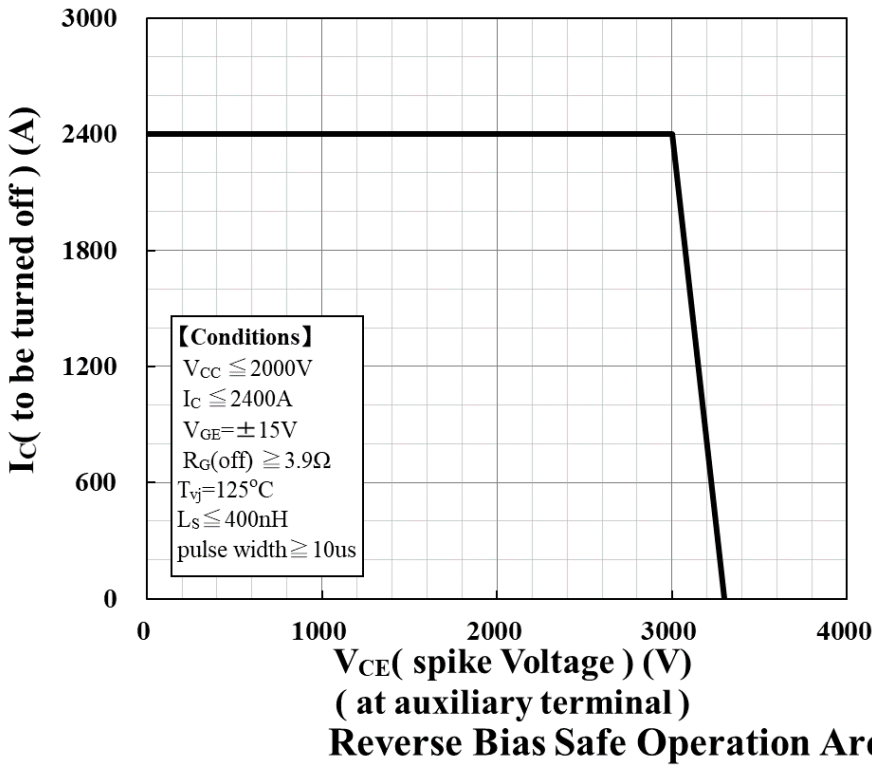


Turn-off loss vs. Gate Resistance

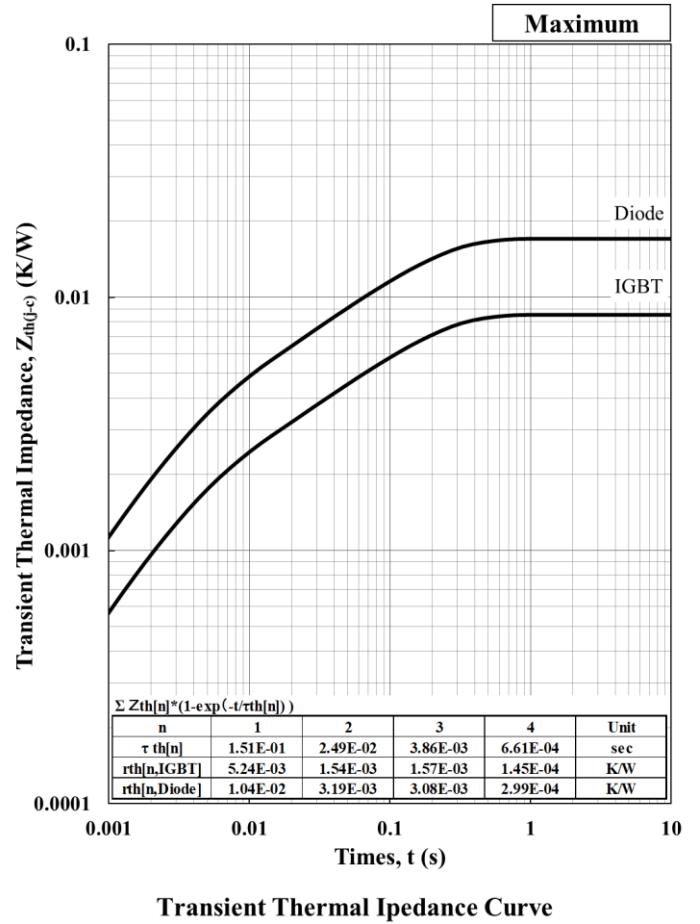
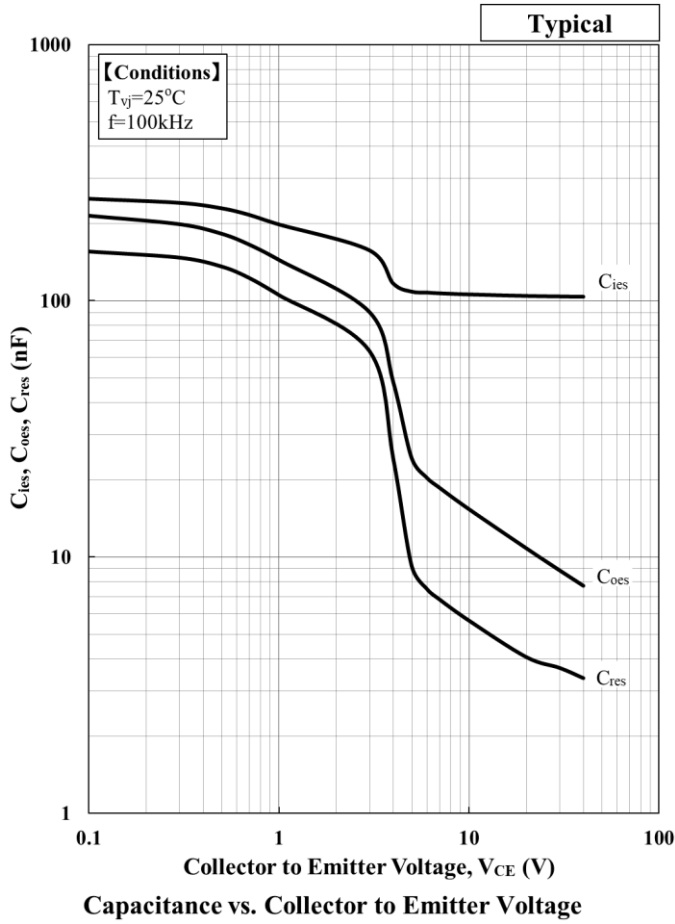


Reverse Recovery loss vs. Gate Resistance

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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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1. Since mishandling of semiconductor devices may cause malfunctions, please be sure to read "Precautions for Safe Use and Notices" in the individual brochure before use.
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