MBN800E33E

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	MBN800E33E
Collector Emitter Voltage		V_{CES}	V	3,300
Gate Emitter Voltage		V_{GES}	V	±20
Collector Current	DC	I_C	A	800
	1ms	I_{CRM}		1,600
Forward Current	DC	I_F	A	800
	1ms	I_{FRM}		1,600
Junction Temperature		$T_{vj\ op}$	°C	-50 ~ +125
Storage Temperature		T_{stg}	°C	-40 ~ +125
Isolation 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

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
				-	14	40	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=800A, 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=800mA, T_{vj}=25°C
Input Capacitance		C_{ies}	nF	-	70	-	V_{CE}=10V, V_{GE}=0V, f=100kHz, T_{vj}=25°C
Internal Gate Resistance		$R_{G(int)}$	Ω	-	2.0	-	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=800A
Rise Time		t_r		1.1	2.1	3.1	L_S=120nH
Turn Off Delay Time		$t_{d(off)}$		-	2.0	-	R_G=5.6Ω (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=800A, 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=800A, L_S=120nH T_{vj}=125°C
Turn On Loss		$E_{on(10\%)}$	J/P	-	1.2	1.6	V_{CC}=1,650V, I_C=800A, L_S=120nH
Turn Off Loss		$E_{off(10\%)}$	J/P	-	1.3	1.7	R_G=5.6Ω (3)
Reverse Recovery Loss		$E_{rr(10\%)}$	J/P	-	1.0	1.5	V_{GE}=±15V, T_{vj}=125°C
Short Circuit Pulse Width		t_{sc}	μs	10	-	-	V_{CC}=2,000V,Ls=120nH R_G(on/off)=5.6/56Ω,V_{GE}=±15V, T_{vj}=125°C
Stray inductance module		L_{SCE}	nH	-	18	-	
Thermal Impedance	IGBT	$R_{th(j-c)}$	K/W	-	-	0.013	Junction to case
	FWD	$R_{th(j-c)}$		-	-	0.026	
Contact Thermal Impedance		$R_{th(c-f)}$	K/W	-	0.008	-	Case to fin

Notes: (3) R_G value is a test condition value for evaluation, not recommended value.
Please, determine the suitable R_G value by measuring switching behaviors.

* 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

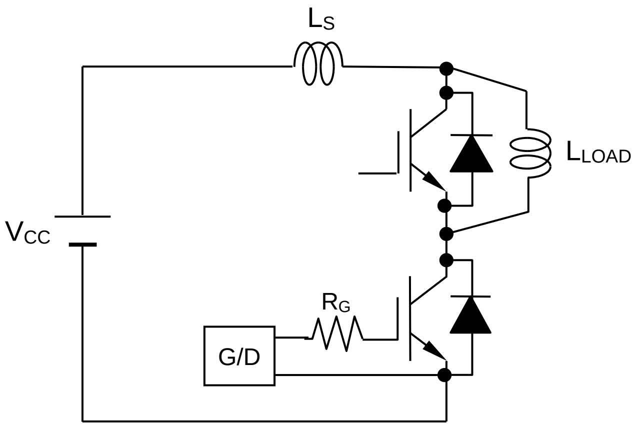
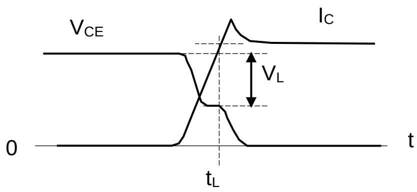
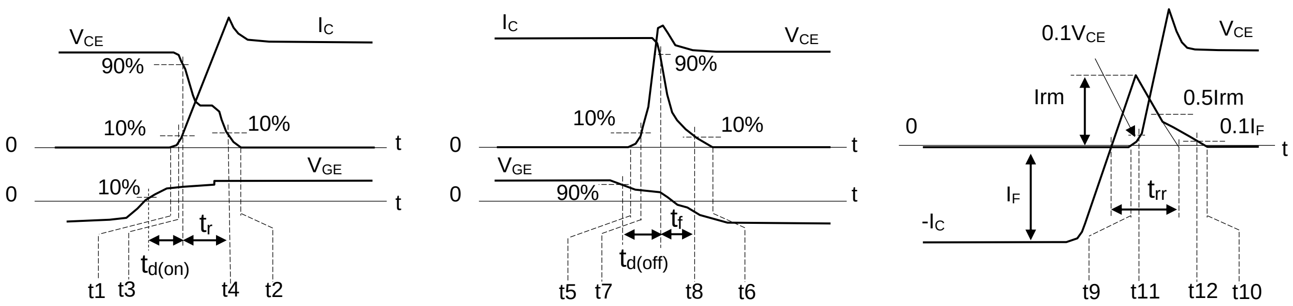


Fig.1 Switching test circuit



$$L_S = \frac{V_L}{\left(\frac{dI_C}{dt}\right)_{t=t_L}}$$

Fig.2 Definition of stray inductance



$$E_{on(10\%)} = \int_{t3}^{t4} I_C \cdot V_{CE}\, dt \qquad E_{off(10\%)} = \int_{t7}^{t8} I_C \cdot V_{CE}\, dt \qquad E_{rr(10\%)} = \int_{t11}^{t12} I_F \cdot V_{CE}\, dt$$

$$E_{on(Full)} = \int_{t1}^{t2} I_C \cdot V_{CE}\, dt \qquad E_{off(Full)} = \int_{t5}^{t6} I_C \cdot V_{CE}\, dt \qquad E_{rr(Full)} = \int_{t9}^{t10} I_F \cdot V_{CE}\, dt$$

Fig.3 Definition of switching loss

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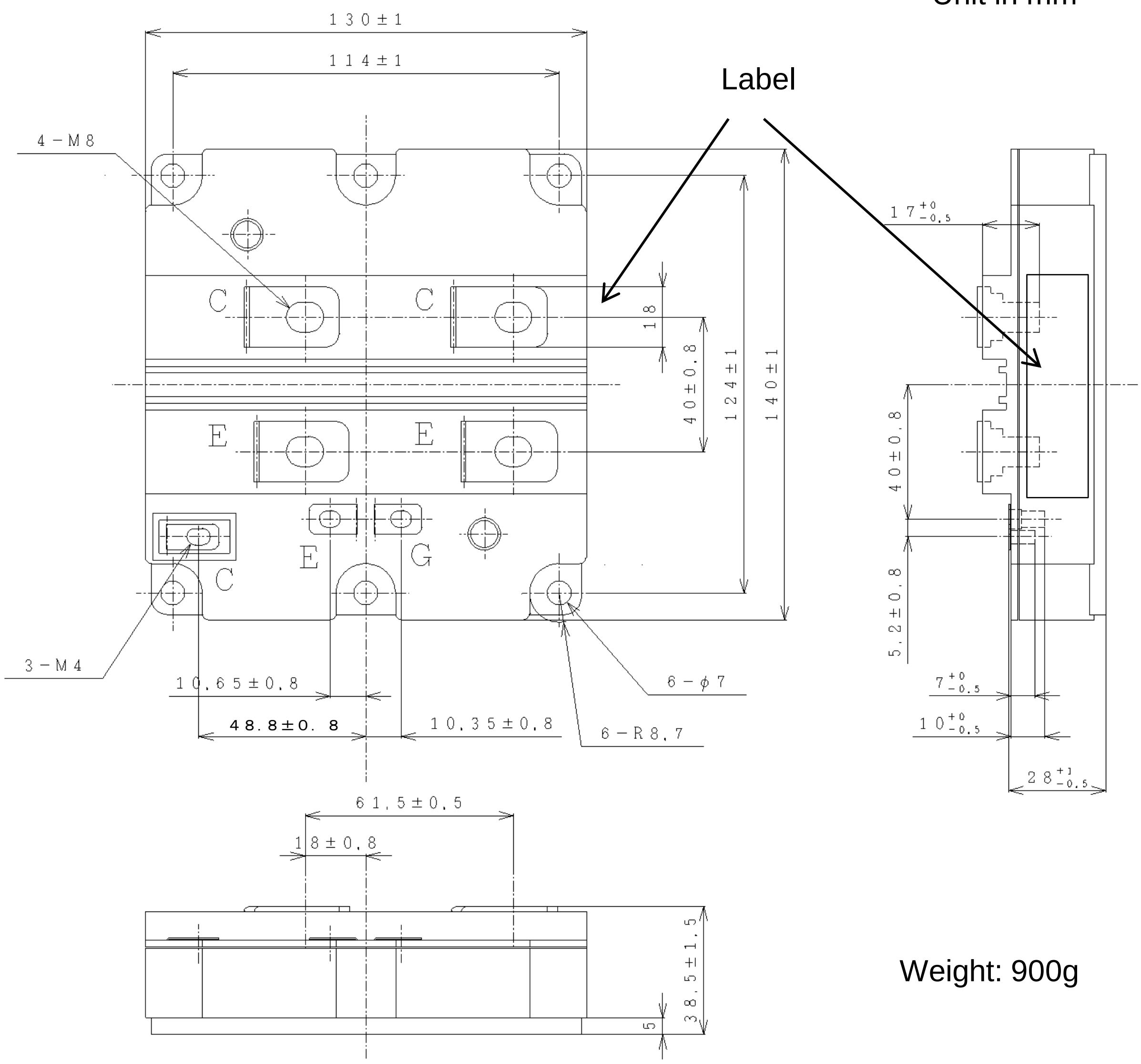
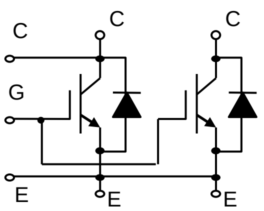
OUTLINE DRAWING

Unit in mm



Weight: 900g

CIRCUIT DIAGRAM



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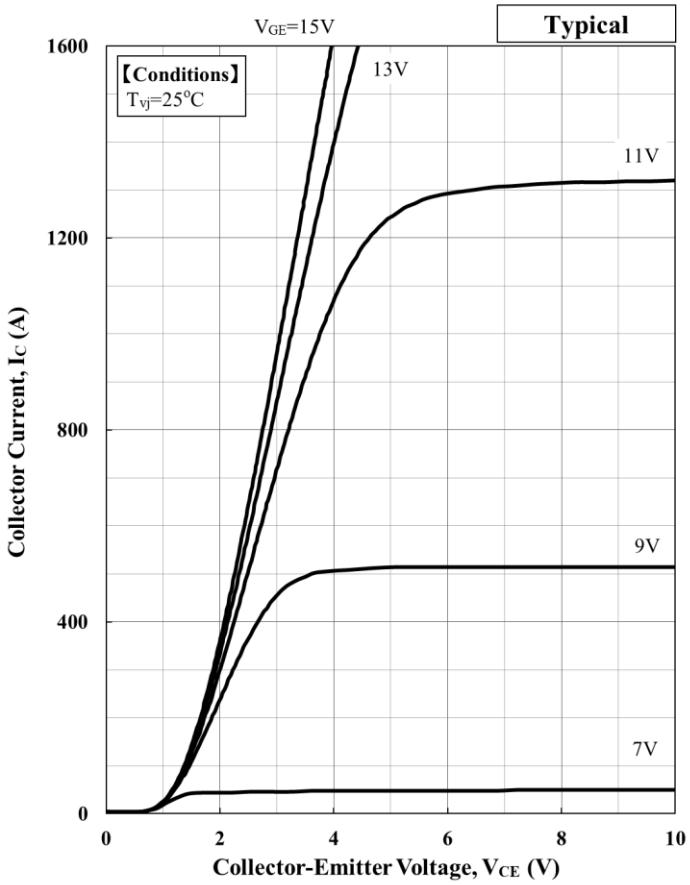
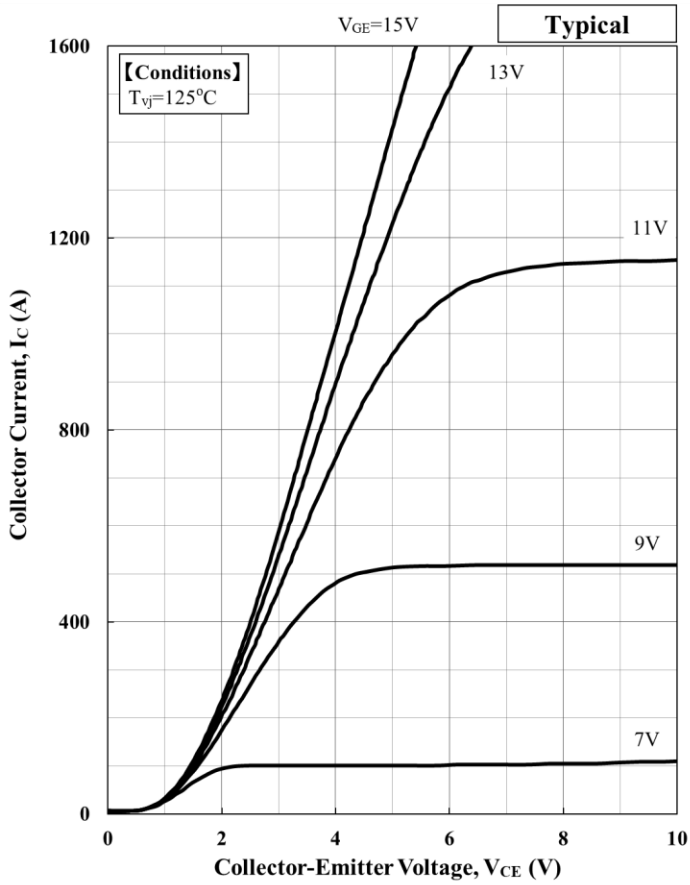
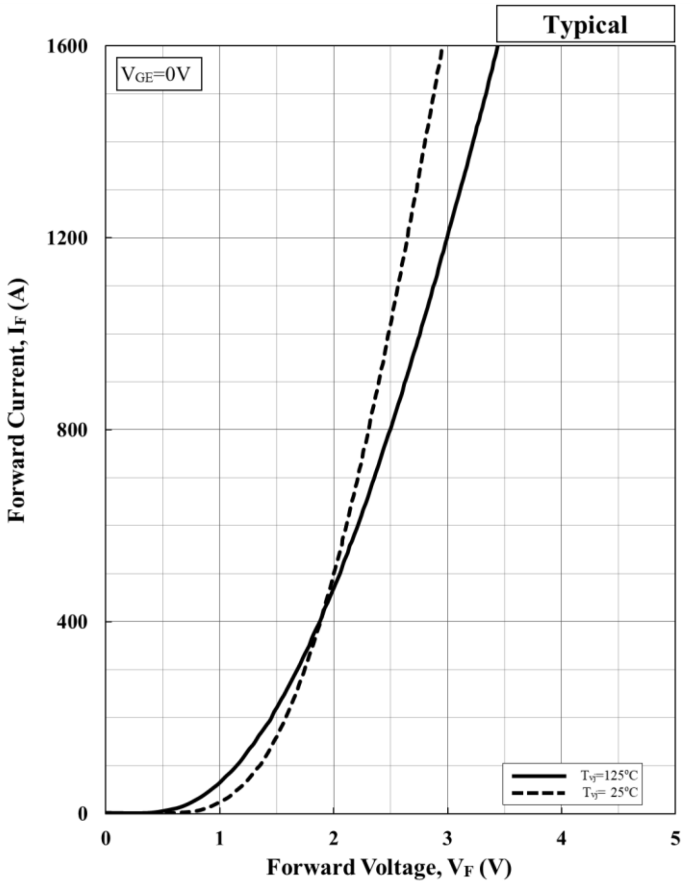


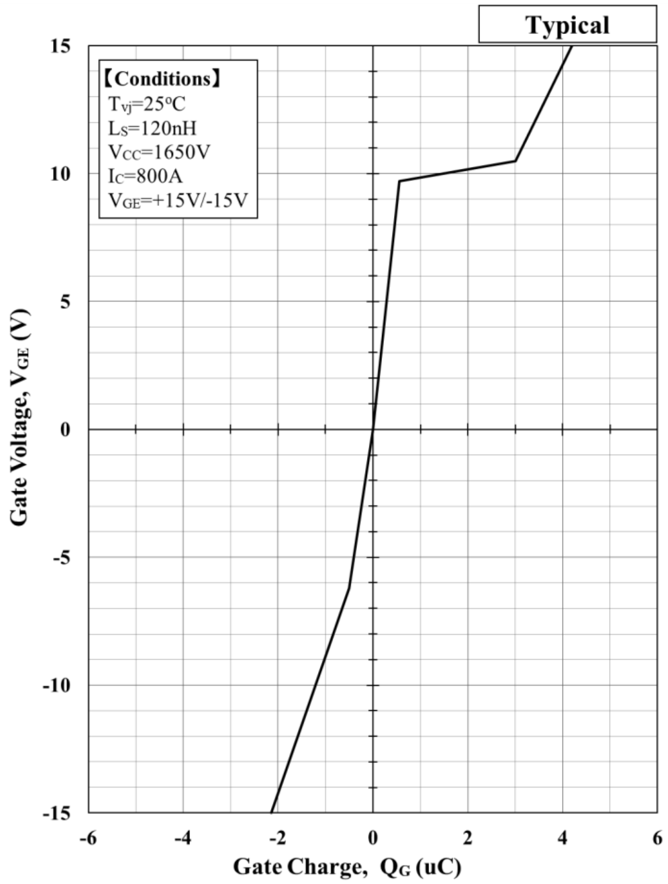
Collector Current vs. Collector Emitter Voltage



Collector Current vs. Collector Emitter Voltage



Forward Voltage of free-wheeling diode



V_{GE}-Q_G curve

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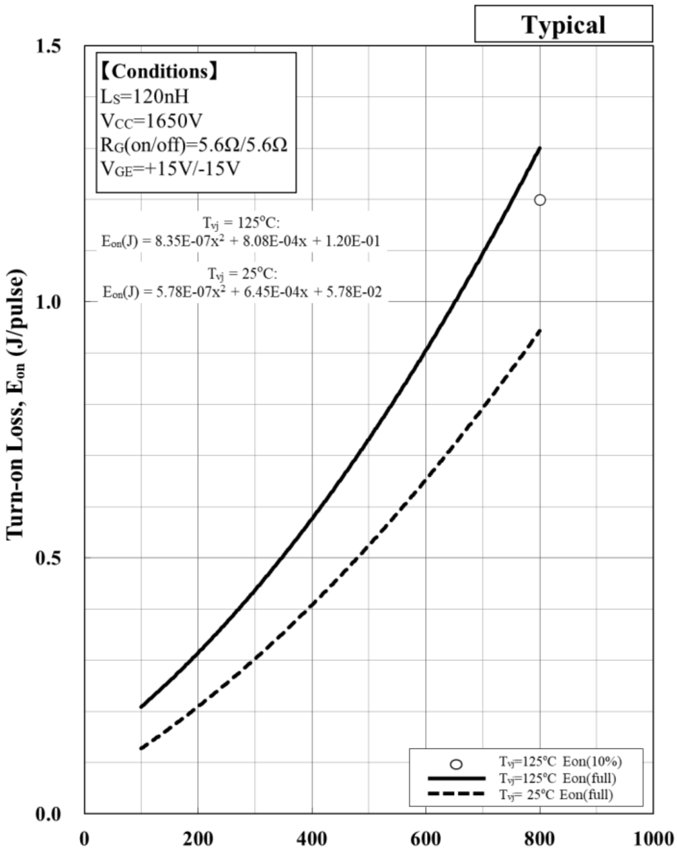
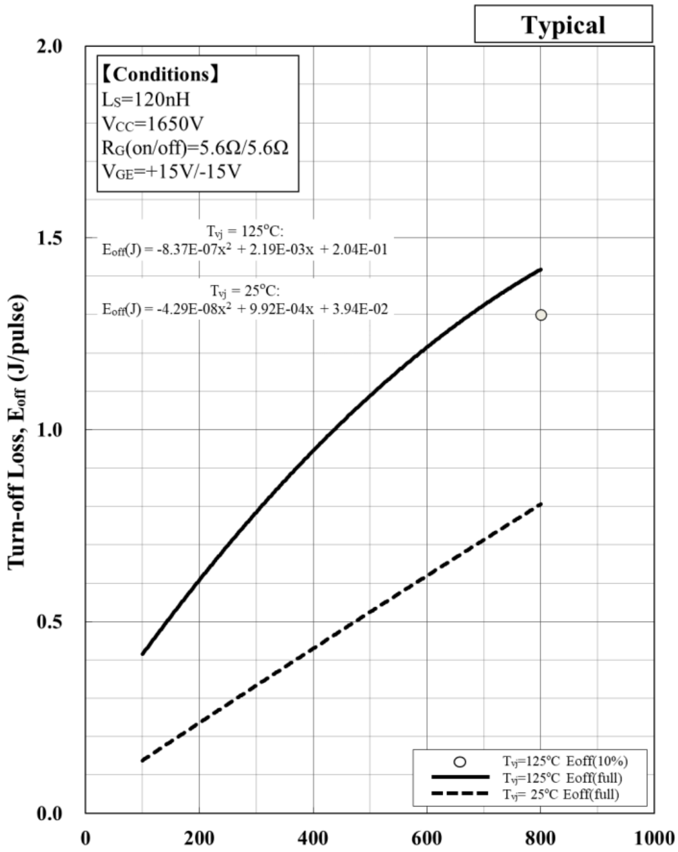
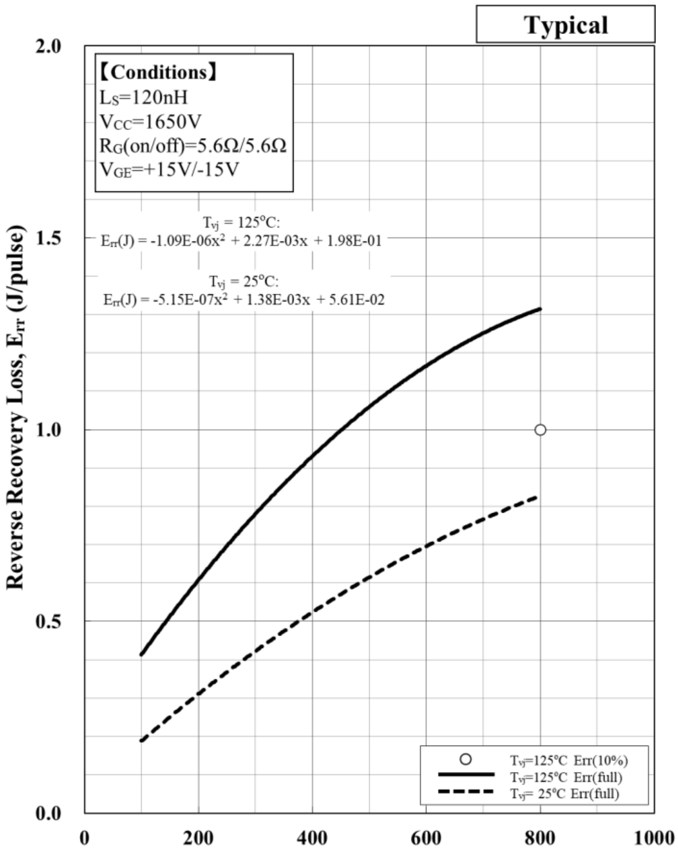


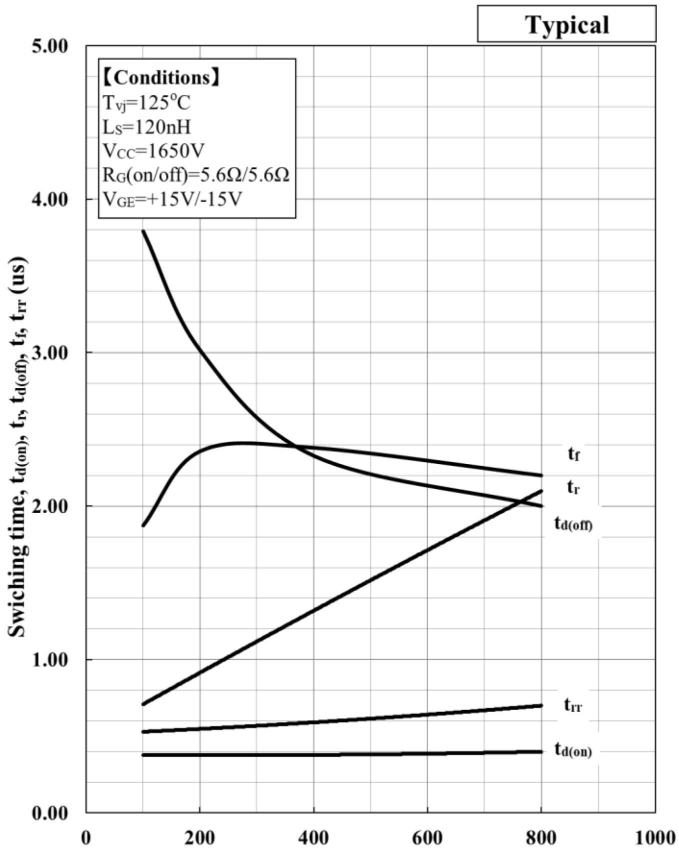
Turn-on loss vs. Collector current



Turn-off loss vs. Collector current



Reverse Recovery loss vs. Forward current



Switching time vs. Collector Current

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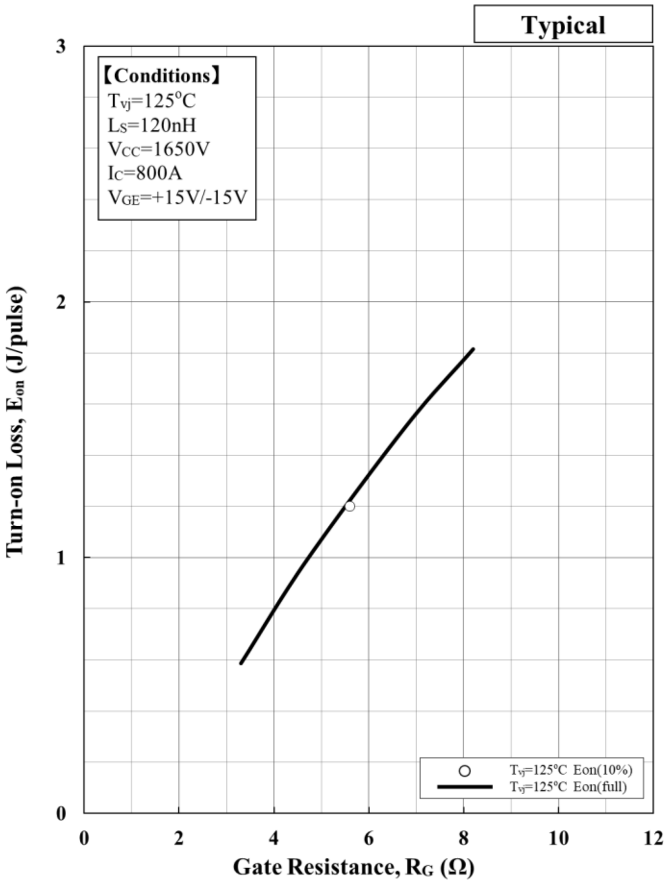
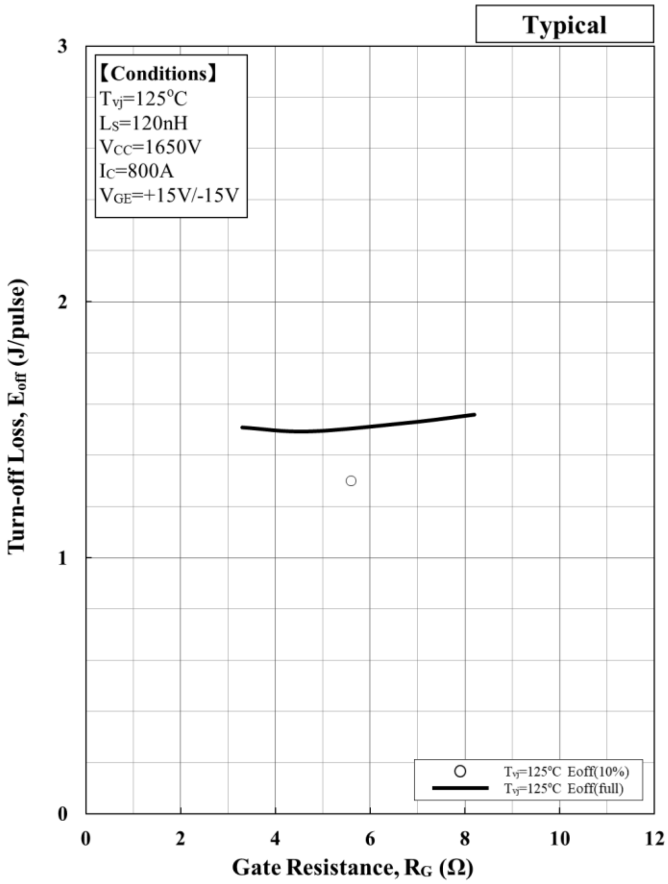
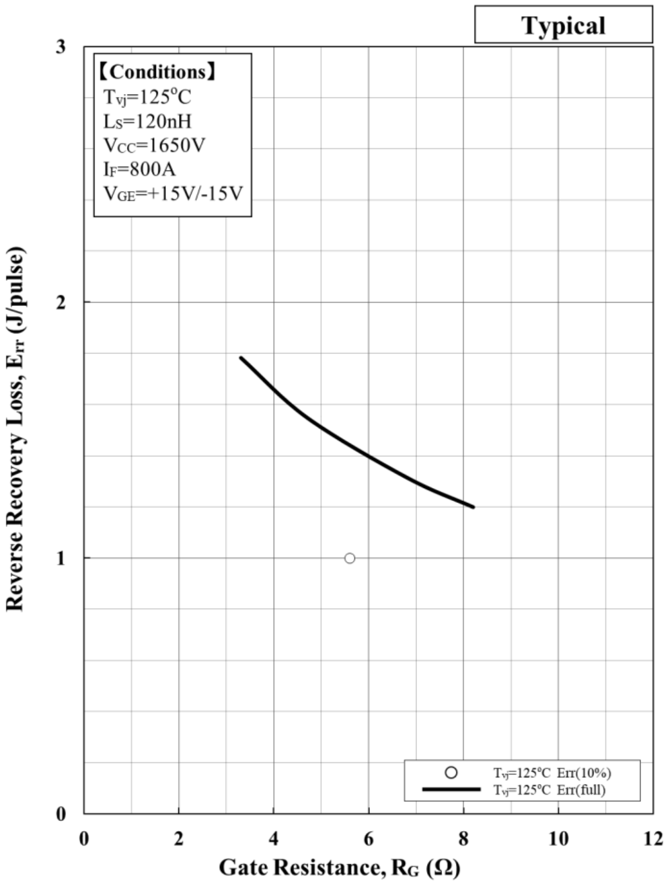


Turn-on loss vs. Gate Resistance



Turn-off loss vs. Gate Resistance



Reverse Recovery loss vs. Gate Resistance

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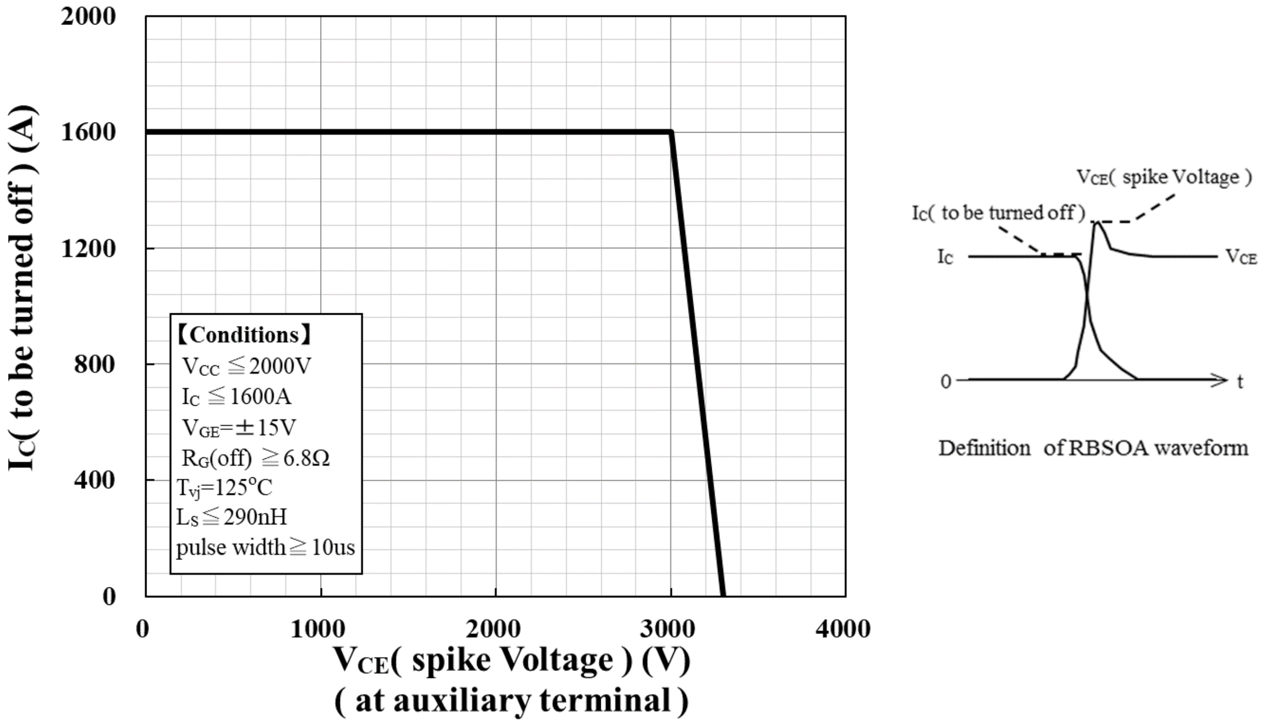
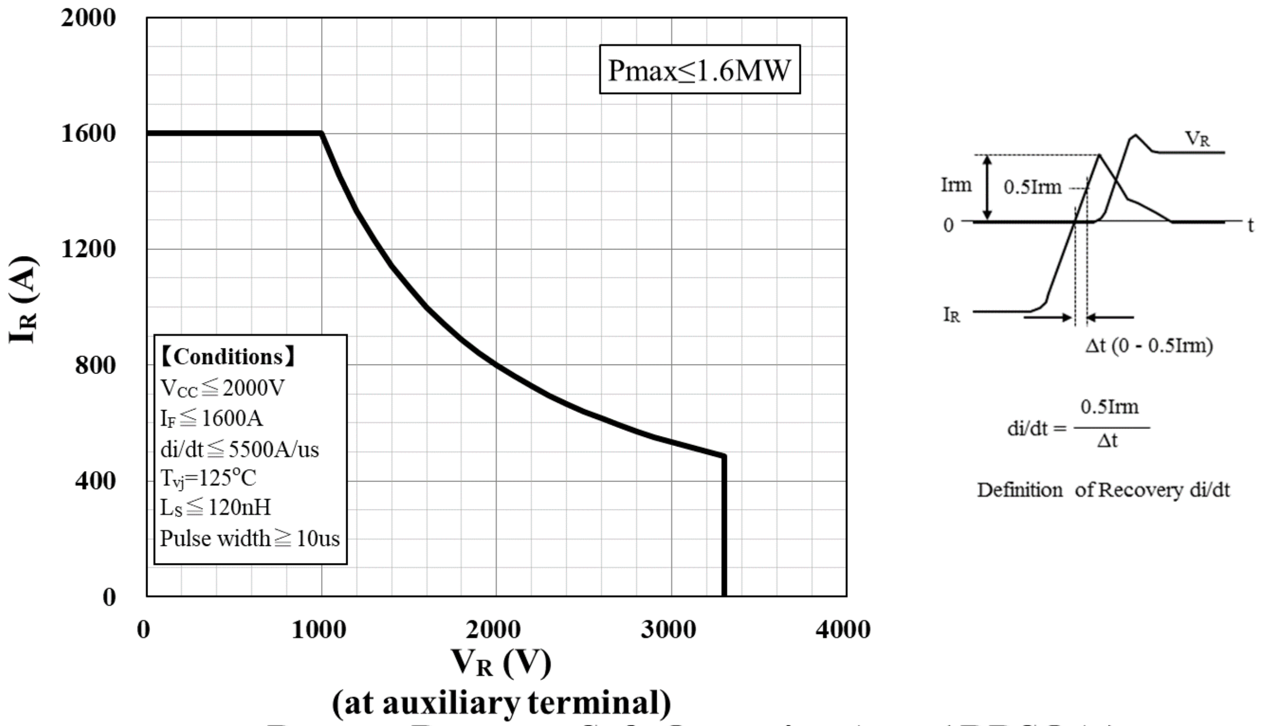


Reverse Bias Safe Operation Area (RBSOA)



Reverse Recovery Safe Operation Area (RRSOA)

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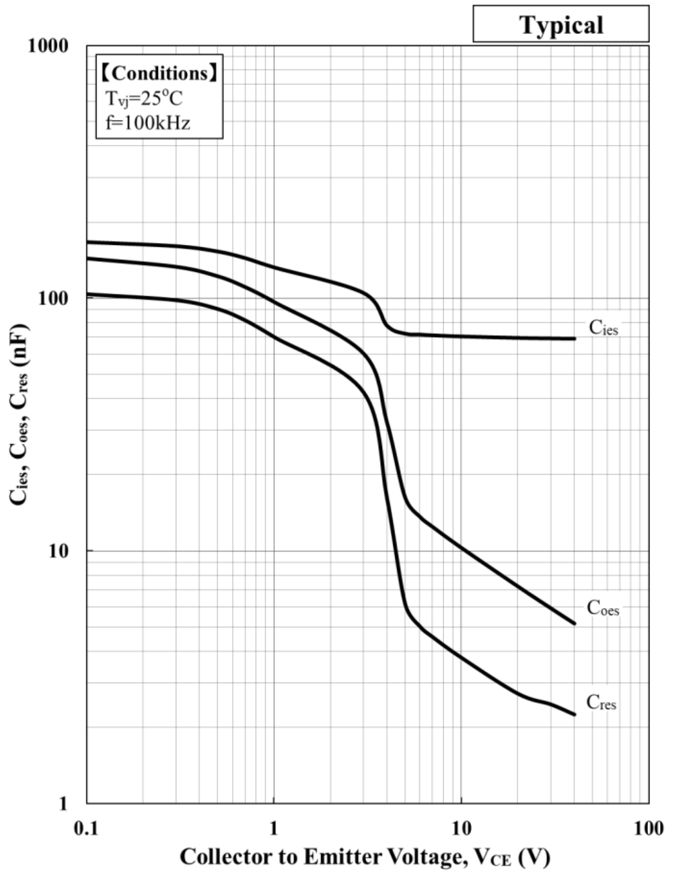
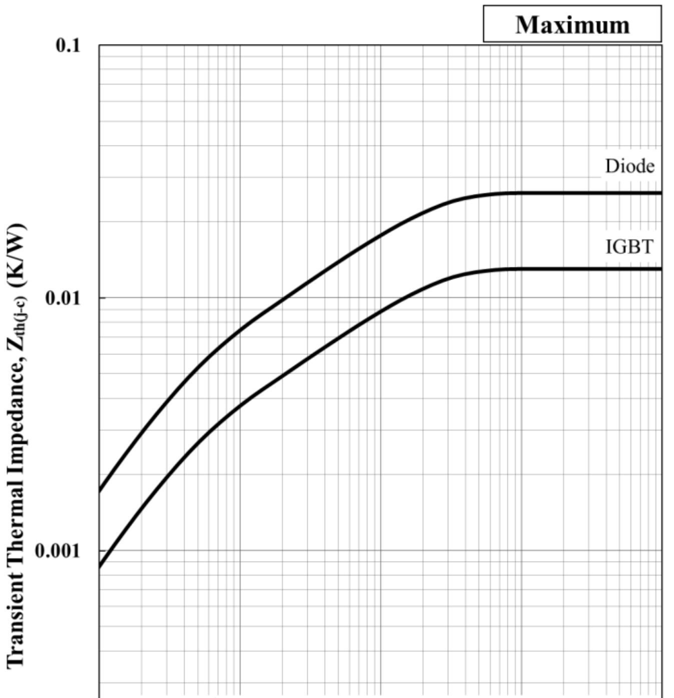


Capacitance vs. Collector to Emitter Voltage



Σ Zth[n]*(1-exp(-t/τth[n]))

n	1	2	3	4	Unit
τ th[n]	1.51E-01	2.49E-02	3.85E-03	6.59E-04	sec
rth[n,IGBT]	8.02E-03	2.36E-03	2.40E-03	2.21E-04	K/W
rth[n,Diode]	1.60E-02	4.88E-03	4.71E-03	4.55E-04	K/W

Transient Thermal Ipedance Curve

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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HITACHI POWER SEMICONDUCTORS

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