

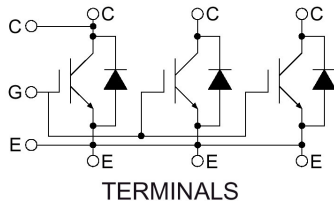
MBN1200E33E

Silicon N-channel IGBT 3300V E version

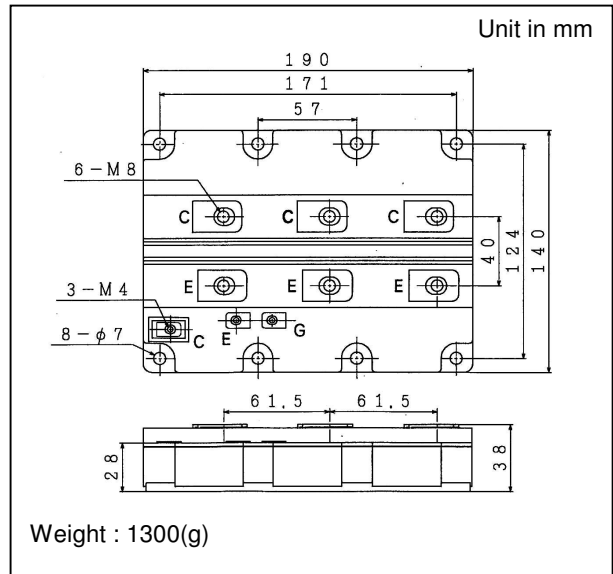
FEATURES

- * 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.
- * High thermal fatigue durability:
($\Delta T_c=70K$, $N>30,000$ cycles)
AISIc base-plate/AlN substrate

CIRCUIT DIAGRAM



OUTLINE DRAWING



ABSOLUTE MAXIMUM RATINGS ($T_c=25^\circ C$)

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_{CP}	2,400
Forward Current	DC	I_F	1,200
	1ms	I_{FM}	2,400
Junction Temperature	T_j	$^\circ C$	-40 ~ +125
Storage Temperature	T_{stg}	$^\circ C$	-40 ~ +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 $1.8 \pm 0.2 / 15^{+0}_{-3} N \cdot m$

(2) Recommended Value $5.5 \pm 0.5 N \cdot m$

ELECTRICAL CHARACTERISTICS

Item	Symbol	Unit	Min.	Typ.	Max.	Test Conditions
Collector Emitter Cut-Off Current	I_{CES}	mA	-	-	12	$V_{CE}=3,300V, V_{GE}=0V, T_j=25^\circ C$
			-	20	60	$V_{CE}=3,300V, V_{GE}=0V, T_j=125^\circ C$
Gate Emitter Leakage Current	I_{GES}	nA	-500	-	+500	$V_{GE}=\pm 20V, V_{CE}=0V, T_j=25^\circ C$
Collector Emitter Saturation Voltage	$V_{CE(sat)}$	V	3.0	3.5	4.2	$I_C=1,200A, V_{GE}=15V, T_j=125^\circ C$
Gate Emitter Threshold Voltage	$V_{GE(TO)}$	V	4.5	6.0	7.0	$V_{CE}=10V, I_C=1,200mA, T_j=25^\circ C$
Input Capacitance	C_{ies}	nF	-	110	-	$V_{CE}=10V, V_{GE}=0V, f=100kHz, T_j=25^\circ C$
Internal Gate Resistance	R_{ge}	Ω	-	1.3	-	$V_{CE}=10V, V_{GE}=0V, f=100kHz, T_j=25^\circ C$
Switching Times	Rise Time	t_r	1.1	2.1	3.1	$V_{CC}=1,650V, I_C=1,200A$
	Turn On Time	t_{on}	1.7	2.5	3.3	$L=100nH$
	Fall Time	t_f	1.3	2.2	3.1	$R_G=3.9/3.9\Omega$ (3)
	Turn Off Time	t_{off}	2.7	4.2	5.7	$V_{GE}=\pm 15V, T_j=125^\circ C$
Peak Forward Voltage Drop	V_{FM}	V	2.0	2.5	3.0	$I_C=1,200A, V_{GE}=0V, T_j=125^\circ C$
Reverse Recovery Time	t_{rr}	μs	0.2	0.7	1.2	$V_{CC}=1,650V, I_C=1,200A, L=100nH, T_j=125^\circ C$
Turn On Loss	$E_{on(10\%)}$	J/P	-	1.7	2.2	$V_{CC}=1,650V, I_C=1,200A, L=100nH$
Turn Off Loss	$E_{off(10\%)}$	J/P	-	1.9	2.4	$R_G=3.9/3.9\Omega$ (3)
Reverse Recovery Loss	$E_{rr(10\%)}$	J/P	-	1.6	2.1	$V_{GE}=\pm 15V, T_j=125^\circ C$
Stray inductance module	L_{SCE}	nH	-	12	-	
Thermal Impedance	IGBT	$R_{th(j-c)}$	-	-	0.0085	Junction to case
	FWD	$R_{th(j-c)}$	-	-	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.

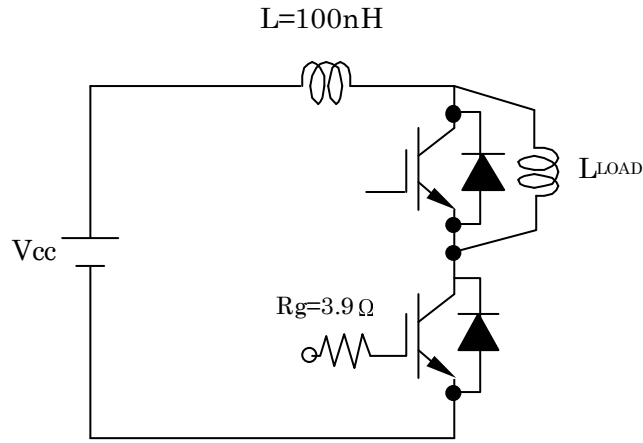


Fig. Switching Test circuit

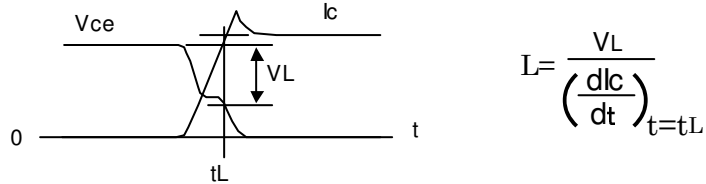


Fig. Difinition of stray inductance

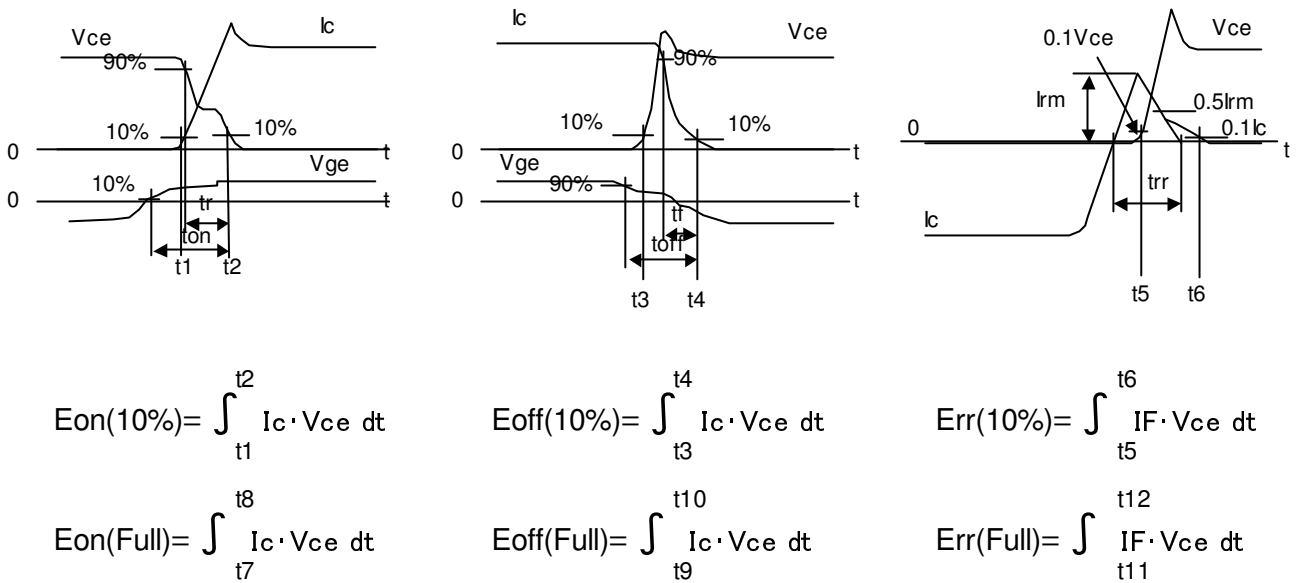
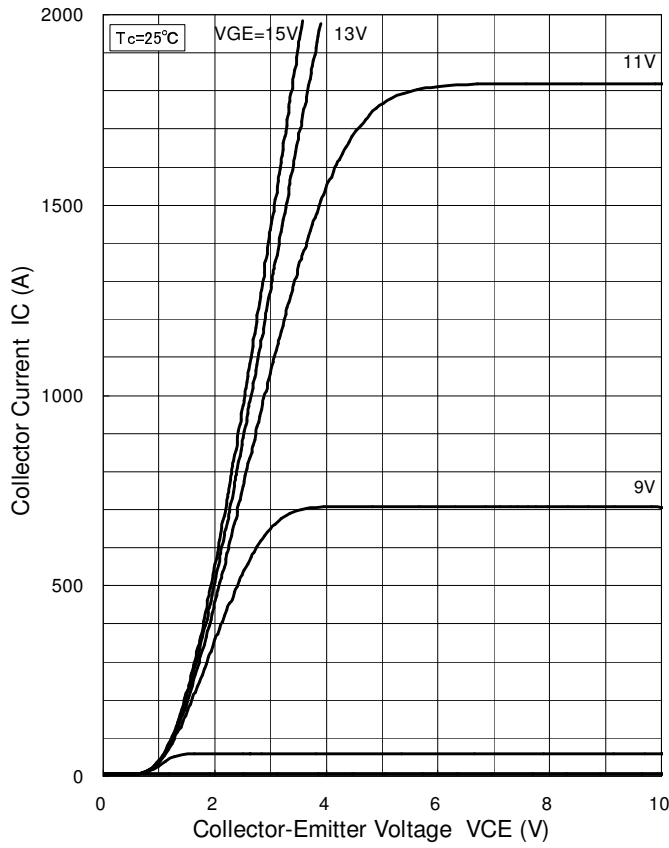


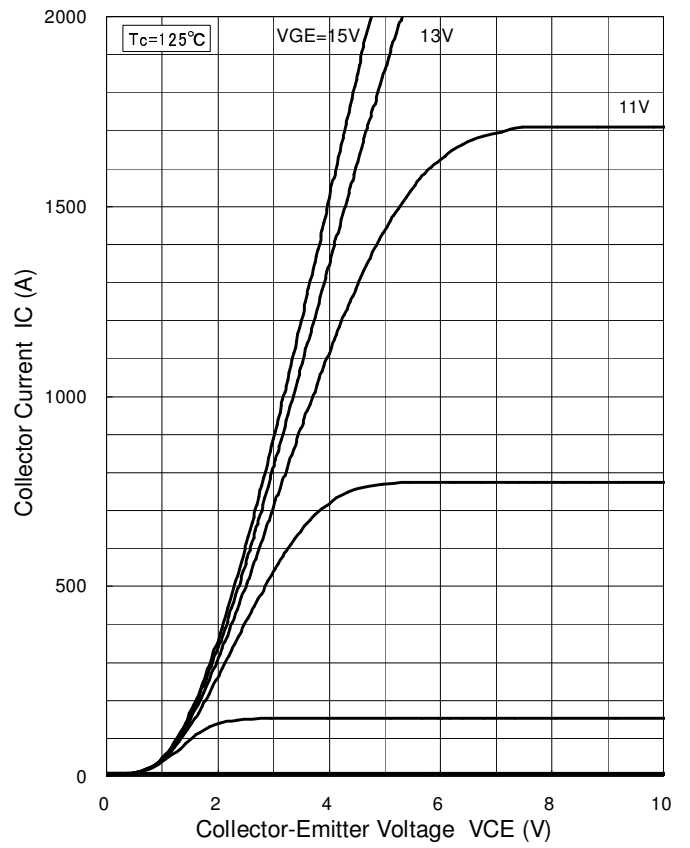
Fig. Definition of switching loss

TYPICAL



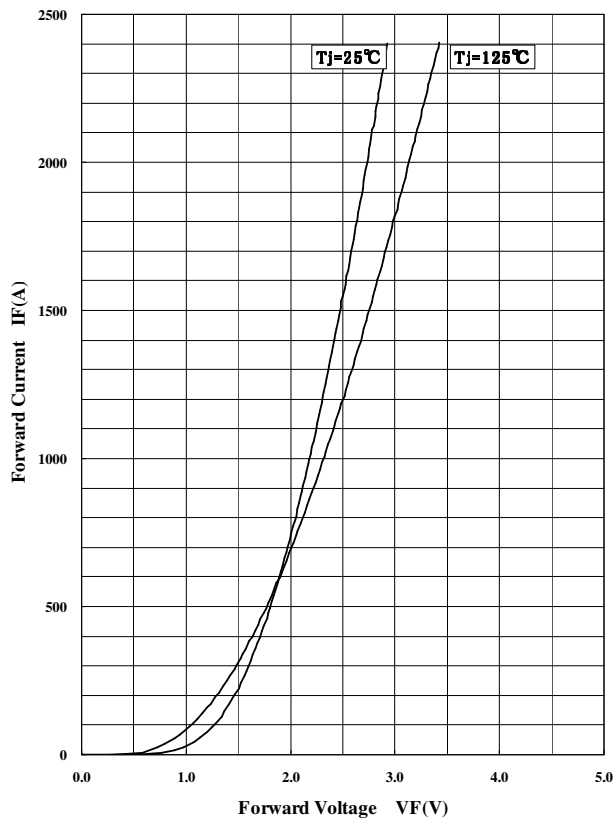
Collector Current vs. Collector to Emitter Voltage

TYPICAL

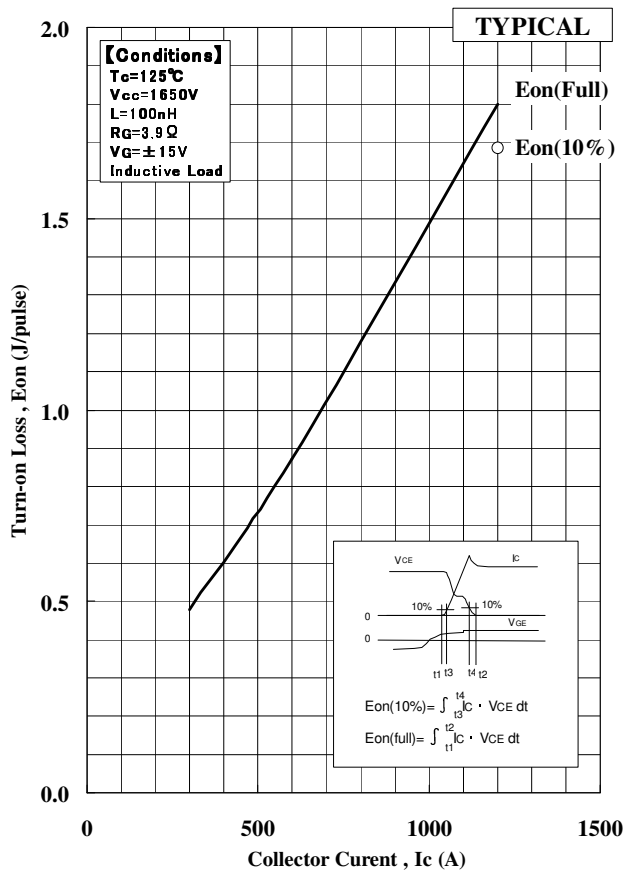


Collector Current vs. Collector to Emitter Voltage

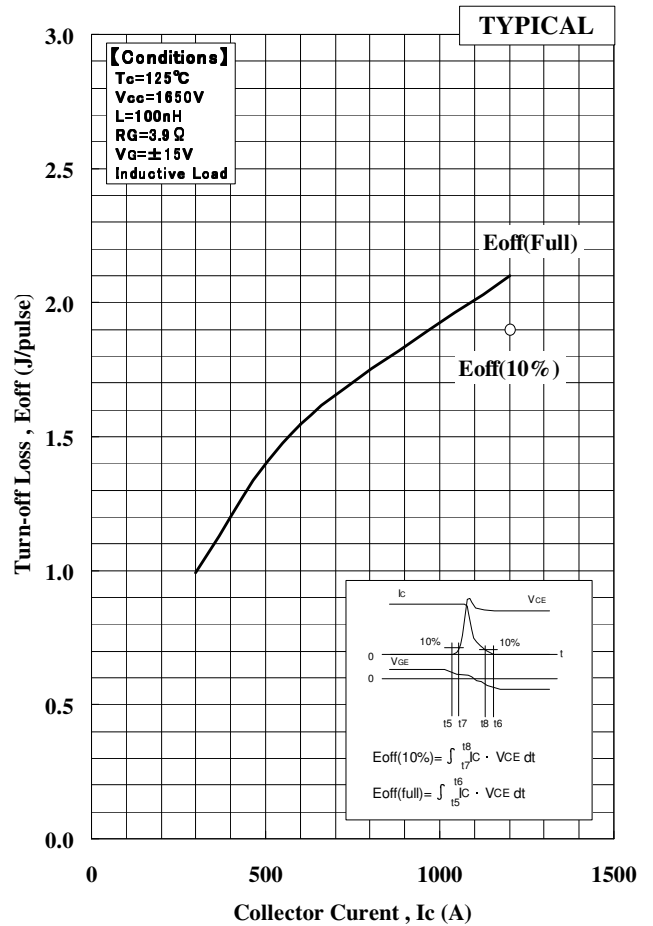
TYPICAL



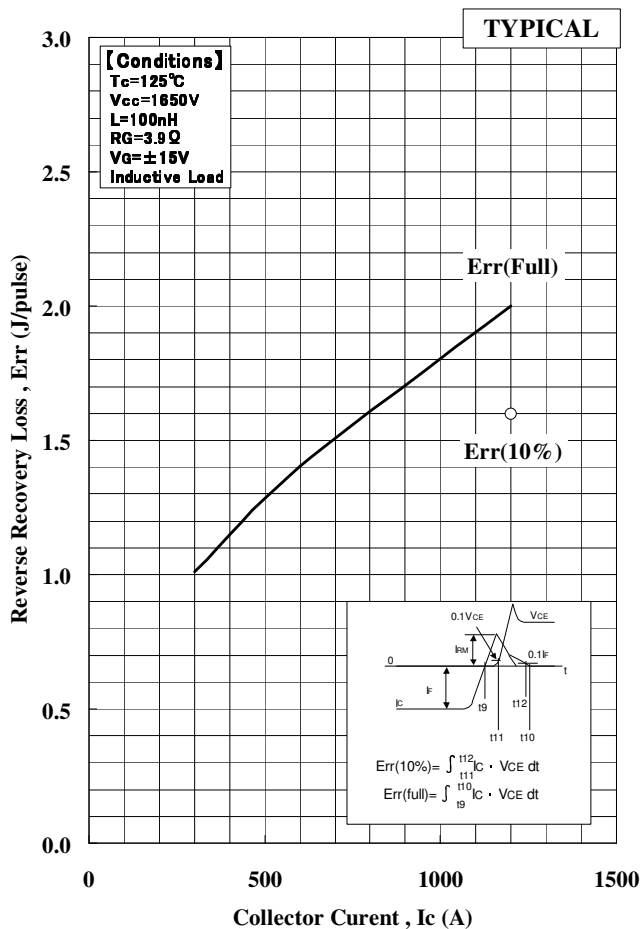
Forward Voltage of free-wheeling diode



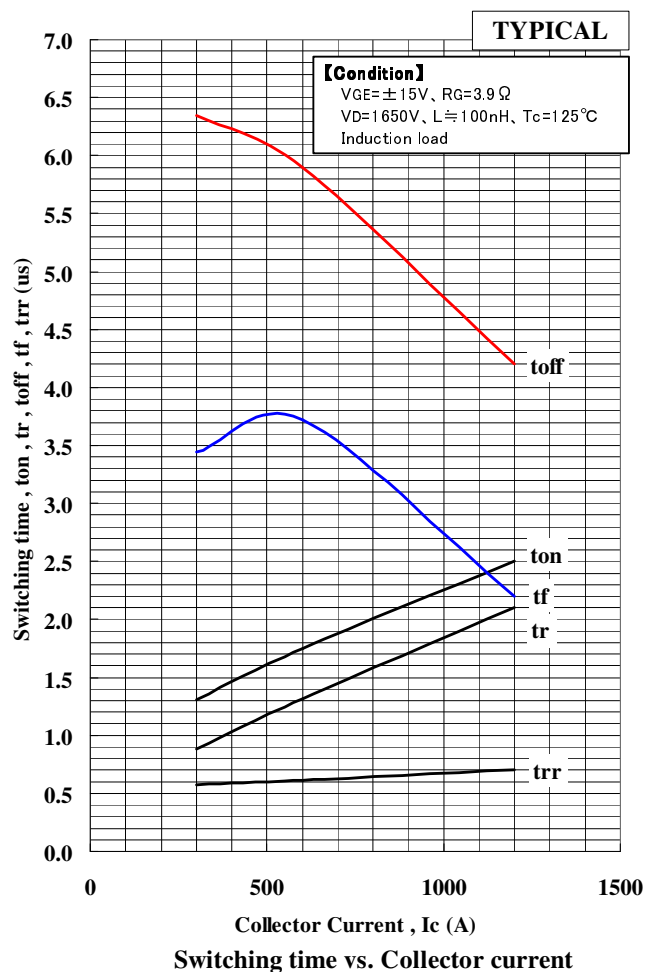
Turn-on Loss vs. Collector Current



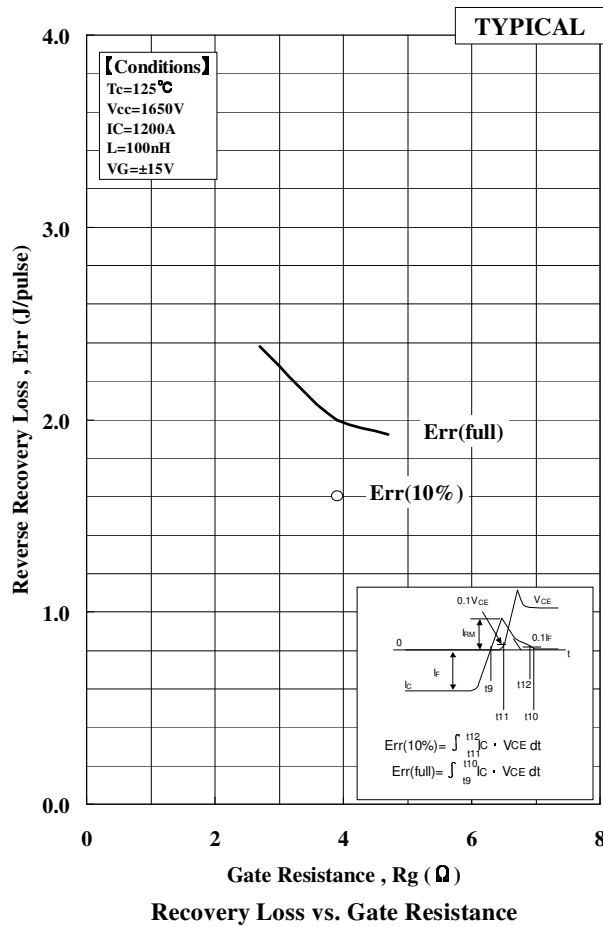
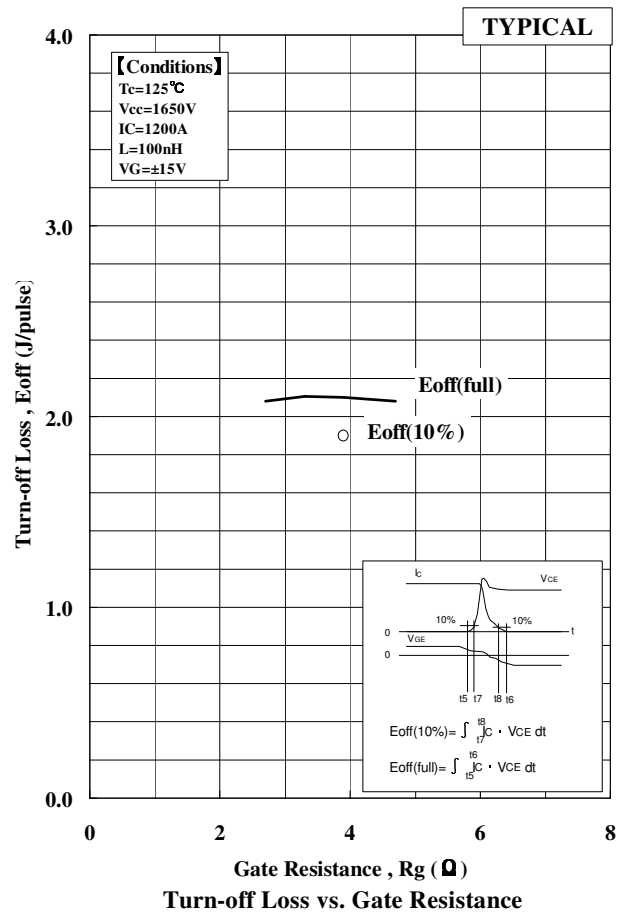
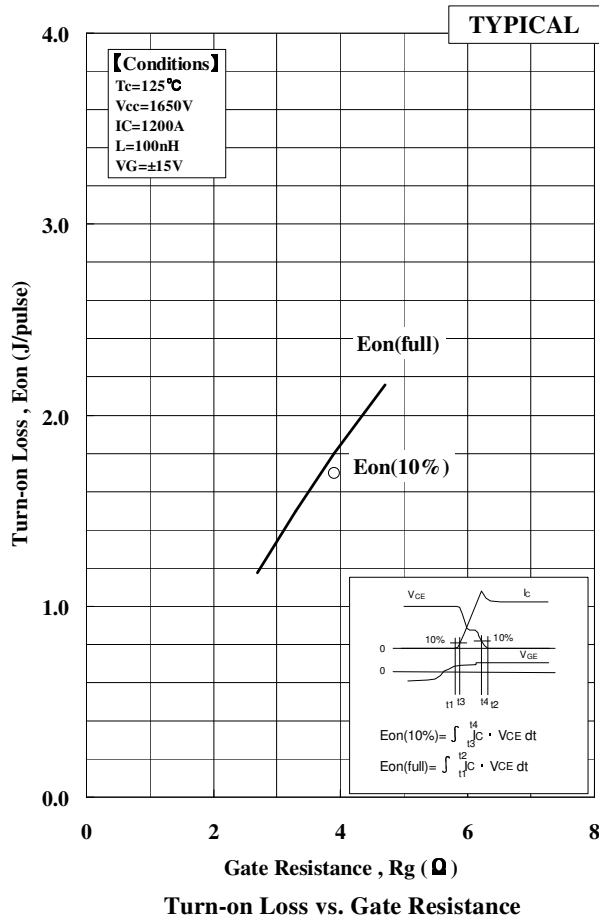
Turn-off Loss vs. Collector Current



Recovery Loss vs. Collector Current

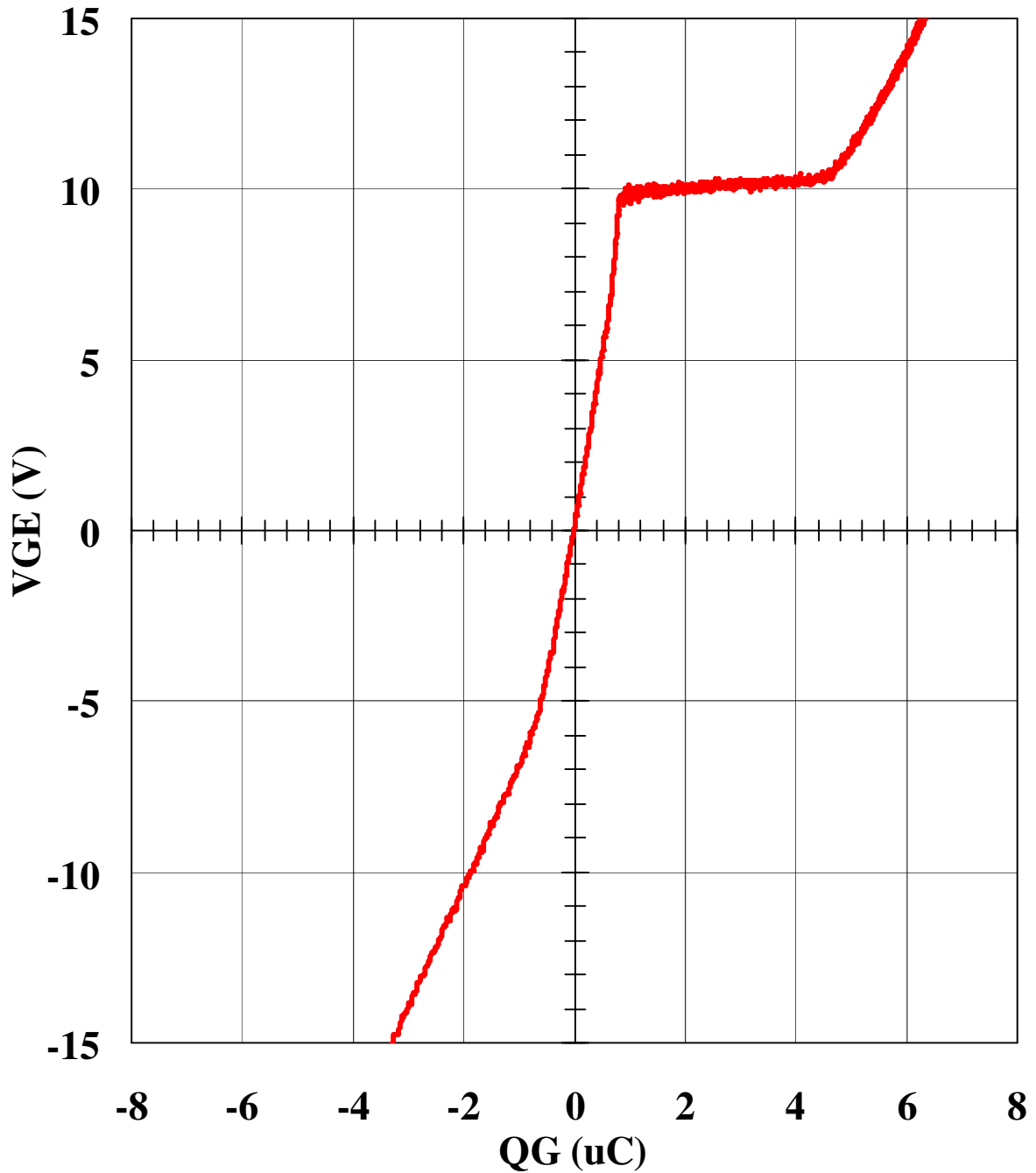


Switching time vs. Collector current

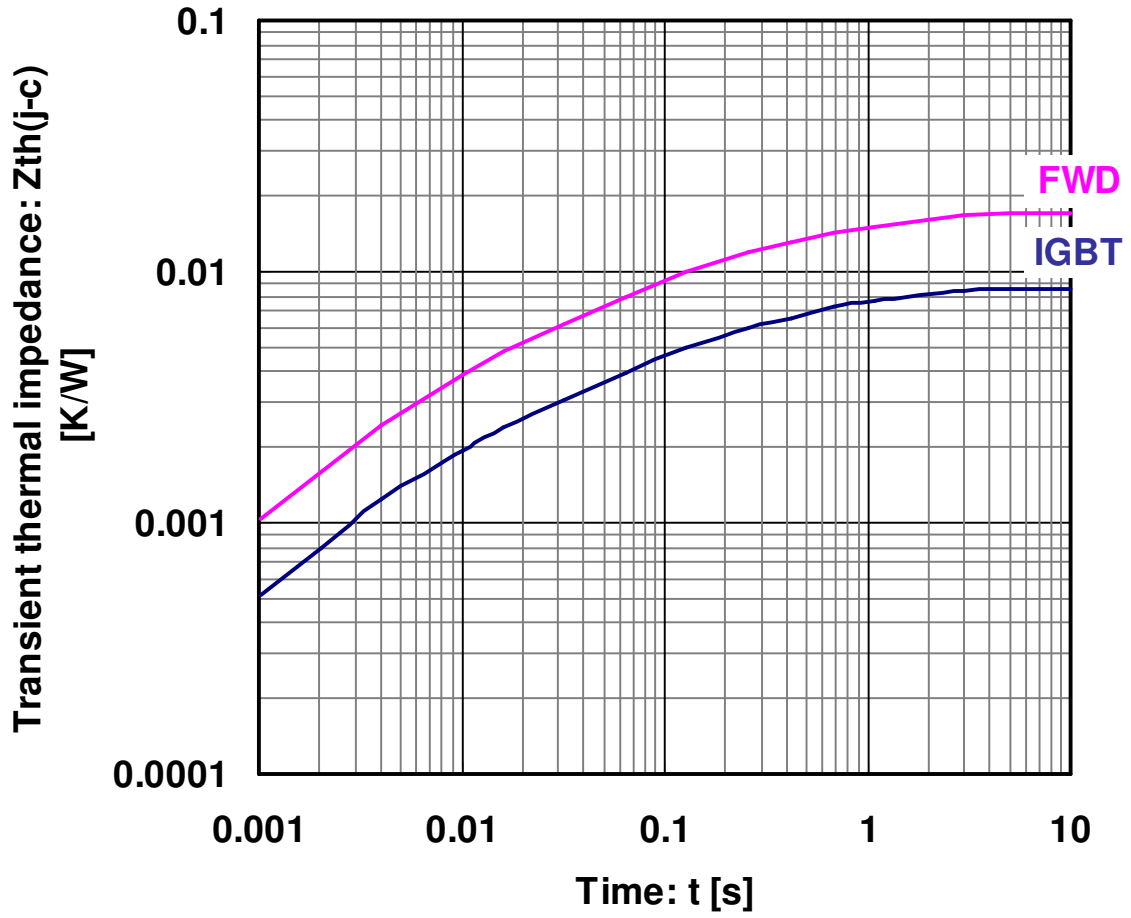


TYPICAL

**Conditions: $L_s=100\text{nH}$, $V_{CC}=1650\text{V}$, $V_{GE}=\pm 15\text{V}$,
 $R_{G(\text{on/off})}=47\ \Omega / 47\ \Omega$, $T_j=25\text{C}$,**



QG-VGE curve



Transient Thermal Impedance Curve (Maximum Value)

HITACHI POWER SEMICONDUCTORS

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