

MBN1500E33D

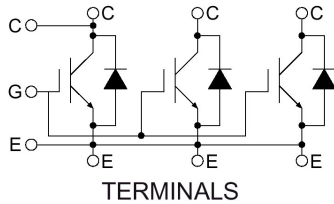
PRELIMINARY SPEC.

Silicon N-channel IGBT

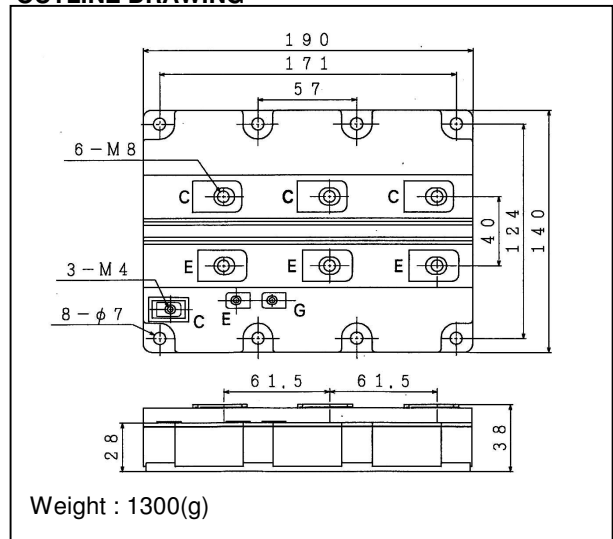
FEATURES

- * High speed, low loss IGBT module.
- * Low driving power due to low input capacitance MOS gate.
- * Low noise due to ultra soft fast recovery diode.
- * High reliability, high durability module.
- * High thermal fatigue durability.
($\Delta T_c=70K$, $N>30,000$ cycles)
- * Isolated head sink (terminal to base).

CIRCUIT DIAGRAM



OUTLINE DRAWING



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

Item	Symbol	Unit	MBN1500E33D
Collector Emitter Voltage	V_{CES}	V	3,300
Gate Emitter Voltage	V_{GES}	V	± 20
Collector Current	DC	I_C	1,500
	1ms	I_{Cp}	3,000
Forward Current	DC	I_F	1,500
	1ms	I_{FM}	3,000
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)	-	2/10 (1)
	Mounting (M6)	-	6 (2)

Notes: (1) Recommended Value $1.8 \pm 0.2/9 \pm 1 N \cdot m$ (2) Recommended Value $5.5 \pm 0.5 N \cdot m$

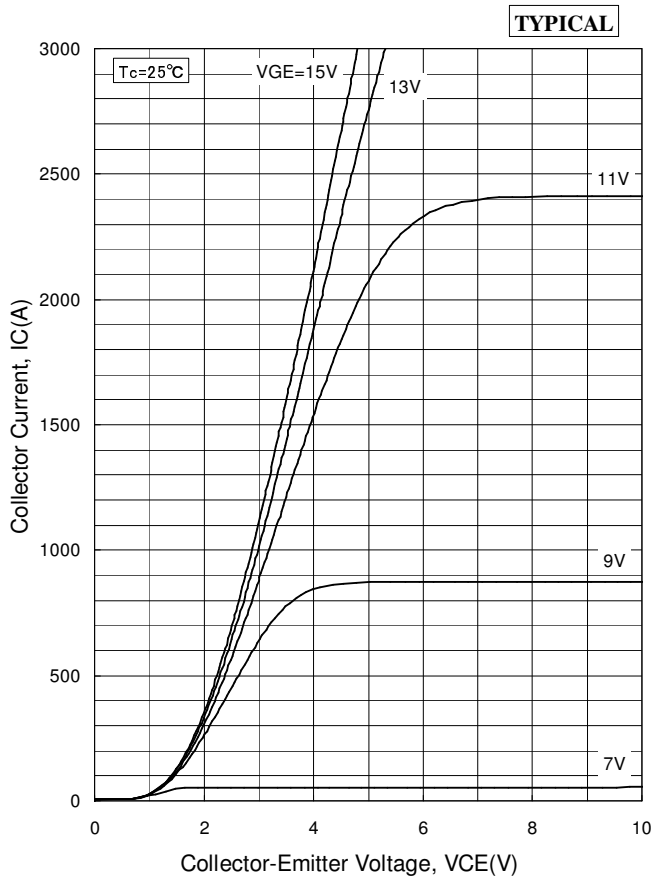
ELECTRICAL CHARACTERISTICS

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	-	4.2	tbd	$I_C=1,500A, V_{GE}=15V, T_j=125^\circ C$	
			-	3.8	-	$I_C=1,200A, V_{GE}=15V, T_j=125^\circ C$	
Gate Emitter Threshold Voltage	$V_{GE(To)}$	V	4.5	6.0	7.0	$V_{CE}=10V, I_C=1,500mA, T_j=25^\circ C$	
Input Capacitance	C_{ies}	nF	-	105	-	$V_{CE}=10V, V_{GE}=0V, f=100kHz, T_j=25^\circ C$	
Internal Gate Resistance	R_{ge}	Ω	-	0.8	-	$V_{CE}=10V, V_{GE}=0V, f=100kHz, T_j=25^\circ C$	
Switching Times	Rise Time	t_r	-	1.6	tbd	$V_{CC}=1,650V, I_C=1,500A, L=75nH, R_G=2.2\Omega/2.2\Omega, C_{GE}=330nF$ (3)	
	Turn On Time	t_{on}	-	2.3	tbd		
	Fall Time	t_f	-	1.2	tbd		
	Turn Off Time	t_{off}	-	3.3	tbd		
Peak Forward Voltage Drop	V_{FM}	V	-	2.7	tbd	$I_C=1,500A, V_{GE}=0V, T_j=125^\circ C$	
			-	2.4	-	$I_C=1,200A, V_{GE}=0V, T_j=125^\circ C$	
Reverse Recovery Time	t_{rr}	μs	-	0.7	tbd	$V_{CC}=1,650V, I_C=1,500A, L=75nH, T_j=125^\circ C$	
Turn On Loss	$E_{on(10\%)}$	J/P	-	2.0	tbd	$V_{CC}=1,650V, I_C=1,500A, L=75nH$	
Turn Off Loss	$E_{off(10\%)}$	J/P	-	1.5	tbd	$R_G=2.2\Omega/2.2\Omega, C_{GE}=330nF$ (3)	
Reverse Recovery Loss	$E_{rr(10\%)}$	J/P	-	1.3	tbd	$V_{GE}=\pm 15V, T_j=125^\circ C$	
Stray inductance module	L_{SCE}	nH	-	12	-		
Thermal Impedance	IGBT	$R_{th(j-c)}$	K/W	-	-	0.0078	Junction to case
	FWD	$R_{th(j-c)}$		-	-	0.0156	
Contact Thermal Impedance	$R_{th(c-f)}$	K/W	-	0.006	-	Case to fin	

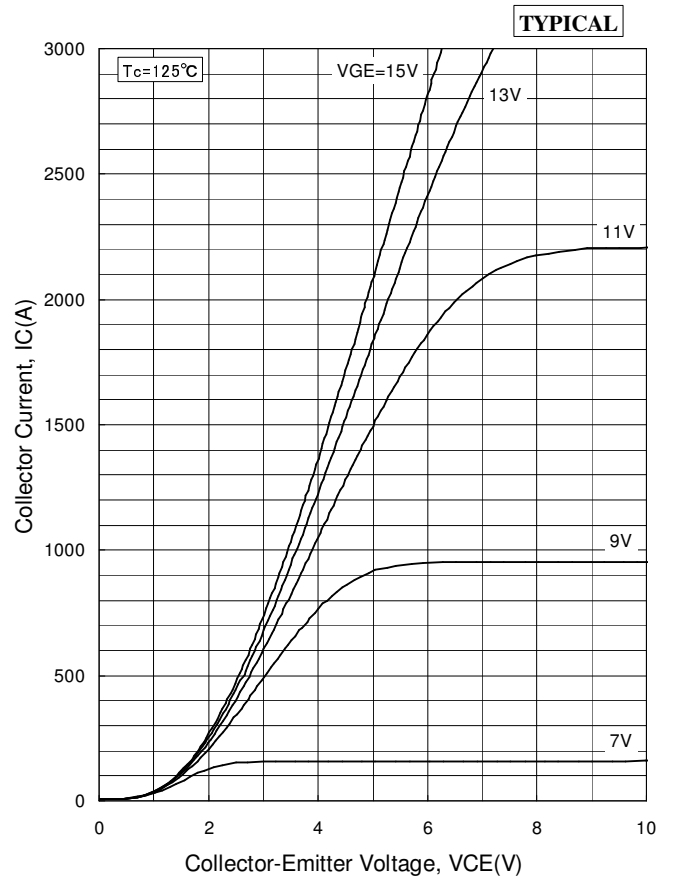
Notes:(3) R_G value is the test condition's value for evaluation of the switching times, not recommended value.

Please, determine the suitable R_G value after the measurement of switching waveforms (overshoot voltage, etc.) with appliance mounted.

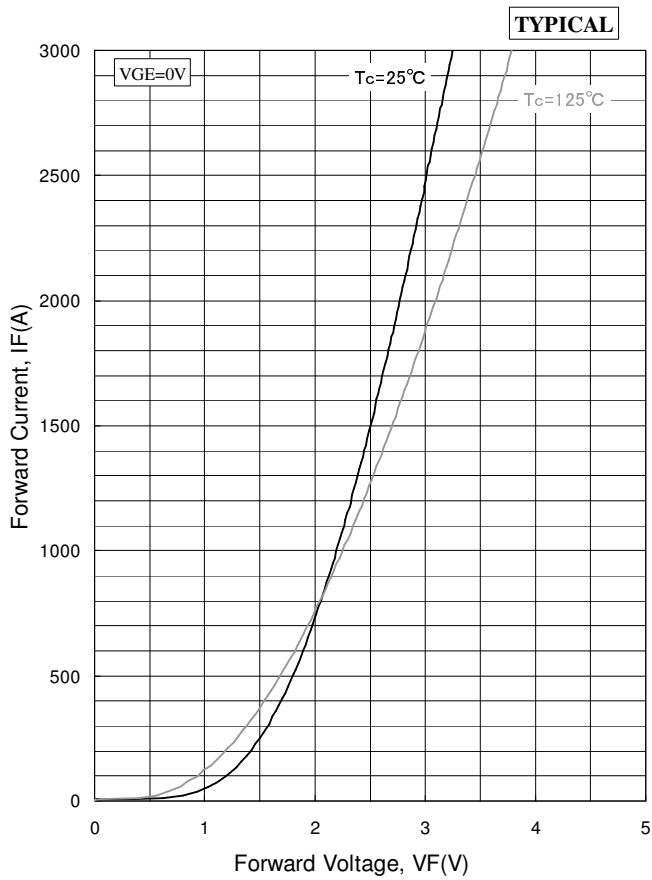
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- * For improvement, specifications are subject to change without notice.
- * For actual application, please confirm this spec sheet is the newest revision.



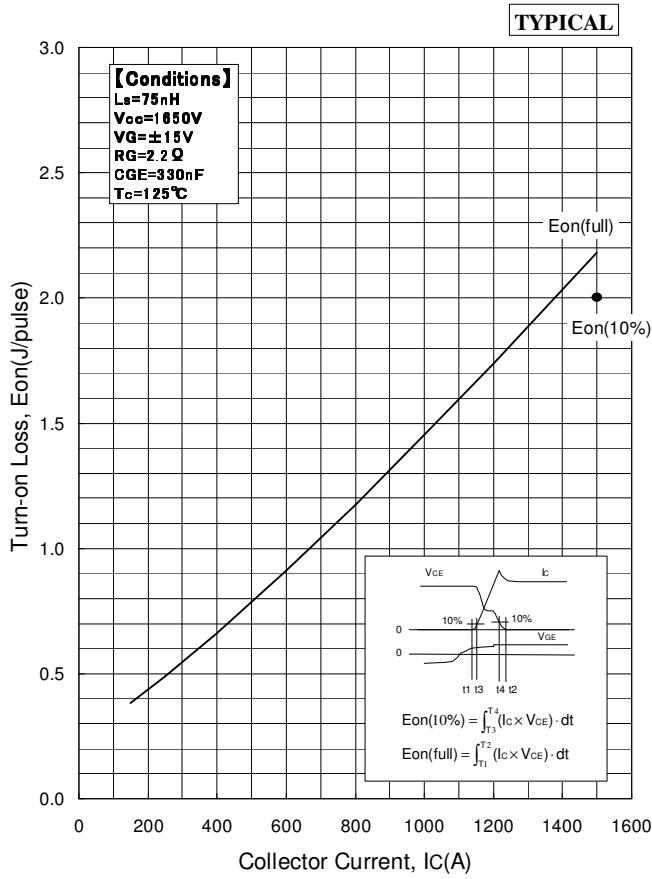
Collector Current vs. Collector to Emmitter Voltage



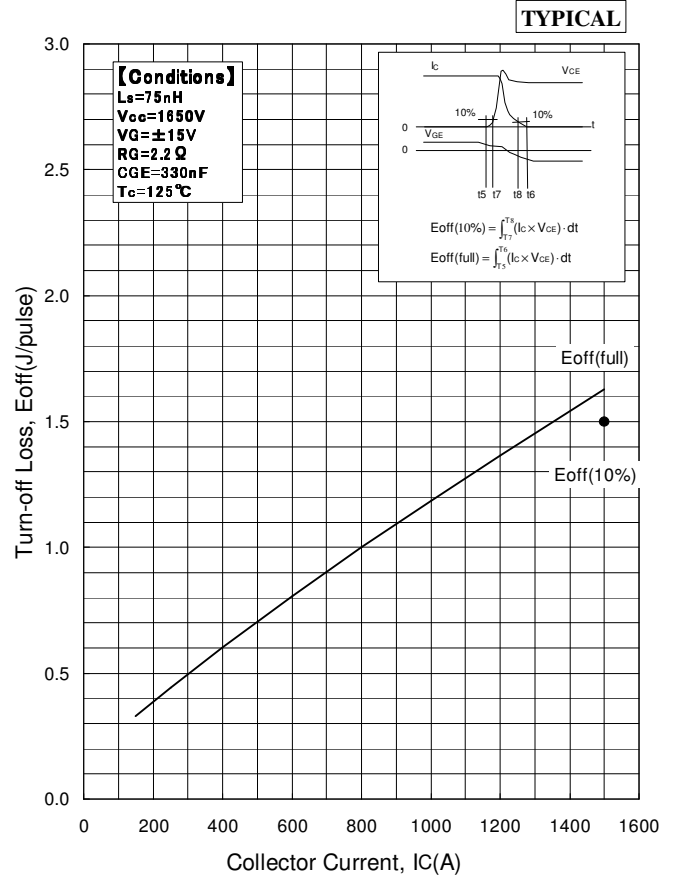
Collector Current vs. Collector to Emmitter Voltage



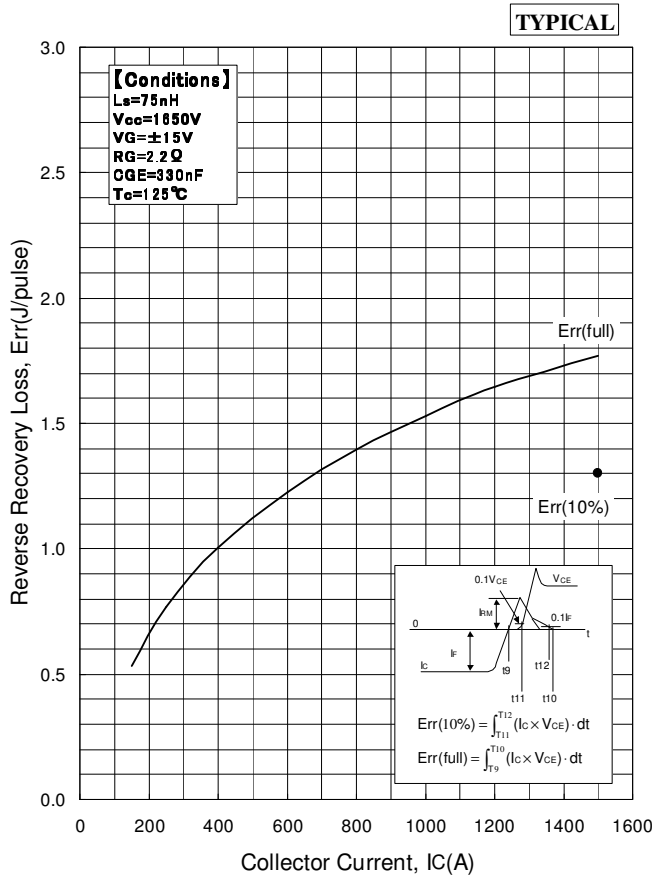
Forward Voltage of free-wheeling diode



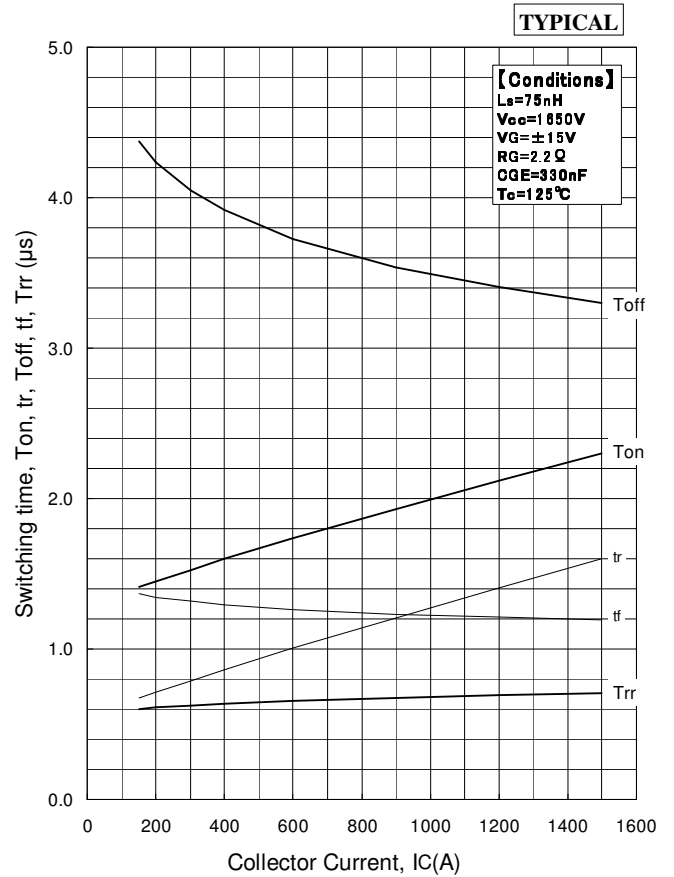
Forward Voltage of free-wheeling diode



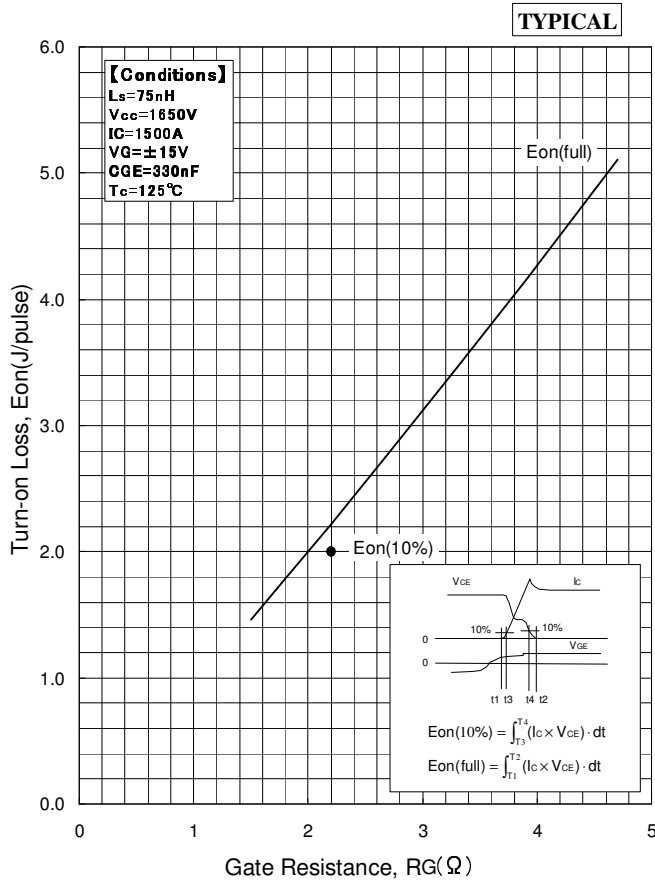
Turn-off Loss vs. Collector Current



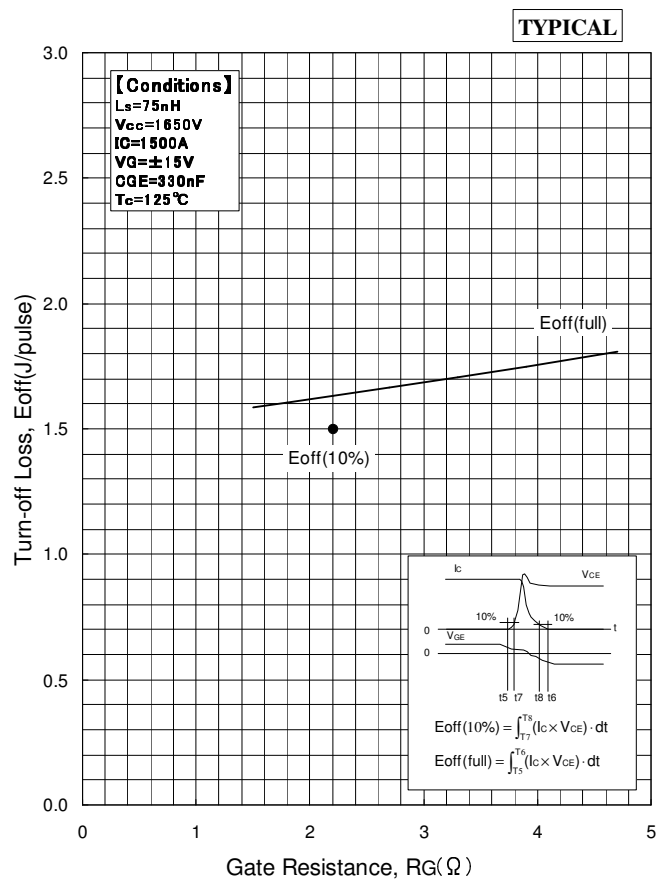
Recovery Loss vs. Collector Current



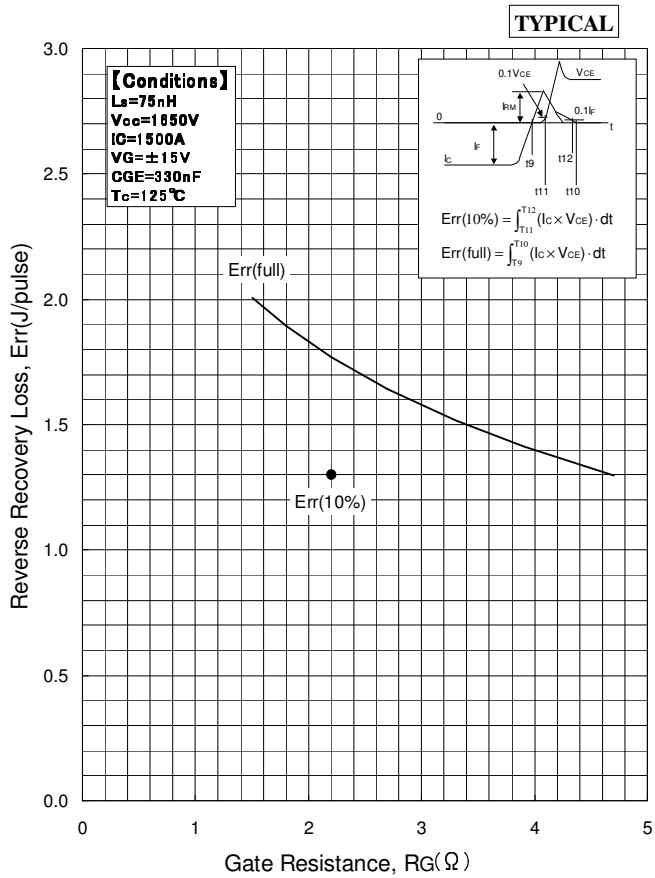
Switching time vs. Collector current



Forward Voltage of free-wheeling diode

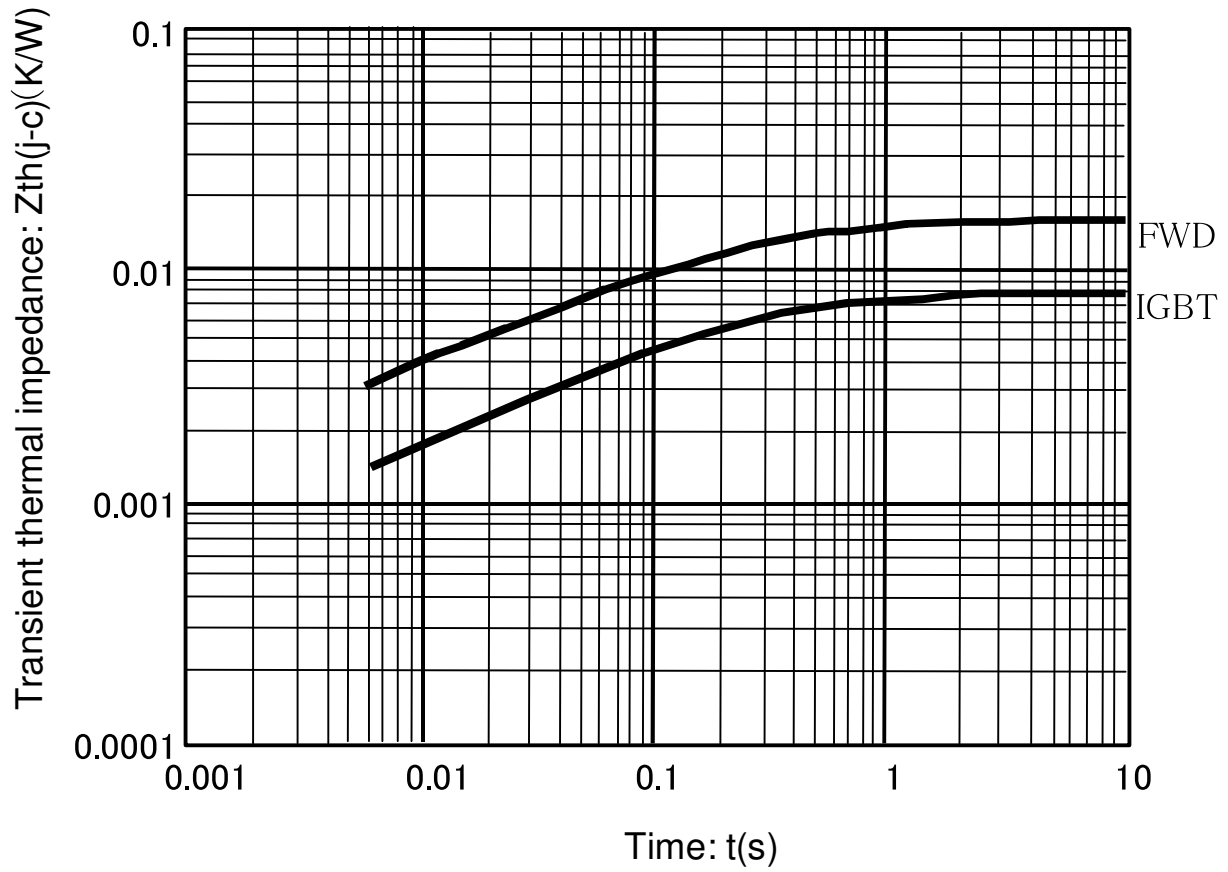


Turn-off Loss vs. Gate Resistance



Recovery Loss vs. Gate Resistance

Maximum



Transient Thermal Impedance Curve

HITACHI POWER SEMICONDUCTORS

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