

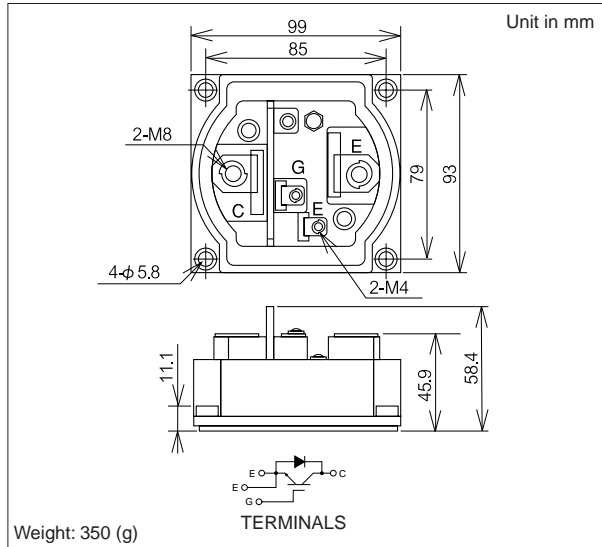
MBN400C20

Silicon N-channel IGBT

OUTLINE DRAWING

FEATURES

- * High thermal fatigue durability.
($\Delta T_c=70^\circ\text{C}, N>20,000\text{cycles}$)
- * low noise due to built-in free-wheeling diode - ultra soft fast recovery diode(USFD).
- * High speed, low loss IGBT module.
- * Low driving power due to low input capacitance MOS gate.
- * High reliability, high durability module.
- * Isolated head sink (terminal to base).



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

Item	Symbol	Unit	MBN400C20
Collector Emitter Voltage	V_{CES}	V	2,000
Gate Emitter Voltage	V_{GES}	V	± 20
Collector Current	DC	I_C	400
	1ms	I_{Cp}	800
Forward Current	DC	I_F	400
	1ms	I_{FM}	800
Collector Power Dissipation	P_c	W	3,000
Junction Temperature	T_j	$^\circ\text{C}$	-40 ~ +125
Storage Temperature	T_{stg}	$^\circ\text{C}$	-40 ~ +125
Isolation Voltage	V_{ISO}	V_{RMS}	4,000(AC 1 minute)
Screw Torque	Terminals(M4/M8)	-	2/10 (1)
	Mounting(M5)	-	2.8 (2)

Notes: (1) Recommended Value $1.8\pm 0.2/9\pm 1\text{N.m}$

(2) Recommended Value $2.6\pm 0.2\text{N.m}$

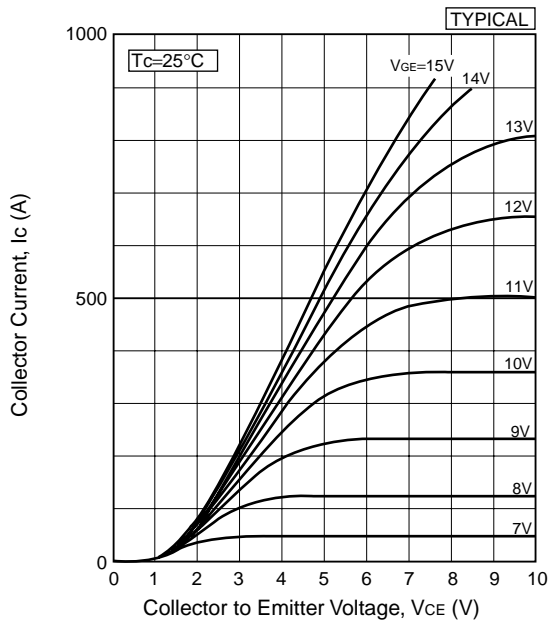
CHARACTERISTICS ($T_c=25^\circ\text{C}$)

Item	Symbol	Unit	Min.	Typ.	Max.	Test Conditions	
Collector Emitter Cut-Off Current	I_{CES}	mA	-	-	4.0	$V_{CE}=2,000\text{V}, V_{GE}=0\text{V}$	
Gate Emitter Leakage Current	I_{GES}	nA	-	-	± 200	$V_{GE}=\pm 20\text{V}, V_{CE}=0\text{V}$	
Collector Emitter Saturation Voltage	$V_{CE(sat)}$	V	-	4.2	5.2	$I_C=400\text{A}, V_{GE}=15\text{V}$	
Gate Emitter Threshold Voltage	$V_{GE(TO)}$	V	4.0	5.1	7.0	$V_{CE}=10\text{V}, I_C=400\text{mA}$	
Input Capacitance	C_{ies}	nF	-	46	100	$V_{CE}=10\text{V}, V_{GE}=0\text{V}, f=100\text{KHz}$	
Switching Times	Rise Time	t_r	-	1.4	2.3	$V_{CC}=1,000\text{V}, I_C=400\text{A}$ $L=200\text{nH}$ $R_G=12\Omega$ (3) $V_{GE}=\pm 15\text{V}$ $T_c=125^\circ\text{C}$	
	Turn On Time	t_{on}	-	1.7	2.6		
	Fall Time	t_f	-	1.8	2.4		
	Turn Off Time	t_{off}	-	4.0	5.9		
Peak Forward Voltage Drop	V_{FM}	V	-	2.4	3.4	$-I_C=400\text{A}, V_{GE}=0\text{V}$	
Reverse Recovery Time	t_{rr}	μs	-	0.5	0.9	$V_{CC}=1,000\text{V}, -I_C=400\text{A}, L=200\text{nH}$, $T_c=125^\circ\text{C}$ (4)	
Thermal Impedance	IGBT	$R_{th(j-c)}$	$^\circ\text{C/W}$	-	-	0.033	Junction to case
	FWD	$R_{th(j-c)}$		-	-	0.10	

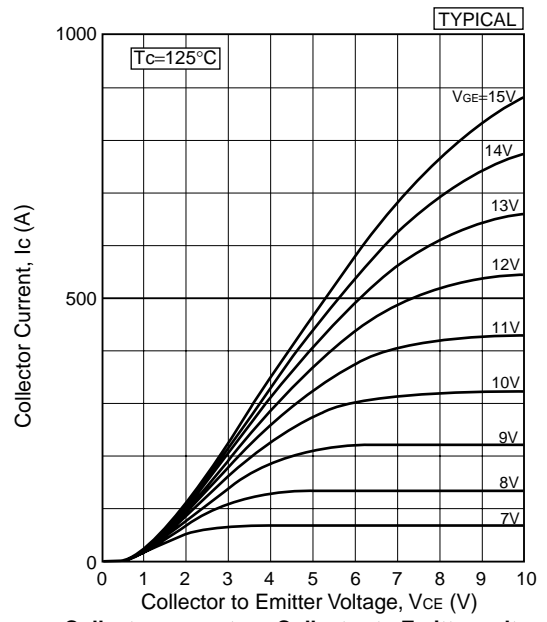
Notes:(3) R_G value is the test condition's value for decision of the switching times, not recommended value.

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

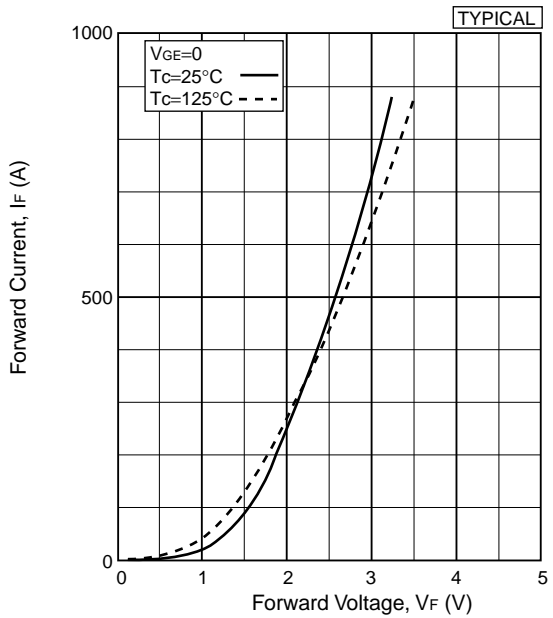
(4) Counter arm IGBT $V_{GE}=-15\text{V}$



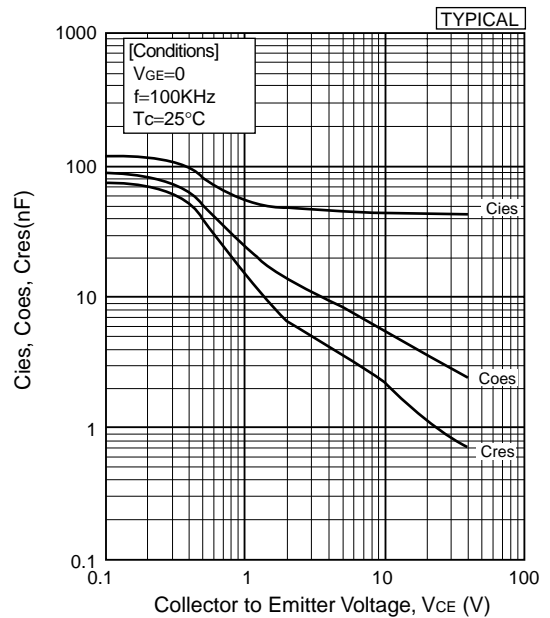
Collector current vs. Collector to Emitter voltage



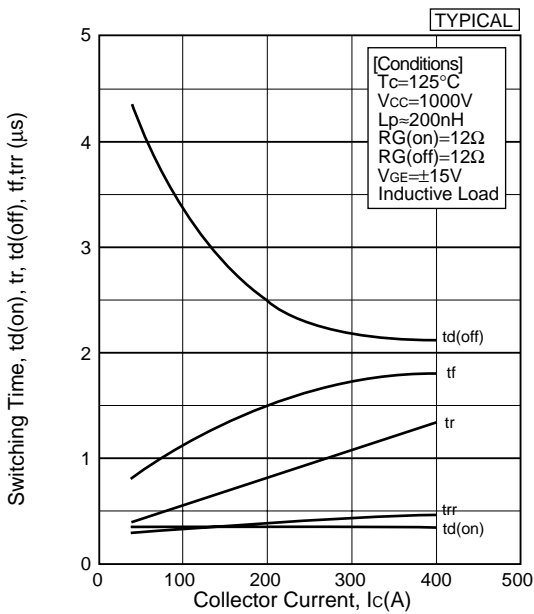
Collector current vs. Collector to Emitter voltage



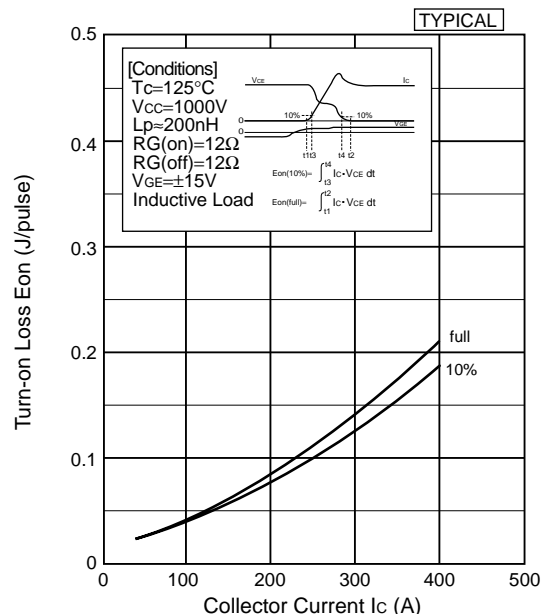
Forward voltage of free-wheeling diode



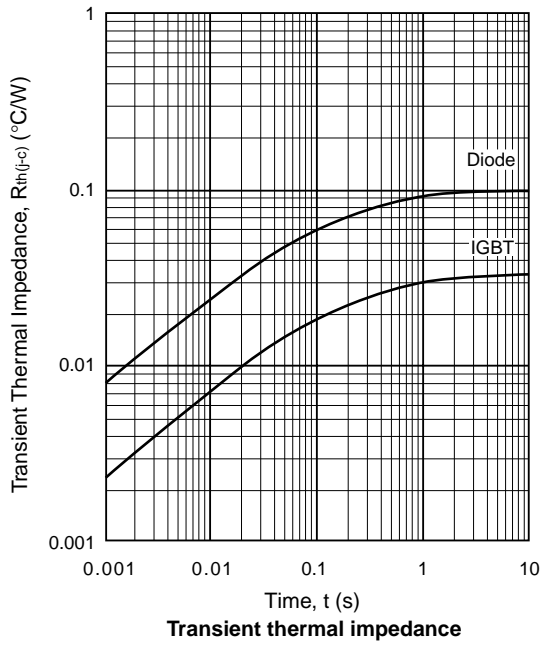
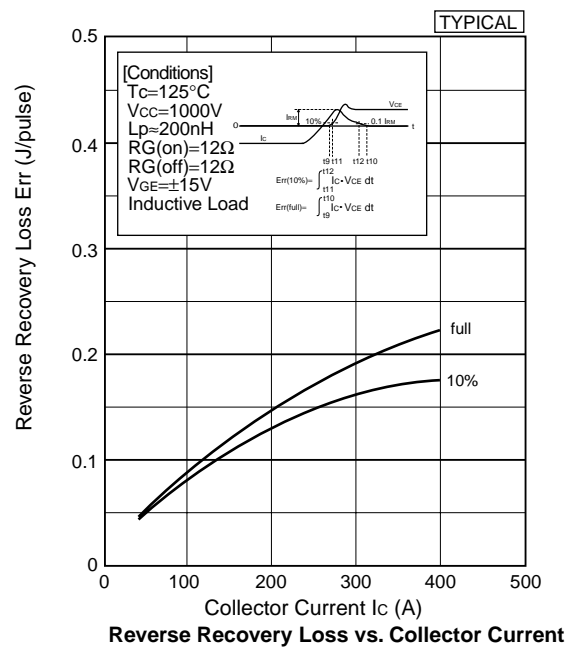
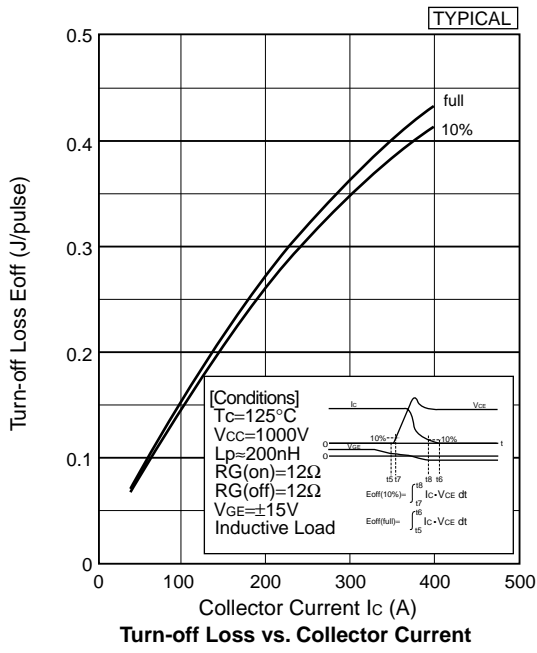
Capacitance vs. Collector to Emitter Voltage



Switching time vs. Collector current



Turn-on Loss vs. Collector Current



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