

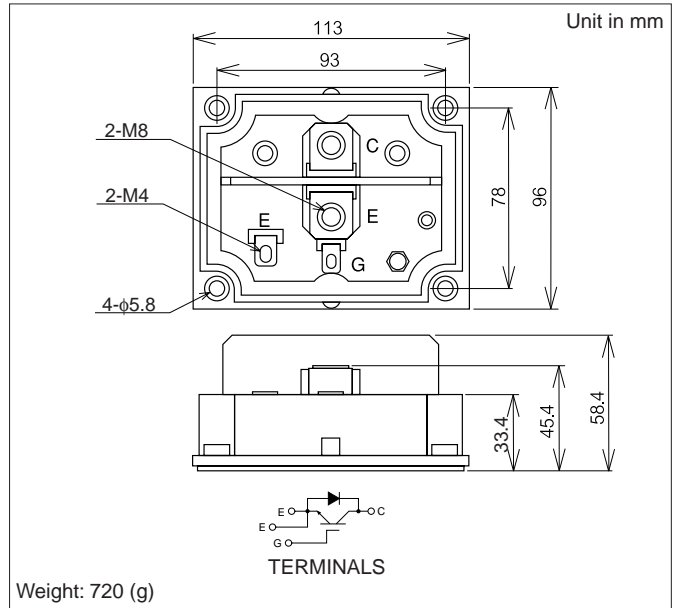
# MBN400C33A

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	MBN400C33A
Collector Emitter Voltage	$V_{CES}$	V	3,300
Gate Emitter Voltage	$V_{GES}$	V	$\pm 20$
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	4,000
Junction Temperature	$T_j$	$^\circ\text{C}$	-40 ~ +125
Storage Temperature	$T_{stg}$	$^\circ\text{C}$	-40 ~ +125
Isolation Voltage	$V_{ISO}$	$V_{RMS}$	5,400(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  $2.6\pm 0.2\text{N.m}$

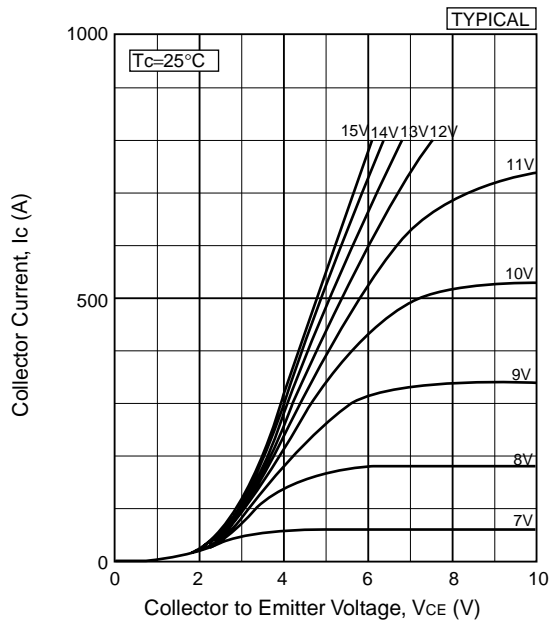
## CHARACTERISTICS ( $T_c=25^\circ\text{C}$ )

Item	Symbol	Unit	Min.	Typ.	Max.	Test Conditions	
Collector Emitter Cut-Off Current	$I_{CES}$	mA	-	-	4.0	$V_{CE}=3,300\text{V}, V_{GE}=0\text{V}$	
Gate Emitter Leakage Current	$I_{GES}$	nA	-	-	$\pm 200$	$V_{GE}=\pm 20\text{V}, V_{CE}=0\text{V}$	
Collector Emitter Saturation Voltage	$V_{CE(sat)}$	V	-	4.5	5.5	$I_C=400\text{A}, V_{GE}=15\text{V}$	
Gate Emitter Threshold Voltage	$V_{GE(To)}$	V	4.0	5.5	7.0	$V_{CE}=10\text{V}, I_C=400\text{mA}$	
Input Capacitance	$C_{ies}$	nF	-	50	-	$V_{CE}=10\text{V}, V_{GE}=0\text{V}, f=100\text{KHz}$	
Switching Times	Rise Time	$t_r$	-	1.6	2.6	$V_{CC}=1,650\text{V}, I_C=400\text{A}$ $L=150\text{nH}$ $R_G=10\Omega$ (3) $V_{GE}=\pm 15\text{V}$ $T_c=125^\circ\text{C}$	
	Turn On Time	$t_{on}$	-	2.3	3.2		
	Fall Time	$t_f$	-	2.1	2.8		
	Turn Off Time	$t_{off}$	-	3.4	5.3		
Peak Forward Voltage Drop	$V_{FM}$	V	-	3.0	4.0	$-I_C=400\text{A}, V_{GE}=0\text{V}$	
Reverse Recovery Time	$t_{rr}$	$\mu\text{s}$	-	0.5	0.9	$V_{CC}=1,650\text{V}, -I_C=400\text{A}, L=150\text{nH}$ , $T_c=125^\circ\text{C}$ (4)	
Thermal Impedance	IGBT	$R_{th(j-c)}$	$^\circ\text{C/W}$	-	-	0.025	Junction to case
	FWD	$R_{th(j-c)}$		-	-	0.05	

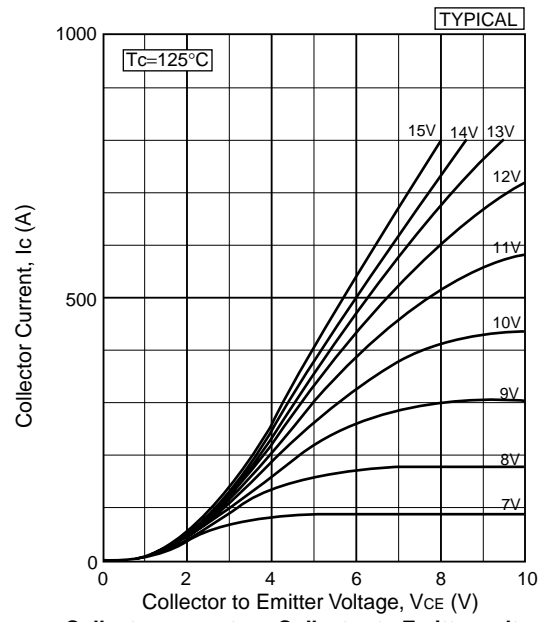
Notes:(3)  $R_G$  value is the test condition's value for decision of the switching times, not recommended value.

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

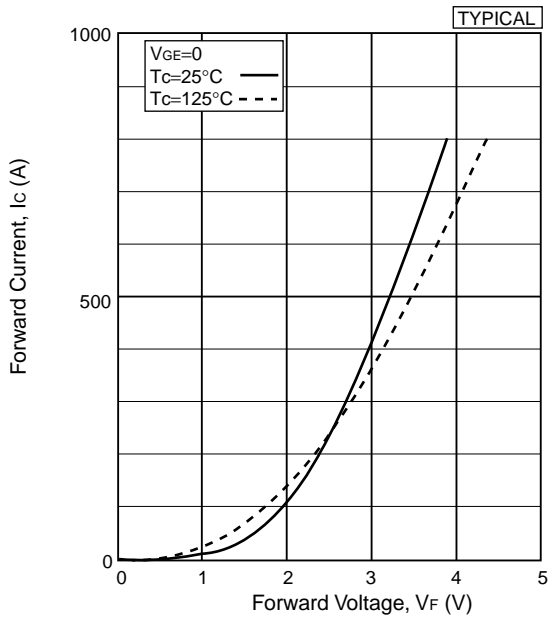
(4) Counter arm IGBT  $V_{GE}=-15\text{V}$



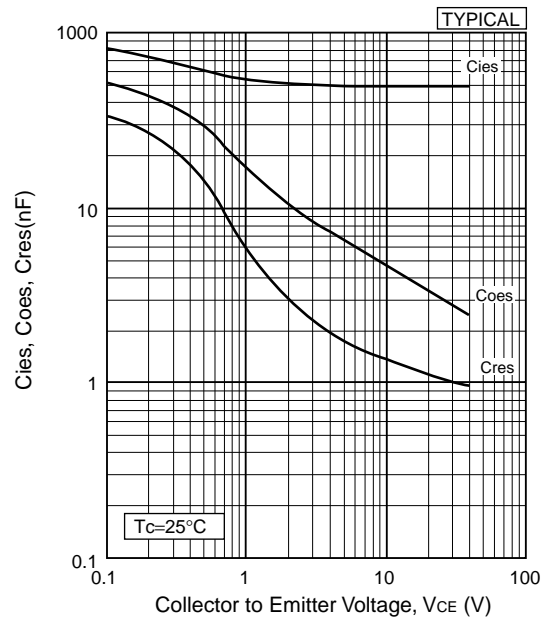
Collector current vs. Collector to Emitter voltage



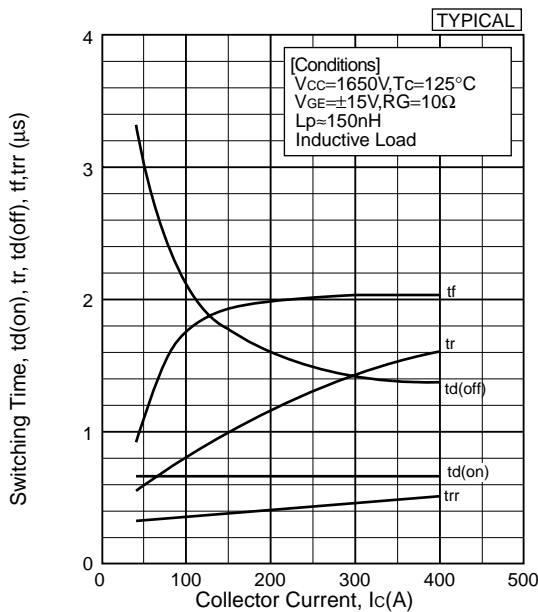
Collector current vs. Collector to Emitter voltage



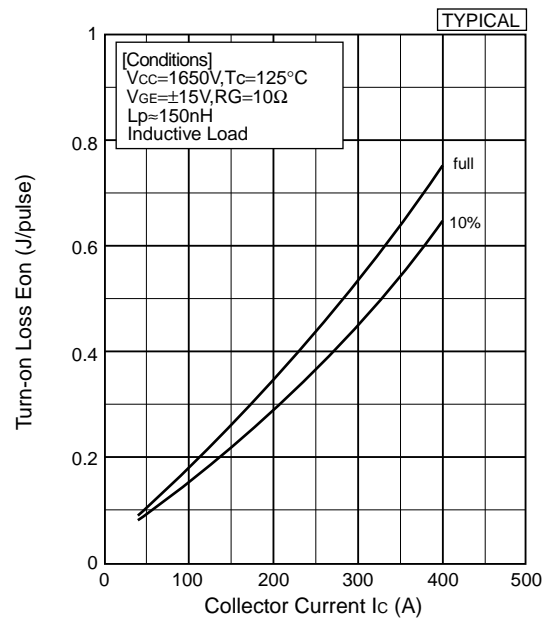
Forward voltage of free-wheeling diode



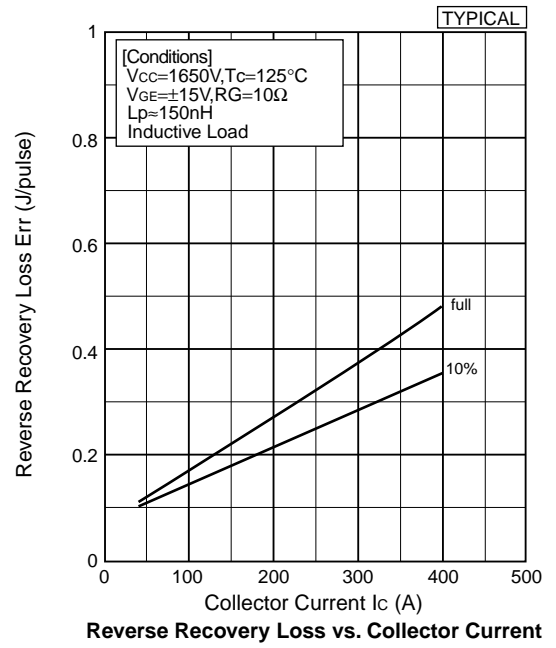
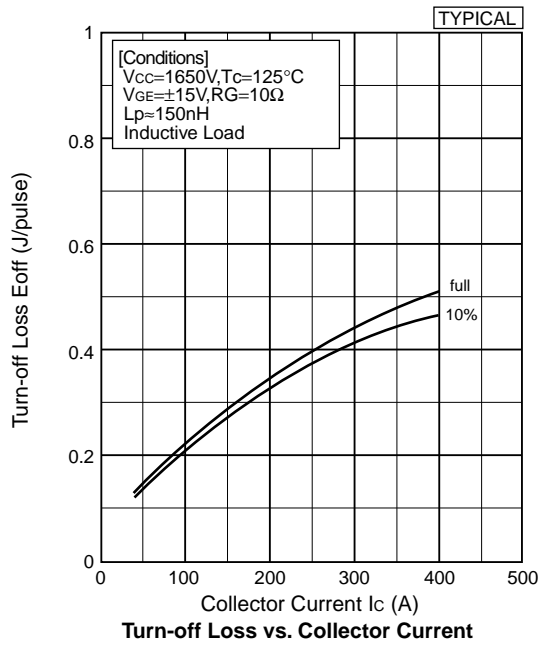
Capacitance vs. Collector to Emitter Voltage



Switching time vs. Collector current



Turn-on Loss vs. Collector Current



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