

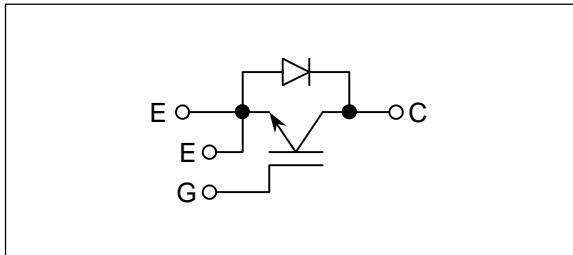
# MBN400GR12

[Rated 400A/1200V, Single-pack type]

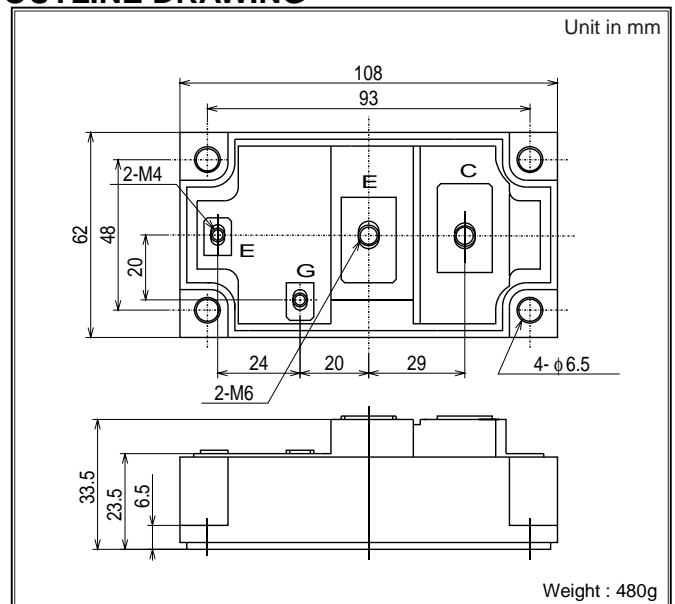
## FEATURES

- Low saturation voltage and high speed.
- Low turn-OFF switching loss.
- Low noise due to build-in free-wheeling diode.  
(Ultra Soft and Fast recovery Diode (USFD))
- High reliability structure.
- Isolated heat sink (terminals to base).

## CIRCUIT DIAGRAM



## OUTLINE DRAWING



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

Item	Symbol	Unit	Value	
Collector-Emitter Voltage	$V_{CES}$	V	1200	
Gate-Emitter Voltage	$V_{GES}$	V	$\pm 20$	
Collector Current	DC	$I_C$	400	
	1ms	$I_{CP}$	800	
Forward Current	DC	$I_F$	400 <sup>*1</sup>	
	1ms	$I_{FM}$	800	
Collector Power Dissipation	$P_C$	W	2080	
Junction Temperature	$T_j$	$^\circ\text{C}$	-40 ~ +150	
Storage Temperature	$T_{stg}$	$^\circ\text{C}$	-40 ~ +125	
Isolation Voltage	$V_{iso}$	$V_{RMS}$	2500(AC 1 minute)	
Screw Torque	Terminals (M4/M6)	-	N·m (kgf·cm)	1.37(14) / 2.94(30) <sup>*2</sup>
	Mounting			2.94(30) <sup>*3</sup>

Notes; \*1: RMS current of Diode  $\leq 120$  Arms

\*2: Recommended value 1.18 / 2.45 N·m (12 / 25 kgf·cm)

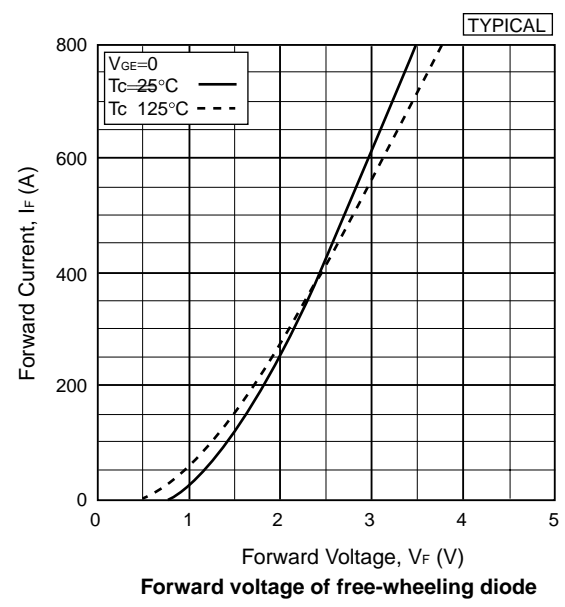
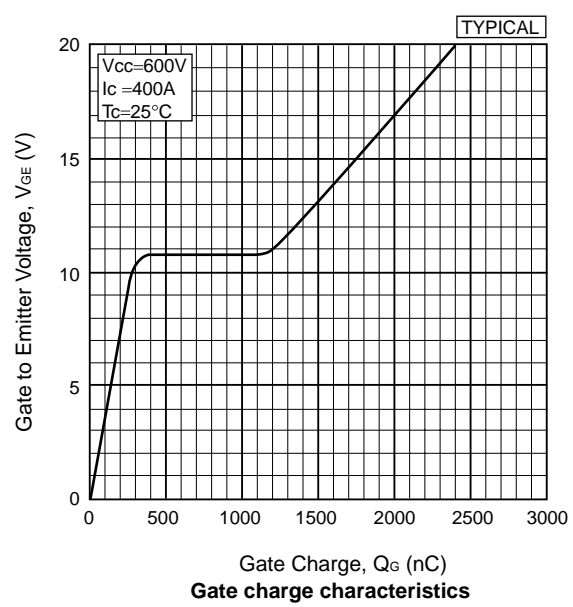
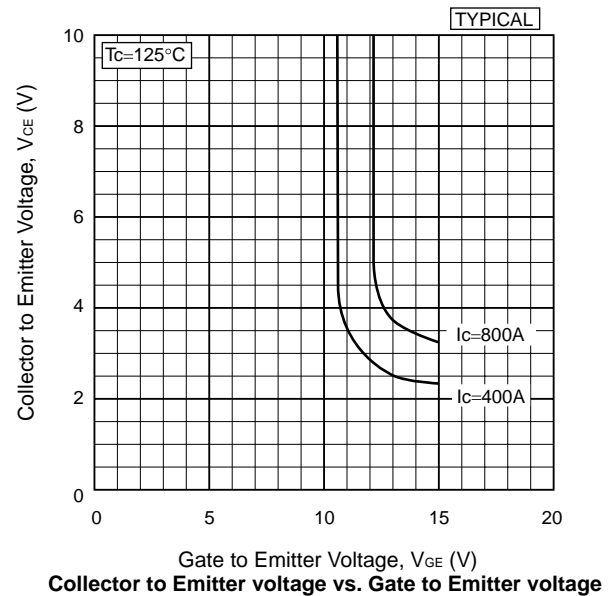
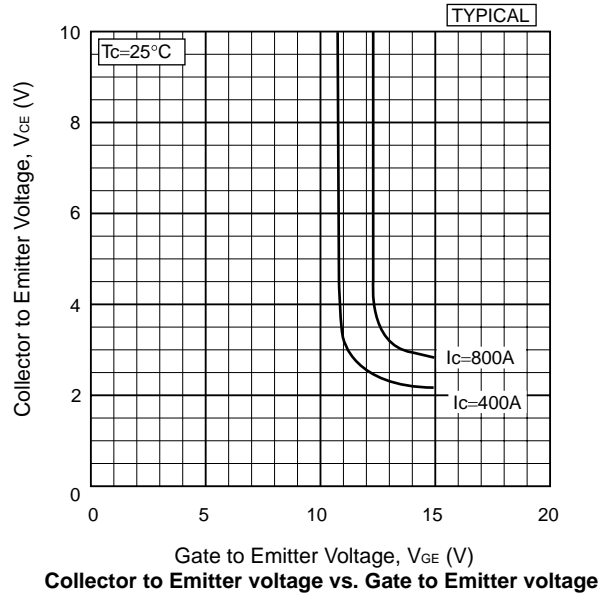
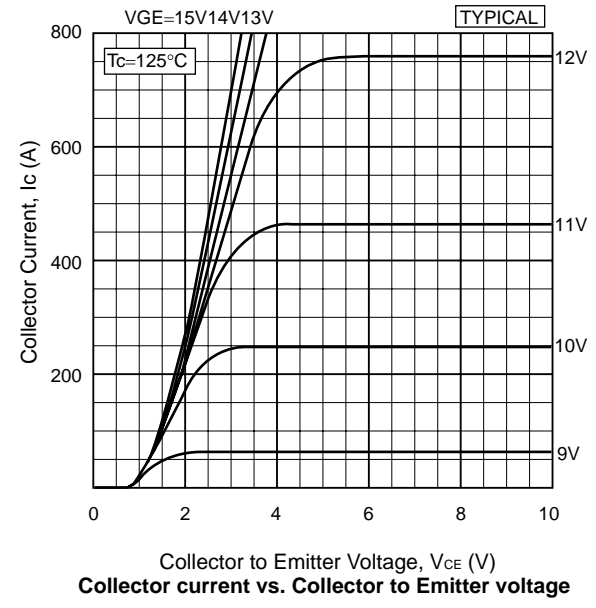
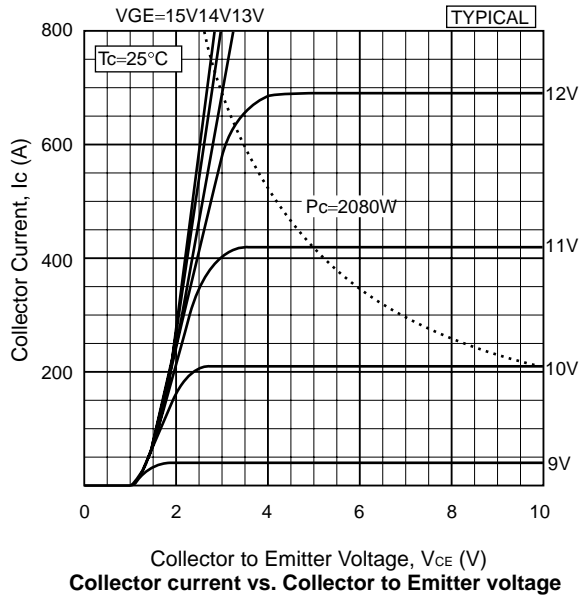
\*3: Recommended value 2.45 N·m (25 kgf·cm)

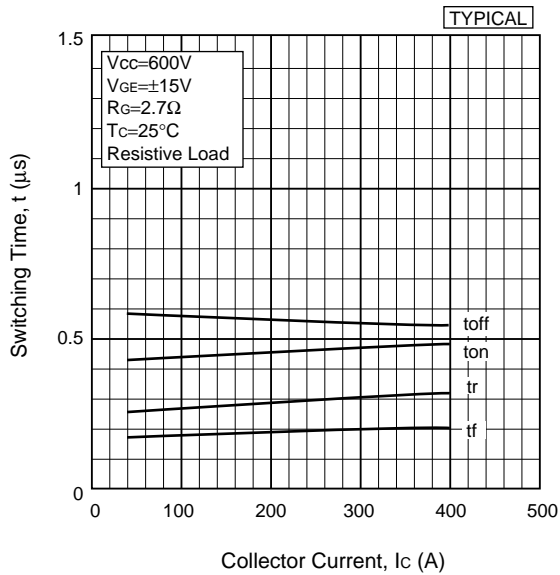
## CHARACTERISTICS ( $T_c=25^\circ\text{C}$ )

Item	Symbol	Unit	Min.	Typ.	Max.	Test Conditions	
Collector-Emitter Cut-Off Current	$I_{CES}$	mA	-	-	1.0	$V_{CE}=1200\text{V}$ , $V_{GE}=0\text{V}$	
Gate-Emitter Leakage Current	$I_{GES}$	nA	-	-	$\pm 500$	$V_{GE}=\pm 20\text{V}$ , $V_{CE}=0\text{V}$	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	V	-	2.2	2.8	$I_C=400\text{A}$ , $V_{GE}=15\text{V}$	
Gate-Emitter Threshold Voltage	$V_{GE(TH)}$	V	-	-	10	$V_{CE}=5\text{V}$ , $I_C=400\text{mA}$	
Input Capacitance	$C_{ies}$	pF	-	37000	-	$V_{CE}=10\text{V}$ , $V_{GE}=0\text{V}$ , $f=1\text{MHz}$	
Switching Times	Rise Time	$t_r$	-	0.25	0.7	$V_{CC}=600\text{V}$ $R_L=1.5\Omega$ $R_G=2.7\Omega$ <sup>*4</sup> $V_{GE}=\pm 15\text{V}$	
	Turn-ON Time	$t_{on}$	-	0.4	0.9		
	Fall Time	$t_f$	-	0.2	0.35		
	Turn-Off Time	$t_{off}$	-	0.7	1.1		
Peak Forward Voltage Drop	$V_{FM}$	V	-	2.5	3.5	$I_F=400\text{A}$ , $V_{GE}=0\text{V}$	
Reverse Recovery Time	$t_{rr}$	$\mu\text{s}$	-	-	0.4	$I_F=400\text{A}$ , $V_{GE}=-10\text{V}$ , $di/dt=400\text{A}/\mu\text{s}$	
Thermal Impedance	IGBT	$R_{th(j-c)}$	$^\circ\text{C/W}$	-	-	0.06	Junction to case
	FWD	$R_{th(j-c)}$				0.10	

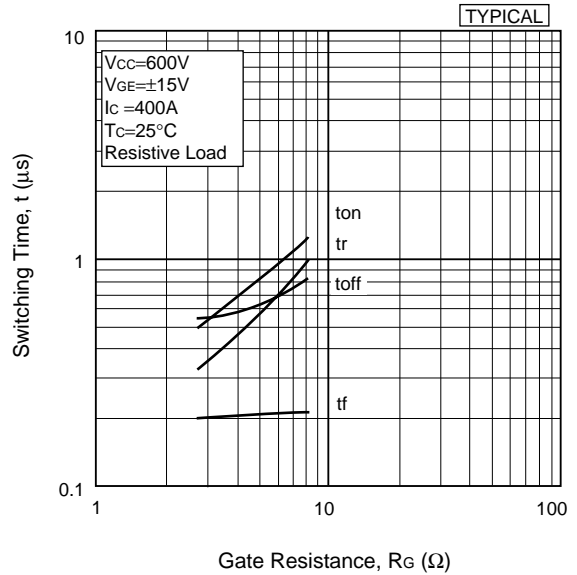
Notes; \*4:  $R_G$  value is the test condition's value for decision of the switching times, not recommended value, please determine the suitable  $R_G$  value after the measurement of switching waveforms (overshoot voltage, etc.) with appliance mounted.

Remark; The specification given herein, is subject to change without prior notice to improve product characteristics.

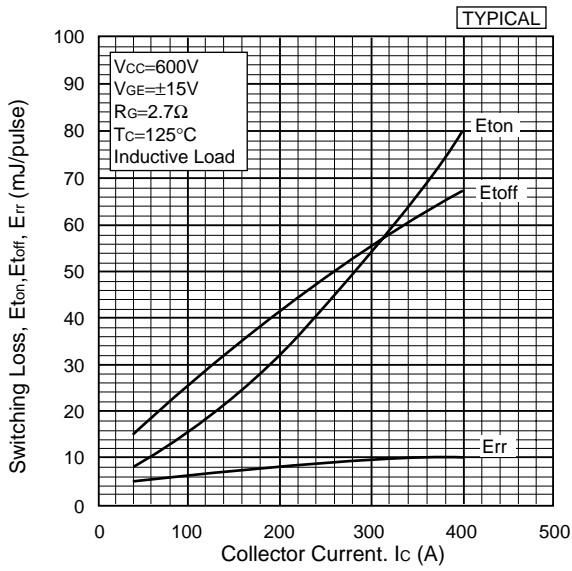




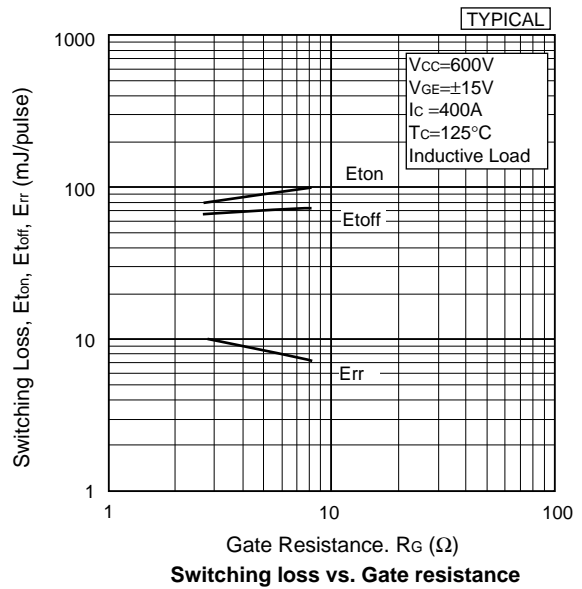
Switching time vs. Collector current



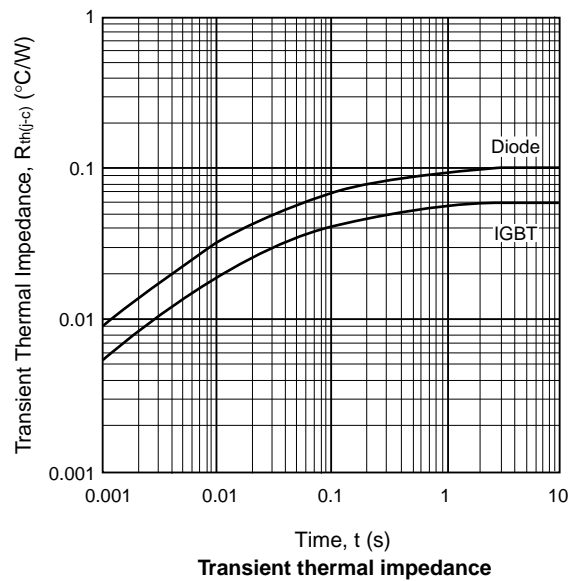
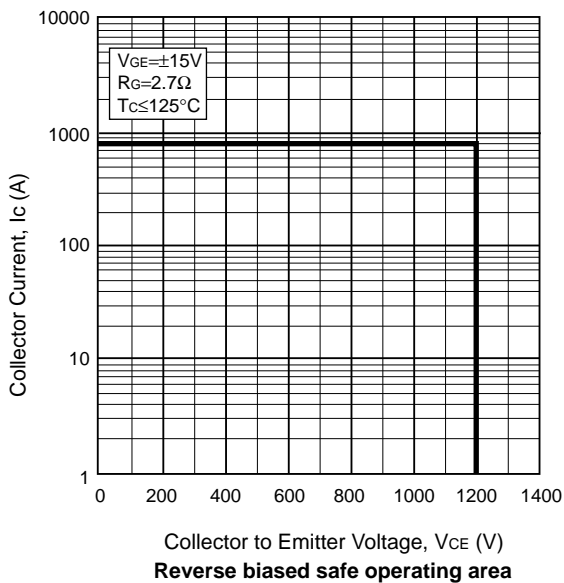
Switching time vs. Gate resistance



Switching loss vs. Collector current



Switching loss vs. Gate resistance



# HITACHI POWER SEMICONDUCTORS

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