FUJI ELECTRIC

1MBI 400NA-120

1-Pack IGBT
1200 V
400 A

IGBT MODULE (N series)

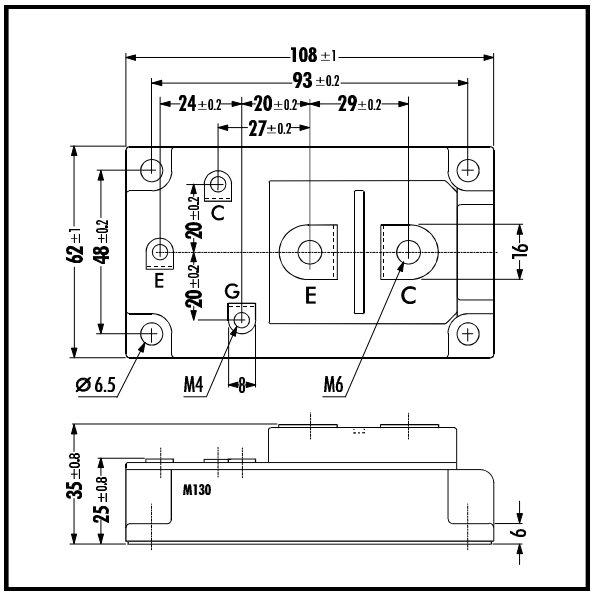
■ Features

- *Square RBSOA*
- *Low Saturation Voltage*
- *Less Total Power Dissipation*
- *Improved FWD Characteristic*
- *Minimized Internal Stray Inductance*
- *Overcurrent Limiting Function (4~5 Times Rated Current)*

■ Applications

- *High Power Switching*
- *A.C. Motor Controls*
- *D.C. Motor Controls*
- *Uninterruptible Power Supply*

■ Outline Drawing



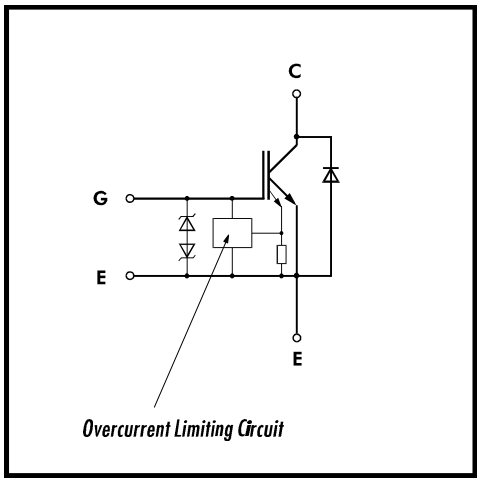
■ Maximum Ratings and Characteristics

• Absolute Maximum Ratings (T_c=25°C)

Items		Symbols	Ratings	Units
Collector-Emitter Voltage		V_{CES}	1200	V
Gate -Emitter Voltage		V_{GES}	± 20	V
Collector Current	Continuous	I_C	400	A
	1ms	$I_{C\ PULSE}$	800	
	Continuous	$-I_C$	400	
	1ms	$-I_{C\ PULSE}$	800	
Max. Power Dissipation		P_C	3100	W
Operating Temperature		T_j	+150	°C
Storage Temperature		T_{stg}	-40 ~ +125	°C
Isolation Voltage	A.C. 1min.	V_{is}	2500	V
Screw Torque		Mounting *1	3.5	Nm
		Terminals *2	4.5	
		Terminals *3	1.7	

Note: *1:Recommendable Value; 2.5 ~ 3.5 Nm (M5) or (M6)
*2:Recommendable Value; 3.5 ~ 4.5 Nm (M6)
*3:Recommendable Value; 1.3 ~ 1.7 Nm (M4)

■ Equivalent Circuit



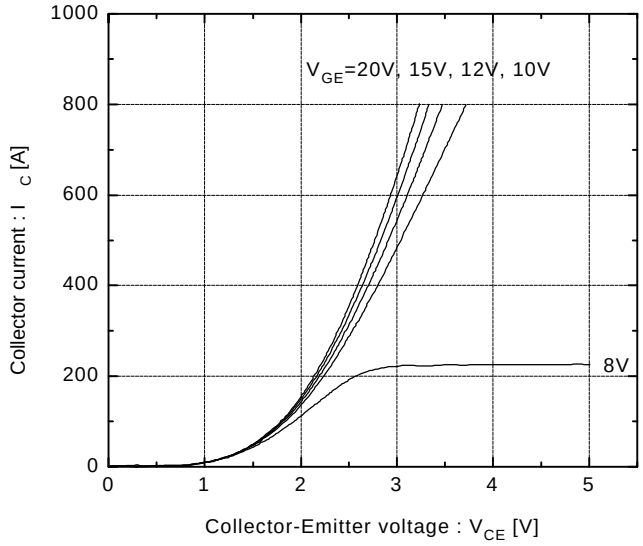
• Electrical Characteristics (at T_j=25°C)

Items	Symbols	Test Conditions	Min.	Typ.	Max.	Units
Zero Gate Voltage Collector Current	I_{CES}	V_{GE}=0V V_{CE}=1200V			4.0	mA
Gate-Emitter Leackage Current	I_{GES}	V_{CE}=0V V_{GE}=± 20V			60	µA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	V_{GE}=20V I_C=400mA	4.5		7.5	V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	V_{GE}=15V I_C=400A			3.3	V
Input capacitance	C_{ies}	V_{GE}=0V		64000		pF
Output capacitance	C_{oes}	V_{CE}=10V		23200		
Reverse Transfer capacitance	C_{res}	f=1MHz		20640		
Turn-on Time	t_{ON}	V_{CC}=600V		0.75	1.2	µs
	t_r	I_C=400A		0.25	0.6	
Turn-off Time	t_{OFF}	V_{GE}=± 15V		1.05	1.5	
	t_f	R_G=1.8Ω		0.35	0.5	
Diode Forward On-Voltage	V_F	I_F=400A V_{GE}=0V			3.0	V
Reverse Recovery Time	t_{rr}	I_F=400A			350	ns

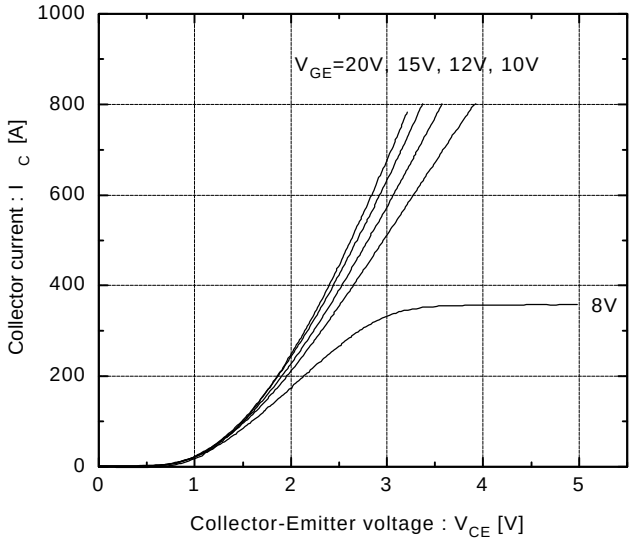
• Thermal Characteristics

Items	Symbols	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance	$R_{th(j-c)}$	IGBT			0.04	°C/W
	$R_{th(j-c)}$	Diode			0.12	
	$R_{th(c-f)}$	With Thermal Compound		0.0125		

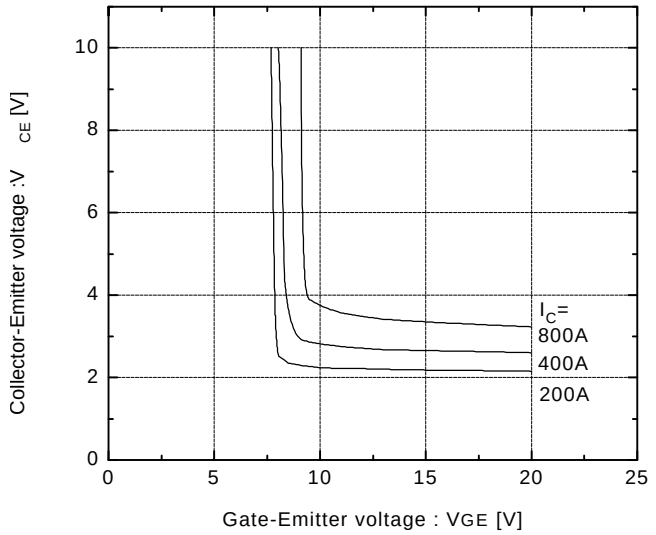
Collector current vs. Collector-Emitter voltage
T_j=25°C



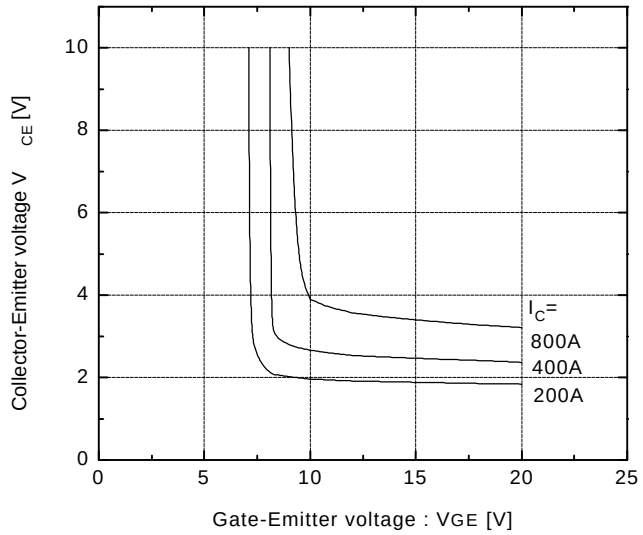
Collector current vs. Collector-Emitter voltage
T_j=125°C



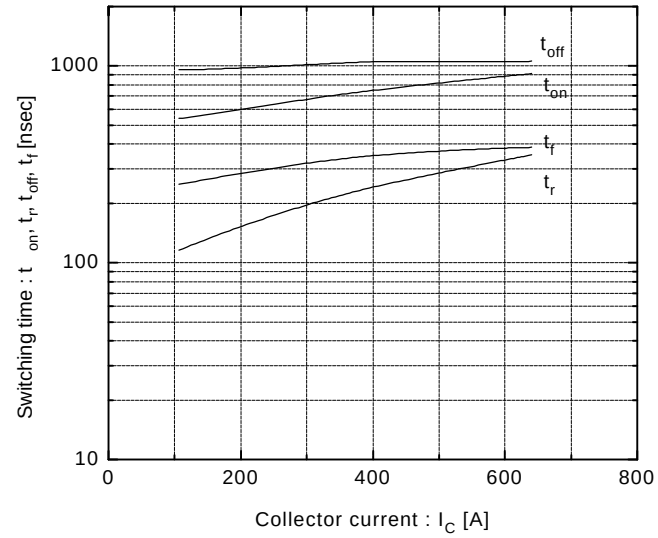
Collector-Emitter vs. Gate-Emitter voltage
T_j=25°C



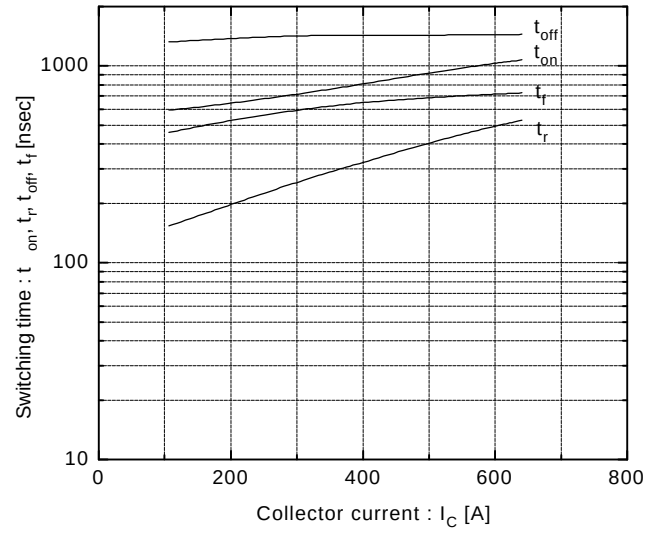
Collector-Emitter vs. Gate-Emitter voltage
T_j=125°C



Switching time vs. Collector current
V_{CC}=600V, R_G=1.8Ω, V_{GE}±15V, T_j=25°C



Switching time vs. Collector current
V_{CC}=600V, R_G=1.8Ω, V_{GE}=±15V, T_j=125°C



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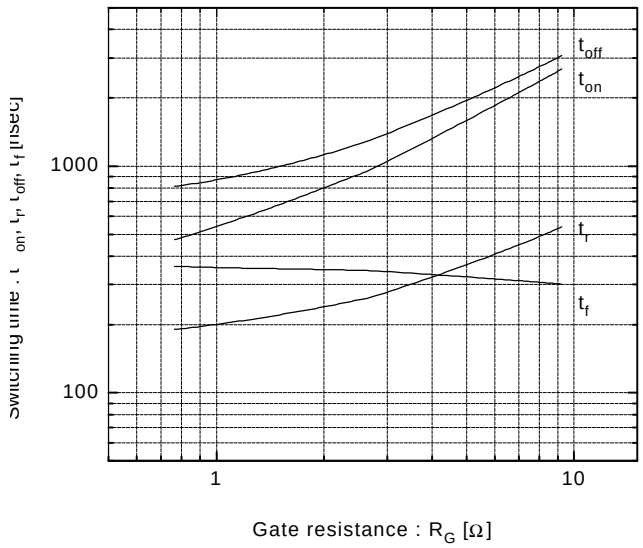
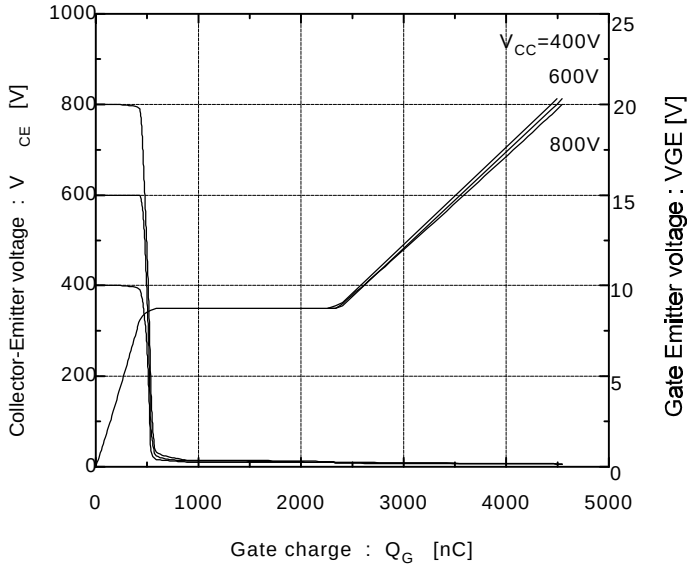
Switching time vs. R_G

V_{CC}=600V, I_C=400A, V_{GE}=±15V, T_j=25°C



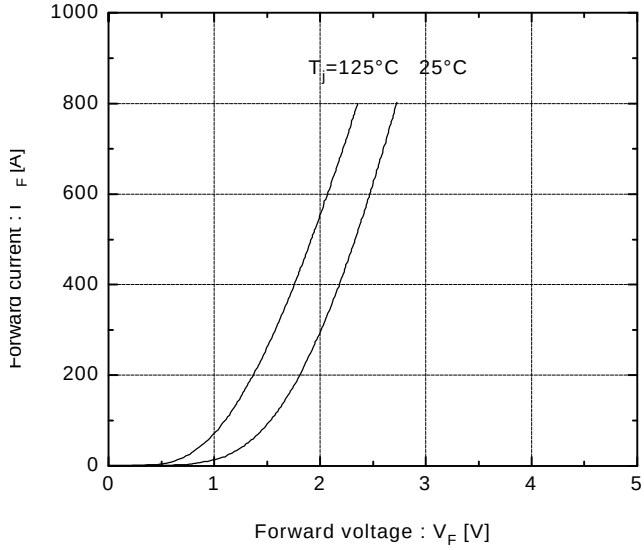
Dynamic input characteristics

T_j=25°C



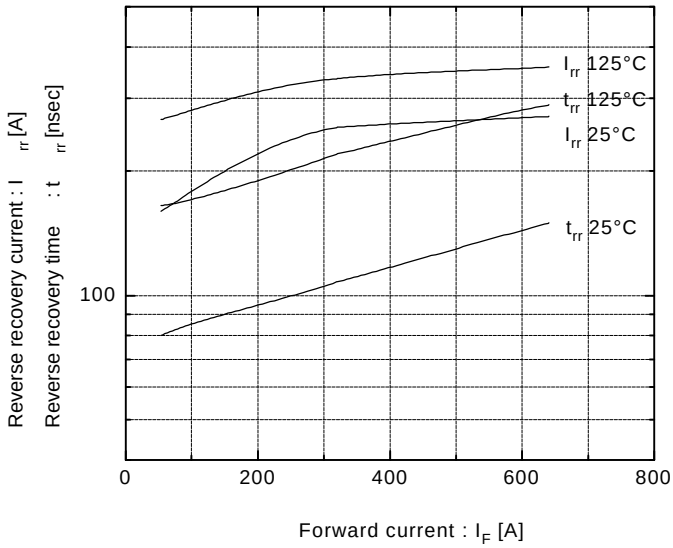
Forward current vs. Forward voltage

V_{GE}=OV

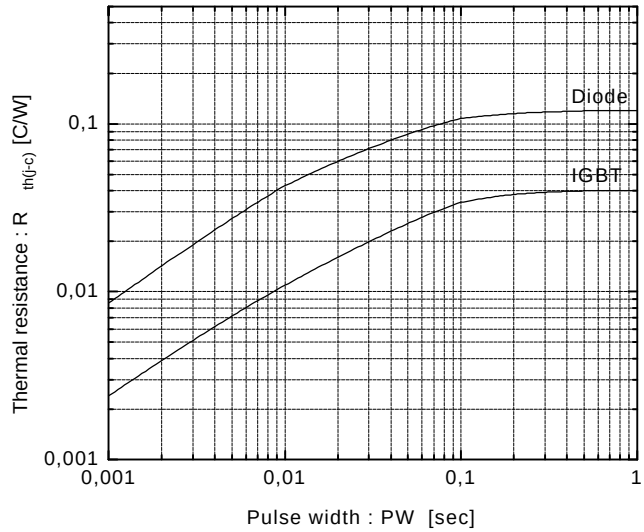


Reverse recovery characteristics

t_{rr}, I_{rr} vs. I_F

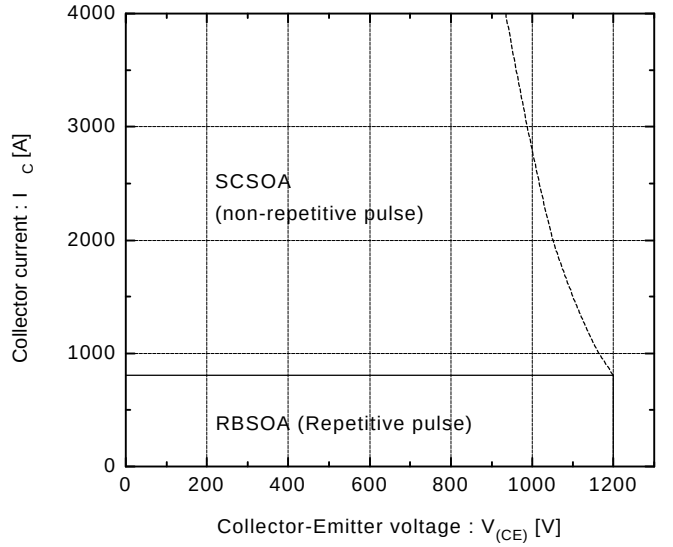


Transient thermal resistance



Reversed biased safe operating area

+V_{GE}=15V, -V_{GE}≤15V, T_j≤125°C, R_G≥1.8Ω



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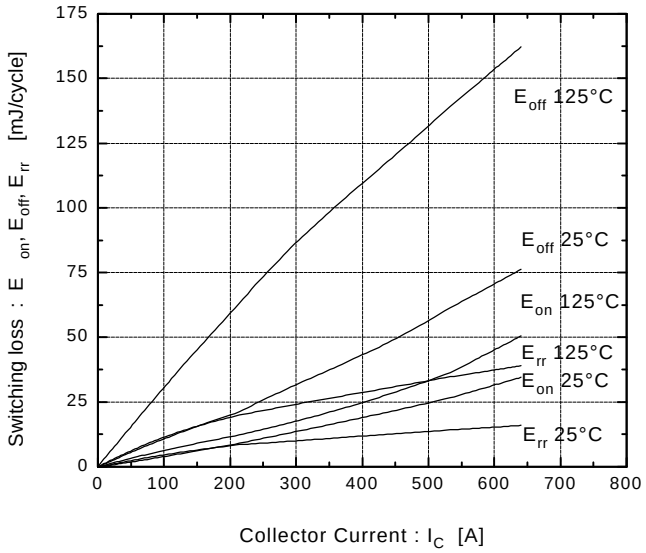
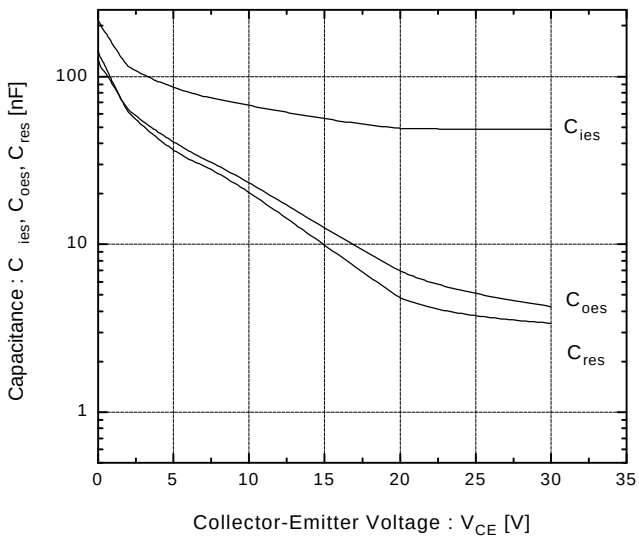
Switching loss vs. Collector current

V_{CC}=600V, R_G=1.8Ω, V_{GE}=±15V



Capacitance vs. Collector-Emitter voltage

T_j=25°C



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