

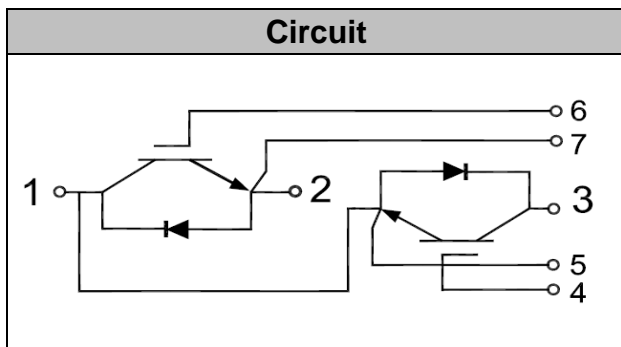
## IGBT Modules



**V<sub>CEs</sub>**            1200V  
**I<sub>c</sub>**                 400A

### Applications

- Welding Machine
- Power Supplies
- Others



### Features

- Short circuit rated 10 $\mu$ s
- Low stray Inductance
- Low switching losses
- V<sub>CE(sat)</sub> with positive temperature coefficient
- Fast switching and short tail current
- Free wheeling diodes with fast and soft reverse recovery

### Absolute Maximum Ratings (T<sub>c</sub> = 25°C unless otherwise specified)

Symbol	Description	Values	Units
V <sub>CEs</sub>	Collector - Emitter Voltage	1200	V
V <sub>GES</sub>	Gate-Emitter Voltage	±20	V
I <sub>c</sub>	DC Collector Current	T <sub>c</sub> =25°C	450 A
		T <sub>c</sub> =80°C	300 A
I <sub>CM</sub>	Repetitive Peak Collector Current	T <sub>c</sub> =25°C, t <sub>p</sub> =1ms	600 A
P <sub>tot</sub>	Power Dissipation Per IGBT		1760 W
T <sub>J</sub>	Junction Temperature Range		40 to +150 °C
T <sub>STG</sub>	Storage Temperature Range		40 to +125 °C
Viso	Insulation Test Voltage	AC, t=1min	3000 V
Mounting Torque	Power Terminals Screw: M6		5±15% N*m
	Mounting Screw:M6		5±15% N*m
Notes :			
(1) Repetitive Rating: Pulse width limited by max. junction temperature			



**Electrical Characteristics of IGBT** ( $T_J = 25^\circ\text{C}$  unless otherwise specified)

Symbol	Item	Conditions	Values			Units
			Min.	Typ.	Max.	
<b>OFF Characteristics</b>						
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage	$V_{GE}=0V, I_C=1mA$	1200			V
$I_{CES}$	Collector Leakage Current	$V_{CE}=1200V, V_{GE}=0V, T_J=25^\circ\text{C}$			0.5	mA
		$V_{CE}=1200V, V_{GE}=0V, T_J=125^\circ\text{C}$			1	mA
$I_{GES}$	Gate Leakage Current	$V_{CE}=0V, V_{GE}=\pm 20V$	-200		200	nA
<b>ON Characteristics</b>						
$V_{GE(th)}$	Gate - Emitter Threshold Voltage	$V_{CE}=V_{GE}, I_C=6mA$	5	6.0	7	V
$V_{CE(sat)}$	Collector – Emitter Saturation Voltage	$I_C=300A, V_{GE}=15V, T_J=25^\circ\text{C}$		1.8	2.0	V
		$I_C=300A, V_{GE}=15V, T_J=125^\circ\text{C}$		2.0	2.3	V
<b>Dynamic Characteristics</b>						
$C_{ies}$	Input Capacitance	$V_{CE}=25V, V_{GE}=0V, f=1MHz$		12.6		nF
$C_{res}$	Reverse Transfer Capacitance			0.45		nF
<b>Switching Characteristics</b>						
$t_{d(on)}$	Turn-on Delay Time	$V_{CC}=600V, I_C=300A, R_G=3.5\Omega, V_{GE}=\pm 15V, T_J=25^\circ\text{C}$ Inductive Load		162		ns
$t_r$	Rise Time			53		ns
$t_{d(off)}$	Turn-off Delay Time			376		ns
$T_f$	Fall Time			133		ns
$t_{d(on)}$	Turn-on Delay Time	$V_{CC}=600V, I_C=300A, R_G=3.5\Omega, V_{GE}=\pm 15V, T_J=125^\circ\text{C}$ Inductive Load		180		ns
$t_r$	Rise Time			56		ns
$t_{d(off)}$	Turn-off Delay Time			429		ns
$T_f$	Fall Time			292		ns
$E_{on}$	Turn-on Switching Loss	$V_{CC}=600V, R_G=3.5\Omega, I_C=300A$	$T_J=25^\circ\text{C}$		13.6	mJ
			$T_J=125^\circ\text{C}$		19.2	mJ
$E_{off}$	Turn-off Switching Loss	$V_{CC}=600V, R_G=3.5\Omega, I_C=300A$	$T_J=25^\circ\text{C}$		22.9	mJ
			$T_J=125^\circ\text{C}$		33.8	mJ
$Q_{ge}$	Gate Charge	$V_{CC}=600V, I_C=300A, V_{GE}=\pm 15V$		590		nC
SCSOA	Short Circuit Safe Operating Area	$V_{CC}=600V, V_{GE}\leq 15V, T_J=125^\circ\text{C}$	10			$\mu\text{s}$
				1700		A



Electrical Characteristics of FWD (T<sub>C</sub> = 25°C unless otherwise specified)

Symbol	Item	Conditions	Min.	Typ.	Max.	Units
V <sub>FM</sub>	Forward Voltage	I <sub>F</sub> =300A, V <sub>GE</sub> =0V;	T <sub>J</sub> =25°C,	1.81	2.0	V
			T <sub>J</sub> =125°C,	1.95	2.3	
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> =300A , V <sub>R</sub> =600V , di <sub>F</sub> /dt=-2885A/μs V <sub>GE</sub> = -15V	T <sub>J</sub> =25°C,	198		ns
			T <sub>J</sub> =125°C,	365		
I <sub>rr</sub>	Peak Reverse Recovery Current	I <sub>F</sub> =300A , V <sub>R</sub> =600V , di <sub>F</sub> /dt=-2885A/μs V <sub>GE</sub> = -15V	T <sub>J</sub> =25°C,	185		A
			T <sub>J</sub> =125°C,	200		
Q <sub>rr</sub>	Reverse Recovery Charge	I <sub>F</sub> =300A , V <sub>R</sub> =600V , di <sub>F</sub> /dt=-2885A/μs V <sub>GE</sub> = -15V	T <sub>J</sub> =25°C,	15.9		mJ
			T <sub>J</sub> =125°C,	29.1		

Thermal Resistance Characteristics

Symbol	Description	Min.	Typ.	Max.	Units
R <sub>θJC</sub>	Junction-To-Case (IGBT Part, Per Leg)			0.07	°C/W
R <sub>θJC</sub>	Junction-To-Case (Diode Part, Per Leg)			0.17	°C/W
R <sub>θCS</sub>	Case-To-Sink (Conductive Grease Applied)			0.1	°C/W
Mt	Power Terminals Screw:M6	3		5	N·m
Ms	Mounting Screw:M6	3		5	N·m
Weight	Weight Of Module			300	g



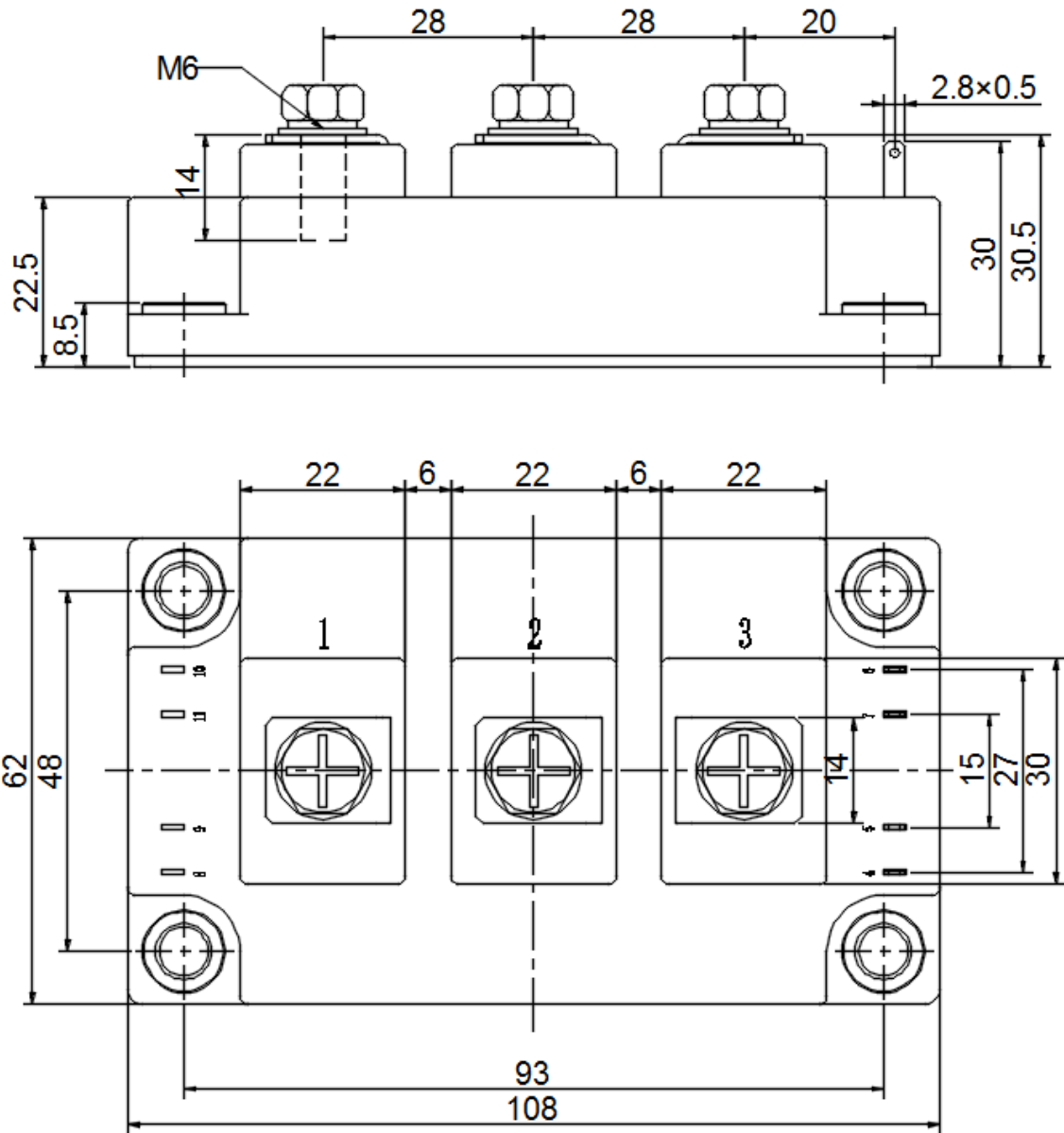
PRELIMINARY

MG400HF12MIC2

RoHS  
COMPLIANT

Package Outline Information

CASE: C2



Dimensions in mm