



JMG400HF12G2S1

Trench FS IGBT

Features

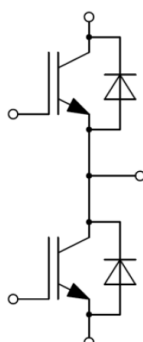
- Short Circuit Rated 10 μ s
- Low Stray Inductance
- Low Saturation Voltage
- Ultra Low loss
- HI-REL Power Terminals
- Lead Free, Compliant with RoHS Requirement

Applications

- Industrial Inverters
- Servo Applications
- SMPS UPS
- Induction Heating
- Welder

Product Summary

Parameter	Value	Unit
V_{CES}	1200	V
$I_C(@ T_C = 100^{\circ}C)$	400	A
$I_{CRM}(@ t_P = 1ms)$	800	A
$V_{CE(sat)}(Typ)$	1.85	V



IGBT, Absolute Maximum Ratings (@ $T_C = 25^{\circ}C$ unless otherwise specified)

Parameter	Conditions	Symbol	Values	Unit
Collector-emitter voltage	$T_{vj} = 25^{\circ}C$	V_{CES}	1200	V
Gate-emitter peak voltage	$T_{vj} = 25^{\circ}C$	V_{GES}	± 20	V
Continuous collector current	$T_C = 25^{\circ}C$	I_C	769	A
	$T_C = 100^{\circ}C$	$I_{C\ nom}$	400	
Repetitive peak collector current	$t_P = 1ms$	I_{CRM}	800	A
Total power dissipation	$T_C = 25^{\circ}C, T_{vj\ max} = 175^{\circ}C$	P_{tot}	2272	W

**IGBT, Electrical Characteristics (@ $T_C = 25^\circ\text{C}$ unless otherwise specified)**

Parameter	Conditions		Symbol	Values			Unit
				Min.	Typ.	Max.	
Collector-emitter saturation voltage	$I_C = 400\text{A}$, $V_{GE} = 15\text{V}$	$T_{vj} = 25^\circ\text{C}$	$V_{CE(sat)}$		1.85	2.30	V
		$T_{vj} = 125^\circ\text{C}$			2.25		
Gate threshold voltage	$V_{CE} = V_{GE}$, $I_C = 16\text{mA}$		$V_{GE(th)}$	5.6	6.2	6.8	V
Collector leakage current	$V_{CE} = 0\text{V}$, $V_{CE} = 1200\text{V}$		I_{CES}			1	mA
Gate-emitter leakage current	$V_{CE} = 0\text{V}$, $V_{GE} = 20\text{V}$		I_{GES}			400	nA
Input capacitance	$f = 1\text{MHz}$, $T_{vj} = 25^\circ\text{C}$, $V_{CE} = 25\text{V}$, $V_{GE} = 0\text{V}$		C_{ies}		43.2		nF
Output capacitance			C_{oes}		1.18		nF
Turn-on delay time, inductive load	$V_{CC} = 600\text{V}$, $I_C = 400\text{A}$, $R_G = 2\Omega$, $V_{GE} = \pm 15\text{V}$, $T_{vj} = 25^\circ\text{C}$		$t_{d(on)}$		288		ns
Rise time, inductive load			t_r		72		ns
Turn-off delay time, inductive load			$t_{d(off)}$		314		ns
Fall time, inductive load			t_f		55		ns
Turn-on energy loss per pulse			E_{on}		43.6		mJ
Turn-off energy loss per pulse			E_{off}		12.4		mJ
Turn-on delay time, inductive load	$V_{CC} = 600\text{V}$, $I_C = 400\text{A}$, $R_G = 2\Omega$, $V_{GE} = \pm 15\text{V}$, $T_{vj} = 125^\circ\text{C}$		$t_{d(on)}$		291		ns
Rise time, inductive load			t_r		76		ns
Turn-off delay time, inductive load			$t_{d(off)}$		351		ns
Fall time, inductive load			t_f		88		ns
Turn-on energy loss per pulse			E_{on}		57.6		mJ
Turn-off energy loss per pulse			E_{off}		17.1		mJ
SC data	$t_p \leq 10\mu\text{s}$, $V_{GE} = 15\text{V}$, $V_{CC} = 800\text{V}$, $V_{CEM} \leq 1200\text{V}$, $T_{vj} = 125^\circ\text{C}$		I_{sc}		1500		A
Gate charge	$V_{GE} = -15 \dots +15\text{V}$		Q_G		3.36		μC
Thermal resistance, junction to case	per IGBT		$R_{th(j-c)}$			0.066	K/W
Temperature under switching conditions			$T_{vj op}$	-40		150	$^\circ\text{C}$

**FRED, Absolute Maximum Ratings (@ $T_C = 25^\circ\text{C}$ unless otherwise specified)**

Parameter	Conditions	Symbol	Values	Unit
Repetitive peak reverse voltage	$T_{vj} = 25^\circ\text{C}$	V_{RRM}	1200	V
Continuous DC forward current		$I_{F(AV)}$	400	A
Repetitive peak forward current	$t_P = 1\text{ms}$	I_{FRM}	800	A

FRED, Electrical Characteristics (@ $T_C = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Conditions		Symbol	Values			Unit
				Min.	Typ.	Max.	
Forward voltage	I _F = 400A	T _{vj} = 25°C	V _F		2.00	2.30	V
		T _{vj} = 125°C			1.60		
Peak reverse recovery current	I _F = 400A, di/dt = 4330A/μs, V _R = 600V, V _{GE} = -15V	T _{vj} = 25°C	I _{RM}		252		A
		T _{vj} = 125°C			255		
Recovered charge		T _{vj} = 25°C	Q _{rr}		38.8		μC
		T _{vj} = 125°C			61.9		
Reverse Recovery energy		T _{vj} = 25°C	E _{rec}		11.2		mJ
		T _{vj} = 125°C			18.7		
Thermal resistance, junction to case	per Diode		R _{th(j-c)}			0.115	K/W
Temperature under switching conditions			T _{vj op}	-40		150	°C

**NTC-Thermistor Characteristics (@ $T_C = 25^\circ\text{C}$ unless otherwise specified)**

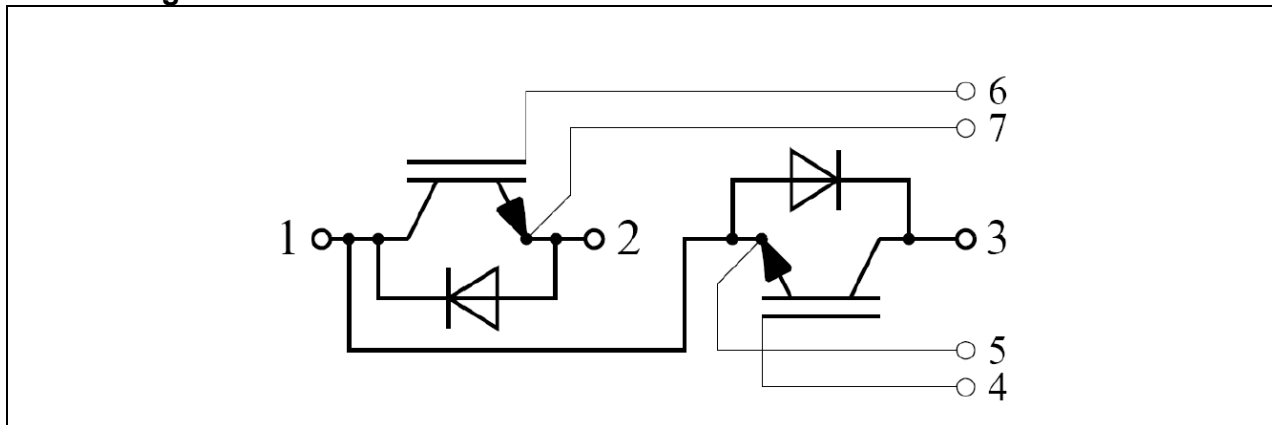
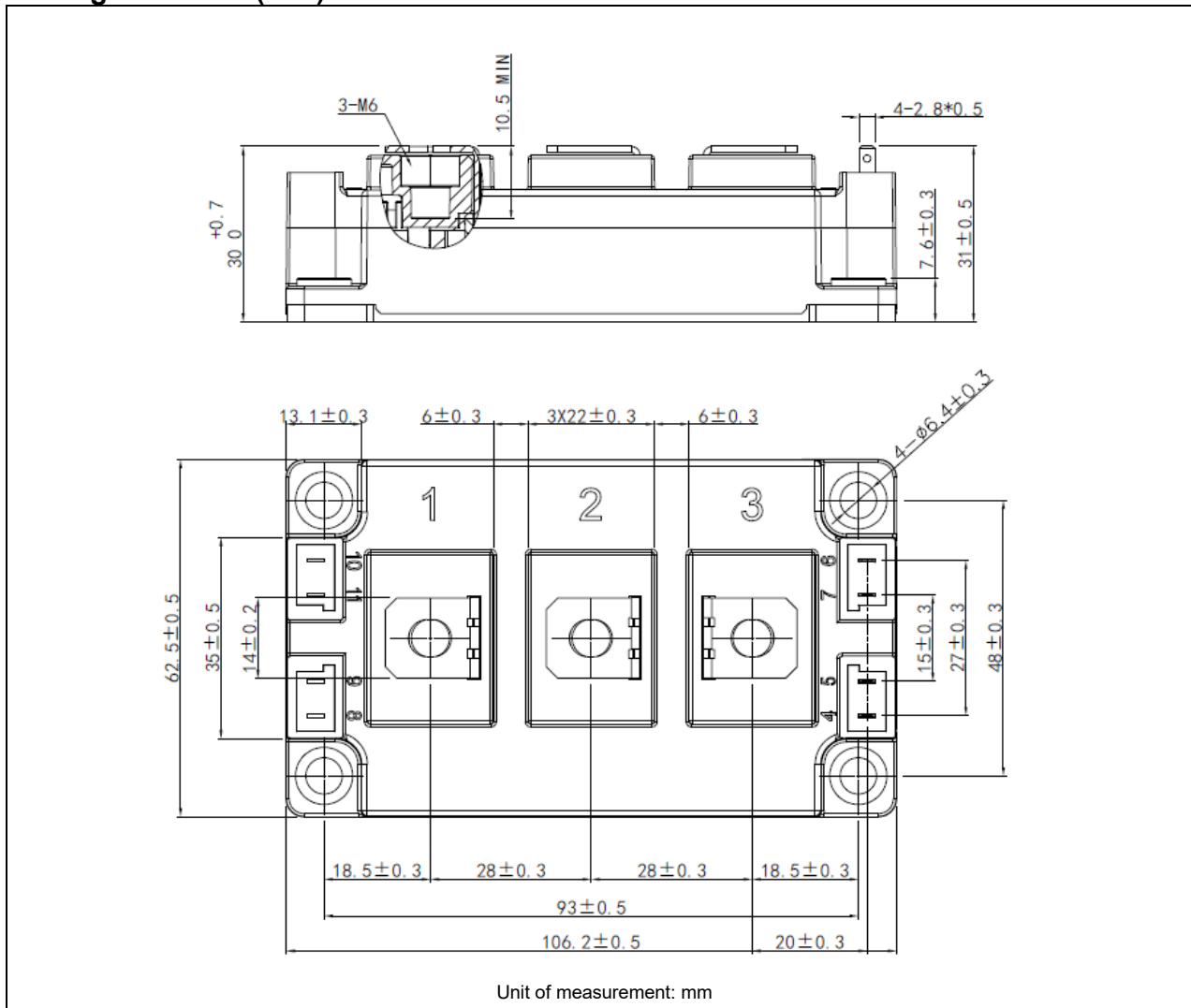
Parameter	Conditions	Symbol	Values			Unit
			Min.	Typ.	Max.	
Rated resistance	$T_C = 25^\circ\text{C}$	R_{25}		5		$\text{K}\Omega$
Deviation of R_{100}	$T_C = 100^\circ\text{C}$, $R_{100} = 493 \Omega$	$\Delta R/R$	-5		5	%
Power dissipation	$T_C = 25^\circ\text{C}$	P_{25}			20	mW
B-value	$R_2 = R_{25} \exp [B_{25}/50(1/T_2 - 1/(298,15 \text{ K}))]$	$B_{25}/50$		3375		K
B-value	$R_2 = R_{25} \exp [B_{25}/80(1/T_2 - 1/(298,15 \text{ K}))]$	$B_{25}/80$		3411		K
B-value	$R_2 = R_{25} \exp [B_{25}/100(1/T_2 - 1/(298,15 \text{ K}))]$	$B_{25}/100$		3433		K

Module Characteristics

Parameter	Conditions	Symbol	Values			Unit
			Min.	Typ.	Max.	
Isolation voltage (All terminals shorted)	$f = 50\text{Hz}$, 1minute	V_{iso}	2.5			kV
Maximum junction temperature		T_J			175	$^\circ\text{C}$
Thermal resistance, case to heatsink	per module	$R_{\text{th(c-s)}}$		1.010		K/W
Storage temperature		T_{stg}	-40		125	$^\circ\text{C}$
Mounting torque	M5	M	3		6	N·m
Terminal connection torque	M6	M	3		6	N·m

Ordering Information

Device	Marking	Package	Weight	Inner Box	Per Carton
JMG400HF12G2S1	JMG400HF12G2S1	G2	300g/PCS	12PCS	60PCS

Circuit Diagram

Package Outlines (mm)




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