

**Trench FS IGBT****Features**

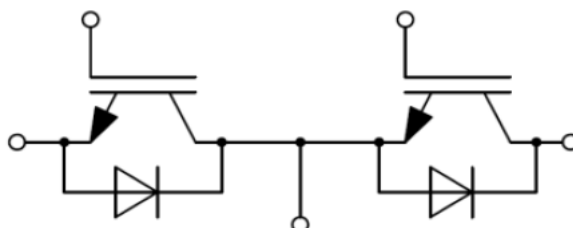
- Short Circuit Rated 10 μ s
- Low Stray Inductance
- Low Saturation Voltage
- Ultra Low loss
- HI-REL Power Terminals
- Lead Free, Compliant with RoHS Requirement

Applications

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

Product Summary

Parameter	Value	Unit
V_{CES}	1200	V
$I_C(@ T_C = 100^{\circ}C)$	100	A
$I_{CRM}(@ t_P = 1ms)$	200	A
$V_{CE(sat)}(Typ)$	1.80	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	162	A
	$T_C = 100^{\circ}C$	$I_{C\ nom}$	100	
Repetitive peak collector current	$t_P = 1ms$	I_{CRM}	200	A
Total power dissipation	$T_C = 25^{\circ}C, T_{vj\ max} = 175^{\circ}C$	P_{tot}	595	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	$I_C = 100\text{A}$, $V_{GE} = 15\text{V}$	$T_{vj} = 25^\circ\text{C}$	$V_{CE(sat)}$		1.80	2.30	V
		$T_{vj} = 125^\circ\text{C}$			2.10		
Gate threshold voltage	$V_{CE} = V_{GE}$, $I_C = 1\text{mA}$		$V_{GE(th)}$	5.2	6.2	6.8	V
Collector leakage current	$V_{CE} = 0\text{V}$, $V_{CE} = 1200\text{V}$		I_{CES}			1.0	mA
Gate-emitter leakage current	$V_{CE} = 0\text{V}$, $V_{GE} = \pm 20\text{V}$		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}		10.8		nF
Output capacitance			C_{oes}		0.30		nF
Turn-on delay time, inductive load	$V_{CC} = 600\text{V}$, $I_C = 100\text{A}$, $R_G = 5.9\Omega$, $V_{GE} = \pm 15\text{V}$, $T_{vj} = 25^\circ\text{C}$		$t_{d(on)}$		153		ns
Rise time, inductive load			t_r		73		ns
Turn-off delay time, inductive load			$t_{d(off)}$		268		ns
Fall time, inductive load			t_f		19		ns
Turn-on energy loss per pulse			E_{on}		10.23		mJ
Turn-off energy loss per pulse			E_{off}		3.86		mJ
Turn-on delay time, inductive load	$V_{CC} = 600\text{V}$, $I_C = 100\text{A}$, $R_G = 5.9\Omega$, $V_{GE} = \pm 15\text{V}$, $T_{vj} = 125^\circ\text{C}$		$t_{d(on)}$		182		ns
Rise time, inductive load			t_r		86		ns
Turn-off delay time, inductive load			$t_{d(off)}$		302		ns
Fall time, inductive load			t_f		52		ns
Turn-on energy loss per pulse			E_{on}		15.58		mJ
Turn-off energy loss per pulse			E_{off}		4.94		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}		400		A
Gate charge	$V_{GE} = -15 \dots +15\text{V}$		Q_G		0.84		μC
Thermal resistance, junction to case	per IGBT		$R_{th(j-c)}$			0.252	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		$I_{F(AV)}$	100	A
Repetitive peak forward current	$t_P = 1\text{ms}$	I_{FRM}	200	A

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

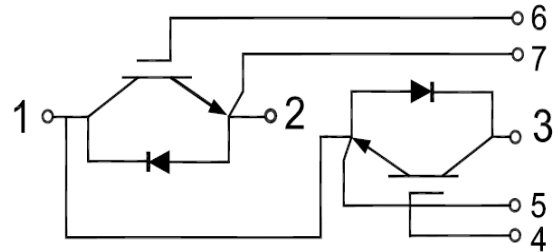
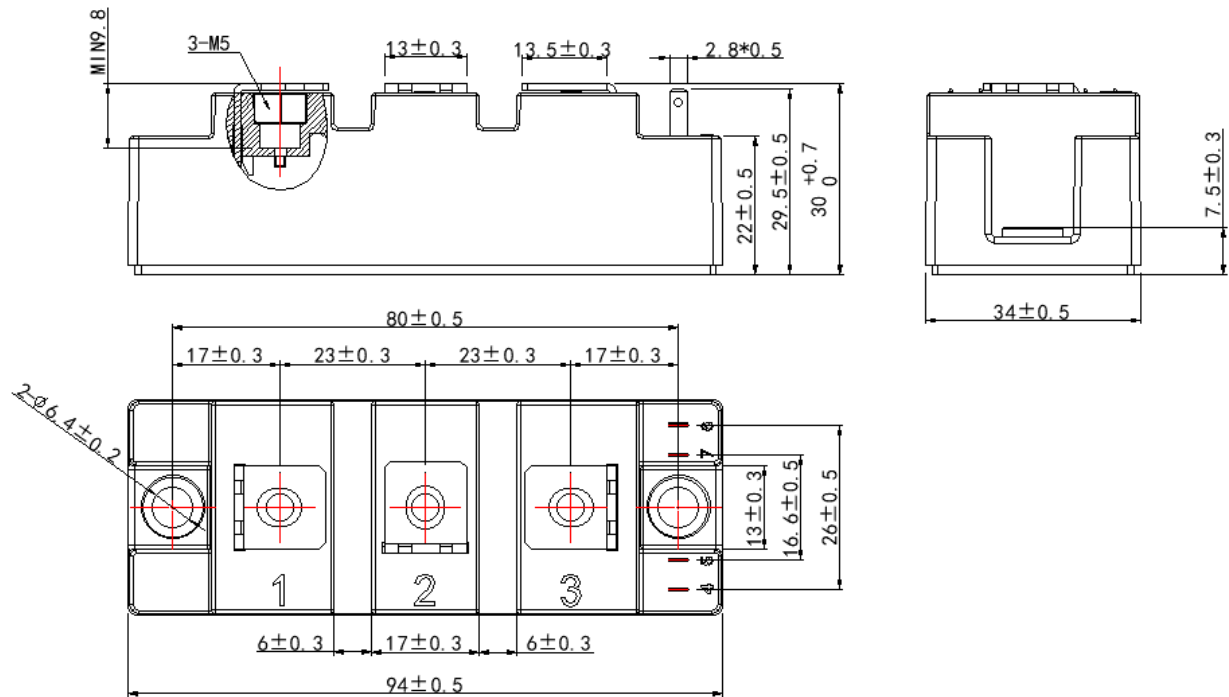
Parameter	Conditions		Symbol	Values			Unit
				Min.	Typ.	Max.	
Forward voltage	$I_F = 100A,$	$T_{vj} = 25^{\circ}C$	V_F		1.80	2.30	V
		$T_{vj} = 125^{\circ}C$			1.60		
Peak reverse recovery current	$I_F = 100A,$ $di/dt = 1000A/\mu s,$ $V_R = 600V,$ $V_{GE} = -15V$	$T_{vj} = 25^{\circ}C$	I_{RM}		44		A
		$T_{vj} = 125^{\circ}C$			59		
Reverse recovery charge		$T_{vj} = 25^{\circ}C$	Q_{rr}		4.6		μC
		$T_{vj} = 125^{\circ}C$			11.7		
Reverse recovery energy		$T_{vj} = 25^{\circ}C$	E_{rec}		1.43		mJ
		$T_{vj} = 125^{\circ}C$			3.45		
Thermal resistance, junction to case	per diode		$R_{th(j-c)}$			0.446	K/W
Temperature under switching conditions			$T_{vj\ op}$	-40		150	$^{\circ}C$

**Module Characteristics**

Parameter	Conditions	Symbol	Values			Unit
			Min.	Typ.	Max.	
Isolation voltage (All terminals shorted)	f = 50Hz, 1minute	V_{iso}	2.5			kV
Maximum junction temperature		T_J			175	°C
Thermal resistance, case to heatsink	per module	$R_{th(c-s)}$		0.050		K/W
Storage temperature		T_{stg}	-40		125	°C
Mounting torque	M5	M	2.5		5.0	N·m
Terminal connection torque	M6	M	3.0		5.0	N·m

Ordering Information

Device	Marking	Package	Weight	Inner Box	Per Carton
JMG100HF12G1S1	JMG100HF12G1S1	G1(34mm)	160g/PCS	4 PCS	48 PCS

Circuit Diagram

Package Outlines (mm)


Unit of measurement: mm

Typical Electrical & Thermal Characteristics

Fig 1. IGBT Output Characteristics,
Inverter(typical) VGE=15 V

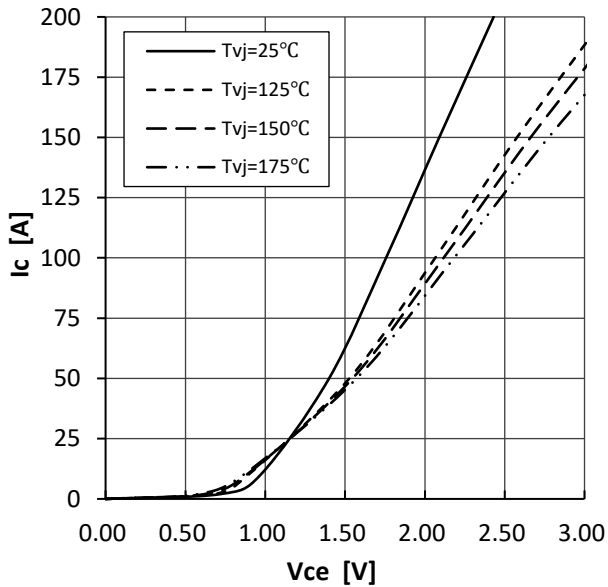


Fig 2. IGBT Output Characteristics,
Inverter(typical)

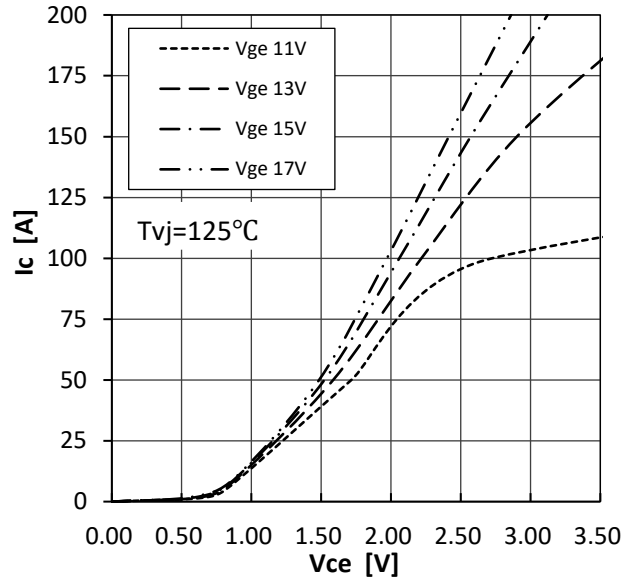


Fig 3. IGBT Switching Loss vs. Ic,
Inverter(typical)
Rg=5.9 Ω, VCE=600 V, VGE=±15 V

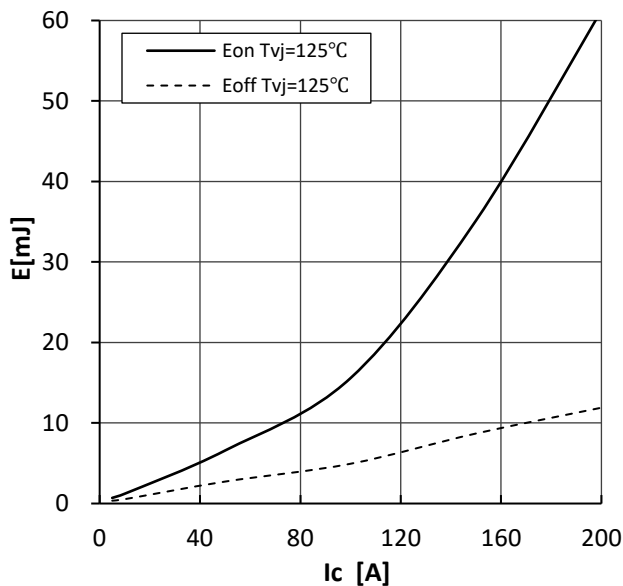


Fig 4. IGBT Switching Loss vs. Rg,
Inverter(typical)
Ic=100 A, VCE=600 V, VGE=±15 V

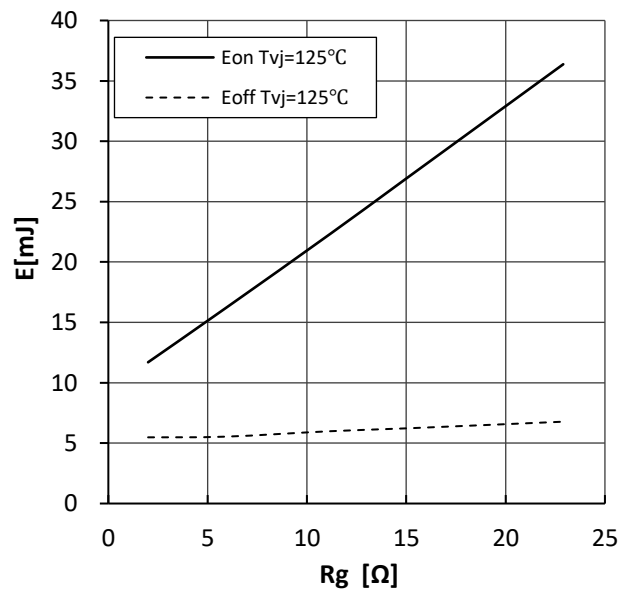


Fig 5. Reverse bias safe operating area, IGBT, Inverter(RBSOA)

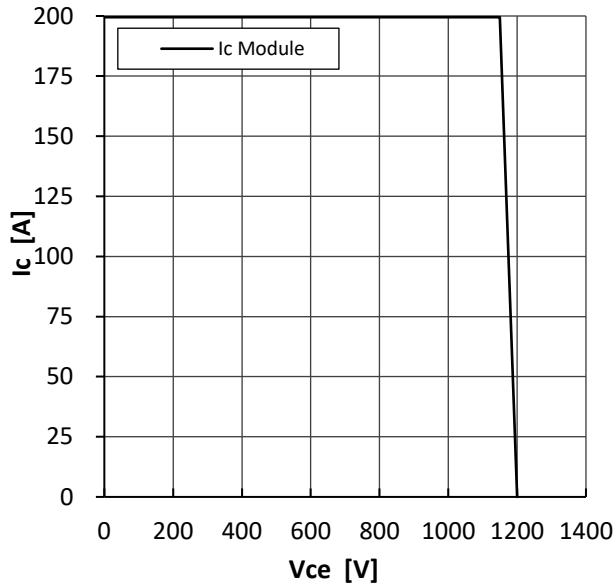


Fig 6. FRED Forward Characteristics, Inverter(typical)

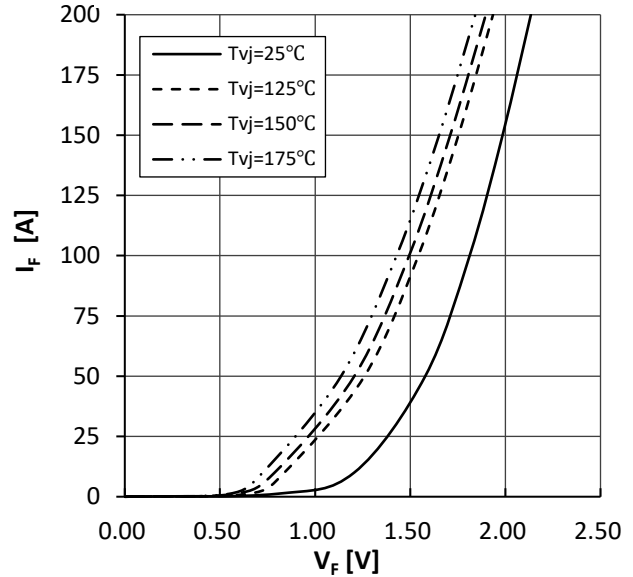


Fig 7. FRED FRED Switching Loss vs. Ic, Inverter(typical)
Rg=5.9 Ω , VCE=600 V

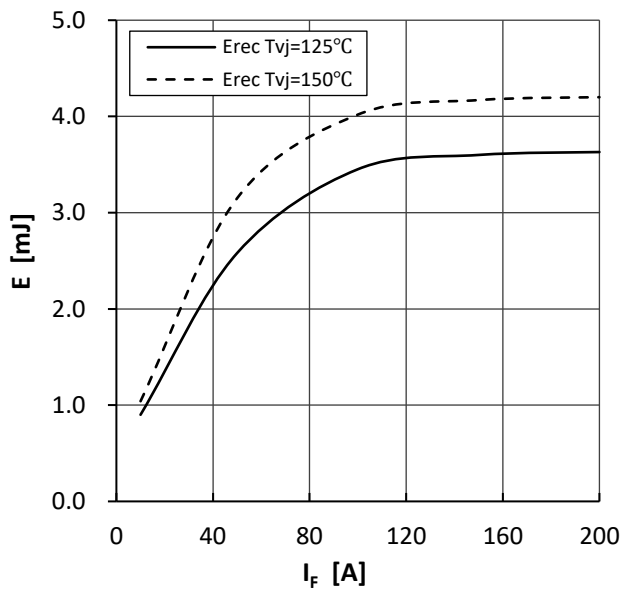
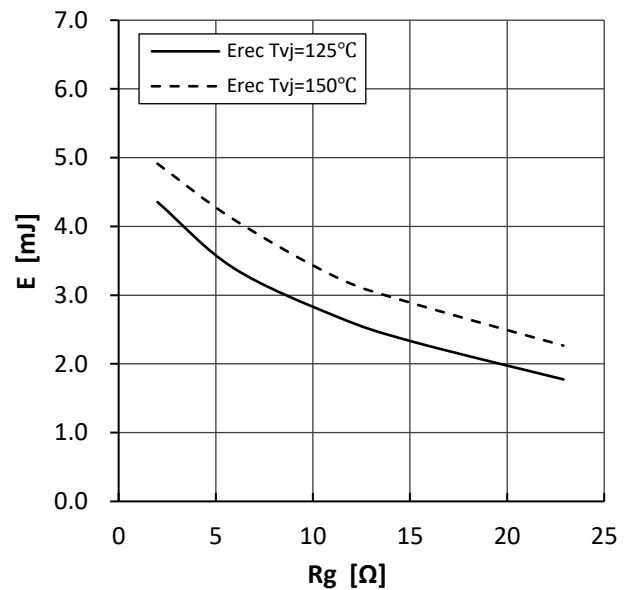


Fig 8. FRED Switching Loss vs. Rg, Inverter(typical)
Ic=100 A, VCE=600 V





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