

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

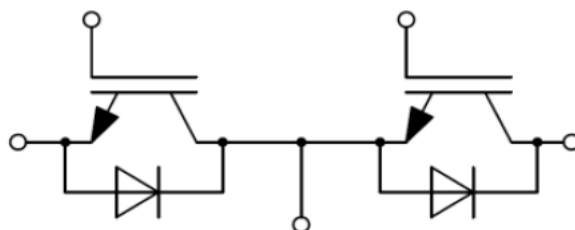
- Short Circuit Rated 10 μ s
- Low Stray Inductance
- Low Saturation Voltage
- Ultra Low loss
- HI-REL Power Terminals
- Lead Free, Compliant With RoHS Requirement

Product Summary

Parameter	Value	Unit
V_{CES}	1200	V
$I_C(@ T_C = 100^{\circ}C)$	150	A
$I_{CRM}(@ t_P = 1ms)$	300	A
$V_{CE(sat)}(Typ)$	1.70	V

Applications

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

**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	200	A
	$T_C = 100^{\circ}C$	$I_{C\ nom}$	150	
Repetitive peak collector current	$t_P = 1ms$	I_{CRM}	300	A
Total power dissipation	$T_C = 25^{\circ}C, T_{vj\ max} = 125^{\circ}C$	P_{tot}	625	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	$I_C = 150\text{A}$, $V_{GE} = 15\text{V}$	$T_{vj} = 25^\circ\text{C}$	$V_{CE(sat)}$		1.70		V
		$T_{vj} = 125^\circ\text{C}$			2.00		
Gate threshold voltage	$V_{CE} = V_{GE}$, $I_C = 6\text{mA}$		$V_{GE(th)}$	5.0	5.5	6.5	V
Collector leakage current	$V_{CE} = 0\text{V}$, $V_{CE} = 1200\text{V}$		I_{CES}			100	μA
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}		18.1		nF
Output capacitance			C_{oes}		0.44		nF
Turn-on delay time, inductive load	$V_{CC} = 600\text{V}$, $I_C = 150\text{A}$, $R_G = 6.8\Omega$, $V_{GE} = \pm 15\text{V}$, $T_{vj} = 25^\circ\text{C}$		$t_{d(on)}$		174.4		ns
Rise time, inductive load			t_r		84.8		ns
Turn-off delay time, inductive load			$t_{d(off)}$		361.6		ns
Fall time, inductive load			t_f		32		ns
Turn-on energy loss per pulse			E_{on}		15.7		mJ
Turn-off energy loss per pulse			E_{off}		7.5		mJ
Turn-on delay time, inductive load	$V_{CC} = 600\text{V}$, $I_C = 150\text{A}$, $R_G = 6.8\Omega$, $V_{GE} = \pm 15\text{V}$, $T_{vj} = 125^\circ\text{C}$		$t_{d(on)}$		177.6		ns
Rise time, inductive load			t_r		97.6		ns
Turn-off delay time, inductive load			$t_{d(off)}$		400		ns
Fall time, inductive load			t_f		97.6		ns
Turn-on energy loss per pulse			E_{on}		21.6		mJ
Turn-off energy loss per pulse			E_{off}		9.57		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		1.41		μC
Thermal resistance, junction to case	per IGBT		$R_{th(j-c)}$			0.26	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		$I_{F(AV)}$	150	A
Repetitive peak forward current	$t_P = 1\text{ms}$	I_{FRM}	200	A
I^2t value for fusing	$T_{vj} = 150^\circ\text{C}$, $t_P = 10\text{ms}$, $V_R = 0\text{V}$	I^2t	4500	A^2s

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

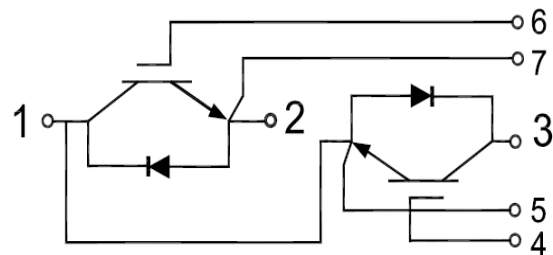
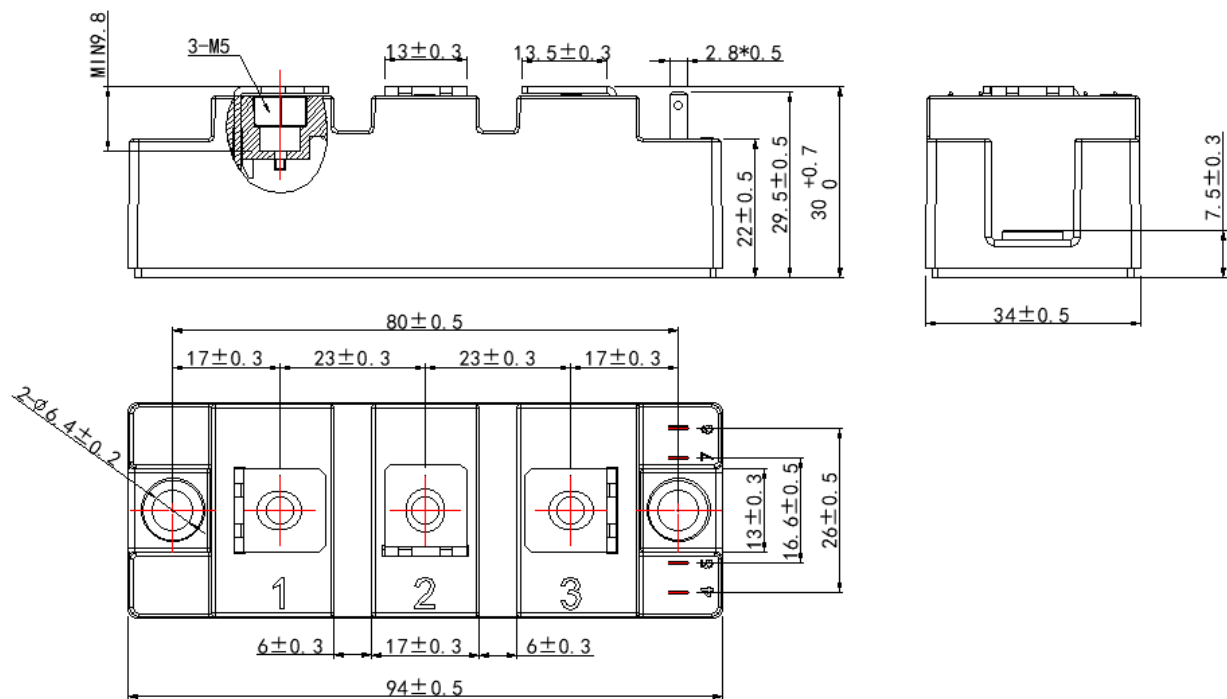
Parameter	Conditions		Symbol	Values			Unit
				Min.	Typ.	Max.	
Forward voltage	I _F = 150A,	T _{vj} = 25°C	V _F		2.10	2.30	V
		T _{vj} = 125°C			1.70		
Peak reverse recovery current	I _F = 150A, di/dt = 2000A/μs, V _R = 600V, V _{GE} = -15V	T _{vj} = 25°C	I _{RM}		62.31		A
		T _{vj} = 125°C			92.38		
Recovered charge		T _{vj} = 25°C	Q _{rr}		4.89		μC
		T _{vj} = 125°C			15.62		
Reverse Recovery energy		T _{vj} = 25°C	E _{rec}		1.48		mJ
		T _{vj} = 125°C			3.42		
Thermal resistance, junction to case	per diode		R _{th(j-c)}			0.36	K/W
Temperature under switching conditions			T _{vj op}	-40		150	°C

**Module Characteristics**

Parameter	Conditions	Symbol	Values			Unit
			Min.	Typ.	Max.	
Isolation voltage (All terminals shorted)	f = 50Hz, 1minute	V_{iso}	3.0			kV
Maximum junction temperature		T_J			175	°C
Thermal resistance, case to heatsink	per module	$R_{th(c-s)}$		0.05		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
JMG150HF12G1S1	JMG150HF12G1S1	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

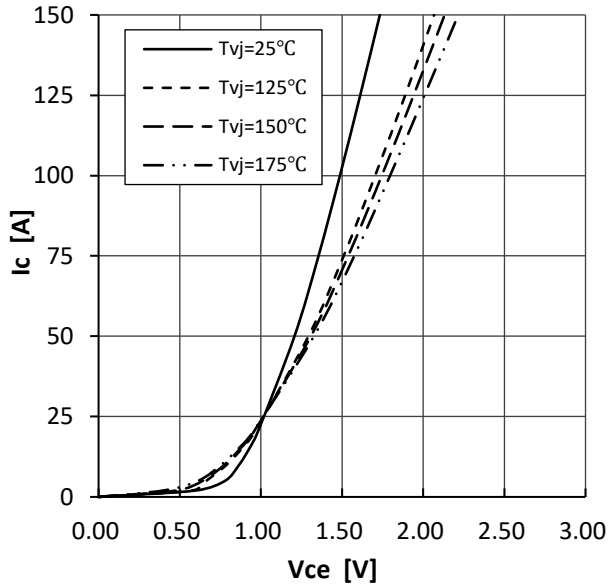


Fig 2. IGBT Output Characteristics,
Inverter(typical)

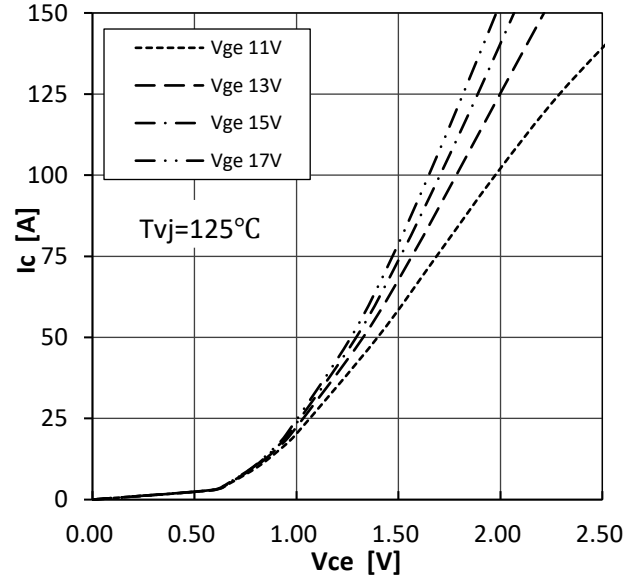


Fig 3. IGBT Switching Loss vs. Ic,
Inverter(typical)
Rg=6.8 Ω, VCE=600 V, VGE=±15 V

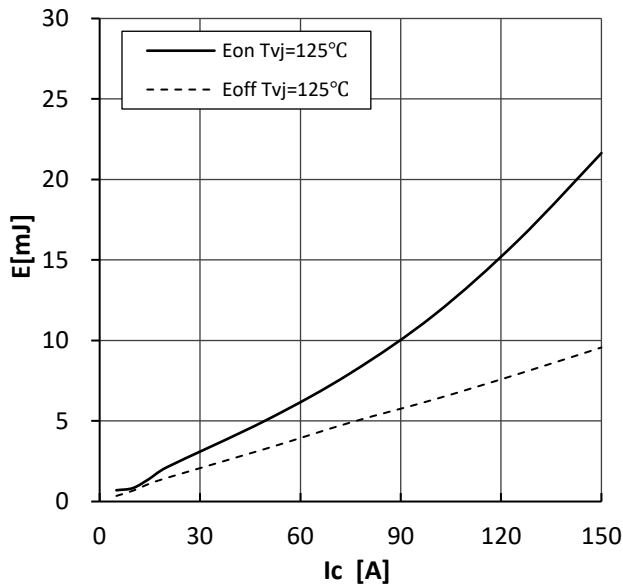


Fig 4. IGBT Switching Loss vs. Rg,
Inverter(typical)
Ic=150 A, VCE=600 V, VGE=±15 V

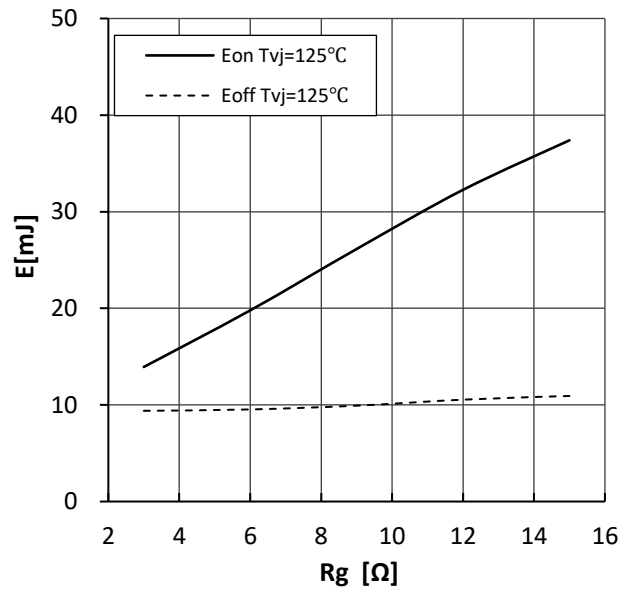


Fig 5. Reverse bias safe operating area, IGBT, Inverter(RBSOA)

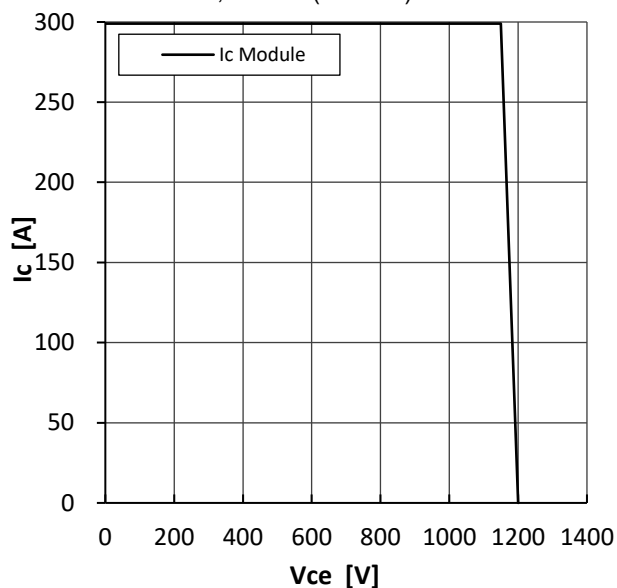


Fig 6. FRED Forward Characteristics, Inverter(typical)

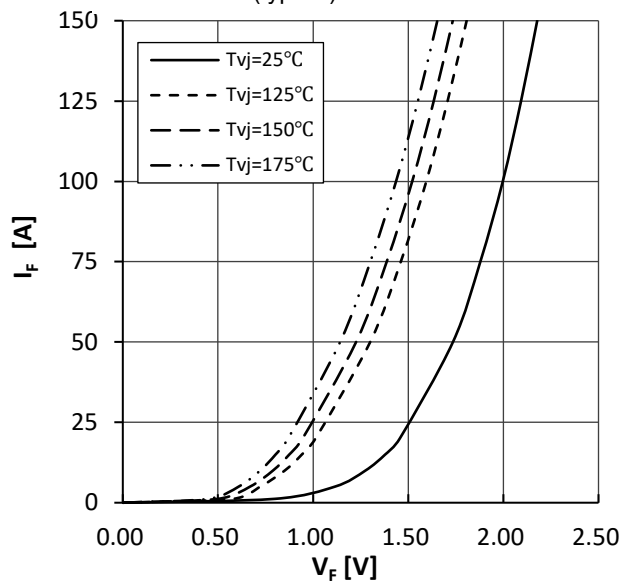


Fig 7. FRED FRED Switching Loss vs. Ic, Inverter(typical)
Rg=6.8 Ω , VCE=600 V

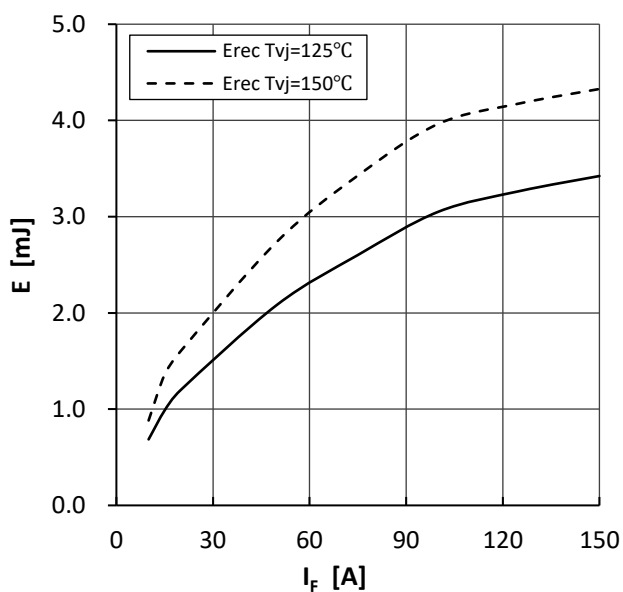
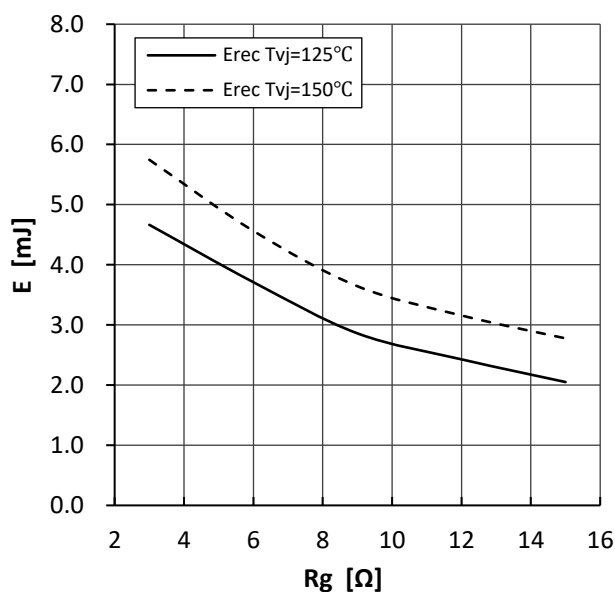


Fig 8. FRED Switching Loss vs. Rg, Inverter(typical)
Ic=150 A, VCE=600 V





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