

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

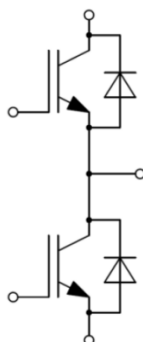
- Short Circuit Rated 10 μ s
- Low Stray Inductance
- Low Saturation Voltage
- Ultra Low loss
- HI-REL Power Terminals
- Lead Free, Compliant with RoHS Requirement

Applications

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

Product Summary

Parameter	Value	Unit
V_{CES}	1200	V
$I_C(@ T_C = 100^{\circ}C)$	200	A
$I_{CRM}(@ t_P = 1ms)$	400	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	324	A
	$T_C = 100^{\circ}C$	$I_{C\ nom}$	200	
Repetitive peak collector current	$t_P = 1ms$	I_{CRM}	400	A
Total power dissipation	$T_C = 25^{\circ}C, T_{vj\ max} = 175^{\circ}C$	P_{tot}	1181	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	$I_C = 200\text{A}$, $V_{GE} = 15\text{V}$	$T_{vj} = 25^\circ\text{C}$	$V_{CE(sat)}$		1.80	2.20	V
		$T_{vj} = 125^\circ\text{C}$			2.10		
Gate threshold voltage	$V_{CE} = V_{GE}$, $I_C = 8\text{mA}$		$V_{GE(th)}$	5.6	6.2	6.8	V
Collector leakage current	$V_{GE} = 0\text{V}$, $V_{CE} = 1200\text{V}$		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}		21.6		nF
Output capacitance			C_{oes}		0.59		nF
Turn-on delay time, inductive load	$V_{CC} = 600\text{V}$, $I_C = 200\text{A}$, $R_G = 6.9\Omega$, $V_{GE} = \pm 15\text{V}$, $T_{vj} = 25^\circ\text{C}$		$t_{d(on)}$		225		ns
Rise time, inductive load			t_r		128		ns
Turn-off delay time, inductive load			$t_{d(off)}$		440		ns
Fall time, inductive load			t_f		25		ns
Turn-on energy loss per pulse			E_{on}		34.94		mJ
Turn-off energy loss per pulse			E_{off}		10.53		mJ
Turn-on delay time, inductive load	$V_{CC} = 600\text{V}$, $I_C = 200\text{A}$, $R_G = 6.9\Omega$, $V_{GE} = \pm 15\text{V}$, $T_{vj} = 125^\circ\text{C}$		$t_{d(on)}$		233		ns
Rise time, inductive load			t_r		145		ns
Turn-off delay time, inductive load			$t_{d(off)}$		489		ns
Fall time, inductive load			t_f		41		ns
Turn-on energy loss per pulse			E_{on}		45.74		mJ
Turn-off energy loss per pulse			E_{off}		13.32		mJ
SC data	$t_p \leq 10\mu\text{s}$, $V_{GE} = 15\text{V}$, $V_{CC} = 900\text{V}$, $V_{CEM} \leq 1200\text{V}$, $T_{vj} = 125^\circ\text{C}$		I_{sc}		1120		A
Gate charge	$V_{GE} = -15 \dots +15\text{V}$		Q_G		1.68		uC
Thermal resistance, junction to case	per IGBT		$R_{th(j-c)}$			0.13	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		$I_{F(AV)}$	200	A
Repetitive peak forward current	$t_P = 1\text{ms}$	I_{FRM}	400	A

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

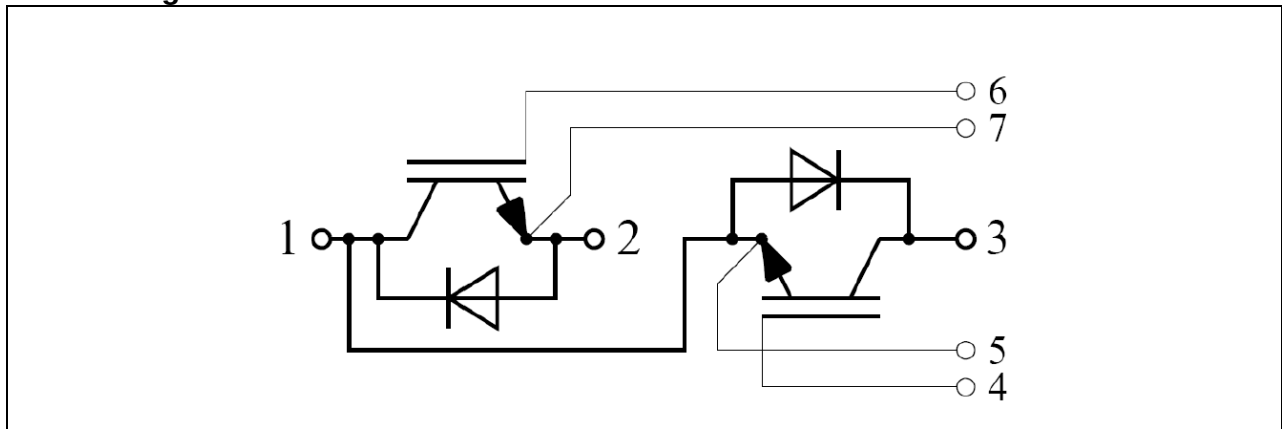
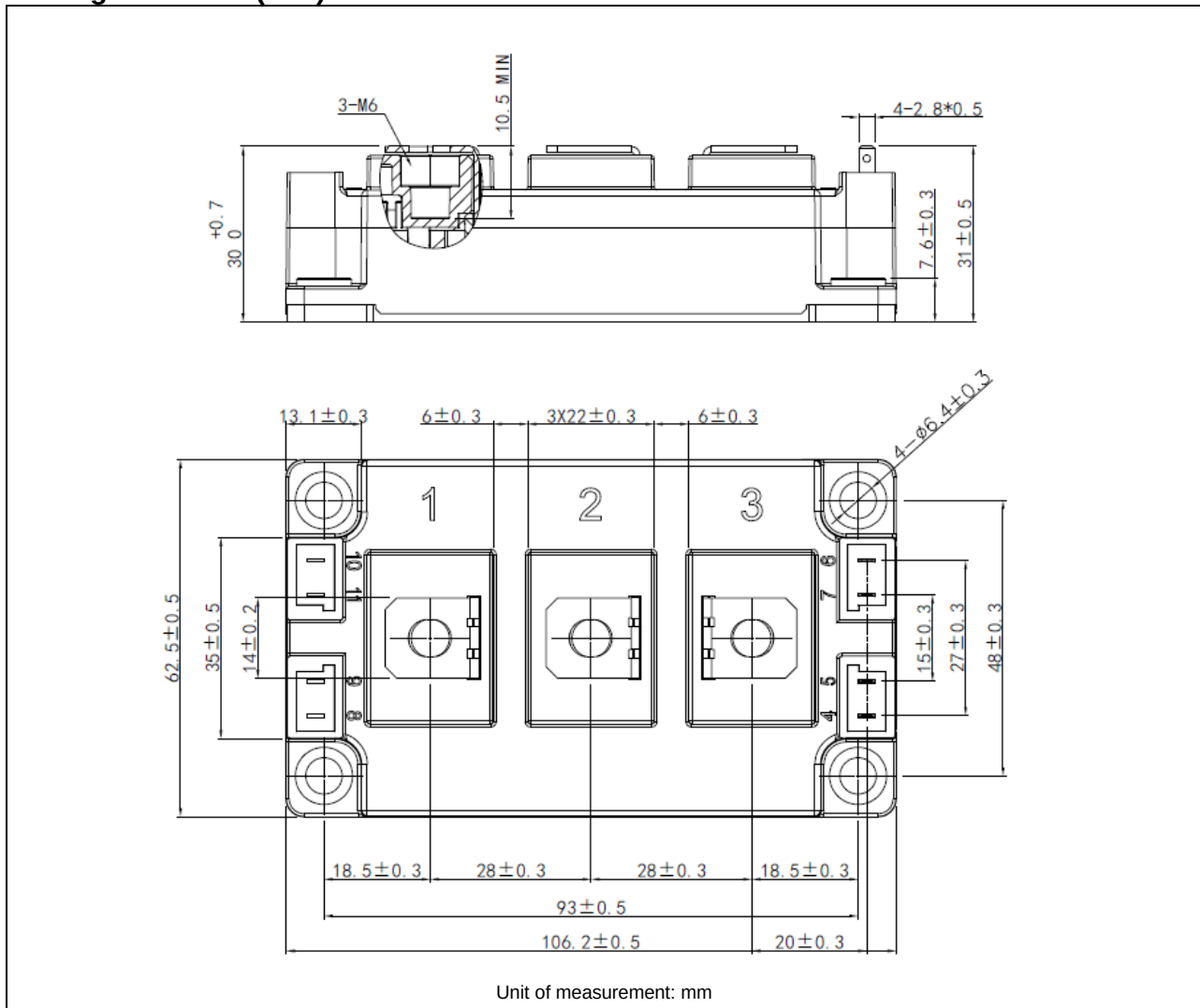
Parameter	Conditions		Symbol	Values			Unit
				Min.	Typ.	Max.	
Forward voltage	I _F = 200A	T _{vj} = 25°C	V _F		2.00	2.30	V
		T _{vj} = 125°C			1.60		
Peak reverse recovery current	I _F = 200A, di/dt = 1100A/μs, V _R = 600V, V _{GE} = -15V	T _{vj} = 25°C	I _{RM}		39.4		A
		T _{vj} = 125°C			63.7		
Recovered charge		T _{vj} = 25°C	Q _{rr}		7.09		μC
		T _{vj} = 125°C			19.1		
Reverse Recovery energy		T _{vj} = 25°C	E _{rec}		2.04		mJ
		T _{vj} = 125°C			5.27		
Thermal resistance, junction to case	per Diode		R _{th(j-c)}			0.2	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}	2.5			kV
Maximum junction temperature		T_J			175	°C
Thermal resistance, case to heatsink	per module	$R_{th(c-s)}$		0.01		K/W
Storage temperature		T_{stg}	-40		125	°C
Mounting torque	M6	M	2.5		5.0	N·m
Terminal connection torque	M6	M	3.0		6.0	N·m

Ordering Information

Device	Marking	Package	Weight	Inner Box	Per Carton
JMG200HF12G2S1	JMG200HF12G2S1	G2	300g/PCS	12PCS	60PCS

Circuit Diagram

Package Outlines (mm)


Typical Electrical & Thermal Characteristics

Fig 1. IGBT Output Characteristics
Inverter (typical) $V_{GE}=15\text{ V}$

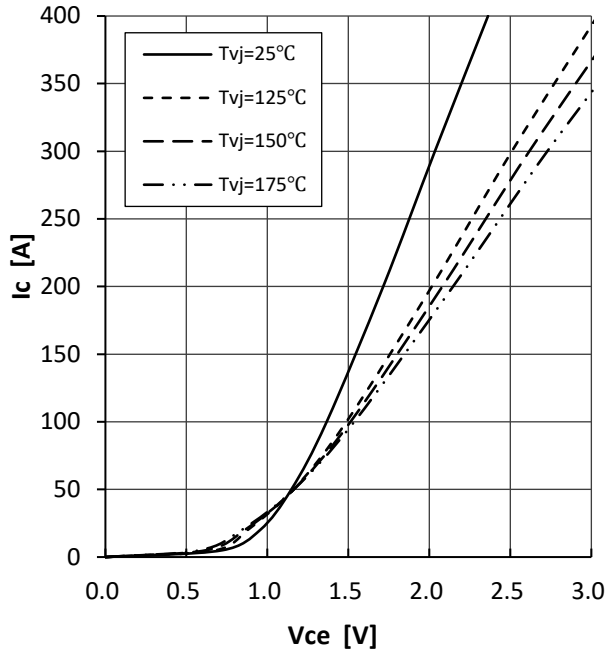


Fig 2. IGBT Output Characteristics
Inverter (typical)

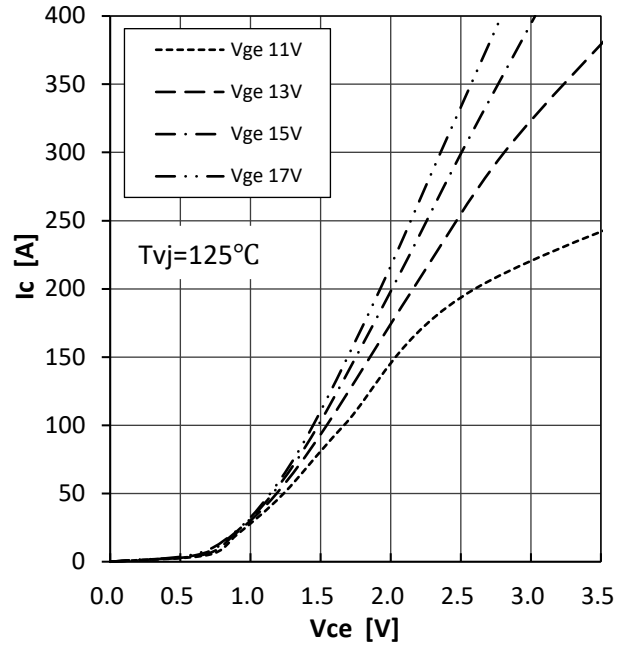


Fig 3. IGBT Transfer Characteristics
Inverter (typical) $V_{CE}=20\text{ V}$

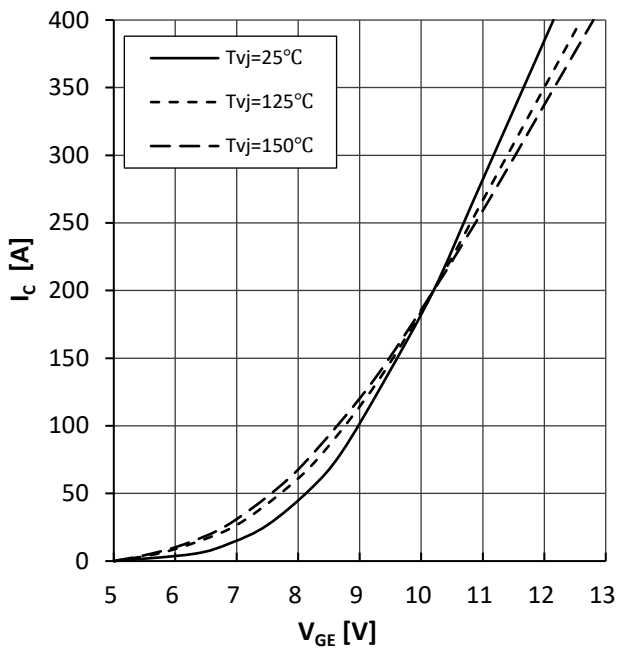


Fig 4. IGBT Switching Loss vs I_c
Inverter (typical)
 $R_g=6.9\ \Omega$, $V_{CE}=600\text{ V}$, $V_{GE}=\pm 15\text{ V}$

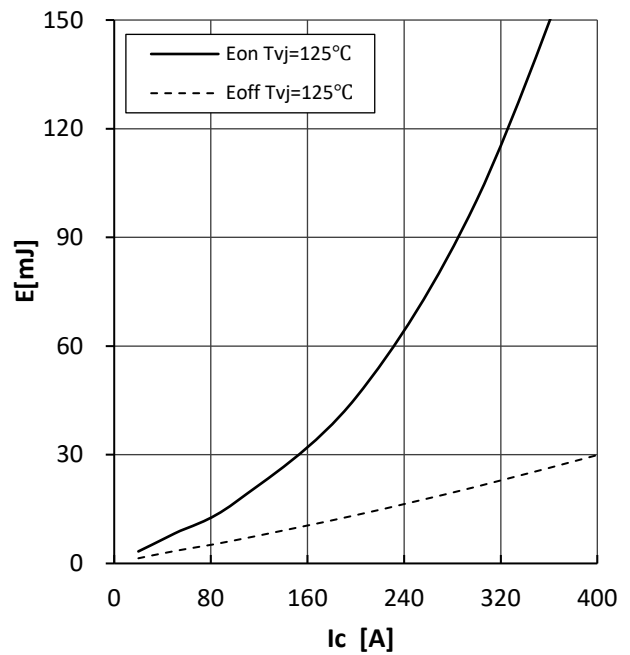


Fig 5. IGBT Switching Loss vs. R_g ,
Inverter (typical)
 $I_c=200$ A, $V_{CE}=600$ V, $V_{GE}=\pm 15$ V

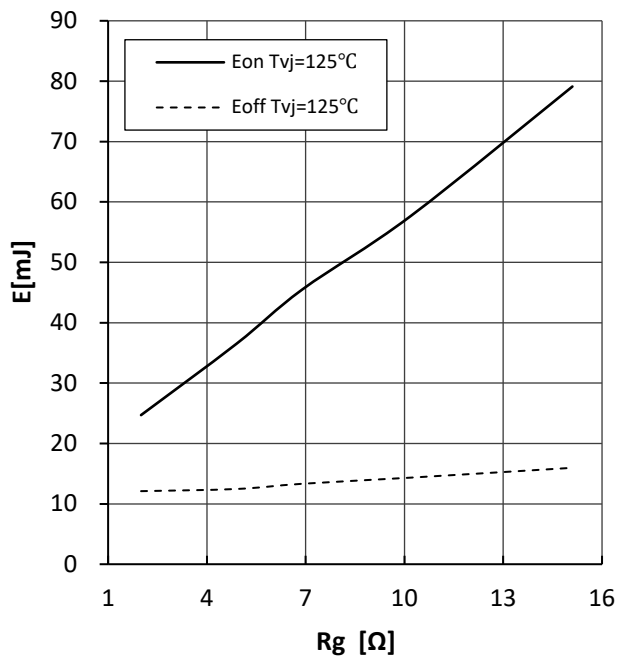


Fig 6. Reverse bias safe operating area
IGBT, Inverter (RBSOA)

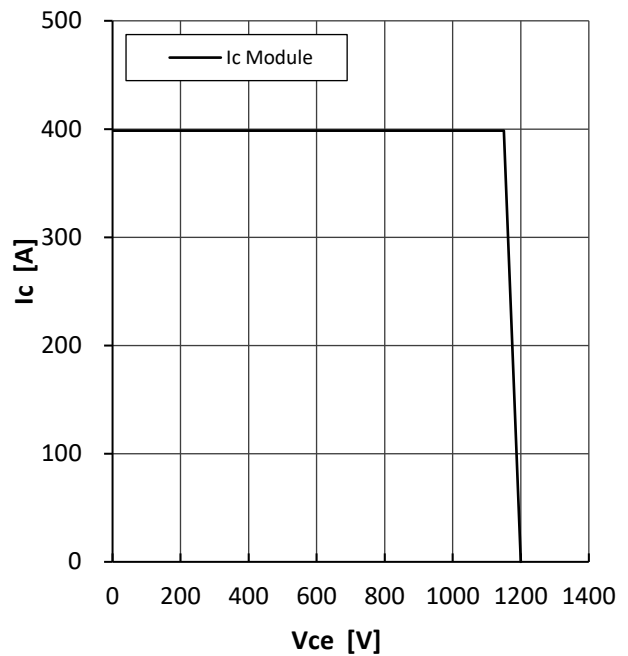


Fig 7. FRED Forward Characteristics,
Inverter (typical)

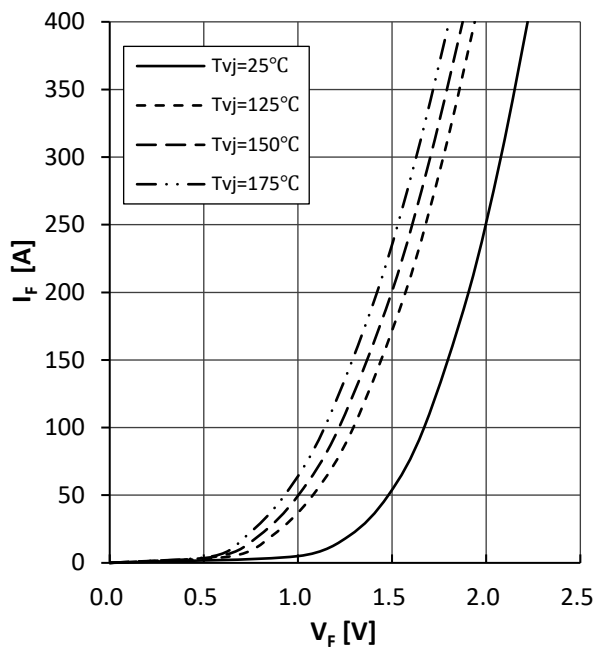


Fig 8. FRED Switching Loss vs. I_c ,
Inverter (typical)
 $R_g=6.9$ Ω, $V_{CE}=600$ V

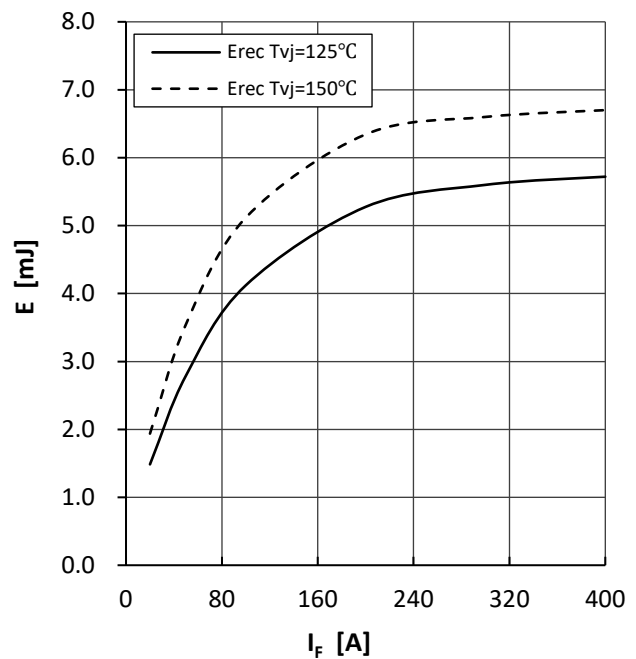
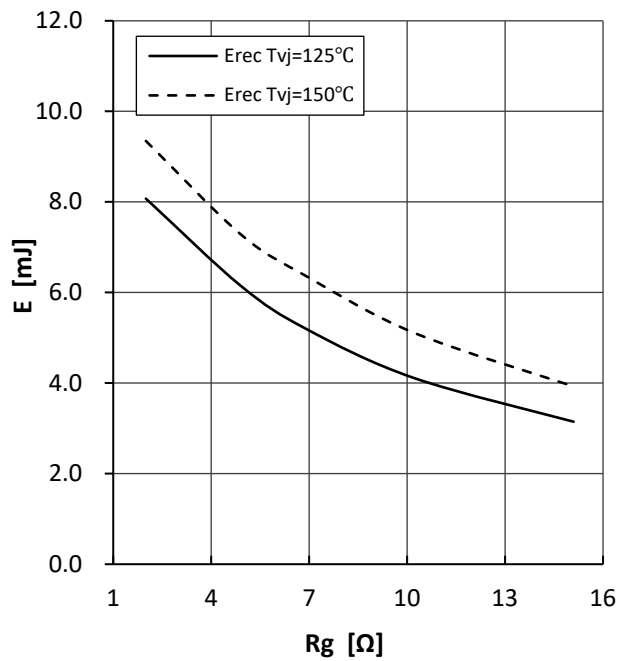


Fig 9. FRED Switching Loss vs. R_g ,
Inverter (typical)
 $I_c=200$ A, $V_{CE}=600$ V





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