Trench FS IGBT

Features

- High Power Density
- High mechanical robustness
- Compact design
- Isolated heatsink using DBC technology
- Very low forward voltage drops
- Fast & soft reverse recovery anti-parallel FWD

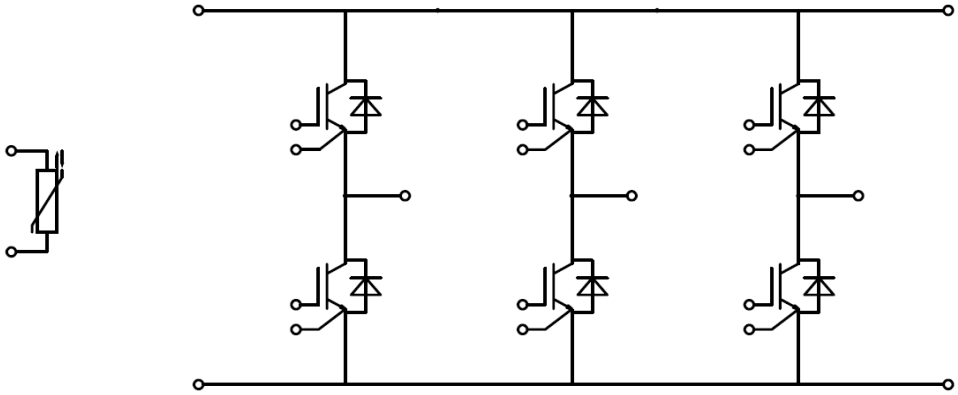
Product Summary

Parameter	Value	Unit
V_{CES}	1200	V
I_C(@ T_C= 100℃)	100	A
I_{CRM}(@ t_P= 1ms)	200	A
$V_{CE(sat)}$(Typ)	1.90	V

Applications

- AC and DC servo drive amplifier
- UPS (Uninterruptible Power Supplies)
- Motor Drives





IGBT, Inverter Absolute Maximum Ratings (@ T_C = 25°C unless otherwise specified)

Parameter	Conditions	Symbol	Values	Unit
Collector-emitter voltage	T_{vj} = 25°C	V_{CES}	1200	V
Gate-emitter peak voltage		V_{GES}	±20	V
Continuous collector current	T_C = 100°C	I_C	100	A
Repetitive peak collector current	t_P = 1ms	I_{CRM}	200	A
Total power dissipation	T_C = 25°C, T_{vj} = 175°C	P_{tot}	517	W

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IGBT, Inverter Electrical Characteristics (@ T_C = 25°C unless otherwise specified)

Parameter	Conditions		Symbol	Values			Unit
				Min.	Typ.	Max.	
Collector-emitter saturation voltage	I_C = 100A, V_{GE} = 15V	T_{vj} = 25°C	$V_{CE(sat)}$		1.90	2.30	V
		T_{vj} = 125°C			2.25		
		T_{vj} = 150°C			2.35		
Gate threshold voltage	V_{CE}=V_{GE}, I_C=4.0mA		$V_{GE(th)}$	5.4	6.0	6.6	V
Gate-emitter leakage current	V_{CE} = 0V, V_{GE} = 20V		I_{GES}			100	nA
Collector leakage current	V_{CE}=1200V，V_{GE}=0V		I_{CES}			1	mA
Input capacitance	f = 1MHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V		C_{ies}		10.4		nF
Reverse transfer capacitance			C_{res}		0.29		nF
Gate charge	V_{GE} = -15V…+15V		Q_G		0.78		μC
Internal gate resistor			R_{Gint}		3.0		Ω
Turn-on delay time, inductive load	V_{CE} = 600V, I_C = 100A, R_G =2Ω, V_{GE} = ±15V, T_{vj} = 25℃		$t_{d(on)}$		128		ns
Rise time, inductive load			t_r		80		ns
Turn-off delay time, inductive load			$t_{d(off)}$		195		ns
Fall time, inductive load			t_f		38		ns
Turn-on energy loss per pulse			E_{on}		8.15		mJ
Turn-off energy loss per pulse			E_{off}		3.92		mJ
Turn-on delay time, inductive load	V_{CE} = 600V, I_C = 100A, R_G =2Ω, V_{GE} = ±15V, T_{vj} = 125℃		$t_{d(on)}$		144		ns
Rise time, inductive load			t_r		93		ns
Turn-off delay time, inductive load			$t_{d(off)}$		235		ns
Fall time, inductive load			t_f		62		ns
Turn-on energy loss per pulse			E_{on}		13.9		mJ
Turn-off energy loss per pulse			E_{off}		5.15		mJ
SC Data	tp≤10us，V_{GE}≤15V，V_{CC}=900V, V_{CEM}≤1200V T_{vj}=125℃		I_{SC}		550		A
Thermal resistance, junction to case	per IGBT		$R_{th(j-c)}$			0.29	K/W
Temperature under switching conditions			$T_{vj\ op}$	-40		150	℃

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FRED, Inverter Absolute Maximum Ratings (@ T_C = 25°C unless otherwise specified)

Parameter	Conditions	Symbol	Values	Unit
Repetitive peak reverse voltage	T_{vj} = 25°C	V_{RRM}	1200	V
Continuous DC forward current		I_F	100	A
Repetitive peak forward current	t_P = 1ms	I_{FRM}	200	A
I^2t value for fusing	t = 10ms, V_R = 0V, T_{vj} =150°C,	I^2t	1800	A^2s

FRED, Inverter Electrical Characteristics (@ T_C = 25°C unless otherwise specified)

Parameter	Conditions		Symbol	Values			Unit
				Min.	Typ.	Max.	
Forward voltage	I_F = 100A, V_{GE} = 0V	T_{vj} = 25°C	V_F		2.10	2.40	V
		T_{vj} = 125°C			1.80		
		T_{vj} = 150°C			1.70		
Peak reverse recovery current	I_F=100A, V_R=600V, V_{GE}=-15V, di/dt=900A/μs	T_{vj} = 25°C	I_{RM}		46		A
		T_{vj} = 125°C			62		
Recovery charge		T_{vj} = 25°C	Q_{rr}		4.27		μC
		T_{vj} = 125°C			10.75		
Peak reverse recovery energy		T_{vj} = 25°C	Erec		1.36		mJ
		T_{vj} = 125°C			3.03		
Thermal resistance, junction to case	per diode		$R_{th(j-c)}$			0.50	K/W
Temperature under switching conditions			$T_{vj\ op}$	-40		150	℃

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NTC-Thermistor Characteristics (@ T_C = 25°C unless otherwise specified)

Parameter	Conditions	Symbol	Values			Unit
			Min.	Typ.	Max.	
Rated resistance	T_C=25℃	R_{25}		5		KΩ
Deviation of R100	T_C = 100°C, R_{100} = 493 Ω	△R/R	-5		5	%
Power dissipation	T_C = 25°C	P_{25}			20	mW
B-value	$R_2 = R_{25} \exp [B25/50(1/T2 - 1/(298,15\ K))]$	$B_{25/50}$		3375		K
B-value	$R_2 = R_{25} \exp [B25/80(1/T2 - 1/(298,15\ K))]$	$B_{25/80}$		3411		K
B-value	$R_2 = R_{25} \exp [B25/100(1/T2 - 1/(298,15\ K))]$	$B_{25/100}$		3433		K

Module Characteristics

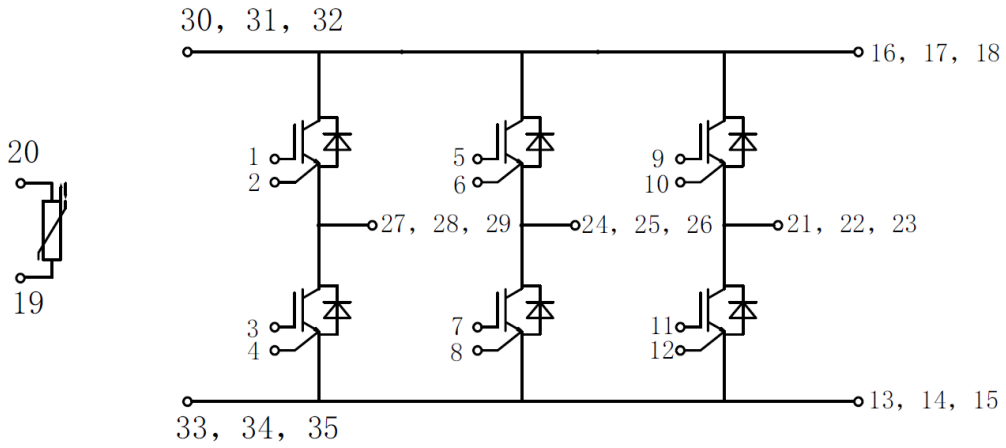
Parameter	Conditions	Symbol	Values			Unit
			Min.	Typ.	Max.	
Isolation Voltage (All Terminals Shorted)	RMS, f = 50Hz,1minute	V_{iso}	2.5			KV
Thermal resistance, case to heatsink	per module	$R_{th(c-s)}$		0.009		K/W
Maximum Junction Temperature	Inverter, brake-chopper	$T_{vj\ max}$			175	℃
Stray inductance module		L_{SCE}		60		nH
Module lead resistance, terminals - chip	per switch	$R_{CC'+EE'}$		4		mΩ
		$R_{AA'+CC'}$		2		mΩ
Storage Temperature		T_{stg}	-40		125	℃
Mounting torque	Module and heatsink fixed torque M5	M	3.0		6.0	N m

Ordering Information

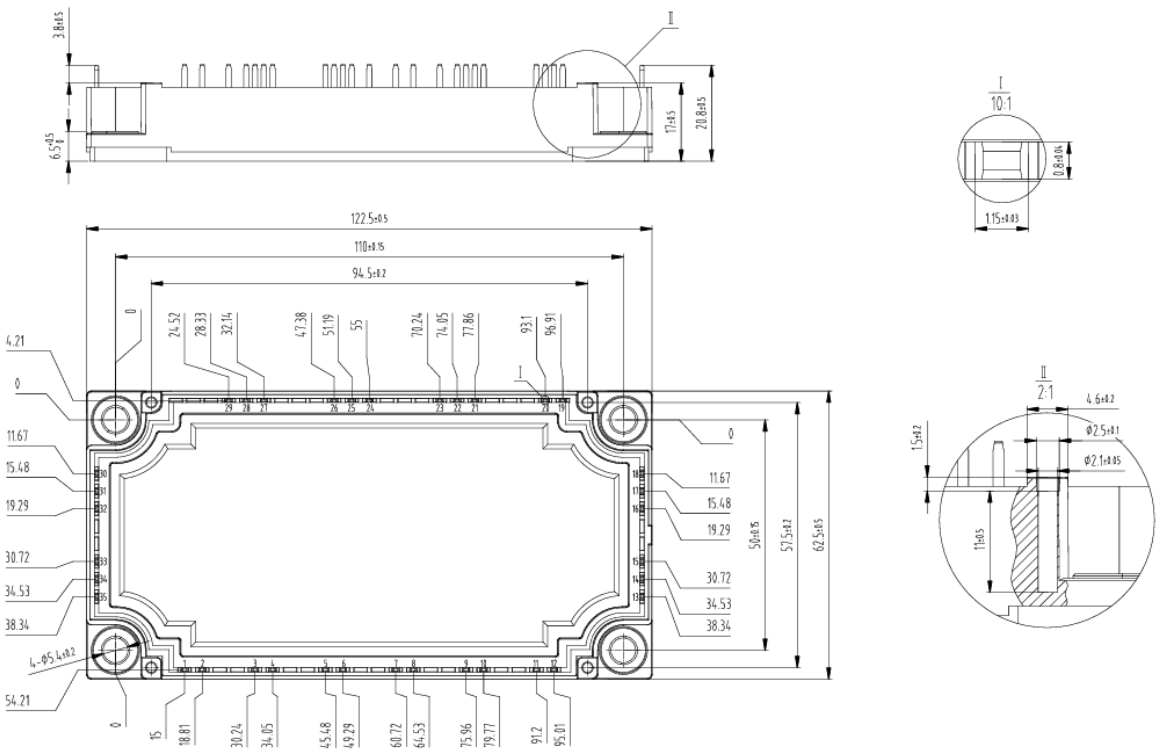
Device	Marking	Package	Weight	Inner Box	Per Carton
JMG100TF12P3S1	JMG100TF12P3S1	P3	300g/PCS	10PCS	50PCS

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Circuit Diagram



Package Outlines (mm)



Unit of measurement: mm

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Typical Electrical & Thermal Characteristics

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

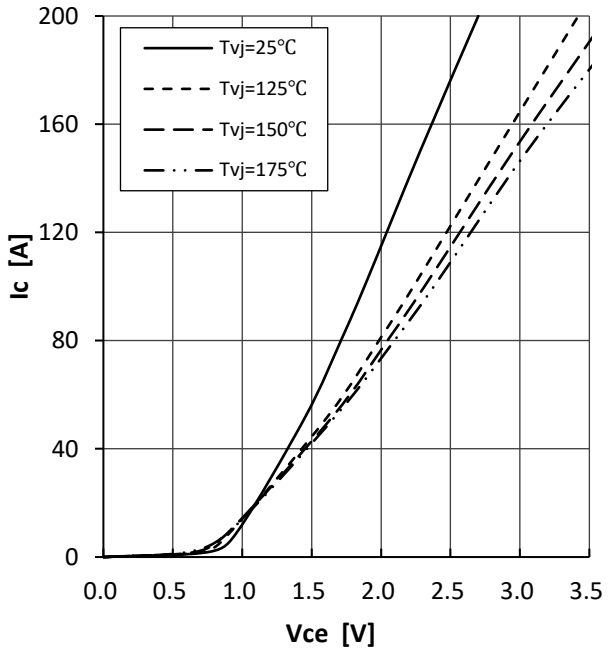


Fig 2. IGBT Output Characteristics
Inverter (typical)

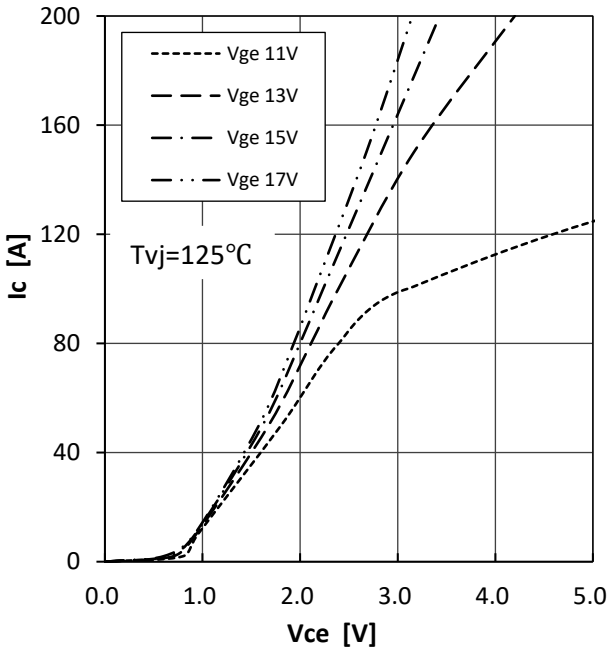


Fig 3. IGBT Transfer Characteristics
Inverter (typical) VCE=20 V

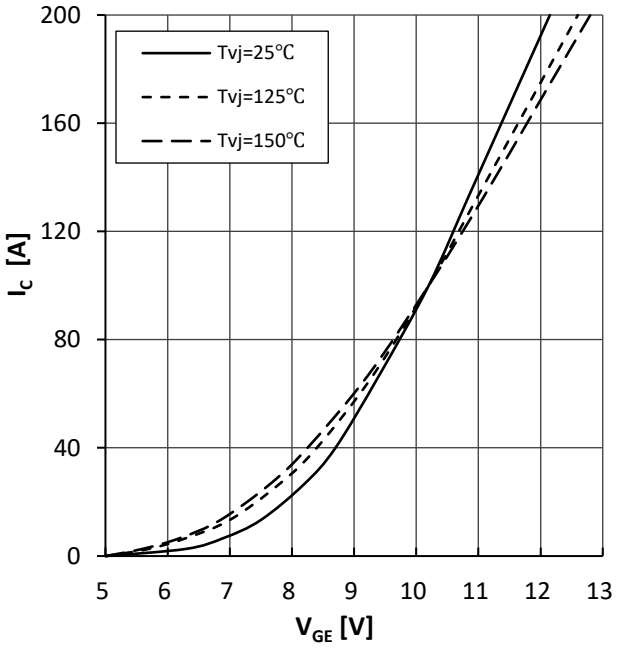
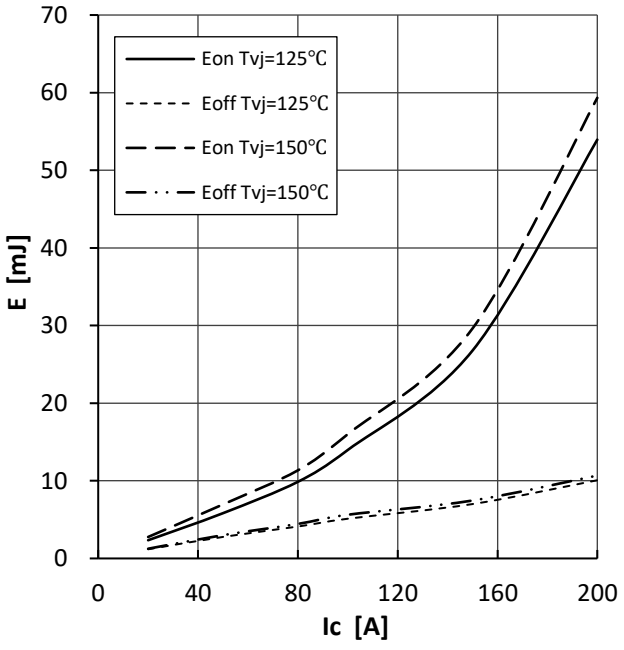


Fig 4. IGBT Switching Loss vs Ic
Inverter (typical)
Rg=2 Ω, VCE=600 V, VGE=±15 V



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Fig 5. IGBT Switching Loss vs. Rg,
Inverter (typical）
Ic=100 A, VCE=600 V, VGE=±15 V

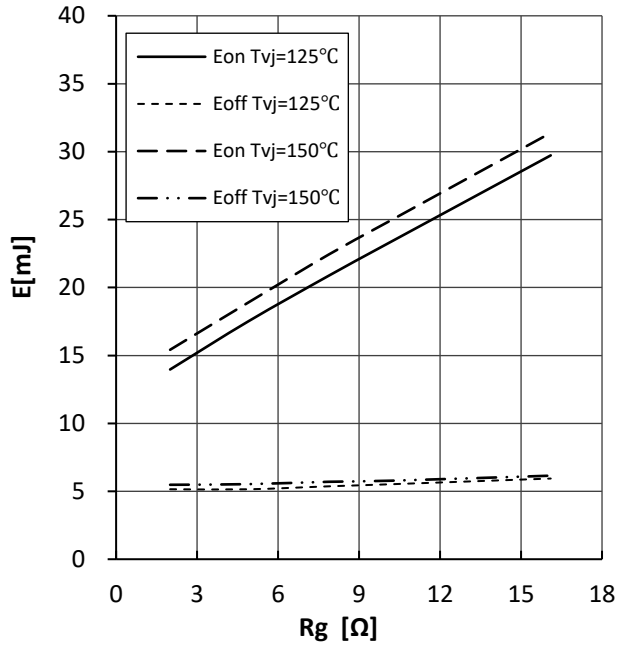


Fig 6. IGBT Transient Thermal Impedance
Inverter

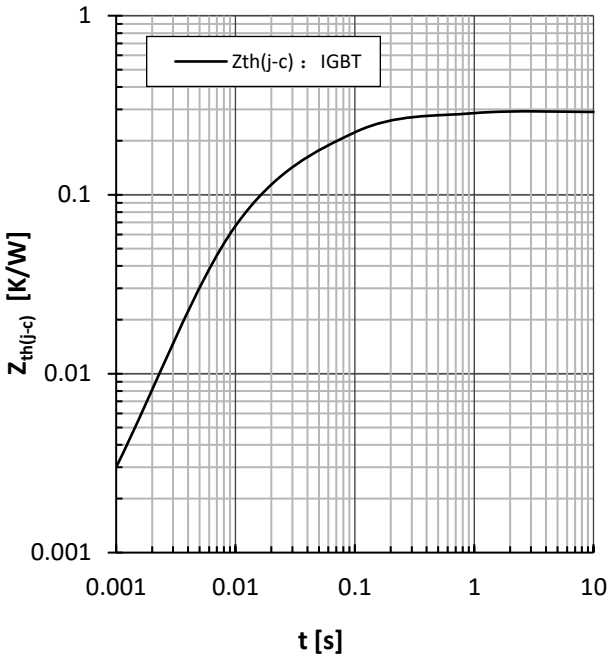


Fig 7. Reverse bias safe operating area
IGBT, Inverter (RBSOA)

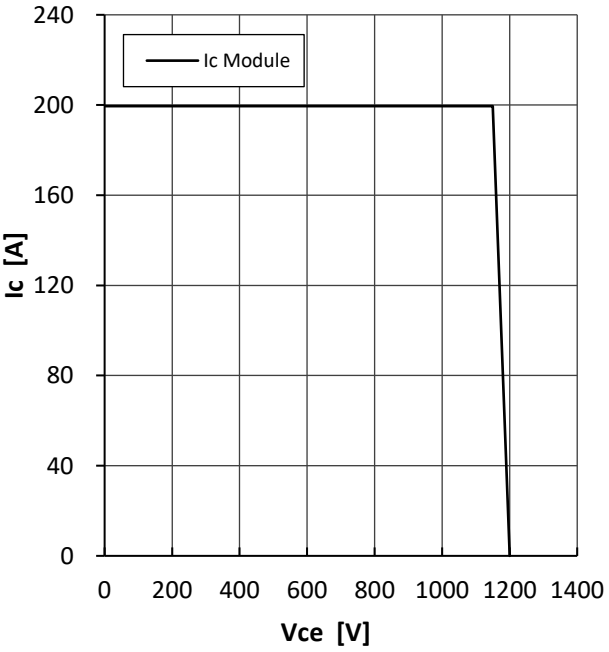
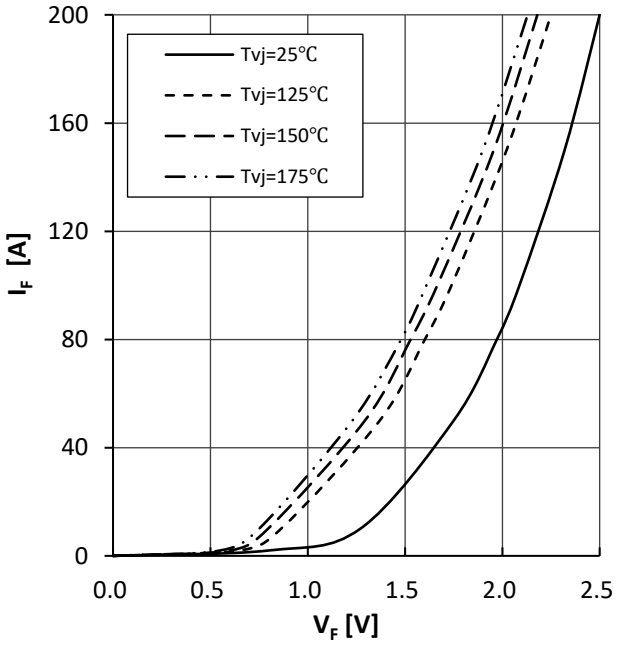


Fig 8. FRED Forward Characteristics,
Inverter (typical)



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Fig 9. FRED Switching Loss vs. Ic,
Inverter (typical)
Rg=2 Ω, VCE=600 V

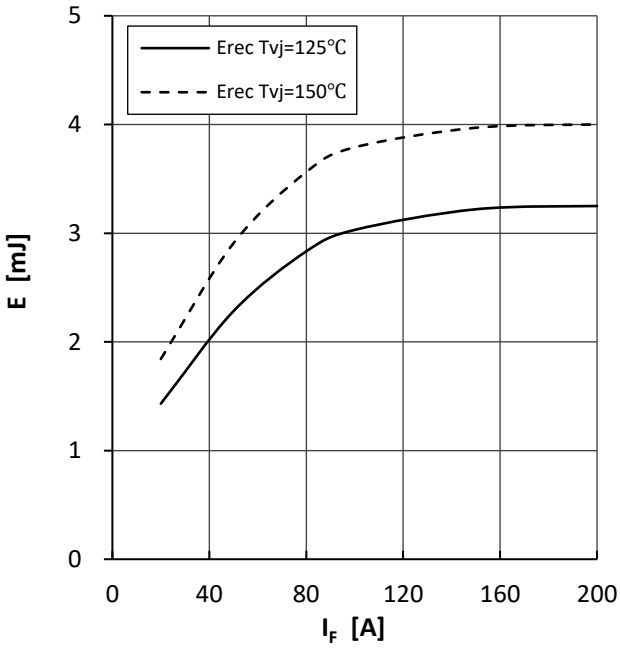


Fig 10. FRED Switching Loss vs. Rg,
Inverter (typical)
Ic=100 A, VCE=600 V

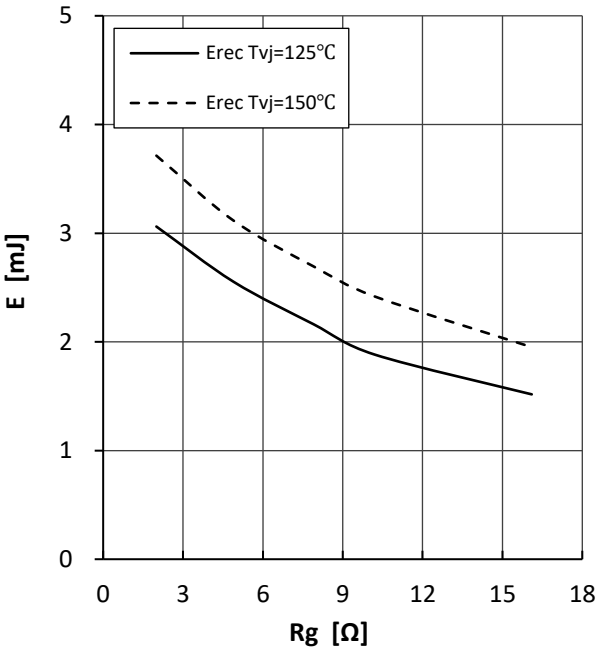


Fig 11. FRED Transient Thermal Impedance
Inverter

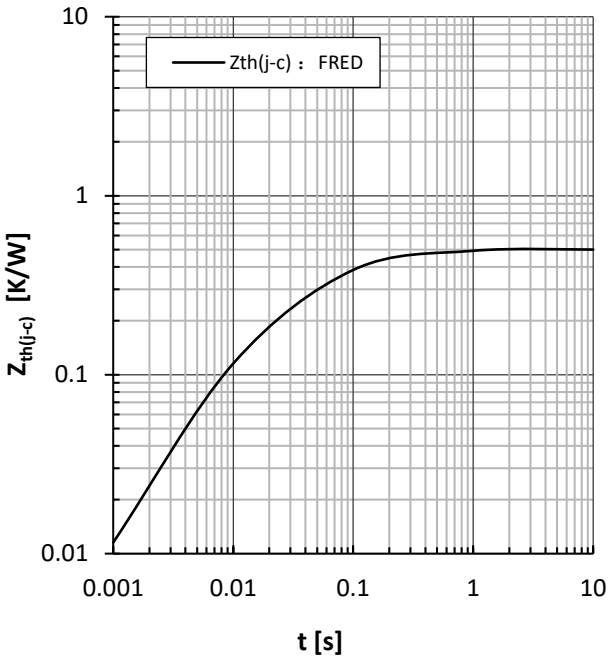
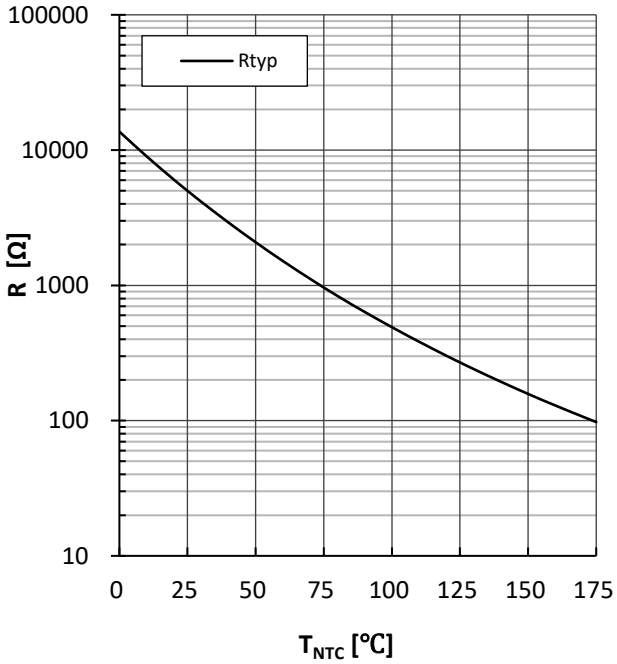


Fig 12. Temperature characteristics,
NTC thermistor (typical)



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