JMG180HL16P2S1

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

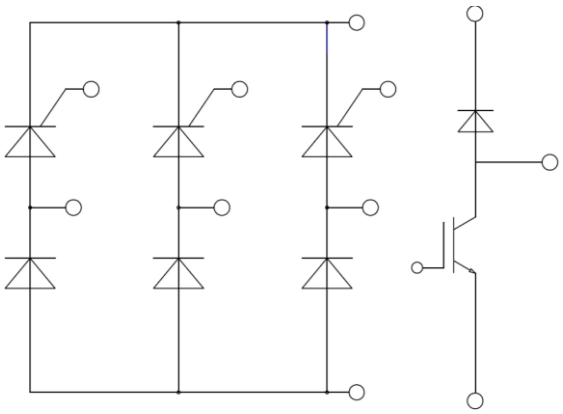
Product Summary

3~Rectifier	Brake Chopper
V_{RRM}=1600V	V_{CES} =1200V
$I_{D\ (AV)}$ =180A	I_C(@ T_C= 100℃)=100A
I_{FSM}=1600A	$V_{CE(sat)}$(Typ)=1.60V

Applications

- Active Rectifier
- Half Controlled B6-bridge
- Motor Drives





IGBT, Brake-Chopper 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, Tvj = 175°C	$I_{C\ nom}$	100	A
Repetitive peak collector current	t_P = 1ms	I_{CRM}	200	A
Total power dissipation	T_C = 25°C, $T_{vj\ max}$ = 175°C	P_{tot}	517	W

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IGBT, Brake-Chopper 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	$V_{CE(sat)}$		1.60	2.00	V
		T_{vj} = 125°C			1.85		
		T_{vj} = 150°C			1.90		
Gate threshold voltage	V_{CE}=V_{GE}, I_C=3.55mA		$V_{GE(th)}$	5.4	6.0	6.6	V
Gate-emitter leakage current	V_{CE} = 0V, V_{GE} = 20V		I_{GES}			400	nA
Collector leakage current	V_{CE}=1200V， V_{GE}=0V		I_{CES}			1.0	mA
Input capacitance	f = 1MHz, Tvj = 25°C, V_{CE} = 25 V, V_{GE} = 0 V		C_{ies}		6.30		nF
Reverse transfer capacitance			C_{res}		0.27		nF
Gate charge	V_{GE} = -15V…+15V		Q_G		0.80		uC
Internal gate resistor			R_{Gint}		7.5		Ω
Turn-on delay time, inductive load	V_{CC} = 600V, I_C = 100A, R_G = 6.9Ω, V_{GE} = ±15V, Tvj = 25℃		$t_{d(on)}$		224		ns
Rise time, inductive load			t_r		99		ns
Turn-off delay time, inductive load			$t_{d(off)}$		363		ns
Fall time, inductive load			t_f		32		ns
Turn-on energy loss per pulse			E_{on}		12.9		mJ
Turn-off energy loss per pulse			E_{off}		4.6		mJ
Turn-on delay time, inductive load	V_{CC} = 600V, I_C = 100A, R_G =6.9Ω, V_{GE} = ±15V, Tvj = 125℃		$t_{d(on)}$		230		ns
Rise time, inductive load			t_r		104		ns
Turn-off delay time, inductive load			$t_{d(off)}$		400		ns
Fall time, inductive load			t_f		89		ns
Turn-on energy loss per pulse			E_{on}		20.2		mJ
Turn-off energy loss per pulse			E_{off}		6.1		mJ
SC data	tp≤10us， V_{GE}≤15V， V_{CC}=900V, V_{CEM}≤1200V T_{vj}=125℃		I_{SC}		770		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, Brake-Chopper Absolute Maximum Ratings (@ T_C = 25°C unless otherwise specified)

Parameter	Conditions	Symbol	Values	Unit
Repetitive peak reverse voltage	Tvj = 25°C	V_{RRM}	1200	V
Continuous DC forward current		I_F	50	A
Repetitive peak forward current	t_P = 1ms	I_{FRM}	100	A
I^2t value for fusing	V_R=0V t_P = 10 ms, Tvj = 25°C	I^2t	510	A^2s

FRED, Brake-Chopper Electrical Characteristics (@ T_C = 25°C unless otherwise specified)

Parameter	Conditions		Symbol	Values			Unit
				Min.	Typ.	Max.	
Forward voltage	I_F = 50A, V_{GE} = 0V	Tvj = 25°C	V_F		1.65	2.00	V
		Tvj = 125°C			1.30		
		Tvj = 150°C			1.25		
Peak reverse recovery current	I_F = 50A, di/dt=700A/µs, V_R= 600V	Tvj = 25°C	I_{RM}		41.7		A
		Tvj = 125°C			64.4		
		Tvj = 150°C			69.3		
Recovered charge	I_F = 50A, di/dt=700A/µs, V_R= 600V	Tvj = 25°C	Q_{rr}		5.92		uC
		Tvj = 125°C			16.05		
		Tvj = 150°C			19.61		
Reverse recovery energy	I_F = 50A, di/dt=700A/µs, V_R= 600V	Tvj = 25°C	E_{rec}		1.53		mJ
		Tvj = 125°C			4.11		
		Tvj = 150°C			5.12		
Thermal resistance, junction to case	per diode		$R_{th(j-c)}$			0.81	K/W
Temperature under switching conditions			$T_{vj\ op}$	-40		150	℃

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Diode, Rectifier Absolute Maximum Ratings (@ T_C = 25°C unless otherwise specified)

Parameter	Conditions	Symbol	Values	Unit
Repetitive peak reverse voltage	Tvj = 25°C	V_{RRM}	1600	V
Bridge output current	T_C = 80°C	$I_{D(AV)}$	180	A
Repetitive peak forward current	t_P = 10 ms, Tvj = 25°C	I_{FSM}	1600	A
I^2t value for fusing	t_P = 10 ms, Tvj = 25°C	I^2t	12800	A^2s

Diode, Rectifier Electrical Characteristics (@ T_C = 25°C unless otherwise specified)

Parameter	Conditions	Symbol	Values			Unit
			Min.	Typ.	Max.	
Forward voltage	Tvj = 150°C, I_F=150A	V_F		1.20	1.60	V
Reverse current	Tvj = 25°C, V_R=1600V	I_R			100	uA
	Tvj = 150°C, V_R=1600V				20	mA
Threshold voltage	Tvj = 150°C	V_{TO}		0.83		V
Dynamic resistance	Tvj = 150°C	R_d		2.30		mΩ
Thermal resistance, junction to case	per diode	$R_{th(j-c)}$			0.35	K/W

Thyristor Rectifier Absolute Maximum Ratings (@ T_C = 25°C unless otherwise specified)

Parameter	Conditions	Symbol	Values	Unit
Repetitive peak reverse voltage		V_{DRM} /$_{RRM}$	1600	V
Non-repetitive peak reverse voltage	Tvj = 25°C	V_{DSM} /$_{RSM}$	1700	V
Bridge output current	T_C = 80°C	$I_{T(AV)}$	180	A
Repetitive peak forward current	t_P = 10 ms, Tvj = 25°C	I_{FSM}	1550	A
I^2t value for fusing	t_P = 10 ms, Tvj = 25°C	I^2t	12000	A^2s
Critical rate of rise of on-state current		di/dt	100	A/μs
Critical rate of rise of voltage	V_D=2/3V_{DRM} T_J=125℃ Gate Open	dv/dt	1000	V/μs

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Thyristor Rectifier Electrical Characteristics (@ T_C = 25°C unless otherwise specified)

Parameter	Conditions		Symbol	Values			Unit
				Min.	Typ.	Max.	
Forward voltage	Tvj = 125°C, I_F=150A		V_F		1.30	1.60	V
Threshold voltage	Tvj = 125°C		V_{TO}		0.85		V
Dynamic resistance	Tvj = 125°C		R_d		3.20		mΩ
Triggering gate voltage	V_D=12V R_L=30Ω		V_{GT}			2	V
Triggering gate current	V_D=12V R_L=30Ω		I_{GT}			100	mA
Holding current	I_T=1A		I_H			220	mA
Latching current	I_G=1.2 I_{GT}		I_L			550	mA
Non triggering gate voltage	V_D=V_{DRM} T_{vj}=125℃		V_{GD}			0.3	V
Repetitive peak reverse current	V_D=V_{DRM} V_R=V_{RRM}	Tvj = 25°C	I_D/I_R			0.5	mA
		Tvj = 125°C	I_D/I_R			10	mA
Thermal resistance, junction to case	per diode		R_{thJC}			0.30	K/W
Temperature under switching conditions			T_{VjOP}	-40		125	℃

Module Characteristics

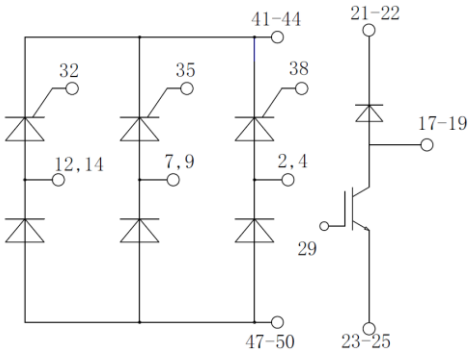
Parameter	Conditions	Symbol	Values			Unit
			Min.	Typ.	Max.	
Isolation Voltage (All Terminals Shorted)	RMS, f = 50Hz,1minute	V_{iso}	2.5			kV
Thermal resistance, case to heatsink	per Module	$R_{th(c-s)}$		0.02		K/W
Maximum Junction Temperature	brake-chopper	Tvj_{max}			175	℃
	rectifier				125	℃
Storage Temperature		T_{stg}	-40		125	℃
Mounting force for module mounting		M	3.00		6.00	N m

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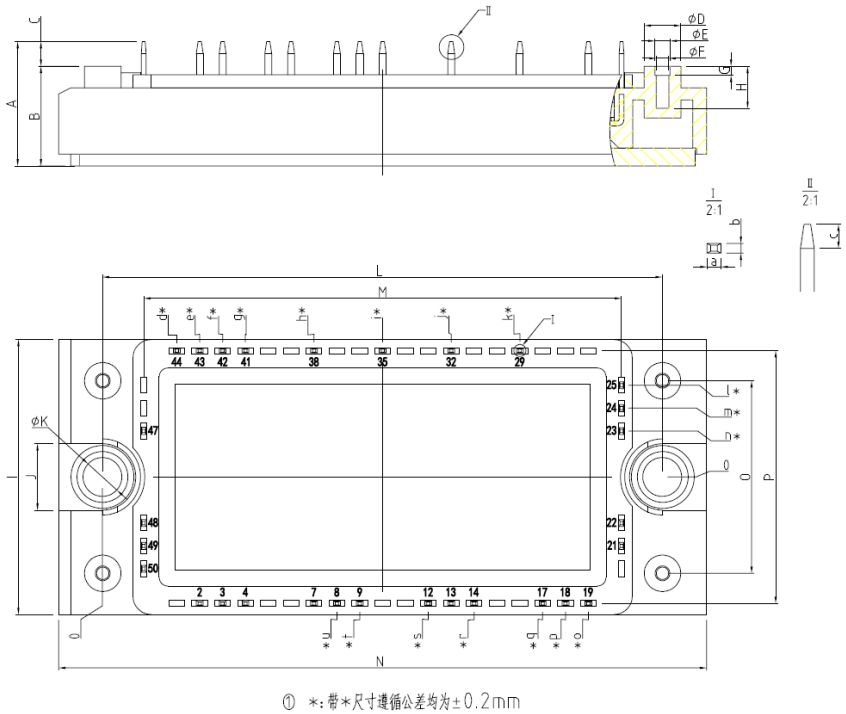
Ordering Information

Device	Marking	Package	Weight	Inner Box	Per Carton
JMG180HL16P2S1	JMG180HL16P2S1	P2 (45.3mm)	185g/PCS	15PCS	75PCS

Circuit Diagram



Package Outlines (mm)



① *:带*尺寸遵循公差均为±0.2mm

Ref	Dimensions					
	Millimeters			Inches		
	Min	Typ	Max	Min	Typ	Max
A	20.5	21	21.5	0.807	0.827	0.846
B	16.3	16.8	17.3	0.642	0.661	0.681
C	3.5	4	4.5	0.138	0.157	0.177
D	5.7	6	6.3	0.224	0.236	0.248
E	2.2	2.5	2.8	0.087	0.098	0.110
F	1.8	2.1	2.4	0.071	0.083	0.094
G	1.8	2.1	2.4	0.071	0.083	0.094
H		7.2			0.283	
I	44.8	45.3	45.8	1.764	1.783	1.803
J	10.6	11	11.2	0.417	0.433	0.441
K	5.2	5.5	5.7	0.205	0.217	0.224
L	92.7	93	93.3	3.650	3.661	3.673
M	78.9	79.2	79.5	3.106	3.118	3.130
N	107.2	107.7	108	4.220	4.240	4.252
O	31.7	32	32.3	1.248	1.260	1.272
P	41.7	41.9	42.1	1.642	1.650	1.657
a	1.1	1.15	1.2	0.043	0.045	0.047
b	0.7	0.8	0.9	0.028	0.031	0.035
c	1.5	1.7	1.9	0.059	0.069	0.075
d		12.35			0.486	
e		16.15			0.636	
f		19.95			0.785	
g		23.75			0.935	
h		35.15			1.384	
i		46.55			1.833	
j		57.95			2.281	
k		69.35			2.730	
l		15.25			0.6	
m		11.45			0.451	
n		7.65			0.301	
o		80.75			3.179	
p		76.95			3.030	
q		73.15			2.880	
r		61.75			2.431	
s		54.15			2.132	
t		42.75			1.683	
u		38.95			1.533	

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Typical Electrical & Thermal Characteristics

Fig 1. IGBT Output Characteristics
Brake-Chopper (typical) VGE=15 V

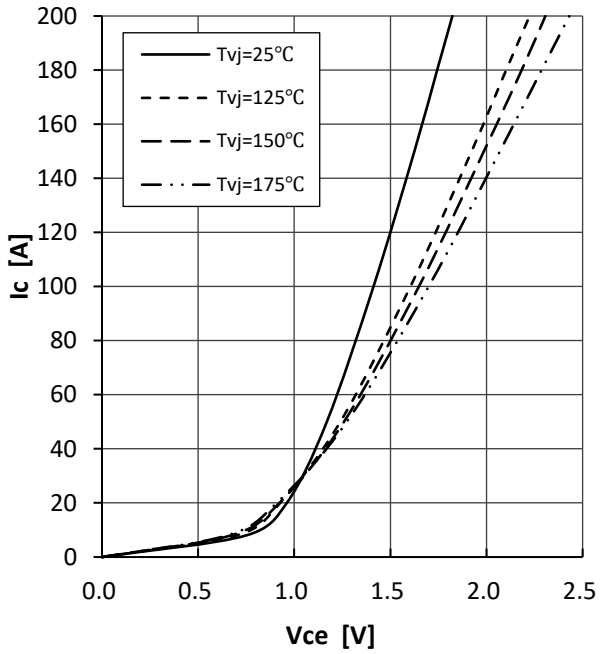


Fig 2. IGBT Output Characteristics
Brake-Chopper (typical)

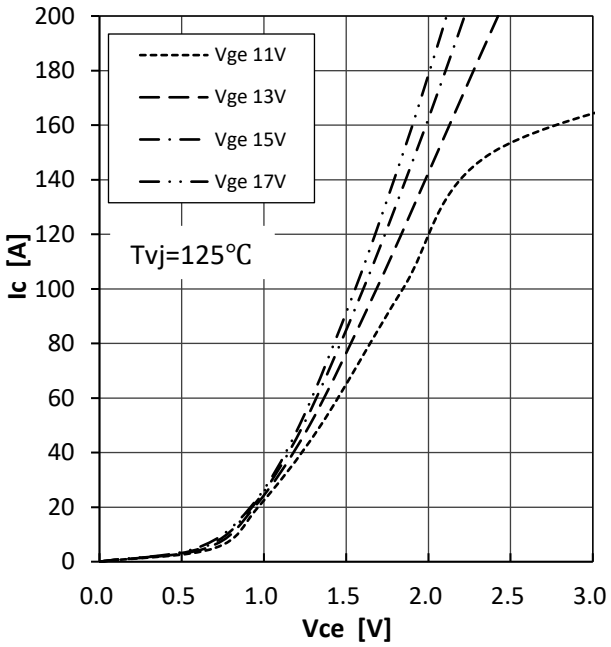


Fig 3. IGBT Transfer Characteristics
Brake-Chopper (typical) VCE=20 V

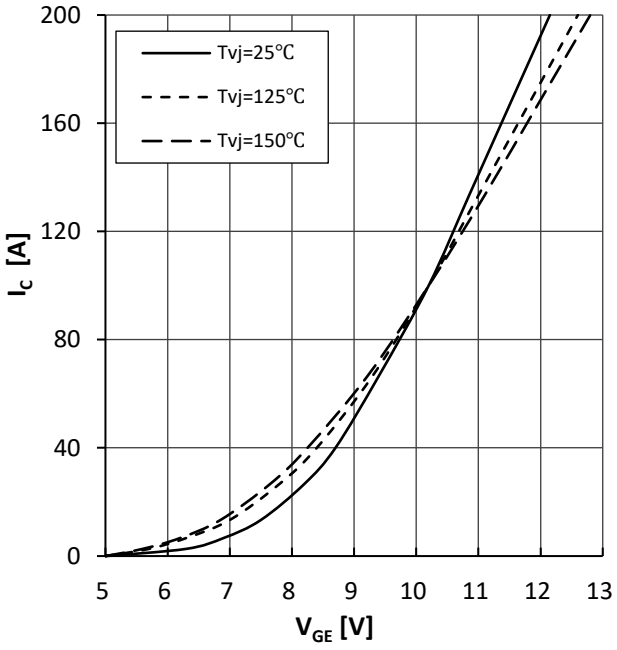
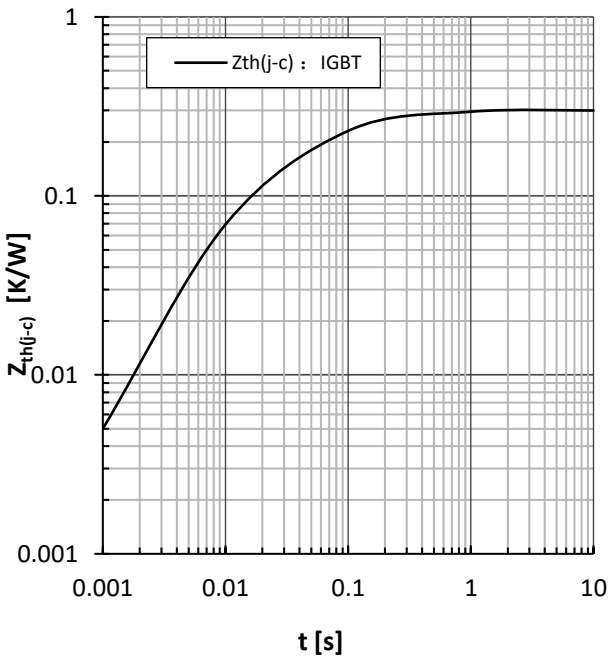


Fig 4. IGBT Transient Thermal Impedance



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Fig 5. Reverse bias safe operating area
IGBT, Brake-Chopper (RBSOA)

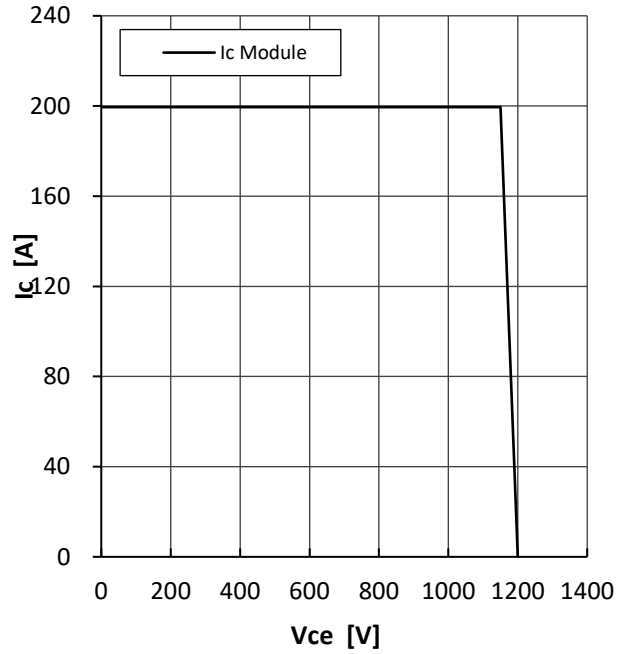


Fig 6. FRED Forward Characteristics,
Brake-Chopper (typical)

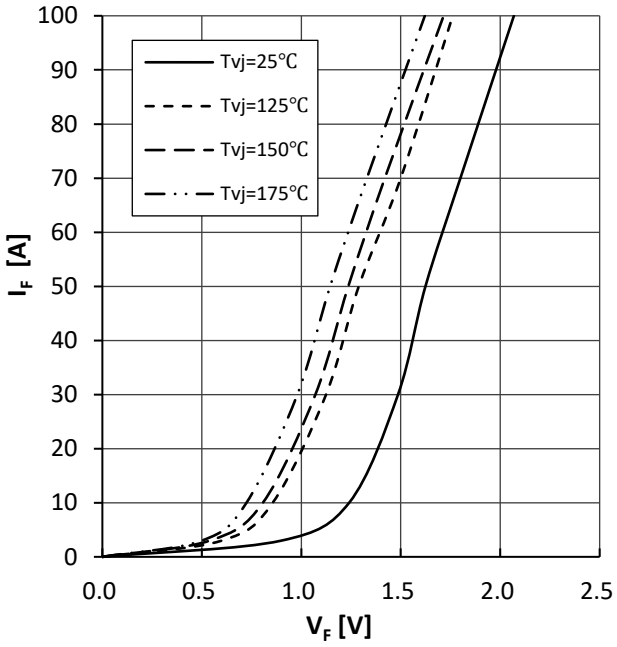


Fig 7. FRED Transient Thermal Impedance

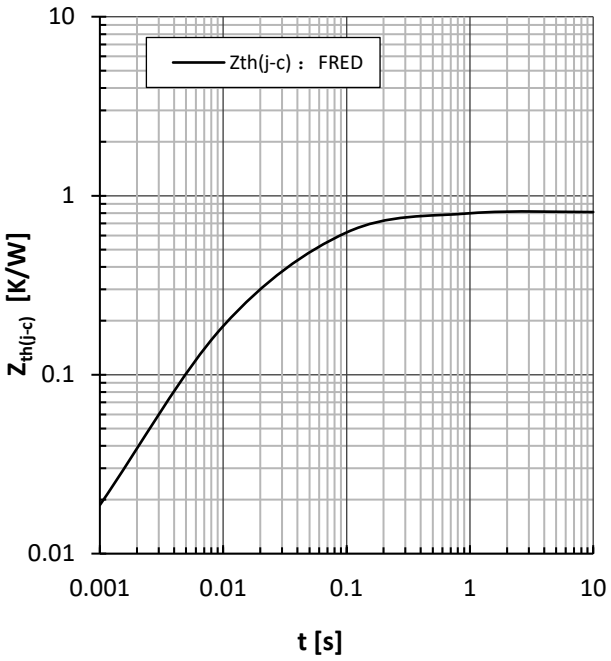
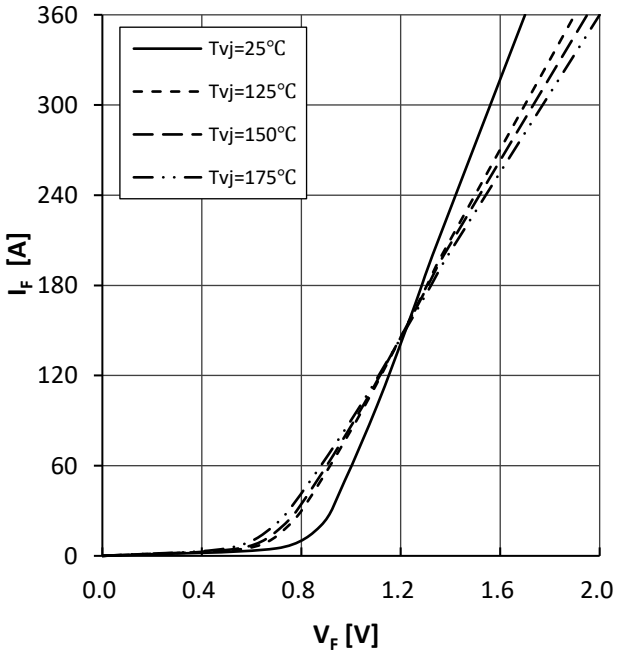


Fig 8. Diode Rectifier Forward Characteristics



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Fig 9. Diode Transient Thermal Impedance

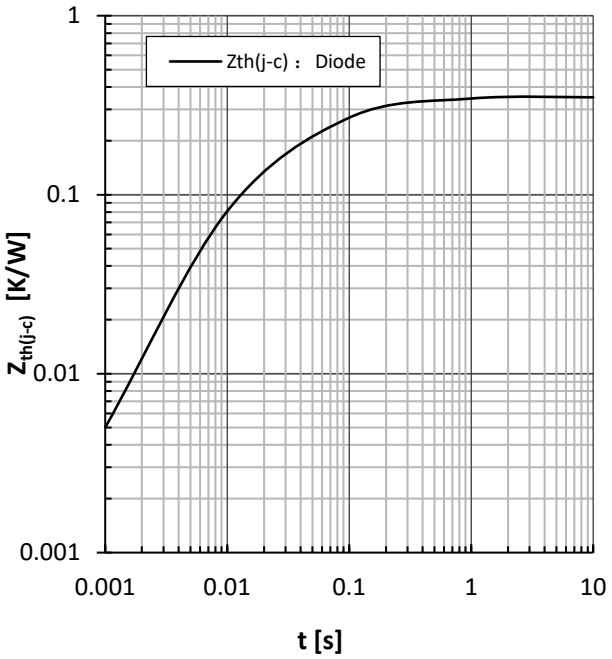


Fig 10. Thyristor Rectifier Forward Characteristics

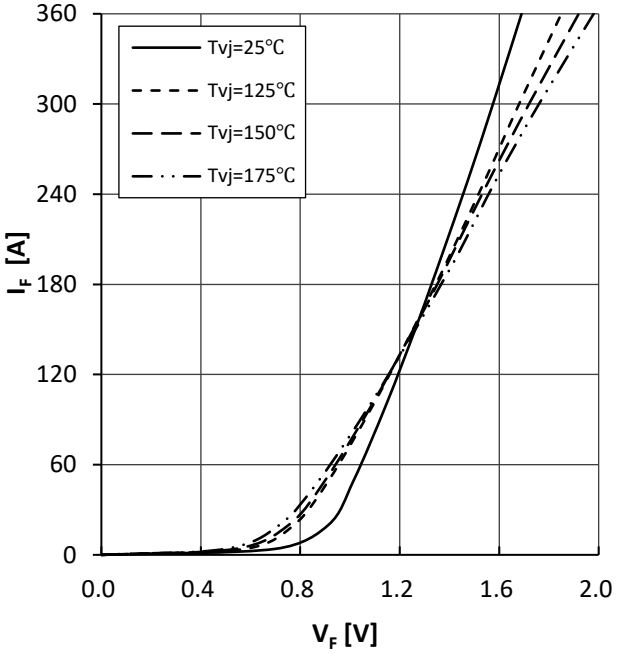
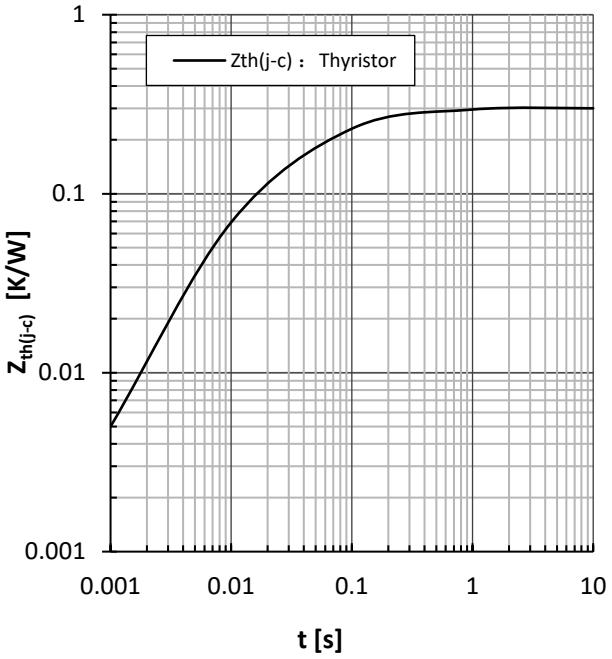


Fig 11. Thyristor Transient Thermal Impedance



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