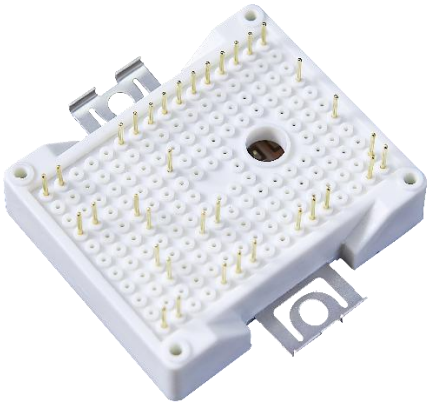
MG50TF12MLP3

RoHS COMPLIANT



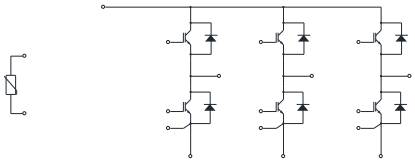
IGBT Modules

V_{CES}	1200V
I_C	50A

Applications

- Motor Drivers
- AC and DC Servo Drive Amplifier
- UPS (Uninterruptible Power Supplies)

Circuit



Features

- Low switching losses
- Low $V_{CE(sat)}$ with positive temperature coefficient
- Including fast & soft recovery anti-parallel FWD
- Low inductance case
- Isolated heatsink using DBC technology
- Maximum junction temperature 175℃

● IGBT- inverter

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Collector-Emitter Voltage	V_{CES}	V_{GE}=0V, I_C =1mA, T_{vj}=25℃	1200	V
Continuous Collector Current	I_C	T_C=100℃, T_{vjmax}=175℃	50	A
Repetitive Peak Collector Current	I_{CRM}	t_p=1ms	100	A
Gate-Emitter Voltage	V_{GES}	T_{vj}=25℃	±20	V
Total Power Dissipation	P_{tot}	T_C=25℃,T_{vjmax}=175℃	182	W

IGBT- inverter

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	V_{GE}=V_{CE}, I_C=1.5mA,T_{vj}=25℃	5.2	5.8	6.5	V
Collector-Emitter Cut-off Current	I_{CES}	V_{CE}=1200V,V_{GE}=0V, T_{vj}=25℃			1.0	mA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C=50A,V_{GE}=15V, T_{vj}=25℃		1.6		V
		I_C=50A,V_{GE}=15V, T_{vj}=150℃		1.9		
		I_C=50A,V_{GE}=15V, T_{vj}=175℃		2.0		
Gate Charge	Q_G			0.57		uC
Input Capacitance	C_{ies}	V_{CE}=25V,V_{GE}=0V, f=1MHz, T_{vj}=25℃		7.29		nF
Reverse Transfer Capacitance	C_{res}			0.09		nF
Gate-Emitter leakage current	I_{GES}	V_{CE}=0V, V_{GE}=20V,T_{vj}=25℃			400	nA
Turn-on Delay Time	$t_{d(on)}$	I_C=50A V_{CE}=600V V_{GE}=±15V R_G=5.6Ω T_{vj}=25℃		27		ns
Rise Time	t_r			14		ns
Turn-off Delay Time	$t_{d(off)}$			173		ns
Fall Time	t_f			190		ns
Energy Dissipation During Turn-on Time	E_{on}			2.8		mJ
Energy Dissipation During Turn-off Time	E_{off}			3.3		mJ
Turn-on Delay Time	$t_{d(on)}$	I_C=50A V_{CE}=600V V_{GE}=±15V R_G=5.6Ω T_{vj}=150℃		26		ns
Rise Time	t_r			14		ns
Turn-off Delay Time	$t_{d(off)}$			200		ns
Fall Time	t_f			265		ns
Energy Dissipation During Turn-on Time	E_{on}			3.5		mJ
Energy Dissipation During Turn-off Time	E_{off}			4.0		mJ

Turn-on Delay Time	$t_{d(on)}$	I_C=50A V_{CE}=600V V_{GE}=±15V R_G=5.6Ω T_{vj}=175℃		26		ns
Rise Time	t_r			15		ns
Turn-off Delay Time	$t_{d(off)}$			192		ns
Fall Time	t_f			288		ns
Energy Dissipation During Turn-on Time	E_{on}			3.9		mJ
Energy Dissipation During Turn-off Time	E_{off}			4.2		mJ
SC Data	I_{SC}	t_p≤6us,V_{GE}=15V,T_{vj}=175℃, V_{CC}=600V,V_{CEM}≤1200V		200		A

Diode-inverter

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Repetitive Peak Reverse Voltage	V_{RRM}	T_{vj}=25℃	1200	V
Continuous DC Forward Current	I_F		50	A
Repetitive Peak Forward Current	I_{FRM}	t_p=1ms	100	A

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Forward Voltage	V_F	I_F=50A,T_{vj}=25℃		2.00	2.80	V
		I_F=50A,T_{vj}=150℃		1.95		
		I_F=50A,T_{vj}=175℃		1.93		
Recovered Charge	Q_{rr}	I_F=50A V_R=600V -di_F/dt =2800A/us T_{vj}=25℃		3.14		uC
Peak Reverse Recovery Current	I_{rr}			24		A
Reverse Recovery Energy	E_{rec}			1.1		mJ
Recovered Charge	Q_{rr}	I_F=50A V_R=600V -di_F/dt =2800A/us T_{vj}=150℃		5.77		uC
Peak Reverse Recovery Current	I_{rr}			36		A
Reverse Recovery Energy	E_{rec}			2.2		mJ
Recovered Charge	Q_{rr}	I_F=50A V_R=600V -di_F/dt =2800A/us T_{vj}=175℃		6.85		uC
Peak Reverse Recovery Current	I_{rr}			40		A
Reverse Recovery Energy	E_{rec}			2.7		mJ

NTC-Thermistor

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Rated Resistance	R_{25}			5.0		kΩ
Deviation of R100	ΔR/R	T_C=100,R_{100}=493.3Ω	-5		5	%
Power Dissipation	P_{25}				20.0	mW
B-value	$B_{25/50}$	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15K))]$		3375		K

Module Characteristics

T_C=25°C unless otherwise specified

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Isolation Voltage	V_{isol}	t=1min,f=50Hz	2500			V
Maximum Junction Temperature	T_{jmax}				175	℃
Operating Junction Temperature	$T_{vj\ op}$		-40		150	℃
Storage Temperature	T_{stg}		-40		125	℃
Stray-inductance-module	L_{SCE}			30		nH
Module Lead Resistance, Terminals-chip	$R_{CC'+EE'}$	T_C=25℃, per switch		5.00		mΩ
	$R_{AA'+CC'}$			6.00		
Thermal Resistance Junction-to Case	$R_{\theta JC}$	per IGBT-inverter			0.83	K/W
		per Diode-inverter			1.14	
Mounting Force Per Clamp	F		30		80	N
Weight of Module	G			45		g

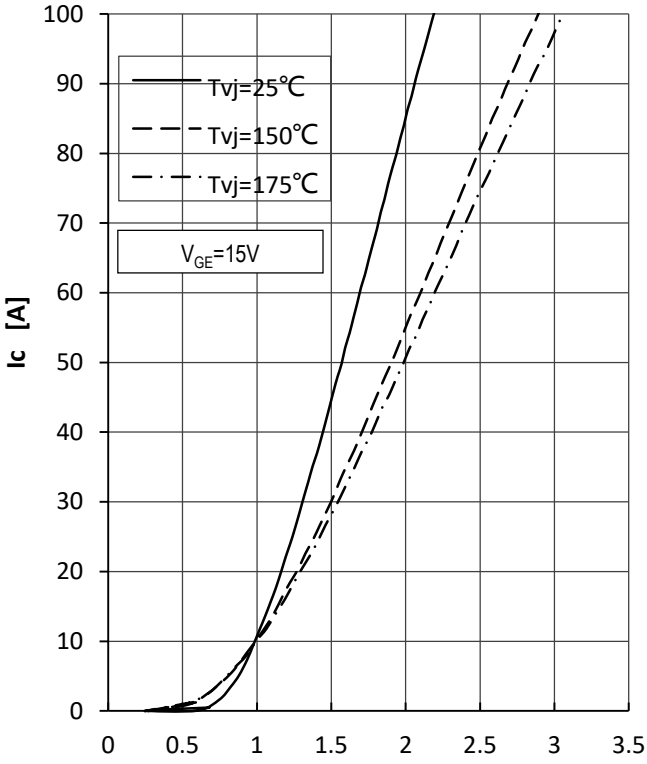


Fig1.IGBT Output Characteristics

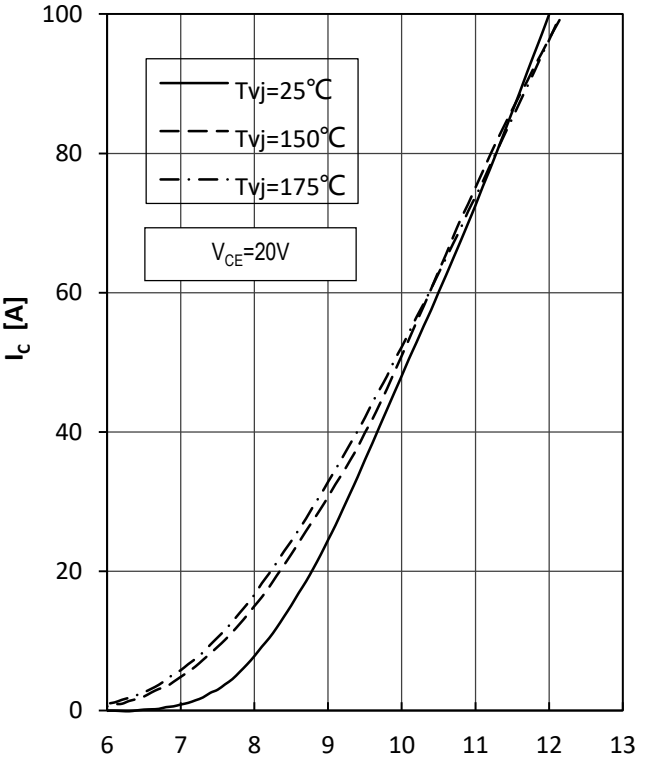


Fig2.IGBT Transfer Characteristics

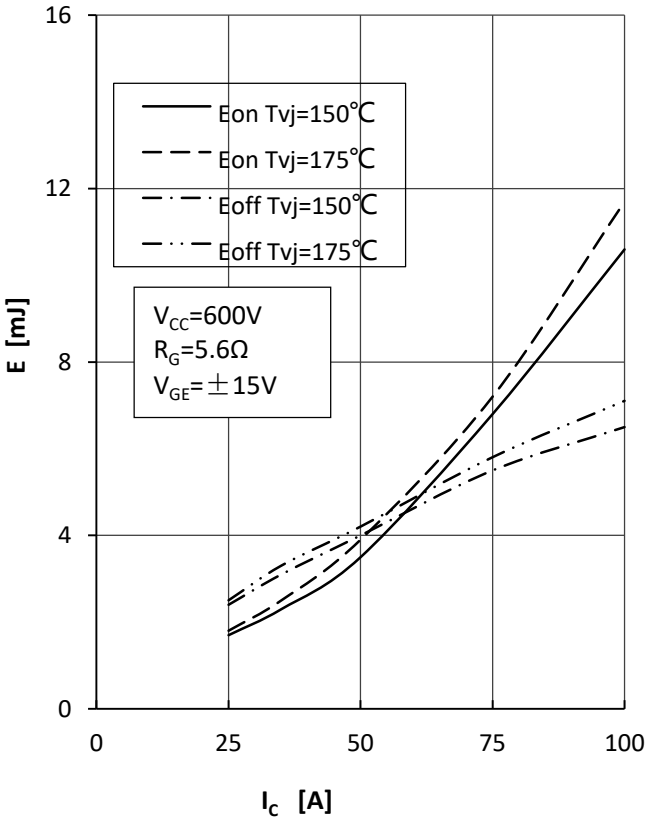


Fig3.IGBT Switching Loss vs.Ic

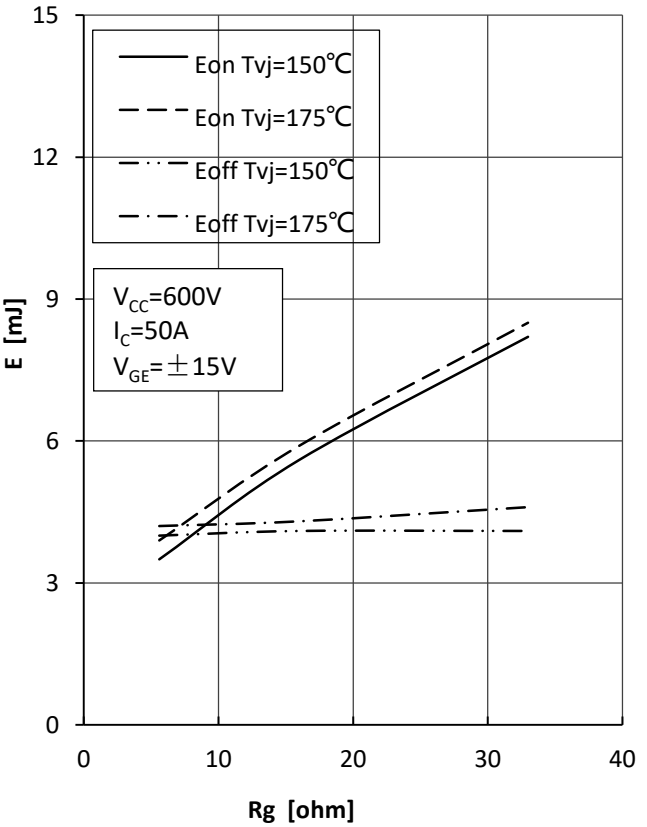


Fig4.IGBT Switching Loss vs.Rg

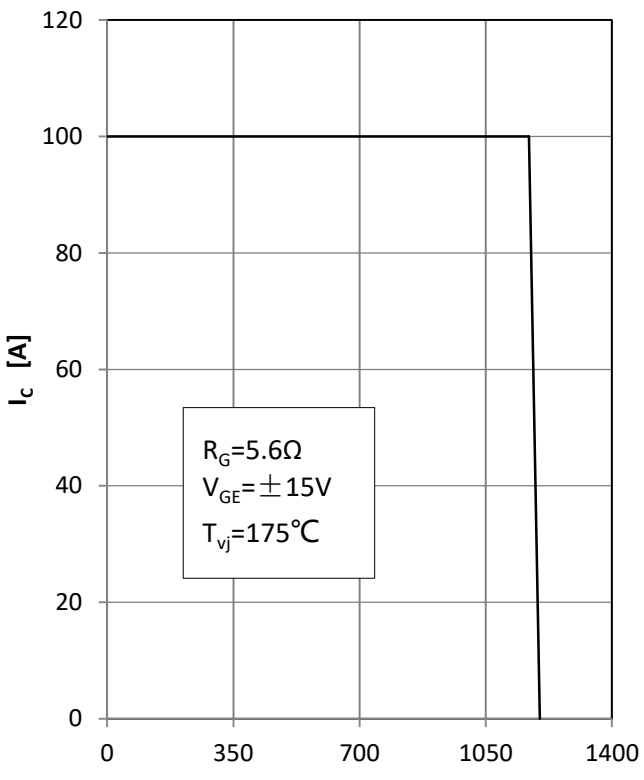


Fig5. RBSOA

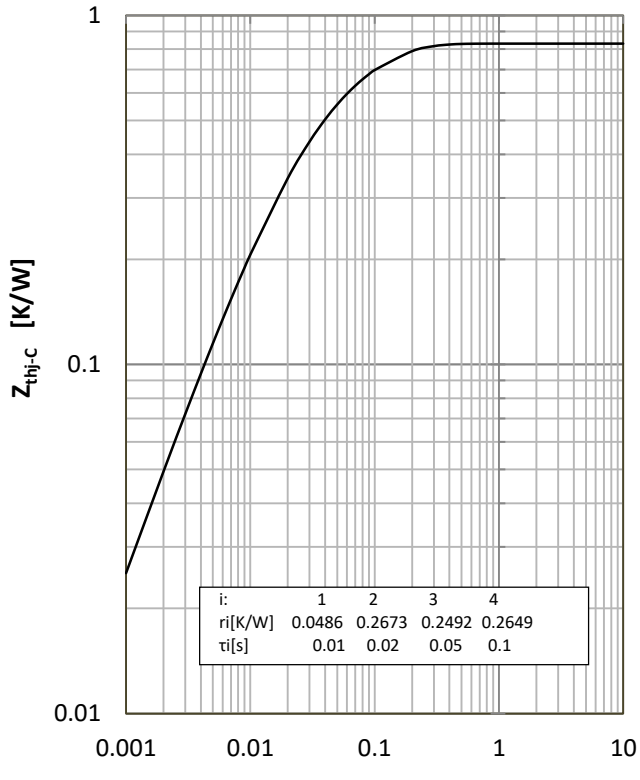


Fig 6. IGBT Transient Thermal Impedance

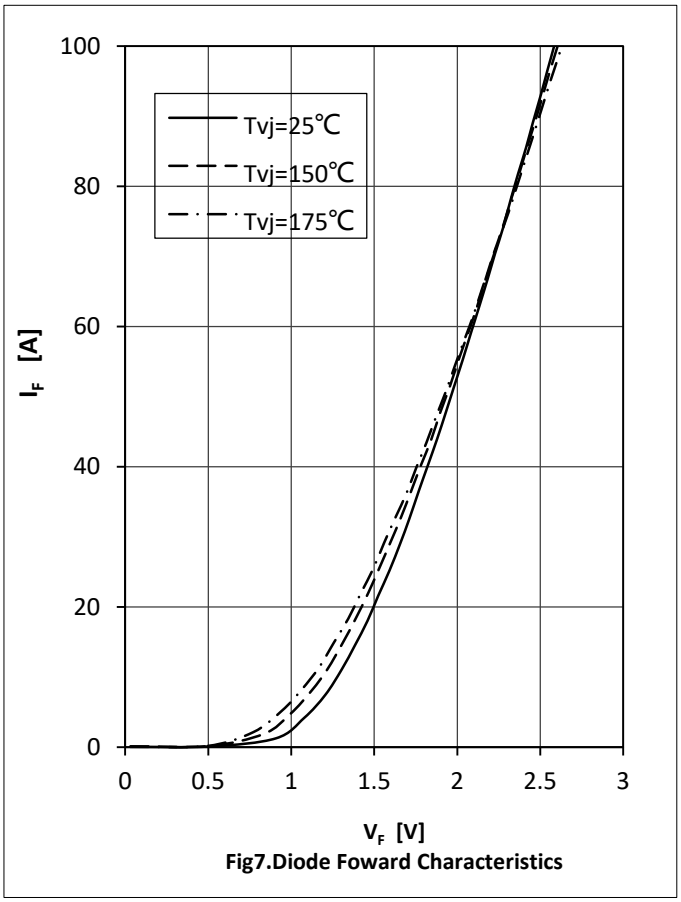


Fig7.Diode Foward Characteristics

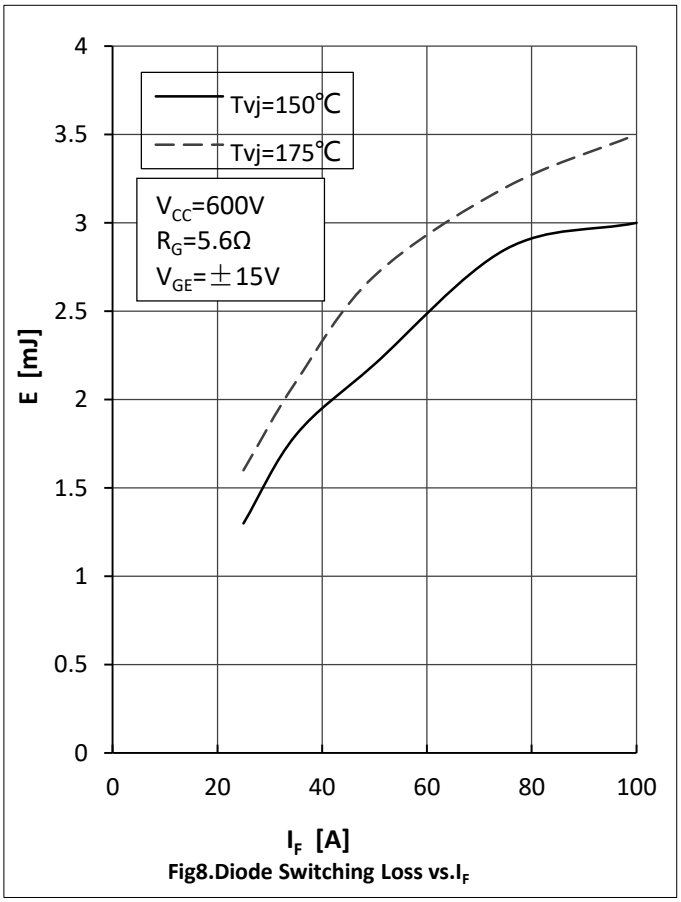


Fig8.Diode Switching Loss vs.I_F

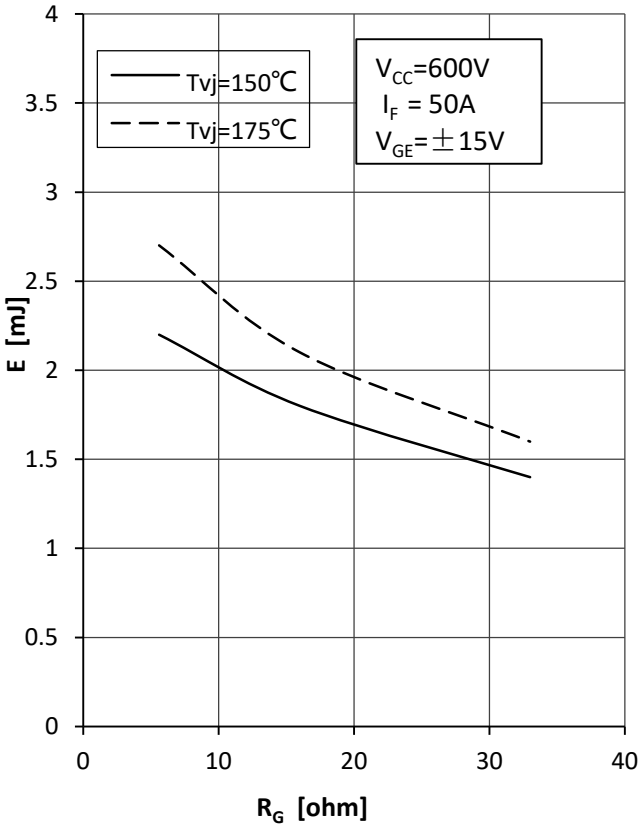


Fig8.Diode Switching Loss vs.Rg

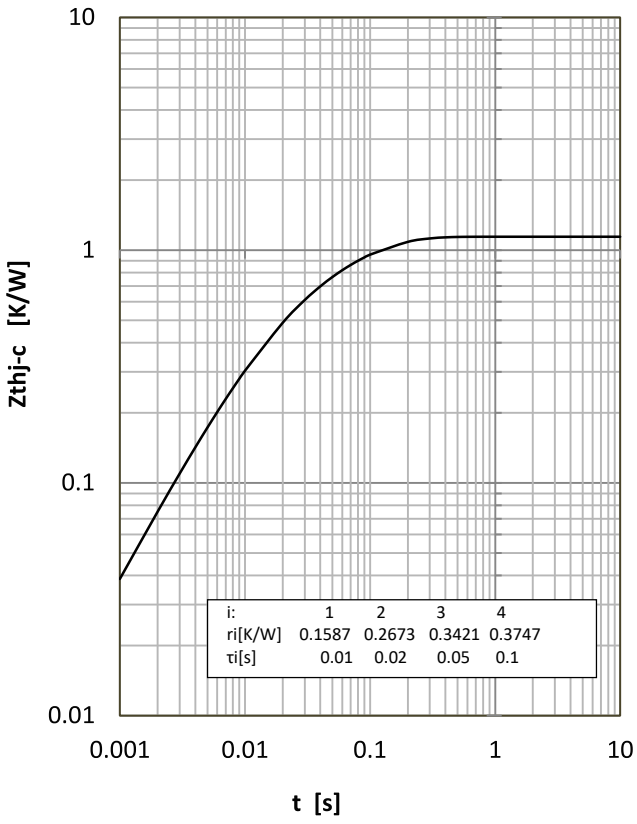


Fig10.Diode Transient Thermal Impedance

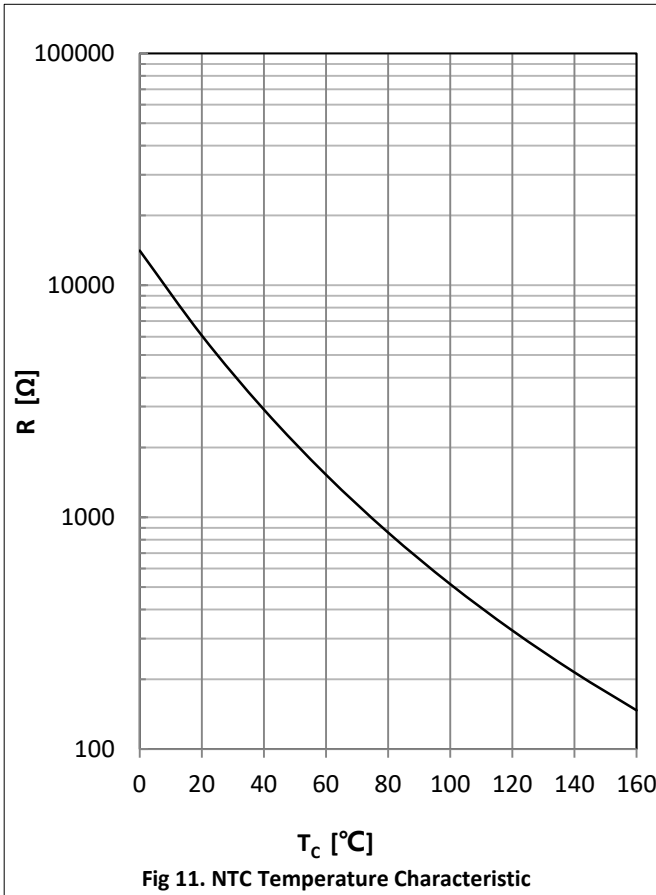
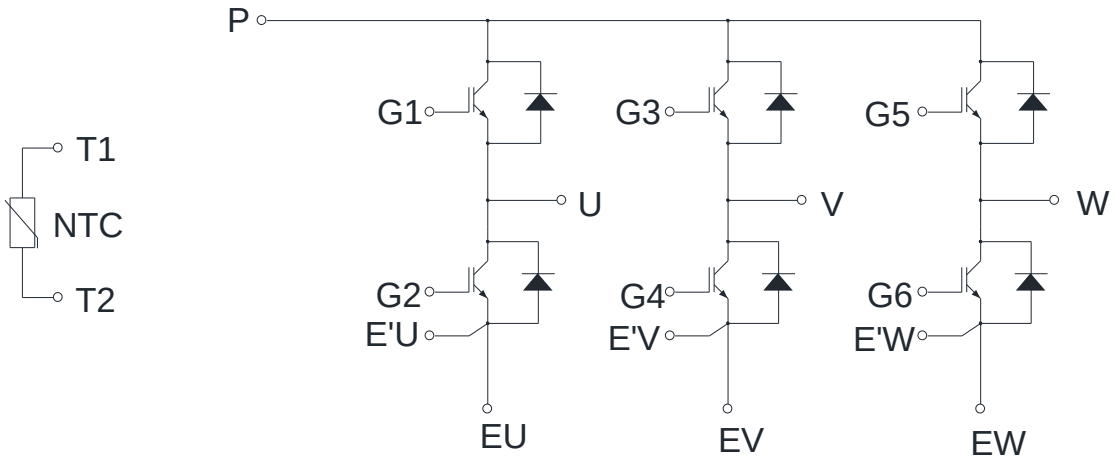
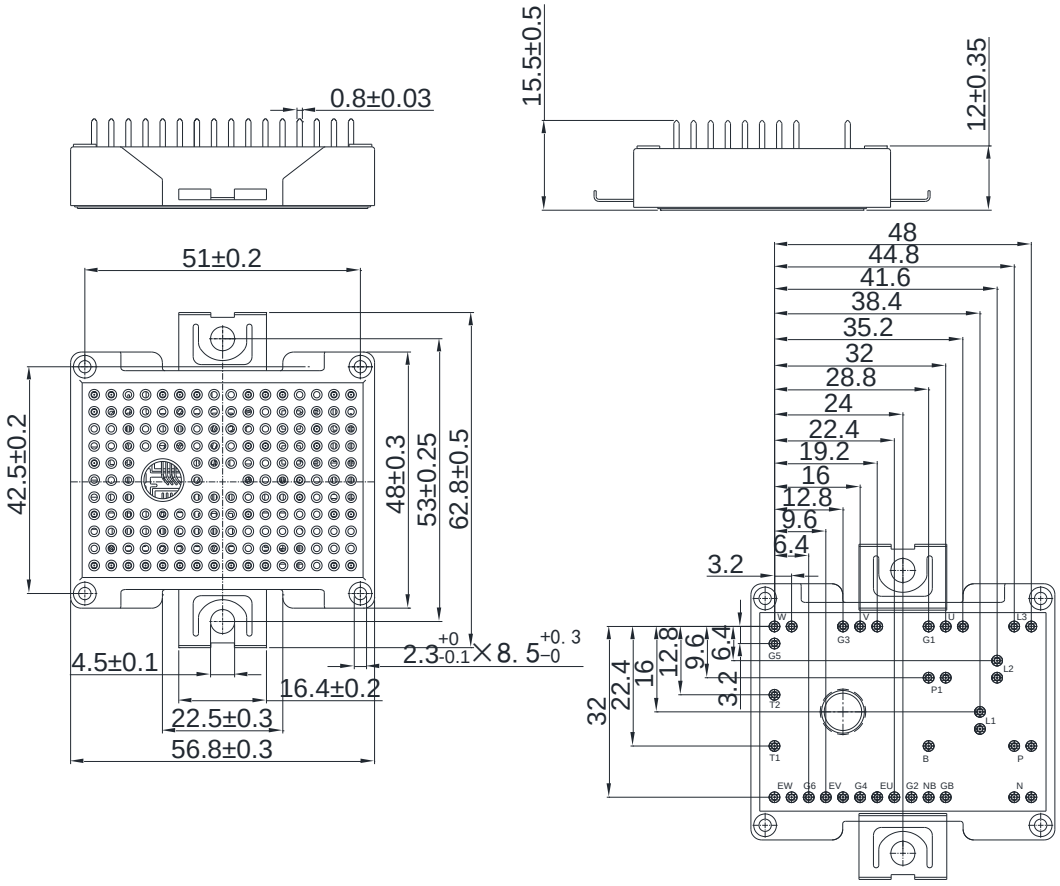


Fig 11. NTC Temperature Characteristic

- **Circuit Diagram**



- **Package Dimensions**



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