MG450HF12TLE3

RoHS COMPLIANT

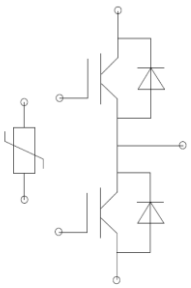
IGBT Modules

V_{CES}	1200V
I_C	450A

Applications

- Motion/sevo control
- High frequency switching application
- UPS (Uninterruptible Power Supplies)
- Welding machine

Circuit



Features

- Low $V_{CE(sat)}$ with trench technology
- Low switching losses especially Eoff
- $V_{ce(sat)}$ with positive temperature coefficient
- High short circuit capability(10us)
- Including ultra fast & soft recovery anti-parallel FWD
- Low inductance package
- Maximum junction temperature 175℃

IGBT

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℃	450	A
Repetitive Peak Collector Current	I_{CRM}	t_p=1ms	900	A
Gate-Emitter Voltage	V_{GES}	T_{vj}=25℃	±20	V
Total Power Dissipation	P_{tot}	T_c=25℃ T_{vjmax}=175℃	2340	W

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Gate-emitter Threshold Voltage	$V_{GE(th)}$	V_{GE}=V_{CE},I_C=12mA,T_{vj}=25℃	5.2	5.8	6.4	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=450A,V_{GE}=15V, T_{vj}=25℃		1.85	2.20	V
		I_C=450A,V_{GE}=15V, T_{vj}=125℃		2.15		
		I_C=450A,V_{GE}=15V, T_{vj}=150℃		2.25		
Gate Charge	Q_G			3.50		uC
Internal Gate Resistance	R_{Gint}			1.67		Ω
Input Capacitance	C_{ies}	V_{CE}=25V,V_{GE} =0V, f=1MHz,T_{vj}=25℃		25.0		nF
Reverse Transfer Capacitance	C_{res}			1.10		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=450A V_{CE}=600V V_{GE}=±15V R_{Gon}=1.3Ω R_{Goff}=1.8Ω T_{vj}=25℃		228		ns
Rise Time	t_r			96		ns
Turn-off Delay Time	$t_{d(off)}$			361		ns
Fall Time	t_f			154		ns
Energy Dissipation During Turn-on Time	E_{on}			52.1		mJ
Energy Dissipation During Turn-off Time	E_{off}			38.2		mJ
Turn-on Delay Time	$t_{d(on)}$	I_C=450A V_{CE}=600V V_{GE}=±15V R_{Gon}=1.3Ω R_{Goff}=1.8Ω T_{vj}=125℃		236		ns
Rise Time	t_r			106		ns
Turn-off Delay Time	$t_{d(off)}$			412		ns
Fall Time	t_f			244		ns
Energy Dissipation During Turn-on Time	E_{on}			72.1		mJ
Energy Dissipation During Turn-off Time	E_{off}			49.1		mJ
Turn-on Delay Time	$t_{d(on)}$	I_C=450A V_{CE}=600V V_{GE}=±15V R_{Gon}=1.3Ω R_{Goff}=1.8Ω T_{vj}=150℃		245		ns
Rise Time	t_r			116		ns
Turn-off Delay Time	$t_{d(off)}$			436		ns
Fall Time	t_f			265		ns
Energy Dissipation During Turn-on Time	E_{on}			84.6		mJ
Energy Dissipation During Turn-off Time	E_{off}			57.9		mJ
SC Data	I_{sc}	t_p≤10us, V_{GE}=15V, T_{vj}=150℃, V_{CC}=900V, V_{CEM}≤1200V		2250		A

Diode

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		450	A
Repetitive Peak Forward Current	I_{FRM}	t_p=1ms	900	A
I²t-value	I²t	V_R=0V,t_p=10ms,T_{vj}=125℃	32000	A²s
		V_R=0V,t_p=10ms,T_{vj}=150℃	30000	

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Forward Voltage	V_F	I_F=450A,T_{vj}=25℃		1.90		V
		I_F=450A,T_{vj}=125℃		1.80		
		I_F=450A,T_{vj}=150℃		1.75		
Recovered Charge	Q_{rr}	I_F=450A V_R=600V -di$_F$/dt=4600A/us T_{vj}=25℃		26.8		uC
Peak Reverse Recovery Current	I_{rr}			155		A
Reverse Recovery Energy	E_{rec}			7.9		mJ
Recovered Charge	Q_{rr}	I_F=450A V_R=600V -di$_F$/dt=4600A/us T_{vj}=125℃		75.4		uC
Peak Reverse Recovery Current	I_{rr}			258		A
Reverse Recovery Energy	E_{rec}			24.9		mJ
Recovered Charge	Q_{rr}	I_F=450A V_R=600V -di$_F$/dt=4600A/us T_{vj}=150℃		82.5		uC
Peak Reverse Recovery Current	I_{rr}			320		A
Reverse Recovery Energy	E_{rec}			36.3		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	℃
Thermal Resistance Junction-to Case	$R_{\theta JC}$	per IGBT			0.065	K/W
		per Diode			0.13	
Thermal Resistance Case-to Sink	$R_{\theta CS}$	Conductive grease applied		0.009		K/W
Comparative Tracking Index	CTI			>200		
Module ElectrodesTorque	M_t	Recommended(M5)	3.0		5.0	N·m
Module-to-SinkTorque	M_s	Recommended(M6)	3.0		5.0	N·m
Weight of Module	G			345		g

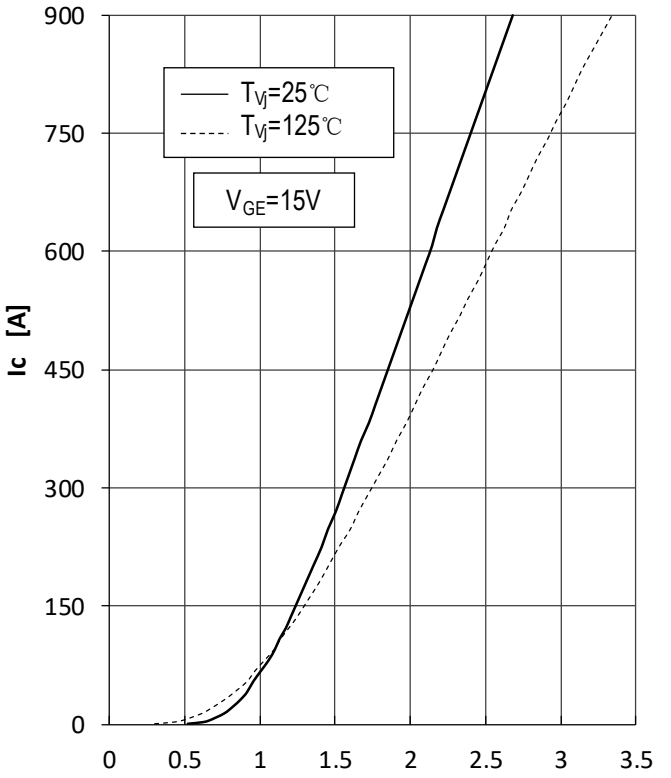


Fig1.IGBT Output Characteristics

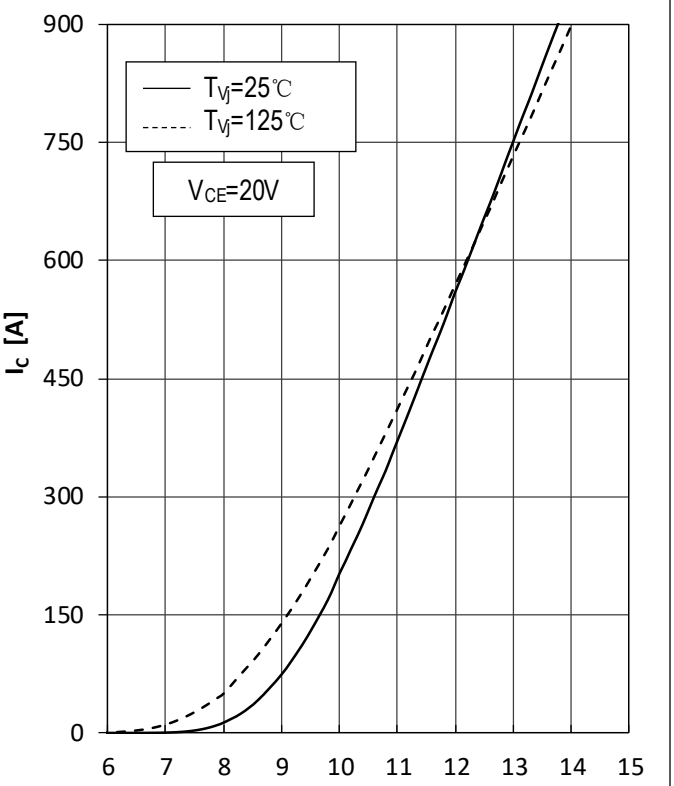


Fig2.IGBT Transfer Characteristics

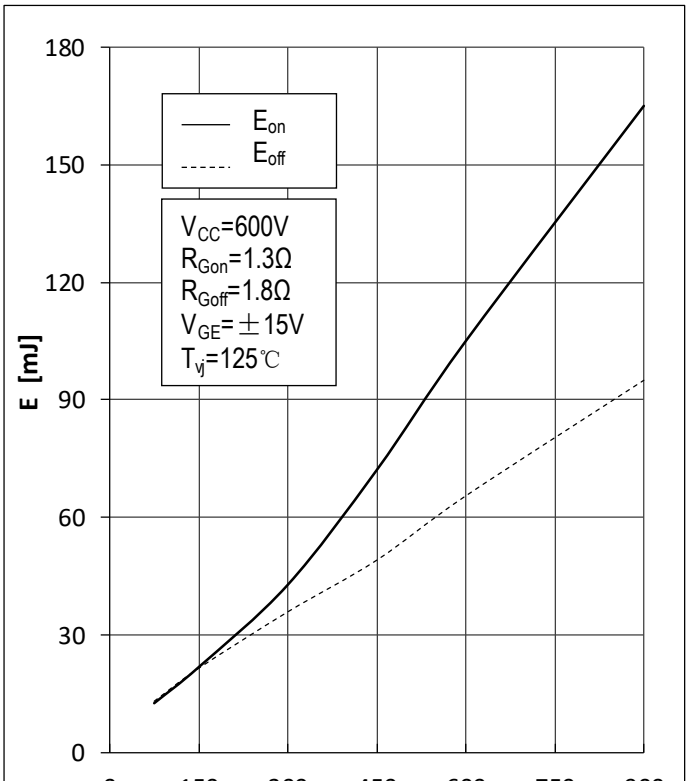


Fig3.IGBT Switching Loss vs.Ic

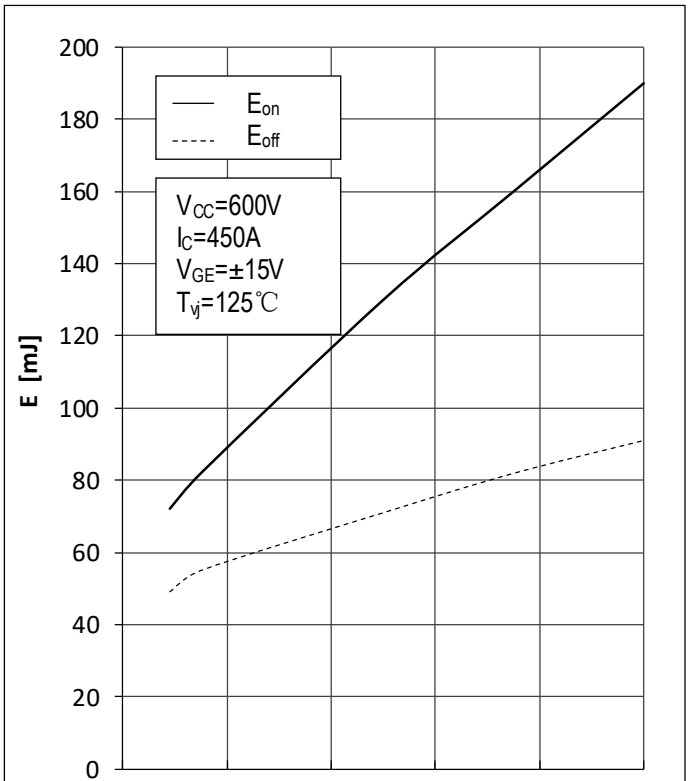


Fig4.IGBT Switching Loss vs.Rg

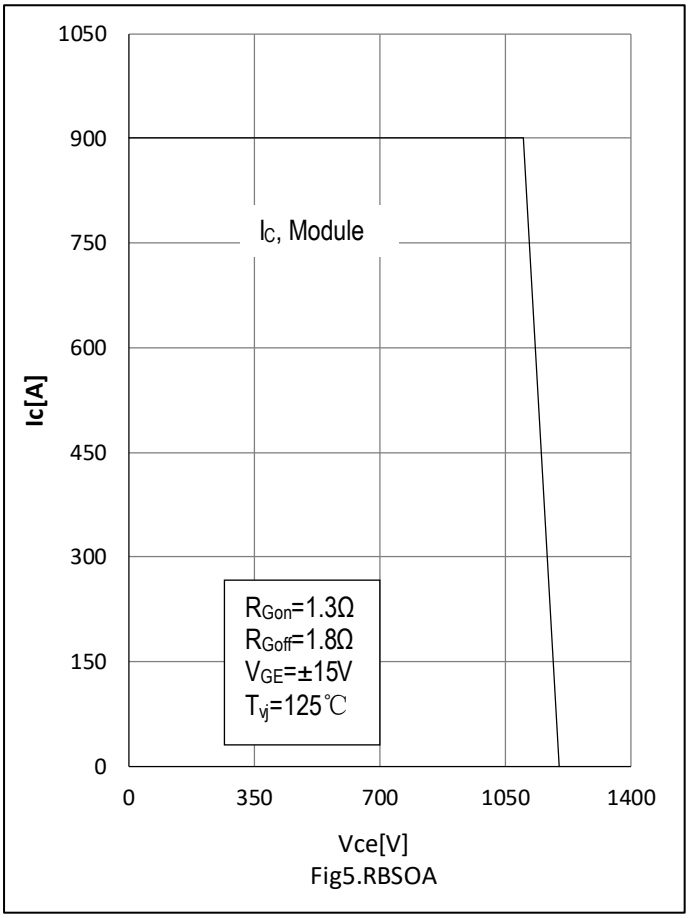


Fig5.RBSOA

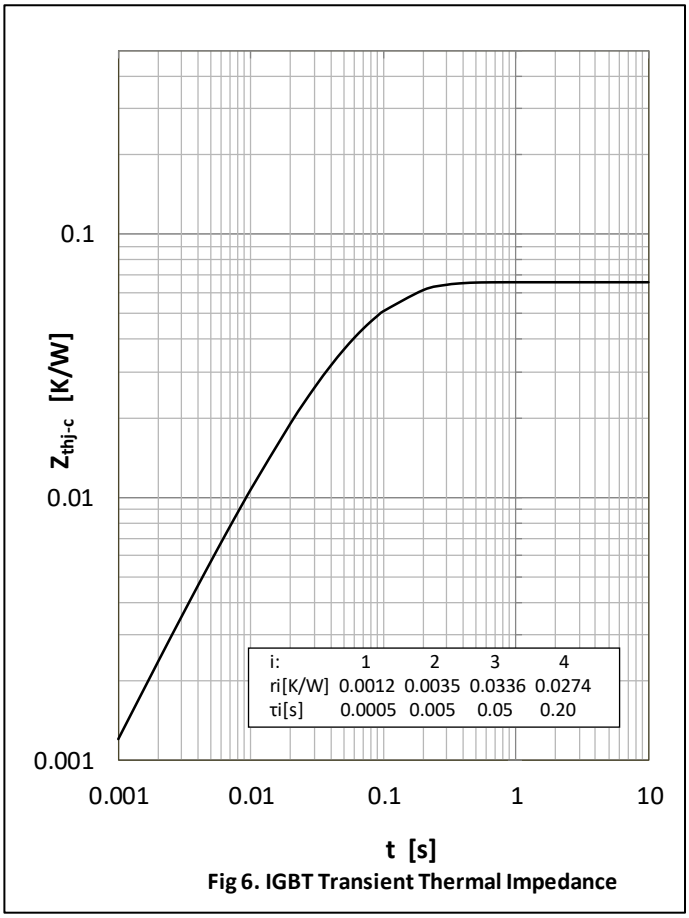


Fig 6. IGBT Transient Thermal Impedance

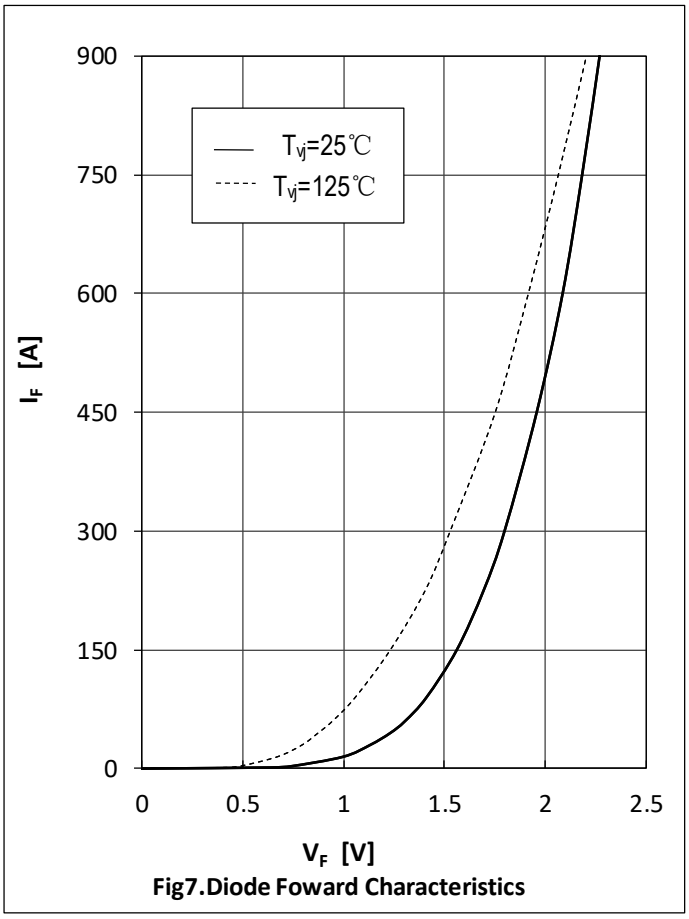


Fig7.Diode Foward Characteristics

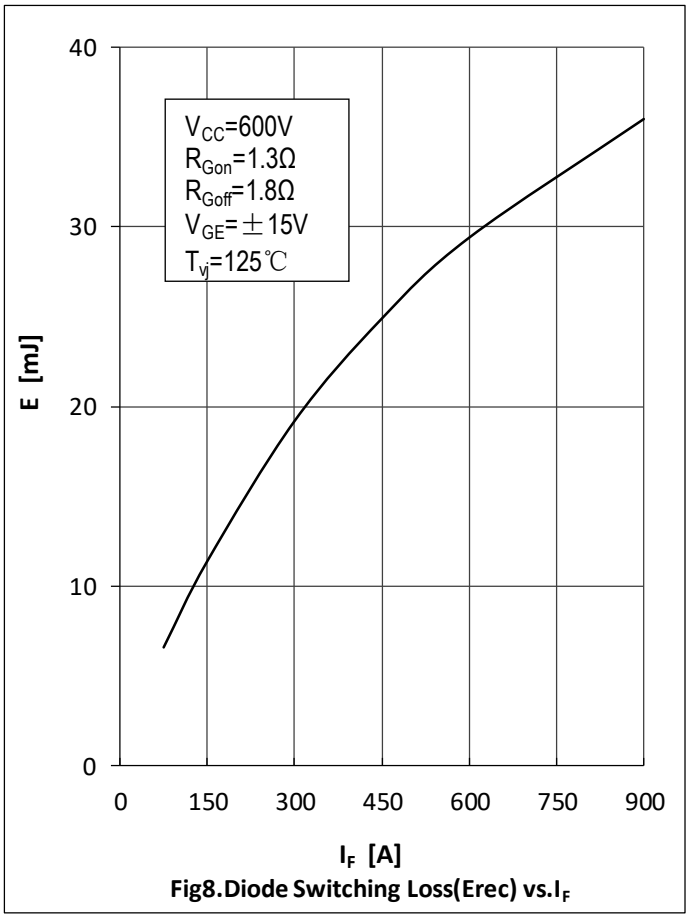


Fig8.Diode Switching Loss(Erec) vs.I_F

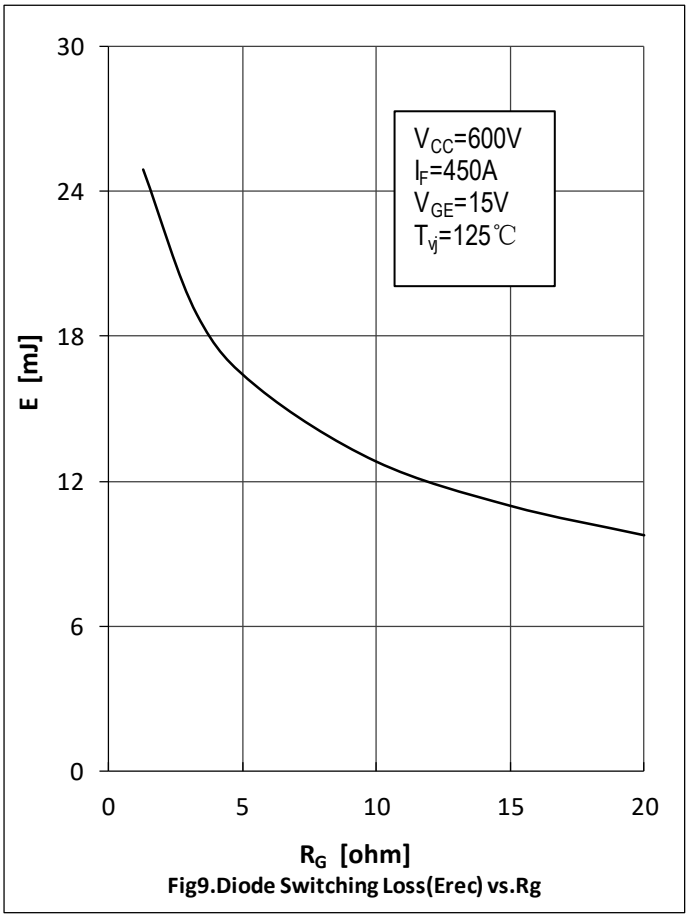


Fig9.Diode Switching Loss(Erec) vs.Rg

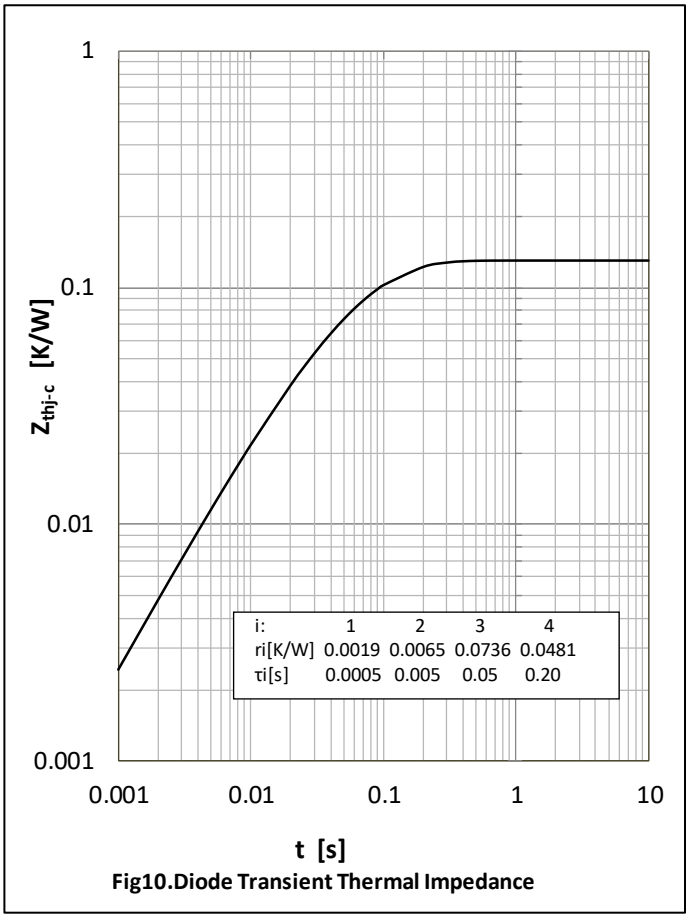


Fig10.Diode Transient Thermal Impedance

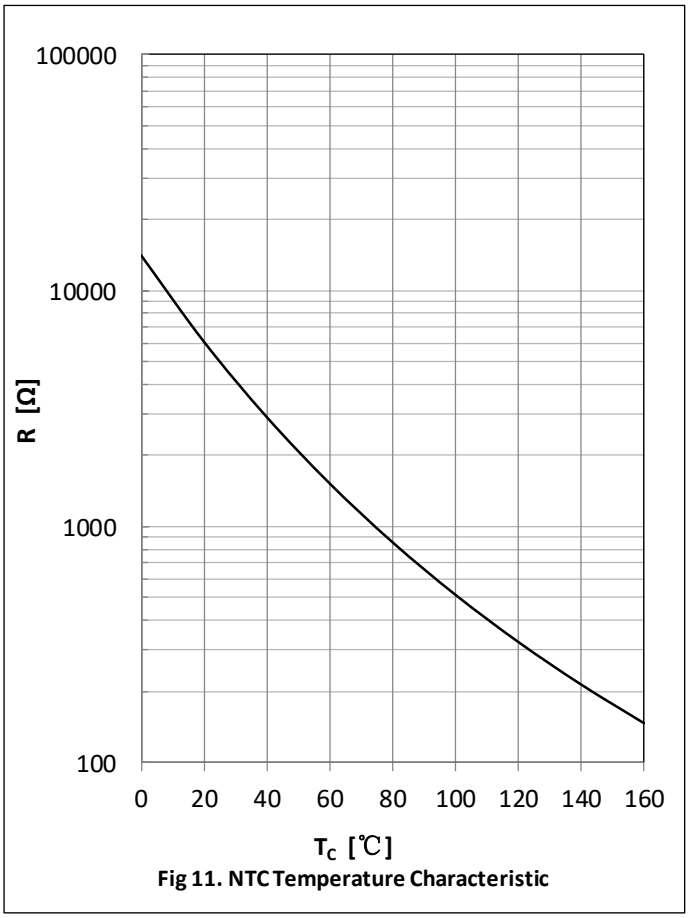
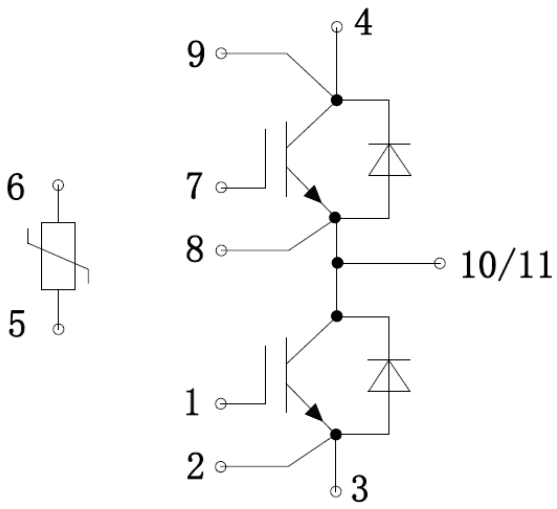
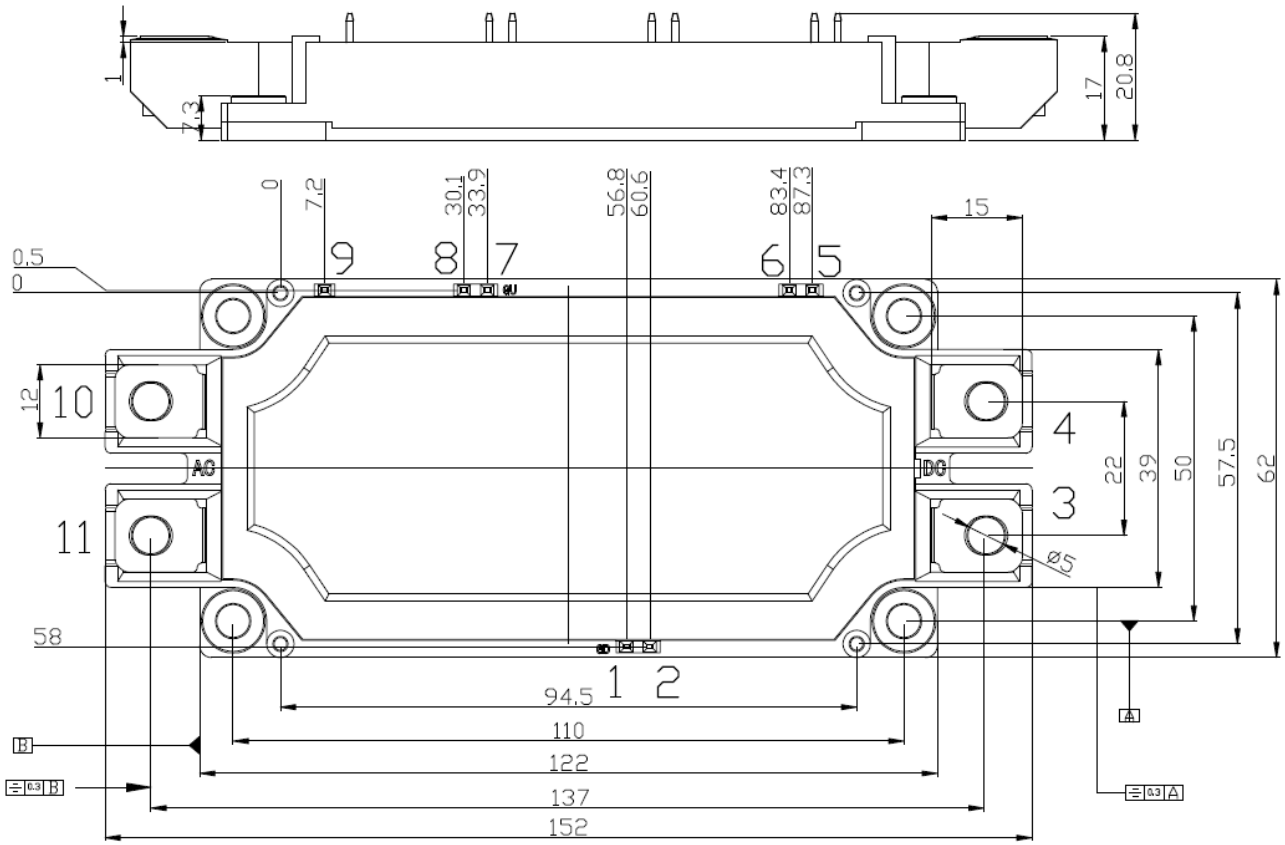


Fig 11. NTC Temperature Characteristic

- **Circuit Diagram**



- **Package Outline Information**



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