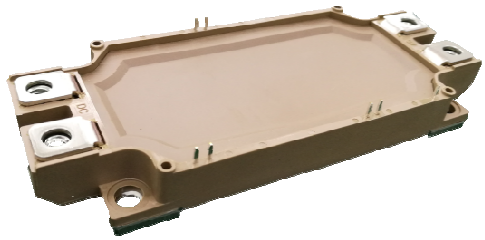
YZPST-450B170E53

IGBT Power Module

V_{CE}=1700V I_C=450A

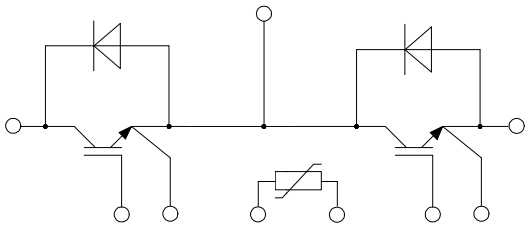


Applications

- Inverter for motor drive
- AC and DC servo drive amplifier
- UPS (Uninterruptible Power Supplies)

Features

- Low $V_{ce(sat)}$ with SPT+ IGBT technology
- $V_{ce(sat)}$ with positive temperature coefficient
- Including fast & soft recovery anti-parallel FWD
- High short circuit capability(10us)
- Low inductance module structure
- Maximum junction temperature 175℃



Equivalent Circuit Schematic

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Collector-Emitter Voltage	V_{CES}	V_{GE}=0V, I_C =1mA, T_{vj}=25℃	1700	V
Continuous Collector Current	I_C	T_c=100℃	450	A
Peak Collector Current	I_{CRM}	tp=1ms	900	A
Gate-Emitter Voltage	V_{GES}	T_{vj}=25℃	±20	V
Total Power Dissipation (IGBT-inverter)	P_{tot}	T_c=25℃ T_{vjmax}=175℃	3260	W

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● IGBT Characteristics

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Gate-emitter Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}$, I_C =24mA,T_{vj}=25℃	5.4	6.2	7.4	V
Collector-Emitter Cut-off Current	I_{CES}	V_{CE}=1700V,V_{GE}=0V, T_{vj}=25℃			1.0	mA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	Ic=450A,V_{GE}=15V, T_{vj}=25℃		2.40	2.75	V
		Ic=450A,V_{GE}=15V, T_{vj}=125℃		2.80		V
		Ic=450A,V_{GE}=15V, T_{vj}=150℃		2.90		V
Gate Charge	Q_G			2.70		uC
Input Capacitance	C_{ies}	V_{CE}=25V,V_{GE} =0V, f=1MHz, T_{vj}=25℃		30.0		nF
Output Capacitance	C_{oes}			1.65		nF
Reverse Transfer Capacitance	C_{res}			1.08		nF
Gate-Emitter leakage current	I_{GES}	V_{CE}=0 V, V_{GE}=20 V, T_{vj} = 25℃			400	nA
Turn-on Delay Time	$t_{d(on)}$	I_C =450 A V_{CE} = 900 V V_{GE} = ±15V R_G = 3.3Ω T_{vj}=25℃		510		ns
Rise Time	t_r			180		ns
Turn-off Delay Time	$t_{d(off)}$			620		ns
Fall Time	t_f			185		ns
Energy Dissipation During Turn-on Time	E_{on}			126		mJ
Energy Dissipation During Turn-off Time	E_{off}			89.0		mJ
Turn-on Delay Time	$t_{d(on)}$	I_C =450 A V_{CE} = 900 V V_{GE} = ±15V R_G = 3.3Ω T_{vj}=125℃		512		ns
Rise Time	t_r			190		ns
Turn-off Delay Time	$t_{d(off)}$			712		ns
Fall Time	t_f			350		ns
Energy Dissipation During Turn-on Time	E_{on}			162		mJ
Energy Dissipation During Turn-off Time	E_{off}			125		mJ

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Turn-on Delay Time	$t_{d(on)}$	I_C =450 A V_{CE} = 900 V V_{GE} = ±15V R_G = 3.3Ω T_{vj}=150℃		515		ns
Rise Time	t_r			200		ns
Turn-off Delay Time	$t_{d(off)}$			730		ns
Fall Time	t_f			430		ns
Energy Dissipation During Turn-on Time	E_{on}			175		mJ
Energy Dissipation During Turn-off Time	E_{off}			130		mJ
SC Data	I_{sc}	T_p≤10us,V_{GE}=15V, T_{vj}=150℃,V_{cc}=1000V, V_{CEM}≤1700V		1450		A

● Diode Characteristics

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Diode DC Forward Current	I_F	T_c=100℃		450		A
Diode Peak Forward Current	I_{FRM}	tp=1ms		900		A
Forward Voltage	V_F	I_F=450A,T_{vj}=25℃		1.85		V
		I_F=450A,T_{vj}=125℃		1.92		V
		I_F=450A,T_{vj}=150℃		1.90		V
Recovered Charge	Q_{rr}	I_F =450 A V_R=900V -di$_F$/dt =2500A/us T_{vj}=25℃		110		uC
Peak Reverse Recovery Current	I_{rr}			348		A
Reverse Recovery Energy	E_{rec}			64.2		mJ
Recovered Charge	Q_{rr}	I_F =450 A V_R=900V -di$_F$/dt =2500A/us T_{vj}=125℃		160		uC
Peak Reverse Recovery Current	I_{rr}			394		A
Reverse Recovery Energy	E_{rec}			94.4		mJ
Recovered Charge	Q_{rr}	I_F =450 A V_R=900V -di$_F$/dt =2500A/us T_{vj}=150℃		176		uC
Peak Reverse Recovery Current	I_{rr}			410		A
Reverse Recovery Energy	E_{rec}			103.2		mJ

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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}=493.3 Ω	-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	4000			V
Maximum Junction Temperature	T_{jmax}				175	℃
Operating Junction Temperature	$T_{vj\ op}$		-40		150	℃
Storage Temperature	T_{stg}		-40		125	℃
Stray Inductance	L_{CE}			20		nH
Module Lead Resistance ,Terminal to Chip	$R_{CC'+EE'}$			1.1		mΩ
Junction-to Case	$R_{\theta jc}$	per IGBT			0.046	K/W
		per Diode			0.080	
Case to Sink (Conductive grease applied)	$R_{\theta cs}$	per IGBT		0.028		K/W
		per Diode		0.049		
		per Module		0.009		
Module Electrodes Torque	M_t	Recommended(M6)	3.0		6.0	N·m
Module-to-Sink Torque	M_s	Recommended(M5)	3.0		6.0	N·m
Weight of Module	G			350		g

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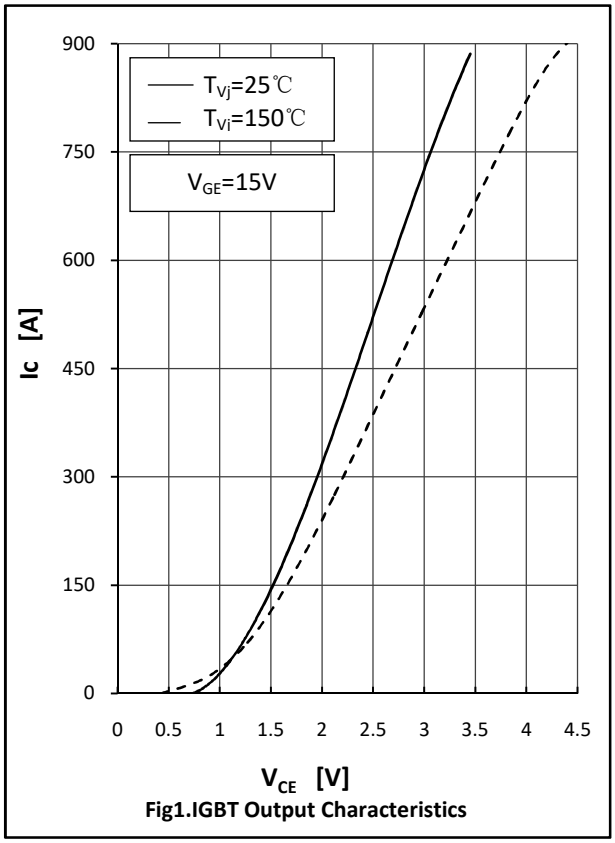

Fig1.IGBT Output Characteristics

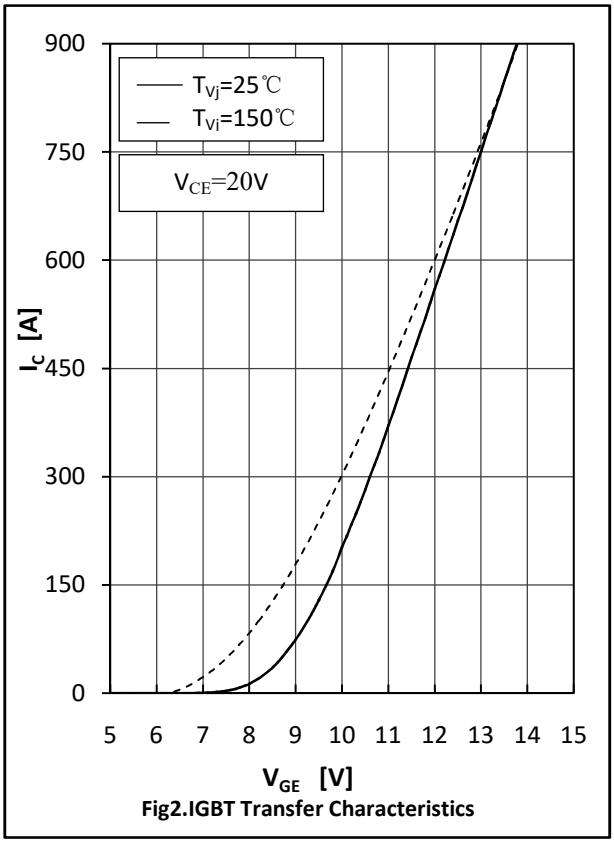

Fig2.IGBT Transfer Characteristics

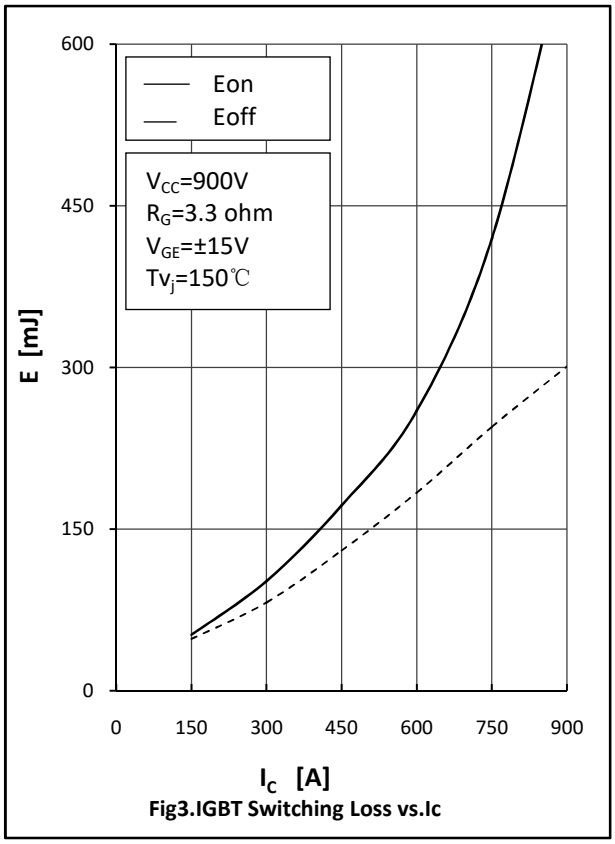

Fig3.IGBT Switching Loss vs.Ic

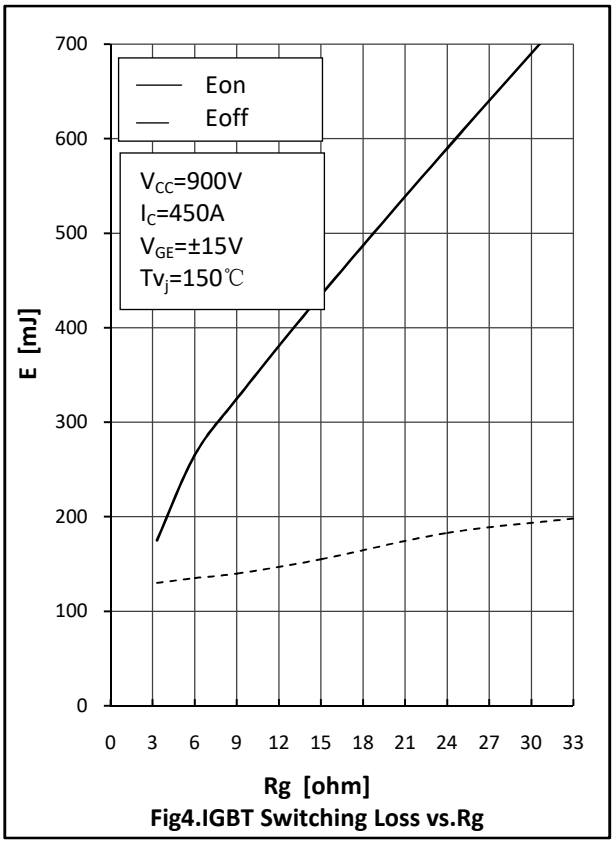

Fig4.IGBT Switching Loss vs.Rg

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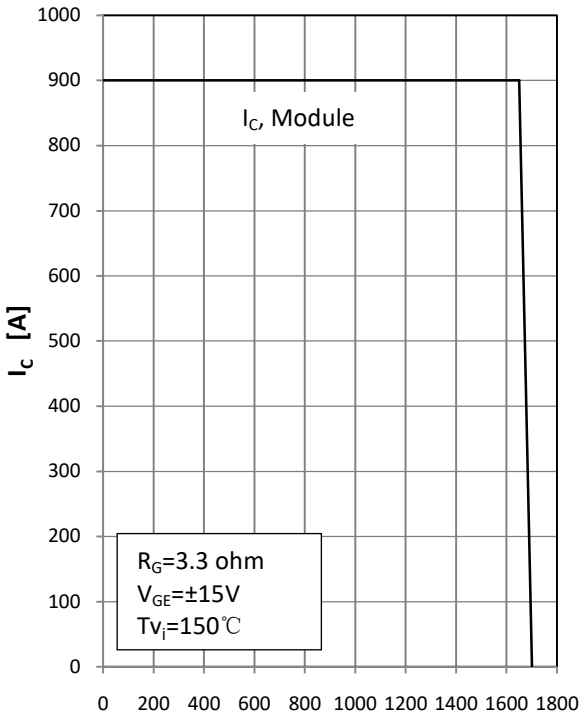

Fig5. RBSOA

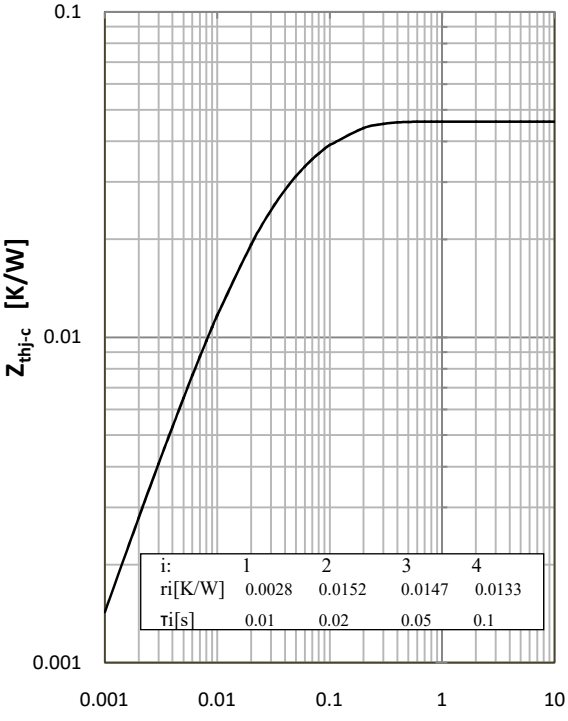

Fig 6. IGBT Transient Thermal Impedance

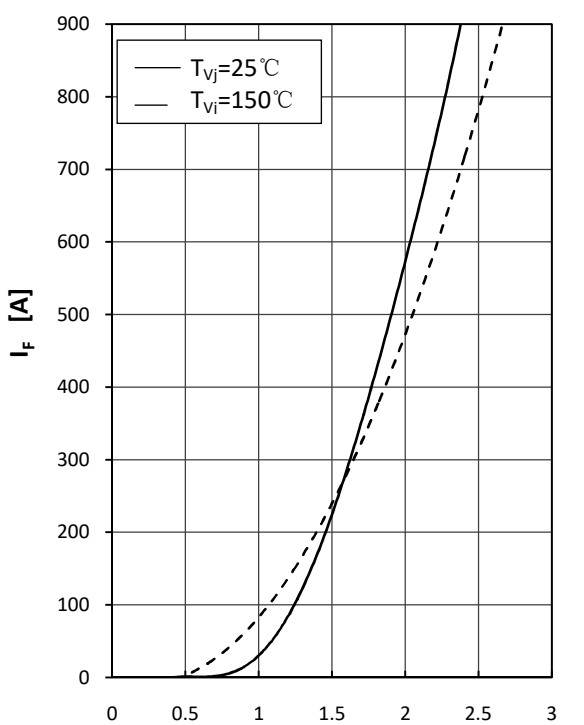

Fig7.Diode Foward Characteristics

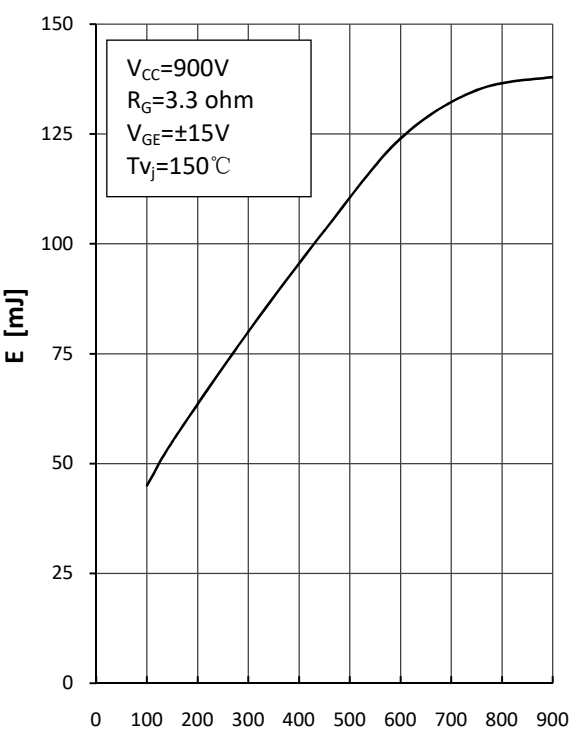

Fig8.Diode Switching Loss(Erec) vs.I_F

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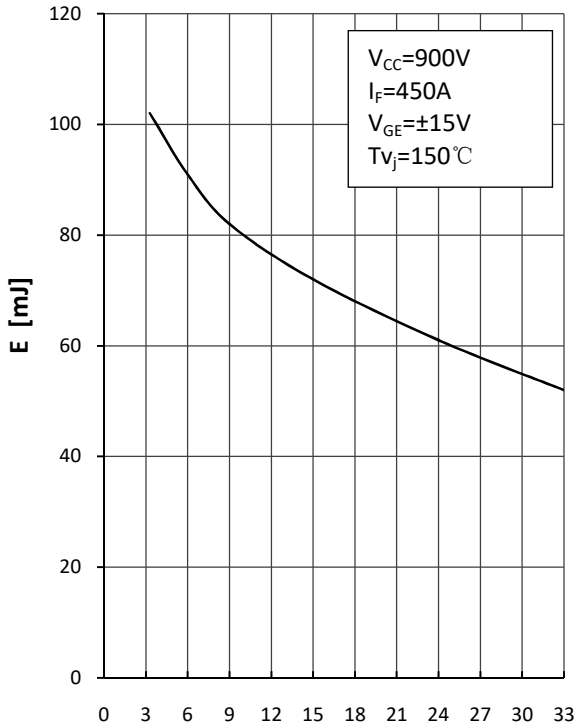

Fig9.Diode Switching Loss(Erec) vs.Rg

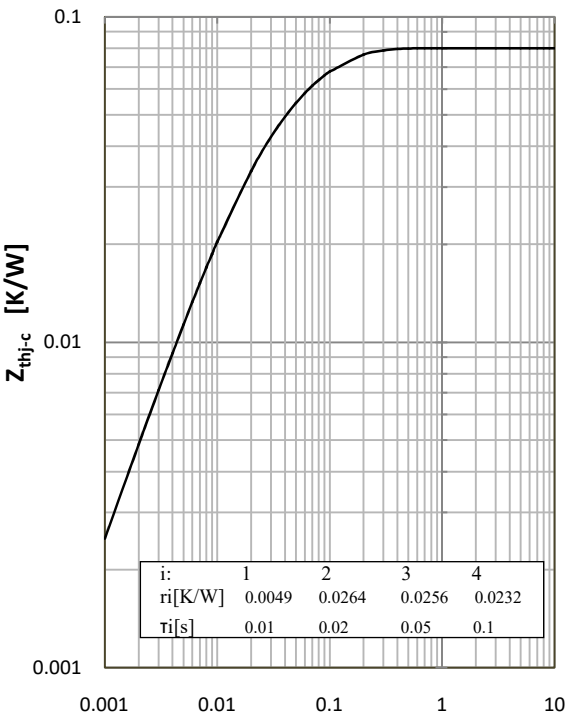

Fig10.Diode Transient Thermal Impedance

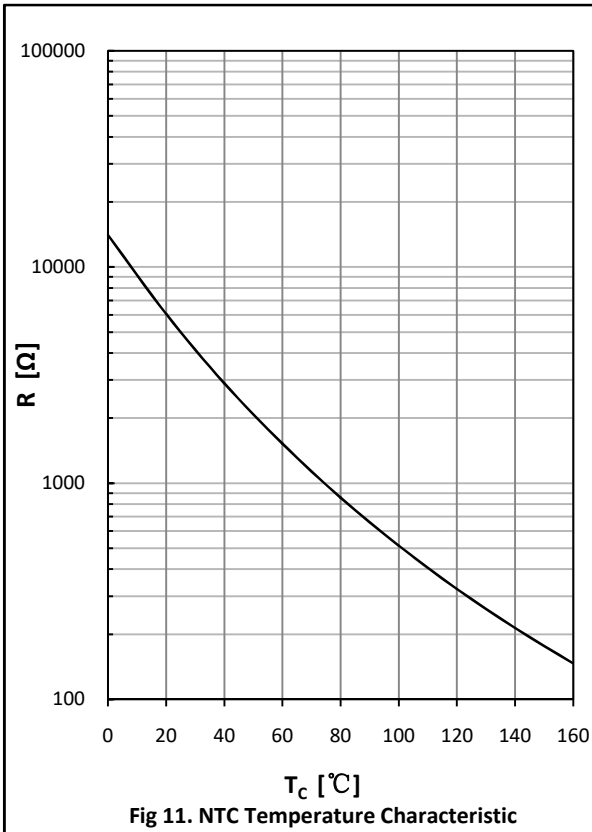

Fig 11. NTC Temperature Characteristic

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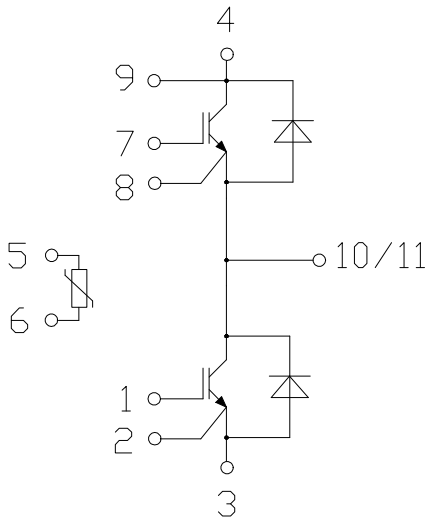
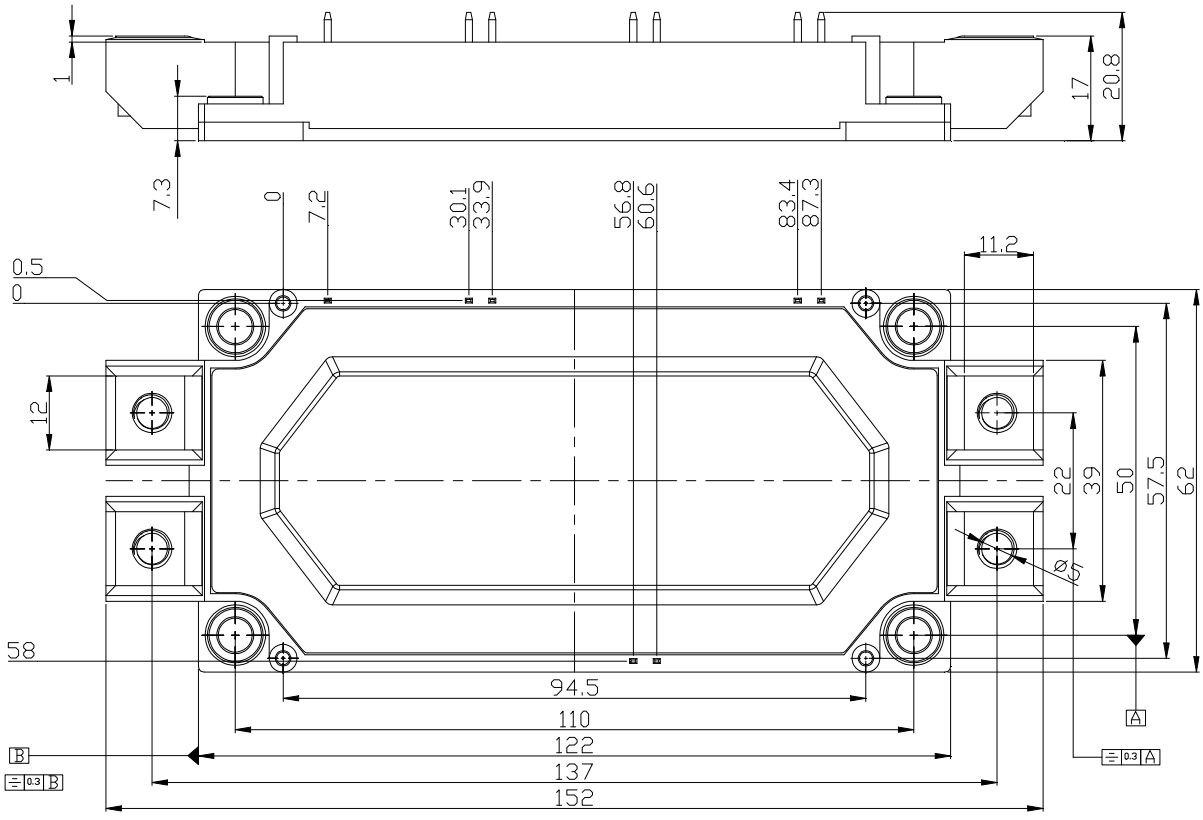
- **Circuit Diagram**



- **Package Dimensions**

Dimensions in Millimeters



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