STARPOWER

SEMICONDUCTOR™

IGBT

GD75FFT170C6S

Molding Type Module

1700V/75A 6 in one-package

General Description

STARPOWER IGBT Power Module provides ultra low conduction loss as well as short circuit ruggedness. They are designed for the applications such as general inverters and UPS.

Features

- Low $V_{CE(sat)}$ trench IGBT technology
- 10μs short circuit capability
- $V_{CE(sat)}$ with positive temperature coefficient
- Maximum junction temperature 175℃
- Low inductance case
- Fast & soft reverse recovery anti-parallel FWD
- Isolated copper baseplate using DBC technology

Typical Applications

- Inverter for motor drive
- AC and DC servo drive amplifier
- Uninterruptible power supply

Absolute Maximum Ratings T_C=25℃ unless otherwise noted

Symbol	Description	GD75FFT170C6S	Units
V_{CES}	Collector-Emitter Voltage	1700	V
V_{GES}	Gate-Emitter Voltage	±20	V
I_C	Collector Current @ T_C=25℃ @ T_C=80℃	150 75	A
$I_{CM(1)}$	Pulsed Collector Current @ T_C=80℃	150	A
I_F	Diode Continuous Forward Current	75	A
I_{FM}	Diode Maximum Forward Current	150	A
P_D	Maximum power Dissipation @ T_j=150℃	556	W
T_j	Maximum Junction Temperature	175	℃
T_{STG}	Storage Temperature Range	-40 to +125	℃
V_{ISO}	Isolation Voltage RMS,f=50Hz,t=1min	3400	V
Mounting Torque	Mounting Screw:M5	3.0 to 6.0	N.m

Notes:

(1) Repetitive rating: Pulse width limited by max. junction temperature

Electrical Characteristics of IGBT T_C=25℃ unless otherwise noted

Off Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage	T_j=25℃	1700			V
I_{CES}	Collector Cut-Off Current	V_{CE}=V_{CES},V_{GE}=0V, T_j=25℃			5.0	mA
I_{GES}	Gate-Emitter Leakage Current	V_{GE}=V_{GES},V_{CE}=0V, T_j=25℃			400	nA

On Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=3.0mA,V_{CE}=V_{GE}, T_j=25℃	5.2	5.8	6.4	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C=75A,V_{GE}=15V, T_j=25℃		2.00	2.45	V
		I_C=75A,V_{GE}=15V, T_j=125℃		2.40		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=900V,I_C=75A, R_G=6.8Ω,V_{GE}=±15V, T_j=25℃		370		ns
t_r	Rise Time			40		ns
$t_{d(off)}$	Turn-Off Delay Time			650		ns
t_f	Fall Time			180		ns
E_{on}	Turn-On Switching Loss			16.5		mJ
E_{off}	Turn-Off Switching Loss			16.0		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=900V,I_C=75A, R_G=6.8Ω,V_{GE}=±15V, T_j=125℃		400		ns
t_r	Rise Time			50		ns
$t_{d(off)}$	Turn-Off Delay Time			800		ns
t_f	Fall Time			300		ns
E_{on}	Turn-On Switching Loss			24.0		mJ
E_{off}	Turn-Off Switching Loss			23.5		mJ
C_{ies}	Input Capacitance	V_{CE}=25V,f=1MHz, V_{GE}=0V		6.80		nF
C_{oes}	Output Capacitance			0.28		nF
C_{res}	Reverse Transfer Capacitance			0.22		nF
I_{SC}	SC Data	T_P≤10μs,V_{GE}=15V, T_j=125℃,V_{CC}=1000V, V_{CEM}≤1700V		300		A
L_{CE}	Stray Inductance			21		nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal To Chip			1.80		mΩ

Electrical Characteristics of DIODE T_C=25℃ unless otherwise noted

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units
V_F	Diode Forward Voltage	I_F=75A	T_j=25℃		1.80	2.20	V
			T_j=125℃		1.90		
Q_r	Recovered charge	I_F=75A, V_R=900V, di/dt=-1800A/μs, V_{GE}=-15V	T_j=25℃		22.0		μC
			T_j=125℃		36.5		
I_{RM}	Peak Reverse Recovery Current		T_j=25℃		115		A
			T_j=125℃		125		
E_{rec}	Reverse Recovery Energy		T_j=25℃		11.5		mJ
			T_j=125℃		20.5		

Electrical Characteristics of NTC T_C=25℃ unless otherwise noted

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

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (per IGBT)		0.27	K/W
$R_{\theta JC}$	Junction-to-Case (per DIODE)		0.50	K/W
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)	0.009		K/W
Weight	Weight of Module	300		g

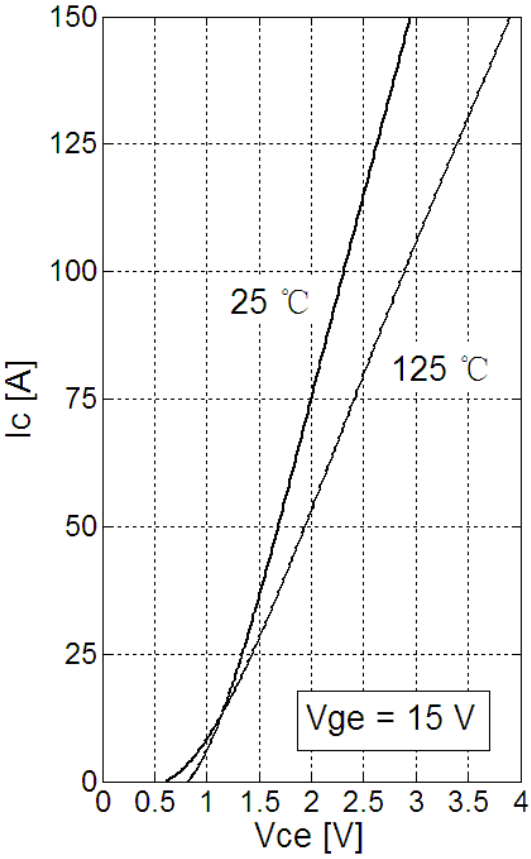


Fig 1. IGBT Output Characteristics

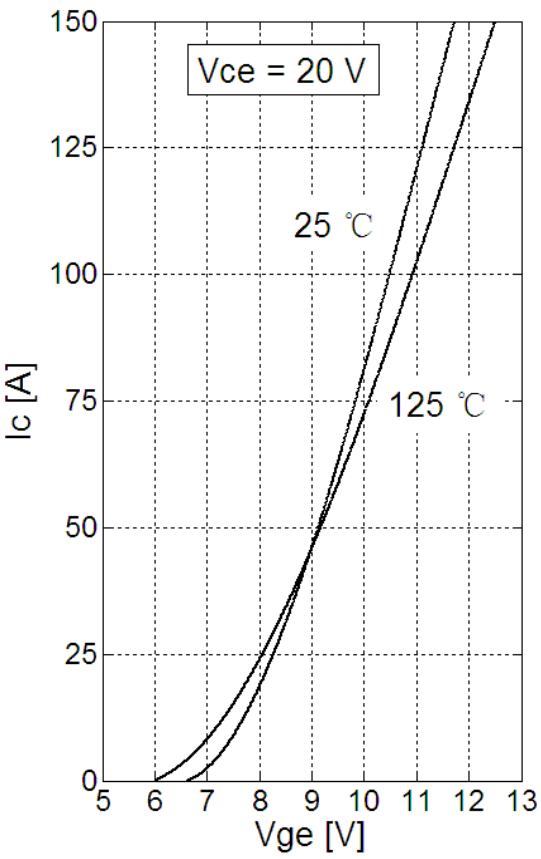


Fig 2. IGBT Transfer Characteristics

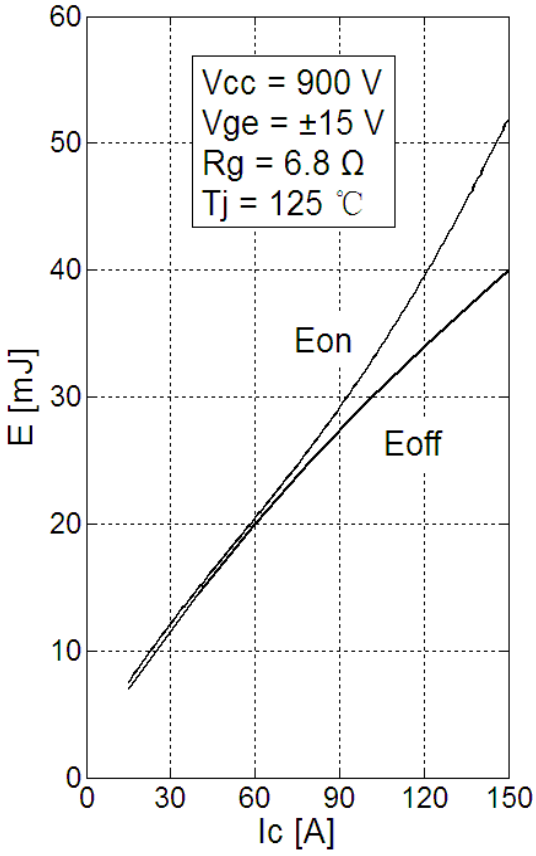


Fig 3. IGBT Switching Loss vs. I_C

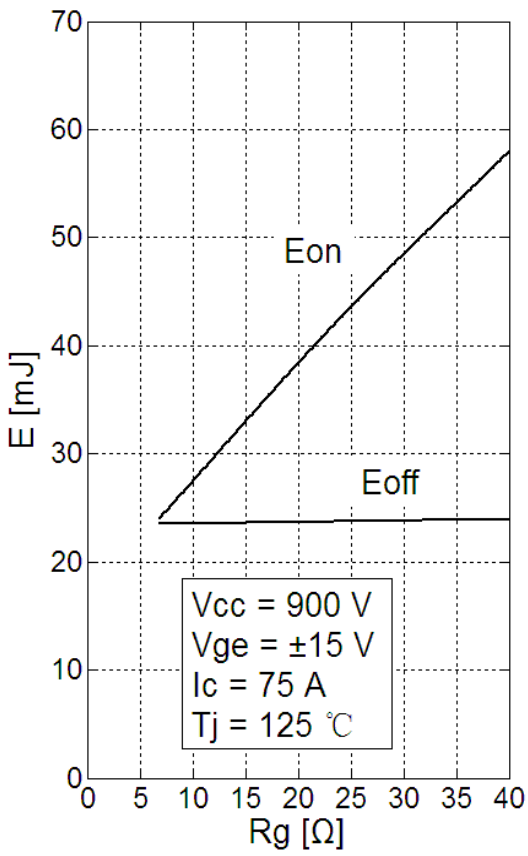


Fig 4. IGBT Switching Loss vs. R_G

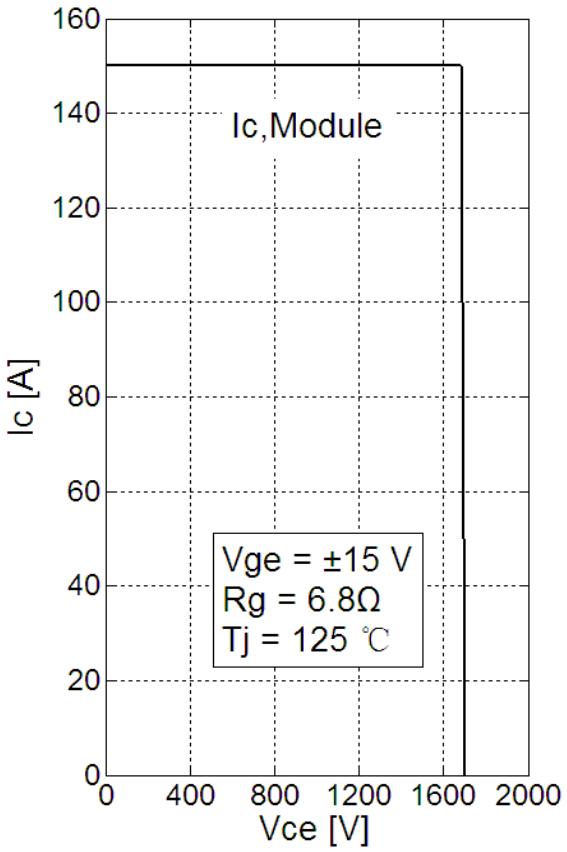


Fig 5. RBSOA

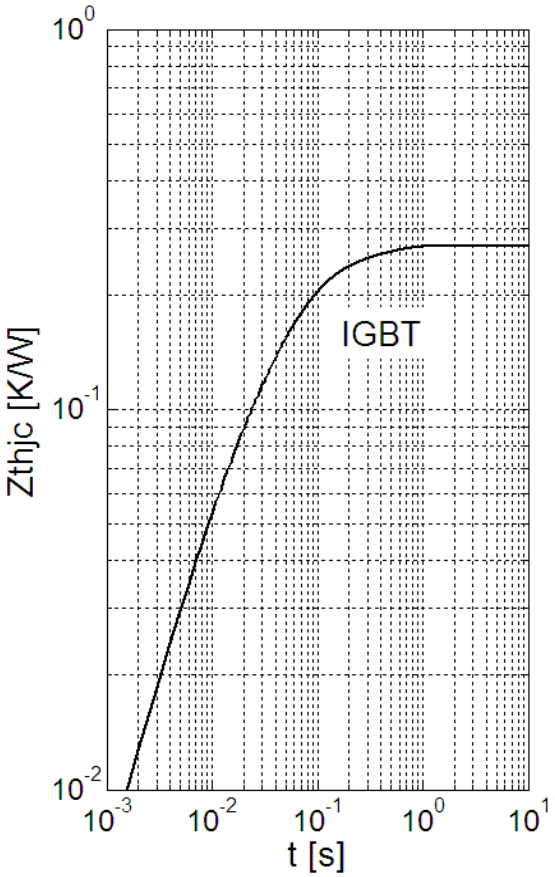


Fig 6. IGBT Transient Thermal Impedance

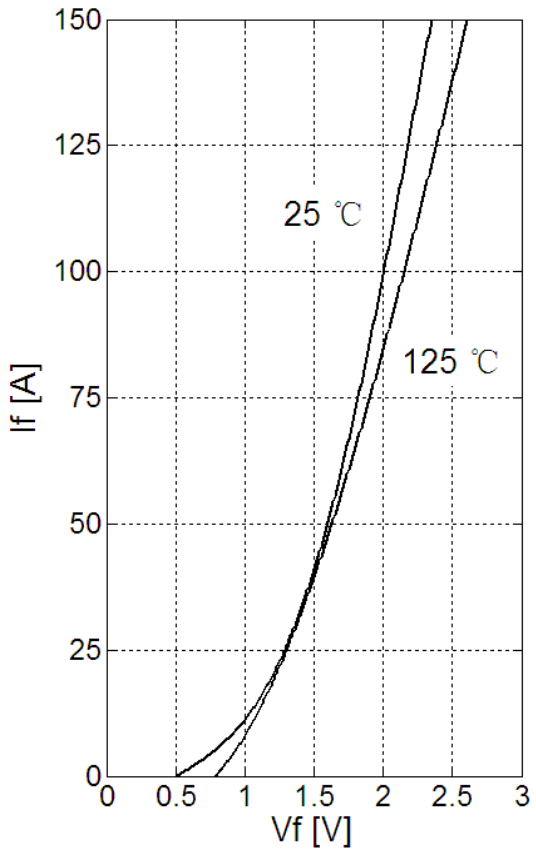


Fig 7. Diode Forward Characteristics

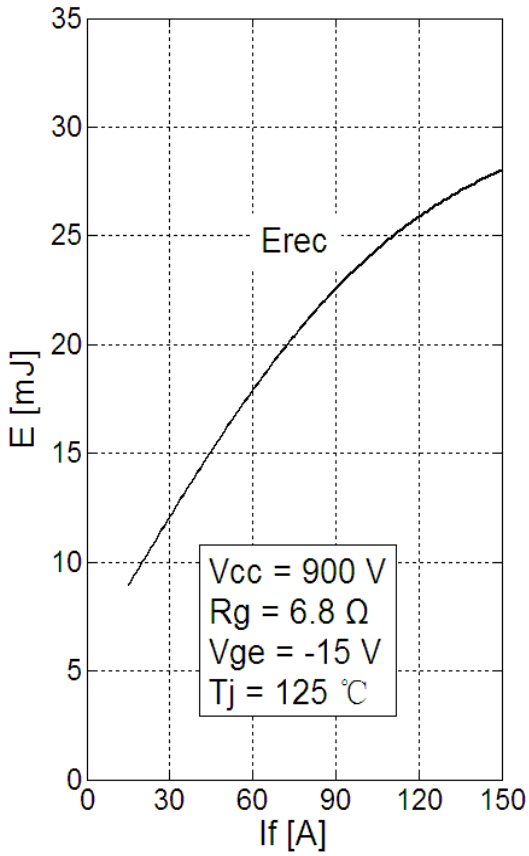


Fig 8. Diode Switching Loss vs. I_F

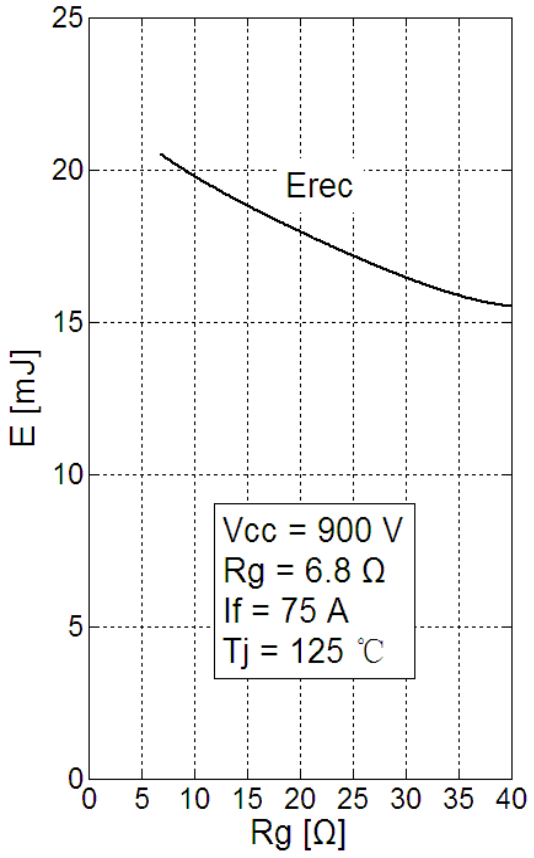


Fig 9. Diode Switching Loss vs. R_G

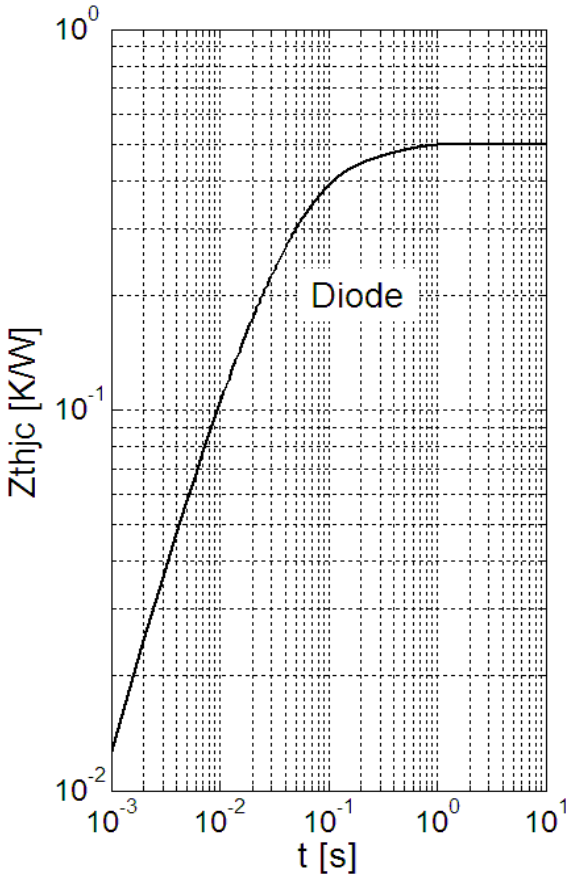


Fig 10. Diode Transient Thermal Impedance

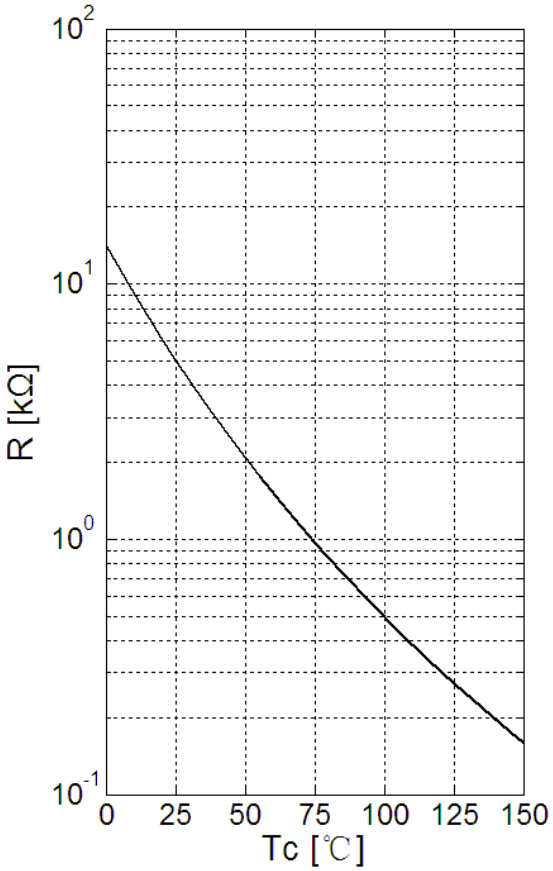
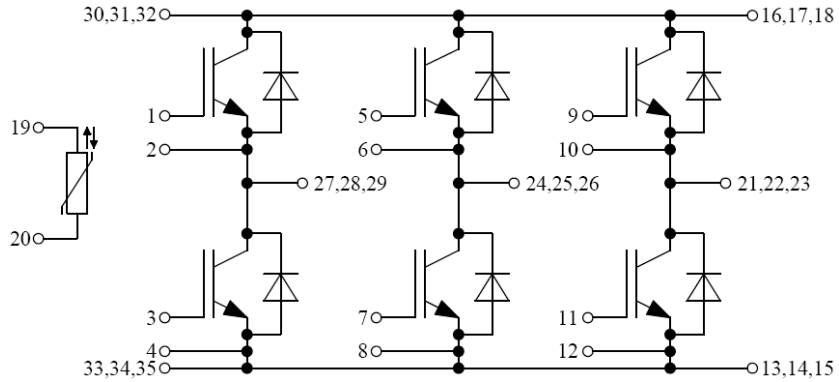


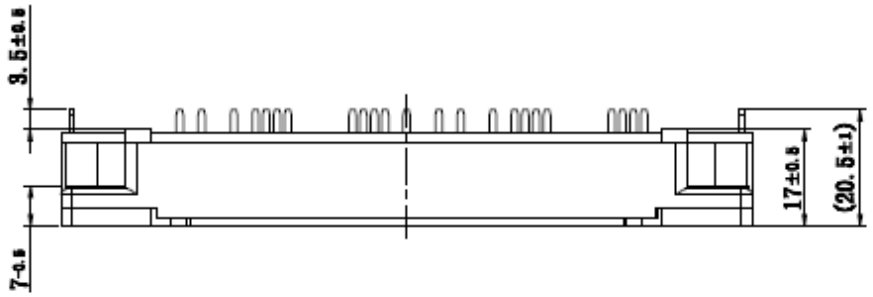
Fig 11. NTC-Temperature Characteristic

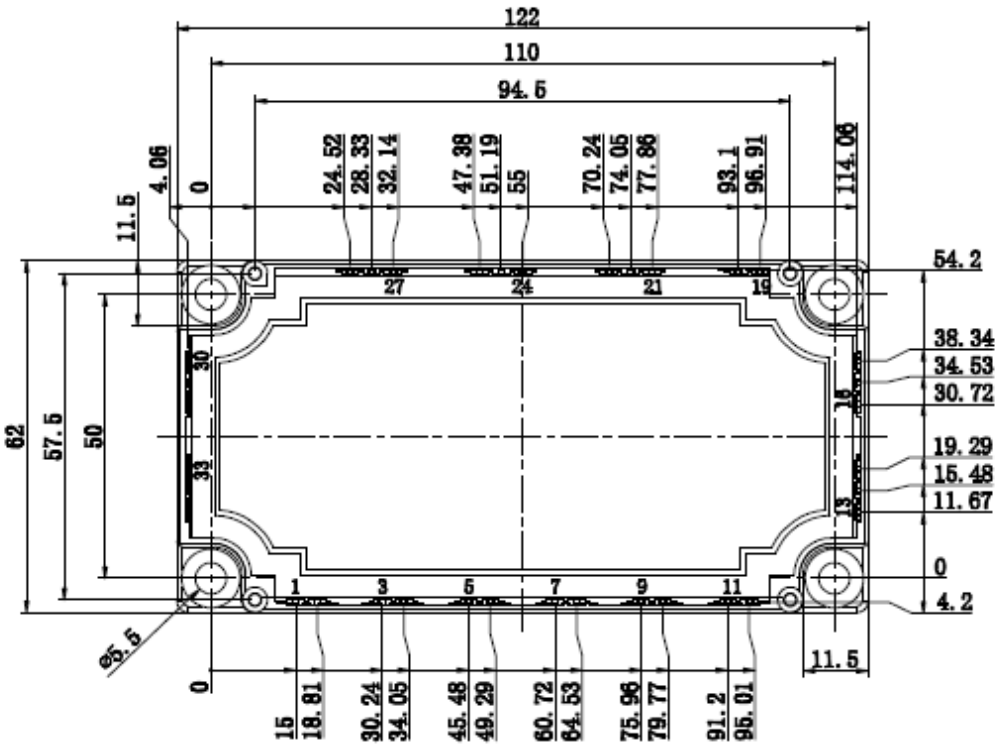
Equivalent Circuit Schematic



Package Dimension

Dimensions in Millimeters





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