STARPOWER

SEMICONDUCTOR **IGBT**

GD75FFL120C6S

Molding Type Module

1200V/75A 6 in one-package

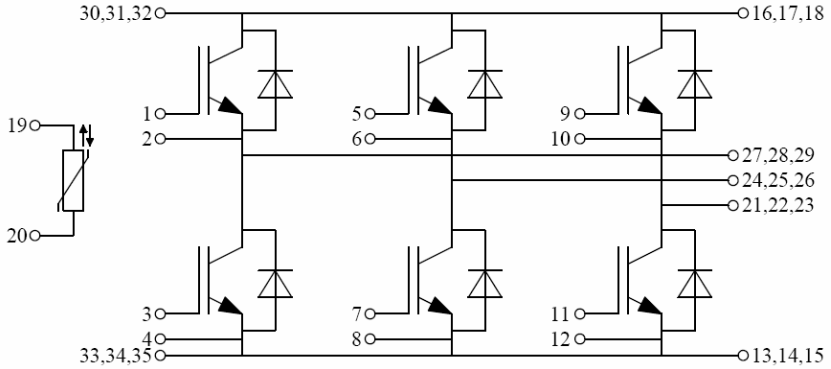
General Description

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

- High short circuit capability, self limiting to 6*I_C
- 10μs short circuit capability
- $V_{CE(sat)}$ with positive temperature coefficient
- Low inductance case
- Fast & soft reverse recovery anti-parallel FWD
- Isolated copper baseplate using DBC technology

Equivalent Circuit Schematic



Typical Applications

- AC inverter drives
- Switching mode power supplies
- Electronic welders at f_{SW} up to 20kHz

Absolute Maximum Ratings T_C=25℃ unless otherwise noted

Symbol	Description	GD75FFL120C6S	Units
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate-Emitter Voltage	±20	V
I_C	Collector Current @ T_C=25℃ @ T_C=100℃	120 75	A
$I_{CM(1)}$	Pulsed Collector Current	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=175℃	429	W
T_{SC}	Short Circuit Withstand Time @ T_j=125℃	10	μs
T_j	Operating Junction Temperature	-40 to +150	℃
T_{STG}	Storage Temperature Range	-40 to +125	℃
I^2t-value, Diode	V_R=0V, t=10ms, T_j=125℃	1190	A^2s
V_{ISO}	Isolation Voltage RMS, f=50Hz, t=1min	2500	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
BV_{CES}	Collector-Emitter Breakdown Voltage	T_j=25℃	1200			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℃	5.0	5.8	6.5	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C=75A,V_{GE}=15V, T_j=25℃		1.9		V
		I_C=75A,V_{GE}=15V, T_j=125℃		2.1		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=75A, R_G=4.7Ω, V_{GE} =±15V, T_j=25℃		260		ns
t_r	Rise Time			30		ns
$t_{d(off)}$	Turn-Off Delay Time			420		ns
t_f	Fall Time			70		ns
E_{on}	Turn-On Switching Loss			4.70		mJ
E_{off}	Turn-Off Switching Loss			6.20		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=75A, R_G=4.7Ω, V_{GE} =±15V, T_j=125℃		290		ns
t_r	Rise Time			50		ns
$t_{d(off)}$	Turn-Off Delay Time			520		ns
t_f	Fall Time			90		ns
E_{on}	Turn-On Switching Loss			6.75		mJ
E_{off}	Turn-Off Switching Loss			10.0		mJ
C_{ies}	Input Capacitance	V_{CE} =25V, f=1MHz, V_{GE} =0V		5.30		nF
C_{oes}	Output Capacitance			0.38		nF
C_{res}	Reverse Transfer Capacitance			0.20		nF
I_{SC}	SC Data	T_P≤10μs, V_{GE}=15V, T_j=125℃, V_{CC}=900V, V_{CEM}≤1200V		300		A
L_{CE}	Stray inductance			25		nH
$R_{CC'+EE'}$	Module lead resistance, terminal to chip	T_C=25℃		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℃		1.9	2.3	V
			T_j=125℃		2.0	2.4	
t_{rr}	Diode Reverse Recovery Time	I_F=75A, V_R=600V, di/dt=-2000A/μs, V_{GE}=-15V	T_j=25℃		100		ns
			T_j=125℃		125		
I_{RM}	Diode Peak Reverse Recovery Current		T_j=25℃		80		A
			T_j=125℃		100		
E_{rec}	Reverse Recovery Energy		T_j=25℃		3.0		mJ
			T_j=125℃		6.0		

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}=439Ω	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)		0.35	K/W
$R_{\theta JC}$	Junction-to-Case (per DIODE)		0.58	K/W
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)	0.009		K/W
Weight	Weight of Module	300		g

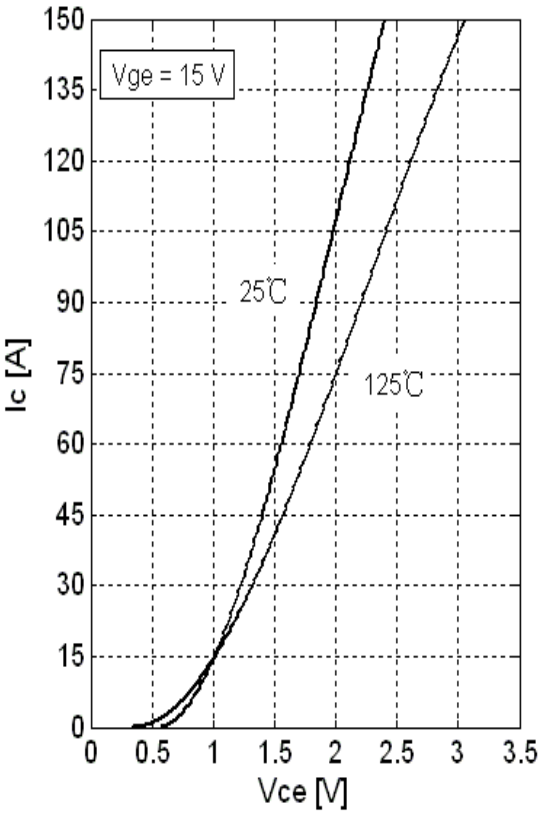


Fig 1. Typical Output Characteristics

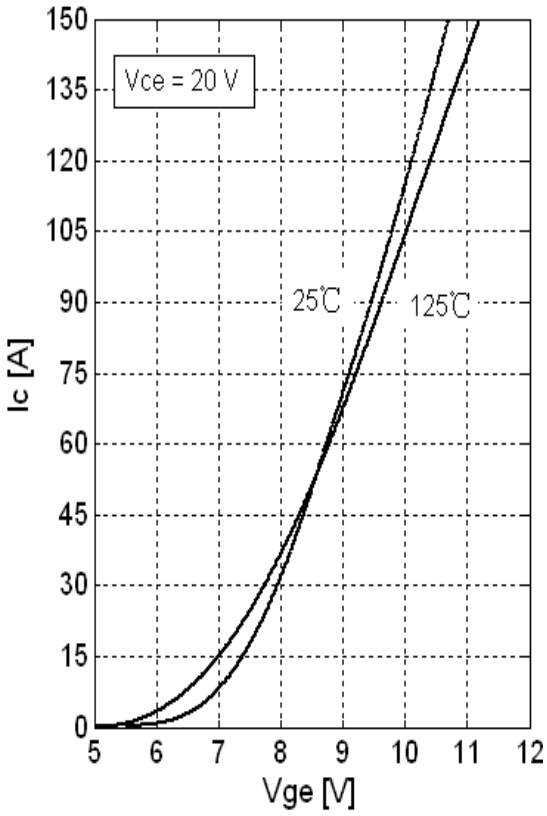


Fig 2. Typical Transfer Characteristics

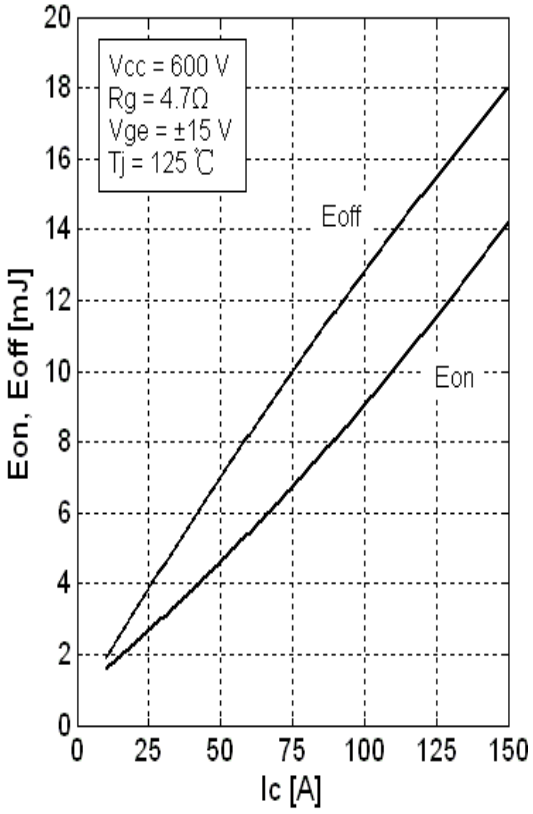


Fig 3. Switching Loss vs Collector Current

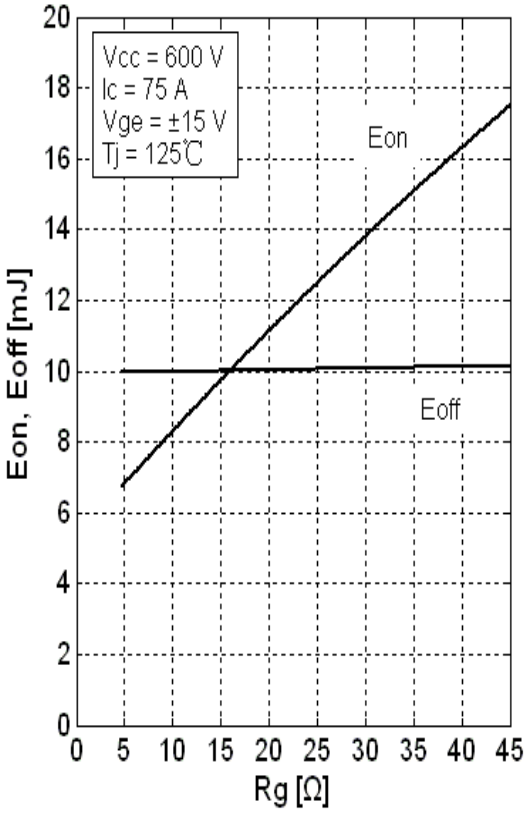


Fig 4. Switching Loss vs Gate Resistor

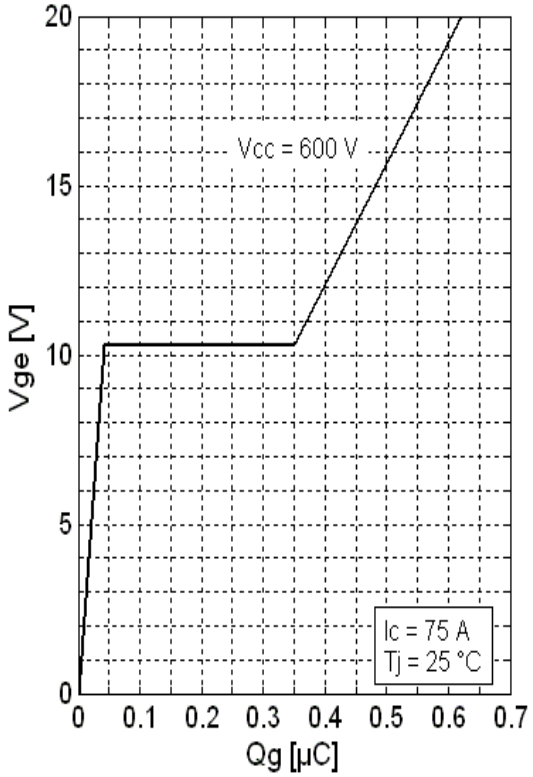


Fig 5. Gate Charge Characteristics.

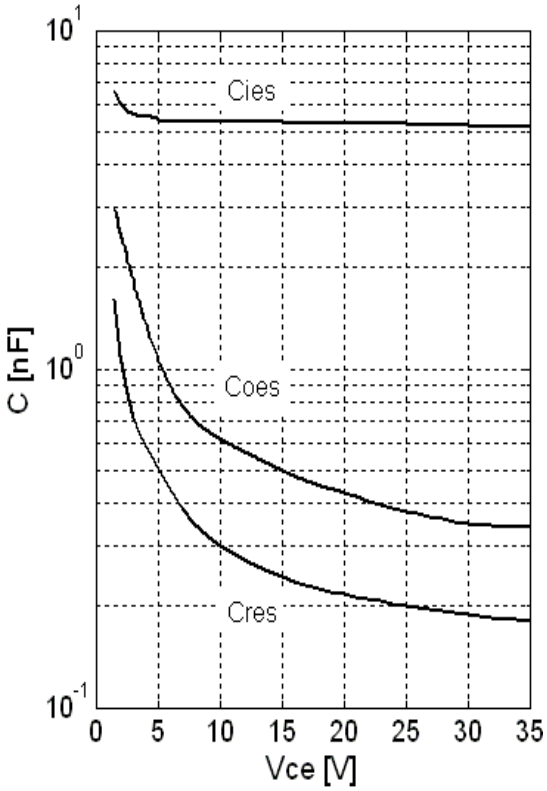


Fig 6. Typical Capacitance vs. Collector-Emitter Voltage

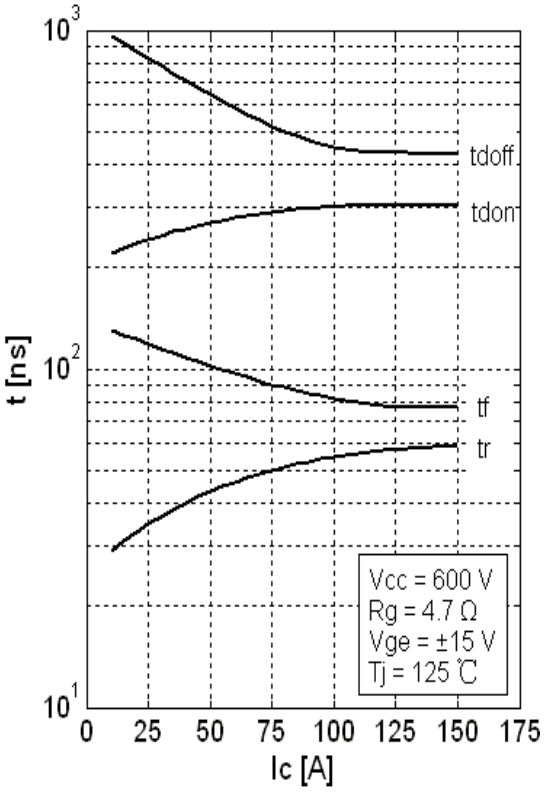


Fig 7. Typical Switching Times vs. I_C

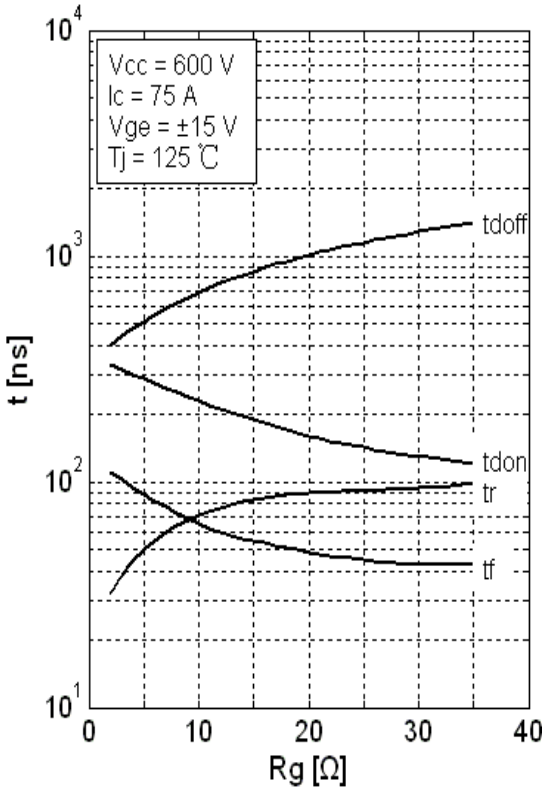


Fig 8. Typical Switching Times vs. Gate Resistance R_G

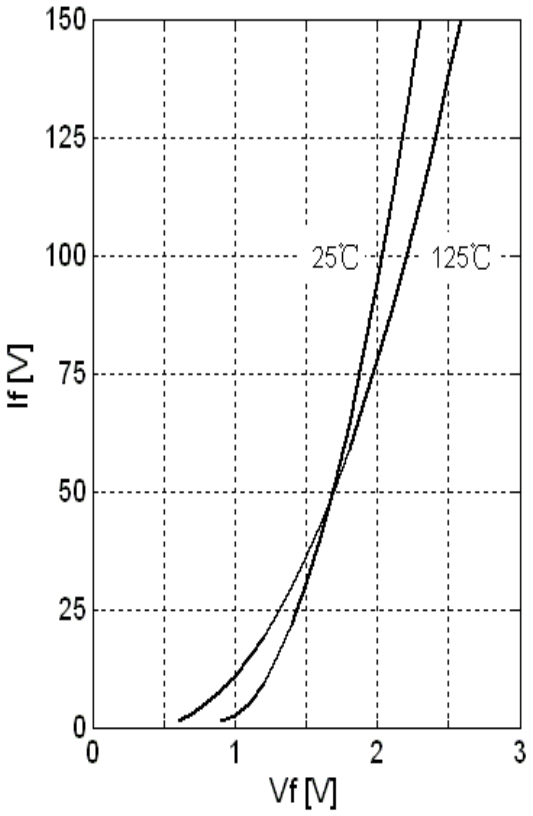


Fig 9. Typical Forward Characteristics (diode)

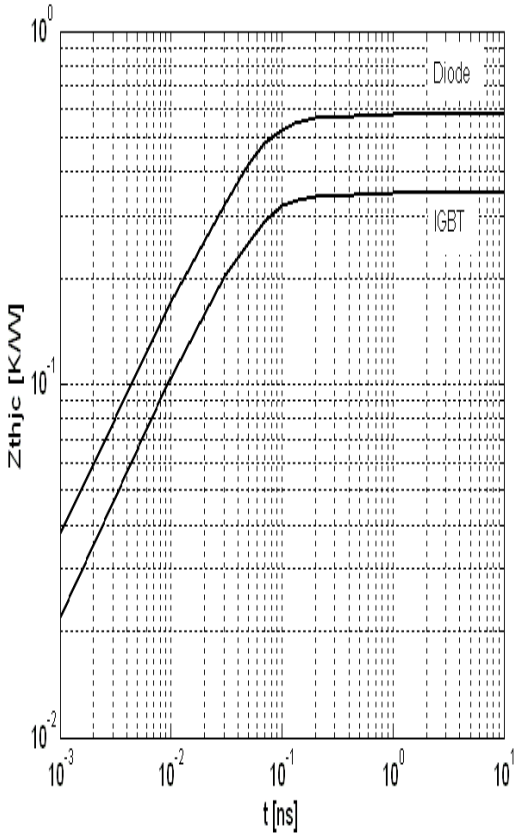


Fig 10. Transient thermal impedance

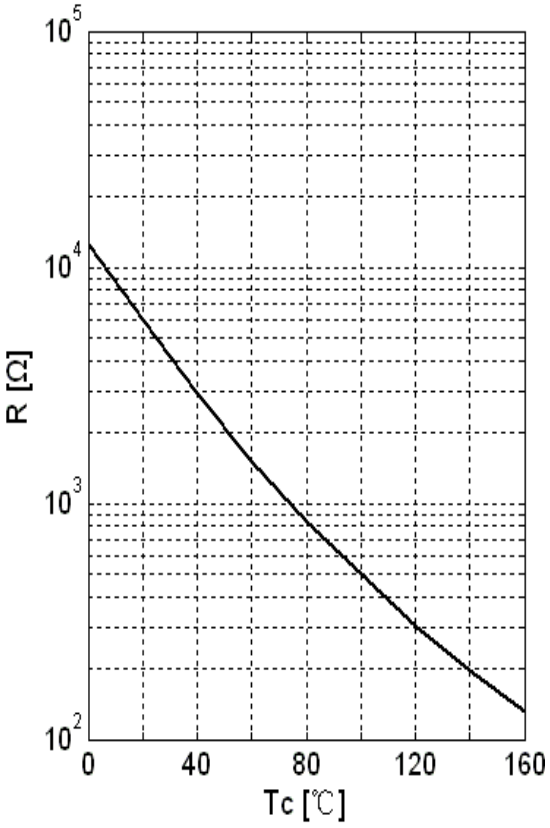
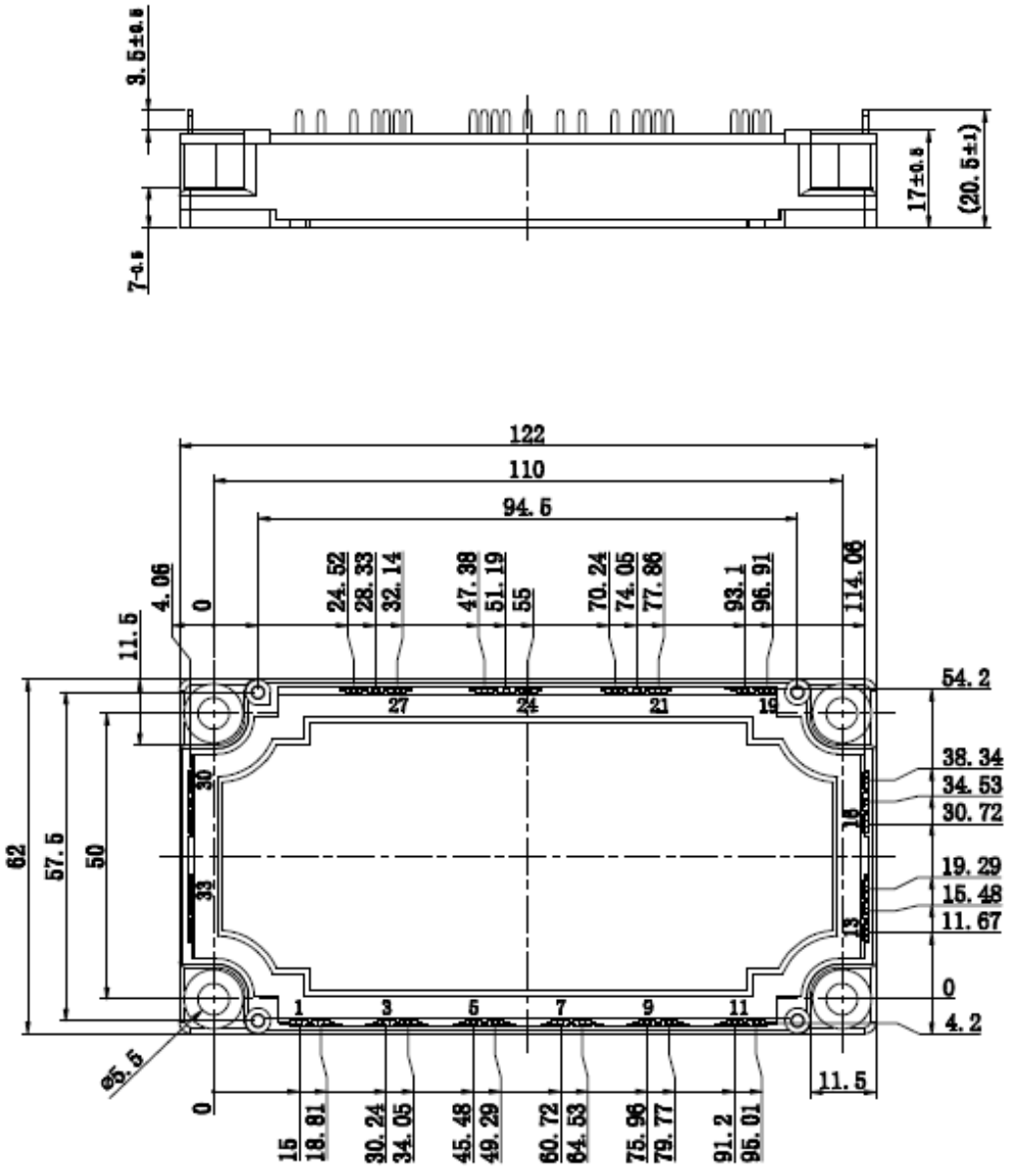


Fig 11. NTC-temperature characteristic

Package Dimension

Dimensions in Millimeters



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