STARPOWER

SEMICONDUCTOR™

IGBT

GD150HTT170C7S

Molding Type Module

1700V/150A 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
- Low switching losses
- Maximum junction temperature 175℃
- 10μs short circuit capability
- Square RBSOA
- $V_{CE(sat)}$ with positive temperature coefficient
- 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

IGBT-inverter T_C=25℃ unless otherwise noted

Maximum Rated Values

Symbol	Description	GD150HTT170C7S	Units
V_{CES}	Collector-Emitter Voltage @ T_j=25℃	1700	V
V_{GES}	Gate-Emitter Voltage @ T_j=25℃	±20	V
I_C	Collector Current @ T_C=25℃ @ T_C=80℃	300 150	A
I_{CM}	Pulsed Collector Current t_p=1ms	300	A
P_{tot}	Total Power Dissipation @ T_j=175℃	1250	W

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℃			3.0	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=6.0mA,V_{CE}=V_{GE}, T_j=25℃	5.2	5.8	6.4	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C=150A,V_{GE}=15V, T_j=25℃		2.00	2.45	V
		I_C=150A,V_{GE}=15V, T_j=125℃		2.40		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
R_{Gint}	Internal Gate Resistance			3.2		Ω
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=900V,I_C=150A, R_G=9.1Ω,V_{GE}=±15V, T_j=25℃		280		ns
t_r	Rise Time			50		ns
$t_{d(off)}$	Turn-Off Delay Time			815		ns
t_f	Fall Time			180		ns
E_{on}	Turn-On Switching Loss			33.1		mJ
E_{off}	Turn-Off Switching Loss			32.0		mJ

$t_{d(on)}$	Turn-On Delay Time	V_{CC}=900V,I_C=150A, R_G=9.1Ω,V_{GE}=±15V, T_j=125℃		300		ns
t_r	Rise Time			65		ns
$t_{d(off)}$	Turn-Off Delay Time			995		ns
t_f	Fall Time			300		ns
E_{on}	Turn-On Switching Loss			47.9		mJ
E_{off}	Turn-Off Switching Loss			47.1		mJ
C_{ies}	Input Capacitance	V_{CE}=25V,f=1Mhz, V_{GE}=0V		13.2		nF
C_{oes}	Output Capacitance			0.55		nF
C_{res}	Reverse Transfer Capacitance			0.44		nF
I_{SC}	SC Data	t_{SC}≤10μs,V_{GE}≤15V, T_j=125℃,V_{CC}=1000V, V_{CEM}≤1700V		600		A

DIODE-inverter T_C=25℃ unless otherwise noted

Maximum Rated Values

Symbol	Description	GD150HTT170C7S	Units
V_{RRM}	Repetitive Peak Reverse Voltage @ T_j=25℃	1700	V
I_F	DC Forward Current @ T_C=80℃	150	A
I_{FRM}	Repetitive Peak Forward Current t_p=1ms	300	A

Characteristics Values

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units
V_F	Diode Forward Voltage	I_F=150A,V_{GE}=0V	T_j=25℃		1.80	2.20	V
			T_j=125℃		1.90		
Q_r	Recovered Charge	I_F=150A, V_R=900V, di/dt=-2100A/μs, V_{GE}=-15V	T_j=25℃		40		μC
			T_j=125℃		64		
I_{RM}	Peak Reverse Recovery Current		T_j=25℃		176		A
			T_j=125℃		190		
E_{rec}	Reverse Recovery Energy		T_j=25℃		20.0		mJ
			T_j=125℃		35.9		

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}	T_C=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

IGBT Module

Symbol	Parameter	Min.	Typ.	Max.	Units
V_{ISO}	Isolation Voltage RMS,f=50Hz,t=1min		3400		V
L_{CE}	Stray Inductance		20		nH
$R_{CC'+EE'}$	Module Lead Resistance,Terminal to Chip @ T_C=25℃		1.1		mΩ
$R_{\theta JC}$	Junction-to-Case (per IGBT) Junction-to-Case (per DIODE)			0.120 0.210	K/W
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)		0.005		K/W
T_{jmax}	Maximum Junction Temperature			175	℃
T_{STG}	Storage Temperature Range	-40		125	℃
Mounting Torque	Power Terminal Screw:M5 Mounting Screw:M6	3.0 3.0		6.0 6.0	N.m
Weight	Weight of Module		910		g

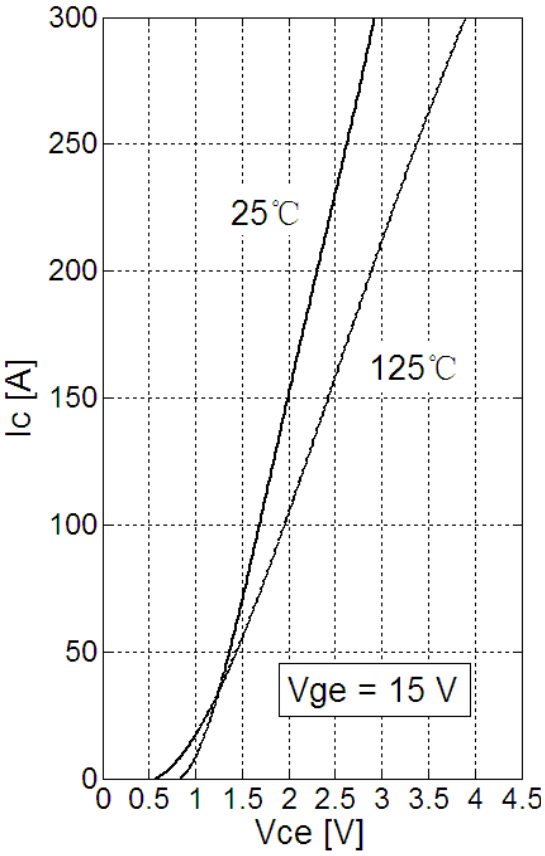


Fig 1. IGBT Output Characteristics

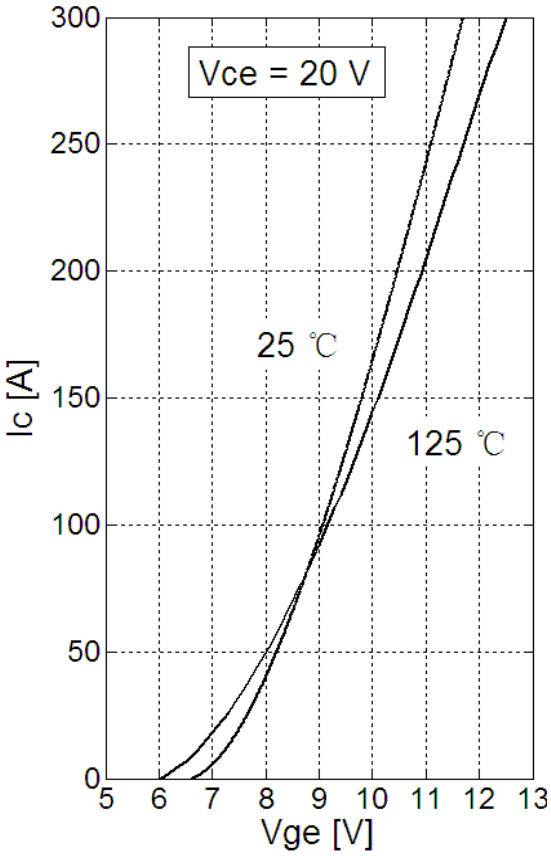


Fig 2. IGBT Transfer Characteristics

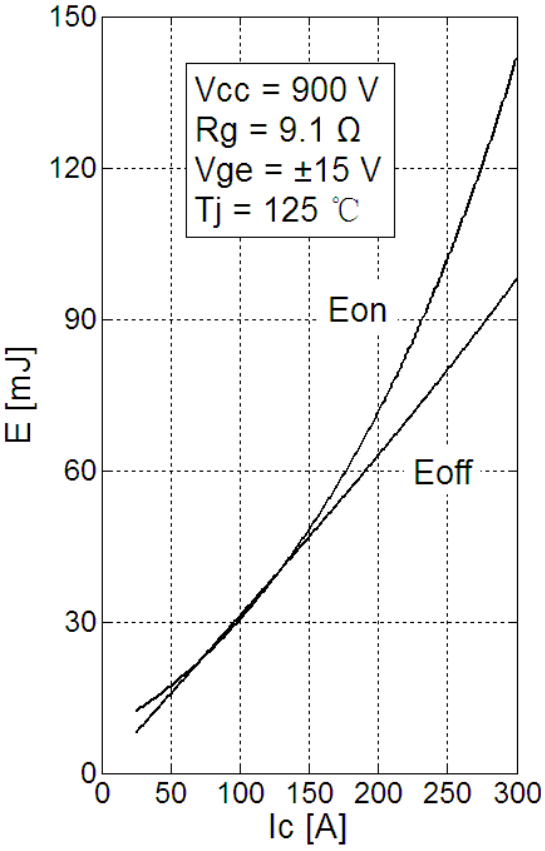


Fig 3. IGBT Switching Loss vs. I_C

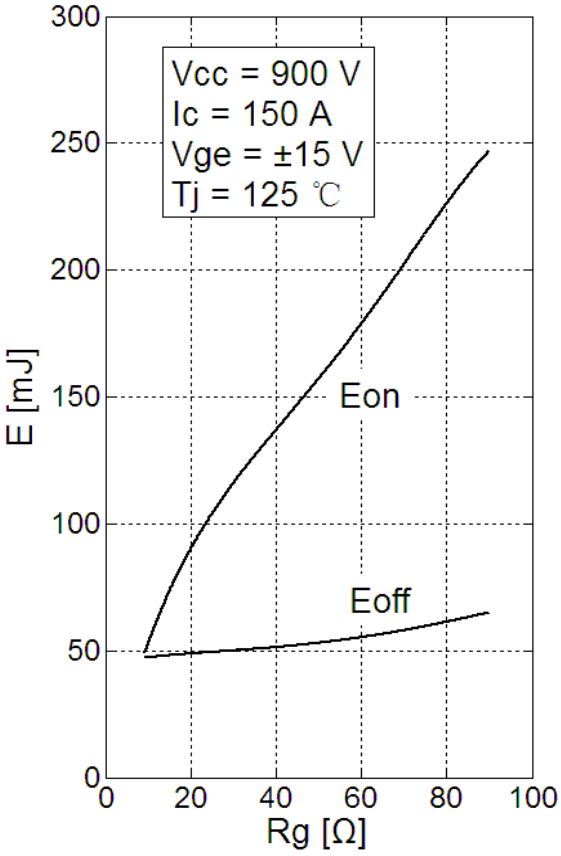


Fig 4. IGBT Switching Loss vs. R_G

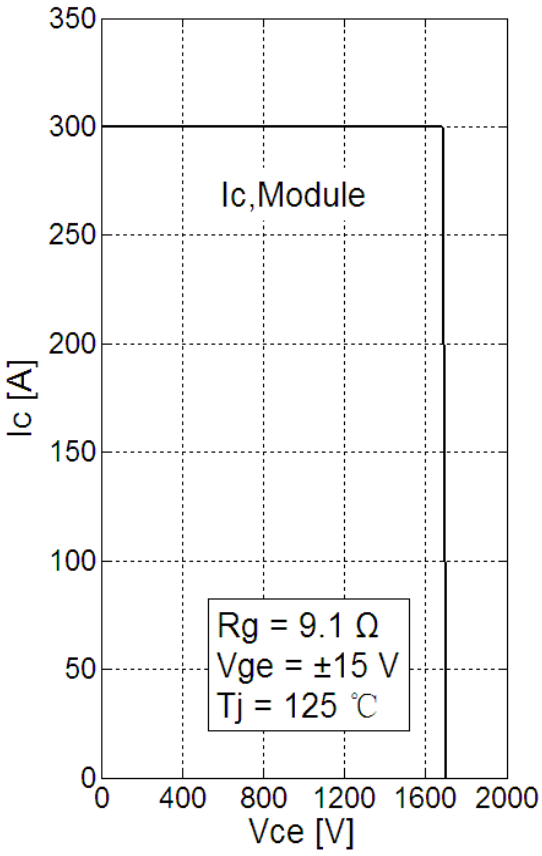


Fig 5. RBSOA

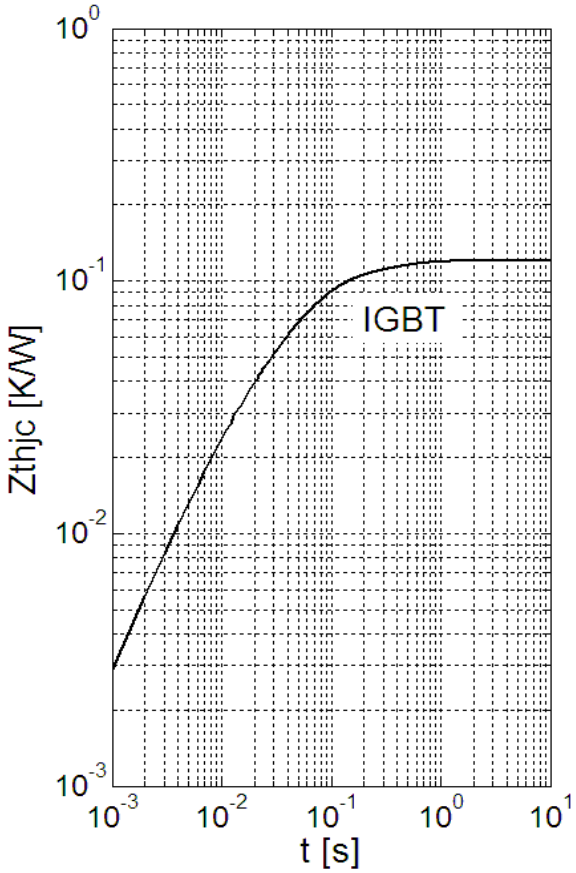


Fig 6. IGBT Transient Thermal Impedance

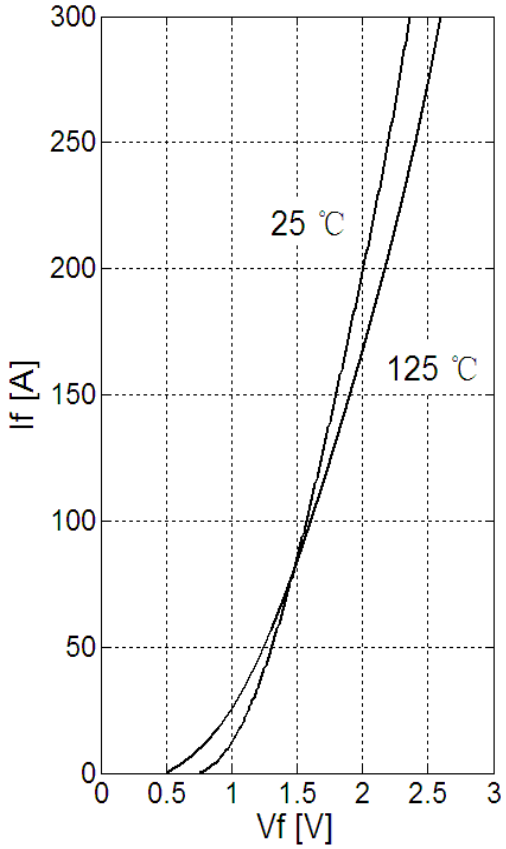


Fig 7. Diode Typical Forward Characteristics

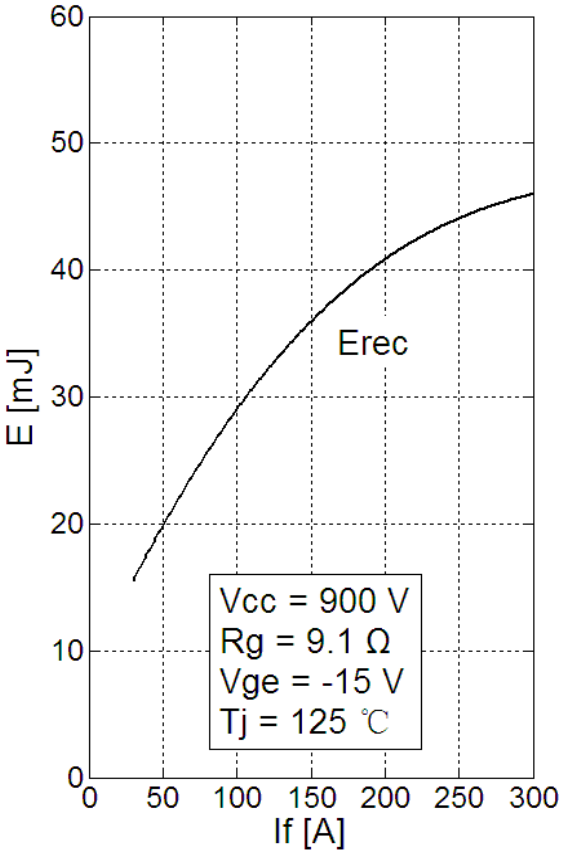


Fig 8. Diode Switching Loss vs. I_F

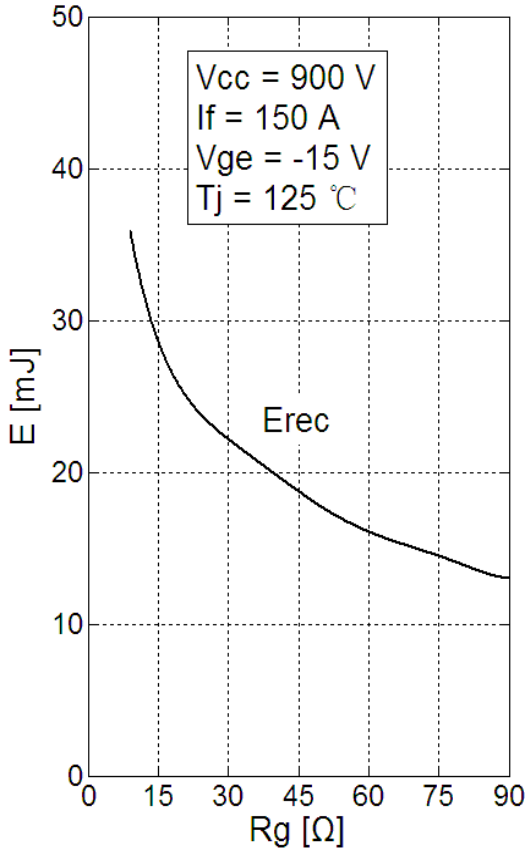


Fig 9. Diode Switching Loss vs. R_G

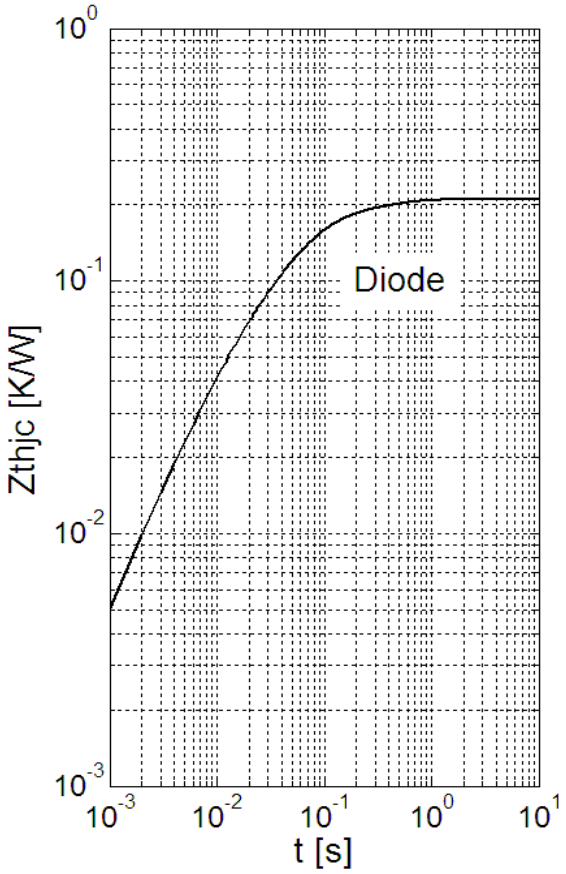


Fig 10. Diode Transient Thermal Impedance

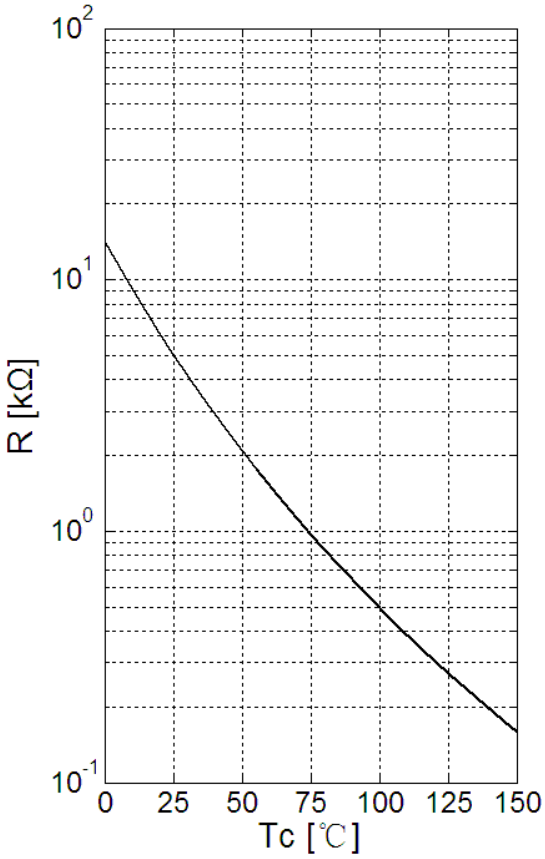
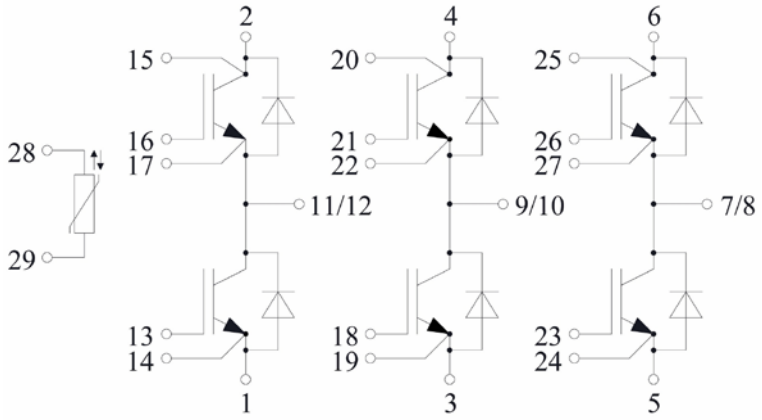


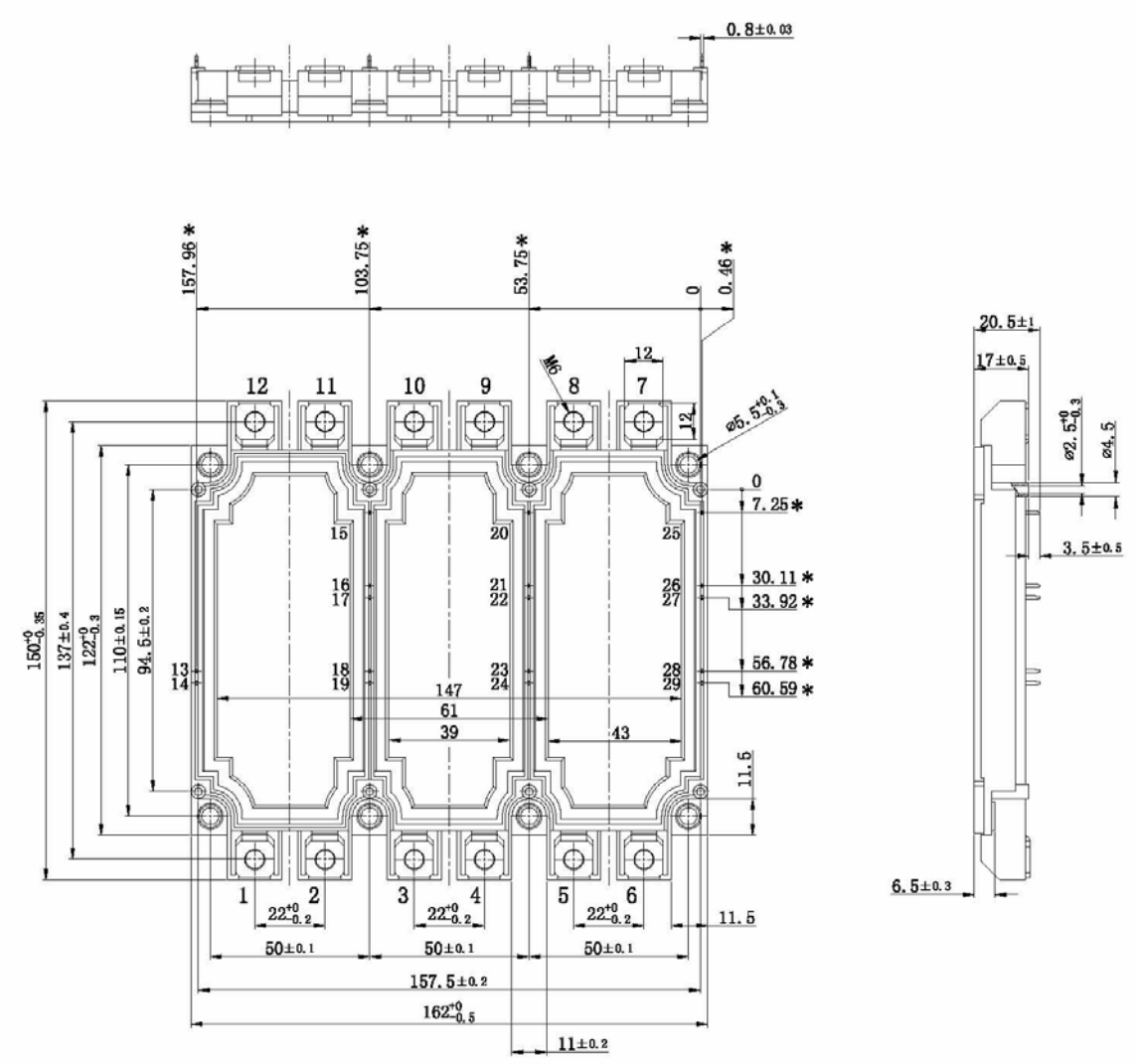
Fig 11. NTC-Temperature Characteristic

Equivalent Circuit Schematic



Package Dimension

Dimensions in Millimeters



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