STARPOWER

SEMICONDUCTOR **IGBT**

GD300HTT120C7S

Molding Type Module

1200V/300A 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
- 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

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	GD300HTT120C7S	Units
V_{CES}	Collector-Emitter Voltage @ T_j=25℃	1200	V
V_{GES}	Gate-Emitter Voltage @ T_j=25℃	±20	V
I_C	Collector Current @ T_C=25℃ @ T_C=80℃	550 300	A
I_{CM}	Pulsed Collector Current t_p=1ms	600	A
P_{tot}	Total Power Dissipation @ T_j=175℃	1744	W

Off Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{(BR)CES}$	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=12.0mA,$V_{CE}=V_{GE}$, T_j=25℃	5.0	5.8	6.5	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C=300A,V_{GE}=15V, T_j=25℃		1.70	2.15	V
		I_C=300A,V_{GE}=15V, T_j=125℃		2.00		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=300A, R_G=2.4Ω,V_{GE}=±15V, T_j=25℃		251		ns
t_r	Rise Time			89		ns
$t_{d(off)}$	Turn-Off Delay Time			545		ns
t_f	Fall Time			135		ns
E_{on}	Turn-On Switching Loss			14.9		mJ
E_{off}	Turn-Off Switching Loss			29.2		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=300A, R_G=2.4Ω,V_{GE}=±15V, T_j=125℃		299		ns
t_r	Rise Time			101		ns
$t_{d(off)}$	Turn-Off Delay Time			655		ns
t_f	Fall Time			178		ns
E_{on}	Turn-On Switching Loss			22.1		mJ
E_{off}	Turn-Off Switching Loss			42.9		mJ
C_{ies}	Input Capacitance	V_{CE}=25V,f=1Mhz, V_{GE}=0V		21.5		nF
C_{oes}	Output Capacitance			1.13		nF
C_{res}	Reverse Transfer Capacitance			0.98		nF
Q_G	Gate Charge	V_{CC}=600V,I_C=300A, V_{GE}=-15…+15V		2.70		μC
R_{Gint}	Internal Gate Resister			2.5		Ω
I_{SC}	SC Data	t_P≤10μs,V_{GE}=15V, T_j=125℃,V_{CC}=900V, V_{CEM}≤1200V		1200		A

Diode-inverter T_C=25℃ unless otherwise noted

Maximum Rated Values

Symbol	Description	GD300HTT120C7S	Units
V_{RRM}	Repetitive Peak Reverse Voltage @ T_j=25℃	1200	V
I_F	DC Forward Current @ T_C=80℃	300	A
I_{FRM}	Repetitive Peak Forward Current t_p=1ms	600	A

Characteristics Values

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units
V_F	Diode Forward Voltage	I_F=300A, V_{GE}=0V	T_j=25℃		1.65	2.10	V
			T_j=125℃		1.65		
Q_r	Recovered Charge	I_F=300A, V_R=600V, R_G=2.4Ω, V_{GE}=-15V	T_j=25℃		30		μC
			T_j=125℃		56		
I_{RM}	Peak Reverse Recovery Current		T_j=25℃		208		A
			T_j=125℃		272		
E_{rec}	Reverse Recovery Energy		T_j=25℃		13.9		mJ
			T_j=125℃		26.1		

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

IGBT Module

Symbol	Parameter	Min.	Typ.	Max.	Units
V_{ISO}	Isolation Voltage RMS,f=50Hz,t=1min	2500			V
L_{CE}	Stray Inductance		20		nH
$R_{CC'+EE'}$	Module Lead Resistance,Terminal to Chip @ T_C=25℃		1.10		mΩ
$R_{\theta JC}$	Junction-to-Case (per IGBT-inverter) Junction-to-Case (per Diode-inverter)			0.086 0.148	K/W
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)		0.005		K/W
T_{jmax}	Maximum Junction Temperature			175	℃
T_{jop}	Operating Junction Temperature	-40		150	℃
T_{STG}	Storage Temperature Range	-40		125	℃
Mounting Torque	Power Terminal Screw:M6 Mounting Screw:M5	3.0 3.0		6.0 6.0	N.m
G	Weight of Module		910		g

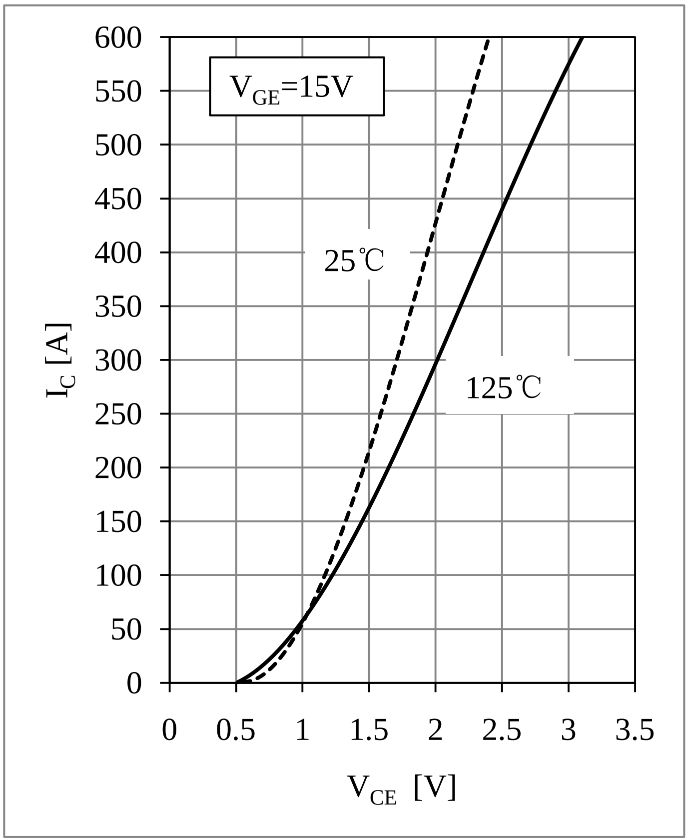


Fig 1. IGBT-inverter Output Characteristic

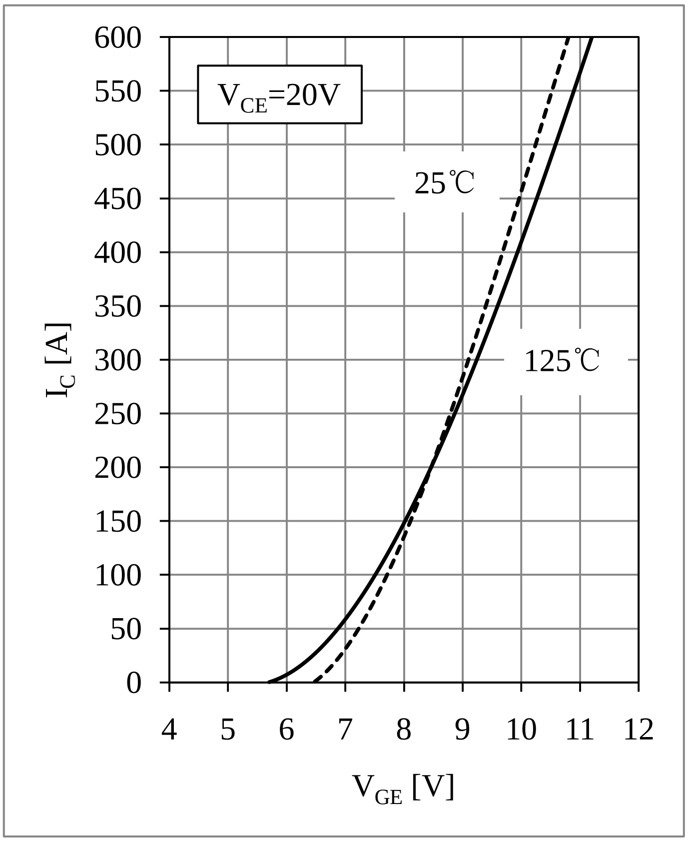


Fig 2. IGBT-inverter Transfer Characteristic

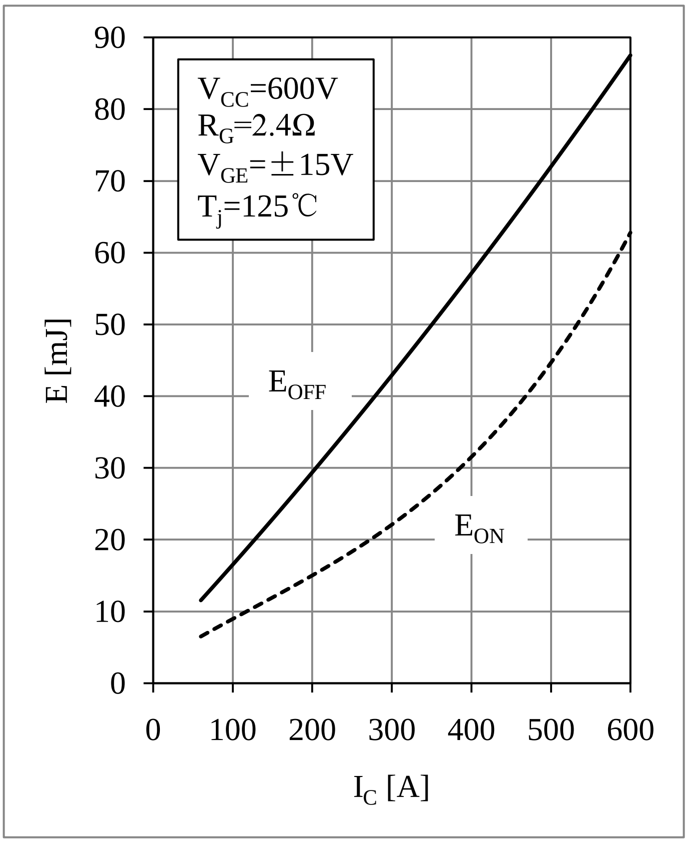


Fig 3. IGBT-inverter Switching Loss vs. I_C

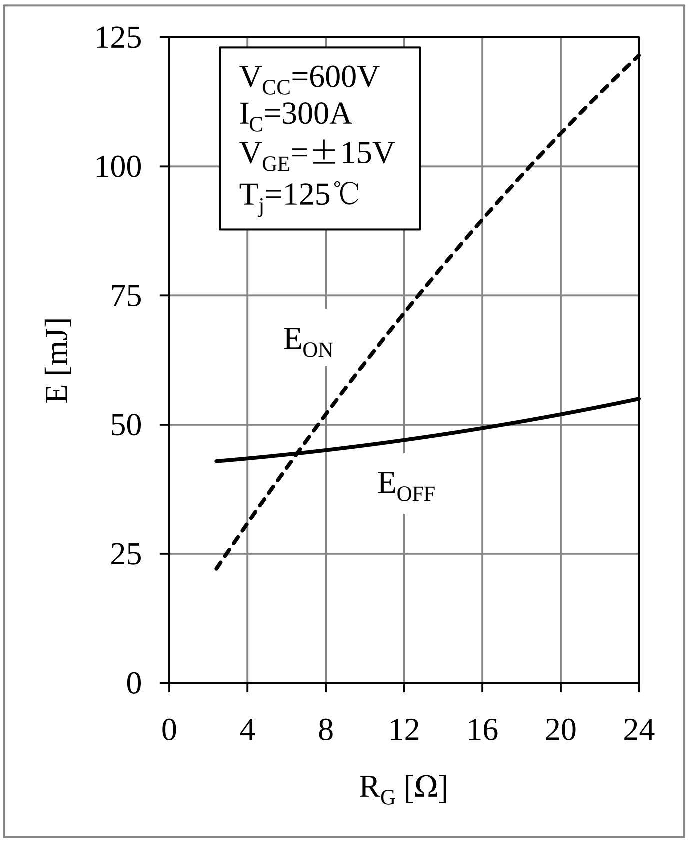


Fig 4. IGBT-inverter Switching Loss vs. R_G

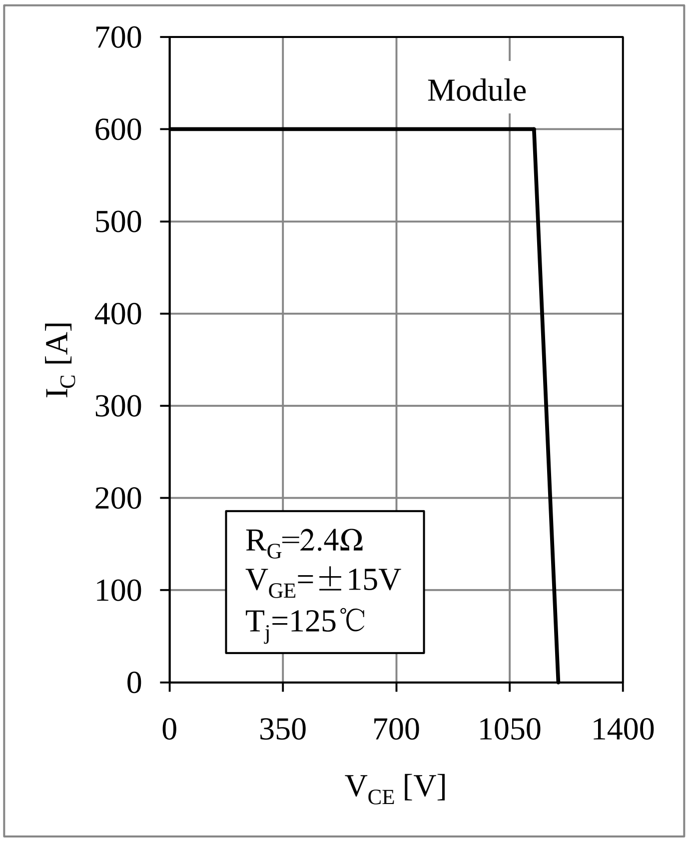


Fig 5. IGBT-inverter RBSOA

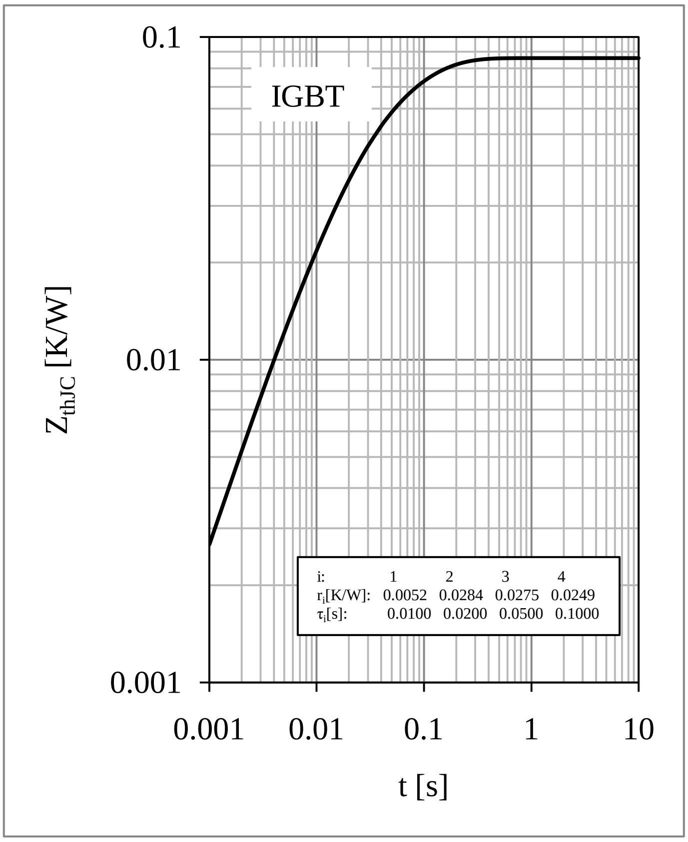


Fig 6. IGBT-inverter Transient Thermal Impedance

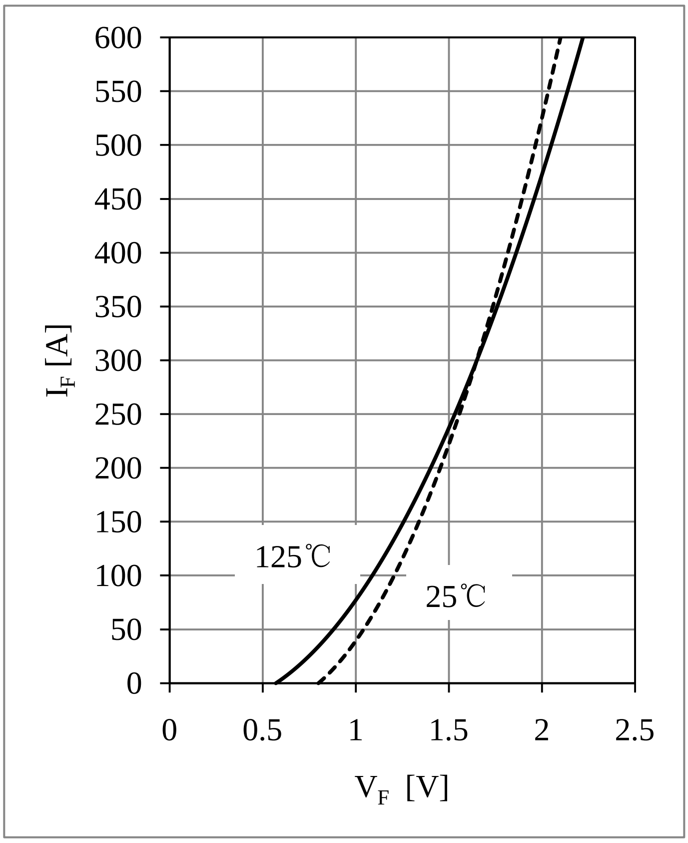


Fig 7. Diode-inverter Forward Characteristic

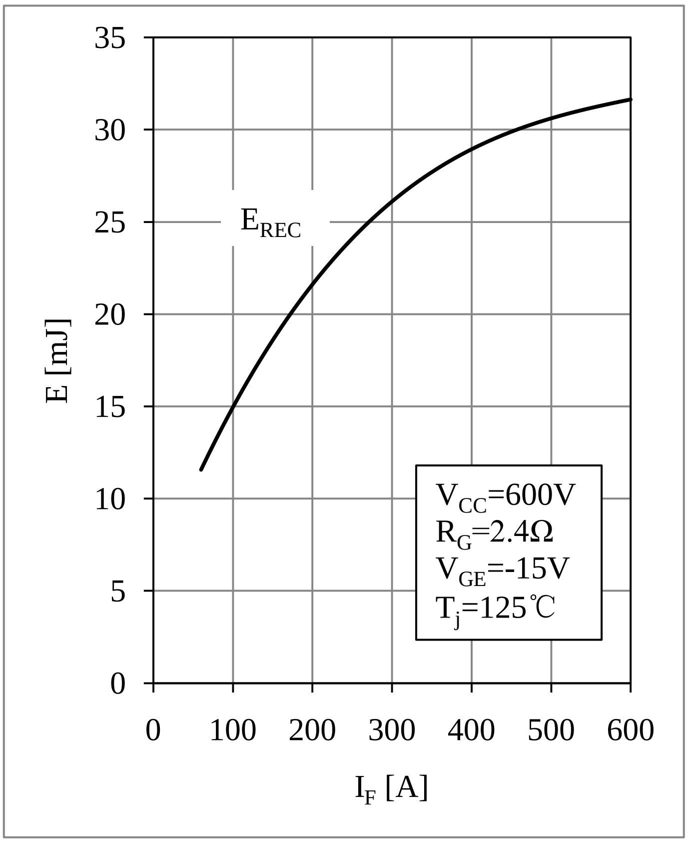


Fig 8. Diode-inverter Switching Loss vs. I_F

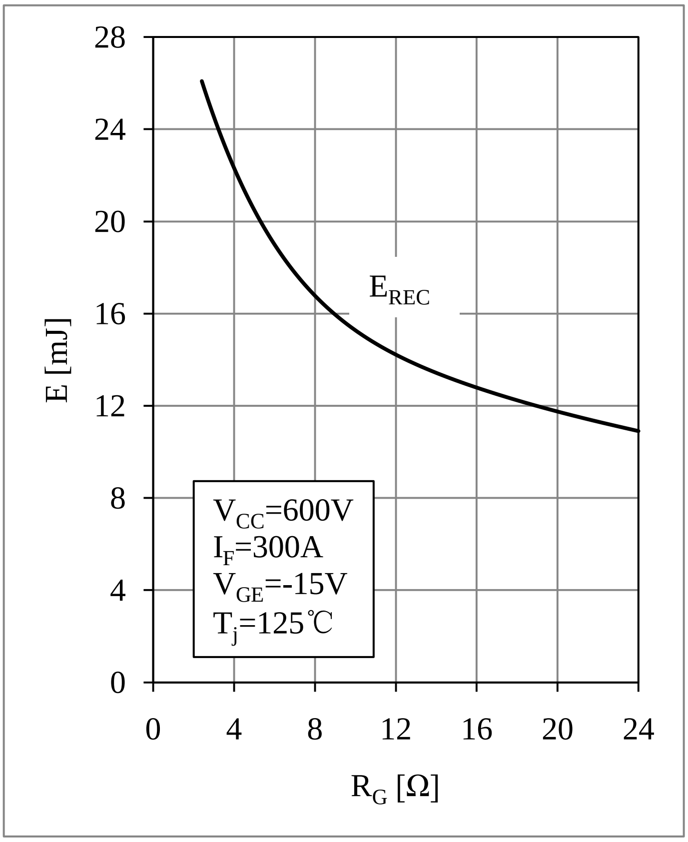


Fig 9. Diode-inverter Switching Loss vs. R_G

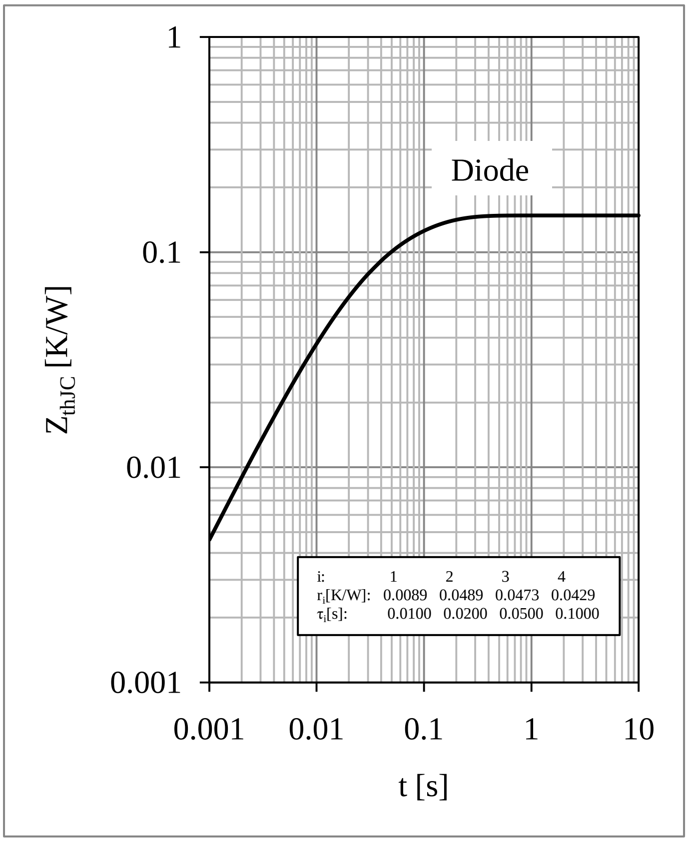


Fig 10. Diode-inverter Transient Thermal Impedance

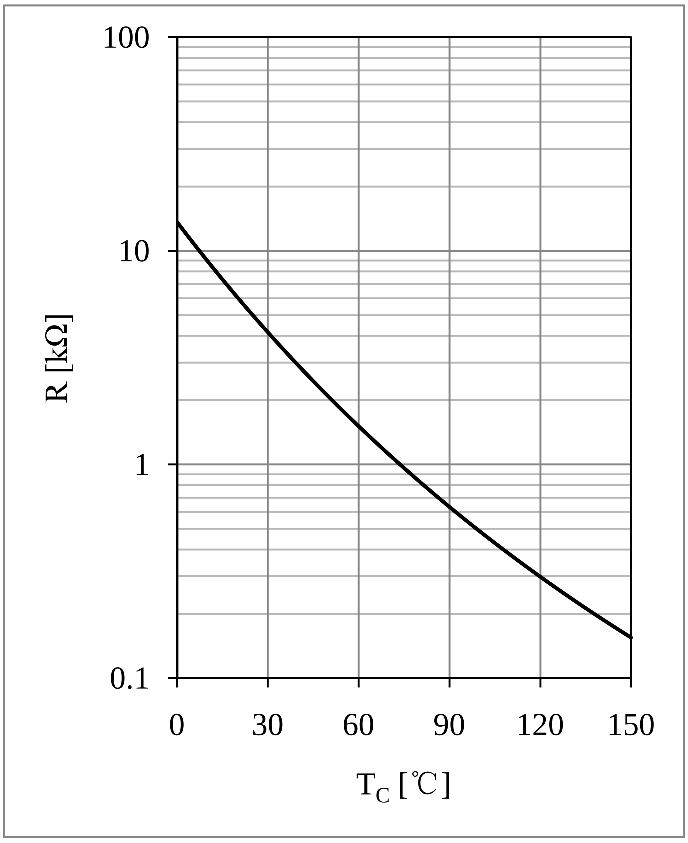
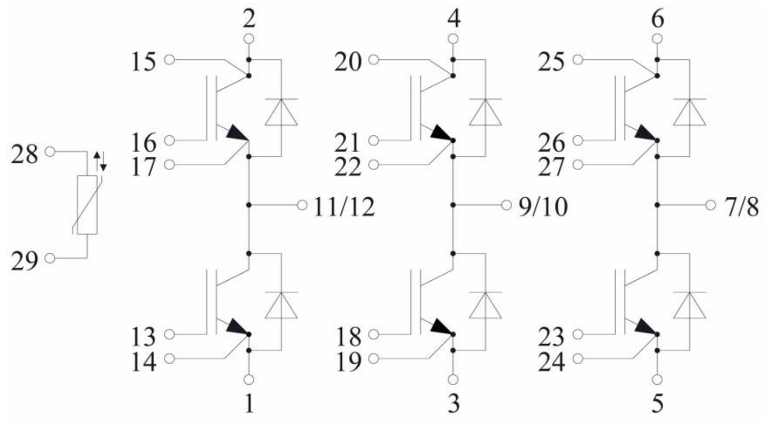


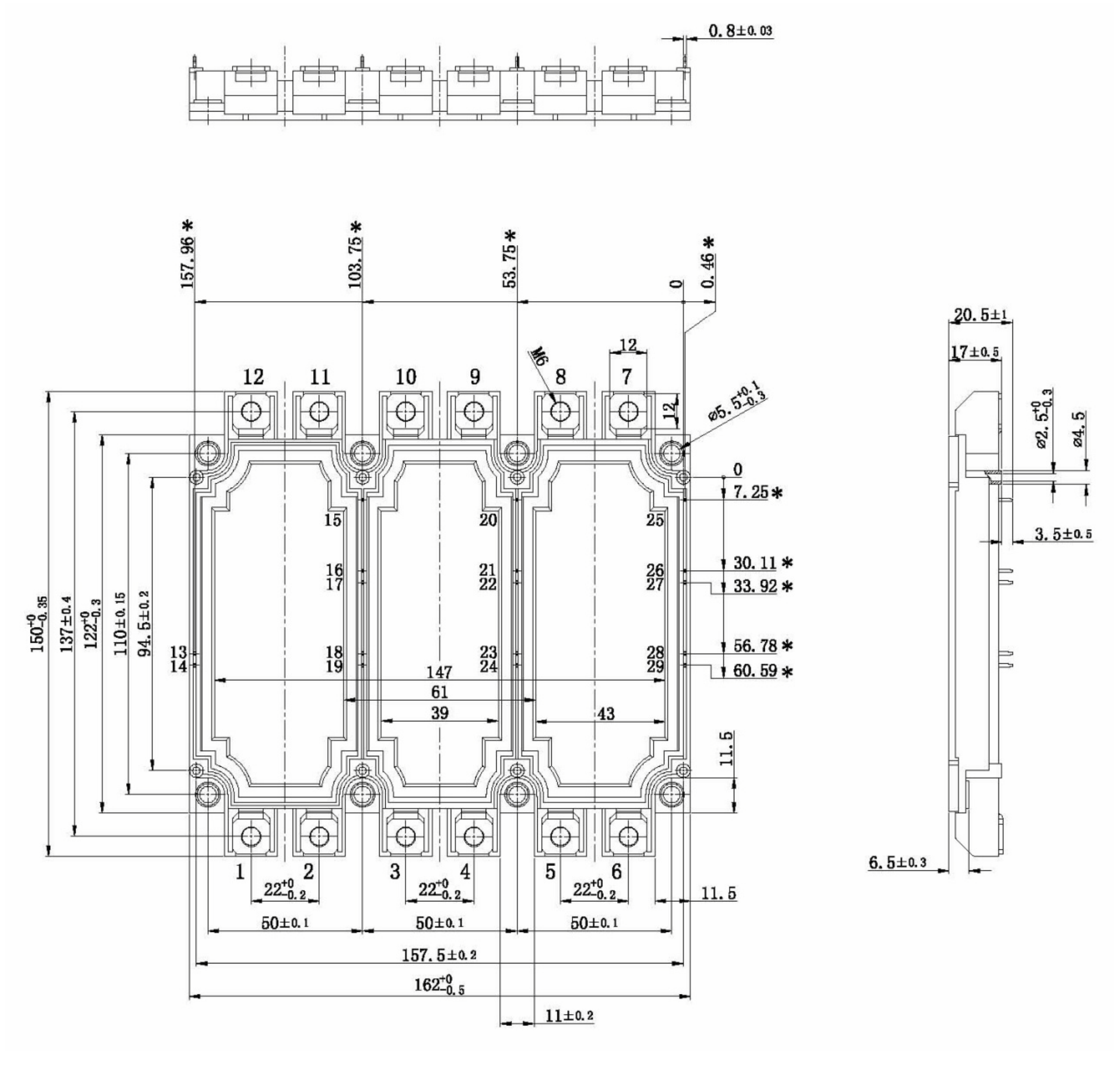
Fig 11. NTC Temperature Characteristic

Equivalent Circuit Schematic



Package Dimensions

Dimensions in Millimeters



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