STARPOWER

SEMICONDUCTOR™

IGBT

GD225HTT120C7S

Molding Type Module

1200V/225A 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	GD225HTT120C7S	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℃	400 225	A
I_{CM}	Pulsed Collector Current t_p=1ms	450	A
P_{tot}	Total Power Dissipation @ T_j=175℃	1442	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=9.0mA,V_{CE}=V_{GE}, T_j=25℃	5.0	5.8	6.5	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C=225A,V_{GE}=15V, T_j=25℃		1.70	2.15	V
		I_C=225A,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=225A, R_G=3.3Ω,V_{GE}=±15V, T_j=25℃		251		ns
t_r	Rise Time			89		ns
$t_{d(off)}$	Turn-Off Delay Time			550		ns
t_f	Fall Time			125		ns
E_{on}	Turn-On Switching Loss			/		mJ
E_{off}	Turn-Off Switching Loss			/		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=225A, R_G=3.3Ω,V_{GE}=±15V, T_j=125℃		305		ns
t_r	Rise Time			100		ns
$t_{d(off)}$	Turn-Off Delay Time			660		ns
t_f	Fall Time			162		ns
E_{on}	Turn-On Switching Loss			15.1		mJ
E_{off}	Turn-Off Switching Loss			35.9		mJ
C_{ies}	Input Capacitance	V_{CE}=25V,f=1Mhz, V_{GE}=0V		16.0		nF
C_{oes}	Output Capacitance			0.84		nF
C_{res}	Reverse Transfer Capacitance			0.73		nF
Q_G	Gate Charge	V_{CC}=600V,I_C=225A, V_{GE}=15V		2.1		μC
R_{Gint}	Internal Gate Resister			3.3		Ω
I_{SC}	SC Data	t_P≤10μs,V_{GE}=15V, T_j=125℃,V_{CC}=900V, V_{CEM}≤1200V		900		A

DIODE-inverter T_C=25℃ unless otherwise noted

Maximum Rated Values

Symbol	Description	GD225HTT120C7S	Units
V_{RRM}	Repetitive Peak Reverse Voltage @ T_j=25℃	1200	V
I_F	DC Forward Current @ T_C=80℃	225	A
I_{FRM}	Repetitive Peak Forward Current t_p=1ms	450	A

Characteristics Values

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units
V_F	Diode Forward Voltage	I_F=225A, V_{GE}=0V	T_j=25℃		1.65	2.15	V
			T_j=125℃		1.65		
Q_r	Recovered Charge	I_F=225A, V_R=600V, R_G=3.3Ω, V_{GE}=-15V	T_j=25℃		22		μC
			T_j=125℃		43		
I_{RM}	Peak Reverse Recovery Current		T_j=25℃		160		A
			T_j=125℃		198		
E_{rec}	Reverse Recovery Energy		T_j=25℃		11.2		mJ
			T_j=125℃		19.9		

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}	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)			0.104 0.173	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:M6 Mounting Screw:M5	3.0 3.0		6.0 6.0	N.m
G	Weight of Module		910		g

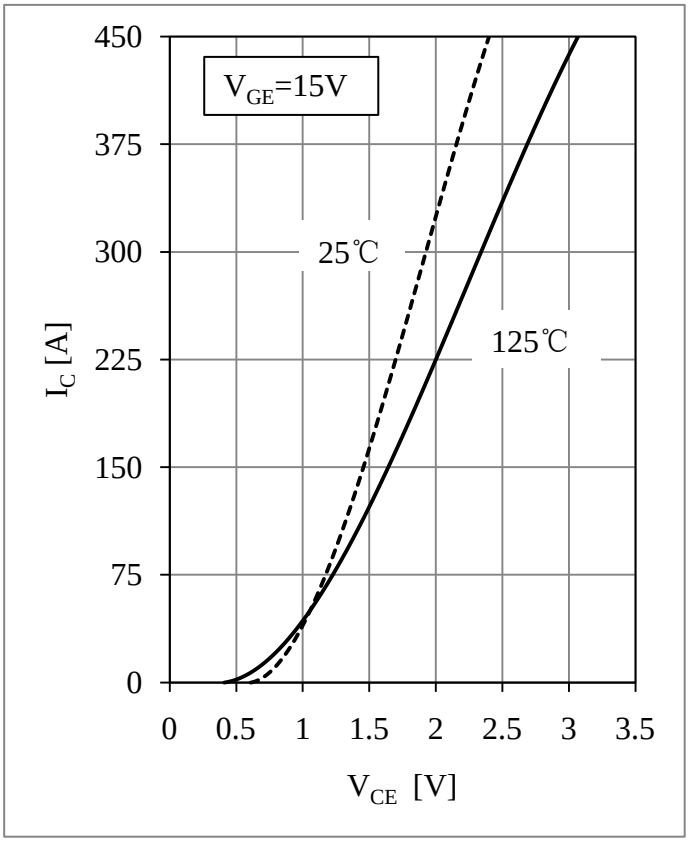


Fig 1. IGBT-inverter Output Characteristic

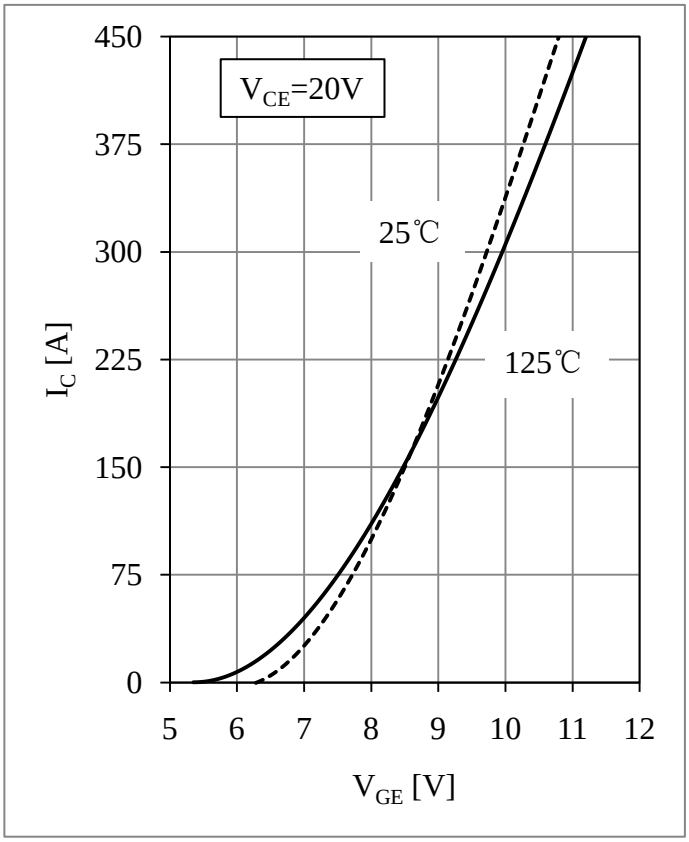


Fig 2. IGBT-inverter Transfer Characteristic

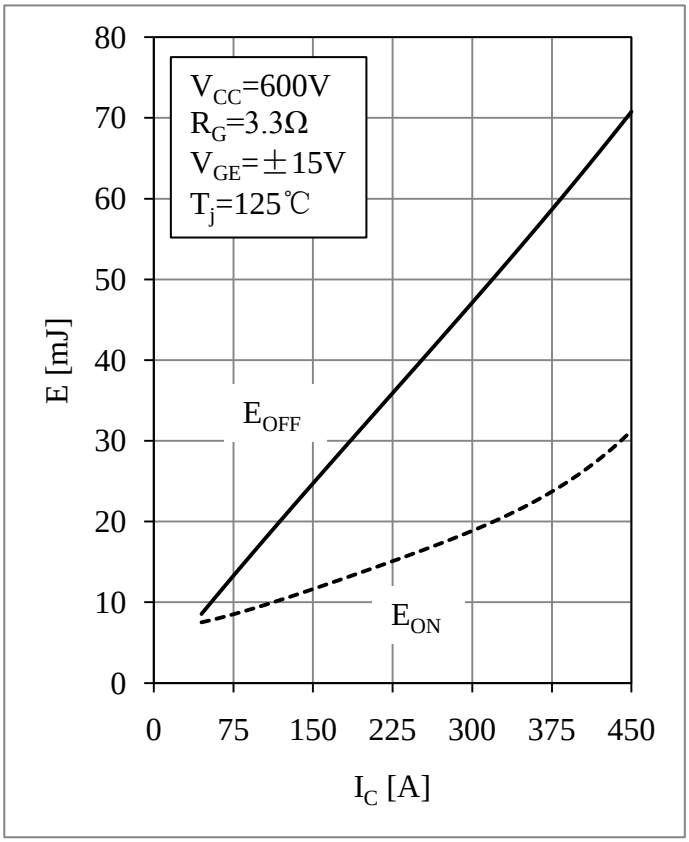


Fig 3. IGBT-inverter Switching Loss vs. I_C

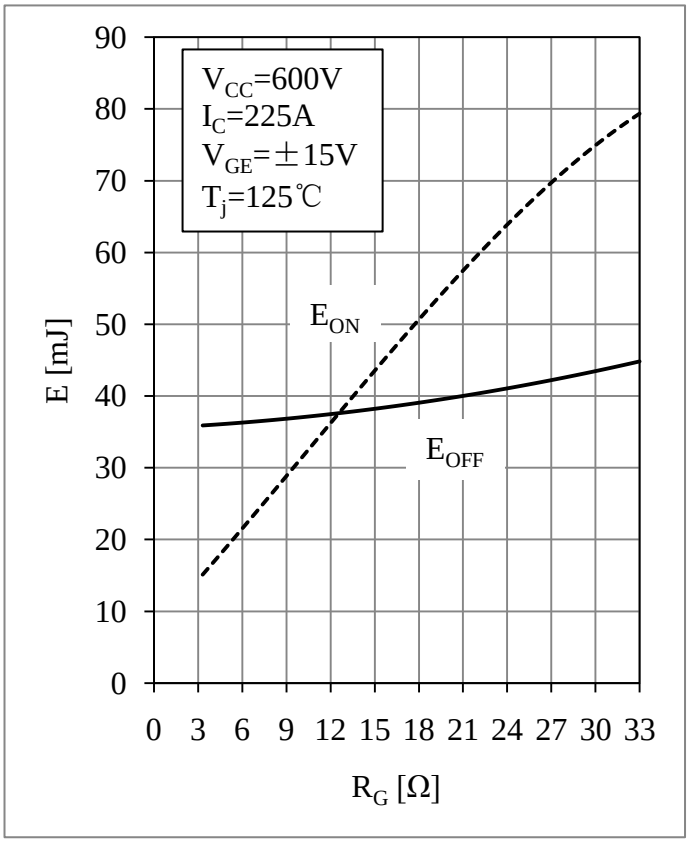


Fig 4. IGBT-inverter Switching Loss vs. R_G

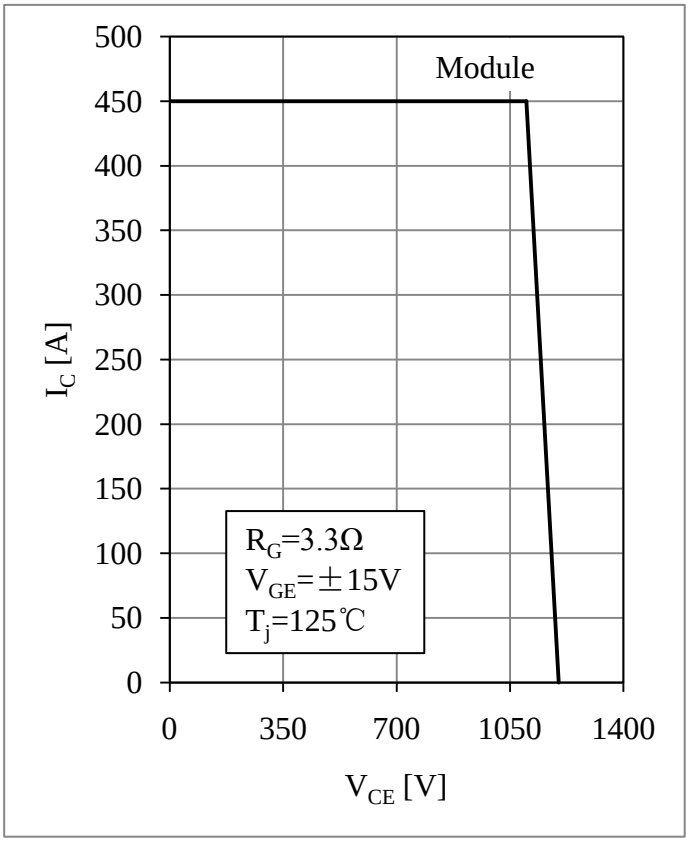


Fig 5. IGBT-inverter RBSOA

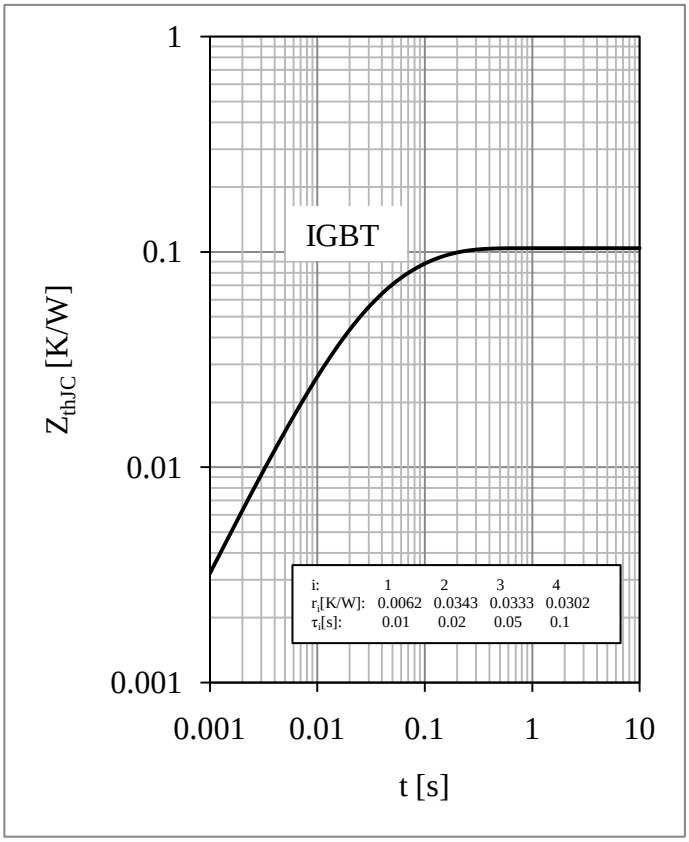


Fig 6. IGBT-inverter Transient Thermal Impedance

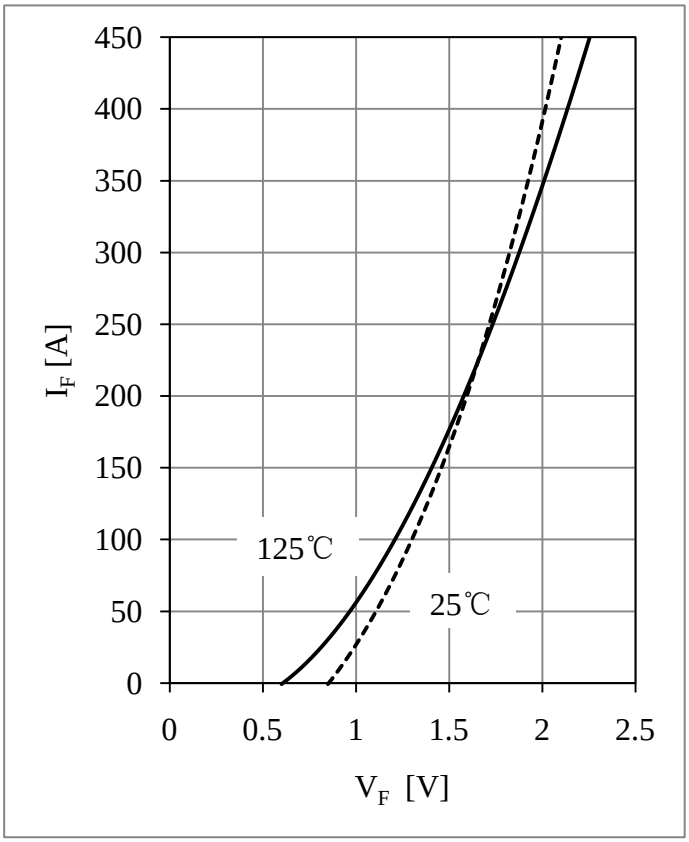


Fig 7. Diode-inverter Forward Characteristic

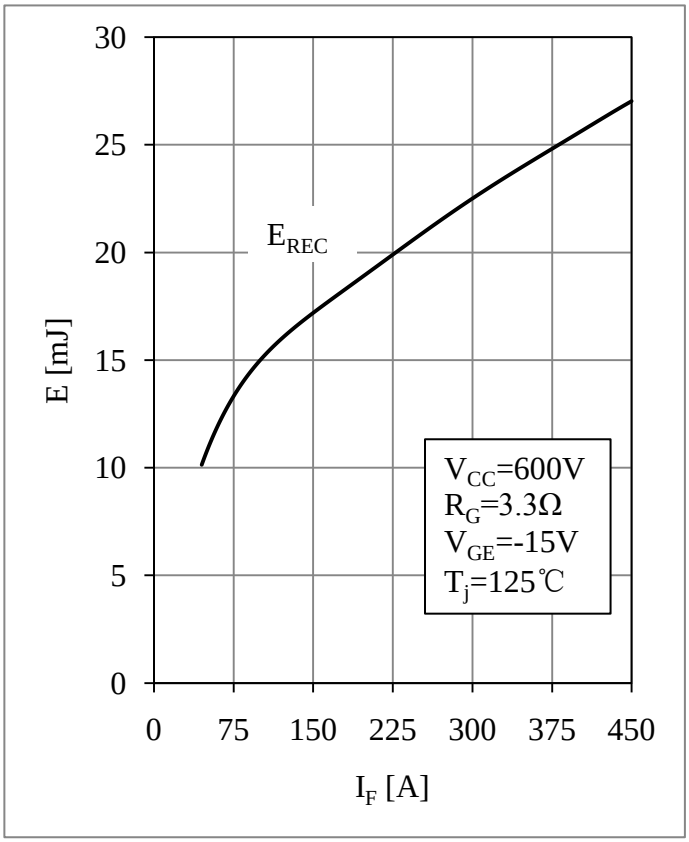


Fig 8. Diode-inverter Switching Loss vs. I_F

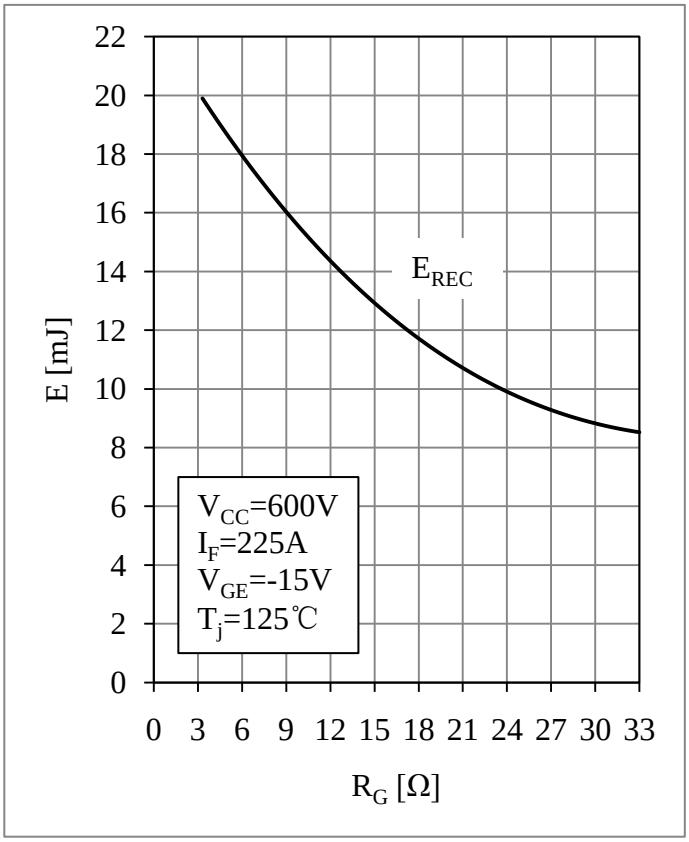


Fig 9. Diode-inverter Switching Loss vs. R_G

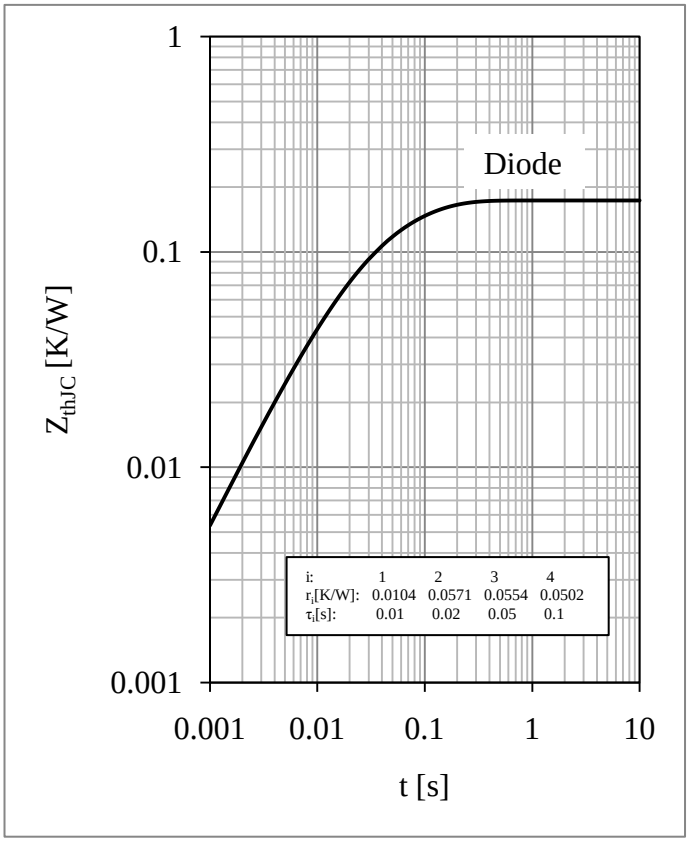


Fig 10. Diode-inverter Transient Thermal Impedance

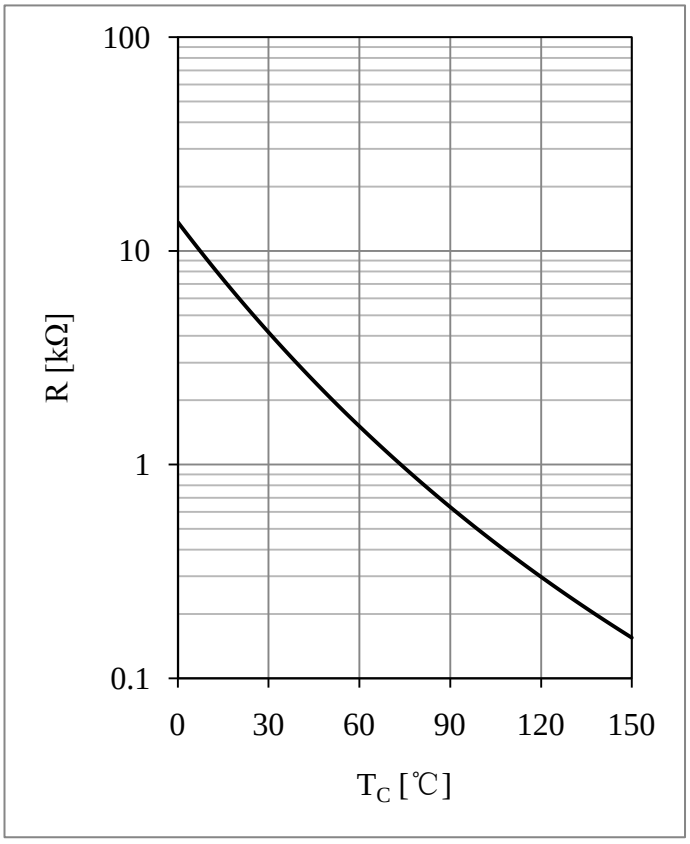
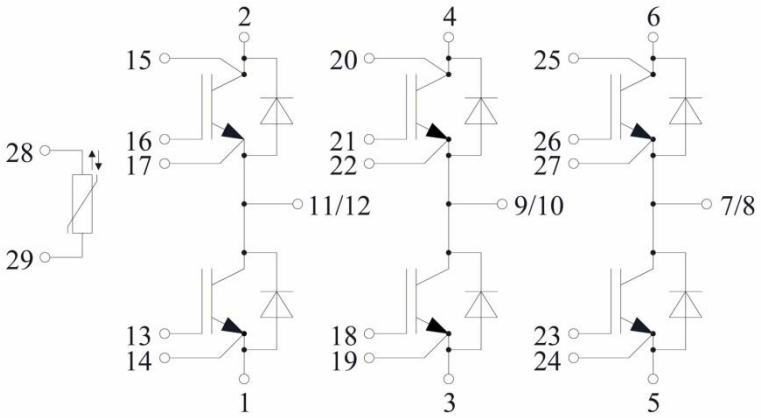


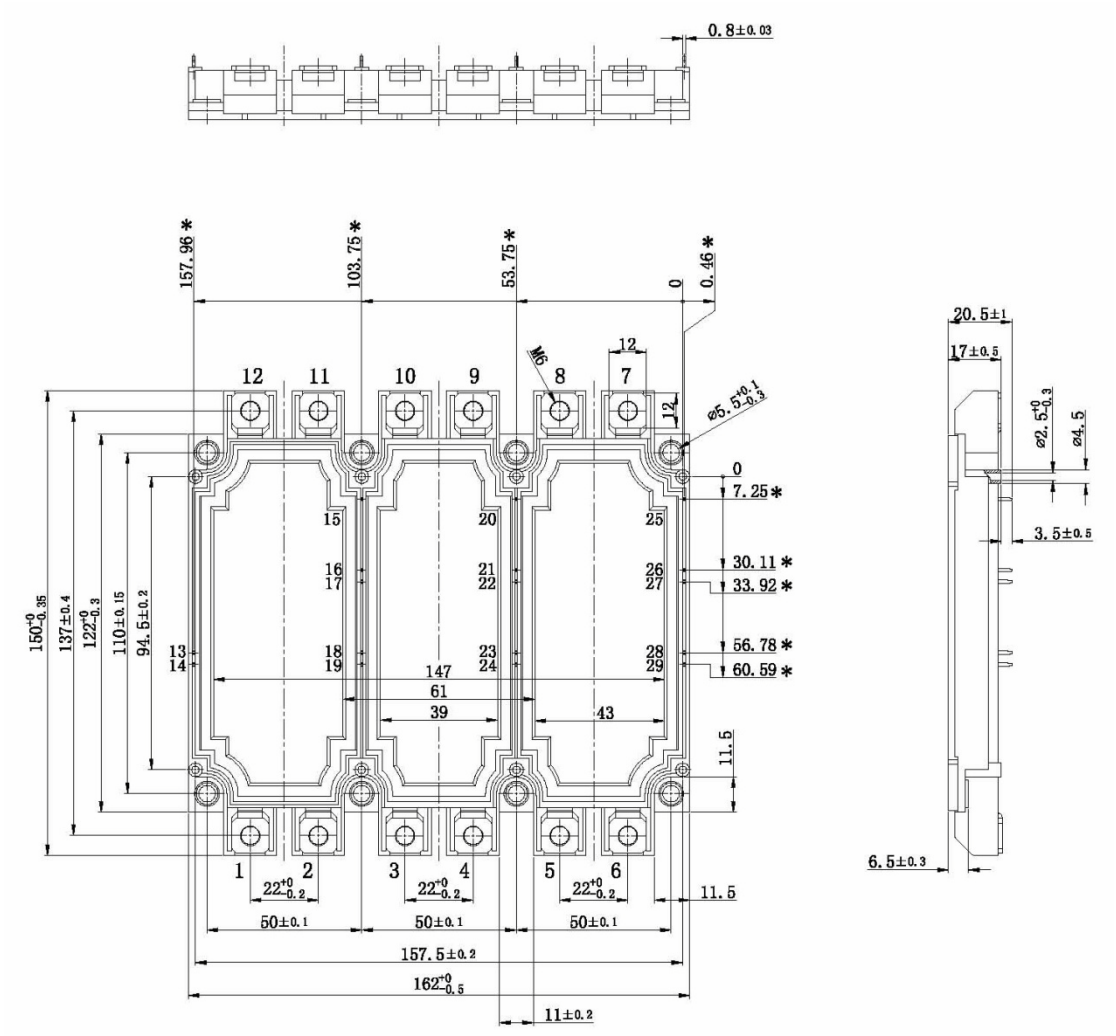
Fig 11. NTC Temperature Characteristic

Equivalent Circuit Schematic



Package Dimensions

Dimensions in Millimeters



Terms and Conditions of Usage

The data contained in this product datasheet is exclusively intended for technically trained staff. you and your technical departments will have to evaluate the suitability of the product for the intended application and the completeness of the product data with respect to such application.

This product data sheet is describing the characteristics of this product for which a warranty is granted. Any such warranty is granted exclusively pursuant the terms and conditions of the supply agreement. There will be no guarantee of any kind for the product and its characteristics.

Should you require product information in excess of the data given in this product data sheet or which concerns the specific application of our product, please contact the sales office, which is responsible for you (see www.powersemi.cc), For those that are specifically interested we may provide application notes.

Due to technical requirements our product may contain dangerous substances. For information on the types in question please contact the sales office, which is responsible for you.

Should you intend to use the Product in aviation applications, in health or live endangering or life support applications, please notify.

If and to the extent necessary, please forward equivalent notices to your customers.
Changes of this product data sheet are reserved.