STARPOWER

SEMICONDUCTOR **IGBT**

GD100HCT170C2S

1700V/100A 4 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 SVG.

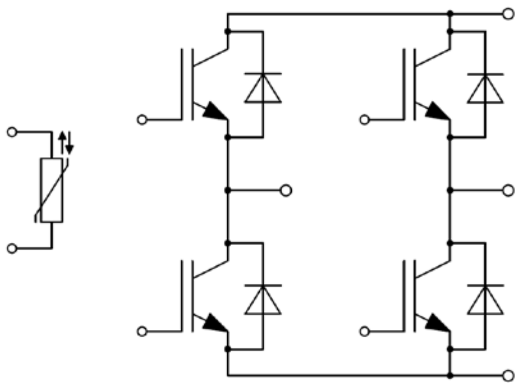
Features

- Low $V_{CE(sat)}$ Trench IGBT technology
- $V_{CE(sat)}$ with positive temperature coefficient
- 10μs short circuit capability
- 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
- Uninterruptible power supply
- SVG

Equivalent Circuit Schematic



Absolute Maximum Ratings T_C=25℃ unless otherwise noted

IGBT

Symbol	Description	Value	Unit
V_{CES}	Collector-Emitter Voltage	1700	V
V_{GES}	Gate-Emitter Voltage	±20	V
I_C	Collector Current @ T_C=25℃ @ T_C=100℃	160 100	A
I_{CM}	Pulsed Collector Current t_p=1ms	200	A
P_D	Maximum Power Dissipation @ T_j=175℃	673	W

Diode

Symbol	Description	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1700	V
I_F	Diode Continuous Forward Current	100	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	200	A

Module

Symbol	Description	Value	Unit
T_{jmax}	Maximum Junction Temperature	175	℃
T_{jop}	Operating Junction Temperature	-40 to +150	℃
T_{STG}	Storage Temperature Range	-40 to +125	℃
V_{ISO}	Isolation Voltage RMS,f=50Hz,t=1min	4000	V

IGBT Characteristics T_C=25℃ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C=100A,V_{GE}=15V, T_j=25℃		2.00	2.45	V
		I_C=100A,V_{GE}=15V, T_j=125℃		2.40		
		I_C=100A,V_{GE}=15V, T_j=150℃		2.50		
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=4.0mA,V_{CE}=V_{GE}, T_j=25℃	5.2	5.8	6.4	V
I_{CES}	Collector Cut-Off Current	V_{CE}=V_{CES},V_{GE}=0V, T_j=25℃			1.0	mA
I_{GES}	Gate-Emitter Leakage Current	V_{GE}=V_{GES},V_{CE}=0V, T_j=25℃			400	nA
R_{Gint}	Internal Gate Resistance			7.5		Ω
C_{ies}	Input Capacitance	V_{CE}=25V,f=1MHz, V_{GE}=0V		8.82		nF
C_{res}	Reverse Transfer Capacitance			0.29		nF
Q_G	Gate Charge	V_{GE}=-15…+15V		1.20		μC
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=900V,I_C=100A, R_G=4.0Ω,V_{GE}=±15V, T_j=25℃		372		ns
t_r	Rise Time			42		ns
$t_{d(off)}$	Turn-Off Delay Time			645		ns
t_f	Fall Time			178		ns
E_{on}	Turn-On Switching Loss			22.1		mJ
E_{off}	Turn-Off Switching Loss			21.5		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=900V,I_C=100A, R_G=4.0Ω,V_{GE}=±15V, T_j=125℃		398		ns
t_r	Rise Time			50		ns
$t_{d(off)}$	Turn-Off Delay Time			805		ns
t_f	Fall Time			302		ns
E_{on}	Turn-On Switching Loss			32.2		mJ
E_{off}	Turn-Off Switching Loss			31.4		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=900V,I_C=100A, R_G=4.0Ω,V_{GE}=±15V, T_j=150℃		410		ns
t_r	Rise Time			51		ns
$t_{d(off)}$	Turn-Off Delay Time			850		ns
t_f	Fall Time			330		ns
E_{on}	Turn-On Switching Loss			34.5		mJ
E_{off}	Turn-Off Switching Loss			34.0		mJ
I_{SC}	SC Data	t_P≤10μs,V_{GE}=15V, T_j=150℃,V_{CC}=1000V, V_{CEM}≤1700V		400		A

Diode Characteristics T_C=25℃ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_F	Diode Forward Voltage	I_F=100A,V_{GE}=0V,T_j=25℃		1.80	2.20	V
		I_F=100A,V_{GE}=0V,T_j=125℃		1.90		
		I_F=100A,V_{GE}=0V,T_j=150℃		1.95		
Q_r	Recovered Charge	V_R=900V,I_F=100A, R_G=4.0Ω,V_{GE}=-15V T_j=25℃		28.8		μC
I_{RM}	Peak Reverse Recovery Current			154		A
E_{rec}	Reverse Recovery Energy			15.4		mJ
Q_r	Recovered Charge	V_R=900V,I_F=100A, R_G=4.0Ω,V_{GE}=-15V T_j=125℃		48.0		μC
I_{RM}	Peak Reverse Recovery Current			165		A
E_{rec}	Reverse Recovery Energy			27.6		mJ
Q_r	Recovered Charge	V_R=900V,I_F=100A, R_G=4.0Ω,V_{GE}=-15V T_j=150℃		52.7		μC
I_{RM}	Peak Reverse Recovery Current			170		A
E_{rec}	Reverse Recovery Energy			30.5		mJ

NTC Characteristics T_C=25℃ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
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

Module Characteristics T_C=25℃ unless otherwise noted

Symbol	Parameter	Min.	Typ.	Max.	Unit
$R_{\theta JC}$	Junction-to-Case (per IGBT) Junction-to-Case (per Diode)			0.223 0.414	K/W
$R_{\theta CS}$	Case-to-Sink (per IGBT) Case-to-Sink (per Diode)		0.215 0.400		K/W
$R_{\theta CS}$	Case-to-Sink		0.035		K/W
M	Terminal Connection Torque, Screw M6 Mounting Torque, Screw M6	2.5 3.0		5.0 5.0	N.m
G	Weight of Module		340		g

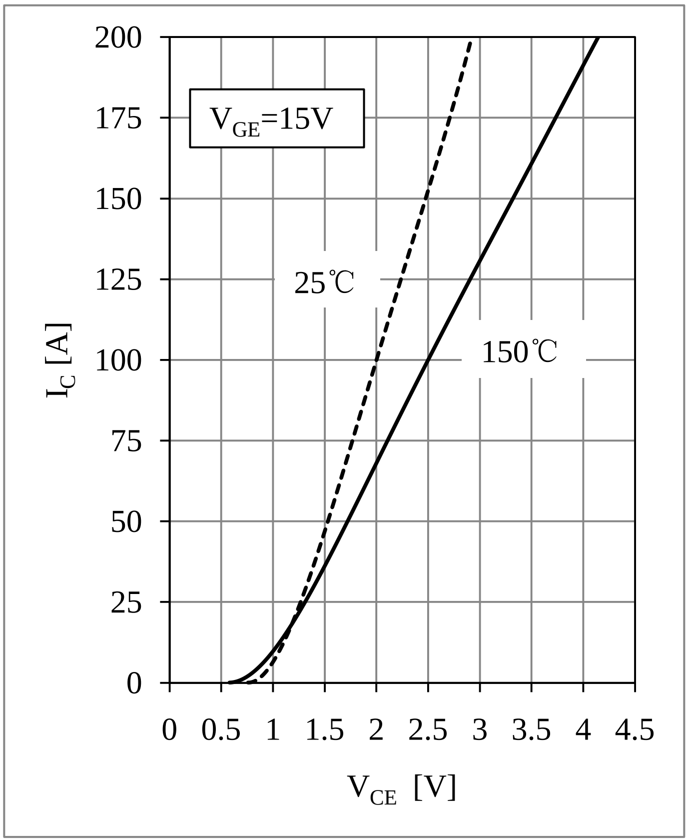


Fig 1. IGBT Output Characteristics

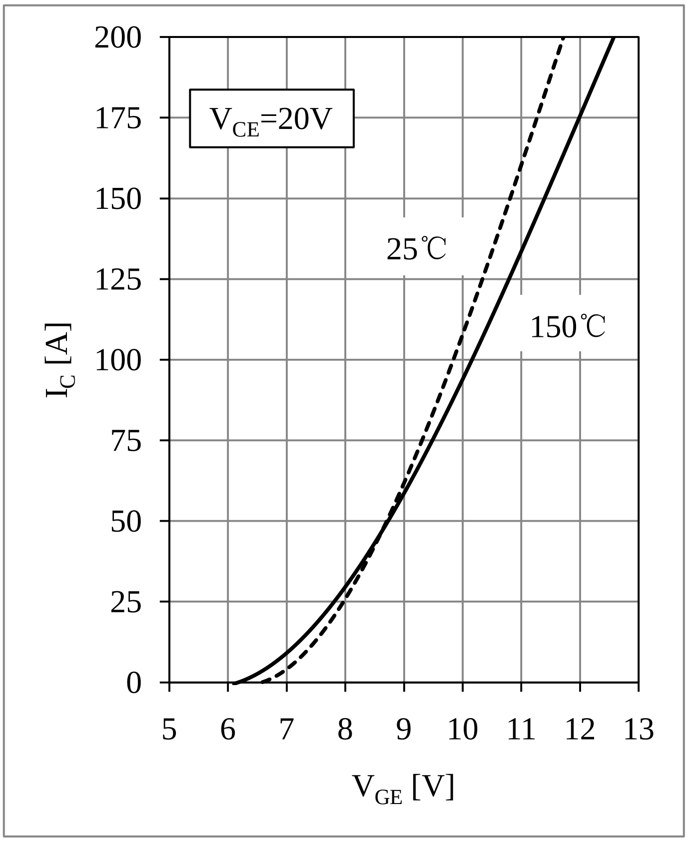


Fig 2. IGBT Transfer Characteristics

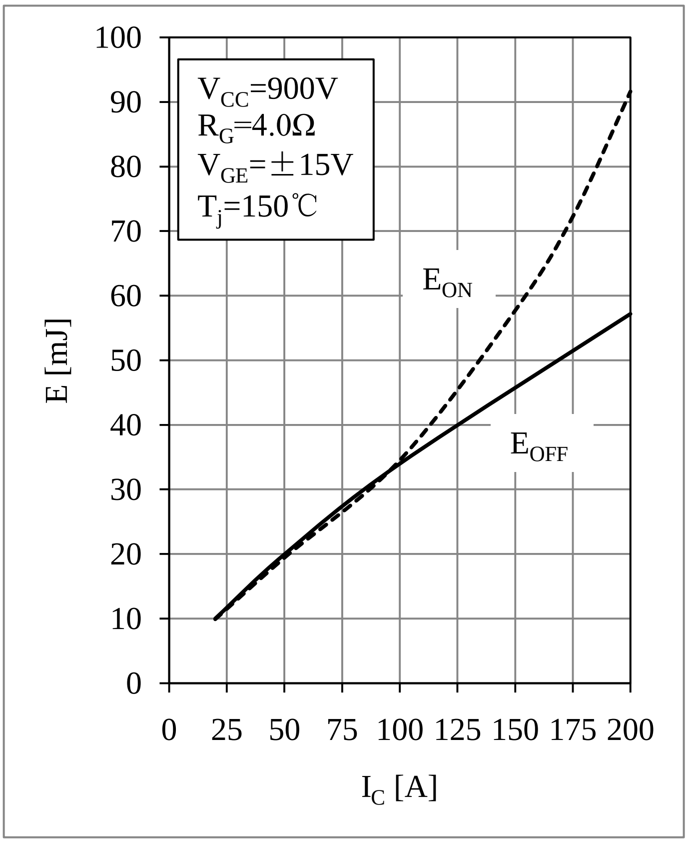


Fig 3. IGBT Switching Loss vs. I_C

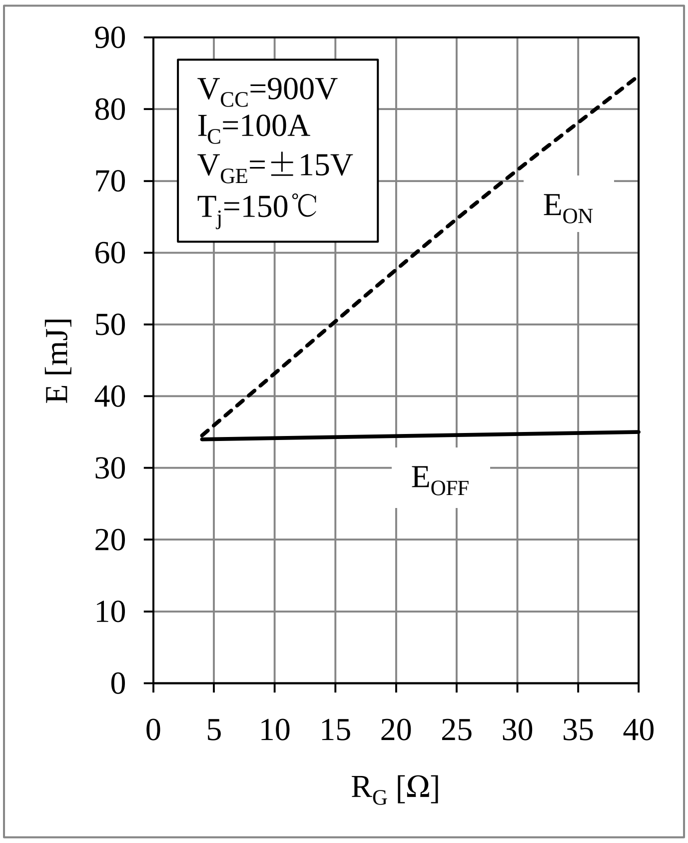


Fig 4. IGBT Switching Loss vs. R_G

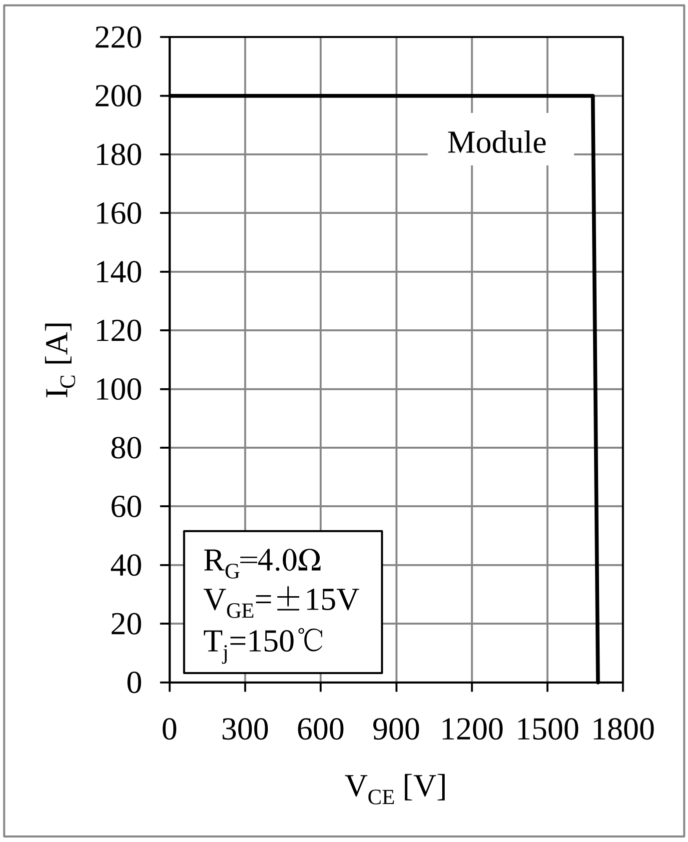


Fig 5. RBSOA

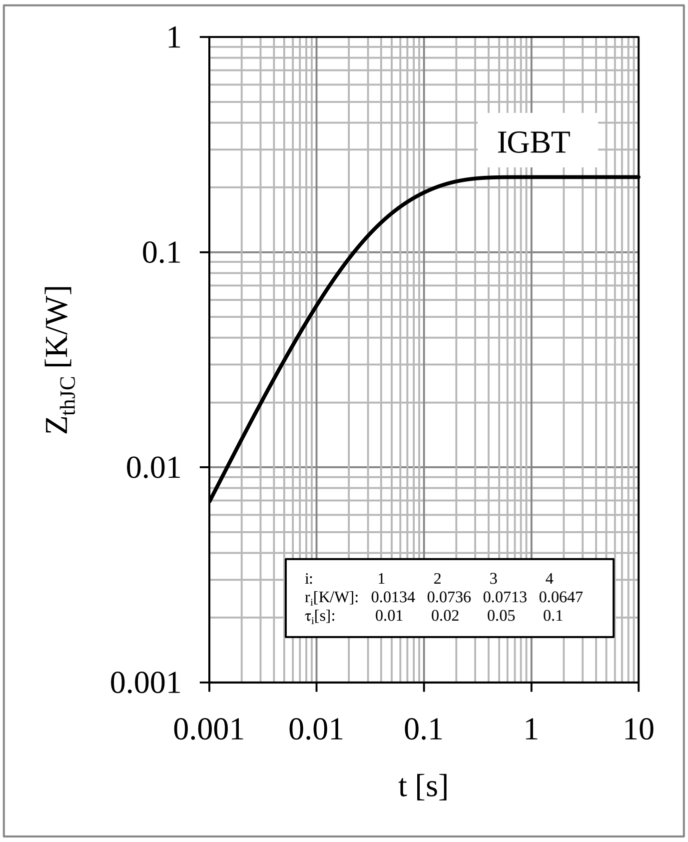


Fig 6. IGBT Transient Thermal Impedance

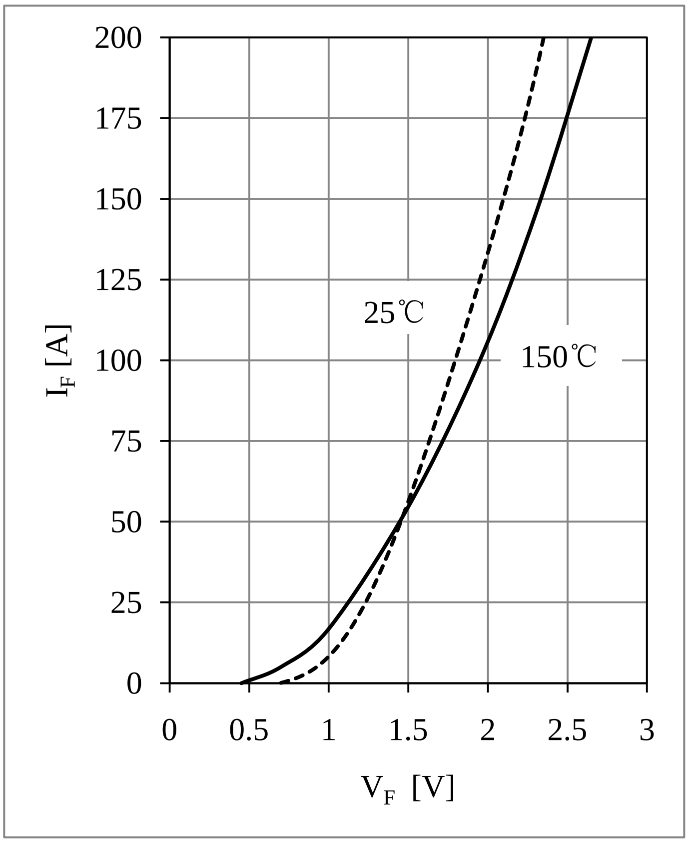


Fig 7. Diode Forward Characteristics

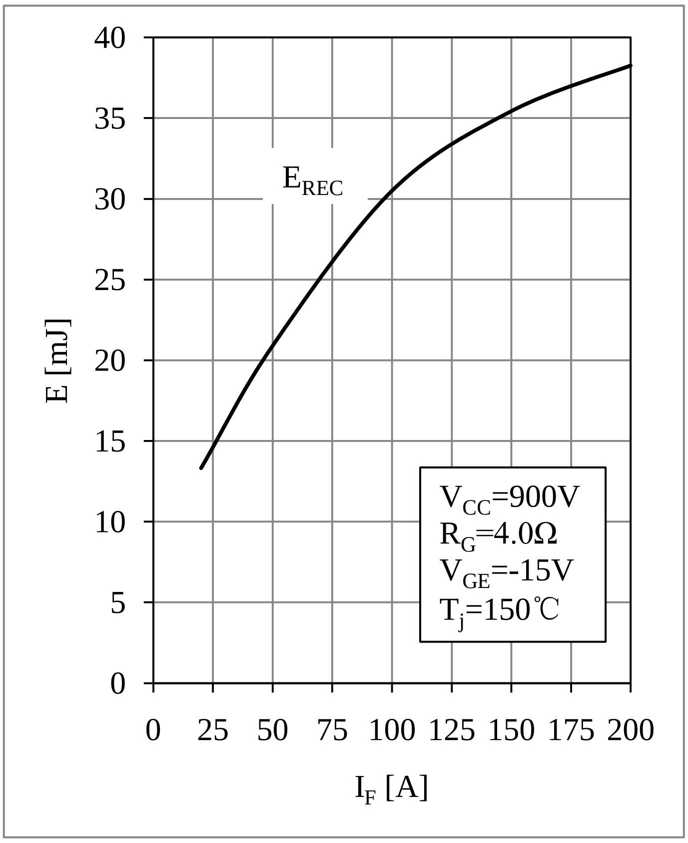


Fig 8. Diode Switching Loss vs. I_F

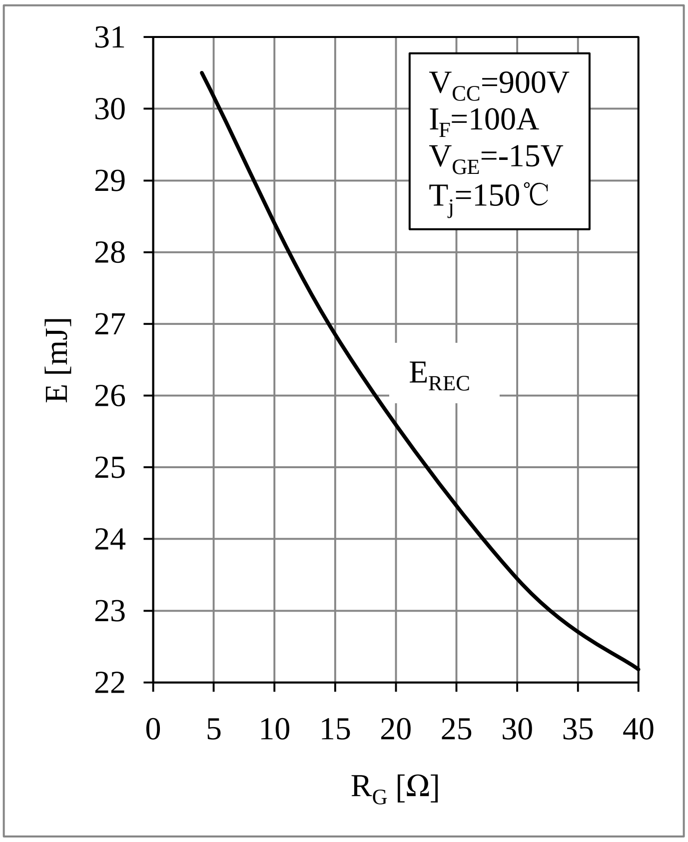


Fig 9. Diode Switching Loss vs. R_G

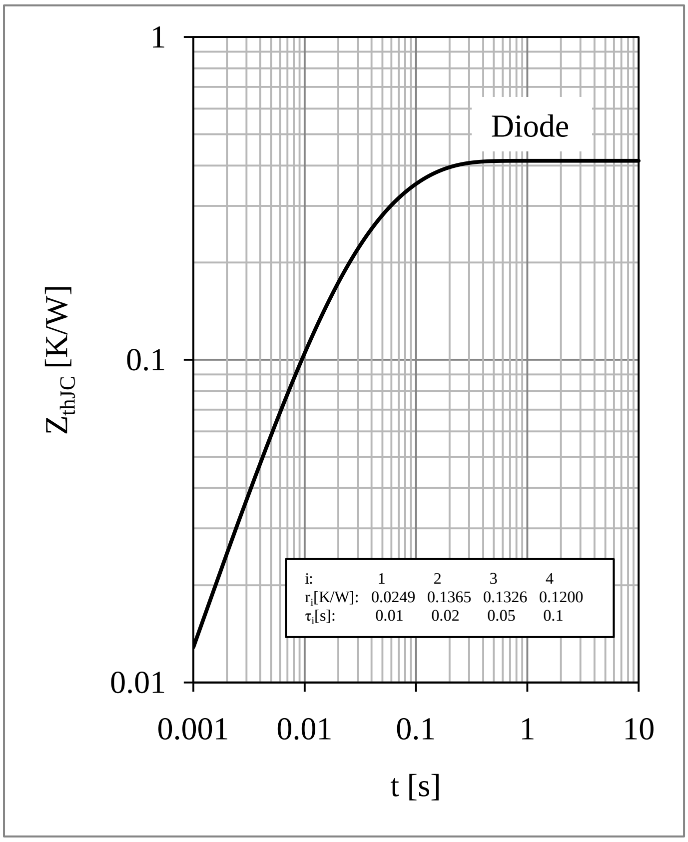


Fig 10. Diode Transient Thermal Impedance

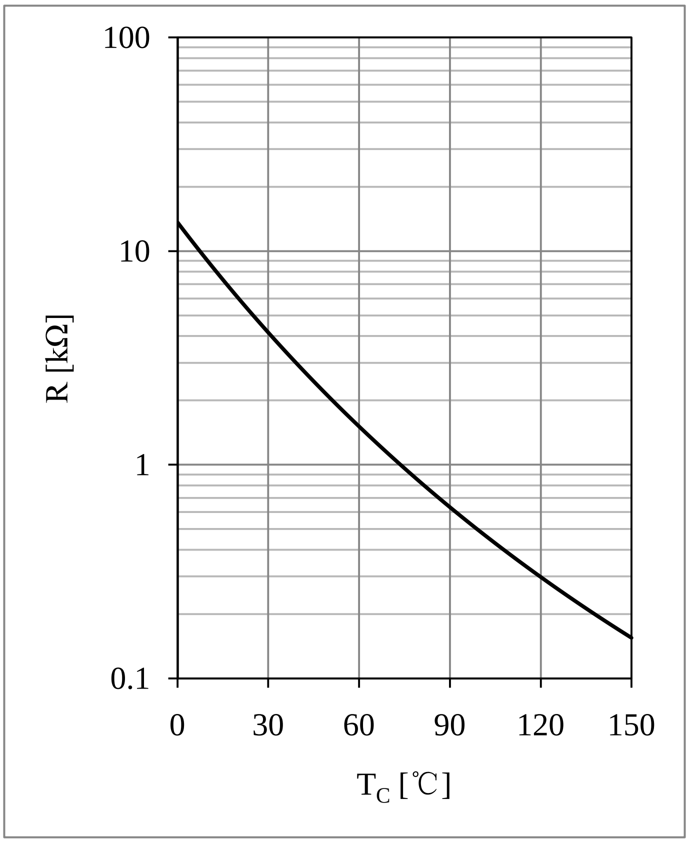
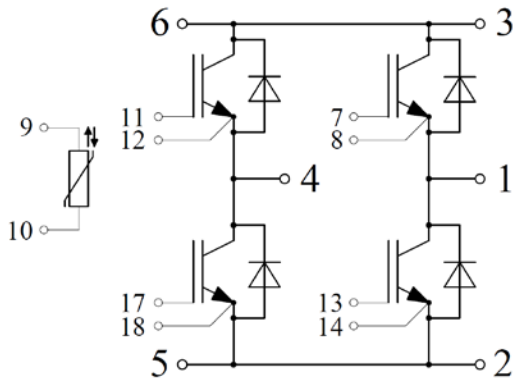


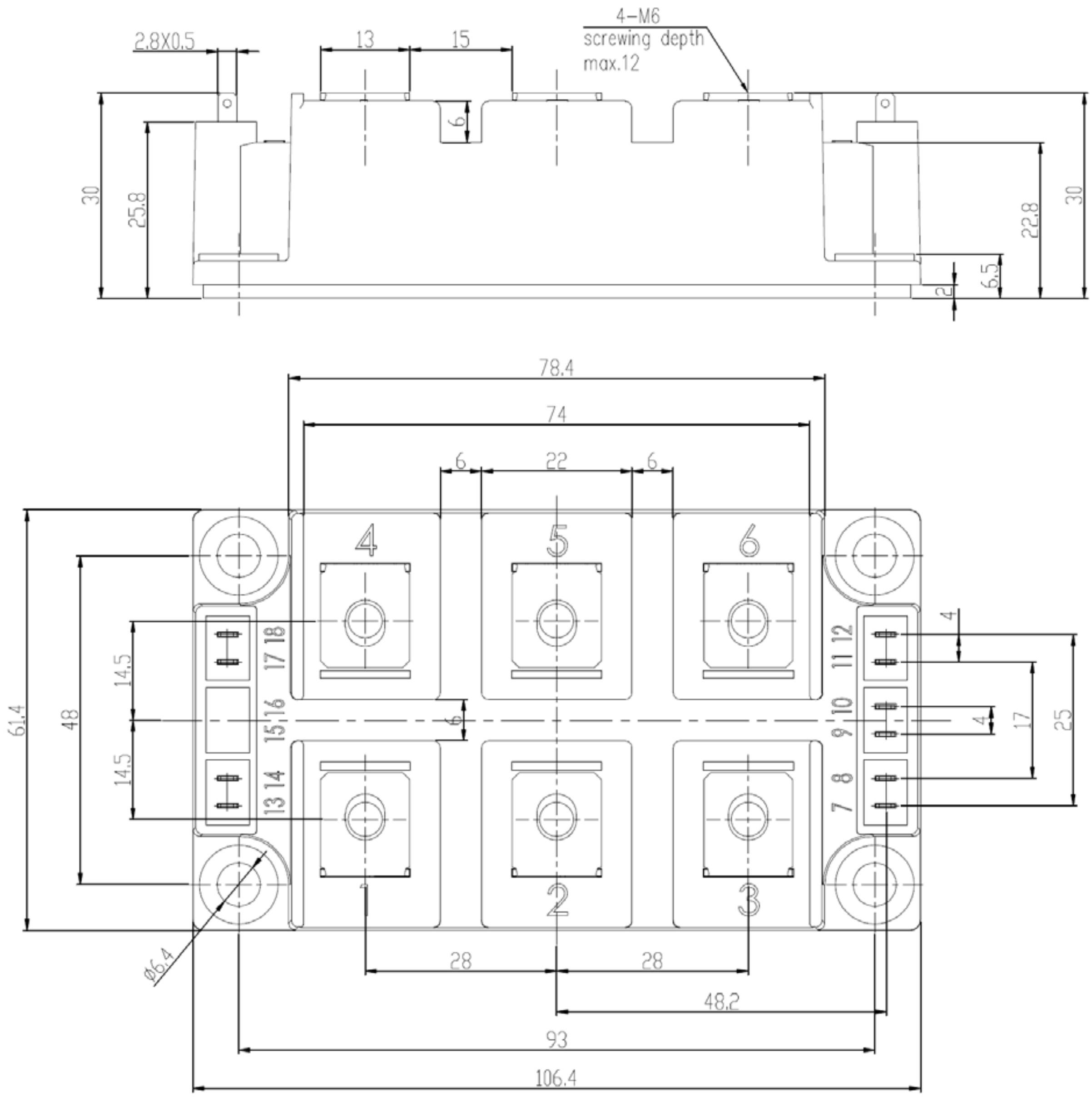
Fig 11. NTC Temperature Characteristic

Circuit Schematic



Package Dimensions

Dimensions in Millimeters



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