STARPOWER

SEMICONDUCTOR

IGBT

GD300CUY120C2S

1200V/300A chopper 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.

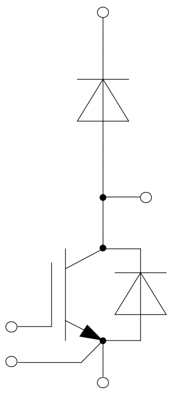
Features

- Low $V_{CE(sat)}$ Trench IGBT technology
- 10μs short circuit capability
- $V_{CE(sat)}$ with positive temperature coefficient
- Maximum junction temperature 175°C
- Low inductance case
- Fast & soft reverse recovery anti-parallel FWD
- Isolated copper baseplate using AlN DBC technology

Typical Applications

- Inverter for motor drive
- AC and DC servo drive amplifier
- Uninterruptible power supply

Equivalent Circuit Schematic



Absolute Maximum Ratings T_C=25°C unless otherwise noted

IGBT

Symbol	Description	Value	Unit
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate-Emitter Voltage	±20	V
I_C	Collector Current @ T_C=25°C @ T_C=100°C	480 300	A
I_{CM}	Pulsed Collector Current t_p=1ms	600	A
P_D	Maximum Power Dissipation @ T_j=175°C	1613	W

Diode

Symbol	Description	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1200	V
I_F	Diode Continuous Forward Current	300	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	600	A

Module

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

IGBT Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C=300A,V_{GE}=15V, T_j=25°C		1.70	2.15	V
		I_C=300A,V_{GE}=15V, T_j=125°C		1.95		
		I_C=300A,V_{GE}=15V, T_j=150°C		2.00		
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=7.50mA,V_{CE}=V_{GE}, T_j=25°C	5.2	6.0	6.8	V
I_{CES}	Collector Cut-Off Current	V_{CE}=V_{CES},V_{GE}=0V, T_j=25°C			1.0	mA
I_{GES}	Gate-Emitter Leakage Current	V_{GE}=V_{GES},V_{CE}=0V, T_j=25°C			400	nA
R_{Gint}	Internal Gate Resistance			2.5		Ω
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=300A, R_G=1.3Ω,V_{GE}=±15V, T_j=25°C		182		ns
t_r	Rise Time			54		ns
$t_{d(off)}$	Turn-Off Delay Time			464		ns
t_f	Fall Time			72		ns
E_{on}	Turn-On Switching Loss			10.6		mJ
E_{off}	Turn-Off Switching Loss			25.8		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=300A, R_G=1.3Ω,V_{GE}=±15V, T_j=125°C		193		ns
t_r	Rise Time			54		ns
$t_{d(off)}$	Turn-Off Delay Time			577		ns
t_f	Fall Time			113		ns
E_{on}	Turn-On Switching Loss			16.8		mJ
E_{off}	Turn-Off Switching Loss			38.6		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=300A, R_G=1.3Ω,V_{GE}=±15V, T_j=150°C		203		ns
t_r	Rise Time			54		ns
$t_{d(off)}$	Turn-Off Delay Time			618		ns
t_f	Fall Time			124		ns
E_{on}	Turn-On Switching Loss			18.5		mJ
E_{off}	Turn-Off Switching Loss			43.3		mJ
I_{SC}	SC Data	t_P≤10μs,V_{GE}=15V, T_j=150°C,V_{CC}=900V, V_{CEM}≤1200V		1200		A

Diode Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_F	Diode Forward Voltage	I_F=300A,V_{GE}=0V,T_j=25°C		1.65	2.10	V
		I_F=300A,V_{GE}=0V,T_j=125°C		1.65		
		I_F=300A,V_{GE}=0V,T_j=150°C		1.65		
Q_r	Recovered Charge	V_{CC}=600V,I_F=300A, -di/dt=6050A/μs,V_{GE}=-15V, T_j=25°C		29		μC
I_{RM}	Peak Reverse Recovery Current			318		A
E_{rec}	Reverse Recovery Energy			18.1		mJ
Q_r	Recovered Charge	V_{CC}=600V,I_F=300A, -di/dt=6050A/μs,V_{GE}=-15V, T_j=125°C		55		μC
I_{RM}	Peak Reverse Recovery Current			371		A
E_{rec}	Reverse Recovery Energy			28.0		mJ
Q_r	Recovered Charge	V_{CC}=600V,I_F=300A, -di/dt=6050A/μs,V_{GE}=-15V, T_j=150°C		64		μC
I_{RM}	Peak Reverse Recovery Current			390		A
E_{rec}	Reverse Recovery Energy			32.8		mJ

Module Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Min.	Typ.	Max.	Unit
L_{CE}	Stray Inductance			20	nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal to Chip		0.35		mΩ
R_{thJC}	Junction-to-Case (per IGBT) Junction-to-Case (per Diode)			0.093 0.155	K/W
R_{thCH}	Case-to-Heatsink (per IGBT) Case-to-Heatsink (per Diode) Case-to-Heatsink (per Module)		0.022 0.037 0.010		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		300		g

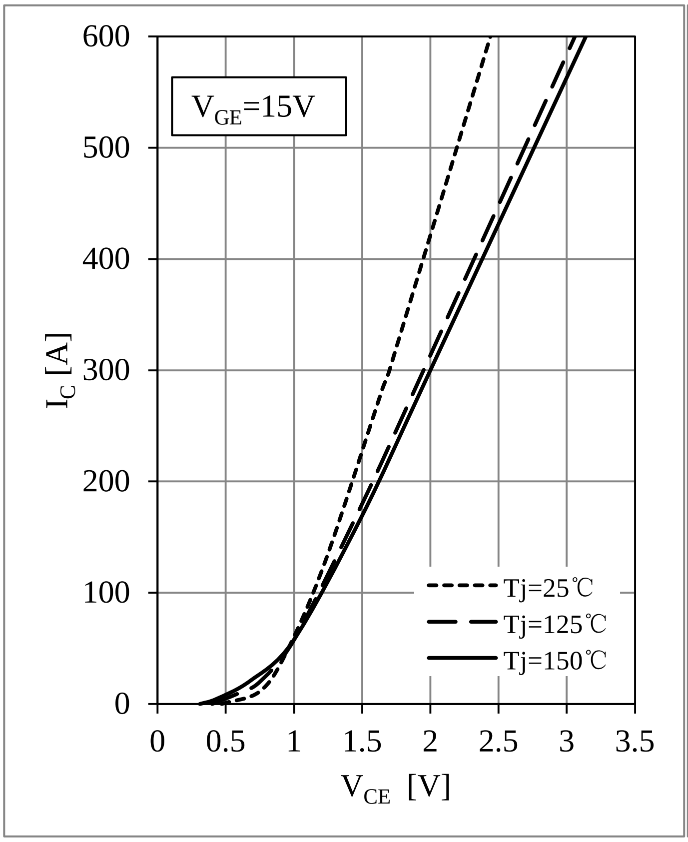


Fig 1. IGBT Output Characteristics

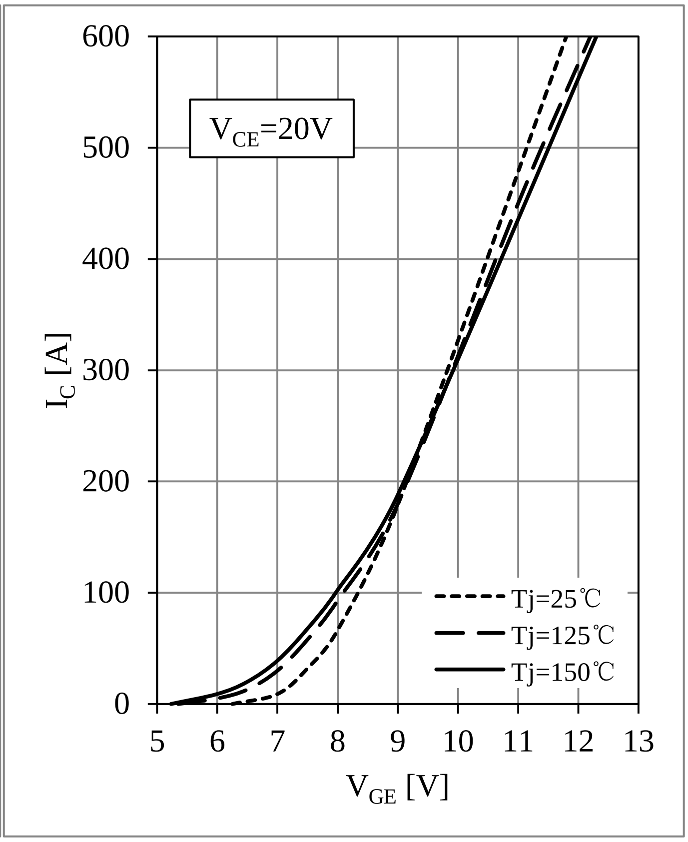


Fig 2. IGBT Transfer Characteristics

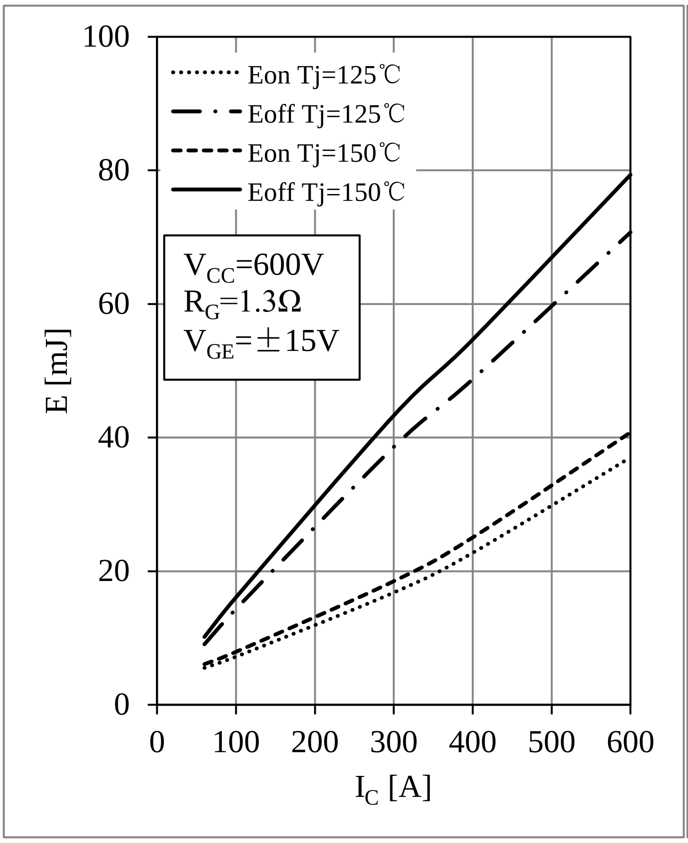


Fig 3. IGBT Switching Loss vs. I_C

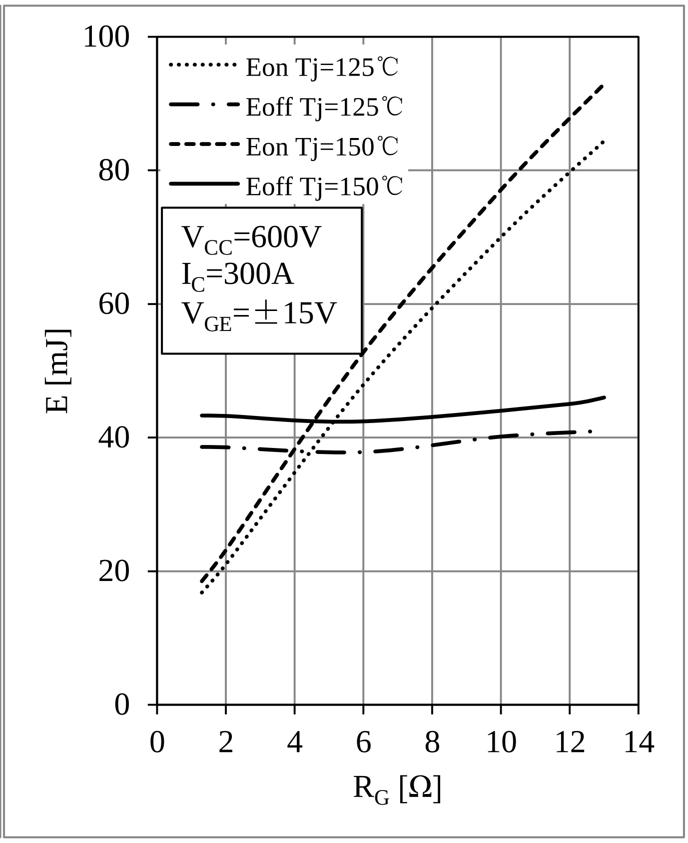


Fig 4. IGBT Switching Loss vs. R_G

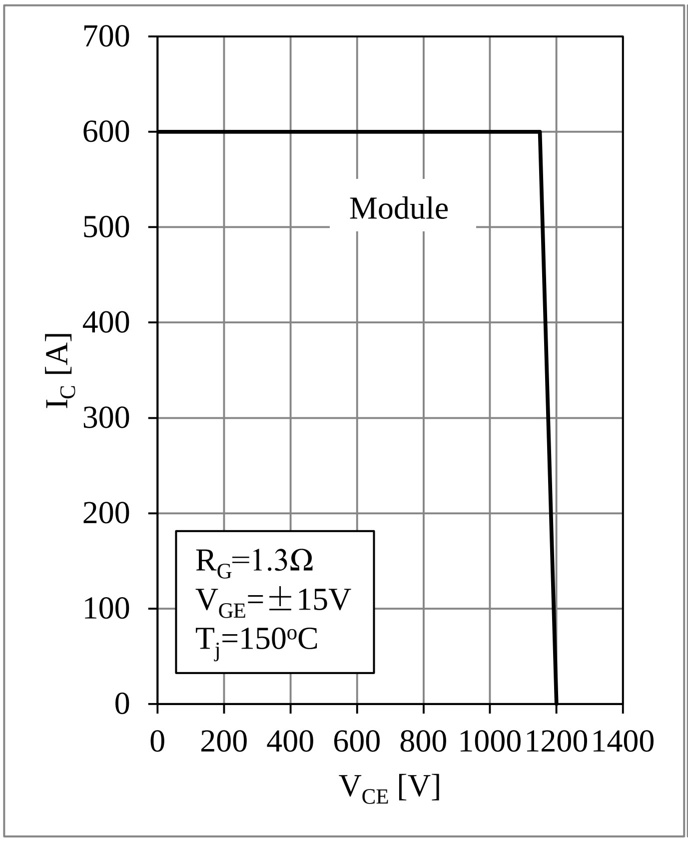


Fig 5. RBSOA

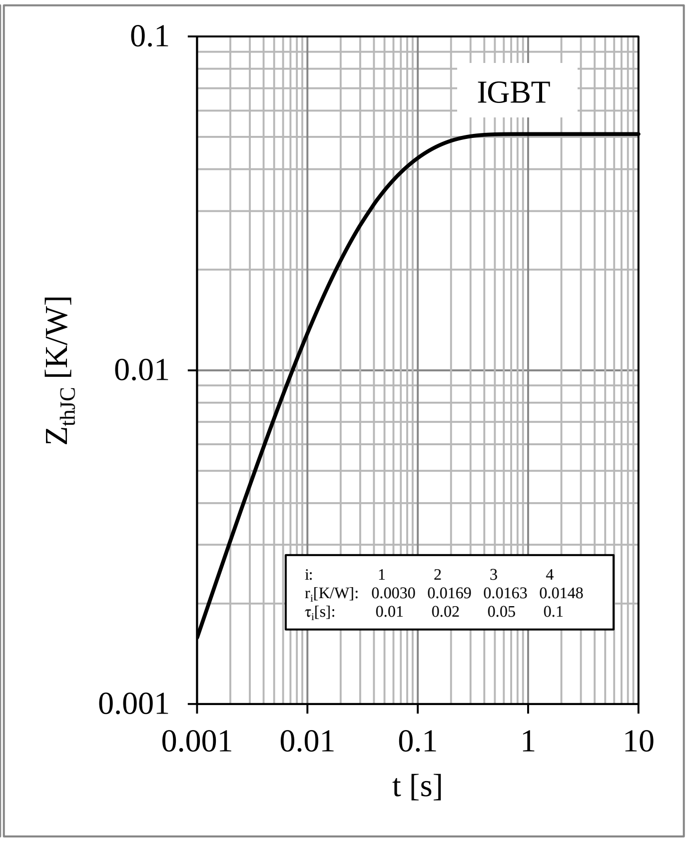


Fig 6. IGBT Transient Thermal Impedance

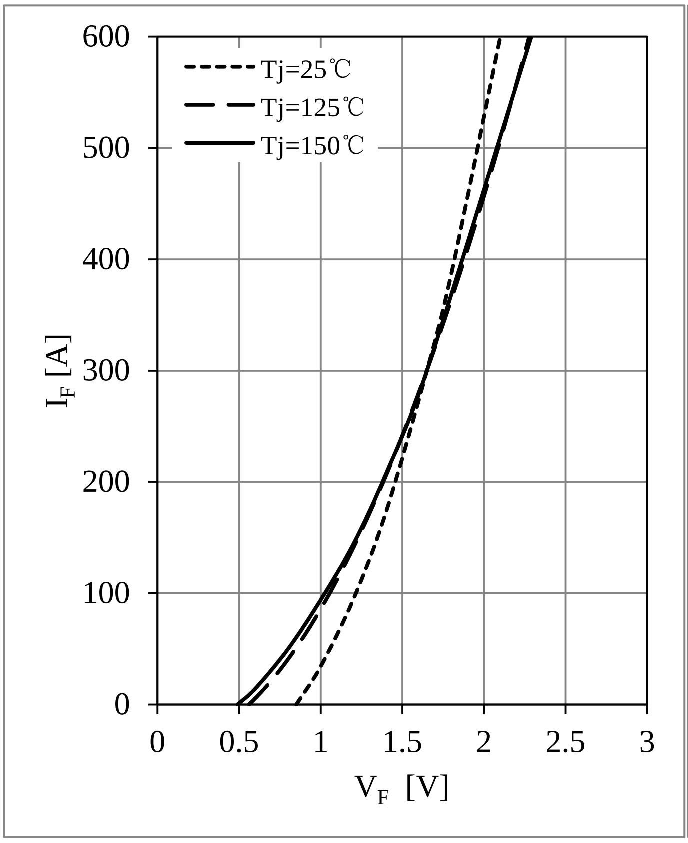


Fig 7. Diode Forward Characteristics

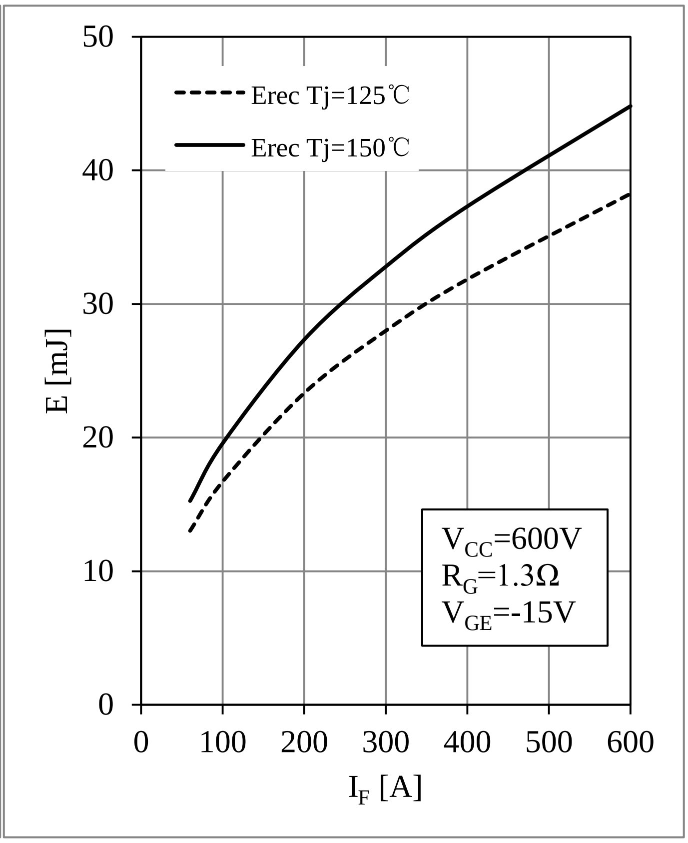


Fig 8. Diode Switching Loss vs. I_F

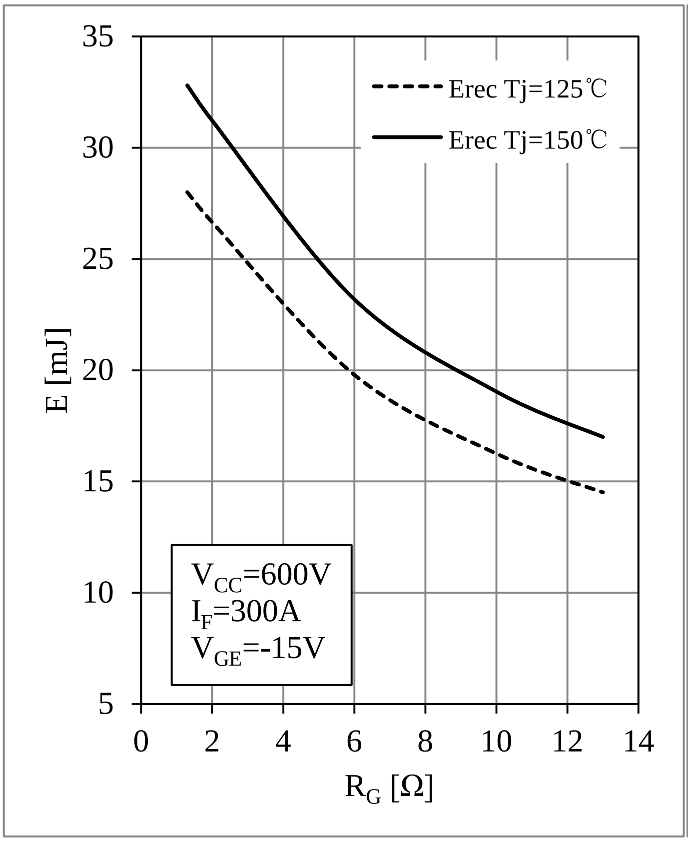


Fig 9. Diode Switching Loss vs. R_G

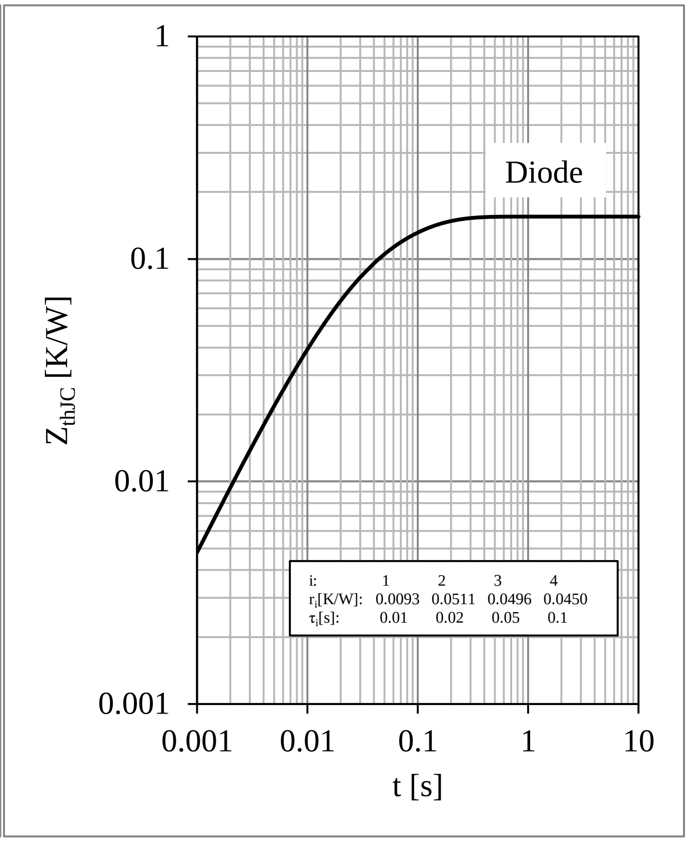
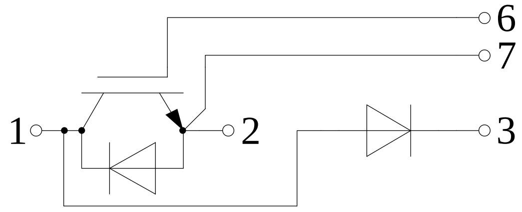


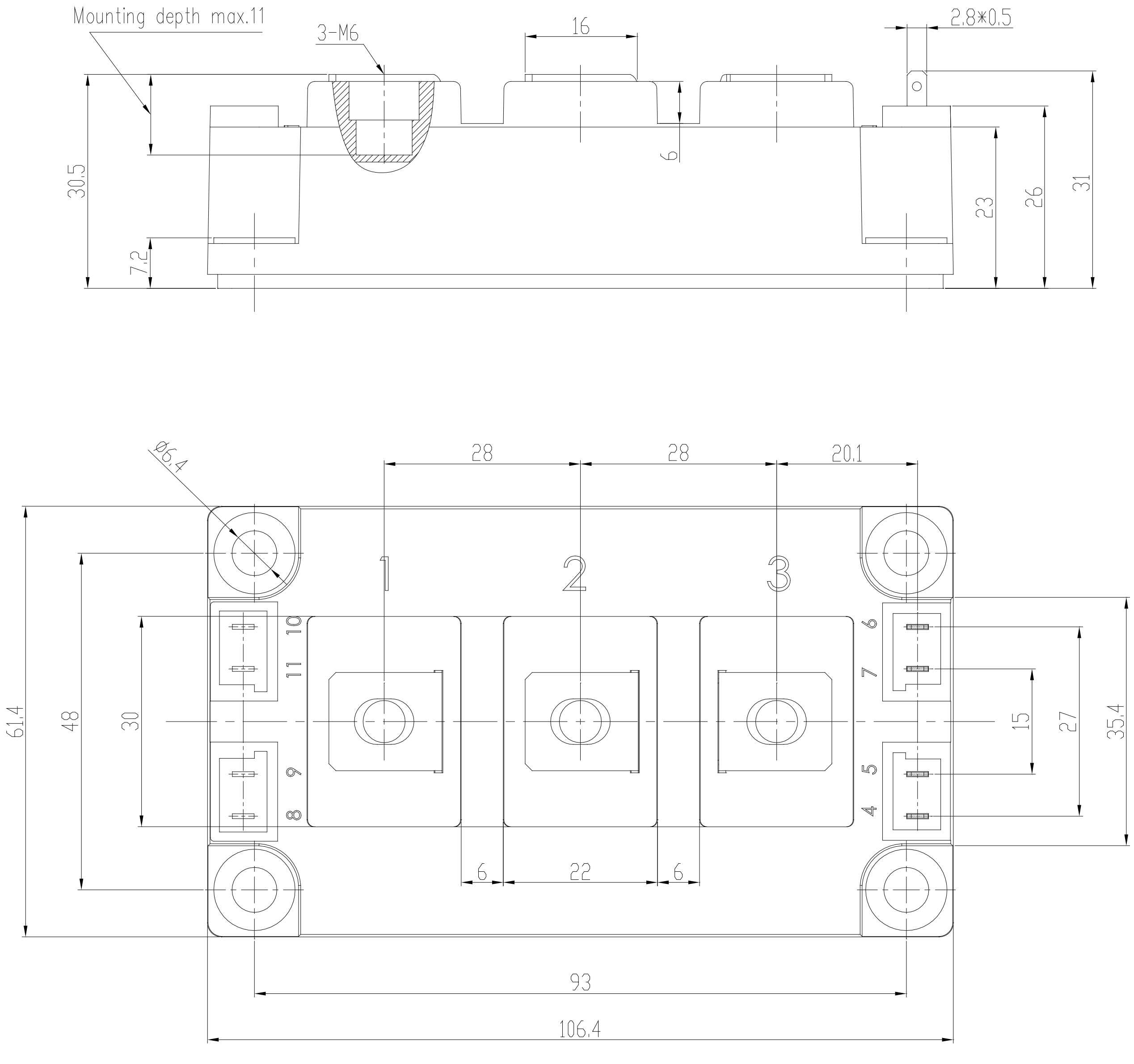
Fig 10. Diode Transient Thermal Impedance

Circuit Schematic



Package Dimensions

Dimensions in Millimeters



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