STARPOWER

SEMICONDUCTOR **IGBT**

GD100HFL170C1S

1700V/100A 2 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.

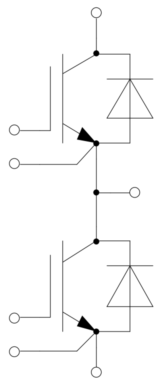
Features

- Low $V_{CE(sat)}$ SPT+ IGBT technology
- 10μs short circuit capability
- $V_{CE(sat)}$ with positive temperature coefficient
- Maximum junction temperature 175^{o}C
- 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

Equivalent Circuit Schematic



Absolute Maximum Ratings T_C=25°C 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°C @ T_C=100°C	150 100	A
I_{CM}	Pulsed Collector Current t_p=1ms	200	A
P_D	Maximum Power Dissipation @ T_j=175°C	691	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	°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=100A,V_{GE}=15V, T_j=25°C		2.40	2.85	V
		I_C=100A,V_{GE}=15V, T_j=125°C		2.80		
		I_C=100A,V_{GE}=15V, T_j=150°C		2.90		
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=4.0mA,V_{CE}=V_{GE}, T_j=25°C	5.4	6.2	7.4	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			7.7		Ω
C_{ies}	Input Capacitance	V_{CE}=25V,f=1MHz, V_{GE}=0V		6.75		nF
C_{res}	Reverse Transfer Capacitance			0.23		nF
Q_G	Gate Charge	V_{GE}=-15…+15V		0.77		μC
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=900V,I_C=100A, R_G=4.1Ω,V_{GE}=±15V, T_j=25°C		206		ns
t_r	Rise Time			71		ns
$t_{d(off)}$	Turn-Off Delay Time			232		ns
t_f	Fall Time			455		ns
E_{on}	Turn-On Switching Loss			23.8		mJ
E_{off}	Turn-Off Switching Loss			15.4		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=900V,I_C=100A, R_G=4.1Ω,V_{GE}=±15V, T_j=125°C		219		ns
t_r	Rise Time			81		ns
$t_{d(off)}$	Turn-Off Delay Time			267		ns
t_f	Fall Time			732		ns
E_{on}	Turn-On Switching Loss			32.5		mJ
E_{off}	Turn-Off Switching Loss			24.3		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=900V,I_C=100A, R_G=4.1Ω,V_{GE}=±15V, T_j=150°C		219		ns
t_r	Rise Time			83		ns
$t_{d(off)}$	Turn-Off Delay Time			270		ns
t_f	Fall Time			797		ns
E_{on}	Turn-On Switching Loss			34.2		mJ
E_{off}	Turn-Off Switching Loss			26.6		mJ
I_{SC}	SC Data	t_P≤10μs,V_{GE}=15V, T_j=150°C,V_{CC}=1000V, V_{CEM}≤1700V		310		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=100A,V_{GE}=0V,T_j=25°C		1.80	2.25	V
		I_F=100A,V_{GE}=0V,T_j=125°C		1.95		
		I_F=100A,V_{GE}=0V,T_j=150°C		1.90		
Q_r	Recovered Charge	V_R=900V,I_F=100A, -di/dt=1350A/μs,V_{GE}=-15V T_j=25°C		23.6		μC
I_{RM}	Peak Reverse Recovery Current			91		A
E_{rec}	Reverse Recovery Energy			13.4		mJ
Q_r	Recovered Charge	V_R=900V,I_F=100A, -di/dt=1350A/μs,V_{GE}=-15V T_j=125°C		35.7		μC
I_{RM}	Peak Reverse Recovery Current			98		A
E_{rec}	Reverse Recovery Energy			20.8		mJ
Q_r	Recovered Charge	V_R=900V,I_F=100A, -di/dt=1350A/μs,V_{GE}=-15V T_j=150°C		40.0		μC
I_{RM}	Peak Reverse Recovery Current			106		A
E_{rec}	Reverse Recovery Energy			23.5		mJ

Module Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Min.	Typ.	Max.	Unit
L_{CE}	Stray Inductance			30	nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal to Chip		0.75		mΩ
R_{thJC}	Junction-to-Case (per IGBT) Junction-to-Case (per Diode)			0.217 0.360	K/W
R_{thCH}	Case-to-Heatsink (per IGBT) Case-to-Heatsink (per Diode) Case-to-Heatsink (per Module)		0.160 0.266 0.050		K/W
M	Terminal Connection Torque, Screw M5 Mounting Torque, Screw M6	2.5 3.0		5.0 5.0	N.m
G	Weight of Module		150		g

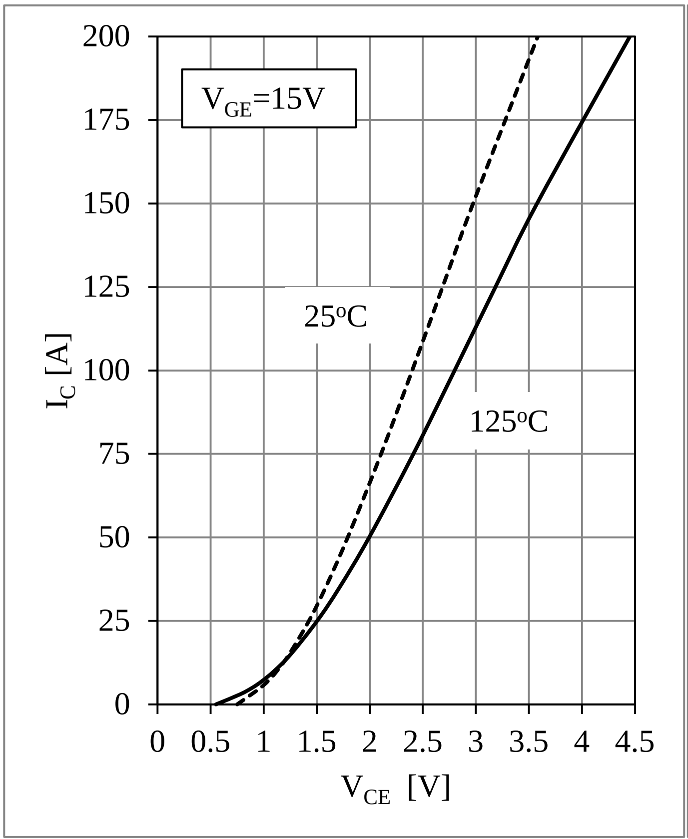


Fig 1. IGBT Output Characteristics

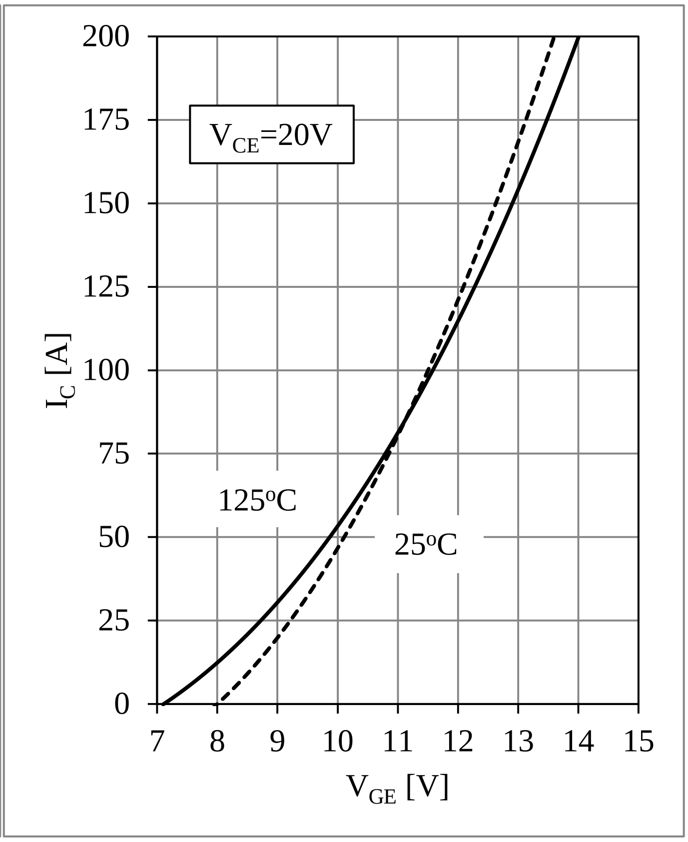


Fig 2. IGBT Transfer Characteristics

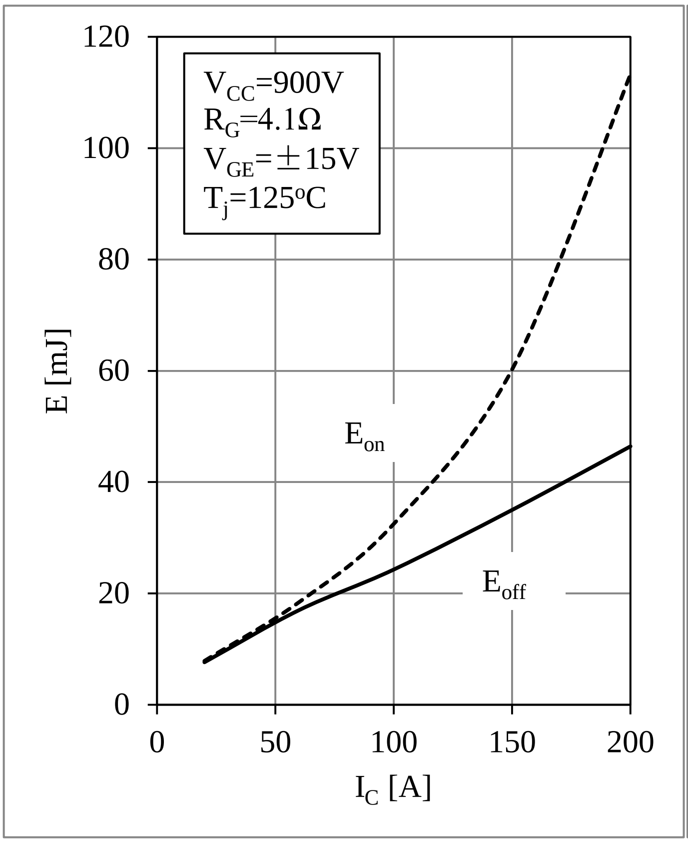


Fig 3. IGBT Switching Loss vs. I_C

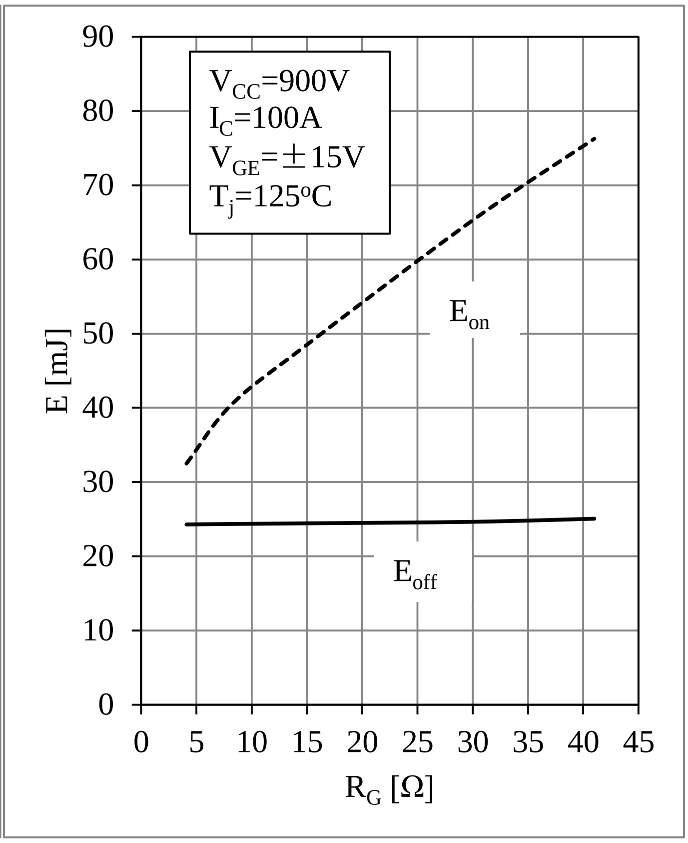


Fig 4. IGBT Switching Loss vs. R_G

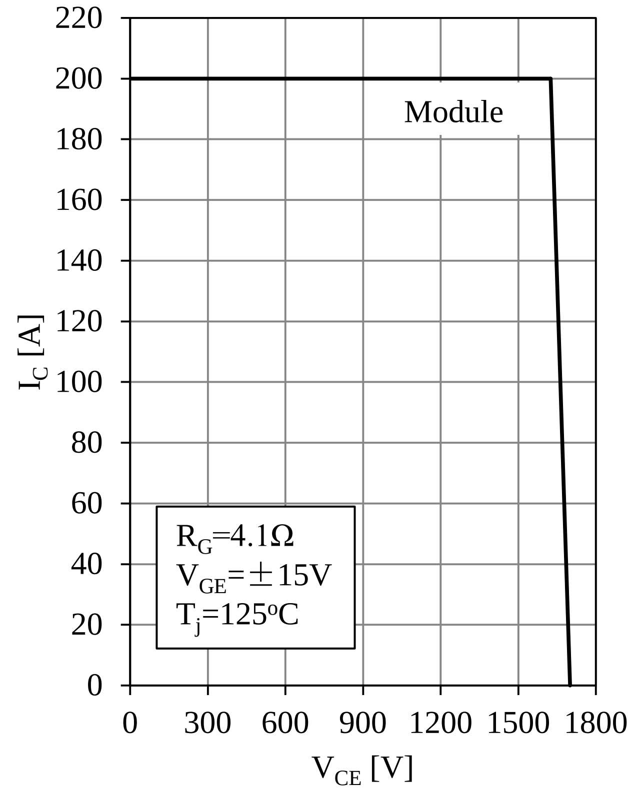


Fig 5. RBSOA

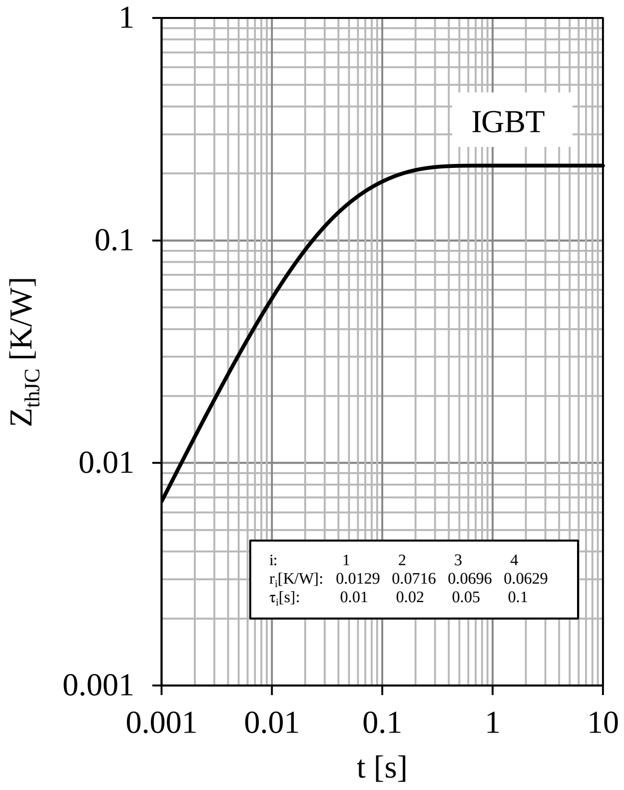


Fig 6. IGBT Transient Thermal Impedance

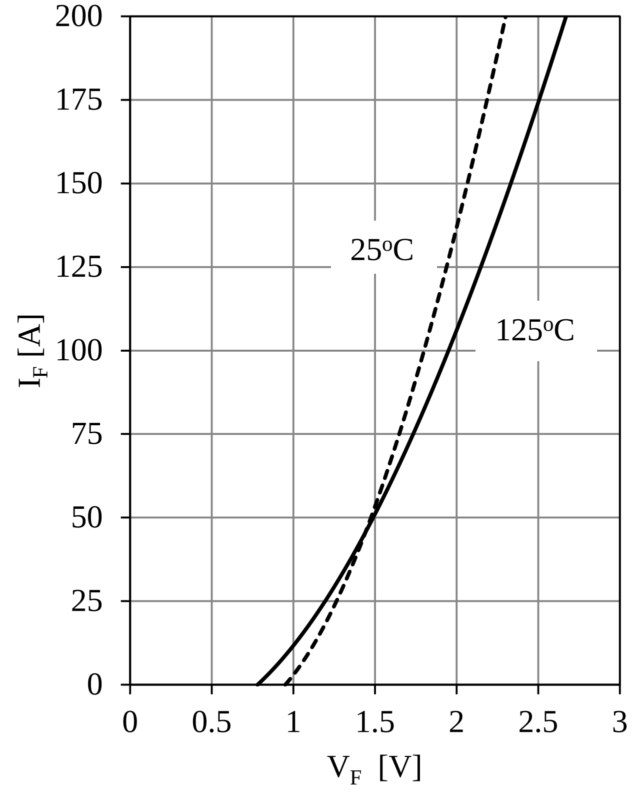


Fig 7. Diode Forward Characteristics

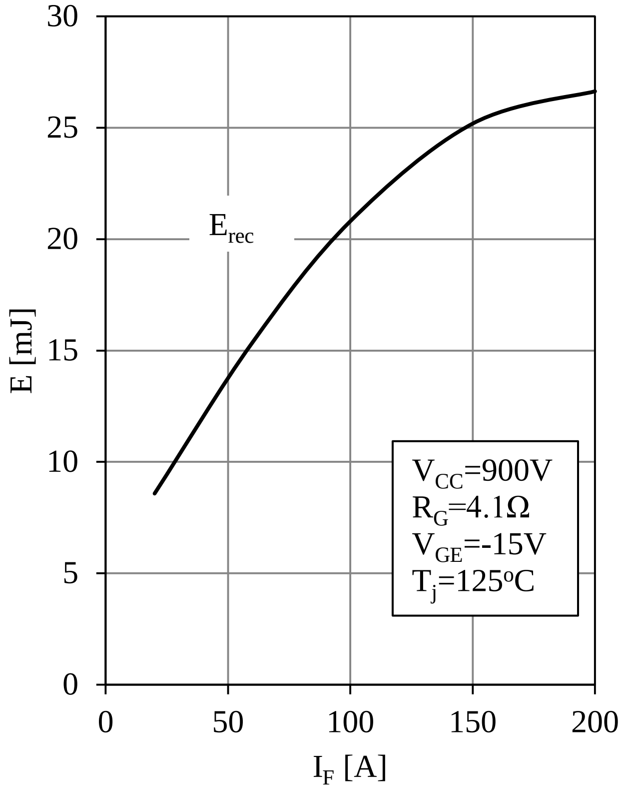


Fig 8. Diode Switching Loss vs. I_F

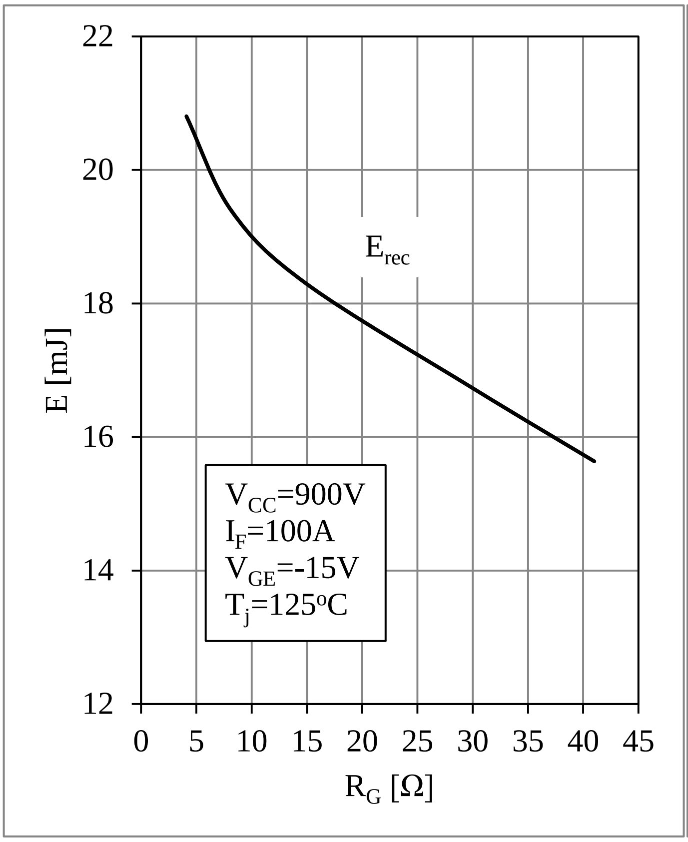


Fig 9. Diode Switching Loss vs. R_G

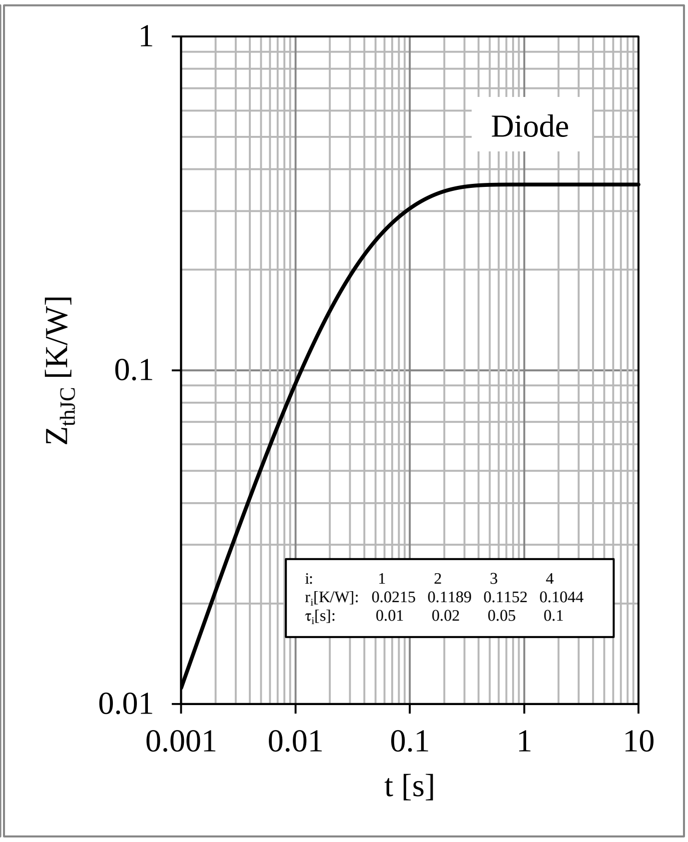
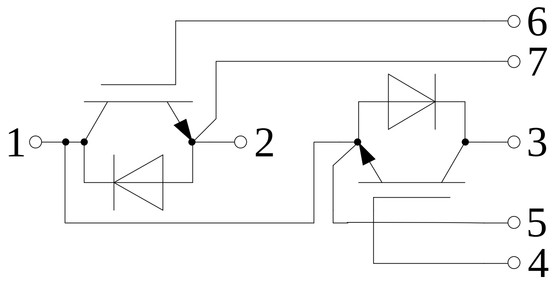


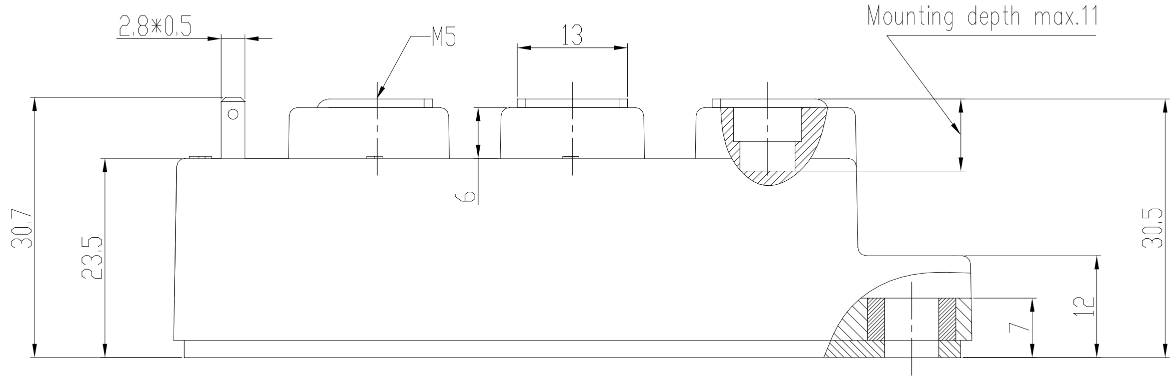
Fig 10. Diode Transient Thermal Impedance

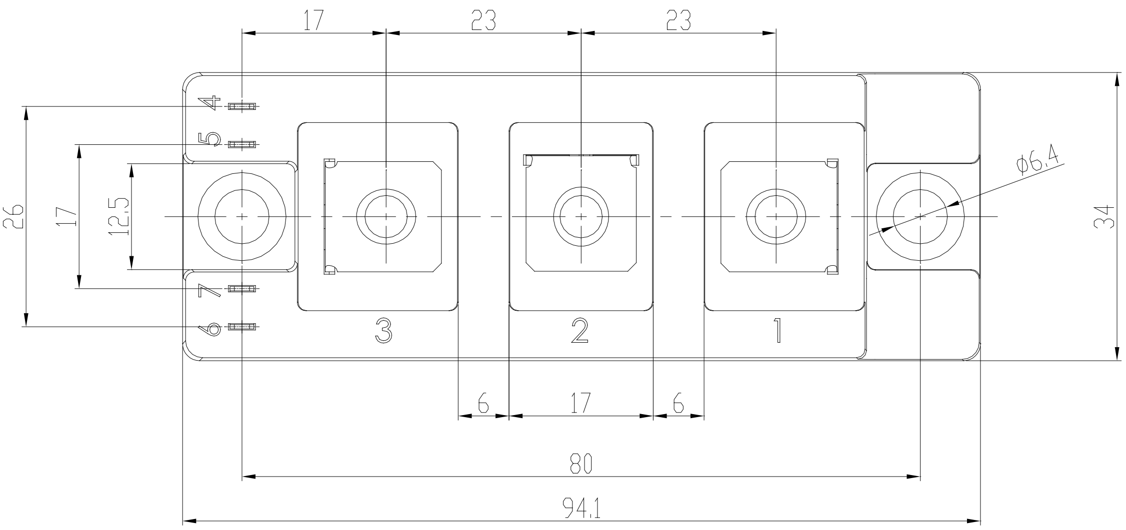
Circuit Schematic



Package Dimensions

Dimensions in Millimeters





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