STARPOWER

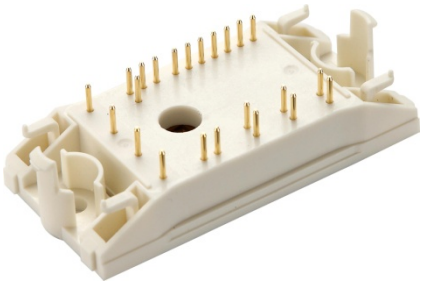
SEMICONDUCTOR **IGBT**

GD100HFT60F1S

600V/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 UPS and SMPS.



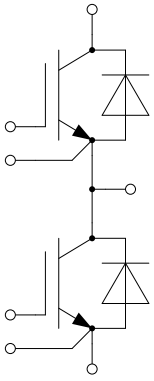
Features

- Low $V_{CE(sat)}$ Trench IGBT technology
- 6μs short circuit capability
- $V_{CE(sat)}$ with positive temperature coefficient
- Maximum junction temperature 175°C
- Fast & soft reverse recovery anti-parallel FWD
- Isolated heatsink using DBC technology

Typical Applications

- Inverter for motor drive
- Switching mode power supply
- 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	650	V
V_{GES}	Gate-Emitter Voltage	±20	V
I_C	Collector Current @ T_C=25°C @ T_C=70°C	130 100	A
I_{CM}	Pulsed Collector Current t_p=1ms	200	A
P_D	Maximum Power Dissipation @ T_j=175°C	331	W

Diode

Symbol	Description	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	650	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		1.45	1.90	V
		I_C=100A,V_{GE}=15V, T_j=125°C		1.60		
		I_C=100A,V_{GE}=15V, T_j=150°C		1.70		
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=1.6mA,V_{CE}=V_{GE}, T_j=25°C	5.1	5.8	6.4	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			2.0		Ω
C_{ies}	Input Capacitance	V_{CE}=25V,f=1MHz, V_{GE}=0V		6.16		nF
C_{res}	Reverse Transfer Capacitance			0.18		nF
Q_G	Gate Charge	V_{GE}=-15…+15V		1.10		μC
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=300V,I_C=100A, R_G=3.3Ω,V_{GE}=±15V, T_j=25°C		51		ns
t_r	Rise Time			25		ns
$t_{d(off)}$	Turn-Off Delay Time			240		ns
t_f	Fall Time			48		ns
E_{on}	Turn-On Switching Loss			0.54		mJ
E_{off}	Turn-Off Switching Loss			2.52		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=300V,I_C=100A, R_G=3.3Ω,V_{GE}=±15V, T_j=125°C		60		ns
t_r	Rise Time			30		ns
$t_{d(off)}$	Turn-Off Delay Time			258		ns
t_f	Fall Time			65		ns
E_{on}	Turn-On Switching Loss			0.86		mJ
E_{off}	Turn-Off Switching Loss			3.34		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=300V,I_C=100A, R_G=3.3Ω,V_{GE}=±15V, T_j=150°C		64		ns
t_r	Rise Time			31		ns
$t_{d(off)}$	Turn-Off Delay Time			269		ns
t_f	Fall Time			76		ns
E_{on}	Turn-On Switching Loss			0.95		mJ
E_{off}	Turn-Off Switching Loss			3.50		mJ
I_{SC}	SC Data	t_P≤6μs,V_{GE}=15V, T_j=150°C,V_{CC}=360V, V_{CEM}≤650V		500		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		1.55	1.95	V
		I_F=100A,V_{GE}=0V,T_j=125°C		1.50		
		I_F=100A,V_{GE}=0V,T_j=150°C		1.45		
Q_r	Recovered Charge	V_R=300V,I_F=100A, -di/dt=3200A/μs,V_{GE}=-15V T_j=25°C		4.1		μC
I_{RM}	Peak Reverse Recovery Current			91		A
E_{rec}	Reverse Recovery Energy			1.22		mJ
Q_r	Recovered Charge	V_R=300V,I_F=100A, -di/dt=3200A/μs,V_{GE}=-15V T_j=125°C		7.9		μC
I_{RM}	Peak Reverse Recovery Current			110		A
E_{rec}	Reverse Recovery Energy			2.16		mJ
Q_r	Recovered Charge	V_R=300V,I_F=100A, -di/dt=3200A/μs,V_{GE}=-15V T_j=150°C		9.0		μC
I_{RM}	Peak Reverse Recovery Current			116		A
E_{rec}	Reverse Recovery Energy			2.40		mJ

Module Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Min.	Typ.	Max.	Unit
R_{thJC}	Junction-to-Case (per IGBT) Junction-to-Case (per Diode)		0.412 0.682	0.453 0.750	K/W
R_{thCH}	Case-to-Heatsink (per IGBT) Case-to-Heatsink (per Diode) Case-to-Heatsink (per Module)		0.112 0.186 0.035		K/W
M	Mounting Torque, Screw M4	2.0		2.2	N.m
G	Weight of Module		26		g

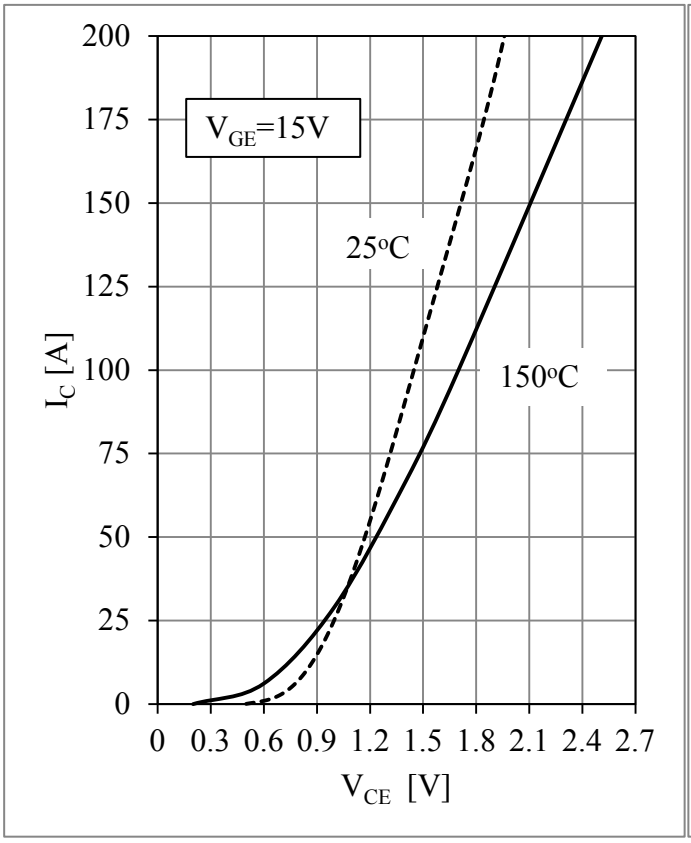


Fig 1. IGBT Output Characteristics

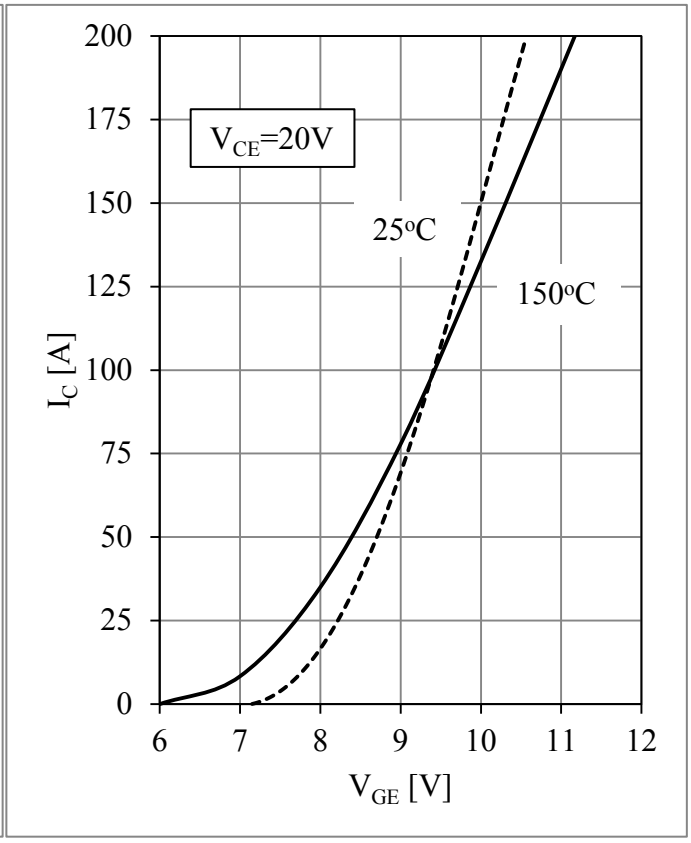


Fig 2. IGBT Transfer Characteristics

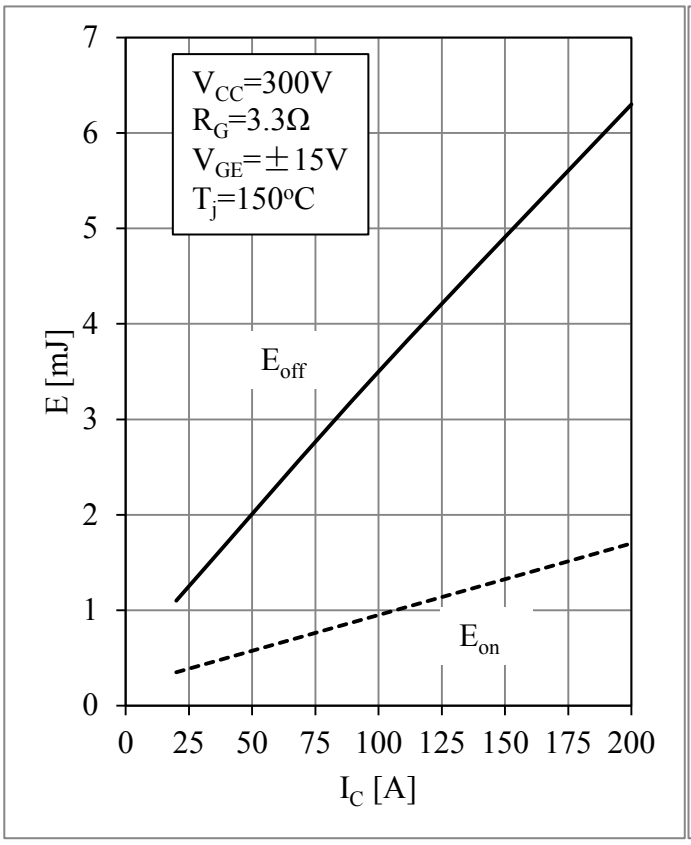


Fig 3. IGBT Switching Loss vs. I_C

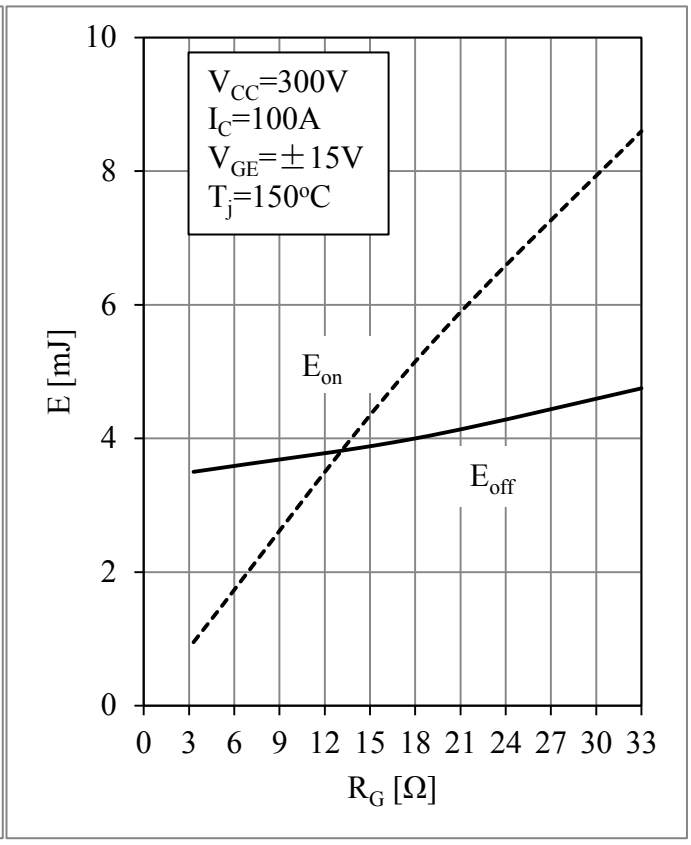


Fig 4. IGBT Switching Loss vs. R_G

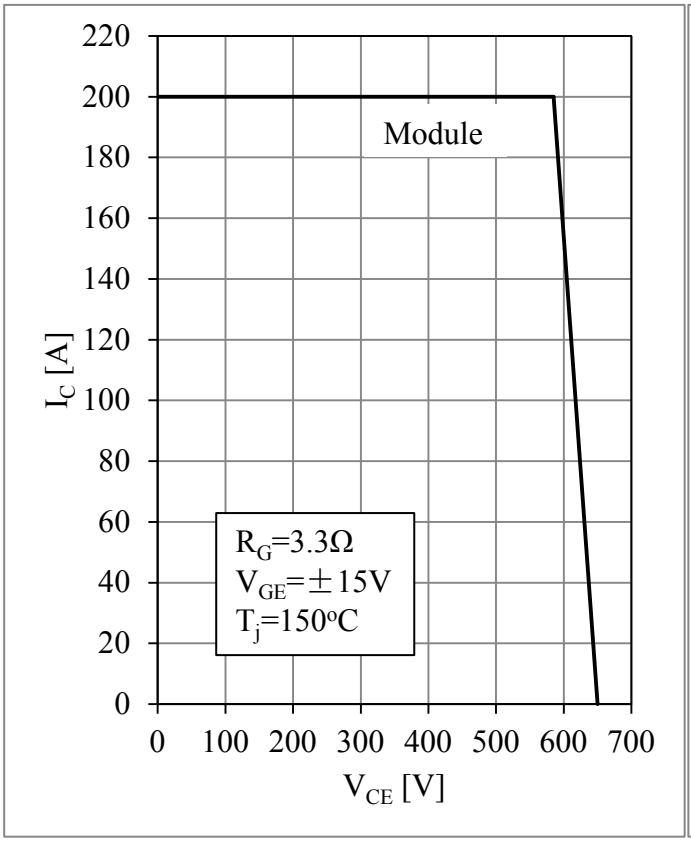


Fig 5. RBSOA

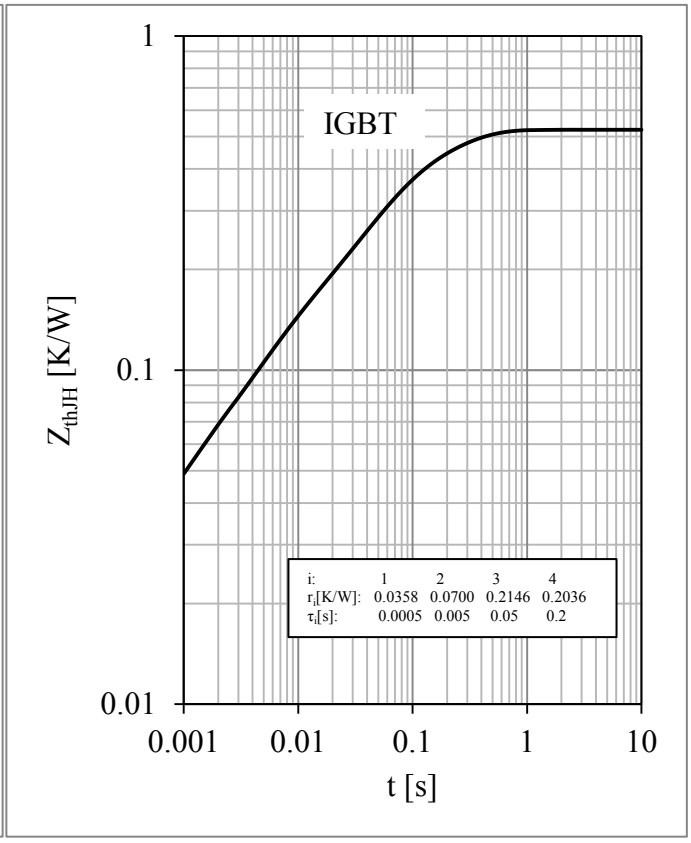


Fig 6. IGBT Transient Thermal Impedance

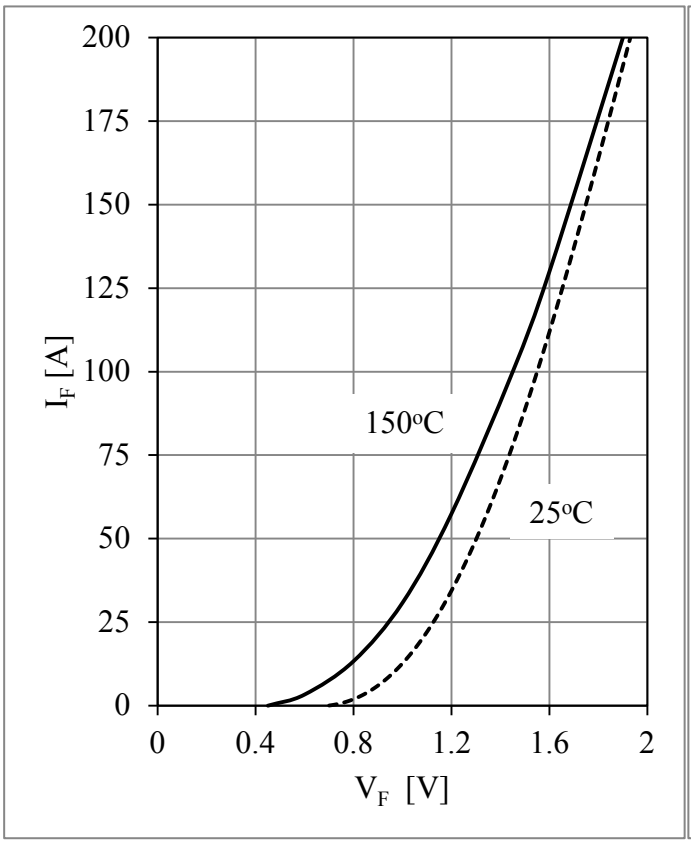


Fig 7. Diode Forward Characteristics

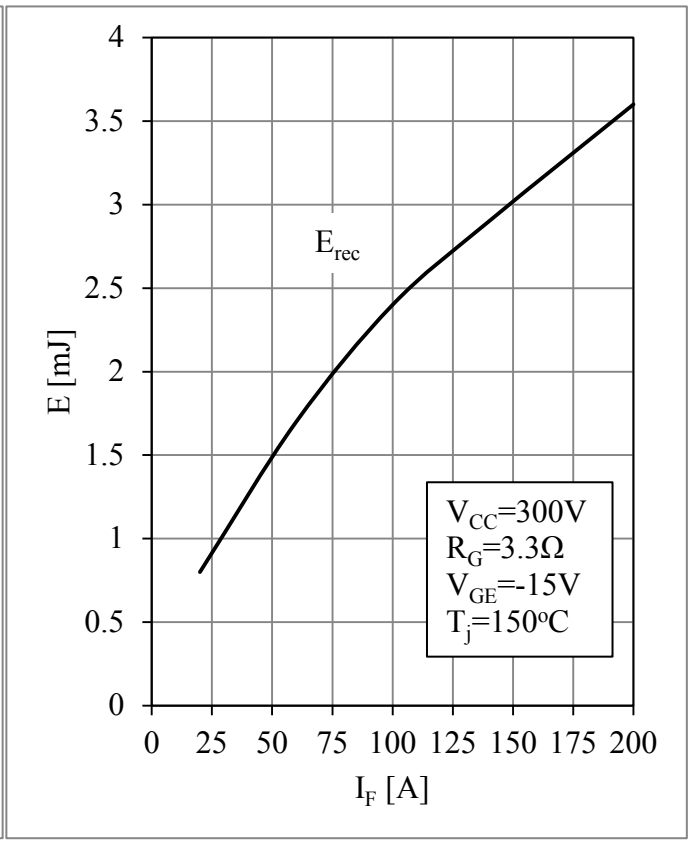


Fig 8. Diode Switching Loss vs. I_F

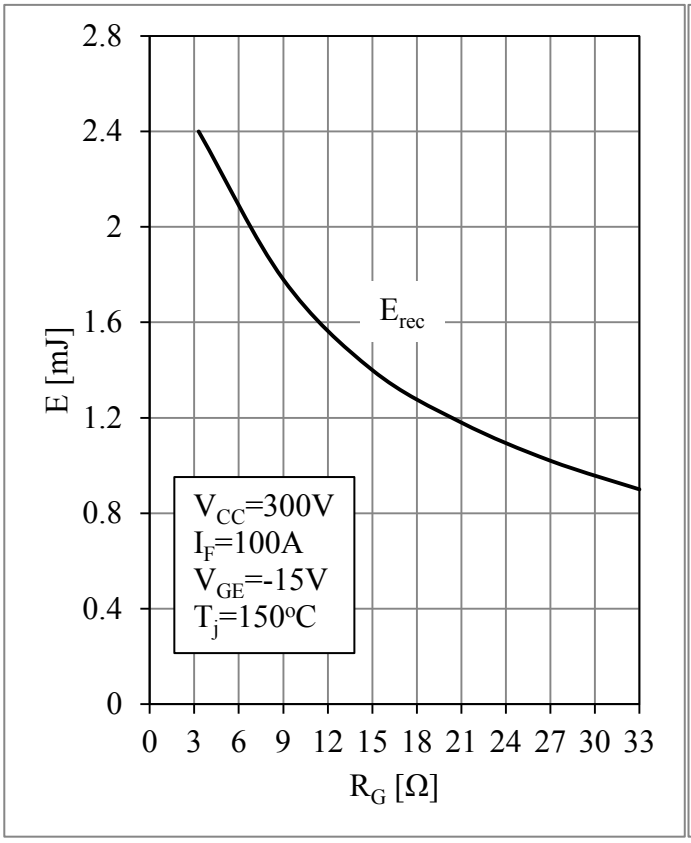


Fig 9. Diode Switching Loss vs. R_G

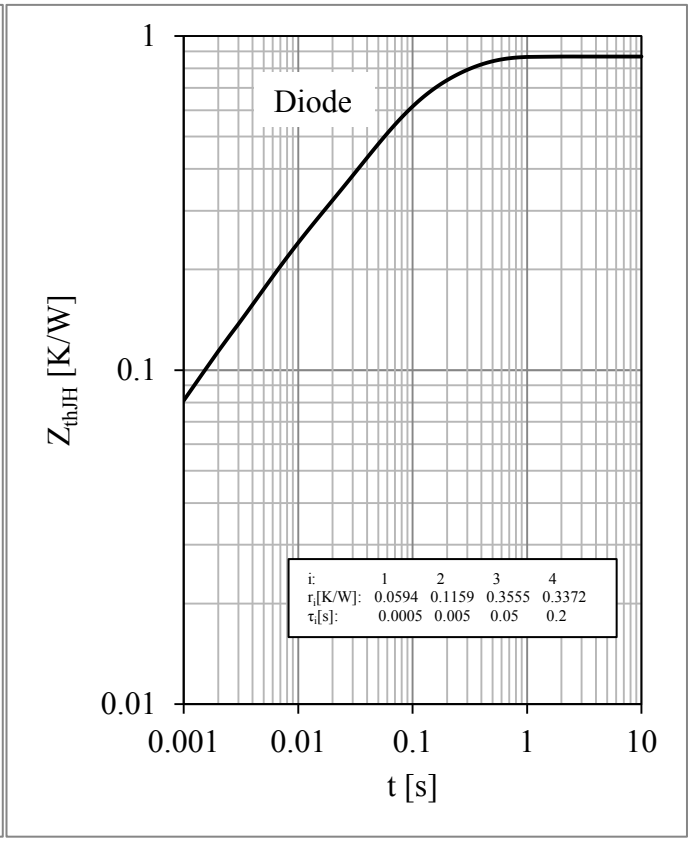
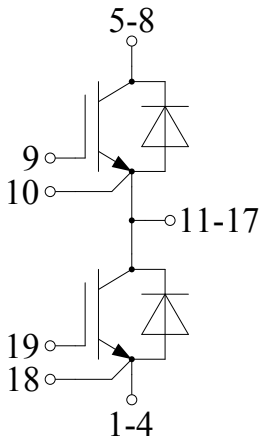


Fig 10. Diode Transient Thermal Impedance

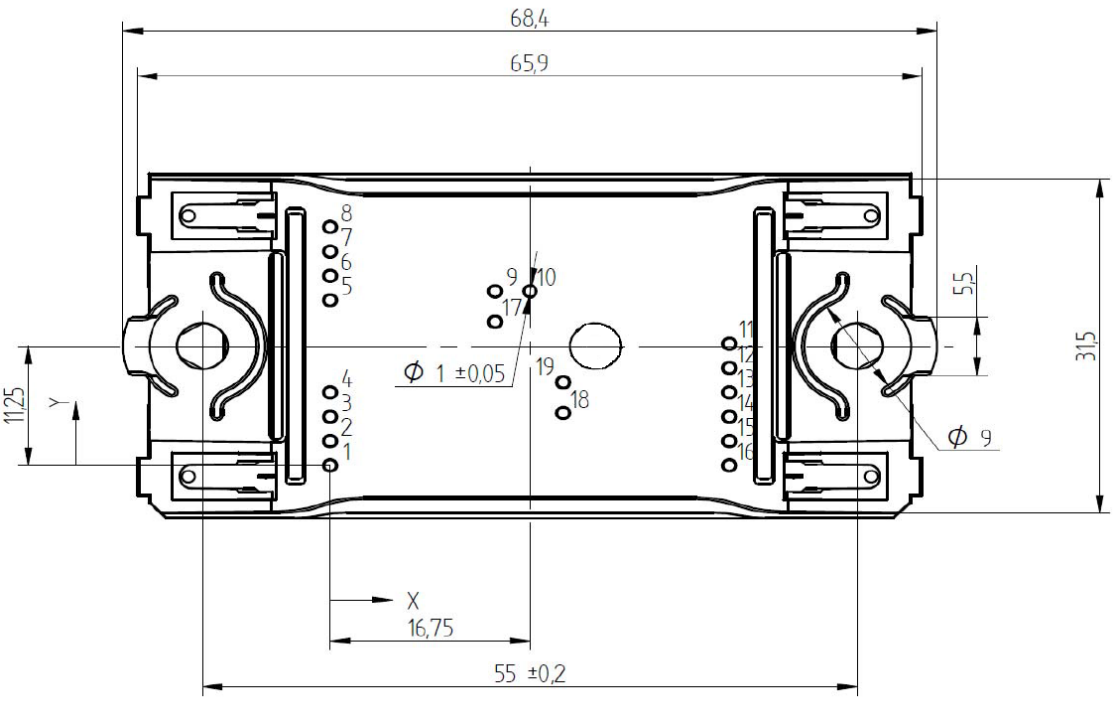
Circuit Schematic



Package Dimensions

Dimensions in Millimeters

Pin table		
Pin	X	Y
1	0	0
2	0	2,3
3	0	4,6
4	0	6,9
5	0	15,6
6	0	17,9
7	0	20,2
8	0	22,5
9	13,85	16,45
10	16,75	16,45
11	33,5	11,5
12	33,5	9,2
13	33,5	6,9
14	33,5	4,6
15	33,5	2,3
16	33,5	0
17	13,85	13,55
18	19,55	4,95
19	19,55	7,85



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