STARPOWER

SEMICONDUCTOR **IGBT**

GD50HCU120B3S

Molding Type Module

1200V/50A 4 in one-package

General Description

STARPOWER IGBT Power Module provides ultrafast switching speed as well as short circuit ruggedness. It's designed for the applications such as electronic welder and inductive heating.

Features

- NPT IGBT technology
- 10μs short circuit capability
- Low switching losse
- $V_{CE(sat)}$ with positive temperature coefficient
- Square RBSOA
- Low inductance case
- Fast & soft reverse recovery anti-parallel FWD
- Isolated copper baseplate using DBC technology

Typical Applications

- Switching mode power supplies
- Inductive heating
- Electronic welder

IGBT-inverter T_C=25℃ unless otherwise noted

Maximum Rated Values

Symbol	Description	GD50HCU120B3S	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℃	75 50	A
I_{CM}	Pulsed Collector Current t_p=1ms	100	A
P_{tot}	Total Power Dissipation @ T_j=150℃	408	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=1.0mA,V_{CE}=V_{GE}, T_j=25℃	4.8	5.5	6.3	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C=50A,V_{GE}=15V, T_j=25℃		2.90	3.35	V
		I_C=50A,V_{GE}=15V, T_j=125℃		3.60		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=50A, R_G=13Ω,V_{GE}=±15V, T_j=25℃		203		ns
t_r	Rise Time			49		ns
$t_{d(off)}$	Turn-Off Delay Time			261		ns
t_f	Fall Time			136		ns
E_{on}	Turn-On Switching Loss			4.20		mJ
E_{off}	Turn-Off Switching Loss			1.64		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=50A, R_G=13Ω,V_{GE}=±15V, T_j=125℃		203		ns
t_r	Rise Time			50		ns
$t_{d(off)}$	Turn-Off Delay Time			271		ns
t_f	Fall Time			170		ns
E_{on}	Turn-On Switching Loss			5.50		mJ
E_{off}	Turn-Off Switching Loss			2.41		mJ
C_{ies}	Input Capacitance	V_{CE}=25V,f=1MHz, V_{GE}=0V		3.45		nF
C_{oes}	Output Capacitance			0.52		nF
C_{res}	Reverse Transfer Capacitance			0.23		nF
I_{SC}	SC Data	t_P≤10μs,V_{GE}=15V, T_j=125℃,V_{CC}=900V, V_{CEM}≤1200V		440		A
Q_G	Gate Charge	V_{CC}=600V,I_C=50A, V_{GE}=-15---+15V		0.63		μC
R_{Gint}	Internal Gate Resistance			/		Ω

Diode-inverter T_C=25℃ unless otherwise noted

Maximum Rated Values

Symbol	Description	GD50HCU120B3S	Units
V_{RRM}	Repetitive Peak Reverse Voltage @ T_j=25℃	1200	V
I_F	DC Forward Current	50	A
I_{FRM}	Repetitive Peak Forward Current t_p=1ms	100	A

Characteristics Values

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units
V_F	Diode Forward Voltage	I_F=50A	T_j=25℃		1.82	2.27	V
			T_j=125℃		1.95		
Q_r	Recovered Charge	I_F=50A, V_R=600V, R_G=13Ω, V_{GE}=-15V	T_j=25℃		3.5		μC
			T_j=125℃		6.7		
I_{RM}	Peak Reverse Recovery Current		T_j=25℃		41		A
			T_j=125℃		56		
E_{rec}	Reverse Recovery Energy		T_j=25℃		1.38		mJ
			T_j=125℃		3.16		

IGBT Module

Symbol	Parameter	Min.	Typ.	Max.	Units
V_{ISO}	Isolation Voltage RMS,f=50Hz,t=1min	2500			V
$R_{\theta JC}$	Junction-to-Case (per IGBT-inverter) Junction-to-Case (per Diode-inverter)			0.306 0.523	K/W
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)		0.035		K/W
T_{jmax}	Maximum Junction Temperature			150	℃
T_{jop}	Operating Junction Temperature	-40		125	℃
T_{STG}	Storage Temperature Range	-40		125	℃
Mounting Torque	Power Terminal Screw:M5 Mounting Screw:M6	2.5 3.0		5.0 6.0	N.m
G	Weight of Module		300		g

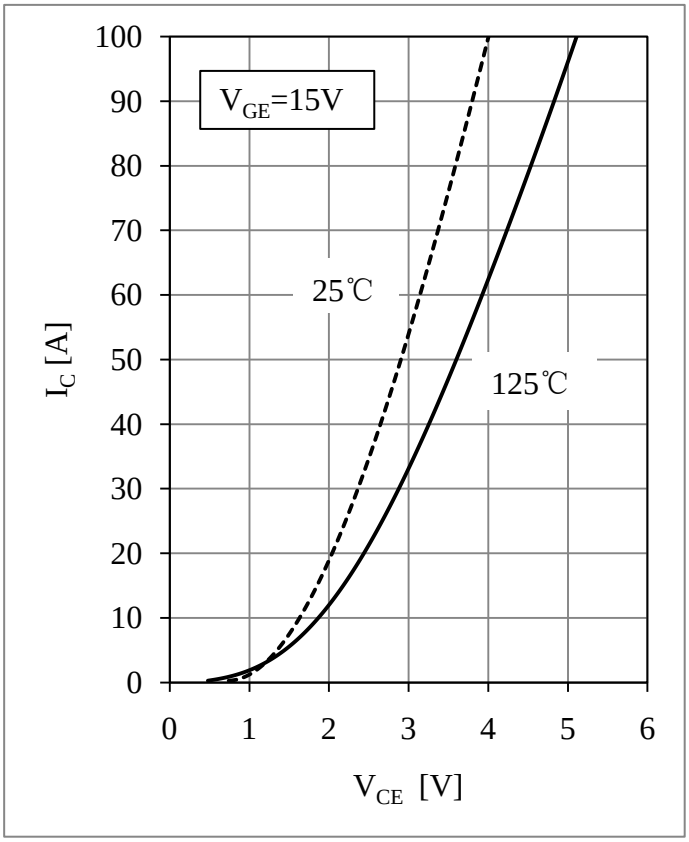


Fig 1. IGBT Output Characteristic

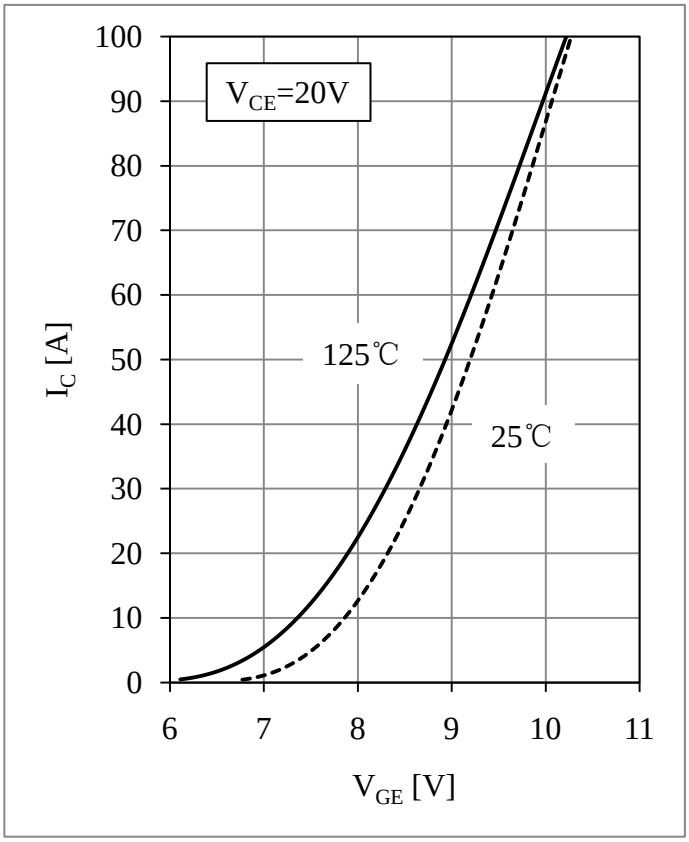


Fig 2. IGBT Transfer Characteristic

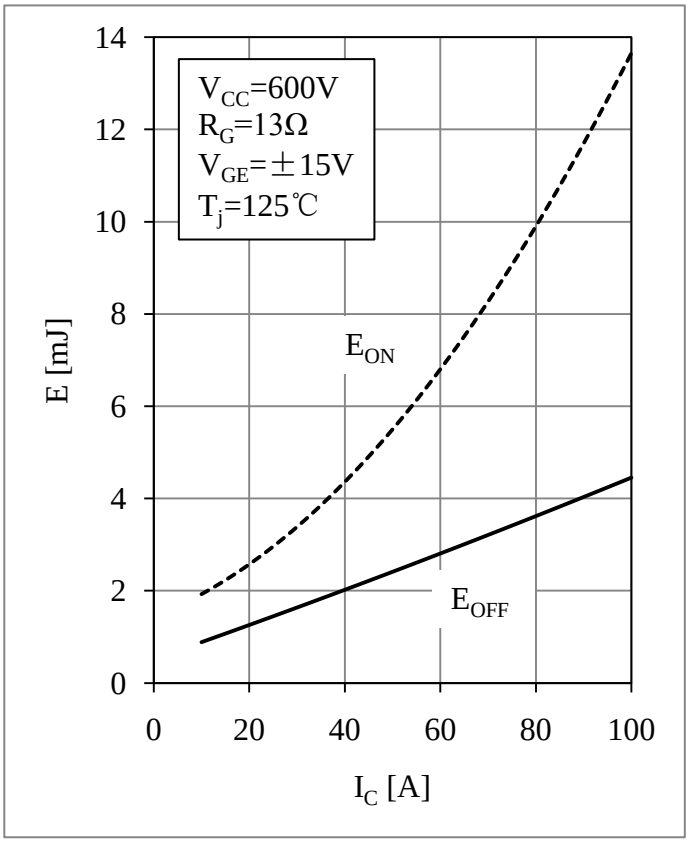


Fig 3. IGBT Switching Loss vs. I_C

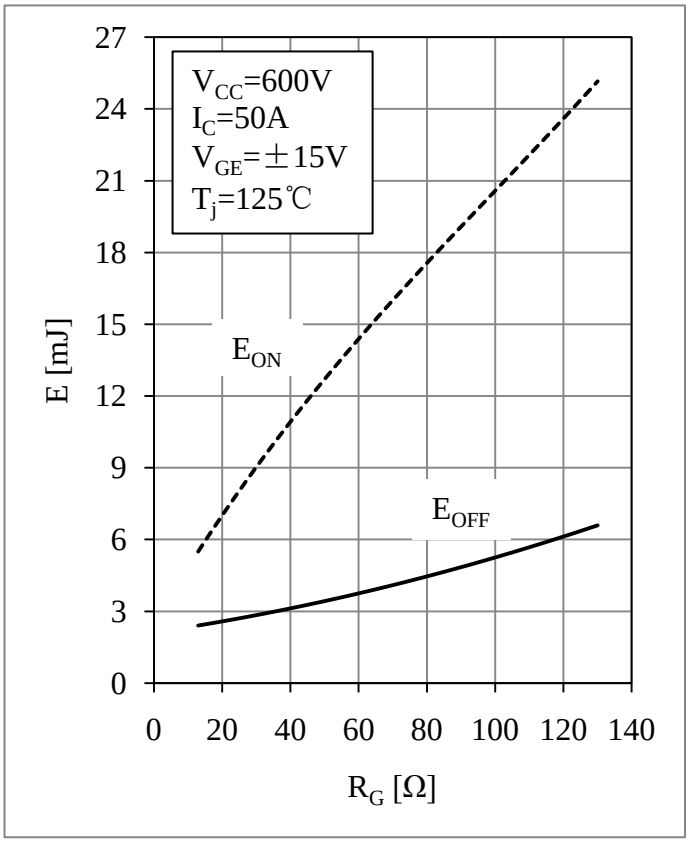


Fig 4. IGBT Switching Loss vs. R_G

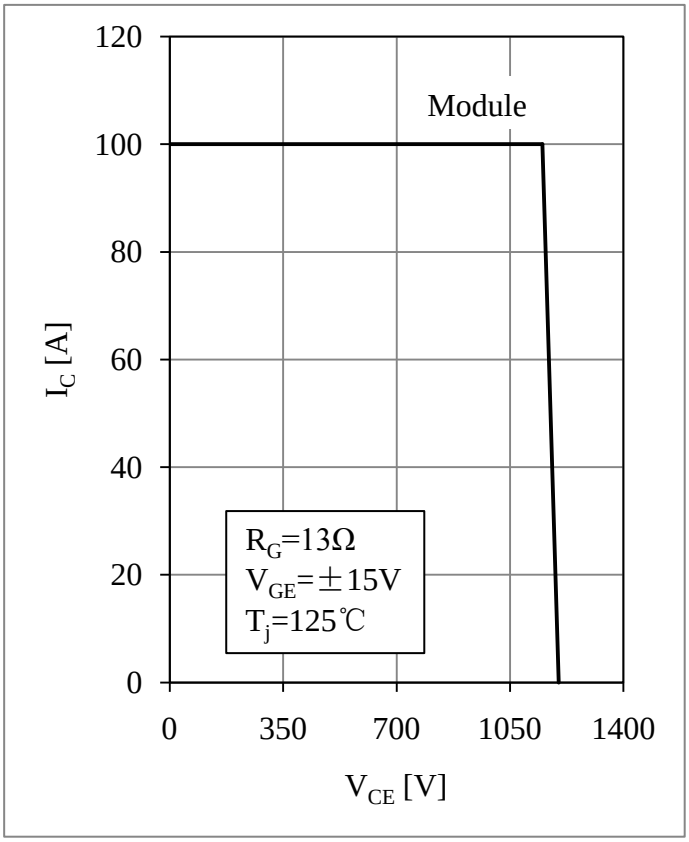


Fig 5. RBSOA

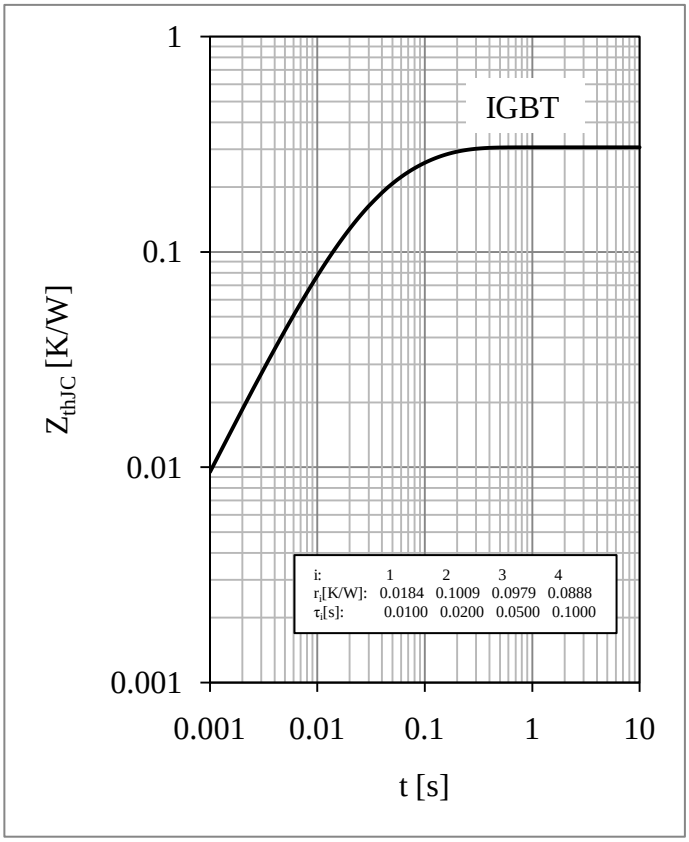


Fig 6. IGBT Transient Thermal Impedance

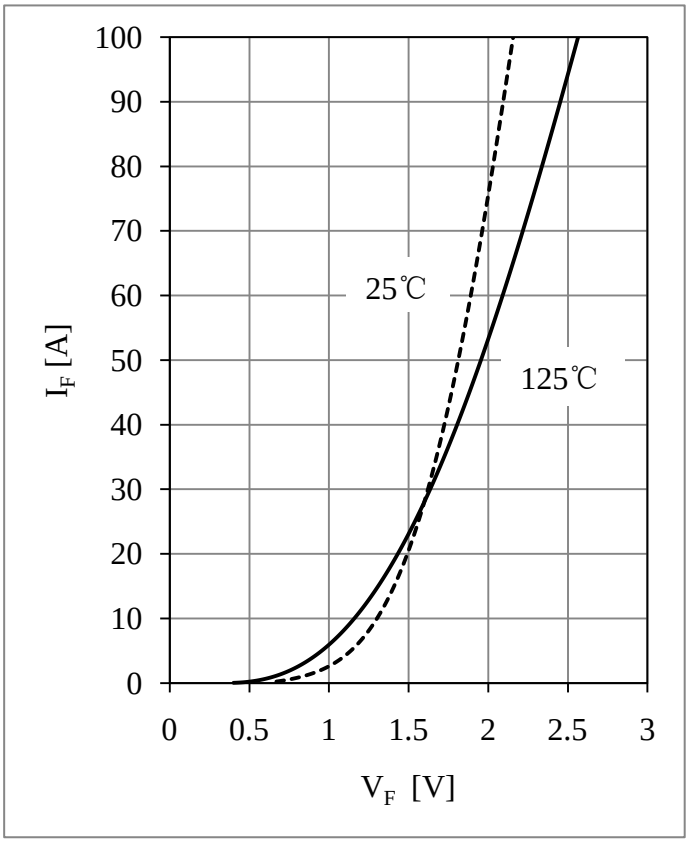


Fig 7. Diode Forward Characteristic

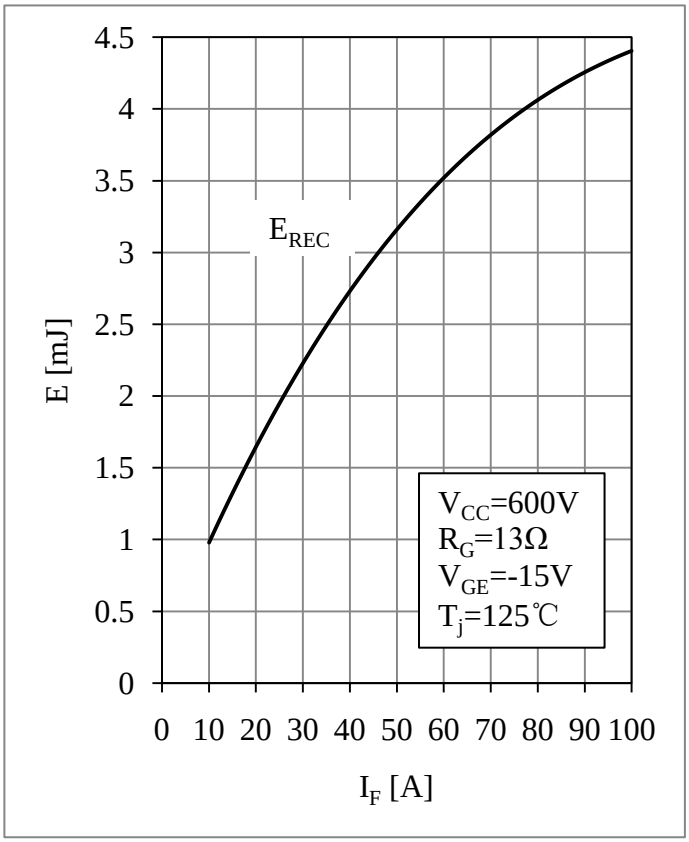


Fig 8. Diode Switching Loss vs. I_F

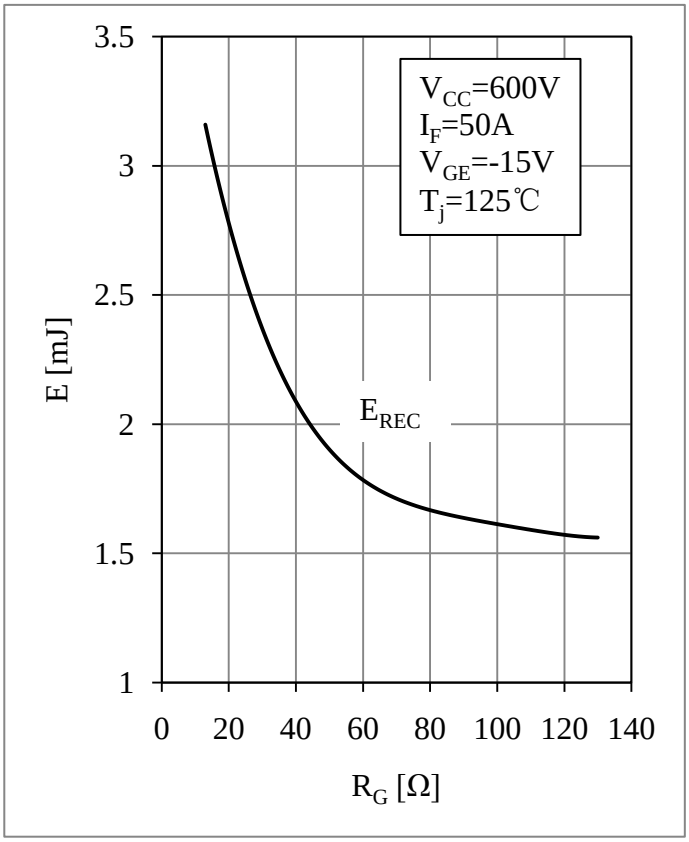


Fig 9. Diode Switching Loss vs. R_G

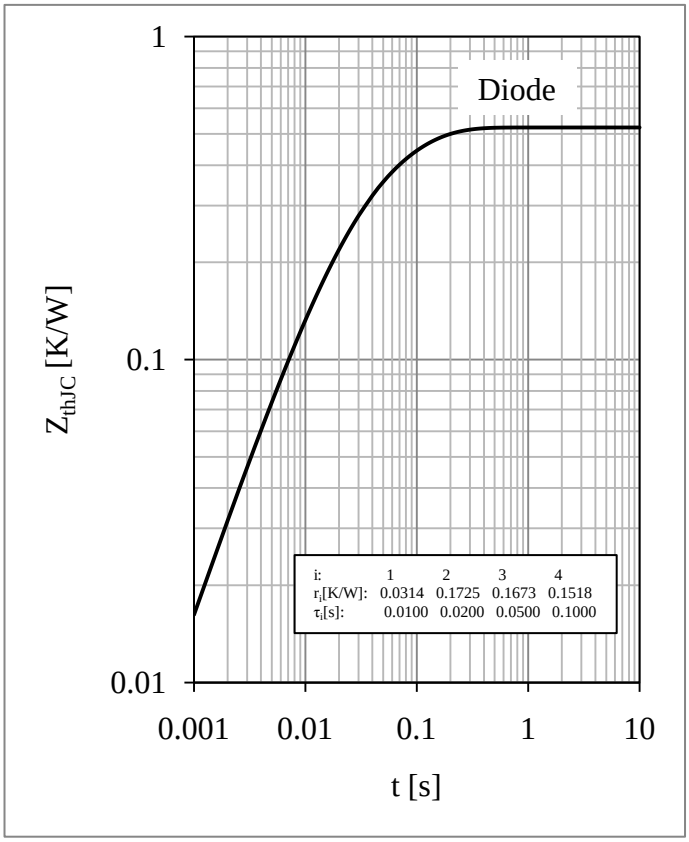
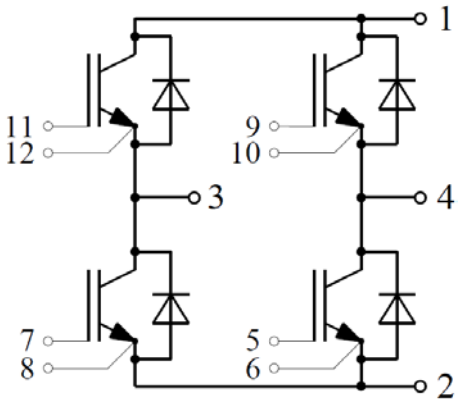


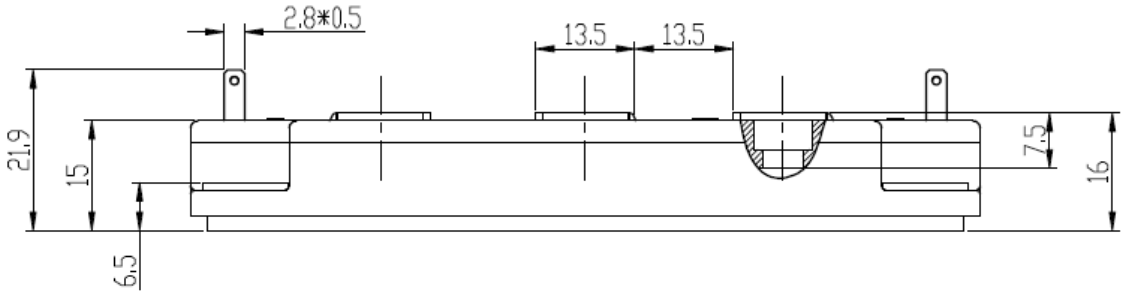
Fig 10. Diode Transient Thermal Impedance

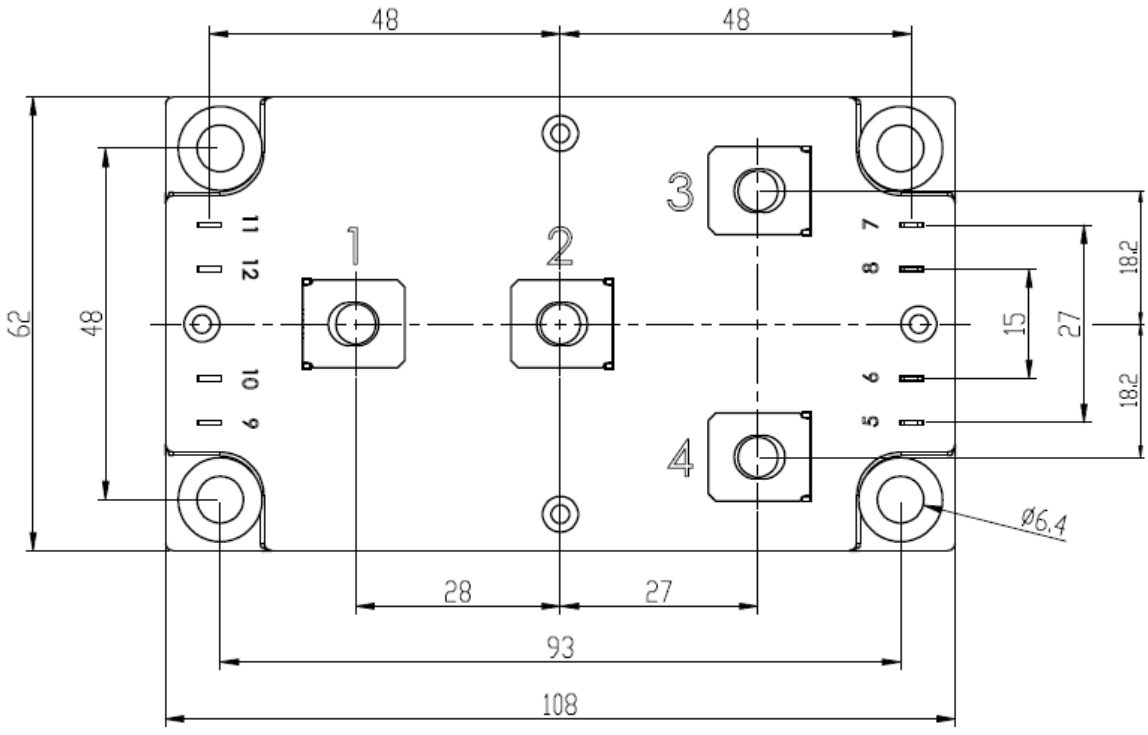
Equivalent Circuit Schematic



Package Dimensions

Dimensions in Millimeters





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