STARPOWER

SEMICONDUCTOR™ **IGBT**

GD150HFU120C2S

Molding Type Module

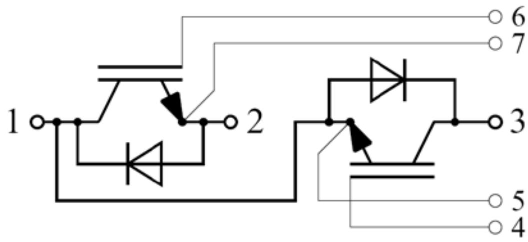
1200V/150A 2 in one-package

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 losses
- Rugged with ultrafast performance
- $V_{CE(sat)}$ with positive temperature coefficient
- Low inductance case
- Fast & soft reverse recovery anti-parallel FWD
- Isolated copper baseplate using DBC technology



Equivalent Circuit Schematic

Typical Applications

- Switching mode power supplies
- Inductive heating
- Electronic welder

Absolute Maximum Ratings T_C=25℃ unless otherwise noted

Symbol	Description	GD150HFU120C2S	Units
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate-Emitter Voltage	±20	V
I_C	Collector Current @ T_C=25℃ @ T_C=80℃	280 150	A
$I_{CM(1)}$	Pulsed Collector Current t_p=1ms	300	A
I_F	Diode Continuous Forward Current	150	A
$I_{FM(1)}$	Diode Maximum Forward Current	300	A
P_D	Maximum power Dissipation @ T_j=150℃	1147	W
T_j	Maximum Junction Temperature	150	℃
T_{STG}	Storage Temperature Range	-40 to +125	℃
V_{ISO}	Isolation Voltage RMS,f=50Hz,t=1min	2500	V
Mounting Torque	Power Terminal Screw:M6	2.5 to 5.0	N.m
	Mounting Screw:M6	3.0 to 6.0	N.m

Notes:

(1) Repetitive rating: Pulse width limited by max. junction temperature

Electrical Characteristics of IGBT T_C=25℃ unless otherwise noted

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=1.5mA,V_{CE}=V_{GE}, T_j=25℃	4.4	5.2	6.0	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C=150A,V_{GE}=15V, T_j=25℃		3.10	3.60	V
		I_C=150A,V_{GE}=15V, T_j=125℃		3.45		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=150A, R_G=6.8Ω,V_{GE}=±15V, L=200nH,T_j=25℃		612		ns
t_r	Rise Time			116		ns
$t_{d(off)}$	Turn-Off Delay Time			546		ns
t_f	Fall Time			125		ns
E_{on}	Turn-On Switching Loss			14.7		mJ
E_{off}	Turn-Off Switching Loss			8.9		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=150A, R_G=6.8Ω,V_{GE}=±15V, L=200nH,T_j=125℃		609		ns
t_r	Rise Time			116		ns
$t_{d(off)}$	Turn-Off Delay Time			564		ns
t_f	Fall Time			148		ns
E_{on}	Turn-On Switching Loss			17.5		mJ
E_{off}	Turn-Off Switching Loss			11.0		mJ
C_{ies}	Input Capacitance	V_{CE}=30V,f=1MHz, V_{GE}=0V		12.7		nF
C_{oes}	Output Capacitance			1.14		nF
C_{res}	Reverse Transfer Capacitance			0.46		nF
I_{SC}	SC Data	T_P≤10μs,V_{GE}=15V, T_j=25℃,V_{CC}=600V, V_{CEM}≤1200V		1400		A
R_{Gint}	Internal Gate Resistance			2.4		Ω
L_{CE}	Stray Inductance				18	nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal To Chip	T_C=25℃		0.32		mΩ

Electrical Characteristics of DIODE T_C=25℃ unless otherwise noted

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units
V_F	Diode Forward Voltage	I_F=150A	T_j=25℃		1.75	2.15	V
			T_j=125℃		1.80		
Q_r	Recovered Charge	I_F=150A, V_R=600V, di/dt=-1500A/μs, V_{GE}=-15V	T_j=25℃		8.2		μC
			T_j=125℃		19.1		
I_{RM}	Peak Reverse Recovery Current		T_j=25℃		85		A
			T_j=125℃		125		
E_{rec}	Reverse Recovery Energy		T_j=25℃		4.2		mJ
			T_j=125℃		8.4		

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (per IGBT)		0.109	K/W
$R_{\theta JC}$	Junction-to-Case (per DIODE)		0.180	K/W
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)	0.035		K/W
G	Weight of Module	300		g

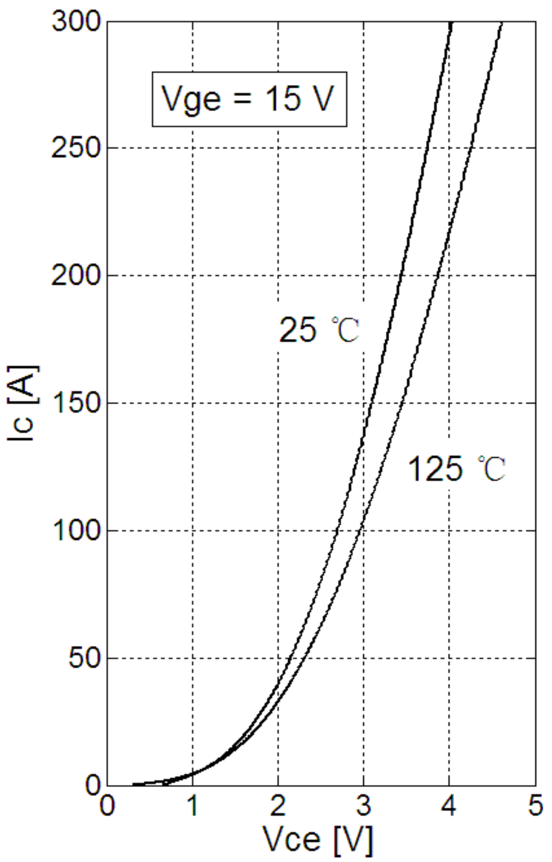


Fig 1. IGBT Typical Output Characteristics

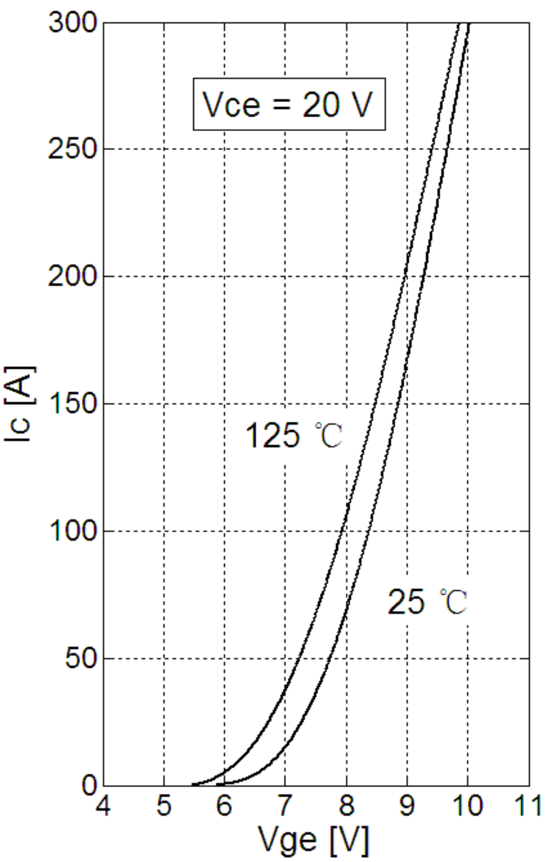


Fig 2. IGBT Typical Transfer Characteristics

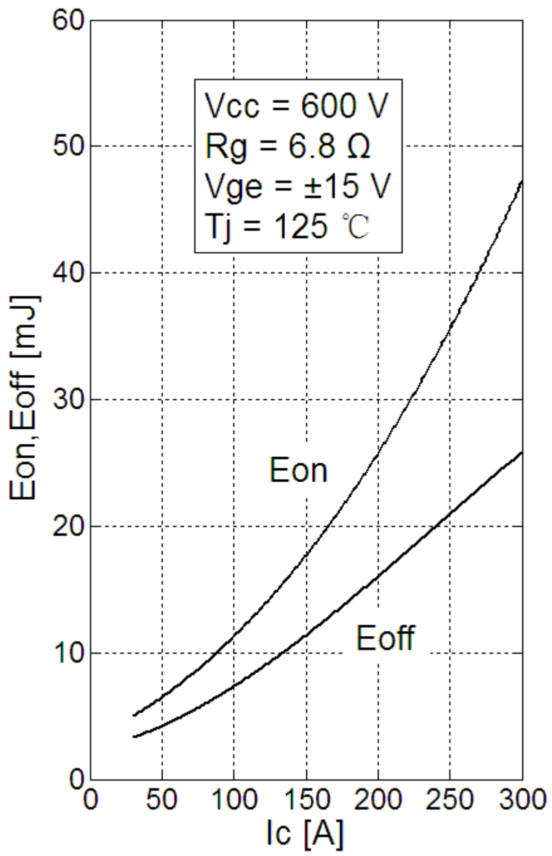


Fig 3. IGBT Switching Loss vs. I_C

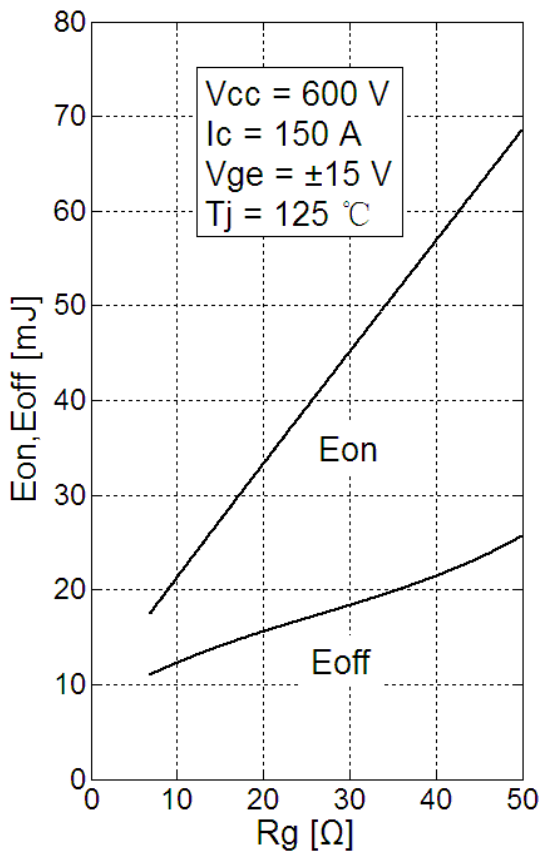


Fig 4. IGBT Switching Loss vs. R_G

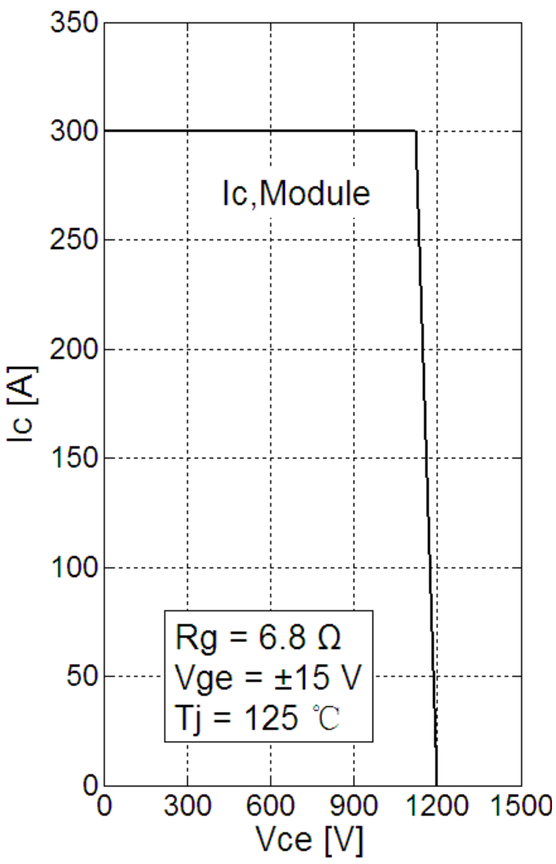


Fig 5. RBSOA

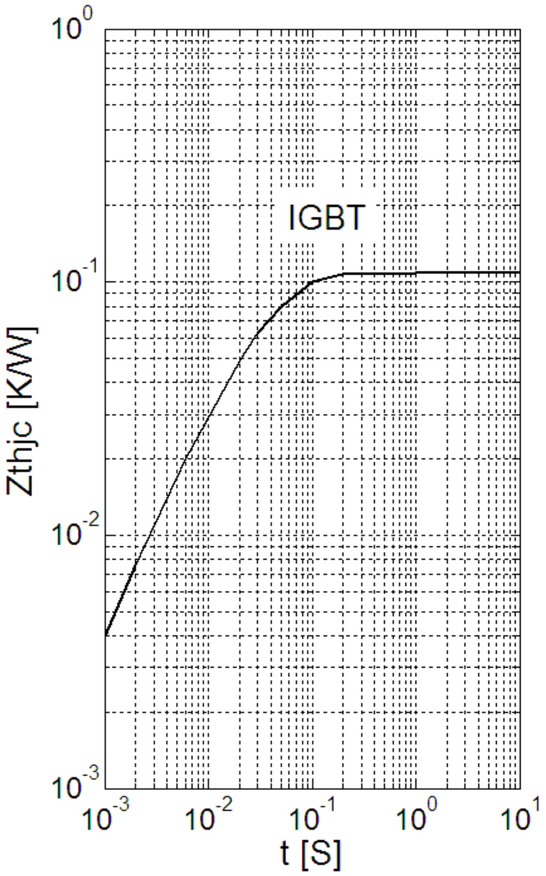


Fig 6. IGBT Transient Thermal Impedance

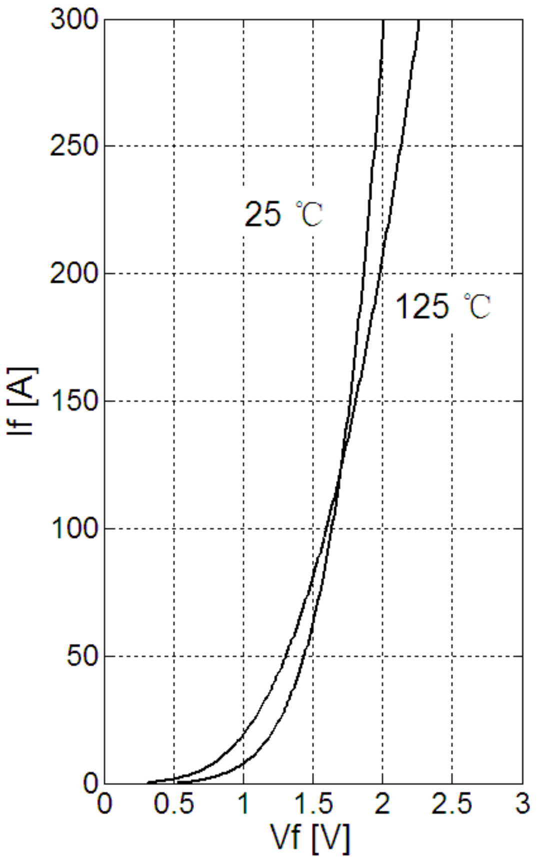


Fig 7. Diode Typical Forward Characteristics

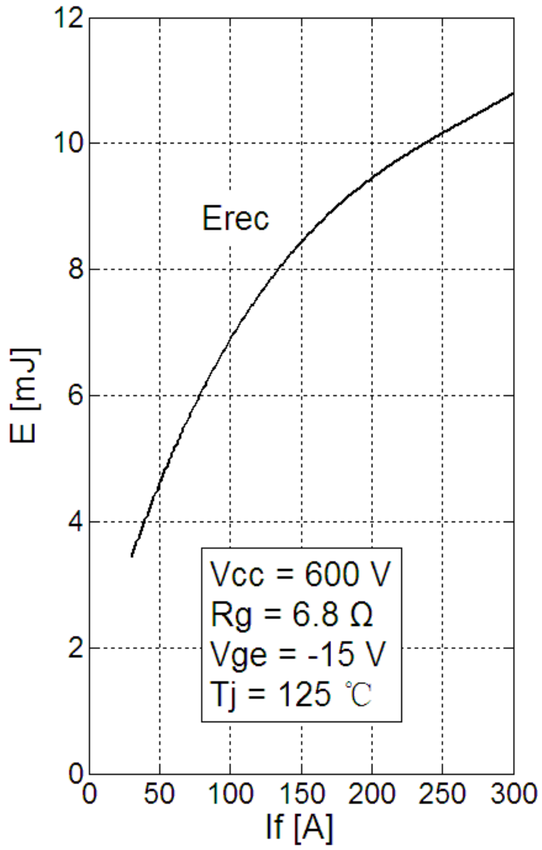


Fig 8. Diode Switching Loss vs. I_F

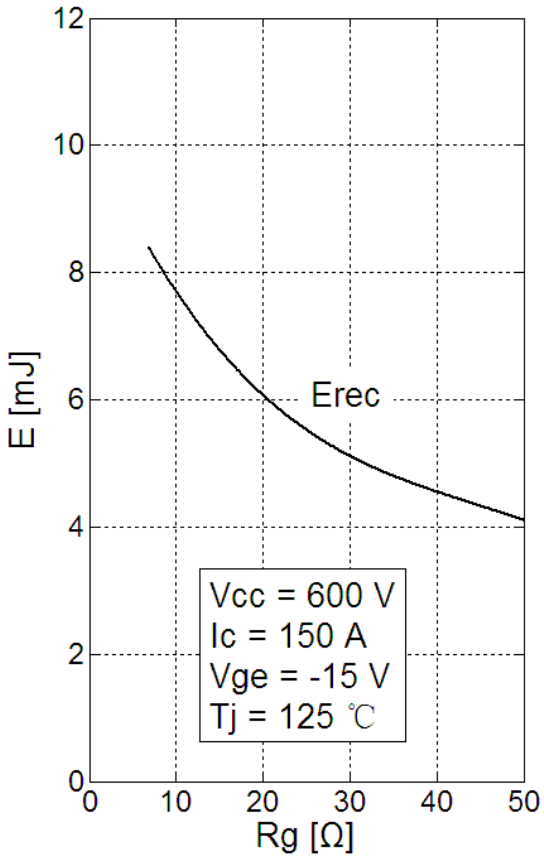


Fig 9. Diode Switching Loss vs. R_G

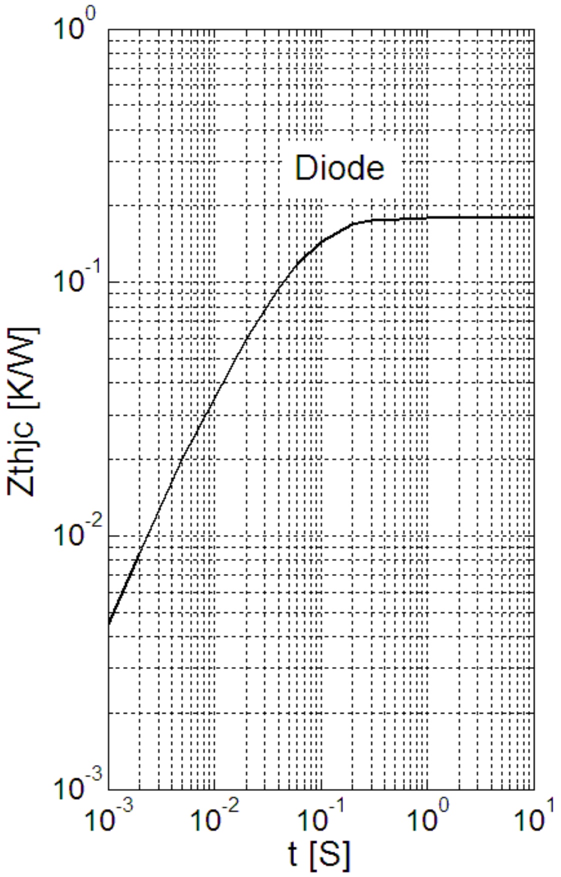
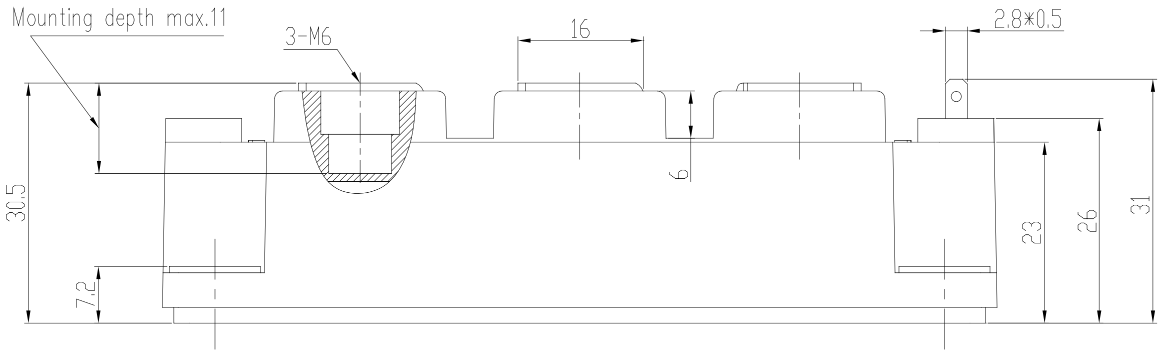
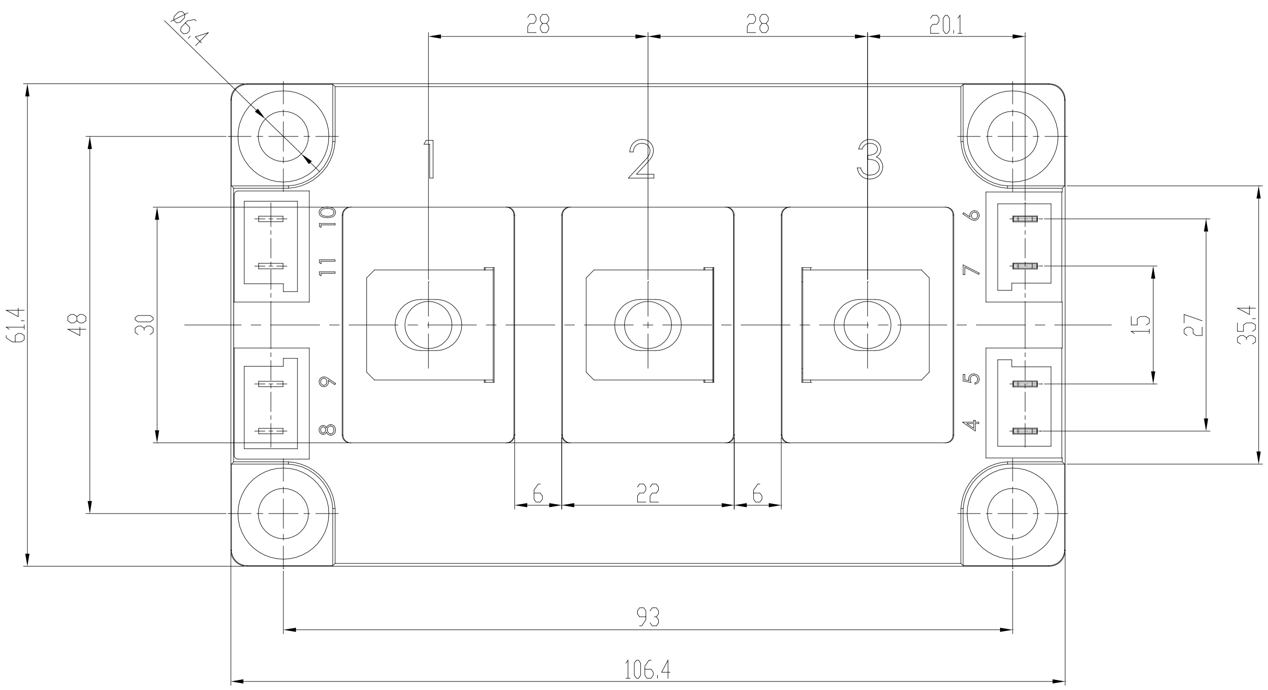


Fig 10. Diode Transient Thermal Impedance

Package Dimension

Dimensions in Millimeters





Terms and Conditions of Usage

The data contained in this product datasheet is exclusively intended for technically trained staff. You and your technical departments will have to evaluate the suitability of the product for the intended application and the completeness of the product data with respect to such application.

This product data sheet is describing the characteristics of this product for which a warranty is granted. Any such warranty is granted exclusively pursuant the terms and conditions of the supply agreement. There will be no guarantee of any kind for the product and its characteristics.

Should you require product information in excess of the data given in this product data sheet or which concerns the specific application of our product, please contact the sales office, which is responsible for you (see www.powersemi.cc), For those that are specifically interested we may provide application notes.

Due to technical requirements our product may contain dangerous substances. For information on the types in question please contact the sales office, which is responsible for you.

Should you intend to use the Product in aviation applications, in health or live endangering or life support applications, please notify.

If and to the extent necessary, please forward equivalent notices to your customers.
Changes of this product data sheet are reserved.