STARPOWER

SEMICONDUCTOR **IGBT**

GD1400HFX170P2S

1700V/1400A 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 wind and solar power.

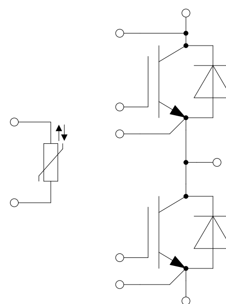
Features

- Low $V_{CE(sat)}$ Trench IGBT technology
- 10μs short circuit capability
- $V_{CE(sat)}$ with positive temperature coefficient
- Maximum junction temperature 175°C
- Enlarged Diode for regenerative operation
- Isolated copper baseplate using DBC technology
- High power and thermal cycling capability

Typical Applications

- Auxiliary Inverters
- High Power Converters
- Wind Power
- Traction Drives

Equivalent Circuit Schematic



Downloaded From Oneyac.com

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	2342 1400	A
I_{CM}	Pulsed Collector Current t_p=1ms	2800	A
P_D	Maximum Power Dissipation @ T_j=175°C	9.37	kW

Diode

Symbol	Description	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1700	V
I_F	Diode Continuous Forward Current	1400	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	2800	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 +150	°C
V_{ISO}	Isolation Voltage RMS,f=50Hz,t=1min	4000	V

Downloaded From Oneyac.com

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=1400A,V_{GE}=15V, T_j=25°C		1.95	2.40	V
		I_C=1400A,V_{GE}=15V, T_j=125°C		2.40		
		I_C=1400A,V_{GE}=15V, T_j=150°C		2.50		
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=56.0mA,V_{CE}=V_{GE}, T_j=25°C	5.6	6.2	6.8	V
I_{CES}	Collector Cut-Off Current	V_{CE}=V_{CES},V_{GE}=0V, T_j=25°C			5.0	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			1.6		Ω
C_{ies}	Input Capacitance	V_{CE}=25V,f=1MHz, V_{GE}=0V		169		nF
C_{res}	Reverse Transfer Capacitance			4.09		nF
Q_G	Gate Charge	V_{GE}=-15…+15V		13.2		μC
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=900V,I_C=1400A, R_G=0.47Ω, R_{Goff}=0.68Ω, V_{GE}=±15V, T_j=25°C		714		ns
t_r	Rise Time			99		ns
$t_{d(off)}$	Turn-Off Delay Time			929		ns
t_f	Fall Time			250		ns
E_{on}	Turn-On Switching Loss			281		mJ
E_{off}	Turn-Off Switching Loss			264		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=900V,I_C=1400A, R_G=0.47Ω, R_{Goff}=0.68Ω, V_{GE}=±15V, T_j=125°C		748		ns
t_r	Rise Time			109		ns
$t_{d(off)}$	Turn-Off Delay Time			1037		ns
t_f	Fall Time			353		ns
E_{on}	Turn-On Switching Loss			443		mJ
E_{off}	Turn-Off Switching Loss			462		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=900V,I_C=1400A, R_G=0.47Ω, R_{Goff}=0.68Ω, V_{GE}=±15V, T_j=150°C		757		ns
t_r	Rise Time			112		ns
$t_{d(off)}$	Turn-Off Delay Time			1064		ns
t_f	Fall Time			379		ns
E_{on}	Turn-On Switching Loss			483		mJ
E_{off}	Turn-Off Switching Loss			512		mJ
I_{SC}	SC Data	t_P≤10μs,V_{GE}=15V, T_j=150°C,V_{CC}=1000V, V_{CEM}≤1700V		5600		A

Downloaded From Oneyac.com

Diode Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_F	Diode Forward Voltage	I_F=1400A,V_{GE}=0V,T_j=25°C		1.80	2.25	V
		I_F=1400A,V_{GE}=0V,T_j=125°C		1.90		
		I_F=1400A,V_{GE}=0V,T_j=150°C		1.95		
Q_r	Recovered Charge	V_R=900V,I_F=1400A, -di/dt=11500A/μs,V_{GE}=-15V T_j=25°C		380		μC
I_{RM}	Peak Reverse Recovery Current			1650		A
E_{rec}	Reverse Recovery Energy			224		mJ
Q_r	Recovered Charge	V_R=900V,I_F=1400A, -di/dt=11500A/μs,V_{GE}=-15V T_j=125°C		644		μC
I_{RM}	Peak Reverse Recovery Current			1650		A
E_{rec}	Reverse Recovery Energy			405		mJ
Q_r	Recovered Charge	V_R=900V,I_F=1400A, -di/dt=11500A/μs,V_{GE}=-15V T_j=150°C		715		μC
I_{RM}	Peak Reverse Recovery Current			1700		A
E_{rec}	Reverse Recovery Energy			462		mJ

NTC Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
R_{25}	Rated Resistance			5.0		kΩ
ΔR/R	Deviation of R_{100}	T_C=100 °C,R_{100}=493.3Ω	-5		5	%
P_{25}	Power Dissipation				20.0	mW
$B_{25/50}$	B-value	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15K))]$		3375		K
$B_{25/80}$	B-value	$R_2=R_{25}\exp[B_{25/80}(1/T_2-1/(298.15K))]$		3411		K
$B_{25/100}$	B-value	$R_2=R_{25}\exp[B_{25/100}(1/T_2-1/(298.15K))]$		3433		K

©2019 STARPOWER Semiconductor Ltd.

Downloaded From Oneyac.com

Module Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Min.	Typ.	Max.	Unit
L_{CE}	Stray Inductance		10		nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal to Chip		0.20		mΩ
R_{thJC}	Junction-to-Case (per IGBT) Junction-to-Case (per Diode)			16.0 35.7	K/kW
R_{thCH}	Case-to-Heatsink (per IGBT) Case-to-Heatsink (per Diode) Case-to-Heatsink (per Module)		8.7 19.4 3.0		K/kW
M	Terminal Connection Torque, Screw M4 Terminal Connection Torque, Screw M8 Mounting Torque, Screw M5	1.8 8.0 3.0		2.1 10.0 6.0	N.m
G	Weight of Module		1200		g

Downloaded From Oneyac.com

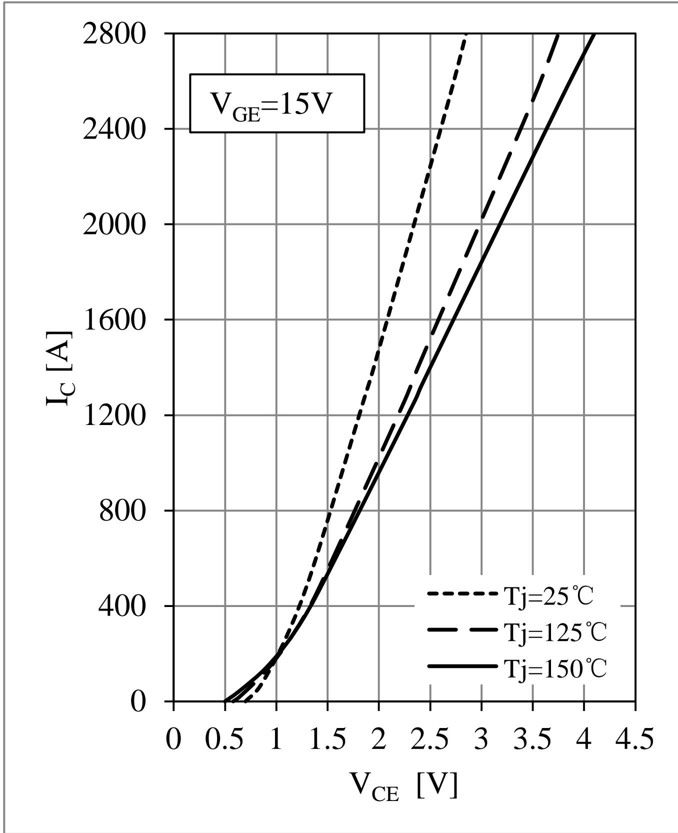


Fig 1. IGBT Output Characteristics

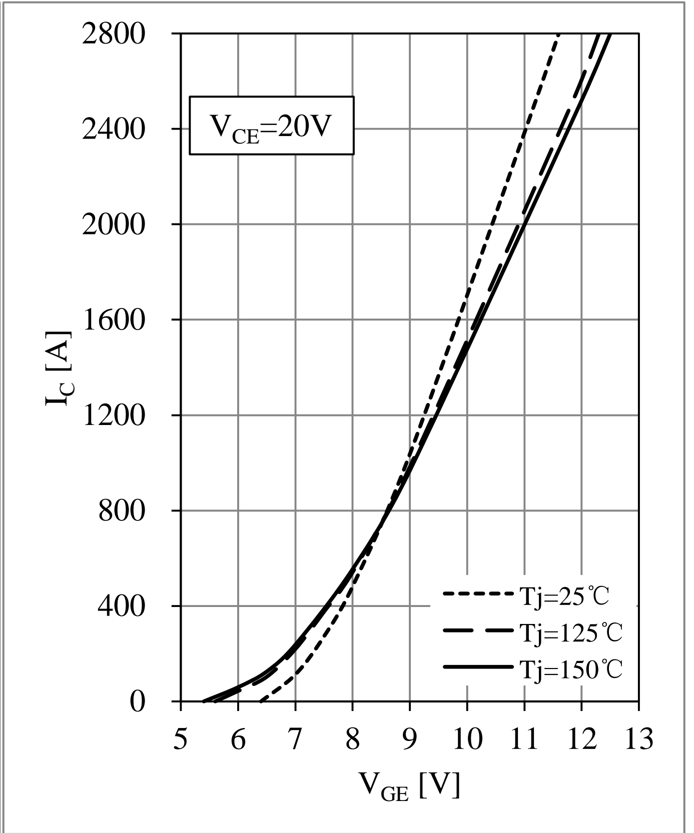


Fig 2. IGBT Transfer Characteristics

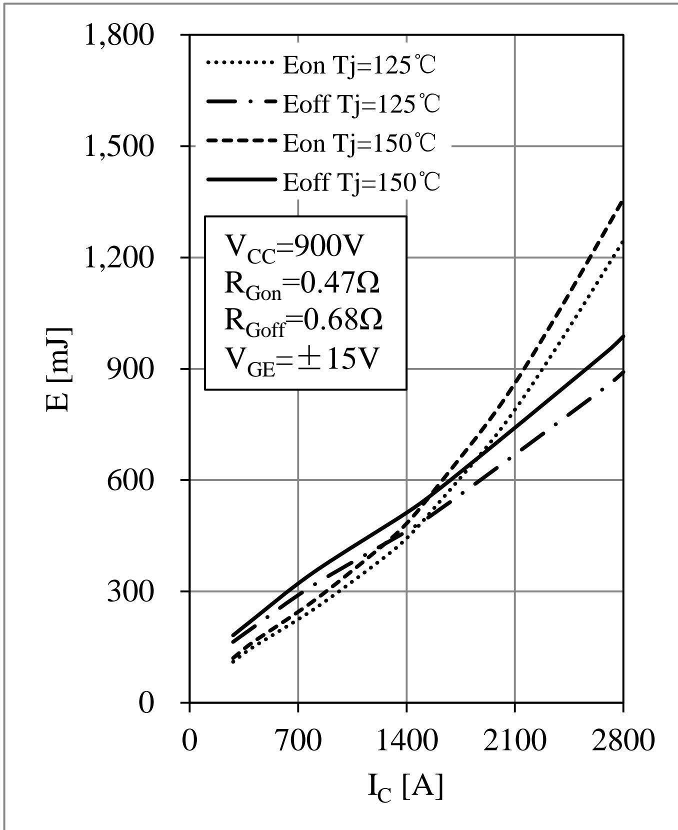


Fig 3. IGBT Switching Loss vs. I_C

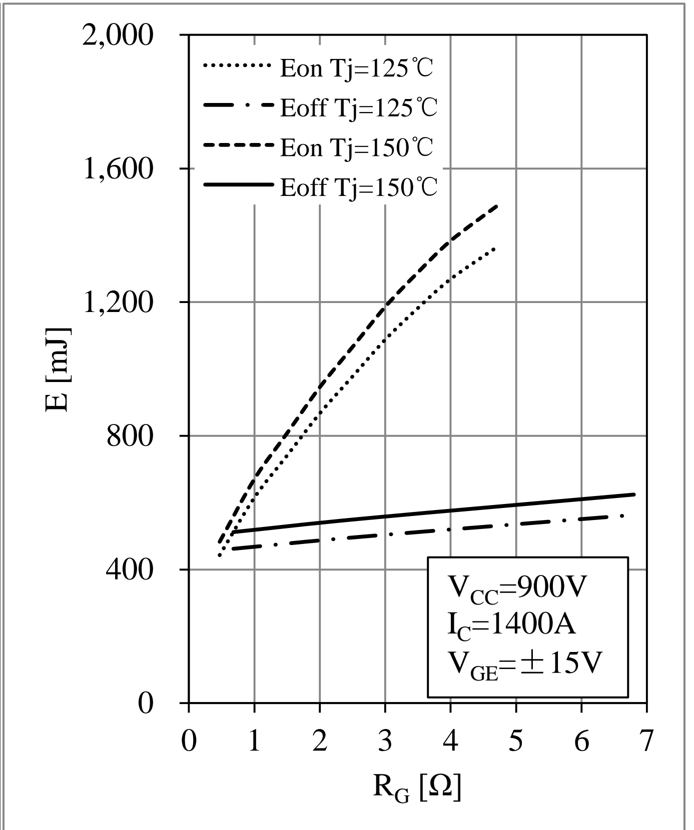


Fig 4. IGBT Switching Loss vs. R_G

Downloaded From Oneyac.com

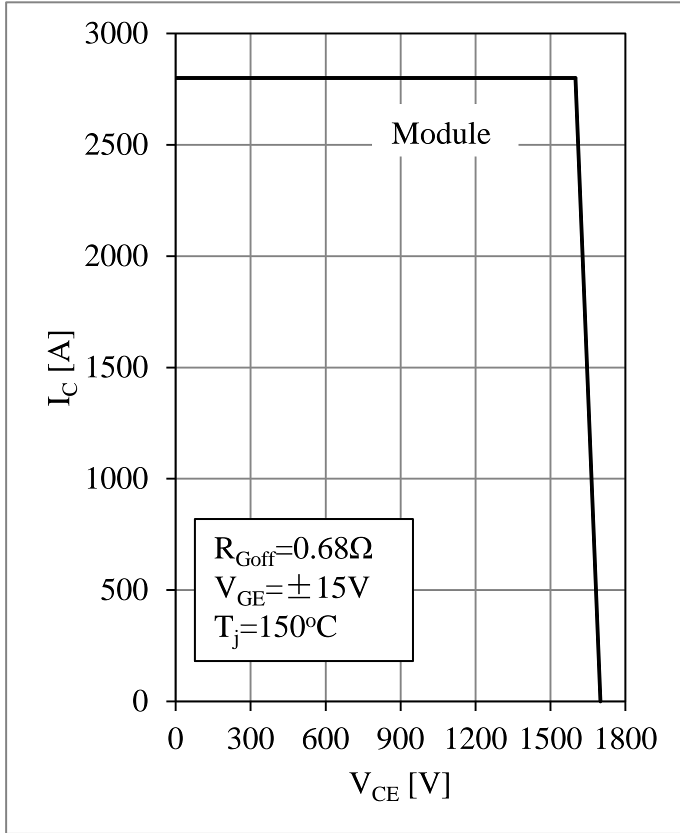


Fig 5. RBSOA

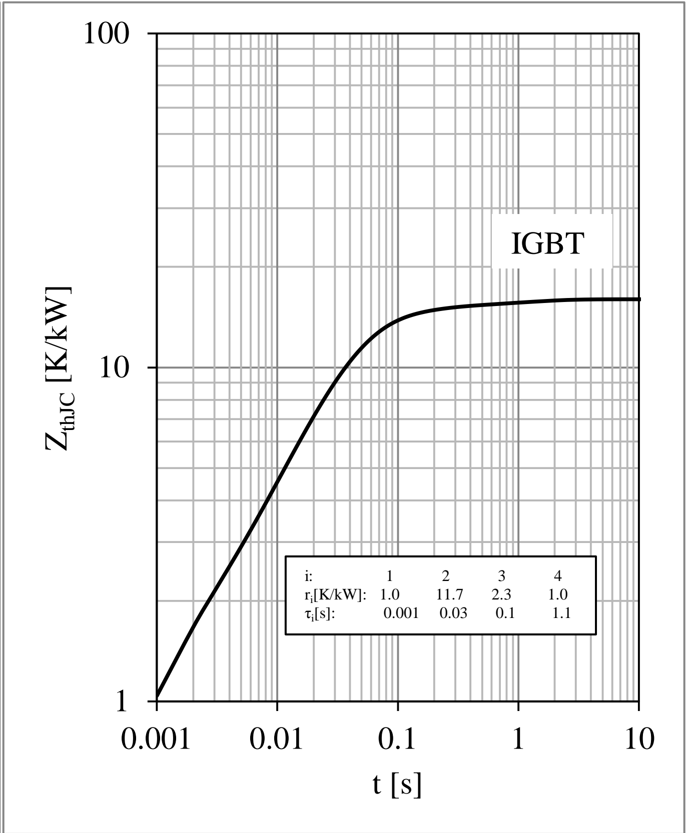


Fig 6. IGBT Transient Thermal Impedance

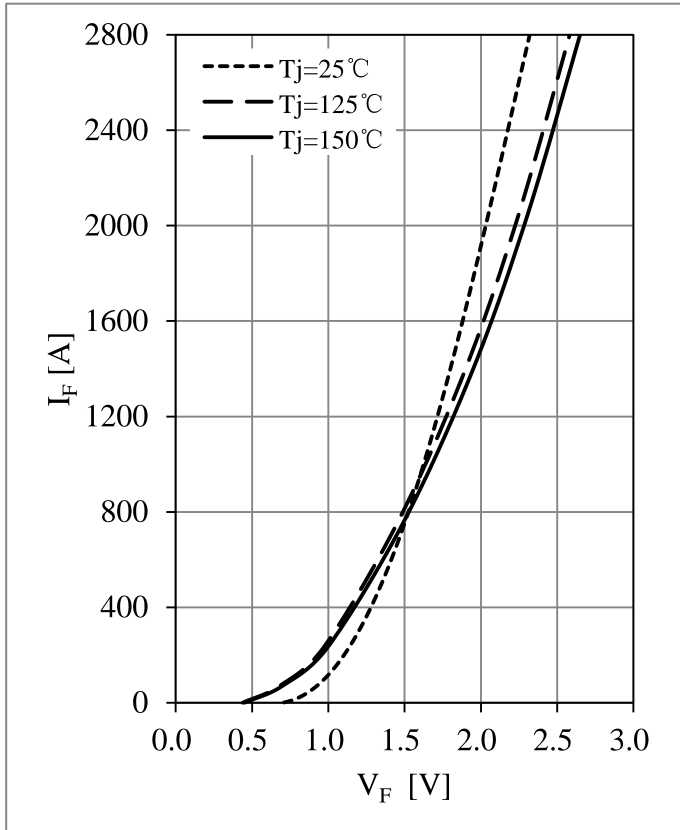


Fig 7. Diode Forward Characteristics

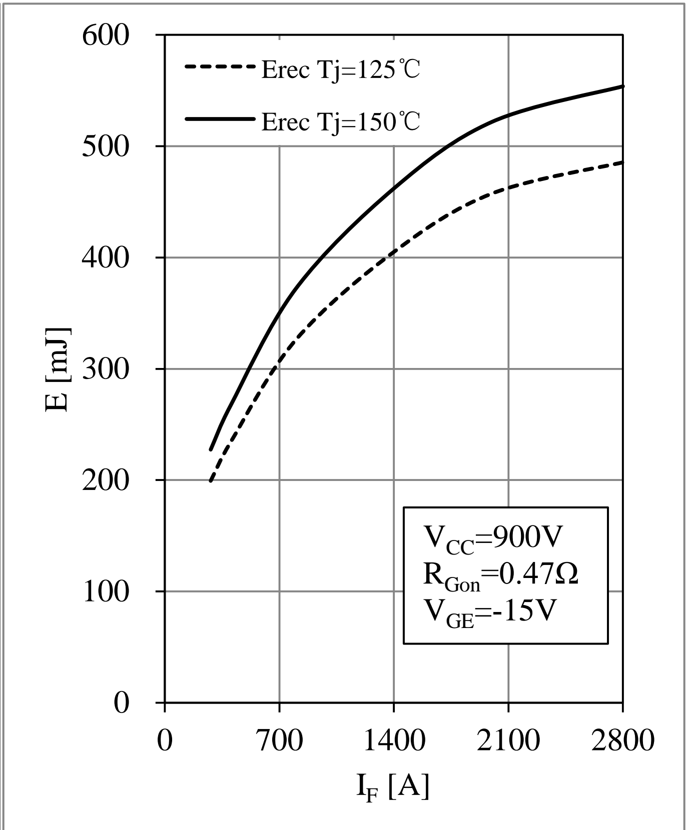


Fig 8. Diode Switching Loss vs. I_F

Downloaded From Oneyac.com

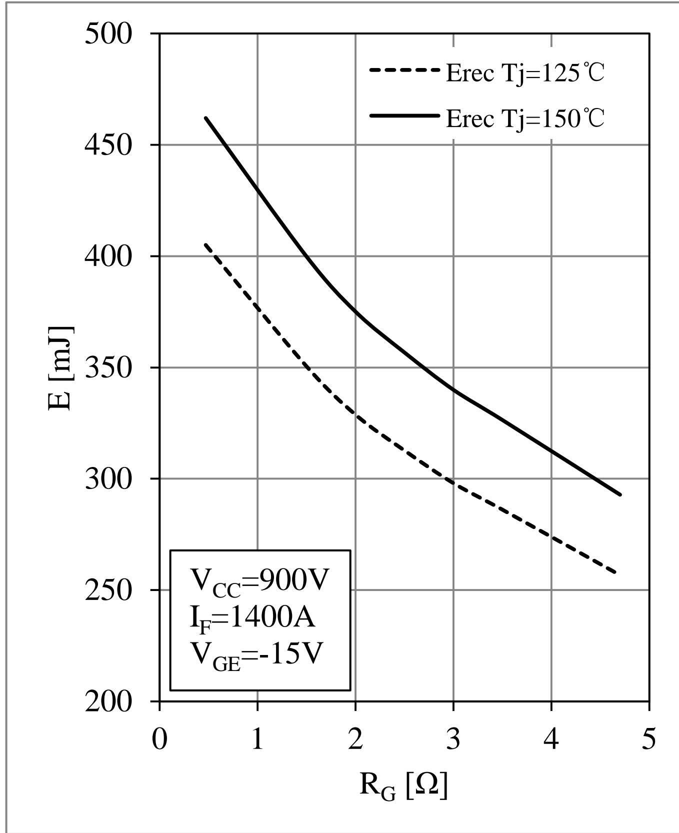


Fig 9. Diode Switching Loss vs. R_G

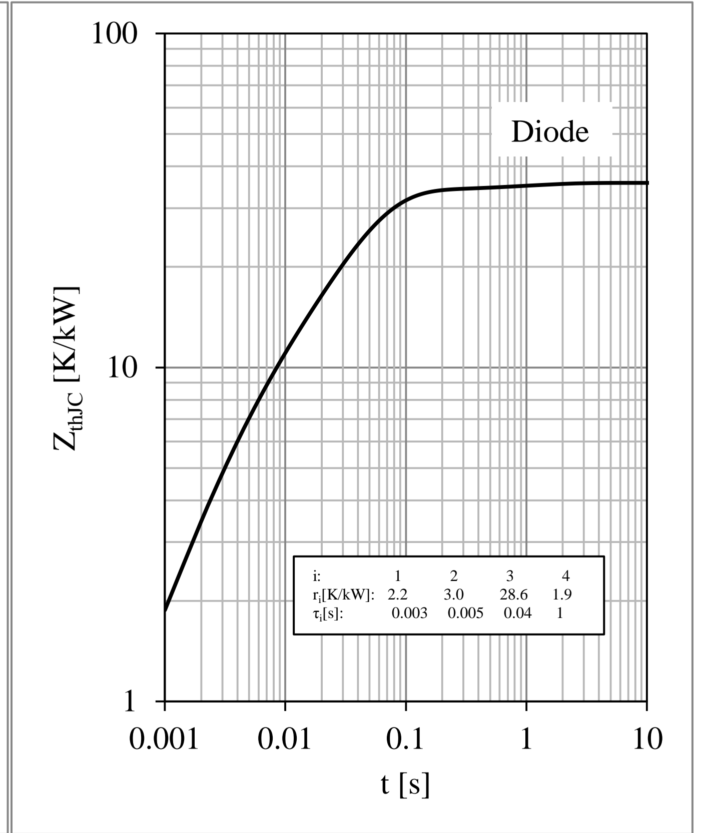


Fig 10. Diode Transient Thermal Impedance

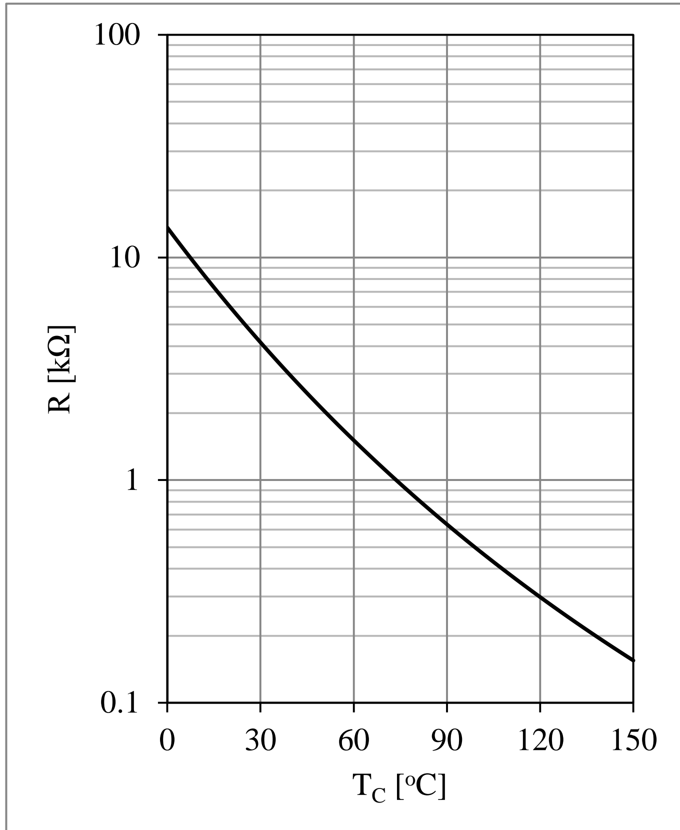
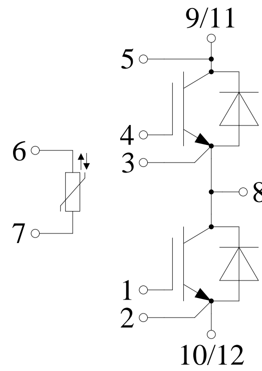


Fig 11. NTC Temperature Characteristic

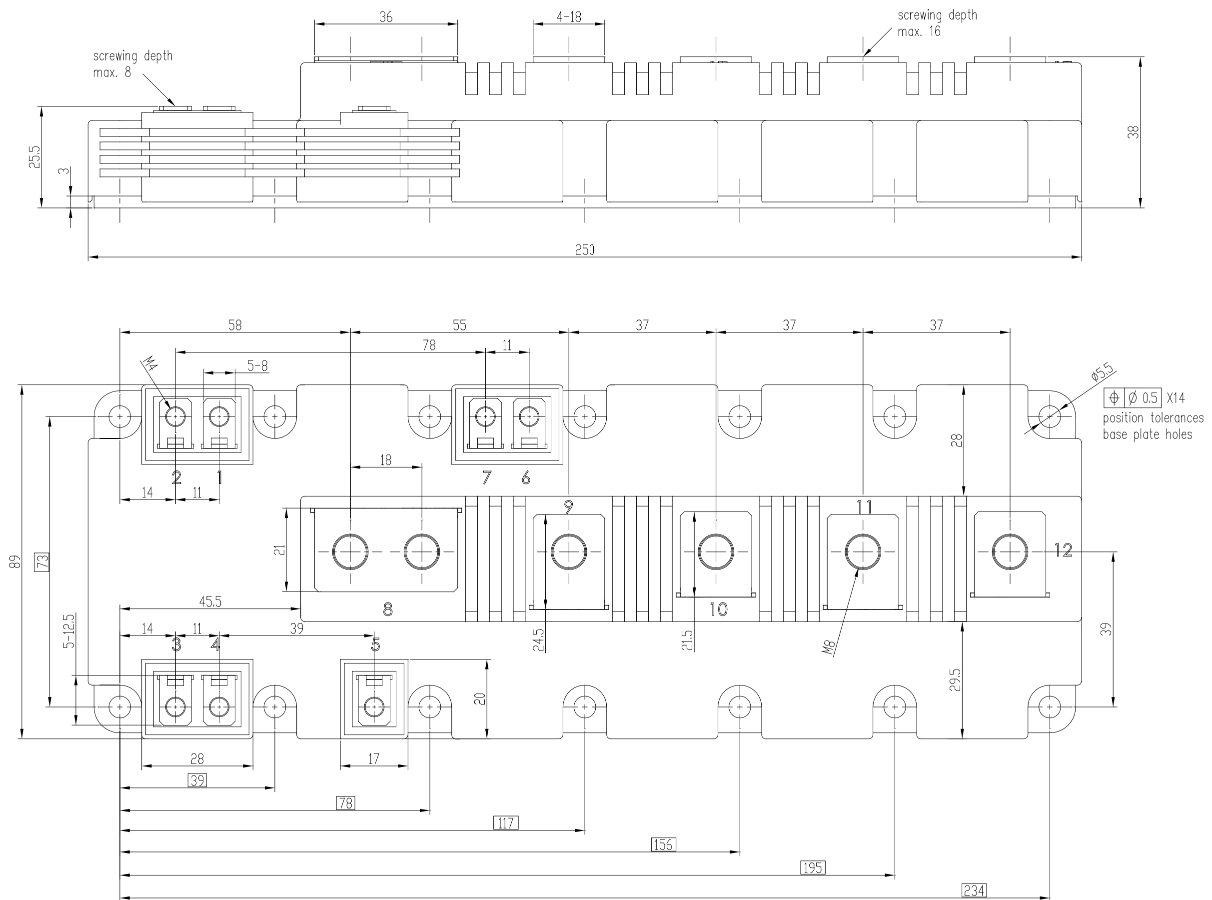
Downloaded From Oneyac.com

Circuit Schematic



Package Dimensions

Dimensions in Millimeters



Downloaded From Oneyac.com

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.

Downloaded From Oneyac.com

单击下面可查看定价，库存，交付和生命周期等信息

>>STARPOWER(斯达)

Downloaded From Oneyac.com