

STARPOWER

SEMICONDUCTOR

IGBT

GD200HFT120C2S

Molding Type Module

1200V/200A 2 in one-package

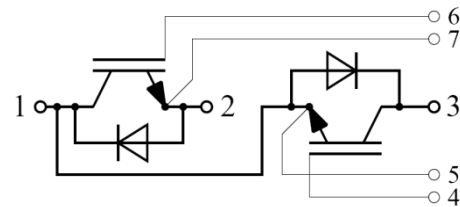
General Description

STARPOWER IGBT Power Module provides ultra low conduction loss as well as short circuit ruggedness. They are designed for the applications such as inverters and UPS.



Features

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



Equivalent Circuit Schematic

Typical Applications

- Inverter for motor drive
- AC and DC servo drive amplifier
- Uninterruptible power supply

Absolute Maximum Ratings $T_C=25^{\circ}\text{C}$ unless otherwise noted

Symbol	Description	GD200HFT120C2S	Units
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate-Emitter Voltage	± 30	V
I_C	Collector Current @ $T_C=25^{\circ}\text{C}$	335	A
	@ $T_C=100^{\circ}\text{C}$	200	
I_{CM}	Pulsed Collector Current $t_p=1\text{ms}$	400	A
I_F	Diode Continuous Forward Current @ $T_C=100^{\circ}\text{C}$	200	A
I_{FM}	Diode Maximum Forward Current $t_p=1\text{ms}$	400	A
P_D	Maximum Power Dissipation @ $T_j=175^{\circ}\text{C}$	1154	W
T_{jmax}	Maximum Junction Temperature	175	$^{\circ}\text{C}$
T_{jop}	Operating Junction Temperature	-40 to +150	$^{\circ}\text{C}$
T_{STG}	Storage Temperature Range	-40 to +125	$^{\circ}\text{C}$
V_{ISO}	Isolation Voltage RMS, $f=50\text{Hz}, t=1\text{min}$	2500	V
Mounting Torque	Power Terminal Screw:M6 Mounting Screw:M6	2.5 to 5.0 3.0 to 5.0	N.m

Electrical Characteristics of IGBT $T_C=25^{\circ}\text{C}$ unless otherwise noted**Off Characteristics**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage	$T_j=25^{\circ}\text{C}$	1200			V
I_{CES}	Collector Cut-Off Current	$V_{CE}=V_{CES}, V_{GE}=0\text{V},$ $T_j=25^{\circ}\text{C}$			5.0	mA
I_{GES}	Gate-Emitter Leakage Current	$V_{GE}=V_{GES}, V_{CE}=0\text{V},$ $T_j=25^{\circ}\text{C}$			400	nA

On Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C=8.0\text{mA}, V_{CE}=V_{GE},$ $T_j=25^{\circ}\text{C}$	5.0	5.9	6.5	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C=200\text{A}, V_{GE}=15\text{V},$ $T_j=25^{\circ}\text{C}$		1.70	2.15	V
		$I_C=200\text{A}, V_{GE}=15\text{V},$ $T_j=125^{\circ}\text{C}$		2.00		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600V, I_C=200A,$ $R_G=2.4\Omega, V_{GE}=\pm 15V,$ $T_j=25^\circ C$		155		ns
t_r	Rise Time			42		ns
$t_{d(off)}$	Turn-Off Delay Time			440		ns
t_f	Fall Time			110		ns
E_{on}	Turn-On Switching Loss			9.65		mJ
E_{off}	Turn-Off Switching Loss			14.0		mJ
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600V, I_C=200A,$ $R_G=2.4\Omega, V_{GE}=\pm 15V,$ $T_j=125^\circ C$		175		ns
t_r	Rise Time			46		ns
$t_{d(off)}$	Turn-Off Delay Time			550		ns
t_f	Fall Time			165		ns
E_{on}	Turn-On Switching Loss			14.5		mJ
E_{off}	Turn-Off Switching Loss			19.2		mJ
C_{ies}	Input Capacitance	$V_{CE}=25V, f=1MHz,$ $V_{GE}=0V$		12.5		nF
C_{oes}	Output Capacitance			0.82		nF
C_{res}	Reverse Transfer Capacitance			0.70		nF
I_{SC}	SC Data	$t_p \leq 10\mu s, V_{GE}=15V,$ $T_j=125^\circ C, V_{CC}=900V,$ $V_{CEM} \leq 1200V$		980		A
Q_G	Gate Charge	$V_{CC}=600V, I_C=200A,$ $V_{GE}=0-15V$		1.3		μC
R_{Gint}	Internal Gate Resistance			2.5		Ω
L_{CE}	Stray Inductance				20	nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal To Chip			0.35		m Ω

Electrical Characteristics of Diode $T_C=25^\circ C$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_F	Diode Forward Voltage	$I_F=200A$	$T_j=25^\circ C$	1.65	2.10	V
			$T_j=125^\circ C$	1.65		
Q_r	Recovered Charge	$I_F=200A,$	$T_j=25^\circ C$	20.0		μC
			$T_j=125^\circ C$	26.1		
I_{RM}	Peak Reverse Recovery Current	$V_R=600V,$ $R_G=2.4\Omega,$	$T_j=25^\circ C$	151		A
			$T_j=125^\circ C$	190		
E_{rec}	Reverse Recovery Energy	$V_{GE}=-15V$	$T_j=25^\circ C$	8.50		mJ
			$T_j=125^\circ C$	15.0		

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (per IGBT)		0.130	K/W
$R_{\theta JC}$	Junction-to-Case (per Diode)		0.220	K/W
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)	0.035		K/W
Weight	Weight of Module	300		g

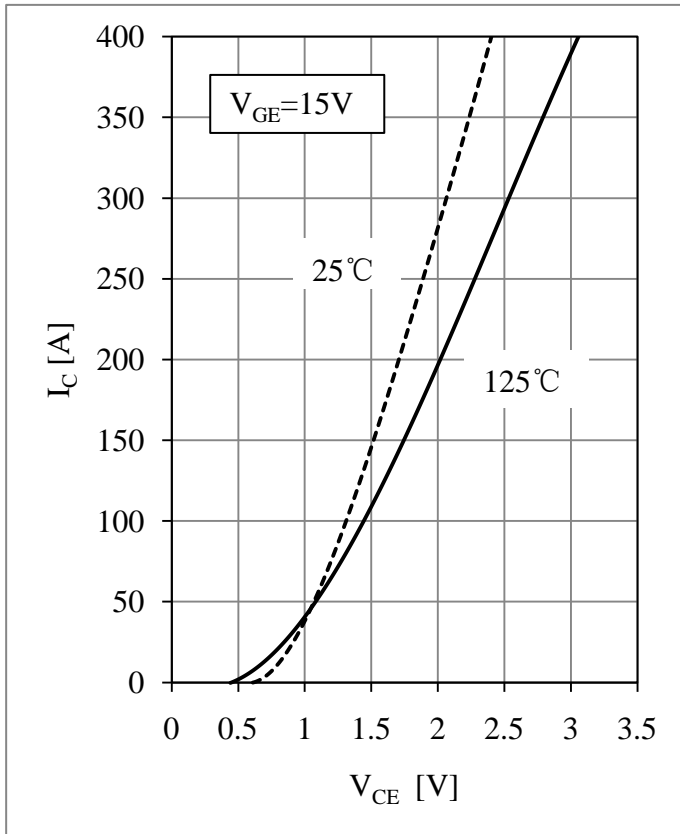


Fig 1. IGBT Output Characteristic

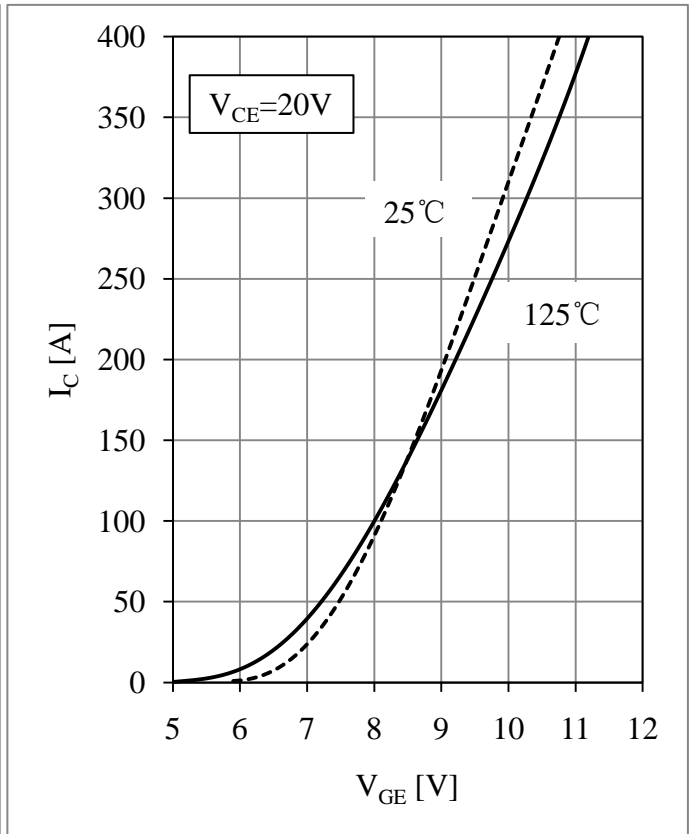


Fig 2. IGBT Transfer Characteristic

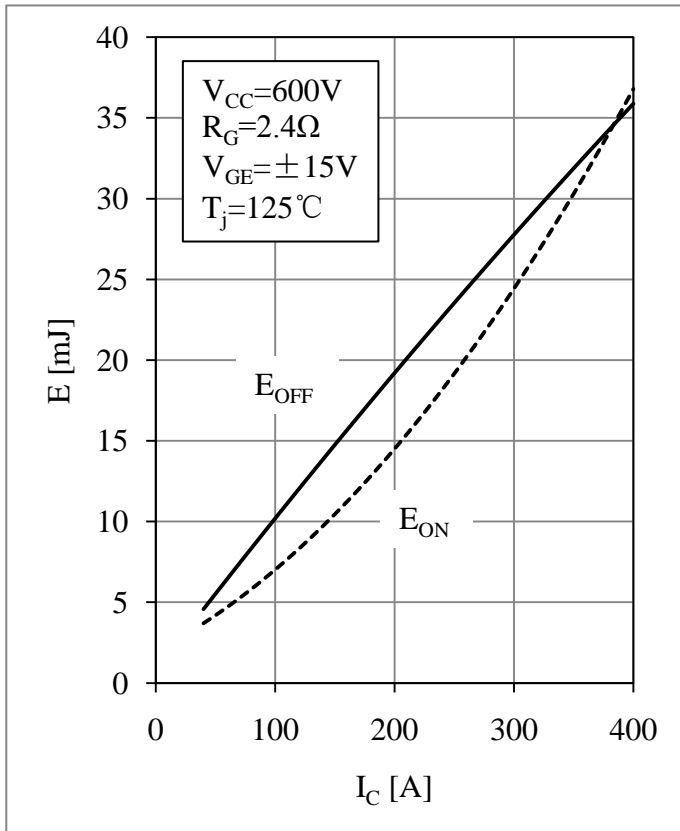


Fig 3. IGBT Switching Loss vs. I_C

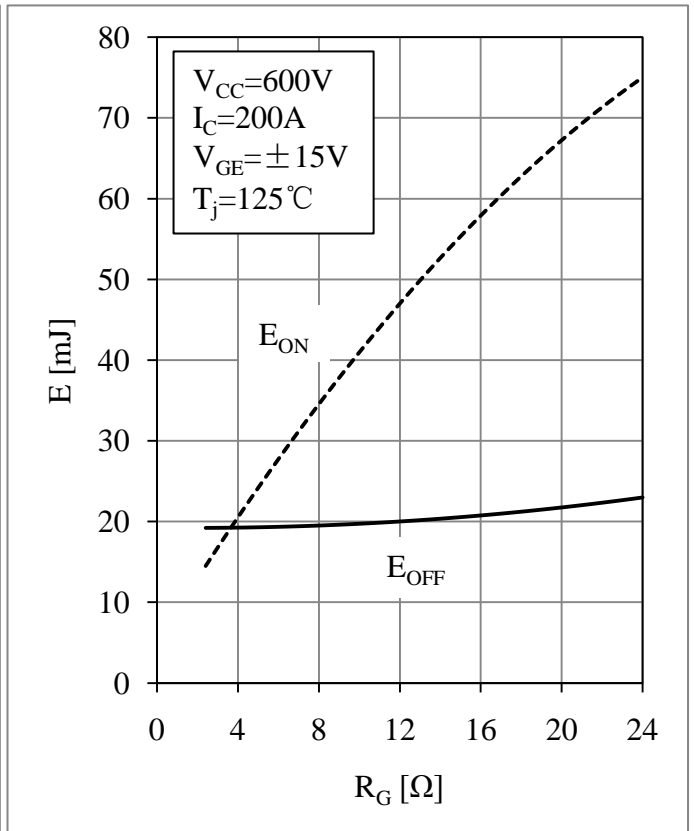


Fig 4. IGBT Switching Loss vs. R_G

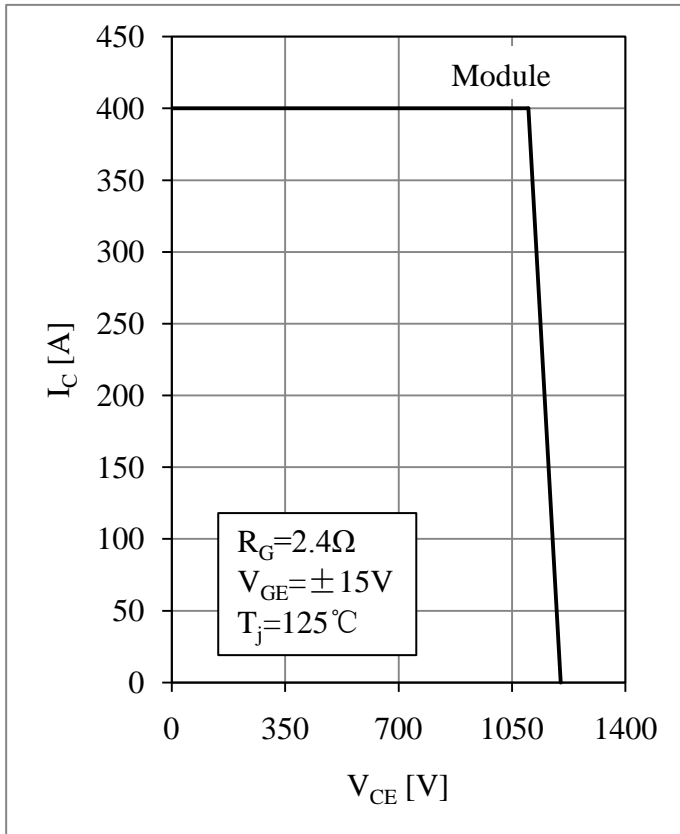


Fig 5. RBSOA

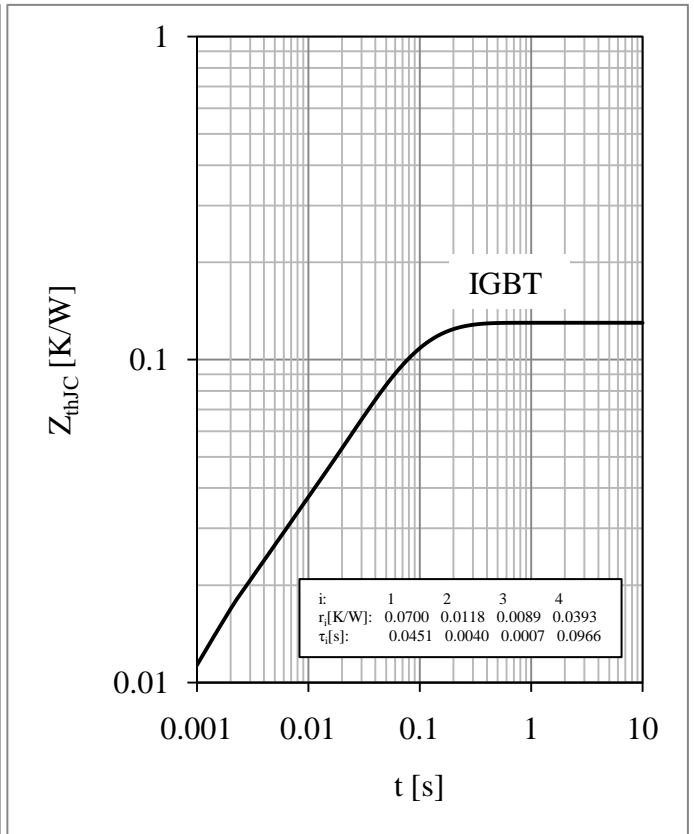


Fig 6. IGBT Transient Thermal Impedance

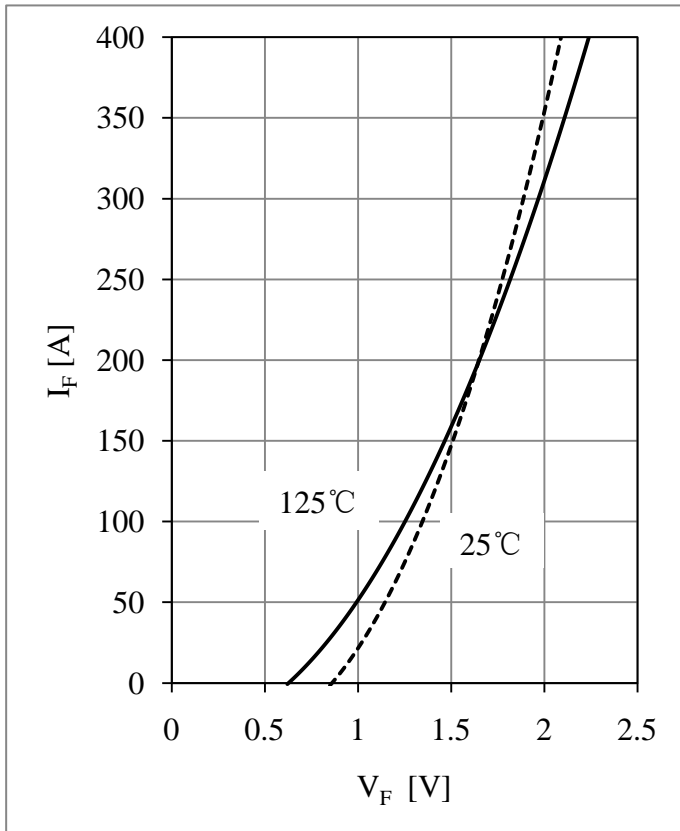


Fig 7. Diode Forward Characteristic

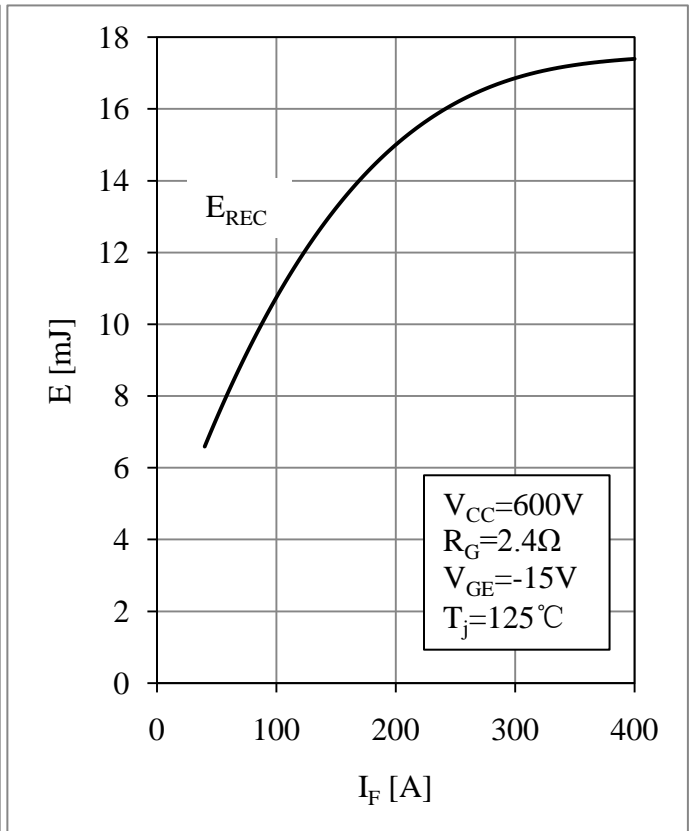


Fig 8. Diode Switching Loss vs. I_F

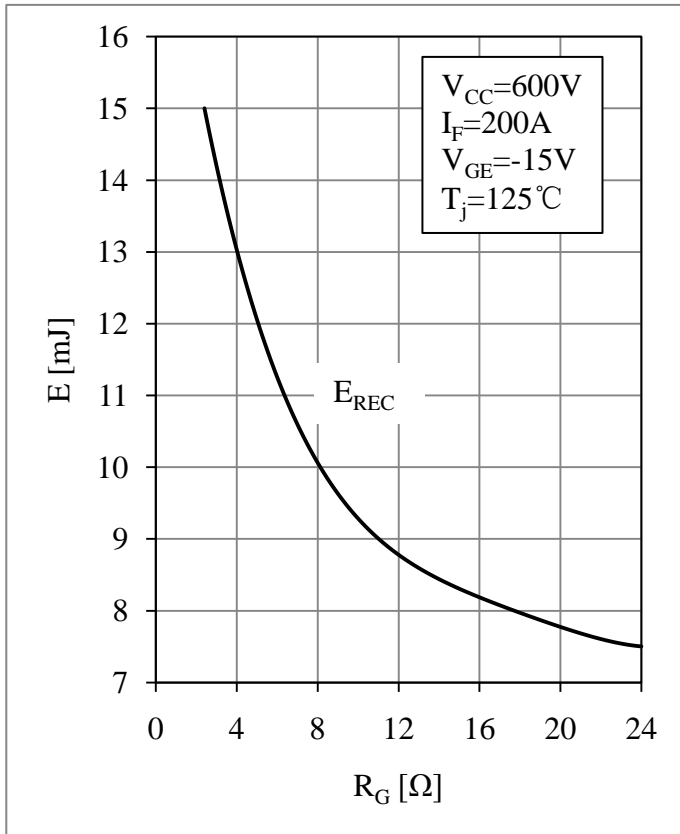


Fig 9. Diode Switching Loss vs. R_G

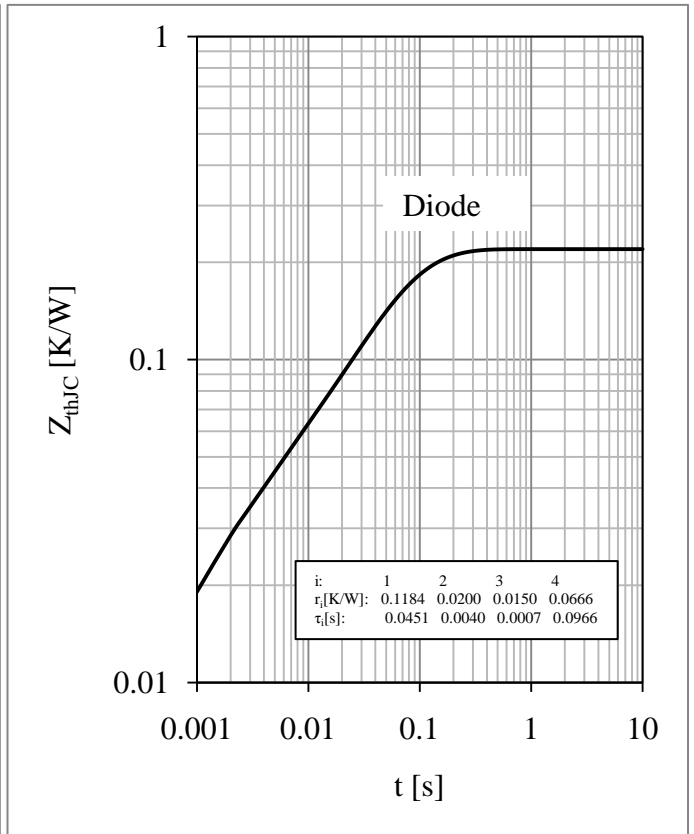


Fig 10. Diode Transient Thermal Impedance

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.