

STARPOWER

SEMICONDUCTOR

IGBT

GD150HFL120C8SN

Molding Type Module

1200V/150A 2 in one-package

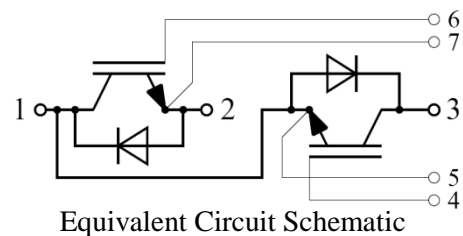
General Description

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



Features

- Low $V_{CE(sat)}$ SPT+ IGBT technology
- 10 μ s short circuit capability
- $V_{CE(sat)}$ with positive temperature coefficient
- Low inductance case
- Fast & soft reverse recovery anti-parallel FWD
- Isolated copper baseplate using DBC technology
- UL file number E340089



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	GD150HFL120C8SN	Units
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate-Emitter Voltage	± 20	V
I_C	Collector Current @ $T_C=25^\circ\text{C}$ @ $T_C=80^\circ\text{C}$	260	A
		150	
I_{CM}	Pulsed Collector Current $t_p=1\text{ms}$	300	A
I_F	Diode Continuous Forward Current @ $T_C=80^\circ\text{C}$	150	A
I_{FM}	Diode Maximum Forward Current $t_p=1\text{ms}$	300	A
P_D	Maximum Power Dissipation @ $T_j=150^\circ\text{C}$	940	W
T_{jmax}	Maximum Junction Temperature	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:M5	2.5 to 3.5	N.m
	Mounting Screw:M5	2.5 to 3.5	

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	$I_C=6.0\text{mA}, V_{CE}=V_{GE},$ $T_j=25^\circ\text{C}$	5.0	6.2	7.0	V
$V_{CE(sat)}$ (chip)	Collector to Emitter Saturation Voltage	$I_C=150\text{A}, V_{GE}=15\text{V},$ $T_j=25^\circ\text{C}$		1.90	2.35	V
		$I_C=150\text{A}, V_{GE}=15\text{V},$ $T_j=125^\circ\text{C}$		2.10		
$V_{CE(sat)}$ (terminal)	Collector to Emitter Saturation Voltage	$I_C=150\text{A}, V_{GE}=15\text{V},$ $T_j=25^\circ\text{C}$		2.00	2.45	
		$I_C=150\text{A}, V_{GE}=15\text{V},$ $T_j=125^\circ\text{C}$		2.20		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600V, I_C=150A,$ $R_G=4.7\Omega, V_{GE}=\pm 15V,$ $T_j=25^\circ C$		347		ns
t_r	Rise Time			75		ns
$t_{d(off)}$	Turn-Off Delay Time			375		ns
t_f	Fall Time			181		ns
E_{on}	Turn-On Switching Loss			8.95		mJ
E_{off}	Turn-Off Switching Loss			9.32		mJ
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600V, I_C=150A,$ $R_G=4.7\Omega, V_{GE}=\pm 15V,$ $T_j=125^\circ C$		352		ns
t_r	Rise Time			80		ns
$t_{d(off)}$	Turn-Off Delay Time			401		ns
t_f	Fall Time			327		ns
E_{on}	Turn-On Switching Loss			11.9		mJ
E_{off}	Turn-Off Switching Loss			16.0		mJ
C_{ies}	Input Capacitance	$V_{CE}=25V, f=1MHz,$ $V_{GE}=0V$		11.0		nF
C_{oes}	Output Capacitance			0.80		nF
C_{res}	Reverse Transfer Capacitance			0.52		nF
I_{SC}	SC Data	$t_p \leq 10\mu s, V_{GE}=15V,$ $T_j=125^\circ C, V_{CC}=900V,$ $V_{CEM} \leq 1200V$		890		A
R_{Gint}	Internal Gate Resistance			1.5		Ω
L_{CE}	Stray Inductance				22	nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal To Chip			0.65		m Ω

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_F (chip)	Diode Forward Voltage	$I_F=150A$	$T_j=25^\circ C$	1.80	2.25	V
			$T_j=125^\circ C$	1.85		
V_F (terminal)	Diode Forward Voltage	$I_F=150A$	$T_j=25^\circ C$	1.90	2.35	V
			$T_j=125^\circ C$	1.95		
Q_r	Recovered Charge	$I_F=150A,$	$T_j=25^\circ C$	14.0		μC
			$T_j=125^\circ C$	28.6		
I_{RM}	Peak Reverse Recovery Current	$V_R=600V,$ $R_G=4.7\Omega,$	$T_j=25^\circ C$	143		A
			$T_j=125^\circ C$	179		
E_{rec}	Reverse Recovery Energy	$V_{GE}=-15V$	$T_j=25^\circ C$	9.54		mJ
			$T_j=125^\circ C$	17.5		

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (per IGBT)		0.133	K/W
$R_{\theta JC}$	Junction-to-Case (per DIODE)		0.223	K/W
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)	0.046		K/W
Weight	Weight of Module	200		g

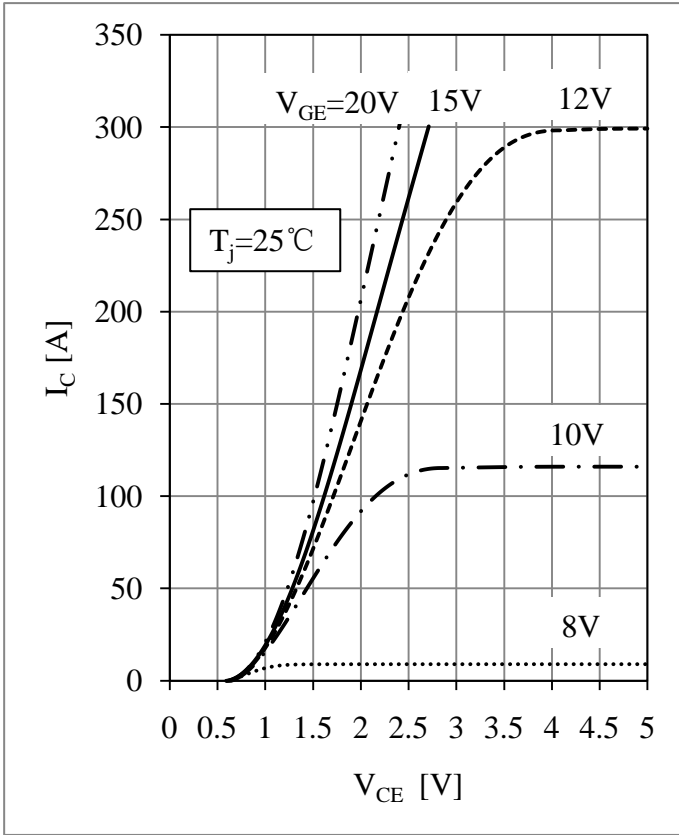


Fig 1. IGBT Output Characteristic

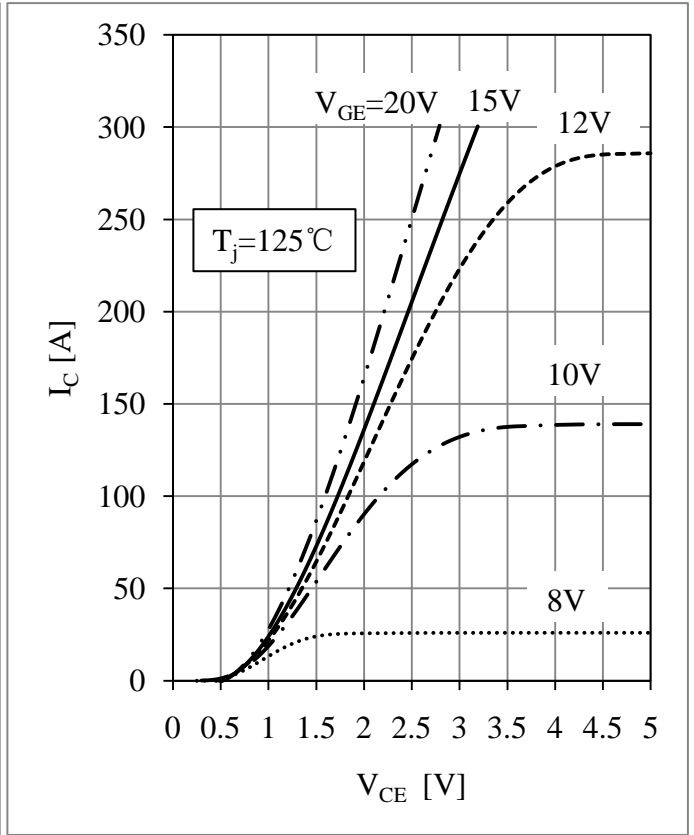


Fig 2. IGBT Output Characteristic

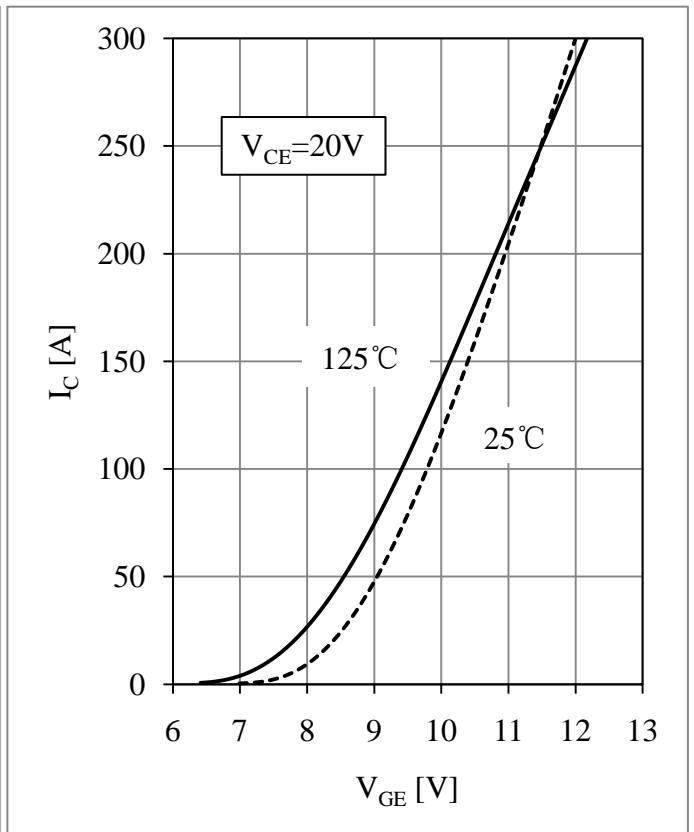
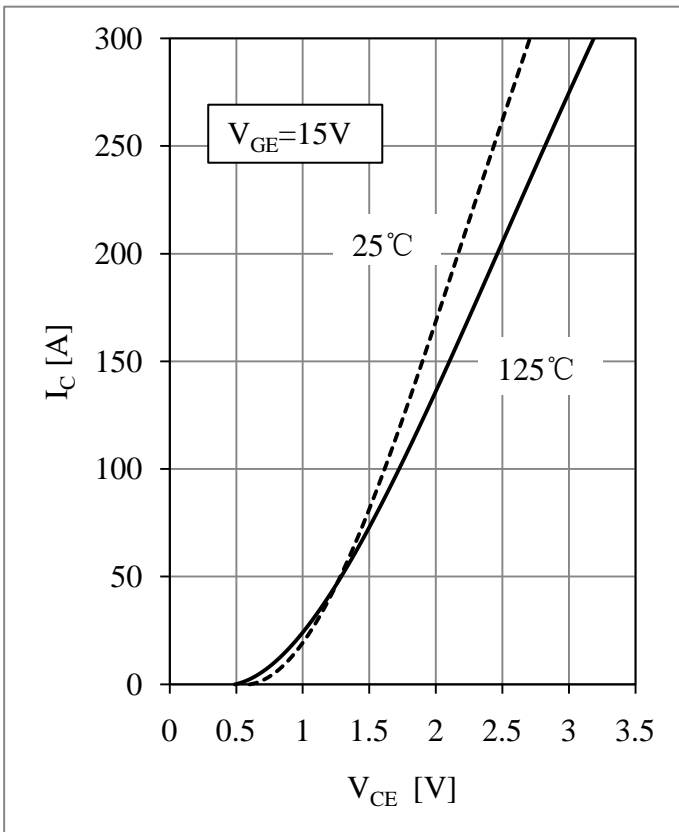


Fig 3. IGBT Output Characteristic

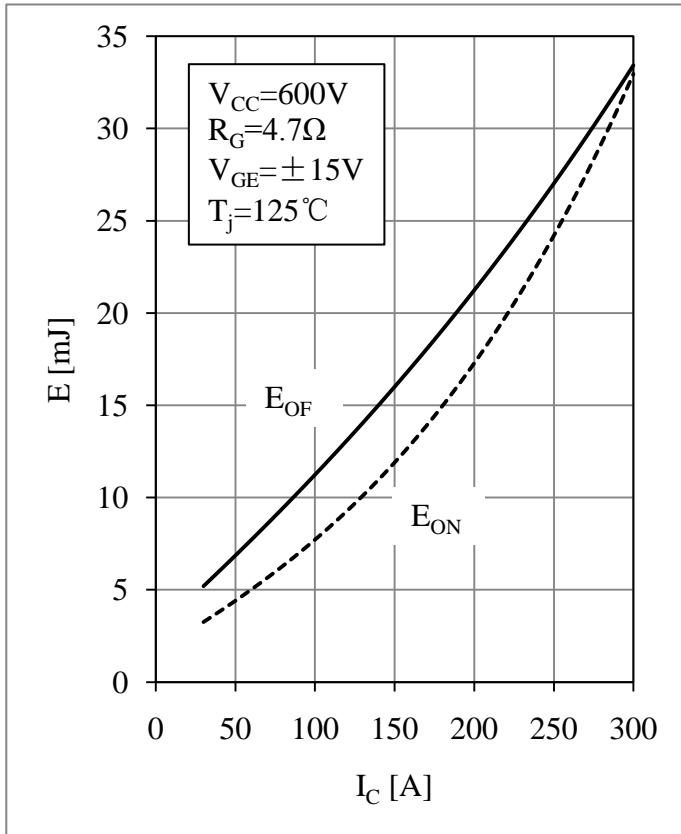


Fig 4. IGBT Transfer Characteristic

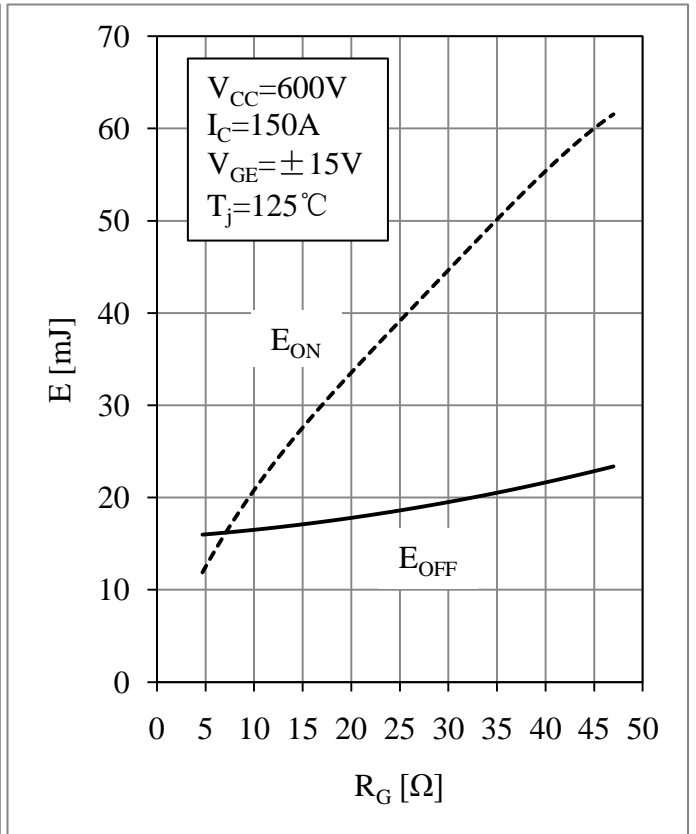


Fig 5. IGBT Switching Loss vs. I_C

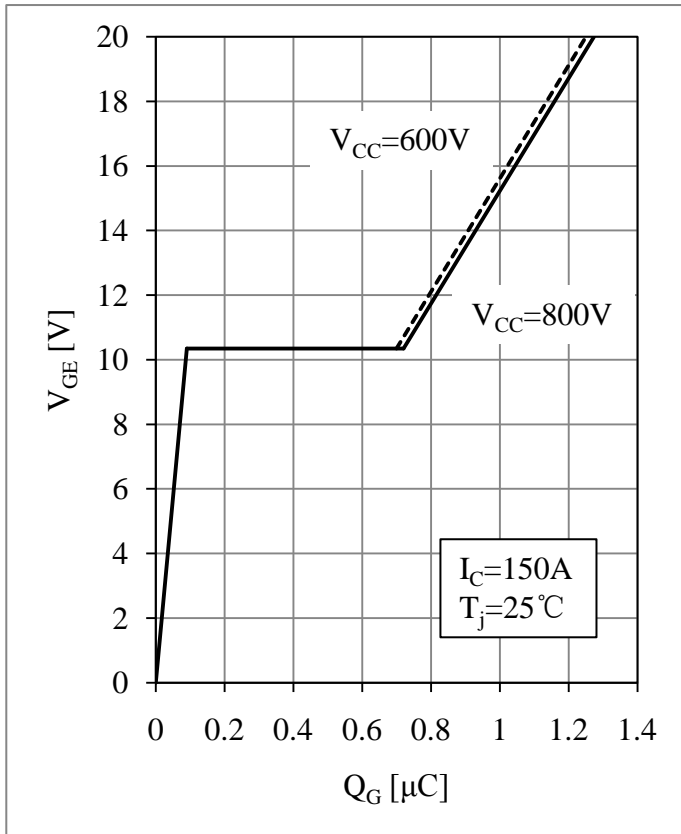


Fig 6. IGBT Switching Loss vs. R_G

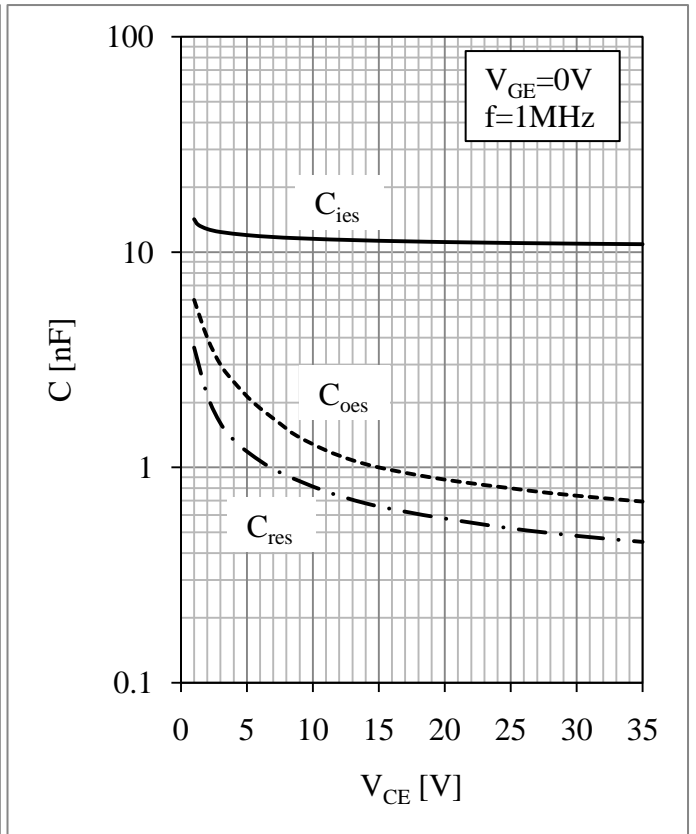


Fig 7. IGBT Gate Charge Characteristic

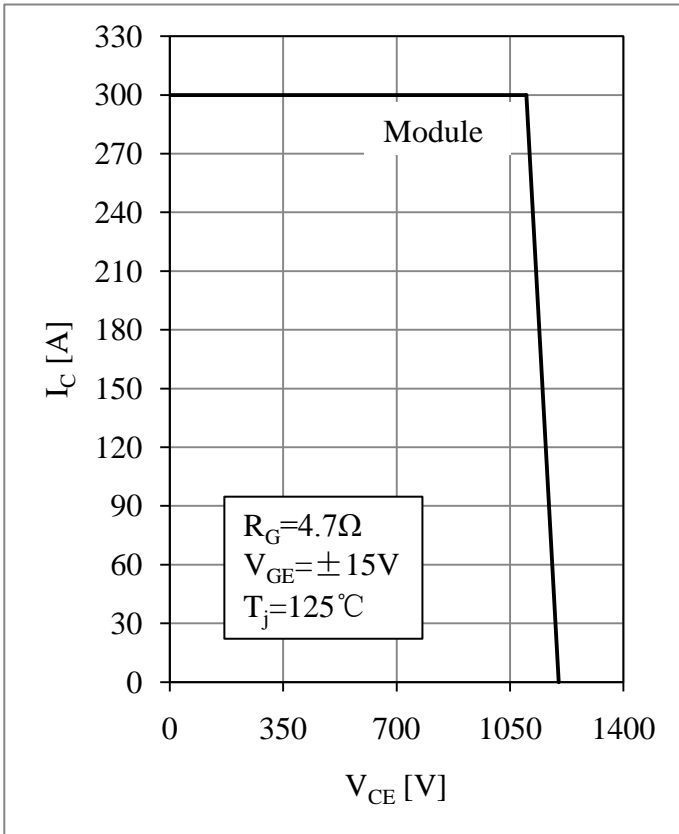


Fig 8. IGBT Capacitances vs. V_{CE}

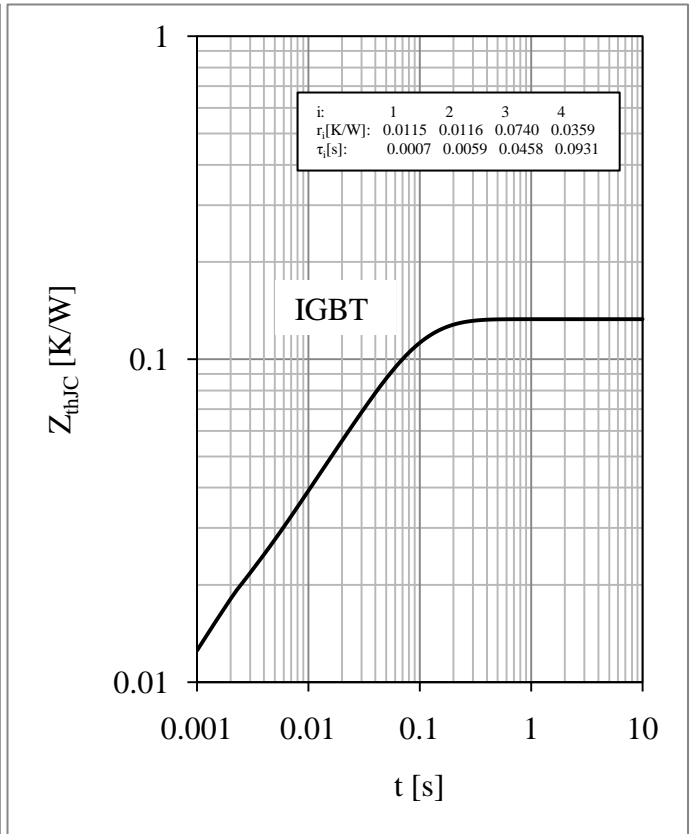


Fig 9. RBSOA

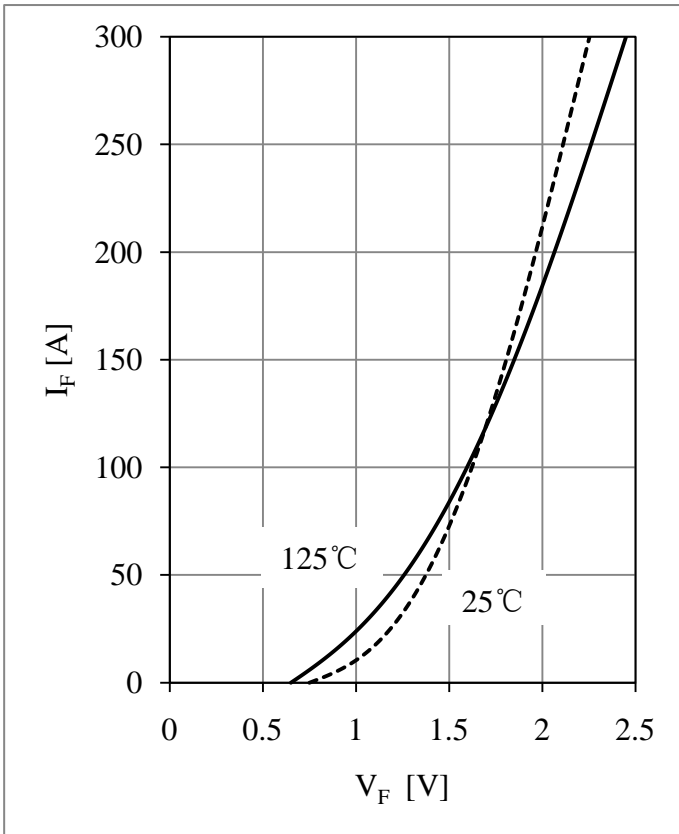


Fig 10. IGBT Transient Thermal Impedance

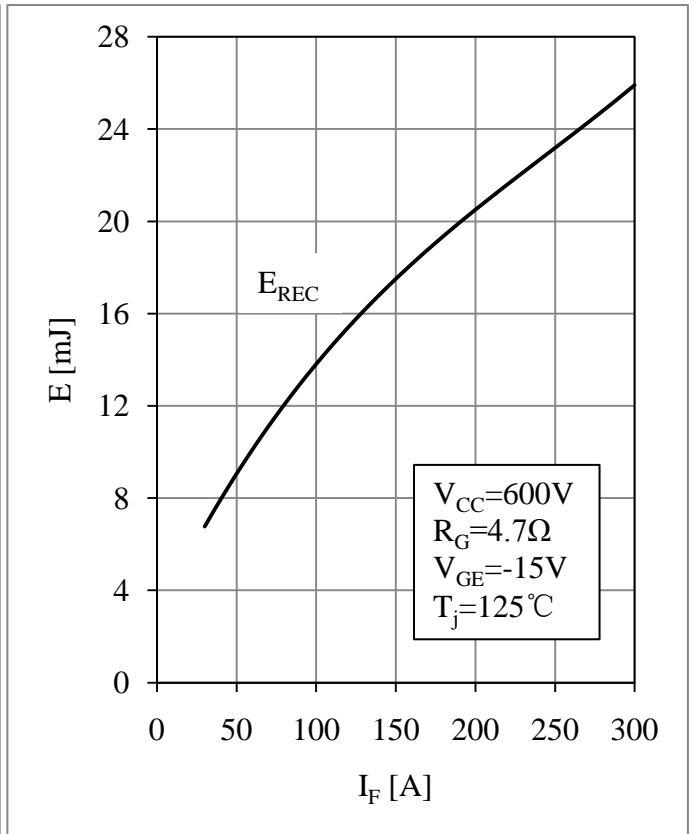


Fig 11. Diode Forward Characteristic

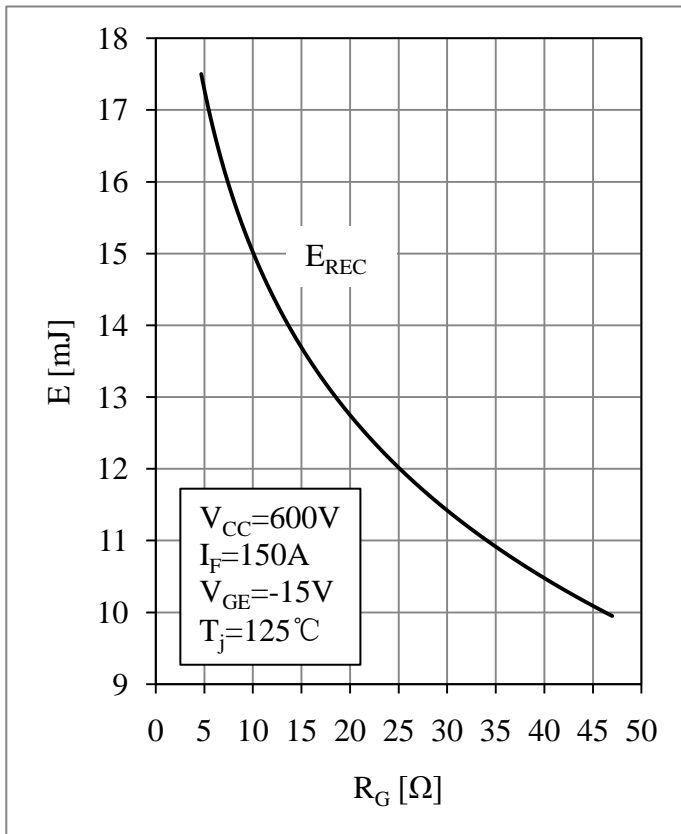


Fig 13. Diode Switching Loss vs. R_G

Fig 12. Diode Switching Loss vs. I_F

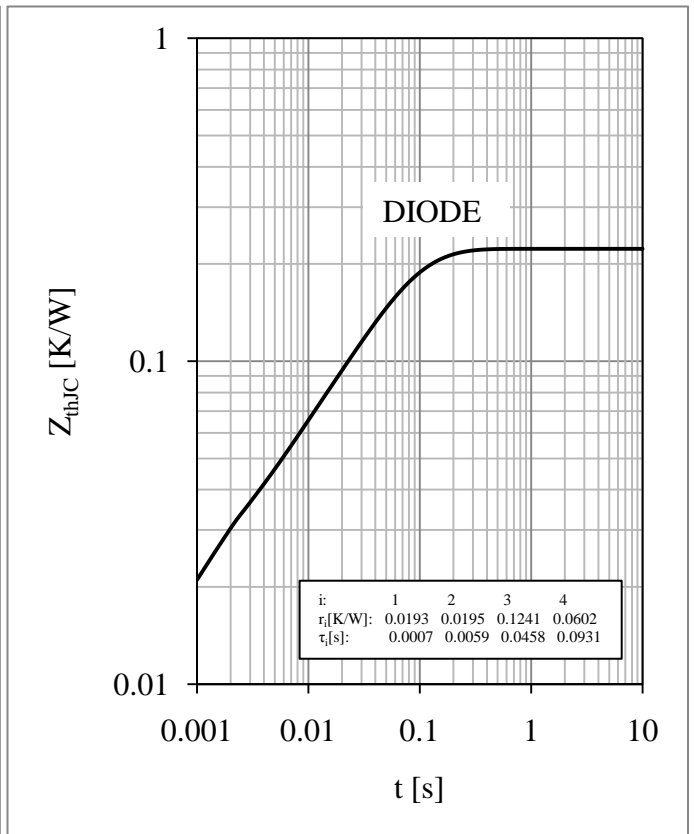
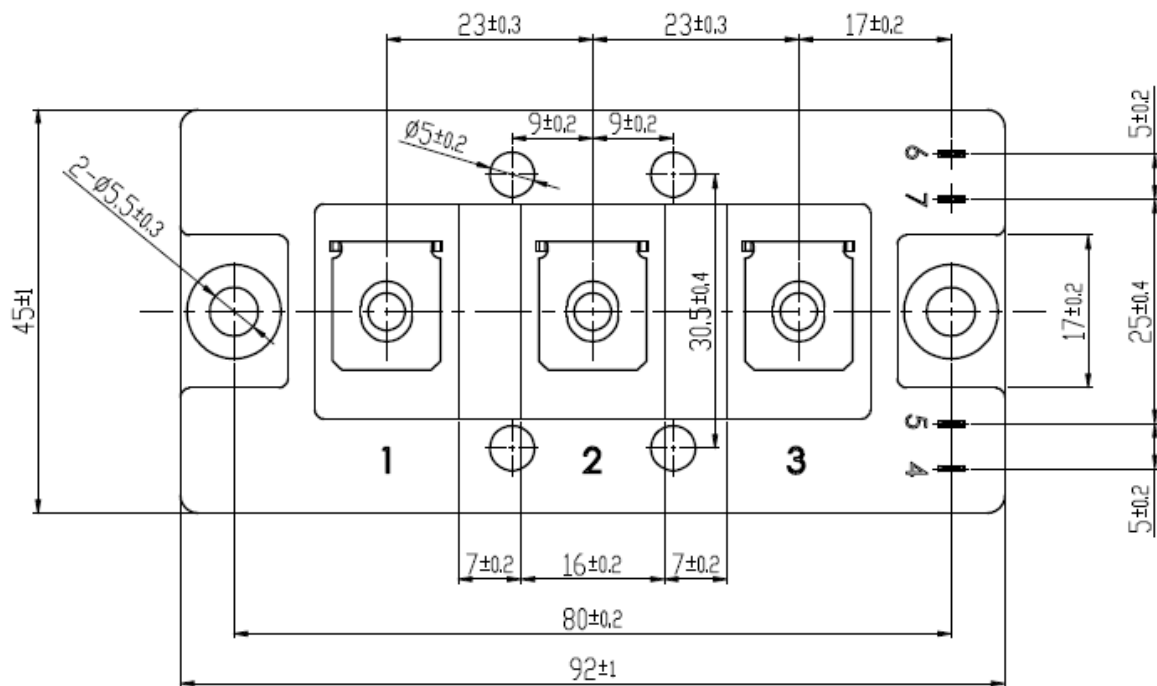
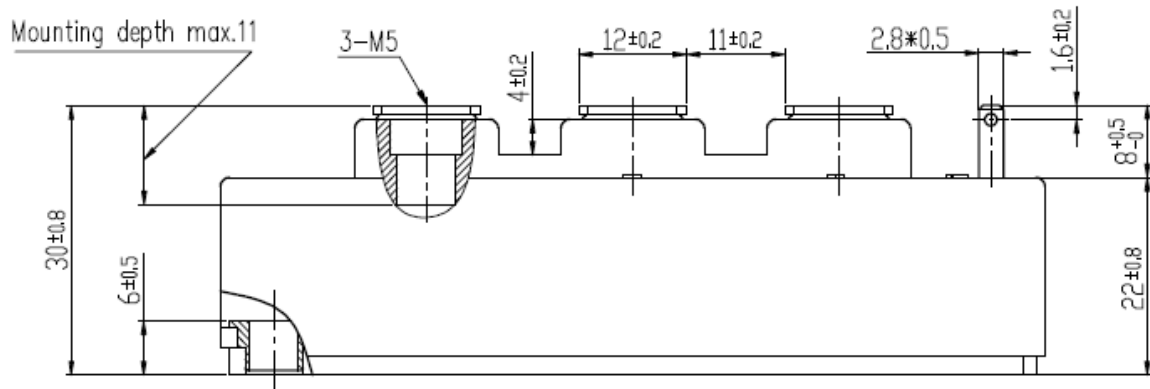


Fig 14. Diode Transient Thermal Impedance

Package Dimensions

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.