STARPOWER

SEMICONDUCTOR **IGBT**

GD800SGT120C3S

Molding Type Module

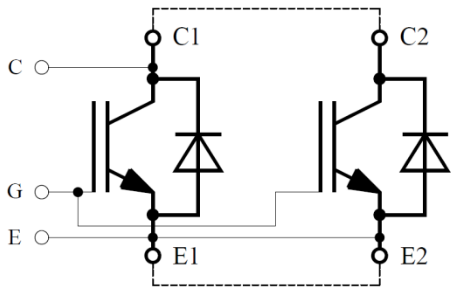
1200V/800A 1 in one-package

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 high power converters.

Features

- Low $V_{CE(sat)}$ Trench IGBT technology
- 10μs 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



Equivalent Circuit Schematic

Typical Applications

- High Power Converters
- Motor Drivers
- AC Inverter Drives

Absolute Maximum Ratings T_C=25℃ unless otherwise noted

Symbol	Description	GD800SGT120C3S	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℃	1350 800	A
I_{CM}	Pulsed Collector Current t_p=1ms	1600	A
I_F	Diode Continuous Forward Current @ T_C=80℃	800	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	1600	A
P_D	Maximum Power Dissipation @ T_j=175℃	4.44	kW
T_{jmax}	Maximum Junction Temperature	175	℃
T_{jop}	Operating Junction Temperature	-40 to +150	℃
T_{STG}	Storage Temperature Range	-40 to +125	℃
V_{ISO}	Isolation Voltage RMS,f=50Hz,t=1min	2500	V
Mounting Torque	Signal Terminal Screw:M4 Power Terminal Screw:M8 Mounting Screw:M6	1.8 to 2.1 8.0 to 10 4.25 to 5.75	N.m

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=32mA,V_{CE}=V_{GE}, T_j=25℃	5.0	5.8	6.5	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C=800A,V_{GE}=15V, T_j=25℃		1.70	2.15	V
		I_C=800A,V_{GE}=15V, T_j=125℃		2.00		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=800A, R_{Gon}=3.6Ω, R_{Goff}=0.91Ω, V_{GE}=±15V,T_j=25℃		250		ns
t_r	Rise Time			190		ns
$t_{d(off)}$	Turn-Off Delay Time			90		ns
t_f	Fall Time			130		ns
E_{on}	Turn-On Switching Loss			58.1		mJ
E_{off}	Turn-Off Switching Loss			85.4		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=800A, R_{Gon}=3.6Ω, R_{Goff}=0.91Ω, V_{GE}=±15V,T_j=125℃		260		ns
t_r	Rise Time			200		ns
$t_{d(off)}$	Turn-Off Delay Time			810		ns
t_f	Fall Time			210		ns
E_{on}	Turn-On Switching Loss			85.5		mJ
E_{off}	Turn-Off Switching Loss			126		mJ
C_{ies}	Input Capacitance	V_{CE}=25V,f=1MHz, V_{GE}=0V		57.7		nF
C_{oes}	Output Capacitance			3.02		nF
C_{res}	Reverse Transfer Capacitance			2.62		nF
I_{SC}	SC Data	t_P≤10μs,V_{GE}=15V, T_j=125℃,V_{CC}=900V, V_{CEM}≤1200V		3200		A
Q_G	Gate Charge	V_{CC}=600V,I_C=800A, V_{GE}=-15…+15V		7.4		μC
R_{Gint}	Internal Gate Resistance			0.78		Ω
L_{CE}	Stray Inductance			15		nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal To Chip			0.10		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=800A	T_j=25℃		1.65	2.10	V
			T_j=125℃		1.65		
Q_r	Recovered Charge	I_F=800A, V_R=600V, R_G=3.6Ω, V_{GE}=-15V	T_j=25℃		48.6		μC
			T_j=125℃		91.2		
I_{RM}	Peak Reverse Recovery Current		T_j=25℃		340		A
			T_j=125℃		440		
E_{rec}	Reverse Recovery Energy		T_j=25℃		21.8		mJ
			T_j=125℃		41.3		

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (per IGBT)		33.8	K/kW
$R_{\theta JC}$	Junction-to-Case (per Diode)		57.4	K/kW
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)	6		K/kW
Weight	Weight of Module	1500		g

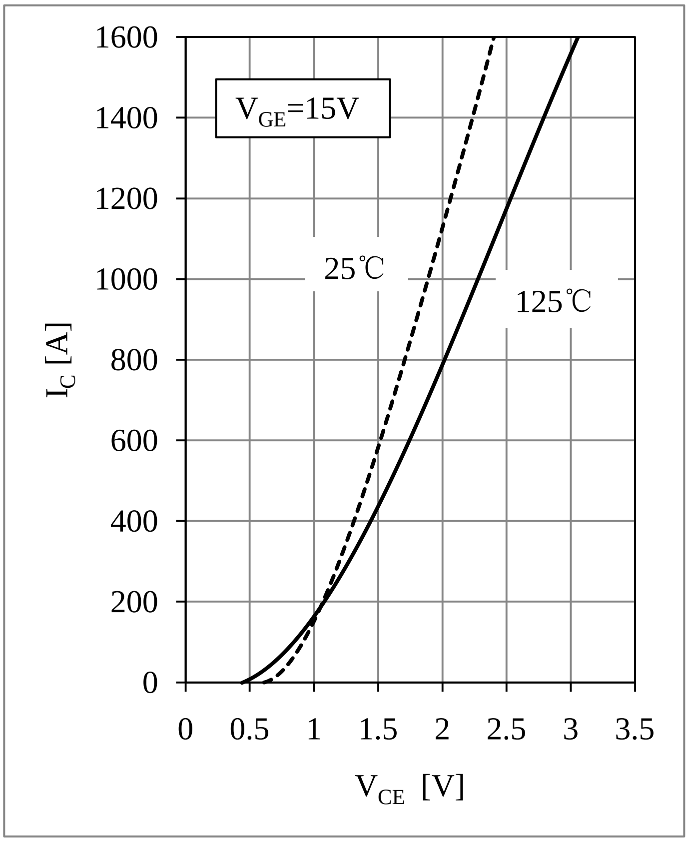


Fig 1. IGBT Output Characteristics

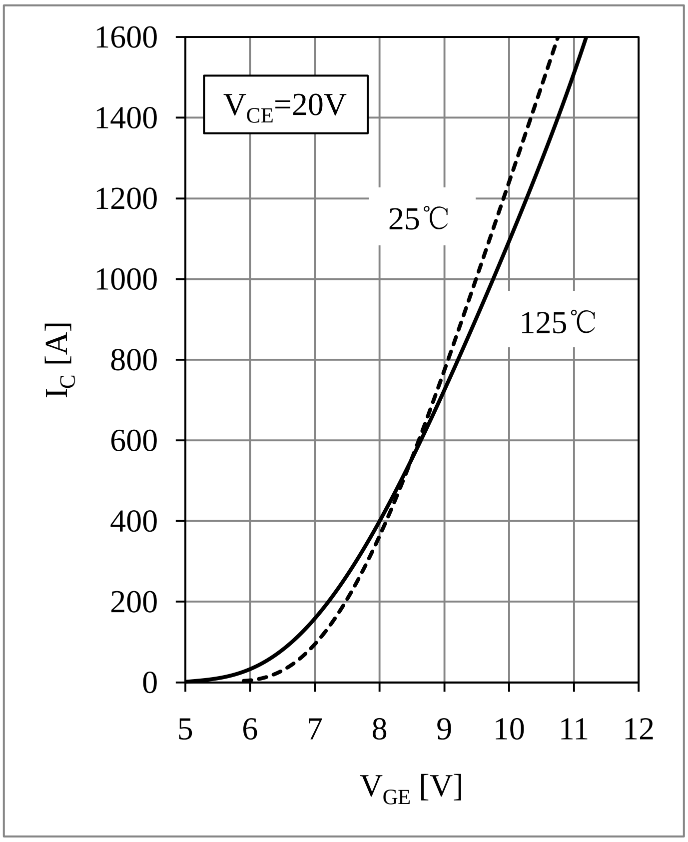


Fig 2. IGBT Transfer Characteristics

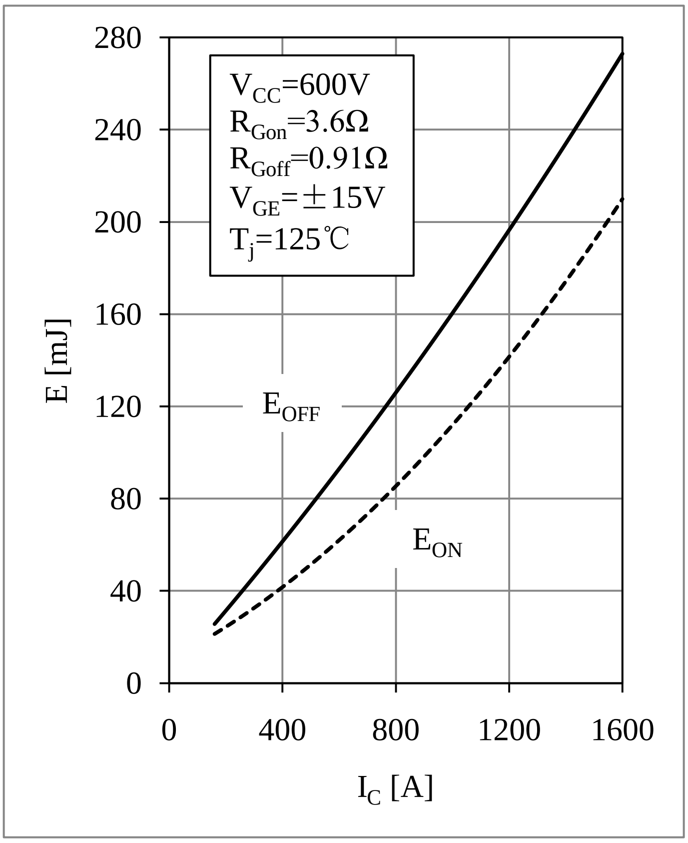


Fig 3. IGBT Switching Loss vs. I_C

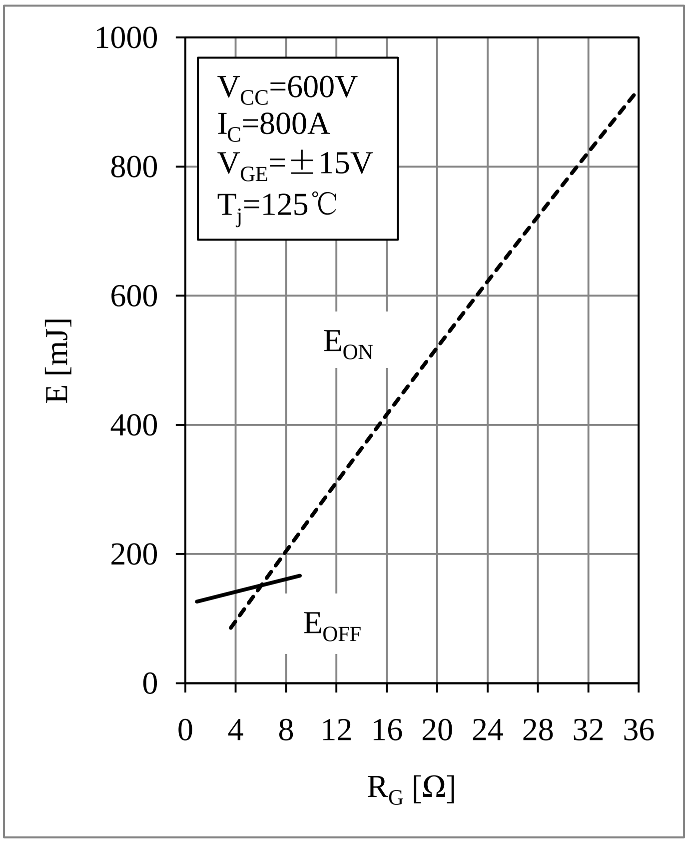


Fig 4. IGBT Switching Loss vs. R_G

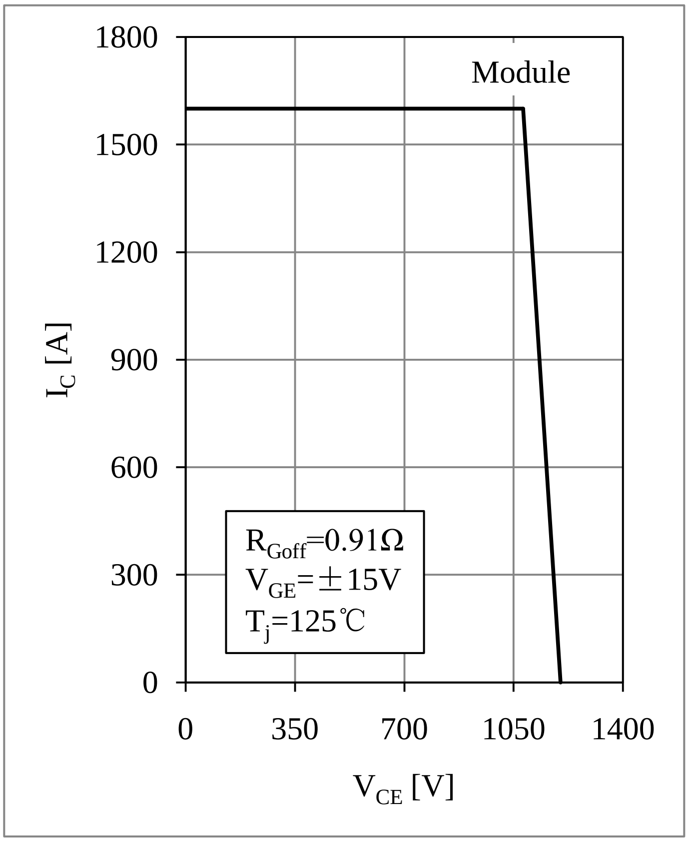


Fig 5. RBSOA

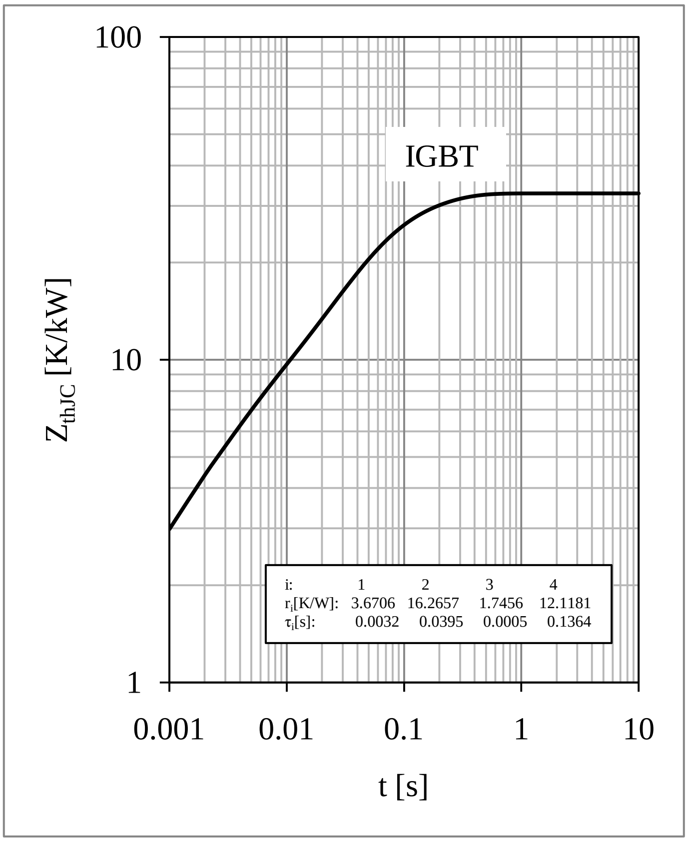


Fig 6. IGBT Transient Thermal Impedance

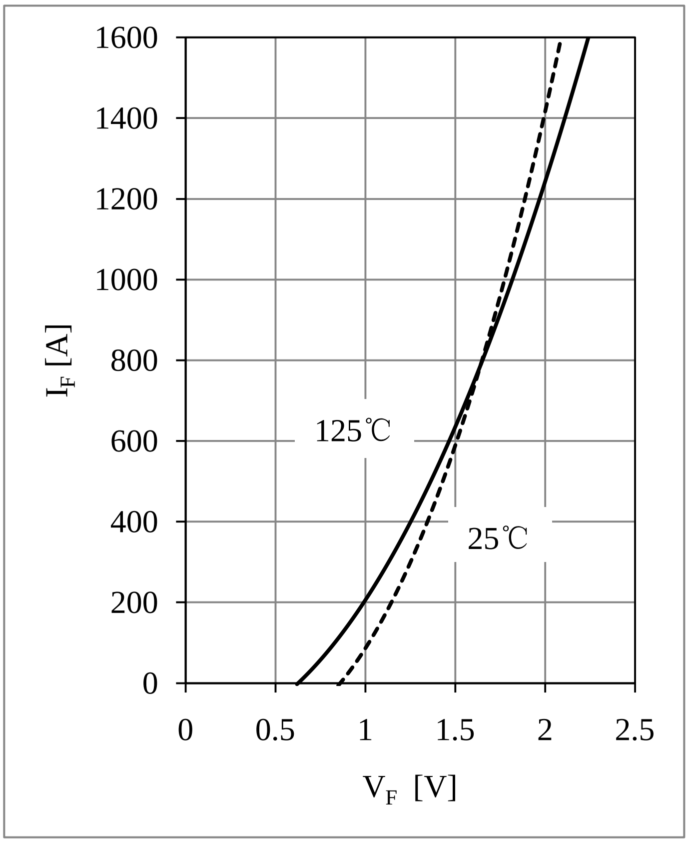


Fig 7. Diode Forward Characteristics

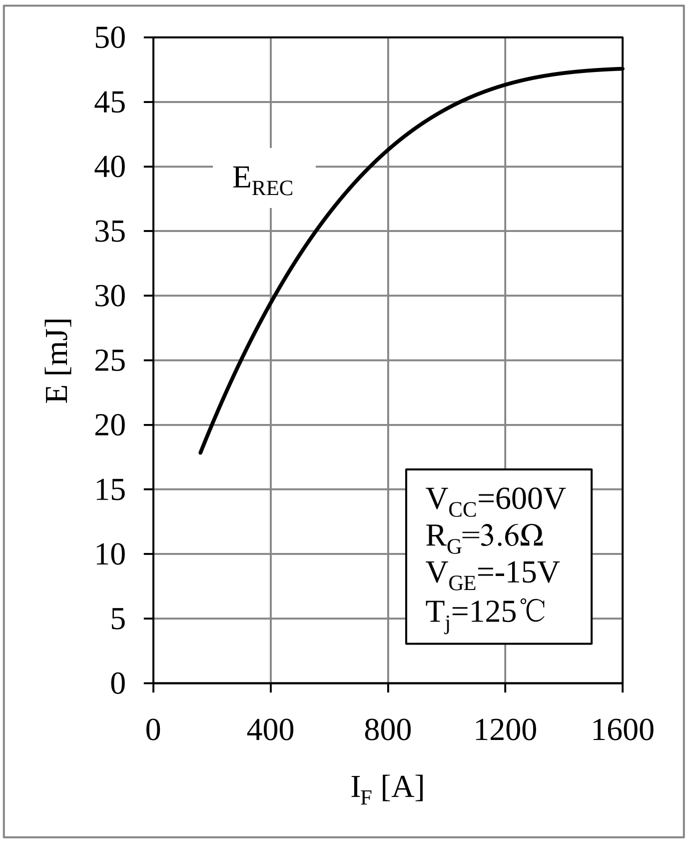


Fig 8. Diode Switching Loss vs. I_F

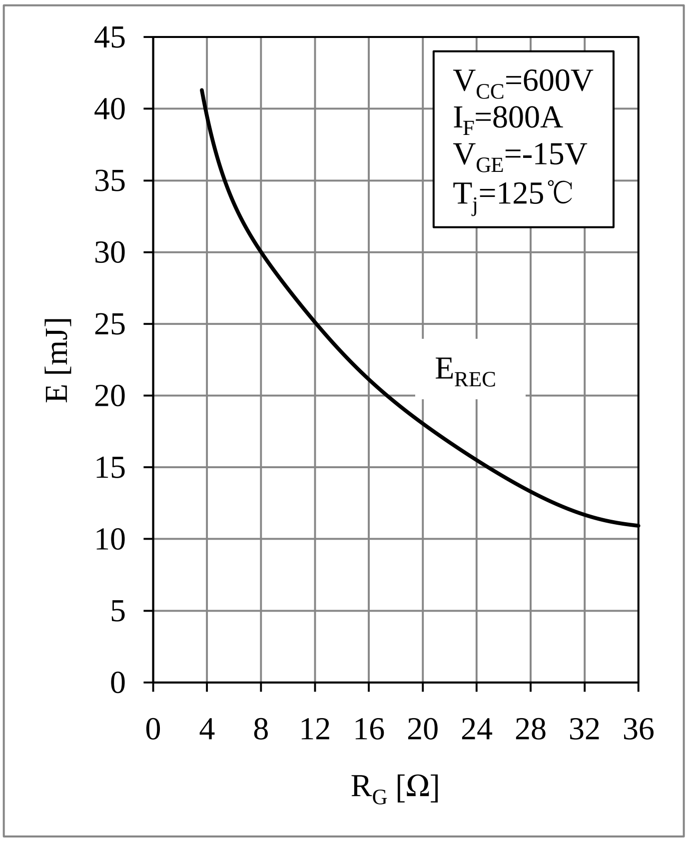


Fig 9. Diode Switching Loss vs. R_G

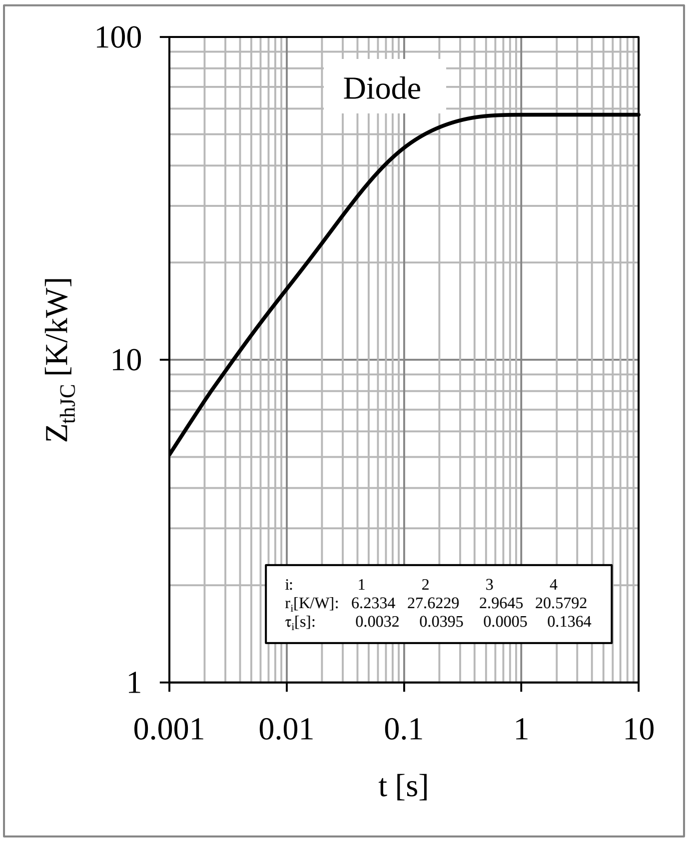
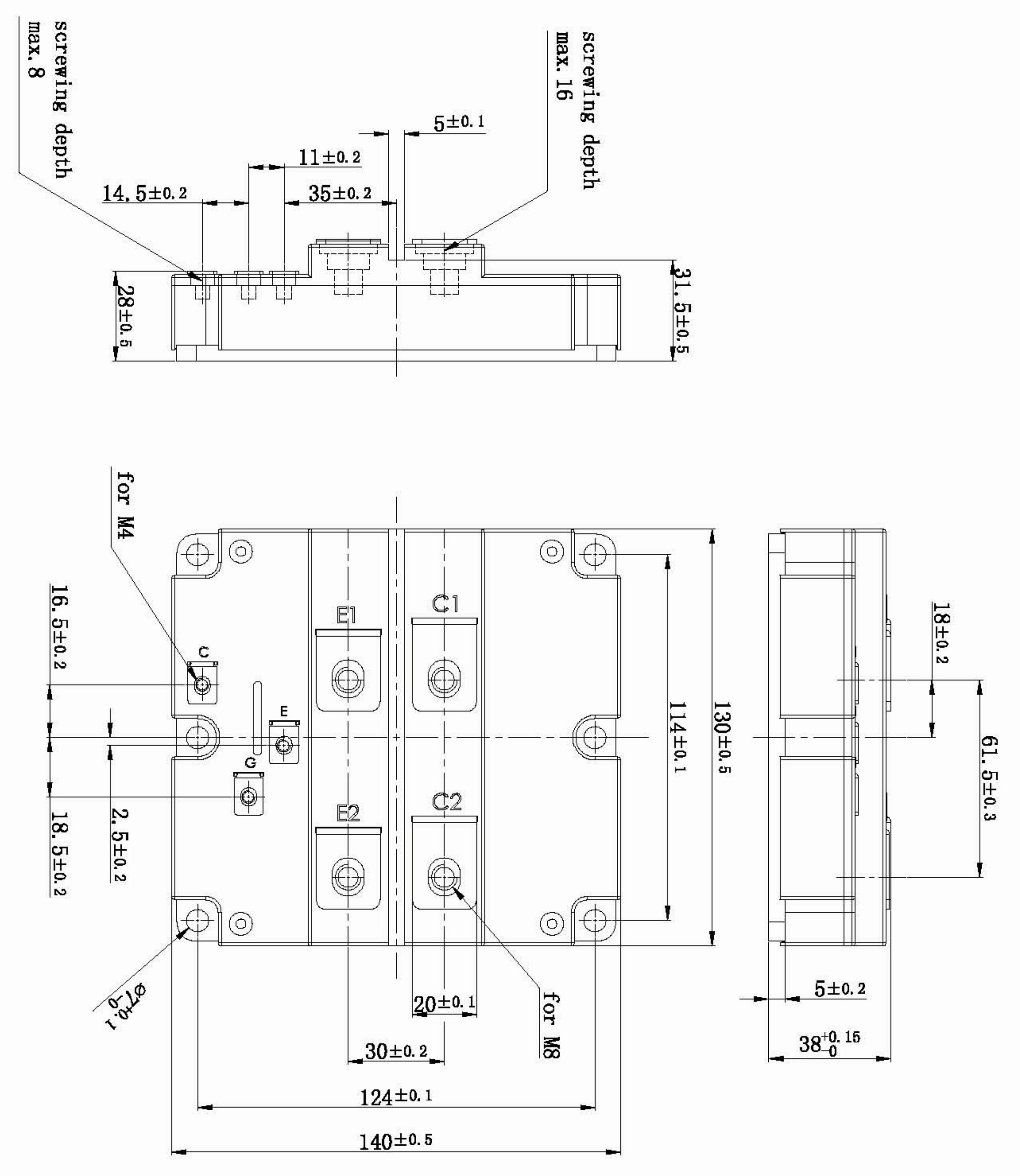


Fig 10. Diode Transient Thermal Impedance

Package 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.