STARPOWER

SEMICONDUCTOR **IGBT**

GD2400SGT170C3S

Molding Type Module

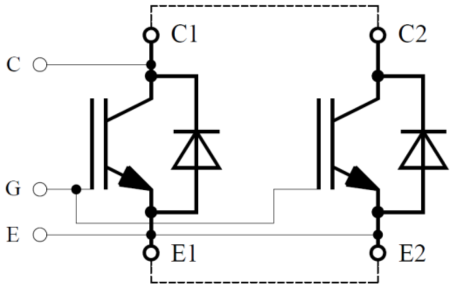
1700V/2400A 1 in one-package

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
- Maximum junction temperature 175℃
- Low inductance case
- Fast & soft reverse recovery anti-parallel FWD
- Isolated copper baseplate using DBC technology



external connection to be done

Equivalent Circuit Schematic

Typical Applications

- High Power Converters
- Motor Drivers
- AC Inverter Drives

Absolute Maximum Ratings T_C=25℃ unless otherwise noted

Symbol	Description	GD2400SGT170C3S	Units
V_{CES}	Collector-Emitter Voltage	1700	V
V_{GES}	Gate-Emitter Voltage	±20	V
I_C	Collector Current @ T_C=25℃ @ T_C=100℃	3400 2400	A
I_{CM}	Pulsed Collector Current t_p=1ms	4800	A
I_F	Diode Continuous Forward Current	2400	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	4800	A
P_D	Maximum Power Dissipation @ T_j=175℃	12.9	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	4000	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
Weight	Weight of Module	1500	g

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℃	1700			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=96mA,V_{CE}=V_{GE}, T_j=25℃	5.2	5.8	6.4	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C=2400A,V_{GE}=15V, T_j=25℃		2.00	2.45	V
		I_C=2400A,V_{GE}=15V, T_j=125℃		2.40		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=900V,I_C=2400A, R_{Gon}=0.6Ω, R_{Goff}=0.8Ω, V_{GE}=±15V,T_j=25℃		608		ns
t_r	Rise Time			181		ns
$t_{d(off)}$	Turn-Off Delay Time			1390		ns
t_f	Fall Time			161		ns
E_{on}	Turn-On Switching Loss			391		mJ
E_{off}	Turn-Off Switching Loss			682		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=900V,I_C=2400A, R_{Gon}=0.6Ω, R_{Goff}=0.8Ω, V_{GE}=±15V,T_j=125℃		662		ns
t_r	Rise Time			188		ns
$t_{d(off)}$	Turn-Off Delay Time			1580		ns
t_f	Fall Time			290		ns
E_{on}	Turn-On Switching Loss			588		mJ
E_{off}	Turn-Off Switching Loss			907		mJ
C_{ies}	Input Capacitance	V_{CE}=25V,f=1MHz, V_{GE}=0V		211		nF
C_{oes}	Output Capacitance			8.78		nF
C_{res}	Reverse Transfer Capacitance			7.01		nF
I_{SC}	SC Data	t_P≤10μs,V_{GE}=15V, T_j=125℃,V_{CC}=1000V, V_{CEM}≤1700V		9100		A
Q_G	Gate Charge	V_{CC}=900V,I_C=2400A, V_{GE}=-15…+15V		28.1		μC
R_{Gint}	Internal Gate Resistance			0.94		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=2400A	T_j=25℃		1.80	2.20	V
			T_j=125℃		1.90		
Q_r	Recovered Charge	I_F=2400A, V_R=900V, R_G=0.6Ω, V_{GE}=-15V	T_j=25℃		566		μC
			T_j=125℃		992		
I_{RM}	Peak Reverse Recovery Current		T_j=25℃		2055		A
			T_j=125℃		2460		
E_{rec}	Reverse Recovery Energy		T_j=25℃		391		mJ
			T_j=125℃		692		

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (per IGBT)		11.6	K/kW
$R_{\theta JC}$	Junction-to-Case (per Diode)		22.8	K/kW
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)	6		K/kW

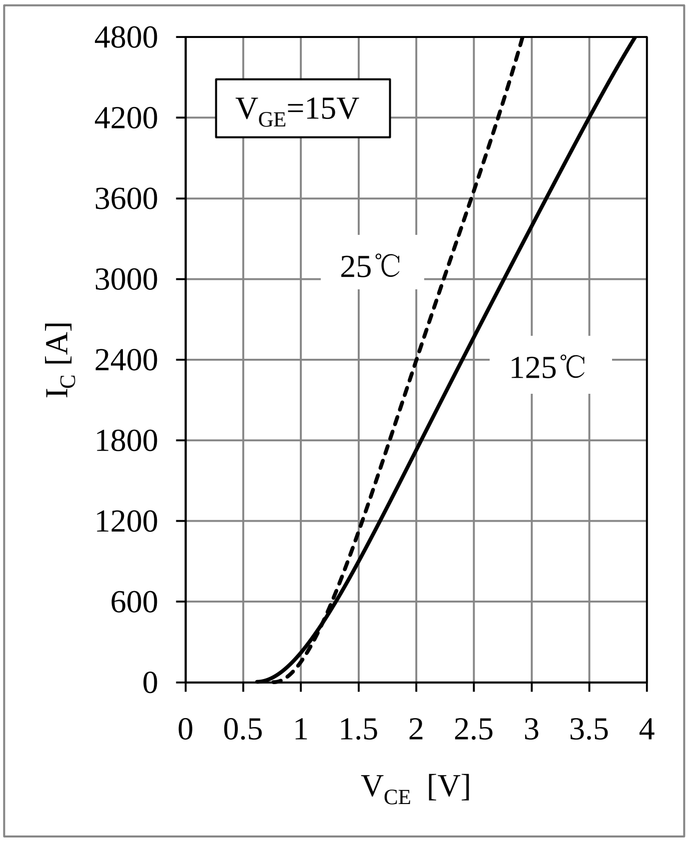


Fig 1. IGBT Output Characteristics

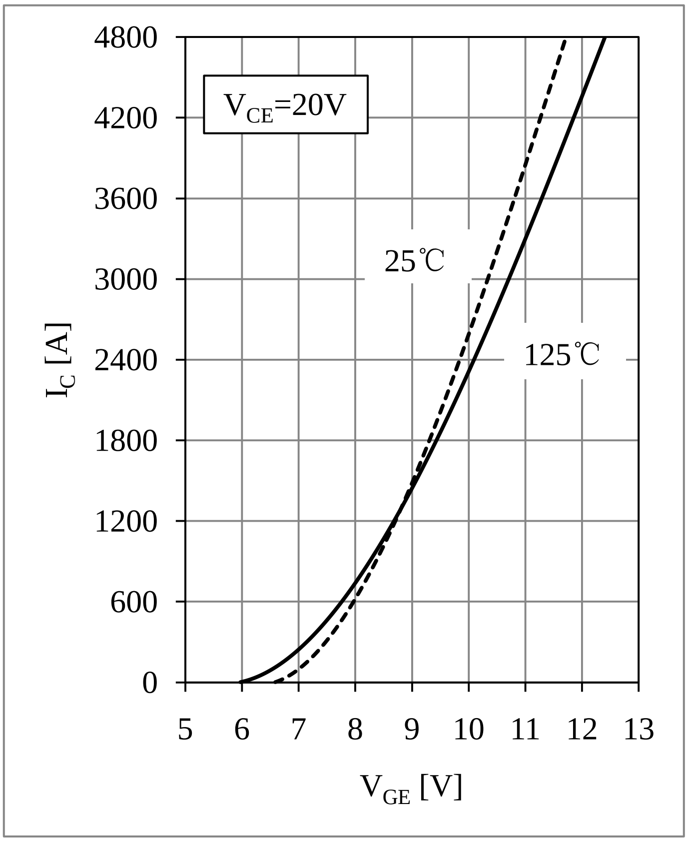


Fig 2. IGBT Transfer Characteristics

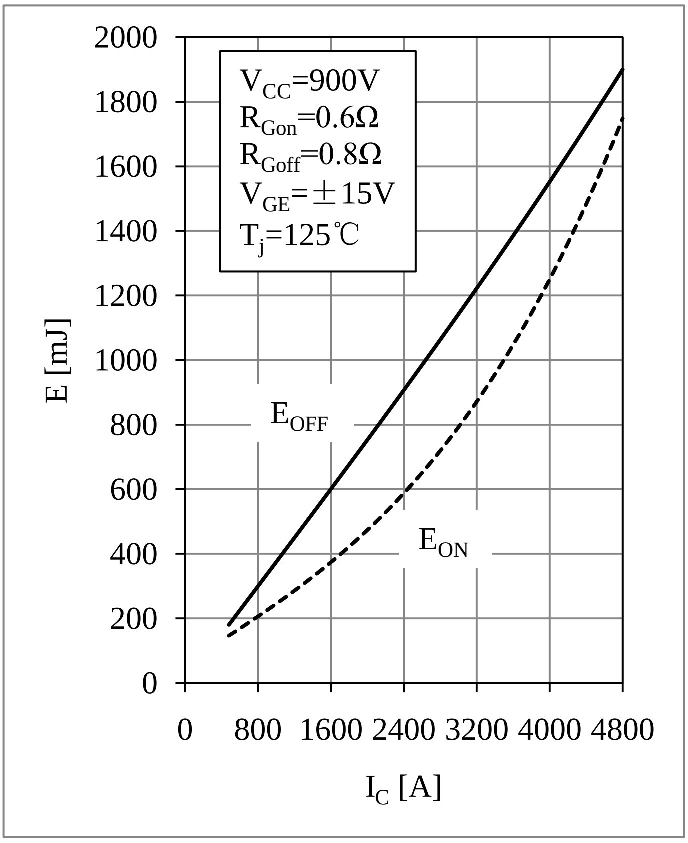


Fig 3. IGBT Switching Loss vs. I_C

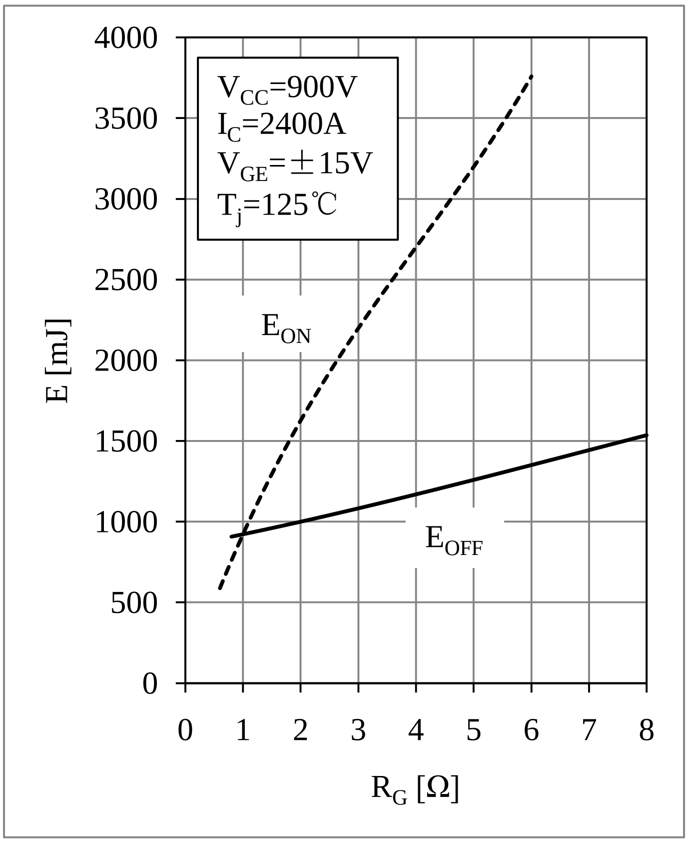


Fig 4. IGBT Switching Loss vs. R_G

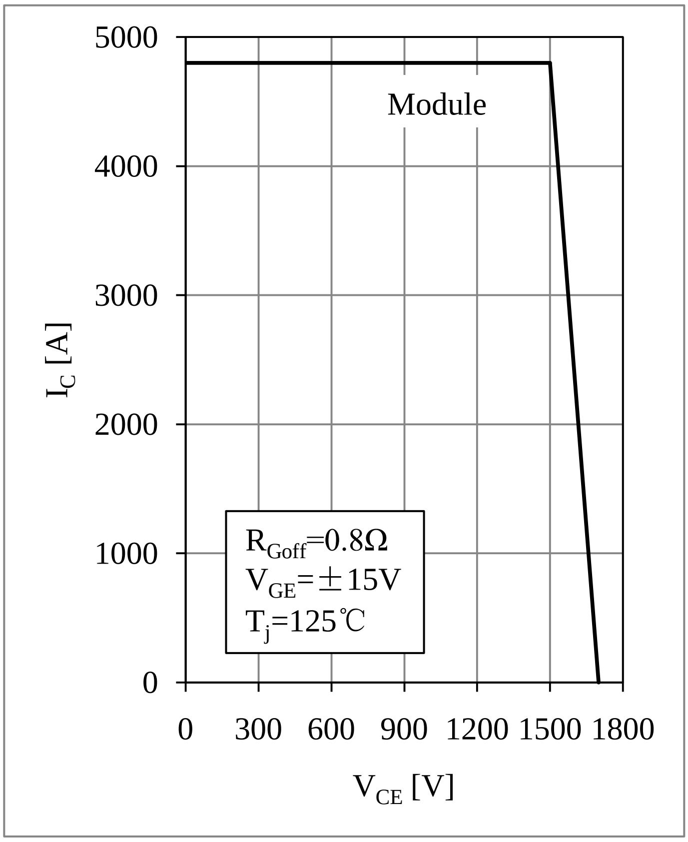


Fig 5. RBSOA

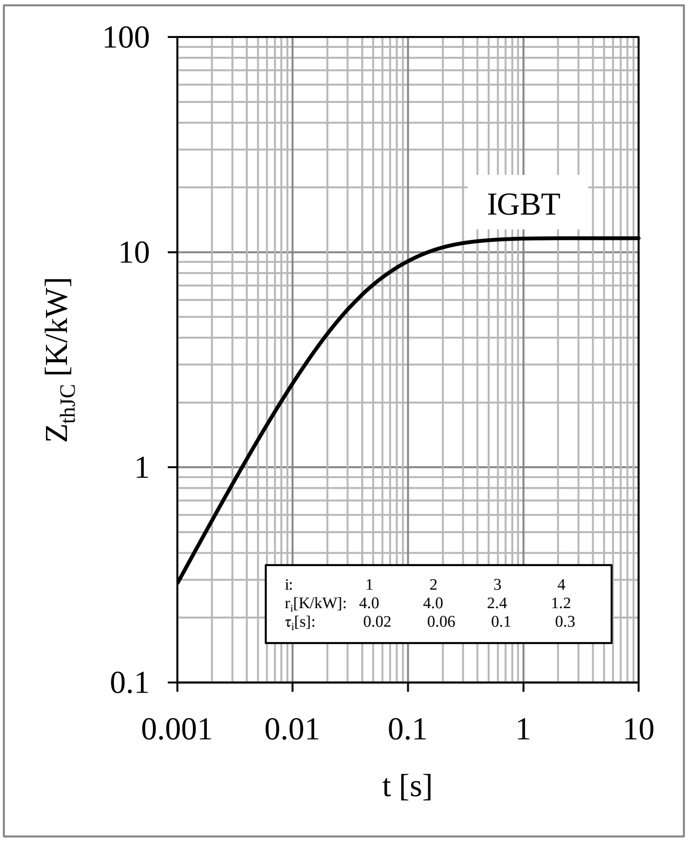


Fig 6. IGBT Transient Thermal Impedance

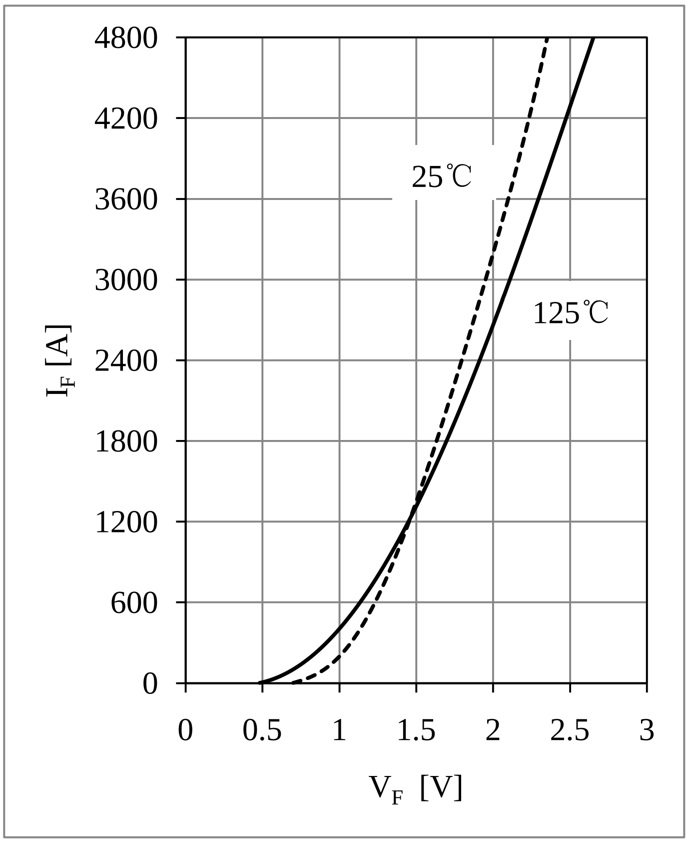


Fig 7. Diode Forward Characteristics

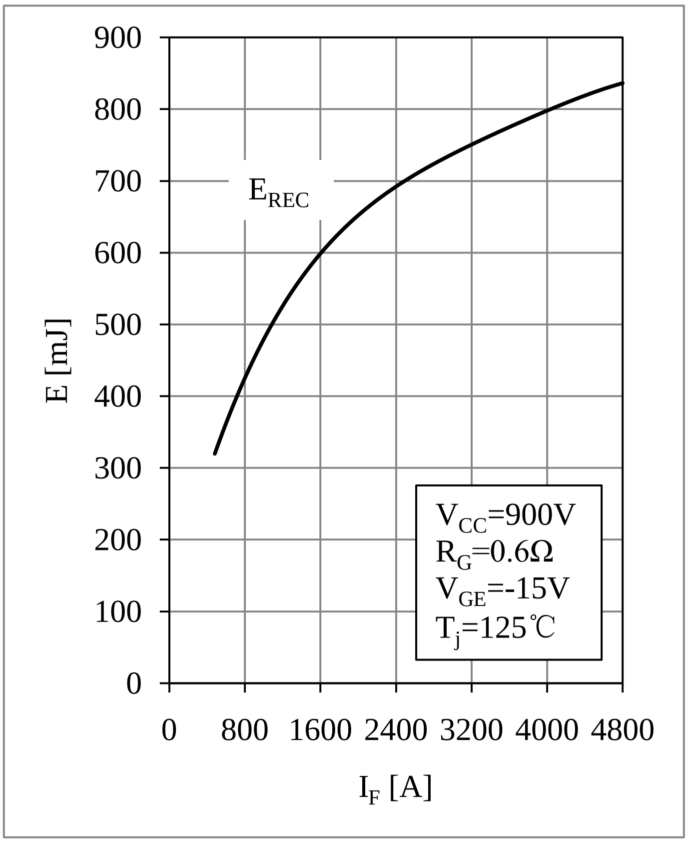


Fig 8. Diode Switching Loss vs. I_F

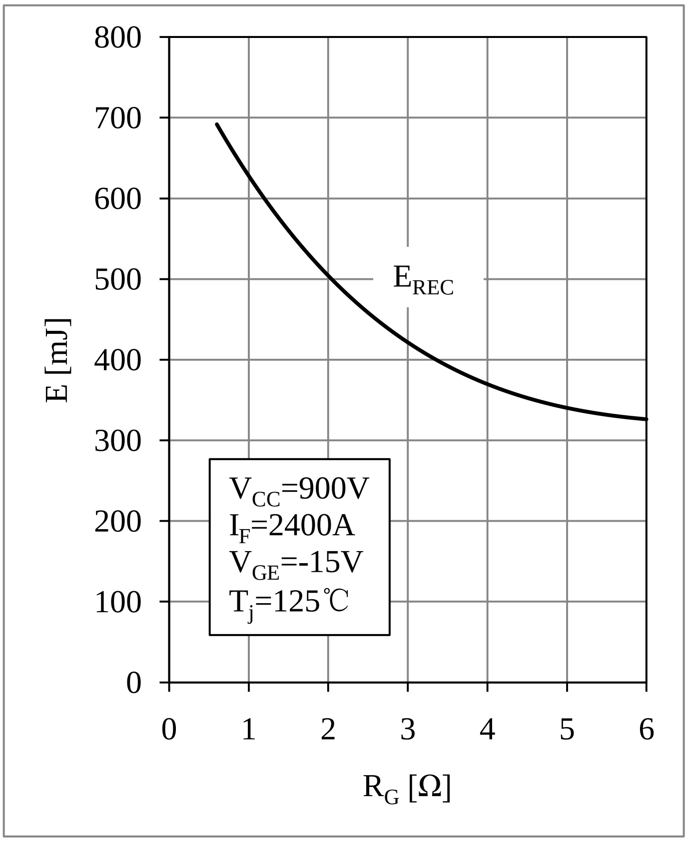


Fig 9. Diode Switching Loss vs. R_G

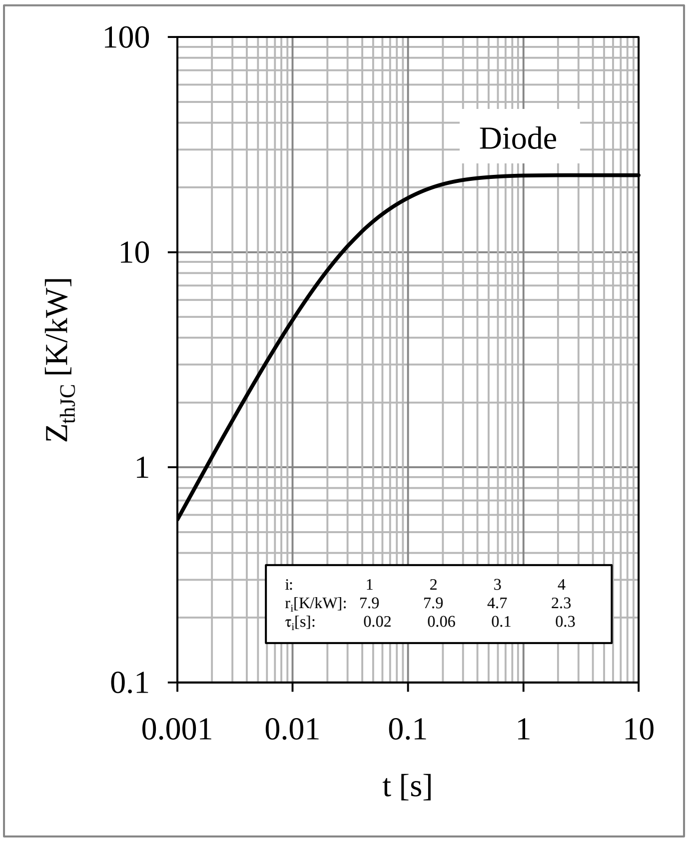
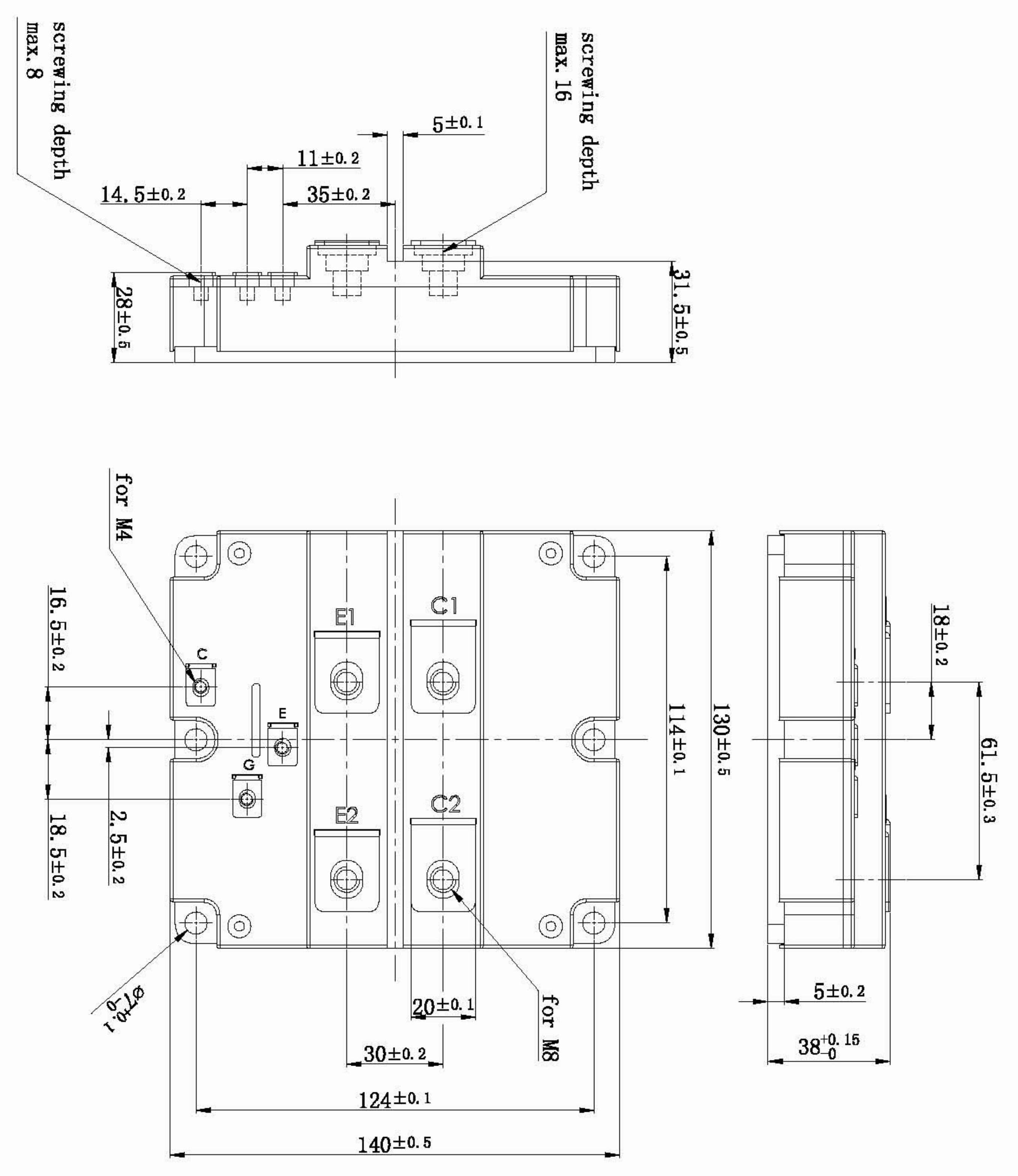


Fig 10. Diode Transient Thermal Impedance

Package Dimensions

Dimensions in Millimeters



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