STARPOWER

SEMICONDUCTOR™

IGBT

GD1200SGL120C3S

Molding Type Module

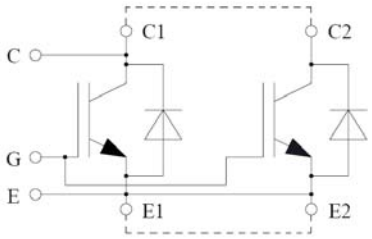
1200V/1200A 1 in one-package

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 general inverters and UPS.

Features

- High short circuit capability, self limiting to 6*I_C
- 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



External Connection(to be done)

Equivalent Circuit Schematic

Typical Applications

- AC inverter drives
- Switching mode power supplies
- Electronic welders

Absolute Maximum Ratings T_C=25℃ unless otherwise noted

Symbol	Description	GD1200SGL120C3S	Units
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate-Emitter Voltage	±20	V
I_C	Collector Current @ T_C=25℃	1900	A
	@ T_C=100℃	1200	
$I_{CM(1)}$	Pulsed Collector Current t_p= 1ms	2400	A
I_F	Diode Continuous Forward Current	1200	A
I_{FM}	Diode Maximum Forward Current	2400	A
P_D	Maximum power Dissipation @ T_j=175℃	8823	W
T_{SC}	Short Circuit Withstand Time @ T_j=125℃	10	μs
T_j	Operating Junction Temperature	-40 to +150	℃
T_{STG}	Storage Temperature Range	-40 to +125	℃
I^2t-value, Diode	V_R=0V, t=10ms, T_j=125℃	300	kA^2s
V_{ISO}	Isolation Voltage RMS, f=50Hz, t=1min	2500	V
Mounting Torque	Power Terminal Screw:M4	1.7 to 2.3	N.m
	Power Terminal Screw:M8	8.0 to 10	
	Mounting Screw:M6	4.25 to 5.75	N.m

Notes:

(1) Repetitive rating: Pulse width limited by max. junction temperature

Electrical Characteristics of IGBT T_C=25℃ unless otherwise noted

Off Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV_{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℃			800	nA

On Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=48.0mA,V_{CE}=V_{GE}, T_j=25℃	5.0	6.5	7.0	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C=1200A,V_{GE}=15V, T_j=25℃		1.9		V
		I_C=1200A,V_{GE}=15V, T_j=125℃		2.1		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
R_{Gint}	Internal gate resistor	T_j=25℃		1.2		Ω
Q_{ge}	Gate charge	I_C=1200A,V_{CE}=600V, V_{GE}=-15…+15V		12.5		μC
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=1200A, R_G=0.82Ω,V_{GE} =±15V, T_j=25℃		790		ns
t_r	Rise Time			170		ns
$t_{d(off)}$	Turn-Off Delay Time			1350		ns
t_f	Fall Time			180		ns
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=1200A, R_G=0.82Ω,V_{GE} =±15V, T_j=125℃		850		ns
t_r	Rise Time			170		ns
$t_{d(off)}$	Turn-Off Delay Time			1500		ns
t_f	Fall Time			220		ns
E_{on}	Turn-On Switching Loss			155		mJ
E_{off}	Turn-Off Switching Loss			190		mJ
C_{ies}	Input Capacitance	V_{CE}=25V, f=1MHz, V_{GE}=0V		92.0		nF
C_{oes}	Output Capacitance			8.40		nF
C_{res}	Reverse Transfer Capacitance			6.10		nF
I_{SC}	SC Data	t_{SC}≤10μs,V_{GE}=15V, T_j=125℃,V_{CC}=900V, V_{CEM}≤1200V		7000		A
L_{CE}	Stray Inductance			15		nH
$R_{CC'+EE'}$	Module lead resistance, terminal to chip	T_C=25℃,per switch		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=1200A	T_j=25℃		1.9		V
			T_j=125℃		2.1		
Q_r	Diode Reverse Recovery Charge	I_F=1200A, V_R=600V, di/dt=-6800A/μs, V_{GE}=-15V	T_j=25℃		110		μC
			T_j=125℃		220		
I_{RM}	Diode Peak Reverse Recovery Current		T_j=25℃		760		A
			T_j=125℃		990		
E_{rec}	Reverse Recovery Energy		T_j=25℃		47		mJ
			T_j=125℃		82		

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (IGBT Part, per Module)		0.017	K/W
$R_{\theta JC}$	Junction-to-Case (Diode Part, per Module)		0.025	K/W
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied, per Module)	0.006		K/W
Weight	Weight of Module	1500		g

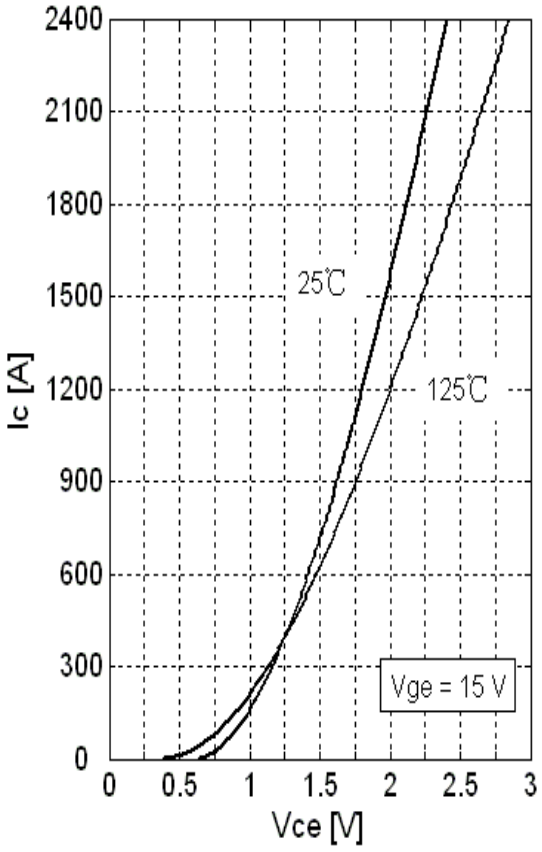


Fig 1. Typical IGBT Output Characteristics

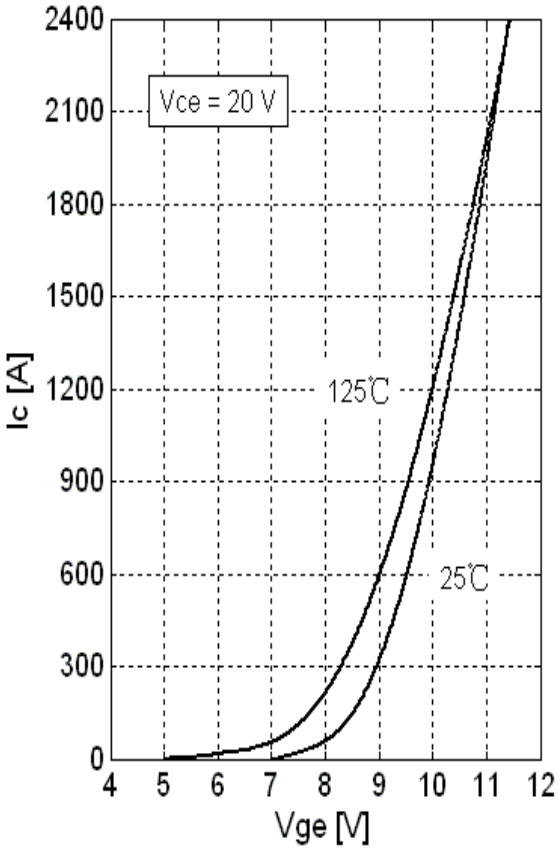


Fig 2. Typical IGBT Transfer Characteristics

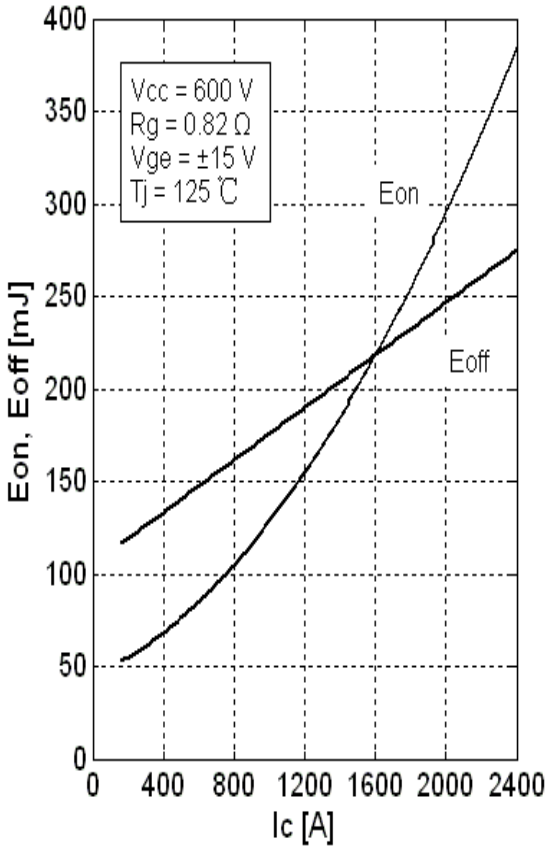


Fig 3. IGBT Switching Loss vs Collector Current

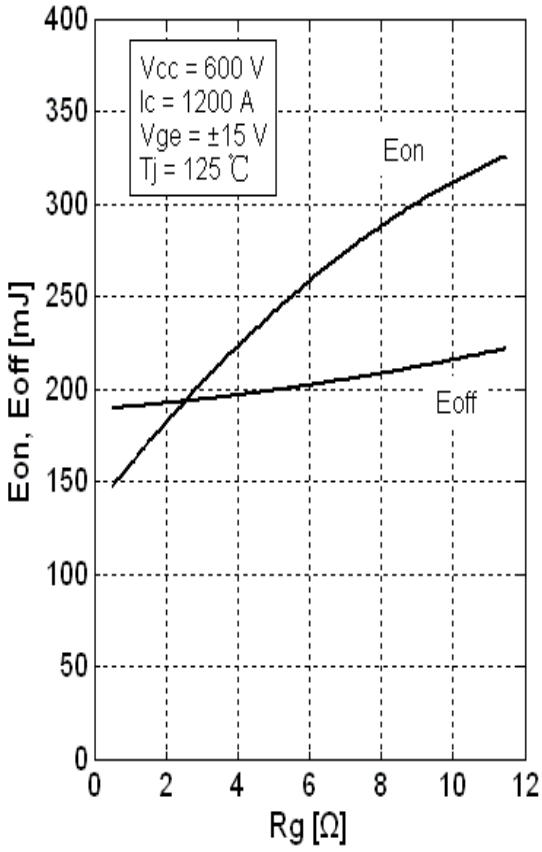


Fig 4. IGBT Switching Loss vs Gate Resistor

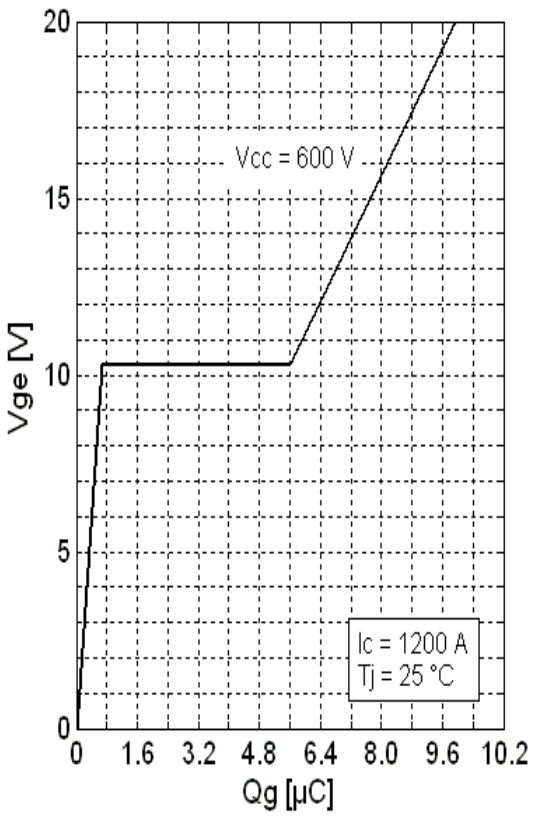


Fig 5. IGBT Gate Charge Characteristics

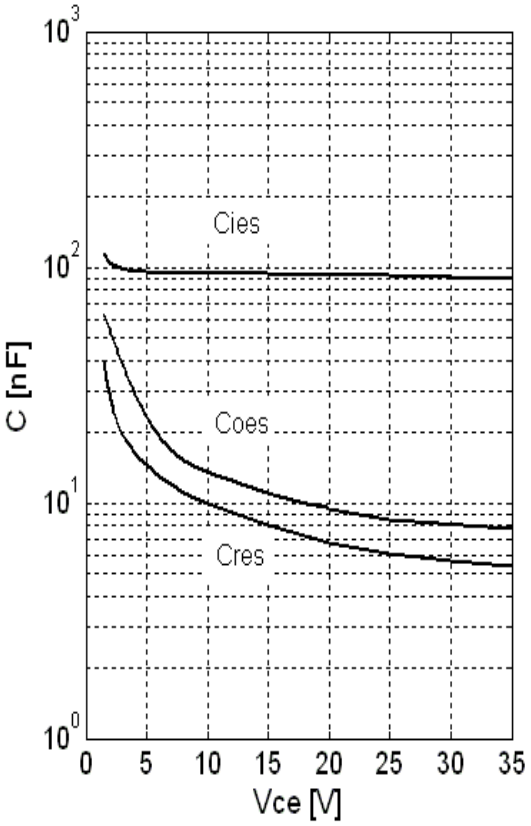


Fig 6. Typical IGBT Capacitance vs Collector-Emitter Voltage

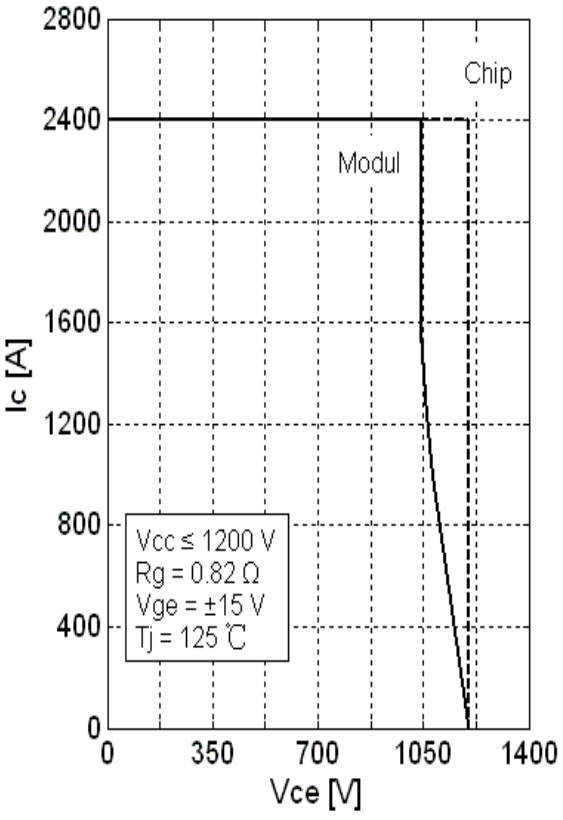


Fig 7. IGBT Turn-off Safe Operating Area (RBSOA)

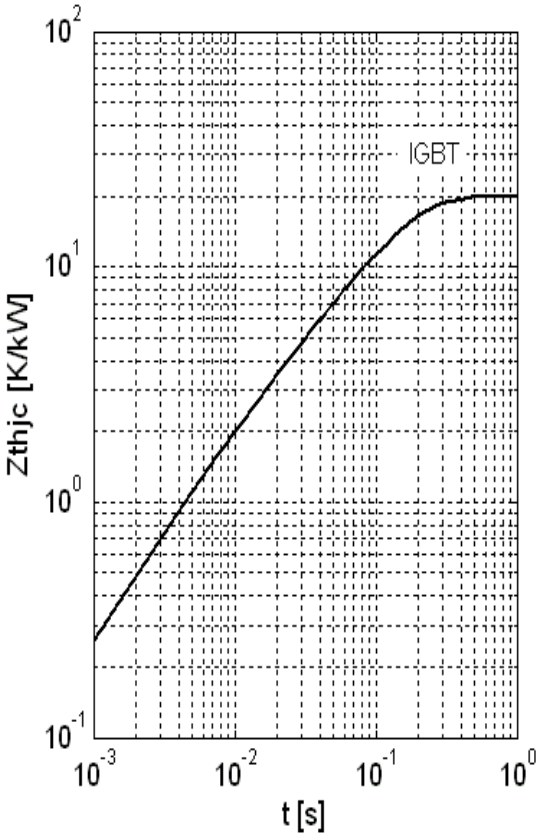


Fig 8. IGBT Transient Thermal Impedance

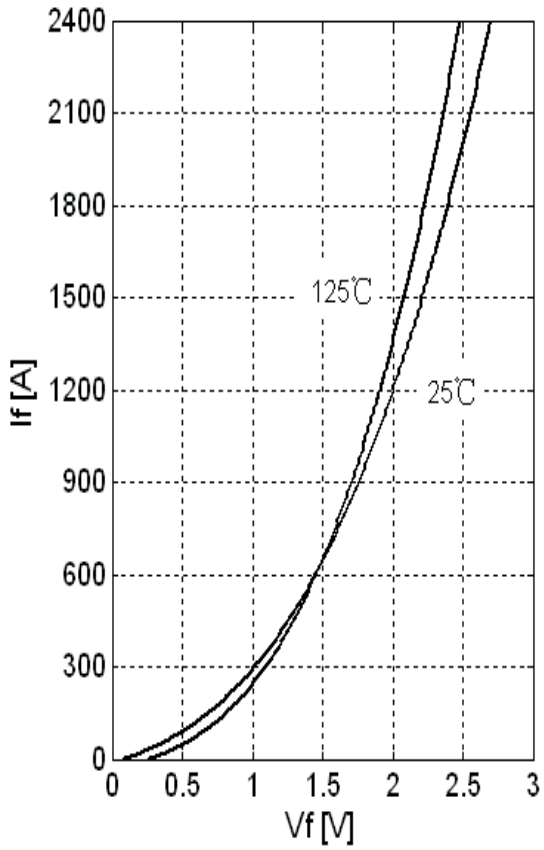


Fig 9. Typical Diode Forward Characteristics

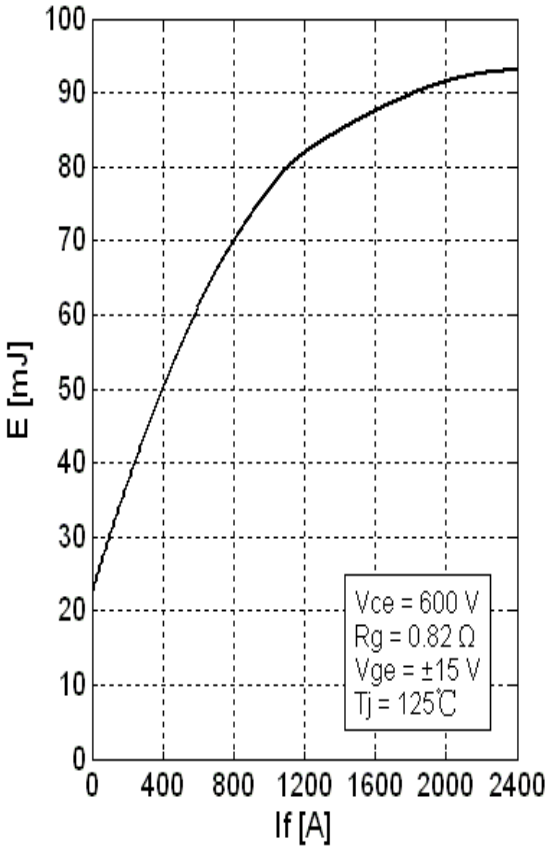


Fig 10. Diode Switching Loss vs Collector Current

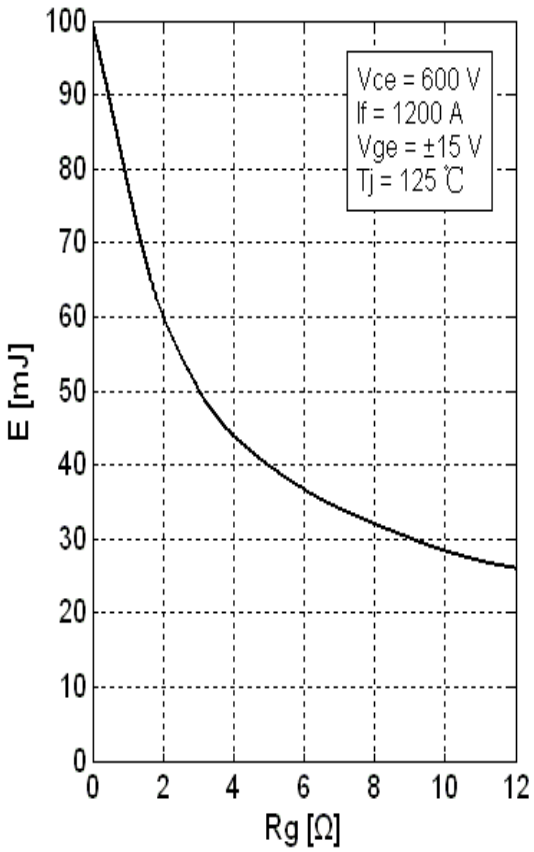


Fig 11. Diode Switching Loss vs Gate Resistor

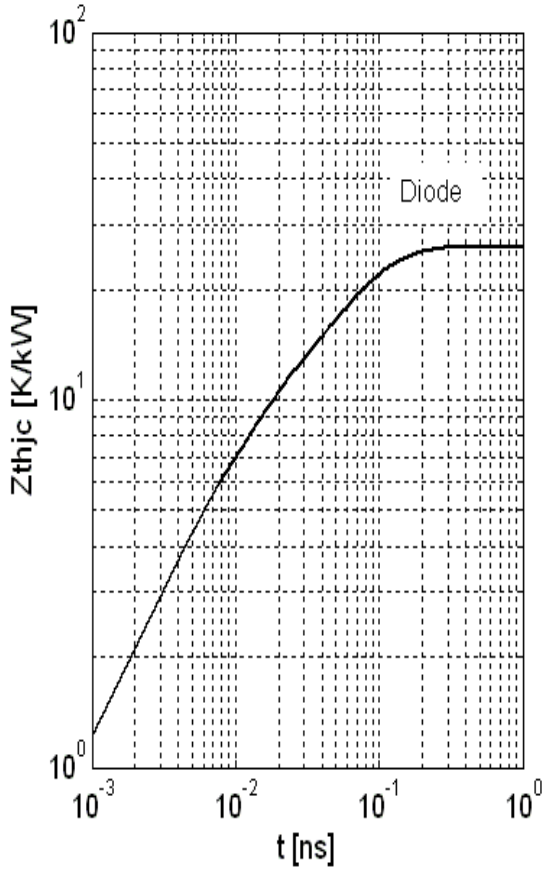
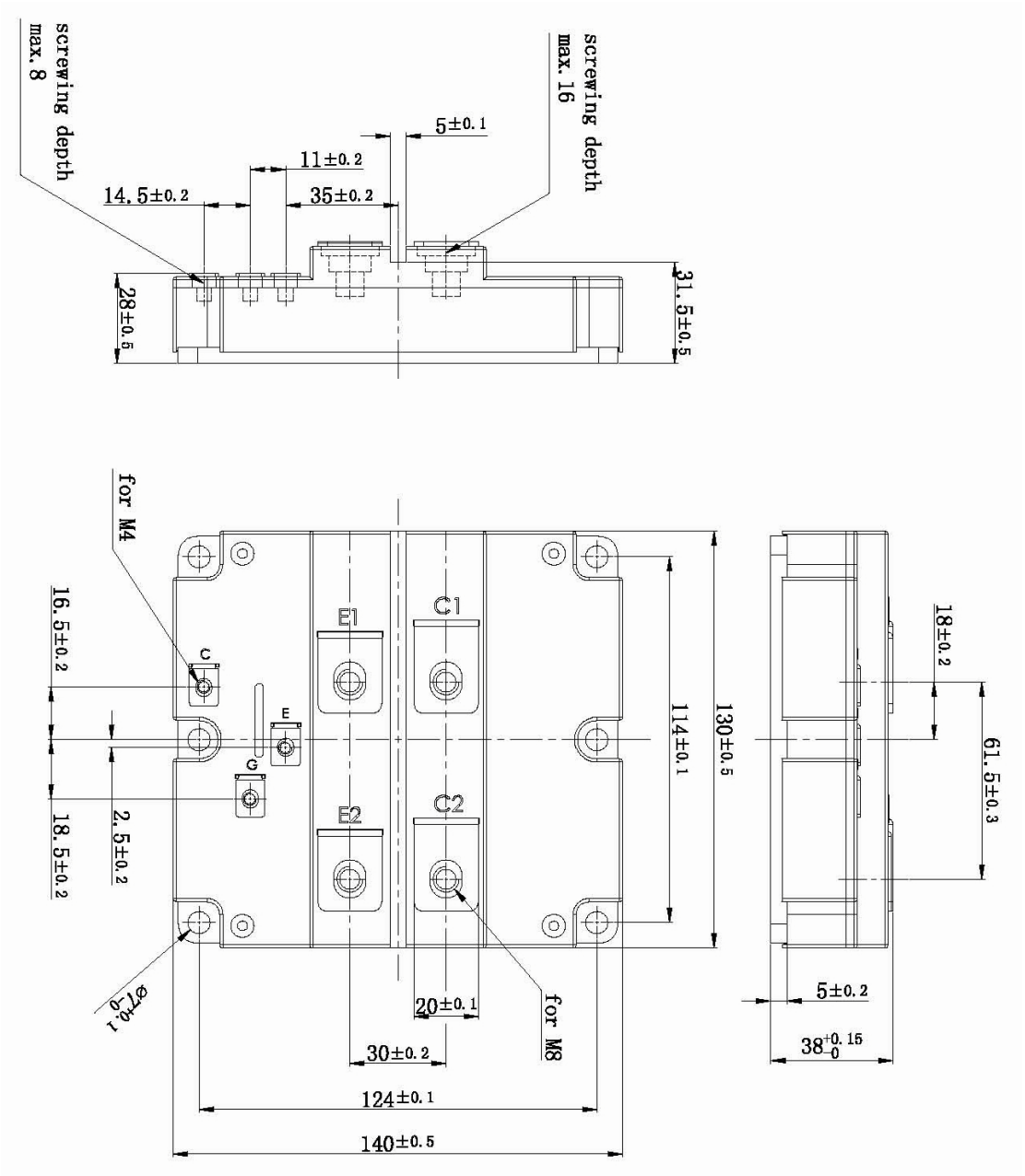


Fig 12. Diode Transient Thermal Impedance

Package Dimension

Dimensions in Millimeters



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