STARPOWER

SEMICONDUCTOR **IGBT**

GD800SGL330A3S

3300V/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.

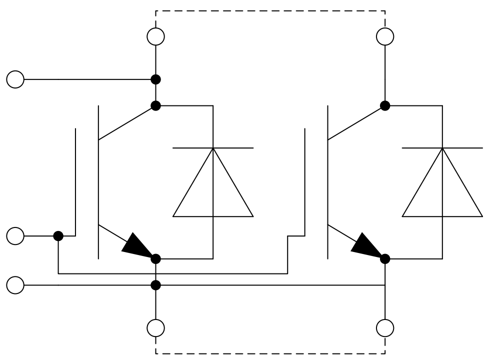
Features

- Low $V_{CE(sat)}$ SPT IGBT technology
- Low switching losses
- 10μs short circuit capability
- $V_{CE(sat)}$ with positive temperature coefficient
- AlSiC baseplate for high power cycling capability
- AlN substrate for low thermal resistance
- High reliability package

Typical Applications

- High Power Converter
- Wind Power
- Traction Drive

Equivalent Circuit Schematic



Absolute Maximum Ratings T_C=25°C unless otherwise noted

IGBT

Symbol	Description	Value	Unit
V_{CES}	Collector-Emitter Voltage	3300	V
V_{GES}	Gate-Emitter Voltage	±20	V
I_C	Collector Current @ T_C=25°C @ T_C=100°C	1500 800	A
I_{CM}	Pulsed Collector Current t_p=1ms	1600	A
P_D	Maximum Power Dissipation @ T_j=150°C	9.62	kW

Diode

Symbol	Description	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	3300	V
I_F	Diode Continuous Forward Current	800	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	1600	A

Module

Symbol	Description	Value	Unit
T_{jmax}	Maximum Junction Temperature	150	°C
T_{jop}	Operating Junction Temperature	-40 to +125	°C
T_{STG}	Storage Temperature Range	-40 to +125	°C
V_{ISO}	Isolation Voltage RMS,f=50Hz,t=1min	6000	V
V_{ISO}	Partial Discharge Extinction Voltage IEC1287,RMS,f=50Hz,Q_{PD}≤10pC	2600	V

IGBT Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C=800A,V_{GE}=15V, T_j=25°C		3.10	3.40	V
		I_C=800A,V_{GE}=15V, T_j=125°C		3.80		
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=160mA,V_{CE}=V_{GE}, T_j=25°C	5.5		7.5	V
I_{CES}	Collector Cut-Off Current	V_{CE}=V_{CES},V_{GE}=0V, T_j=25°C			12.0	mA
I_{GES}	Gate-Emitter Leakage Current	V_{GE}=V_{GES},V_{CE}=0V, T_j=25°C			500	nA
C_{ies}	Input Capacitance	V_{CE}=25V,f=1MHz, V_{GE}=0V		125		nF
C_{res}	Reverse Transfer Capacitance			1.48		nF
Q_G	Gate Charge	V_{CE}=1800V, V_{GE}=-15…+15V		8.07		μC
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=1800V,I_C=800A, R_G=2.2Ω,V_{GE}=±15V, T_j=25°C		525		ns
t_r	Rise Time			190		ns
$t_{d(off)}$	Turn-Off Delay Time			1050		ns
t_f	Fall Time			340		ns
E_{on}	Turn-On Switching Loss			1000		mJ
E_{off}	Turn-Off Switching Loss			880		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=1800V,I_C=800A, R_G=1.2Ω,V_{GE}=±15V, T_j=125°C		530		ns
t_r	Rise Time			200		ns
$t_{d(off)}$	Turn-Off Delay Time			1200		ns
t_f	Fall Time			460		ns
E_{on}	Turn-On Switching Loss			1380		mJ
E_{off}	Turn-Off Switching Loss			1250		mJ
I_{SC}	SC Data	t_P≤10μs,V_{GE}=15V, T_j=125°C,V_{CC}=2500V, V_{CEM}≤3300V		3300		A

Diode Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_F	Diode Forward Voltage	I_F=800A,V_{GE}=0V,T_j=25°C		2.30	2.60	V
		I_F=800A,V_{GE}=0V,T_j=125°C		2.35		
Q_r	Recovered Charge	V_R=1800V,I_F=800A, -di/dt=4200A/μs,V_{GE}=-15V, T_j=25°C		710		μC
I_{RM}	Peak Reverse Recovery Current			500		A
E_{rec}	Reverse Recovery Energy			620		mJ
Q_r	Recovered Charge	V_R=1800V,I_F=800A, -di/dt=4200A/μs,V_{GE}=-15V, T_j=125°C		950		μC
I_{RM}	Peak Reverse Recovery Current			925		A
E_{rec}	Reverse Recovery Energy			1180		mJ

Module Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Min.	Typ.	Max.	Unit
L_{CE}	Stray Inductance		20		nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal to Chip		0.18		mΩ
$R_{\theta JC}$	Junction-to-Case (per IGBT) Junction-to-Case (per Diode)			13.0 25.0	K/kW
$R_{\theta CS}$	Case-to-Sink (per IGBT) Case-to-Sink (per Diode)		12.2 23.4		K/kW
$R_{\theta CS}$	Case-to-Sink		8.0		K/kW
M	Terminal Connection Torque, Screw M4 Terminal Connection Torque, Screw M8 Mounting Torque, Screw M6	1.8 8.0 4.25		2.1 10 5.75	N.m
G	Weight of Module		1050		g

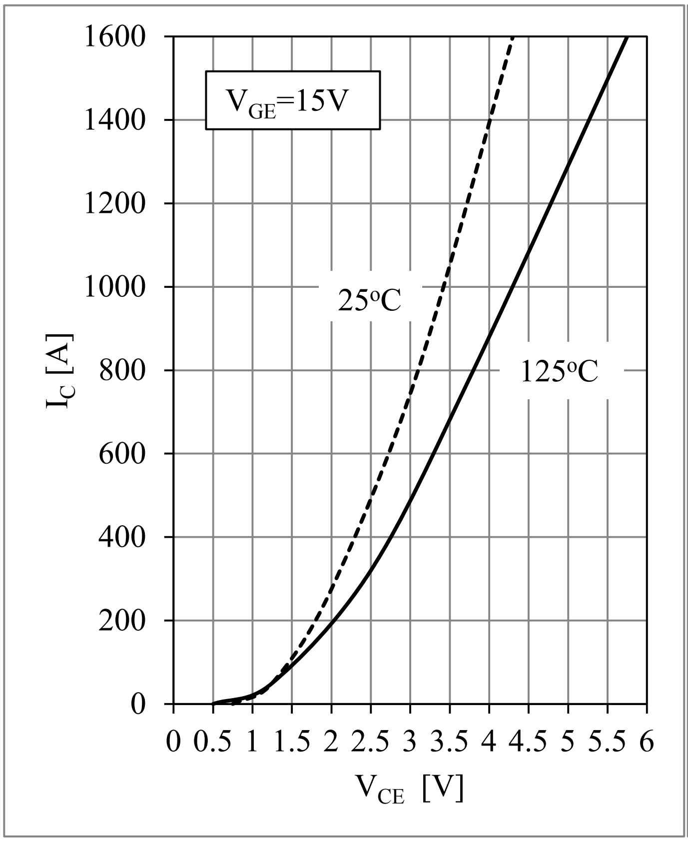


Fig 1. IGBT Output Characteristics

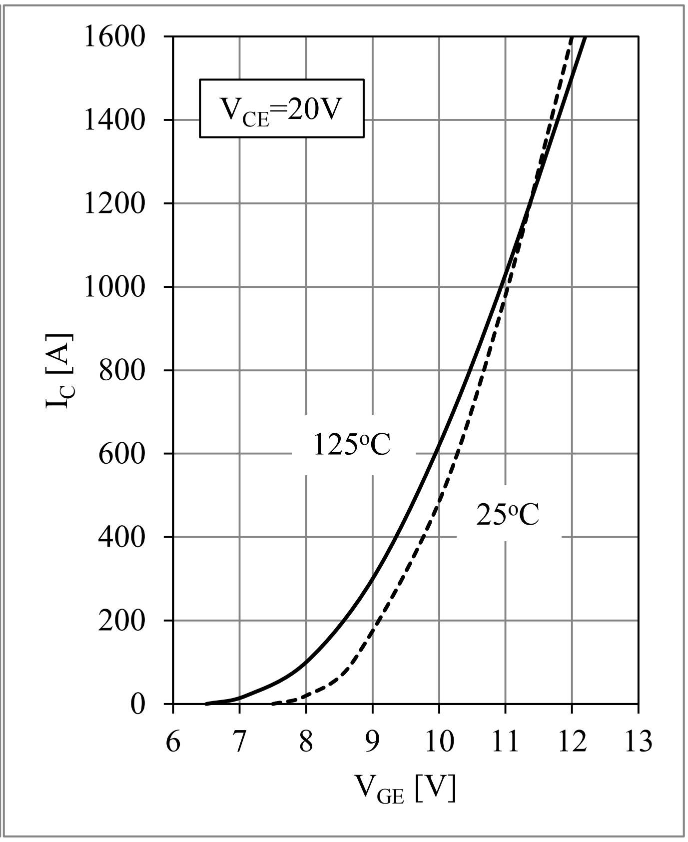


Fig 2. IGBT Transfer Characteristics

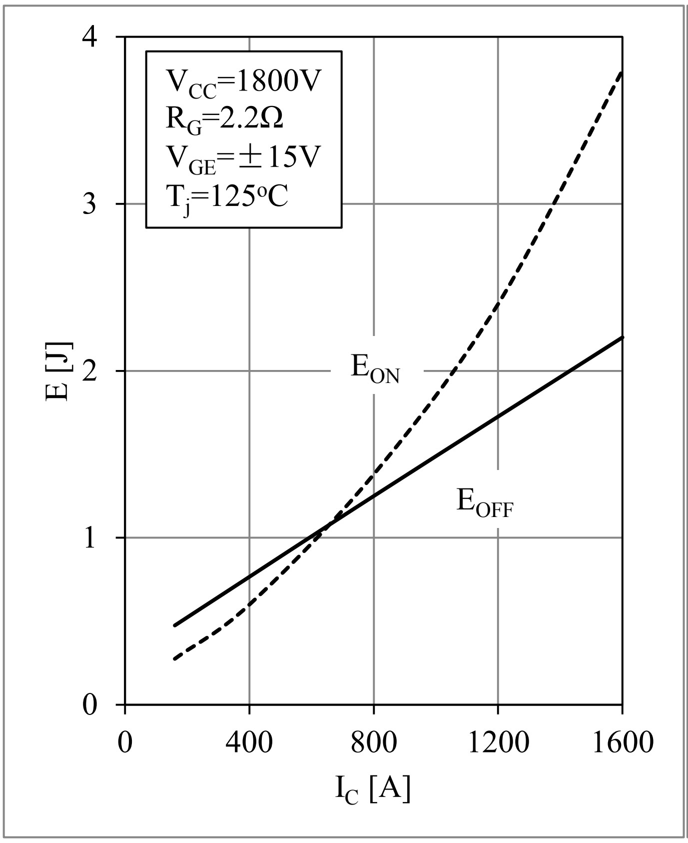


Fig 3. IGBT Switching Loss vs. I_C

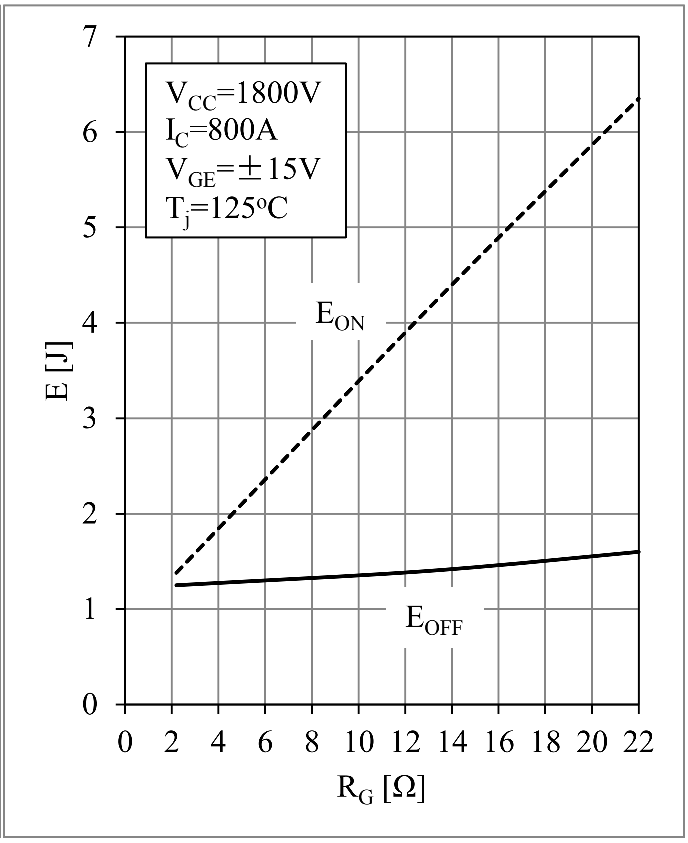


Fig 4. IGBT Switching Loss vs. R_G

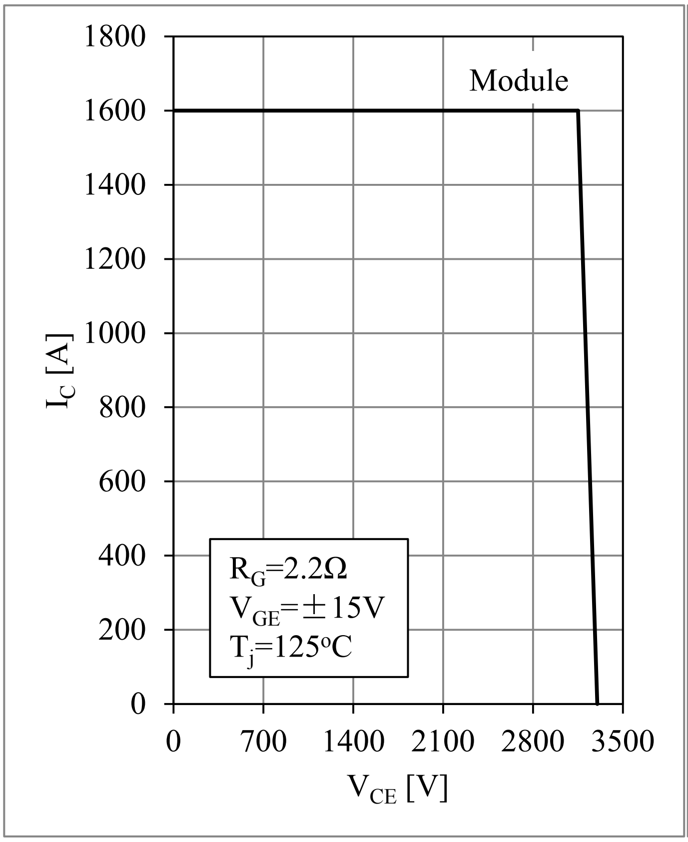


Fig 5. RBSOA

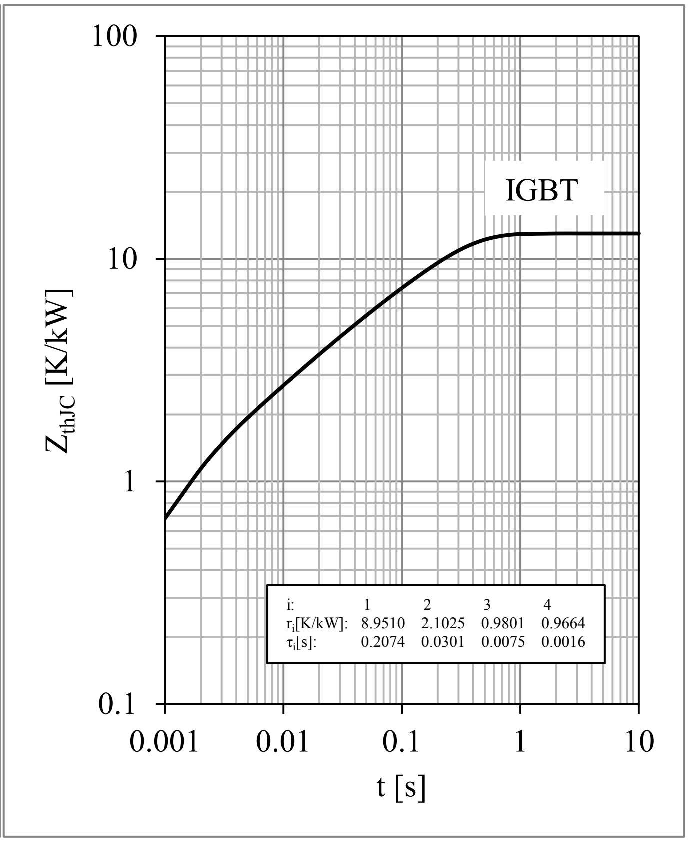


Fig 6. IGBT Transient Thermal Impedance

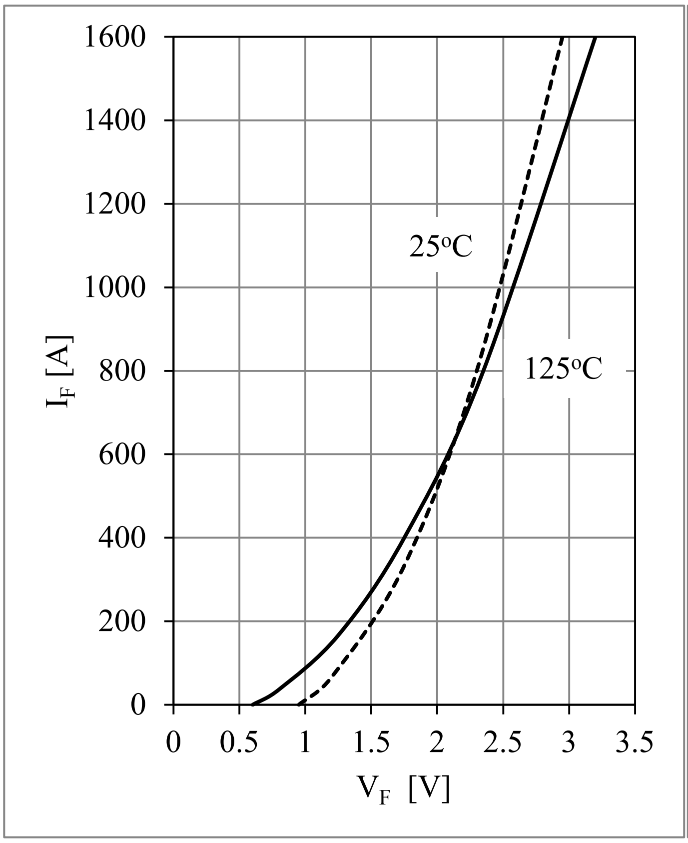


Fig 7. Diode Forward Characteristics

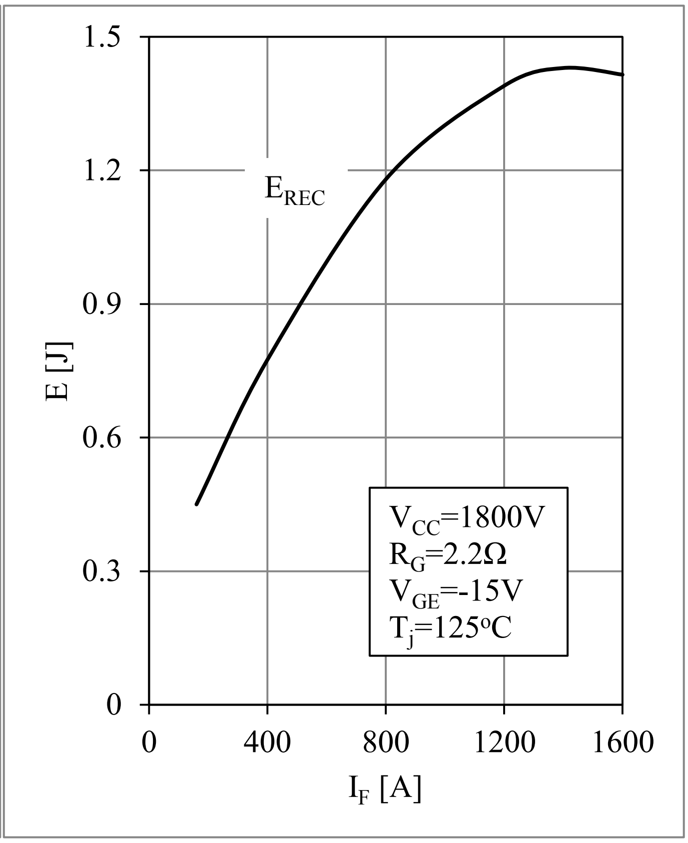


Fig 8. Diode Switching Loss vs. I_F

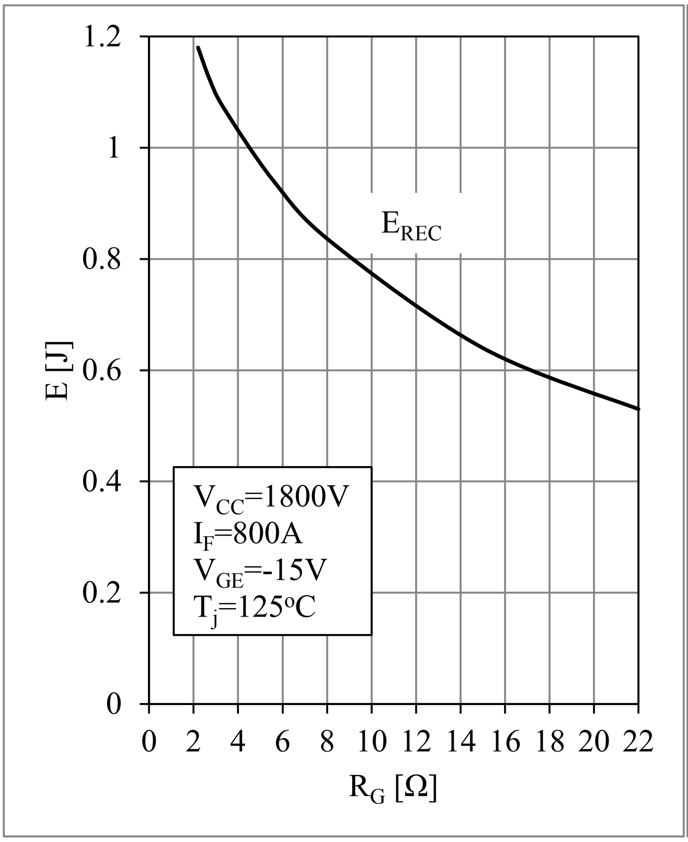


Fig 9. Diode Switching Loss vs. R_G

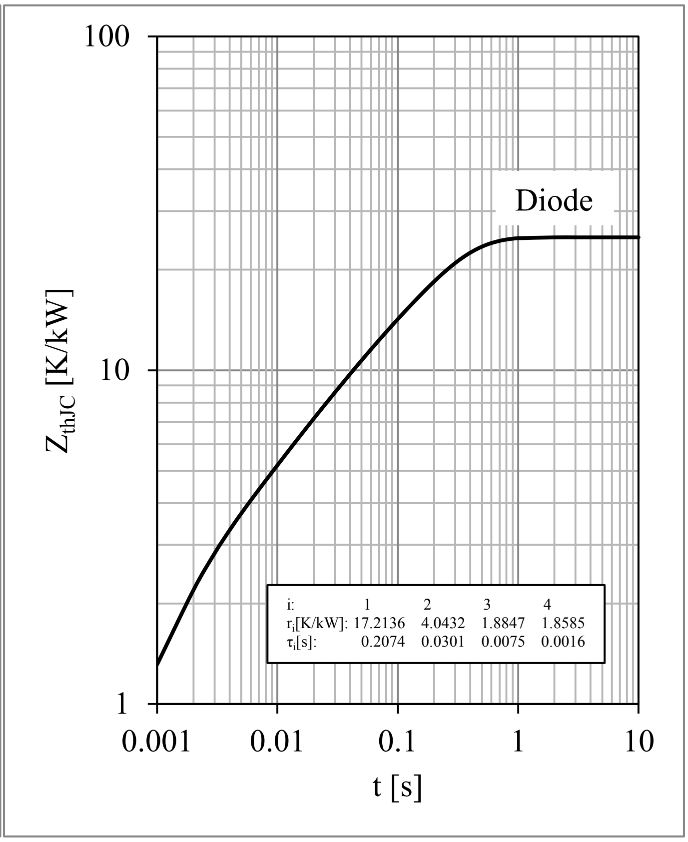
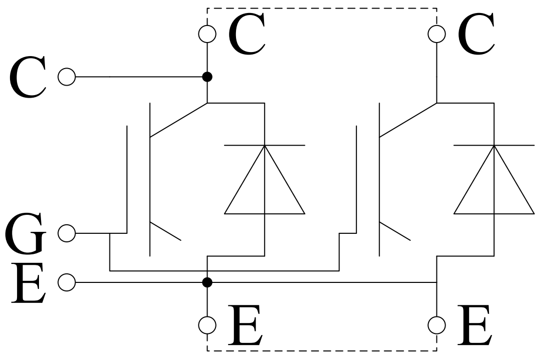


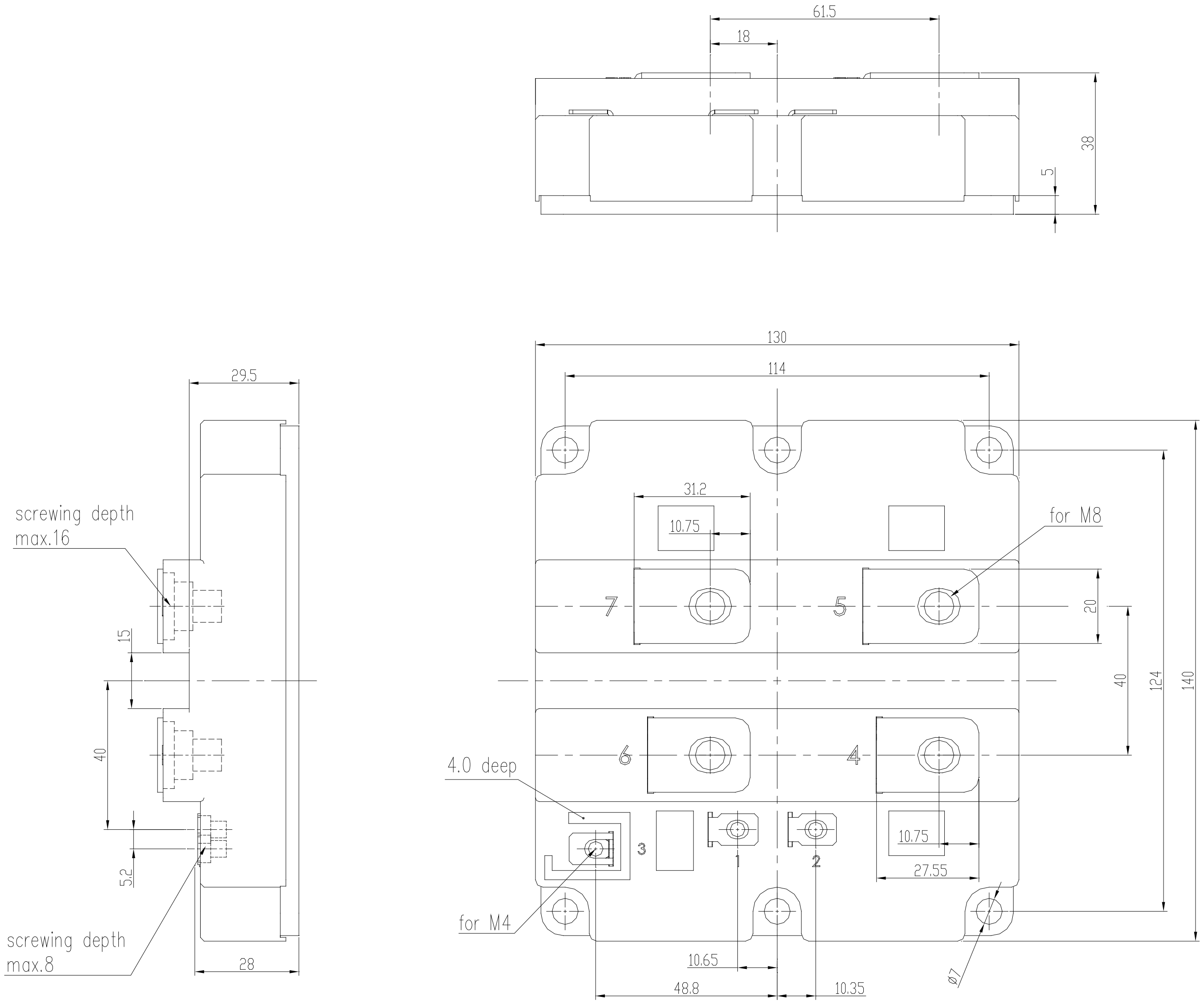
Fig 10. Diode Transient Thermal Impedance

Circuit Schematic



Package Dimensions

Dimensions in Millimeters



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