STARPOWER

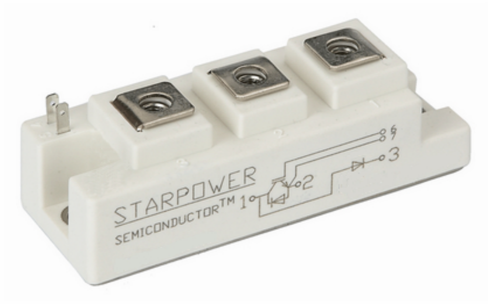
SEMICONDUCTOR™

IGBT

GD100CUT120C1S

Molding Type Module

1200V/100A chopper in one-package

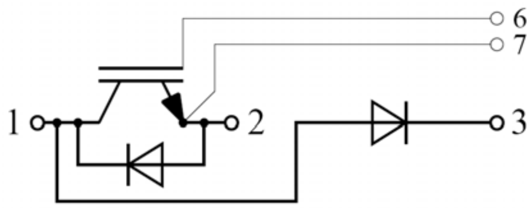


General Description

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 $V_{CE(sat)}$ trench IGBT technology
- Low switching losses
- 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

- Inverter for motor drive
- AC and DC servo drive amplifier
- Uninterruptible power supply

Absolute Maximum Ratings T_C=25℃ unless otherwise noted

Symbol	Description	GD100CUT120C1S	Units
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate-Emitter Voltage	±20	V
I_C	Collector Current @ T_C=25℃	180	A
	@ T_C=80℃	100	
$I_{CM(1)}$	Pulsed Collector Current t_p=1ms	200	A
I_F	Diode Continuous Forward Current	100	A
I_{FM}	Diode Maximum Forward Current	200	A
P_D	Maximum Power Dissipation @ T_j=150℃	446	W
T_j	Maximum Junction Temperature	150	℃
T_{STG}	Storage Temperature Range	-40 to +125	℃
V_{ISO}	Isolation Voltage RMS,f=50Hz,t=1min	2500	V
Mounting Torque	Power Terminal Screw:M5 Mounting Screw:M6	2.5 to 5.0 3.0 to 5.0	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
$V_{(BR)CES}$	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=4.0mA,V_{CE}=V_{GE}, T_j=25℃	5.0	5.8	6.5	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C=100A,V_{GE}=15V, T_j=25℃		1.70	2.15	V
		I_C=100A,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=100A, R_G=3.9Ω,V_{GE}=±15V, T_j=25℃		259		ns
t_r	Rise Time			30		ns
$t_{d(off)}$	Turn-Off Delay Time			415		ns
t_f	Fall Time			70		ns
E_{on}	Turn-On Switching Loss			/		mJ
E_{off}	Turn-Off Switching Loss			/		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=100A, R_G=3.9Ω,V_{GE}=±15V, T_j=125℃		289		ns
t_r	Rise Time			51		ns
$t_{d(off)}$	Turn-Off Delay Time			521		ns
t_f	Fall Time			90		ns
E_{on}	Turn-On Switching Loss			10.0		mJ
E_{off}	Turn-Off Switching Loss			12.0		mJ
C_{ies}	Input Capacitance	V_{CE}=25V,f=1MHz, V_{GE}=0V		7.21		nF
C_{oes}	Output Capacitance			0.38		nF
C_{res}	Reverse Transfer Capacitance			0.33		nF
I_{SC}	SC Data	t_{SC}≤10μs,V_{GE}=15V, T_j=125℃,V_{CC}=600V, V_{CEM}≤1200V		400		A
R_{Gint}	Internal Gate Resistance			7.5		Ω
L_{CE}	Stray Inductance				30	nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal to Chip	T_C=25℃		0.75		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=100A	T_j=25℃		1.82	2.22	V
			T_j=125℃		1.95		
Q_r	Recovered Charge	I_F=100A, V_R=600V, di/dt=-1900A/μs, V_{GE}=-15V	T_j=25℃		5.4		μC
			T_j=125℃		11.2		
I_{RM}	Peak Reverse Recovery Current		T_j=25℃		81		A
			T_j=125℃		101		
E_{rec}	Reverse Recovery Energy		T_j=25℃		3.54		mJ
			T_j=125℃		6.57		

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (per IGBT)		0.28	K/W
$R_{\theta JC}$	Junction-to-Case (per DIODE)		0.31	K/W
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)	0.05		K/W
Weight	Weight of Module	150		g

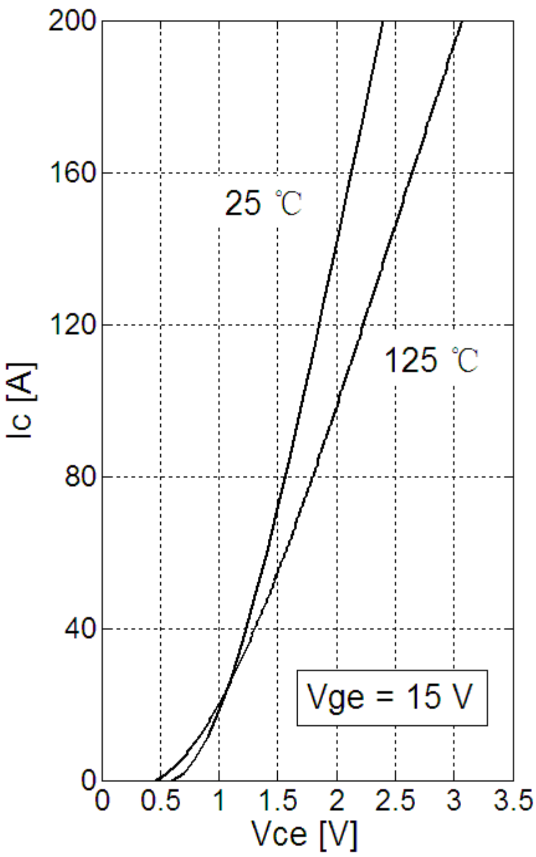


Fig 1. IGBT Typical Output Characteristics

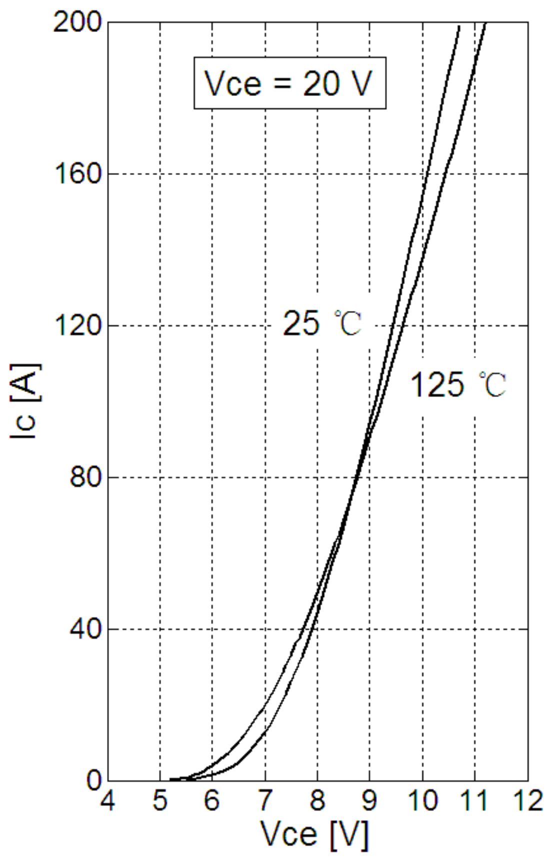


Fig 2. IGBT Typical Transfer Characteristics

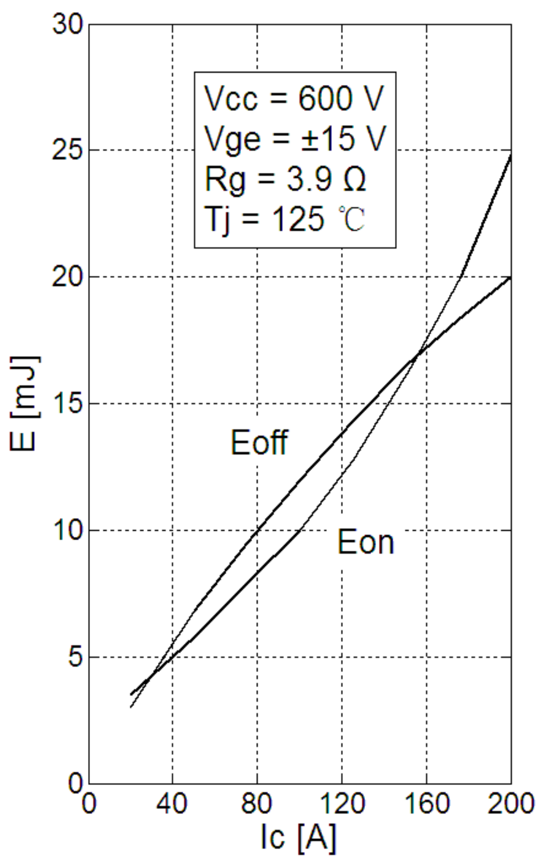


Fig 3. IGBT Switching Loss vs. I_C

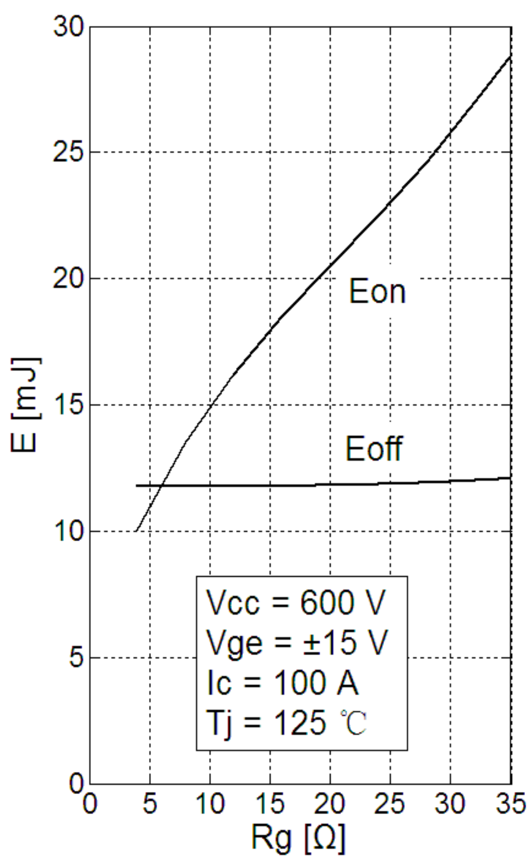


Fig 4. IGBT Switching Loss vs. R_G

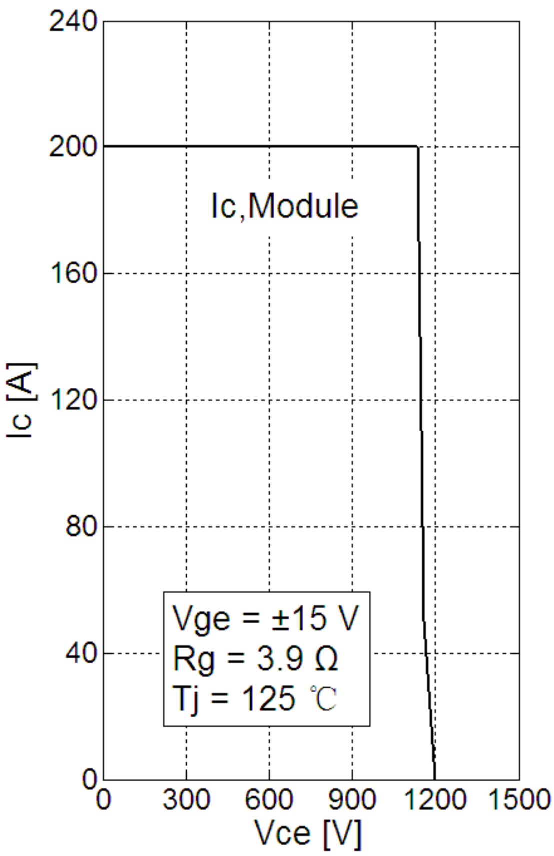


Fig 5. RBSOA

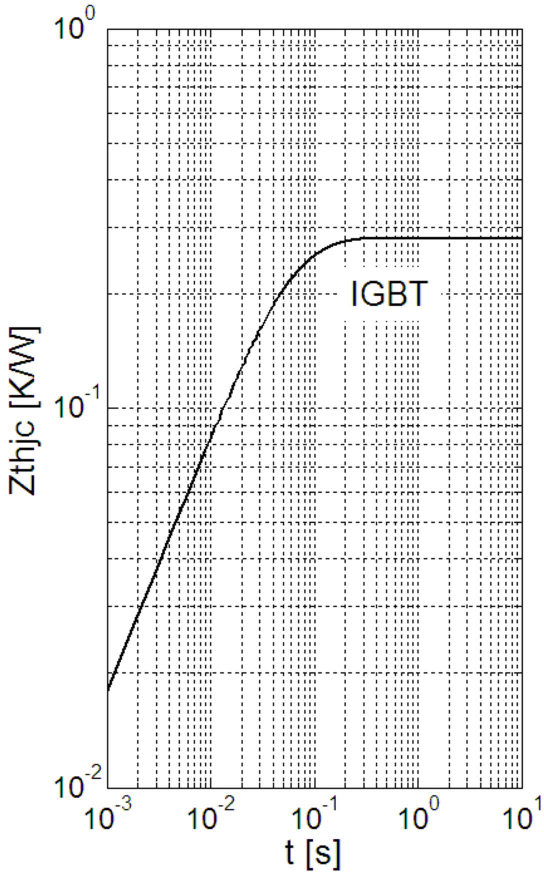


Fig 6. IGBT Transient Thermal Impedance

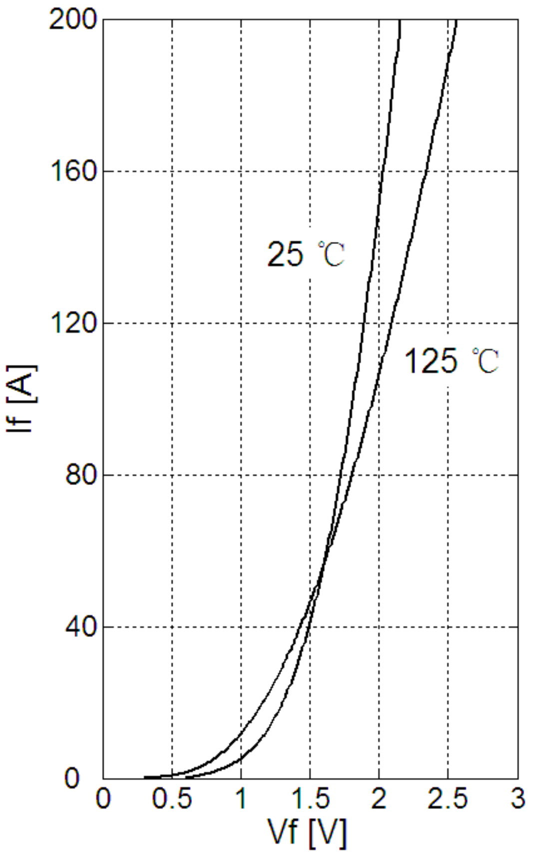


Fig 7. Diode Typical Forward Characteristics

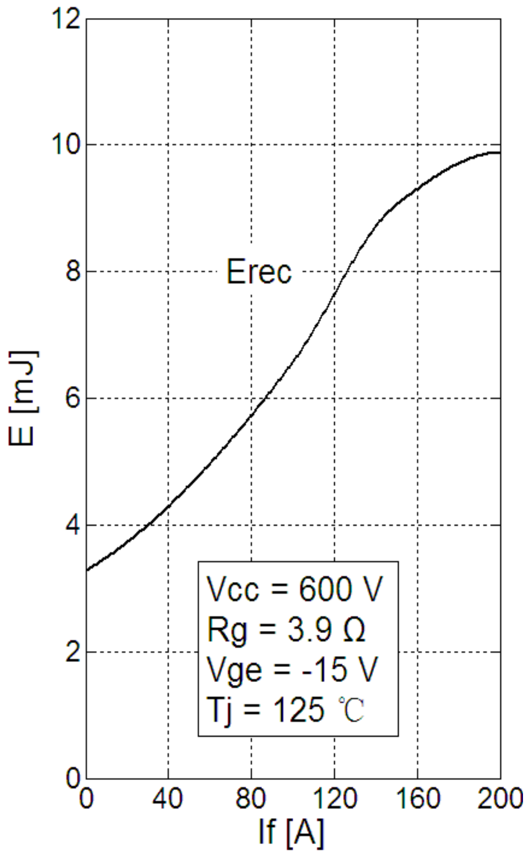


Fig 8. Diode Switching Loss vs. I_F

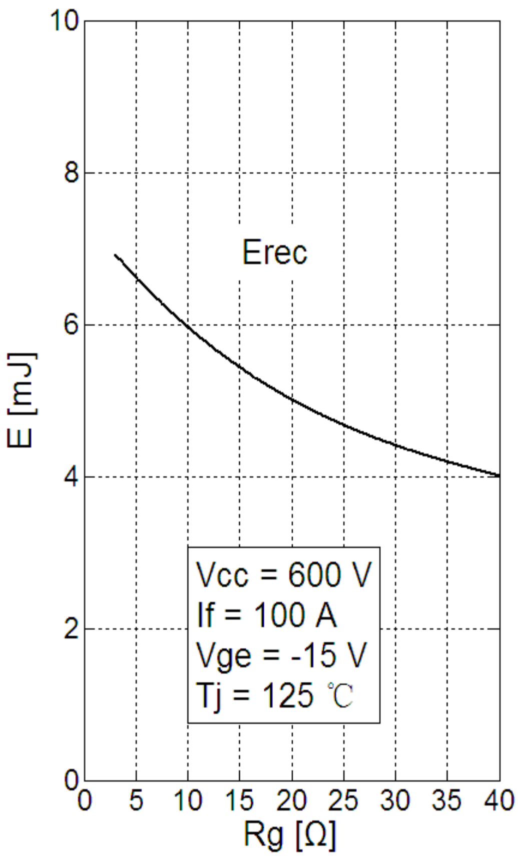


Fig 9. Diode Switching Loss vs. R_G

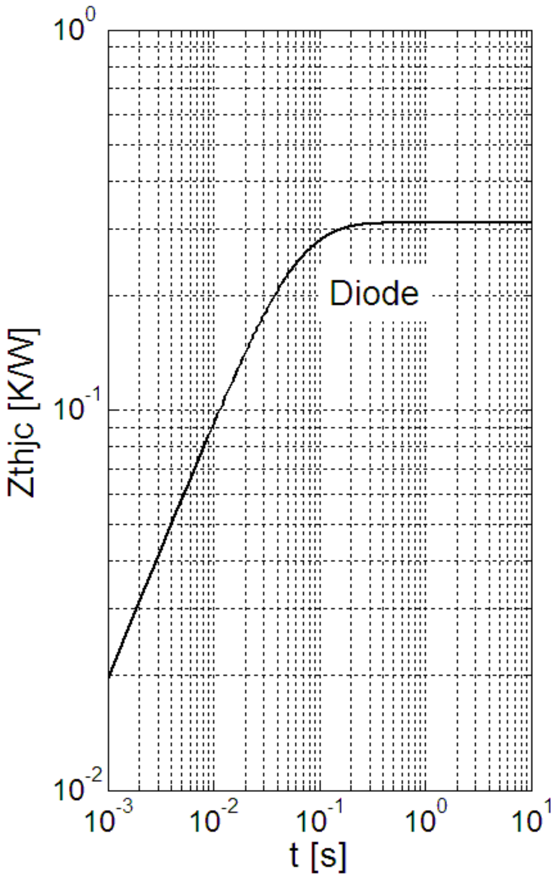
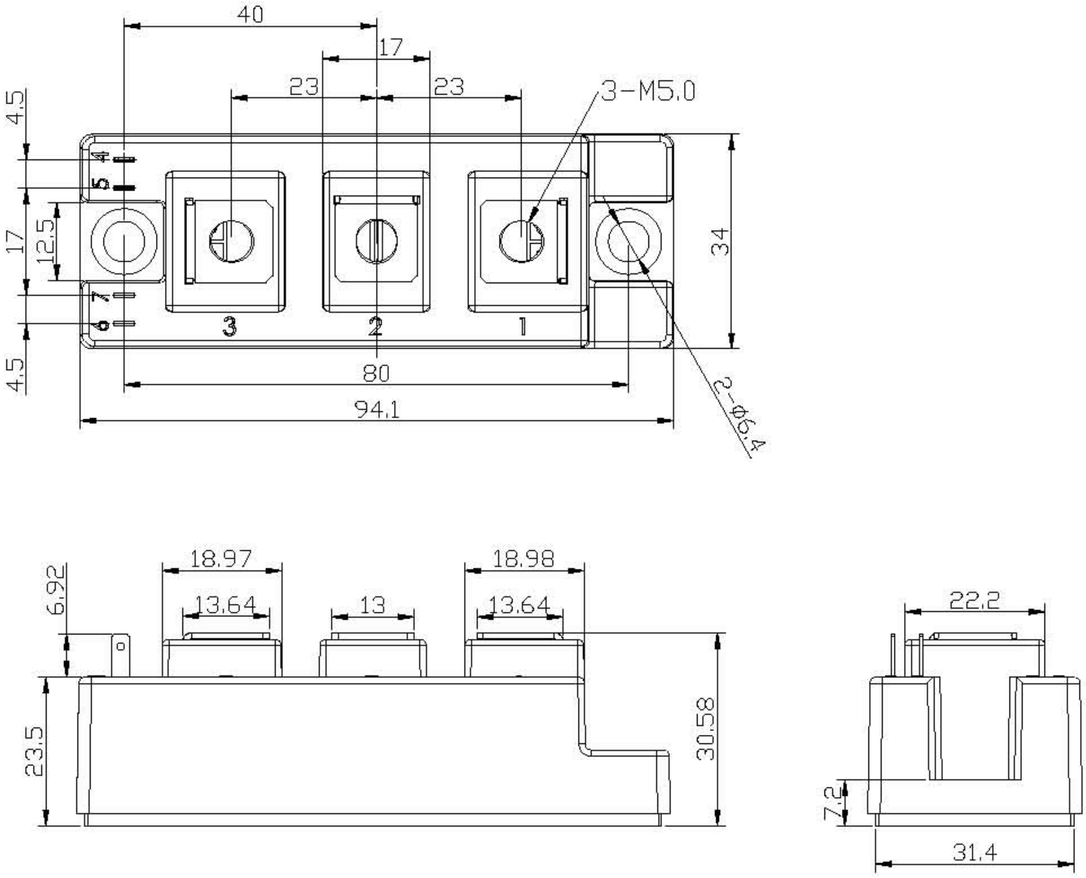


Fig 10. Diode Transient Thermal Impedance

Package Dimension

Dimensions in Millimeters



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