

STARPOWER

SEMICONDUCTOR™

IGBT

GD600SGT170C2S

Molding Type Module

1700V/600A 1 in one-package

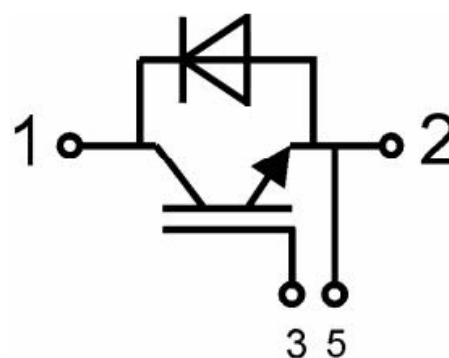
General Description

STARPOWER IGBT Power Module provides ultra low conduction loss as well as short circuit ruggedness. They are designed for the applications such as Inverters and UPS.



Features

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

- AC inverter drives
- Switching mode power supplies

Absolute Maximum Ratings $T_C=25^\circ\text{C}$ unless otherwise noted

Symbol	Description	GD600SGT170C2S	Units
V_{CES}	Collector-Emitter Voltage	1700	V
V_{GES}	Gate-Emitter Voltage	± 20	V

Symbol	Description	GD600SGT170C2S	Units
I _C	Collector Current @ T _C =25°C	1100	A
	@ T _C =80°C	600	
I _{CM(1)}	Pulsed Collector Current t _p =1ms	1200	A
I _F	Diode Continuous Forward Current	600	A
I _{FM}	Diode Maximum Forward Current	1200	A
P _D	Maximum Power Dissipation @ T _j =175°C	4167	W
T _{SC}	Short Circuit Withstand Time @ T _j =125°C	10	μs
T _{jmax}	Maximum Junction Temperature	175	°C
T _{STG}	Storage Temperature Range	-40 to +125	°C
I ² t-value, Diode	V _R =0V, t=10ms, T _j =125°C	53000	A ² s
V _{ISO}	Isolation Voltage RMS, f=50Hz, t=1min	4000	V
Mounting Torque	Power Terminal Screw:M4	1.1 to 2.0	N.m
	Power Terminal Screw:M6	2.5 to 5.0	
	Mounting Screw:M6	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°C unless otherwise noted**Off Characteristics**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V _{(BR)CES}	Collector-Emitter Breakdown Voltage	V _{GE} =0V, I _C =16mA, T _j =25°C	1700			V
I _{CES}	Collector Cut-Off Current	V _{CE} =V _{CES} , V _{GE} =0V, T _j =25°C			5.0	mA
I _{GES}	Gate-Emitter Leakage Current	V _{GE} =V _{GES} , V _{CE} =0V, T _j =25°C			400	nA

On Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V _{GE(th)}	Gate-Emitter Threshold Voltage	I _C =24mA, V _{CE} =V _{GE} , T _j =25°C	5.2	5.8	6.4	V
V _{CE(sat)}	Collector to Emitter Saturation Voltage	I _C =600A, V _{GE} =15V, T _j =25°C		2.00	2.45	V
		I _C =600A, V _{GE} =15V, T _j =125°C		2.40		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
t _{d(on)}	Turn-On Delay Time	V _{CC} =900V, I _C =600A, R _G =2.4Ω, V _{GE} =±15V, T _j =25°C		281		ns
t _r	Rise Time			99		ns
t _{d(off)}	Turn-Off Delay Time				852	ns

t_f	Fall Time	$V_{CC}=900V, I_C=600A,$ $R_G=2.4\Omega, V_{GE}=\pm 15V,$ $T_j=25^\circ C$		151		ns
E_{on}	Turn-On Switching Loss			/		mJ
E_{off}	Turn-Off Switching Loss			/		mJ
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=900V, I_C=600A,$ $R_G=2.4\Omega, V_{GE}=\pm 15V,$ $T_j=125^\circ C$		331		ns
t_r	Rise Time			101		ns
$t_{d(off)}$	Turn-Off Delay Time			1002		ns
t_f	Fall Time			228		ns
E_{on}	Turn-On Switching Loss			201		mJ
E_{off}	Turn-Off Switching Loss			188		mJ
C_{ies}	Input Capacitance	$V_{CE}=25V, f=1MHz,$ $V_{GE}=0V$		50		nF
C_{oes}	Output Capacitance			2.2		nF
C_{res}	Reverse Transfer Capacitance			1.8		nF
I_{SC}	SC Data	$t_{sc} \leq 10\mu s, V_{GE}=15V,$ $T_j=125^\circ C, V_{CC}=1000V,$ $V_{CEM} \leq 1700V$		2220		A
R_{Gint}	Internal Gate Resistance			1.25		Ω
L_{CE}	Stray Inductance				20	nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal to Chip			0.18		m Ω

Electrical Characteristics of DIODE $T_C=25^\circ C$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units	
V_F	Diode Forward Voltage	$I_F=600A$	$T_j=25^\circ C$		1.80	2.20	V
			$T_j=125^\circ C$		1.90		
Q_r	Diode Reverse Recovery Charge	$I_F=600A,$ $V_R=900V,$ $di/dt=-5200A/\mu s,$ $V_{GE}=-15V$	$T_j=25^\circ C$		151		μC
			$T_j=125^\circ C$		248		
I_{RM}	Diode Peak Reverse Recovery Current		$T_j=25^\circ C$		638		A
			$T_j=125^\circ C$		702		
E_{rec}	Reverse Recovery Energy		$T_j=25^\circ C$		84		mJ
			$T_j=125^\circ C$		146		

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (IGBT Part, per Module)		0.036	K/W
$R_{\theta JC}$	Junction-to-Case (DIODE Part, per Module)		0.075	K/W
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)	0.035		K/W
Weight	Weight of Module	300		g

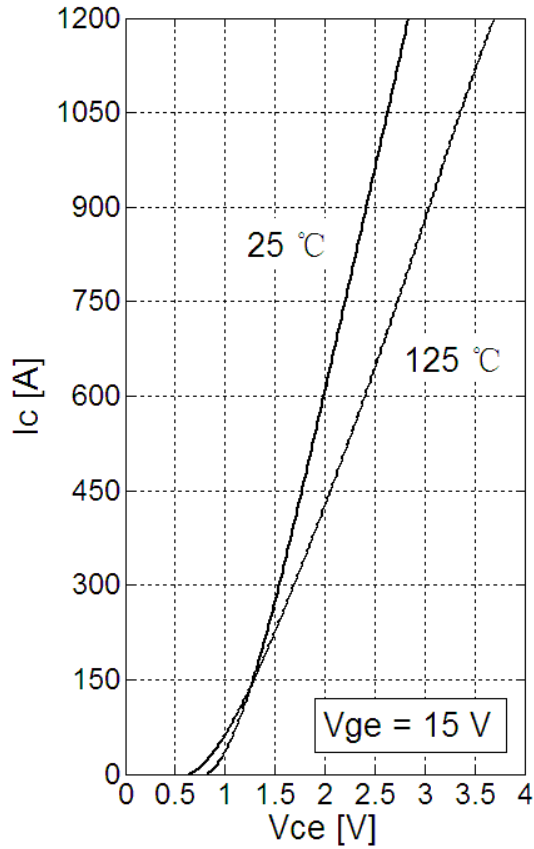


Fig 1. IGBT Typical Output Characteristics

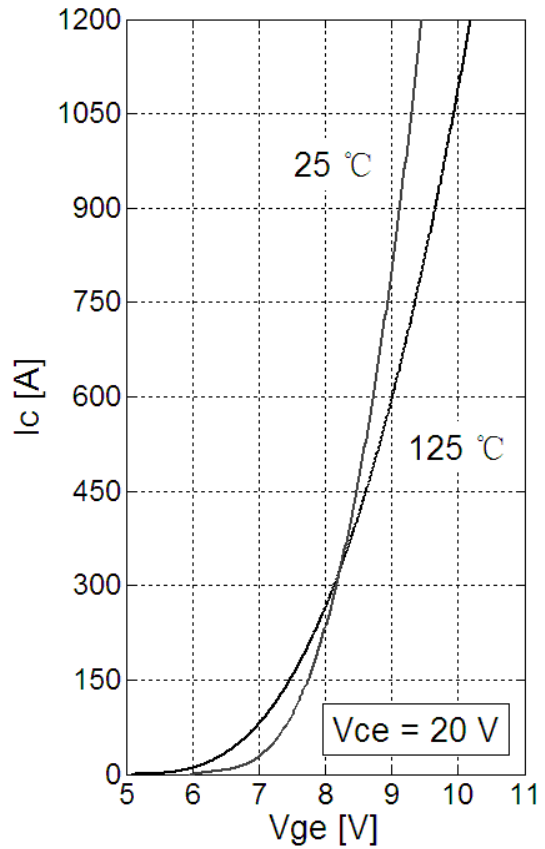


Fig 2. IGBT Typical Transfer Characteristics

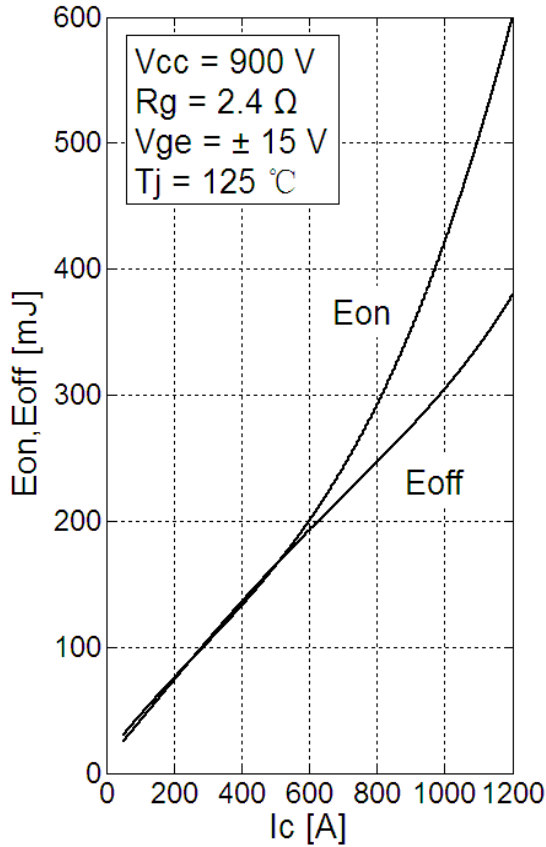


Fig 3. IGBT Switching Loss vs. I_C

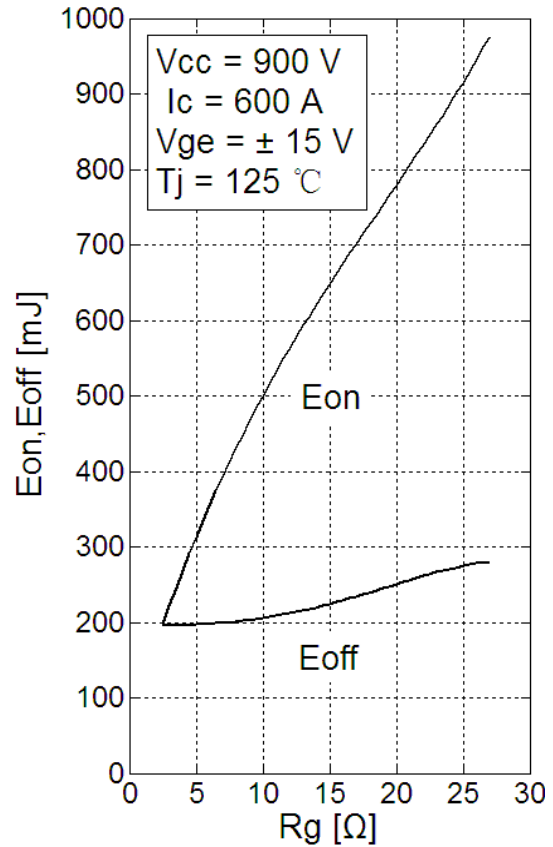


Fig 4. IGBT Switching Loss vs. R_G

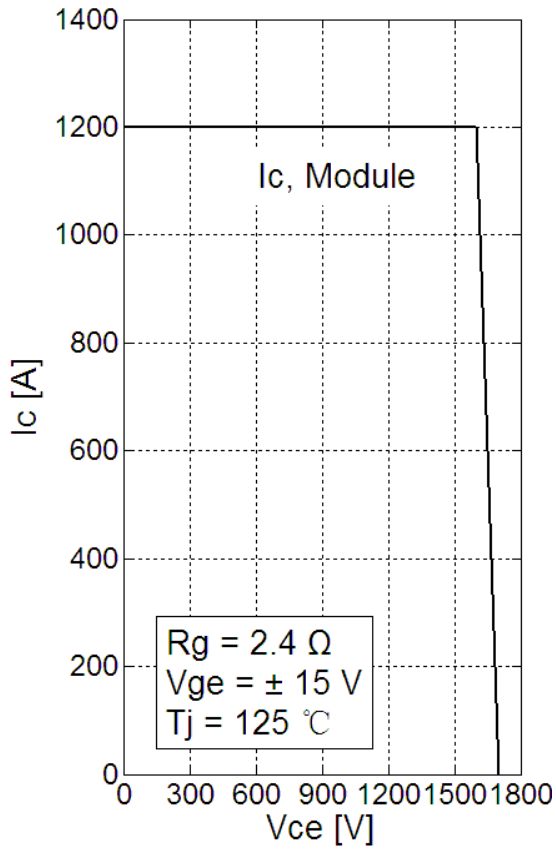


Fig 5. RBSOA

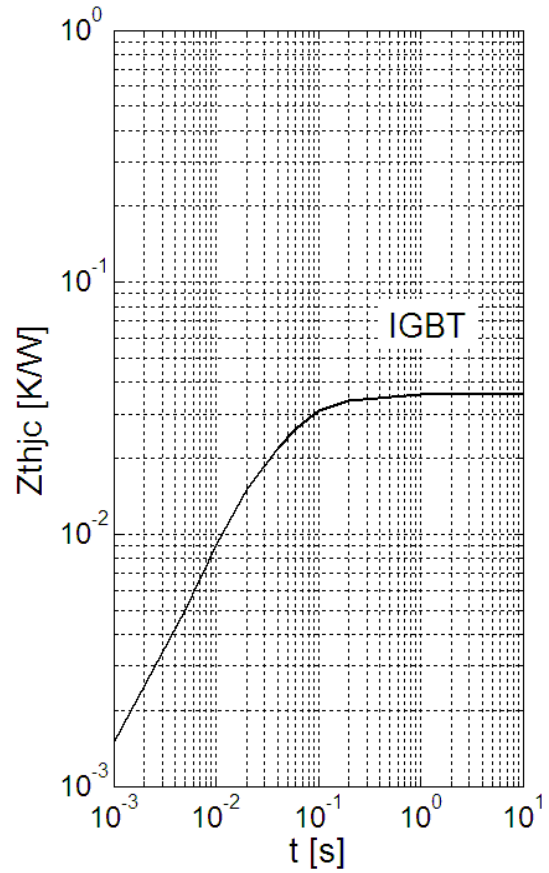


Fig 6. IGBT Transient Thermal Impedance

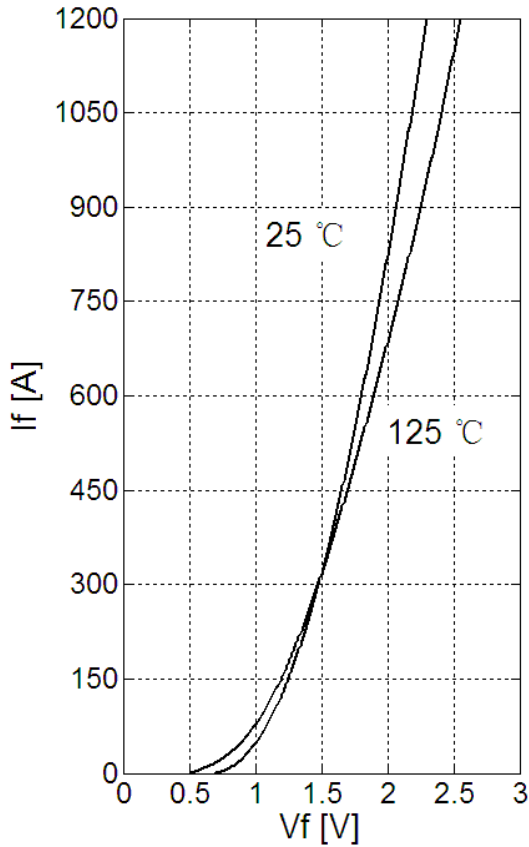


Fig 7. Diode Forward Characteristics

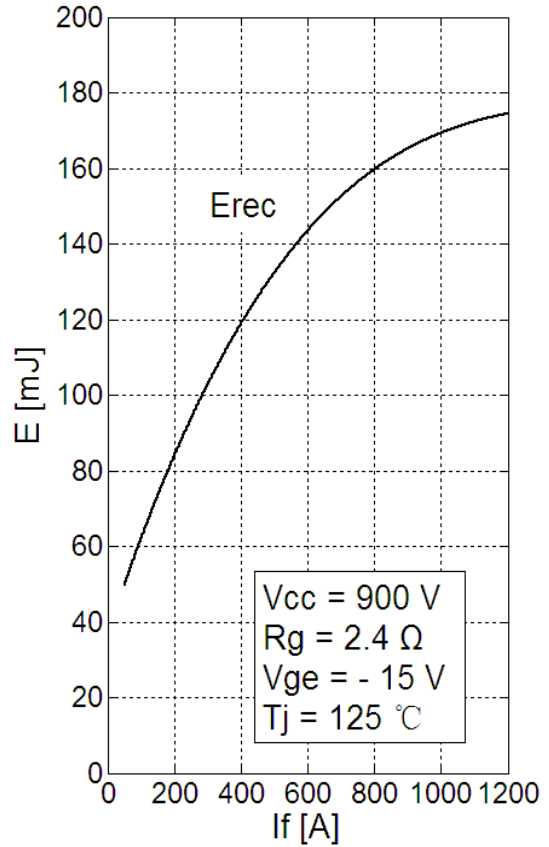


Fig 8. Diode Switching Loss vs. I_f

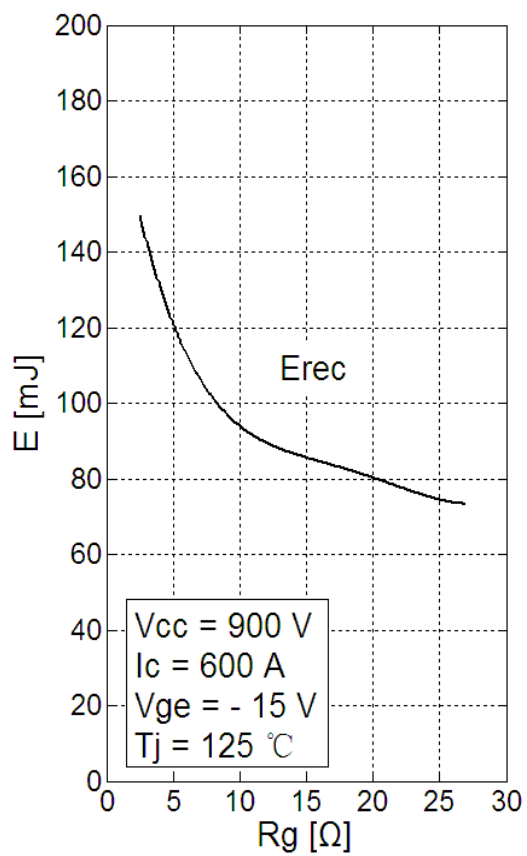


Fig 9. Diode Switching Loss vs. R_G

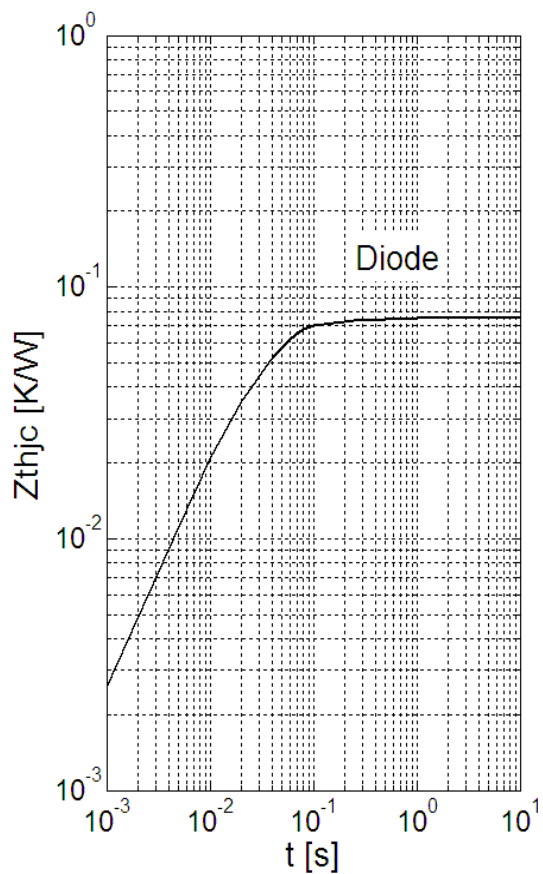
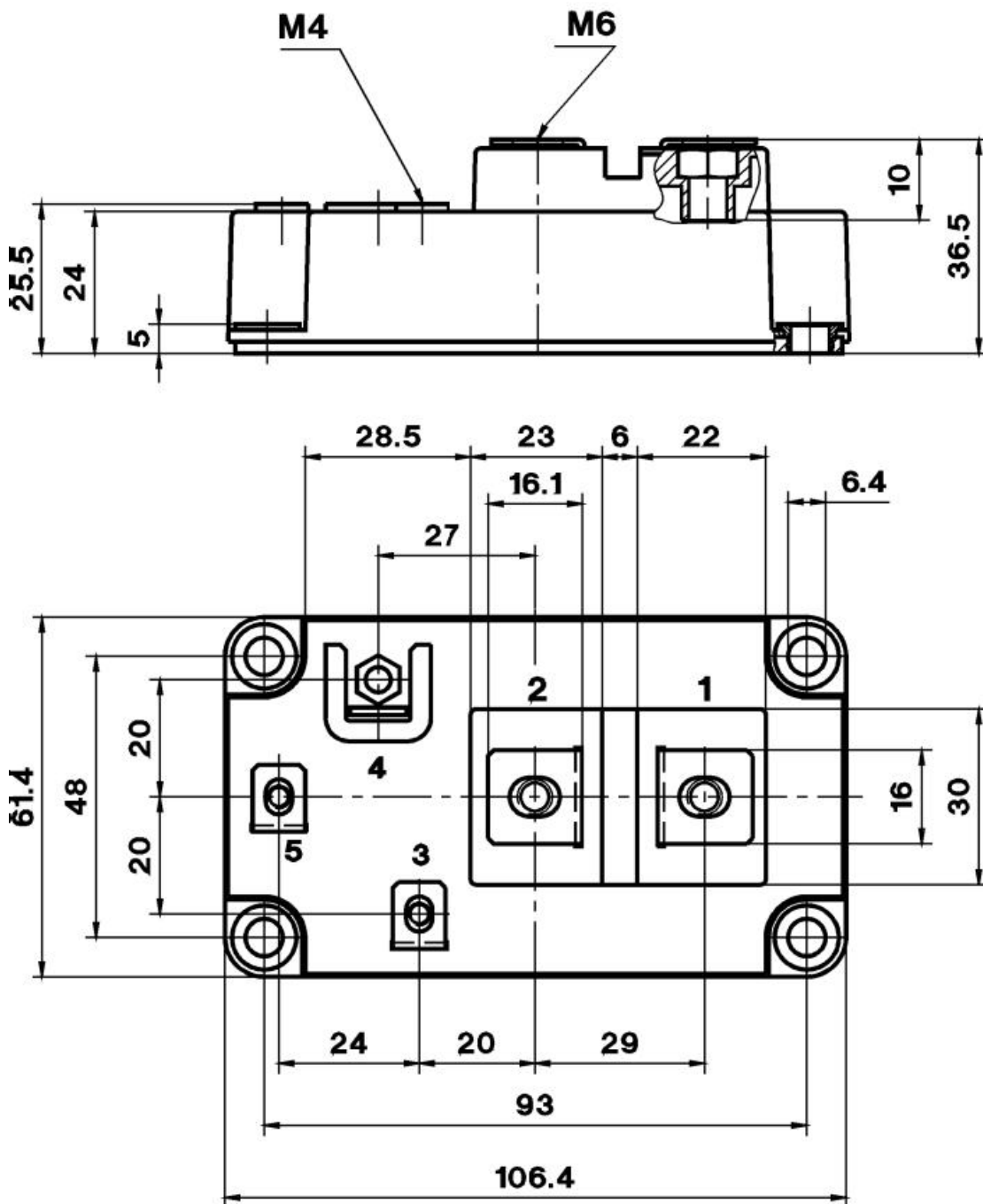


Fig 10. Diode Transient Thermal Impedance

Package Dimension

Dimensions in Millimeters



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