

STARPOWER

SEMICONDUCTOR™

IGBT

GD200HFK60C2S

Molding Type Module

600V/200A 2 in one-package

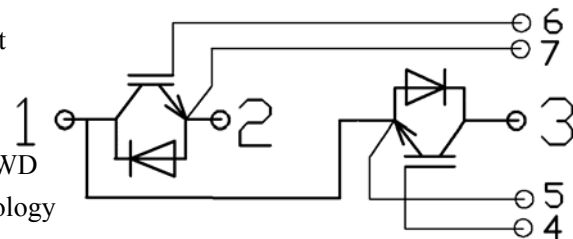
General Description

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



Features

- High short circuit capability
- 10 μ s short circuit capability
- $V_{CE(sat)}$ with positive temperature coefficient
- Latch-up free
- Low inductance case
- Fast & soft reverse recovery anti-parallel FWD
- Isolated copper baseplate using DBC technology



Equivalent Circuit Schematic

Typical Applications

- UPS
- Switching mode power supplies
- Electronic welders

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

Symbol	Description	GD200HFK60C2S	Units
V_{CES}	Collector-Emitter Voltage	600	V

Symbol	Description	GD200HFK60C2S	Units
V_{GES}	Gate-Emitter Voltage	$\pm 20V$	V
I_C	Collector Current @ $T_C=25^\circ C$ @ $T_C=80^\circ C$	260	A
		200	
$I_{CM(1)}$	Pulsed Collector Current $t_p=1ms$	400	A
I_F	Diode Continuous Forward Current	200	A
I_{FM}	Diode Maximum Forward Current	400	A
P_D	Maximum power Dissipation @ $T_j=150^\circ C$	1042	W
T_{SC}	Short Circuit Withstand Time @ $T_j=125^\circ C$	10	μs
T_j	Operating Junction Temperature	-40 to +150	$^\circ C$
T_{STG}	Storage Temperature Range	-40 to +125	$^\circ C$
I^2t -value, Diode	$V_R=0V, t=10ms, T_j=125^\circ C$	4900	A^2s
V_{ISO}	Isolation Voltage RMS, $f=50Hz, t=1min$	2500	V
Mounting Torque	Power Terminal Screw:M6	2.5 to 5.0	N.m
	Mounting Screw:M6	3.0 to 6.0	N.m

Notes:

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

Electrical Characteristics of IGBT $T_C=25^\circ C$ unless otherwise noted**Off Characteristics**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV_{CES}	Collector-Emitter Breakdown Voltage	$T_j=25^\circ C$	600			V
I_{CES}	Collector Cut-Off Current	$V_{CE}=V_{CES}, V_{GE}=0V,$ $T_j=25^\circ C$			5.0	mA
I_{GES}	Gate-Emitter Leakage Current	$V_{GE}=V_{GES}, V_{CE}=0V,$ $T_j=25^\circ C$			400	nA

On Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C=0.25mA, V_{CE}=V_{GE},$ $T_j=25^\circ C$	3.5	4.5	5.5	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C=200A, V_{GE}=15V, T_j=25^\circ C$		1.9		V
		$I_C=200A, V_{GE}=15V,$ $T_j=125^\circ C$		2.3		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=300V, I_C=200A,$ $R_G=4.7\Omega, V_{GE} = \pm 15V,$ $T_j=25^\circ C$		106		ns
t_r	Rise Time			45		ns
$t_{d(off)}$	Turn-Off Delay Time				460	

t_f	Fall Time	$V_{CC}=300V, I_C=200A,$ $R_G=4.7\Omega, V_{GE} = \pm 15V,$ $T_j=25^\circ C$		51		ns
E_{on}	Turn-On Switching Loss			4.2		mJ
E_{off}	Turn-Off Switching Loss			9.0		mJ
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=300V, I_C=200A,$ $R_G=4.7\Omega, V_{GE} = \pm 15V,$ $T_j=125^\circ C$		120		ns
t_r	Rise Time			68		ns
$t_{d(off)}$	Turn-Off Delay Time			510		ns
t_f	Fall Time			70		ns
E_{on}	Turn-On Switching Loss			5.1		mJ
E_{off}	Turn-Off Switching Loss			11.3		mJ
C_{ies}	Input Capacitance	$V_{CE} = 25V, f=1MHz,$ $V_{GE} = 0V$		13.1		nF
C_{oes}	Output Capacitance			0.71		nF
C_{res}	Reverse Transfer Capacitance			0.38		nF
I_{SC}	SC Data	$T_P \leq 10\mu s, V_{GE}=15V,$ $T_j=125^\circ C, V_{CC}=300V,$ $V_{CEM} \leq 600V$		650		A
L_{CE}	Stray inductance			20		nH
$R_{CC'+EE'}$	Module lead resistance, terminal to chip	$T_C=25^\circ C$		0.35		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	$I_F=200A$	$T_j=25^\circ C$		1.4	1.6	V
			$T_j=125^\circ C$		1.6	1.8	
Q_r	Diode Reverse Recovery Charge	$I_F=200A,$ $V_R=300V,$ $di/dt=-6000A/\mu s,$ $V_{GE}=-15V$	$T_j=25^\circ C$		9		μC
			$T_j=125^\circ C$		16		
I_{RM}	Diode Peak Reverse Recovery Current		$T_j=25^\circ C$		140		A
			$T_j=125^\circ C$		165		
E_{rec}	Reverse Recovery Energy		$T_j=25^\circ C$		2.4		mJ
			$T_j=125^\circ C$		4.2		

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (per IGBT)		0.12	K/W
$R_{\theta JC}$	Junction-to-Case (per DIODE)		0.27	K/W
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)	0.03		K/W
Weight	Weight of Module	325		g

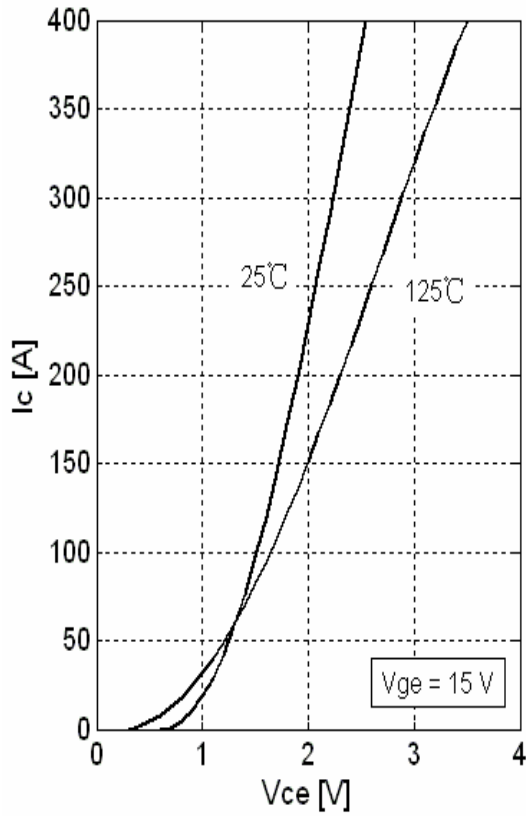


Fig 1. Typical Output Characteristics

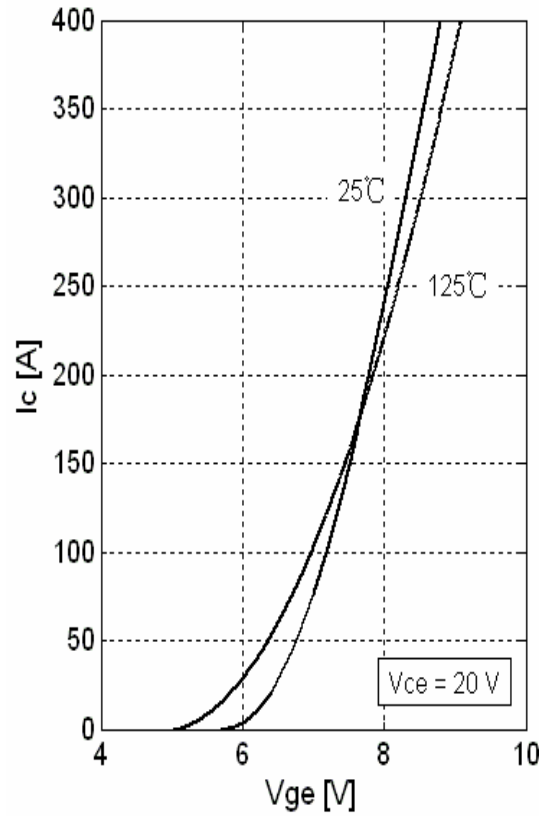


Fig 2. Typical Transfer Characteristics

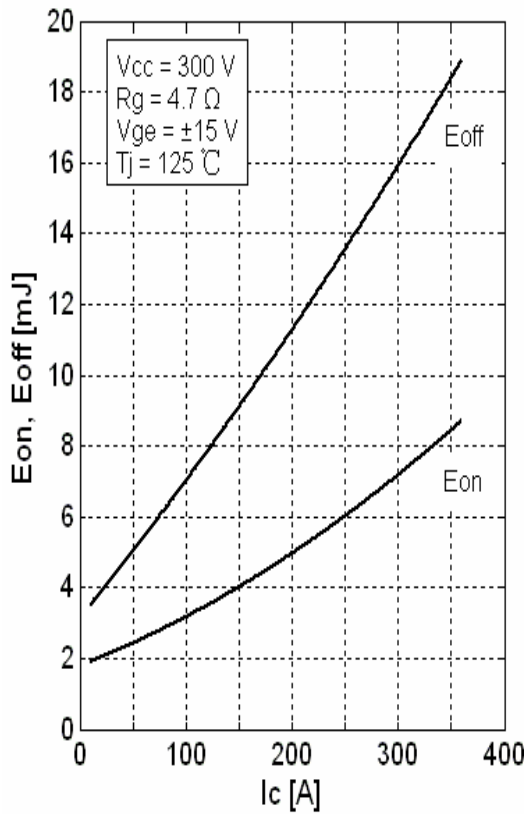


Fig 3. Switching Loss vs Collector Current

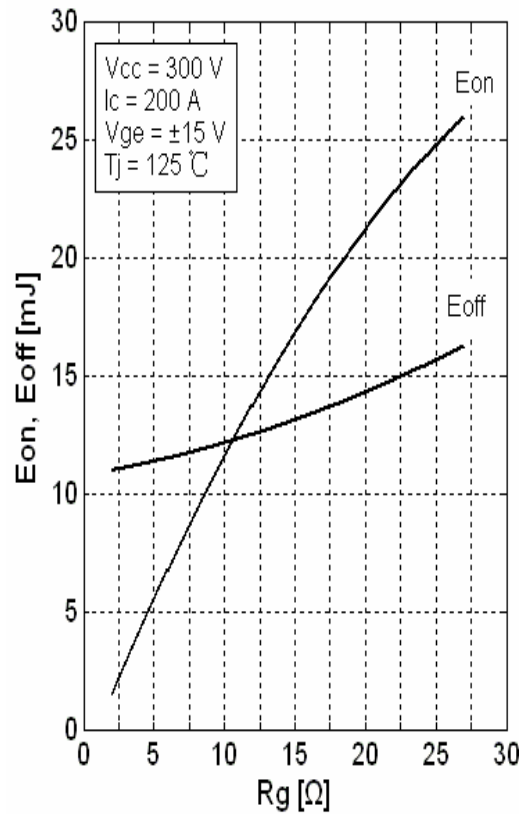


Fig 4. Switching Loss vs Gate Resistor

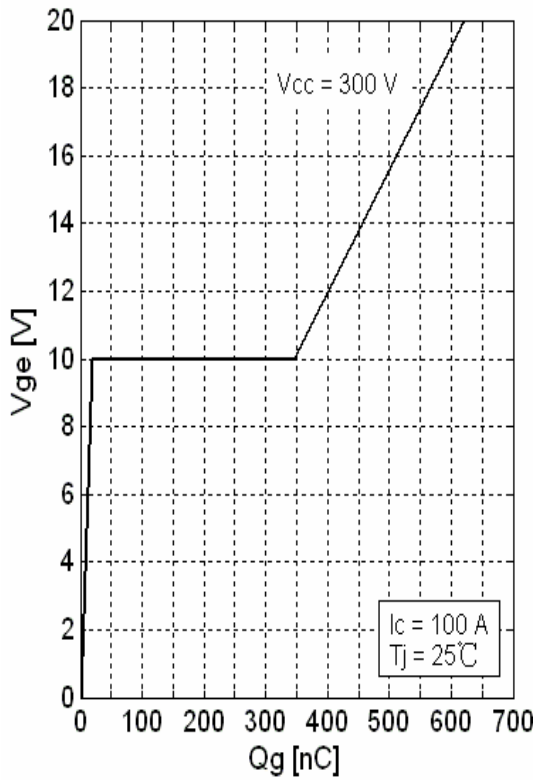


Fig 5. Gate Charge Characteristics.

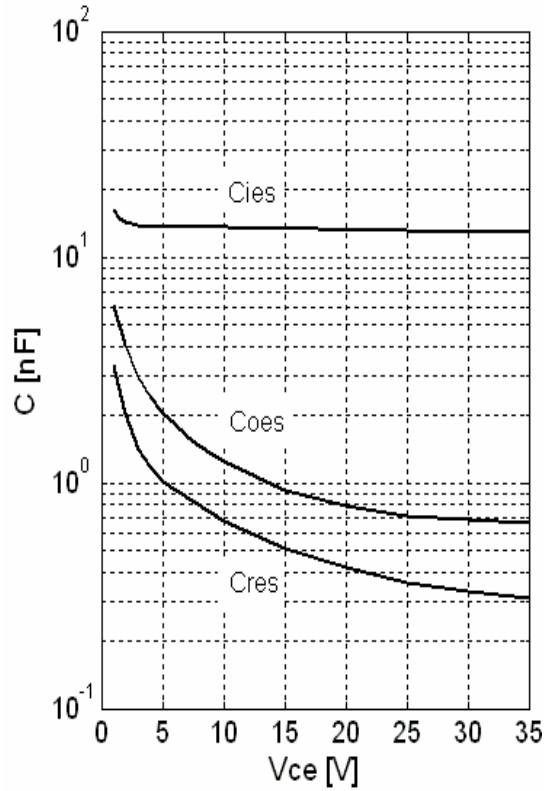


Fig 6. Typical Capacitance vs Collector-Emitter Voltage

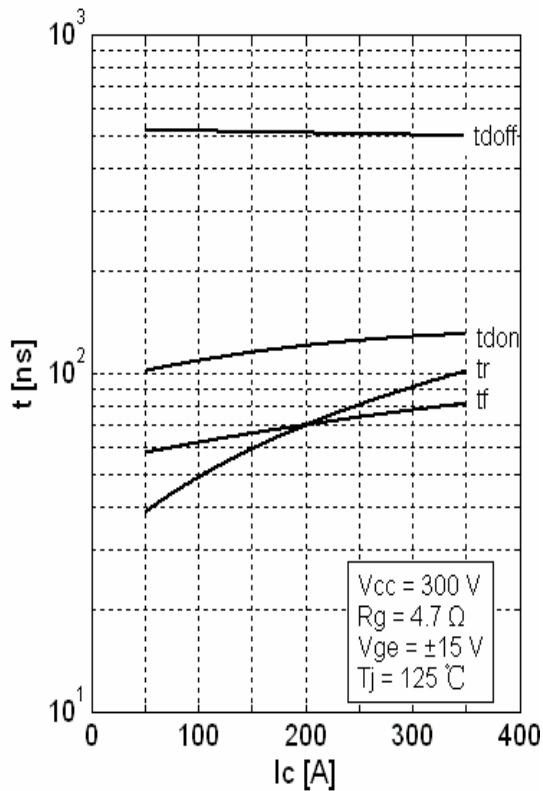


Fig 7. Typical Switching Times vs I_C

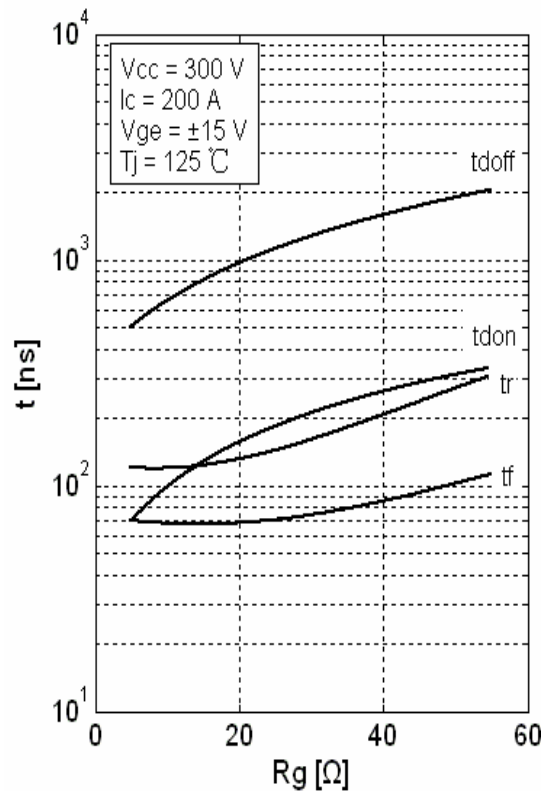


Fig 8. Typical Switching Times vs Gate Resistance R_G

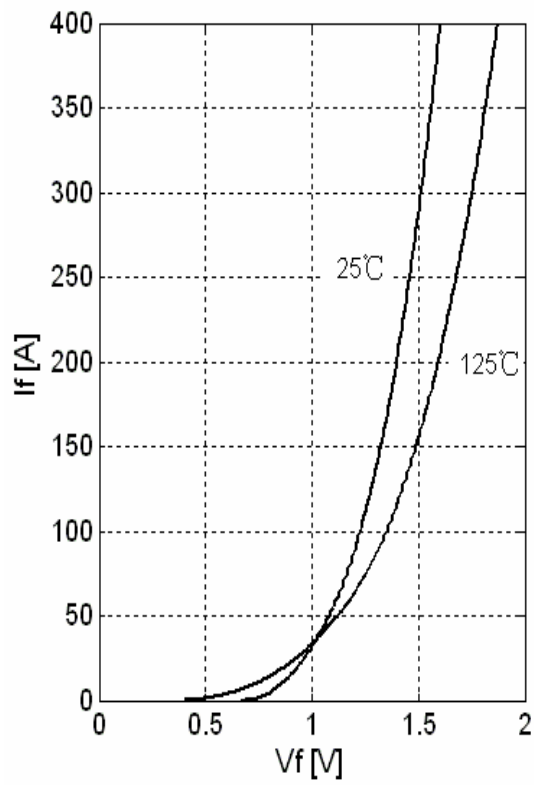


Fig 9. Typical Forward Characteristics (diode)

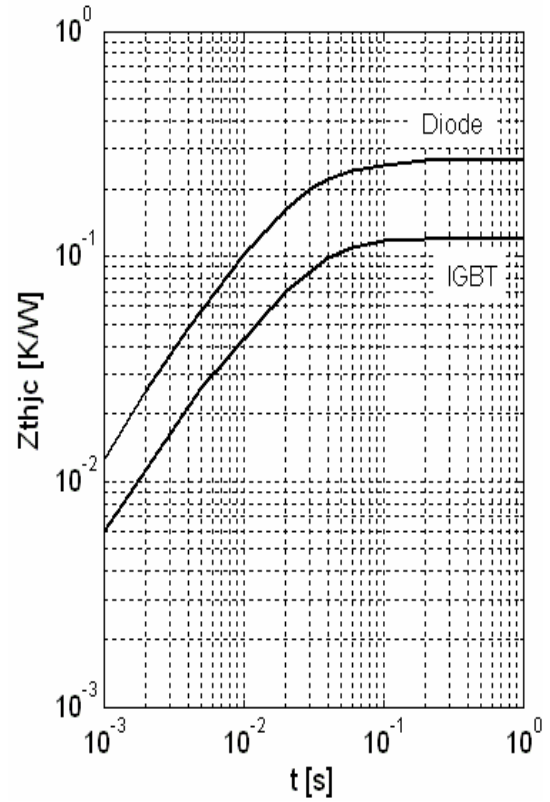
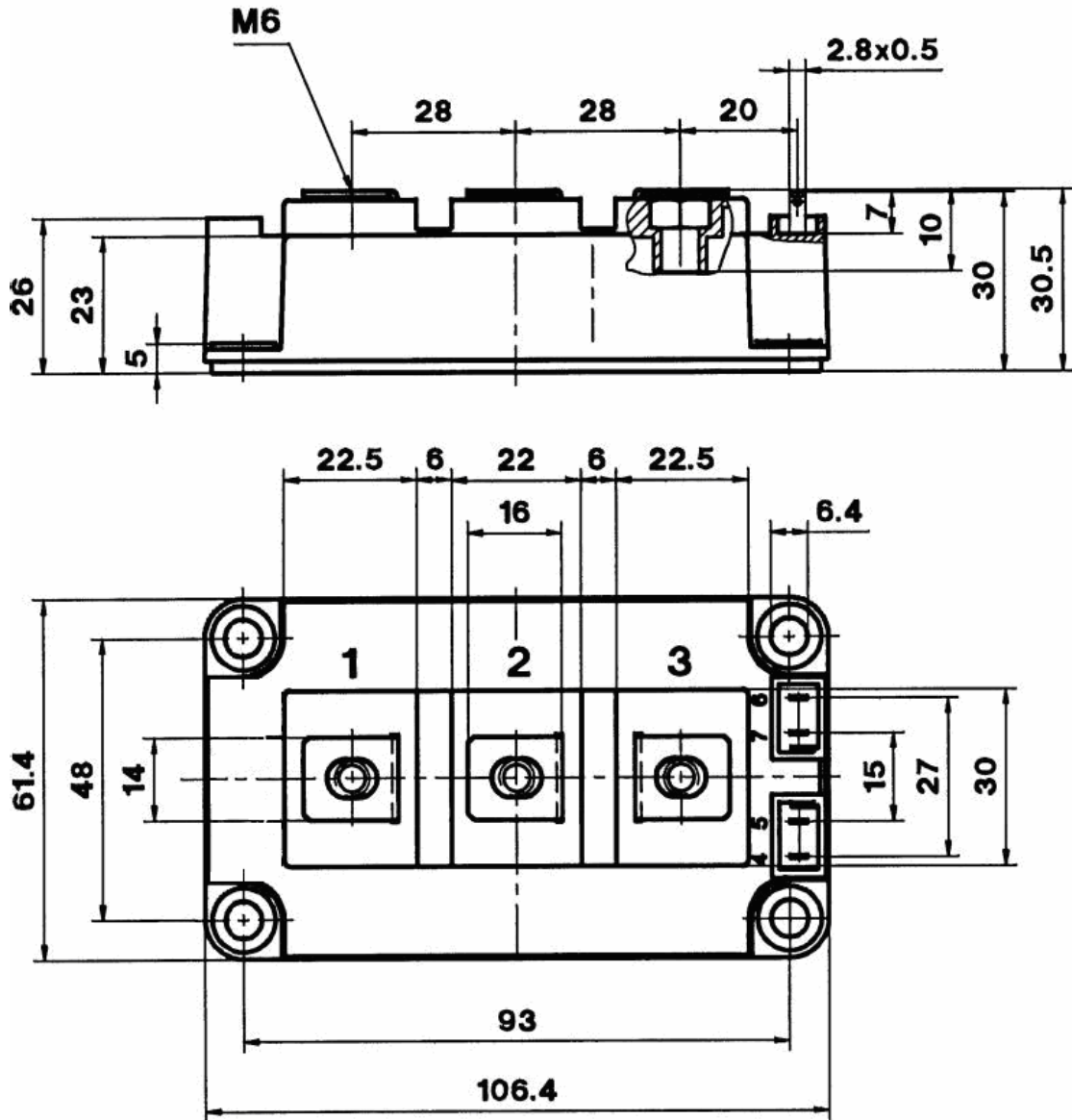


Fig 10. Transient thermal impedance

Package Dimension

Dimensions in Millimeters



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