STARPOWER

SEMICONDUCTOR™

IGBT

GD200SGK120C2S

Molding Type Module

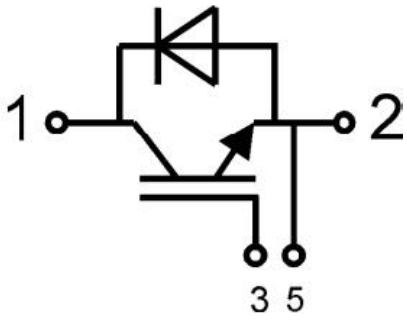
1200V/200A 1 in one-package

General Description

StarPower IGBT Power Module provides ultra low conduction loss as well as short circuit ruggedness. It's designed for the applications such as Welders and UPS.

Features

- High short circuit capability, self limiting to 6*I_{Cnom}
- very low tail current IGBT technology
- Low inductance case
- Fast & soft reverse recovery anti-parallel FWD
- Latch-up free
- Isolated copper baseplate using DCB Direct Copper Bonding technology



Equivalent Circuit Schematic

Typical Applications

- Switching mode power supplies
- DC servo and robot drives
- AC motor speed control
- UPS
- Induction heating
- Electronic welders
- Hard switching: 8-40kHz, Resonant mode great than 200kHz

Absolute Maximum Ratings Tc=25℃ unless otherwise noted

Symbol	Description	GD200SGK120C2S	Units
V_{CES}	Collector-Emitter Voltage	1200	V

Symbol	Description	GD200SGK120C2S	Units
V_{GES}	Gate-Emitter Voltage	±20V	V
I_C	Collector Current @25℃	300	A
	@80℃	200	
$I_{CM(1)}$	Pulsed Collector Current @80℃	400	A
I_F	Diode Continuous Forward Current	200	A
I_{FM}	Diode Maximum Forward Current	400	A
P_D	Maximum power Dissipation @ Tc=25℃	1500	W
T_{SC}	Short Circuit Withstand Time @ Tc=100℃	10	us
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℃	tbd	A^2s
V_{ISO}	Isolation Voltage	2500	V
Mounting Torque	Power Terminal Screw:M6/M4	2.5 to 5/1.1 to 2	N.m
	Mounting Screw:M6	3 to 6	N.m

Notes:

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

Electrical Characteristics of IGBT Tc=25℃ unless otherwise noted

Off Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
B_{VCES}	Collector-Emitter Breakdown Voltage	V_{GE}=0V	1200			V
I_{CES}	Collector Cut-Off Current	V_{CE}=V_{CES},V_{GE}=0V		0.1	0.5	mA
I_{GES}	Gate-Emitter Leakage Current	V_{GE}=V_{GES},V_{CE}=0V @ T_J=25℃			0.5	uA

On Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=8mA,V_{CE}=V_{GE}	4.4	5.20	6.0	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C=200A,V_{GE}=15V，@25℃		2.2		V
		I_C=200A,V_{GE}=15V，@125℃		2.5		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=200A,R_G=4.7Ω, V_{GE} =±15V, T_C = 25℃		110		ns
t_r	Rise Time			80		ns
$t_{d(off)}$	Turn-Off Delay Time			500		ns
t_f	Fall Time			75		ns

E_{on}	Turn-On Switching Loss			25		mJ
E_{off}	Turn-Off Switching Loss			20		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=200A, R_G=4.7Ω, V_{GE} =±15V,T_C = 125℃		120		ns
t_r	Rise Time			82		ns
$t_{d(off)}$	Turn-Off Delay Time			520		ns
t_f	Fall Time			76		ns
E_{on}	Turn-On Switching Loss			26		mJ
E_{off}	Turn-Off Switching Loss			22		mJ
C_{ies}	Input Capacitance	V_{CE} =25V, f=1MHz, V_{GE} =0V		14		nF
C_{oes}	Output Capacitance			2		nF
C_{res}	Reverse Transfer Capacitance			1		nF
L_{CE}	Stray inductance			15		nH
$R_{CC'+EE'}$	Module lead resistance, terminal to chip			0.2		mΩ

Electrical Characteristics of DIODE Tc=25℃ unless otherwise noted

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units
V_{FM}	Diode Forward Voltage	I_F=200A	T_C = 25℃		2.15	2.2	V
			T_C = 125℃		2.25	2.3	
Q_{rr}	Diode Reverse Recovery Charge	I_F=200A, V_R=600V,di /dt=-2000A/us, V_{GE}=-15V	T_C = 25℃		12		uC
			T_C = 125℃		30		
I_{rr}	Diode Peak Reverse Recovery Current		T_C = 25℃		60		A
			T_C = 125℃		100		
E_{rec}	Reverse Recovery Energy		T_C = 25℃		12		mJ
			T_C = 125℃		20		

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (IGBT Part, per 1/2 Module)		0.08	℃/W
$R_{\theta JC}$	Junction-to-Case (DIODE Part, per 1/2 Module)		0.18	℃/W
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)	0.04		℃/W
Weight	Weight of Module	320		g

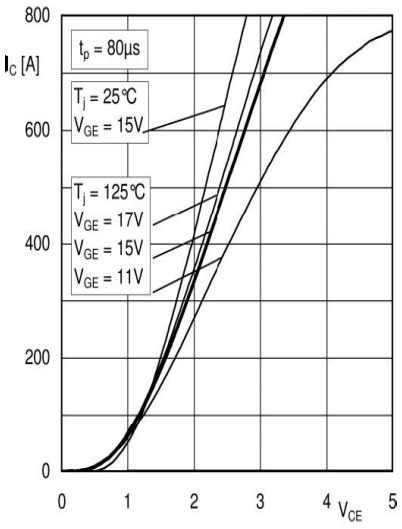


Fig 1. Typical Output Characteristics

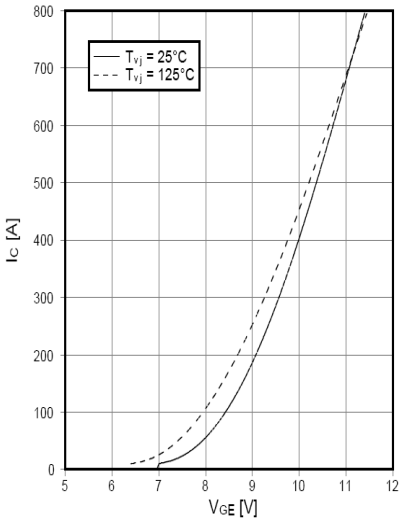


Fig 2. Typical Transfer Characteristics

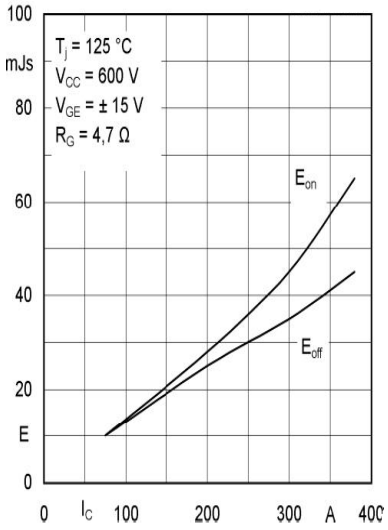


Fig 3.Switching Loss vs Collector Current

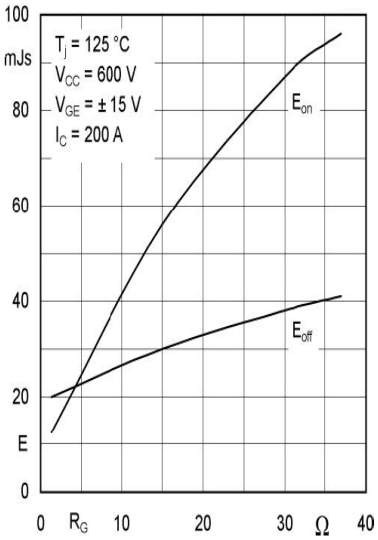


Fig 4. Switching Loss vs Gate Resistor

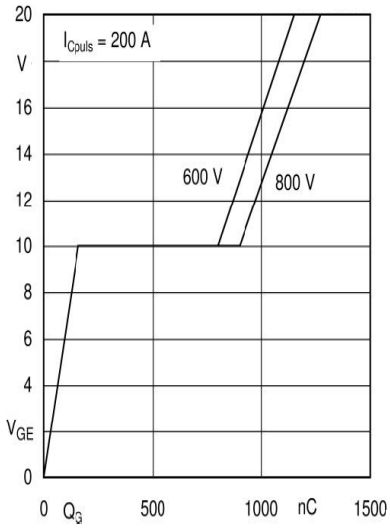


Fig 5. Gate Charge Characteristics.

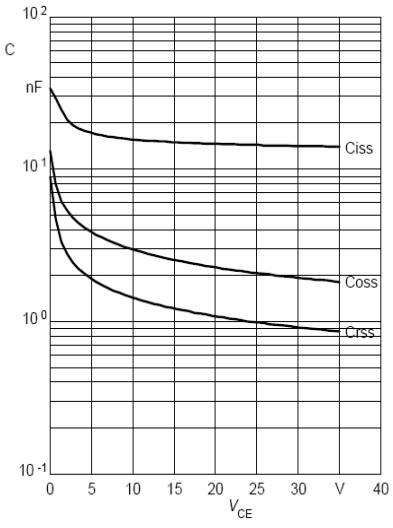


Fig 6. Typical Capacitance vs Collector-Emitter Voltage

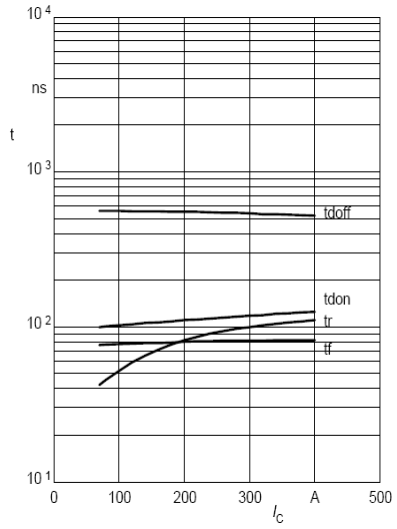


Fig 7. Typical Switching Times vs I_C

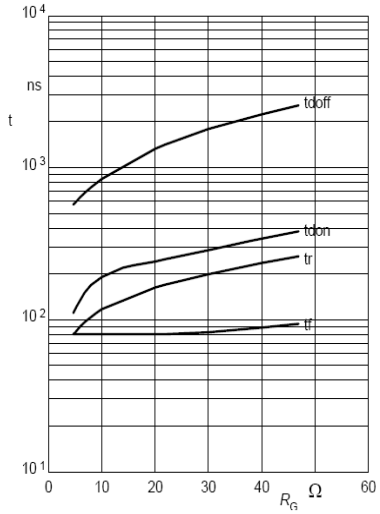


Fig 8. Typical Switching Times vs Gate Resistance R_G

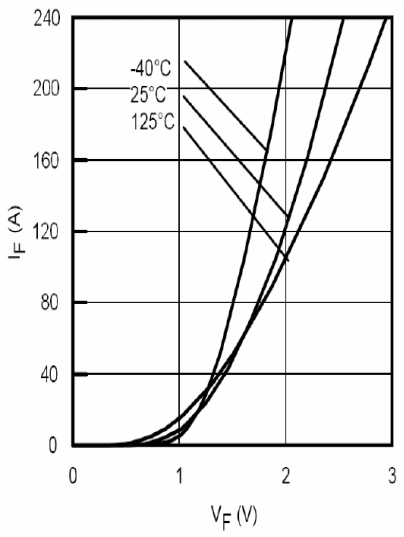


Fig 9.Typical Forward Characteristics (diode)

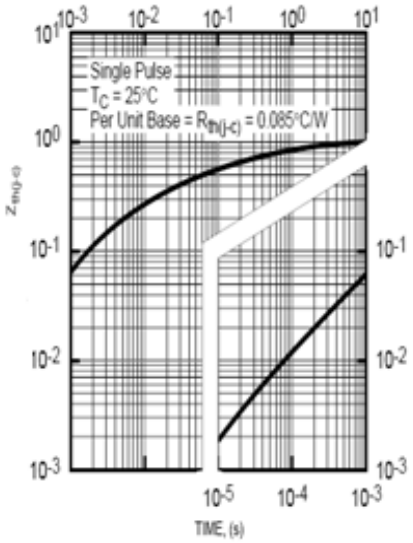


Fig 10. Transient thermal impedance of IGBT

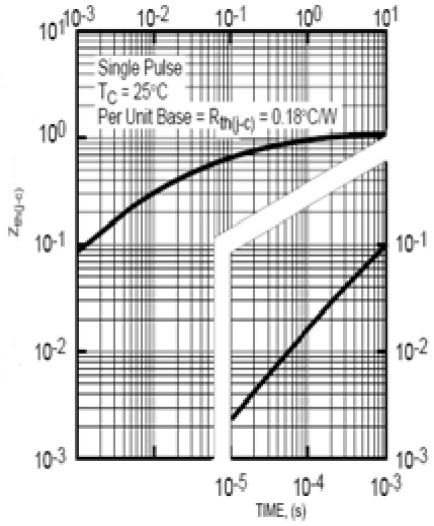
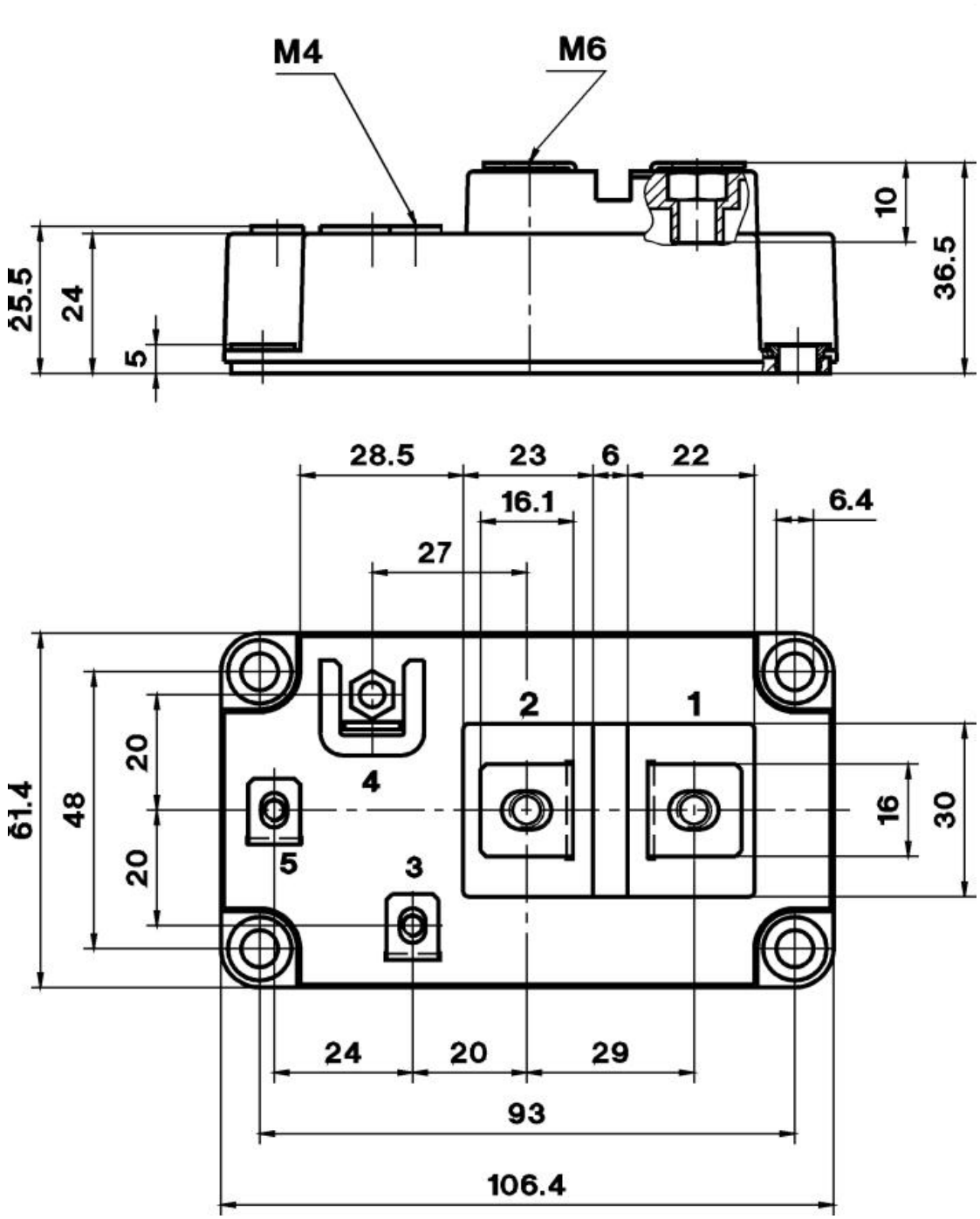


Fig 11.Transient thermal impedance of FWD

Package Dimension

Dimensions in Millimeters



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