STARPOWER

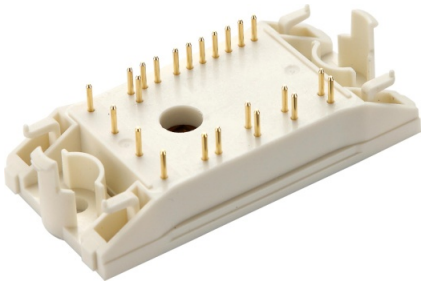
SEMICONDUCTOR **IGBT**

GD10FFT120F1S_G8

1200V/10A 6 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.



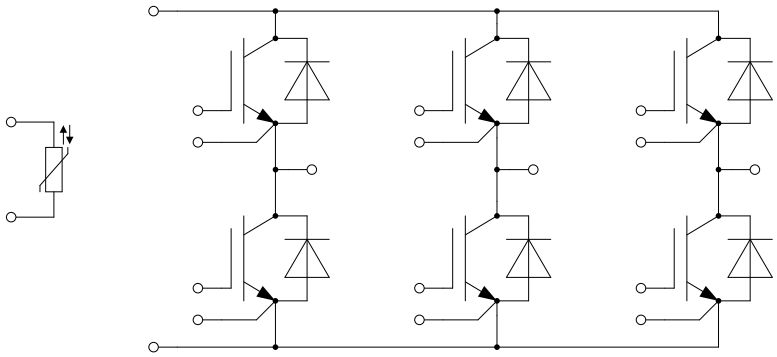
Features

- Low $V_{CE(sat)}$ Trench IGBT technology
- Low switching loss
- 10μs short circuit capability
- $V_{CE(sat)}$ with positive temperature coefficient
- Maximum junction temperature 175°C
- Fast & soft reverse recovery anti-parallel FWD
- Isolated heatsink using DBC technology

Typical Applications

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

Equivalent Circuit Schematic



Absolute Maximum Ratings T_C=25°C unless otherwise noted

IGBT-inverter

Symbol	Description	Value	Unit
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate-Emitter Voltage	±30	V
I_C	Collector Current @ T_C=25°C @ T_C=100°C	20 10	A
I_{CM}	Pulsed Collector Current t_p=1ms	20	A
P_D	Maximum Power Dissipation @ T_j=175°C	110	W

Diode-inverter

Symbol	Description	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1200	V
I_F	Diode Continuous Forward Current	10	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	20	A

Module

Symbol	Description	Value	Unit
T_{jmax}	Maximum Junction Temperature	175	°C
T_{jop}	Operating Junction Temperature	-40 to +150	°C
T_{STG}	Storage Temperature Range	-40 to +125	°C
V_{ISO}	Isolation Voltage RMS,f=50Hz,t=1min	4000	V

IGBT-inverter 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=10A,V_{GE}=15V, T_j=25°C		1.70	2.15	V
		I_C=10A,V_{GE}=15V, T_j=125°C		1.95		
		I_C=10A,V_{GE}=15V, T_j=150°C		2.00		
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=0.40mA,V_{CE}=V_{GE}, T_j=25°C	5.0	5.6	6.5	V
I_{CES}	Collector Cut-Off Current	V_{CE}=V_{CES},V_{GE}=0V, T_j=25°C			1.0	mA
I_{GES}	Gate-Emitter Leakage Current	V_{GE}=V_{GES},V_{CE}=0V, T_j=25°C			400	nA
R_{Gint}	Internal Gate Resistance			/		Ω
C_{ies}	Input Capacitance	V_{CE}=30V,f=1MHz, V_{GE}=0V		0.90		nF
C_{res}	Reverse Transfer Capacitance			0.03		nF
Q_G	Gate Charge	V_{GE}=-15…+15V		0.06		μC
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=10A, R_G=82Ω,V_{GE}=±15V, T_j=25°C		188		ns
t_r	Rise Time			45		ns
$t_{d(off)}$	Turn-Off Delay Time			209		ns
t_f	Fall Time			353		ns
E_{on}	Turn-On Switching Loss			1.53		mJ
E_{off}	Turn-Off Switching Loss			0.63		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=10A, R_G=82Ω,V_{GE}=±15V, T_j=125°C		184		ns
t_r	Rise Time			42		ns
$t_{d(off)}$	Turn-Off Delay Time			226		ns
t_f	Fall Time			521		ns
E_{on}	Turn-On Switching Loss			1.90		mJ
E_{off}	Turn-Off Switching Loss			1.00		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=10A, R_G=82Ω,V_{GE}=±15V, T_j=150°C		182		ns
t_r	Rise Time			42		ns
$t_{d(off)}$	Turn-Off Delay Time			239		ns
t_f	Fall Time			548		ns
E_{on}	Turn-On Switching Loss			2.11		mJ
E_{off}	Turn-Off Switching Loss			1.10		mJ
I_{SC}	SC Data	t_P≤10μs,V_{GE}=15V, T_j=150°C,V_{CC}=900V, V_{CEM}≤1200V		40		A

Diode-inverter Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_F	Diode Forward Voltage	I_F=10A,V_{GE}=0V,T_j=25°C		1.85	2.30	V
		I_F=10A,V_{GE}=0V,T_j=125°C		2.05		
		I_F=10A,V_{GE}=0V,T_j=150°C		2.10		
Q_r	Recovered Charge	V_R=600V,I_F=10A, -di/dt=300A/μs,V_{GE}=-15V T_j=25°C		0.5		μC
I_{RM}	Peak Reverse Recovery Current			13		A
E_{rec}	Reverse Recovery Energy			0.28		mJ
Q_r	Recovered Charge	V_R=600V,I_F=10A, -di/dt=300A/μs,V_{GE}=-15V T_j=125°C		0.7		μC
I_{RM}	Peak Reverse Recovery Current			14		A
E_{rec}	Reverse Recovery Energy			0.48		mJ
Q_r	Recovered Charge	V_R=600V,I_F=10A, -di/dt=300A/μs,V_{GE}=-15V T_j=150°C		0.8		μC
I_{RM}	Peak Reverse Recovery Current			15		A
E_{rec}	Reverse Recovery Energy			0.58		mJ

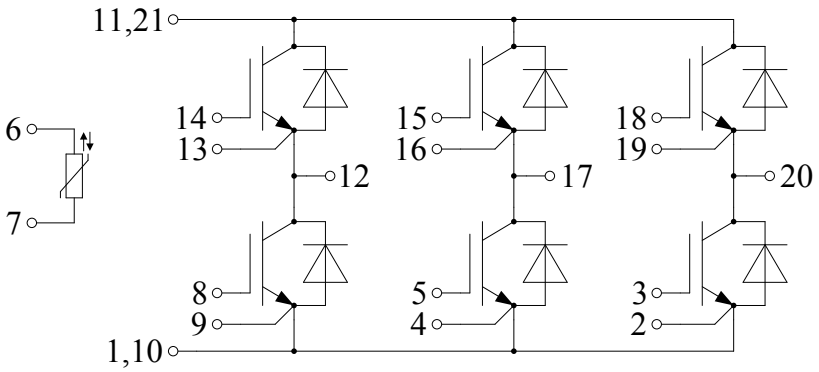
NTC Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
R_{25}	Rated Resistance			22.0		kΩ
ΔR/R	Deviation of R_{100}	T_C=100°C,R_{100}=1486.1Ω	-5		5	%
P_{25}	Power Dissipation				200	mW
$B_{25/50}$	B-value	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15K))]$		4000		K

Module Characteristics T_C=25°C unless otherwise noted

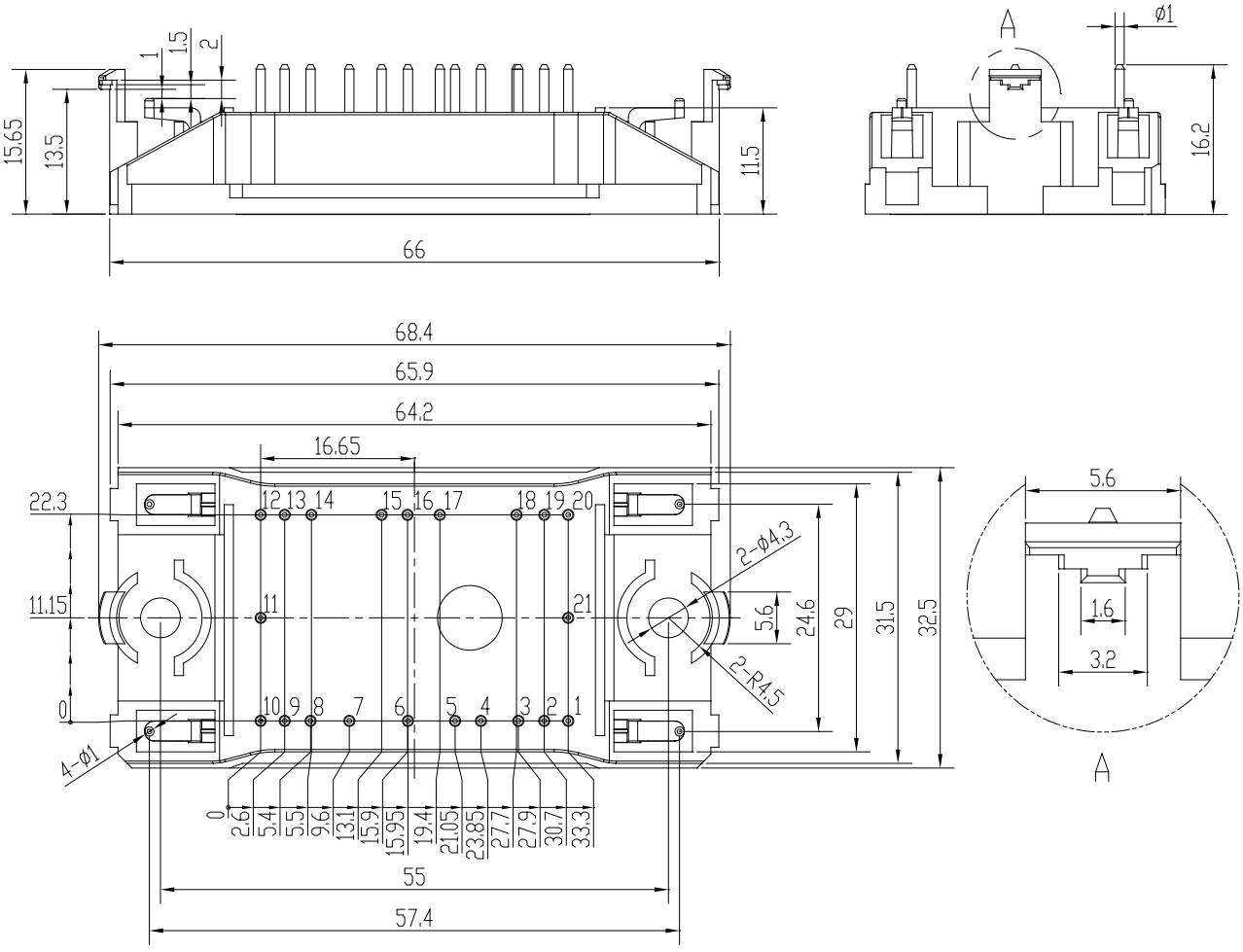
Symbol	Parameter	Min.	Typ.	Max.	Unit
R_{thJC}	Junction-to-Case (per IGBT-inverter) Junction-to-Case (per Diode-inverter)		1.237 2.223	1.361 2.445	K/W
R_{thCH}	Case-to-Heatsink (per IGBT-inverter) Case-to-Heatsink (per Diode-inverter) Case-to-Heatsink (per Module)		0.327 0.587 0.035		K/W
M	Mounting Torque, Screw M4	2.0		2.2	N.m
G	Weight of Module		26		g

Circuit Schematic



Package Dimensions

Dimensions in Millimeters



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