STARPOWER

SEMICONDUCTOR **IGBT**

GD20FST60L4S

Molding Type Module

600V/20A 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
- 8μs short circuit capability
- $V_{CE(sat)}$ with positive temperature coefficient
- Maximum junction temperature 175℃
- Low inductance case
- Fast & soft reverse recovery anti-parallel FWD

Typical Applications

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

IGBT-inverter T_C=25℃ unless otherwise noted

Maximum Rated Values

Symbol	Description	GD20FST60L4S	Units
V_{CES}	Collector-Emitter Voltage @ T_j=25℃	600	V
V_{GES}	Gate-Emitter Voltage @ T_j=25℃	±20	V
I_C	Collector Current @ T_C=25℃ @ T_C=100℃	35 20	A
I_{CM}	Pulsed Collector Current t_p=1ms	40	A
P_{tot}	Total Power Dissipation @ T_j=175℃	84	W

Off Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage	T_j=25℃	600			V
I_{CES}	Collector Cut-Off Current	V_{CE}=V_{CES},V_{GE}=0V, T_j=25℃			1.0	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=0.30mA,V_{CE}=V_{GE}, T_j=25℃	4.9	5.8	6.5	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C=20A,V_{GE}=15V, T_j=25℃		1.55	2.00	V
		I_C=20A,V_{GE}=15V, T_j=125℃		1.70		
		I_C=20A,V_{GE}=15V, T_j=150℃		1.80		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=300V,I_C=20A, R_G=18Ω,V_{GE}=±15V, T_j=25℃		228		ns
t_r	Rise Time			289		ns
$t_{d(off)}$	Turn-Off Delay Time			138		ns
t_f	Fall Time			99		ns
E_{on}	Turn-On Switching Loss			0.37		mJ
E_{off}	Turn-Off Switching Loss			0.45		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=300V,I_C=20A, R_G=18Ω,V_{GE}=±15V, T_j=125℃		230		ns
t_r	Rise Time			331		ns
$t_{d(off)}$	Turn-Off Delay Time			162		ns
t_f	Fall Time			141		ns
E_{on}	Turn-On Switching Loss			0.47		mJ
E_{off}	Turn-Off Switching Loss			0.58		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=300V,I_C=20A, R_G=18Ω,V_{GE}=±15V, T_j=150℃		232		ns
t_r	Rise Time			342		ns
$t_{d(off)}$	Turn-Off Delay Time			170		ns
t_f	Fall Time			152		ns
E_{on}	Turn-On Switching Loss			0.51		mJ
E_{off}	Turn-Off Switching Loss			0.61		mJ
C_{ies}	Input Capacitance	V_{CE}=25V,f=1Mhz, V_{GE}=0V		1.10		nF
C_{oes}	Output Capacitance			0.07		nF
C_{res}	Reverse Transfer Capacitance			0.03		nF
Q_G	Gate Charge	V_{CC}=300V,I_C=20A, V_{GE}=-15---+15V		200		nC
I_{SC}	SC Data	t_P≤6μs,V_{GE}=15V, T_j=150℃,V_{CC}=360V, V_{CEM}≤600V		100		A

Diode-inverter T_C=25℃ unless otherwise noted

Maximum Rated Values

Symbol	Description	GD20FST60L4S	Units
V_{RRM}	Repetitive Peak Reverse Voltage @ T_j=25℃	600	V
I_F	DC Forward Current	20	A
I_{FRM}	Repetitive Peak Forward Current t_p=1ms	40	A

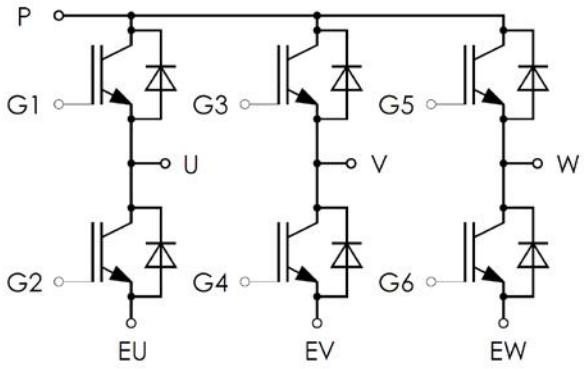
Characteristics Values

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units
V_F	Diode Forward Voltage	I_F=20A,V_{GE}=0V	T_j=25℃		1.60	2.00	V
			T_j=125℃		1.55		
			T_j=150℃		1.50		
Q_r	Recovered Charge	I_F=20A, V_R=300V, R_G=18Ω, V_{GE}=-15V	T_j=25℃		1.3		μC
			T_j=125℃		2.3		
			T_j=150℃		2.7		
I_{RM}	Peak Reverse Recovery Current		T_j=25℃		29		A
			T_j=125℃		34		
			T_j=150℃		37		
E_{rec}	Reverse Recovery Energy		T_j=25℃		0.20		mJ
			T_j=125℃		0.42		
			T_j=150℃		0.52		

IGBT Module

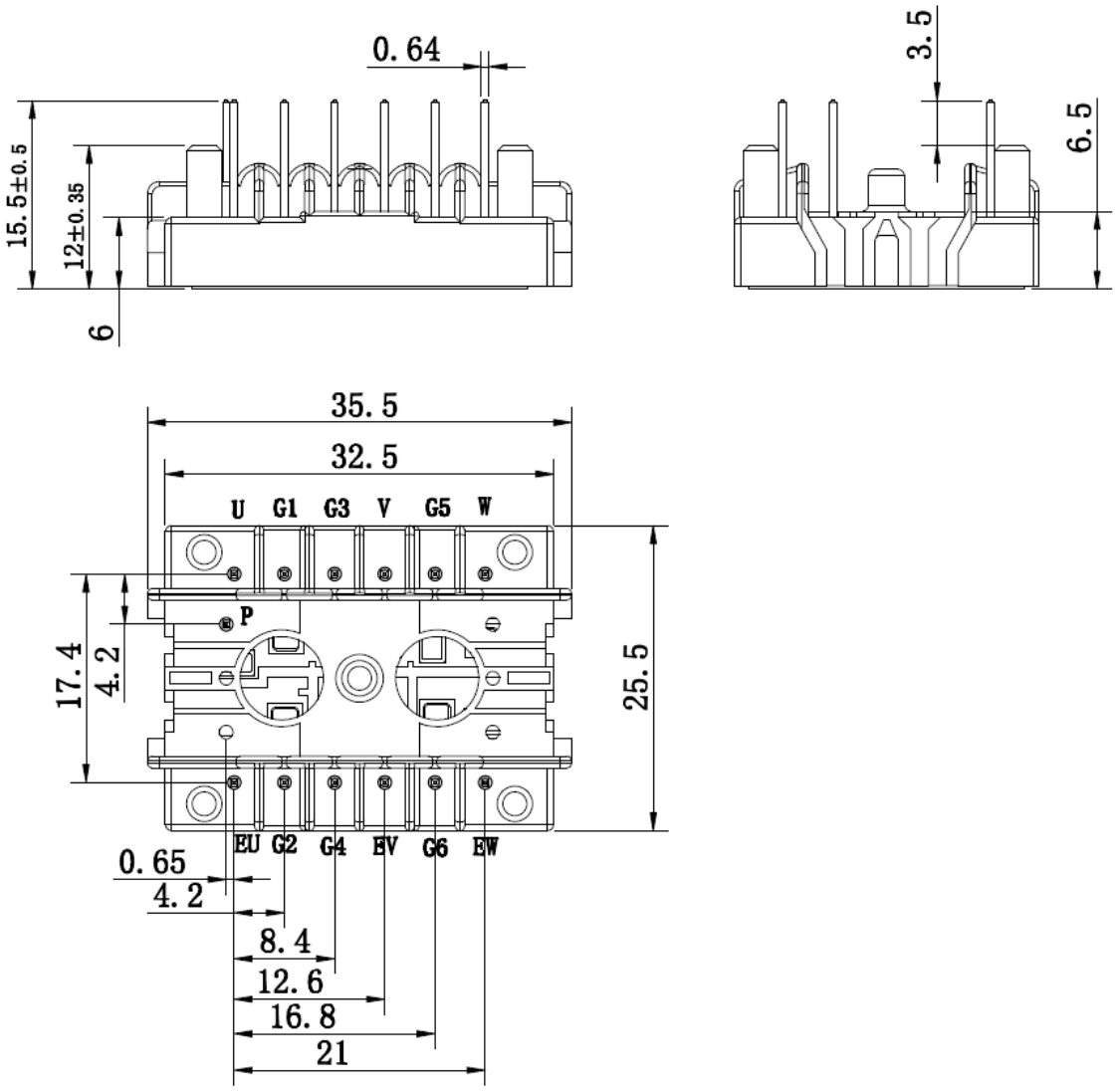
Symbol	Parameter	Min.	Typ.	Max.	Units
V_{ISO}	Isolation Voltage RMS,f=50Hz,t=1min	4000			V
L_{CE}	Stray Inductance		25		nH
$R_{CC'+EE'}$	Module Lead Resistance,Terminal to Chip @ T_C=25℃		9.50		mΩ
$R_{\theta JC}$	Junction-to-Case (per IGBT-inverter) Junction-to-Case (per Diode-inverter)			1.777 2.626	K/W
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)		0.077		K/W
T_{jmax}	Maximum Junction Temperature			175	℃
T_{jop}	Operating Junction Temperature	-40		150	℃
T_{STG}	Storage Temperature Range	-40		125	℃
F	Mounting Force Per Clamp	30		50	N
G	Weight of Module		10		g

Equivalent Circuit Schematic



Package Dimensions

Dimensions in Millimeters



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