

STARPOWER

SEMICONDUCTOR™

IGBT

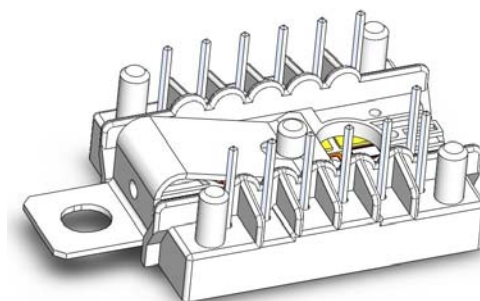
GD15FST60L4S

Preliminary

Molding Type Module**600V/15A 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 losses
- 5 μ s short circuit capability
- $V_{CE(sat)}$ with positive temperature coefficient
- Maximum junction temperature 175°C
- Low inductance case
- Fast & soft reverse recovery anti-parallel FWD
- Isolated copper baseplate using DBC technology

Typical Applications

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

IGBT $T_C=25^{\circ}\text{C}$ unless otherwise noted

Maximum Rated Values

Symbol	Description	GD15FST60L4S	Units
V_{CES}	Collector-Emitter Voltage @ $T_J=25^{\circ}\text{C}$	600	V
V_{GES}	Gate-Emitter Voltage	± 20	V
I_C	Collector Current @ $T_C=25^{\circ}\text{C}$	28	A
	@ $T_C=80^{\circ}\text{C}$	15	
I_{CM}	Pulsed Collector Current $t_p=1\text{ms}$	30	A
P_{tot}	Total Power Dissipation @ $T_J=175^{\circ}\text{C}$	76	W

Off Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage	$T_J=25^{\circ}\text{C}$	600			V
I_{CES}	Collector Cut-Off Current	$V_{CE}=V_{CES}, V_{GE}=0\text{V},$ $T_J=25^{\circ}\text{C}$			1.0	mA
I_{GES}	Gate-Emitter Leakage Current	$V_{GE}=V_{GES}, V_{CE}=0\text{V},$ $T_J=25^{\circ}\text{C}$			400	nA

On Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C=350\mu\text{A}, V_{CE}=V_{GE},$ $T_J=25^{\circ}\text{C}$	4.0		6.5	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C=15\text{A}, V_{GE}=15\text{V},$ $T_J=25^{\circ}\text{C}$		1.65	2.10	V
		$I_C=15\text{A}, V_{GE}=15\text{V},$ $T_J=175^{\circ}\text{C}$		2.10		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=400\text{V}, I_C=15\text{A},$ $R_G=22\Omega, V_{GE}=\pm 15\text{V},$ $T_J=25^{\circ}\text{C}$		31		ns
t_r	Rise Time			19		ns
$t_{d(off)}$	Turn-Off Delay Time			75		ns
t_f	Fall Time			25		ns
E_{on}	Turn-On Switching Loss			0.10		mJ
E_{off}	Turn-Off Switching Loss			0.23		mJ
E_{tot}	Total Switching Loss			0.33		mJ

$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=400V, I_C=15A,$ $R_G=22\Omega, V_{GE}=\pm 15V,$ $T_J=175^\circ C$		30		ns
t_r	Rise Time			20		ns
$t_{d(off)}$	Turn-Off Delay Time			90		ns
t_f	Fall Time			40		ns
E_{on}	Turn-On Switching Loss			0.22		mJ
E_{off}	Turn-Off Switching Loss			0.41		mJ
E_{tot}	Total Switching Loss			0.63		mJ
C_{ies}	Input Capacitance	$V_{CE}=30V, f=1Mhz,$ $V_{GE}=0V$		765		pF
C_{oes}	Output Capacitance			52		pF
C_{res}	Reverse Transfer Capacitance			23		pF
I_{SC}	SC Data	$T_P \leq 5\mu s, V_{GE}=15V,$ $T_J=150^\circ C, V_{CC}=360V,$ $V_{CEM} \leq 600V$		TBD		A

DIODE $T_C=25^\circ C$ unless otherwise noted**Maximum Rated Values**

Symbol	Description	GD15FST60L4S	Units
V_{RRM}	Collector-Emitter Voltage @ $T_J=25^\circ C$	600	V
I_F	DC Forward Current @ $T_C=80^\circ C$	15	A
I_{FRM}	Repetitive Peak Forward Current $t_p=1ms$	30	A

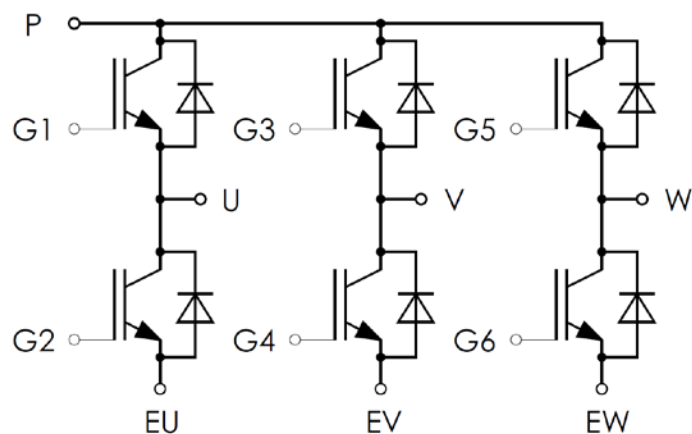
Characteristics Values

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units
V_F	Diode Forward Voltage	$I_F=15A, V_{GE}=0V$	$T_J=25^\circ C$		1.20	1.60	V
			$T_J=125^\circ C$		1.15		
Q_{rr}	Recovered Charge	$I_F=15A,$ $V_R=300V,$ $di/dt=-1500A/\mu s,$	$T_J=25^\circ C$		1.0		μC
			$T_J=125^\circ C$		1.6		
I_{RM}	Peak Reverse Recovery Current	$V_{GE}=-15V$	$T_J=25^\circ C$		25		A
			$T_J=125^\circ C$		29		
E_{rec}	Reverse Recovery Energy	$V_{GE}=-15V$	$T_J=25^\circ C$		0.17		mJ
			$T_J=125^\circ C$		0.31		

IGBT Module

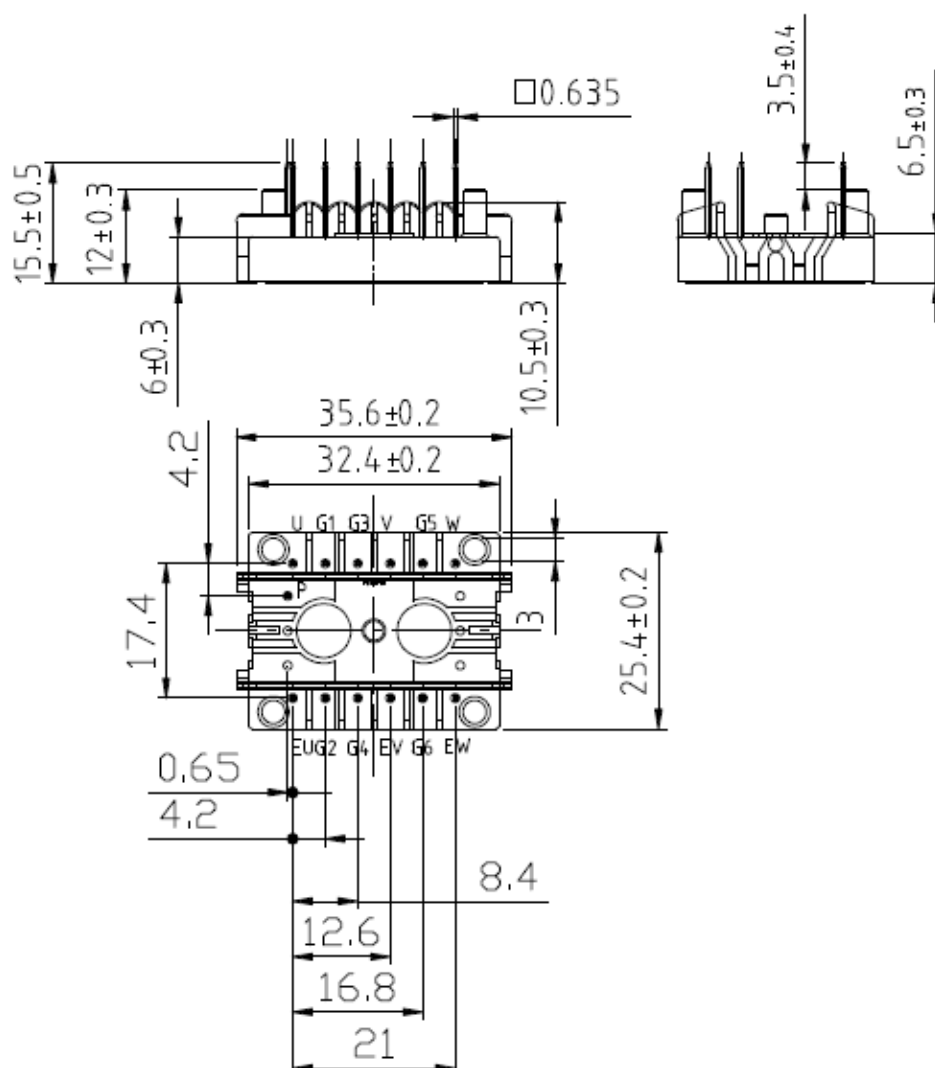
Symbol	Parameter	Min.	Typ.	Max.	Units
V _{ISO}	Isolation Voltage RMS, f=50Hz, t=1min	2500			V
L _{CE}	Stray Inductance		25		nH
R _{CC'+EE'}	Module Lead Resistance, Terminal to Chip @ T _C =25°C		9.50		mΩ
R _{θJC}	Junction-to-Case (per IGBT) Junction-to-Case (per DIODE)			1.98 2.46	K/W
R _{θCS}	Case-to-Sink (Conductive grease applied)		0.085		K/W
T _j	Maximum Junction Temperature			175	°C
T _{STG}	Storage Temperature Range	-40		125	°C
F	Mounting Force Per Clamp	30		50	N
G	Weight of Module		10		g

Equivalent Circuit Schematic



Package Dimension

Dimensions in Millimeters



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