

STARPOWER

SEMICONDUCTOR

IGBT

GD50FSA120L3S

1200V/50A 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.

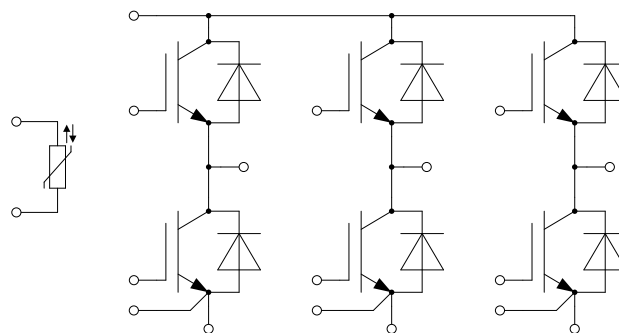
Features

- Low $V_{CE(sat)}$ Trench IGBT technology
- 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 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 $T_H=25^{\circ}\text{C}$ unless otherwise noted**IGBT**

| Symbol | Description | Value | Unit |
|-----------|--|----------|------|
| V_{CES} | Collector-Emitter Voltage | 1200 | V |
| V_{GES} | Gate-Emitter Voltage | ± 20 | V |
| I_C | Collector Current @ $T_H=65^{\circ}\text{C}$ | 56 | A |
| I_{CRM} | Repetitive Peak Collector Current tp limited by T_{vjop} | 100 | A |

Diode

| Symbol | Description | Value | Unit |
|-----------|--|-------|------|
| V_{RRM} | Repetitive Peak Reverse Voltage | 1200 | V |
| I_F | Diode Continuous Forward Current | 50 | A |
| I_{FRM} | Repetitive Peak Forward Current tp limited by T_{vjop} | 100 | A |

Module

| Symbol | Description | Value | Unit |
|-------------|---|-------------|--------------------|
| T_{vjmax} | Maximum Junction Temperature | 175 | $^{\circ}\text{C}$ |
| T_{vjop} | Operating Junction Temperature | -40 to +175 | $^{\circ}\text{C}$ |
| T_{STG} | Storage Temperature Range | -40 to +125 | $^{\circ}\text{C}$ |
| V_{ISO} | Isolation Voltage RMS, $f=50\text{Hz}, t=1\text{min}$ | 2500 | V |

Note: $T_{vjop} > 150^{\circ}\text{C}$ is allowed for operation at overload conditions.

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

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---------------|---|---|------|------|------|---------------|
| $V_{CE(sat)}$ | Collector to Emitter Saturation Voltage | $I_C=50\text{A}, V_{GE}=15\text{V}, T_{vj}=25^\circ\text{C}$ | | 1.50 | 1.95 | V |
| | | $I_C=50\text{A}, V_{GE}=15\text{V}, T_{vj}=125^\circ\text{C}$ | | 1.70 | | |
| | | $I_C=50\text{A}, V_{GE}=15\text{V}, T_{vj}=150^\circ\text{C}$ | | 1.80 | | |
| $V_{GE(th)}$ | Gate-Emitter Threshold Voltage | $I_C=1.00\text{mA}, V_{CE}=V_{GE}, T_{vj}=25^\circ\text{C}$ | 5.3 | 6.2 | 7.0 | V |
| I_{CES} | Collector Cut-Off Current | $V_{CE}=V_{CES}, V_{GE}=0\text{V}, T_{vj}=25^\circ\text{C}$ | | | 50 | μA |
| I_{GES} | Gate-Emitter Leakage Current | $V_{GE}=V_{GES}, V_{CE}=0\text{V}, T_{vj}=25^\circ\text{C}$ | | | 100 | nA |
| R_{Gint} | Internal Gate Resistance | | | 0 | | Ω |
| C_{ies} | Input Capacitance | $V_{CE}=25\text{V}, f=1\text{MHz}, V_{GE}=0\text{V}$ | | 4.42 | | nF |
| C_{res} | Reverse Transfer Capacitance | | | 0.04 | | nF |
| Q_G | Gate Charge | $V_{GE}=-15\dots+15\text{V}$ | | 0.32 | | μC |

Diode Characteristics $T_H=25^\circ\text{C}$ unless otherwise noted

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|--------|-----------------------|--|------|------|------|------|
| V_F | Diode Forward Voltage | $I_F=50\text{A}, V_{GE}=0\text{V}, T_{vj}=25^\circ\text{C}$ | | 1.60 | 2.05 | V |
| | | $I_F=50\text{A}, V_{GE}=0\text{V}, T_{vj}=125^\circ\text{C}$ | | 1.65 | | |
| | | $I_F=50\text{A}, V_{GE}=0\text{V}, T_{vj}=150^\circ\text{C}$ | | 1.65 | | |

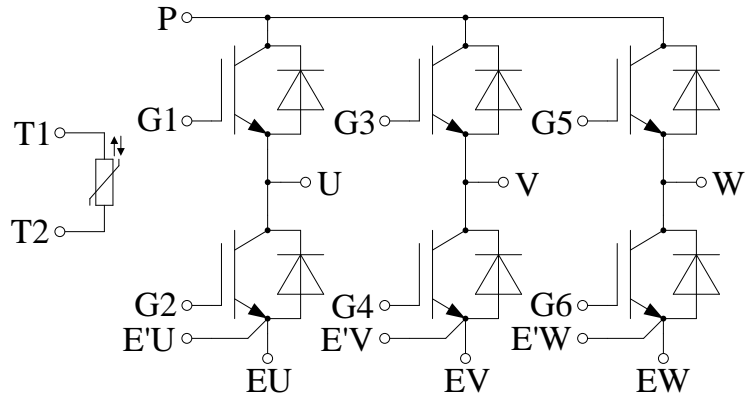
NTC Characteristics $T_H=25^\circ\text{C}$ unless otherwise noted

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|--------------|------------------------|--|------|------|------|------------|
| R_{25} | Rated Resistance | | | 5.0 | | k Ω |
| $\Delta R/R$ | Deviation of R_{100} | $T_C=100^\circ\text{C}, R_{100}=493.3\Omega$ | -5 | | 5 | % |
| P_{25} | Power Dissipation | | | | 20.0 | mW |
| $B_{25/50}$ | B-value | $R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15\text{K}))]$ | | 3375 | | K |
| $B_{25/80}$ | B-value | $R_2=R_{25}\exp[B_{25/80}(1/T_2-1/(298.15\text{K}))]$ | | 3411 | | K |
| $B_{25/100}$ | B-value | $R_2=R_{25}\exp[B_{25/100}(1/T_2-1/(298.15\text{K}))]$ | | 3433 | | K |

Module Characteristics $T_H=25^{\circ}\text{C}$ unless otherwise noted

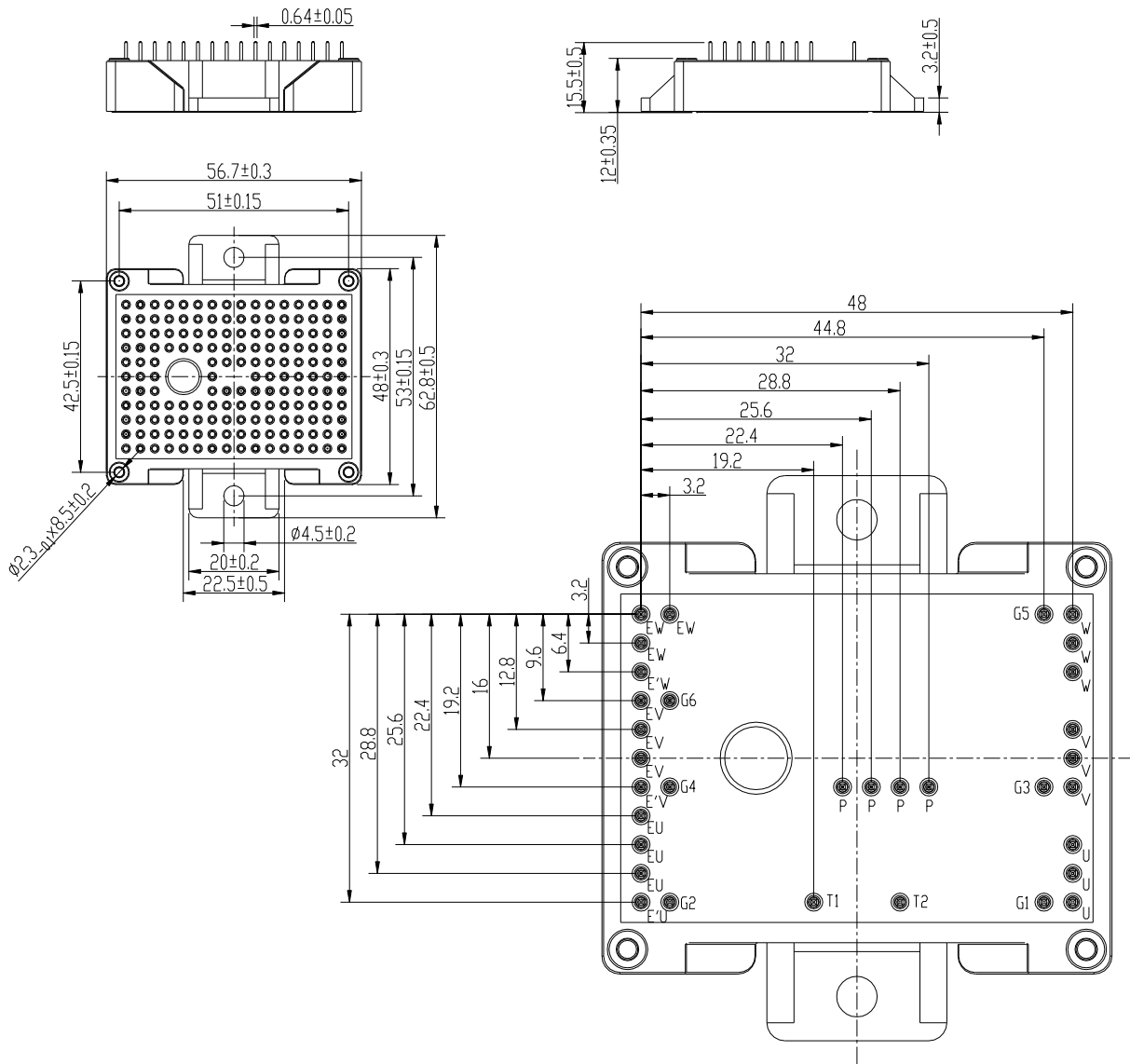
| Symbol | Parameter | Min. | Typ. | Max. | Unit |
|--------------------------------|---|------|----------------|------|------------|
| L_{CE} | Stray Inductance | | 30 | | nH |
| $R_{CC'+EE'}$ $R_{AA'+CC'}$ | Module Lead Resistance, Terminal to Chip | | 5.00 6.00 | | m Ω |
| R_{thJH} | Junction-to-Heatsink(per IGBT, $\lambda_{grease}=3.3$ W/(m*K)) Junction-to-Heatsink(per Diode, $\lambda_{grease}=3.3$ W/(m*K)) | | 0.955 1.220 | | K/W |
| F | Mounting Force Per Clamp | 40 | | 80 | N |
| G | Weight of Module | | 39 | | g |

Circuit Schematic



Package Dimensions

Dimensions in Millimeters



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