

# GIGAFUSE: HIGH VOLTAGE BATTERY FAST DISCONNECT

A FAST AND PRECISE CIRCUIT PROTECTION SOLUTION FOR ADVANCED BATTERY SYSTEMS DURING SHORT CIRCUIT AND OVERCURRENT SITUATIONS

The high current levels and power densities in advanced battery systems demand equally high-performance safety components. Available in both passive and passive/active (active version production phase available at 3Q2023) combinations, the GigaFuse from GIGAVAC, a brand of Sensata Technologies, is a fast-acting electromechanical device with low heat generation that allows for circuit trips at exact currents and features a design that easily pairs with contactors and eliminates thermal aging fatigue associated with typical DC fuses.



## Features

- Functional Safety: Passive technology with electro-mechanical release mechanism
- Fast disconnect: <3ms clear time independent from current level
- System protection coordination: tunable trip current to easily pair with HV contactors
- Optional active control: to provide designers flexibility of active/passive protection methods (production phase available at 2Q2023)
- Up to 10MW interrupt capability
- 400A continuous current carry (4/0 busbars); Consult engineering for higher current

## Sensata's Value

- World-class automotive component supplier
- Application expertise, significant automotive knowledge base including quality and supply chain
- Global/Local approach, engineering, and commercial support
- Surety of supply: global manufacturing capability

## SPECIFICATIONS

| Specifications   | Units   | Data                      |
|--|---|---------------------------|
| <b>Rated Voltage</b>   | V   | 1000                      |
| <b>Continuous Current Rating<sup>2</sup></b>                       | A   | 400                       |
| <b>Maximum Breaking Power<sup>3</sup></b>                          | MW  | 10                        |
| <b>Fault Clear Time at 10MW<sup>4</sup></b>                        | ms  | 3                         |
| <b>Device Resistance, beginning of life</b>                        | mΩ  | < 0.15                    |
| <b>Trip Tolerance</b>  | A   | +100 / -400               |
| <b>Insulation Resistance After Interrupt (1000VDC)<sup>4</sup></b> | MΩ  | ≥0.5                      |
| <b>Operating Temperature (Ambient)<sup>5</sup></b>                 | °C  | -40 to +85                |
| <b>Allowed Terminal Temperature Maximum<sup>6</sup></b>            | °C  | 150                       |
| <b>Trip Sensitivity to Mechanical Shock<sup>7</sup></b>            | 50G powered<br>100G unpowered                                       |                           |
| <b>Vibration<sup>8</sup></b>                                       | 5G RMS Sinusoidal, 12hr/axis, 10-2000Hz, 400A continuous (See Note) |                           |
| <b>Mass</b>  | g   | 750, Passive, 790, Active |



# DIMENSIONS

Dimensions are in [inches] millimeters  
Tolerance is +/- 0.5mm for all dimensions, unless stated otherwise.

### Mounting

M5 or No. 10 Screws  
Torque 1.7 - 4 Nm [15-35in-lb]

### Case Material

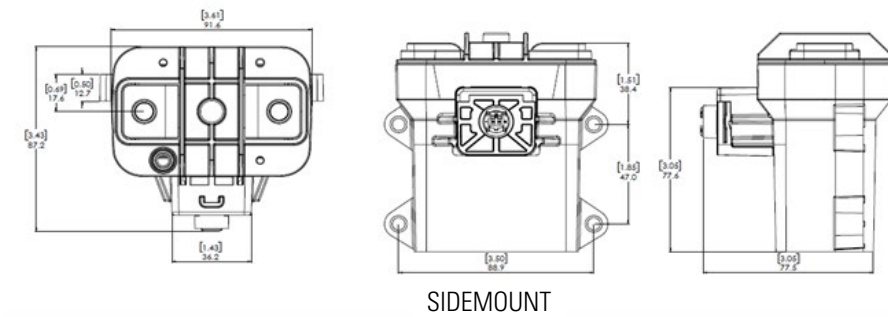
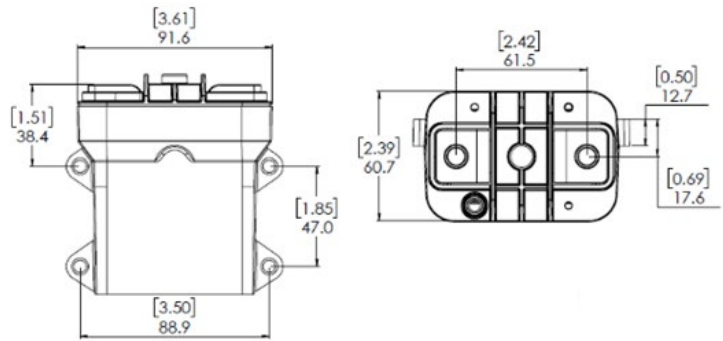
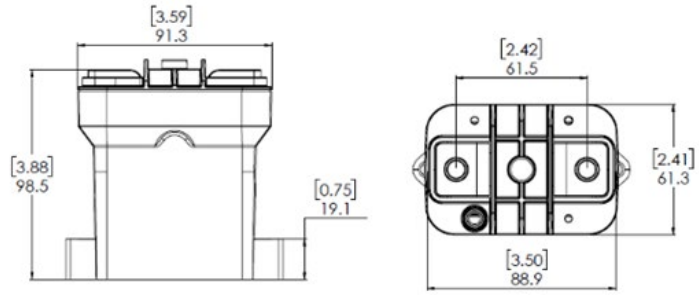
Thermoplastic Polyamide Resin

### Power Connection

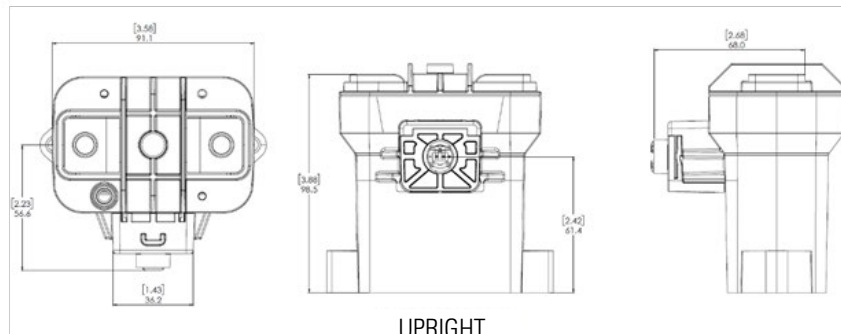
M8 x 1.25 Female  
Torque 12-18 Nm [106-159 in-lb]

### Pyro Connection

TE 411-78033  
Qualified Acc. to LV 16 and USCAR  
Initiator Resistance:  $\geq 1.7\Omega$  and  $\leq 2.5\Omega$   
Triggering Pulse Current:  $\geq 1.75A / 0.5ms$   
 $\geq 1.2A / 2.0ms$   
Diagnostic Current:  $\leq 100mA$   
No Trigger Current:  $\leq 0.4A$  or  $\leq 5.0A / 4\mu s$   
Color of connector retainer may vary due to supply availability



SIDEMOUNT



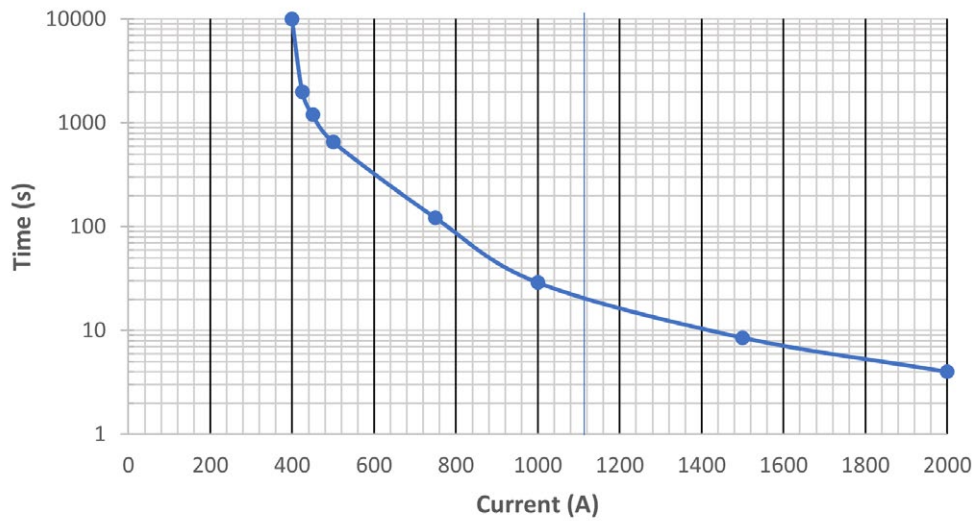
UPRIGHT



# MOMENTARY CURRENT CURVE

80°C terminal temperature rise at specified curve

### Momentary Carry Current vs Time (70C Ambient, 105mm<sup>2</sup> busbars)



## ORDERING OPTIONS

Example: GFPA415B  
 Passive/Active, 1500A Trip Current, Horizontal Mount Orientation

|  |                |           |          |
|--|----------------|-----------|----------|
| <b>Family</b>  | <b>GFP(A)4</b> | <b>15</b> | <b>B</b> |
| <b>GFP400</b>  |                |           |          |
| <b>Active Function</b>   |                |           |          |
| <b>Optional A:</b> (production phase available at 2Q2023)                    |                |           |          |
| <b>Trip Trigger Current</b>  |                |           |          |
| <b>15:</b> 1500A<br><b>20:</b> 2000A<br><b>22:</b> 2200A<br><b>25:</b> 2500A |                |           |          |
| <b>Orientation</b>   |                |           |          |
| <b>Upright:</b> A<br><b>Side Mount:</b> B                                    |                |           |          |



## GENERAL NOTES

1. For customers who can accommodate a vented device, contact Sensata Technologies for more information.
2. Current rating (both continuous and momentary) is dependent on bus bar size and customer specific application conditions. Consult with Sensata Technologies for specific details.
3. Performance in application will vary based on customer environment and system isolation requirements. Validated at following conditions: 650 V, 15.5kA, 12  $\mu$ H system inductance. Up to 850 V, 12kA, with 4  $\mu$ H system inductance. For 1000V application above 3kA, contact Sensata engineering
4. Clear time below 5kA can reach up to 4 ms max. IR after 8MW interrupt  $>1M\Omega$
5. Insulation resistance is dependent on power level of max interrupt load and IR increases with reduced power levels or lower system inductance. IR after standalone short circuit may be below 0.5M at system inductance over 4uH. Performance when tested at system level will show improved IR post interrupt.
6. Device can operate in higher ambient temperatures with derated current carry while below maximum terminal temperature.
7. Measured on top of the bus bar at the bolted joint. Customer is responsible for ensuring this condition is met otherwise damage to device can occur.
8. Sensata Technologies recommends orienting Z axis orthogonal to any mechanical shock pulses to ensure robust performance under load. Sensitivity is dependent on trip setting, consult with Sensata Technologies for more details. See photo for axis orientation.
9. Performance depends on specific vibration profile and trip level, consult with Sensata Technologies for your specific requirements.
10. For Automotive Applications please request technical workshop with Sensata Technologies Application Engineering.



## WARNINGS



### RISK OF MATERIAL DAMAGE AND HOT ENCLOSURE

- The product's side panels may be hot, allow the product to cool before touching
- Follow proper mounting instructions including torque values
- Do not allow liquids or foreign objects to enter this product

**Failure to follow these instructions can result in serious injury, or equipment damage.**



### HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Disconnect all power before installing or working with this equipment
- Verify all connections and replace all covers before turning on power

**Failure to follow these instructions can result in death or serious injury.**



### STRONG MAGNETS PRESENT

- This device may present a risk to people with pacemakers if brought within 5 inches (125mm) of device
- This device may present a risk to computer drives or other magnetic sensitive electronics or attract small metal tools within 4 inches (100mm) of the device.

**Failure to follow these instructions can result in death or serious injury.**

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