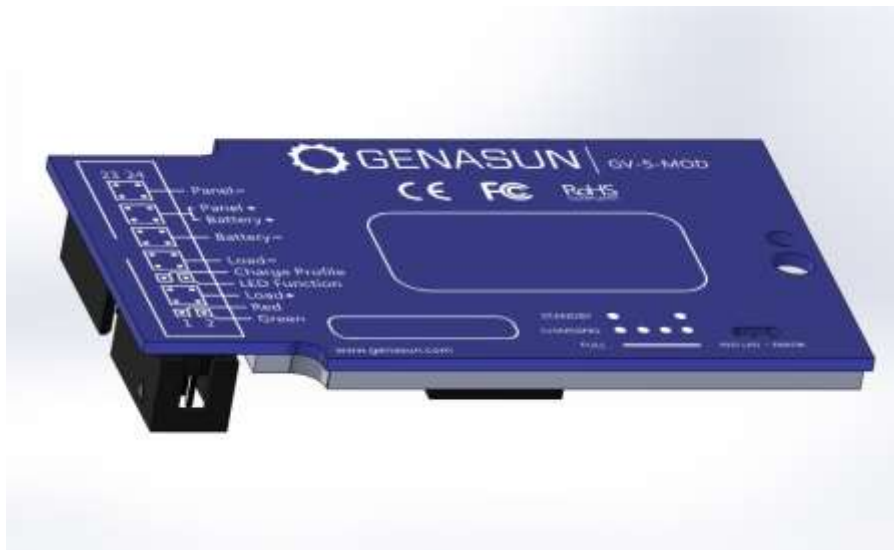


The GV-5-MOD is a connectorized module version of Genasun’s GV-5 series of MPPT solar charge controllers. The GV-5-MOD allows for easy integration into solar-powered products by reducing assembly labor and total system cost, and is available for nearly all 12V battery types, whether lithium- or lead-based. This specification is intended to complement the standard GV-5 manual, and the GV-5-MOD mechanical drawings and solid models.



GV-5-MOD

GENERAL SPECIFICATIONS

Size Overall: 3.275 x 1.880 x 0.480”, 83.2 x 48.8 x 12.2mm

Weight: ~28g

ELECTRICAL AND CHARGING SPECIFICATIONS

[See GV-5 Manual and specs for specific model]

CONNECTOR

Sullins Corporation SBH11-NBPC-D12-SM-BK, 24-pin, dual-row shrouded header, 0.100” spacing, gold-plated 0.025”/0.64mm square posts.

SUGGESTED MATING CONNECTORS

PCB, Through-hole: Sullins Corp. SFH11-PBPC-D12-ST-BK or PPPC122LFBN-RC

PCB, SMT: Sullins Corp. NPPC132KFMS-RC

Ribbon cable, IDC: Sullins Corp. SFH210-PPPC-D12-ID-BK

Many compatible mates are available from various manufactures. Use a gold-plated mate to avoid galvanic-corrosion problems from mixed platings.

MOUNTING

The end of the GV-5-MOD opposite the connector should be supported at the same height as the height of the mated connector stack. For the suggested mates, this height is very close to 0.500", therefore, a half-inch/12.7mm or 12mm spacer may be used. Two holes of different diameters are provided (0.187"/3.18mm and 0.125"/2.29mm) in the GV-5-MOD to allow the use of a wide range of spacers and fasteners. A clearance radius of 0.200"/5mm is provided from the center of each hole; the use of a fastener with a larger radius may cause damage to the GV-5-MOD. Two suitable example fasteners are:

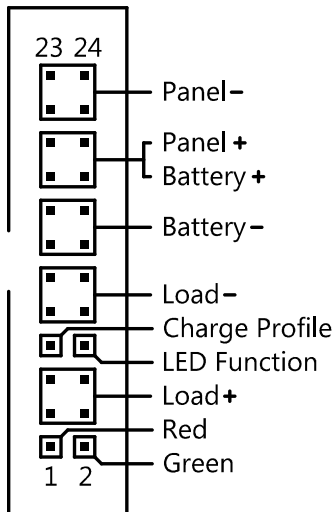


Keystone 9022



Keystone 9067

PIN DESCRIPTIONS



Pin 1: Red LED Output. Optional. Indicates errors. 56 Ohm output resistance, 15mA maximum source, 20mA maximum sink. See LED Function Select (Pin 8) description and LED Timings section for additional information.

Pin 2: Green LED Output. Optional. Indicates normal operating modes. 56 Ohm output resistance, 15mA maximum source, 20mA maximum sink. See LED Function Select (Pin 8) description and LED Timings section for additional information.

Pins 3-6: Load Positive Output. Optional. Connect pins in parallel if used. This is a MOSFET-switched output from Battery Positive (Pins 17-20) that controls the load to provide over-discharge protection (LVD or low voltage disconnect) for the battery. If this function is not needed, or the load draws more than 5A continuous, 10A peak, the load positive should be connected to Battery Positive.

Pinout of mating female connector, mating side.

Pin 7: Charge Profile Select. Optional. Leave this pin floating for the default charge profile. If a second charge profile is programmed (see GV-5-MOD label), connect this pin to Load Negative (Pins 9-12) to select the alternate charging profile and voltage setpoints (typically higher voltage). The source current on this pin is 180uA or less. See the description for Load Negative (Pins 9-12) for additional information. Connecting this pin to Load Negative (Pins 9-12) if a second charge profile is not programmed will disable all functions of the GV-5-MOD. In this state, the quiescent current drawn from the battery will be 1-2mA.

Pin 8: LED Function Select. Optional. If this pin is left floating, the internal LEDs are active, and the LED Outputs (Pins 1 and 2) are driven to 5V when the associated LED is active and 0V when inactive (voltages

relative to Load Negative (Pins 9-12)). In this mode, these outputs can be used with additional current-limiting resistors to drive independent external LEDs referenced to Load Negative (Pins 9-12), or two LEDs connected in reverse parallel, such as a 2-pin bi-color LED.

If this pin is connected to Load Negative (Pins 9-12), then the internal LEDs are disabled, and the LED Outputs (Pins 1 and 2) function as open-collector outputs. When the associated LED would be on, the output is tied to Load Negative (Pins 9-12). Otherwise, the output is left floating. The maximum voltage, relative to Load Negative (Pins 9-12), that should be applied to the LED outputs (Pins 1 and 2) is 5V. Greater voltages may damage the internal microcontroller. This operating mode can be used to interface the GV-5-MOD to digital systems with lower-voltage logic, such as 1.8 or 3.3V.

Note that if the LED Function Select pin is changed while the GV-5-MOD is operating, the change will take effect at the next LED transition. The source current on this pin is 270uA or less. See the description for Pins 9-12 for additional information.

Pins 9-12: Load Negative Output. Optional. Connect pins in parallel if used. This group of pins is connected in parallel to the Battery Negative through a MOSFET. Under normal operation, this MOSFET is on (closed). If the battery is connected in reverse, this MOSFET turns off (open) to protect the GV-5-MOD and the attached load from reverse polarity. If the load draws more than 5A continuous, 10A peak, the load negative should be connected to the battery negative.

This output is also the internal ground and signal reference for the GV-5-MOD, including the LED output and control inputs (Pins 1, 2, 7 and 8). If any of these pins are connected to equipment connected to battery negative, rather than load negative, care should be taken to prevent damaging reverse current flow from the connected equipment to the GV-5-MOD in the event the battery is connected in reverse. This protection can be implemented by connecting diodes (such as common LL4148/1N914/1N4148 diodes, etc.), between the GV-5-MOD pins and connected equipment, with the anode of the diode connected to the GV-5-MOD.

Pins 13-16: Battery Negative. Required. Connect pins in parallel to the Battery Negative. The GV-5-MOD and attached loads are protected from reverse battery connections provided there are no explicit connections or accidental ground loops connecting Battery Negative (Pins 13-16) to Load Negative (Pins 9-12).

Pins 17-20: Battery Positive and Panel Positive. Required. Connect these pins in parallel to the battery positive terminal and the solar panel positive lead. The battery should be fused close to the battery terminals with a fast-acting fuse or circuit breaker of 10A or less.

Pins 21-24: Panel Negative. Required. Connect pins in parallel to the panel negative lead. The GV-5-MOD is protected from reverse panel polarity by an antiparallel diode across the input. Long term operation with reverse polarity or sources producing more than the rated power may cause damage to the GV-5-MOD through overheating.

LED TIMINGS

The LED timings below can be used for electronic interpretation of charging status. The timings given are approximate and may vary somewhat with temperature, operating parameters, and between GV-5-MODs.

COLOR	DURATION	SPACING	PERIOD	MEANING
Green	0.4ms	N/A	8-10s	Sleep, insufficient solar input
Green	0.4ms	N/A	4-5s	Charging, < ~0.3A
Green	0.4ms	N/A	1-1.2s	Solar present, but below minimum battery charge temperature (if applicable), not charging
Green	0.4ms	N/A	1-10ms	Charging startup
Green	0.4ms	N/A	40-500ms	Charging ~0.3-3A
Green	100-200ms	N/A	0.8-1.6s	Charging > ~3A
Green Long/Short	100-200ms, 50-100ms	100- 200ms	0.8-1.6s	Operating at internal current limit
Green	Solid	N/A	N/A	Battery at charging voltage setpoint
Red/Green	0.4s each	None	N/A	Power-on LED sequence
Red/Green	0.4s each	None	Any	Repetition indicates battery voltage to low
Red	Solid	N/A	N/A	Error, battery voltage too low
2 Red	0.2s	0.2s	>1s	Error, over-temperature (see manual)
3 Red	0.2s	0.2s	>1s	Error, exceeded hard current limit (see manual)
4 Red	0.2s	0.2s	>1s	Error, battery voltage too low (see manual)
5 Red	0.2s	0.2s	>1s	Error, battery voltage too high (see manual)
6 Red	0.2s	0.2s	>1s	Error, input voltage too high (see manual)

Specification Table

	GV-5-MOD-PB		GV-5-MOD-LFP		GV-5-MOD-LI	
Charge Profile: (Selectable with Pin 7)	Default Charge Profile	Secondary Charge Profile	Default Charge Profile	Secondary Charge Profile	Default Charge Profile	Secondary Charge Profile
Battery Type:	Gel/SLA	AGM/Flooded	9V (3S) LiFePO4	12V (4S) LiFePO4	3S LiCo/Mn/Ni	4S LiCo/Mn/Ni
Rated Panel Power:	65W		50W	65W	55W	75W
Rated Battery (Output) Current:	5A		5A		5A	
Nominal Battery Voltage:	12V		-	-	-	-
Max Input Voltage:	27V		27V		27V	
Recommended Max Panel Voc at STC:	22V		22V		22V	
Max Input Short Circuit Current: ¹	5A		5A		5A	
Max Input Current: ²	9A		8A		9A	
Min Battery Voltage for Normal Operation:	7.2V		7.2V		7.2V	
Trickle Charge to Recover Dead (0V) Battery:	Yes		Yes		Yes	
Continuous Rated Load Current:	5A		5A		5A	
Input Voltage Range:	0-27V		0-27V		0-27V	
Tracking Efficiency:	99+% typical		99+% typical		99+% typical	
MPPT Tracking Speed:	15Hz		15Hz		15Hz	
Electrical Efficiency:	94% – 99.85% typical	94% – 99.85% typical	94% – 99.85% typical	96% – 99.85% typical	95% – 99.85% typical	96% – 99.85% typical
Operating Consumption:	0.150mA (150µA)		0.150mA (150µA)		0.150mA (150µA)	
Standby Consumption:	0.125mA (125µA)		0.125mA (125µA)		0.125mA (125µA)	
Charge Profile:	Multi-stage		CC/CV		CC/CV	
CV Voltage	-	-	10.7V	14.2V	12.5V	16.7V
Bulk Voltage:	14.3V	14.6V	-	-	-	-
Absorption Voltage:	14.1V	14.4V	-	-	-	-
Absorption Time:	2 hours		-	-	-	-
Float Voltage:	13.6V	13.4V	-	-	-	-

Battery Temperature Compensation:	-24mV/°C (referred to 25°C)	Disabled		Disabled	
Reabsorb (Re-Bulk): ³	12.5V	-	-	-	-
Load Disconnect (LVD)/Reconnect Voltage:	11.4V/12.5V	8.2V/9.0V	11.0V/12.0V	9.3V/10.5V	12.4V/14.0V
Operating Temperature:	-40°C – 85°C	-40°C – 85°C		-40°C – 85°C	
Max Full Power Operating Ambient: ^{4,5}	45°C	45°C		45°C	
Connection	24-pin, dual-row shrouded polarized male header, 0.100" spacing, gold-plated	24-pin, dual-row shrouded polarized male header, 0.100" spacing, gold-plated		24-pin, dual-row shrouded polarized male header, 0.100" spacing, gold-plated	
Weight:	1.0oz (28g)	1.0oz (28g)		1.0oz (28g)	
Dimensions:	3.28" x 1.88" x 0.48" (8.32cm x 4.78cm x 1.22 cm)	3.28" x 1.88" x 0.48" (8.32cm x 4.78cm x 1.22 cm)		3.28" x 1.88" x 0.48" (8.32cm x 4.78cm x 1.22 cm)	
Environmental Protection:	Conformal Coating, Gold-Plated Connections	Conformal Coating, Gold-Plated Connections		Conformal Coating, Gold-Plated Connections	
Certifications:	CE, FCC, and RoHS	CE, FCC, and RoHS		CE, FCC, and RoHS	CE, FCC, and RoHS
Warranty:	10 years	10 years		10 years	10 years

1. Panel Isc. Maximum input power and maximum input voltage requirements must also be respected.
2. Maximum current that the controller could draw from an unlimited source. This specification is not intended for determining PV input.
- 3: If the battery voltage drops below this point, the controller will attempt to run an absorption cycle. Otherwise, it will charge to the float voltage.
4. 16V input, 13V output.
5. At high ambient temperatures and input voltages, the GV-5-MOD will automatically limit charging power. When limiting in this manner, the LED will display the "Current Limit" blinks. Moving the GV-5-MOD to a cooler location or providing increased airflow may increase charging power.