



Industrial DC/DC CONVERTER MGDI-100 Wide Input : 100W POWER

Industrial Grade ■

4:1 & 5:1 Wide Input Single Output Metallic Case - 1.500 VDC Isolation



- Wide input range
- Nominal power up to 100 W
- High efficiency (typ. 88%)
- Soft start
- Galvanic isolation 1.500 VDC according to EN 60950
- Integrated LC input filter
- Permanent short circuit protection
- External synchronisation
- External trim and sense adjustment : -20/+10%
- No optocoupler for high reliability
- RoHS process

1-General

The MGDI-100 wide input series is a full family of DC/DC power modules designed for use in distributed power architecture where variable input voltage and transient are prevalent making them ideal particularly for transportation, railways or high-end industrial applications. These modules use a high frequency fixed switching topology at 260KHz providing excellent reliability, low noise characteristics and high power density. Standard models are available with wide input voltage range of 14-55 and 36-140 volts for 24/36/72/110V batteries. The serie includes single output voltage choices of 2.5, 3.3, 5, 12, 15 and 26 volts (for 24Vdc applications).

The MGDI-100 serie is designed in conformity with safety standards EN60950 and UL1950. All the modules are designed with LC network filters to minimize reflected input current ripple and output voltage ripple according to ease EN55022 and FCC Part 15J standard.

The modules include a soft-start, an input undervoltage and overvoltage lock-out, a permanent short circuit protection, a thermal protection and an output overvoltage protection to ensure efficient module protections. The soft-start allows current limitation and eliminates inrush current during start-up. The short circuit protection completely protects the modules against short-circuits of any duration by a shut-down and restores to normal when the overload is removed.

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2-Product Selection

Single output model : MGDSI - 100 - -

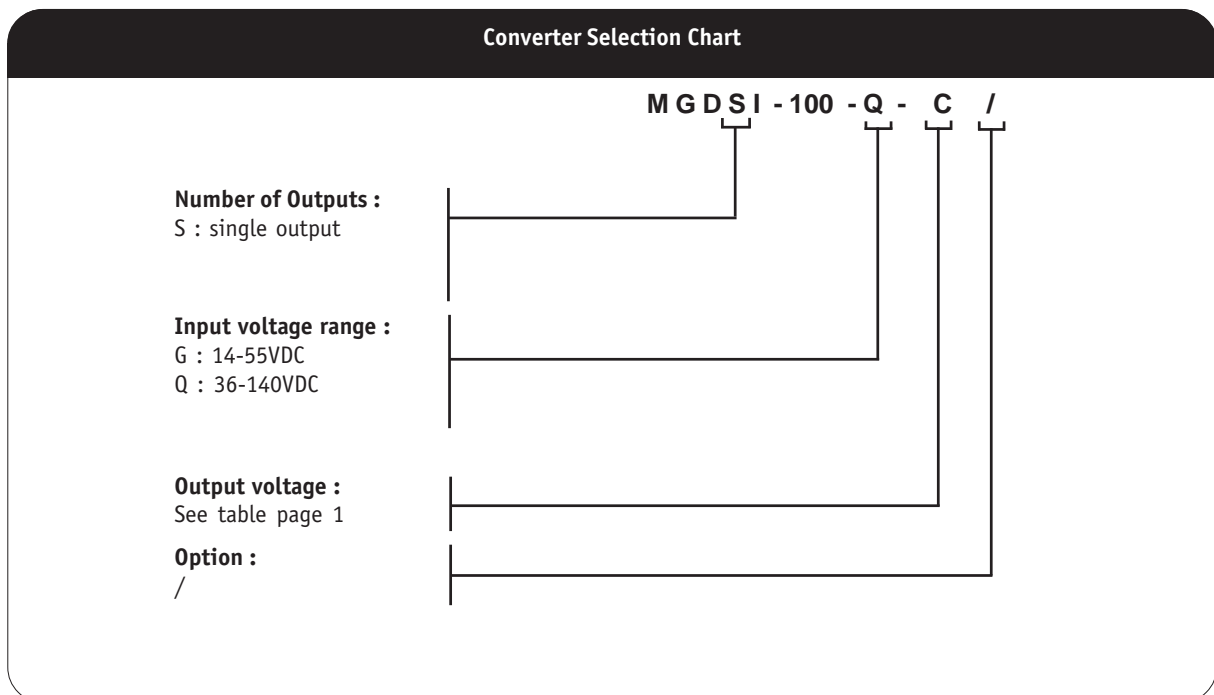
| Input Voltage Range | | |
|---------------------|--------------|----------------|
| | Permanent | Extended Range |
| G | : 14-55 VDC | 55 VDC |
| Q | : 36-140 VDC | 175 VDC |

| Output |
|--|
| B : 3.3 VDC |
| C : 5 VDC |
| E : 12 VDC |
| F : 15 VDC |
| 26 : 26 VDC (for 24 VDC application) |
| For lower output voltage below 3.3V please consult factory |

2- Product Selection (continued)

| Input range | Output | Current | Reference | Options |
|-------------|---------|---------|----------------|---------|
| 14-55 VDC | 3,3 VDC | 20 A | MGDSI-100-G-B | / |
| 14-55 VDC | 5 VDC | 20 A | MGDSI-100-G-C | / |
| 14-55 VDC | 12 VDC | 8,25 A | MGDSI-100-G-E | / |
| 14-55 VDC | 15 VDC | 6,5 A | MGDSI-100-G-F | / |
| 14-55 VDC | 26 VDC | 3,8 A | MGDSI-100-G-26 | / |
| 36-140 VDC | 3,3 VDC | 20 A | MGDSI-100-Q-B | / |
| 36-140 VDC | 5 VDC | 20 A | MGDSI-100-Q-C | / |
| 36-140 VDC | 12 VDC | 8,25 A | MGDSI-100-Q-E | / |
| 36-140 VDC | 15 VDC | 6,5 A | MGDSI-100-Q-F | / |
| 36-140 VDC | 26 VDC | 3,8 A | MGDSI-100-Q-26 | / |

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3- Electrical Specifications

Data are valid at +25°C, unless otherwise specified.

| Parameter | Conditions | Limit or typical | Units | Single Output MGDSI-100 | |
|--|---|------------------|-------|--|---------|
| | | | | 100 - G | 100 - Q |
| Input | | | | | |
| Nominal input voltage | Full temperature range | Nominal | VDC | 24 | 72 |
| Permanent input voltage range (Ui) | Full temperature range | Min. - Max. | VDC | 14-55 | 36-140 |
| Extended permanent input voltage range | Full temperature range (Consult factory) | Min. - Max. | VDC | NA | 36-175 |
| Transient input voltage | Full load (Consult factory) | Maximum | VDC/S | 60/1 | NA |
| Undervoltage lock-out (UVLO) | Turn-on voltage | Nominal | VDC | 13,5 ⁽¹⁾ | 34 |
| | Turn-off voltage | Nominal | VDC | 12,5 ⁽¹⁾ | 33 |
| Overvoltage lock-out (OVLO) | Turn-on voltage | Nominal | VDC | NA | 177 |
| | Turn-off voltage | Nominal | VDC | | 179 |
| Start up time | Ui nominal within 3 ms Nominal output Full load : resistive | Maximum | ms | 30 | 30 |
| Reflected ripple current | Ui nominal, full load at switching freq. BW = 20MHz | Maximum | mApp | TBD | TBD |
| No load input power | Ui min. to max. No load | Maximum | W | for Vo<=12Vdc : 10W for Vo>12Vdc : 2W | |
| Standby input power | Ui min. to max. No load | Maximum | W | 1 | 1 |
| Output | | | | | |
| Output voltage * | | Nominal | VDC | 3,3 | 3,3 |
| | Full temperature range | Nominal | VDC | 5 | 5 |
| | Ui min. to max. | Nominal | VDC | 12 | 12 |
| | 75% load | Nominal | VDC | 15 | 15 |
| | | Nominal | VDC | 26 | 26 |
| Set Point accuracy * | Ambient temperature : +25°C Ui nominal, 75% load | Maximum | % | +/- 2 | +/- 2 |
| Output power ** | Full temperature range Ui min. to max. | Maximum | W | see section 10 | |
| Output current ** | | | | | |
| 3,3V output | | Maximum | A | 20 | 20 |
| 5V output | Full temperature range | Maximum | A | 20 | 20 |
| 12V output | Ui min. to max. | Maximum | A | 8,25 | 8,25 |
| 15V output | | Maximum | A | 6,5 | 6,5 |
| 26V output | | Maximum | A | 3,8 | 3,8 |
| Ripple output voltage *** | | | | | |
| 3,3V and 5V output | Ui nominal | Maximum | mVpp | 50 | 50 |
| 12V output | Full load | Maximum | mVpp | 100 | 100 |
| 15V output | BW = 20MHz | Maximum | mVpp | 150 | 150 |
| 26V output | | Maximum | mVpp | 250 | 250 |
| Output regulation* (Line + load + thermal) | Ui min. to max. 0% to full load | Maximum | % | +/- 1 | +/- 1 |
| output Voltage Trim | As a function of output voltage | Minimum | % | 80 | 80 |
| | | Maximum | % | 110 | 110 |
| Efficiency | Ui nominal | Typical | % | 88 | 88 |
| | Full load | | | | |

Note (1) : A 47KOhm resistance need to be connected across pins Gin and UVLO (see section 12-1)

Note * : These performances are measured with the sense line connected.

Note ** : It is recommended to mount the converter on a heatsink for this test, see section 10 for further details.

Note *** : The ripple output voltage is the periodic AC component imposed on the output voltage, an aperiodic and random component (noise) has also to be considered. This noise can be reduced by adding 1 external decoupling capacitor connected between Gin and Gout. These capacitance should be layed-out as close as possible from the converter. The ripple output voltage is measured by connecting a ceramic chip capacitor Co across Vo and Go pins (C=100µF if Vo<5Vdc C=10µF if Vo>5Vdc)

4- Switching Frequency

| Parameter | Conditions | Limit or typical | Specifications |
|---------------------|---|------------------|----------------|
| Switching frequency | Full temperature range Ui min. to max. No load to full load | Nominal, fixed | 260 KHz |

5- Isolation

| Parameter | Conditions | Limit or typical | Specifications |
|--------------------------------|---------------------------------|--------------------|----------------------|
| Electric strength test voltage | Input to output | Minimum | 1.500 VDC / 1 min |
| Isolation resistance | Input to case Output to case | Minimum Minimum | 100 MOhm 100 MOhm |

6- Protection Functions

| Characteristics | Protection Device | Recovery | Limit or typical | Specifications |
|--|---|--------------------|-------------------------------------|------------------------------|
| Input undervoltage lock-out (UVLO) | Turn-on, turn-off circuit with hysteresis cycle | Automatic recovery | Turn-on nominal Turn-off nominal | See section 3 |
| Input overvoltage lock-out (OVLO) | Turn-on, turn-off circuit with hysteresis cycle | Automatic recovery | Turn-on nominal Turn-off nominal | See section 3 |
| Output current limitation protection (OCP) | Straight line current limitation | Automatic recovery | Nominal | 130% |
| Output overvoltage protection (OVP) | Overvoltage protection limitation | Automatic recovery | Min. - max. | 120% +/-5% of output voltage |
| Over temperature protection (OTP) | Thermal device with hysteresis cycle | Automatic recovery | Nominal | 115°C |

7- Reliability Data

| Characteristics | Conditions | Temperature | Specifications |
|--|--------------------|------------------------------|----------------------------|
| Mean Time Between Failure (MTBF) According to MIL-HDBK-217F | Ground fixed (Gf) | Case at 40°C Case at 70°C | 600.000 Hrs 300.000 Hrs |
| | Ground mobile (Gm) | Case at 40°C Case at 70°C | 300.000 Hrs 150.000 Hrs |
| Mean Time Between Failure (MTBF) According to IEC-62380-TR | Telecom switchers | / | Consult factory |

8- Electromagnetic Interference

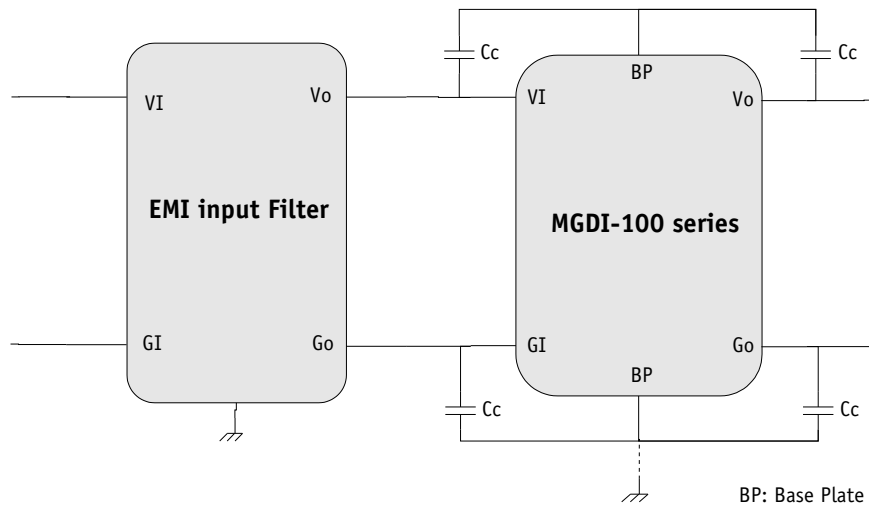
Electromagnetic interference requirements according to EN55022 class A and class B can be easily achieved as indicated in the following table :

| Electromagnetic Interference according to EN55022 | | |
|---|---------------|--|
| Conducted noise emission | Configuration | With 4 common mode capacitors $C_c = 10\text{nF}$ and external filter |
| | Models | Class B |
| Radiated noise emission | Configuration | With 4 common mode capacitors $C_c = 10\text{ nF}$ and external filter |
| | Models | Class B |

8-1 Module Compliance with EN55022 class A/class B Standard

Electromagnetic interference requirements according to EN55022 class A or class B can be easily achieved by adding an external common mode noise capacitance ($C_c = 10\text{nF}/\text{rated voltage}$ depending on isolation

requirement) and an external filter. The common mode noise capacitance C_c should be layed-out as close as possible from the DC/DC converter. Please consult factory for details.



* Note : Value of common mode noise capacitance depends on isolation requirements (typically 10nF/1500V or 10nF/3000V). In case of dielectric strength test in AC mode, adapt the capacitance value in order to be compatible with maximum admissible leakage current.

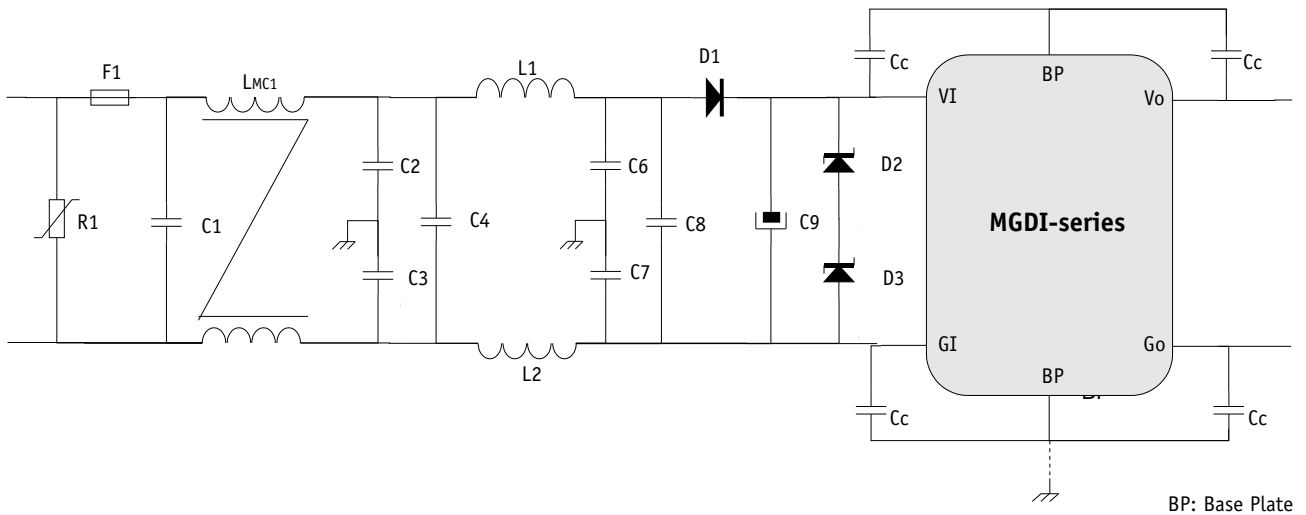
9- Surge Susceptibility EN61000-4-5 & EN50155

Surge susceptibility requirements according to EN50155, EN61000-4-5 and electromagnetic interference requirements of EN55022 class A can easily be achieved using :

- an input limiter filter : schematics of discret components, to sustain the following surge levels :

| Characteristics | Standards | Levels |
|-------------------------|--------------|---|
| Spikes Line to line | EN 61000-4-5 | Level 4 with 4.000 V waveform 50 μ s, impedance 2 Ohm |
| | EN 50155 | Level 1.800 V waveform 50 μ s, impedance 100 and 5 Ohm Level 8.400 V waveform 0.1 μ s, impedance 100 Ohm |
| Spikes Line to earth | EN 61000-4-5 | Level 4 with 4.000 V waveform 50 μ s, impedance 12 Ohm |
| | EN 50155 | Level 1.800 V waveform 50 μ s, impedance 100 and 5 Ohm Level 8.400 V waveform 0.1 μ s, impedance 100 Ohm |

The input limiter filter schematics is given below, please consult design note «Surge filter recommendations for 50W up to 200W modules for details and components description.

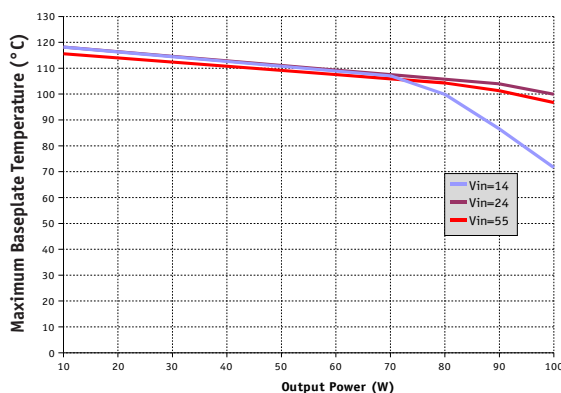


10- Thermal Characteristics

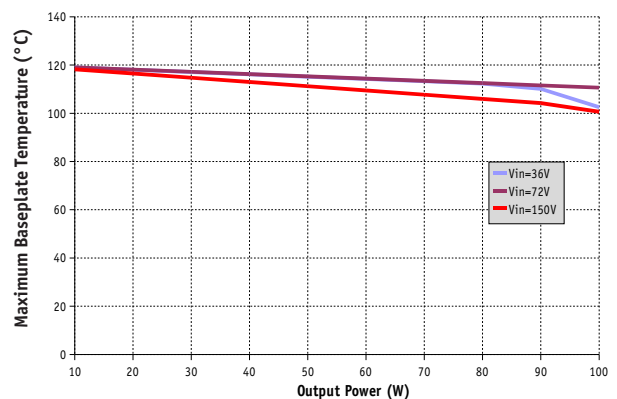
| Characteristics | Conditions | Limit or typical | Performances |
|---|--|--------------------|----------------------|
| Operating ambient temperature range | Ambient temperature | Minimum Maximum | -40°C see curves |
| Operating case temperature range at full load | Case temperature | Minimum Maximum | - 40°C see curves |
| Storage temperature range | Non functioning | Minimum Maximum | - 40°C + 115°C |
| Thermal resistance | Rth case to ambient in free air natural convection | Typical | 6°C /W |

The MGDI-100 series maximum **baseplate** temperature must not exceed following values and is a function of output load as described in the following figures :

MGDI-100-G-x Series Maximum Baseplate Temperature Versus Output Power



MGDI-100-Q-x Series Maximum Baseplate Temperature Versus Output Power



Heat can be removed from the baseplate via three basic mechanisms :

- Radiation transfert : radiation is counting for less than 5% of total heat transfert in majority of case, for this reason the presence of radiant cooling is used as a safety margin and is not considered.
- Conduction transfert : in most of the applications, heat will be conducted from the baseplate into an attached heatsink or heat conducting member; heat is conducted thru the interface.
- Convection transfert : convecting heat transfer into air refers to still air or forced air cooling.

In majority of the applications, heat will be removed from the baseplate either with :

- heatsink,
- forced air cooling,
- both heatsink and forced air cooling.

To calculate a maximum admissible ambient temperature the following method can be used.

Knowing the maximum baseplate temperature $T_{max, baseplate}$ of the module, the power used P_{out} and the efficiency η :

- determine the power dissipated by the module P_{diss} that should be evacuated :

$$P_{diss} = P_{out} / (\eta - 1) \quad (A)$$

- determine the maximum ambient temperature :

$$T_a = T_{max, baseplate} - R_{th}(b-a) \times P_{diss} \quad (B)$$

where $R_{th}(b-a)$ is the thermal resistance from the baseplate to ambient.

This thermal $R_{th}(b-a)$ resistance is the summ of :

- the thermal resistance of baseplate to heatsink ($R_{th}(b-h)$). The interface between baseplate and heatsink can be nothing or a conducting member, a thermal compound, a thermal pad.... The value of $R_{th}(b-h)$ can range from 0.4°C/W for no interface down to 0.1°C/W for a thermal conductive member interface.
- the thermal resistance of heatsink to ambient air ($R_{th}(h-a)$), which is depending of air flow and given by heatsink supplier.

10- Thermal Characteristics (continued)

The table hereafter gives some example of thermal resistance for different heat transfert configurations.

| Heat transfert | Thermal resistance heatsink to air Rth(h-a) | Thermal resistance baseplate to heatsink | Global resistance |
|-----------------------------|--|--|-------------------|
| Free air cooling only | No Heatsink baseplate only : 6°C/W | No need of thermal pad | 6°C/W |
| | Heatsink Aavid Thermalloy 824353B03250 3,9°C/W | Bergquist Silpad* : 0,13°C/W | 4,03°C/W |
| Forced air cooling 200 LFM | No Heatsink baseplate only : 3,8°C/W | No need of thermal pad | 3,8°C/W |
| | Heatsink Aavid Thermalloy 824353B03250 2,1°C/W | Bergquist Silpad* : 0,13°C/W | 2,23°C/W |
| Forced air cooling 400 LFM | No Heatsink baseplate only : 2,63°C/W | No need of thermal pad | 2,63°C/W |
| | Heatsink Aavid Thermalloy 824353B0250 1,5°C/W | Bergquist Silpad* : 0,13°C/W | 1,63°C/W |
| Forced air cooling 1000 LFM | No Heatsink baseplate only : 1,54°C/W | No need of thermal pad | 1,54°C/W |
| | Heatsink Aavid Thermalloy 824353B03250 1°C/W | Bergquist Silpad* : 0,13°C/W | 1,13°C/W |

Aavid Thermalloy is a heatsink manufacturers. «Silpad» ® is a registered trademark of Bergquist.
 Note* : Silpad performance are for Silpad 400 with pressure conditions of 50 Psi.

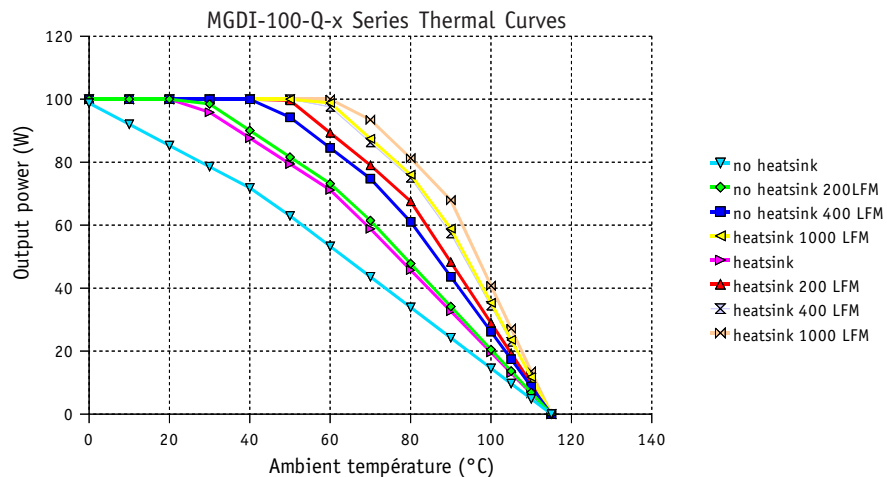
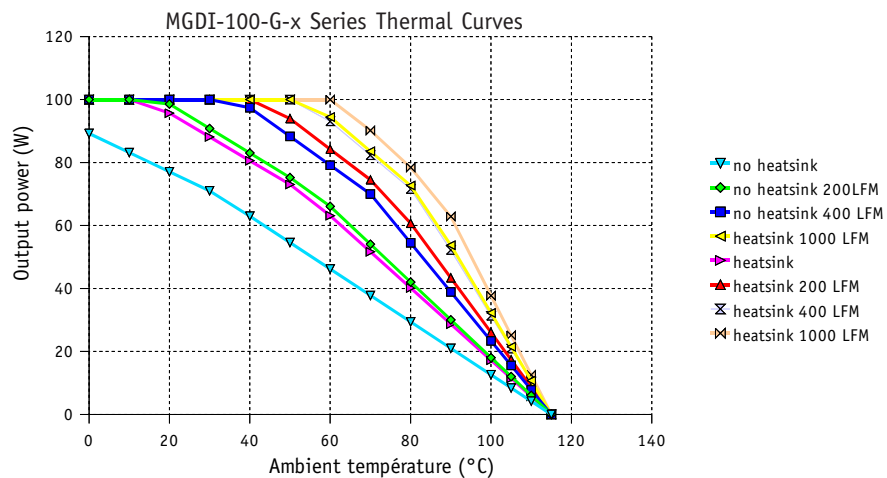
The two formulas (A) and (B) described in previous page :

- $P_{diss} = P_{out}(1/\eta - 1)$ (A)
- $T_a = T_{base} - R_{th}(b-a) \times P_{diss}$ (B)

conduct to curves determining the ambient temperature admissible as a function of output power for various heat transfert conditions.

In particular, as example the following typical curves are calculated with :

- no heatsink
- a Aavid Thermalloy heatsink reference 824353B03250 and a Bergquist «Silpad» for various cooling conditions.



11- Environmental Qualifications

The modules have been subjected to the following environmental qualifications.

| Characteristics | Conditions | Severity | Test procedure |
|---|--|--|--|
| Climatic Qualifications | | | |
| Life at high temperature | Duration Temperature Status of unit | 1.000 Hrs 95°C case unit operating | IEC 68-2-2 |
| Humidity steady | Damp heat Temperature Duration Status of unit | 93 % relative humidity 40°C 56 days unit not operating | IEC 68-2-3 Test Ca |
| Temperature cycling | Number of cycles Temperature change Transfert time Steady state time Status of unit | 200 -40°C / +71°C 40 min. 20 min. unit not operating | IEC 68-2-14 Test N |
| Temperature shock | Number of shocks Temperature change Transfert time Steady state time Status of unit | 50 -40°C / +105°C 10 sec. 20 min. unit not operating | IEC 68-2-14 Test Na |
| Mechanical Qualifications | | | |
| Vibration (Sinusoidal) | Number of cycles Frequency : amplitude Frequency : acceleration Amplitude /acceleration Duration Status of unit | 10 cycles in each axis 10 to 60 Hz / 0.7 mm 60 to 2000 Hz / 10 g 0.7 mm/10 g 2h 30 min. per axis unit not operating | IEC 68-2-6 Test Fc |
| Shock (Half sinus) | Number of shocks Peak acceleration Duration Shock form Status of unit | 3 shocks in each axis 100 g 6 ms 1/2 sinusoidal unit not operating | IEC 68-2-27 Test Ea |
| Bump (Half sinus) | Number of bumps Peak acceleration Duration Status of unit | 2000 bumps in each axis 25 g 6 ms unit not operating | IEC 68-2-29 Test Eb |
| Electrical Immunity Qualifications | | | |
| Electrical discharge susceptibility | Number of discharges Air discharge level Contact discharge level Air discharge level Contact discharge level | 10 positive & 10 negative discharges 4 kV : sanction A 2 Kk : sanction A 8 Kk : sanction B 4 kV : sanction B | EN55082-2 with : EN61000-4-2 IEC 801-2 |
| Electrical field susceptibility | Antenna position Electromagnetic field Wave form signal Frequency range | at 1 m 10 V/m AM 80%, 1 kHz 26 MHz to 1 GHz | EN55082-2 with : EN61000-4-3 IEC801-3 |
| Electrical fast transient susceptibility | Burst form Wave form signal Impedance Level 1 Level 3 | 5/50 ns 5 kHz with 15 ms burst duration period 300 ms 50 Ohm 0,5 kV : sanction A 2 kV : sanction B | EN55082-2 with : EN61000-4-4 IEC801-4 |
| Surge Susceptibility | Surge form Impedance Level 4 | 1,2/50 µs 2 Ohm 4 kV : with transient protection (see section surge) | EN61000-4-5 EN50155 |

12- Description of Protections

The MGDI-100 series include 5 types of protection devices.

12-1 Input Undervoltage Lockout (UVLO) and Overvoltage Lockout (OVLO)

12-1-1 Undervoltage Lockout (UVLO)

An input undervoltage protection will inhibit the module when input voltage drops below the lock-out turn-off threshold (see section 3 for value) and restores to normal operation automatically when the input voltage rises the lock-out turn-on threshold.

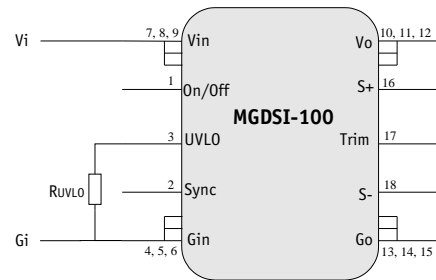
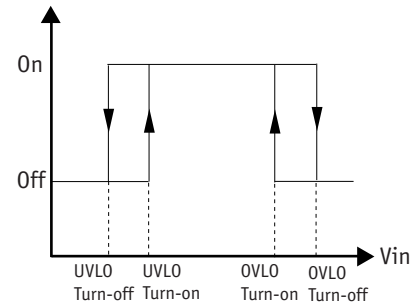
The input undervoltage lock-out threshold (UVLO) can be trimmed up by connecting a resistor between UVLO and Gi pins. This resistance can be calculated as follow :

$$R_{UVLO} = \frac{a \times (1 + b - n)}{(n - 1)} \quad \text{where } n = \frac{UVLO_{trim}}{UVLO_{threshold}}$$

| | Input G | Input Q |
|---|---------|---------|
| a | NA | 1000 |
| b | NA | 6.55 |

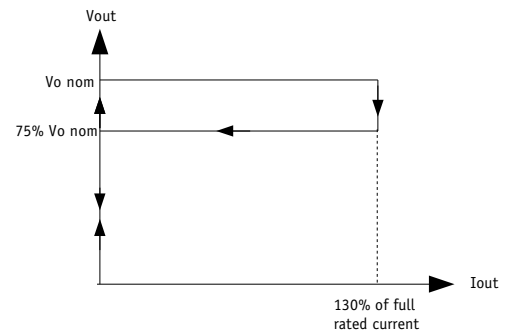
12-1-2 Overvoltage Lockout (OVLO)

An input overvoltage protection will inhibit the module when input voltage reaches the overvoltage lockout turn-off threshold (see section 3 for value) and restores to normal operation automatically when the input voltage drops below the overvoltage Lockout turn on threshold.



12-2 Output Over Current Protection (OCP)

The MGDI-100 Series incorporates a straight line current limit and protection circuit. When the output current reaches 130% of its full-rated current (Icurrent limit), the output voltage decreases down to 75% of nominal output voltage. Below this threshold the converter falls in hiccup mode by testing periodically if an overload is applied. The module restart automatically to normal operation when overcurrent is removed.

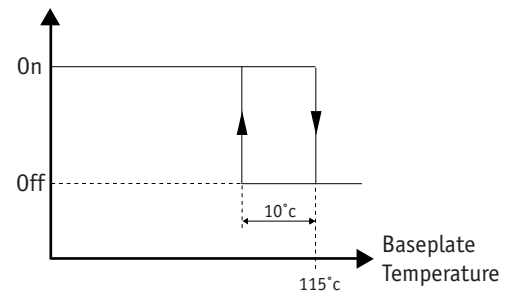


12-3 Output Overvoltage Protection (OVP)

The MGDI-100 series has an internal overvoltage protection circuit that monitors the voltage across the output power terminals. It is designed to limit the converter at 120% (+/-5%) of output voltage.

12-4 Over Temperature Protection (OTP)

A thermal protection device adjusted at 115°C (+/-5%) internal temperature with 10°C hysteresis cycle will inhibit the module as long as the overheat is present and restores to normal operation automatically when overheat is removed. The efficiency of the OTP function is warranty with the module mounted on a heatsink.



13- Description of Functions

13-1 Trim Function

The output voltage V_o may be trimmed in a range of 80%/110% of the nominal output voltage via a single external trimpot or fixed resistor.

Trim Up Function

Do not attempt to trim the module higher than 110% of nominal output voltage as the overvoltage protection may occur.

Also do not exceed the maximum rated output power when the module is trimmed up.

The trim up resistor must be connected to S+ pin.

The trim up resistance must be calculated with the following formula :

$$R_u = \frac{R_1 \times (V_o - V_{ref}) \times V_{o_{nom}}}{(V_o - V_{o_{nom}}) \times V_{ref}} - R_1 - R_2$$

Trim Down Function

Do not trim down more than -20% of nominal output voltage otherwise the module may turn off.

The available output power is reduced by the same percentage that output voltage is trimmed down.

The trim down resistor must be connected to S- pin.

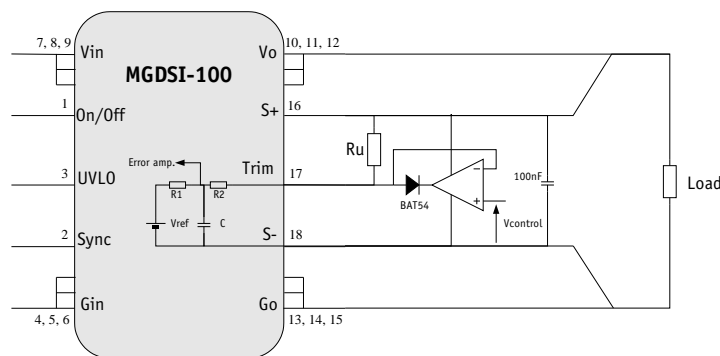
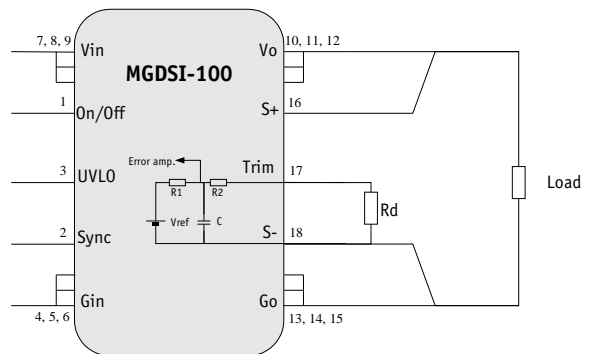
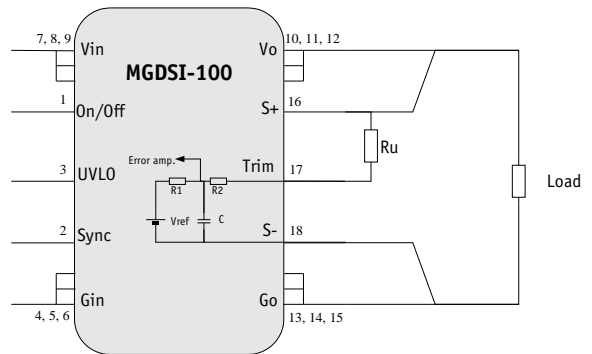
The trim down resistance must be calculated with the following formula :

$$R_d = \frac{(R_2 + R_1) \times V_o - R_2 \times V_{o_{nom}}}{V_{o_{nom}} - V_o}$$

Trim via a voltage

The output voltage is given by the following formula :

$$V_o = \left[1 + \frac{R_1}{(R_1 + R_2)} \times \frac{(V_{cont} - 1)}{V_{ref}} \right] \times V_{nom}$$

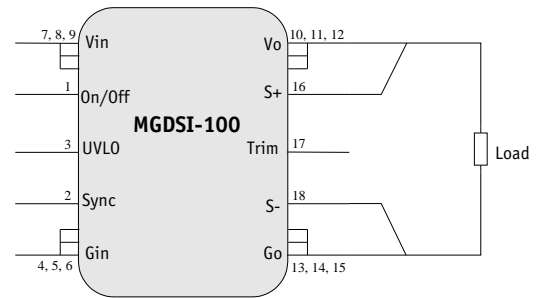


| Parameter | Unit | Min. | Typ. | Max. |
|---------------------|------|------|------|------|
| Trim reference Vref | Vdc | 2,45 | 2,5 | 2,55 |
| Resistor R1 | Ohm | / | 39K | / |
| Resistor R2 | Ohm | / | 270 | / |
| Trim capacitor C | nF | / | 10 | / |

13- Description of Functions (continued)

13-2 Sense Function

If the load is separated from the output by any line length, some of these performance characteristics will be degraded at the load terminals by an amount proportional to the impedance of the load leads. Sense connections enable to compensate the line drop at a maximum of 10% of output voltage. The overvoltage protection will be activated if remote sense tries to boost output voltage above 120% of nominal output voltage. Connection is described in figure herein.

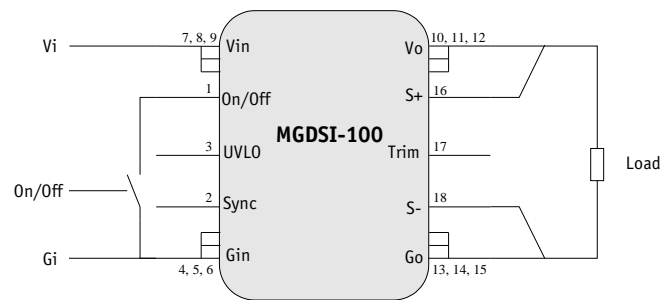


13-3 On/Off Function

The control pin 1 (On/Off) can be used for applications requiring On/Off operation. This may be done with an open collector transistor, a switch, a relay or an optocoupler. Several converters may be disabled with a single switch by connecting all On/Off pins together.

- The converter is disabled by pulling low the pin 1.
- No connection or high impedance on pin 1 enables the converter.

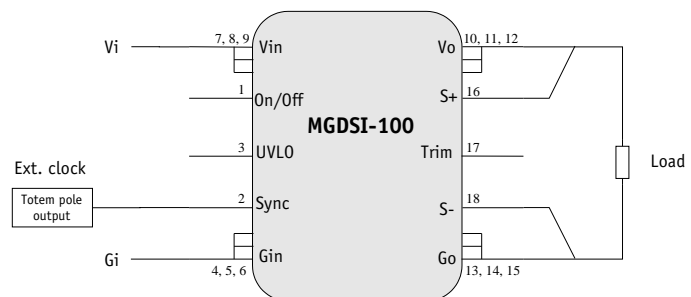
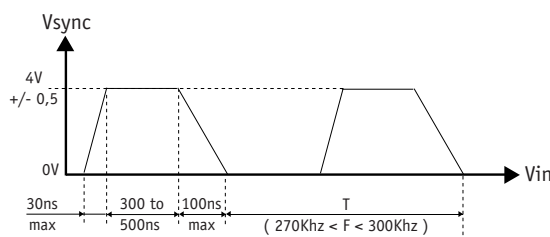
By releasing the On/Off function, the converter will restart within the start up time specifications given in table section 3



| Parameter | Unit | Min. | Typ. | Max. | Notes, conditions |
|-------------------------------|------|------|------|------|--|
| On/Off module enable voltage | Vdc | 3.5 | / | 5 | Open, the switch must not sink more than 100µA |
| On/Off module disable voltage | Vdc | 0 | / | 0.5 | The switch must be able to sink 1mA |
| On/Off alarm level | Vdc | 0 | / | 0.5 | OTP faulty module |
| On/Off module enable delay | ms | / | / | 30 | The module restarts with the same delay after alarm mode removed |
| On/Off module disable delay | µs | / | / | 100 | Vi nominal, full load |

13-4 Synchronization Function

An external clock with pulse signals can be used to lock one or more converters. The external clock signal should have a frequency range from 270KHz to 300KHz, a low level below 0,5V a high level of 4V (+/-0.5V), a rise time of 30 ns max., a fall time of 100ns max., and a pulse width of 300 to 500 ns. Several converters can be synchronized by connecting their Sync pin together.



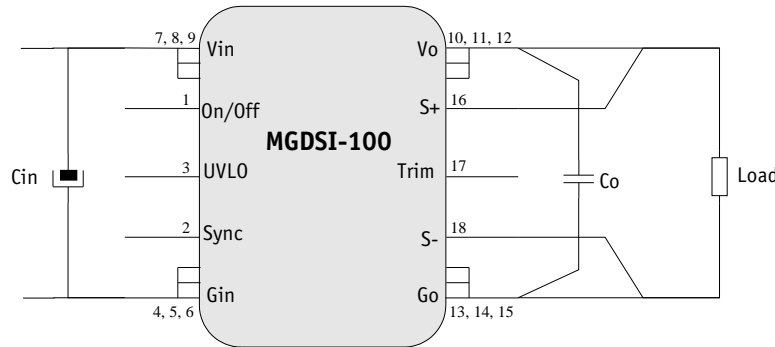
14- Application Notes

14-1 Input to Output Impedance

The MGDI-100 converters have been designed to be stable with no external capacitors when used in low inductance input and output circuits.

However, in many applications, the inductance associated with the distribution from the power source to the input of the converter can affect the stability of the converter. The addition of a $C_{in}=10\mu F$ electrolytic capacitor with an ESR < 1 Ohm across the input helps ensure stability of the converter.

In many applications, the user has also to use decoupling capacitance at the load. The addition of a decoupling ceramic chip capacitor C_o ($C_o=10\mu F$ if $V_o>5Vdc$ or $C_o=100\mu F$ if $V_o\leq 5Vdc$) across the output and placed close to the converter allows to achieve the output voltage ripple specified in the table page 3.

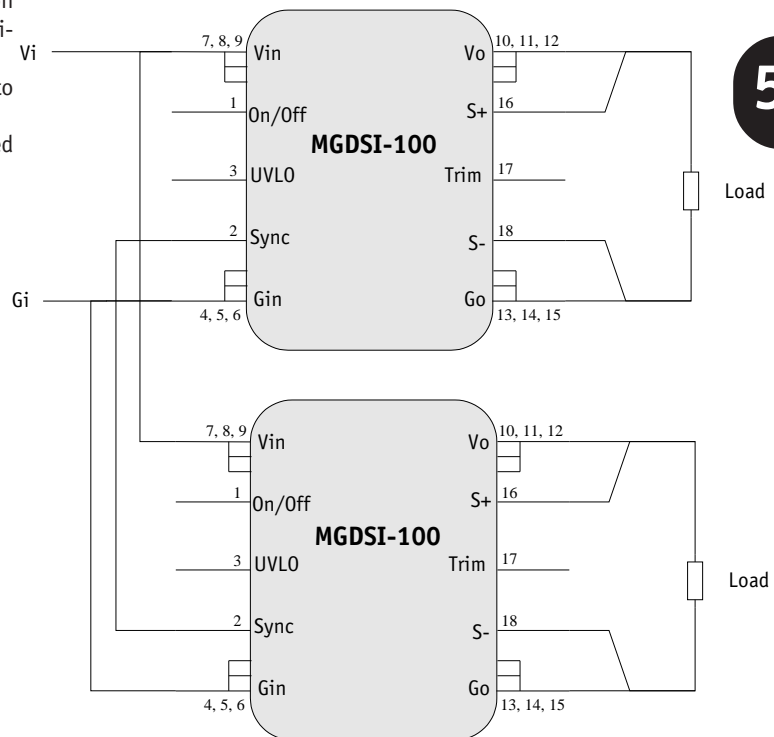


14-2 Synchronization of Modules

The MGDI-100 series provides a synchronization function through the pin 2 (Synchro) to enable automatic synchronization between several converters.

If several converters are used, they lock themselves into the highest switching frequency.

The synchronization signal available on pin 2 is referenced to ground in (Gi).



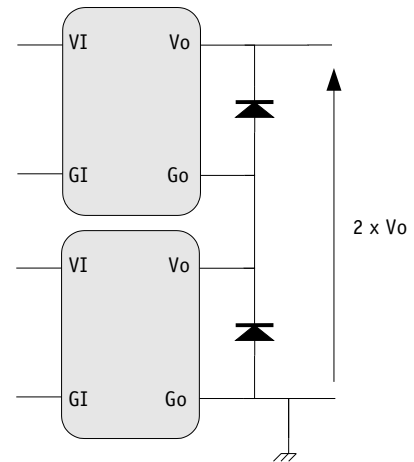
5

14-3 Connection of Modules in Series

The output of single output units can be connected in series without any precautions to provide higher output voltage level.

Nevertheless, GAIA Converter recommends to protect each individual output by a low power shottky diode rated with the maximum current of the converter to avoid reverse polarity at any output.

Reverse polarity may occur at start up if the output voltages do not rise at the same time.



15- PCB Mounting Specifications

The MGDI-100 series has been designed for low profile applications.

Two levels of mounting can be designed :

- On-board mounting with 12,5 mm height
- In-board mounting with 10,5 mm height and PCB hole design on the mother board

On-board Mounting

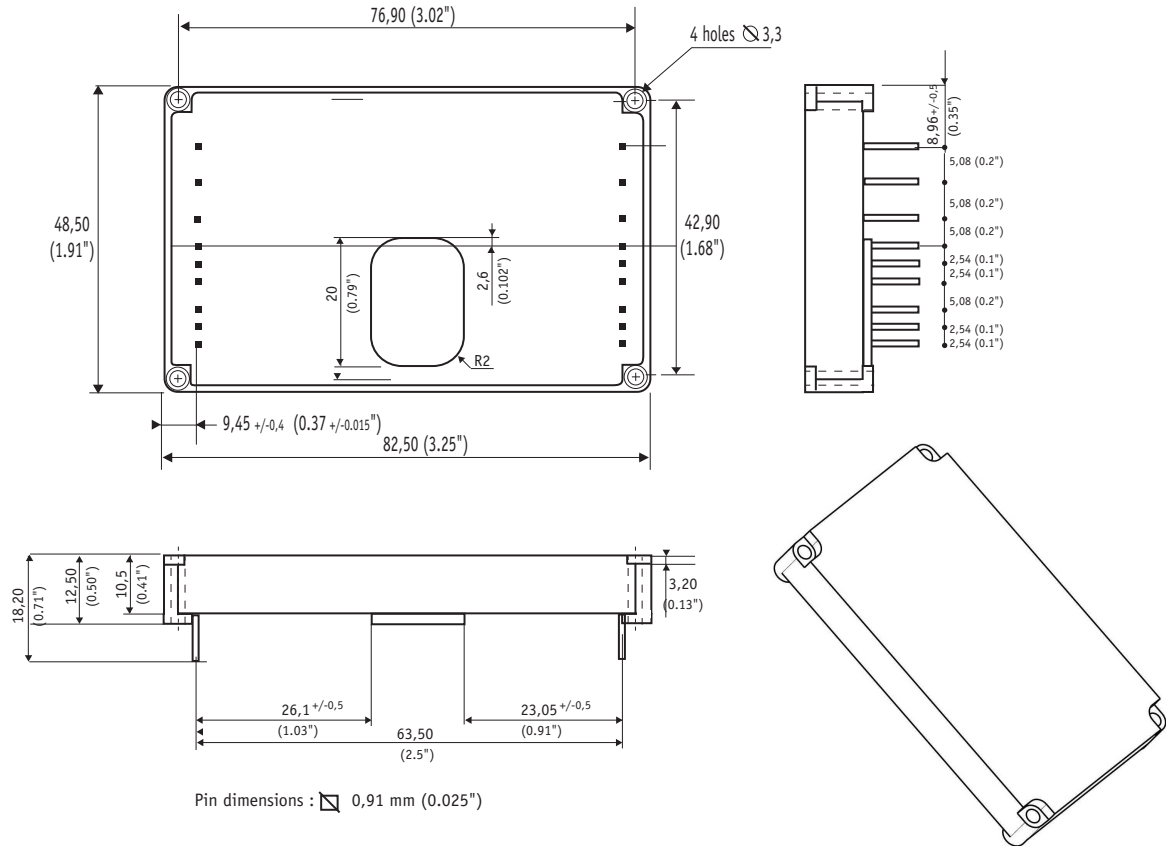


In-board Mounting



16- Dimensions

Dimension are given in mm (inches). Tolerance : +/- 0,2 mm (+/- 0.01 ") unless otherwise indicated.
Weight : 65 grams (2.30 Ozs) max.



17- Materials

Case : Metallic black anodized coating.

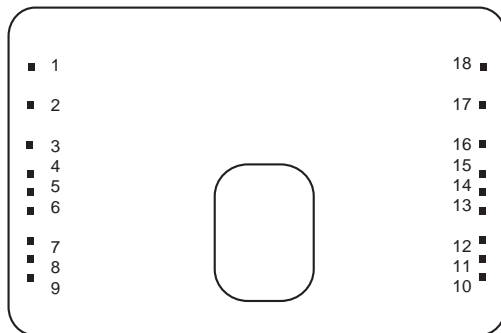
Pins : Plated with pure matte tin over nickel underplate.

18- Product Marking

Upper face : Company logo, location of manufacturing.

Side face : Module reference, option, date code : year and week of manufacturing.

19- Connections



Bottom view

| Pin | Single |
|------------|----------------|
| 1 | On / Off |
| 2 | Synchro (Sync) |
| 3 | UVLO |
| 4, 5, 6 | - Input (Gi) |
| 7, 8, 9 | + Input (Vi) |
| 10, 11, 12 | Output (Vo) |
| 13, 14, 15 | Common (Go) |
| 16 | Sense + |
| 17 | Trim |
| 18 | Sense - |



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