

10-36V & 36-154V Input
85V & 385V Transient Limitor
8.4kV Spike Suppressor
Metallic Case



- Spike suppressor module
 - EN50155 level 1.800V
 - RIA12 level 8.400V
- Transient suppressor module
 - EN50155
 - IEC 571
 - RIA12
- Input reverse polarity protection
- High efficiency (98%)
- Power range : from 4W to 50W
- Integrated EMI filter EN55022 class A
- Inhibition function
- RoHS process

1-General

The Gaia Converter limitor LGDS-50 Series designates an active power adaptor module designed to protect electronical systems against fast transient and high spike levels that can occur from an input bus line with no voltage stabilization devices.

The LGDS-50 delivers an adapted output voltage compliant with Gaia Converter DC/DC range of modules. This line of module is optimized to provide high efficiency up to 98% over the whole power range between 4W and 50W power.

The module includes also an EMI filter to provide compliance with EN55022 Class A together with GAIA Converter DC/DC modules.

The module is manufactured in a fully automated process to guaranty high quality. Each module is tested with a Gaia Converter automated test

equipment.

The LGDS-50 features 2 modes of operations as follow :

• Normal operation :

Normal operation occurs when input bus line is in steady state permanent range. The LGDS-50 is then operating in steady transparency state providing an output with a typical 1,5V drop-out voltage.

• Transient and spikes operation

The LGDS-50 can sustain both :

- transient during 1s and 20 ms according to RIA12 or EN50155 requirements,
- high spike levels up to 1.8kV with 5 Ohms impedance and 8,4kV with 100 Ohms impedance to meet international input bus standards of EN50155, RIA12 or IEC 571.

2-Product Selection

Single output model : LGDS - 50 - input - output

Input Voltage Range

Permanent

J : 10-36 VDC
Q : 36-154 VDC

Output

K

3- Modes of Operation

3-1 LGDS-50 Modes of Operation

The LGDS-50 series features 3 modes of operations detailed hereafter and illustrated by the 2 figures which depict the transfer functions for both models LGDS-50-J-K and LGDS-50-Q-K :

- **Power fail operation :**

An undervoltage lock-out stops operation for input voltage below the low line operation threshold (typically 10Vdc).

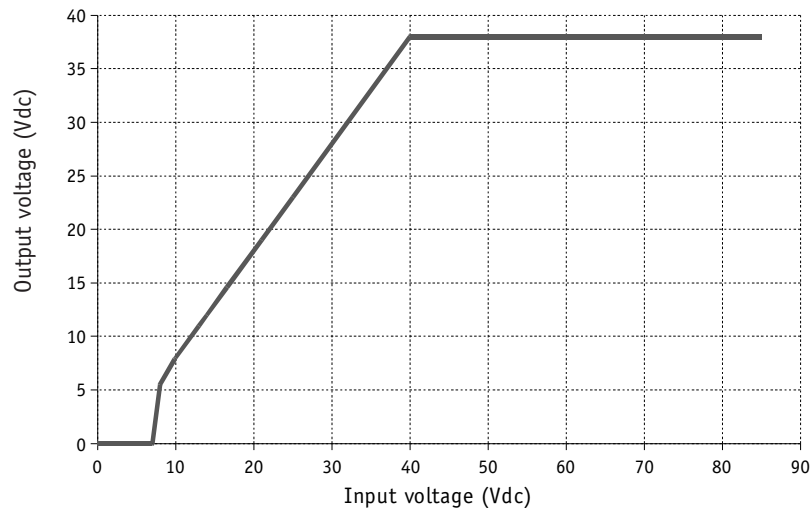
- **Normal operation :**

During normal operation the module is operating in steady transparency state.

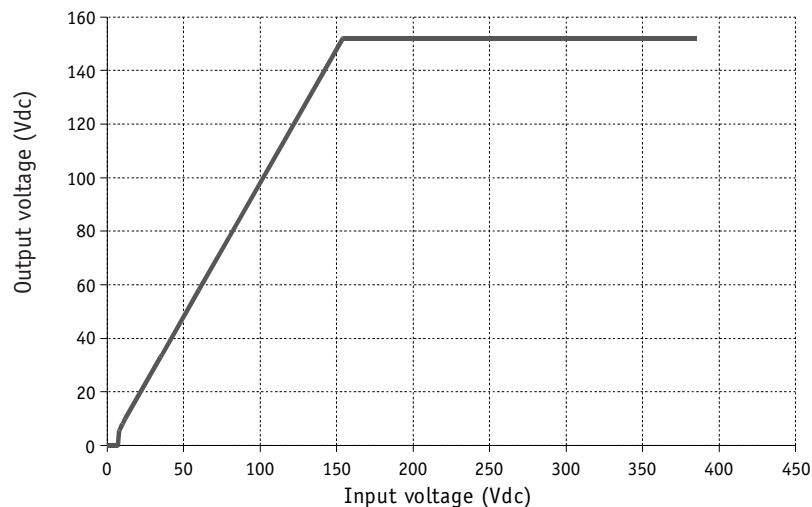
- **Transient and spike operation :**

The LGDS-50 series can sustain input transient and spike describe in section 3 by a clamping input system.

LGDS-50-J-K Transfer Function



LGDS-50-Q-K Transfer Function



4- Electrical Specifications

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

Parameter	Conditions	Limit or typical	Units	LGDS-50-J-K	LGDS-50-Q-K
Input					
Compatible with nominal battery voltage	Full temperature range	Nominal	VDC	24	72 / 96 / 110
Limiter start up voltage	Full temperature range	Maximum	VDC	10	10
Permanent input voltage range	Full temperature range	Min. - Max.	VDC	10-36	36-154
Transient input voltage	Full temperature range Full load meet standards EN50155, RIA12 Transient 1 sec. Transient 20 ms	Maximum Maximum	VDC/s VDC/ms	40/1 85/20	165/1 385/20
Spike input voltage limit (Direct spike and indirect coupled spike)	Full temperature range Full load meet standard EN50155 RIA12	Level A Level B Level C Level D and H Level E and J Level F and K Level G and L	VDC VDC VDC VDC VDC VDC VDC	1 800 8 400 960 1 800 3 600 4 800 8 400	(5/50μs, 5 Ohm or 100 Ohm) (0,05/0,1μs, 100 Ohm) (10/100μs, 5 Ohm) (5/50μs, 5 Ohm) (0,5/5μs, 100 Ohm) (0,1/1μs, 100 Ohm) (0,05/0,1μs, 1000hm)
Current in inhibit mode	No load to full load	Maximum	mA	10	10
Output					
Nominal output voltage in normal operation	In permanent input voltage mode	Maximum Minimum	VDC VDC	Ui - 0,5 Ui - 2	Ui - 0,5 Ui - 2
Output voltage in limitation operation	In transient input voltage mode	Maximum	VDC	38	152
Efficiency	At indicated nominal input Full load	Typical	%	95% at 24V input	96% at 48V input 98% at 110V input
Output power range	Full temperature range	Maximum	W	See figure section 4	50

4- Electrical Characteristics (continued)

Figure 1 : LGDS-50-J-K 36V/1s RIA12 Transient Response

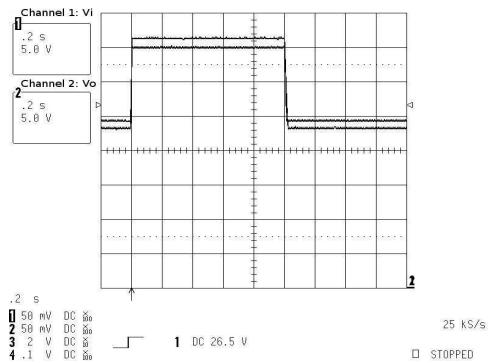


Figure 2 : LGDS-50-Q-K 165V/1s RIA12 Transient Response

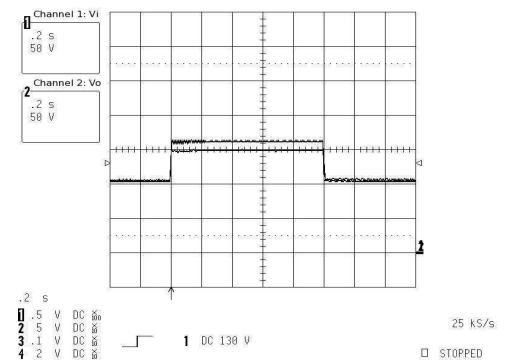


Figure 3 : LGDS-50-J-K 85V/20ms RIA12 Transient Response

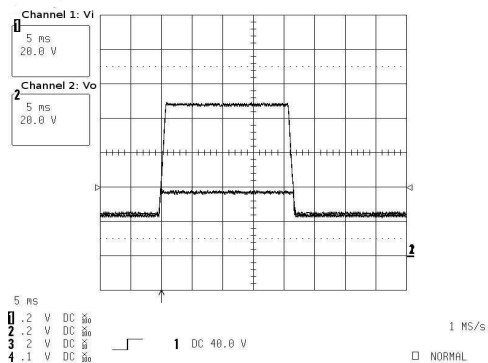


Figure 4 : LGDS-50-Q-K 385V/20ms RIA12 Transient Response

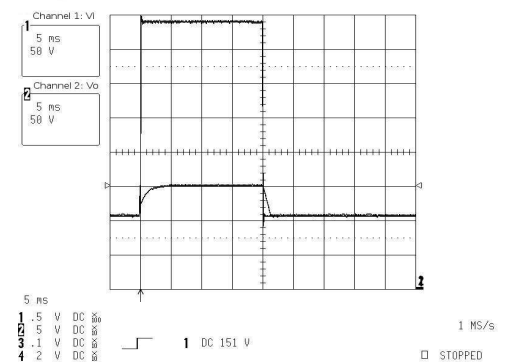


Figure 5 : LGDS-50-J-K 1800V Spike Response

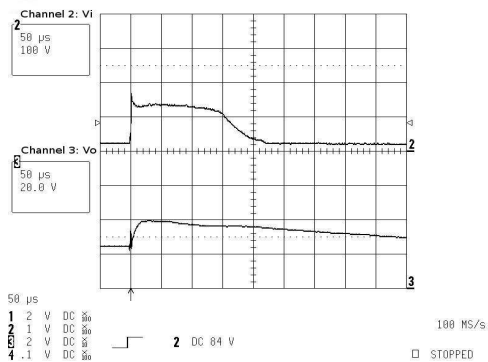


Figure 6 : LGDS-50-Q-K 1800V Spike Response

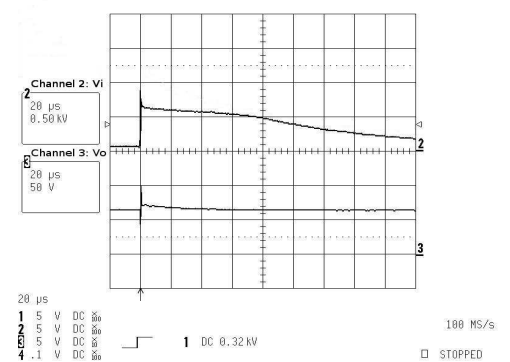
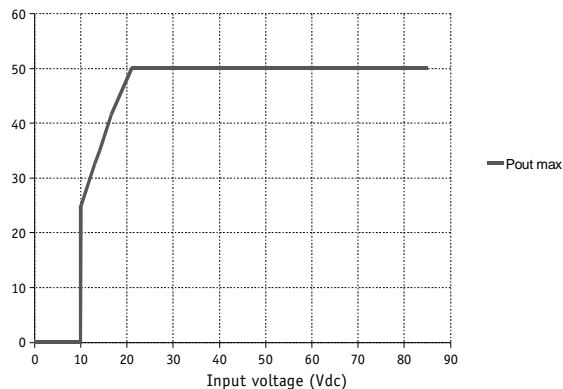


Figure 7 : LGDS-50-J-K Output Power versus Input Voltage



5- Functional Characteristics

Characteristics	Conditions	Limit or typical	Performances
Isolation voltage	Between any pin	Typical	No isolation
Input reverse polarity protection	Reverse polarity	Maximum	Maximum permanent input voltage

6- Thermal Characteristics

Characteristics	Conditions	Limit or typical	Performances
Operating ambient temperature range	Ambient temperature *	Minimum Maximum	- 40°C + 71°C
Operating case temperature range	Case temperature	Minimum Maximum	- 40°C + 95°C
Storage temperature range	Non fonctionning	Minimum Maximum	- 40°C + 105°C

Note * : The upper temperature range depends on configuration, the user must assure a max. case temperature of + 95°C (See Application Notes : Ambient versus case temperature).

7- Reliability Characteristics

Characteristics	Conditions	Temperature	Performances
Mean Time Between Failure (MTBF) According to MIL-HDBK-217F	Ground fixed (Gf)	Case at 40°C Case at 70°C	2 500 000 Hrs 1 100 000 Hrs

8- Environmental and Electromagnetic Interference Qualifications

Characteristics	Conditions	Severity	Test procedure
Humidity	Damp heat Temperature	93 % H.R 56 Days 40°C	IEC 68-2-3
Vibration (Sinusoidal)	Number of cycle Frequency Amplitude /acceleration	10 cycles in each axis 10 to 60 Hz/ 60 to 2000 Hz 0.7 mm/10 g	IEC 68-2-6
Shock (Half sinus)	Number of shocks Peak acceleration Duration	3 shocks in each axis 100 g 6 ms	IEC 68-2-27
Bump (Half sinus)	Number of bumps Duration Peak acceleration	2 000 Bumps in each axis 6 ms 25 g	IEC 68-2-29
Conducted noise emission	Frequency range 150 KHz to 30 MHz	Class A compliance together with GAIA Converter DC/DC modules stand alone	EN55022
Radiated noise emission	Frequency range 30 MHz to 1.000 MHz	Class A compliance together with GAIA Converter DC/DC modules stand alone	EN55022
Electrical discharge susceptibility	Air discharge level +/-4 KV Contact discharge level +/- 2KV Air discharge level 8 KV Contact discharge level 4 KV	sanction A sanction A sanction B sanction B	EN55082-2 with : EN61000-4-2 IEC 801-2
Electrical field susceptibility	Antenna at 1 m Wave form : AM modulated 80 %, 1KHz Test : 26 KHz to 1 GHz	Value 10V/m	EN55082-2 with : EN61000-4-3 IEC801-3
Electrical fast transient susceptibility	Level 1 : 0.5 KV Level 3 : 2 KV	sanction A sanction B	EN55082-2 with : EN61000-4-4 IEC801-4
Surge Susceptibility	Level 4	See section 3	EN61000-4-5 EN50155, RIA12

9- Application Notes

9-1 Reverse Polarity Compatibility

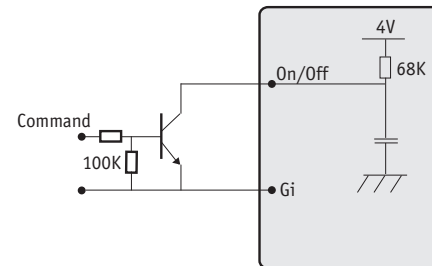
The LGDS-50 integrates a reverse polarity protection connected directly on Vin (pin 1).

9-2 On/Off Function

The control pin 2 (On/Off) can be used for applications requiring On/Off operations. By using an open collector command with a transistor Q referenced to the terminal Gi :

- A Level 1 on command disables the converter,
- A Level 0 an command or no connection / high impedance enables the converter.

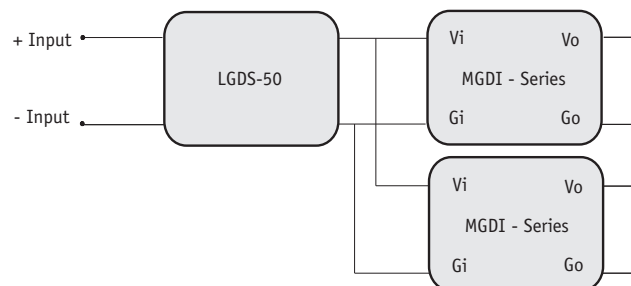
In off mode, the current consumption stays below 10mA.



9-3 Typical Schematic

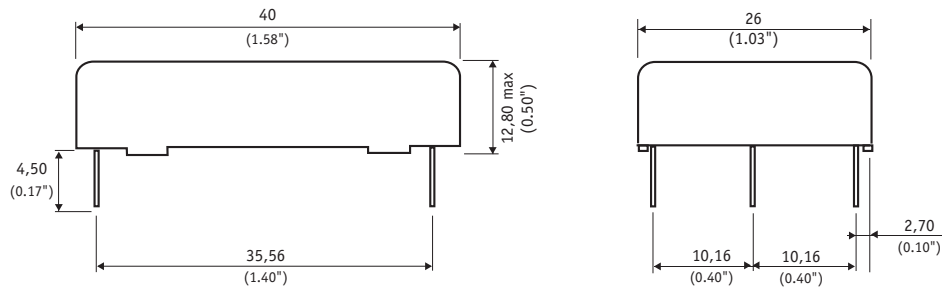
The LGDS-50 Series are suitable to be used with several DC/DC GAIA converter modules in a parallel configuration as follow.

- The LGDS-50-J-K works in conjunction with GAIA Converter H input (9-36V) series or J input (16-40V) series.
- The LGDS-50-Q-K works in conjunction with GAIA Converter Q input (36-140V) series.



10- Dimensions

Dimension are given in mm (inches). Tolerance : +/- 0,2 mm (+/- 0.01 ") unless otherwise indicated.
Weight : 28 grams (1 Ozs) max.



Pin dimensions : Ø 0,73 mm (0.03 ")

11- Materials

Case : Metallic black anodized coating.

Pins : Plated with pure matte tin over nickel underplate.

12- Product Marking

Upper face : Company logo, location of manufacturing.

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

13- Connections



Bottom view

Pin	LGDS-50
1	+ Input (Vi)
2	On / Off
3	- Input (Gi)
4	Common (Go)
5	Output (Vo)



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