

Highlights

- Compact, ultra low-power SMT module design
- HiberBand RF signal and baseband processing
- GPS-based satellite tracking algorithm
- Serial UART-based host processor interface
- On-board HiberBand and GPS antenna connectors
- Integrated GPS receiver

Hiber LPGAN modem



Introduction

The Hiber LPGAN modem is a highly integrated, low-power communications front-end designed for global delivery of sensor data through Hiber's satellite-based HiberBand Low-Power Global Area Network (LPGAN). Designed as a compact, solderable SMT module, it is straightforward to integrate in IoT devices. The application host processor of the IoT device interacts with the Hiber LPGAN modem through a UART-based serial interface using a command-response protocol. The Hiber LPGAN modem provides two connectors for the HiberBand and GPS antennas.

For detailed technical documentation, please contact Hiber at support@hiber.global.

1 Mechanical dimensions

The mechanical drawing of the Hiber LPGAN modem is shown in figure 1 (all dimensions in millimeters).

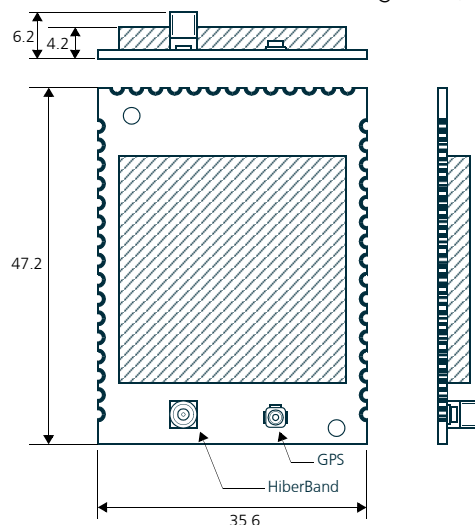
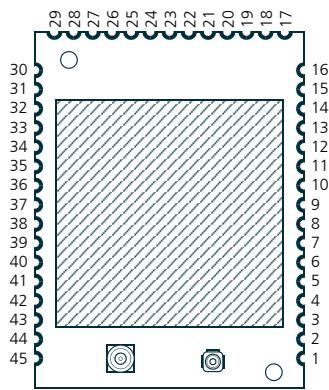


Figure 1: Mechanical drawing Hiber LPGAN modem

The Hiber LPGAN modem has two antenna connectors: one MMCX-female for the HiberBand antenna and one U.FL-female for the GPS antenna.

2 Hiber LPGAN modem pin-assignment



The pin numbering scheme of the HiberBand LPGAN modem is shown in figure 2. The module pins are implemented as so-called castellations that allow soldering onto a printed circuit board (PCB) using standard reflow manufacturing techniques.

The Hiber LPGAN modem provides two on-board antenna connectors, one for the HiberBand satellite communication, and one for the GPS receiver. The antenna details are described in section 1.

The pin function assignment is given in table 1.

Figure 2: Hiber LPGAN modem pin numbering scheme

Function	Pin name	I/O	Description	Hiber LPGAN modem pin numbers
Power	VCC	I	Supply voltage	12, 13, 14, 15, 16, 40, 41, 42
	GND	n/a	Ground	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 20, 23, 26, 29, 43, 44, 45
	VREF	n/a	I/O reference voltage	19
System	SYS_RXD	I	System UART receive	18
	SYS_TXD	O	System UART transmit	17
	WKUP	I	System wake-up	25
	RESETn	I	System reset	24
Debug	DBG_RXD	I	Debug UART receive	28
	DBG_TXD	O	Debug UART transmit	27
Reserved	-	n/a	Reserved for internal or future use. Leave unconnected!	11, 21, 22, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39

Table 1: Hiber LPGAN modem pin assignment overview

3 Power supply

The power supply characteristics of the Hiber LPGAN modem are specified in table 2.

Parameter	Description	Min	Typ	Max	Unit
VCC	Module supply voltage	3.2	3.3	3.9	V
ICC	Current consumption - Hibernation Mode	0.5	5	20	µA
	Current consumption - Host Communication Mode	10	20	25	mA
	Current consumption - Geo-location Mode	40	100	120	mA
	Current consumption - HiberBand Listen Mode	20	23	30	mA
	Current consumption - HiberBand Transmission Mode	100	1250	1500	mA
VREF	VREF supply voltage (all ranges)	2.7	3.3	4.5	V

Table 2: Power supply specifications

4 Operating temperature ranges

The following temperature ranges are defined for operation of the Hiber LPGAN modem:

- **Normal operating temperature:** the Hiber LPGAN modem is fully functional and meets all its product specifications across the specified temperature range.
- **Extended operating temperature:** the Hiber LPGAN modem is fully functional but RF performance may be degraded.

The environmental operating ranges of the Hiber LPGAN modem are defined in table 3.

Parameter	Description	Min	Typ	Max	Unit
T _{operating}	Typical operating temperature		+25		°C
	Normal operating temperature	-30		+70	°C
	Extended operating temperature	-40		+85	°C

Table 3: Environmental conditions

5 Frequency ranges

The frequency ranges of the Hiber LPGAN modem are given in table 4.

Parameter		Min	Max	Unit	Remarks
HiberBand frequency range	Uplink	399.90	400.05	MHz	
	Downlink	400.15	401.00	MHz	
GPS frequency range	Downlink	1575.42	1575.42	MHz	Only GPS is supported

Table 4: Hiber LPGAN modem RF frequency bands

6 Typical application circuit

A typical interface between the application host processor, generally a microcontroller, and the Hiber LPGAN modem is shown in Figure 3.

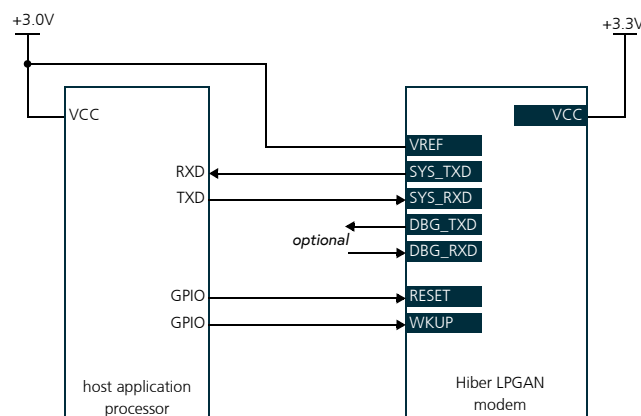


Figure 3: Typical integration of a Hiber LPGAN modem with an application host processor

In the example design shown above, the host application processor runs at 3.0V, while the Hiber LPGAN modem has a +3.3V supply voltage. The processor interfaces with the Hiber LPGAN modem through a UART interface for serial device-to-device communication. Optionally, the debug UART may be used in the application. Furthermore, two GPIO pins (configured as outputs) are used to drive the RESET and WKUP inputs of the Hiber LPGAN modem,

both of which have active HIGH levels. The signal levels of the processor-modem UART interfaces is set by applying the appropriate voltage to the VREF input of the Hiber LPGAN modem. Other than ensuring that the power supply is able to deliver the necessary current within a sufficiently fast transient response time, this covers the integration of Hiber's LPGAN connectivity in an IoT device.

7 Hiber LPGAN modem design support

Hiber is strongly committed to providing good support to its partners. In addition to documentation, Hiber offers CAD libraries, reference schematics and board layout footprints, that can be obtained upon request. Please contact us at support@hiber.global for any assistance you may need.

8 Revision history

Date	Revision	Changes
March 14, 2018	1	Initial release
April 18, 2018	1.1	Changed naming of RESETn to RESET to reflect active HIGH level

Table 5: Document revision history

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