RAK833-SPI/USB

LoRa Gateway Concentrator Module Mini PCIe

Most convenient solution for LoRa Module

INDUSTRIAL GRADE

868MHz/915MHz

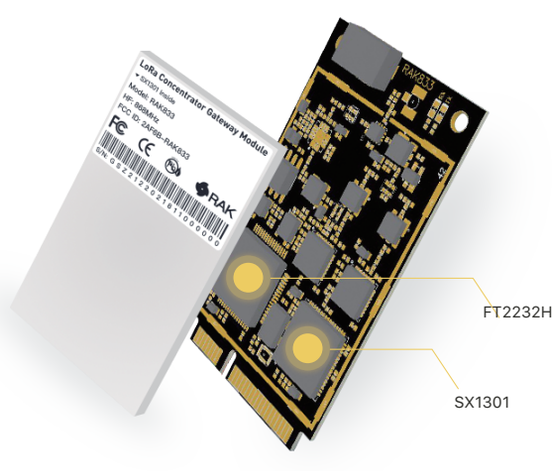
LoRa Gateway Concentrator Module RAK833-SPI/USB based on Semtech SX1301 and FT2232H Chips in Mini PCIe Form Factor

RAK833-SPI/USB of cards enable OEMs and system integrators to build high-performance, certified LoRaWAN gateway solutions. Moreover it allows to retofit existing routers and other edge-level network equipment with LoRaWAN gateway capabilities.

RAK833-SPI/USB is complete and cost efficient LoRa gateway solution offering up to 10 programmable parallel demodulation paths. It targeted at smart metering fixed networks and IoT applications with up to 500 nodes per km^2 in moderately interfered environment.

The modules have the industry standard PCI Express Mini Card form factor, which enables easy integration into an application board and is also ideal for manufacturing of small series.

RAK833-SPI/USB refer Semtech's reference design of SX1301, add a 4 chancel SPDT to switch SPI of SX1301 to PCI edge connector or FT2232H which convert SPI to USB2.0 interface.



A SPI interface is provided on the PCIe_SCK, PCIe_MISO, PCIe_MOSI, PCIe_CSN, PCIe_RST(Reset) pins of the system connector. The SPI interface gives access to the configuration register of SX1301 via a synchronous full-duplex protocol. Only the slave side is implemented.

Support high speed USB to SPI by FT2232H, it includes a high-speed USB 2.0 compliant interface with maximum 480 Mb/s data rate, representing the interface for any communication with an external host application processor. The module itself acts as a USB device and can be connected to any USB host equipped with compatible drivers. For more information, please refer to the data sheet of FT2232H.

Key Features

- Compact size
- Frequency band 868MHz & 915MHZ
- Standard Mini PCI-e form factor with 52Pin
- Voltage of Mini PCI-e is 3.3v which compatible with 3G/LTE card of mini-PCIe type
- Max. Tx power is 25dbm & sensitivity -136.5dbm
- Interfaces USB & SPI (through mini PCIe)
- sx1301 base band processor emulates 49 x lora demodulators 10 parallel demodulation paths
- Module build in FT2232H to convert SPI interface of SX1301 to USB2.0

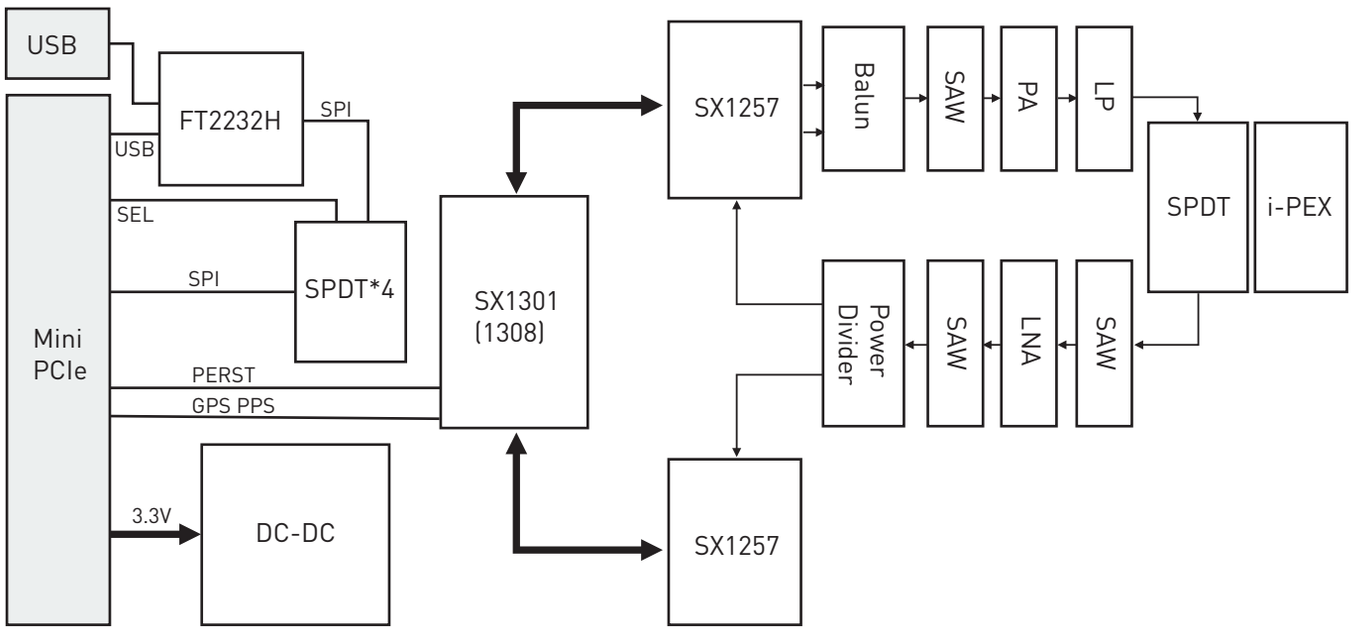
Application Areas

- Internet of Things (IoT) and Industrial Internet of Things (IIoT) Applications
- Machine to Machine (M2M)
- Smart City
- Agricultural Monitoring
- Home-, Building-, Industrial Monitoring and Control
- Remote Control
- Wireless Alarm and Security Systems
- Tracking Applications

Specifications

Gategory	Feature	Description
Name		RAK833-SPI/USB
General Radio	Semetech Radio	SX1301
Connectors	Connector Type	Mini PCI Express (full length)
	External Antenna	High gain antenna (Optional)
Host Interface		SPI / USB (FT2232H inside)
mPCIe Compatibility		Standard Mini PCI-e form factor with 52Pin
Power	Input Voltage	DC 3.3 ± 5%
	Consumption	TX (max): 135 mA
		RX (all channels): 260 mA
		Idle: 71 mA
RF	Frequency Range	865 to 872MHz
		902 to 928MHz
	RX Sensitivity	Up to -124dBm at SF7, BW 125KHz
		Up to -136.5dBm at SF12, BW 125KHz
	Max RF Output	Up to +25 dBm
	Mean RF Output	Up to +23 dBm
Status Indication	LEDs, Red	TX, RX
Operating Conditions	Temperatur	-48 to +85° C
Size	WxHxD	50.95 x 30 x 4.5 mm (PCB)

Block Diagram



Interface

Mini PCIe Connector

Pin #	Symbol	Type	Description
1	NC	-	
2	3.3Vaux	MPCI supply input	Connect to external 3.3 V supply.
3	NC	-	
4	GND	Ground	
5	NC	-	
6	NC	-	
7	NC	-	
8	NC	-	
9	GND	Ground	Connect to ground
10	NC	-	
11	NC	-	
12	NC	-	
13	NC	-	
14	NC	-	
15	GND	Ground	Connect to ground
16	NC	-	
17	SPDT_SEL	-	
18	GND	Ground	Connect to ground
19	GPS_PPS	-	

Pin #	Symbol	Type	Description
20	NC	-	
21	GND	Ground	Connect to ground
22	RESET	MPCI reset input	Active high for SX1301 reset
23	NC	-	
24	3.3Vaux	MPCI supply input	Connect to external 3.3 V supply
25	NC	-	
26	GND	Ground	Connect to ground
27	GND	-	Connect to ground
28	NC	-	
29	GND	Ground	Connect to ground
30	NC	-	
31	NC	-	
32	NC	-	
33	NC	-	
34	GND	Ground	Connect to ground
35	GND	Ground	Connect to ground
36	USB_D-	USB Data line D-	90 nominal differential impedance. Pull-up, pull-down and series resistors as required by USB 2.0 specifications [6] are part of the USB pin driver and need
37	GND	Ground	Connect to ground
38	USB_D+	USB Data line D+	90 nominal differential impedance. Pull-up, pull-down and series resistors as required by USB 2.0 specifications [6] are part of the USB pin driver and need
39	3.3Vaux	MPCI supply input	Connect to external 3.3 V supply.
40	GND	Ground	Connect to ground
41	3.3Vaux	MPCI supply input	Connect to external 3.3 V supply.
42	NC	-	
43	GND	Ground	Connect to ground
44	NC	-	
45	PCIe_SCK	Host SPI interface	Max 10MHz clock
46	NC	-	
47	PCIe_MISO	Host SPI interface	
48	NC	-	
49	PCIe_MOSI	Host SPI interface	
50	GND	Ground	Connect to ground
51	PCIe_CSN	Host SPI interface	
52	3.3VAux	MPCI supply input	Connect to external 3.3 V supply.

Product Portfolio

Part Number	Type	Host Interface	Description
RAK833-SPI/USB-868	SX1301 based 868 MHz variant	SPI / USB	Q3 2018
RAK833-SPI/USB-915	SX1301 based 915 MHz variant	SPI / USB	Q1 2019