Datasheet – PatrIoT

DSPWorks' India band high power LoRa radio module

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Author: Fahad Ansari

DSPWORKS
dspworks@dspworks.in

Contents

Introduction

This document provides detailed information on DSPWorks' India band LoRa module named PatrIoT, offering high transmit power at lower power consumption.

Features

- LoRa and FSK technology supported
- Class A and Class C LoRa mode operations
- LoRaWAN Protocol Stack available
- 30dBm Transmit Power
- -136 dBm Receiver sensitivity
- Low Receiver current consumption : <20mA
- Standby mode current consumption : <100uA
- Sleep mode current consumption : 42uA
- Available for India free band, 865MHz to 867 MHz
- On board powerful CortexM3 MCU
- Available ports : 2 UART, 3 USART, 2 I2C, 3 SPI, 9 ADC & 9 GPIO (configurable)
- AT commands available providing immediate deployment and quick prototyping

Description

DSPWorks' PatrIoT uses Semtech's SX1276 chip and is powered by STM Cortex M3 controller (STM32L15xx) along with additional PA and LNA to boost power for even longer range. The PatrIoT can also be used in FSK mode. The module is LoRaWAN compliant with Class A and Class C mode of operations.

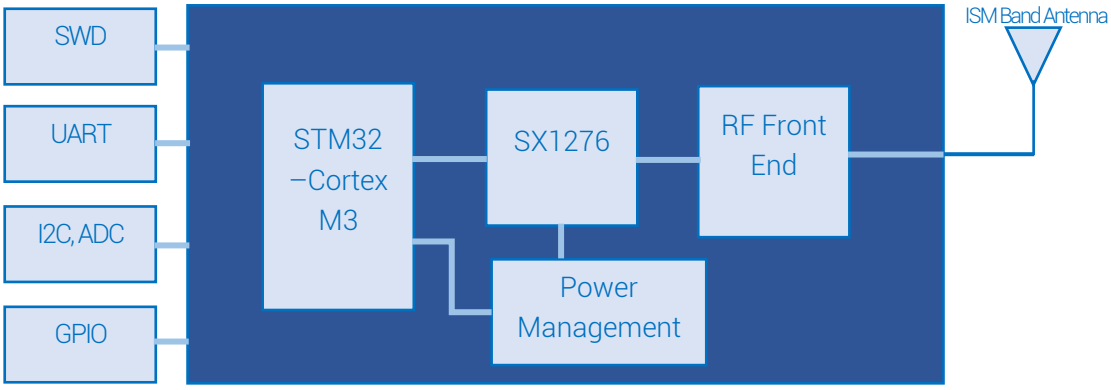
PatrIoT is suitable for LoRaWAN sensor applications and can be customized for majority of IoT products. The PatrIoT can communicate with LoRaWAN gateway and can also be configured for peer to peer Communications.

Designed in an optimum 35mm x 50mm size, it ensures all your IoT applications are fulfilled with best performance and cost.

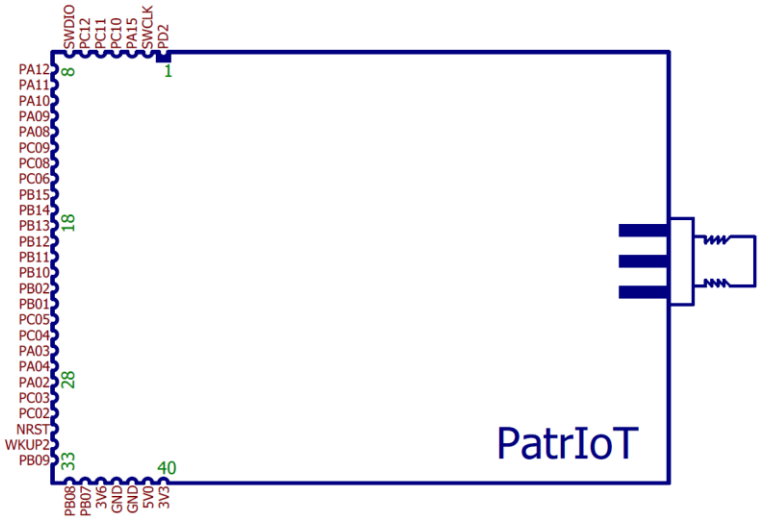
Applications

Temperature and Humidity Sensor
GPS Tracker
Serial Modem
AMR (Automated Meter Reader)
Home and Building Automation
Industrial Monitoring and Automation
Security and alarming

Block Diagram



Pinout



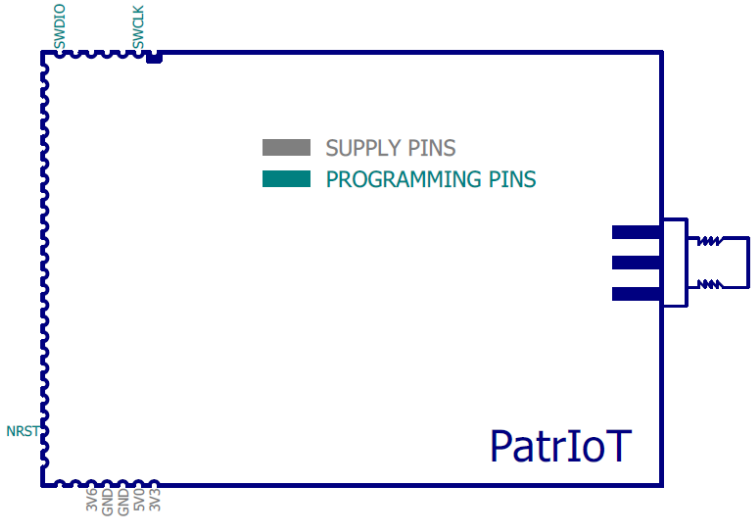
Pin Description

Pin #	Pin Name	Functions
01	PD2	UART5_RX
02	SWCLK	Programming Clock pin
03	PA15	SPI1/3_NSS
04	PC10	SPI3_SCK/UART4_TX/USART3_TX
05	PC11	SPI3_MISO/UART4_RX/USART3_RX
06	PC12	SPI3_MOSI/UART5_TX/USART3_CK
07	SWDIO	Programming Data pin
08	PA12	USART1_RTS/SPI1_MOSI
09	PA11	USART1_CTS/SPI1_MISO
10	PA10	USART1_RX
11	PA09	USART1_TX
12	PA08	USART1_CK
13	PC09	GPIO_PC09
14	PC08	GPIO_PC08
15	PC06	GPIO_PC06
16	PB15	SPI2_MOSI
17	PB14	USART3_RTS/SPI2_MISO
18	PB13	USART3_CTS/SPI2_SCK
19	PB12	USART3_CK/SPI2_NSS/I2C2_SMBA
20	PB11	USART3_RX/I2C2_SDA
21	PB10	USART3_TX/I2C2_SCL
22	PB02	BOOT1/GPIO_PB02/ADC_IN0b
23	PB01	GPIO_PB01/ADC_IN9
24	PC05	GPIO_PC05/ADC_IN15
25	PC04	GPIO_PC04/ADC_IN14
26	PA03	USART2_RX/ADC_IN3
27	PA04	SPI1/3_NSS/USART2_CK/ADC_IN4
28	PA02	USART2_TX/ADC_IN2
29	PC03	GPIO_PC03/ADC_IN13
30	PC02	GPIO_PC02/ADC_IN12
31	NRST	Programming Reset pin
32	WKUP2	Wakeup pin
33	PB09	I2C1_SDA
34	PB08	I2C1_SCL
35	PB07	USART1_RX/I2C1_SDA
36	3V6	3.6V, Input supply in absence of 5V
37	GND	Ground
38	GND	Ground
39	5V0	5V, 1A input supply
40	3V3	3.3V Input supply in absence of 5V

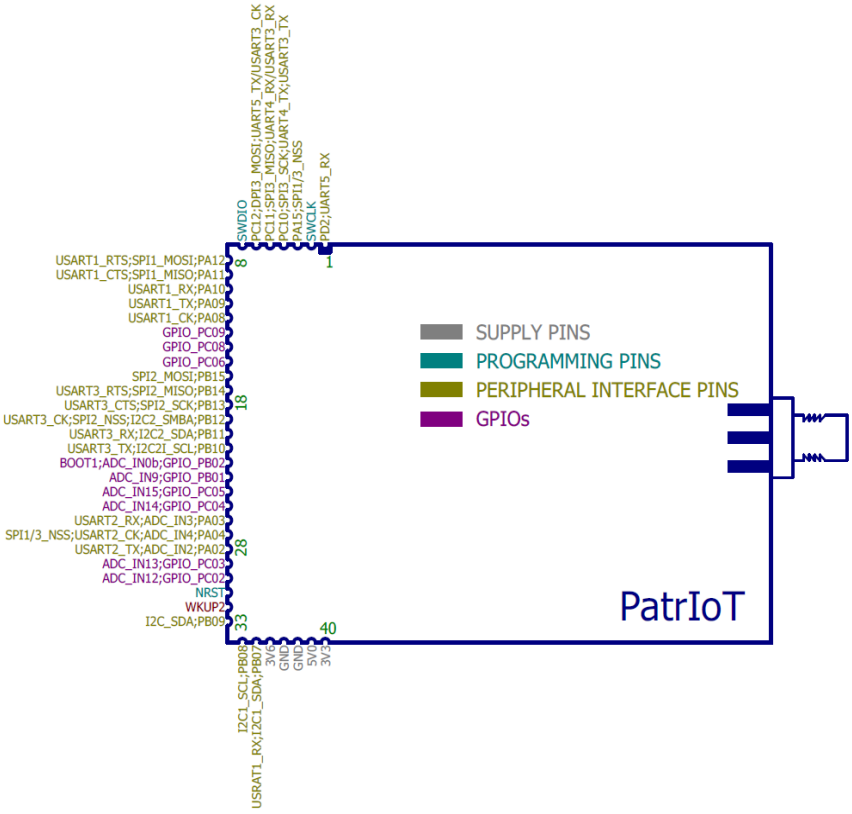
Connections: SX1276 – STM32L15xx

Sr #	SX1276 Signal	STM Pin	Remarks
1	DIO0	PA1	
2	DIO1	PB3	
3	DIO2	PB5	
4	DIO3	PB4	
5	DIO4	PB0	
6	DIO5	PC7	
7	SCK	PA5	
8	MOSI	PA6	
9	MISO	PA7	
10	NSS	PB6	SPI CS
11	RX_LNA_BYPASS	PC1	High to Enable
12	PA_RX_ENABLE	PC0	High to Enable

Connection Diagram – Programming



Connection Diagram – External Communications



Electrical Specification

Supply Voltage	: 5V – 6.5V
TX Current	: 650mA
Peak TX Current	: 800mA
RX Current	: 15mA
Peak RX Current	: 20mA
Standby Current	: <100uA
Sleep mode Current	: 42uA

Radio Characteristics

Operation Mode	: LoRa and FSK
Operation Frequency range	: 865MHz to 867MHz (India free band)
Supported Bandwidth	: 125kHz, 250kHz, 500kHz
Supported Data rate	: 0.018 – 300kbps
Transmit Power (Total TX Out)	: 29 – 30dBm
PA Gain	: 20 – 22dBm
LNA Gain	: 16dBm
Receiver Sensitivity (LoRa)	: - 136dBm
Link Budget (Typical)	: 150dBm
Recommended antenna gain	: +2dBi to +6dBi
Antenna Connector	: Edge mount SMA Female

Physical Dimension

Available Applications

- PatrIoT based Temperature and Humiture Sensor

Humiture Device (HDC1080) connected to PatrIoT module sends Humidity and temperature data to server. Please visit DSPWorks' web shop at dspworks.in/shop for product details and availability.

- PatrIoT based GPS Tracker

A tiny GPS module on PatrIoT acting as a GPS tracker can be used for Asset tracking, inventory tracking and even person tracking. Please visit DSPWorks' web shop at dspworks.in/shop for product details and availability.

- PatrIoT based Serial Modem

A pair of PatrIoTs can be used as serial Modem, sending data fed on serial port at one end and receiving same data at other end on serial port for further actions. This application can be used for serial communication, remote monitoring or even controlling devices remotely. Please visit DSPWorks' web shop at dspworks.in/shop for product details and availability.

Notes

- Ensure J3 is always shorted with jumper
- Ensure there is no polarity swap at input voltage
- 3V3 and 3V6 are generated on board, no need to supply these to board
- Link Budget calculation will depend on mode and configuration

Warnings

- TX Power of SX1276 should never exceed 8dBm. Power higher than this can damage RF front End and/or PatrIoT
- Never power up PatrIoT without antenna connected to it. The RF reflection can damage radio transceiver
- Power supply less than 4.5V can cause performance issues
- Make sure power supply is able to supply a peak current of 1A to achieve maximum TX Power and maximum range

Version History

Version Number	Dated	Author	Remarks
V1.00	31 January 2018	Fahad	First Release
V1.01	21 February 2018	Fahad	1. Corrected sleep mode current value 2. Modified supported bandwidth data (500kHz added)