Connecting innovation for Intelligent wireless

SPR27S3 Micro.sp©
434MHz receiver
data sheet

MICRO.SP TECHNOLOGY

via Leonardo Bistolfi, 49 - 20134, Milano, Italia
tel: 02.26411765 fax: +39 02.2640118
www.stecom.com - info@stecom.com

SPR27S3 Micro.sp© 434MHz receiver

About Micro.sp© technology

Micro.sp© technology, patented by STE, is based on short RF pulses transmitted with Pulse Position Modulation (PPM) technique, which guarantees high RF peak power, as required for radio link reliability, but with a very low average power (Power Density) and consequently low current absorption during the transmission period.

This allows the system to be powered by a small battery for a very long lifetime (typically over 10 years) and also by autonomous energy sources (Energy Scavengers).

Low power consumption is the greatest advantage of Micro.sp transmitter over traditional RF systems which use standard ASK or FSK modulation and either require the use of large batteries or have a very limited battery lifetime.

Benefits of Micro.SP© technology are:

- high reliability
- excellent RF performance
- lower power consuption
- low cost

sp.net - the network evolution

sp.net is the new multi-technology sensors network produced by STE.

Thanks to sp.net you will be able to create your own wireless infrastructure with just few easy steps while saving your money.

With sp.net you will be able to control any kind of sensor within any environment.

A wide range of applications which go from small home sensors to bigger urban systems as well as more sophisticated use such as checking wheel pressure through a sensor placed into the tyre which sends data directly to your smartphone.

sp.net
wireless sensors

Product Description

SPR27S3 is a high data speed 434MHz RF receiver. The radio has been designed to receive messages based on the micro.sp© technology by STE. It can also decode normal ASK or OOK modulated messages with data rates up to 1 Mbps (NRZ) or 500 kbps (Manchester coding).

SPR27S3 conforms to EN-300-220 EU harmonized standards and to ERC/REC 70-03 recommendation (Annex 1 – band f1).

It can be used together with any 434MHz wireless transmitter to create a wireless sensor network system.

fig. 1 - SPR27S3 receiver module

Evaluation Tools

EVR27x Evaluation Board

STE transmitters compatible

SPT27 Micro Tag

SPT37 RF Active Tag

SPS207 Magnetomer, Accelerometer and Temperature Sensor

SPS307 Humidity and Temperature Sensor

SPS407 On/Off Switch

SPS507 Reed Magnetic Contact

SPS607 Luminosity Detector

Applications

Smart City

Social Alarms

Home Automation

Monitoring

Local-based Services

via Leonardo Bistolfi, 49 - 20134, Milano, Italia

tel: 02.26411765 - fax: +39 02.2640118 - www.stecom.com - info@stecom.com

SPR27S3 Micro.sp© 434MHz receiver

RF Description

SPR27S3 module is based on the proprietary micro.sp© technology by STE.

The micro.sp© technology is based on a form of PPM (Pulse Position Modulation) transmission where the data message is converted into an ultra-low duty cycle pulse stream. The SPX Rx circuit (Patent pending) is designed to receive micro.sp© messages and standard ASK/OOK modulation as well.

Due to the very short duration of pulses (2µs), average current consumption is very low, so that the system can operate for many years even when powered by a small battery.

SPR27S3 is a direct amplification receiver with a SAW filtered front-end and a linear group delay post detection filter. The Adaptive Data Slicer is one of the several features implemented to capture nanosecond rise-time pulses with an enhanced ≥80dB dynamic range.

Digital Decoding

LPC1114 ARM-Cortex M0 is the microcontroller adopted to manage and decode micro.sp© RF messages.

Received pulse streams are sent to the microcontroller for correlation and decoding; valid-decoded messages are immediately sent through the UART serial line in ASCII coding. The radio receiver operates with energy management strategy to achieve a very low energy consumption (14mA current absorption in operating mode).

Technical Specifications

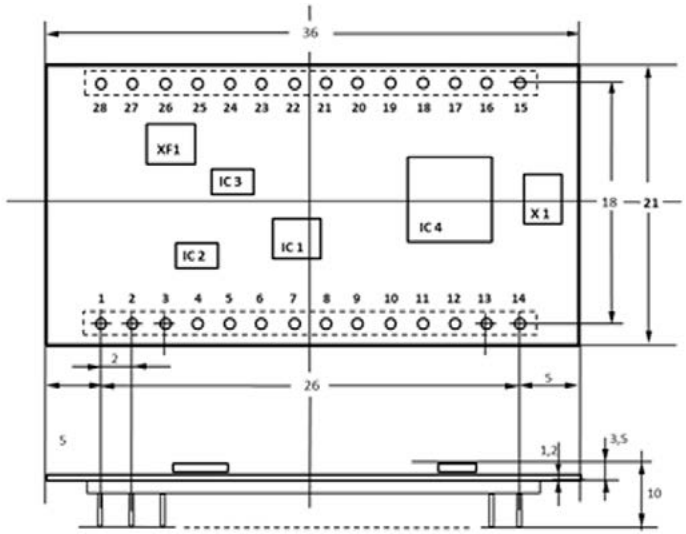

fig. 2 - Physical dimensions (units in mm)

Operating Value

Operating Frequency	434,4 MHz
Selectivity	500 KHz
Sensitivity	96 dBm *(Pulse modulation)* 100 dBm *(ASK modulation)*
Modulation	PPM / ASK / OOK
Supply Voltage	3V ÷ 3,6V DC
Current Consuption	14 mA
RF Input Impedance	50 Ω
Data rate	10kbps
Operating Temp.	-40°C / +85°C
Size	36x21x3,5 mm

via Leonardo Bistolfi, 49 - 20134, Milano, Italia

tel: 02.26411765 - fax: +39 02.2640118 - www.stecom.com - info@stecom.com

Pinout

Pin n.	Description	Pin n.	Description
1	GND	15	LED 2 (Decode)
2	RF input (Antenna) Z = 50Ω	16	S2 selector
3	GND	17	S1 selector
4	AUX.	18	Vcc
5	CTS	19	PROG. - SWDIO
6	PULSE - Data output	20	PROG. - SWCLK
7	I2C - SCL	21	PROG. - ISP
8	I2C - SDA	22	UART 0 -TXD (Output)
9	RST - Reset	23	UART 0 - RXD (Input)
10	GND	24	RTS / 485 (Output)
11	SPI - SCK	25	LED 1 - (RF carrier/ Noise)
12	SPI - SSEL	26	RSSI (Output - Fig.4)
13	SPI - MISO	27	High/Low Sensitivity (if left unconnected: High sensitivity)
14	SPI - MOSI	28	GND

Applications Information

The figure below shows a typical application circuit as employed in the SPR27S3 version programmed to decode the data messages received from 434MHz transmitters.

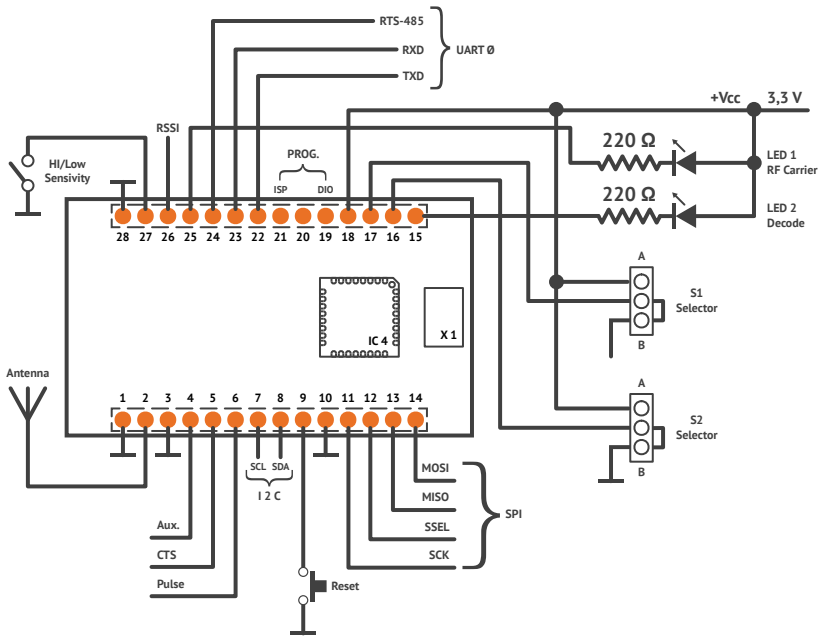

fig. 3 - Typical basic functions and connections

The radio provides two control pins (pin 15 and pin 25) that can be connected to LEDs for evaluating or debug task. In particular, the pin 15 (LED 1) shows the reception of a generic RF signal; in case the RF signal is a valid message that has been correctly decoded by SPR27, also the pin 25 (LED 2) will blink.

Pin 15 and pin 25 are normally high (+Vcc) and they go down (GND) when there is a generic RF signal (pin 25) or a valid message (pin 15). A limiting resistor (typically 220 Ω) is necessary to avoid overcurrent to pins of the microcontroller.

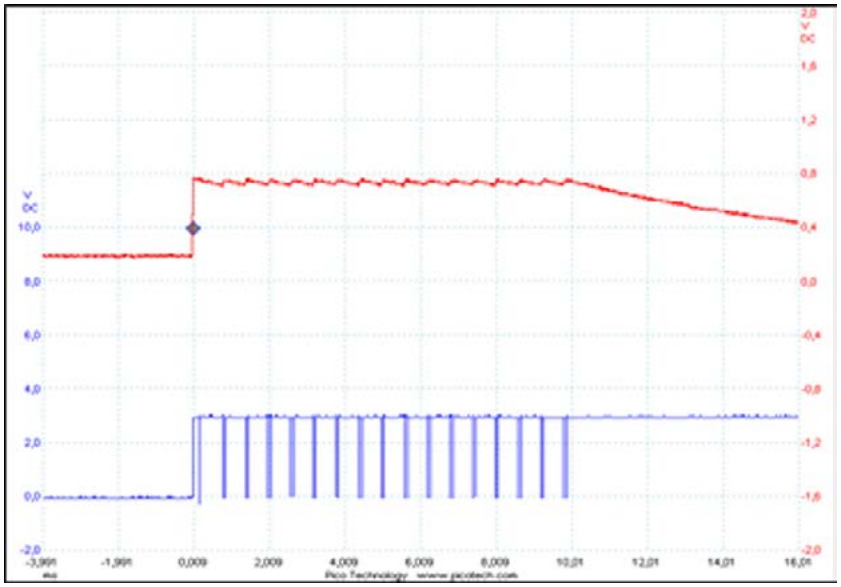

fig. 4 - Example of RSSI (red) and PULSE (blue) signals

In case of deeper analysis, analog RSSI output is available at pin 26. RSSI means Received Signal Strength Indicator and it defines the level of power of a received message from the radio receiver.

Message Encoding (TX) / Decoding (RX)

SPR27 can receive and decode messages from different types of 434MHz transmitters. Generic data format is the following:

where:

STX	II	H	M	CCCCC	DDD	B	NNN	SSS	ETX

STX = start of transmission (2 bits)

- II = string type identifier (8 bits: it also defines data packet length)
- M = Model ID (4-6 bits, defines sensor type)
- CCCCC = sensor ID code (22 bits)
- DDD = data field (length depending on sensor type)
- B = battery voltage level (2-10 bits)
- NNN = noise level (10 bits)
- SSS = RSSI signal level (10 bits)
- ETX = end of transmission (2 bits)

The output message from SPR27 is ASCII coded. A standard message is made of a number of ASCII characters depending on sensor type, plus final line feed (LF). Every character, except for the first one that indicates the start of the message, displays hex values.

Every string coming from SPR27 is the output of a single 434 transmitter. In case of multiple transmitters, SPR27 will send several strings, one for each sensor.