

EVR27A Evaluation Board

SPR27x3xx "microSP" Receiver
(433.920 - 434.350 MHz)



EVR27A
Evaluation Board

- RF performance test and evaluation of the SPR27G3xx and SPR27S3xx receiver modules.
- Access to the programming interface.
- Data reception from a generic wireless sensor and link performances evaluation.
- Evaluation and test of the RF Link with the SPT17x3 transmitter on the EVT17S3 Eval-board.
- Test and measurements on antennas.
- Understanding and evaluation of the propagation of electromagnetic waves and related anomalies.



The SPR27S3-D2 receiver module and the $\lambda/4$ Antenna
(Ste n.195020) mounted on the EVR27A Eval-board

Overview

The EVR27A Eval-board is designed to allow performance evaluations of the SPR27x3xx receiver modules and in particular of the SPR27S3-D2 version.

The SPR27x3x module is the prototype of a series of "microSP" receivers and is ideal for studying and evaluating all the wireless data transmission advantages offered by the "microSP" Technology.

The EVR27A Eval-board allows measurements and any type of evaluation on RF links, in particular for "IoT", "M2M" and similar applications. The Eval-board has a USB serial port and with the SPR27x3-D2 receiver allows a complete analysis of the quality and reliability of the signals received from "microSP" wireless sensor/alarms.

Through the USB it is possible to visualize the messages and the received data both in "string" and "clear" format. It is also possible to view the waveforms of the received signal on an oscilloscope directly from the receiver output (Rx output) or from the various data decoding steps.

Assessing radio Link performance with the Eval-board

The Eval-board can be powered from USB or from an external power supply and in addition to testing the receiver's performance, can also be used via the JTAG port to program and debug the IC4 receiver's microcontroller. The "RSSI" and "Pulse" signals are available on the J2 connector where it is also possible to have a direct connection with the microcontroller's UART (S6, S7, S8 and S9 selectors).

Mainly two different types of tests can be performed :

- 1) Test of data messages as received from a "microSP" wireless sensor, as an example, from the SPT17S3-D2 transmitter module mounted on the EVT17S3 Eval-board.
- 2) Laboratory tests to acknowledge the complex and elusive field of wireless radio applications. Measurements of the received signal strength, of radio waves propagation anomalies, of the noise or interferences and measures on the antenna efficiency.

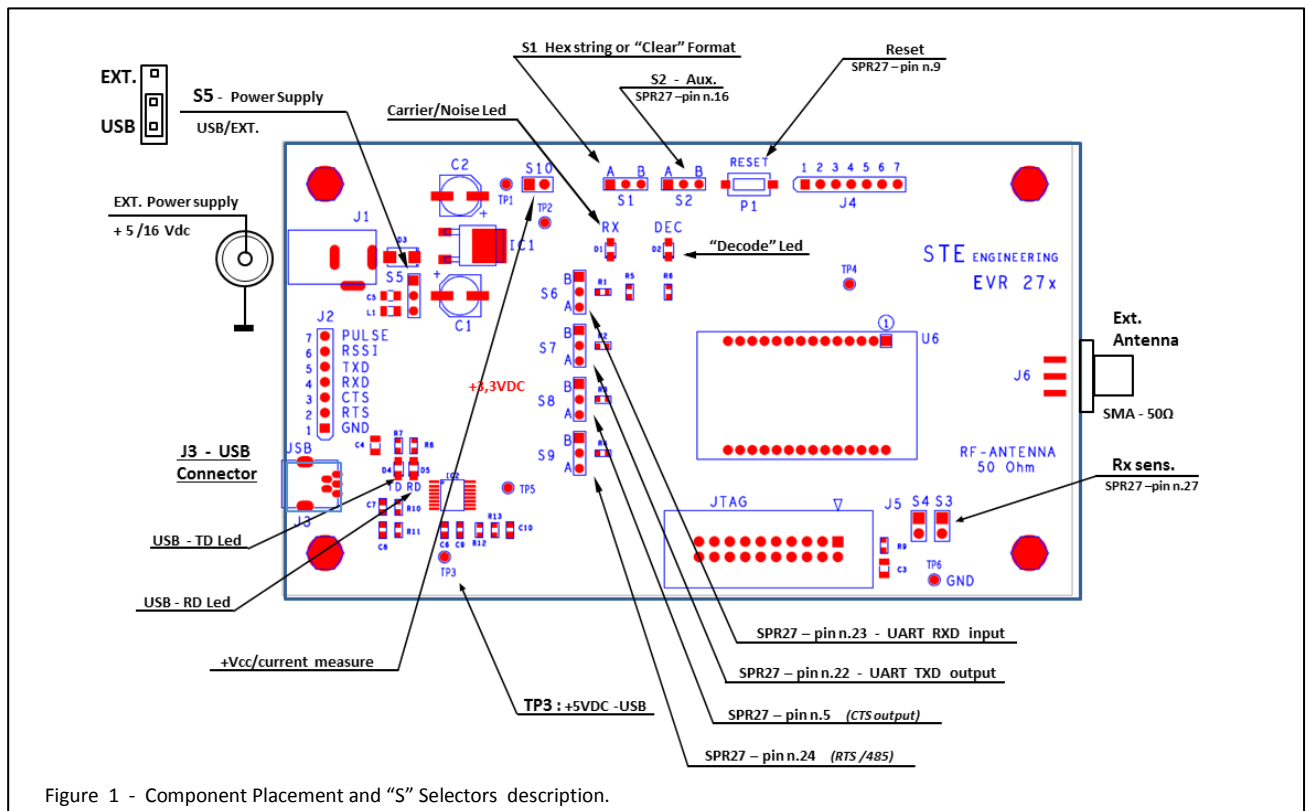


Figure 1 - Component Placement and "S" Selectors description.

S5 - Power supply selection :

- "USB" or "External" power supply can be selected by means of S5 .("USB" is the default position)
External power through J1 connector from 5 to 16 Vdc.
- S10 Jumper to permit RX current measurement (Default position = Jumper in S10)

S1 – S2 Selectors :

- S1 Jumper is employed to select UART output message format.
- S2 Jumper is reserved to auxiliary functions.
(Default position = Jumpers in "A")

S3 – S4 Selectors :

- S3 Jumper to select the "ISP" program function (Default position = "Open")
- S4 Jumper is employed to reduce the Rx sensitivity (Default position = "Open")
A "Short" in S3 reduces the Rx sensitivity by about 10 dB .

S6-S7-S8-S9 Selectors :

- Jumpers on the selectors allow redirecting the receiver's μ C UART port from the USB to the J2 connector.
(Default position = Jumpers in "A")

EVR27A Evaluation Board Schematic

A linear regulator (IC1 - LM1117) is used for the 3.3 Vdc power supply of the board and the SPR27X3 receiver to eliminate any possible source of EMI disturbances, which could instead derive from a switching mode regulator. For further considerations on how to protect the receiver from EMI noise, refer to Application Note AN-906.

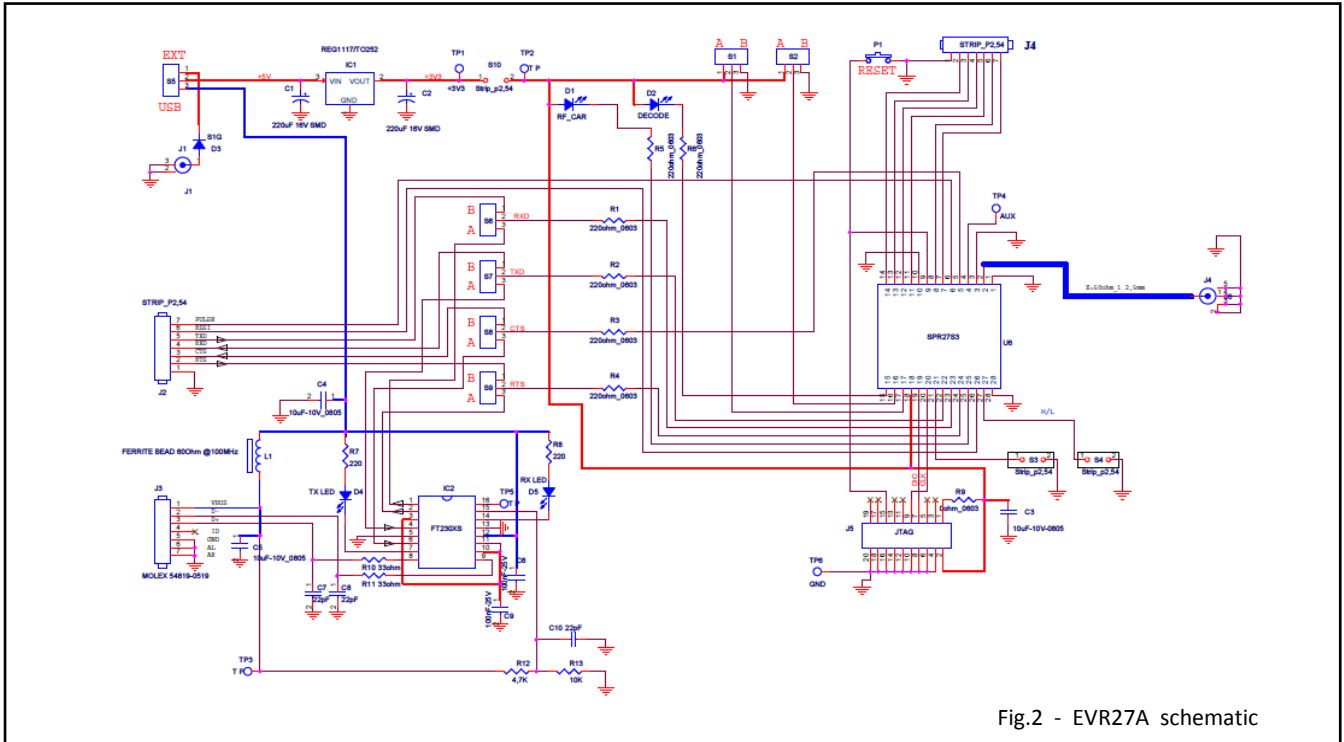


Fig.2 - EVR27A schematic

Message display on a PC

The Eval-board used with the Rx module SPR27S3-D2 (F = 434.35 MHz) to receive and display messages from a TPMS transmitter on a "Terminal Emulator" (Teraterm) program.

With the "D2" Software it is possible to display via the jumper on selector S1 (Fig. 1) the data as a "Hex" string or as plain text in "clear" format.

In the design phase, displaying in plain text offers considerable advantages and in addition the possibility to control the signal intensity and the "noise" on the radio channel allows the reliability of the radio link to be assessed and, for example, the antennas to be corrected or improved. .



Fig.3 – Receiving data from a wireless sensor

Observe the messages, the waveforms and disturbances present on the radio channel.

"RSSI" (Received Signal Strength Indicator) is the most important signal and the most convenient to observe to realize the intensity of the messages, their relationship with respect to possible disturbances, collisions, etc. It is the signal at the "Peak detector" output and can clearly show the presence of radio wave propagation anomalies as well as distortions caused by disturbances from other emissions or multiple reflections.

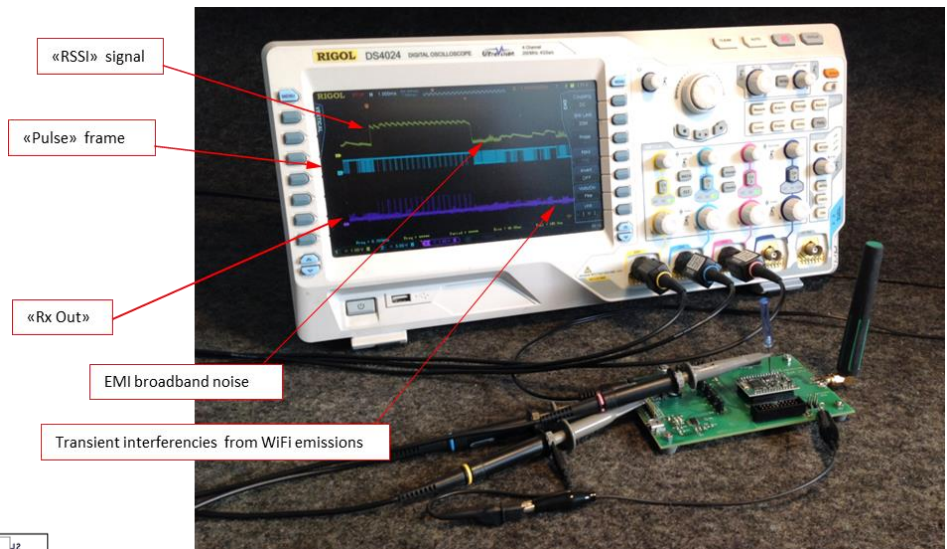
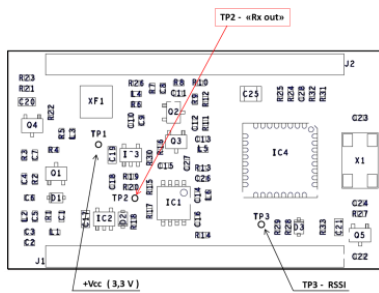


Fig.4 - The Eval-board used to "watch" on the radio channel.

Fig.5 - The "Rx out" Test Point on the SPR27x3 receiver.

"Rx out" is the demodulated output of the receiver's RF signal and is like a "window" on the 434 MHz radio channel with a video "BW" determined by the selectivity of the XF1 "SAW" filter. "Rx out" can give a more in-depth view of what happens "Over-the-Air" and can help you better understand the receive mode and most problems with a wireless connection. For more information on the use of the EVR27A Eval-board for analysis and testing of wireless applications, practical field tests, antenna evaluations and measurements and the radio wave propagation theory, refer to the application note AN-904.