

“microSP” Wireless Sensor SKS3137VTHM

433,92 MHz

**Vibration , Temperature,
Humidity, Magnetometer**



Fig. 1
SKS3137VTHM

1) SKS3137xx Wireless Sensors Series Description

The SKS3137xx series is a battery operated wireless transmitter based on the patented “microSP” pulse “Spread Spectrum” Technology. Operating on the 434 MHz “SRD” unlicensed band the “microSP” pulse position (PPM) modulation offers exceptional RF performances and a high peak RF power with a very low mean current consumption. The series can be equipped with sensors of Temperature, Humidity, Vibration, Shock, Luminosity plus a three axis Magnetometer. The series includes several models according to the combinations of these sensors. Model SKS3137VTHM is equipped with sensors to measure Vibration, Temperature, Humidity plus a 3 Axis Magnetometer

2) The SKS3137VTHM-A1

The SKS3137VTHM measures the vibration level with a Minisense 100 Sensor (Measurement Specialist) with a 10 bit resolution and measures the Temperature (-25 +85 °C) and the Humidity (0-100 %) with the SI7021-A20 Sensor (Silicon Labs) with a 12-bit resolution. The MAG3110 Magnetometer (Freescale) measures the magnetic field (three axis) with a 10 bit resolution .

It is designed to detect micro vibrations, in particular for security and alarm of precious objects and artworks in museums . With the “A1” SW it offers in conjunction with environmental measurements of temperature and humidity a full 24/24 hours monitoring with an expected autonomy of more than twenty years. The magnetometer also offers the possibility of assessing the movement of the object or a different degree of protection based on the relief of the field generated by a permanent magnet positioned outside of the system.

3) OP Mode Selectors

The dip/switch selector S1B allows you to choose up to eight different operating modes (Table 1) . The interval time between “Hearth Beat” transmissions and between the sensors sample measurements can be adapted to different operating situations. Vibration and movement controls can be done in two ways : with sampled measurements and a 10 seconds time constant, or with a faster sampling rate and permanent Vcc supply to the amplifier/peak detector circuit (at the expense of a higher power consumption).

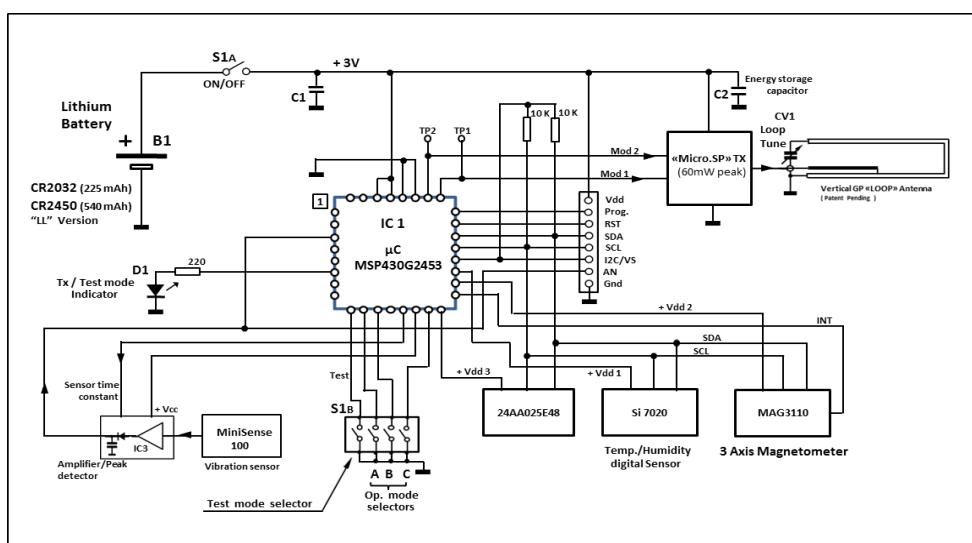


Fig. 2
Block Diagram

RF specifications

Tx frequency	434,4 MHz
RF peak power	80 mW
ERP (peak)	10mW
ERP power density	<-13dBm/10kHz
Emission BW	>500kHz
Pulse width	2 μ s

Measurement performances

Vibration

Sensitivity	0,0001 g
Meas. range	0,0001 g (min) - 1 g (max)

Temperature (Si7020-A20)

Range	-40 +85 °C
Resolution	12 bit
Accuracy	total range (typ.) $\pm 0,7$ °C
	from 0 to 80 °C $\pm 0,4$ °C

Humidity (Si7020-A20)

Range	0 – 100 % RH
Resolution	12 bit
Accuracy	total range (typ.) ± 5 %
	from 0 % to 80 % RH ± 4 %

3 Axis Magnetometer (MAG3110)

Resolution	12 bit
Full scale range	± 1000 μ T
Sensitivity	0,10 μ T

Physical and Environmental Specs

Operating enviroment	IP54 (Indoor use)
Operating Temperature	-25 +60 °C
Operating Humidity	0 – 95% (non condensing)
Dimensions	70x36x22 mm
Weight	xx g

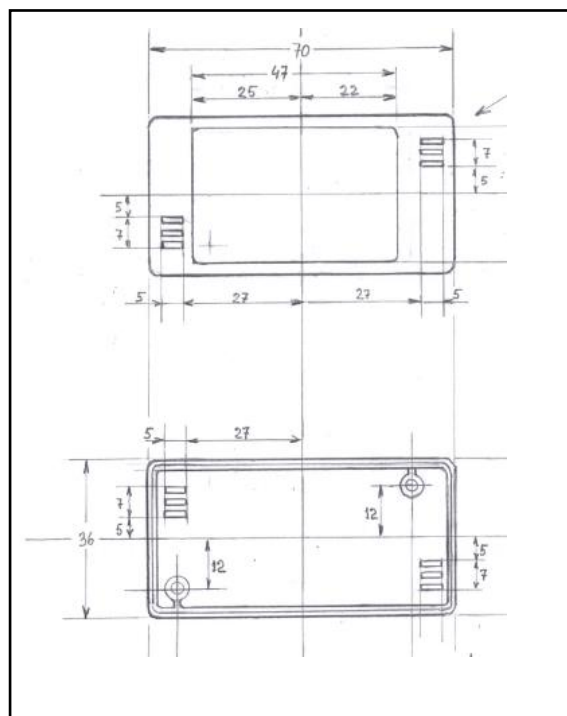
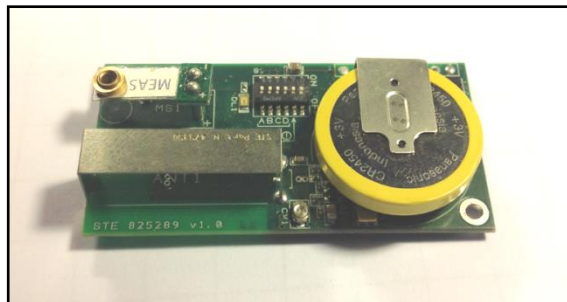


Table 2 - List of operating modes

S2 Selector	Sensors Sampling Time and TX Rep. Time (sec.)				Current	Expected Life CR2032 Batt.	Expected Life (LL Vers.) CR2450 Batt.
T A B C	Vibration	Temp./Humid.	Magnetometer	Heartbeat	μA	Years	Years
0 0 0 0	2 (1)	30	10	120	2	10	20
0 0 0 1	2 (1)	30	10	60	2,5	8	16
0 0 1 0	10 (2)	10	10	120	2	10	20
0 0 1 1	10 (2)	10	10	60	2,5	8	16
0 1 0 0	5 (3)	10	5	60	3	6	12
0 1 0 1	5 (3)	10	5	30	3,5	5	10
0 1 1 0	Active mode (4)	10	10	120	1,5	12	25
0 1 1 1	Active mode (4)	10	5	15	4	5	10

Note : (1) Vibration level peak detector RC time constant >2 s – measurement sampled every two seconds .
 (2) Vibration level peak detector RC time constant >10 s – measurement sampled every ten seconds .
 (3) Permanent Vcc Supply to the Amplifier/Peak Detector with short (2 sec) RC time constant.
 (4) In active mode the Amplifier/Peak Detector is permanently “on” and the RC time constant is <2 sec.
 The vibration level is sampled every second and an immediate transmission is performed at a pre-determined alarm level.

Table 3 - Test mode

S2 Selector	Sensors Sampling Time and TX Rep. Time (sec.)				Current	Expected Life CR2032 Batt.	Expected Life (LL Vers.) CR2450 Batt.
T A B C	Vibration	Temp./Humid.	Magnetometer	Heartbeat	μA	Years	Years
1 x x x	2	10	2	2	> 10	not appl.	not appl.

Network Set-up and Test mode

The "Test" mode is activated by positioning the "T" switch of S1 in the "On" position.

In "Test mode" the position of the other switches "A", "B" and "C" is irrelevant.

When the sensor is in "Test mode" a fast operating mode is forced to facilitate the "Set up" and "Test" operations of the Wireless Network. The transmission takes place every 2 seconds, and so does the sampling of the most critical sensors. In "Test mode" consumption increases by exiting the operating specifications and therefore its use is limited to the only installation phase.

Message collisions and “Duty cycle” limit.

In "Test mode" the limit of the "Duty cycle" provided by the regulations is exceeded, and the system's capacity to operate properly is also greatly reduced by increasing the probability of collisions. This especially in presence of networks of "Wireless sensors" with a large number of sensors and alarms.