Trakia Journal of Sciences, Vol. 8, Suppl. 3, pp 33-36, 2010

Available online at:
http://www.uni-sz.bg

ISSN 1313-7069 (print)
ISSN 1313-3551 (online)

# WIRELESS DATA TRANSMITTER FROM GSM CELL

**N. Kolev**

## INTRODUCTION

Mobility of measurement devices requires specific constructive solutions for the collection and storage of the recorded data for the purpose of their further processing. There are two commonly used methods in order to achieve this, and the preference to use each of them is based on factors such as: the type of the measurement device, the number of measurements performed over time, the number of sensors, the remoteness of the transformers from the electronic plate, the physical work conditions (temperature, humidity, dust content, presence of a field) and the necessary exchange speed between the device and the possibly influencing it correction unit.

This report presents the application of a single-chip receiver- transmitter device MC13192, built into the microcontroller of the electronic block of a GSM cell.

## DIAGRAM SOLUTIONS

Two different approaches can be used in order to achieve the construction of a mobile transmitter. In the microcontroller can be implanted a memory of certain size, which periodically will be read or the data from the sensors will be send by a radio signal to the stationary (mobile center management) system. The advantage, which both approaches benefit from, is that the measurement device is not bound by a cable, which allows the usage of more mobile systems in it.

Example: The purpose of the transmitter is to transmit data in real time, to register the load of the cell, the different speeds achieved during information exchange, emission, the consumed energy, emission power and others

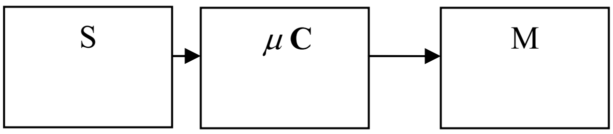
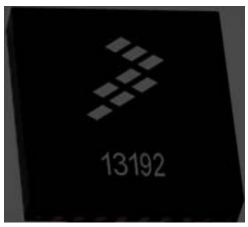



**Fig. 1.** Diagram
S- sensor ; $\mu$ **K**-microcontroller; M-memory;




The use of memory **(Fig. 1)** depends on the number of measurements for a defined period of time and that will determine the frequency of the readings. A memory with large enough capacity exists, which allows the accumulation of information for a week up to one month.

The problem arises, when the memory has to be read.

The use of a radio signal in order to send the recorded data **(Fig. 2)** until now would be considered impossible, but the progress in cell communication has lead to the development of technologically new integral diagrams, incorporating in them the entire high frequency tract of the receivers and transmitters.

The miniaturization of the elements implied more modest capabilities when the emitted and received capacities were considered, but for the purposes of the digital technology this turned out to be an advantage.
A possible drawback would be the presence of much more powerful emission devices.

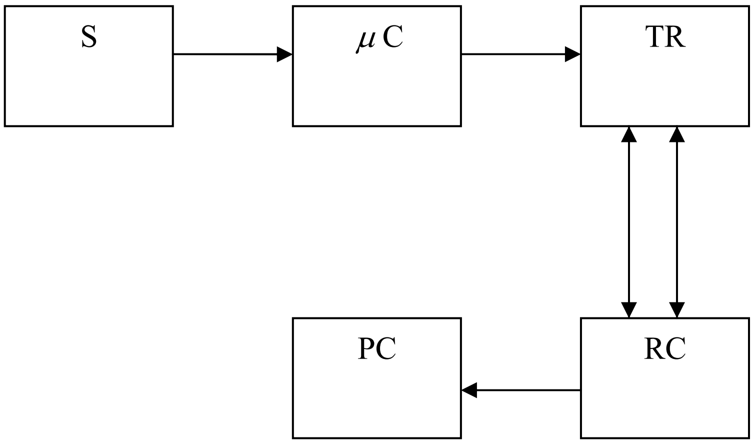



**Fig. 2.** Block diagram with a transmitter
S – sensor; $\mu$C- microcontroller
TR – transmitter, RC- receiver; PC – Personal Computer

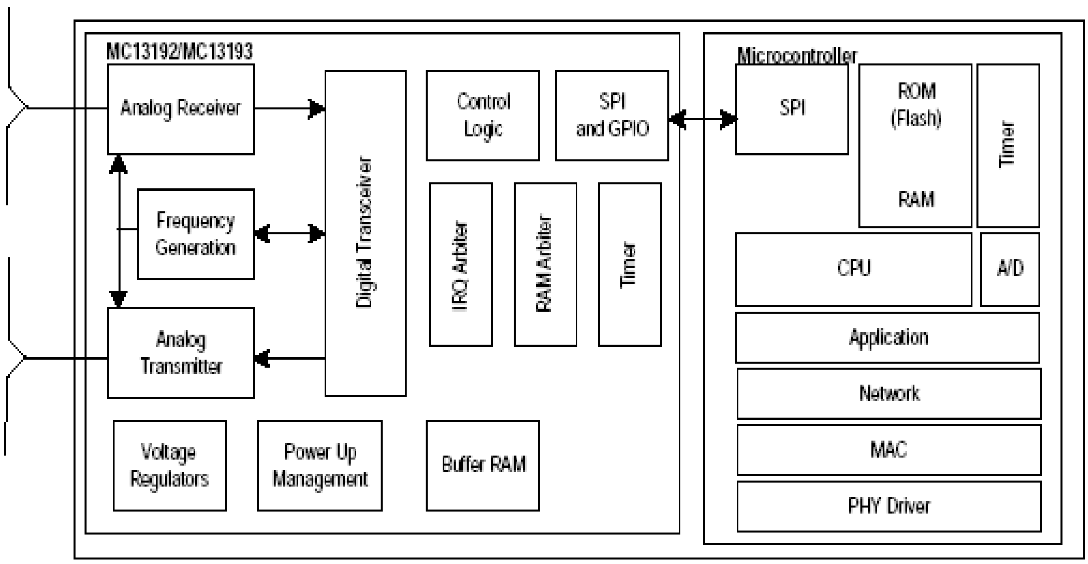



**Fig. 3.** Inside structure of a transmitter

For that specific purpose, these devices have incorporated in them modules for modulation and demodulation, which guarantee the quality of the transmitted/received information.

**CHOICE OF A TRANSMITTER**

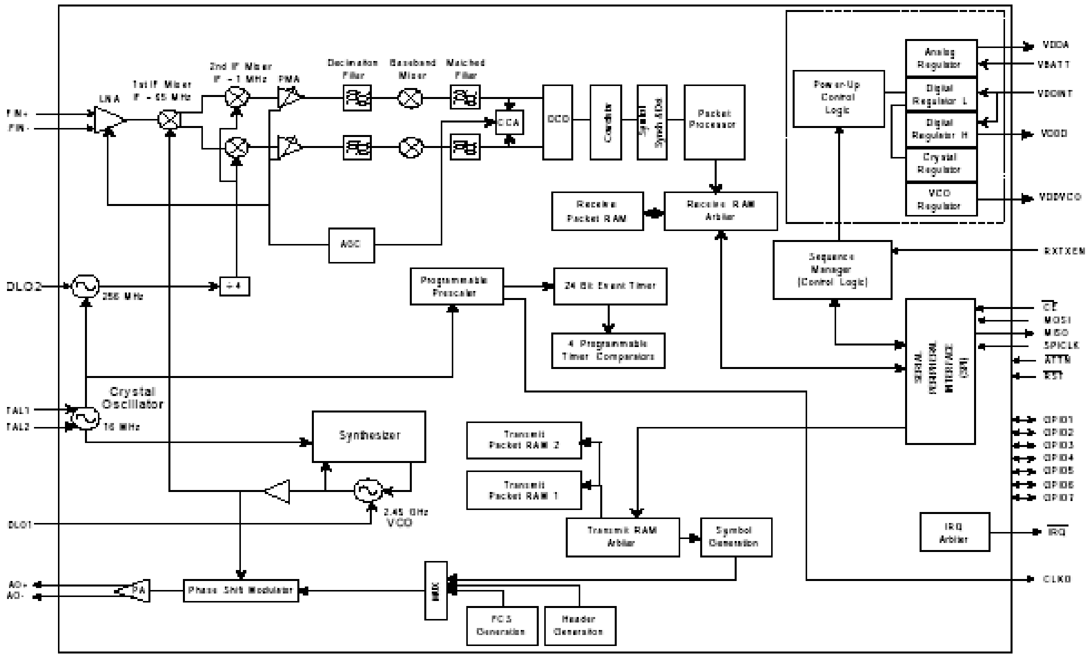
After the conducted investigation in regard to the manufacture of single-chip transmitter/receivers, as most appropriate was chosen the transmitter MC13192, produced by the company Freescale **(Fig. 3).**

- Outgoing emission power is 1mW;
- Frequency of operation - 2.4 GHz;
- 
- Power supply voltage - 3V;
- Possibility of working in two data-transfer modes exists:

- Packet mode of data transmission
- Streaming mode of data transmission (word by word)

**CONNECTION OF THE TRANSMITTOR WITH THE PROCESSOR AND THE EMITTING/RECEIVING ANTENNA**

The connection to the processor is accomplished through seven general purpose input-output information ports. The connection to receiving/transmitting antenna is accomplished through coordination links.




For the receiving antenna, this is the parallel oscillating circuit or more common the internal capacitive connection, since the antennas are of the „guided" type and react to the electric component of the electromagnetic field.

For the transmitting antenna is used an impedance harmonizer:

$$Zout = Zin \qquad (1)$$

For convenience purposes, parts of double conductor lines with impedance 115 Ω are used.

## ANTENNAS

The antennas are half-wave dipoles, meaning their length L is equal to half of the length of the wave:

$$L = 0.5.\lambda \qquad (2)$$

Due to the high frequency - 2,4 GHz, the wave length is in the centimeter range.

$$\lambda = \frac{c}{f} = \frac{3.10^8}{2,4.10^9} = 0,125[m] \qquad (3)$$

Therefore the length of the antenna is sufficiently small in order for it to e located on the plate itself, as part of the PCB. In order to improve the guidance of the antenna, it is possible to change its construction parameters, as in this case the proportionality coefficient will not be exactly 0.5, but a number close to it.

A suggestion model is represented in **Fig. 5.**

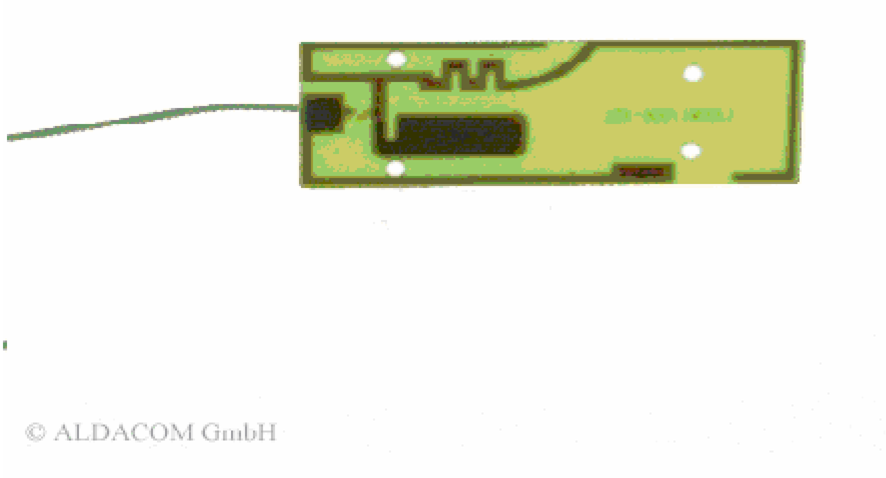



**Fig. 5** - Antenna

The effective length of the antenna will be numerically determined in the following way :

$$L = 30{,}53.10^3 + 2.\sqrt{\left[\left(12{,}73.10^3\right)\right]^2}.\left(8{,}46.10^3\right)^2 = 61{,}09.10^3\left[m\right] \qquad (4)$$

From this equation follows that, the proportionality coefficient between L and $\lambda$ is 0,48872.

**CONCLUSION**

The so constructed data transmitter is not limited in the number of transceived results, because it is turned on all of the time and is able to send data to the mobile dispatch center. The used integral scheme consists of 16 channels and allows for the connection of other sensors (humidity, temperature, etc.) under the condition that the programming of the controller permits for that.

The results we have achieved at this stage satisfy the needs of telecommunication companies, management and observation centers and monitoring teams.

**REFERENCES**


1. Petrov N., T. Pehlivanova. Electronics, electric technology and management schemes – Thracian University 2008.
2. Karausheva K, A. Petrakiev. Wireless data transmitter – A. Zlatarov University, Burgas. Yearly report 2004 page 73-75
3. Karausheva K. Method for the calibration of an electronic transformer in an electric anemometer. Conference in meteorological safety MMO-2004, Sozopol, in print.
4. Freescale 2004. Freescale Semiconductor. Products preview, MC13192/D Rev.2.4. 07.2004.