



## 1. Product Description

CYBIKO Extreme is a hand-held communication device that transmits and receives short digital messages to and from other devices of the same type via radio waves. Effective transmission range varies from 100 to 350 ft depending on the environment.

The device is the size of a personal organizer (141 x 82 x 18 mm) and has an LCD display and a full QWERTY keyboard. It also utilizes a microprocessor, memory, and RF transceiver and power source.

Each CYBIKO Extreme device has its own unique ID and displays only those messages sent to this particular device. In the broadcast mode, CYBIKO Extreme is capable of sending messages to all devices of the same type located within its transmission area. Device includes analogue Walkie-Talkie function. The transmitter operates in the frequency range 903.2-926.8 MHz, which does not require special licensing in our target countries.

Also CYBIKO Extreme has Vibration Alert, Speaker, Microphone, 55-key keyboard, 30-pin extension cartridge socket, USB PC connection socket, 2 recharging NiMH batteries.

Based on technical capabilities the main functions of CYBIKO Extreme include:

- Wireless chat
- Multi-player wireless games
- Business and personal planner applications (text editor and dairy, address/phone book, organizer/to do list manager, alarm clock/calendar, calculator, phrasebook/dictionary, graphic editor).

## 2. Hardware specifications:

**Main Processor:** 16 bit, 18 MHz Hitachi HD64F2323

**Coprocessor:** ATMEL AT90S2313 4 MHz

**RAM:** 16 MB

**Parallel Flash:** 4 MB

**LCD display:** 160x100 dots, 59x40 mm, and 4 level grayscale

**RF transceiver:** RFMD 2915

**USB port:** National USBN9603 24 MHz

### 3. Electrical Characteristics

Operating Frequency:	903.2-926.8MHz
Modulation Type:	FSK
Frequency Deviation:	+/- 35KHz
No. of channels:	60
Channel Width:	400kHz
Channel Spacing:	400kHz
Frequency Stability (-10C- +55C):	+/-10ppm
RF output power into 50ohm:	< 0 dBm
Field Strength of fundamental (@3meters):	≤ 50mV/meter (94dBuV/m)
Field Strength of Harmonics (@3meters):	≤ 500uV/meter (54dBuV/m)
Spurious Emission:	-55dBm (52dBuV)
RF sensitivity:	-95dBm
Intermediate Frequency:	10.7 MHz
Data Rate:	19.2Kbps
Supply Current:	60-110mA
Operating supply voltage (Two 1.2V battery):	2-2.8Volts
Charging mode	Using USB
Operating Ambient Temperature:	0-40°C
Antenna (Permanently attached):	Whip
Dimensions (L x W x H)	141 x 82 x 18 mm
Weight (with batteries)	150g

### 4. Functional block diagram

The functional block diagram CYBIKO Extreme is shown on Figure below. The transceiver module is based on the IC RF2915, (RF MICRO-DEVICES INC.) which was specially designed for wireless data transceiver and IC LMX2315. Functionally, the IC RF2915 provides a monolithic superheterodyne receiver and a FM transmitter. The main building block of the receiver consists of LNA, RF Mixer, IF Amplifiers, Received Signal Strength Indicator (RSSI), FM Demodulator and Data Amplifier. The receiver also utilizes the on-chip VCO. The FM transmitter includes variable gain amplifier, power amplifier (PA) and on chip VCO.

A message to be transmitted is packed by MCU HD64F2323 into frames with 50 or 200 bytes length and sent to MCU AT90S2313. The MCU AT90S2313 encodes the frames by adding synchronization bits and sends with Manchester encoding.

The data stream coming from the controller AT90S2313 goes through a low-pass filter LPF to the MOD IN pin of RF2915 and modulates the frequency of the VCO. The low-pass filter helps to limit the bandwidth occupied by transmitter. RF signal from TX OUT RF2915 goes through RF filter to the permanently attached antenna.

Receiving frequency modulation signal from antenna pass through RF filter in RX IN pin of RF2915. From out RF2915 (pin 29) the signal goes through a low-pass filter LPF to AT90S2313 for decoding, and then frames come to MCU HD64F2323 for further processing.

The DC/DC converters MAX1677 is used to generate a fixed power supply voltage 3.3 V for all IC and 17.2 V for LCD.

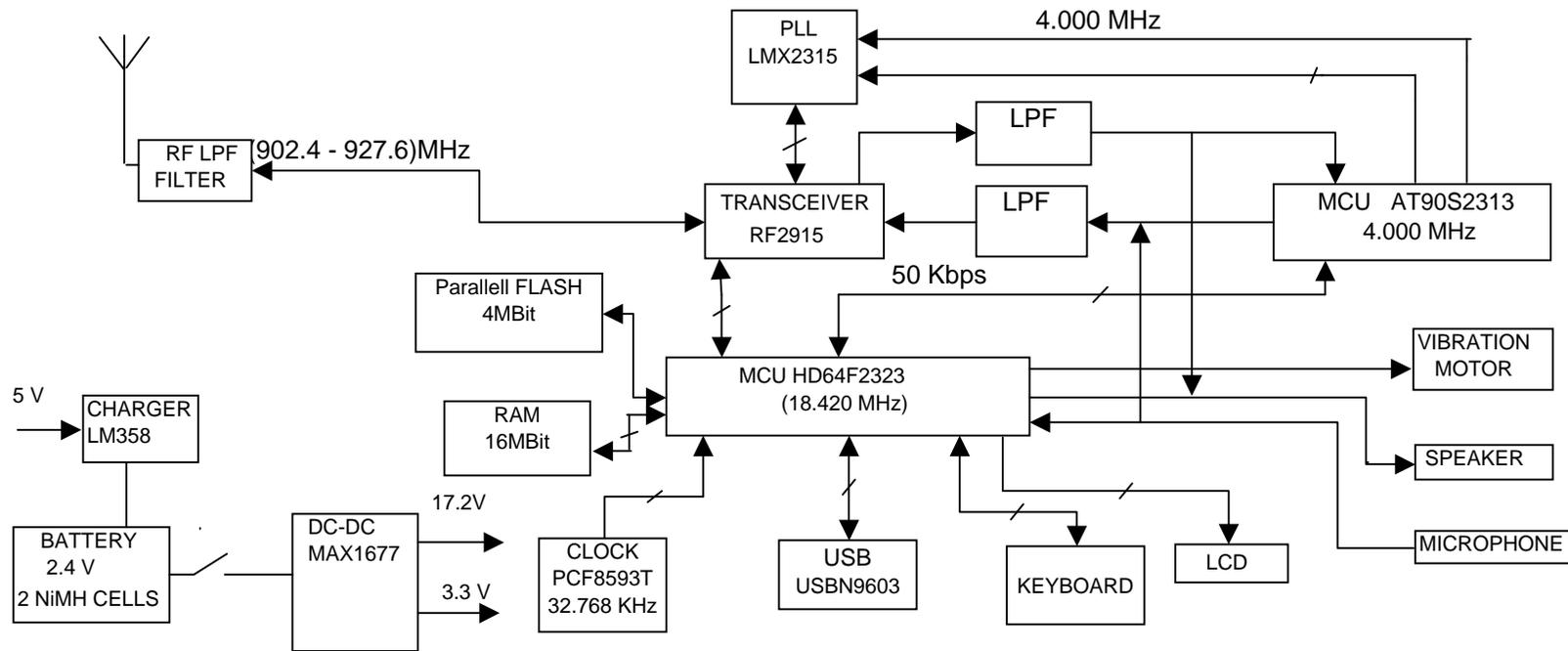


Fig.1. Functional Block Diagram of CYBIKO Extreme.

The DC/DC converter is designed for the application of 2 NiMH cells.

The LMX2315 is high performance frequency synthesizers with integrated prescalers.

Serial data is transferred into the LMX2315 from MCU AT90S2313 via a three line interface (Data, Enable, Clock).

The PCF8593 is a CMOS clock/calendar circuit, optimized for low power consumption. Addresses and data are transferred serially in MCU via the two-line bidirectional I<sup>2</sup> C-bus. He has built-in 32.768 kHz oscillator circuit.

HD64F2323 MCU controls and monitors all other peripheral devises: RAM, DataFlash, USB port, charger, Real Time Clock, keyboard, LCD, speaker, microphone, vibration motor and extensions.

Table 1: Channel frequencies

Ch	F <sub>i</sub> , MHz												
		11	906.4	21	910.4	31	914.4	41	918.4	51	922.4	61	926.4
		12	906.8	22	910.8	32	914.8	42	918.8	52	922.8	62	926.8
3	903.2	13	907.2	23	911.2	33	915.2	43	919.2	53	923.2		
4	903.6	14	907.6	24	911.6	34	915.6	44	919.6	54	923.6		
5	904.0	15	908.0	25	912.0	35	916.0	45	920.0	55	924.0		
6	904.4	16	908.4	26	912.4	36	916.4	46	920.4	56	924.4		
7	904.8	17	908.8	27	912.8	37	916.8	47	920.8	57	924.8		
8	905.2	18	909.2	28	913.2	38	917.2	48	921.2	58	925.2		
9	905.6	19	909.6	29	913.6	39	917.6	49	921.6	59	925.6		
10	906.0	20	910.0	30	914.0	40	918.0	50	922.0	60	926.0		

## 5. Crystal frequencies

There are 4 crystals in CYBIKO Extreme:

- Main Processor HD64F2323 clock 18420 KHz.
- Coprocessor AT90S2313 clock 4000 KHz.
- Real time clock 32.768 KHz.
- USB port USBN9603 clock 24000 KHz.