Wireless LAN radio module (WLM-1)　for CF-07 , CF-VDW07　Description

Rev. 0.1

【Contents】

Revision History

Rev	Date	Author	Summary of Changes
0.1	2001/07/02	Akira Itoh	Initial Release for FCC Submission

1.Abstract

This Panasonic radio module (WLM-1) provides a wireless connection for Panasonic Mobile Data Wireless Display PC (Display: CF-VDW07 Main Unit: CF-07) in accordance with IEEE standard 802.11DSSS (Direct Sequence Spread Spectrum).
It can work at 11, 5.5, 2 or 1 Mbps.
The product, one piece of hardware, contains the following blocks;
-50pin proprietary connecor; this interface is compatible 16bits PC Card standard (PCMCIA) electrically.
-Wireless Medium Access Control (WMAC); this chip is used for handshaking with the 16bits PC Card standard interface (PCMCIA bus) and for handling the IEEE protocol; it also does frequency management and interface to FlashROM for parameters on frequencies and call codes. Here also selection for 11, 5.5, 2, or 1 Mbps is handled.
-Baseband processor takes care of all modulation/demodulation for DSSS for all above rates.
-A antenna connector provides a connection to external antenna.
Please refer to the Theory of Operation for the description of tranmitter and receiver blocks.

2.Technical Specification

Frequency Range	2412 – 2462 MHz					
Channel Assignments	**1ch**	**2ch**	**3ch**	**4ch**	**5ch**	**6ch**
	2412MHz	2417MHz	2422MHz	2427MHz	2432MHz	2437MHz
	7ch	**8ch**	**9ch**	**10ch**	**11ch**	
	2442MHz	2447MHz	2452MHz	2457MHz	2462MHz	
Data rates	11 , 5.5 , 2 or 1Mbps					
Peak Output Power	13.0dBm (20mW) @ antenna connector on this module					

3.Antenna Specification

Internal antenna of CF-VDW07

Type	Planar Inverted F-antenna
Gain	Maximum + 4 dBi @ 2450MHz
	Average -1.7 dBi @2450MHz

Internal antenna of CF-07

Type	Planar Inverted F-antenna
Gain	Maximum +1.5 dBi @2450MHz
	Average -1.9 dBi @2450MHz

4.Diagram

4.1.Theory of Operation

The various parts of the Block diagarm are numbered and an explanation is given of these blocks.

Transmitter functions:

A)Baseband processor (18)

Function: Generate spreaded signal with an Barker sequence of 11, the original raw data rate of 1, 2, 5.5 or 11 Megabits is transformed to a symbol rate of one MegaBaud and multiplied with eleven and modulated with a DBPSK modulation for 1Mbps or a DQPSK modulation for 2Mbps.For 5.5Mbps or 11Mbps, it is modulated with a DQPSK CCK(CCK=Complementary Code Keying) modulation.The unfiltered data comes out of I and Q and goes to the up mixer in IF I/Q Modulator (6).

B)The above signals are mixed in (6) in a so called quadrature modulator with the Intermediate Frequency (IF) of 374MHz.

C)The up mixer is fed by the VCO (7) of 748MHz, which is divided by 2 to 374MHz.

D)The SAW filter (8) filters all unwanted mixing products, such that only the 374MHz band remains.

E)This signal goes into the RF upmixer in RF/IF converter (9).
It is mixed with the RF VCO (16) with a range 2038 to 2110 MHz.

F)The signal is fed through a 2.4- 2.5GHz bandpass filter (10) to remove all unwanted mixer Products, and thus to get a clean signal for further processing.

G)The signal is amplified in (11), with approx. 30dB to an output level of approx. 13dBm.

H)This signal goes to the TX/RX antenna which is integrated into the host device via the special connector.

I) The output power is controlled with a so called power feed back loop (12) in which the output power level is controlled via (13) by the baseband processor.

Receiver functions:

J)The receive signal enters the TX/RX antenna and goes through the 2.4GHz filter (15) to remove all unwanted spectral components in order to deliver a clean signal for receiver.

K)This signal goes to the TX/RX switch (14) which is set to RX mode.

L)A Low Noise Amplifier (LNA) in RF/IF converter (9) is used to amplify the weak signal to a level fitted for down mixing.The AGC (17) can amplify the signal.

M)The down mixer in RF/IF converter (9) mixes the 2.4GHz with 2.1GHz to the 374MHz IF.

N)The signal of 374MHz is filtered by a SAW filter (8) which is the same filter as in transmit mode.

O)The signal of 374MHz is amplified again in IF I/Q Demodulator (6) and AGC (17) can increase the signal level to the required level.

P)This amplified signal goes to the second mixer in (6) .
The down mixer in (6) mixes the 374MHz signal down to the I and Q signals.

Q)The Baseband processor (18) removes the spreading as present on the signal with a so called autocorrelation function. The resulting output of the processor is a received data rate of 1, 2, 5.5 or 11 Megabits.

VCO, PLL and OSC:

R)There are two of the blocks that generate a single tone signal for up/down mixing.
One is for the IF LO (PLL is in (6) and VCO is (7).) (374MHz), other is for the RF LO (PLL is in (9) and VCO is (16).) (2038-2110MHz).

S)All the PLL's and processor (2) and (18) have one reference Crystal of 44MHz (4) with an accuracy of 25ppm.

Genaral circuits:

T)Antenna.
This module has not antenna diversity function. So it has only one antenna connector.

U)Automatic Gain control.
Depending on the signal strength and signal quality the baseband processor (18) can choose to increase or decrease the signal level at the digital input, this is done by reducing or increasing the gain in the receiver via the LNA-RF-AGC (in 9) and IF-AGC (in 6).

V)The baseband processor (18) can read via the WMAC (2) the registers for programming all Parameters for transmit / receive functions.

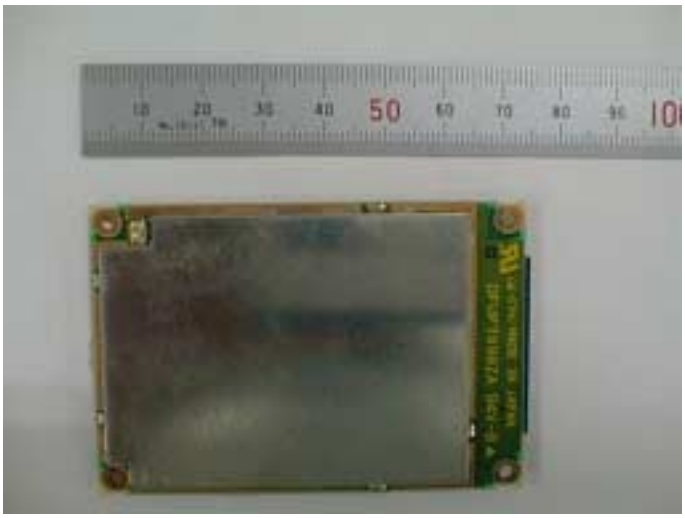
W)3.3 volt should be supplied for power via the PCMCIA bus.

4.2.Block Diagram

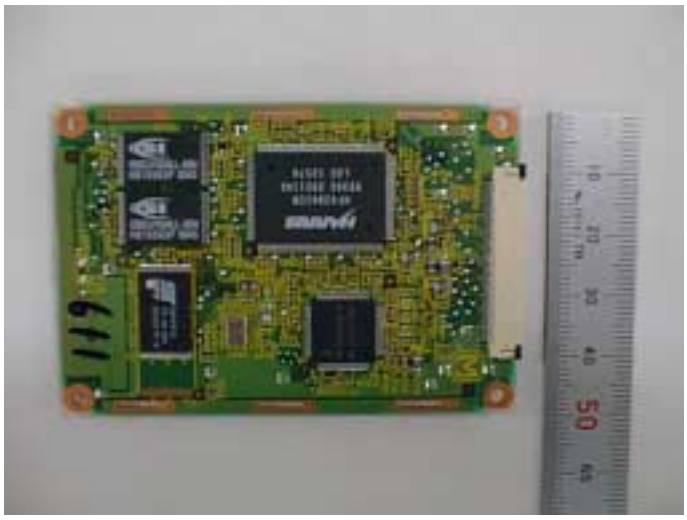
Please refer to other document. << Blockdiagram.doc>>

4.4.Photo

Top View



Bottom View



Top Internal View