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**Two Ports Mini Reader**

**Operational Descriptions**



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## 1. Module Operation

**NOTE:** This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

The TWO PORTS MINI READER is a dual-antenna reader module. The backscatter signal is demodulated to baseband through a standard mixer stage and is filtered and amplified. The baseband signal is then sampled and processed by a microcontroller.

The entire RF section of the reader module can be completely turned OFF under software control by the microcontroller. This allows the TWO PORTS MINI READER to consume very low power when in standby mode. During RFID operation, the transmit power of the TWO PORTS MINI READER is 1W, so the total power consumption is 1.8A during the fraction of a second that is required to read the tags in the field. A flow chart of module is given in Fig 1.

TWO PORTS MINI READER implements a PHEMT GaAs IC switch to change transceiver path from one antenna the other antenna. For this device is working with data transmitter and receiver at one path and one time only. The GaAs IC, called as221-306, is a reflective SP4T switch. It is an ideal switch for high power applications. It can be used for GSM dual-band handset applications where low loss low current, and small size are critical parameters. The applications are very straight forward to lay out the circuit in the PCB Board.

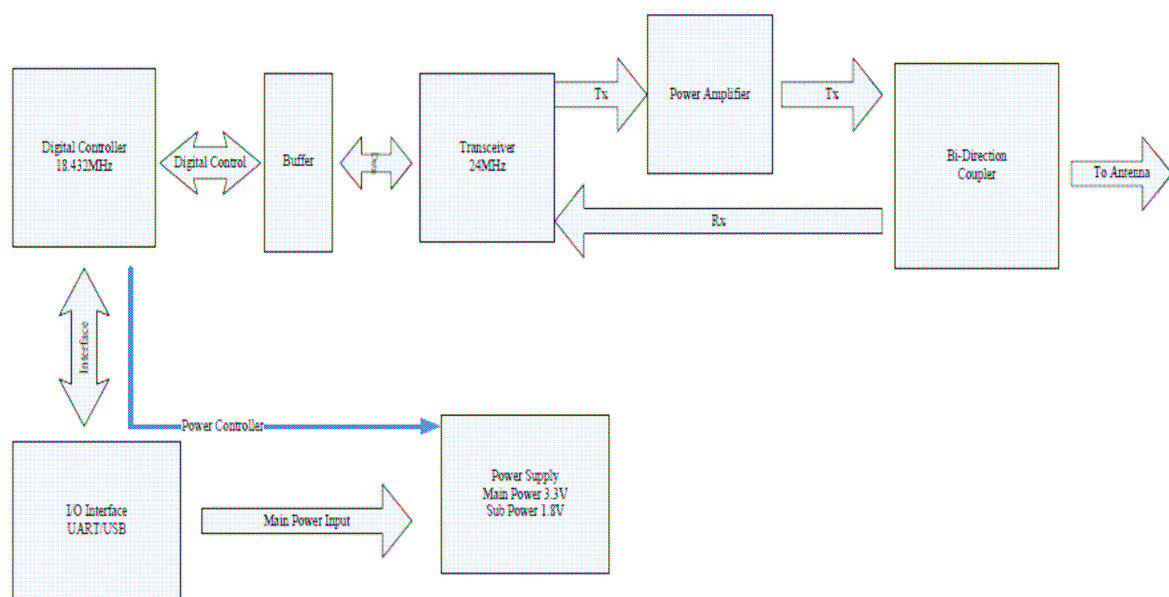
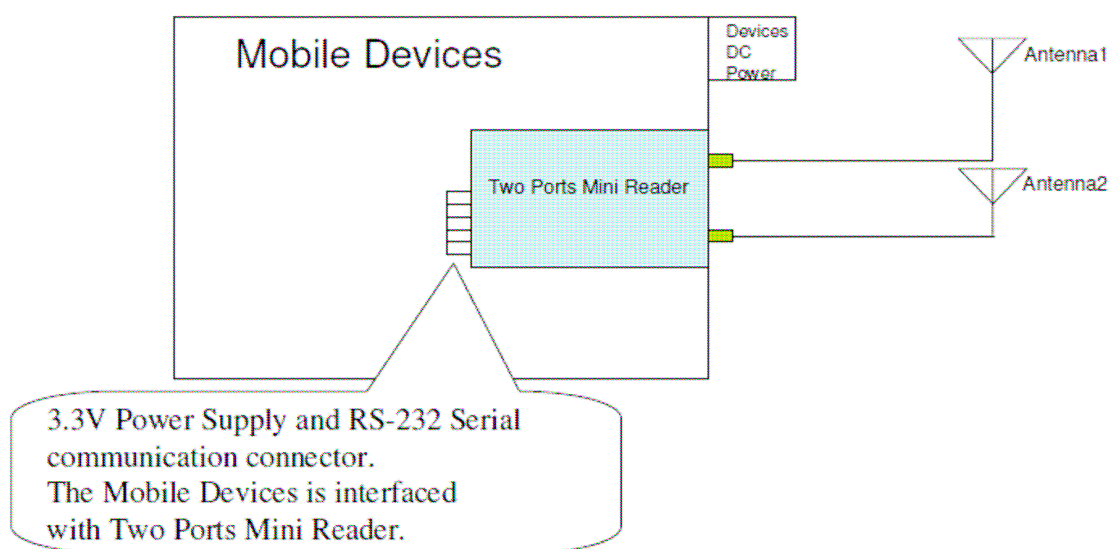


Fig 1. TWO PORTS MINI READER FLOW CHART

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## 2. Interfacing with TWO PORTS MINI READER

The TWO PORTS MINI READER is designed to interface with another circuit board (as following photo) and communicate using a simple 3-wire serial interface. However, for testing purposes, it is possible to connect the TWO PORTS MINI READER to a computer using a serial RS-232 adapter. In this case, the TWO PORTS MINI READER Control Panel software can be used.



## 3. Frequency-hopping spread-spectrum waveform

The two ports mini reader uses frequency-hopping spread spectrum (FHSS) signaling. The reader's RF envelope shall comply with Fig2 and Table 1. The RF envelope shall not fall below the 90% point in Figure2 during interval  $T_{hs}$ . The reader shall not issue commands before the end of maximum setting-time interval in Table 1 (i.e. before  $T_{hs}$ ). The maximum time between frequency hops and the minimum RF-off time during a hop shall meet local regulatory requirements.

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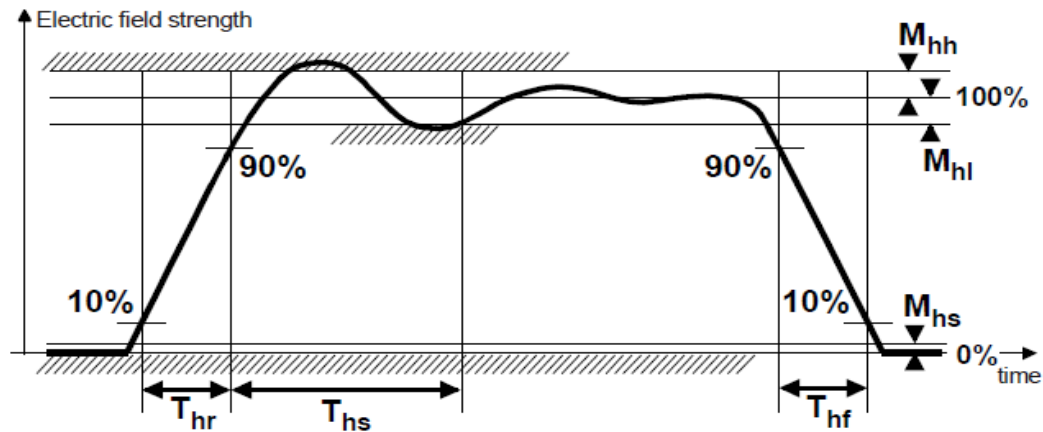


Fig 2

Parameter	Definition	Minimum	Typical	Maximum	Units
$T_{hr}$	Rise time			500	$\mu s$
$T_{hs}$	Settling time			1500	$\mu s$
$T_{hf}$	Fall time			500	$\mu s$
$M_{hs}$	Signal level during hop			1	% full scale
$M_{hl}$	Undershoot			5	% full scale
$M_{hh}$	Overshoot			5	% full scale

Table1

Commanded Tag backscatter format	Channel width	Channel center frequencies $f_c$	Guardbands
Subcarrier	500 kHz	Channel 1: 902.75 MHz Channel 2: 903.25 MHz • • Channel 50: 927.25 MHz	Lower bandedge: 902 MHz – 902.5 MHz  Upper bandedge: 927.5 MHz – 928 MHz
FM0	In accordance with local regulations		

Table 2

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## 4. Frequency Channel configuration Table

This table3 contains the power up default configuration for US FCC. This is a Pseudo Random, 50 channel table with frequencies from 902 to 928 MHz on 500KHz centers with appropriate guard bands.

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Channel	Frequency	HST_RFTC FRQCH_CFG	HST_RFTC FRQCH_DESC PLLDIVMULT	HST_RFTC FRQCH_DESC PLLDACCTL
0	915.75	0x00000001	0x00180E4F	0x14020200
1	915.25	0x00000001	0x00180E4D	0x14020200
2	903.25	0x00000001	0x00180E1D	0x14020200
3	926.75	0x00000001	0x00180E7B	0x14020200
4	926.25	0x00000001	0x00180E79	0x14020200
5	904.25	0x00000001	0x00180E21	0x14020200
6	927.25	0x00000001	0x00180E7D	0x14020200
7	920.25	0x00000001	0x00180E61	0x14020200
8	919.25	0x00000001	0x00180E5D	0x14020200
9	909.25	0x00000001	0x00180E35	0x14020200
10	918.75	0x00000001	0x00180E5B	0x14020200
11	917.75	0x00000001	0x00180E57	0x14020200
12	905.25	0x00000001	0x00180E25	0x14020200
13	904.75	0x00000001	0x00180E23	0x14020200
14	925.25	0x00000001	0x00180E75	0x14020200
15	921.75	0x00000001	0x00180E67	0x14020200
16	914.75	0x00000001	0x00180E4B	0x14020200
17	906.75	0x00000001	0x00180E2B	0x14020200
18	913.75	0x00000001	0x00180E47	0x14020200
19	922.25	0x00000001	0x00180E69	0x14020200
20	911.25	0x00000001	0x00180E3D	0x14020200
21	911.75	0x00000001	0x00180E3F	0x14020200
22	903.75	0x00000001	0x00180E1F	0x14020200
23	908.75	0x00000001	0x00180E33	0x14020200
24	905.75	0x00000001	0x00180E27	0x14020200
25	912.25	0x00000001	0x00180E41	0x14020200
26	906.25	0x00000001	0x00180E29	0x14020200
27	917.25	0x00000001	0x00180E55	0x14020200
28	914.25	0x00000001	0x00180E49	0x14020200
29	907.25	0x00000001	0x00180E2D	0x14020200
30	918.25	0x00000001	0x00180E59	0x14020200
31	916.25	0x00000001	0x00180E51	0x14020200
32	910.25	0x00000001	0x00180E39	0x14020200

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33	910.75	0x00000001	0x00180E3B	0x14020200
34	907.75	0x00000001	0x00180E2F	0x14020200
35	924.75	0x00000001	0x00180E73	0x14020200
36	909.75	0x00000001	0x00180E37	0x14020200
37	919.75	0x00000001	0x00180E5F	0x14020200
38	916.75	0x00000001	0x00180E53	0x14020200
39	913.25	0x00000001	0x00180E45	0x14020200
40	923.75	0x00000001	0x00180E6F	0x14020200
41	908.25	0x00000001	0x00180E31	0x14020200
42	925.75	0x00000001	0x00180E77	0x14020200
43	912.75	0x00000001	0x00180E43	0x14020200
44	924.25	0x00000001	0x00180E71	0x14020200
45	921.25	0x00000001	0x00180E65	0x14020200
46	920.75	0x00000001	0x00180E63	0x14020200
47	922.75	0x00000001	0x00180E6B	0x14020200
48	902.75	0x00000001	0x00180E1B	0x14020200
49	923.25	0x00000001	0x00180E6D	0x14020200

Table 3

## 5. Starting Windows Demo Program

After installing the demo program, you can connect the reader to the computer using a serial cable (standard DB9 connectors). Please make sure that you have the antenna connected to the reader.

The program supplied with the kit is able to interface to all the RFID readers made by CARMAR. You should open the program (CARMAR reader control panel), then go to the Reader menu and selected . Then go to the ComPort menu and select the proper COM port where you connected the reader. You should then verify that the Baud Rate setting is correct (9600), then you can click the CONNECT button. After you run the program for the first time, the software settings will be saved automatically so you should not need to reconfigure the control program unless you switch to another reader product.

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標籤讀取

參數設定/擷取

連線設定

Read/Write/Lock/Kill

Hibiki Protocol

System Control

Inventory

Mini turn on power test

Tag ID	Read Count	Mini-RSSI	MAX-RSSI	Aver-RSSI	Memory Data

Reader menu

ComPort menu

Inventory 條件

讀取次數

1

☐ Inventory With Memory?

Matched Tag ID

MemBank

RESERVED

WordPtr

WordCount

Access Password

inventory

clear

開始測試，經過

0

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分

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秒

Is the hopping sequence pseudorandom, based on the technical description?

Yes.

Is each channel used equally on average, based on the technical description?

Yes

Does the associated system receiver have a compliant input bandwidth, based on the measured 20 dB emission bandwidth?

Yes

Does the associated system receiver have the ability to hop in synchronization with the transmitter, based on the technical description?

Yes

15.247(g) Does the design of the frequency hopping system allow it to comply with all pertinent requirements when presented with a lengthy data stream?

Yes

15.247(h) Does the frequency hopping system comply with the non-coordination requirement?

Yes