

RXC Inspect & Validate Plan

Need

Measurement of RX-Circuit (RXC) on Wallet for validation of design & verification of operation

Plan

Approach this in steps, using reference equipment when possible

Stages

- A. CC1200EMK CW-On Inspection
 - a. Square-Wave On-Off Patterns
- B. CC1200EMK CW-On + WISP-Tx Demo
 - a. 10ms CW-On Pulses @ 50 Hz
 - b. 1ms WISP-Tx Bursts @ 500 Hz (a packet of misc. chips)
- C. RFID Reader Inspect (no tags)
 - a. TSS Reader @ $P_{tx}=30$ dBm
 - b. TSS Reader @ $P_{tx}=14$ dBm
- D. RFID Reader + Tag Inspect (one tag)
 - a. TSS Reader @ $P_{tx}=30$ dBm
 - b. TSS Reader @ $P_{tx}=14$ dBm
- E. CC1200EMK CW-On + RFID-Tx Demo (one tag)
 - a. Select + Query
- F. Wallet Inspect (no tags)
 - a. Tx-Demo
 - b. RFID-Demo
- G. Wallet Inspect (one tag)
 - a. RFID-Demo

@note the above listing is a summary, see the following sections for full detail

@note this test plan makes use of the CC1200EMK over the CC1175EMK as a point of simplicity and can be interchanged if needed

@note hardware is permanently affixed whenever possible (e.g. double-sided tape or hot-glue)

Hardware

The following listing is provided to assist in testing & use.

Product

- Wallet
 - Target Product for RXC
- RXC ([ref](#))
 - The target RXC circuit on the Wallet PCB, assembled & operational
- RXC-Eval
 - Demo or eval of RXC circuit from Wallet if generated

Radio Dev

- [TI CC1175EMK](#)
- [TI CC1200EMK](#)
- [TI TrxEB](#)
- Blue Tag Sniffer – ASK Demod Circuit & Antenna in place of RXC for illustration

Readers

- [TSS mURM Reader](#)
- [Thingmagic M6e Reader](#)
- [Acura Global Edge50 Reader](#)

Demos

- **WISP-TX**
misc. blurb of WISP Tx-Wiggles

<open – screenshot>

- **RFID-Demo**
1ms CW-On, Select, 100us CW-On, Query, 3ms CW-On, Repeat (T=10ms)

<open – screenshot>

Stage A - CC1200EMK CW-On Inspection

Get CW Output & validate reception with RXC

Hardware

- TI TrxEB + CC1200EMK
- RXC
- Antennas – As available, documented with stored results (e.g. '.TXT')

Test Configuration

- Direct alignment & orientation of antennas for maximal transmission & reception
- $D = 8''$

Software Configuration

- Install SmartRF Studio7 (<http://www.ti.com/tool/smartrfstudio>)

Reference Example Illustrations

- See the contents of /img for all listed pictures below (@ref)



Figure 1: Justin's 'Stage A' Setup (ref using Blue Tag Sniffer in place of RXC)

CC1200EMK Configuration

- Apply TrxEB Jumpers & Switches

S2: Enable

S1: SmartRF

MAIN POWER: Off

P17: USB (2nd from left)

Board Currents: All jumpers on

Else: Opens

@ref jmr_trxeb_ref.jpg

- Insert EMK w/Antenna

RF1/RF2 connectors in upper right corner

Insert SMA antenna to EMK

@ref jmr_trxeb-emk_ref.jpg

- Apply USB

- Apply POWER

MAIN POWER: On

@rslt S2 LED should illuminate

@rslt 'SmartRF TrxEB' should appear in Device Manager->'Cebal controlled devices'

- Open SmartRF Studio7, open 'Sub-1 GHz' tab

@rslt CC1200 icon is illuminated in Orange

@rslt 'TrxEM --CC1200' is listed as "Connected Devices"

@ref jmr_smartrf.jpg

- Double Click on 'CC1200' icon

@rslt CC1200 Control Panel Opens

- Open Demo Tab

Open 'Expert Mode' tab

Select 'Register View' and 'RF Parameters' checkboxes at top

@ref jmr_dev_control_panel.jpg

- Configure Demo (apply these in order listed)

*Typical Settings: Row 9 – '500ksps, max throughput, ETSI Standard (868 MHz)'

*RF-Carrier: 915.0 MHz

*Xtal: 40.0 MHz

Symbol Rate: 80 ksps

Modulation: ASK/OOK

TX Power: 14 dBm

Perf: High Performance

@note this config is designed to use a chip size of 12.5us, useful for RFID dev in future if interested

- Apply Test Vector (Packet Tx tab below)

Packet Count: Infinite

802.15.4g Mode: Unchecked

Length Config: Variable

Sync Word Length: 16 bits (D.C.)

Sync Word: 'FF' 'FF' (D.C.)

Preamble: '10101010 (0xAA)' (D.C.)

Preamble Count: No preamble

Add Seq Number: Unchecked

Hex: Selected (checked, on left side)

Input Hex-String: (200 chars (10ms), cut-n-paste below)

```
"FFFF00FF01FF03FF0FFF55555555FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF
FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF
FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF "
```

Advanced: Checked

Advanced->Use Default: Unchecked

Packet Interval: 30ms (looks pretty @ 30... ;))

@rslt Radio State: 'IDLE' (bottom bar)

@ref jmr_final_cfg.jpg

- Press 'Start' in bottom-right

@rslt 'Sent Packets' begins incrementing @

@rslt 10ms CW-On pulse @ 33Hz, misc. ASK at both ends (dang RFStudio...)

@rslt Radio State: 'N.A.' (bottom bar)

@ref jmr_demo_pic1.jpg, jmr_demo_pic1.jpg

- Result:

10ms CW-On Pulses from CC1200EMK Module in T=30ms loop

Stage B through G

All content & demos have been generated with working examples and will be integrated here in subsequent revisions as RXC validation progresses. Contact Justin for B-G content if interested.