

CE DFS Test Report

Equipment : 802.11abgn, USB module
Brand Name : SparkLAN
Model No. : WUBR-508N
Applicant : SparkLAN Communications, Inc.
Manufacturer : 8F., No. 257, Sec. 2, Tiding Blvd., Neihu District, Taipei City 11493, Taiwan
Standard : EN 301 893 V2.1.1(2017-05)
Operate Mode : Slave without radar detection

The product sample received on Apr. 10, 2012 and completely tested on Apr. 19, 2012. We, SPORTON, would like to declare that the tested sample has been evaluated in accordance with the procedures given in EN 301 893 V2.1.1(2017-05) and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.


Phoenix Chen
SPORTON INTERNATIONAL INC.





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APPENDIX A. TEST PHOTOS

Summary of Test Result

| Requirements and Conformance Test Specifications | | | | | |
|--|------------------|--|--|--------------------------------|----------|
| Report Clause | Ref. Std. Clause | Description | Measured | Limit | Result |
| - | 4.7.2.1 | DFS: Channel Availability Check | N/A | EN 301 893 Table D.1, D.5 | N/A |
| - | 4.7.2.2 | DFS: Off-Channel CAC - Radar Detection Threshold | N/A | EN 301 893 Table D.1, D.5 | N/A |
| - | 4.7.2.2 | DFS: Off-Channel CAC - Detection Probability | N/A | EN 301 893 Table D.1, D.5 | N/A |
| - | 4.7.2.3 | DFS: In-service Monitoring | N/A | EN 301 893 Table D.1, D.5 | N/A |
| 3.2 | 4.7.2.4 | DFS: Channel Shutdown | CMT < 10sec CCTT < 1sec | EN 301 893 Table D.1 | Complied |
| - | 4.7.2.5 | DFS: Non-occupancy Period | N/A | EN 301 893 Table D.1 | N/A |
| - | 4.7.2.6 | DFS: Uniform Spreading | N/A | EN 301 893 Clause 4.7.2.6.1 | N/A |
| 3.1.6 | 4.10 | User Access Restrictions | Manufacturer attestation NOT accessible to user | DFS controls | Complied |

Revision History

[illegible]

1 General Description

1.1 Information

1.1.1 RF General Information

| IEEE Std. 802.11 | Channel Bandwidth (MHz) |
|---|-------------------------|
| a, n (HT20) | 20 |
| n (HT40) | 20 |
| 802.11a/n uses a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM modulation. | |

1.1.2 Antenna Information

| Antenna Category | |
|-------------------------------------|---|
| <input checked="" type="checkbox"/> | Integral antenna (antenna permanently attached) |
| <input checked="" type="checkbox"/> | Temporary RF connector provided |
| <input type="checkbox"/> | No temporary RF connector provided Transmit chains bypass antenna and soldered temporary RF connector provided for connected measurement. In case of conducted measurements the transmitter shall be connected to the measuring equipment via a suitable attenuator and correct for all losses in the RF path. |
| <input type="checkbox"/> | External antenna (dedicated antennas) |
| <input type="checkbox"/> | Single power level with corresponding antenna(s). |
| <input type="checkbox"/> | Multiple power level and corresponding antenna(s). |

| Antenna General Information | | | |
|---|-----------|-----------|------------|
| No. | Ant. Cat. | Ant. Type | Gain (dBi) |
| 1 | Integral | Printed | 6.64 |
| <input checked="" type="checkbox"/> For conducted tests, antenna ports are used for the tests and Master lowest antenna gain [3] dBi that was used to set the DFS Detection Threshold level during calibration of the test setup. | | | |

1.1.3 Table for Existing Change

This product is an extension of original one reported under Sporton project number: EY232843-13

Below is the table for the change of the product with respect to the original one.

| Modifications | Performance Checking |
|--|----------------------|
| Update standard to EN 301 893 V2.1.1 (2017-05) | N/A |

1.2 Accessories and Support Equipment

| Support Equipment | | | |
|-------------------|--------------|------------|------------------|
| No. | Equipment | Brand Name | Model Name |
| 1 | Notebook PC | DELL | Latitude E5510 |
| 2 | Notebook PC | HP Compaq | Presario B1251TU |
| 3 | Access Point | 3Com | WL-605 |

1.3 Testing Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ EN 301 893 V2.1.1 (2017-05)

1.4 Testing Location Information

| Testing Location | | | |
|-------------------------------------|--------|---|----------------------|
| <input checked="" type="checkbox"/> | HWA YA | ADD : No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) | |
| | | TEL : 886-3-327-3456 | FAX : 886-3-327-0973 |
| Test Condition | | Test Site No. | Test Engineer |
| DFS Site | | DFS01 -HY | Ben Tseng |
| | | | Test Environment |
| | | | 25.4°C / 60.3% |

1.5 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2))

| Measurement Uncertainty | | | |
|-------------------------------|---------------|--------------------------|------------------------|
| Test Item | | Uncertainty | Limit |
| Radio frequency | | $\pm 8.7 \times 10^{-7}$ | $\pm 1 \times 10^{-5}$ |
| RF output power, conducted | | ± 0.63 dB | ± 1.5 dB |
| RF power radiated | | ± 2.59 dB | ± 6 dB |
| Spurious emissions, conducted | 30 – 1000 MHz | ± 0.51 dB | ± 3 dB |
| | 1 – 18 GHz | ± 0.67 dB | ± 3 dB |
| | 18 – 26 GHz | ± 0.83 dB | ± 3 dB |
| Spurious emissions, radiated | 30 – 1000 MHz | ± 2.28 dB | ± 6 dB |
| | 1 – 18 GHz | ± 2.59 dB | ± 6 dB |
| | 18 – 26 GHz | ± 2.87 dB | ± 6 dB |
| Temperature | | ± 0.8 °C | ± 1 °C |
| Humidity | | ± 3 % | ± 5 % |
| Time | | ± 1.42 % | ± 10 % |

2 Test Configuration of EUT

2.1 DFS and TPC Information

| The DFS Related Operating Mode(s) of the Equipment | | | |
|---|---|---|--------------------------------------|
| <input type="checkbox"/> Master | | | |
| <input type="checkbox"/> Slave with radar detection | | | |
| <input checked="" type="checkbox"/> Slave without radar detection | | | |
| Software / Firmware Version | | 5.1.19.0 | |
| Communication Mode | | <input checked="" type="checkbox"/> IP Based (Load Based) | <input type="checkbox"/> Frame Based |
| IEEE Std. 802.11 Protocol | Frequency Range (MHz) | TPC (Transmit Power Control) | Passive Scan |
| a n (HT20/HT40) | <input checked="" type="checkbox"/> 5250-5350 | Yes | Yes |
| | <input checked="" type="checkbox"/> 5470-5725 | Yes | Yes |
| | <input checked="" type="checkbox"/> 5600-5650 | Yes | Yes |

2.2 The Worst Case Measurement Configuration

| The Worst Case Mode for Following Conformance Tests | |
|--|--|
| Tests Item | Dynamic Frequency Selection (DFS) |
| Test Condition | Conducted measurement at transmit chains The EUT shall be configured to operate at the highest transmitter output power setting. If more than one antenna assembly is intended for this power setting, the gain of the antenna assembly with the lowest gain shall be used. |
| Modulation Mode | HT20,HT40 |
| Modulation modes consist of below configuration: HT20/HT40: IEEE 802.11n | |

3 Dynamic Frequency Selection (DFS) Test Result

3.1 General DFS Information

3.1.1 DFS Parameters

| Table D.1: DFS requirement values | |
|-----------------------------------|-------------------------|
| Parameter | Value |
| Channel Availability Check Time | 60 seconds (see note 1) |
| Minimum Off-Channel CAC Time | 6 minutes (see note 2) |
| Maximum Off-Channel CAC Time | 4 hours (see note 2) |
| Channel Move Time | 10 seconds |
| Channel Closing Transmission Time | 1 second. |
| Non-occupancy period | Minimum 30 minutes |

Note 1: For channels whose nominal bandwidth falls completely or partly within the band 5600 MHz to 5650 MHz, the *Channel Availability Check Time* shall be 10 minutes.

Note 2: For channels whose nominal bandwidth falls completely or partly within the band 5600 MHz to 5650 MHz, the *Maximum Off-Channel CAC Time* shall be 24 hours.

| Table D.2: Interference threshold values | |
|--|---------------------------|
| EIRP Spectral Density (dBm/MHz) | Value (see notes 1 and 2) |
| 10 | -62 |

Note 1: This is the level at the input of the receiver of a RLAN device with a maximum EIRP density of 10 dBm/MHz and assuming a 0 dBi receive antenna. For devices employing different EIRP spectral density and/or a different receive antenna gain G (dBi) the DFS threshold level at the receiver input follows the following relationship: DFS Detection Threshold (dBm) = -62 + 10 · EIRP Spectral Density (dBm/MHz) + G (dBi), however the DFS threshold level shall not be lower than -64 dBm assuming a 0 dBi receive antenna gain.

Note 2: Slave devices with a maximum EIRP of less than 23 dBm do not have to implement radar detection.

| Table D.3: Parameters of the reference DFS test signal | | |
|--|--------------------------------------|------------------------|
| Pulse width W [μs] | Pulse repetition frequency PRF [pps] | Pulses per burst [PPB] |
| 1 | 700 | 18 |

Table D.4: Parameters of radar test signals

| Radar test signal # (note 1 to 3) | Pulse width W [μ s] | | Pulse repetition frequency PRF (PPS) | | Number of different PRFs | Pulses per burst for each PRF (PPB) (note 5) |
|--------------------------------------|-------------------------------|-----|---|------|--------------------------|--|
| | Min | Max | Min | Max | | |
| 1 | 0.5 | 5 | 200 | 1000 | 1 | 10 (note 6) |
| 2 | 0.5 | 15 | 200 | 1600 | 1 | 15 (note 6) |
| 3 | 0.5 | 15 | 2300 | 4000 | 1 | 25 |
| 4 | 20 | 30 | 2000 | 4000 | 1 | 20 |
| 5 | 0.5 | 2 | 300 | 400 | 2/3 | 10 (note 6) |
| 6 | 0.5 | 2 | 400 | 1200 | 2/3 | 15 (note 6) |

Note 1: Radar test signals 1 to 4 are constant PRF based signals. See figure D.1. These radar test signals are intended to simulate also radars using a packet based Staggered PRF. See figure D.2.

Note 2: Radar test signal 4 is a modulated radar test signal. The modulation to be used is a chirp modulation with a ± 2.5 MHz frequency deviation which is described below.

Note 3: Radar test signals 5 and 6 are single pulse based Staggered PRF radar test signals using 2 or 3 different PRF values. For radar test signal 5, the difference between the PRF values chosen shall be between 20 and 50 pps. For radar test signal 6, the difference between the PRF values chosen shall be between 80 and 400 pps. See figure D.3

Note 4: Apart for the Off-Channel CAC testing, the radar test signals above shall only contain a single burst of pulses. See figure D.1, D.2 and D.3. For the Off-Channel CAC testing, repetitive bursts shall be used for the total duration of the test. See figure D.4.

Note 5: The total number of pulses in a burst is equal to the number of pulses for a single PRF multiplied by the number of different PRFs used.

Note 6: For the CAC and Off-Channel CAC requirements, the minimum number of pulses (for each PRF) for any of the radar test signals to be detected in the band 5600 to 5650 MHz shall be 18.

3.1.2 Radar Test Signal Figure

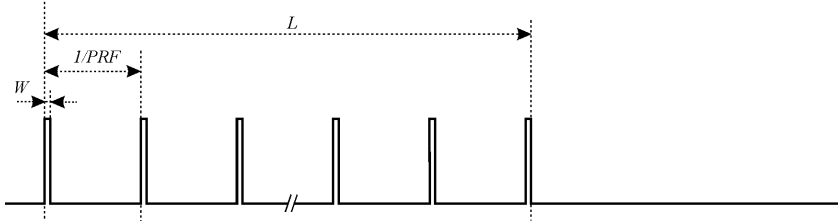
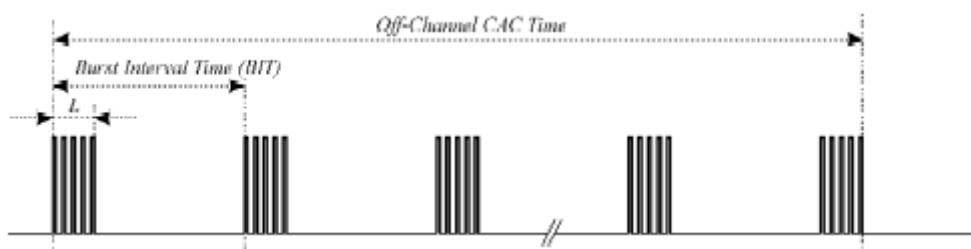
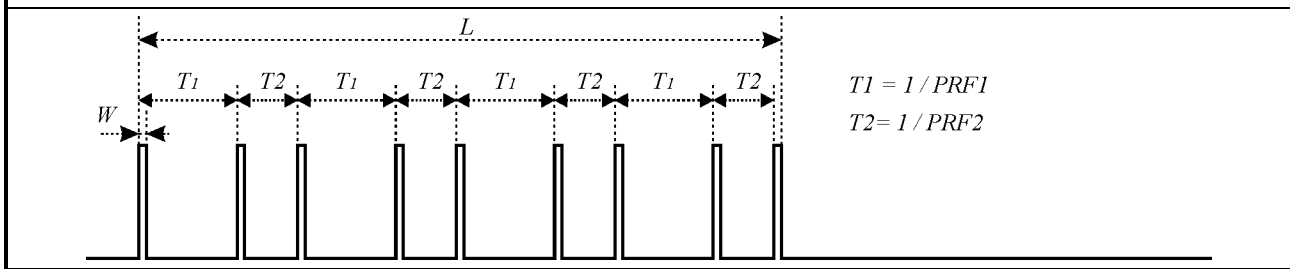
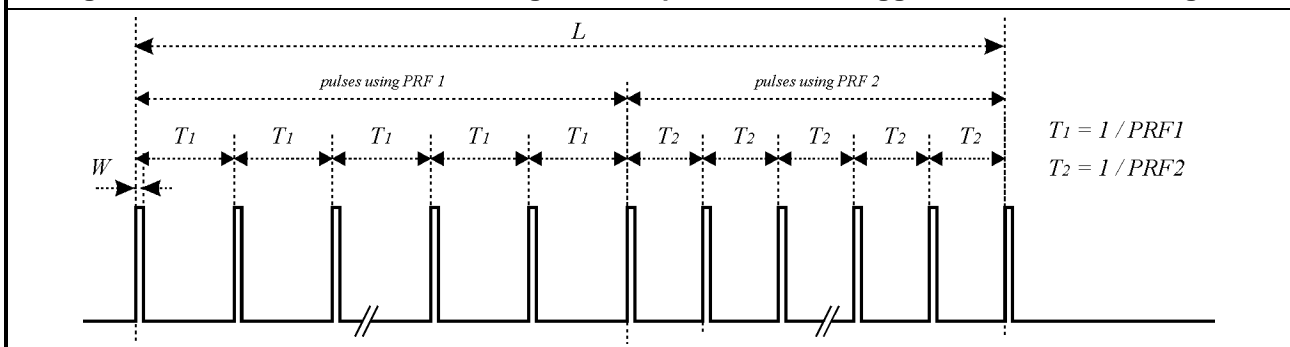
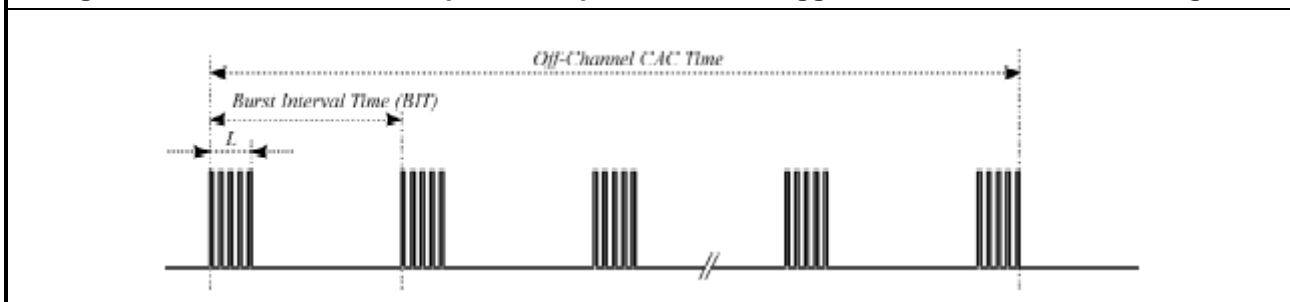
Figure D.1: General structure of a single burst / constant PRF based radar test signal

Figure D.2: General structure of a multiple burst / constant PRF based radar test signal


Figure D.3: General structure of a single burst/single pulse based staggered PRF radar test signal

Figure D.4: General structure of a single burst / packet based staggered PRF radar test signal

Figure D.5: Structure of a multiple burst / packet based staggered PRF based radar test signal


3.1.3 DFS Technical Requirements Specifications

| Requirement | DFS Operational mode | | |
|----------------------------|----------------------|---|--|
| | Master | Slave without radar detection (see table D.2) | Slave with radar detection (see table D.2) |
| Channel Availability Check | ✓ | Not required | ✓ (note 2) |
| Off-Channel CAC (note 1) | ✓ | Not required | ✓ (note 2) |
| In-Service Monitoring | ✓ | Not required | ✓ |
| Channel Shutdown | ✓ | ✓ | ✓ |
| Non-Occupancy Period | ✓ | Not required | ✓ |
| Uniform Spreading | ✓ | Not required | Not required |

Note 1: Where implemented by the manufacturer.

Note 2: A slave with radar detection is not required to perform a CAC or Off-Channel CAC at initial use of the channel but only after the slave has detected a radar signal on a channel by In-Service Monitoring.

3.1.4 Master DFS Threshold Level

| DFS Threshold Level | |
|--|--|
| DFS Threshold level: -56.93 dBm | <input checked="" type="checkbox"/> at the antenna connector (-56.93 dBm conducted) <input type="checkbox"/> in front of the antenna (-64 dBm e.i.r.p.) |
| Note 1: DFS Detection Threshold (dBm) = -62 + 10 - EIRP Spectral Density (dBm/MHz) The DFS Detection Threshold Level is (-62dBm) + 10 - 7.93 + 3 dBi = -56.93 dBm Note 2: However, the DFS threshold level shall not be lower than -64 dBm assuming a 0 dBi receive antenna gain. If more than one antenna is intended for this TPC, range or power setting, the antenna gain of the antenna with the lowest gain shall be used. | |

3.1.5 Off Channel CAC Feature Implemented

| Off Channel CAC Feature Implemented | |
|---|-------|
| <input checked="" type="checkbox"/> No | |
| <input type="checkbox"/> Yes | |
| If yes, specify the Off Channel CAC Time: | Hours |
| If the <i>Off Channel CAC Time</i> for the band 5600 MHz to 5650 MHz is different from the <i>Off-Channel CAC Time</i> for frequencies outside this band, please specify the <i>Off-Channel CAC Time</i> for the band | |
| If yes, specify the Off Channel CAC Time:5600 MHz to 5650 MHz: | Hours |
| Minimum Off-Channel CAC Time | |

3.1.6 User Access Restrictions

| User Access Restrictions |
|---|
| <input checked="" type="checkbox"/> DFS controls (hardware or software) related to radar detection are NOT accessible to the user |

3.1.7 Channel Loading/Data Streaming

| |
|---|
| <input checked="" type="checkbox"/> Test transmission sequence is from the Master to the Slave. |
| <input checked="" type="checkbox"/> Channel Shutdown, Off-Channel CAC Check and In-Service Monitoring with about 30% loading over 100 ms interval. <input type="checkbox"/> No transmissions on channels being checked during a Channel Availability Check or during an Off Channel CAC check. |

3.2 Channel Shutdown

3.2.1 Channel Shutdown Limit

| Channel Shutdown Limit | |
|-------------------------------------|--|
| <input checked="" type="checkbox"/> | The <i>Channel Move Time</i> shall not exceed the limit defined in clause 3.1.1 table D.1. |
| <input checked="" type="checkbox"/> | The <i>Channel Closing Transmission Time</i> shall not exceed the limit defined in clause 3.1.1 table D.1. |

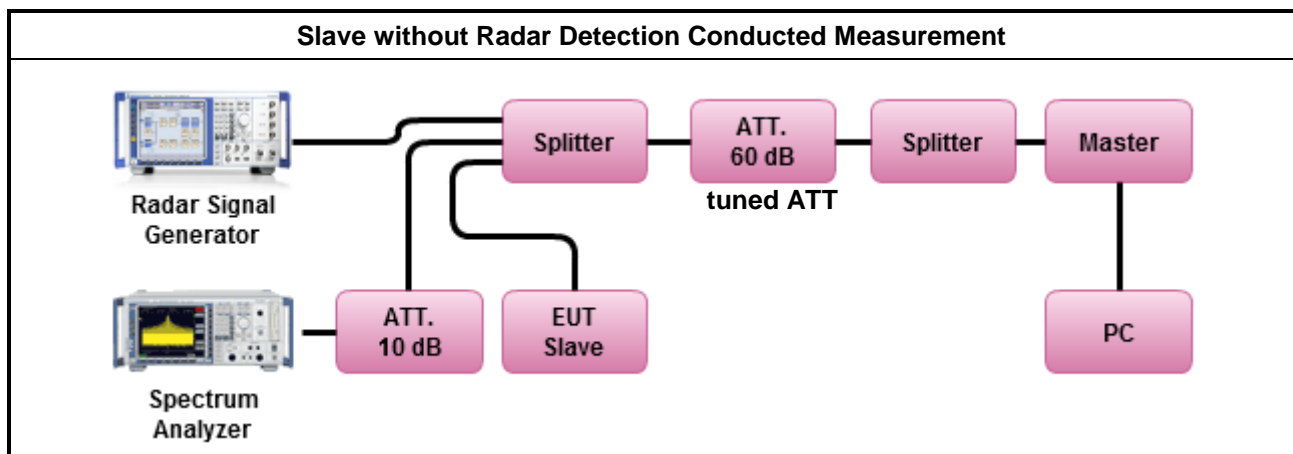
3.2.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.2.3 Test Procedures

| Test Method | |
|-------------------------------------|---|
| <input checked="" type="checkbox"/> | Refer as EN 301 893, clause 5.1.3 for test channel. One channel out of the declared channels for this frequency range. If more than one nominal channel bandwidth has been declared for this sub-band, testing shall be performed using the lowest and highest nominal channel bandwidth. Where the declared channel plan includes channels whose nominal channel bandwidth falls completely or partly within the 5600 MHz to 5650 MHz band, the tests for the <i>Channel Availability Check</i> (and where implemented, for the <i>Off-Channel CAC</i>) shall be performed on one of these channels in addition to a channel within the band 5470 MHz to 5600 MHz or 5650 MHz to 5725 MHz band. |
| <input checked="" type="checkbox"/> | Refer as EN 301 893, clause 5.3.8.2.1.5 for <i>Channel Shutdown</i> |
| <input checked="" type="checkbox"/> | Refer as EN 301 893, clause 5.3.8.2.1 for conducted measurement. |
| <input checked="" type="checkbox"/> | For conducted measurements on devices with multiple transmit chains and receive chains. The power splitter/combiner shall be used to combine all the transmit/receive chains (antenna outputs) into a single test point. The insertion loss of the power splitter/combiner shall be taken into account. |
| <input type="checkbox"/> | Refer as EN 301 893, clause 5.3.8.2.2 for radiated measurement. |

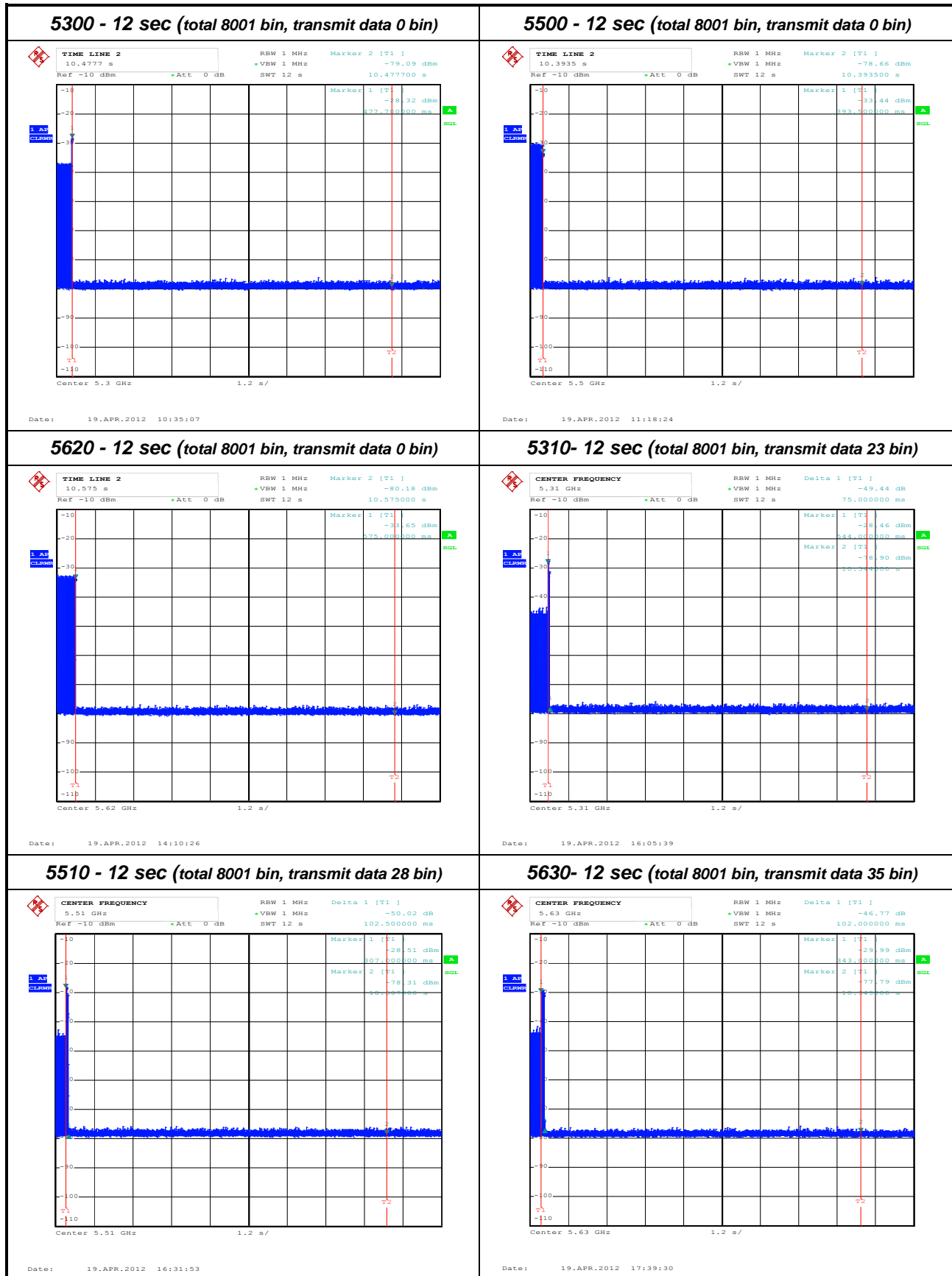
3.2.4 Test Setup



3.2.5 Test Result of Channel Shutdown

| Channel Shutdown Result | | | | |
|---|-------------|-------------------|--|-----------------------|
| Minimum Antenna Gain (dBi) | | | 6.64 | |
| Detection Threshold Level (dBm) | | | -62dBm+10dB | |
| Modulation Mode | Freq. (MHz) | Radar Test Signal | Channel Closing Transmission Time (ms) | Channel Move Time (s) |
| HT20 | 5300 | Reference | 0 | 0 |
| HT20 | 5500 | Reference | 0 | 0 |
| HT20 | 5620 | Reference | 0 | 0 |
| HT40 | 5310 | Reference | 34.50 | 0.0750 |
| HT40 | 5510 | Reference | 42.00 | 0.1025 |
| HT40 | 5630 | Reference | 52.50 | 0.1020 |
| Limit | | | 1 sec | 10 sec |
| Result | | | Complied | |
| Note 1: Table D.3: Parameters of the reference DFS test signal. | | | | |

3.2.6 Channel Shutdown Plots



4 Test Equipment and Calibration Data

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Calibration Due Date |
|-------------------------|--------------|--------------|------------|-----------------|------------------|----------------------|
| Spectrum Analyzer | R&S | FSP 7 | 100643 | 9kHz ~ 7GHz | Aug. 23, 2011 | Aug. 22, 2012 |
| Vector Signal Generator | R&S | SMU200A | 102098 | 100kHz ~ 6GHz | Oct. 05, 2011 | Oct. 04, 2012 |
| RF Cable-3m | HUBER+SUHNER | SUCOFLEX_104 | 302338 | 1 ~ 26.5GHz | Jan. 01, 2012 | Dec. 31, 2012 |
| RF Cable-10m | HUBER+SUHNER | SUCOFLEX_104 | 302345 | 1 ~ 26.5GHz | Jan. 01, 2012 | Dec. 31, 2012 |
| Horn Antenna | ETS-LINDGREN | 3117 | 00091920 | 1 ~ 18GHz | Nov. 15, 2011 | Nov. 14, 2012 |
| Horn Antenna | COM-POWER | AH-118 | 711064 | 1 ~ 18GHz | Jul. 27, 2011 | Jul. 26, 2012 |

Appendix A. TEST PHOTOS

Photographs of DFS Test Configuration

