TEST REPORT

Test Report No. : UL-RPT-RP10011076JD01C

Manufacturer	:	Siemens AG
Model No.	:	SCALANCE W788C-2 RJ45
FCC ID	:	LYHMPCIE1V1
IC Certification No.	:	267AA-MPCIE1V1
Test Standard(s)	:	FCC Part 15.407(h)(2) Subpart E, RSS-210 A9.3 Issue 8 December 2010

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2. The results in this report apply only to the sample(s) tested.
3. The sample tested is in compliance with the above standard(s).
4. The test results in this report are traceable to the national or international standards.
5. Version 1.0

Date of Issue: 29 August 2013

Checked by:

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WiSE Project Lead

Issued by :

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0644

This laboratory is accredited by UKAS. The tests reported herein have been performed in accordance with its' terms of accreditation.

UL VS LTD

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1. Customer Information

Company Name:	Siemens AG
Address:	Östliche Rheinbrückenstr. 50 761687 Karlsruhe Germany

2. Summary of Testing

2.1. General Information

Specification Reference:	47CFR15.407
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart E (Unlicensed National Information Infrastructure Devices) - Section 15.407
Specification Reference:	Industry Canada RSS-210 Issue 8 December 2010
Specification Title:	Low-power Licence-exempt Radio communication Devices (All Frequency Bands): Category I Equipment.
Site Registration:	FCC: 209735; Industry Canada: 3245B-2
Test Date:	24 May 2013

2.2. Summary of Test Results

FCC Reference (47CFR)	IC Reference	Measurement	Result
Part 15.407(h)(2)	RSS-210 A9.3(a)	Statistical Performance Check – Short Pulse Radar Types 1-4	✓
Part 15.407(h)(2)	RSS-210 A9.3(a)	Statistical Performance Check – Long Pulse Radar Type 5	✓
Part 15.407(h)(2)	RSS-210 A9.3(a)	Statistical Performance Check – Frequency Hopping Radar Type 6	✓
Key to Results ✓ = Complied ✗ = Did not comply			

Note(s):

1. Only DFS tests at the lowest EUT bandwidth (20 MHz) are required in accordance with clause 8.3)18) of FCC 06-96.
2. The requirements of DFS apply for the 5250-5350 MHz and 5470–5725 MHz bands. The EUT transmits in the range 5150–5875 MHz.
3. Due to the EUT being almost identical to the W788-2 variant and incorporating the same radio module, only the statistical performance check was tested to check detection threshold for all radar types. Other operation such as channel shutdown timings, the ability to detect during CAC, and non-occupancy period should therefore be identical to the W788-2 variant (report UL-RPT-RP10011076JD01A).

2.3. Methods and Procedures

Reference:	FCC 06-96
Title:	Compliance Measurement Procedures for Unlicensed-National Information Infrastructure Devices Operating in the 5250-5350 MHz and 5470-5725 MHz Bands Incorporating Dynamic Frequency Selection

2.4. Deviations from the Test Specification

There were no deviations from, additions to, or exclusions from the test specification identified above.

3. Equipment Under Test (EUT)

3.1. Identification of Equipment Under Test (EUT)

Brand Name:	Siemens AG
Model Name or Number:	SCALANCE W788C-2 RJ45
Serial Number:	1P 6GK5788-2FC00-1AA0
FCC ID:	LYHMPCIE1V1
Industry Canada Certification Number:	267AA-MPCIE1V1

3.2. Untested Variants

The customer has declared that the above SCALANCE W788C-2 RJ45 used for testing is also a representative model for the following variants in terms of both hard ware & firmware.

They have declared that these variants only differ in terms of their hardware options (number of radio cards mounted, type of Ethernet /antenna connector, number of radio cards)

Type	Certification Name
SCALANCE W788C-2 RJ45	RAPN-W2-RJ-E3
SCALANCE W788C-2 M12	RAPN-W2-M12-E3
SCALANCE W788C-2 M12 EEC	RAPN-W2-M12-E3

3.3. Description of EUT

The equipment under test was a Wi-Fi Access Point.

The EUT can be operated in either Master or Client mode depending on the firmware configuration. The testing covered in this report is with a Master configuration only.

3.4. Modifications Incorporated in the EUT

No modifications were made to the EUT during testing.

3.5. Additional Information Related to Testing

Technology Tested:	WLAN (IEEE 802.11a,n) / U-NII Bands	
Type of Unit:	Access Point	
Data rates:	802.11a	6, 9, 12, 18, 24, 36 ,48 & 54 Mbps
	802.11n HT20	MCS0 to MCS23 (3 spatial stream)
	802.11n HT40	MCS0 to MCS23 (3 spatial stream)
Power Supply Requirement(s):	Nominal	12-24 VDC
Maximum Antenna Gain:	5 dBi	
Channel Spacing:	20 MHz	
Transmit Frequency Band:	5150 MHz to 5850 MHz (excluded 5600 MHz to 5650 MHz)	
Transmit Channels Tested:	**Channel Number**	**Channel Frequency (MHz)**
	100	5500

3.6. Support Equipment

The following support equipment was used to exercise the EUT during testing:

Description:	Access Point (operating in client mode)
Brand Name:	Siemens AG
Model Name or Number:	W788-2
Serial Number:	1P 6GK5788-2FC00-0AA0

Description:	Test Laptop
Brand Name:	Dell
Model Name or Number:	Latitude D610
Serial Number:	CN-0C4708-48643-5CP-2346

4. Operation and Monitoring of the EUT during Testing

4.1. Operating Modes

The EUT was tested in the following operating modes, unless otherwise stated:

- The EUT was tested as a Master unit connected to a Client transmitting on full power using OFDM modulation as the manufacturer declared this as a representative modulation mode for DFS testing and further declared that the modulation mode used would not impact the results.
- The EUT has three MIMO channels which normally connect to external antennas. The radar signal was applied to the external Port R1 A1 (Radio 1, Antenna 1) only, at the levels defined in FCC 06-96.
- The EUT was operated on channel 5500 MHz.
- The device was tested with a power level of 20 dBm (100 mW). This was designed to simulate the use of an antenna with the minimum specified gain of +5 dBi.
- The DFS detection threshold of -62 dBm was used throughout, as the maximum transmit power was <200 mW.
    - The customer declared the highest gain of the antennas used in the product to be +5 dBi. Since the test is performed conducted, this additional gain which would normally be present in the signal is added to the radar test level.
    - The radar level to be presented at the antenna ports was calculated as:
      -62 dBm +5 dBi antenna gain +1 dB to account for variations = -56.0 dBm radar level at external antenna ports.

FCC 06-96 Table 3: DFS Detection Thresholds for Master Devices and Client Devices With Radar Detection

Maximum Transmit Power	**Value (See Notes 1 and 2)**
< 200 milliwatt	-62 dBm
Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna. Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response.	

4.2. Configuration and Peripherals

The EUT was tested in the following configuration(s):

- All measurements were made using a conducted link.
- A laptop PC was used to configure the EUT parameters during the testing using a standard web browser and via a terminal application. The laptop was connected to the EUT via Ethernet and serial connections to set EUT parameters.
- The EUT's serial interface was used to report radar detection events.
- When the system required channel loading, a MPEG video file that streamed full motion video at 30 frames per second was downloaded from http://ntiacsd.ntia.doc.gov/dfs/ and played between 2 laptops. The file was transferred from the master device to the client device during this testing.

5. Measurements, Examinations and Derived Results

5.1. General Comments

Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to *Section 6. Measurement Uncertainty* for details.

In accordance with UKAS requirements all the measurement equipment is on a calibration schedule. All equipment was within the calibration period on the date of testing.

5.2. Test Results

5.2.1. Statistical Performance Check – Short Pulse Radar Types 1 - 4

Test Summary:

Test Engineer:	Sandeep Bharat	**Test Date:**	24 May 2013
Test Sample Serial Number:	1P 6GK5788-2FC00-1AA0		

FCC Reference:	Part 15.407(h)(2)
Industry Canada Reference:	RSS-210 A9.3(a)
Test Method Used:	FCC 06-96 Section 7.8.4.1

Environmental Conditions:

Temperature (°C):	22
Relative Humidity (%):	40

Note(s):

1. Non-detected radars marked with an asterisk indicate that the type of radar pulse was not detected the first time, but was detected with subsequent trials with the same radar parameters.

Results: 20 MHz / Radar Type 1

Radar Type	Trial Number	Detected?	Trial Number	Detected?
1	1	Yes	16	Yes
	2	Yes	17	Yes
	3	Yes	18	Yes
	4	Yes	19	Yes
	5	Yes	20	Yes
	6	Yes	21	Yes
	7	Yes	22	Yes
	8	Yes	23	Yes
	9	Yes	24	Yes
	10	Yes	25	Yes
	11	Yes	26	Yes
	12	Yes	27	Yes
	13	Yes	28	Yes
	14	Yes	29	Yes
	15	Yes	30	Yes
	Detection level		100 %	

Statistical Performance Check – Short Pulse Radar Types 1 - 4 (continued)

Results: 20 MHz / Radar Type 2

Radar Type	Trial Number	Number Pulses per Burst	Pulse Width (µs)	PRI (µs)	Detected?
2	1	23	1.1	224	Yes
	2	25	1.6	171	Yes
	3	28	1.7	165	Yes
	4	26	1.7	221	Yes
	5	26	1.9	230	Yes
	6	24	2.0	165	Yes
	7	29	2.1	221	Yes
	8	28	2.2	217	Yes
	9	28	2.3	152	Yes
	10	29	2.4	172	Yes
	11	25	2.5	227	Yes
	12	25	2.6	162	Yes
	13	23	2.8	164	Yes
	14	28	3.3	167	Yes
	15	27	3.3	201	Yes
	16	28	3.6	210	Yes
	17	29	3.6	225	Yes
	18	26	3.7	183	Yes
	19	29	4.0	150	Yes
	20	26	4.0	184	No*
	21	24	4.0	224	Yes
	22	24	4.1	188	Yes
	23	27	4.1	189	Yes
	24	23	4.3	182	Yes
	25	29	4.4	179	Yes
	26	23	4.4	198	Yes
	27	24	4.6	181	Yes
	28	27	4.6	219	Yes
	29	29	4.8	224	Yes
	30	26	5.0	219	Yes
	Detection Level			96.6%	

Statistical Performance Check – Short Pulse Radar Types 1 - 4 (continued)

Results: 20 MHz / Radar Type 3

Radar Type	Trial Number	Number Pulses per Burst	Pulse Width (µs)	PRI (µs)	Detected?
3	1	16	6.3	478	Yes
	2	16	6.4	200	Yes
	3	18	6.4	270	Yes
	4	16	6.6	204	Yes
	5	18	6.6	401	Yes
	6	18	6.7	392	Yes
	7	16	6.8	328	Yes
	8	17	6.8	477	Yes
	9	17	6.9	469	Yes
	10	18	6.9	470	Yes
	11	18	7.3	431	Yes
	12	18	7.4	246	No*
	13	17	7.4	488	Yes
	14	16	7.5	264	Yes
	15	16	7.6	239	Yes
	16	18	7.6	241	Yes
	17	17	7.6	472	Yes
	18	16	7.6	497	Yes
	19	17	7.7	309	Yes
	20	17	7.7	498	Yes
	21	18	7.8	482	Yes
	22	18	7.9	212	Yes
	23	18	8.0	342	No*
	24	17	8.0	344	Yes
	25	17	8.8	297	Yes
	26	17	9.0	233	Yes
	27	18	9.4	396	Yes
	28	18	9.6	429	Yes
	29	16	9.8	212	Yes
	30	16	9.8	309	Yes
	Detection Level			93.3 %	

Statistical Performance Check – Short Pulse Radar Types 1 - 4 (continued)

Results: 20 MHz / Radar Type 4

Radar Type	Trial Number	Number Pulses per Burst	Pulse Width (µs)	PRI (µs)	Detected?
4	1	12	11.1	486	Yes
	2	15	11.2	409	Yes
	3	12	11.6	293	Yes
	4	14	11.7	456	Yes
	5	13	12.6	221	No*
	6	13	13.3	462	Yes
	7	16	13.4	403	Yes
	8	12	13.6	333	Yes
	9	15	13.6	338	Yes
	10	14	14.5	307	Yes
	11	14	14.5	382	Yes
	12	16	14.5	384	Yes
	13	13	15.1	232	Yes
	14	13	15.2	422	Yes
	15	12	15.3	372	Yes
	16	12	15.9	260	Yes
	17	16	16.5	492	Yes
	18	14	16.7	279	Yes
	19	12	17.2	320	Yes
	20	14	17.4	431	Yes
	21	15	17.9	232	Yes
	22	13	18.0	449	Yes
	23	15	18.1	203	Yes
	24	14	18.5	335	Yes
	25	15	18.5	431	Yes
	26	13	18.9	428	Yes
	27	12	19.2	252	Yes
	28	12	19.2	371	Yes
	29	13	19.4	412	No*
	30	14	19.9	253	Yes
	Detection Level			93.3 %	

Statistical Performance Check – Short Pulse Radar Types 1 - 4 (continued)

Limits:

Table 5 – Short Pulse Radar Test Waveforms

Radar Type	Pulse Width (µsec)	PRI (µsec)	Number of Pulses	Minimum Percentage of Successful Detection	Minimum Number of Trials
1	1	1428	18	60%	30
2	1-5	150-230	23-29	60%	30
3	6-10	200-500	16-18	60%	30
4	11-20	200-500	12-16	60%	30
Aggregate (Radar Types 1-4)				80%	120

5.2.2. Statistical Performance Check – Long Pulse Radar Type 5

Test Summary:

Test Engineer:	Sandeep Bharat	**Test Date:**	24 May 2013
Test Sample Serial Number:	1P 6GK5788-2FC00-1AA0		

FCC Reference:	Part 15.407(h)(2)
Industry Canada Reference:	RSS-210 A9.3(a)
Test Method Used:	FCC 06-96 Section 7.8.4.2

Environmental Conditions:

Temperature (°C):	22
Relative Humidity (%):	40

Results: 20 MHz / Radar Type 5

Radar Type	Trial Number	Detected?	Trial Number	Detected?
5	1	Yes	16	Yes
	2	Yes	17	Yes
	3	Yes	18	Yes
	4	Yes	19	Yes
	5	Yes	20	Yes
	6	Yes	21	Yes
	7	Yes	22	Yes
	8	Yes	23	Yes
	9	Yes	24	Yes
	10	Yes	25	Yes
	11	Yes	26	Yes
	12	Yes	27	Yes
	13	Yes	28	Yes
	14	Yes	29	Yes
	15	Yes	30	Yes
	Detection level		100 %	

Notes:

Further details of all parameters on which the trials using Radar Type 5 were created and can be found in Appendix 5: Statistical Performance Check– Radar Type 5 Trial Records.

Statistical Performance Check – Long Pulse Radar Type 5 (continued)

Limits:

Table 6 – Long Pulse Radar Test Waveform

Radar Type	Pulse Width (µsec)	Chirp Width (MHz)	PRI (µsec)	Number of Pulses per *Burst*	Number of *Bursts*	Minimum Percentage of Successful Detection	Minimum Number of Trials
5	50-100	5-20	1000-2000	1-3	8-20	80%	30

5.2.3. Statistical Performance Check – Frequency Hopping Radar Type 6

Test Summary:

Test Engineer:	Sandeep Bharat	**Test Date:**	24 May 2013
Test Sample Serial Number:	1P 6GK5788-2FC00-1AA0		

FCC Reference:	Part 15.407(h)(2)
Industry Canada Reference:	RSS-210 A9.3(a)
Test Method Used:	FCC 06-96 Section 7.8.4.3

Environmental Conditions:

Temperature (°C):	22
Relative Humidity (%):	40

Results: 20 MHz / Radar Type 6

Radar Type	Trial Number	Detected?	Trial Number	Detected?
6	1	Yes	16	Yes
	2	Yes	17	Yes
	3	Yes	18	Yes
	4	Yes	19	Yes
	5	Yes	20	Yes
	6	Yes	21	Yes
	7	Yes	22	Yes
	8	Yes	23	Yes
	9	Yes	24	Yes
	10	Yes	25	Yes
	11	Yes	26	Yes
	12	Yes	27	Yes
	13	Yes	28	Yes
	14	Yes	29	Yes
	15	Yes	30	Yes
	Detection level		100 %	

Limits:

Table 7 – Frequency Hopping Radar Test Waveform

Radar Type	Pulse Width (µsec)	PRI (µsec)	Pulses per Hop	Hopping Rate (kHz)	Hopping Sequence Length (msec)	Minimum Percentage of Successful Detection	Minimum Number of Trials
6	1	333	9	0.333	300	70%	30

6. Measurement Uncertainty

No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently the result of a measurement is only an approximation to the value of the measurand (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

The uncertainty of the result may need to be taken into account when interpreting the measurement results.

The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor such that a confidence level of approximately 95% is maintained. For the purposes of this document “approximately” is interpreted as meaning “effectively” or “for most practical purposes”.

Measurement Type	Confidence Level (%)	Calculated Uncertainty
Dynamic Frequency Selection (DFS) – Radar Amplitude	95%	± 2.17 dB

The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty the published guidance of the appropriate accreditation body is followed.

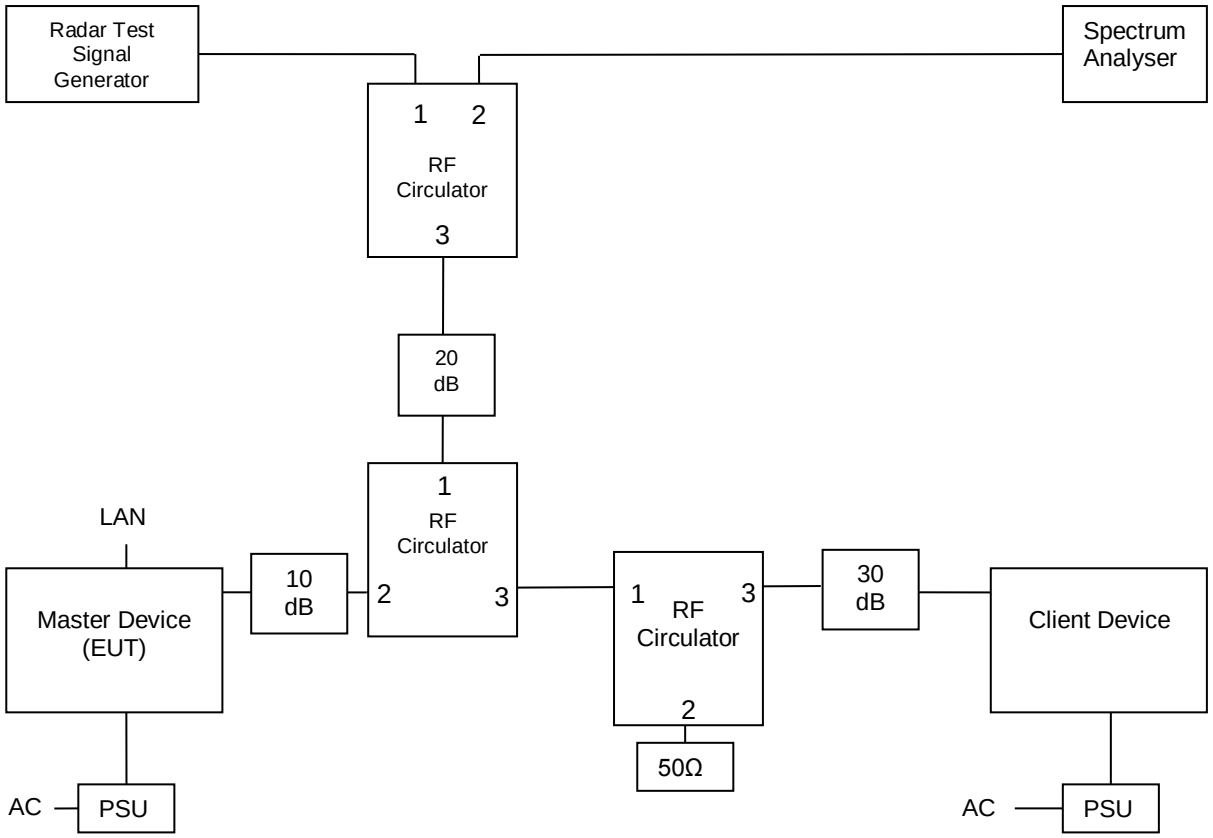
Appendix 1. Test Equipment Used

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1631	DFS Test System	Aeroflex	PXI 3000	300110/291	11 Jun 2015	24
M1630	Test Receiver	Rohde & Schwarz	ESU40	100233	07 Feb 2014	12
A248	Step Attenuator	Narda	743-60	01411	Calibrated before use	-
A030	Step Attenuator	Narda	445-69	01544	Calibrated before use	-
A163	Step Attenuator	Narda	743-80	01344	Calibrated before use	-
A2179	Coaxial Circulator	Atlantec	ACC-20130-SF-SF-SF	120409230	Calibrated before use	-
A2182	Coaxial Circulator	Atlantec	ACC-20130-SF-SF-SF	120409231	Calibrated before use	-
A2183	Coaxial Circulator	Atlantec	ACC-20130-SF-SF-SF	120409232	Calibrated before use	-

Appendix 2. Monitoring Methods Diagrams

All tests were performed as conducted measurements using the setups as shown below

Setup Diagram – EUT – Master, Radar Injection at Master



Note: The circulators have approximately 18 dB loss in the reverse direction.

Appendix 3. Radar Type 1-6 Calibration and Verification Data

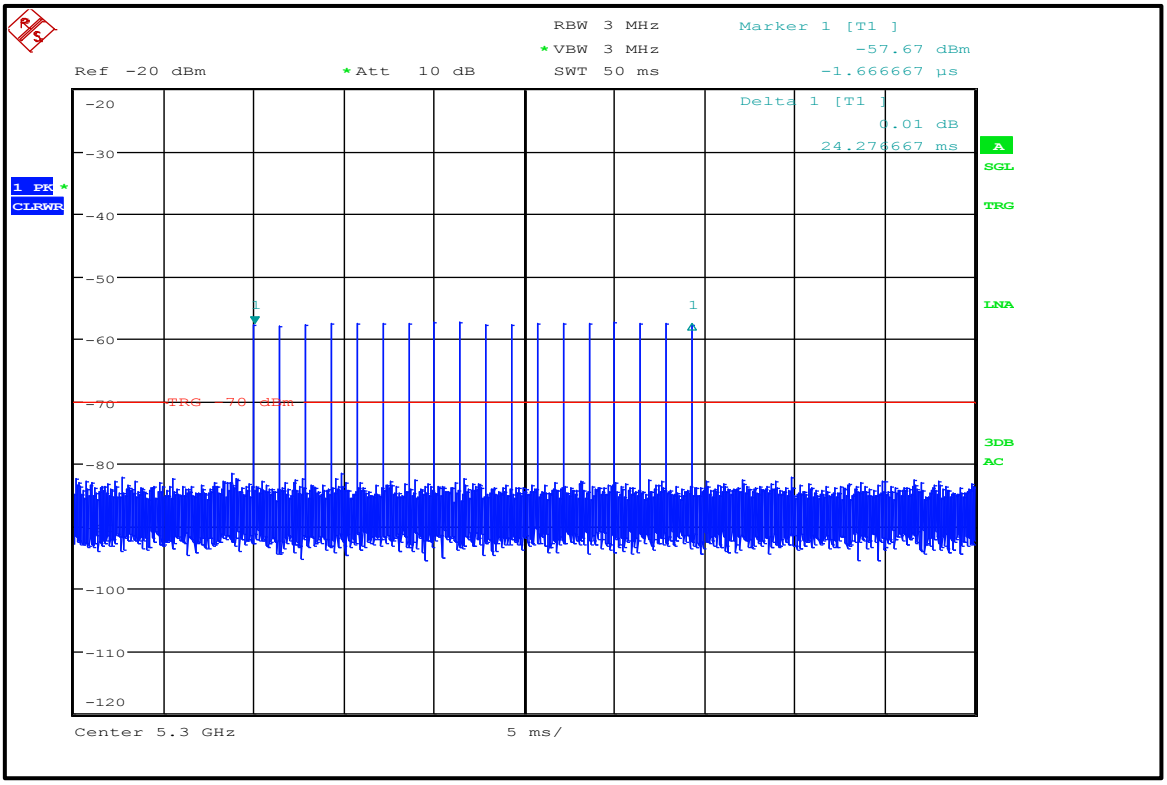
All radars were generated and produced by an Aeroflex DFS test system. The radar pulse generation of this system has previously been verified by the FCC (see Appendix 4).

The radar amplitude was calibrated using the setup diagram above. The spectrum analyser was replaced by a 50Ω load. The EUT was replaced by a spectrum analyser. The radar pulses types 1-4 were then played back by the Aeroflex DFS test system. The amplitude was measured on the spectrum analyser using a 3 MHz RBW/VBW. The path loss was then put into the Aeroflex test system as an output level offset. The test system output level could then be set in the software to the correct level into the EUT, as calculated in section 4.1, before the tests were performed.

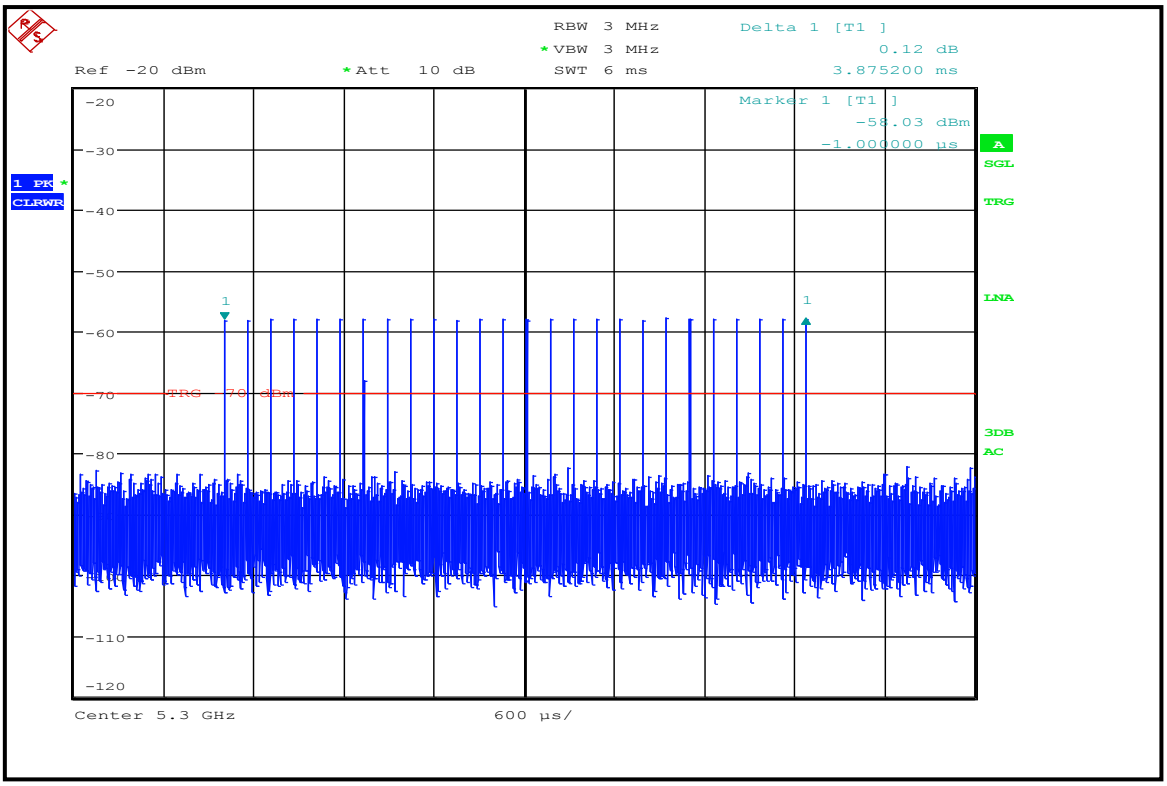
Setup Photographs

Radar Verification

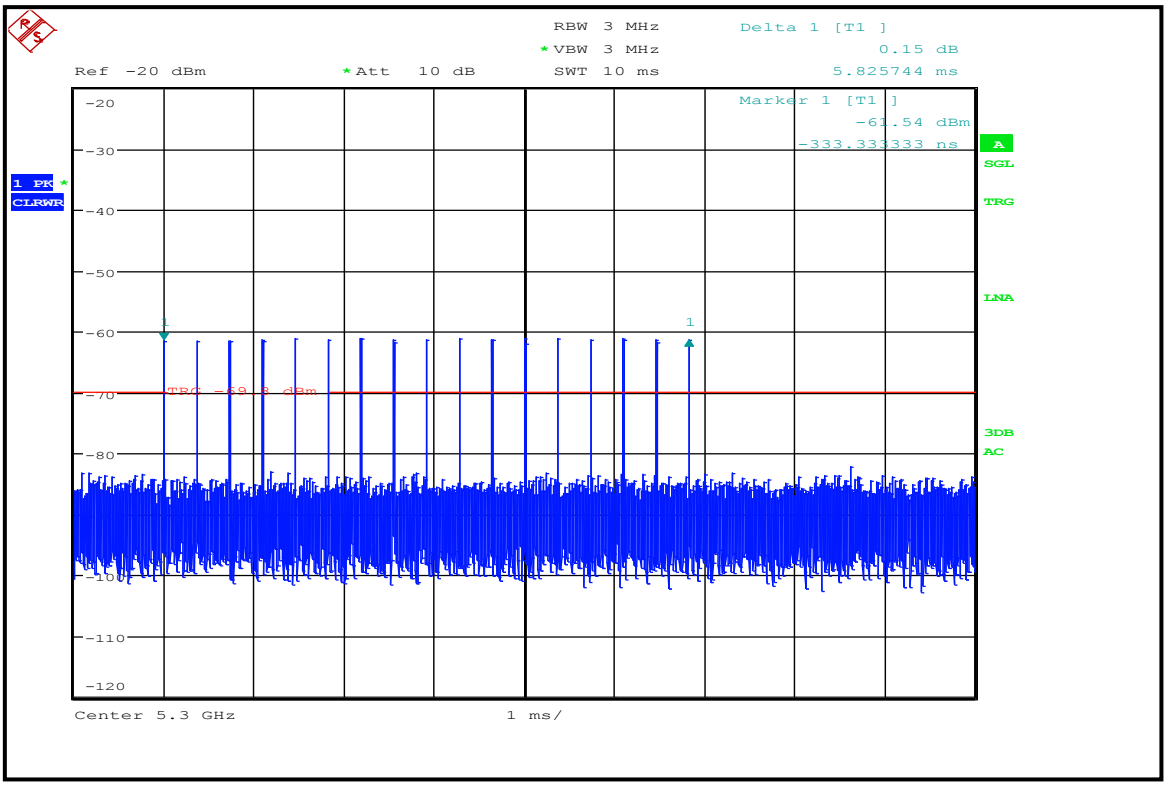
Below are sample plots of the radar waveforms showing timing properties. Once the path loss for the test network was found this was set in the DFS test system and the amplitude at the EUT receiver input could be adjusted as required.



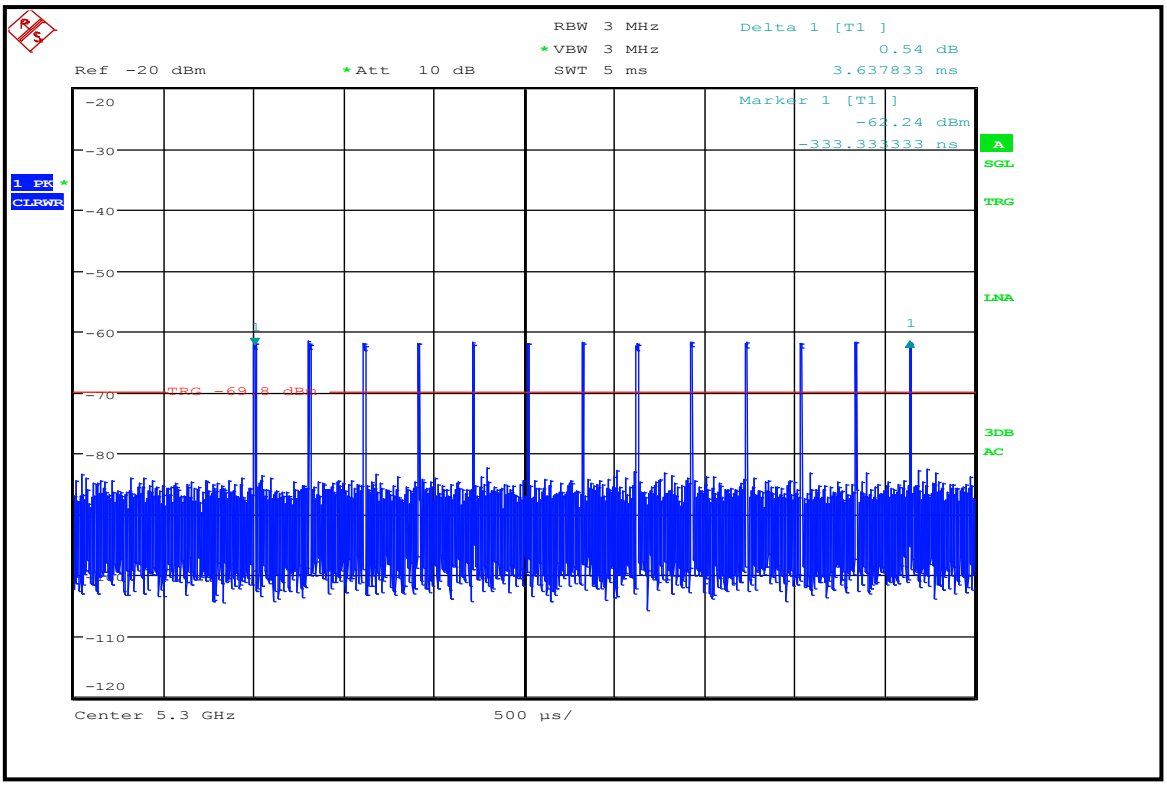
Radar Pulse 1



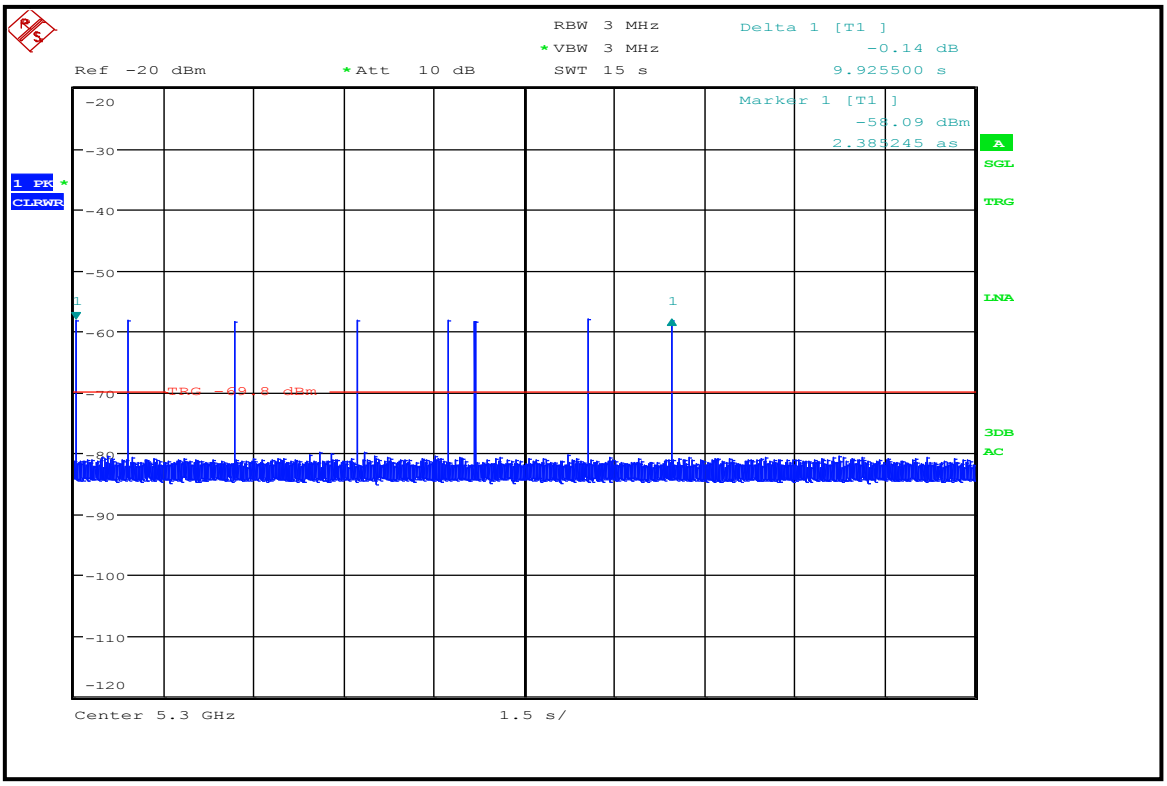
Radar Pulse 2



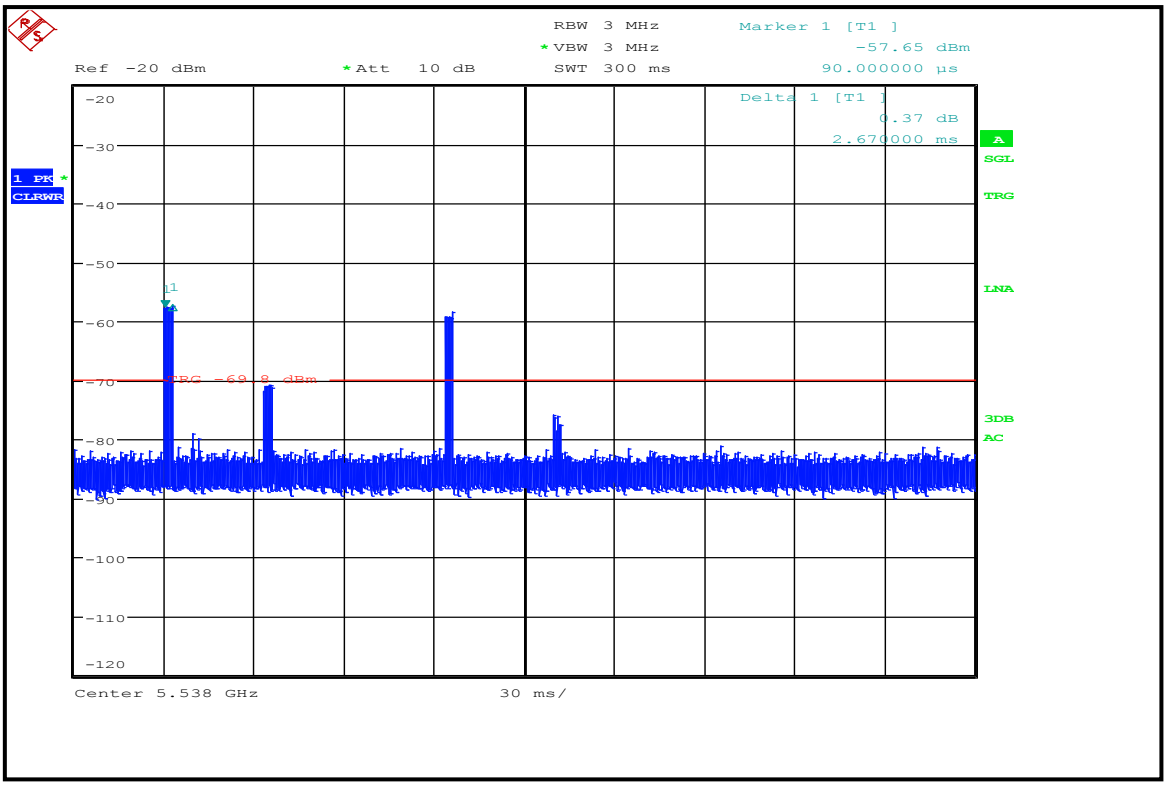
Radar Pulse 3



Radar Pulse 4



Long Radar Pulse 5



Hopping Radar Pulse 6 (Centre Frequency adjusted to first hop frequency)

Appendix 4. Test platform confirmation email

From: Andrew Leimer [mailto:Andrew.Leimer@fcc.gov]
Sent: Friday, September 23, 2011 4:24 PM
To: Chisham, Steve
Cc: Carey, Tim; Hack, Barry; Rashmi Doshi; Joe Dichoso
Subject: RE: Certification for Aeroflex DFS solution

Hello Steve,
The Aeroflex "DXI based DFS test solution" system used for DFS alternative radar signal generation has been approved by the FCC and NTIA.
This approval permits the system to be used by labs in the testing of DFS devices for equipment authorization Certification. It is recommended that applicants that use your system for testing include a statement in the Test Report or a Letter Exhibit stating that the system has FCC and NTIA approval. This E-mail is your record of this approval.
Note that the appropriate term for your system is Approved as the term Certification is reserved for devices gaining equipment authorization through the FCC or a TCB.

Regards,
Andy Leimer

FCC/OET/EACB

Appendix 5. Statistical Performance Check– Radar Type 5 Trial Records

20 MHz – Trial 1

Burst Segment	Number of Pulses	Pulse Width (usec)	Chirp Width (MHz)	Pulse 1-to-2 Spacing (usec)	Pulse 2-to-3 Spacing (usec)	Starting Location Within Interval (usec)
1	2	88	5	1852	-	631467
2	2	78	13	1176	-	559417
3	3	59	14	1299	1705	306967
4	2	64	16	1911	-	608503
5	2	51	7	1121	-	454054
6	1	83	16	-	-	516501
7	2	75	8	1467	-	654355
8	3	96	18	1263	1174	184112
9	3	86	10	1175	1527	124991
10	1	78	11	-	-	446583
11	1	96	15	-	-	604834
12	3	87	19	1731	1268	341589
13	3	93	11	1458	1362	656203
14	1	66	18	-	-	368556
15	3	50	13	1633	1121	605341
16	3	98	14	1494	1877	69205
17	1	55	9	-	-	391374
18	2	78	7	1140	-	10027

20 MHz - Trial 2

Burst Segment	Number of Pulses	Pulse Width (usec)	Chirp Width (MHz)	Pulse 1-to-2 Spacing (usec)	Pulse 2-to-3 Spacing (usec)	Starting Location Within Interval (usec)
1	3	83	11	1950	1323	1164387
2	3	77	6	1893	1712	1139957
3	3	54	11	1025	1787	1232317
4	1	98	7	-	-	1031587
5	2	90	13	1297	-	236009
6	3	73	13	1169	1698	715433
7	3	51	18	1255	1171	783328
8	3	57	5	1418	1985	522705
9	2	61	8	1190	-	677482

20 MHz - Trial 3

Burst Segment	Number of Pulses	Pulse Width (usec)	Chirp Width (MHz)	Pulse 1-to-2 Spacing (usec)	Pulse 2-to-3 Spacing (usec)	Starting Location Within Interval (usec)
1	1	55	6	-	-	659038
2	1	51	14	-	-	259102
3	1	85	5	-	-	56009
4	2	86	5	1319	-	137372
5	1	77	17	-	-	409781
6	2	61	17	1080	-	236436
7	2	70	7	1067	-	651627
8	2	98	17	1950	-	393056
9	2	84	17	1838	-	446647
10	3	78	6	1101	1972	594610
11	1	69	6	-	-	15077
12	1	83	16	-	-	105382
13	3	95	9	1908	1867	242956
14	1	63	20	-	-	479412
15	2	57	16	1773	-	280681
16	3	76	9	1701	1098	551953
17	3	55	16	1109	1459	260751
18	1	51	5	-	-	559899

20 MHz - Trial 4

Burst Segment	Number of Pulses	Pulse Width (usec)	Chirp Width (MHz)	Pulse 1-to-2 Spacing (usec)	Pulse 2-to-3 Spacing (usec)	Starting Location Within Interval (usec)
1	1	81	6	-	-	421517
2	1	89	19	-	-	282686
3	2	76	14	1399	-	389013
4	3	57	12	1958	1255	296339
5	3	98	15	1326	1106	471903
6	2	90	11	1974	-	94901
7	1	96	19	-	-	309958
8	3	56	16	1720	1651	449240
9	1	61	14	-	-	182565
10	1	85	5	-	-	165513
11	1	96	6	-	-	461943
12	2	98	20	1569	-	177170
13	3	96	15	1975	1528	296485
14	1	65	16	-	-	311973
15	1	96	5	-	-	469944
16	1	80	16	-	-	337311
17	3	51	5	1935	1090	301584
18	2	55	6	1093	-	275699
19	2	97	13	1361	-	492378
20	3	91	5	1779	1793	436571

20 MHz - Trial 5

Burst Segment	Number of Pulses	Pulse Width (usec)	Chirp Width (MHz)	Pulse 1-to-2 Spacing (usec)	Pulse 2-to-3 Spacing (usec)	Starting Location Within Interval (usec)
1	1	74	7	-	-	1005102
2	2	63	6	1828	-	180253
3	3	70	9	1538	1274	30274
4	3	56	12	1425	1428	259586
5	3	66	14	1601	1542	231898
6	1	71	14	-	-	1052122
7	3	100	17	1014	1452	991441
8	2	57	18	1949	-	289301
9	1	78	13	-	-	293518
10	3	77	16	1986	1872	355994
11	2	65	5	1170	-	171007

20 MHz - Trial 6

Burst Segment	Number of Pulses	Pulse Width (usec)	Chirp Width (MHz)	Pulse 1-to-2 Spacing (usec)	Pulse 2-to-3 Spacing (usec)	Starting Location Within Interval (usec)
1	1	92	5	-	-	64453
2	2	79	18	1625	-	219494
3	3	63	14	1911	1553	240019
4	2	74	20	1542	-	610594
5	1	66	16	-	-	531586
6	1	72	16	-	-	509516
7	2	84	16	1844	-	235711
8	1	63	10	-	-	624466
9	3	94	16	1720	1903	791397
10	1	64	7	-	-	59478
11	1	51	17	-	-	659778
12	1	82	11	-	-	409073
13	3	55	11	1755	1952	673486
14	1	61	14	-	-	51662
15	2	64	14	1289	-	784147

20 MHz - Trial 7

Burst Segment	Number of Pulses	Pulse Width (usec)	Chirp Width (MHz)	Pulse 1-to-2 Spacing (usec)	Pulse 2-to-3 Spacing (usec)	Starting Location Within Interval (usec)
1	2	55	18	1045	-	111610
2	2	84	11	1186	-	246837
3	2	81	14	1860	-	434373
4	1	96	18	-	-	183030
5	1	69	6	-	-	610998
6	3	76	15	1403	1977	579452
7	3	75	5	1044	1970	141165
8	3	91	10	1344	1651	288183
9	1	79	14	-	-	294287
10	2	80	16	1411	-	133494
11	2	88	5	1775	-	278062
12	2	59	19	1529	-	324260
13	3	85	13	1327	1878	248405
14	2	83	15	1694	-	267257
15	2	74	14	1773	-	249466
16	2	67	12	1924	-	54332
17	3	78	15	1482	1730	10029
18	1	78	16	-	-	514650

20 MHz - Trial 8

Burst Segment	Number of Pulses	Pulse Width (usec)	Chirp Width (MHz)	Pulse 1-to-2 Spacing (usec)	Pulse 2-to-3 Spacing (usec)	Starting Location Within Interval (usec)
1	3	93	16	1733	1514	151887
2	3	53	5	1944	1085	450825
3	3	91	9	1391	1001	27066
4	3	93	12	1606	1406	165316
5	1	92	18	-	-	93687
6	2	65	6	1933	-	580128
7	2	87	14	1907	-	25109
8	3	65	15	1371	1898	86664
9	2	93	18	1662	-	277507
10	2	63	13	1759	-	579274
11	2	60	12	1453	-	376291
12	3	70	13	1708	1730	527728
13	1	90	9	-	-	51818
14	3	74	20	1181	1653	137803
15	1	86	9	-	-	427491
16	1	98	7	-	-	446889
17	3	51	14	1174	1001	94741
18	2	58	12	1443	-	110739
19	3	53	15	1168	1297	272880

20 MHz - Trial 9

Burst Segment	Number of Pulses	Pulse Width (usec)	Chirp Width (MHz)	Pulse 1-to-2 Spacing (usec)	Pulse 2-to-3 Spacing (usec)	Starting Location Within Interval (usec)
1	2	79	17	1139	-	459895
2	1	55	16	-	-	370903
3	2	59	17	1309	-	1097112
4	1	93	20	-	-	1051304
5	1	99	17	-	-	182410
6	2	75	5	1519	-	8670
7	3	57	12	1540	1971	363740
8	1	67	14	-	-	1406546

20 MHz - Trial 10

Burst Segment	Number of Pulses	Pulse Width (usec)	Chirp Width (MHz)	Pulse 1-to-2 Spacing (usec)	Pulse 2-to-3 Spacing (usec)	Starting Location Within Interval (usec)
1	3	63	6	1301	1904	16909
2	3	84	7	1444	1690	184499
3	3	73	5	1456	1258	383149
4	1	63	6	-	-	630314
5	1	68	13	-	-	625458
6	3	60	13	1073	1381	488545
7	3	69	20	1977	1909	392646
8	1	77	13	-	-	283052
9	2	78	5	1910	-	617577
10	1	96	17	-	-	782457
11	3	79	15	1488	1934	754663
12	3	87	6	1056	1774	114462
13	1	53	6	-	-	258018
14	1	74	6	-	-	438480
15	3	63	12	1750	1755	320394

20 MHz - Trial 11

Burst Segment	Number of Pulses	Pulse Width (usec)	Chirp Width (MHz)	Pulse 1-to-2 Spacing (usec)	Pulse 2-to-3 Spacing (usec)	Starting Location Within Interval (usec)
1	1	83	5	-	-	629609
2	1	88	6	-	-	360107
3	1	62	19	-	-	32301
4	1	59	17	-	-	68420
5	2	87	8	1325	-	351675
6	3	79	12	1585	1843	167615
7	1	81	6	-	-	649623
8	3	77	8	1415	1090	79791
9	1	74	11	-	-	680961
10	2	52	6	1428	-	311370
11	1	67	5	-	-	116765
12	1	50	13	-	-	54140
13	1	66	6	-	-	387957
14	1	73	13	-	-	622104
15	3	98	10	1155	1515	590565
16	3	83	20	1314	1264	571677
17	2	98	20	1503	-	21589

20 MHz - Trial 12

Burst Segment	Number of Pulses	Pulse Width (usec)	Chirp Width (MHz)	Pulse 1-to-2 Spacing (usec)	Pulse 2-to-3 Spacing (usec)	Starting Location Within Interval (usec)
1	3	95	8	1443	1079	1215866
2	1	73	19	-	-	131050
3	1	78	18	-	-	37386
4	3	54	15	1098	1766	362356
5	3	60	14	1350	1182	926330
6	3	87	16	1313	1377	746616
7	2	58	15	1622	-	905279
8	2	94	11	1967	-	79829
9	3	84	15	1420	1457	313855

20 MHz - Trial 13

Burst Segment	Number of Pulses	Pulse Width (usec)	Chirp Width (MHz)	Pulse 1-to-2 Spacing (usec)	Pulse 2-to-3 Spacing (usec)	Starting Location Within Interval (usec)
1	1	65	18	-	-	442050
2	3	60	14	1314	1851	155622
3	2	58	12	1739	-	368828
4	3	73	5	1693	1372	159506
5	2	59	8	1361	-	182878
6	3	65	19	1716	1763	142727
7	2	91	12	1016	-	321729
8	3	88	20	1065	1308	495062
9	1	74	8	-	-	305858
10	1	64	20	-	-	101835
11	2	88	18	1657	-	522749
12	1	80	11	-	-	271599
13	2	65	11	1135	-	298462
14	1	83	15	-	-	180160
15	2	59	15	1284	-	445143
16	1	98	14	-	-	595764
17	3	56	17	1546	1001	554222
18	2	69	12	1643	-	90258
19	2	96	19	1449	-	184296
20	2	89	19	1693	-	418618

20 MHz - Trial 14

Burst Segment	Number of Pulses	Pulse Width (usec)	Chirp Width (MHz)	Pulse 1-to-2 Spacing (usec)	Pulse 2-to-3 Spacing (usec)	Starting Location Within Interval (usec)
1	2	93	5	1695	-	776607
2	2	54	5	1556	-	696130
3	1	55	18	-	-	246792
4	2	90	9	1496	-	589212
5	1	84	5	-	-	498620
6	3	85	9	1192	1977	141615
7	2	53	19	1293	-	415800
8	2	97	13	1307	-	149608
9	1	65	12	-	-	86933
10	2	63	17	1078	-	202054
11	2	90	12	1387	-	102606
12	2	84	13	1361	-	284692

20 MHz - Trial 15

Burst Segment	Number of Pulses	Pulse Width (usec)	Chirp Width (MHz)	Pulse 1-to-2 Spacing (usec)	Pulse 2-to-3 Spacing (usec)	Starting Location Within Interval (usec)
1	2	67	6	1879	-	31209
2	2	71	18	1436	-	1029188
3	3	64	20	1347	1573	1218715
4	1	97	5	-	-	705683
5	3	58	20	1325	1342	85098
6	3	89	16	1749	1012	858977
7	1	65	14	-	-	1020028
8	1	79	6	-	-	1247935

20 MHz - Trial 16

Burst Segment	Number of Pulses	Pulse Width (usec)	Chirp Width (MHz)	Pulse 1-to-2 Spacing (usec)	Pulse 2-to-3 Spacing (usec)	Starting Location Within Interval (usec)
1	3	82	13	1930	1524	309636
2	1	77	17	-	-	286844
3	2	66	18	1120	-	222049
4	2	90	13	1964	-	587258
5	2	55	16	1674	-	93056
6	1	84	16	-	-	564113
7	2	82	18	1213	-	392250
8	3	77	12	1396	1818	354075
9	2	62	19	1294	-	251927
10	1	71	7	-	-	171580
11	1	70	5	-	-	64483
12	3	60	18	1955	1842	490583
13	2	91	10	1636	-	89904
14	3	87	6	1192	1217	516322
15	3	70	16	1400	1285	244291
16	1	70	9	-	-	562357
17	2	75	12	1560	-	150750
18	2	89	10	1412	-	21864
19	2	82	14	1329	-	476279

20 MHz - Trial 17

Burst Segment	Number of Pulses	Pulse Width (usec)	Chirp Width (MHz)	Pulse 1-to-2 Spacing (usec)	Pulse 2-to-3 Spacing (usec)	Starting Location Within Interval (usec)
1	2	90	12	1655	-	153497
2	1	99	12	-	-	459799
3	3	66	16	1614	1822	682137
4	2	78	19	1879	-	301508
5	3	53	19	1220	1979	786763
6	3	59	8	1240	1780	388198
7	2	98	17	1397	-	915443
8	2	87	11	1543	-	275
9	1	62	9	-	-	64299
10	3	80	10	1016	1065	721124
11	2	73	12	1538	-	881899
12	1	84	10	-	-	453671

20 MHz - Trial 18

Burst Segment	Number of Pulses	Pulse Width (usec)	Chirp Width (MHz)	Pulse 1-to-2 Spacing (usec)	Pulse 2-to-3 Spacing (usec)	Starting Location Within Interval (usec)
1	1	61	8	-	-	621465
2	1	83	5	-	-	191401
3	2	98	7	1501	-	504848
4	3	99	15	1946	1915	59305
5	1	92	8	-	-	116147
6	1	97	8	-	-	327157
7	1	76	15	-	-	628464
8	2	97	17	1794	-	585518
9	1	67	5	-	-	26781
10	2	53	10	1118	-	378199
11	3	85	14	1563	1220	206289
12	3	64	9	1949	1980	30110
13	1	100	18	-	-	112595
14	3	89	20	1004	1782	383758
15	3	53	6	1641	1603	601840
16	1	82	17	-	-	569553
17	1	74	20	-	-	330673
18	3	84	9	1349	1180	64733

20 MHz - Trial 19

Burst Segment	Number of Pulses	Pulse Width (usec)	Chirp Width (MHz)	Pulse 1-to-2 Spacing (usec)	Pulse 2-to-3 Spacing (usec)	Starting Location Within Interval (usec)
1	3	91	18	1860	1349	104610
2	3	87	9	1390	1113	587505
3	2	85	13	1469	-	433521
4	3	93	8	1622	1179	93256
5	3	84	5	1371	1275	100523
6	2	82	18	1685	-	688690
7	1	63	9	-	-	585990
8	1	89	7	-	-	680304
9	2	73	20	1703	-	462076
10	3	68	8	1715	1642	243205
11	3	51	15	1690	1846	139382
12	2	89	14	1602	-	606405
13	3	64	6	1451	1515	198308
14	1	90	12	-	-	65643
15	1	86	16	-	-	495205
16	1	99	11	-	-	429220

20 MHz - Trial 20

Burst Segment	Number of Pulses	Pulse Width (usec)	Chirp Width (MHz)	Pulse 1-to-2 Spacing (usec)	Pulse 2-to-3 Spacing (usec)	Starting Location Within Interval (usec)
1	3	89	20	1498	1813	555701
2	2	79	11	1595	-	573274
3	3	79	9	1669	1708	410356
4	2	58	9	1104	-	627874
5	3	59	8	1825	1321	587246
6	1	90	8	-	-	604093
7	1	85	15	-	-	28614
8	3	90	9	1566	1967	437089
9	3	60	13	1089	1465	257375
10	1	98	11	-	-	233460
11	1	64	17	-	-	588948
12	3	90	9	1989	1564	385115
13	2	81	11	1954	-	504062
14	3	82	14	1944	1863	195682
15	2	66	11	1199	-	449432
16	2	57	10	1912	-	568840
17	1	70	18	-	-	464912
18	3	95	16	1196	1961	333276
19	1	50	10	-	-	98537

20 MHz - Trial 21

Burst Segment	Number of Pulses	Pulse Width (usec)	Chirp Width (MHz)	Pulse 1-to-2 Spacing (usec)	Pulse 2-to-3 Spacing (usec)	Starting Location Within Interval (usec)
1	3	80	9	1574	1777	487733
2	1	77	5	-	-	743280
3	3	70	16	1135	1159	133578
4	2	83	16	1463	-	248955
5	2	61	19	1003	-	1070006
6	2	100	10	1010	-	718393
7	3	62	5	1889	1054	1028922
8	3	56	12	1067	1876	943890
9	1	97	12	-	-	7939
10	1	90	11	-	-	806586

20 MHz - Trial 22

Burst Segment	Number of Pulses	Pulse Width (usec)	Chirp Width (MHz)	Pulse 1-to-2 Spacing (usec)	Pulse 2-to-3 Spacing (usec)	Starting Location Within Interval (usec)
1	2	85	20	1293	-	372032
2	2	79	19	1981	-	26495
3	1	52	5	-	-	8244
4	1	86	8	-	-	105074
5	1	92	13	-	-	213998
6	2	66	16	1100	-	955193
7	2	95	10	1181	-	911894
8	2	62	10	1559	-	39466
9	2	84	12	1216	-	250593
10	2	52	15	1742	-	96401
11	3	67	9	1814	1697	166540
12	3	92	11	1297	1643	547814

20 MHz - Trial 23

Burst Segment	Number of Pulses	Pulse Width (usec)	Chirp Width (MHz)	Pulse 1-to-2 Spacing (usec)	Pulse 2-to-3 Spacing (usec)	Starting Location Within Interval (usec)
1	2	53	20	1615	-	920962
2	1	86	17	-	-	750202
3	2	84	15	1423	-	858952
4	2	63	16	1354	-	714463
5	1	50	5	-	-	172479
6	2	78	12	1746	-	554769
7	2	95	9	1396	-	49855
8	2	51	7	1253	-	981192
9	1	69	5	-	-	356353
10	1	89	14	-	-	176076
11	1	69	8	-	-	615600

20 MHz - Trial 24

Burst Segment	Number of Pulses	Pulse Width (usec)	Chirp Width (MHz)	Pulse 1-to-2 Spacing (usec)	Pulse 2-to-3 Spacing (usec)	Starting Location Within Interval (usec)
1	3	100	13	1268	1411	634116
2	2	53	10	1539	-	140145
3	2	90	10	1282	-	427085
4	1	89	12	-	-	9895
5	3	58	9	1969	1678	553341
6	2	100	11	1211	-	258786
7	1	93	7	-	-	225769
8	2	75	7	1612	-	178554
9	3	92	18	1852	1834	684972
10	2	72	10	1555	-	182853
11	2	87	13	1933	-	551426
12	3	79	14	1624	1512	289795
13	3	57	7	1892	1496	446357
14	1	94	6	-	-	615013
15	1	61	7	-	-	677441
16	1	71	7	-	-	495154
17	2	98	15	1836	-	670010

20 MHz - Trial 25

Burst Segment	Number of Pulses	Pulse Width (usec)	Chirp Width (MHz)	Pulse 1-to-2 Spacing (usec)	Pulse 2-to-3 Spacing (usec)	Starting Location Within Interval (usec)
1	2	65	8	1536	-	482886
2	3	78	20	1742	1440	117748
3	3	84	20	1480	1809	312737
4	2	72	11	1460	-	361363
5	2	99	12	1311	-	313274
6	3	64	14	1752	1835	138585
7	2	66	8	1407	-	327547
8	1	59	10	-	-	116360
9	2	86	17	1639	-	515414
10	1	61	13	-	-	351654
11	1	69	14	-	-	207247
12	1	96	9	-	-	54267
13	2	74	15	1710	-	121892
14	3	66	12	1262	1627	202493
15	2	99	9	1257	-	48217
16	1	51	15	-	-	127148
17	3	79	9	1667	1743	49338

20 MHz - Trial 26

Burst Segment	Number of Pulses	Pulse Width (usec)	Chirp Width (MHz)	Pulse 1-to-2 Spacing (usec)	Pulse 2-to-3 Spacing (usec)	Starting Location Within Interval (usec)
1	2	82	6	1252	-	220273
2	1	69	18	-	-	572491
3	2	73	9	1033	-	366956
4	1	73	14	-	-	746843
5	1	76	20	-	-	105713
6	2	100	5	1249	-	60977
7	1	90	8	-	-	796280
8	3	55	7	1888	1855	109509
9	2	50	9	1592	-	360994
10	2	70	18	1734	-	505240
11	3	84	6	1688	1734	484358
12	2	80	10	1138	-	100813
13	1	51	6	-	-	105705
14	1	75	15	-	-	391066
15	1	95	14	-	-	236915

20 MHz - Trial 27

Burst Segment	Number of Pulses	Pulse Width (usec)	Chirp Width (MHz)	Pulse 1-to-2 Spacing (usec)	Pulse 2-to-3 Spacing (usec)	Starting Location Within Interval (usec)
1	1	96	19	-	-	925804
2	2	80	6	1158	-	292001
3	2	68	14	1687	-	532501
4	1	68	13	-	-	542569
5	2	86	5	1149	-	984288
6	1	73	11	-	-	47038
7	3	67	13	1744	1148	373028
8	3	75	17	1725	1627	111245
9	3	52	20	1934	1411	715776
10	2	66	20	1400	-	130365
11	2	67	20	1580	-	320550
12	1	97	16	-	-	465898

20 MHz - Trial 28

Burst Segment	Number of Pulses	Pulse Width (usec)	Chirp Width (MHz)	Pulse 1-to-2 Spacing (usec)	Pulse 2-to-3 Spacing (usec)	Starting Location Within Interval (usec)
1	2	67	17	1759	-	1306987
2	1	60	19	-	-	53125
3	2	82	19	1431	-	1275436
4	2	52	8	1575	-	687869
5	3	55	6	1350	1220	1324136
6	2	57	17	1455	-	686203
7	3	50	7	1056	1179	1078487
8	1	58	13	-	-	767004

20 MHz - Trial 29

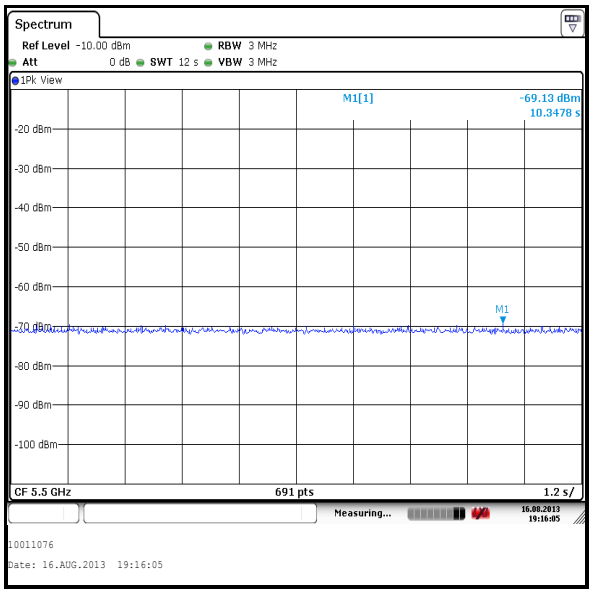
Burst Segment	Number of Pulses	Pulse Width (usec)	Chirp Width (MHz)	Pulse 1-to-2 Spacing (usec)	Pulse 2-to-3 Spacing (usec)	Starting Location Within Interval (usec)
1	2	97	20	1497	-	724067
2	3	57	19	1277	1824	359598
3	1	78	20	-	-	457524
4	3	79	18	1475	1056	416519
5	2	79	14	1615	-	762419
6	2	84	20	1883	-	41679
7	1	98	14	-	-	685834
8	1	70	16	-	-	159066
9	2	50	18	1177	-	633470
10	2	89	14	1106	-	720544
11	3	79	9	1062	1455	914825
12	3	67	11	1883	1962	539288

20 MHz - Trial 30

Burst Segment	Number of Pulses	Pulse Width (usec)	Chirp Width (MHz)	Pulse 1-to-2 Spacing (usec)	Pulse 2-to-3 Spacing (usec)	Starting Location Within Interval (usec)
1	3	70	17	1324	1299	832139
2	1	65	14	-	-	740054
3	3	100	5	1543	1278	805505
4	1	92	7	-	-	229348
5	3	60	9	1741	1975	420554
6	2	86	18	1022	-	719678
7	1	97	13	-	-	768268
8	3	93	8	1473	1634	719460
9	2	57	16	1586	-	58392
10	2	69	15	1405	-	272982
11	1	91	9	-	-	449239
12	3	54	5	1350	1807	267218
13	2	74	13	1022	-	442971
14	1	76	15	-	-	424163

Appendix 6. System Noise floor Reference Plots

As required by section 8.3.18(iii) of FCC 06-96, the following plots show the reference noise floor of the system used during measurement.



Noise floor of test system