



**CONFORMANCE TEST REPORT
FOR
FCC Part 15, subpart D**

Report No.: 14-10-MAS-148-02

Client: **Lightspeed Technologies Inc.**
Product: **Access Link**
Model: **AL**
FCC ID: **ORV-LSAL**

Manufacturer/supplier: **REOR ELECTRONICS CO., LTD.**

Date test item received: 2014/10/17
Date test campaign completed: 2014/11/11
Date of issue: 2014/11/11

The test result only corresponds to the tested sample. It is not permitted to copy this report, in part or in full, without the permission of the test laboratory.
Total number of pages of this test report: 87 pages
Total number of pages of photos: External photos 3 pages
Internal photos 3 pages
Setup photos 2 pages

Test Engineer	Checked By	Approved By
John Li	Perry Lin	James Cheng

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1 GENERAL INFORMATION

1.1 Testing Laboratory

Name: Electronic Testing Center, Taiwan
Address: No. 8, Lane 29, Wenming Rd., Leshan Tsuen, Guishan Shiang, Taoyuan Country, 33383, Taiwan, R.O.C.
Telephone: 886-3-3280026
Fax: 886-3-3276188
NVLAP lab registration #: 200133-0
IC OATS registration #: IC 2949-1
E-Mail: jamescheng@etc.org.tw

1.2 Client Information

Name: Lightspeed Technologies Inc.
Address: 11509 SW Herman Road, Tualatin, OR 97062 USA
Telephone: 800-732-8999
Contact person: Michael A. Frost

1.3 Manufacturer

Name: REOR ELECTRONICS CO., LTD.
Address: 5F., No. 122, Cioahe Rd., Jhonghe Dist., New Taipei City 23558, Taiwan.

2 TEST INFORMATION

2.1 Description of Tested Device(s)

The tested equipment is a DECT Handset that complies with ETSI EN 300175. The frequencies have been reprogrammed to comply with the FCC and IC requirements to an Isochronous UPCS device after FCC Part 15D and Industry Canada RSS-213 Issue 2.

The EUT is a responding device as described in ANSI C63.17 and is designed to operate together with a DECT base station, which is then the initiating device.

Frequency Channel	Frequency	Test Frequency
CH4	1921.536 MHz	F _L
CH3	1923.264 MHz	-
CH2	1924.992 MHz	F _M
CH1	1926.720 MHz	-
CH0	1928.448 MHz	F _H

2.2 Test Environment

Normal test condition

Temperature:	20 - 25 °C
Relative humidity:	55 - 75%

Extreme test condition (declared by manufacturer)

Please see the manufacturer declaration form.

3 TEST REPORT SUMMARY**3.1 Test Summary**

Requirement	FCC Paragraph #	Required	Customer Declaration	Test Pass
Coordination with fixed microwave	15.307	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Cross Reference	15.33 (a), 15.309(b)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Labeling requirements	15.311,15.19(a)(3)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Power line Conducted Emission	15.315,15.207	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Antenna Requirement	15.317, 15.203	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Digital Modulation Techniques	15.319(b)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Peak transmit Power	15.319(c)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Power Spectral Density	15.319(d)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Antenna gain	15.319(e)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Automatic discontinuation of transmission	15.319(f)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Safety exposure levels	15.319(i)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Emission Bandwidth	15.323(a)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Monitoring time	15.323(c)(1)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Monitoring threshold	15.323(c)(2)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Maximum transmit period	15.323(c)(3)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
System acknowledgement	15.323(c)(4)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Least Interfered Channel, LIC	15.323(c)(5)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Random waiting	15.323(c)(6)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Monitoring bandwidth and reaction time	15.323(c)(7)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Monitoring antenna	15.323(c)(8)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Monitoring threshold relaxation	15.323(c)(9)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Duplex system LBT	15.323(c)(10)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Co-located device LBT	15.323(c)(11)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Fair access	15.323(c)(12)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Emissions inside and outside the subband	15.323(d)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Frame period and jitter	15.323(e)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Carrier frequency stability	15.323(f)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

note : For test results, see the EMC report as attached.

3.2 Other Comments

All measurements are traceable to national standards.

The tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC CFR47 Part 15, Paragraph 15.323 for Isochronous UPCS Devices and Industry Canada RSS-213 Issue 2.

The conducted test methods have been in accordance with ANSI C63.17-1998 and ANSI C63.17-2013 where applicable. Radiated tests were conducted in accordance with ANSI C63.4-2003.

Where a test method specified in this Standard cannot be followed, a test method given in ANSI C63.17 may be used by quoting the test section number. An equivalent alternative method may also be used provided that it is fully described in the test report.

Where a test is not practicable (e.g. the test for an access protocol of Section 4.3.4), the certification applicant may submit to Industry Canada the manufacturer's declaration that the access protocol has nevertheless been met in the design and prototype tests. Full justification as to why testing is not practicable should be given for Industry Canada's consideration.

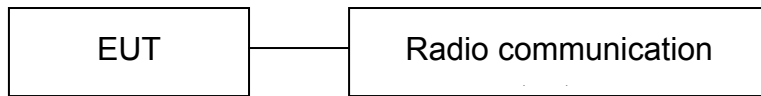
A mid-band carrier frequency should normally be used for tests.

When an antenna conducted measurement is used to determine the RF output power of the device, the effective gain of the antenna intended for the device must be stated, based on measurement or on data from the antenna manufacturer. Any antenna gain in excess of 3 dBi (3 dB above isotropic gain) shall be added to the measured RF output power before using the power limits specified in this standard.

Accessories and peripheral equipment that are normally required to be connected to the device in actual use, shall be so connected with representative cable lengths for the tests. Only one test using representative peripherals and accessories is required. The emission tests shall be performed with the device and accessories configured in a manner which tends to produce the maximum level of emissions within the range of variations that can be expected under normal operating conditions.

4 TEST SETUP

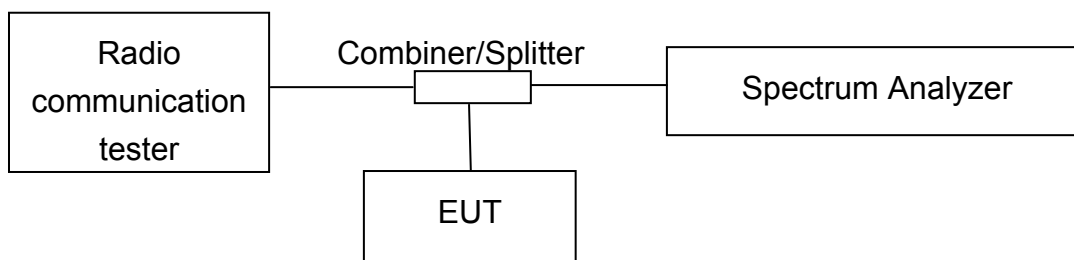
4.1 Frequency and Timing Measurements



Test Set-up 1

This setup is used for measuring Frame repetition stability, Jitter, Carrier frequency stability at normal and extreme temperatures.

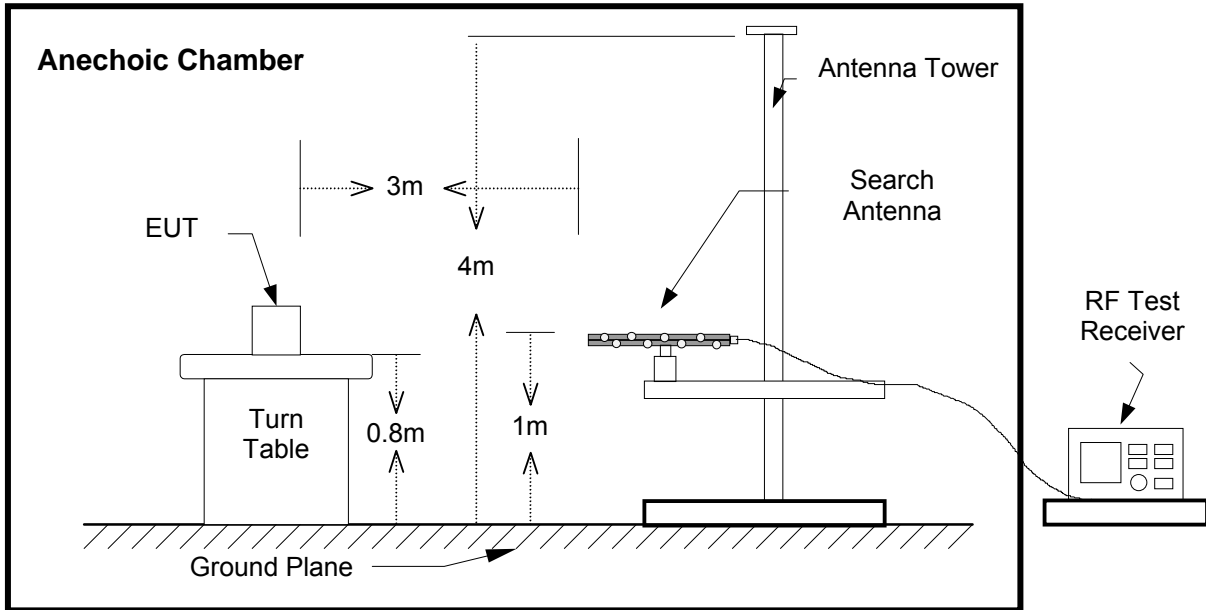
4.2 Conducted Emission Tests



Test Set-up 2

This setup is used for all conducted emission tests.

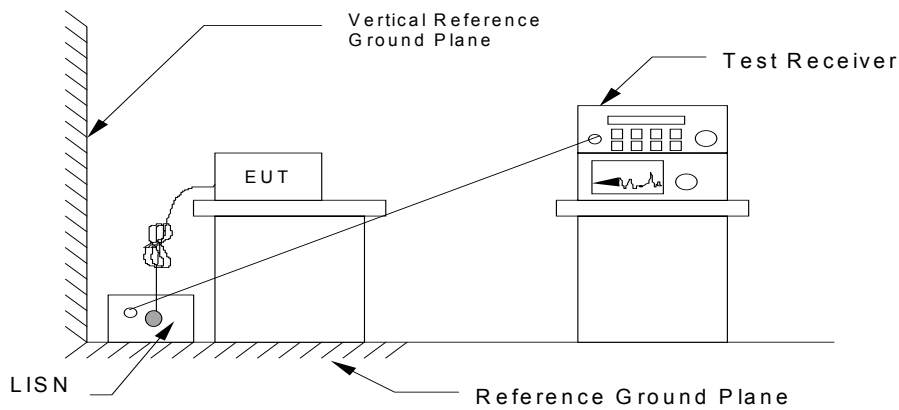
4.3 Radiated Emission Tests



Test Set-Up 3

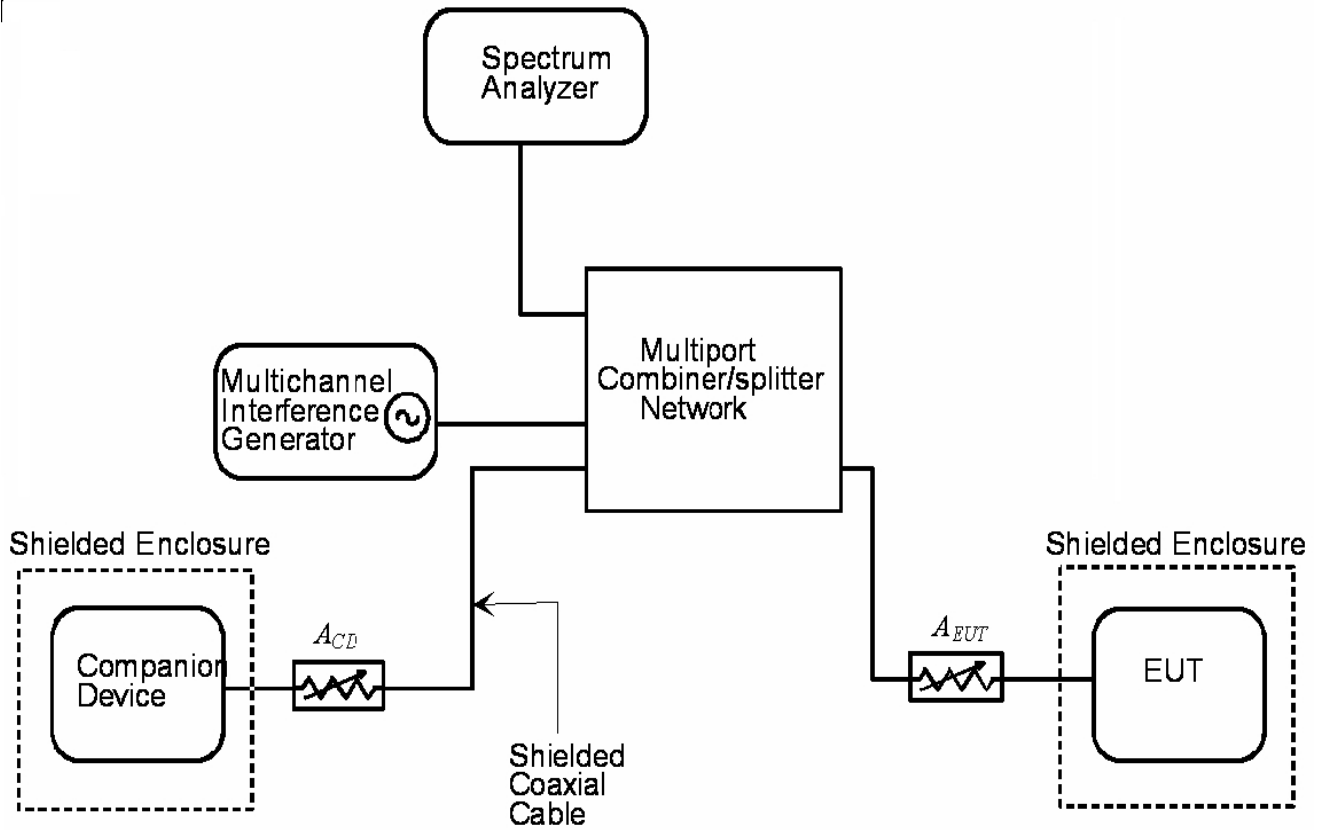
This test setup is used for all radiated emissions tests. For frequencies below 30 MHz the measuring distance is 10 m, for all other frequencies it is 3 m. Emissions above 1 GHz were measured with the Spectrum Analyzer, Horn Antenna and the preamplifier after the antenna.

4.4 Power line Conducted Tests



Test Set-Up 4

4.5 Monitoring Tests



Test Set-Up 5

This test setup is used for all Monitoring and Time and Spectrum Access Procedure tests.

Companion Device	A _{CD} (dB)	EUT	A _{EUT} (dB)
Base	50	Handset	0
Handset	30	Base	0

5 TEST EQUIPMENT LIST

To facilitate inclusion on each page of the test equipment used for related tests, each item of test equipment and ancillaries are identified (numbered) by the Test Laboratory.

Equipment	Manufacturer	Model No.	S/N	Calibration Date (MM/DD/YY)	Next Calibration Date (MM/DD/YY)
EMI Test Receiver	Rohde & Schwarz	ESIB7	13054414-001	07/20/2014	07/19/2015
BiLog Antenna	ETC	MCTD2786	BL09D01001	02/07/2014	02/06/2015
Horn Antenna	EMCO	3115	13059201-001	07/16/2014	07/15/2015
Horn Antenna	EMCO	3116	13059202-001	08/22/2014	08/21/2015
Preamplifier	Hewlett-Packard	8449B	13040709-001	11/26/2013	11/25/2014
Spectrum Analyzer	Agilent	E4446A	13052013-001	10/07/2014	10/06/2015
Spectrum Analyzer	Rohde & Schwarz	FSU46	13040904-001	01/20/2014	01/19/2015
EMI Test Receiver	R&S	ESCI	13054418-001	07/03/2014	07/02/2015
V-LISN	R&S	ENV216	13057719-001	05/07/2014	05/06/2015
Radio Communication Tester	Rohde & Schwarz	CTS60	13046802-002	09/15/2014	09/14/2015
RF Downconverter	National Instruments	PXI-5600	E35372	03/23/2014	03/22/2015
RF Downconverter	National Instruments	PXI-5600	E224BD	03/23/2014	03/22/2015
64 MS/s Digitizer	National Instruments	PXI-5620	E34BOB	03/23/2014	03/22/2015
64 MS/s Digitizer	National Instruments	PXI-5620	E22946	03/23/2014	03/22/2015
100 MS/s AWG OSP	National Instruments	PXI-5441	E32987	03/23/2014	03/22/2015
8-Bit 250 MS/s Digitizer	National Instruments	PXI-5114	E41FBC	03/23/2014	03/22/2015
8-Bit 250 MS/s Digitizer	National Instruments	PXI-5114	E41FBE	03/23/2014	03/22/2015
RF Upconverter	National Instruments	PXI-5610	E35372	03/23/2014	03/22/2015
Loop Antenna	EMCO	6512	13054104-001	07/01/2014	06/30/2017
PRE-Amplifier	EMCI	PA303N	13040720-001	07/03/2014	07/02/2015

6 TEST RESULT

6.1 Coordination with fixed microwave

6.1.1 Standard Applicable: FCC 15.307

Each application for certification of equipment operating under the provisions of this Subpart must be accompanied by an affidavit from UTAM, Inc. certifying that the applicant is a participating member of UTAM, Inc. In the event a grantee fails to fulfill the obligations attendant to participation in UTAM, Inc., the Commission may invoke administrative sanctions as necessary to preclude continued marketing and installation of devices covered by the grant of certification, including but not limited to revoking certification.

Result

The affidavit from UTAM, Inc. is included in the documentation supplied by the applicant:

Yes

No

6.2 Cross Reference

6.2.1 Standard Applicable:

15.309(b)

The requirements of Subpart D apply only to the radio transmitter contained in the PCS device. Other aspects of the operation of a PCS device may be subject to requirements contained elsewhere in this Chapter. In particular, a PCS device that includes digital circuitry not directly associated with the radio transmitter also is subject to the requirements for unintentional radiators in Subpart B.

15.109(a)

For unintentional device, according to **FCC §15.109(a)**, the field strength of radiated emissions from unintentional except for class A digital device radiators at a distance of 3 meters shall not exceed the following values:

Frequency MHz	Distance Meters	Radiated μ V/m	Radiated dB μ V/m
30 - 88	3	100	40.0
88 - 216	3	150	43.5
216 - 960	3	200	46.0
above 960	3	500	54.0

For intentional radiator device, according to §15.209(a), the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table::

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

6.2.2 Test Results:

This requirement is not applicable because test sample do not include digital circuitry which is not direct associated with the radio transmitter	<input type="checkbox"/>
For test results according to FCC part 15 subpart B, see the EMC report as attached	<input type="checkbox"/>
For test results according to FCC part 15 subpart B, see the measurement data as follow	<input checked="" type="checkbox"/>
This requirement is covered by results of power line conducted emission test according to FCC 15.315	<input checked="" type="checkbox"/>
Radiated measurement to evaluate simultaneous transmission operations with DECT + IEEE802.15.4 ZigBee.	<input checked="" type="checkbox"/>

Note: For radiated test, if EUT is a handset, rotate the EUT in turns with three orthogonal axes to determine the axis of maximum emission as a worse case.

Radiated Emission Test

A. 30MHz to 20GHz

File: alz Data: #34 Date: 2014/10/20 Temperature: 25 °C
Time: AM 09:33:19 Humidity: 56 %

Condition: **FCC Part15 RE-Class B_30-1000MHz** Polarization: **Horizontal**

No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	30.0000	1.70	peak	20.45	22.15	40.00	-17.85
2	35.8317	3.70	peak	17.33	21.03	40.00	-18.97
3	39.7194	3.35	peak	15.51	18.86	40.00	-21.14
4	64.9900	10.08	peak	7.25	17.33	40.00	-22.67
5	247.7154	4.83	peak	16.17	21.00	46.00	-25.00
6	751.1824	4.24	peak	25.87	30.11	46.00	-15.89

Condition: **FCC Part15 RE-Class B_30-1000MHz** Polarization: **Vertical**

No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	31.9439	5.11	peak	19.39	24.50	40.00	-15.50
2	49.4389	8.92	peak	10.84	19.76	40.00	-20.24
3	64.9900	16.36	peak	7.25	23.61	40.00	-16.39
4	94.1483	8.44	peak	11.00	19.44	43.50	-24.06
5	199.1182	7.63	peak	13.60	21.23	43.50	-22.27
6	945.5711	3.84	peak	29.50	33.34	46.00	-12.66

B. below 30MHz

Frequency (MHz)	. Reading (dBuV/m) Peak	Duty (dB)	Factor (dB)	Result @3m (dBuV/m)			Limit @3m (dBuV/m)	
				Peak	QP	AVG	Peak	AVG
Radiated emission frequencies from 9 kHz to 30 MHz were too low to be measured.								

- Note: 1. Place of Measurement: Measuring site of the ETC.
 2. The measurements of radiated emission frequencies from 100kHz to 30MHz were greater than 20dB below the limit.
 3. The estimated measurement uncertainty of the result measurement is
 ±4.2dB (9kHz ≤ f ≤ 30MHz).
 ±4.6dB (30MHz ≤ f < 300MHz).
 ±4.4dB (300MHz ≤ f < 1000MHz).
 ±4.1dB (1GHz ≤ f < 18GHz).
 ±4.4dB (18GHz ≤ f ≤ 40GHz).

6.3 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor, High Pass Filter Loss(if used) and Cable Loss, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation calculation is as follows:

$$\mathbf{Result = Reading + Corrected Factor}$$

where

$$\text{Corrected Factor} = \text{Antenna Factor} + \text{Cable Loss} + \text{High Pass Filter Loss} - \text{Amplifier Gain}$$

6.4 Labeling Requirements

6.4.1 Standard Applicable: FCC 15.19, RSS-213 3

The FCC Identifier shall be displayed on the label, and the device(s) shall bear the following statement in a conspicuous location on the device or in the user manual if the device is too small:

Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

The label itself shall be of a permanent type, not a paper label, and shall last the lifetime of the equipment.

6.4.2 Result

See separate documents showing the label design and the placement of the label on the EUT.

6.5 Power line Conducted Emissions

6.5.1 Standard Applicable:

15.315

An unlicensed PCS device that is designed to be connected to the public utility (AC) power line must meet the limits specified in Section 15.207.

15.207(a)

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency MHz	Quasi Peak dB μ V	Average dB μ V
0.15 - 0.5	66-56*	56-46*
0.5 - 5.0	56	46
5.0 - 30.0	60	50

*Decreases with the logarithm of the frequency.

RSS-213 6.3

The limits of AC power line conducted emissions are given is RSS-Gen, Section 7.

6.5.2 Measurement Procedure

ANSI C63.4-2003 using 50 μ H/50 ohms LISN.

6.5.3 Test Results: Complies

Measurement Data: See attached graph, (Peak detector).

Highest measured value (L1 and N):

All emissions were below the QP and Average limits when measured with Peak detector.

The test was performed with the EUT in standby charging and repeated with the EUT transmitting in speakerphone mode and charging.

6.6 Result Data Calculation

The result data is calculated by adding the LISN Factor to the measured reading. The basic equation with a sample calculation is as follows:

$$\mathbf{RESULT = READING + LISN FACTOR (Included Cable Loss)}$$

6.7 Antenna Requirement

6.7.1 Standard Applicable: FCC 15.317, 15.203. RSS-213 4.1(e)

Does the EUT have detachable antenna?

Yes

No

If detachable, is the antenna connector non-standard?

Yes

No

The tested equipment has only integral antennas. The conducted tests were performed on a sample with a temporary antenna connector.

6.8 Digital Modulation Techniques

6.8.1 Standard Applicable: FCC 15.319(b), RSS-213 6.1

All transmissions must use only digital modulation techniques.

6.8.2 Result: Meets the requirement

Please see the declaration provided by applicant.

6.9 Peak Transmit Power

6.9.1 Standard Applicable: FCC 15.319(c) & (e) same as RSS-213 6.5

(c) Peak transmit power shall not exceed 100 microwatts multiplied by the square root of the emission bandwidth in hertz. Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage. The measurement results shall be properly adjusted for any instrument limitations, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, sensitivity, etc., so as to obtain a true peak measurement for the emission in question over the full bandwidth of the channel.

(e) The peak transmit power shall be reduced by the amount in decibels that the maximum directional gain of the antenna exceeds 3 dBi.

RSS-213 4.3.1 Peak Transmit Power

The transmitter shall be modulated with digital sequence(s) representative of those encountered in a real system operation. The peak transmit power shall be measured and recorded.

6.9.2 Measurement procedure

Measurement method according to ANSI C63.17 2013 paragraph 6.1.2

6.9.3 Test Results: Complies

Measurement Data:

Test Date : Oct. 22, 2014

Temperature : 24°C

Humidity : 58%

Channel	Frequency (MHz)	Maximum Peak Output Power (dBm)	Limit (dBm)
F _L	1921.536	10.96	20.82
F _M	1924.992	10.94	20.82
F _H	1928.448	10.91	20.82

Limit:

Conducted: $5 \text{ Log (B)} - 10 = 20.82 \text{ dBm}$

Where B is the emission bandwidth in Hz measured at 26 dBm.

Maximum Peak Output Power: CH FL

Agilent
R L

Ch Freq 1.92154 GHz
Trig VidIF

Burst Power
Averages: 100

Ref 20 dBm
#Atten 40 dB
Ext PG -7 dB

#Peak Log

Res BW 3 MHz
#VBW 3 MHz
Sweep 520 μs (601 pts)

Output Power (Above Threshold Lvl)	Amplitude Threshold	-30.00 dB
10.96 dBm	Current Data	
Full Burst Width: ----	Output Pwr	Max Pt
	10.95 dBm	11.17 dBm
		Min Pt
		-18.34 dBm

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Meas Setup

Avg Number
100
On Off

Avg Mode
Exp Repeat

Average Type
Log RMS

Threshold Lvl
-30.00 dB
Abs Rel

Meas Method
Above Threshold Lvl

Burst Width
500.0 μs
Auto Man

Optimize Ref Level

Maximum Peak Output Power: CH Fm

Agilent
R L

Ch Freq 1.92499 GHz Trig VidIF	Detector												
Burst Power Averages: 100	Auto												
Ref 20 dBm #Atten 40 dB Ext PG -7 dB	Normal												
#Peak Log 10 dB/	Average (Log/RMS/V)												
	Peak												
Res BW 3 MHz #VBW 3 MHz Sweep 520 μs (601 pts)	Sample												
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">Output Power (Above Threshold Lvl)</td> <td style="width: 30%;">Amplitude Threshold</td> <td style="width: 40%;">-30.00 dB</td> </tr> <tr> <td style="text-align: center; font-size: 1.2em;">10.94 dBm</td> <td colspan="2" style="text-align: center;"><u>Current Data</u></td> </tr> <tr> <td>Full Burst Width: ----</td> <td>Output Pwr</td> <td>Max Pt Min Pt</td> </tr> <tr> <td></td> <td>10.94 dBm</td> <td>11.15 dBm -17.66 dBm</td> </tr> </table>	Output Power (Above Threshold Lvl)	Amplitude Threshold	-30.00 dB	10.94 dBm	<u>Current Data</u>		Full Burst Width: ----	Output Pwr	Max Pt Min Pt		10.94 dBm	11.15 dBm -17.66 dBm	Negative Peak
Output Power (Above Threshold Lvl)	Amplitude Threshold	-30.00 dB											
10.94 dBm	<u>Current Data</u>												
Full Burst Width: ----	Output Pwr	Max Pt Min Pt											
	10.94 dBm	11.15 dBm -17.66 dBm											
Copyright 2000-2008 Agilent Technologies	More 1 of 2												

Maximum Peak Output Power: CH F#

Agilent
R L

Ch Freq 1.92845 GHz
Trig VidIF

Burst Power
Averages: 100

Ref 20 dBm
#Atten 40 dB
Ext PG -7 dB

#Peak
Log

-10 μs
510 μs

Res BW 3 MHz
#VBW 3 MHz
Sweep 520 μs (601 pts)

Output Power <small>(Above Threshold Lvl)</small>	Amplitude Threshold	-30.00 dB
10.91 dBm	Current Data	
Full Burst Width: ----	Output Pwr	Max Pt
	10.92 dBm	11.11 dBm
		Min Pt
		-15.97 dBm

Sweep

Sweep Time
520.0 μs

Sweep
Single Cont

Auto Sweep
Time
Norm

Gate
On Off

Gate Setup ▾

Points
601

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6.10 Power Spectral Density

6.10.1 Standard Applicable: FCC 15.319(d)

Power spectral density shall not exceed 3 milliwatts in any 3 kHz bandwidth as measured with a spectrum analyzer having a resolution bandwidth of 3 kHz.

RSS-213 4.3.2.1 Peak Power Spectral Density Test

This test is to measure the occupied bandwidth and the maximum power spectral density. With the transmitter modulated as in Section 4.3.1, obtain spectrum plots. Record the maximum spectral level of the modulated signal as the reference spectral level (dBs). Measure and record the 99% bandwidth. Measure and record the power spectral density per 3 kHz.

RSS-213 6.6 Power Spectral Density

The peak-hold power spectral density shall not exceed 12 milliwatts per any 3 kHz bandwidth. As an alternative to the peak-hold power spectral density, the time-averaged power spectral density may be measured and it shall not exceed 3 milliwatts per any 3 kHz bandwidth.

6.10.2 Measurement procedure

Measurement method according to ANSI C63.17 2013 paragraph 6.1.5

6.10.3 Test Results: Complies

Measurement Data:

Test Date : Oct. 22, 2014

Temperature : 24°C

Humidity : 58%

Channel	Frequency (MHz)	Power Spectral Density (dBm)	Limit (dBm)
FL	1921.524	-10.64	4.77
F _M	1924.998	-10.70	4.77
F _H	1928.454	-11.89	4.77

Power Spectral Density: CH F1

Agilent R L

Ch Freq 1.92155 GHz Trig VidIF

Burst Power Averages: 100

Ref 20 dBm #Atten 40 dB Ext PG -7 dB

#Samp #VBW 10 kHz Sweep 1 ms (601 pts)

Log 10 dB/

-114.8 μ s 885.2 μ s

Output Power (Measured Burst Width)	Amplitude Threshold	-30.00 dB
-10.64 dBm	Current Data	
Full Burst Width: 733.8 μ s	Output Pwr	Max Pt
	-10.28 dBm	-4.95 dBm
		Min Pt
		-34.69 dBm

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Sweep

Sweep Time
1.000 ms

Sweep
Single Cont

Auto Sweep
Time
Norm

Gate
On Off

Gate Setup ▶

Points
601

Power Spectral Density: CH Fm

Agilent
R L

Ch Freq 1.92501 GHz
Trig VidIF

Burst Power
Averages: 100

Ref 20 dBm #Atten 40 dB Ext PG -7 dB

-95.67 μs 904.3 μs

Res BW 3 kHz
#VBW 10 kHz
Sweep 1 ms (601 pts)

Output Power (Measured Burst Width)	Amplitude Threshold	-30.00 dB
-10.70 dBm	Current Data	
Full Burst Width: 732.1 μs	Output Pwr	Max Pt
	-11.42 dBm	-5.81 dBm
		Min Pt
		-35.56 dBm

Sweep

Sweep Time
1.000 ms

Sweep
Single Cont

Auto Sweep
Time
Norm

Gate
On Off

Gate Setup ▾

Points
601

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Power Spectral Density: CH Fh

Agilent
R L

Ch Freq 1.92846 GHz
Trig VidIF

Burst Power Averages: 100

Ref 20 dBm
#Atten 40 dB
Ext PG -7 dB

#Samp 10
 Log dB/

-104 μs
896 μs

Res BW 3 kHz
#VBW 10 kHz
Sweep 1 ms (601 pts)

Output Power (Measured Burst Width)	Amplitude Threshold	-30.00 dB
-11.89 dBm	Current Data	
Full Burst Width: 752.1 μs	Output Pwr	Max Pt Min Pt
	-11.48 dBm	-6.41 dBm -36.14 dBm

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Sweep
 Sweep Time 1.000 ms
 Sweep Single Cont
 Auto Sweep Time Norm
 Gate On Off
 Gate Setup
 Points 601

6.11 Antenna Gain

6.11.1 Standard Applicable: FCC 15.323(e)

The peak transmit power shall be reduced by the amount in decibels that the maximum directional gain of the antenna exceeds 3 dBi.

6.11.2 Results: Meets the requirement

The antenna gain value provided by manufacturer is -2 dBi.

6.12 Automatic discontinuation of transmission

6.12.1 Standard Applicable: FCC 15.319(f) same as 4.3.4 (a)

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude transmission of control and signaling information or use of repetitive codes used by certain digital technologies to complete frame or burst intervals.

6.12.2 Procedure

Please see the declaration provided by applicant.

6.12.3 Results: Meets the requirement

6.13 Safety exposure levels

6.13.1 Standard Applicable: FCC 15.319(i)

UPCS devices are subject to the radio frequency radiation exposure requirements specified in FCC parts 1.1307 (b), 2.1091 and 2.1093, as appropriate. All equipment shall be considered to operate in a “general population / uncontrolled environment. For portable devices tests according to IEEE 1528 are requested, if applicable.

6.13.2 Measurement procedure

Consideration of radio frequency radiation exposure for EUT is done as

SAR test according OET65c (for PP)	<input type="checkbox"/>
MPE calculation as below (for FP, Repeater)	<input checked="" type="checkbox"/>

SAR test results: See SAR test report.

MPE calculation: not applicable

The EUT is considered as a mobile device according to OET Bulletin 65, Edition -97-01. Therefore distance to human body of min. 20 cm is determined.

The limit of Power density for General Population / Umcontrolled Exposure is 1.0 mW/cm².

Formula:

$$S = EIRP / 4\pi R^2$$

Calculation:

Radio Technology	Operation Frequency (MHz)	Distance (cm)	Maximum Peak Output Power (dBm)	Antenna Gain (dBi)	Power Density (mW/cm ²)	Limit (mW/cm ²)
DECT	1921	20	10.96	-2	0.001566	1
ZigBee	2405	20	-2.27	-2	0.000074	1

Simultaneous Evaluation:

ZigBee 2.4GHz and DECT radio can transmit simultaneously.

The formula of calculated MPE is:

$$\text{CPD1/LPD1} + \text{CPD2/LPD2} + \dots \text{etc.} < 1$$

CPD=Calculated Power Density

LPD=Limit of Power Density

Radio Technology	Worse CPD (mW/cm ²)
ZigBee	0.000074
DECT	0.001566

The MPE evaluation is $0.000074/1 + 0.001566/1 = 0.00164 < 1$, which confirm the device comply the MPE limit.

6.13.3 Results : Complies

6.14 Emission Bandwidth B

6.14.1 Standard Applicable: FCC 15.323(a)

The 26 dB Bandwidth B shall be larger than 50 kHz and less than 2.5 MHz.

6.14.2 Measurement procedure

Measurement method according to ANSI C63.17 2013 paragraph 6.1.3

6.14.2 Results: Complies

Measurement Data:

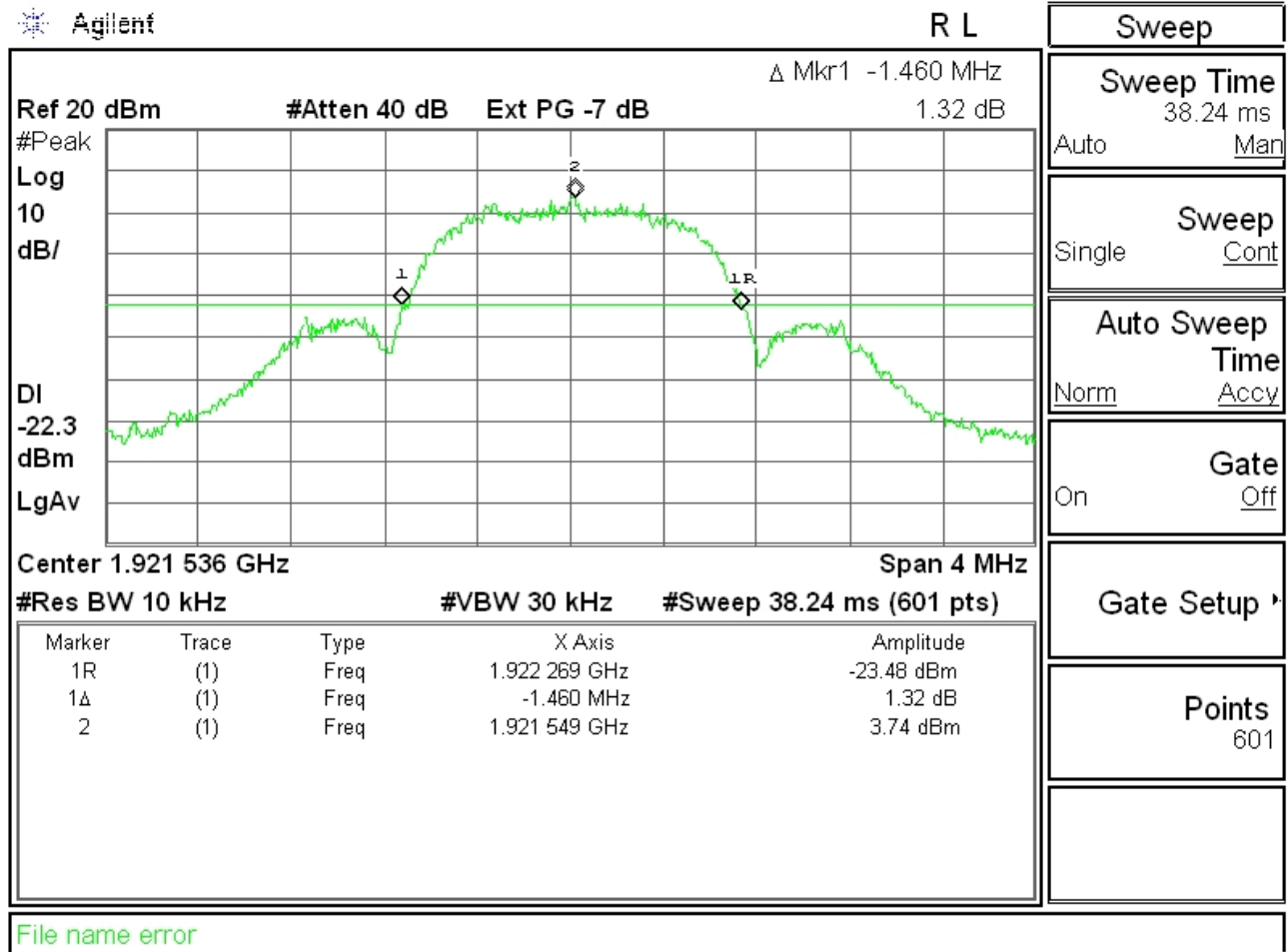
Test Date : Oct. 22, 2014

Temperature : 24°C

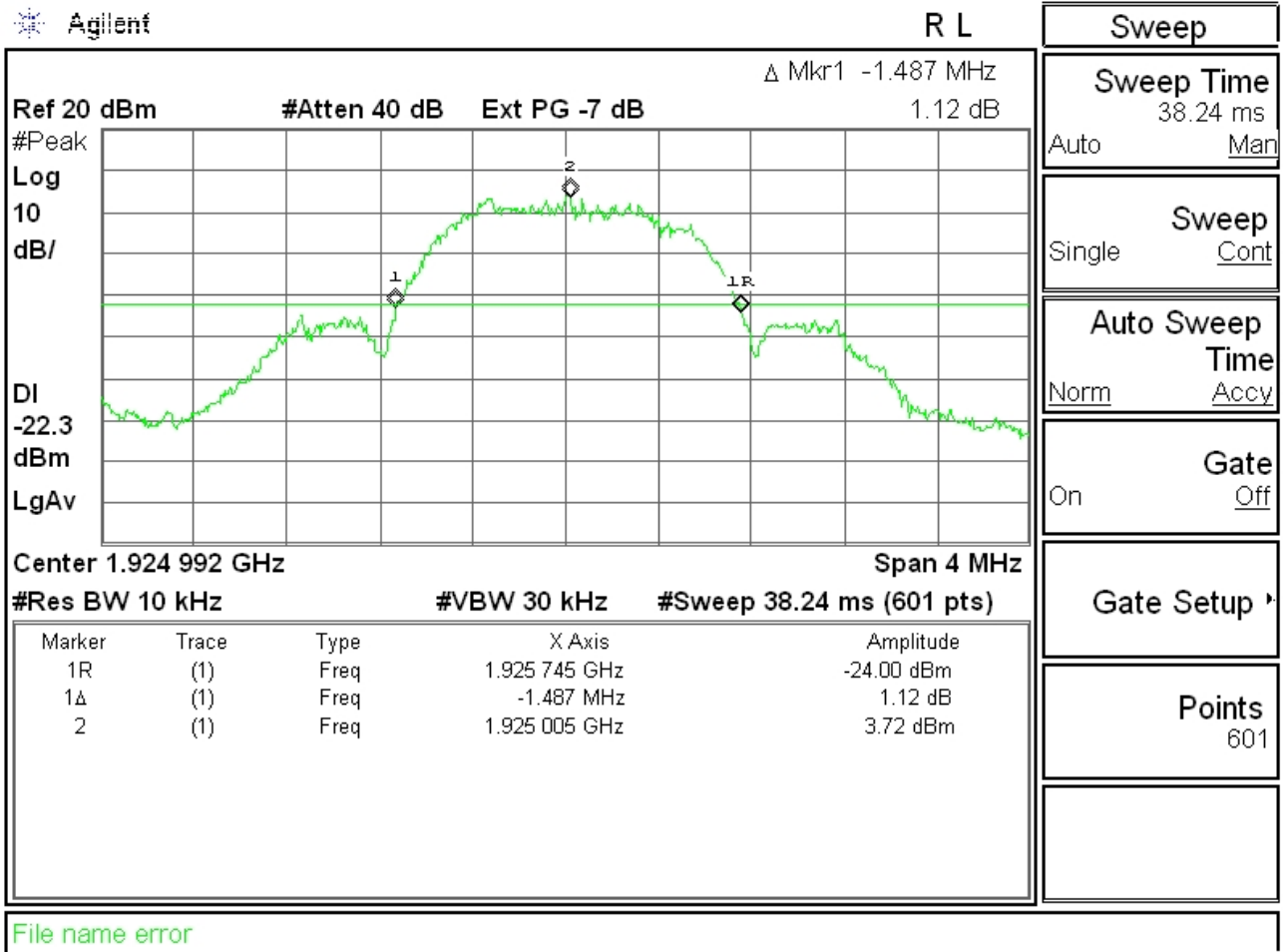
Humidity : 58%

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
FL	1921.536	1.46
F _M	1924.992	1.487
FH	1928.448	1.473

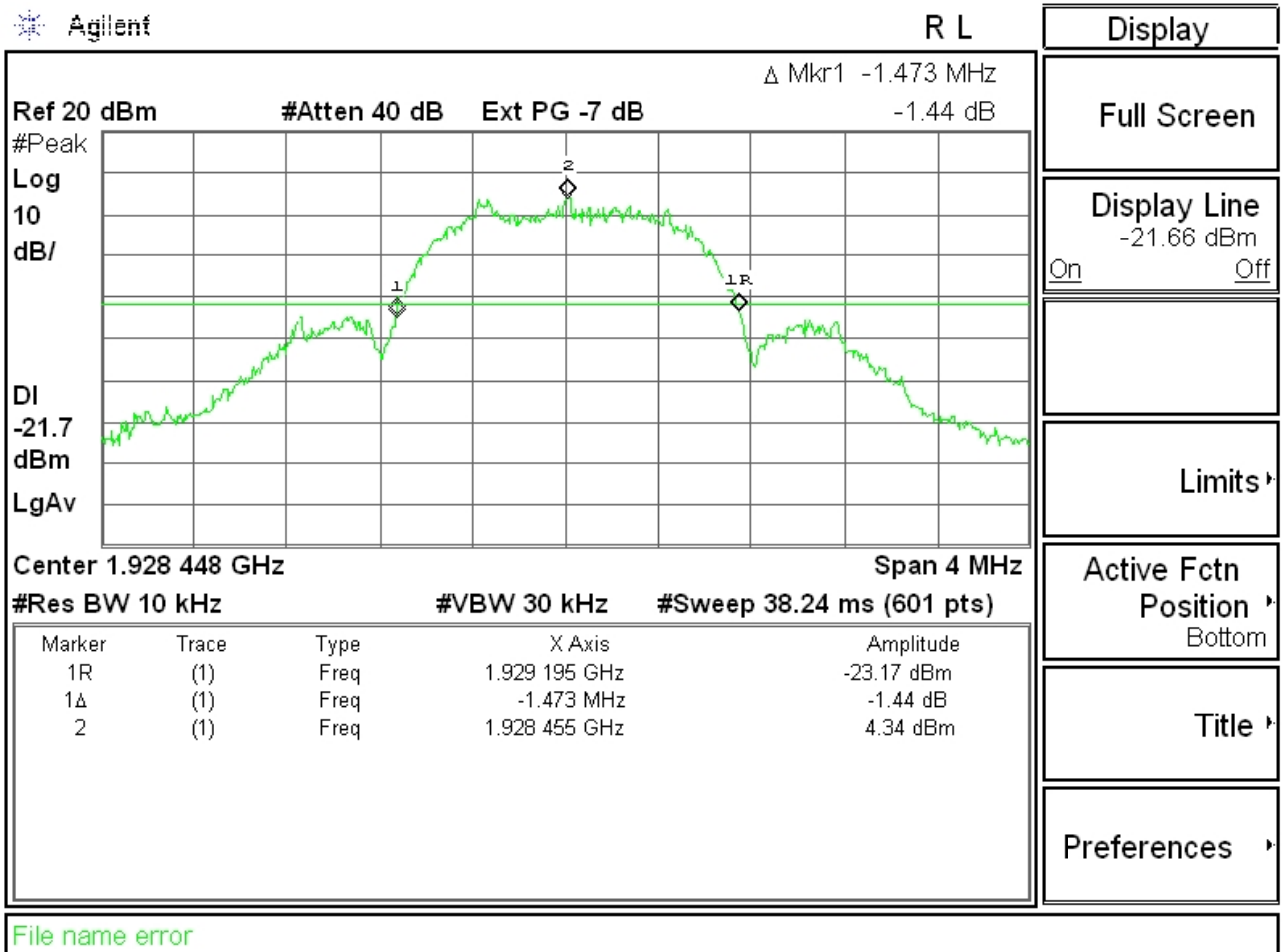
26 dB Bandwidth B: CH FL



26 dB Bandwidth B: CH Fm



26 dB Bandwidth B: CH Fh



6.15 Monitoring time

6.15.1 Standard Applicable: FCC 15.323(c)(1) same as RSS-213 4.3.4 (b)(1)

Immediately prior to initiating transmission, devices must monitor the combined time and spectrum window in which they intend to transmit. For a period of at least 10 milliseconds for systems designed to use a 10 millisecond or shorter frame period or at least 20 milliseconds for systems designed to use a 20 millisecond frame period.

6.15.2 Measurement procedure

Measurement method according to ANSI C63.17 2013 paragraph 7.3.3

6.15.2 Results: Complies

EUT monitors the combined time and spectrum window prior to initiation of transmission.

Measurement Data:

This requirement is covered by results of Least Interfered Channel (LIC) test according to FCC 15.323(c) (5)	<input checked="" type="checkbox"/>
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6.16 Monitoring threshold

6.16.1 Standard Applicable: FCC 15.323(c)(2) same as RSS-213 4.3.4 (b)(2)

The monitoring threshold must not be more than 30 dB above the thermal noise power for a bandwidth equivalent to the emission bandwidth of the device.

6.16.2 Measurement procedure

Measurement method according to ANSI C63.17 2013 paragraph 7.3.1

6.16.3 Result: Not apply

Note: For EUT which support LIC there is no need to measure monitoring threshold because it is automatically met by LIC Procedure.

6.17 Maximum transmit period

6.17.1 Standard Applicable: FCC 15.323(C) (3) same as RSS-213 4.3.4 (b)(3)

Occupation of the same combined time and spectrum windows by a device or group of cooperating devices continuously over a period of time longer than 8 hours is not permitted without repeating the access criteria.

6.17.2 Measurement procedure

Measurement method according to ANSI C63.17 2013 paragraph 8.2.2

6.17.3 Test Results: Complies

Measurement Data:

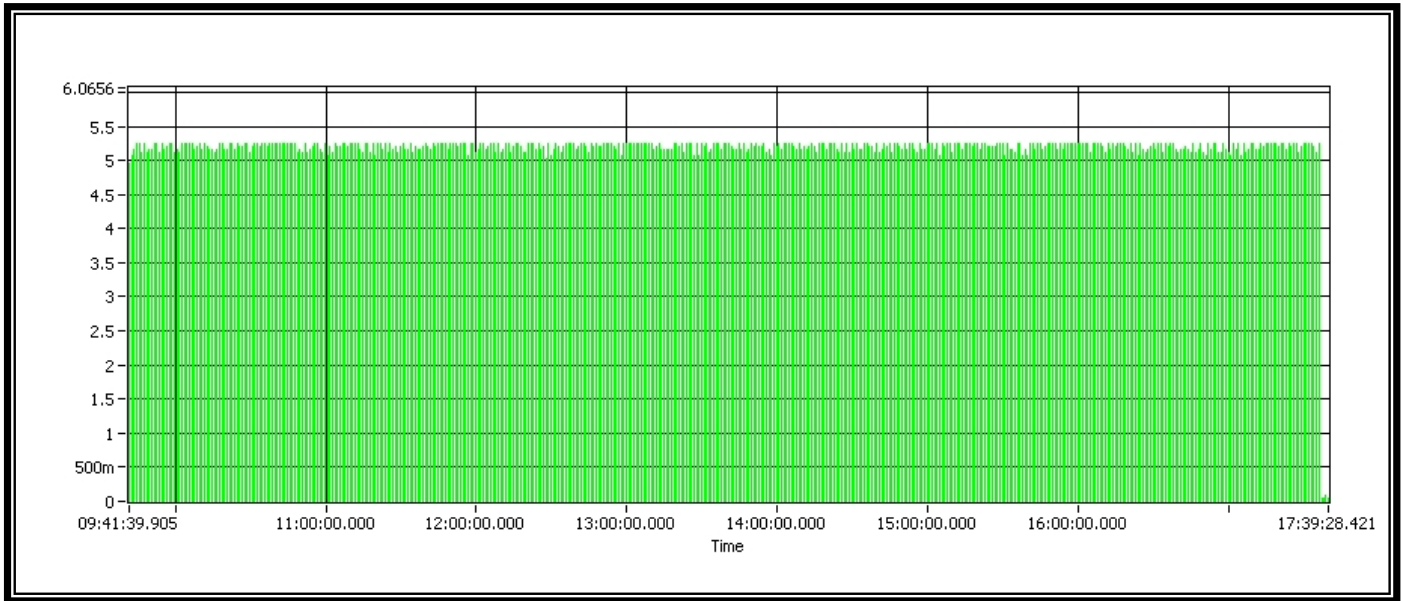
Test Date : Oct. 22, 2014

Temperature : 24°C

Humidity : 58%

	Observation	Limit
Maximum transmission time	7 hours 56 minutes	8 hours

Start to transmission time and Cease of transmission time:



6.18 System Acknowledgement

6.18.1 Standard Applicable: FCC 15.323 (c)(4) same as RSS-213 4.3.4 (b)(4)

Once access to specific combined time and spectrum windows is obtained an acknowledgement from a system participant must be received by the initiating transmitter within one second or transmission must cease. Periodic acknowledgements must be received at least every 30 seconds or transmission must cease. Channels used exclusively for control and signaling information may transmit continuously for 30 seconds without receiving an acknowledgement, at which time the access criteria must be repeated.

6.18.2 Measurement procedure

Measurement method according to ANSI C63.17 2013 paragraph 8

6.18.3 Results: Complies

Measurement Data

Unacknowledged transmission:

Limit:

Requirement	Value
Change of access criteria for control information	30 s
Pause length	> 10 ms
Change of access channel	mandatory

Result:

Test Date : Oct. 22, 2014

Temperature : 24°C

Humidity : 58%

Requirement	Time	Verdict
Change of access criteria for control information	----	n.a.
Pause length	----	n.a.
Change of access channel	----	n.a.

Connection acknowledgement:

Limit:

Requirement	Value
Connection acknowledgement	1 s
Termination of transmission	30 s

Result:

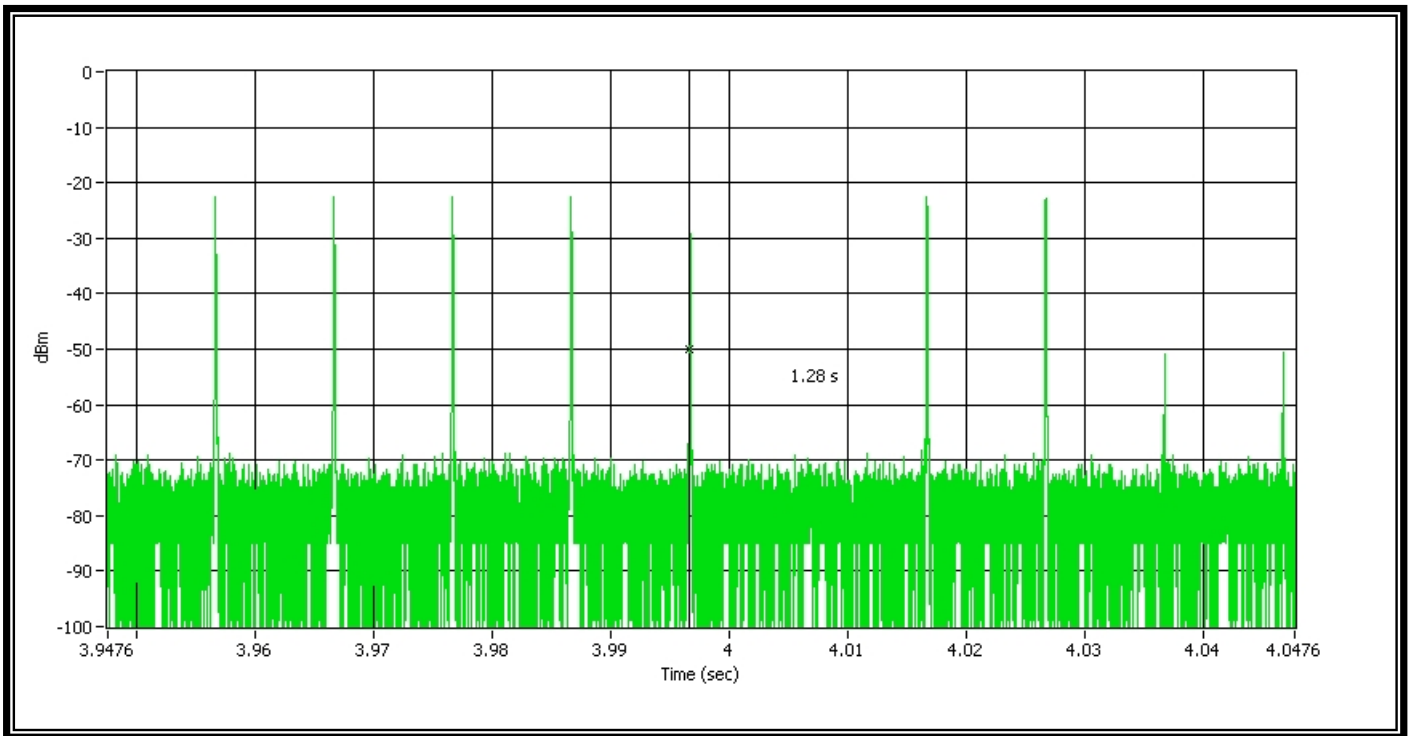
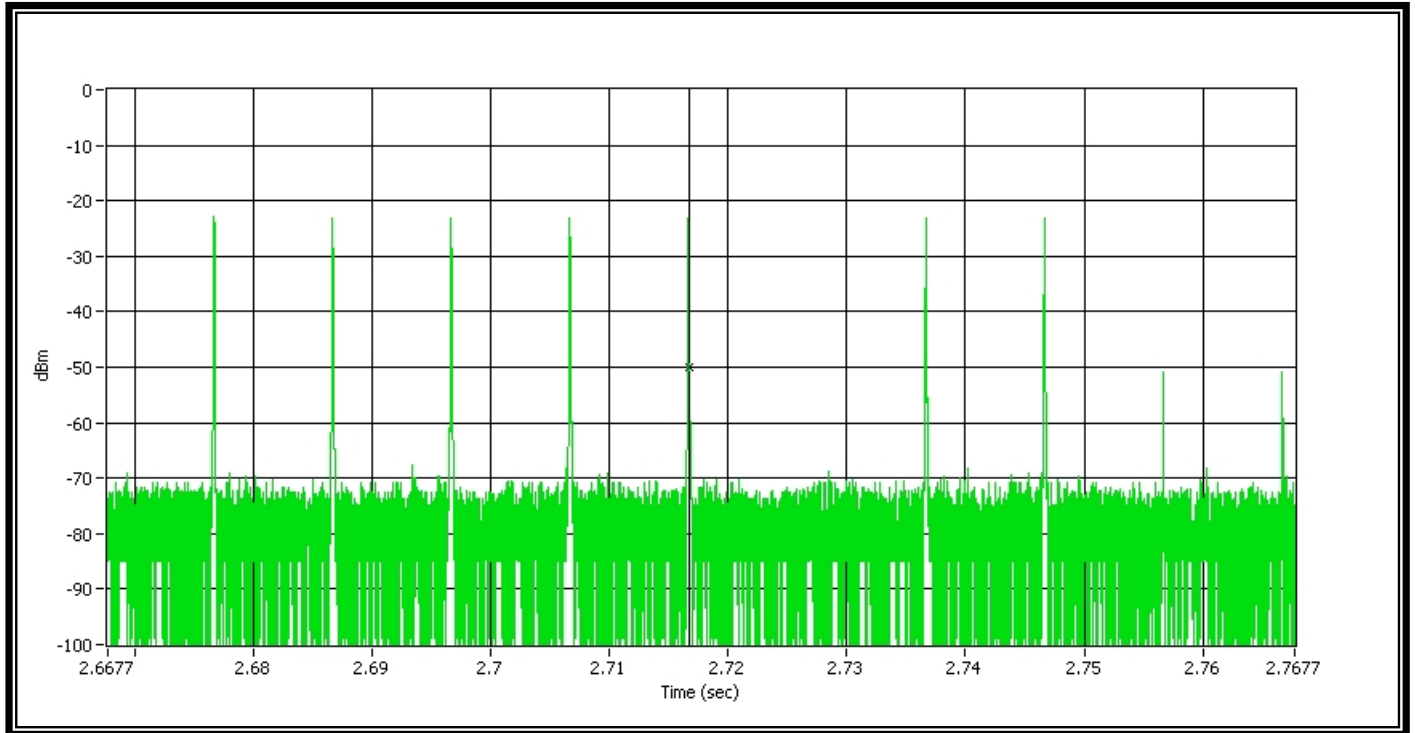
Test Date : Oct. 22, 2014

Temperature : 24°C

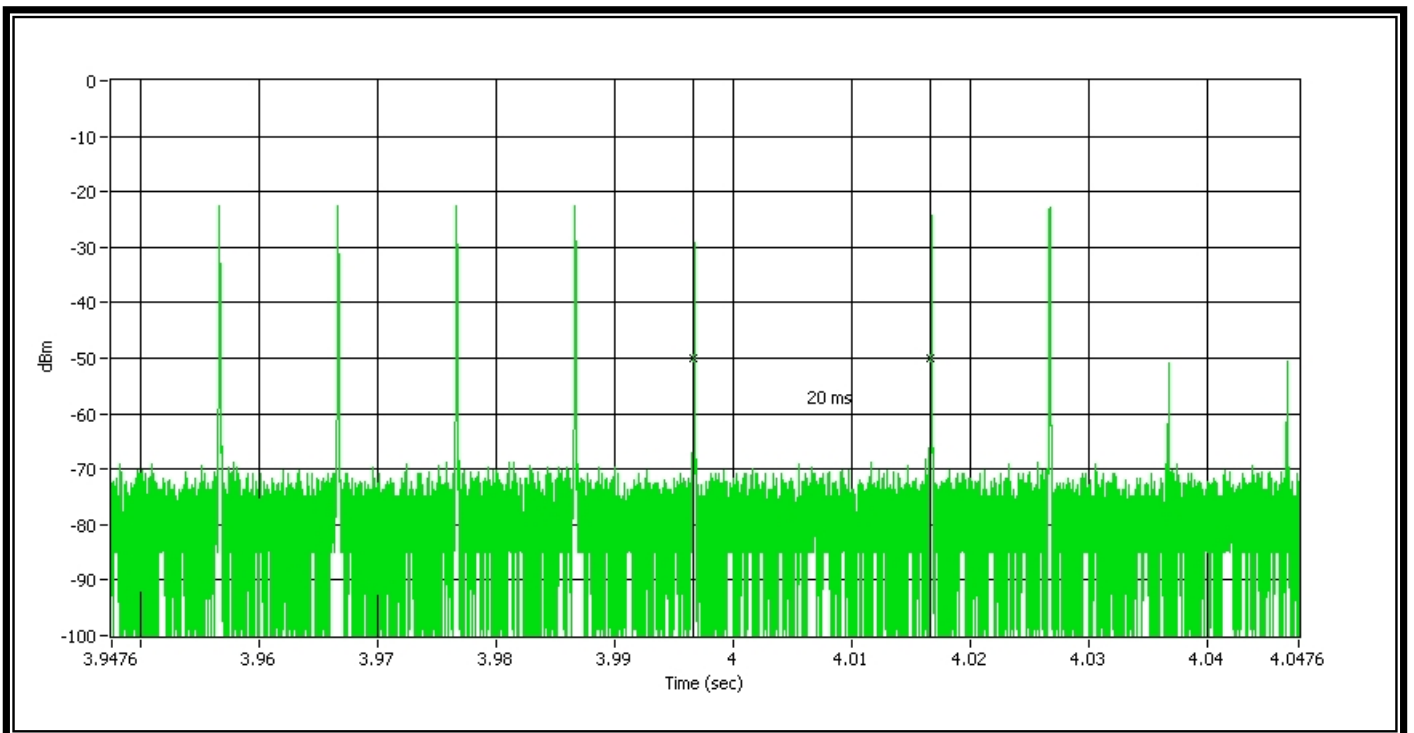
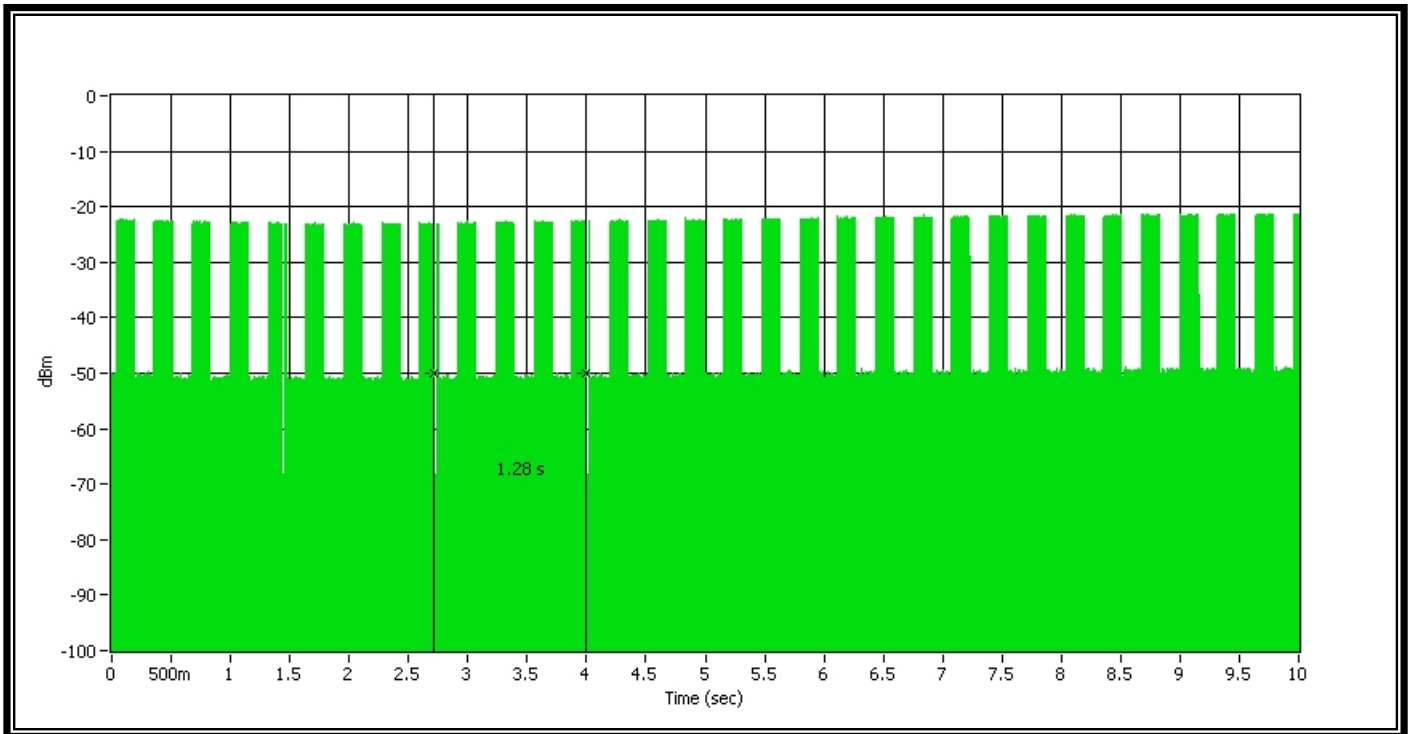
Humidity : 58%

Requirement	Time observed	Verdict
Connection acknowledgement	5 ms	Pass
Termination of transmission	5.01 s	Pass

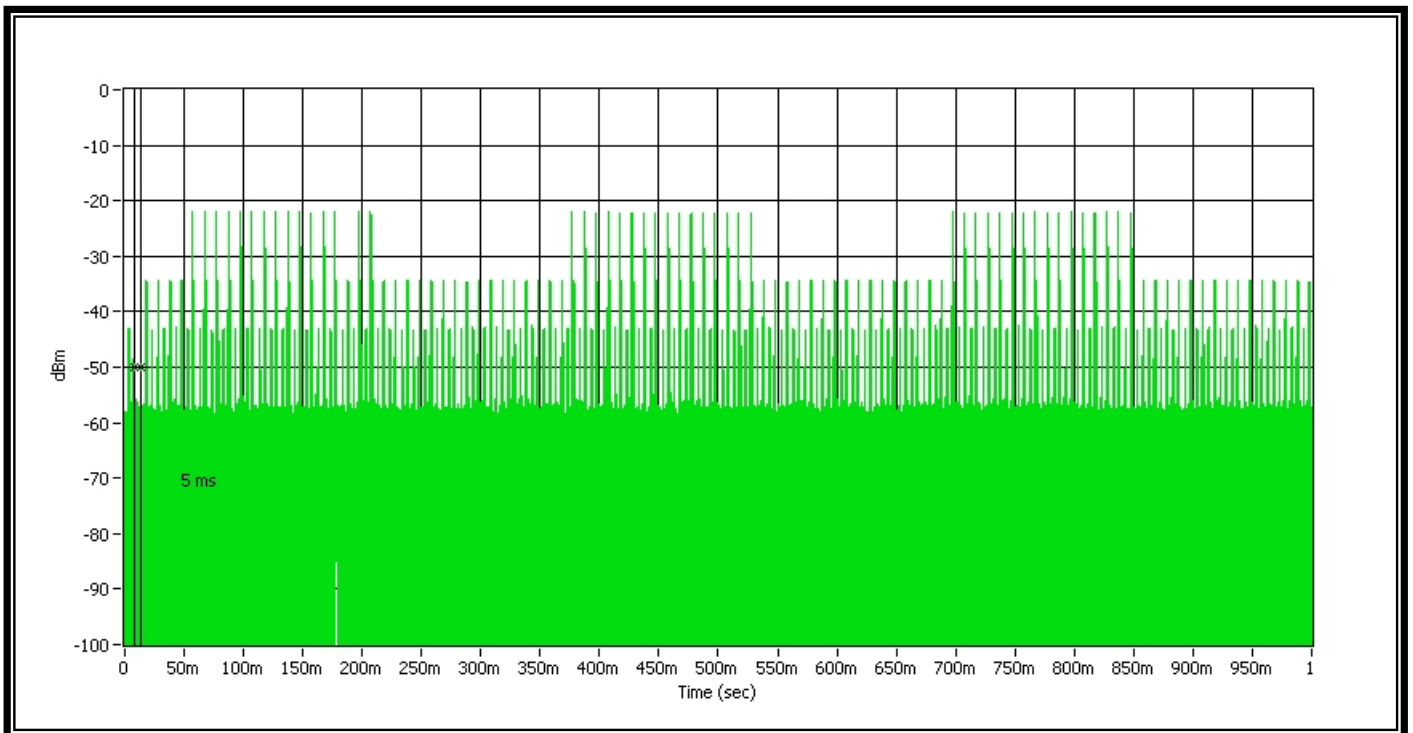
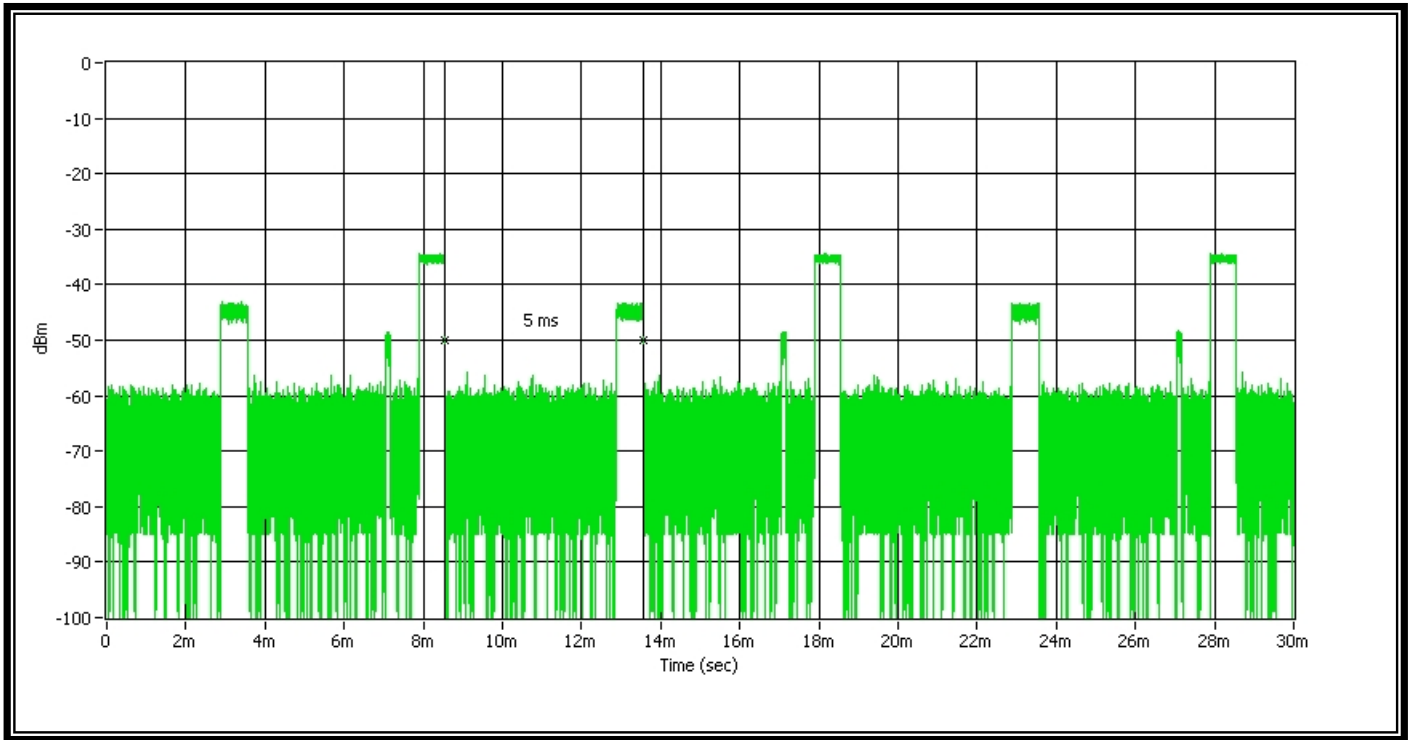
Comment: Unacknowledged transmission



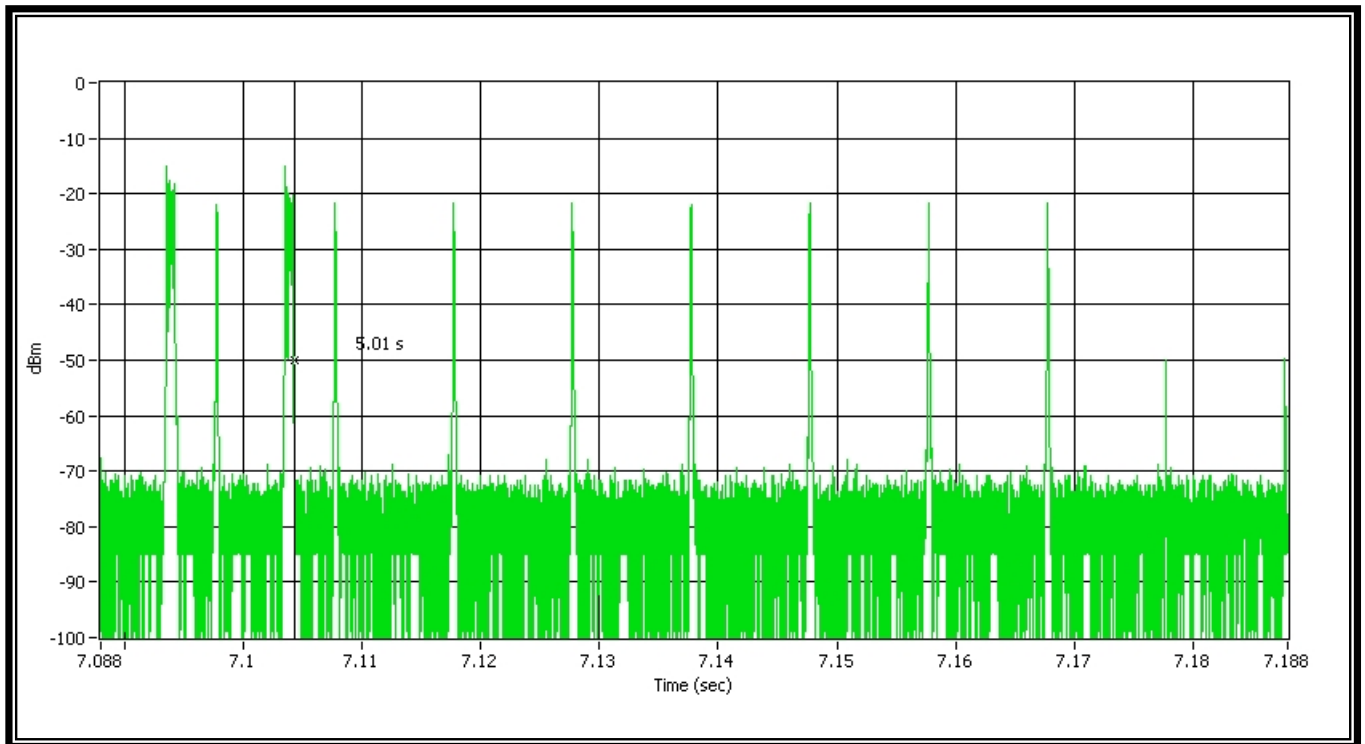
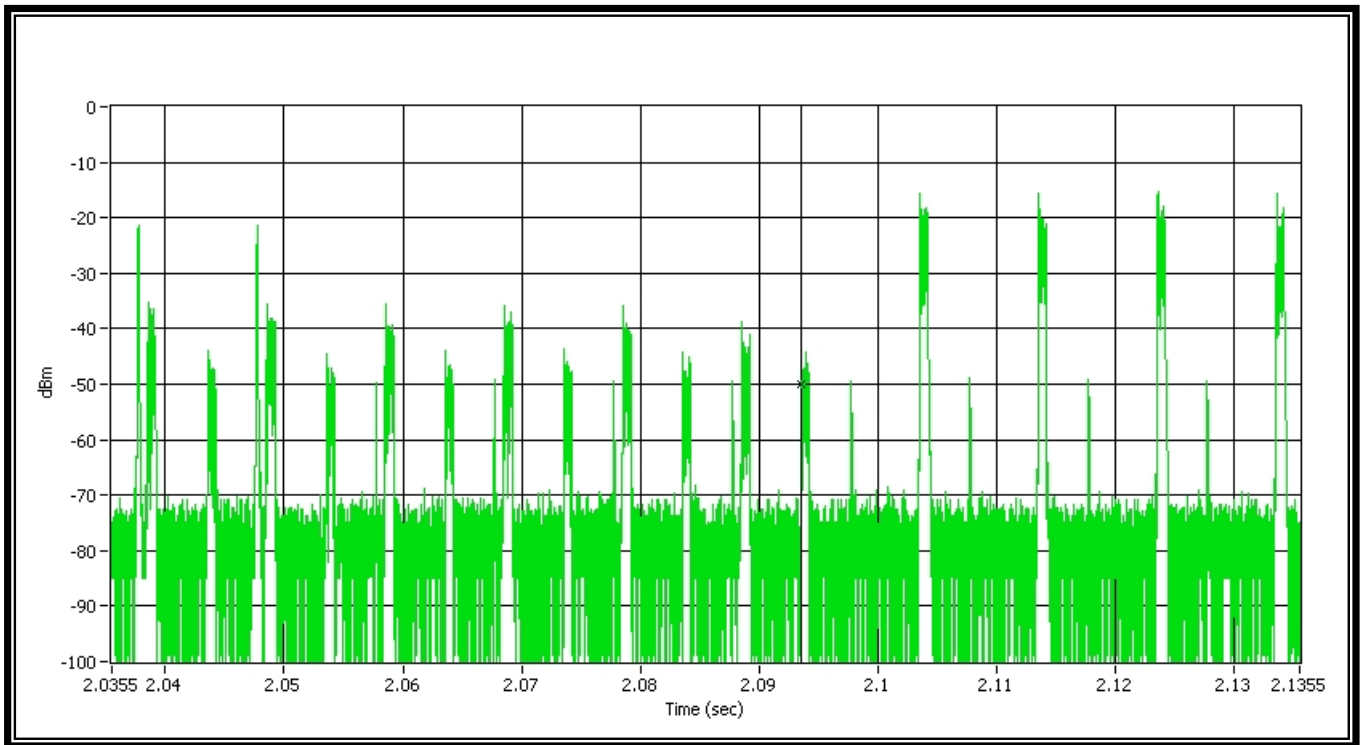
Comment: Unacknowledged transmission



Comment: Connection acknowledgement



Comment: Termination of transmission



Comment: Termination of transmission

