

TEST REPORT

1. Applicant

Name : Ericsson-LG Enterprise Co., Ltd.
Address : 77,Heungan-daero 81 beon-gil,Dongan-gu, Anyang-si,Gyeonggi-do,
Korea

2. Products

Name : Wireless Handy Telephone
Model : GDC-480H
Manufacturer : Ericsson-LG Enterprise Co., Ltd.

3. Test Standard/Method : FCC Part 15 Subpart D & RSS-213, Issue 3 / ANSI C63.17 - 2013

4. Test Results : Positive

5. Use of Report : -

6. Date of Application : October 08, 2015

7. Date of Issue : November 30, 2015

Tested by

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Approved by

T.H. Jang

Jang tae-heon

RF Application Technology Center
Manager

The test results contained apply only to the test sample(s) supplied by the applicant, and this test report shall not be reproduced in full or in part without approval of the KTL in advance.

Korea Testing Laboratory

REVISION HISTORY

REPORT No.	Version	Description	Issued Date
12-056909-01-1	Rev 01	Initial Issue	Dec 26, 2012
15-059152-01-1	Rev 02	Removal of bluetooth module All conducted test results are re-used	Dec 30, 2015

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1. GENERAL INFORMATIONS

1.1 Applicant (Client)

Name	Ericsson-LG Enterprise Co., Ltd.
Address	77,Heungan-daero 81 beon-gil,Dongan-gu, Anyang-si,Gyeonggi-do, Korea
Contact Person	Sang-Jin Kang
Telephone No.	82 31 8054 6017
Facsimile No.	82 31 450 4745
E-mail address	Sangjin.kang@ercssonlg.com
Manufacturer	Ericsson-LG Enterprise Co., Ltd.
Manufacturer Address	77,Heungan-daero 81 beon-gil,Dongan-gu, Anyang-si,Gyeonggi-do, Korea

1.2 Equipment (EUT)

Name	Wireless Handy Telephone
Model Name	GDC-480H
FCC ID	2ABGAGDC-480H
IC Number	11597A-GDC480H
Operating Frequency	1921.536 ~ 1928.448 MHz
Number of channels	5
Type of Modulation	GFSK
Nominal Voltage	3.7 VDC
Hardware Version	1.0
Software Version	2.1ab
Serial No.	Prototype

1.3 Technical specifications

Frequency Band	1920 ~ 1930 MHz
Frame Period	10 ms
Time Slot Length	416.67 us
Slots	12 RX, 12 TX slots
Slot Structure	6 active duplex pairs per frame
Bit Rate	1.152 Mbit
Number of channels	5 RF Channels, 5x12=60 TDMA duplex Channels

Frequency Band	Frequency
Channel 1	1921.536 MHz
Channel 2	1923.264 MHz
Channel 3	1924.992 MHz
Channel 4	1926.720 MHz
Channel 5	1928.448 MHz

1.4 Testing Laboratory

Testing Place	Korea Testing Laboratory (KTL) 723, Haeam-ro, Sangnok-gu, Ansan-si Gyunggi-Do, Korea
FCC registration number	408324
Industry Canada filing number	6298A
Test Engineer	Cho Sung-Kyu
Telephone number	+82 31 5000 132
Facsimile number	+82 31 5000 149
E-mail address	skcho@ktl.re.kr

2. SUMMARY OF TEST RESULTS

Name of Test	FCC Part	IC RSS-213	Test Procedure ANSIC63.17	Verdict
Antenna Requirements	15.317, 15.203	RSS-GEN 7.1.2	--	Attestation
Digital Modulation Techniques	15.319(b)	5.1	6.1.4	Attestation
Emission Bandwidth	15.323(a)	5.5	6.1.3	Complies
Power adjustment for antenna gain	15.319(e)	4	4.3.1	Complies
Conducted Emission	15.207(a)	5.4	ANSI C63.4	Complies
Radiated Out of Band Emission	15.209(a)	RSS-GEN 8.9	ANSI C63.4	Complies
Peak transmit power	15.319(c)(e)	5.6	6.1.2	Complies
Power spectral density	15.319(d)	5.7	6.1.5	Complies
Automatically discontinue transmission	15.319(f)	5.2	--	Complies
In-band emissions	15.323(d)	5.8.2	6.1.6.1	Complies
Out-of-band emission	15.323(d)	5.8.1	6.1.6.2	Complies
Carrier frequency stability	15.323(f)	5.3	6.2.1	Complies
Frame repetition stability	15.323(e)	5.2(13)	6.2.2	Complies
Frame period and jitter	15.323(e)	5.2(13)	6.2.3	Complies
Monitoring time	15.323(c)(1)	5.2(1)	7.3.3	Complies
Monitoring threshold	15.323(c)(2)	5.2(2&9)	7.3.1	Complies
Maximum transmit time	15.323(c)(3)	5.2(3)	8.2.2	Attestation
System acknowledgement	15.323(c)(4)	5.2(4)	8.1.1 & 8.2.1	Complies
Least Interfered Channel	15.323(c)(5)	5.2(5)	7.3.2, 7.3.3	Complies
Random waiting	15.323(c)(6)	5.2(6)	8.1.3	Attestation
Monitoring Bandwidth	15.323(c)(7)	5.2(7)	7.4	Complies
Maximum reaction time	15.323(c)(7)	5.2(7)	7.5	Complies
Monitoring antenna	15.323(c)(8)	5.2(8)	4	Attestation
Duplex Connections	15.323(c)(10)	5.2(10)	8.3	Complies
Alternative Monitoring Interval for Co-located Device	15.323(c)(11)	5.2(11)	8.4	Complies

Note 1 : Test results reported in this document relate only to the items tested

Note 2 : The required tests demonstrated compliance as per client declaration of test configuration, monitoring methodology and associated pass/fail criteria

Note 3 : Test results apply only to the item(s) tested

*** Modifications required for compliance**

No modifications were implemented by KTL.

All results in this report pertain to the un-modified sample provided to KTL.

3. TEST RESULTS

3.1 Antenna Requirements

3.1.1 Requirement

EUT must meet the antenna requirement of FCC Rule 15.203

- ☒ EUT uses a permanently attached antenna which is considered sufficient to comply with the provisions of this rule.
- ☐ EUT uses a unique antenna jack or electrical connector which is considered sufficient to comply with the provisions of this rule.

3.1.2 Attestation

The EUT use permanently attached antennas.

3.2 Digital Modulation Techniques

3.2.1 Requirement

All transmissions must use only digital modulation techniques.

3.2.2 Attestation

The tested equipment is based on DECT technology described in the ETSI EN 300 175, the only difference is that the channel allocation is modified to operate in the 1920-1930 MHz band.

3.3 Emission Bandwidth

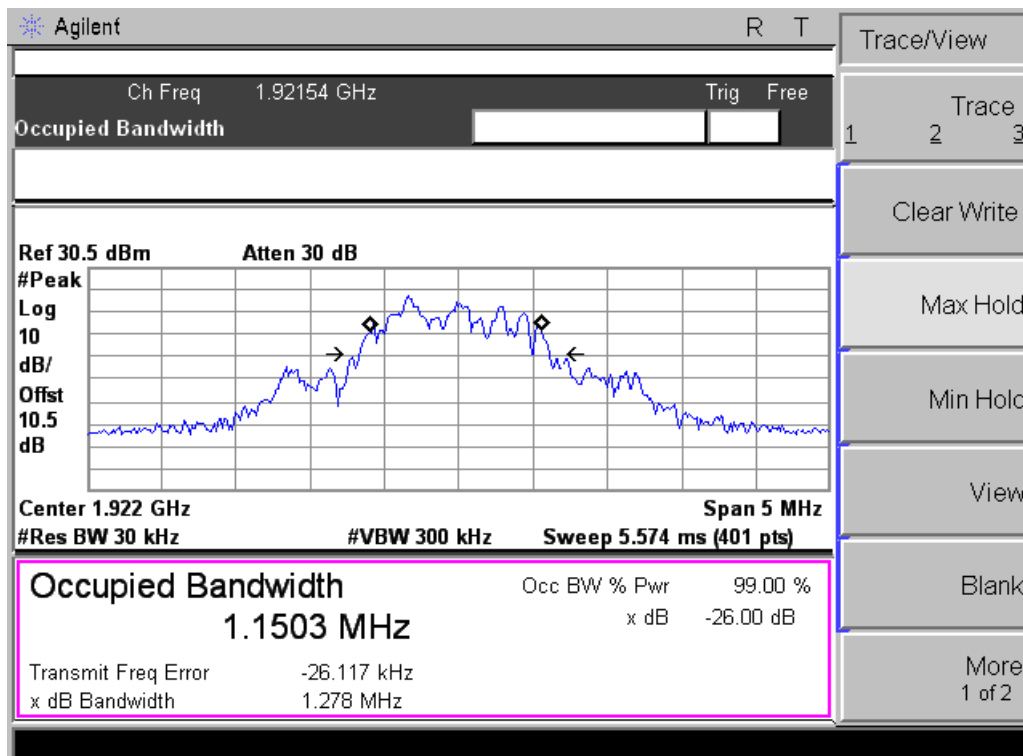
3.3.1 FCC rule - FCC 15.323(a)

- (a) Operation shall be contained within the 1920-1930 MHz band. The emission bandwidth shall be less than 2.5 MHz. The power level shall be as specified in § 15.319(c), but in no event shall the emission bandwidth be less than 50 kHz.

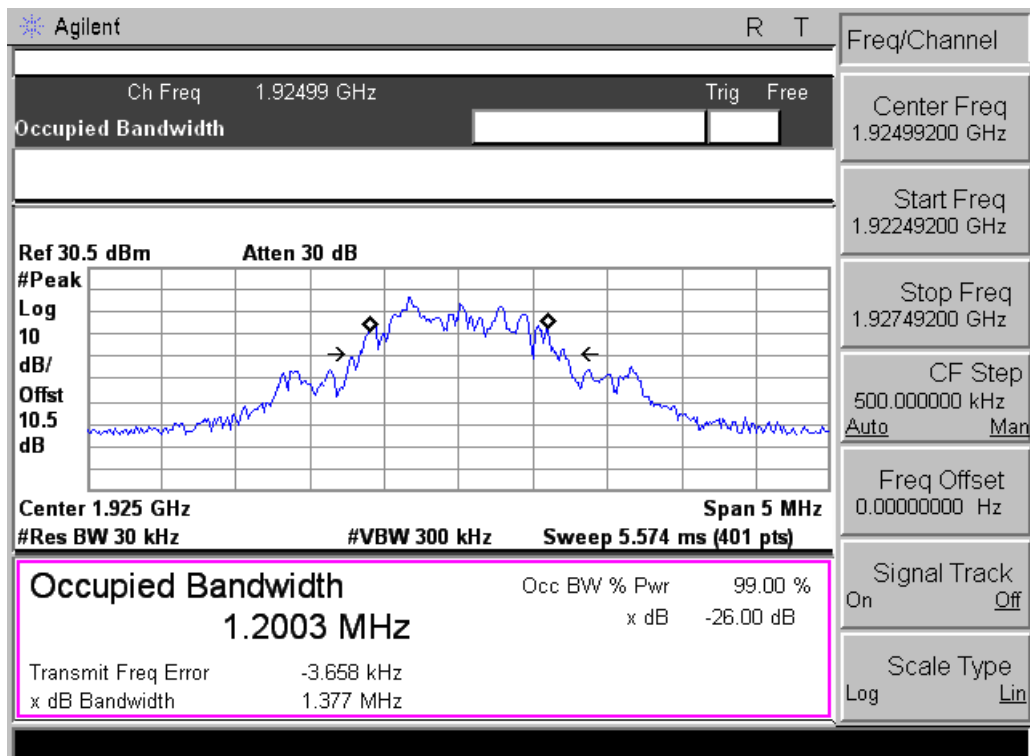
3.3.2 Test Procedure - ANSI C63.17 sub-clause 6.1.3.

3.3.3 Test Results

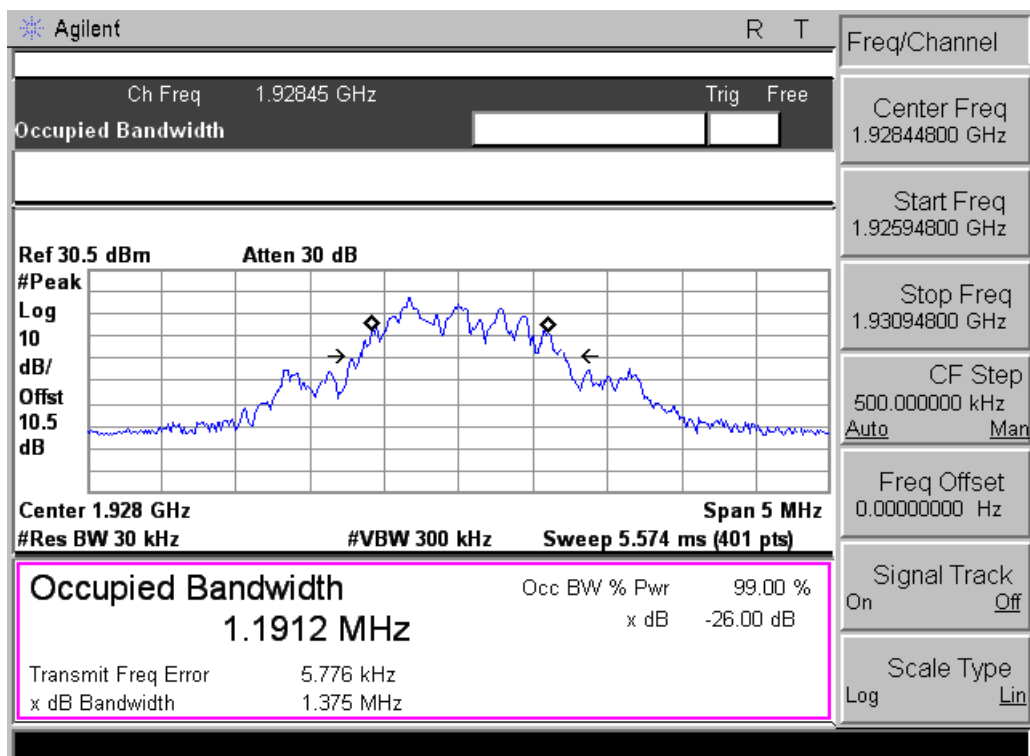
Channel	Result (MHz)	Limit (MHz)	Verdict
1	1.15	2.5	Complies
2	1.20	2.5	Complies
3	1.19	2.5	Complies



– Emission Bandwidth of Ch 1 –



– Emission Bandwidth of Ch 3 –



– Emission Bandwidth of Ch 5 –

3.4 Power adjustment for antenna gain

3.4.1 Test limit - FCC 15.319(e)

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

3.4.2 Test results

The maximum antenna gain is 2.49 dBi.

3.5 Radiated Out of Band Emission

3.5.1 Test procedure – FCC Part 15.209

3.5.1.1 Preliminary Testing for Reference

Preliminary testing was performed in a KTL absorber-lined room to determine the emission characteristics of the EUT. The EUT was placed on the wooden table which has dimensions of 0.8 meters in height, 1 meter in length and 1.5 meters in width. Receiving antenna (Biconi-Log antenna : 30 to 1000 MHz or Horn Antenna : 1 to 40 GHz) was placed at the distance of 3 meter from the EUT.

An attempt was made to maximize the emission level with the various configurations of the EUT. Emission levels from the EUT with various configurations were examined on a spectrum analyzer connected with a RF amplifier and graphed.

The emission was within the illumination area of the 3 dB beam width of the antenna so that the maximum emission from the EUT is measured.

3.5.1.2 Final Radiated Emission Test at an Absorber-Lined Room

The final measurement of radiated field strength was carried out in a KTL Absorber-Lined Room that was listed up at FCC according to the "Radiated Emissions Testing" procedure specified by ANSI C63.4.

Based on the test results in preliminary test, measurement was made in same test set up and configuration which produced maximum emission level. Receiving antenna was installed at 3-meter distance from the EUT, and was connected to an EMI receiver.

Turntable was rotated through 360 degrees and receiving antenna height was varied from 1 to 4 meters above the ground plane to read maximum emission level. Receiving antenna polarization was changed vertical and horizontal. The worst value was recorded.

If necessary, the radiated emission measurements could be performed at a closer distance than specified distance to ensure higher accuracy and their results were extrapolated to the specified distance using an inverse linear distance extrapolation factor (20 dB/decade) as per Section 15.31(f).

The maximum emission level from the EUT occurred in such configuration as shown in the following photograph.

Tested in x, y, z axis and worst case results are reported

The maximum frequency range measuring with the spectrum from 30 MHz to 40 GHz is investigated with the transmitter

3.5.1.3 Limits

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	MHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(2)
13.36 - 13.41			

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency Field Strength Measurement Distance (MHz) (microvolts/meter) (meters)

Frequency (MHz)	Field Strength (microvolts/meter)	Distance (Meters)
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.

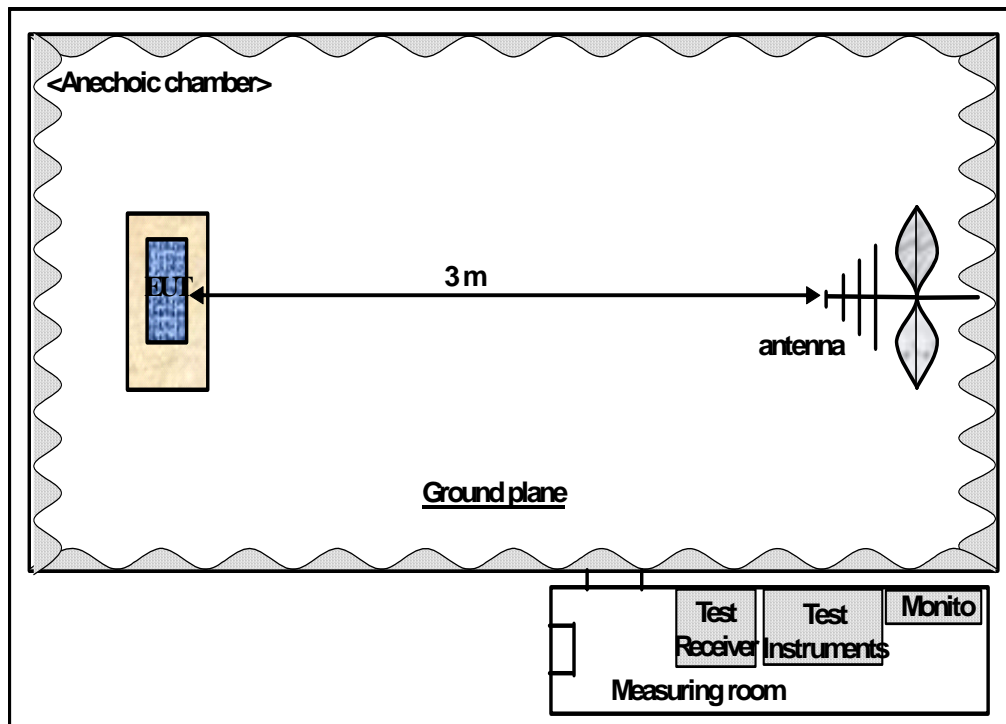
3.5.1.4 Sample Calculation

The emission level measured in decibels above one microvolt ($\text{dB } \mu\text{V}$) was following sample calculation.

For example ;

Measured Value at <u>2375.40 MHz</u>	38.35 $\text{dB } \mu\text{V}$
Antenna Factor, Cable loss & Preamplifier	26.37 dB
<hr/>	
= Radiated Emission	64.72 $\text{dB } \mu\text{V/m}$

3.5.1.5 Measurement Configuration



3.5.2 Test result

3.5.2.1 Spurious Radiated Emission (Worst case configuration, 30 MHz ~ 1 GHz)

Test mode: Lowest Channel

Frequency (MHz)	Antenna Pol.	Reading level [Peak detector]	Correction factor (dB)	Level Corrected (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Plane X/Y/Z
3843.10	H	46.7	2.1	48.8	54.0	5.2	X
3843.10	V	47.4	2.1	49.5	54.0	4.5	X
7686.15	V	32.6	7.5	40.1	54.0	13.9	Y
13 450.87	V	29.9	11.3	41.2	54.0	12.8	X

Test mode: Highest Channel

Frequency (MHz)	Antenna Pol.	Reading level [Peak detector]	Correction factor (dB)	Level Corrected (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Plane X/Y/Z
3857.25	H	47.5	2.2	49.7	54.0	4.3	X
3857.25	V	47.9	2.2	50.1	54.0	3.9	X
11 396.62	H	39.1	10.7	49.8	54.0	4.2	X

Level Corrected = Reading level + Correction factor (dB/m)

Correction factor = Antenna factor + Cable loss – Pre-amplifier (when using a pre-amplifier)

- Note**
1. Measurement was done over the frequency range from 30 MHz to 1 GHz. The EUT was rotated and the antenna was changed to a range of height of from 1 m to 4 m above the ground plane for maximum response.
 2. Testing is include the rotation of the EUT through three orthogonal axes to determine the maximum emission.
 3. Any emission values 20dB lower than the limit are not recorded.

- Remark**
1. Noise floor of 30 ~ 1000 MHz : <20 dBuV at 3m distance
 2. Noise floor of 1000 ~ 5000 MHz : <40 dBuV at 3m distance
 3. Noise floor of 5000 ~ 25000 MHz : <45 dBuV at 3m distance

3.6 Peak transmit power

3.6.1 Test limit - FCC 15.319(c)

(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.

Calculation of Peak transmit power Limit:

The antenna gain = 0.16 dBi

The measured emission bandwidth = 1.326 MHz

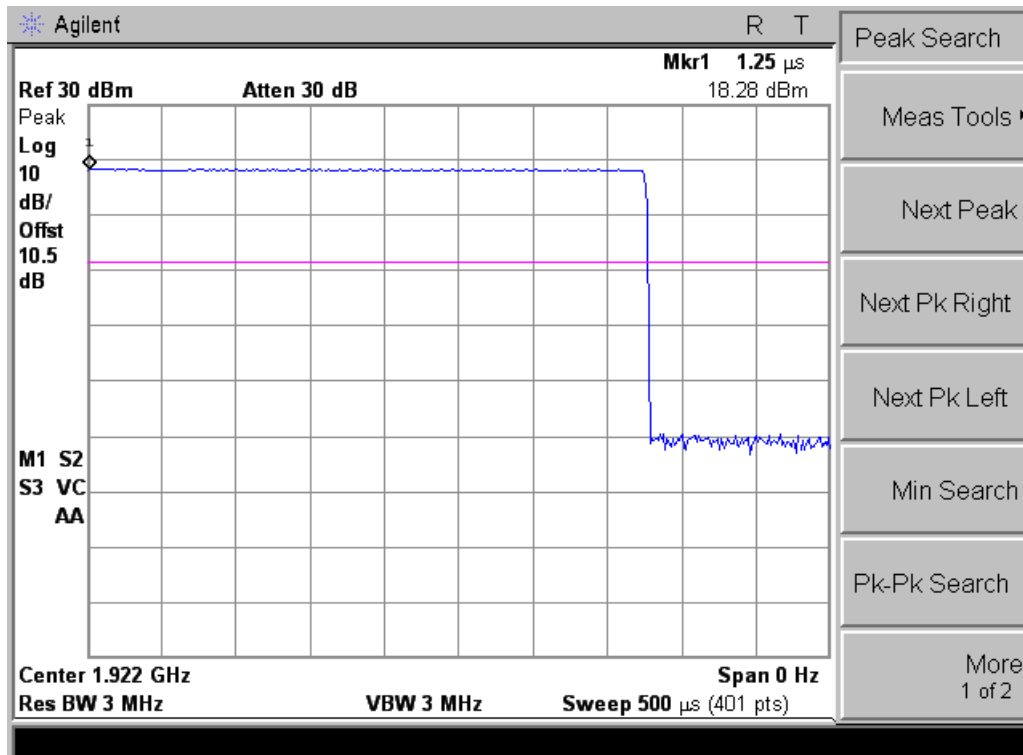
Limit : $5 \log B(\text{bandwidth in Hz}) - 10 \text{ dBm} = 20.61 \text{ dBm}$

The Maximum allowed peak transmit power is 20.61 dBm

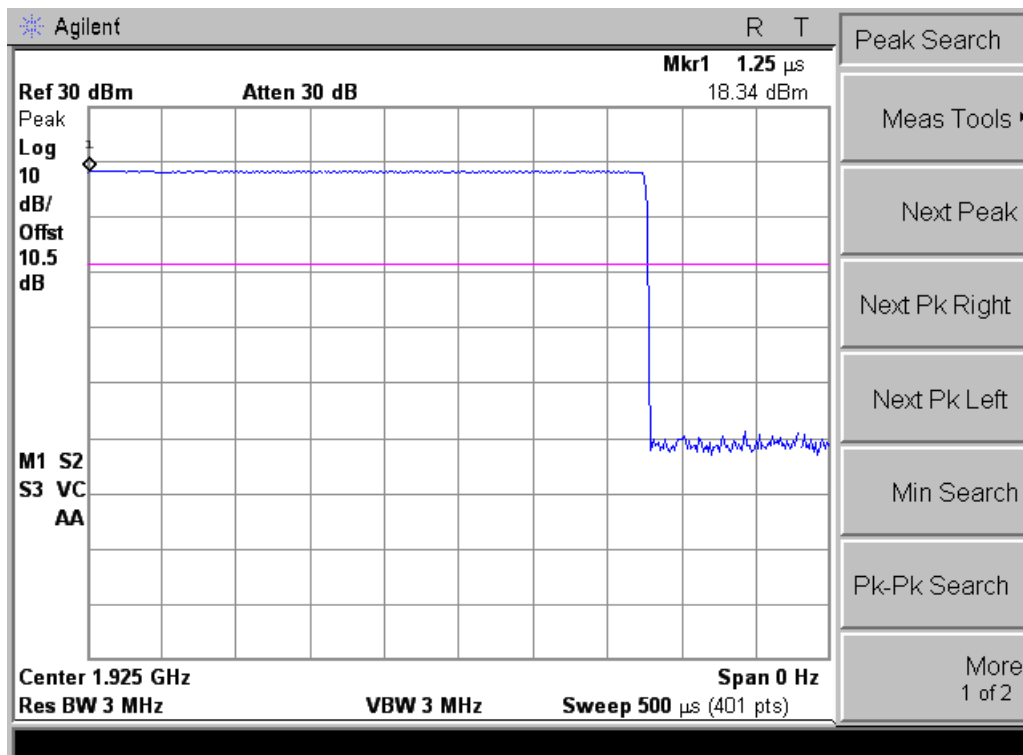
3.6.2 Test procedure - ANSI C63.17 sub-clause 6.1.2.

3.6.3 Test results

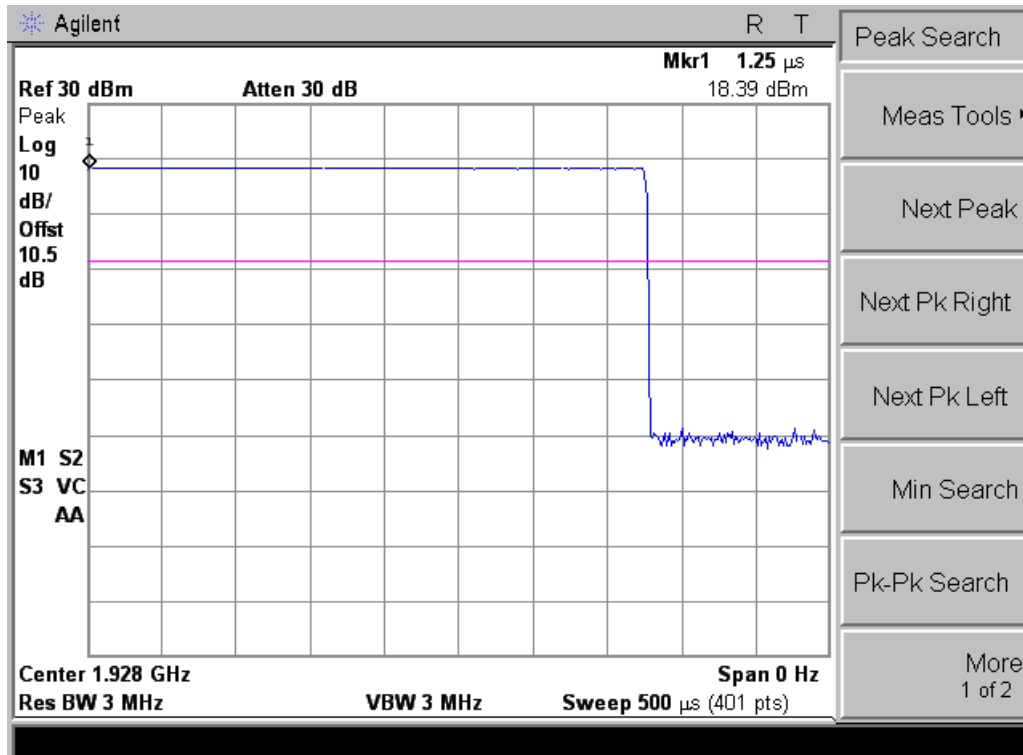
Channel	Result (dBm)	Limit (dBm)	Verdict
1	18.28	20.61	Complies
3	18.34	20.61	Complies
5	18.39	20.61	Complies



– Peak transmit power of Ch 1 –



– Peak transmit power of Ch 3 –



– Peak transmit power of Ch 5 –

3.7 Power spectral density

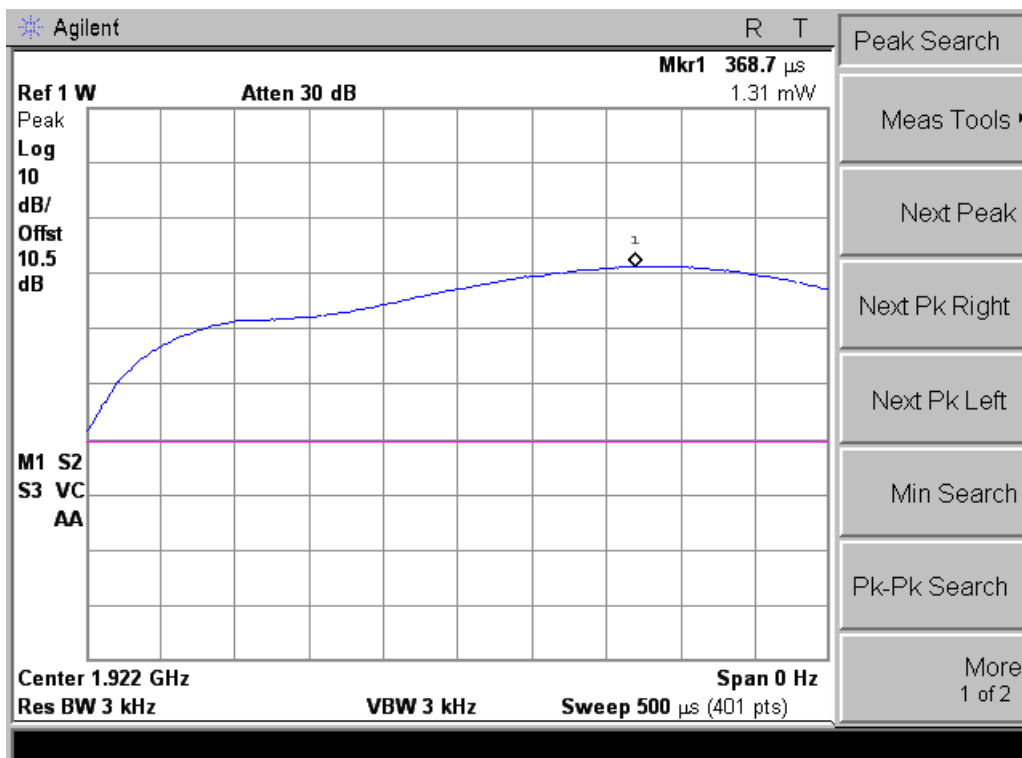
3.7.1 Test limit - FCC 15.319(d)

(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.

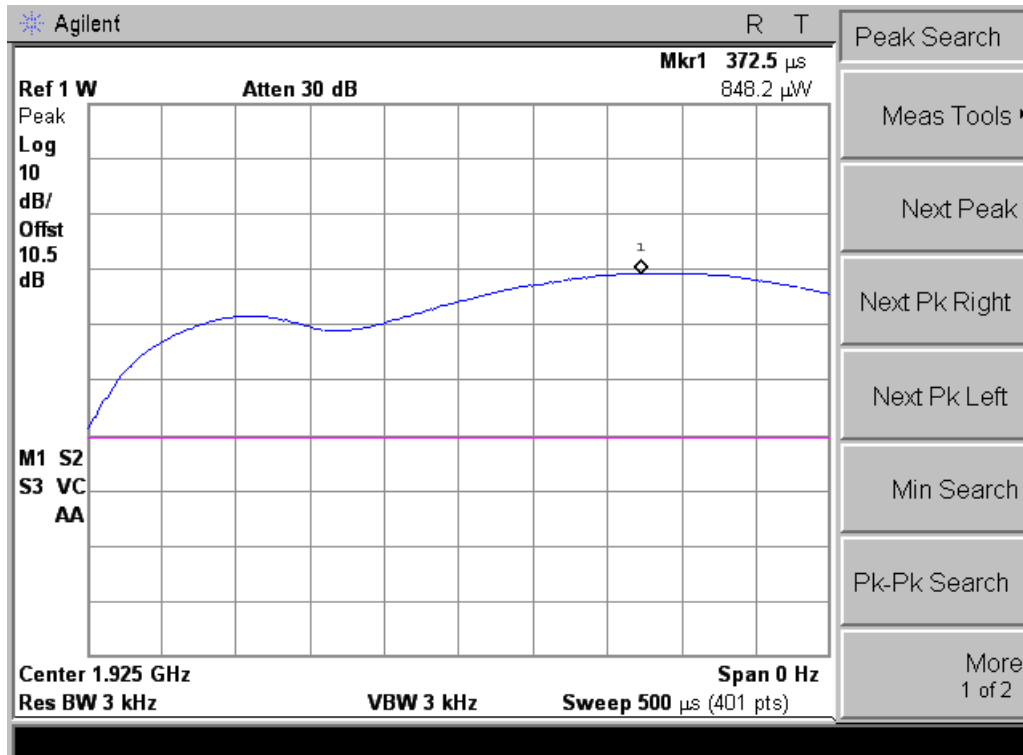
3.7.2 Test procedure - ANSI C63.17 sub-clause 6.1.5.

3.7.3 Test results

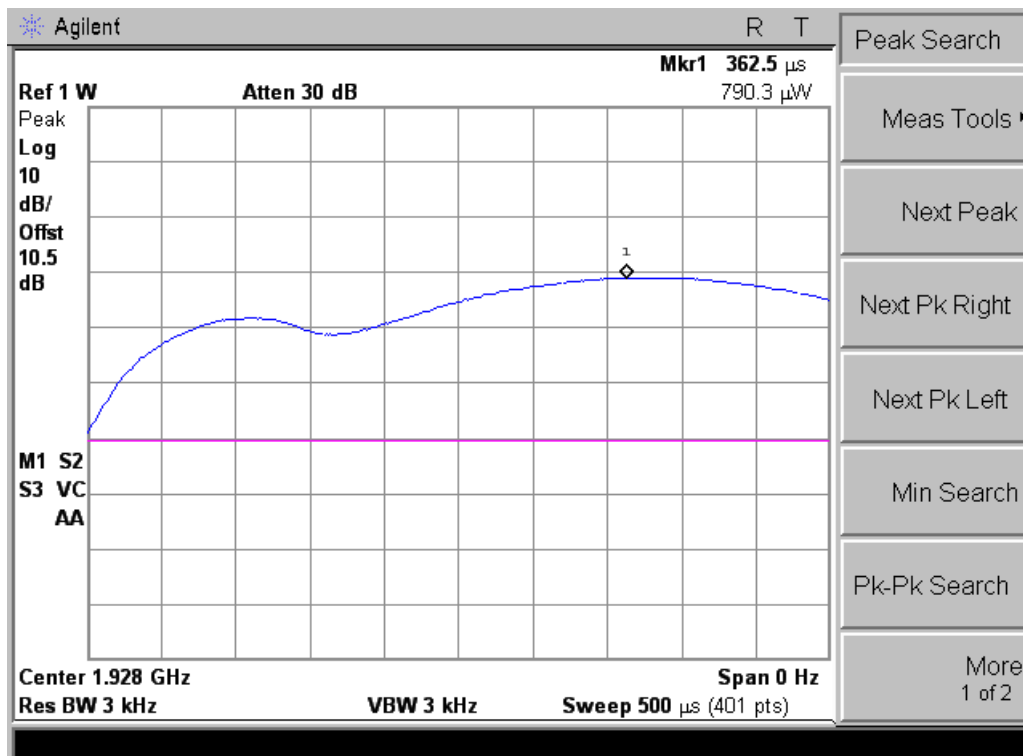
Channel	Result (mW)	Limit (mW)	Verdict
1	1.31	3	Complies
3	0.848	3	Complies
5	0.790	3	Complies



– Power spectral density of Ch 1 –



– Power spectral density of Ch 3 –



– Power spectral density of Ch 5 –

3.8 Automatically Discontinued Transmission

3.8.1 Test limit - FCC 15.319(f)

- (f) 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.

3.8.2 Test procedure

The following tests simulate the reaction of the EUT in case of either absence of information to transmit or operational failure after a connection with the companion devices is established.

	Test	EUT Reaction	Verdict
1	Power removed from the EUT	A/B/C	Pass/Fail
2	EUT Switch Off	A/B/C	Pass/Fail
3	Hook-On by companion device	A/B/C	Pass/Fail
4	Hook-On by EUT	A/B/C	Pass/Fail
5	Power Removed from Companion Device	A/B/C	Pass/Fail
6	Companion Device Switch Off	A/B/C	Pass/Fail

A – Connection breakdown, Cease of all transmissions

B – Connection breakdown, EUT transmits control and signaling information

C – Connection breakdown, Companion Device transmits control and signaling information

NA – Not applicable

3.8.3 Test results

	Test	EUT Reaction	Verdict
1	Power removed from the EUT	C	Pass
2	EUT Switch Off	C	Pass
3	Hook-On by companion device	NA	Pass
4	Hook-On by EUT	C	Pass
5	Power Removed from Companion Device	A	Pass
6	Companion Device Switch Off	NA	Pass

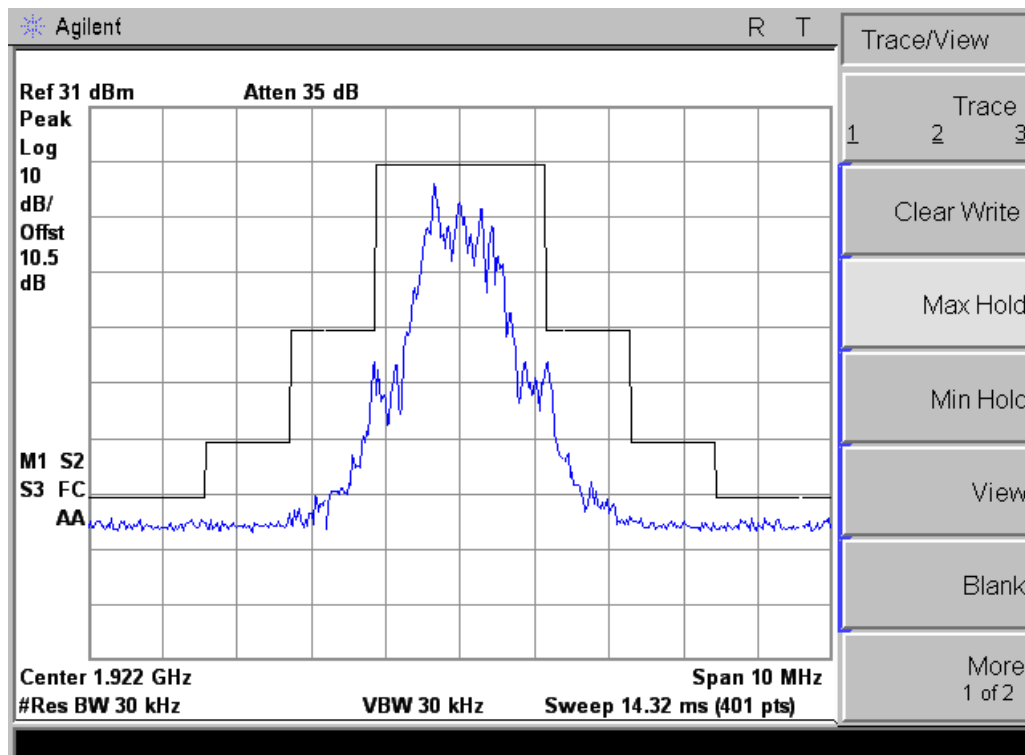
3.9 In-band emissions

3.9.1 Test limit - FCC 15.323(d)

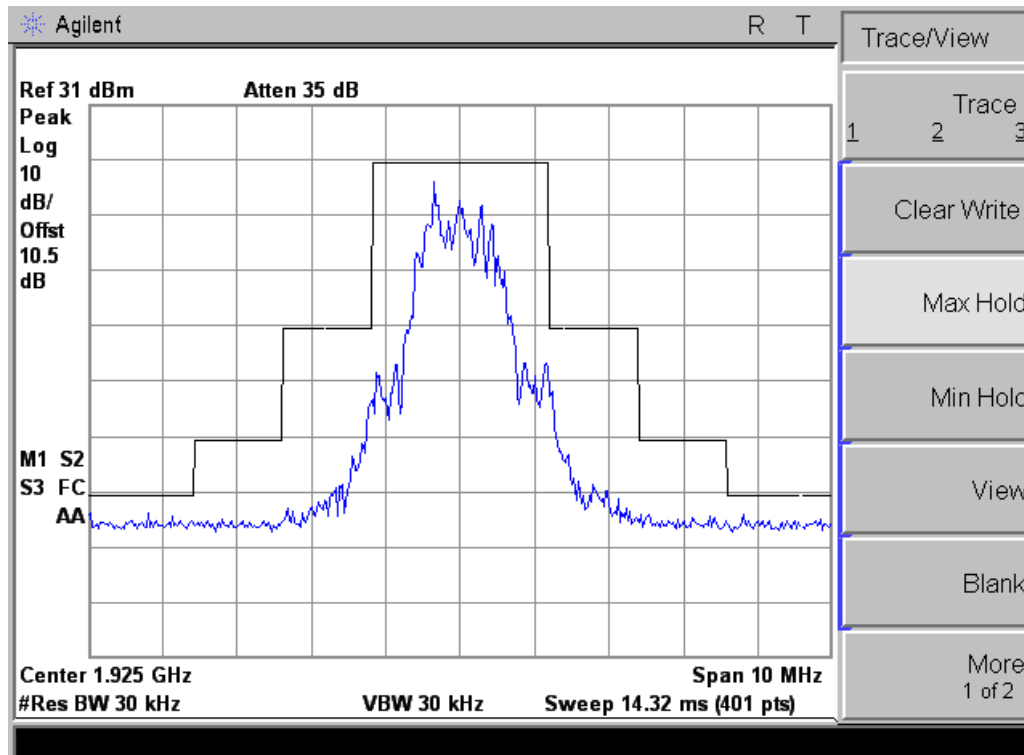
- (d) Emissions outside the sub-band shall be attenuated below a reference power of 112 milliwatts as follows: 30 dB between the sub-band and 1.25 MHz above or below the sub-band; 50 dB between 1.25 and 2.5 MHz above or below the sub-band; and 60 dB at 2.5 MHz or greater above or below the subband. Emissions inside the sub-band must comply with the following emission mask: In the bands between 1B and 2B measured from the center of the emission bandwidth the total power emitted by the device shall be at least 30 dB below the transmit power permitted for that device; in the bands between 2B and 3B measured from the center of the emission bandwidth the total power emitted by an intentional radiator shall be at least 50 dB below the transmit power permitted for that radiator; in the bands between 3B and the sub-band edge the total power emitted by an intentional radiator in the measurement bandwidth shall be at least 60 dB below the transmit power permitted for that radiator. "B" is defined as the emission bandwidth of the device in hertz. Compliance with the emission limits is based on the use of measurement instrumentation employing peak detector function with an instrument resolution bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement.

3.9.2 Test procedure - ANSI C63.17 sub-clause 6.1.6.1.

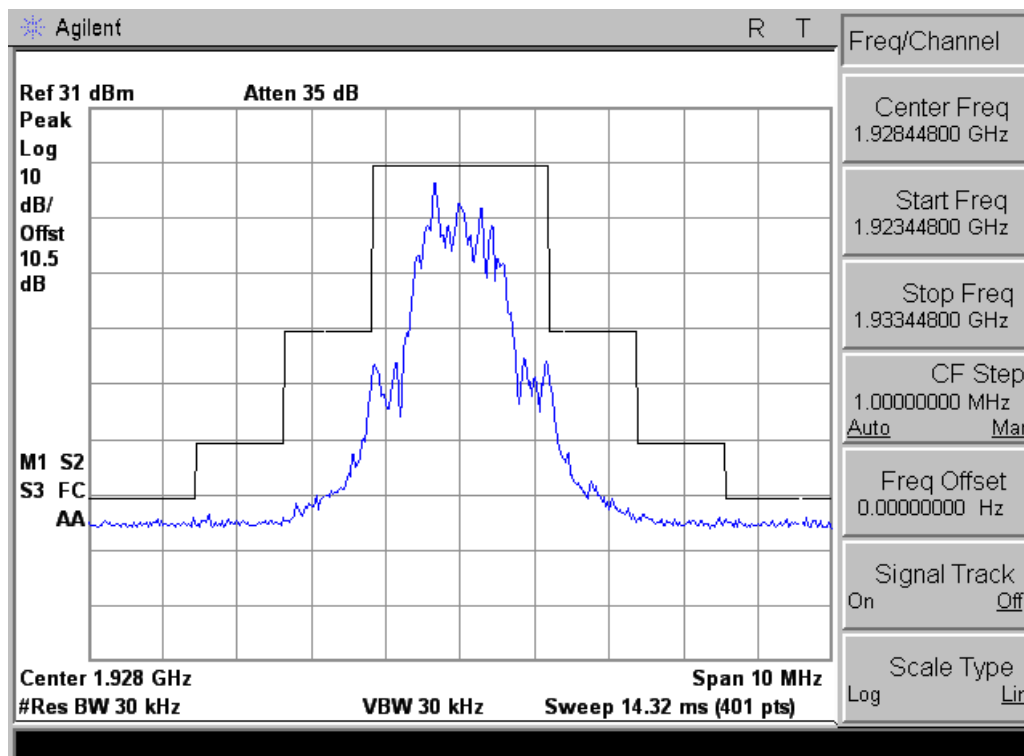
3.9.3 Test results



– In-band emission of Ch 1 –



– In-band emission of Ch 3 –



– In-band emission of Ch 5 –

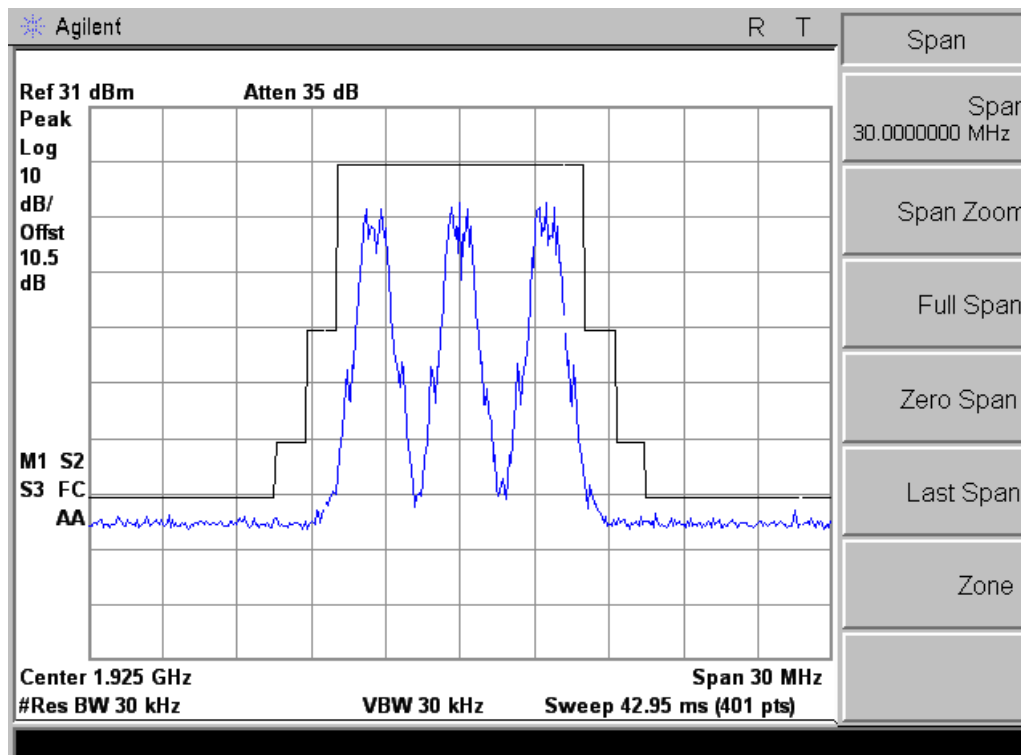
3.10 Out-of-band emissions

3.10.1 Test limit - FCC 15.323(d)

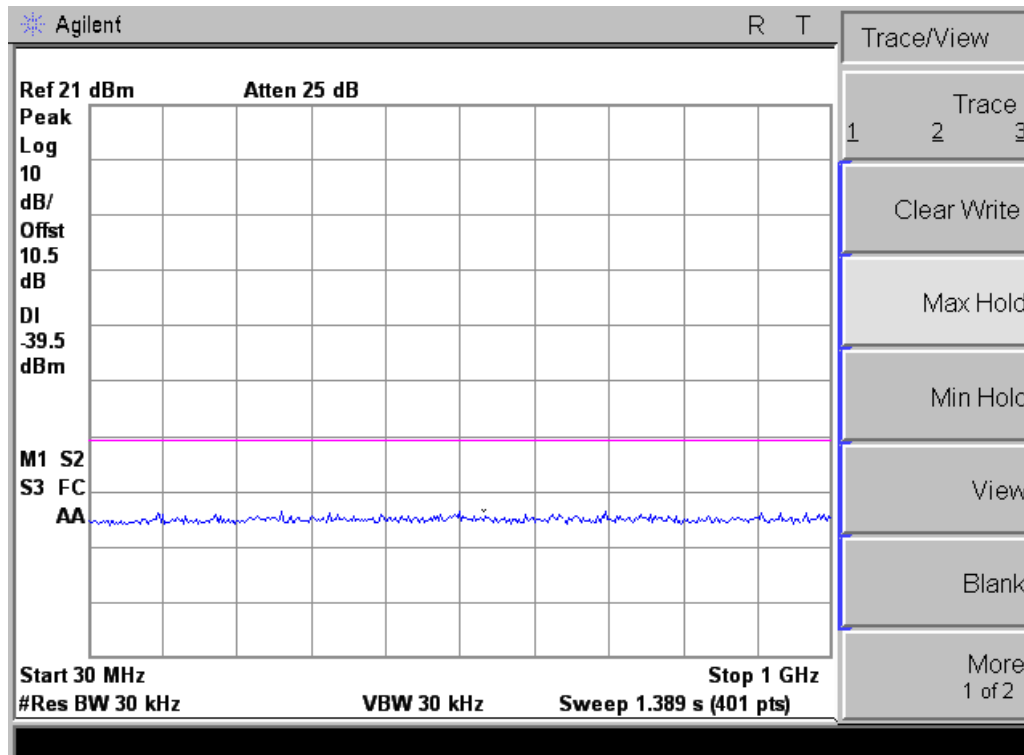
- (d) Emissions outside the sub-band shall be attenuated below a reference power of 112 milliwatts as follows: 30 dB between the sub-band and 1.25 MHz above or below the sub-band; 50 dB between 1.25 and 2.5 MHz above or below the sub-band; and 60 dB at 2.5 MHz or greater above or below the subband. Emissions inside the sub-band must comply with the following emission mask: In the bands between 1B and 2B measured from the center of the emission bandwidth the total power emitted by the device shall be at least 30 dB below the transmit power permitted for that device; in the bands between 2B and 3B measured from the center of the emission bandwidth the total power emitted by an intentional radiator shall be at least 50 dB below the transmit power permitted for that radiator; in the bands between 3B and the sub-band edge the total power emitted by an intentional radiator in the measurement bandwidth shall be at least 60 dB below the transmit power permitted for that radiator. "B" is defined as the emission bandwidth of the device in hertz. Compliance with the emission limits is based on the use of measurement instrumentation employing peak detector function with an instrument resolution bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement.

3.10.2 Test procedure - ANSI C63.17 sub-clause 6.1.6.2.

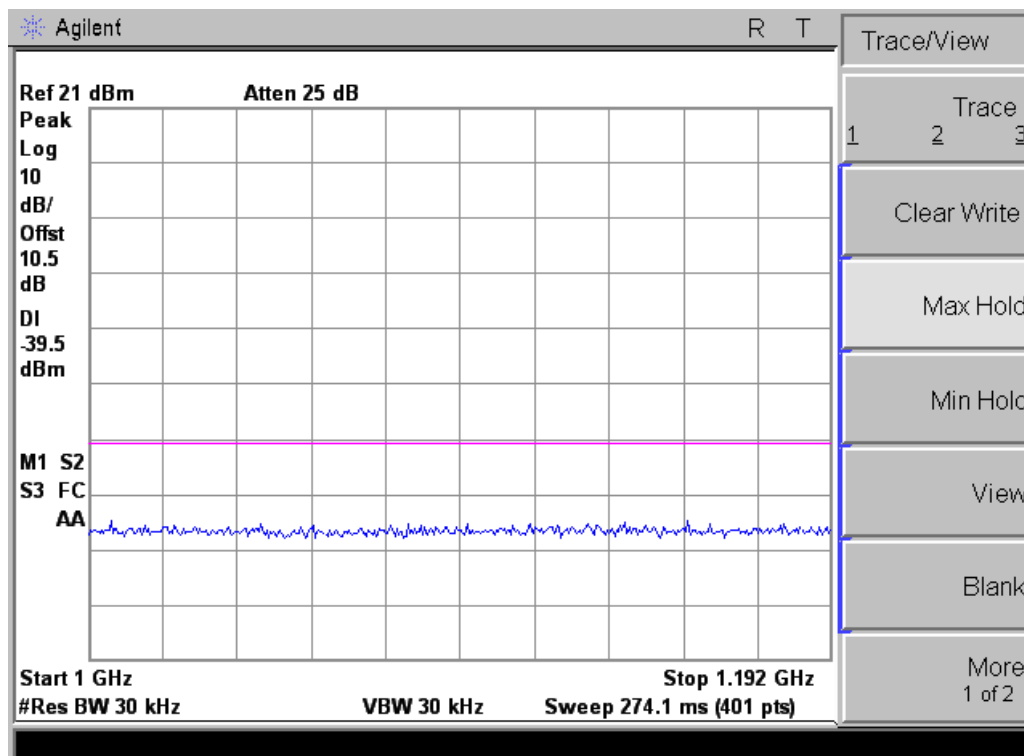
3.10.3 Test results



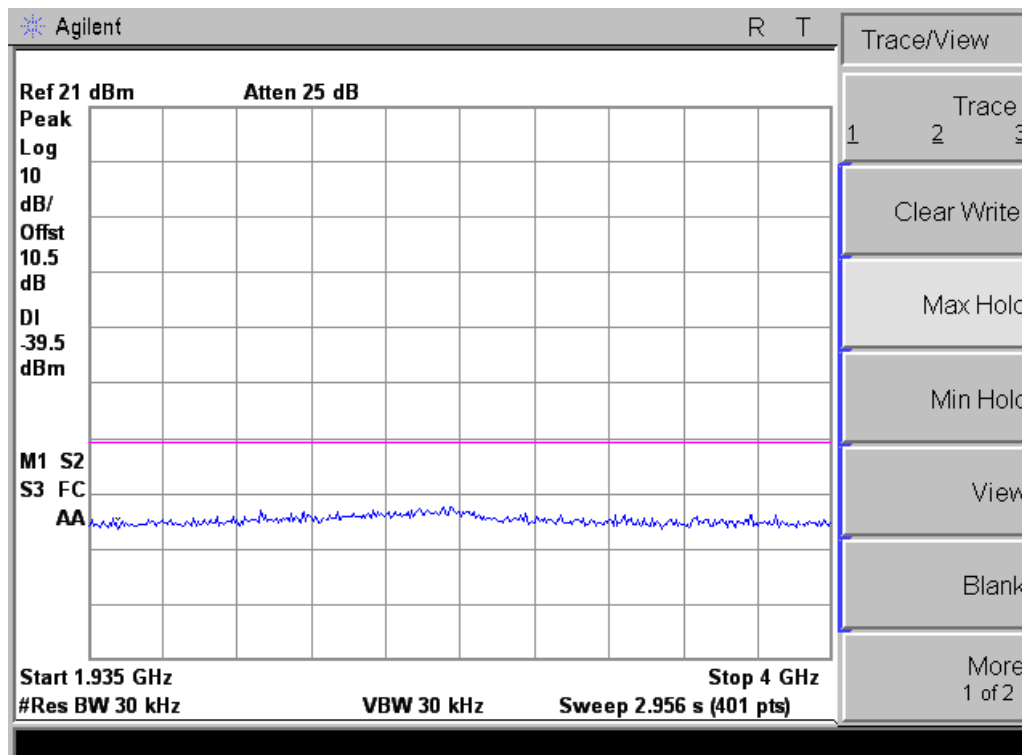
– Out-of-band emission –



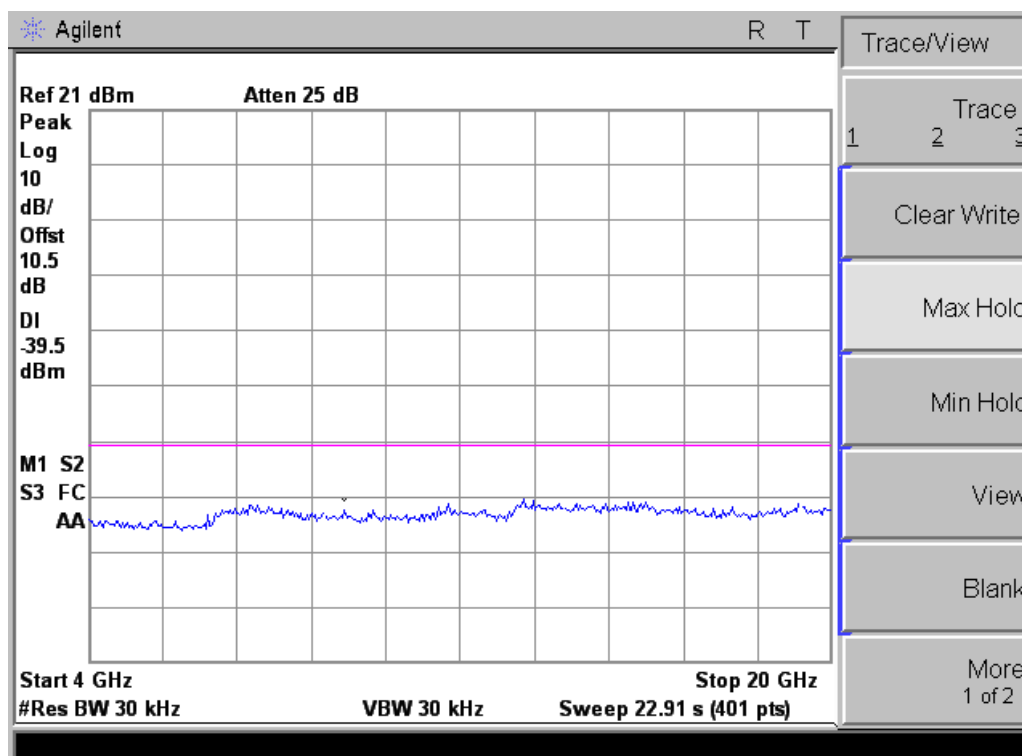
– Out-of-band emission of ch1 –



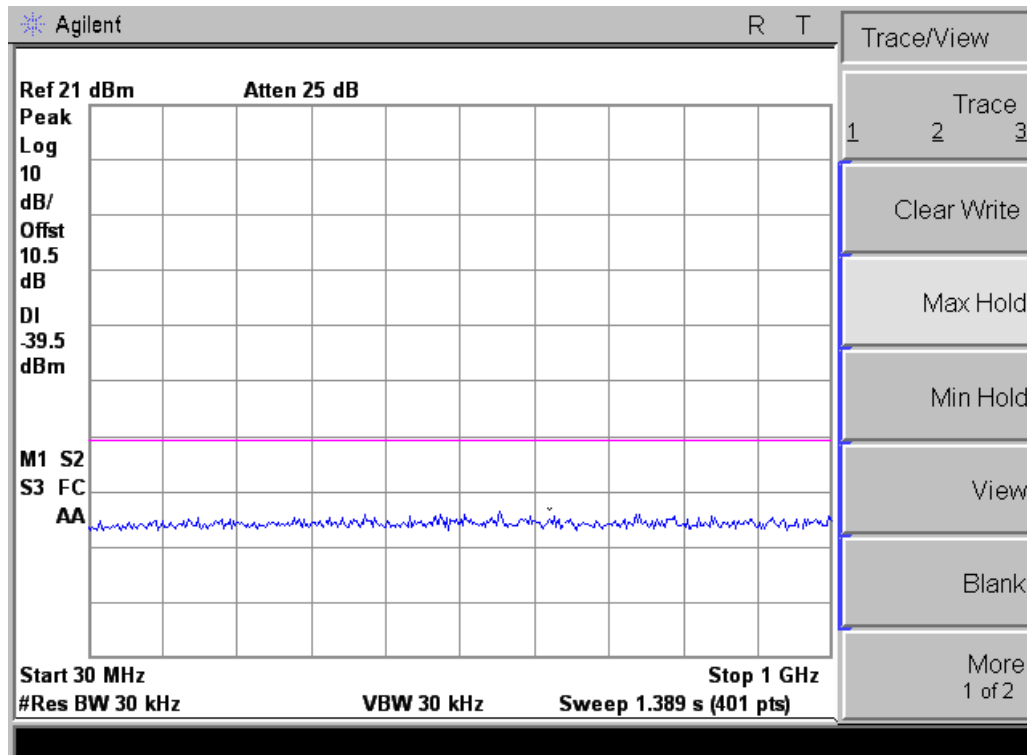
– Out-of-band emission of ch1 –



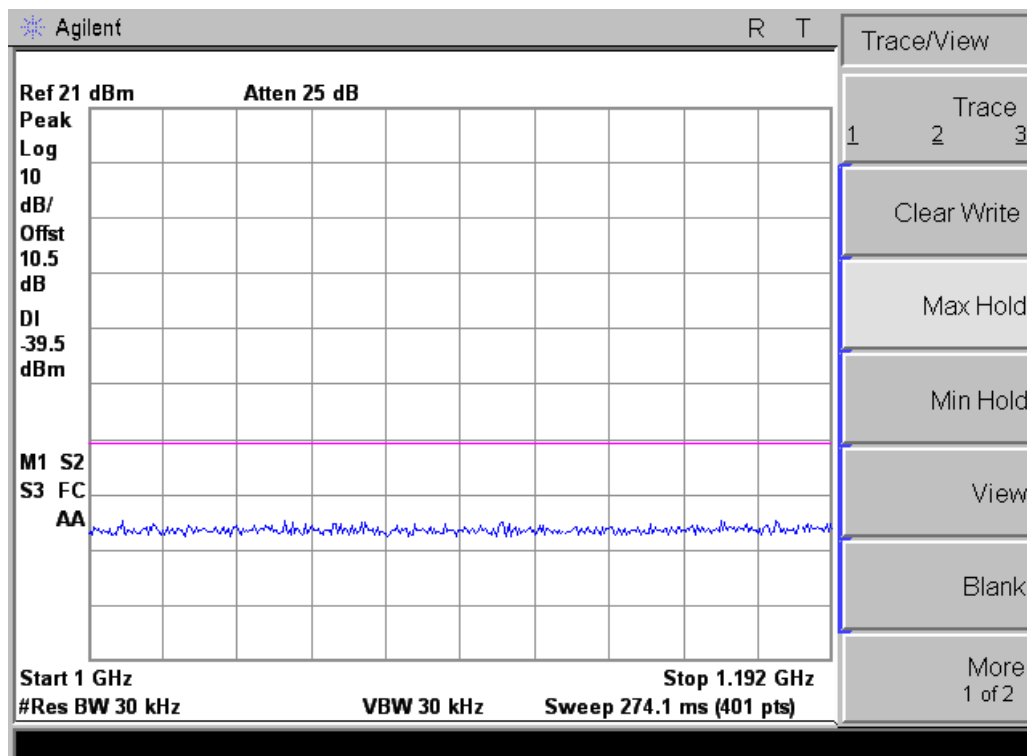
- Out-of-band emission of ch1 -



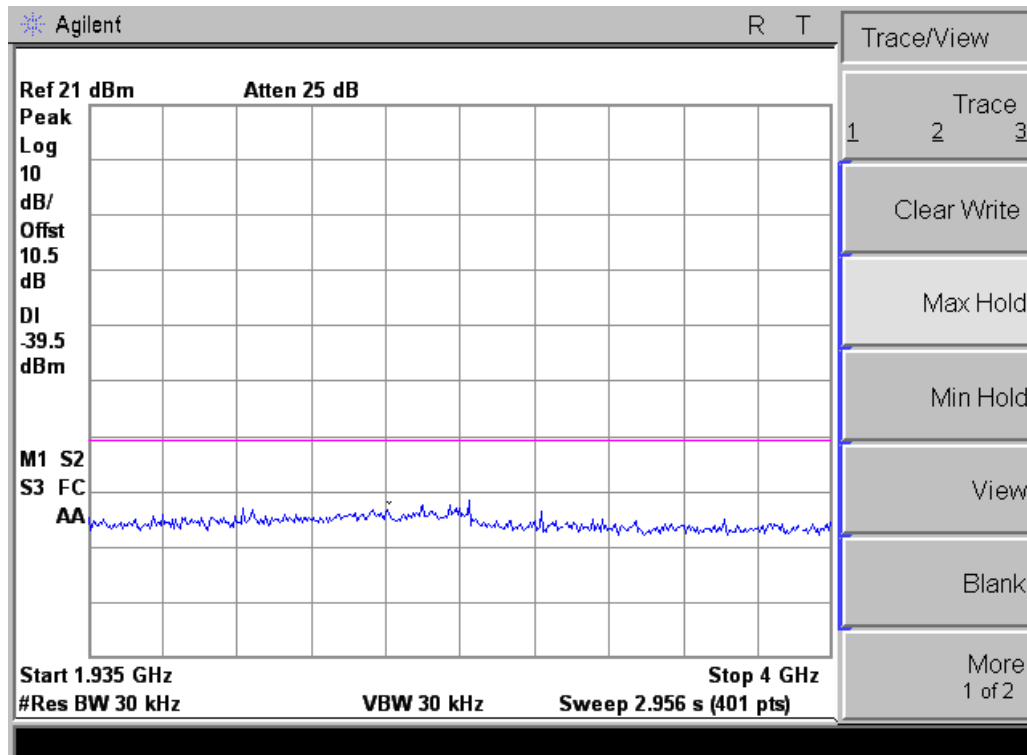
- Out-of-band emission of ch1 -



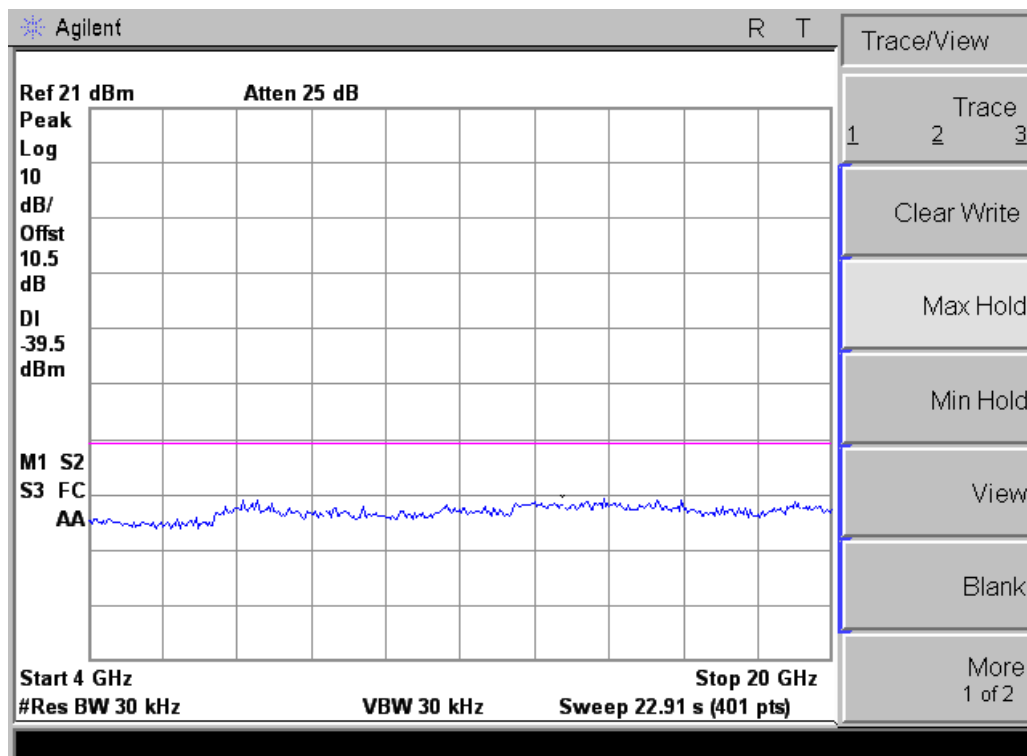
– Out-of-band emission of ch3 –



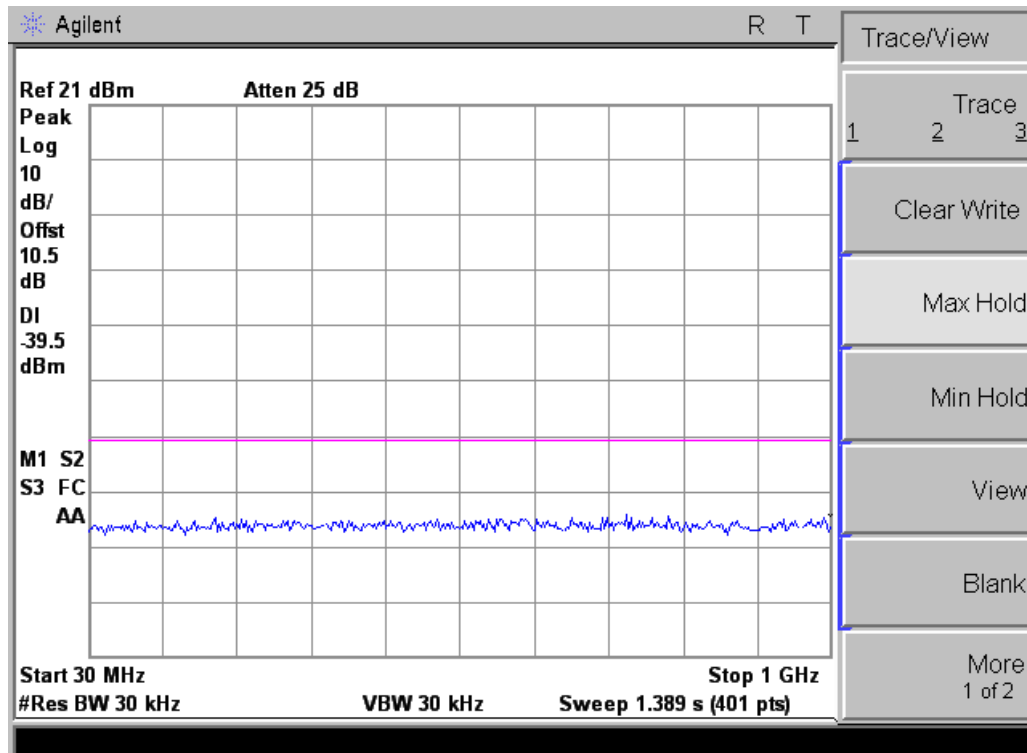
– Out-of-band emission of ch3 –



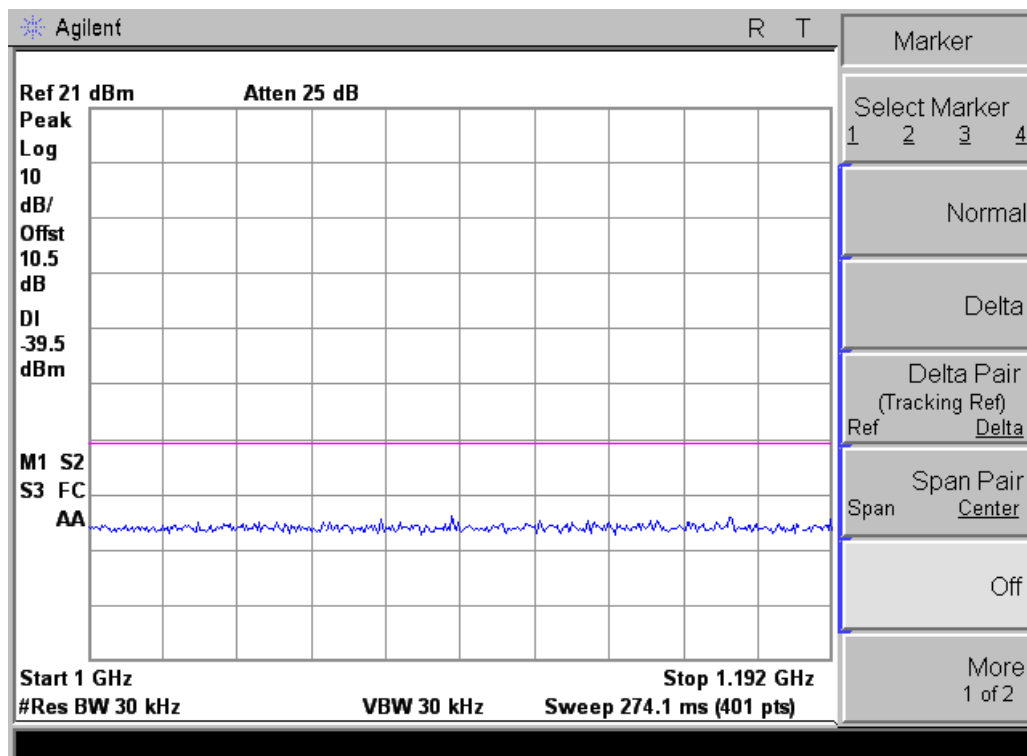
– Out-of-band emission of ch3 –



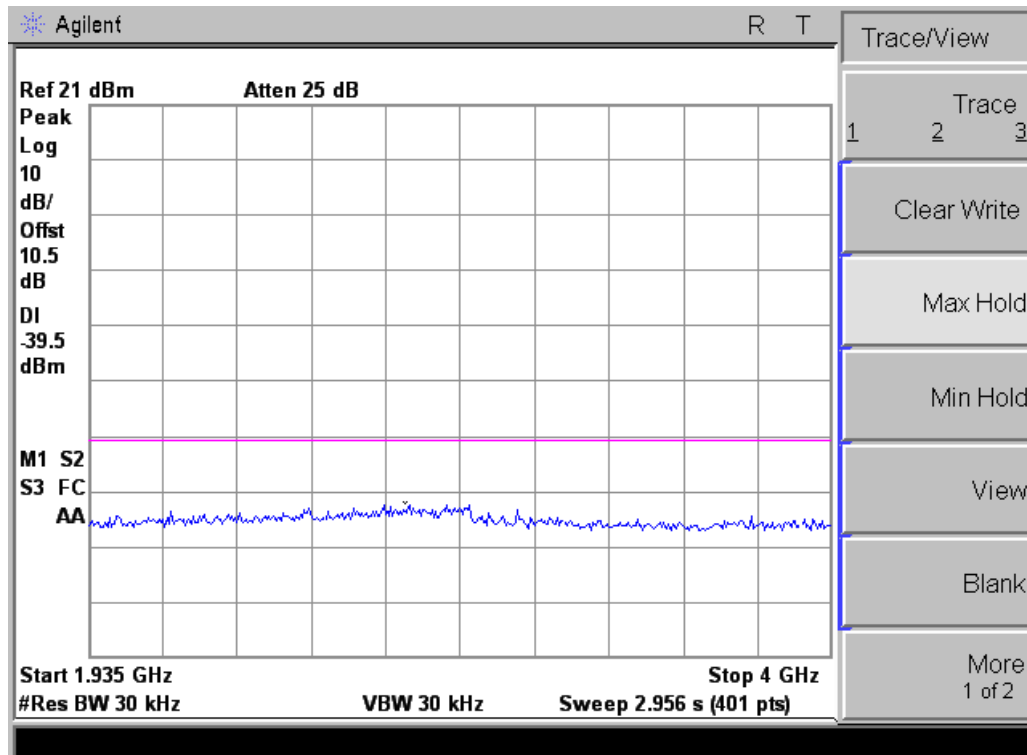
– Out-of-band emission of ch3 –



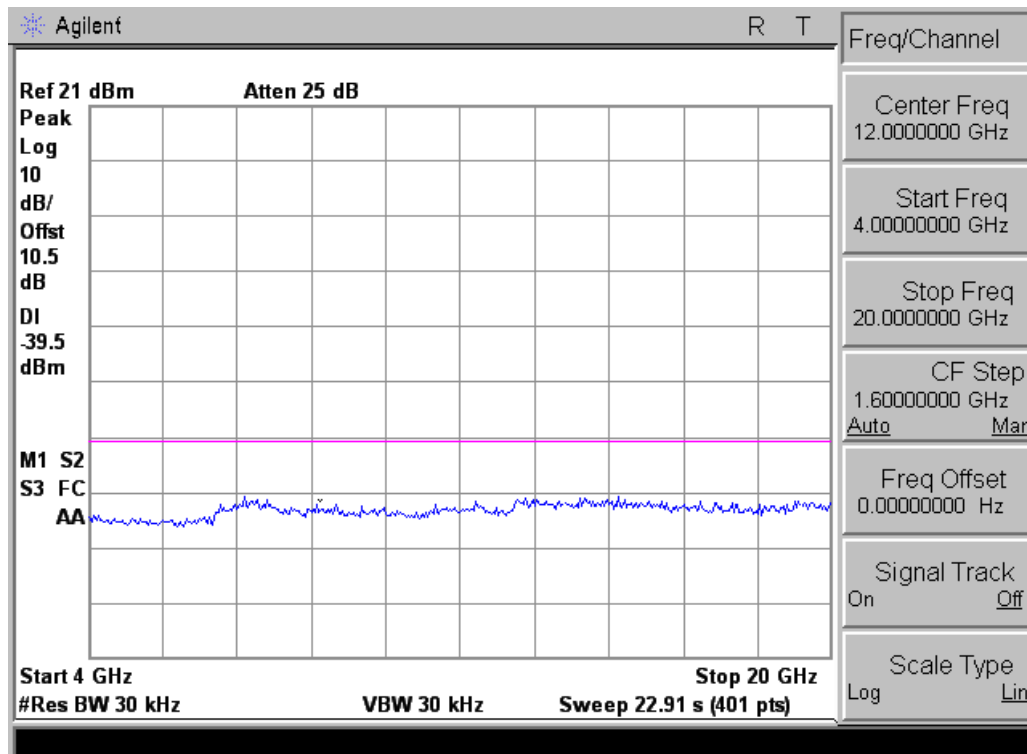
– Out-of-band emission of ch5 –



– Out-of-band emission of ch5 –



– Out-of-band emission of ch5 –



– Out-of-band emission of ch5 –

3.11 Carrier frequency stability

3.11.1 Test limit - FCC 15.323(f)

(f) The frequency stability of the carrier frequency of the intentional radiator shall be maintained within ± 10 ppm over 1 hour or the interval between channel access monitoring, whichever is shorter. The frequency stability shall be maintained over a temperature variation of -20 to +50 degrees C at normal supply voltage, and over a variation in the primary supply voltage of 85 percent to 115 percent of the rated supply voltage at a temperature of 20 °C. For equipment that is capable only of operating from a battery, the frequency stability tests shall be performed using a new battery without any further requirement to vary supply voltage.

3.11.2 Test procedure - ANSI C63.17 sub-clause 6.2.1.

3.11.3 Test results

I . Carrier Frequency Stability over time

Supply Voltage	Temperature (°C)	Peak to Peak Diff (kHz)	Max Dev.(ppm)	Limit (ppm)	Verdict
V _{nom}	+23	+1	+0.5	± 10	Complies

II . Carrier Frequency Stability over Power Supply Voltage

* This test does not apply for EUT that is powered from battery.

Supply Voltage	Temperature (°C)	Measured Frequency Offset Over an hour (ppm)	Limit (ppm)	Verdict
85 %	+23	N/A	± 10	N/A
115%	+23	N/A	± 10	N/A

III. Carrier Frequency Stability over Temperature

Supply Voltage	Temperature (°C)	Measured Frequency Offset Over an hour (ppm)	Limit (ppm)	Verdict
Nominal	-20	+1.5	± 10	Complies
	-10	+1.5		
	0	+2.0		
	+10	-1.0		
	+20	-1.5		

	+30	-1.0		
	+40	-1.0		
	+50	-0.5		

3.12 Frame repetition stability

3.12.1 Test limit - FCC 15.323(e)

(e) The frame period (a set of consecutive time slots in which the position of each time slot can be identified by reference to a synchronizing source) of an intentional radiator operating in these subbands shall be 20 milliseconds/X where X is a positive whole number. Each device that implements time division for the purposes of maintaining a duplex connection on a given frequency carrier shall maintain a frame repetition rate with a frequency stability of at least 50 parts per millions (ppm). Each device which further divides access in time in order to support multiple communication links on a given frequency carrier shall maintain a frame repetition rate with a frequency stability of at least 10 ppm. The jitter (time-related, abrupt, spurious variations in the duration of the frame interval) introduced at the two ends of such a communication link shall not exceed 25 microseconds for any two consecutive transmissions. Transmissions shall be continuous in every time and spectrum window during the frame period defined for the device.

Limit :

Frame Repetition Stability (ppm)	± 10 ppm (TDMA)
----------------------------------	---------------------

3.12.2 Test procedure - ANSI C63.17 sub-clause 6.2.2.

3.12.3 Test results

Maximum Frame Repetition Stability (ppm)	Limit (ppm)	Verdict
-0.22	10	Complies

3.13 Frame Period and Jitter

3.13.1 Test limit - FCC 15.323(e)

(e) The frame period (a set of consecutive time slots in which the position of each time slot can be identified by reference to a synchronizing source) of an intentional radiator operating in these subbands shall be 20 milliseconds/X where X is a positive whole number. Each device that implements time division for the purposes of maintaining a duplex connection on a given frequency carrier shall maintain a frame repetition rate with a frequency stability of at least 50 parts per millions (ppm). Each device which further divides access in time in order to support multiple communication links on a given frequency carrier shall maintain a frame repetition rate with a frequency stability of at least 10 ppm. The jitter (time-related, abrupt, spurious variations in the duration of the frame interval) introduced at the two ends of such a communication link shall not exceed 25 microseconds for any two consecutive transmissions. Transmissions shall be continuous in every time and spectrum window during the frame period defined for the device.

3.13.2 Test procedure - ANSI C63.17 sub-clause 6.2.3.

3.13.3 Test results

Measured Maximum Jitter (μ s)	Lmiit (μ s)	Verdict
+0.87	25	Complies

3.14 Monitoring time

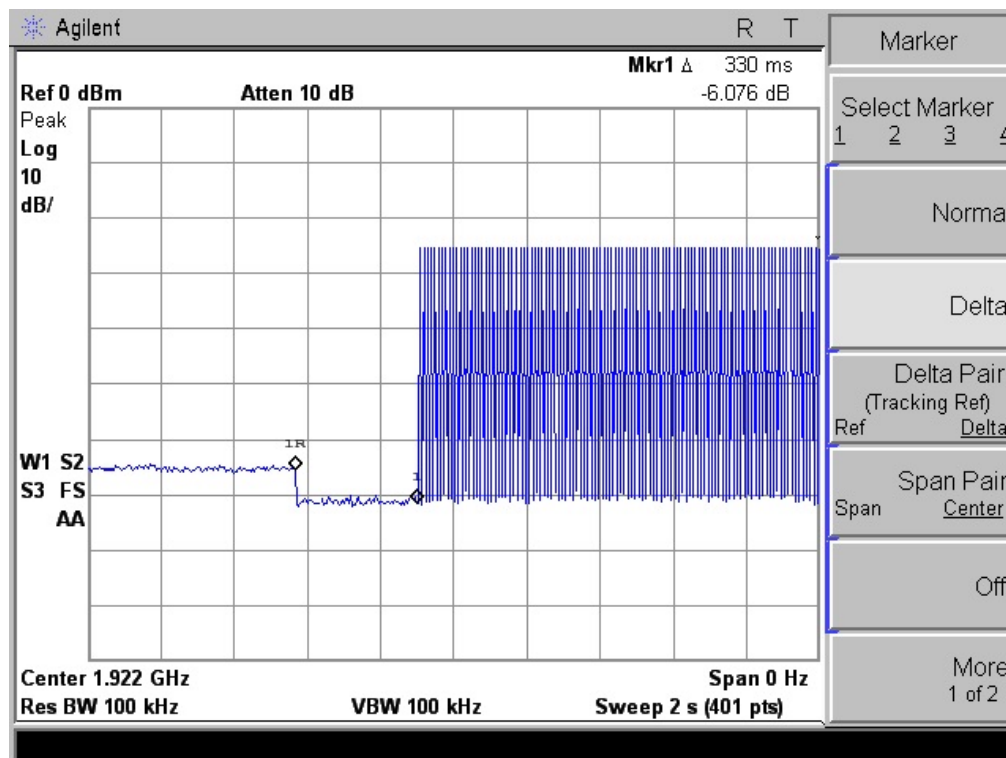
3.14.1 Test limit - FCC 15.323(c)

- (c) Devices must incorporate a mechanism for monitoring the time and spectrum windows that its transmission is intended to occupy. The following criteria must be met:
- (1) Immediately prior to initiating transmission, devices must monitor the combined time and spectrum windows 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.

3.14.2 Test procedure - ANSI C63.17 sub-clause 7.3.3.

3.14.3 Test results

Measured monitoring time (ms)	Lmiit (ms)	Verdict
330	greater than 10 ms	Complies



– Monitoring time –

3.15 Monitoring threshold

3.15.1 Test limit - FCC 15.323(c)(2)(9)

- (c) Devices must incorporate a mechanism for monitoring the time and spectrum windows that its transmission is intended to occupy. The following criteria must be met:
- (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.
- (9) Devices that have a power output lower than the maximum permitted under the rules may increase their monitoring detection threshold by one decibel for each one decibel that the transmitter power is below the maximum permitted.

3.15.2 Test procedure - ANSI C63.17 sub-clause 7.3.1.

Calculation of Monitoring Threshold Limit:

Lower monitoring threshold : $T_L \leq (-174 + 10\log B + M_L + P_{MAX} - P_{EUT})$ dBm

Upper monitoring threshold : $T_U \leq (-174 + 10\log B + M_U + P_{MAX} - P_{EUT})$ dBm

Where, B = Measured Emission Bandwidth : 1.20×10^6 Hz

M = 30 dB for Lower Monitoring Threshold / 50 dB for Upper Monitoring Threshold

$P_{MAX} = 5\log_{10} B - 10$ dBm = 20.4 dBm

P_{EUT} = Measured Peak Transmit Power : 18.39 dBm

Calculated lower Monitoring Threshold (dBm)	-81.20
Calculated upper Monitoring Threshold (dBm)	-61.20

3.15.3 Test results

The Upper Threshold is applicable for systems with more than 40 duplex system access channels and that implements the Least Interfered Channel Procedure (LIC).

Lower Monitoring Threshold (dBm)	--	N/A
Upper Monitoring Threshold (dBm)	-65.50	Pass

3.16 Maximum transmit time

3.16.1 Test limit - FCC 15.323(c)(3)

- (c) Devices must incorporate a mechanism for monitoring the time and spectrum windows that its transmission is intended to occupy. The following criteria must be met:
- (3) If no signal above the threshold level is detected, transmission may commence and continue with the same emission bandwidth in the monitored time and spectrum windows without further monitoring. However, 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.

3.16.2 Test procedure - ANSI C63.17 sub-clause 8.2.2.

3.16.3 Attestation

The maximum transmission time is 14400 seconds (4 hours).

3.17 System acknowledgement

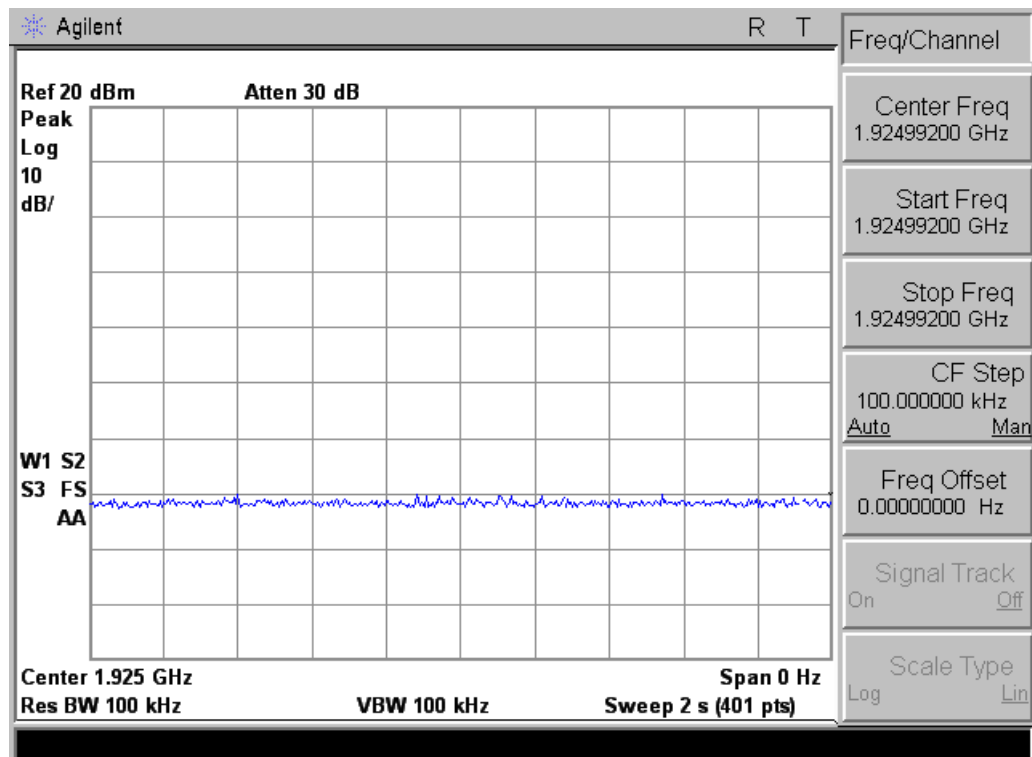
3.17.1 Test limit - FCC 15.323(c)(4)

- (c) Devices must incorporate a mechanism for monitoring the time and spectrum windows that its transmission is intended to occupy. The following criteria must be met:
- (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 signalling information may transmit continuously for 30 seconds without receiving an acknowledgement, at which time the access criteria must be repeated.

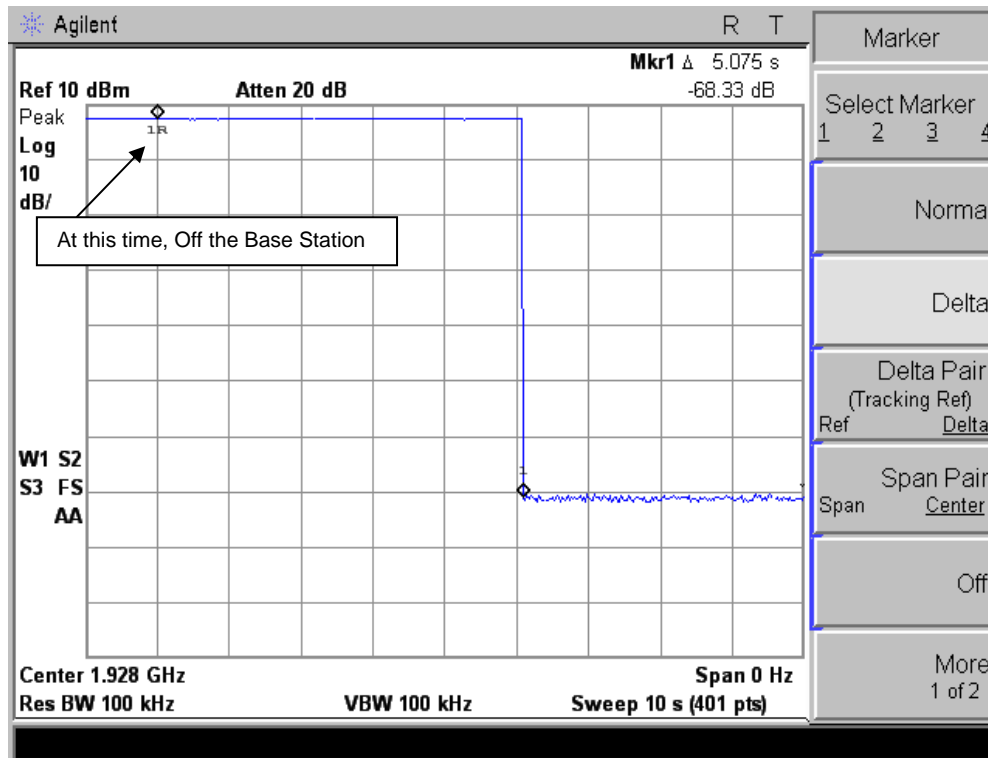
3.17.2 Test procedure - ANSI C63.17 sub-clause 8.1.1 & 8.2.1

3.17.3 Test results

Test	Result (s)	Limit (s)	Verdict
Initial transmission without acknowledgements	0	1	Complies
Transmission time after loss of acknowledgements	5.07	30	Complies



– Initial transmission without acknowledgements –



– Transmission time after loss of acknowledgements –

3.18 Least Interfered Channel & Channel confirmation

3.18.1 Test limit - FCC 15.323(c)(5)

- (c) Devices must incorporate a mechanism for monitoring the time and spectrum windows that its transmission is intended to occupy. The following criteria must be met:
- (5) If access to spectrum is not available as determined by the above, and a minimum of 20 duplex system access channels are defined for the system, the time and spectrum windows with the lowest power level may be accessed. A device utilizing the provisions of this paragraph must have monitored all access channels defined for its system within the last 10 seconds and must verify, within the 20 milliseconds (40 milliseconds for devices designed to use a 20 milliseconds frame period) immediately preceding actual channel access that the detected power of the selected time and spectrum windows is no higher than the previously detected value. The power measurement resolution for this comparison must be accurate to within 6 dB. No device or group of co-operating devices located within 1 meter of each other shall during any frame period occupy more than 6 MHz of aggregate bandwidth, or alternatively, more than one third of the time and spectrum windows defined by the system.

3.18.2 Test procedure - ANSI C63.17 sub-clause 7.3.3

Calculated Lower monitoring threshold : -81.20 dBm

Calculated Upper monitoring threshold : -61.20 dBm

The upper threshold is applicable for systems with more than 40 duplex system access channels and that implements the Least Interfered Channel Procedure (LIC).

3.18.3 Test results

Test	Results	Verdict
Apply interference on CH1 at level $T_L + U_m + 7$ dB Apply interference on CH5 at level $T_L + U_m$ dB	Transmission always on CH5	Complies
Apply interference on CH1 at level $T_L + U_m$ dB Apply interference on CH5 at level $T_L + U_m + 7$ dB	Transmission always on CH1	Complies
Apply interference on CH1 at level $T_L + U_m + 1$ dB Apply interference on CH5 at level $T_L + U_m - 6$ dB	Transmission always on CH5	Complies
Apply interference on CH1 at level $T_L + U_m - 6$ dB Apply interference on CH5 at level $T_L + U_m + 1$ dB	Transmission always on CH1	Complies

3.19 Random waiting

3.19.1 Test limit - FCC 15.323(c)(6)

- (c) Devices must incorporate a mechanism for monitoring the time and spectrum windows that its transmission is intended to occupy. The following criteria must be met:
- (6) If the selected combined time and spectrum windows are unavailable, the device may either monitor and select different windows or seek to use the same windows after waiting an amount of time, randomly chosen from a uniform random distribution between 10 and 150 milliseconds, commencing when the channel becomes available.

3.19.2 Test procedure - ANSI C63.17 sub-clause 8.1.3

3.19.3 Attestation

The option 15.323(c)(6) is not implemented by this product.

3.20 Monitoring Bandwidth

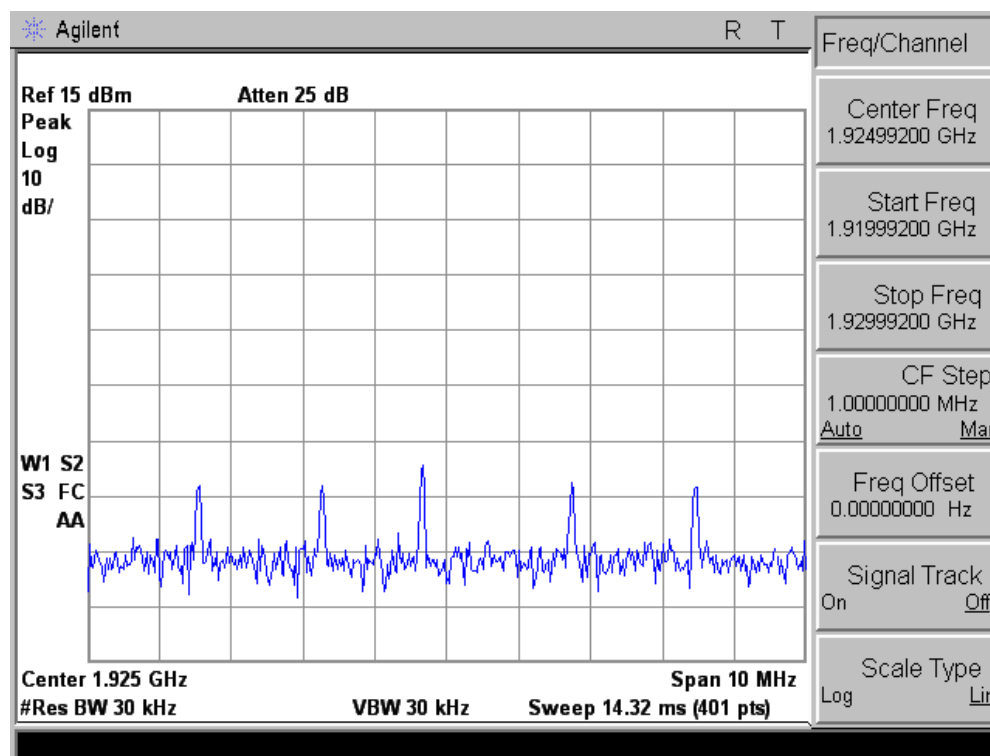
3.20.1 Test limit - FCC 15.323(c)(7)

- (c) Devices must incorporate a mechanism for monitoring the time and spectrum windows that its transmission is intended to occupy. The following criteria must be met:
- (7) The monitoring system bandwidth must be equal to or greater than the emission bandwidth of the intended transmission and have a maximum reaction time less than $50 \times \text{SQRT}(1.25/\text{emission bandwidth in MHz})$ microseconds for signals at the applicable threshold level but shall not be required to be less than 50 microseconds.

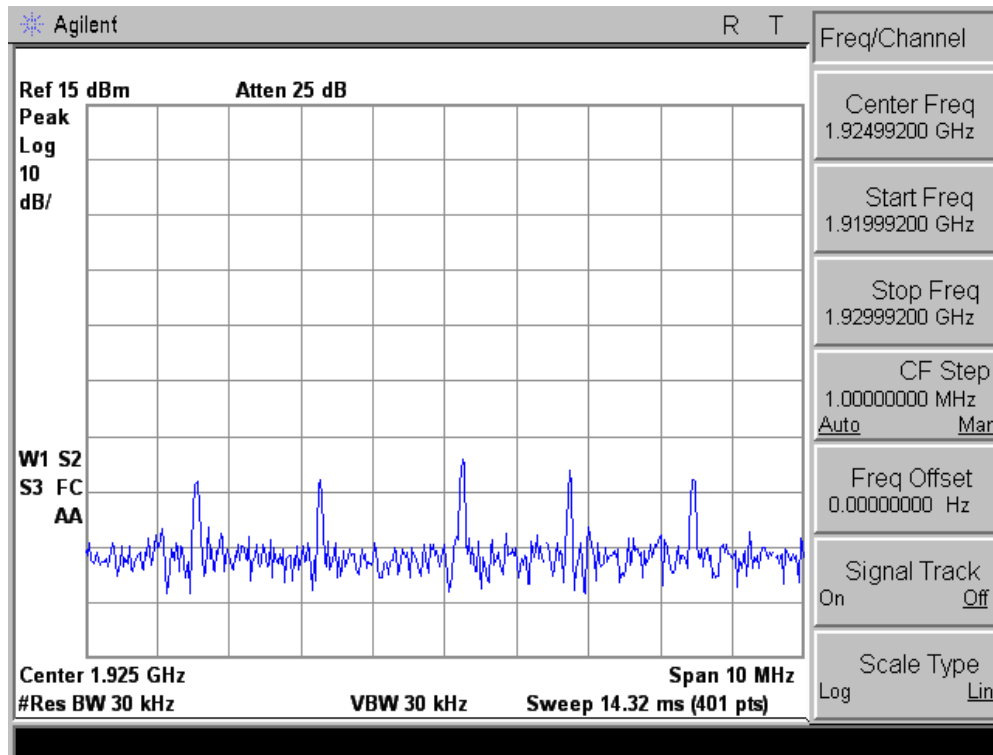
3.20.2 Test procedure - ANSI C63.17 sub-clause 7.4.2 – more detailed test

3.20.3 Test results

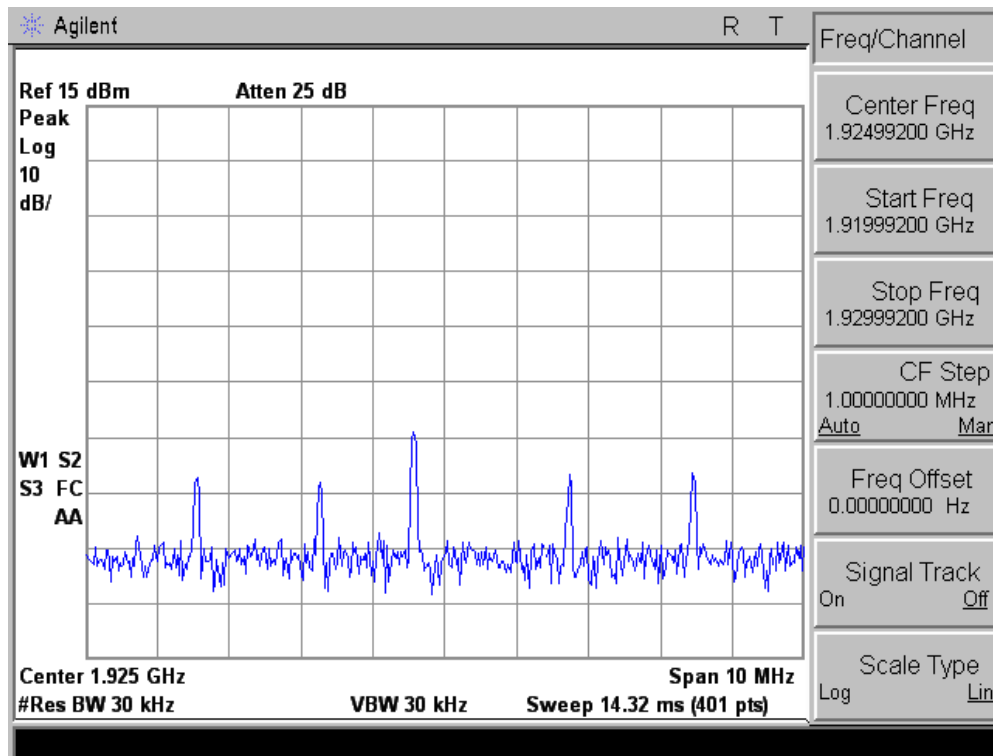
Test frequency	Test level (above $T_U + U_M$)	Result	Verdict
-6 dB points	-55.20 dBm	No transmission	Complies
-12 dB points	-49.20 dBm	No transmission	Complies



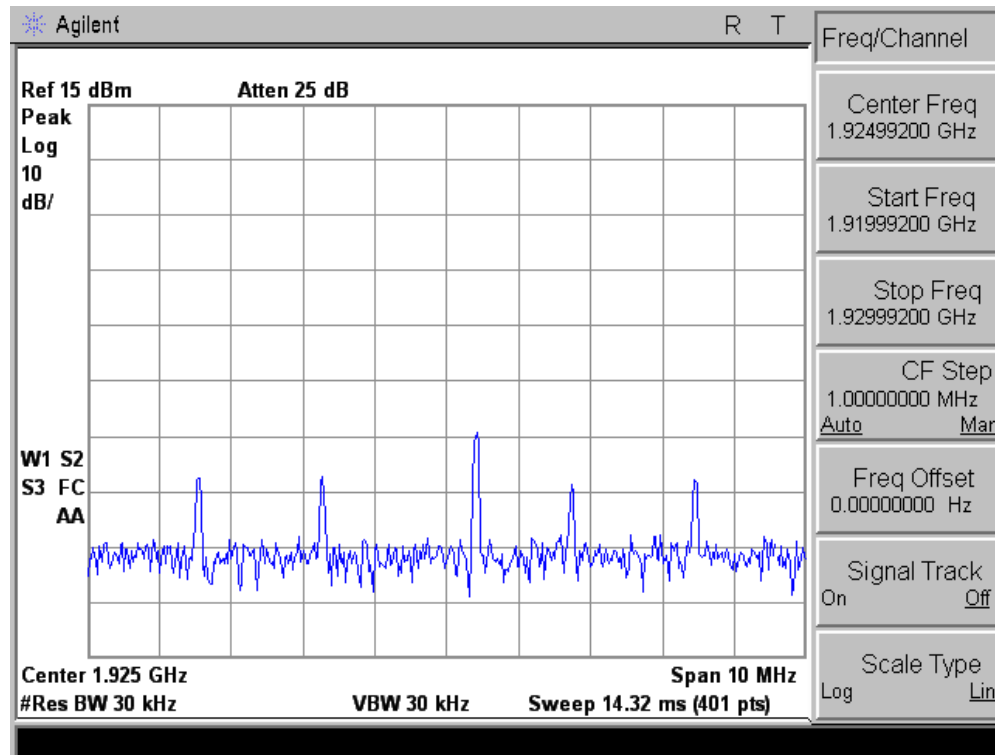
– Interference level on -6 dB lower point –



– Interference level on +6 dB higher point –



– Interference level on -12 dB lower point –



– Interference level on +12 dB higher point –

3.21 Maximum reaction time

3.21.1 Test limit - FCC 15.323(c)(7)

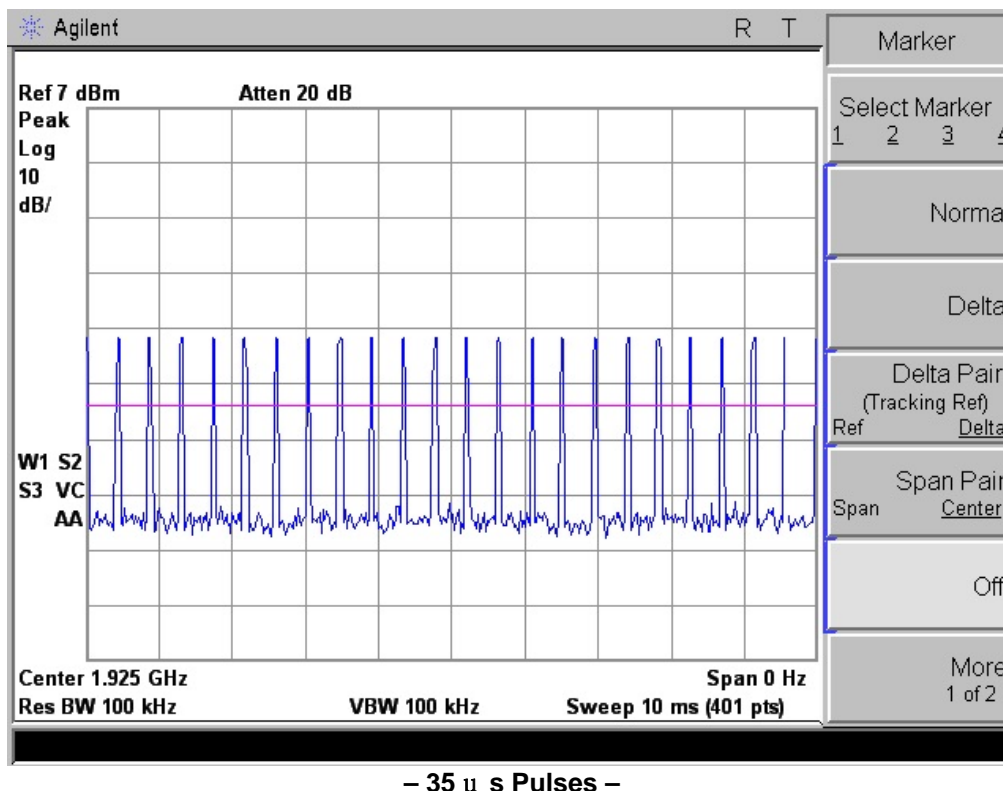
- (c) Devices must incorporate a mechanism for monitoring the time and spectrum windows that its transmission is intended to occupy. The following criteria must be met:
- (7) If a signal is detected that is 6 dB or more above the applicable threshold level, the maximum reaction time shall be $35 \times \text{SQRT}(1.25/\text{emission bandwidth in MHz})$ microseconds but shall not be required to be less than 35 microseconds.

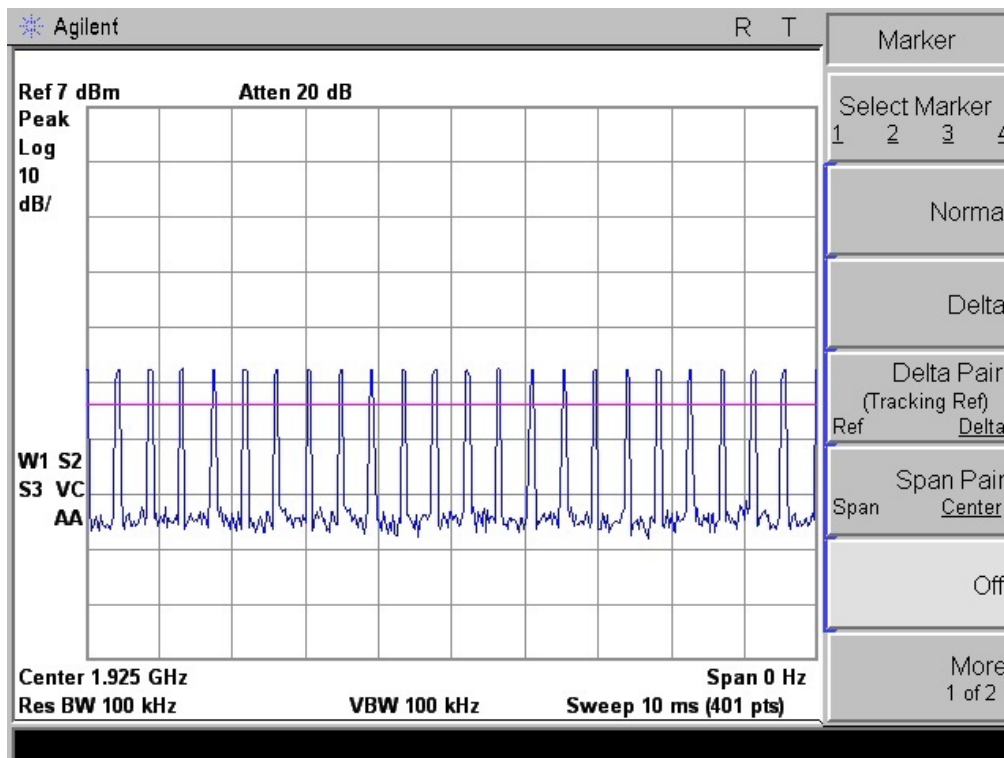
3.21.2 Test procedure - ANSI C63.17 sub-clause 7.5.

3.21.3 Test results

Pulse Width	Results	Verdict
35 us	No transmission	Complies
50 us	No transmission	Complies

* Since Emission bandwidth is greater than 1.25 MHz the test was performed with pulse lengths 35 & 50 us.





– 50 μ s pulses –

3.22 Monitoring antenna

3.22.1 Test limit - FCC 15.323(c)(8)

- (c) Devices must incorporate a mechanism for monitoring the time and spectrum windows that its transmission is intended to occupy. The following criteria must be met:
- (8) The monitoring system shall use the same antenna used for transmission, or an antenna that yields equivalent reception at that location.

3.22.2 Test procedure - ANSI C63.17 sub-clause 4

3.22.3 Attestation

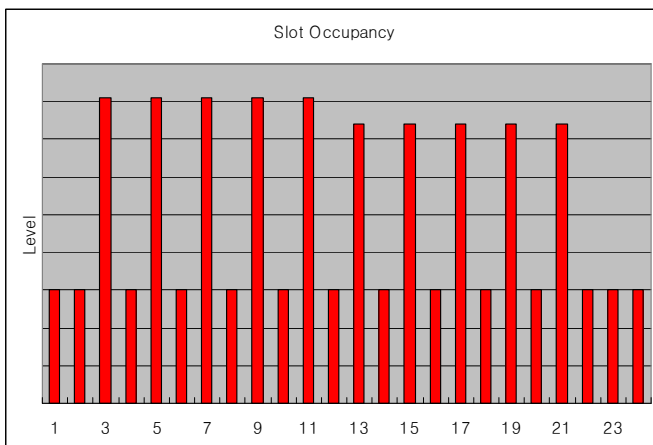
EUT uses the same antenna used for transmission and monitoring that is in compliance meet above provision.

3.23 Duplex Connections

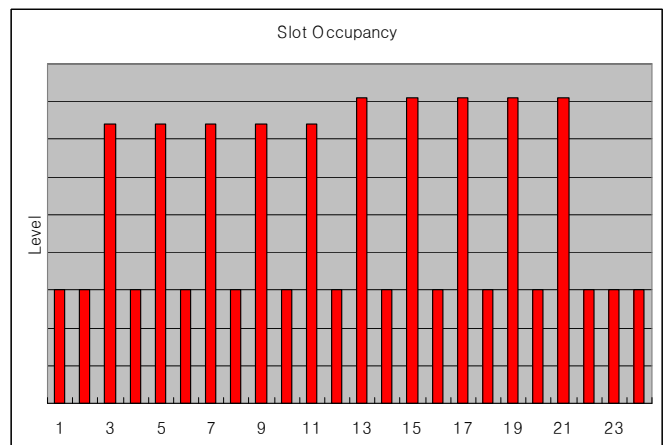
3.23.1 Test limit - FCC 15.323(c)(10)

- (c) Devices must incorporate a mechanism for monitoring the time and spectrum windows that its transmission is intended to occupy. The following criteria must be met:
- (10) An initiating device may attempt to establish a duplex connection by monitoring both its intended transmit and receive time and spectrum windows. If both the intended transmit and receive time and spectrum windows meet the access criteria, then the initiating device can initiate a transmission in the intended transmit time and spectrum window. If the power detected by the responding device can be decoded as a duplex connection signal from the initiating device, then the responding device may immediately begin transmitting on the receive time and spectrum window monitored by the initiating device.

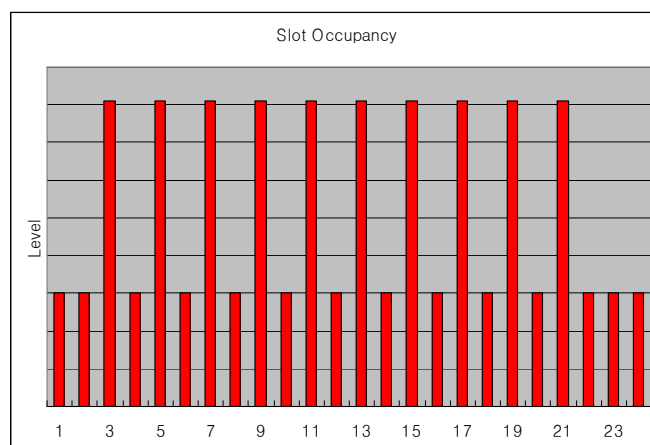
3.23.2 Test procedure - ANSI C63.17 sub-clause 8.3.2



– Slot Occupancy for clause 8.3.2(c) –

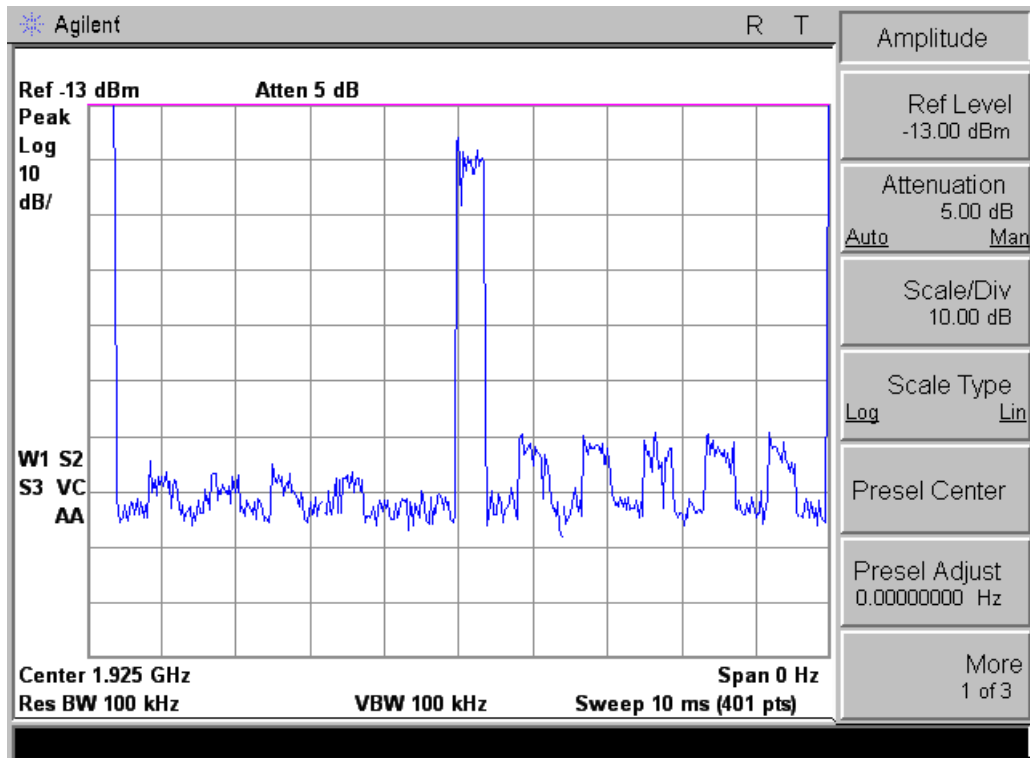


– Slot Occupancy for clause 8.3.2(e) –

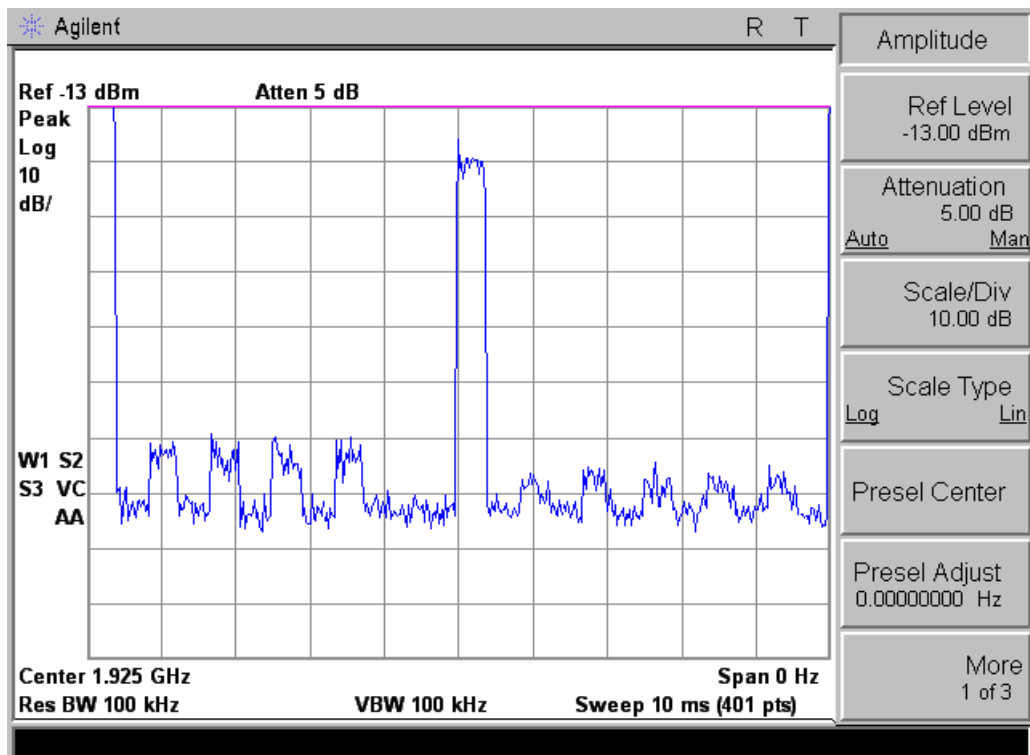


– Slot Occupancy for clause 8.3.2(f) –

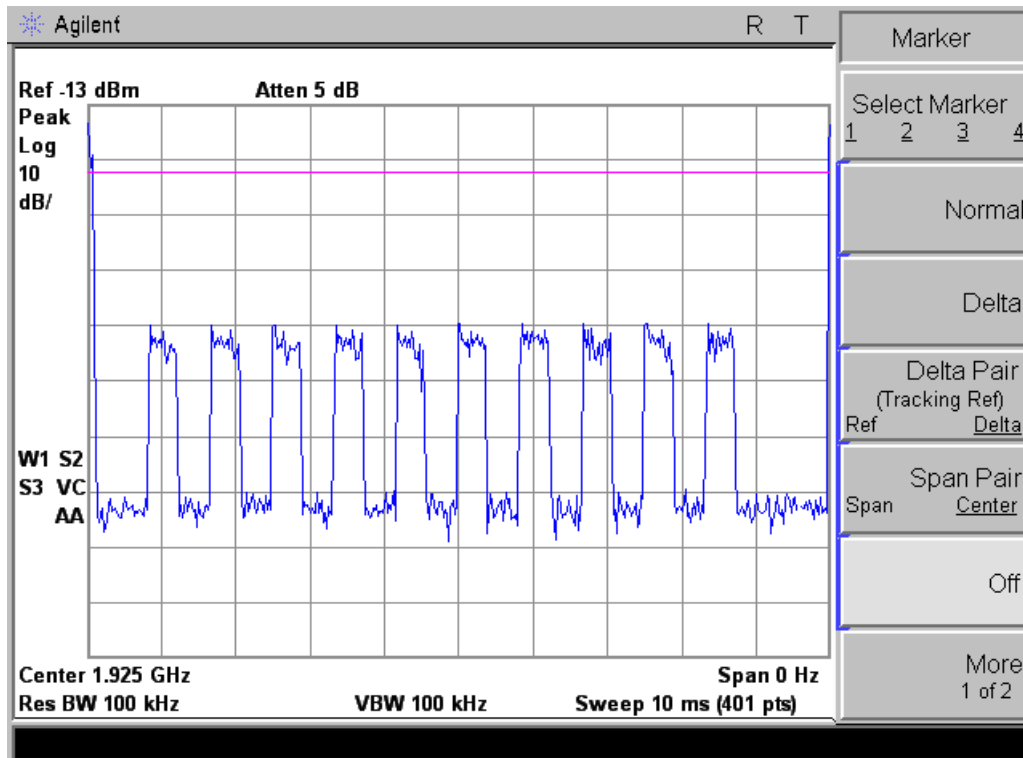
3.23.3 Test results



– EUT transmits on interference free receive slot –



– EUT transmits on interference free transmit slot –



– Slot Occupancy for clause 8.3.2(f) & No connection was established –

Test	Results	Verdict
Slot Occupancy for clause 8.3.2(c)	Transmission on interference-free receive time/spectrum window	Complies
Slot Occupancy for clause 8.3.2(e)	Transmission on interference-free transmit time/spectrum window	Complies
Slot Occupancy for clause 8.3.2(f)	No transmission	Complies

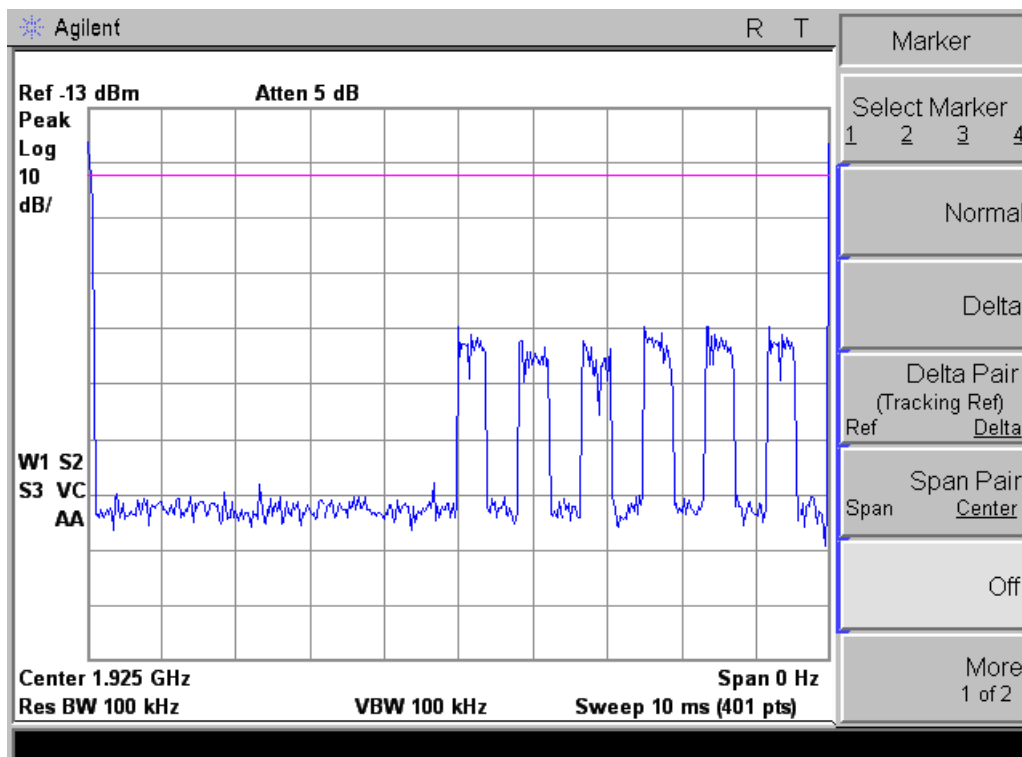
3.24 Alternative Monitoring Interval for Co-located Device

3.24.1 Test limit - FCC 15.323(c)(11)

- (c) Devices must incorporate a mechanism for monitoring the time and spectrum windows that its transmission is intended to occupy. The following criteria must be met:
- (11) An initiating device that is prevented from monitoring during its intended transmit window due to monitoring system blocking from the transmissions of a co-located (within one meter) transmitter of the same system, may monitor the portions of the time and spectrum windows in which they intend to receive over a period of at least 10 milliseconds. The monitored time and spectrum window must total at least 50 percent of the 10 millisecond frame interval and the monitored spectrum must be within 1.25 MHz of the center frequency of channel(s) already occupied by that device or collocated co-operating devices. If the access criteria is met for the intended receive time and spectrum window under the above conditions, then transmission in the intended transmit window by the initiating device may commence.

3.24.2 Test procedure - ANSI C63.17 sub-clause 8.4.

3.24.3 Test results



– No connection was established –

4. Self Declaration

Applicant Name	Ericsson-LG Enterprise Co., Ltd.		
Address	77,Heungan-daero 81 beon-gil,Dongan-gu, Anyang-si,Gyeonggi-do, Korea		
Contact person	Chang-Won, Yang		
E-mail address	changwon.yang@ericsson.com		
Phone No.	+82-31-8054-6019	Fax No. :	+82-31-8054-6656
Manufacture Name	Ericsson-LG Enterprise Co., Ltd.		
Address	77,Heungan-daero 81 beon-gil,Dongan-gu, Anyang-si,Gyeonggi-do, Korea		

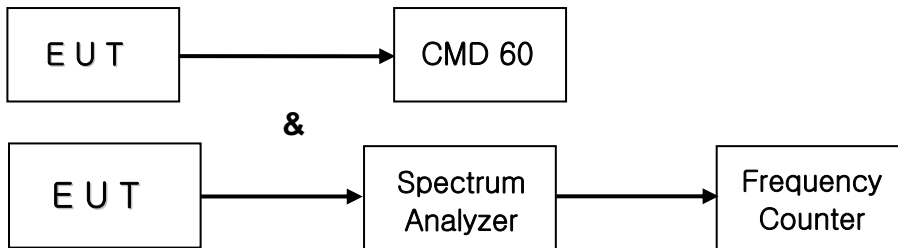
Model name	GDC-480H		
FCC ID	2ABGAGDC-480H		
			Remarks
According to 47CFR 15.323(C)(3) does the EUT satisfy Maximum transmit time of 8 hours in an occupation of the same combined time and spectrum windows?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
Does a system built with the EUT that implement the provisions of 47CFR 15.323(C)(5) enabling the use of the upper threshold for deferral?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
According to 47CFR 15.323(C)(5).4, does your model not use bandwidth in further cooperation with other devices at any range?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
Does a system built using the EUT that operate under the provisions of 47CFR 15.323(c)(6) incorporating provisions for Waiting for a channel to go clear?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
According to 47CFR15.323(C)(8), does EUT use the same antennas for transmission and reception as for monitoring?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
Does a system built with the EUT that operate under the provisions of 47CFR 15.323(C)(10) to test for deferral only in conjunction with a companion device?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
Does a system built with the EUT that operate under the provisions of 47CFR 15.323(C)(11) enabling the access criteria check on the receive channel while in the presence of collocated interferers?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
According to 47CFR15.323(C)(12), does EUT not work in a mode with denies fair access to spectrum for other devices.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Signed by : Sang-Jin Kang
Date November 16, 2015

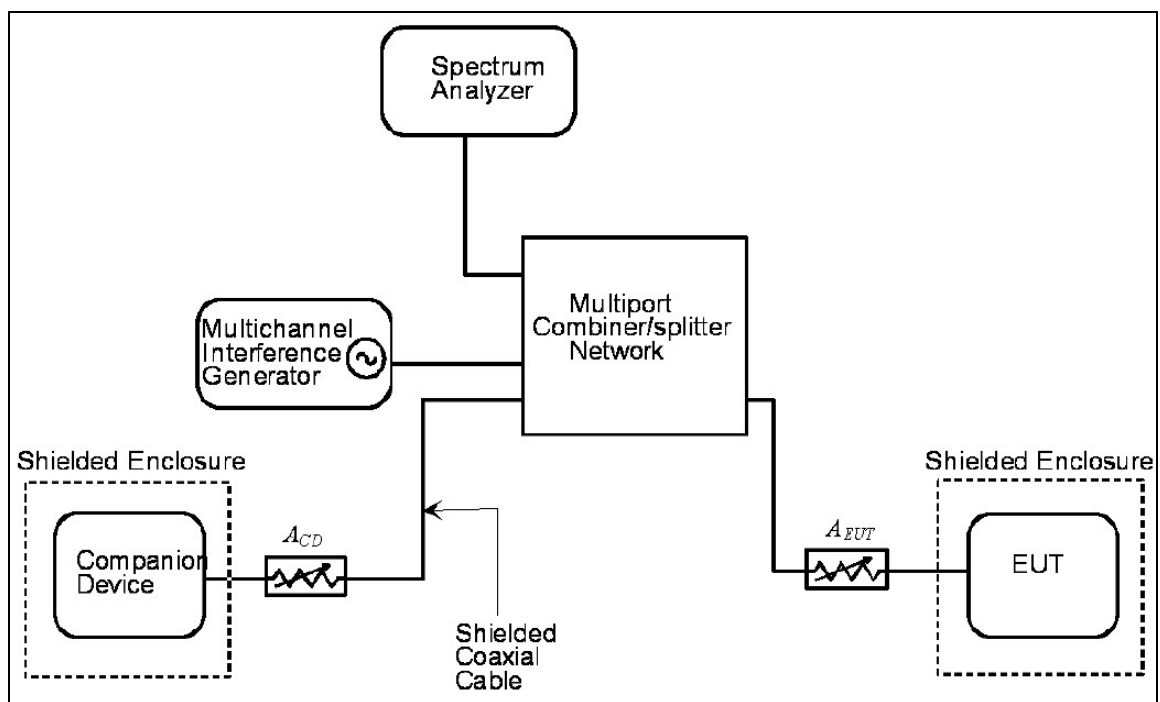
signature: SANGJIN KANG

5. TEST SET UP

5.1 Frequency & Timing Measurement



5.2 Monitoring Tests



6. TEST EQUIPMENT

No.	Equipment	Manufacturer	Model	S/N	Calibration Due date
1	Spectrum Analyzer	Agilent	E4407B	US41443316	2016-02-03
2	Synthesized Sweeper	HP	83620A	3250A01653	2016-02-11
3	Digital RF Signal Generator	Agilent	E4438C	US41460859	2016-02-09
4	Signal Generator	R&S	SMIQ O3	DE22348	2016-02-09
6	PSA Series Spectrum Analyzer	Agilent	E4448A	US44300484	2016-02-04
7	DC Power Supply	Agilent	E4356A	MY41000296	2016-01-29
9	Oscilloscope	Tektronix	TDS3052B	B010173	2016-02-16
10	Directional Coupler	Agilent	87300C	MY44300126	2016-02-05
11	Directional Coupler	Agilent	773D	MY28390213	2016-01-26
12	VHF Attenuator	HP	355D	2522A45959	2016-01-27
13	Coaxial Attenuator	Weinchel	56-10	58777	2016-04-08
14	Coaxial Attenuator	Agilent	8491B	50109	2016-01-23
15	Power Divider	HP	11636A	6047	2016-01-27
16	Power Splitter	HP	11667A	21063	2016-01-27
17	Frequency Counter	Anritsu	MF2412B	2108A07645	2016-01-28
18	Synthesized Sweeper	HP	83620A	3250A01053	2016-02-11
19	Temp/Humidity Chamber	ESPEC	SH-641	92007483	2016-01-07
20	Function/Arbitrary Waveform Generator	Agilent	33250A	MY40015646	2016-02-12
21	EMI Receiver	R&S	ESPI	100043	2016-09-17

No.	Equipment	Manufacturer	Model	S/N	Calibration Due date
22	Pre-Amplifier	HP	8347A	2834A00543	2016-01-30
23	Pre-Amplifier	HP	8449B	3008A00302	2016-09-26
24	Log-Periodic Antenna	ETS-Lindgren	3148	5051	2016-05-11
25	Tuned Dipole Antenna	Schwarzbeck	VHA 9103	--	2016-03-05
26	Biconi-Log Antenna	ETS-Lindgren	3142B	00023784	2016-05-11
27	Double Ridge Wave Guide	ETS-Lindgren	3115	6913	2016-05-13

7. Measurement Uncertainty

The expanded measurement uncertainties ($k = 2$) for the output power, frequency error, occupied bandwidth, spurious emissions results reported above have been determined to be as follows:

Measurement Uncertainty	
Frequency error (Hz)	1 720.928
Occupied Bandwidth (Hz)	8 791.270
Spurious Emissions (dB)	1.406
Output Power (dB)	1.400