EMC TEST REPORT for Intentional Radiator
No. 130600832SHA-002

Applicant	:	Canton Elektronik GmbH & Co. KG Neugasse 21-23 Weilrod - Niederlauken 61276 Germany
Manufacturer	:	Everbright audio (Shenzhen) company limited. No. 19, fareast industry area, Hsin Ho, Fuyung, Bao An, Shenzhen, China
Product Name	:	Soundbar
Type/Model	:	DM 50

SUMMARY

The equipment complies with the requirements according to the following standard(s):

47CFR Part 15 (2012): Radio Frequency Devices

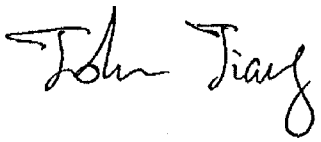
ANSI C63.4 (2003): American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

RSS-210 Issue 8 (December 2010): Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment

RSS-Gen Issue 3 (December 2010): General Requirements and Information for the Certification of Radiocommunication Equipment

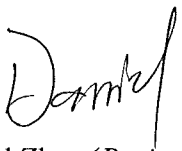
Date of issue: October 25, 2013

Prepared by:



John Jiang (*Project Engineer*)

Reviewed by:



Daniel Zhao (*Reviewer*)

Description of Test Facility

Name: Intertek Testing Services Ltd. Shanghai ETL Semko
Address: Building No.86, 1198 Qinzhou Road(North), Shanghai 200233, P.R. China

FCC Registration Number: 236597
IC Assigned Code: 2042B-1

Name of contact: Steve Li
Tel: +86 21 64956565 ext. 214
Fax: +86 21 54262335 ext. 214

Content

1. General Information

1.1 Applicant Information

Applicant:	Canton Elektronik GmbH & Co. KG Neugasse 21-23 Weilrod - Niederlauken 61276 Germany
Name of contact:	Mr. Markus Brueckner
Tel:	+49-6083-287-0
Fax:	+49-6083-28113
Manufacturer:	Everbright audio (Shenzhen) company limited. No. 19, fareast industry area, Hsin Ho, Fuyung, Bao An, Shenzhen, China
Sample received date:	Oct 10, 2013
Sample Identification No:	*0131010-22-001*
Date of test:	Oct 10, 2013

1.2 Identification of the EUT

Equipment:	Soundbar
Type/model:	DM 50
FCC ID:	WHZ-DM50
IC:	7824A-DM50

1.3 Technical specification

Operation Frequency Band:	2402 - 2480 MHz
Modulation:	GFSK (Frequency Hopping Spread Spectrum)
Antenna Designation:	internal antenna, detachable
Gain of Antenna:	2.0dBi max used.
Rating:	AC 100-240V~, 50/60 Hz, max.150W
Description of EUT:	Here is one model only. BT Module using Bluetooth 3.0 technology.
Channel Description:	There are 79 channels in all. The designed channel spacing is 1MHz.

Channel Identifier	Frequency (MHz)
low	2402
middle	2441
high	2480

1.4 Mode of operation during the test / Test peripherals used

Within this test report, EUT was tested under work normal operation mode and rated voltage and frequency.

Test Peripherals:
PC: HP Compaq 6280 Pro Microtower

2. Test Specification

2.1 Instrument list

Equipment	Type	Manu.	Internal no.	Cal. Date	Due date
Test Receiver	ESIB 26	R&S	EC 3045	2012-12-21	2013-12-20
Semi-anechoic chamber	-	Albatross project	EC 3048	2012-12-12	2013-12-11
Broadband Antenna	CBL 6112D	TESEQ	EC 4206	2012-12-16	2013-12-15
Horn antenna	HF 906	R&S	EC 3049	2012-12-13	2013-12-12
Pre-amplifier	Pre-amp 18	R&S	EC 3222	2013-4-10	2014-4-9
Test Receiver	ESCS 30	R&S	EC 2107	2012-12-21	2013-12-20
A.M.N.	ESH2-Z5	R&S	EC 3119	2012-12-9	2013-12-8
A.M.N.	ESH3-Z5	R&S	EC 2109	2012-12-10	2013-12-9
High Pass Filter	WHKX 1.0/15G-10SS	Wainwright	EC4297-1	2013-1-9	2014-1-8
High Pass Filter	WHKX 2.8/18G-12SS	Wainwright	EC4297-2	2013-1-9	2014-1-8
High Pass Filter	WHKX 7.0/1.8G-8SS	Wainwright	EC4297-3	2013-1-9	2014-1-8
Band Reject Filter	WRCGV 2400/2483-2390/2493-35/10SS	Wainwright	EC4297-4	2013-1-9	2014-1-8
Power sensor / Power meter	N1911A/N1921A	Agilent	EC 4318	2013-4-12	2014-4-11
EMC analyzer	E7402A	Agilent	EC2254	2013-8-16	2014-8-15
Loop antenna	9230-1/9229-1	Schwarzbeck	086814/084814	2012-12-16	2013-12-15
Horn antenna	HAP18-26W	ETS	EC 4792-3	2012-4-10	2014-4-9

2.2 Test Standard

47CFR Part 15 (2012)
ANSI C63.4: 2003
RSS-210 Issue 8 (December 2010)
RSS-Gen Issue 3 (December 2010)

2.3 Test Summary

This report applies to tested sample only. This report shall not be reproduced in part without written approval of Intertek Testing Service Shanghai Limited.

TEST ITEM	FCC REFERANCE	IC REFERANCE	RESULT
20 dB Bandwidth	15.247(a)(1)	RSS-210 Issue 8 Annex 8	Tested
Carrier Frequency Separation	15.247(a)(1)	RSS-210 Issue 8 Annex 8	Pass
Output power	15.247(b)(1)	RSS-210 Issue 8 Annex 8	Pass
Radiated Spurious Emissions	15.205 & 15.209	RSS-210 Issue 8 Clause 2	Pass
Conducted Spurious Emissions & Band Edge	15.247(d)	RSS-210 Issue 8 Annex 8	Pass
Power line conducted emission	15.207	RSS-Gen Issue 3 Clause 7.2.4	Pass
Number of Hopping Frequencies	15.247(a)(1)(iii)	RSS-210 Issue 8 Annex 8	Pass
Dwell time	15.247(a)(1)(iii)	RSS-210 Issue 8 Annex 8	Pass
Occupied bandwidth	-	RSS-Gen Issue 3 Clause 4.6.1	Tested
Spurious emission for receiver	15B	RSS-310 Issue 3 Clause 3.1	NA

Note: “NA” means “not applied”.

3. 20 dB Bandwidth

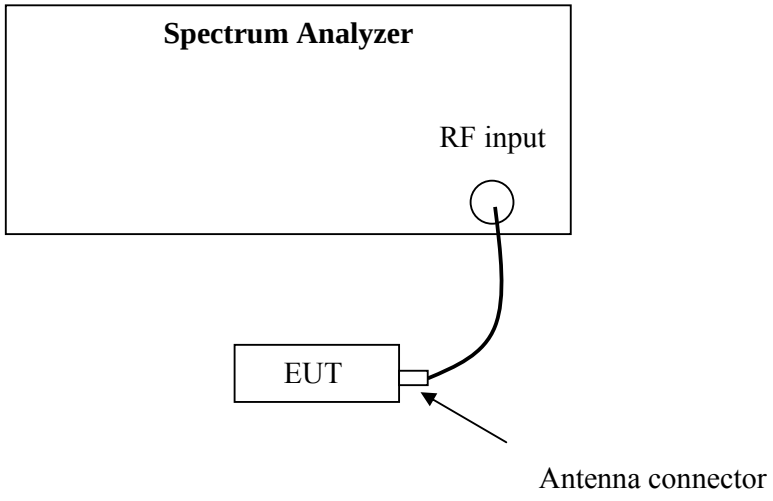
Test result: Tested

3.1 Limit

☐ Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

☒ Frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125mW.

3.2 Test Configuration



3.3 Test Procedure and test setup

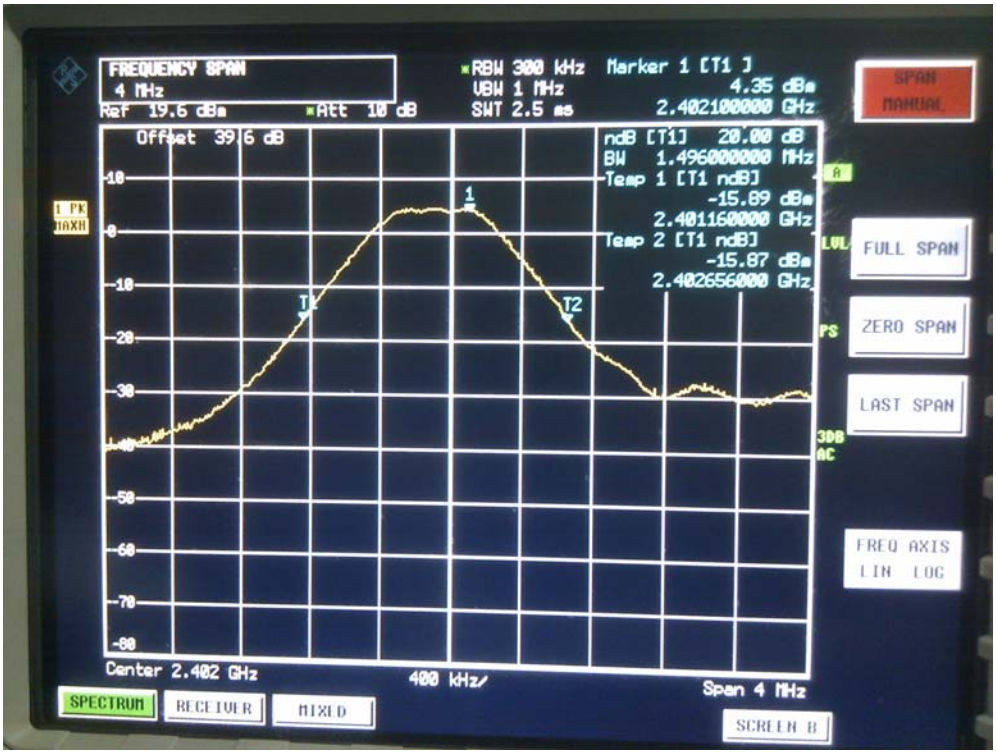
The 20 bandwidth per FCC § 15.247(a)(1) is measured using the Spectrum Analyzer with Span = 2 to 3 times the 20 dB bandwidth, RBW≥1% of the 20 dB bandwidth, VBW≥RBW, Sweep = auto, Detector = peak, Trace = max hold.
The test was performed at 3 channels (lowest, middle and highest channel).
The EUT was tested according to DA 00-705 (Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems)

3.4 Test Protocol

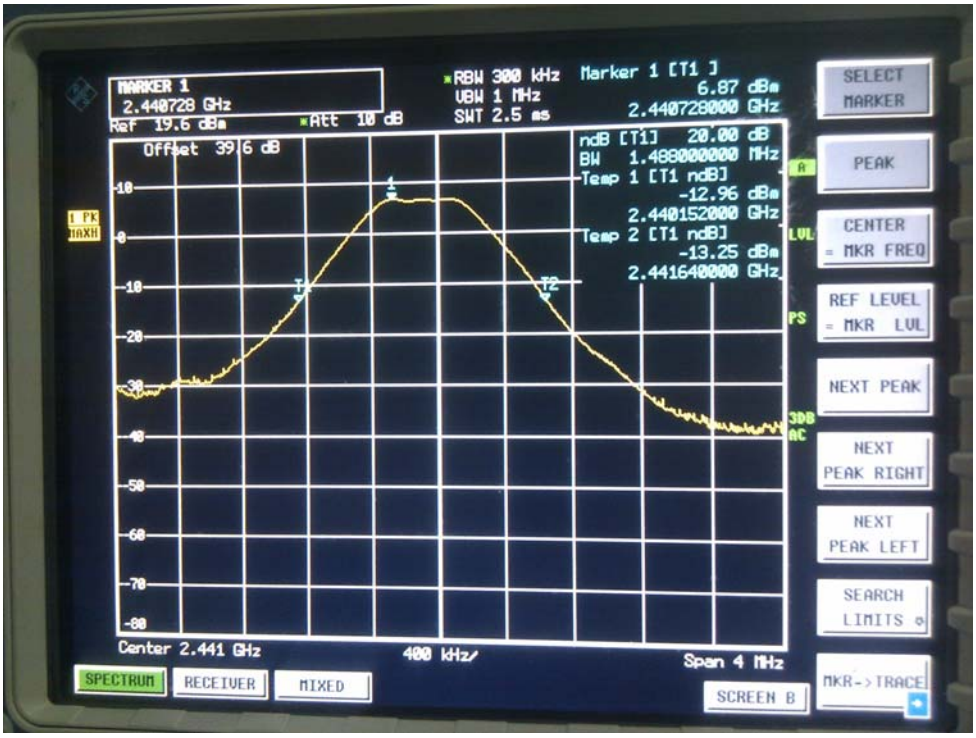
Temperature : 22°C
Relative Humidity : 48 %

CH	Bandwidth (kHz)
L	1496
M	1488
H	1504

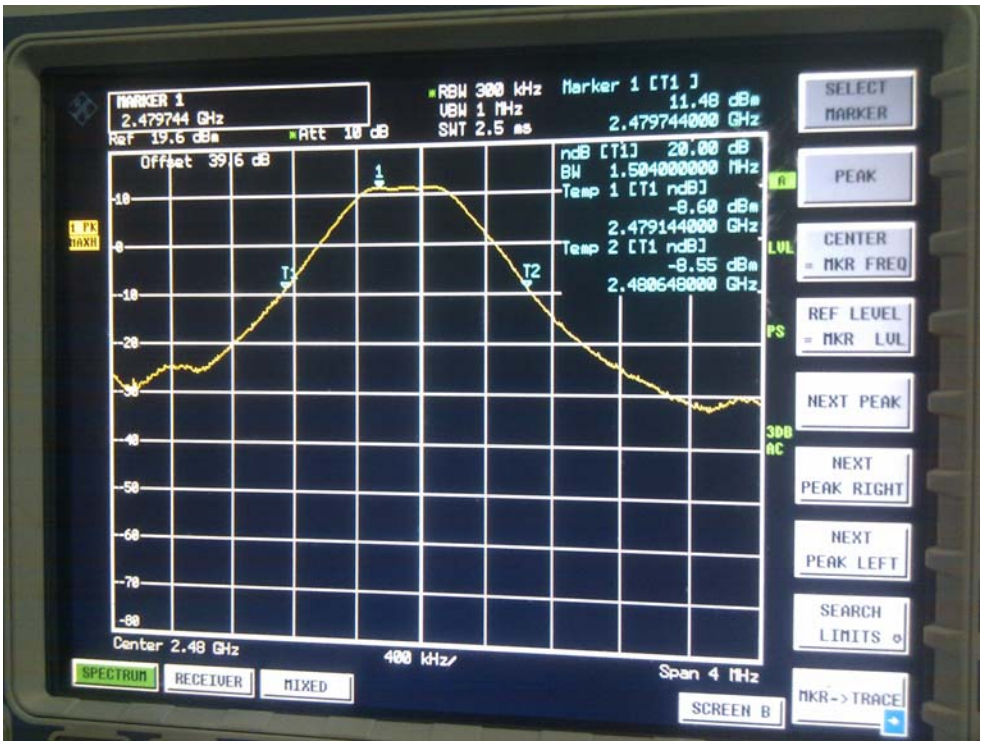
Channel L



Channel M



Channel H



4. Carrier Frequency Separation

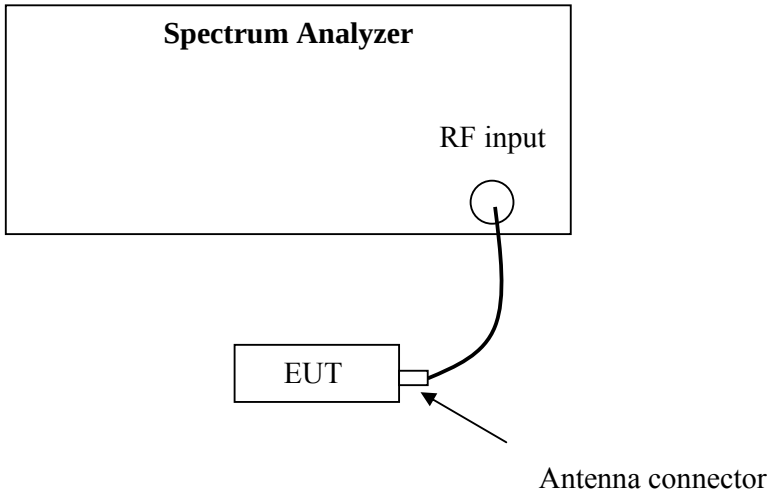
Test result: Pass

4.1 Limit

☐ Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

☒ Frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125mW.

4.2 Test Configuration



4.3 Test Procedure and test setup

The Carrier Frequency Separation per FCC § 15.247(a)(1) is measured using the Spectrum Analyzer with Span can capture two adjacent channels, RBW≥1% of the span, VBW≥RBW, Sweep = auto, Detector = peak, Trace = max hold.
The test was performed at 3 channels (lowest, middle and highest channel).
The EUT was tested according to DA 00-705 (Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems)

4.4 Test Protocol

Temperature : 22°C
Relative Humidity : 48 %

CH	Frequency Separation (kHz)	Limit (kHz)
L	1014	≥1002.67
M	1008	≥1002.67
H	1014	≥1002.67

Channel L

Channel M

Channel H

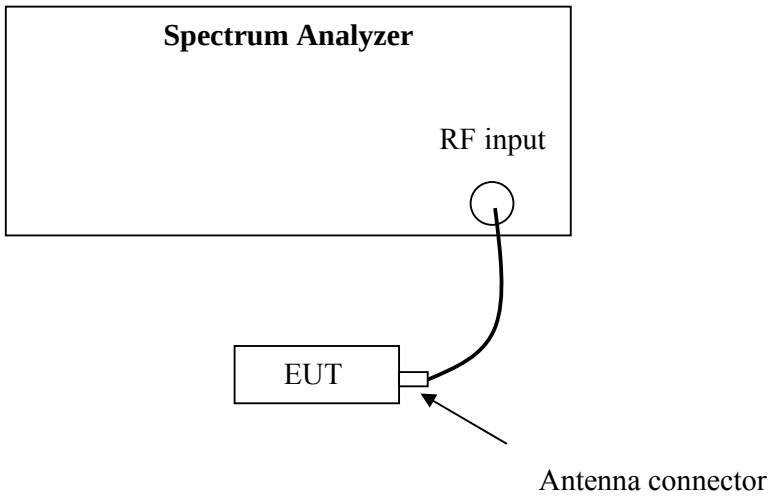
5. Maximum peak output power

Test result: Pass

5.1 Test limit

☐ For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt
☒ For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts
If the transmitting antenna of directional gain greater than 6dBi is used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.
☐ For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt.

5.2 Test Configuration



5.3 Test procedure and test setup

The power output per FCC § 15.247(b) is measured using the Spectrum Analyzer with Span = 5 times the 20 dB bandwidth, RBW≥ the 20 dB bandwidth, VBW≥RBW, Sweep = auto, Detector = peak, Trace = max hold.
The test was performed at 3 channels (lowest, middle and highest channel).
The EUT was tested according to DA 00-705 (Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems)

5.4 Test protocol

Temperature : 22 °C
Relative Humidity : 48 %

CH	Cable loss (dB)	Corrected reading (dBm)	Limit (dBm)
L	1.00	4.61	≤20.97
M	1.00	4.27	≤20.97
H	1.00	4.28	≤20.97

6. Radiated Spurious Emissions

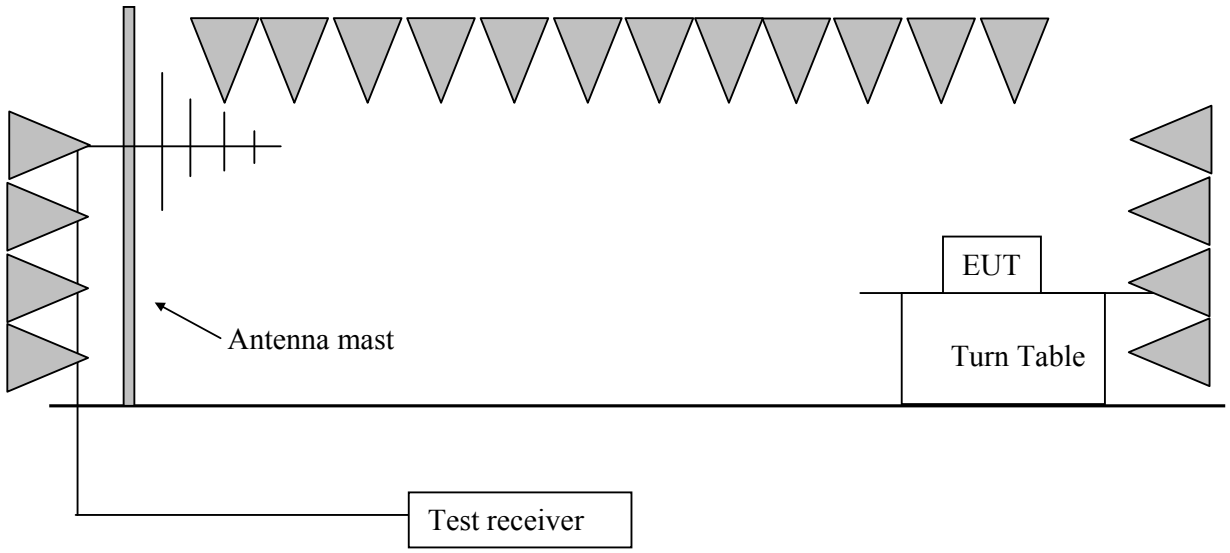
Test result: **PASS**

6.1 Test limit

The radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) showed as below:

Frequency (MHz)	Field Strength (dBuV/m)	Measurement Distance (m)
30 - 88	40.0	3
88 - 216	43.5	3
216 - 960	46.0	3
Above 960	54.0	3

6.2 Test Configuration



6.3 Test procedure and test setup

The measurement was applied in a semi-anechoic chamber. While testing for spurious emission higher than 1GHz, if applied, the pre-amplifier would be equipped just at the output terminal of the antenna.
The EUT and simulators were placed on a 0.8m high wooden turntable above the horizontal metal ground plane. The turn table rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna which was mounted on an antenna mast. The antenna moved up and down between from 1meter to 4 meters to find out the maximum emission level.

For test radiated emission below 30MHz, the center of the loop antenna shall be 1 m above the horizontal metal ground plane. The turn table rotated 360 degrees to determine the position of the maximum emission level. The X, Y and Z polarities of the loop antenna were assessed and the max hold reading of the three axes was listed in this report.

The radiated emission was measured using the Spectrum Analyzer with the resolutions bandwidth set as:

RBW=300 Hz, VBW=1 kHz (9 kHz~150 kHz);

RBW=10kHz, VBW=30kHz (150kHz~30MHz);

RBW = 100kHz, VBW = 300kHz (30MHz~1GHz)
RBW = 1MHz, VBW = 3MHz (>1GHz for PK);
RBW = 1MHz, VBW = 10Hz (>1GHz for AV);

If the dwell time per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a “duty cycle correction factor”.

6.4 Test protocol

CH	Antenna	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	V	2402.80	33.10	100.70	Fundamental	/	PK
	H	135.31	12.80	39.80	43.50	3.70	QP
	V	66.93	9.10	37.40	40.00	2.60	QP
	V	74.70	9.20	37.10	40.00	2.90	PK
	V	2324.64	-8.00	50.60	54.00	3.40	PK
	V	4803.88	-0.80	56.70	74.00	17.30	PK
	V	4803.88	-0.80	45.20	54.00	8.80	AV
	H	9583.16	11.60	48.90	54.00	5.10	PK
	H	2287.84	-8.00	49.80	54.00	4.20	PK
	V	12010.39	11.70	48.10	54.00	5.90	PK
M	V	2442.88	34.30	101.40	Fundamental	/	PK
	H	135.31	12.80	39.80	43.50	3.70	QP
	V	66.93	9.10	37.40	40.00	2.60	QP
	V	74.70	9.20	37.10	40.00	2.90	PK
	V	1304.60	-8.00	49.20	54.00	4.80	PK
	V	1328.65	-8.00	50.90	54.00	3.10	AV
	H	7328.65	10.50	52.00	74.00	22.00	PK
	H	7328.65	10.50	34.50	54.00	19.50	AV
H	H	2480.16	34.50	102.20	Fundamental	/	PK
	H	135.31	12.80	39.80	43.50	3.70	QP
	V	66.93	9.10	37.40	40.00	2.60	QP
	V	74.70	9.20	37.10	40.00	2.90	PK
	V	2486.91	-8.00	51.20	54.00	2.80	PK
	V	2268.15	-0.20	58.10	74.00	15.90	PK
	V	2268.15	-0.20	33.00	54.00	21.00	AV
	H	2301.85	-0.20	55.10	74.00	18.90	PK

	H	2301.85	-0.20	30.90	54.00	23.10	AV

Remark: 1. For fundamental emission, no amplifier is employed.
2. Correct Factor = Antenna Factor + Cable Loss (-Amplifier, is employed)
3. Corrected Reading = Original Receiver Reading + Correct Factor
4. Margin = limit – Corrected Reading
5. If the PK reading is lower than AV limit, the AV test can be elided.
6. The emission was conducted from 30MHz to 25GHz.
7. All the frequency points assessed with QP detector in above table have repetition rate higher than 10Hz.

Example: Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB,
Gain of Preamplifier = 32.00dB, Original Receiver Reading = 10dBuV.
Then Correct Factor = 30.20 + 2.00 – 32.00 = 0.20dB/m; Corrected Reading = 10dBuV + 0.20dB/m = 10.20dBuV/m
Assuming limit = 54dBuV/m, Corrected Reading = 10.20dBuV/m, then Margin = 54 -10.20 = 43.80dBuV/m

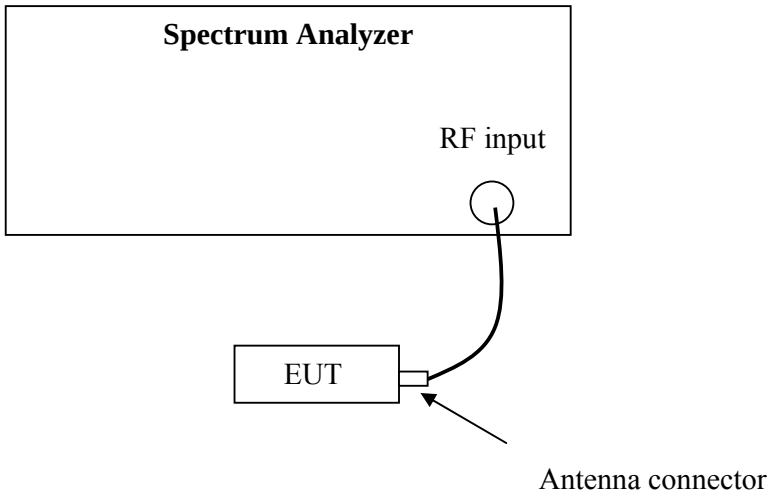
7. Conducted Spurious Emissions & Band Edge

Test result: **PASS**

7.1 Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

7.2 Test Configuration



7.3 Test procedure and test setup

The Conducted Spurious Emissions per FCC § 15.247(d) is measured using the Spectrum Analyzer with Span wide enough capturing all spurious from the lowest emission frequency of the EUT up to 10th harmonics, RBW = 100kHz, VBW≥RBW, Sweep = auto, Detector = peak, Trace = max hold.
The test was performed at 3 channels (lowest, middle and highest channel).
The EUT was tested according to DA 00-705 (Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems)

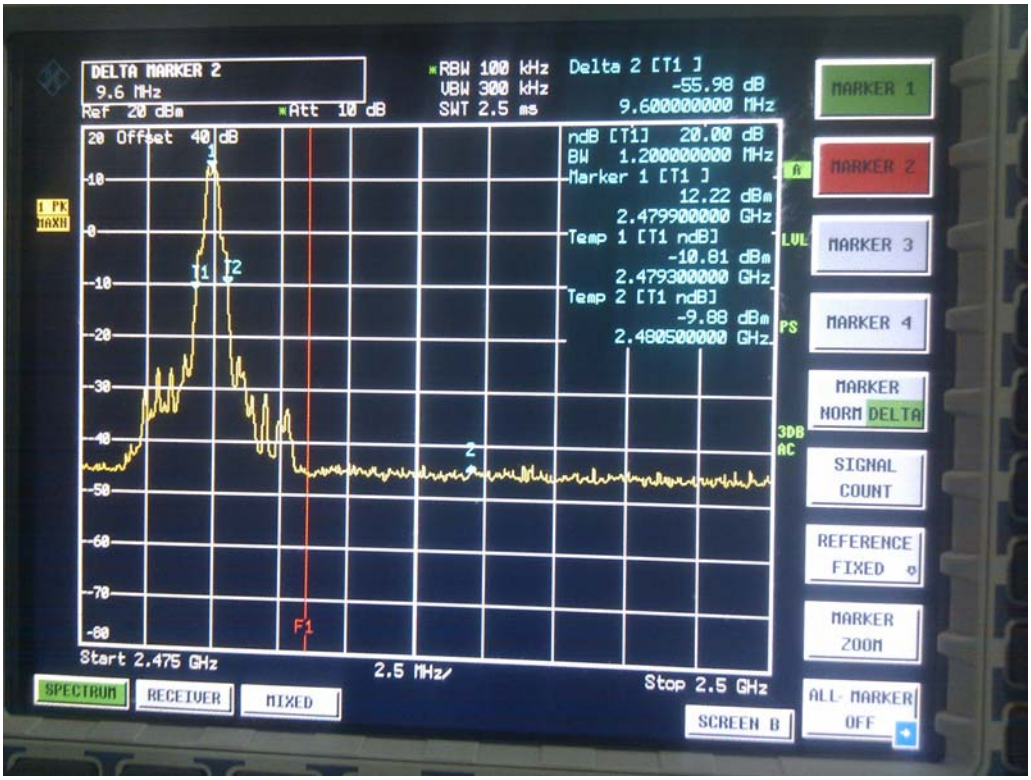
7.4 Test protocol

CH	Max reading among band (dBm)	The most restrict Attenuation outside band (dB)	Limit (dB)
L	4.90	56.89	≥20
M	8.53	53.91	
H	9.88	55.98	

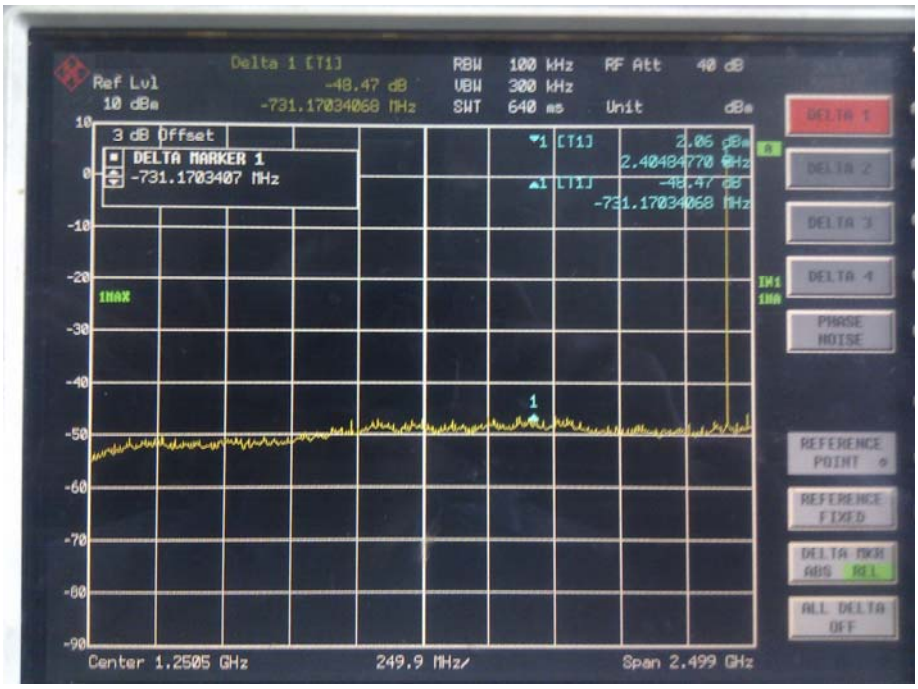
The test was conducted from 30MHz-25GHz. Here only band edge emission was listed as below.

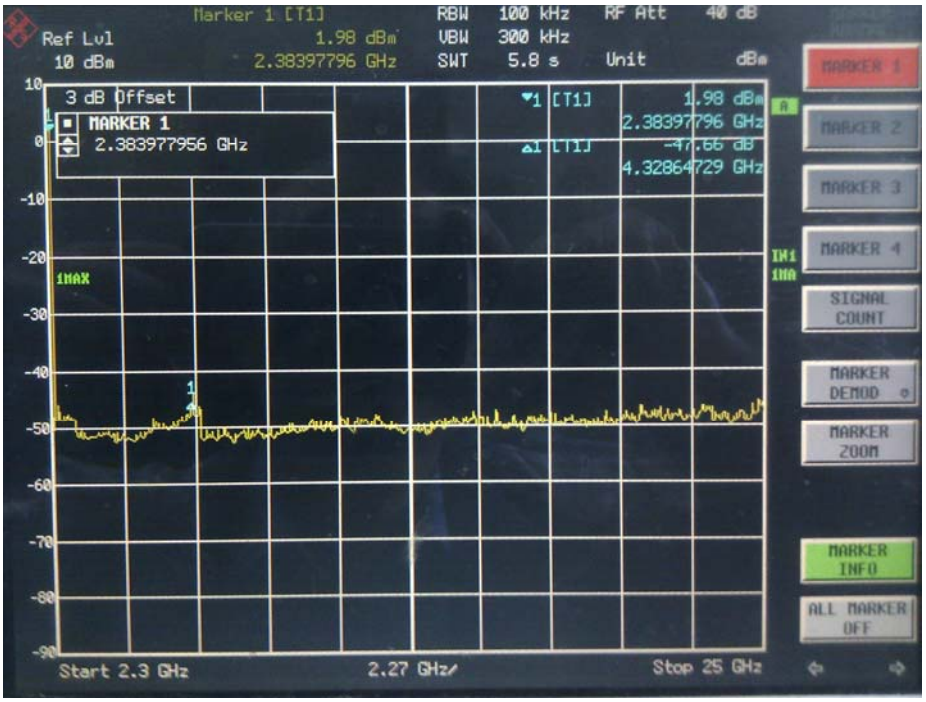
Channel L

Channel H

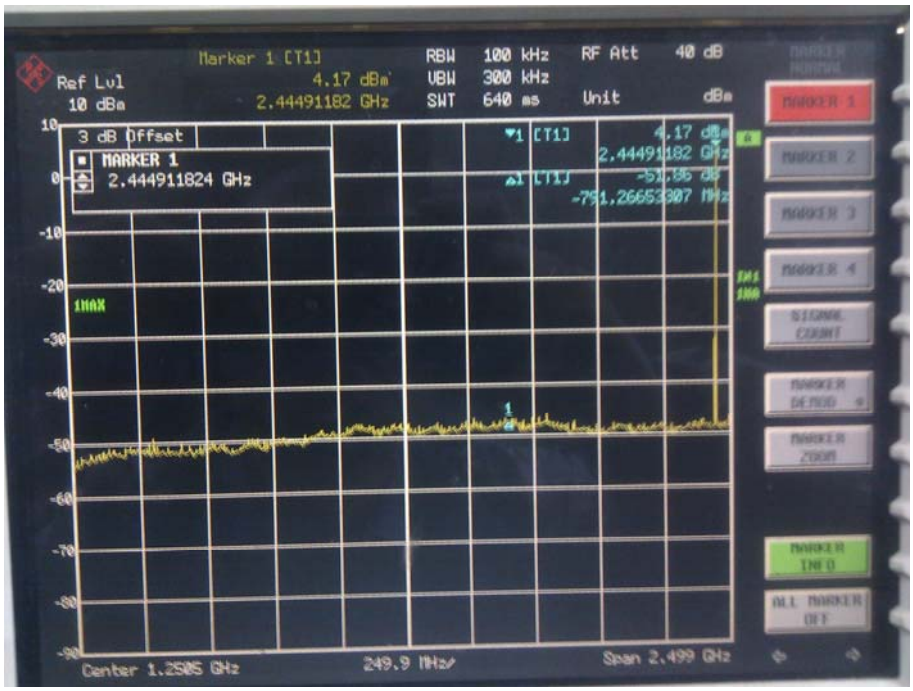

DELTA MARKER 2
9.6 MHz
Ref 20 dBm
Att 10 dB
RBW 100 kHz
VBW 300 kHz
SWT 2.5 ms
Delta 2 [T1]
-55.98 dB
9.600000000 MHz
20 Offset 40 dB
ndB [T1] 20.00 dB
BW 1.200000000 MHz
Marker 1 [T1]
12.22 dBm
2.479900000 GHz
Temp 1 [T1 ndB]
-10.81 dBm
2.479300000 GHz
Temp 2 [T1 ndB]
-9.88 dBm
2.480500000 GHz
1 PK MAXH
T1
T2
F1
Start 2.475 GHz
2.5 MHz/
Stop 2.5 GHz
SPECTRUM
RECEIVER
MIXED
SCREEN B
MARKER 1
MARKER 2
MARKER 3
MARKER 4
MARKER NORM DELTA
SIGNAL COUNT
REFERENCE FIXED
MARKER ZOOM
ALL MARKER OFF

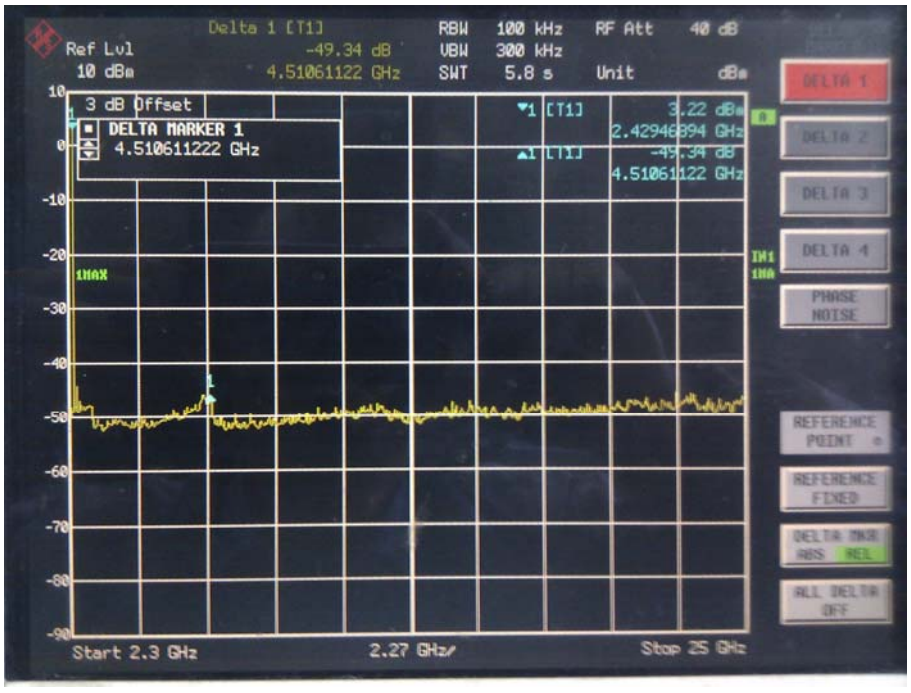
Channel L


Delta 1 [T1]
Ref Lvl
10 dBm
-48.47 dB
-731.17034068 MHz
RBW 100 kHz
VBW 300 kHz
SWT 640 ms
RF Att 40 dB
Unit dBm
3 dB Offset
DELTA MARKER 1
-731.1703407 MHz
1MAX
Center 1.2505 GHz
249.9 MHz/
Span 2.499 GHz
DELTA 1
DELTA 2
DELTA 3
DELTA 4
PHASE NOISE
REFERENCE POINT
REFERENCE FIXED
DELTA MKR ABS REL
ALL DELTA OFF

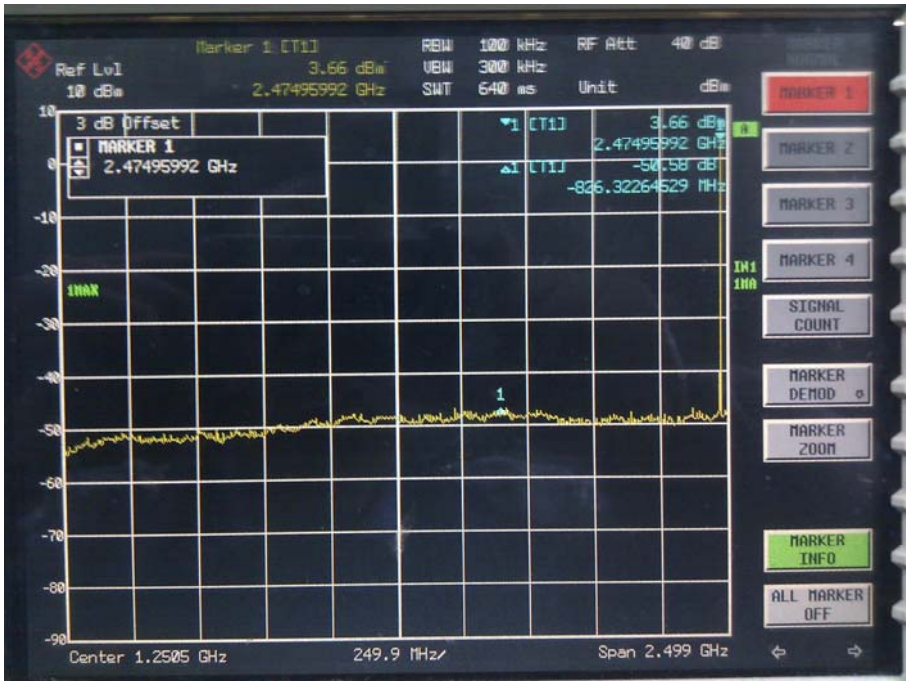

Marker 1 [T1]
Ref Lvl
10 dBm
1.98 dBm
2.38397796 GHz
RBW 100 kHz
VBW 300 kHz
SWT 5.8 s
RF Att 40 dB
Unit dBm
3 dB Offset
MARKER 1
2.383977956 GHz
1MAX
Start 2.3 GHz
2.27 GHz/
Stop 25 GHz
MARKER 1
MARKER 2
MARKER 3
MARKER 4
SIGNAL COUNT
MARKER DEMOD
MARKER ZOOM
MARKER INFO
ALL MARKER OFF

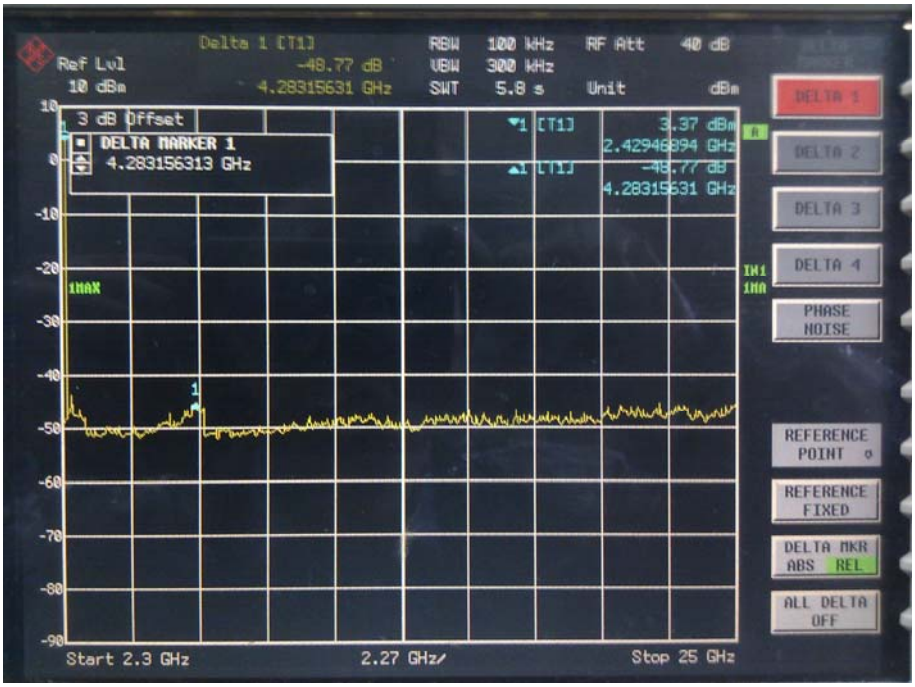
Channel M


Marker 1 [T1]
RBW 100 kHz
RF Att 40 dB
Ref Lvl
4.17 dBm
VBW 300 kHz
10 dBm
2.44491182 GHz
SWT 640 ms
Unit dBm
3 dB Offset
MARKER 1
2.444911824 GHz
1MAX
Center 1.2505 GHz
249.9 MHz/
Span 2.499 GHz


Delta 1 [T1]
RBW 100 kHz
RF Att 40 dB
Ref Lvl
-49.34 dB
VBW 300 kHz
10 dBm
4.51061122 GHz
SWT 5.8 s
Unit dBm
3 dB Offset
DELTA MARKER 1
4.510611222 GHz
1MAX
Start 2.3 GHz
2.27 GHz/
Stop 25 GHz

Channel H


Marker 1 [T1]
Ref Lvl
10 dBm
3.66 dBm
2.47495992 GHz
RBW 100 kHz
VBW 300 kHz
SWT 640 ms
RF Att 40 dB
Unit dBm
3 dB Offset
MARKER 1
2.47495992 GHz
1MAX
Center 1.2505 GHz
249.9 MHz/
Span 2.499 GHz
MARKER 1
MARKER 2
MARKER 3
MARKER 4
SIGNAL COUNT
MARKER DEMOD
MARKER ZOOM
MARKER INFO
ALL MARKER OFF


Delta 1 [T1]
Ref Lvl
10 dBm
-48.77 dB
4.28315631 GHz
RBW 100 kHz
VBW 300 kHz
SWT 5.8 s
RF Att 40 dB
Unit dBm
3 dB Offset
DELTA MARKER 1
4.283156313 GHz
1MAX
Start 2.3 GHz
2.27 GHz/
Stop 25 GHz
DELTA 1
DELTA 2
DELTA 3
DELTA 4
PHASE NOISE
REFERENCE POINT
REFERENCE FIXED
DELTA MKR ABS REL
ALL DELTA OFF

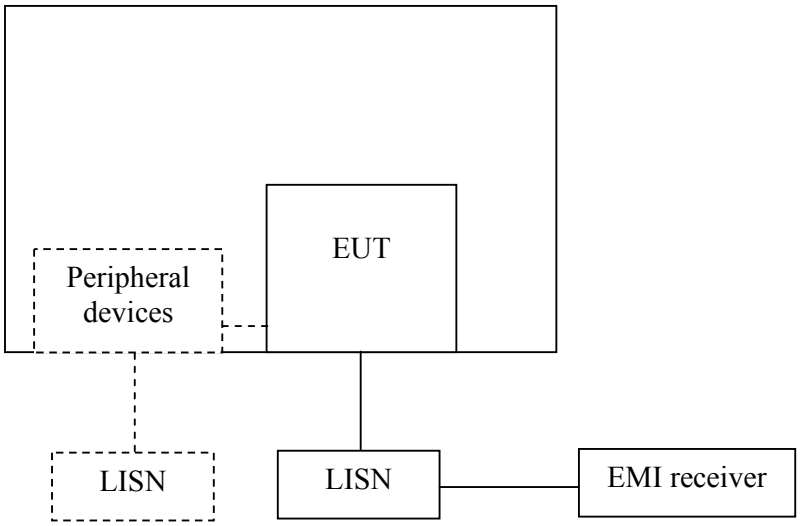
8. Power line conducted emission

Test result: **Pass**

8.1 Limit

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	QP	AV
0.15-0.5	66 to 56*	56 to 46 *
0.5-5	56	46
5-30	60	50
* Decreases with the logarithm of the frequency.		

8.2 Test configuration



☒ For table top equipment, wooden support is 0.8m height table

☐ For floor standing equipment, wooden support is 0.1m height rack.

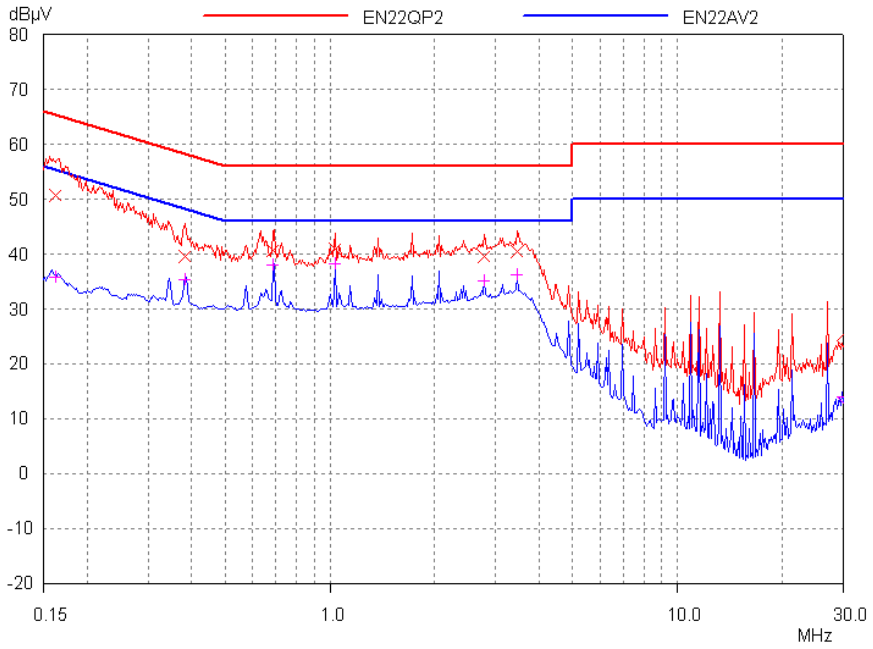
8.3 Test procedure and test set up

The EUT are connected to the main power through a line impedance stabilization network (LISN). This provides a 50Ω/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50Ω/50uH coupling impedance with 50Ω termination.
Both sides (Line and Neutral) of AC line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4 on conducted measurement.
The bandwidth of the test receiver is set at 9 kHz.

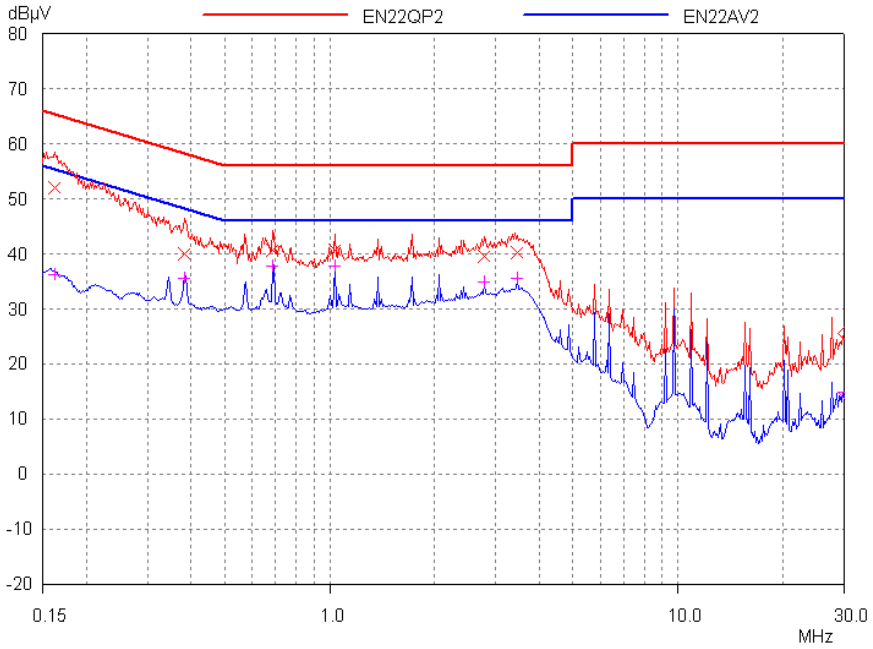
8.4 Test protocol

Frequency	Correct Factor (dB)	Corrected Reading (dBuV)		Limit (dBuV)		Margin (dB)	
		QP	AV	QP	AV	QP	AV
0.16 (N)	3.00	51.94	36.24	65.37	55.37	13.43	19.13
0.38 (N)	3.00	40.02	35.64	58.24	48.24	18.22	12.60
0.68 (N)	3.00	40.70	37.76	56.00	46.00	15.30	8.24
1.03 (L)	3.00	40.81	38.28	56.00	46.00	15.19	7.72
2.75 (N)	3.00	39.49	34.84	56.00	46.00	16.51	11.16
3.44 (L)	3.00	40.54	36.22	56.00	46.00	15.46	9.78
Remark: 1. Correction Factor (dB) = LISN Factor (dB) + Cable Loss (dB). 2. Margin (dB) = Limit - Corrected Reading.							

L line:


dBµV
EN22QP2
EN22AV2
80
70
60
50
40
30
20
10
0
-10
-20
0.15
1.0
10.0
30.0
MHz

N line:


dBµV
EN22QP2
EN22AV2
80
70
60
50
40
30
20
10
0
-10
-20
0.15
1.0
10.0
30.0
MHz

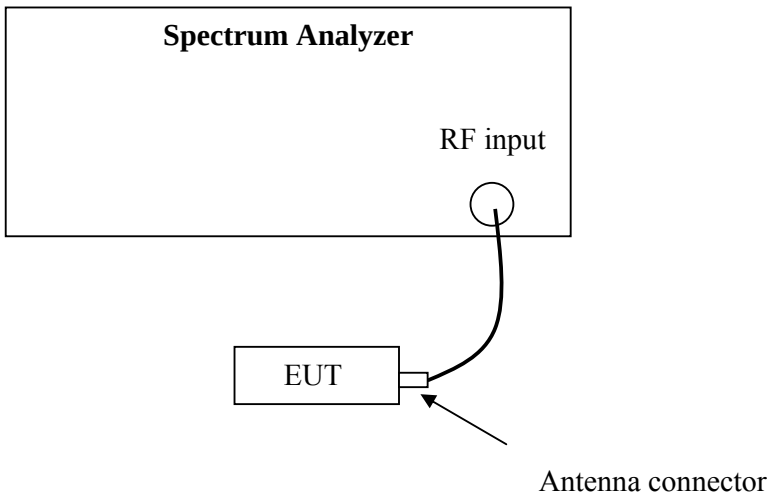
9. Number of Hopping Frequencies

Test result: **Pass**

9.1 Limit

Number of Hopping Frequencies in the 2400-2483.5 MHz band shall use at least 15 channels.

9.2 Test Configuration

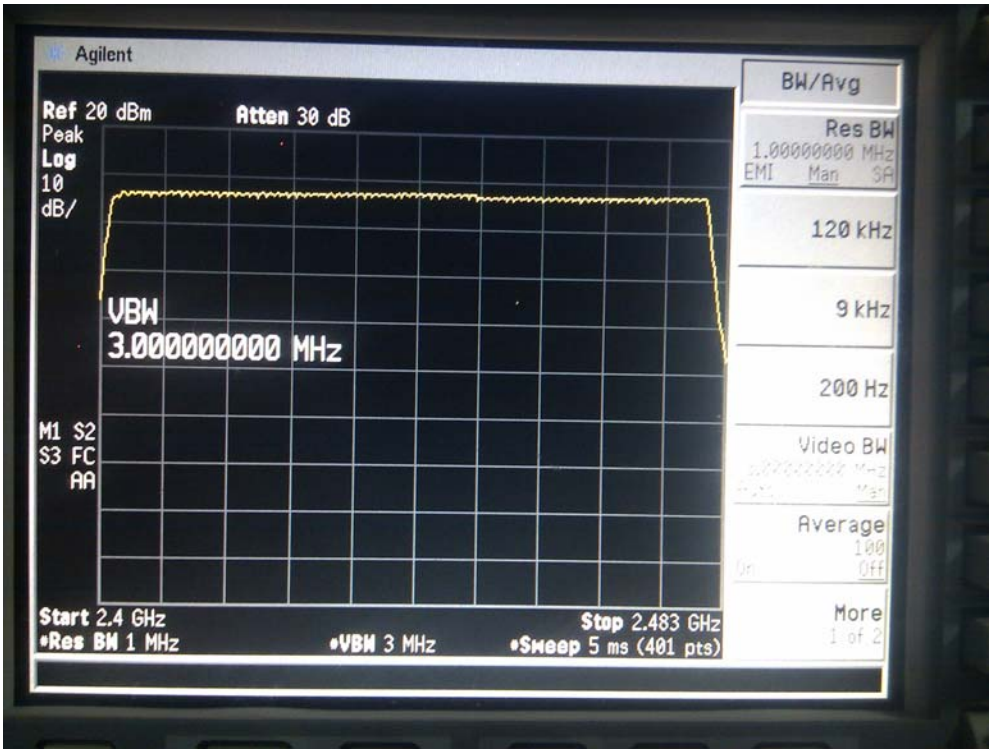


9.3 Test procedure and test setup

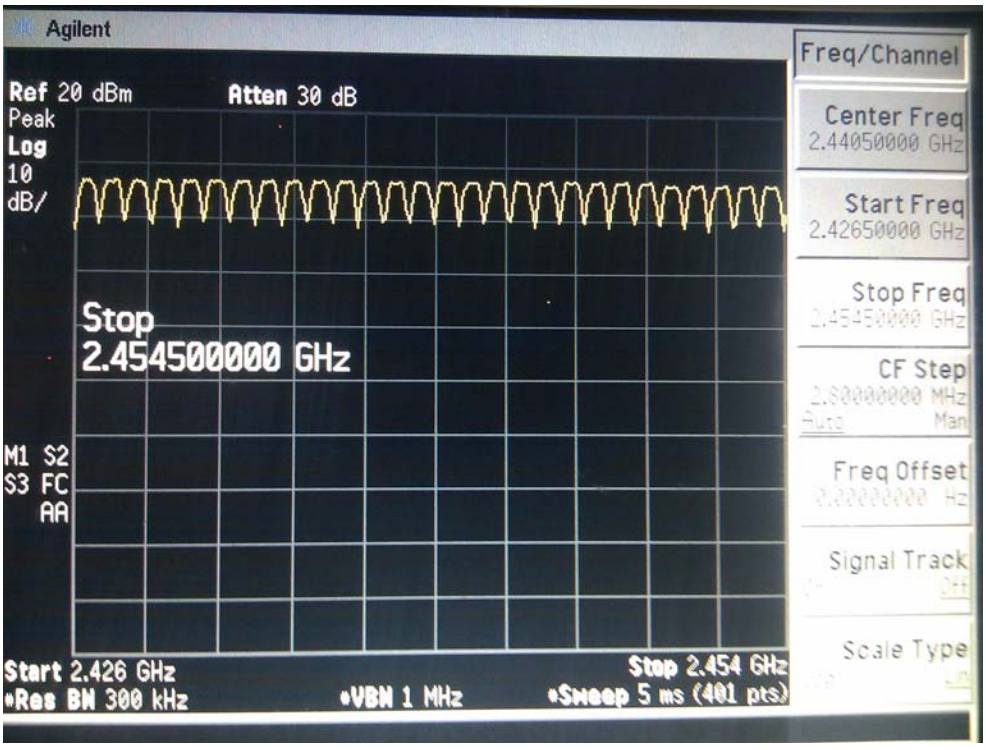
The channel number per FCC §15.247(a)(1)(iii) is measured using the Spectrum Analyzer with RBW=100kHz, VBW≥RBW, Sweep = auto, Detector = peak, Trace = max hold. The EUT was tested according to DA 00-705 (Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems).

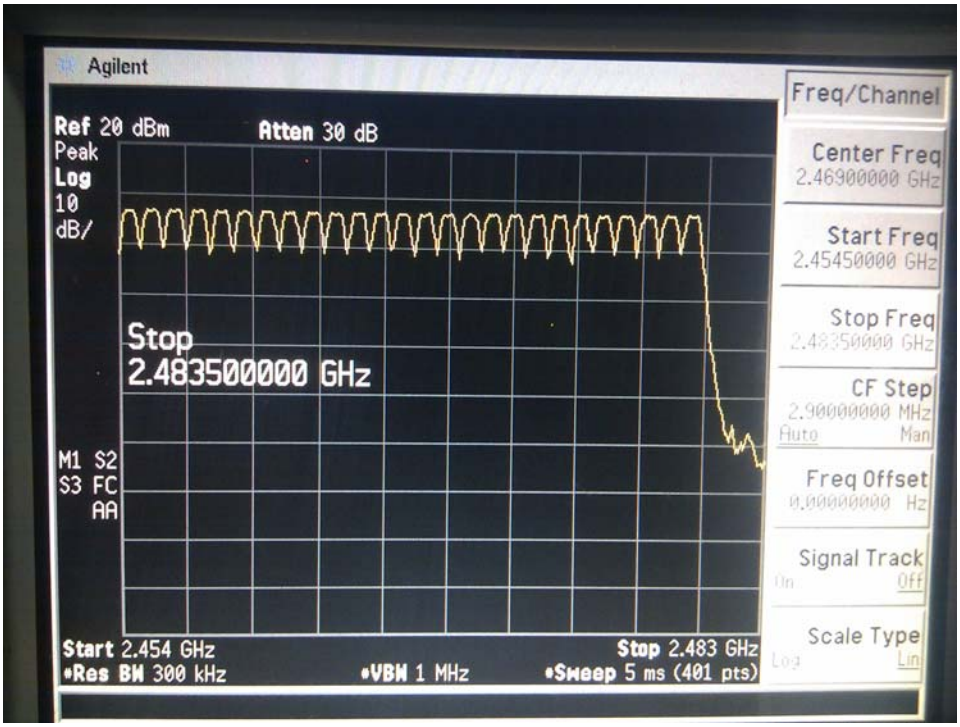
9.4 Test protocol

Channel Number	Limit
79	≥15




Agilent
Ref 20 dBm
Atten 30 dB
Peak
Log
10
dB/
Center
2.413250000 GHz
M1 S2
S3 FC
AA
Center 2.413 GHz
#Res BW 300 kHz
#VBW 1 MHz
Span 26.5 MHz
#Sweep 4 ms (401 pts)
Freq/Channel
Center Freq
2.41325000 GHz
Start Freq
2.40000000 GHz
Stop Freq
2.42650000 GHz
CF Step
2.65000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
Scale Type
Log
Lin


Agilent
Ref 20 dBm
Atten 30 dB
Peak
Log
10
dB/
Stop
2.454500000 GHz
M1 S2
S3 FC
AA
Start 2.426 GHz
#Res BW 300 kHz
#VBW 1 MHz
Stop 2.454 GHz
#Sweep 5 ms (401 pts)
Freq/Channel
Center Freq
2.44050000 GHz
Start Freq
2.42650000 GHz
Stop Freq
Scale Type


Agilent
Ref 20 dBm
Atten 30 dB
Peak
Log
10
dB/
Stop
2.483500000 GHz
M1 S2
S3 FC
AA
Start 2.454 GHz
#Res BW 300 kHz
#VBW 1 MHz
Stop 2.483 GHz
#Sweep 5 ms (401 pts)
Freq/Channel
Center Freq
2.46900000 GHz
Start Freq
2.45450000 GHz
Stop Freq
2.48350000 GHz
CF Step
2.90000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
Scale Type
Log
Lin

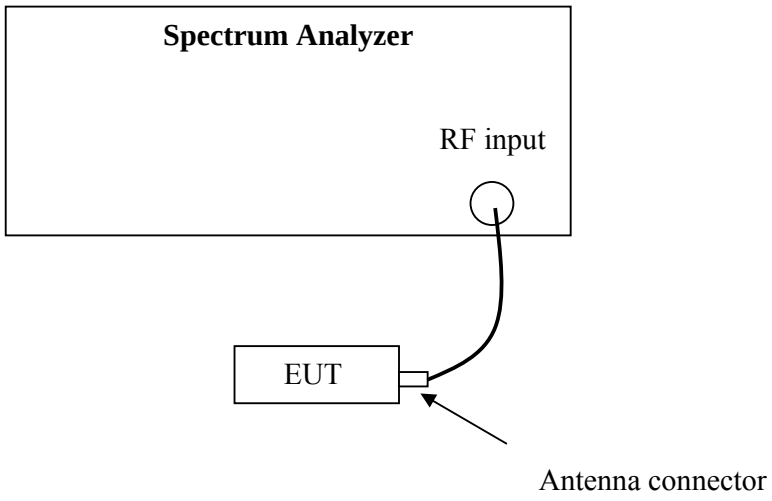
10. Dwell Time

Test result: **Pass**

10.1 Limit

The dwell time on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

10.2 Test Configuration



10.3 Test procedure and test setup

Dwell time per FCC § 15.247(a)(1)(iii) is measured using the Spectrum Analyzer with Span = 0, RBW=1MHz, VBW≥RBW, Sweep can capture the entire dwell time, Detector = peak, Trace = max hold.
The EUT was tested according to DA 00-705 (Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems).

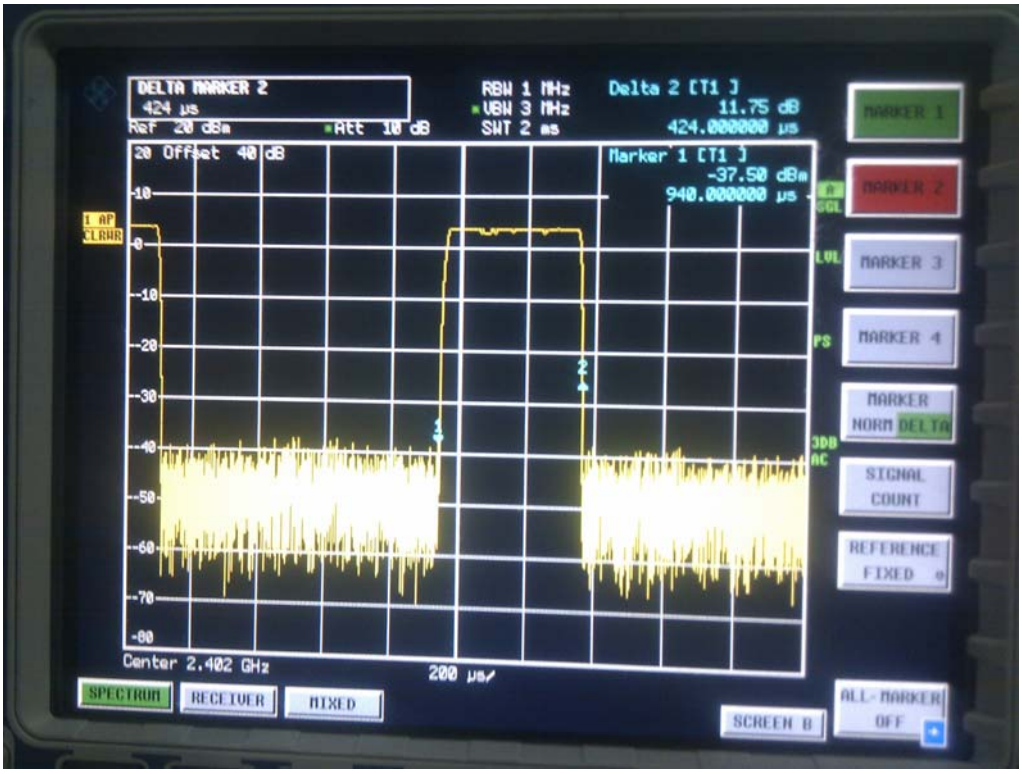
10.4 Test protocol

Packet	Occupancy time for single hop (ms) **O**	CH	Real observed period (s) **P**	Hops among Observed period **I**	Dwell time (s) **T**	Limit (s)
DH1	0.42	L	3.16	32	0.13	≤0.4
		M	3.16	32	0.13	
		H	3.16	32	0.13	
DH3	1.68	L	3.16	16	0.27	
		M	3.16	16	0.27	
		H	3.16	16	0.27	
DH5	2.93	L	3.16	11	0.32	
		M	3.16	11	0.32	
		H	3.16	11	0.32	

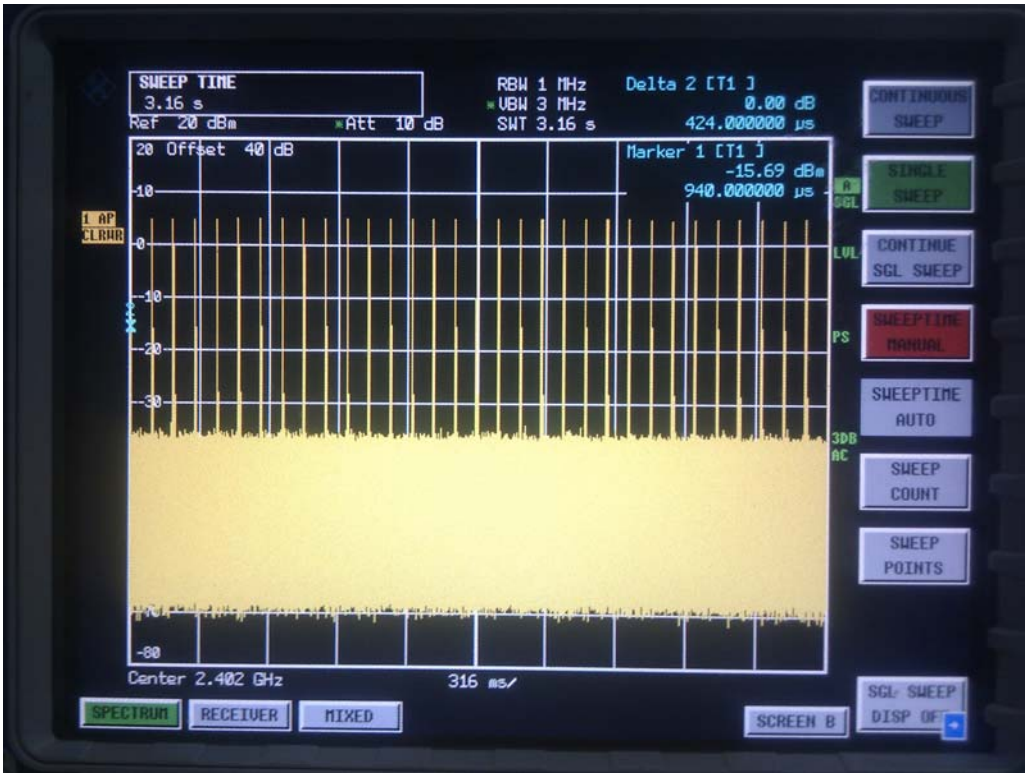
Remark: 1. There are 79 channels in all. So the complete observed period P = 0.4 * 79 = 31.6 s.

2. Average time of occupancy **T = O *I * 31.6 / P**

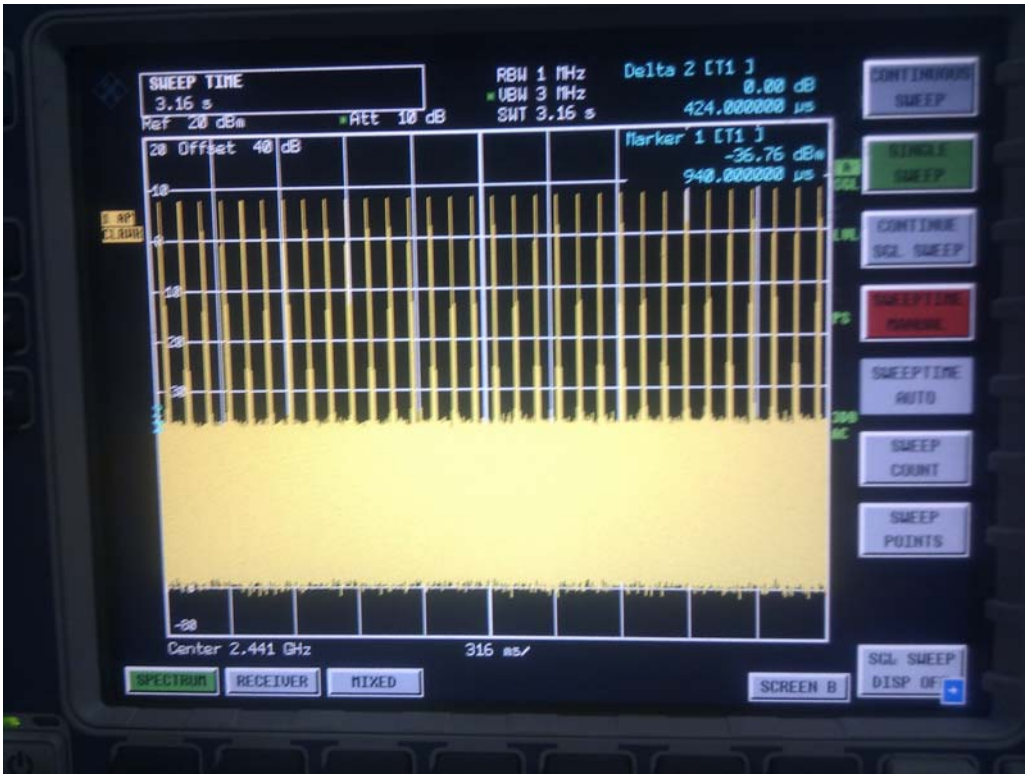
Single pulse of DH1



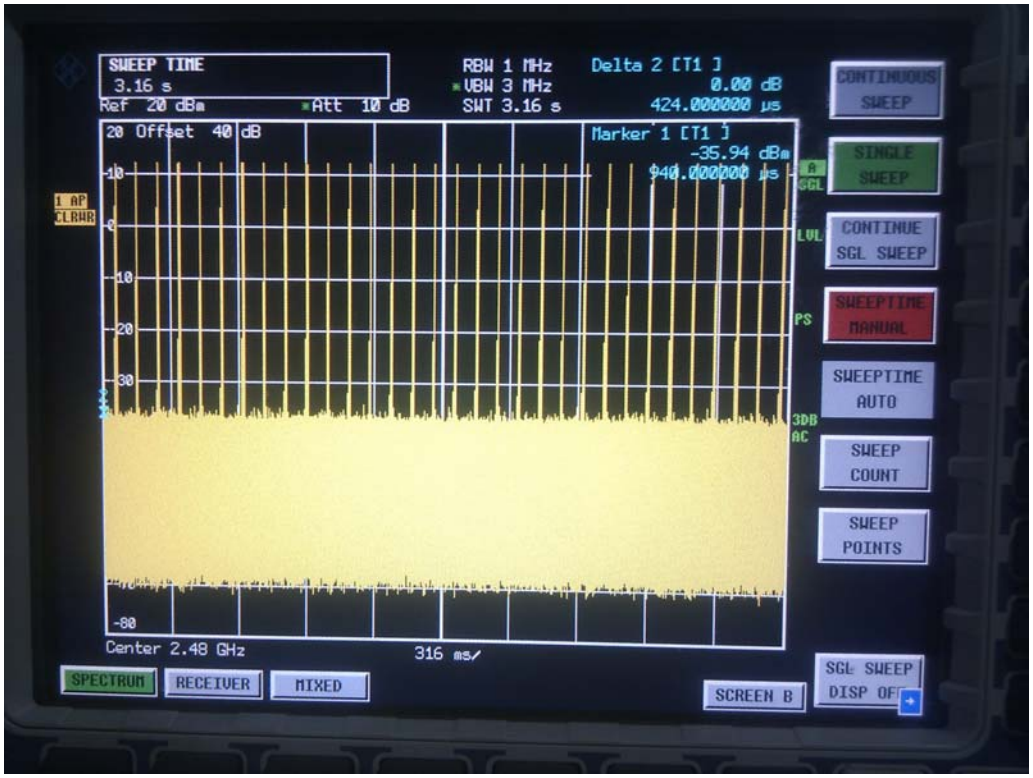
Channel L of DH1



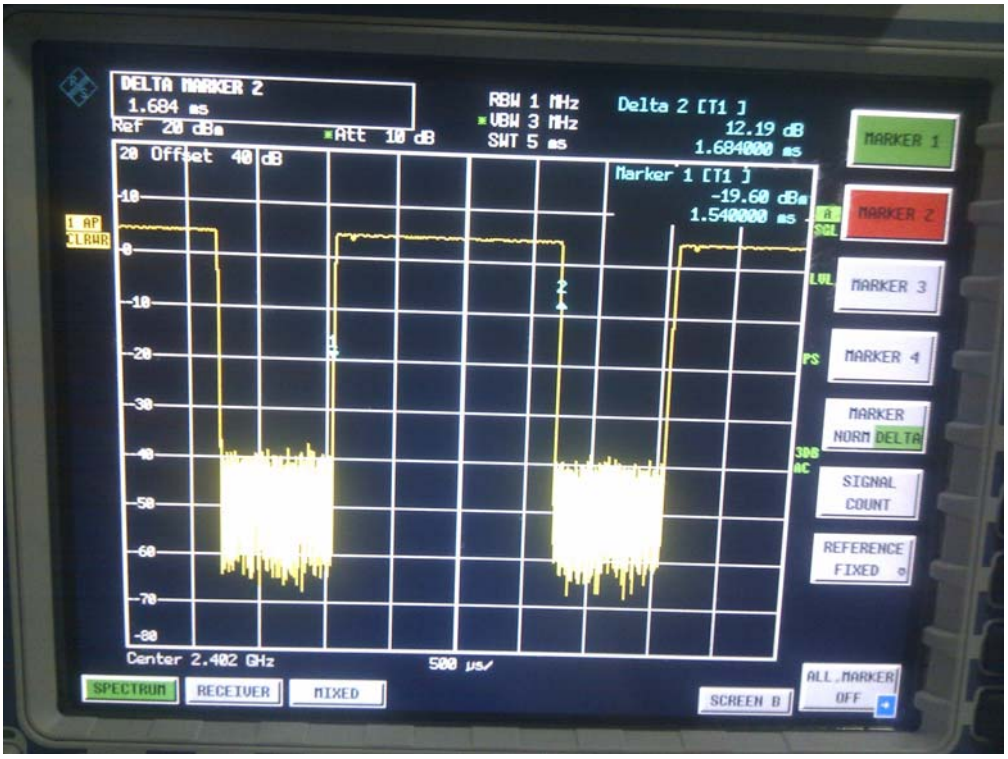
Channel M of DH1



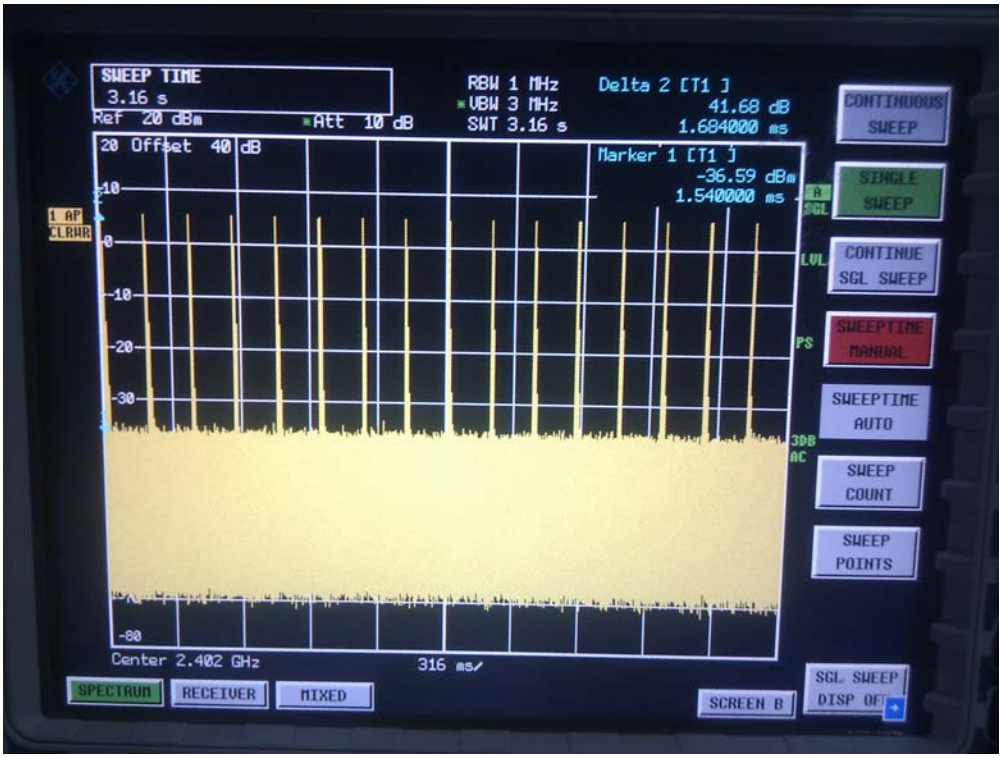
Channel H of DH1



Single pulse of DH3

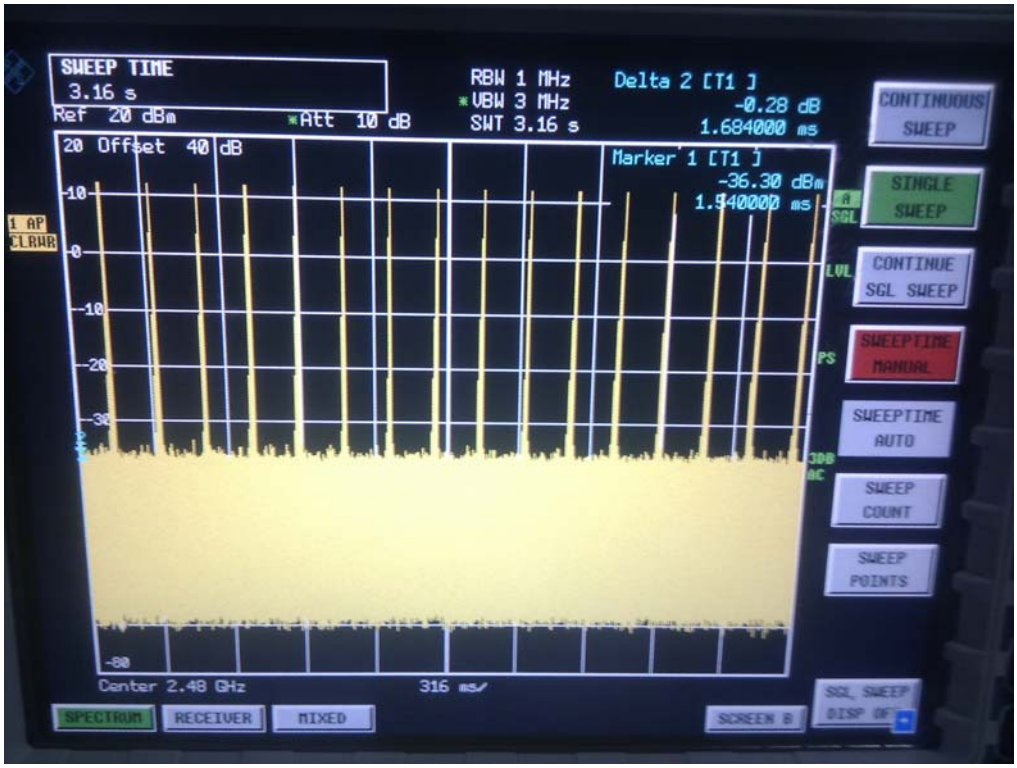


Channel L of DH3

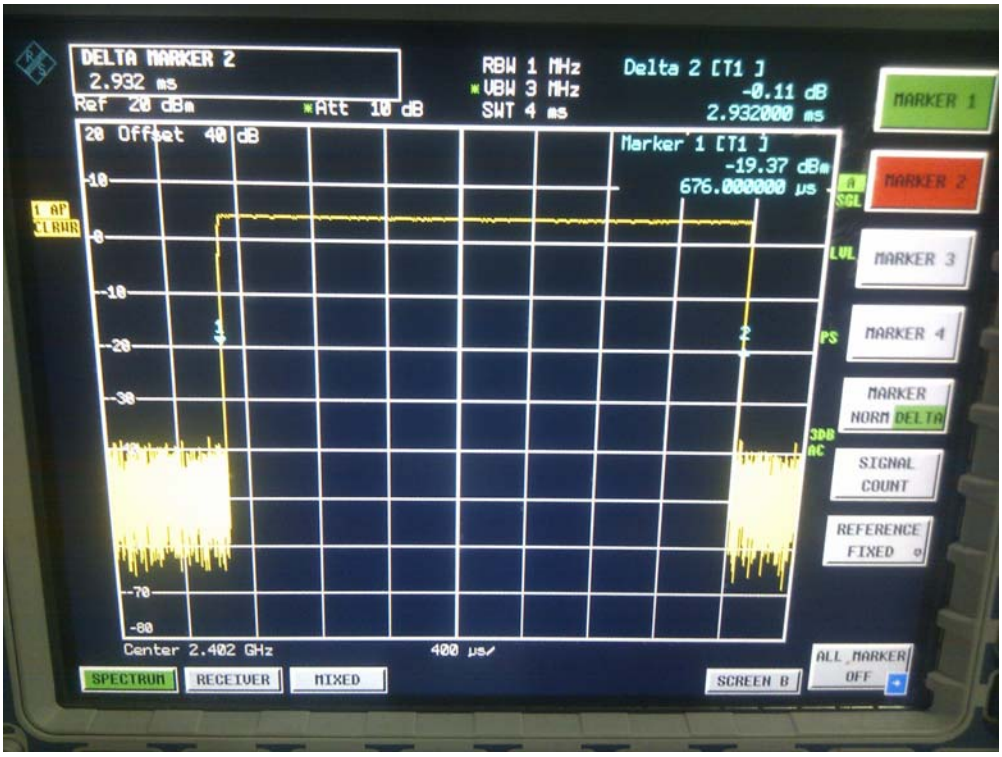


Channel M of DH3

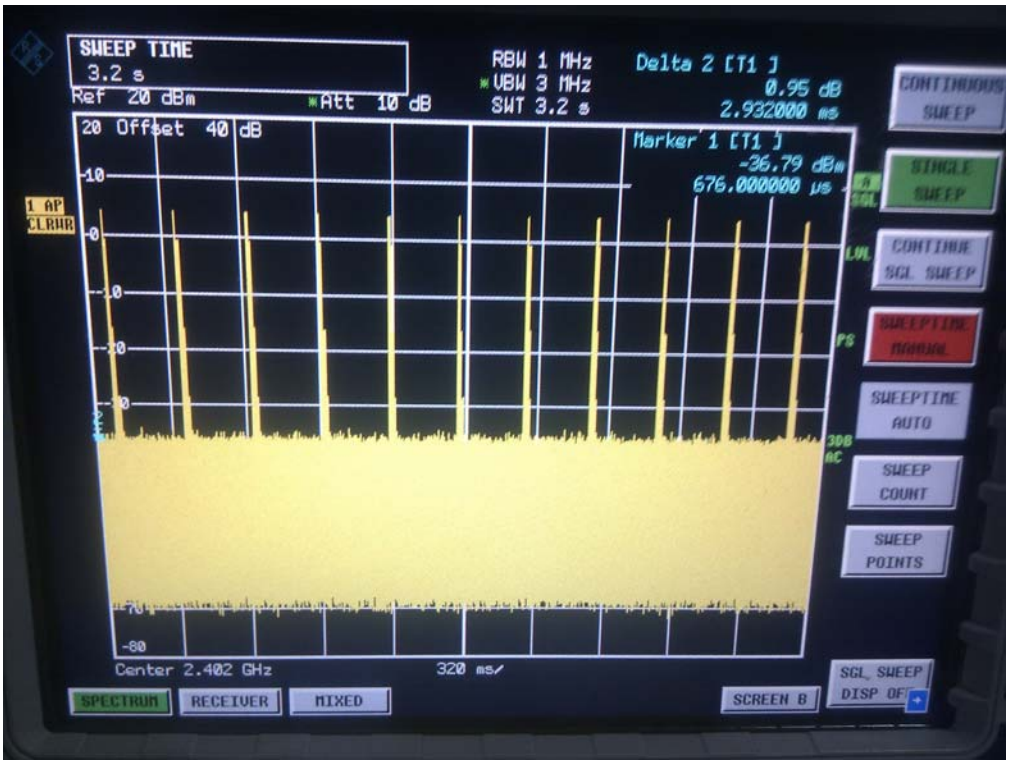
Channel H of DH3



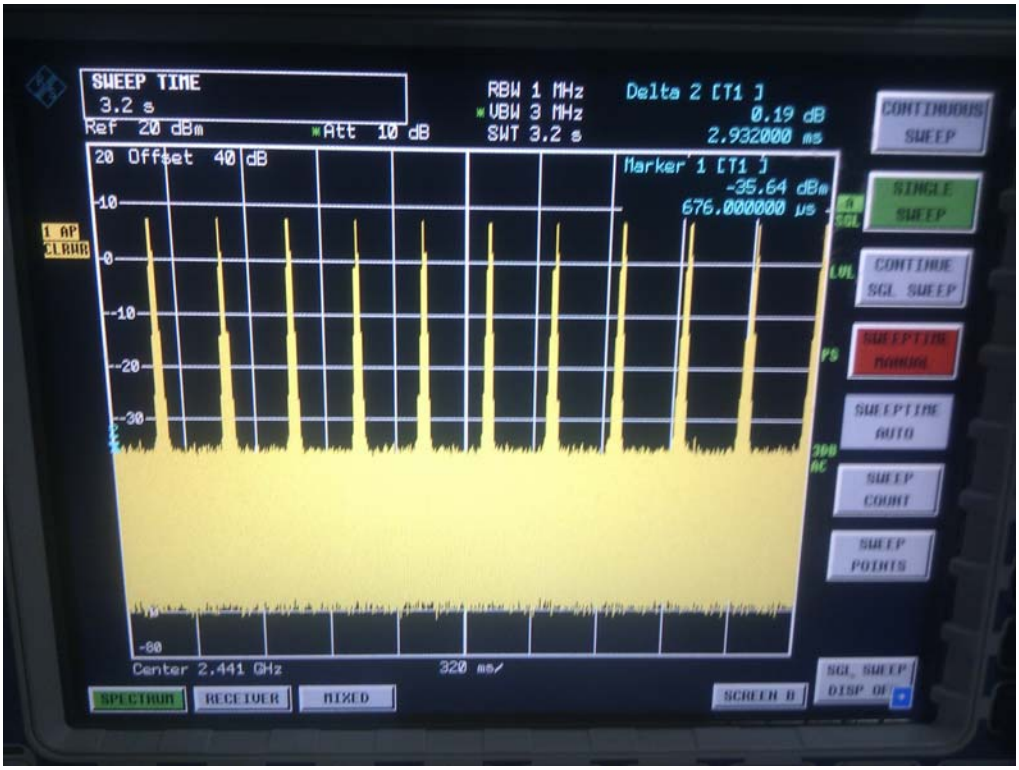
Single pulse of DH5



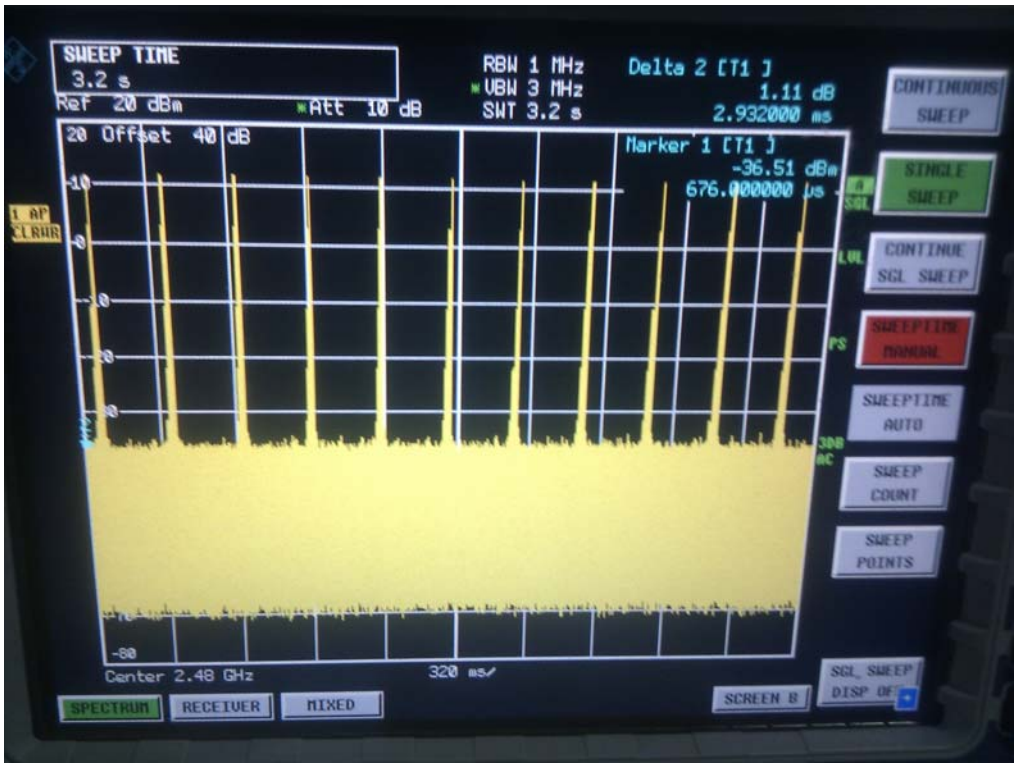
Channel L of DH5



Channel M of DH5



Channel H of DH5



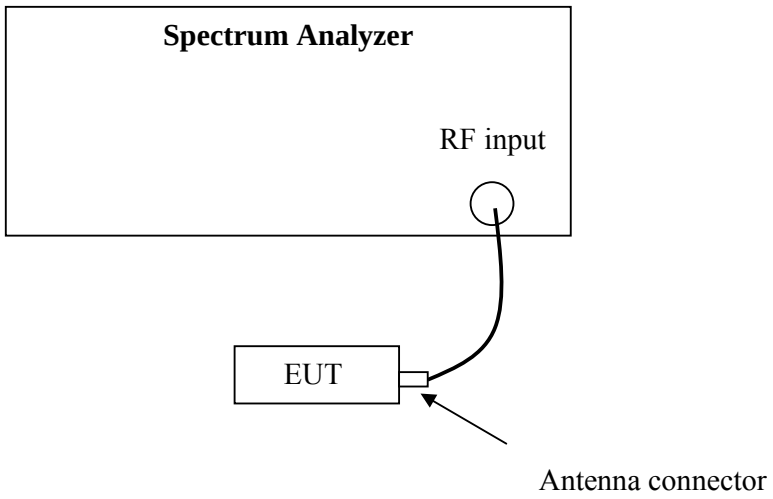
11. Occupied Bandwidth

Test Status: Tested

11.1 Test limit

None

11.2 Test Configuration



11.3 Test procedure and test setup

The occupied bandwidth per RSS-Gen Issue 3 Clause 4.6.1 was measured using the Spectrum Analyzer with the RBW close to 1% of the selected span, VBW = 3 * RBW Detector = Sample, Sweep = Auto.

11.4 Test protocol

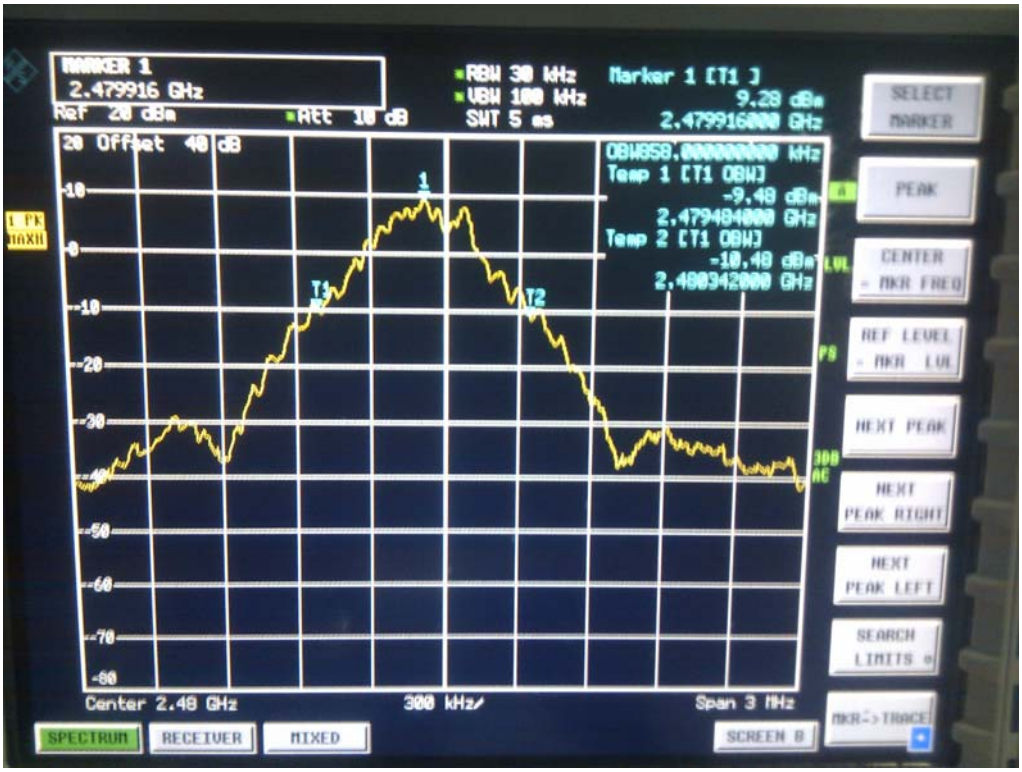
Temperature : 22 °C
Relative Humidity : 48 %

Channel	Occupied Bandwidth (kHz)
L	870
M	858
H	858

Channel L

Channel M

Channel H



12. Spurious emission for receiver

Test result: **NA**

12.1 Test limit

The spurious emission shall test through 3 times tuneable or local oscillator frequency whichever is the higher, without exceeding 40 GHz.

☐ If a conducted measurement is made, no spurious output signals appearing at the antenna terminals shall exceed 2nW per any 4 kHz spurious frequency in the band 30-1000 MHz, or 5nW above 1 GHz.

☐ If a radiated measurement is made, all spurious emissions shall comply with the limits of Table below:

Frequency (MHz)	Field Strength (dBuV/m)	Measurement Distance (m)
30 - 88	40.0	3
88 - 216	43.5	3
216 - 960	46.0	3
Above 960	54.0	3

12.2 Test Configuration

Please refer to clause 6.2

12.3 Test procedure and test setup

Please refer to clause 6.3.

12.4 Test protocol

Polarization	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-

Remark: 1. Correct Factor = Antenna Factor + Cable Loss (-Amplifier, is employed)
2. Corrected Reading = Original Receiver Reading + Correct Factor
3. Margin = limit – Corrected Reading

Example: Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB,
Original Receiver Reading = 10dBuV.
Then Correct Factor = 30.20 + 2.00 = 32.20dB/m; Corrected Reading = 10dBuV + 32.20dB/m = 42.20dBuV/m
Assuming limit = 54dBuV/m, Corrected Reading = 42.20dBuV/m, then Margin = 54 -42.20 = 11.80dBuV/m