REPORT No.: SZ18020074W02

TEST REPORT

APPLICANT	:	Qmax Systems India Private Limited
PRODUCT NAME	:	On Board Diagnostic Device
MODEL NAME	:	OBD II Device
BRAND NAME	:	Tekion
FCC ID	:	2APD6TEKOBD
STANDARD(S)	:	47 CFR Part 15 Subpart C
TEST DATE	:	2018-03-26 to 2018-04-03
ISSUE DATE	:	2018-04-17

Tested by: Tu Ya'nan

Tu Ya'nan (Test Engineer)

Approved by: Andy Yeh

Andy Yeh (Technical Director)

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DIRECTORY

Change History		
Issue	**Date**	**Reason for change**
1.0	2018-04-17	First edition

1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

Applicant:	Qmax Systems India Private Limited
Applicant Address:	795, Trunk Road, Poonamallee, Chennai 600056. Tamil Nadu, India
Manufacturer:	Qmax Systems India Private Limited
Manufacturer Address:	795, Trunk Road, Poonamallee, Chennai 600056. Tamil Nadu, India

1.2. Equipment Under Test (EUT) Description

Product Name:	On Board Diagnostic Device
Serial No:	(N/A, marked #1 by test site)
Hardware Version:	V1.0
Software Version:	V1.0
Modulation Type:	FHSS
Operating Frequency Range:	125 kHz Bandwidth: 902.3MHz-914.9MHz 500 kHz Bandwidth: 903.0MHz-914.2MHz
Antenna Type:	FPC Antenna
Antenna Gain:	3.0 dBi

Note 1: The EUT contains LoRa Module operating at 902MHz~928MHz ISM band and it supports two kinds of bandwidth: 125 kHz and 500 kHz.

For 125kHz bandwidth, the frequencies is F(MHz)=902.3+0.2*n (0<=n<=63). The lowest, middle, highest channel numbers of the LoRa Module used and tested in this report are separately 0 (902.3MHz), 32 (908.7MHz) and 63 (914.9MHz).

For 500kHz bandwidth, the frequencies is F(MHz)=903.0+1.6*(n-64) (64<=n<=71). The lowest, middle, highest channel numbers of the LoRa Module used and tested in this report are separately 64 (903.0MHz), 68 (909.4MHz) and 71 (914.2MHz).

Note 2: The EUT can operate in 125 kHz bandwidth as frequency range 902.3 MHz -914.9 MHz using 64 channels and it can also operate as a hybrid system when use a subset of 8 channels. When operate as a hybrid system, the equipment has eight hopping mode: FSB1 to FSB8, just as the table below. In every hopping mode, it has eight channels which can work in a pseudo-random mode.

Hopping mode	Frequency Block (MHz)	Number of hopping channel	Mid Channel	
			Channel	Center Frequency (MHz)
FSB1	902.2-903.8	8	3	902.9
FSB2	903.8-905.4	8	11	904.5
FSB3	905.4-907.0	8	19	906.1
FSB4	907.0-908.6	8	27	907.7
FSB5	908.6-910.2	8	35	909.3
FSB6	910.2-911.8	8	43	910.9
FSB7	911.8-913.4	8	51	912.5
FSB8	913.4-915.0	8	59	914.1

Note 3: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

1.3. Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart C (902MHz-928MHz ISM band radiators) for the EUT FCC ID Certification:

No	Identity	Document Title
1	47 CFR Part 15 (10-1-15 Edition)	Radio Frequency Devices
2	KDB 558074 D01	DTS Meas Guidance v04

Test detailed items/section required by FCC rules and results are as below:

No.	Section in CFR 47	Description	Test Date	Test Engineer	Result
1	15.203	Antenna Requirement	N/A	N/A	PASS
2	15.247(a)	Number of Hopping Frequency	Mar 26, 2018	Tu Ya'nan	PASS
3	15.247	Duty Cycle	Mar 29, 2018 Apr 02, 2018	Tu Ya'nan	PASS
4	15.247(b)	Conducted Output Power	Mar 29, 2018 Apr 02, 2018	Tu Ya'nan	PASS
5	15.247(e)	Power spectral density (PSD)	Mar 29, 2018 Apr 02, 2018	Tu Ya'nan	PASS
6	15.247(a)	20dB Bandwidth	Mar 29, 2018 Apr 02, 2018	Tu Ya'nan	PASS
7	15.247(a)	Carrier Frequency Separation	Mar 26, 2018	Tu Ya'nan	PASS
8	15.247(a)	Time of Occupancy (Dwell time)	Mar 26, 2018	Tu Ya'nan	PASS
9	15.247(d)	Conducted Spurious Emission	Mar 29, 2018 Apr 02, 2018	Tu Ya'nan	PASS
10	15.209, 15.247(d)	Radiated Emission	Apr 03, 2018	Wang Dalong	PASS
11	15.207	Conducted Emission	Apr 03, 2018	Wang Dalong	PASS
Note1: The tests were performed according to the method of measurements prescribed in ANSI C63.10-2013 and KDB 558074 D01 DTS Meas Guidance v04 dated 05/04/2017.					

1.4. Environmental Conditions

During the measurement, the environmental conditions were within the listed ranges:

Temperature (°C):	15 - 35
Relative Humidity (%):	30 -60
Atmospheric Pressure (kPa):	86-106

2. 47 CFR Part 15C Requirements

2.1. Antenna requirement

2.1.1. Applicable Standard

According to FCC 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

2.1.2. Result: Compliant

The EUT has a permanently and irreplaceable attached antenna. Please refer to the EUT internal photos.

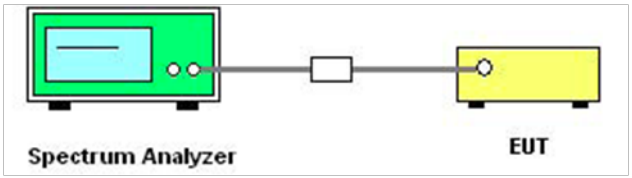
2.2. Number of Hopping Frequency

2.2.1. Requirement

According to FCC §15.247(f), there is no channel limit for hybrid system.

2.2.2. Test Description

A. Test Setup:



The EUT is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.
The Module operates at every hopping mode; the frequencies number employed is counted to verify the Module's using the number of hopping frequency.

B. Equipments List:

Please refer ANNEX A(1.5).

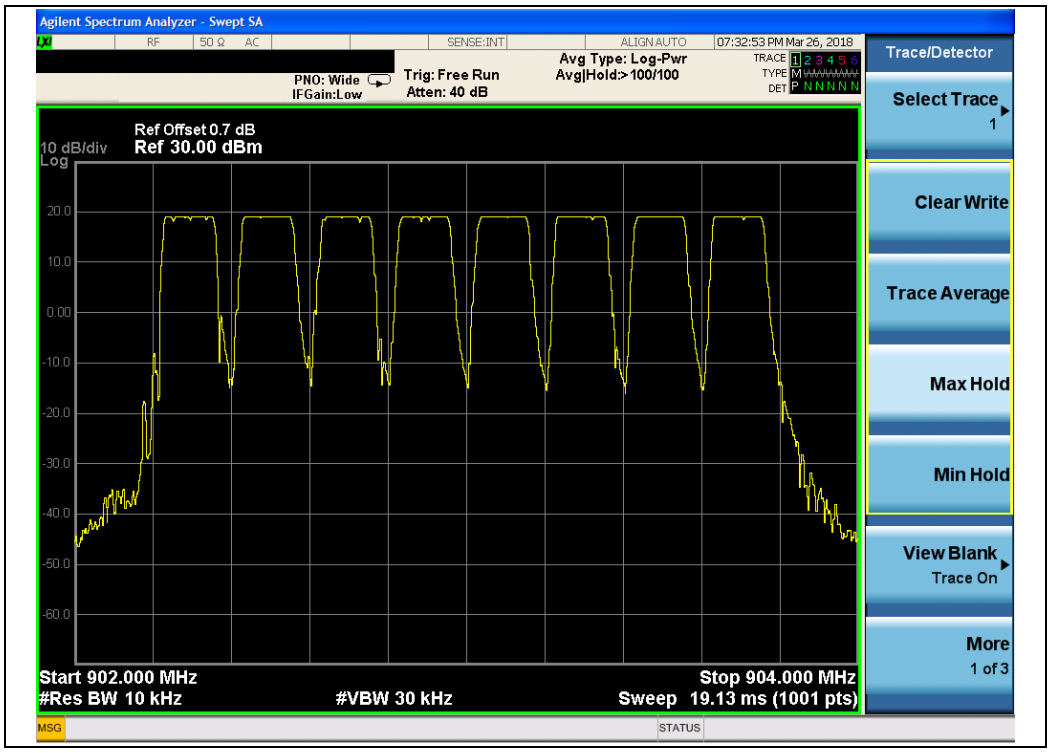
2.2.3. Test Result

A. Test Verdict:

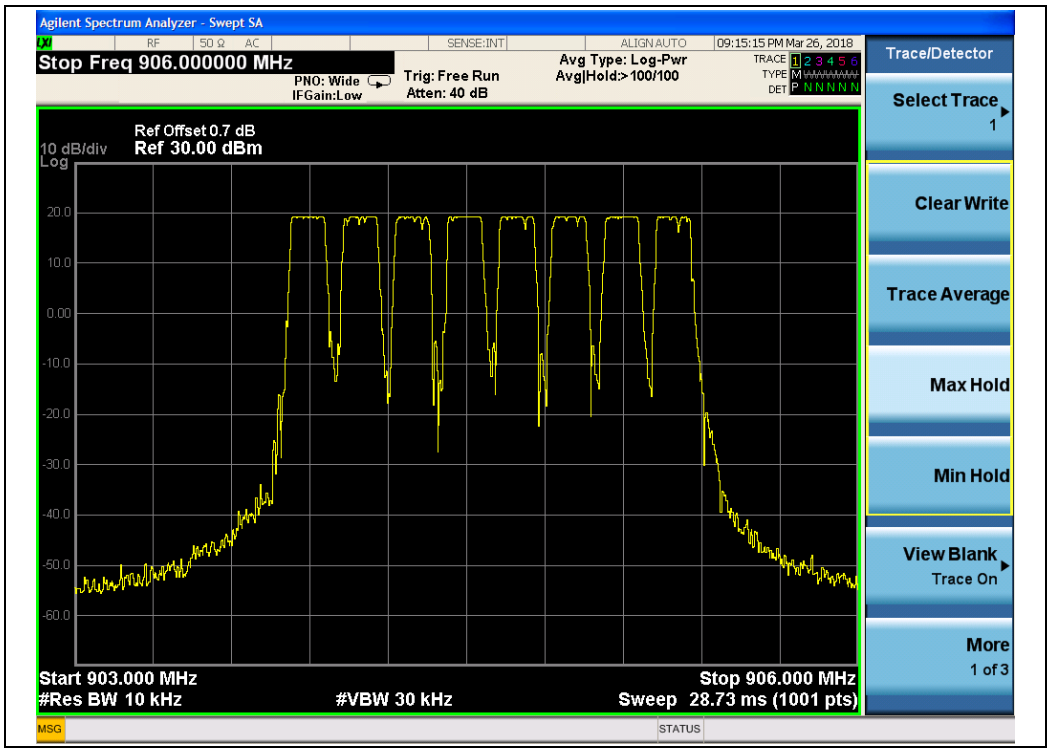
Hopping mode	Frequency Block (MHz)	Measured Channel Numbers	Min. Limit	Verdict
FSB1	902.2-903.8	8	N/A	N/A
FSB2	903.8-905.4	8	N/A	N/A
FSB3	905.4-907.0	8	N/A	N/A
FSB4	907.0-908.6	8	N/A	N/A
FSB5	908.6-910.2	8	N/A	N/A
FSB6	910.2-911.8	8	N/A	N/A
FSB7	911.8-913.4	8	N/A	N/A
FSB8	913.4-915.0	8	N/A	N/A

Note: There is no channel limit for Hybrid System.

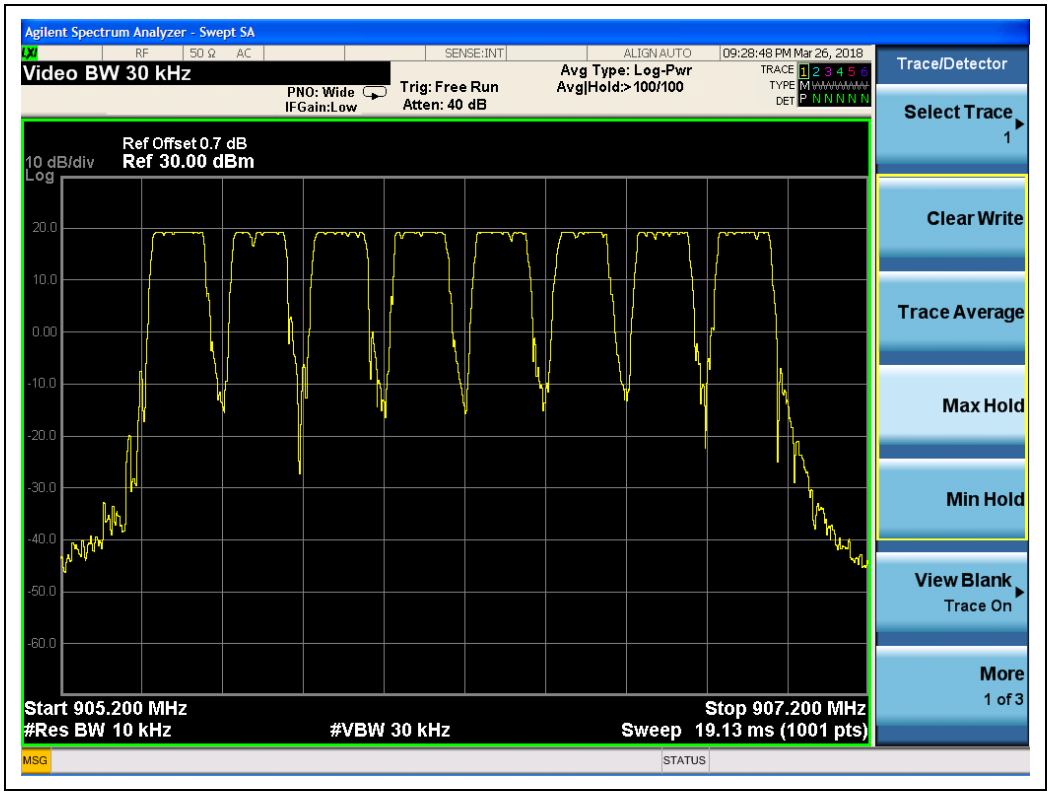
B. Test Plots:



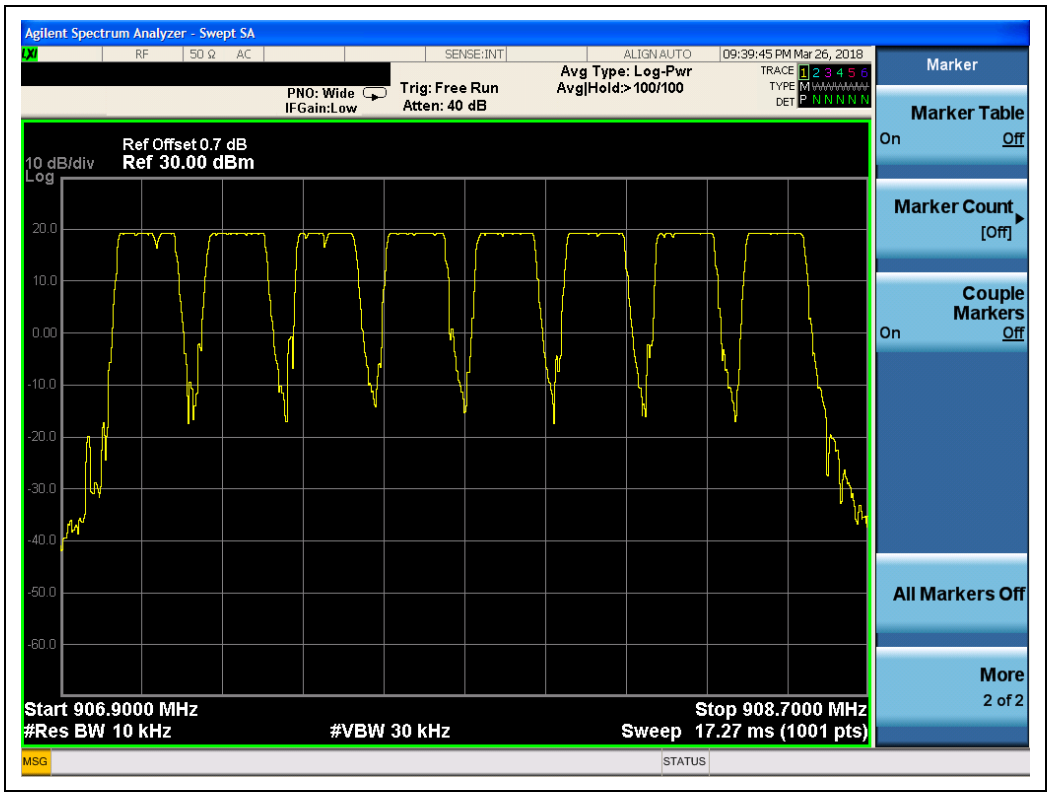
(FSB1)



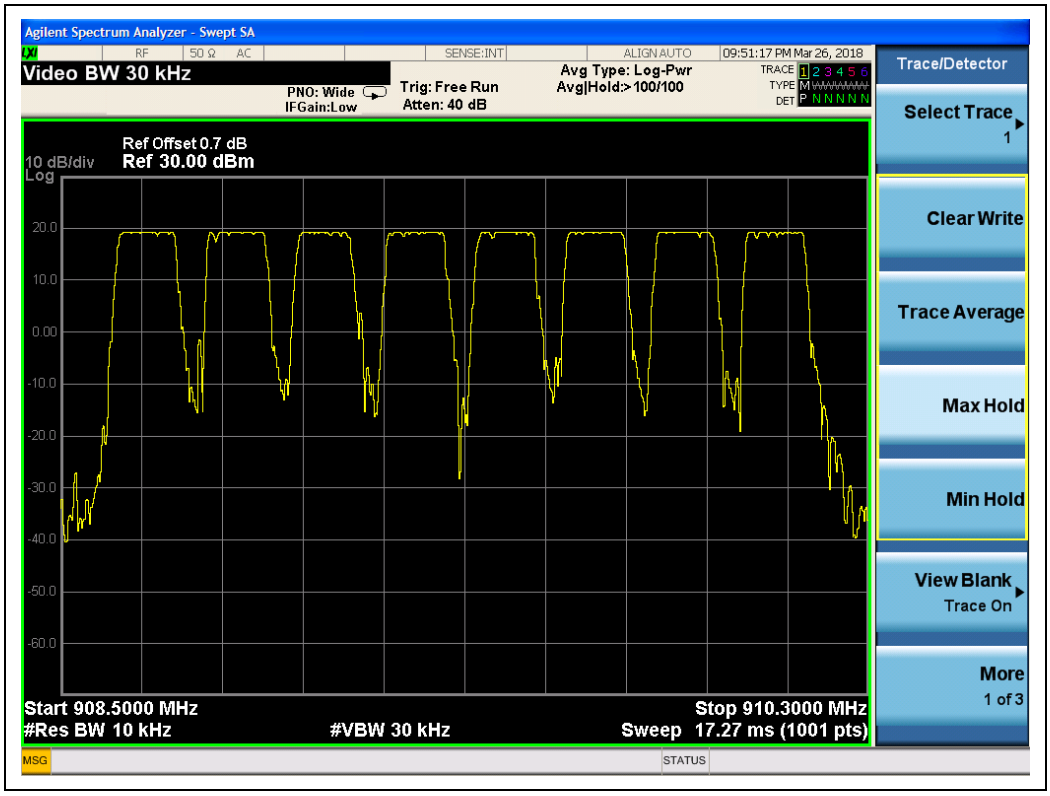
(FSB2)


Agilent Spectrum Analyzer - Swept SA
RF
50 Ω AC
SENSE:INT
ALIGN AUTO
09:28:48 PM Mar 26, 2018
Video BW 30 kHz
PNO: Wide
IFGain:Low
Trig: Free Run
Atten: 40 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
TRACE 1 2 3 4 5 6
TYPE M
DET P N N N N N
Ref Offset 0.7 dB
10 dB/div
Log
Ref 30.00 dBm
20.0
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
Start 905.200 MHz
#Res BW 10 kHz
#VBW 30 kHz
Stop 907.200 MHz
Sweep 19.13 ms (1001 pts)
MSG
STATUS
Trace/Detector
Select Trace
1
Clear Write
Trace Average
Max Hold
Min Hold
View Blank
Trace On
More
1 of 3

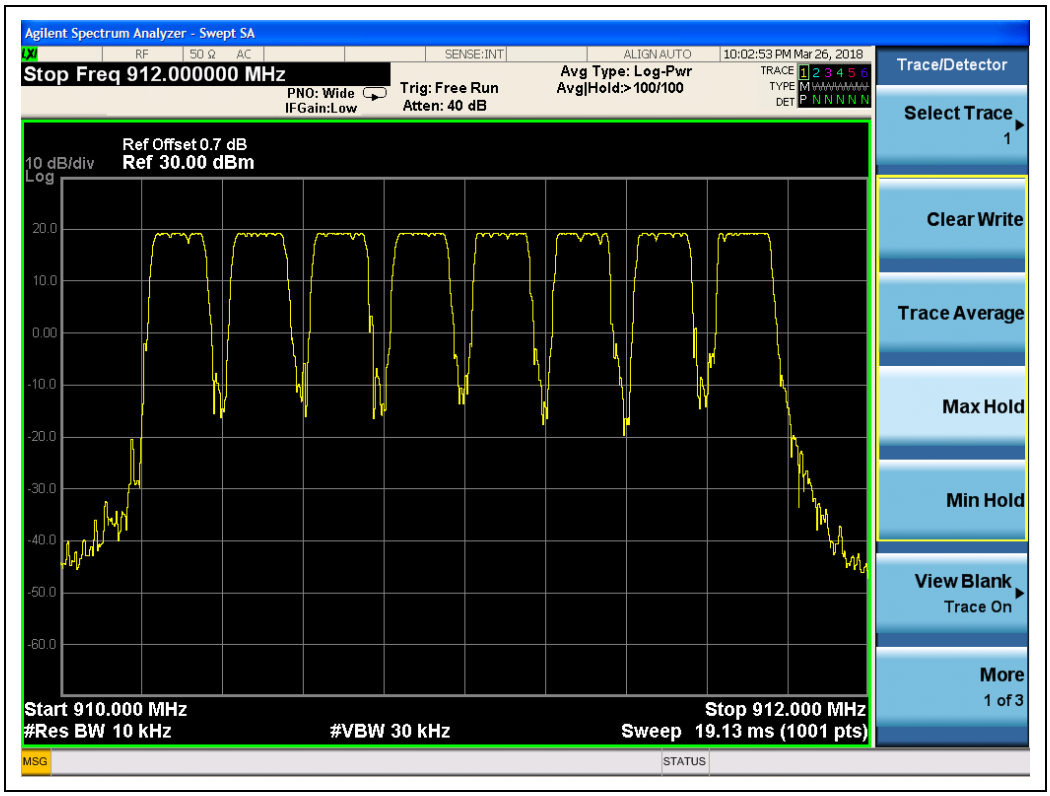
(FSB3)


Agilent Spectrum Analyzer - Swept SA
RF
50 Ω AC
SENSE:INT
ALIGN AUTO
09:39:45 PM Mar 26, 2018
PNO: Wide
IFGain:Low
Trig: Free Run
Atten: 40 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
TRACE 1 2 3 4 5 6
TYPE M
DET P N N N N N
Ref Offset 0.7 dB
10 dB/div
Log
Ref 30.00 dBm
20.0
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
Start 906.9000 MHz
#Res BW 10 kHz
#VBW 30 kHz
Stop 908.7000 MHz
Sweep 17.27 ms (1001 pts)
MSG
STATUS
Marker
Marker Table
On Off
Marker Count
[Off]
Couple Markers
On Off
All Markers Off
More
2 of 2

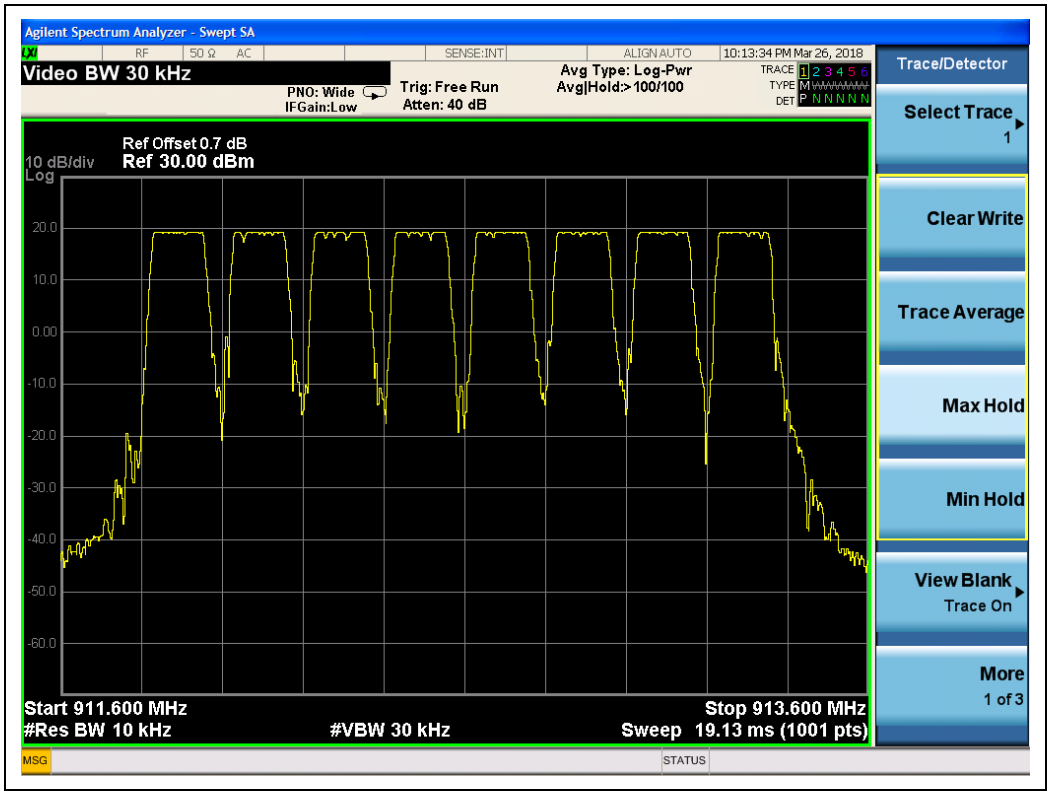
(FSB4)


Agilent Spectrum Analyzer - Swept SA
RF
50 Ω AC
SENSE:INT
ALIGN AUTO
09:51:17 PM Mar 26, 2018
Video BW 30 kHz
PNO: Wide
IFGain:Low
Trig: Free Run
Atten: 40 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
TRACE 1 2 3 4 5 6
TYPE M
DET P N N N N N
Ref Offset 0.7 dB
10 dB/div
Log
Ref 30.00 dBm
20.0
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
Start 908.5000 MHz
#Res BW 10 kHz
#VBW 30 kHz
Stop 910.3000 MHz
Sweep 17.27 ms (1001 pts)
MSG
STATUS
Trace/Detector
Select Trace 1
Clear Write
Trace Average
Max Hold
Min Hold
View Blank Trace On
More 1 of 3

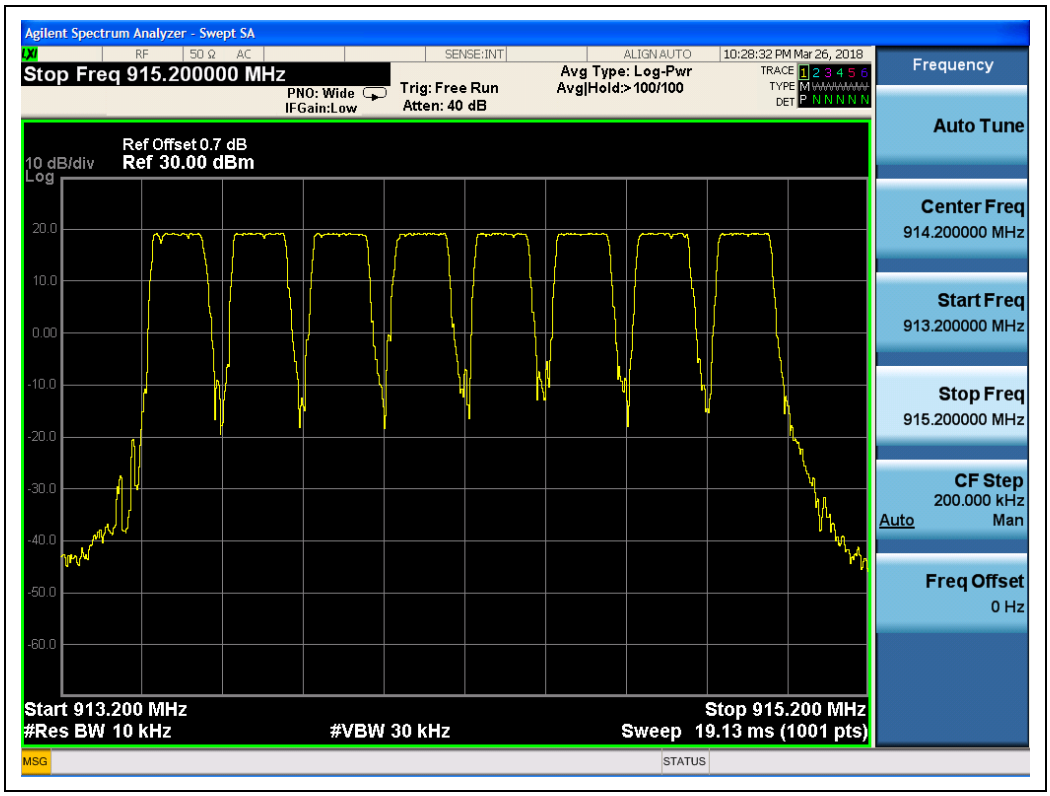
(FSB5)


Agilent Spectrum Analyzer - Swept SA
RF
50 Ω AC
SENSE:INT
ALIGN AUTO
10:02:53 PM Mar 26, 2018
Stop Freq 912.000000 MHz
PNO: Wide
IFGain:Low
Trig: Free Run
Atten: 40 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
TRACE 1 2 3 4 5 6
TYPE M
DET P N N N N N
Ref Offset 0.7 dB
10 dB/div
Log
Ref 30.00 dBm
20.0
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
Start 910.000 MHz
#Res BW 10 kHz
#VBW 30 kHz
Stop 912.000 MHz
Sweep 19.13 ms (1001 pts)
MSG
STATUS
Trace/Detector
Select Trace 1
Clear Write
Trace Average
Max Hold
Min Hold
View Blank Trace On
More 1 of 3

(FSB6)


Agilent Spectrum Analyzer - Swept SA
Video BW 30 kHz
PNO: Wide
IFGain:Low
Trig: Free Run
Atten: 40 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
10:13:34 PM Mar 26, 2018
Ref Offset 0.7 dB
10 dB/div
Log
Ref 30.00 dBm
Start 911.600 MHz
#Res BW 10 kHz
#VBW 30 kHz
Stop 913.600 MHz
Sweep 19.13 ms (1001 pts)
Trace/Detector
Select Trace 1
Clear Write
Trace Average
Max Hold
Min Hold
View Blank Trace On
More 1 of 3

(FSB7)


Agilent Spectrum Analyzer - Swept SA
Stop Freq 915.200000 MHz
PNO: Wide
IFGain:Low
Trig: Free Run
Atten: 40 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
10:28:32 PM Mar 26, 2018
Ref Offset 0.7 dB
10 dB/div
Log
Ref 30.00 dBm
Start 913.200 MHz
#Res BW 10 kHz
#VBW 30 kHz
Stop 915.200 MHz
Sweep 19.13 ms (1001 pts)
Frequency
Auto Tune
Center Freq 914.200000 MHz
Start Freq 913.200000 MHz
Stop Freq 915.200000 MHz
CF Step 200.000 kHz Auto Man
Freq Offset 0 Hz

(FSB8)

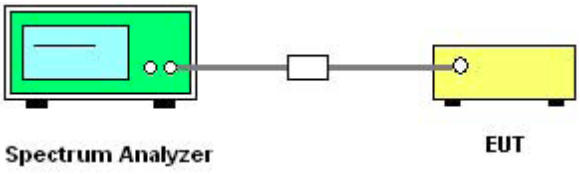
2.3. Duty Cycle

2.3.1. Definition

The duty cycle refers to the fraction of time over which the transmitter is on and is transmitting at its maximum power control level.
There is no compliance requirement to be met by this test, so therefore no Pass / Fail criteria.

2.3.2. Test Description

A. Test Setup:



The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The Duty Cycle (x) of the single channel operation of the radio as controlled by the provided test software was measured for each of the EUT operating modes.
The measurements were made using a zero span on the spectrum analyzer to see the pulses in the time domain. The transmit power was set to its default maximum.
The duty cycle was calculated by dividing the transmission pulse duration (T) by the total period of a single on and total off time.
If the transmit duty cycle <98 percent, burst gating may have been used during some of the other tests in this report to only take the measurement during the burst duration.

B. Equipments List:

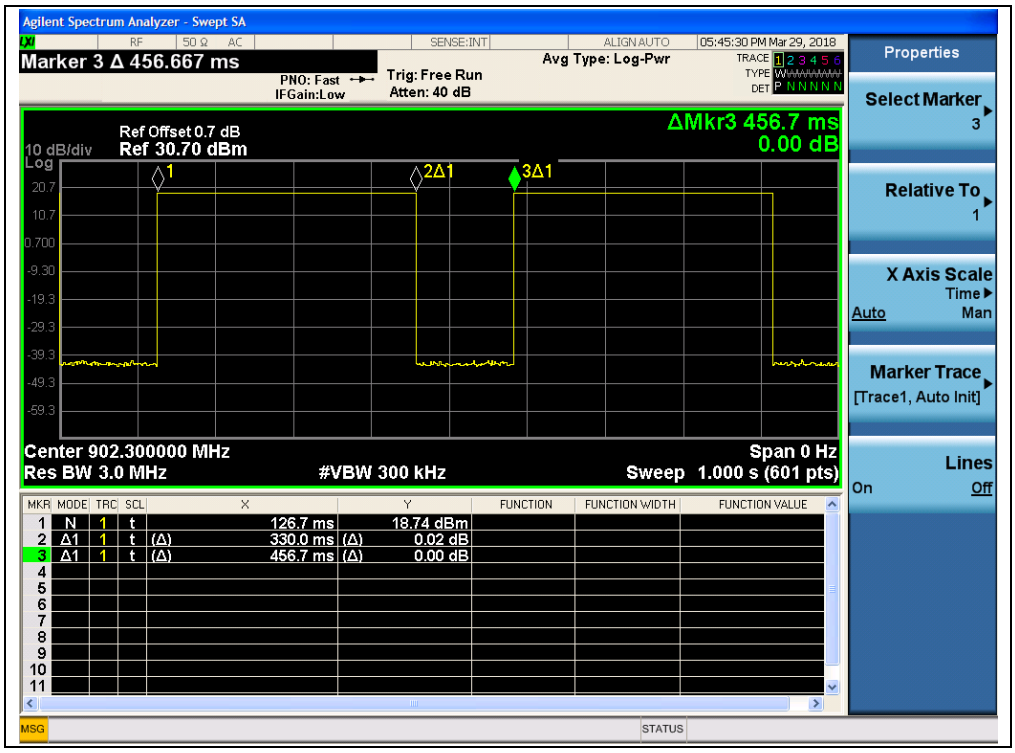
Please refer ANNEX A(1.5).

2.3.3. Test Result

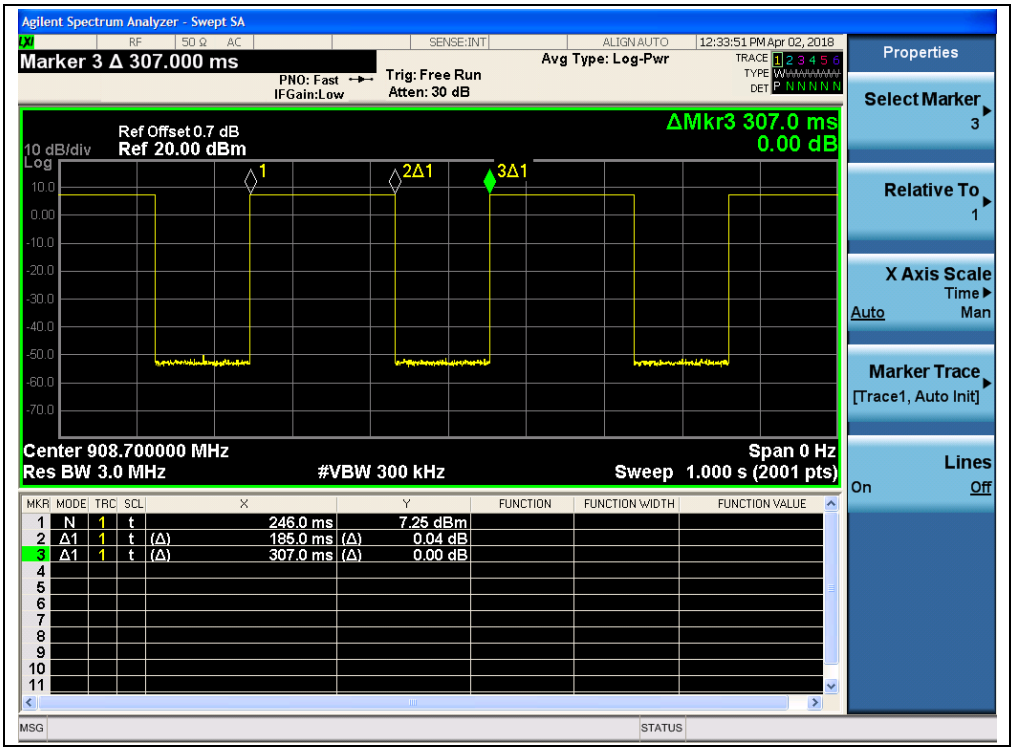
A. Test Verdict:

Bandwidth (kHz)	Channel	Frequency (MHz)	Number fo Pulses	Pulse Width (ms)	Period (ms)	Duty Cycle	Duty Cycle Factor
125	Low	902.3	1	330.00	456.70	0.72	1.41
	Mid	908.7	1	185.00	307.00	0.60	2.20
	High	914.9	1	185.20	306.30	0.60	2.19
500	Low	903.0	1	23.00	146.80	0.16	8.05
	Mid	909.4	1	23.25	147.00	0.16	8.01
	High	914.2	1	23.25	147.00	0.16	8.01

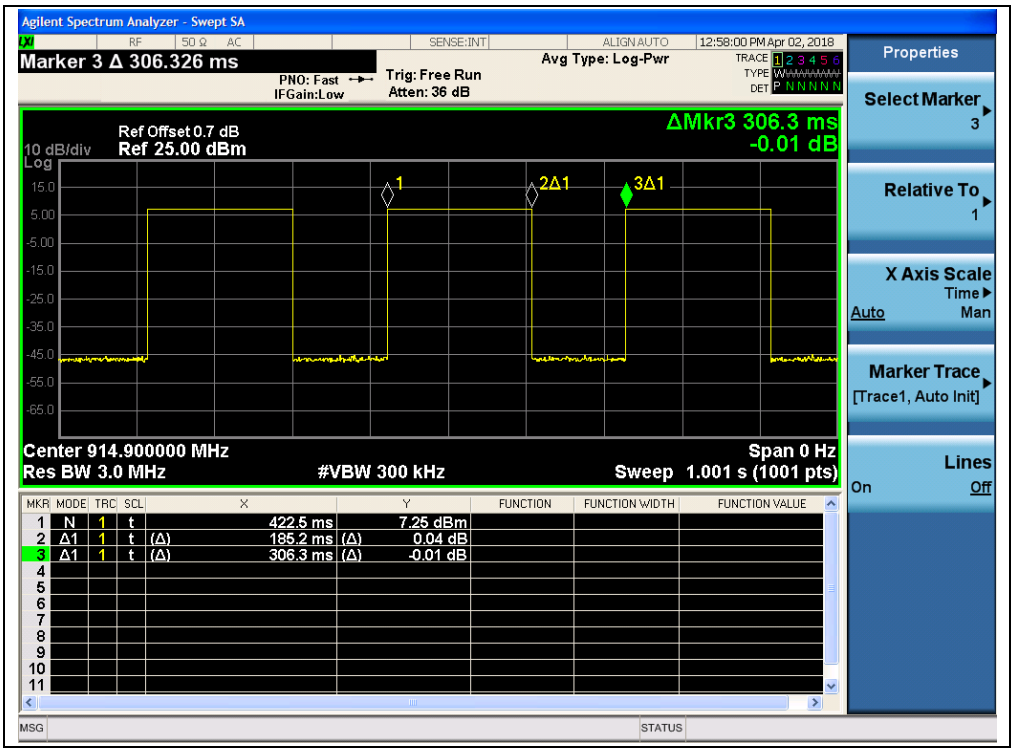
B. Test Plots:



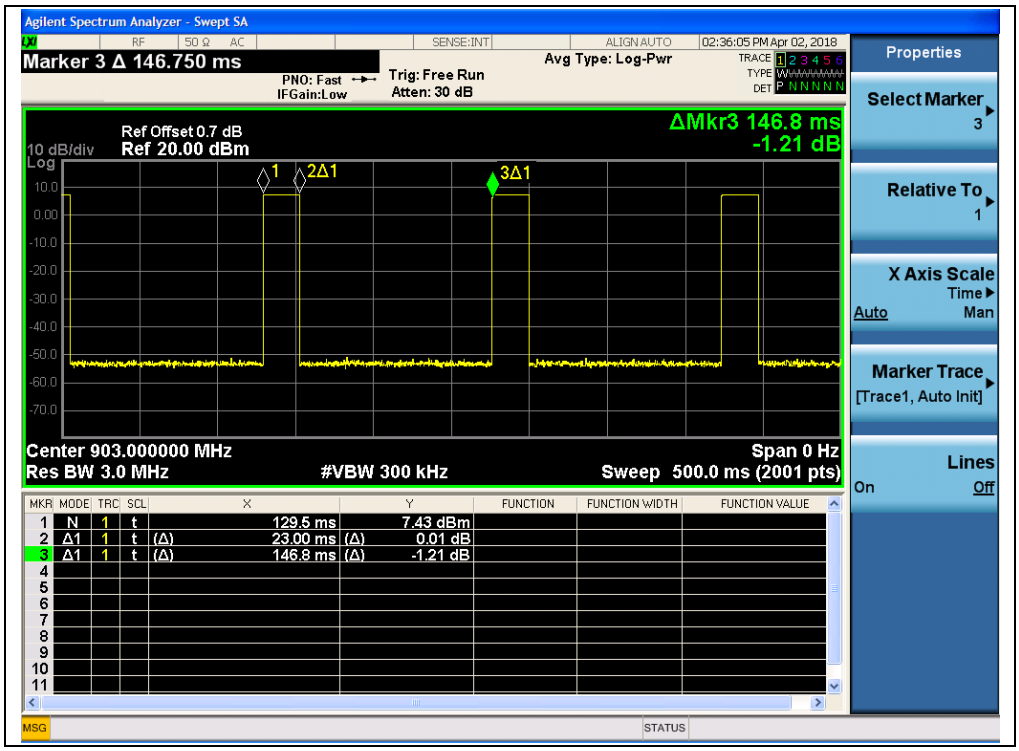
(125 kHz BW, Low Channel, 902.3MHz)



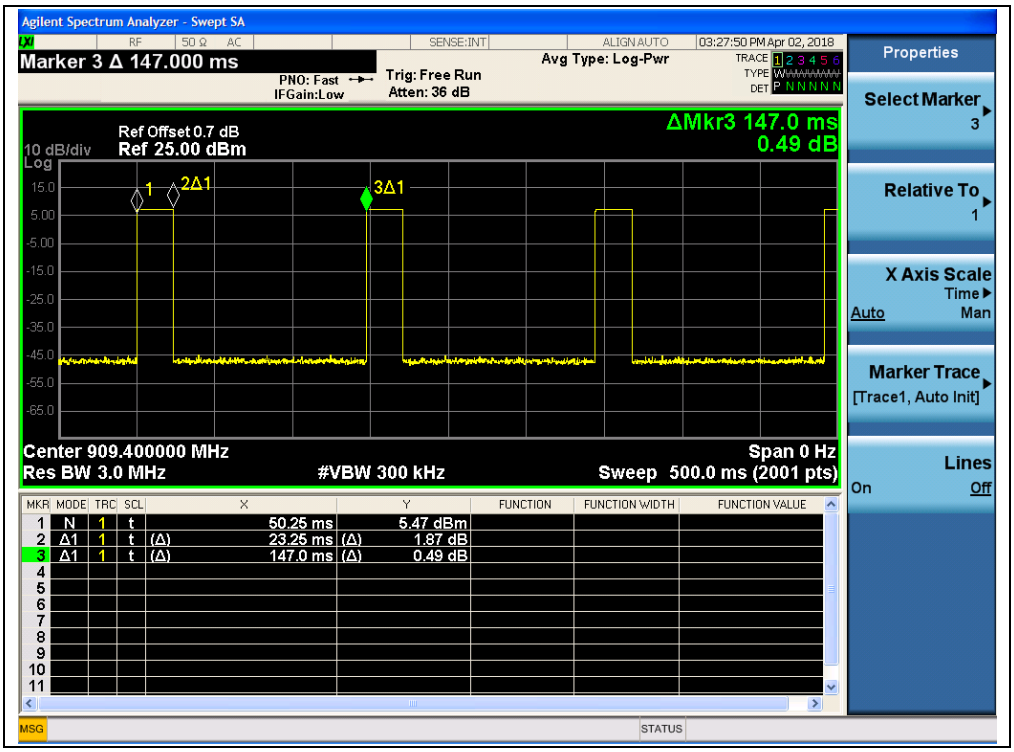
(125 kHz BW, Mid Channel, 908.7MHz)



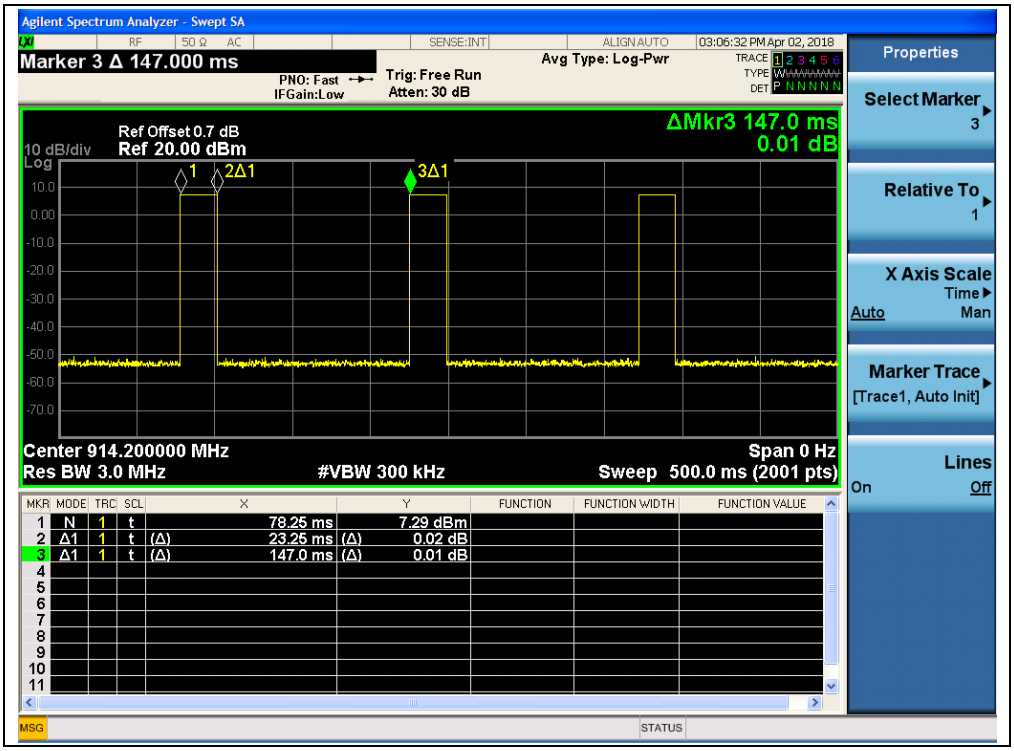
(125 kHz BW, High Channel, 914.9MHz)



(500 kHz BW, Low Channel, 903.0MHz)



(500 kHz BW, Mid Channel, 909.4MHz)



(500 kHz BW, High Channel, 914.2MHz)

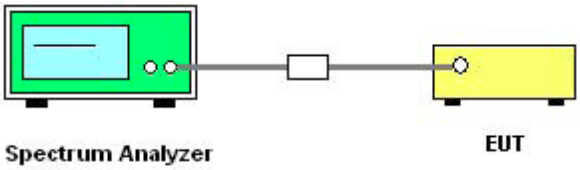
2.4. Maximum Conducted Output Power

2.4.1. Requirement

According to FCC §15.247(b)(2), for frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels.
Hybrid systems shall comply with the 1W limit.

2.4.2. Test Description

A. Test Setup:



The EUT is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.
The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The fundamental emission output power (maximum average conducted output power) was measured using the channels and modes as called out on the following data sheets. The transmit power was set to its default maximum.
Prior to measuring output power; the emission bandwidth (B) and the transmission pulse duration (T) were measured. Both are required to determine the method of measuring Maximum Conducted Output Power. The transmission pulse duration (T) was measured using a zero span on the spectrum analyzer to see the pulses in the time domain.
The method AVGSA-2 in section 11.9.2.2.4 of ANSI C63.10:2013 was used to make the measurement. This method uses trace averaging across ON and OFF times of the EUT transmissions in the spectrum analyzer channel power function using an RMS detector. Following the measurement a duty cycle correction was applied by adding[10log(1/D)],where D is the duty cycle, to the measured power to compute the average power during the actual transmission times.

B. Equipments List:

Please refer ANNEX A(1.5).

2.4.3. Test Result

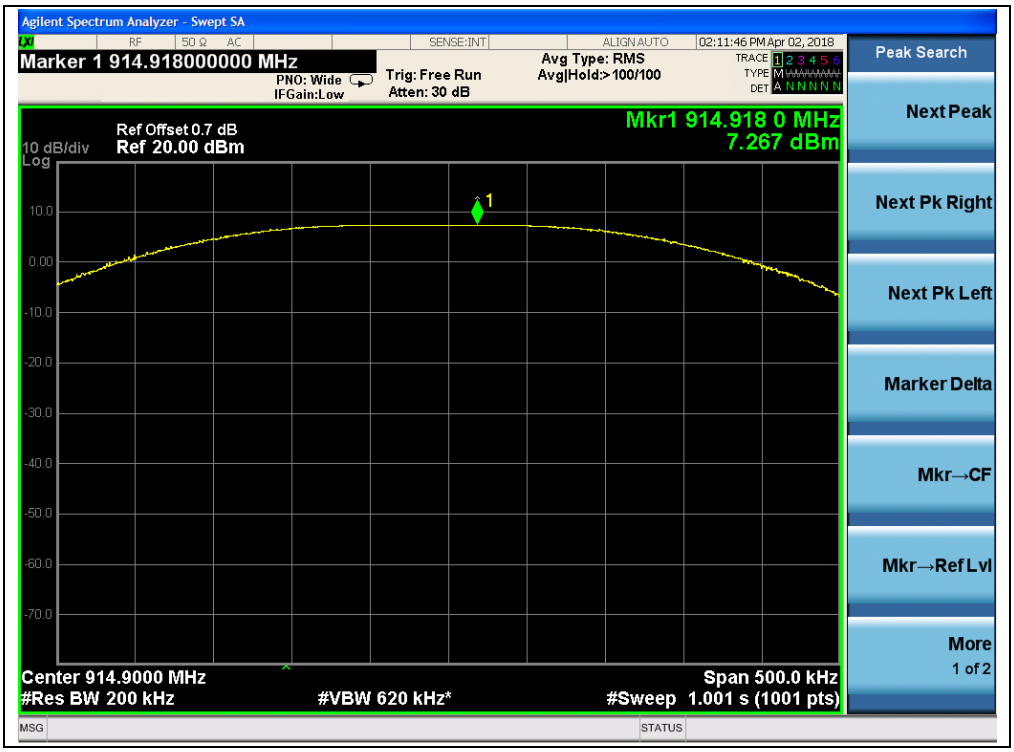
A. Test Verdict:

Bandwidth (kHz)	Channel	Frequency (MHz)	Average Power (dBm)	Duty Cycle Factor (dB)	Maximum Output Power (dBm)	Limit (dBm)	Verdict
125	Low	902.3	7.30	1.41	8.71	30	PASS
	Mid	908.7	7.18	2.20	9.38		PASS
	High	914.9	7.27	2.19	9.46		PASS
500	Low	903.0	7.24	8.05	15.29	30	PASS
	Mid	909.4	7.11	8.01	15.12		PASS
	High	914.2	7.20	8.01	15.21		PASS

B. Test Plots:

(125 kHz BW, Low Channel, 902.3MHz)

(125 kHz BW, Mid Channel, 908.7MHz)



(125 kHz BW, High Channel, 914.9MHz)

(500 kHz BW, Low Channel, 903.0MHz)

(500 kHz BW, Mid Channel, 909.4MHz)

(500 kHz BW, High Channel, 914.2MHz)

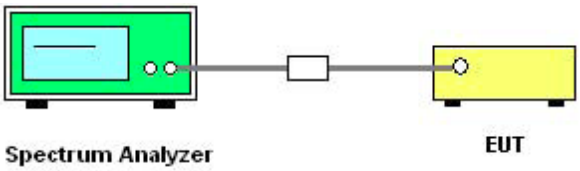
2.5. Power spectral density (PSD)

2.5.1. Requirement

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission. The same method of determining the conducted output power shall be used to determine the power spectral density.

2.5.2. Test Description

A. Test Set:



The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The maximum power spectral density measurements were measured using the channels and modes as called out on the following datasheets.
Per the AVGPSD-2 method outlined in FCC KDB 558074 D01, the average power spectral density was measured in a 3 kHz RBW with a duty cycle correction factor.

B. Equipments List:

Please refer ANNEX A(1.5).

2.5.3. Test Result

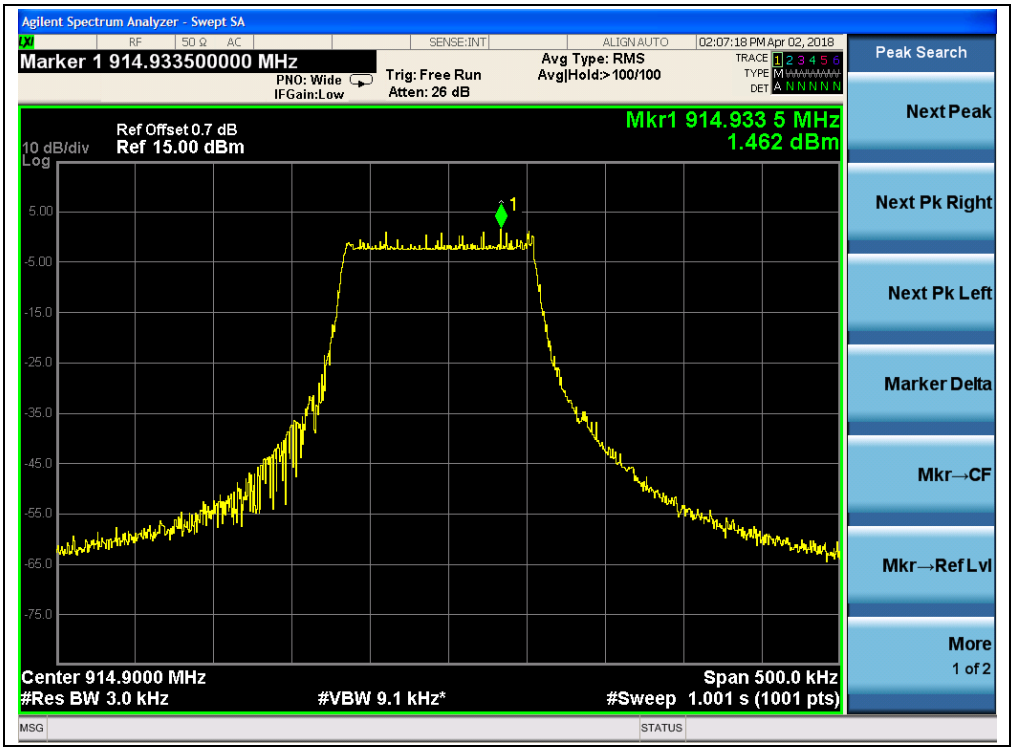
A. Test Verdict:

Bandwidth (kHz)	Channel	Frequency (MHz)	Power (dBm/3kHz)	Duty Cycle Factor (dB)	Density (dBm/3kHz)	Limit≤ (dBm/3kHz)	Verdict
125	Low	902.3	4.32	1.41	5.73	8	PASS
	Mid	908.7	1.35	2.20	3.55		PASS
	High	914.9	1.46	2.19	3.65		PASS
500	Low	903.0	-9.59	8.05	-1.54	8	PASS
	Mid	909.4	-9.80	8.01	-1.79		PASS
	High	914.2	-9.51	8.01	-1.50		PASS

B. Test Plots:

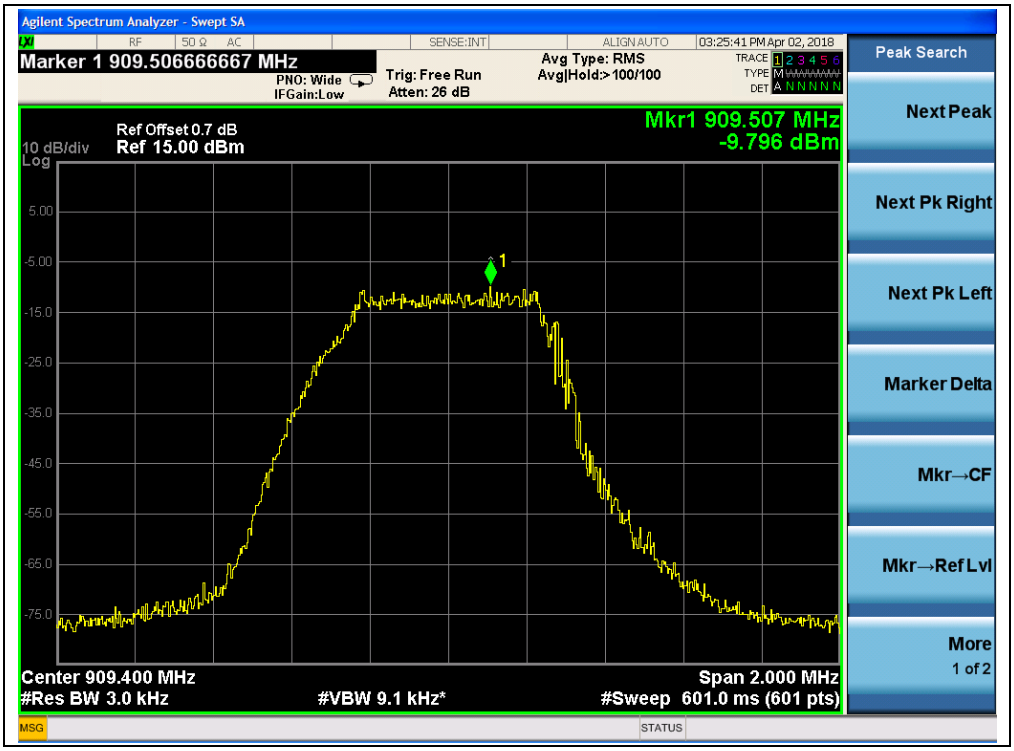
(125 kHz BW, Low Channel, 902.3MHz)

(125 kHz BW, Mid Channel, 908.7MHz)

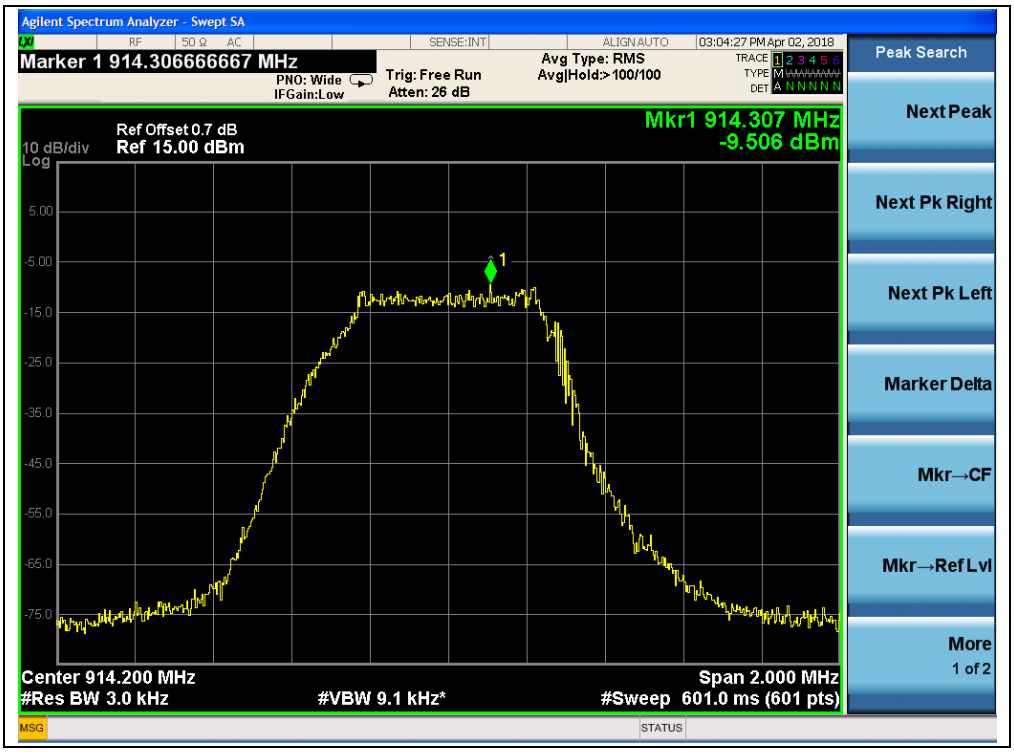


(125 kHz BW, High Channel, 914.9MHz)

(500 kHz BW, Low Channel, 903.0MHz)



(500 kHz BW, Mid Channel, 909.4MHz)



(500 kHz BW, High Channel, 914.2MHz)

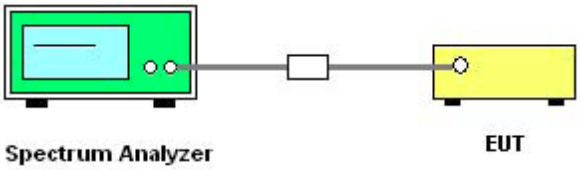
2.6. 20dB Bandwidth

2.6.1. Definition

According to FCC §15.247(a)(1), the 20dB bandwidth is known as the 99% emission bandwidth, or 20dB bandwidth (10*log1% = 20dB) taking the total RF output power.

2.6.2. Test Description

A. Test Setup:



The EUT is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The 20dB occupied bandwidth was measured with the EUT set to low,medium and high transmit frequencies in the band. The EUT was transmitting at the data rate(s) listed in the datasheet in a no-hop mode.

B. Equipments List:

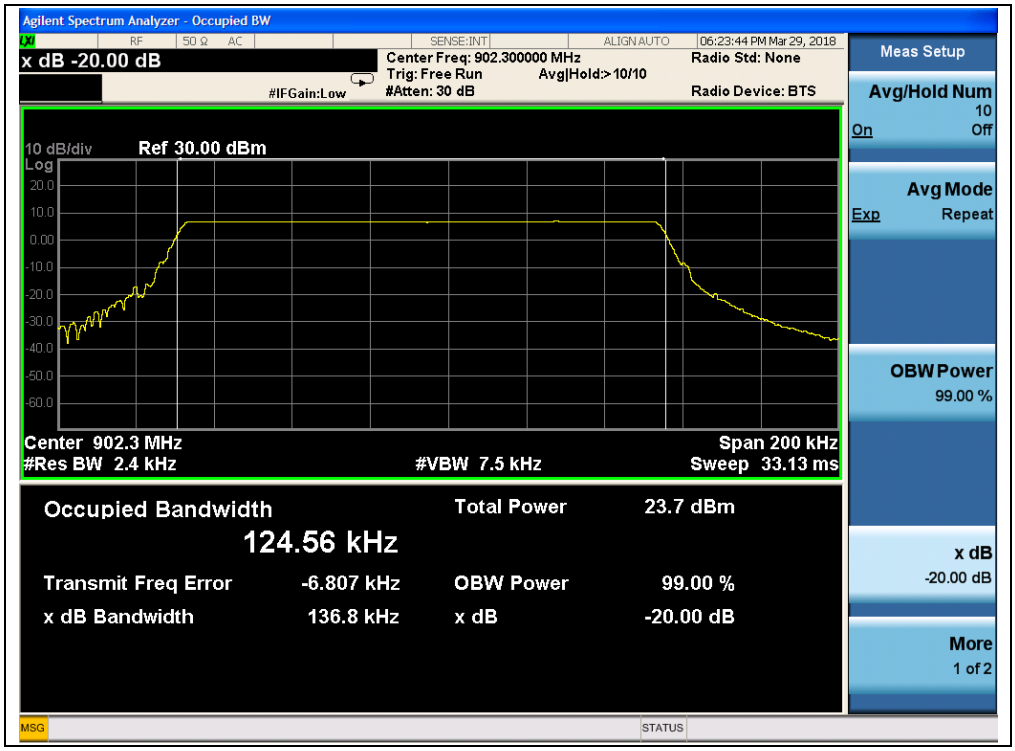
Please refer ANNEX A(1.5).

2.6.3. Test Result

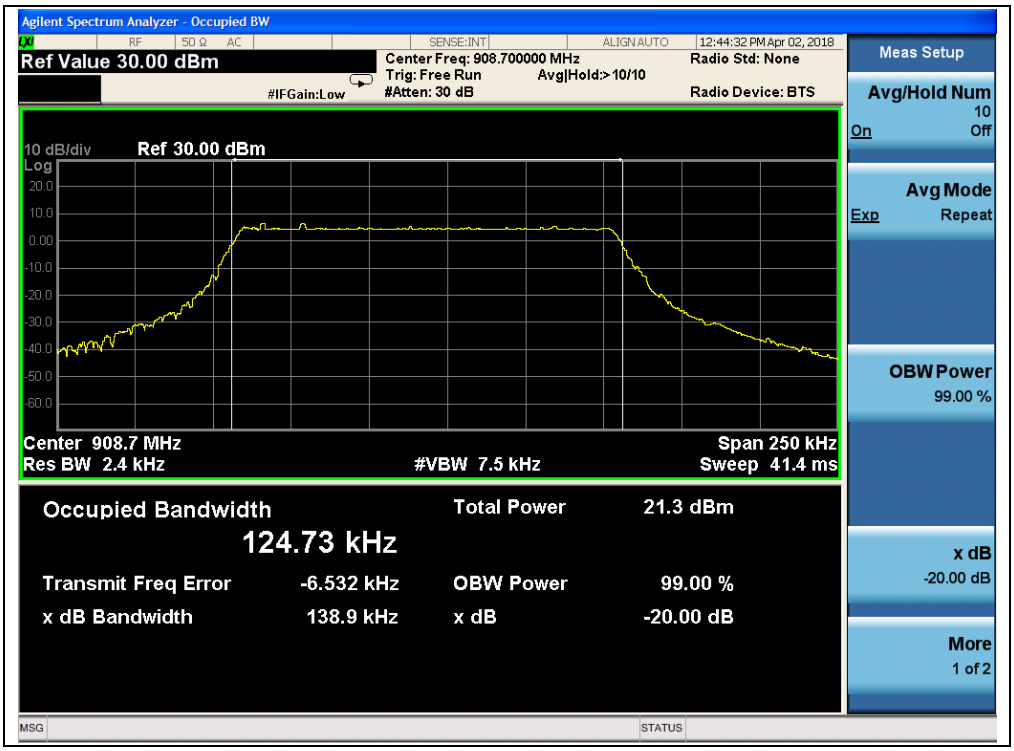
A. Test Verdict:

Bandwidth (kHz)	Channel	Frequency (MHz)	20dB Bandwidth (kHz)	Limit (dBm)	Verdict
125	Low	902.3	136.8	N/A	PASS
	Mid	908.7	138.9		PASS
	High	914.9	137.2		PASS
500	Low	903.0	722.3	N/A	PASS
	Mid	909.4	679.8		PASS
	High	914.2	708.0		PASS

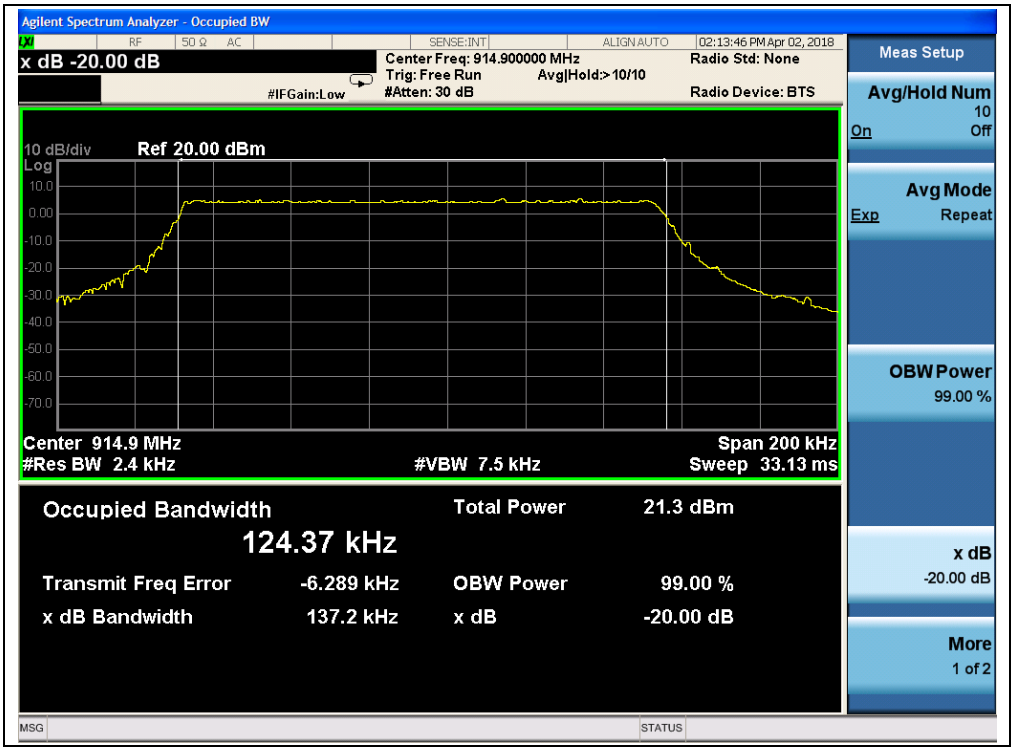
A. Test Plots:



(125 kHz BW, Low Channel, 902.3MHz)



(125 kHz BW, Mid Channel, 908.7MHz)



(125 kHz BW, High Channel, 914.9MHz)

(500 kHz BW, Low Channel, 903.0MHz)

(500 kHz BW, Mid Channel, 909.4MHz)

(500 kHz BW, High Channel, 914.2MHz)

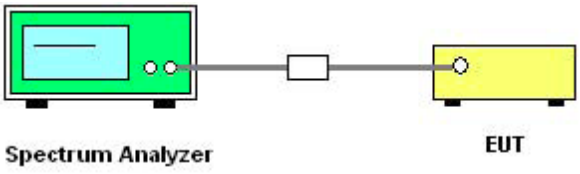
2.7. Carried Frequency Separation

2.7.1. Definition

According to FCC §15.247(a)(1), frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater.

2.7.2. Test Description

C. Test Setup:



The EUT is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.
The EUT was operated in pseudorandom hopping mode. The spectrum was scanned across two adjacent peaks. The separation between the peaks of these channels was measured.

D. Equipments List:

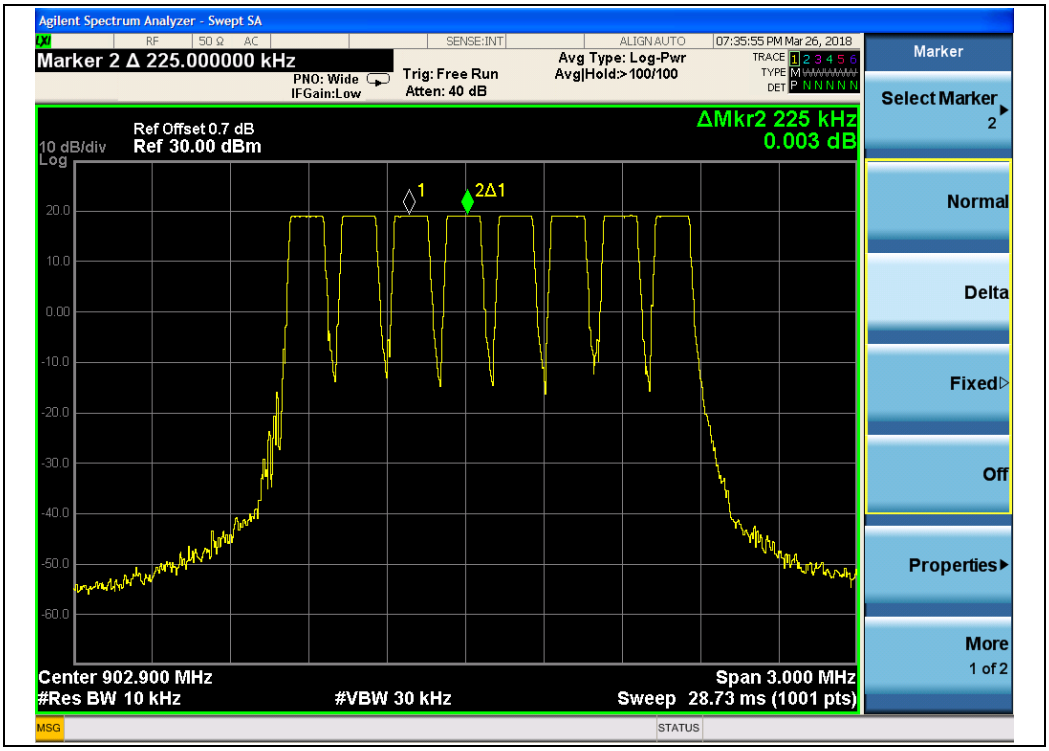
Please refer ANNEX A(1.5).

2.7.3. Test Result

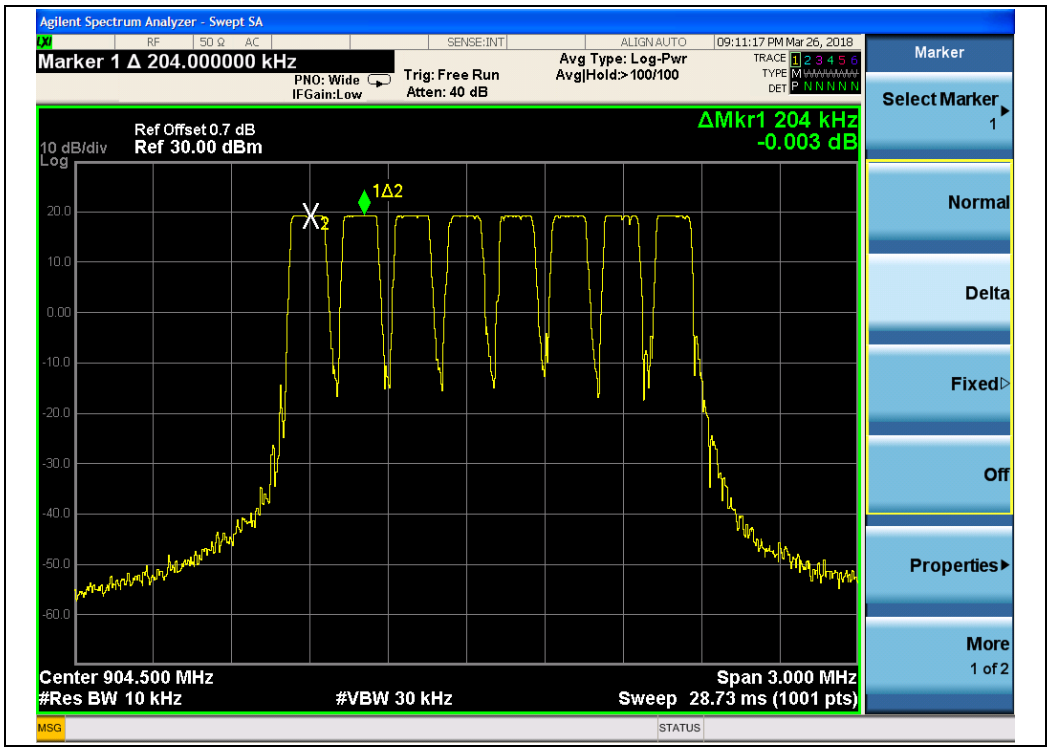
A. Test Verdict:

Hopping mode	Frequency Block (MHz)	Mid Channel (MHz)	Carried Frequency Separation (kHz)	Limit (≥)	Verdict
FSB1	902.2-903.8	902.9	225	138.9	PASS
FSB2	903.8-905.4	904.5	204	138.9	PASS
FSB3	905.4-907.0	906.1	202	138.9	PASS
FSB4	907.0-908.6	907.7	247	138.9	PASS
FSB5	908.6-910.2	909.3	200	138.9	PASS
FSB6	910.2-911.8	910.9	198	138.9	PASS
FSB7	911.8-913.4	912.5	210	138.9	PASS
FSB8	913.4-915.0	914.1	203	138.9	PASS

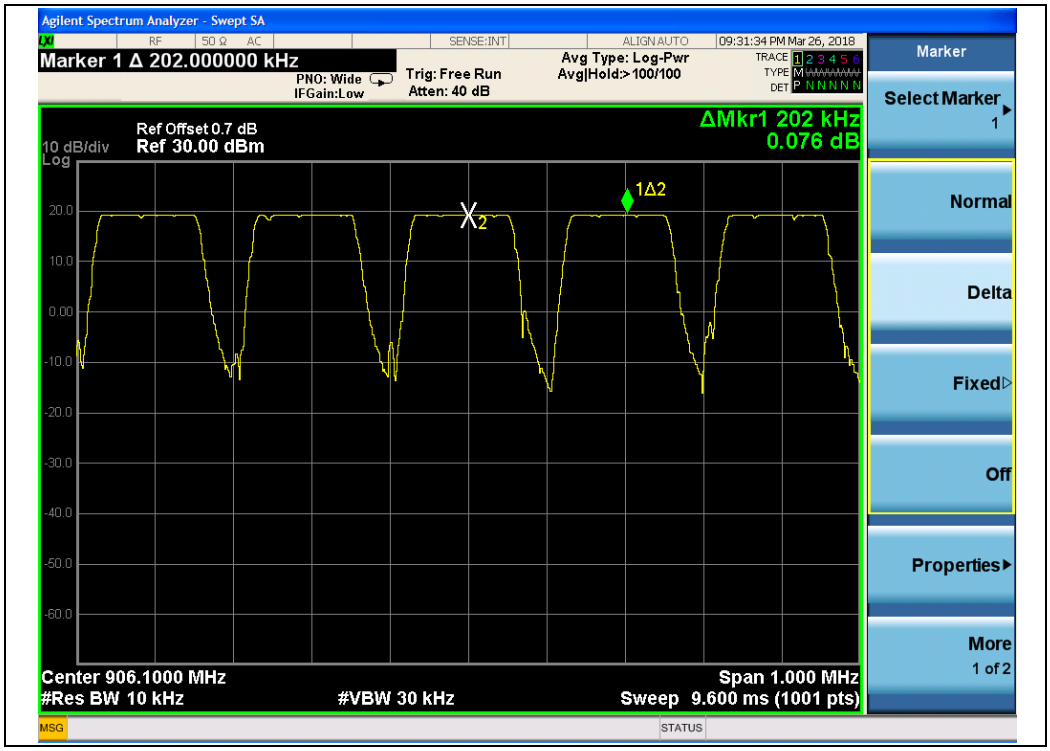
B. Test Plots:



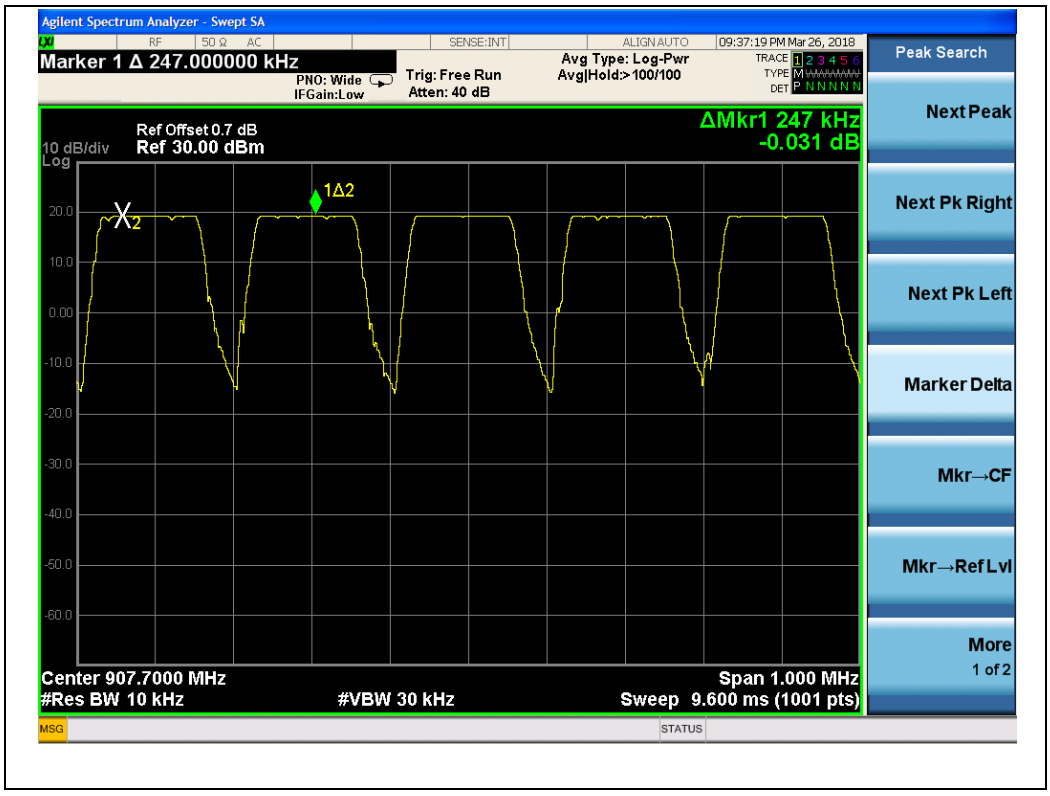
(FSB1)



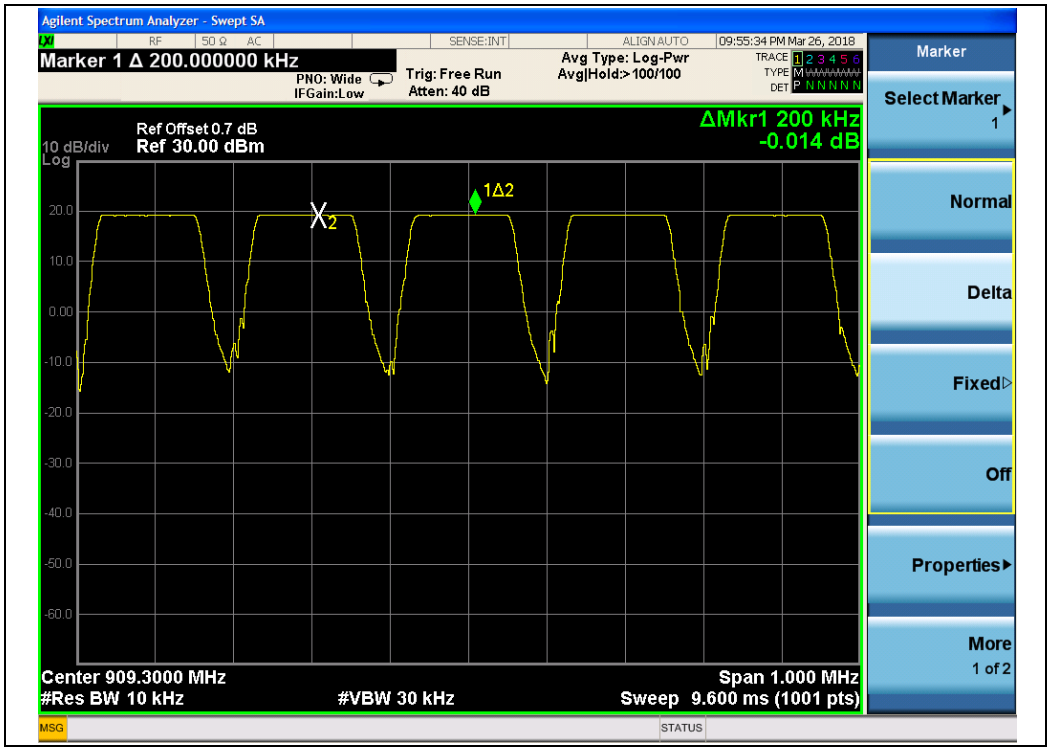
(FSB2)


Agilent Spectrum Analyzer - Swept SA
Marker 1 Δ 202.000000 kHz
PNO: Wide
IFGain:Low
Trig: Free Run
Atten: 40 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
09:31:34 PM Mar 26, 2018
Ref Offset 0.7 dB
10 dB/div
Ref 30.00 dBm
ΔMkr1 202 kHz
0.076 dB
Center 906.1000 MHz
#Res BW 10 kHz
#VBW 30 kHz
Span 1.000 MHz
Sweep 9.600 ms (1001 pts)
Marker
Select Marker
Normal
Delta
Fixed
Off
Properties
More
1 of 2
MSG
STATUS

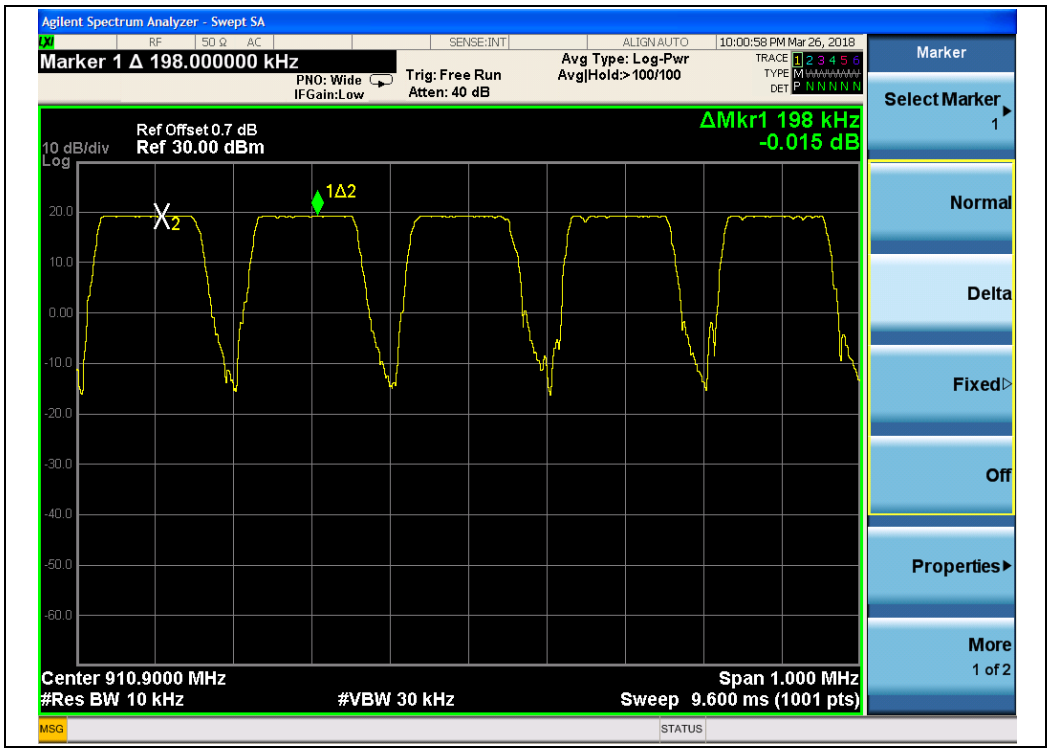
(FSB3)


Agilent Spectrum Analyzer - Swept SA
Marker 1 Δ 247.000000 kHz
PNO: Wide
IFGain:Low
Trig: Free Run
Atten: 40 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
09:37:19 PM Mar 26, 2018
Ref Offset 0.7 dB
10 dB/div
Ref 30.00 dBm
ΔMkr1 247 kHz
-0.031 dB
Center 907.7000 MHz
#Res BW 10 kHz
#VBW 30 kHz
Span 1.000 MHz
Sweep 9.600 ms (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2
MSG
STATUS

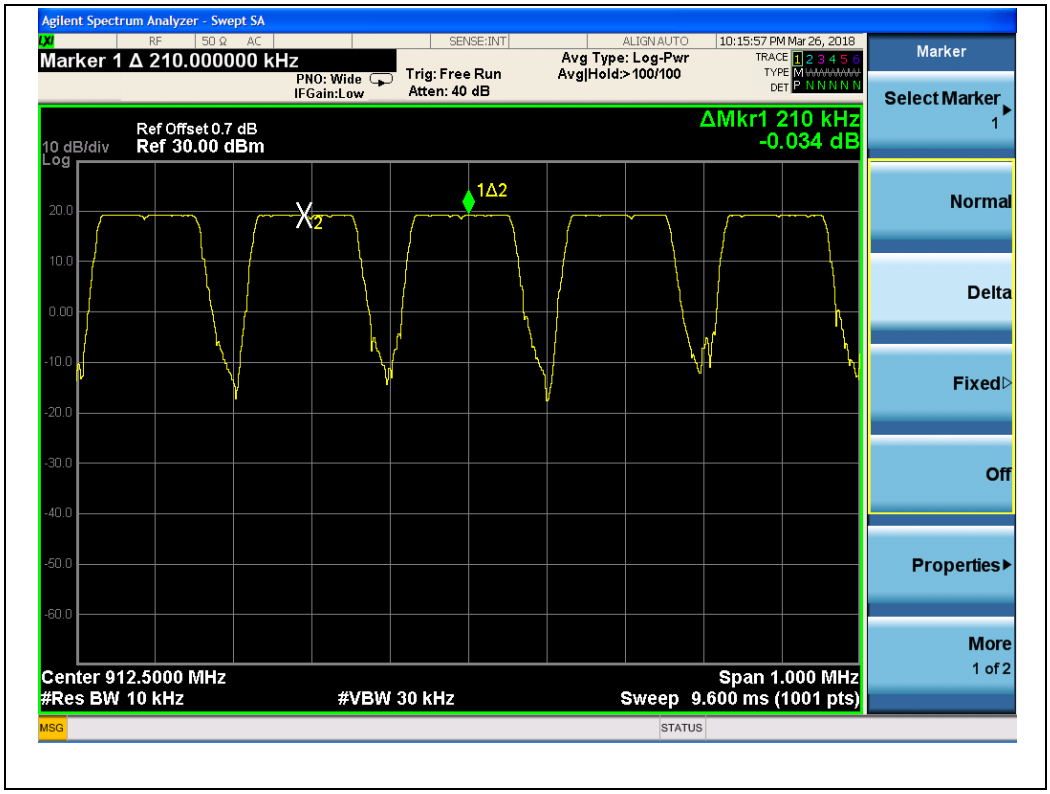
(FSB4)


Agilent Spectrum Analyzer - Swept SA
Marker 1 Δ 200.000000 kHz
PNO: Wide
IFGain:Low
Trig: Free Run
Atten: 40 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
09:55:34 PM Mar 26, 2018
Ref Offset 0.7 dB
10 dB/div
Log
Ref 30.00 dBm
ΔMkr1 200 kHz
-0.014 dB
Center 909.3000 MHz
#Res BW 10 kHz
#VBW 30 kHz
Span 1.000 MHz
Sweep 9.600 ms (1001 pts)
Marker
Select Marker
Normal
Delta
Fixed
Off
Properties
More
1 of 2

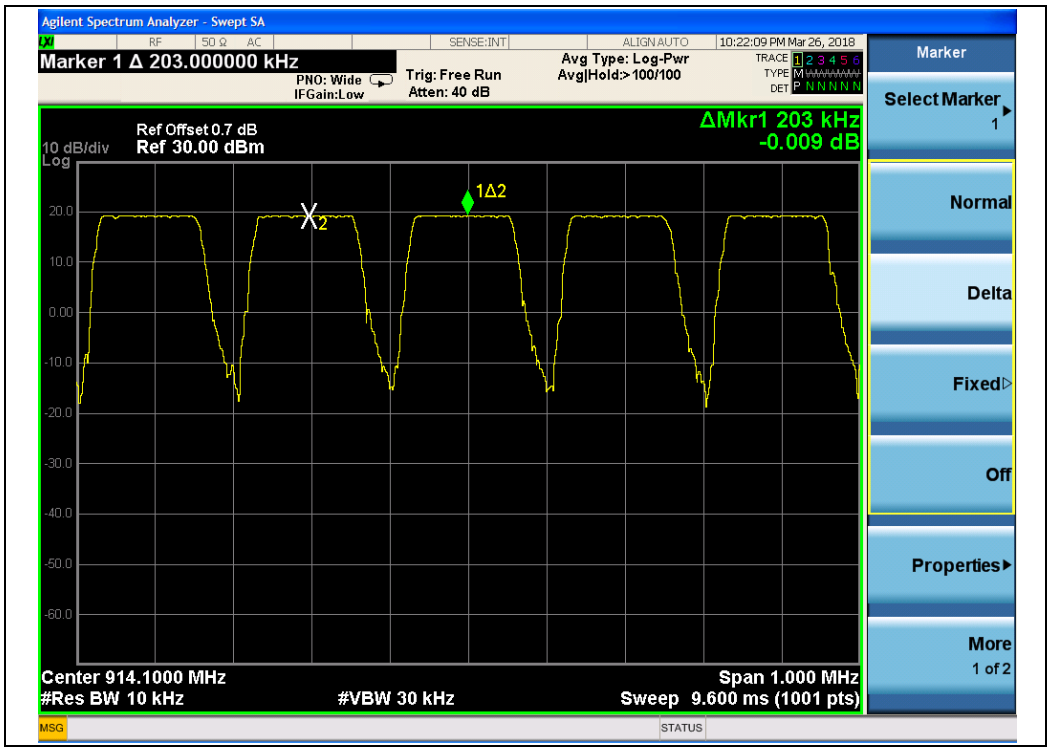
(FSB5)


Agilent Spectrum Analyzer - Swept SA
Marker 1 Δ 198.000000 kHz
PNO: Wide
IFGain:Low
Trig: Free Run
Atten: 40 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
10:00:58 PM Mar 26, 2018
Ref Offset 0.7 dB
10 dB/div
Log
Ref 30.00 dBm
ΔMkr1 198 kHz
-0.015 dB
Center 910.9000 MHz
#Res BW 10 kHz
#VBW 30 kHz
Span 1.000 MHz
Sweep 9.600 ms (1001 pts)
Marker
Select Marker
Normal
Delta
Fixed
Off
Properties
More
1 of 2

(FSB6)


Agilent Spectrum Analyzer - Swept SA
Marker 1 Δ 210.000000 kHz
PNO: Wide
IFGain:Low
Trig: Free Run
Atten: 40 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
10:15:57 PM Mar 26, 2018
Ref Offset 0.7 dB
10 dB/div
Log
Ref 30.00 dBm
ΔMkr1 210 kHz
-0.034 dB
1Δ2
Center 912.5000 MHz
#Res BW 10 kHz
#VBW 30 kHz
Span 1.000 MHz
Sweep 9.600 ms (1001 pts)
Marker
Select Marker
Normal
Delta
Fixed
Off
Properties
More
1 of 2
MSG
STATUS

(FSB7)


Agilent Spectrum Analyzer - Swept SA
Marker 1 Δ 203.000000 kHz
PNO: Wide
IFGain:Low
Trig: Free Run
Atten: 40 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
10:22:09 PM Mar 26, 2018
Ref Offset 0.7 dB
10 dB/div
Log
Ref 30.00 dBm
ΔMkr1 203 kHz
-0.009 dB
1Δ2
Center 914.1000 MHz
#Res BW 10 kHz
#VBW 30 kHz
Span 1.000 MHz
Sweep 9.600 ms (1001 pts)
Marker
Select Marker
Normal
Delta
Fixed
Off
Properties
More
1 of 2
MSG
STATUS

(FSB8)

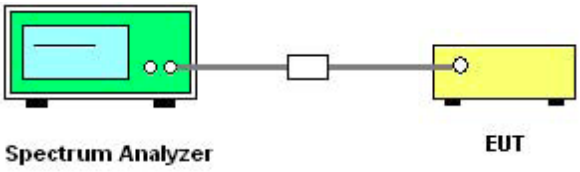
2.8. Time of Occupancy (Dwell time)

2.8.1. Requirement

According to FCC §15.247(f), the frequency hopping operation of the hybrid system, with the direct sequence or digital modulation operation turned-off, shall have an average time of occupancy on any frequency not to exceed 0.4 seconds within a time period in seconds equal to the number of hopping frequencies employed multiplied by 0.4.

2.8.2. Test Description

A. Test Setup:



The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The average dwell time per hopping channel was measured at one hopping channel in the middle of the authorized band. The hopping function of the EUT was enabled.

The dwell time limit is based on the Number of Hopping Channels*400ms. For this radio, this would be 8 Channels*400ms=3.2 Sec.

B. Equipments List:

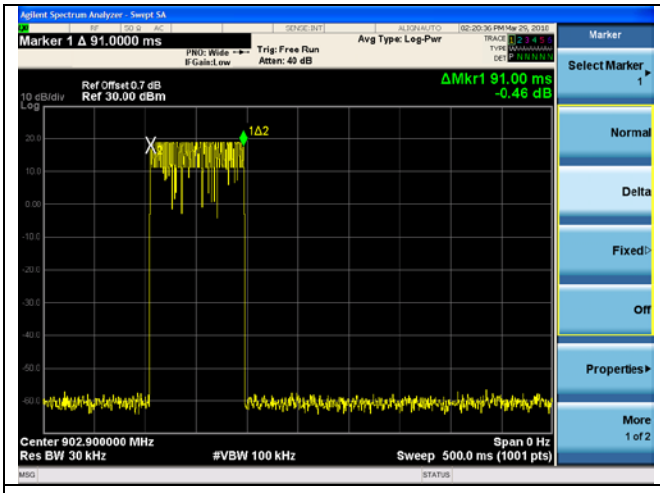
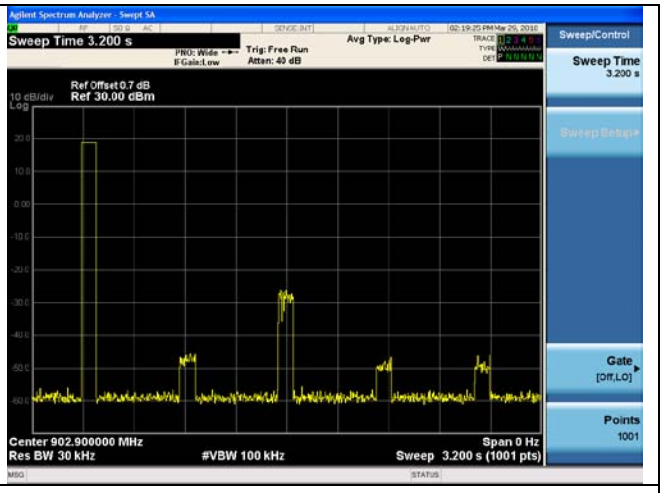
Please refer ANNEX A(1.5).

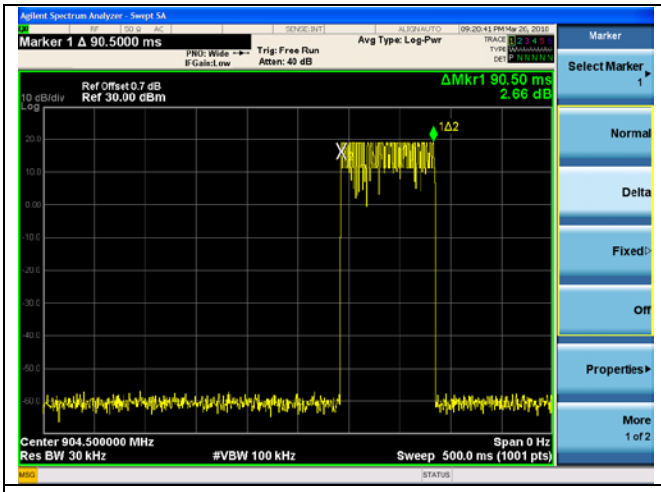
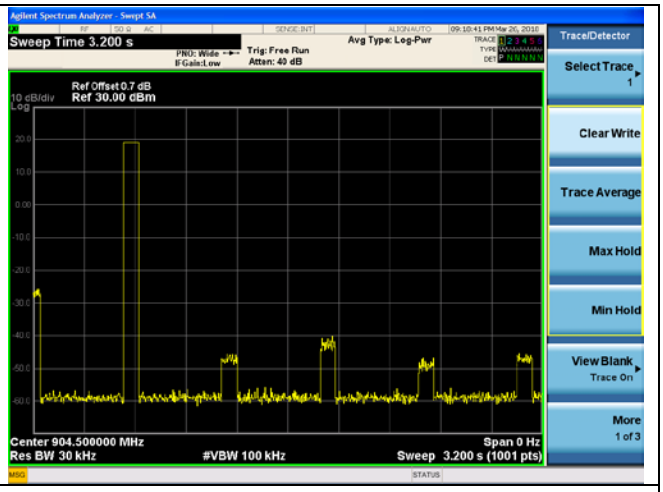
2.8.3. Test Result

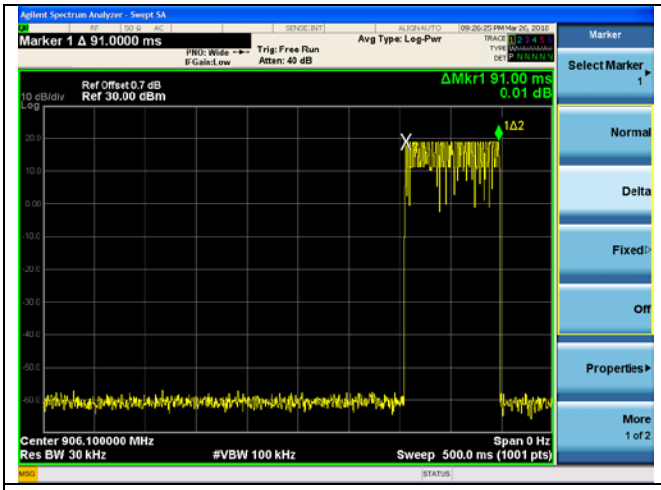
A. Test Verdict:

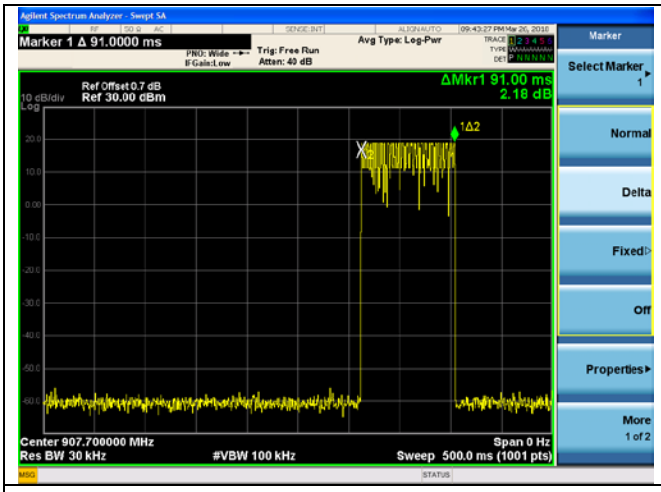
Hopping mode	Mid Channel (MHz)	Pulse Width (ms)	Number of pulse in 3.2 seconds	Average Time of Occupancy in 3.2 seconds(ms)	Limit (ms)	Verdict
FSB1	902.9	91.0	1	91.0	400	PASS
FSB2	904.5	90.5	1	90.5		PASS
FSB3	906.1	91.0	1	91.0		PASS
FSB4	907.7	91.0	1	91.0		PASS
FSB5	909.3	91.5	1	91.5		PASS
FSB6	910.9	91.0	1	91.0		PASS
FSB7	912.5	91.5	1	91.5		PASS
FSB8	914.1	90.5	1	90.5		PASS

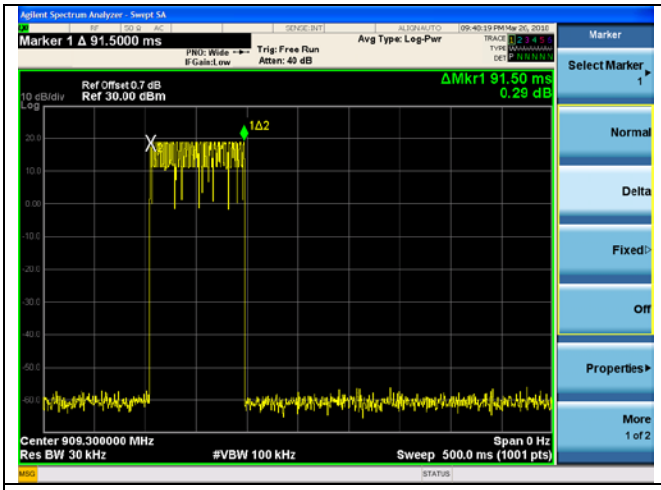
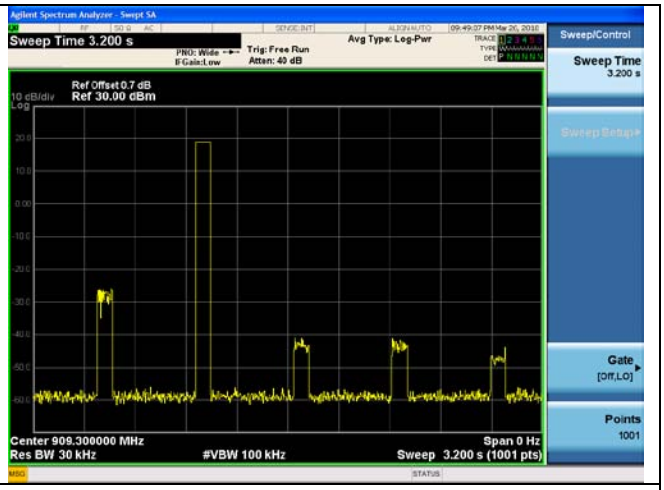
B. Test Plots:

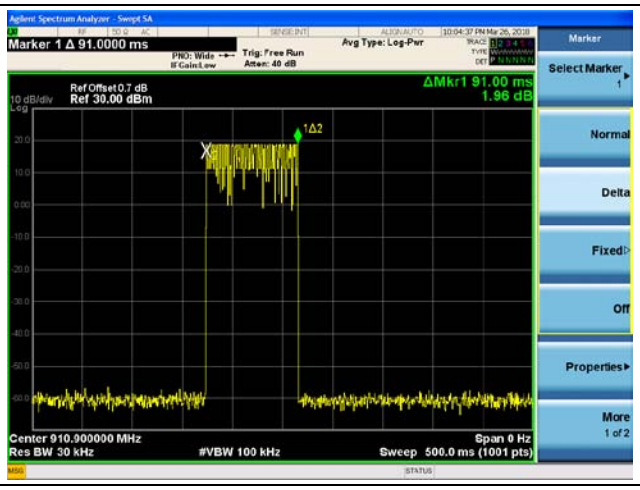
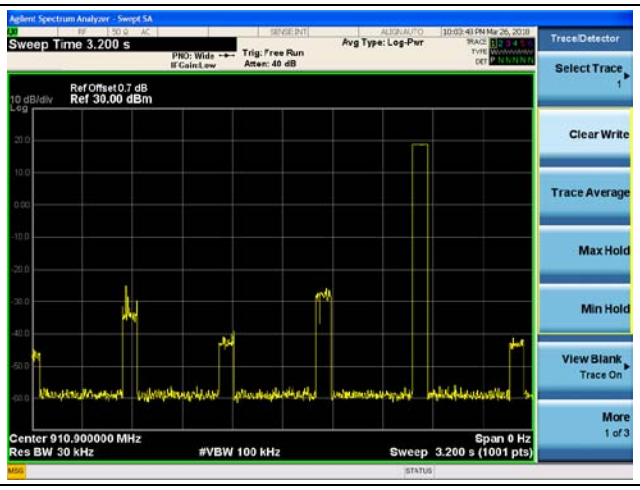
<table>
<tr><td> 
</td><td> 
</td></tr>
<tr><td>Pulse Width</td><td>Number of pulse in 3.2s</td></tr>
<tr><td colspan="2">FSB1</td></tr>
</table>

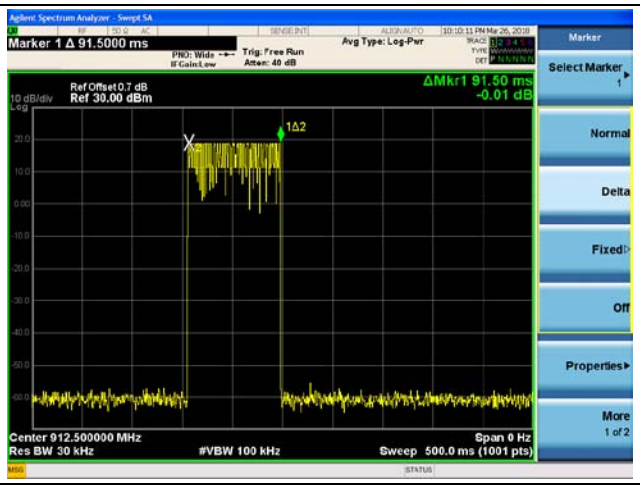
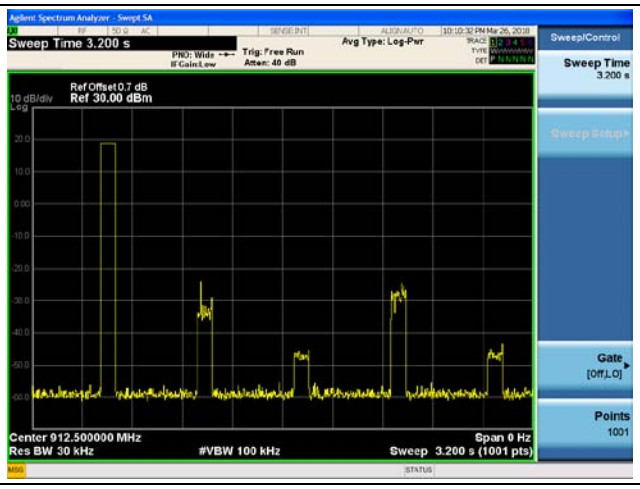
	
Pulse Width	Number of pulse in 3.2s
FSB2	

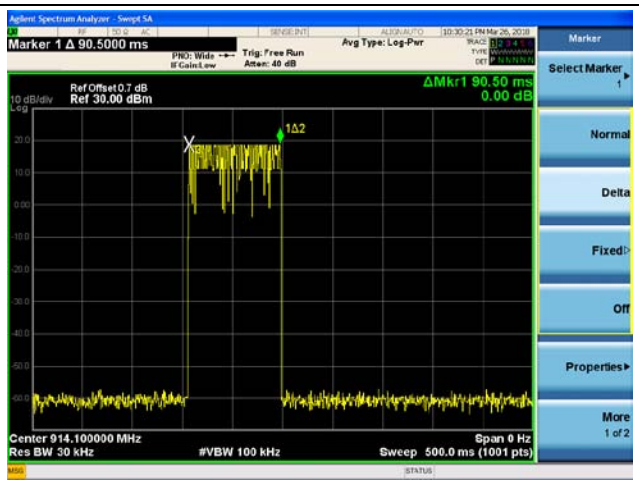
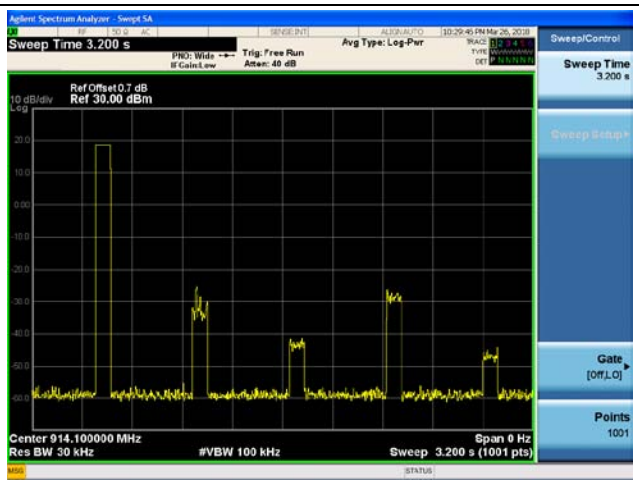
	
Pulse Width	Number of pulse in 3.2s
FSB3	

	
Pulse Width	Number of pulse in 3.2s
FSB4	

	
Pulse Width	Number of pulse in 3.2s
FSB5	

	
Pulse Width	Number of pulse in 3.2s
FSB6	

	
Pulse Width	Number of pulse in 3.2s
FSB7	

	
Pulse Width	Number of pulse in 3.2s
FSB8	

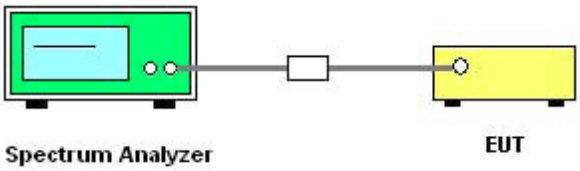
2.9. Conducted Spurious Emissions

2.9.1. Requirement

According to FCC §15.247(d), in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

2.9.2. Test Description

A. Test Setup:



The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The spurious RF conducted emissions were measured with the EUT set to low, medium and high transmit frequencies. The EUT was transmitting at the data rate(s) listed in the datasheet in a no-hop mode. For each transmit frequency, the measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency.

B. Equipments List:

Please refer ANNEX A(1.5).

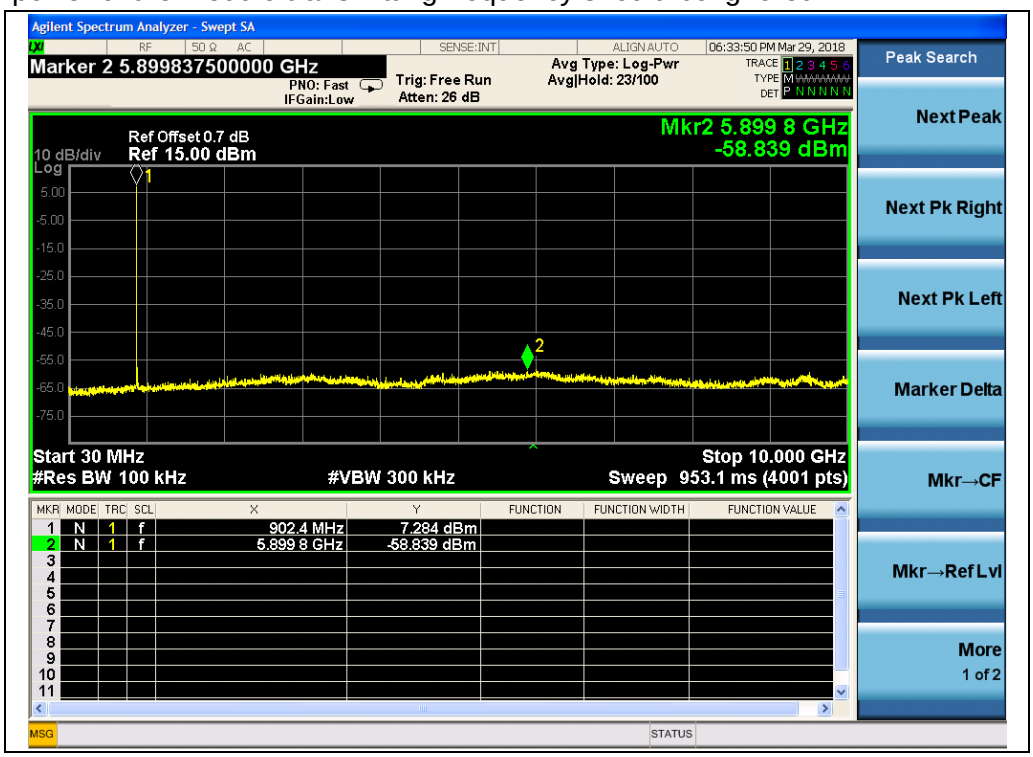
2.9.3. Test Result

A. Test Verdict:

Bandwidth (kHz)	Channel	Frequency (MHz)	dBc (dB)	Limit (dB)	Verdict
125	Low	902.3	66.12	⩾20	PASS
	Mid	908.7	66.24		PASS
	High	914.9	59.44		PASS
500	Low	903.0	61.05		PASS
	Mid	909.4	61.67		PASS
	High	914.2	53.92		PASS

B. Test Plots:

Note: the power of the Module transmitting frequency should be ignored.



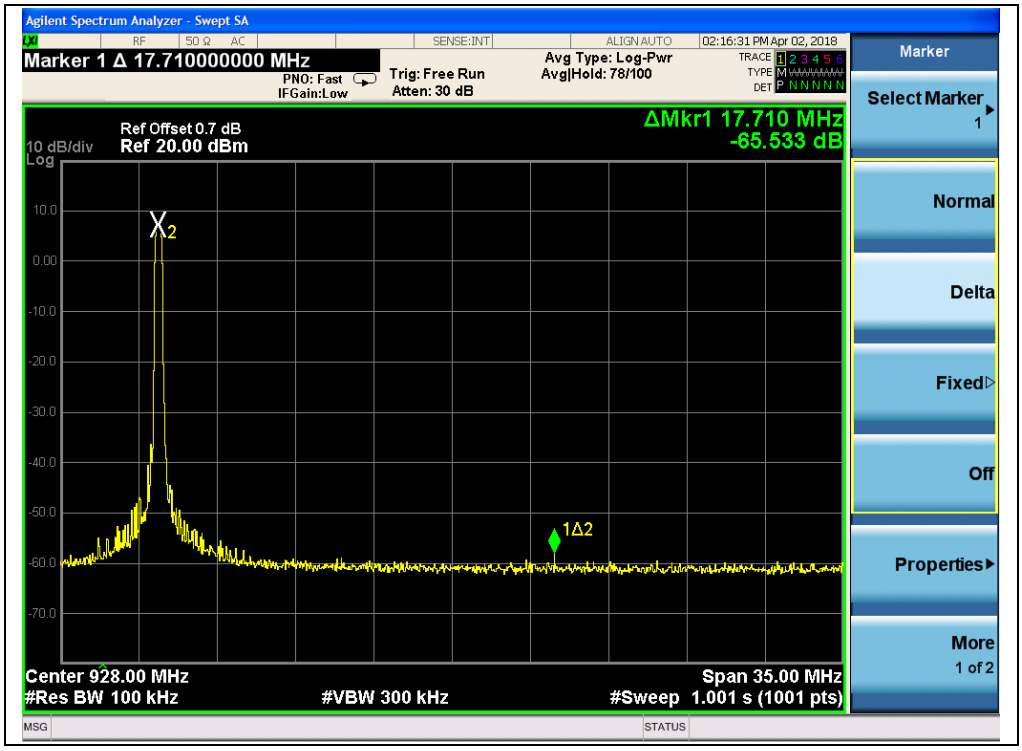
(125 kHz BW, Low Channel, 30MHz to 25GHz)

(125 kHz BW, Low Channel, Band edge)

(125 kHz BW, Low Channel, Band edge with hopping on)

(125 kHz BW, Mid Channel, 30MHz to 25GHz)

(125 kHz BW, High Channel, 30MHz to 25GHz)



(125 kHz BW, High Channel, Band edge)

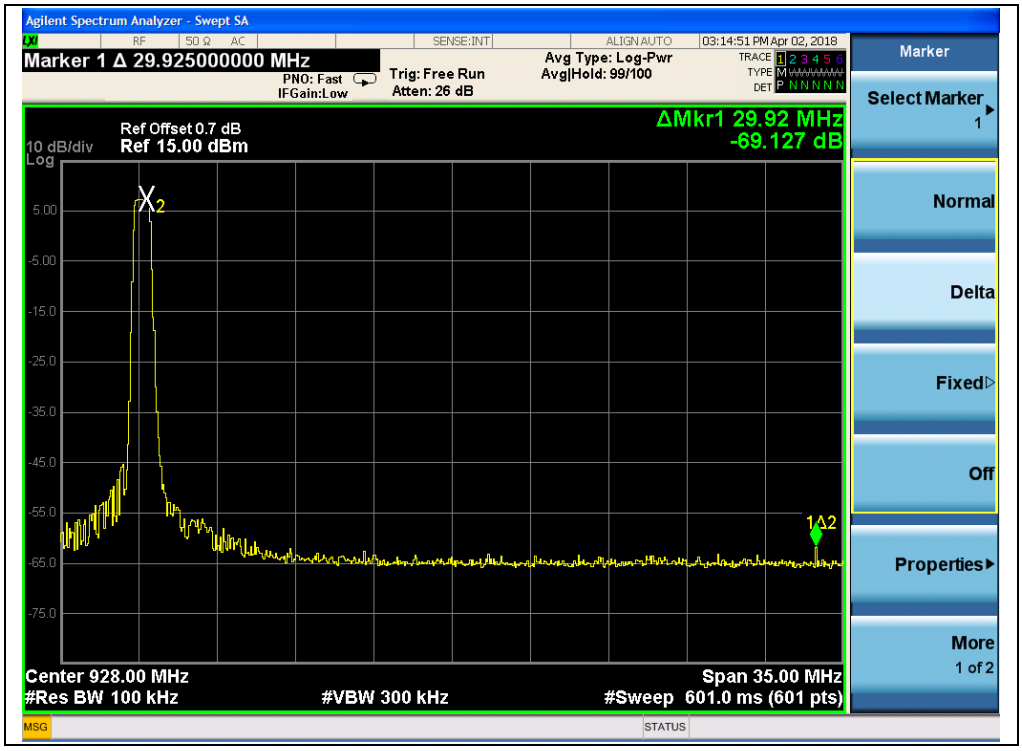
(125 kHz BW, High Channel, Band edge with hopping on)

(500 kHz BW, Low Channel, 30MHz to 25GHz)

(500 kHz BW, Low Channel, Band edge)

(500 kHz BW, Mid Channel, 30MHz to 25GHz)

(500 kHz BW, High Channel, 30MHz to 25GHz)



(500kHz BW, High Channel, Band edge)

2.10. Conducted Emission

2.10.1. Requirement

According to FCC section 15.207, 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 within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50μH/50Ω line impedance stabilization network (LISN).

Frequency range (MHz)	Conducted Limit (dBμV)	
	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5- 30	60	50

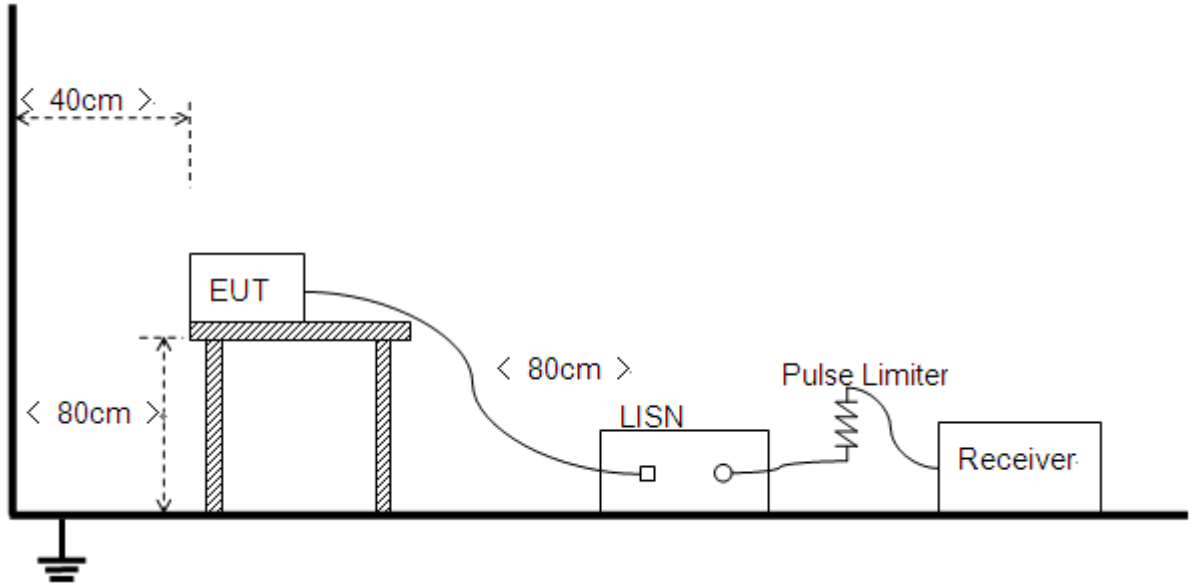
NOTE:

(a) The lower limit shall apply at the band edges.

(b) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

2.10.2. Test Description

A. Test Setup:



The Table-top EUT was placed upon a non-metallic table 0.8m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm from LISN. The set-up and test methods were according to ANSI C63.10: 2013.

Equipment is tested with power cords that are normally used or that have electrical or shielding

characteristics that are the same as those cords normally used.

B. Equipments List:

Please reference ANNEX A(1.5).

2.10.3. Test Result

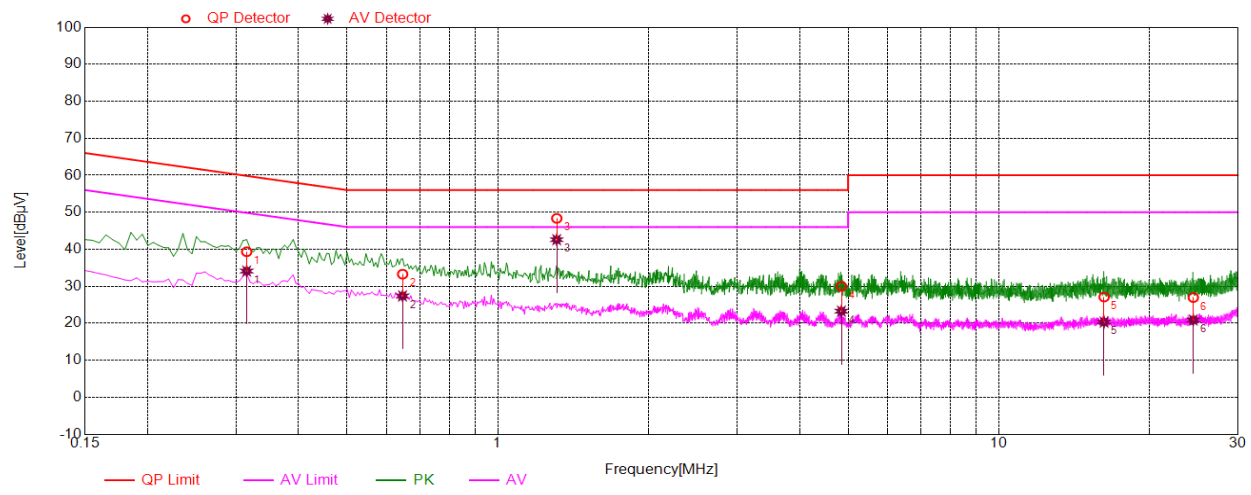
The maximum conducted interference is searched using Peak (PK), if the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. Refer to recorded points and plots below.

A. Test setup:

The EUT configuration of the emission tests is EUT + Link.

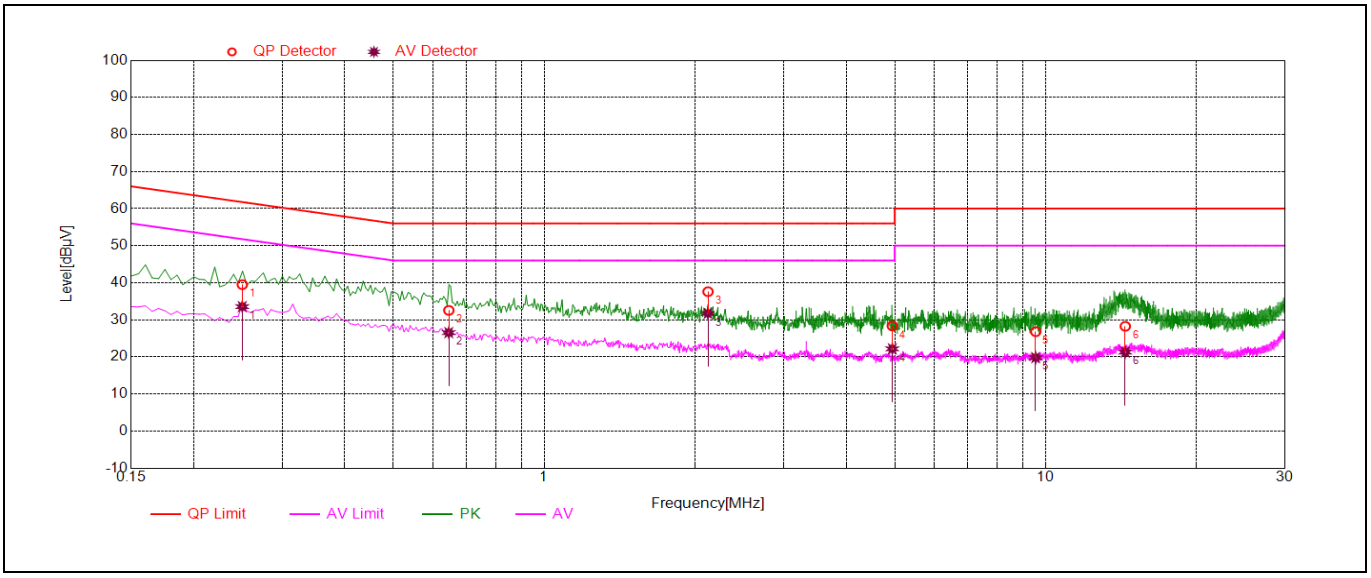
Note: The test voltage is AC 120V/60Hz.

B. Test Plots:



(Plot A: L Phase)

NO.	Fre. (MHz)	Emission Level (dBµV)		Limit (dBµV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.32	39.34	34.11	59.84	49.84	Line	PASS
2	0.64	33.28	27.39	56.00	46.00		PASS
3	1.31	48.35	42.59	56.00	46.00		PASS
4	4.85	30.00	23.27	56.00	46.00		PASS
5	16.22	27.10	20.32	60.00	50.00		PASS
6	24.45	26.95	20.89	60.00	50.00		PASS



(Plot B: N Phase)

NO.	Fre. (MHz)	Emission Level (dBµV)		Limit (dBµV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.25	39.51	33.56	61.77	51.77	Neutral	PASS
2	0.64	32.55	26.55	56.00	46.00		PASS
3	2.12	37.60	31.74	56.00	46.00		PASS
4	4.95	28.36	22.18	56.00	46.00		PASS
5	9.55	26.81	19.80	60.00	50.00		PASS
6	14.42	28.26	21.30	60.00	50.00		PASS

2.11. Radiated Emission

2.11.1. Requirement

According to FCC section 15.247(d), radiated emission outside the frequency band attenuation below the general limits specified in FCC section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC section 15.205(a), must also comply with the radiated emission limits specified in FCC section 15.209(a).
According to FCC section 15.209 (a), 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 (MHz)	Field Strength (μV/m)	Measurement Distance (m)
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

Note:

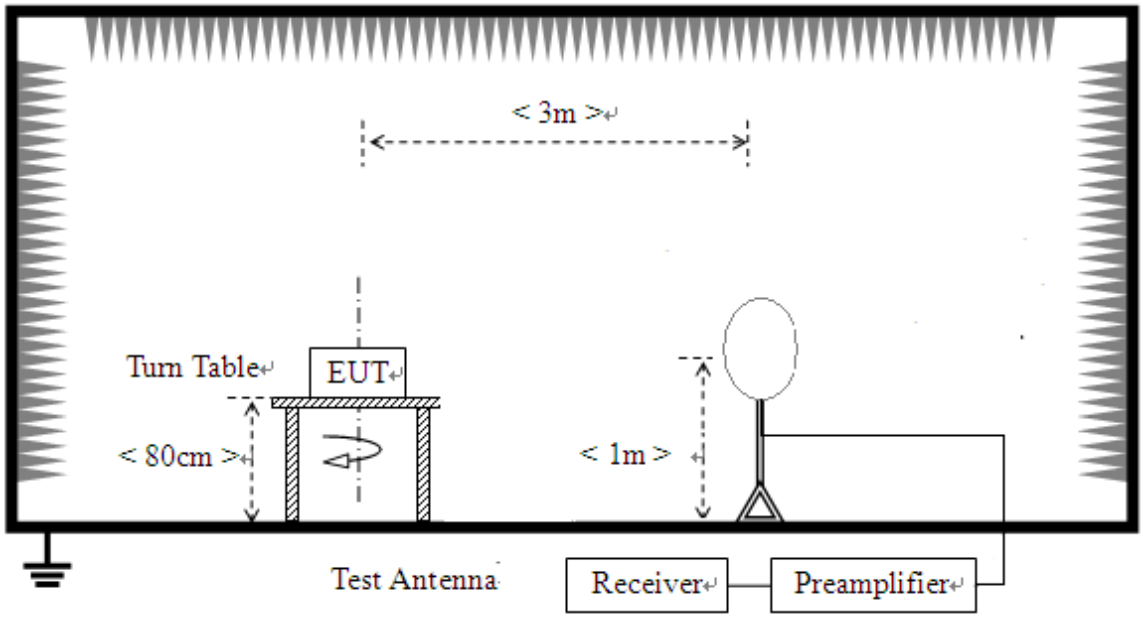
1. For Above 1000MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.
2. For above 1000MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK)

In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), also should comply with the radiated emission limits specified in Section 15.209(a)(above table)

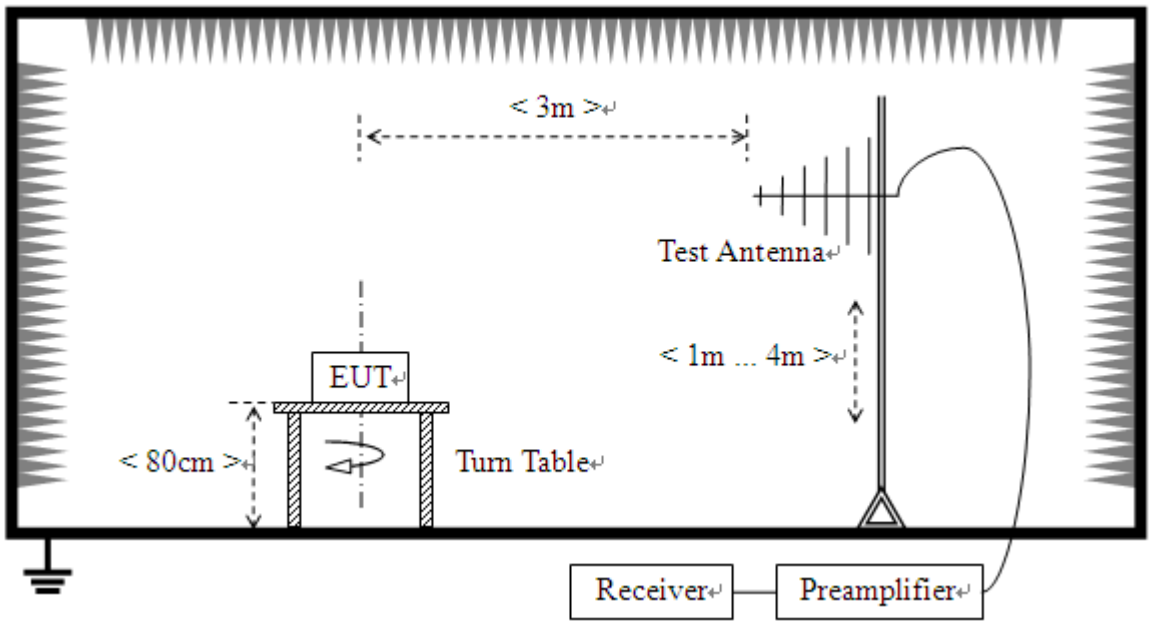
2.11.2. Test Description

A. Test Setup:

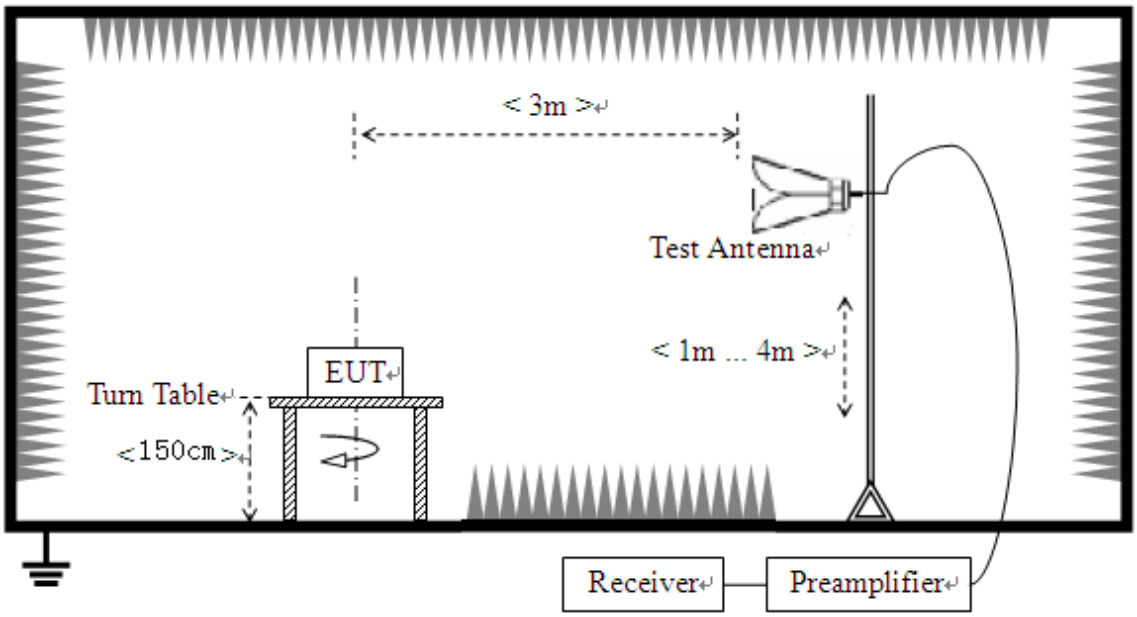
1) For radiated emissions from 9kHz to 30MHz



2) For radiated emissions from 30MHz to1GHz



3) For radiated emissions above 1GHz



The RF absorbing material used on the reference ground plane and on the turntable have a maximum height (thickness) of 30 cm (12 in) and have a minimum-rated attenuation of 20 dB at all frequencies from 1 GHz to 18 GHz.

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4dB according to the standards: ANSI C63.10 (2013). For radiated emissions below or equal to 1GHz, the EUT was set-up on insulator 80cm above the Ground Plane, For radiated emissions above 1GHz, The EUT was set-up on insulator 150cm above the Ground Plane. The set-up and test methods were according to ANSI C63.10.

The EUT is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading.

For the Test Antenna:

(a) In the frequency range of 9kHz to 30MHz, magnetic field is measured with Loop Test Antenna. The Test Antenna is positioned with its plane vertical at 1m distance from the EUT. The center of the Loop Test Antenna is 1m above the ground. During the measurement the Loop Test Antenna rotates about its vertical axis for maximum response at each azimuth about the EUT.
(b) In the frequency range above 30MHz, Bi-Log Test Antenna (30MHz to 1GHz) and Horn Test Antenna (above 1GHz) are used. Place the test antenna at 3m away from area of the EUT, while keeping the test antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The test antenna may have to be

higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final test antenna elevation shall be that which maximizes the emissions. The test antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane. The emission levels at both horizontal and vertical polarizations should be tested.

B. Equipments List:

Please refer ANNEX A(1.5).

2.11.3. Test Result

According to ANSI C63.10, because of peak detection will yield amplitudes equal to or greater than amplitudes measured with the quasi-peak (or average) detector, the measurement data from a spectrum analyzer peak detector will represent the worst-case results, if the peak measured value complies with the quasi-peak limit, it is unnecessary to perform an quasi-peak measurement.

The measurement results are obtained as below:

$E\ [dB\mu V/m] = U_R + A_T + A_{Factor}\ [dB]$; $A_T = L_{Cable\ loss}\ [dB] - G_{preamp}\ [dB]$

A_T: Total correction Factor except Antenna

U_R: Receiver Reading

G_{preamp}: Preamplifier Gain

A_{Factor}: Antenna Factor at 3m

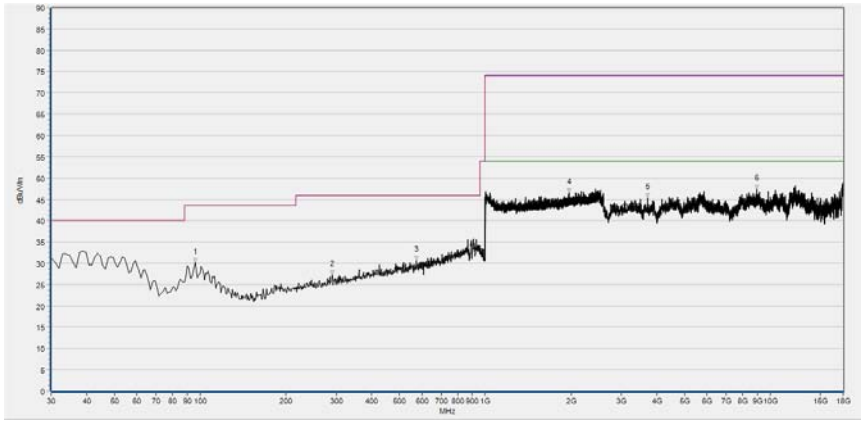
During the test, the total correction Factor AT and A_{Factor} were built in test software.

Note1: All radiated emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

Note2: For the frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit was not recorded.

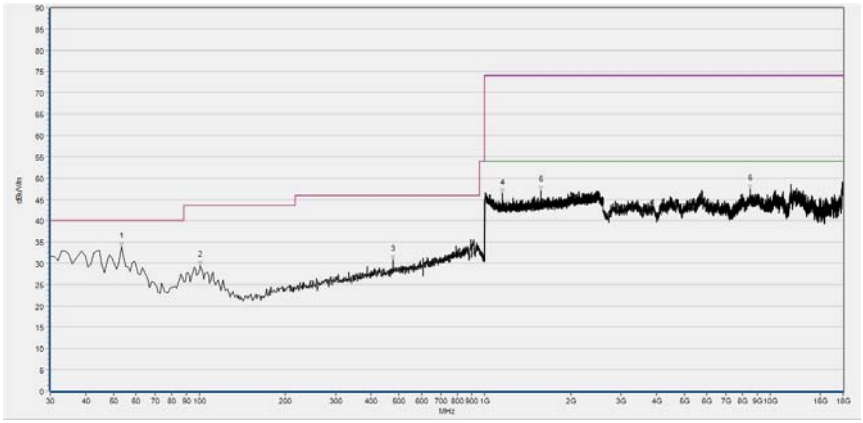
For 125kHz bandwidth

Plots for CH0, 902.3MHz



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
95.960	30.25	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
289.960	27.32	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
572.230	30.67	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1970.133	46.66	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
3708.800	45.47	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
8969.440	47.49	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

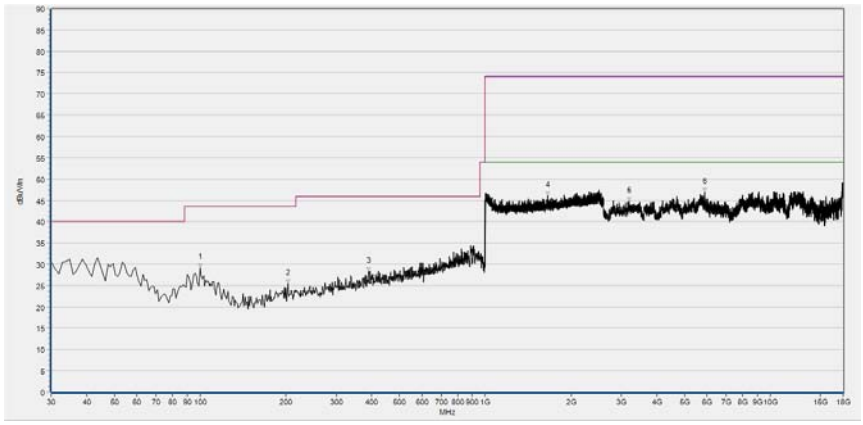
(30MHz to 10GHz, Antenna Horizontal, 125kHz, channel 0)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
53.280	33.88	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
100.810	29.50	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
477.170	30.83	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1154.133	46.43	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
1568.000	47.03	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8519.760	47.47	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

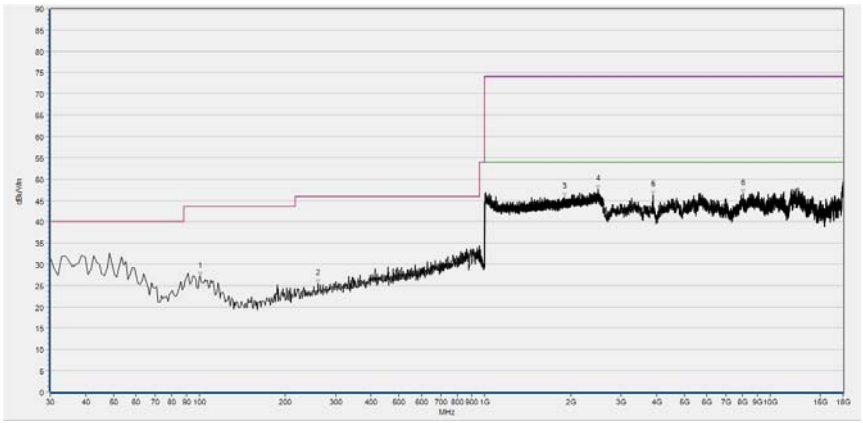
(30MHz to 10GHz, Antenna Vertical, 125kHz, channel 0)

Plot for CH 32, 908.7MHz



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
99.840	29.13	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
203.630	25.52	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
389.870	28.32	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1656.000	46.05	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
3188.280	44.80	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5874.040	47.00	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

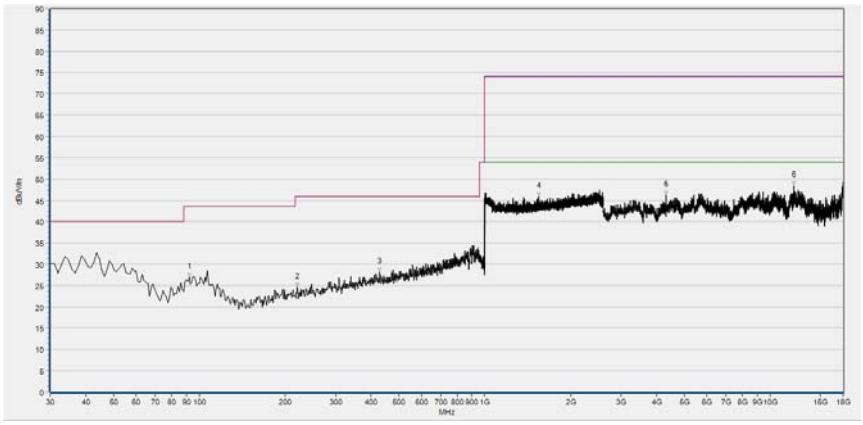
(30MHz to 10GHz, Antenna Horizontal, 125kHz, channel 32)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
100.810	27.14	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
259.890	25.50	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1904.000	45.83	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
2496.533	47.65	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
3884.360	46.18	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8017.720	46.66	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

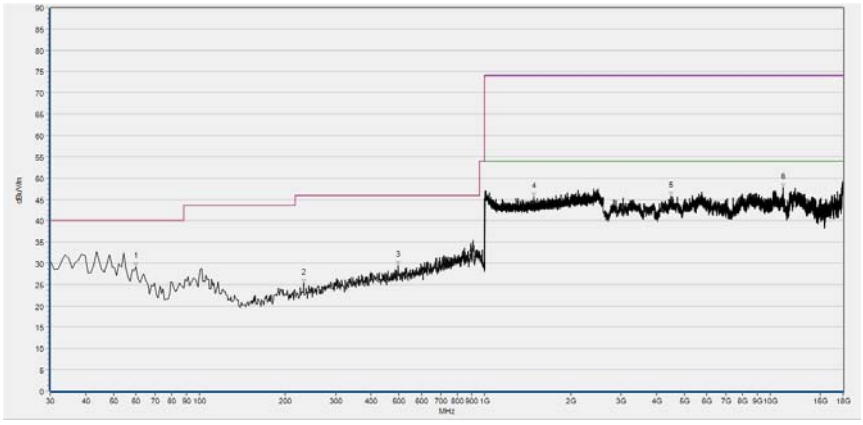
(30MHz to 10GHz, Antenna Vertical, 125kHz, channel 32)

Plot for CH63, 914.9MHz



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
92.080	26.99	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
220.120	24.68	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
428.670	28.09	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1541.867	45.90	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4321.720	46.18	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12104.880	48.40	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(30MHz to 10GHz, Antenna Horizontal, 125kHz, channel 63)

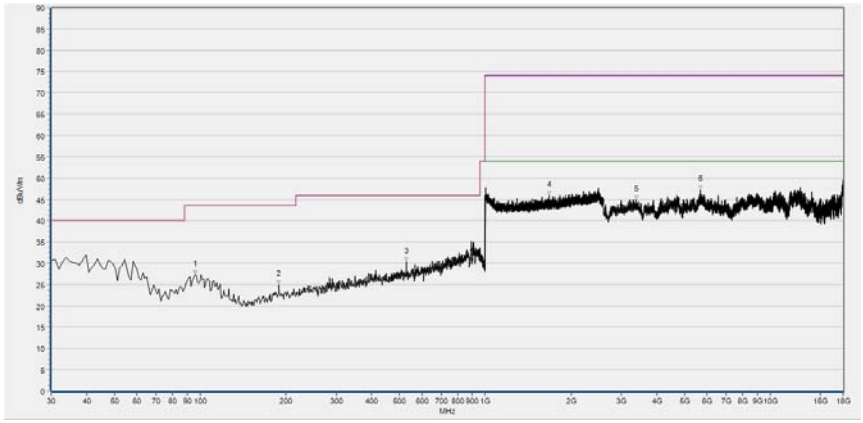


Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
60.070	29.22	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
231.760	25.25	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
497.540	29.44	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1485.333	45.56	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4478.800	45.77	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
11063.840	47.81	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(30MHz to 10GHz, Antenna Vertical, 125kHz, channel 63)

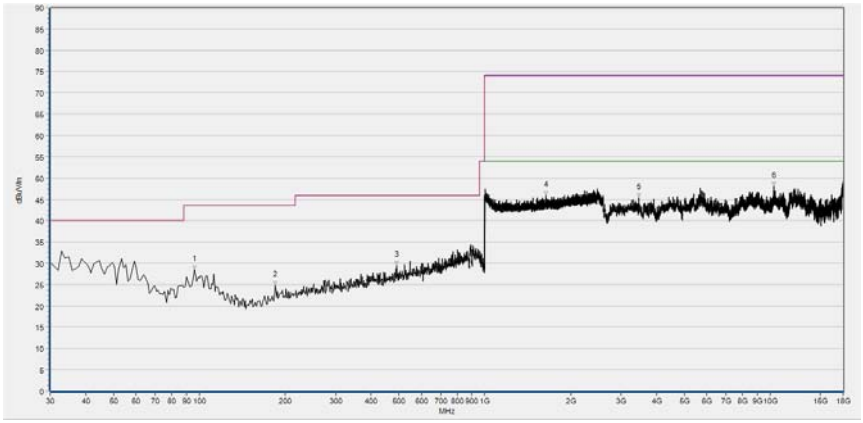
For 500kHz bandwidth

Plots for CH64, 903.0MHz



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
95.960	27.30	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
189.080	24.95	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
527.610	30.33	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1673.600	45.92	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
3379.240	44.91	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5683.080	47.34	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

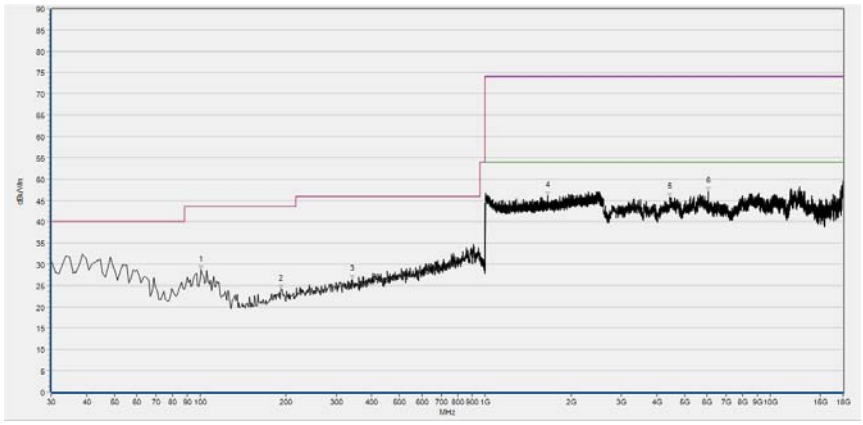
(30MHz to 10GHz, Antenna Horizontal, 500kHz, channel 64)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
95.960	28.41	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
184.230	24.76	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
491.720	29.51	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1635.200	45.94	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
3465.480	45.40	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
10275.360	48.18	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

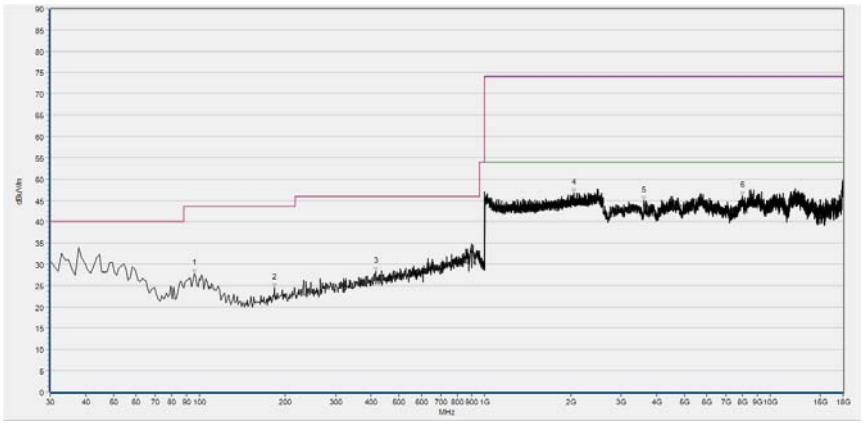
(30MHz to 10GHz, Antenna Vertical, 500kHz, channel 64)

Plot for CH 68, 909.4MHz



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
100.810	28.70	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
191.990	24.18	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
342.340	26.40	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1658.667	46.10	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4444.920	45.83	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
6052.680	47.12	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

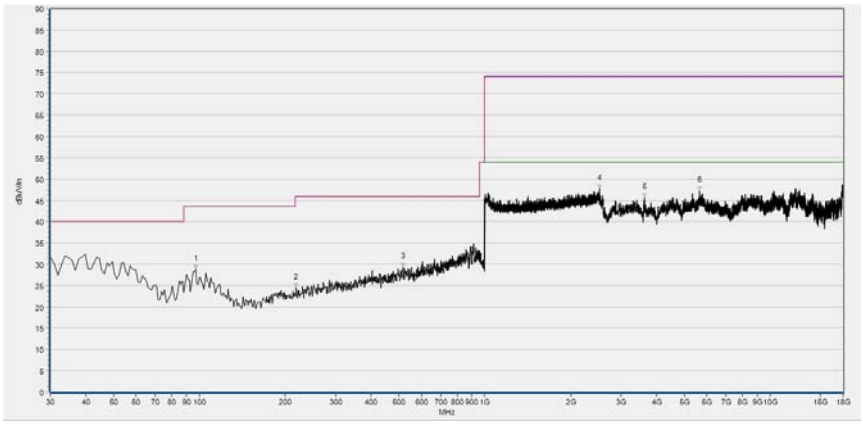
(30MHz to 10GHz, Antenna Horizontal, 500kHz, channel 68)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
95.960	27.75	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
183.260	24.42	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
415.090	28.31	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2053.333	46.84	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
3607.160	44.90	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
7986.920	46.11	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

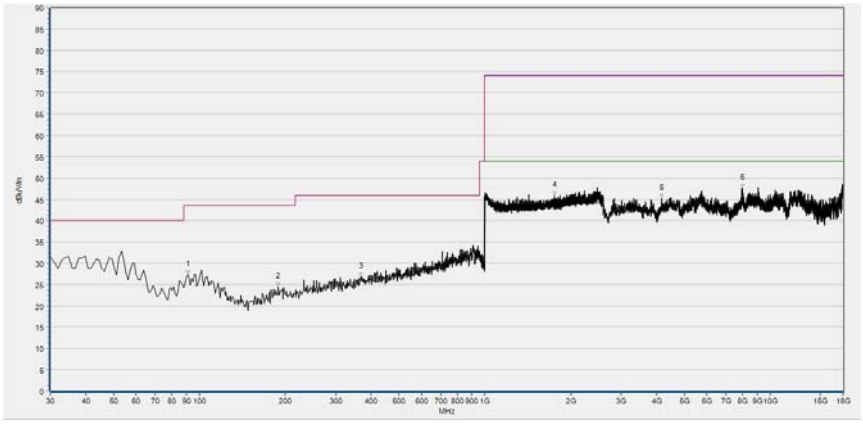
(30MHz to 10GHz, Antenna Vertical, 500kHz, channel 68)

Plot for CH71, 914.2MHz



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
96.930	28.80	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
218.180	24.50	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
517.910	29.32	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2519.467	47.78	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
3634.880	45.65	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5661.520	47.28	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(30MHz to 10GHz, Antenna Horizontal, 500kHz, channel 71)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
91.110	27.30	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
189.080	24.51	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
367.560	26.79	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1755.200	45.90	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4173.880	45.20	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
7968.440	47.56	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(30MHz to 10GHz, Antenna Vertical, 500kHz, channel 71)

Annex A Test Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for test performed on the EUT as specified in CISPR 16-1-2:

Test items	Uncertainty
Number of Hopping Frequency	±5%
Peak Output Power	±2.22dB
20dB Bandwidth	±5%
Carrier Frequency Separation	±5%
Time of Occupancy (Dwell time)	±5%
Conducted Spurious Emission	±2.77 dB
Restricted Frequency Bands	±5%
Radiated Emission	±2.95dB
Conducted Emission	±2.44dB

This uncertainty represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2

Annex B Testing Laboratory Information

1. Identification of the Responsible Testing Laboratory

Company Name:	Shenzhen Morlab Communications Technology Co., Ltd.
Department:	Morlab Laboratory
Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China
Responsible Test Lab Manager:	Mr. Su Feng
Telephone:	+86 755 36698555
Facsimile:	+86 755 36698525

2. Identification of the Responsible Testing Location

Name:	Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory
Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China

3. Facilities and Accreditations

All measurement facilities used to collect the measurement data are located at FL.3, Building A, FeiYang Science Park, Block 67, BaoAn District, Shenzhen, 518101 P. R. China. The test site is constructed in conformance with the requirements of ANSI C63.10-2013 and CISPR Publication 22; the FCC designation number is CN1192.

4. Test Equipments Utilized

4.1 Conducted Test Equipments

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Cal. Due
Bluetooth Base Station	6K00006210	MT8852B	Anritsu	2017.05.24	2018.05.23
Power Splitter	NW521	1506A	Weinschel	2017.05.24	2018.05.23
Attenuator 1	(N/A.)	10dB	Resnet	2017.05.24	2018.05.23
Attenuator 2	(N/A.)	3dB	Resnet	2017.05.24	2018.05.23
EXA Signal Analzyer	MY53470836	N9010A	Agilent	2017.12.03	2018.12.02
RF cable (30MHz-26GHz)	CB01	RF01	Morlab	N/A	N/A
Coaxial cable	CB02	RF02	Morlab	N/A	N/A
SMA connector	CN01	RF03	HUBER-SUHNER	N/A	N/A

4.2 Conducted Emission Test Equipments

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Cal. Due
Receiver	MY56400093	N9038A	KEYSIGHT	2017.07.13	2018.07.12
LISN	812744	NSLK 8127	Schwarzbeck	2017.05.17	2018.05.16
Pulse Limiter (20dB)	9391	VTSD 9561-D	Schwarzbeck	2017.05.17	2018.05.16
Coaxial cable(BNC) (30MHz-26GHz)	CB01	EMC01	Morlab	N/A	N/A

4.3Auxiliary Test Equipment

Equipment Name	Model No.	Brand Name	Manufacturer	Cal.Date	Cal. Due
Computer	T430i	Think Pad	Lenovo	N/A	N/A

4.4 List of Software Used

Description	Manufacturer	Software Version
Test system	Tonscend	V2.6
Power Panel	Agilent	V3.8
MORLAB EMCR V1.2	MORLAB	V 1.0

4.4 Radiated Test Equipments

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Cal. Due
Receiver	MY54130016	N9038A	Agilent	2017.05.17	2018.05.16
Test Antenna - Bi-Log	9163-519	VULB 9163	Schwarzbeck	2017.05.14	2018.05.13
Test Antenna - Horn	9170C-531	BBHA9170	Schwarzbeck	2017.09.13	2018.09.12
Test Antenna - Loop	1519-022	FMZB1519	Schwarzbeck	2018.03.03	2019.03.02
Test Antenna - Horn	01774	BBHA 9120D	Schwarzbeck	2017.09.13	2018.09.12
Coaxial cable (N male) (9KHz-30MHz)	CB04	EMC04	Morlab	N/A	N/A
Coaxial cable (N male) (30MHz-26GHz)	CB02	EMC02	Morlab	N/A	N/A
Coaxial cable (N male) (30MHz-26GHz)	CB03	EMC03	Morlab	N/A	N/A
1-18GHz pre-Amplifier	MA02	TS-PR18	Rohde& Schwarz	2017.05.17	2018.05.16
18-26.5GHz pre-Amplifier	MA03	TS-PR18	Rohde& Schwarz	2017.05.17	2018.05.16
Anechoic Chamber	N/A	9m*6m*6m	CRT	2017.11.19	2020.11.18

END OF REPORT