REPORT No.: SZ18090177W01

TEST REPORT

APPLICANT	:	HARXON CORPORATION
PRODUCT NAME	:	Wireless data transceiver module
MODEL NAME	:	HX-DU2017D-900, HX-DU20XXD-900 series: From HX-DU2025D-900 to HX-DU2075D-900
BRAND NAME	:	HARXON
FCC ID	:	2ACRAHX-DU2017D-900
STANDARD(S)	:	47 CFR Part 15 Subpart C
TEST DATE	:	2018-09-28 to 2018-10-26
ISSUE DATE	:	2018-10-26

Tested by: Su Hang

Su Hang (Test Engineer)

Approved by: Peng Huarui

Peng Huarui (Supervisor)

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MORLAB

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Change History		
Issue	**Date**	**Reason for change**
1.0	2018-10-26	First edition

1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

Applicant:	HARXON CORPORATION
Applicant Address:	6/F, Block B, D3 Building, TCL International E City, No. 1001 Zhongshanyuan Road, Nanshan District, Shenzhen,518055,PRC
Manufacturer:	HARXON CORPORATION
Manufacturer Address:	6/F, Block B, D3 Building, TCL International E City, No. 1001 Zhongshanyuan Road, Nanshan District, Shenzhen,518055,PRC

1.2. Equipment Under Test (EUT) Description

Product Name:	Wireless data transceiver module
Serial No:	(N/A, marked #1 by test site)
Hardware Version:	V1R1
Software Version:	A022.00.02
Modulation Technology:	FHSS
Modulation Type:	GFSK
Operating Frequency Range:	902.60MHz – 927.80MHz
Channel Number:	63
Antenna Type:	Whip Antenna
Antenna Gain:	2.0 dBi

Note 1: According to the certificate holder, they declared that the models: HX-DU2017D-900 and HX-DU20XXD-900 series (From HX-DU2025D-900 to HX-DU2075D-900) only the model names are different, the PCB layout, interior structure and electrical circuits are the same. The main measuring model is HX-DU2017D-900, only the results for HX-DU2017D-900 were recorded in this report.

Note 2: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

1.3. The channel number and frequency of EUT

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	**902.60**	22	911.40	43	919.80
1	903.00	23	911.80	44	920.20
2	903.40	24	912.20	45	920.60
3	903.80	25	912.60	46	921.00
4	904.20	26	913.00	47	921.40
5	904.60	27	913.40	48	921.80
6	905.00	28	913.80	49	922.20
7	905.40	29	914.20	50	922.60
8	905.80	30	914.60	51	923.00
9	906.20	**31**	**915.00**	52	923.40
10	906.60	32	915.40	53	923.80
11	907.00	33	915.80	54	924.20
12	907.40	34	916.20	55	924.60
13	907.80	35	916.60	56	925.00
14	908.20	36	917.00	57	925.40
15	908.60	37	917.40	58	925.80
16	909.00	38	917.80	59	926.20
17	909.40	39	918.20	60	926.60
19	910.20	40	918.60	61	927.00
20	910.60	41	919.00	62	927.40
21	911.00	42	919.40	**63**	**927.80**

Note 1: The black bold channels were selected for test.

1.4. Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart C for the EUT FCC ID Certification:

No	Identity	Document Title
1	47 CFR Part 15	Radio Frequency Devices

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	Sep 28, 2018	Su Hang	PASS
3	15.247(b)	Peak Output Power	Sep 28, 2018	Su Hang	PASS
4	15.247(a)	20dB Bandwidth	Oct 26, 2018	Su Hang	PASS
5	15.247(a)	Carrier Frequency Separation	Sep 28, 2018	Su Hang	PASS
6	15.247(a)	Time of Occupancy (Dwell time)	Sep 28, 2018	Su Hang	PASS
7	15.247(d)	Conducted Spurious Emission	Sep 28, 2018	Su Hang	PASS
8	15.207	Conducted Emission	Oct 22, 2018	Zheng Fengjian	PASS
9	15.209, 15.247(d)	Radiated Emission	Oct 18, 2018	Zheng Fengjian	PASS
Note 1: The tests were performed according to the method of measurements prescribed in ANSI C63.10-2013.					

1.5. 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.

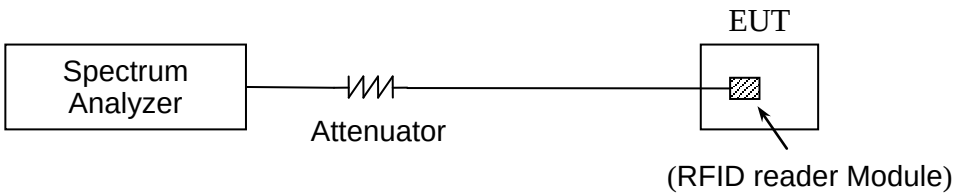
2.2. Number of Hopping Frequency

2.2.1. Requirement

According to FCC section 15.247(a)(1)(i), frequency hopping systems operating in the 902MHz to 928MHz bands shall use at least 50 hopping frequencies if the 20dB bandwidth of the hopping channel is less than 250KHz; or at least 25 hopping frequencies if the 20dB bandwidth of the hopping channel is 250KHz or greater.

2.2.2. Test Description

Test Setup:



The EUT is coupled to the Spectrum Analyzer (SA) with Attenuators the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. During the measurement, the RFID Reader Module of the EUT is activated by the PC via Lan port.

2.2.3. Test Procedure

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:
Span = the frequency band of operation
RBW ≥ 1% of the span
VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold
Allow the trace to stabilize

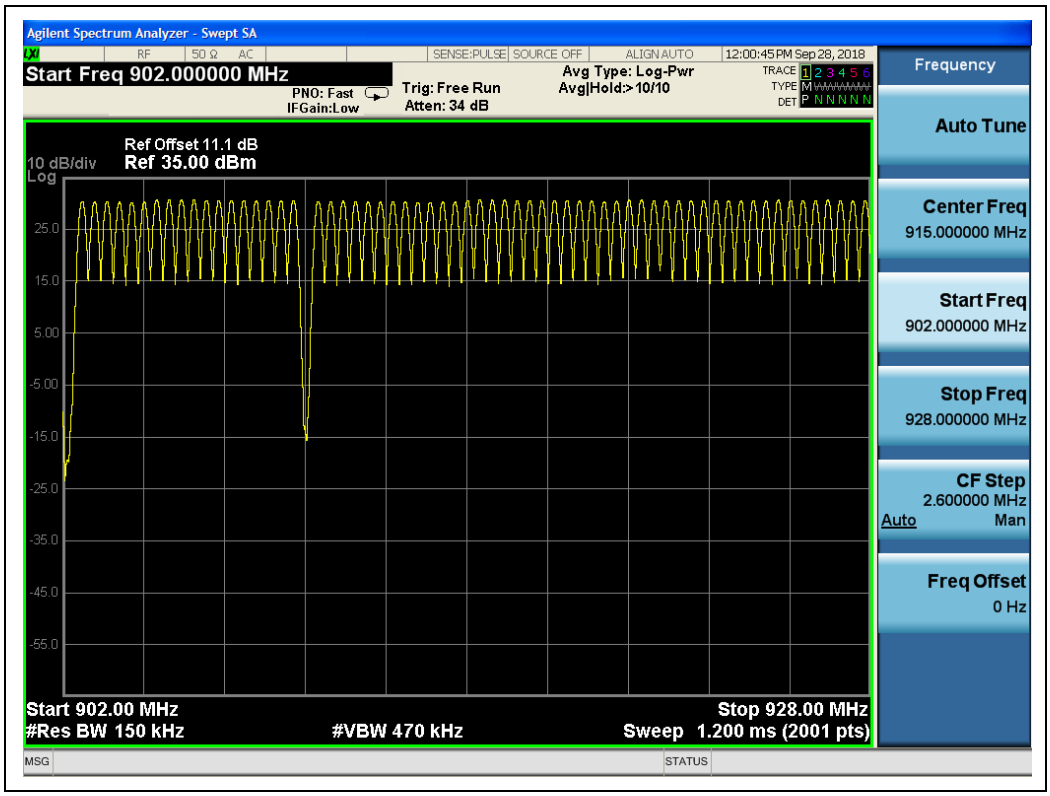
2.2.4. Test Result

The EUT operates at hopping-on test mode; the frequencies number employed is counted to verify the Module's using the number of hopping frequency.

A. Test Verdict:

Frequency Block (MHz)	Measured Channel Numbers	Min. Limit	Verdict
902-928	63	50	PASS

B. Test Plots:



(Number of Hopping Frequency)

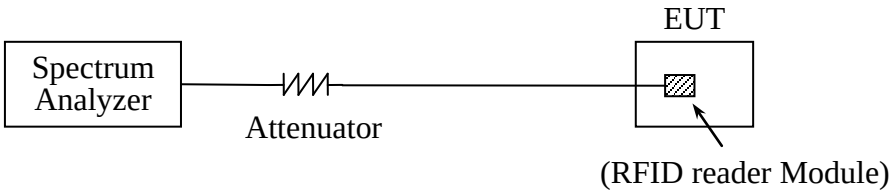
2.3. Peak Output Power

2.3.1. Requirement

According to FCC section 15.247(b)(2), for frequency hopping systems that operates in the 902MHz to 928MHz band employing at least 50 hopping channels, the maximum peak output power of the intentional radiator shall not exceed 1Watt, and 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels.

2.3.2. Test Description

Test Setup:



The EUT is coupled to the Spectrum Analyzer (SA) with Attenuators the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. During the measurement, the RFID Reader Module of the EUT is activated by the PC via Lan port.

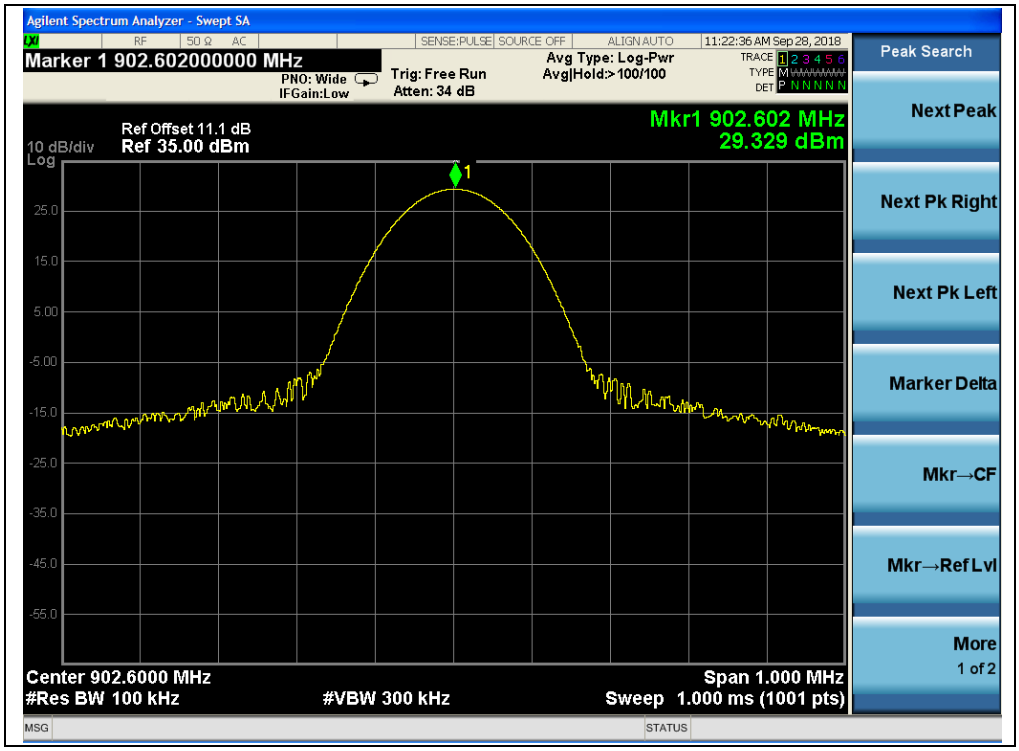
2.3.3. Test Result

The EUT operates at hopping-off test mode. The lowest, middle and highest channels are selected to perform testing to verify the conducted RF output peak power of the Module.

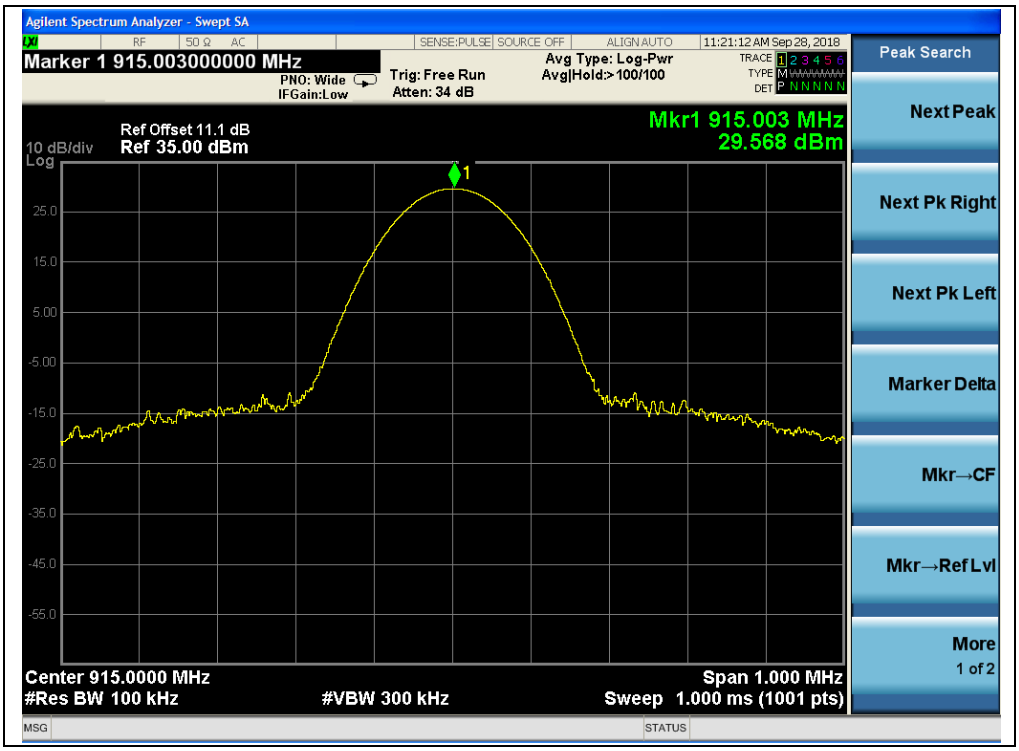
A. Test Verdict:

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
0	902.6	29.33	0.857	30	1	PASS
31	915.0	29.57	0.906			PASS
63	927.8	29.93	0.984			PASS

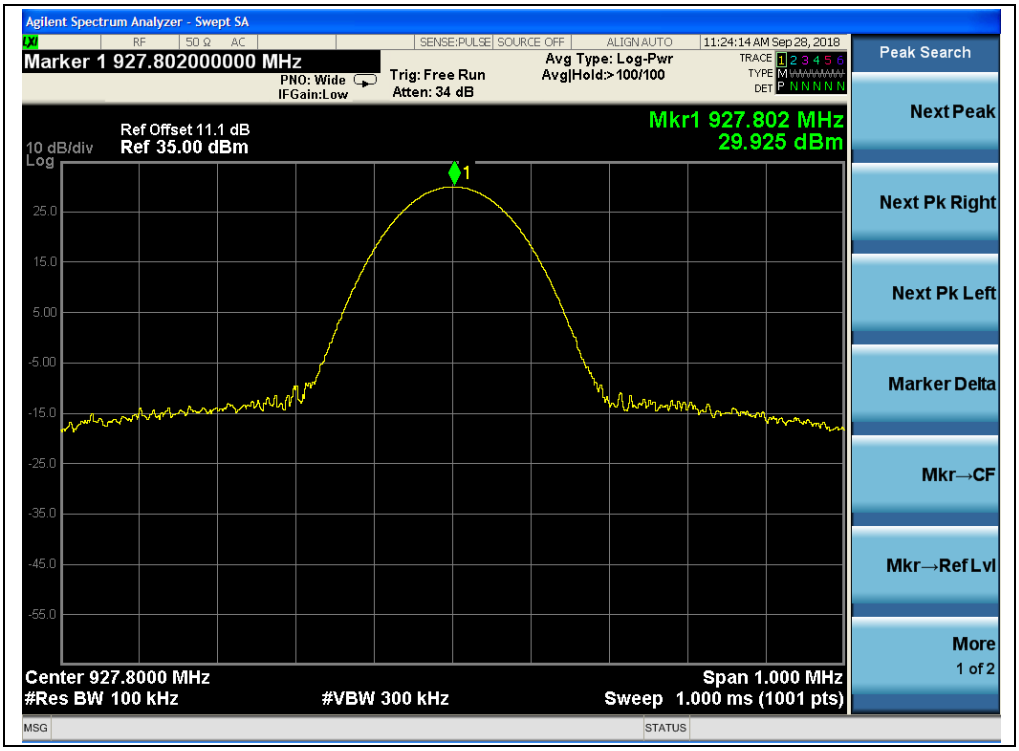
B. Test Plots:



(Power, Channel 0, 902.6MHz)



(Power, Channel 31, 915.0MHz)



(Power, Channel 63, 927.8MHz)

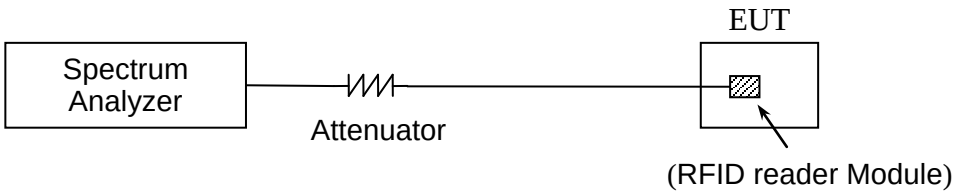
2.4. 20dB Bandwidth

2.4.1. 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.

2.4.2. Test Description

Test Setup:



The EUT is coupled to the Spectrum Analyzer (SA) with Attenuators the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. During the measurement, the RFID Reader Module of the EUT is activated by the PC via Lan port.

2.4.3. Test Procedure

Use the following spectrum analyzer settings:
Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel
RBW ≥ 1% of the 20 dB bandwidth
VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold

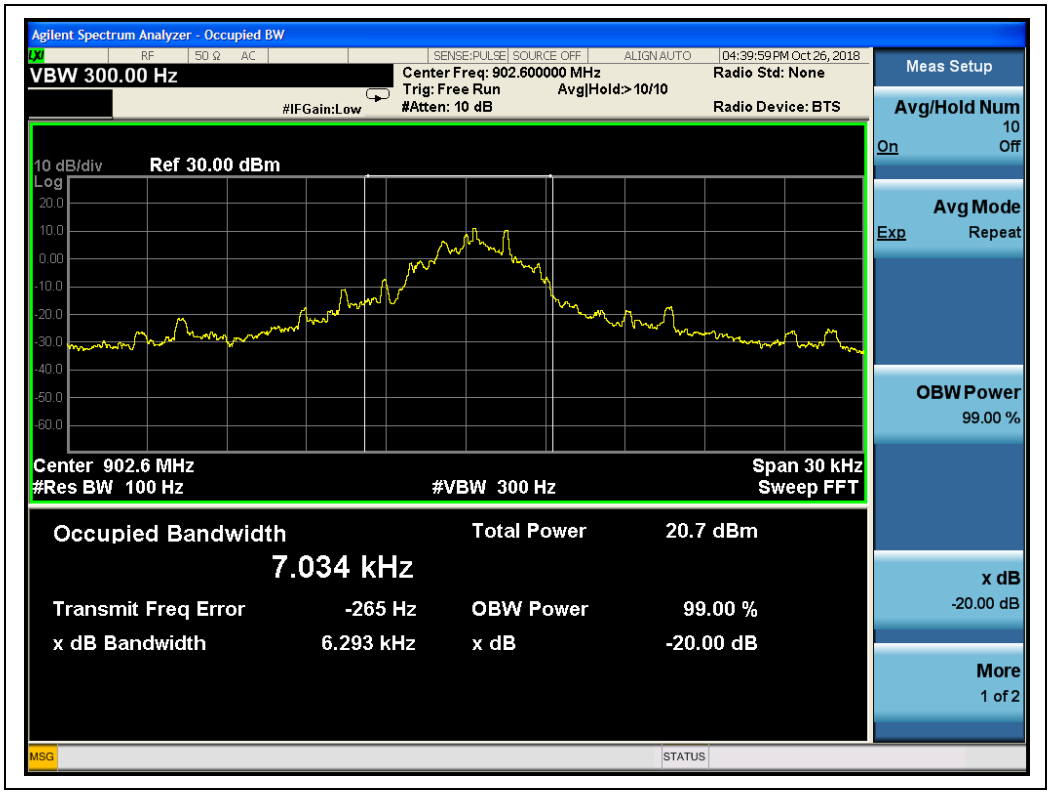
2.4.4. Test Result

The EUT operates at hopping-off test mode. The lowest, middle and highest channels are selected to perform testing to record the 20dB bandwidth of the Module.

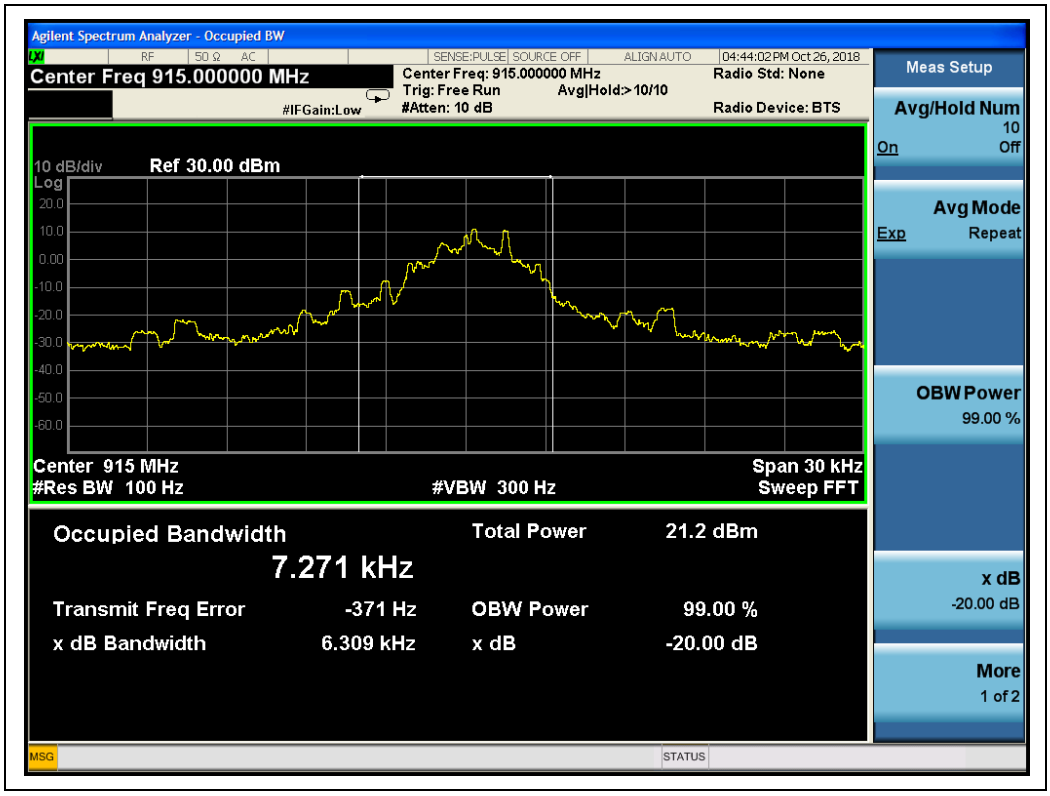
A. Test Verdict:

Channel	Frequency (MHz)	20dB Bandwidth (kHz)	Result
0	902.6	6.29	PASS
31	915.0	6.31	PASS
63	927.8	6.26	PASS

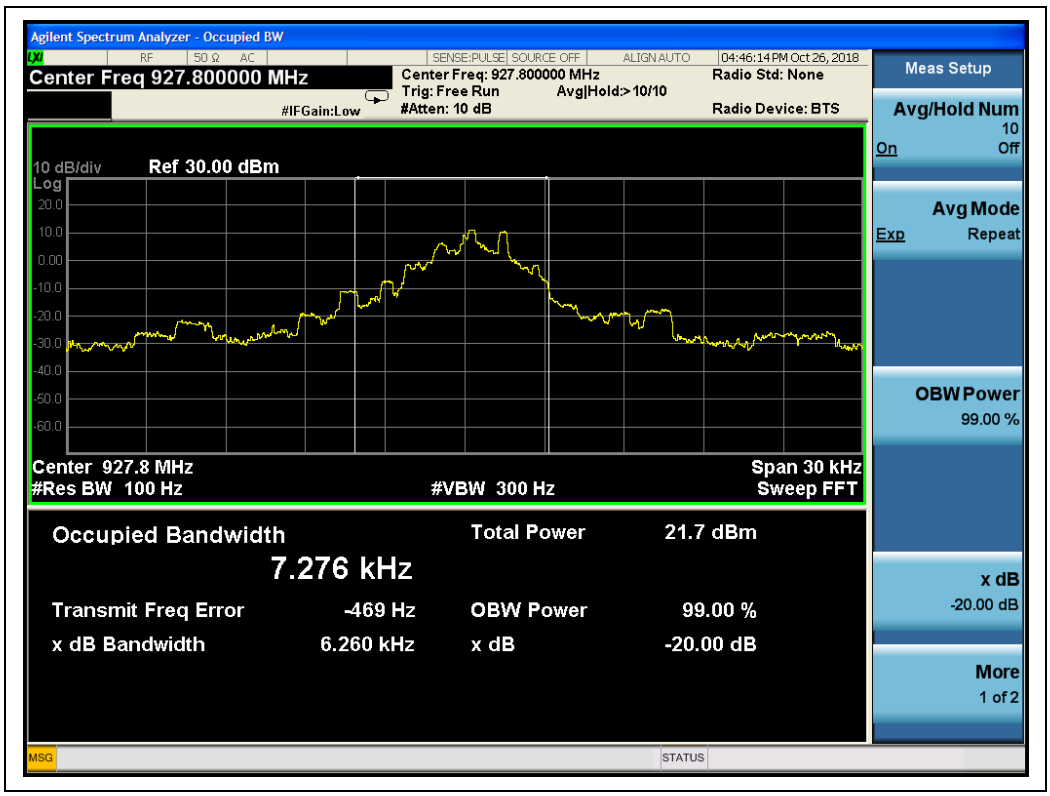
B. Test Plots:



(Bandwidth, Channel 1, 902.6MHz)



(Bandwidth, Channel 26, 915.0MHz)



(Bandwidth, Channel 50, 927.8MHz)

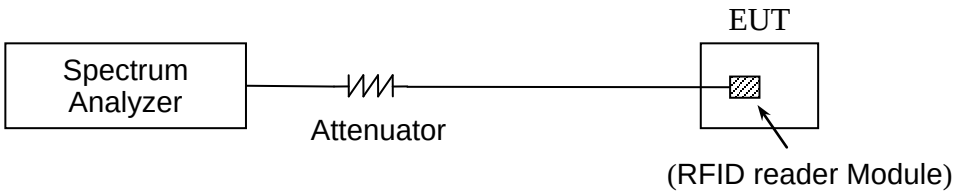
2.5. Carried Frequency Separation

2.5.1. Definition

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

2.5.2. Test Description

A. Test Setup:



The EUT is coupled to the Spectrum Analyzer (SA) with Attenuators the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. During the measurement, the RFID Reader Module of the EUT is activated by the PC via Lan port.

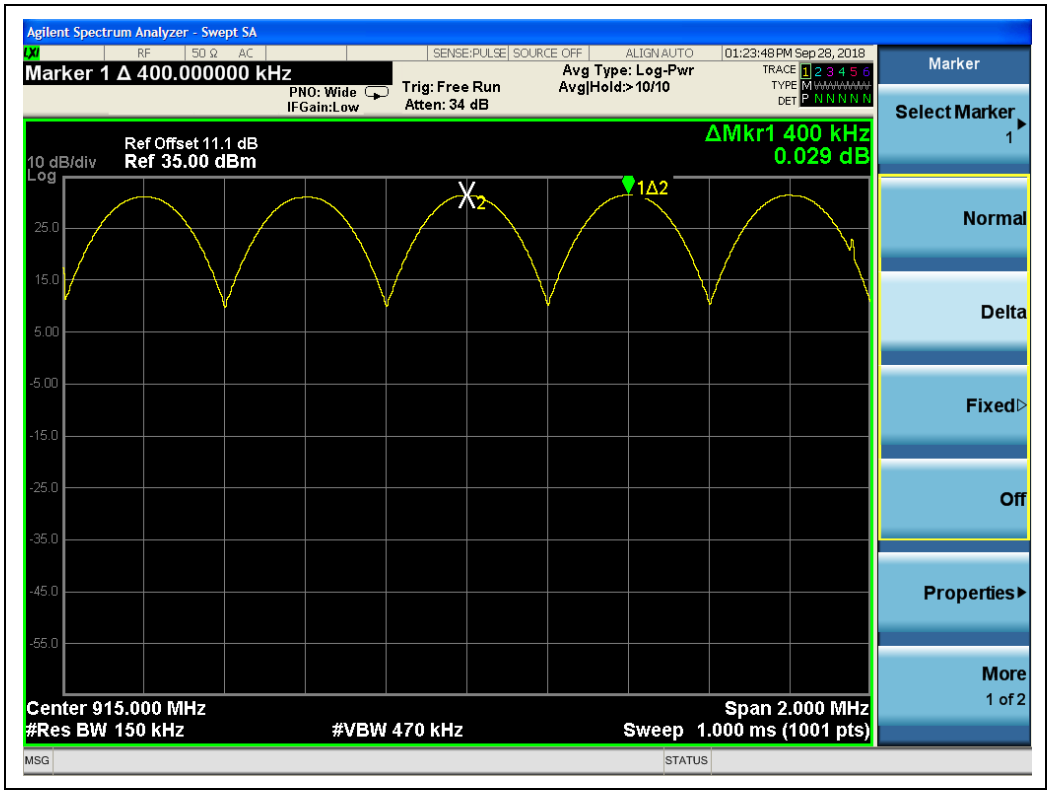
2.5.3. Test Procedure

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:
Span = wide enough to capture the peaks of two adjacent channels
Resolution (or IF) Bandwidth (RBW) ≥ 1% of the span
Video (or Average) Bandwidth (VBW) ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold
Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

2.5.4. Test Result

The EUT operates at hopping-on test mode. For any adjacent channels (e.g. the channel 26 and 27), the EUT does have hopping channel carrier frequencies separated by a minimum of 25 kHz or two-thirds of the 20dB bandwidth of the hopping channel (refer to section 2.4.4), whichever is greater. So, the verdict is PASSING

Measured Channel Numbers	Carried Frequency Separation (kHz)	20dB bandwidth (kHz)	Min. Limit	Verdict
30 and 31	400	6.26	20dB bandwidth	PASS



(Frequency Separation)

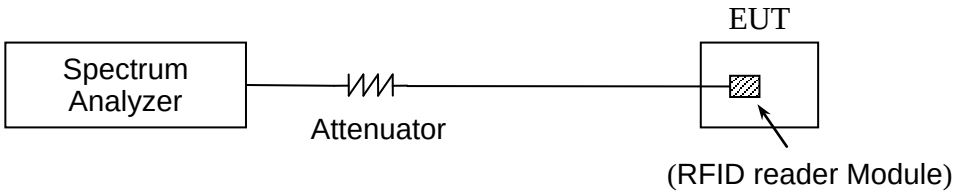
2.6. Time of Occupancy (Dwell time)

2.6.1. Requirement

According to FCC section 15.247(a)(1)(i), frequency hopping systems in the 902 - 928MHz band shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period.

2.6.2. Test Description

Test Setup:



The EUT is coupled to the Spectrum Analyzer (SA) with Attenuators the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. During the measurement, the RFID Reader Module of the EUT is activated by the PC via Lan port.

2.6.3. Test Procedure

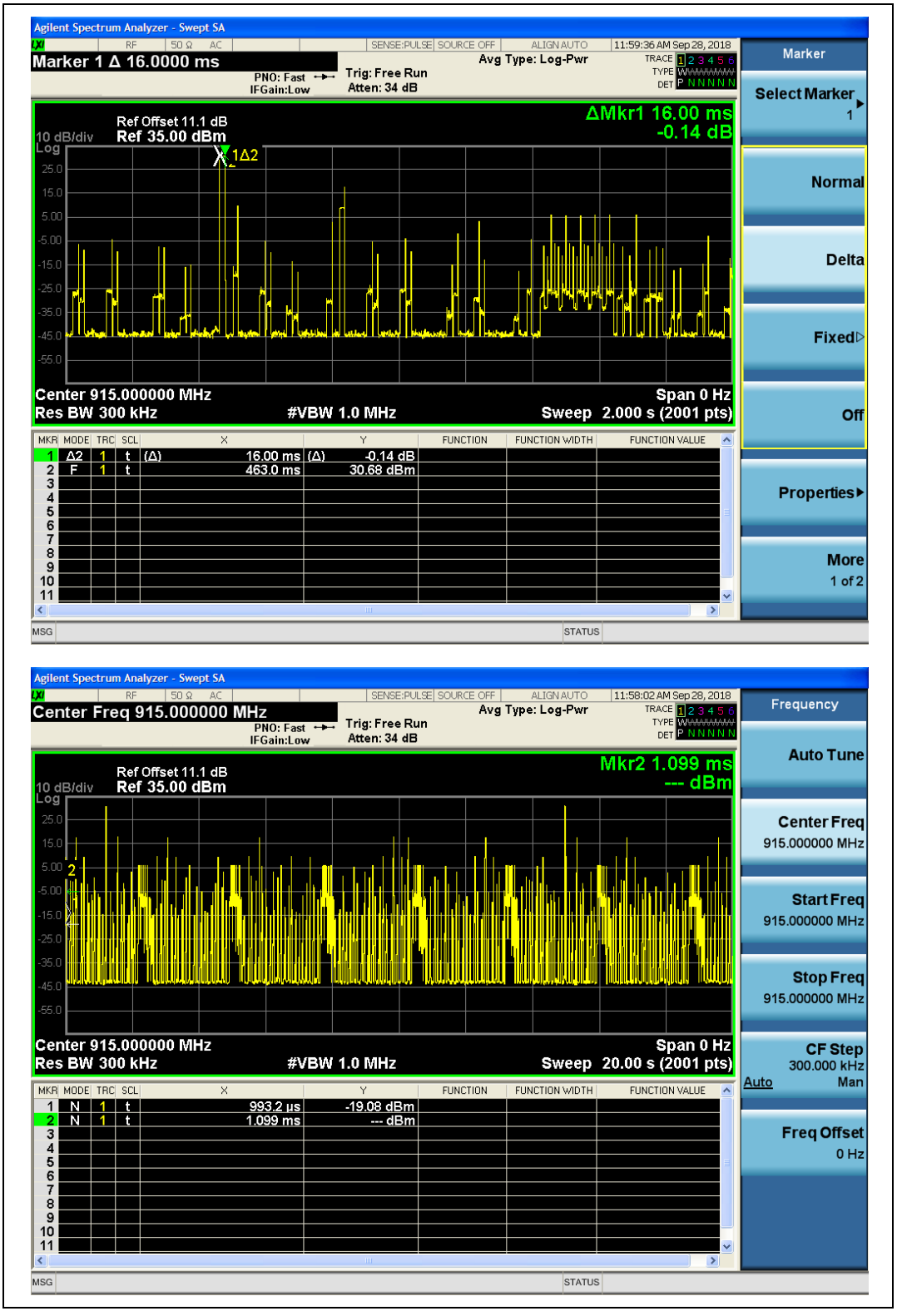
The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in 20 second scan, to enable resolution of each occurrence.
The average time of occupancy in the specified 20 second period is equal to (# of pulses in 20s) * pulse width.

2.6.4. Test Result

A. Test Verdict:

Pulse Width (sec)	Number of pulse in 20 seconds	Average Time of Occupancy (sec)	Limit (sec)	Verdict
0.016	2	0.064	0.4	PASS

B. Test Plots:



(Dwell time)

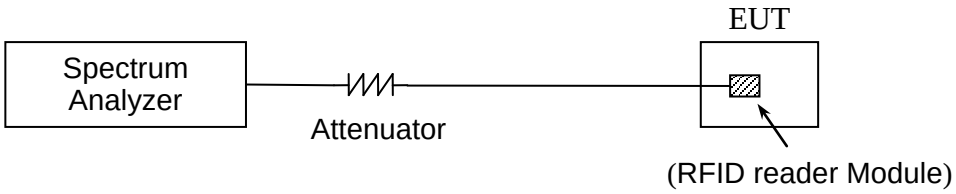
2.7. Conducted Spurious Emissions

2.7.1. 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.

2.7.2. Test Description

Test Setup:



The EUT is coupled to the Spectrum Analyzer (SA) with Attenuators the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. During the measurement, the RFID Reader Module of the EUT is activated by the PC via Lan port.

2.7.3. Test Procedure

Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.
RBW = 100 kHz
VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold
Allow the trace to stabilize.

2.7.4. Test Result

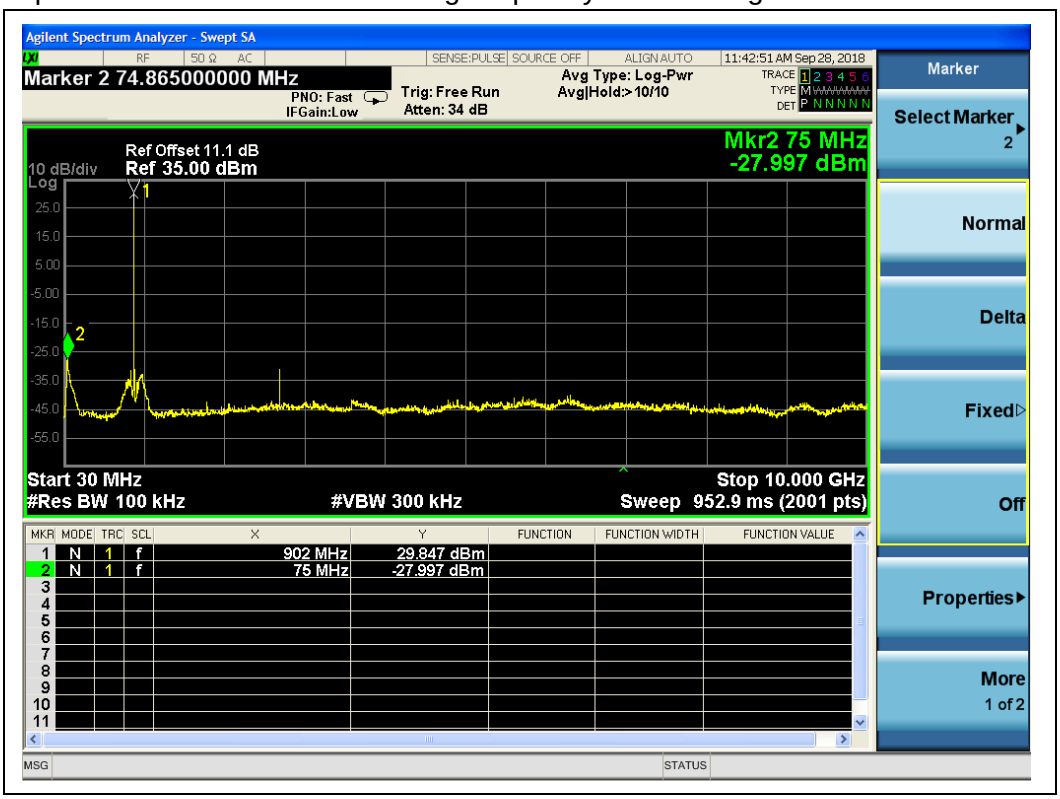
The EUT operates at hopping-off test mode. The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions.

A. Test Verdict:

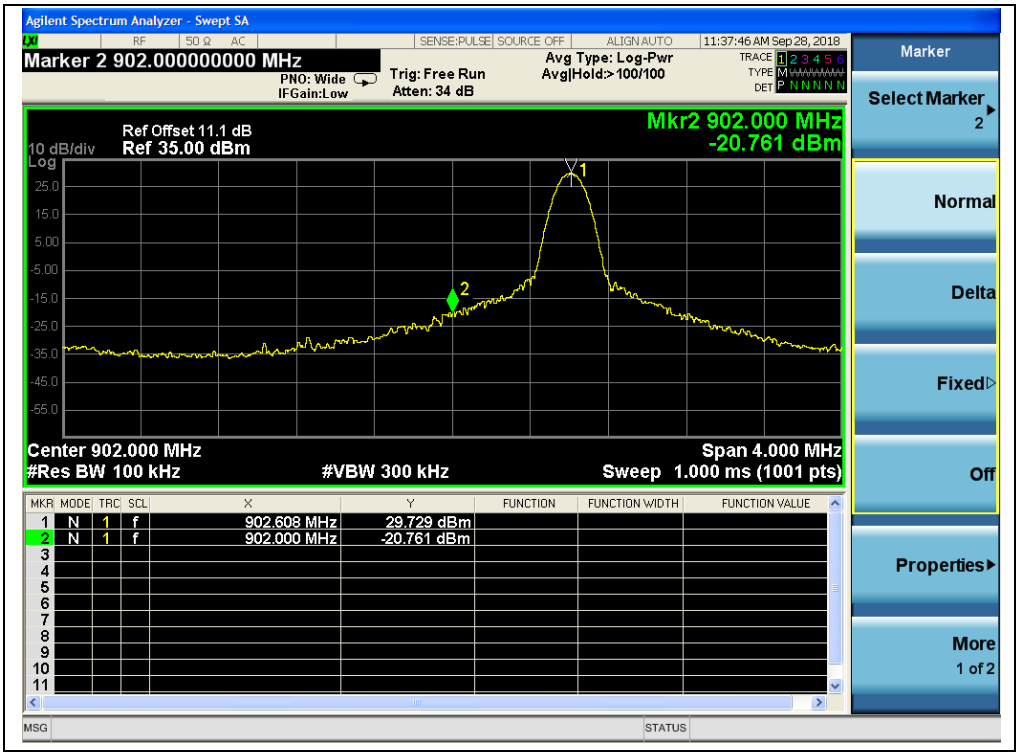
Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
0	902.6	-28.00	29.85	9.85	PASS
31	915.0	-29.64	30.31	10.31	PASS
63	927.8	-28.40	30.00	10.00	PASS

B. Test Plots:

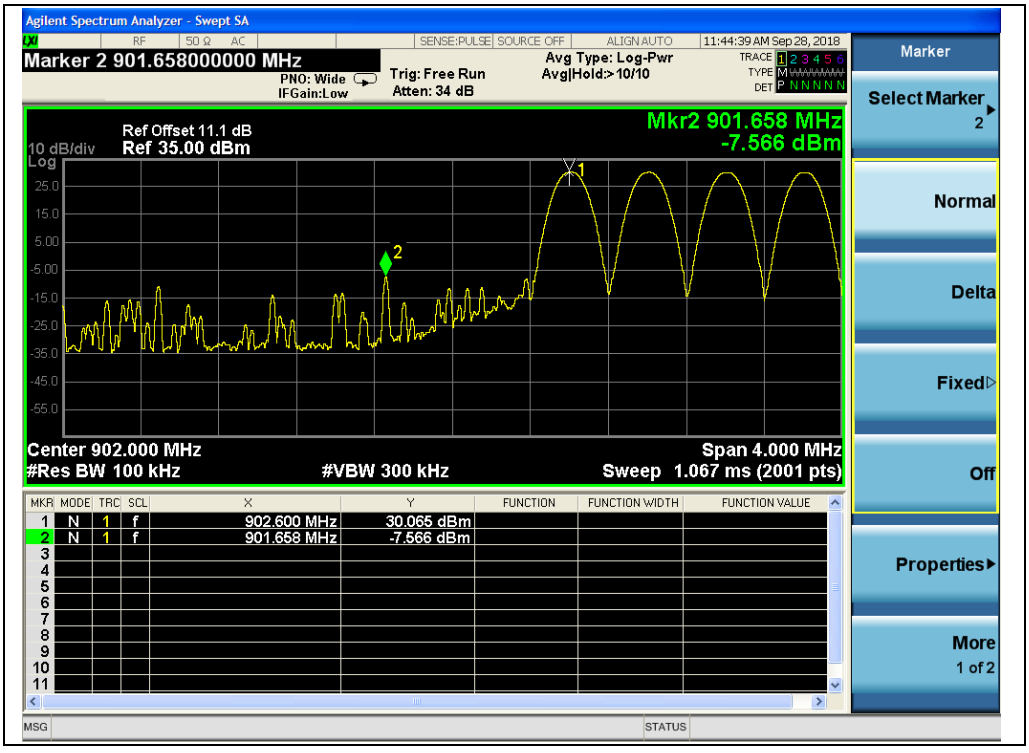
Note: The power of the Module transmitting frequency should be ignored.



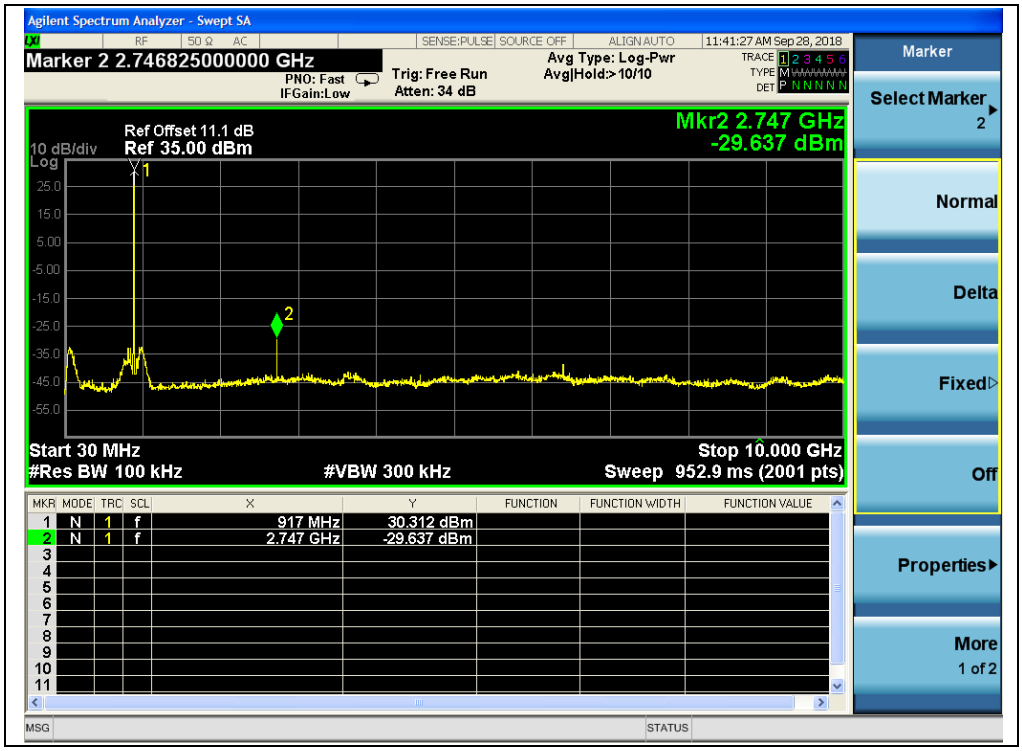
(Channel = 1, 30MHz to 25GHz)



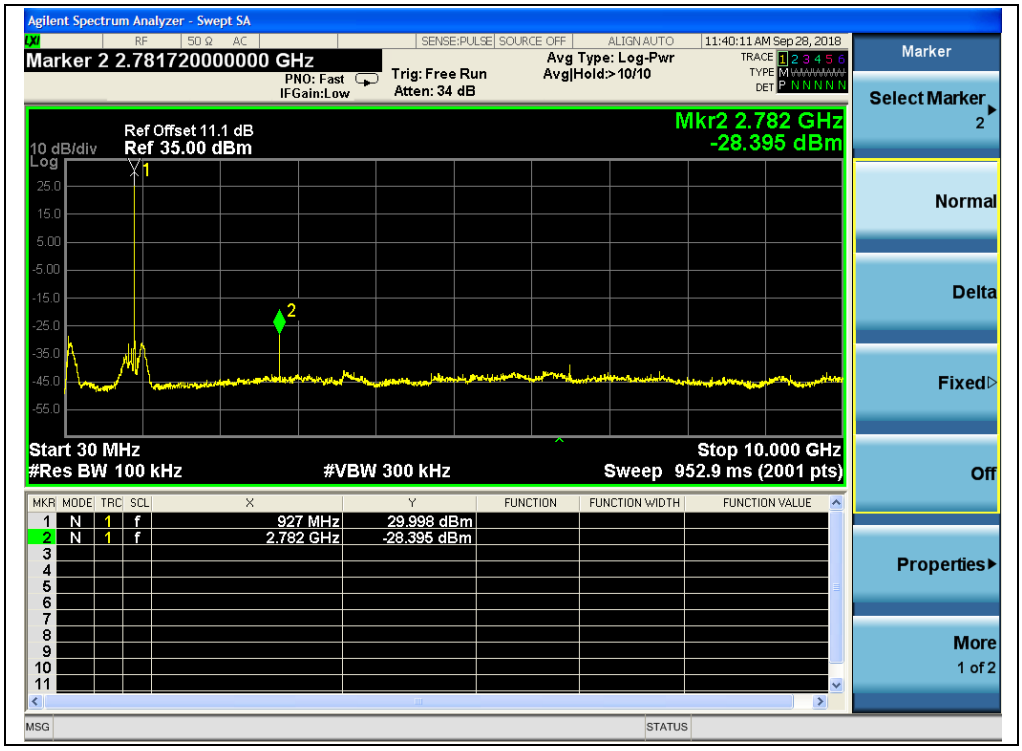
(Channel = 1, Band edge)



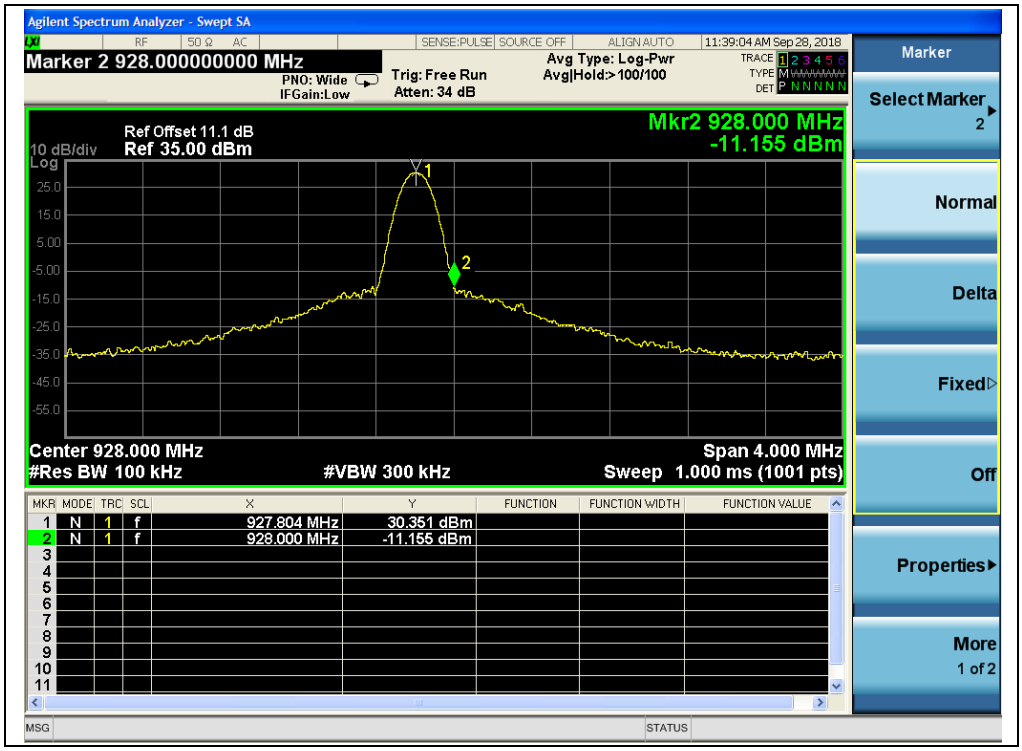
(Channel = 1, Band edge with hopping on)



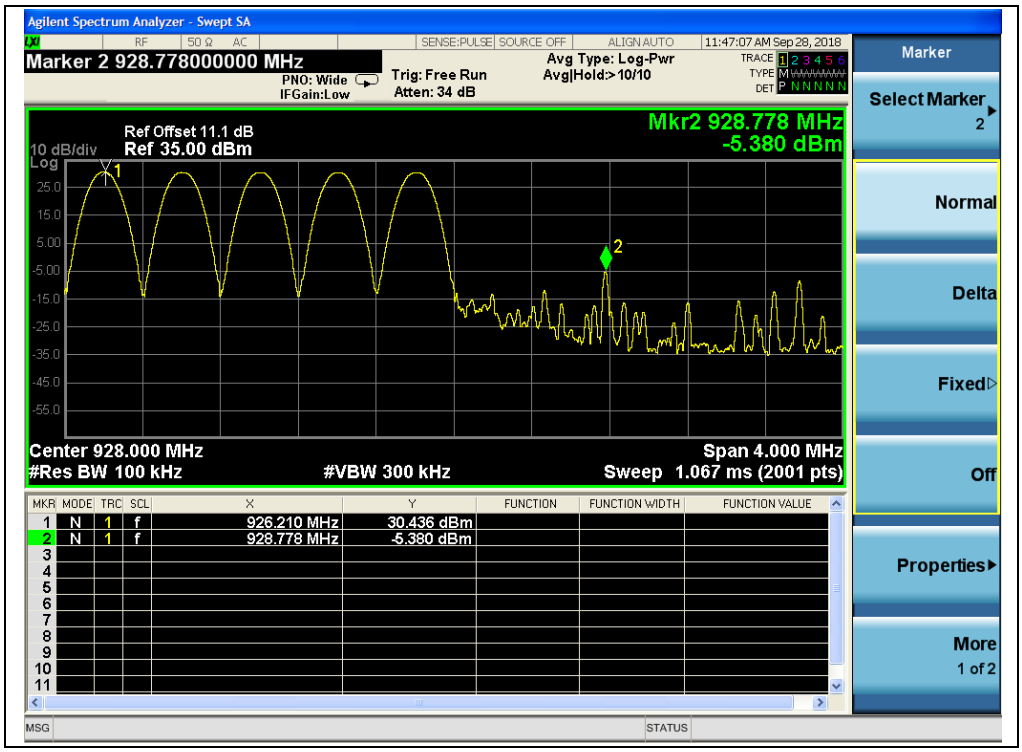
(Channel = 26, 30MHz to 25GHz)



(Channel = 50, 30MHz to 25GHz)



(Channel = 50, Band edge)



(Channel = 50, Band edge with hopping on)

2.8. Conducted Emission

2.8.1. Requirement

According to RSS-GEN section 8.8, 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

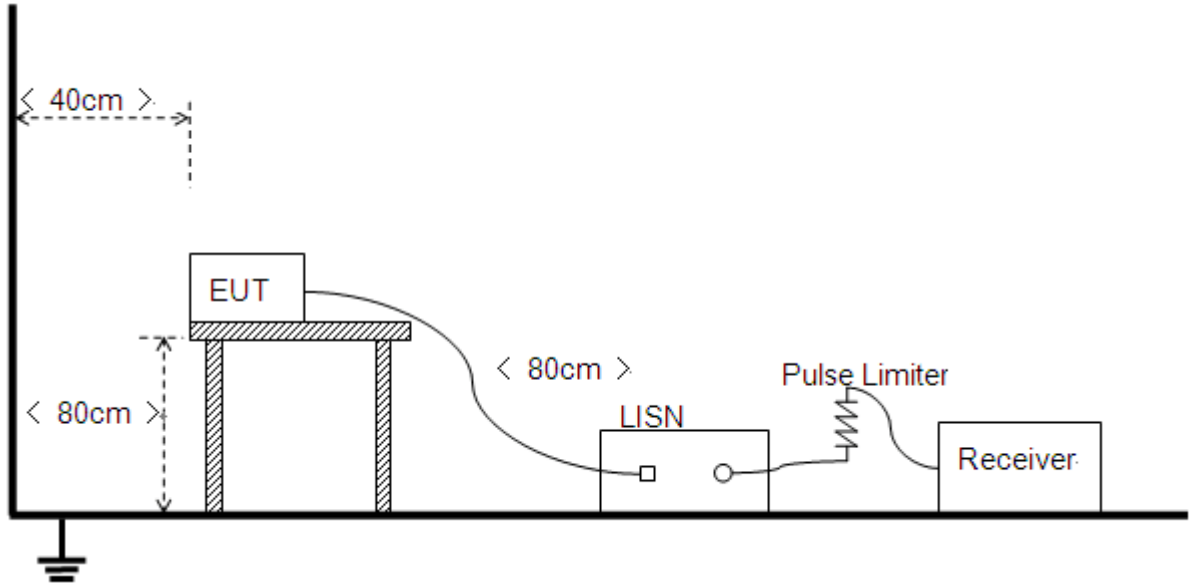
NOTE:

(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.

2.8.2. 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.

The factors of the site are calibrated to correct the reading. During the measurement, the Bluetooth

EUT is activated and controlled by the Bluetooth Service Supplier (SS) via a Common Antenna, and is set to operate under hopping-on test mode transmitting 339 bytes DH5 packages at maximum power.

B. Equipments List:

Please reference ANNEX B(4).

2.8.3. 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.

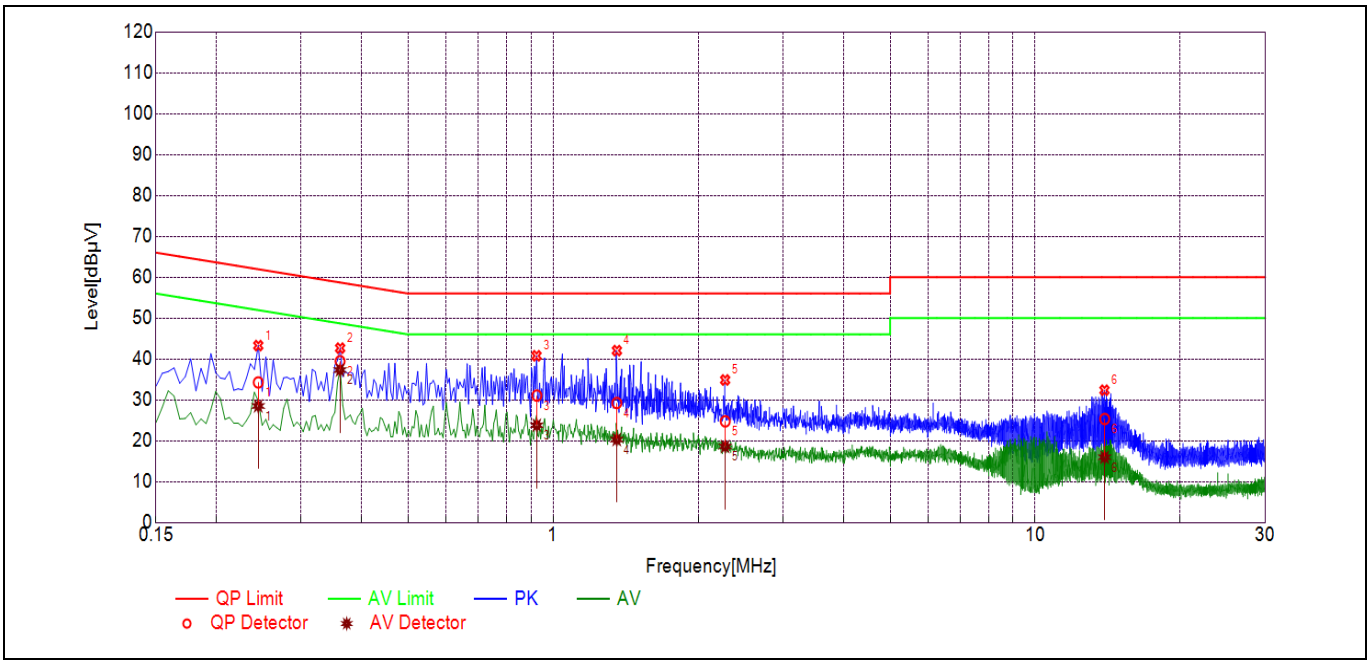
Note: Both of the test voltage AC 120V/60Hz and AC 230V/50Hz were considered and tested respectively, only the results of the worst case AC 120V/60Hz were recorded in this report.

A. Test setup:

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

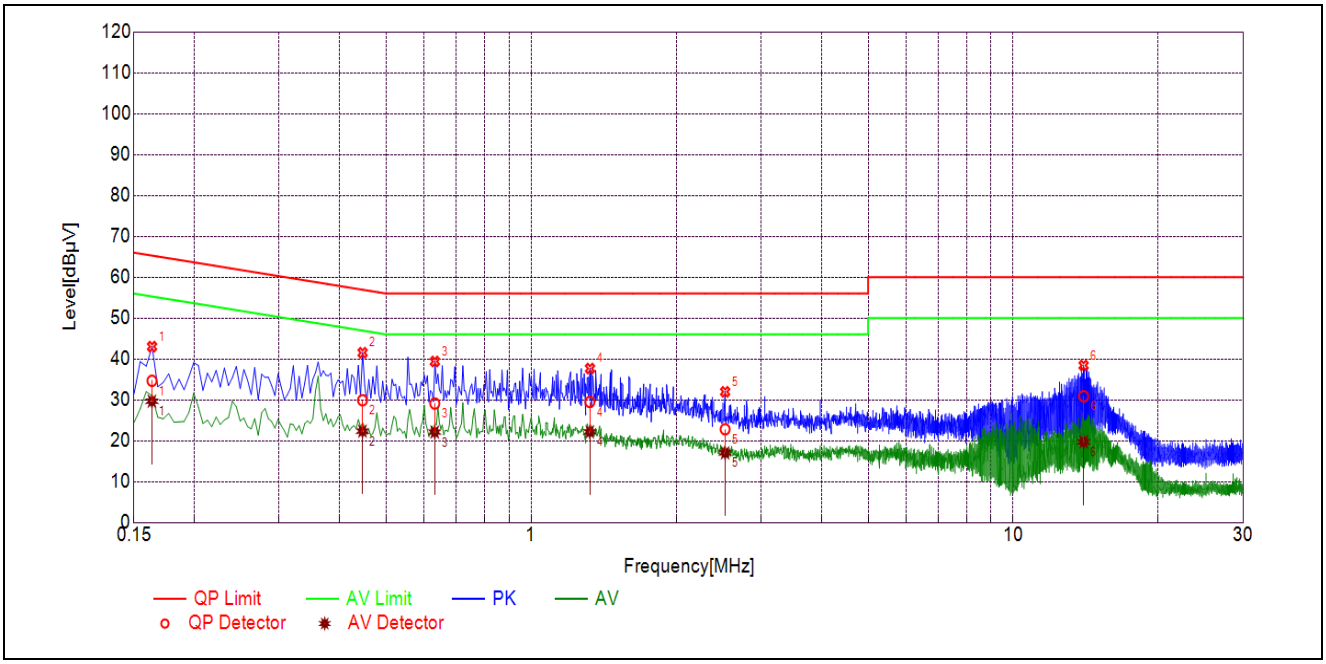
Note: The test voltage is AC 120V/60Hz.

B. Test Plots:



(L Phase)

NO.	Fre. (MHz)	Emission Level (dBµV)		Limit (dBµV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.2444	34.27	28.50	61.95	51.95	Line	PASS
2	0.3613	39.46	37.28	58.70	48.70		PASS
3	0.9248	31.05	23.79	56.00	46.00		PASS
4	1.3549	29.23	20.29	56.00	46.00		PASS
5	2.2747	24.74	18.59	56.00	46.00		PASS
6	13.9336	25.32	15.96	60.00	50.00		PASS



(N Phase)

NO.	Fre. (MHz)	Emission Level (dBµV)		Limit (dBµV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.1634	34.66	29.67	65.29	55.29	Neutral	PASS
2	0.4467	29.90	22.35	56.94	46.94		PASS
3	0.6309	29.11	22.12	56.00	46.00		PASS
4	1.3235	29.49	22.17	56.00	46.00		PASS
5	2.5253	22.80	17.03	56.00	46.00		PASS
6	14.0003	30.88	19.72	60.00	50.00		PASS

2.9. Radiated Emission

2.9.1. 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:

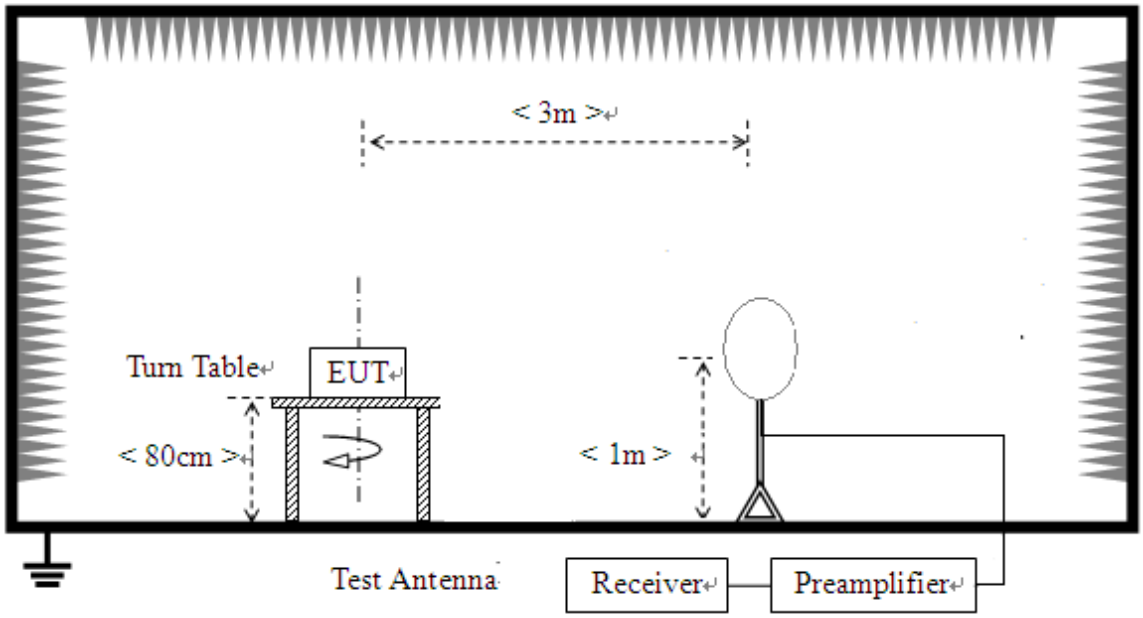
1. For Above 1000MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.
2. For above 1000MHz, limit field strength 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)

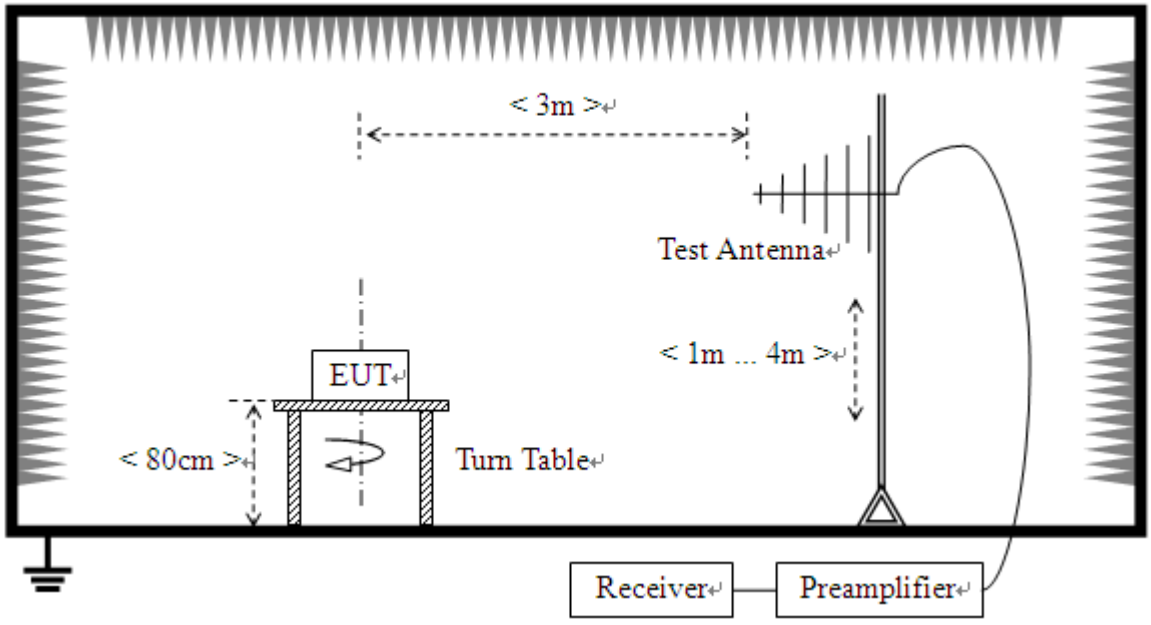
2.9.2. Test Description

A. Test Setup:

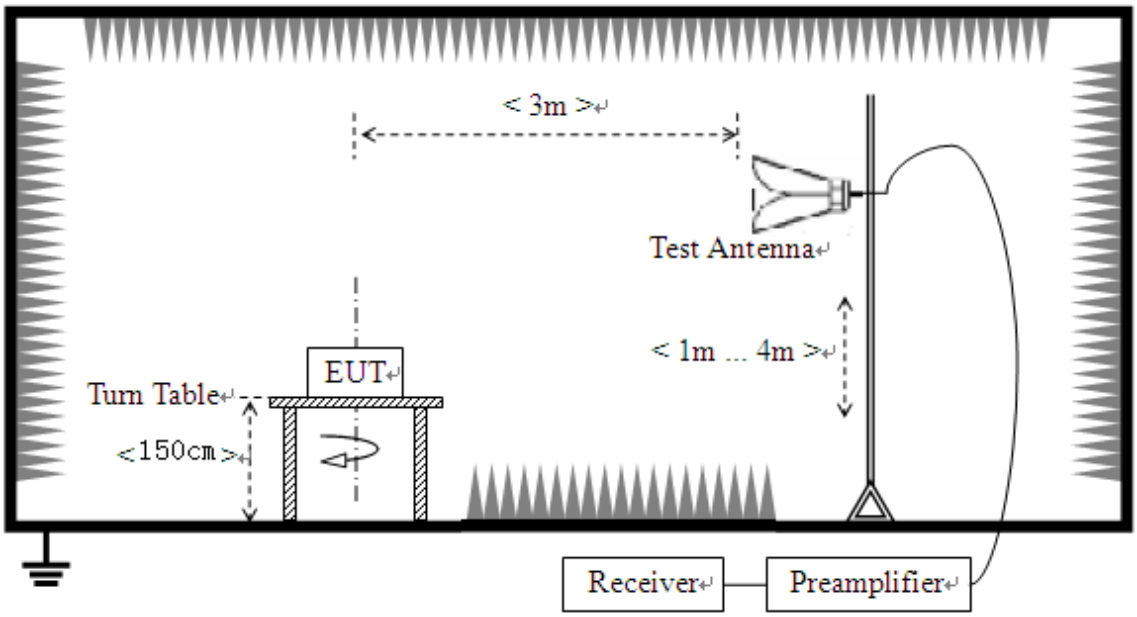
1) For radiated emissions from 9kHz to 30MHz



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 B(4).

2.9.3. Test Procedure

Use the following spectrum analyzer settings:
Span = wide enough to fully capture the emission being measured
RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz
VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold

2.9.4. 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

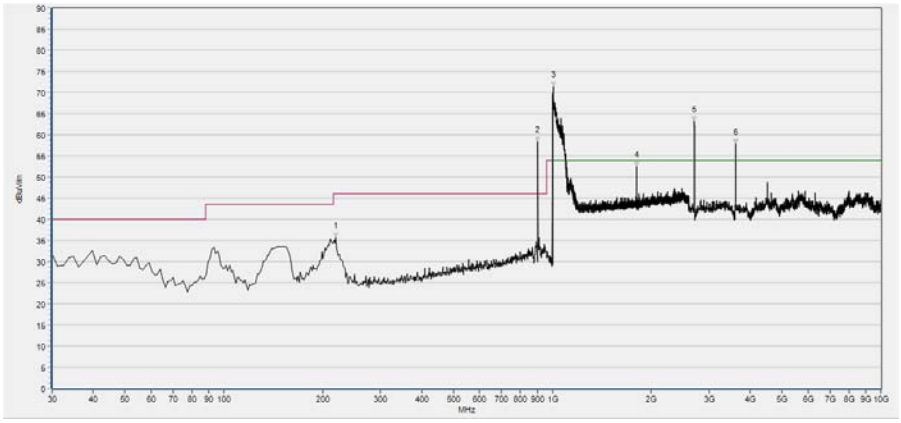
G_{preamp}: Preamplifier Gain

A_{Factor}: Antenna Factor at 3m

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

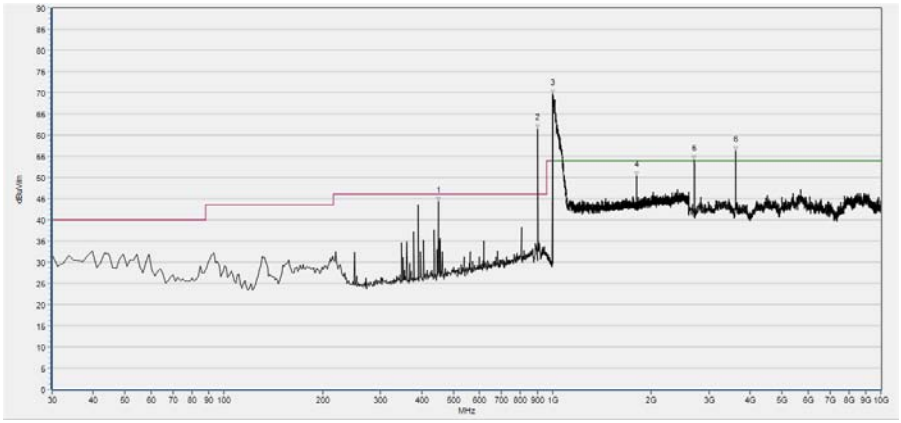
Note1: All radiated emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.
Note2: For the frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit was not recorded.
Note3: For the frequency, which started from 25GHz to 40GHz, was pre-scanned and the result which was 20dB lower than the limit was not recorded.

Plots for 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
219.387	35.71	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
902.879	58.40	N/A	N/A	N/A	46.00	N/A	Horizontal	N/A
1009.600	71.47	N/A	46.25	74.00	N/A	54.00	Horizontal	PASS
1804.802	52.48	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
2707.900	63.01	N/A	51.99	74.00	N/A	54.00	Horizontal	PASS
3610.400	57.79	N/A	42.38	74.00	N/A	54.00	Horizontal	PASS

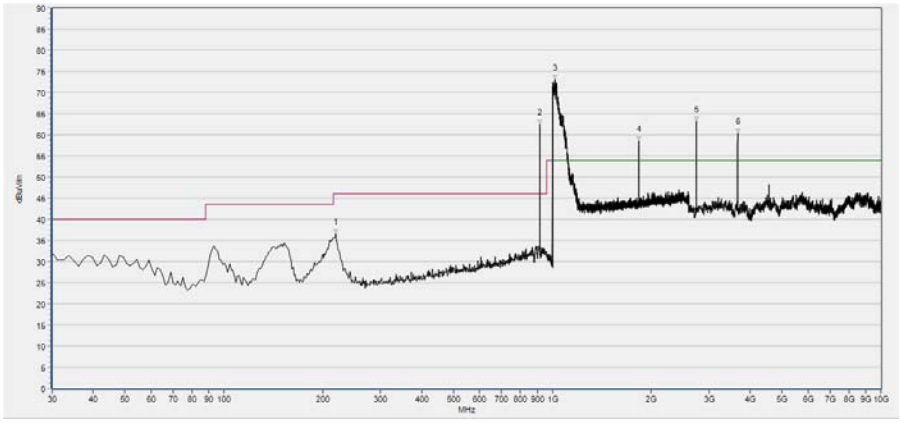
(30MHz to 10GHz, Antenna Horizontal, channel 0)



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
450.050	44.20	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
902.879	61.49	N/A	N/A	N/A	46.00	N/A	Vertical	N/A
1001.980	69.20	N/A	41.06	74.00	N/A	54.00	Vertical	PASS
1804.802	50.28	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
2707.900	54.51	N/A	48.83	74.00	N/A	54.00	Vertical	PASS
3610.400	56.57	N/A	50.79	74.00	N/A	54.00	Vertical	PASS

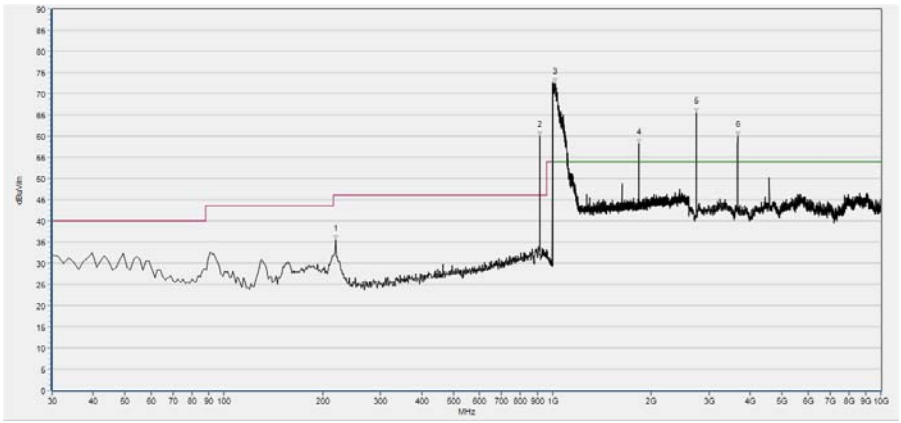
(30MHz to 10GHz, Antenna Vertical, channel 0)

Plot for Channel = 31



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
219.387	36.64	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
915.019	62.44	N/A	N/A	N/A	46.00	N/A	Horizontal	N/A
1016.500	73.13	N/A	49.28	74.00	N/A	54.00	Horizontal	PASS
1830.700	58.09	N/A	44.33	74.00	N/A	54.00	Horizontal	PASS
2746.200	63.47	N/A	53.10	74.00	N/A	54.00	Horizontal	PASS
3661.500	60.85	N/A	45.16	74.00	N/A	54.00	Horizontal	PASS

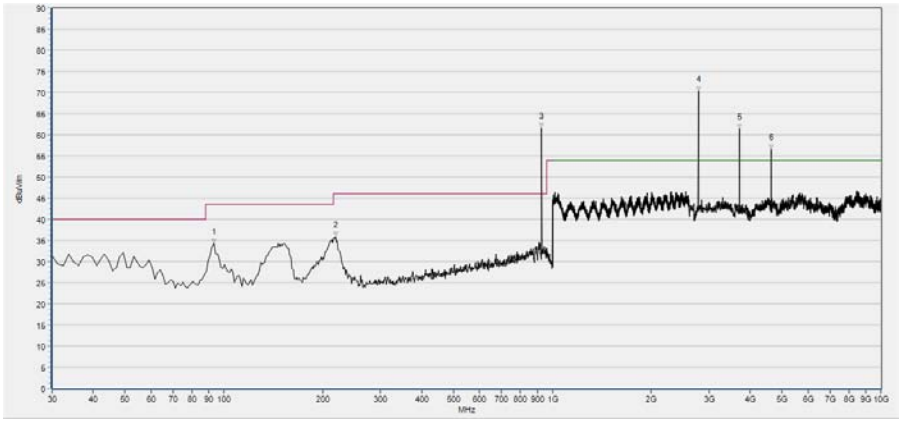
(30MHz to 10GHz, Antenna Horizontal, channel 31)



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
219.387	35.58	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
915.019	60.09	N/A	N/A	N/A	46.00	N/A	Vertical	N/A
1013.900	72.31	N/A	42.99	74.00	N/A	54.00	Vertical	PASS
1830.800	58.80	N/A	44.54	74.00	N/A	54.00	Vertical	PASS
2746.200	65.40	N/A	52.67	74.00	N/A	54.00	Vertical	PASS
3661.600	60.86	N/A	42.49	74.00	N/A	54.00	Vertical	PASS

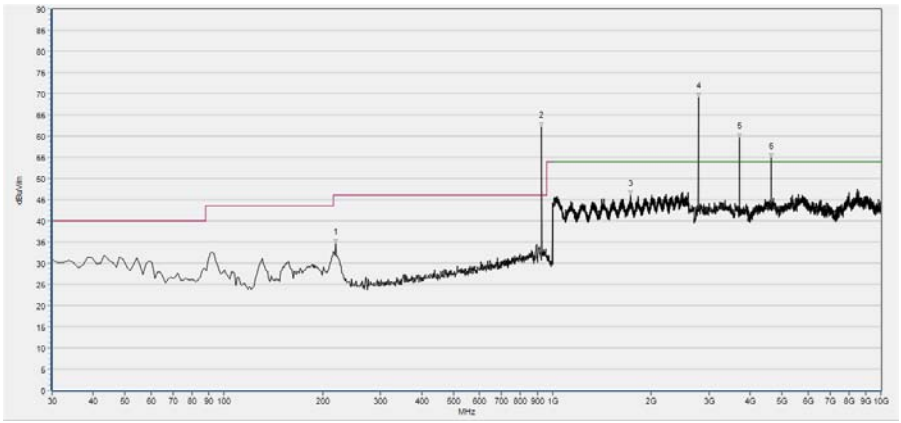
(30MHz to 10GHz, Antenna Vertical, channel 31)

Plot for 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
93.129	34.32	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
219.387	35.94	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
927.159	61.62	N/A	N/A	N/A	46.00	N/A	Horizontal	N/A
2783.400	70.47	N/A	53.20	74.0	N/A	54.00	Horizontal	PASS
3711.200	61.32	N/A	48.26	74.0	N/A	54.00	Horizontal	PASS
4639.100	56.66	N/A	39.62	74.0	N/A	54.00	Horizontal	PASS

(30MHz to 10GHz, Antenna Horizontal, 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
219.387	34.64	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
927.159	62.11	N/A	N/A	N/A	46.00	N/A	Vertical	N/A
1734.374	46.12	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
2783.400	69.79	N/A	50.67	74.00	N/A	54.00	Vertical	PASS
3711.200	59.80	N/A	44.91	74.00	N/A	54.00	Vertical	PASS
4639.100	54.92	N/A	41.46	74.00	N/A	54.00	Vertical	PASS

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

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
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, the test firm registration number is 226174.

4. Test Equipments Utilized

4.1 Conducted Test Equipments

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Cal. Due
Power Splitter	NW521	1506A	Weinschel	2018.04.17	2019.04.16
Attenuator 1	(N/A.)	10dB	Resnet	2018.04.17	2019.04.16
Attenuator 2	(N/A.)	3dB	Resnet	2018.04.17	2019.04.16
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	2018.05.08	2019.05.07
LISN	812744	NSLK 8127	Schwarzbeck	2018.05.08	2019.05.07
Pulse Limiter (20dB)	9391	VTSD 9561-D	Schwarzbeck	2018.05.08	2019.05.07
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 Radiated Test Equipments

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Cal. Due
Receiver	MY54130016	N9038A	Agilent	2018.08.04	2019.08.03
Test Antenna - Bi-Log	9163-519	VULB 9163	Schwarzbeck	2018.05.18	2019.05.17
Test Antenna - Loop	1519-022	FMZB1519	Schwarzbeck	2018.03.03	2019.03.02
Test Antenna – Horn	01774	BBHA 9120D	Schwarzbeck	2018.08.06	2019.08.05
Test Antenna – Horn	BBHA9170 #774	BBHA9170	Schwarzbeck	2018.08.02	2019.08.01
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	2018.05.08	2019.05.07
18-26.5GHz pre-Amplifier	MA03	TS-PR18	Rohde& Schwarz	2018.05.08	2019.05.07
Anechoic Chamber	N/A	9m*6m*6m	CRT	2017.11.19	2020.11.18

END OF REPORT