REPORT No.: SZ17080240W01

FCC RF TEST REPORT

APPLICANT	:	SHENZHEN MARKTRACE CO.,LTD
PRODUCT NAME	:	UHF RFID Reader
MODEL NAME	:	MR6211E
TRADE NAME	:	Marktrace RFID
BRAND NAME	:	Marktrace RFID
FCC ID	:	2AJQV-MR6211
STANDARD(S)	:	47 CFR Part 15 Subpart C
ISSUE DATE	:	2017-10-18

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DIRECTORY

Change History		
Issue	Date	Reason for change
1.0	2017-10-18	First edition

TEST REPORT DECLARATION

Applicant	SHENZHEN MARKTRACE CO.,LTD
Applicant Address	F5, Bldg.7, Changyuan New Material Port Keyuan RD, Science & Industry Park, Shenzhen, P.R.CHINA
Manufacturer	SHENZHEN MARKTRACE CO.,LTD
Manufacturer Address	F5, Bldg.7, Changyuan New Material Port Keyuan RD, Science & Industry Park, Shenzhen, P.R.CHINA
Product Name	UHF RFID Reader
Model Name	MR6211E
Brand Name	Marktrace RFID
HW Version	V1.0
SW Version	V7.1
Test Standards	47 CFR Part 15 Subpart C
Test Date	2017-09-14 to 2017-10-16
Test Result	PASS

Tested by : Tu Ya'nan

Tu Ya'nan (Test Engineer)

Approved by : Andy Yeh

Andy Yeh (Technical Director)

1. GENERAL INFORMATION

1.1 EUT Description

Product Name.....:	UHF RFID Reader
Serial No. .....:	(n.a, marked #1 by test site)
Frequency Range.....:	The frequency range used is 902.5MHz – 927.0MHz (50 channels, at intervals of 500kHz);
Modulation Type.....:	FHSS
Antenna Type.....:	Linear polarized Antenna
Antenna Gain.....:	12dBi

NOTE:

1. The EUT is a UHF RFID Reader, it contains Radio Module operating at 900MHz ISM band; the frequencies allocated for the Radio Module is F(MHz)=902+0.5*n (1<=n<=50). The lowest, middle, highest channel numbers of the Radio Module used and tested in this report are separately 1 (902.5MHz), 26 (915.0MHz) and 50 (927.0MHz).
2. For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

1.2 Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart C (900 MHz ISM Band Frequency Hopping Spread Spectrum Transmitter) for the EUT FCC ID Certification:

No.	Identity	Document Title
1	47 CFR Part 15 (10-1-15 Edition)	Radio Frequency Devices

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

No.	Section in CFR 47	Description	Test Date	Result
1	15.203	Antenna Requirement	N.A	**N.A**
2	15.247(a)	Number of Hopping Frequency	Sep 29, 2017	**PASS**
3	15.247(b)	Peak Output Power	Sep 29, 2017	**PASS**
4	15.247(a)	20dB Bandwidth	Sep 29, 2017	**PASS**
5	15.247(a)	Carrier Frequency Separation	Sep 29, 2017	**PASS**
6	15.247(a)	Time of Occupancy (Dwell time)	Sep 29, 2017	**PASS**
7	15.247(d)	Conducted Spurious Emission	Sep 29, 2017	**PASS**
8	15.209 15.247(d)	Radiated Emission	Oct 16, 2017	**PASS**
9	15.207	Conducted Emission	Sep 14, 2017	**PASS**

NOTE: The tests were performed according to the method of measurements prescribed in ANSI C63.10-2013.

1.3 Test Environment 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 maximum gain of antenna was defined by manufacturer. The max gain is 4.8dBi.The antenna type is SMA Antenna. For more info, please refer to the user manual.

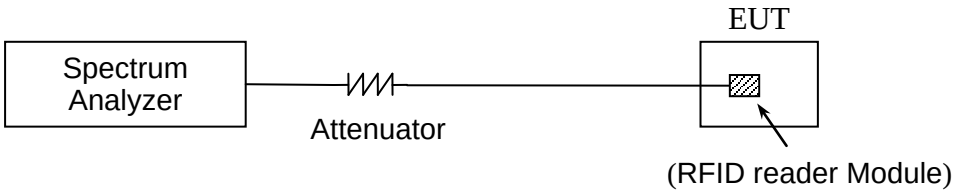
2.2 Number of Hopping Frequency

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

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.

B. Equipments List:

Please reference ANNEX A(1.5).

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

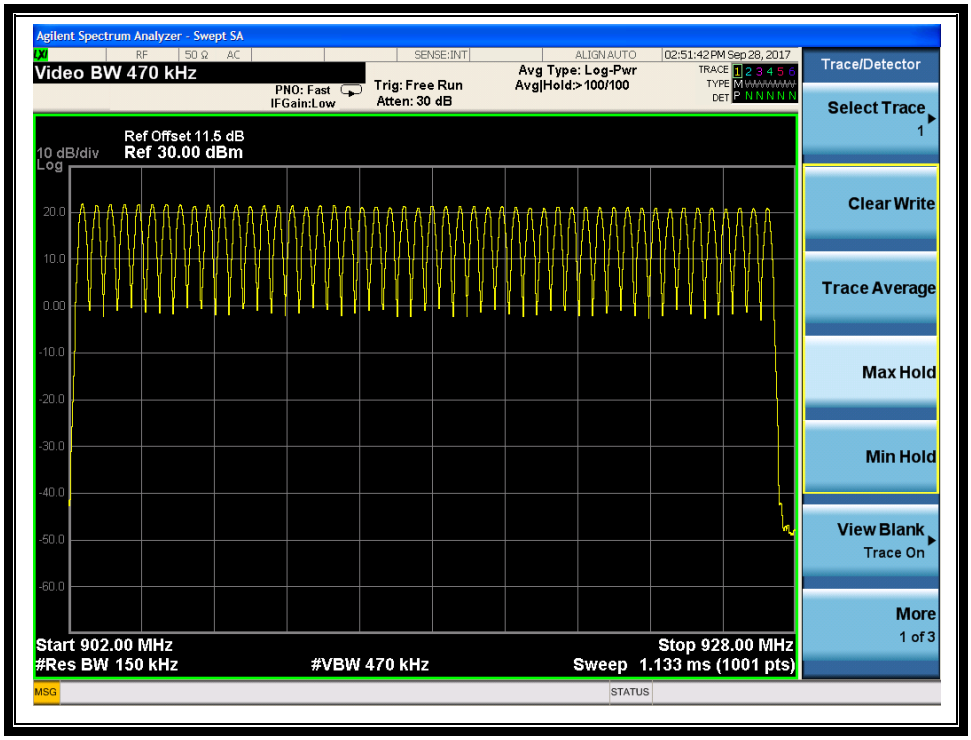
2.2.4 Test Result

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	Refer to Plot	Verdict
902 - 928	50	50	Plot A	PASS

B. Test Plots:



(Plot A: 902MHz to 928MHz)

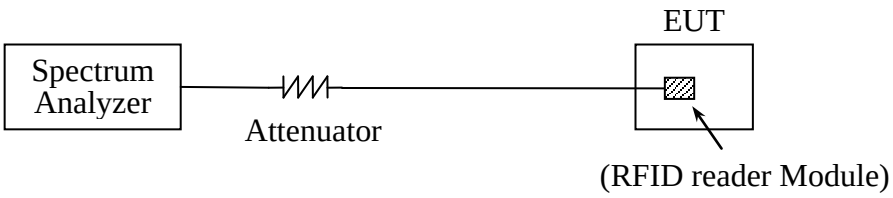
2.3 Peak Output Power

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

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.

B. Equipments List:

Please reference ANNEX A(1.5).

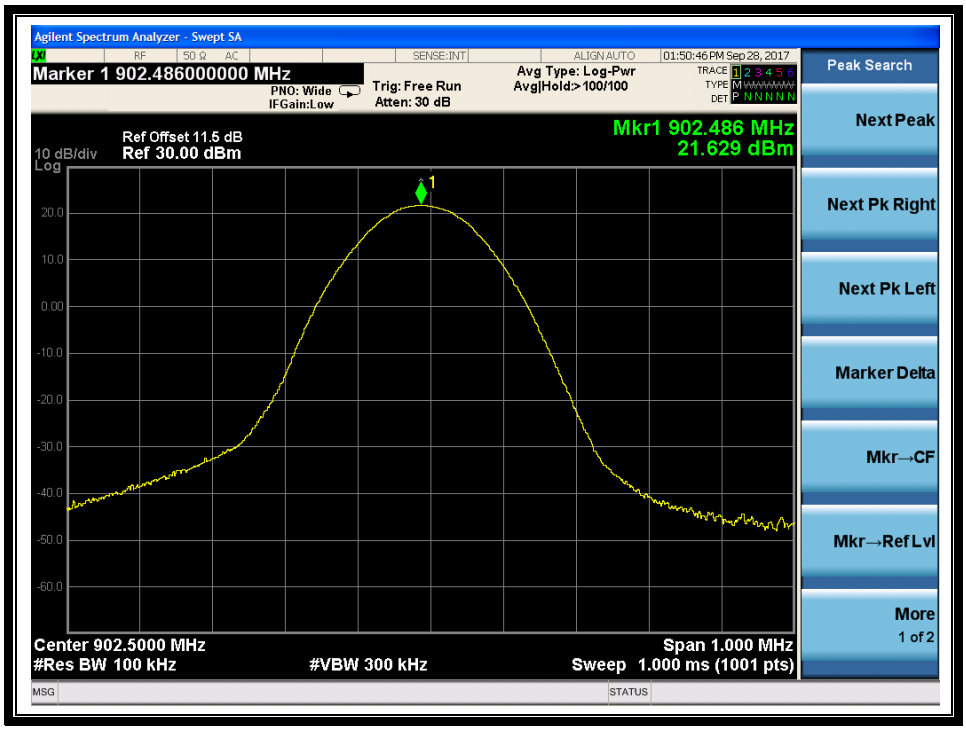
2.3.3 Test Result

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.

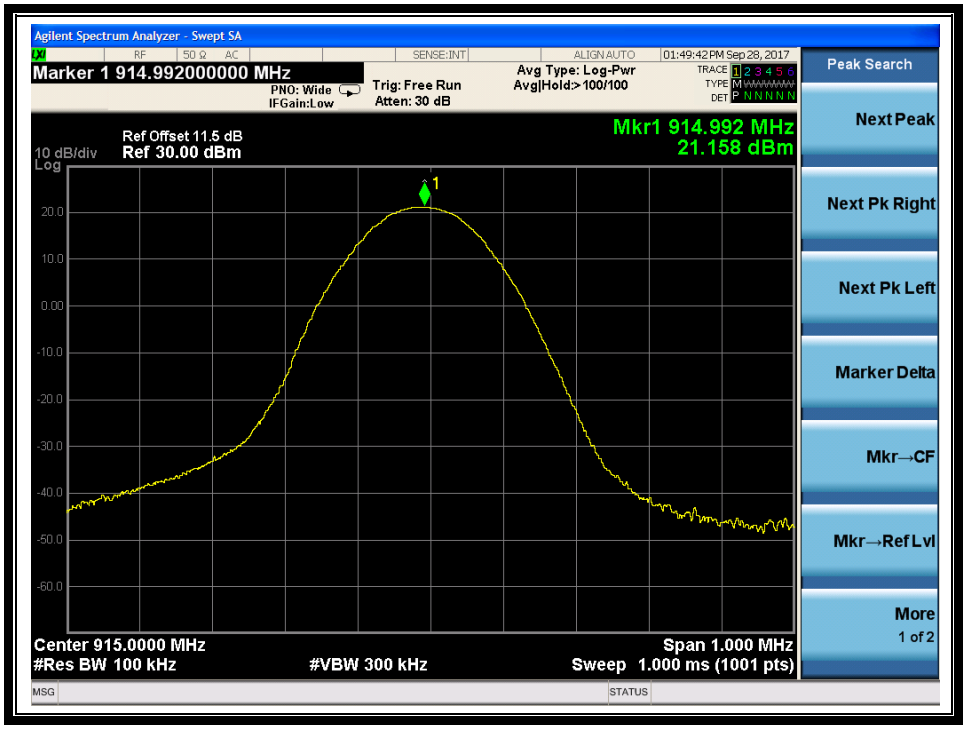
A. Test Verdict:

Channel	Frequency (MHz)	Measured Output Peak Power			Limit (W)	Verdict
		dBm	W	Refer to Plot		
1	902.5	21.63	0.14555	Plot A	1	PASS
26	915.0	21.16	0.13062	Plot B		PASS
50	927.0	20.70	0.11749	Plot C		PASS

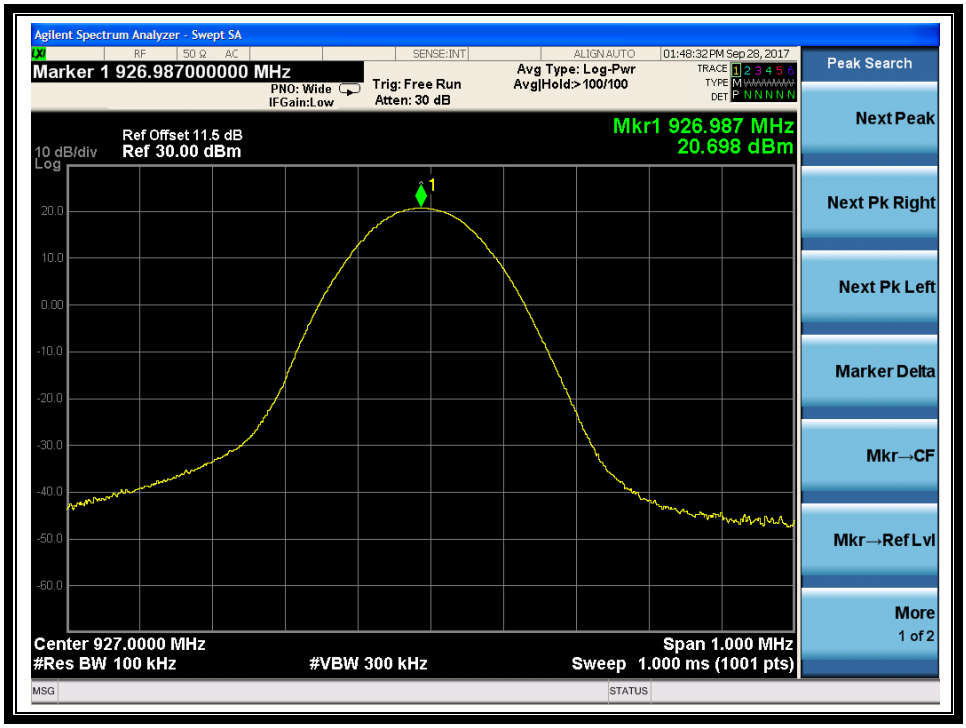
B. Test Plot:



(Plot A: Channel = 1)



(Plot B: Channel = 26)



(Plot C: Channel = 50)

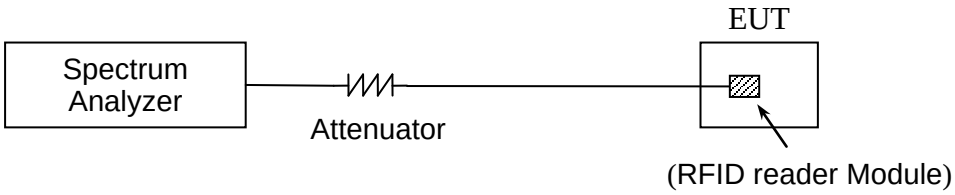
2.4 20dB Bandwidth

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

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.

B. Equipments List:

Please reference ANNEX A(1.5).

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

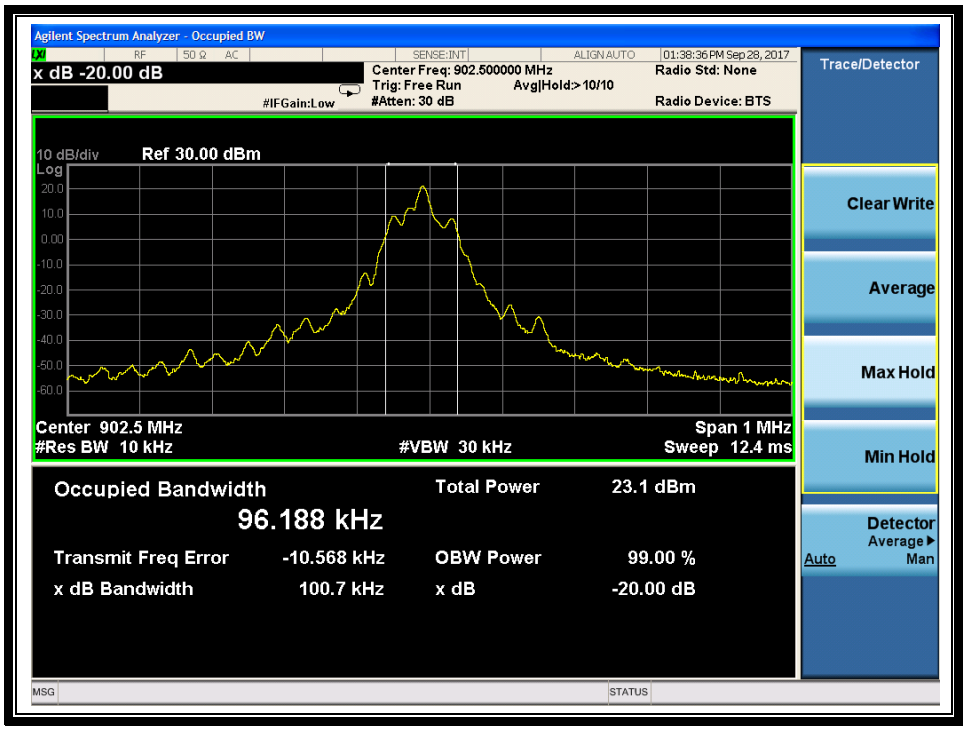
2.4.4 Test Result

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.

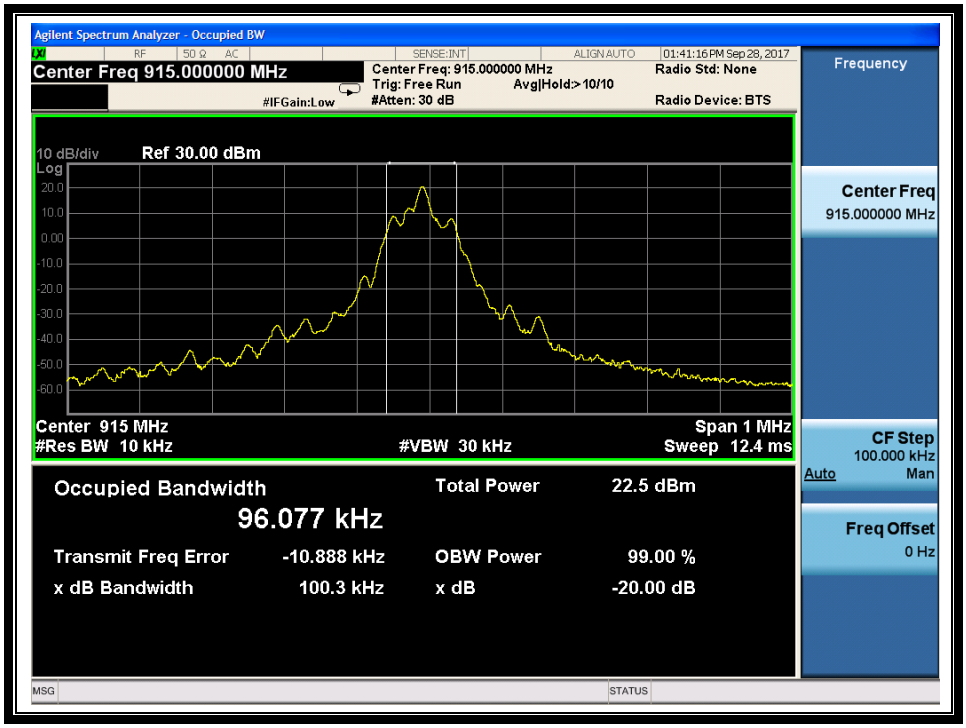
A. Test Verdict:

Channel	Frequency (MHz)	20dB Bandwidth (KHz)	Refer to Plot
1	902.5	100.7	Plot A
26	915.0	100.3	Plot B
50	927.0	99.81	Plot C

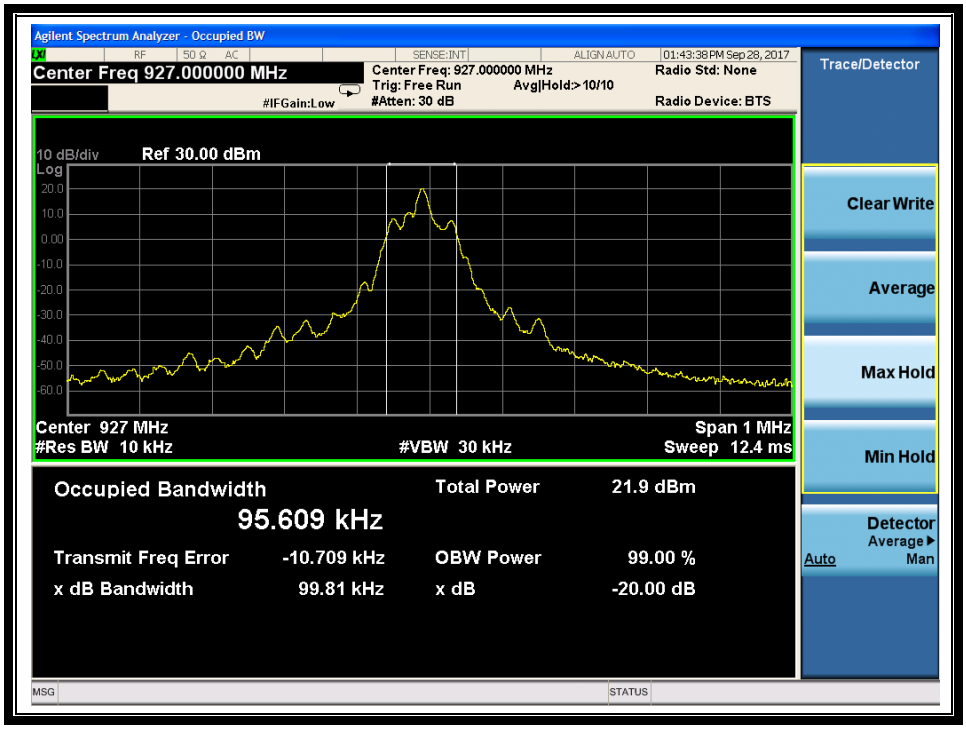
B. Test Plots:



(Plot A: Channel = 1)



(Plot B: Channel = 26)



(Plot C: Channel = 50)

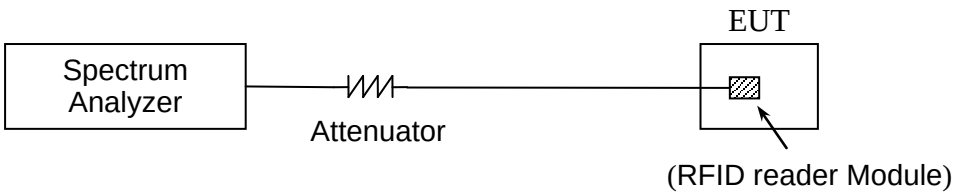
2.5 Carried Frequency Separation

2.5.1 Definition

According to FCC section 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.

B. Equipments List:

Please reference ANNEX A(1.5).

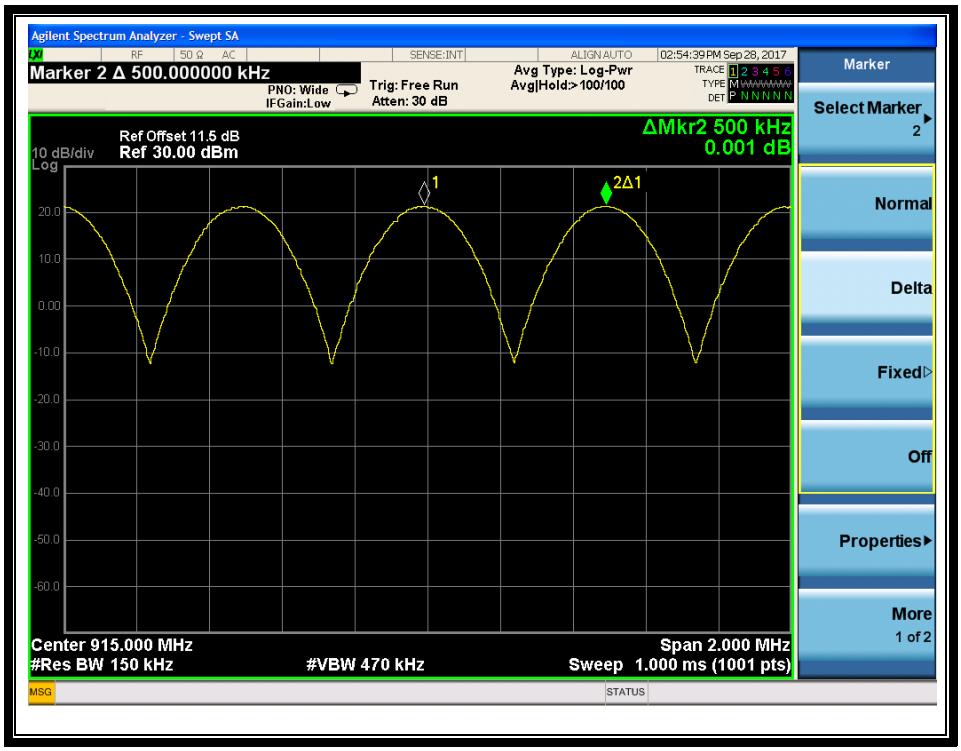
2.5.3 Test Procedure

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 as showed in the Plot A), the Module does 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. So, the verdict is PASSING



(Plot A: Carried Frequency Separation)

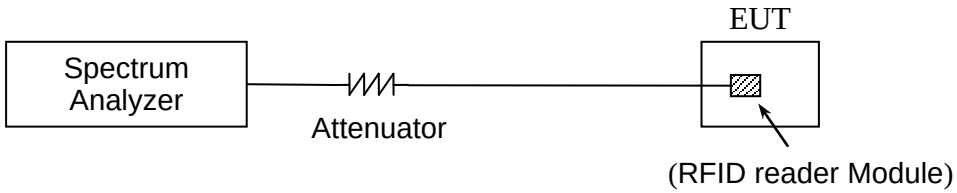
2.6 Time of Occupancy (Dwell time)

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

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.

B. Equipments List:

Please reference ANNEX A(1.4).

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.

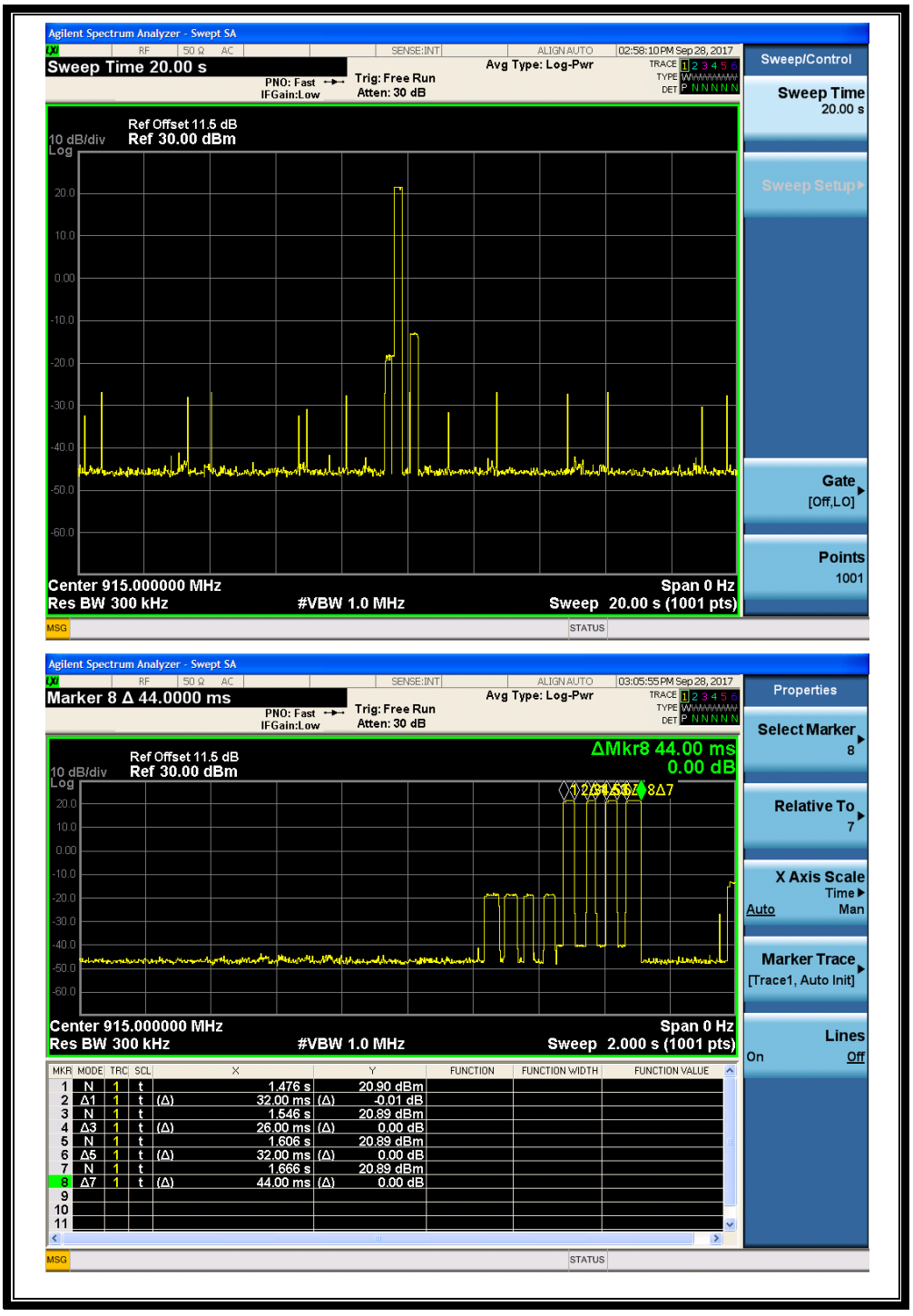
The average time of occupancy in the specified 20 second period is equal to (# of pulses in 20s) * pulse width.

2.6.4 Test Result

A. Test Verdict:

Pulse Width (msec)	Number of pulse in 20 seconds	Refer to Plot	Average Time of Occupancy (sec)	Limit (sec)	Verdict
44	1	Plot A	0.044	0.4	PASS

B. Test Plots:



(Plot A: Dwell time)

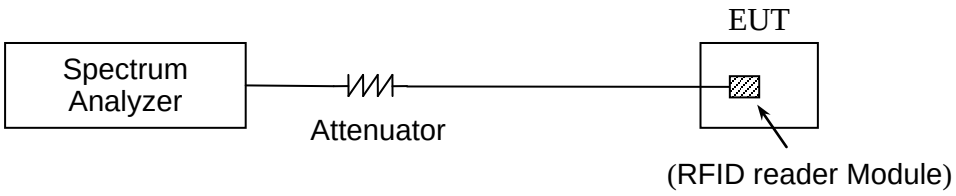
2.7 Conducted Spurious Emissions and Band Edge

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

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.

B. Equipments List:

Please reference ANNEX A(1.5).

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

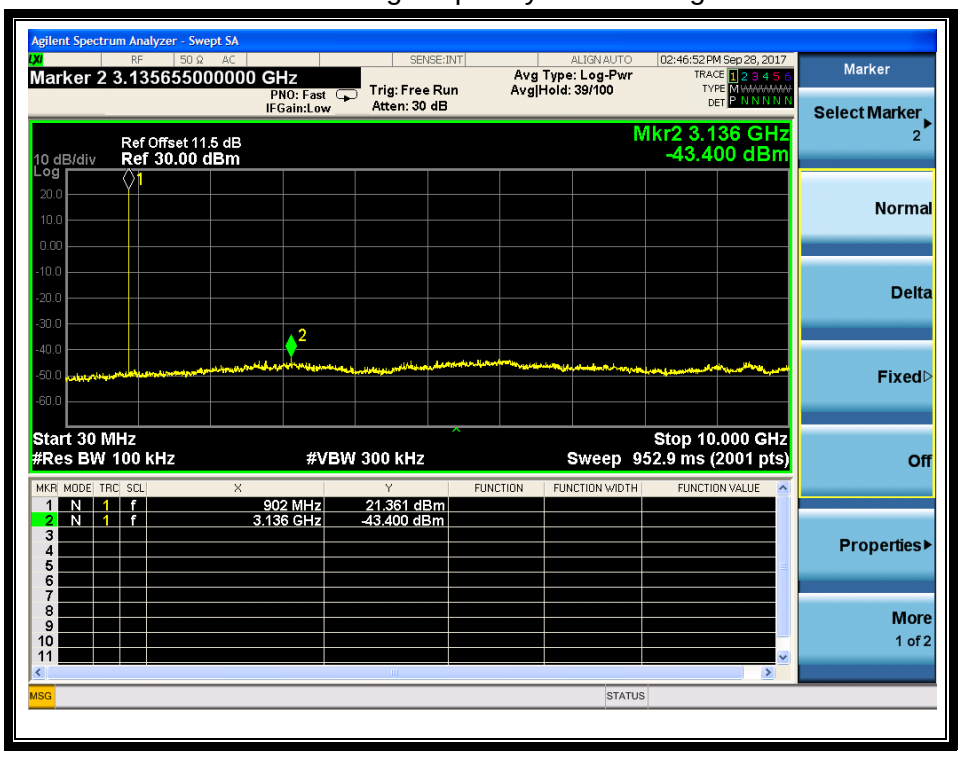
The EUT operates at hopping-off test mode. The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions.

A. Test Verdict:

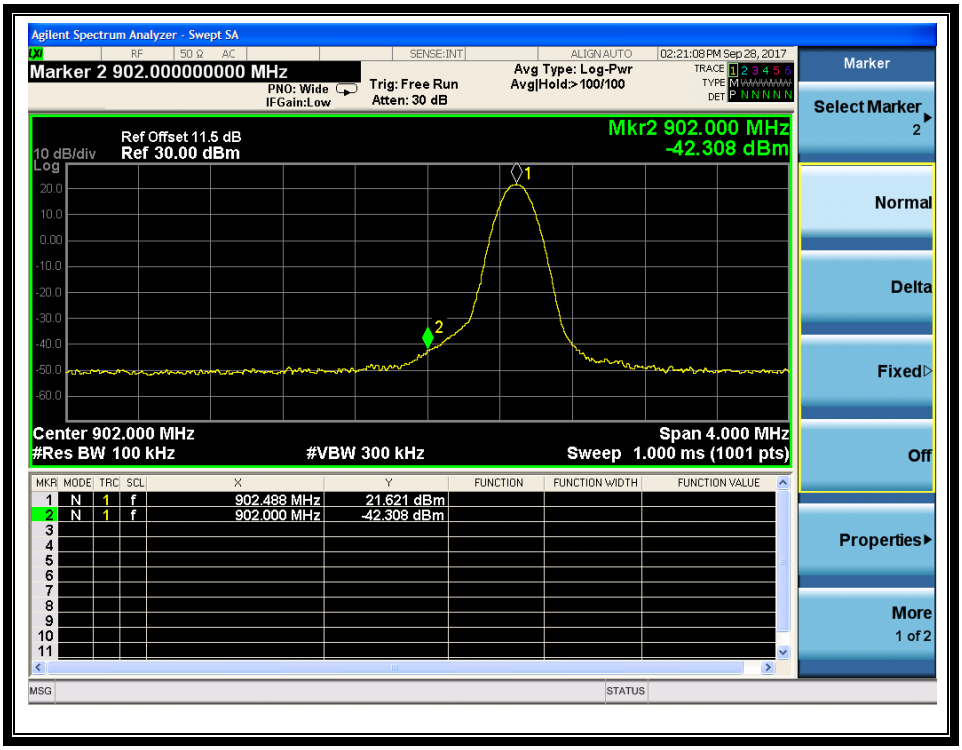
Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Plot	Limit (dBm)		Verdict
				Carrier Level	Calculated -20dBc Limit	
1	902.5	-43.40	Plot A	21.36	1.36	PASS
26	915.0	-43.76	Plot B	20.92	0.92	PASS
50	927.0	-43.98	Plot C	20.46	0.46	PASS

B. Test Plots:

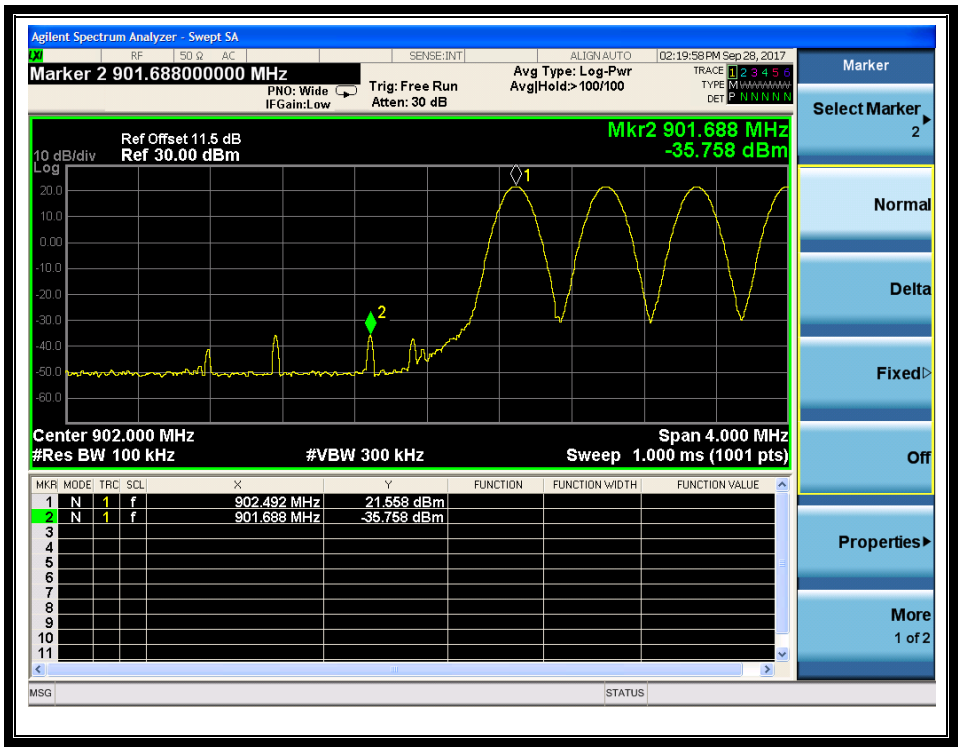
Note: the power of the Module transmitting frequency should be ignored.



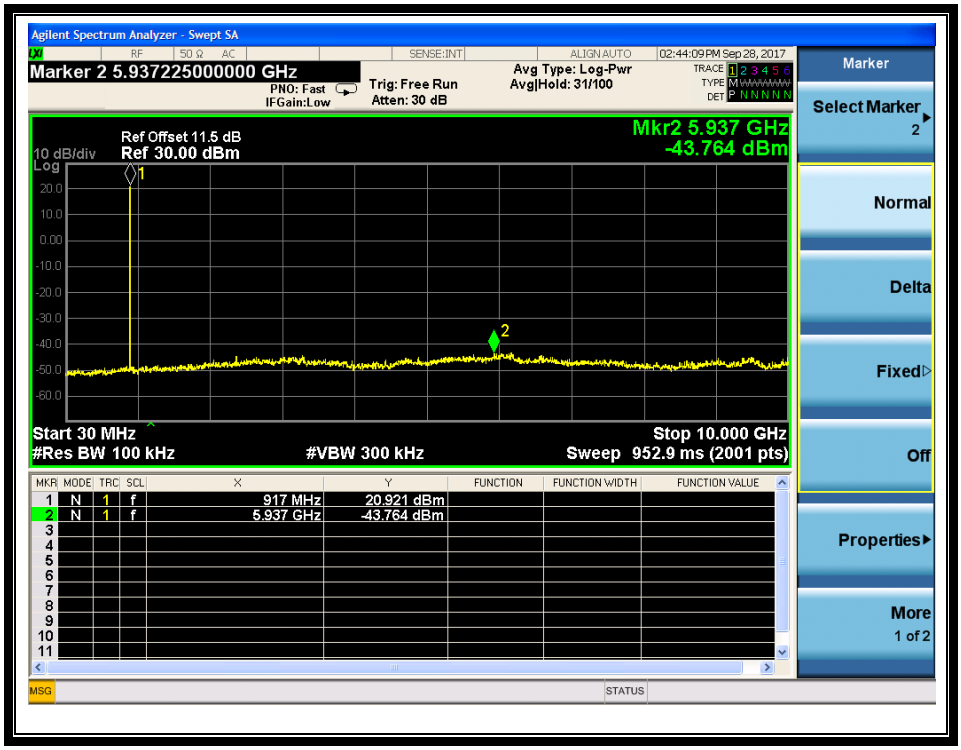
(Plot A.1: Channel = 1, 30MHz to 10GHz)



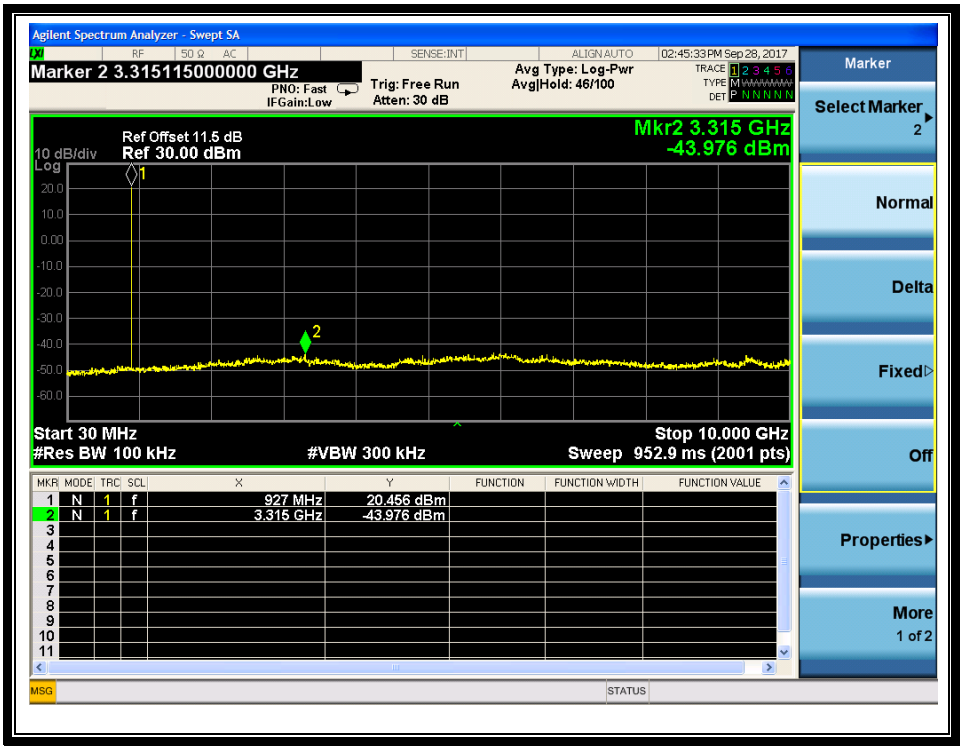
(Channel = 1, Band edge)



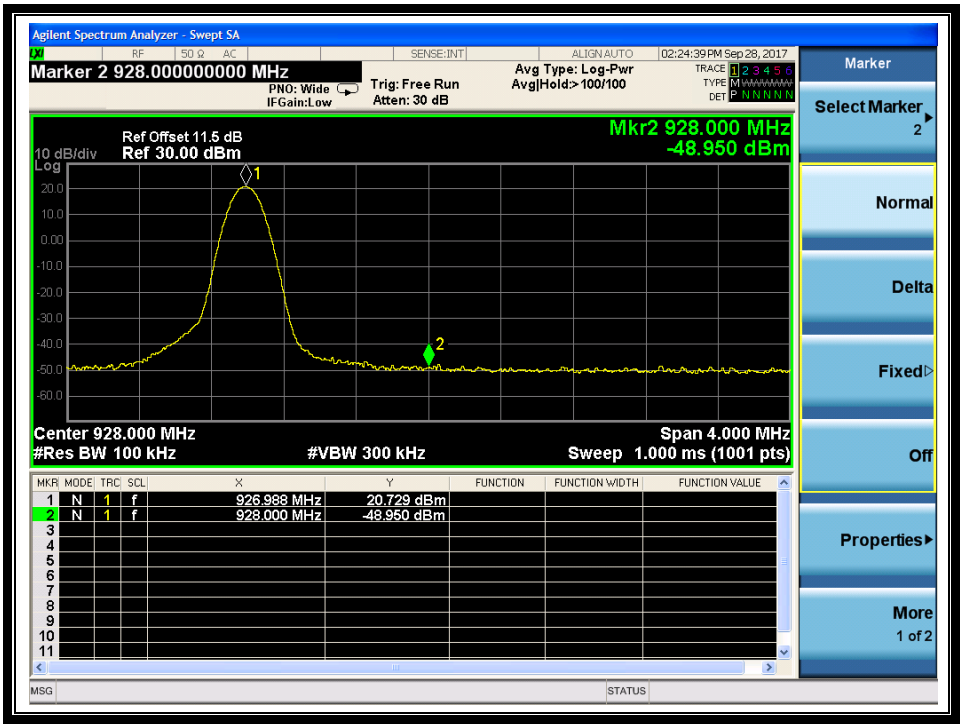
(Channel = 1, Band edge with hopping)



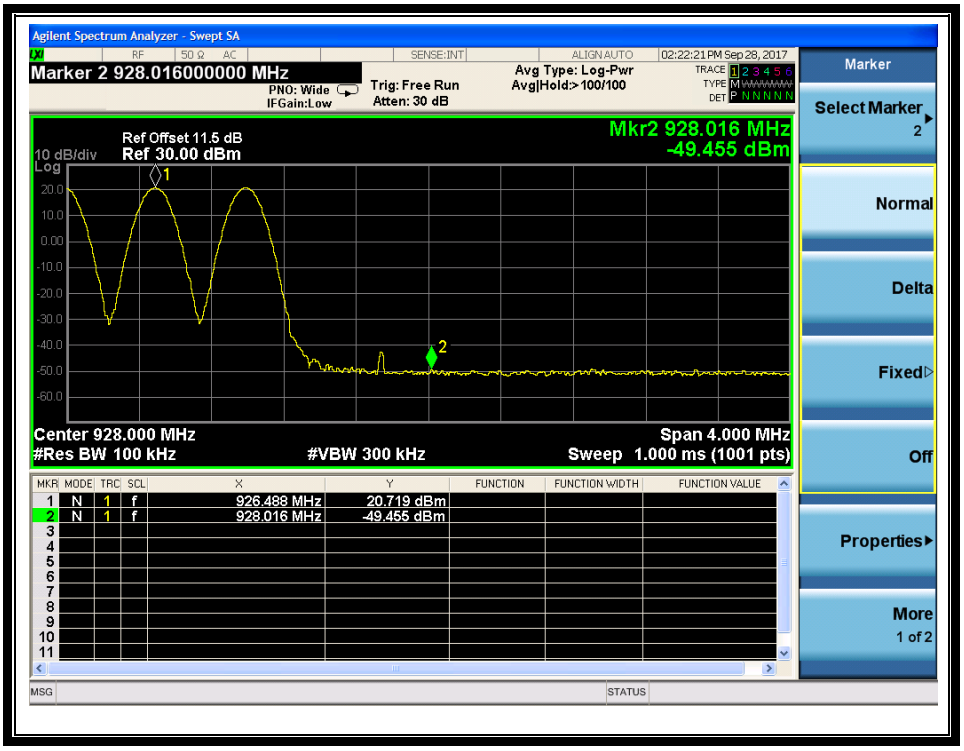
(Plot B.1: Channel = 26, 30MHz to 10GHz)



(Plot C.1: Channel = 50, 30MHz to 10GHz)



(Channel = 50, Band edge)



(Channel = 50, Band edge with hopping on)

2.8 Conducted Emission

2.8.1 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

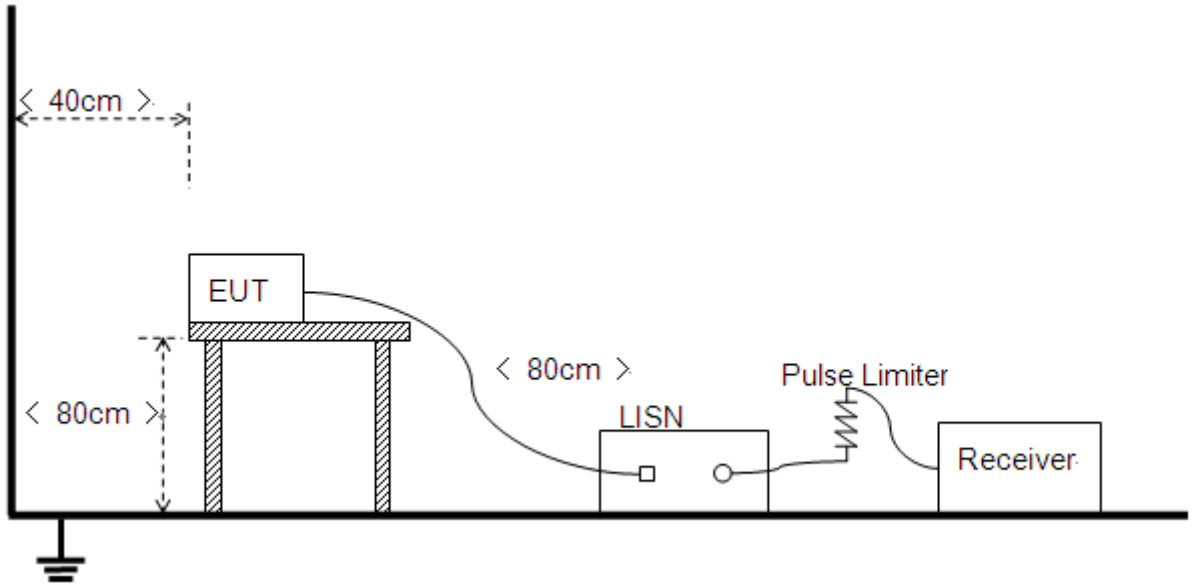
NOTE:

(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.

2.8.2 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 A(1.5).

2.8.3 Test Result

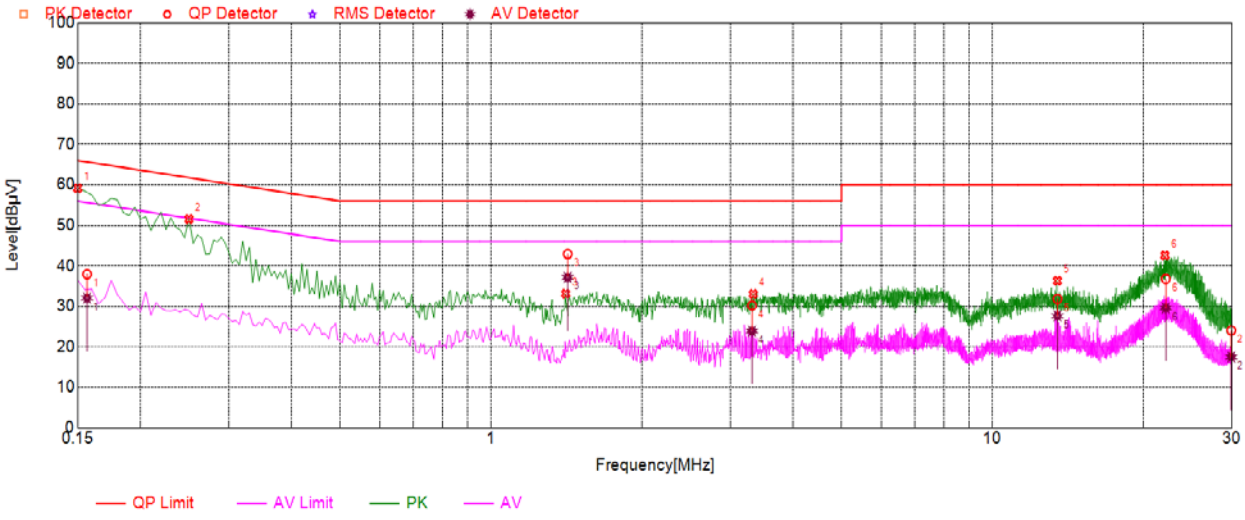
The maximum conducted interference is searched using Peak (PK), if the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT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

A. Test setup:

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

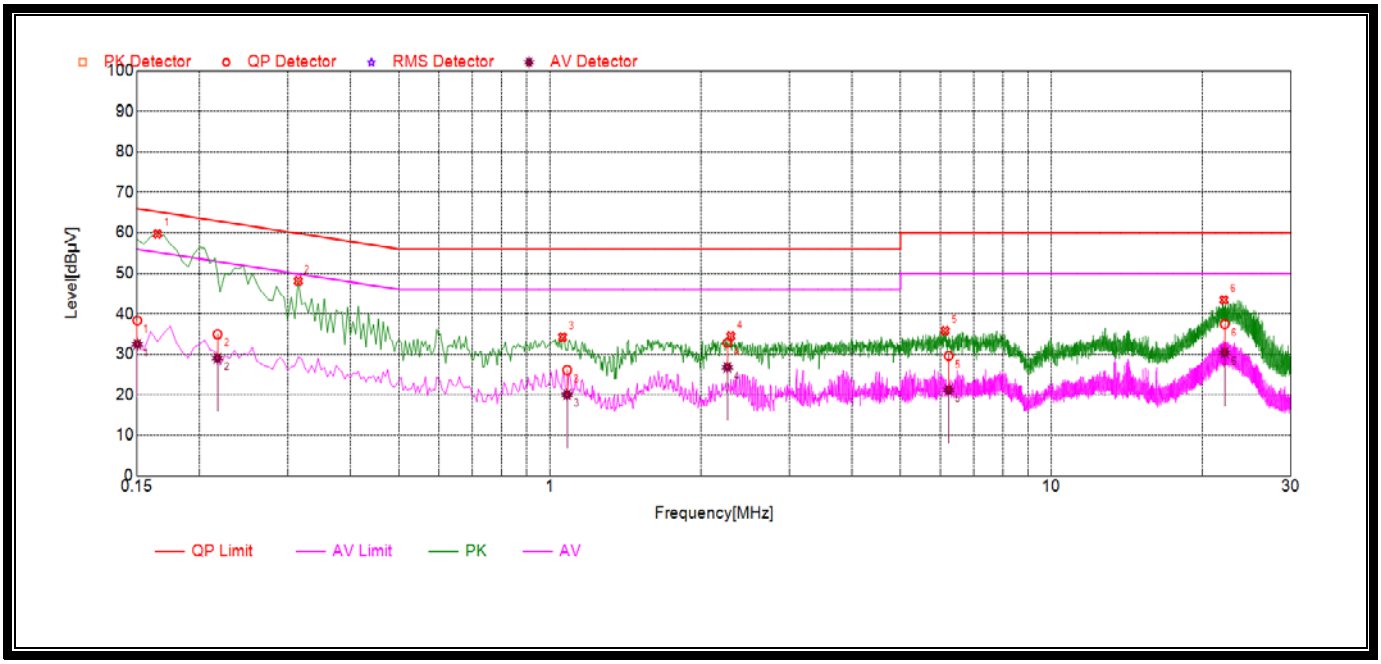
Note: The test voltage is AC 120V/60Hz.

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	0.1566	37.96	32.05	65.64	55.64	Line	PASS
2	29.944	24.07	17.51	60.00	50.00		PASS
3	1.4226	42.92	37.15	56.00	46.00		PASS
4	3.3166	30.21	23.92	56.00	46.00		PASS
5	13.4806	31.83	27.64	60.00	50.00		PASS
6	22.1642	36.78	29.61	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	0.1504	38.36	32.49	65.98	55.98	Line	PASS
2	0.2174	34.95	29.06	62.92	52.92		PASS
3	1.0822	26.13	20.05	56.00	46.00		PASS
4	2.2596	32.85	26.80	56.00	46.00		PASS
5	6.239	29.63	21.22	60.00	50.00		PASS
6	22.154	37.52	30.41	60.00	50.00		PASS

2.9 Radiated Emission

2.9.1 Requirement

According to FCC section 15.247(d) and RSS-A8.5, 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:

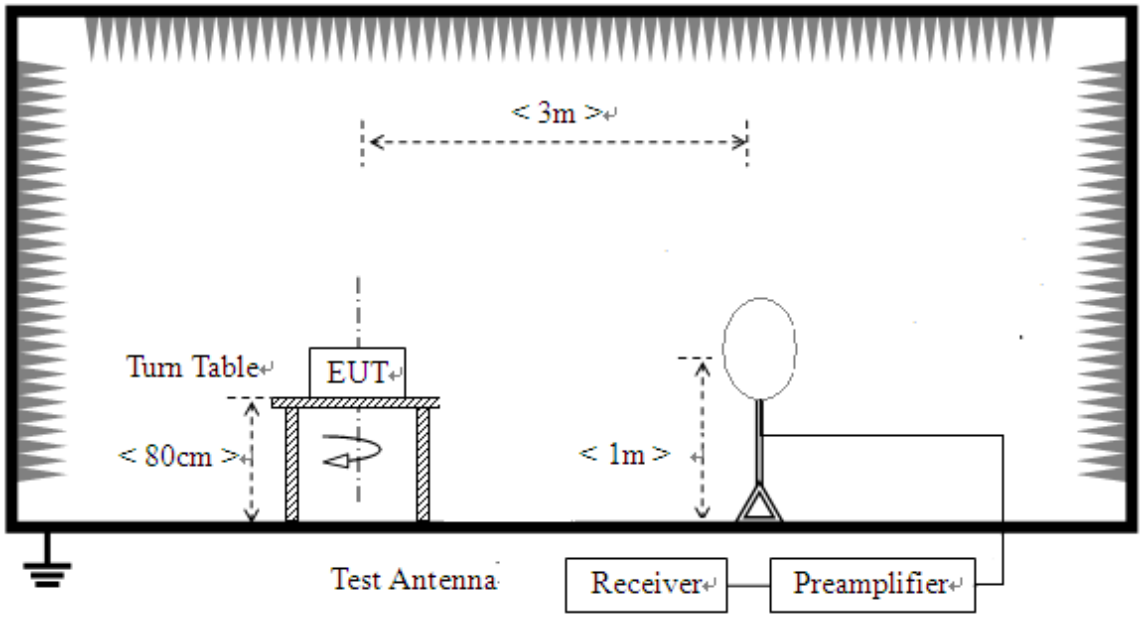
1. For Above 1000MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.
2. For above 1000MHz, limit field strength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

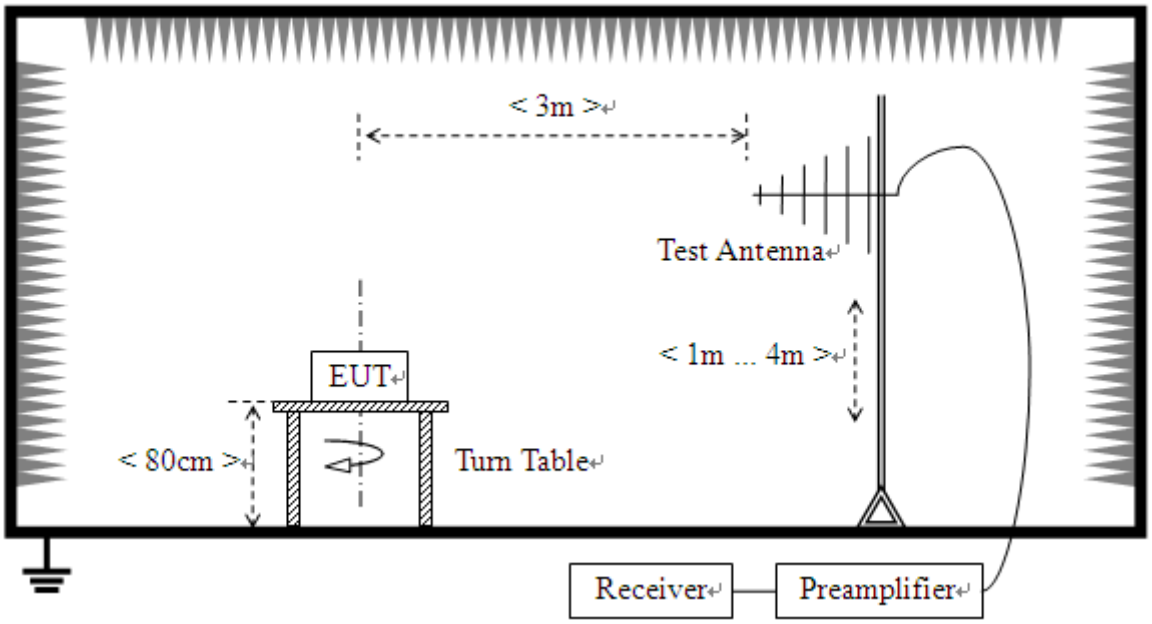
2.9.2 Test Description

A. Test Setup:

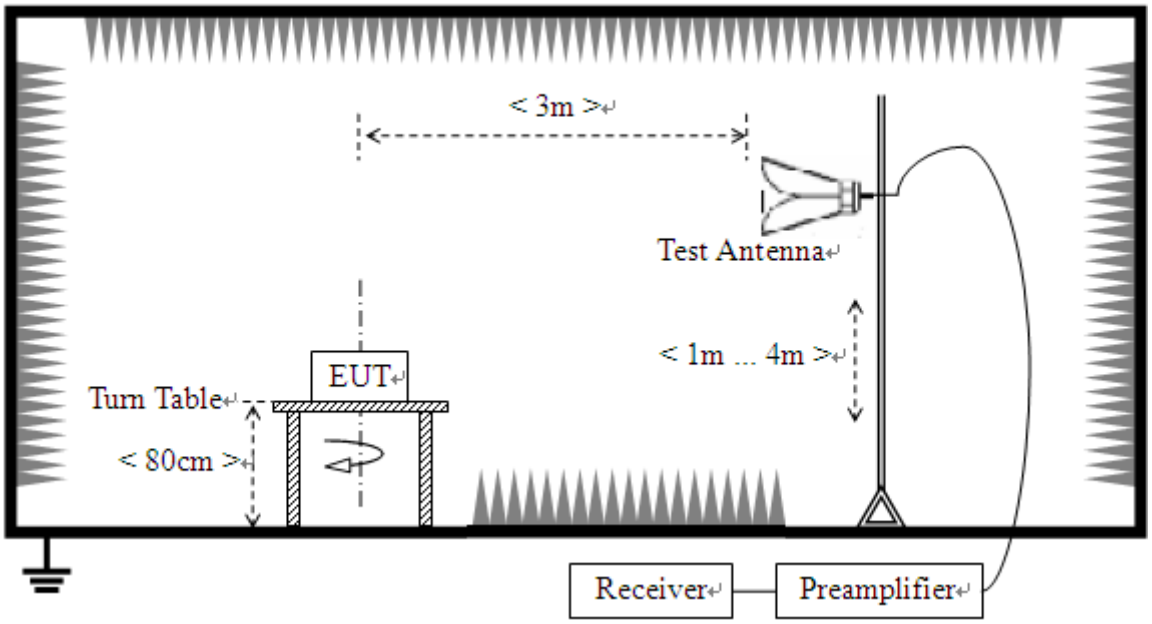
1) For radiated emissions from 9kHz to 30MHz



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. Test site have a minimum area of the ground plane covered with RF absorbing material as specified in Figure 6 of ANSI C63.4: 2014.

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 reference ANNEX A(1.5).

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

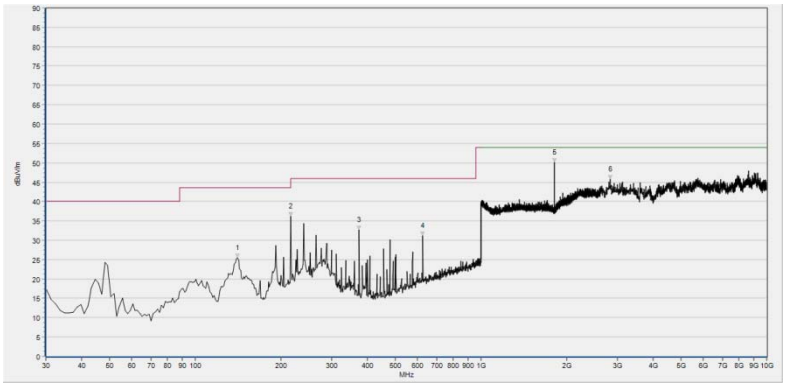
During the test, the total correction Factor AT and A_{Factor} were built in test software.

Note: 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.

The low frequency, which started from 9KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

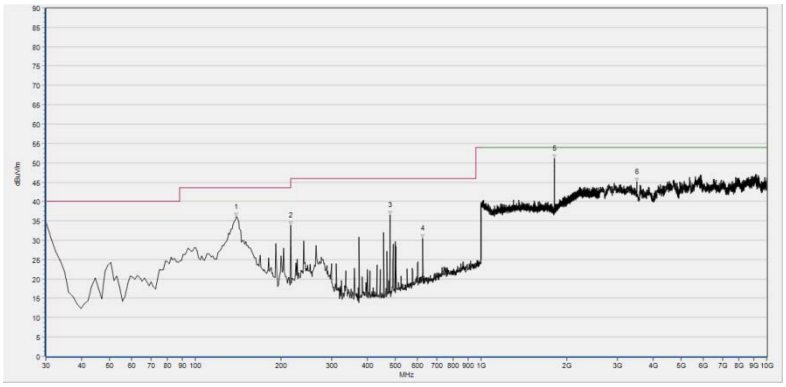
A. Test Plots for the Whole Measurement Frequency Range:

Plots for Channel = 1



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
140.476	25.54	N.A	N.A	N.A	43.50	N.A	Horizontal	PASS
215.745	36.17	N.A	N.A	N.A	43.50	N.A	Horizontal	PASS
374.781	32.76	N.A	N.A	N.A	46.00	N.A	Horizontal	PASS
624.869	31.13	N.A	N.A	N.A	46.00	N.A	Horizontal	PASS
1804.802	50.11	N.A	N.A	74.0	N.A	54.00	Horizontal	PASS
2836.261	45.76	N.A	N.A	74.0	N.A	54.00	Horizontal	PASS

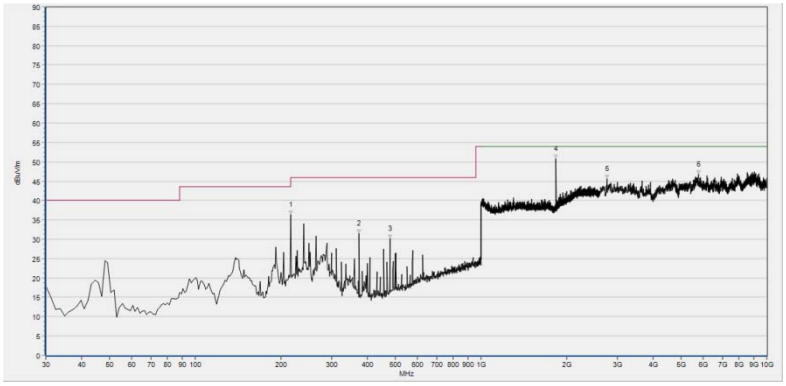
(Plot A.1: 30MHz to 10GHz, Antenna Horizontal, channel 1)



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
139.262	36.09	N.A	N.A	N.A	43.50	N.A	Horizontal	PASS
215.745	33.81	N.A	N.A	N.A	43.50	N.A	Horizontal	PASS
480.401	36.47	N.A	N.A	N.A	46.00	N.A	Horizontal	PASS
624.869	30.58	N.A	N.A	N.A	46.00	N.A	Horizontal	PASS
1804.802	51.15	N.A	N.A	74.0	N.A	54.00	Horizontal	PASS
3508.383	45.09	N.A	N.A	74.0	N.A	54.00	Horizontal	PASS

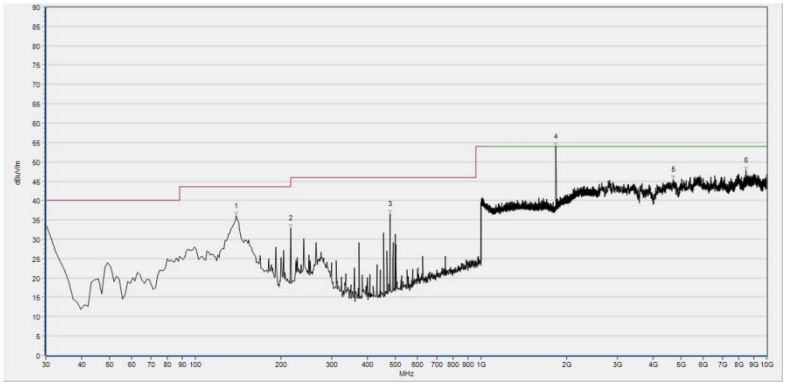
(Plot A.2: 30MHz to 10GHz, Antenna Vertical, channel 1)

Plot for Channel = 26



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
215.745	36.44	N.A	N.A	N.A	43.50	N.A	Horizontal	PASS
374.781	31.59	N.A	N.A	N.A	46.00	N.A	Horizontal	PASS
480.401	30.16	N.A	N.A	N.A	46.00	N.A	Horizontal	PASS
1829.132	50.81	N.A	N.A	74.0	N.A	54.00	Horizontal	PASS
2754.792	45.54	N.A	N.A	74.0	N.A	54.00	Horizontal	PASS
5761.011	46.70	N.A	N.A	74.0	N.A	54.00	Horizontal	PASS

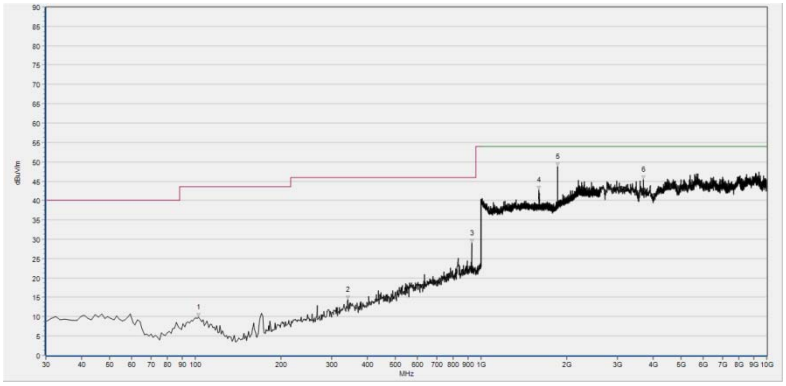
(Plot B.1: 30MHz to 10GHz, Antenna Horizontal, channel 26)



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
139.262	36.11	N.A	N.A	N.A	43.50	N.A	Horizontal	PASS
215.745	32.87	N.A	N.A	N.A	43.50	N.A	Horizontal	PASS
480.401	36.46	N.A	N.A	N.A	46.00	N.A	Horizontal	PASS
1829.500	54.08	53.41	52.60	74.0	N.A	54.00	Horizontal	PASS
4701.909	45.37	N.A	N.A	74.0	N.A	54.00	Horizontal	PASS
8457.647	47.84	N.A	N.A	74.0	N.A	54.00	Horizontal	PASS

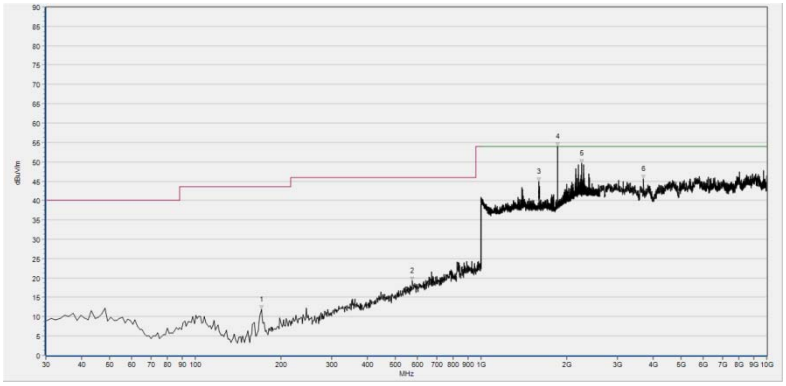
(Plot B.2: 30MHz to 10GHz, Antenna Vertical, channel 26)

Plot for Channel = 50



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
102.841	9.84	N.A	N.A	N.A	43.50	N.A	Horizontal	PASS
342.003	14.47	N.A	N.A	N.A	46.00	N.A	Horizontal	PASS
927.159	29.06	N.A	N.A	N.A	46.00	N.A	Horizontal	PASS
1595.438	42.75	N.A	N.A	74.0	N.A	54.00	Horizontal	PASS
1854.102	48.71	N.A	N.A	74.0	N.A	54.00	Horizontal	PASS
3707.983	45.46	N.A	N.A	74.0	N.A	54.00	Horizontal	PASS

(Plot C.1: 30MHz to 10GHz, Antenna Horizontal @ Profile 0, channel 50)



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
170.826	11.84	N.A	N.A	N.A	43.50	N.A	Horizontal	PASS
575.094	19.26	N.A	N.A	N.A	46.00	N.A	Horizontal	PASS
1594.158	44.98	N.A	N.A	74.0	N.A	54.00	Horizontal	PASS
1854.000	54.44	53.62	52.78	74.0	N.A	54.00	Horizontal	PASS
2246.579	49.54	N.A	N.A	74.0	N.A	54.00	Horizontal	PASS
3707.983	45.53	N.A	N.A	74.0	N.A	54.00	Horizontal	PASS

(Plot C.2: 30MHz to 10GHz, Antenna Vertical @ Profile 0, channel 50)

ANNEX A GENERAL INFORMATION

1.1 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

1.2 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

1.3 Facilities and Accreditations

Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L3572.

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.

1.4 Maximum measurement 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

1.5 Test Equipments Utilized

1.5.1 Conducted Test Equipments

Conducted Test Equipment						
No.	**Equipment Name**	**Serial No.**	**Type**	**Manufacturer**	**Cal. Date**	**Cal. Due**
1	Spectrum Analyzer	MY45101810	E4407B	Agilent	2017.05.24	2018.05.23
2	Power Splitter	NW521	1506A	Weinschel	2017.05.24	2018.05.23
3	Attenuator 1	(N/A.)	10dB	Resnet	2017.05.24	2018.05.23
4	Attenuator 2	(N/A.)	3dB	Resnet	2017.05.24	2018.05.23
5	EXA Signal Analzyer	MY53470836	N9010A	Agilent	2016.12.07	2017.12.06
6	Bluetooth Test Set	6K00006210	MT8852B	Anritsu	2017.05.24	2018.05.23
7	USB Wideband Power Sensor	MY54210011	U2021XA	Agilent	2017.05.24	2018.05.23
8	RF cable (30MHz-26GHz)	CB01	RF01	Morlab	N/A	N/A
9	Coaxial cable	CB02	RF02	Morlab	N/A	N/A
10	SMA connector	CN01	RF03	HUBER-SUHNER	N/A	N/A

1.5.2 Conducted Emission Test Equipments

Conducted Emission Test Equipments						
No.	**Equipment Name**	**Serial No.**	**Type**	**Manufacturer**	**Cal. Date**	**Cal. Due**
1	Receiver	US44210471	E7405A	Agilent	2017.05.24	2018.05.23
2	LISN	812744	NSLK 8127	Schwarzbeck	2017.05.24	2018.05.23
3	Service Supplier	100448	CMU200	R&S	2017.05.24	2018.05.23
4	Pulse Limiter (20dB)	9391	VTSD 9561-D	Schwarzbeck	2017.05.24	2018.05.23
5	Coaxial cable(BNC) (30MHz-26GHz)	CB01	EMC01	Morlab	N/A	N/A

1.5.3 Auxiliary Test Equipment

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

1.5.4 Radiated Test Equipments

Radiated Test Equipments						
No.	**Equipment Name**	**Serial No.**	**Type**	**Manufacturer**	**Cal. Date**	**Cal.Due Date**
1	System Simulator	GB45360846	8960-E5515C	Agilent	2017.05.17	2018.05.16
2	Receiver	MY54130016	N9038A	Agilent	2017.05.17	2018.05.16
3	Test Antenna - Bi-Log	N/A	VULB9163	Schwarzbeck	2016.12.09	2017.12.08
4	Test Antenna - Horn	9120C-384	BBHA 9120C	Schwarzbeck	2017.03.30	2018.03.29
5	Test Antenna - Loop	1519-022	FMZB1519	Schwarzbeck	2017.03.30	2018.03.29
6	Coaxial cable (N male) (9KHz-30MHz)	CB04	EMC04	Morlab	N/A	N/A
7	Coaxial cable (N male) (30MHz-26GHz)	CB02	EMC02	Morlab	N/A	N/A
8	Coaxial cable(N male) (30MHz-26GHz)	CB03	EMC03	Morlab	N/A	N/A
9	1-18GHz pre-Amplifier	MA02	TS-PR18	Rohde& Schwarz	2017.05.17	2018.05.16
10	18-26.5GHz pre-Amplifier	MA03	TS-PR18	Rohde& Schwarz	2017.05.17	2018.05.16

1.5.5 Climate Chamber

Climate Chamber						
No.	**Equipment Name**	**Serial No.**	**Type**	**Manufacturer**	**Cal.Date**	**Cal.Due Date**
1	Climate Chamber	2004012	HL4003T	Yinhe	2017.01.11	2018.01.10

1.5.6 Vibration Table

Vibration Table						
No.	**Equipment Name**	**Serial No.**	**Type**	**Manufacturer**	**Cal.Date**	**Cal.Due Date**
1	Vibration Table	N/A	ACT2000-S015L	CMI-COM	2017.01.11	2018.01.10

1.5.7 Anechoic Chamber

Anechoic Chamber						
No.	**Equipment Name**	**Serial No.**	**Type**	**Manufacturer**	**Cal.Date**	**Cal.Due Date**
1	Anechoic Chamber	N/A	9m*6m*6m	Changning	2017.01.11	2018.01.10

***** END OF REPORT *****