



TEST REPORT

FCC ID: 2A7HH-NNIONGIN

Report Number.....: ZKT-220718004E

Date of Test..... Jun. 28, 2022 to Jul. 28, 2022

Date of issue.....: Jul. 29, 2022

Test Result.....: PASS

Testing Laboratory.....: **Shenzhen ZKT Technology Co., Ltd.**

Address: 1/F, No. 101, Building B, No. 6, Tangwei Community Industrial Avenue, Fuhai Street, Bao'an District, Shenzhen, China

Applicant's name: **Golden Gate Consulting Solutions FZC**

Address: 4-6-119, Al Shmookh Business Center, One UAQ, UAQ Free Trade Zone, Umm Al Quwain, U.A.E

Manufacturer's name: **Golden Gate Consulting Solutions FZC**

Address: 4-6-119, Al Shmookh Business Center, One UAQ, UAQ Free Trade Zone, Umm Al Quwain, U.A.E

Test specification:

Standard.....: FCC CFR Title 47 Part 15 Subpart C Section 15.247

Test procedure.....: /

Non-standard test method: N/A

Test Report Form No.....: TRF-EL-110_V0

Test Report Form(s) Originator.....: ZKT Testing

Master TRF: Dated: 2020-01-06

This device described above has been tested by ZKT, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

This report shall not be reproduced except in full, without the written approval of ZKT, this document may be altered or revised by ZKT, personal only, and shall be noted in the revision of the document.

Product name.....: **Nitro ION Gateway**

Trademark: NITRO

Model/Type reference.....: NNIONGIN

Ratings.....: SWITCHING ADAPTER
MODEL:HP-050200A1-VDE
INPUT:AC100-240V~50/60Hz 0.3A
OUTPUT:DC5V/2000mA



Testing procedure and testing location:

Testing Laboratory.....: Shenzhen ZKT Technology Co., Ltd.

**Address.....: 1/F, No. 101, Building B, No. 6, Tangwei Community
Industrial Avenue, Fuhai Street, Bao'an District,
Shenzhen, China**

Tested by (name + signature).....: Jim Liu

Jim Liu

Reviewer (name + signature).....: Tom Zou

Tom Zou

Approved (name + signature).....: Lake Xie





TABLE OF CONTENTS

Page

1.VERSION	4
2. TEST SUMMARY	5
2.1 TEST FACILITY	6
2.2 MEASUREMENT UNCERTAINTY	6
3. GENERAL INFORMATION	7
3.1 GENERAL DESCRIPTION OF EUT	7
3.2 TEST MODE	9
3.3 TEST SETUP CONFIGURATION	9
3.4 SUPPORT EQUIPMENT	9
3.5 TEST INSTRUMENTS LIST	10
4. EMC EMISSION TEST	11
4.1 CONDUCTED EMISSIONS	11
4.2 CONDUCTED PEAK OUTPUT POWER	14
4.3 20dB EMISSION BANDWIDTH	16
4.4 CARRIER FREQUENCIES SEPARATION	18
4.5 HOPPING CHANNEL NUMBER	20
4.6 DWELL TIME	21
4.7 BAND EDGE	23
5. ANTENNA REQUIREMENT	42
6. TEST SETUP PHOTO	43
7. EUT CONSTRUCTIONAL DETAILS	43



1.Version

Report No.	Version	Description	Approved
ZKT-220718002E	Rev.01	Initial issue of report	Jul 19, 2022
ZKT-220718004E	Rev.02	Update on the original report	Jul. 29, 2022



2. Test Summary

Test Item	Section in CFR 47	Result
Antenna Requirement	15.203/15.247 (c)	Pass
AC Power Line Conducted Emission	15.207	Pass
Conducted Peak Output Power	15.247 (b)(2)	Pass
20dB Occupied Bandwidth	15.247 (a)(1)	Pass
Carrier Frequencies Separation	15.247 (a)(1)	Pass
Hopping Channel Number	15.247 (a)(1)	Pass
Dwell Time	15.247 (a)(1)	Pass
Pseudorandom Frequency Hopping Sequence	15.247(a)(1)	Pass
Radiated Emission	15.205/15.209	Pass
Band Edge	15.247(d)	Pass

NOTE:

(1) "N/A" denotes test is not applicable in this Test Report



2.1 TEST FACILITY

Shenzhen ZKT Technology Co., Ltd.

Add. : 1/F, No. 101, Building B, No. 6, Tangwei Community Industrial Avenue, Fuhai Street,
Bao'an District, Shenzhen, China

FCC Test Firm Registration Number: 692225

Designation Number: CN1299

IC Registered No.: 27033

2.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

No.	Item	Uncertainty
1	3m chamber Radiated spurious emission(9KHz-30MHz)	U=4.5dB
2	3m chamber Radiated spurious emission(30MHz-GHz)	U=4.8dB
3	3m chamber Radiated spurious emission(1GHz-6GHz)	U=4.9dB
4	3m chamber Radiated spurious emission(6GHz-40GHz)	U=5.0dB
5	Conducted disturbance	U=3.2dB
6	RF Band Edge	U=1.68dB
7	RF power conducted	U=1.86dB
8	RF conducted Spurious Emission	U=2.2dB
9	RF Occupied Bandwidth	U=1.8dB
10	RF Power Spectral Density	U=1.75dB
11	humidity uncertainty	U=5.3%
12	Temperature uncertainty	U=0.59℃



3. General Information

3.1 General Description of EUT

Product Name:	Nitro ION Gateway
Model No.:	NNIONGIN
Sample(s) Status:	Engineer sample
Serial No.:	N/A
Hardware Version:	H1.0
Software Version:	S1.0
Operation Frequency:	125kHz: 902.3MHz~914.9MHz
Channel numbers:	64
Channel separation:	200kHz
Modulation type:	GFSK
Antenna Type:	ANT1: Stick antenna ANT2: Fiber glass antenna
Antenna gain:	ANT1: 5dBi ANT2: 3dBi
Power supply:	SWITCHING ADAPTER MODEL:HP-050200A1-VDE INPUT:AC100-240V~50/60Hz 0.3A OUTPUT:DC5V/2000mA



125KHz for FHSS:

Operation Frequency each of channel							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	902.3	21	906.3	41	910.3	61	914.3
2	902.5	22	906.5	42	910.5	62	914.5
3	902.7	23	906.7	43	910.7	63	914.7
4	902.9	24	906.9	44	910.9	64	914.9
.	.	.	.	.	.	.	.
.	.	32	908.5	.	.	.	.
.	.	.	.	.	.	.	.
17	905.5	37	909.5	57	913.5	.	.
18	905.7	38	909.7	58	913.7	.	.
19	905.9	39	909.9	59	913.9	.	.
20	906.1	40	910.1	60	914.1	.	.

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency(125KHz)
The lowest channel	902.30MHz
The middle channel	908.50MHz
The Highest channel	914.90MHz

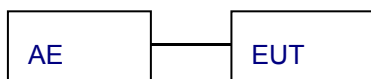


3.2 Test mode

Transmitting mode	Keep the EUT in continuously transmitting mode.
<i>Remark: During the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.</i>	

3.3 Test Setup Configuration

Conducted Emission



Radiated Emission



Conducted Spurious



3.4 Support Equipment

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
E-1	Nitro ION Gateway	NITRO	NNIONGIN	N/A	EUT

Item	Shielded Type	Ferrite Core	Length	Note

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.



3.5 Test Instruments list

Radiation Test equipment

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Spectrum Analyzer (9kHz-26.5GHz)	KEYSIGHT	9020A	MY45109572	Sep. 22, 2021	Sep. 21, 2022
2	Spectrum Analyzer (1GHz-40GHz)	Agilent	E4446A	100363	Sep. 22, 2021	Sep. 21, 2022
3	Test Receiver (9kHz-7GHz)	R&S	ESCI7	101169	Sep. 22, 2021	Sep. 21, 2022
4	Bilog Antenna (30MHz-1400MHz)	Schwarzbeck	VULB9168	00877	Sep. 22, 2021	Sep. 21, 2022
5	Horn Antenna (1GHz-18GHz)	SCHWARZBEC K	BBHA9120D	1541	Sep. 22, 2021	Sep. 21, 2022
6	Horn Antenna (18GHz-40GHz)	A.H. System	SAS-574	588	Sep. 22, 2021	Sep. 21, 2022
7	Amplifier (30-1000MHz)	EM Electronics	EM330 Amplifier	N/A	Sep. 22, 2021	Sep. 21, 2022
8	Amplifier (1GHz-40GHz)	QUANJUDA	DLE-161	097	Sep. 22, 2021	Sep. 21, 2022
9	Loop Antenna (9KHz-30MHz)	SCHWARZBEC K	FMZB1519B	014	Sep. 22, 2021	Sep. 21, 2022
10	RF cables1 (9kHz-30MHz)	N/A	9kHz-30MHz	N/A	Sep. 22, 2021	Sep. 21, 2022
11	RF cables2 (30MHz-1GHz)	N/A	30MHz-1GHz	N/A	Sep. 22, 2021	Sep. 21, 2022
12	RF cables3 (1GHz-40GHz)	N/A	1GHz-40GHz	N/A	Sep. 22, 2021	Sep. 21, 2022
13	CMW500 Test	R&S	CMW500	106504	Sep. 22, 2021	Sep. 21, 2022
14	ESG Signal Generator	Agilent	E4421B	GB40051203	Sep. 22, 2021	Sep. 21, 2022
15	Signal Generator	Agilent	N5182A	MY47420215	Sep. 22, 2021	Sep. 21, 2022
16	D.C. Power Supply	LongWei	TPR-6405D	\	\	\
17	Software	Frad	EZ-EMC	FA-03A2 RE	\	\

Conduction Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	LISN	R&S	ENV216	101471	Sep. 22, 2021	Sep. 21, 2022
2	LISN	CYBERTEK	EM5040A	E1850400149	Sep. 22, 2021	Sep. 21, 2022
3	Test Cable	N/A	C01	N/A	Sep. 22, 2021	Sep. 21, 2022
4	Test Cable	N/A	C02	N/A	Sep. 22, 2021	Sep. 21, 2022
5	EMI Test Receiver	R&S	ESRP3	101946	Sep. 22, 2021	Sep. 21, 2022
6	Absorbing Clamp	DZ	ZN23201	N/A	Sep. 22, 2021	Sep. 21, 2022



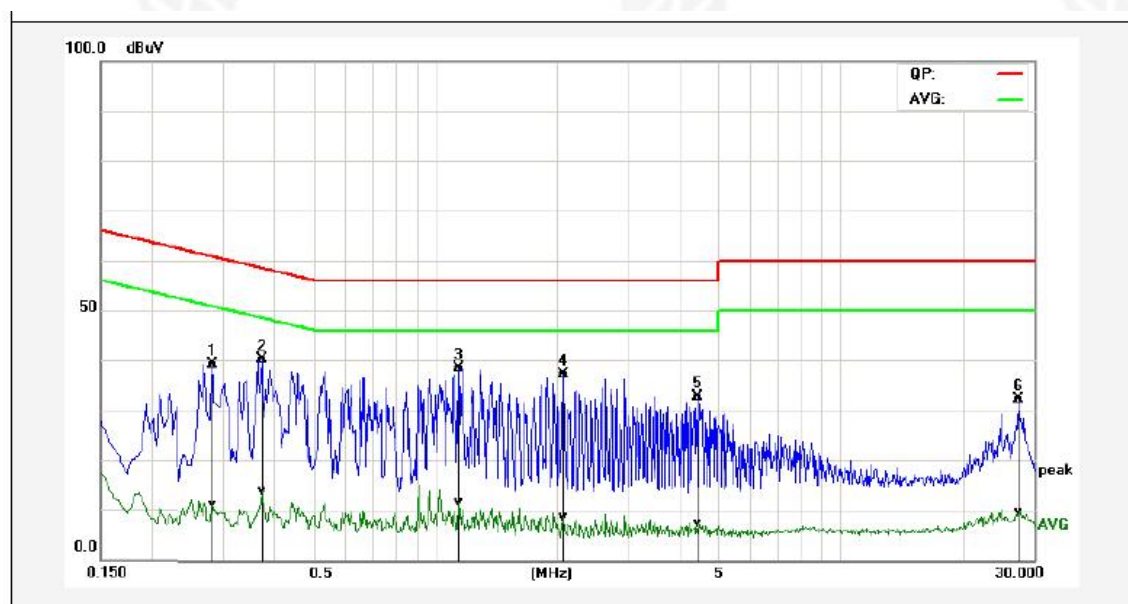
4. EMC EMISSION TEST

4.1 Conducted Emissions

Test Requirement:	FCC Part15 C Section 15.207					
Test Method:	ANSI C63.10:2013					
Test Frequency Range:	150KHz to 30MHz					
Class / Severity:	Class B					
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto					
Limit:	Frequency range (MHz)		Limit (dBuV)			
			Quasi-peak		Average	
	0.15-0.5		66 to 56*		56 to 46*	
	0.5-5		56		46	
	5-30		60		50	
* Decreases with the logarithm of the frequency.						
Test setup:	Reference Plane Test table/Insulation plane <i>Remark:</i> E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m					
Test procedure:	1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment. 2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs). 3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2013 on conducted measurement.					
Test Instruments:	Refer to section 6.0 for details					
Test mode:	Refer to section 5.2 for details					
Test environment:	Temp.:	25 °C	Humid.:	52%	Press.:	1012mbar
Test voltage:	AC 120V/60Hz					
Test results:	Pass					



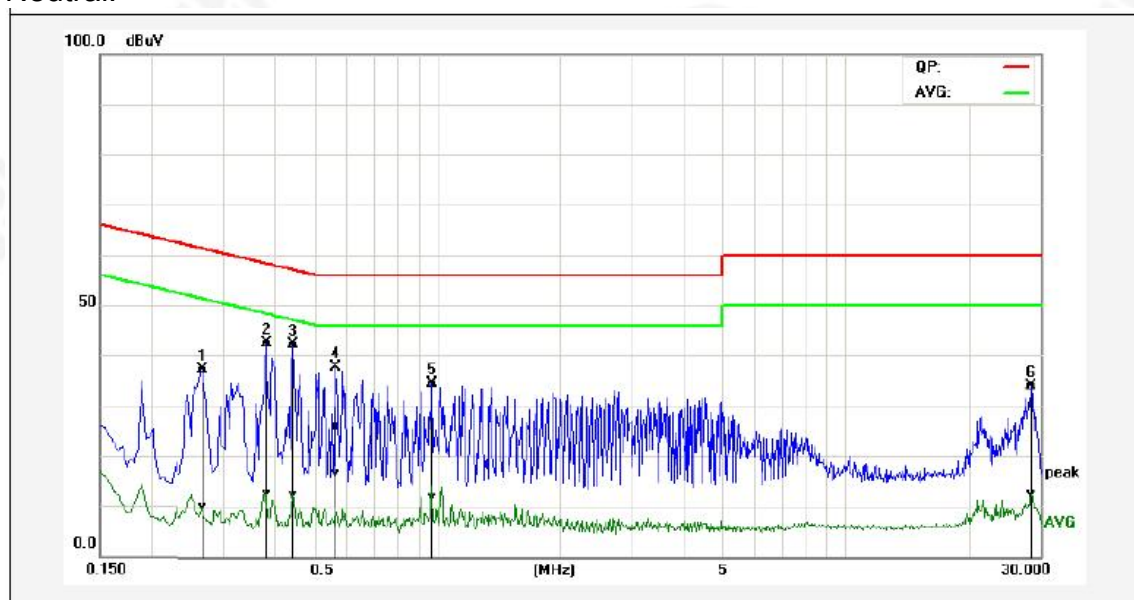
Line:



No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1P	0.2819	29.07	0.92	10.10	39.17	11.02	60.76	50.76	-21.59	-39.74	Pass
2P	0.3740	29.91	3.71	10.10	40.01	13.81	58.41	48.41	-18.40	-34.60	Pass
3*	1.1460	28.18	1.41	10.11	38.29	11.52	56.00	46.00	-17.71	-34.48	Pass
4P	2.0660	26.92	-1.50	10.12	37.04	8.62	56.00	46.00	-18.96	-37.38	Pass
5P	4.4420	22.42	-2.78	10.17	32.59	7.39	56.00	46.00	-23.41	-38.61	Pass
6P	27.4860	21.48	-1.12	10.74	32.22	9.62	60.00	50.00	-27.78	-40.38	Pass



Neutral:

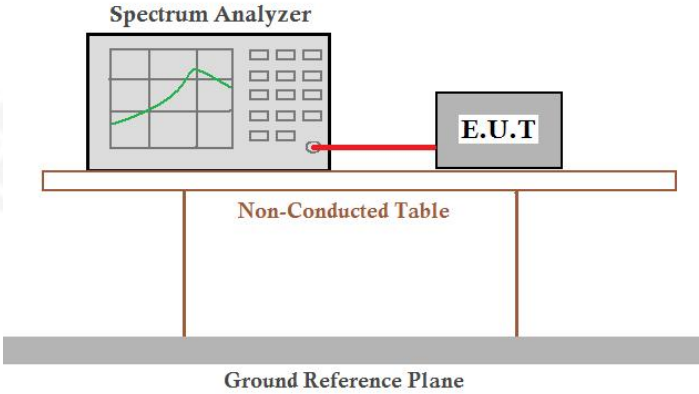


No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1P	0.2660	27.05	-0.14	10.11	37.16	9.97	61.24	51.24	-24.08	-41.27	Pass
2P	0.3820	32.20	2.44	10.10	42.30	12.54	58.23	48.24	-15.93	-35.70	Pass
3*	0.4460	31.99	2.34	10.11	42.10	12.45	56.95	46.95	-14.85	-34.50	Pass
4P	0.5660	15.84	6.65	10.10	25.94	16.75	56.00	46.00	-30.06	-29.25	Pass
5P	0.9740	24.20	1.72	10.12	34.32	11.84	56.00	46.00	-21.68	-34.16	Pass
6P	28.5300	23.01	1.91	10.76	33.77	12.67	60.00	50.00	-26.23	-37.33	Pass

Remark: Factor = Insertion Loss + Cable Loss, Result=Reading + Factor, Margin=Result – Limit.



4.2 Conducted Peak Output Power

Test Requirement:	FCC Part15 C Section 15.247 (b)(3)
Test Method:	ANSI C63.10:2013
Limit:	30dBm
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

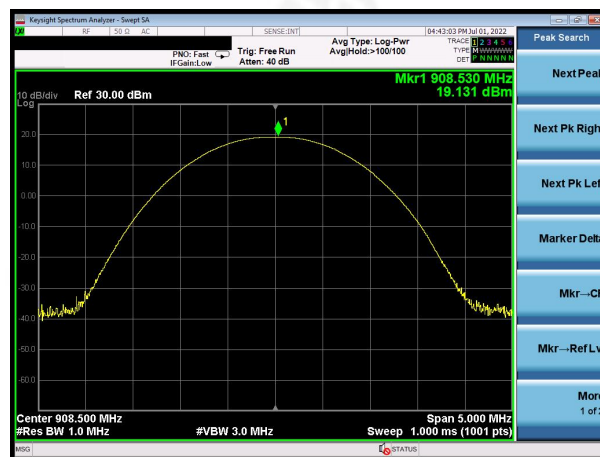
Test channel	Peak Output Power (dBm)	Limit(dBm)	Result
Lowest	20.058	30.00	Pass
Middle	19.131		
Highest	21.317		



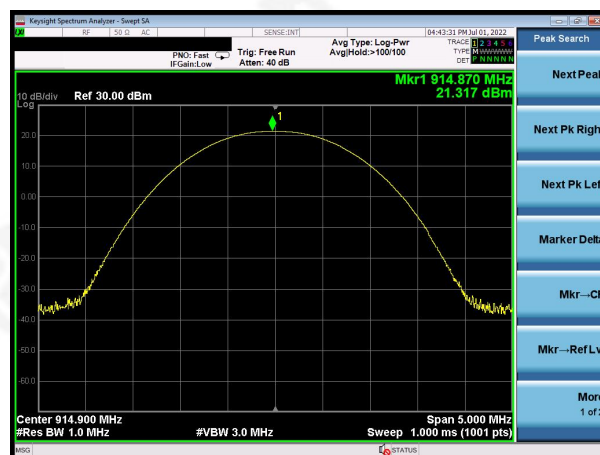
Test plot as follows:



Lowest channel



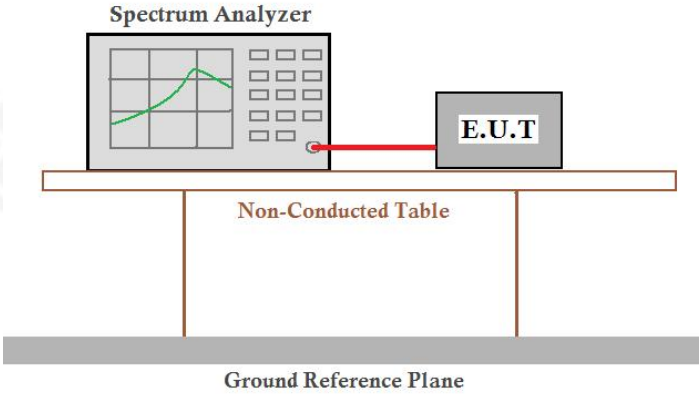
Middle channel



Highest channel



4.3 20dB Emission Bandwidth

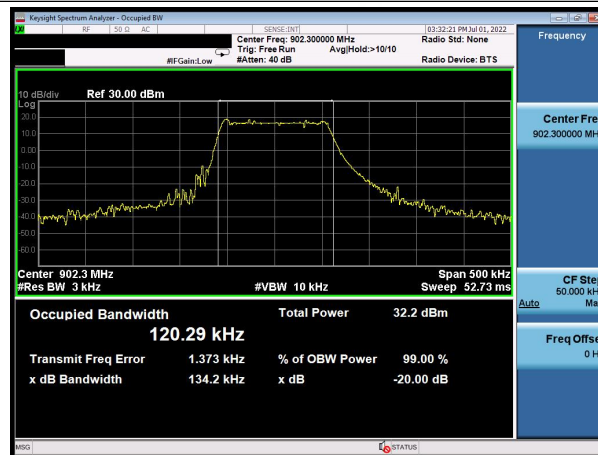
Test Requirement:	FCC Part15 C Section 15.247 (a)(2)
Test Method:	ANSI C63.10:2013
Limit:	N/A
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

Mode	Test channel	-20dB Bandwidth (kHz)	Result
125KHz Bandwidth	Lowest	134.2	Pass
	Middle	131.4	
	Highest	131.0	



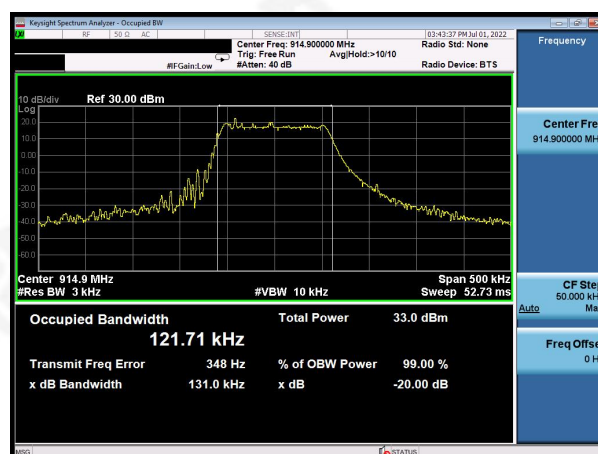
Test plot as follows:



Lowest channel



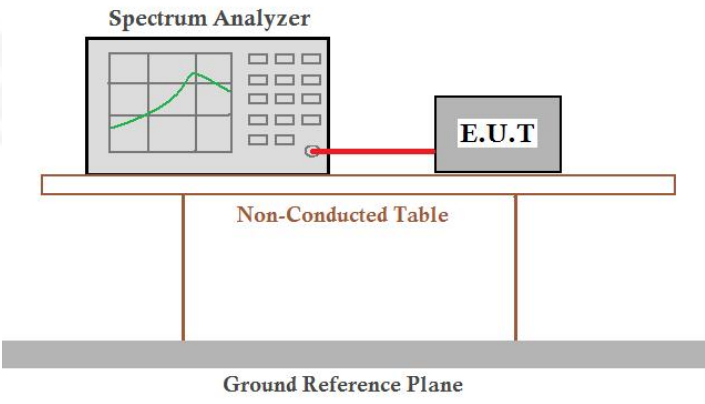
Middle channel



Highest channel



4.4 Carrier Frequencies Separation

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013
Receiver setup:	RBW=100KHz, VBW=300KHz, detector=Peak
Limit:	Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

Mode	Test channel	Carrier Frequencies Separation (kHz)	Limit (kHz)	Result
125KHz Bandwidth	Lowest	200.0	25KHz or 20dB Bandwidth	Pass
	Middle	200.0		Pass
	Highest	200.0		Pass



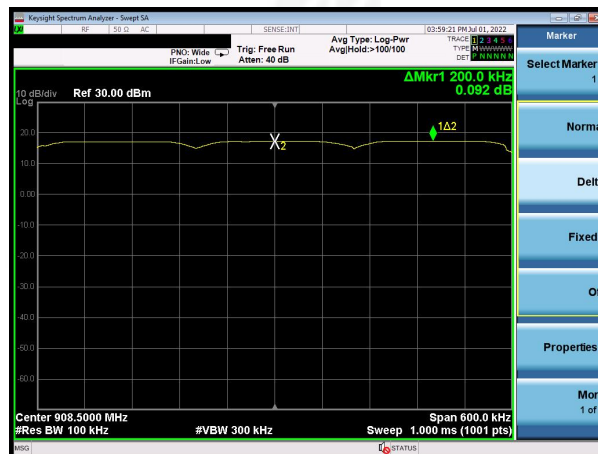
Test plot as follows:

Modulation mode:

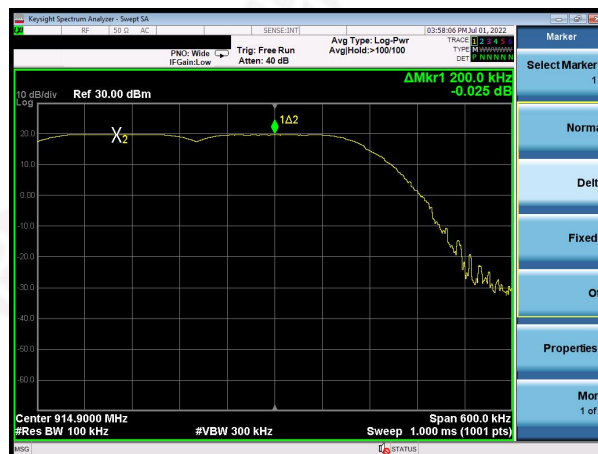
125KHz Bandwidth



Lowest channel



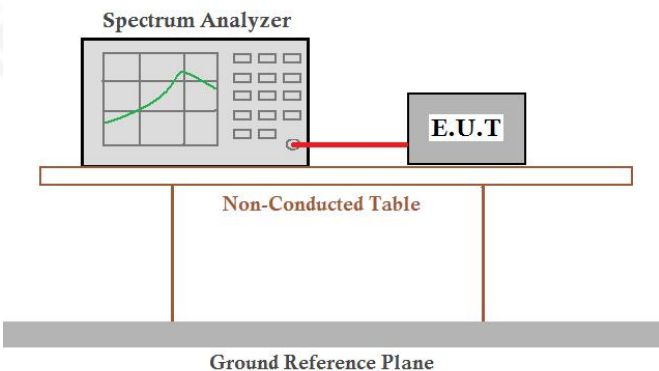
Middle channel



Highest channel

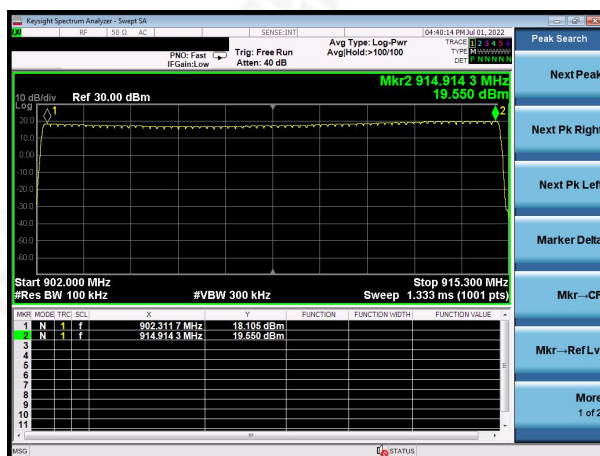


4.5 Hopping Channel Number

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013
Receiver setup:	RBW=100kHz, VBW=300kHz, Frequency range=902-916MHz, Detector=Peak
Limit:	If the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies. If the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

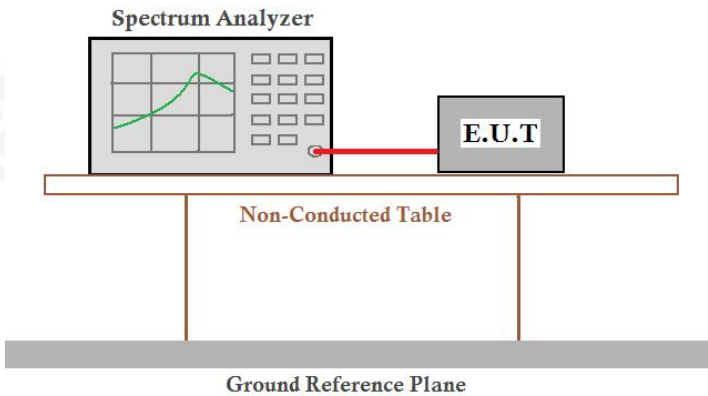
Measurement Data:

Mode	Hopping channel numbers	Limit	Result
125KHz Bandwidth	64	50	Pass





4.6 Dwell Time

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013
Receiver setup:	RBW=10kHz, VBW=30KHz, Span=0Hz, Detector=Peak
Limit:	0.4 Second
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

Mode	Ton(ms)	Tcycle(ms)	Dwell time(ms)	Limit(ms)	Result
125KHz Bandwidth	2.0	8.22	46.715	400	Pass

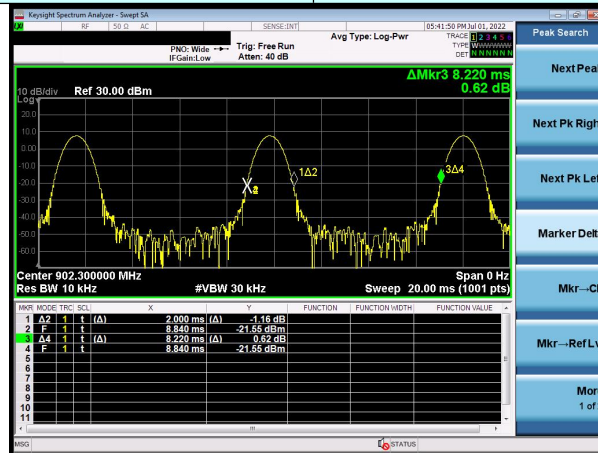
Note: Transmit numbers= Continue TX Time/Tcycle
Dwell time=Transmit numbers*Ton



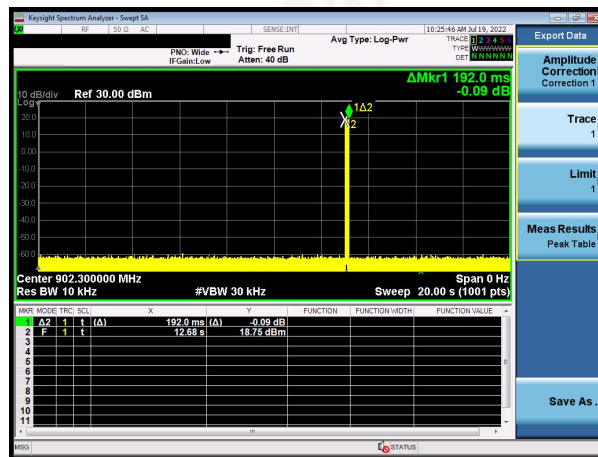
Test plot as follows:

Test Mode:

125KHz Bandwidth



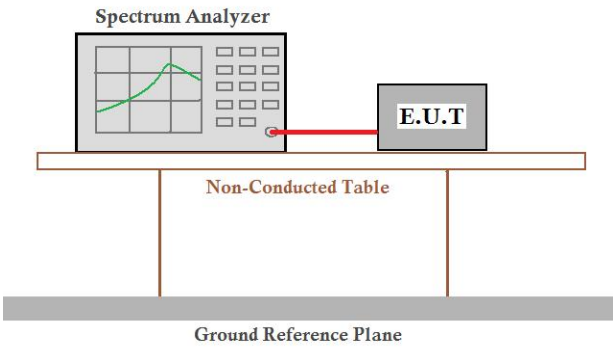
Ton&Tcycle



Continue TX Time



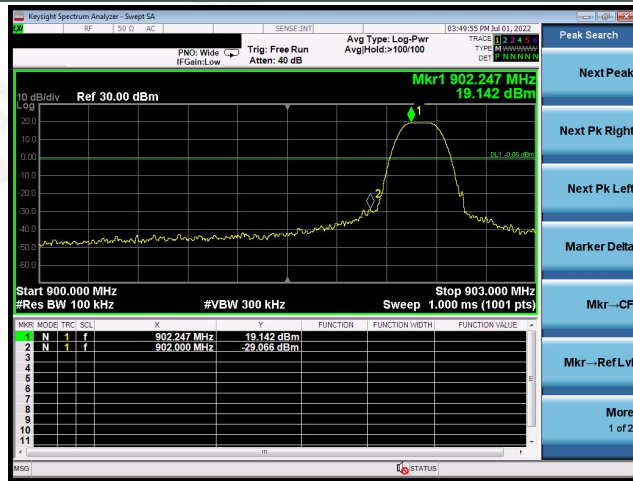
4.7 Band Edge

Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	ANSI C63.10:2013
Receiver setup:	RBW=100kHz, VBW=300kHz, Detector=Peak
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Test setup:	 The diagram illustrates the test setup for Band Edge testing. It shows a Spectrum Analyzer connected to an E.U.T (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T are placed on a Non-Conducted Table, which is supported by two vertical legs. Below the table is a Ground Reference Plane.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass



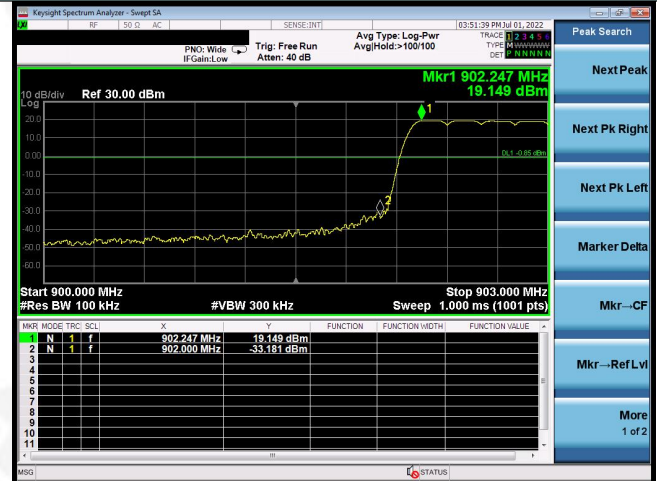
Test plot as follows:
125KHz Bandwidth:

Test channel:



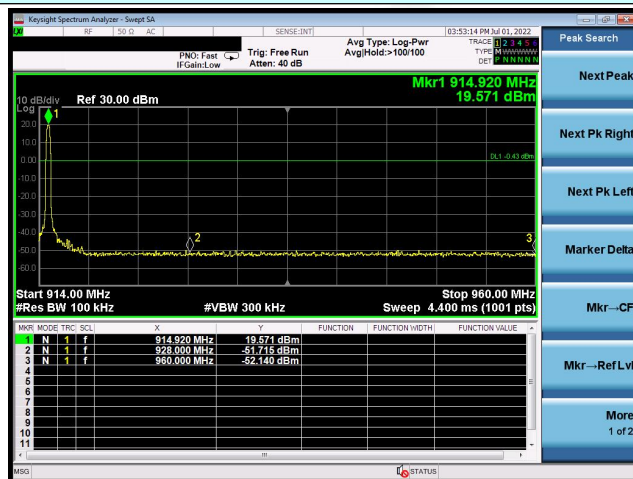
No-hopping mode

Lowest channel



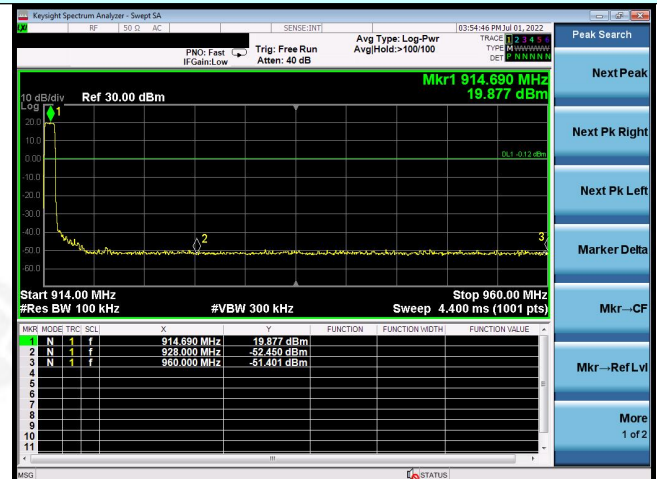
Hopping mode

Test channel:



No-hopping mode

Highest channel



Hopping mode

**Measurement Data****Ant 1:**

Test channel:	Lowest channel
---------------	----------------

Quasi-peak:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
902.00	34.32	22.30	4.87	37.60	23.89	46.00	-22.11	Horizontal
902.00	35.21	22.30	4.87	37.60	24.78	46.00	-21.22	Vertical

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
902.00	28.53	22.30	4.87	37.60	18.10	46.00	-27.90	Horizontal
902.00	28.45	22.30	4.87	37.60	18.02	46.00	-27.98	Vertical

Test channel:	Highest channel
---------------	-----------------

Quasi-peak:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
928.00	37.63	22.41	4.96	37.57	27.43	46.00	-18.57	Horizontal
928.00	39.24	22.41	4.96	37.57	29.04	46.00	-16.96	Vertical

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
928.00	32.14	22.41	4.96	37.57	21.94	46.00	-24.06	Horizontal
928.00	32.64	22.41	4.96	37.57	22.44	46.00	-23.56	Vertical

Remarks:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.
3. The pre-test were performed on lowest, middle and highest frequencies, only the worst case's (lowest and highest frequencies) data was showed.



Ant 2:

Test channel:	Lowest channel
---------------	----------------

Quasi-peak:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
902.00	32.14	22.3	4.87	37.6	21.71	46.00	-24.29	Horizontal
902.00	34.63	22.3	4.87	37.6	24.2	46.00	-21.8	Vertical

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
902.00	27.12	22.3	4.87	37.6	16.69	46.00	-29.31	Horizontal
902.00	28.02	22.3	4.87	37.6	17.59	46.00	-28.41	Vertical

Test channel:	Highest channel
---------------	-----------------

Quasi-peak:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
928.00	35.26	22.41	4.96	37.57	25.06	46.00	-20.94	Horizontal
928.00	38.32	22.41	4.96	37.57	28.12	46.00	-17.88	Vertical

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
928.00	31.23	22.41	4.96	37.57	21.03	46	-24.97	Horizontal
928.00	33.15	22.41	4.96	37.57	22.95	46	-23.05	Vertical

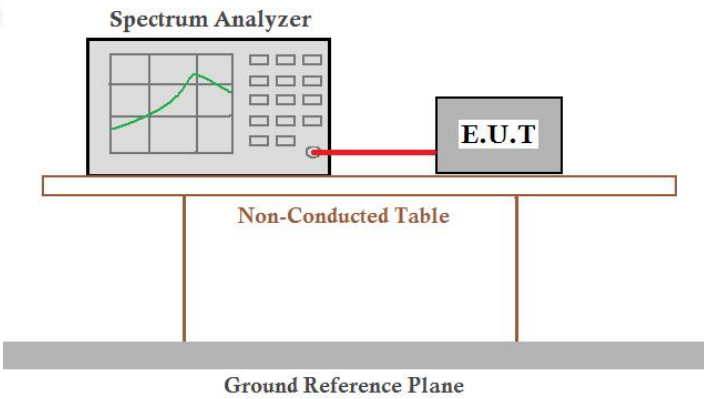
Remarks:

4. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
5. The emission levels of other frequencies are very lower than the limit and not show in test report.
6. The pre-test were performed on lowest, middle and highest frequencies, only the worst case's (lowest and highest frequencies) data was showed.



4.8 Spurious Emission

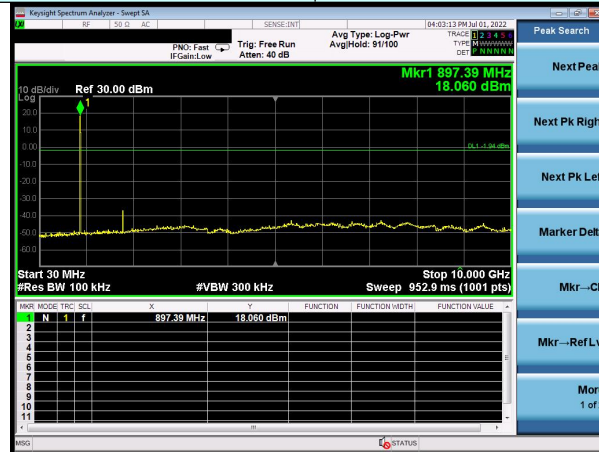
Conducted Emission Method

Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	ANSI C63.10:2013
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass



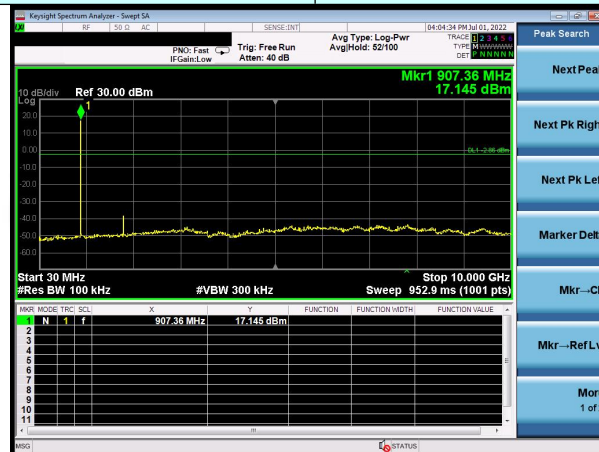
125KHz Bandwidth:

Test channel:	Lowest channel
---------------	----------------



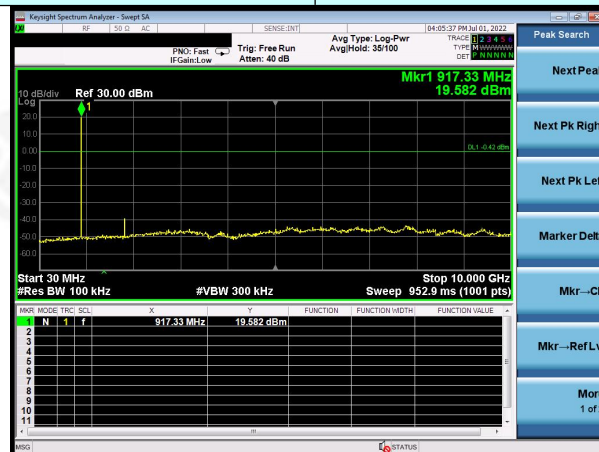
30MHz~10GHz

Test channel:	Middle channel
---------------	----------------



30MHz~10GHz

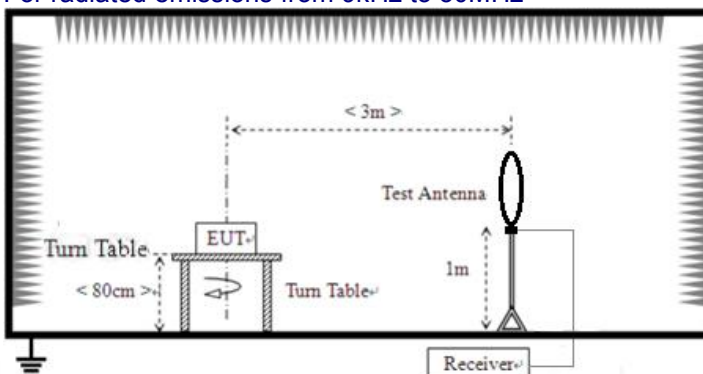
Test channel:	Highest channel
---------------	-----------------



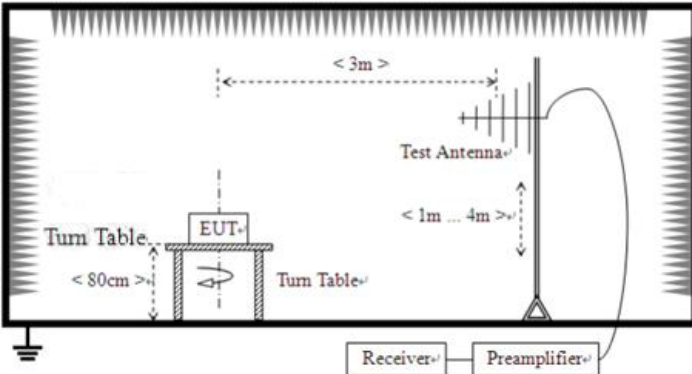
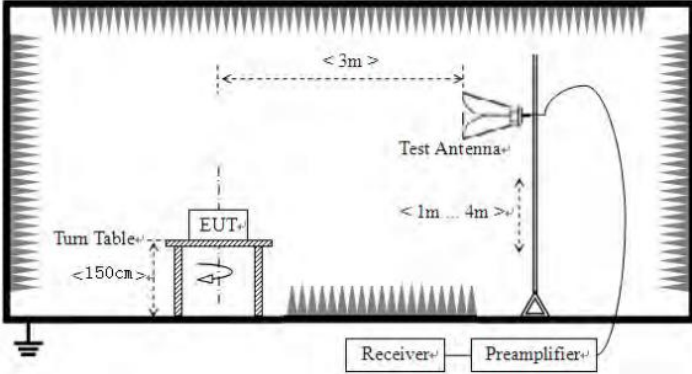
30MHz~10GHz



Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209				
Test Method:	ANSI C63.10:2013				
Test Frequency Range:	9kHz to 25GHz				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Value
	9KHz-150KHz	Quasi-peak	200Hz	600Hz	Quasi-peak
	150KHz-30MHz	Quasi-peak	9KHz	30KHz	Quasi-peak
	30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak
	Above 1GHz	Peak	1MHz	3MHz	Peak
		Peak	1MHz	10Hz	Average
Limit:	Frequency	Limit (uV/m)		Value	Measurement Distance
	0.009MHz-0.490MHz	2400/F(KHz)		QP	300m
	0.490MHz-1.705MHz	24000/F(KHz)		QP	30m
	1.705MHz-30MHz	30		QP	30m
	30MHz-88MHz	100		QP	3m
	88MHz-216MHz	150		QP	
	216MHz-960MHz	200		QP	
	960MHz-1GHz	500		QP	
	Above 1GHz	500		Average	
		5000		Peak	
Test setup:	For radiated emissions from 9kHz to 30MHz				
					



	For radiated emissions from 30MHz to1GHz 					
	For radiated emissions above 1GHz 					
Test Procedure:	1. The EUT was placed on the top of a rotating table (0.8m for below 1G and 1.5m for above 1G) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. 4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.					
Test Instruments:	Refer to section 6.0 for details					
Test mode:	Refer to section 5.2 for details					
Test environment:	Temp.:	25 °C	Humid.:	52%	Press.:	1012mbar
Test voltage:	AC 120V/60Hz					
Test results:	Pass					



Measurement data:

Remarks:

1. Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis which it is worse case.

■ **9kHz~30MHz**

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

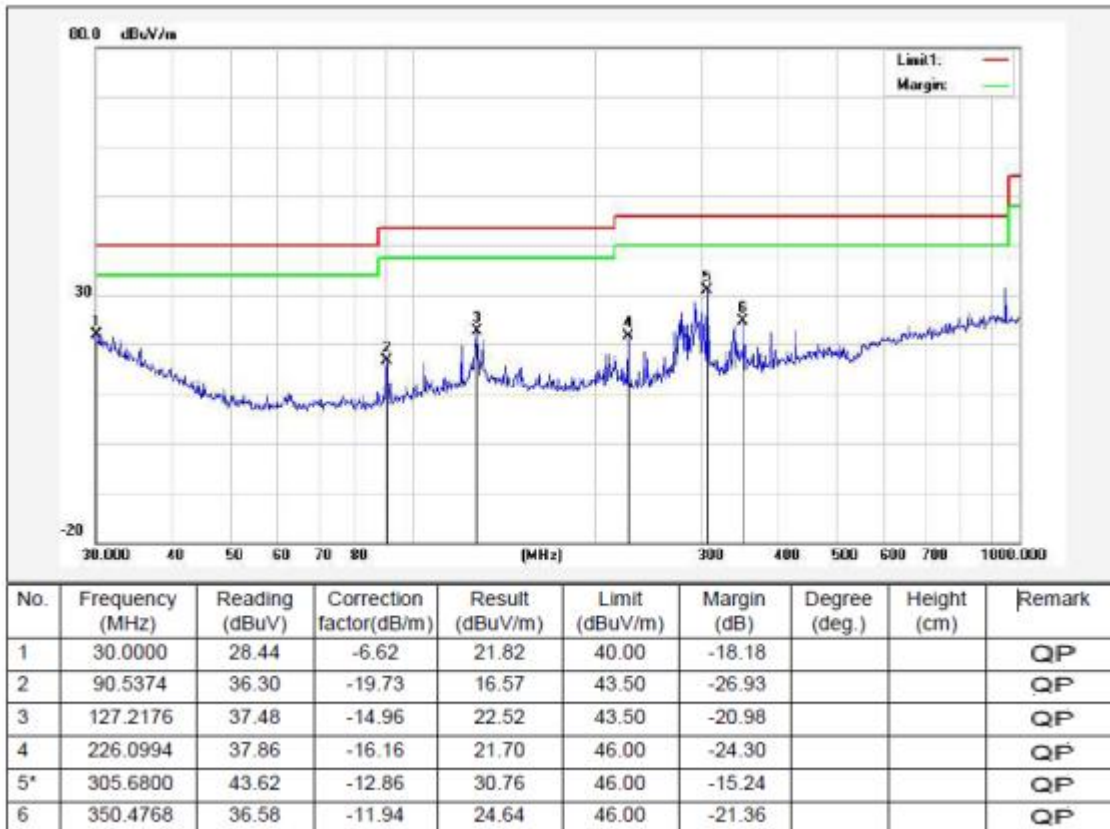


■ Below 1GHz

Pre-scan all test modes, found worst case at lowest channel of 125KHz bandwidth, so only show the worst case on the report.

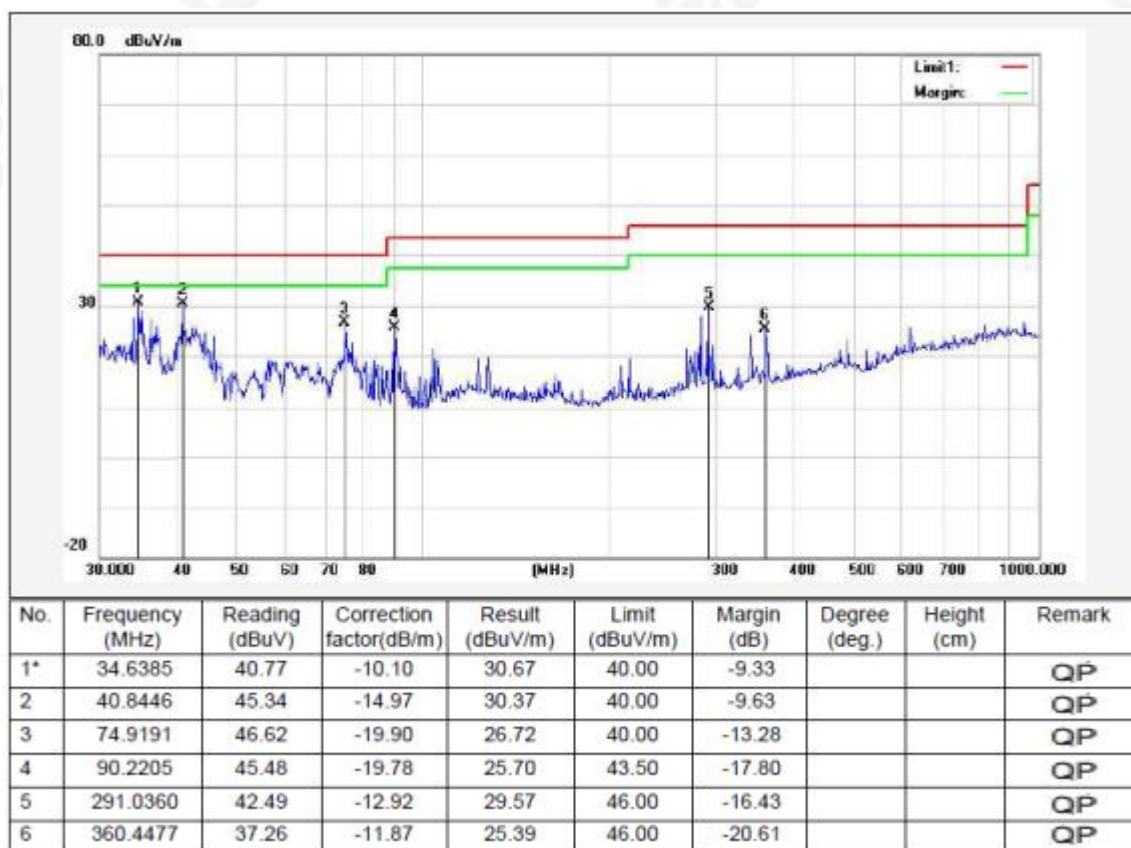
ANT 1

Horizontal:





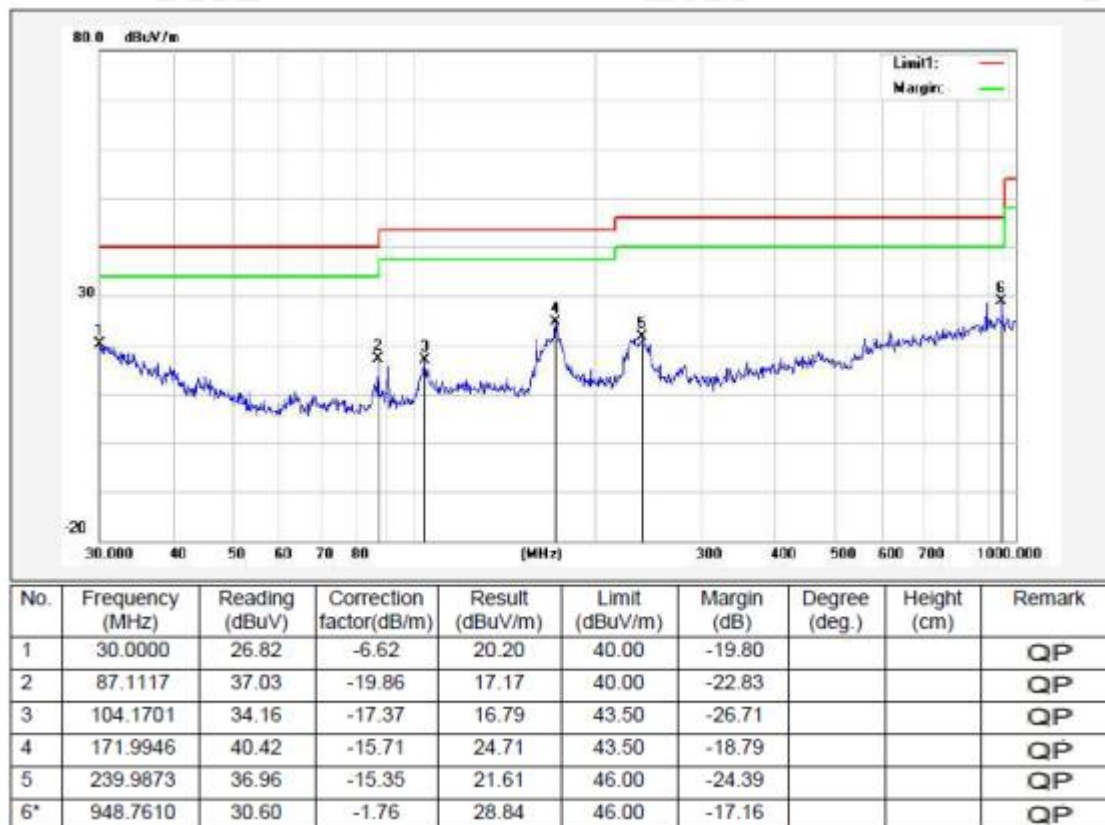
Vertical:





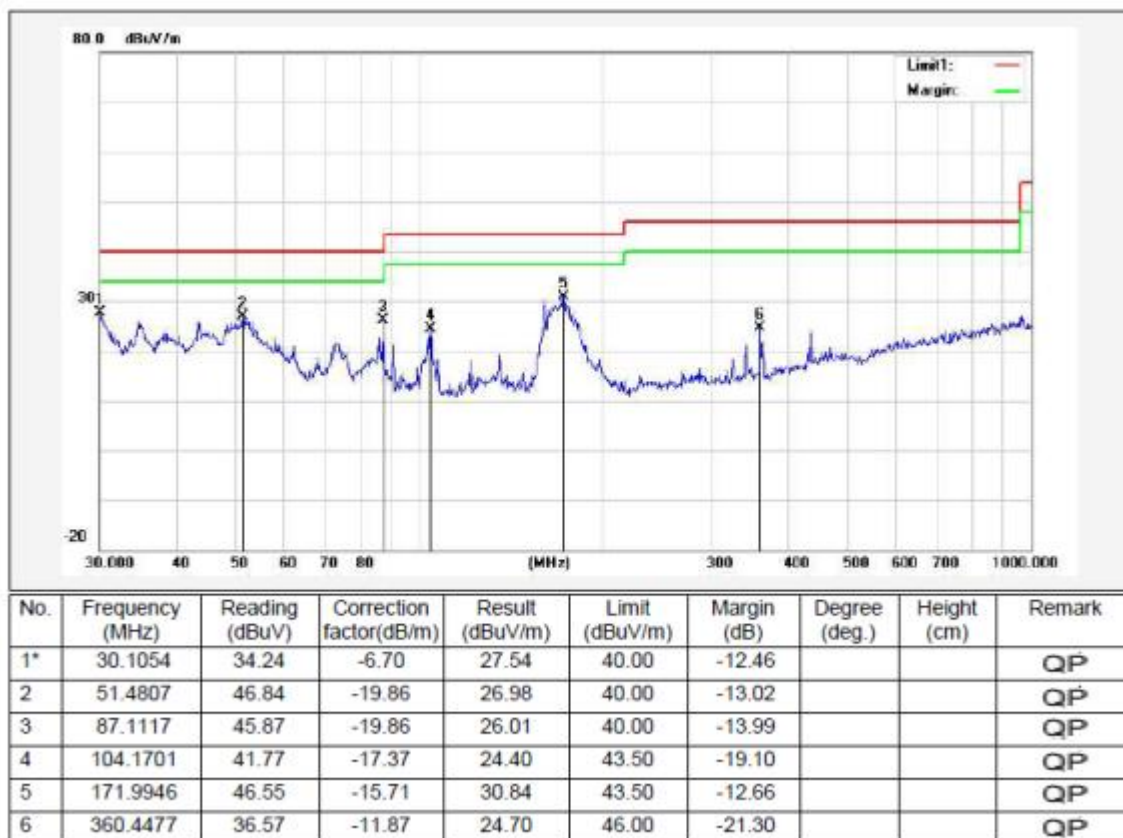
ANT2:

Horizontal:





Vertical:





■ Above 1GHz

ANT 1:

Test channel:	Lowest channel
---------------	----------------

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
1823.72	41.55	26.46	4.67	34.04	38.64	74.00	-35.36	Vertical
2714.89	34.67	29.34	5.43	33.25	36.19	74.00	-37.81	Vertical
3621.32	33.85	27.24	7.11	37.34	30.86	74.00	-43.14	Vertical
4532.43	*					74.00		Vertical
5408.58	*					74.00		Vertical
6314.22	*					74.00		Vertical
1823.72	43.85	26.76	4.67	34.04	41.24	74.00	-32.76	Horizontal
2714.89	33.77	27.83	5.43	33.25	33.78	74.00	-40.22	Horizontal
3621.32	33.85	29.85	7.11	37.34	33.47	74.00	-40.53	Horizontal
4532.43	*					74.00		Horizontal
5408.58	*					74.00		Horizontal
6314.22	*					74.00		Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
1812.43	32.06	25.35	4.67	34.04	28.04	54.00	-25.96	Vertical
2721.52	21.08	28.26	5.43	33.25	21.52	54.00	-32.48	Vertical
3618.45	21.98	29.18	7.11	37.34	20.93	54.00	-33.07	Vertical
4506.50	*					54.00		Vertical
5431.46	*					54.00		Vertical
6322.24	*					54.00		Vertical
1812.43	31.97	25.35	4.67	34.04	27.95	54.00	-26.05	Horizontal
2721.52	25.06	28.26	5.43	33.25	25.50	54.00	-28.50	Horizontal
3618.45	21.08	29.18	7.11	37.34	20.03	54.00	-33.97	Horizontal
4506.50	*					54.00		Horizontal
5431.46	*					54.00		Horizontal
6322.24	*					54.00		Horizontal



Test channel:

Middle channel

Quasi-peak:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
1835.34	41.55	25.43	4.89	34.12	37.75	74.00	-36.25	Vertical
2752.12	39.63	28.34	5.68	33.57	40.08	74.00	-33.92	Vertical
3664.57	36.55	29.42	7.29	37.66	35.60	74.00	-38.40	Vertical
4567.45	*					74.00		Vertical
5485.53	*					74.00		Vertical
6412.35	*					74.00		Vertical
1835.34	40.45	25.43	4.89	34.12	36.65	74.00	-37.35	Horizontal
2752.12	35.58	28.34	5.68	33.57	36.03	74.00	-37.97	Horizontal
3664.57	35.85	29.42	7.29	37.66	34.90	74.00	-39.10	Horizontal
4567.45	*					74.00		Horizontal
5485.53	*					74.00		Horizontal
6412.35	*					74.00		Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
1826.42	28.08	25.43	4.89	34.12	24.28	54.00	-29.72	Vertical
2762.47	25.06	28.34	5.68	33.57	25.51	54.00	-28.49	Vertical
3658.27	21.36	29.42	7.29	37.66	20.41	54.00	-33.59	Vertical
4582.48	*					54.00		Vertical
5485.58	*					54.00		Vertical
6403.57	*					54.00		Vertical
1826.42	28.97	25.43	4.89	34.12	25.17	54.00	-28.83	Horizontal
2762.47	26.17	28.34	5.68	33.57	26.62	54.00	-27.38	Horizontal
3658.27	25.06	29.42	7.29	37.66	24.11	54.00	-29.89	Horizontal
4582.48	*					54.00		Horizontal
5485.58	*					54.00		Horizontal
6403.57	*					54.00		Horizontal



Test channel:	Highest channel
---------------	-----------------

Quasi-peak:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
1857.23	43.63	25.64	4.75	34.67	39.35	74.00	-34.65	Vertical
2781.24	38.47	28.46	5.87	33.83	38.97	74.00	-35.03	Vertical
3721.54	36.42	29.75	7.59	37.76	36.00	74.00	-38.00	Vertical
4646.27	*					74.00		Vertical
5558.42	*					74.00		Vertical
6485.68	*					74.00		Vertical
1857.23	41.85	25.64	4.75	34.67	37.57	74.00	-36.43	Horizontal
2781.24	34.96	28.46	5.87	33.83	35.46	74.00	-38.54	Horizontal
3721.54	34.67	29.75	7.59	37.76	34.25	74.00	-39.75	Horizontal
4646.27	*					74.00		Horizontal
5558.42	*					74.00		Horizontal
6485.68	*					74.00		Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
1847.23	36.32	25.64	4.75	34.67	32.04	54.00	-21.96	Vertical
2787.12	27.63	28.46	5.87	33.83	28.13	54.00	-25.87	Vertical
3706.36	25.32	29.75	7.59	37.76	24.90	54.00	-29.10	Vertical
4643.56	*					54.00		Vertical
5569.35	*					54.00		Vertical
6499.02	*					54.00		Vertical
1847.23	38.84	25.64	4.75	34.67	34.56	54.00	-19.44	Horizontal
2787.12	27.99	28.46	5.87	33.83	28.49	54.00	-25.51	Horizontal
3706.36	22.47	29.75	7.59	37.76	22.05	54.00	-31.95	Horizontal
4643.56	*					54.00		Horizontal
5569.35	*					54.00		Horizontal
6499.02	*					54.00		Horizontal

Remarks:

1. *Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *“*”*, means this data is the too weak instrument of signal is unable to test.
3. *The emission levels of other frequencies are very lower than the limit and not show in test report.*
4. *The test data shows only the worst case 125KHz bandwidth mode.*



ANT 2:

Test channel:	Lowest channel
---------------	----------------

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
1821.53	38.42	26.46	4.67	34.04	38.79	74.00	-36.57	Vertical
2707.21	32.14	29.34	5.43	33.25	36.34	74.00	-39.23	Vertical
3616.34	30.42	27.24	7.11	37.34	31.01	74.00	-43.36	Vertical
4530.21	*					74.00		Vertical
5405.24	*					74.00		Vertical
6310.21	*					74.00		Vertical
1821.53	42.53	26.76	4.67	34.04	41.04	74.00	-32.96	Horizontal
2707.21	32.08	27.83	5.43	33.25	33.25	74.00	-40.75	Horizontal
3616.34	31.97	29.85	7.11	37.34	32.88	74.00	-41.12	Horizontal
4530.21	*					74.00		Horizontal
5405.24	*					74.00		Horizontal
6310.21	*					74.00		Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
1807.32	32.01	25.35	4.67	34.04	27.99	54.00	-26.01	Vertical
2716.23	21.14	28.26	5.43	33.25	21.58	54.00	-32.42	Vertical
3615.93	22.04	29.18	7.11	37.34	20.99	54.00	-33.01	Vertical
4501.94	*					54.00		Vertical
541.45	*					54.00		Vertical
6320.52	*					54.00		Vertical
1807.32	30.82	25.35	4.67	34.04	26.8	54.00	-27.2	Horizontal
2716.23	25.23	28.26	5.43	33.25	25.67	54.00	-28.33	Horizontal
3615.93	20.02	29.18	7.11	37.34	18.97	54.00	-35.03	Horizontal
4501.94	*					54.00		Horizontal
541.45	*					54.00		Horizontal
6320.52	*					54.00		Horizontal



Test channel:

Middle channel

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
1832.52	41.55	25.43	4.89	34.12	37.75	74.00	-36.25	Vertical
2748.23	39.63	28.34	5.68	33.57	40.08	74.00	-33.92	Vertical
3660.21	36.55	29.42	7.29	37.66	35.60	74.00	-38.40	Vertical
4562.41	*					74.00		Vertical
5482.58	*					74.00		Vertical
6415.35	*					74.00		Vertical
1832.52	40.45	25.43	4.89	34.12	36.65	74.00	-37.35	Horizontal
2748.23	35.58	28.34	5.68	33.57	36.03	74.00	-37.97	Horizontal
3660.21	35.85	29.42	7.29	37.66	34.90	74.00	-39.10	Horizontal
4562.41	*					74.00		Horizontal
5482.58	*					74.00		Horizontal
6415.35	*					74.00		Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
1822.42	28.08	25.43	4.89	34.12	24.49	54.00	-29.51	Vertical
2760.21	25.06	28.34	5.68	33.57	25.72	54.00	-28.28	Vertical
3655.24	21.36	29.42	7.29	37.66	20.62	54.00	-33.38	Vertical
4580.54	*					54.00		Vertical
5482.14	*					54.00		Vertical
6400.62	*					54.00		Vertical
1822.42	28.97	25.43	4.89	34.12	25.38	54.00	-28.62	Horizontal
2760.21	26.17	28.34	5.68	33.57	26.83	54.00	-27.17	Horizontal
3655.24	25.06	29.42	7.29	37.66	24.32	54.00	-29.68	Horizontal
4580.54	*					54.00		Horizontal
5482.14	*					54.00		Horizontal
6400.62	*					54.00		Horizontal



Test channel:	Highest channel
---------------	-----------------

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
1843.63	43.63	25.64	4.75	34.67	39.35	74.00	-34.65	Vertical
2776.34	38.47	28.46	5.87	33.83	38.97	74.00	-35.03	Vertical
3712.66	36.42	29.75	7.59	37.76	36.00	74.00	-38.00	Vertical
4643.86	*					74.00		Vertical
5551.97	*					74.00		Vertical
6480.88	*					74.00		Vertical
1843.63	41.85	25.64	4.75	34.67	37.57	74.00	-36.43	Horizontal
2776.34	34.96	28.46	5.87	33.83	35.46	74.00	-38.54	Horizontal
3712.66	34.67	29.75	7.59	37.76	34.25	74.00	-39.75	Horizontal
4643.86	*					74.00		Horizontal
5551.97	*					74.00		Horizontal
6480.88	*					74.00		Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
1840.64	35.23	25.64	4.75	34.67	30.95	54.00	-23.05	Vertical
2785.35	26.25	28.46	5.87	33.83	26.75	54.00	-27.25	Vertical
3705.23	25.32	29.75	7.59	37.76	24.90	54.00	-29.10	Vertical
4641.69	*					54.00		Vertical
5566.35	*					54.00		Vertical
6502.52	*					54.00		Vertical
1840.64	36.98	25.64	4.75	34.67	32.70	54.00	-21.30	Horizontal
2785.35	27.25	28.46	5.87	33.83	27.75	54.00	-26.25	Horizontal
3705.23	22.53	29.75	7.59	37.76	22.11	54.00	-31.89	Horizontal
4641.69	*					54.00		Horizontal
5566.35	*					54.00		Horizontal
6502.52	*					54.00		Horizontal

Remarks:

5. *Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
6. *“*”*, means this data is the too weak instrument of signal is unable to test.
7. *The emission levels of other frequencies are very lower than the limit and not show in test report.*
8. *The test data shows only the worst case 125KHz bandwidth mode.*



5. Antenna Requirement

Standard requirement:	FCC Part15 C Section 15.203 /247(c)
15.203 requirement: 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, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. 15.247(c) (1)(i) requirement: (i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.	
EUT Antenna:	
The antenna is as below, reference to the EUT photos for details ANT1: Stick antenna , 5dBi ANT2: Fiber glass antenna , 3dBi	



6. Test Setup Photo

Reference to the appendix I for details.

7. EUT Constructional Details

Reference to the appendix II for details.

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