



FCC Test Report

Report No: FCS202112026W03

Issued for

Applicant:	Hangzhou Shakaraka Technology Co., Ltd.
Address:	Room 4120, Building 2, No. 1197, Bin'an Road, Binjiang District, Hangzhou City, Zhejiang Province
Product Name:	Pisces outdoor gateway
Brand Name:	PISCES
Model Name:	P100
Series Model:	N/A
FCC ID:	2A3AD-P100
Issued By: Flux Compliance Service Laboratory Add: Room 105 Floor Bao hao Technology Building 1 NO.15 Gong ye West Road Hi-Tech Industrial, Song shan lake Dongguan Tel: 769-27280901 Fax:769-27280901 http://www.FCS-lab.com	

TEST RESULT CERTIFICATION

Applicant's Name.....: Hangzhou Shakaraka Technology Co., Ltd.
Address.....: Room 4120, Building 2, No. 1197, Bin'an Road, Binjiang District,
Hangzhou City, Zhejiang Province
Manufacture's Name.....: Hangzhou Green Palm Technology Co., Ltd.
Address.....: 2nd Floor, No. 2617, Xincheng Road, Xiaoshan District, Hangzhou

Product Description

Product Name.....: Pisces outdoor gateway
Model Name.....: P100
Series Model.....: N/A
Test Standards.....: FCC Rules and Regulations Part 15 Subpart C, Section 247
Test Procedure.....: ANSI C63.10:2013

This device described above has been tested by Flux Compliance Service Laboratory, 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.

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Date of Test.....:

Date (s) of performance of tests.: 08 Dec, 2021 ~ 20 Dec, 2021

Date of Issue.....: 20 Dec, 2021

Test Result.....: Pass

Tested by

:

Scott Shen

(Scott Shen)

Reviewed by

:

Duke Qian

(Duke Qian)

Approved by

:

Jack Wang

(Jack Wang)

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Revision History

Rev.	Issue Date	Effect Page	Contents
00	20 Dec, 2021	N/A	N/A

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

KDB 558074 D01 15.247 Meas Guidance v05r02

FCC Part 15.247,Subpart C			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	N/A	--
15.247(a)(1)	Hopping Channel Separation	PASS	--
15.247 (b)(2)	Output Power	PASS	--
15.209	Radiated Spurious Emission	PASS	--
15.247(d)	Conducted Spurious & Band Edge Emission	PASS	--
15.247(a)(1)(i)	Number of Hopping Frequency	PASS	--
15.247(a)(1)(i)	Dwell Time	PASS	--
15.247(a)(1)	20dB Bandwidth 99% Bandwidth	PASS	--
15.205	Restricted bands of operation	PASS	--
Part 15.247(d)/part 15.209(a)	Band Edge Emission	PASS	
15.203	Antenna Requirement	PASS	

NOTE:

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

(2) All tests are according to ANSI C63.10-2013

1.1 TEST FACTORY

Company Name:	Flux Compliance Service Laboratory
Address:	Room 105 Floor Bao hao Technology Building 1 NO.15 Gong ye West Road Hi-Tech Industrial, Song shan lake Dongguan
Telephone:	+86-769-27280901
Fax:	+86-769-27280901
FCC Test Firm Registration Number: 514908 Designation number: CN0127 A2LA accreditation number: 5545.01	

1.2 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	RF output power, conducted	$\pm 0.71\text{dB}$
2	Unwanted Emissions, conducted	$\pm 2.988\text{ dB}$
3	Conducted Emission (9KHz-150KHz)	$\pm 4.13\text{ dB}$
4	Conducted Emission (150KHz-30MHz)	$\pm 4.74\text{ dB}$
5	All emissions, radiated (<1G) 30MHz-1000MHz	$\pm 5.2\text{ dB}$
6	All emissions, radiated 1GHz -18GHz	$\pm 4.66\text{ dB}$
7	All emissions, radiated 18GHz -40GHz	$\pm 4.31\text{ dB}$

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF THE EUT

Product Name	Pisces outdoor gateway
Trade Name	PISCES
Model Name	P100
Series Model	N/A
Model Difference	N/A
Channel List	Please refer to the Note 2.
Operation frequency	902.3MHz-914.9MHz
Modulation:	LongFi
Transmitter rate:	1MHz
Power supply	DC 48V
Hardware version number	V1.0
Software version number	V1.0
Connecting I/O Port(s)	Please refer to the User's Manual

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

2.

Channel List					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	902.3	23	906.7	45	911.1
02	902.5	24	906.9	46	911.3
03	902.7	25	907.1	47	911.5
04	902.9	26	907.3	48	911.7
05	903.1	27	907.5	49	911.9
06	903.3	28	907.7	50	912.1
07	903.5	29	907.9	51	912.3
08	903.7	30	908.1	52	912.5
09	903.9	31	908.3	53	912.7
10	904.1	32	908.5	54	912.9
11	904.3	33	908.7	55	913.1
12	904.5	34	908.9	56	913.3
13	904.7	35	909.1	57	913.5
14	904.9	36	909.3	58	913.7
15	905.1	37	909.5	59	913.9
16	905.3	38	909.7	60	914.1
17	905.5	39	909.9	61	914.3
18	905.7	40	910.1	62	914.5
19	905.9	41	910.3	63	914.7
20	906.1	42	910.5	64	914.9
21	906.3	43	910.7		
22	906.5	44	910.9		

3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
1	NA	REFA	external Antenna	N/A	1.0	Antenna

2.2 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

Block diagram of EUT configuration for test



Test software: the FCC tool

The test software was used to control EUT work in continuous TX mode, and select test channel, Wireless mode as below table

No.	Test model description
1	Low channel LongFi
2	Middle channel LongFi
3	High channel LongFi
4	Hopping LongFi

Test model description	Frequency(MHz)
Low channel GFSK	902.3
Middle channel GFSK	908.5
High channel GFSK	914.9

Note:

1. All the test modes can be supply by battery, only the result of the worst case recorded in the report. GFSK mode is worst mode.
2. For radiated emission, 3 axis were chosen for testing for each applicable mode.
3. The EUT used fully charge battery when tested.
4. During the test, the dutycycle>98%, the test voltage was tuned from 85% to 115% of the Nominal rate supply votage, and found that the worst case was the nominal rated supply condition, So the report just shows that condition's data

2.3 DESCRIPTION OF NECESSARY ACCESSORIES AND SUPPORT UNITS

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.

Necessary accessories

Item	Equipment	Mfr/Brand	Model/Type No.	Serial No.	Note

Support units

Item	Equipment	Mfr/Brand	Model/Type No.	Serial No.	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) “YES” is means “shielded” “with core”; “NO” is means “unshielded” “without core”.

2.4 EQUIPMENTS LIST

Radiation Test equipment

Kind of Equipment	Manufacturer	Type No.	Company No.	Last calibration	Calibrated until
EMI Test Receiver	R&S	ESRP 3	FCS-E001	2021.05.26	2022.05.25
Signal Analyzer	R&S	FSV40-N	FCS-E012	2021.05.26	2022.05.25
Active loop Antenna	ZHINAN	ZN30900C	FCS-E013	2021.07.08	2022.07.07
Bilog Antenna	SCHWARZBECK	VULB 9168	FCS-E002	2021.08.26	2022.08.25
Horn Antenna	SCHWARZBECK	BBHA 9120D	FCS-E003	2021.08.26	2022.08.25
SHF-EHF Horn Antenna (18G-40GHz)	A-INFO	LB-180400-KF	FCS-E018	2021.05.26	2022.05.25
Pre-Amplifier(0.1M-3G Hz)	EMCI	EM330N	FCS-E004	2021.05.26	2022.05.25
Pre-Amplifier (1G-18GHz)	N/A	TSAMP-0518SE	FCS-E014	2021.05.26	2022.05.25
Pre-Amplifier (18G-40GHz)	TERA-MW	TRLA-0400	FCS-E019	2021.07.08	2022.07.07
Temperature & Humidity	HTC-1	victor	FCS-E005	2021.08.26	2022.08.25
Testing Software	EZ-EMC(Ver.STSLAB 03A1 RE)				

Conduction Test equipment

Kind of Equipment	Manufacturer	Type No.	Company No.	Last calibration	Calibrated until
EMI Test Receiver	R&S	ESPI	FCS-E020	2021.05.26	2022.05.25
LISN	R&S	ENV216	FCS-E007	2021.07.08	2022.07.07
LISN	ETS	3810/2NM	FCS-E009	2021.05.26	2022.05.25
Temperature & Humidity	HTC-1	victor	FCS-E008	2021.07.08	2022.07.07
Testing Software	EZ-EMC(Ver.EMC-CON 3A1.1)				

RF Connected Test

Kind of Equipment	Manufacturer	Type No.	Company No.	Last calibration	Calibrated until
MXA SIGNAL Analyzer	Keysight	N9020A	FCS-E015	2021.05.26	2022.05.25
Spectrum Analyzer	Agilent	E4447A	MY50180039	2021.07.08	2022.07.07
Spectrum Analyzer	R&S	FSV-40	101499	2021.08.26	2022.08.25
Power Sensor	Agilent	UX2021XA	FCS-E021	2021.05.26	2022.05.25
Testing Software	EZ-EMC(Ver.STSLAB 03A1 RE)				

3. 20DB BANDWIDTH

3.1 Limit

FCC Part 15.247, Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(1)(i)	(20dB bandwidth)	<250kHz	902-928	PASS

3.2 Test Procedure

(1) The EUT was directly connected to the spectrum analyzer and antenna output port as shown in the block diagram below.

(2) Set the spectrum analyzer as follows

RBW: 3kHz
 VBW: 10kHz
 Detector Mode: AVG
 Sweep time: auto
 Trace mode: Max hold

3.3 Test setup

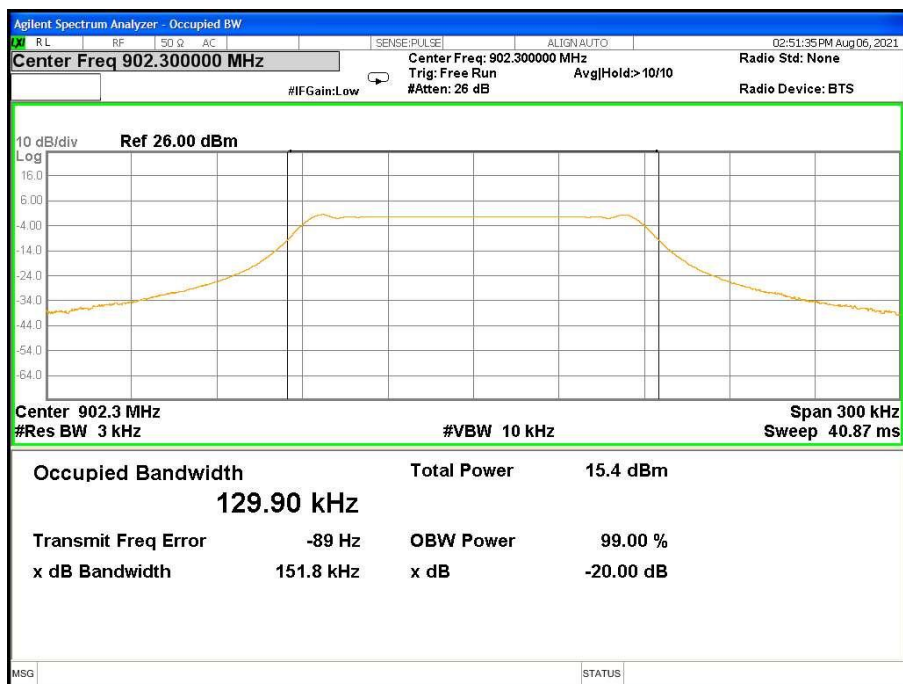


3.4 Test results

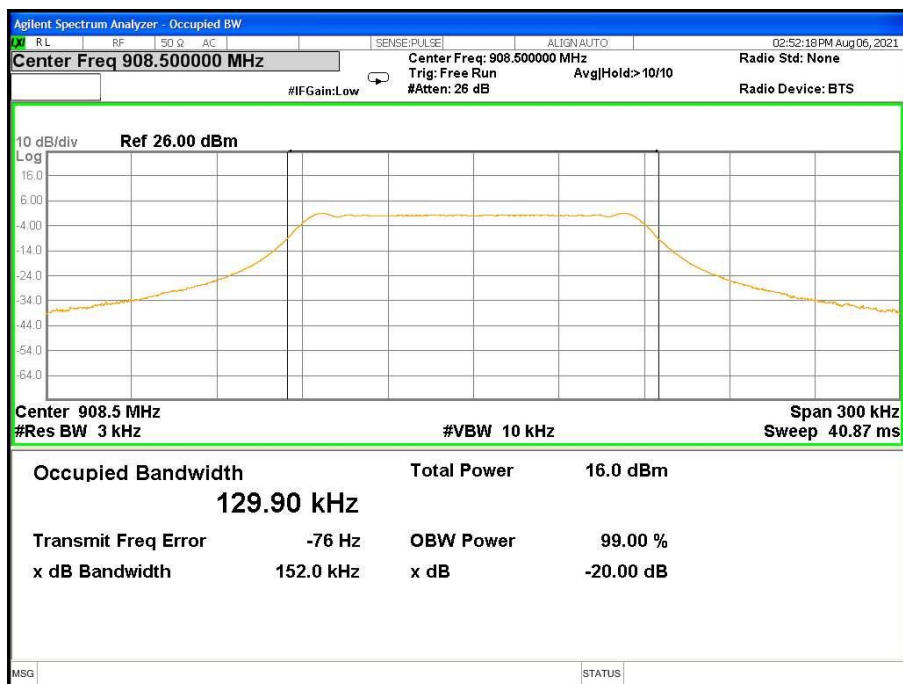
Frequency	20dB Bandwidth (MHz)	Result
902.3 MHz	0.1518	PASS
908.5 MHz	0.1520	PASS
914.9 MHz	0.1519	PASS

3.5 Original Test Data

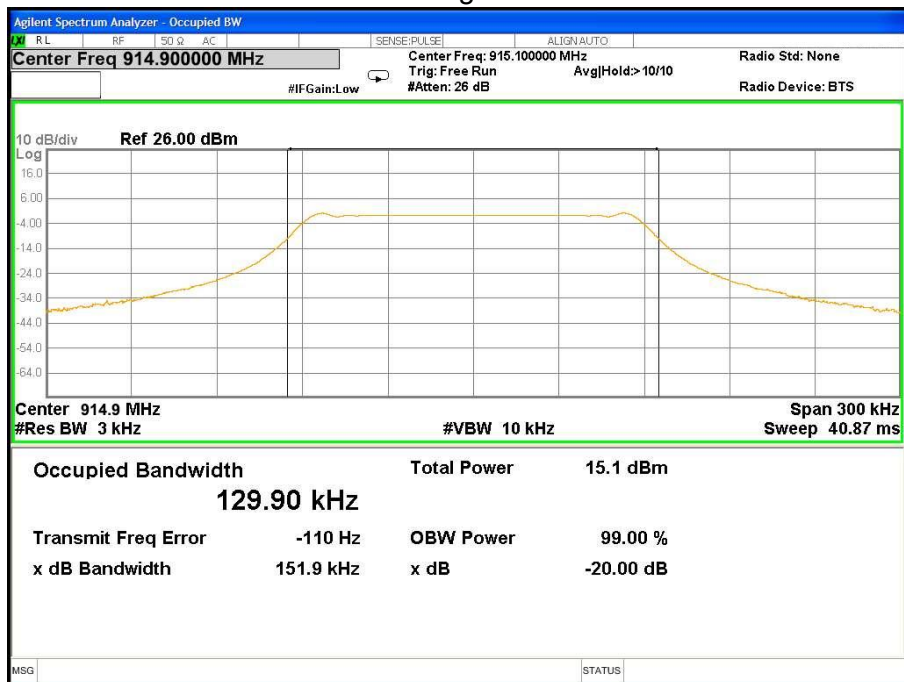
Low



Middle



High



4 CONDUCTED OUTPUT POWER

4.1 LIMIT

For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

4.2 TEST PROCEDURE

- Connect each EUT's antenna output to power sensor by RF cable and attenuator
- Measure the PK output power of each antenna port by power sensor.

4.3 TEST SETUP



4.5 TEST RESULTS

Channel (MHz)	Result (dBm)	Limit (dBm)	Verdict
902.3MHz	8.99	30	Pass
908.5MHz	8.34	30	Pass
914.9MHz	8.56	30	Pass

5. AVERAGE TIME OF OCCUPANCY

5.1 LIMIT

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system 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. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

5.2 TEST PROCEDURE

- The transmitter output (antenna port) was connected to the spectrum analyzer.
 - Set RBW = 68KHz/BW = 200KHz.
 - Use a video trigger with the trigger level set to enable triggering only on full pulses.
 - Sweep Time is $0.4 \times \text{channel number}$.
- Set the center frequency on any frequency would be measure and set the frequency span to zero span.
- Measure the maximum time duration of one single pulse.

5.3 TEST SETUP



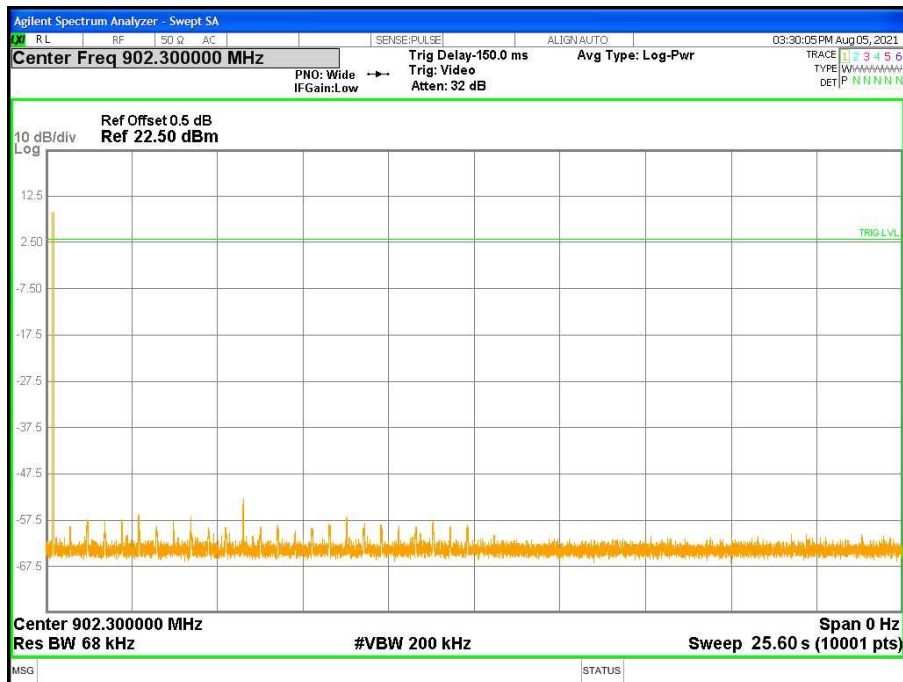
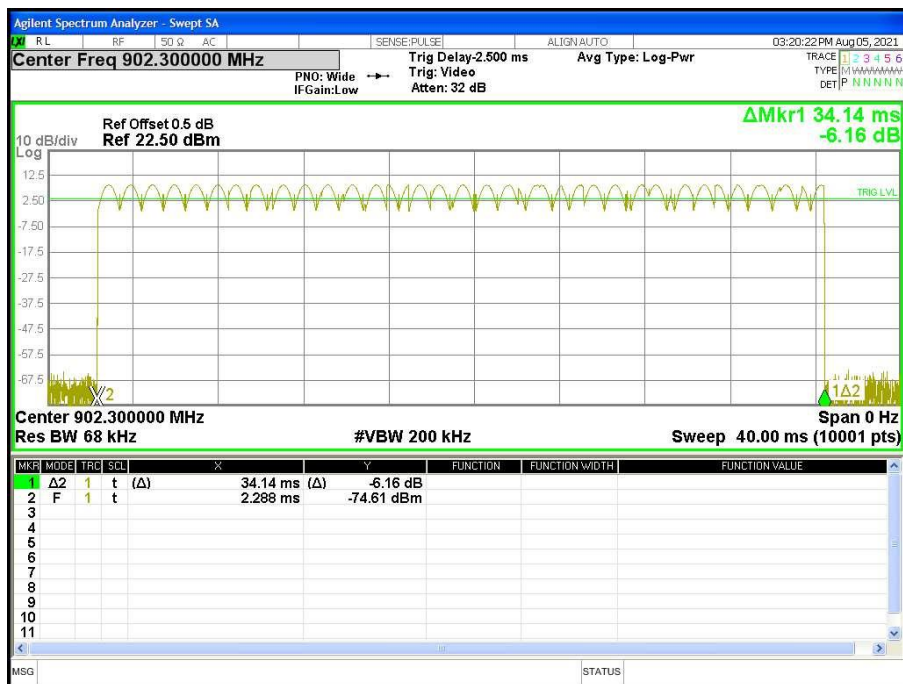
5.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

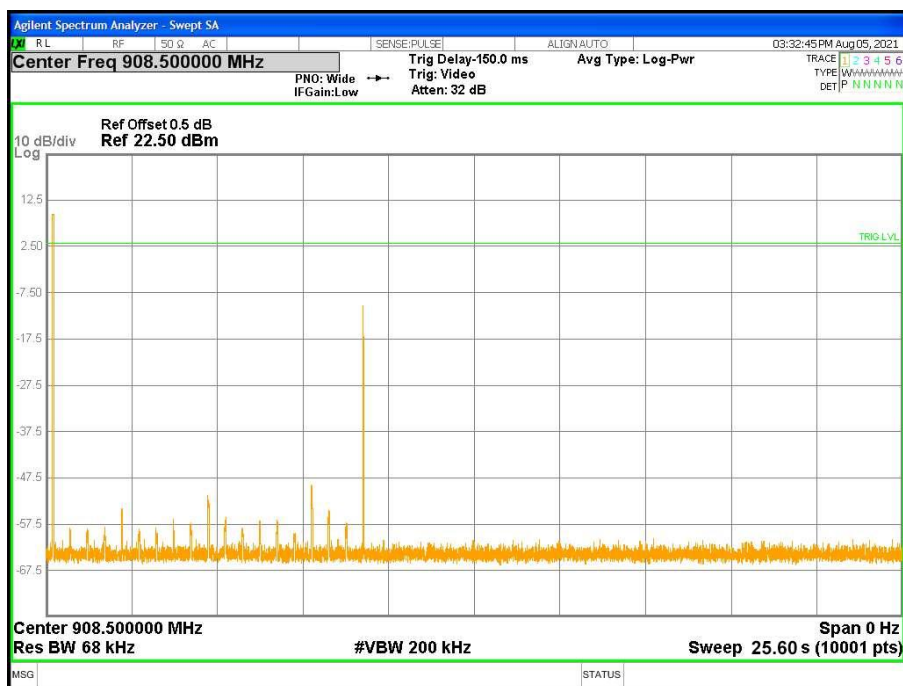
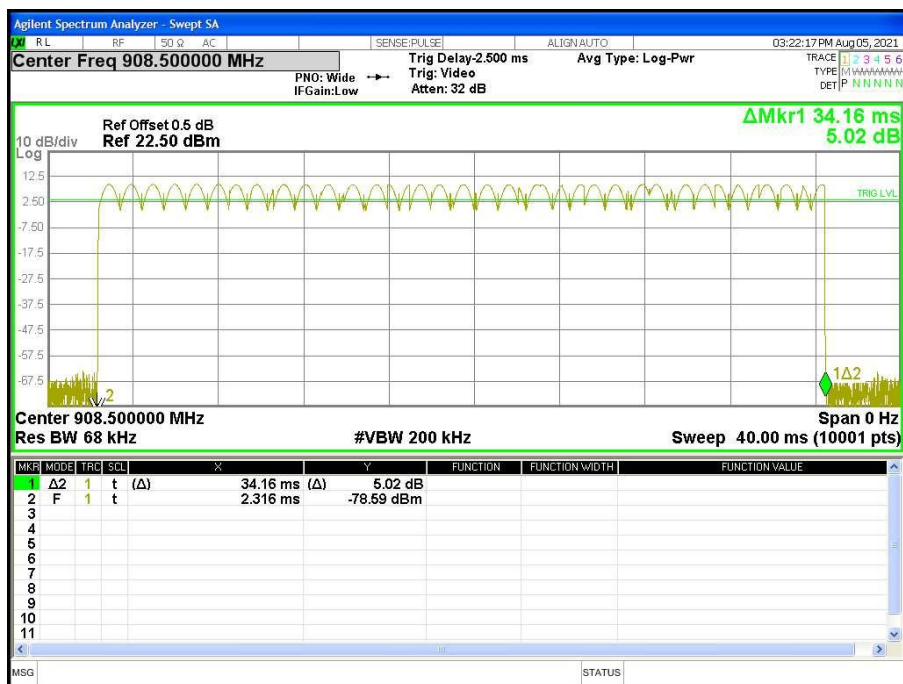
5.5 TEST RESULTS

Modulation	Channel	pulse time(ms)	Burst Number	Dwell Time(s)	Limits(s)
LongFi	low	34.140	1	0.034	0.4
	middle	34.160	1	0.034	0.4
	high	34.170	1	0.034	0.4

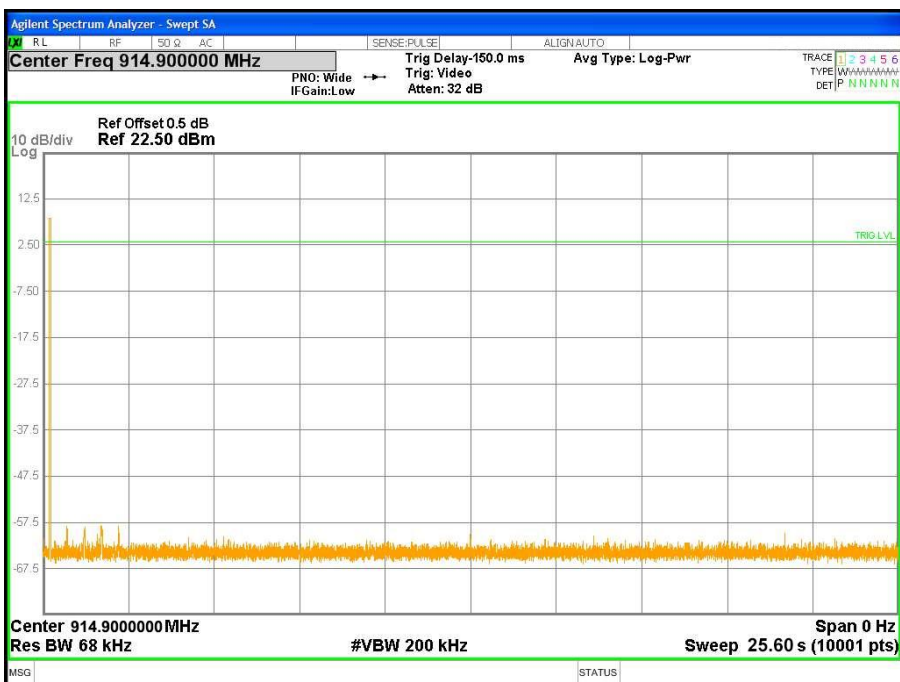
Low



Middle



High



6 BAND EDGE AND SPURIOUS(CONDUCTED)

6.1 LIMIT

In any 100kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 30dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power.

6.2 TEST PROCEDURE

(1) Connect EUT's antenna output to spectrum analyzer by RF cable.

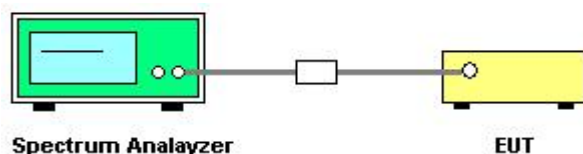
(2) Establish Allow the trace to stabilize, use the peak marker function to determine the maximum peak power level to establish the reference level.

(3) Set the spectrum analyzer as follows:

RBW:	100kHz
VBW:	300kHz
Span	Encompass frequency range to be measured
Number of measurement points	$\geq \text{span}/\text{RBW}$
Detector Mode:	Pake
Sweep time:	auto
Trace mode	Max hold

(4) Allow the trace to stabilize, use the peak marker function to determine the maximum amplitude of all unwanted emissions outside of the authorized frequency band

6.3 TEST SETUP

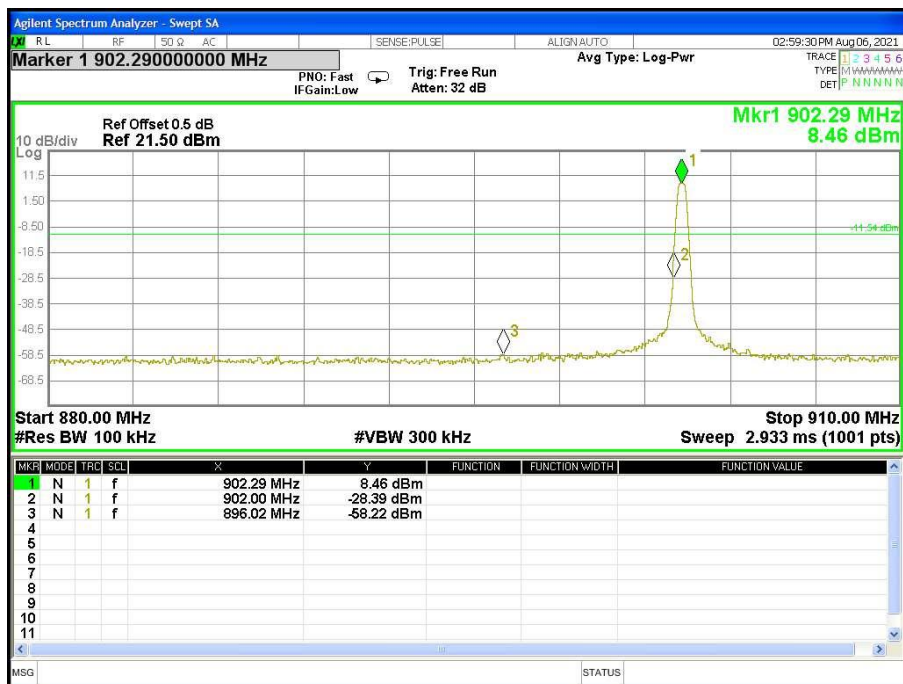


6.4 TEST RESULTS

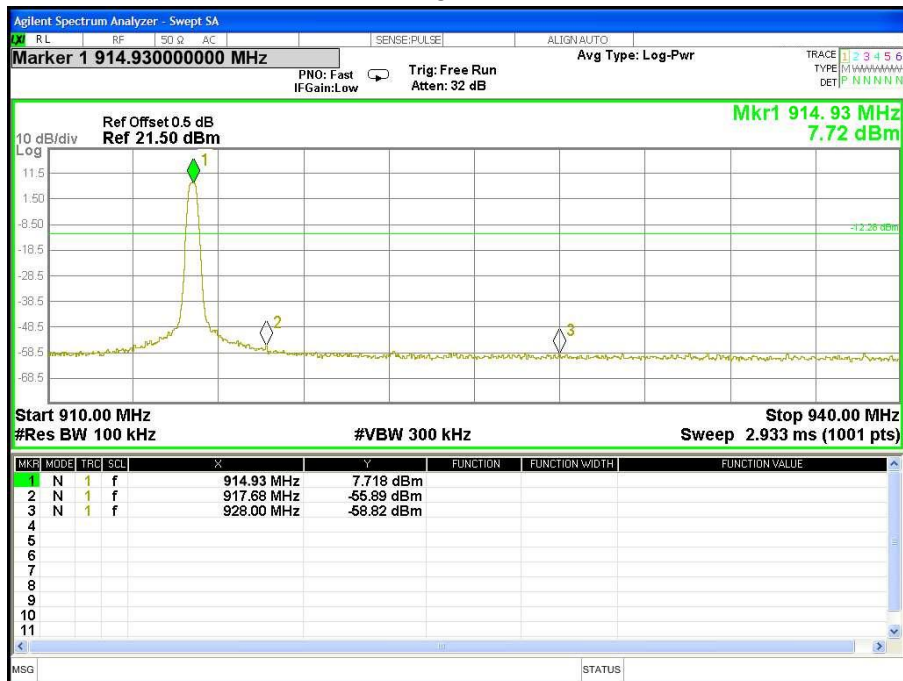
Eut set mode	CH or Frequency	Result
GFSK	CH 1	Pass
	CH 64	Pass

6.5 Original test data

Low CH

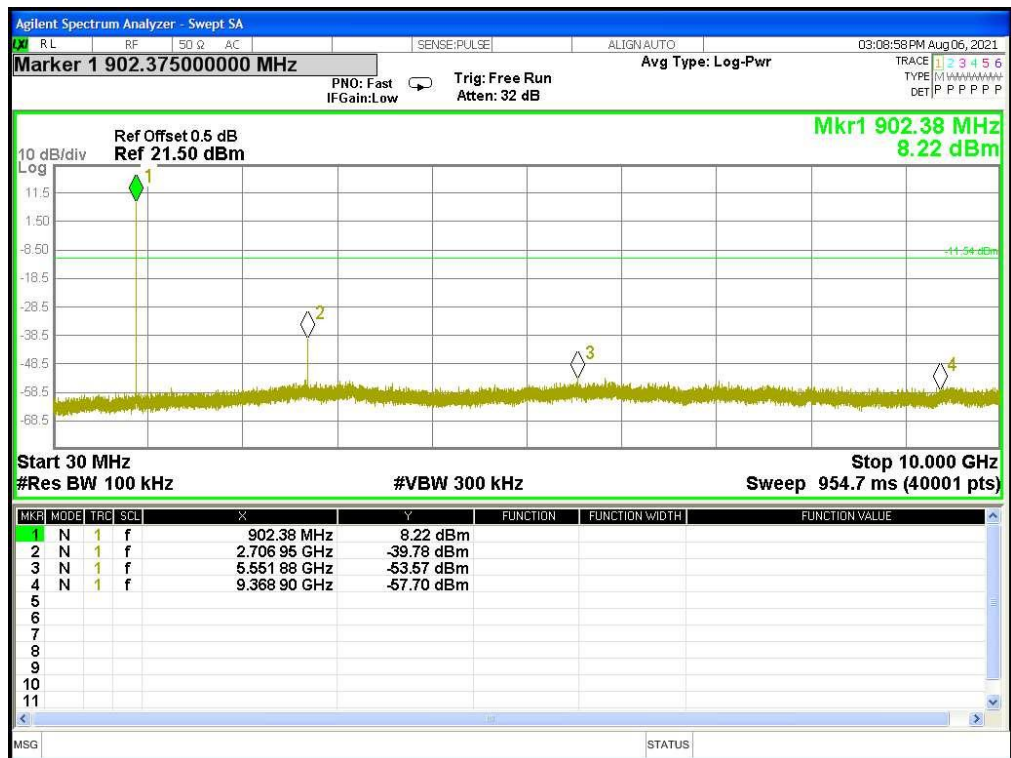


High CH

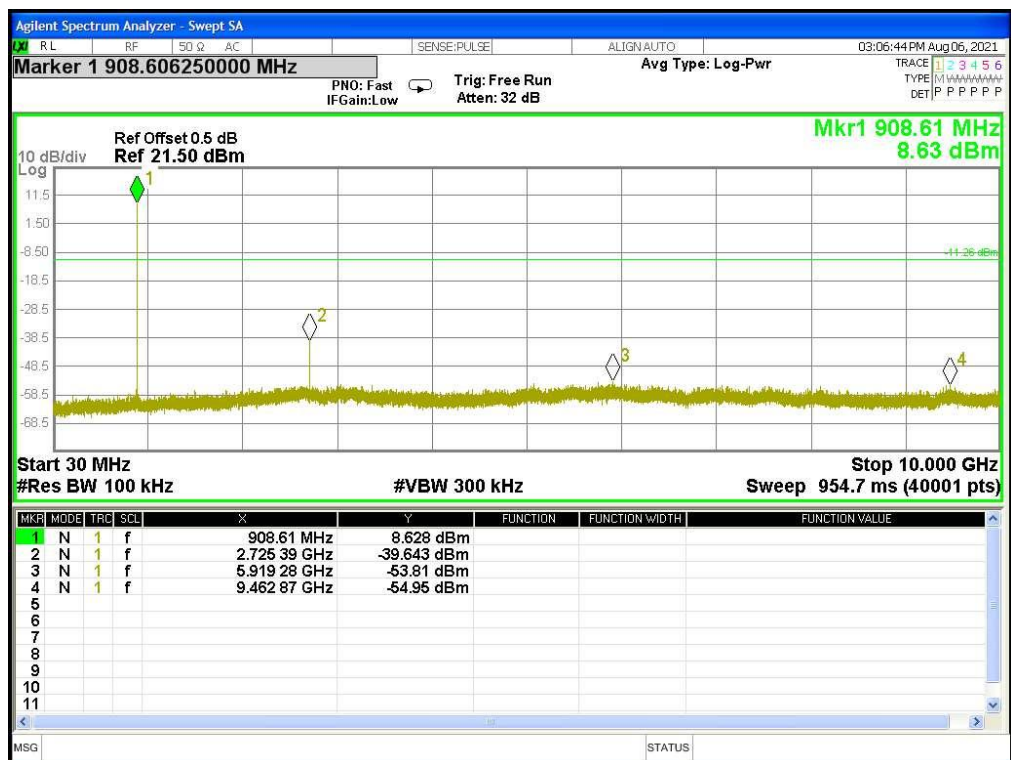


Spurious emissions

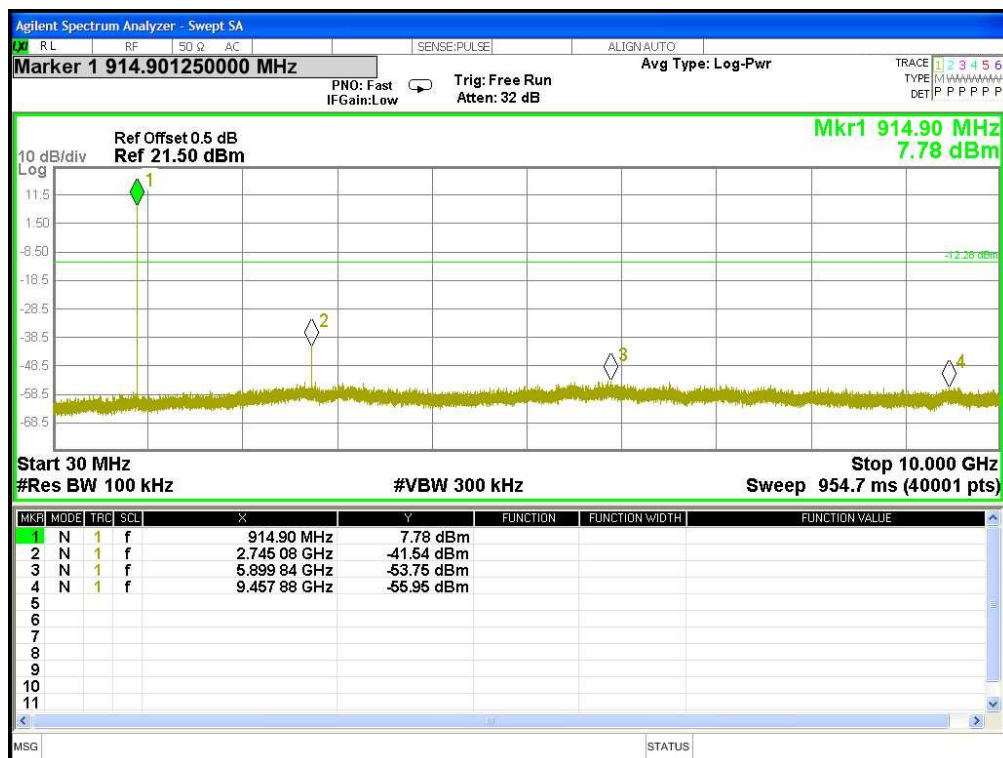
low CH
30MHz-10GHz



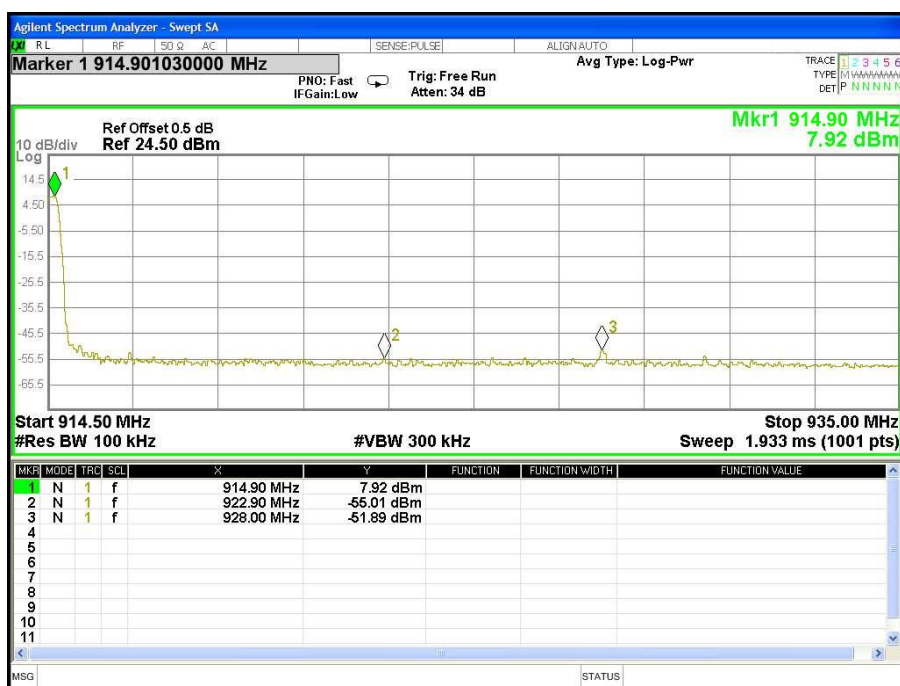
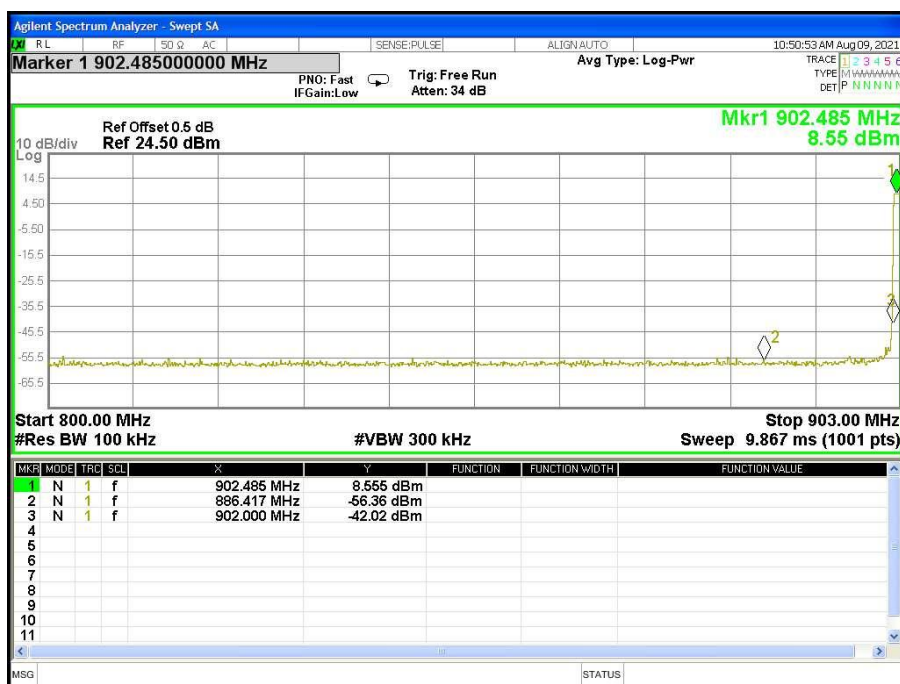
Middle CH
30MHz-10GHz



High CH 30MHz-10GHz



For Hopping Band edge



7 RADIATED EMISSION MEASUREMENT

7.1 RADIATED EMISSION LIMITS

In any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the Restricted band specified on Part15.205(a)&209(a) limit in the table and according to ANSI C63.10-2013 below has to be followed

LIMITS OF RADIATED EMISSION MEASUREMENT (0.009MHz - 1000MHz)

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
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

LIMITS OF RADIATED EMISSION MEASUREMENT (1GHz-25 GHz)

FREQUENCY (MHz)	(dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

For Radiated Emission

Spectrum Parameter	Setting
Attenuation	Auto
Detector	Peak/AV
Start Frequency	1000 MHz(Peak/AV)
Stop Frequency	10th carrier hamonic(Peak/AV)
RB / VB (emission in restricted band)	PK=1MHz / 1MHz, AV=1 MHz /10 Hz

For Band edge

Spectrum Parameter	Setting
Detector	Peak/AV
Start/Stop Frequency	Lower Band Edge: 2300 to 2403 MHz Upper Band Edge: 2479 to 2500 MHz
RB / VB (emission in restricted band)	PK=1MHz / 1MHz, AV=1 MHz / 10 Hz

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~90kHz / RB 200Hz for PK & AV
Start ~ Stop Frequency	90kHz~110kHz / RB 200Hz for QP
Start ~ Stop Frequency	110kHz~490kHz / RB 200Hz for PK & AV
Start ~ Stop Frequency	490kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

7.2 TEST PROCEDURE

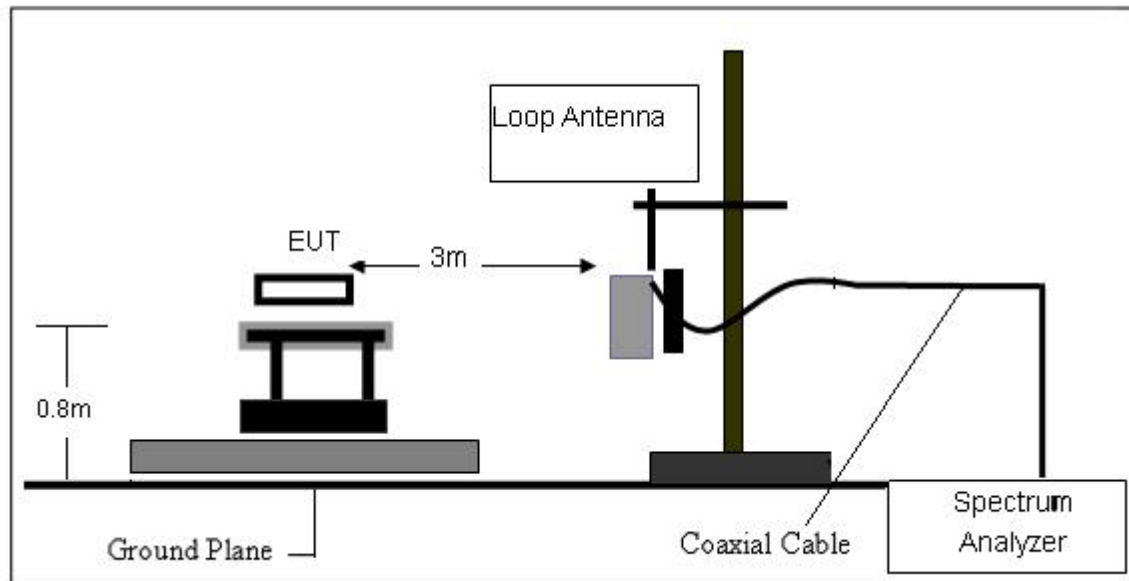
- The measuring distance of at 3 m shall be used for measurements at frequency 0.009MHz up to 1GHz, and above 1GHz.
- The EUT was placed on the top of a rotating table 0.8 meters (above 1GHz is 1.5 m) above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- The height of the equipment shall be 0.8 m (above 1GHz is 1.5 m); the height of the test antenna shall vary between 1 m to 4 m. horizontal and vertical polarizations of the antenna are set to make the measurement.
- The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then QuasiPeak detector mode re-measured.
- If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

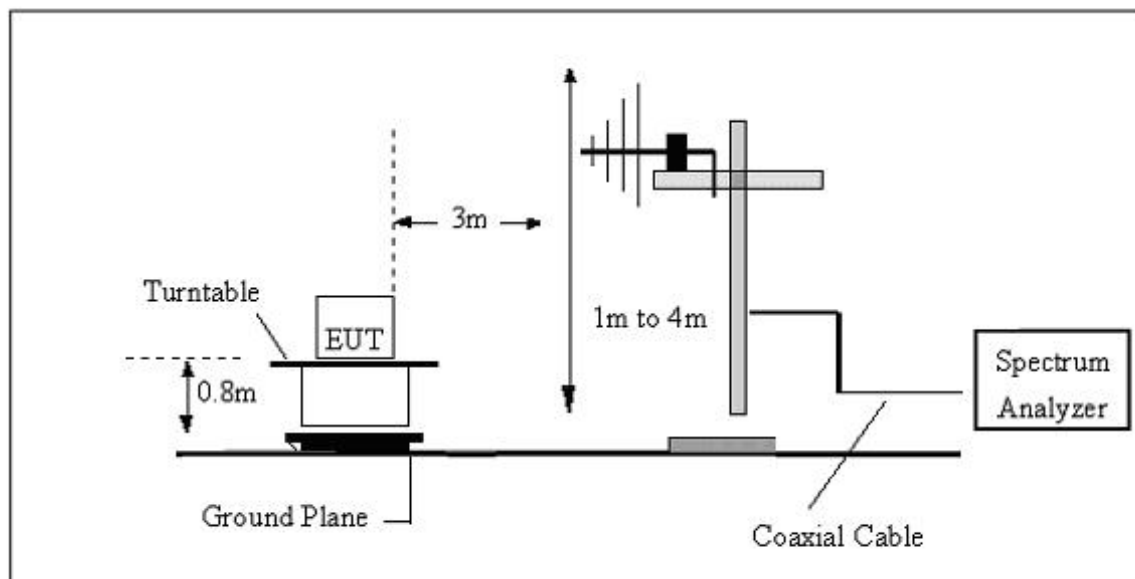
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

7.3 TESTSETUP

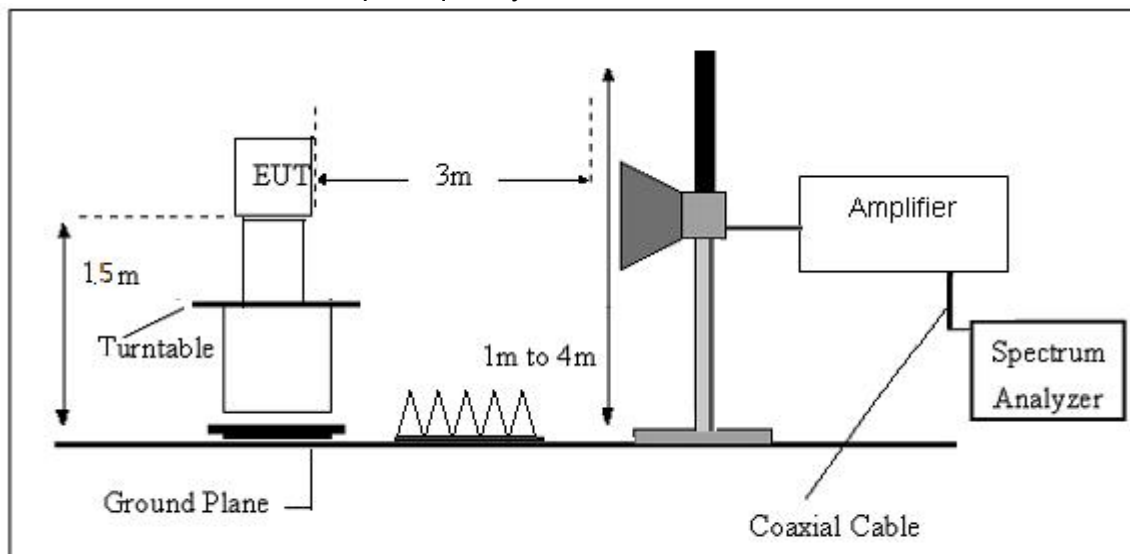
(A) Radiated Emission Test-Up Frequency Below 30MHz



(B) Radiated Emission Test-Up Frequency 30MHz~1GHz



(C) Radiated Emission Test-Up Frequency Above 1GHz



7.4. TEST RESULTS

(9KHz-30MHz)

Temperature:	22.7℃	Relative Humidity:	61%
Test Voltage:	DC 48V	Test Mode:	LongFi

Freq.	Reading	Limit	Margin	State	Test Result
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F	
--	--	--	--	--	PASS
--	--	--	--	--	PASS

Note:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor = $40 \log (\text{specific distance}/\text{test distance})$ (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

30MHz-1GHz

Temperature:	24.7°C	Relative Humidity:	61%
Test Voltage:	DC 48V	Phase:	Horizontal
Test Mode:	LongFi/914.9MHz(worst)		



No.	Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	31.0703	40.95	-13.78	27.17	40.00	-12.83	QP
2	61.5617	34.14	-17.68	16.46	40.00	-23.54	QP
3	148.4410	43.05	-20.05	23.00	43.50	-20.50	QP
4	230.0985	42.87	-15.35	27.52	46.00	-18.48	QP
5	340.7817	43.41	-12.80	30.61	46.00	-15.39	QP
6	758.0407	33.37	-4.83	28.54	46.00	-17.46	QP

Note: 1. Margin = Result (Result =Reading + Factor)-Limit

2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.

3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

Temperature:	24.7°C	Relative Humidity:	61%
Test Voltage:	DC 48V	Phase:	Vertical
Test Mode:	LongFi/914.9MHz(worst)		



No.	Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	32.8637	47.41	-14.89	32.52	40.00	-7.48	QP
2	58.6126	41.12	-16.92	24.20	40.00	-15.80	QP
3	83.2296	41.35	-21.34	20.01	40.00	-19.99	QP
4	125.0066	46.47	-20.39	26.08	43.50	-17.42	QP
5	322.1886	39.47	-13.23	26.24	46.00	-19.76	QP
6	640.6110	35.71	-7.03	28.68	46.00	-17.32	QP

Note: 1. Margin = Result (Result =Reading + Factor)-Limit

2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.

3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

■ Above 1GHz

For 1 GHz to 10GHz

For 902.30MHz

Horizontal

Frequency	Reading Level	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1804.6	58.53	-9.12	49.41	74	-24.59	peak
1804.6	42.69	-9.12	33.57	54	-20.43	AVG
2706.9	61.37	-8.86	52.51	74	-21.49	peak
2706.9	49.49	-8.86	40.63	54	-13.37	AVG
3609.2	57.36	-4.09	53.27	74	-20.73	peak
3609.2	43.68	-4.06	39.62	54	-14.38	AVG
Remark: Factor = Antenna Factor + Cable Loss — Pre-amplifier.						

Vertical

Frequency	Ivleter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1804.6	59.83	-9.12	50.71	74	-23.29	peak
1804.6	43.97	-9.12	34.85	54	-19.15	AVG
2706.9	63.39	-8.86	54.53	74	-19.47	peak
2706.9	48.45	-8.86	39.59	54	-14.41	AVG
3609.2	58.75	-4.09	54.66	74	-19.34	peak
3609.2	42.39	-4.06	38.33	54	-15.67	AVG
Remark: Factor = Antenna Factor + Cable Loss — Pre-amplifier.						

For 908.50MHz

Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1817.0	58.85	-9.12	49.73	74	-24.27	peak
1817.0	44.18	-9.12	35.06	54	-18.94	AVG
2725.5	66.36	-8.8	57.56	74	-16.44	peak
2725.5	48.45	-8.8	39.65	54	-14.35	AVG
3634.0	57.21	-4.07	53.14	74	-20.86	peak
3634.0	43.39	-4.07	39.32	54	-14.68	AVG
Remark: Factor = Antenna Factor + Cable Loss — Pre-amplifier.						

Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1817.0	60.12	-9.12	51	74	-23	peak
1817.0	45.68	-9.12	36.56	54	-17.44	AVG
2725.5	62.39	-8.8	53.59	74	-20.41	peak
2725.5	46.85	-8.8	38.05	54	-15.95	AVG
3634.0	60.19	-4.07	56.12	74	-17.88	peak
3634.0	43.75	-4.07	39.68	54	-14.32	AVG
Remark: Factor = Antenna Factor + Cable Loss — Pre-amplifier.						

For 914.90MHz

Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1829.8	58.42	-9.12	49.3	74	-24.7	peak
1829.8	43.83	-9.12	34.71	54	-19.29	AVG
2744.7	62.74	-8.75	53.99	74	-20.01	peak
2744.7	47.79	-8.75	39.04	54	-14.96	AVG
3659.6	58.42	-4.03	54.39	74	-19.61	peak
3659.6	42.91	-4.03	38.88	54	-15.12	AVG

Remark: Factor = Antenna Factor + Cable Loss — Pre-amplifier.

Vertical

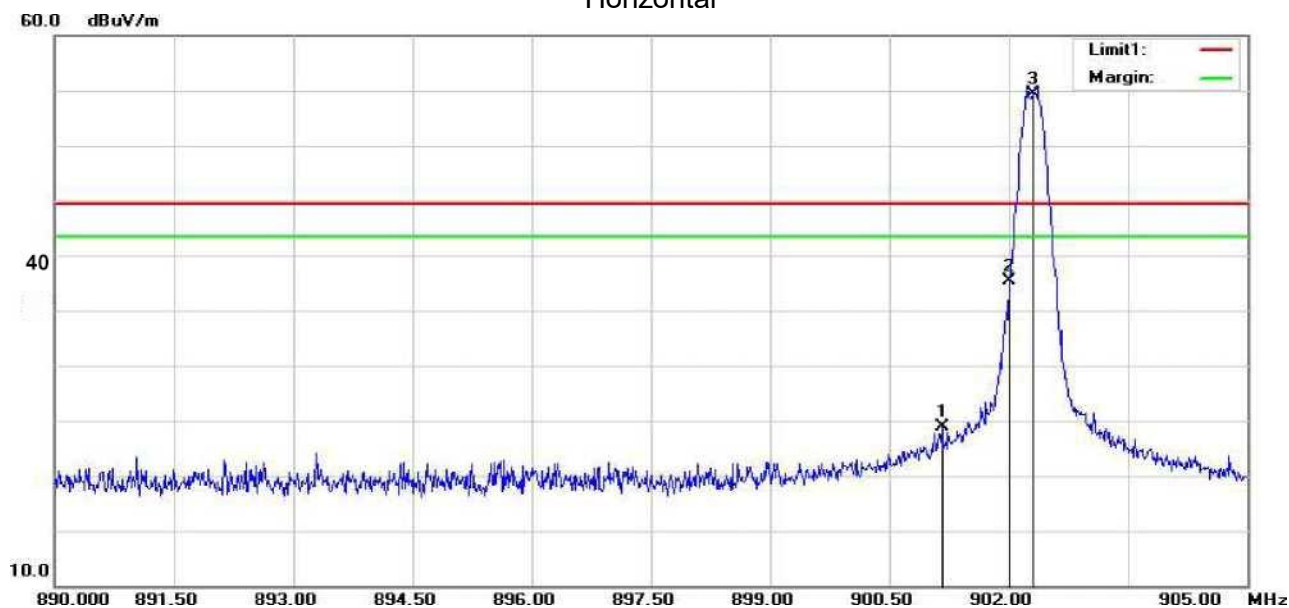
Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1829.8	58.95	-9.12	49.83	74	-24.17	peak
1829.8	45.83	-9.12	36.71	54	-17.29	AVG
2744.7	62.72	-8.75	53.97	74	-20.03	peak
2744.7	46.69	-8.75	37.94	54	-16.06	AVG
3659.6	55.32	-4.03	51.29	74	-22.71	peak
3659.6	41.33	-4.03	37.3	54	-16.7	AVG

Remark: Factor = Antenna Factor + Cable Loss — Pre-amplifier.

Radiated Band Edge data

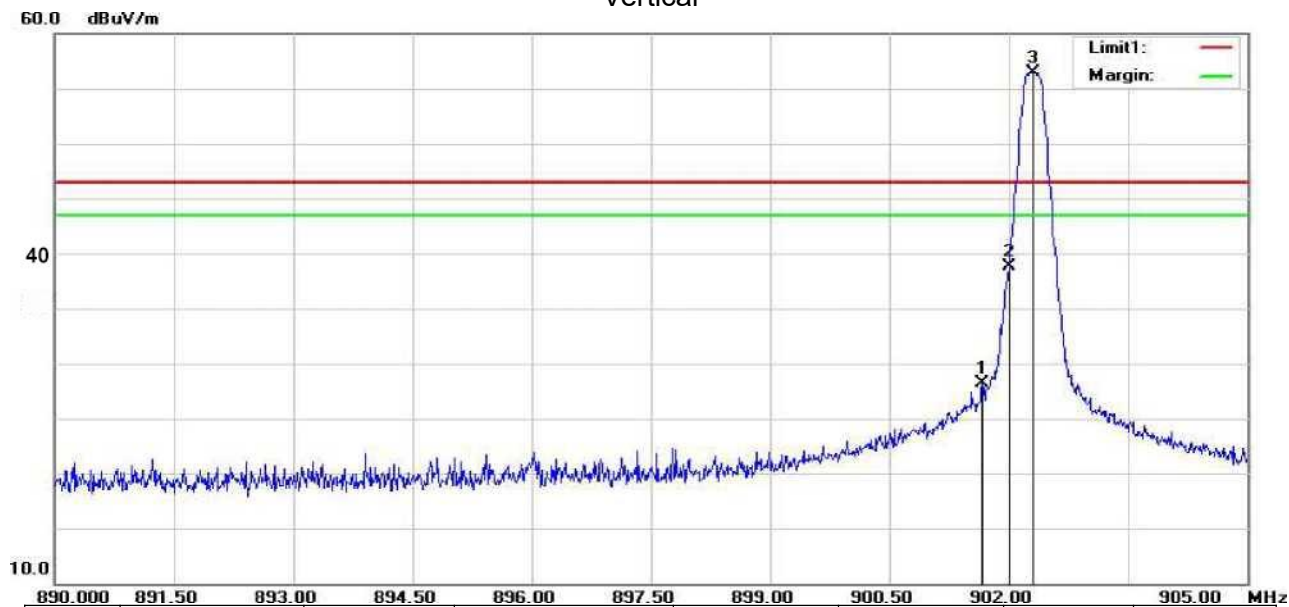
Remark: All restriction band have been tested, and only the worst case is shown in report

Low Horizontal



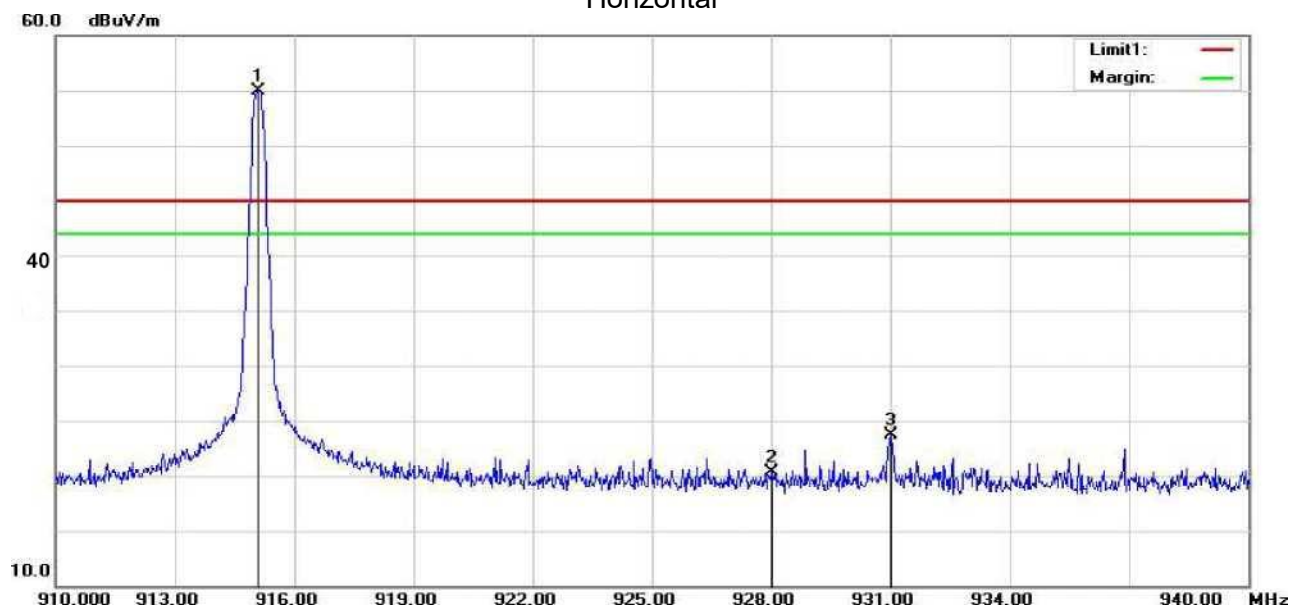
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	901.6000	23.54	-0.41	23.14	46	-22.86	QP
2	902.0000	31.24	-0.40	30.84	46	-15.16	QP
3	902.3000	55.93	-0.39	55.54	/	/	QP

Vertical



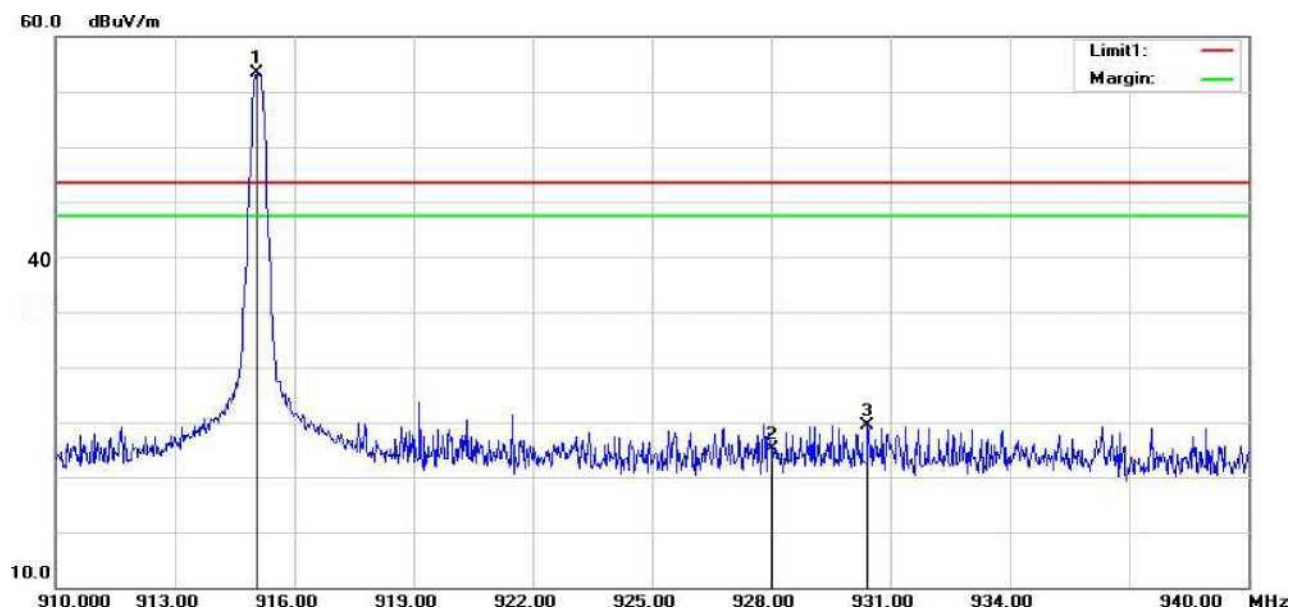
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	901.6700	24.31	-0.40	23.91	46	-22.09	QP
2	902.0000	32.26	-0.40	31.86	46	-14.14	QP
3	902.3000	59.63	-0.39	59.24	/	/	QP

High Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	914.9000	57.13	-0.10	57.03	/	/	QP
2	928.0000	16.34	0.43	16.77	46	-29.23	QP
3	931.0000	18.23	0.63	18.86	46	-27.14	QP

Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	914.9000	58.31	-0.10	58.21	/	/	QP
2	928.0000	17.65	0.43	18.08	46	-27.92	QP
3	930.4300	19.39	0.58	19.97	46	-26.03	QP

8.NUMBER OF HOPPING CHANNEL

8.1 LIMIT

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system 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. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

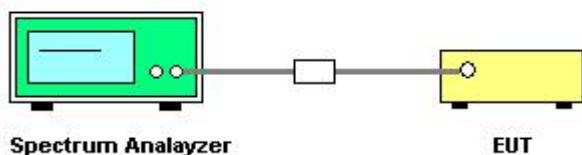
Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> Operating Frequency Range
RB	30KHz
VB	100KHZ
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

8.2 TEST PROCEDURE

The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.

Spectrum Setting: RBW= 30KHz, VBW=100KHZ, Sweep time = Auto.

8.3 TEST SETUP

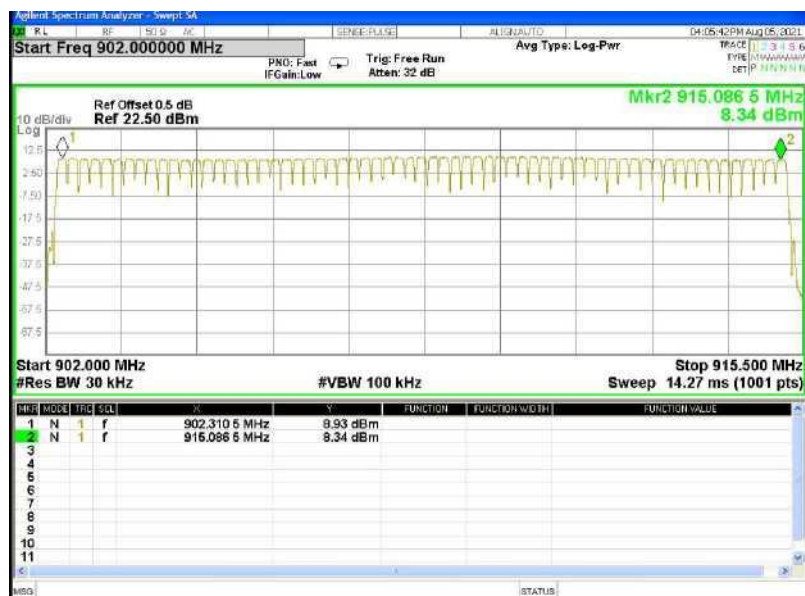


8.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

8.5 TEST RESULTS

Temperature:	25 °C	Relative Humidity:	60%
Test Mode:	Hopping Mode -LongFi Mode	Test Voltage:	DC 48V



9. HOPPING CHANNEL SEPARATION MEASUREMENT

9.1 LIMIT

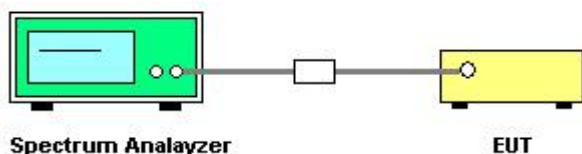
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	500KHz
RB	30 KHz
VB	100 KHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

9.2 TEST PROCEDURE

- The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
- Spectrum Setting: RBW= 30KHz, VBW= 100KHz, Sweep time = Auto.

9.3 TEST SETUP



9.4 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

Temperature:	25 °C	Relative Humidity:	60%
Test Mode:	CH1/CH35/CH64 -LongFi Mode	Test Voltage:	DC 48V

9.5 TEST RESULTS

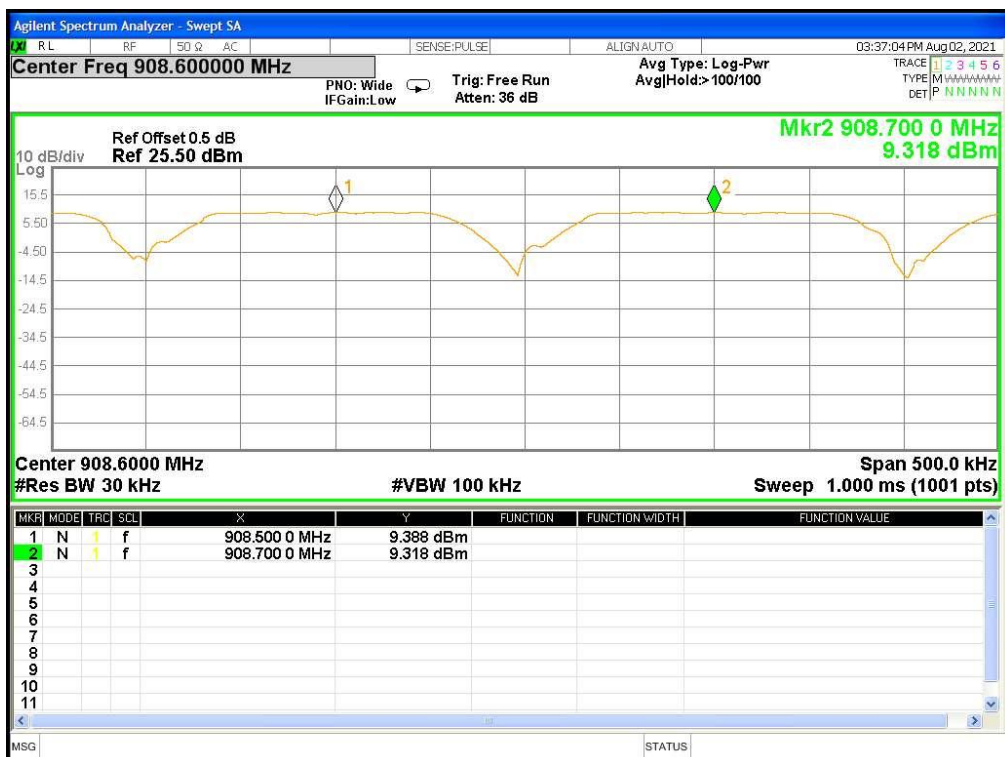
Frequency	Mark1 Frequency (MHz)	Mark2 Frequency (MHz)	Ch. Separation (MHz)	Limit (MHz)	Result
902.3 MHz	902.300	902.500	0.200	0.152	Complies
908.5 MHz	908.500	908.700	0.200	0.152	Complies
914.9 MHz	914.900	915.100	0.200	0.152	Complies

For LongFi: Ch. Separation Limits: > 20dB bandwidth

CH 1



CH 35



CH 64



10. ANTENNA REQUIREMENT

10.1 STANDARD REQUIREMENT

For intentional device, according to FCC 47 CFR Section 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. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

10.2 RESULT

The antennas used for this product are external antenna and no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is 1.0dBi.

XXXXXXXXEND OF THE REPORTXXXXXX