



FCC Test Report

Report No: FCS202202152W01

Issued for

Applicant:	Zhong Shan Anders Electronics Co.,Ltd
Address:	No.2 WeiHao Street, LongJuHuan Village,ShaXi Town ZhongShan China
Product Name:	Wireless Voice Transmission Device
Brand Name:	N/A
Model Name:	ATG-780T;
Series Model:	ATG-780R, ATG-780HT, ATG-3806T,ATG-3806HT ATG-3806R, ATG-C32,ATG-C16,ATG-C64, ATG-CG32
FCC ID:	2AVHJ-ATG-780T
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TEST RESULT CERTIFICATION

Applicant's Name.....: Zhong Shan Anders Electronics Co.,Ltd
Address.....: No.2 WeiHao Street, LongJuHuan Village,ShaXi Town
ZhongShan China
Manufacture's Name.....: Zhong Shan Anders Electronics Co.,Ltd
Address.....: No.2 WeiHao Street, LongJuHuan Village,ShaXi Town
ZhongShan China

Product Description

Product Name.....: Wireless Voice Transmission Device
Brand Name: N/A
Model Name.....: ATG-780T;
Series Model.....: Refer to page 1
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.: 24 Mar ,2022 ~ 17 Mar ,2022

Date of Issue.....: 12 Apr ,2022

Test Result.....: Pass

Tested by : Scott Shen
(Scott Shen)
Reviewed by : Duke Qian
(Duke Qian)
Approved by : Jack Wang
(Jack Wang)



Table of Contents	Page
1. SUMMARY OF TEST RESULTS	6
1.1 TEST FACTORY	7
1.2 MEASUREMENT UNCERTAINTY	7
2. GENERAL INFORMATION	8
2.1 GENERAL DESCRIPTION OF THE EUT	8
2.2 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	9
2.3 DESCRIPTION OF NECESSARY ACCESSORIES AND SUPPORT UNITS	11
2.4 EQUIPMENTS LIST	12
3. 20DB BANDWIDTH	13
3.1 Limit	13
3.2 Test Procedure	13
3.3 Test setup	13
3.4 Test results	14
3.5 Original Test Data	14
4 CONDUCTED OUTPUT POWER	16
4.1 LIMIT	16
4.2 TEST PROCEDURE	16
4.3 TEST SETUP	16
4.5 TEST RESULTS	16
5. AVERAGE TIME OF OCCUPANCY	17
5.1 LIMIT	17
5.2 TEST PROCEDURE	17
5.3 TEST SETUP	17
5.4 EUT OPERATION CONDITIONS	17
5.5 TEST RESULTS	18
6 BAND EDGE AND SPURIOUS(CONDUCTED)	21
6.1 LIMIT	21
6.2 TEST PROCEDURE	21
6.3 TEST SETUP	21
6.4 TEST RESULTS	22
6.5 Original test data	22
Low CH	22
.....	22

Table of Contents	Page
High CH	22
Spurious emissions	23
low CH	23
30MHZ-10GHZ	23
Middle CH	23
30MHz-10GHz	23
High CH	24
30MHZ-10GHZ	24
For Hopping Band edge	25
7 RADIATED EMISSION MEASUREMENT	26
7.1 RADIATED EMISSION LIMITS	26
7.2 TEST PROCEDURE	27
7.3 TESTSETUP	28
7.4. TEST RESULTS	30
8.NUMBER OF HOPPING CHANNEL	37
8.1 LIMIT	37
8.2 TEST PROCEDURE	37
8.3 TEST SETUP	37
8.4 EUT OPERATION CONDITIONS	37
8.5 TEST RESULTS	38
9.HOPPING CHANNEL SEPARATION MEASUREMEN	39
9.1 LIMIT	39
9.2 TEST PROCEDURE	39
9.3 TEST SETUP	39
9.4 EUT OPERATION CONDITIONS	39
9.5 TEST RESULTS	40
10. CONDUCTED EMISSION MEASUREMENT	42
10.3 TEST SETUP	43
11. ANTENNA REQUIREMENT	46
11.1 STANDARD REQUIREMENT	46
11.2 RESULT	46

Revision History

Rev.	Issue Date	Effect Page	Contents
00	11 Apr, 2022	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	PASS	--
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:	Baohao Technolong Building 1 No.15 Gongye West Road Hi-Tech Industrial Park Songsham Lake Dongguan,Guangdong. 523808 P.R.C
Telephone:	+86-769-27280901
Fax:	+86-769-27280901
Laboray Accreditations	
FCC Test Firm Registration Number: 514908 CNAS Number: L15566 Designation number: CN0127 A2LA accreditation number: 5545.01 ISED Number: 25801 CAB ID : CN0097	

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expended 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	Wireless Voice Transmission Device
Trade Name	N/A
Model Name	ATG-780T;
Series Model	Refer to page 1
Model Difference	The above product with same circuit, PCB layout, electrical parts, materials and wiring structures, Appearance shape, the materials of decorative accessories is same, only different color.
Channel List	Please refer to the Note 2.
Operation frequency	902.3MHz-927.5MHz
Modulation:	GFSK
Transmitter rate:	1MHz
Power supply	DC 5V
Battery	DC 3.7V
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	Frequency (MHz)	Channel	Frequency (MHz)
1	902.3	65	915.1
2	902.5	66	915.3
...	...	...	...
...	...	...	...
63	914.7	126	927.3
64	914.9	127	927.5

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 GFSK
2	Middle channel GFSK
3	High channel GFSK
4	Hopping GFSK

Test model description	Frequency(MHz)
Low channel GFSK	902.3
Middle channel GFSK	914.9
High channel GFSK	927.5

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
1	Adapter	XIAOMI	MDY-10-EF	N/A	Test using

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	2022.02.10	2023.02.09
Signal Analyzer	R&S	FSV40-N	FCS-E012	2022.02.10	2023.02.09
Active loop Antenna	ZHINAN	ZN30900C	FCS-E013	2022.02.10	2023.02.09
Bilog Antenna	SCHWARZBECK	VULB 9168	FCS-E002	2022.02.10	2023.02.09
Horn Antenna	SCHWARZBECK	BBHA 9120D	FCS-E003	2022.02.10	2023.02.09
SHF-EHF Horn Antenna (18G-40GHz)	A-INFO	LB-180400-KF	FCS-E018	2022.02.10	2023.02.09
Pre-Amplifier(0.1M-3G Hz)	EMCI	EM330N	FCS-E004	2022.02.10	2023.02.09
Pre-Amplifier (1G-18GHz)	N/A	TSAMP-0518SE	FCS-E014	2022.02.10	2023.02.09
Pre-Amplifier (18G-40GHz)	TERA-MW	TRLA-0400	FCS-E019	2022.02.10	2023.02.09
Temperature & Humidity	HTC-1	victor	FCS-E005	2022.02.10	2023.02.09
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	2022.02.10	2023.02.09
LISN	R&S	ENV216	FCS-E007	2022.02.10	2023.02.09
LISN	ETS	3810/2NM	FCS-E009	2022.02.10	2023.02.09
Temperature & Humidity	HTC-1	victor	FCS-E008	2022.02.10	2023.02.09
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	2022.02.10	2023.02.09
Spectrum Analyzer	Agilent	E4447A	MY50180039	2022.02.10	2023.02.09
Spectrum Analyzer	R&S	FSV-40	101499	2022.02.10	2023.02.09
Power Sensor	Agilent	UX2021XA	FCS-E021	2022.02.10	2023.02.09
Testing Software	EZ-EMC(Ver.STSLAB 03A1 RE)				

3. 20DB BANDWIDTH

3.1 Limit

FCC Part 5 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

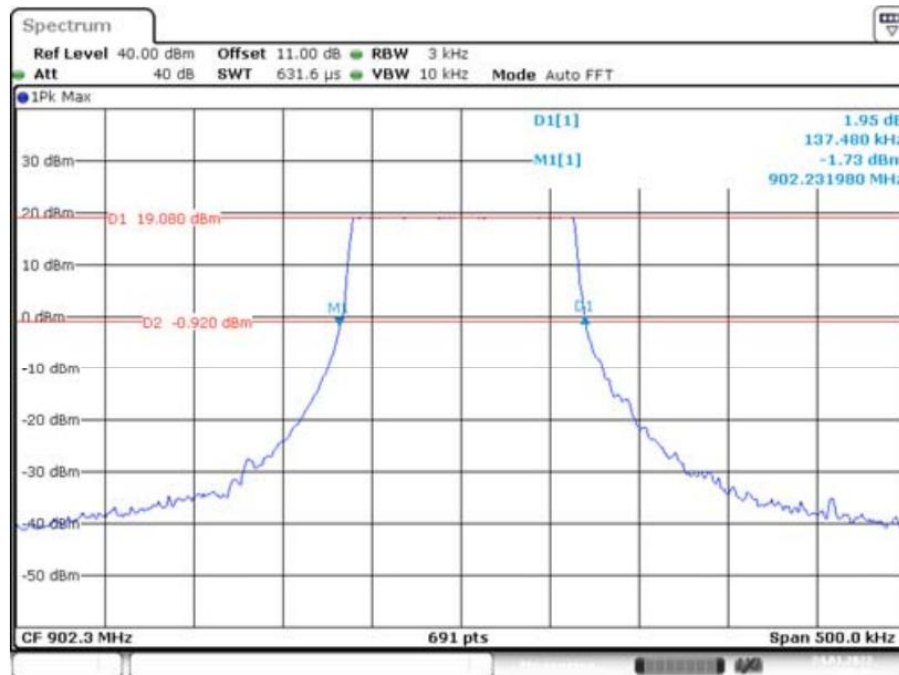


3.4 Test results

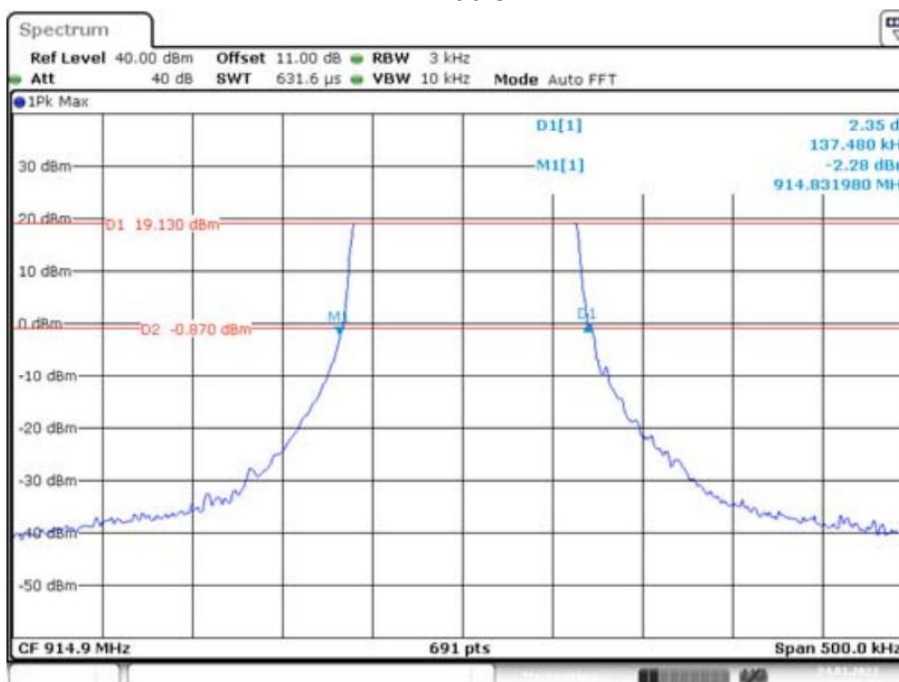
Frequency	20dB Bandwidth (MHz)	Result
902.3 MHz	0.137	PASS
914.9 MHz	0.137	PASS
927.5 MHz	0.140	PASS

3.5 Original Test Data

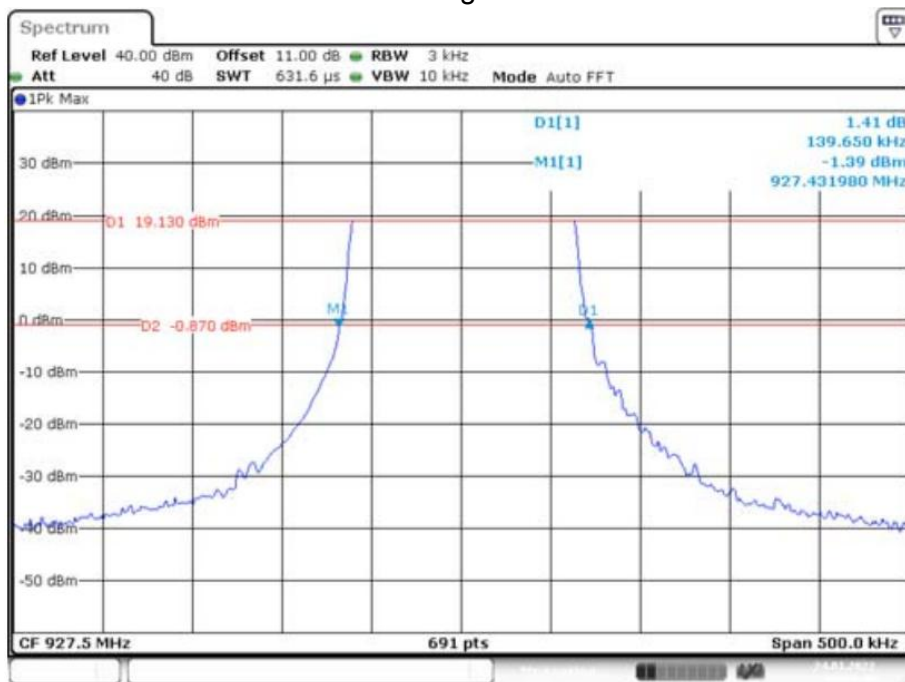
Low



Middle



High



4 CONDUCTED OUTPUT POWER

4.1 LIMIT

FCC Part 15.247, Subpart C RSS-247 Issue 2				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (b)(2) RSS-247	Output Power	1 W	902-928	PASS
RSS-247	EIRP	4W	902-928	PASS

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
914.9MHz	8.34	30	Pass
927.5MHz	8.56	30	Pass

5. AVERAGE TIME OF OCCUPANCY

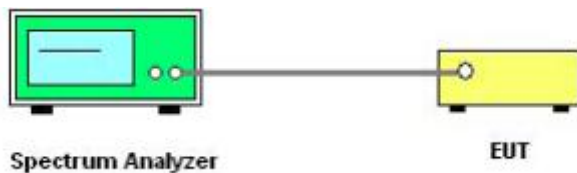
5.1 LIMIT

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



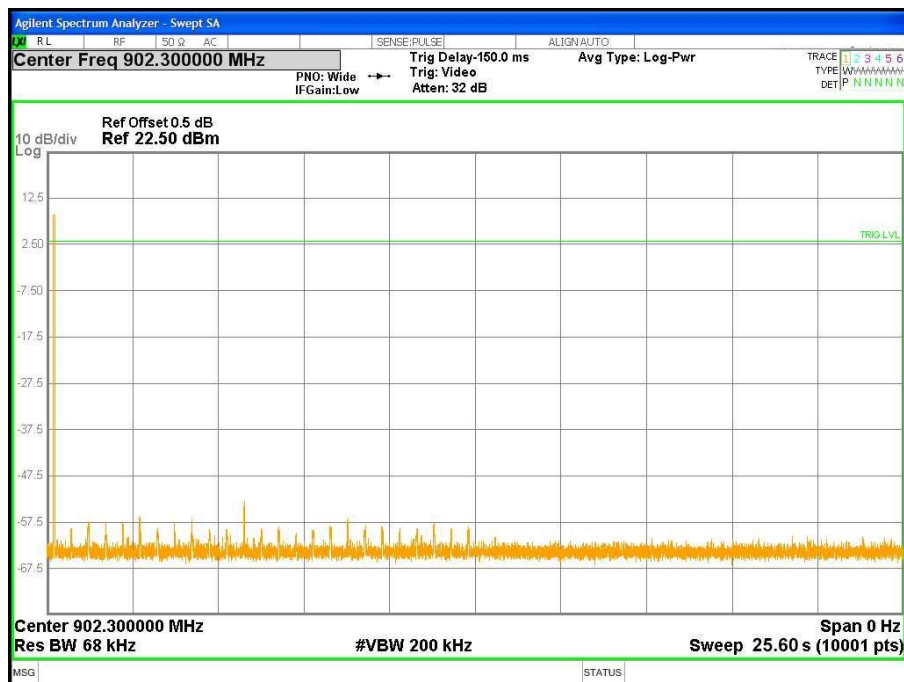
5.4 EUT OPERATION CONDITIONS

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.

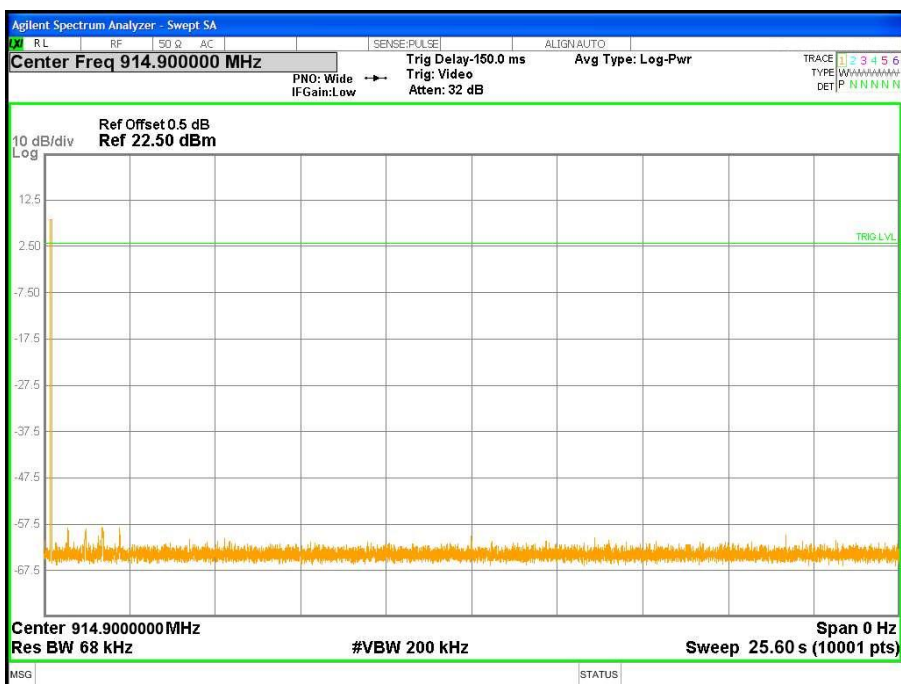
5.5 TEST RESULTS

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

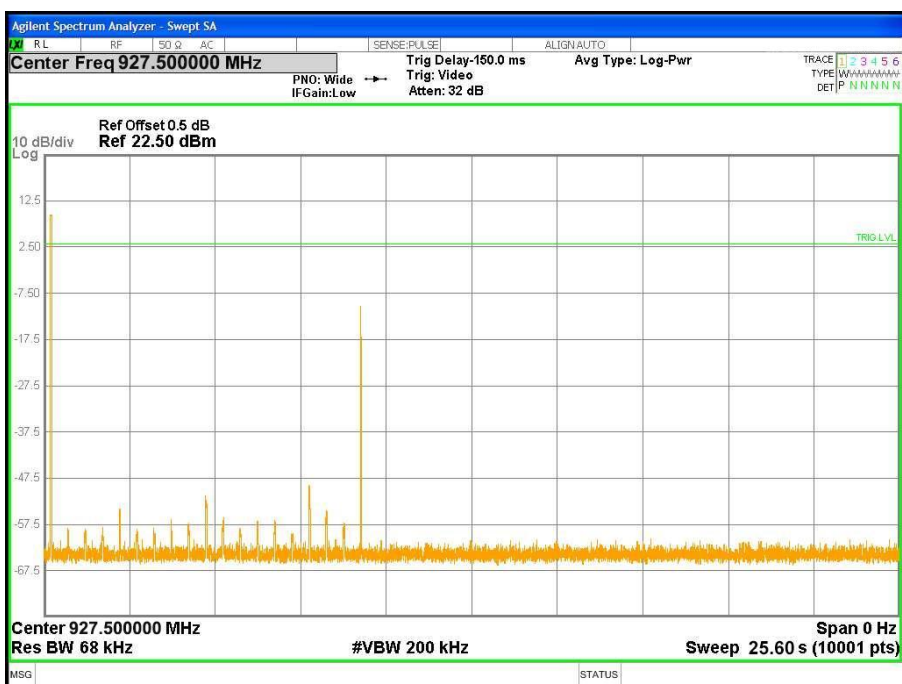
Low



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 a reference level by using the following procedure:

Center frequency	DTS Channel center frequency
RBW:	100kHz
VBW:	300kHz
Span	1.5times the DTS bandwidth
Detector Mode:	Pake
Sweep time:	auto
Trace mode	Max hold

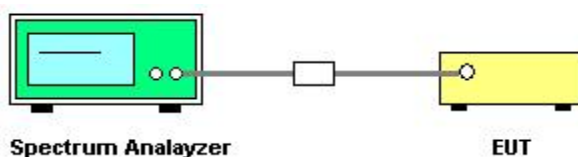
(3) Establish Allow the trace to stabilize, use the peak marker function to determine the maximum peak power level to establish the reference level.

(4) 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

(5) 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

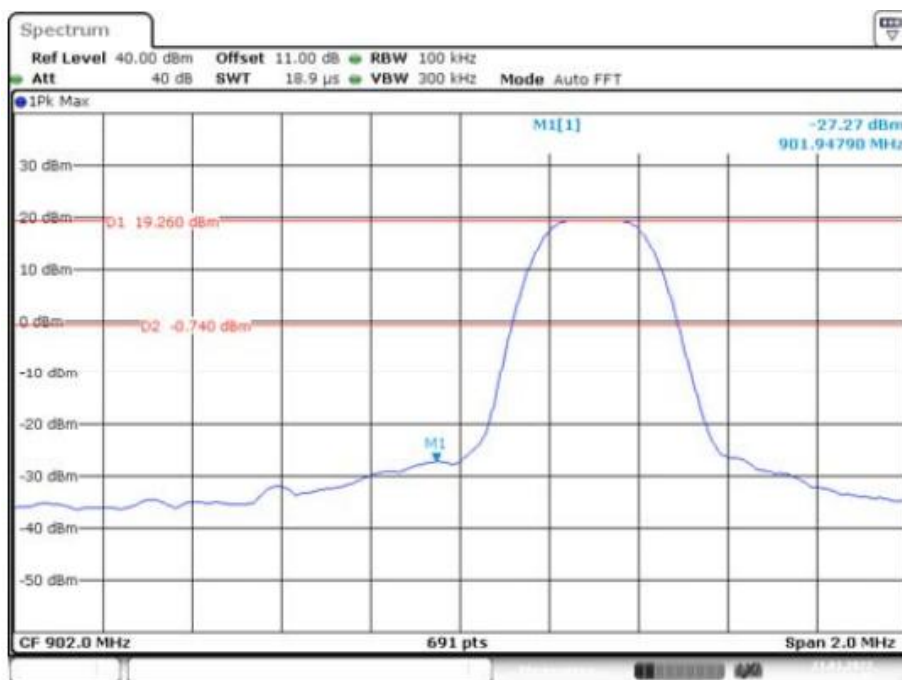


6.4 TEST RESULTS

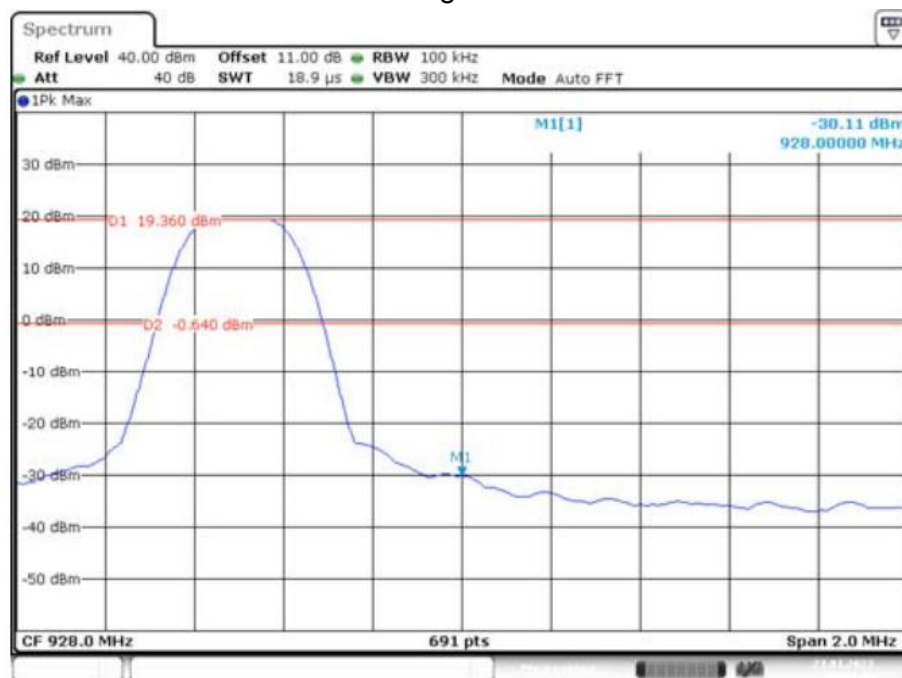
Eut set mode	CH or Frequency	Result
GFSK	LOW	Pass
	HIGH	Pass

6.5 Original test data

Low CH

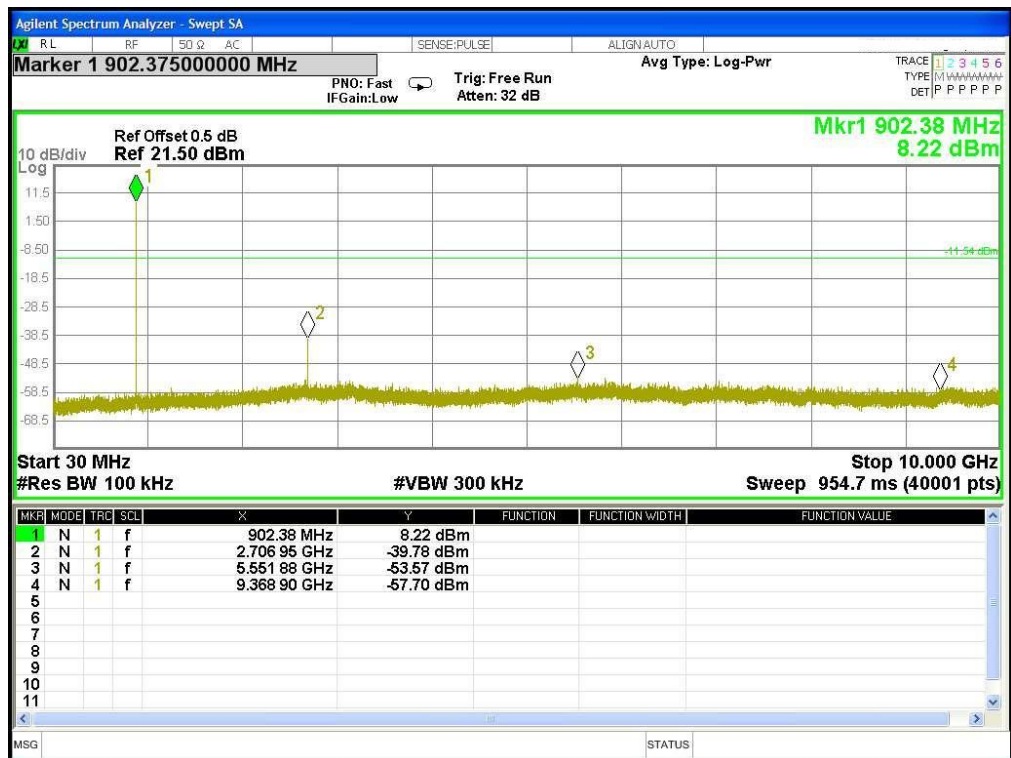


High CH

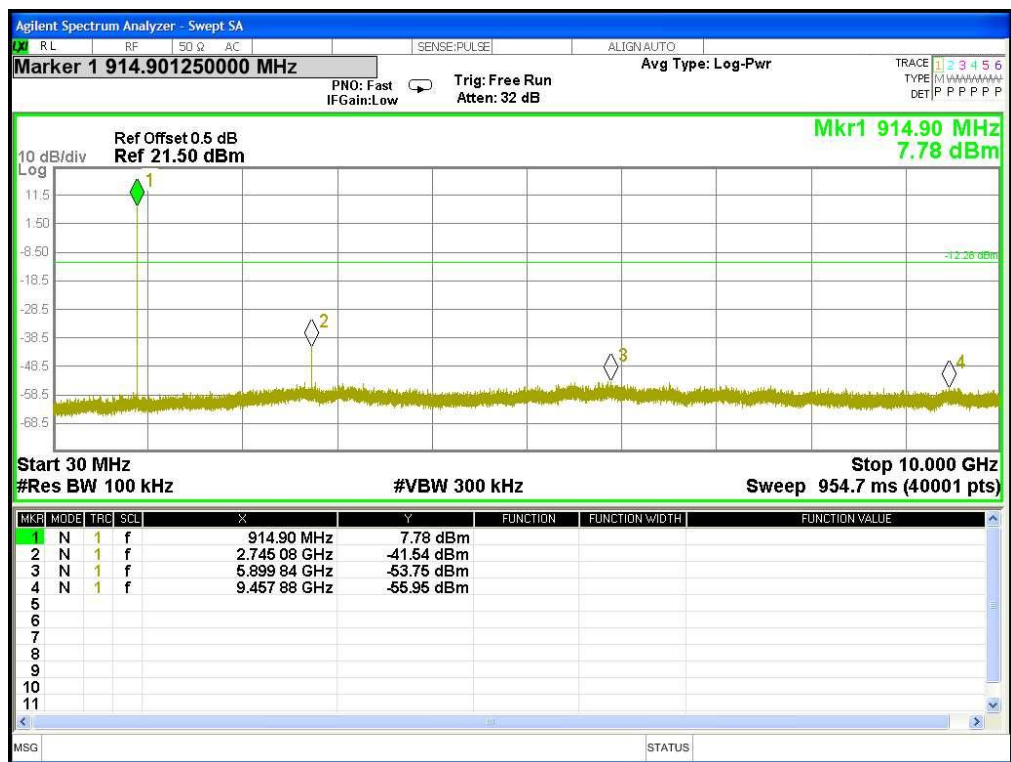


Spurious emissions

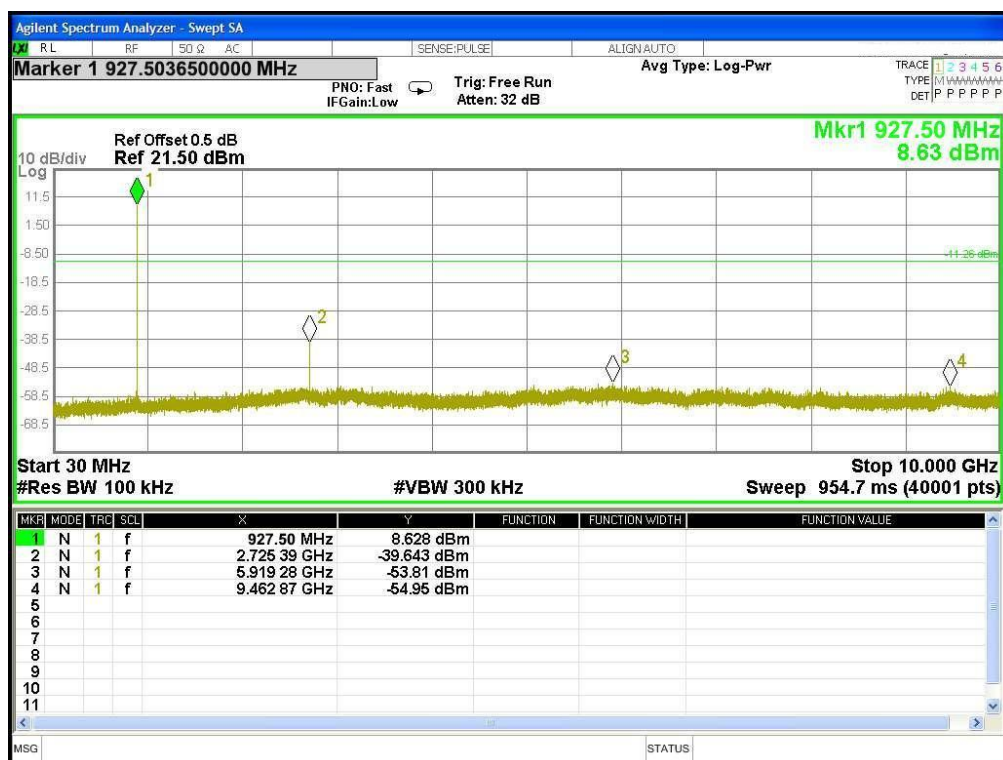
low CH
30MHz-10GHz



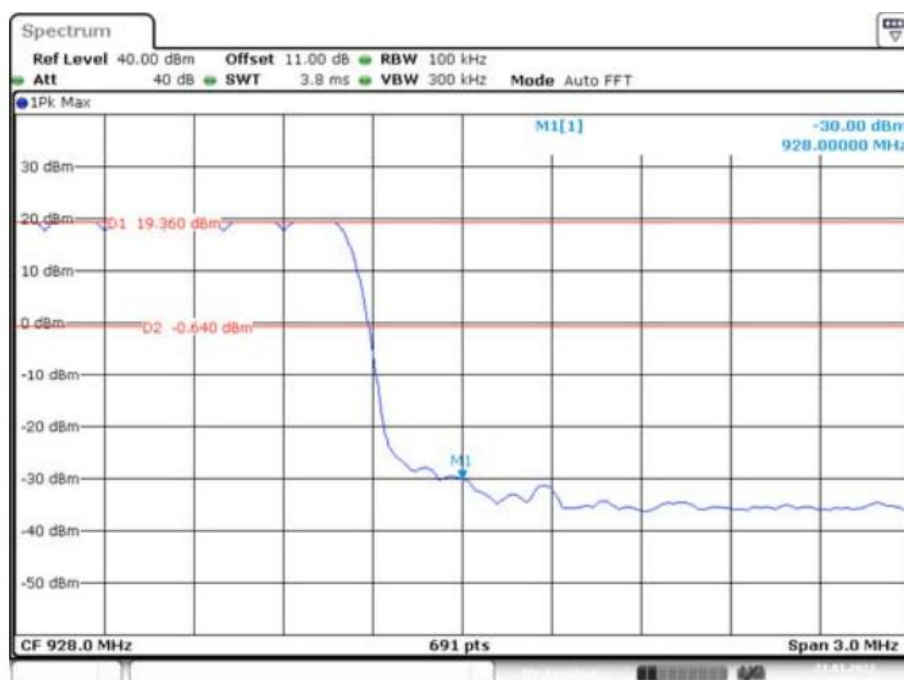
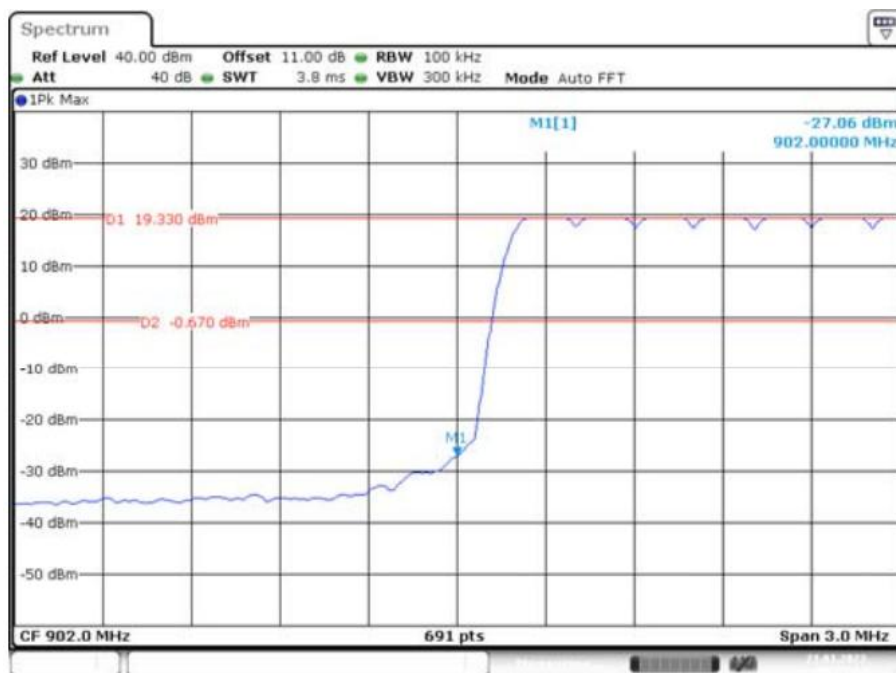
Middle CH
30MHz-10GHz



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

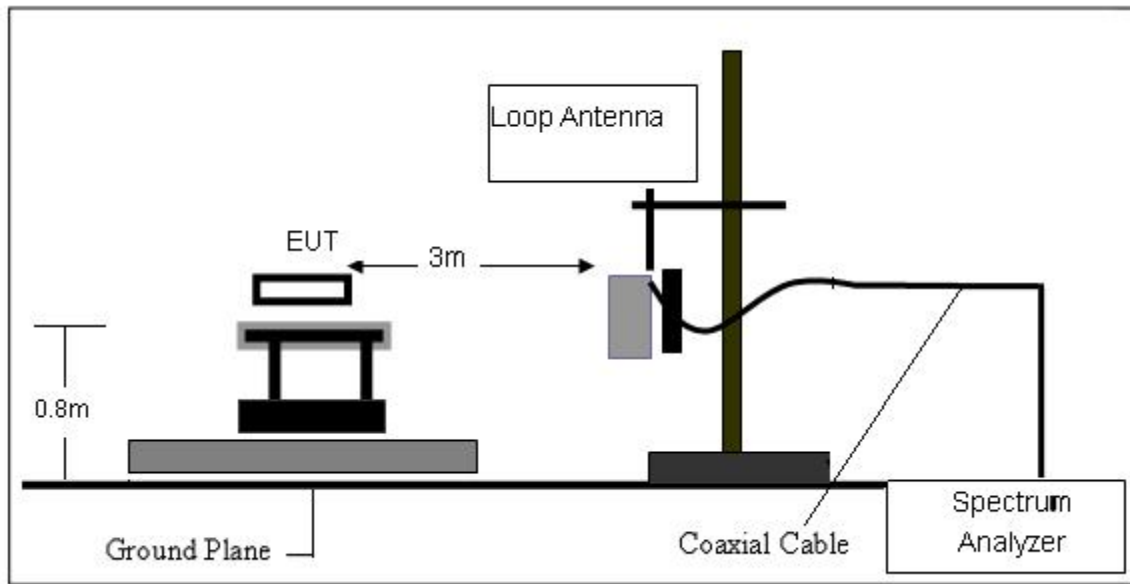
- The measuring distance of at 3 m shall be used for measurements at frequency 0.009MHz up to 1GHz, and above 1GHz.
- The EUT was placed on the top of a rotating table 0.8 meters (above 1GHz is 1.5 m) above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine 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:

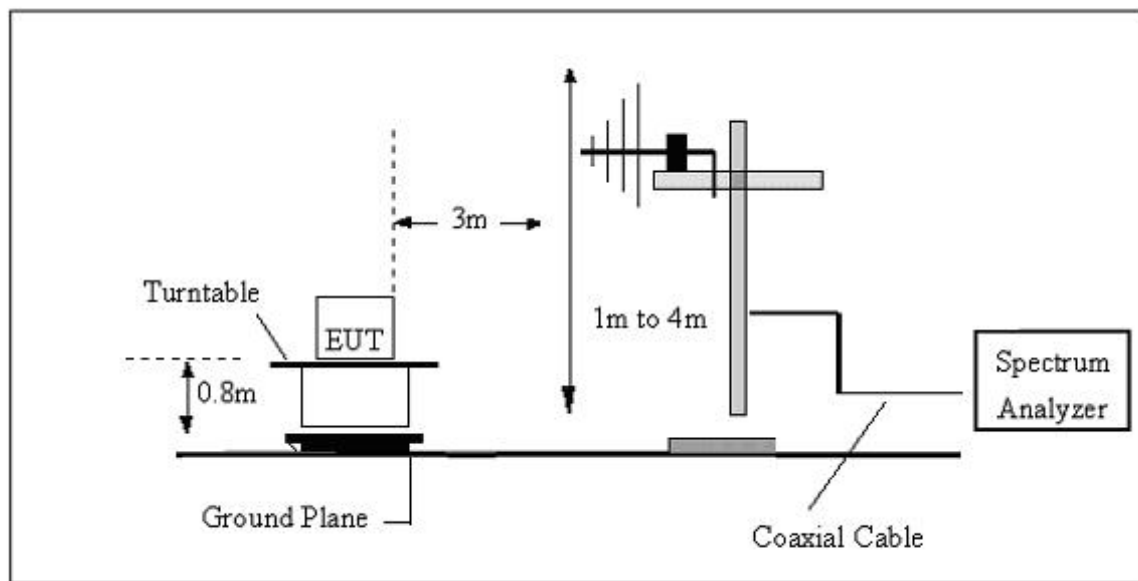
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

7.3 TESTSETUP

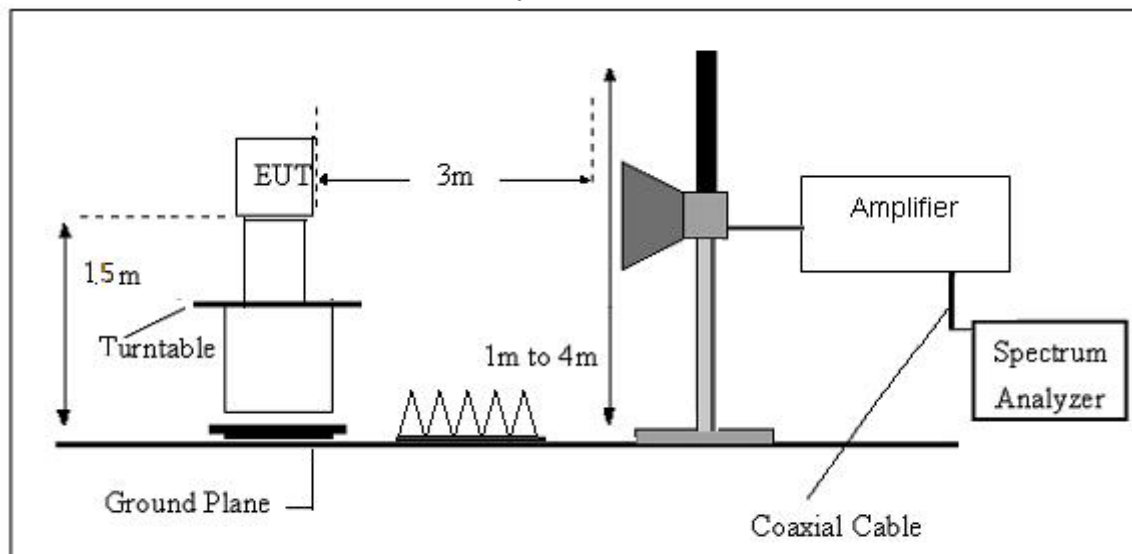
(A) Radiated Emission Test-Up Frequency Below 30MHz



(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°C	Relative Humidity:	61%
Test Voltage:	DC 3.7V	Test Mode:	GFSK

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

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

30MHz-1GHz

Temperature:	24.7°C	Relative Humidity:	61%
Test Voltage:	DC 3.7V	Phase:	Horizontal
Test Mode:	GFSK/914.9MHz(worst)		



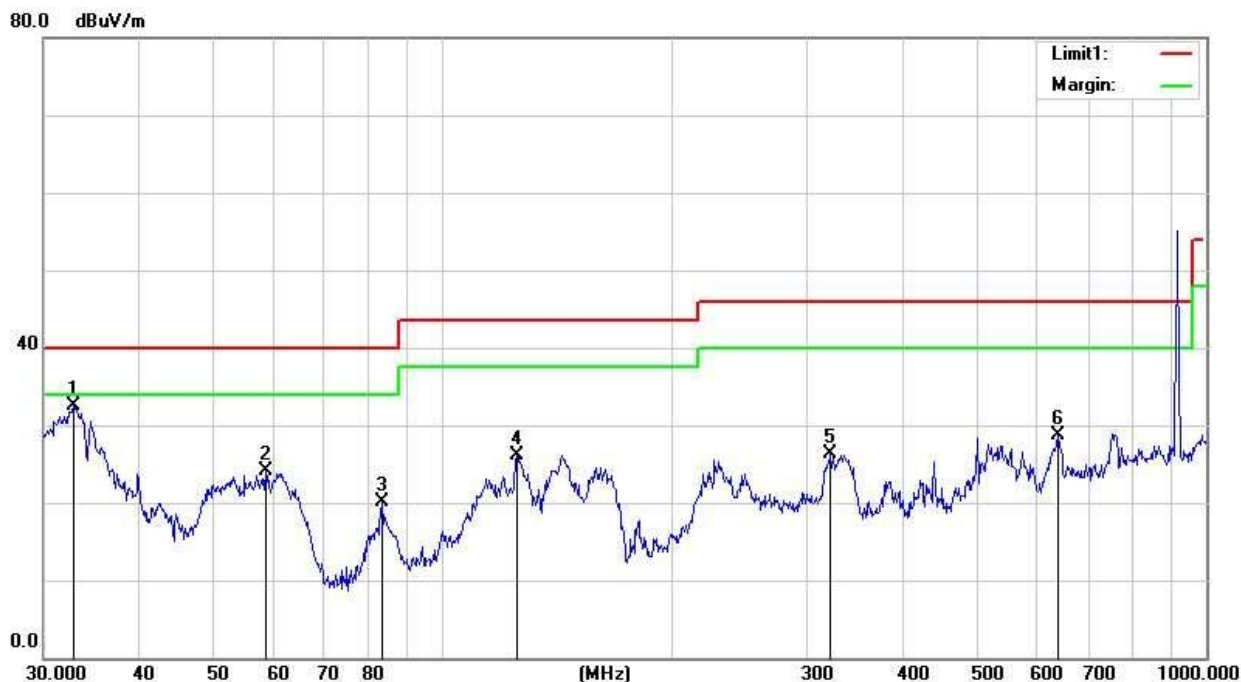
No.	Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	31.0703	40.95	-13.78	27.17	40.00	-12.83	QP
2	61.5617	34.14	-17.68	16.46	40.00	-23.54	QP
3	148.4410	43.05	-20.05	23.00	43.50	-20.50	QP
4	230.0985	42.87	-15.35	27.52	46.00	-18.48	QP
5	340.7817	43.41	-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 3.7V	Phase:	Vertical
Test Mode:	GFSK/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 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.

For 927.50MHz

Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBpV)	(dB)	(dB μ V/m)	(dBpV/m)	(dB)	
1855.0	58.42	-9.12	49.30	74	-24.70	peak
1855.0	43.72	-9.12	34.60	54	-19.40	AVG
2782.5	62.63	-8.75	53.88	74	-20.12	peak
2782.5	47.89	-8.75	39.14	54	-14.86	AVG
3710.0	58.31	-4.03	54.28	74	-19.72	peak
3710.0	42.81	-4.03	38.78	54	-15.22	AVG

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

Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBpV)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)	
1855.0	58.84	-9.12	49.72	74	-24.28	peak
1855.0	45.72	-9.12	36.60	54	-17.40	AVG
2782.5	62.61	-8.75	53.86	74	-20.14	peak
2782.5	46.58	-8.75	37.83	54	-16.17	AVG
3710.0	55.43	-4.03	51.40	74	-22.60	peak
3710.0	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

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Polarity
1	901.1600	23.54	-0.41	23.14	46	-22.86	QP	Horizontal
2	902.0000	31.24	-0.40	30.84	46	-15.16	QP	Horizontal
3	902.3000	55.93	-0.39	55.54	/	/	QP	Horizontal
4	901.1600	24.31	-0.40	23.91	46	-22.09	24.31	Vertical
5	902.0000	32.26	-0.40	31.86	46	-14.14	32.26	Vertical
6	902.3000	59.63	-0.39	59.24	/	/	59.63	Vertical

High

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Polarity
1	927.5000	22.65	-0.40	22.25	46	-23.75	QP	Horizontal
2	928.0000	33.26	-0.39	32.87	46	-13.13	QP	Horizontal
3	928.3000	57.29	-0.39	56.90	/	/	QP	Horizontal
4	927.5000	22.96	-0.40	22.56	46	-23.44	QP	Vertical
5	928.0000	33.61	-0.39	32.22	46	-13.78	QP	Vertical
6	928.3000	56.95	-0.39	56.56	/	/	QP	Vertical

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.

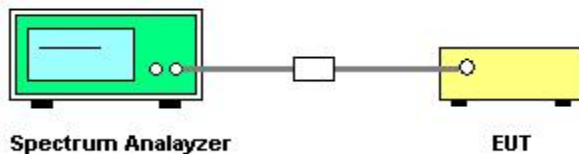
Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> Operating Frequency Range
RB	30KHz
VB	100KHZ
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

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

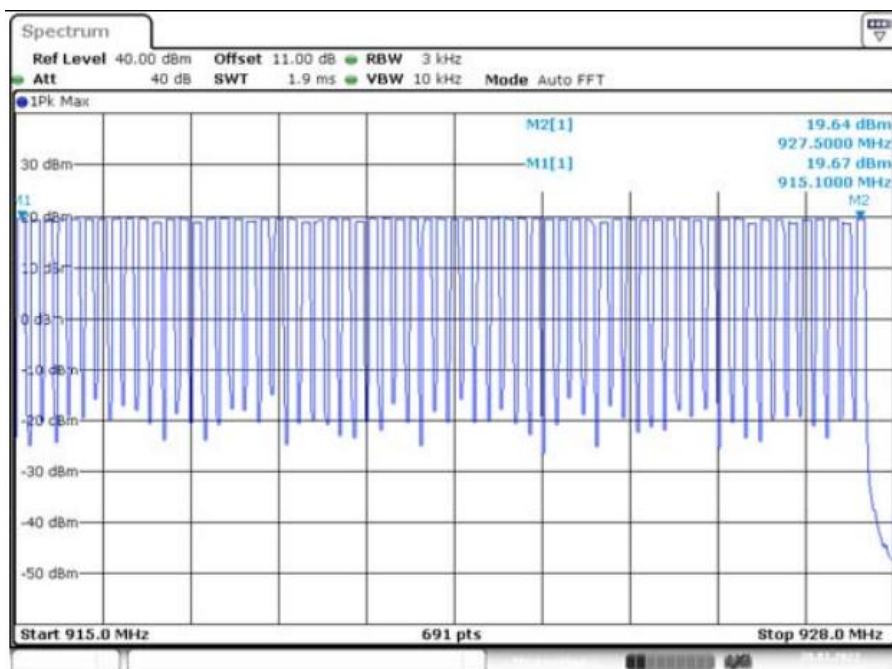
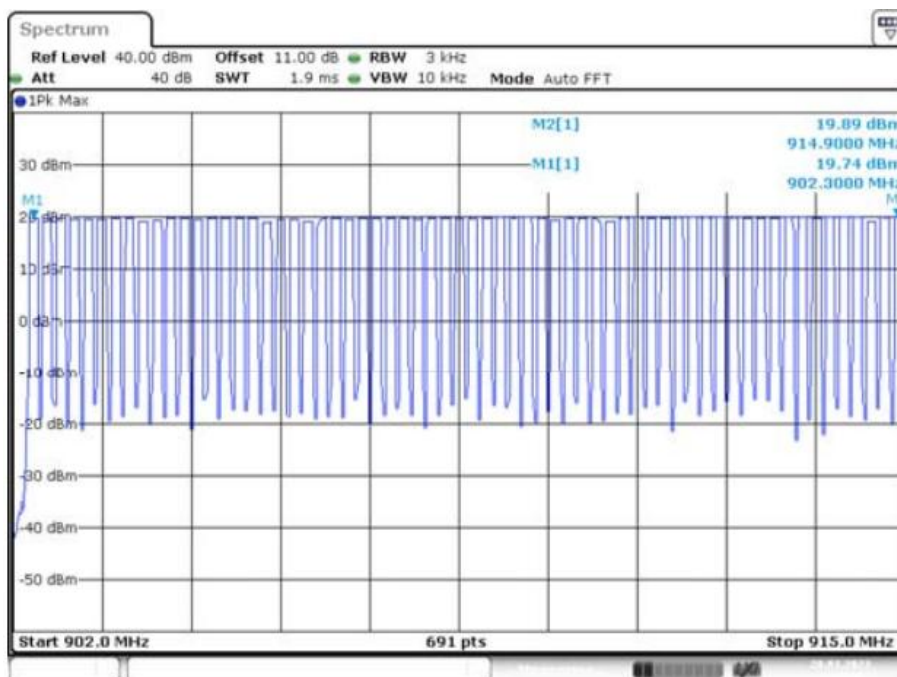


8.4 EUT OPERATION CONDITIONS

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	Test Voltage:	DC 3.7V



9. HOPPING CHANNEL SEPARATION MEASUREMENT

9.1 LIMIT

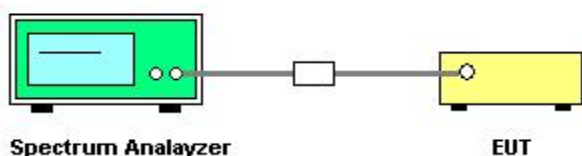
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

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.

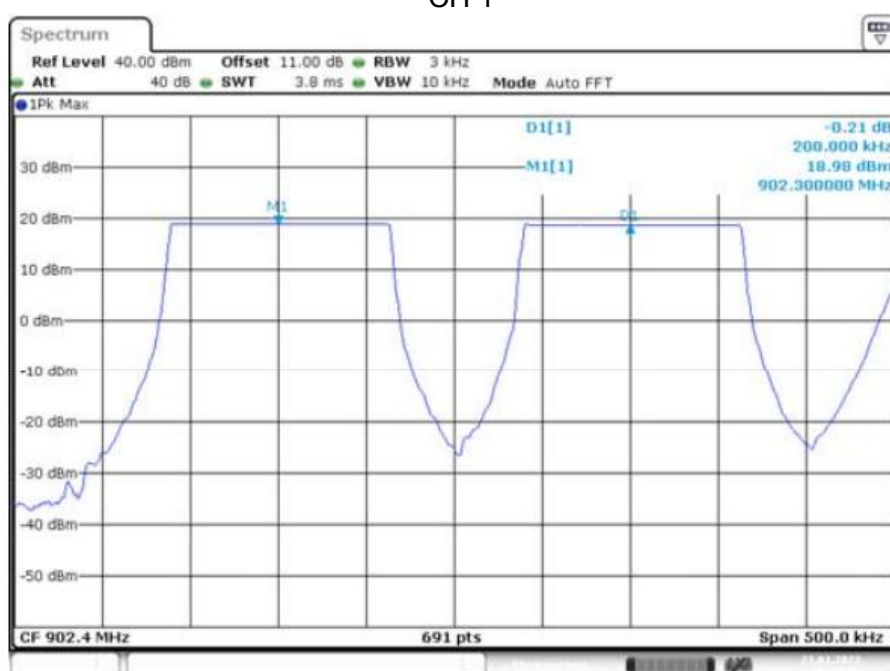
Temperature:	25 °C	Relative Humidity:	60%
Test Mode:	CH1/CH64/CH127 -LongFi Mode	Test Voltage:	DC 5V

9.5 TEST RESULTS

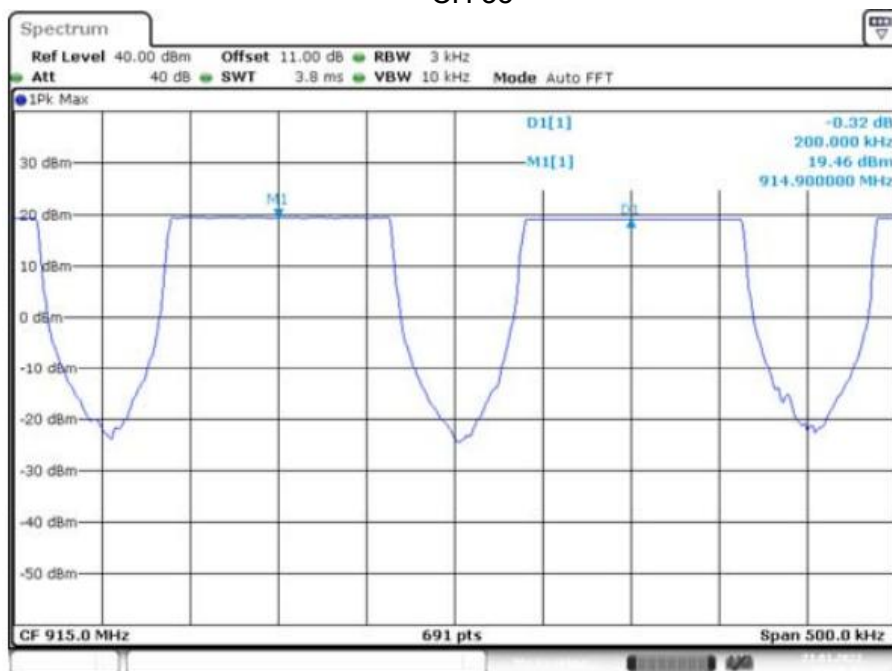
Frequency	Mark1 Frequency (MHz)	Mark2 Frequency (MHz)	Ch. Separation (MHz)	Limit (MHz)	Result
902.3 MHz	902.300	902.500	0.200	0.152	Complies
914.9 MHz	914.900	915.100	0.200	0.152	Complies
927.5 MHz	927.300	927.500	0.200	0.152	Complies

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

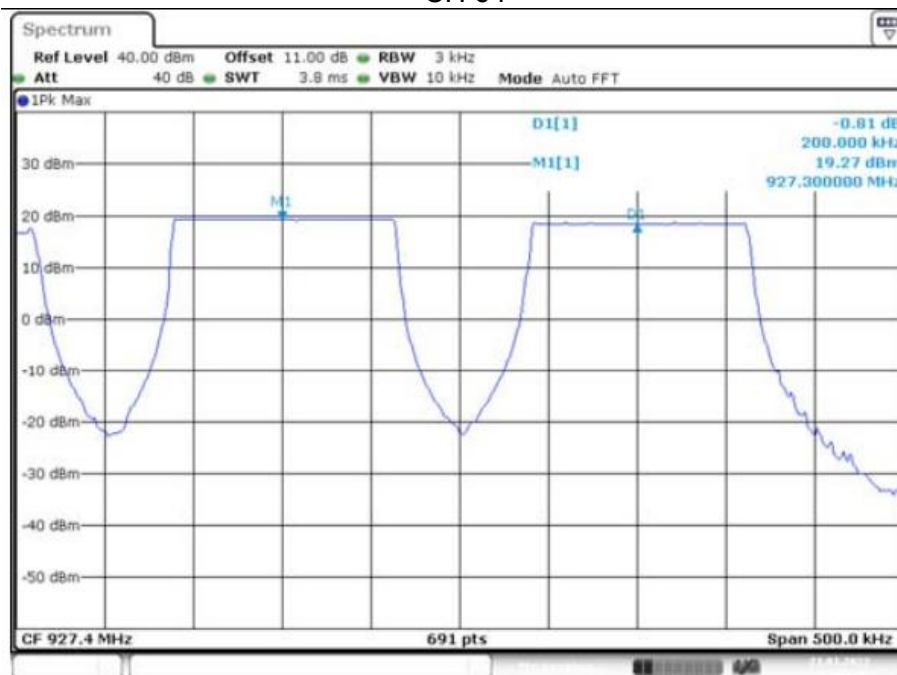
CH 1



CH 35



CH 64



10. CONDUCTED EMISSION MEASUREMENT

10.1 LIMIT

Operating frequency band. In case the emission fall within the restricted band specified on Part 207(a) limit in the table below has to be followed.

FREQUENCY (MHz)	Conducted Emission limit (dBuV)	
	Quasi-peak	Average
0.15 -0.5	66 - 56 *	56 - 46 *
0.50 -5.0	56.00	46.00
5.0 -30.0	60.00	50.00

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

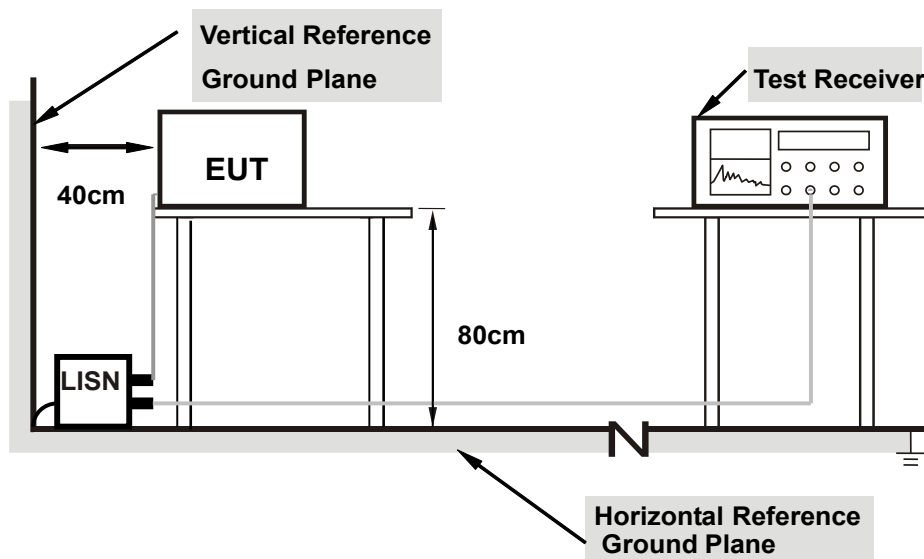
10.2 TEST PROCEDURE

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

- a. The EUT was 0.8 meters from the horizontal ground plane and 0.4 meters from the vertical ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- d. LISN at least 80 cm from nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

10.3 TEST SETUP

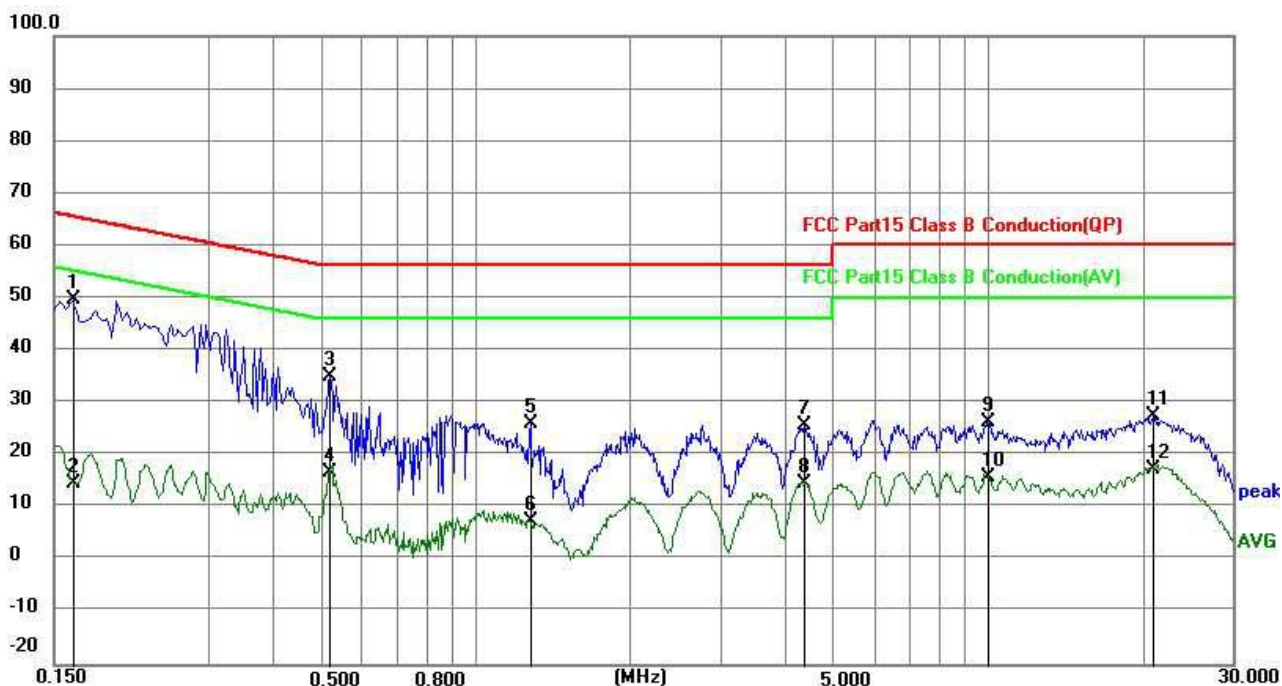


Note: 1.Support units were connected to second LISN.

2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

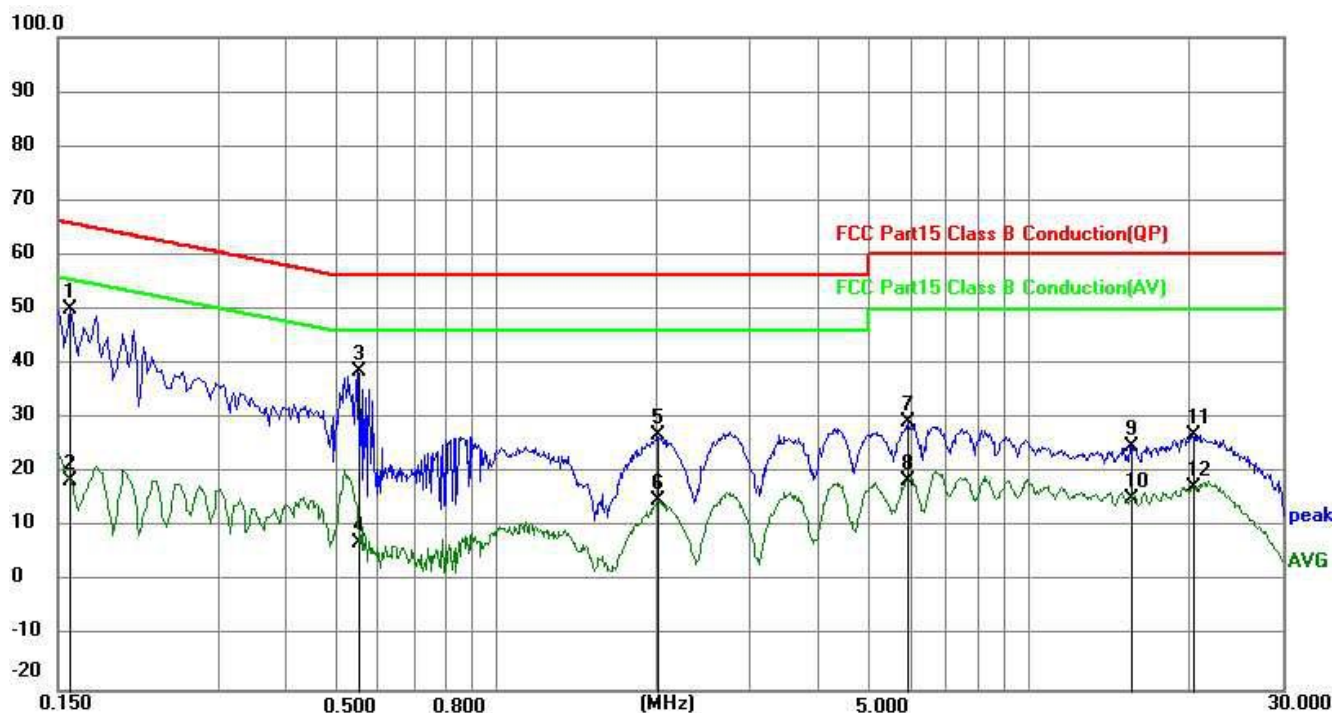
10.4 TEST RESULTS

Temperature:	25°C	Relative Humidity:	50%
Test Mode:	GFSK(worst mode)	Test Voltage:	DC 5V by adapter
Phase:	L	Result:	Pass



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.1635	40.22	9.52	49.74	65.28	15.54	QP
2	0.1635	5.08	9.52	14.60	55.28	40.68	AVG
3	0.5190	25.56	9.56	35.12	56.00	20.88	QP
4	0.5190	7.17	9.56	16.73	46.00	29.27	AVG
5	1.2795	16.63	9.57	26.20	56.00	29.80	QP
6	1.2795	-1.98	9.57	7.59	46.00	38.41	AVG
7	4.3665	16.25	9.59	25.84	56.00	30.16	QP
8	4.3665	5.06	9.59	14.65	46.00	31.35	AVG
9	9.9240	16.58	9.63	26.21	60.00	33.79	QP
10	9.9240	6.34	9.63	15.97	50.00	34.03	AVG
11	20.9310	17.90	9.76	27.66	60.00	32.34	QP
12	20.9310	7.73	9.76	17.49	50.00	32.51	AVG

Temperature:	25°C	Relative Humidity:	50%
Test Mode:	GFSK(worst mode)	Test Voltage:	DC 5V by adapter
Phase:	N	Result:	Pass



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.1590	40.49	9.51	50.00	65.52	15.52	QP
2	0.1590	8.91	9.51	18.42	55.52	37.10	AVG
3	0.5505	29.11	9.56	38.67	56.00	17.33	QP
4	0.5505	-2.38	9.56	7.18	46.00	38.82	AVG
5	2.0085	17.44	9.58	27.02	56.00	28.98	QP
6	2.0085	5.29	9.58	14.87	46.00	31.13	AVG
7	5.9325	19.54	9.69	29.23	60.00	30.77	QP
8	5.9325	9.00	9.69	18.69	50.00	31.31	AVG
9	15.5805	15.17	9.80	24.97	60.00	35.03	QP
10	15.5805	5.54	9.80	15.34	50.00	34.66	AVG
11	20.3145	16.99	9.84	26.83	60.00	33.17	QP
12	20.3145	7.49	9.84	17.33	50.00	32.67	AVG

Remark:

1. All readings are Quasi-Peak and Average values.

11. ANTENNA REQUIREMENT

11.1 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.

11.2 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.

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