

S

T

S

L

A

B



Certificate #4338.01

RADIO TEST REPORT

Report No:STS1911155W02

Issued for

Wuxi Wisen Innovation Co., Ltd.

Office D501, 530 Mansion, Taihu International Hi-tech Zone,
Xinwu District, Wuxi, China

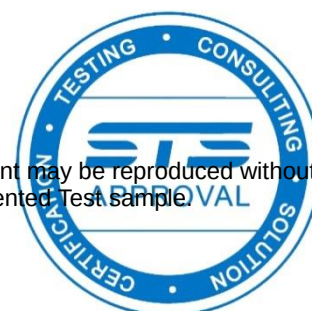
Product Name:	L-Series Omni Tilt & Distance Sensor Node
Brand Name:	WISENMESHNET®
Model Name:	6F08
Series Model:	6F07
FCC ID:	2AUZW-6F08-07
Test Standard:	FCC Part 15.247

Any reproduction of this document must be done in full. No single part of this document may be reproduced without permission from STS, All Test Data Presented in this report is only applicable to presented Test sample.

Shenzhen STS Test Services Co., Ltd.

A 1/F, Building B, Zhuoke Science Park, No.190 Chongqing Road, HepingShequ,
Fuyong Sub-District, Bao'an District, Shenzhen, Guang Dong, China

TEL: +86-755 3688 6288 FAX: +86-755 3688 6277 E-mail: sts@stsapp.com



**TEST RESULT CERTIFICATION**

Applicant's Name.....: Wuxi Wisen Innovation Co., Ltd.
Address: Office D501, 530 Mansion, Taihu International Hi-tech Zone, Xinqu District, Wuxi, China
Manufacture's Name.....: Wuxi Wisen Innovation Co., Ltd.
Address: Office D501, 530 Mansion, Taihu International Hi-tech Zone, Xinqu District, Wuxi, China

Product Description

Product Name.....: L-Series Omni Tilt & Distance Sensor Node
Brand Name: WISENMESHNET®
Model Name: 6F08
Series Model.....: 6F07

Test Standards: FCC Part15.247
Test Procedure: ANSI C63.10-2013

This device described above has been tested by STS, 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 STS, this document may be altered or revised by STS, personal only, and shall be noted in the revision of the document.

Date of Test.....:

Date (s) of performance of tests: 04 Nov. 2019 ~ 25 Nov. 2019

Date of Issue.....: 26 Nov. 2019

Test Result.....: **Pass**

Testing Engineer :

(Chris Chen)

Technical Manager :

(Sunday Hu)

Authorized Signatory :

(Vita Li)





Table of Contents

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 DESCRIPTION OF THE TEST MODES	10
2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	10
2.4 DESCRIPTION OF NECESSARY ACCESSORIES AND SUPPORT UNITS	11
2.5 EQUIPMENTS LIST	12
3. EMC EMISSION TEST	13
3.1 CONDUCTED EMISSION MEASUREMENT	13
3.2 TEST PROCEDURE	14
3.3 TEST SETUP	14
3.4 TEST RESULTS	14
4. RADIATED EMISSION MEASUREMENT	15
4.1 RADIATED EMISSION LIMITS	15
4.2 TEST PROCEDURE	16
4.3 TEST SETUP	17
4.4 EUT OPERATING CONDITIONS	17
4.5 FIELD STRENGTH CALCULATION	18
4.6 TEST RESULTS	19
5. CONDUCTED SPURIOUS & BAND EDGE EMISSION	26
5.1 LIMIT	26
5.2 TEST PROCEDURE	26
5.3 TEST SETUP	26
5.4 EUT OPERATION CONDITIONS	26
5.5 TEST RESULTS	27
6. POWER SPECTRAL DENSITY TEST	31
6.1 LIMIT	31
6.2 TEST PROCEDURE	31
6.3 TEST SETUP	31
6.4 EUT OPERATION CONDITIONS	31
6.5 TEST RESULTS	32



Table of Contents

7. BANDWIDTH TEST	34
7.1 LIMIT	34
7.2 TEST PROCEDURE	34
7.3 TEST SETUP	34
7.4 EUT OPERATION CONDITIONS	34
7.5 TEST RESULTS	35
8. PEAK OUTPUT POWER TEST	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. ANTENNA REQUIREMENT	39
9.1 STANDARD REQUIREMENT	39
9.2 EUT ANTENNA	39
10. EUT TEST PHOTO	40

**Revision History**

Rev.	Issue Date	Report NO.	Effect Page	Contents
00	26 Nov. 2019	STS1911155W02	ALL	Initial Issue





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)(2)	6dB Bandwidth	PASS	--
15.247 (b)(3)	Output Power	PASS	--
15.247 (c)	Radiated Spurious Emission	PASS	--
15.247 (d)	Conducted Spurious & Band Edge Emission	PASS	--
15.247 (e)	Power Spectral Density	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

SHENZHEN STS TEST SERVICES CO., LTD

Add. : A 1/F, Building B, Zhuoke Science Park, No.190 Chongqing Road, HepingShequ, Fuyong Sub-District, Bao'an District, Shenzhen, Guang Dong, China

FCC test Firm Registration Number: 625569

IC test Firm Registration Number: 12108A

A2LA Certificate No.: 4338.01

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	$\pm 0.68\text{dB}$
2	Unwanted Emissions, conducted	$\pm 2.988\text{dB}$
3	All emissions, radiated 30-1GHz	$\pm 6.7\text{dB}$
4	All emissions, radiated 1G-6GHz	$\pm 5.5\text{dB}$
5	All emissions, radiated >6G	$\pm 5.8\text{dB}$
6	Conducted Emission (9KHz-150KHz)	$\pm 4.43\text{dB}$
7	Conducted Emission (150KHz-30MHz)	$\pm 5\text{dB}$



2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF THE EUT

Product Name	L-Series Omni Tilt & Distance Sensor Node	
Trade Name	WISENMESHNET®	
Model Name	6F08	
Series Model	6F07	
Model Difference	The difference between 6F07 and 6F08 is on the laser distance range, where 6F07 is up to 33m measurement range and 6F08 is up to 100m measurement range.	
Product Description	The EUT is a L-Series Omni Tilt & Distance Sensor Node	
	Operation Frequency:	905 ~ 925 MHz
	Modulation Type:	LoRa/FSK
	Number Of Channel:	5
	Antenna Designation:	Please see Note 3.
	Antenna Gain (dBi)	0dBi
Channel List	Please refer to the Note 2.	
Battery	Rated Voltage: 3.6V Capacity: 19AH	
Hardware version number	V2.1	
Software version number	V1158	
Temperature Range:	-10°C ~ +50°C	
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)
01	905
02	910
03	915
04	920
05	925

3.

Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
1	WISENMES HNET®	6F08	Omni-directional	N/A	0dBi	ANT.





2.2 DESCRIPTION OF THE TEST MODES

For conducted test items and radiated spurious emissions

Each of these EUT operation mode(s) or test configuration mode(s) mentioned below was evaluated respectively.

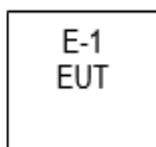
Worst Mode	Description	Modulation
Mode 1	TX CH01(905MHz)	LoRa/FSK
Mode 2	TX CH03(915MHz)	LoRa/FSK
Mode 3	TX CH05(925MHz)	LoRa/FSK

Note:

- (1) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported
- (2) Controlled using a bespoke application on the laptop PC supplied by the customer. The application was used to enable a continuous transmission mode and to select the test channels, data rates and modulation schemes as required.

2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Radiated Spurious Emission Test





2.4 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
N/A	N/A	N/A	N/A	N/A	N/A

Support units

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

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”.



2.5 EQUIPMENTS LIST

Radiation Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Test Receiver	R&S	ESCI	101427	2019.7.29	2020.7.28
Signal Analyzer	Agilent	N9020A	MY51110105	2019.03.02	2020.03.01
Active loop Antenna	ZHINAN	ZN30900C	16035	2018.03.11	2021.03.10
Bilog Antenna	TESEQ	CBL6111D	34678	2017.11.02	2020.11.1
Horn Antenna	SCHWARZBECK	BBHA 9120D(1201)	9120D-1343	2018.10.19	2021.10.18
SHF-EHF Horn Antenna (18G-40GHz)	A-INFO	LB-180400-KF	J211020657	2018.03.11	2021.03.10
Pre-Amplifier(0.1M-3G Hz)	EM	EM330	060665	2019.10.9	2020.10.8
Pre-Amplifier (1G-18GHz)	SKET	LNPA-01018G-45	SK201808090 1	2019.10.12	2020.10.11
Temperature & Humidity	HH660	Mieo	N/A	2019.10.12	2020.10.11
turn table	EM	SC100_1	60531	N/A	N/A
Antenna mast	EM	SC100	N/A	N/A	N/A
Test SW	FARAD	EZ-EMC(Ver.STSLAB-03A1 RE)			

RF Connected Test

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
USB RF power sensor	DARE	RPR3006W	15I00041SNO03	2019.10.9	2020.10.8
Signal Analyzer	Agilent	N9020A	MY49100060	2019.10.9	2020.10.8
Temperature & Humidity	HH660	Mieo	N/A	2019.10.12	2020.10.11
Test SW	FARAD	LZ-RF /LzRf-3A3			



3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION LIMITS

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.

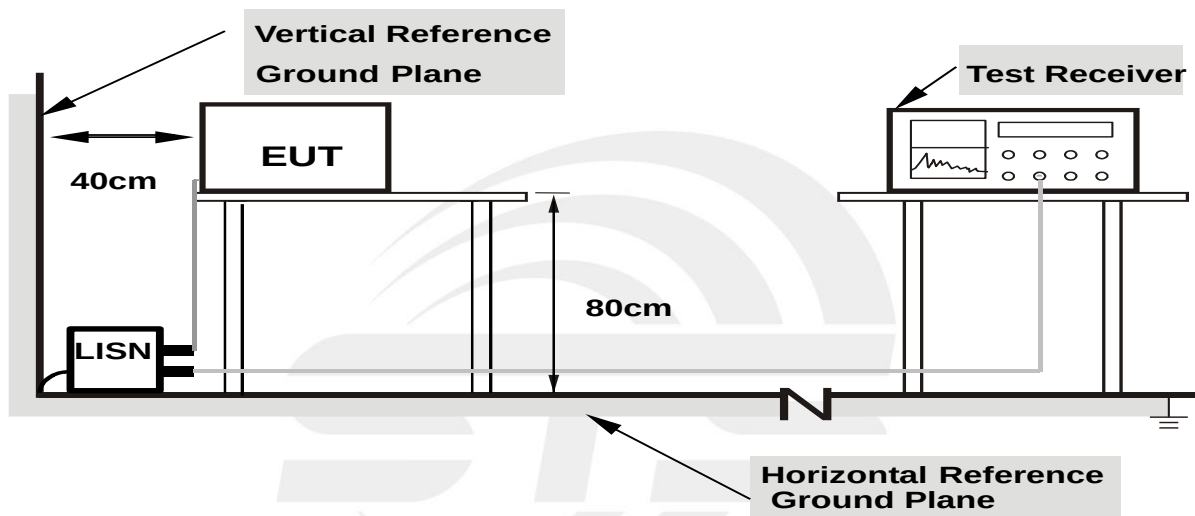
The following table is the setting of the receiver

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

3.2 TEST PROCEDURE

- 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.
- 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.
- 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.
- LISN at least 80 cm from nearest part of EUT chassis.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.3 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

3.4 TEST RESULTS

Temperature:	25.1(°C)	Relative Humidity:	57%RH
Test Voltage:	N/A	Phase:	L/N
Test Mode:	N/A		

Note: EUT is only power by battery, So it is not applicable for this test.



4. RADIATED EMISSION MEASUREMENT

4.1 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 (Frequency Range 9kHz-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 (Above 1000MHz)

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).

LIMITS OF RESTRICTED FREQUENCY BANDS

FREQUENCY (MHz)	FREQUENCY (MHz)	FREQUENCY (MHz)	FREQUENCY (GHz)
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41			



For Radiated Emission

Spectrum Parameter	Setting
Attenuation	Auto
Detector	Peak/AV
Start Frequency	1000 MHz(Peak/AV)
Stop Frequency	10th carrier harmonic(Peak/AV)
RB / VB (emission in restricted band)	1 MHz / 3 MHz

For Band edge

Spectrum Parameter	Setting
Detector	Peak/AV
Start/Stop Frequency	Lower Band Edge: 890 to 908 MHz Upper Band Edge: 922 to 940 MHz
RB / VB (emission in restricted band)	1 MHz / 3 MHz

Receiver Parameter	Setting
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/ RB 9kHz for PK & AV
Start ~ Stop Frequency	490kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

4.2 TEST PROCEDURE

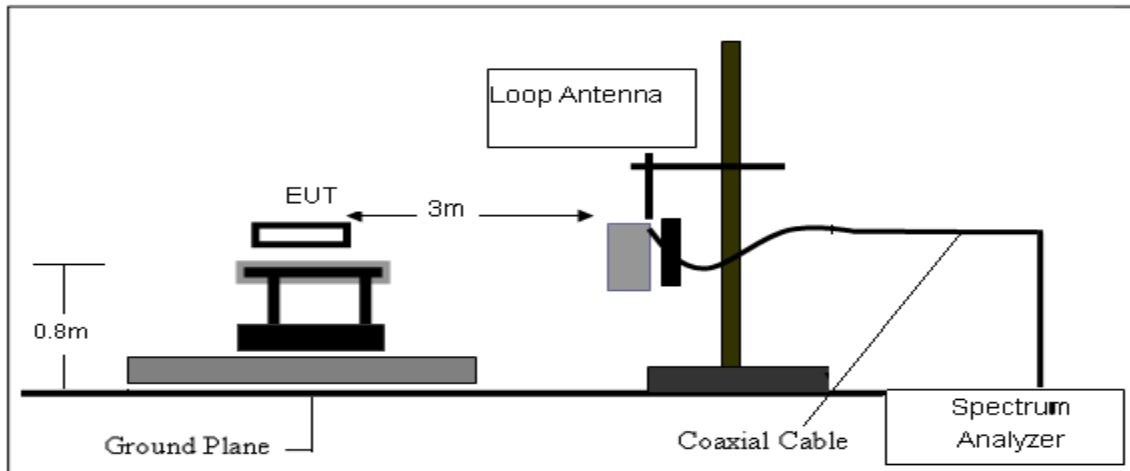
- The measuring distance of at 3 m shall be used for measurements at frequency 0.009MHz up to 1GHz, and above 1GHz.
- The EUT was placed on the top of a rotating table 0.8 meters(above 1GHz is 1.5 m) above the ground at a 3 meter anechoic chamber. The table was rotated 360 degrees to determine the position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

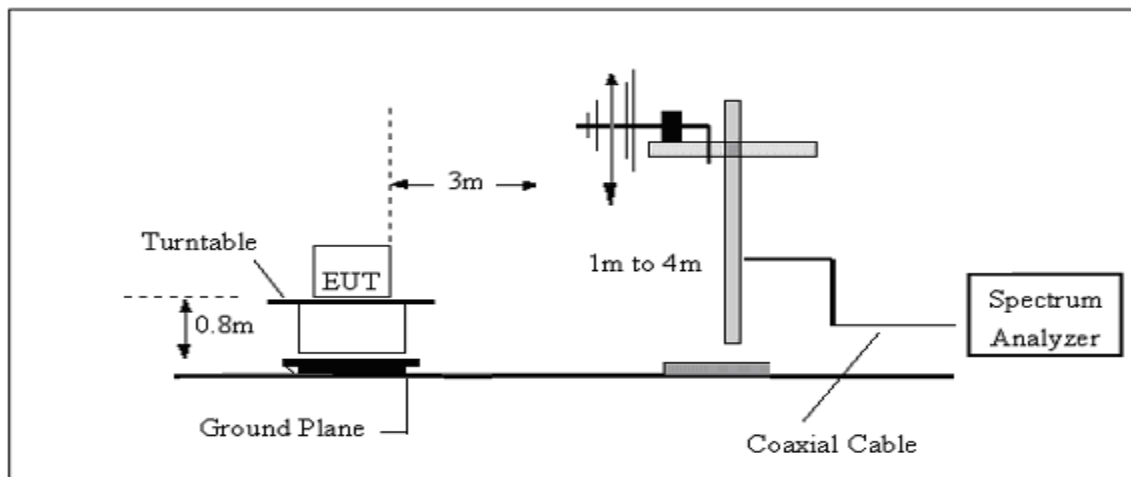
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported. New full battery is used during all test.

4.3 TEST SETUP

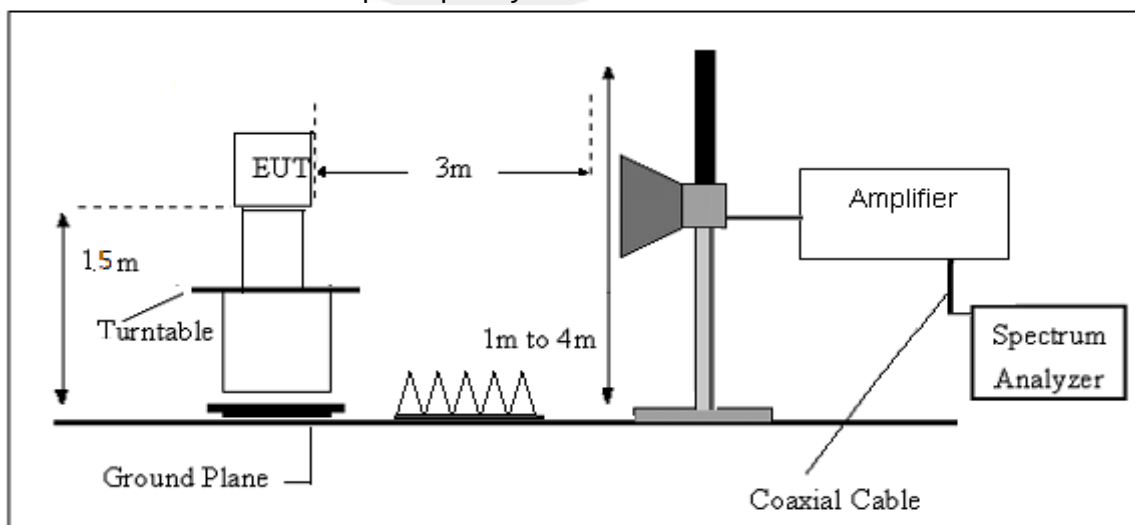
(A) Radiated Emission Test-Up Frequency Below 30MHz



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



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



4.4 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.



4.5 FIELD STRENGTH CALCULATION

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where

FS = Field Strength

CL = Cable Attenuation Factor (Cable Loss)

RA = Reading Amplitude

AG = Amplifier Gain

AF = Antenna Factor

For example

Frequency	FS	RA	AF	CL	AG	Factor
(MHz)	(dBμV/m)	(dBμV/m)	(dB)	(dB)	(dB)	(dB)
300	40	58.1	12.2	1.6	31.9	-18.1

$$\text{Factor} = \text{AF} + \text{CL} - \text{AG}$$





4.6 TEST RESULTS

(Between 9KHz – 30 MHz)

Temperature:	24.8(°C)	Relative Humidity:	55%RH
Test Voltage:	DC 3.6V	Polarization:	--
Test Mode:	TX Mode		

Freq.	Reading	Limit	Margin	State
(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 = $40 \log (\text{specific distance}/\text{test distance})(\text{dB})$;

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



(30MHz -1000MHz)

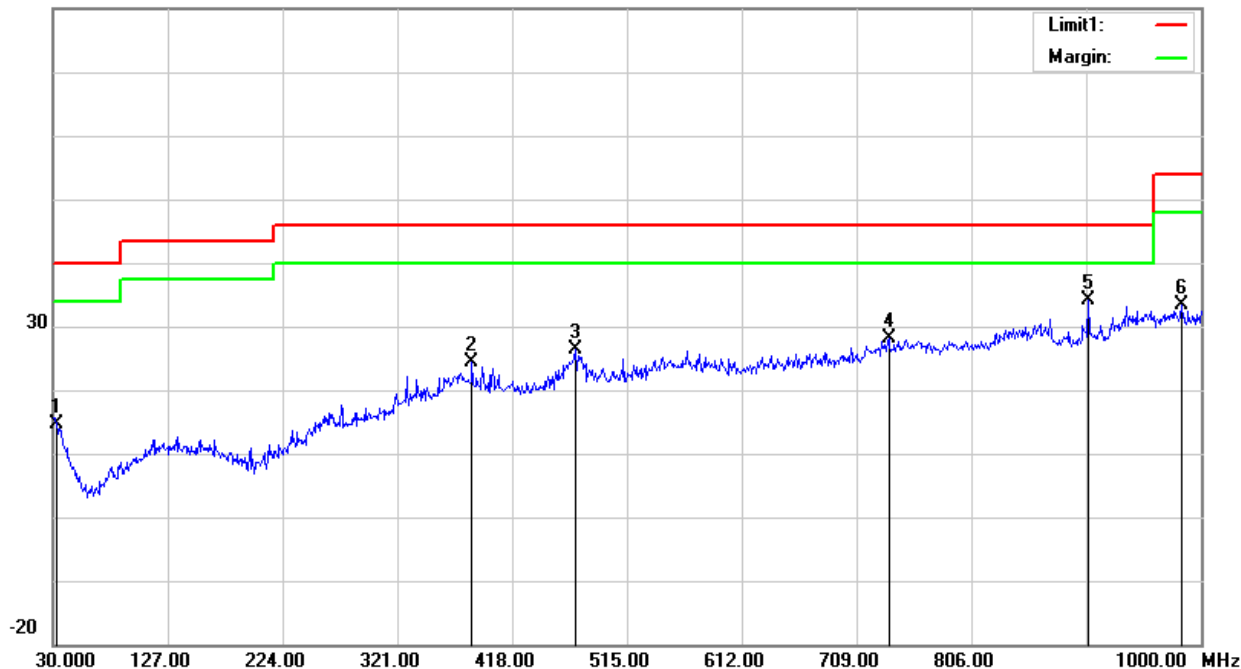
Temperature:	24.8(°C)	Relative Humidity:	55%RH
Test Voltage:	DC 3.6V	Phase:	Horizontal
Test Mode:	Mode 1/2/3(Mode 1 worst case)		

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	32.9100	28.89	-14.33	14.56	40.00	-25.44	QP
2	384.0500	36.40	-11.99	24.41	46.00	-21.59	QP
3	471.3500	35.36	-8.95	26.41	46.00	-19.59	QP
4	736.1600	30.27	-2.25	28.02	46.00	-17.98	QP
5	904.9400	34.45	-0.32	34.13	46.00	-11.87	QP
6	983.5100	31.03	2.46	33.49	54.00	-20.51	QP

Remark:

1. Margin = Result (Result =Reading + Factor)–Limit

80.0 dBuV/m





Temperature:	24.8(°C)	Relative Humidity:	55%RH
Test Voltage:	DC 3.6V	Phase:	Vertical
Test Mode:	Mode 1/2/3(Mode 1 worst case)		

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	33.8800	30.70	-14.80	15.90	40.00	-24.10	QP
2	402.4800	41.35	-11.00	30.35	46.00	-15.65	QP
3	576.1100	32.40	-5.70	26.70	46.00	-19.30	QP
4	751.6800	31.84	-2.17	29.67	46.00	-16.33	QP
5	872.9300	34.52	-0.57	33.95	46.00	-12.05	QP
6	936.9500	32.16	1.13	33.29	46.00	-12.71	QP

Remark:

1. Margin = Result (Result =Reading + Factor)–Limit

80.0 dBuV/m





(1GHz-25GHz)Restricted band and Spurious emission Requirements

Frequency (MHz)	Meter Reading (dBμV)	Amplifier (dB)	Loss (dB)	Antenna Factor (dB/m)	Orrected Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type	Comment
Low Channel (905 MHz)										
1230.02	61.28	44.70	6.70	28.20	-9.80	51.48	74.00	-22.52	PK	Vertical
1230.02	51.52	44.70	6.70	28.20	-9.80	41.72	54.00	-12.28	AV	Vertical
1230.00	61.66	44.70	6.70	28.20	-9.80	51.86	74.00	-22.14	PK	Horizontal
1230.00	50.85	44.70	6.70	28.20	-9.80	41.05	54.00	-12.95	AV	Horizontal
1810.15	59.51	44.20	9.04	31.60	-3.56	55.95	74.00	-18.05	PK	Vertical
1810.15	50.11	44.20	9.04	31.60	-3.56	46.55	54.00	-7.45	AV	Vertical
1810.13	58.49	44.20	9.04	31.60	-3.56	54.93	74.00	-19.07	PK	Horizontal
1810.13	50.23	44.20	9.04	31.60	-3.56	46.67	54.00	-7.33	AV	Horizontal
2019.36	49.24	44.20	9.86	32.00	-2.34	46.90	74.00	-27.10	PK	Vertical
2019.36	40.06	44.20	9.86	32.00	-2.34	37.72	54.00	-16.28	AV	Vertical
2019.36	47.41	44.20	9.86	32.00	-2.34	45.07	74.00	-28.93	PK	Horizontal
2019.36	38.64	44.20	9.86	32.00	-2.34	36.30	54.00	-17.70	AV	Horizontal
2714.91	53.74	43.50	11.40	35.50	3.40	57.14	74.00	-16.86	PK	Vertical
2714.91	43.72	43.50	11.40	35.50	3.40	47.12	54.00	-6.88	AV	Vertical
2714.92	53.94	43.50	11.40	35.50	3.40	57.34	74.00	-16.66	PK	Horizontal
2714.92	44.04	43.50	11.40	35.50	3.40	47.44	54.00	-6.56	AV	Horizontal
Middle Channel (915 MHz)										
1224.26	60.93	44.70	6.70	28.20	-9.80	51.13	74.00	-22.87	PK	Vertical
1224.26	50.00	44.70	6.70	28.20	-9.80	40.20	54.00	-13.80	AV	Vertical
1224.24	61.47	44.70	6.70	28.20	-9.80	51.67	74.00	-22.33	PK	Horizontal
1224.24	51.31	44.70	6.70	28.20	-9.80	41.51	54.00	-12.49	AV	Horizontal
1830.22	59.22	44.20	9.04	31.60	-3.56	55.66	74.00	-18.34	PK	Vertical
1830.22	50.19	44.20	9.04	31.60	-3.56	46.63	54.00	-7.37	AV	Vertical
1830.22	59.61	44.20	9.04	31.60	-3.56	56.05	74.00	-17.95	PK	Horizontal
1830.22	49.65	44.20	9.04	31.60	-3.56	46.09	54.00	-7.91	AV	Horizontal
2009.91	49.11	44.20	9.86	32.00	-2.34	46.77	74.00	-27.23	PK	Vertical
2009.91	39.04	44.20	9.86	32.00	-2.34	36.70	54.00	-17.30	AV	Vertical
2009.92	48.09	44.20	9.86	32.00	-2.34	45.75	74.00	-28.25	PK	Horizontal
2009.92	38.15	44.20	9.86	32.00	-2.34	35.81	54.00	-18.19	AV	Horizontal
2745.34	53.85	43.50	11.40	35.50	3.40	57.25	74.00	-16.75	PK	Vertical
2745.34	44.60	43.50	11.40	35.50	3.40	48.00	54.00	-6.00	AV	Vertical
2745.26	54.20	43.50	11.40	35.50	3.40	57.60	74.00	-16.40	PK	Horizontal
2745.26	44.81	43.50	11.40	35.50	3.40	48.21	54.00	-5.79	AV	Horizontal



High Channel (925 MHz)										
1217.66	61.35	44.70	6.70	28.20	-9.80	51.55	74.00	-22.45	PK	Vertical
1217.66	51.20	44.70	6.70	28.20	-9.80	41.40	54.00	-12.60	AV	Vertical
1217.67	62.05	44.70	6.70	28.20	-9.80	52.25	74.00	-21.75	PK	Horizontal
1217.67	49.86	44.70	6.70	28.20	-9.80	40.06	54.00	-13.94	AV	Horizontal
1850.15	58.89	44.20	9.04	31.60	-3.56	55.33	74.00	-18.67	PK	Vertical
1850.15	49.79	44.20	9.04	31.60	-3.56	46.23	54.00	-7.77	AV	Vertical
1850.20	58.23	44.20	9.04	31.60	-3.56	54.67	74.00	-19.33	PK	Horizontal
1850.20	49.68	44.20	9.04	31.60	-3.56	46.12	54.00	-7.88	AV	Horizontal
1999.12	49.44	44.20	9.86	32.00	-2.34	47.10	74.00	-26.90	PK	Vertical
1999.12	38.99	44.20	9.86	32.00	-2.34	36.65	54.00	-17.35	AV	Vertical
1999.09	47.87	44.20	9.86	32.00	-2.34	45.53	74.00	-28.47	PK	Horizontal
1999.09	38.95	44.20	9.86	32.00	-2.34	36.61	54.00	-17.39	AV	Horizontal
2774.89	54.19	43.50	11.40	35.50	3.40	57.59	74.00	-16.41	PK	Vertical
2774.89	43.73	43.50	11.40	35.50	3.40	47.13	54.00	-6.87	AV	Vertical
2774.88	53.62	43.50	11.40	35.50	3.40	57.02	74.00	-16.98	PK	Horizontal
2774.88	44.53	43.50	11.40	35.50	3.40	47.93	54.00	-6.07	AV	Horizontal

Note:

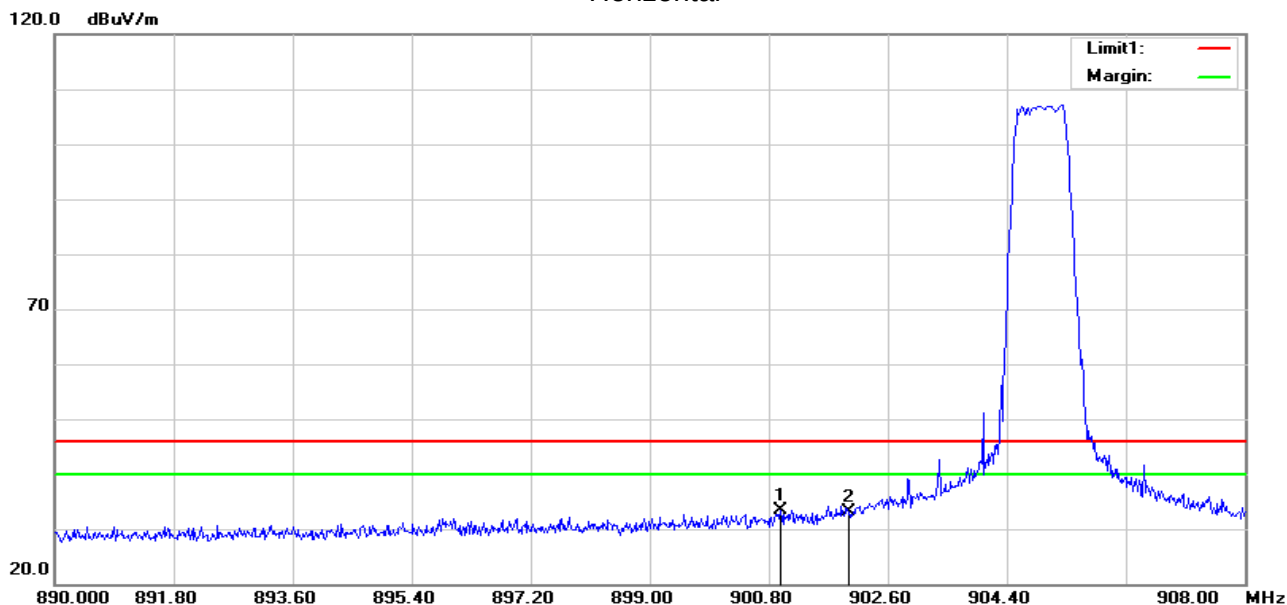
1) Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Emission Level = Reading + Factor

2) The frequency emission of peak points that did not show above the forms are at least 20dB below the limit, the frequency emission is mainly from the environment noise.

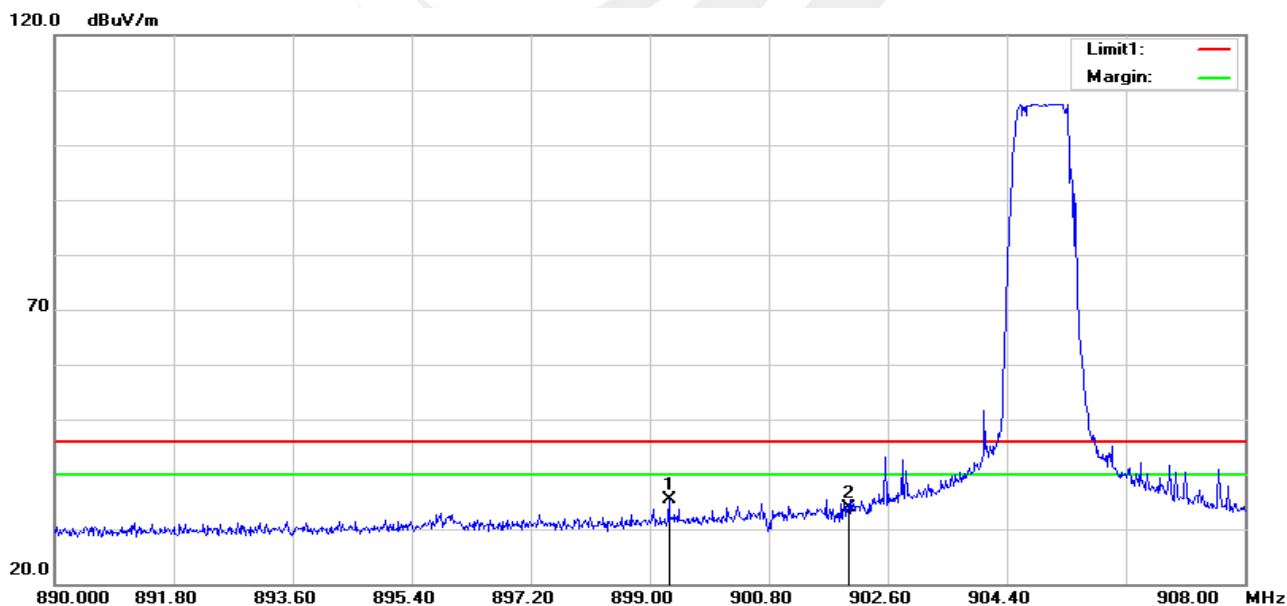


4.6 TEST RESULTS (Restricted Bands Requirements)

Low channel
Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	900.9800	33.74	-0.43	33.31	46.00	-12.69	peak
2	902.0000	33.49	-0.40	33.09	46.00	-12.91	peak

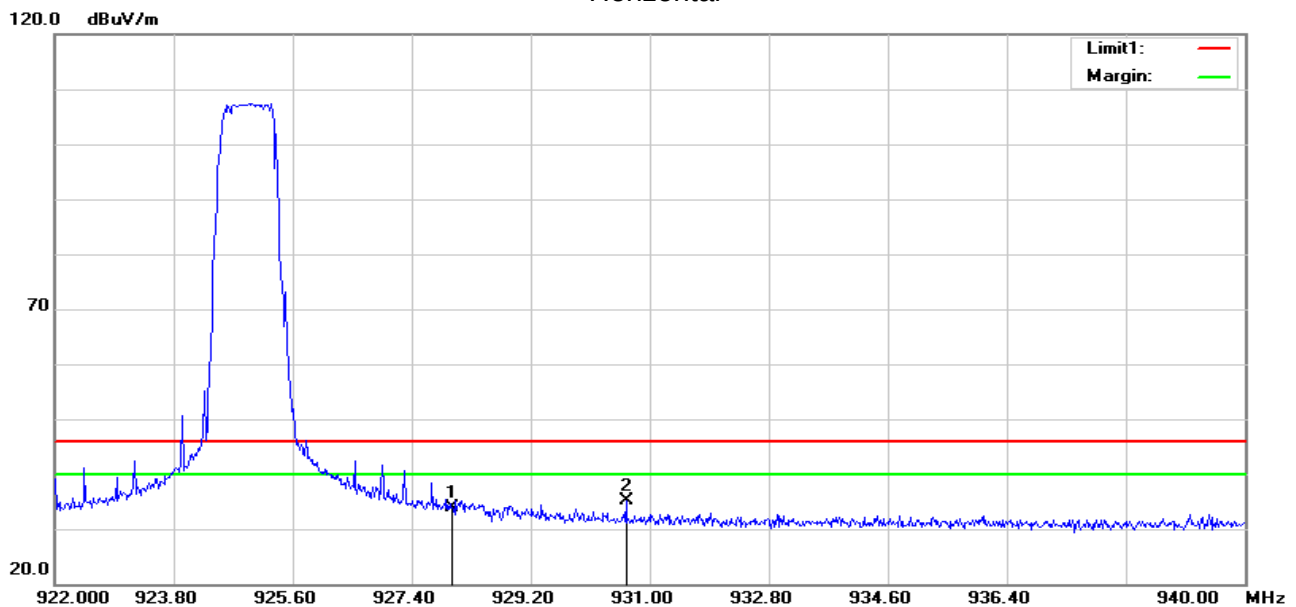
Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	899.2880	35.75	-0.47	35.28	46.00	-10.72	peak
2	902.0000	34.16	-0.40	33.76	46.00	-12.24	peak

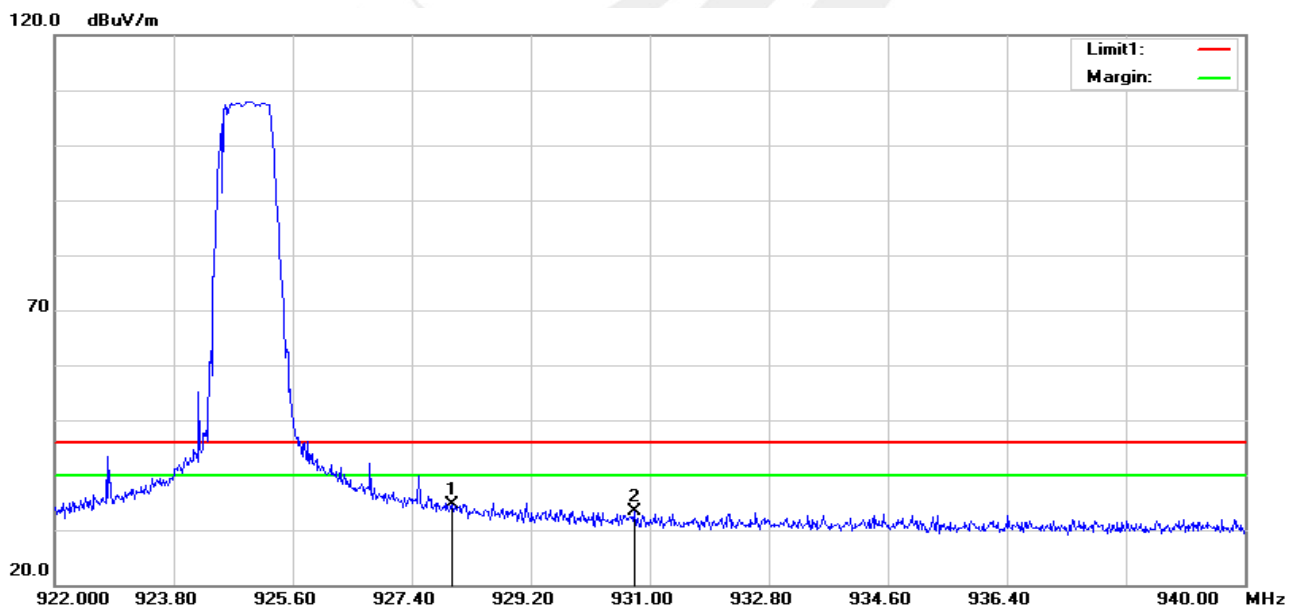


High channel Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	928.0000	33.54	0.43	33.97	46.00	-12.03	peak
2	930.6400	34.61	0.60	35.21	46.00	-10.79	peak

Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	928.0000	34.27	0.43	34.70	46.00	-11.30	peak
2	930.7660	32.85	0.61	33.46	46.00	-12.54	peak

5. CONDUCTED SPURIOUS & BAND EDGE EMISSION

5.1 LIMIT

According to FCC section 15.247(d), in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

5.2 TEST PROCEDURE

Spectrum Parameter	Setting
Detector	Peak
Start/Stop Frequency	30 MHz to 10th carrier harmonic
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold

For Band edge

Spectrum Parameter	Setting
Detector	Peak
Start/Stop Frequency	Lower Band Edge: 800 – 907 MHz Upper Band Edge: 923 – 1000 MHz
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold

5.3 TEST SETUP



The EUT which is powered by the Battery, is connected to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50 Ohm; the path loss as the factor is calibrated to correct the reading. Make the measurement with the spectrum analyzer's resolution bandwidth(RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW.

5.4 EUT OPERATION CONDITIONS

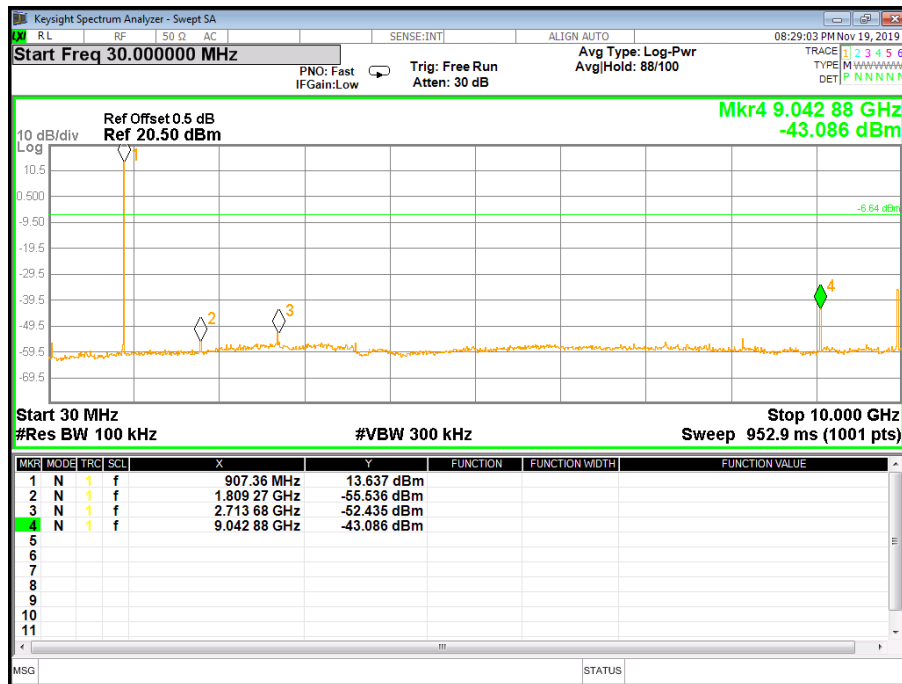
The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.



5.5 TEST RESULTS

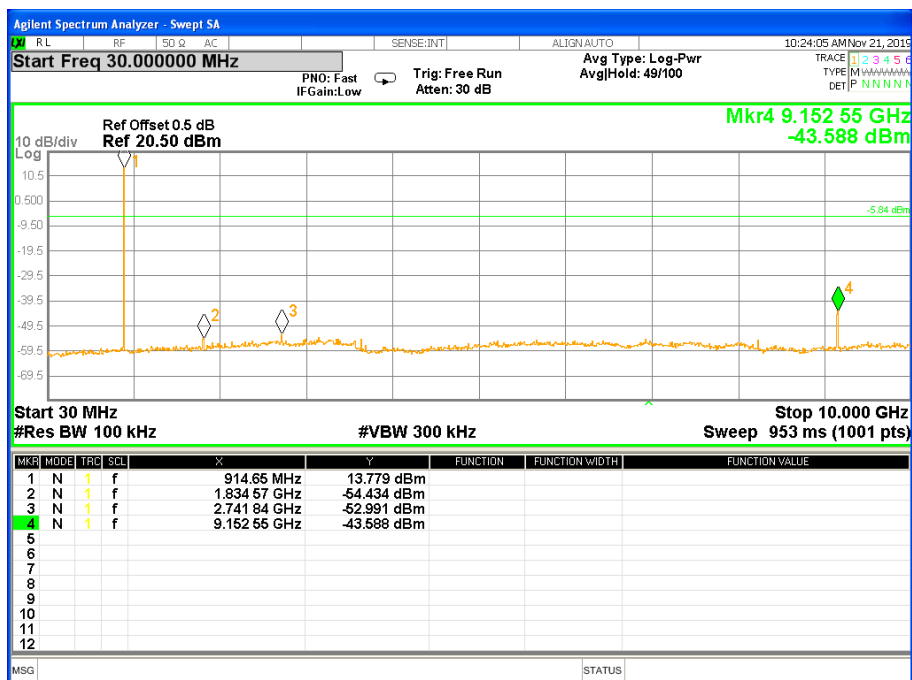
Temperature:	25 °C	Relative Humidity:	50%
Test Voltage:	DC 3.6V	Test Mode:	TX Mode /CH01, CH03, CH05

01 CH

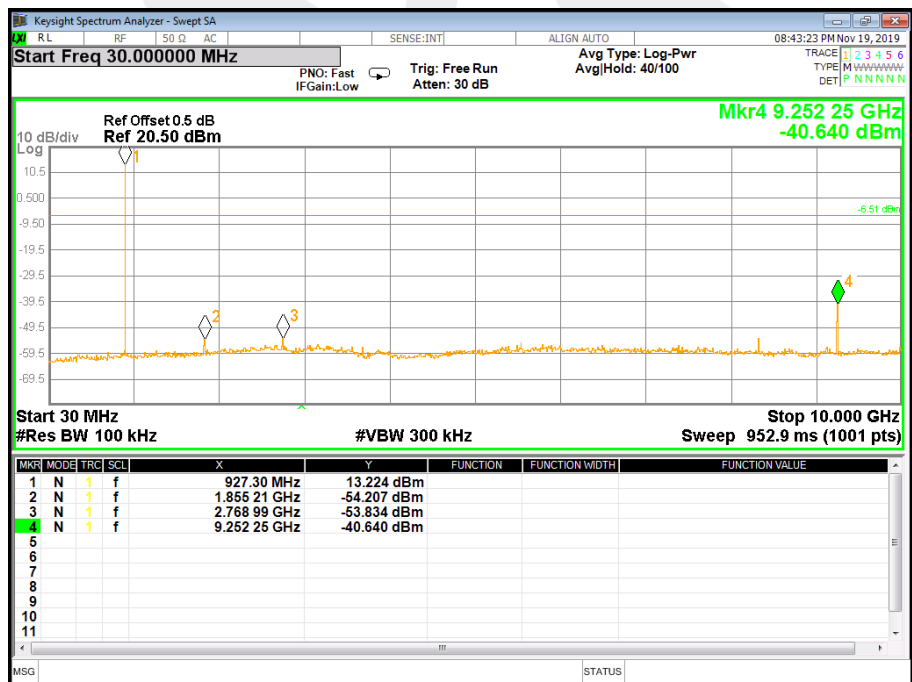




03 CH



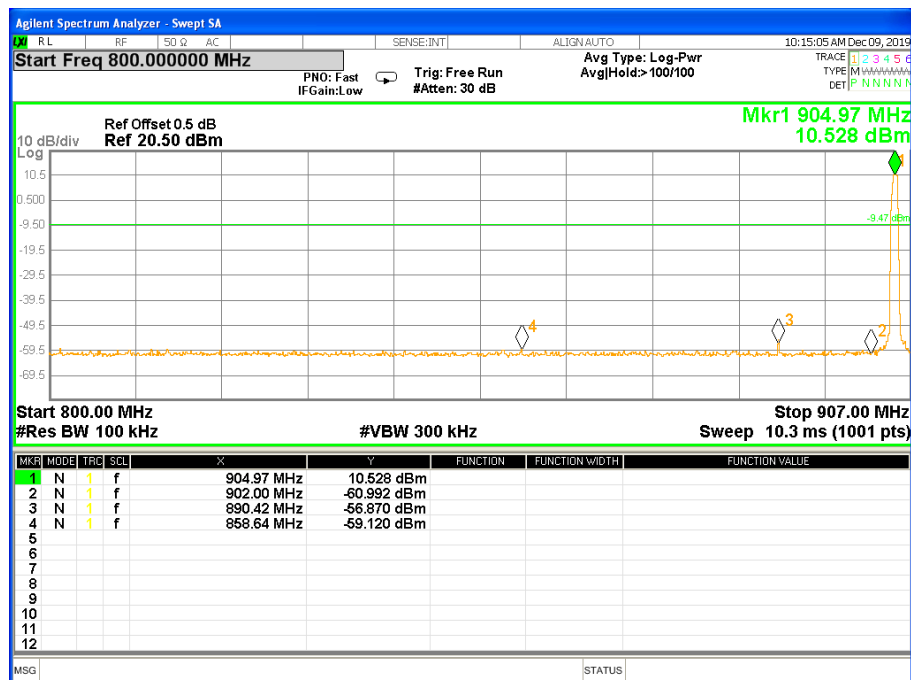
05 CH



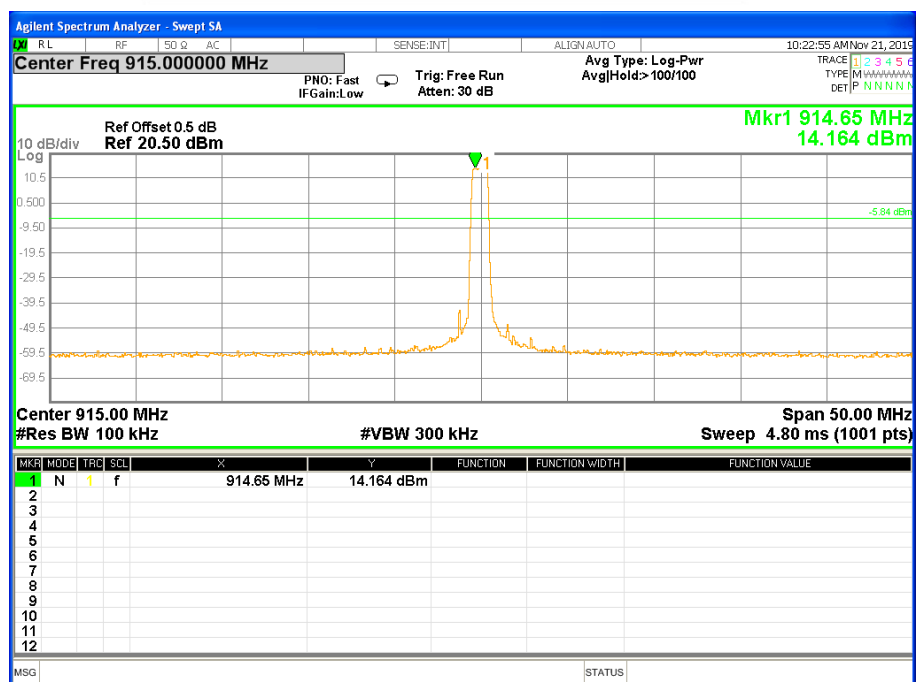


For Band edge

01 CH

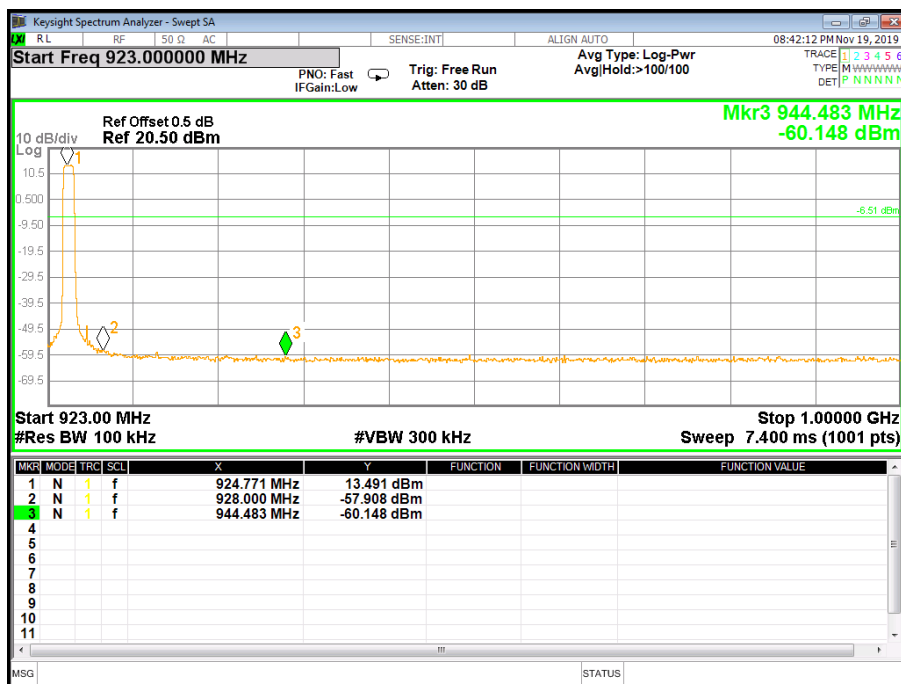


03 CH





05 CH





6. POWER SPECTRAL DENSITY TEST

6.1 LIMIT

FCC Part 15.247, Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(e)	Power Spectral Density	≤ 8 dBm (RBW ≥ 3 KHz)	902-928	PASS

6.2 TEST PROCEDURE

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS channel bandwidth.
3. Set the RBW to: $100 \text{ kHz} \geq \text{RBW} \geq 3 \text{ kHz}$.
4. Set the VBW $\geq 3 \times \text{RBW}$.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

6.3 TEST SETUP



6.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

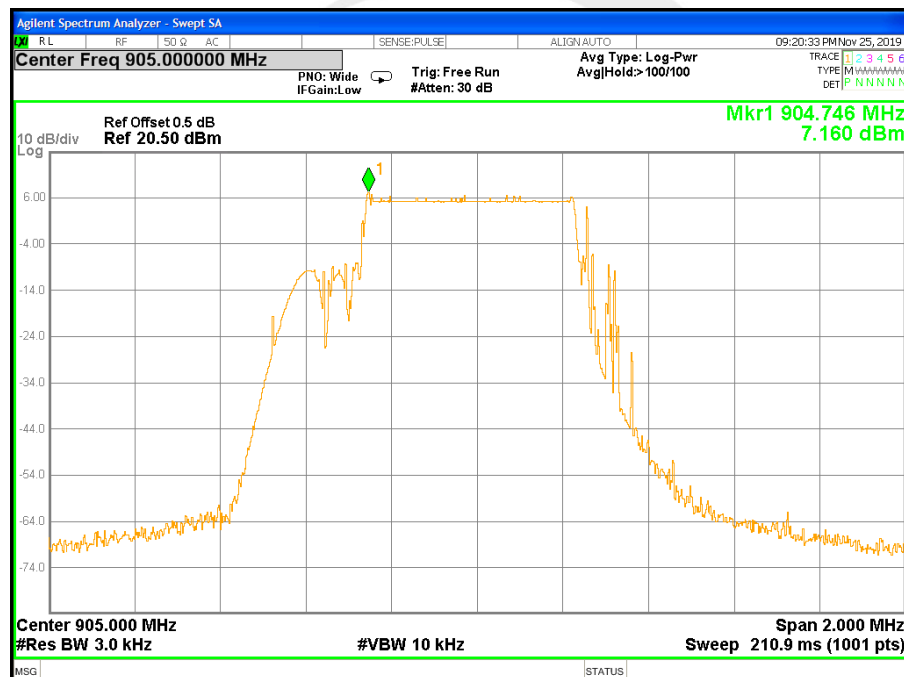


6.5 TEST RESULTS

Temperature:	25 °C	Relative Humidity:	60%
Test Voltage:	DC 3.6V	Test Mode:	TX Mode /CH01, CH03, CH05

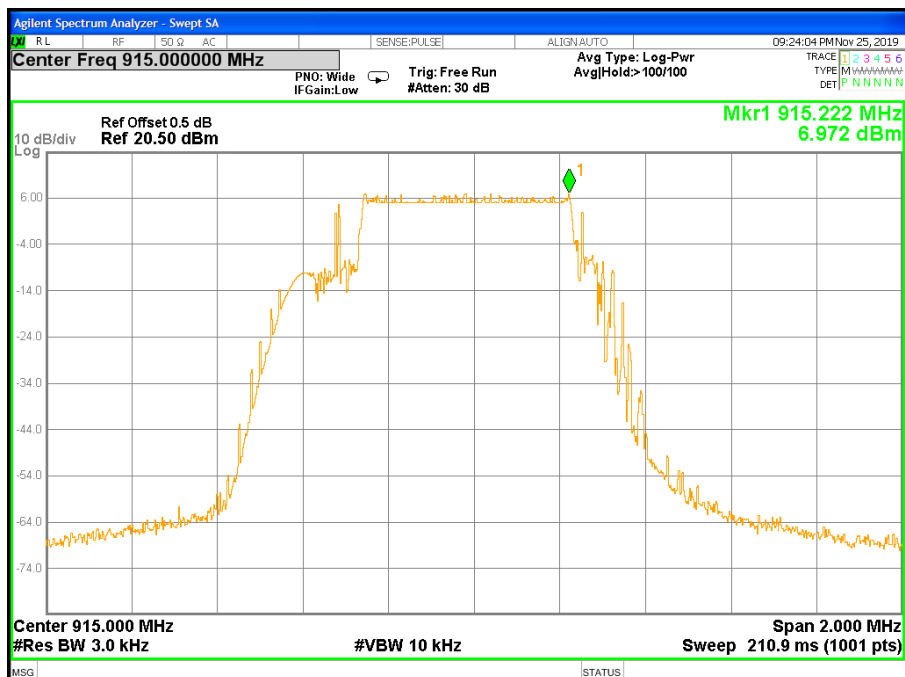
Frequency	Power Density (dBm/3kHz)	Limit (dBm/3KHz)	Result
905 MHz	7.160	≤8	PASS
915 MHz	6.972	≤8	PASS
925 MHz	6.845	≤8	PASS

TX CH01

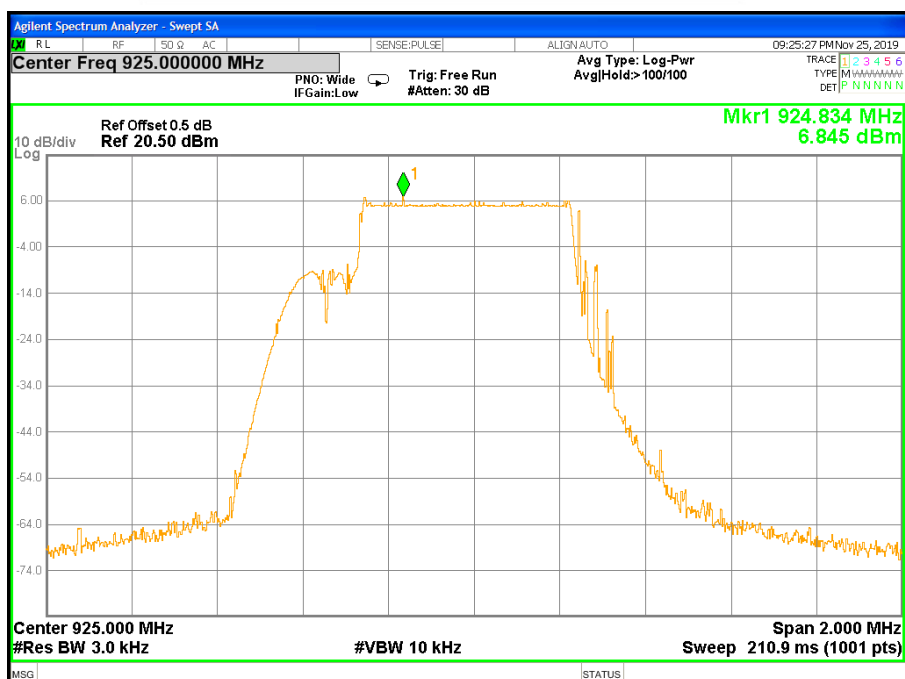




TX CH03



TX CH05





7. BANDWIDTH TEST

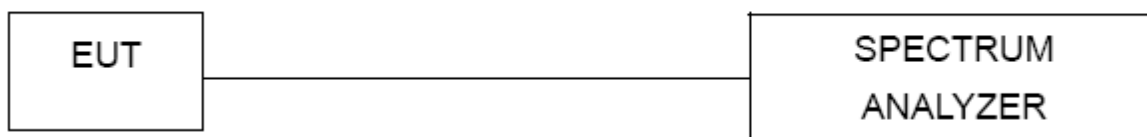
7.1 LIMIT

FCC Part 15.247, Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(2)	Bandwidth	$\geq 500\text{KHz}$ (6dB bandwidth)	902-928	PASS

7.2 TEST PROCEDURE

The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described above (i.e., RBW = 100 kHz, VBW $\geq 3\text{RBW}$, peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be $\geq 6\text{ dB}$.

7.3 TEST SETUP



7.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

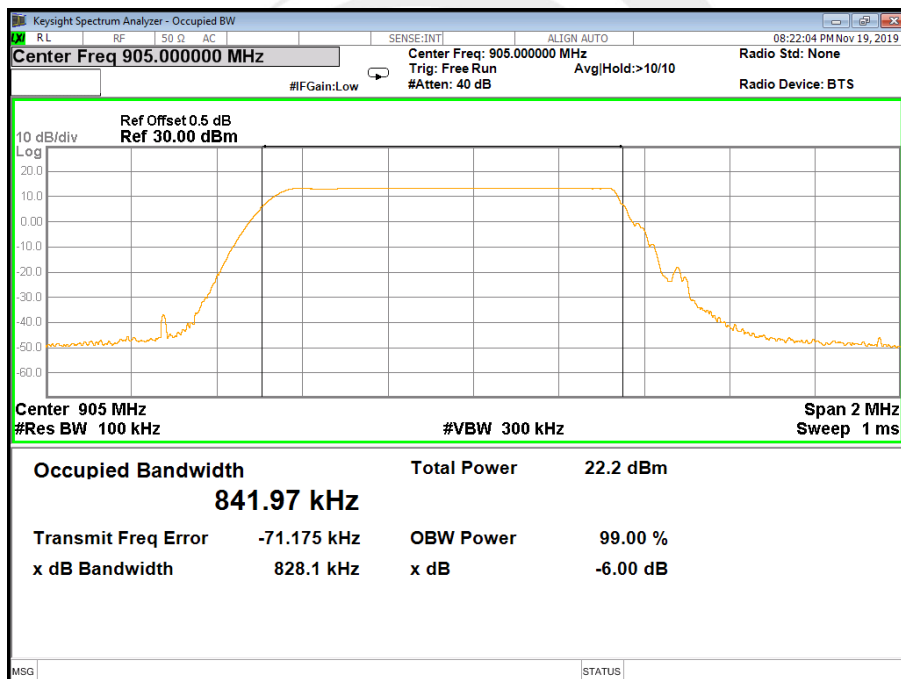


7.5 TEST RESULTS

Temperature:	25 °C	Relative Humidity:	60%
Test Voltage:	DC 3.6V	Test Mode:	TX Mode /CH01, CH03, CH05

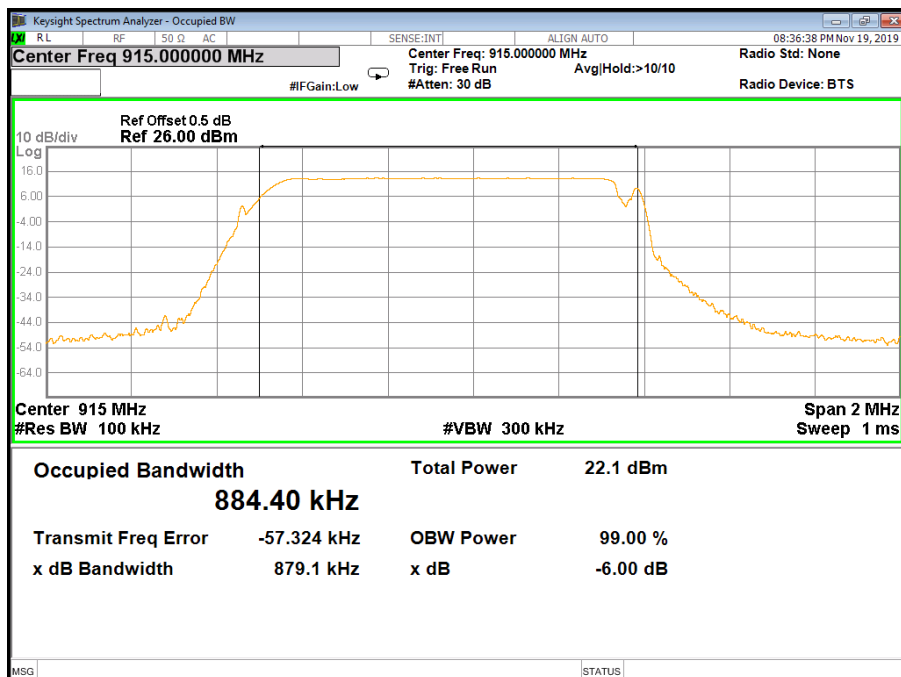
Frequency	6dB Bandwidth (KHz)	Channel Separation (KHz)	Result
905 MHz	828.100	≥500KHz	PASS
915 MHz	879.100	≥500KHz	PASS
925 MHz	841.100	≥500KHz	PASS

TX CH 01

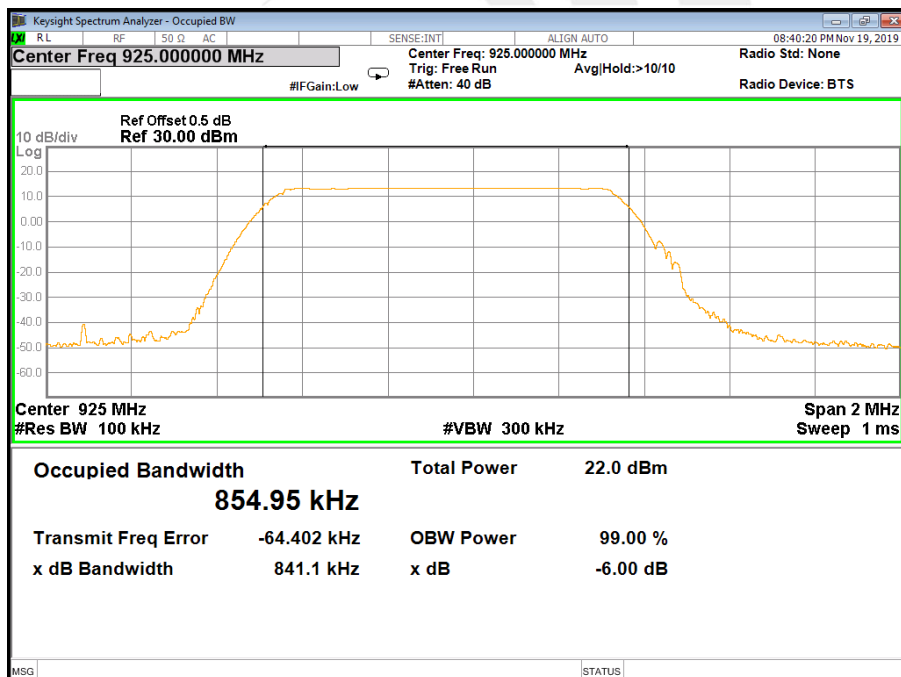




TX CH 03



TX CH 05





8. PEAK OUTPUT POWER TEST

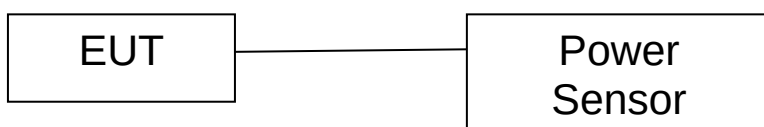
8.1 LIMIT

FCC Part 15.247, Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(3)	Output Power	1 watt or 30dBm	902-928	PASS

8.2 TEST PROCEDURE

- The EUT was directly connected to the Power Sensor&PC

8.3 TEST SETUP



8.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.3 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 Voltage:	DC 3.6V	Test Mode:	TX Mode /CH01, CH03, CH05

Test Channe	Frequency	Peak Conducted Output Power	Average Conducted Output Power	LIMIT
	(MHz)	(dBm)	(dBm)	dBm
CH1	905	14.12	14.09	30
CH3	915	14.11	14.05	30
CH5	925	14.12	14.08	30





9. ANTENNA REQUIREMENT

9.1 STANDARD REQUIREMENT

15.203 requirement: For intentional device, according to 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.

9.2 EUT ANTENNA

The EUT antenna is Omni-directional Antenna. It comply with the standard requirement.





10. EUT TEST PHOTO

Note: See test photos in setup photo document for the actual connections between Product and support equipment.

※※※※END OF THE REPORT※※※※

