RADIO TEST REPORT

Report No: STS1508102F01

Issued for

GTSYS LIMITED

R07 Unit E, 9/F Kwai Shing Industral Building Phase2, Kwai Chung, Hong Kong

Product Name:	GTSYS - RFID UHF Integrated Reader
Brand Name:	GTSYS R.I.A.
Model No.:	IR-U-POEv2/7
Series Model:	N/A
FCC ID:	A2BIRUPOE-07-V2
Test Standard:	FCC Part 15.247

Shenzhen STS Test Services Co., Ltd.
1/F., Building B, Zhuoke Science Park, No.190,Chongqing Road,
Fuyong Street, Bao'an District, Shenzhen, Guangdong,China
TEL: +86-755 3688 6288 FAX: +86-755 3688 6277 E-mail:sts@stsapp.com

TEST RESULT CERTIFICATION

Applicant'sname……	GTSYS LIMITED
Address	R07 Unit E, 9/F Kwai Shing Industral Building Phase2, Kwai Chung, Hong Kong
Manufacture's Name.....	CWLINUX LIMITED
Address	Unit 138, 13/F Weswick Cermercial Bld. 147-151 Queen's Road East , Wan Chai, Hong Kong

Product description

Product name	GTSYS - RFID UHF Integrated Reader
Brand name.....	GTSYS R.I.A.
Model and/or type reference	IR-U-POEv2/7
Standards.....	FCC Part 15.247
Test procedure.....	ANSI C63.10-2013

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

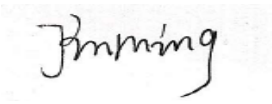
This report shall not be reproduced except in full, without the written approval of STS, this document may be altered or revised by STS, personal only, and shall be noted in the revision of the document.

Date of Test.....

Date (s) of performance of tests.. 06 Sep. 2015 ~11 Sep. 2015

Date of Issue..... 14 Sep. 2015

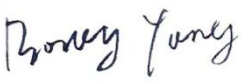
Test Result ..... Pass

Testing Engineer : 

(Jin Ming)

Technical Manager : 

(Vita Li)

Authorized Signatory : 

(Bovey Yang)

Table of Contents Page

Table of Contents Page

Revision History

Rev.	Issue Date	Report NO.	Effect Page	Contents
00	14 Sep. 2015	STS1508102F01	ALL	Initial Issue

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (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)(1)	Peak Output Power	PASS	--
15.247(c)	Radiated Spurious Emission	PASS	--
15.247(d)	Conducted Spurious Emission	PASS	--
15.247(a)(iii)	Number of Hopping Frequency	PASS	--
15.247(a)(iii)	Dwell Time	PASS	--
15.247(a)(1)	Bandwidth	PASS	--
15.205	Band Edge Emission	PASS	--
15.203	Antenna Requirement	PASS	--

NOTE:

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

1.1 TEST FACTORY

Shenzhen STS Test Services Co., Ltd.
Add. : 1/F., Building B, Zhuoke Science Park, No.190,Chongqing Road,
Fuyong Street, Bao'an District, Shenzhen, Guangdong,China
CNAS Registration No.: L7649;
FCC Registration No.: 842334; IC Registration No.: 12108A-1

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y ± 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	Conducted Emission (9KHz-150KHz)	±2.88dB
2	Conducted Emission (150KHz-30MHz)	±2.67dB
3	RF power,conducted	±0.70dB
4	Spurious emissions,conducted	±1.19dB
5	All emissions,radiated(<1G) 30MHz-200MHz	±2.83dB
6	All emissions,radiated(<1G) 200MHz-1000MHz	±2.94dB
7	All emissions,radiated(>1G)	±3.03dB
8	Temperature	±0.5°C
9	Humidity	±2%

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	GTSYS - RFID UHF Integrated Reader
Trade Name	GTSYS R.I.A.
Model Name	IR-U-POEv2/7
Serial Model	N/A
Model Difference	N/A
Channel List	Please refer to the Note 2.
Bluetooth	Frequency:902.8-927.8 MHz Modulation: GFSK
Antenna gain	7.5dBi
Hardware version number	--
Software versioning number	--
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)
00	902.8	27	916.3
01	903.3	28	916.8
02	903.8	29	917.3
03	904.3	30	917.8
04	904.8	31	918.3
05	905.3	32	918.8
06	905.8	33	919.3
07	906.3	34	919.8
08	906.8	35	920.3
09	907.3	36	920.8
10	907.8	37	921.3
11	908.3	38	921.8
12	908.8	39	922.3
13	909.3	40	922.8
14	909.8	41	923.3
15	910.3	42	923.8
16	910.8	43	924.3
17	911.3	44	924.8
18	911.8	45	925.3
19	912.3	46	925.8
20	912.8	47	926.3
21	913.3	48	926.8
22	913.8	49	927.3
23	914.3	50	927.8
24	914.8		
25	915.3		
26	915.8		

3. Table for Filed Antenna

Ant	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
1	GTSYS R.I.A.	IR-U-POEv2/7	flat panel Antenna	N/A	7.5	BT Antenna

The EUT antenna is flat panel Antenna. no antenna other than that furnished by the responsible party shall be used with the device.

2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	CH00
Mode 2	CH24
Mode 3	CH50
Mode 4	Charging + Keeping TX mode

For Conducted Emission	
Final Test Mode	Description
Mode 4	Charging + Keeping TX mode

For Radiated Emission	
Final Test Mode	Description
Mode 1	CH00
Mode 2	CH24
Mode 3	CH50
Mode 4	Charging + Keeping TX mode

Note:

(1) The measurements are performed at the highest, middle, lowest available channels.

(2) We have be tested for all avaiable U.S. voltage and frequencies(For 120V,50/60Hz and 240V, 50/60Hz) for which the device is capable of operation.

2.3 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING

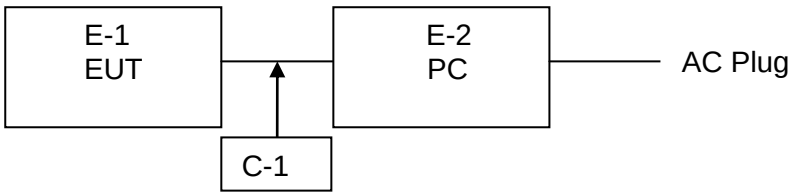
During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final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

Test software Version	Test program: N/A		
Frequency	902.8 MHz	914.8 MHz	927.8 MHz
Parameters(1Mbps)	DEF	DEF	DEF

2.4 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 power parameters of FHSS

Radiated Spurious Emission Test



2.5 DESCRIPTION OF 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.

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
E-1	GTSYS - RFID UHF Integrated Reader	N/A	IR-U-POEv2/7	N/A	EUT
E-2	PC	HP	500-320cx	N/A	N/A

Item	Shielded Type	Ferrite Core	Length	Note
C-1	unshielded	NO	101cm	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”.

2.6 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Spectrum Analyzer	Agilent	E4407B	MY50140340	2014.10.25	2015.10.24
Test Receiver	R&S	ESCI	101427	2014.10.25	2015.10.24
Bilog Antenna	TESEQ	CBL6111D	34678	2014.11.25	2015.11.24
Horn Antenna	Schwarzbeck	BBHA 9120D(1201)	9120D-1343	2015.03.06	2016.03.05
50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2015.06.06	2016.06.05
PreAmplifier	Agilent	8449B	60538	2014.10.25	2015.10.24
Loop Antenna	ARA	PLA-1030/B	1029	2015.06.08	2016.06.07
USB RF power sensor	DARE	RPR3006W	15I00041SNO03	2014.10.25	2015.10.24

Conduction Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
EMI Test Receiver	R&S	ESPI	102086	2014.11.20	2015.11.19
LISN	R&S	ENV216	101242	2014.10.25	2015.10.24
LISN	EMCO	3810/2NM	000-23625	2014.10.25	2015.10.24

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 15.247&207(a) limit in the table below has to be followed.

FREQUENCY (MHz)	Class B (dBuV)		Standard
	Quasi-peak	Average	
0.15 -0.5	66 - 56 *	56 - 46 *	CISPR
0.50 -5.0	56.00	46.00	CISPR
5.0 -30.0	60.00	50.00	CISPR

0.15 -0.5	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	56.00	46.00	FCC
5.0 -30.0	60.00	50.00	FCC

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.

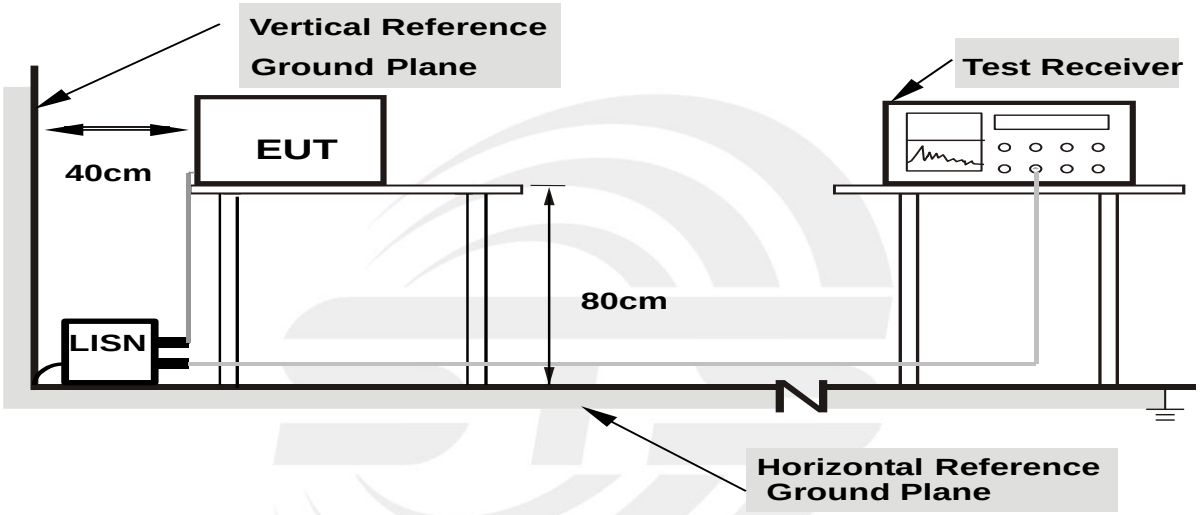
The following table is the setting of the receiver

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

3.1.2 TEST PROCEDURE

a. The EUT was placed 0.4 meters from the horizontal 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.

3.1.3 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

3.1.4 EUT OPERATING CONDITIONS

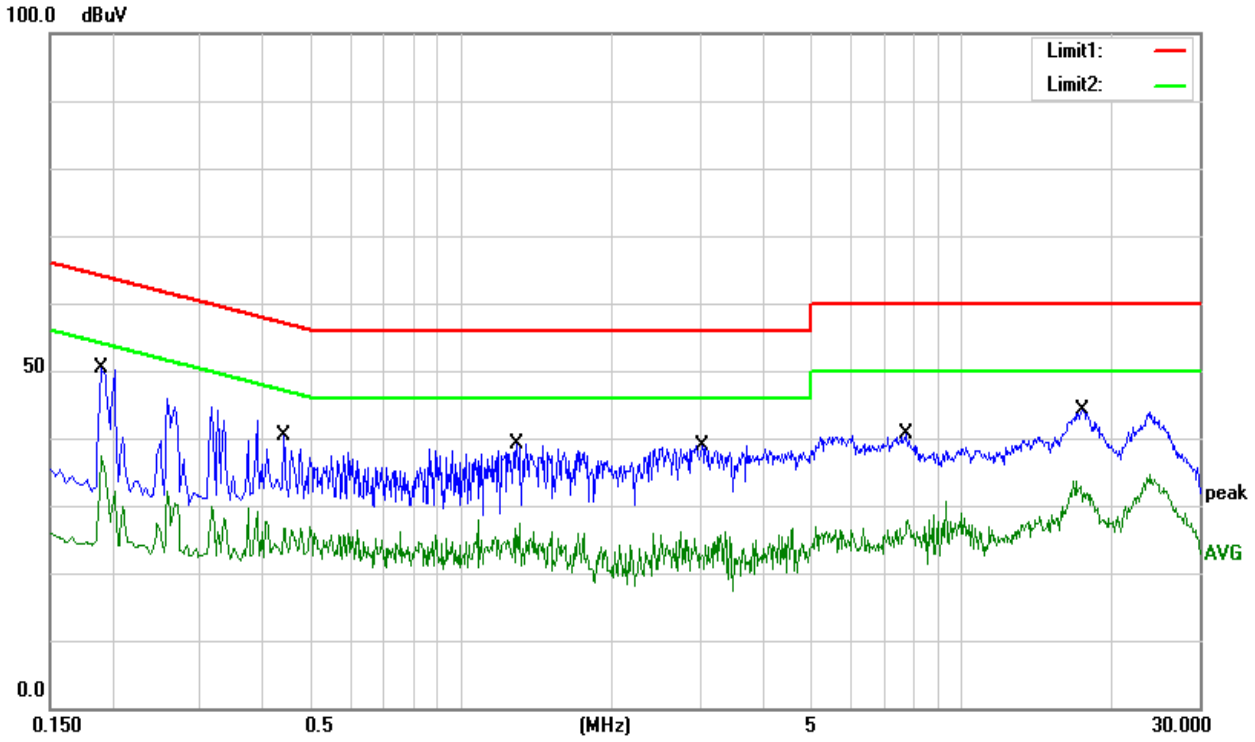
The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

3.1.5 TEST RESULTS

EUT:	GTSYS - RFID UHF Integrated Reader	Model Name.:	IR-U-POEv2/7
Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	1010hPa	Phase:	L
Test Voltage:	AC120V/60Hz	Test Mode:	Mode 4

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
0.1900	40.25	10.00	50.25	64.04	-13.79	QP
0.1900	27.08	10.00	37.08	54.04	-16.96	AVG
0.4420	30.20	10.07	40.27	57.02	-16.75	QP
0.4420	16.63	10.07	26.70	47.02	-20.32	AVG
1.2900	29.19	9.93	39.12	56.00	-16.88	QP
1.2900	15.73	9.93	25.66	46.00	-20.34	AVG
3.0380	28.96	10.00	38.96	56.00	-17.04	QP
3.0380	12.59	10.00	22.59	46.00	-23.41	AVG
7.7380	30.48	10.25	40.73	60.00	-19.27	QP
7.7380	17.08	10.25	27.33	50.00	-22.67	AVG
17.5500	33.50	10.56	44.06	60.00	-15.94	QP
17.5500	19.96	10.56	30.52	50.00	-19.48	AVG

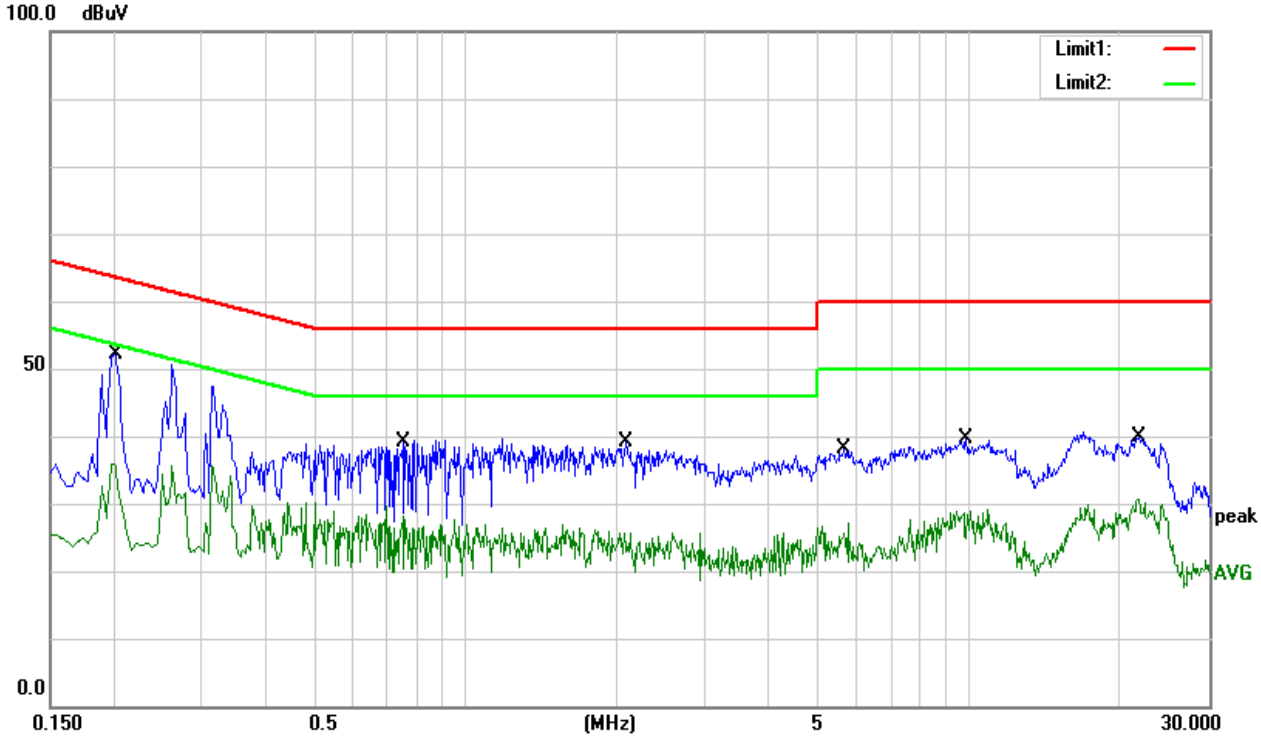
Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.



EUT:	GTSYS - RFID UHF Integrated Reader	Model Name.:	IR-U-POEv2/7
Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	1010hPa	Phase:	N
Test Voltage:	AC120V/60Hz	Test Mode:	Mode 4

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
0.2020	42.21	10.00	52.21	63.53	-11.32	QP
0.2020	24.60	10.00	34.60	53.53	-18.93	AVG
0.7540	29.05	10.00	39.05	56.00	-16.95	QP
0.7540	10.32	10.00	20.32	46.00	-25.68	AVG
2.0940	29.07	10.00	39.07	56.00	-16.93	QP
2.0940	14.27	10.00	24.27	46.00	-21.73	AVG
5.6780	27.87	10.20	38.07	60.00	-21.93	QP
5.6780	15.31	10.20	25.51	50.00	-24.49	AVG
9.8780	29.32	10.20	39.52	60.00	-20.48	QP
9.8780	14.68	10.20	24.88	50.00	-25.12	AVG
21.7900	29.12	10.64	39.76	60.00	-20.24	QP
21.7900	19.98	10.64	30.62	50.00	-19.38	AVG

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



3.2 RADIATED EMISSION MEASUREMENT

3.2.1 RADIATED EMISSION LIMITS

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on Part 15247&205(a), then the Part 15 247&209(a) limit in the table below has to be followed.

LIMITS OF RADIATED EMISSION MEASUREMENT (30MHz - 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)	Class B (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).

FREQUENCY RANGE OF RADIATED MEASUREMENT (For unintentional radiators)

Highest frequency generated or Upper frequency of measurement used in the device or on which the device operates or tunes (MHz)	Range (MHz)
Below 1.705	30
1.705 – 108	1000
108 – 500	2000
500 – 1000	5000
Above 1000	5th harmonic of the highest frequency or 40 GHz, whichever is lower

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

Receiver Parameter	**Setting**
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

3.2.2 TEST PROCEDURE

a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
b. 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 open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
c. The height of the equipment or of the substitution antenna 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. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. 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.
e. 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.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

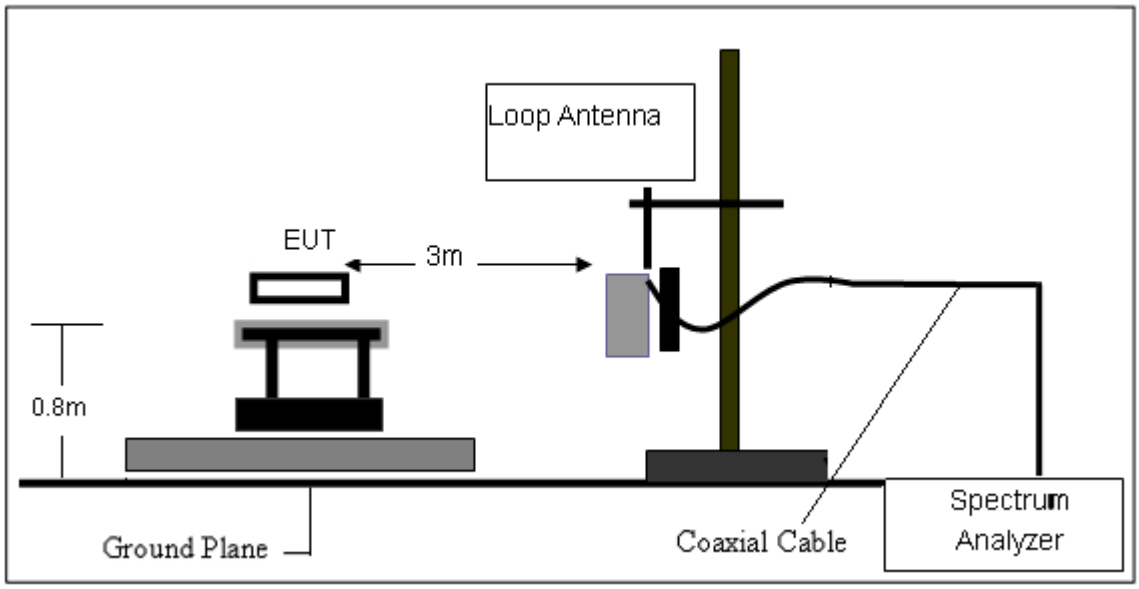
Both horizontal and vertical antenna polarities were tested
and performed pretest to three orthogonal axis. The worst case emissions were reported

3.2.3 DEVIATION FROM TEST STANDARD

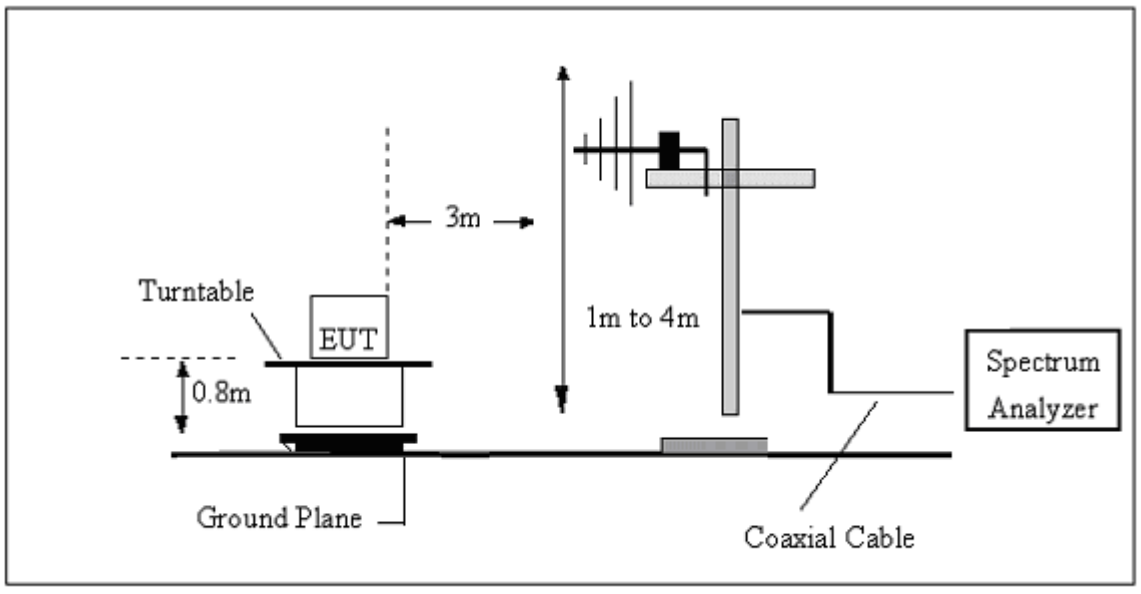
No deviation

3.2.4 TEST SETUP

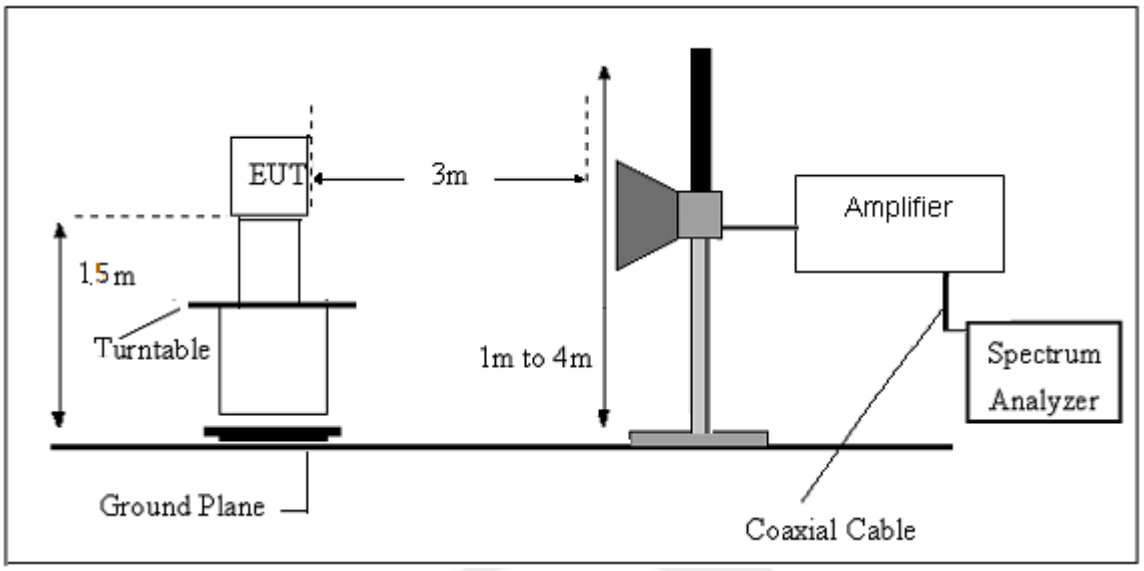
（A）Radiated Emission Test-Up Frequency Below 30MHz



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



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



3.2.5 EUT OPERATING 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.

3.2.6 TEST RESULTS

Below 30MHz

EUT:	GTSYS - RFID UHF Integrated Reader	Model Name.:	IR-U-POEv2/7
Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	1010hPa	Test Mode:	Mode 4
Test Voltage:	AC120V/60Hz		

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

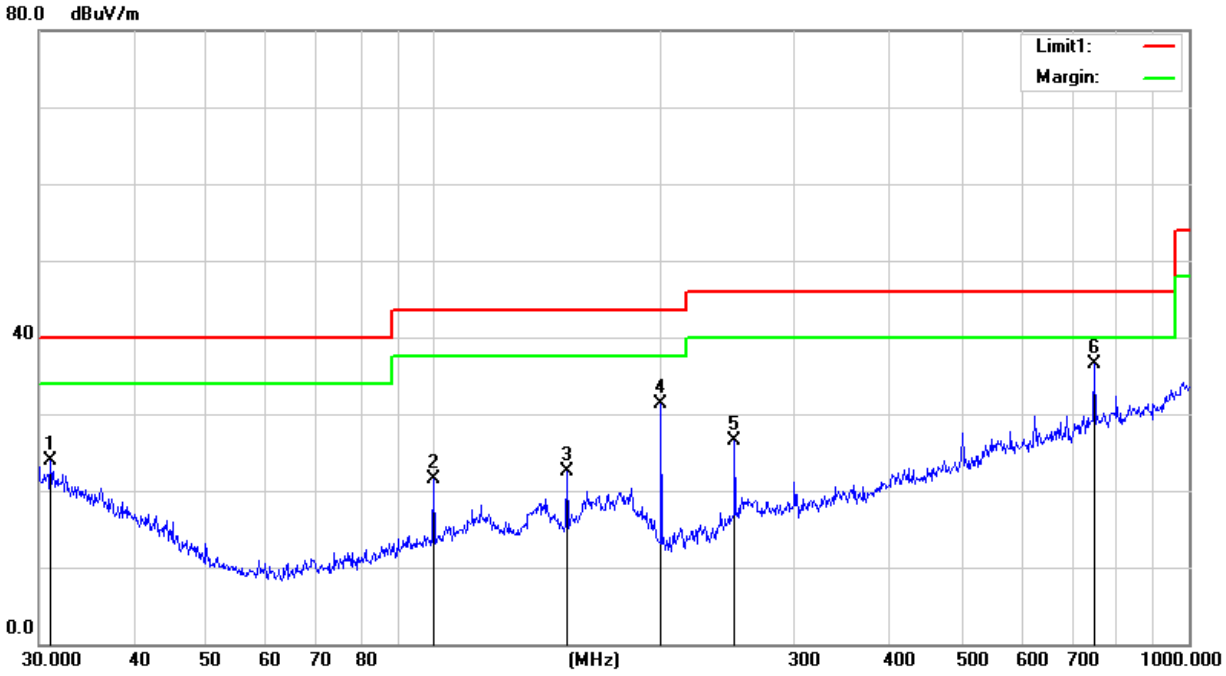
NOTE:
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
Distance extrapolation factor =40 log (specific distance/test distance)(dB);
Limit line = specific limits(dBuv) + distance extrapolation factor.

Between 30-1000MHz

EUT:	GTSYS - RFID UHF Integrated Reader	Model Name.:	IR-U-POEv2/7
Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	1010hPa	Phase:	Horizontal
Test Voltage:	AC 120V/60Hz	Test Mode:	Mode 4

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	31.0703	5.65	18.16	23.81	40.00	-16.19	QP
2	99.8777	10.80	10.70	21.50	43.50	-22.00	QP
3	150.0107	10.62	11.98	22.60	43.50	-20.90	QP
4	199.9856	22.15	9.11	31.26	43.50	-12.24	QP
5	250.3010	12.71	13.70	26.41	46.00	-19.59	QP
6	750.1083	11.21	25.28	36.49	46.00	-9.51	QP

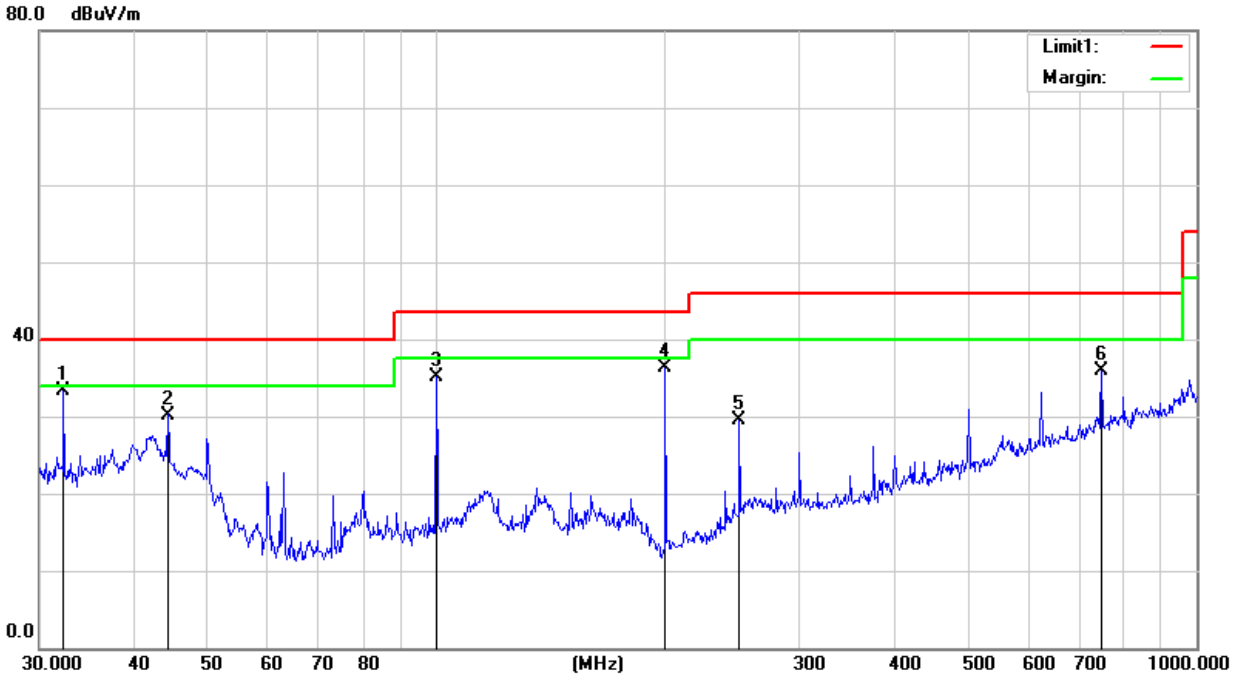
Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.



EUT:	GTSYS - RFID UHF Integrated Reader	Model Name.:	IR-U-POEv2/7
Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	1010hPa	Phase:	Vertical
Test Voltage:	AC 120V/60Hz	Test Mode:	Mode 4

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	32.2925	15.70	17.52	33.22	40.00	-6.78	QP
2	44.2751	19.07	11.13	30.20	40.00	-9.80	QP
3	99.8777	24.31	10.70	35.01	43.50	-8.49	QP
4	199.9856	27.21	9.11	36.32	43.50	-7.18	QP
5	250.3010	15.71	13.70	29.41	46.00	-16.59	QP
6	750.1082	10.55	25.28	35.83	46.00	-10.17	QP

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



Above 1000 MHz

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type	Comment
Low Channel (902.8 MHz)							
1805.60	65.15	-13.77	51.38	74	-22.62	PK	Vertical
1805.60	45.87	-13.77	32.1	54	-21.9	AV	Vertical
2708.40	60.69	-10.2	50.49	74	-23.51	PK	Vertical
2708.39	39.98	-10.2	29.78	54	-24.22	AV	Vertical
3611.19	61.07	-7.9	53.17	74	-20.83	PK	Horizontal
3611.19	42.78	-7.9	34.88	54	-19.12	AV	Horizontal
Mid Channel (914.8 MHz)							
1829.60	63.49	-13.72	49.77	74	-24.23	PK	Vertical
1829.60	47.48	-13.72	33.76	54	-20.24	AV	Vertical
2744.40	59.88	-10.1	49.78	74	-24.22	PK	Vertical
2744.40	42.71	-10.1	32.61	54	-21.39	AV	Vertical
3659.20	59.86	-7.7	52.16	74	-21.84	PK	Horizontal
3659.19	43.67	-7.7	35.97	54	-18.03	AV	Horizontal
High Channel (927.8 MHz)							
1855.60	59.63	-13.69	45.94	74	-28.06	PK	Vertical
1855.59	43.75	-13.69	30.06	54	-23.94	AV	Vertical
2783.40	60.14	-10.05	50.09	74	-23.91	PK	Vertical
2783.39	43.84	-10.05	33.79	54	-20.21	AV	Vertical
3711.19	59.85	-7.6	52.25	74	-21.75	PK	Horizontal
3711.20	43.69	-7.6	36.09	54	-17.91	AV	Horizontal

Note:

1) 30MHz~10GHz

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

Emission Level = Meter Reading + Factor

Margin = Limit - Emission Leve

Band edge

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type	Comment
901.9	37.10	26.69	63.79	74	-10.21	PK	Vertical
901.9	24.11	26.69	50.8	54	-3.2	AV	Vertical
901.9	35.42	26.69	62.11	74	-11.89	PK	Horizontal
901.9	21.94	26.69	48.63	54	-5.37	AV	Horizontal
928.1	35.39	27.49	62.88	74	-11.12	PK	Vertical
928.1	21.44	27.49	48.93	54	-5.07	AV	Vertical
928.1	36.56	27.49	64.05	74	-9.95	PK	Horizontal
928.1	23.15	27.49	50.64	54	-3.36	AV	Horizontal

Low measurement frequencies is range from 890 to 902 MHz, high measurement frequencies is range from 928 to 940 MHz.
Only show the worst point data of the emissions in the frequency 890-902 MHz and 928-940 MHz.

Hopping

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type	Comment
902	36.50	26.69	63.19	74	-10.81	PK	Vertical
902	23.70	26.69	50.39	54	-3.61	AV	Vertical
902	36.02	26.69	62.71	74	-11.29	PK	Horizontal
902	21.46	26.69	48.15	54	-5.85	AV	Horizontal
928	35.49	27.49	62.98	74	-11.02	PK	Vertical
928	21.54	27.49	49.03	54	-4.97	AV	Vertical
928	36.95	27.49	64.44	74	-9.56	PK	Horizontal
928	22.80	27.49	50.29	54	-3.71	AV	Horizontal

Low measurement frequencies is range from 890 to 902 MHz, high measurement frequencies is range from 928 to 940 MHz.
Only show the worst point data of the emissions in the frequency 890-902 MHz and 928-940 MHz.

4. CONDUCTED SPURIOUS EMISSIONS

4.1 REQUIREMENT

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.

4.2 TEST PROCEDURE

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.

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

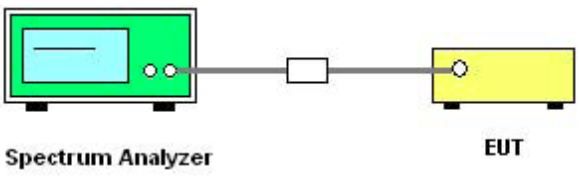
.

For Band edge

Spectrum Parameter	Setting
Detector	Peak
Start/Stop Frequency	Lower Band Edge: 901.9 – 902 MHz Upper Band Edge: 928 – 928.1 MHz
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold

Remark : Hopping on and Hopping off mode all have been tested,only worst case hopping off is reported.

4.3 TEST SETUP



The EUT which is powered by the Battery, is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; 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.

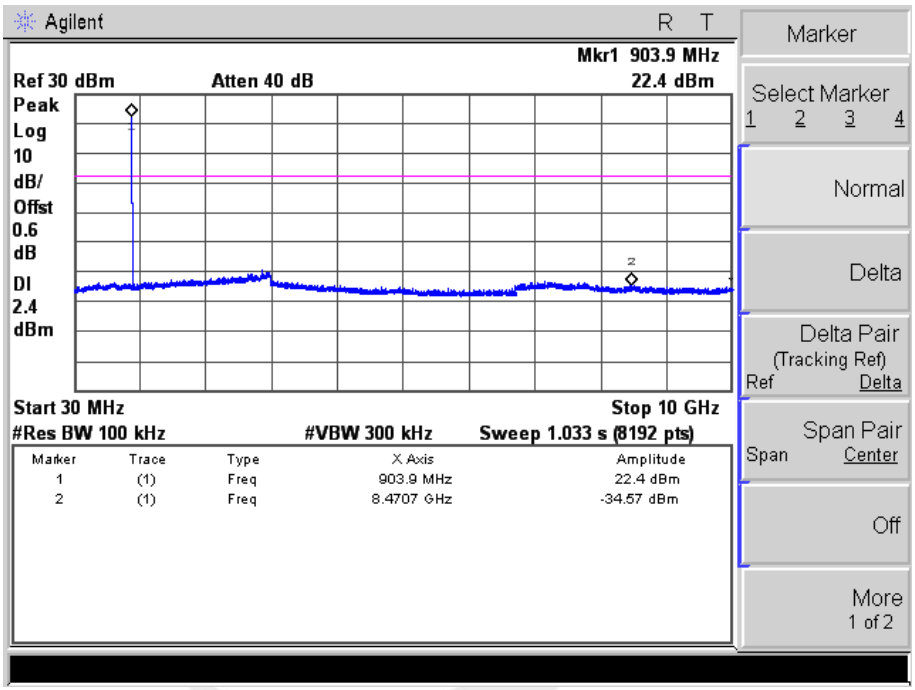
4.4 EUT OPERATION CONDITIONS

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.

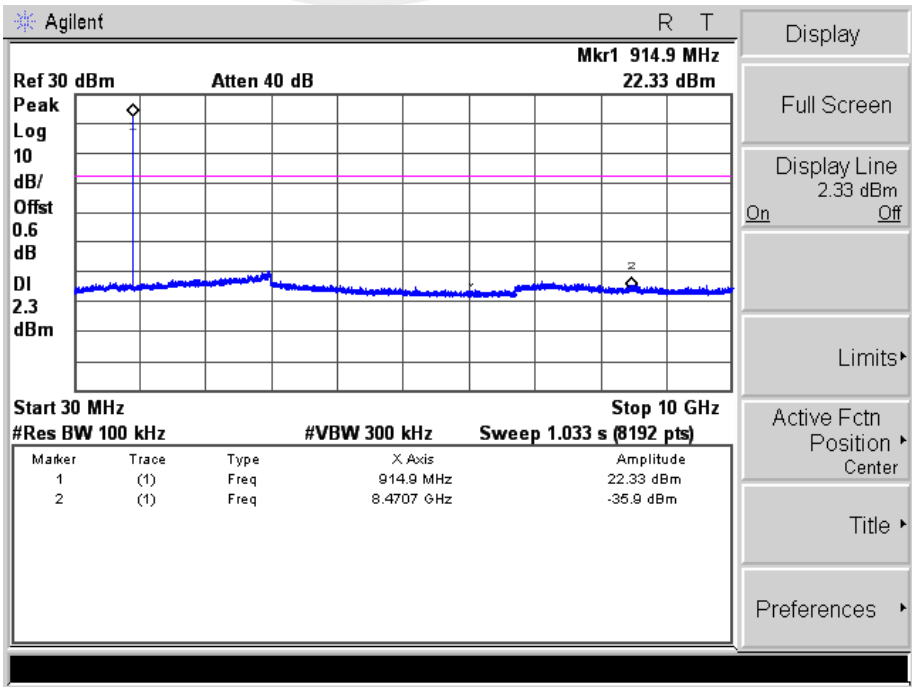
4.5 TEST RESULTS

EUT：	GTSYS - RFID UHF Integrated Reader	Model Name ：	IR-U-POEv2/7
Temperature：	25 ℃	Relative Humidity：	50%
Pressure：	1012 hPa	Test Voltage ：	DC 48V
Test Mode ：	GFSK-00/24/50CH		

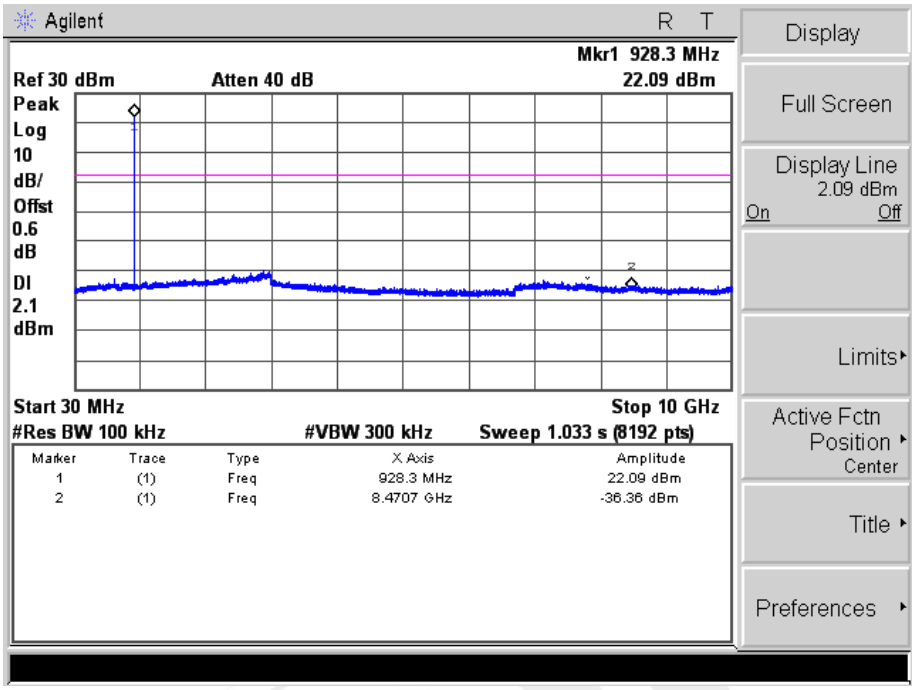
00 CH



24 CH

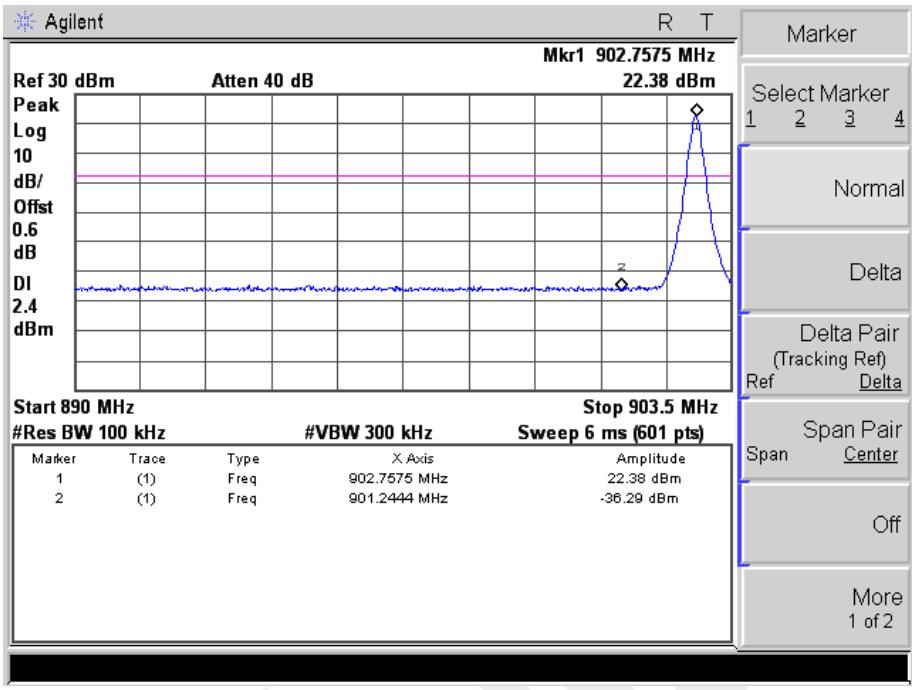


50 CH

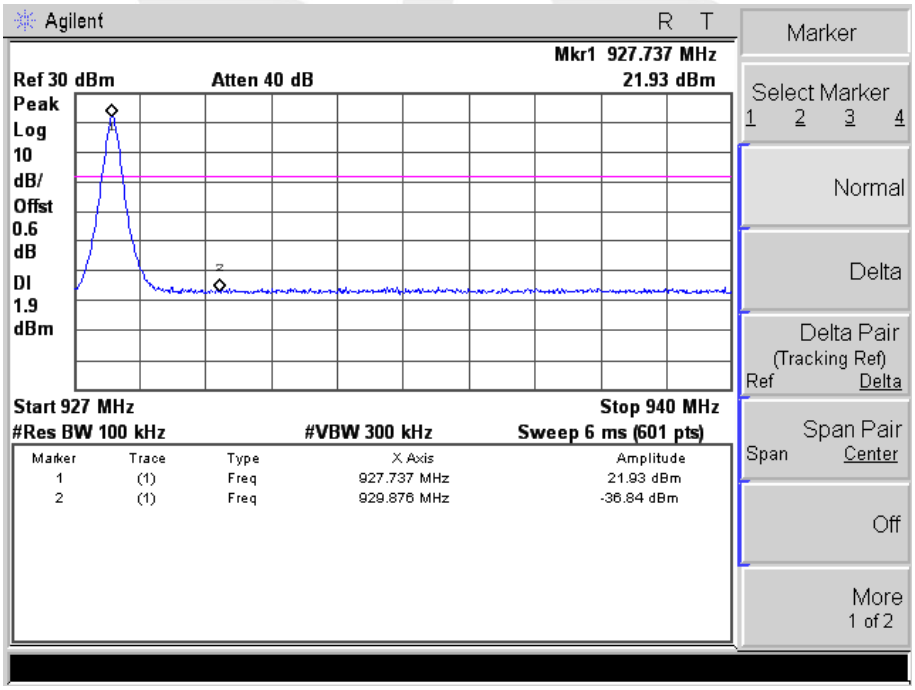

Agilent
R T
Mkr1 928.3 MHz
Ref 30 dBm
Atten 40 dB
22.09 dBm
Peak
Log
10
dB/
Offst
0.6
dB
Dl
2.1
dBm
Start 30 MHz
Stop 10 GHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 1.033 s (8192 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 928.3 MHz 22.09 dBm
2 (1) Freq 8.4707 GHz -36.36 dBm
Display
Full Screen
Display Line
2.09 dBm
On Off
Limits
Active Fctn
Position
Center
Title
Preferences

For Band edge

00 CH



50 CH



5. NUMBER OF HOPPING CHANNEL

5.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(1)(iii)	Number of Hopping Channel	≥15	902-928	PASS

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

5.2 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
b. Spectrum Setting : RBW= 100K, VBW=100K, Sweep time = Auto.

5.3 TEST SETUP

5.4 EUT OPERATION CONDITIONS

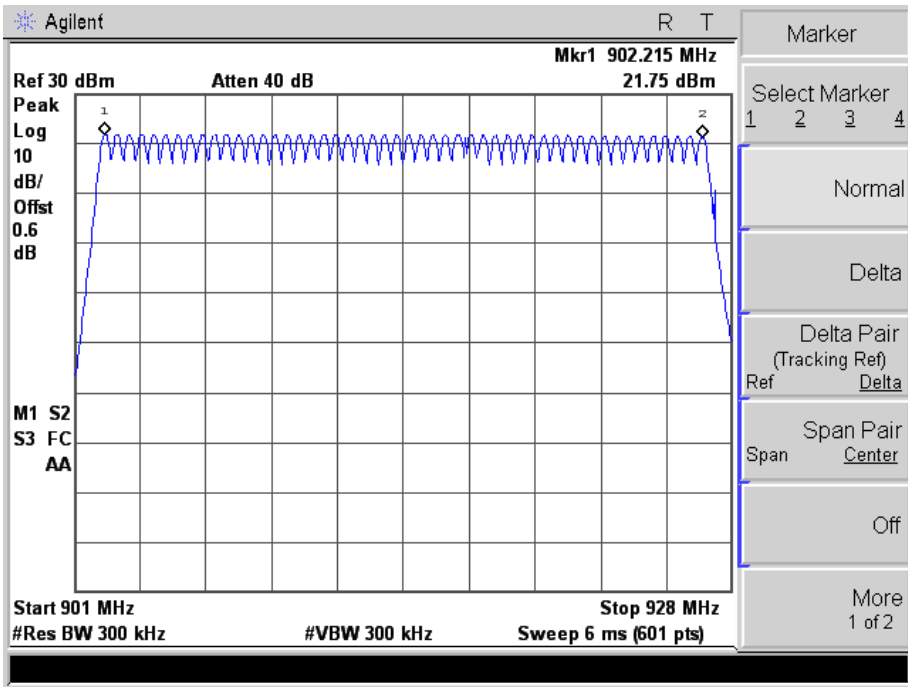
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

5.5 TEST RESULTS

EUT：	GTSYS - RFID UHF Integrated Reader	Model Name ：	IR-U-POEv2/7
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1015 hPa	Test Voltage ：	DC 48V
Test Mode ：	Hopping Mode		

Number of Hopping Channel 79

Hopping channel



6. AVERAGE TIME OF OCCUPANCY

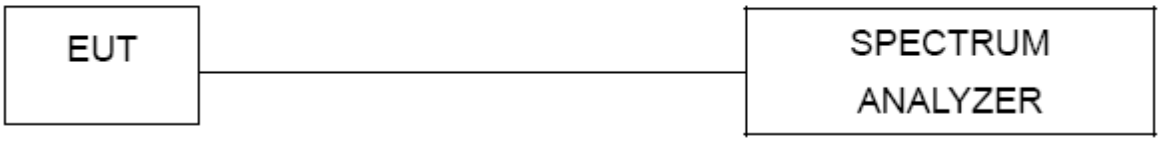
6.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(1)(iii)	Average Time of Occupancy	0.4sec	902-928	PASS

6.2 TEST PROCEDURE

a. The transmitter output (antenna port) was connected to the spectrum analyzer
b. Set RBW of spectrum analyzer to 1MHz and VBW to 3MHz.
c. Use a video trigger with the trigger level set to enable triggering only on full pulses.
d. Sweep Time is more than once pulse time.
e. Set the center frequency on any frequency would be measure and set the frequency span to zero span.
f. Measure the maximum time duration of one single pulse.
i. and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period.

6.3 TEST SETUP



6.4 EUT OPERATION CONDITIONS

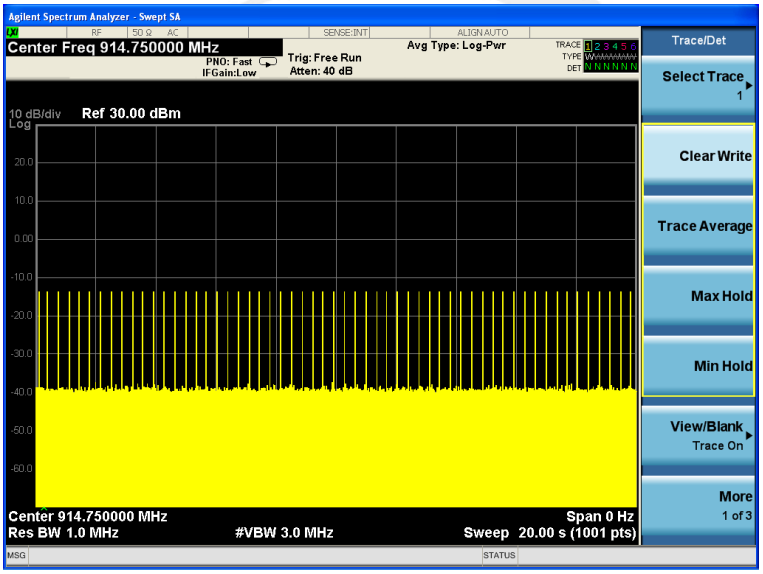
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

6.5 TEST RESULTS

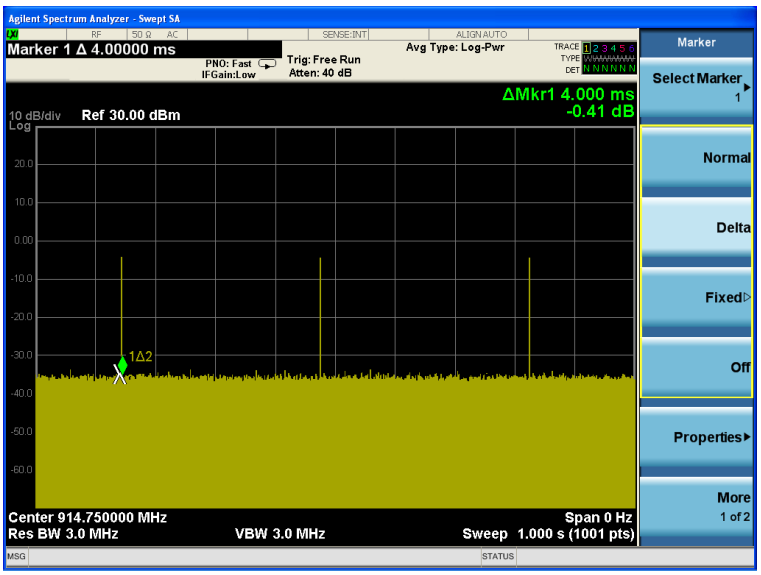
EUT：	GTSYS - RFID UHF Integrated Reader	Model Name ：	IR-U-POEv2/7
Temperature：	25 ℃	Relative Humidity：	50%
Pressure：	1012 hPa	Test Voltage ：	DC 48V
Test Mode ：	GFSK		

Center Channel (MHz)	within 20 (s)period	Pulse Duration (ms)	Dwell Time (s)	Limits(s)
914.8MHz	57	4	0.228	0.4

CH39-DH1



CH39-DH3



7. HOPPING CHANNEL SEPARATION MEASUREMEN

7.1 APPLIED PROCEDURES / LIMIT

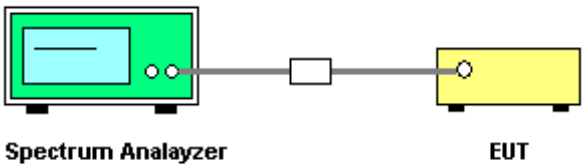
Frequency hopping systems operating in the 902-928 MHz band may have hopping channel carrier frequencies that are separated by 20 dB bandwidth of the hopping channel, whichever is greater.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RB	30 kHz (20dB Bandwidth) / 30 kHz (Channel Separation)
VB	100 kHz (20dB Bandwidth) / 100 kHz (Channel Separation)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

7.2 TEST PROCEDURE

a. The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
b. The resolution bandwidth of 30 kHz and the video bandwidth of 100 kHz were utilised for 20 dB bandwidth measurement.
c. The resolution bandwidth of 30 kHz and the video bandwidth of 100 kHz were utilised for channel separation measurement.

7.3 TEST SETUP



7.4 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

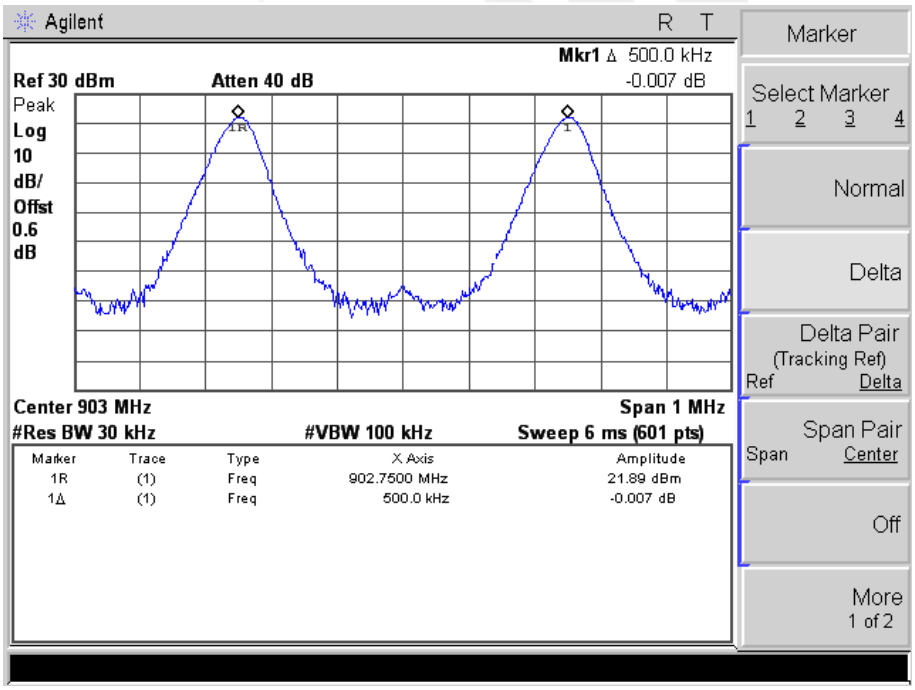
7.5 TEST RESULTS

EUT：	GTSYS - RFID UHF Integrated Reader	Model Name ：	IR-U-POEv2/7
Temperature：	25 ℃	Relative Humidity：	50%
Pressure：	1012 hPa	Test Voltage ：	DC 48V
Test Mode ：	GFSK		

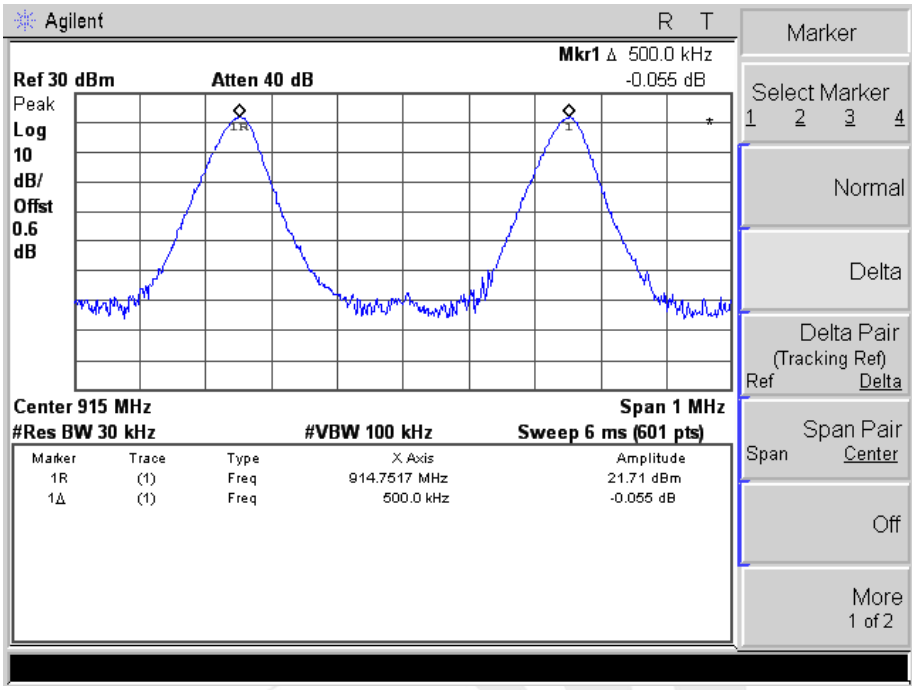
Frequency	Ch. Separation (KHz)	Limit(MHz)	Result
902.8 MHz	500.0	0.199	Complies
914.8 MHz	500.0	0.190	Complies
927.8 MHz	500.0	0.188	Complies

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

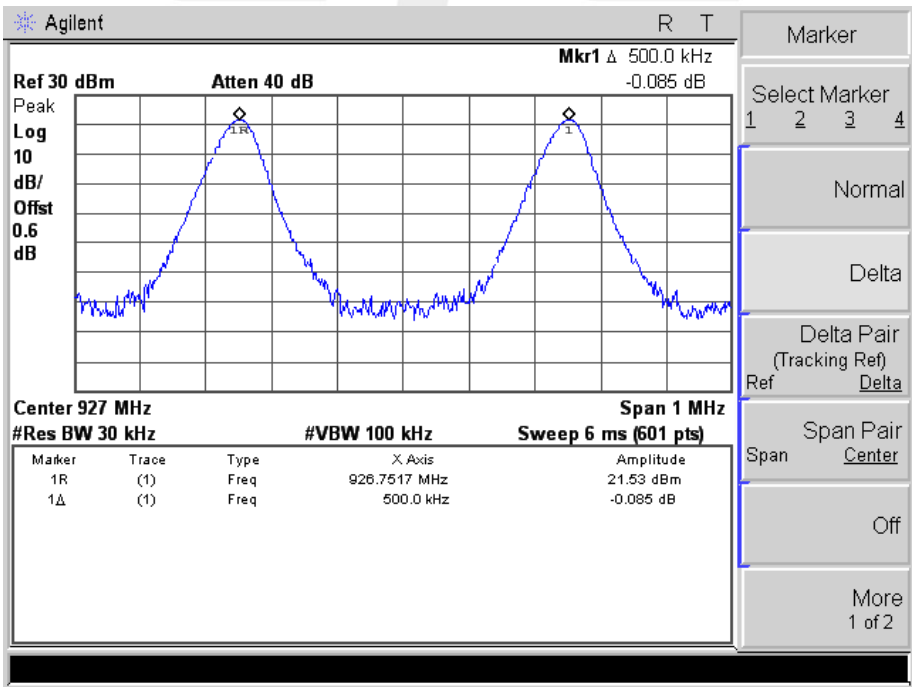
CH00 -1Mbps



CH39 -1Mbps



CH78 -1Mbps



8. BANDWIDTH TEST

8.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C

Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(1)	Bandwidth	(20dB bandwidth)	902-928	PASS

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RB	30 kHz (20dB Bandwidth) / 30 kHz (Channel Separation)
VB	100 kHz (20dB Bandwidth) / 100 kHz (Channel Separation)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

8.2 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
b. Spectrum Setting : RBW= 30KHz, VBW=100KHz, Sweep time = Auto.

8.3 TEST SETUP

8.4 EUT OPERATION CONDITIONS

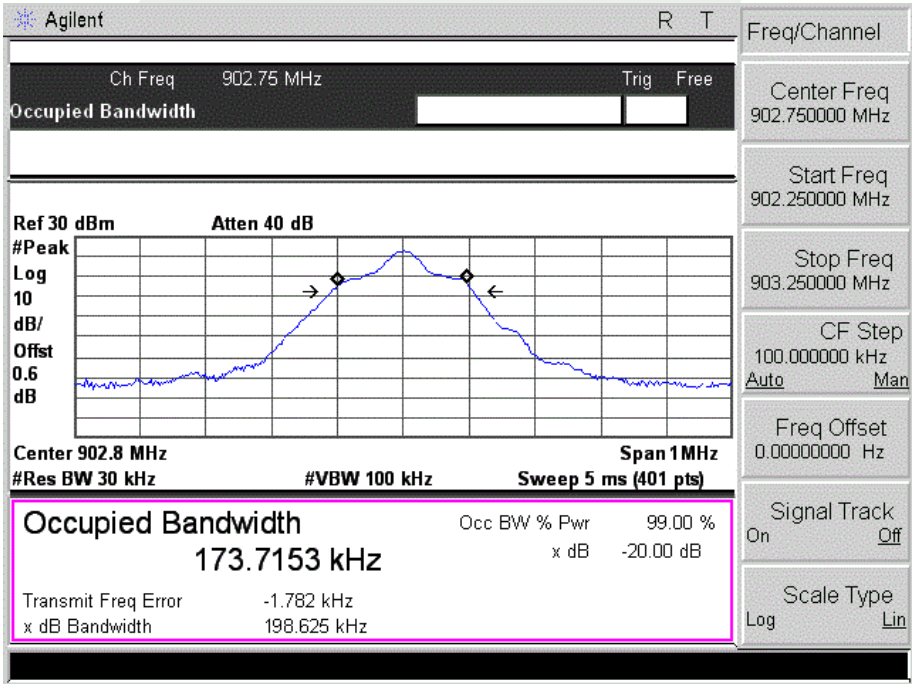
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

8.5 TEST RESULTS

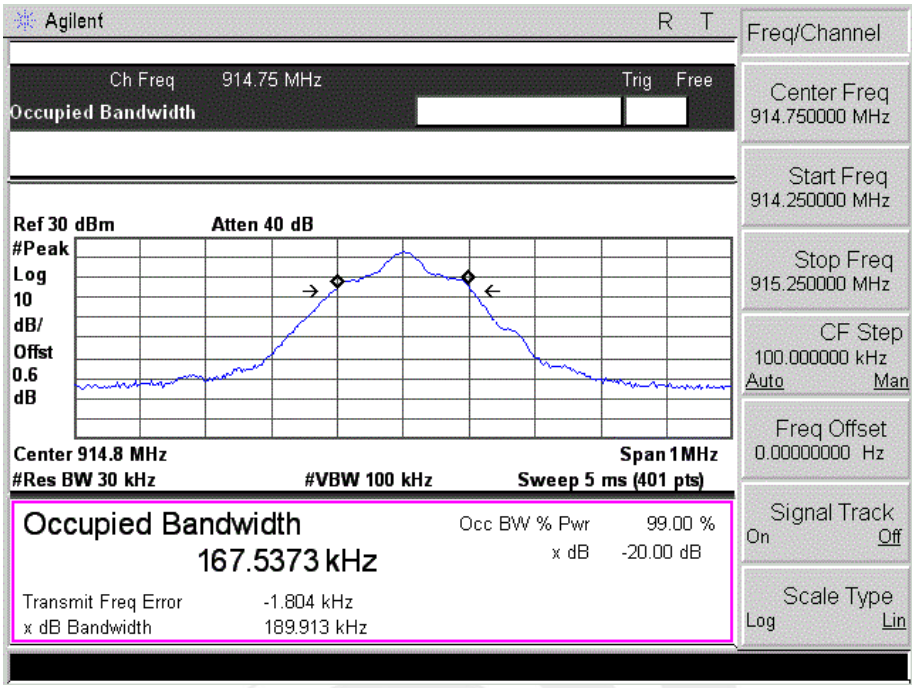
EUT：	GTSYS - RFID UHF Integrated Reader	Model Name ：	IR-U-POEv2/7
Temperature：	25 ℃	Relative Humidity：	50%
Pressure：	1012 hPa	Test Voltage ：	DC 48V
Test Mode ：	GFSK		

Frequency	20dB Bandwidth (MHz)	Result
902.8 MHz	0.199	PASS
914.8 MHz	0.190	PASS
927.8 MHz	0.188	PASS

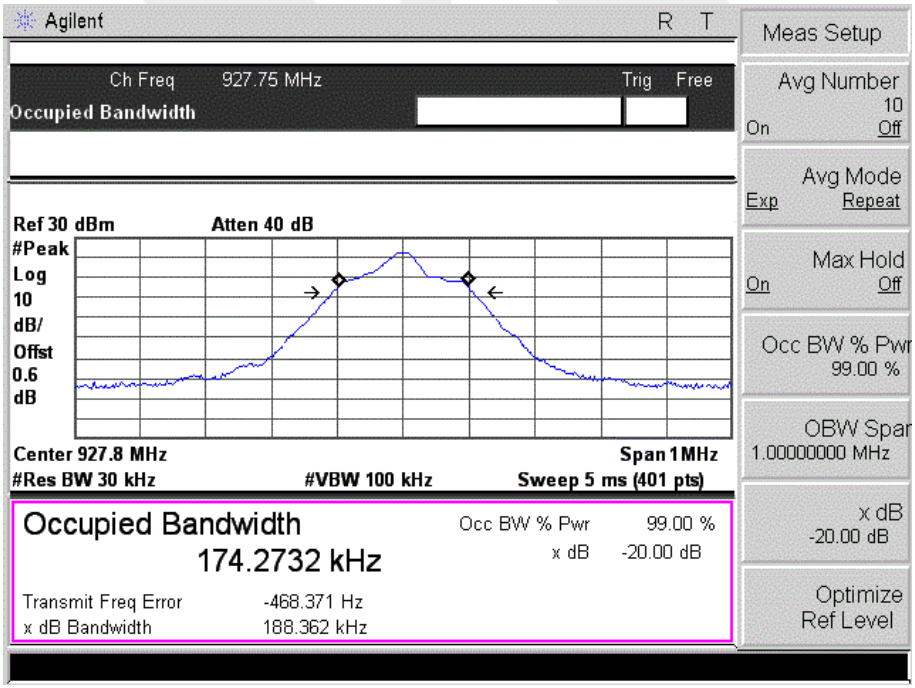
CH00



CH24


Agilent
R T
Ch Freq 914.75 MHz
Trig Free
Occupied Bandwidth
Ref 30 dBm
Atten 40 dB
#Peak
Log
10
dB/
Offst
0.6
dB
Center 914.8 MHz
Span 1 MHz
#Res BW 30 kHz
#VBW 100 kHz
Sweep 5 ms (401 pts)
Occupied Bandwidth
167.5373 kHz
Occ BW % Pwr 99.00 %
x dB -20.00 dB
Transmit Freq Error -1.804 kHz
x dB Bandwidth 189.913 kHz
Freq/Channel
Center Freq
914.750000 MHz
Start Freq
914.250000 MHz
Stop Freq
915.250000 MHz
CF Step
100.000000 kHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Scale Type
Log Lin

CH50


Agilent
R T
Ch Freq 927.75 MHz
Trig Free
Occupied Bandwidth
Ref 30 dBm
Atten 40 dB
#Peak
Log
10
dB/
Offst
0.6
dB
Center 927.8 MHz
Span 1 MHz
#Res BW 30 kHz
#VBW 100 kHz
Sweep 5 ms (401 pts)
Occupied Bandwidth
174.2732 kHz
Occ BW % Pwr 99.00 %
x dB -20.00 dB
Transmit Freq Error -468.371 Hz
x dB Bandwidth 188.362 kHz
Meas Setup
Avg Number
10
On Off
Avg Mode
Exp Repeat
Max Hold
On Off
Occ BW % Pwr
99.00 %
OBW Span
1.00000000 MHz
x dB
-20.00 dB
Optimize
Ref Level

9. PEAK OUTPUT POWER TEST

9.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C

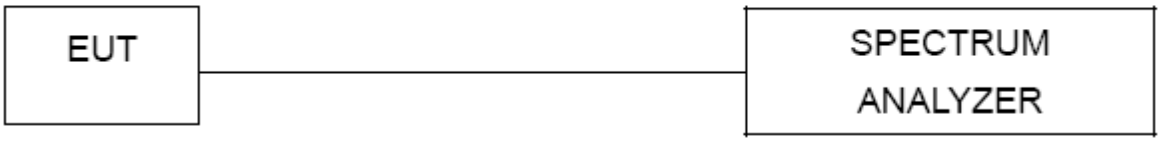
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (b)(2)	Peak Output Power	1 W	902-928	PASS

9.2 TEST PROCEDURE

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

b. Spectrum Setting : GFSK:RBW= 1MHz, VBW= 3MHz, Sweep time = Auto.

9.3 TEST SETUP



9.4 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.

9.5 TEST RESULTS

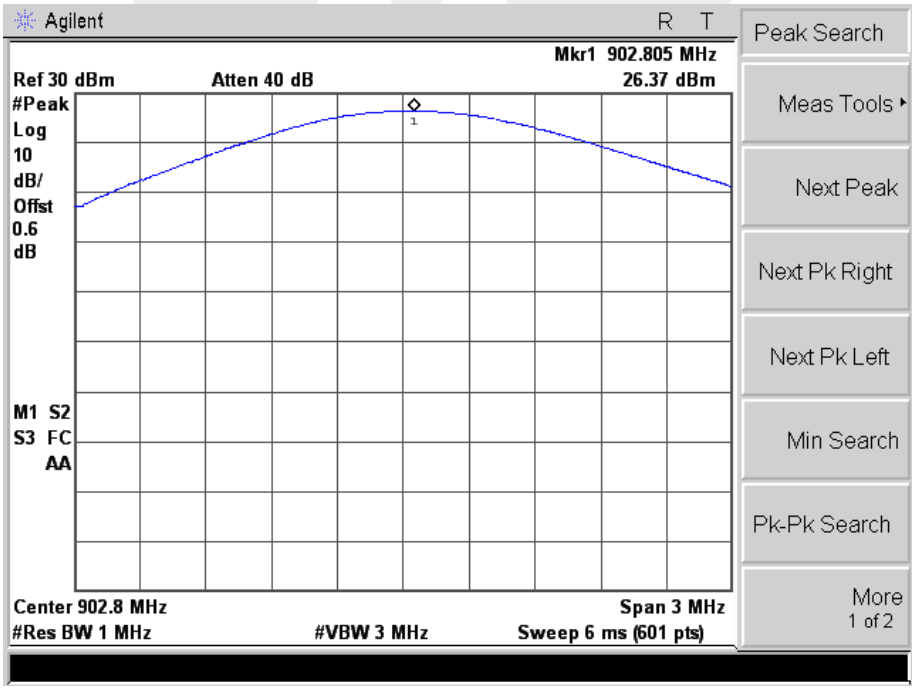
EUT：	GTSYS - RFID UHF Integrated Reader	Model Name ：	IR-U-POEv2/7
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 48V
Test Mode ：	CH00/ CH24 /CH50 GFSK		

Test Channel	Frequency (MHz)	Peak Output Power (dBm)	LIMIT (dBm)
CH00	902.8	26.37	28.5
CH24	914.8	25.94	28.5
CH50	927.8	25.73	28.5

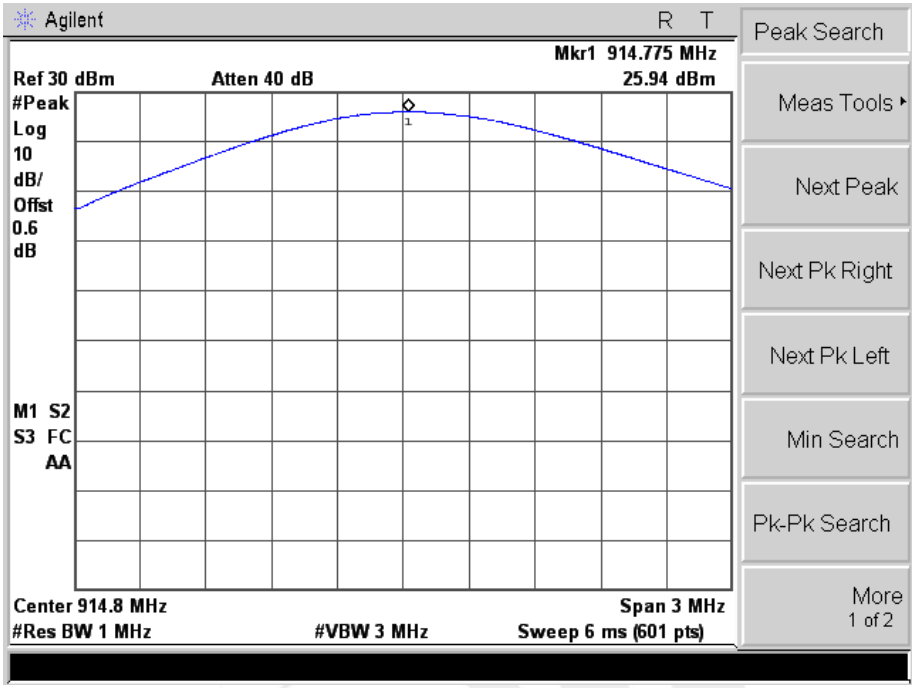
Note: (1) the channel separation > bandwidth

(2) Operation with directional antenna gains greater than 6 dBi. intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

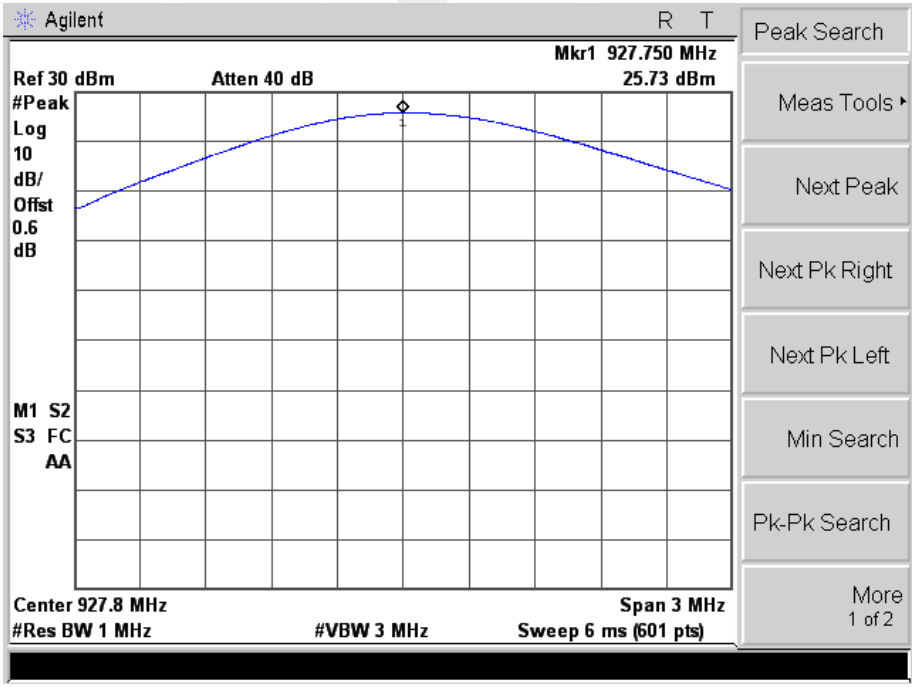
CH00



CH24


Agilent
R T
Mkr1 914.775 MHz
Ref 30 dBm
Atten 40 dB
25.94 dBm
#Peak
Log
10
dB/
Offst
0.6
dB
M1 S2
S3 FC
AA
Center 914.8 MHz
Span 3 MHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 6 ms (601 pts)
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

CH50


Agilent
R T
Mkr1 927.750 MHz
Ref 30 dBm
Atten 40 dB
25.73 dBm
#Peak
Log
10
dB/
Offst
0.6
dB
M1 S2
S3 FC
AA
Center 927.8 MHz
Span 3 MHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 6 ms (601 pts)
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

10. ANTENNA REQUIREMENT

10.1 STANDARD REQUIREMENT

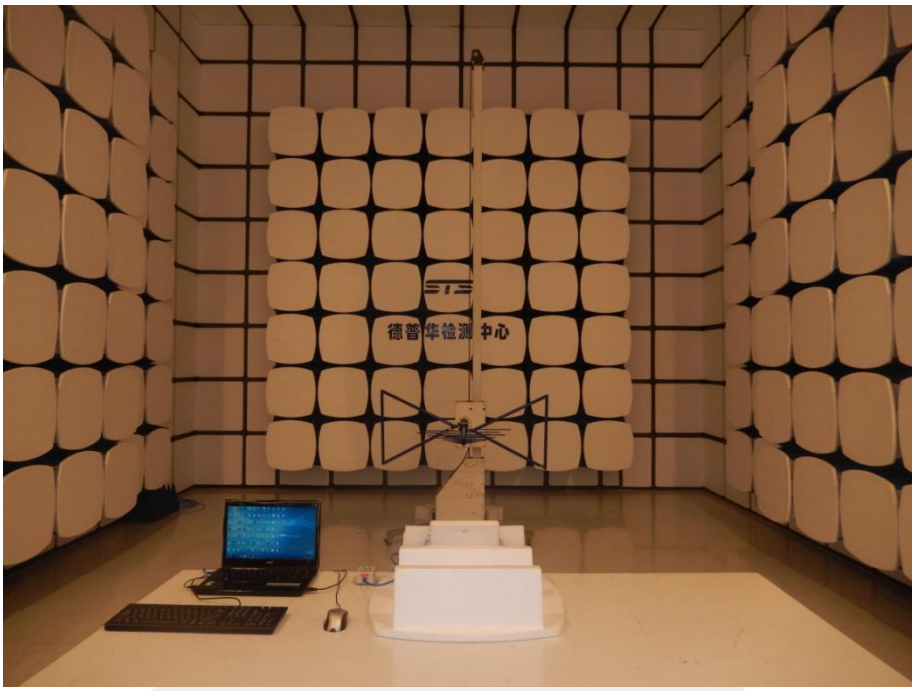
15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

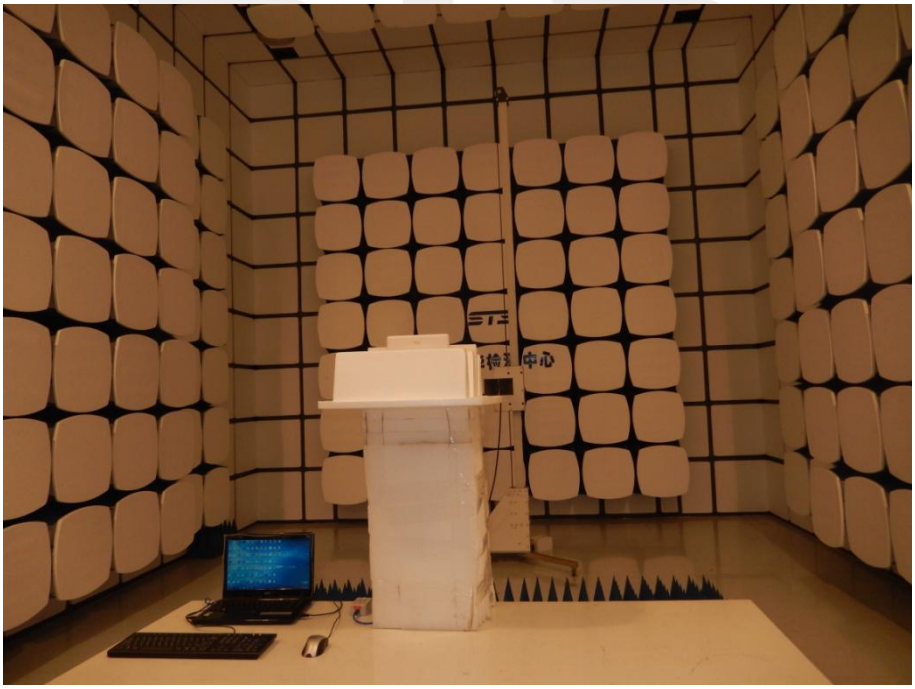
10.2 EUT ANTENNA

The EUT antenna is flat panel Antenna. It comply with the standard requirement.

APPENDIX- PHOTOS OF TEST SETUP

Radiated Measurement Photos





Conducted Measurement Photos

※※※※※END OF THE REPORT※※※※※