



Test Report

FCC Part15 Subpart C& RSS-247 Issue 2

Product Name : Push Button
Model No. : TBPB100-915
FCC ID : 2AMUGTBPB100
IC : 22980-TBPB100

Applicant : TrackNet, Inc
Address : 900 Lafayette Street #329 Santa Clara, CA 95050
USA

Date of Receipt : Aug. 22, 2017
Test Date : Aug. 22, 2017~ Dec. 01, 2017
Issued Date : Dec. 22, 2017
Report No. : 1782102R-RF-US-P06V02
Report Version : V1.0

The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration of the equipment and evaluated measurement uncertainty herein.

This report must not be used to claim product endorsement by TAF, A2LA or any agency of the government.

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Test Report Certification

Issued Date : Dec. 22, 2017
Report No. : 1782102R-RF-US-P06V02



Product Name : Push Button
Applicant : TrackNet, Inc
Address : 900 Lafayette Street #329 Santa Clara, CA 95050 USA

Manufacturer : FLEXTRONICS COMPUTING (SUZHOU) CO., LTD
Address : No. 1 Guanpu Road, Guoxiang Street, Wuzhong District
Suzhou, Jiangsu, China, 215124

Model No. : TBPB100-915
FCC ID : 2AMUGTBPB100
IC : 22980-TBPB100

EUT Voltage : DC 3.7V
Brand Name : N/A

Applicable Standard : FCC CFR Title 47 Part 15 Subpart C
ANSI C63.10:2013
KDB558074 D01V04
ISED RSS-Gen Issue 4 / RSS-247 Issue 2

Test Result : Complied
Performed Location : DEKRA Testing & Certification (Suzhou) Co., Ltd.
No.99 Hongye Rd., Suzhou Industrial Park, Suzhou, 215006,
Jiangsu, China

TEL: +86-512-6251-5088 / FAX: +86-512-6251-5098
FCC Registration Number: CN1199;

Documented By :



(Project Assistant: Kitty Li)

Reviewed By :



(Senior Project Manager: Frank He)

Approved By :



(Engineering Manager: Harry Zhao)

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History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
1782102R-RF-US-P06V02	V1.0	Initial Issued Report	Dec. 18, 2017
1782102R-RF-US-P06V02	V2.0	Update Model No. and Antenna Gain	Dec. 22, 2017

1. General Information

1.1. EUT Description

Product Name	Push Button
Model No.	TBPB100-915
EUT Voltage	DC 3.7V
Frequency Range	902~928MHz
Channel Number	8
Type of Modulation	LoRa
Data Rate	DR4:12500bps
Channel Control	Auto

Working Frequency of Each Channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
00	903 MHz	01	904.6 MHz	02	906.2 MHz	03	907.8 MHz
04	909.4 MHz	05	911.0 MHz	06	912.6 MHz	07	914.2 MHz

1.2. Antenna information

Model No.	N/A					
Antenna manufacturer	N/A					
Antenna Delivery	☒	1*TX+1*RX	☐	2*TX+2*RX	☐	3*TX+3*RX
Antenna technology	☒	SISO				
	☐	MIMO	☐	Basic		
			☐	CDD		
			☐	Sectorized		
			☐	Beam-forming		
Antenna Type	☐	External	☐	Dipole		
			☐	Sectorized		
	☒	Internal	☒	PIFA		
			☐	PCB		
			☐	helical antenna		
			☐	Ceramic Chip Antenna		
			☐	Metal plate type F antenna		
Antenna Technology		Ant Gain (dBi)				
☒	SISO	-1.69				

1.3. Mode of Operation

Test Modes List
Mode 1: Transmit

Note:

1. For portable device, radiated spurious emission was verified over X, Y, Z Axis, and shown the worst case on this report.
2. Regards to the frequency band operation for systems using FHSS modulation: normal operation (hopping) was selected to test for conducted spurious test.
3. The extreme test condition for voltage and temperature were declared by the manufacturer.
4. The reading values of all the test items contain cable loss.

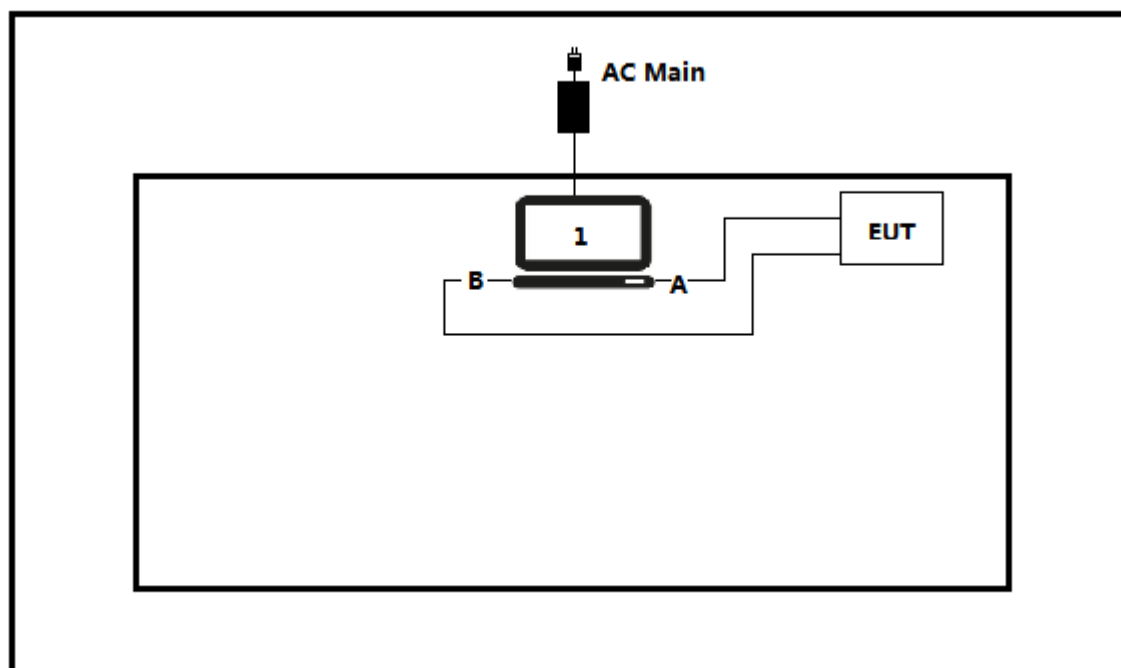
1.4. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

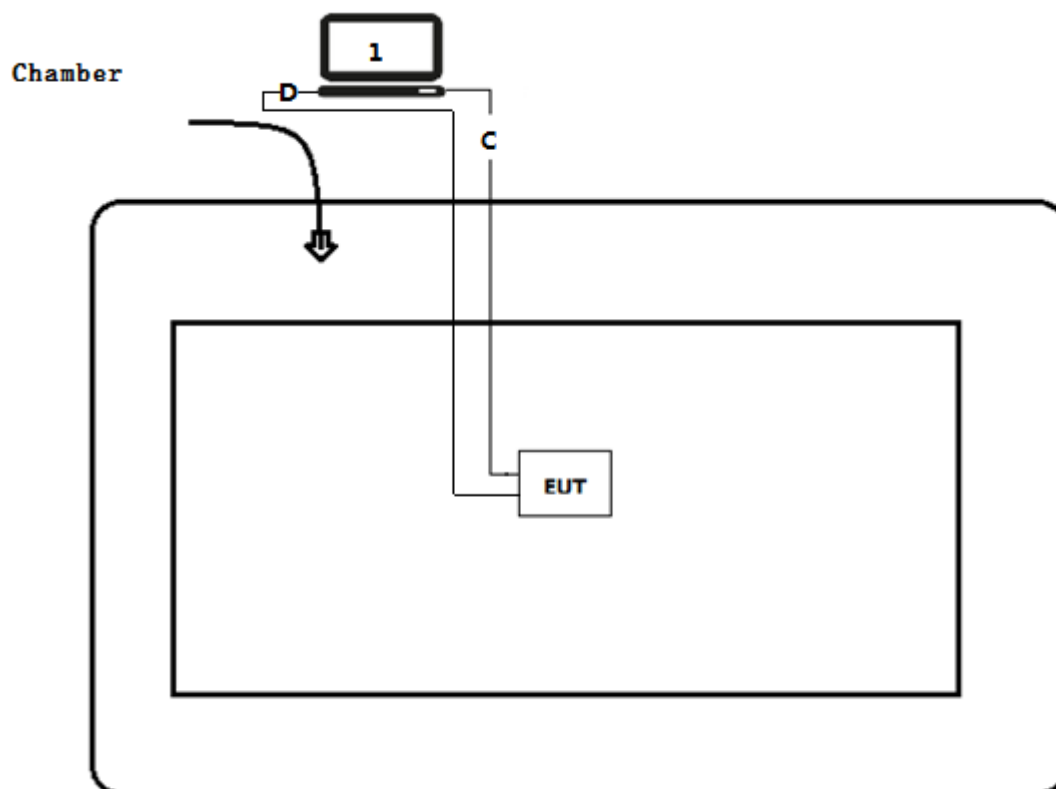
No.	Product	Manufacturer	Model No.	Serial No.	Power Cord
1	Notebook	Lenovo	Think pad x220	SUA0600195	Power by adapter
A	USB Cable	N/A	N/A	N/A	Shield, 0.75m
B	Serial Cable	N/A	N/A	N/A	Shield, 0.75m
C	USB Cable	N/A	N/A	N/A	Shield, 10m
D	Serial Cable	N/A	N/A	N/A	Shield, 10m

1.5. Configuration of Tested System

Test setup Diagram- AC Line Conducted Emission Test



Test setup Diagram- Radiated Emission



1.6. EUT Exercise Software

1	Setup the EUT and simulators as shown on above.
2	Turn on the power of all equipment.
3	Run "cmd", and set the test mode and channel, then start continue Transmit.

2. Technical Test

2.1. Summary of Test Result

For FCC:

Performed Test Item	Normative References	Limit	Result
AC Power Line Conducted Emission	FCC CFR Title 47 Part 15 Subpart C: 2015 Section 15.207	FCC 15.207	PASS
Emissions in restricted frequency bands	FCC CFR Title 47 Part 15 Subpart C: 2015 Section 15.209	FCC 15.209	PASS
Emissions in non-restricted frequency bands	FCC CFR Title 47 Part 15 Subpart C: 2015 Section 15.247(d)	$\geq 20\text{dBc}$	PASS
Radiated Emission Band Edge	FCC CFR Title 47 Part 15 Subpart C: 2015 15.247(d)	FCC 15.209	PASS
Occupied Bandwidth	FCC CFR Title 47 Part 15 Subpart C: 2015 Section 15.247(a)(2)	$\geq 500\text{kHz}$	PASS
Fundamental emission output power	FCC CFR Title 47 Part 15 Subpart C: 2015 Section 15.247(b)(3)	$\leq 30\text{dBm}$	PASS
Power Spectral Density	FCC CFR Title 47 Part 15 Subpart C: 2015 Section 15.247(e)	$\leq 8\text{dBm}/3\text{kHz}$	PASS
Antenna Requirement	FCC CFR Title 47 Part 15 Subpart C: 2015 Section 15.203	FCC 15.203	PASS

For ISED :

Performed Test Item	Normative References	Limit	Result
AC Power Line Conducted Emission	RSS-Gen Issue 4 Section 8.8	RSS-Gen	N/A
Emissions in restricted frequency bands	RSS-Gen Issue 4 Section 8.9	RSS-Gen	PASS
Emissions in non-restricted frequency bands	RSS-247 Issue 2 Section A5.5	$\geq 20\text{dBc}$	PASS
Radiated Emission Band Edge	RSS-247 Issue 2 Section A5.5	RSS-247	PASS
Occupied Bandwidth	RSS-Gen Issue 4 Section 6.6 RSS-247 Issue 2 Section A5.2(1)	$\geq 500\text{kHz}$	PASS
Fundamental emission output power	RSS-247 Issue 2 Section A5.4(4)	$\leq 30\text{dBm}$	PASS
Power Spectral Density	RSS-247 Issue 2 Section A5.2(2)	$\leq 8\text{dBm}/3\text{kHz}$	PASS
Antenna Requirement	RSS-Gen Issue 4 Section 8.3	RSS-Gen Issue 4	PASS

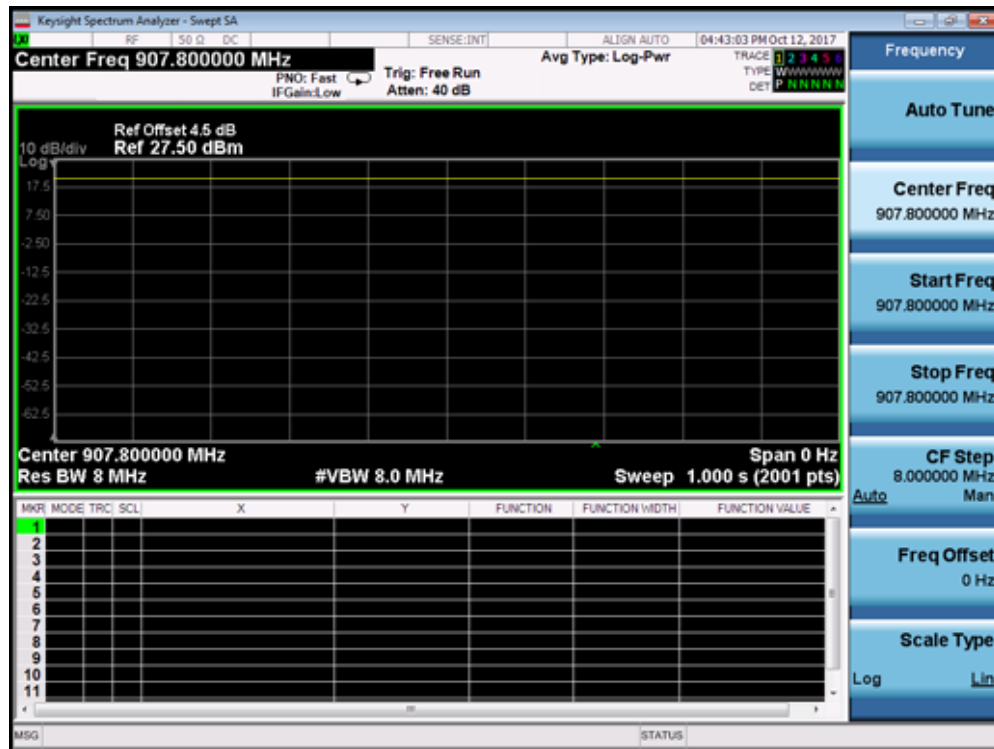
2.2. Test Frequency configuration:

Channel	Frequency	Channel	Frequency	Channel	Frequency
Low	903 MHz	Mid	907.8 MHz	High	914.2 MHz

2.3. Duty Cycle

Test Mode	Tx On (ms)	Tx Off (ms)	VBW	Tx On + Tx Off (ms)	Duty Cycle
1	N/A	N/A	10Hz	N/A	100%

Frequency 907.8MHz



2.4. Test Environment

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	21
Humidity (%RH)	25-75	50
Barometric pressure (mbar)	860-1060	950-1000

2.5. Measurement Uncertainty

Test Items	Uncertainty
AC Power Line Conducted Emission	$\pm 2.02\text{dB}$
Radiated Emission	Below 1GHz $\pm 3.8\text{ dB}$
	Above 1GHz $\pm 3.9\text{ dB}$
RF Antenna Port Conducted Emission	$\pm 1.27\text{dB}$
Radiated Emission Band Edge	$\pm 3.9\text{dB}$
Occupied Bandwidth	$\pm 1\text{kHz}$
Power Spectral Density	$\pm 1.27\text{dB}$

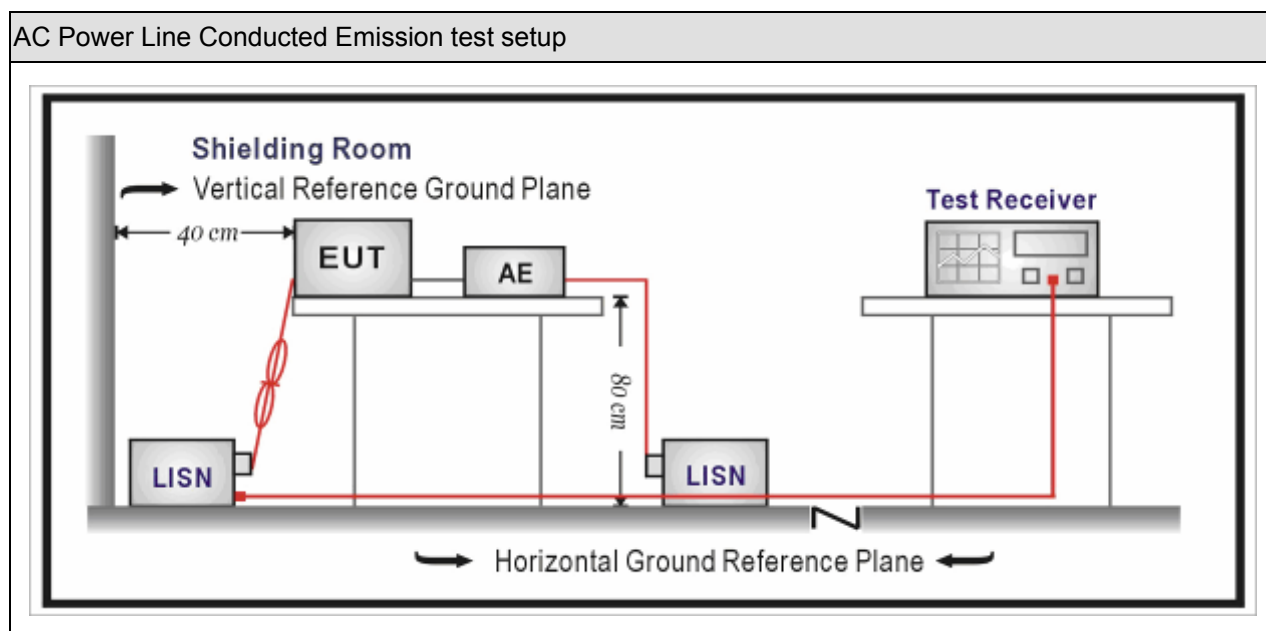
3. AC Power Line Conducted Emission

3.1. Test Equipment

AC Power Line Conducted Emission / TR-1					
Instrument	Manufacturer	Type No.	Serial No.	Cal. Date	Cal. Due Date
EMI Test Receiver	R&S	ESCI	100906	2017.03.05	2018.03.04
Two-Line V-Network	R&S	ENV 216	101189	2017.07.16	2018.07.15
Two-Line V-Network	R&S	ENV 216	101044	2017.09.04	2018.09.03
50ohm Coaxial Switch	Anritsu	MP59B	6200464462	N/A	N/A
50ohm Termination	SHX	TF2	07081402	2017.09.04	2018.09.03
Temperature/Humidity Meter	Zhichen	ZC1-2	TR1-TH	2017.01.05	2018.01.04

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

3.2. Test Setup



3.3. Limit

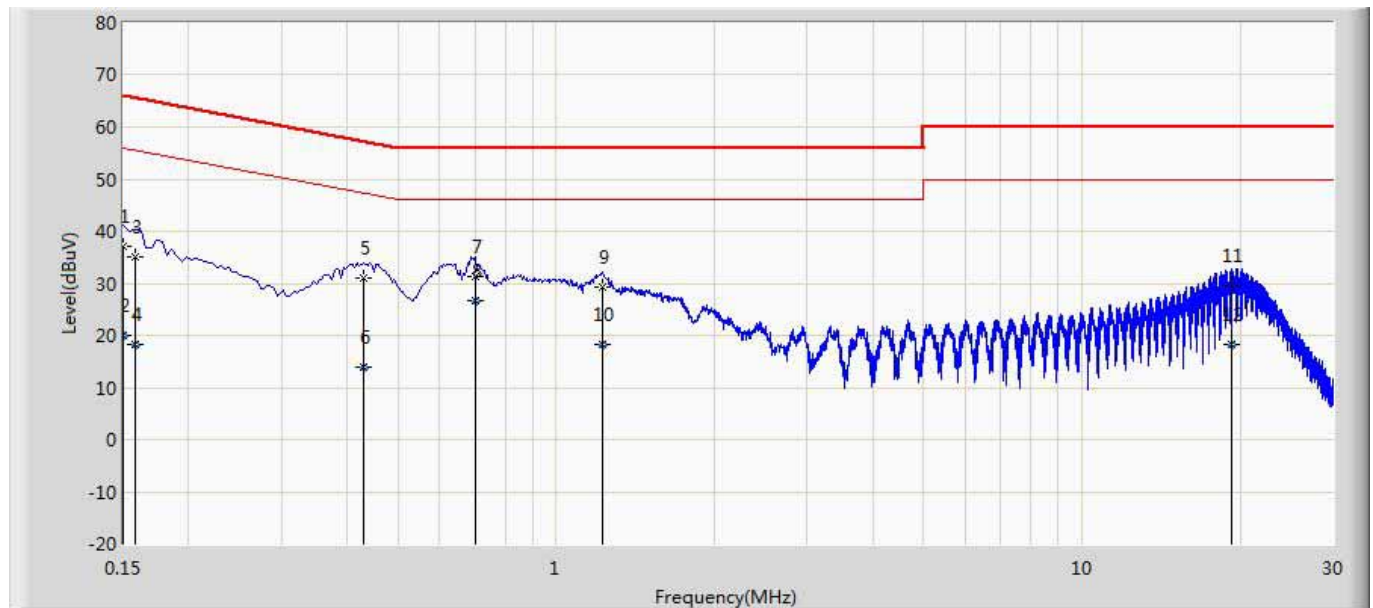
Frequency of Emission (MHz)	Conducted Limit	
	Quasi-peak (dB μ V)	Average (dB μ V)
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50
Note 1: The lower limit shall apply at the transition frequencies.		
Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.		

3.4. Test Procedure

Test Method			
	References Rule	Chapter	Item
☒	ANSI C63.10-2013	6.2	Standard test method for ac power-line conducted emissions from unlicensed wireless devices

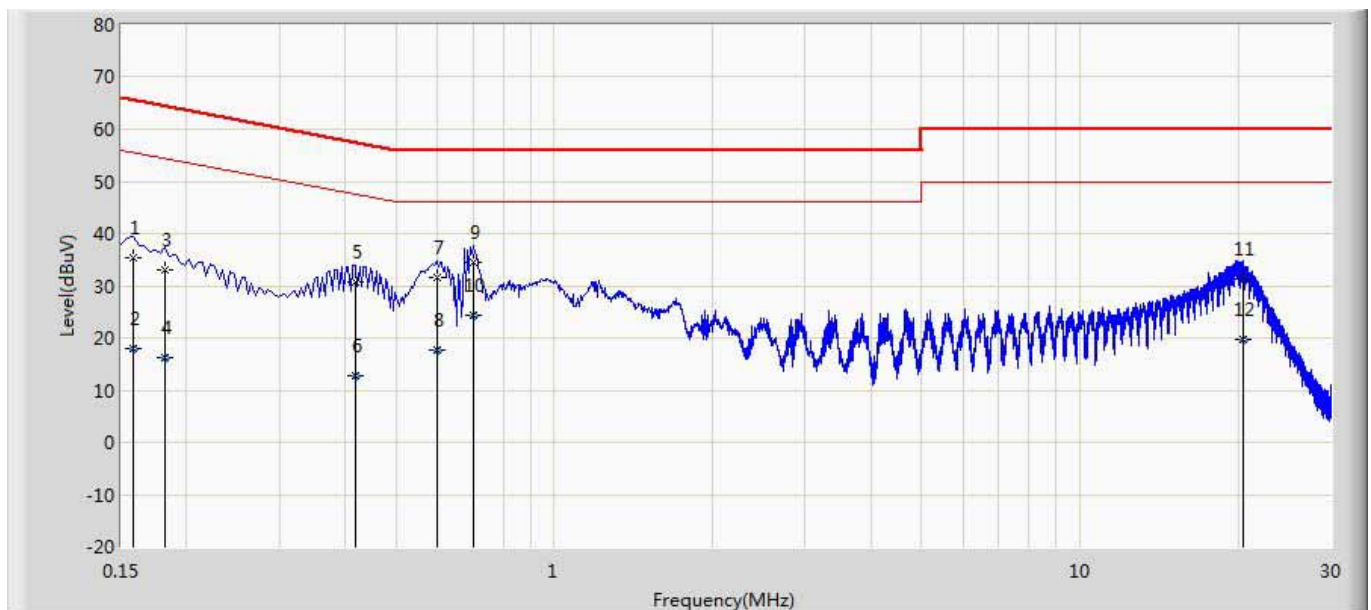
3.5. Test Result

Site: TR1	Time: 2017/09/15
Limit: FCC_Part15.207_CE	Margin: 0
Probe: ENV216_101190(0.009-30MHz)	Polarity: Line
EUT: Push Button	Power: AC 120V/60Hz
Note: Mode 1:Transmit at 903MHz	



No	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Probe (dB)	Cable (dB)	Amp (dB)	Type
1		0.150	37.079	27.444	-28.921	66.000	9.610	0.025	0.000	QP
2		0.150	20.074	10.440	-35.926	56.000	9.610	0.025	0.000	AV
3		0.158	35.083	25.449	-30.485	65.568	9.608	0.026	0.000	QP
4		0.158	18.285	8.651	-37.283	55.568	9.608	0.026	0.000	AV
5		0.430	30.924	21.284	-26.329	57.253	9.600	0.040	0.000	QP
6		0.430	13.972	4.332	-33.281	47.253	9.600	0.040	0.000	AV
7		0.702	31.443	21.793	-24.557	56.000	9.600	0.050	0.000	QP
8	*	0.702	26.602	16.952	-19.398	46.000	9.600	0.050	0.000	AV
9		1.226	29.336	19.660	-26.664	56.000	9.610	0.066	0.000	QP
10		1.226	18.123	8.447	-27.877	46.000	9.610	0.066	0.000	AV
11		19.286	29.443	19.054	-30.557	60.000	10.106	0.283	0.000	QP
12		19.286	18.123	7.735	-31.877	50.000	10.106	0.283	0.000	AV

Site: TR1	Time: 2017/09/15
Limit: FCC_Part15.207_CE	Margin: 0
Probe: ENV216_101190(0.009-30MHz)	Polarity: Neutral
EUT: Push Button	Power: AC 120V/60Hz
Note: Mode 1:Transmit at 903MHz	



No	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Probe (dB)	Cable (dB)	Amp (dB)	Type
1		0.158	35.351	25.733	-30.218	65.568	9.592	0.026	0.000	QP
2		0.158	17.888	8.270	-37.681	55.568	9.592	0.026	0.000	AV
3		0.182	32.984	23.359	-31.410	64.394	9.597	0.028	0.000	QP
4		0.182	16.263	6.638	-38.131	54.394	9.597	0.028	0.000	AV
5		0.418	30.776	21.145	-26.712	57.488	9.592	0.039	0.000	QP
6		0.418	12.716	3.085	-34.771	47.488	9.592	0.039	0.000	AV
7		0.598	31.710	22.074	-24.290	56.000	9.590	0.046	0.000	QP
8		0.598	17.794	8.158	-28.206	46.000	9.590	0.046	0.000	AV
9	*	0.702	34.354	24.714	-21.646	56.000	9.590	0.050	0.000	QP
10		0.702	24.266	14.626	-21.734	46.000	9.590	0.050	0.000	AV
11		20.374	31.291	20.783	-28.709	60.000	10.216	0.291	0.000	QP
12		20.374	19.796	9.289	-30.204	50.000	10.216	0.291	0.000	AV

4. Emissions in restricted frequency bands

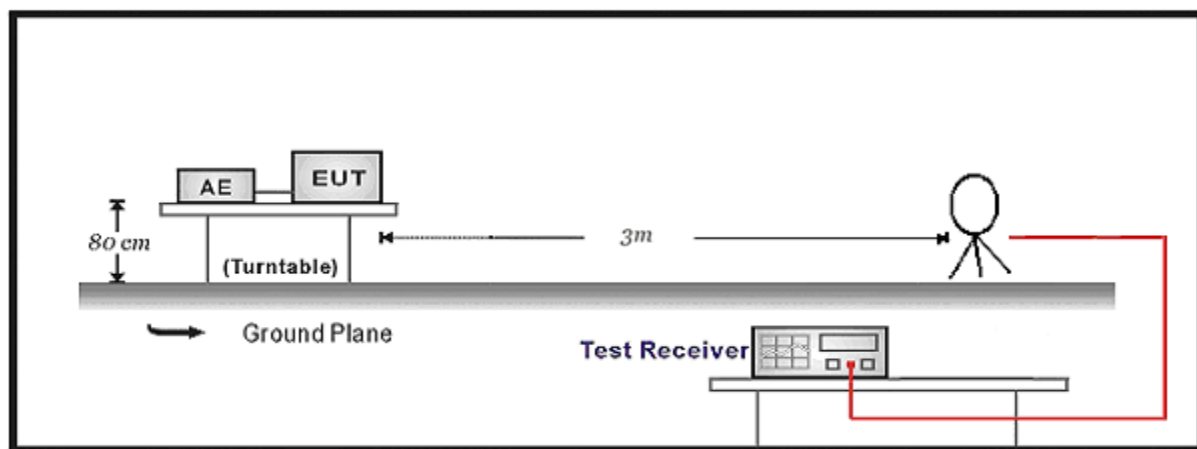
4.1. Test Equipment

Radiated Emission(Below 1GHz) / AC-2					
Instrument	Manufacturer	Type No.	Serial No.	Cal. Date	Cal. Due Date
EMI Test Receiver	R&S	ESCI	100573	2017.03.05	2018.03.04
Loop Antenna	R&S	HFH2-Z2	833799/003	2017.11.07	2018.11.06
Bilog Antenna	Teseq GmbH	CBL6112D	27611	2017.08.10	2018.08.09
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC2-C	2017.02.28	2018.02.27
Temperature/Humidity Meter	Zhichen	ZC1-2	AC2-TH	2017.01.05	2018.01.04
Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.					

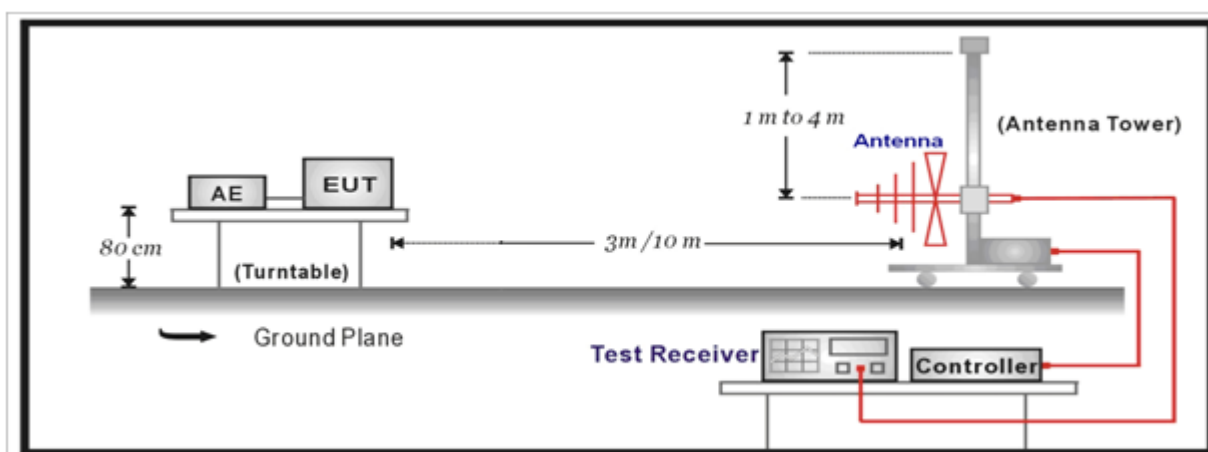
Radiated Emission(Above 1GHz) / AC-5					
Instrument	Manufacturer	Type No.	Serial No.	Cal. Date	Cal. Due Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2017.01.04	2018.01.03
Preamplifier	Miteq	NSP1800-25	1364185	2017.05.03	2018.05.02
Preamplifier	QuieTek	AP-040G	CHM-0906001	2017.05.06	2018.05.05
DRG Horn	ETS-Lindgren	3117	00123988	2017.01.22	2018.01.20
Broad-Band Horn Antenna	Schwarzbeck	BBHA9170	294	2017.11.25	2018.11.23
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C1	2017.03.02	2018.03.01
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C2	2017.03.02	2018.03.01
Coaxial Cable	Huber+Suhner	SUCOFLEX 102	AC5-C3	2017.03.02	2018.03.01
EMI Receiver	Agilent	N9038A	MY51210196	2017.06.10	2018.06.09
Temperature/Humidity Meter	Zhichen	ZC1-2	AC5-TH	2017.01.04	2018.01.03
Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.					

4.2. Test Setup

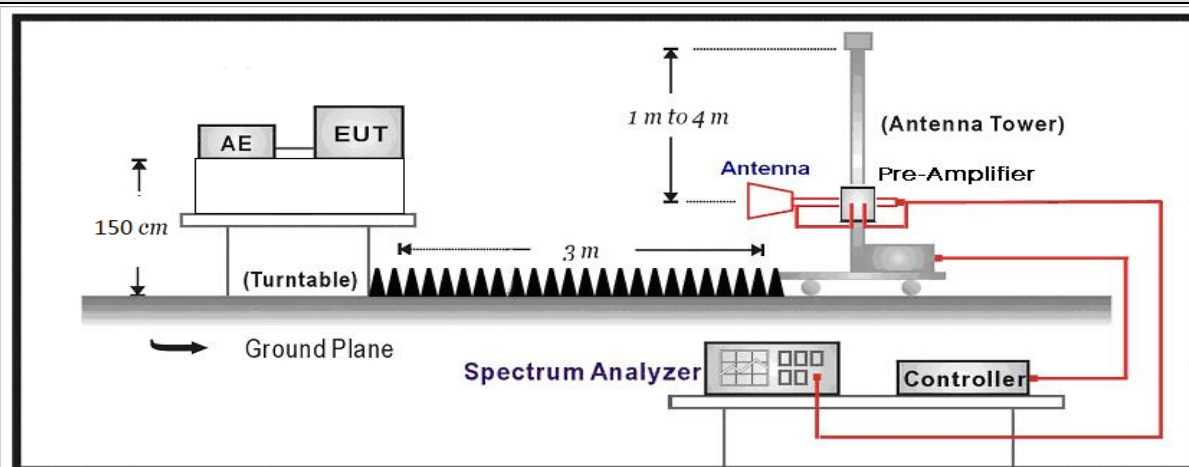
Below 30MHz Test Setup:



30MHz-1GHz Test Setup:



Above 1GHz Test Setup:



4.3. Limit

For FCC

Restricted Bands of operation			
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
8.81425 – 8.81475	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	
13.36 – 13.41			

For ISED:

Restricted Bands of operation			
Frequency (MHz)	Frequency (MHz)	Frequency (MHz)	Frequency (GHz)
0.090-0.110	13.36-13.41	1645.5-1646.5	9.0-9.2
2.1735-2.1905	16.42-16.423	1660-1710	9.3-9.5
3.020-3.026	16.69475-16.69525	1718.8-1722.2	10.6-12.7
4.125-4.128	16.80425-16.80475	2200-2300	13.25-13.4
4.17725-4.17775	25.5-25.67	2310-2390	14.47-14.5
4.20725-4.20775	37.5-38.25	2655-2900	15.35-16.2
5.677-5.683	73-74.6	3260-3267	17.7-21.4
6.215-6.218	74.8-75.2	3332-3339	22.01-23.12
6.26775-6.26825	108-138	3345.8-3358	23.6-24.0
6.31175-6.31225	156.52475-156.52525	3500-4400	31.2-31.8
8.291-8.294	156.7-156.9	4500-5150	36.43-36.5
8.362-8.366	240-285	5350-5460	Above 38.6
8.37625-8.38675	322-335.4	7250-7750	
8.41425-8.41475	399.9-410	8025-8500	
12.29-12.293	608-614		
12.51975-12.52025	960-1427		
12.57675-12.57725	1435-1626.5		

Restricted Band Emissions Limit			
Frequency (MHz)	Field strength (μ V/m)	Field strength (dB μ V/m)	Measurement distance (m)
0.009 - 0.49	2400/F(kHz)	48.5 – 13.8	300 _(Note 1)
0.49 - 1.705	24000/F(kHz)	33.8 - 23	30 _(Note 1)
1.705 - 30	30	29.5	30 _(Note 1)
30 - 88	100	40	3 _(Note 2)
88 - 216	150	43.5	3 _(Note 2)
216 - 960	200	46	3 _(Note 2)
Above 960	500	54	3 _(Note 2)

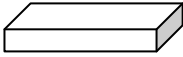
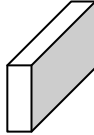
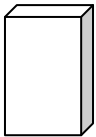
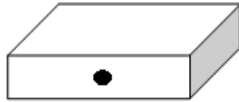
Note 1: At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade).

Note 2: At frequencies at or above 30 MHz, measurements may be performed at a distance other than what is specified provided: measurements are not made in the near field except where it can be shown that near field measurements are appropriate due to the characteristics of the device; and it can be demonstrated that the signal levels needed to be measured at the distance employed can be detected by the measurement equipment. Measurements shall not be performed at a distance greater than 30 meters unless it can be further demonstrated that measurements at a distance of 30 meters or less are impractical. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse linear-distance for field strength measurements; inverse-linear-distance-squared for power density measurements).

4.4. Test Procedure

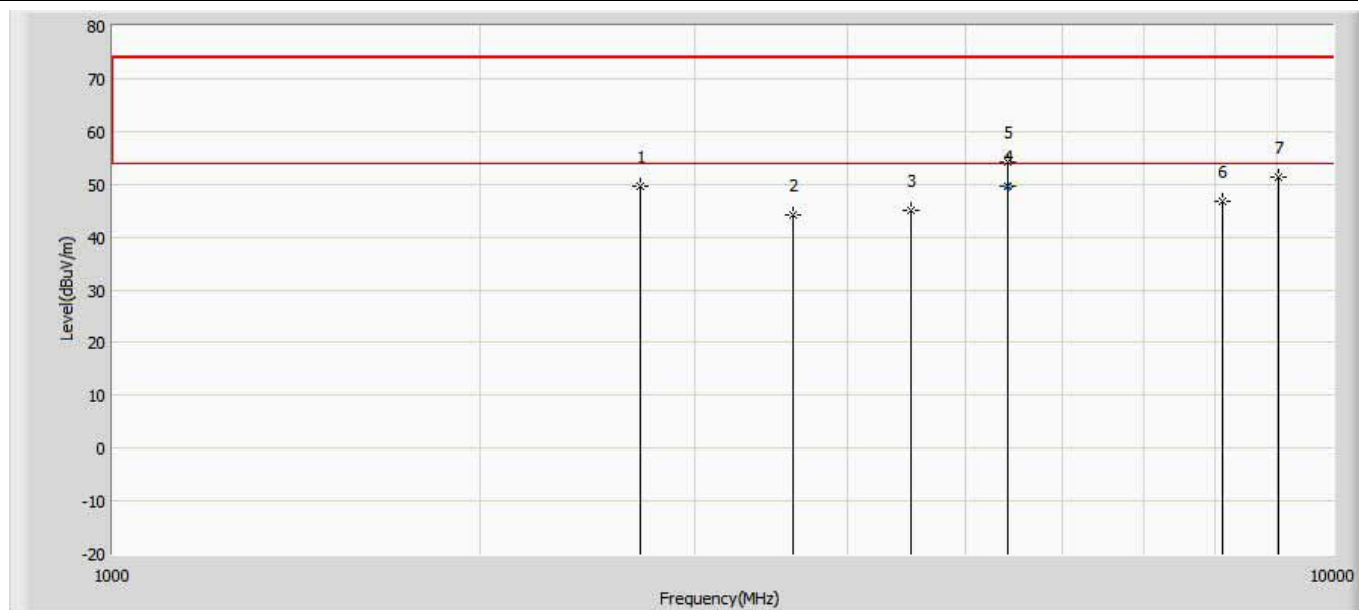
Test Method						
	References Rule		Chapter	Description		
☐	ANSI C63.10		11.11	Emissions in non-restricted frequency bands		
	☐	ANSI C63.10	11.11.2	Reference level measurement		
	☐	ANSI C63.10	11.11.3	Emission level measurement		
☒	ANSI C63.10		11.12	Emissions in restricted frequency bands		
	☒	ANSI C63.10	11.12.1	Radiated emission measurements		
	☒	ANSI C63.10	11.12.2.7	Radiated spurious emission test		
		☒	ANSI C63.10	6.4	Radiated emissions from unlicensed wireless devices below 30 MHz	
		☒	ANSI C63.10	6.5	Radiated emissions from unlicensed wireless devices in the frequency range of 30 MHz to 1000 MHz	
		☒	ANSI C63.10	6.6	Radiated emissions from unlicensed wireless devices above 1 GHz	
		☐	ANSI C63.10	11.12.2.3	Quasi-peak measurement procedure	
		☒	ANSI C63.10	11.12.2.4	Peak power measurement procedure	
		☒	ANSI C63.10	11.12.2.5	Average power measurement procedures	
			☐	ANSI C63.10	11.12.2.5.1	Trace averaging with continuous EUT transmission at full power
			☐	ANSI C63.10	11.12.2.5.2	Trace averaging across ON and OFF times of the EUT transmissions followed by duty cycle correction
			☒	ANSI C63.10	11.12.2.5.3	Reduced VBW averaging across ON and OFF times of the EUT transmissions with max hold

4.5. EUT test Axis definition

Item	Emissions in restricted frequency bands			
Device Category	☐	Fixed position use		
	☒	Mobile position use		
Test mode	Mode 1			
Test method	☒	Radiated		
		X Axis	Y Axis	Z Axis
				
		Worst Axis ☒	Worst Axis ☐	Worst Axis ☐
	☐	Conducted		
	☐	Chain 1		
				
	☐	Chain 1	Chain 2	
				
	☐	Chain 1	Chain 2	Chain 3
				

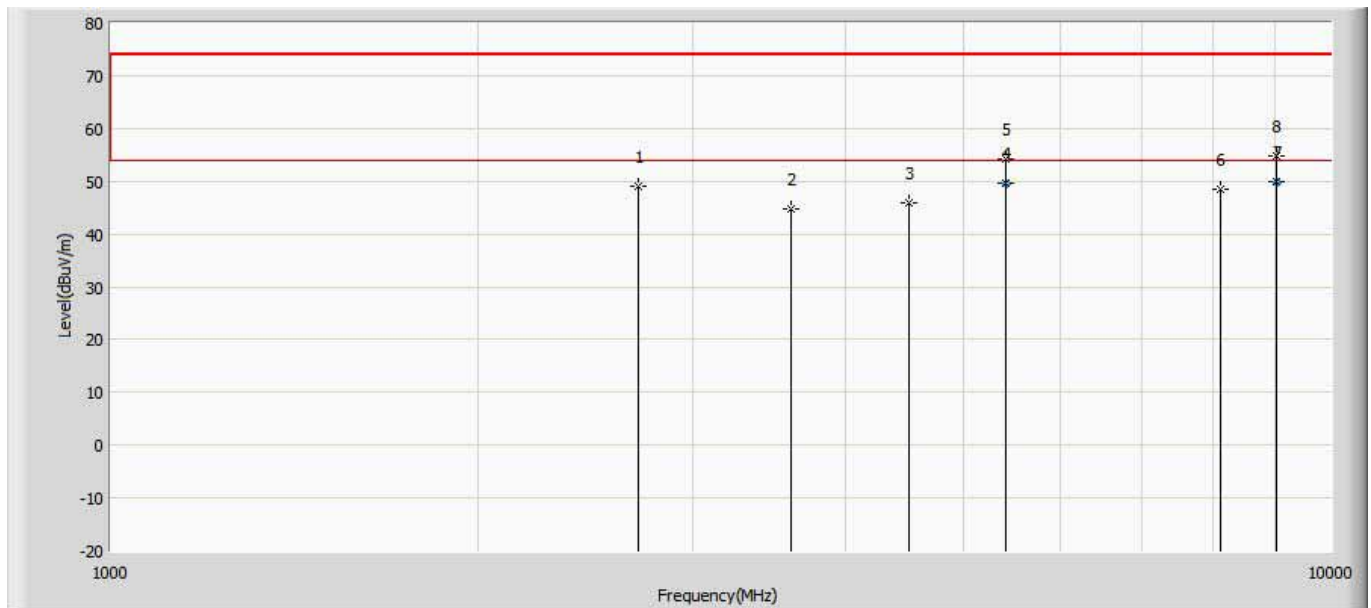
4.6. Test Result

Site: AC5	Time: 2017/10/13 - 13:51
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: Push Button	Power: AC 120V/60Hz
Note: Mode 1:Transmit at 903MHz	



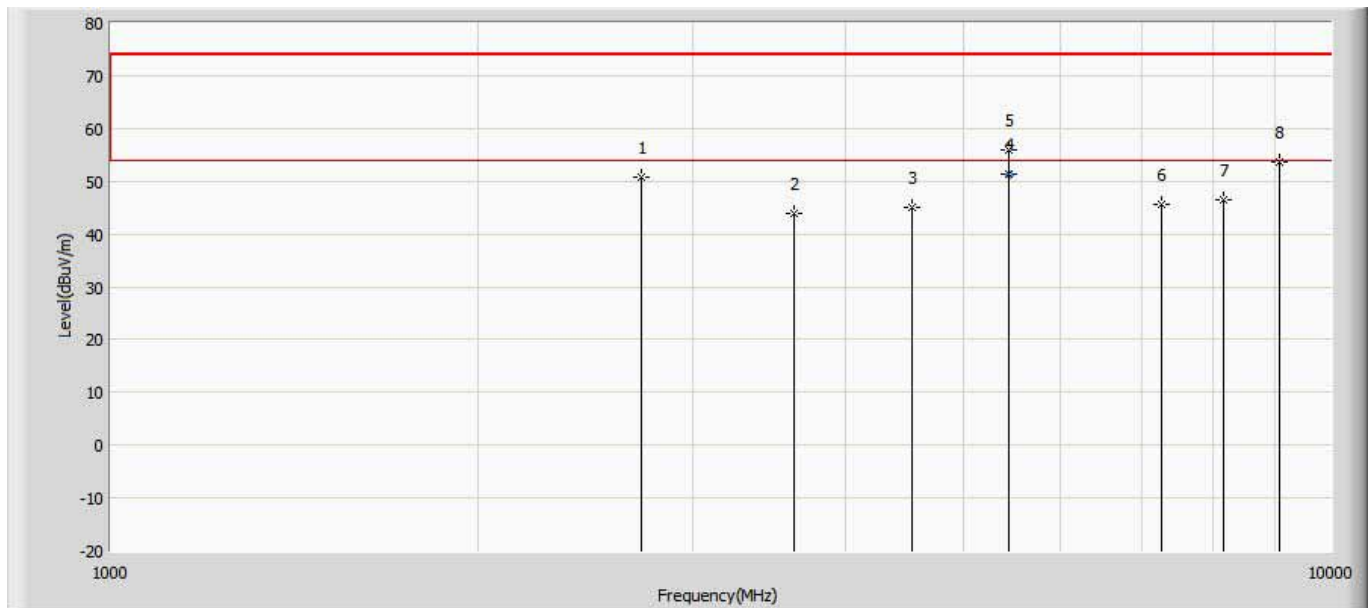
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2710.000	49.558	66.508	-24.442	74.000	-16.950	PK
2		3610.000	44.294	58.934	-29.706	74.000	-14.640	PK
3		4514.500	44.995	58.005	-29.005	74.000	-13.010	PK
4	*	5418.648	49.500	61.730	-4.500	54.000	-12.230	AV
5		5419.000	54.281	66.511	-19.719	74.000	-12.230	PK
6		8127.000	46.762	51.662	-27.238	74.000	-4.900	PK
7		9032.500	51.451	53.291	-22.549	74.000	-1.840	PK

Site: AC5	Time: 2017/10/13 - 13:51
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: Push Button	Power: AC 120V/60Hz
Note: Mode 1:Transmit at 903MHz	



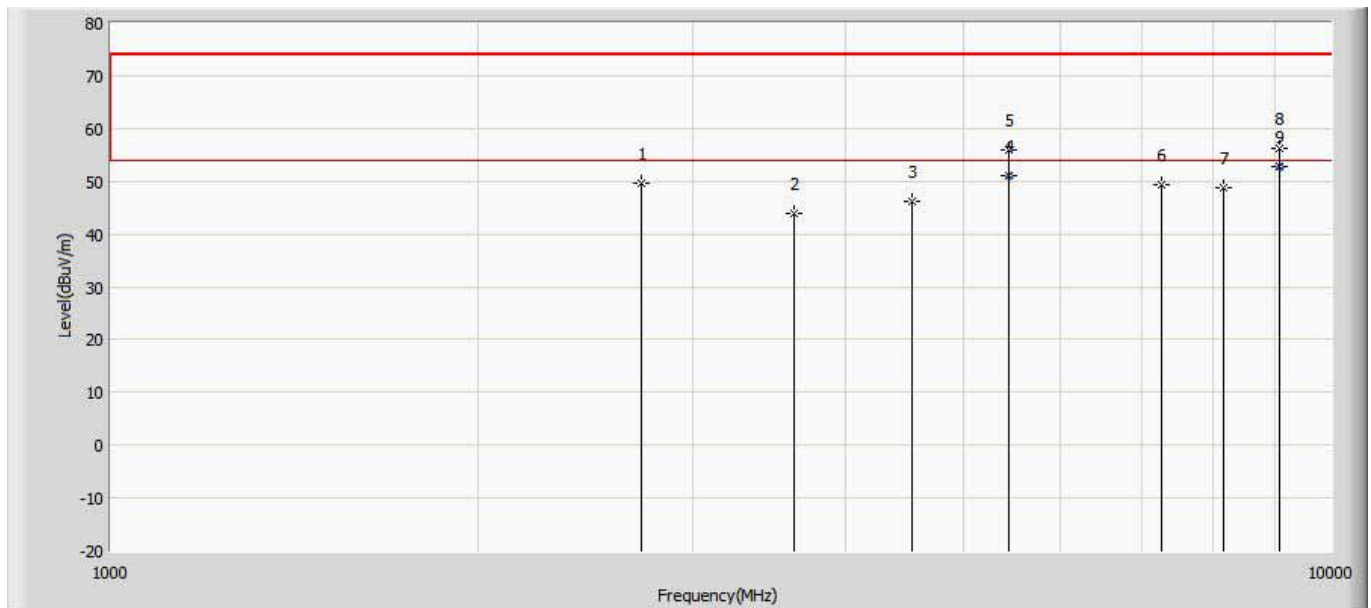
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2710.000	48.954	65.904	-25.046	74.000	-16.950	PK
2		3610.000	44.881	59.521	-29.119	74.000	-14.640	PK
3		4514.500	45.894	58.904	-28.106	74.000	-13.010	PK
4		5418.265	49.610	61.840	-4.390	54.000	-12.230	AV
5		5419.000	54.260	66.490	-19.740	74.000	-12.230	PK
6		8128.000	48.494	53.394	-25.506	74.000	-4.900	PK
7	*	9027.869	49.850	51.690	-4.150	54.000	-1.840	AV
8		9028.000	54.693	56.533	-19.307	74.000	-1.840	PK

Site: AC5	Time: 2017/10/13 - 13:51
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: Push Button	Power: AC 120V/60Hz
Note: Mode 1:Transmit at 907.8MHz	



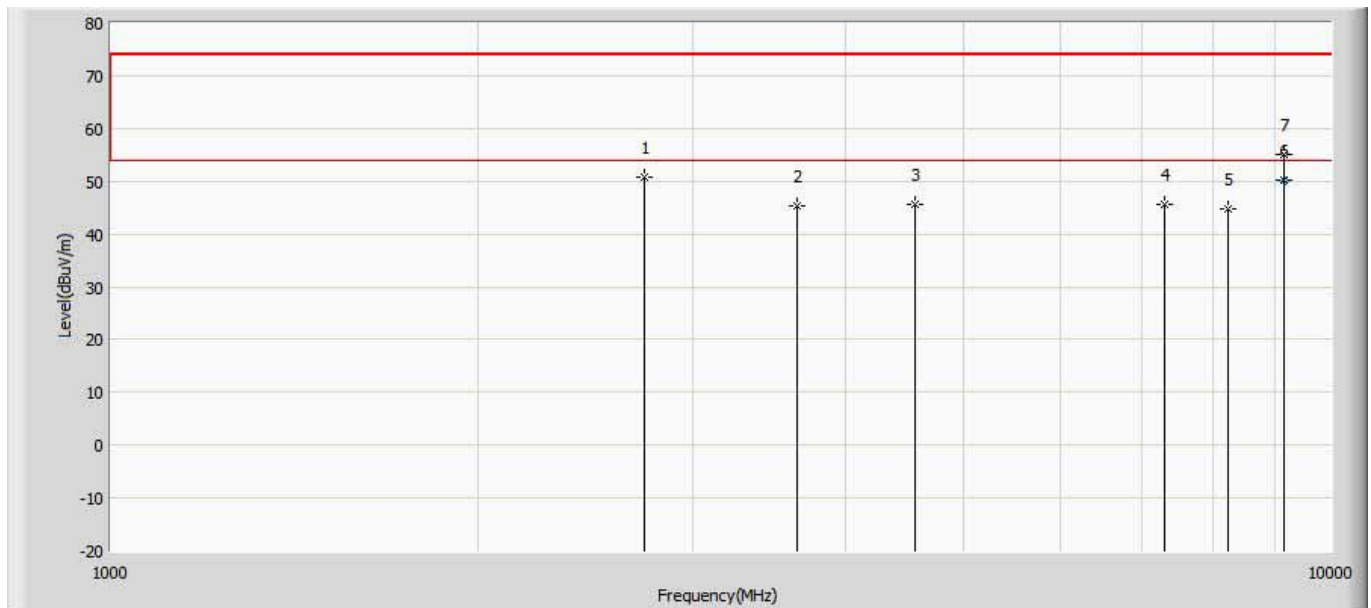
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2723.500	50.787	67.737	-23.213	74.000	-16.950	PK
2		3632.500	43.945	58.585	-30.055	74.000	-14.640	PK
3		4537.000	44.953	57.963	-29.047	74.000	-13.010	PK
4	*	5445.729	51.340	62.060	-2.660	54.000	-10.720	AV
5		5446.000	56.022	66.742	-17.978	74.000	-10.720	PK
6		7264.000	45.588	53.298	-28.412	74.000	-7.710	PK
7		8170.200	46.601	51.501	-27.399	74.000	-4.900	PK
8		9077.500	53.609	55.449	-20.391	74.000	-1.840	PK

Site: AC5	Time: 2017/10/13 - 13:51
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: Push Button	Power: AC 120V/60Hz
Note: Mode 1:Transmit at 907.8MHz	



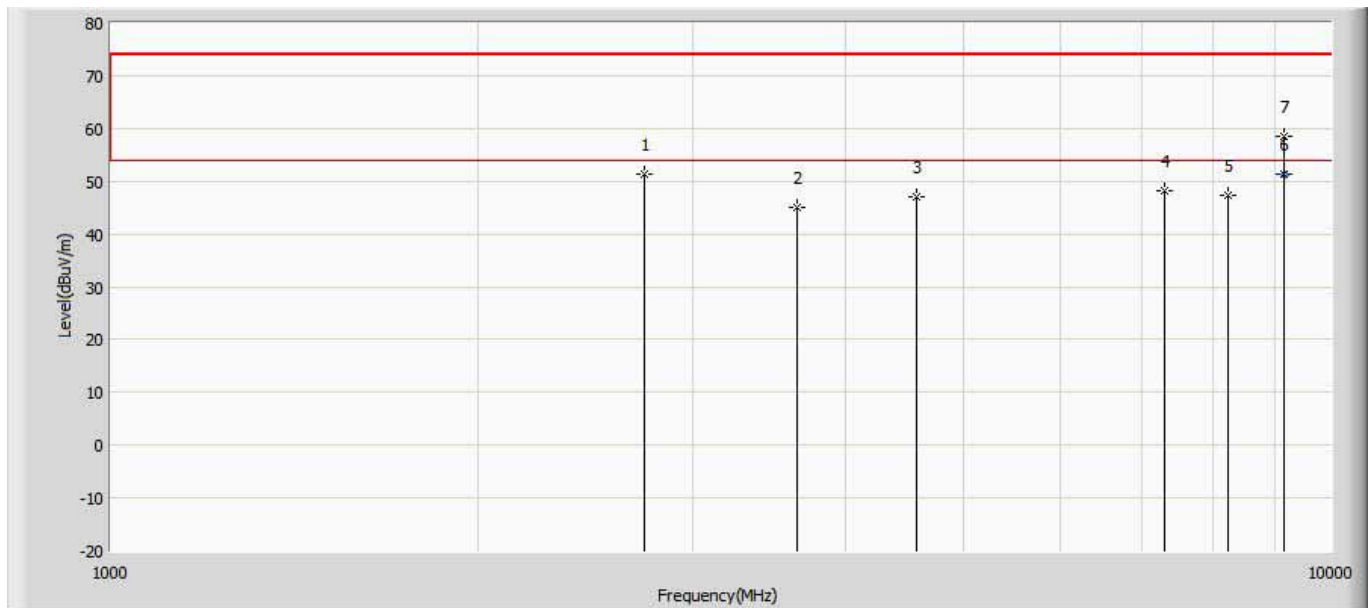
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2723.500	49.714	66.664	-24.286	74.000	-16.950	PK
2		3628.000	43.926	58.566	-30.074	74.000	-14.640	PK
3		4537.000	46.317	59.327	-27.683	74.000	-13.010	PK
4		5445.723	50.998	61.718	-3.002	54.000	-10.720	AV
5		5446.000	55.810	66.530	-18.190	74.000	-10.720	PK
6		7264.000	49.462	57.172	-24.538	74.000	-7.710	PK
7		8168.500	48.871	53.771	-25.129	74.000	-4.900	PK
8		9077.500	56.285	58.125	-17.715	74.000	-1.840	PK
9	*	9077.802	52.780	54.620	-1.220	54.000	-1.840	AV

Site: AC5	Time: 2017/10/13 - 13:51
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: Push Button	Power: AC 120V/60Hz
Note: Mode 1:Transmit at 914.2MHz	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2741.500	50.759	67.709	-23.241	74.000	-16.950	PK
2		3655.000	45.190	59.830	-28.810	74.000	-14.640	PK
3		4568.500	45.728	58.738	-28.272	74.000	-13.010	PK
4		7313.500	45.617	53.327	-28.383	74.000	-7.710	PK
5		8227.800	44.834	49.734	-29.166	74.000	-4.900	PK
6	*	9143.973	50.250	52.090	-3.750	54.000	-1.840	AV
7		9145.000	55.019	56.859	-18.981	74.000	-1.840	PK

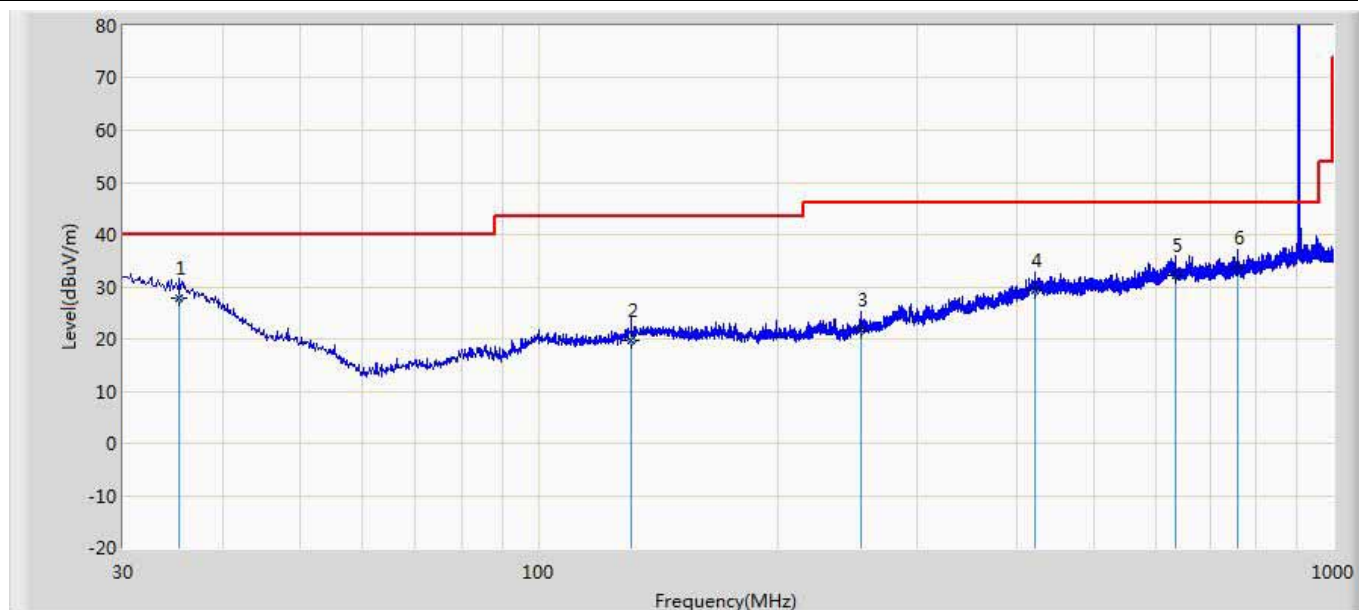
Site: AC5	Time: 2017/10/13 - 13:51
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: Push Button	Power: AC 120V/60Hz
Note: Mode 1:Transmit at 914.2MHz	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2741.500	51.241	68.191	-22.759	74.000	-16.950	PK
2		3655.000	45.029	59.669	-28.971	74.000	-14.640	PK
3		4573.000	47.026	60.036	-26.974	74.000	-13.010	PK
4		7313.500	48.214	55.924	-25.786	74.000	-7.710	PK
5		8227.000	47.201	52.101	-26.799	74.000	-4.900	PK
6	*	9142.785	51.460	53.300	-2.540	54.000	-1.840	AV
7		9145.000	58.516	60.356	-15.484	74.000	-1.840	PK

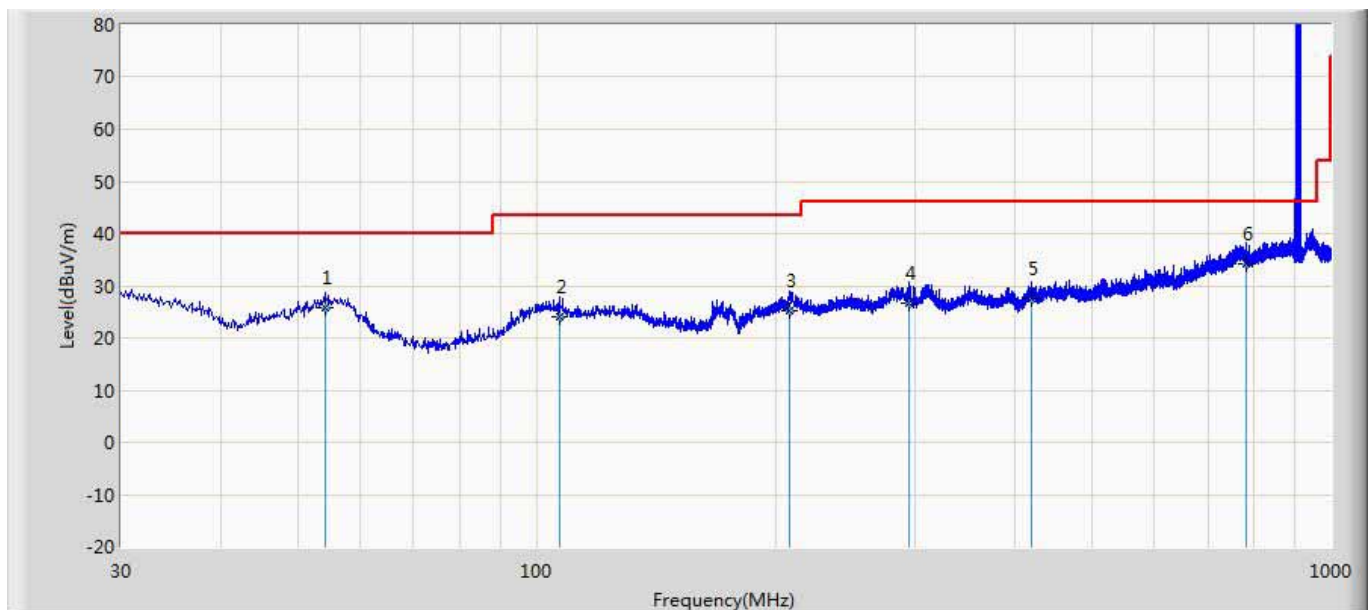
The worst case of Radiated Emission below 1GHz:

Site: AC3	Time: 2017/09/19
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: AC3_3m (30-1000MHz)	Polarity: Horizontal
EUT: Push Button	Power: AC 120V/60Hz
Note: Mode 1:Transmit at 903MHz	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Probe (dB/m)	Cable (dB)	Amp (dB)	Ant Pos (cm)	Table Pos (deg)	Type
1	*	35.335	27.747	2.100	-12.253	40.000	19.154	6.494	0.000	300	185	QP
2		131.001	19.737	2.400	-23.763	43.500	10.341	6.996	0.000	400	265	QP
3		255.161	21.757	2.800	-24.243	46.000	11.485	7.472	0.000	200	19	QP
4		421.510	29.303	2.100	-16.697	46.000	19.243	7.960	0.000	208	0	QP
5		635.037	32.179	3.400	-13.821	46.000	20.263	8.516	0.000	300	311	QP
6		758.349	33.537	3.900	-12.463	46.000	20.842	8.795	0.000	100	296	QP

Site: AC3	Time: 2017/09/19
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: AC3_3m (30-1000MHz)	Polarity: Vertical
EUT: Push Button	Power: AC 120V/60Hz
Note: Mode 1:Transmit at 903MHz	



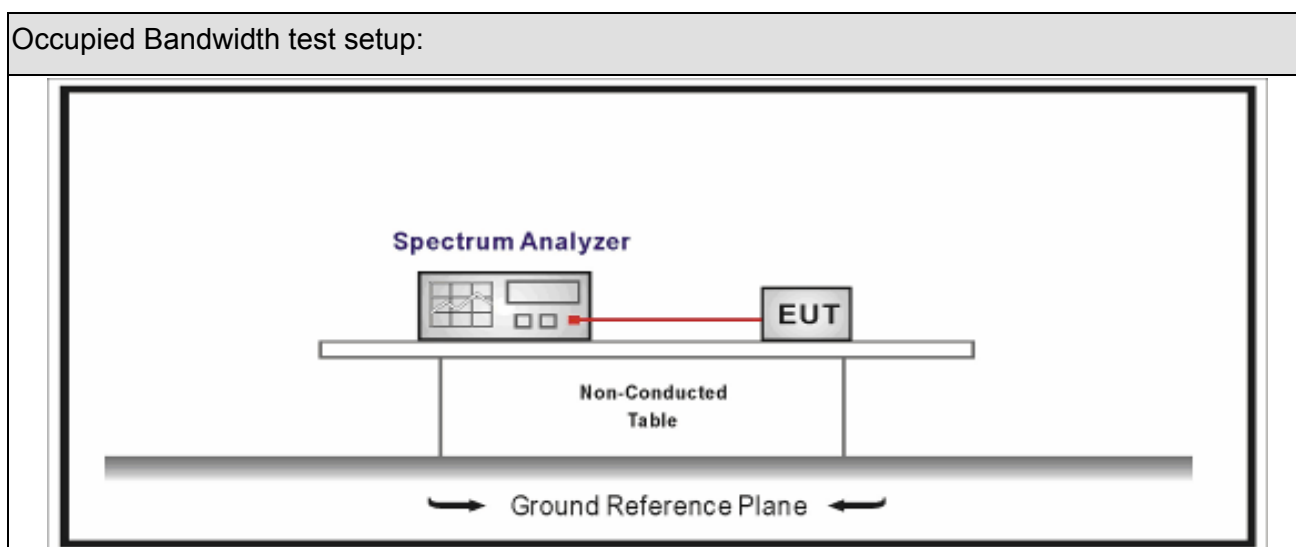
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Probe (dB/m)	Cable (dB)	Amp (dB)	Ant Pos (cm)	Table Pos (deg)	Type
1		54.129	25.756	8.600	-14.244	40.000	10.537	6.619	0.000	100	322	QP
2		106.751	24.014	2.200	-19.486	43.500	14.928	6.886	0.000	100	283	QP
3		208.359	25.188	1.900	-18.312	43.500	15.975	7.313	0.000	100	101	QP
4		294.689	26.771	2.800	-19.229	46.000	16.366	7.605	0.000	100	322	QP
5		420.304	27.665	2.200	-18.335	46.000	17.505	7.960	0.000	300	53	QP
6	*	781.144	34.168	2.500	-11.832	46.000	22.828	8.839	0.000	298	0	QP

5. Emissions in non-restricted frequency bands

5.1. Test Equipment

Occupied Bandwidth / TR-8					
Instrument	Manufacturer	Type No.	Serial No.	Cal. Date	Cal. Due Date
Spectrum Analyzer	Agilent	N9010A	MY48030494	2017.02.04	2018.02.03
EXA Spectrum Analyzer	Keysight	N9010A	MY55370495	2017.04.09	2018.04.08
MXA Signal Analyzer	Keysight	N9020A	MY56060147	2017.04.09	2018.04.08
Temperature/Humidity Meter	zhichen	ZC1-2	TR8-TH	2017.04.10	2018.04.09
Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.					

5.2. Test Setup



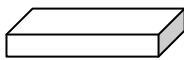
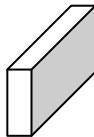
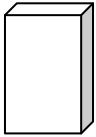
5.3. Limit

Un-Restricted Band Emissions Limit	
RF Output power (Detection methods)	Limit(dB)
RF Output power(Average detector)	30c(Note1)
RF Output power(PK detector)	20c(Note2)
Note 1: If maximum conducted (average) output power was used to demonstrate compliance as described in 9.2, then the peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum in-band peak PSD level in 100 kHz (i.e., 30 dBc). Note 2: If the maximum peak conducted output power procedure was used, then the peak output power measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz (i.e., 20 dBc).	

5.4. Test Procedure

Test Method					
	References Rule		Chapter	Description	
☒	ANSI C63.10		11.11	Emissions in non-restricted frequency bands	
	☒	ANSI C63.10	11.11.2	Reference level measurement	
	☒	ANSI C63.10	11.11.3	Emission level measurement	
☐	ANSI C63.10		11.12	Emissions in restricted frequency bands	
	☐	ANSI C63.10	11.12.1	Radiated emission measurements	
	☐	ANSI C63.10	11.12.2.7	Radiated spurious emission test	
☐	ANSI C63.10		6.4	Radiated emissions from unlicensed wireless devices below 30 MHz	
☐	ANSI C63.10		6.5	Radiated emissions from unlicensed wireless devices in the frequency range of 30 MHz to 1000 MHz	
☐	ANSI C63.10		6.6	Radiated emissions from unlicensed wireless devices above 1 GHz	
	☒	ANSI C63.10		11.12.2	Antenna-port conducted measurements
		☐	ANSI C63.10	11.12.2.3	Quasi-peak measurement procedure
		☒	ANSI C63.10	11.12.2.4	Peak power measurement procedure
		☐	ANSI C63.10	11.12.2.5	Average power measurement procedures
		☐	ANSI C63.10	11.12.2.5.1	Trace averaging with continuous EUT transmission at full power
		☐	ANSI C63.10	11.12.2.5.2	Trace averaging across ON and OFF times of the EUT transmissions followed by duty cycle correction
		☐	ANSI C63.10	11.12.2.5.3	Reduced VBW averaging across ON and OFF times of the EUT transmissions with max hold

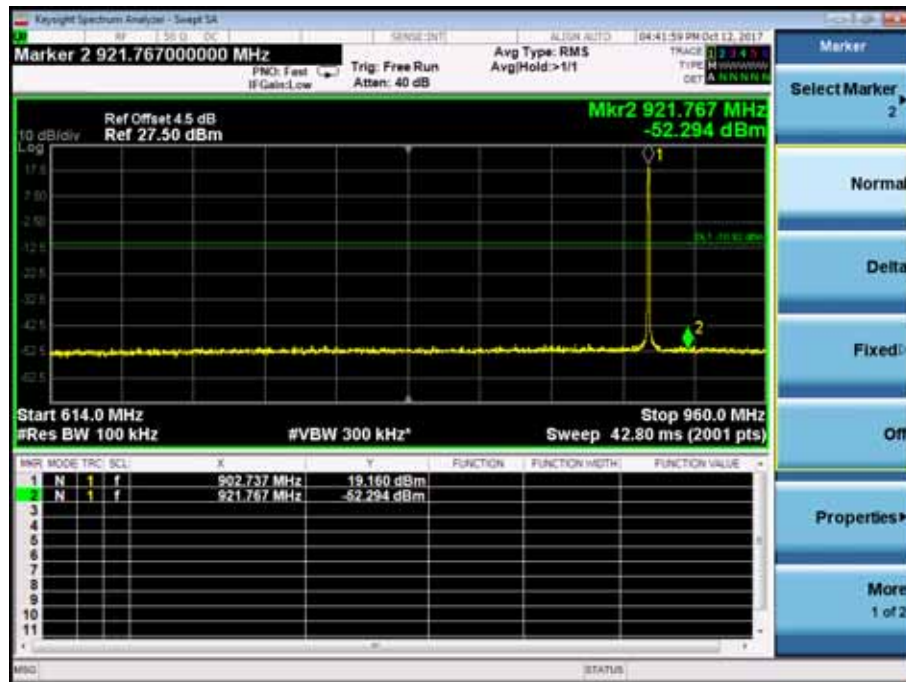
5.5. EUT test Axis definition

Item	Emissions in non-restricted frequency bands			
Device Category	☐	Fixed position use		
	☒	Mobile position use		
Test mode	Mode 1			
Test method	☐	Radiated		
		X Axis	Y Axis	Z Axis
				
		Worst Axis ☐	Worst Axis ☐	Worst Axis ☐
	☒	Conducted		
	☒	Chain 0		
				
	☐	Chain 0	Chain 1	
				
	☐	Chain 0	Chain 1	Chain 2
				

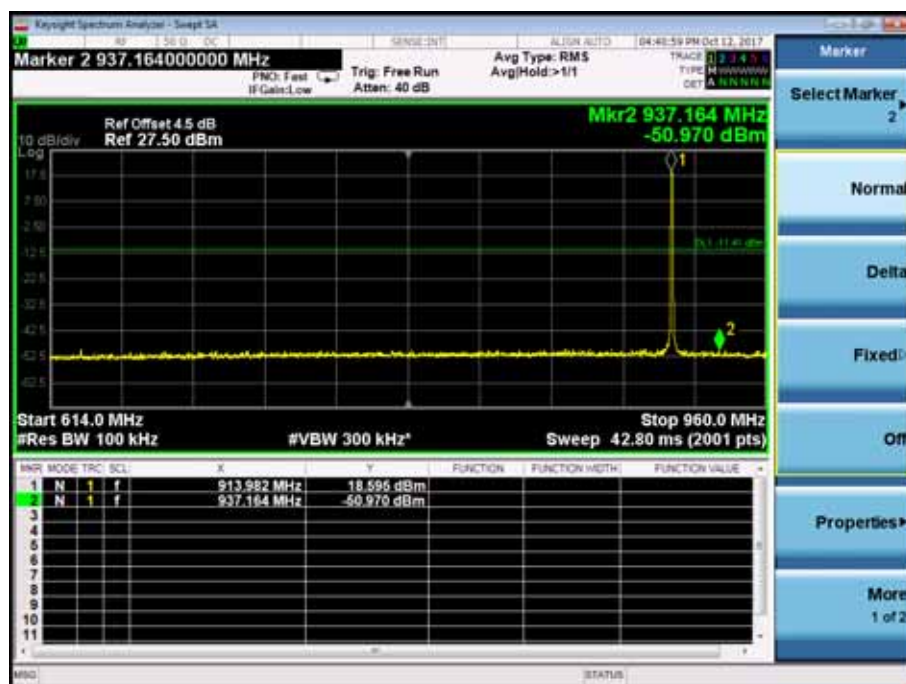
5.6. Test Result

Product Name	: Push Button	Power	: AC 120V/60Hz
Test Mode	: Mode1	Test Site	: TR8
Test Date	: 2017.10.10		

Mode 1 Channel(903MHz)



Mode 1 Channel(914.2MHz)

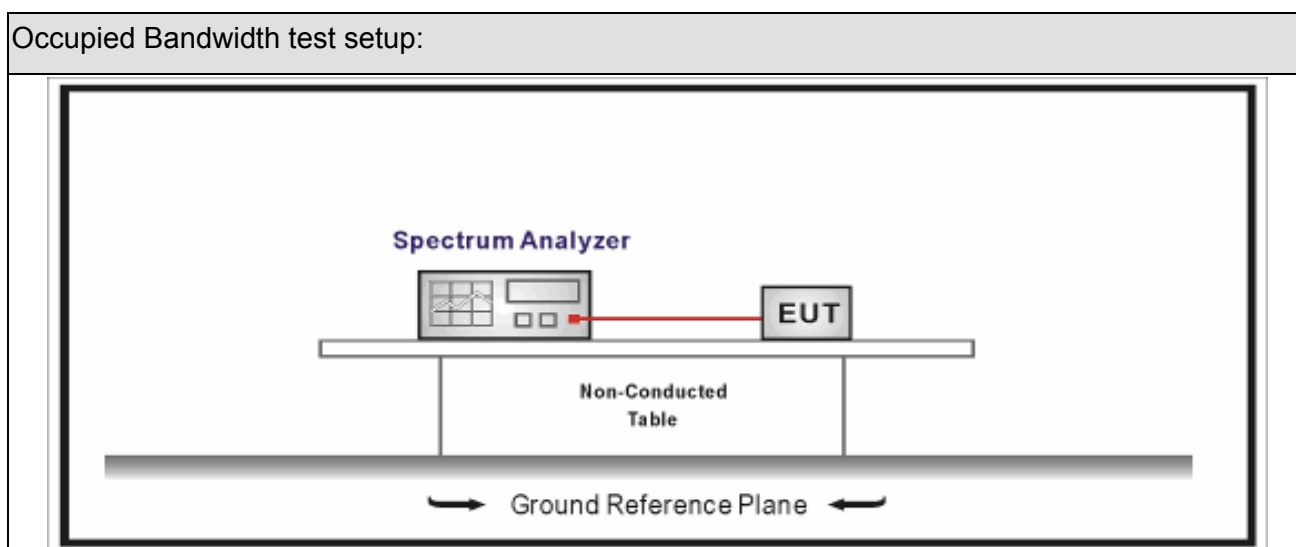


6. Occupied Bandwidth

6.1. Test Equipment

Occupied Bandwidth / TR-8					
Instrument	Manufacturer	Type No.	Serial No.	Cal. Date	Cal. Due Date
Spectrum Analyzer	Agilent	N9010A	MY48030494	2017.02.04	2018.02.03
EXA Spectrum Analyzer	Keysight	N9010A	MY55370495	2017.04.09	2018.04.08
MXA Signal Analyzer	Keysight	N9020A	MY56060147	2017.04.09	2018.04.08
Temperature/Humidity Meter	zhichen	ZC1-2	TR8-TH	2017.04.10	2018.04.09
Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.					

6.2. Test Setup



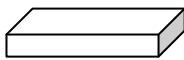
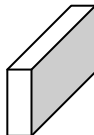
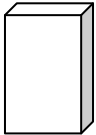
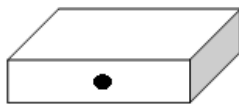
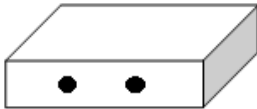
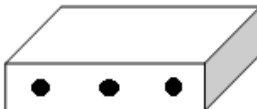
6.3. Limit

Occupied Bandwidth
Systems using digital modulation techniques operate in the 902-928 MHz .The minimum 6 dB bandwidth shall be at least 500 kHz

6.4. Test Procedure

Test Method				
	Reference Rule		Chapter	Description
☒	ANSI C63.10		11.8	DTS bandwidth
	☐	ANSI C63.10	11.8.1	Option 1
	☒	ANSI C63.10	11.8.2	Option 2

6.5. EUT test definition

Item	Occupied Bandwidth			
Device Category	☐	Fixed position use		
	☒	Mobile position use		
Test mode	Mode 1			
Test method	☐	Radiated		
		X Axis	Y Axis	Z Axis
				
		Worst Axis ☐	Worst Axis ☐	Worst Axis ☐
	☒	Conducted		
	☒	Chain 0		
				
	☐	Chain 0	Chain 1	
				
	☐	Chain 0	Chain 1	Chain 2
				

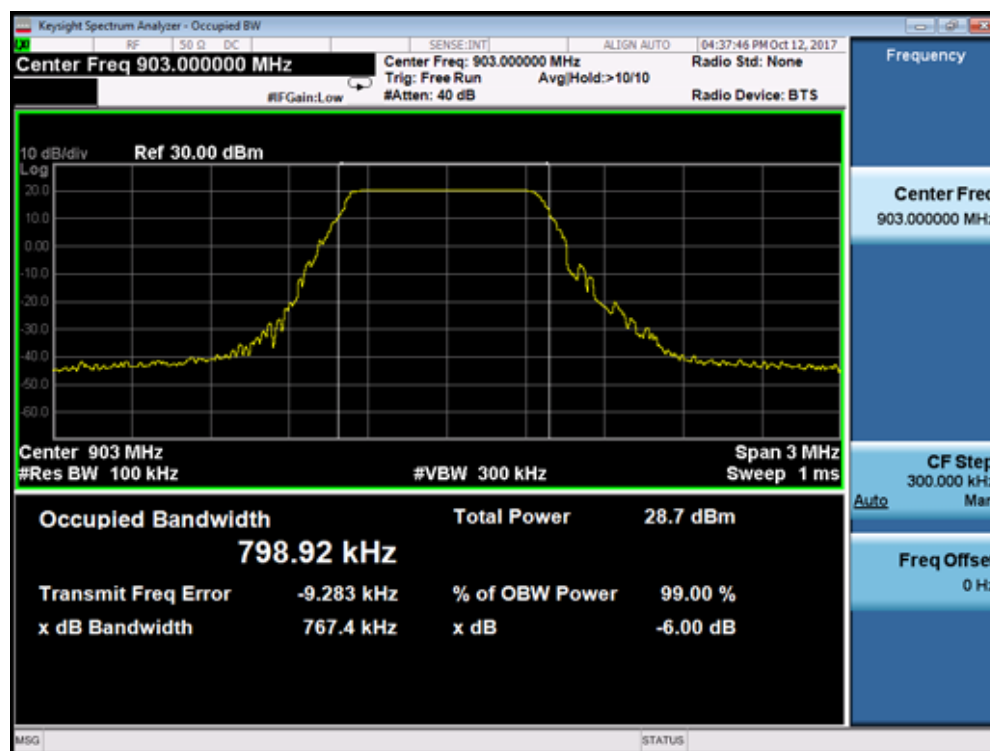
6.6. Test Result

Product Name	: Push Button	Power	: AC 120V/60Hz
Test Mode	: Mode1	Test Site	: TR8
Test Date	: 2017.10.09		

Mode	CH.	Test Freq. (MHz)	99% Occupied Bandwidth (KHz)	6dB Occupied Bandwidth (KHz)	Limit (kHz)	Result
1	Low	903	798.92	767.4	>500	Pass
1	Mid	907.8	810.85	771.8	>500	Pass
1	High	914.2	808.44	767.5	>500	Pass

Note : The worst case of Occupied Bandwidth as below :

Mode 1 Low Channel (903MHz)



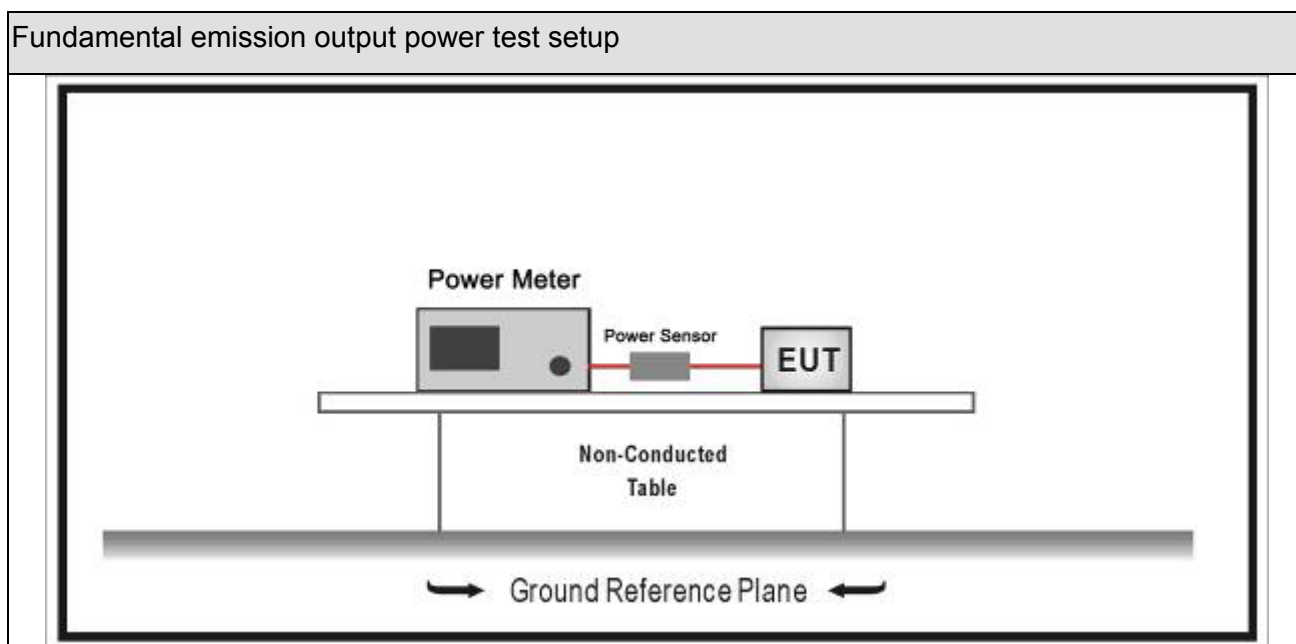
7. Fundamental emission output power

7.1. Test Equipment

Fundamental emission output power/ TR-8					
Instrument	Manufacturer	Type No.	Serial No.	Cal. Date	Cal. Due Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2017.01.04	2018.01.03
Spectrum Analyzer	Agilent	N9010A	MY48030494	2017.02.04	2018.02.03
Wideband Peak Power Meter	Anritsu	ML2495A	0905006	2017.10.14	2018.10.13
Power Sensor	Anritsu	MA2411B	0846014	2017.10.14	2018.10.13
Temperature/Humidity Meter	zhicheng	ZC1-2	TR8-TH	2017.04.10	2018.04.09

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

7.2. Test Setup



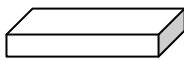
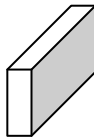
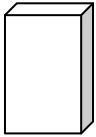
7.3. Limit

Fundamental emission output power Limit		
☒	$G_{TX} < 6\text{dBi}$	$P_{out} \leq 30\text{dBm}$
☐	$G_{TX} > 6\text{dBi}$	
☐	Non-Fix point-point	$P_{out} \leq 30 - (G_{TX} - 6)$
☐	Fix point-point	$P_{out} \leq 30 - [(G_{TX} - 6)]/3$
☐	Point-to-multipoint	$P_{out} \leq 30 - (G_{TX} - 6)$
☐	Overlap Beams	$P_{out} \leq 30 - [(G_{TX} - 6)]/3$
☐	Aggregate power transmitted simultaneously on all beams	$P_{out} \leq 30 - [(G_{TX} - 6)]/3$
☐	single directional beam	$P_{out} \leq 30 - [(G_{TX} - 6)]/3 + 8\text{dB}$
Note 1 : G_{TX} directional gain of transmitting antennas.		
Note 2 : P_{out} is maximum peak conducted output power .		

7.4. Test Procedure

Fundamental emission output power Test Method							
	References Rule			Chapter	Description		
☒	ANSI C63.10			11.9	Fundamental emission output power		
	☐	ANSI C63.10			11.9.1	Maximum peak conducted output power	
		☐	ANSI C63.10	11.9.1.1	RBW ≥ DTS bandwidth		
		☐	ANSI C63.10	11.9.1.2	Integrated band power method		
		☐	ANSI C63.10	11.9.1.3	PKPM1 Peak power meter method		
	☒	ANSI C63.10			11.9.2	Maximum conducted (average) output power	
		☐	ANSI C63.10			11.9.2.2	Measurement using a spectrum analyzer (SA)
			☐	ANSI C63.10	11.9.2.2.2	Method AVGSA-1(Duty cycle ≥ 98%)	
			☐	ANSI C63.10	11.9.2.2.3	Method AVGSA-1A(Duty cycle ≥ 98%)	
			☐	ANSI C63.10	11.9.2.2.4	Method AVGSA-2(Duty cycle ≤ 98%)	
			☐	ANSI C63.10	11.9.2.2.5	Method AVGSA-2A(Duty cycle ≤ 98%)	
			☐	ANSI C63.10	11.9.2.2.4	Method AVGSA-3	
			☐	ANSI C63.10	11.9.2.2.5	Method AVGSA-3A	
		☒	ANSI C63.10			11.9.2.3	Measurement using a power meter (PM)
			☒	ANSI C63.10	11.9.2.3.1	Method AVGPM	
			☐	ANSI C63.10	11.9.2.3.2	Method AVGPM-G	

7.5. EUT test definition

Item	Fundamental emission output power			
Device Category	☐	Fixed position use		
	☒	Mobile position use		
Test mode	Mode 1			
Test method	☐	Radiated		
		X Axis	Y Axis	Z Axis
				
		Worst Axis ☐	Worst Axis ☐	Worst Axis ☐
	☒	Conducted		
	☒	Chain 0		
				
	☐	Chain 0	Chain 1	
				
	☐	Chain 0	Chain 1	Chain 2
				

7.6. Test Result

Product Name	:	Push Button	Power	:	AC 120V/60Hz
Test Mode	:	Mode1	Test Site	:	TR8
Test Date	:	2017.10.18			

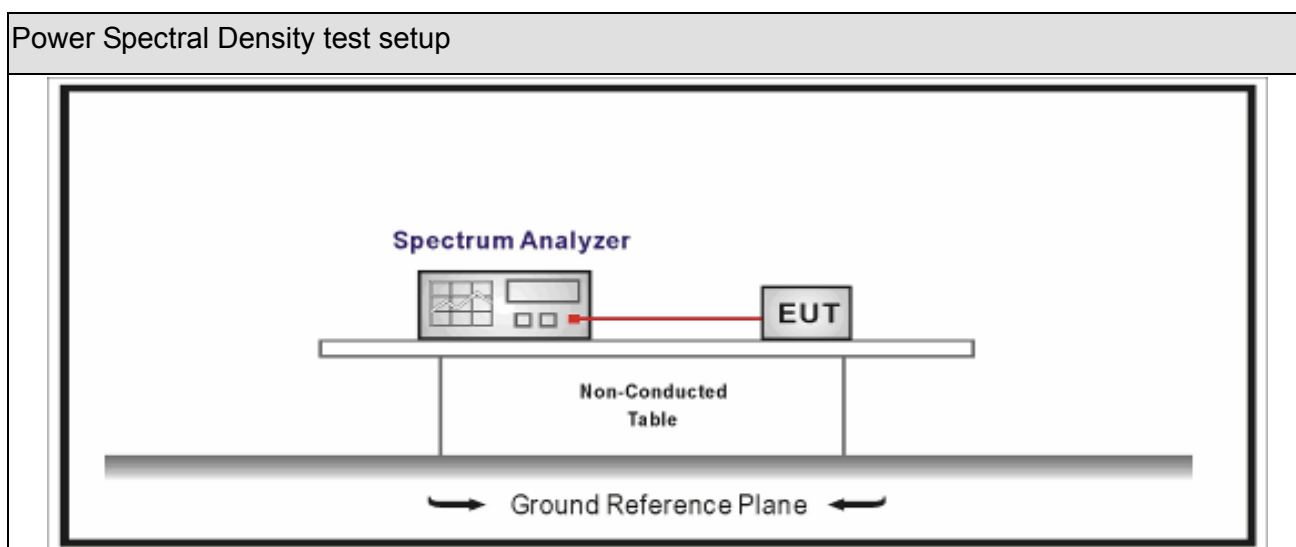
Mode	Channel	Test Frequency (MHz)	Peak Power Output (dBm)	Antenna Gain (dBi)	Limit (dBm)	Result
1	Low	903	20.32	-6.7	30	Pass
1	Mid	907.8	20.27	-6.7	30	Pass
1	High	914.2	20.28	-6.7	30	Pass

8. Power Spectral Density

8.1. Test Equipment

Power Spectral Density / TR-8					
Instrument	Manufacturer	Type No.	Serial No.	Cal. Date	Cal. Due Date
Spectrum Analyzer	Agilent	N9010A	MY48030494	2017.02.04	2018.02.03
EXA Spectrum Analyzer	Keysight	N9010A	MY55370495	2017.04.09	2018.04.08
MXA Signal Analyzer	Keysight	N9020A	MY56060147	2017.04.09	2018.04.08
Temperature/Humidity Meter	zhichen	ZC1-2	TR8-TH	2017.04.10	2018.04.09
Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.					

8.2. Test Setup



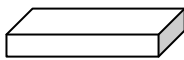
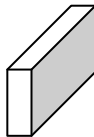
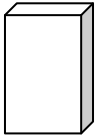
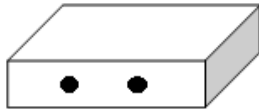
8.3. Limit

Power Spectral Density Limit
Power Spectral Density $\leq 8\text{dBm}/3\text{kHz}$

8.4. Test Procedure

Power Spectral Density Test Method				
	References Rule		Chapter	Description
☒	ANSI C63.10		11.10	Maximum power spectral density level in the fundamental emission
	☐	ANSI C63.10	11.10.2	Method PKPSD (peak PSD)
	☒	ANSI C63.10	11.10.3	Method AVGPSD-1(Duty cycle ≥ 98%)
	☐	ANSI C63.10	11.10.4	Method AVGPSD-1A(Duty cycle ≥ 98%)
	☐	ANSI C63.10	11.10.5	Method AVGPSD-2(Duty cycle < 98%)
	☐	ANSI C63.10	11.10.6	Method AVGPSD-2A(Duty cycle < 98%)
	☐	ANSI C63.10	11.10.7	Method AVGPSD-3
	☐	ANSI C63.10	11.10.8	Method AVGPSD-3A

8.5. EUT test definition

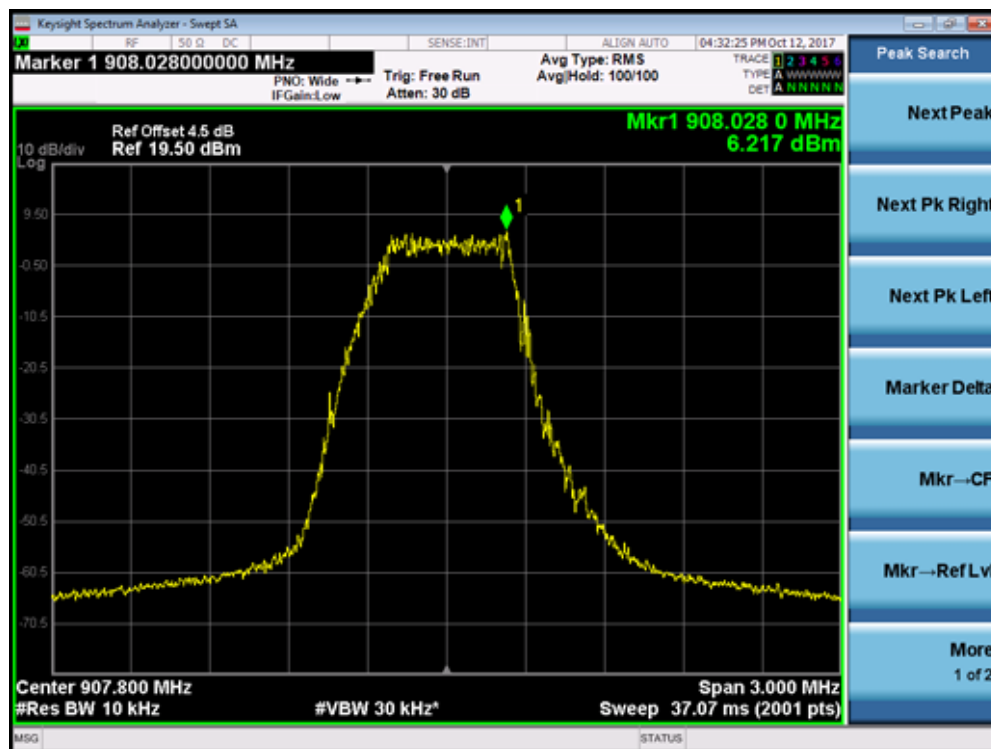
Item	Power Spectral Density Test Method			
Device Category	☐	Fixed position use		
	☒	Mobile position use		
Test mode	Mode 1			
Test method	☐	Radiated		
		X Axis	Y Axis	Z Axis
				
		Worst Axis ☐	Worst Axis ☐	Worst Axis ☐
	☒	Conducted		
	☒	Chain 0		
				
	☐	Chain 0	Chain 1	
				
	☐	Chain 0	Chain 1	Chain 2
				

8.6. Test Result

Product Name	: Push Button	Power	: AC 120V/60Hz
Test Mode	: Mode1	Test Site	: TR8
Test Date	: 2017.10.18		

Mode	Channel	Test Frequency (MHz)	Measurement PSD (dBm/3kHz)	Antenna Gain (dBi)	Limit (dBm/3kHz)	Result
1	Low	903	6.050	-6.7	8.0	Pass
1	Mid	907.8	6.217	-6.7	8.0	Pass
1	High	914.2	5.507	-6.7	8.0	Pass

Mode 1 Mid Channel (907.8MHz)



9. Antenna Requirement

9.1. Limit

Antenna Requirement Limit	
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.	

9.2. Antenna Connector Construction

Antenna Connector Construction	
☒	The use of a permanently attached antenna
☐	The antenna use of a unique coupling to the intentional radiator
☐	The use of a nonstandard antenna jack or electrical connector
Please refer to the attached document "Internal Photograph" to show the antenna connector.	

_____ The End _____