TEST REPORT

Report No. :	**HST201610-6387-FCC**
Product description:	**Professional digital wireless vocal microphone**
Model/Type :	**DIGITAL-1**
Applicant's name:	**MICA ELECTRONIC CORP /DBA VOCOPRO**

Lab: Guangdong Huesent Testing & Inspection Technology Co., Ltd
Add: No. 91, Dongguanzhuang Road, Guangzhou, Guangdong, China.
Http://www.hst.org.cn E-mail:hst@hst.org.cn
Tel: +86-20-28263230 Fax: +86-20-28263237

TEST REPORT

FCC Part 15.249: 2015

FCC ID: 2AAMDDIGITAL-1

Report Reference No. .....:	HST201610-6387-FCC	
Tested by (+ signature) .....:	Lemon Fu	Lemon Fu
Review by (+ signature) .....:	Sandy Yu	Sandy Yu
Approved by (+ signature).....		Robin Peng
Date of test .....:	Oct. 25, 2016 to Nov. 21, 2016	
Date of issue .....:	Nov. 22, 2016	
Total number of pages .....:	36 Pages	
Testing Laboratory……..:	Guangdong Environment Radiation Monitoring Center (Accredited by CNAS, Accredited Number: L5539) FCC- Registration No: 667318 Renewal on Sep. 12, 2012	
Address .....:	No. 860, South Guangzhou Avenue, Guangzhou, 510300 China	
Applicant's name .....:	MICA ELECTRONIC CORP /DBA VOCOPRO	
Address .....:	1728 CURTISS COURT LA VERNE California United States	
Manufacturer's name .....:	ENPING SANGE ELECTRONICS CO.,LTD	
Address .....:	No. F12 Civilian and foreign capital industry area, Enping city, Guangdong China	
Test specification……:	Entrusted testing	
Standard.....:	FCC Part 15.249: 2015	
Non-standard test method……..:	N/A	
Test item description .....:	Professional digital wireless vocal microphone	
Trade Mark.....:	VOCOPRO	
Model/Type reference .....:	DIGITAL-1	
Ratings .....:	3.7Vdc 1*18500HP 1100mAh Lithium battery	

TABLE OF CONTENT

1 TEST SUMMARY

Test	Test Requirement	Test Method	Class / Severity	Result
Radiated Emission (9kHz to 25GHz)	FCC PART 15.249	ANSI C63.10:2013	In FCC PART 15.249	PASS
Occupied Bandwidth	FCC PART 15.215	ANSI C63.10:2013	In FCC PART 15.215	PASS
Conducted Emissions at Mains Terminals	FCC PART 15.207	ANSI C63.10: 2013: Clause 6.2	In FCC PART 15.207	PASS
Frequency Stability	FCC PART 15.249	FCC CFR 47 Part 2.1055	In FCC PART 15.249.b)2)	N/A1

Note:
N/A1: Not applicable, since the frequency stability test was only for the “fixed, point-to-point operation is permitted in the 24.05-24.25 GHz band“ equipments.

♣

Channel	Frequency/ MHz
Lowest	902.3
Middle	911.3
Highest	927.7

The tests were carried out on the 3 samples with the typical frequency of lowest/ middle/ highest channels listed above.

2 GENERAL INFORMATION

2.1 Client Information

Applicant:	MICA ELECTRONIC CORP /DBA VOCOPRO
Address of Applicant:	1728 CURTISS COURT LA VERNE California United States

2.2 General Description of E.U.T.

EUT Name:	Professional digital wireless vocal microphone
Item No.:	DIGITAL-1
Serial No.:	Not supplied by client

2.3 Details of E.U.T.

Power Supply:	3.7Vdc 1*18500HP 1100mAh Lithium battery
Main Function:	Wireless microphone system with an associated receiver for transmitting voice.
Oscillating Frequency:	Y1: 24.576MHz
Port:	N/A
Frequency Range:	902.3 MHz to 927.7 MHz

Modulation: FM; Emission designator: 248KF3E

Occupied bandwidth (99 % BW): 248kHz

Antenna Number & Type: One & Fixed on PCB; Gained: 0 dBi

2.4 Description of Support Units

/

2.5 Standards Applicable for Testing

The standard used was 47 CFR Part 15.249: 2015

The EUT belongs to low power communication device transmitter, and it's an unlicensed low power auxiliary device.

2.6 Test Location

Guangdong Environment Radiation Monitoring Center
Address: No. 860, South Guangzhou Avenue, Guangzhou, 510300 China
Accredited by CNAS, Accredited Number: L5539
FCC- Registration No: 667318 Renewal on Sep. 12, 2012

2.7 Deviation from Standards

None.

2.8 Abnormalities from Standard Conditions

None.

3 TEST RESULTS

3.1 **Radiation Interference**

Test Requirement:	FCC Part15.249, a) & FCC Part15.209
Test Method:	ANSI C63.10:2013
Detector:	Peak for pre-scan (The resolution bandwidth was 100 kHz and the video bandwidth was 300 kHz up to 1.0GHz and 1.0 MHz with a video BW of 3.0 MHz above 1.0GHz.) Average detector if maximised peak within 6dB of limit

3.1.1 **E.U.T. Operation**

Operating Environment:

Temperature: 20°C Humidity:50% RH Atmospheric Pressure: 103 kPa

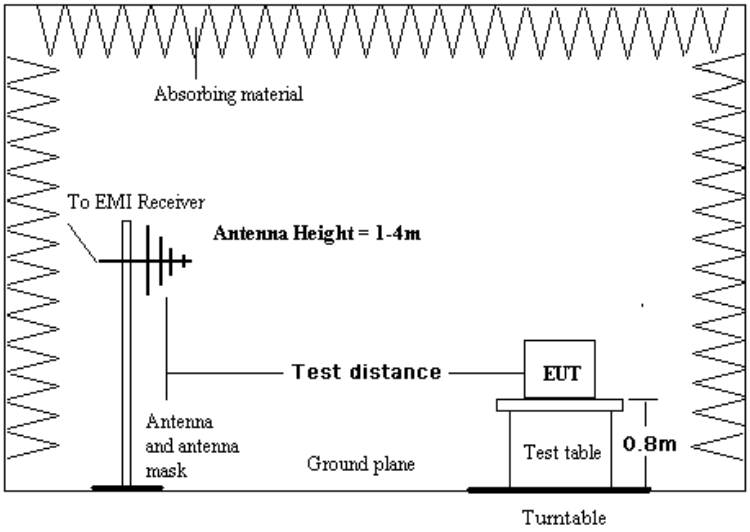
EUT Operation:

In the fundamental test, connecting the EUT to peripheral devices.

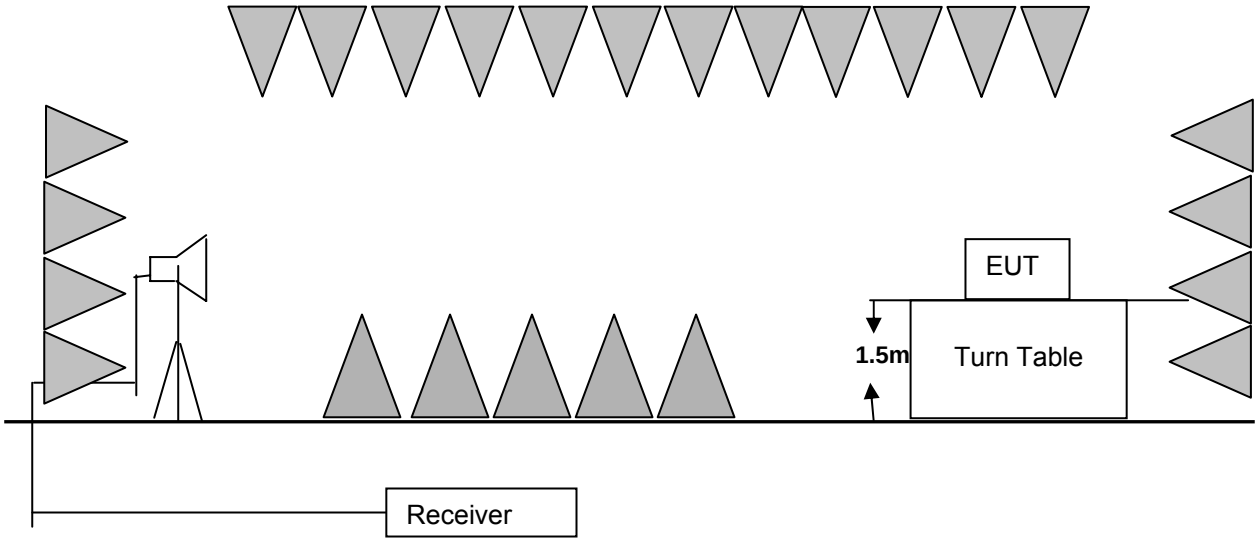
Test the EUT work normally in on mode during the whole test.

3.1.2 **Test Setup**

30MHz-1GHz emissions:



1 GHz to 40 GHz emissions:



3.1.3 **Test Procedure**

ANSI STANDARD C63.10-2013 6.5 Radiated emissions from unlicensed wireless devices in the frequency range of 30 MHz to 1000 MHz

An initial pre-scan was performed in the 3m chamber using the spectrum analyser in peak detection mode. Average measurements were conducted based on the peak sweep graph. When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical polarities. The EUT was measured for both the Horizontal and Vertical polarities and performed a pre-test three orthogonal planes and choose the worst case of X/ Y/ Z orthogonal planes for the final measurement.

3.1.4 **Measurement Data**

Copy from FCC Part 15.249.a)

(a) Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental	Field Strength	
Frequency	Fundamental	Harmonics
MHz	millivolts/meter(mV/m)	microvolts/meter(uV/m)
902 - 928	50	500
2400 - 2483.5	50	500
5725 - 5875	50	500
24000 - 24250	250	2500

Quasi-Peak measurement of carrier

Frequency	Level		Transducer	Limit	Margin	
MHz	dBuV/m		dB	dBuV/m	dB	
	V	H			V	H
902.3 (L)	87.1	75.0	27.6	94	-6.9	-19.0
911.3 (M)	87.8	71.2	27.8	94	-6.2	-22.8
927.7 (H)	88.2	76.3	27.9	94	-5.8	-17.7

Note:

50mV/m (94dBuV/m) for QP limit in band (902MHz to 928MHz).

The transducer factor = antenna factor + cable loss - preamplifier. In band 902MHz to 928MHz, preamplifier factor = 0 dB.

The Level = Read level + transducer factor.

H: Antenna polarization horizontal direction. V: Antenna polarization vertical direction.

The EUT was measured for both the Horizontal and Vertical polarities and performed a pre-test three orthogonal planes and choose the worst case of X orthogonal plane for the final measurement.

Peak measurement of harmonics and spurious emission at lowest channel 902.3 MHz

Frequency		Level		Transducer	Limit	Min. Margin	
MHz		dBuV/m		dB	dBuV/m	dB	
		V	H			V	H
2nd	1804.6	58.5	56.2	-2.6		-15.5	-17.8
3rd	2706.9	46.1	48.1	-2.1		-27.9	-25.9
4th	3609.2	<50	<50	0.3		< -24	< -24
5th	4511.5	<50	<50	4.1		< -24	< -24
6th	5413.8	<50	<50	1.0	74dB	< -24	< -24
7th	6316.1	<50	<50	5.1		< -24	< -24
8th	7218.4	<50	<50	5.0		< -24	< -24
9th	8120.7	<50	<50	6.0		< -24	< -24
10th	9023.0	<50	<50	7.3		< -24	< -24

Average measurement of harmonics and spurious emission at lowest channel 902.3 MHz

Frequency		Level		Transducer	Limit	Min. Margin	
MHz		dBuV/m		dB	dBuV/m	dB	
		V	H			V	H
2nd	1804.6	44.5	44.0	-2.6		-9.5	-10.0
3rd	2706.9	<40	<40	-2.1		< -14	< -14
4th	3609.2	<40	<40	0.3		< -14	< -14
5th	4511.5	<40	<40	4.1		< -14	< -14
6th	5413.8	<40	<40	1.0	54dB	< -14	< -14
7th	6316.1	<40	<40	5.1		< -14	< -14
8th	7218.4	<40	<40	5.0		< -14	< -14
9th	8120.7	<40	<40	6.0		< -14	< -14
10th	9023.0	<40	<40	7.3		< -14	< -14

Peak measurement of harmonics and spurious emission at middle channel 911.3 MHz

Frequency		Level		Transducer	Limit	Min. Margin	
MHz		dBuV/m		dB	dBuV/m	dB	
		V	H			V	H
2nd	1822.60	58.9	56.7	-2.6	74dB	-15.1	-17.3
3rd	2733.90	45.7	48.1	-2.1		-28.3	-25.9
4th	3645.20	<50	45.7	0.3		< -24	-28.3
5th	4556.50	<50	<50	4.1		< -24	< -24
6th	5467.80	<50	<50	1.0		< -24	< -24
7th	6379.10	<50	<50	5.1		< -24	< -24
8th	7290.40	<50	<50	5.0		< -24	< -24
9th	8201.70	<50	<50	6.0		< -24	< -24
10th	9113.00	<50	<50	7.3		< -24	< -24

Average measurement of harmonics and spurious emission at middle channel 911.3 MHz

Frequency		Level		Transducer	Limit	Min. Margin	
MHz		dBuV/m		dB	dBuV/m	dB	
		V	H			V	H
2nd	1822.60	44.3	44.2	-2.6	54dB	-9.7	-9.8
3rd	2733.90	32.7	37.0	-2.1		-21.3	-17.0
4th	3645.20	<40	38.6	0.3		< -14	-15.4
5th	4556.50	<40	<40	4.1		< -14	< -14
6th	5467.80	<40	<40	1.0		< -14	< -14
7th	6379.10	<40	<40	5.1		< -14	< -14
8th	7290.40	<40	<40	5.0		< -14	< -14
9th	8201.70	<40	<40	6.0		< -14	< -14
10th	9113.00	<40	<40	7.3		< -14	< -14

Peak measurement of harmonics and spurious emission at highest channel 927.7MHz

Frequency		Level		Transducer	Limit	Min. Margin	
MHz		dBuV/m		dB	dBuV/m	dB	
		V	H			V	H
2nd	1855.4	57.5	56.2	-2.6	74dB	-16.5	-17.8
3rd	2783.1	<50	<50	-2.1		< -24	< -24
4th	3710.8	<50	<50	0.3		< -24	< -24
5th	4638.5	<50	<50	4.1		< -24	< -24
6th	5566.2	<50	<50	1.0		< -24	< -24
7th	6493.9	<50	<50	5.1		< -24	< -24
8th	7421.6	<50	<50	5.0		< -24	< -24
9th	8349.3	<50	<50	6.0		< -24	< -24
10th	9277.0	<50	<50	7.3		< -24	< -24

Average measurement of harmonics and spurious emission at highest channel 927.7MHz

Frequency		Level		Transducer	Limit	Min. Margin	
MHz		dBuV/m		dB	dBuV/m	dB	
		V	H			V	H
2nd	1855.4	44.1	44.4	-2.6	54dB	-9.9	-9.6
3rd	2783.1	<40	<40	-2.1		< -14	< -14
4th	3710.8	<40	<40	0.3		< -14	< -14
5th	4638.5	<40	<40	4.1		< -14	< -14
6th	5566.2	<40	<40	1.0		< -14	< -14
7th	6493.9	<40	<40	5.1		< -14	< -14
8th	7421.6	<40	<40	5.0		< -14	< -14
9th	8349.3	<40	<40	6.0		< -14	< -14
10th	9277.0	<40	<40	7.3		< -14	< -14

Note:

500μV/m (54dBuV/m) for AVG limit, and Peak limit= AVG limit + 20dB.

The transducer factor = antenna factor + cable loss - preamplifier. In band 1GHz to 18GHz, preamplifier factor = -30dB.

The Level = Read level + transducer factor.

H: Antenna polarization horizontal direction. V: Antenna polarization vertical direction.

The EUT was measured for both the Horizontal and Vertical polarities and performed a pre-test three orthogonal planes and choose the worst case of X orthogonal plane for the final measurement.

Note:

The EUT's transmitting frequency range belonged to 902MHz to 928 MHz, and it is complied with the requirements of FCC Part 15.249.a).

The EUT was measured for both the Horizontal and Vertical polarities and performed a pre-test three orthogonal planes and choose the worst case of X orthogonal plane for the final measurement.

3.1.5 **Radiated outside of the specified frequency bands**

Copy from FCC Part 15.249.d)

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

Copy from FCC Part 15.209: Radiated emission limits, general requirements

(a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency	Field Strength	Measurement Distance
MHz	microvolts/meter(uV/m)	(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

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

(d) The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

Note:

Since the fundamental emissions peak and average values are shown on section 6.1.4 of this report, the general radiated emission limits in Section 15.209 is the lesser attenuation.

Limits for the frequency bands of 902 M - 928 MHz

Frequency	FCC Part 15.209 Radiated limits	
MHz	dBuV/m@3m	
	QP	AVG
30 - 88	40	/
88 - 216	43.5	/
216 - 960	46	/
960 - 1000	54	/
Above 1000	74(PK)	54

Frequency	15.249.d) limits	
MHz	dBuV/m@3m	
	QP	AVG
30 - 88	44	/
88 - 216	44	/
216 - 902	46	/
928-960	46	/
960 - 1000	54	/
1000-9280	74(PK)	54

Remark:
1. RF line voltage (dBuV)= 20 log RF line voltage (uV)
2. In the above table, the tighter limit applies at the band edges.
3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

3.1.6 **Measurement Data for 15.249.d**

Test the EUT work normally in transmitting mode in mains.

1) 9kHz~30MHz Test result

The Low frequency, which started from 9kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not report.

2) 30 MHz~1 GHz Spurious Emissions. Quasi-Peak Measurement

Test curves (with the Quasi-peak measurement and QP limit), 30M-1GHz, Horizontal & Vertical:

lowest channel 902.3MHz

Quasi-peak measurement: Horizontal

Frequency	Level	Transducer	Limit	Margin
MHz	dBuV/m	dB	dBuV/m	dB
30.0	17.3	17.9	44	26.7
184.2	16.6	8.9	44	27.4
447.4	24.4	16.6	46	21.6
860.1*	29.4	23.0	46	16.6
936.2*	29.8	24.2	46	16.2
972.6	29.0	23.9	54	25.0

Quasi-peak measurement: Vertical

Frequency	Level	Transducer	Limit	Margin
MHz	dBuV/m	dB	dBuV/m	dB
30.0	16.5	17.9	44	27.5
184.1	13.4	8.9	44	30.6
444.2	22.4	18.8	46	23.6
900.4*	30.5	23.9	46	15.5
935.2*	30.5	24.2	46	15.5
981.7	30.3	23.7	54	23.7

Note:

The transducer factor includes antenna factor and cable loss.

* means the frequency with max Quasi peak value for band-edge (frequency range of 802 MHz to 902MHz and 928 MHz to 1000 MHz, except for harmonics).

middle channel 911.3MHz

Quasi-peak measurement: Horizontal

Frequency	Level	Transducer	Limit	Margin
MHz	dBuV/m	dB	dBuV/m	dB
30.0	17.1	17.9	44	26.9
188.1	13.6	8.9	44	30.4
447.2	21.5	16.6	46	24.5
854.1*	29.1	23.0	46	16.9
935.3*	29.7	24.2	46	16.3
972.8	29.1	23.9	54	24.9

Quasi-peak measurement: Vertical

Frequency	Level	Transducer	Limit	Margin
MHz	dBuV/m	dB	dBuV/m	dB
30.0	16.8	17.9	44	27.2
184.3	13.8	8.9	44	30.2
448.3	26.5	18.8	46	19.5
880.4*	30.3	23.9	46	15.7
937.2*	34.5	24.2	46	11.5
967.7	31.7	23.7	54	22.3

Note:

The transducer factor includes antenna factor and cable loss.

* means the frequency with max Quasi peak value for band-edge (frequency range of 802 MHz to 902MHz and 928 MHz to 1000 MHz, except for harmonics).

highest channel 927.7MHz

Quasi-peak measurement: Horizontal

Frequency	Level	Transducer	Limit	Margin
MHz	dBuV/m	dB	dBuV/m	dB
30.0	17.4	17.9	44	26.6
187.3	13.6	8.9	44	30.4
449.2	21.3	16.6	46	24.7
873.1*	29.0	23.0	46	17.0
936.3*	29.3	24.2	46	16.7
975.2	29.1	23.9	54	24.9

Quasi-peak measurement: Vertical

Frequency	Level	Transducer	Limit	Margin
MHz	dBuV/m	dB	dBuV/m	dB
30.0	17.1	17.9	44	26.9
182.1	18.4	8.9	44	25.6
453.5	31.2	18.8	46	14.8
900.2*	30.2	23.9	46	15.8
947.2*	30.8	24.2	46	15.2
978.7	29.3	23.7	54	24.7

Note:

The transducer factor includes antenna factor and cable loss.

* means the frequency with max Quasi peak value for band-edge (frequency range of 802 MHz to 902MHz and 928 MHz to 1000 MHz, except for harmonics).

3) 1 GHz~9.30 GHz Spurious Emissions .Average & PK Measurement

Horizontal & Vertical:

Average measurement at lowest channel: 902.3 MHz

Frequency	Level		Transducer	Limit	Margin	
GHz	dBuV/m		dB	dBuV/m	dB	
	Horizontal	Vertical			Horizontal	Vertical
1.136	39.5	38.1	-5.2	54	-14.5	-15.9
2.393	<40	<40	-3.4		< -14	< -14
2.562	<40	<40	-3.2		< -14	< -14
5.243	<40	<40	3.1		< -14	< -14
7.458	<40	<40	5.9		< -14	< -14
9.217	<40	<40	7.5		< -14	< -14

Peak measurement at lowest channel: 902.3 MHz

Frequency	Level		Transducer	Limit	Margin	
GHz	dBuV/m		dB	dBuV/m	dB	
	Horizontal	Vertical			Horizontal	Vertical
1.136	43.3	43.2	-5.2	74	-30.7	-30.8
2.393	<50	<50	-3.4		< -24	< -24
2.562	<50	<50	-3.2		< -24	< -24
5.243	<50	<50	3.1		< -24	< -24
7.458	<50	<50	5.9		< -24	< -24
9.217	<50	<50	7.5		< -24	< -24

Note:

The transducer factor = antenna factor + cable loss - preamplifier. In band 1GHz to 18GHz, preamplifier factor = -30dB.

The Level = Read level + transducer factor.

H: Antenna polarization horizontal direction. V: Antenna polarization vertical direction.

The EUT was measured for both the Horizontal and Vertical polarities and performed a pre-test three orthogonal planes and choose the worst case of X orthogonal plane for the final measurement.

Average measurement at middle channel: 911.3 MHz

Frequency	Level		Transducer	Limit	Margin	
GHz	dBuV/m		dB	dBuV/m	dB	
	Horizontal	Vertical			Horizontal	Vertical
1.087	39.1	38.9	-5.2	54	-14.9	-15.1
2.391	<40	<40	-3.4		< -14	< -14
2.614	<40	<40	-3.2		< -14	< -14
5.158	<40	<40	3.1		< -14	< -14
7.462	<40	<40	5.9		< -14	< -14
9.168	<40	<40	7.5		< -14	< -14

Peak measurement at middle channel: 911.3 MHz

Frequency	Level		Transducer	Limit	Margin	
GHz	dBuV/m		dB	dBuV/m	dB	
	Horizontal	Vertical			Horizontal	Vertical
1.087	43.6	43.7	-5.2	74	-30.4	-30.3
2.391	<50	<50	-3.4		< -24	< -24
2.614	<50	<50	-3.2		< -24	< -24
5.158	<50	<50	3.1		< -24	< -24
7.462	<50	<50	5.9		< -24	< -24
9.168	<50	<50	7.5		< -24	< -24

Note:

The transducer factor = antenna factor + cable loss - preamplifier. In band 1GHz to 18GHz, preamplifier factor = -30dB.

The Level = Read level + transducer factor.

H: Antenna polarization horizontal direction. V: Antenna polarization vertical direction.

The EUT was measured for both the Horizontal and Vertical polarities and performed a pre-test three orthogonal planes and choose the worst case of X orthogonal plane for the final measurement.

Average measurement at highest channel: 927.7 MHz

Frequency	Level		Transducer	Limit	Margin	
GHz	dBuV/m		dB	dBuV/m	dB	
	Horizontal	Vertical			Horizontal	Vertical
1.064	39.2	38.3	-5.2	54	-14.8	-15.7
2.391	<40	<40	-3.4		< -14	< -14
2.612	<40	<40	-3.2		< -14	< -14
5.324	<40	<40	3.1		< -14	< -14
7.462	<40	<40	5.9		< -14	< -14
9.266	<40	<40	7.5		< -14	< -14

Peak measurement at highest channel: 927.7 MHz

Frequency	Level		Transducer	Limit	Margin	
GHz	dBuV/m		dB	dBuV/m	dB	
	Horizontal	Vertical			Horizontal	Vertical
1.064	43.4	43.3	-5.2	74	-30.6	-30.7
2.391	<50	<50	-3.4		< -24	< -24
2.612	<50	<50	-3.2		< -24	< -24
5.324	<50	<50	3.1		< -24	< -24
7.462	<50	<50	5.9		< -24	< -24
9.266	<50	<50	7.5		< -24	< -24

Note:

The transducer factor = antenna factor + cable loss - preamplifier. In band 1GHz to 18GHz, preamplifier factor = -30dB.

The Level = Read level + transducer factor.

H: Antenna polarization horizontal direction. V: Antenna polarization vertical direction.

The EUT was measured for both the Horizontal and Vertical polarities and performed a pre-test three orthogonal planes and choose the worst case of X orthogonal plane for the final measurement.

Note:

The EUT's transmitting frequency range belonged to 902MHz to 928 MHz, and it is complied with the requirements of FCC Part 15.249.d).

3.2 Occupied Bandwidth

Test Requirement:	FCC Part15.215
Test Method:	ANSI C63.10: 2013
Detector:	Peak for scan (The resolution bandwidth was 30kHz and the video bandwidth was 10kHz, span was 2MHz) maximised peak hold

3.2.1 E.U.T. Operation

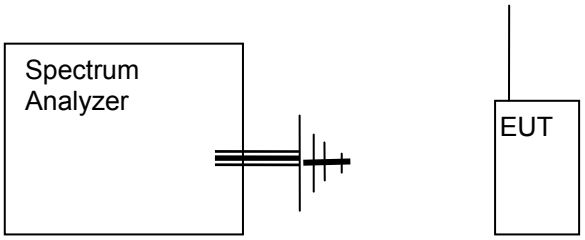
Operating Environment:

Temperature: 25°C Humidity:45% RH Atmospheric Pressure: 1020mBar

EUT Operation:

Pre-test the EUT with 1k to 20kHz sine wave signal input(level: 0.3 Vp-p). And the max 99%BW was measured as the EUT with 20 kHz sine wave signal input.

3.2.2 Test Setup



3.2.3 Test Procedure

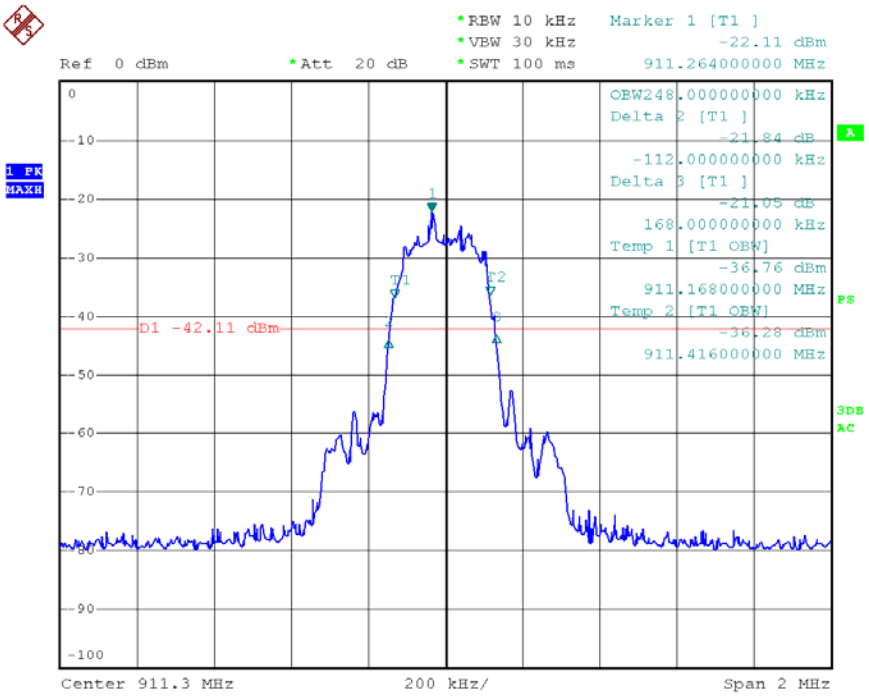
ANSI STANDARD C63.10-2013 6.9 Occupied bandwidth tests:

An initial pre-scan was performed in the 3m chamber using the spectrum analyzer in peak detection mode. Average measurements were conducted based on the peak sweep graph. When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical polarities.

3.2.4 Measurement Data

Test for the EUT with switch ON. Input with 20 kHz AF, 50% modulation + 16dB.

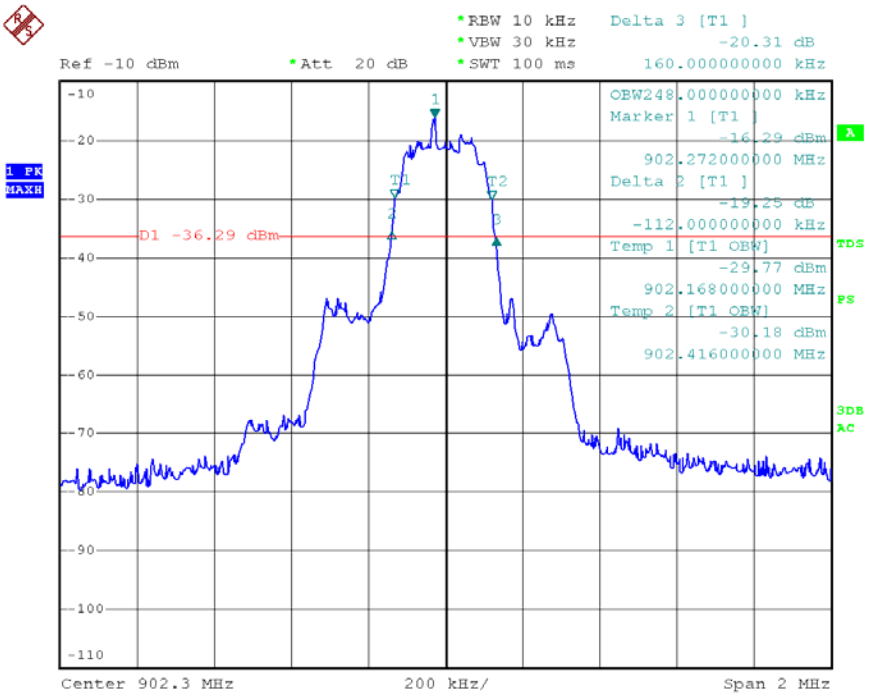
Maximum Peak hold measurement for 911.3 MHz



Date: 3.NOV.2016 05:36:17

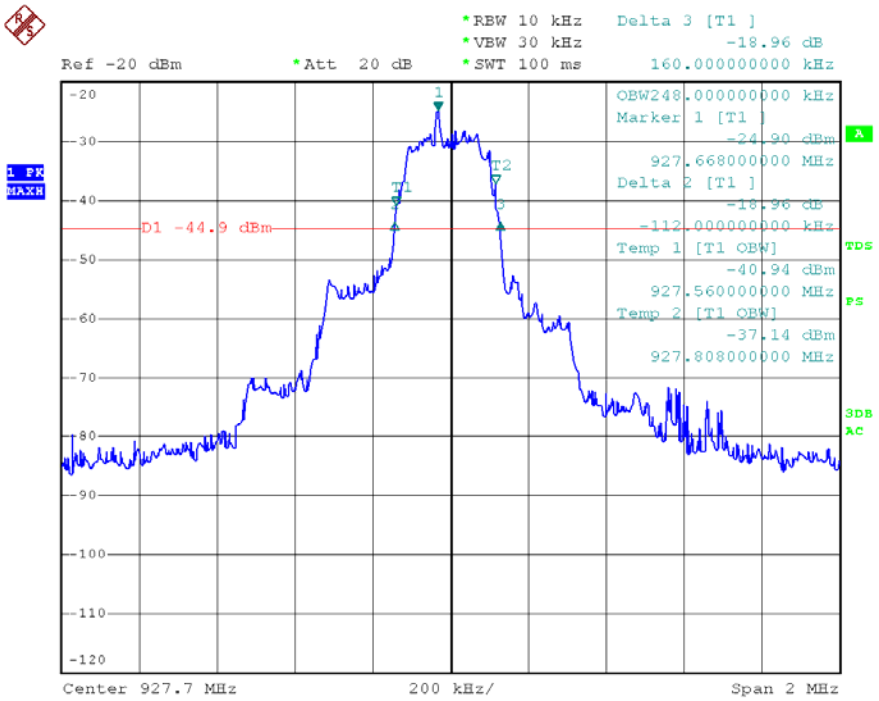
Frequency/ MHz	ΔFL- / kHz	ΔFL+ / kHz	-20dB Bandwidth/ kHz	Occupied Bandwidth (99% of total power)/ kHz
911.3	-112	168	280	248

Maximum Peak hold measurement for 902.3 MHz



Frequency/ MHz	ΔFL- / kHz	ΔFL+ / kHz	-20dB Bandwidth/ kHz	Occupied Bandwidth (99% of total power)/ kHz
902.3	-112	160	272	248

Maximum Peak hold measurement for 927.7 MHz



Frequency/ MHz	ΔFL- / kHz	ΔFL+ / kHz	-20dB Bandwidth/ kHz	Occupied Bandwidth (99% of total power)/ kHz
927.7	-112	160	272	248

3.3 Conducted Emissions at Mains Terminals 150 kHz to 30 MHz

Test Requirement: FCC Part 15 C section 15.207

Test Method: ANSI C63.10: 2013: Clause 6.2

Frequency Range: 150 kHz to 30 MHz

Detector: Peak for pre-scan (9 kHz Resolution Bandwidth)

Test Limit

Limits for conducted disturbance at the mains ports of class B

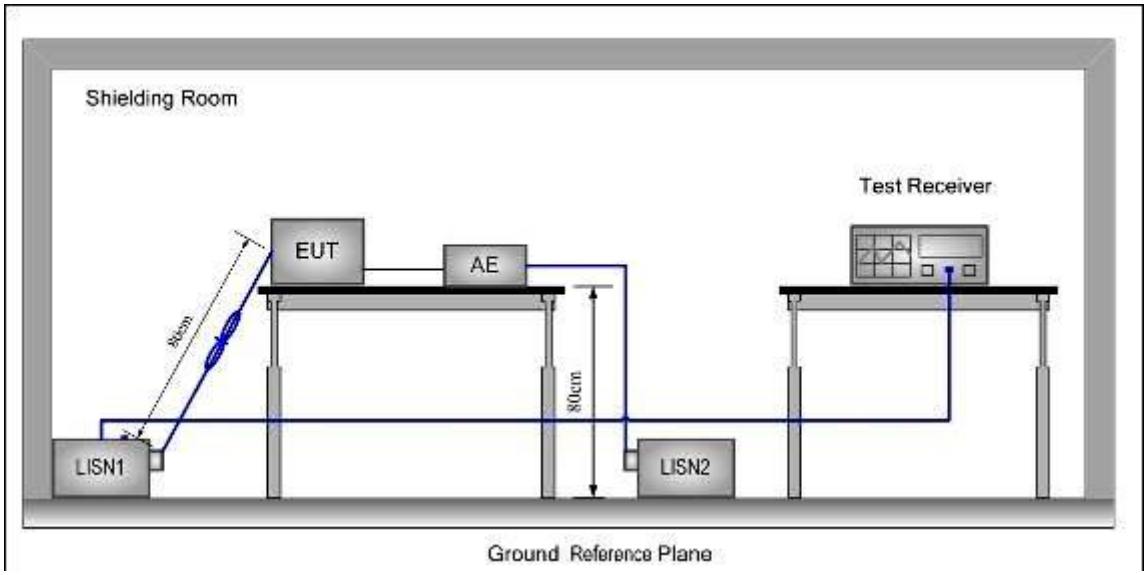
Frequency Range	Class B Limit dB(μV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
NOTE 1 The limit decreases linearly with the logarithm of the frequency in the range 0,15 MHz to 0,50 MHz.		

3.3.1 EUT Operation

Test in normal operating mode. For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage.

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

3.3.2 Test Configuration



3.3.3 Test Procedure

1. The mains terminal disturbance voltage test was conducted in a shielded room.

2. The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.

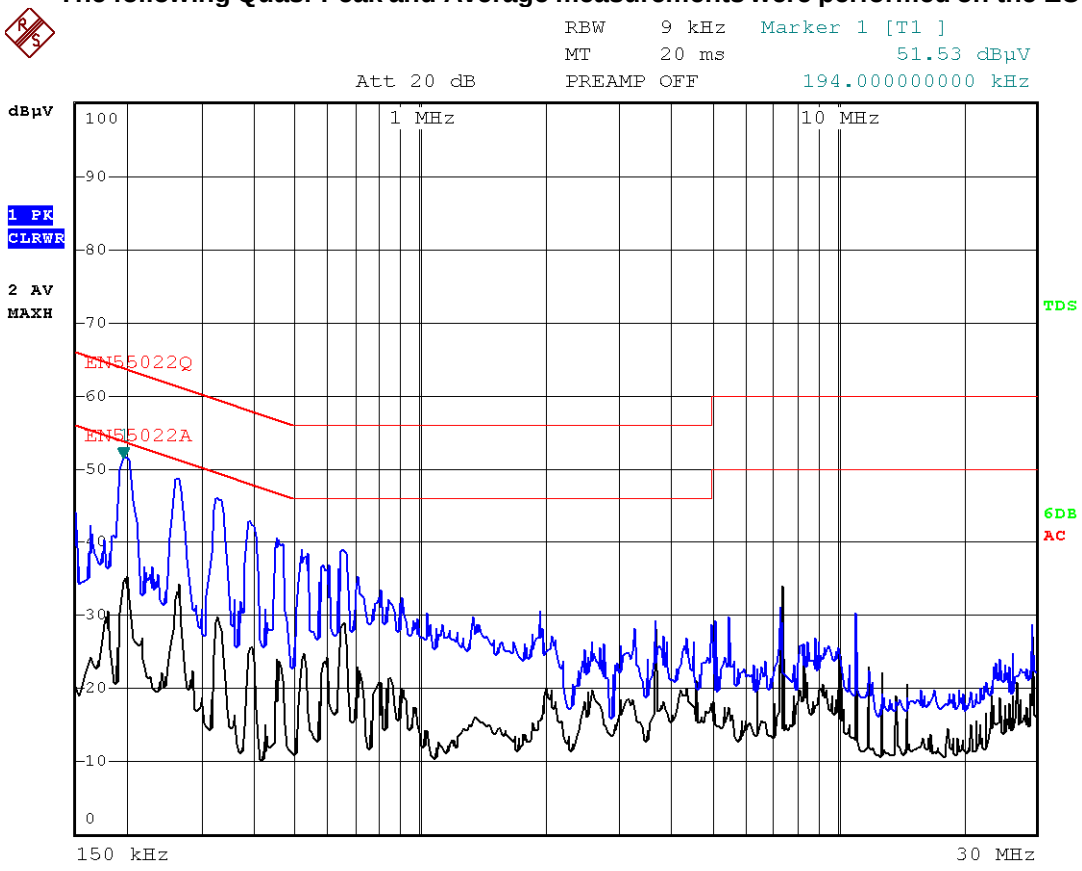
3. The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation.

4. The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0,4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0,8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0,8 m from the LISN 2.

3.3.4 **Measurement Data**

An initial pre-scan was performed on the live and neutral lines with peak detector. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected. For EUT the communicating was worst case mode.

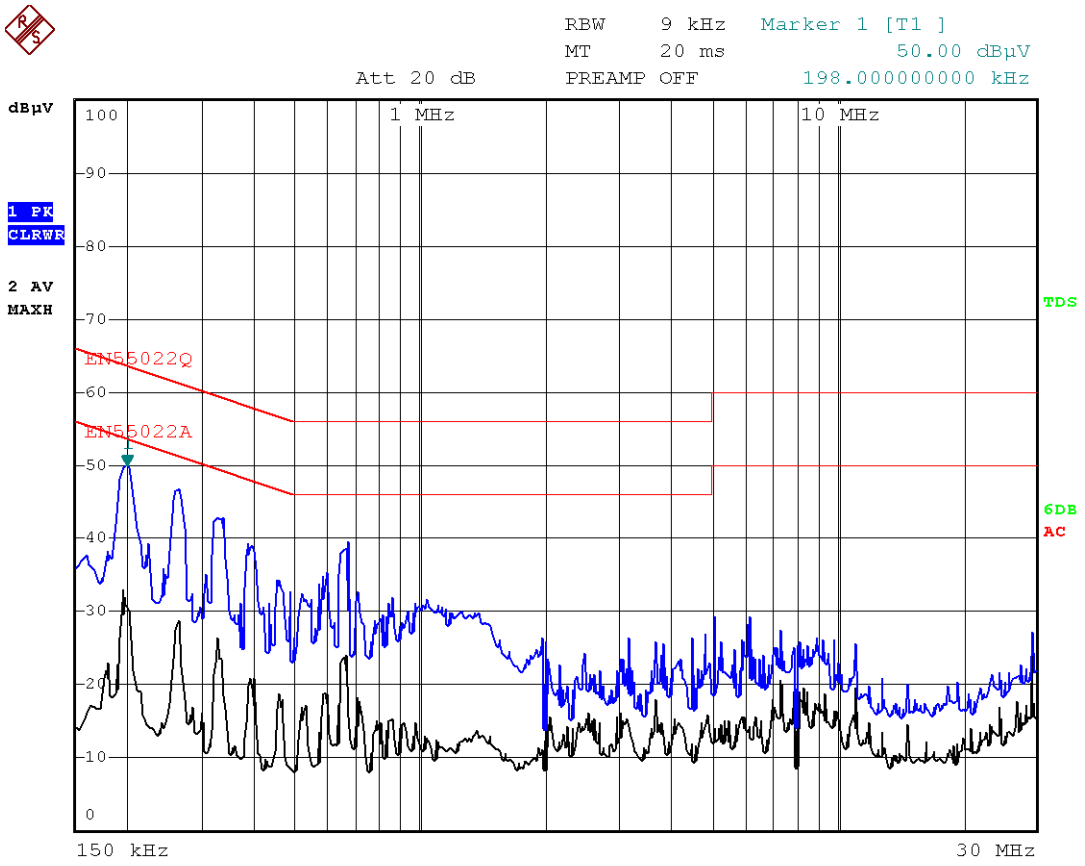
The following Quasi-Peak and Average measurements were performed on the EUT:



Date: 2.NOV.2016 06:42:44

Quasi-peak and Average measurement

Freq. (MHz)	Line	LISN factor (dB)	Cable loss (dB)	QP (dBµV)	QP limit (dBµV)	Margin (dB)	AV (dBµV)	AV limit (dBµV)	Margin (dB)
0.195	Live	0.1	0.1	48.2	63.8	15.6	35.1	53.8	18.7
0.263	Live	0.1	0.1	44.2	61.3	17.1	33.1	51.3	18.2
0.520	Live	0.1	0.1	35.1	56	20.9	24.6	46	21.4
0.656	Live	0.1	0.1	35.3	56	20.7	28.7	46	17.3
7.237	Live	0.2	0.2	33.1	60	26.9	31.2	50	18.8
12.01	Live	0.2	0.3	20.0	60	40.0	16.1	50	33.9



Date: 2.NOV.2016 06:44:07

Quasi-peak and Average measurement

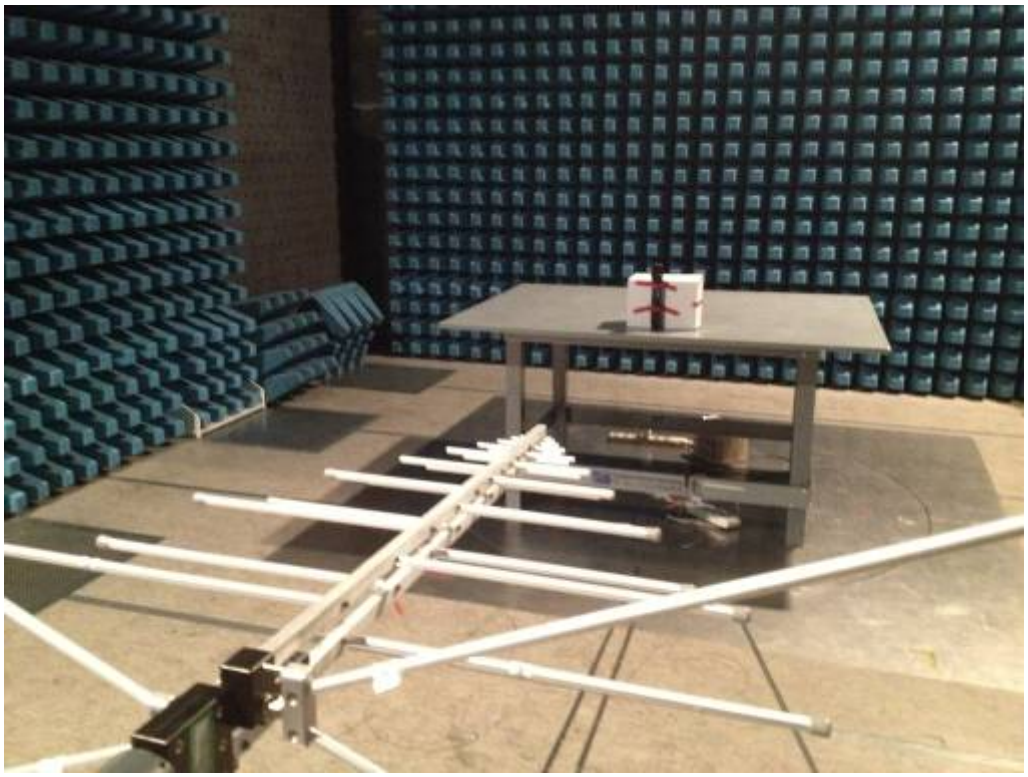
Freq. (MHz)	Line	LISN factor (dB)	Cable loss (dB)	QP (dBµV)	QP limit (dBµV)	Margin (dB)	AV (dBµV)	AV limit (dBµV)	Margin (dB)
0.198	Neutral	0.1	0.1	48.3	63.6	15.3	33.6	53.6	20.0
0.272	Neutral	0.1	0.1	42.4	61.1	18.7	28.0	51.1	23.1
0.589	Neutral	0.1	0.1	33.3	56	22.7	19.3	46	26.7
0.676	Neutral	0.1	0.1	37.6	60	22.4	23.7	50	26.3
6.070	Neutral	0.2	0.2	28.4	60	31.6	15.2	50	34.8
29.03	Neutral	0.2	0.3	27.1	60	32.9	21.5	50	28.5

4 PHOTOGRAPHS

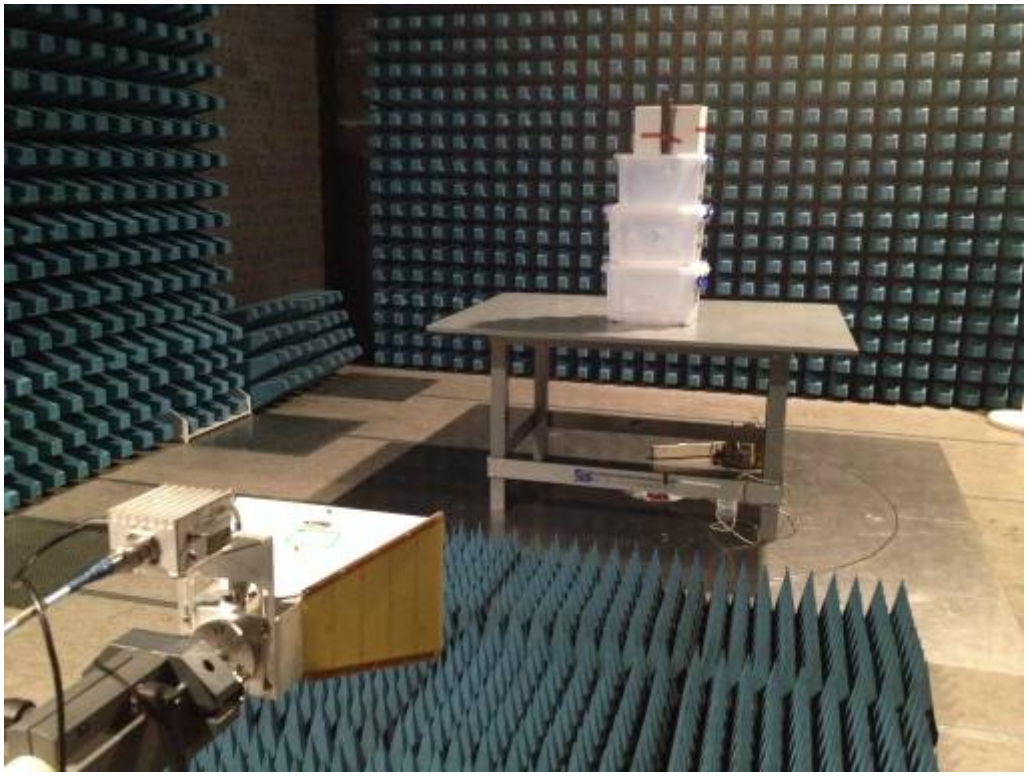
4.1 **Radiated Emission Test Setup**

9kHz - 30MHz

30MHz – 1GHz

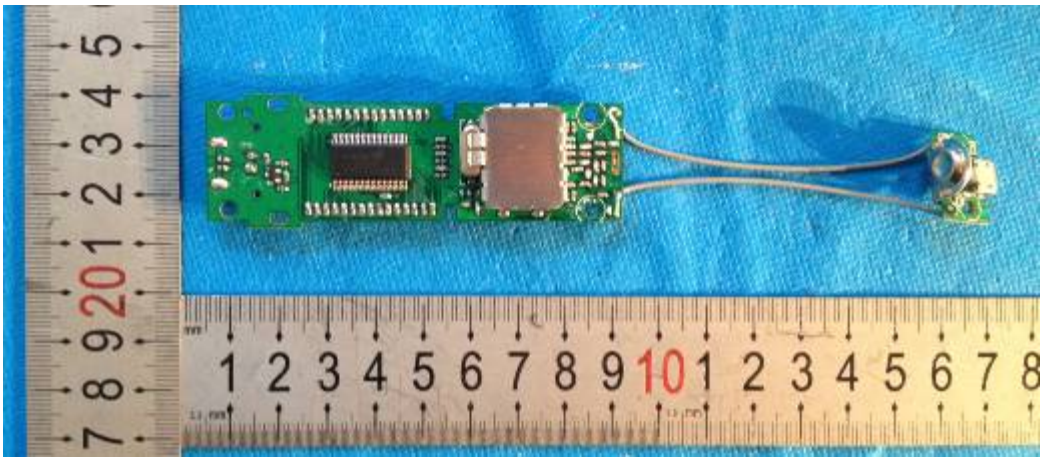


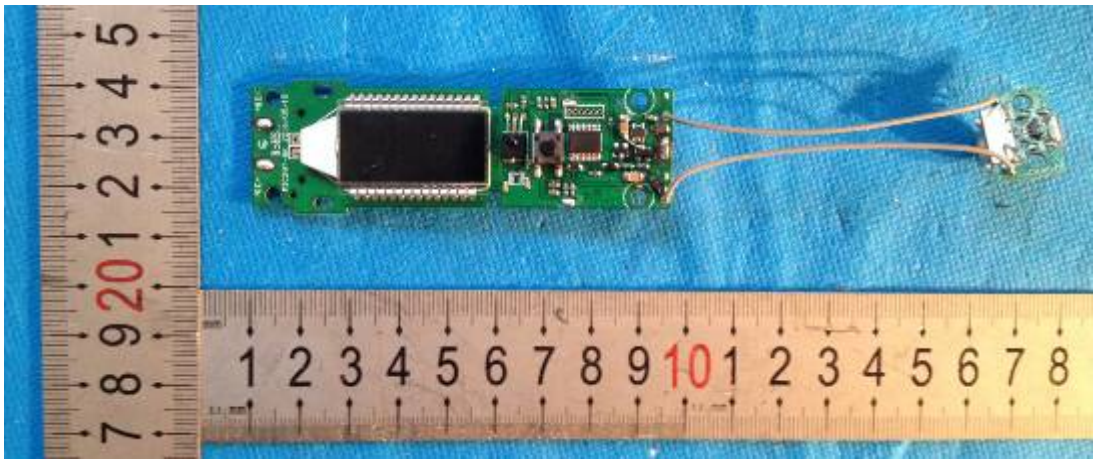
1GHz – 9.3GHz



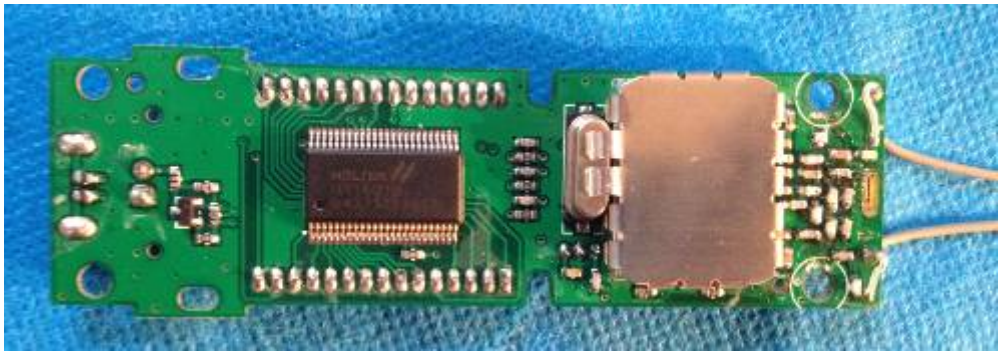
4.2 **Conducted Emission Test Setup**

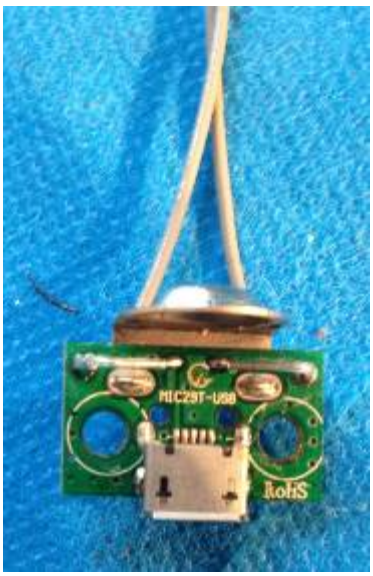
4.3 **EUT Constructional Details**



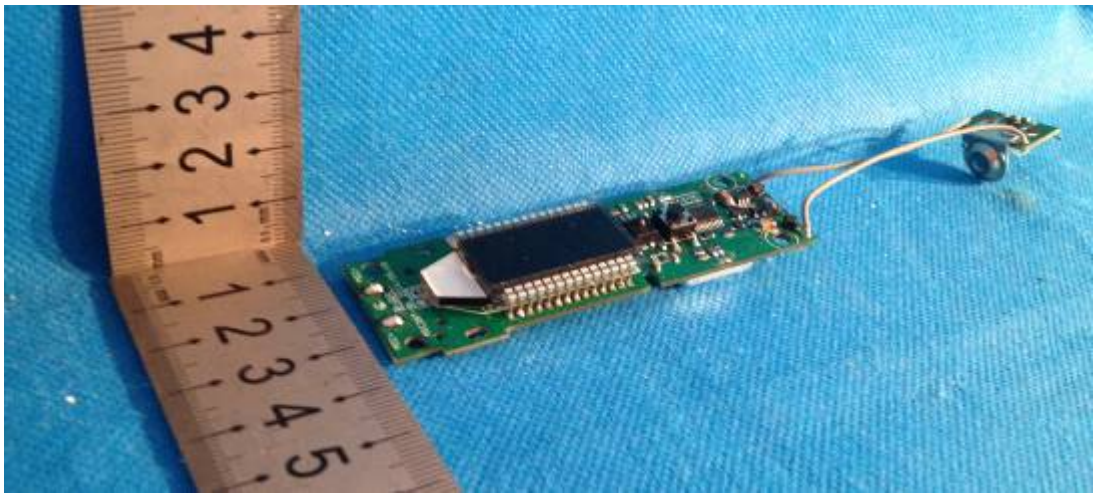


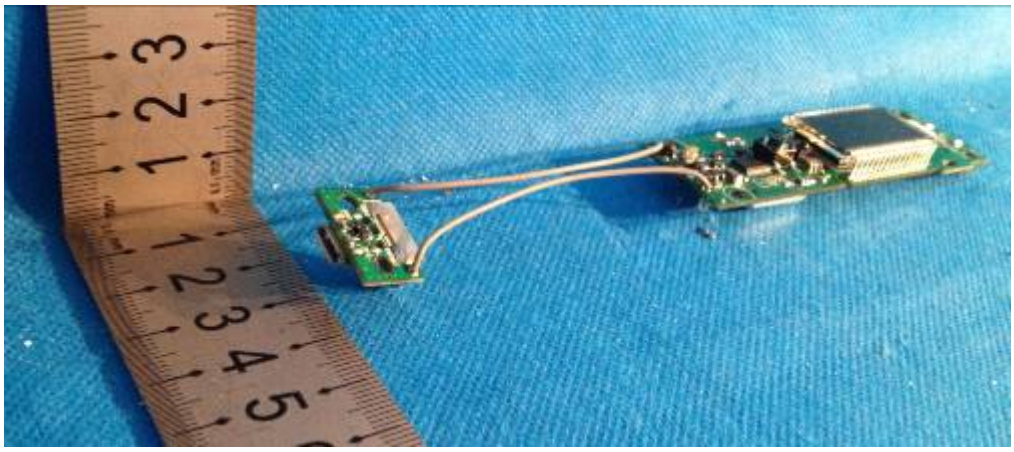

MIC-
MIC+
RoHS
MIC297-BK 2016-05-10

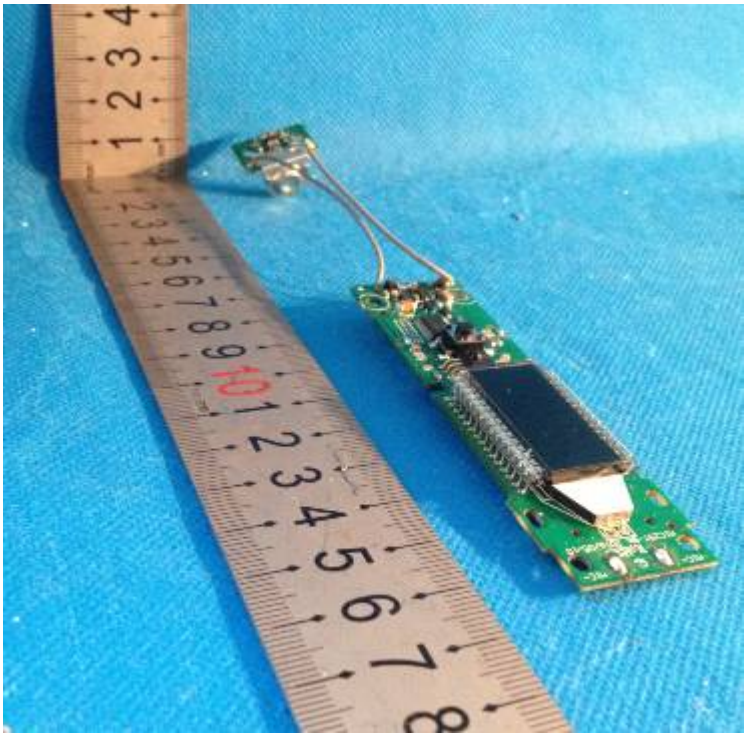


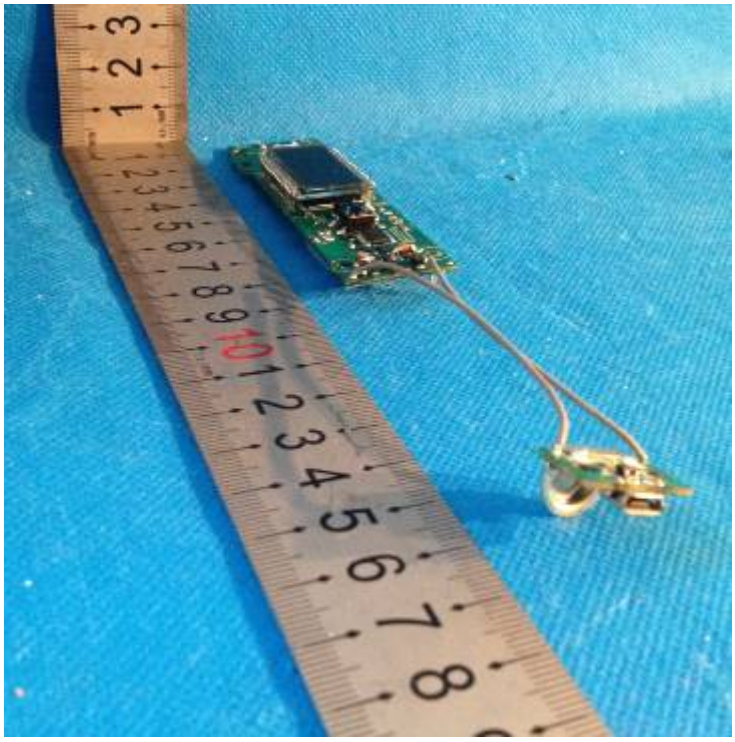

MIC29T-USB
RoHS

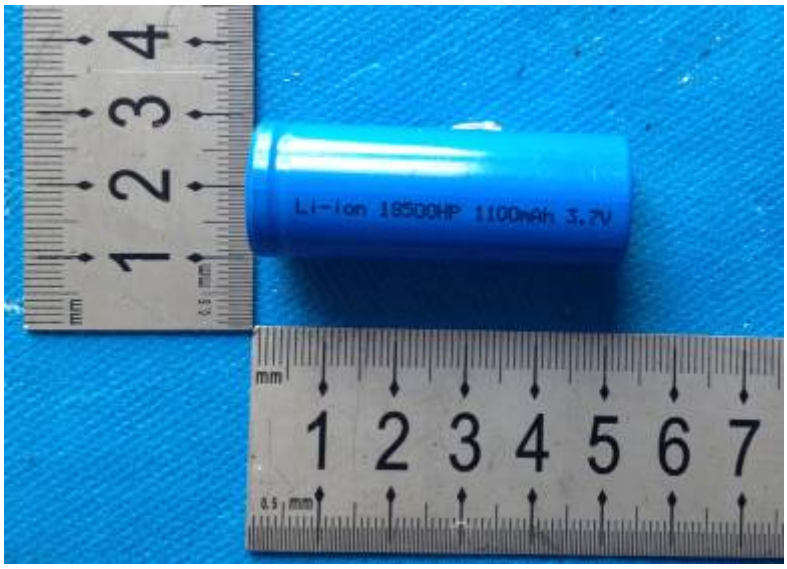

MIC29T-USB
RoHS





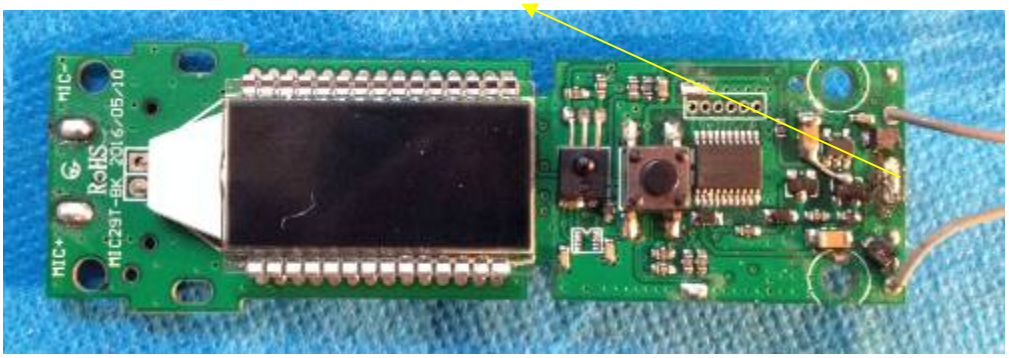




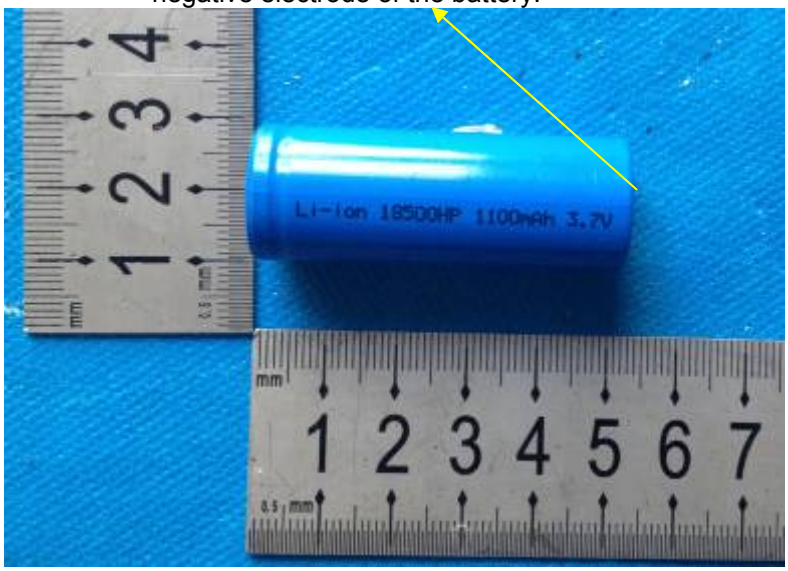

Li-ion 18500HP 1100mAh 3.7V

4.4 **Antenna Photo**

Antenna: The antenna is connected to the negative electrode of the battery.



negative electrode of the battery.



negative electrode of the battery.

Note:

The EUT was used permanently attached antenna, and it's complied with the requirements of section 15.203: antenna requirement.

5 EQUIPMENTS USED DURING TEST

Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date	Cal. Due date
1	RF Generator	Rohde & Schwarz	SMB100A-B106	1.031	2016-5-10	2017-5-10
2	Spectrum Analyzer	Rohde & Schwarz	FSP30	EMC0001	2016-3-24	2017-3-24
3	EMI Test Receiver	Rohde & Schwarz	ESCI	EMC1002	2016-3-24	2017-3-24
4	2-Channel Power Meter	Rohde & Schwarz	NRP2	1.033	2016-5-10	2017-5-10
5	Audio Analyzer	Hewlett Packard	8903B	EMC0011	2015-11-5 2016-11-5	2016-11-5 2017-11-5
6	Power Sensor	Rohde & Schwarz	NRP-Z91	1.034	2016-5-10	2017-5-10
7	Power Sensor	Rohde & Schwarz	NRP-Z91	1.035	2016-5-10	2017-5-10
8	Temperature Chamber	Gongwen	GDS-250	SFT0009	2015-11-5 2016-11-5	2016-11-5 2017-11-5
9	D.C. Power Supply	KIKUSUI	PAN35-10A	SFT0319	2015-11-5 2016-11-5	2016-11-5 2017-11-5
10	Temperature Chamber	Gongwen	GDS-250	SFT0009	2015-11-5 2016-11-5	2016-11-5 2017-11-5
11	D.C. Power Supply	KIKUSUI	PAN35-10A	SFT0319	2015-11-5 2016-11-5	2016-11-5 2017-11-5
12	Humidity/ Temperature Meter	Anymetre	TH101B	SFT0063	2015-11-5 2016-11-5	2016-11-5 2017-11-5
13	Barometer	ChangChun	DYM3	SEL0088	2016-6-8	2017-6-8
14	Multimeter	UNI-T	UT70A	EMC0017	2015-11-5 2016-11-5	2016-11-5 2017-11-5
15	Monopole Antenna	HST	N/A	EMC0089	2015-11-5 2016-11-5	2016-11-5 2017-11-5
16	Low loss coaxial cable	HST	2 m	EMC1008	2015-11-5 2016-11-5	2016-11-5 2017-11-5
17	Monopole Antenna	HST	N/A	N/A	2015-11-5 2016-11-5	2016-11-5 2017-11-5
18	Noise Generaror	Ningbo Zhongce	DF1681	EMC0009	2015-11-5 2016-11-5	2016-11-5 2017-11-5
19	Semi-Anechoic chamber	ETS•Lindgren	FACT3 2.0	ITL-100	2016-6-17	2017-6-17
20	EMI Test receiver	R&S	ESVS10	ITL-111	2016-1-19	2017-1-19
21	EXA Spectrum Analyzer	Agilent Technologies	N9010A	ITL-114	2016-1-19	2017-1-19
22	Biconilog Antenna	ETS•Lindgren	3142D	ITL-105	2015-1-24	2018-1-24
23	Pre Amplifier	HP	8447F	ITL-116	2016-1-19	2017-1-19
24	Wideband Amplifier Super Ultra	Mini-circuits	ZVA-183-S+	ITL-117	2016-1-19	2017-1-19
25	Horn Antenna	A-INFOMW	JXTXLB-10180-N	ITL-110	2015-1-24	2018-1-24
26	Software	Audix	E3	ITL-109	/	/
27	Loop Antenna	BJ 2nd Factory	ZN30900A	EMC6001	2016-7-29	2019-7-29

End of report