FCC RADIO TEST REPORT
FCC ID: 2ANUXMT101BTN

Product： Wireless Smart Gateway

Trade Name： TASHI, Unitech, WELLDO, TVPRO

Model Name： MT101

Serial Model： HD3 S

Prepared for

TASHI Smartech Co., Ltd

3F, No.188, Baoqiao Road, Xindian District, New Taipei City 231, Taiwan R.O.C

Prepared by

Dongguan Yaxu (AiT) Technology Limited

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TEST RESULT CERTIFICATION

Applicant's name ..... TASHI Smartech Co., Ltd

Address ..... 3F, No.188, Baoqiao Road, Xindian District, New Taipei City 231, Taiwan R.O.C

Manufacture's Name..... TASHI Smartech Co., Ltd

Address ..... 3F, No.188, Baoqiao Road, Xindian District, New Taipei City 231, Taiwan R.O.C

Product description

Product name ..... Wireless Smart Gateway

Model and/or type reference MT101

Serial Model ..... HD3 S

Standards ..... FCC Part15.247

Test procedure ..... ANSI C63.10-2013

This device described above has been tested by AiT, 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.

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Date of Test .....

Date (s) of performance of tests ..... Jul. 01, 2017 ~ Jul. 11, 2017

Date of Issue..... Jul.11, 2017

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

Testing Engineer : Jack Yu

(Jack Yu)

Technical Manager : Can Liu

(Can Liu)

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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)(2)	6dB Bandwidth	PASS	
15.247 (b)	Peak Output Power	PASS	
15.247 (c)	Radiated Spurious Emission	PASS	
15.247 (d)	Power Spectral Density	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 FACILITY

The test facility is recognized, certified or accredited by the following organizations:

.CNAS- Registration No: L6177

Dongguan Yaxu (AiT) technology Limited is accredited to ISO/IEC 17025:2005 general Requirements for the competence of testing and calibration laboratories (CNAS-CL01 Accreditation Criteria for the competence of testing and calibration laboratories) on Apr. 18, 2013

.FCC- Registration No: 248337

The 3m Semi-Anechoic Chamber, 3m/10m Open Area Test Site and Shielding Room of Dongguan Yaxu (AiT) Technology Limited have been registered by Federal Communications Commission (FCC) on Aug.29, 2014.

.Industry Canada(IC)-Registration No: IC6819A-1

The 3m Semi-Anechoic Chamber and 3m of Dongguan Yaxu (AiT) Technology Limited have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing on Oct. 01, 2014.

.VCCI- Registration No: 2705

The 3m/10m Open Area Test Site, Shielding Room and 3m Chamber of Dongguan Yaxu (AiT) Technology Limited have been registered by Voluntary Control Council for Interference on Nov. 21, 2012. The Telecommunication Ports Conducted Disturbance Measurement of Dongguan Yaxu (AiT) Technology Limited have been registered by Voluntary Control Council for Interference on May. 13, 2013.

.TUV NORD

Dongguan Yaxu (AiT) Technology Limited has been assessed on Jun. 13, 2013 that it can carry out EMC tests by order and under supervision of TUV NORD.

.ITS- Registration No: TMPSHA031

Dongguan Yaxu (AiT) Technology Limited has been assessed and included in Intertek Shanghai TMP Program regarding Laboratory facilities and test equipment on Jul.22, 2012.

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 Test	±1.38dB
2	RF power,conducted	±0.16dB
3	Spurious emissions,conducted	±0.21dB
4	All emissions,radiated(<1G)	±4.68dB
5	All emissions,radiated(>1G)	±4.89dB
6	Temperature	±0.5°C
7	Humidity	±2%

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	Wireless Smart Gateway
Model Name	MT101
Serial Model	HD3 S
Model Difference	All models are identical except model name and colors.
Product Description	The EUT is a Wireless Smart Gateway Operation Frequency: 2402~2480MHz Modulation Type: GFSK Bluetooth version: 4.0 BLE Bit Rate of Transmitter 1 Mbps Number Of Channel 40CH Antenna Designation: Please see Note 3. Output Power(Conducted): 7.66dBm(PK) Antenna Gain (dBi) 0dbi
Channel List	Please refer to the Note 2.
Ratings	DC 5V, 0.1A
Adapter	M/N:XSG0502000US Input:100-240V~, 50/60Hz, 0.6A Output:5Vdc, 2A
Battery	N/A
BT versions	V4.0
HW	V4.0
SW	V4.1

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
2.

Channel	Frequency (MHz)
00	2402
01	2404
……	……
38	2478
39	2480

3.

Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE

A	N/A	N/A	PCB antenna	N/A	0	BT Antenna

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	CH19
Mode 3	CH39
Mode 4	BT link

For Conducted Emission	
Final Test Mode	Description
Mode 4	BT link

For Radiated Emission	
Final Test Mode	Description
Mode 1	CH00
Mode 2	CH19
Mode 3	CH39

Note:

(1) The measurements are performed at the highest, middle, lowest available channels. Test performed by full-charge battery.

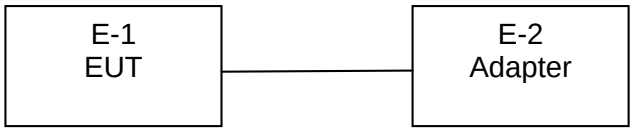
(2) The EUT was programmed to be in continuously transmitting mode and the transmit duty cycle is not less than 98%.

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: 8761_V4.0		
Frequency	2402 MHz	2440 MHz	2480 MHz
Parameters	DEF	DEF	DEF

2.4 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



2.5 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

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	Brand	Model/Type No.	Series No.	Note
E-1	Wireless Smart Gateway	TASHI, Unitech, WELLDO, TVPRO	MT101	N/A	EUT
E-2	Adapter	N/A	YNQX09T060060VL		

Item	Shielded Type	Ferrite Core	Length	Note
USB Cable	NO	NO	100cm	

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.

2.6 EQUIPMENTS LIST FOR ALL TEST ITEMS

Equipment No.	Instrument	Manufacturer	Model Name	Serial Number	Specification	Cal. Data	calibration due dates
1	Semi-anechoic chamber	Changzhou Chengyu	EC3088	N/A	9*6*6m	10/25/2016	10/24/2017
2	Loop Antenna	ARA	PLA-1030/B	1029	9kHz-30 MHz	03/20/2017	03/19/2018
3	Broadband antenna	R&S	VULB 9160	VULB91 60-516	30MHz-1500 MHz	10/25/2016	10/24/2017
4	Horn antenna	R&S	BBHA 9120D	10087	1GHz-18GH z	06/05/2017	06/04/2018
5	SHF-EHF Horn	SCHWARZBECK	BBHA9170	BBHA9170367	15GHz-26.5GH z	12/03/2016	12/02/2017
6	Test receiver	R&S	ESCI	101686	9KHz-3GHz	10/25/2016	10/24/2017
7	EMI Measuring Receiver	Agilent	N9020A	MY49100104	20KHz-26.5G Hz	10/25/2016	10/24/2017
8	Multi-device controller	MF	MF-7868	MF78680 8762	N/A	10/25/2016	10/24/2017
9	Amplifier	EM	EM-30180	060538	1GHz-18GH z	10/25/2016	10/24/2017
10	Amplifier	Schwarzbeck	BBV 9475	BBV 9475-663	1GHz-18GH z	06/05/2016	06/04/2017
11	Spectrum Analyzer	agilent	E4440B	US44300368	9kHz-26.5GH z	06/05/2017	06/04/2018
12	Test receiver	R&S	ESCI	101689	9KHz-3GHz	10/25/2016	10/24/2017
13	LISN	R&S	NSLK81 26	8126466	9k-30MHz	10/25/2016	10/24/2017
14	LISN	Narda	L2-16B	5589756	9k-30MHz	10/25/2016	10/24/2017
15	Power Meter	Anritsu	ML2495A	N/A	40MHz	10/25/2016	10/24/2017
16	Power sensor	Anritsu	MA2411B	N/A	40MHz	10/25/2016	10/24/2017
17	Radiated Cable 1#	FUJIKURA	5D-2W	01	30MHz-1GHz	10/25/2016	10/24/2017

18	Radiated Cable 2#	FUJIKURA	10D2W	02	1GHz -25GHz	10/25/2016	10/24/2017
19	Conducted Cable 1#	FUJIKURA	1D-2W	01	9KHz-30MHz	10/25/2016	10/24/2017
20	SMA Antenna connector	Dosin	Dosin-SMA	N/A	N/A	10/25/2016	10/24/2017
Note: The SMA antenna connector is soldered on the PCB board in order to perform conducted tests and this SMA antenna connector is listed in the equipment list. The Cal.Interval was one year							

3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150KHz-30MHz)

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)		Standard
	Quasi-peak	Average	Quasi-peak	Average	
0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *	CISPR
0.50 -5.0	73.00	60.00	56.00	46.00	CISPR
5.0 -30.0	73.00	60.00	60.00	50.00	CISPR

0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	73.00	60.00	56.00	46.00	FCC
5.0 -30.0	73.00	60.00	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

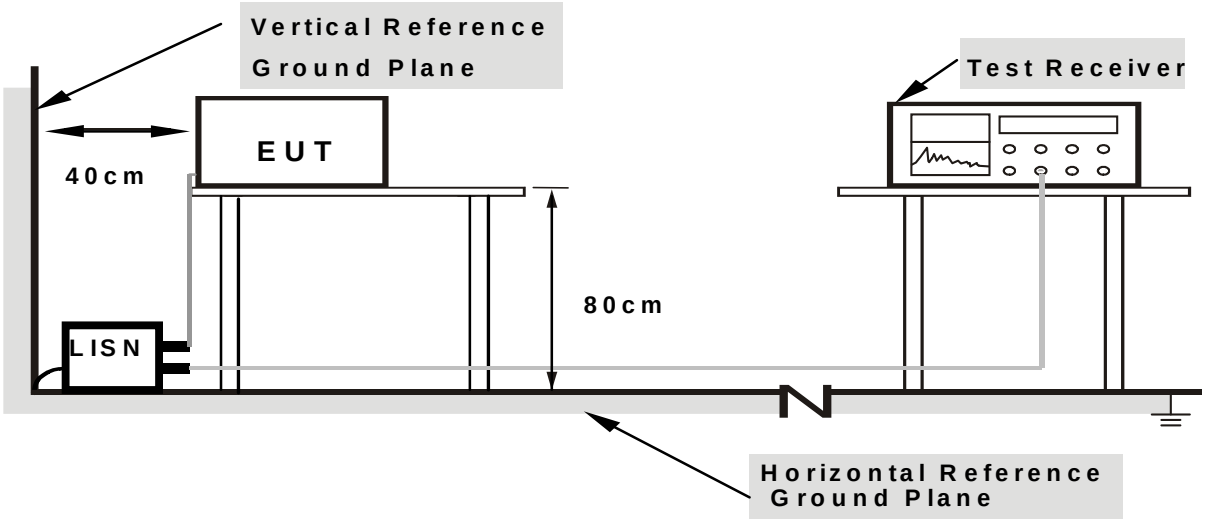
3.1.2 TEST PROCEDURE

a. The EUT was placed 0.8 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 DEVIATION FROM TEST STANDARD

No deviation

3.1.4 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

3.1.5 EUT OPERATING CONDITIONS

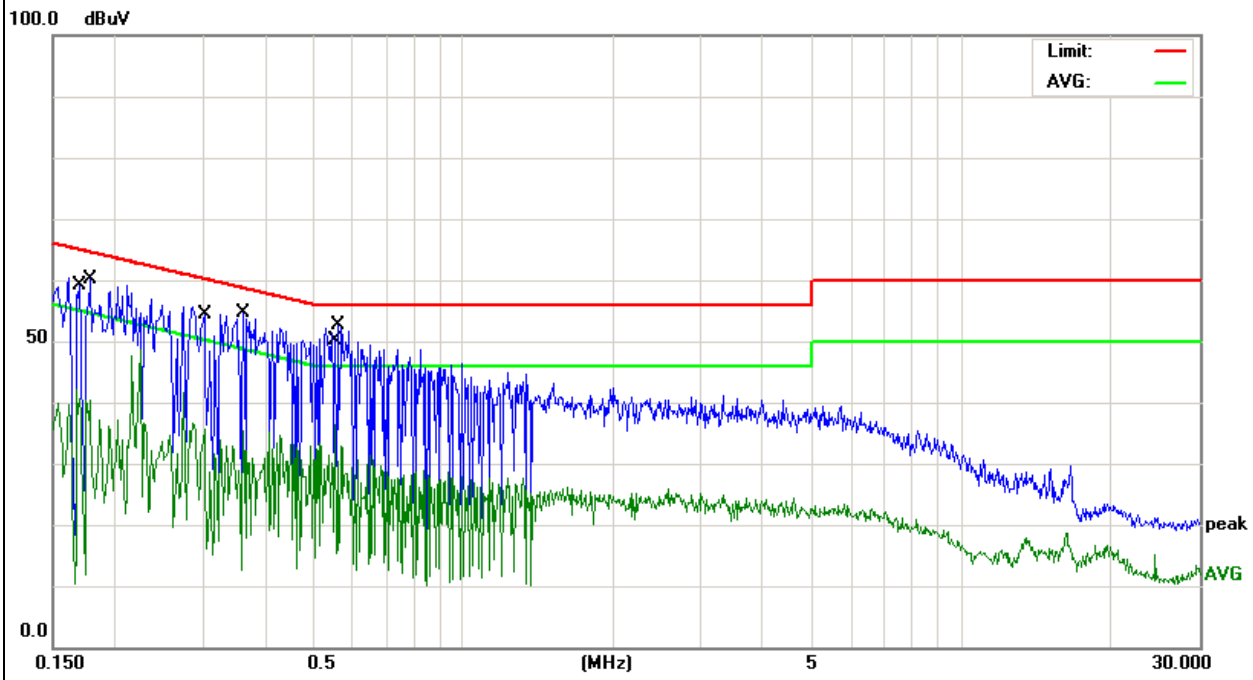
The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

3.1.6 TEST RESULTS

EUT：	Wireless Smart Gateway	Model Name. ：	MT101
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 5V from adapter AC 120V/60Hz
Test Mode ：	4	Phase:	L

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1676	30.50	11.59	42.09	55.07	-12.98	AVG	
2		0.1780	48.64	11.41	60.05	64.57	-4.52	QP	
3		0.3020	25.42	10.17	35.59	50.19	-14.60	AVG	
4		0.3620	44.41	10.12	54.53	58.68	-4.15	QP	
5		0.5540	26.37	9.97	36.34	46.00	-9.66	AVG	
6	*	0.5620	42.75	9.97	52.72	56.00	-3.28	QP	

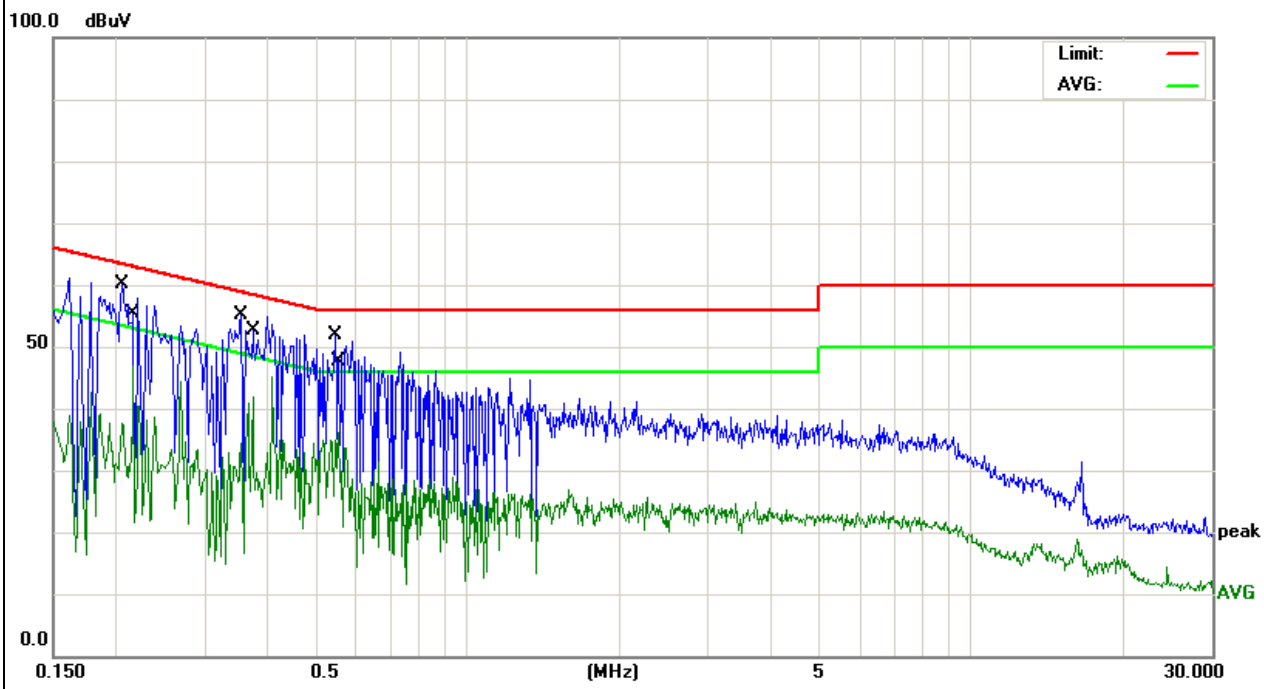
Remark:
Factor = Insertion Loss + Cable Loss.



EUT：	Wireless Smart Gateway	Model Name. ：	MT101
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 5V from adapter AC 120V/60Hz
Test Mode ：	4	Phase:	N

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.2060	49.09	11.09	60.18	63.36	-3.18	QP	
2		0.2162	35.74	11.02	46.76	52.96	-6.20	AVG	
3		0.3540	45.03	10.13	55.16	58.87	-3.71	QP	
4		0.3740	31.79	10.11	41.90	48.41	-6.51	AVG	
5		0.5460	42.02	9.97	51.99	56.00	-4.01	QP	
6		0.5540	26.18	9.97	36.15	46.00	-9.85	AVG	

Remark:
Factor = Insertion Loss + Cable Loss.



3.2 RADIATED EMISSION MEASUREMENT

3.2.1 RADIATED EMISSION LIMITS (Frequency Range 9kHz-1000MHz)

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a)&A8.5, then the 15.209(a) limit in the table below has to be followed.
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section A8.4 (4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

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 A (dBuV/m) (at 3M)		Class B (dBuV/m) (at 3M)	
	PEAK	AVERAGE	PEAK	AVERAGE
Above 1000	80	60	74	54

Notes:

(1) Emission level (dBuV/m)=20log Emission level (uV/m).

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / *10Hz* for Average

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 0.1m 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 0.1 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: Fro radiated meissiont test above 1GHz:

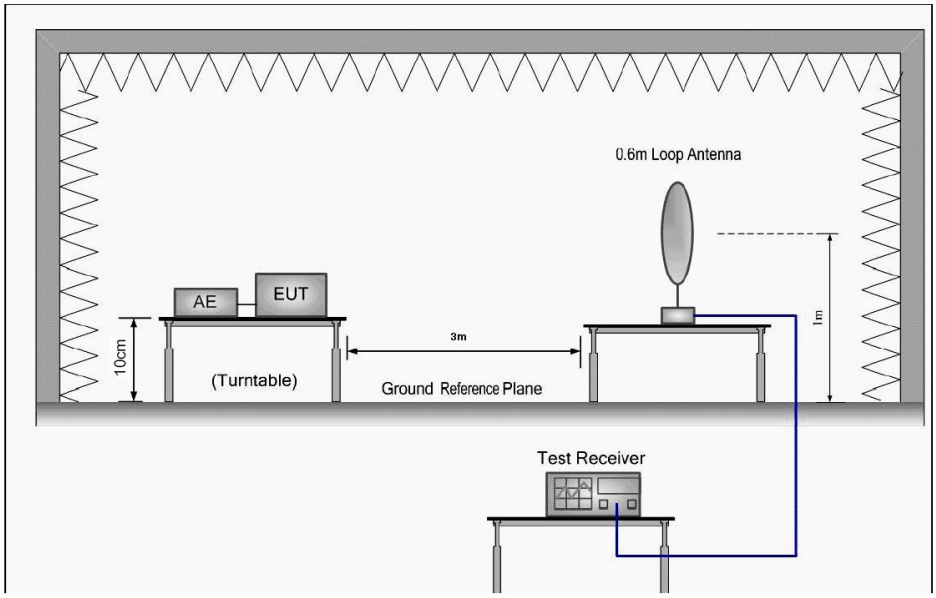
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.
Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

3.2.3 DEVIATION FROM TEST STANDARD

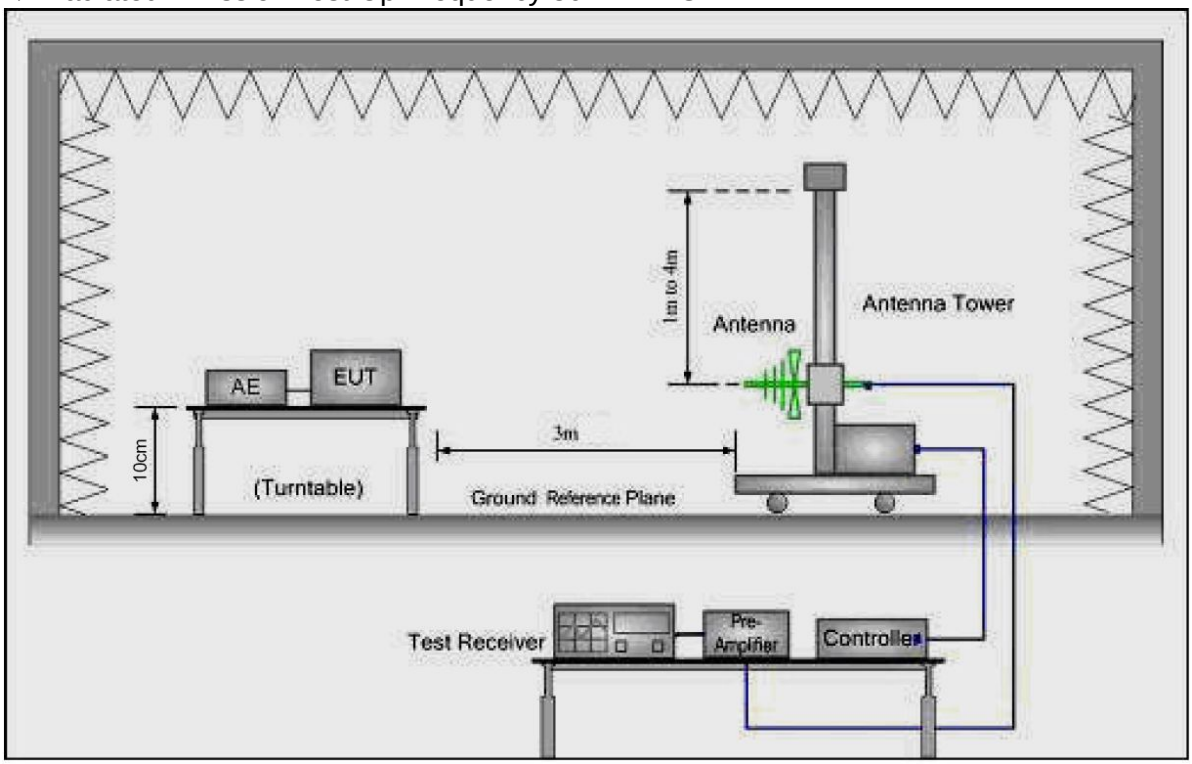
No deviation

3.2.4 TEST SETUP

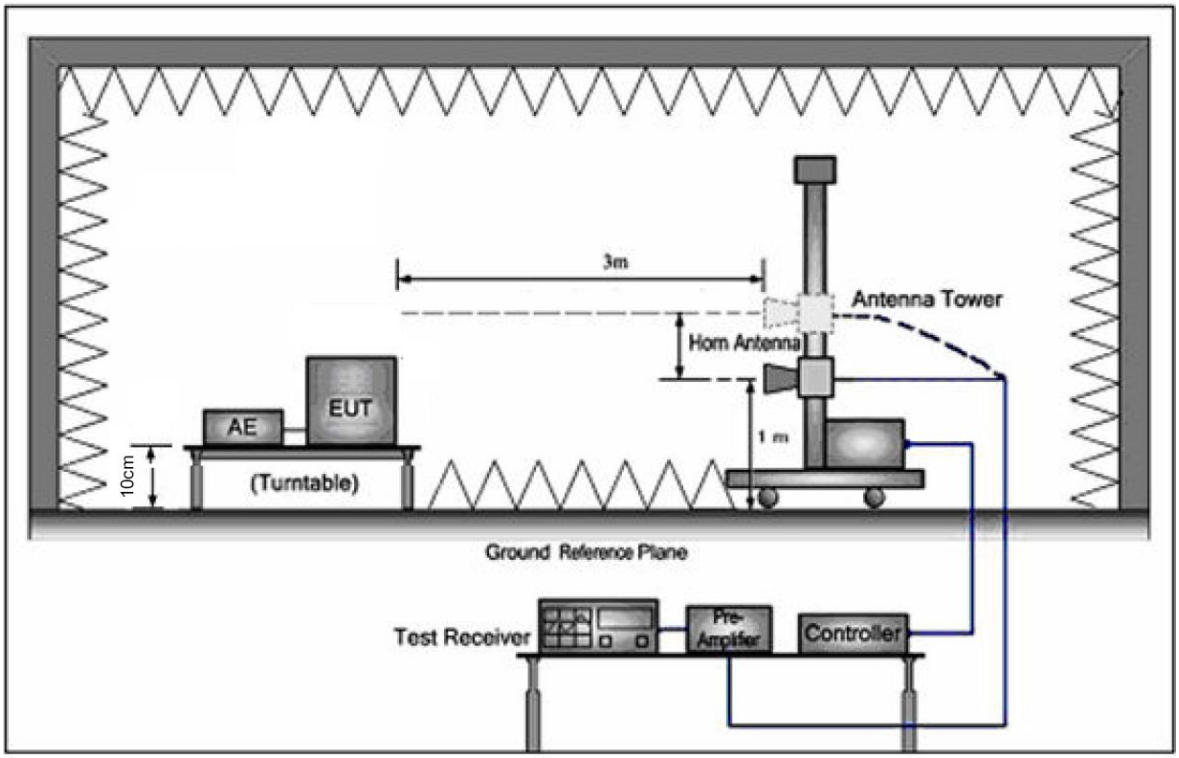
（A）Radiated Emission Test-Up Frequency Below 30MHz



（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 (BETWEEN 9KHZ – 30 MHZ)

EUT：	Wireless Smart Gateway	Model Name. ：	MT101
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 5V from adapter AC 120V/60Hz
Test Mode ：	TX	Polarization :	--

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

NOTE:

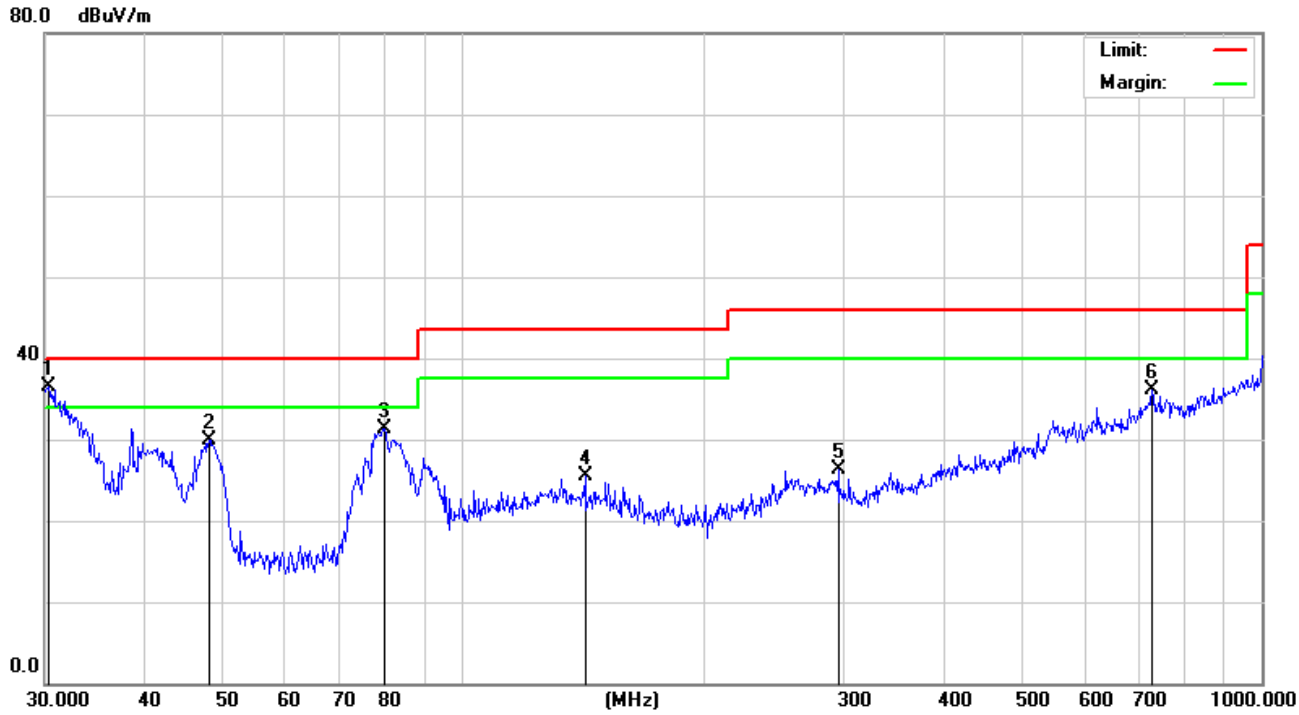
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
Distance extrapolation factor =40 log (specific distance/test distance)(dB);
Limit line = specific limits(dBuv) + distance extrapolation factor.

3.2.7 TEST RESULTS (BETWEEN 30MHZ – 1GHZ)

EUT：	Wireless Smart Gateway	Model Name ：	MT101
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 5V from adapter AC 120V/60Hz
Test Mode ：	TX 2440(worse-case)		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	30.3172	46.19	-9.64	36.55	40.00	-3.45	QP			
2		48.1625	48.68	-18.68	30.00	40.00	-10.00	QP			
3		79.8002	51.63	-20.39	31.24	40.00	-8.76	QP			
4		142.3243	41.65	-16.12	25.53	43.50	-17.97	QP			
5		295.1469	40.18	-13.97	26.21	46.00	-19.79	QP			
6		729.3582	40.51	-4.39	36.12	46.00	-9.88	QP			

Vertical

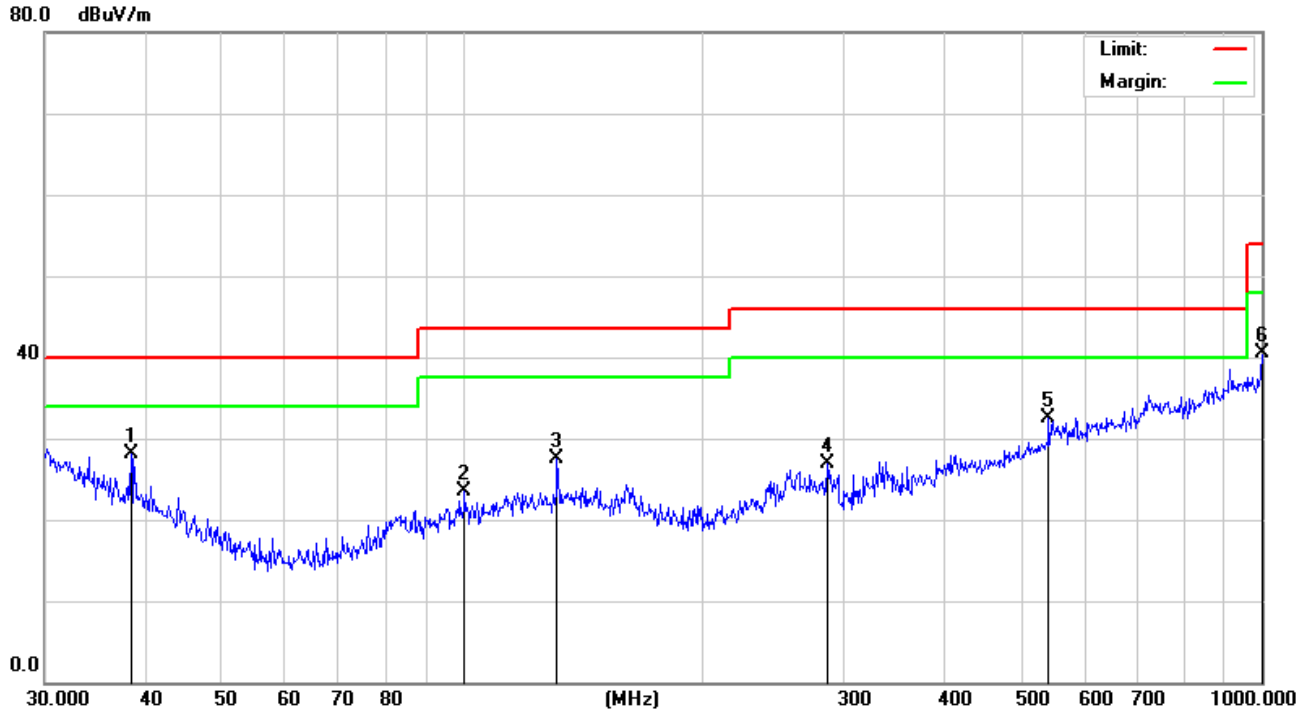


Remark:

Measurement Level= ReadingLevel+ Factor, Margin= Measurement Level - Limit

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	38.4808	41.70	-13.69	28.01	40.00	-11.99	QP			
2		100.5806	40.94	-17.43	23.51	43.50	-19.99	QP			
3		131.2965	43.46	-15.98	27.48	43.50	-16.02	QP			
4		285.9778	41.38	-14.41	26.97	46.00	-19.03	QP			
5		541.3724	39.79	-7.30	32.49	46.00	-13.51	QP			
6		1000.000	38.08	2.50	40.58	54.00	-13.42	QP			

Horizontal



Remark:

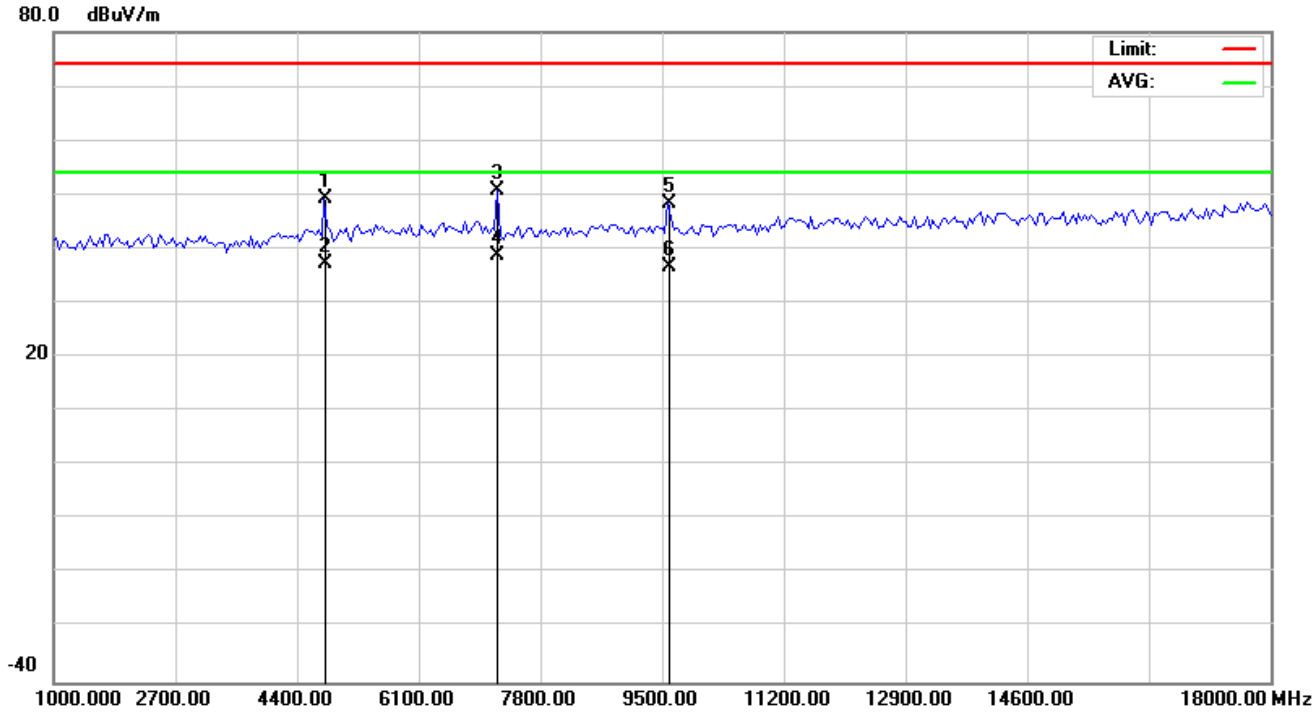
Measurement Level= ReadingLevel+ Factor, Margin= Measurement Level - Limit

3.2.8 TEST RESULTS (1GHZ~ 10TH HARMONIC)

Note:We tested lowest, middle, highest channels, recorded the worst case at the 2402MHz .

Test mode:	TX 2402 MHz	Polarization:	Horizontal
Frequency range:	1-26.5GHz		

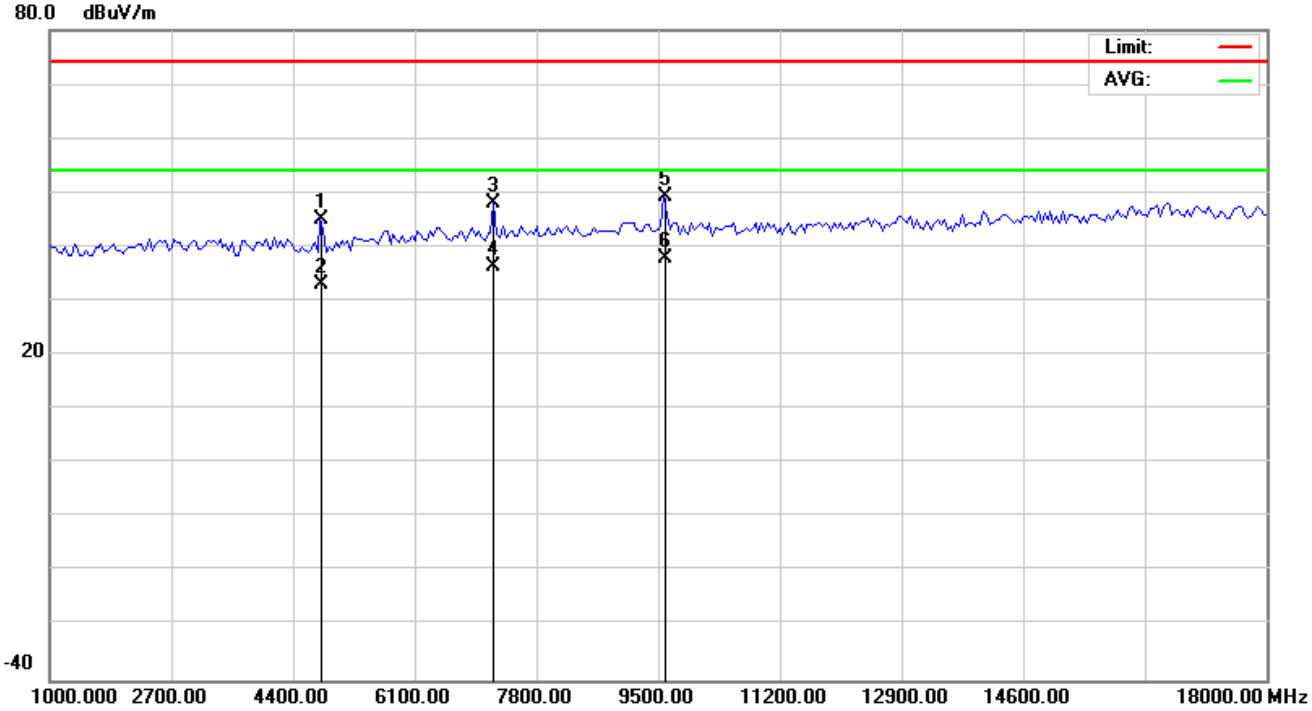
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		4804.000	41.18	8.12	49.30	74.00	-24.70	QP			
2		4804.000	29.03	8.12	37.15	54.00	-16.85	AVG			
3		7206.000	39.11	11.59	50.70	74.00	-23.30	QP			
4	*	7206.000	27.15	11.59	38.74	54.00	-15.26	AVG			
5		9608.000	31.01	17.49	48.50	74.00	-25.50	QP			
6		9608.000	19.05	17.49	36.54	54.00	-17.46	AVG			



NOTE: No detected above 18GHz

Test mode:	TX 2402 MHz	Polarization:	Vertical
Frequency range:	1-26.5GHz		

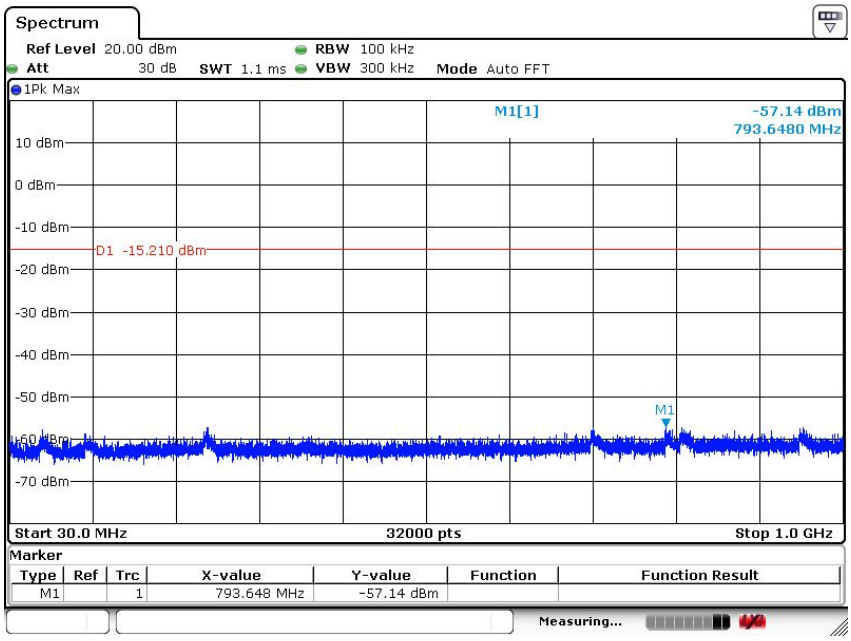
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		4804.000	37.08	8.12	45.20	74.00	-28.80	QP			
2		4804.000	25.00	8.12	33.12	54.00	-20.88	AVG			
3		7206.000	36.41	11.59	48.00	74.00	-26.00	QP			
4		7206.000	24.76	11.59	36.35	54.00	-17.65	AVG			
5		9608.000	31.91	17.49	49.40	74.00	-24.60	QP			
6	*	9608.000	20.46	17.49	37.95	54.00	-16.05	AVG			

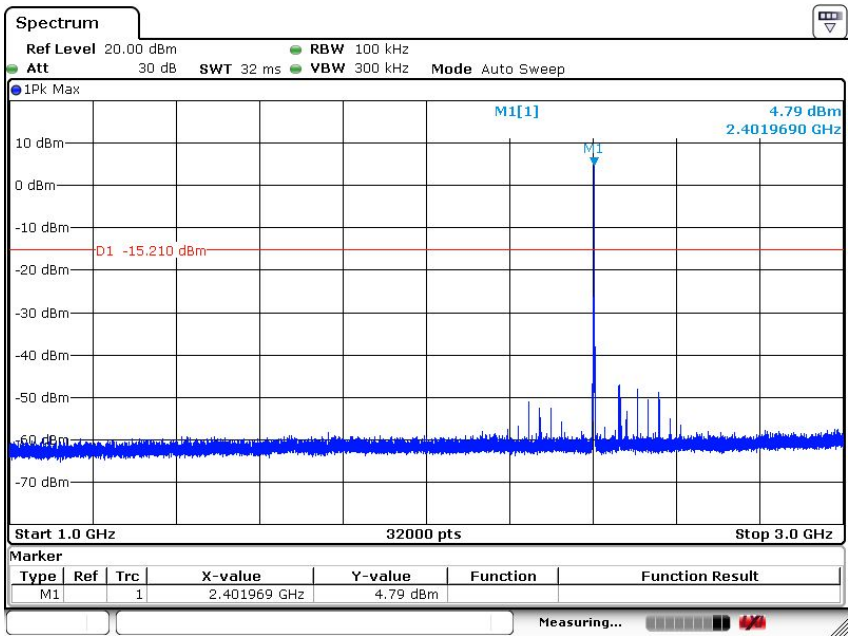


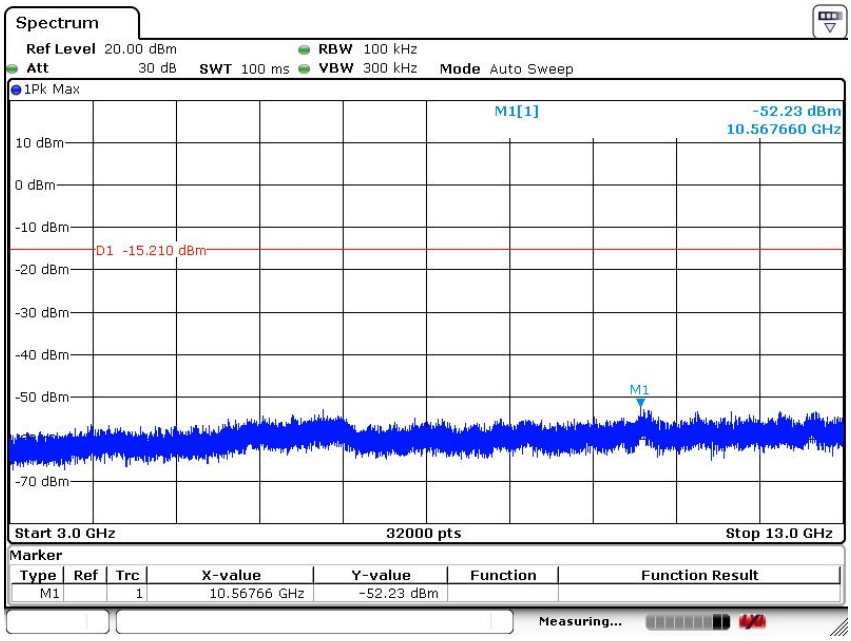
NOTE: No detected above 18GHz

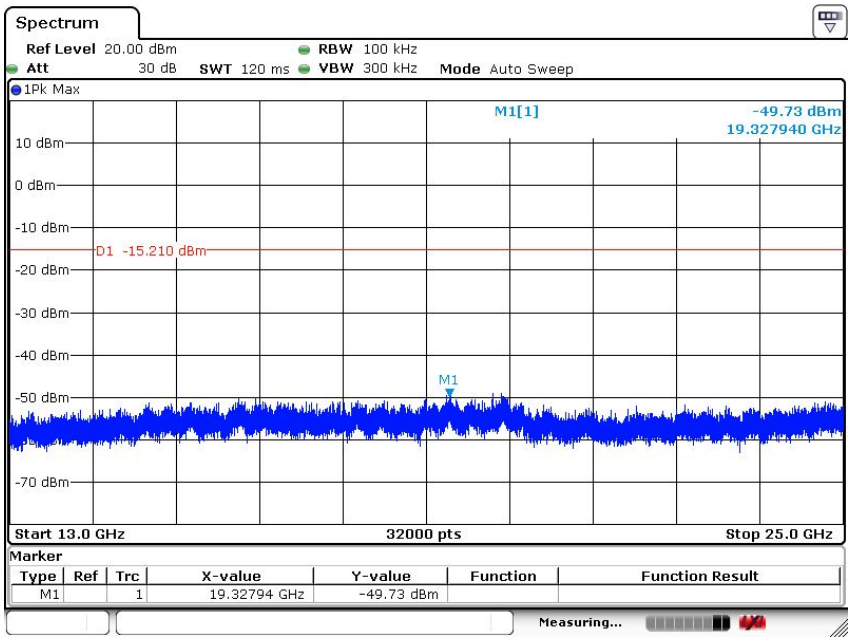
Conducted Spurious Emissions at Antenna Port:

Low Channel

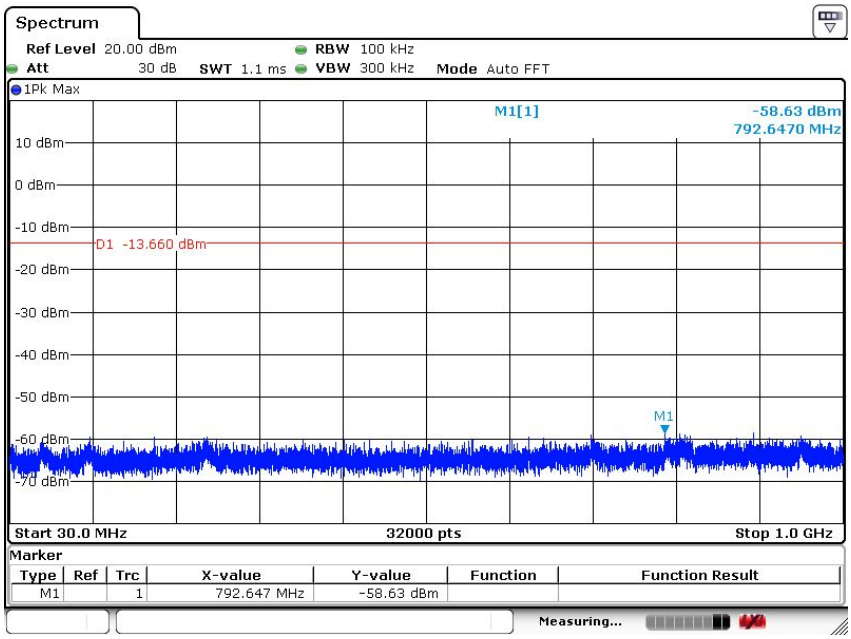


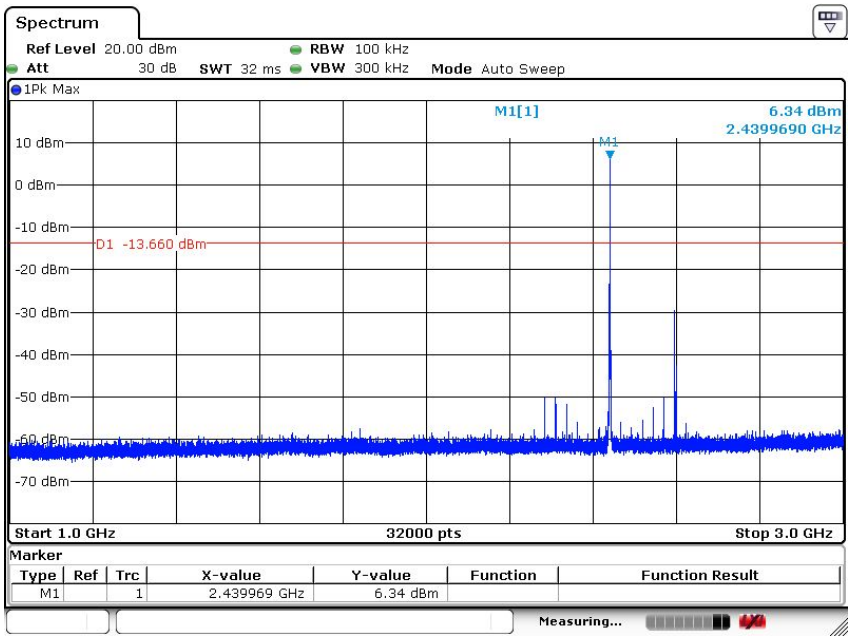


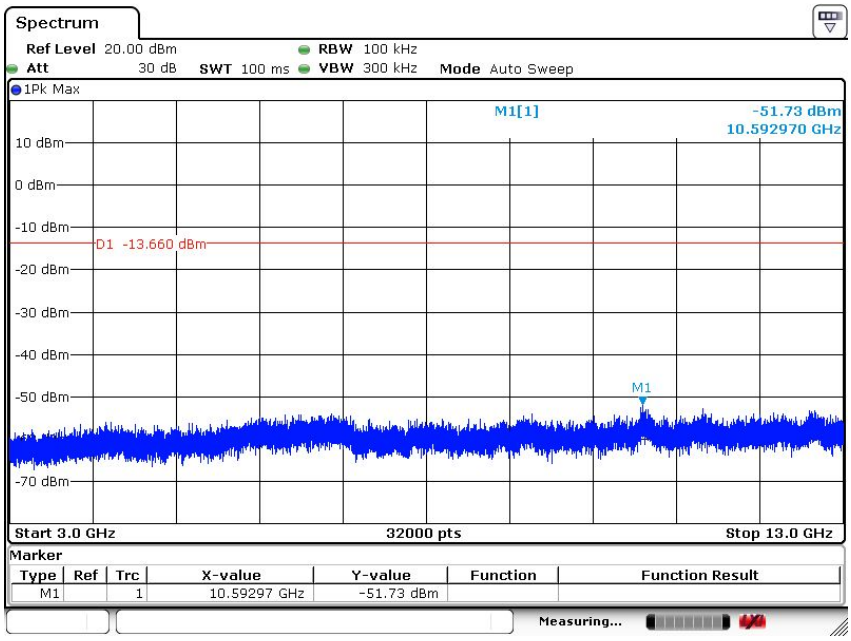

Spectrum
Ref Level 20.00 dBm
RBW 100 kHz
Att 30 dB
SWT 100 ms
VBW 300 kHz
Mode Auto Sweep
1Pk Max
M1[1]
-52.23 dBm
10.567660 GHz
10 dBm
0 dBm
-10 dBm
D1 -15.210 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
M1
-70 dBm
Start 3.0 GHz
32000 pts
Stop 13.0 GHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 10.56766 GHz -52.23 dBm
Measuring...

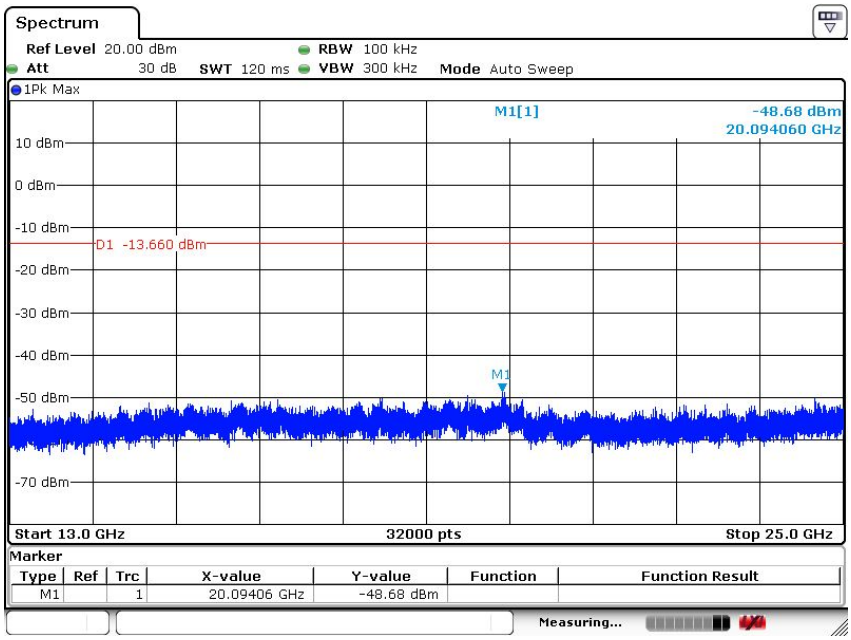

Spectrum
Ref Level 20.00 dBm
RBW 100 kHz
Att 30 dB
SWT 120 ms
VBW 300 kHz
Mode Auto Sweep
1Pk Max
M1[1]
-49.73 dBm
19.327940 GHz
10 dBm
0 dBm
-10 dBm
D1 -15.210 dBm
-20 dBm
-30 dBm
-40 dBm
M1
-50 dBm
-70 dBm
Start 13.0 GHz
32000 pts
Stop 25.0 GHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 19.32794 GHz -49.73 dBm
Measuring...

Middle Channel

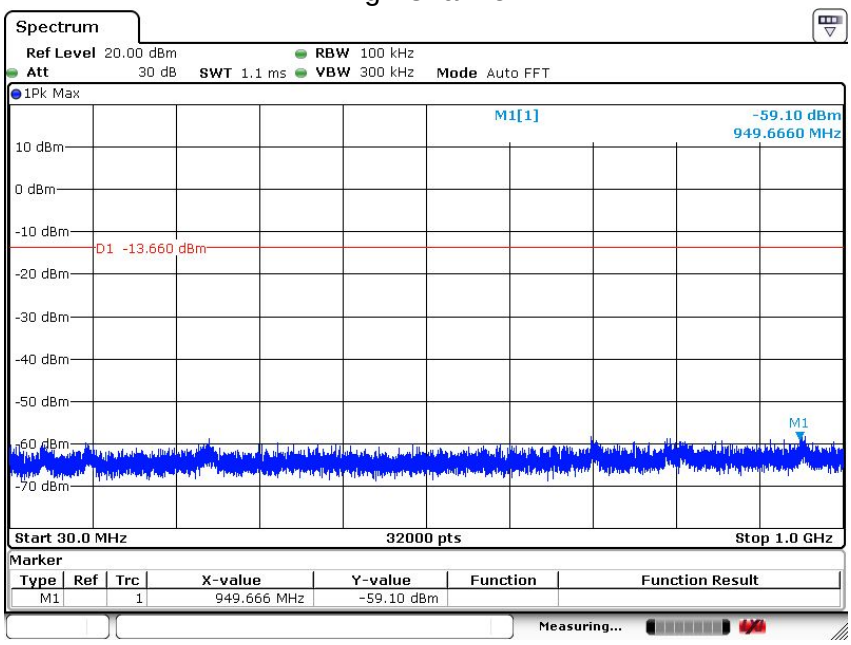


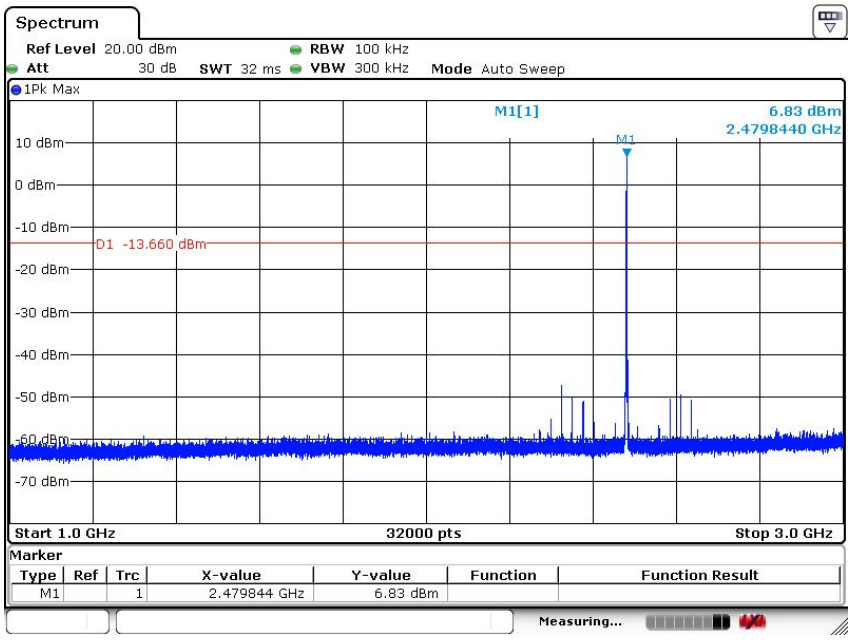


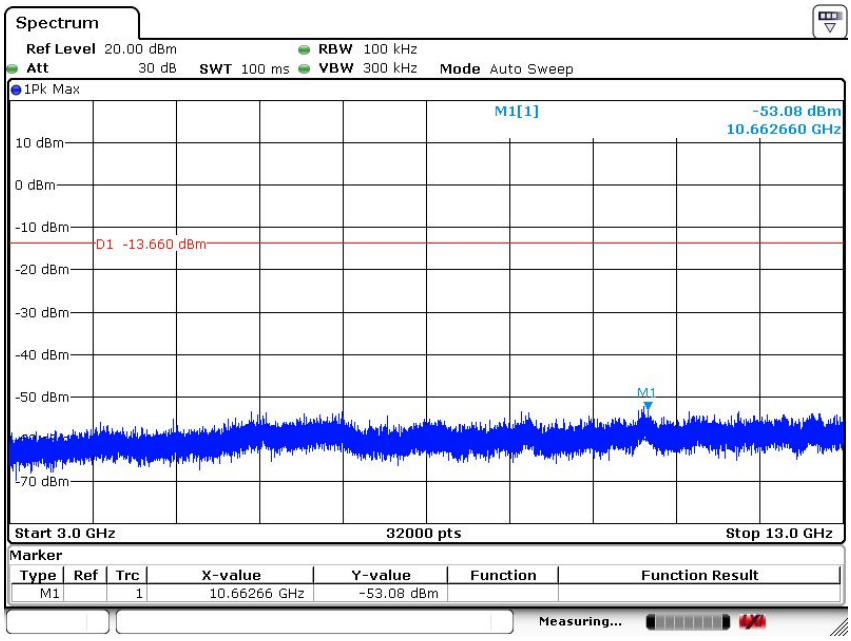

Spectrum
Ref Level 20.00 dBm
RBW 100 kHz
Att 30 dB
SWT 100 ms
VBW 300 kHz
Mode Auto Sweep
1Pk Max
M1[1]
-51.73 dBm
10.592970 GHz
10 dBm
0 dBm
-10 dBm
D1 -13.660 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
M1
-70 dBm
Start 3.0 GHz
32000 pts
Stop 13.0 GHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 10.59297 GHz -51.73 dBm
Measuring...

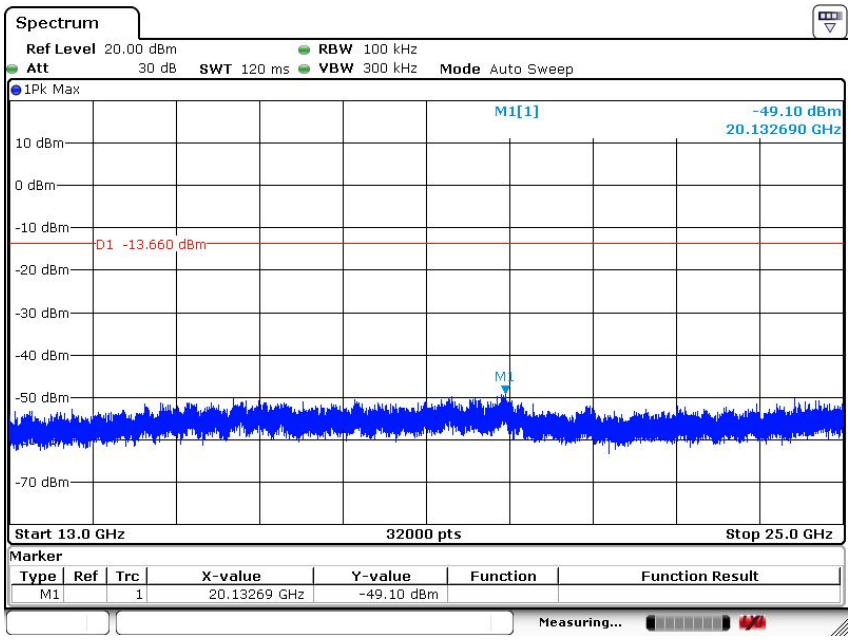

Spectrum
Ref Level 20.00 dBm
RBW 100 kHz
Att 30 dB
SWT 120 ms
VBW 300 kHz
Mode Auto Sweep
1Pk Max
M1[1]
-48.68 dBm
20.094060 GHz
10 dBm
0 dBm
-10 dBm
D1 -13.660 dBm
-20 dBm
-30 dBm
-40 dBm
M1
-50 dBm
-70 dBm
Start 13.0 GHz
32000 pts
Stop 25.0 GHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 20.09406 GHz -48.68 dBm
Measuring...

High Channel






Spectrum
Ref Level 20.00 dBm
RBW 100 kHz
Att 30 dB
SWT 100 ms
VBW 300 kHz
Mode Auto Sweep
1Pk Max
M1[1]
-53.08 dBm
10.662660 GHz
10 dBm
0 dBm
-10 dBm
D1 -13.660 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-70 dBm
M1
Start 3.0 GHz
32000 pts
Stop 13.0 GHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 10.66266 GHz -53.08 dBm
Measuring...


Spectrum
Ref Level 20.00 dBm
RBW 100 kHz
Att 30 dB
SWT 120 ms
VBW 300 kHz
Mode Auto Sweep
1Pk Max
M1[1]
-49.10 dBm
20.132690 GHz
10 dBm
0 dBm
-10 dBm
D1 -13.660 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-70 dBm
M1
Start 13.0 GHz
32000 pts
Stop 25.0 GHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 20.13269 GHz -49.10 dBm
Measuring...

4. POWER SPECTRAL DENSITY TEST

4.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C&A8.2				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247	Power Spectral Density	8 dBm (in any 3KHz)	2400-2483.5	PASS

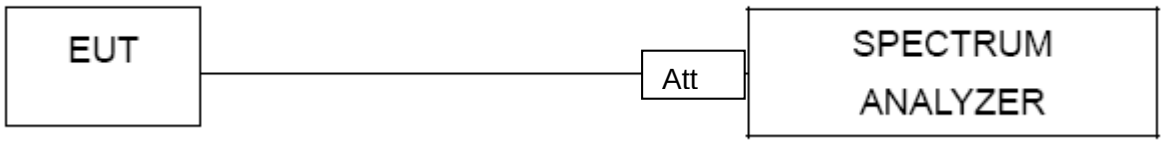
4.1.1 TEST PROCEDURE

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

4.1.2 DEVIATION FROM STANDARD

No deviation.

4.1.3 TEST SETUP



4.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.1 Unless otherwise a special operating condition is specified in the follows during the testing.

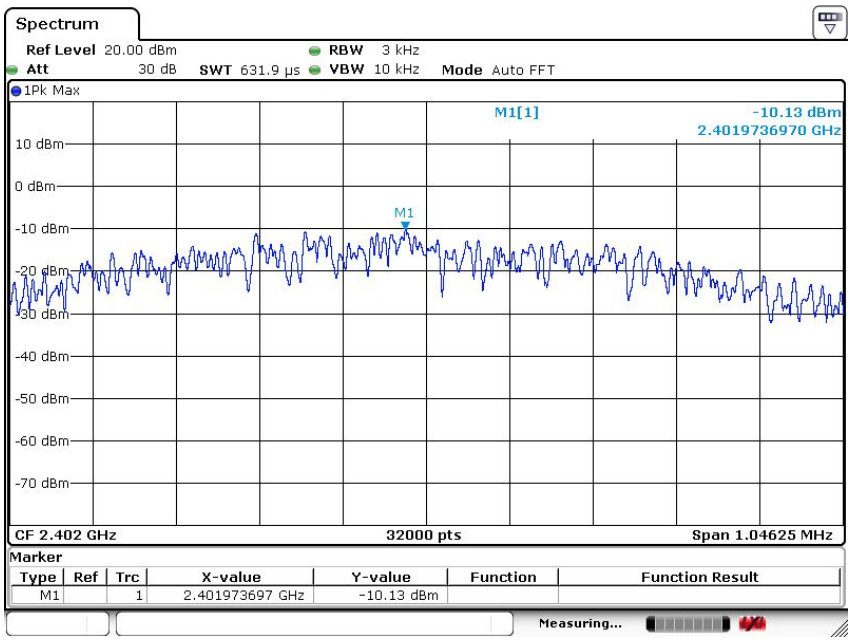
4.1.5 TEST RESULTS

EUT：	Wireless Smart Gateway	Model Name ：	MT101
Temperature：	25 ℃	Relative Humidity：	56%
Pressure：	1015 hPa	Test Voltage ：	DC 5V from adapter AC 120V/60Hz
Test Mode ：	TX Mode /CH00, CH19, CH39		

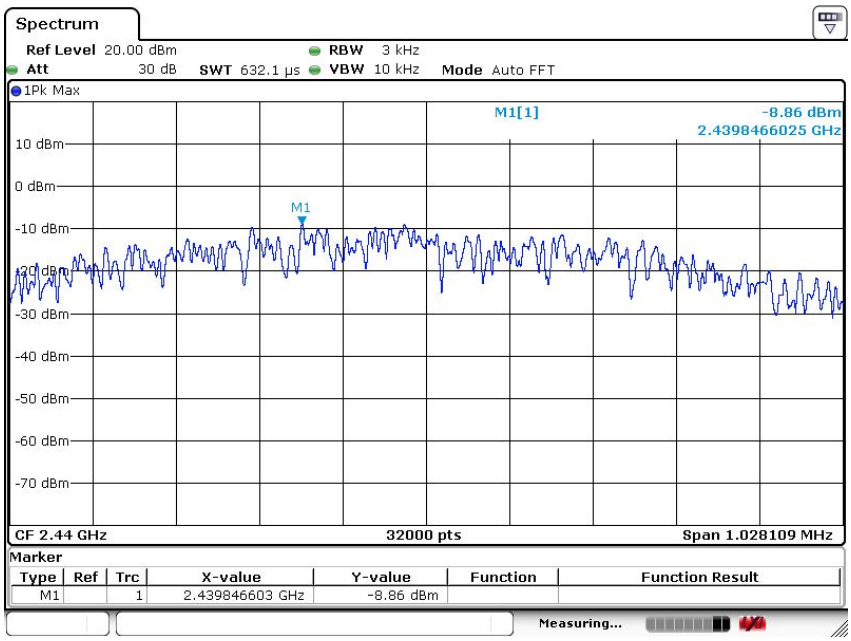
Note: The relevant measured result has the offset with cable loss already.

Frequency	Power Density (dBm/3kHz)	Limit (dBm/3 kHz)	Result
2402 MHz	-10.13	8	PASS
2440 MHz	-8.86	8	PASS
2480 MHz	-8.48	8	PASS

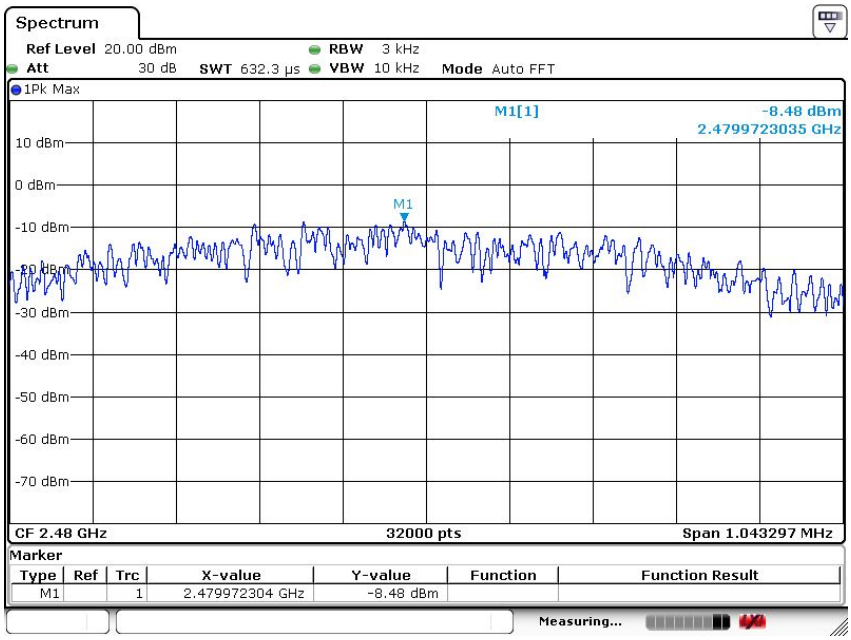
TX CH00



TX CH19



TX CH39



5. BANDWIDTH TEST

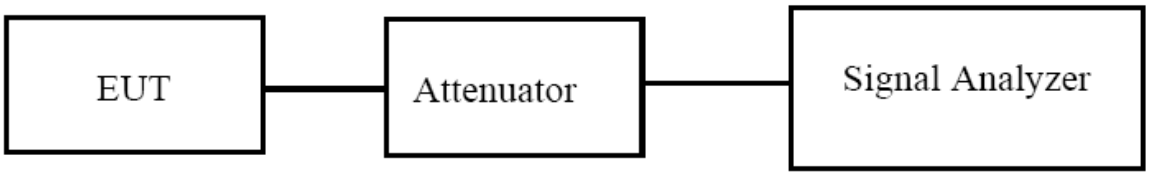
5.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C&A8.2				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(2) &A8.2	Bandwidth	>= 500KHz (6dB bandwidth)	2400-2483.5	PASS

5.1.1 TEST PROCEDURE

According to KDB 558074 D01 DTS Meas Guidance v03r04

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 6 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.



5.1.2 EUT OPERATION CONDITIONS

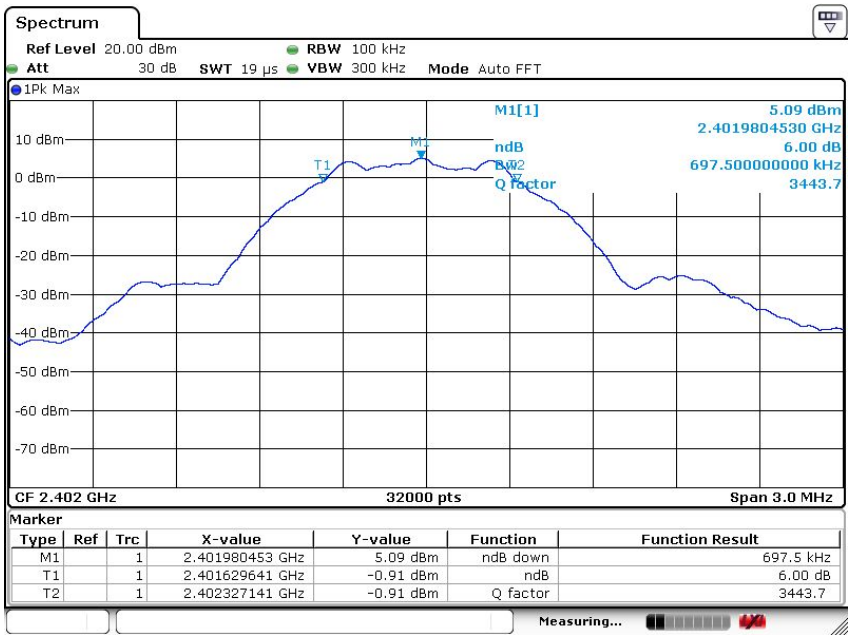
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

5.1.3 TEST RESULTS

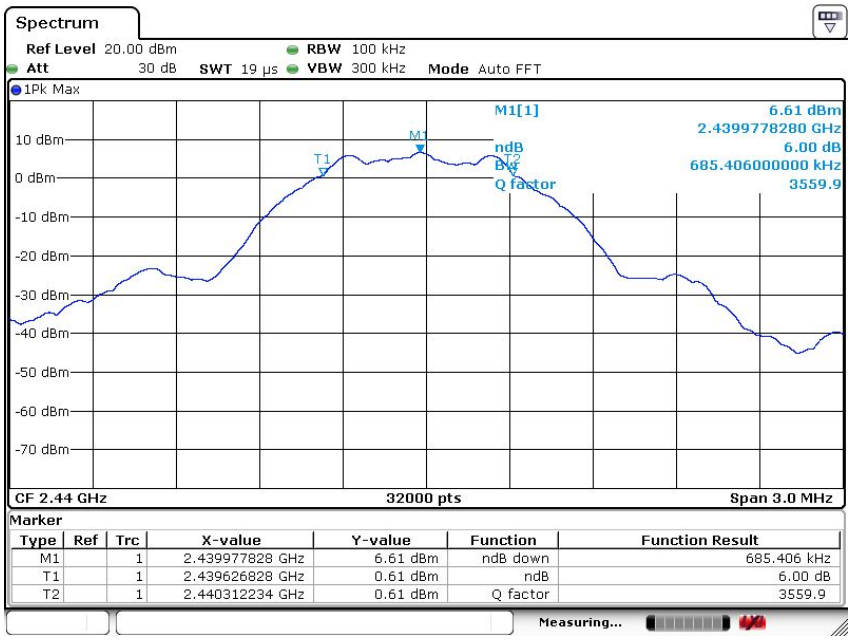
EUT：	Wireless Smart Gateway	Model Name ：	MT101
Temperature：	25 ℃	Relative Humidity：	56%
Pressure：	1012 hPa	Test Voltage ：	DC 5V from adapter AC 120V/60Hz
Test Mode ：	TX Mode /CH00, CH19, CH39		

Channel	Frequency (MHz)	6dB bandwidth (kHz)	99% bandwidth (MHz)	Limit (kHz)	Result
Low	2402	697.5	/	＞500	Pass
Middle	2440	685.4	/	＞500	Pass
High	2480	695.5	/	＞500	Pass

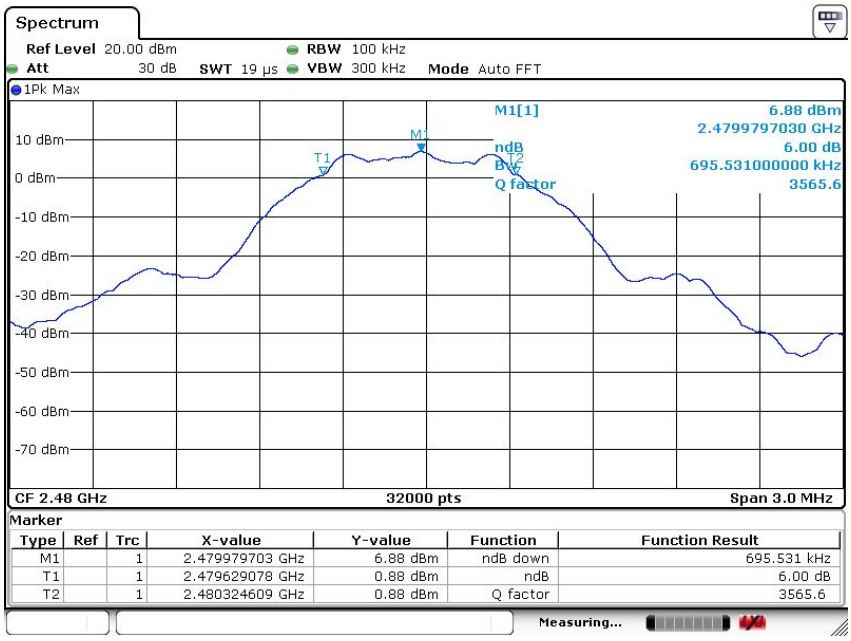
TX CH 00



TX CH 19



TX CH 39



6. PEAK OUTPUT POWER TEST

6.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C &A8.4				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(3) &A8.4	Peak Output Power	1 watt or 30dBm	2400-2483.5	PASS

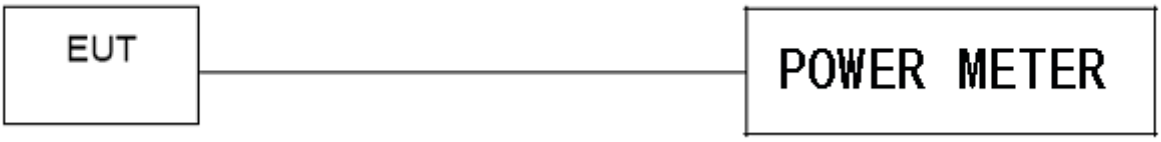
6.1.1 TEST PROCEDURE

a. The EUT was directly connected to the Power meter

6.1.2 DEVIATION FROM STANDARD

No deviation.

6.1.3 TEST SETUP



6.1.4 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.

6.1.5 TEST RESULTS

EUT：	Wireless Smart Gateway	Model Name ：	MT101
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 5V from adapter AC 120V/60Hz
Test Mode ：	TX Mode		

TX Mode			
Test Channe	Frequency	Maximum Conducted Output Power （PK）	LIMIT
	(MHz)	(dBm)	dBm
CH00	2402	7.28	30
CH19	2440	7.66	30
CH39	2480	7.19	30

7. 100 KHZ BANDWIDTH OF FREQUENCY BAND EDGE

APPLICABLE STANDARD

In any 100 kHz 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 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a)&A1.1 is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a)&A8.5, must also comply with the radiated emission limits specified in §15.209(a) &A1.1 (see §15.205(c)) &A8.5.

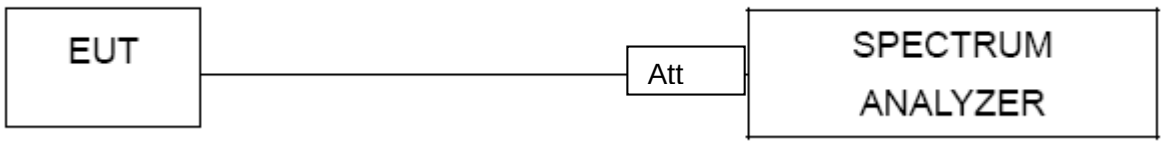
TEST PROCEDURE

a) Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
b) Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
c) Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
d) Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
e) Repeat above procedures until all measured frequencies were complete.

7.1 DEVIATION FROM STANDARD

No deviation.

7.2 TEST SETUP



7.3 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.

7.4 TEST RESULTS

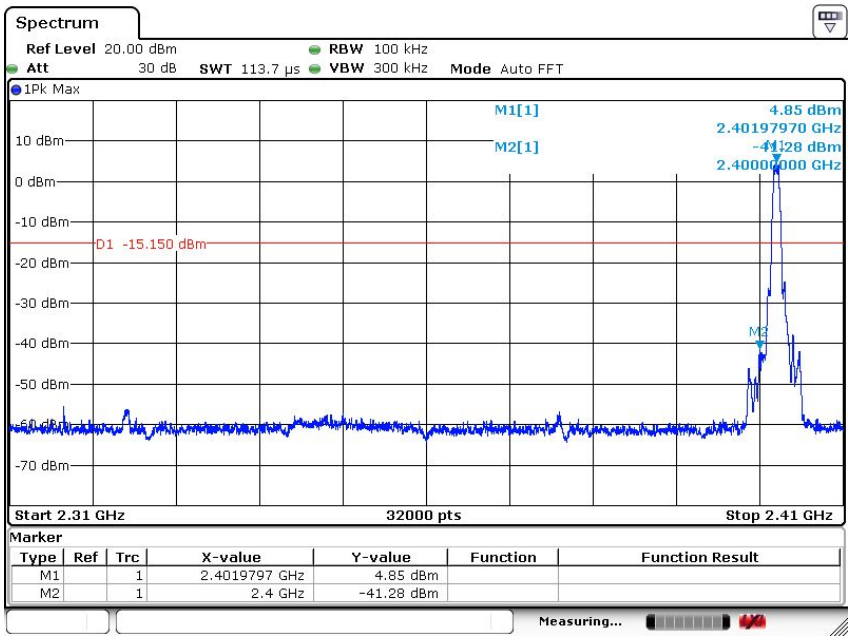
EUT：	Wireless Smart Gateway	Model Name ：	MT101
Temperature：	25 ℃	Relative Humidity：	56%
Pressure：	1012 hPa	Test Voltage ：	DC 5V from adapter AC 120V/60Hz

Frequency Band	Delta Peak to band emission (dBc)	＞Limit (dBc)	Result
2390.00	46.13	20	Pass
2483.50	60.89	20	Pass

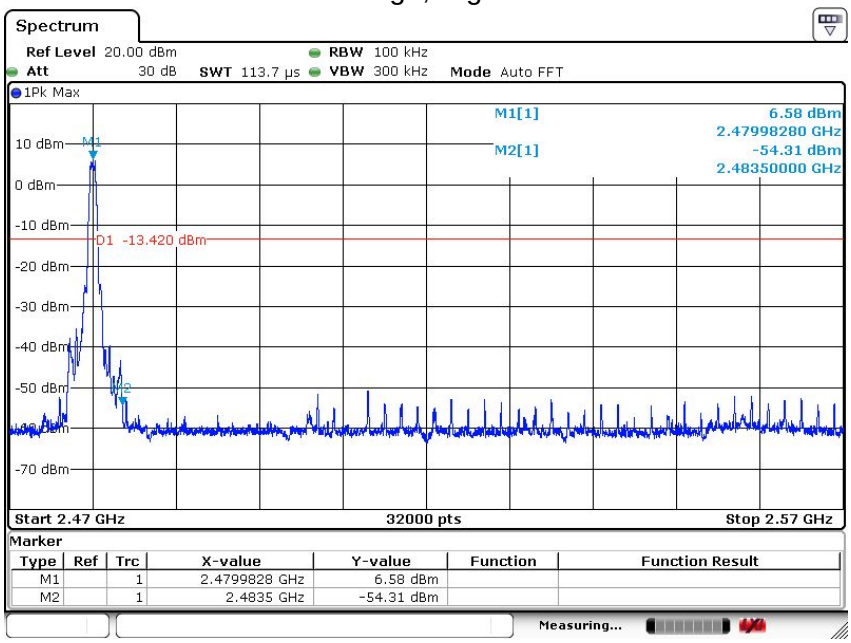
Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type	Comment
2390	45.36	1.05	46.41	74	-27.59	peak	Vertical
2390	47.26	1.05	48.31	74	-25.69	peak	Horizontal
2483.5	48.56	1.29	49.85	74	-24.15	peak	Vertical
2483.5	44.18	1.29	45.47	74	-28.53	peak	Horizontal

Note: Test method to see chapter 3.2 . When PK value is lower than the Average value limit, average not record.

Band Edge, Left Side



Band Edge, Right Side



8. ANTENNA REQUIREMENT

8.1 STANDARD REQUIREMENT

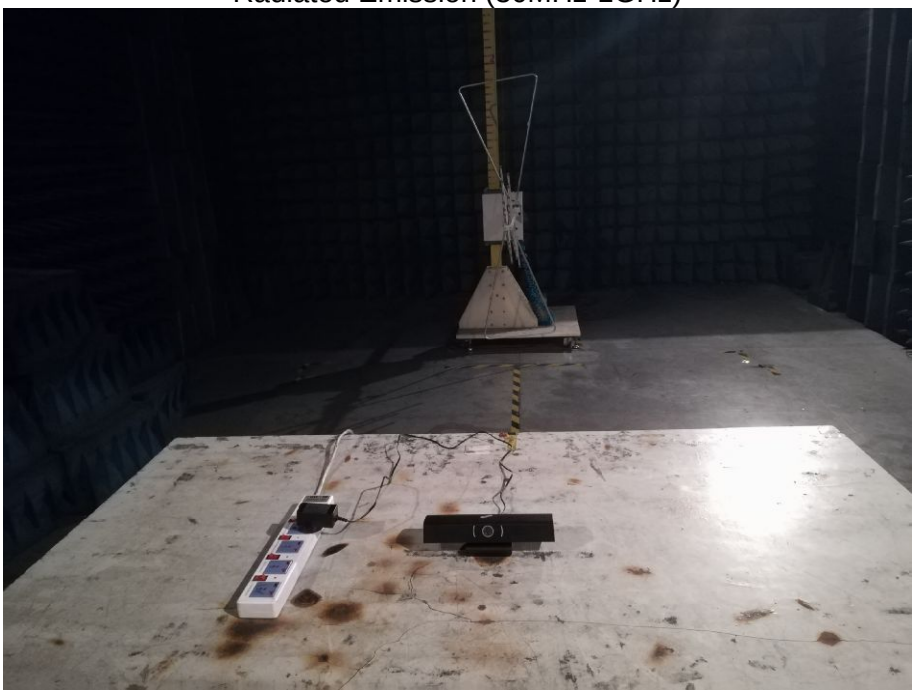
15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

8.2 EUT ANTENNA

The EUT antenna is Internal antenna with 0dBi gain, it conform to FCC part rule.

9. EUT TEST PHOTO

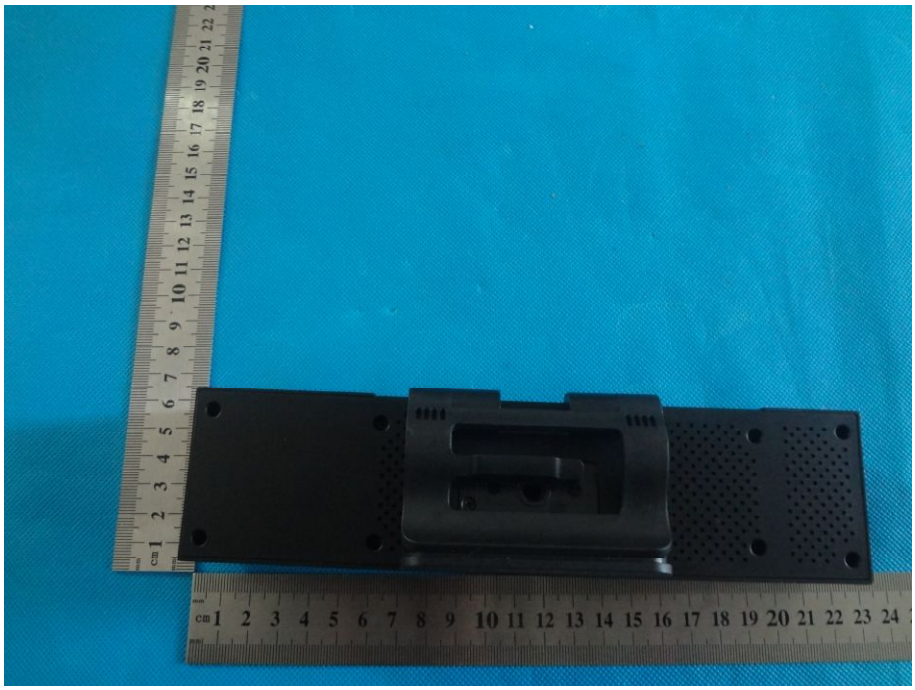
Radiated Emission (30MHz-1GHz)

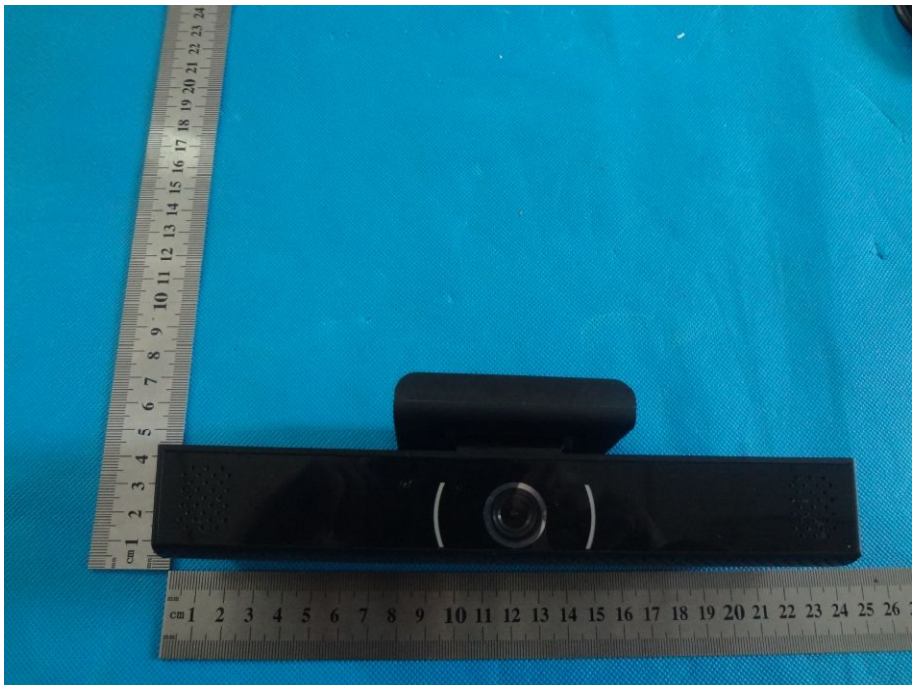


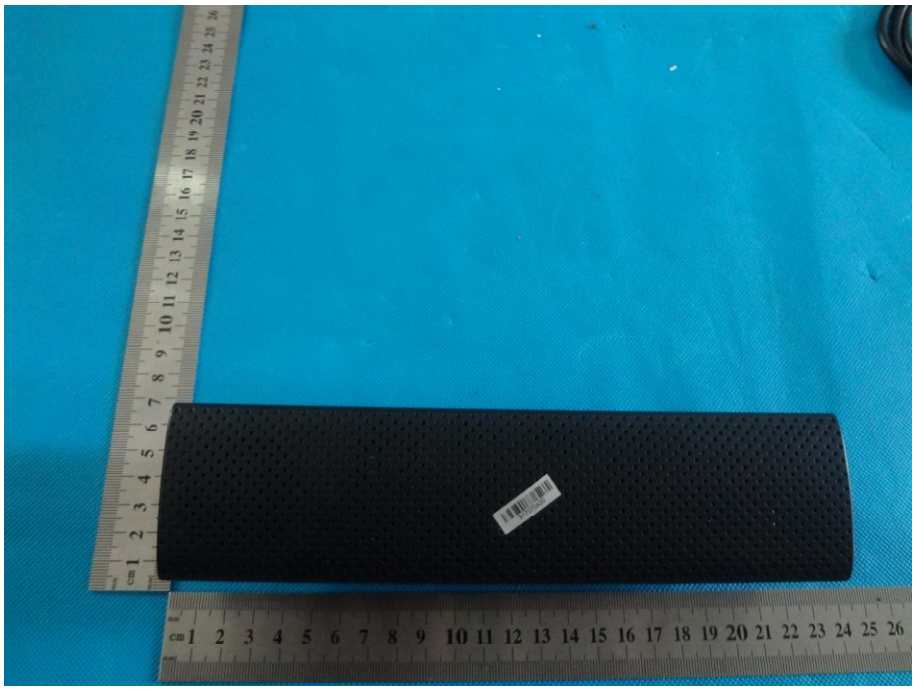
Radiated Emission (above 1GHz)

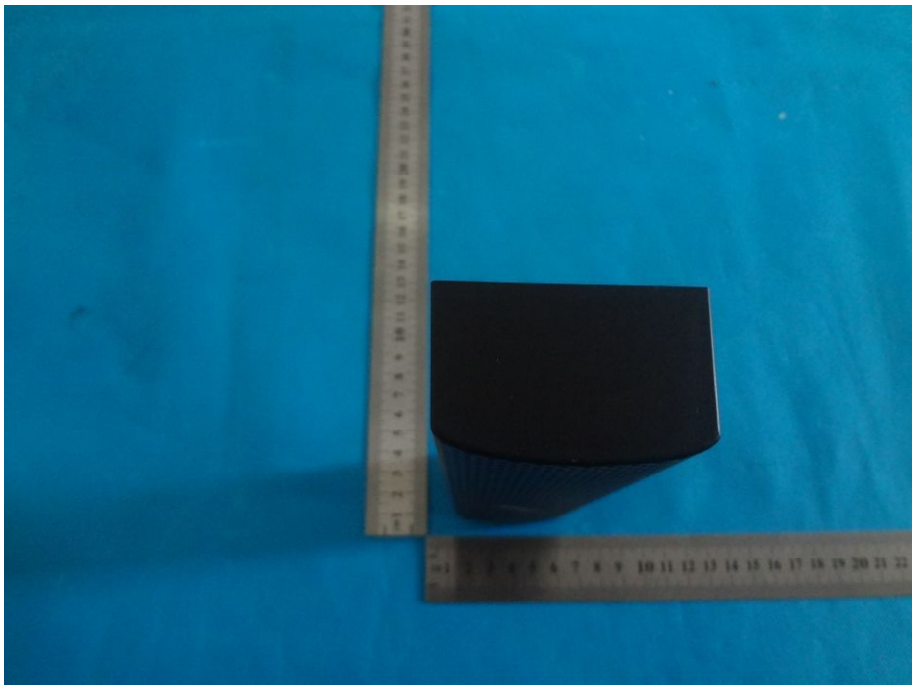
Conducted Emission (AC Mains)

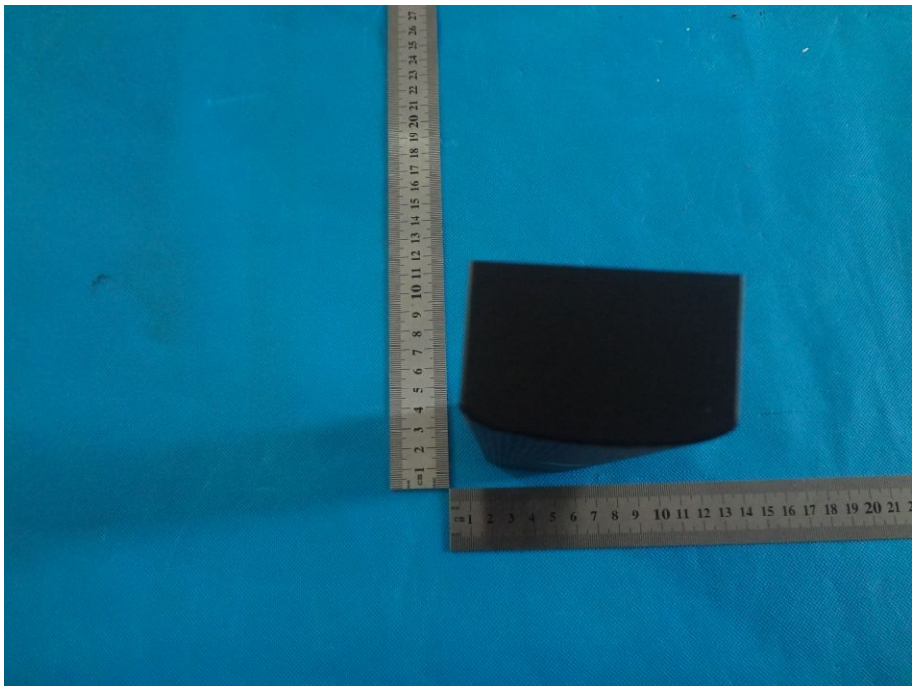
External photo



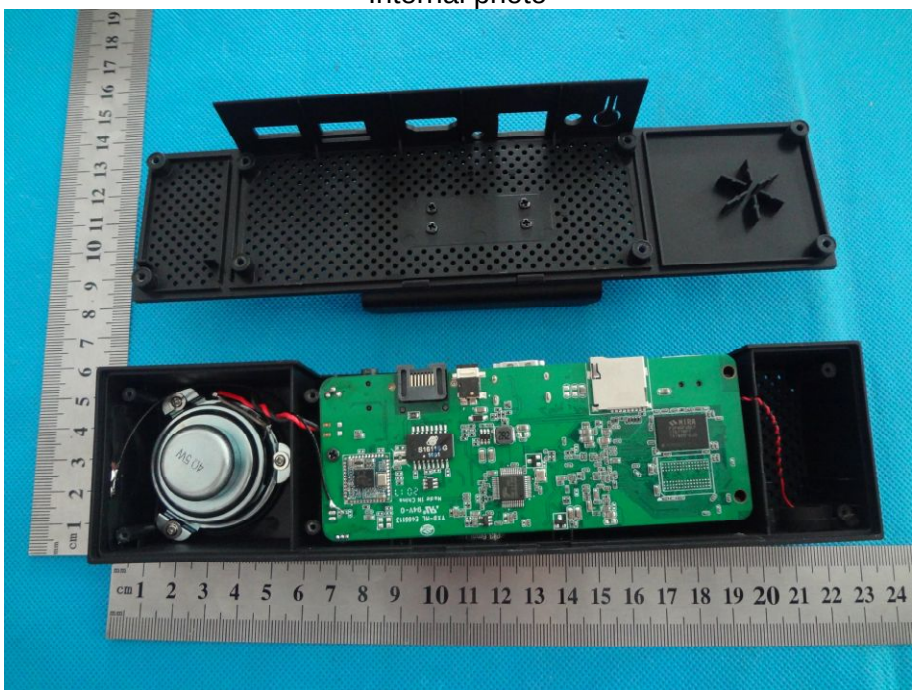


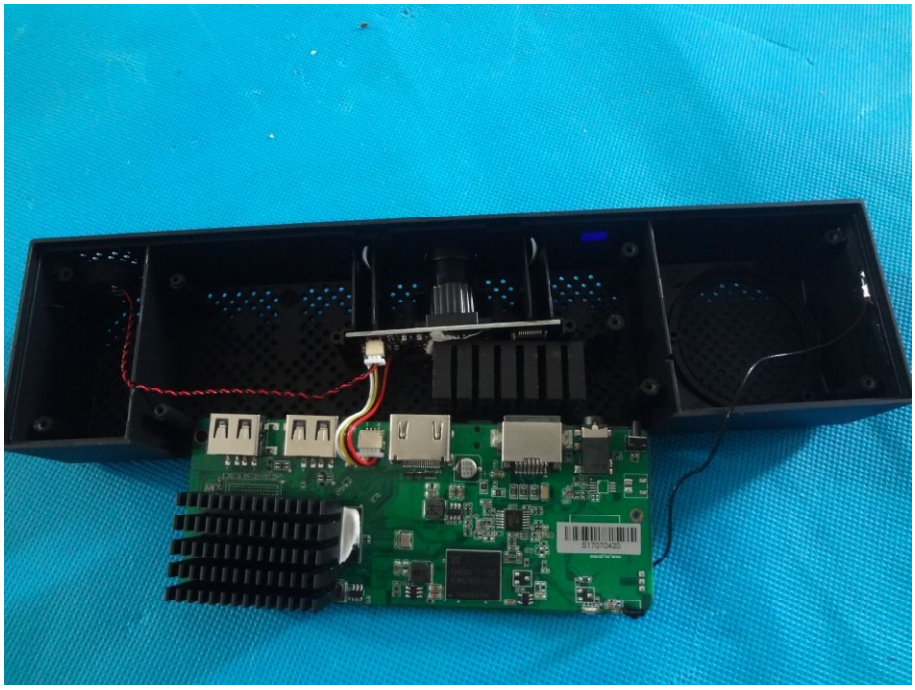


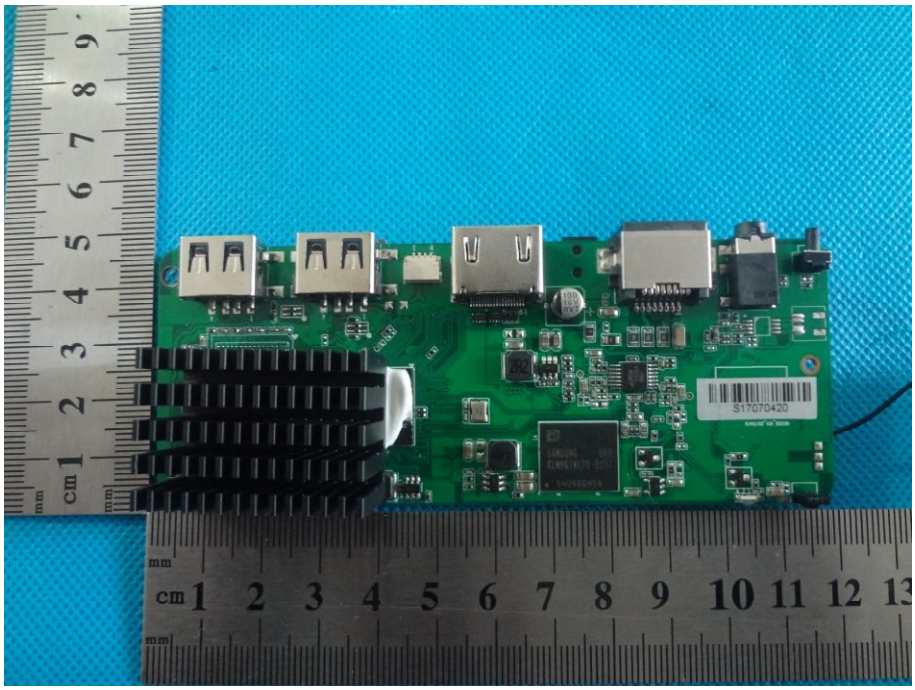


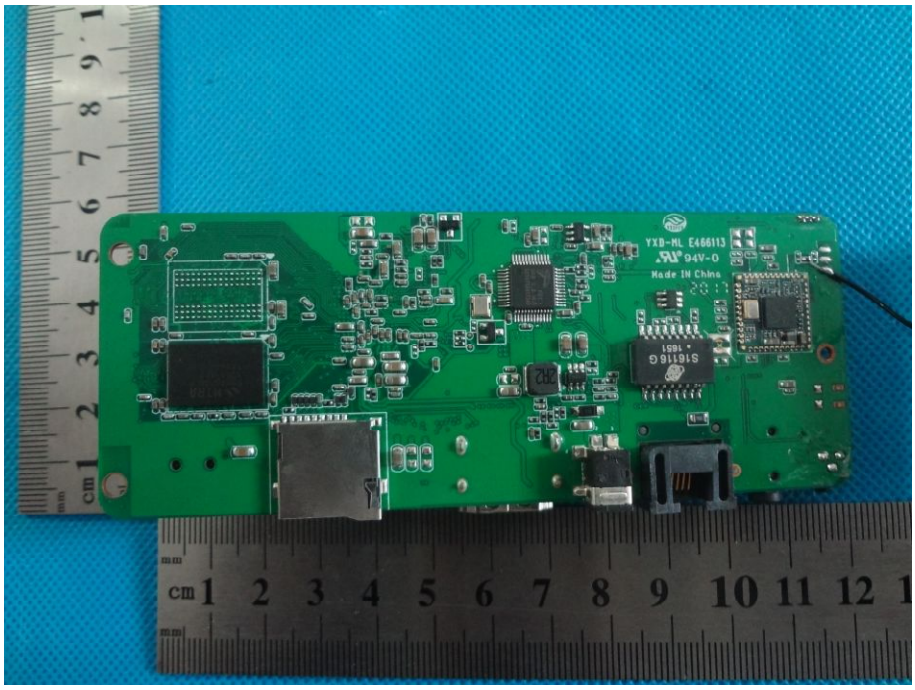


Internal photo

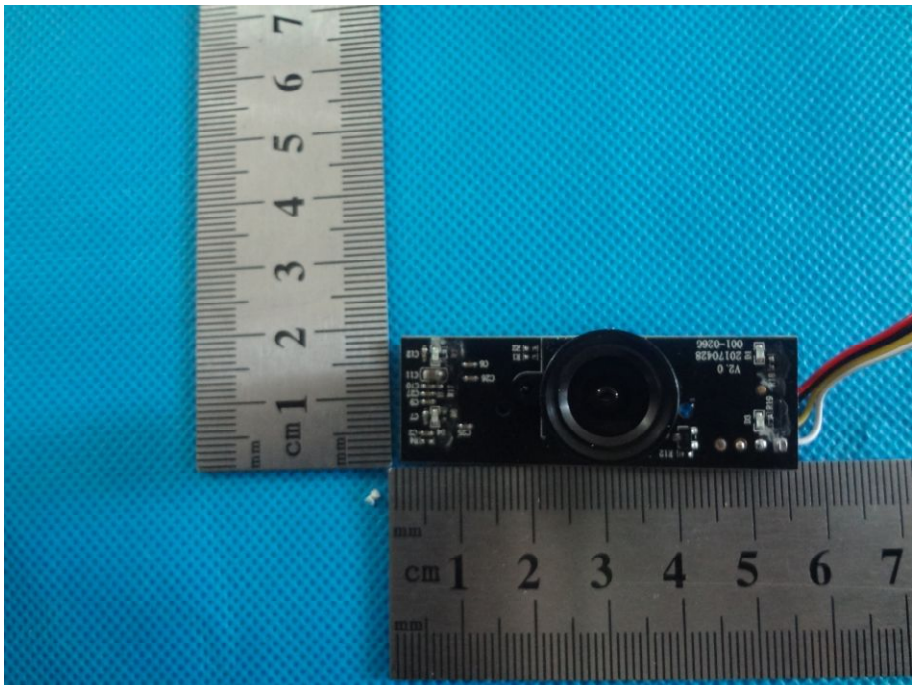


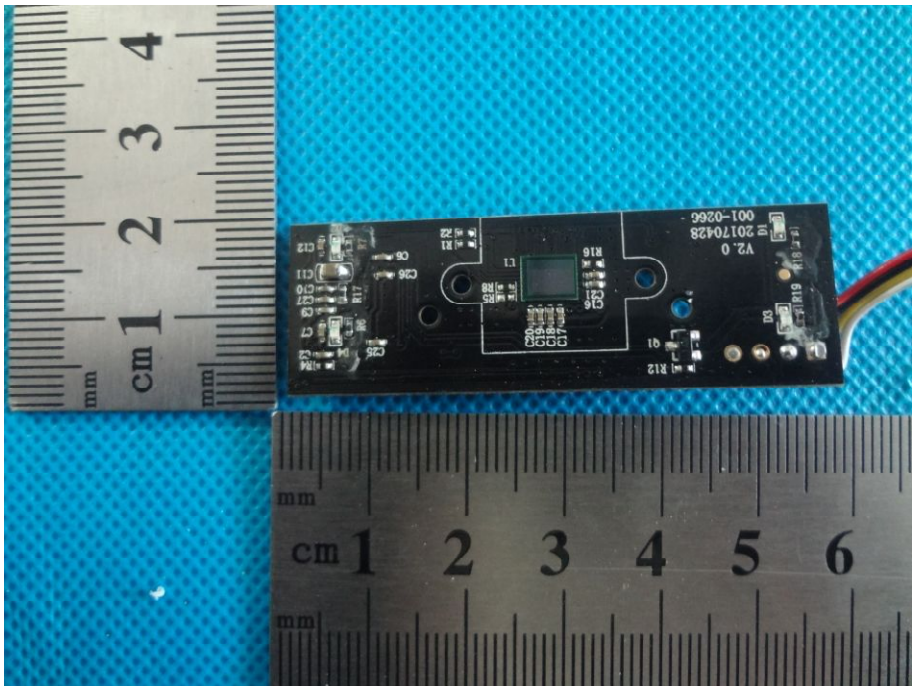


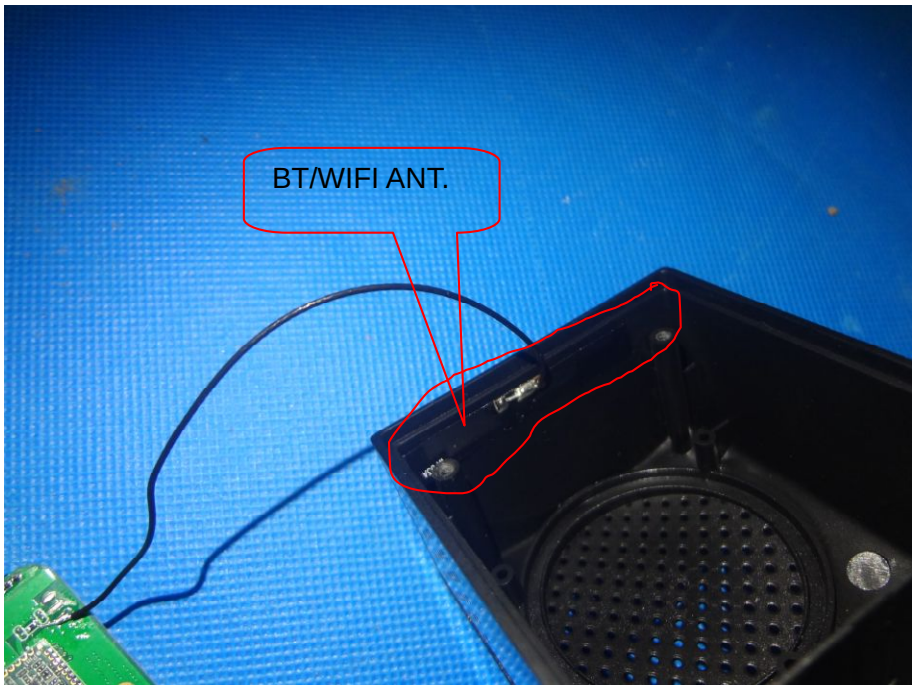




S16116 G
1651
Made IN China
94V-0
YXD-ML E466113


cm 1 2 3 4 5 6 7
mm





.....End of Report.....