

FCC - TEST REPORT

Report Number : **64.790.15.05625.01** Date of Issue: January 7, 2016

Model : S6, D5, D5T, D8, S2, S9, X6, K3, I6, Z1

Product Type : Laser Distance Meter

Applicant : Shenzhen Mileseey Technology Co., Ltd

Address : F/6, Building 9, Zhongguan Honghualing Industrial South Park II, 1213 Liuxian Ave, 518055 Taoyuan Street, Nanshan District, Shenzhen, P.R. China

Production Facility : Shenzhen Mileseey Technology Co., Ltd

Address : F/6, Building 9, Zhongguan Honghualing Industrial South Park II, 1213 Liuxian Ave, 518055 Taoyuan Street, Nanshan District, Shenzhen, P.R. China

Test Result : ☒ **Positive** ☐ **Negative**



Total pages including Appendices : 25

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Product Service

2 Details about the Test Laboratory

Details about the Test Laboratory

Test Site 1

Company name: TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park,
Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052,
P. R. China

Telephone: 86 755 8828 6998

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3 Description of the Equipment under Test

Description of the Equipment Under Test

Product:	Laser Distance Meter
Model No.:	S6, D5, D5T, D8, S2, S9, X6, K3, I6, Z1
Remark:	All models are identical in circuit design, PCB layout and components used but only different in appearance(color, shape or dimentions). Tests were only performed on S6.
FCC ID:	2AEOGMC160001
Options and accessories:	N/A
Rating:	DC 3V input
RF Transmission Frequency:	2402MHz-2480MHz
No. of Operated Channel:	40 channels
Modulation:	GFSK
Duty Cycle:	100% during test
Antenna Type:	ceramic chip antenna
Antenna Gain:	1.5dBi
Description of the EUT:	EUT is a distance measure meter with Bluetooth function.



4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2014 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators

All the test methods were according to KDB558074 D01 DTS Measure Guidance v03r02 and ANSI C63.10 (2013).

5 Summary of Test Results

Technical Requirements			
FCC Part 15 Subpart C			
Test Condition		Pages	Test Result
§15.207	Conducted emission AC power port	10	N/A
§15.247(b)(1)	Conducted peak output power	11	Pass
§15.247(a)(2)	6dB bandwidth	12	Pass
§15.247(e)	Power spectral density*	14	Pass
§15.247(a)(1)	20dB bandwidth and 99% Occupied Bandwidth	--	N/A
§15.247(a)(1)	Carrier frequency separation	--	N/A
§15.247(a)(1)(iii)	Number of hopping frequencies	--	N/A
§15.247(a)(1)(iii)	Dwell Time	--	N/A
§15.247(d)	Spurious RF conducted emissions	15	Pass
§15.247(d)	Band edge	19	Pass
§15.247(d) & §15.209 &	Spurious radiated emissions for transmitter and receiver	21	Pass
§15.203	Antenna requirement	See note 1	Pass

Remark 1: N/A – Not Applicable.

Note 1: The EUT uses a ceramic chip antenna, whose gain is 1.5dBi. In accordance to §15.203, It is considered sufficiently to comply with the provisions of this section.



Product Service

6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: 2AEOGMC160001, complies with Section 15.209, 15.247 of the FCC Part 15 Subpart C Rules.

SUMMARY:

All tests according to the regulations cited on page 5 were

☒ - Performed

☐ - **Not** Performed

The Equipment under Test

☒ - **Fulfills** the general approval requirements.

☐ - **Does not** fulfill the general approval requirements.

Sample Received Date: December 14, 2015

Testing Start Date: December 17, 2015

Testing End Date: December 18, 2015

- TÜV SÜD Certification and Testing (China) Co., Ltd. Guangzhou Branch -

Reviewed by:

Prepared by:

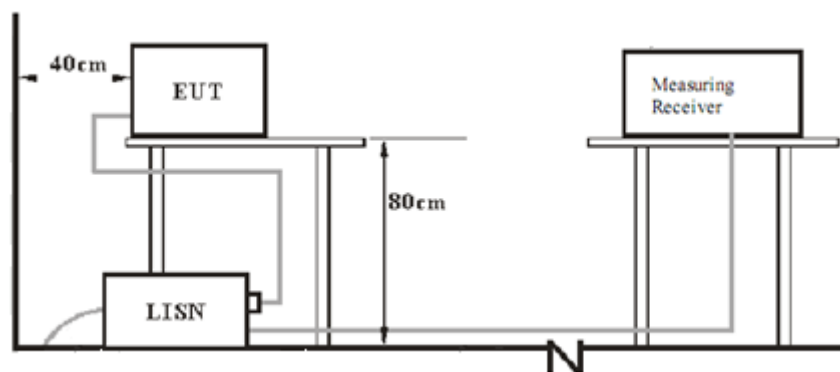

Celia Xiang



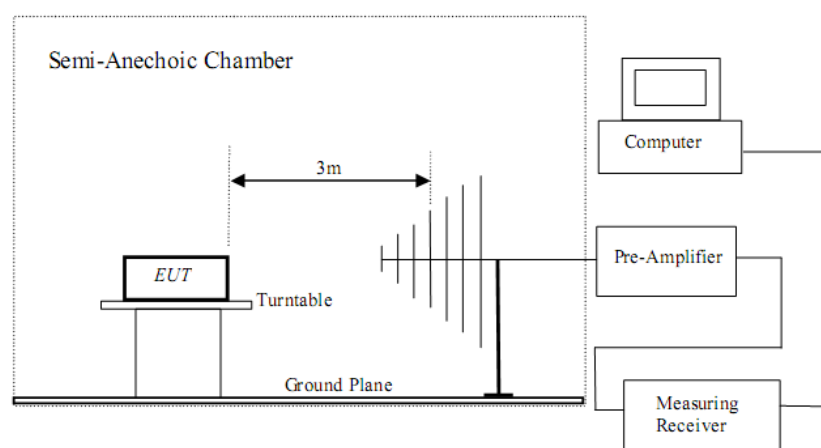

Peter Jia

7 Test Setups

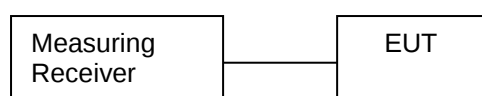
7.1 AC Power Line Conducted Emission test setups



7.2 Radiated test setups



7.3 Conducted RF test setups



8 Systems test configuration

Auxiliary Equipment Used during Test:

Description	Manufacturer	Model no.	S/N

Test software: SampleCode4_3Demo2.apk

The system was configured to channel 1(2402MHz), 20(2440MHz), and 40(2480MHz) for the tests.

9 Technical Requirement

9.1 Conducted Emission

Test Method

1. The EUT was placed on a table, which is 0.8m above ground plane
2. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.).
3. Maximum procedure was performed to ensure EUT compliance
4. A EMI test receiver is used to test the emissions from both sides of AC line

Limit

Frequency MHz	QP Limit dB μ V	AV Limit dB μ V
0.150-0.500	66-56*	56-46*
0.500-5	56	46
5-30	60	50

Decreasing linearly with logarithm of the frequency

Test data: N/A

Remark: EUT is portable product and operating with battery.

9.2 Conducted peak output power

Test Method

1. Use the following spectrum analyzer settings:
RBW > the 6 dB bandwidth of the emission being measured, VBW $\geq$ 3RBW, Span $\geq$ 3RBW
Sweep = auto, Detector function = peak, Trace = max hold.
2. Add a correction factor to the display.
3. Use a power meter to measure the conducted peak output power.

Limits

Frequency Range MHz	Limit W	Limit dBm
2400-2483.5	≤ 1	≤ 30

Test result as below table

Frequency	Conducted Peak Output Power dBm	Result
Low channel 2402MHz	-0.49	Pass
Middle channel 2440MHz	-1.47	Pass
High channel 2480MHz	-2.01	Pass

9.3 6dB Bandwidth

Test Method

1. Use the following spectrum analyzer settings:
RBW=100K, VBW $\geq$ 3RBW, Sweep = auto, Detector function = peak, Trace = max hold
2. Use the automatic bandwidth measurement capability of an instrument, may be employed using the X dB bandwidth mode with X set to 6 dB, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be ≥ 6 dB.
3. Allow the trace to stabilize, record the X dB Bandwidth value.

Limit

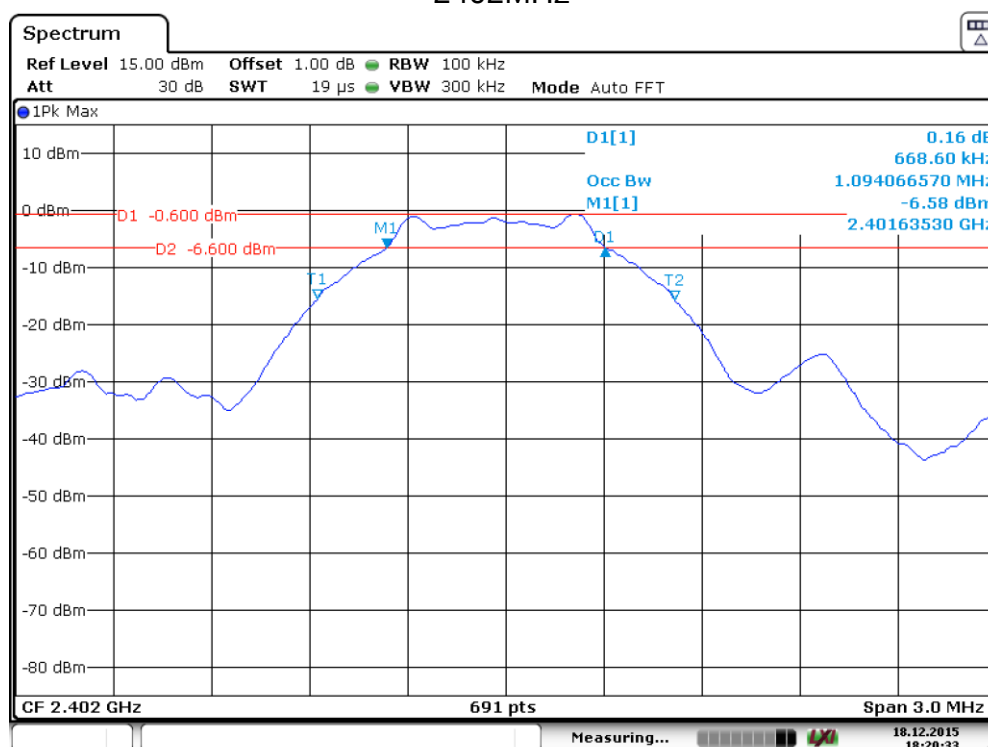
Limit [kHz]

≥ 500

Test result

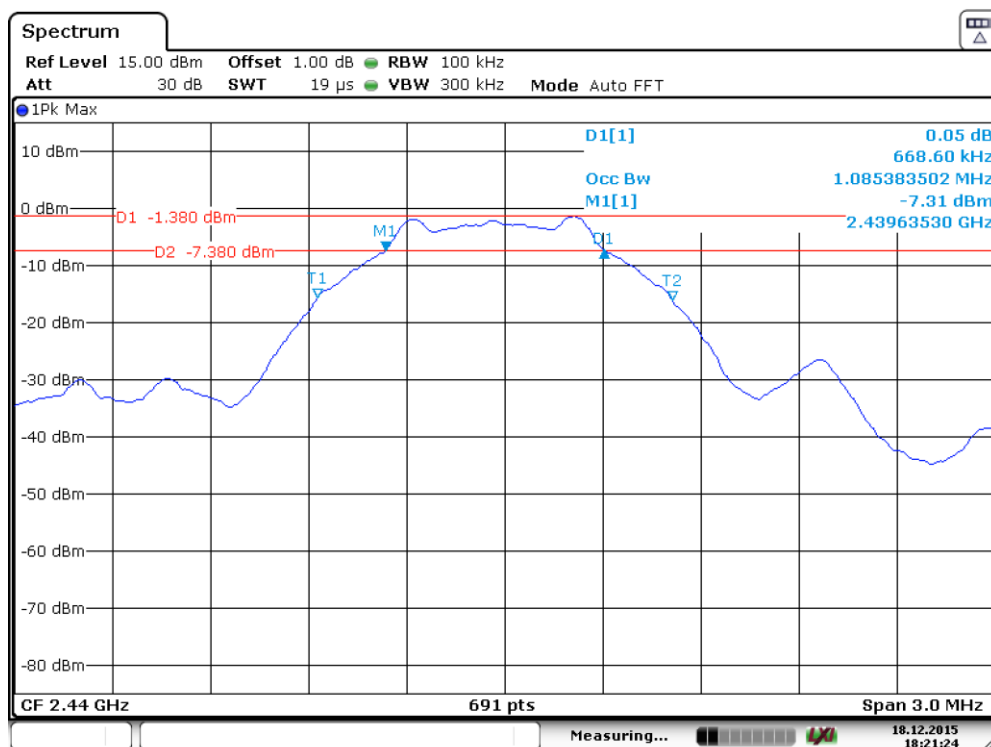
Frequency	6dB bandwidth KHz	Result
Low channel 2402MHz	668.6	Pass
Middle channel 2440MHz	668.6	Pass
High channel 2480MHz	668.6	Pass

2402MHz



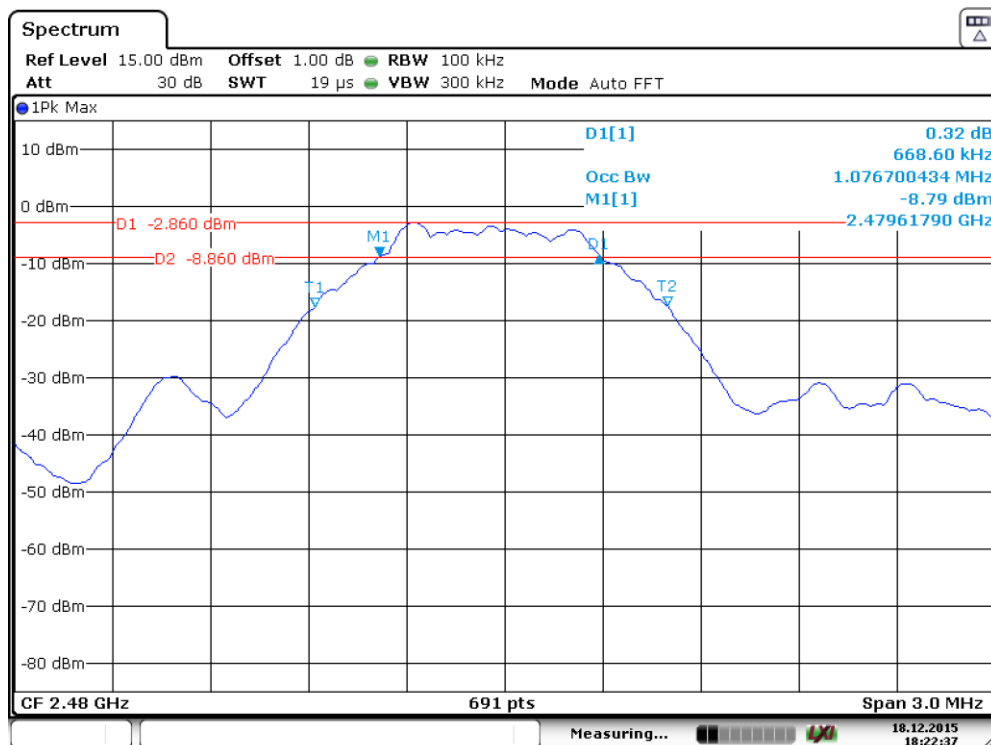
Date: 18.DEC.2015 18:20:33

2440MHz



Date: 18.DEC.2015 18:21:25

2480MHz



Date: 18.DEC.2015 18:22:38

9.4 Power spectral density

Test Method

This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance:

1. Set analyzer center frequency to DTS channel center frequency.
RBW=3kHz, VBW $\geq$ 3RBW, Span=1.5 times DTS bandwidth, Detector=Peak, Sweep=auto, Trace= max hold.
2. Allow trace to fully stabilize, use the peak marker function to determine the maximum amplitude level within the RBW.
3. Repeat above procedures until other frequencies measured were completed.

Limit

Limit [dBm]

≤ 8

Test result

Frequency	Power spectral density dBm	Result
Low channel 2402MHz	-12.79	Pass
Middle channel 2440MHz	-13.39	Pass
High channel 2480MHz	-14.06	Pass

9.5 Spurious RF conducted emissions

Test Method

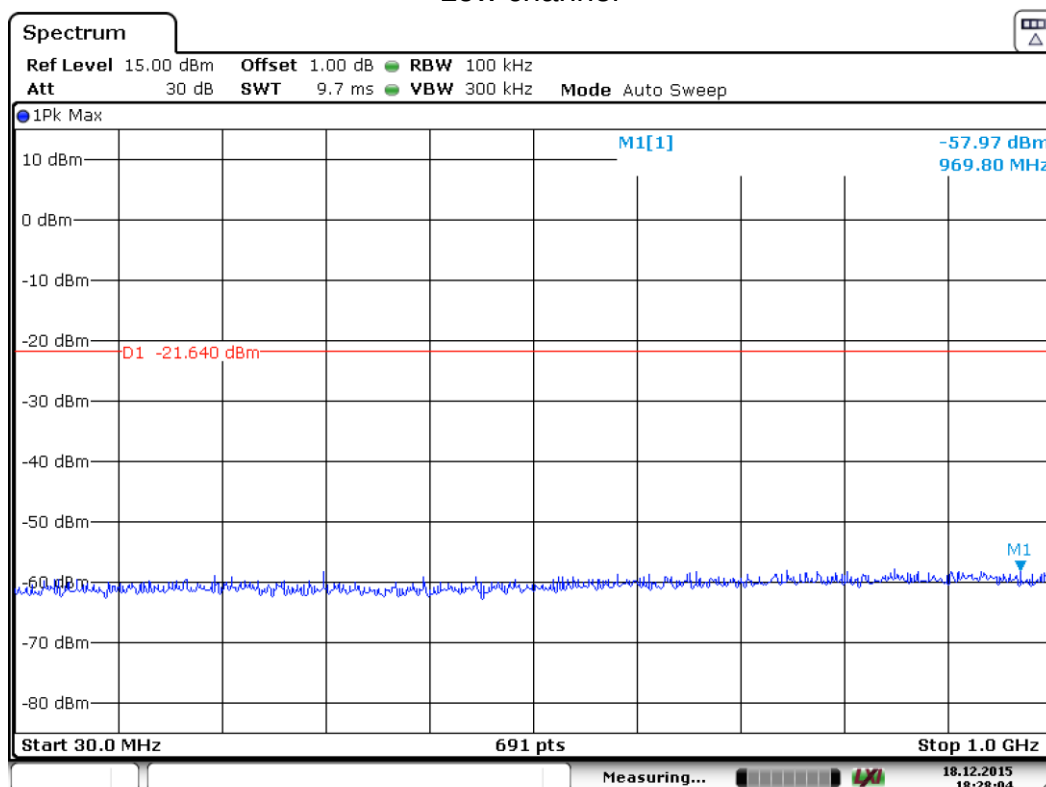
1. Establish a reference level by using the following procedure:
 - a. Set RBW=100 kHz. VBW $\geq$ 3RBW. Detector =peak, Sweep time = auto couple, Trace mode = max hold.
 - b. Allow trace to fully stabilize, use the peak marker function to determine the maximum PSD level.
2. Use the maximum PSD level to establish the reference level.
 - a. Set the center frequency and span to encompass frequency range to be measured.
 - b. Use the peak marker function to determine the maximum amplitude level. Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements, report the three highest emissions relative to the limit.
3. Repeat above procedures until other frequencies measured were completed.

Limit

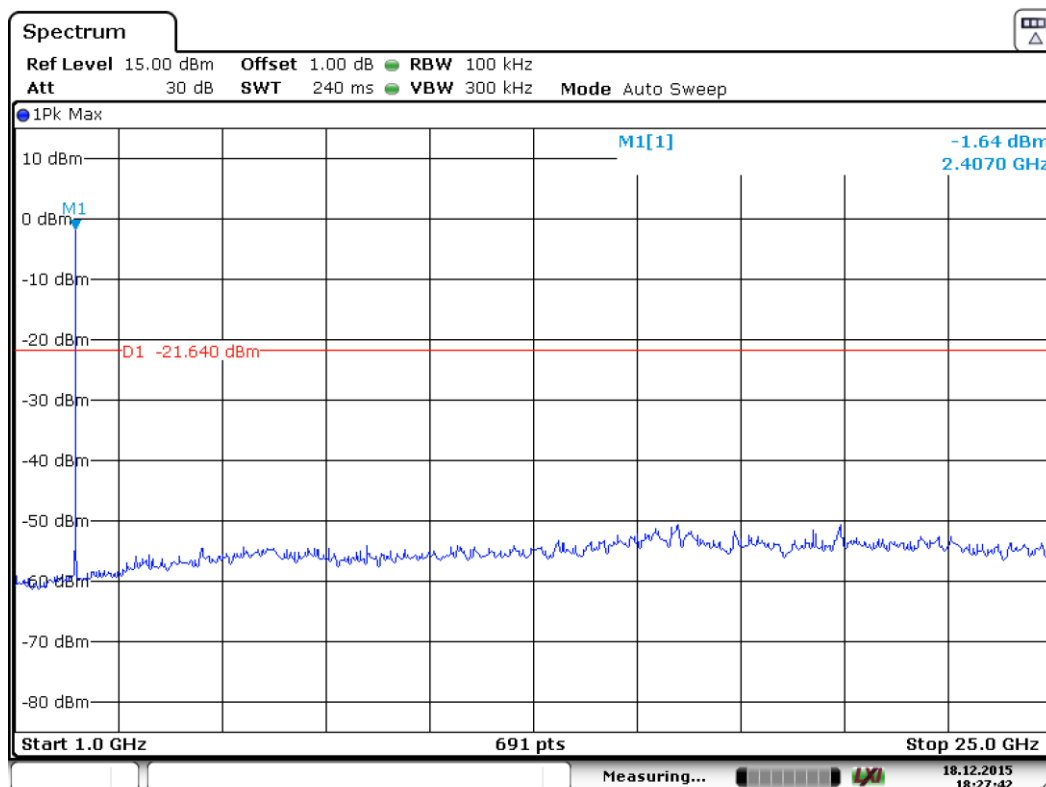
Frequency Range MHz	Limit (dBc)
30-25000	-20

Test data:

Low channel

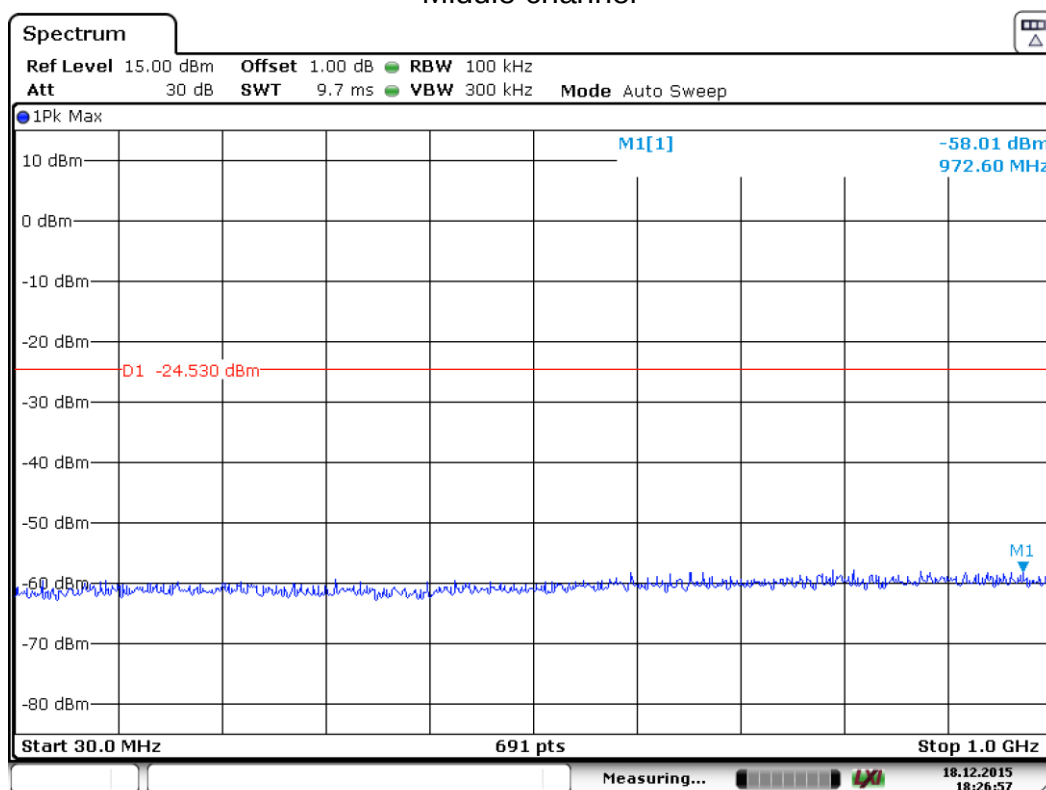


Date: 18.DEC.2015 18:28:04

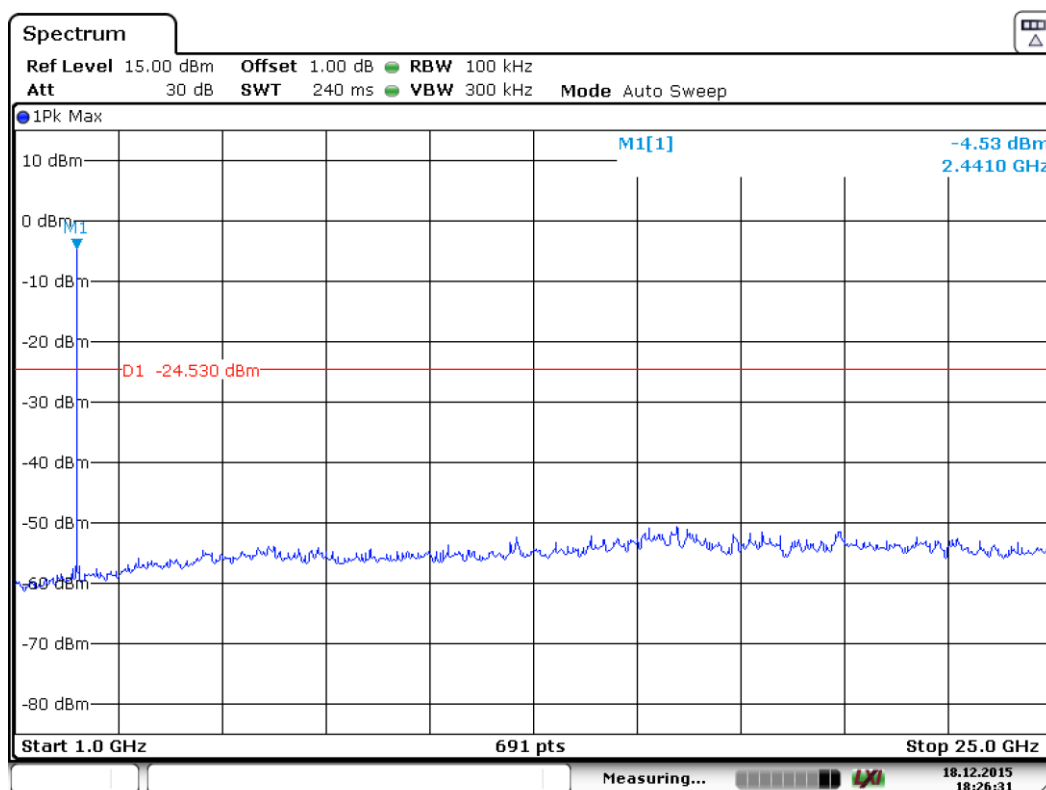


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Middle channel

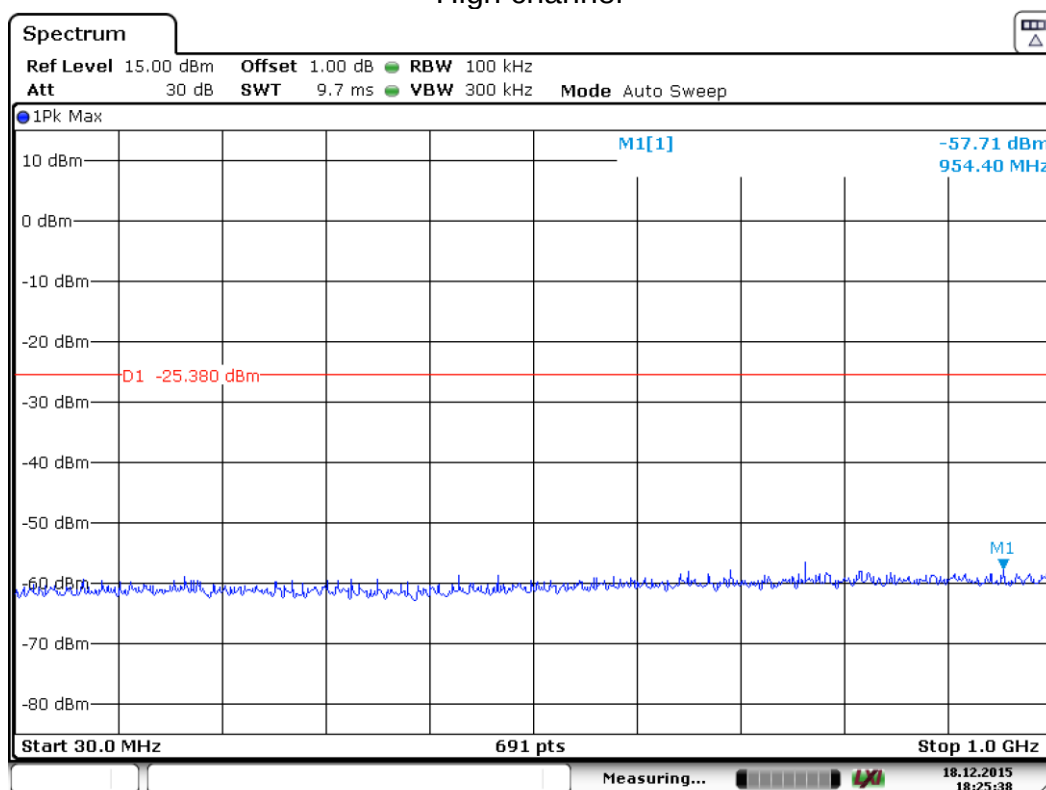


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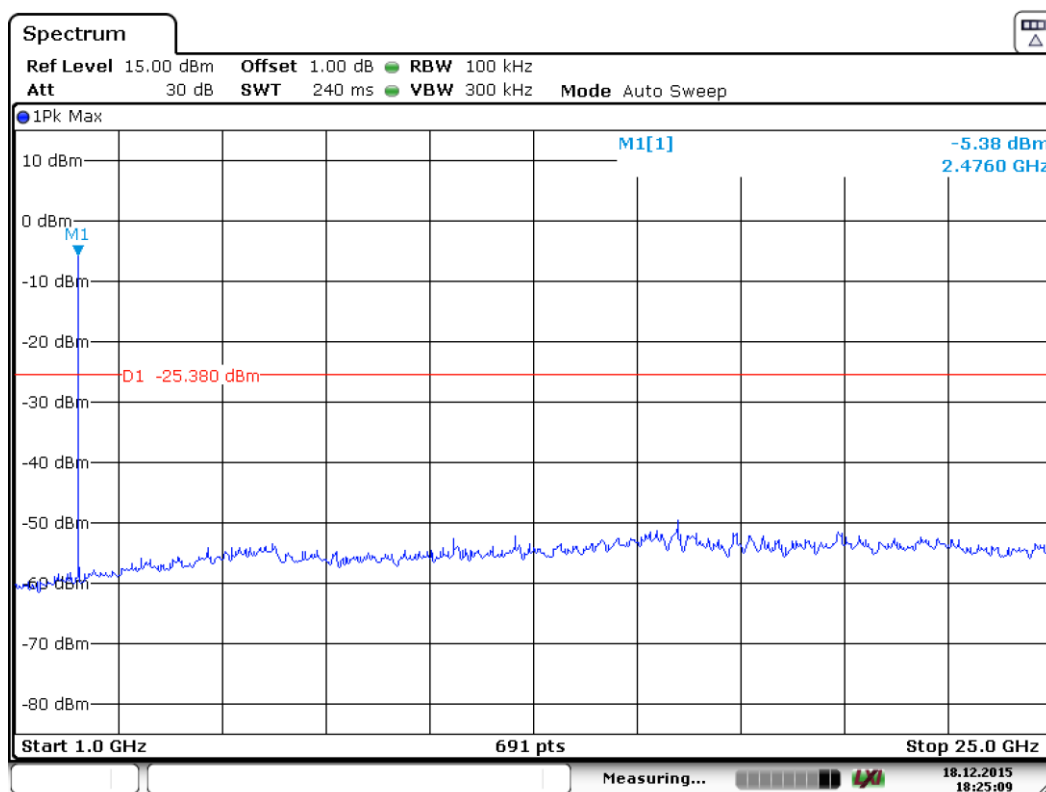


Date: 18.DEC.2015 18:26:30

High channel



Date: 18.DEC.2015 18:25:38



Date: 18.DEC.2015 18:25:10

9.6 Band edge

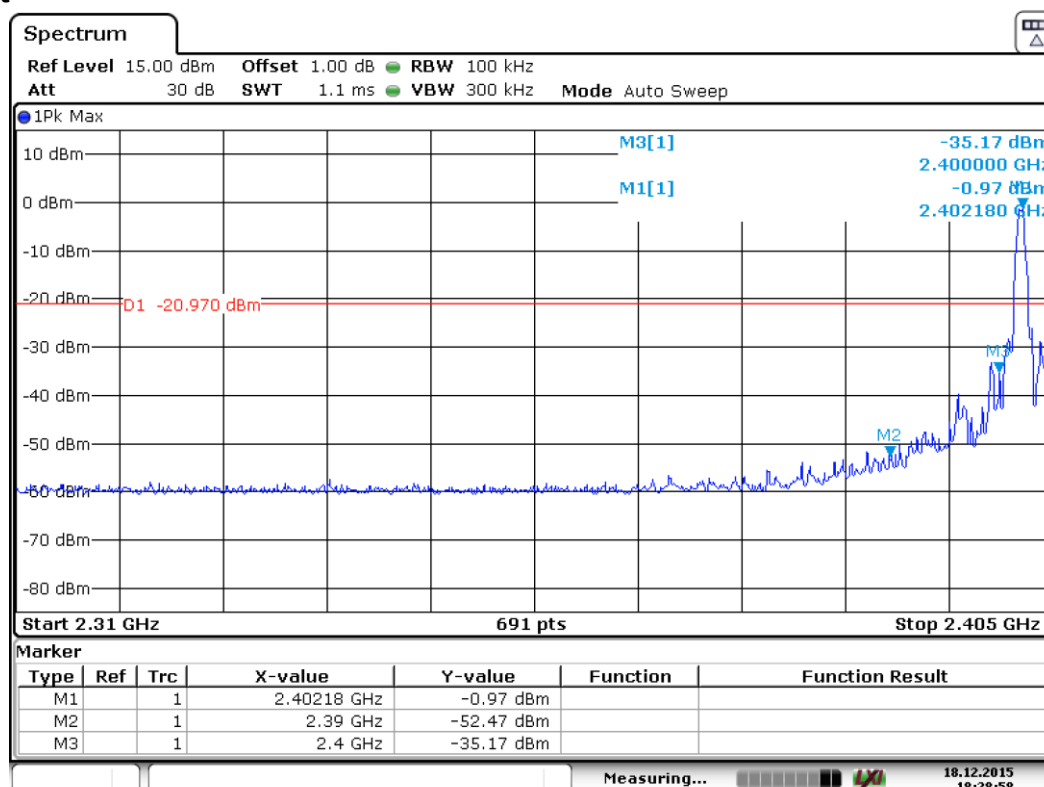
Test Method

- 1 Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 100 kHz, VBW $\geq$ RBW, Sweep = auto, Detector function = peak, Trace = max hold.
- 2 Allow the trace to stabilize, use the peak and delta measurement to record the result.
- 3 The level displayed must comply with the limit specified in this Section.

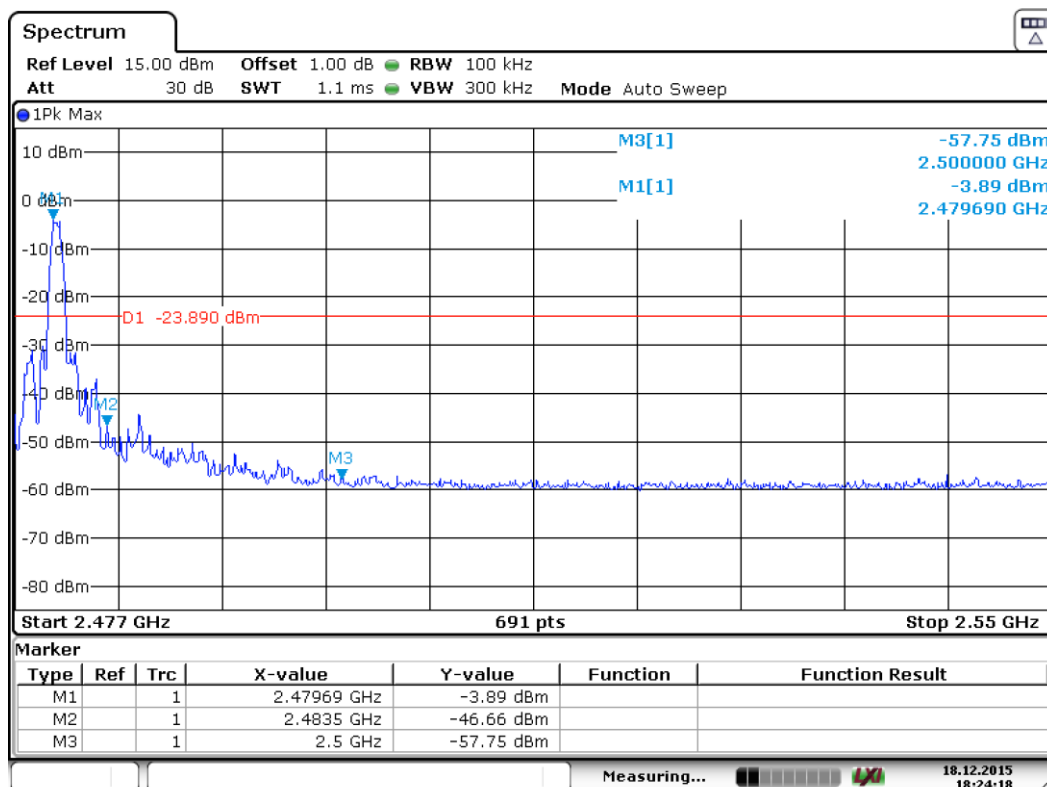
Limit

In any 100 kHz bandwidth outside the frequency bands in which the spread spectrum 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. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a) and RSS-Gen8.10, must also comply with the radiated emission limits specified in 15.209(a) (see Section 15.205(c)) and RSS-Gen.

Test result



Date: 18.DEC.2015 18:28:58



Date: 18.DEC.2015 18:24:18

9.7 Spurious radiated emissions for transmitter

Test Method

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
3. Use the following spectrum analyzer settings:
Span = wide enough to fully capture the emission being measured, RBW = 1 MHz for $f \geq 1\text{GHz}$, 100 kHz for $f < 1\text{GHz}$, VBW $\geq$ RBW, Sweep = auto, Detector function = peak, Trace = max hold
4. Follow the guidelines in ANSI C63.4-1992 with respect to maximizing the emission by rotating the EUT, adjusting the measurement antenna height and polarization, etc.
The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, submit this data. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
5. Set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. If the duty cycle per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a "duty cycle correction factor", derived from $20\log(\text{duty cycle}/100\text{ ms})$, in an effort to demonstrate compliance with the 15.209 limit. Submit this data.

Limit

The radio emission outside the operating frequency band 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. Radiated emissions which fall in the restricted bands, as defined in section 15.205, must comply with the radiated emission limits specified in section 15.209.

Frequency MHz	Field Strength uV/m	Field Strength dB μ V/m	Detector
30-88	100	40	QP
88-216	150	43.5	QP
216-960	200	46	QP
960-1000	500	54	QP
Above 1000	500	54	AV
Above 1000	5000	74	PK

Spurious radiated emissions for transmitter

According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.

Transmitting spurious emission test result as below:

Emission below 1GHz

Frequency (MHz)	QP (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol
192.960000	33.24	43.50	10.26	H
205.031111	41.80	43.50	1.70	H
337.705556	28.81	46.00	17.19	H
883.653889	33.82	46.00	12.18	H
46.274444	19.37	40.00	20.63	V
192.960000	19.30	43.50	24.20	V
430.663889	18.86	46.00	27.14	V
876.378889	30.64	46.00	15.36	V

Emission above 1GHz

2402MHz

Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol
1256.700000	32.85	74.00	41.15	V
2278.966667	33.20	74.00	40.80	V
4804.033333	42.18	74.00	31.82	V
7307.000000	37.77	74.00	36.23	V
1266.333333	33.18	74.00	40.82	H
4804.033333	41.05	74.00	32.95	H
7242.966667	36.57	74.00	37.43	H

2440MHz

Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol
1257.266667	32.67	74.00	41.33	H
4879.966667	41.48	74.00	32.52	H
7313.800000	38.39	74.00	35.61	H
1257.266667	32.03	74.00	41.97	V
4879.400000	42.37	74.00	31.63	V
7419.766667	37.67	74.00	36.33	V

2480MHz

Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol
1269.733333	33.24	74.00	40.76	H
4959.300000	41.41	74.00	32.59	H
7464.533333	39.31	74.00	34.69	H
1255.566667	32.05	74.00	41.95	V
4960.433333	42.25	74.00	31.75	V
7453.766667	39.06	74.00	34.94	V

Remark:

- (1) AV Emission Level= PK Emission Level+20log (dutycycle)
- (2) Data of measurement within 30-1000MHz frequency range shown "--" in the table above means the reading of emissions are attenuated more than 20db below the permissible limits or the field strength is too small to be measured.
- (3) "*" means the emission(s) appear within the restrict bands shall follow the requirement of section 15.205.

10 Test Equipment List

List of Test Instruments

	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
CE	EMI Test Receiver	Rohde & Schwarz	ESR 3	101782	2016-7-24
	LISN	Rohde & Schwarz	ENV4200	100249	2016-7-24
	LISN	Rohde & Schwarz	ENV216	100326	2016-7-24
	ISN	Rohde & Schwarz	ENY81	100177	2016-7-24
	ISN	Rohde & Schwarz	ENY81-CAT6	101664	2016-7-24
	High Voltage Probe	Rohde & Schwarz	TK9420(VT9 420)	9420-58	2016-7-24
	RF Current probe	Rohde & Schwarz	EZ-17	100816	2016-7-24
C	Signal Generator	Rohde & Schwarz	SMB100A	108272	2016-7-24
	Signal Analyzer	Rohde & Schwarz	FSV40	101030	2016-7-24
	Vector Signal Generator	Rohde & Schwarz	SMU 200A	105324	2016-7-24
	RF Switch Module	Rohde & Schwarz	OSP120/OS P-B157	101226/100851	2016-7-24
	EMI Test Receiver	Rohde & Schwarz	ESR 26	101269	2016-7-24
RE	Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	707	2016-8-14
	Horn Antenna	Rohde & Schwarz	HF907	102294	2016-7-24
	Pre-amplifier	Rohde & Schwarz	SCU 18	102230	2016-7-24
	3m Semi-anechoic chamber	TDK	9X6X6	----	2019-5-29

C - Conducted RF tests

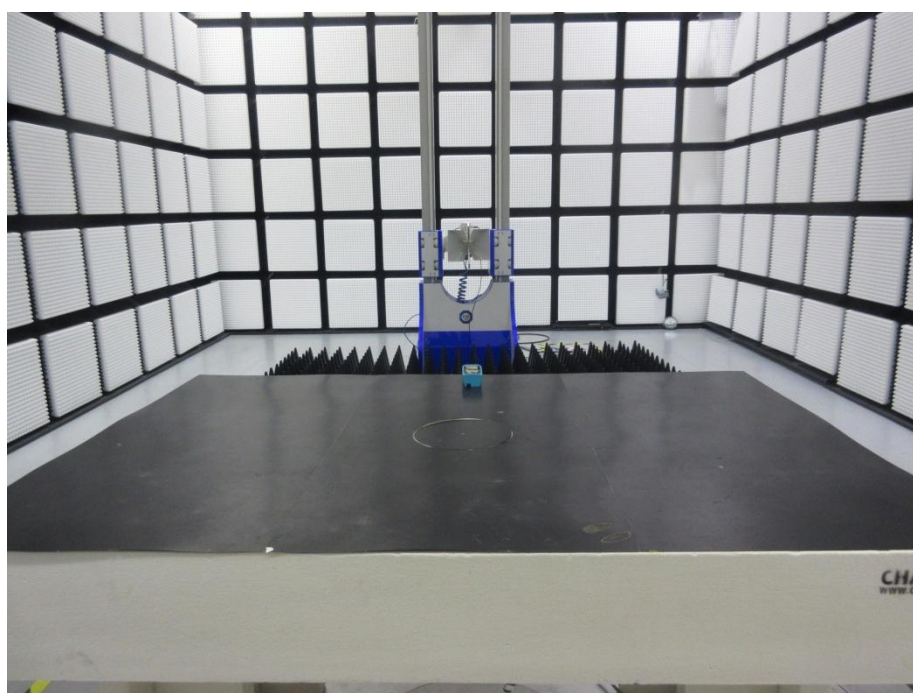
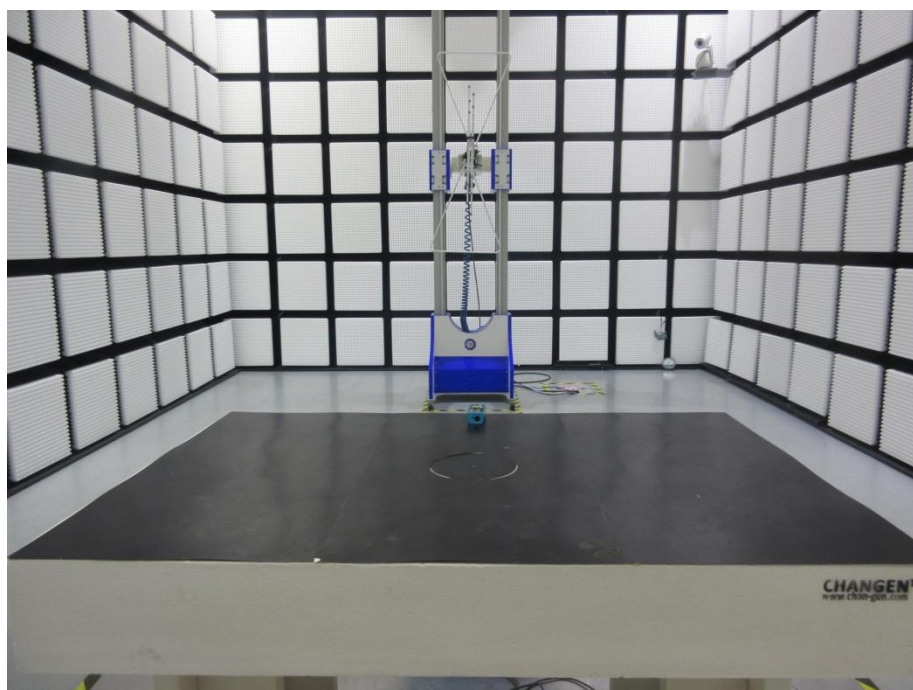
- Conducted peak output power
- 6dB bandwidth and 99% Occupied Bandwidth
- Power spectral density*
- Spurious RF conducted emissions
- Band edge

11 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

System Measurement Uncertainty	
Test Items	Extended Uncertainty
Radiation emission	U=4.32dB (30MHz-25GHz)
Output power test	0.94 dB
Power density test	2.10 dB
Bandwidth	1×10^{-9}

12 Appendix A - TEST SETUP PHOTOS

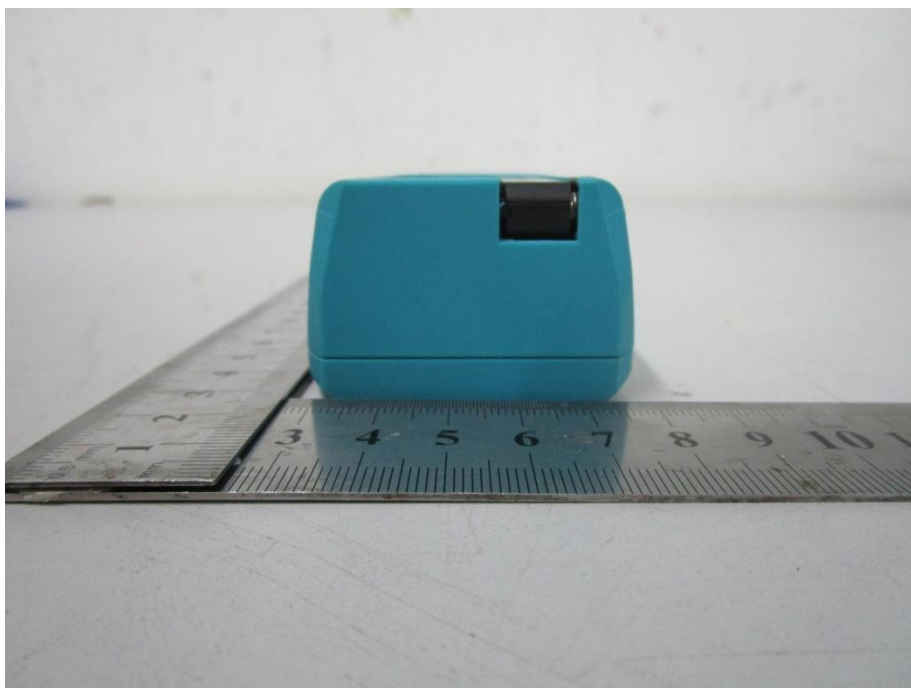


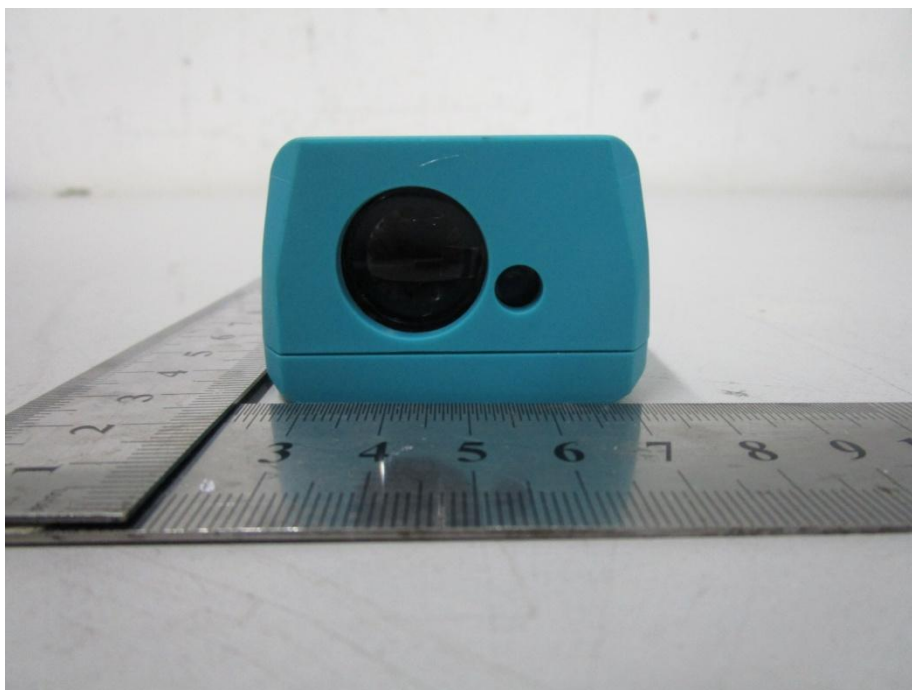
13 Appendix B - EUT PHOTOS

External photos



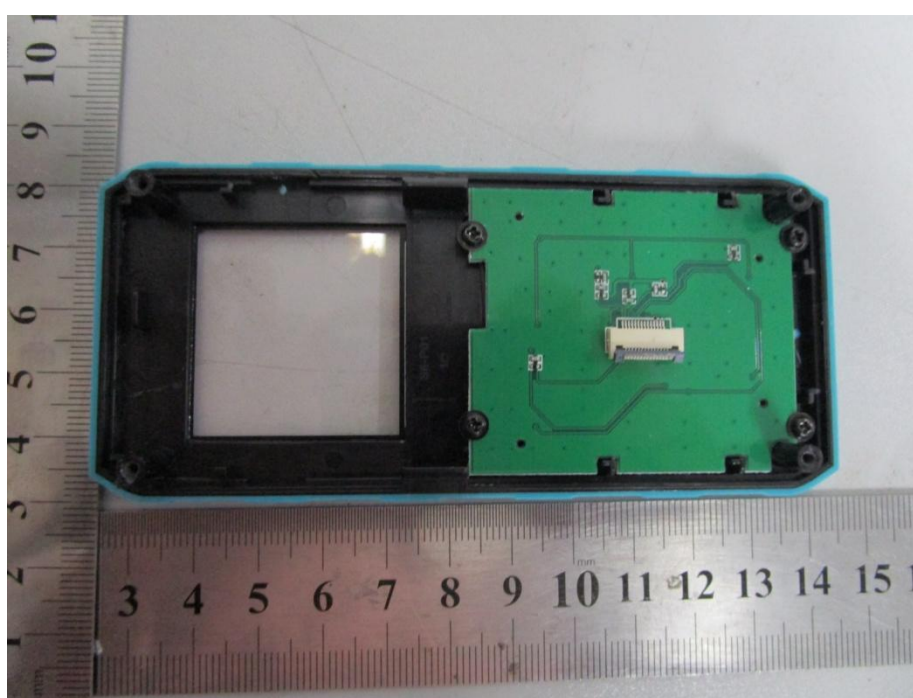


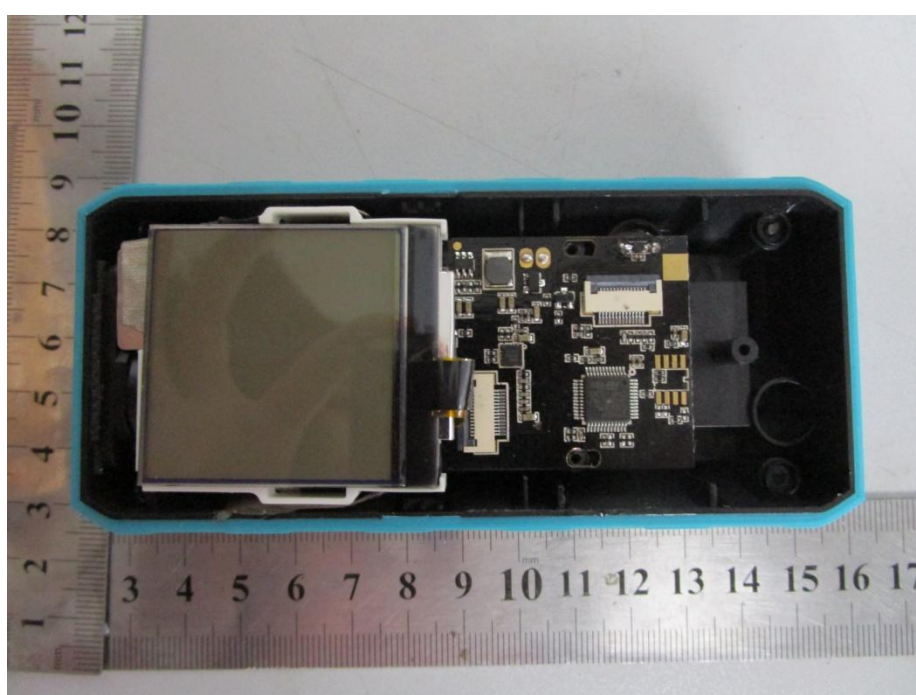


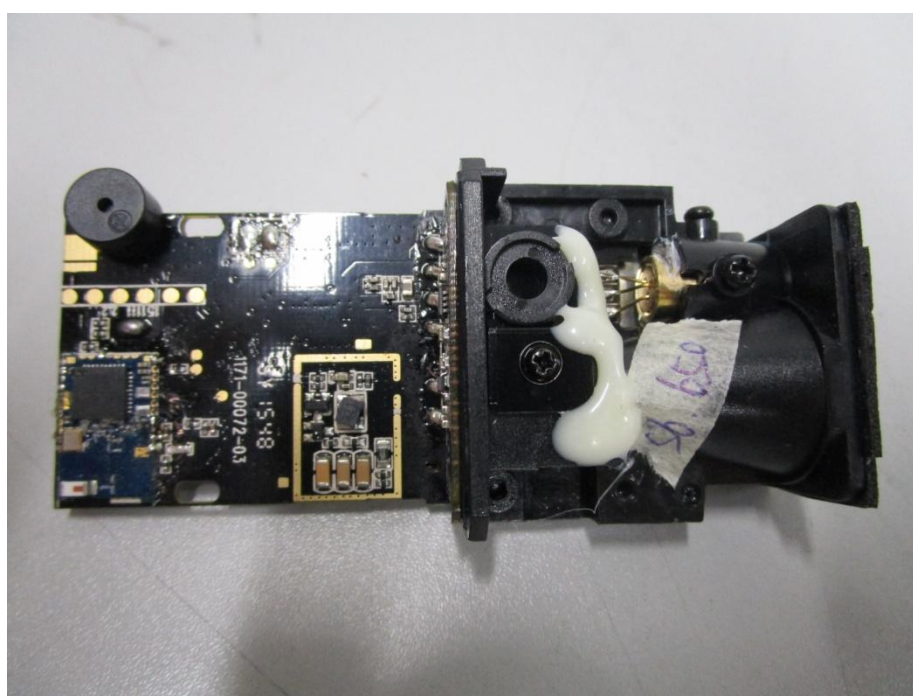


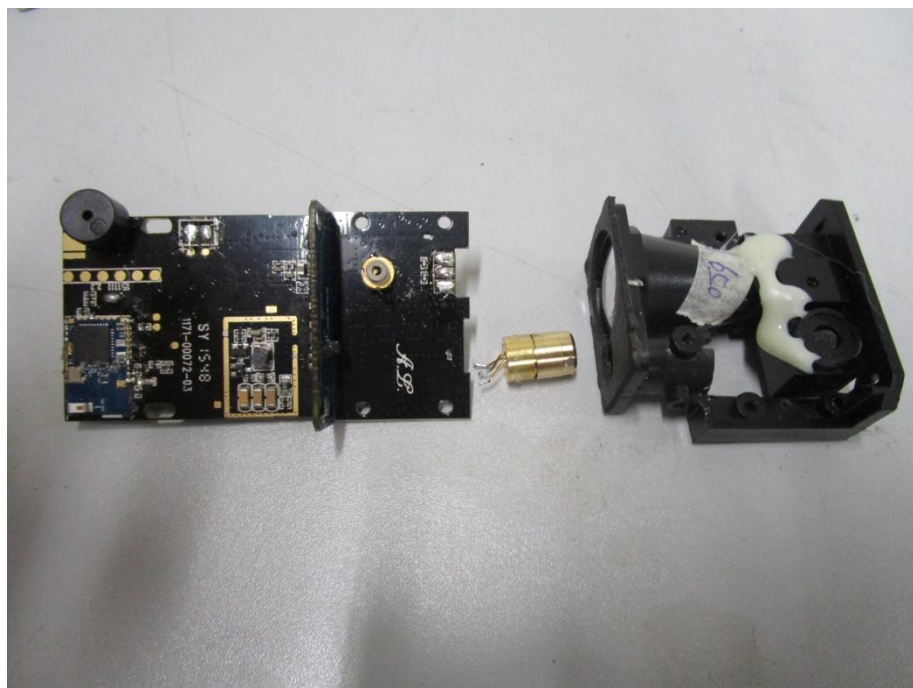
Internal photos

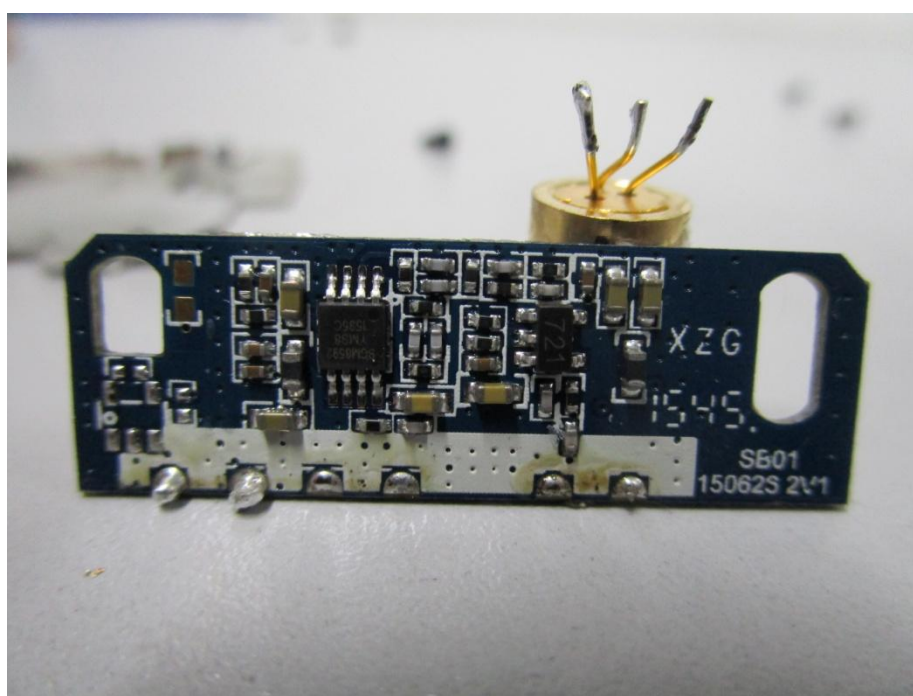


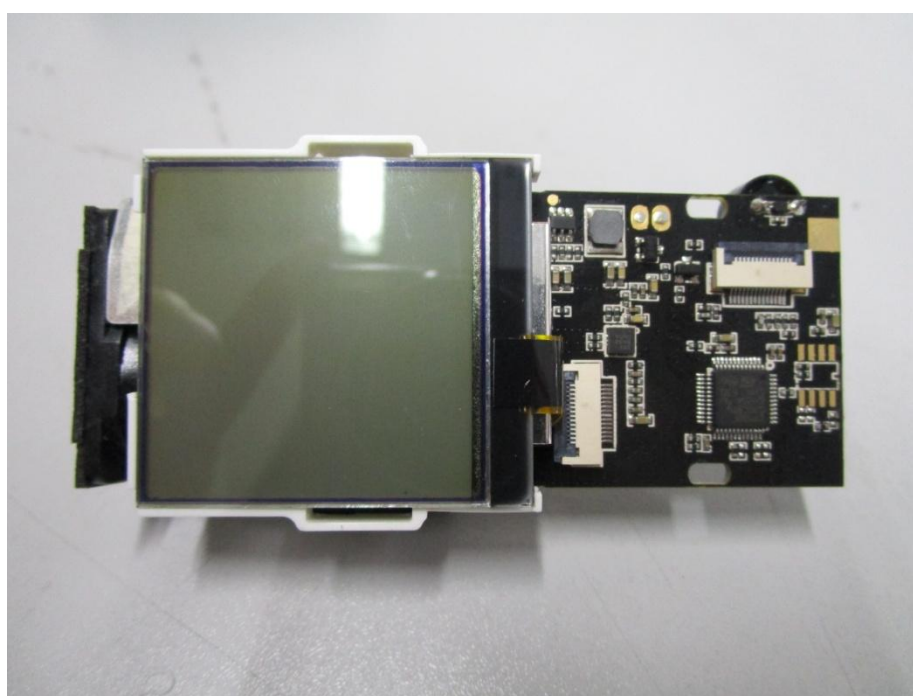
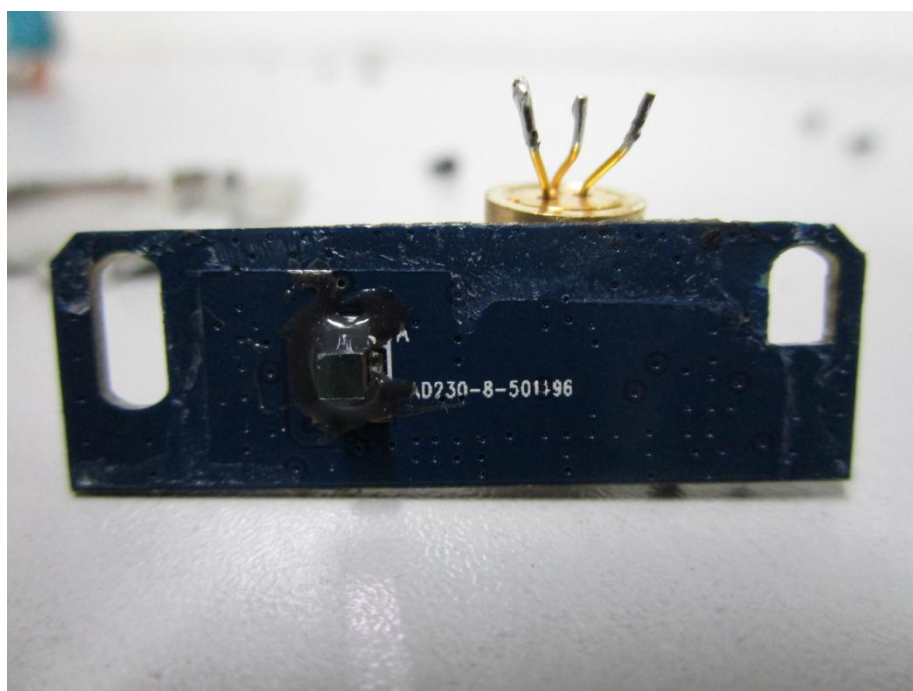


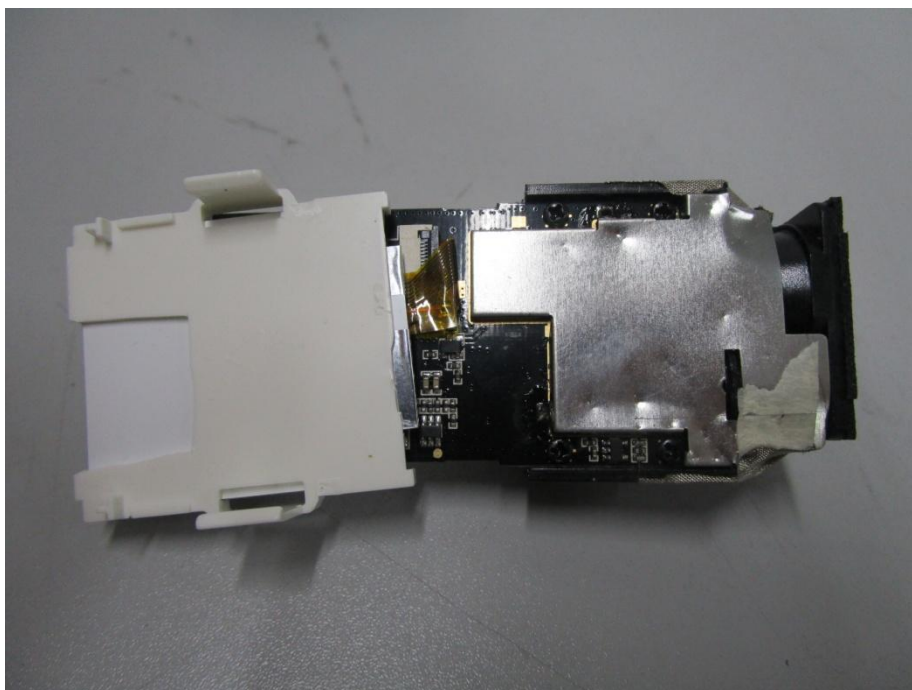


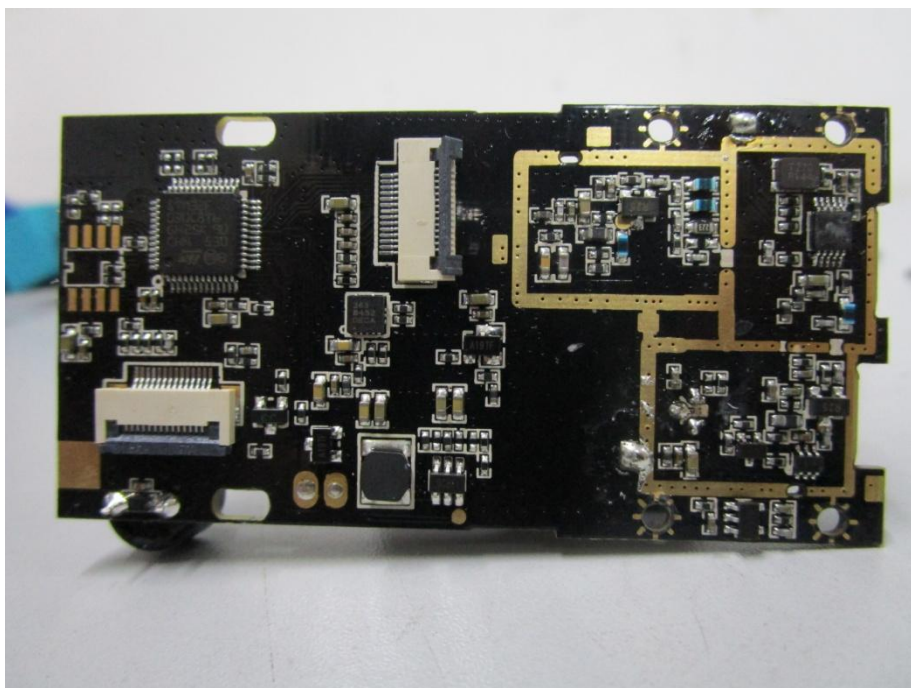












ANTENNA POSITION

