

EMC

Measurement and Test Report

For

ShenZhen HaiLingKe Electronic co., Ltd.

**3F Caiyue Mansion, No.24 Liuxian blvd, LongHua District,
Shenzhen, Guangdong, China**

Test Standards: Draft ETSI EN 301 489-1 V2.2.0 (2017-03)
Draft ETSI EN 301 489-17 V3.2.0 (2017-03)

Product Description: WIFI module

Tested Model: HLK-RM80S

Report No.: STR17058329E-3

Tested Date: 2017-06-12 to 2017-07-04

Issued Date: 2017-07-06

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Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by Shenzhen SEM.Test Technology Co., Ltd.

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1.GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Manufacturer: ShenZhen HaiLingKe Electronic co., Ltd.
Address of manufacturer: 3F Caiyue Mansion, No.24 Liuxian blvd, LongHua District,
Shenzhen, Guangdong, China

General Description of EUT	
Product Name:	WIFI module
Brand Name:	HI-LINK
Model No.:	HLK-RM80S
Adding Model(s):	/
Rated Voltage:	3.3V by DC power supply
Software Version:	/
Hardware Version:	/
<i>Note: The test data is gathered from a production sample, provided by the manufacturer.</i>	

Technical Characteristics of EUT	
Support Standards:	802.11b, 802.11g, 802.11n-HT20/40
Frequency Range:	2412-2472MHz for 802.11b/g/n(HT20) 2422-2462MHz for 802.11n(HT40)
Max.RF Output Power:	18.94dBm (EIRP)
Type of Modulation:	CCK, OFDM, QPSK, BPSK, 16QAM, 64QAM
Data Rate:	1-11Mbps, 6-54Mbps, up to 150Mbps
Quantity of Channels	13 for 802.11b/g/n(HT20), 9 for 802.11n(HT40)
Channel Separation:	5MHz
Type of Antenna:	Integral Antenna
Antenna Gain:	2.94dBi

1.2 Test Standards

The following report is prepared on behalf of the ShenZhen HaiLingKe Electronic co., Ltd. in accordance with Draft ETSI EN 301 489-1 V2.2.0, Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; and Draft ETSI EN 301 489-17 V3.2.0, Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for 2,4 GHz wideband transmission systems and 5 GHz high performance RLAN equipment.

The objective of the manufacturer is to demonstrate compliance with the standards Draft ETSI EN 301489-1 and Draft ETSI EN 301489-17.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product maybe which result in lowering the emission/immunity should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with the standard ETSI EN 301489-1, Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements.

1.4 Test Facility

FCC – Registration No.: 934118

Shenzhen SEM.Test Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files and the Registration is 934118.

Industry Canada (IC) Registration No.: 11464A

The 3m Semi-anechoic chamber of Shenzhen SEM.Test Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A.

CNAS Registration No.: L4062

Shenzhen SEM.Test Technology Co., Ltd. is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L4062. All measurement facilities used to collect the measurement data are located at 1/F, Building A, Hongwei Industrial Park, Liuxian 2nd Road, Bao'an District, Shenzhen, P.R.C (518101).

1.5 EUT Setup and Operation Mode

The equipment under test (EUT) was configured to measure its highest possible emission/immunity level. The test modes were adapted according to the operation manual for use, more detailed description as follows:

Test Mode List		
Test Mode	Description	Remark
TM1	Working	Test with DC power supply
TM2	Transmitting	TT, CT for EMS testing
TM3	Receiving	TR, CR for EMS testing

Special Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
DC power supply	QJE	QJ6010E	29476

1.6 Measurement Uncertainty

Measurement uncertainty		
Parameter	Conditions	Uncertainty
Conducted Emissions	150kHz-30MHz	$\pm 2.88\text{dB}$
Radiated Emissions	30MHz-6GHz	$\pm 5.10\text{dB}$

1.7 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal Date	Due Date
Spectrum Analyzer	Rohde & Schwarz	FSP	836079/035	2017-06-12	2018-06-11
EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2017-06-12	2018-06-11
Amplifier	Agilent	8447F	3113A06717	2017-06-12	2018-06-11
Amplifier	C&D	PAP-1G18	2002	2017-06-12	2018-06-11
Broadband Antenna	Schwarz beck	VULB9163	9163-333	2017-06-12	2018-06-11
Horn Antenna	ETS	3117	00086197	2017-06-12	2018-06-11
Loop Antenna	Schwarz beck	FMZB 1516	9773	2017-06-12	2018-06-11
EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2017-06-12	2018-06-11
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2017-06-12	2018-06-11
AC LISN	Schwarz beck	NSLK8126	8126-224	2017-06-12	2018-06-11
DC LISN	Schwarz beck	NNBM8126D	279	2017-06-12	2018-06-11
8-WIRE LISN	Schwarz beck	8158	CAT3-8158-0059	2017-06-12	2018-06-11
8-WIRE LISN	Schwarz beck	8158	CAT5-8158-0117	2017-06-12	2018-06-11
Digital Power Analyzer	California Instrument	PACS-1	72831	2017-06-12	2018-06-11

Power Source	California Instrument	5001iX	25965	2017-06-12	2018-06-11
ESD Generator	TESQ AG	NSG 437	161	2017-06-12	2018-06-11
Signal Generator	Rohde & Schwarz	SMT03	100059	2017-06-12	2018-06-11
Voltage Probe	Rohde & Schwarz	URV5-Z2	100013	2017-06-12	2018-06-11
Power Amplifier	AR	150W1000	300999	2017-06-12	2018-06-11
Power Amplifier	AR	25S1G4AM1	305993	2017-06-12	2018-06-11
Transient 2000	EMC PARTNER	TRA2000	863	2017-06-12	2018-06-11
CW Simulator	EM Test	CWS 500C	0900-03	2017-06-12	2018-06-11
EMC PRO	KEYTEK	EMCPro	0509124	2017-06-12	2018-06-11
Coil	KEYTEK	F-1000-4-8	0533	2017-06-12	2018-06-11

1.8 Performance Criteria for EMS

According Clause 6.1 of EN 301 489-17,

The performance criteria are:

- performance criteria A for immunity tests with phenomena of a continuous nature;
- performance criteria B for immunity tests with phenomena of a transient nature;
- performance criteria C for immunity tests with power interruptions exceeding a certain time.

The equipment shall meet the minimum performance criteria as specified in the following clauses.

Table 1: Performance criteria

Criteria	During test	After test
A	Shall operate as intended. (see note 1). Shall be no loss of function. Shall be no unintentional transmissions.	Shall operate as intended. Shall be no degradation of performance (see note 3). Shall be no loss of function. Shall be no loss of stored data or user programmable functions.
B	May show loss of function (one or more). May show degradation of performance (see note 2). Shall be no unintentional transmissions.	Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no degradation of performance (see note 3). Shall be no loss of stored data or user programmable functions.
C	May be loss of function (one or more).	Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no degradation of performance (see note 3).
<p>NOTE 1: Operate as intended during the test allows a level of degradation not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.</p> <p>NOTE 2: Degradation of performance during the test is understood as a degradation to a level not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.</p> <p>NOTE 3: No degradation of performance after the test is understood as no degradation below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. After the test no change of actual operating data or user retrievable data is allowed. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.</p>		

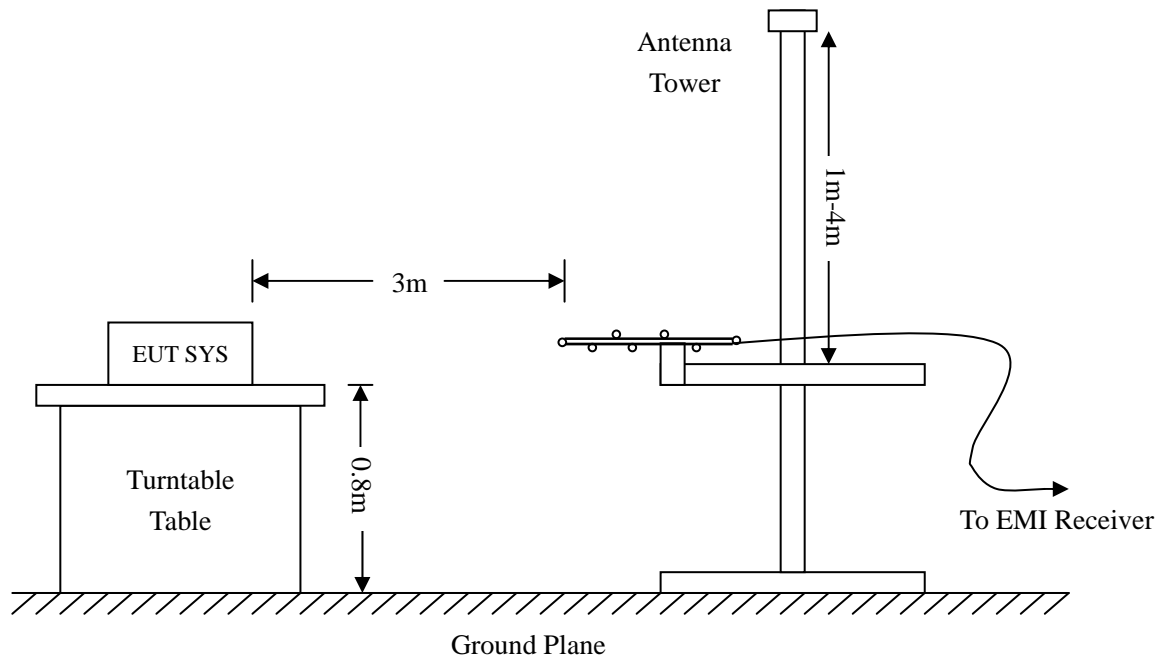
2. SUMMARY OF TEST RESULTS

Standards	Reference	Description of Test Item	Result
Draft ETSI EN 301489-1 V2.2.0 (2017-03)	8.2	Radiated Emissions	Pass
	8.3	Conducted Emissions for DC Power Port	N/A
	8.4	Conducted Emissions for AC Power Port	N/A
	8.5	Harmonic Current Emissions	N/A
	8.6	Voltage Fluctuations and Flicker	N/A
	8.7	Telecommunication Ports	N/A
	9.2	Radio Frequency Electromagnetic Field	Pass
	9.3	Electrostatic Discharge	Pass
	9.4	Fast Transients, Common Mode	N/A
	9.5	Radio Frequency, Common Mode	N/A
	9.6	Transient and Surges in the Vehicular Environment	N/A
	9.7	Voltage Dips and Interruptions	N/A
	9.8	Surges	N/A
<p>Pass: The EUT complies with the essential requirements in the standard</p> <p>Fail: The EUT does not comply with the essential requirements in the standard</p> <p>N/A: not applicable</p>			

3. Radiated Emissions

3.1 Test Procedure

Test is conducting under the description of EN55022 Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement.



3.2 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and the Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dBμV means the emission is 6dBμV below the maximum limit for Class B device. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{EN 301489 Class B Limit}$$

3.3 Environmental Conditions

Temperature:	23° C
Relative Humidity:	53%
ATM Pressure:	1011 mbar

3.4 Summary of Test Results/Plots

According to the data in section 4.4, the EUT complied with the EN 301489 Class B standards, and had the worst margin is:

-8.77 dB at 95.7622 MHz in the Horizontal polarization, 30 MHz to 6 GHz, 3Meters

Plot of Radiated Emissions Test Data (Below 1GHz)

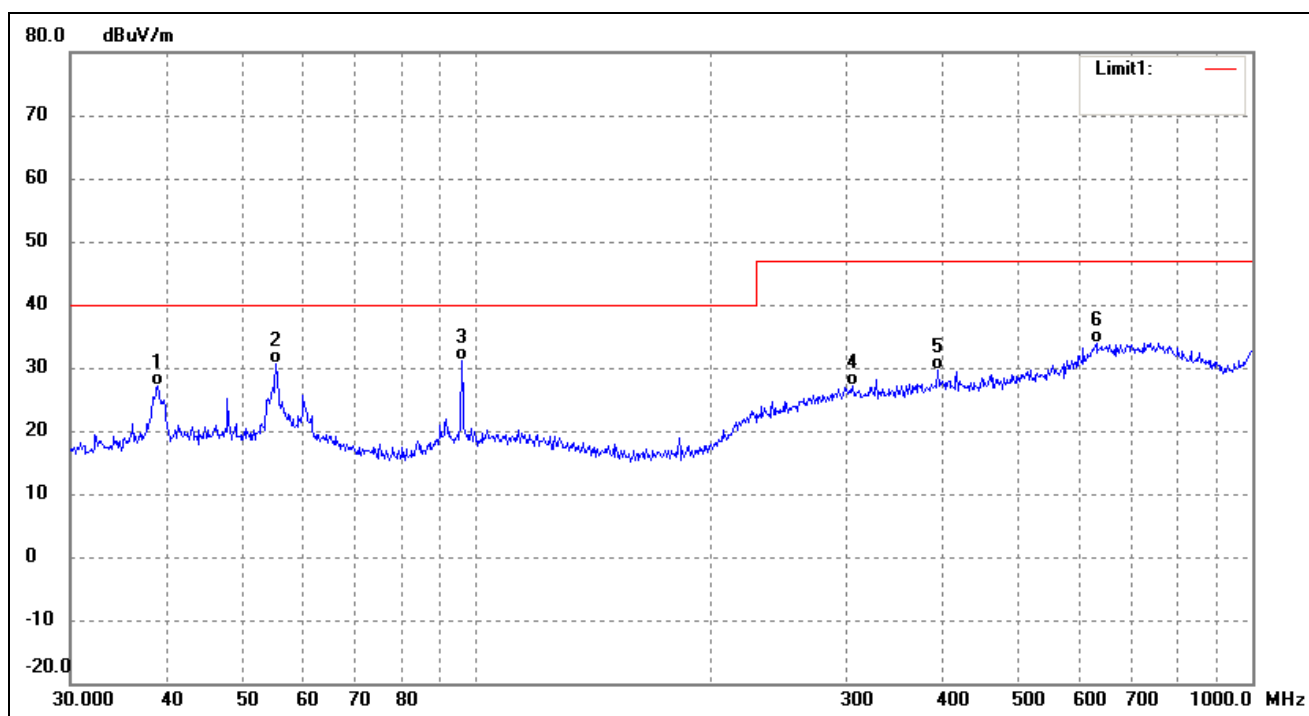
EUT: *WIFI module*

Tested Model: *HLK-RM80S*

Operating Condition: *TM1*

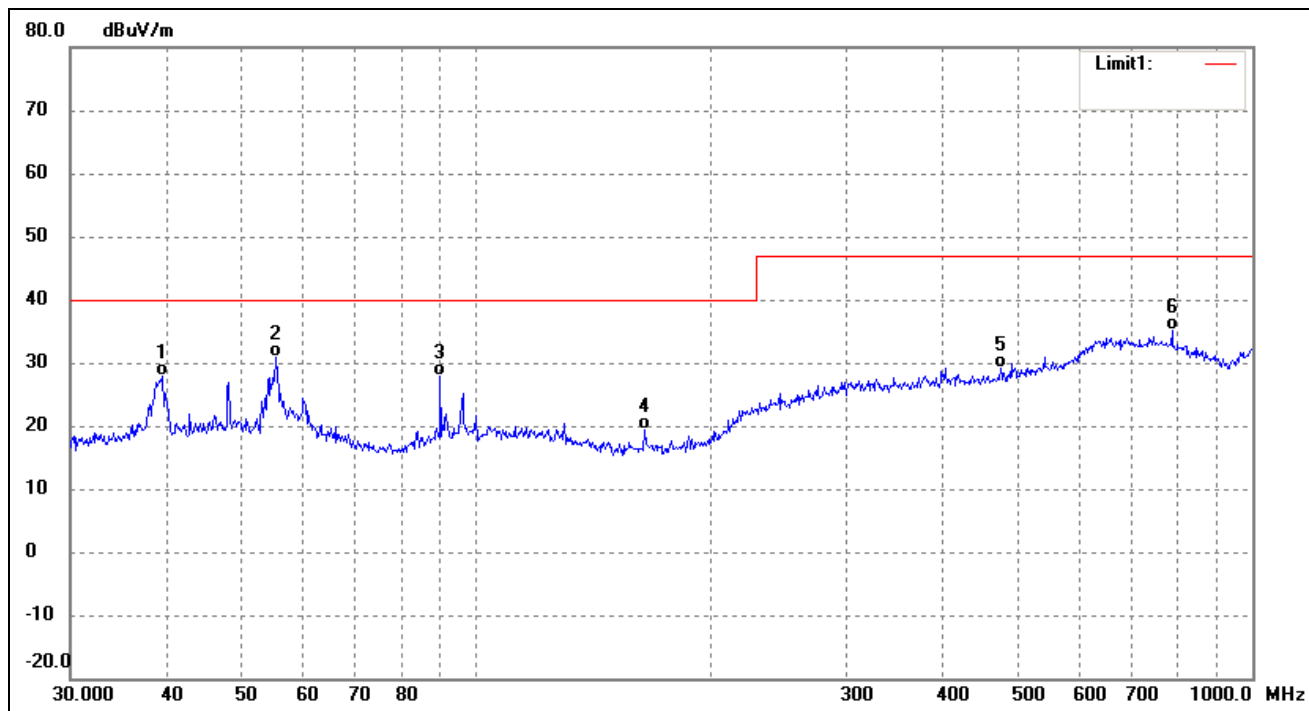
Comment: *DC 3.3V*

Test Specification: *Horizontal*



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	38.8879	22.48	4.76	27.24	40.00	-12.76	337	100	QP
2	55.2207	25.53	5.02	30.55	40.00	-9.45	90	100	QP
3	95.7622	26.94	4.29	31.23	40.00	-8.77	70	100	QP
4	305.6800	15.07	11.94	27.01	47.00	-19.99	112	100	QP
5	393.4724	17.25	12.39	29.64	47.00	-17.36	160	100	QP
6	629.4772	16.14	17.70	33.84	47.00	-13.16	306	100	QP

Test Specification: Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	39.4372	23.00	4.85	27.85	40.00	-12.15	258	100	QP
2	55.2207	25.74	5.02	30.76	40.00	-9.24	94	100	QP
3	89.9047	24.61	3.38	27.99	40.00	-12.01	280	100	QP
4	164.9075	16.99	2.44	19.43	40.00	-20.57	111	100	QP
5	473.8347	16.32	12.70	29.02	47.00	-17.98	260	100	QP
6	787.8513	18.47	16.59	35.06	47.00	-11.94	189	100	QP

Plot of Radiated Emissions Test Data (Above 1GHz)

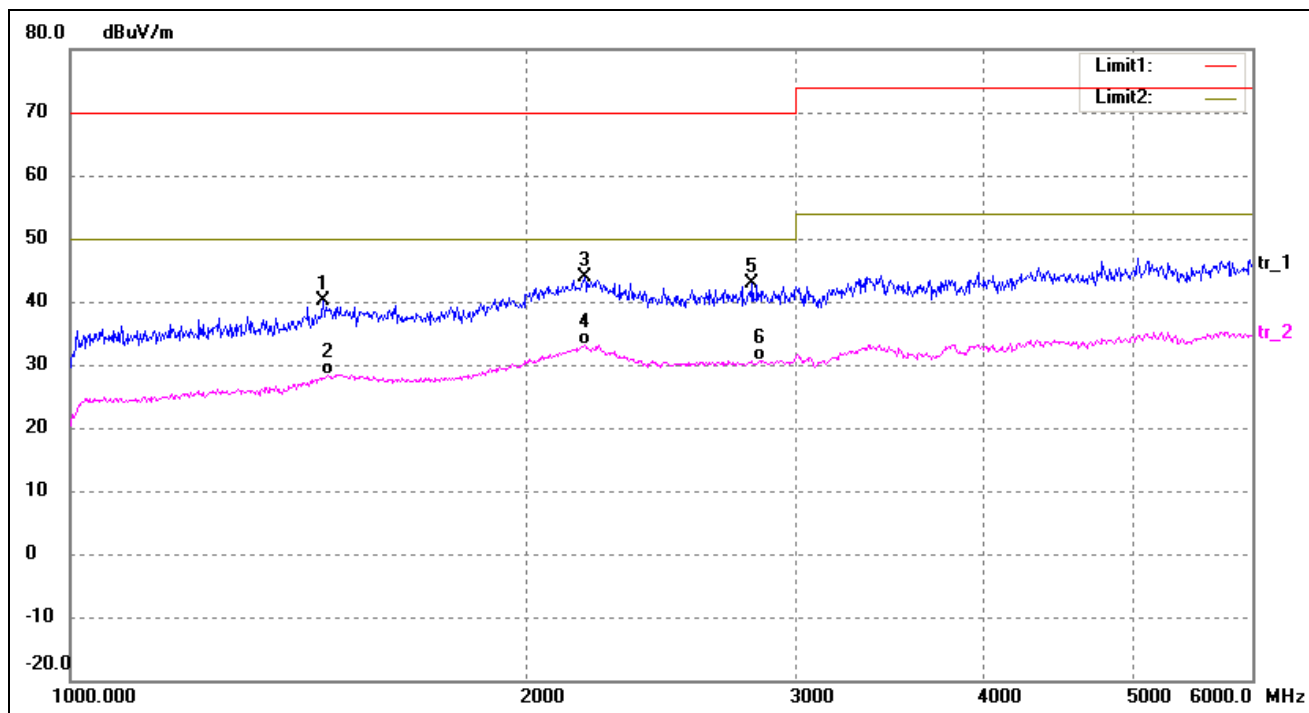
EUT: WIFI module

Tested Model: HLK-RM80S

Operating Condition: TM1

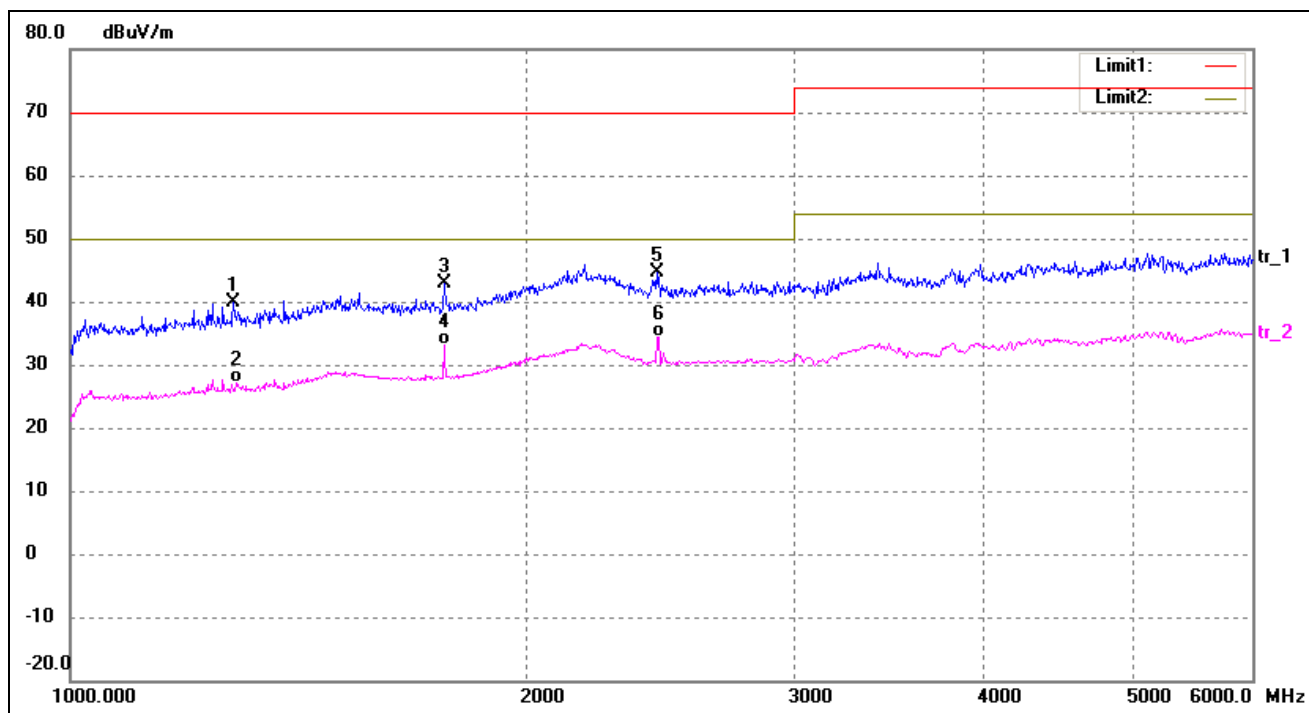
Comment: DC 3.3V

Test Specification: Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	1467.318	47.45	-7.24	40.21	70.00	-29.79	242	100	QP
2	1477.872	35.32	-7.05	28.27	50.00	-21.73	91	100	AVG
3	2180.197	46.02	-2.02	44.00	70.00	-26.00	88	100	QP
4	2180.197	35.25	-2.02	33.23	50.00	-16.77	192	100	AVG
5	2811.857	46.97	-4.08	42.89	70.00	-27.11	315	100	QP
6	2842.249	34.73	-4.06	30.67	50.00	-19.33	215	100	AVG

Test Specification: Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	1280.516	49.20	-9.36	39.84	70.00	-30.16	179	100	QP
2	1287.417	36.38	-9.34	27.04	50.00	-22.96	337	100	AVG
3	1761.553	49.91	-7.05	42.86	70.00	-27.14	78	100	QP
4	1761.553	40.29	-7.05	33.24	50.00	-16.76	265	100	AVG
5	2431.997	49.09	-4.42	44.67	70.00	-25.33	55	100	QP
6	2440.728	38.81	-4.41	34.40	50.00	-15.60	109	100	AVG

4. Electrostatic Discharge (ESD)

4.1 Test Procedure

Test is conducting under the description of IEC61000-4-2.

Test Performance

Performance Criterion: B for TT, TR

Environmental Conditions

Temperature:	26 °C
Relative Humidity:	55%
ATM Pressure:	1011 mbar

4.2 Electrostatic Discharge Immunity Test Data

EN 61000-4-2 Test Points	Test Levels (kV)							
	-2	+2	-4	+4	-6	+6	-8	+8
Air Discharge								
/	/	/	/	/	/	/	/	/
Direct Contact Discharge								
Shielding case	B	B	B	B				
Base pin	B	B	B	B				
Antenna connector	B	B	B	B				

EN 61000-4-2 Test Points	Test Levels (kV)							
	Indirect Contact Discharge (HCP)				Indirect Contact Discharge (VCP)			
	-2	+2	-4	+4	-2	+2	-4	+4
Front Side	A	A	A	A	A	A	A	A
Top Side	A	A	A	A	A	A	A	A
Back Side	A	A	A	A	A	A	A	A
Left Side	A	A	A	A	A	A	A	A
Right Side	A	A	A	A	A	A	A	A

Test Result: Pass

5. Radio Frequency Electromagnetic Field (R/S)

5.1 Test Procedure

Test is conducting under the description of IEC61000-4-3.

Test Performance

Performance Criterion: A for CT, CR

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	52%
ATM Pressure:	1010 mbar

5.2 Continuous Radiated Disturbances Test Data

Frequency step: 1% of fundamental

Dwell time: 1 second



Modulation: AM by 1kHz sine wave with 80% modulation depth

Frequency Range(MHz)	Field (V/m)	Front		Rear		Left Side		Right Side	
		VERT	HORI	VERT	HORI	VERT	HORI	VERT	HORI
80-1000	3	A	A	A	A	A	A	A	A
1000-3000	3	A	A	A	A	A	A	A	A
3000-6000	3	A	A	A	A	A	A	A	A

Test Result: Pass

EXHIBIT 1 - PRODUCT LABELING

Proposed CE Label Format

WIFI module Model: HLK-RM80S Brand: HI-LINK Importer Name: XXX Importer Address: XXX ShenZhen HaiLingKe Electronic co., Ltd. 3F Caiyue Mansion, No.24 Liuxian blvd, LongHua District, Shenzhen, Guangdong, China	 
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Specifications: Text is Black in color and is justified. Labels are printed in indelible ink on permanent adhesive backing or silk-screened onto the EUT or shall be affixed at a conspicuous location on the EUT. The 'CE' marking must be affixed to the EUT or to its data plate. Where this is not possible or not warranted on account of the nature of the apparatus, it must be affixed to the packaging, if any, and to the accompanying documents. The 'CE' marking is allowed less than 5 mm but must clear. If the 'CE' marking is reduced or enlarged the proportions given in the above graduated drawing must be respected. The Importer name, address and Manufacturer name and address should indicate on marking label or packaging or in a document accompanying

Proposed Label Location on EUT

CE Label Location

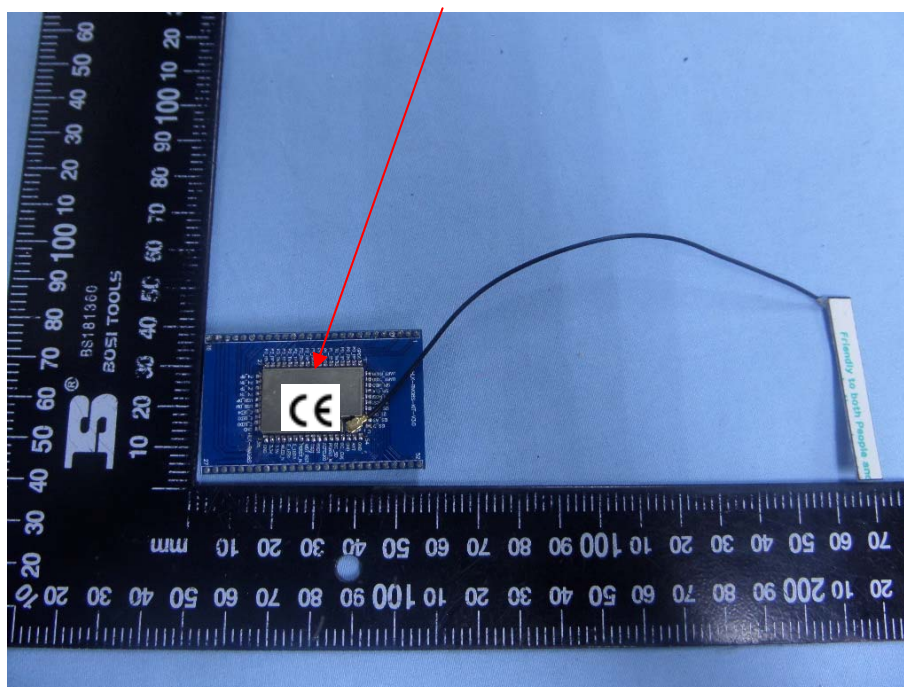
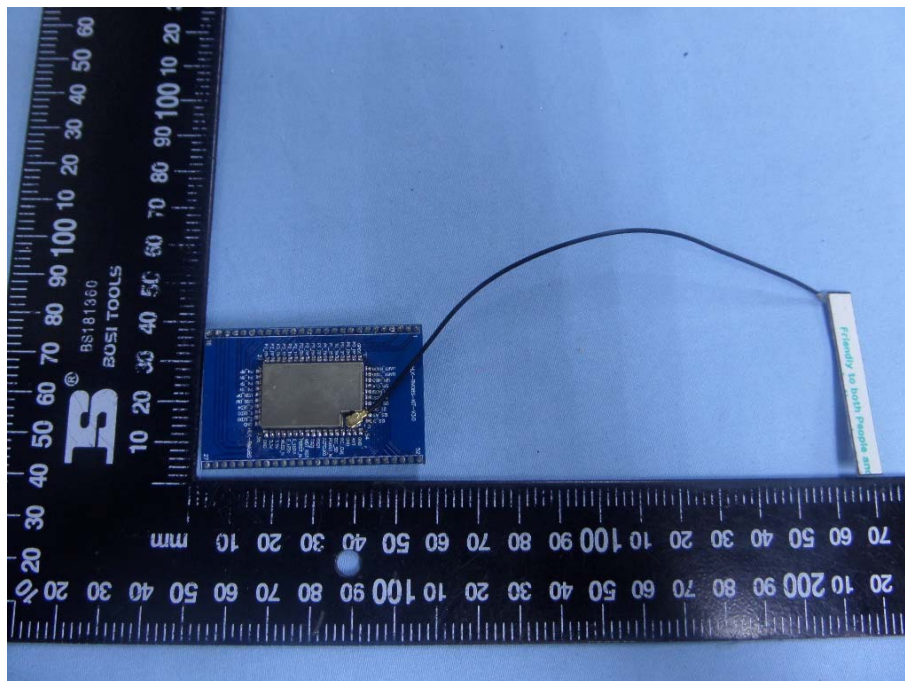
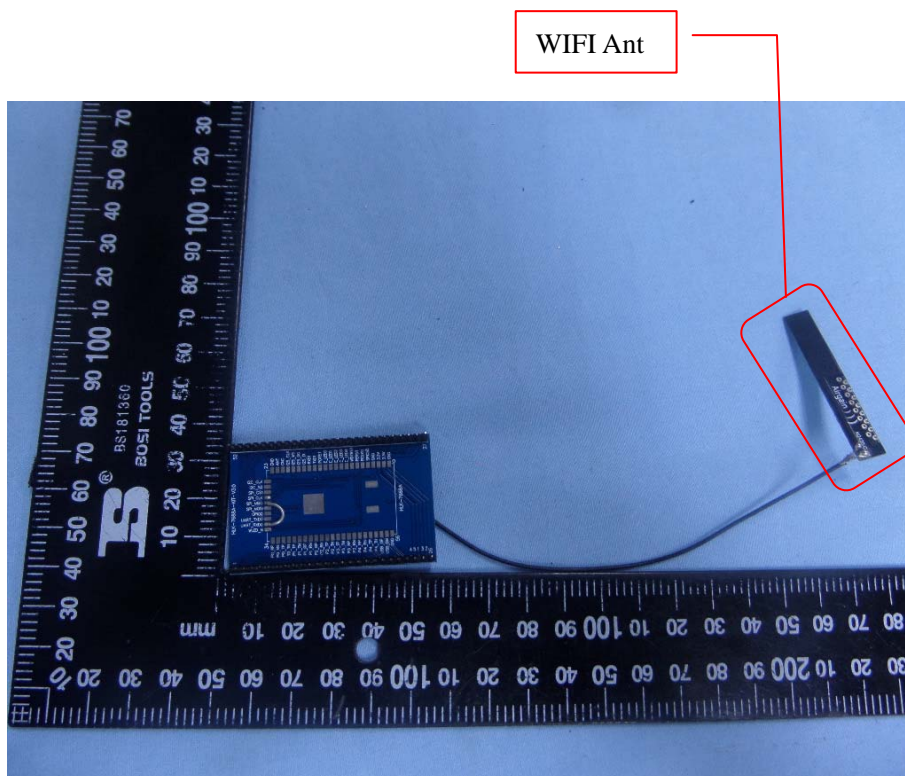


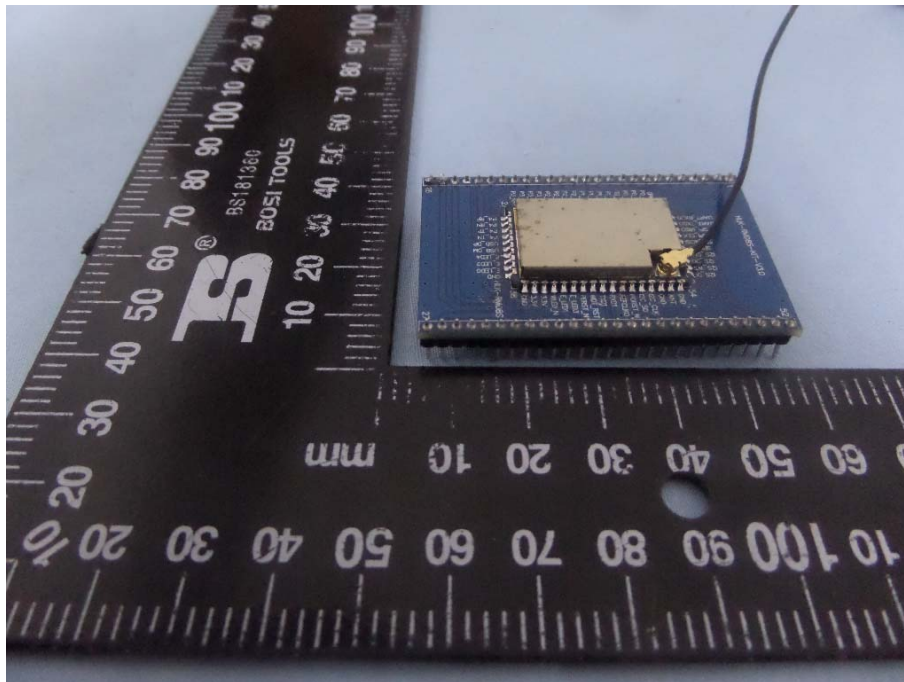
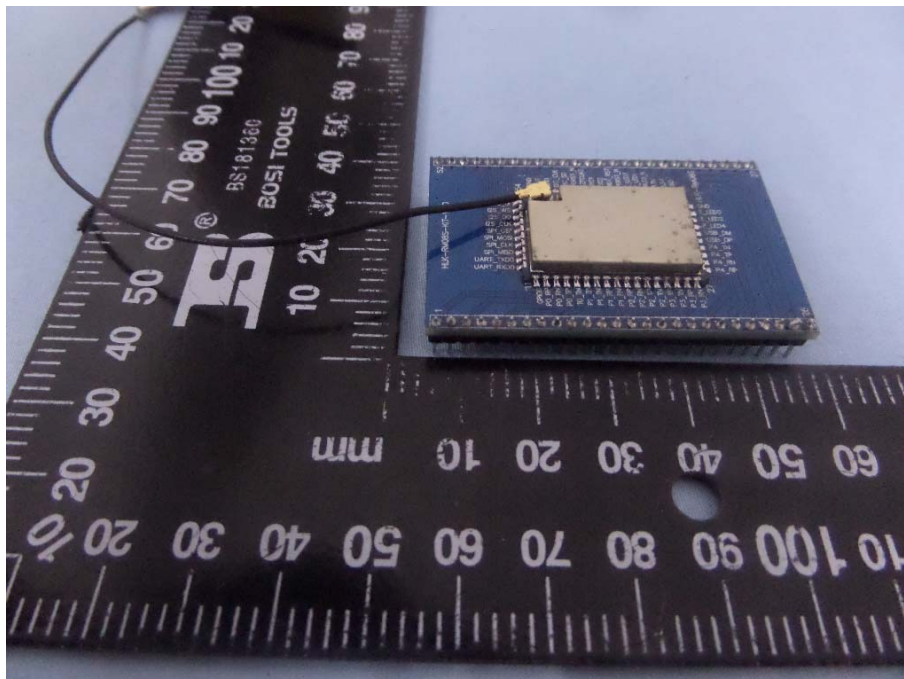
EXHIBIT 2 - EUT PHOTOGRAPHS

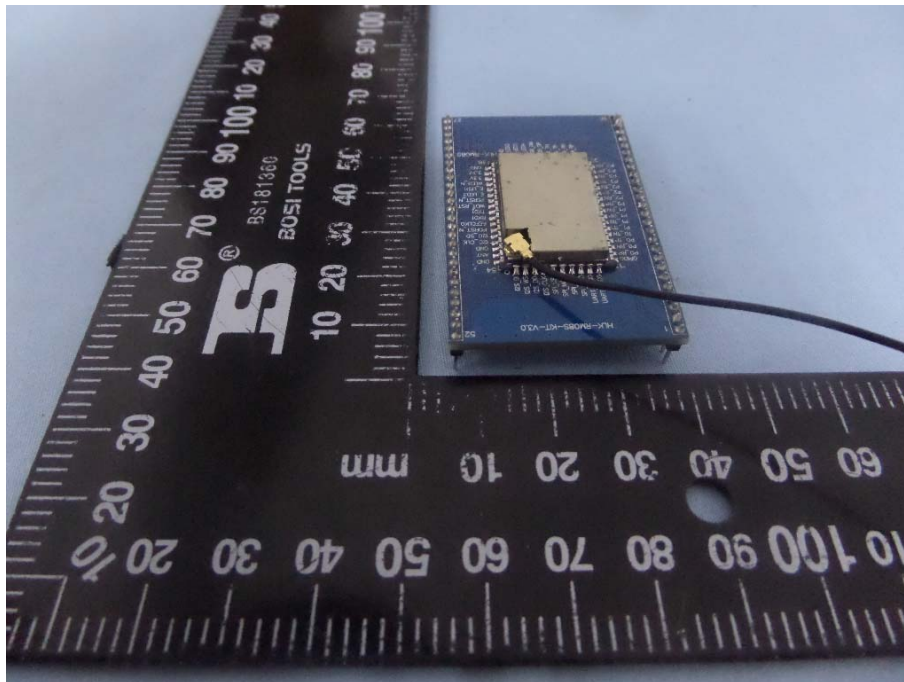
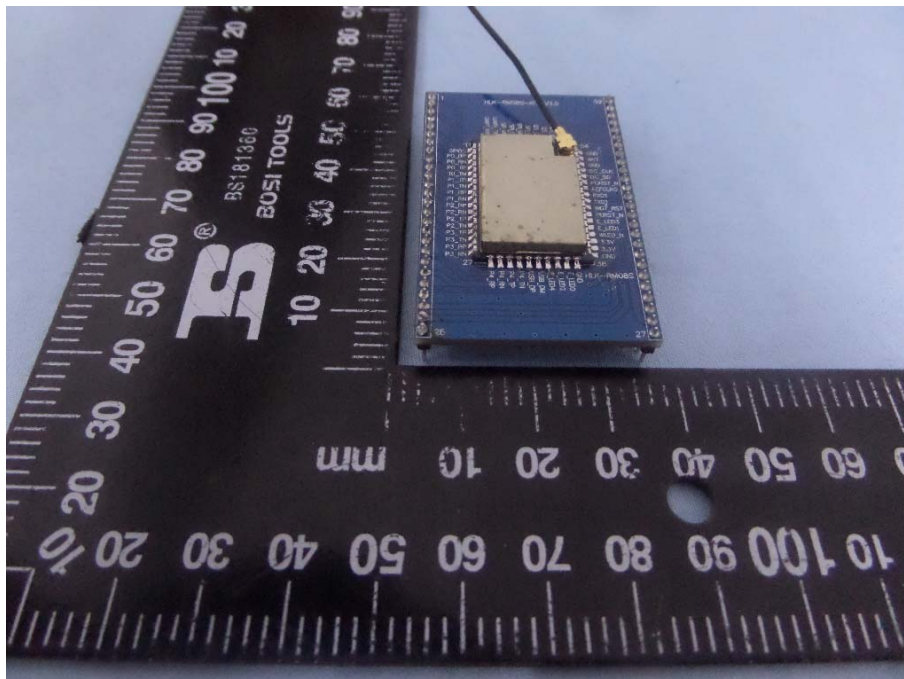
EUT View 1

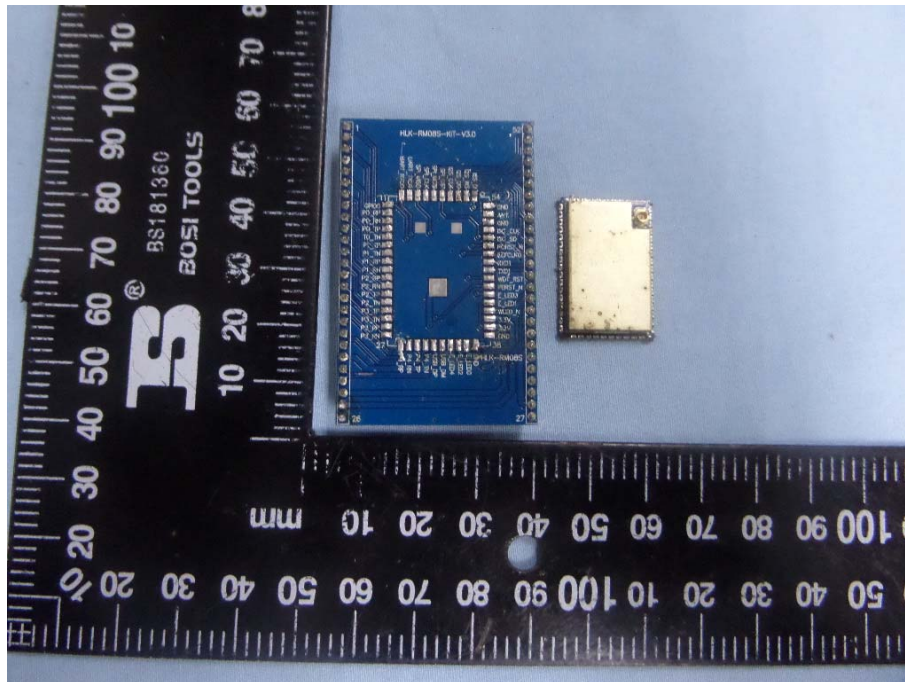
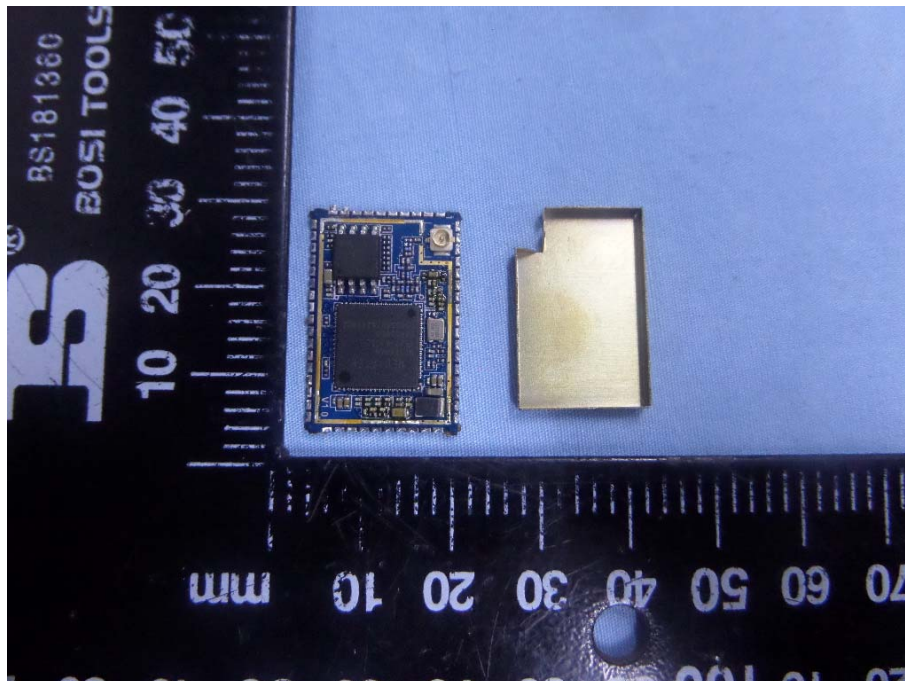


EUT View 2

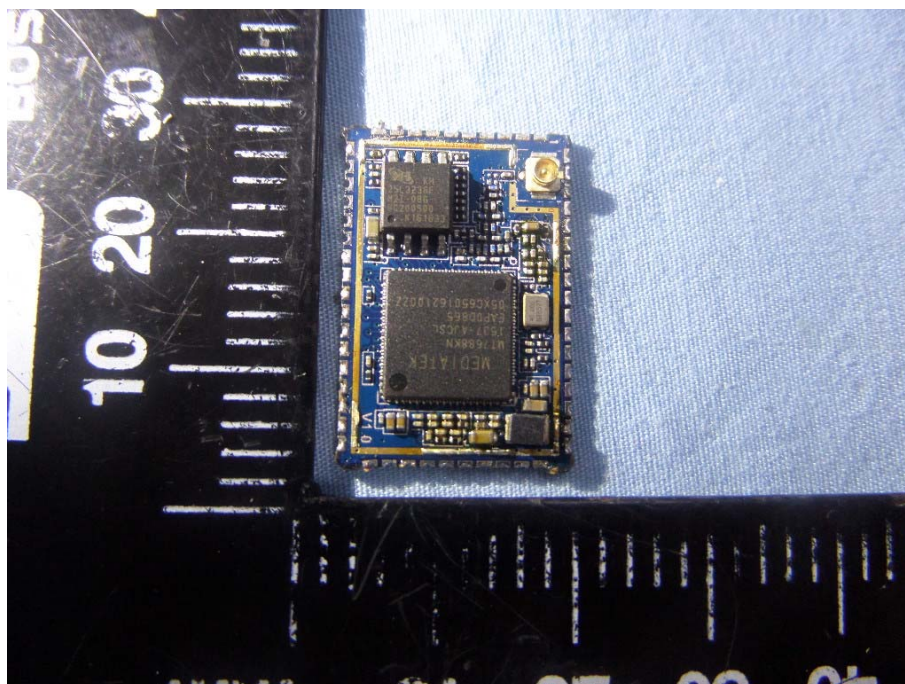


EUT View 3**EUT View 4**

EUT View 5**EUT View 6**

EUT Housing and Board View 1**EUT Housing and Board View 2**

Solder Board-Component View 1



Solder Board-Component View 2

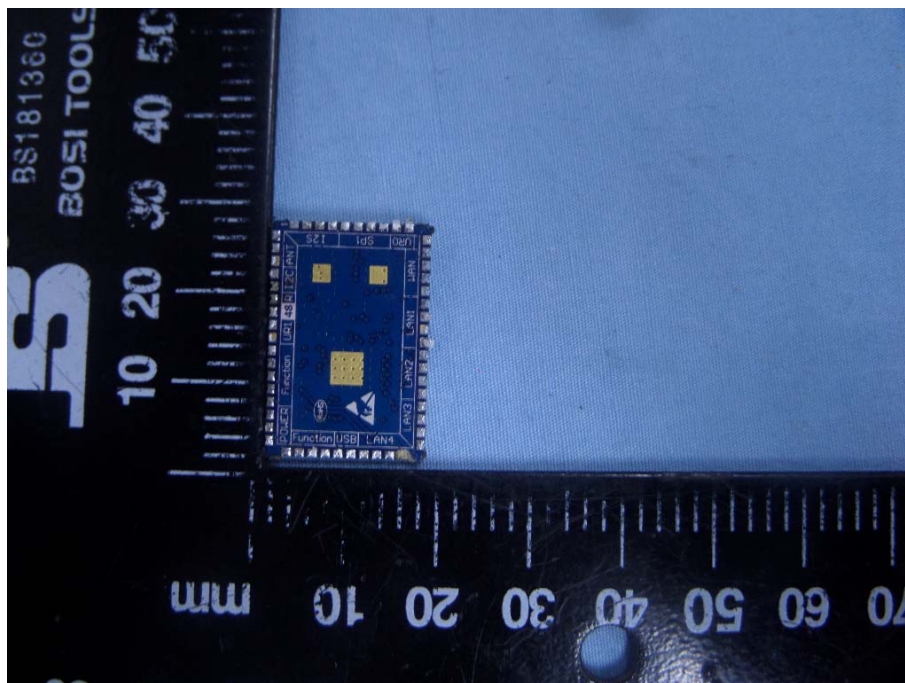
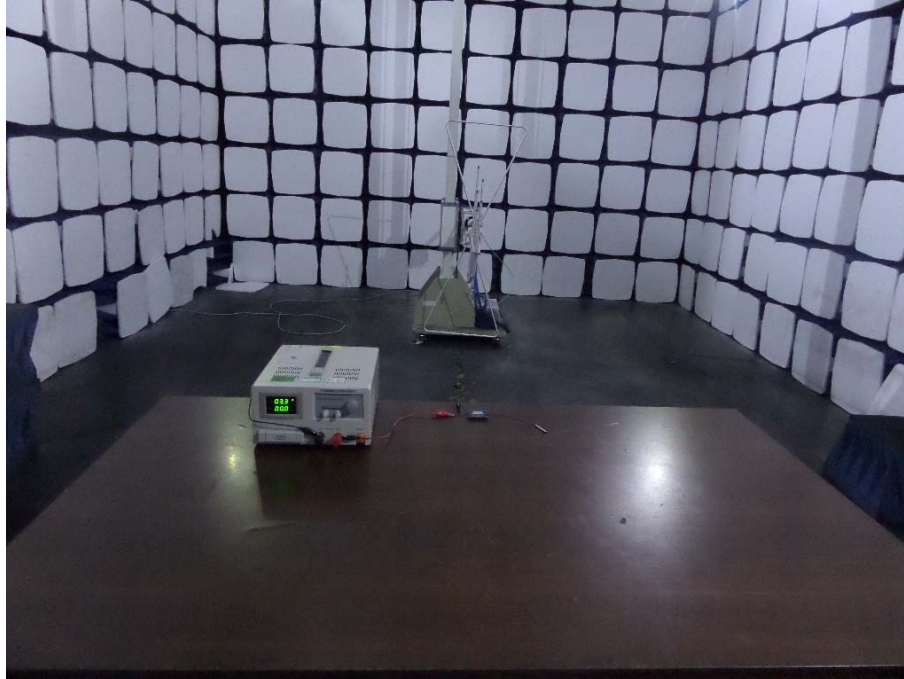
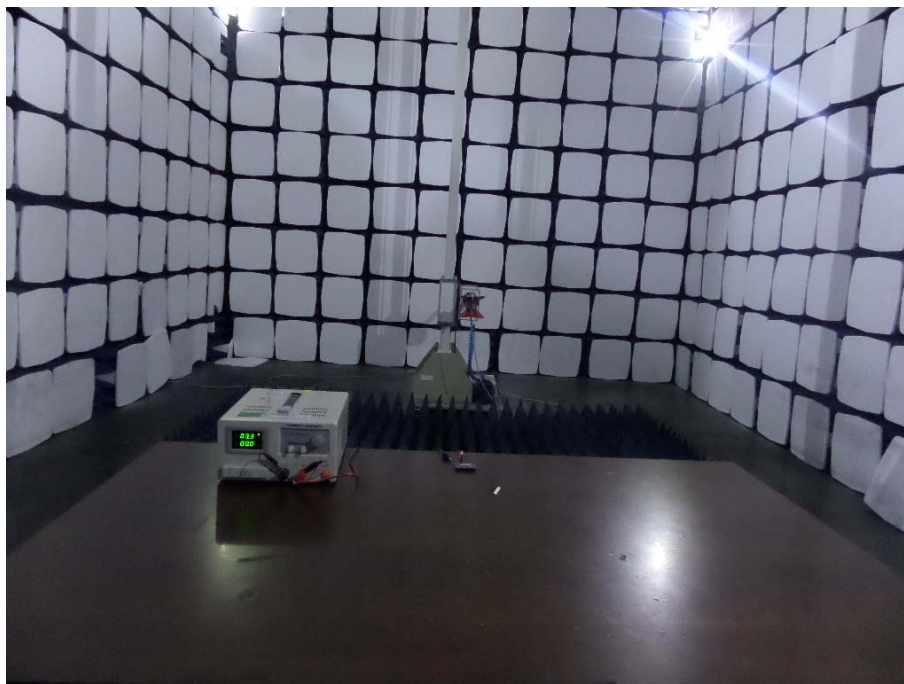


EXHIBIT 3 - TEST SETUP PHOTOGRAPHS

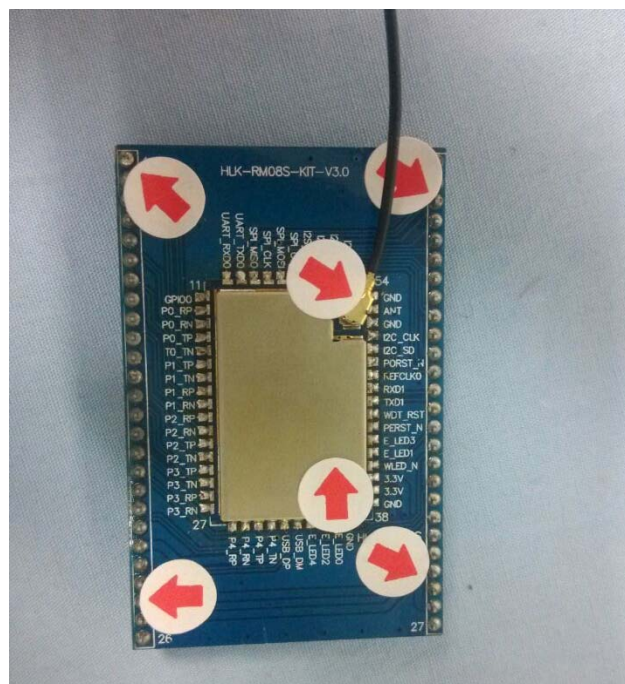
Radiation Emission Test View (Below 1GHz)

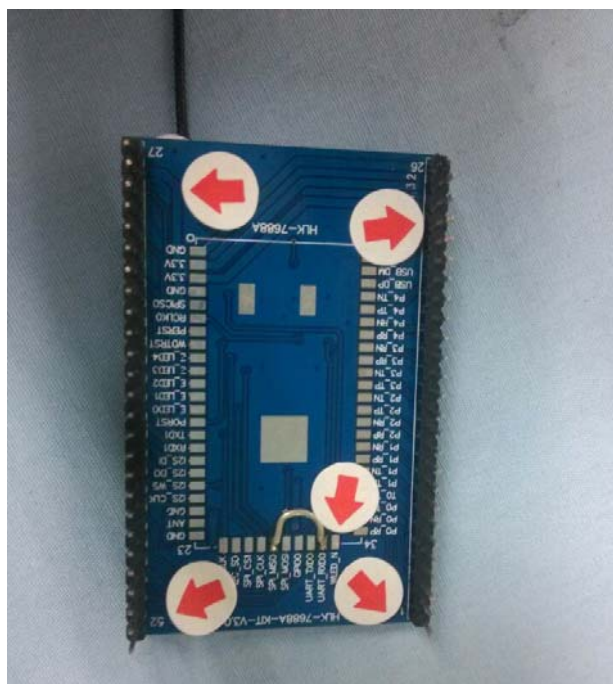


Radiation Emission Test View (Above 1GHz)



IEC61000-4-2 Test View





IEC61000-4-3 Test View



***** END OF REPORT *****