FCC TEST REPORT

for

Marvelworks Limited

Wireless Bedwetting alarm

Model Number: DE300

FCC ID: 2AKU6-DE300

Prepared for	:	Marvelworks Limited
Address	:	Room 1512, 15/F, Trend Centre, 29 Cheung Lee Street, Chai Wan, Hong Kong
Prepared by	:	Keyway Testing Technology Co., Ltd.
Address	:	Building 1, Baishun Industrial Zone, Zhangmutou Town, Dongguan, Guangdong, China
		Tel: 86-769-8718 2258
		Fax: 86-769-8718 1058

Report No.	:	16KWE124902F
Date of Test	:	Dec. 24-30, 2016
Date of Report	:	Jan. 03, 2017

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Keyway Testing Technology Co., Ltd.

Applicant: **Address:**	Marvelworks Limited Room 1512, 15/F, Trend Centre, 29 Cheung Lee Street, Chai Wan, Hong Kong		
Manufacturer: **Address:**	Huizhou LongJi Electronics Co., Ltd Na Ya Bei Lu, Shi Wan, Boluo, Huizhou, Guangdong, China.		
E.U.T:	Wireless Bedwetting alarm		
Model Number:	DE300		
Trade Name:	DryEasy Plus	**Serial No.:**	------
Date of Receipt:	Dec. 23, 2016	**Date of Test:**	Dec. 24-30, 2016
Test Specification:	FCC Part15.249 01, Oct. 2015 ANSI C63.10-2013		
Test Result:	The equipment under test was found to be compliance with the requirements of the standards applied.		

Issue Date: Jan. 03, 2017

Tested by:	Reviewed by:	Approved by:
Keven Wu / Engineer	Mark.Li / Supervisor	Andy Gao / Supervisor

Other Aspects:

None.

Abbreviations: OK/P=passed fail/F=failed n.a/N=not applicable E.U.T=equipment under tested

This test report is based on a single evaluation of one sample of above mentioned products. It is not permitted to be duplicated in extracts without written approval of Keyway Testing Technology Co., Ltd.

1. TEST SUMMARY

Test Items	Test Requirement	Result
Conducted Emissions	15.207	N/A
Spurious Emissions	15.205(a)/15.209/15.249(d)	PASS
Fundamental emissions	15.249 (a)	PASS
Emissions from out of band	15.249(d)	PASS
Antenna Requirement	15.203	PASS

2. GENERAL PRODUCT INFORMATION

2.1. Product Function

Refer to Technical Construction Form and User Manual.

2.2. Description of Device (EUT)

Product Name:	Wireless Bedwetting alarm
Model No.:	DE300
Operation Frequency:	2419MHz-2474MHz
Channel numbers:	16
Modulation technology:	GFSK
Data speed (IEEE 802.11b):	62.5Kbps
Antenna Type:	PCB
Antenna gain:	3.3dBi
Power supply:	DC 3V (1.5V AAA battery*2)

2.3. Independent Operation Modes

The basic operation modes are:

Test mode	Frequency
Mode 1	2419MHz
Mode 2	2446MHz
Mode 3	2474MHz

2.4. Channel List

Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2419MHz	10	2454MHz		
2	2426MHz	11	2456MHz		
3	2429MHz	12	2458MHz		
4	2434MHz	13	2464MHz		
5	2439MHz	14	2466MHz		
6	2440MHz	15	2469MHz		
7	2444MHz	16	2474MHz		
8	2446MHz				
9	2449MHz				

2.5. TEST SITES

Lab Qualifications : 944 Shielded Room built by ETS-Lindgren, USA
Date of completion: March 28, 2011

966 Chamber built by ETS-Lindgren, USA
Date of completion: March 28, 2011

Certificated by TUV Rheinland, Germany.
Registration No.: UA 50207153
Date of registration: July 13, 2011

Certificated by UL, USA
Registration No.: 100567-237
Date of registration: December 1, 2011

Certificated by Intertek
Registration No.: 2011-RTL-L1-31
Date of registration: October 11, 2011

Certificated by Industry Canada
Registration No.: 9868A
Date of registration: December 8, 2011

Certificated by FCC, USA
Registration No.: 370994
Date of registration: February 21, 2012

Certificated by CNAS China
Registration No.: CNAS L5783
Date of registration: August 8, 2012

Name of Firm : Keyway Testing Technology Co., Ltd.

Site Location : Baishun Industrial Zone, Zhangmutou Town,
Dongguan, Guangdong, China

2.6. List of Test and Measurement Instruments

2.6.1. For conducted emission at the mains terminals test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESCI	101156	Apr. 09,16	Apr. 09,17
Artificial Mains Network	Rohde&Schwarz	ENV216	101315	Apr. 09,16	Apr. 09,17
Artificial Mains Network (AUX)	Rohde&Schwarz	ENV216	101314	Apr. 09,16	Apr. 09,17
RF Cable	FUJIKURA	3D-2W	944 Cable	Apr. 09,16	Apr. 09,17

2.6.2. For radiated emission test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESCI	101156	Apr. 09,16	Apr. 09,17
System Simulator	Agilent	E5515C	GB43130245	Apr. 09,16	Apr. 09,17
Power Splitter	Weinschel	1506A	NW425	Apr. 09,16	Apr. 09,17
Bilog Antenna	ETS-LINDGREEN	3142D	135452	Apr. 09,16	Apr. 09,17
Spectrum Analyzer	Agilent	E4411B	MY4511304	Apr. 09,16	Apr. 09,17
Spectrum Analyzer	R&S	FSV40	132.1.3008K39 -100967	Apr. 09,16	Apr. 09,17
3m Semi-anechoic Chamber	ETS-LINDGREEN	966	KW01	Apr. 09,16	Apr. 09,17
Signal Amplifier	SONOMA	310	187016	Apr. 09,16	Apr. 09,17
Signal Amplifier	Agilent	8449B	3008A00251	Apr. 09,16	Apr. 09,17
RF Cable	IMRO	IMRO-400	966 Cable 1#	N/A	N/A
MULTI-DEVICE Controller	ETS-LINDGREEN	2090	126913	N/A	N/A
Horn Antenna	DAZE	ZN30701	11003	Apr. 09,16	Apr. 09,17
Horn Antenna	SCHWARZBECK	BBHA9170	9170-068	Apr. 09,16	Apr. 09,17
Spectrum Analyzer	Agilent	8593E	3911A04271	Apr. 09,16	Apr. 09,17
Spectrum Analyzer	Agilent	E4408B	MY44211125	Apr. 09,16	Apr. 09,17
Signal Amplifier	DAZE	ZN3380C	11001	Apr. 09,16	Apr. 09,17
High Pass filter	Micro	HPM50111	324216	Apr. 09,16	Apr. 09,17
Filter	COM-MW	ZBSF-C836.5-25-X	KW032	Apr. 09,16	Apr. 09,17
Filter	COM-MW	ZBSF-C1747.5-75-X2	KW035	Apr. 09,16	Apr. 09,17
Filter	COM-MW	ZBSF-C1880-60-X2	KW037	Apr. 09,16	Apr. 09,17
DC Power Supply	LongWei	PS-305D	010964729	Apr. 09,16	Apr. 09,17
Constant temperature and humidity box	GF	GTH-800-40-1P	MAA9906-005	Apr. 09,16	Apr. 09,17
Universal radio communication tester	Rohde&Schwarz	CMU200	3215420	Apr. 09,16	Apr. 09,17
Splitter	Agilent	11636B	0025164	Apr. 09,16	Apr. 09,17
Loop Antenna	ARA	PLA-1030/B	1029	Apr. 09,16	Apr. 09,17

3. TEST SET-UP AND OPERATION MODES

3.1. Principle of Configuration Selection

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the Operating Instructions.

3.2. Block Diagram of Test Set-up

System Diagram of Connections between EUT and Simulators

(EUT: Wireless Bedwetting alarm)

3.3. Test Operation Mode and Test Software

None.

3.4. Special Accessories and Auxiliary Equipment

None.

3.5. Countermeasures to Achieve EMC Compliance

None.

4. EMISSION TEST RESULTS

4.1. Conducted Emission at the Mains Terminals Test

4.1.1. Limit 15.207 limits

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

4.1.2. Test Setup

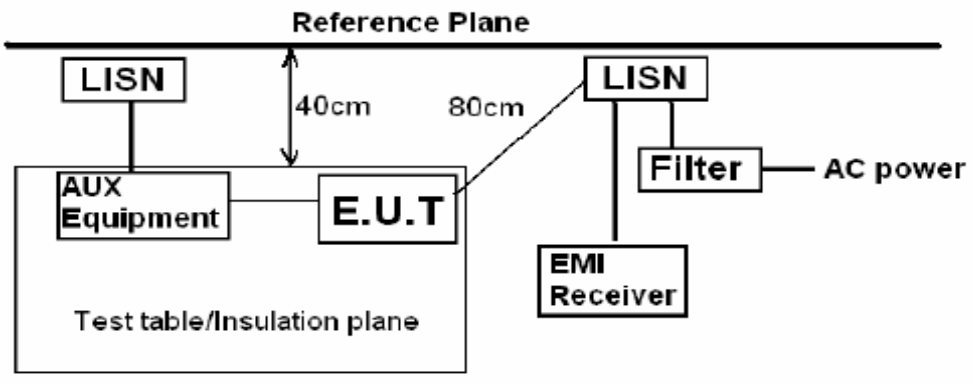
The EUT was put on a wooden table which was 0.8 m high above the ground and connected to the AC mains through the Artificial Mains Network (AMN). Where the mains cable supplied by the manufacture was longer than 0.8 m, the excess was folded back and forth parallel to the cable at the centre so as to form a bundle no longer than 0.4 m.

The EUT was kept 0.4 m from any other earthed conducting surface. Both sides of AC line were checked to find out the maximum conducted emission levels according to the test procedure during the conducted emission test.

The frequency range from 150 kHz to 30 MHz was investigated.

The bandwidth of the test receiver was set at 9 kHz.

Pretest for all mode, The test data of the worst case condition(s) was reported on the following page.



Remark:
E.U.T: Equipment Under Test
LISN: Line Impedence Stabilization Network
Test table height=0.8m

Note: There is no need for conduction emissions test, because the power supply of the EUT is dry battery only.

4.2. Radiated Emission Test

4.2.1. Limit 15.209 limits

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		μV/m	dB(μV)/m
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	

4.2.2. Restricted bands of operation

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	([2])

All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

4.2.3. Test setup

The EUT was placed on a turn table which was 0.8 m(above 1GHz, the table was 1.5m) above the ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was set 3 m away from the receiving antenna which was mounted on an antenna tower. The measuring antenna moved up and down to find out the maximum emission level. It moved from 1 m to 4 m for both horizontal and vertical polarizations.

The EUT was tested in the Chamber Site. It was pre-scanned with a Peak detector from the spectrum, and all the final readings from the test receiver were measured with the Quasi-Peak detector.

The bandwidth of the EMI test receiver is set at 120kHz for frequency range from 30MHz to 1000 MHz.

The bandwidth of the Spectrum's VBW is set at 3MHz and RBW is set at 1MHz for peak emissions measurement above 1GHz and 1MHz RBW, 10Hz VBW for average emissions measure above 1GHz.

The frequency range from 30MHz to 10^{th} harmonic (25GHz) are checked. and no any emissions were found from 18GHz to 25 GHz, So the radiated emissions from 18GHz to 25GHz were not record.

Notes: 1. Emission Level = Antenna Factor + Cable Loss + Meter Reading-Preamp Factor.

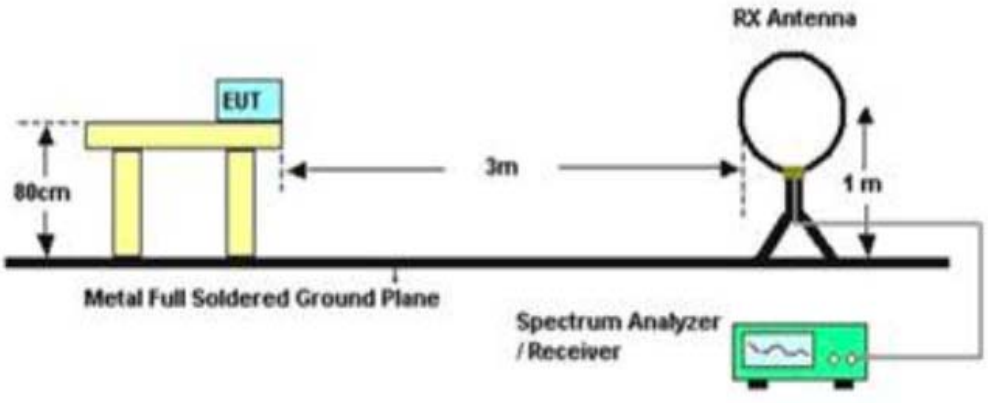
2. Measurement Uncertainty: ±3.2 dB at a level of confidence of 95%.

3. For emissions above 1GHz, if peak level comply with average limit, then the average level is deemed to comply with average limit.

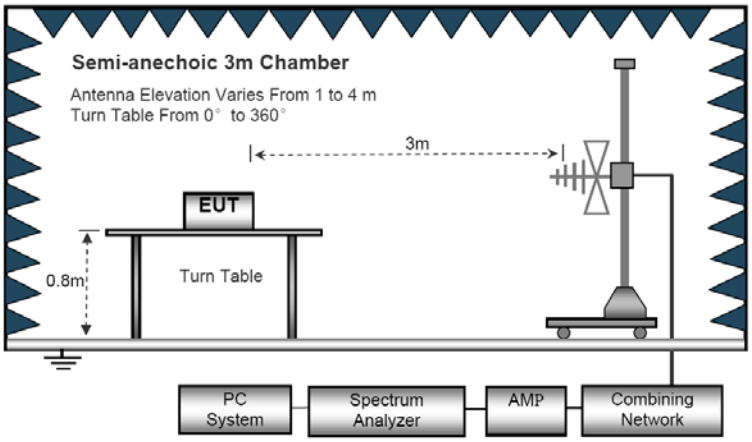
4. For emissions below 1GHz, pretest for all mode, The test data of the worst case condition(s) was reported on the following pages.

5. 5.EUT Pre-scan X/Y/Z orientation, only worst case is presented in the report (Z orientation).

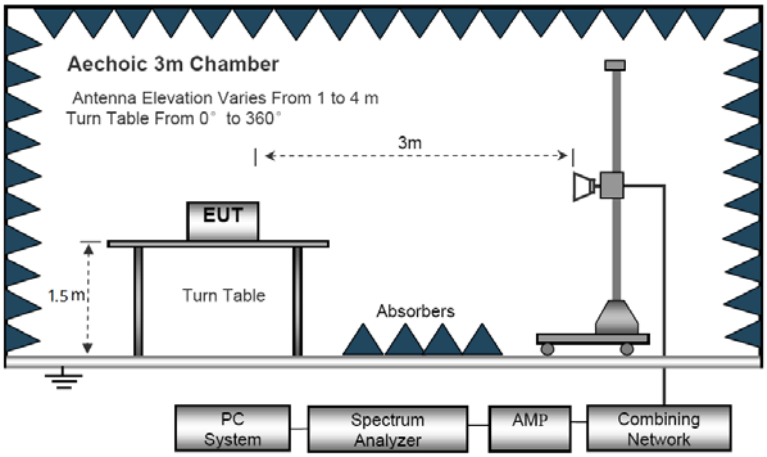
Radiated Emission Test-Up Frequency Below 30MHz



30MHz- 1GHz



Above 1GHz



Below 30MHz

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.

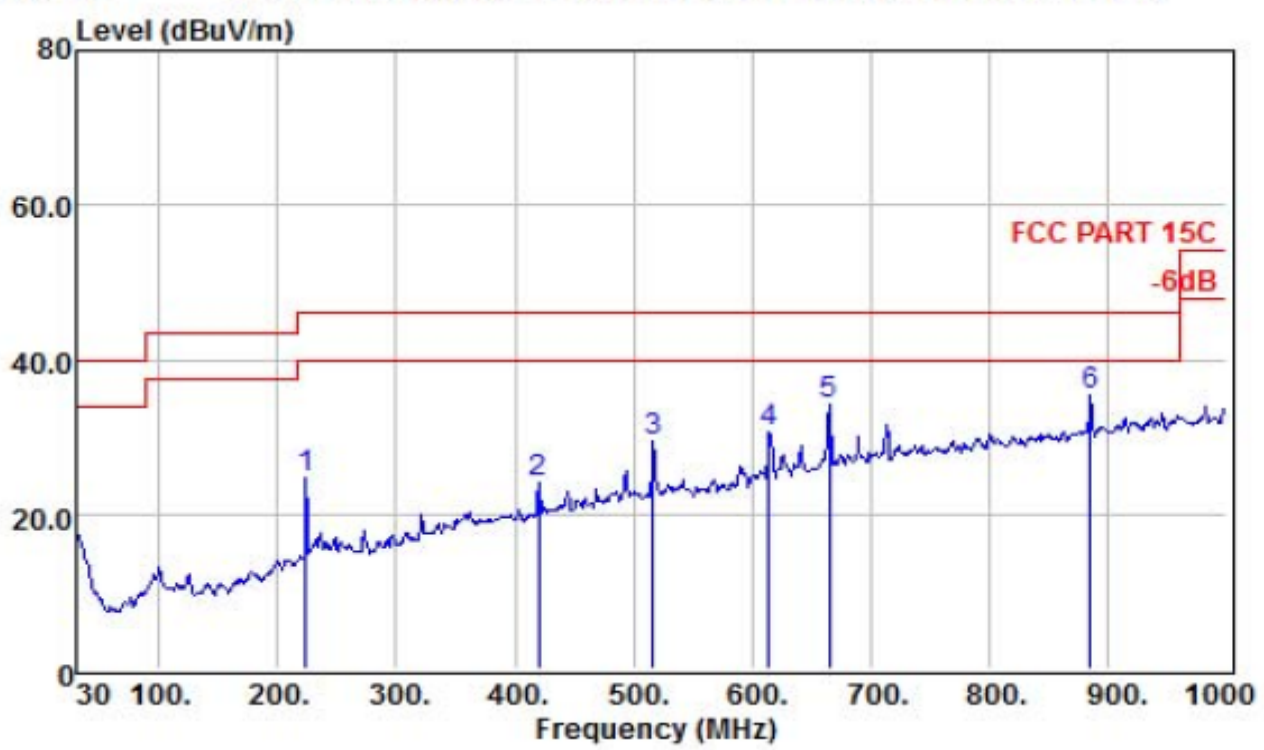
Distance extrapolation factor =40 log (specific distance/test distance)(dB);

Limit line = specific limits(dBuv) + distance extrapolation factor.

Test Result

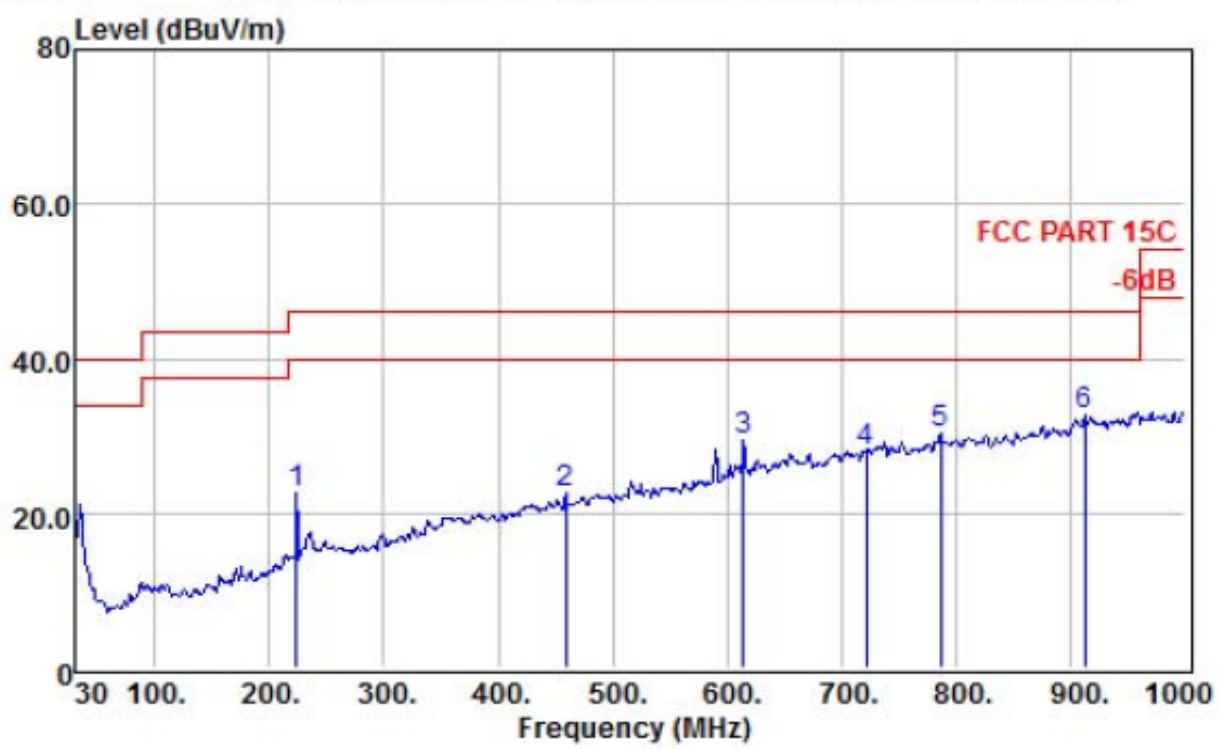
EUT：	Wireless Bedwetting alarm	Model Name ：	DE300
Temperature：	25 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Test Voltage：	DC 3V
Test Mode ：	TX		

Below 1GHz
Horizontal



	Freq	Read Level	Preamp Factor	Antenna Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB/m	dB	dBuV/m	dBuV/m	dB	
1	224.00	41.88	30.95	12.15	1.53	24.61	46.00	-21.39	QP
2	419.94	35.22	30.63	16.94	2.48	24.01	46.00	-21.99	QP
3	516.94	38.08	30.65	19.04	2.94	29.41	46.00	-16.59	QP
4	613.94	37.00	30.63	20.99	3.38	30.74	46.00	-15.26	QP
5	665.35	39.46	30.80	21.77	3.69	34.12	46.00	-11.88	QP
6	885.54	36.96	30.15	23.71	4.76	35.28	46.00	-10.72	QP

Vertical



	Freq	Read Level	Preamp Factor	Antenna Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB/m	dB	dBuV/m	dBuV/m	dB	
1	224.00	39.89	30.95	12.15	1.53	22.62	46.00	-23.38	QP
2	458.74	32.83	30.61	17.84	2.62	22.68	46.00	-23.32	QP
3	613.94	35.62	30.63	20.99	3.38	29.36	46.00	-16.64	QP
4	721.61	32.27	30.65	22.51	3.96	28.09	46.00	-17.91	QP
5	786.60	33.79	30.60	22.84	4.29	30.32	46.00	-15.68	QP
6	912.70	33.39	29.96	24.36	4.87	32.66	46.00	-13.34	QP

NOTE:

Absolute Level= ReadingLevel+antenna Factor+cable loss-preamp factor,
Over Limit= Absolute Level – Limit

Above 1GHz

Frequency (MHz)	Reading (dB μ V)	Antenna Factor (dB)	Preamp factor (dB)	cable loss (dB)	Corrected Amplitude (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Remark	Polar (H/V)
Low channel(2419MHz)									
2419.000	75.13	28.74	26.32	7.39	84.94	114	-29.06	Pk	Horizontal
2419.000	63.57	28.74	26.32	7.39	73.38	94	-20.62	AV	Horizontal
4838.000	36.56	32.42	27.54	8.95	50.39	74	-23.61	Pk	Horizontal
4838.000	25.24	32.42	27.54	8.95	39.07	54	-14.93	AV	Horizontal
7257.000	44.63	25.28	27.96	10.45	52.4	74	-21.6	Pk	Horizontal
7257.000	34.15	25.28	27.96	10.45	41.92	54	-12.08	AV	Horizontal
2419.000	66.28	28.74	26.32	7.39	76.09	114	-37.91	Pk	Vertical
2419.000	54.33	28.74	26.32	7.39	64.14	94	-29.86	AV	Vertical
4838.000	30.47	32.42	27.54	8.95	44.3	74	-29.7	Pk	Vertical
4838.000	20.18	32.42	27.54	8.95	34.01	54	-19.99	AV	Vertical
7257.000	38.56	25.28	27.96	10.45	46.33	74	-27.67	Pk	Vertical
7257.000	27.35	25.28	27.96	10.45	35.12	54	-18.88	AV	Vertical
Middle channel(2446MHz)									
2446.000	76.19	28.76	26.34	7.46	86.07	114	-27.93	Pk	Horizontal
2446.000	64.72	28.76	26.34	7.46	74.6	94	-19.4	AV	Horizontal
4892.000	36.75	32.45	27.64	9.05	50.61	74	-23.39	Pk	Horizontal
4892.000	26.13	32.45	27.64	9.05	39.99	54	-14.01	AV	Horizontal
7338.000	45.18	25.32	27.86	10.71	53.35	74	-20.65	Pk	Horizontal
7338.000	35.15	25.32	27.86	10.71	43.32	54	-10.68	AV	Horizontal
2446.000	66.92	28.76	26.34	7.46	76.8	114	-37.2	Pk	Vertical
2446.000	55.28	28.76	26.34	7.46	65.16	94	-28.84	AV	Vertical
4892.000	30.74	32.45	27.64	9.05	44.6	74	-29.4	Pk	Vertical
4892.000	21.05	32.45	27.64	9.05	34.91	54	-19.09	AV	Vertical
7338.000	38.69	25.32	27.86	10.71	46.86	74	-27.14	Pk	Vertical
7338.000	28.33	25.32	27.86	10.71	36.5	54	-17.5	AV	Vertical
High channel(2474MHz)									
2474.000	77.55	28.79	26.34	7.57	87.57	114	-26.43	Pk	Horizontal
2474.000	65.29	28.79	26.34	7.57	75.31	94	-18.69	AV	Horizontal
4948.000	37.18	32.48	27.62	9.12	51.16	74	-22.84	Pk	Horizontal
4948.000	26.49	32.48	27.62	9.12	40.47	54	-13.53	AV	Horizontal
7422.000	45.71	25.36	27.88	10.84	54.03	74	-19.97	Pk	Horizontal
7422.000	35.56	25.36	27.88	10.84	43.88	54	-10.12	AV	Horizontal
2474.000	67.55	28.79	26.34	7.57	77.57	114	-36.43	Pk	Vertical
2474.000	55.83	28.79	26.34	7.57	65.85	94	-28.15	AV	Vertical
4948.000	31.12	32.48	27.62	9.12	45.1	74	-28.9	Pk	Vertical
4948.000	21.56	32.48	27.62	9.12	35.54	54	-18.46	AV	Vertical
7422.000	39.37	25.36	27.88	10.84	47.69	74	-26.31	Pk	Vertical
7422.000	28.86	25.36	27.88	10.84	37.18	54	-16.82	AV	Vertical

NOTE:

Corrected Amplitude=Reading+ Antenna Factor+cable loss-Preamp factor

Margin= Absolute Level – Limit

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has not to be reported.

5. BAND EDGE COMPLIANCE TEST

5.1. Limits

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 con-ducted or a radiated measurement.

5.2. Test setup

The EUT was placed on a turn table which was 1.5 m above the ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was set 3 m away from the receiving antenna which was mounted on an antenna tower. The measuring antenna moved up and down to find out the maximum emission level. It moved from 1 m to 4 m for both horizontal and vertical polarizations.

Set to span from the lowest frequency generated in the device up to and including the tenth harmonic of the highest fundamental frequency

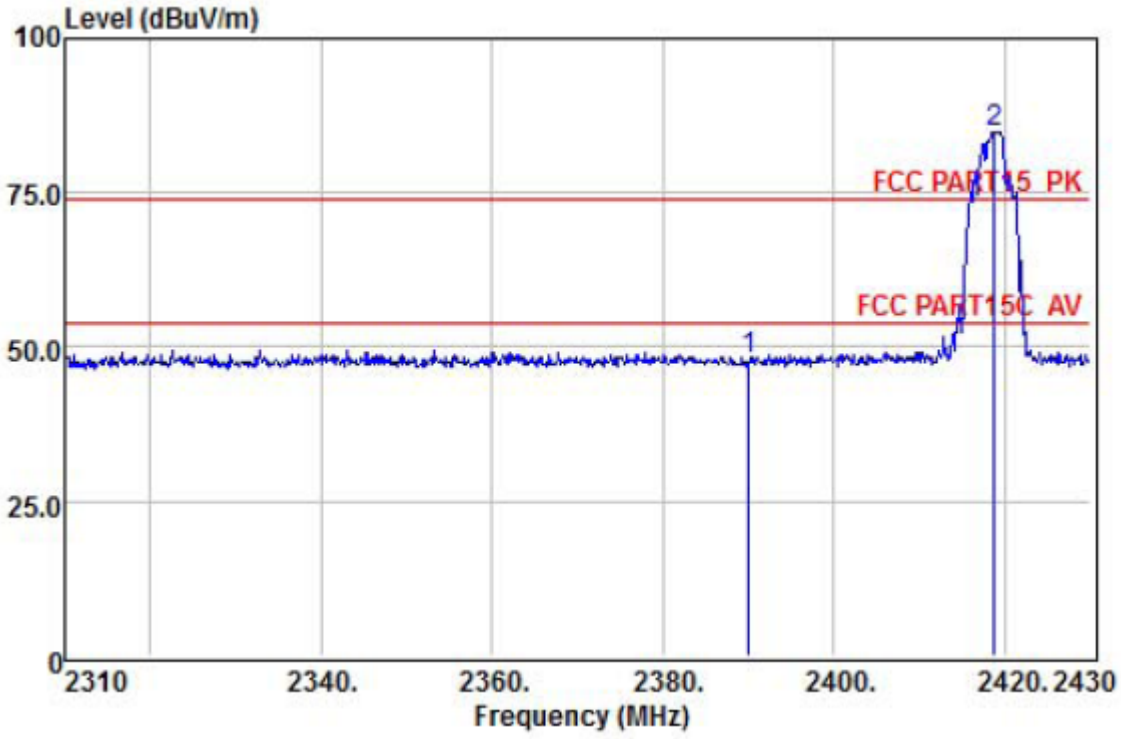
The bandwidth of the Spectrum's VBW is set at 3MHz and RBW is set at 1MHz for peak emissions measurement above 1GHz and 1MHz RBW, 10Hz VBW for average emissions measure. For all test, used peak detector.

Note: If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.

For radiated test as follows:

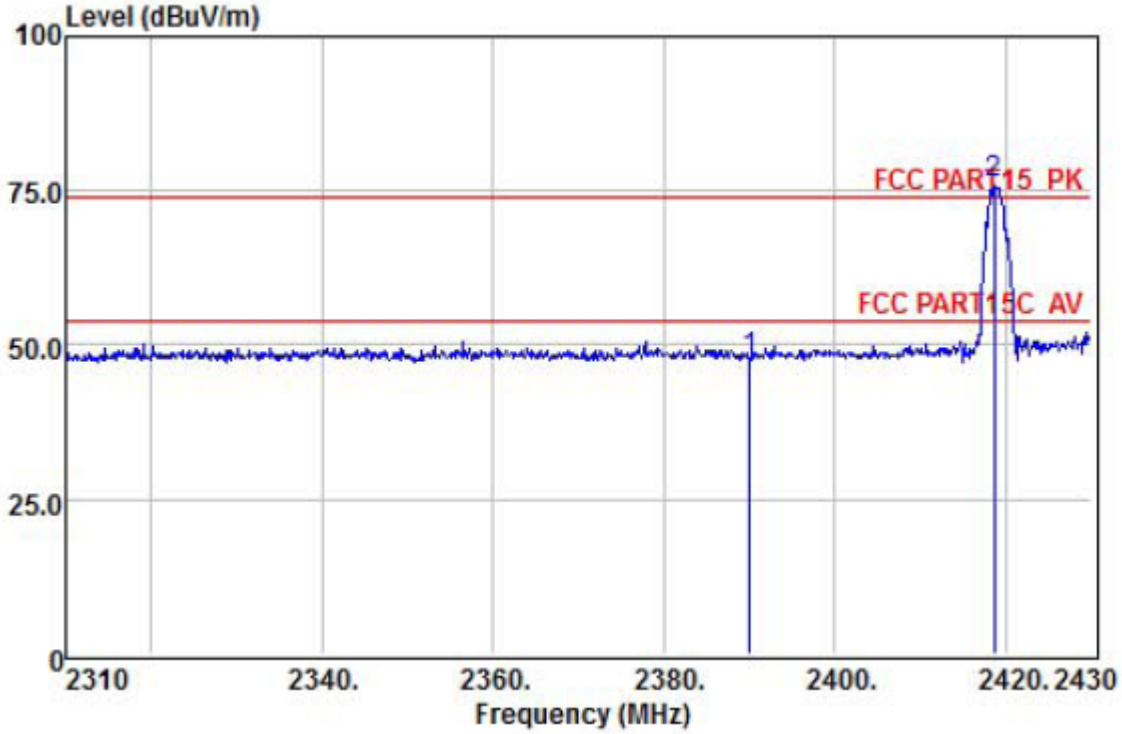
EUT：	Wireless Bedwetting alarm	Model Name ：	DE300
Temperature：	25 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Test Voltage：	DC 3V
Test Mode ：	TX		

Horizontal -Low



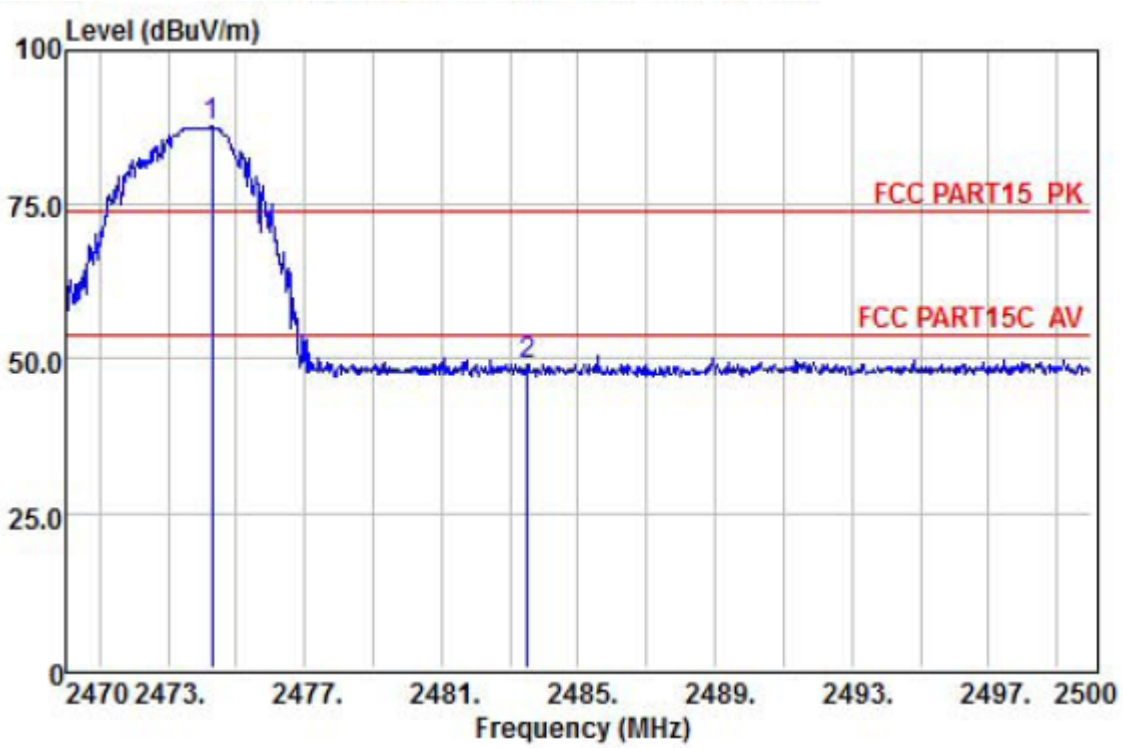
	Freq	Read Level	Preamp Factor	Antenna Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB/m	dB	dBuV/m	dBuV/m	dB	
1	2390.00	38.22	26.32	28.72	7.34	47.96	74.00	-26.04	Peak
2 *	2418.84	75.13	26.32	28.73	7.39	84.93	74.00	10.93	Peak

Vertical -Low



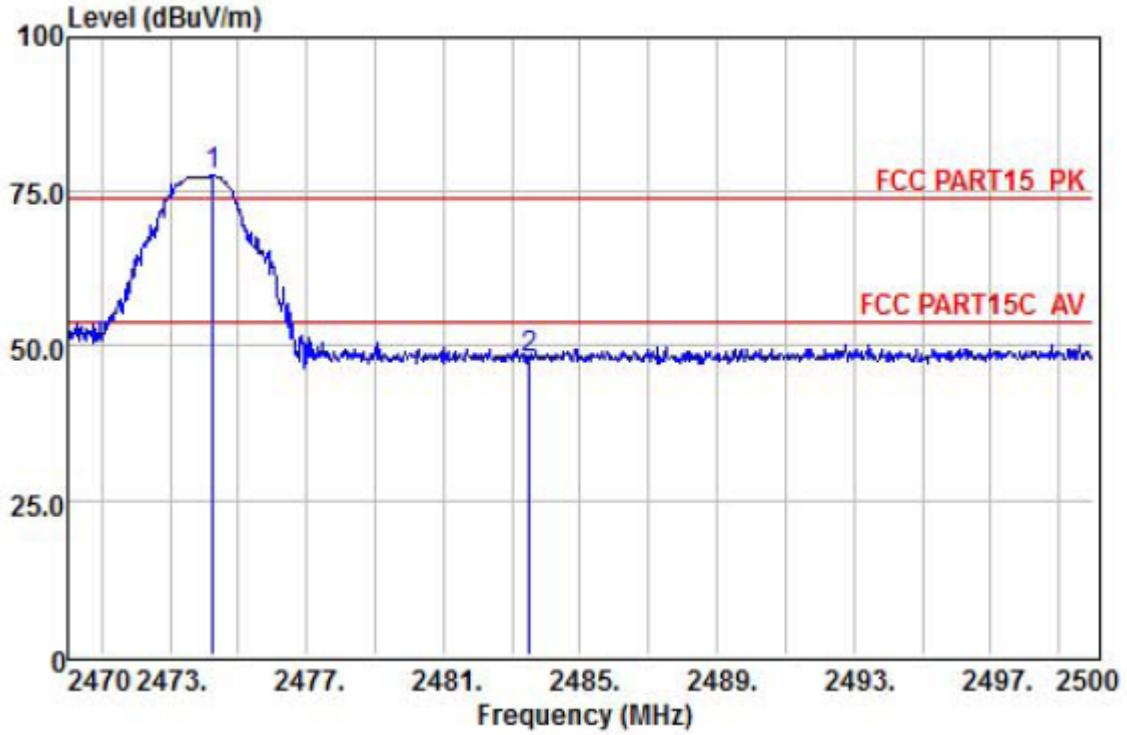
	Freq	Read Level	Preamp Factor	Antenna Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB/m	dB	dBuV/m	dBuV/m	dB	
1	2390.00	37.91	26.32	28.72	7.34	47.65	74.00	-26.35	Peak
2 *	2418.72	66.29	26.32	28.73	7.39	76.09	74.00	2.09	Peak

Horizontal -High



	Freq	Read Level	Preamp Factor	Antenna Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB/m	dB	dBuV/m	dBuV/m	dB	
1 *	2474.29	77.55	26.34	28.79	7.57	87.57	74.00	13.57	Peak
2	2483.50	39.01	26.34	28.79	7.57	49.03	74.00	-24.97	Peak

Vertical -High



	Freq	Read Level	Preamp Factor	Antenna Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB/m	dB	dBuV/m	dBuV/m	dB	
1 *	2474.26	67.60	26.34	28.79	7.52	77.57	74.00	3.57	Peak
2	2483.50	37.96	26.34	28.79	7.57	47.98	74.00	-26.02	Peak

If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.

6. ANTENNA REQUIREMENTS

6.1. Limits

For intentional device, according to FCC 47 CFR Section 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. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

6.2. Result

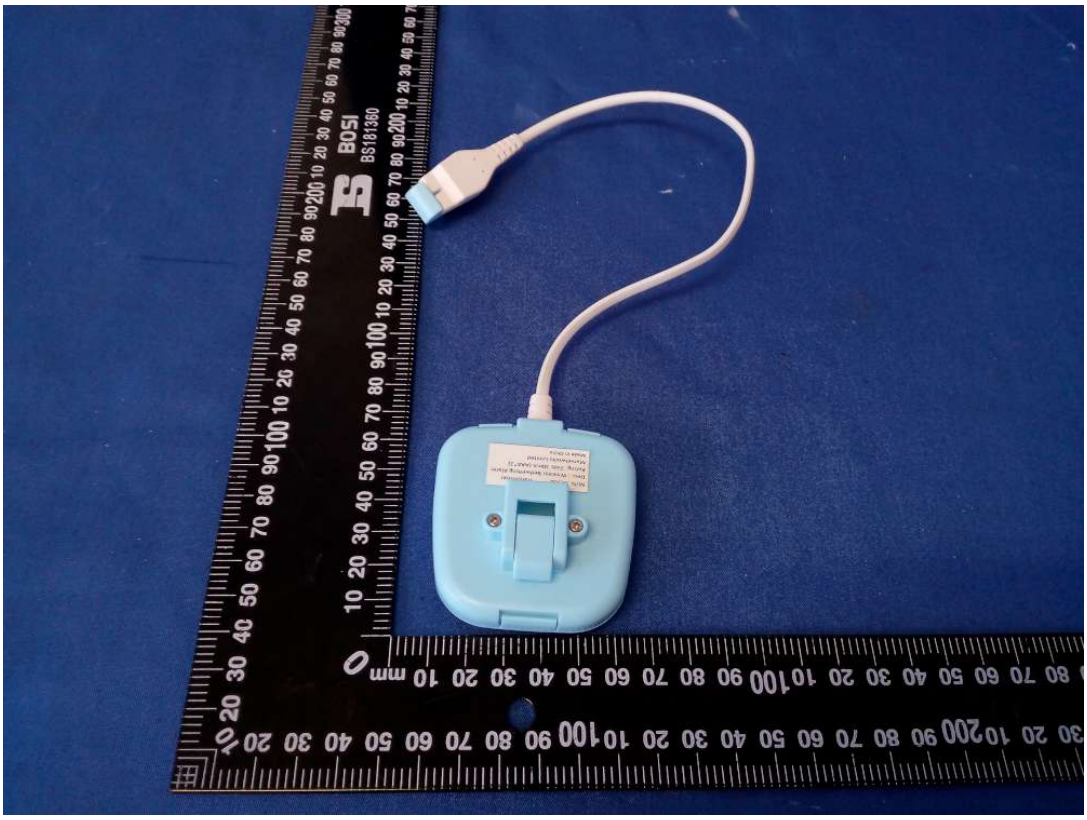
The antenna used for this product is PCB antenna and that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is only 3.3dBi.

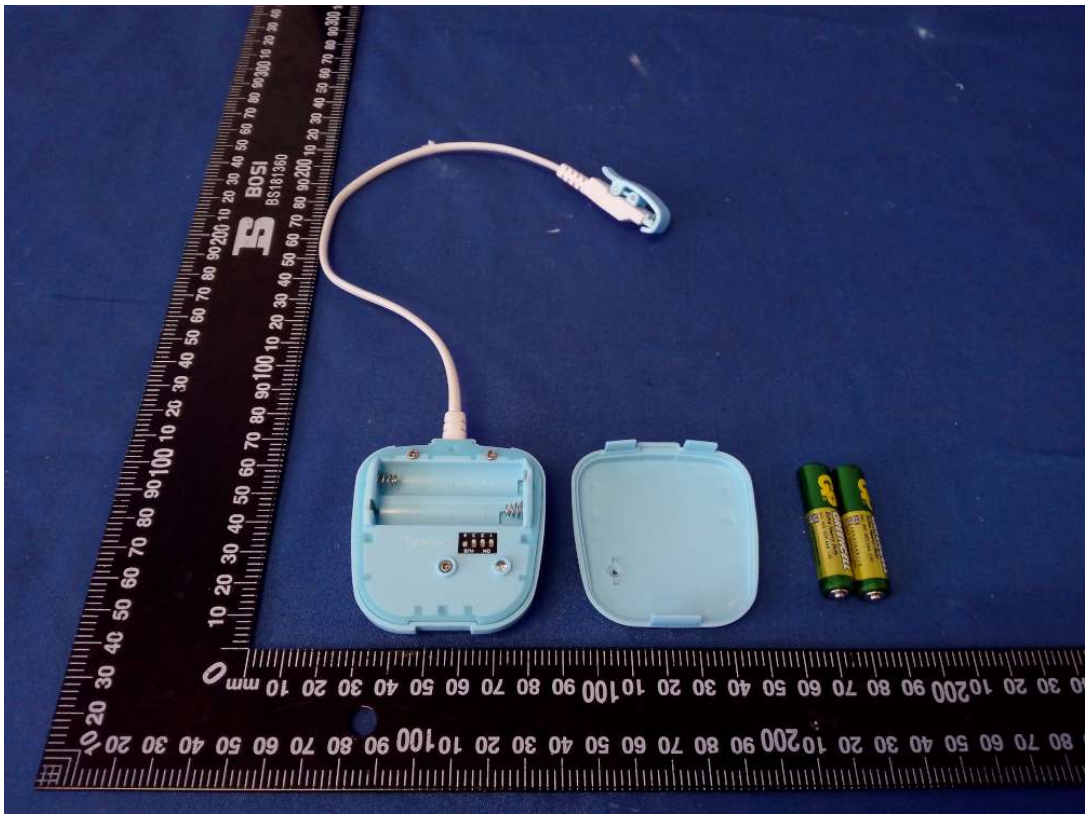
7. PHOTOGRAPHS OF TEST SET-UP

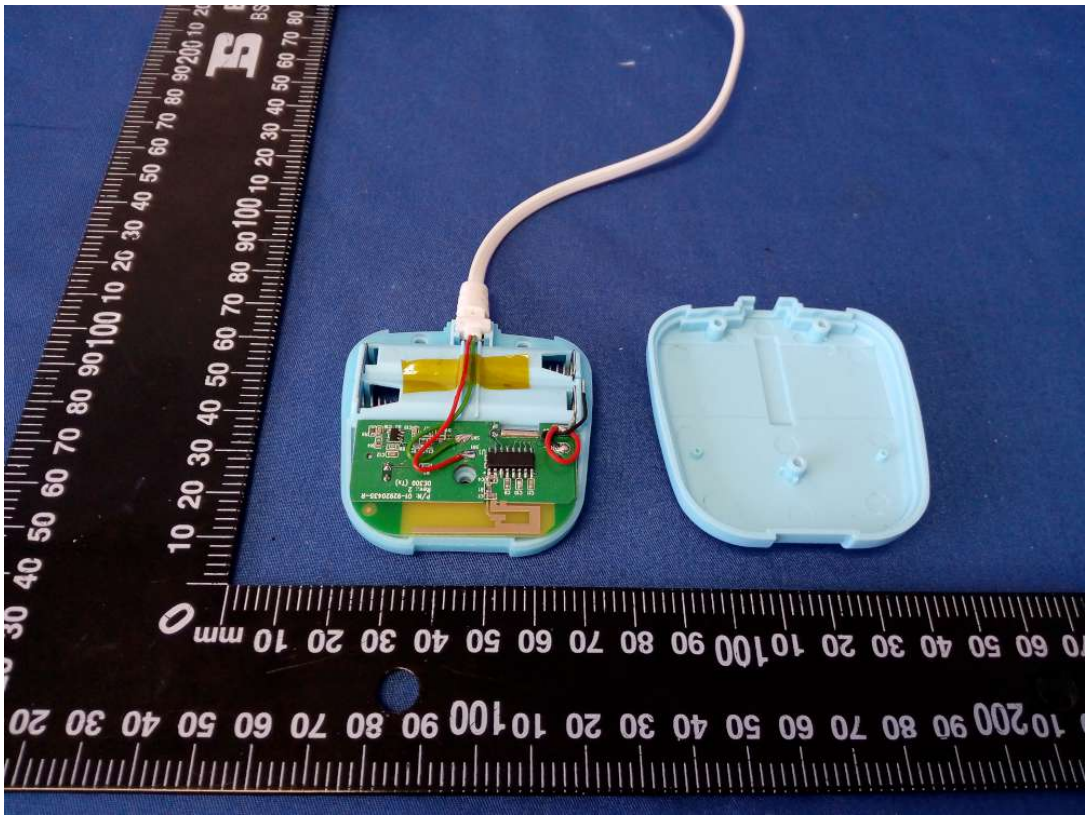
Radiated Emission Test

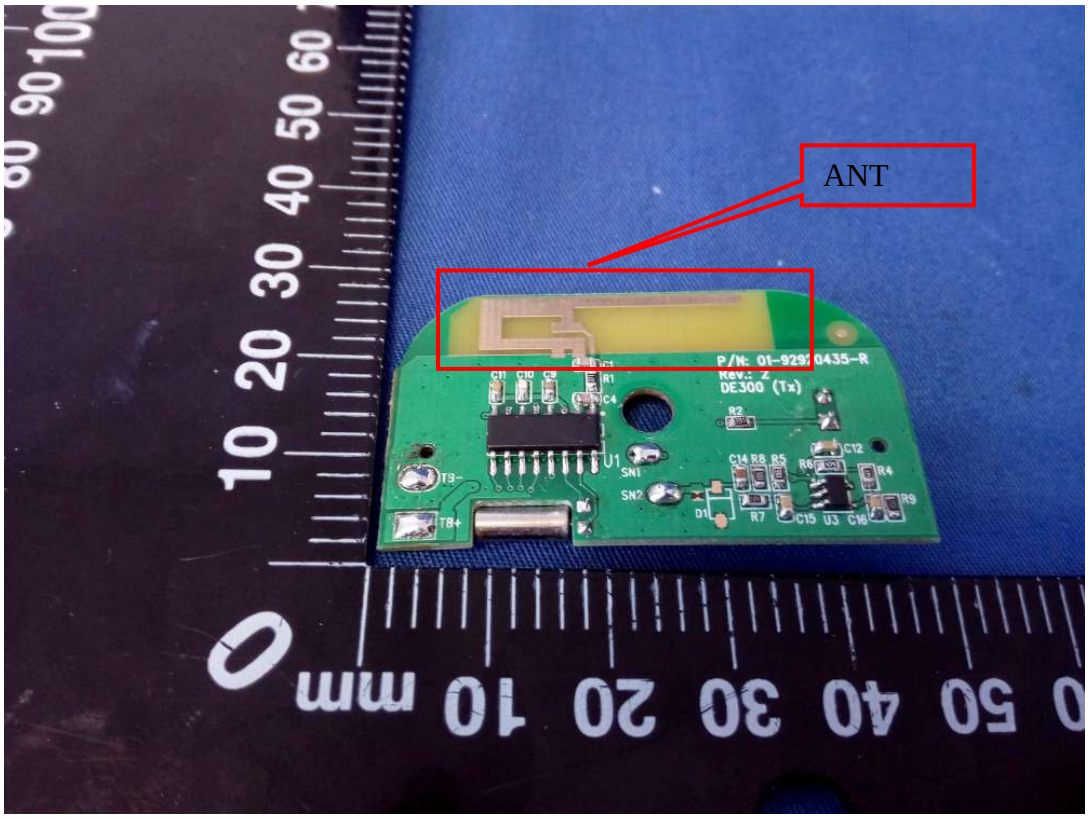
8. PHOTOGRAPHS OF THE EUT

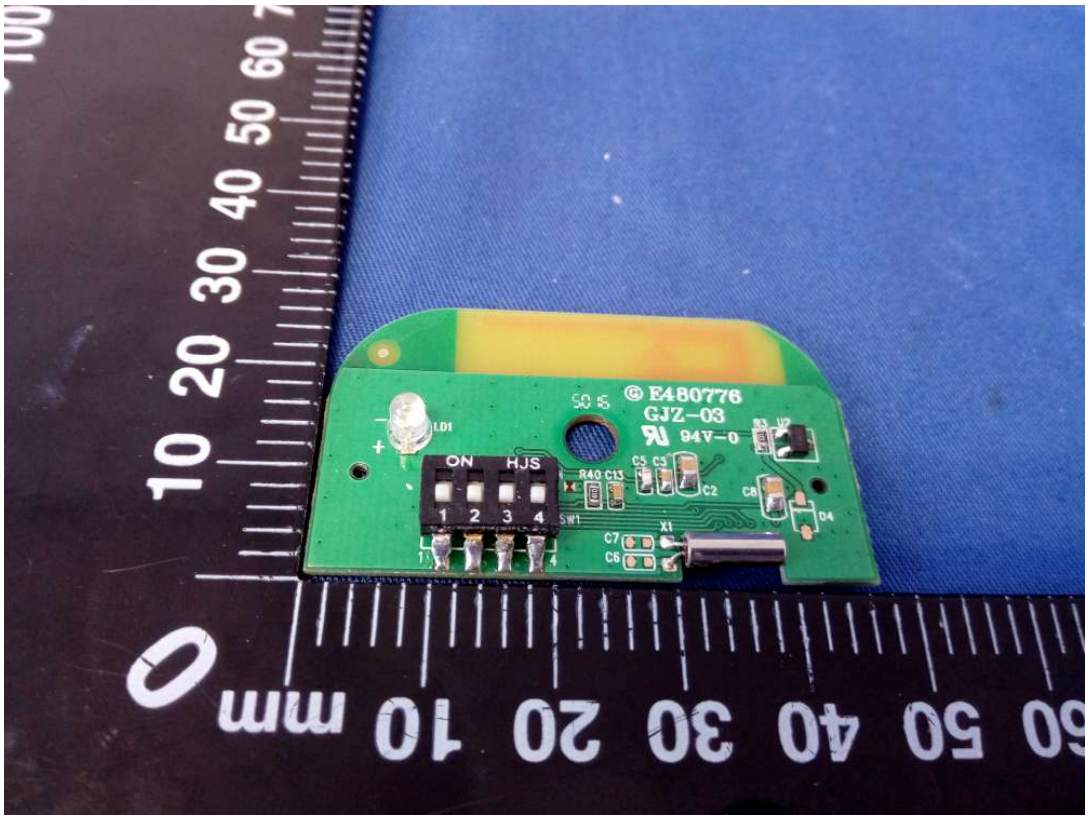

BOSI
BS181380


BOSI
BS181380









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