APPLICATION CERTIFICATION
On Behalf of

HSIEN LONG CO LTD

WIRELESS DOOR CHIME
Model No.: WD-3604, WD-3604S

FCC ID: K3QWD-3604S

Prepared for	:	HSIEN LONG CO LTD
Address	:	4F, No 8, Alley 11, Lane 327, Sec 2, Chung Shan Road, Chung-Ho City, Taipei Hsien, Taiwan
Prepared by	:	Shenzhen Accurate Technology Co., Ltd.
Address	:	1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China
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Report Number	:	ATE20172609
Date of Test	:	Jan. 3-Jan. 5, 2018
Date of Report	:	Jan. 5, 2018

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Description Page

Test Report Certification

Applicant	:	HSIEN LONG CO LTD
Manufacturer	:	YACHING ELECTRONIC(SHENZHEN)CO., LTD
EUT Description	:	WIRELESS DOOR CHIME
Model No.	:	WD-3604, WD-3604S
Trade Mark	:	N/A

Measurement Procedure Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.231a
ANSI C63.10-2013

The device described above is tested by Shenzhen Accurate Technology Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C Section 15.231a. The measurement results are contained in this test report and Shenzhen Accurate Technology Co., Ltd. is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC requirements.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of Shenzhen Accurate Technology Co., Ltd.

Date of Test : Jan. 3-Jan. 5, 2018
Date of Report : Jan. 5, 2018

Prepared by : (S Yang, Engineer)

Approved & Authorized Signer : (Sean Liu, Manager)

1. GENERAL INFORMATION

1.1.Description of Device (EUT)

EUT	:	WIRELESS DOOR CHIME
Model Number	:	WD-3604, WD-3604S (Note: Above series are identical in schematic, structure and critical components except for model name. So we prepare WD-3604 for test only.)
Power Supply	:	DC 12V (battery 1x)
Modulation Mode	:	ASK
Operation Frequency	:	315MHz
Antenna type	:	PCB antenna
Antenna gain	:	0dBi
RF power setting in test	:	Max power
Applicant	:	HSIEN LONG CO LTD
Address	:	4F, No 8, Alley 11, Lane 327, Sec 2, Chung Shan Road, Chung-Ho City, Taipei Hsien, Taiwan
Manufacturer	:	YACHING ELECTRONIC(SHENZHEN)CO., LTD
Address	:	2ND FLOOR, BUILDING A, NO.338, BANTIAN, JUNG FA ROAD, LONGGANG DISTRICT, SHENZHEN CITY
Date of sample received	:	Dec. 29, 2017
Date of Test	:	Jan. 3-Jan. 5, 2018

1.2.Description of Test Facility

EMC Lab	:	Recognition of accreditation by Federal Communications Commission (FCC) The Designation Number is CN1189 The Registration Number is 708358 Listed by Innovation, Science and Economic Development Canada (ISEDC) The Registration Number is 5077A-2 Accredited by China National Accreditation Service for Conformity Assessment (CNAS) The Registration Number is CNAS L3193 Accredited by American Association for Laboratory Accreditation (A2LA) The Certificate Number is 4297.01
Name of Firm	:	Shenzhen Accurate Technology Co., Ltd.
Site Location	:	1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China

1.3.Measurement Uncertainty

Conducted Emission Expanded Uncertainty	=	2.23dB, k=2
Radiated emission expanded uncertainty (9kHz-30MHz)	=	3.08dB, k=2
Radiated emission expanded uncertainty (30MHz-1000MHz)	=	4.42dB, k=2
Radiated emission expanded uncertainty (Above 1GHz)	=	4.06dB, k=2

2. MEASURING DEVICE AND TEST EQUIPMENT

Table 1: List of Test and Measurement Equipment

Kind of equipment	Manufacturer	Type	S/N	Calibrated dates	Cal. Interval
EMI Test Receiver	Rohde&Schwarz	ESCS30	100307	Jan. 07, 2017	One Year
EMI Test Receiver	Rohde&Schwarz	ESPI3	101526/003	Jan. 07, 2017	One Year
Spectrum Analyzer	Agilent	E7405A	MY45115511	Jan. 07, 2017	One Year
Pre-Amplifier	Rohde&Schwarz	CBLU1183540-01	3791	Jan. 07, 2017	One Year
Loop Antenna	Schwarzbeck	FMZB1516	1516131	Jan. 13, 2017	One Year
Bilog Antenna	Schwarzbeck	VULB9163	9163-323	Jan. 13, 2017	One Year
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-655	Jan. 13, 2017	One Year
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1067	Jan. 13, 2017	One Year
LISN	Rohde&Schwarz	ESH3-Z5	100305	Jan. 07, 2017	One Year
LISN	Schwarzbeck	NSLK8126	8126431	Jan. 07, 2017	One Year
Highpass Filter	Wainwright Instruments	WHKX3.6/18G-10SS	N/A	Jan. 07, 2017	One Year
Band Reject Filter	Wainwright Instruments	WRCG2400/2485-2375/2510-60/11SS	N/A	Jan. 07, 2017	One Year

3. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
Section 15.207	Conducted Emission	N/A
Section 15.231(b)	Radiated Emission	Compliant
Section 15.231(c)	20dB Bandwidth	Compliant
Section 15.231(a)(1)	Release Time Measurement	Compliant
Section 15.203	Antenna Requirement	Compliant

The product is a manually operated transmitter.
Section 15.231 (a) (2), (3), (4) and (5) are not applicable.

Note: The power supply mode of the EUT is DC 12V, According to the FCC standard requirements, conducted emission is not applicable

All normal using modes of the normal function were tested but only the worst test data of the worst mode is recorded by this report.

4. THE FIELD STRENGTH OF RADIATION EMISSION

4.1.Block Diagram of Test Setup

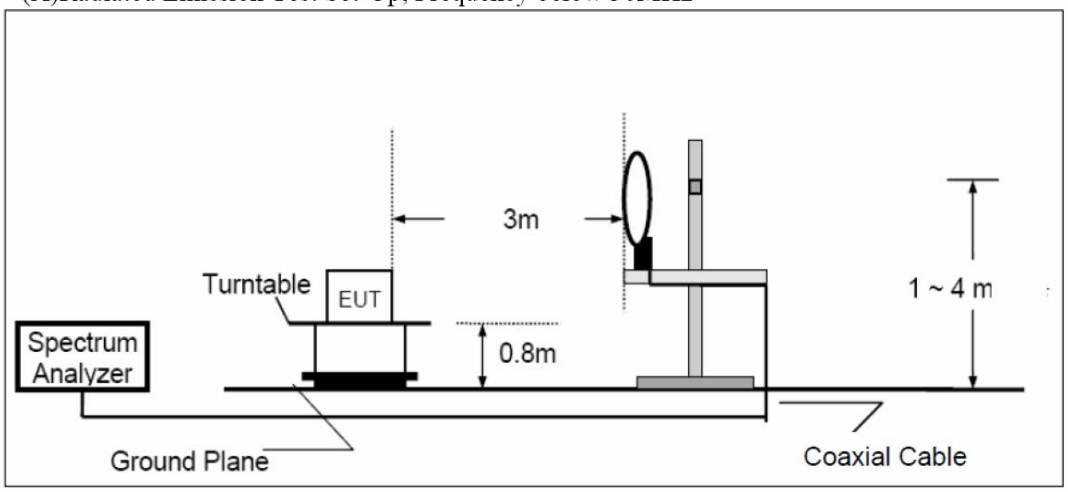
4.1.1.Block diagram of connection between the EUT and simulators

EUT

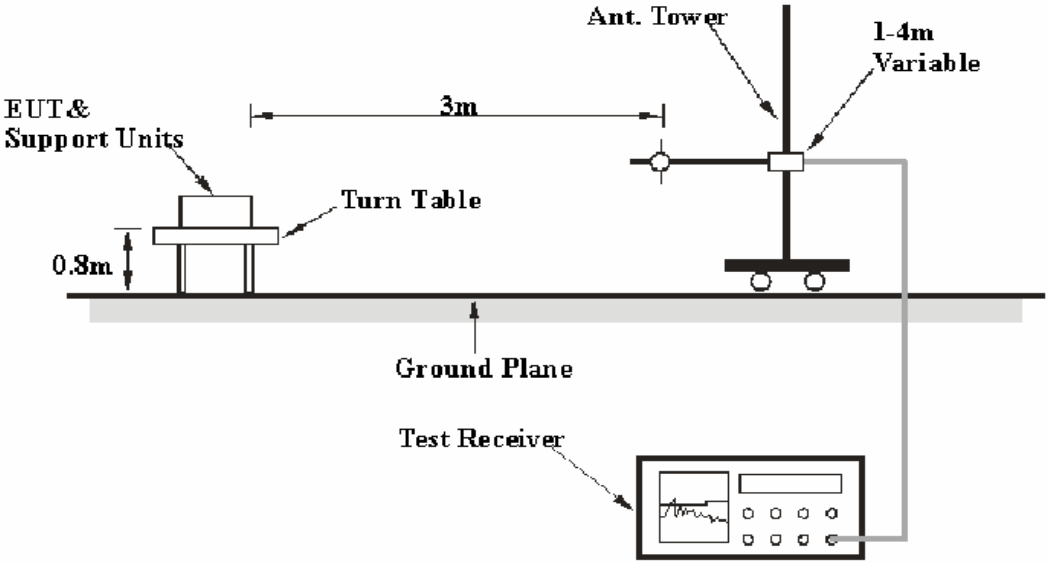
(EUT: WIRELESS DOOR CHIME)

4.1.2.Semi-Anechoic Chamber Test Setup Diagram

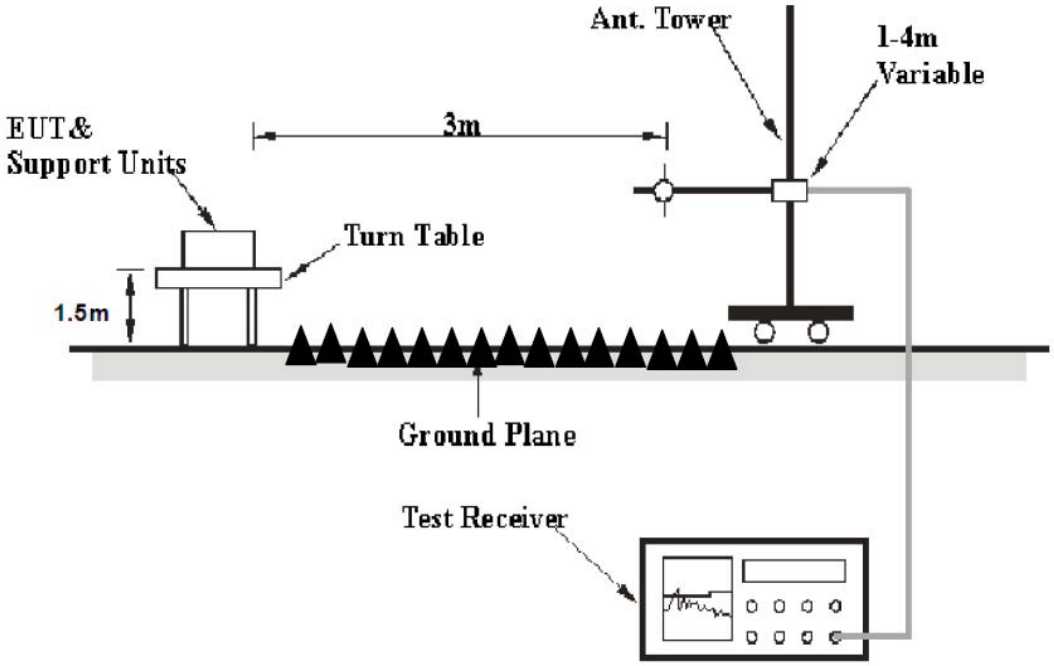
(A)Radiated Emission Test Set-Up, Frequency below 30MHz



(B) Radiated Emission Test Set-Up, Frequency 30-1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1GHz



4.2. The Field Strength of Radiation Emission Measurement Limits

4.2.1. Radiation Emission Measurement Limits According to FCC Part 15 Section 15.231(b)

Frequency Range of Fundamental [MHz]	Field Strength of Fundamental Emission [Average] [μV/m]	Field Strength of Spurious Emission [Average] [μV/m]
40.66-40.70	2250	225
70-130	1250	125
130-174	1250-3750	125-375
174-260	3750	375
260-470	3750-12500	375-1250
Above 470	12500	1250

Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz, uV/m at 3 meters = 56.82(F) - 6136; for the band 260-470 MHz, uV/m at 3 meters = 41.67(F) - 7083. The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.

4.2.2. Restricted Band Radiation Emission Measurement Limits According to FCC part 15 Section 15.205 and Section15.209.

4.3. Configuration of EUT on Measurement

The equipment is installed on Radiated Emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

4.4. Operating Condition of EUT

4.4.1. Setup the EUT and simulator as shown as Section 4.1.

4.4.2. Turn on the power of all equipment.

4.4.3. Let the EUT work in TX mode measure it.

4.5. Test Procedure

The EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground(Below 1GHz). The EUT and its simulators are placed on a turntable, which is 1.5 meter high above ground(Above 1GHz). The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bi-log antenna) is used as receiving antenna. Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission levels, all of the EUT location must be manipulated according to ANSI C63.10:2013 on radiated emission measurement. This EUT was tested in 3 orthogonal positions and the worst case position data was reported.

The bandwidth of test receiver is set at 120 kHz in 30-1000 MHz, and 1 MHz in 1000 MHz.

4.6. The Field Strength of Radiation Emission Measurement Results

PASS.

The frequency range from 30 MHz to 4000 MHz is checked.

EUT :	WIRELESS DOOR CHIME		
Model No. :	WD-3604	Power Supply :	DC 12V
Test Mode :	TX	Test Engineer :	James

Frequency (MHz)	Reading (dBμV/m)	Factor Corr.	Average Factor	Result(dBμV/m)		Limit(dBμV/m)		Margin(dB)		Polarization
	PEAK	(dB)	(dB)	AV	PEAK	AV	PEAK	AV	PEAK	
315.00	84.50	-8.58	**-8.31**	**67.61**	75.92	**75.63**	**95.63**	**-8.02**	**-19.71**	Horizontal
631.0884	59.32	-1.95	**-8.31**	49.06	57.37	55.63	75.63	-6.57	-18.26	
945.0398	47.21	3.03	**-8.31**	41.93	50.24	55.63	75.63	-13.7	-25.39	
1260.003	58.30	-6.68	**-8.31**	43.31	51.62	55.63	75.63	-12.32	-24.01	
1575.008	57.11	-5.00	**-8.31**	43.80	52.11	55.63	75.63	-11.83	-23.52	
1890.494	52.82	-2.25	**-8.31**	41.96	50.57	55.63	75.63	-13.67	-25.06	
315.00	83.12	-8.58	**-8.31**	**66.23**	74.54	**75.63**	**95.63**	**-9.40**	**-21.09**	Vertical
630.0884	55.25	-1.95	**-8.31**	44.99	53.30	55.63	75.63	-10.64	-22.33	
945.0398	45.57	3.03	**-8.31**	40.29	48.60	55.63	75.63	-15.34	-27.03	
1260.057	59.16	-6.69	**-8.31**	44.16	52.47	55.63	75.63	-11.47	-23.16	
1575.008	56.70	-5.00	**-8.31**	43.39	51.70	55.63	75.63	-12.24	-23.93	
1890.494	53.29	-2.25	**-8.31**	42.73	51.04	55.63	75.63	-12.90	-24.57	

Note:

1. Emissions attenuated more than 20 dB below the permissible value are not reported.
2. The field strength is calculated by adding the antenna factor, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is as follows:

Result = Reading + Corrected Factor

Where Corrected Factor = Antenna Factor + Cable Loss + High Pass Filter Loss – Amplifier Gain

3. FCC Limit for Average Measurement = 41.67(315)-7083 = 6043.05 μV/m =75.63 dBμV/m

4. The spectral diagrams in appendix I display the measurement of peak values.

5. Average value= PK value + Average Factor (duty factor)

6. If the peak-detected amplitude can be shown to comply with the average limit, then it is not necessary to perform a separate average measurement.

7. The EUT is tested radiation emission in three axes(X,Y,Z). The worst emissions are reported in three axes.

8. Pulse Desensitization Correction Factor

Pulse Width (PW) = 0.4ms

2/PW = 2/0.4ms = 5kHz

RBW (100kHz) > 2/PW (5kHz)

Therefore PDCF is not needed.

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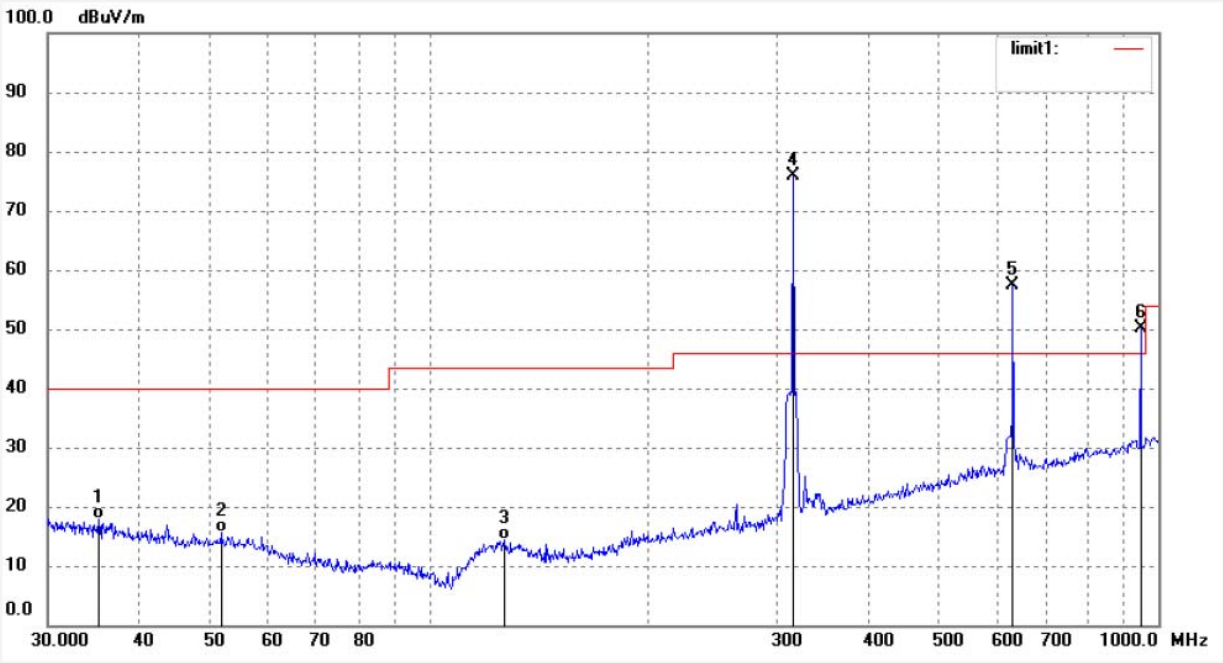
Job No.: JC #349	Polarization: Horizontal
Standard: FCC Class B 3M Radiated	Power Source: DC 12V
Test item: Radiation Test	Date: 18/01/03/
Temp.(C)/Hum.(%) 23 C / 48 %	Time: 10/36/17
EUT: WIRELESS DOOR CHIME	Engineer Signature: star
Mode: TX	Distance: 3m
Model: WD-3604	
Manufacturer: YACHING	

Note: Report NO.:ATE20172609



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	35.2512	28.23	-10.47	17.76	40.00	-22.24	QP	100	344	
2	51.8430	28.24	-12.72	15.52	40.00	-24.48	QP	100	231	
3	126.7723	27.97	-13.68	14.29	43.50	-29.21	QP	100	342	
4	315.0806	84.50	-8.58	75.92			peak	100	124	
5	630.0884	59.32	-1.95	57.37			peak	100	111	
6	945.0397	47.21	3.03	50.24			peak	100	275	

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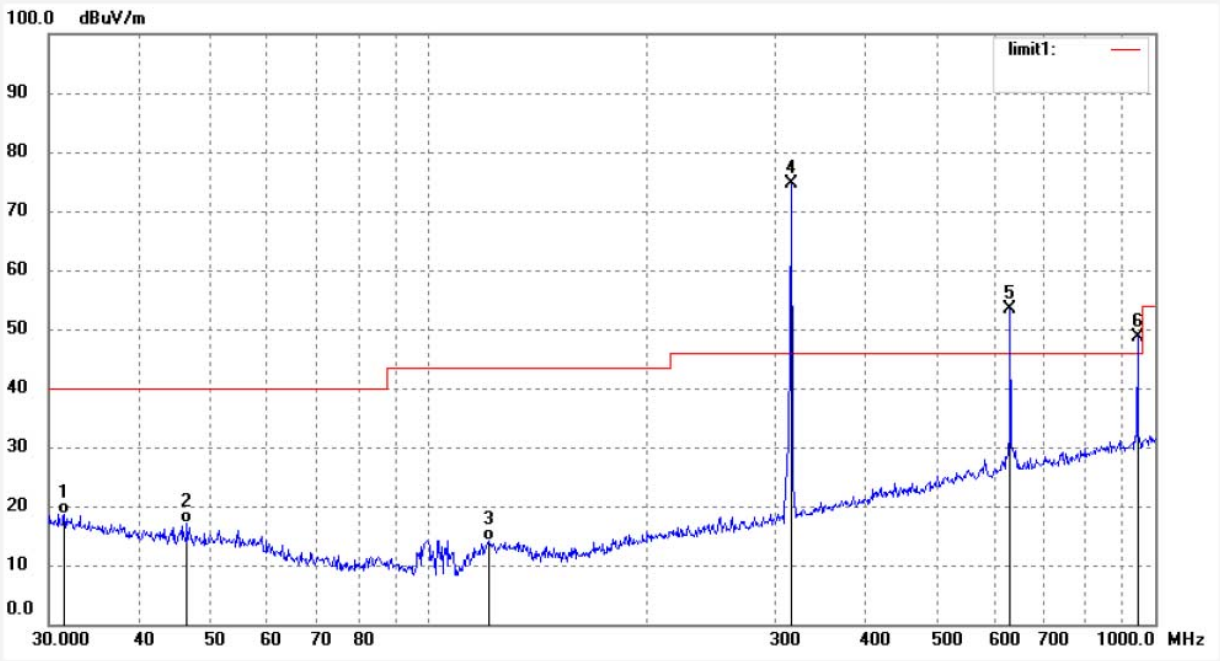
Fax:+86-0755-26503396

Job No.: JC #348
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 23 C / 48 %
EUT: WIRELESS DOOR CHIME
Mode: TX
Model: WD-3604
Manufacturer: YACHING

Polarization: Vertical
Power Source: DC 12V
Date: 18/01/03/
Time: 10/37/43
Engineer Signature: star
Distance: 3m

Note: Report NO.:ATE20172609



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	31.5095	27.97	-9.38	18.59	40.00	-21.41	QP	100	322	
2	46.5030	29.65	-12.60	17.05	40.00	-22.95	QP	100	123	
3	121.1231	27.22	-13.19	14.03	43.50	-29.47	QP	100	152	
4	315.4806	83.12	-8.58	74.54			peak	100	241	
5	630.0884	55.25	-1.95	53.30			peak	100	147	
6	945.0397	45.57	3.03	48.60			peak	100	251	

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Site: 2# Chamber
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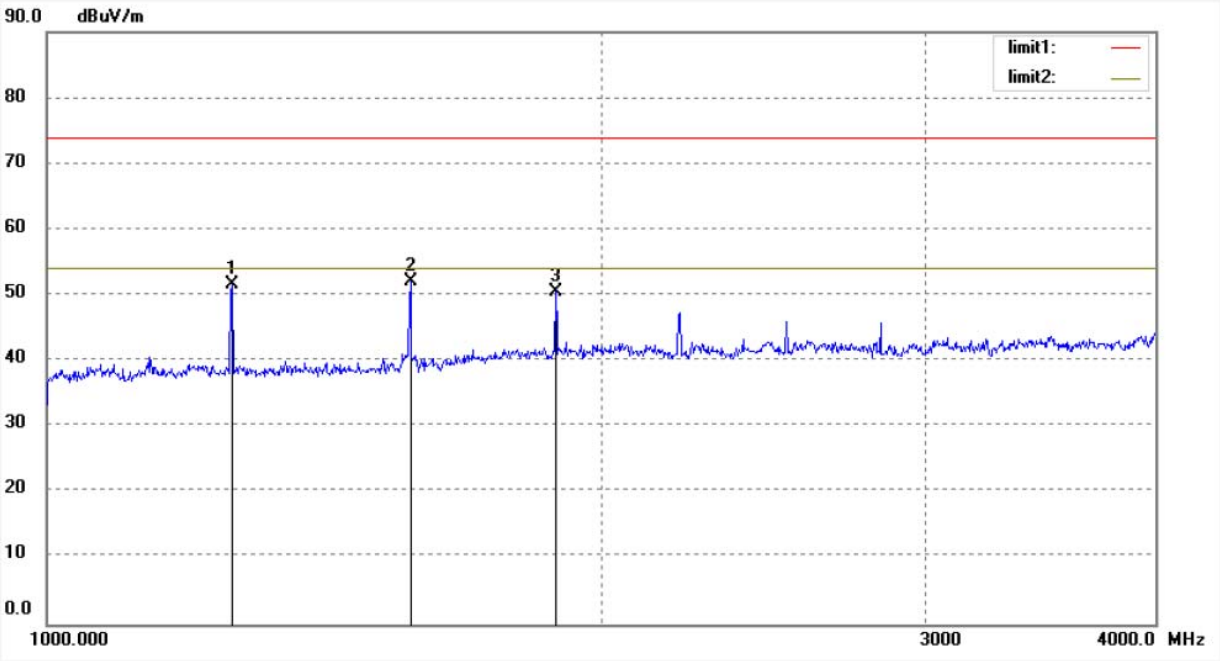
Job No.: JC #346	Polarization: Horizontal
Standard: FCC PK	Power Source: DC 12V
Test item: Radiation Test	Date: 18/01/03/
Temp.(C)/Hum.(%) 23 C / 48 %	Time: 10/48/14
EUT: WIRELESS DOOR CHIME	Engineer Signature: star
Mode: TX	Distance: 3m
Model: WD-3604	
Manufacturer: YACHING	

Note: Report NO.:ATE20172609



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	1260.003	58.30	-6.68	51.62			peak	150	147	
2	1575.707	57.11	-5.00	52.11			peak	150	265	
3	1889.494	52.82	-2.25	50.57			peak	150	134	

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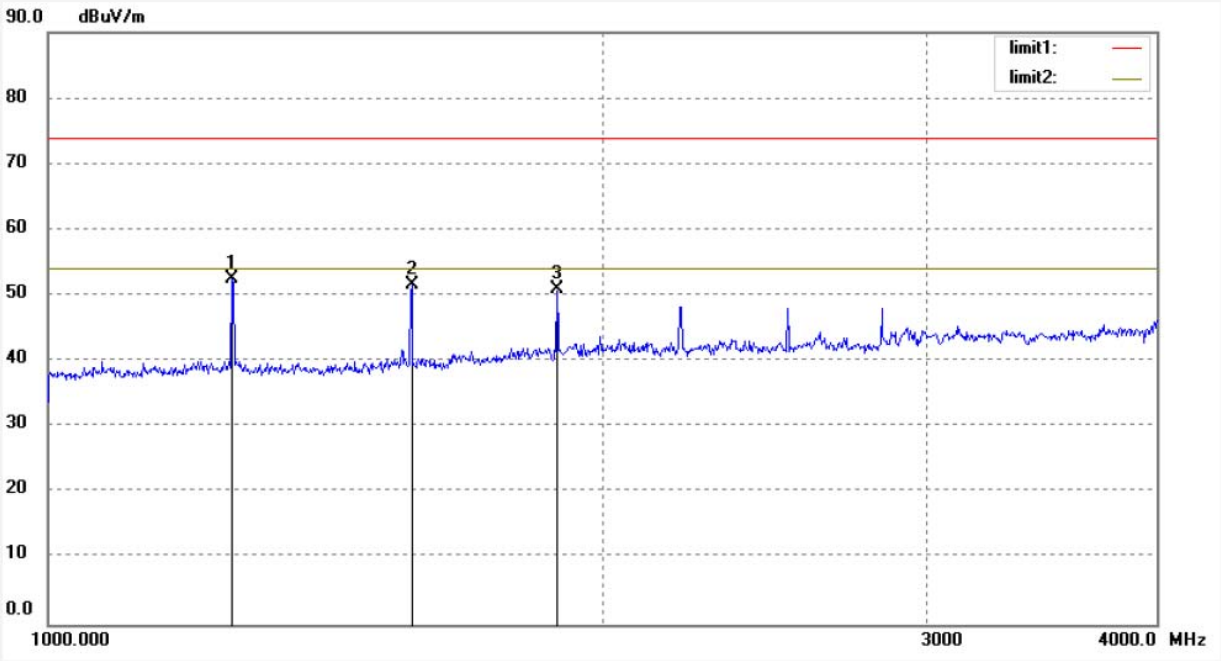
Fax:+86-0755-26503396

Job No.: JC #347	Polarization: Vertical
Standard: FCC PK	Power Source: DC 12V
Test item: Radiation Test	Date: 18/01/03/
Temp.(C)/Hum.(%) 23 C / 48 %	Time: 10/45/13
EUT: WIRELESS DOOR CHIME	Engineer Signature: star
Mode: TX	Distance: 3m
Model: WD-3604	
Manufacturer: YACHING	

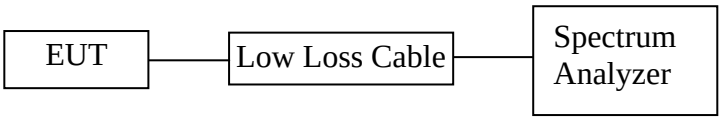
Note: Report NO.:ATE20172609



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	1258.757	59.16	-6.69	52.47			peak	150	14	
2	1575.707	56.70	-5.00	51.70			peak	150	44	
3	1889.494	53.29	-2.25	51.04			peak	150	124	

5. 20DB OCCUPIED BANDWIDTH

5.1.Block Diagram of Test Setup



(EUT: WIRELESS DOOR CHIME)

5.2.The Bandwidth of Emission Limit According To FCC Part 15 Section 15.231(c)

The bandwidth of emission shall be no wider than 0.25% of the center frequency. Therefore, the bandwidth of the emission limit is 315 MHz×0.25% = 787.5kHz. Bandwidth is determined at the two points 20 dB down from the top of modulated carrier.

5.3.EUT Configuration on Measurement

The equipment are installed on the bandwidth of emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

5.4.Operating Condition of EUT

5.4.1.Setup the EUT and simulator as shown as Section 5.1.

5.4.2.Turn on the power of all equipment.

5.4.3.Let the EUT work in TX mode measure it.

5.5.Test Procedure

5.5.1. Set SPA Center Frequency = Fundamental frequency, RBW = 10 kHz, VBW = 30 kHz, Span = 400KHz.

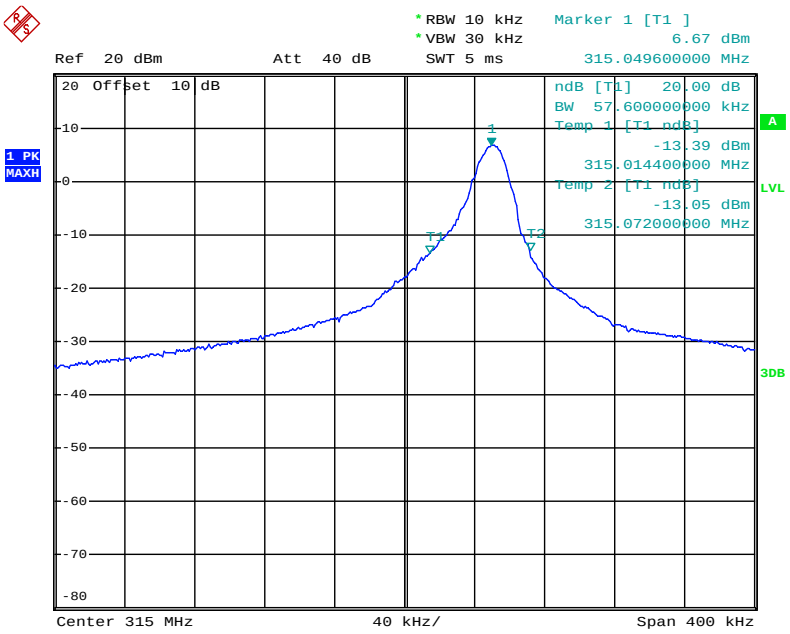
5.5.2.Set SPA Max hold, Mark peak, -20 dB.

5.6.Measurement Result

The EUT does meet the FCC requirement.

-20 dB bandwidth =57.6 kHz <787.5KHz.

The spectral following.



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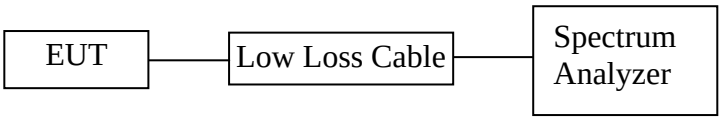
6. RELEASE TIME MEASUREMENT

6.1.Block Diagram of Test Setup



(EUT: WIRELESS DOOR CHIME)

6.2.Release Time Measurement According To FCC Part 15 Section 15.231(a)

Section 15.231(a) (1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

6.3.EUT Configuration on Measurement

The equipment are installed on Release Time Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

6.4. Operating Condition of EUT

6.4.1.Setup the EUT and simulator as shown as Section 6.1.

6.4.2.Turn on the power of all equipment.

6.4.3.Let the EUT work in TX mode measure it.

6.5.Test Procedure

6.5.1. Set SPA Center Frequency = Fundamental frequency, RBW = 100 kHz, VBW = 300 kHz, Span = 0 Hz. Sweep time = 5 s.

6.5.2.Set EUT as normal operation and press Transmitter button.

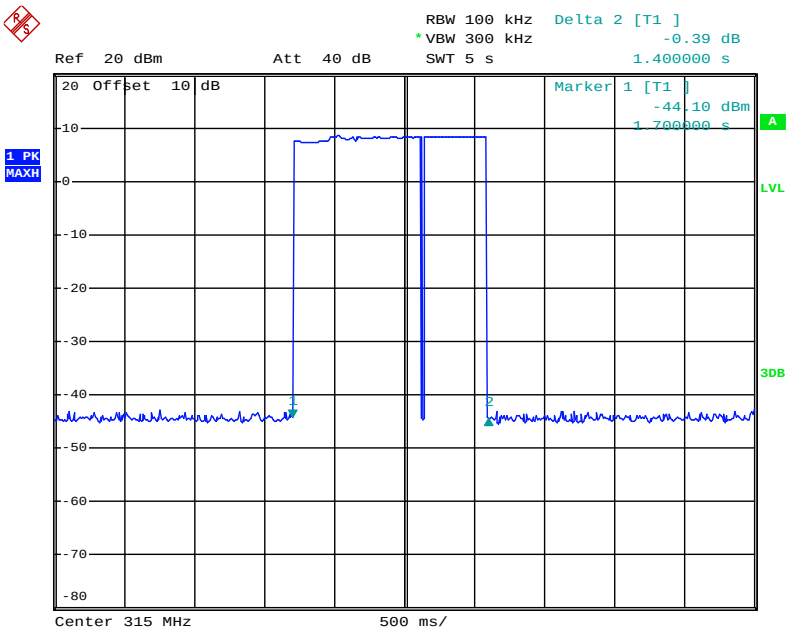
6.5.3.Set SPA View. Delta Mark time.

6.6. Measurement Result

The release time less than 5 seconds.

Release Time = 1.4s

The spectral following.



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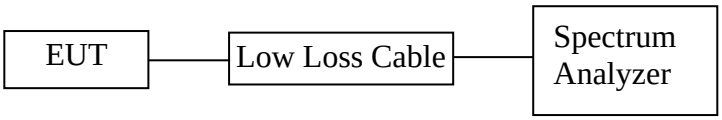
7. AVERAGE FACTOR MEASUREMENT

7.1.Block Diagram of Test Setup



(EUT: WIRELESS DOOR CHIME)

7.2.Average factor Measurement according to ANSI C63.10-2013

ANSI C63.10-2013 Section 7.5 Unless otherwise specified, when the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 s (100 ms). In cases where the pulse train exceeds 0.1 s, the measured field strength shall be determined during a 0.1 s interval.64 The following procedure is an example of how the average value may be determined. The average field strength may be found by measuring the peak pulse amplitude (in log equivalent units) and determining the duty cycle correction factor (in dB) associated with the pulse modulation as shown in Equation (10):

Average factor in dB = 20 log (duty cycle)

7.3.EUT Configuration on Measurement

The equipment are installed on average factor Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

7.4. Operating Condition of EUT

7.4.1.Setup the EUT and simulator as shown as Section 7.1.

7.4.2.Turn on the power of all equipment.

7.4.3.Let the EUT work in TX mode measure it.

7.5.Test Procedure

7.5.1.The time period over which the duty cycle is measured is 100 milliseconds, or the repetition cycle, whichever is a shorter time frame. The worst case (highest percentage on) duty cycle is used for the calculation.

7.5.2.Set SPA Center Frequency = Fundamental frequency, RBW = 100 kHz, VBW = 300 kHz, Span = 0 Hz.

7.5.3.Set EUT as normal operation.

7.5.4.Set SPA View. Delta Mark time.

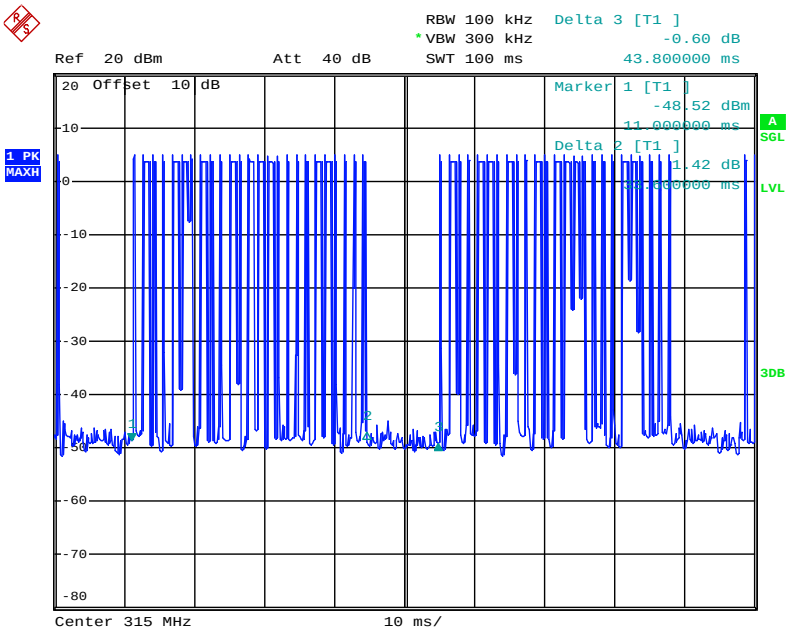
7.6. Measurement Result

The duty cycle is simply the on time divided by the period:

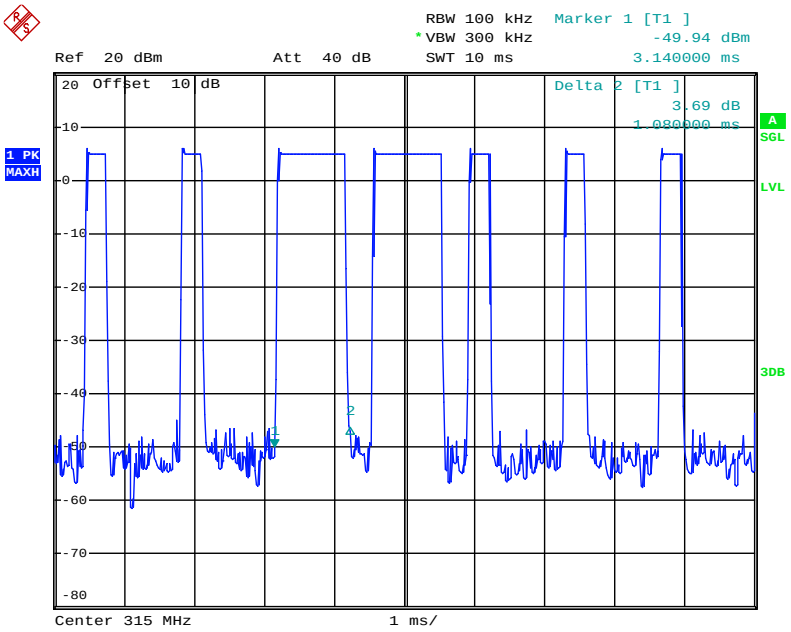
The duration of one cycle = 43.8ms
Effective period of the cycle = (1.08×10) + (0.4×15)ms =16.8 ms
DC =16.8ms/43.8ms=0.384
Therefore, the average factor is found by 20log0.384= -8.31dB

The spectral following.

The graph shows the pattern of coding during the signal transmission.
The duration of one cycle = 43.8 ms.



The graph shows the duration of ‘on’ signal. From marker 1 to marker 2, duration is 1.08ms.



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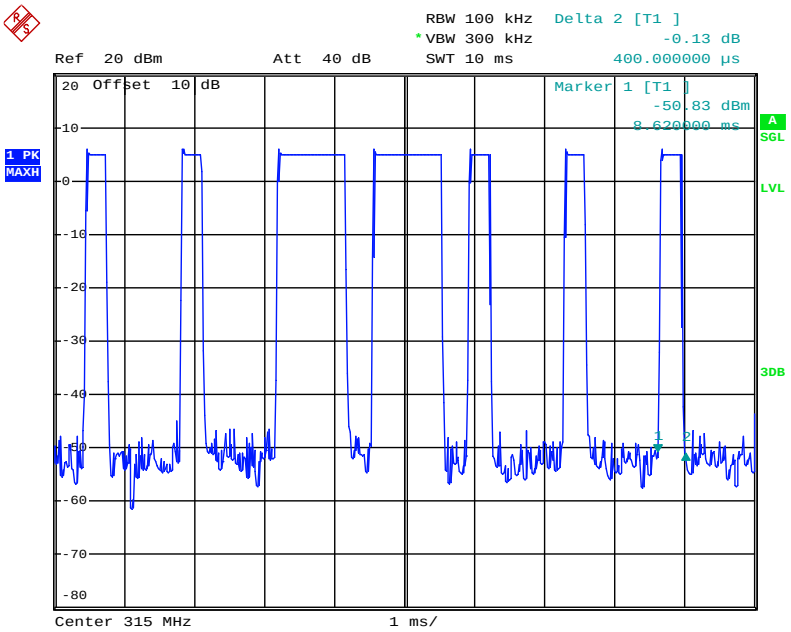
The graph shows the duration of ‘on’ signal. From marker 1 to marker 2, duration is 0.4ms.



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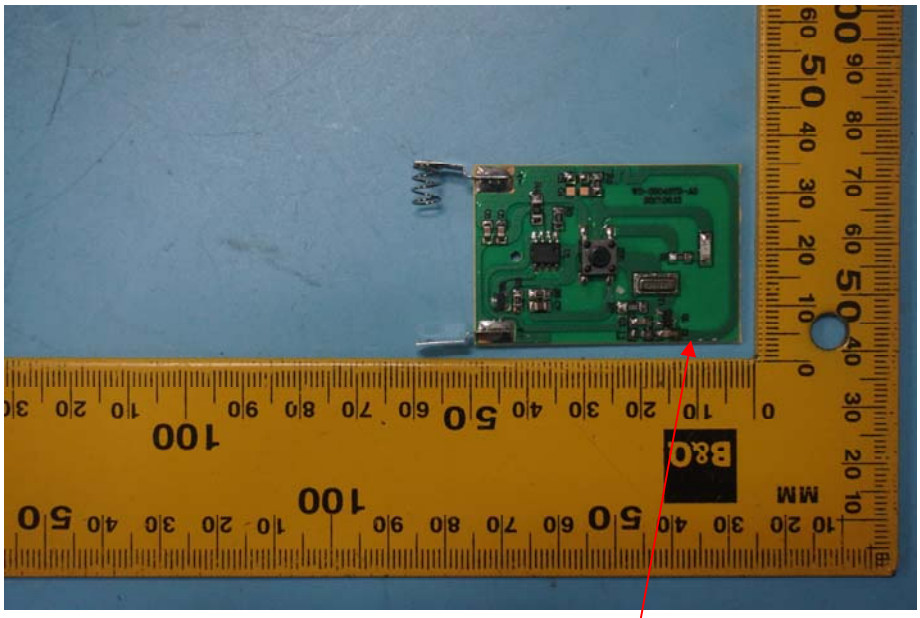
8. ANTENNA REQUIREMENT

8.1. The Requirement

According to 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.

8.2. Antenna Construction

Device is equipped with permanent attached antenna, which isn't displaced by other antenna. The Antenna gain of EUT is 0dBi. Therefore, the equipment complies with the antenna requirement of Section 15.203.



Antenna

******* End of Test Report *******