

FCC Test Report

FCC ID:2ALLY-PE9202

Product : Wireless Doorbell

Trade Name : N/A

Model Name : PE-9202

Report No. : WST170320065-E

Prepared for

MSR Imports, Inc.

6920 Central Highway, Pennsauken, NJ 08109, USA

Prepared by

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TEST RESULT CERTIFICATION

Applicant's name MSR Imports, Inc.

Address 6920 Central Highway, Pennsauken, NJ 08109, USA

Manufacture's Name Shenzhen Qiyao Plastic & Electronic Co. Ltd

Address 6th BLD, 4#Chuangye Road, Ailian, Longgang District, Shenzhen, China

Product description

Product name Wireless Doorbell

Model and/or type reference PE-9202

Trademark: N/A

Test procedure FCC Part15.231

Standards ANSI C63.10-2013

This device described above has been tested by WST, 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: Mar. 20, 2017 ~ Mar. 24, 2017

Date of Issue.....: Mar. 24, 2017

Testing Engineer :



(Eric Xie)

Technical Manager :



(Dora Qin)

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(Kait Chen)

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1. TEST SUMMARY

Test procedures according to the technical standards:

FCC Part15 (15.231) , Subpart C			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	N/A	
15.209,15.231b	Fundamental &Radiated Spurious Emission Measurement	PASS	
15.231c	Occupy Bandwidth	PASS	
15.231a	Dwell time	PASS	
15.203	Antenna Requirement	PASS	

NOTE:

(1)" N/A" denotes test is not applicable in this Test Report

1.1 TEST FACILITY

Test Firm : QTC Certification & Testing Co., Ltd.
Certificated by FCC, Registration No.: 588523
Address : 2nd Floor,B1 Building,Fengyeyuan Industrial Plant, Liuxian 2st. Road,
Xin'an Street, Bao'an District, Shenzhen, China.

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$ · 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	$\pm 1.38\text{dB}$
2	RF power, conducted	$\pm 0.16\text{dB}$
3	Spurious emissions, conducted	$\pm 0.21\text{dB}$
4	All emissions, radiated(<1G)	$\pm 4.68\text{dB}$
5	All emissions, radiated(>1G)	$\pm 4.89\text{dB}$
6	Temperature	$\pm 0.5^{\circ}\text{C}$
7	Humidity	$\pm 2\%$

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	Wireless Doorbell	
Trade Mark:	N/A	
Model Name.	PE-9202	
DIFF: :	N/A	
Product Description:	The EUT is a Wireless Doorbell.	
	Operation Frequency:	315MHz
	Modulation Type:	ASK
	Antenna Designation:	PCB antenna
	Antenna Gain	0dBi
	Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User's Manual.	
Battery:	DC9V from battery	
Connecting I/O Port(s):	Please refer to the User's Manual	

Note:

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

2.2 DESCRIPTION OF TEST MODES

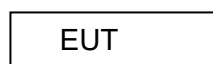
For All Emission	
Final Test Mode	Description
Mode 1	TX Mode

Note:

- (1) Fully-charged battery is used during the test
- (2) There four button for product, we pretest all mode, only the up button(Mode 1) was worst, all data was in this mode.

2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Radiated Spurious Emission Test



2.4 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	Mfr/Brand	Model/Type No.	Series No.	Note
E-1	Wireless Doorbell	N/A	PE-9202	N/A	EUT

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.
- (3) YES" is means "shielded" "with core"; "NO" is means "unshielded" "without core".

2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Spectrum Analyzer	Agilent	E4407B	MY45108040	2016.07.06	2017.07.05	1 year
2	Test Receiver	R&S	ESPI	101318	2016.06.07	2017.06.06	1 year
3	Bilog Antenna	TESEQ	CBL6111D	31216	2016.07.06	2017.07.05	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2016.06.07	2017.06.06	1 year
5	Spectrum Analyzer	ADVANTEST	R3132	150900201	2016.06.07	2017.06.06	1 year
6	Horn Antenna	EM	EM-AH-10180	2011071402	2016.07.06	2017.07.05	1 year
7	Horn Ant	Schwarzbeck	BBHA 9170	9170-181	2016.07.06	2017.07.05	1 year
8	Amplifier	EM	EM-30180	060538	2016.12.22	2017.12.21	1 year
9	Loop Antenna	ARA	PLA-1030/B	1029	2016.06.08	2017.06.07	1 year
10	Power Meter	R&S	NRVS	100696	2016.07.06	2017.07.05	1 year
11	Power Sensor	R&S	URV5-Z4	0395.1619.05	2016.07.06	2017.07.05	1 year
12	RF cables	R&S	R203	R20X	2016.07.06	2017.07.05	1 year

Conduction Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Test Receiver	R&S	ESCI	101160	2016.06.06	2017.06.05	1 year
2	LISN	R&S	ENV216	101313	2016.08.24	2017.08.23	1 year
3	LISN	EMCO	3816/2	00042990	2016.08.24	2017.08.23	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2016.06.07	2017.06.06	1 year
5	Passive Voltage Probe	R&S	ESH2-Z3	100196	2016.06.07	2017.06.06	1 year
6	Absorbing clamp	R&S	MOS-21	100423	2016.06.08	2017.06.07	1 year
7	RF cables	R&S	R204	R20X	2016.07.06	2017.07.05	1 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	
0.1-0.5	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

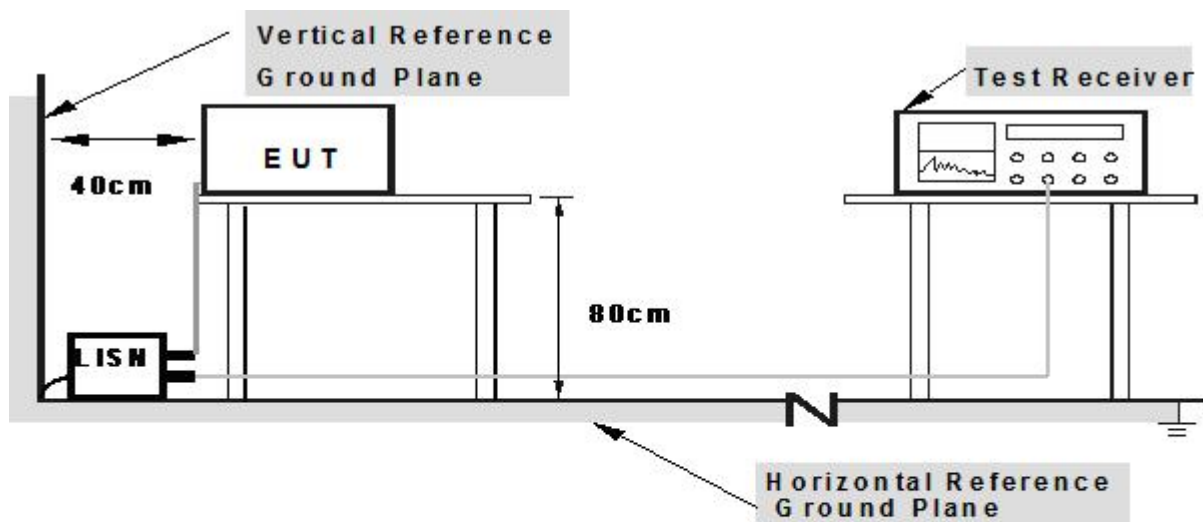
3.1.2 TEST PROCEDURE

- The EUT was placed 0.4 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.
- 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.
- 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.
- LISN at least 80 cm from nearest part of EUT chassis.
- 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 cm 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

Temperature:	26 °C	Relative Humidity:	54%
Pressure:	1010hPa	Test Date :	N/A
Test Mode:	N/A	Phase :	N/A
Note :			

Note: This EUT is powered by the battery only, this test item is not applicable.

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), then the 15.231(b) limit in the table below has to be followed.

Frequencies(MHz)	Field Strength(microvolts/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 B (dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

FUNDAMENTAL AND HARMONICS EMISSION LIMITS

Fundamental Frequency (MHz)	Field Strength of Fundamental (microvolts/meter)	Field Strength of Spurious Emissions (microvolts/meter)
40.66 - 40.70	2,250	225
70 - 130	1,250	125
130 - 174	1,250 to 3,750 **	125 to 375 **
174 - 260	3,750	375
260 - 470	3,750 to 12,500 **	375 to 1,250 **
Above 470	12,500	1,250

** linear interpolations

[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, $\mu\text{V/m}$ at 3 meters = $56.81818(F) - 6136.3636$; for the band 260-470 MHz, $\mu\text{V/m}$ at 3 meters = $41.6667(F) - 7083.3333$. The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.]

FREQUENCY RANGE OF RADIATED MEASUREMENT (For unintentional radiators)

Highest frequency generated or Upper frequency of measurement used in the device or on which	Range (MHz)
Below 1.705	30
1.705 – 108	1000
108 – 500	2000
500 – 1000	5000
Above 1000	5 th harmonic of the highest frequency or 40 GHz, whichever is lower

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RBW / VBW setting	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

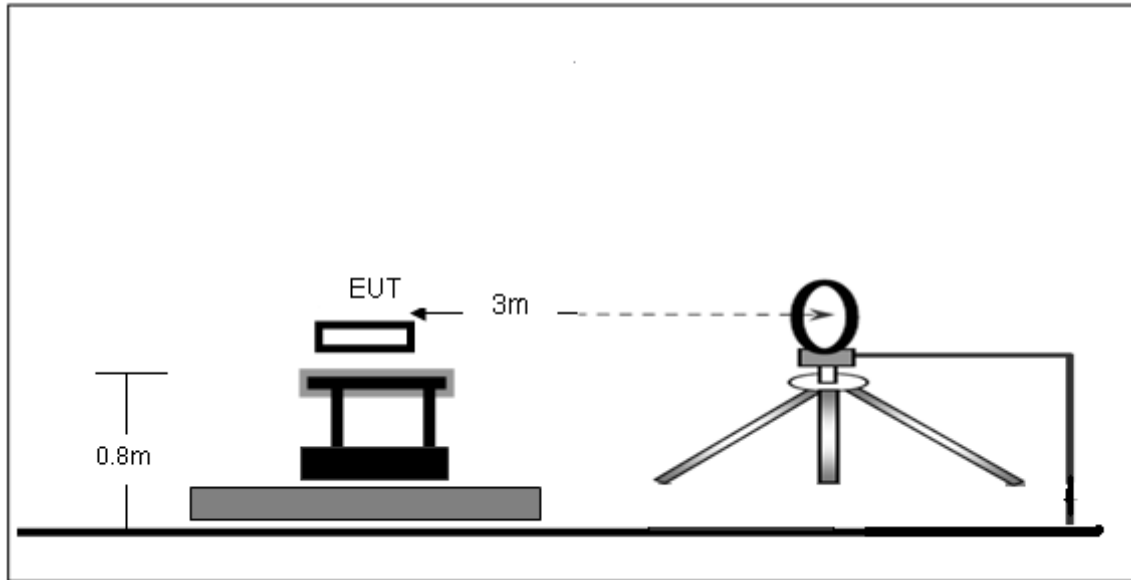
- The measuring distance of at 10 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- The height of the equipment or of the substitution antenna shall be 0.8 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.
- 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.
- 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.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

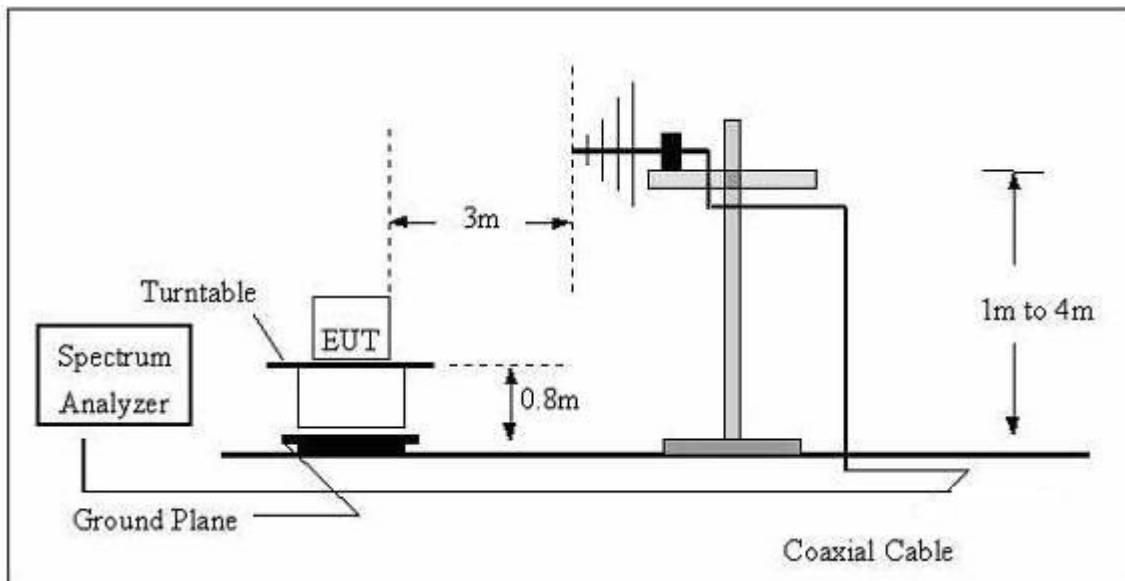
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case was X axis and the emissions were reported.

3.2.3 TEST SETUP

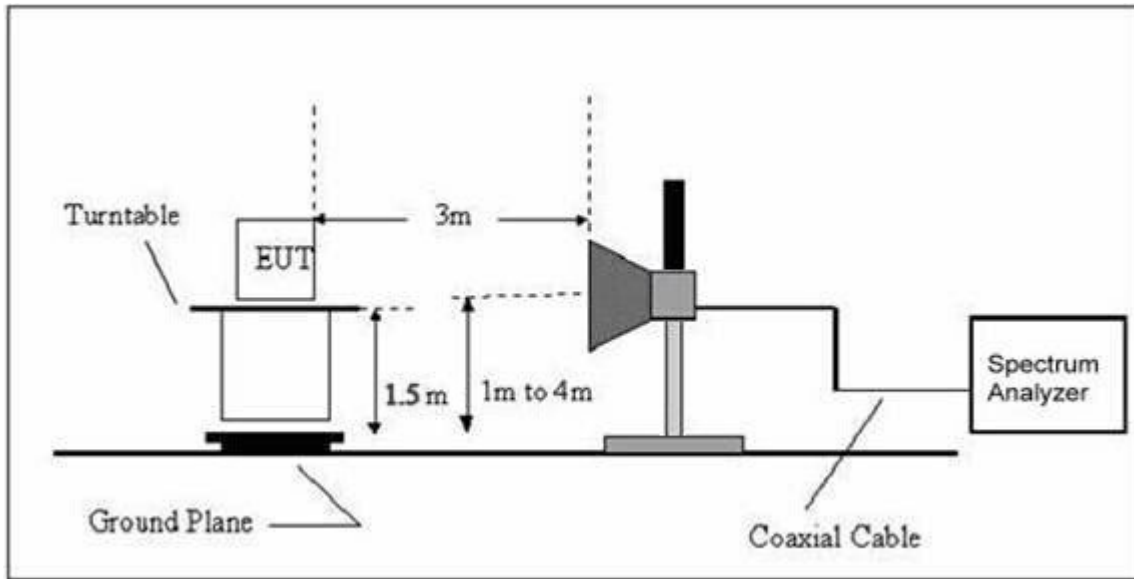
(A) Radiated Emission Test Set-Up Frequency Below 30MHz



(B) Radiated Emission Test-Up Frequency 30MHz~1GHz



(C) Radiated Emission Test-Up Frequency Above 1GHz



3.2.4 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.

3.2.5 TEST RESULTS

Radiated Spurious Emission (Below 30MHz)

Temperature:	20 °C	Relative Humidity:	48%
Pressure:	1010 hPa	Test Date :	2017-03-22
Test Mode :	Tx	Polarization :	/
Test Power :	DC9V		

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

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 = $40 \log (\text{specific distance/test distance})(\text{dB})$;

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

Radiated Spurious Emission (Between 30MHz – 1GHz)

Temperature:	24 °C	Relative Humidity:	54%
Pressure:	1010 hPa	Test Date :	2017-03-22
Test Mode :	Tx	Polarization :	Horizontal
Test Power :	DC9V		

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
31.9544	34.29	-18.02	16.27	40.00	-23.73	QP
60.7043	27.82	-16.37	11.45	40.00	-28.55	QP
107.1337	25.78	-16.29	9.49	43.50	-34.01	QP
315.0000	101.42	-11.77	89.65	95.62	-5.97	PK
630.0000	71.78	-4.15	67.63	75.62	-7.99	PK
945.0000	65.15	1.20	66.35	75.62	-9.27	PK

Temperature:	24 °C	Relative Humidity:	54%
Pressure:	1010 hPa	Test Date :	2017-03-22
Test Mode :	Tx	Polarization :	Vertical
Test Power :	DC9V		

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
31.9544	33.32	-18.02	15.30	40.00	-24.70	QP
99.8779	35.42	-16.51	18.91	43.50	-24.59	QP
112.5245	34.93	-16.85	18.08	43.50	-25.42	QP
315.0000	99.42	-11.77	87.65	95.62	-7.97	PK
630.0000	68.65	-4.15	64.50	75.62	-11.12	PK
945.0000	57.19	1.20	58.39	75.62	-17.23	PK

For average Emission

Frequency MHz	Peak Level dBuV/m	Duty cycle factor	AverageLevel dBuV/m	Limit AV	Margin	Polarization
315.00	87.65	-16.48	71.17	75.62	-4.45	Vertical
630.00	64.5	-16.48	48.02	55.62	-7.6	Vertical
945.00	58.39	-16.48	41.91	55.62	-13.71	Vertical

Notes: 1. Average emission Level = Peak Level + Duty cycle factor
2. Duty cycle level please see clause 5.

Frequency MHz	Peak Level dBuV/m	Duty cycle factor	AverageLevel dBuV/m	Limit AV	Margin	Polarization
315.00	89.65	-16.48	73.17	75.62	-2.45	Horizontal
630.00	67.63	-16.48	51.15	55.62	-4.47	Horizontal
945.00	66.35	-16.48	49.87	55.62	-5.75	Horizontal

Notes: 1. Average emission Level = Peak Level + Duty cycle factor
2. Duty cycle level please see clause 5.

Radiated Spurious Emission (1GHz to 10th harmonics)

Mode 1								
Frequency MHz	Peak Level dBuV/m	Duty cycle factor	Average Level dBuV/m	Limit		Margin(dB)		Polarization
				PK	AV	PK	AV	
1260.75	64.42	-16.48	47.94	75.62	55.62	-11.20	-7.68	Vertical
1575.63	63.57	-16.48	47.09	75.62	55.62	-12.05	-8.53	Vertical
1890.42	60.35	-16.48	43.87	75.62	55.62	-15.27	-11.75	Vertical
2205.25	59.69	-16.48	43.21	75.62	55.62	-15.93	-12.41	Vertical
2520.05	52.46	-16.48	35.98	75.62	55.62	-23.16	-19.64	Vertical
2834.26	53.63	-16.48	37.15	75.62	55.62	-21.99	-18.47	Vertical
1260.75	65.65	-16.48	49.17	75.62	55.62	-9.97	-6.45	Horizontal
1575.63	63.99	-16.48	47.51	75.62	55.62	-11.63	-8.11	Horizontal
1890.42	61.61	-16.48	45.13	75.62	55.62	-14.01	-10.49	Horizontal
2205.25	58.43	-16.48	41.95	75.62	55.62	-17.19	-13.67	Horizontal
2520.05	53.75	-16.48	37.27	75.62	55.62	-21.87	-18.35	Horizontal
2834.26	54.39	-16.48	37.91	75.62	55.62	-21.23	-17.71	Horizontal

Note: 1. Average emission Level = Peak Level + Duty cycle factor

2. Duty cycle level please see clause 5.

3. Pulse Desensitization Correction Factor

Pulse Width (PW) = 48.55ms

$2/PW = 2/48.55\text{ms} = 0.041\text{kHz}$

RBW (100 kHz) > 2/PW (0.041kHz)

Therefore PDCF is not needed

4. Other harmonics emissions are lower than 20dB below the allowable limit.

4. BANDWIDTH TEST

4.1 APPLIED PROCEDURES / LIMIT

According to FCC 15.231(c) requirement:

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating between 70 MHz to 900 MHz. Those devices operating above 900 MHz, the emission spurious shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

$$\text{B.W (20dBc) Limit} = 0.25\% * f(\text{MHz}) = 0.25\% * 315\text{MHz} = 787.5\text{KHz}$$

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RB	100kHz
VB	≥RBW
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

4.1.1 TEST PROCEDURE

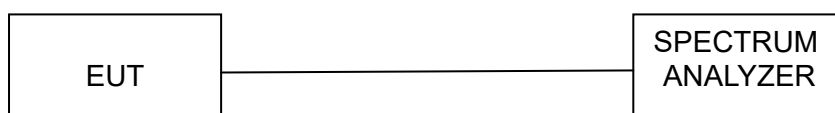
The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,

Spectrum Setting: RBW= 100kHz, VBW ≥ RBW, Sweep time = Auto.

4.1.2 DEVIATION FROM STANDARD

No deviation.

4.1.3 TEST SETUP



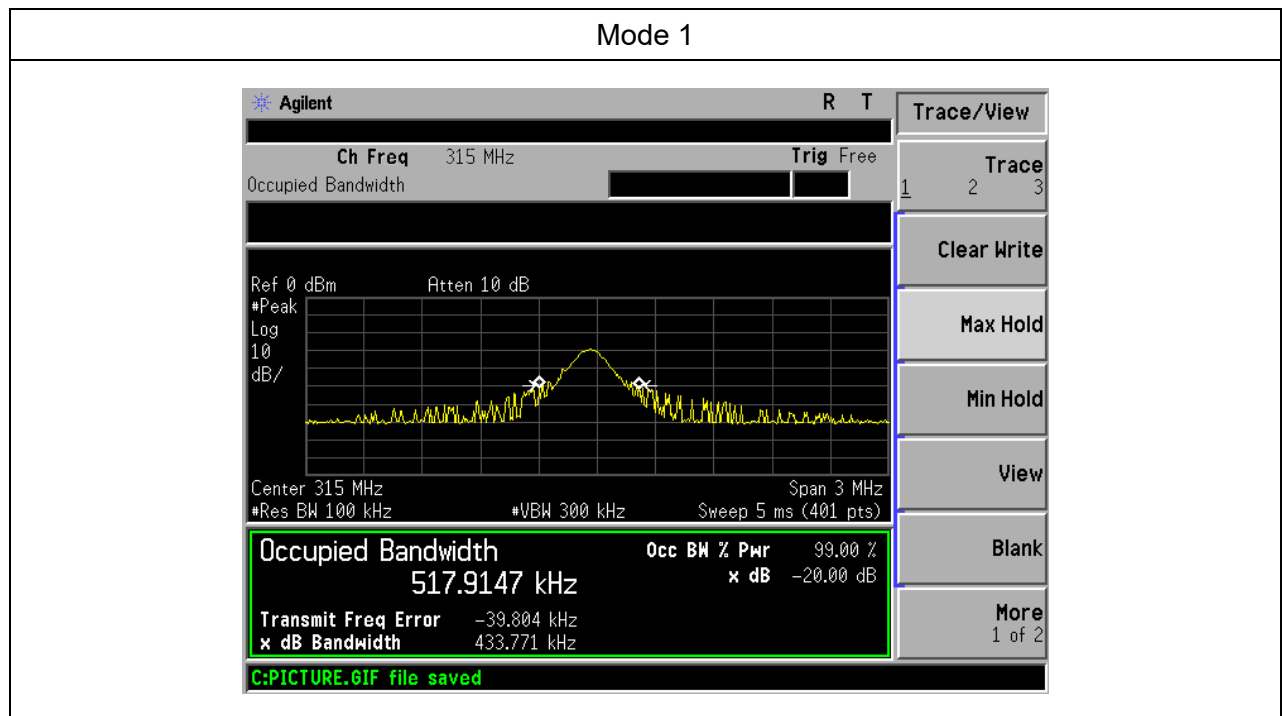
4.1.4 EUT OPERATION CONDITIONS

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

4.1.5 TEST RESULTS

EUT:	Wireless Doorbell	Model Name :	PE-9202
Temperature:	25 °C	Relative Humidity:	60%
Pressure:	1010 hPa	Test Power :	DC9V
Test Power :	TX Mode		

Frequency	20dB Bandwidth (kHz)	Limit (KHz)	Result
315MHz	433.771	787.5	PASS



5 CALCULATION OF AVERAGE FACTOR

The output field strengths of specification in accordance with the FCC rules specify measurements with an average detector. During the test, a spectrum analyzer incorporating a peak detector was used. Therefore, a reduction factor can be applied to the resultant peak signal level and compared to the limit for measurement instrumentation incorporating an average detector.

The duty cycle is measured in 100 ms or the repetition cycle period, whichever is a shorter time frame. The duty cycle is measured by placing the spectrum analyzer to set zero span at 100kHz resolution bandwidth.

Averaging factor in dB = $20\log(\text{duty cycle})$

The duration of one cycle = 48.55ms

The duty cycle is simply the on-time divided the duration of one cycle

Duty Cycle = $(0.64\text{ms} \times 3 + 0.235\text{ms} \times 22) / 48.55$

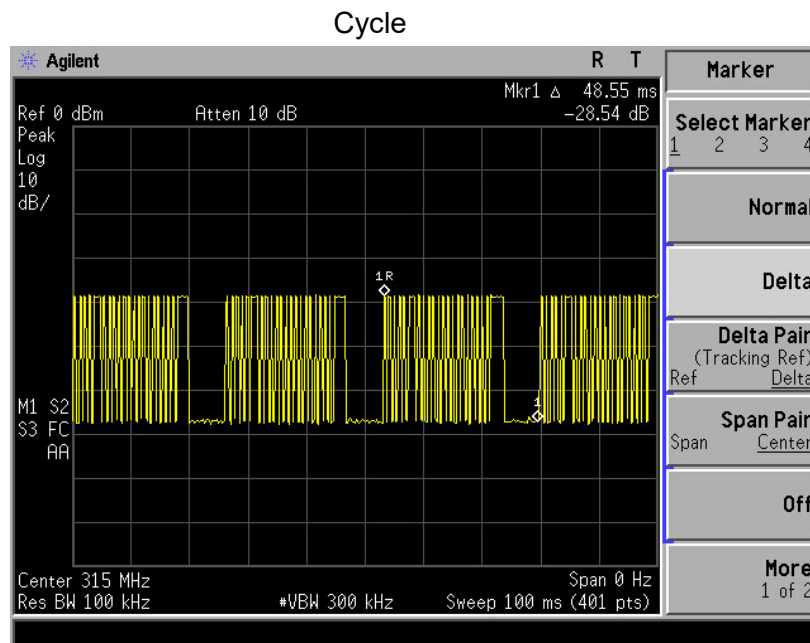
= $7.09\text{ms} / 48.55\text{ms}$

= 0.15

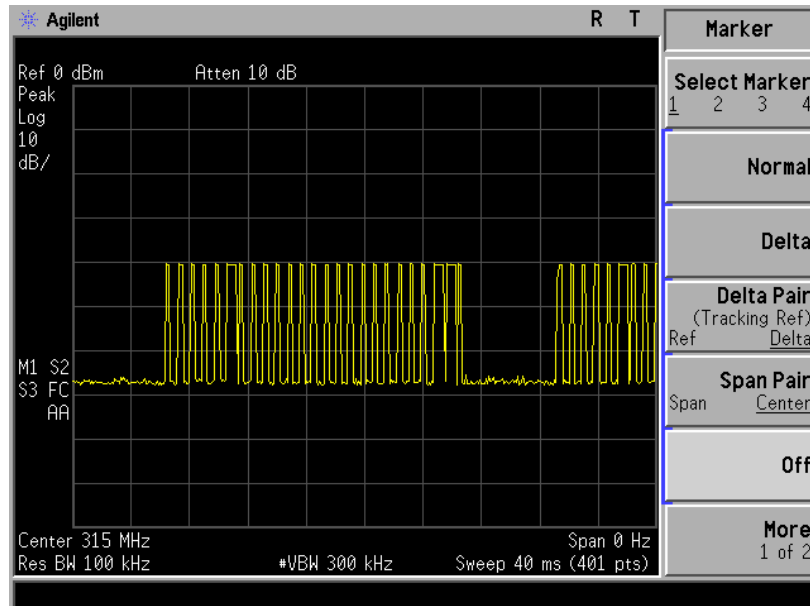
Therefore, the averaging factor is found by $20\log 0.15 = -16.48\text{dB}$

Test plot as follows:

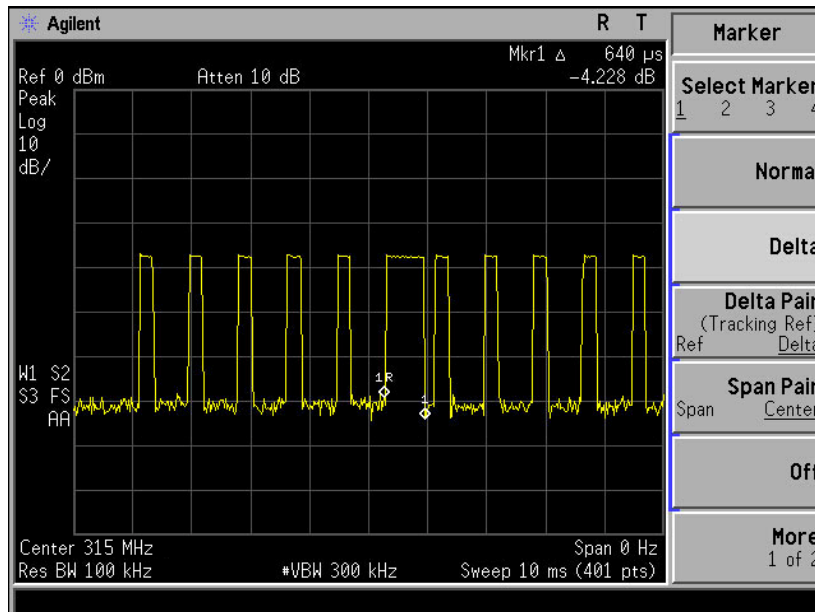
Note: During the 100ms, the amount of pulse and on-time of pulse are the same for every pulse train.



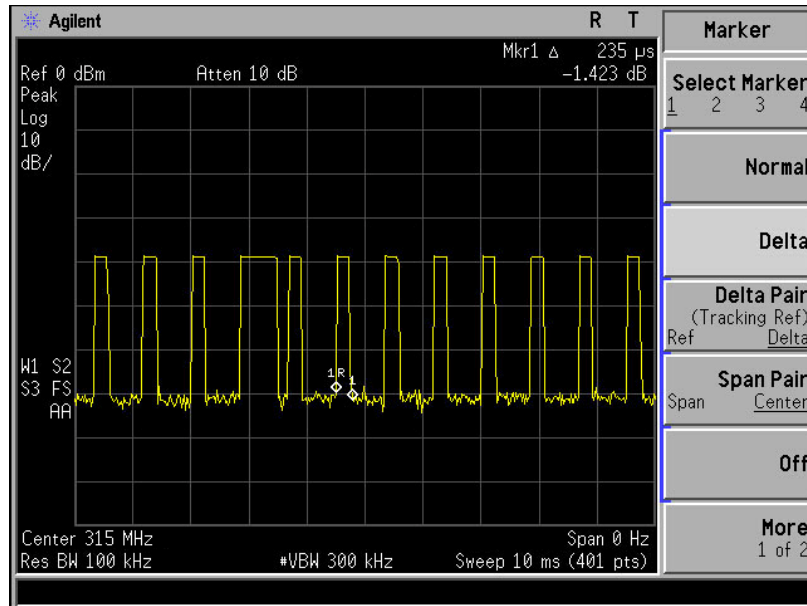
Pulse



On-time



On-time



6 DWELL TIME

APPLICABLE STANDARD

According to FCC 15.231(a) requirement:

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

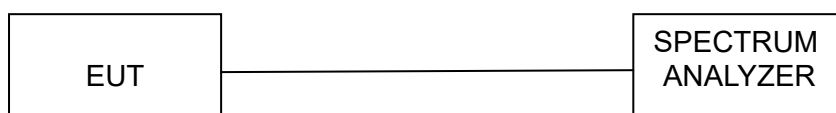
TEST PROCEDURE

- 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.

6.1 DEVIATION FROM STANDARD

No deviation.

6.2 TEST SETUP



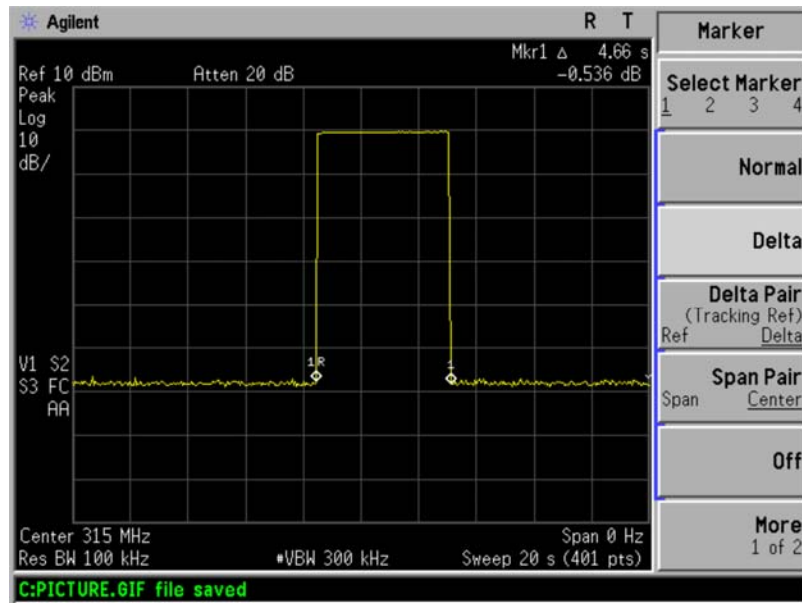
6.3 EUT OPERATION CONDITIONS

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.

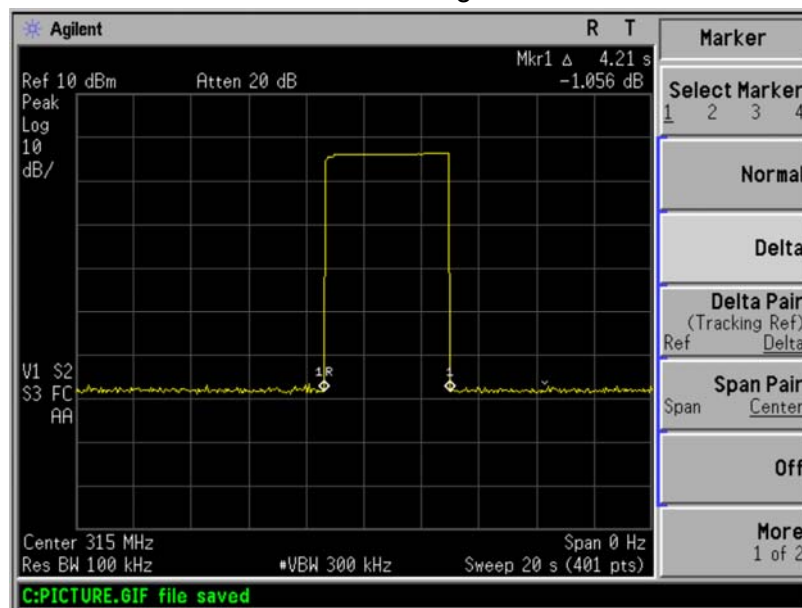
6.4 TEST RESULTS

	Dwell time (second)	Limit (second)	Result
Full voltage	4.66	<5s	Pass
Low voltage	4.21	<5s	Pass

Mode 1
Full Voltage



Low voltage



7. ANTENNA REQUIREMENT

Standard Applicable

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 15.231, 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.

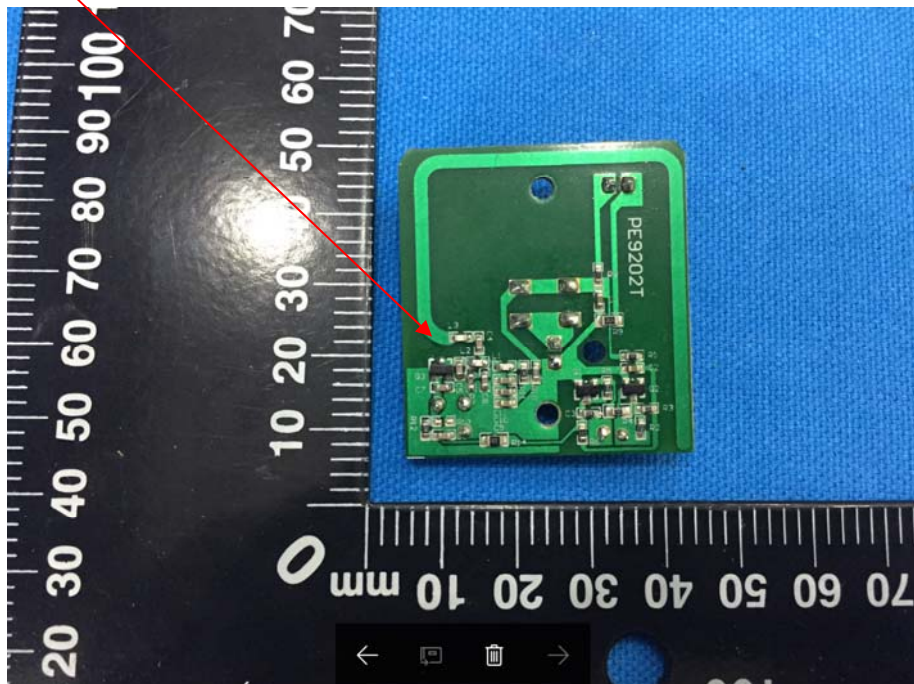
Refer to statement below for compliance.

The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

Antenna Connected Construction

The antenna used in this product is a PCB Antenna, The directional gains of antenna used for transmitting is 0dBi.

ANTENNA :



8. EUT TEST PHOTO

Radiated Measurement Photos

