APPLICATION CERTIFICATION
On Behalf of
HSIEN LONG CO LTD

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

FCC ID: K3QWD-3604

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	:	ACCURATE TECHNOLOGY CO., LTD
Address	:	F1, Bldg. A, Changyuan New Material Port, Keyuan Rd. Science & Industry Park, Nanshan, Shenzhen, Guangdong P.R. China
		Tel: (0755) 26503290
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Report Number	:	ATE20150536
Date of Test	:	March 19-March 26, 2015
Date of Report	:	March 26, 2015

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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
		(A) MODEL NO.: WD-3604, WD-3604S
		(B) SERIAL NO.: N/A
		(C) POWER SUPPLY: DC 12V (Battery 1x)

Measurement Procedure Used:

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

The device described above is tested by 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 15.231(a). The measurement results are contained in this test report and 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 ACCURATE TECHNOLOGY CO., LTD.

Date of Test : March 19-March 26, 2015
Date of Report: March 26, 2015

Prepared by : Tim Zhang
(Tim.zhang, Engineer)

Approved & Authorized Signer : Sean Liu
(Sean Liu, Manager)

1. GENERAL INFORMATION

1.1.Description of Device (EUT)

EUT	:	WIRELESS DOOR CHIME
Model Number	:	WD-3604, WD-3604S
Power Supply	:	DC 12V (battery 1x)
Modulation:	:	ASK
Operation Frequency	:	315MHz
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	:	March 19, 2015
Date of Test	:	March 19-March 26, 2015

1.2.Description of Test Facility

EMC Lab	:	Accredited by TUV Rheinland Shenzhen Listed by FCC The Registration Number is 752051 Listed by Industry Canada The Registration Number is 5077A-2 Accredited by China National Accreditation Committee for Laboratories The Certificate Registration Number is L3193
Name of Firm	:	ACCURATE TECHNOLOGY CO., LTD
Site Location	:	F1, Bldg. A, Changyuan New Material Port, Keyuan Rd. Science & Industry Park, Nanshan, 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	Calibrated until
EMI Test Receiver	Rohde&Schwarz	ESCS30	100307	Jan. 11, 2015	Jan. 10, 2016
EMI Test Receiver	Rohde&Schwarz	ESPI3	101526/003	Jan. 11, 2015	Jan. 10, 2016
Spectrum Analyzer	Agilent	E7405A	MY45115511	Jan. 11, 2015	Jan. 10, 2016
Pre-Amplifier	Rohde&Schwarz	CBLU1183540-01	3791	Jan. 11, 2015	Jan. 10, 2016
Loop Antenna	Schwarzbeck	FMZB1516	1516131	Jan. 15, 2015	Jan. 14, 2016
Bilog Antenna	Schwarzbeck	VULB9163	9163-323	Jan. 15, 2015	Jan. 14, 2016
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-655	Jan. 15, 2015	Jan. 14, 2016
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1067	Jan. 15, 2015	Jan. 14, 2016
LISN	Rohde&Schwarz	ESH3-Z5	100305	Jan. 11, 2015	Jan. 10, 2016
LISN	Schwarzbeck	NSLK8126	8126431	Jan. 11, 2015	Jan. 10, 2016
Highpass Filter	Wainwright Instruments	WHKX3.6/18G-10SS	N/A	Jan. 11, 2015	Jan. 10, 2016
Band Reject Filter	Wainwright Instruments	WRCG2400/2485-2375/2510-60/11SS	N/A	Jan. 11, 2015	Jan. 10, 2016

3. SUMMARY OF TEST RESULTS

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

The product is a manually operated WIRELESS DOOR CHIME transmitter.

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

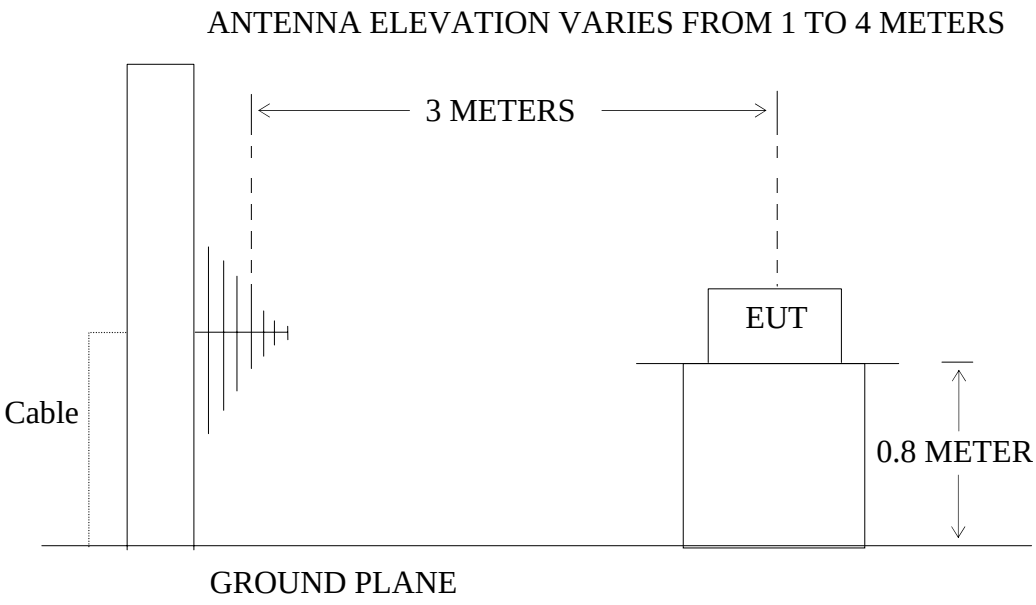
4.1.1.Block diagram of connection between the EUT and simulators

EUT

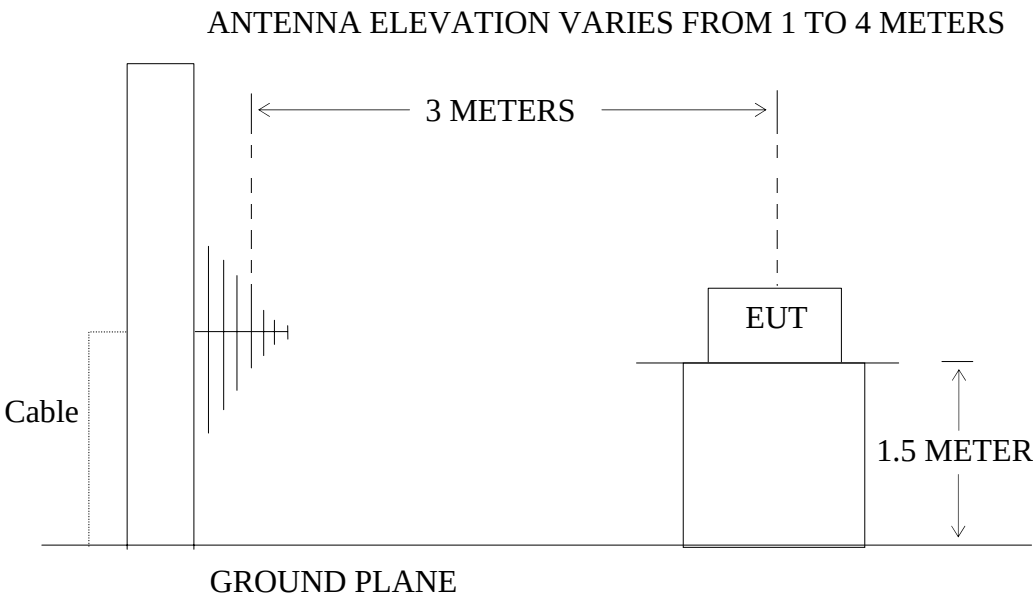
(EUT: WIRELESS DOOR CHIME)

4.1.2.Semi-Anechoic Chamber Test Setup Diagram

Below 1GHz



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(a)

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] 1,250 to 3,750	[1] 125 to 375
174–260	3,750	375
260–470	[1] 3,750 to 12,500	[1] 375 to 1,250
Above 470	12,500	1,250

[1] Linear interpolations.

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

4.2.3. Except as provided elsewhere in FCC 15.231(a), the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequencies (MHz)	Field Strength (micorvolts/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

4.3. Configuration of EUT on Measurement

The following 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. The EUT was tested in 3 orthogonal planes.

The bandwidth of test receiver is set at 120 kHz in 30-1000 MHz, and 1 MHz in 1000-4000 MHz.

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

4.6. The Field Strength of Radiation Emission Measurement Results

PASS.

The frequency range 30MHz to 4000MHz is investigated.

Date of Test:	Mar 21, 2015	Temperature:	25°C
EUT:	WIRELESS DOOR CHIME	Humidity:	50%
Model No.:	WD-3604	Power Supply:	DC 12V
Test Mode:	TX	Test Engineer:	Star

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	**94.92**	**-17.51**	**-10.47**	**66.94**	**77.41**	**75.63**	**95.63**	**8.69**	**18.22**	Horizontal
630.30	72.51	-11.19	-10.47	50.85	61.32	54.00	74.00	3.15	12.68	
945.42	49.09	-5.59	-10.47	33.03	43.50	54.00	74.00	20.97	23.55	
1260.75	53.95	-3.50	-10.47	39.98	50.45	54.00	74.00	14.02	23.23	
1575.33	54.52	-2.41	-10.47	41.64	52.11	54.00	74.00	12.36	21.89	
315	**78.19**	**-17.51**	**-10.47**	**50.21**	**60.68**	**75.63**	**95.63**	**25.42**	**34.95**	Vertical
630.30	65.06	-11.19	-10.47	43.40	53.87	54.00	74.00	10.60	20.13	
945.42	36.52	-5.59	-10.47	20.46	30.93	54.00	74.00	33.54	43.07	
1260.75	54.27	-3.50	-10.47	40.30	50.77	54.00	74.00	13.70	23.23	
1575.33	54.64	-2.41	-10.47	41.76	52.23	54.00	74.00	12.24	21.77	

Note:

1. Emissions attenuated more than 20 dB below the permissible value are not reported.
2. *: Denotes restricted band of operation.

   Measurements were made using a peak detector. Any emission falling within the restricted bands of FCC Part 15 Section 15.205 were compliance with the emission limit of FCC Part 15 Section 15.209.
3. 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
4. The spectral diagrams in appendix I display the measurement of peak values.
5. Average value= PK value + Average Factor (duty factor)
6. Pulse Desensitization Correction Factor

   Pulse Width (PW) = 29.95ms

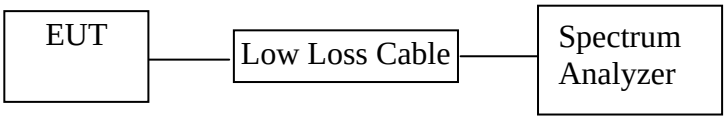
   1/PW = 1/29.95ms = 0.03kHz

RBW (100 kHz) > 1/PW (0.03 kHz)

Therefore PDCF is not needed

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% = 787.5 kHz. Bandwidth is determined at the two points 20 dB down from the top of modulated carrier.

5.3. EUT Configuration on Measurement

The following 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 = 100 kHz, VBW = 300 kHz, Span = 2MHz.

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

5.6.Measurement Result

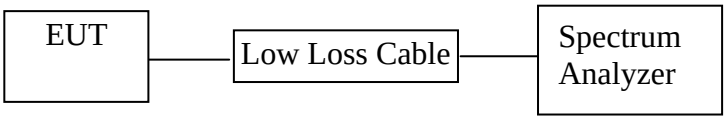
The EUT does meet the FCC requirement.

-20 dB bandwidth = 500 kHz <315MHz*0.25% = 787.5KHz.

The spectral diagrams in appendix I.

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)

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 following 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.

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

6.5.3.Set SPA View. Delta Mark time.

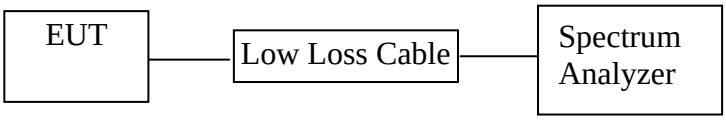
6.6. Measurement Result

Frequency (MHz)	Max Transmission Time (s)	Limit (s)	Result
315	1.37	5	Pass

The spectral diagrams in appendix I.

7. AVERAGE FACTOR MEASUREMENT

7.1.Block Diagram of Test Setup



(EUT: WIRELESS DOOR CHIME)

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

ANSI C63.10-2013 Section 7.5

1. Adjust and configure any EUT switches, controls, or input data streams to ensure that the EUT is transmitting or encoded to obtain the “worst-case” pulse ON time.
2. Couple the final radio frequency output signal to the input of a spectrum analyzer. This may be performed by a radiated, direct connection (i.e., conducted) or by a “near-field” coupling method. The signal received shall be of sufficient level to trigger adequately the spectrum analyzer sweep display.
3. Adjust the center frequency of the spectrum analyzer to the center of the RF signal.
4. Set the spectrum analyzer for ZERO SPAN.
5. Adjust the SWEEP TIME to obtain at least a 100 ms period of time on the horizontal display axis of the spectrum analyzer.
6. If the pulse train is periodic (i.e., consists of a series of pulses that repeat in a characteristic pattern over a constant time period), and the period (T) is less than or equal to 100 ms, then:

1) Set the TRIGGER on the spectrum analyzer to capture at least one period of the pulse train, including any blanking intervals.
2) Determine the total maximum pulse “ON time” (tON) over one period of the pulse train. An example of a periodic pulse train and the associated period is shown in Figure 14. If the pulse train contains pulses of different widths, then tON is determined by summing the duration of all of the pulses within the pulse train [i.e., tON = (t1 + t2 + …tn)].
3) The duty cycle is then determined by dividing the total maximum “ON time” by the period of the pulse train (tON/T).

Average factor in dB = 20 log (duty cycle)

7.3.EUT Configuration on Measurement

The following 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:

Effective period of the cycle = (0.58×7) + (0.23×11)ms=6.59 ms

DC = 6.59ms/22ms=29.95%

Therefore, the average factor is found by 20log0.2955=-10.47dB

The spectral diagrams in appendix I.

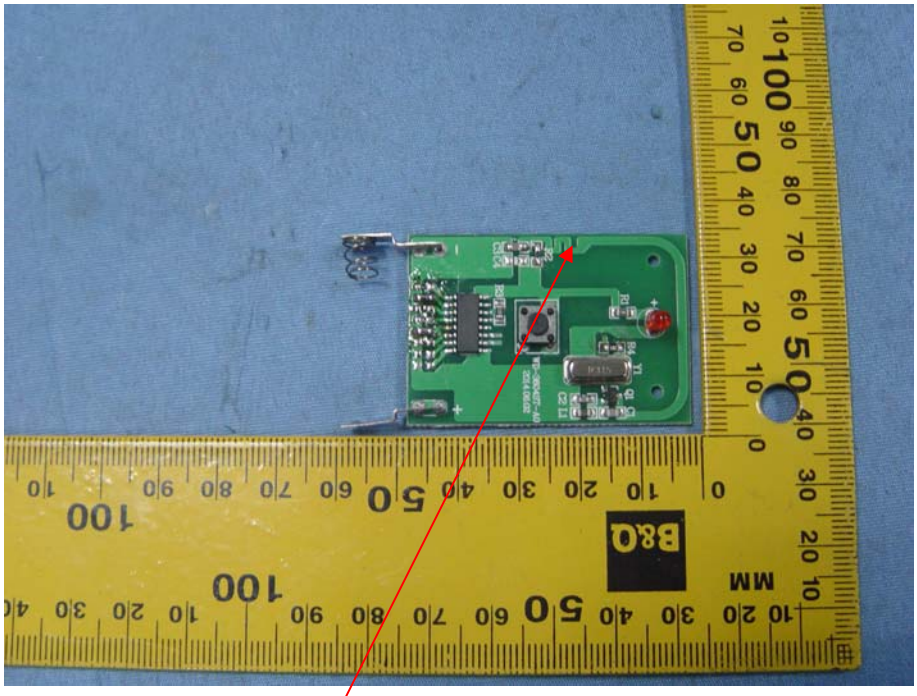
8. ANTENNA REQUIREMENT

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.



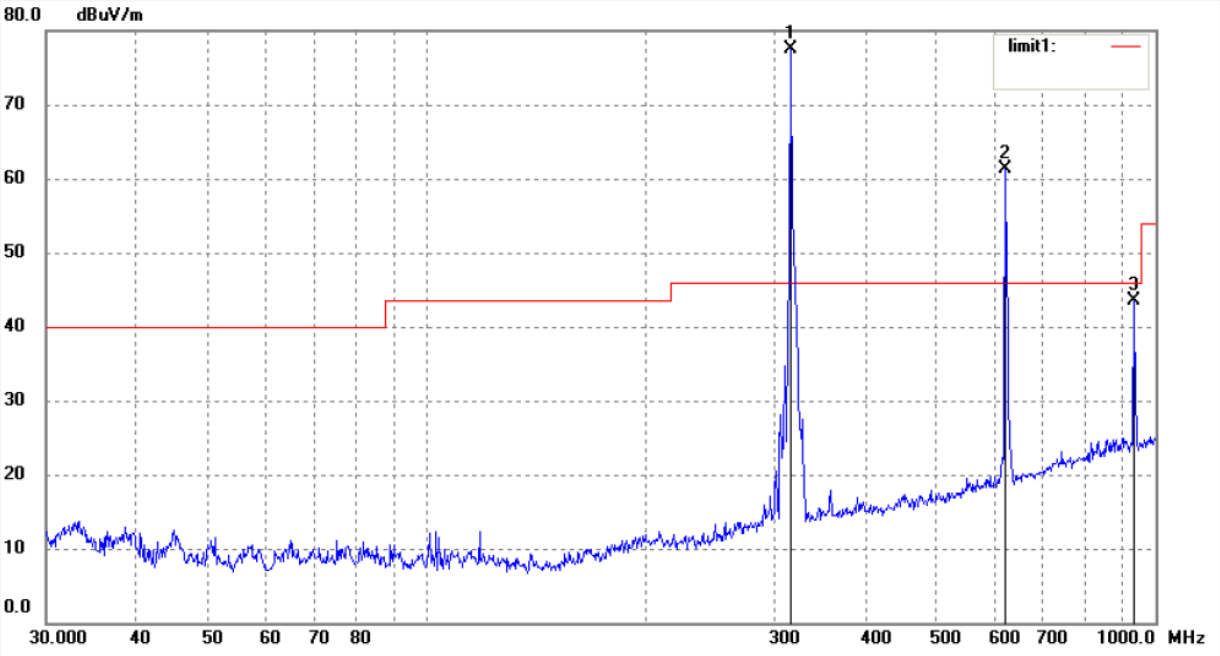
APPENDIX I

(Test Curves)

ACCURATE TECHNOLOGY CO., LTD.
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China
Site: 1# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: star2015 #414	Polarization: Horizontal
Standard: FCC Class B 3M Radiated	Power Source: DC 12V
Test item: Radiation Test	Date: 15/03/21/
Temp.(C)/Hum.(%) 25 C / 55 %	Time: 9/11/33
EUT: WIRELESS DOOR CHIME	Engineer Signature:
Mode: TX	Distance: 3m
Model: WD-3604	
Manufacturer: YACHING	

Note: Report No.:ATE20150536



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	315.8599	94.92	-17.51	77.41	46.00	31.41	peak			
2	630.2993	72.51	-11.19	61.32	46.00	15.32	peak			
3	945.4211	49.09	-5.59	43.50	46.00	-2.50	peak			

ACCURATE TECHNOLOGY CO., LTD.
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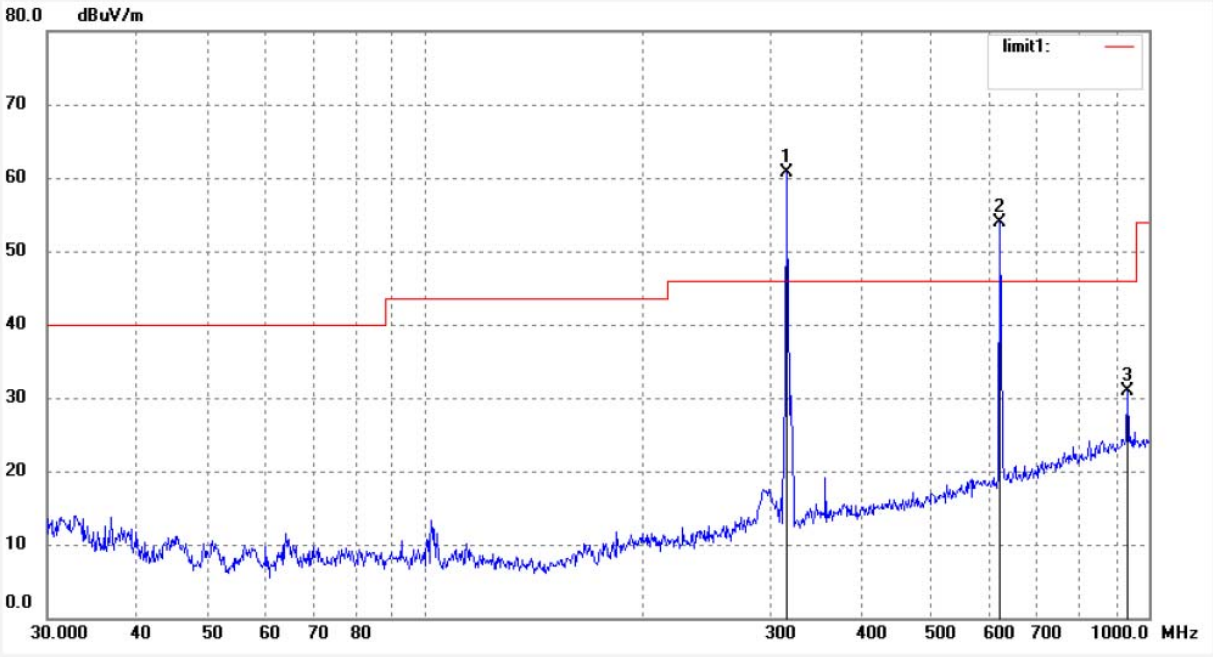
Science & Industry Park,Nanshan Shenzhen,P.R.China
Site: 1# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: star2015 #415	Polarization: Vertical
Standard: FCC Class B 3M Radiated	Power Source: DC 12V
Test item: Radiation Test	Date: 15/03/21/
Temp.(C)/Hum.(%) 25 C / 55 %	Time: 9/12/19
EUT: WIRELESS DOOR CHIME	Engineer Signature:
Mode: TX	Distance: 3m
Model: WD-3604	
Manufacturer: YACHING	

Note: Report No.:ATE20150536



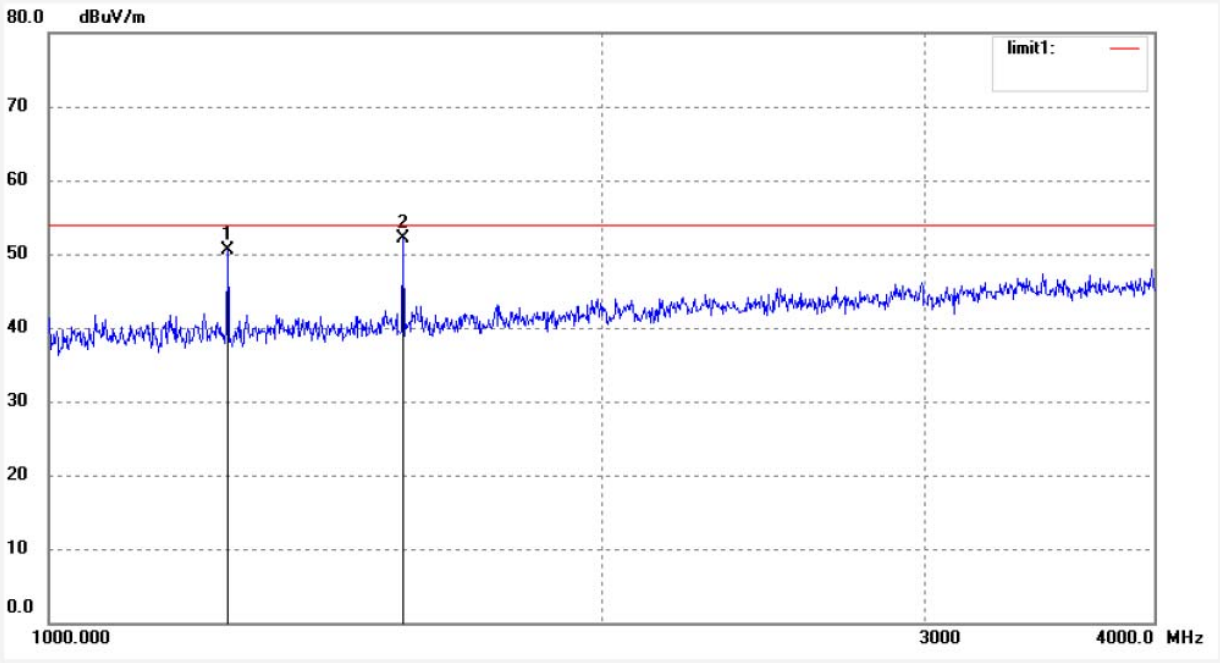
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	315.8599	78.19	-17.51	60.68	46.00	14.68	peak			
2	630.2993	65.06	-11.19	53.87	46.00	7.87	peak			
3	945.4211	36.52	-5.59	30.93	46.00	-15.07	peak			

ACCURATE TECHNOLOGY CO., LTD.
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China
Site: 1# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: star2015 #417
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: WIRELESS DOOR CHIME
Mode: TX
Model: WD-3604
Manufacturer: YACHING

Polarization: Horizontal
Power Source: DC 12V
Date: 15/03/21/
Time: 9/15/43
Engineer Signature:
Distance: 3m

Note: Report No.:ATE20150536



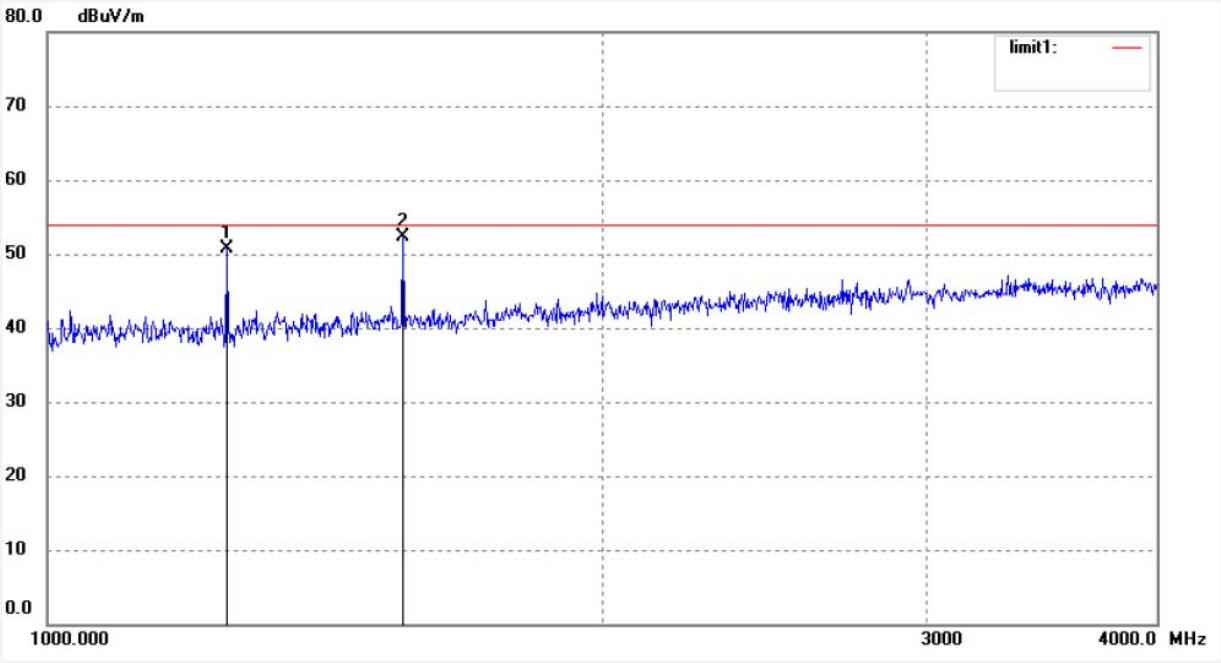
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	1260.747	53.95	-3.50	50.45	54.00	-3.55	peak			
2	1575.330	54.52	-2.41	52.11	54.00	-1.89	peak			

ACCURATE TECHNOLOGY CO., LTD.
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China
Site: 1# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

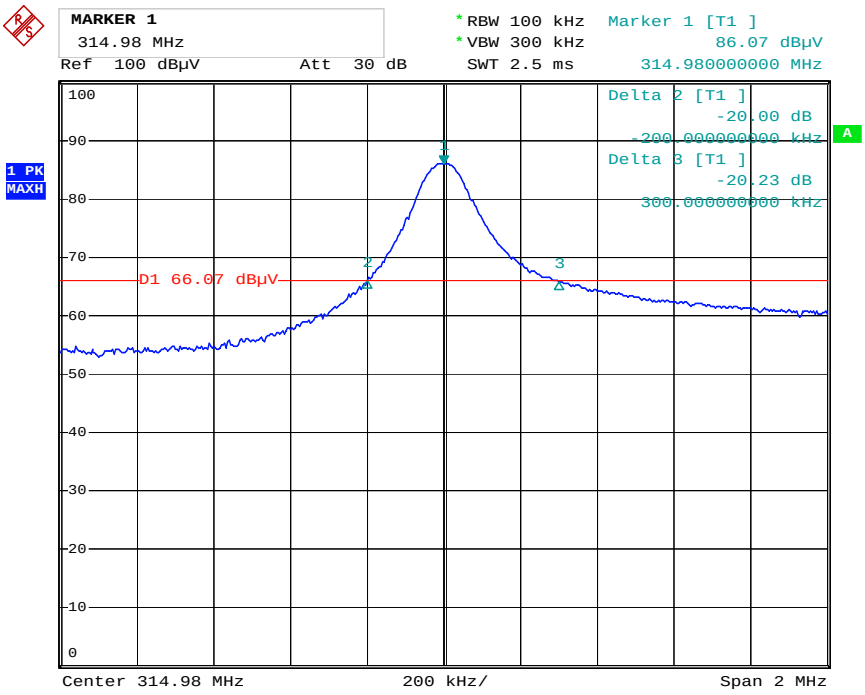
Job No.: star2015 #416
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: WIRELESS DOOR CHIME
Mode: TX
Model: WD-3604
Manufacturer: YACHING

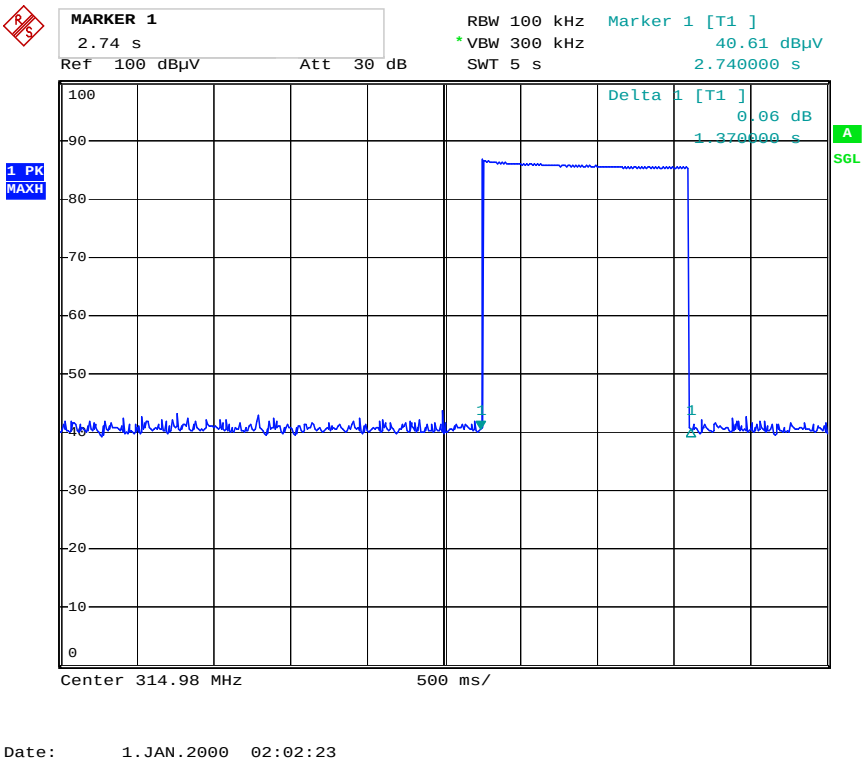
Polarization: Vertical
Power Source: DC 12V
Date: 15/03/21/
Time: 9/14/29
Engineer Signature:
Distance: 3m

Note: Report No.:ATE20150536

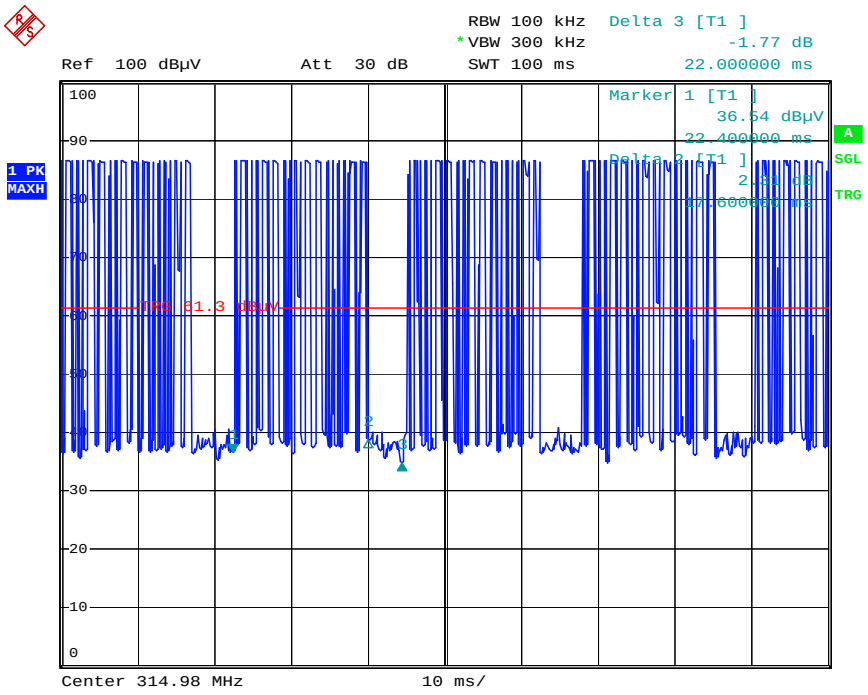


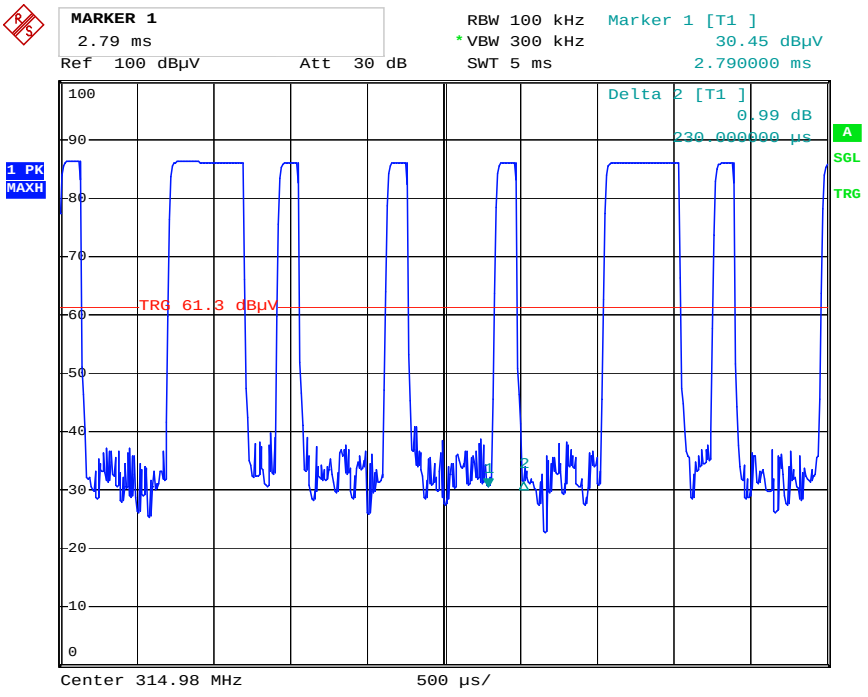
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	1260.747	54.27	-3.50	50.77	54.00	-3.23	peak			
2	1575.330	54.64	-2.41	52.23	54.00	-1.77	peak			


MARKER 1
314.98 MHz
*RBW 100 kHz
*VBW 300 kHz
SWT 2.5 ms
Marker 1 [T1]
86.07 dBµV
314.980000000 MHz
Ref 100 dBµV
Att 30 dB
Delta 2 [T1]
-20.00 dB
-200.000000000 kHz
Delta 3 [T1]
-20.23 dB
300.000000000 kHz
1 PK
MAXH
A
D1 66.07 dBµV
100
90
80
70
60
50
40
30
20
10
0
Center 314.98 MHz
200 kHz/
Span 2 MHz

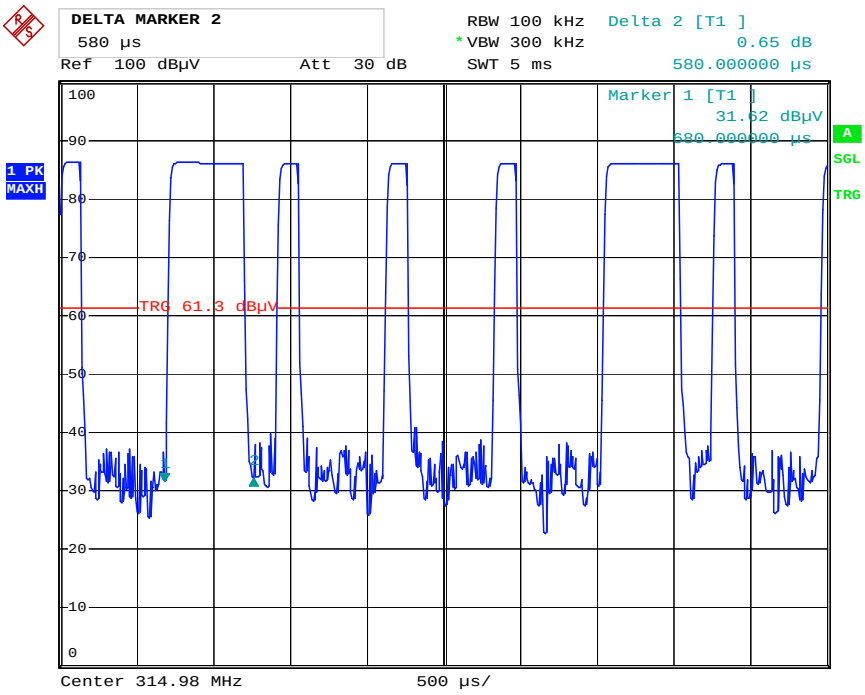


Release Time = 1.37s





The graph shows the duration of ‘on’ signal. From marker 1 to Delta 1, duration is 0.58 ms.



The graph shows the duration of ‘on’ signal. From marker 1 to Delta 1, duration is 0.23 ms.