

APPLICATION FOR CERTIFICATION
On Behalf of
Darjung Industries Co., Ltd.

Wireless Door Bell Remote Control/Transmitter

Model No. : (1)RH-2000T-XXX (2)RH-2000-XXX

FCC ID : QJWRH2000T

Prepared for : Darjung Industries Co., Ltd.
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TEST REPORT CERTIFICATION

Applicant : Darjung Industries Co., Ltd.
 Manufacturer : Zhuhai Comfort Electronic Inc.
 EUT Description : Wireless Door Bell Remote Control/Transmitter
 FCC ID : QJWRH2000T
 (A) MODEL NO. : (1)RH-2000T-XXX (2)RH-2000-XXX
 (B) SERIAL NO. : N/A
 (C) POWER SUPPLY : DC 12V

Measurement Procedure Used:

FCC RULES AND REGULATIONS PART 15 SUBPART C, MAY 2002
AND ANSI C63.4/1992

The device described above was tested by TAIWAN TOKIN EMC ENG. CORP. to determine the maximum emission levels emanating from the device. The maximum emission levels were compared to the FCC Part 15 subpart C limits both radiated and conducted emissions.

The measurement results are contained in this test report and TAIWAN TOKIN EMC ENG. CORP. is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT to be technically compliant with the FCC official limits.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of Taiwan Tokin EMC Eng. corp.

Date of Test : Aug. 07 ~ 08, 2002

Prepared by : Cherry Wang Aug 16 2002
(Cherry Wang/Assistant Manager)

Test Engineer : Allen Wang Aug 16 2002
(Allen Wang/Deputy Manager)

Approve & Authorized Signer : Leon Liu Aug 16 2002
(Leon Liu/Manager)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

Description : Wireless Door Bell Remote Control/Transmitter

Model Number : (1)RH-2000T-XXX (2)RH-2000-XXX
 The “XXX” are numbers 0 ~ 9 or Blank for different styles of the appearance.
 The difference between model (1) and (2) is for sales is:
 Model (1) for individually sale. (Transmitter only)
 Model (2) for whole sale. (Transmitter + Receiver)

FCC ID : QJWRH2000T

Applicant : Darjung Industries Co., Ltd.
 No. 15, Hau-Chou-Tzu Rd., Tamsui Chen,
 251 Taipei Hsien, Taiwan.

Manufacturer : Zhuhai Comfort Electronic Inc.
 Hong Gi Industrial Area, Zhuhai City,
 GuangDong, China

Receiving Frequency : 312MHz

Date of Receipt of Sample : Jul. 23, 2002

Date of Test : Aug. 07 ~ 08, 2002

Wireless Door Bell Receiver

Model Number :	RH-2000R-XXX
Serial Number :	N/A
FCC ID :	QJWRH2000R
Manufacturer :	Zhuhai Comfort Electronic Inc.

Remark:

The operation of this device is manually operated transmitter that is automatically deactivated the transmitter within not more than 5 seconds of being released, Compliance with §15.231 (a)- (1). (The measured graph is attached in Appendix)

Antenna requirement: This EUT's transmitter antenna is design in soldered to a printed circuit board, comply with §15.203 and inform to user that any change and modify is prohibited.

1.2. Description of Test Facility

Semi-Anechoic Chamber Description	:	May 16, 2000 Re-file on Federal Communication Commission Registration Number: 90993
Name of Firm	:	Taiwan Tokin EMC Eng. Corp.
Site Location #1	:	No. 53-11, Tin-Fu Tsun, Lin-Kou, Taipei Hsien, Taiwan, R.O.C.
Site Location #2	:	No. 67-4, Tin-Fu Tsun, Lin-Kou, Taipei Hsien, Taiwan, R.O.C.
NVLAP Lab Code	:	200077-0

1.3. Measurement Uncertainty

Test Item	Frequency Range	Uncertainty (dB)
Conduction Test	150KHz~30MHz	±2.66dB
Radiation Test (Distance: 3m)	30MHz~300MHz	+4.26dB / -4.22dB
	300MHz~1000MHz	+5.28dB / -4.0dB

Remark : Uncertainty = Kμc(y)

2. POWERLINE CONDUCTED TEST

【The EUT only employ battery power for operation, no conductive emissions limits are required according to FCC Part 15 Section §15.207】

3. RADIATED EMISSION TEST

3.1. Test Equipment

The following test equipment are used during the radiated emission tests :

3.1.1. For 30MHz~1000MHz Frequency (at Semi-Anechoic Chamber)

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum Analyzer	HP	8593EM	3826A00248	Sep. 04, 01'	1 Year
2.	Test Receiver	Rohde&Schwarz	ESVP	879691/036	Jun.09, 02'	1 Year
3.	Pre-Amplifier	HP	8447D	2944A06305	Mar.05, 02'	1 Year
4.	Broadband Antenna	Schwarzbeck	BBA 9106	A3L	Jan. 08, 02'	1 Year
5.	Broadband Antenna	Schwarzbeck	UHALP9108-A	0139	Jan. 08, 02'	1 Year

3.1.2. For 1GHz~3GHz frequency (at Semi-Anechoic Chamber)

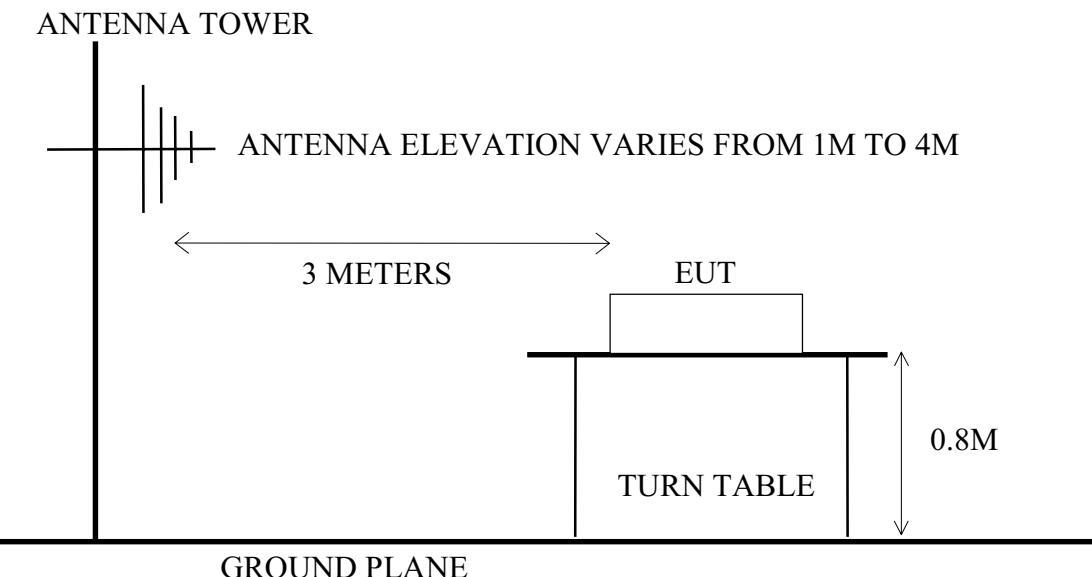
Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum Analyzer	HP	8593EM	3826A00248	Sep.04, 01'	1 Year
2.	Amplifier	HP	8449B	3008A00529	Jan.05, 02'	1 Year
3.	Horn Antenna	EMCO	3115	9112-3775	Apr.16, 02'	1 Year

3.2. Test Setup

3.2.1. Block Diagram of connection between EUT and simulators

**WIRELESS DOOR BELL REMOTE
CONTROL/TRANSMITTER (EUT)**

3.2.2. Open Field Test Site (3M) Setup Diagram



3.3. Radiation Limit (§15.231)

Fundamental Frequency= 312MHz

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMITS	
		µV/m	dBµV/m
Fundamental Freq.	3	5916.6	75.44 (Quasi-Peak)
Spurious Emission	3	591.6	55.44 (Quasi-Peak)
Above 1GHz *(4)	3	---	74.0 (Peak)

- Remark :
- (1) Emission level (dBµV/m) = 20 log Emission level (µV/m)
 - (2) The tighter limit applies at the band edges.
 - (3) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
 - (4) The over 1GHz limit, FCC limit is used based on CFR 47 Part 15.35 (b) and Part 15.205(b) & Part 15.109 (g).

3.4. EUT's Configuration during Compliance Measurement

The following equipment were installed on radiated measurement to meet the commission requirement and operating in a manner which tended to maximize its emission characteristics in a normal application.

3.4.1. Wireless Door Bell Remote Control/Transmitter (EUT)

Model Number	:	RH-2000T-XXX
Serial Number	:	N/A
FCC ID	:	QJWRH2000T
Manufacturer	:	Zhuhai Comfort Electronic Inc.
Fundamental Frequency	:	312MHz

3.5. Operating Condition of EUT

- 3.5.1. Setup the EUT and simulator as shown on 3.2.
- 3.5.2. Turned on the power of all equipment.
- 3.5.3. The EUT (Wireless Door Bell Remote Control/Transmitter) was emitted the fundamental frequency with data code.
- 3.5.4. The EUT was at worked on maximum transmitting status during all testing.
- 3.5.5. Repeated the above procedures from 3.5.3 to 3.5.4.

3.6. Test Procedure

The EUT and its simulators were placed on a turn table which was 0.8 meter above the ground. The turn table rotated 360 degrees to determine the position of the maximum emission level. For 30MHz to 3GHz frequency range, EUT was set 3 meters away from the receiving antenna which was mounted on a antenna tower. The antenna moved up and down between 1 to 4 meters for 30MHz to 3GHz frequency range to find out the maximum emission level. Broadband antenna such as calibrated biconical and log- periodical antenna or horn antenna were used as a receiving antenna. Both horizontal and vertical polarization of the antenna were set on measurement. In order to find the maximum emission, all of the interface cables were manipulated according to FCC ANSI C63.4-1992 regulation.

The bandwidth of test receiver was set at 120KHz and resolution bandwidth of spectrum analyzer was set at 1MHz.

The frequency range from 30MHz to 3GHz was checked.

EUT with three kinds of position (on Stand、Side、Lie) were done during radiated measurement and all the test results are listed in section 3.8.

3.7. Test Results

PASSED. Please refer to the following pages.

3.8. Radiated Emission Noise Measurement Results

The frequency spectrum from 30 MHz to 3GHz is investigated. All the emissions not reported below are too low against the FCC Part 15 official limits.

Date of Test : Aug. 08, 2002 Temperature : 24°C

EUT : Wireless Door Bell Remote Control/Transmitter Humidity : 64%

Test Mode : EUT on Stand

Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading dBμV	Emission Level dBμV/m	Limits dBμV/m	Margin dB
Fundamental Freq. (Quasi-Peak Value)						
312.300	14.52	4.00	44.32	62.84	75.44	12.60
Spurious / Harmonic Freq. (Below 1000MHz, Quasi-Peak Value)						
125.850	19.00	2.30	-0.55	20.75	55.44	34.69
174.450	21.50	2.80	-0.69	23.61	55.44	31.83
234.390	24.14	3.38	0.09	27.61	55.44	27.83
624.400	19.70	6.20	12.13	38.03	55.44	17.41
936.900	22.83	7.50	10.08	40.41	55.44	15.03
Spurious / Harmonic Freq. (Above 1GHz, Peak Value)						
1248.022	25.31	4.67	13.65	43.63	74.00	30.37
1560.808	25.74	5.86	9.72	41.32	74.00	32.68
1872.916	27.26	6.52	8.00	41.78	74.00	32.22
2184.563	28.19	6.09	1.73	36.01	74.00	37.99
2496.215	28.80	6.47	1.71	36.98	74.00	37.02
2808.381	30.09	6.94	-2.63	34.40	74.00	39.60
3120.513	31.04	7.31	-4.46	33.89	74.00	40.11

Remark : 1. Emission Level = Antenna Factor + Cable Loss + Meter Reading.
 2. Measurement was up to 10th harmonic (~3GHz), but the emissions level were too low against the official limit and not report.

Date of Test : Aug. 08, 2002 Temperature : 24°C

EUT : Wireless Door Bell Remote Control/Transmitter Humidity : 64%

Test Mode : EUT on Stand

Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading dBµV	Emission Level Vertical dBµV/m	Limits dBµV/m	Margin dB
Fundamental Freq. (Quasi-Peak Value)						
312.300	14.50	4.00	40.90	59.40	75.44	16.04
Spurious / Harmonic Freq. (Below 1000MHz, Quasi-Peak Value)						
97.230	17.19	2.05	-0.11	19.13	55.44	36.31
154.200	21.30	2.60	-0.99	22.91	55.44	32.53
246.540	25.49	3.50	-0.36	28.63	55.44	26.81
624.400	19.60	6.20	15.33	41.13	55.44	14.31
936.900	22.90	7.50	9.86	40.26	55.44	15.18
Spurious / Harmonic Freq. (Above 1GHz, Peak Value)						
1248.022	25.31	4.67	12.02	42.00	74.00	32.00
1560.808	25.74	5.86	10.28	41.88	74.00	32.12
1872.916	27.26	6.52	7.60	41.38	74.00	32.62
2184.563	28.19	6.09	1.10	35.38	74.00	38.62
2496.215	28.80	6.47	1.57	36.84	74.00	37.16
2808.381	30.09	6.94	-2.83	34.20	74.00	39.80
3120.513	31.04	7.31	-4.21	34.14	74.00	39.86

Remark : 1. Emission Level = Antenna Factor + Cable Loss + Meter Reading.
 2. Measurement was up to 10th harmonic (~3GHz), but the emissions level were too low against the official limit and not report.

Date of Test : Aug. 08, 2002 Temperature : 24°C

EUT : Wireless Door Bell Remote Control/Transmitter Humidity : 64%

Test Mode : EUT on Side

Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading dBµV	Emission Level dBµV/m	Limits dBµV/m	Margin dB
Fundamental Freq. (Quasi-Peak Value)						
312.300	14.52	4.00	42.57	61.09	75.44	14.35
Spurious / Harmonic Freq. (Below 1000MHz, Quasi-Peak Value)						
140.700	20.27	2.50	0.35	23.12	55.44	32.32
197.940	22.00	3.00	0.47	25.47	55.44	29.97
250.590	24.80	3.50	1.32	29.62	55.44	25.82
624.800	19.58	6.20	15.48	41.26	55.44	14.18
936.900	22.90	7.50	10.83	41.23	55.44	14.21
Spurious / Harmonic Freq. (Above 1GHz, Peak Value)						
1248.022	25.31	4.67	12.35	42.33	74.00	31.67
1560.808	25.74	5.86	9.95	41.55	74.00	32.45
1872.916	27.26	6.52	7.58	41.36	74.00	32.64
2184.563	28.19	6.09	2.38	36.66	74.00	37.34
2496.215	28.80	6.47	1.18	36.45	74.00	37.55
2808.381	30.09	6.94	-2.88	34.15	74.00	39.85
3120.513	31.04	7.31	-3.37	34.98	74.00	39.02

Remark : 1. Emission Level = Antenna Factor + Cable Loss + Meter Reading.
 2. Measurement was up to 10th harmonic (~3GHz), but the emissions level were too low against the official limit and not report.

Date of Test : Aug. 08, 2002 Temperature : 24°C

EUT : Wireless Door Bell Remote Control/Transmitter Humidity : 64%

Test Mode : EUT on Side

Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading dBµV	Emission Level Vertical dBµV/m	Limits dBµV/m	Margin dB
Fundamental Freq. (Quasi-Peak Value)						
312.300	14.50	4.00	43.24	61.74	75.44	13.70
Spurious / Harmonic Freq. (Below 1000MHz, Quasi-Peak Value)						
94.260	16.90	2.00	1.12	20.02	55.44	35.42
149.340	20.48	2.60	-0.12	22.96	55.44	32.48
235.200	24.30	3.40	-0.44	27.26	55.44	28.18
624.800	19.58	6.20	16.95	42.73	55.44	12.71
936.300	22.90	7.50	11.64	42.04	55.44	13.40
Spurious / Harmonic Freq. (Above 1GHz, Peak Value)						
1247.700	25.31	4.67	13.68	43.66	74.00	30.34
1560.808	25.74	5.86	11.15	42.75	74.00	31.25
1872.916	27.26	6.52	8.42	42.20	74.00	31.80
2184.702	28.19	6.09	6.30	40.58	74.00	33.42
2496.810	28.80	6.47	5.34	40.61	74.00	33.39
2808.667	30.09	6.94	3.42	40.45	74.00	33.55
3120.799	31.04	7.31	2.54	40.89	74.00	33.11
3432.931	31.60	7.66	0.19	39.45	74.00	34.55

Remark : 1. Emission Level = Antenna Factor + Cable Loss + Meter Reading.
 2. Measurement was up to 10th harmonic (~3GHz), but the emissions level were too low against the official limit and not report.

Date of Test : Aug. 08, 2002 Temperature : 24°C

EUT : Wireless Door Bell Remote Control/Transmitter Humidity : 64%

Test Mode : EUT on Lie

Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading dBμV	Emission Level dBμV/m	Limits dBμV/m	Margin dB
Fundamental Freq. (Quasi-Peak Value)						
312.300	14.52	4.00	50.17	68.69	75.44	6.75
Spurious / Harmonic Freq. (Below 1000MHz, Quasi-Peak Value)						
140.430	20.17	2.50	0.43	23.10	55.44	32.34
194.430	22.00	3.00	-0.88	24.12	55.44	31.32
250.590	24.80	3.50	1.32	29.62	55.44	25.82
624.800	19.70	6.20	14.59	40.49	55.44	14.95
936.900	22.83	7.50	9.87	40.20	55.44	15.24
Spurious / Harmonic Freq. (Above 1GHz, Peak Value)						
1248.022	25.31	4.67	12.32	42.30	74.00	31.70
1560.808	25.74	5.86	10.02	41.62	74.00	32.38
1872.916	27.26	6.52	6.93	40.71	74.00	33.29
2184.563	28.19	6.09	1.59	35.87	74.00	38.13
2496.215	28.80	6.47	1.34	36.61	74.00	37.39
2808.381	30.09	6.94	-2.55	34.48	74.00	39.52
3120.513	31.04	7.31	-3.49	34.86	74.00	39.14

Remark : 1. Emission Level = Antenna Factor + Cable Loss + Meter Reading.
 2. Measurement was up to 10th harmonic (~3GHz), but the emissions level were too low against the official limit and not report.

Date of Test : Aug. 08, 2002 Temperature : 24°C

EUT : Wireless Door Bell Remote Control/Transmitter Humidity : 64%

Test Mode : EUT on Lie

Emission Frequency MHz	Antenna Factor	Cable Loss	Meter Reading dBµV	Emission Level Vertical dBµV/m	Limits dBµV/m	Margin dB
Fundamental Freq. (Quasi-Peak Value)						
312.300	14.50	4.00	41.83	60.33	75.44	15.11
Spurious / Harmonic Freq. (Below 1000MHz, Quasi-Peak Value)						
93.990	16.74	2.00	3.53	22.27	55.44	33.17
167.970	21.50	2.70	-0.25	23.95	55.44	31.49
243.840	25.17	3.40	1.22	29.79	55.44	25.65
624.800	19.58	6.20	16.12	41.90	55.44	13.54
936.900	22.90	7.50	11.20	41.60	55.44	13.84
Spurious / Harmonic Freq. (Above 1GHz, Peak Value)						
1248.022	25.31	4.67	10.42	40.40	74.00	33.60
1560.808	25.74	5.86	9.79	41.39	74.00	32.61
1872.916	27.26	6.52	7.27	41.05	74.00	32.95
2184.563	28.19	6.09	1.49	35.77	74.00	38.23
2496.215	28.80	6.47	0.44	35.71	74.00	38.29
2808.381	30.09	6.94	-4.69	32.34	74.00	41.66
3120.513	31.04	7.31	-5.66	32.69	74.00	41.31

Remark : 1. Emission Level = Antenna Factor + Cable Loss + Meter Reading.
 2. Measurement was up to 10th harmonic (~3GHz), but the emissions level were too low against the official limit and not report.

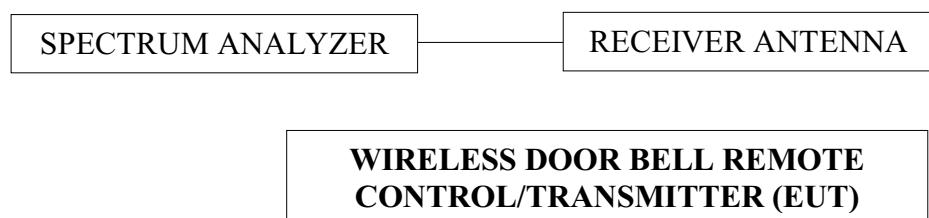
4. EMISSION BANDWIDTH TEST

4.1. Test Equipment

The following test equipment were used during the Emission Bandwidth Test :

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum Analyzer	HP	8593EM	3826A00248	Sep. 04, 01'	1 Year

4.2. Block Diagram of Test Setup



4.3. Test Equipment

The following test equipment were used during the Emission Bandwidth Test :

4.4. Specification Limits (§15.231-(c))

The bandwidth of emission shall be no wider than 0.25% of the center frequency for device operating above 70MHz and below 900MHz. Bandwidth is determined at the points 20dB down from the modulated carrier.

4.5. EUT's Configuration during Compliance Measurement

The configuration of EUT were same as section 3.4.

4.6. Emission Bandwidth Measurement Results

Fundamental Frequency: 312MHz

Date of Test: Aug. 08, 2002

No.	Center Frequency	Bandwidth	Tolerance (%)
1.	312.2030MHz	56.0kHz	0.0179%

The graph of bandwidth measured is attached in next page.

(Graph of Bandwidth Measurement)

21:02:55 AUG 08, 2002

MKR 56.0 kHz

REF 80.0 dB μ V #AT 0 dB

.14 dB

PEAK

LOG

5

dB/

DL

57.1

dB μ V

VA SB

SC FC

CORR

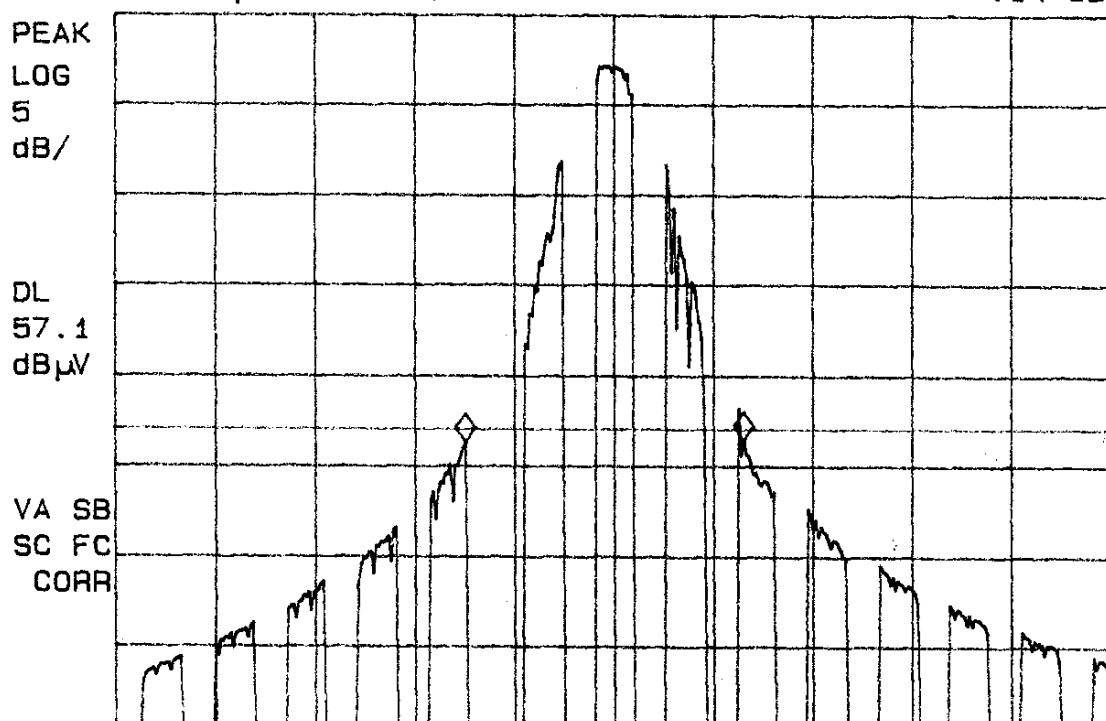
CENTER 312.2030 MHz

#RES BW 10 kHz

SPAN 200.0 kHz

#VBW 10 kHz

#SWP 500 msec

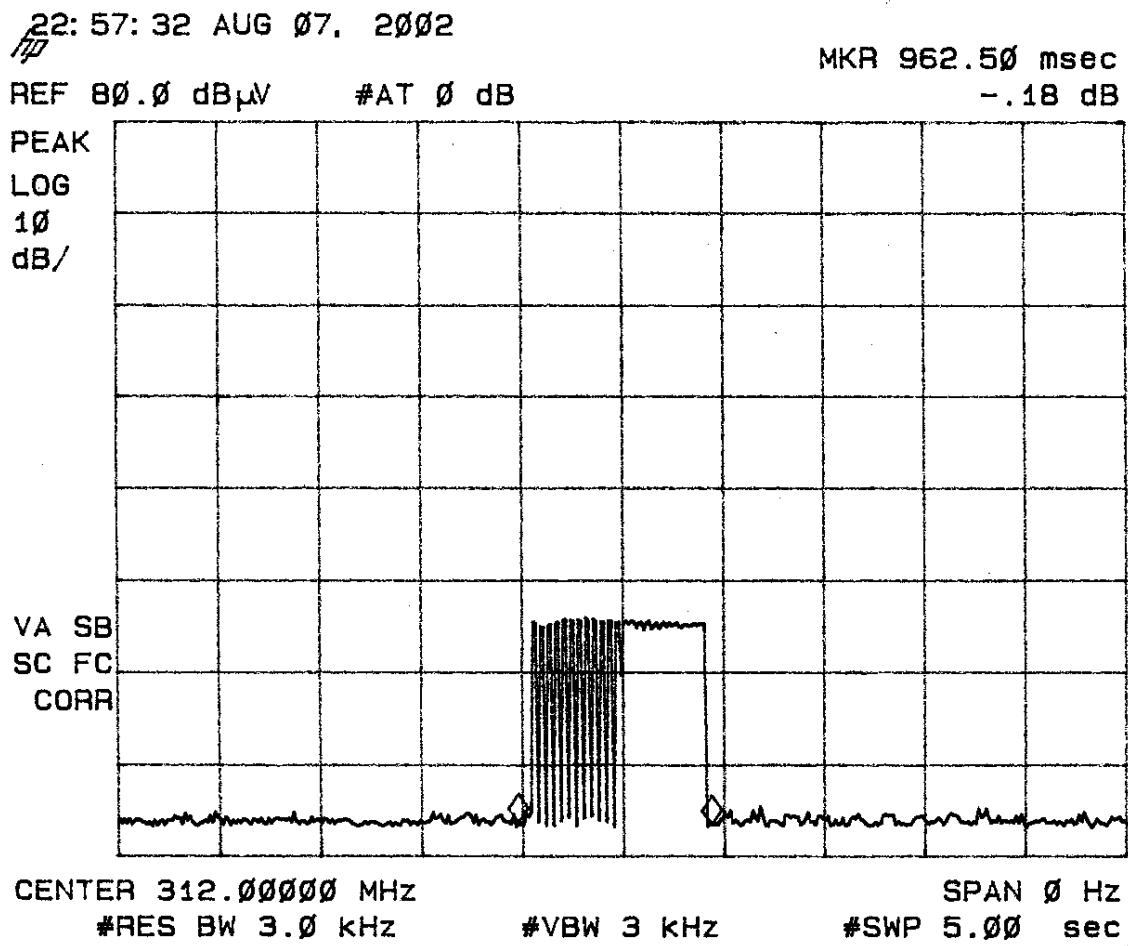


5. DEVIATION TO TEST SPECIFICATIONS

【NONE】

APPENDIX

Graph of Periodic Operated Measurement



『Remark: The device (Wireless Door Bell Remote Control/Transmitter, EUT) is a manually operated transmitter, that is automatically deactivated the transmitter within not more than 5 seconds of being released. Compliance with §15.231 (a)-(1).』