

Prüfbericht - Nr.: 14008204 001		Seite 1 von 13	
Test Report No.		Page 1 of 13	
Auftraggeber: Applicant	Union Best Enterprise Ltd. Unit D, 7/F. Good Year Industry Building 119-121 How Ming Street Kwun Tong, Kowloon Hong Kong		
Gegenstand der Prüfung: Test item	Low Power Transmitter		
Bezeichnung: Identification	Refer to page 6.	Serien-Nr.: Serial No.	Engineering sample
Wareneingangs-Nr.: Receipt No.	041104067	Eingangsdatum: Date of receipt	06.11.2004
Prüfört: Testing location	TÜV Rheinland Hong Kong Ltd. Unit 8, 25 th Floor, Skyline Tower, 39 Wang Kwong Road, Kowloon Bay Kowloon, Hong Kong Hong Kong Productivity Council HKPC Building, 78 Tat Chee Avenue, Kowloon, Hong Kong		
Prüfgrundlage: Test specification	FCC Part 15, Subpart C		
Prüfergebnis: Test Result	Das vorstehend beschriebene Gerät wurde geprüft und entspricht oben genannter Prüfgrundlage. The above mentioned product was tested and passed .		
geprüft / tested by:		kontrolliert / reviewed by:	
15.12.2004	Prudence Poon	15.12.2004	Thomas Berns
Datum Date	Name Name	Unterschrift Signature	Unterschrift Signature
Sonstiges: FCCID: SSC-DBU600WST Other Aspects			
Abkürzungen:	OK, Pass, P = entspricht Prüfgrundlage Fail, F = entspricht nicht Prüfgrundlage N/A = nicht anwendbar NT = nicht getestet	Abbreviations:	OK, Pass, P = passed Fail, F = failed N/A = not applicable NT = not tested
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. This test report relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicate in extracts. This test report does not entitle to carry any safety mark on this or similar products.			

Test Summary

Radiated Emission of Carrier Frequency

Result: Pass

Spurious Radiated Emissions

Result: Pass

Bandwidth Measurement

Result: Pass

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General Remarks

Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix 1: Test Results

Appendix 2: Test Setup

Appendix 3: EUT External Photo

Appendix 4: EUT Internal Photo

Appendix 5: FCCID Label, Block Diagram, Schematics and User manual.

List of Test and Measurement Instruments

Kind of Equipment	Manufacturer	Type	S/N
Test Receiver	Rohde & Schwarz	ESVS30	842807/009
Biconical Antenna	Rohde & Schwarz	HK116	841489/015
Log.-Periodic Antenna	Rohde & Schwarz	HL223	841516/017
Double Ridge Horn Antenna	EMCO	3115	9002-3351
Double Ridge Horn Antenna	EMCO	3115	9002-3347
Signal Generator	Rohde & Schwarz	SMY 01	844146/024
Signal Generator	Rohde & Schwarz	SMY 01	844146/023
Spectrum Analyzer	Rohde & Schwarz	FSP30	1093.4495K30

General Product Information

Product Function and Intended Use

The equipment under test (EUT) is a transmitter for the RC door chime operating at 433.920 MHz.

After our construction checking and declaration by the manufacturer, it is deemed that the transmitter of U-601,U-632AW, U-632BW, U-635W, U-639F and U-639W are identical in PCB layout and function, they only differ in cosmetic design. Hence the representative transmitter for model:U-639F was chosen to conduct all testing.

FCCID: SSC-DBU600WST

Model	Product description
U-601,U-632AW, U-632BW, U-635W, U-639F U-639W	Wireless Door Chime (Transmitter)

Circuit Description

U1 and the associated circuit act as address Code Encode. Q2 and the associated circuit act as a 433.920MHz Oscillator. Ask Modulator to limit the harmonic content and provide to antenna output.

Ratings and System Details

	Transmitter
Frequency range	: 433.920 MHz
Number of channels	: 1
Type of antenna	: Integral antenna
Power supply	: Battery operated 12.0V, Type:23AE
Ports	: none
Protection Class	: III

Independent Operation Modes

The basic operation modes are:

- **Remote Control:** It has a push to operate switch and is under manual control at all transmission time. It will cease transmission within 5 seconds after activation.

For further information refer to User Manual

Submitted Documents

The submitted documents are listed as follow:

- Circuit diagram
- Block diagram
- User manual
- Label artwork

Related Submittal(s) Grants

This is single application for certification of the transmitter.

Test Set-up and Operation Mode

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 instructions for use.

Test Operation and Test Software

Test operation should refer to test methodology.

- There was no special software to exercise the device.

Special Accessories and Auxiliary Equipment

The product has been tested together with the following additional accessories:

- none

Countermeasures to achieve EMC Compliance

The test sample, which has been tested, contained the noise suppression parts as described in the Circuit Diagram or the Technical Construction File. No additional measures were employed to achieve compliance.

Test Methodology

Radiated Emission

The radiated emission measurements were performed according to the procedures in ANSI C63.4-2003.

The equipment under test (EUT) was placed at the middle of the 80 cm height turntable, and the turntable is 3 meters far from the measuring antenna. During the testing, the EUT was operated standalone and arranged for maximum emissions. The EUT was tested in three orthogonal planes.

The investigation is performed with the EUT rotated 360°, the antenna height scanned between 1m and 4m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Repeat the measurement steps until the maximum emissions were obtained.

All radiated tests were performed at an antenna to EUT with 3 meters distance, unless stated otherwise in section 7.1.1 and 7.1.2 of this test report.

Field Strength Calculation

The field strength at 3 m was established by adding the meter reading of the spectrum analyzer to the factors associated with antenna correction factor, cable loss, preamplifiers and filter attenuation.

The equation is expressed as follow:

$$FS = R + AF + CF + FA - PA$$

Where FS = Field Strength in dBuV/m at 3 meters.
R = Reading of Spectrum Analyzer in dBuV.
AF = Antenna Factor in dB.
CF = Cable Attenuation Factor in dB.
FA = Filter Attenuation Factor in dB.
PA = Preamplifier Factor in dB.

$$\text{System Factor} = CF + FA - PA.$$

FA and PA are only be used for the measuring frequency above 1 GHz.

Average value of FS = FS –Average factor.

Average Factor = 20 log duty cycle.

Test Results

Radiated Emission of Carrier Frequency

Section 15.231(b)

RESULT:

Pass

Test Specification : FCC Part 15 Section 15.231(b1 and b2)
 Test Method : ANSI 63.4-2003
 Measurement Location : Semi Anechoic Chamber
 Measurement Distance : 3m
 Detector Function : Peak Detector
 Measurement BW : 100 kHz
 Supply Voltage : DC 12.0V

Polarization: Vertical

Value	Frequency	System Factor	Measured Field strength at 3m (pk)	Average Factor	Net Field strength at 3m	Limit	Delta to Limit
	(MHz)	(dB)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
Peak	433.70	18.1	85.3	-	85.3	100.8	-15.50
Average	433.70	18.1	85.3	-5.1	80.2	80.8	-0.6

Polarization: Horizontal

Value	Frequency	System Factor	Measured Field strength at 3m (pk)	Average Factor	Net Field strength at 3m	Limit	Delta to Limit
	(MHz)	(dB)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
Peak	433.70	18.1	83.4	-	83.4	100.8	-17.40
Average	433.70	18.1	83.4	-5.1	78.3	80.8	-2.5

Remark: Calculation method of average factor is shown in Appendix (supplementary).

Limit

Section 15.231(b2)

Frequency within the band (MHz)	Peak Emission		Average Emission	
	(microvolt/meter)	dBμV/m	(microvolt/meter)	dBμV/m
433.70	109,875	100.8	10,987	80.8

According to section 15.35(b), When average radiated emission measurements are specified, including emission measurement below 1000MHz, there also is limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit for the frequency being investigated.

Spurious Radiated Emissions**Section 15.231(b)****RESULT:****Pass**

Test Specification : FCC Part 15 Section 15.231(b1 and b3)
 Test Method : ANSI 63.4-2003
 Measurement Location : Semi Anechoic Chamber
 Measurement Distance : 3m
 Detector Function : Peak Detector
 Measurement BW : 100 kHz
 Supply Voltage : DC 3.0V
 Measuring Frequency Range : 30-4330MHz

Polarization: Vertical

Frequency (MHz)	Reading (pk) (dBuV/m)	Antenna Factor (dBuV/m)	System Factor (dB)	Field strength at 3m (pk) (dBuV/m)	Average Factor (dB)	Field strength at 3m (av) (dBuV/m)	Limit at 3m (dBuV/m)	Delta to Limit (dB)
867.39	34.60	22.20	2.60	59.40	-5.1	54.30	60.8	-6.50
*1301.10	63.04	24.90	-34.34	53.60	-5.1	48.50	54.0	-5.50
1734.80	50.37	26.50	-33.27	43.60	-5.1	38.50	60.8	-22.30
2167.54	48.93	27.80	-33.10	43.63	-5.1	38.53	60.8	-22.27
2602.17	44.37	28.88	-31.15	42.10	-5.1	37.00	60.8	-23.80
3036.93	38.14	30.00	-29.73	38.41	-5.1	33.31	60.8	-27.49
3464.95	36.92	30.24	-31.09	36.07	-5.1	30.97	60.8	-29.83
*3901.17	35.45	32.24	-30.27	37.42	-5.1	32.32	54.0	-21.68
*4337.11	35.15	32.45	-29.91	37.69	-5.1	32.59	60.8	-28.21

Polarization: Horizontal

Frequency (MHz)	Reading (Pk) (dBuV/m)	Antenna Factor (dBuV/m)	System Factor (dB)	Field strength at 3m (pk) (dBuV/m)	Average Factor (dB)	Field strength at 3m (av) (dBuV/m)	Limit at 3m (dBuV/m)	Delta to Limit (dB)
867.46	27.60	22.20	2.60	52.40	-5.1	47.30	60.8	-13.50
*1301.04	51.03	24.90	-34.34	41.59	-5.1	36.49	54.0	-17.51
1734.82	50.17	26.50	-33.27	43.40	-5.1	38.30	60.8	-22.50
2168.57	43.91	27.80	-33.10	38.61	-5.1	33.51	60.8	-27.29
2602.13	46.56	28.88	-31.15	44.29	-5.1	39.19	60.8	-21.61
3035.94	37.90	30.00	-29.73	38.17	-5.1	33.07	60.8	-27.73
3469.34	37.52	30.24	-31.09	36.67	-5.1	31.57	60.8	-29.23
*3898.87	36.03	32.24	-30.27	38.00	-5.1	32.90	54.0	-21.10
*4335.13	35.15	32.45	-29.91	37.69	-5.1	32.59	60.8	-28.21

Remark: ' * ' indicates the frequency of the emissions fall into the restricted band.

Limit**Section 15.231(b3)**

Fundamental Frequency (MHz)	Field strength of Spurious Emission (microvolt/meter)	Field strength of Spurious Emission (dB μ V/m)	Measurement distance (meters)
260-470	1,099	$20 \cdot \log(1099) = 60.8$	3

Section 15.209

Radiated emissions, which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209.

Limit for Radiated Emission under Section 15.209:

Frequency (MHz)	Field strength (microvolt/meter)	Field strength (dB μ V/m)	Measurement distance (meters)
30-88	100	$20 \cdot \log(100) = 40.0$	3
88-216	150	$20 \cdot \log(150) = 43.5$	3
216-960	200	$20 \cdot \log(200) = 46.0$	3
960-2500	500	$20 \cdot \log(500) = 54.0$	3

The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector and above 1000 MHz are based on the measurements employing an average detector.

Bandwidth Measurement

Section 15.231(c)

RESULT:

Pass

Test Specification	:	FCC Part 15 section 15.231(c)
Port of Testing	:	Antenna port
Detector Function	:	Peak
Supply Voltage	:	DC 12.0V

The 20dB bandwidth shall be no wider than 0.25% (1.08MHz) of the centre frequency 433.700MHz. From the result, it shows that the 20 dB points of the lower edge and upper edge are 7.2KHz and 5.6KHz respectively apart from the centre frequency. Hence it is deemed to fulfil the requirement.

For test results refer to Appendix 1, page 1.

Limit

Section 15.231(c)

The bandwidth of the emission shall be no wider than 0.25% if the center frequency for devices operating above 70MHz and below 900MHz.