EMC TEST REPORT

For

FCC Part 15 Certification

No. JSH0312294-003A

Summary

The equipment comply with the requirements according to the following standard(s):

47CFR Part 15:2003: RADIO FREQUENCY DEVICES

ANSI C63.4 : 2001 : American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz.

Description

The appliances were tested by and found compliance with relevant requirements described in FCC Part 15: 2003: RADIO FREQUENCY DEVICES.

Test results are contained in this test report and Intertek Testing Services ETL SEMKO Shanghai Limited is assumed full responsibility for the accuracy and completeness of these measurements.

The test report applies to tested samples only and shall not be reproduced in part without written approval of Intertek Testing Services ETL SEMKO Shanghai Limited.

Date of Test: June 28, 2004

Date of Issue: July 7, 2004

Prepared by: Report Approved by:

Tino Pan *(Projector Engineer)*   Steve Li *(EMC Manager)*

FCC ID: RUMCL3

Description of Test Facility

Name of Firm	:	QuieTek (Shanghai) Corporation
Site Location	:	716 Yishan Road, Shanghai, China 200233
Name of contact	:	Mr. Hall (first name) Wang (last name)
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FCC Registration number:		142171

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1. Applicant Information

Applicant:	Geemarc Telecom International Ltd. 19F Mass Mutual Tower 38 Gloucester Road Wanchai Hong Kong
Name of contact:	Ms. Chen Qingruan
Telephone:	86 592 6036442
Telefax:	86 592 6037860
Manufacturer:	Xiamen Xinglian Electronics Co., Ltd. 6-7 F No.2 Bldg 2nd Stage Tian An Industrial District, Xiamen, Fujian, P.R.C

2.Information of Equipment Under Test (EUT)

2.1 Identification of the EUT

Equipment:	ClearSounds Emergency Response/Phone Signaler
Type of EUT:	☑ Production ☐ Pre-product ☐ Pro-type
Type/model:	CL3, CS-CL3, BT-CL3
Serial number:	0312294-001~003
Date of sample receipt	2004-6-26
Date of test	2004-6-28
Test mode	the product has two button which was "stop" and "alarm", "stop"and "alarm" buttons to deactivate and activate the alarm respectively, therefore, only "stop"and "alarm" mode were tested during test. New battery was used during test.
Rating:	DC 12V Transmitter Operation frequency : 433.92MHz

Trademark:

Model Number	Trademark
CL3	Geemarc
CS-CL3	Hitec
BT-CL3	Beltone

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2.2 Additional information about the EUT

Description: There are three models mentioned in the report.
                                And   they are all the same in schematics diagram.
                                The difference among them is their different trade
                                mark. Therefore the model CL3 (series number 0312294-
                                001)was chose to be tested as a representative.
                                Internal antenna used. Detail pls. Refer to internal picture.

FCC Rule part(s):   FCC Part 15 C 15.231

2.3 Peripheral equipment

None

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3. Conducted Powerline Measurement

Conclusion: The product was powered by battery, without external power supply from power network, therefore, conducted powerline measurement is not applicable.

4. Radiated emission measurement

4.1 Radiated emission limit
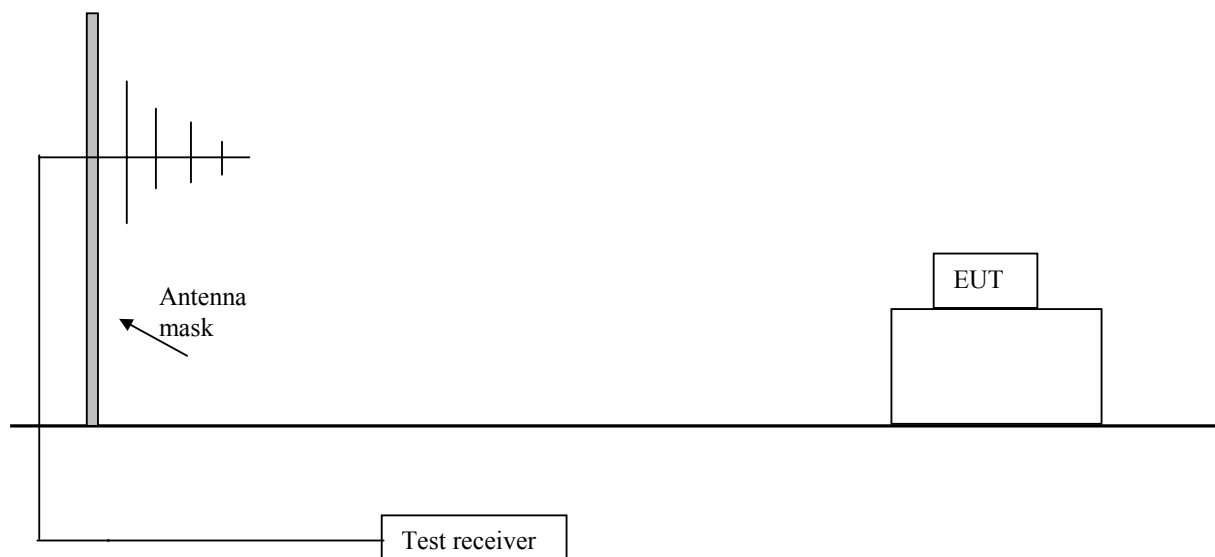
the limit for transmitter part

Frequency of emission (MHz)	Field strength of fundamental (μV/m)	Field strength of fundamental (dBμV/m)	Field strength of spurious emission (μV/m)	Field strength of spurious emission (dBμV/m)
40.66-40.70	2,250	67.04	225	47.04
70-130	1,250	61.94	125	41.94
130-174	1,250 to 3,750*	61.94 to 71.48*	125 to 375*	41.94-51.48*
174-260	3,750	71.48	375	51.48
260-470	3,750 to 12,500*	71.48 to 81.9*	375 to 1,250*	51.48 to 61.9*
Above 470	12,500	81.9	1,250	61.9
Note: 1. "*" means linear interpolation 2. 20lg Field strength (μV/m)=Field strength (dBμV/m) such as follows: 20lg2,250(μV/m)=67.04(dBμV/m)				

4.2 Instruments list

Item	Equipment	Manu.	Type	Serials no.	Last Cal.	Cal. Interval
1	EMI Test Receiver	Rohde & Schwarz	ESI 26	838786/011	2004-2-8	1 Year
2	Log Periodic Antenna	Rohde & Schwarz	HL 562	100019	2004-4-15	1 Year
3	Horn Antenna	SCHWARZ BECK	BBHA9120D	249	2004 -5-25	1 Year
4	Spectrum Analyzer	Agilent	E7402A	US40240228	2004 -5-25	1 Year
5	Digital Phosphor Oscilloscope	Tektronix	TDS 5104	B020899	2004 -2-25	1 Year

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4.3 Test setup

4.4 Test configuration

The measurement was applied in Semi- anechoic Chamber.
At frequency range 30MHz –1000MHz, logical periodic antenna was used to get the field strength emitted from EUT. At frequency range 1GHz – 5GHz, Horn antenna was used to get the field strength emitted from EUT. Both antenna was moved up and down from 1m to 4m to find maximum emission.
The bandwidth setting on R&S Test Receiver ESI 26 was 120kHz for measurement from 30-1000MHz, and 1MHz for measurement 1-5GHz. Test distance is 3m.
The mode (transmission) was checked and test results are listed in the sec.4.6.

The transmitter was rotated through three orthogonal axes (X, Y, Z). The antenna was placed two polarizations (Horizontal & Vertical).

For measurement above 1GHz, average value was used by calculate the average factor according to section 15.35.

4.5 Test procedure

4.5.1   Establish the test setup as sec. 4.3.
4.5.2   Set the ClearSounds Emergency Response/Phone Signaler to "Transmission" mode.
4.5.3   Proceed the measurement (both for frequency below 1GHz and above 1GHz)

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4.6   Test Results

■ Pass   □ Fail

4.6.1 Measurement environment

Temperature : 25.2 °C   Relative Humidity : 41 %

4.6.2   Average factor measurement and calculation

For measurement frequency above 1GHz, average value was used to evaluate the emission level, average factor calculation is as follow:

Average Factor   = 20 lg (wanted signal duration/complete pulse train)
                            = 20 lg (5.16/15.5)
                            = -9.60 dB

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4.6.3   Data table

All emissions not listed below are too low against the prescribed limits.
For measurement below 1GHz
Emission level = Reading level + Cable loss + Antenna factor
For measurement above 1GHz
Emission level = Reading level + Cable loss + Antenna factor + Average factor

The protocol for transmitter part (fundamental)
Orthogonal axe: X

Polarization	Frequency (MHz)	Reading level (dBuV)	Cable Loss (dB)	Antenna Factor (dB/m)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)
Horizontal	434.026575	58.77	3.71	14.26	76.74	80.80	4.06
Vertical	434.026575	58.61	3.71	14.26	76.58	80.80	4.22

Orthogonal axe: Y

Polarization	Frequency (MHz)	Reading level (dBuV)	Cable Loss (dB)	Antenna Factor (dB/m)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)
Horizontal	434.026575	59.38	3.71	14.26	77.35	80.80	3.45
Vertical	*434.026575*	*59.46*	*3.71*	*14.26*	*77.43*	*80.80*	*3.37*

Orthogonal axe: Z

Polarization	Frequency (MHz)	Reading level (dBuV)	Cable Loss (dB)	Antenna Factor (dB/m)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)
Horizontal	434.026575	56.79	3.71	14.26	74.76	80.80	6.04
Vertical	434.026575	55.06	3.71	14.26	73.03	80.80	7.77

Note:
1.   Emission level = Reading level + Antenna factor + Cable loss
2.   Margin = Limit – Emission level
3.   The worst emission was founded at 434.026575 MHz with emission level 77.43dBµV /m for vertical polarity with 3.37dB margin.

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The protocol for transmitter part (spurious emission)

Orthogonal axe: X

Polarization	Frequency (MHz)	Reading level (dBuV)	Cable Loss (dB)	Antenna Factor (dB/m)	Emission Level (dBuV/m)	Limits (dBuV/ m)	Margin (dB)
Horizontal	868.259519	31.78	5.33	20.23	57.34	60.80	3.46
Vertical	868.259519	30.63	5.33	20.23	56.19	60.80	4.61

Orthogonal axe: Y

Polarization	Frequency (MHz)	Reading level (dBuV)	Cable Loss (dB)	Antenna Factor (dB/m)	Emission Level (dBuV/m)	Limits (dBuV/ m)	Margin (dB)
Horizontal	868.259519	32.16	5.33	20.23	57.72	60.80	3.08
Vertical	*868.259519*	*32.35*	*5.33*	*20.23*	*57.91*	*60.80*	*2.89*

Orthogonal axe: Z

Polarization	Frequency (MHz)	Reading level (dBuV)	Cable Loss (dB)	Antenna Factor (dB/m)	Emission Level (dBuV/m)	Limits (dBuV/ m)	Margin (dB)
Horizontal	868.259519	29.17	5.33	20.23	54.73	60.80	6.07
Vertical	868.259519	28.46	5.33	20.23	54.02	60.80	6.78

Note:
1. Emission level = Reading level + Antenna factor + Cable loss
2. Margin = Limit – Emission level
3. The worst emission was founded at 868.259519 MHz with emission level 57.91dBμV /m for vertical polarity with 2.89dB margin.

FCC ID: RUMCL3

Orthogonal axe: X

Polarization	Frequency (MHz)	Reading level (dBuV)	Cable Loss (dB)	Antenna Factor (dB/m)	Average factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)
Horizontal	1296.083156	38.61	4.30	23.30	-9.60	56.61	60.80	4.19
	1727.173382	37.27	5.00	24.50	-9.60	57.17	60.80	3.63
	2170.200681	29.84	5.60	26.90	-9.60	52.74	60.80	8.06
	2603.206413	32.64	5.80	28.20	-9.60	57.04	60.80	3.76
	3476.953908	21.57	7.10	30.70	-9.60	49.77	60.80	11.03
	3909.819639	22.75	7.60	31.90	-9.60	52.65	54.00	1.35
Vertical	1296.083156	36.82	4.30	23.30	-9.60	54.82	60.80	5.98
	1727.173382	35.44	5.00	24.50	-9.60	55.34	60.80	5.46
	2170.200681	34.15	5.60	26.90	-9.60	57.05	60.80	3.75
	2603.206413	33.95	5.80	28.20	-9.60	58.35	60.80	2.45
	3476.953908	23.75	7.10	30.70	-9.60	51.95	60.80	8.85
	3909.819639	22.97	7.60	31.90	-9.60	52.87	54.00	1.13

Orthogonal axe: Y

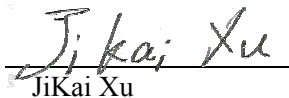| Polarization	Frequency (MHz)	Reading level (dBuV)	Cable Loss (dB)	Antenna Factor (dB/m)	Average factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)
Horizontal	1296.083156	38.77	4.30	23.30	-9.60	56.77	60.80	4.03
	1727.173382	37.28	5.00	24.50	-9.60	57.18	60.80	3.62
	2170.200681	34.14	5.60	26.90	-9.60	57.04	60.80	3.76
	2603.206413	33.05	5.80	28.20	-9.60	57.45	60.80	3.35
	3476.953908	24.23	7.10	30.70	-9.60	52.43	60.80	8.37
	3909.819639	21.82	7.60	31.90	-9.60	51.72	54.00	2.28
Vertical	1296.083156	39.21	4.30	23.30	-9.60	57.21	60.80	3.59
	1727.173382	37.19	5.00	24.50	-9.60	57.09	60.80	3.71
	2170.200681	31.13	5.60	26.90	-9.60	54.03	60.80	6.77
	2603.206413	30.34	5.80	28.20	-9.60	54.74	60.80	6.06
	3476.953908	16.53	7.10	30.70	-9.60	44.73	60.80	16.07
	3909.819639	*23.03*	*7.60*	*31.90*	*-9.60*	*52.93*	*54.00*	*1.07*

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Orthogonal axe: Z

Polarization	Frequency (MHz)	Reading level (dBuV)	Cable Loss (dB)	Antenna Factor (dB/m)	Average factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/ m)	Margin (dB)
Horizontal	1296.083156	39.89	4.30	23.30	-9.60	57.89	60.80	2.91
	1727.173382	38.08	5.00	24.50	-9.60	57.98	60.80	2.82
	2170.200681	32.83	5.60	26.90	-9.60	55.73	60.80	5.07
	2603.206413	32.64	5.80	28.20	-9.60	57.04	60.80	3.76
	3476.953908	24.76	7.10	30.70	-9.60	52.96	60.80	7.84
	3909.819639	22.94	7.60	31.90	-9.60	52.84	54.00	1.16
Vertical	1296.083156	40.39	4.30	23.30	-9.60	58.39	60.80	2.41
	1727.173382	38.08	5.00	24.50	-9.60	57.98	60.80	2.82
	2170.200681	33.96	5.60	26.90	-9.60	56.86	60.80	3.94
	2603.206413	30.61	5.80	28.20	-9.60	55.01	60.80	5.79
	3476.953908	21.85	7.10	30.70	-9.60	50.05	60.80	10.75
	3909.819639	22.83	7.60	31.90	-9.60	52.73	54.00	1.27

Note:
1. Emission level = Reading level + Antenna factor + Cable loss + Average factor
2. Margin = Limit – Emission level
3. The worst emission was founded at 3909.819639 MHz with emission level 52.93 dBμV /m for vertical polarity with 1.07dB margin.

Test Engineer: _JiKai Xu_   Date of test: 2004-06-28
                JiKai Xu

4.6.4. Automatic shut off function test

This device is manually operated, and will be automatically deactivate within 5 seconds after button being released. Also will shut down immediately after push stop button.

4.7 Measurement Uncertainty

Measurement uncertainty of radiated emission test is ±3.92dB
The measurement uncertainty is given with a confidence of 95%, k=2

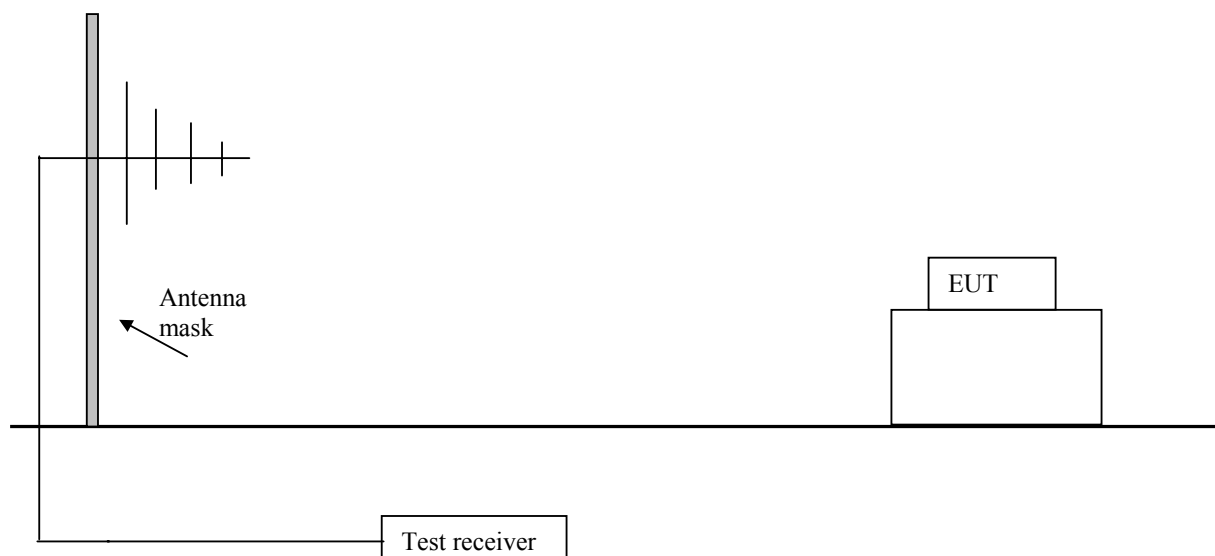*FCC ID: RUMCL3*

5. The bandwidth of the emission

5.1 the limit of the bandwidth of the emission
The bandwidth of the emission shall be mo wider than 0.25% of the center frequency for devices operating above 70MHz and below 900MHz. For devices operating above 900MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determine at the points 20dB down from the modulated carrier.

5.2 Instruments list

Item	Equipment	Manu.	Type	Serials no.	Last Cal.	Cal. Interval
1	EMI Test Receiver	Rohde & Schwarz	ESI 26	838786/011	2004-2-8	1 Year
2	Log Periodic Antenna	Rohde & Schwarz	HL 562	100019	2004-4-15	1 Year

5.3 Test setup

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5.4 Test configuration

The measurement was applied in Semi- anechoic Chamber.
Logical periodic antenna was used to get the center frequency of the EUT.
The bandwidth setting on R&S Test Receiver ESI 26 was 100kHz. Test distance is 3m.
The mode (Transmission) was checked during test and all the test results are listed in the sec.5.6.

5.5 Test procedure

5.5.1   Establish the test setup as sec. 5.3.
5.5.2   Set the transmitter to emit the emission.
5.5.3   Proceed the measurement

5.6   Test Results

■ Pass   □   Fail

5.6.1 Measurement environment

   Temperature：25.3 °C   Relative Humidity：41.5 %

5.6.2 Data table

Center Frequency (MHz)	Low Frequency (MHz)	High Frequency (MHz)	Bandwidth (MHz)	Bandwidth Limit (MHz)	Margin (MHz)
433.897796	433.492986	434.328657	0.835671	1.08474449	0.24907349

Note:
1. Bandwidth = High Frequency – Low Frequency
2. Margin =Bandwidth Limit – Bandwidth

Test Engineer: *JiKai Xu*   Date of test: 2004-06-28
            JiKai Xu

5.7 Measurement Uncertainty

Measurement uncertainty of bandwidth test is ± 0.01%.
The measurement uncertainty is given with a confidence of 95%, k=2

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6. Sample field strength calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and average factor for frequency above 1GHz.

The sample calculation is as follow:

$dB(\mu V/m) = 20lg(\mu V/m)$

For measurement at frequency below 1GHz

$FS = RL + AF + CL$

Where FS = Field strength
   RL= Reading Level
   AF = Antenna factor
   CL = Cable loss

Example 1: @   434.026575

   Part 15 subpart C limit = 80.80 dBµV/m
   Reading level = 59.46 dBµV
   Cable loss = 3.71 dB
   Antenna factor = 14.26 dB/m

FS (Emission level) = 59.46+3.71+14.26 = 77.43 dBµV/m
  Margin = 80.80 – 77.43 = 3.37dB

Emission level is 3.37dB below the limit.

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For measurement frequency above 1GHz

FS = RL + AF + CL + Ave.F

Where FS = Field strength
      RL = Reading Level
      AF = Antenna factor
      CL = Cable loss
      Ave.F = Average factor

Example 2 @   3909.813639 MHz

    Part 15 subpart C limit = 54.00 dBµV/m (according to 15.205)
    Reading level = 23.03 dBµV
    Cable loss = 7.60 dB
    Antenna factor = 31.90 dB/m
    Average factor = -9.6 dB
FS (Emission level) = 23.03+31.90+7.60-9.6 = 52.92 dBµV/m
    Margin = 54.00 – 52.93 = 1.07dB

Emission level is 1.07dB below the limit.

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