

## TEST REPORT

**Report Number: HK10120447-1**

Application  
for  
Original Grant of 47 CFR Part 15 Certification

433.92MHz Transmitter-Remote Device of  
Door Bell and Telephone Ringer Amplifier

**FCC ID: RUM-AC2T**

Prepared and Checked by:



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Koo Wai Ip  
Lead Engineer  
March 09, 2011

Approved by:



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Supervisor  
March 09, 2011

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### GENERAL INFORMATION

<b>Applicant Name:</b>	Geemarc Telecom International Limited
<b>Applicant Address:</b>	1902 Mass Mutual Tower, 38 Gloucester Road, Wan Chai, Hong Kong.
<b>FCC Specification Standard:</b>	FCC Part 15, October 1, 2009 Edition
<b>FCC ID:</b>	RUM-AC2T
<b>FCC Model(s):</b>	AMPLICALL 2, AMPLICALL 1
<b>Type of EUT:</b>	Remote Control Device
<b>Description of EUT:</b>	433.92MHz Transmitter-Remote Device of Door Bell and Telephone Ringer Amplifier
<b>Serial Number:</b>	N/A
<b>Sample Receipt Date:</b>	December 13, 2010
<b>Date of Test:</b>	February 15 to March 03, 2011
<b>Report Date:</b>	March 09, 2011
<b>Environmental Conditions:</b>	Temperature: +10 to 40°C Humidity: 10 to 90%

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### **EXHIBIT 1 TEST RESULTS SUMMARY & STATEMENT OF COMPLIANCE**

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### 1.0 Test Results Summary & Statement of Compliance

#### 1.1 Summary of Test Results

Test Items	FCC Part 15 Section	Results	Details see section
Antenna Requirement	15.203	Pass	2.1
Radiated Emission Timing Bandwidth	15.231(b) 15.109 15.231(a) 15.231(c)	Pass Pass Pass	4.2 4.3.1
Radiated Emission in Restricted Bands	15.205	Pass	4.2
AC Power Line Conducted Emission	15.207 & 15.107	N/A	4.4

Note: Pursuant to FCC Part 15 Section 15.215(c), the 20dB bandwidth of the emission was contained within the frequency band designated (mentioned as above) which the EUT operated. The effects, if any, from frequency sweeping, frequency hopping, other modulation techniques and frequency stability over expected variations in temperature and supply voltage were considered.

#### 1.2 Statement of Compliance

The equipment under test is found to be complying with the following standard:

FCC Part 15, October 1, 2009 Edition

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### **EXHIBIT 2 GENERAL DESCRIPTION**

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### 2.0 General Description

#### 2.1 Product Description

The Equipment Under Test (EUT) is a 433.92 MHz transmitter-remote device of door bell and/or telephone ringer amplifier. It operates at 433.92MHz. The EUT is powered by a A23 size 12VDC battery.

The antenna used in EUT is integral, and the test sample is a prototype.

The Model(s): AMPLICALL 1 is the same as the Model: AMPLICALL 2 in electronics/electrical designs including software & firmware, PCB layout and construction design/physical design/enclosure. The only differences between these models for marketing purpose are: model number, AMPLICALL 1 has press button and AMPLICALL 2 has both pull switch and press button.

The circuit description is attached in the Appendix and saved with filename: descri.pdf.

#### 2.2 Test Methodology

Radiated emission measurements was performed according to the procedures in ANSI C63.4 (2003). Preliminary radiated scans and all radiated measurements were performed in Open Area Test Sites. All Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application.

#### 2.3 Test Facility

The open area test site facility used to collect the radiated data and conducted data is at Roof Top of Intertek Testing Services Hong Kong Ltd., which is located at Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong. This test facility and site measurement data have been fully placed on file with the FCC.

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### **EXHIBIT 3 SYSTEM TEST CONFIGURATION**



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### 3.0 **System Test Configuration**

#### 3.1 Justification

For radiated emissions testing, the equipment under test (EUT) was setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, all cables (if any) were manipulated to produce worst case emissions.

The EUT was powered by a New A23 size 12VDC battery.

For the measurements, the EUT was attached to a plastic stand if necessary and placed on the wooden turntable. If the EUT attached to peripherals, they were connected and operational to simulate typical use.

The signal was maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization were varied during the search for maximum signal level. The antenna height was varied from 1 to 4 meters. Radiated emissions were taken at three meters unless the signal level was too low for measurement at that distance. If necessary, a pre-amplifier was used and/or the test was conducted at a closer distance.

For transmitter radiated measurement, the spectrum analyzer resolution bandwidth was 100kHz for frequencies below 1000MHz. The resolution bandwidth was 1MHz for frequencies above 1000MHz.

Radiated emission measurement for transmitter was performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

Emission that are directly caused by digital circuits in the transmit path and transmitter portion were measured, and the limit are according to FCC Part 15 Section 15.109.

Detector function for radiated emissions is in peak mode.

#### 3.2 EUT Exercising Software

There was no special software to exercise the device. Once the unit is switched on, it transmits the RF signal continuously.

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### 3.3 Details of EUT and Description of Accessories

#### Details of EUT:

A battery (provided with the unit) was used to power the device. Their description are listed below.

- (1) Operated Battery: A23 size battery 12VDC (Provided by Client)

#### Description of Peripherals:

There are no special accessories necessary for compliance of this product.

### 3.4 Measurement Uncertainty

When determining of the test conclusion, the Measurement Uncertainty of test has been considered.

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### **EXHIBIT 4 TEST RESULTS**

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### 4.0 Test Results

Data is included of the worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

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### 4.1 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

$$FS = RA + AF + CF - AG + PD + AV$$

where      FS = Field Strength in dB $\mu$ V/m  
             RA = Receiver Amplitude (including preamplifier) in dB $\mu$ V  
             CF = Cable Attenuation Factor in dB  
             AF = Antenna Factor in dB  
             AG = Amplifier Gain in dB  
             PD = Pulse Desensitization in dB  
             AV = Average Factor in -dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

$$FS = RA + AF + CF - AG + PD + AV$$

#### Example

Assume a receiver reading of 62.0 dB $\mu$ V is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0 dB, and the resultant average factor was -10 dB. The net field strength for comparison to the appropriate emission limit is 32 dB $\mu$ V/m. This value in dB $\mu$ V/m was converted to its corresponding level in  $\mu$ V/m.

$$\begin{aligned} RA &= 62.0 \text{ dB}\mu\text{V} \\ AF &= 7.4 \text{ dB} \\ CF &= 1.6 \text{ dB} \\ AG &= 29 \text{ dB} \\ PD &= 0 \text{ dB} \\ AV &= -10 \text{ dB} \\ FS &= 62 + 7.4 + 1.6 - 29 + 0 + (-10) = 32 \text{ dB}\mu\text{V/m} \end{aligned}$$

$$\text{Level in } \mu\text{V/m} = \text{Common Antilogarithm} [(32 \text{ dB}\mu\text{V/m})/20] = 39.8 \mu\text{V/m}$$

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### 4.2 Radiated Emissions

#### 4.2.1 Radiated Emission Configuration Photograph

Worst Case Radiated Emission  
at

35.800MHz

The worst case radiated emission configuration photographs are attached in the Appendix and saved with filename: config photos.pdf

#### 4.2.2 Radiated Emission Data

The data in tables 1-2 list the significant emission frequencies, the limit and the margin of compliance.

Judgement -

Passed by 6.4 dB margin

#### 4.2.3 Transmitter Duty Cycle Calculation

The average factor is not applicable for this device because the peak detector measured data is substituted for the average detector data to show compliance.

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Mode: TX

Table 1

### Radiated Emission Data

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp (dB)	Antenna factor (dB)	Net at 3m (dBμV/m)	Limit at 3m (dBμV/m)	Margin (dB)
V	433.920	43.6	16	25.0	52.6	80.8	-28.2
V	867.840	24.6	16	31.0	39.6	60.8	-21.2
<b><i>H</i></b>	<b><i>1301.760</i></b>	<b><i>50.1</i></b>	<b><i>33</i></b>	<b><i>26.1</i></b>	<b><i>43.2</i></b>	<b><i>54.0</i></b>	<b><i>-10.8</i></b>
H	1735.680	48.3	33	27.2	42.5	60.8	-18.3
H	2169.600	45.8	33	29.4	42.2	60.8	-18.6
H	2603.520	43.2	33	30.4	40.6	60.8	-20.2
H	3037.440	41.9	33	31.9	40.8	60.8	-20.0
H	3471.360	41.1	33	31.9	40.0	60.8	-20.8
<b><i>H</i></b>	<b><i>3905.280</i></b>	<b><i>39.3</i></b>	<b><i>33</i></b>	<b><i>33.3</i></b>	<b><i>39.6</i></b>	<b><i>54.0</i></b>	<b><i>-14.4</i></b>

- NOTES:
1. Peak detector is used for the emission measurement. The above peak detector measured data is substituted for the average detector data to show compliance.
  2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
  3. Negative value in the margin column shows emission below limit.
  4. Horn antenna is used for the emission over 1000MHz.
  5. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205.

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Mode: TX

Table 2

### Radiated Emission Data

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-amp (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	35.800	39.6	16	10.0	33.6	40.0	-6.4
V	71.600	42.4	16	7.0	33.4	40.0	-6.6
H	107.400	36.2	16	14.0	34.2	43.5	-9.3
H	143.200	36.1	16	14.0	34.1	43.5	-9.4
H	179.000	29.5	16	20.0	33.5	43.5	-10.0
H	214.800	31.8	16	17.0	32.8	43.5	-10.7

- NOTES:
1. Peak detector is used for the emission measurement.
  2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
  3. Negative value in the margin column shows emission below limit.
  4. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205.



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### 4.3 Transmitter Bandwidth and 5-Second Transmission

#### 4.3.1 Measured Bandwidth

The plot shows the fundamental emission when modulated is attached in the Appendix and saved with filename: bw.pdf. From the plot, the bandwidth is observed to be 403.200kHz, at 20dBc where the bandwidth limit is 1084.8kHz.

Therefore, the EUT meets the requirement of FCC Part 15 Section 15.231(c).

#### 4.3.2 5-Second Transmission Requirement

- ☒ Pursuant to FCC Part 15 Section 15.231(a)(1), a manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released. The EUT meets the requirement. A preliminary copy of the 5-second transmission requirement is attached in the Appendix and saved with filename: 5s.pdf.
- ☐ Pursuant to FCC Part 15 Section 15.231(a)(2), a transmitter activated automatically shall cease transmitter within 5 seconds after activation. The EUT meets the requirement. A preliminary copy of the 5-seconds transmission requirement is attached in the Appendix and saved with filename: 5s.pdf.

### 4.4 AC Power Line Conducted Emission

- ☒ Not applicable – EUT is only powered by battery for operation.
- ☐ EUT connects to AC power line. Emission Data is listed in following pages.
- ☐ Base Unit connects to AC power line and has transmission. Handset connects to AC power line but has no transmission. Emission Data of Base Unit is listed in following pages.

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### **EXHIBIT 5 EQUIPMENT LIST**

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### 5.0 Equipment List

#### 1) Radiated Emissions Test

Equipment	Biconical Antenna	Log Periodic Antenna	Double Ridged Guide Antenna (1GHz - 18GHz)
Registration No.	EW-0954	EW-0446	EW-1015
Manufacturer	EMCO	EMCO	EMCO
Model No.	3104C	3146	3115
Calibration Date	Apr. 14, 2010	Apr. 26, 2010	Feb. 09, 2010
Calibration Due Date	Oct. 14, 2011	Oct. 26, 2011	Aug. 09, 2011

Equipment	EMI Test Receiver	Spectrum Analyzer	Spectrum Analyzer 40GHz
Registration No.	EW-2666	EW-2188	EW-2253
Manufacturer	R&S	AGILENTTECH	R&S
Model No.	ESCI7	E4407B	FSP40
Calibration Date	Oct. 12, 2010	Dec. 27, 2010	Nov. 23, 2010
Calibration Due Date	Oct. 12, 2011	Dec. 31, 2011	Nov. 23, 2011

Equipment	Digital Multimeter	EMI Test Receiver
Registration No.	EW-1237	EW-2251
Manufacturer	FLUKE	R&S
Model No.	179	ESCI
Calibration Date	Sep. 01, 2010	Oct. 22, 2009
Calibration Due Date	Oct. 01, 2011	Apr. 22, 2011

**END OF TEST REPORT**