



NVLAP LAB CODE 200707-0



## FCC PART 95

### EMI MEASUREMENT AND TEST REPORT

For

**Andus Technologies Ltd.**

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**FCC ID: UNSH61056**

<b>This Report Concerns:</b> <input checked="" type="checkbox"/> Class II permissive change	<b>Equipment Type:</b> FRS/GMRS
<b>Test Engineer:</b> Merry Zhao <i>Merry Zhao</i>	
<b>Report No.:</b> RSZ07020602	
<b>Test Date:</b> 2007-02-13 to 2007-02-15	
<b>Report Date:</b> 2007-02-15	
<b>Reviewed By:</b> EMC Manager: Boni Baniquid <i>Boni</i>	
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**Note:** This test report is for the customer shown above and their specific product only. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratory Corp. (Shenzhen). This report **must not** be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government

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## GENERAL INFORMATION

### Product Description for Equipment under Test (EUT)

The *Andus Technologies Ltd.*'s product, model number: H61056B or the "EUT" as referred to in this report is a FRS/GMRS. The EUT is measured approximately 13.0 cm L x 7.0 cmW x 5.5 cmH rated input voltage: DC 3.6 V or 4.5 V Battery, with permanent Antenna.

*\* The test data gathered are from production sample, serial number: 0702005 provided by the manufacturer, we received the EUT on 2007-02-06.*

### Objective

This Type approval report is prepared on behalf of *Andus Technologies Ltd.* in accordance with Part 2, Subpart J, and Part 95 of the Federal Communication Commissions rules.

This is the C2PC application of the device. The difference between the original device and the current one is as follows:

- Change the Model Number H61056 to H61056B.
- Change the Appearance Color of EUT.
- Change the power supply from 4x"AAA" battery to 3x"AAA" battery
- Add a 3x 1/3"AAA" battery pack internally
- Change the charging PCB outline and circuitry
- Change the placement of Dynamo, 3x"AAA" Battery and 3x 1/3"AAA" battery pack
- Change the charging PCB location

For the changes made to the device, ERP, Spurious Emissions and Frequency stability testing were performed.

### Related Submittal(s)/Grant(s)

This is a Class II permissive change application. The original application was granted on 2006-11-05, the original frequency range is 462.5625 -467.7125 MHz & 462.55000-462.72500.

### Test Methodology

All tests and measurements indicated in this document were performed in accordance with Part 95 Subpart B and Subpart E of the Federal Communication Commissions rules.

All emissions measurement was performed and Bay Area Compliance Laboratory Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

**Test Facility**

The Test site used by Bay Area Compliance Laboratory Corp. (Shenzhen) to collect radiated and conducted emission measurement data is located in the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China.

Test site at Bay Area Compliance Laboratory Corp. (Shenzhen) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on November 04, 2004. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 382179 and Industrial Canada registration test site No.: 5500A. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Laboratory Corp. (Shenzhen) is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200707-0). The current scope of accreditations can be found at  
<http://ts.nist.gov/ts/htdocs/210/214/scopes/2007070.htm>

## SYSTEM TEST CONFIGURATION

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### Description of Test Configuration

The system was configured for testing in a typical fashion (as normally used by a typical user).

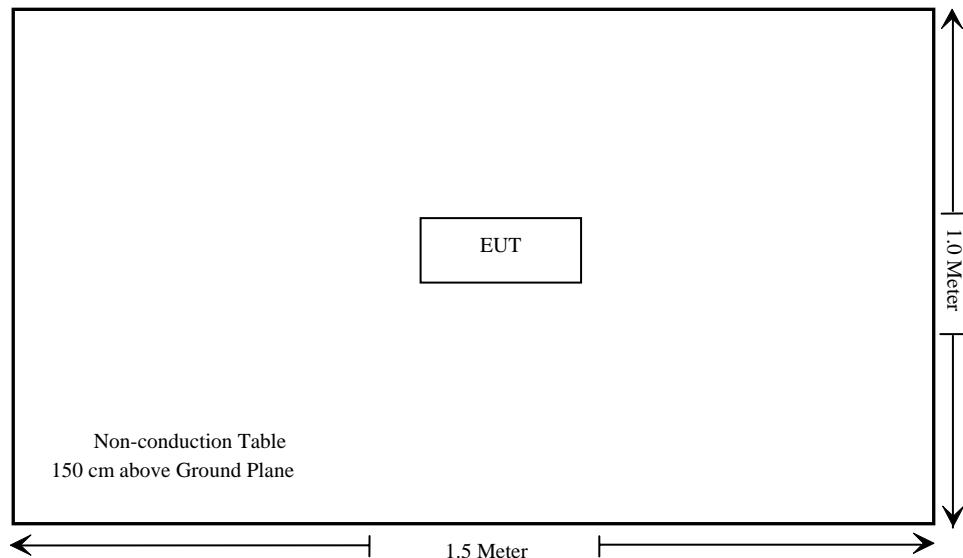
### Equipment Modifications

Bay Area Compliance Laboratory Corp. (Shenzhen) has not done any modification on the EUT.

## Configuration of Test Setup



## Block Diagram of Test Setup



**SUMMARY OF TEST RESULTS**

FCC RULES	DESCRIPTION OF TEST	RESULT
§1.1307(b) (1)	RF Exposure	Please refer to original report
§2.1046, §95.135 and §95.639(d)	RF Output Power	Compliant
§2.1047, and §95.637(a)	Modulation Characteristic	Please refer to original report
§2.1049, and § 95.633(a)(c)	Occupied Bandwidth	Please refer to original report
§2.1053 §95.635(b) (7)	Spurious Radiated Emissions	Compliant
§2.1055 (d), §95.627(b) and §95.621	Frequency stability	Compliant

## §2.1046, §95.135 and §95.639(d) - RF OUTPUT POWER

### Applicable Standard

Per FCC §2.1046, and §95.639(d), No FRS Unit, under any condition of modulation, shall exceed a 0.500 w effective radiated power (ERP).

Per §95.135, A small base station must transmit with no more than 5 watts effective radiated power (ERP).

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Signal Generator	HP8657A	2849U00982	2006-09-29	2007-09-29
Agilent	Spectrum Analyzer	8564E	3943A01781	2006-11-22	2007-11-22
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2006-08-14	2007-08-14
COM POWER	Dipole Antenna	AD-100	041000	2006-09-25	2007-09-25

\* **Statement of Traceability:** Bay Area Compliance Lab Corp. (ShenZhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

### Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load, which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT .The test was performed by placing the EUT on 3-orthogonal axis.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the emissions were measured by the substitution.

**Test Data****Environmental Conditions**

Temperature:	25 ° C
Relative Humidity:	50%
ATM Pressure:	1005mbar

*The testing was performed by Merry Zhao on 2007-02-15.*

*Test Mode: Transmitting*

Indicated		Table	Test Antenna		Substituted			Antenna Gain	Cable Loss dB	FCC Part 95			
Frequency (MHz)	Reading (dBuV)		Angle Degree	Height Meter	Polar H/V	Frequency (MHz)	Level (dBm)	Polar H/V		Absolute Level (dBm)	Absolute Level in Watt	Limit in Watt	
462.6375	91.54	180	1.45	V	462.6375	24.50	V	0	5.07	19.43	0.0877	0.5	FRS
467.6375	90.50	175	1.50	V	467.6375	23.45	V	0	5.07	18.38	0.0689	0.5	FRS
462.6250	91.95	90	1.45	V	462.625	23.78	V	0	5.07	18.71	0.0743	5.0	GMRS

**Test Result:** Pass

## §2.1053 and §95.635(b) (7) - RADIATED SPURIOUS EMISSION

### Applicable Standard

§2.1053 and §95.635

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Signal Generator	HP8657A	2849U00982	2006-09-29	2007-09-29
Agilent	Spectrum Analyzer	8564E	3943A01781	2006-11-22	2007-11-22
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2006-08-14	2007-08-14
COM POWER	Dipole Antenna	AD-100	041000	2006-09-25	2007-09-25
SUNOL SCIENCES	Horn Antenna	DRH-118	A052604	2006-09-25	2007-09-25

\* **Statement of Traceability:** Bay Area Compliance Laboratory Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

### Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load, which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB =  $10 \log_{10} (\text{TXpwr in Watts} / 0.001)$  - the absolute level

Spurious attenuation limit in dB =  $43 + 10 \log_{10} (\text{power out in Watts})$

### Test Results Summary

For channel 4: 20.2 dB at 88.20 MHz. (FRS)

For channel 11: 17.28 dB at 146.4 MHz. (FRS)

For channel 18: 12.34 dB at 4163.625 MHz. (GMRS)

## Test Data

### Environmental Conditions

Temperature:	25 ° C
Relative Humidity:	50%
ATM Pressure:	1005mbar

The testing was performed by Merry Zhao on 2007-02-13.

Test Mode: Transmitting (Channel 4, 462.6375MHz)

FRS

Indicated		Table	Test Antenna	Substituted				Antenna Gain Correction	Cable Loss (dB)	FCC Part 95		
Frequency (MHz)	Reading (dBuV)			Angle Degree	Height Meter	Polar H/V	Frequency (MHz)			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
88.2000	37.07	175	1.8	V	88.2000	-31.4	V	0.0	1.80	-33.2	-13	20.2
33.8800	38.63	185	1.5	H	33.8800	-32.1	H	0.0	1.13	-33.23	-13	20.23
1850.5500	70.00	56	1.8	V	1850.5500	-39.3	V	6.1	0.43	-33.63	-13	20.63
1850.5500	65.50	152	1.4	H	1850.5500	-39.4	H	6.1	0.43	-33.73	-13	20.73
871.9600	37.22	180	1.6	H	871.9600	-28.1	H	0.0	5.71	-33.81	-13	20.81
3700.0000	55.83	214	1.4	H	3238.4625	-40.0	H	6.7	0.76	-34.06	-13	21.06
635.2800	36.65	105	1.5	H	635.2800	-29.2	H	0.0	4.92	-34.12	-13	21.12
925.2750	40.29	60	1.0	V	925.2750	-30.2	V	0.0	7.62	-37.82	-13	24.82
1387.9125	66.33	26	1.3	V	1387.9125	-45.0	V	6.5	0.33	-38.83	-13	25.83
600.3600	37.60	180	1.6	V	600.3600	-34.3	V	0.0	4.68	-38.98	-13	25.98
925.2750	35.82	45	1.2	H	925.2750	-31.5	H	0.0	7.62	-39.12	-13	26.12
1387.9125	61.50	324	1.2	H	1387.9125	-45.5	H	6.5	0.33	-39.33	-13	26.33
2775.8250	54.67	54	1.2	V	2775.8250	-46.5	V	7.4	0.51	-39.61	-13	26.61
2775.8250	57.83	157	1.2	H	2775.8250	-47.0	H	7.4	0.51	-40.11	-13	27.11
3238.0000	4625	23	1.3	V	3238.4625	-46.6	V	6.8	0.73	-40.53	-13	27.53
2313.1875	57.50	87	1.2	H	2313.1875	-48.5	H	7.3	0.32	-41.52	-13	28.52
2313.1875	54.67	90	1.4	V	2313.1875	-54.5	V	7.3	0.32	-47.52	-13	34.52

*Test Mode: Transmitting (Channel 11, 467.6375MHz)*

*FRS*

Indicated		Table	Test Antenna		Substituted			Antenna Gain Correction	Cable Loss (dB)	FCC Part 95		
Frequency (MHz)	Reading (dBuV)		Angle Degree	Height Meter	Polar H/V	Frequency (MHz)	Level (dBm)			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
146.4000	37.65	180	1.5	V	146.4000	-28.5	V	0.0	1.78	-30.28	-13	17.28
1870.5500	70.17	56	1.8	V	1870.5500	-37.8	V	6.1	0.43	-32.13	-13	19.13
592.6000	37.14	185	1.8	H	592.6000	-28.9	H	0.0	4.63	-33.53	-13	20.53
935.2750	38.40	45	1.2	H	935.2750	-29.1	H	0.0	6.08	-35.18	-13	22.18
1402.9125	68.67	324	1.2	V	1402.9125	-42.0	V	6.5	0.33	-35.83	-13	22.83
3273.4625	57.33	23	1.3	H	3273.4625	-42.0	H	6.8	0.65	-35.85	-13	22.85
2805.825	59.17	157	1.2	H	2805.825	-43.4	H	7.4	0.51	-36.51	-13	23.51
782.7200	37.33	180	1.6	V	782.7200	-31.4	V	0.0	5.45	-36.85	-13	23.85
641.1000	37.02	105	1.5	V	641.1000	-32.2	V	0.0	4.99	-37.19	-13	24.19
1870.5500	63.50	152	1.4	H	1870.5500	-42.9	H	6.1	0.43	-37.23	-13	24.23
935.2750	38.19	60	1.0	V	935.2750	-32.3	V	0.0	6.08	-38.38	-13	25.38
2805.8250	54.67	54	1.2	V	2805.8250	-45.60	V	7.4	0.51	-38.71	-13	25.71
1402.9125	61.00	26	1.3	H	1402.9125	-46.0	H	6.5	0.33	-39.83	-13	26.83
3273.4625	52.83	214	1.4	V	3273.4625	-46.9	V	6.8	0.65	-40.75	-13	27.75
2338.1875	55.00	87	1.2	V	2338.1875	-50.1	V	7.0	0.33	-43.43	-13	30.43
2338.1875	53.67	90	1.4	H	2338.1875	-53.0	H	7.0	0.33	-46.33	-13	33.33

*Test Mode: Transmitting (Channel 18, 462.625MHz)*

*GMRS*

Indicated		Table	Test Antenna		Substituted			Antenna Gain Correction	Cable Loss (dB)	FCC Part 95		
Frequency (MHz)	Reading (dBuV)		Angle Degree	Height Meter	Polar H/V	Frequency (MHz)	Level dBm			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
4163.6250	67.00	214	1.4	V	3238.3750	-32.5	V	7.8	0.64	-25.34	-13	12.34
146.4000	36.86	180	1.9	V	146.4000	-27.8	V	0.0	1.78	-29.58	-13	16.58
925.2500	40.51	60	1.0	V	925.2500	-24.8	V	0.0	7.62	-32.42	-13	19.42
544.1000	37.40	180	1.6	H	544.1000	-28.9	H	0.0	4.25	-33.15	-13	20.15
1850.5000	66.00	152	1.4	H	1850.5000	-39.9	H	6.1	0.43	-34.23	-13	21.23
1850.5000	69.33	56	1.8	V	1850.5000	-40.0	V	6.1	0.43	-34.33	-13	21.33
4163.6250	57.17	23	1.3	H	3238.3750	-43.2	H	7.8	0.64	-36.04	-13	23.04
699.3000	37.37	175	1.8	V	699.3000	-32.0	V	0.0	5.06	-37.06	-13	24.06
925.2500	36.97	45	1.2	H	925.2500	-30.8	H	0.0	7.62	-38.42	-13	25.42
1387.8750	66.00	324	1.2	V	1387.8750	-44.7	V	6.5	0.33	-38.53	-13	25.53
1387.8750	62.17	26	1.3	H	1387.8750	-45.1	H	6.5	0.33	-38.93	-13	25.93
2775.7500	55.17	54	1.2	V	2775.7500	-46.0	V	7.4	0.51	-39.11	-13	26.11
2775.7500	58.00	157	1.2	H	2775.7500	-47.1	H	7.4	0.51	-40.21	-13	27.21
2313.3250	57.17	90	1.4	H	2313.3250	-48.8	H	7.3	0.33	-41.83	-13	28.83
2313.3250	55.17	87	1.2	V	2313.3250	-54.0	V	7.3	0.33	-47.03	-13	34.03

## §2.1055 (d), §95.627(b) and §95.621- FREQUENCY STABILITY

### Applicable Standard

According to FCC §2.1055(a)(1), the frequency stability shall be measured with variation of ambient temperature from  $-30^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$ , and according to FCC 2.1055(d)(2), the frequency stability shall be measured with reducing primary supply voltage to the battery operating end point which is specified by the manufacturer.

According to FCC §95.627(b), Each FRS Unit must be maintained within a frequency tolerance of 0.00025%.

According to FCC §95.621, Each GMRS transmitter for mobile station, small base station and control station operation must be maintained within a frequency tolerance of 0.0005%.

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde&Schwarz	EMI Test Receiver	ESCI	100035	2006-09-29	2007-09-29

\* **Statement of Traceability:** Bay Area Compliance Lab Corp. (ShenZhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

### Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to the spectrum analyzer via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the Spectrum Analyzer.

Frequency Stability vs. Voltage: An external variable DC power supply Source. The voltage was set to 115% of the nominal value and was then decreased until the transmitter light no longer illuminated; i.e., the end point. The output frequency was recorded for each voltage.

### Test Data

#### Environmental Conditions

Temperature:	25 °C
Relative Humidity:	50%
ATM Pressure:	1005mbar

*The testing was performed by Merry Zhao on 2007-02-15.*

Test Result: Pass

Test Mode: Transmitting

For FRS Channel 4 on transmitting mode:

Reference Frequency: 462.6375 MHz, Limit: 2.5 ppm			
Environment Temperature (°C)	Power Supplied (Vdc)	Measured with Time Elapsed	
		Frequency (MHz)	Error (ppm)
50	4.5	462.638254	1.63
40	4.5	462.63798	1.04
30	4.5	462.637886	0.83
20	4.5	462.637880	0.82
10	4.5	462.637658	0.34
0	4.5	462.637448	-0.11
-10	4.5	462.637198	-0.65
-20	4.5	462.637024	-1.02
-30	4.5	462.637058	-0.96

*Frequency Stability versus Input Voltage*

Reference Frequency: 462.6375 MHz, Limit: 2.5 ppm		
Power Supplied (Vdc)	Measured with Time Elapsed	
	Frequency (MHz)	Error (ppm)
3.6	462.637658	+0.34

For FRS Channel 11 on transmitting mode:

Reference Frequency: 467.6375 MHz, Limit: 2.5 ppm			
Environment Temperature (°C)	Power Supplied (Vdc)	Measured with Time Elapsed	
		Frequency (MHz)	Error (ppm)
50	4.5	467.637980	1.03
40	4.5	467.637880	0.81
30	4.5	467.637798	0.64
20	4.5	467.637656	0.33
10	4.5	467.637588	0.19
0	4.5	467.637402	-0.21
-10	4.5	467.637320	-0.38
-20	4.5	467.636908	-0.13
-30	4.5	467.636950	-1.18

*Frequency Stability versus Input Voltage*

Reference Frequency: 467.6375 MHz, Limit: 2.5 ppm		
Power Supplied (Vdc)	Measured with Time Elapsed	
	Frequency (MHz)	Error (ppm)
3.6	467.637865	+0.78

For GMRS Channel 18 on transmitting mode

Reference Frequency: 462.62500 MHz, Limit: 5 ppm			
Environment Temperature (°C)	Power Supplied (Vdc)	Measured with Time Elapsed	
		Frequency (MHz)	Error (ppm)
50	4.5	462.625868	1.88
40	4.5	462.625756	1.63
30	4.5	462.625568	1.23
20	4.5	462.625325	0.70
10	4.5	462.625028	0.06
0	4.5	462.624904	-0.20
-10	4.5	462.624782	-0.47
-20	4.5	462.624512	-1.05
-30	4.5	462.6241	-1.95

*Frequency Stability Versus Input Voltage*

Reference Frequency: 462.625 MHz, Limit: 5 ppm			
Power Supplied (Vdc)	Measured with Time Elapsed		
	Frequency (MHz)	Error (ppm)	
3.6	462.625368	+0.80	

**END OF REPORT**