



FCC PART 90

TEST REPORT

For

Shenzhen Friendcom Technology Development Co., Ltd.

6/F, 17 Building, Guangqian Industrial Park, Longzhu Road, Xili Town, Nanshan,
Shenzhen, China

FCC ID: UU3FC302U2

Report Type: Original Report	Product Type: FC-302 Data Radio
Test Engineer: Candy Li 	
Report Number: <u>RSZ151218007-00</u>	
Report Date: <u>2015-12-21</u>	
Reviewed By: Jimmy Xiao RF Engineer	
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Note: This test report is prepared for the customer shown above and for the equipment described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp.

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Shenzhen Friendcom Technology Development Co., Ltd.*'s product, model number: *FC-302 U2 (FCC ID: UU3FC302U2)* or the "EUT" in this report was a *FC-302 Data Radio*, which was measured approximately: 117 mm (L) × 63 mm (W) × 32 mm (H), rated input voltage: DC 12 V.

Note: This series products model: FC-302 U2-SI and FC-302 U2 are identical schematics, the difference among them is just the model number and interface due to marketing purpose, and model FC-302 U2 was selected for fully testing, the detailed information can be referred to the attached declaration letter that stated and guaranteed by the applicant.

** All measurement and test data in this report was gathered from production sample serial number: 1507429 (Assigned by Applicant). The EUT supplied by the applicant was received on 2015-12-18.*

Objective

This test report is prepared on behalf of *Shenzhen Friendcom Technology Development Co., Ltd.* in accordance with Part 2 and Part 90 of the Federal Communication Commissions rules.

Related Submittal(s)/Grant(s)

No related submittal(s).

Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of federal Regulations Title 47 Part 2, Sub-part J as well as the following individual parts:

Part 90 – Private Land Mobile Radio Service

Applicable Standards: TIA 603-D

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

Measurement uncertainty with radiated emission is 5.91 dB for 30MHz-1GHz and 4.92 dB for above 1GHz, 1.95dB for conducted measurement.

Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on 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 Laboratories 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 October 31, 2013. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

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

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in a test mode which has been done in the factory.

EUT Exercise Software

1. FC-302 QuickSet En v0.1.11.exe
2. ComMonitor.exe

Equipment Modifications

No modification was made to the EUT tested.

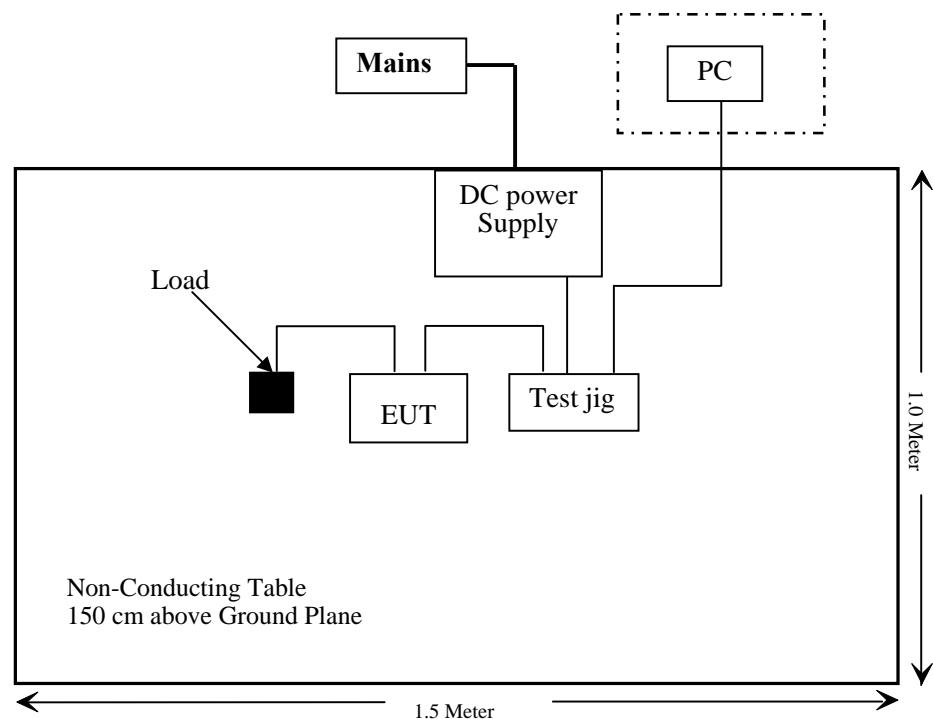
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
GWINSTEK	DC Power Supply	GPS-3030DD	N/A
N/A	50 ohm Load	N/A	N/A
Friendcom	Test jig	FC-302-SetBoard V2	N/A

External I/O Cable

Cable Description	Length (m)	From/Port	To
Un-shielding Detachable AC Power Cable	1.5	DC Power Supply	Mains
Un-shielding Detachable DC Power Cable	1.2	DC Power Supply	Test jig
Un-shielding Detachable RF Cable	0.5	EUT	Load
Un-shielding Detachable RSS 232Cable	0.3	EUT	Test jig
Un-shielding Detachable RS232-to-USB Cable	1.5	Test jig	PC

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§15.247 (i), §1.1307 (b) (1)& §2.1091	Maximum Permissible Exposure(MPE)	Compliance
§2.1046;§90.205	RF Output Power	Compliance*
§2.1047;§90.207	Modulation Characteristic	Compliance*
§2.1049;§90.209; §90.210	Occupied Bandwidth & Emission Mask	Compliance*
§2.1051;§90.210	Spurious Emission at Antenna Terminal	Compliance*
§2.1053;§90.210	Spurious Radiated Emissions	Compliance
§2.1055;§90.213	Frequency Stability	Compliance*
§90.214	Transient Frequency Behavior	Compliance*

Compliance*: Please referred to FCC ID: UU3FC302U2D granted on 2016-01-04, report No.: RSZ151030001-00, which was tested by Bay Area Compliance Laboratories Corp. (Shenzhen).

Note: The difference between the EUT and the device of FCC ID: UU3FC302U2D is as below:
The device of FCC ID: UU3FC302U2D has a GMSK board, but the EUT doesn't have the GMSK board. All others are same.

FCC §15.247 (i) & §1.1307 (b) (1) & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 15.247 (i) and subpart 1.1307 (b)(1), 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (Minutes)
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

f = frequency in MHz

* = Plane-wave equivalent power density

Result

Calculated Formulary:

Predication of MPE limit at a given distance

$$S = \frac{PG}{4\pi R^2}$$

S = power density (in appropriate units, e.g. mW/cm²)

P = power input to the antenna (in appropriate units, e.g., mW).

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain.

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

Frequency (MHz)	Antenna Gain		Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)
	(dBi)	(numeric)	(dBm)	(mW)			
470.0125	5.0	3.16	37.5	5623.4	100	0.14	0.31

Note: To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 100cm from nearby persons.

Result: Compliance

FCC §2.1053 & §90.210 - RADIATED SPURIOUS EMISSIONS

Applicable Standard

FCC §2.1053 and §90.210

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2015-11-03	2016-11-03
HP	Amplifier	8447E	1937A01046	2015-05-06	2016-05-05
Sunol Sciences	Broadband Antenna	JB3	A111513	2014-06-18	2017-06-17
Rohde & Schwarz	Signal Analyzer	FSIQ26	837405/023	2015-08-22	2016-08-22
Sunol Sciences	Horn Antenna	DRH-118	A052304	2013-12-01	2016-11-30
HP	Synthesized Sweeper	8341B	2624A00116	2015-06-03	2016-06-03
Mini-Circuits	Amplifier	ZVA-183-S+	5969001149	2015-04-23	2016-04-22
A.H. System	Horn Antenna	SAS-200/571	135	2015-02-11	2016-02-10
COM POWER	Dipole Antenna	AD-100	041000	NCR	NCR

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements, traceable to National Primary Standards and International System of Units (SI).

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 teeth 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 = $50 + 10 \log_{10}(\text{power out in Watts})$ for EUT with a 12.5 kHz channel bandwidth.

Spurious attenuation limit in dB = $55 + 10 \log_{10}(\text{power out in Watts})$ for EUT with a 6.25 kHz channel bandwidth.

Test Data

Environmental Conditions

Temperature:	24 °C
Relative Humidity:	49 %
ATM Pressure:	101.0 kPa

The testing was performed by Candy Li on 2015-12-21.

Test Mode: Transmitting

30 MHz – 5 GHz:

Frequency (MHz)	Receiver Reading (dB μ V)	Turn Table Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	FCC Part 90				
			Height (m)	Polar (H/V)	SG Level (dBm)	Cable Loss (dB)	Antenna Gain (dB)		Limit (dBm)	Margin (dB)			
FC-302 U2													
Analog 470.0125 MHz 6.25kHz													
262.80	46.29	138	1.5	H	-50.7	0.32	0	-51.02	-25	26.02			
262.80	39.74	177	1.3	V	-57.3	0.32	0	-57.62	-25	32.62			
940.03	54.86	231	2.1	H	-42.1	0.70	0	-42.80	-25	17.80			
940.03	46.32	301	1.5	V	-50.7	0.70	0	-51.40	-25	26.40			
1410.04	47.67	292	1.7	H	-50.2	1.23	6.40	-45.03	-25	20.03			
1410.04	51.47	86	1.8	V	-46.4	1.23	6.40	-41.23	-25	16.23			
Analog 470.0125 MHz 12.5kHz													
119.24	43.39	18	2.0	H	-53.6	0.26	0	-53.86	-20	33.86			
119.24	45.16	103	1.8	V	-51.8	0.27	0	-52.07	-20	32.07			
262.80	46.63	55	1.4	H	-50.4	0.32	0	-50.72	-20	30.72			
262.80	40.62	127	2.2	V	-56.4	0.32	0	-56.72	-20	36.72			
940.03	57.85	12	1.7	H	-39.1	0.70	0	-39.80	-20	19.80			
940.03	50.39	112	2.3	V	-46.6	0.70	0	-47.30	-20	27.30			
1410.04	47.59	204	1.8	H	-50.3	1.23	6.40	-45.13	-20	25.13			
1410.04	52.51	326	1.6	V	-45.4	1.23	6.40	-40.23	-20	20.23			

Frequency (MHz)	Receiver Reading (dB μ V)	Turn Table Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	FCC Part 90				
			Height (m)	Polar (H/V)	SG Level (dBm)	Cable Loss (dB)	Antenna Gain (dB)		Limit (dBm)	Margin (dB)			
FC-302 U2-SI													
Analog 470.0125 MHz 6.25kHz													
262.80	46.16	305	1.4	H	-50.8	0.32	0	-51.12	-25	26.12			
262.80	39.51	209	1.9	V	-57.5	0.32	0	-57.82	-25	32.82			
940.03	55.27	118	1.8	H	-41.7	0.70	0	-42.40	-25	17.40			
940.03	47.27	171	2.3	V	-49.7	0.70	0	-50.40	-25	25.40			
1410.04	46.24	83	2.2	H	-51.6	1.23	6.40	-46.43	-25	21.43			
1410.04	50.76	213	1.6	V	-47.1	1.23	6.40	-41.93	-25	16.93			
Analog 470.0125 MHz 12.5kHz													
119.24	43.54	157	1.9	H	-53.5	0.26	0	-53.76	-20	33.76			
119.24	44.34	183	2.2	V	-52.7	0.27	0	-52.97	-20	32.97			
262.80	47.25	100	2.2	H	-49.7	0.32	0	-50.02	-20	30.02			
262.80	40.28	348	1.5	V	-56.7	0.32	0	-57.02	-20	37.02			
940.03	56.84	212	2.2	H	-40.2	0.70	0	-40.90	-20	20.90			
940.03	50.31	146	2.1	V	-46.7	0.70	0	-47.40	-20	27.40			
1410.04	46.57	230	1.6	H	-51.3	1.23	6.40	-46.13	-20	26.13			
1410.04	51.90	344	1.4	V	-46.0	1.23	6.40	-40.83	-20	20.83			

Note:

Absolute Level = SG Level - Cable loss + Antenna Gain

Margin = Limit- Absolute Level

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PRODUCT SIMILARITY DECLARATION LETTER

Shenzhen Friendcom Technology Development Co., Ltd.
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2015-12-18

Product Similarity Declaration

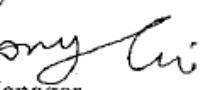
To Whom It May Concern,

We, Shenzhen Friendcom Technology Development Co., Ltd., hereby declare that we have a product named as FC-302 Data Radio (Model number: FC-302 U2) was tested by BACL, meanwhile, for our marketing purpose, we would like to list a series models (FC-302 U2-SI) on reports and certificate, all the models are identical schematics, just the interface is different. The interface of FC-302 U2 is DB9 and the interface of FC-302 U2-SI is DB15.

No other changes are made to them.

We confirm that all information above is true, and we'll be responsible for all the consequences. Please contact me if you have any question.

Signature:

Tony Cai 
General Manager

***** END OF REPORT *****