



FCC PART 15.245

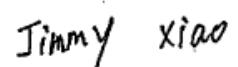
MEASUREMENT AND TEST REPORT

For

Hytronik Electronics Co., Ltd.

Block A6, Haosi Linpo Keng Ind.Park Shajing Town Bao'an District Shenzhen P.R.C

FCC ID: OZ3HFM-01

Report Type: Original Report	Product Type: HF-MODULE
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Report Number: <u>RSZ131211005-00</u>	
Report Date: <u>2013-12-31</u>	
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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 *Hytronik Electronics Co., Ltd.*'s product, model *HFM-01 (FCC ID: OZ3HFM-01)*, or the "EUT" as referred to in this report is a *HF-MODULE*, which was measured approximately: 3.15cm (L) x 2.18cm (W) x 0.71cm. Rated input voltage: DC 5V.

**All measurement and test data in this report was gathered from production sample serial number: 1312052 (Assigned by the BACL, Shenzhen). The EUT supplied by applicant was received on 2013-12-11.*

Objective

This report is prepared on behalf of *Hytronik Electronics Co., Ltd.* in accordance with Part 2-Subpart J, and Part 15-Subparts A, B and C of the Federal Communication Commissions rules.

The tests were performed in order to determine the compliance of EUT with FCC Part 15, Subpart C, section 15.203, 15.205, 15.207, 15.209 and 15.245 rules.

Related Submittal(s)/Grant(s)

No related submittal (s).

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2009, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All emissions measurement was performed at 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 December 06, 2010. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2009.

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

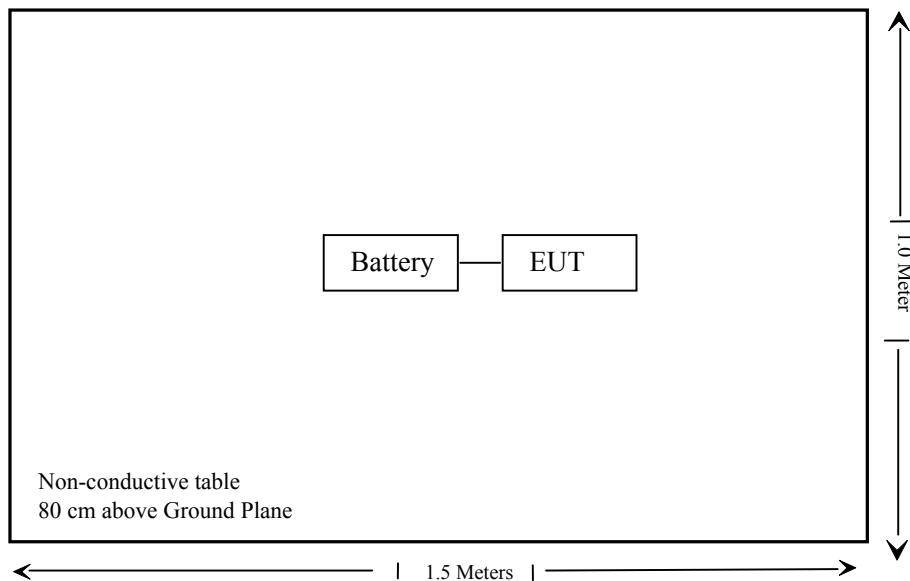
Justification

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

Equipment Modifications

No modification was made to the EUT tested.

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliance
§15.207(a)	Conducted Emissions	Not Applicable
15.205, §15.209, §15.245(b)	Radiated Emissions	Compliance

FCC§15.203 - ANTENNA REQUIREMENT

Applicable Standard

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used.

Antenna Connector Construction

The EUT has an integral flat antenna, which was permanently attached and the antenna gain is 2.58 dBi, fulfill the requirement of this section. Please refer to the internal photos.

Result: Compliant, Please refer to the EUT photos.

FCC§15.205, §15.209&§15.245(b) - RADIATED EMISSIONS**Applicable Standard**

As per FCC§15.245 (b), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency (MHz)	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (millivolts/meter)
902–928	500	1.6
2435–2465	500	1.6
5785–5815	500	1.6
10500–10550	2500	25.0
24075–24175	2500	25.0

(1) Regardless of the limits shown in the above table, harmonic emissions in the restricted bands below 17.7 GHz, as specified in §15.205, shall not exceed the field strength limits shown in §15.209. Harmonic emissions in the restricted bands at and above 17.7 GHz shall not exceed the following field strength limits:

(i) For the second and third harmonics of field disturbance sensors operating in the 24075–24175 MHz band and for other field disturbance sensors designed for use only within a building or to open building doors, 25.0 mV/m.

(ii) For all other field disturbance sensors, 7.5 mV/m.

(iii) Field disturbance sensors designed to be used in motor vehicles or aircraft must include features to prevent continuous operation unless their emissions in the restricted bands, other than the second and third harmonics from devices operating in the 24075–24175 MHz band, fully comply with the limits given in §15.209. Continuous operation of field disturbance sensors designed to be used in farm equipment, vehicles such as fork lifts that are intended primarily for use indoors or for very specialized operations, or railroad locomotives, railroad cars and other equipment which travels on fixed tracks is permitted. A field disturbance sensor will be considered not to be operating in a continuous mode if its operation is limited to specific activities of limited duration (e.g., putting a vehicle into reverse gear, activating a turn signal, etc.).

(2) Field strength limits are specified at a distance of 3 meters.

(3) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

(4) The emission limits shown above are based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply.

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

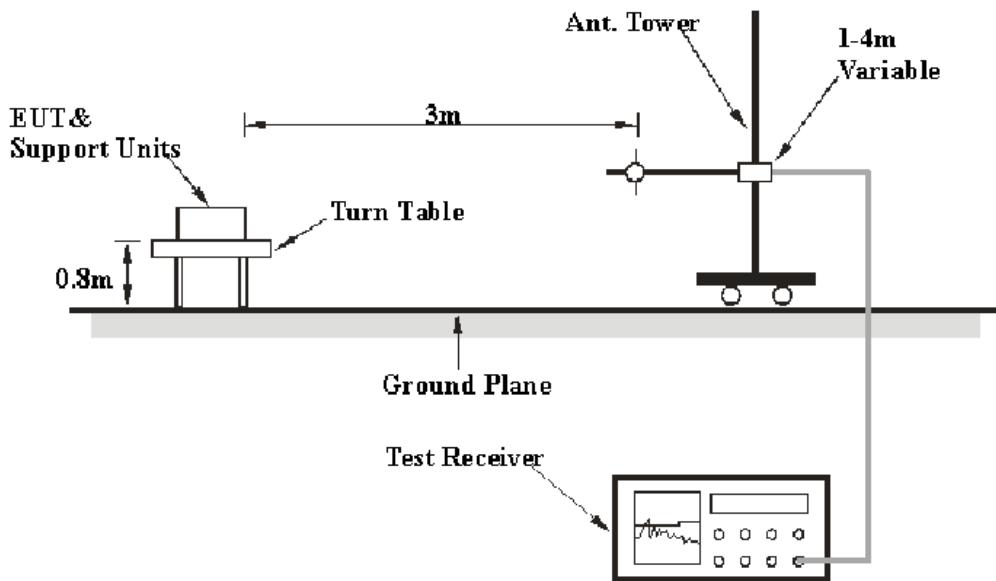
Test Equipment Setup

The system was investigated from 30 MHz to 40 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30 MHz – 1000 MHz	100 kHz	300 kHz	120kHz	QP
Above 1 GHz	1 MHz	3 MHz	/	PK
	1 MHz	10 Hz	/	Ave.

EUT Setup



The radiated emission and out of band emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.4-2009. The specification used was the FCC 15.209 /205 and FCC 15.245 limits.

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

The EUT is set 3 meter away from the testing antenna, which is varied from 1-4 meter, and the EUT is placed on a turntable, which is 0.8 meter above ground plane, the table shall be rotated for 360 degrees to find out the highest emission. The receiving antenna should be changed the polarization both of horizontal and vertical.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\begin{aligned}\text{Corrected Amplitude} &= \text{Meter Reading} + \text{Correction Factor} \\ \text{Correction Factor} &= \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}\end{aligned}$$

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	8447E	1937A01046	2013-09-30	2014-09-30
Rohde & Schwarz	EMI Test Receiver	ESCI	101122	2013-09-17	2014-09-17
Sunol Sciences	Broadband Antenna	JB1	A040904-2	2011-11-28	2014-11-27
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2013-04-03	2014-04-03
Sunol Sciences	Horn Antenna	DRH-118	A052304	2011-12-01	2014-11-30
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2013-11-12	2014-11-12
the electro-Mechanics Co.	Horn Antenna	3116	9510-2270	2013-10-14	2016-10-13
Rohde & Schwarz	Auto test Software	EMC32	V9.10	--	--
DUCOMMUN	Pre-amplifier	ALN-22093530-01	991373-01	2013-08-03	2014-08-03

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

Test Results Summary

According to the data in the following table, the EUT complied with the FCC Part 15.209, 15.205 & 15.245, with the worst margin reading of:

9.92 dB at 11584 MHz in the **Horizontal** polarization

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level is in compliance with the limit if

$$L_m + + U_{(Lm)} \leq L_{\lim} + + U_{\text{cisp}} \quad (1)$$

in BACL., $U_{(Lm)}$ is less than $+ U_{\text{cisp}}$, if L_m is less than L_{\lim} , it implies that the EUT complies with the limit.

Test Data

Environmental Conditions

Temperature:	24 °C
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by Mike Hu on 2013-12-16.

Test Mode: Transmitting

30 MHz -40 GHz:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dB μ V/m)	FCC Part 15.245/205/209		Remark
	Reading (dB μ V)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dB μ V/m)	Margin (dB)	
235.1	42.79	QP	185	1.4	V	-15.4	27.39	46	18.61	Spurious
5790.2	78.01	PK	206	1.3	H	13.87	91.88	134	42.12	Fundamental
5790.2	64.31	Ave.	206	1.3	H	13.87	78.18	114	35.82	Fundamental
5790.2	76.12	PK	22	1.3	V	13.87	89.99	134	44.01	Fundamental
5790.2	62.04	Ave.	22	1.3	V	13.87	75.91	114	38.09	Fundamental
1235.2	41.62	PK	208	1.2	V	0.16	41.78	74	32.22	Spurious
1235.2	26.94	Ave.	208	1.2	V	0.16	27.10	54	26.90	Spurious
1593.1	39.86	PK	214	1.3	H	1.70	41.56	74	32.44	Spurious
1593.1	24.18	Ave.	214	1.3	H	1.70	25.88	54	28.12	Spurious
2385.6	37.24	PK	321	1.5	V	6.13	43.37	74	30.63	Spurious
2385.6	22.26	Ave.	321	1.5	V	6.13	28.39	54	25.61	Spurious
2491.5	34.62	PK	246	1.4	H	7.21	41.83	74	32.17	Spurious
2491.5	22.15	Ave.	246	1.4	H	7.21	29.36	54	24.64	Spurious
4886.2	36.12	PK	88	1.2	V	12.46	48.58	74	25.42	Spurious
4886.2	23.10	Ave.	88	1.2	V	12.46	35.56	54	18.44	Spurious
11584.0	35.66	PK	124	1.3	H	20.41	56.07	74	17.93	Harmonics
11584.0	23.67	Ave.	124	1.3	H	20.41	44.08	54	9.92	Harmonics

FCC §15.215(c) – 20 dB EMISSION BANDWIDTH

Applicable Standard

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

The EUT is set 3 meter away from the testing antenna, which is varied from 1-4 meter, and the EUT is placed on a turntable, which is 0.8 meter above ground plane, the table shall be rotated for 360 degrees to find out the highest emission. The receiving antenna should be changed the polarization both of horizontal and vertical.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
TDK	Chamber	Chamber B	1#	2011-07-23	2014-07-22
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2013-04-03	2014-04-03
BIZI	Signal Analyser	FSIQ26	8386001028	2013-11-12	2014-11-12
A.H.System	Horn Antenna	SAS-200/571	135	2012-02-11	2015-02-10

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Test Data

Environmental Conditions

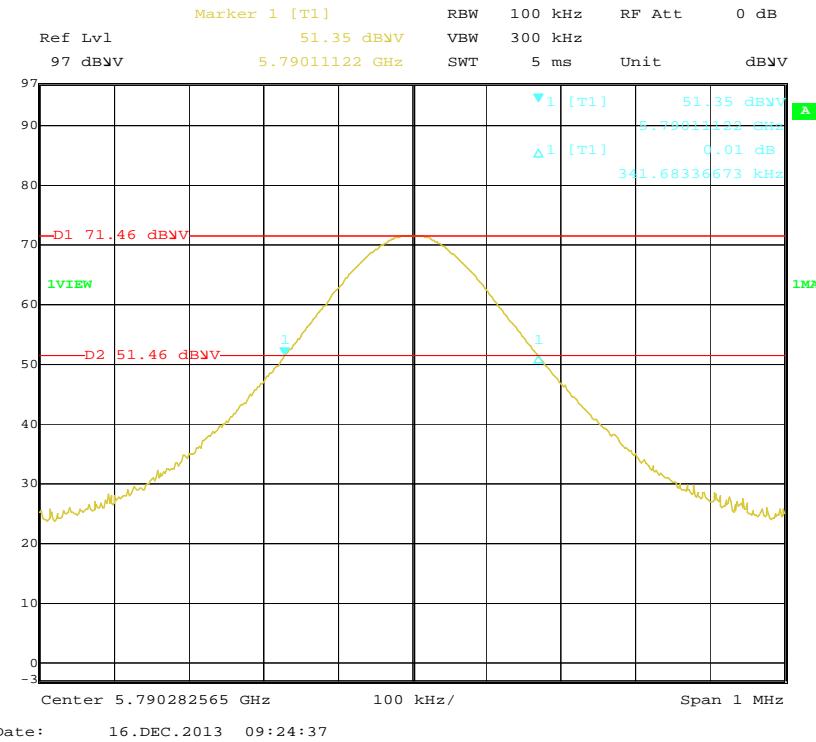
Temperature:	24 °C
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by Mike Hu on 2013-12-16.

EUT operation mode: Transmitting

Test Result: Compliance. Please refer to following tables and plots

Center Frequency (MHz)	20 dB Bandwidth (MHz)
5790.2	0.342



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