

# **FCC Radio Test Report**

# FCC ID: XHM-J690111

This report concerns (check one): ⊠Original Grant □Class II Change

Project No. : 1510114 Equipment : POS Model Name : J2 690

**Applicant**: FLYTECH Technology Co., Ltd.

Address: 1F, No. 168, Sing-Ai Rd., NeiHu District 11494,

Taipei, Taiwan

Date of Receipt : Oct. 13, 2015

**Date of Test** : Oct. 13, 2015 ~ Feb. 26, 2016

Issued Date : Feb. 29, 2016 Tested by : BTL Inc.

**Testing Engineer** 

(Rush Kao)

Technical Manager

(Jeff Yang)

**Authorized Signatory** 

# BTL INC.

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#### **Declaration**

**BTL** represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with standards traceable to international standard(s) and/or national standard(s).

**BTL**'s reports apply only to the specific samples tested under conditions. It is manufacture's responsibility to ensure that additional production units of this model are manufactured with the identical electrical and mechanical components. **BTL** shall have no liability for any declarations, inferences or generalizations drawn by the client or others from **BTL** issued reports.

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**BTL**'s laboratory quality assurance procedures are in compliance with the **ISO Guide 17025** requirements, and accredited by the conformity assessment authorities listed in this test report.

#### Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

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# **REPORT ISSUED HISTORY**

Issue No.	Description	Issued Date
BTL-FCCP-2-1510114	Original Issue.	Feb. 29, 2015

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#### 1 CERTIFICATION

Equipment : POS
Brand Name : FLYTECH
Model Name : J2 690

Applicant : FLYTECH Technology Co., Ltd. Manufacturer : FLYTECH Technology Co., Ltd.

Address : 1F, No. 168, Sing-Ai Rd., NeiHu District 11494, Taipei, Taiwan

Factory: FLYTECH TECHNOLOGY CO., LTD.

Address : No.36 Huaya 3<sup>rd</sup> Rd., Guishan Township, Taoyuan Country 33383, Taiwan

Date of Test : Oct. 13, 2015 ~ Feb. 26, 2016

Test Sample: Engineering Sample

Standards : FCC Part 15, Subpart C (15.225)

ANSI C63.10-2013

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.

The test data, data evaluation, and equipment configuration contained in our test report (Ref No. BTL-FCCP-2-1510114) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of TAF according to the ISO-17025 quality assessment standard and technical standard(s).

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## **2 SUMMARY OF TEST RESULTS**

Test procedures according to the technical standards:

Standard Section	Test Item	Result
15.207	Conducted emission	PASS
15.35 / 15.205 / 15.209 / 15.225	Radiated emission	PASS
15.225(e)	Frequency Stability	PASS
15.203	Antenna Requirement	PASS

NOTE:

1. N/A: denotes test is not applicable in this test report

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#### 2.1 TEST FACILITY

The test facilities used to collect the test data in this report:

#### **Conducted emission Test:**

C05: (VCCI RN: C-4742; FCC RN:965108; FCC DN:TW1082)

No. 68-1, Ln. 169, Sec.2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan

#### **Radiated emission Test:**

**CB11:** (VCCI RN: R-4260)

No. 68-1, Ln. 169, Sec.2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan

#### 2.2 MEASUREMENT UNCERTAINTY

# The measurement uncertainty is not specified by FCC/Industry Canada rules and for reference only.

The reported uncertainty of measurement  $\mathbf{y} \pm \mathbf{U}$ , where expanded uncertainty  $\mathbf{U}$  is based on a standard uncertainty multiplied by a coverage factor of  $\mathbf{k=2}$ , providing a level of confidence of approximately 95%.

The measurement instrumentation uncertainty considerations contained in CISPR 16-4-2.

The BTL measurement uncertainty is less than the CISPR 16-4-2 Ucispr requirement.

#### A. Conducted emission test:

Test Site	Method	Measurement Frequency Range	U, (dB)
C05	CISPR	150 kHz~30MHz	2.04

#### B. Radiated emission test:

Test Site	Method	Measurement Frequency Range	Ant. H / V	U, (dB)
		30 MHz ~ 200 MHz	V	3.06
CB11	CISPR	30 MHz ~ 200 MHz	Н	2.58
(3m)	CISPR	200 MHz ~ 1, 000 MHz	V	3.50
		200 MHz ~ 1, 000 MHz	Н	3.10

Our calculated Measurement Instrumentation Uncertainty is shown in the tables above. These are our  $U_{lab}$  values in CISPR 16-4-2 terminology.

Since Table 1 of CISPR 16-4-2 has values of measurement instrumentation uncertainty, called U<sub>CISPR</sub>, as follows:

Conducted Disturbance (mains port) - 150 kHz - 30 MHz: 3.6 dB

Radiated Disturbance (electric field strength on an open area test site or alternative test site) – 30 MHz - 1000 MHz: 5.2 dB

It can be seen that our  $U_{\text{lab}}$  values are smaller than  $U_{\text{CISPR}}$ .

Note: Unless specifically mentioned, the uncertainty of measurement has not been taken into account to declare the compliance or non-compliance to the specification.

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# **3 GENERAL INFORMATION**

#### 3.1 GENERAL DESCRIPTION OF EUT

Equipment	POS		
Brand Name	FLYTECH		
Model Name	J2 690		
Model Difference	N/A		
Broduct Description	Operation Frequency	13.56MHz	
Product Description	Antenna Designation	LOOP Antenna	
Power Source	DC voltage supplied from External Power Supply.		
Power Rating	I/P: 100-240V~50-60Hz, 2A O/P: 19V6.32A		
2 * Mother Board: D92(Q87) & D92(H81) 1 * CPU: Intel, Haswell i5-4590S 3.0G/Cache 6M 1 * Panel: 15" 2 * 2nd Display: (1) 10.1", (2) 14" 1 * HDD: 2.5" 1 * External Power Supply: Chicony / A11-120P1A		.ùG/Cache 6M	

#### Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

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#### 3.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	13.56MHz Transmit

Conducted emission test			
Final Test Mode	Description		
Mode 1	13.56MHz Transmit		

Radiated emission test			
Final Test Mode	Description		
Mode 1	13.56MHz Transmit		

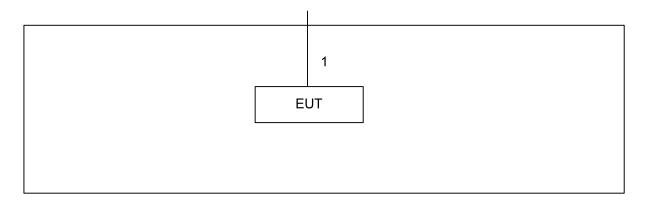
Frequency Stability test			
Final Test Mode	Description		
Mode 1	13.56MHz Transmit		

Antenna Requirement test							
Final Test Mode	I Test Mode Description						
Mode 1	13.56MHz Transmit						

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#### 3.3 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



#### 3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.
-	-	-	-	-	-

Item	Shielded Type	Ferrite Core	Length	Note
1	NO	NO	1.5m	Power Line

Note:

(1) The support equipment was authorized by Declaration of Conformity (DOC).

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#### 4 CONDUCTED EMISSION

#### 4.1 LIMITS

FREQUENCY	(dBuV)				
(MHz)	Quasi-peak	Average			
0.15 - 0.5	66 - 56 *	56 - 46 *			
0.50 - 5.0	56.00	46.00			
5.0 - 30.0	60.00	50.00			

#### NOTE:

- 1. The tighter limit applies at the band edges.
- 2. The limit of " \* " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.
- The test result calculated as following:
   Measurement Value = Reading Level + Correct Factor
   Correct Factor = Insertion Loss + Cable Loss + Attenuator Factor(if use)
   Margin Level = Measurement Value Limit Value

#### **4.2 TEST PROCEDURES**

- a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- d. LISN at least 80 cm from nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

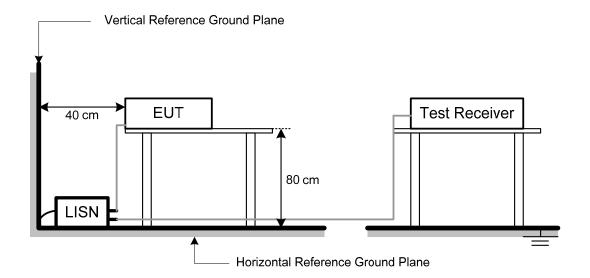
#### NOTE:

- a. Reading in which marked as Peak, QP or AVG means measurements by using are Quasi-Peak or Average Mode with Detector BW=9 kHz (6 dB Bandwidth).
- b. All readings are Peak Mode value unless otherwise stated QP or AVG in column of Note. If the Peak or QP Mode Measured value compliance with the QP Limits and lower than AVG Limits, the EUT shall be deemed to meet both QP & AVG Limits and then only Peak or QP Mode was measured, but AVG Mode didn't perform.

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#### 4.3 TEST SETUP LAYOUT



#### 4.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.5 EUT OPERATING CONDITIONS

The EUT used during radiated and/or conducted emission measurement was designed to exercise in a manner similar to a typical use.

#### 4.6 EUT TEST CONDITIONS

Temperature: 25°C Relative Humidity: 54% Test Voltage: AC 120V/60Hz

#### 4.7 TEST RESULTS

Please refer to the Attachment A.

#### Remark:

- (1) All readings are QP Mode value unless otherwise stated AVG in column of <code>『Note』</code>. If the QP Mode Measured value compliance with the QP Limits and lower than AVG Limits, the EUT shall be deemed to meet both QP & AVG Limits and then only QP Mode was measured, but AVG Mode didn't perform in this case, a "\*" marked in AVG Mode column of Interference Voltage Measured.
- (2) Measuring frequency range from 150KHz to 30MHz.

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#### **5 RADIATED EMISSION**

#### 5.1 LIMITS

	FCC Part 15.209							
Frequency	Field Strength Limitation		Field Strength Limitation at 3m Measurement Dist					
(MHz)	(uV/m)	Dist	(uV/m)	(dBuV/m)				
0.009 - 0.490	2400 / F(KHz)	300m	10000 * 2400/F(KHz)	20log 2400/F(KHz) + 80				
0.490 - 1.705	24000 / F(KHz)	30m	100 * 24000/F(KHz)	20log 24000/F(KHz) + 40				
1.705 – 30.00	30 30m		100* 30	20log 30 + 40				
30.0 – 88.0	100	3m	100	20log 100				
88.0 – 216.0	88.0 – 216.0 150		150	20log 150				
216.0 – 960.0	0 200 3		200	20log 200				
Above 960.0	500	3m	500	20log 500				
		FCC P	art 15.225(a)/(b)/(c)					
Frequency	Field Streng Limitation		Field Strength Limitatio	n at 3m Measurement Dist				
(MHz)	(uV/m)	Dist	(uV/m)	(dBuV/m)				
13.553 – 13.567	13.553 – 13.567 15,848 30 n		15,848*100	124				
13.567 – 13.710	334	30 m	334*100	90.5				
13.110 – 13.410 13.710 – 14.010 106 30 m		106*100	80.5					

#### NOTE:

- (1) The tighter limit shall apply at the boundary between two frequency range.
- (2) Limitation expressed in dBuV/m is calculated by 20log Emission Level (uV/m).
- (3) If measurement is made at 3m distance, then F.S Limitation at 3m distance is adjusted by using the formula of  $L_{d1} = L_{d2} * (d_2/d_1)^2$ .

### Example:

F.S Limit at 30m distance is 30uV/m , then F.S Limitation at 3m distance is adjusted as  $L_{d1}=L_{1}=30uV/m$  \*  $(10)^{2}=100$  \* 30 uV/m

(4) The test result calculated as following:

Measurement Value = Reading Level + Correct Factor

Correct Factor = Insertion Loss + Cable Loss + Attenuator Factor(if use)

Margin Level = Measurement Value - Limit Value

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#### **5.2 TEST PROCEDURE**

- a. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
- b. The height of the equipment or of the substitution antenna shall be 0.8 m or 1.5m, the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- c. The initial step in collecting radiated emission data is a receiver peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- d. All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform. (below 1GHz)
- e. For the actual test configuration, please refer to the related Item -EUT Test Photos.

#### **NOTE: (FCC PART 15.209)**

- a. Reading in which marked as QP or Peak means measurements by using are Quasi-Peak Mode with Detector BW=120 kHz.
- b. All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.

#### **NOTE: (FCC PART 15.225)**

- a. Spectrum Setting:
  - 9 KHz 150 KHz, RBW= 200Hz, VBW=200Hz, Sweep time = 200 ms.
  - 150 K Hz -30 MHz, RBW= 10 KHz, VBW=10 KHz, Sweep time = 200 ms.
  - 30 MHz 1000 MHz, RBW= 100KHz, VBW=100KHz, Sweep time = 200 ms.
- b. All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.
- c. The Log-Bicon Antenna will use to test frequency range from 30MHz to 1000MHz and the Loop Antenna will use to test frequency below 30MHz.

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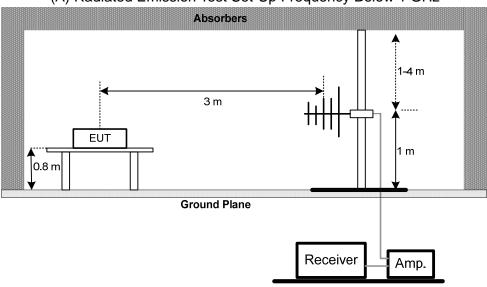


#### 5.3 DEVIATION FROM TEST STANDARD

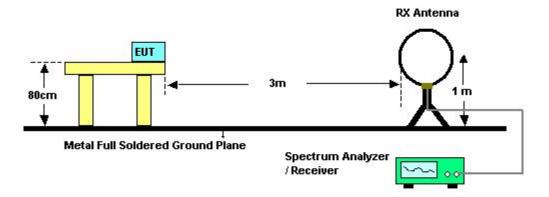
No deviation

#### 5.4 TEST SETUP

(A) Radiated Emission Test Set-Up Frequency Below 1 GHz



(B) For radiated emissions below 30MHz



#### 5.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of **4.5** unless otherwise a special operating condition is specified in the follows during the testing.

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### **5.6 EUT TEST CONDITIONS**

Temperature: 25°C Relative Humidity: 45% Test Voltage: AC 120V/60Hz

5.7 TEST RESULTS (BELOW 30MHZ) - FCC PART 15.209

Please refer to the Attachment B.

5.8 TEST RESULTS - (30-1000MHZ) - FCC PART 15.209

Please refer to the Attachment C.

5.9 TEST RESULTS- FCC PART 15.225

Please refer to the Attachment D.

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#### **6 FREQUENCY STABILITY**

#### 6.1 LIMITS

#### FCC Part 15.225(e)

The frequency tolerance of the carrier signal shall be maintained within +/-0.01% of the operating frequency over a temperature variation of - 20 degrees to + 50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.

For battery operated equipment, the equipment tests shall be performed using a new battery.

#### **6.2 TEST PROCEDURE**

- a. The equipment under test was connected to an external AC power supply and the RF output was connected to a frequency counter via feed through attenuators. The EUT was placed inside the temperature chamber.
  - After the temperature stabilized for approximately 20 minutes, the frequency of the output signal was recorded from the counter.
- b. At room temperature (25±5°C), an external variable AC power supply was connected to the EUT. The frequency of the transmitter was measured for 115%, 100% and 85% of the nominal operating input voltage.

#### 6.3 DEVIATION FROM TEST STANDARD

No deviation

#### **6.4 EUT OPERATING CONDITIONS**

The EUT tested system was configured as the statements of **4.5.** unless otherwise a special operating condition is specified in the follows during the testing.

#### **6.5 EUT TEST CONDITIONS**

Temperature: 25°C Relative Humidity: 45% Test Voltage: AC 120V/60Hz

#### 6.6 TEST RESULTS

Please refer to the Attachment E.

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## 7. MEASUREMENT INSTRUMENTS LIST

	Conducted Emission Measurement								
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until				
1	TWO-LINE V-NETWORK	R&S	ENV216	101050	Jan. 01, 2017				
2	Test Cable	TIMES	CFD300-NL	C05	Jun. 14, 2016				
3	EMI Test Receiver	R&S	ESR3	101854	Dec. 10, 2016				
4	Measurement Software	EZ	EZ_EMC (Version NB-03A)	N/A	N/A				

	Radiated Emission Measurement								
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until				
1	Spectrum Analyzer	Agilent	N9038A	MY51210215	Jun. 07, 2016				
2	Microwave Pre_amplifier	HP	8447D	2944A08891	Mar. 08, 2016				
3	Test Cable	EMCI	EMC8D-NM-N M-8000	150301	Mar. 08, 2016				
4	Test Cable	EMCI	EMC8D-NM-N M-2500	150303	Mar. 08, 2016				
5	Test Cable	EMCI	EMC8D-NM-N M-1000	150304	Mar. 08, 2016				
6	Trilog-Broadband Antenna	Schwarzbeck	VULB9168	9168-364	Feb. 03, 2017				
7	Loop Antenna	EMCO	6502	00042960	Nov. 15. 2016				

	Frequency Stability Measurement							
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until			
1	Spectrum Analyzer	R&S	FSP-40	100129	Jan. 17, 2017			

Remark: "N/A" denotes no model name, serial no. or calibration specified.

All calibration period of equipment list is one year.

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## **8 EUT TEST PHOTO**

# Conducted emission test photos

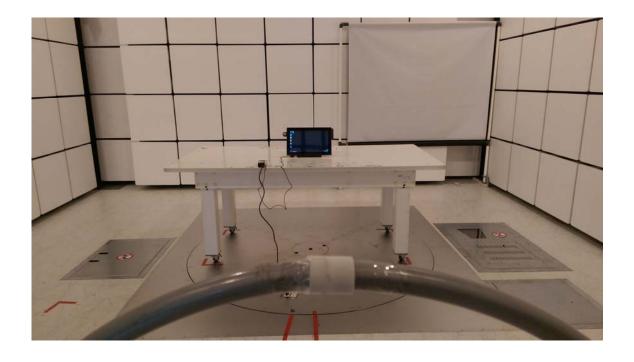


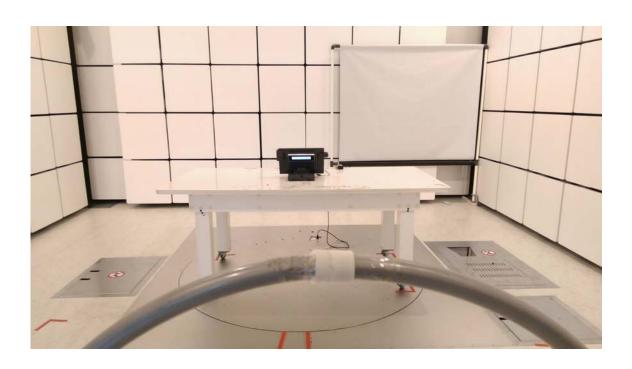


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# Radiated emission test photos 9KHz to 30MHz

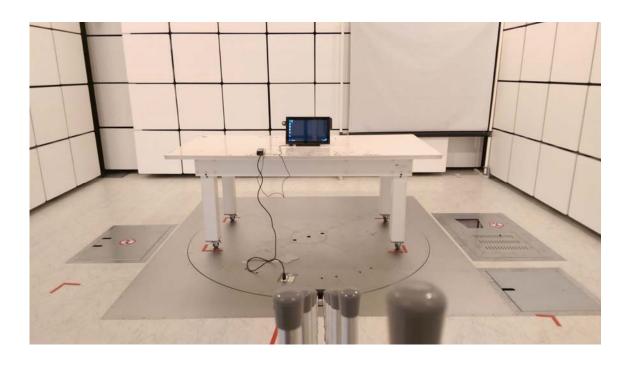


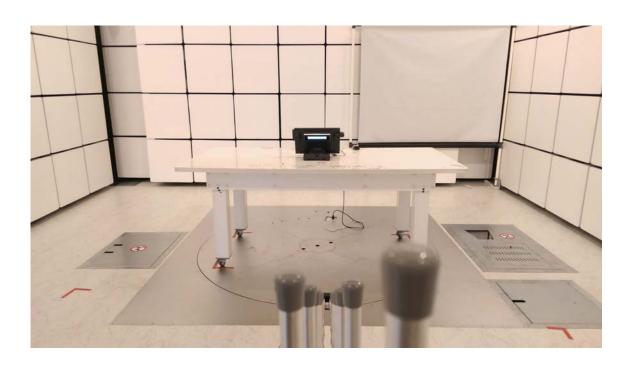


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# Radiated emission test photos 30MHz to 1000MHz





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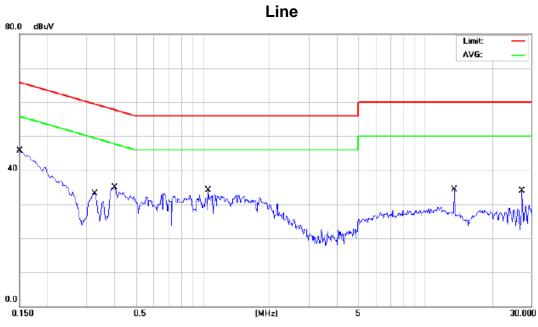


ATTACHMENT A - CONDUCTED EMISSION

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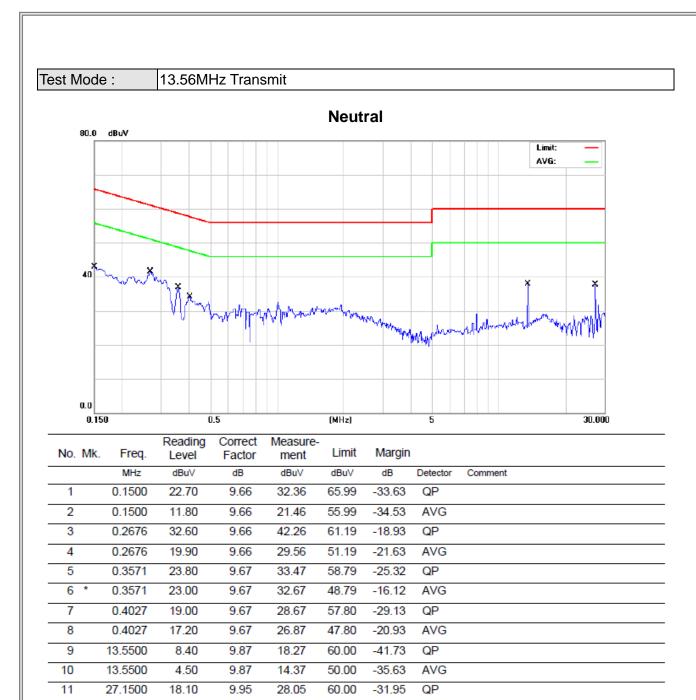




No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin		
		MHz	dBu∀	dB	dBu∀	dBu∀	dB	Detector	Comment
1		0.1500	26.50	9.67	36.17	65.99	-29.82	QP	
2		0.1500	17.90	9.67	27.57	55.99	-28.42	AVG	
3		0.3257	19.50	9.66	29.16	59.56	-30.40	QP	
4		0.3257	17.70	9.66	27.36	49.56	-22.20	AVG	
5		0.4013	23.70	9.66	33.36	57.83	-24.47	QP	
6		0.4013	11.40	9.66	21.06	47.83	-26.77	AVG	
7		1.0580	20.00	9.70	29.70	56.00	-26.30	QP	
8	*	1.0580	14.80	9.70	24.50	46.00	-21.50	AVG	
9		13.5500	20.50	9.87	30.37	60.00	-29.63	QP	
10		13.5500	8.00	9.87	17.87	50.00	-32.13	AVG	
11		27.1500	14.00	9.91	23.91	60.00	-36.09	QP	
12		27.1500	13.10	9.91	23.01	50.00	-26.99	AVG	

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12

27.1500

11.90

9.95

21.85

50.00

-28.15

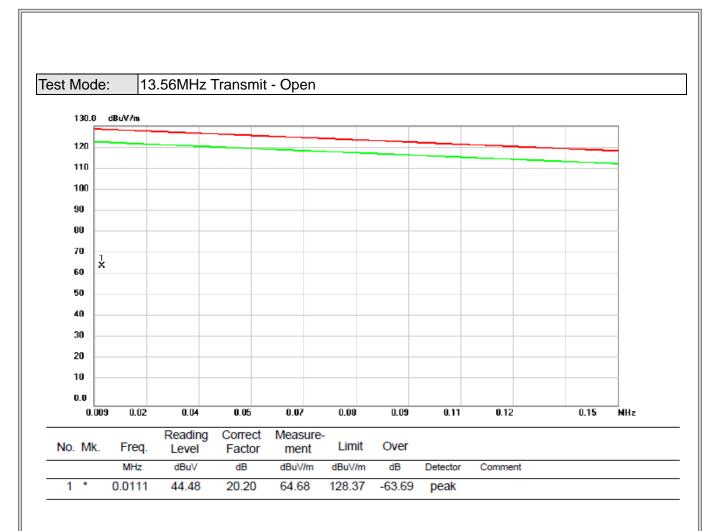
AVG



ATTACHMENT B - RADIATED EMISSION (9KHZ-30MHZ)

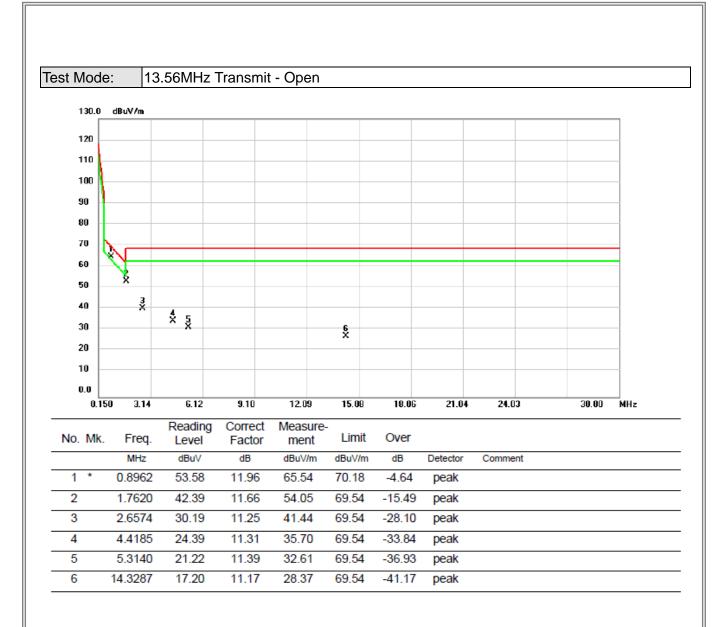
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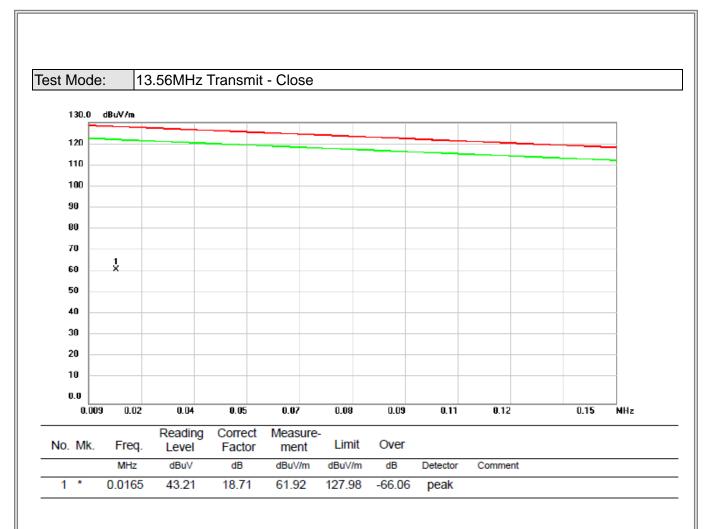


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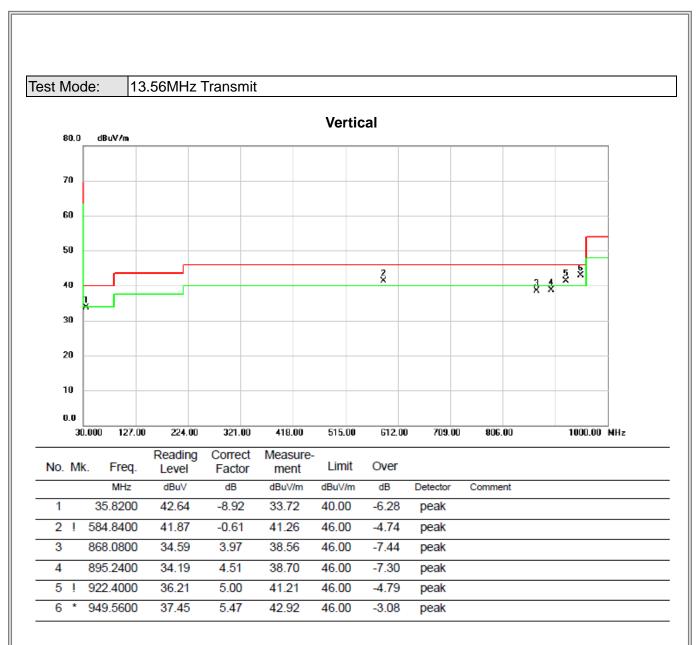




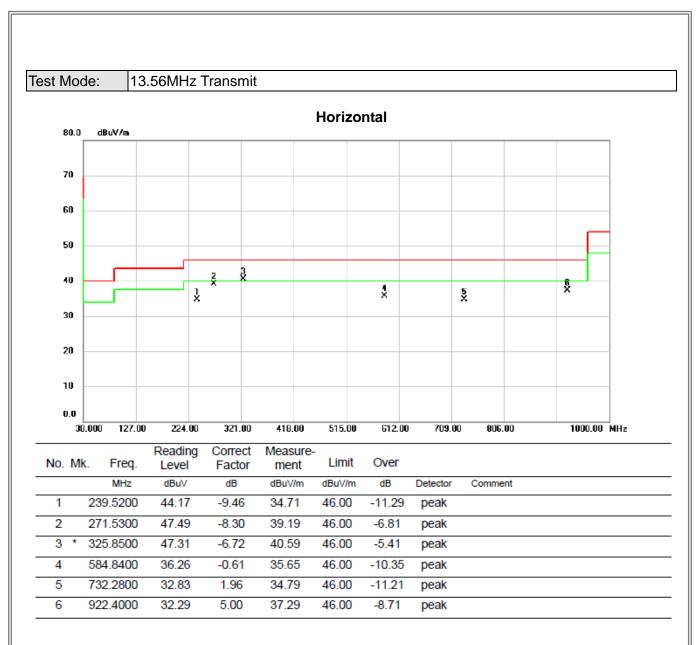
A	TTACHMENT C - RADIATED EMISSION (30MHZ TO 1000MHZ)

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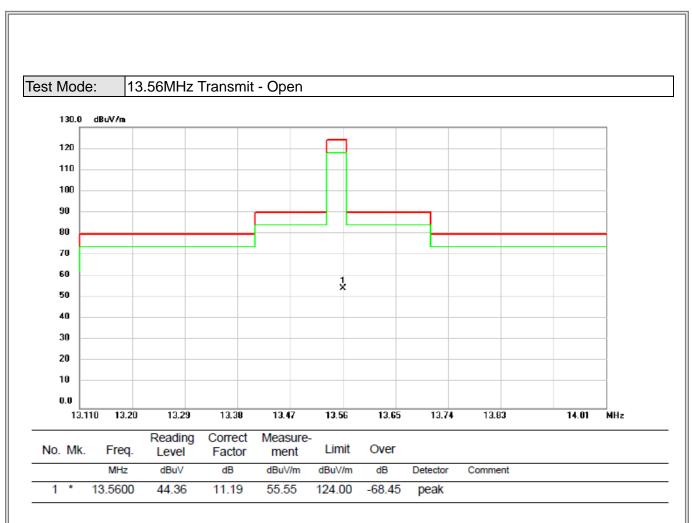
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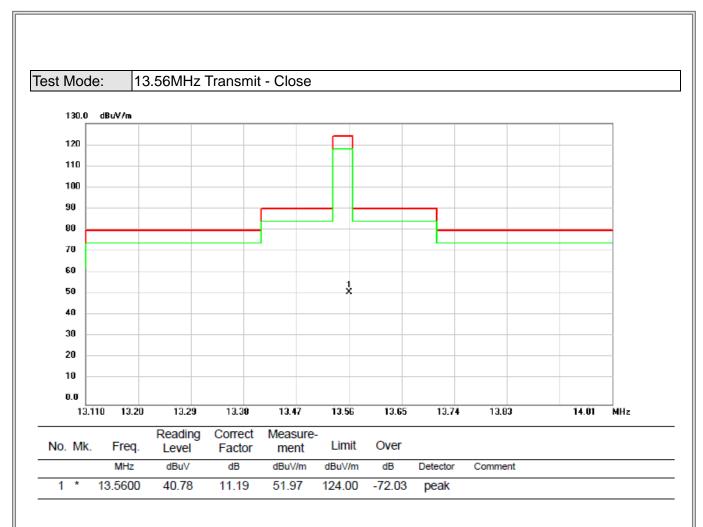
ATTACHMENT D - RADIATED EMISSION (FCC PART 15.225)		

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ATTACHMENT E - FREQUENCY STABILITY MEASUREMENT		

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Test Mode: 13.56MHz Transmit

# Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)
(V)	13.560000
126.5	13.560100
110	13.560110
93.5	13.560120
Max. Deviation (MHz)	0.000120
Max. Deviation (ppm)	8.85

# Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)
(℃)	13.560000
-20	13.560010
-10	13.560012
0	13.560010
10	13.560008
20	13.560006
30	13.560002
40	13.560004
50	13.560003
55	13.560001
Max. Deviation (MHz)	0.000012
Max. Deviation (ppm)	0.88

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