FCC Test Report

Equipment	**:**	**3010DADA**
Brand Name	**:**	**JET**
Model No.	**:**	**KA0000N001**
FCC ID	**:**	**Z3K3010DABOX02**
Standard	**:**	**47 CFR FCC Part 15.239**
Operating Band	**:**	**88 MHz – 108 MHz**
FCC Classification	**:**	**DXX**
Applicant Manufacturer	**:**	**JET OPTOELECTRONICS CO.,LTD.** 3F.,No.300,Yangguang St.,Neihu Dist., Taipei City 11491,Taiwan,R.O.C

The product sample received on Aug. 03, 2015 and completely tested on Aug. 16, 2015. We, SPORTON, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by:

Vic Hsiao / Supervisor

Testing Laboratory
1190

Table of Contents

Summary of Test Result

Conformance Test Specifications					
Report Clause	**Ref. Std. Clause**	**Description**	**Measured**	**Limit**	**Result**
1.1.2	15.203	Antenna Requirement	Antenna connector mechanism complied	FCC 15.203	Complied
3.1	15.207	AC Power-line Conducted Emissions	-	FCC 15.207	NA
3.2	15.239(b)	Fundamental Emissions	[dBuV/m at 3m]: 47.00 (Margin 1.00dB) average	[dBuV/m at 3m]: average: 48	Complied
3.3	15.239(a)	20dB Bandwidth	51.66 kHz	≤ 200 kHz	Complied
3.4	15.239(c)	Transmitter Unwanted Emissions	[dBuV/m at 3m]:441.500kHz 38.13(Margin7.87dB) - PK	FCC 15.209	Complied

Revision History

Report No.	Version	Description	Issued Date
FR580311	Rev. 01	Initial issue of report	Sep. 10, 2015

1 General Description

1.1 Information

1.1.1 RF General Information

RF General Information				
Frequency Range (MHz)	**Ch. Frequency (MHz)**	**Modulation Mode**	**Channel Number**	**Fundamental Field Strength (dBuV/m)**
88 - 108	88.3 - 107.7	FM	98	47.00
Note 1: Field strength performed average level at 3m. Note 2: A Carrier frequency is 0.2 MHz per a channel.				

1.1.2 Antenna Information

Antenna Category	
☒	Integral antenna (antenna permanently attached)
☐	External antenna (dedicated antennas) ; Unique antenna connector

1.1.3 Type of EUT

Identify EUT	
EUT Serial Number	N/A
Presentation of Equipment	☒ Production ; ☐ Pre-Production ; ☐ Prototype
Type of EUT	
☒	Stand-alone
☐	Combined (EUT where the radio part is fully integrated within another device) Combined Equipment - Brand Name / Model No.: …
☐	Plug-in radio (EUT intended for a variety of host systems) Host System - Brand Name / Model No.: …
☐	Other:

1.1.4 Test Signal Duty Cycle

Operated Mode for Worst Duty Cycle	
☐ Operated normally hopping mode for worst duty cycle	
☒ Operated test mode for worst duty cycle	
Test Signal Duty Cycle (x)	**Power Duty Factor [dB] – (10 log 1/x)**
☒ 100% - test mode single channel	0.00

1.1.5 EUT Operational Condition

Supply Voltage	☐ AC mains	☒ DC	
Type of DC Source	☐ From Host System	☒ External DC Source	☐ Li-ion Battery

1.2 Accessories and Support Equipment

Accessories			
No.	**Equipment**	**Brand Name**	**Model Name**
1	FM Antenna	NA	NA

Reminder: Regarding to more detail and other information, please refer to user manual.

Support Equipment - RF Conducted			
No.	**Equipment**	**Brand Name**	**Model Name**
1	7"Monitor REV-LT	Invision	K9070N4032
2	7"Monitor REV-LT	Invision	K9070N4032

Note: The 7"Monitor REV-LT provide by customer.

Support Equipment - Radiated Emission			
No.	**Equipment**	**Brand Name**	**Model Name**
1	7"Monitor REV-LT	Invision	K9070N4032
2	DC Power Supply (Remote Workstation)	GW	GTC-6030D

Note: The 7"Monitor REV-LT provide by customer.

1.3 Testing Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- 47 CFR FCC Part 15
- ANSI C63.10-2013

1.4 Testing Location Information

Testing Location					
☒	HWA YA	ADD :	No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C.		
		TEL :	886-3-327-3456	FAX :	886-3-318-0055
Test Site Registration Number: FCC 636805					
Test Condition		**Test Site No.**		**Test Engineer**	**Test Environment**
RF Conducted		TH01-HY		Ian	22.5 °C / 65 %
Radiated Emission		03CH02-HY		Joe	22 °C / 63 %

1.5 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)

Measurement Uncertainty		
Test Item		**Uncertainty**
AC power-line conducted emissions		±2.2 dB
Emission bandwidth		±1.4 %
Unwanted emissions, conducted	9 – 150 kHz	±0.3 dB
	0.15 – 30 MHz	±0.4 dB
	30 – 1000 MHz	±0.5 dB
All emissions, radiated	9 – 150 kHz	±2.4 dB
	0.15 – 30 MHz	±2.2 dB
	30 – 1000 MHz	±2.5 dB
Temperature		±0.8 °C
Humidity		±3 %
DC and low frequency voltages		±3 %
Time		±1.4 %
Duty Cycle		±1.4 %

2 Test Configuration of EUT

2.1 The Worst Case Modulation Configuration

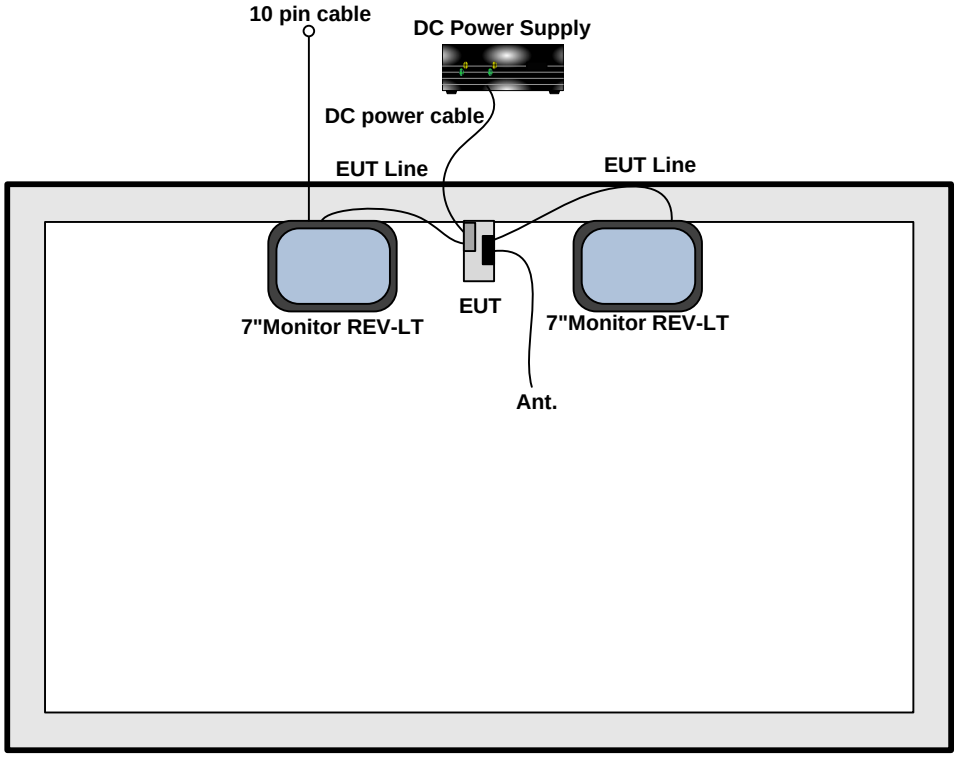
Modulation Used for Conformance Testing	
Test Mode	**Field Strength (dBuV/m at 3 m)**
FM-Transmit	47.00

2.2 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests	
Tests Item	Fundamental Emissions, Radiated Unwanted Emissions, Emission Bandwidth
Test Condition	Radiated measurement
User Position	☒ EUT will be placed in fixed position.
	☐ EUT will be placed in mobile position and operating multiple positions. EUT shall be performed three orthogonal planes.
	☐ EUT will be a hand-held or body-worn battery-powered devices and operating multiple positions.
Operating Mode	Transmit Mode
Test Mode	FM-Transmit
Orthogonal Planes of EUT	**X Plane**
	

2.3 Test Setup Diagram

Test Setup Diagram - Radiated Test (Below 1GHz)



3 Transmitter Test Result

3.1 AC Power-line Conducted Emissions

3.1.1 AC Power-line Conducted Emissions Limit

AC Power-line Conducted Emissions Limit		
Frequency Emission (MHz)	**Quasi-Peak**	**Average**
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50
Note 1: * Decreases with the logarithm of the frequency.		

3.1.2 Measuring Instruments

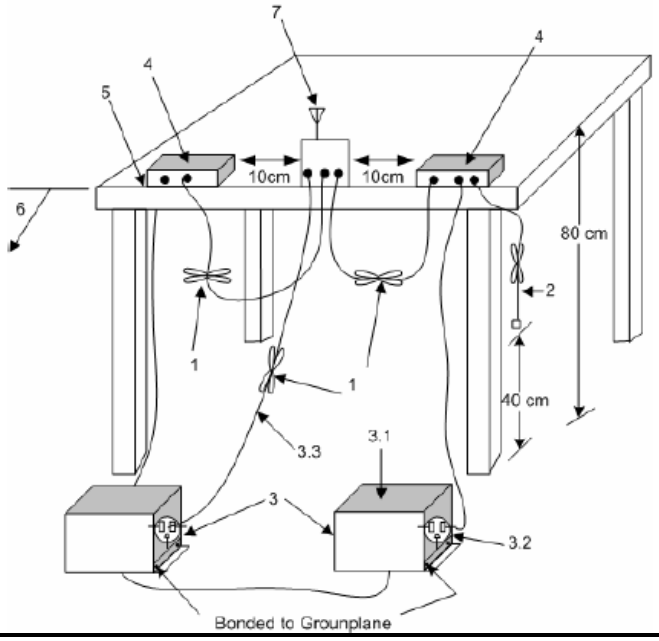
Refer a test equipment and calibration data table in this test report.

3.1.3 Test Procedures

Test Method
☒ Refer as ANSI C63.10-2013, clause 6.2 for AC power-line conducted emissions.

3.1.4 Test Setup

AC Power-line Conducted Emissions



3.1.5 Test Result of AC Power-line Conducted Emissions

The EUT is power by DC source so there is no need to do this test.

3.2 Fundamental Emissions Limit

Frequency Band (MHz)	Fundamental Emissions Limit (dBuV/m) at 3m
88~108	48 (Average)
88~108	68 (Peak)

3.2.1 Measuring Instruments

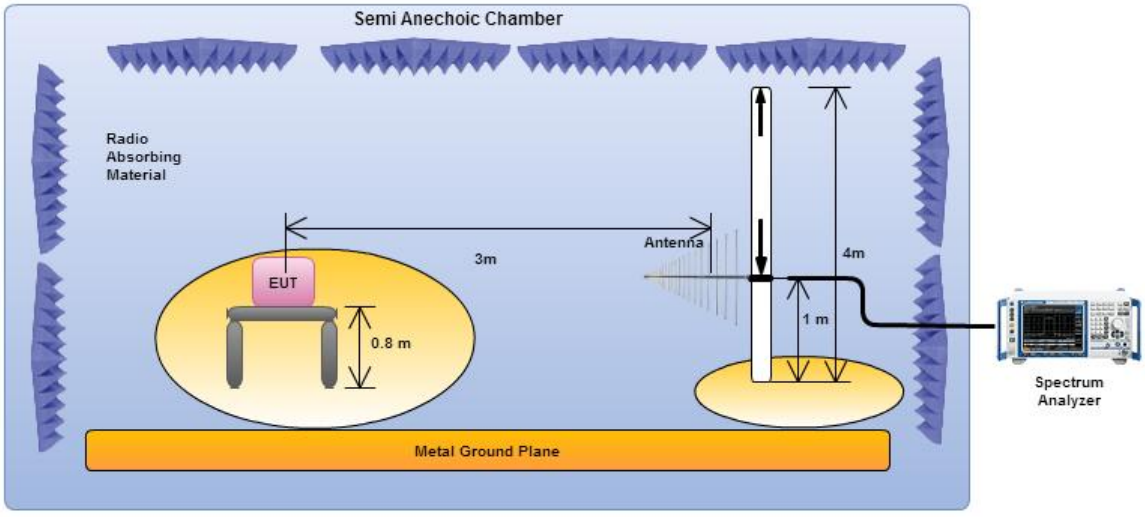
Refer a test equipment and calibration data table in this test report.

3.2.2 Test Procedures

☒	The average emission levels shall be measured in [duty cycle =100 or by duty cycle correction factor].	
☒	For the transmitter emissions shall be measured using following options below:	
	☐	Refer as ANSI C63.10, clause 4.1.4.2.3 (Reduced VBW) – Duty cycle = 100%.
	☒	Refer as ANSI C63.10, clause 4.1.4.2.4 average value of pulsed emissions. Adjusted by a “duty cycle correction factor”, derived from 20log (dwell time/100 ms). Average emission = peak emission + 20 log (duty cycle).
	☒	Refer as ANSI C63.10, clause 4.1.4.2.2 measurement procedure peak limit.
☒	Refer as ANSI C63.10, clause 6.5 for radiated emissions and test distance is 3m.	

3.2.3 Test Setup

Fundamental Emissions



3.2.4 Test Result of Fundamental Emissions

Field Strength of Fundamental Emissions Result					
Modulation Mode	**Frequency (MHz)**	**Fundamental (dBuV/m)@3m**	**Margin (dB)**	**Limit (dBuV/m)@3m**	**Type**
FM-Transmit	88.3	47.12	20.88	68	peak
FM-Transmit	88.3	47.00	1.00	48	average
FM-Transmit	98.1	46.81	21.19	68	peak
FM-Transmit	98.1	46.52	1.48	48	average
FM-Transmit	107.7	47.19	20.81	68	peak
FM-Transmit	107.7	46.97	1.03	48	average
Result		**Complied**			
Note 1: Measurement worst emissions of receive antenna polarization: Vertical. Note 2: If duty cycle < 100%, average emission = peak emission + 20 log (duty cycle).					

3.3 Emission Bandwidth

3.3.1 Emission Bandwidth Limit

Emissions from the intentional radiator shall be confined within a band 200 kHz wide centered on the operating frequency.

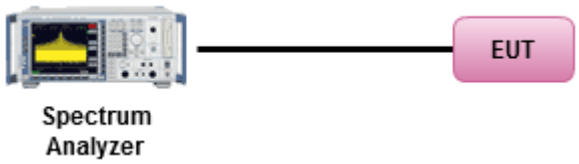
3.3.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.3.3 Test Procedures

Test Method	
☒	For the emission bandwidth refer ANSI C63.10, clause 6.9.2 for occupied bandwidth testing.
☒	For radiated measurement. Loop antenna was rotated about the horizontal and vertical axis and the equipment to be measured and the test antenna shall be oriented to obtain the maximum emitted field strength level.

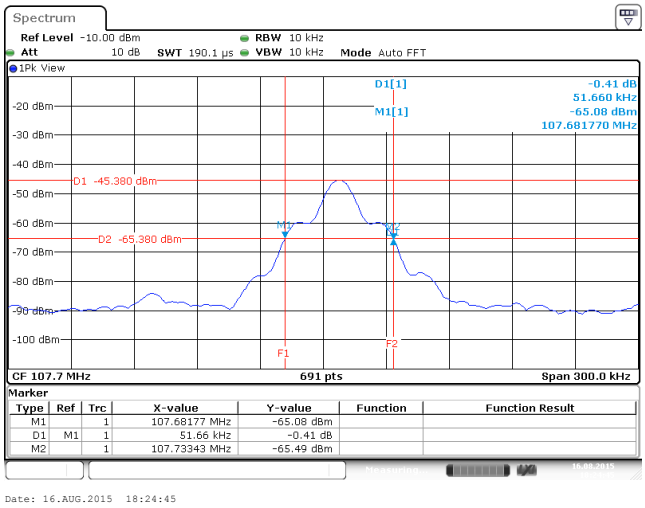
3.3.4 Test Setup

20dB Bandwidth


3.3.5 Test Result of Emission Bandwidth

Occupied Channel Bandwidth Result					
Modulation Mode	**Frequency (kHz)**	**20dB Bandwidth (kHz)**	**99% Bandwidth (kHz)**	**Frequency range (MHz) f_L＞88MHz**	**Frequency range (MHz) f_H＜108MHz**
FM-Transmit	88.3	51.66	47.75	88.2804	-
	98.1	51.23	47.75	-	-
	107.7	51.66	48.19	-	107.7334
Result		**Complied**			

Emission Bandwidth Plot



3.4 Transmitter Unwanted Emissions

3.4.1 Transmitter Radiated Unwanted Emissions Limit

Restricted Band Emissions Limit			
Frequency Range (MHz)	**Field Strength (uV/m)**	**Field Strength (dBuV/m)**	**Measure Distance (m)**
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300
0.490~1.705	24000/F(kHz)	33.8 - 23	30
1.705~30.0	30	29	30
30~88	100	40	3
88~216	150	43.5	3
216~960	200	46	3
Above 960	500	54	3

Note 1: Test distance for frequencies at or above 30 MHz, measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).

Note 2: Test distance for frequencies at below 30 MHz, measurements may be performed at a distance closer than the EUT limit distance; however, an attempt should be made to avoid making measurements in the near field. When performing measurements below 30 MHz at a closer distance than the limit distance, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two or more distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). The test report shall specify the extrapolation method used to determine compliance of the EUT.

3.4.2 Measuring Instruments

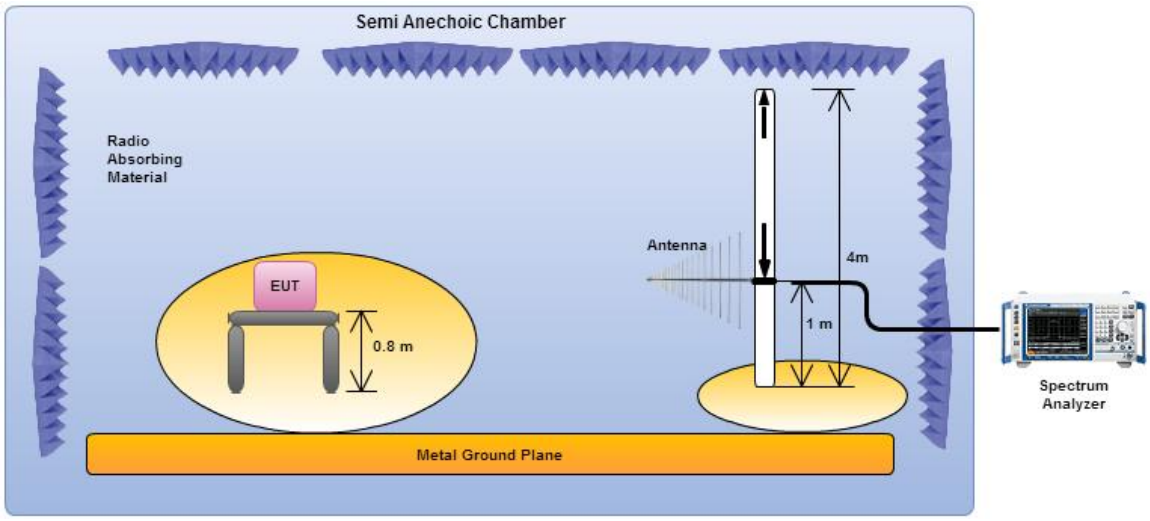
Refer a test equipment and calibration data table in this test report.

3.4.3 Test Procedures

Test Method	
☒	Measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).
☒	The average emission levels shall be measured in [duty cycle ≥ 98 or duty factor].
☒	For radiated measurement, refer as ANSI C63.10.
☒	Refer as ANSI C63.10, clause 6.4 for radiated emissions below 30 MHz and test distance is 3m.
☒	Refer as ANSI C63.10, clause 6.5 for radiated emissions 30 MHz to 1 GHz and test distance is 3m.
☒	Refer as ANSI C63.10, clause 6.6 for radiated emissions above 1 GHz and test distance is 3m.
☒	The any unwanted emissions level shall not exceed the fundamental emission level.
☒	All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

3.4.4 Test Setup

Transmitter Radiated Unwanted Emissions



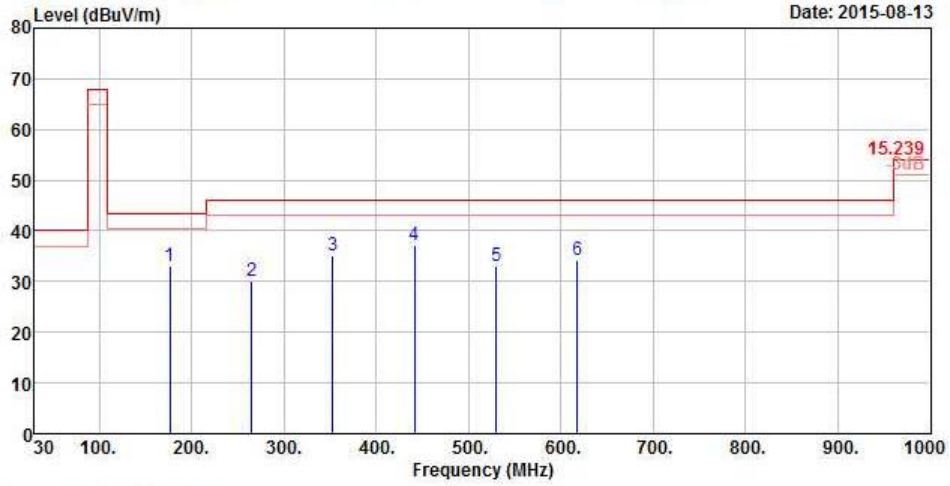
Magnetic field tests shall be performed in the frequency range of 9 kHz to 30 MHz using a calibrated loop antenna. Electric field tests shall be performed in the frequency range of 30 MHz to 1000 MHz using a calibrated bi-log antenna and the frequency range of 1 GHz to 40 GHz using a calibrated horn antenna.

3.4.5 Transmitter Radiated Unwanted Emissions (Below 30MHz)

All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

3.4.6 Transmitter Radiated Unwanted Emissions (Below 1GHz)

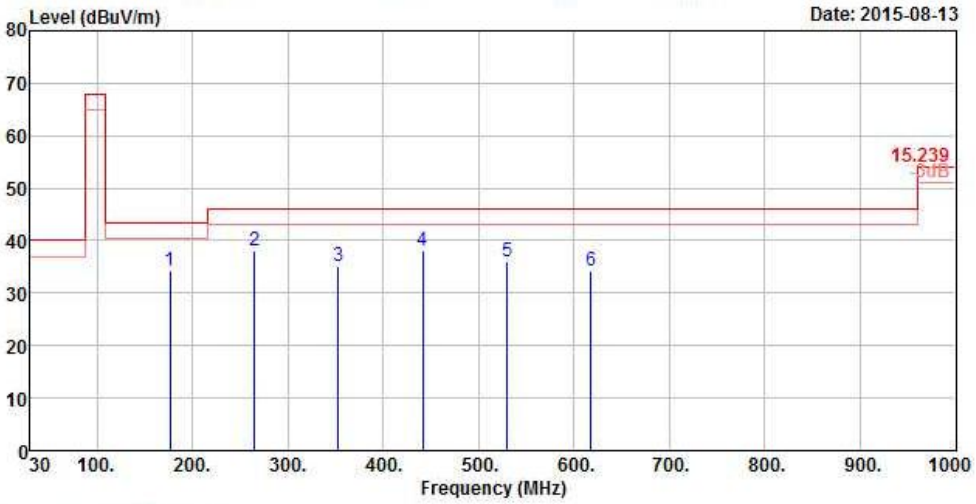
Transmitter Radiated Unwanted Emissions (Below 1GHz)			
Frequency (kHz)	88.3	**Operating Function**	Transmit
Polarization	V		



	Freq	Level	Limit	Line	Level	Factor	Loss	Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	176.600	33.16	-10.34	43.50	49.41	9.34	1.92	27.51	Peak
2	264.900	30.16	-15.84	46.00	41.99	12.95	2.39	27.17	Peak
3	353.200	35.16	-10.84	46.00	45.59	14.26	2.80	27.49	Peak
4	441.500	37.16	-8.84	46.00	45.96	16.23	3.09	28.12	Peak
5	529.800	33.16	-12.84	46.00	40.83	17.34	3.41	28.42	Peak
6	618.100	34.16	-11.84	46.00	40.22	18.60	3.75	28.41	Peak

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical).
Note 4: No level of unwanted emissions exceeds the level of the fundamental emission.

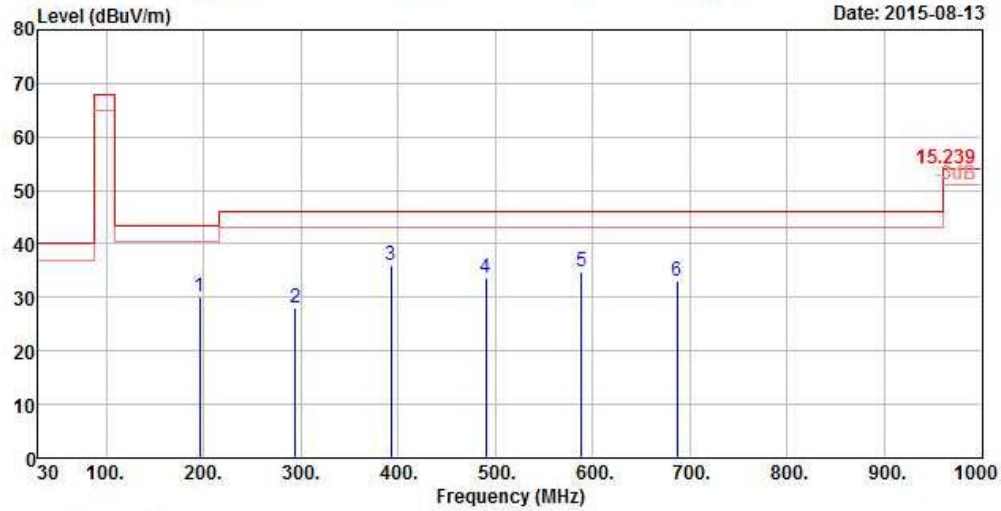
Transmitter Radiated Unwanted Emissions (Below 1GHz)			
Frequency (kHz)	88.3	**Operating Function**	Transmit
Polarization	H		



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	176.600	34.13	-9.37	43.50	50.38	9.34	1.92	27.51	Peak
2	264.900	38.13	-7.87	46.00	49.96	12.95	2.39	27.17	Peak
3	353.200	35.13	-10.87	46.00	45.56	14.26	2.80	27.49	Peak
4	441.500	38.13	-7.87	46.00	46.93	16.23	3.09	28.12	Peak
5	529.800	36.13	-9.87	46.00	43.80	17.34	3.41	28.42	Peak
6	618.100	34.13	-11.87	46.00	40.19	18.60	3.75	28.41	Peak

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical).
Note 4: No level of unwanted emissions exceeds the level of the fundamental emission.

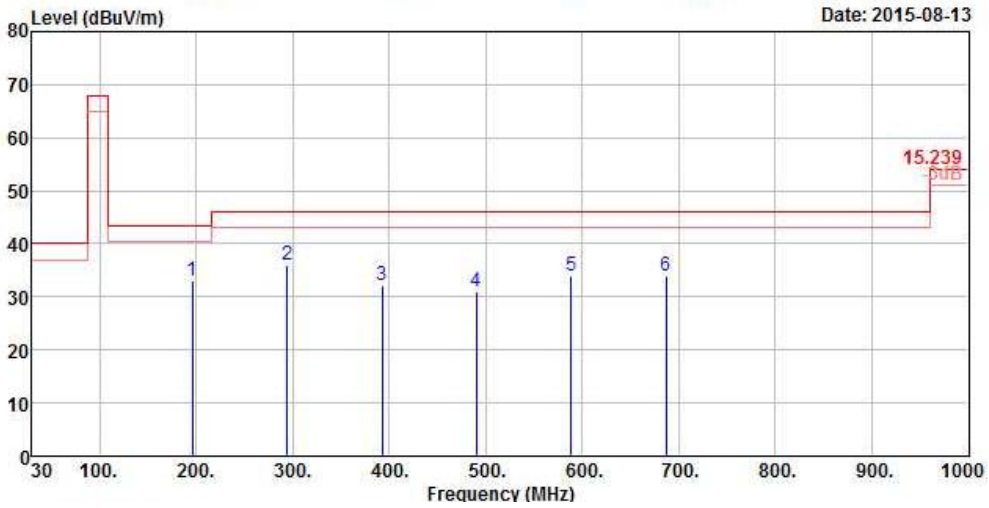
Transmitter Radiated Unwanted Emissions (Below 1GHz)			
Frequency (kHz)	98.1	**Operating Function**	Transmit
Polarization	V		



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	196.200	30.16	-13.34	43.50	46.63	8.95	2.03	27.45	Peak
2	294.300	28.08	-17.92	46.00	39.93	12.72	2.49	27.06	Peak
3	392.400	36.06	-9.94	46.00	45.87	15.12	2.90	27.83	Peak
4	490.500	33.72	-12.28	46.00	41.74	17.14	3.21	28.37	Peak
5	588.600	34.91	-11.09	46.00	41.39	18.28	3.66	28.42	Peak
6	686.700	32.94	-13.06	46.00	38.79	18.54	3.96	28.35	Peak

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical).
Note 4: No level of unwanted emissions exceeds the level of the fundamental emission.

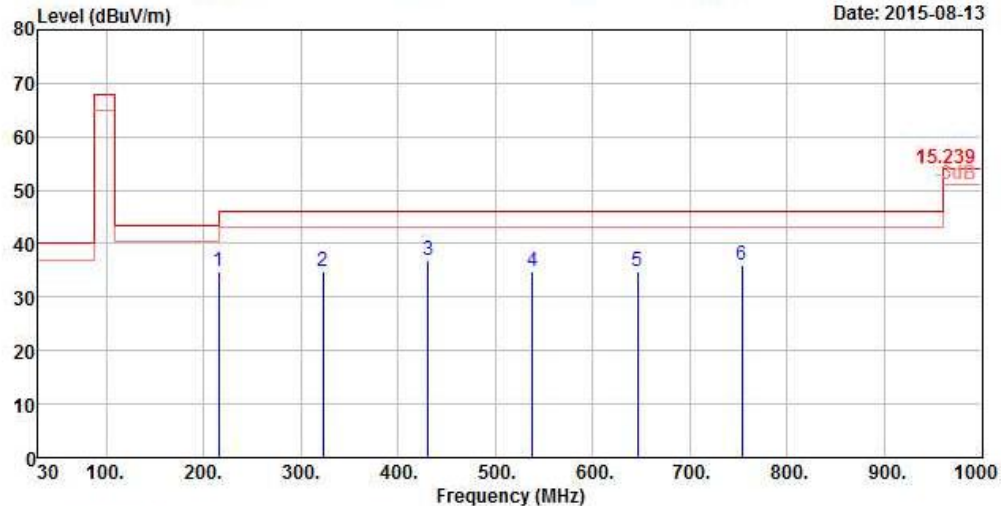
Transmitter Radiated Unwanted Emissions (Below 1GHz)			
Frequency (kHz)	98.1	**Operating Function**	Transmit
Polarization	H		



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	196.200	33.06	-10.44	43.50	49.53	8.95	2.03	27.45	Peak
2	294.300	36.06	-9.94	46.00	47.91	12.72	2.49	27.06	Peak
3	392.400	32.06	-13.94	46.00	41.87	15.12	2.90	27.83	Peak
4	490.500	31.06	-14.94	46.00	39.08	17.14	3.21	28.37	Peak
5	588.600	34.06	-11.94	46.00	40.54	18.28	3.66	28.42	Peak
6	686.700	34.06	-11.94	46.00	39.91	18.54	3.96	28.35	Peak

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical).
Note 4: No level of unwanted emissions exceeds the level of the fundamental emission.

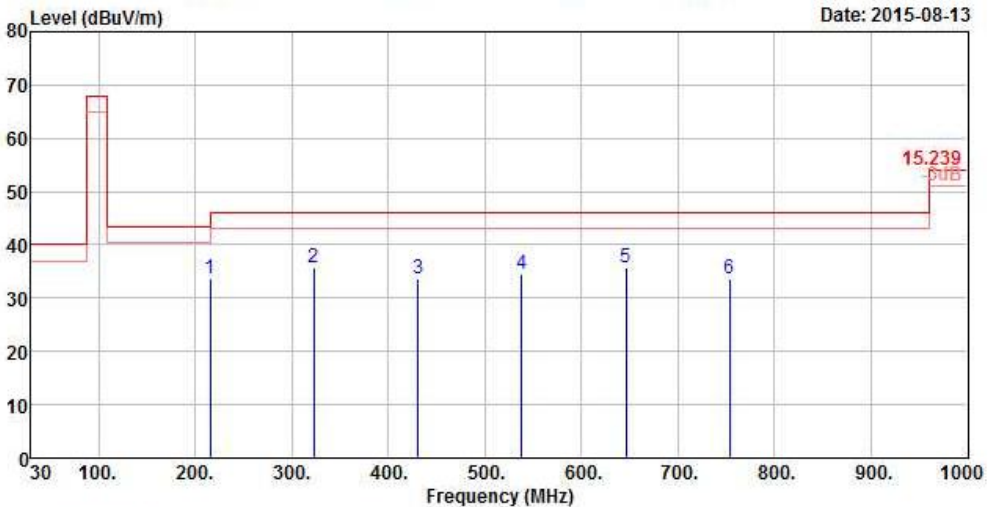
Transmitter Radiated Unwanted Emissions (Below 1GHz)			
Frequency (kHz)	107.7	**Operating Function**	Transmit
Polarization	V		



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	215.400	34.88	-8.62	43.50	51.35	8.77	2.14	27.38	Peak
2	323.100	34.88	-11.12	46.00	46.19	13.26	2.65	27.22	Peak
3	430.800	36.88	-9.12	46.00	45.67	16.22	3.05	28.06	Peak
4	538.500	34.88	-11.12	46.00	41.98	17.86	3.46	28.42	Peak
5	646.200	34.88	-11.12	46.00	40.80	18.62	3.84	28.38	Peak
6	753.900	35.88	-10.12	46.00	40.47	19.37	4.18	28.14	Peak

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical).
Note 4: No level of unwanted emissions exceeds the level of the fundamental emission.

Transmitter Radiated Unwanted Emissions (Below 1GHz)			
Frequency (kHz)	107.7	**Operating Function**	Transmit
Polarization	H		



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	215.400	33.67	-9.83	43.50	50.14	8.77	2.14	27.38	Peak
2	323.100	35.67	-10.33	46.00	46.98	13.26	2.65	27.22	Peak
3	430.800	33.67	-12.33	46.00	42.46	16.22	3.05	28.06	Peak
4	538.500	34.67	-11.33	46.00	41.77	17.86	3.46	28.42	Peak
5	646.200	35.67	-10.33	46.00	41.59	18.62	3.84	28.38	Peak
6	753.900	33.67	-12.33	46.00	38.26	19.37	4.18	28.14	Peak

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical).
Note 4: No level of unwanted emissions exceeds the level of the fundamental emission.

4 Test Equipment and Calibration Data

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Spectrum Analyzer	R&S	FSV 40	101500	9KHz~40GHz	May. 06, 2015	RF Conducted
DC Power Source	G.W.	GPC-6030D	C671845	DC 1V ~ 60V	Jul. 22, 2015	RF Conducted

Note: Calibration Interval of instruments listed above is one year.

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Spectrum Analyzer	R&S	FSP40	100593	9kHz ~ 40GHz	Oct. 02, 2014	Radiation
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH02-HY	30MHz ~ 1GHz 3m	May 03, 2015	Radiation
Amplifier	Agilent	8447D	2944A11149	100kHz ~ 1.3GHz	Jul. 24,2015	Radiation
RF Cable-R03m	Jye Bao	RG142	CB021	9kHz ~ 1GHz	Nov. 08, 2014	Radiation
Bilog Antenna	SCHAFFNER	CBL61128	2723	30MHz ~ 2GHz	Sep 20, 2014	Radiation
Turn Table	Chaintek Instruments	3000	MF7802058	0~ 360 degree	N/A	Radiation
Antenna Mast	MF	MF7802	MF780208205	1 ~ 4 m	N/A	Radiation

Note: Calibration Interval of instruments listed above is one year.

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Loop Antenna	TESEQ	HLA 6120	31244	9 kHz~30 MHz	Feb. 02, 2015	Radiation

Note: Calibration Interval of instruments listed above is two years.