Test Report

Product	:	SX10 Water Sentinel
Trade mark	:	FLO-n-STOP
Model/Type reference	:	SX301
Serial Number	:	N/A
Ratings	:	DC 3V
FCC ID	:	2ACJ7SX301
Report Number	:	EESZG04140007
Date	:	May 20, 2014
Regulations	:	See below

Standards	Results
☒ 47 CFR FCC Part 15 Subpart C 15.231:2013	Pass

Prepared for:

Millennium International Development Corp.
2608 NW Boca Raton Blvd. Boca Raton, FL 33431, United States

Prepared by:

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Tested by: _____ Reviewed by: _____

Approved by: _____ Approved date: May 20, 2014

Jimmy Li
Lab manager

Check No.: 1702001376

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Description Page

N/A means not applicable.

1. GENERAL INFORMATION

Applicant:	Millennium International Development Corp. 2608 NW Boca Raton Blvd. Boca Raton, FL 33431, United States
Manufacturer:	ico products,llc 5247 Secor Rd Unit 5 toledo Ohio United States
Product:	SX10 Water Sentinel
Model/Type reference:	SX301
FCC ID:	2ACJ7SX301
Trade Name:	FLO-n-STOP
Serial Number:	N/A
Report Number:	EESZG04140007-1
Sample Received Date:	Apr. 15, 2014
Sample tested Date:	Apr. 15, 2014 to May 20, 2014

2. TEST SUMMARY

No.	Test Item	Rule	Result
1	20dB & 99% bandwidth	FCC Part15.231(c) & RSS-210 A1.1.3	PASS
2	Time measurement	FCC Part15.231(a)(1) & RSS-210 A1.1.1	PASS
3	Radiated Emission	FCC Part15.231(b) & FCC Part15.209(a) & RSS-210 A1.1, Table (A)	PASS
4	Antenna Requirements	FCC PART15.203 & RSS-Gen 7.1.2	PASS*

*: According to Section 15.203 and RSS-Gen 7.1.2, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The EUT has a built in antenna which is a short wire solder on the PCB, this is permanently attached antenna and meets the requirements of this section.

3. MEASUREMENT UNCERTAINTY

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Test item	Value (dB)
Radiated disturbance (30MHz to 1GHz)	4.9
Radiated disturbance (1GHz to 6GHz)	4.7

4. PRODUCT INFORMATION

Items	Description
Rating	DC 3V by battery
Equipments Class	Security/Remote Control Transmitter
Modulation	ASK
Frequency Range	310 MHz
Channel Number	1
Antenna Type	PCB antenna
Antenna Gain	0dBi

5. TEST EQUIPMENT

Equipment	Manufacturer	Model	Serial No.	Due Date
3M Chamber & Accessory Equipment	ETS-LINDGREN	FACT-3	3510	07/12/2016
Spectrum Analyzer	Agilent	E4443A	MY45300910	01/15/2015
Receiver	R&S	ESCI	100435	07/19/2014
TRILOG Broadband Antenna	schwarzbeck	VULB 9163	618	06/25/2014
Multi device Controller	ETS-LINGREN	2090	00057230	N/A
Horn Antenna	ETS-LINGREN	3117	00057407	07/19/2014
Microwave Preamplifier	Agilent	8449B	3008A02425	03/19/2015
Spectrum Analyzer	R&S	FSP40	100416	07/06/2014
Receiver	R&S	ESCI	100009	07/19/2014

6. 20DB & 99% BANDWIDTH MEASUREMENT

6.1. LIMITS

The 20dB & 99% bandwidth shall be no wider than 0.25% of the centre frequency for devices operating between 70-900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the centre frequency.

As the center frequency for the device operating is 310MHz, thus, the 20dB & 99% bandwidth limit is 775 kHz.

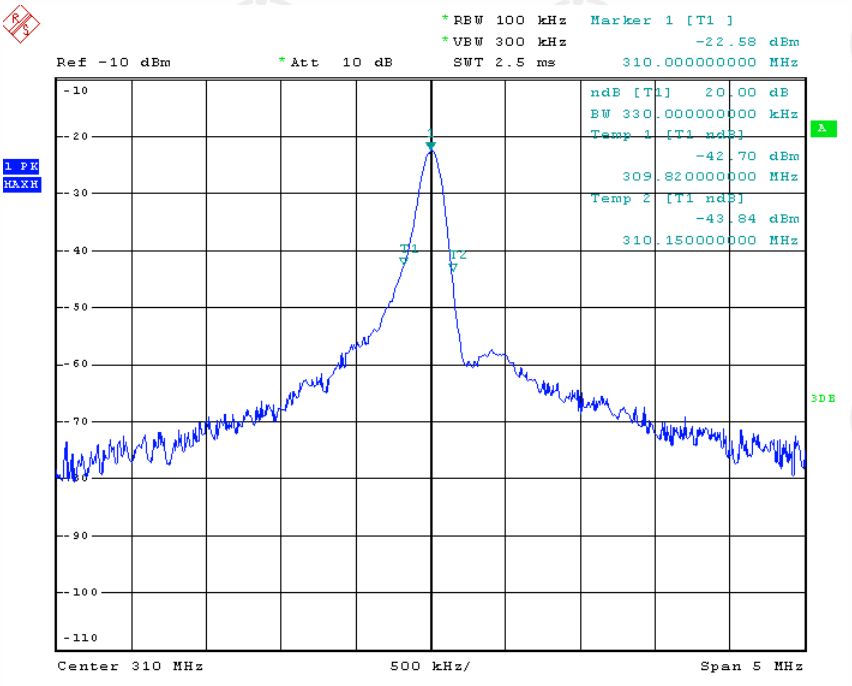
6.2. BLOCK DIAGRAM OF TEST SETUP

6.3. TEST PROCEDURE

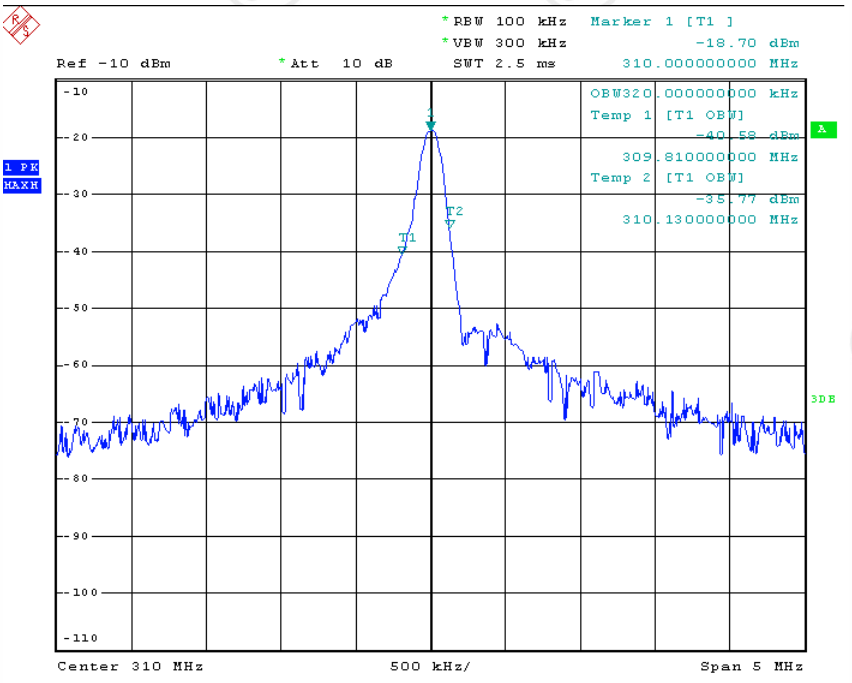
1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. Set spectrum analyzer's RBW and VBW to applicable value with Peak in Max Hold.
3. A PEAK output reading and 20dB & 99% OBW function in spectrum analyzer were taken.

6.4. TEST RESULT

Channel	Frequency (MHz)	20dB BW (kHz)	99% BW (kHz)	Result (Pass / Fail)
1	310	330	320	Pass


*RBW 100 kHz
*VBW 300 kHz
Ref -10 dBm
*Att 10 dB
SWT 2.5 ms
Marker 1 [T1]
-22.58 dBm
310.000000000 MHz
ndB [T1] 20.00 dB
BW 330.000000000 kHz
Temp 1 [T1 ndB]
-42.70 dBm
309.820000000 MHz
Temp 2 [T1 ndB]
-43.84 dBm
310.150000000 MHz
1 PK
MAXH
3DB
Center 310 MHz
500 kHz/
Span 5 MHz

20dB BW


*RBW 100 kHz
*VBW 300 kHz
Ref -10 dBm
*Att 10 dB
SWT 2.5 ms
Marker 1 [T1]
-18.70 dBm
310.000000000 MHz
OBW320.000000000 kHz
Temp 1 [T1 OBW]
-40.58 dBm
309.810000000 MHz
Temp 2 [T1 OBW]
-35.77 dBm
310.130000000 MHz
1 PK
MAXH
3DB
Center 310 MHz
500 kHz/
Span 5 MHz

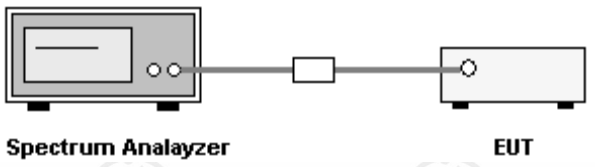
99% BW

7. TIME MEASUREMENT

7.1. LIMITS

A transmitter activated automatically shall cease transmission within 5 seconds after activation (i.e. maximum 5 seconds of operation).

7.2. BLOCK DIAGRAM OF TEST SETUP



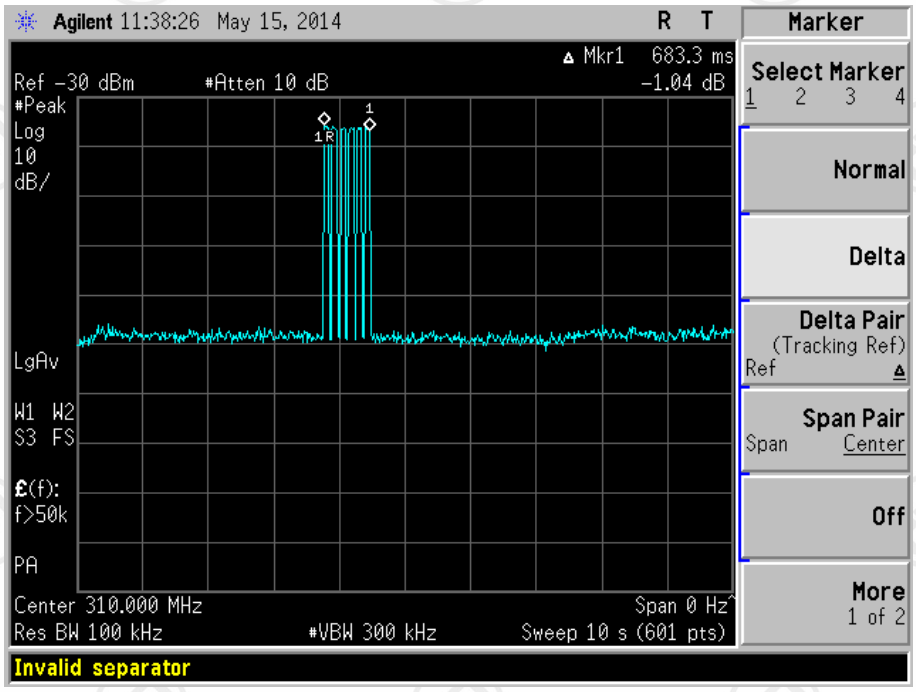
7.3. TEST PROCEDURE

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. Set the center frequency is 310MHz and set the Span is 0Hz.
3. Set spectrum analyzer's RBW and VBW to applicable value with Peak.
4. Read the transmission time and silent time from the spectrum analyzer directly.

7.4. TEST RESULT

Transmission Time:

Frequency (MHz)	Transmission (Turn on) (s)	Limit (s)	Result (Pass / Fail)
310	0.68	5	Pass



8. RADIATED EMISSIONS MEASUREMENT

8.1. LIMITS

Table A: Permissible Field Steength Limits for Mimentarity Operated Devices

Fundamental Frequency(MHz), excluding restricted band frequencies of RSS-Gen	Field Strength of the Fundamental (Note 1) (microvolts/m at 3 metres)	Field Strength of Unwanted Emissions (Note 1) (microvolts/m at 3 metres)
70-130	1,250	125
130-174	1,250 to 3,750*	125 to 375
174-260 (Note 2)	3,750	375
260-470 (Note 2)	3,750 to 12,500*	375 to 1,250
Above 470	12,500	1,250

Note 1: Limits on the field strength of emissions, as shown in this table, are based on the average value of the measured emissions. As an alternative, compliance with the limits in this table may be based on the use of measurement instrumentation with a CISPR quasi-peak detector.

* Linear interpolation with frequency F in MHz:

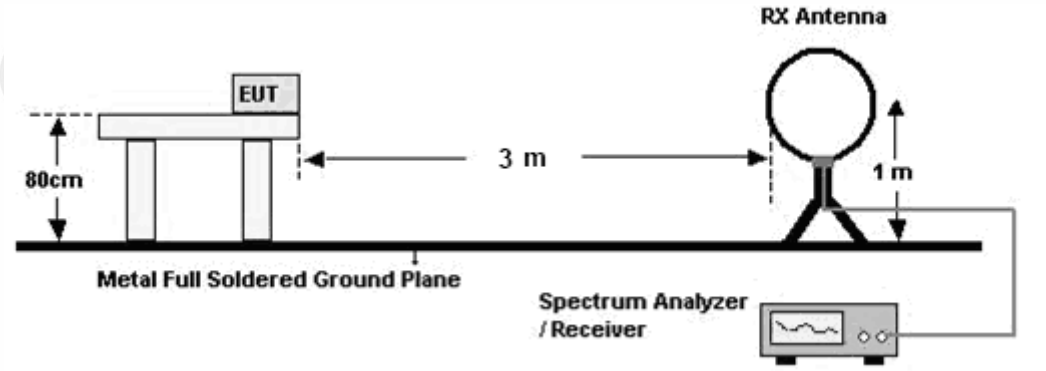
For 130-174 MHz: FS (microvolts/m) = (56.82 x F)-6136

For 260-470 MHz: FS (microvolts/m) = (41.67 x F)-7083

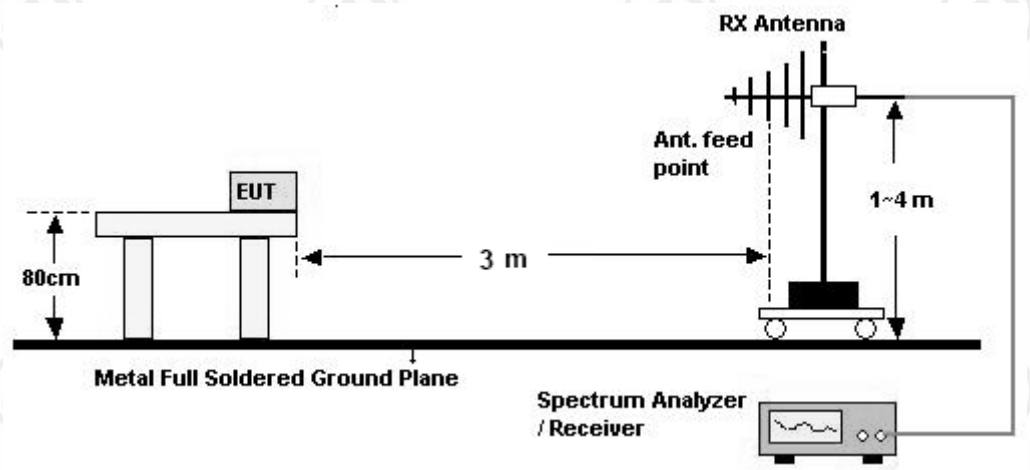
Note 2: The frequency band 225-399.9 MHz is allocated for Government of Canada usage. There are different types of operations in different parts of this band of frequencies, including communications with aircraft and operations using high-power transmitters. Besides avoiding the restricted frequency bands listed in RSS-Gen, it is recommended that the entire 225-399.9 MHz band be avoided.

8.2. BLOCK DIAGRAM OF TEST SETUP

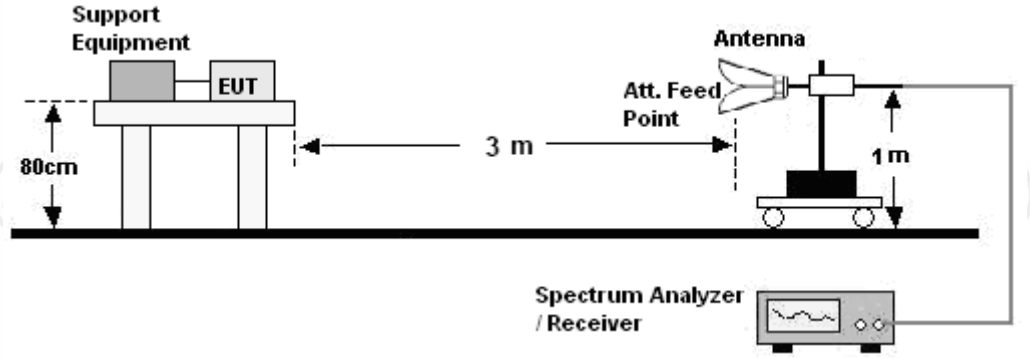
For radiated emissions from 9 kHz to 30MHz.



For radiated emissions from 30 - 1000MHz.



For radiated emissions above 1GHz.



8.3. TEST PROCEDURE

Below 30MHz

a. The Product is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna (loop antenna). The maximum values of the field strength are recorded by adjusting the polarizations of the test antenna and rotating the turntable.

b. For each suspected emission, the Product was arranged to its worst case and then turn table was turned from 0 degrees to 360 degrees to find the maximum reading.

c. The test frequency analyzer system was set to Peak Detect (300Hz RBW in 9kHz to 150kHz and 10kHz RBW in 150kHz to 30MHz) Function and Specified Bandwidth with Maximum Hold Mode.

30MHz ~ 1GHz:

a. The Product was placed on the non-conductive turntable 0.8m above the ground at a chamber.

b. Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 100 kHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied between 1~4 m in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.

c. For each frequency whose maximum record was higher or close to limit, measure its QP value (120 kHz RBW): vary the antenna's height and rotate the turntable from 0 to 360 degrees to find the height and degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to QP Detector and specified bandwidth with Maximum Hold Mode, and record the maximum value.

Above 1GHz:

a. The EUT was placed on the non-conductive turntable 0.8 m above the ground at a chamber.

b. Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 1MHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.

8.4. TEST RESULT

Frequency (MHZ)	Polarization (H/V)	Emission _PK (dBμV/m)	AV factor (dB)	Emission _AV (dBμV/m)	PK Limit (dBμV/m)	AV Limit (dBμV/m)	Result (Pass / Fail)
310	H	81.9	-9.9	72.0	95.3	75.3	Pass
310	V	76.1	-9.9	66.2	95.3	75.3	Pass

Note 1: The above table only shows the frequencies which peak emission exceed the average limit. The peak data of other frequencies are all below the average limit (please refer to the test graph in following pages), so the average data of other frequencies are deems to fulfill the average limits and not reported.

Note 2: The emissions below 30MHz are not reported for they are much lower than the limits.

Note 3: Below 1GHz: The total factor = cable loss+ antenna factor.

Above 1GHz: The total factor = cable loss+ antenna factor -amplifier factor.

Final Emission _PK = Reading Level_ PK+ total factor.

Final Emission _AV = Final Emission _PK + AV factor.

Note 4: The duty cycle is simply the on-time divided by the period:

The duration of one cycle = 100ms

Effective period of the cycle = 0.667ms *33+10ms *1

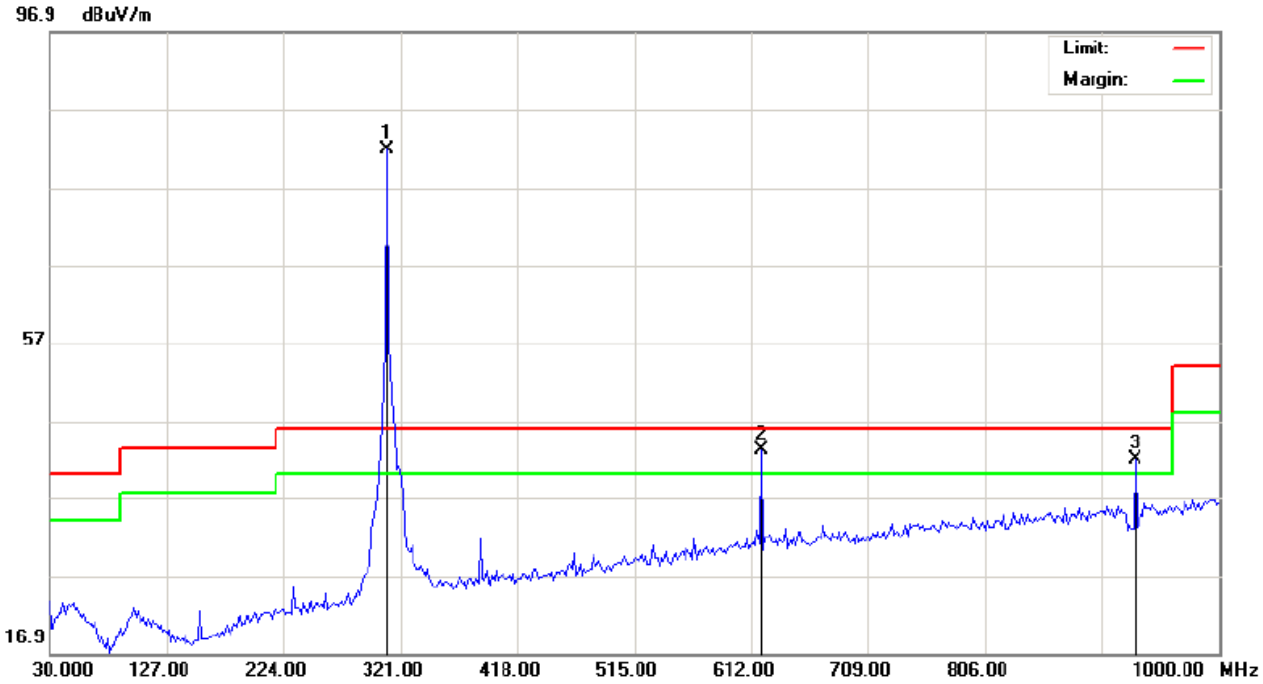
= 32.011ms

DC = 32.011ms / 100ms = 0.32011

Therefore, the averaging factor is found by 20 $\log_{10}$ 0.32011 = -9.9dB

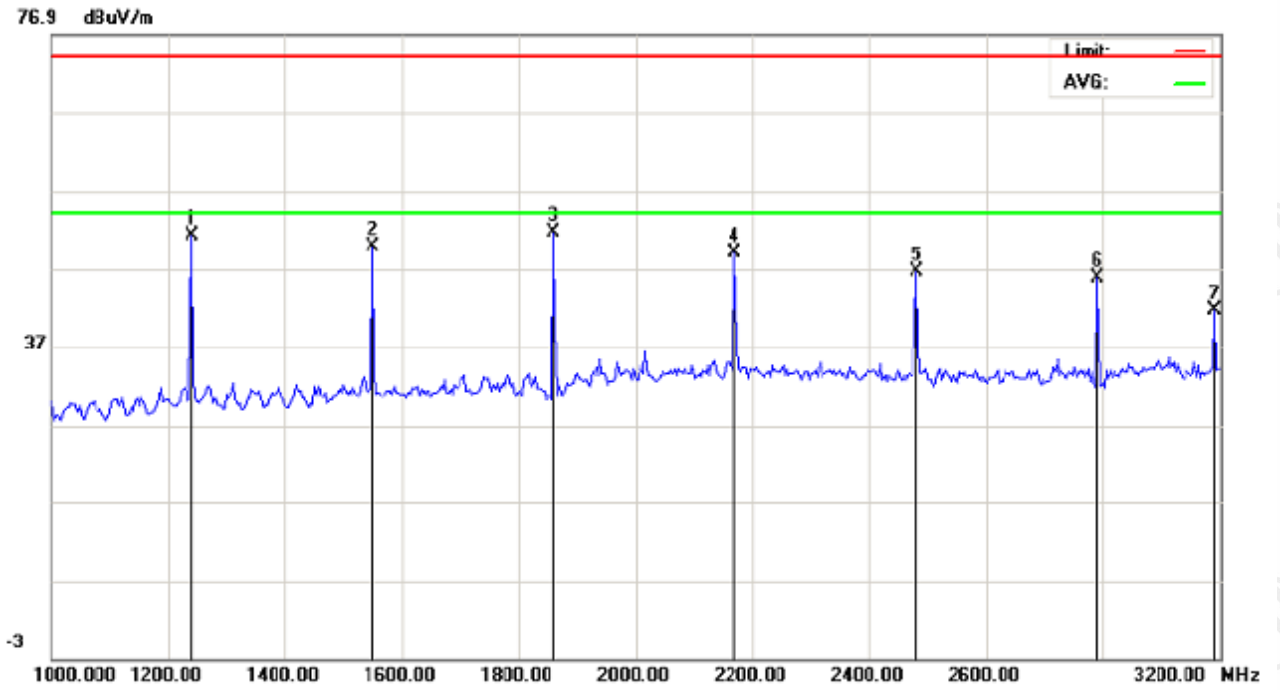
Test graph of radiated emission

H:



Frequency (MHZ)	Polarization (H/V)	Emission _PK (dBµV/m)	Emission _QP (dBµV/m)	PK Limit (dBµV/m)	QP Limit (dBµV/m)	Result (Pass / Fail)
*310.0	H	81.9	--	--	--	--
620.0	H	43.2	42.5	--	46.0	Pass
930.0	H	42.0	--	--	46.0	Pass

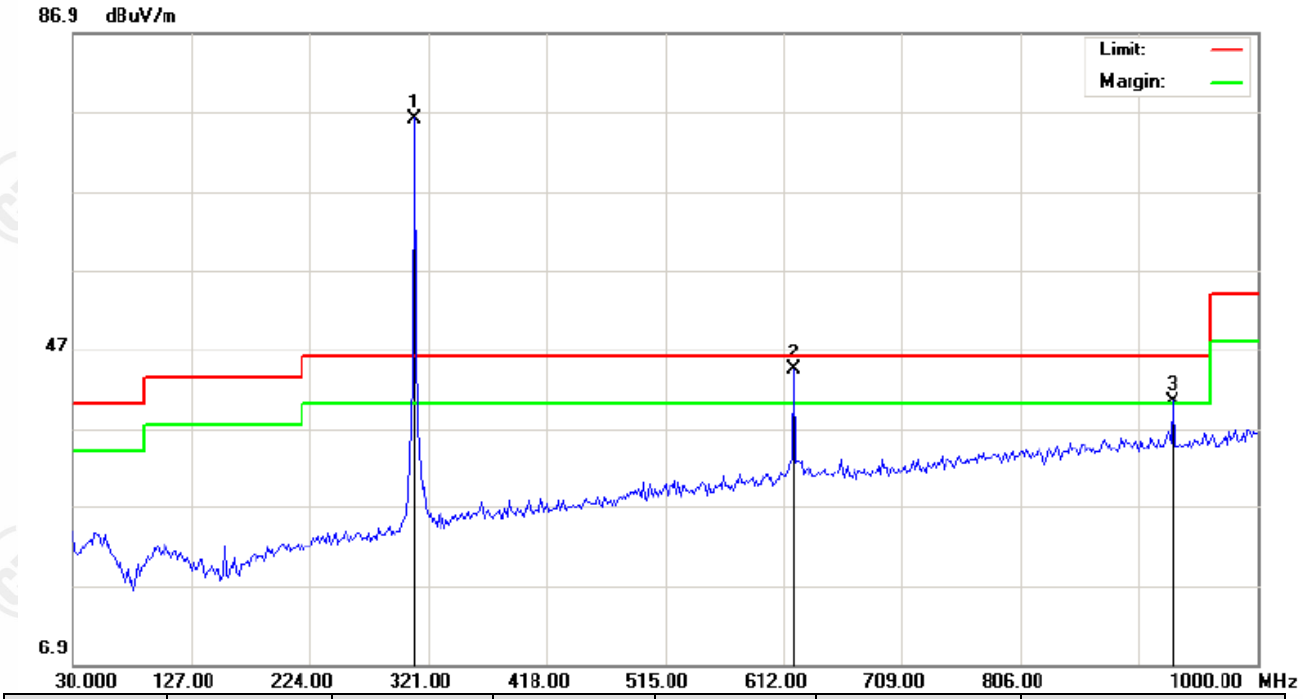
***:** Fundamental frequency



Frequency (MHZ)	Polarization (H/V)	Emission _PK (dBµV/m)	AV factor (dB)	Emission _AV (dBµV/m)	PK Limit (dBµV/m)	AV Limit (dBµV/m)	Result (Pass / Fail)
*1240.0	H	51.1	-9.9	41.2	74.0	54.0	Pass
*1550.0	H	49.7	-9.9	39.8	74.0	54.0	Pass
1860.0	H	51.7	-9.9	41.8	75.3	55.3	Pass
2170.0	H	48.9	-9.9	39.0	75.3	55.3	Pass
2480.0	H	46.6	-9.9	36.7	75.3	55.3	Pass
*2790.0	H	45.7	-9.9	35.8	74.0	54.0	Pass
3100.0	H	41.6	-9.9	31.7	75.3	55.3	Pass

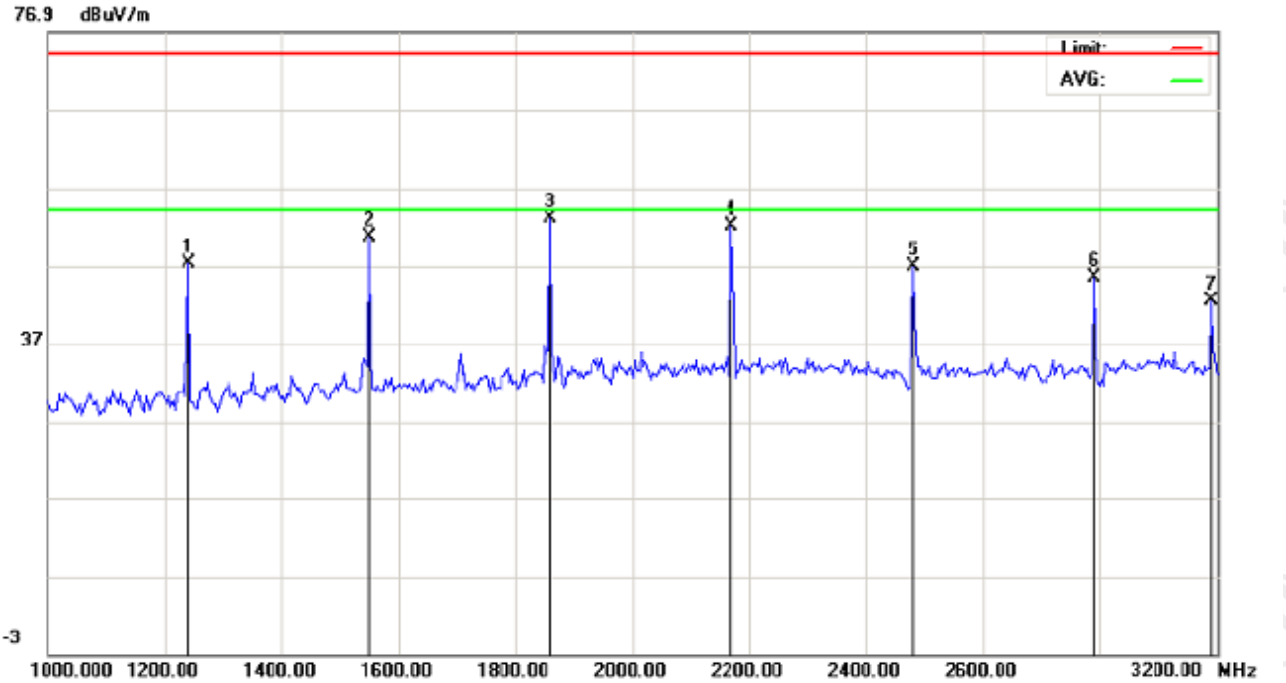
*: Restricted frequency

V:



Frequency (MHZ)	Polarization (H/V)	Emission _PK (dBµV/m)	Emission _QP (dBµV/m)	PK Limit (dBµV/m)	QP Limit (dBµV/m)	Result (Pass / Fail)
*310.0	V	76.1	--	--	--	--
620.0	V	44.3	43.1	--	46.0	Pass
930.0	V	40.0	--	--	46.0	Pass

***:** Fundamental frequency



Frequency (MHZ)	Polarization (H/V)	Emission _PK (dBµV/m)	AV factor (dB)	Emission _AV (dBµV/m)	PK Limit (dBµV/m)	AV Limit (dBµV/m)	Result (Pass / Fail)
*1240.0	V	47.2	-9.9	37.3	74.0	54.0	Pass
*1550.0	V	50.6	-9.9	40.7	74.0	54.0	Pass
1860.0	V	53.0	-9.9	43.1	75.3	55.3	Pass
2170.0	V	51.9	-9.9	42.0	75.3	55.3	Pass
2480.0	V	46.9	-9.9	37.0	75.3	55.3	Pass
*2790.0	V	45.5	-9.9	35.6	74.0	54.0	Pass
3100.0	V	42.3	-9.9	32.4	75.3	55.3	Pass

*: Restricted frequency

The plots of duty cycle: