



TEST REPORT

Date: 2014-04-10

Report No.: 60.870.14.008.01F

Applicant: Sensitech Inc.
800 Cummings Ctr, Suite 258X Beverly, MA 01915-6197,
USA

Description of Samples: Model name: TempTale RF² Datalogger, RF Temperature Monitor
Brand name: ---
Model no.: TempTale RF² Datalogger
FCCID: SRMT11012294

Date Samples Received: 2014-03-06

Date Tested: 2014-03-07 to 2014-04-09

Investigation Requested: FCC Part 15 Subpart C, Section 15.249

Conclusions: The submitted product COMPLIED with the requirements of Federal Communications Commission [FCC] Rules and Regulations Part 15. The tests were performed in accordance with the standards described above and on Section 2.2 in this Test Report.

Remarks: ----

Checked by:

Approved by:-

Ray Cheung
Project Engineer
Wireless & Telecom department

Jeff Pong
Operation Manager
Wireless & Telecom department



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1.0 General Details

1.1 Test Laboratory

Attestation of Global Compliance Co., Ltd
1&2F, No. 2 Building, Huafeng No.1 Industrial Park, Gushu
Community Xixiang Street, Bao'an District, Shenzhen,
China
Registration Number: 259865

Tested by:

A handwritten signature in blue ink that reads 'John Zhi'.

John Zhi

**1.2 Applicant Details
Applicant**

Sensitech INC.
800 Cummings Ctr, Suite 258X Beverly, MA
01915-6197, USA.

Manufacturer

Blue Ocean Innovation Ltd.
RM 1813, Fo Tan Indus. Ctr. 26 – 28 Au Pui Wan
Street, Fotan, HK.



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1.3 Equipment Under Test [EUT]

Description of EUT

Model Name:	TempTale RF ² Datalogger, RF Temperature Monitor
Brand Name:	---
Model Number:	TempTale RF ² Datalogger
FCCID:	SRMT11012294
Rating:	3 VDC (1 x 3V "CR123A" Lithium battery)
Antenna Type:	Integral
Operated Frequency:	921.5MHz to 924.5 MHz
No. of Channel:	3 (921.5 MHz, 923.5 MHz and 924 MHz)
Accessories and Auxiliary Equipment:	None
EUT Exercising Software:	None

General Operation of EUT

The Equipment Under Test (EUT) is a Monitor with RF temperature Sensor operated at 921.5 MHz to 924.5 MHz.

1.4 Equipment Modification

No modification was made to the tested unit by TÜV SÜD Hong Kong Ltd.

1.5 Related Submittal(s) Grants

This is a single application of certification for this transmitter.



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2.0 Technical Details

2.1 Investigations Requested

Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2012 and ANSI C63.4: 2009.

2.2 Test Standards and Results Summary Tables

EMISSION Results Summary				
Test Condition	FCC Test Requirement	Test Result		
		Pass	Failed	N/A
Field Strength of Fundamental and Harmonics	Part 15.249 (a),(e)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Spurious Radiated Emission	Part 15.249 (d) Part 15.209 Part 15.205	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Out of Band Emissions	Part 15.249 (d)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bandwidth Measurement	Part 15.215 (c)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Conducted Emission	Part 15.207	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Note: N/A - Not Applicable



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3.0 Test Methodology

3.1 Radiated Emission

The sample was placed 0.8m above the ground plane on a standard emission test site *. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.

3.2 Field Strength Calculation

The field strength at 3 m was established by adding the meter reading of the spectrum analyzer to the factors associated with antenna correction factor, cable loss, preamplifiers and filter attenuation.

The equation is expressed as follow:

$$\begin{aligned} \text{FS} &= \text{R} + \text{System Factor} \\ \text{System Factor} &= \text{AF} + \text{CF} + \text{FA} - \text{PA} \end{aligned}$$

Where FS = Net Field Strength in dBuV/m at 3 meters.

R = Reading of Spectrum Analyzer / Test Receiver in dBuV.

AF = Antenna Factor in dB.

CF = Cable Attenuation Factor in dB.

FA = Filter Attenuation Factor in dB.

PA = Preamplifier Factor in dB.

FA and PA are only be used for the measuring frequency above 1 GHz.

3.3 Conducted Emissions

The EUT was placed on a non-metallic table 0.8m above the horizontal metal reference place and 0.4m from a vertical ground plane which is connected to the horizontal metal ground plane. Meanwhile, the AC main of EUT was connected to the distance of 0.8m line impedance stabilization network (LISN) during measurement.

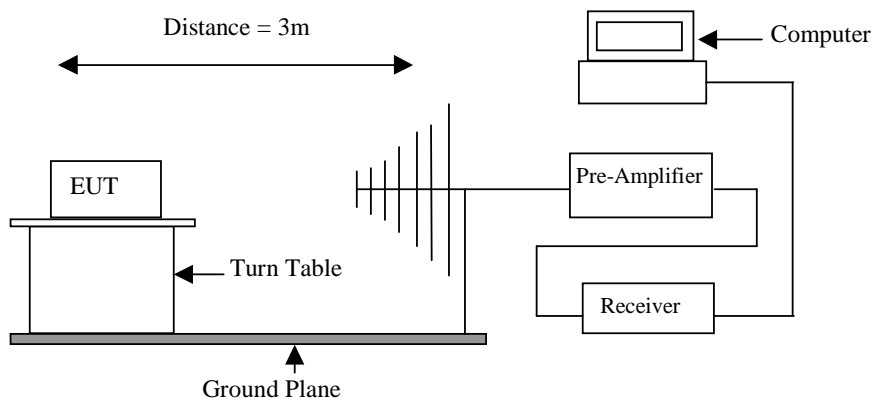
Initial measurements were performed in quasi-peak and average detection modes by the test receiver, any emissions recorded within 30dB of the relevant limit lines were re-measured using quasi-peak and average detection on the live and neutral lines with the worst case recorded in the table of results.

4.0 Test Results

4.1 Field Strength of Fundamental and Harmonics

Test Requirement:	FCC part 15 section 15.249(a)(e)
Test Method:	ANSI C63.4:2009
Test Date:	2014-04-01
Mode of Operation:	Transmitting mode.
Detector Function:	Quasi-peak (Below 1000 MHz) Average and Peak (Above 1000 MHz)
Measurement BW:	120 kHz (Below 1000 MHz) 1 MHz (Above 1000 MHz)

Test Setup:





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Results: PASS

Field Strength of Fundamental and Harmonics									
Channel	Value	Emissions Frequency	E-Field Polarity	Reading	System Factor	Field Strength at 3m	Limit	Delta to Limit	Remarks
		MHz		dB μ V/m	dB	dB μ V/m	dB μ V/m	dB μ V/m	
Low	QP	921.50	V	59.28	29.19	88.47	94.00	-5.53	Fund.
	QP		H	60.06	29.19	89.25	94.00	-4.75	Fund.
Mid	QP	923.50	V	60.68	29.28	89.96	94.00	-4.04	Fund.
	QP		H	55.27	29.28	84.55	94.00	-9.45	Fund.
High	QP	924.00	V	61.67	29.28	90.95	94.00	-3.05	Fund.
	QP		H	59.16	29.28	88.44	94.00	-5.56	Fund.
Low	PK	1842.67	V	53.47	-11.79	41.68	74.00	-32.32	Harmonic
	PK		H	53.72	-11.79	41.93	74.00	-32.07	Harmonic
Mid	PK	1850.00	V	60.22	-12.75	47.47	74.00	-26.53	Harmonic
	PK		H	55.43	-12.75	42.68	74.00	-31.32	Harmonic
High	PK	1850.00	H	66.48	-12.75	53.73	74.00	-20.27	Harmonic
	PK		H	52.71	-12.75	39.96	74.00	-34.04	Harmonic

Remark : - (*) Radiated emissions which fall in the restricted bands as defined in Section 15.205(a).

- Calculated measurement uncertainty: ± 5.0 dB



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Limits of Field Strength for Fundamental and Harmonics Frequency [Section 15.249 (a)]:

Fundamental Frequency [MHz]	Field Strength of Fundamental		Field Strength of Harmonics	
	[mV/m]	[dB μ V/m]	[μ V/m]	[dB μ V/m]
902 - 928	50	94	500	54

Compliance with the limits in the above table may be based on the use of measurement instrumentation with a CISPR quasi-peak detector.

Limit Requirement under Section 15.249 (e) :

According to section 15.249 (e), for frequencies above 1000MHz, the above field strength limits is based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20dB under any condition of modulation.

Limit for Radiated Emission [Section 15.209]:

Frequency (MHz)	Field Strength [μ V/m]	Field Strength [dB μ V/m]
30-88	100	40.0
88-216	150	43.5
216-960	200	46.0
Above 960	500	54.0

Radiated emissions, which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209.

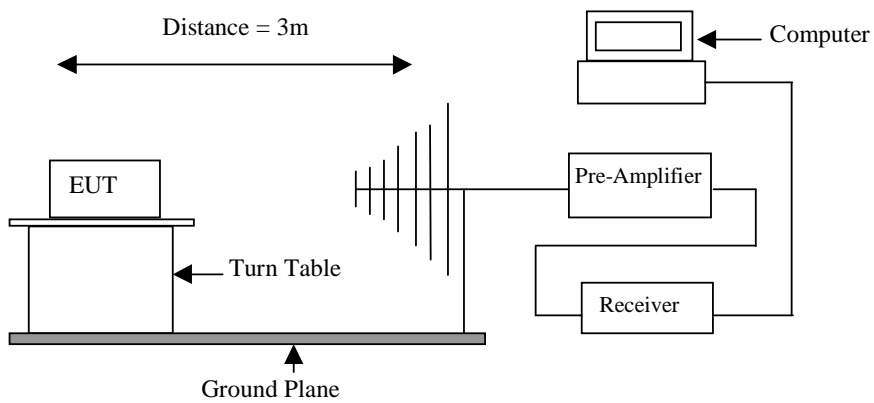
The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

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4.2 Spurious Radiated Emission

Test Requirement:	FCC part 15 section 15.249(d), 15.209
Test Method:	ANSI C63.4:2009
Test Date:	2014-04-01
Mode of Operation:	Transmitting Mode
Detector Function:	Quasi-peak (Below 1000 MHz) Average and Peak (Above 1000 MHz)
Measurement BW:	120 kHz (Below 1000 MHz) 1 MHz (Above 1000 MHz)

Test Setup:





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Results: PASS

Spurious Radiated Emissions								
Channel	Polarity	Frequency MHz	Reading dBuV	Factor dB/m	Measurement dBuV/m	Limit dBmV/m	Margin dB	Detector
Low	V	47.7833	25.95	8.39	34.34	40.00	-5.66	QP
Low	V	143.1667	21.45	15.22	36.67	43.50	-6.83	QP
Low	V	240.1667	27.90	12.94	40.84	46.00	-5.16	QP
Low	V	335.5500	24.17	17.78	41.95	46.00	-4.05	QP
Low	V	479.4333	22.01	20.91	42.92	46.00	-3.08	QP
Low	V	1750.000	54.43	12.75	41.68	74.00	-32.32	PK
Low	V	2016.667	54.60	-10.10	44.50	74.00	-29.50	PK
Low	V	2766.667	53.65	-8.92	44.73	74.00	-29.27	PK
Low	H	144.7833	27.22	15.23	42.45	43.50	-1.05	QP
Low	H	377.5833	23.39	18.92	42.31	46.00	-3.69	QP
Low	H	479.4333	19.79	20.91	40.70	46.00	-5.30	QP
Low	H	568.3500	12.58	22.57	35.15	46.00	-10.85	QP
Low	H	799.5333	7.97	27.31	35.28	46.00	-10.72	QP
Low	H	1750.000	53.73	-12.75	40.98	74.00	-33.02	PK
Low	H	2016.667	49.66	-10.10	39.56	74.00	-34.44	PK
Mid	V	47.7833	25.91	8.39	34.30	40.00	-5.70	QP
Mid	V	143.1667	21.33	15.22	36.55	43.50	-6.95	QP
Mid	V	240.1667	28.76	12.94	41.70	46.00	-4.30	QP
Mid	V	335.5500	23.73	17.78	41.51	46.00	-4.49	QP
Mid	V	479.4333	18.71	20.91	39.62	46.00	-6.38	QP
Mid	V	1750.000	61.02	-12.75	48.27	74.00	-25.73	PK
Mid	V	2766.667	49.72	-8.92	40.80	74.00	-33.20	PK
Mid	H	72.0333	33.14	3.76	36.90	40.00	-3.10	QP
Mid	H	143.1667	26.90	15.22	42.12	43.50	-1.38	QP
Mid	H	377.5833	20.52	18.92	39.44	46.00	-6.56	QP
Mid	H	479.4333	18.69	20.91	39.60	46.00	-6.40	QP
Mid	H	623.3167	12.44	23.25	35.69	46.00	-10.31	QP
Mid	H	1750.000	67.83	-12.75	53.08	74.00	-20.92	PK
Mid	H	2016.667	55.36	-10.10	45.26	74.00	-28.74	PK
Mid	H	2433.333	58.10	-9.64	48.46	74.00	-25.54	PK
Mid	H	4925.000	49.53	-2.00	47.53	74.00	-26.47	PK
High	V	47.7833	25.83	11.39	37.22	40.00	-2.78	QP
High	V	96.2833	32.00	10.07	42.07	43.50	-1.43	QP
High	V	240.1667	27.79	13.53	41.32	46.00	-4.68	QP
High	V	335.5500	23.61	17.78	41.39	46.00	-4.61	QP
High	V	479.4333	21.03	20.91	41.94	46.00	-4.06	QP
High	V	1750.000	64.81	-12.75	52.06	74.00	-21.94	PK
High	V	2775.000	59.51	-8.90	50.61	74.00	-23.39	PK
High	H	72.0333	33.22	3.76	36.98	40.00	-3.02	QP
High	H	143.1667	26.85	15.22	42.07	43.50	-1.43	QP
High	H	379.2000	23.82	18.93	42.75	46.00	-3.25	QP
High	H	479.4333	19.26	20.91	40.17	46.00	-5.83	QP
High	H	1750.000	62.61	-12.75	49.86	74.00	-24.14	PK
High	H	2016.667	50.90	-10.10	40.80	74.00	-33.20	PK
High	H	2441.667	47.08	-9.63	37.45	74.00	-36.55	PK
High	H	2441.667	47.08	-9.63	37.45	74.00	-36.55	PK



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- Note:
- No further spurious emissions found between 30MHz and lowest internal used / generated frequency.
 - Result data graph is shown at the next pages for reference.

- Remark :
- (*) Radiated emissions which fall in the restricted bands as defined in Section 15.205(a).
 - Calculated measurement uncertainty: $\pm 5.0\text{dB}$.

Limit of Outside of the Specified Bands [Section 15.249 (d)]

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 section 15.209, whichever is the lesser attenuation

Limit for Radiated Emission [Section 15.209]:

Frequency (MHz)	Field Strength [$\mu\text{V}/\text{m}$]	Field Strength [$\text{dB}\mu\text{V}/\text{m}$]
30-88	100	40.0
88-216	150	43.5
216-960	200	46.0
Above 960	500	54.0

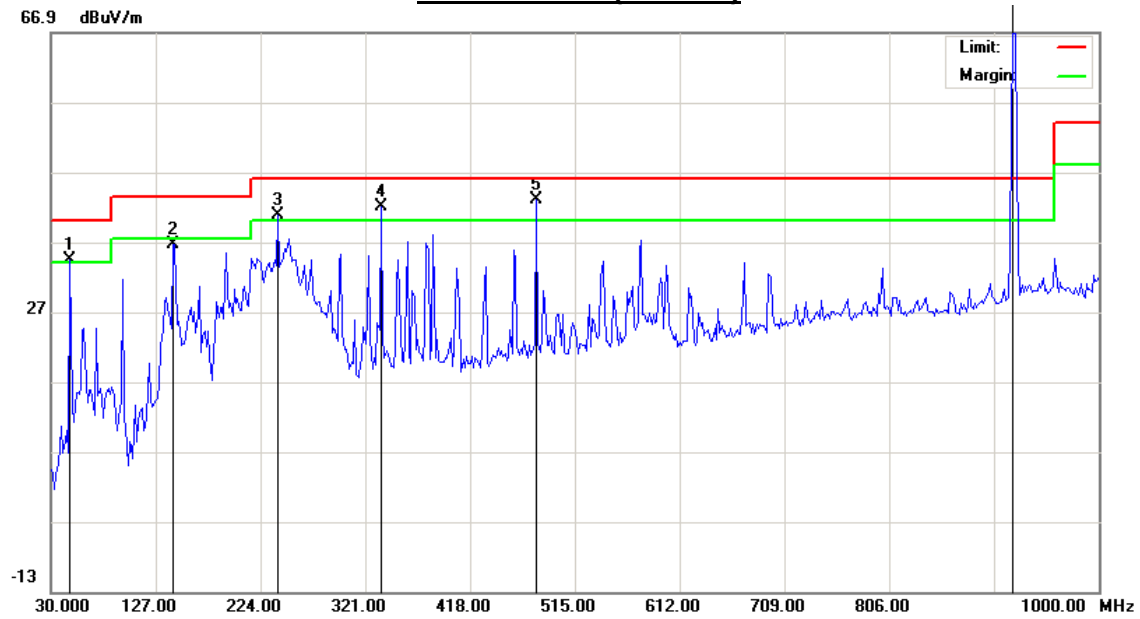
Radiated emissions, which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209.

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

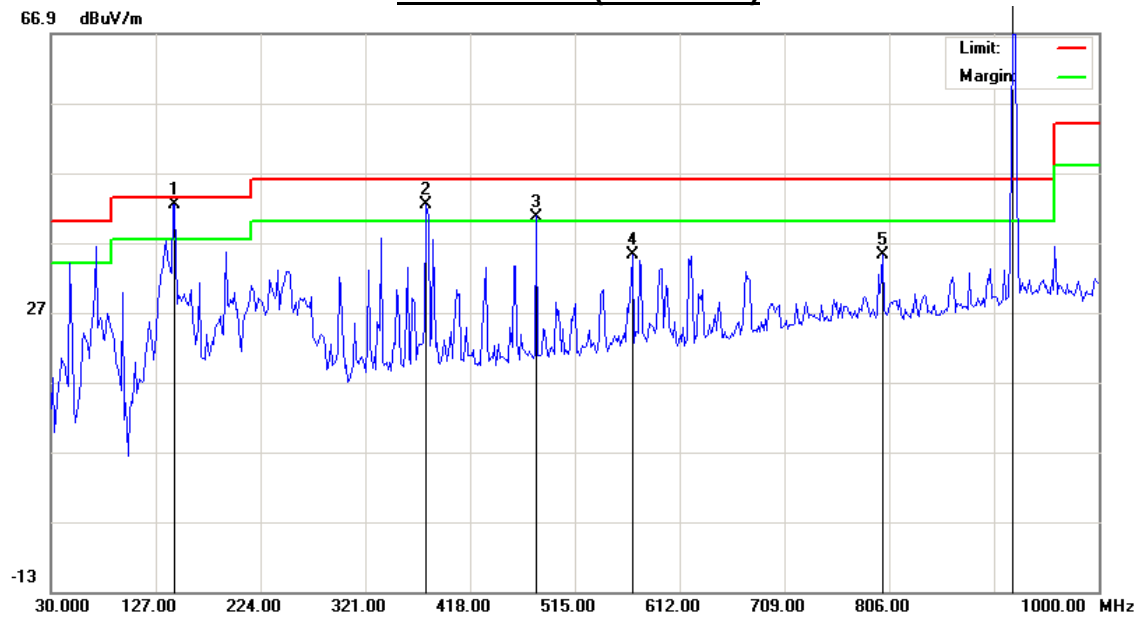


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Low Channel (Vertical)



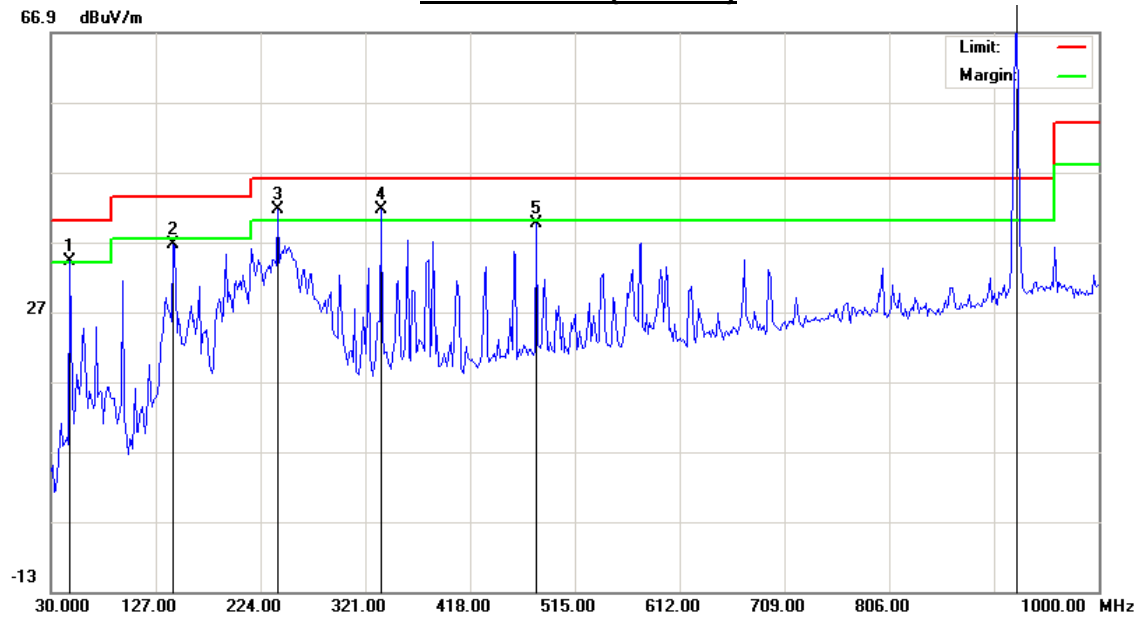
Low Channel (Horizontal)



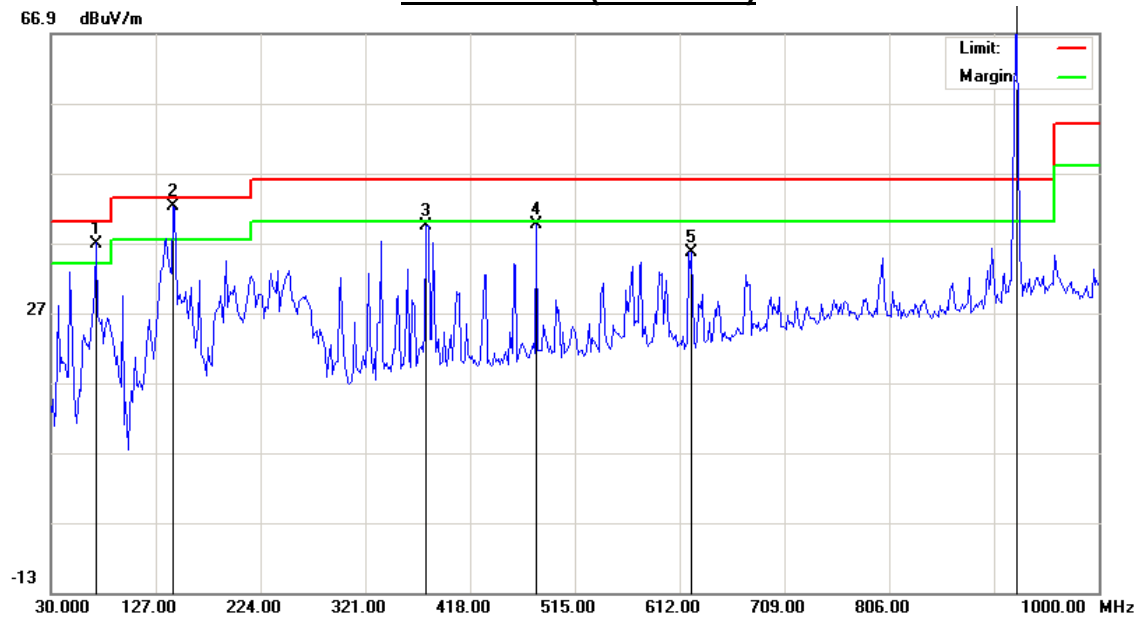


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Mid Channel (Vertical)



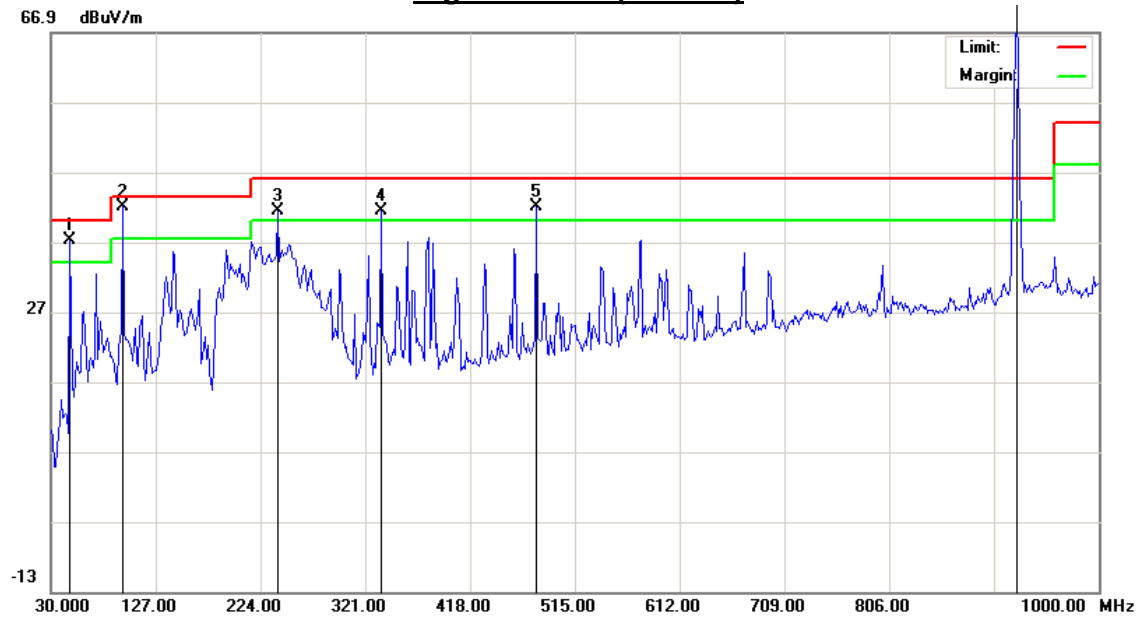
Mid Channel (Horizontal)



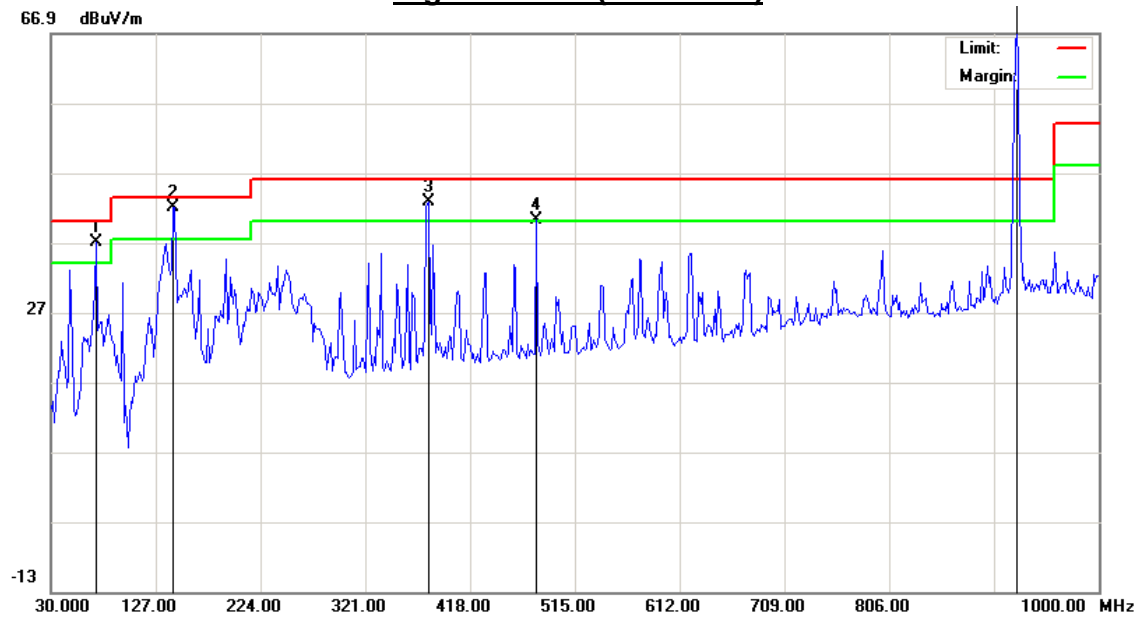


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High Channel (Vertical)



High Channel (Horizontal)





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4.3 Out of Band Emissions

Test Requirement:	FCC part 15 section 15.249 (d)
Test Method:	ANSI C63.4:2009
Test Date:	2014-04-01
Mode of Operation:	Transmitting mode.
Detector Function:	Peak

Results: PASS

Refer to the data graph, the lower and higher edge of the specified frequency bands fulfill the general radiated emission limits in section 15.209. Therefore, the EUT meets the requirement of section 15.249 (d).

Limit for Out of Band Emissions [Section 15.249 (d)]

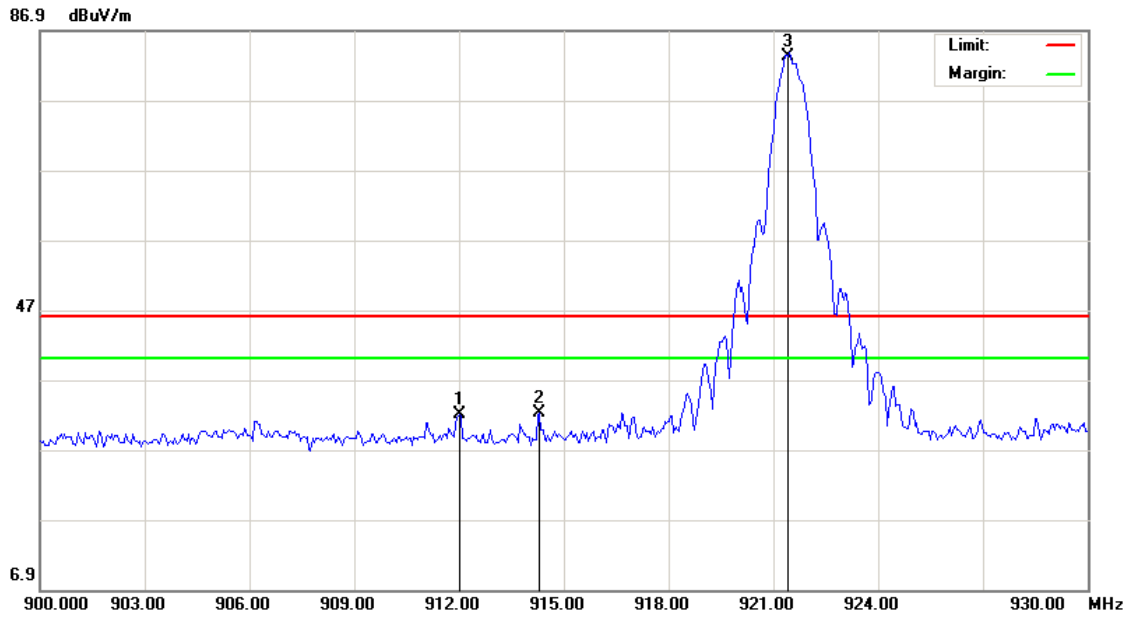
Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in section 15.209, whichever is the lesser attenuation.

Test Result: Result data graph is shown at the next pages for reference.

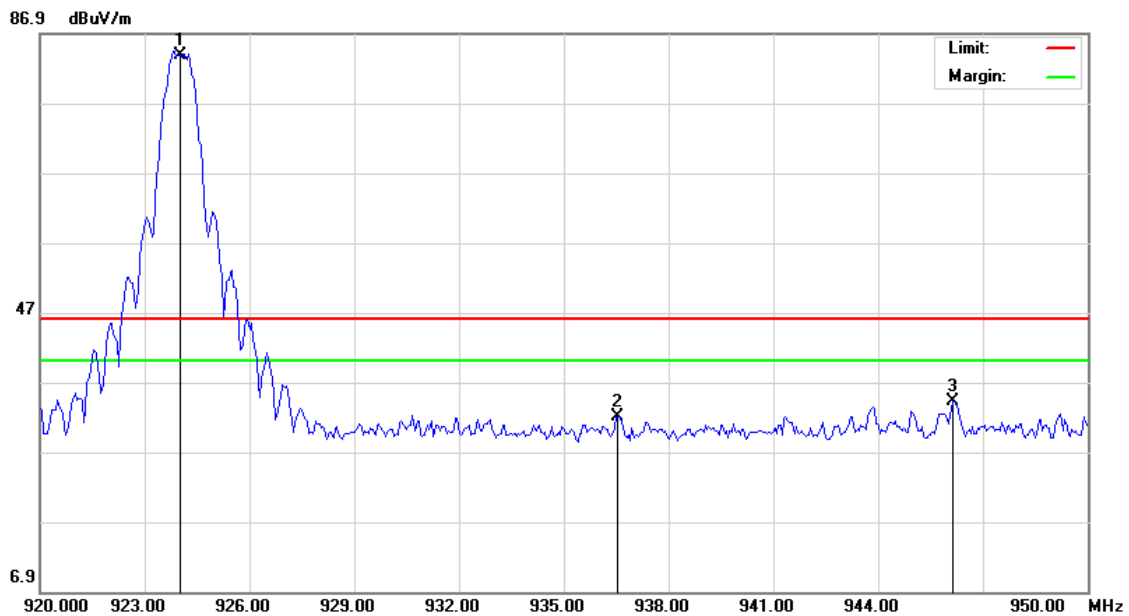


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Lowest Channel



Highest Channel





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4.4 Bandwidth Measurement

Test Requirement:	FCC part 15 section 15.215 (c)
Test Method:	ANSI C63.4:2009
Test Date:	2014-04-01
Mode of Operation:	Transmitting mode.
Detector Function:	Peak

Results: PASS

Refer to the data graph, the 20dB points of Low Channel, Mid Channel and High Channel are 1.257MHz, 1.233MHz and 1.268Hz. All channels within the operation bandwidth when equipment is operated. Therefore, the EUT meets the requirement of section 15.215(c).

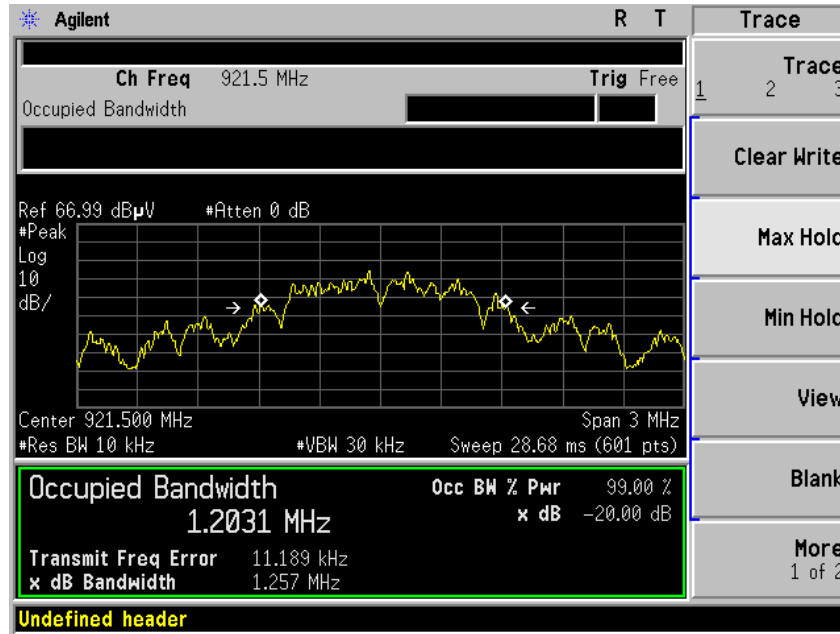
Limit for Bandwidth [Section 15.215 (c)]

The 20dB bandwidth of the emission shall be within the frequency band designated in the rule section under which the equipment is operated.

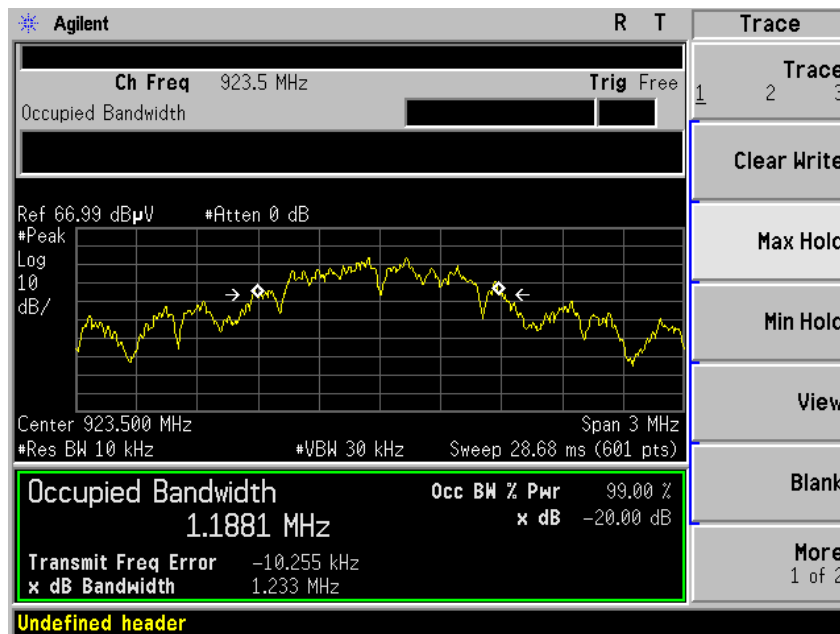
Test Result: Result data graph is shown at the next pages for reference.



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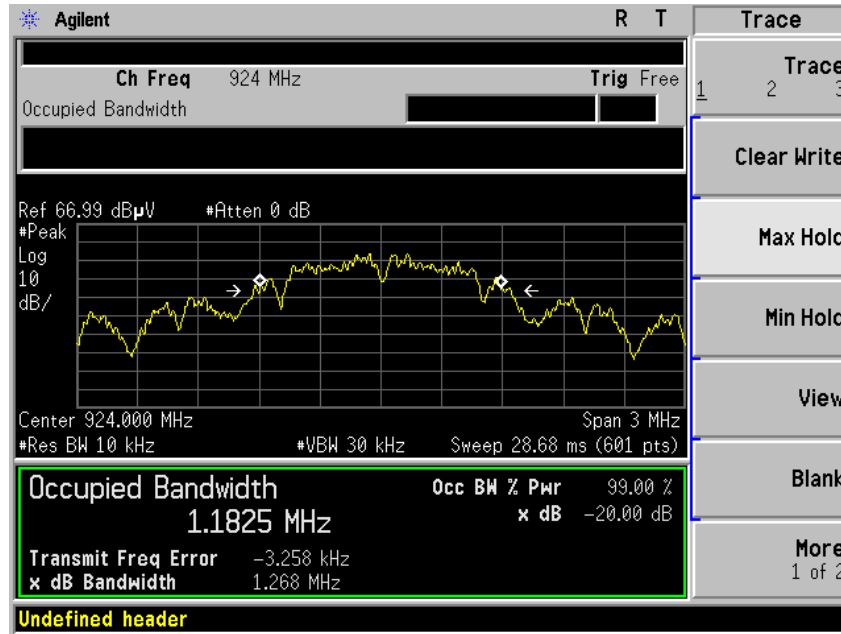
Low Channel – 20 dB point, Bandwidth 1.257MHz



Mid Channel – 20 dB point, Bandwidth 1.233MHz



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High Channel – 20 dB point, Bandwidth 1.268MHz

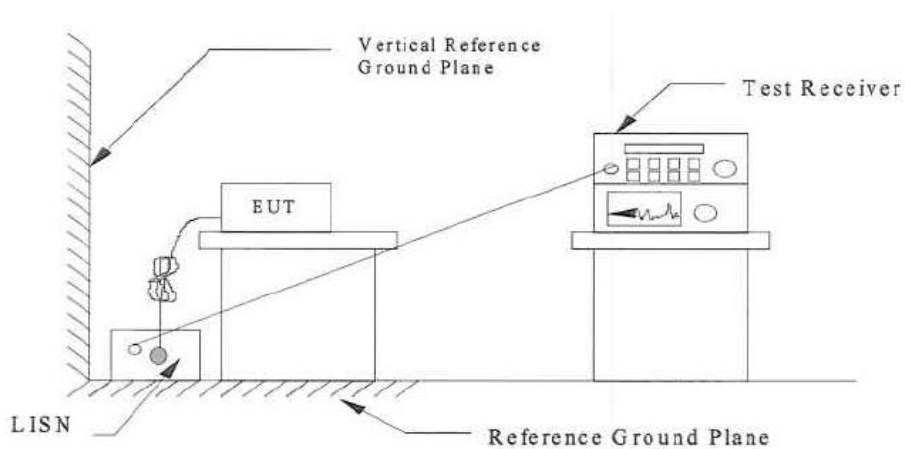
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4.5 Conducted Emissions (0.15MHz to 30MHz)

Test Requirement: FCC part 15 Section 15.207 Class B
 Test Method: ANSI C63.4:2009
 Test Date: ---
 Mode of Operation: ---
 Detector Function: Quasi-peak, average
 Measurement BW: 9 kHz

Remark: This test is not applicable for battery operated device.

Test Setup:



Results: N/A

Limits for Conducted Emission [Section 15.207]:

Frequency Range [MHz]	Quasi-Peak Limit [dB μ V]	Average Limit [dB μ V]
0.15-0.5	66 to 56*	56 to 46*
0.5-5.0	56	46
5.0-30.0	60	50

* Decreases with the logarithm of the frequency.



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5.0 List of Measurement Equipment

Radiated Emission and Out of Band Emissions

Description	Manufacturer	Model no.	Serial no.	CAL due
N/A	3m Semi- Anechoic Chamber	9.0(L)*6.0(W)*6.0(H)	N/A	Jul. 16 2014
Agilent	Spectrum Analyzer	E4440A	US41421290	Jul. 16 2014
R&S	EMI Test Receiver	ESCI	100694	Jul. 16 2014
A.H.	Wideband Antenna	SAS-521-4	26	Jul. 16 2014
EMCO	Antenna	3142C	60447	Jul. 16 2014
EM	Horn Antenna	EM-AH-10180	67	Jul. 16 2014
EM	Power Amplifier	EM30180	0607030	Jul. 16 2014
MF	Position Controller	MF-7802	MF780208138	N/A

Remarks:

CM Corrective Maintenance
N/A Not Applicable or Not Available