

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT

OF

Product Name: ION700 RT

Brand Name: BONTRAGER

Model No.: 503062

Model Difference: N/A

FCC ID: 2ADH7I97371576

Report No.: E2/2014/B0036

Issue Date: Dec. 18, 2014

FCC Rule Part: §15.249

Prepared for: Q-LITE CO., LTD.
NO.223, Xiangshun 2nd Rd., Beitun District
Taichung City(406), Taiwan R.O.C

Prepared by: SGS Taiwan Ltd.
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VERIFICATION OF COMPLIANCE

Applicant: Q-LITE CO., LTD.
 NO.223, Xiangshun 2nd Rd., Beitun District Taichung City(406),
 Taiwan R.O.C

Product Description: ION700 RT

Brand Name: BONTRAGER

Model No.: 503062

Model Difference: N/A

FCC ID: 2ADH7I97371576

File Number: E2/2014/B0036

Date of test: Nov. 19, 2014 ~ Dec. 18, 2014

Date of EUT Received: Nov. 19, 2014

We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd., Electronics & Communication Laboratory.

The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4:2009 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.249.

The test results of this report relate only to the tested sample identified in this report.

Test By: Jazz Huang *Date:* Dec. 18, 2014

Prepared By: Jazz Huang / Sr. Engineer
Karen Huang *Date:* Dec. 18, 2014

Approved By: Karen Huang / Clerk
Jim Chang *Date:* Dec. 18, 2014
Jim Chang / Supervisor

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Version

Version No.	Date	Description
00	Dec. 18, 2014	Initial creation of document

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1. GENERAL INFORMATION

1.1. Product Description

General:

Product Name:	ION700 RT	
Brand Name:	BONTRAGER	
Model No.:	503062	
Model Difference:	N/A	
Micro-USB Cable:	Model No.: CH1398AL310 , Supplier: Conness Co., Ltd.	
Sync Bracket	Model No.: 303471, Supplier: N/A	
Operation Frequency:	2457MHz	
Channel Number:	1 channel	
Channel Space:	0MHz	
Modulation Type:	GFSK	
Hardware Version:	4	
Software Version:	0	
Power Supply:	3.7Vdc form rechargeable battery or 5Vdc USB port	
	Battery :	S/N.: AP2904130E2805056 Supplier: GETAC TECHNOLOGY CORP.
Antenna Designation:	Internal Antenna, Antenna Gain: 2.34dBi	

This report complies with FCC 15.249

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1.2. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: 2ADH7Q97371576 filing to comply with Section 15.249 of the FCC Part 15, Subpart C Rules.

1.3. Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4:2009. Radiated testing was performed at an antenna to EUT distance 3 meters.

1.4. Test Facility

The measurement facilities used to collect the 3m Radiated Emission and AC power line conducted data are located on the address of SGS Taiwan Ltd. Electronics & Communication Laboratory No.2, Keji 1st Rd., Guishan Township, Taoyuan County, Taiwan which are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2009. FCC Registration Number: 990257. The address of SGS Taiwan Ltd. Electronics & Communication Laboratory 1F, No.134, Wukung Road New Taipei City TAIWAN 24803, Canada Registration Number: 4620A-5.

The 10 m Open Area Test Sites located on the address of SGS Taiwan Ltd. Electronics & Communication Laboratory No.2, Keji 1st Rd., Guishan Township, Taoyuan County, Taiwan which is constructed and calibrated to meet the CISPR 22/EN 55022 requirements. FCC Registration Number: 455997. The address of SGS Taiwan Ltd. Electronics & Communication Laboratory 1F, No.134, Wukung Road New Taipei City TAIWAN 24803, IC Registration Number: 4620A-6.

1.5. Special Accessories

There are no special accessories used while test was conducted.

1.6. Equipment Modifications

There was no modification incorporated into the EUT.

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2. SYSTEM TEST CONFIGURATION

2.1. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2. EUT Exercise

An engineering test mode (software/firmware) that applicant provided was utilized to manipulate the EUT into transmit, selection of the test channel, and modulation scheme.

2.3. Test Procedure

2.3.1 Conducted Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. According to the requirements in Section 7.3.1 of ANSI C63.4-2009. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz and the measurement procedure 7.3 in ANSI 63.4:2009 & 6.2.2 is followed to carry out the test. The CISPR Quasi-Peak and Average detector mode is employed according to §15.107

2.3.2 Radiated Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter(EUT) was rotated through three orthogonal axes according to the requirements in Section 8 and 13 of ANSI C63.4-2009.

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2.4. Limitation

(1) Conducted Emission

According to section 15.207(a) Conducted Emission Limits is as following.

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15 – 0.5	66 - 56	56 - 46
0.5 – 5	56	46
5 - 30	60	50

(2) Radiated Emission 15.249(a)

The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following.

Frequency (MHz)	Field strength of Fundamental	Field strength of Harmonics	Distance (m)
902 - 928	50 mV/m (94dBuV/m)	500 uV/m (54dBuV/m)	3
2400 – 2483.5	50 mV/m (94dBuV/m)	500 uV/m (54dBuV/m)	3
5725 – 5875	50 mV/m (94dBuV/m)	500 uV/m (54dBuV/m)	3
24.0 – 24.25GHz	250 mV/m (107.95dBuV/m)	2500 uV/m (67.95dBuV/m)	3

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(3) Radiated Emission 15.249 (d)

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

Frequency (MHz)	Field strength $\mu\text{V/m}$	Distance (m)	Field strength at 3m $\text{dB}\mu\text{V/m}$
1.705-30	30	30	69.54
30-88	100	3	40
88-216	150	3	43.5
216-960	200	3	46
Above 960	500	3	54

(4) Radiated Emission 15.249(e)

For frequencies above 1000MHz, the above field strength limits are based on average limits. 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.

- Remark:
1. Emission level in $\text{dB}\mu\text{V/m} = 20 \log (\mu\text{V/m})$
 2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
 3. Only spurious frequency is permitted to locate within the Restricted Bands specified in provision of ξ 15.205
 4. Emission spurious frequency which appearing within the Restricted Bands specified in provision of ξ 15.205, then the general radiated emission limits in ξ 15.209 apply.

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2.5. Configuration of Tested System

Fig. 2-1 Radiated Emission Configuration



Fig. 2-2 Conducted (Antenna Port) Configuration

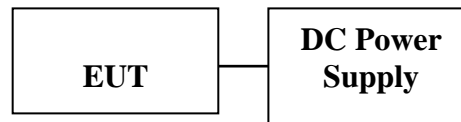


Fig. 2-3 AC Power Line Conducted Configuration

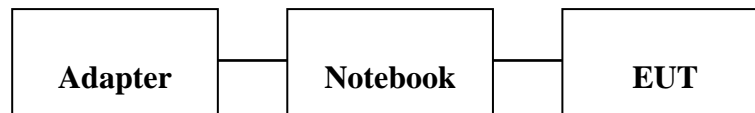


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	Test Software	N/A	N/A	N/A	N/A	N/A
2.	DC Power Supply	Agilent	E3634A	MY53180030	Shielding	Un-shielding
3.	Notebook	Lenovo	L412	LR-027LM	Shielding	Un-shielding

Note: All the above equipment/cables were placed in worse case positions to maximize emission signals during emission test.

Grounding: Grounding was in accordance with the manufacturer's requirements and conditions for the intended use.

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3. SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.207(a)	AC Power Line Conducted Emission	Compliant
§15.249(a)(e)	Radiated Emission	Compliant
§15.215(c)	20dB band width Measurement	Compliant

4. DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition.

The EUT is staying in continuous transmitting mode.

2457MHz with highest data rate are chosen for full testing.

The field strength of radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) Transmitter for one channel, and the worst case E2 position was reported.

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5. MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 2.586 dB
20dB Bandwidth	+/- 123.36 Hz
Temperature	+/- 0.8 °C
Humidity	+/- 4.7 %
DC / AC Power Source	DC= +/- 1%, AC= +/- 0.2%

Radiated Spurious Emission:

Measurement uncertainty	9kHz - 30MHz: +/- 2.3dB
-------------------------	-------------------------

Measurement uncertainty (Polarization : Vertical)	30MHz - 180MHz: +/- 3.37dB
	180MHz -417MHz: +/- 3.19dB
	0.417GHz-1GHz: +/- 3.19dB
	1GHz - 18GHz: +/- 4.04dB
	18GHz - 40GHz: +/- 4.04dB

Measurement uncertainty (Polarization : Horizontal)	30MHz - 167MHz: +/- 4.22dB
	167MHz -500MHz: +/- 3.44dB
	0.5GHz-1GHz: +/- 3.39dB
	1GHz - 18GHz: +/- 4.08dB
	18GHz - 40GHz: +/- 4.08dB

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

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6. CONDUCTED EMISSIONS TEST

6.1 Standard Applicable:

According to §15.207, frequency range within 150kHz to 30MHz shall not exceed the Limit table as below.

Frequency range MHz	Limits dB(uV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Note

- The lower limit shall apply at the transition frequencies
- The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

6.2 Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESCI 3	101311	2014/06/20	2015/06/19
Coaxial Cables	N/A	N30N30-1042-150c m	N/A	2014/02/07	2015/02/06
LISN	Schwarzbeck	NSLK 8127	8127-648	2014/06/10	2015/06/09
LISN	Rolf-Heine	NNB-2/16Z	99012	2014/03/26	2015/03/25
Test Software	Farad	EZ-EMC	Ver. SGS-03A2	N.C.R.	N.C.R.

6.3 EUT Setup:

- The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.4:2009
- The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
- The LISN was connected with 120Vac/60Hz power source.

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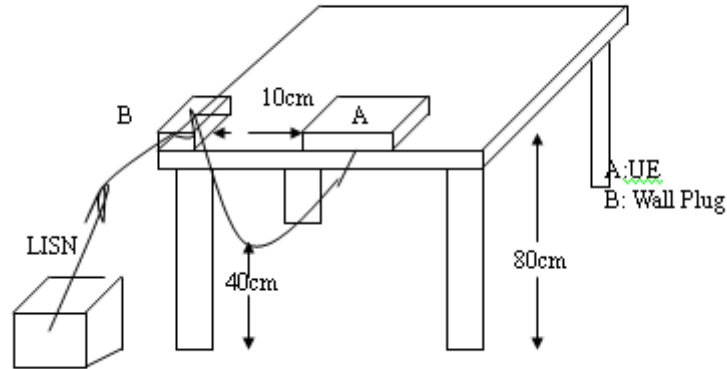
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6.4. Test SET-UP (Block Diagram of Configuration)



6.5. Measurement Procedure:

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all phases of power being supplied by given UE are completed

6.6. Measurement Result:

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

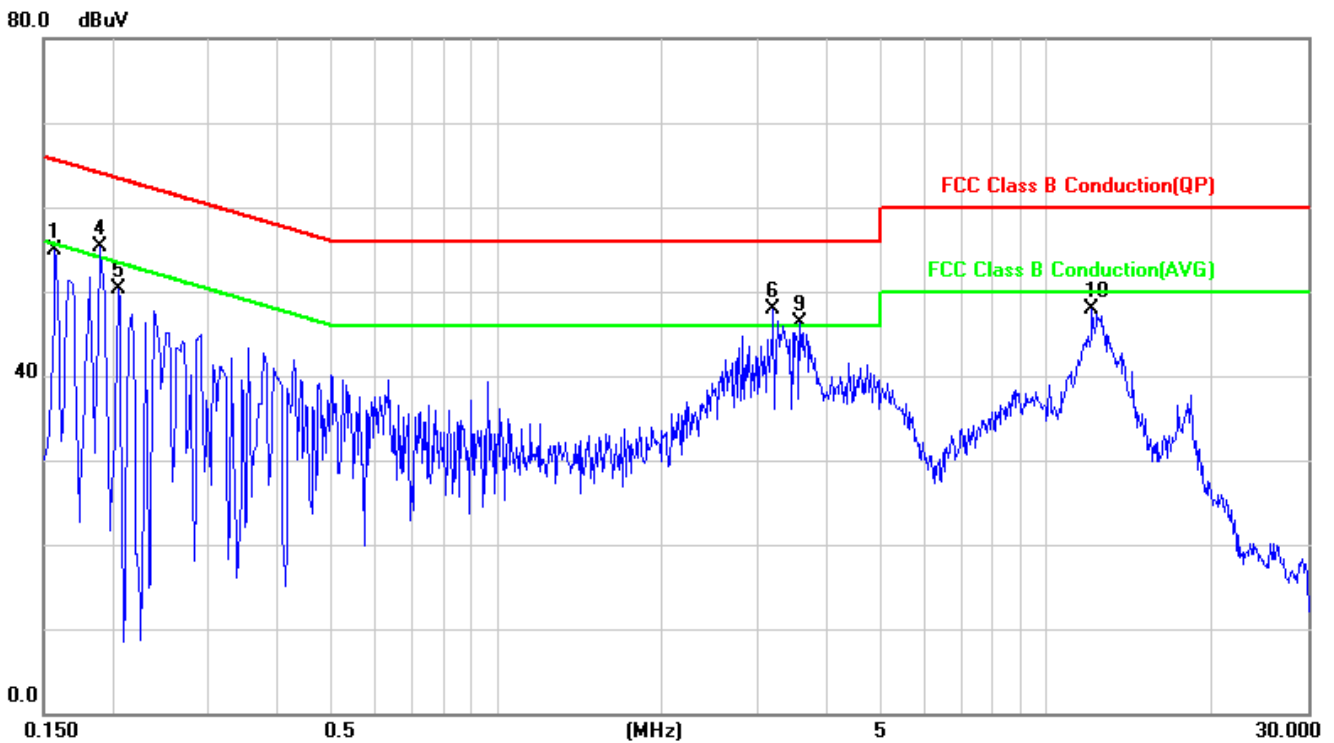
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Operation Mode:	Operation mode		Test Date:	Dec. 02, 2014
Temperature:	21 °C	Humidity:	50 %	Test By: Jerry
Model No.:	503062		Phase:	L1



No.	Mk.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Measurement (dBuV)	Limit (dBuV)	Over (dB)	Detector	Comment
1		0.1580	54.73	0.09	54.82	65.57	-10.75	peak	
2		0.1580	17.47	0.09	17.56	55.57	-38.01	AVG	
3		0.1887	34.70	0.08	34.78	54.09	-19.31	AVG	
4		0.1900	55.20	0.08	55.28	64.04	-8.76	peak	
5		0.2060	50.21	0.08	50.29	63.37	-13.08	peak	
6	*	3.1900	47.36	0.60	47.96	56.00	-8.04	peak	
7		3.2215	27.40	0.60	28.00	46.00	-18.00	AVG	
8		3.5535	27.80	0.60	28.40	46.00	-17.60	AVG	
9		3.5820	45.69	0.60	46.29	56.00	-9.71	peak	
10		12.1620	47.29	0.64	47.93	60.00	-12.07	peak	
11		12.2020	34.24	0.64	34.88	50.00	-15.12	AVG	

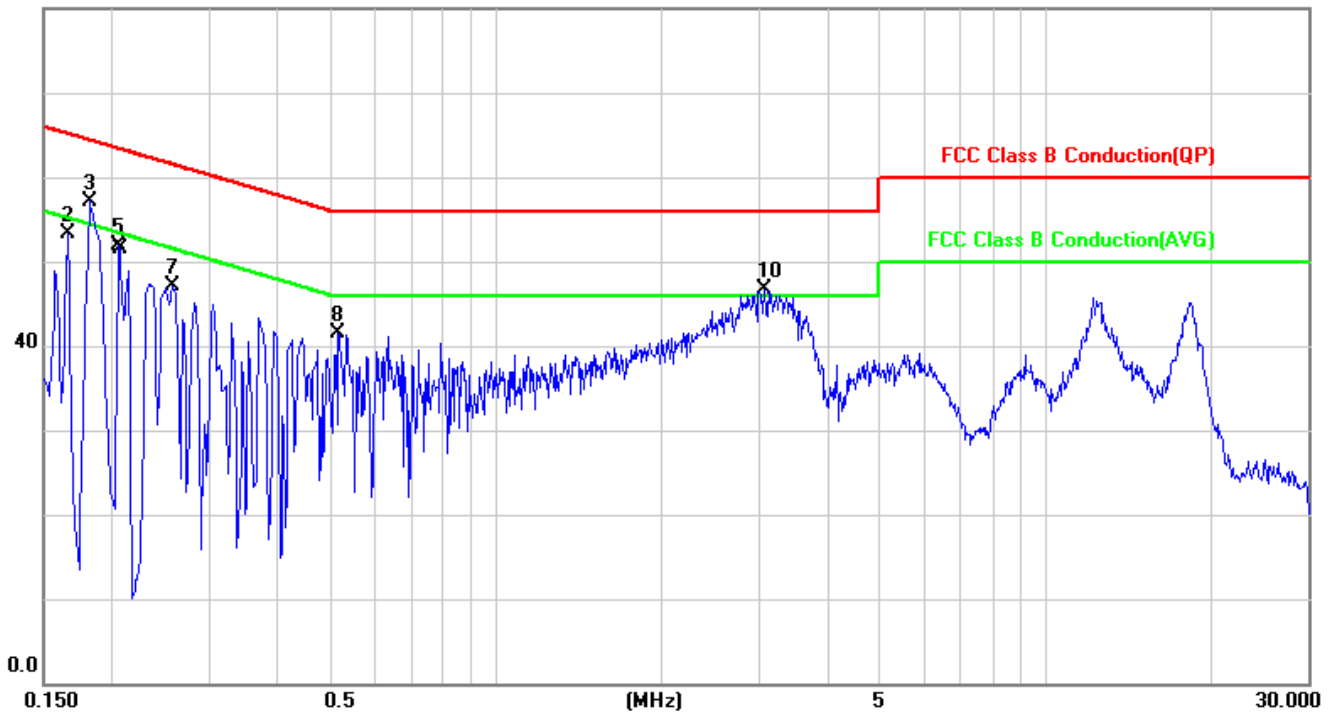
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Operation Mode:	Operation mode		Test Date:	Dec. 02, 2014	
Temperature:	21 °C	Humidity:	50 %	Test By:	Jerry
Model No.:	503062		Phase:	N	

80.0 dBuV



No.	Mk.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Measurement (dBuV)	Limit (dBuV)	Over (dB)	Detector	Comment
1		0.1638	17.80	0.09	17.89	55.27	-37.38	AVG	
2		0.1660	53.17	0.09	53.26	65.16	-11.90	peak	
3	*	0.1820	57.10	0.10	57.20	64.39	-7.19	peak	
4		0.1827	37.10	0.10	37.20	54.36	-17.16	AVG	
5		0.2060	51.73	0.09	51.82	63.37	-11.55	peak	
6		0.2083	17.60	0.09	17.69	53.27	-35.58	AVG	
7		0.2580	46.90	0.12	47.02	61.50	-14.48	peak	
8		0.5180	41.19	0.25	41.44	56.00	-14.56	peak	
9		3.0490	29.52	0.60	30.12	46.00	-15.88	AVG	
10		3.0740	46.20	0.60	46.80	56.00	-9.20	peak	

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7. RADIATED EMISSION TEST

7.1 Measurement Procedure

- 1 The EUT was placed on a turn table which is 0.8m above ground plane.
- 2 The turn table shall rotate 360 degrees to determine the position of maximum emission level.
- 3 EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
- 4 When measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” is still within the 3dB illumination BW of the measurement antenna.
- 5 Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 6 And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 7 Repeat above procedures until all frequency of the interest measured were complete.

Auxiliary Procedure (Setting on Spectrum to capture the reading of emission level):

Span = wide enough to fully capture the emission being measured

RBW = 1 MHz for $f \geq 1$ GHz, 100 kHz for $f < 1$ GHz

VBW \geq RBW

Sweep = auto

Detector function = peak

Trace = max hold

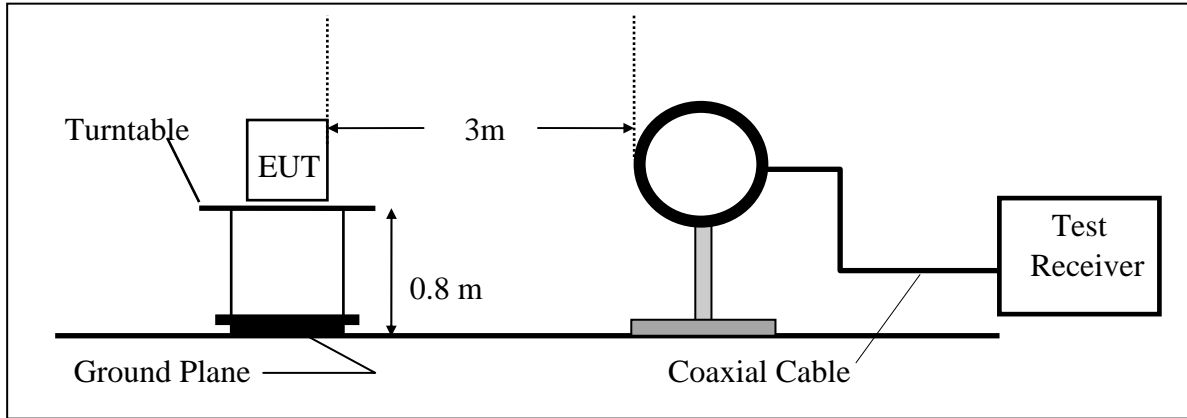
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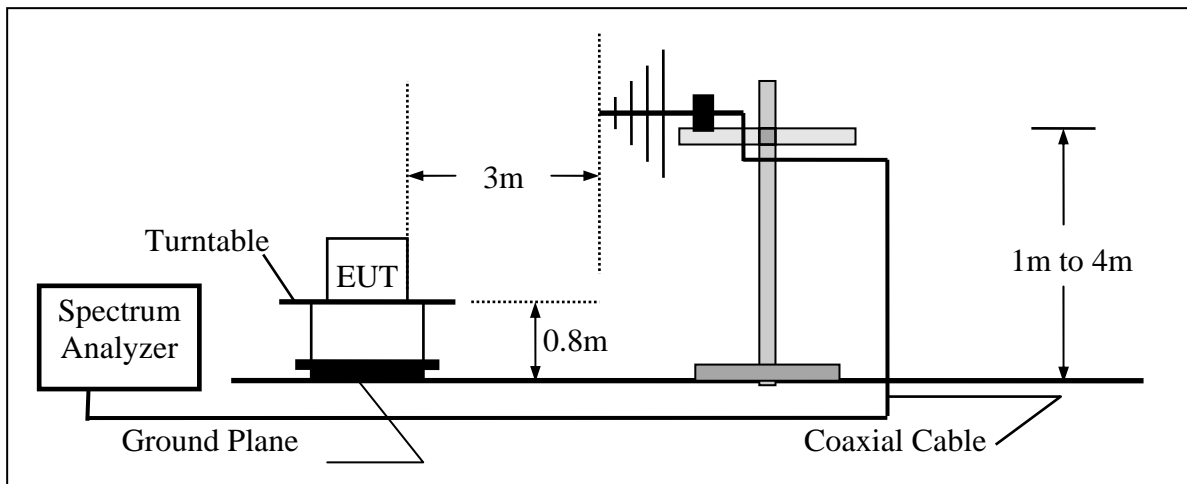
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7.2. Test SET-UP (Block Diagram of Configuration)

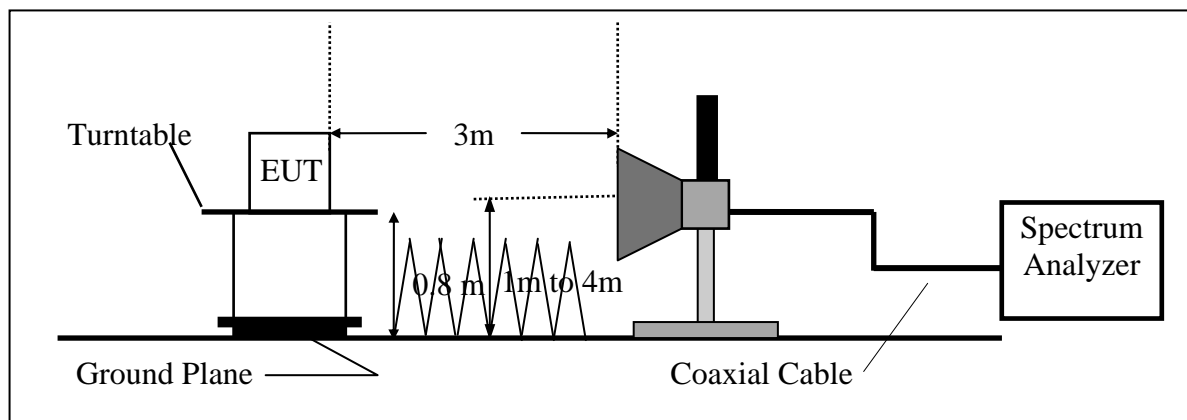
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(B) Radiated Emission Test Set-UP Frequency Over 1 GHz



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7.3 Measurement Equipment Used:

966 Chamber					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESU 40	100363	2014/04/12	2015/04/11
Loop Antenna	ETS-Lindgren	6502	00143303	2014/01/16	2015/01/15
Broadband Antenna	TESEQ	CBL 6112D	35240	2014/01/17	2015/01/16
Horn Antenna	ETS-Lindgren	3117	00143272	2014/01/27	2015/01/26
Horn Antenna	ETS-Lindgren	3160-09	00117911	2014/01/22	2015/01/21
Pre Amplifier	R&S	SCU-18	10204	2014/03/26	2015/03/25
Pre Amplifier	R&S	SCU-26	100780	2014/03/26	2015/03/25
Pre Amplifier	EMC Instruments	EMC330	980096	2014/03/26	2015/03/25
Coaxial Cable	Huber+Suhner	RG 214/U	W21.03	2014/03/26	2015/03/25
Coaxial Cable	Huber+Suhner	RG 214/U	W22.03	2014/03/26	2015/03/25
Coaxial Cable	Huber+Suhner	SUCCOFLEX 104	MY17413/4	2014/03/26	2015/03/25
Coaxial Cable	Huber+Suhner	SUCCOFLEX 104	MY17404/4	2014/03/26	2015/03/25
Coaxial Cable	Huber+Suhner	SUCCOFLEX 104	MY17394/4	2014/03/26	2015/03/25
Coaxial Cable	Huber+Suhner	SUCCOFLEX 104	MY17386/4	2014/03/26	2015/03/25
Coaxial Cable	Huber+Suhner	SUCCOFLEX 104	MY17388/4	2014/03/26	2015/03/25
Attenuator	WOKEN	218FS-10	HY-151	2014/01/06	2015/01/05
Controller	MF	MF-7802	N/A	N.C.R.	N.C.R.
Antenna Master	MF	N/A	N/A	N.C.R.	N.C.R.
Turn Table	MF	N/A	N/A	N.C.R.	N.C.R.
Site NSA	SGS	966 Chamber C	SAC-C	2014/03/05	2015/03/04
Site VSWR	SGS	966 Chamber C	SAC-C	2014/04/10	2015/04/09
Test Software	World-Pallas	Dr. E	V 3.0 Lite	N.C.R.	N.C.R.

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7.4 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

Note: 15.31(o) The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported.

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7.5 Measurement Result

Radiated Spurious Emission Measurement Result (MAIN)

Operation Band	:2.4G	Test Date	:2014-12-08
Fundamental Frequency	:2457 MHz	Temp./Humi.	:24.6 deg_C/53 RH
Operation Mode	:MAIN	Engineer	:Jerry
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL

Actual FS(dB μ V/m) = SPA. Reading level(dB μ V) + Factor(dB)

Factor(dB) = Antenna Factor(dB μ V/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we’ve employed is peak detector.

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Safe Margin dB
2456.87	F	Peak	84.16	3.30	87.46	114.00	-26.54
2456.87	F	Average	81.92	3.30	85.22	94.00	-8.78

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Operation Band	:2.4G	Test Date	:2014-12-08
Fundamental Frequency	:2457 MHz	Temp./Humi.	:24.6 deg_C/53 RH
Operation Mode	:MAIN	Engineer	:Jerry
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we’ve employed is peak detector.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2456.89	F	Peak	84.49	3.30	87.78	114.00	-26.22
2456.89	F	Average	82.43	3.30	85.73	94.00	-8.27

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Radiated Emission:

(Unwanted Emissions into Restricted Frequency Bands): 2457 MHz

Operation Band	:2.4G	Test Date	:2014-12-08
Fundamental Frequency	:2457 MHz	Temp./Humi.	:24.6 deg_C/53 RH
Operation Mode	:Band Edge	Engineer	:Jerry
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we’ve employed is peak detector.

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Safe Margin dB
2390.00	E	Peak	50.74	3.14	53.87	74.00	-20.13
2390.00	E	Average	36.61	3.14	39.75	54.00	-14.25

Operation Band	:2.4G	Test Date	:2014-12-08
Fundamental Frequency	:2457 MHz	Temp./Humi.	:24.6 deg_C/53 RH
Operation Mode	:Band Edge	Engineer	:Jerry
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	: HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we’ve employed is peak detector.

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Safe Margin dB
2390.00	E	Peak	50.54	3.14	53.68	74.00	-20.32
2390.00	E	Average	36.63	3.14	39.77	54.00	-14.23

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Operation Band	:2.4G	Test Date	:2014-12-08
Fundamental Frequency	:2457 MHz	Temp./Humi.	:24.6 deg_C/53 RH
Operation Mode	:Band Edge	Engineer	:Jerry
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---“ : denotes Noise Floor.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we’ve employed is peak detector.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2483.50	E	Peak	51.35	3.35	54.71	74.00	-19.29
2483.50	E	Average	37.07	3.35	40.42	54.00	-13.58

Operation Band	:2.4G	Test Date	:2014-12-08
Fundamental Frequency	:2457 MHz	Temp./Humi.	:24.6 deg_C/53 RH
Operation Mode	:Band Edge	Engineer	:Jerry
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	: HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---“ : denotes Noise Floor.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we’ve employed is peak detector.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2483.50	E	Peak	51.21	3.35	54.57	74.00	-19.43
2483.50	E	Average	37.07	3.35	40.42	54.00	-13.58

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Radiated Spurious Emission Measurement Result

Operation Band	:2.4G	Test Date	:2014-12-08
Fundamental Frequency	:2457 MHz	Temp./Humi.	:24.6 deg_C/53 RH
Operation Mode	:TX	Engineer	:Jerry
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---“ : denotes Noise Floor.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we’ve employed is peak detector.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level	dB	FS	@3m	dB
		PK/QP/AV	dBμV		dBμV/m	dBμV/m	
36.79	S	Peak	50.39	-19.45	30.94	40.00	-9.06
106.63	S	Peak	39.35	-22.36	16.99	43.50	-26.51
279.29	S	Peak	33.58	-19.55	14.03	46.00	-31.97
558.65	S	Peak	31.59	-12.30	19.28	46.00	-26.72
774.96	S	Peak	33.06	-10.27	22.79	46.00	-23.21
994.18	S	Peak	30.68	-8.21	22.48	54.00	-31.52
4914.00	H	Peak	48.78	0.46	49.24	74.00	-24.76
4914.00	H	Average	45.17	0.46	45.63	54.00	-8.37
7371.00	H	Peak	47.46	4.99	52.45	74.00	-21.55
7371.00	H	Average	42.96	4.99	47.95	54.00	-6.05
9828.00	H	Peak	---				
12285.00	H	Peak	---				
14742.00	H	Peak	---				
17199.00	H	Peak	---				
19656.00	H	Peak	---				
22113.00	H	Peak	---				
24570.00	H	Peak	---				

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Operation Band	:2.4G	Test Date	:2014-12-08
Fundamental Frequency	:2457 MHz	Temp./Humi.	:24.6 deg_C/53 RH
Operation Mode	:TX	Engineer	:Jerry
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---“ : denotes Noise Floor.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level	dB	FS	@3m	dB
		PK/QP/AV	dBμV		dBμV/m	dBμV/m	
36.79	S	Peak	31.69	-19.45	12.24	40.00	-27.76
130.88	S	Peak	33.25	-21.55	11.71	43.50	-31.79
443.22	S	Peak	32.60	-15.18	17.42	46.00	-28.58
721.61	S	Peak	32.48	-11.12	21.36	46.00	-24.64
844.80	S	Peak	32.71	-9.83	22.88	46.00	-23.12
996.12	S	Peak	30.69	-8.16	22.53	54.00	-31.47
4914.00	H	Peak	45.25	0.46	45.71	74.00	-28.29
4914.00	H	Average	39.35	0.46	39.81	54.00	-14.19
7371.00	H	Peak	49.39	4.99	54.38	74.00	-19.62
7371.00	H	Average	44.86	4.99	49.85	54.00	-4.15
9828.00	H	Peak	---				
12285.00	H	Peak	---				
14742.00	H	Peak	---				
17199.00	H	Peak	---				
19656.00	H	Peak	---				
22113.00	H	Peak	---				
24570.00	H	Peak	---				

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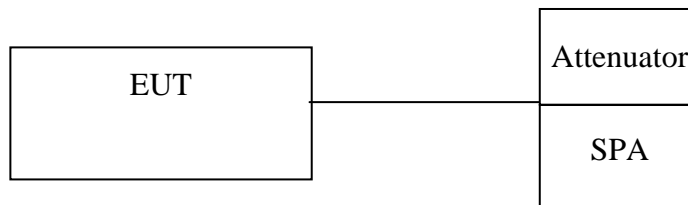
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8. 20 dB BAND WIDTH MEASUREMENT

8.1 Measurement Procedure

- 1 Place the EUT on the table and set it in transmitting mode.
- 2 Set the spectrum analyzer Frequency = fundamental frequency, RBW=100 kHz, VBW = 300 kHz, Span= 5MHz, Sweep=auto, and Max hold for 20dB test.
- 3 Mark the max reading.
- 4 Repeat above procedures until all frequency measured were complete.

8.2. Test SET-UP (Block Diagram of Configuration)



8.3. Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	N9010A	MY53400256	2014/10/15	2015/10/14
Power Meter	Anritsu	ML2496A	1326001	2014/06/20	2015/06/19
Power Sensor	Anritsu	MA2411B	1315048	2014/06/20	2015/06/19
Power Sensor	Anritsu	MA2411B	1315049	2014/06/20	2015/06/19
Coaxial Cable 30cm	WOKEN	00100A1F1A195C	2	2014/01/06	2015/01/05
DC Block	Mini-Circuits	BLK-18-S+	4	2014/01/06	2015/01/05
Splitter	RF-LAMBAD	RFLT2W1G18G	11-JSPF412-019	2014/01/06	2015/01/05
Attenuator	WOKEN	218FS-10	7	2014/01/06	2015/01/05
Bluetooth Test Set	Anritsu	8852B	1329002	2014/7/16	2015/07/15

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8.4. Measurement Results:

20dB Bandwidth:

Frequency MHz	20dB Bandwidth (MHz)
2457	1.314

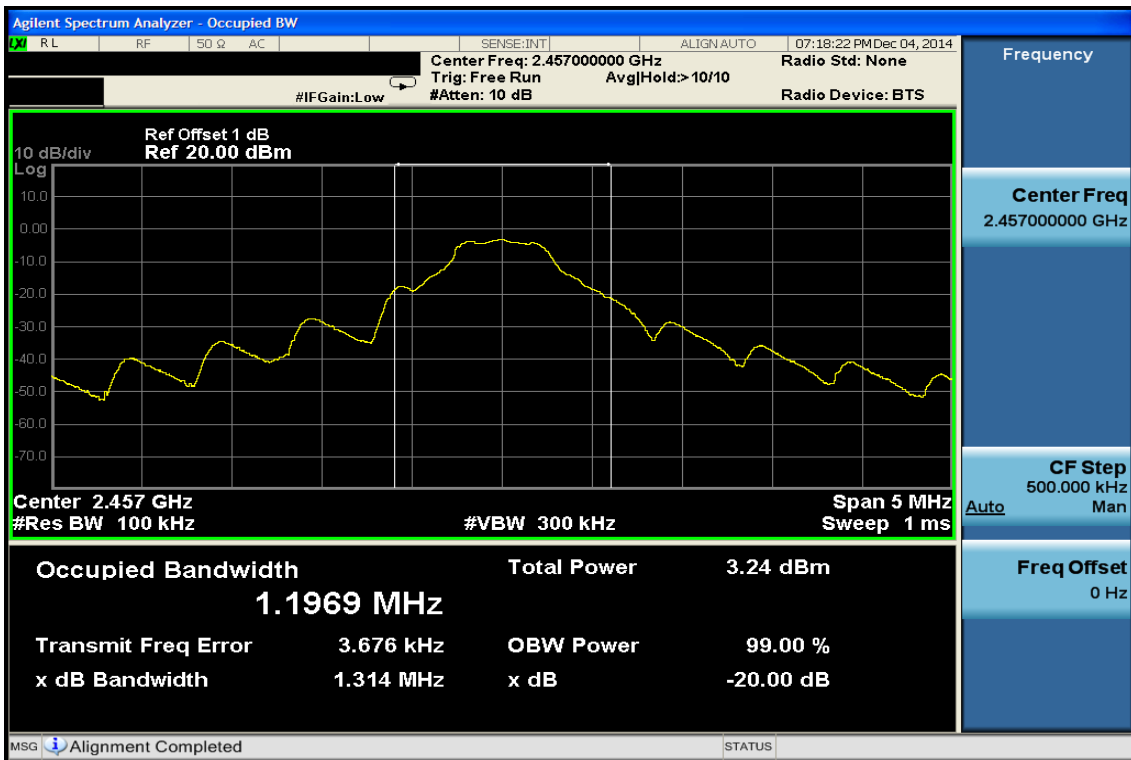
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20dB Bandwidth Test Data



~ End of Report ~

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