



No. 1 Workshop, M-10, Middle section, Science & Technology Park,
Shenzhen, Guangdong, China 518057

Telephone: +86 (0) 755 2601 2053

Fax: +86 (0) 755 2671 0594

Email: sgs_internet_operations@sgs.com

Report No.: SZEMO11010031402

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FCC REPORT

Application No.: SZEM1108003212RF
Applicant: Current Cost Ltd
Product Name: Envi R Energy Monitor receiver and transmitter
Operation Frequency : 433.92MHz
FCC ID: WW9-2011-ENVIR
Standards: FCC CFR Title 47 Part 15 Subpart C Section 15.231: 2010
Date of Receipt: 2011-01-20
Date of Test: 2011-01-26 to 2011-06-23
Date of Issue: 2011-09-06

Test Result :	PASS *
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- * In the configuration tested, the EUT complied with the standards specified above. This report supersedes our previous report SZEMO11010031401, issued on 2011-07-07, which is hereby deemed null and void.

Authorized Signature:

Jack Zhang
EMC Laboratory Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. All test results in this report can be traceable to National or International Standards.

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3 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	15.203	Pass
Field strength of the fundamental signal	15.231 (e)	Pass
Spurious emissions	15.231 (e)/15.209	Pass
20dB Bandwidth	15.231 (c)	Pass
Transmit Time and Silent Period	15.231 (e)	Pass

Remark: Pass: The EUT complies with the essential requirements in the standard.

Fail: The EUT does not comply with the essential requirements in the standard.



4 General Information

4.1 Client Information

Applicant:	Current Cost Ltd
Address of Applicant:	Anglesey Lodge, Farnborough Road, Aldershot, Hampshire GU11 3BJ
Manufacturer:	Current Cost Ltd
Address of Manufacturer:	Anglesey Lodge, Farnborough Road, Aldershot, Hampshire GU11 3BJ
Factory:	Current Cost Ltd
Address of Factory:	Anglesey Lodge, Farnborough Road, Aldershot, Hampshire GU11 3BJ

4.2 General Description of E.U.T.

Product Name:	Envi R Energy Monitor receiver and transmitter
Model No.:	Envi R
Operation Frequency:	433.92MHz
Modulation Type:	FSK
Antenna Type:	Integral
Antenna gain:	0dBi
Power supply:	DC 3V

4.3 E.U.T Operation mode

Operating Environment:	
Temperature:	24.0 °C
Humidity:	50 % RH
Atmospheric Pressure:	1004 mbar
Test mode:	
Transmitting mode:	Keep the EUT transmitting continuously with modulation signal.



4.4 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **CNAS (No. CNAS L2929)**
CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.
- **VCCI**
The 3m Semi-anechoic chamber and Shielded Room (7.5m x 4.0m x 3.0m) of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-2197 and C-2383 respectively.
Date of Registration: September 29, 2008. Valid until September 28, 2011.
- **FCC – Registration No.: 556682**
SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 556682, March 16, 2011
- **Industry Canada (IC)**
The 3m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1.

4.5 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch E&E Lab

No. 1 Workshop, M-10, Middle section, Science & Technology Park, Shenzhen, Guangdong, China
518057

Telephone: +86 (0) 755 2601 2053 Fax: +86 (0) 755 2671 0594

No tests were sub-contracted.

4.6 Other Information Requested by the Customer

None.

**4.7 Test Instruments list**

RE in Chamber						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (yyyy-mm-dd)	Cal.Due date (yyyy-mm-dd)
1	3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEL0017	2010-06-10	2011-06-10
2	EMI Test Receiver	Rohde & Schwarz	ESIB26	SEL0023	2010-05-26	2011-05-26
3	EMI Test software	AUDIX	E3	SEL0050	N/A	N/A
4	Coaxial cable	SGS	N/A	SEL0028	2010-05-29	2011-05-29
5	BiConiLog Antenna (26-3000MHz)	ETS-LINDGREN	3142C	SEL0015	2010-11-09	2011-11-09
6	Double-ridged horn (1-18GHz)	ETS-LINDGREN	3117	SEL0006	2010-11-09	2011-11-09
7	Pre-amplifier (0.1-1300MHz)	Agilent Technologies	8447D	SEL0053	2010-05-26	2011-05-26

RE in Chamber						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (yyyy-mm-dd)	Cal.Due date (yyyy-mm-dd)
1	3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEL0017	2011-06-10	2012-06-10
2	EMI Test Receiver	Rohde & Schwarz	ESIB26	SEL0023	2011-05-26	2012-05-26
3	EMI Test software	AUDIX	E3	SEL0050	N/A	N/A
4	Coaxial cable	SGS	N/A	SEL0028	2011-05-29	2012-05-29
5	BiConiLog Antenna (26-3000MHz)	ETS-LINDGREN	3142C	SEL0015	2010-11-09	2011-11-09
6	Double-ridged horn (1-18GHz)	ETS-LINDGREN	3117	SEL0006	2010-11-09	2011-11-09
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RF conducted						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (yyyy-mm-dd)	Cal.Due date (yyyy-mm-dd)
1	Spectrum Analyzer	Rohde & Schwarz	FSP 30	SEL0154	2010-10-27	2011-10-27
2	Coaxial cable	SGS	N/A	SEL0028	2010-05-29	2011-05-29

RF conducted						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (yyyy-mm-dd)	Cal.Due date (yyyy-mm-dd)
1	Spectrum Analyzer	Rohde & Schwarz	FSP 30	SEL0154	2010-10-27	2011-10-27
2	Coaxial cable	SGS	N/A	SEL0028	2011-05-29	2012-05-29

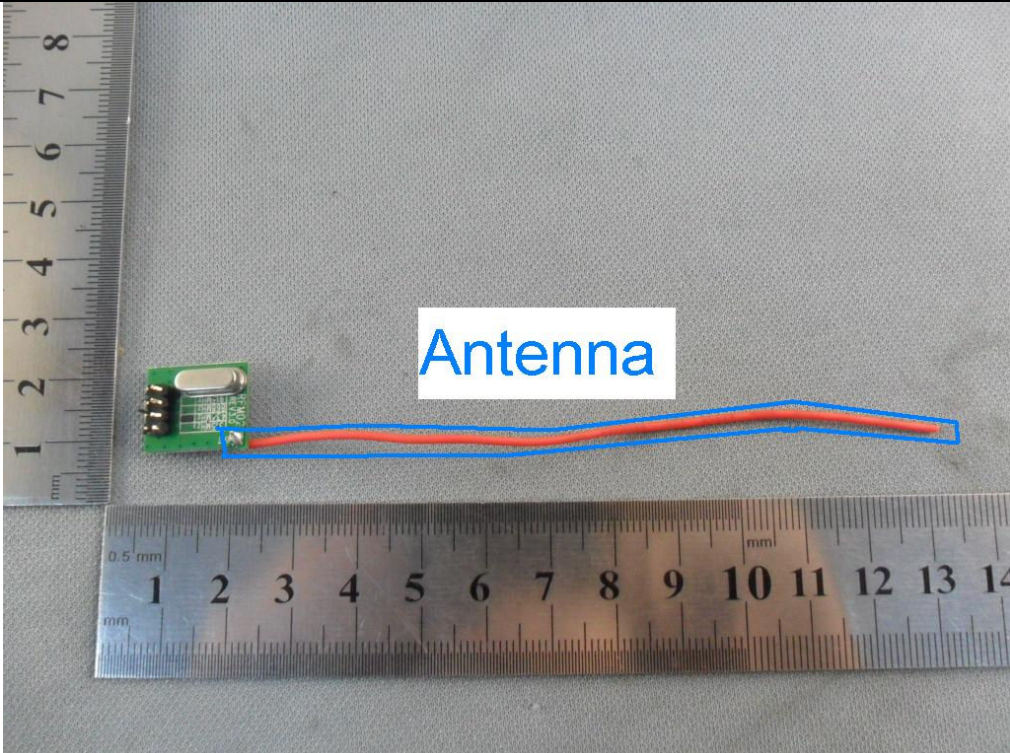
General used equipment						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (yyyy-mm-dd)	Cal.Due date (yyyy-mm-dd)
1	Humidity/ Temperature Indicator	Shanghai	ZJ1-2B	SEL0102 to SEL0103	2010-11-04	2011-11-04
2	Humidity/ Temperature Indicator	Shanghai	ZJ1-2B	SEL0101	2010-03-10	2011-03-10
3	Barometer	ChangChun	DYM3	SEL0088	2010-05-18	2011-05-18

General used equipment						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (yyyy-mm-dd)	Cal.Due date (yyyy-mm-dd)
1	Humidity/ Temperature Indicator	Shanghai	ZJ1-2B	SEL0102 to SEL0103	2010-11-04	2011-11-04
2	Humidity/ Temperature Indicator	Shanghai	ZJ1-2B	SEL0101	2011-03-10	2012-03-10
3	Barometer	ChangChun	DYM3	SEL0088	2011-05-18	2012-05-18

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5 Test results and Measurement Data

5.1 Antenna requirement:

Standard requirement:	FCC Part15 C Section 15.203
<p>15.203 requirement: <i>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 use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.</i></p>	
E.U.T Antenna:	
<p>The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 0dBi.</p>	
	

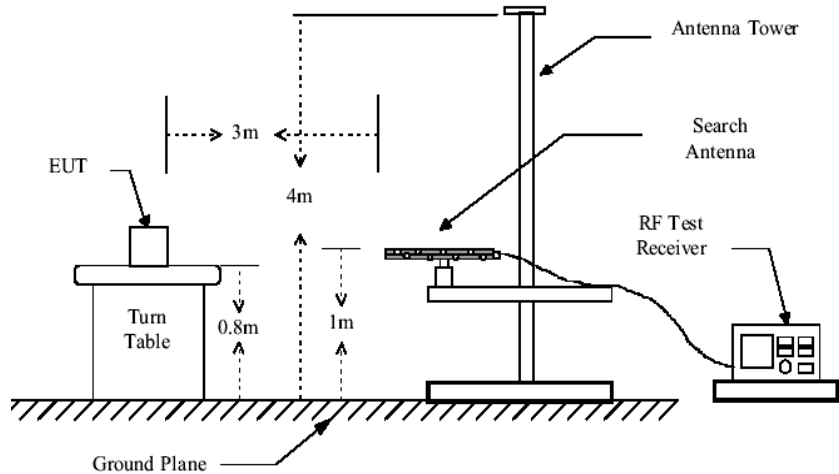


5.2 Radiated Emission

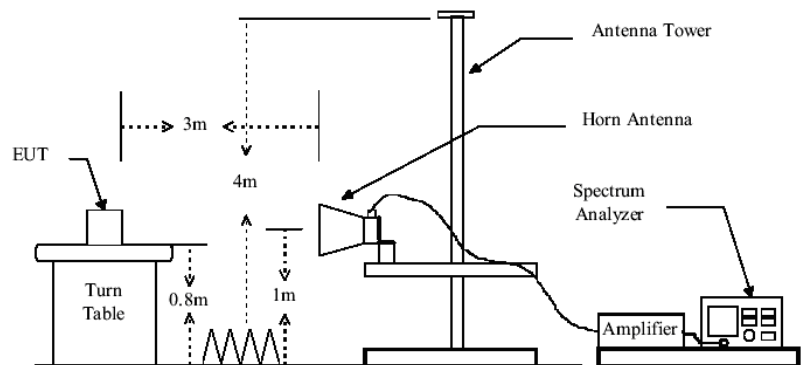
Test Requirement:	FCC Part15 C Section 15.231(e) and 15.209				
Test Method:	ANSI C63.10: 2009				
Test Frequency Range:	30MHz to 4340MHz				
Test site:	Measurement Distance: 3m (Semi-Anechoic Chamber)				
Receiver setup:					
	Frequency	Detector	RBW	VBW	Remark
	30MHz-1GHz	Quasi-peak	100kHz	300kHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
Limit: (Field strength of the fundamental signal)					
	Frequency		Limit (dBuV/m @3m)		Remark
	433.92MHz		72.87		Average Value
			92.87		Peak Value
Limit: (Spurious Emissions)					
	Frequency		Limit (dBuV/m @3m)		Remark
	30MHz-88MHz		40.0		Quasi-peak Value
	88MHz-216MHz		43.5		Quasi-peak Value
	216MHz-960MHz		46.0		Quasi-peak Value
	960MHz-1GHz		54.0		Quasi-peak Value
	Above 1GHz		54.0		Average Value
			74.0		Peak Value
Or The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level whichever limit permits a higher field strength.					
Test Procedure:	The E.U.T and its simulators are placed on a turn table which is 0.8meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.				
	Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10:2009 on radiated measurement.				
	The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.				
Test Instruments:	Refer to section 4.7 for details				
Test mode:	Transmitting mode				
Test results:	Pass				

Test setup:

Below 1GHz



Above 1GHz



Note:

The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

$$\text{Final Test Level} = \text{Receiver Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Preamplifier Factor}$$

**Measurement Data****5.2.1 Field Strength Of The Fundamental Signal****Peak value:**

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamplifier Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
433.92	2.35	16.59	27.35	75.19	66.76	92.87	-21.21	Horizontal
433.92	2.35	16.59	27.35	85.44	77.02	92.87	-15.85	Vertical

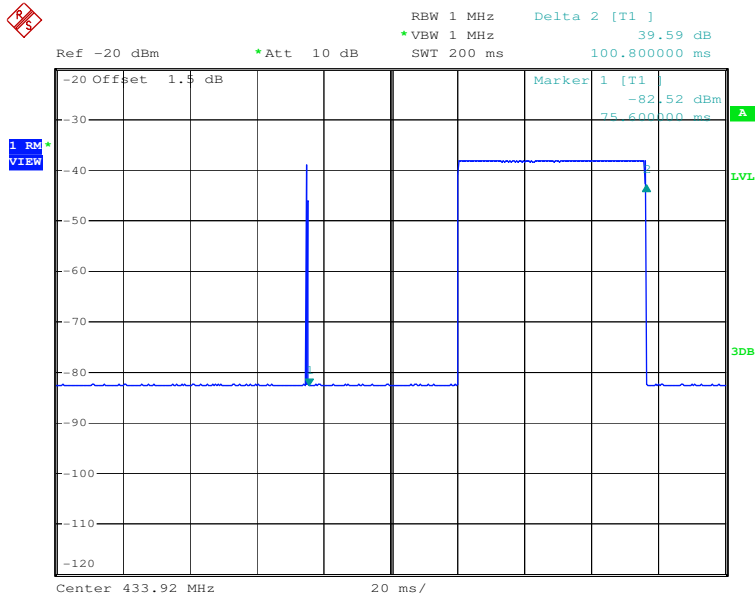
Average value:

Calculate Formula:	Average value=Peak value + PDCF
	PDCF=20 log(Duty cycle)
	Duty cycle= T on time / T period
Test data:	Ton time =56.4ms
	T period =100ms
	Average value= 72.05 dBuV/m

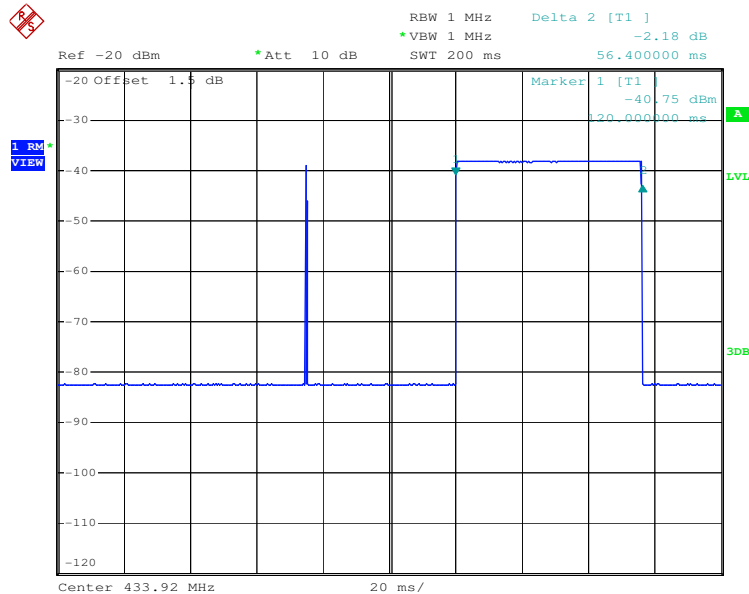


Test plot as follows:

Duty cycle numbers



Time slot:

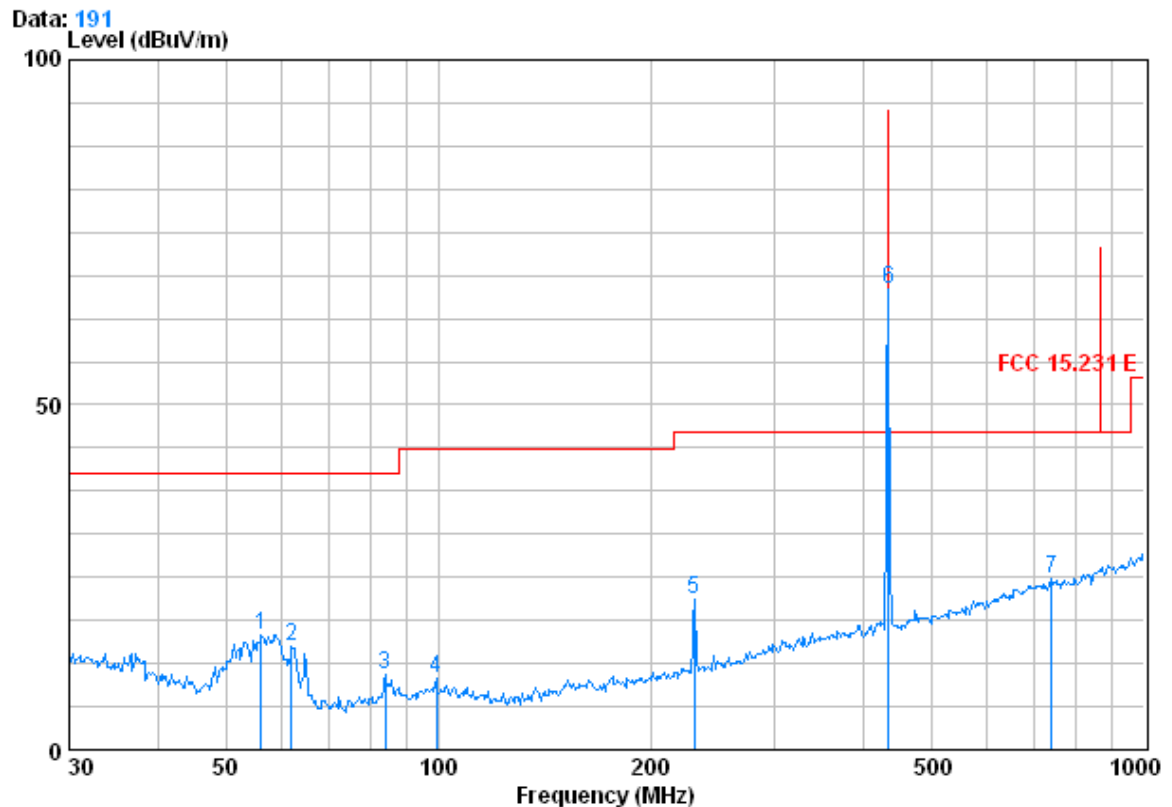




5.2.2 Spurious Emissions

30MHz~1GHz

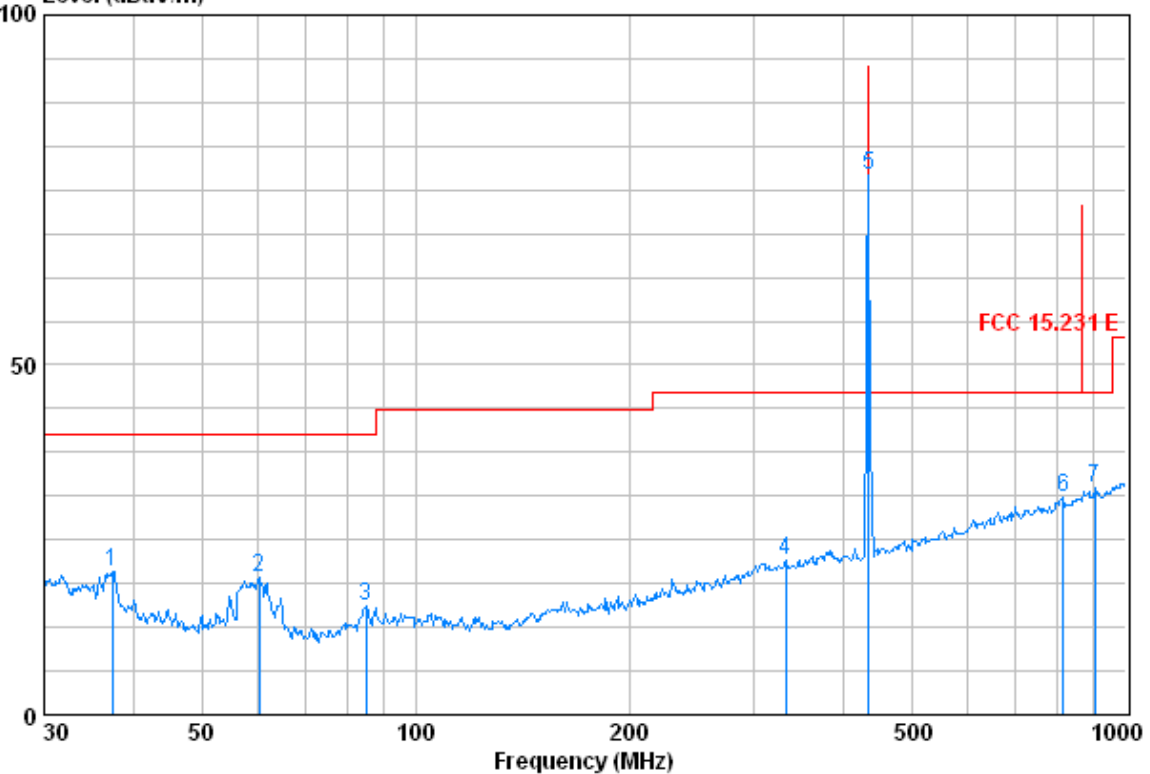
Horizontal:



		CableAntenna		Preamp	Read		Limit	Over
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	56.197	0.80	7.65	27.27	35.57	16.75	40.00	-23.25
2	61.995	0.80	7.14	27.26	34.25	14.93	40.00	-25.07
3	84.110	1.10	8.14	27.22	28.82	10.84	40.00	-29.16
4	99.528	1.19	9.09	27.20	27.19	10.27	43.50	-33.23
5	230.907	1.58	11.70	26.59	35.18	21.87	46.00	-24.13
7	739.661	3.02	21.66	27.37	27.48	24.79	46.00	-21.21



Vertical:

Data: 193
Level (dBuV/m)

	Freq	Cable Loss	Antenna Factor	Preamp Factor	Read Level	Level	Limit	Over
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	37.416	0.60	12.10	27.33	35.10	20.47	40.00	-19.53
2	60.280	0.80	7.19	27.27	38.83	19.54	40.00	-20.46
3	85.298	1.10	8.26	27.22	33.33	15.47	40.00	-24.53
4	332.519	2.01	15.01	26.66	31.70	22.06	46.00	-23.94
6	815.968	3.27	22.29	27.20	32.73	31.09	46.00	-14.91
7	903.309	3.60	23.21	26.75	32.45	32.51	46.00	-13.49

**Above 1GHz**

Peak value:

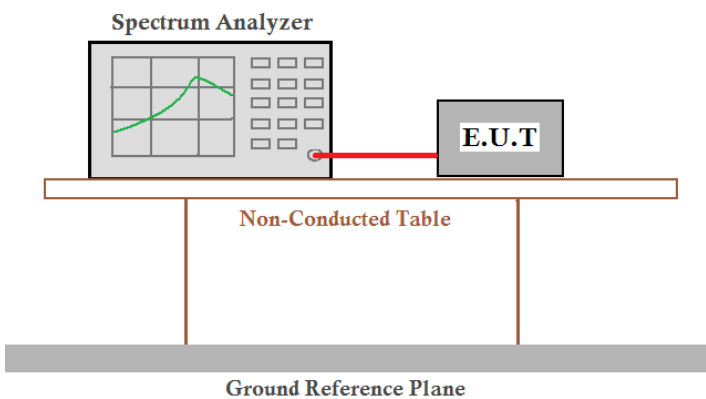
Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamplifier Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
1735.680	2.66	29.83	39.46	54.41	47.44	74.00	-26.56	Vertical
2018.600	2.84	31.83	39.58	48.96	44.05	74.00	-29.95	Vertical
2169.724	2.90	32.11	39.70	50.30	45.61	74.00	-28.39	Vertical
2533.292	3.06	32.75	39.96	49.83	45.68	74.00	-28.32	Vertical
3089.651	3.39	33.37	40.37	50.00	46.39	74.00	-27.61	Vertical
3618.234	3.84	33.34	40.76	50.64	47.06	74.00	-26.94	Vertical
1299.149	2.38	27.76	39.27	50.76	41.63	74.00	-32.37	Horizontal
1381.786	2.44	27.88	39.30	50.41	41.43	74.00	-32.57	Horizontal
1735.680	2.66	29.83	39.46	54.52	47.55	74.00	-26.45	Horizontal
1970.602	2.81	31.55	39.55	50.18	44.99	74.00	-29.01	Horizontal
3164.906	3.46	33.34	40.42	50.83	47.21	74.00	-26.79	Horizontal
3706.364	3.91	33.45	40.81	52.29	48.84	74.00	-25.16	Horizontal

Remark:

As shown in this section, for frequencies above 1GHz, the field strength limits are 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 20 dB under any condition of modulation. So, only the peak measurements were shown in the report.



5.3 20dB Bandwidth

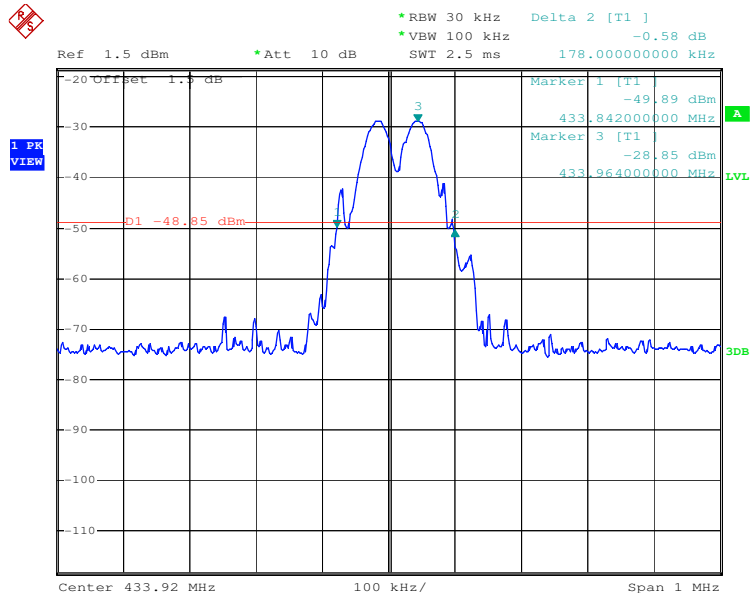
Test Requirement:	FCC Part15 C Section 15.231 (c)
Test Method:	ANSI C63.10:2009
Receiver setup:	RBW=30kHz, VBW=100kHz, detector: Peak
Limit:	The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.
Test mode:	Transmitting mode
Test Procedure:	<ol style="list-style-type: none"> 1. According to the follow Test-setup, keep the relative position between the artificial antenna and the EUT. 2. Set the EUT to proper test channel. 3. Max hold the radiated emissions, mark the peak power frequency point and the -20dB upper and lower frequency points. 4. Read 20dB bandwidth.
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Electronic Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T. are placed on a Non-Conducted Table. The table is supported by two vertical legs and sits on a Ground Reference Plane, which is represented by a thick grey bar at the bottom.</p>
Test Instruments:	Refer to section 4.7 for details
Test results:	Pass

Measurement Data

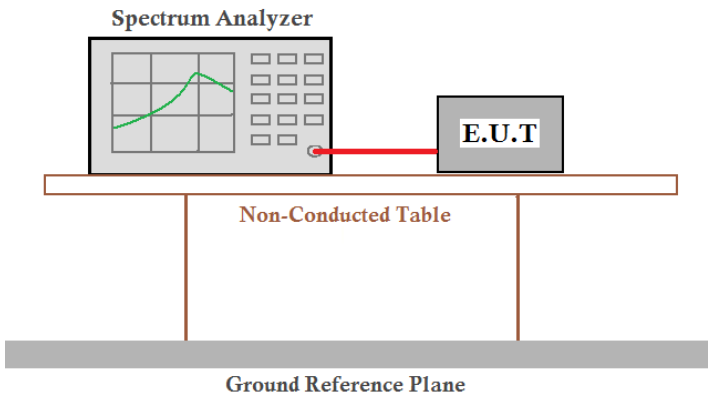
20dB bandwidth (MHz)	Limit (MHz)	Results
0.178	1.08	pass



Test plot as follows:



5.4 Transmit Time and Silent Period:

Test Requirement:	FCC Part15 C Section 15.231 (e)
Test Method:	ANSI C63.10:2009
Receiver setup:	RBW=1MHz, VBW=1MHz, span=0Hz, detector: Peak
Limit:	The duration of each transmission shall not be greater than one second The silent period shall be at least 30 times the transmit time but in no case less than 10 seconds.
Test mode:	Transmitting mode
Test Procedure:	1. According to the follow Test-setup, keep the relative position between the artificial antenna and the EUT. 2. Set the EUT to proper test channel. 3. Single scan the transmit, and read the transmission time.
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected via a red cable to an E.U.T. (Equipment Under Test). Both are placed on a Non-Conducted Table. Below the table is a Ground Reference Plane.</p>
Test Instruments:	Refer to section 4.7 for details
Test results:	Pass

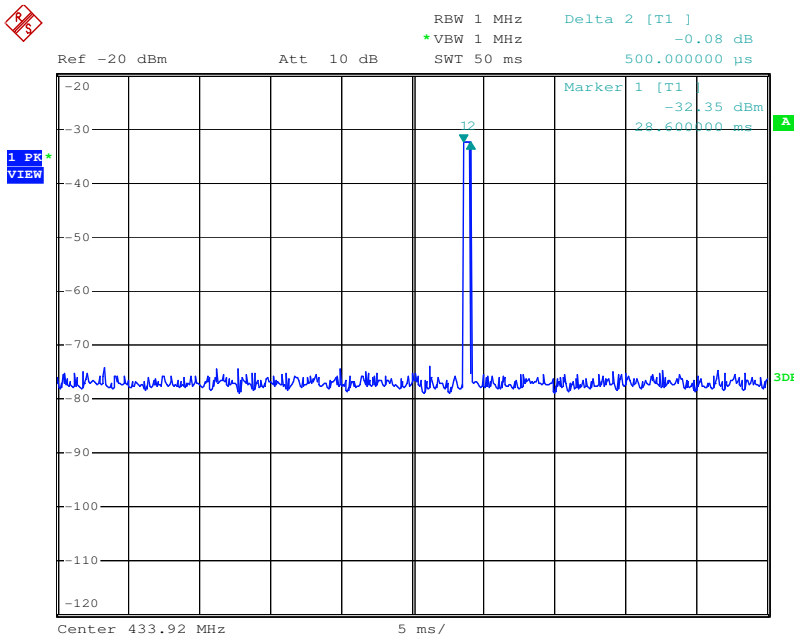
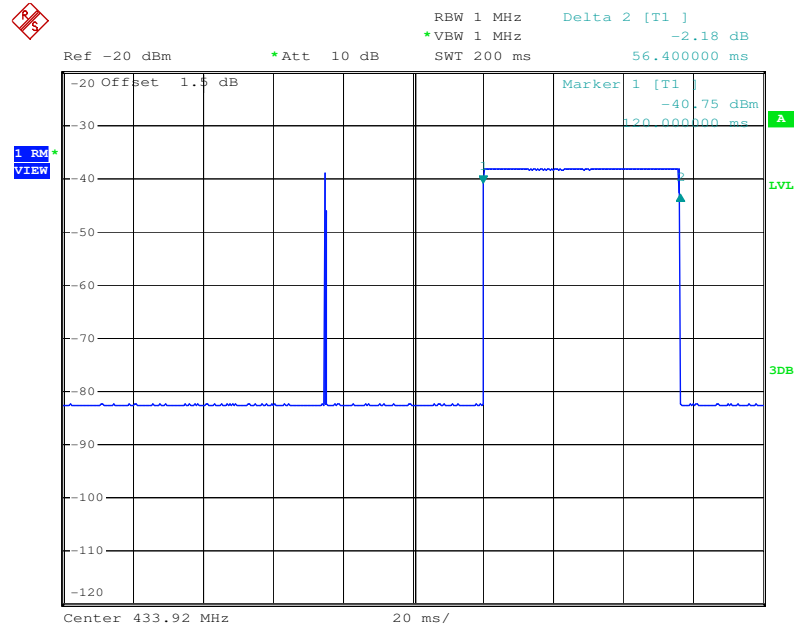
Measurement Data

Test item	Test data (second)	Limit (second)
Transmitting time	0.0569	<1
Silent Period	10.008	>10 and ≥ 30 times the transmit time



Test plot as follows:

Transmitting time





Silent Period

