

FCC&IC Radio Test Report

FCC ID: SEP-CORE

IC: 20477-CORE

This report concerns (check one): ☒ Original Grant ☐ Class II Change

Project No. : 1503C019
Equipment : Wireless Speaker System
Model Name : Core
Applicant for FCC : MASS FIDELITY
Address for FCC : 326 Adeliade Street West suite 400 Toronto ON M5V 1R3 Canada
Applicant for IC : Mass Fidelity Inc.
Address for IC : 326 Adeliade Street West Toronto ON M5V 1R3 Canada

Date of Receipt : Mar. 05, 2015
Date of Test : Mar. 05, 2015 ~ Jun. 25, 2015
Issued Date : Jun. 26, 2015
Tested by : BTL Inc.

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Declaration

BTL represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with the standards traceable to National Measurement Laboratory (**NML**) of **R.O.C.**, or National Institute of Standards and Technology (**NIST**) of **U.S.A.**

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For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

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REPORT ISSUED HISTORY

Issued No.	Description	Issued Date
BTL-FICP-3-1503C019	Original Issue.	Jun. 26, 2015

1. CERTIFICATION

Equipment : Wireless Speaker System
Brand Name : massFIDELITY
Model Name : Core
Applicant for FCC : MASS FIDELITY
Applicant for IC : Mass Fidelity Inc.
Manufacturer for FCC : MASS FIDELITY
Address for FCC : 326 Adeliade Street West suite 400 Toronto ON M5V 1R3 Canada
Manufacturer for IC : Mass Fidelity Inc.
Address for IC : 326 Adeliade Street West Toronto ON M5V 1R3 Canada
Factory : ZHONG SHAN CITY LI TAI ELECTRONIC INSTUDRIAL CO.,LTD
Address : No.3 Industrial Park, Wuguishan Town, Zhongshan, Guangdong, China
Date of Test : Mar. 05, 2015 ~ Jun. 25, 2015
Test Sample : Engineering Sample
Standard(s) : FCC Part15, Subpart E(15.407) / ANSI C63.10-2013
FCC KDB 789033 D02 General UNII Test Procedures New Rules v01.
Canada RSS-247 Issue 1, May 2015
RSS-GEN Issue 4, Nov 2014

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.

The test data, data evaluation, and equipment configuration contained in our test report (Ref No. BTL-FICP-3-1503C019) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of TAF according to the ISO-17025 quality assessment standard and technical standard(s).

2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

FCC Part15, Subpart E Canada RSS-247 Issue 1May 2015/RSS-GEN Issue 4, Nov 2014				
Standard(s) Section		Test Item	Judgment	Remark
FCC	IC			
15.207	RSS-GEN 8.8	AC Power Line Conducted Emissions	PASS	
15.407(a)	RSS-247 5.2 (1)	6dB Bandwidth	PASS	
15.407(a)	RSS-247 5.4 (4)	Maximum Conducted Output Power	PASS	
15.407(a)	RSS-247 5.2 (2)	Power Spectral Density	PASS	
15.407(a)	RSS-247 5.5	Radiated Emissions	PASS	
15.407(b)	RSS-247 5.5	Band Edge Emissions	PASS	
15.407(b)	RSS-247 5.5	Antenna conducted Spurious Emission		
15.407(g)	-	Frequency Stability	PASS	
15.203	RSS-247 5.5	Antenna Requirements	PASS	

NOTE:

(1)" N/A" denotes test is not applicable in this test report.

2.1 TEST FACILITY

The test facilities used to collect the test data in this report is at the location of No.3, Jinshagang 1st Road, Shixia, Dalang Town, Dongguan, Guangdong, China.

BTL's test firm number for FCC: 319330

BTL's test firm number for IC: 4428B-1

2.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately **95%**.

The BTL measurement uncertainty is less than the CISPR 16-4-2 U_{cispr} requirement.

A. Conducted Measurement:

Test Site	Method	Measurement Frequency Range	U, (dB)	Note
DG-C02	CISPR	150 KHz~30MHz	2.32	

B. Radiated Measurement:

Test Site	Method	Measurement Frequency Range	Ant. H / V	U, (dB)	Note
DG-CB03	CISPR	9kHz~30MHz	V	3.79	
		9kHz~30MHz	H	3.57	
		30MHz~200MHz	V	3.82	
		30MHz~200MHz	H	3.60	
		200MHz~ 1,000MHz	V	3.86	
		200MHz~ 1,000MHz	H	3.94	
		1GHz~18GHz	V	3.12	
		1GHz~18GHz	H	3.68	
		18GHz~40GHz	V	4.15	
		18GHz~40GHz	H	4.14	

Note: Unless specifically mentioned, the uncertainty of measurement has not been taken into account to declare the compliance or non-compliance to the specification.

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Equipment	Wireless Speaker System	
Brand Name	massFIDELITY	
Model Name for	Core	
Model Difference	N/A	
Product Description	Operation Frequency	5736-5814MHz
	Modulation Type	QPSK
	Bit Rate of Transmitter	192kbps
	Output Power (Max.)	6.36dBm
Power Source	DC voltage supplied from AC/DC adapter. Brand/ Model: massFIDELITY/ ADS-65SI-19-2 18045G	
Power Rating	I/P: 100-240V~ 50/60Hz 1.5A max O/P: 18VDC 2.5A	

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
2. Channel List:

Channel	Frequency (MHz)
01	5736
02	5762
03	5814

3. Antenna Specification:

Ant.	Manufacturer	Model Name	Antenna Type	Connector	Gain (dBi)	Note
1	N/A	N/A	Printed	N/A	3.2	TX/RX
2	N/A	N/A	Printed	N/A	3.2	TX/RX

Note:

- (1) The EUT incorporates a MIMO function. Physically, the EUT provides two completed transmitters and receivers (2T2R), all transmit signals are completely uncorrelated, then, **Direction gain = G_{ANT}** , that is Directional gain=3.2.

3.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Test Mode	Description
Mode 1	TX Mode/ CH01, CH02, CH03

The EUT system operated these modes were found to be the worst case during the pre-scanning test as following:

For Conducted Test	
Final Test Mode	Description
Mode 1	TX Mode

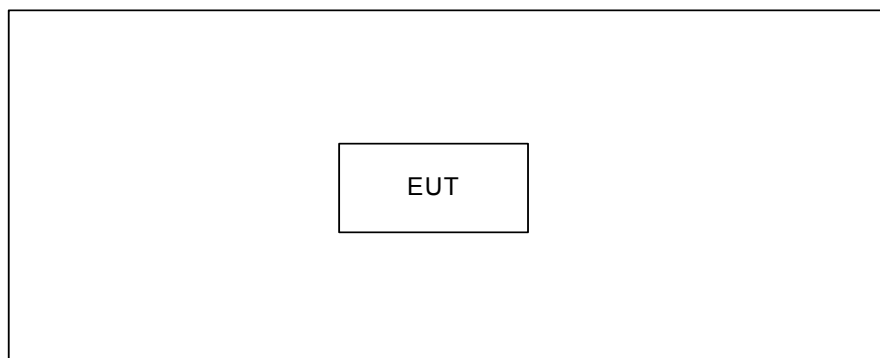
For Radiated Test	
Final Test Mode	Description
Mode 1	TX Mode/ CH01, CH02, CH03

3.3 TABLE OF PARAMETERS OF TEST SOFTWARE SETTING

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product

Test Software Version	N/A		
Frequency (MHz)	5736	5762	5814
	N/A	N/A	N/A

3.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



3.5 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note
-	-	-	-	-	-	

Item	Shielded Type	Ferrite Core	Length	Note
-	-	-	-	

4. EMC EMISSION TEST

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 POWER LINE CONDUCTED EMISSION (Frequency Range 150kHz-30MHz)

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *
0.50 -5.0	73.00	60.00	56.00	46.00
5.0 -30.0	73.00	60.00	60.00	50.00

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.
- (3) The test result calculated as following:
 Measurement Value = Reading Level + Correct Factor
 Correct Factor = Insertion Loss + Cable Loss + Attenuator Factor(if use)
 Margin Level = Measurement Value - Limit Value

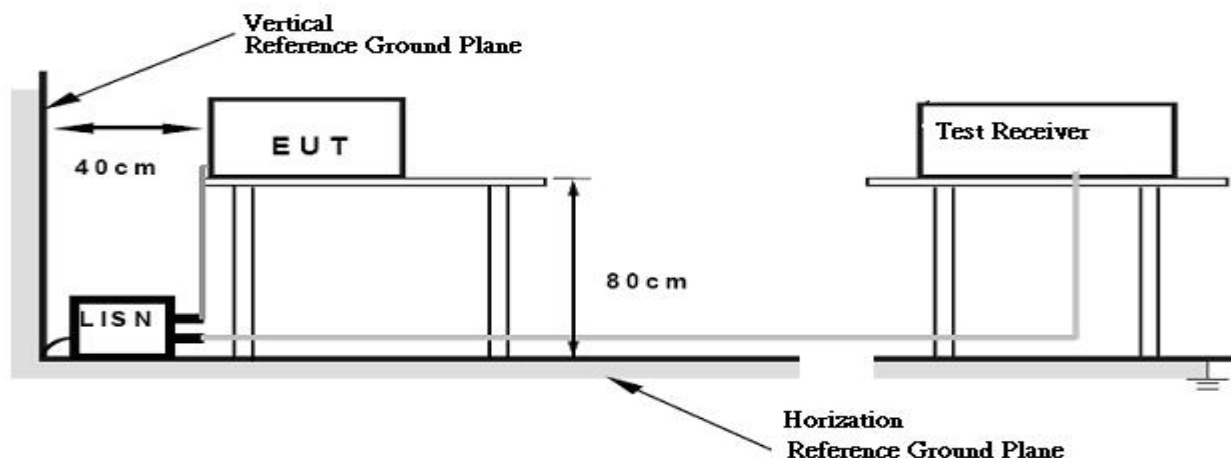
4.1.2 TEST PROCEDURE

- a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the groundplane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- d. LISN at least 80 cm from nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.1.3 DEVIATION FROM TEST STANDARD

No deviation

4.1.4 TEST SETUP



4.1.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

The EUT was programmed to be in continuously transmitting/TX Mode mode.

4.1.6 EUT TEST CONDITIONS

Temperature: 24°C Relative Humidity: 60% Test Voltage: AC 120V/60Hz

4.1.7 TEST RESULTS

Please refer to the Attachment A.

Remark:

- (1) All readings are QP Mode value unless otherwise stated AVG in column of『Note』. If the QP Mode Measured value compliance with the QP Limits and lower than AVG Limits, the EUT shall be deemed to meet both QP & AVG Limits and then only QP Mode was measured, but AVG Mode didn't perform. In this case, a “ * ” marked in AVG Mode column of Interference Voltage Measured.
- (2) Measuring frequency range from 150kHz to 30MHz.

4.2 RADIATED EMISSION MEASUREMENT

4.2.1 RADIATED EMISSION LIMITS

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a) and RSS-247 6.2.2 (2), then the 15.209(a) and RSS-Gen limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(kHz)	300
0.490~1.705	24000/F(kHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

Note:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.

LIMITS OF UNWANTED EMISSION OUT OF THE RESTRICTED BANDS

Frequencies (MHz)	EIRP Limit (dBm)	Equivalent Field Strength at 3m (dBμV/m)
5150-5250	-27	68.3
5250-5350	-27	68.3
5470-5725	-27	68.3
5725-5850	-27 (beyond 10MHz of the band edge)	68.3
	-17 (within 10 MHz of band edge)	78.3

Note: The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

$$E = \frac{1000000 \sqrt{30P}}{3} \mu\text{V/m}, \text{ where } P \text{ is the eirp (Watts)}$$

4.2.2 TESTPROCEDURE

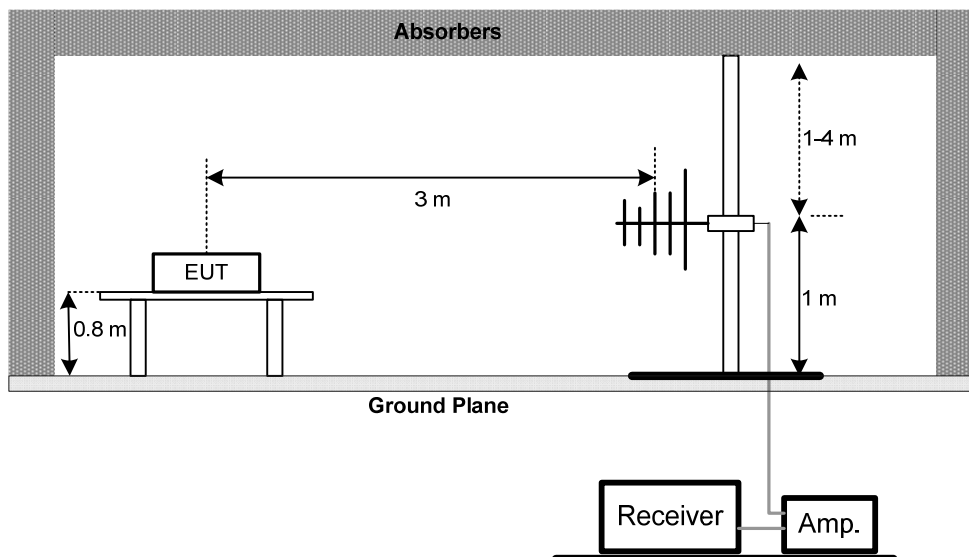
- The measuring distance of at 3m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
- The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(above 1GHz)
- The height of the equipment or of the substitution antenna shall be 0.8 m or 1.5m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.2.3 DEVIATION FROM TEST STANDARD

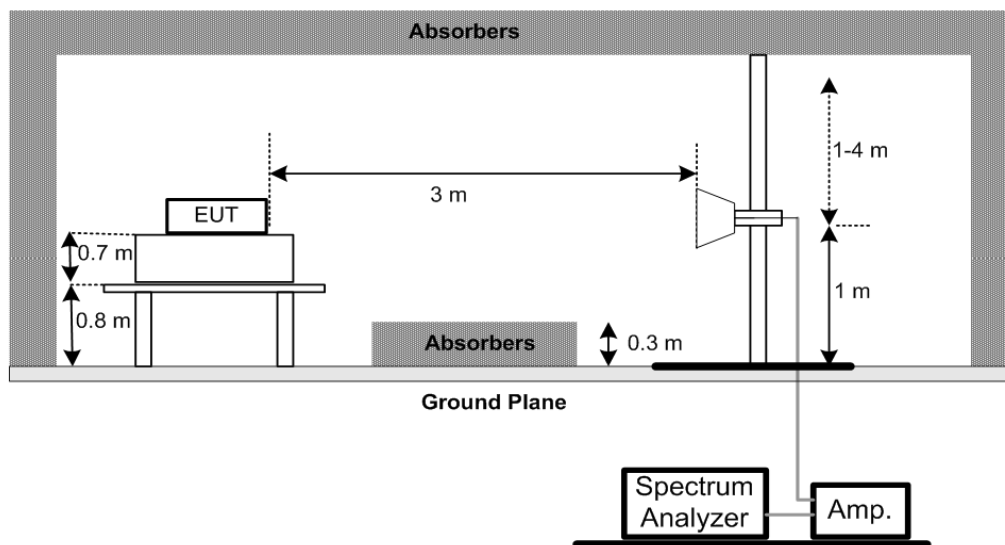
No deviation

4.2.4 TEST SETUP

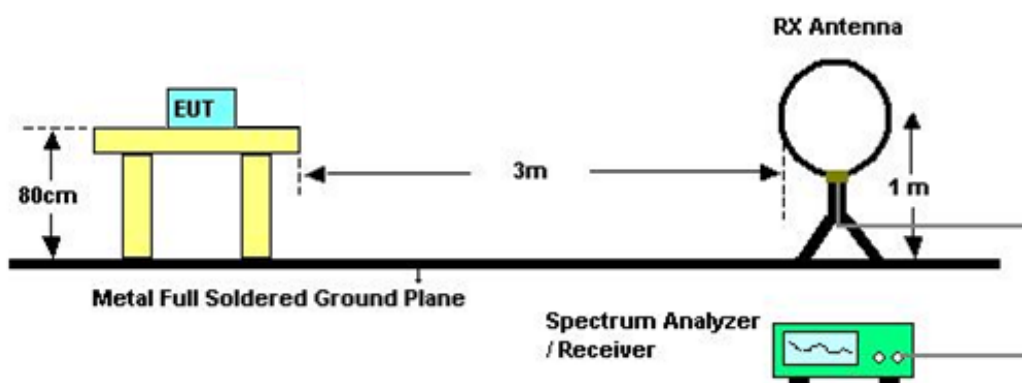
(A) Radiated Emission Test Set-Up Frequency Below 1GHz



(B) Radiated Emission Test Set-Up Frequency Above 1 GHz



(C) Radiated emissions below 30MHz



4.2.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 4.1.5 unless otherwise a special operating condition is specified in the follows during the testing.

4.2.6 EUT TEST CONDITIONS

Temperature: 28°C Relative Humidity: 60% Test Voltage: AC 120V/60Hz

4.2.7 TEST RESULTS (9K TO 30MHz)

Please refer to the Attachment B

Remark:

- (1) The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.
- (2) Distance extrapolation factor = $40 \log (\text{specific distance} / \text{test distance})$ (dB);
- (3) Limit line = specific limits (dBuV) + distance extrapolation factor.

4.2.8 TEST RESULTS (30 TO 1000 MHz)

Please refer to the Attachment C.

Remark:

- (1) Reading in which marked as QP or Peak means measurements by using are Quasi-Peak Mode or Peak Modewith Detector BW=120kHz ; SPA setting in RBW=120kHz, VBW =120kHz, Swp. Time = 0.3 sec./MHz.
- (2) All readings are Peak unless otherwise stated QP in column of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.
- (3) Measuring frequency range from 30MHz to 1000MHz.
- (4) If the peak scan value lower limit more than 20dB, then this signal data does not show in table.

4.2.9 TEST RESULTS (ABOVE1000 MHz)

Please refer to the Attachment D.

Remark:

- (1) Spectrum Setting: 30MHz – 1000MHz , RBW= 100kHz, VBW=100kHz, Sweep time = 200 ms. 1GHz- 40GHz, RBW= 1MHz, VBW= 1MHz, Sweep time = Auto
- (2) All readings are Peak unless otherwise stated AV in column of 『Note』 . Peak denotes that the Peak reading compliance with the AV Limits and then AV Mode measurement didn't perform.
- (3) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission .
- (4) Data of measurement within this frequency range shown “ * ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
- (6) EUT Orthogonal Axes:
“X” - denotes Laid on Table ; “Y” - denotes Vertical Stand ; “Z” - denotes Side Stand
- (7) During the measurements above 1GHz it is taken care of that the EUT is always within the 3dB cone of radiation BW of the used antenna.
- (8) No limit: This is fundamental signal, the judgment is not applicable.
For fundamental signal judgment was referred to Peak output test.

5.2 6dB SPECTRUM BANDWIDTH

5.1 APPLIED PROCEDURES / LIMIT

FCC Part15, Subpart E/ RSS-247			
Test Item	Limit	Frequency Range (MHz)	Result
Bandwidth	Minimum 500kHz 6dB Bandwidth	5725-5850	PASS

5.1.1 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,

b.

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> 26dB Bandwidth
RBW	300 kHz
VBW	1000 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

- c. Measured the spectrum width with power higher than 26dB below carrier

5.1.2 DEVIATION FROM STANDARD

No deviation.

5.1.3 TEST SETUP



5.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 4.1.5 unless otherwise a special operating condition is specified in the follows during the testing.

5.1.5 EUT TEST CONDITIONS

Temperature: 28°C Relative Humidity: 60% Test Voltage: AC 120V/60Hz

5.1.6 TEST RESULTS

Please refer to the Attachment E.

6. MAXIMUM CONDUCTED OUTPUT POWER

6.1 APPLIED PROCEDURES / LIMIT

FCC Part15, Subpart E/ RSS-247			
Test Item	Limit	Frequency Range (MHz)	Result
Conducted Output Power	1 Watt (30dBm)	5725-5850	PASS

6.1.1 TEST PROCEDURE

- a. The EUT was directly connected to the power meter and antenna output port as show in the block diagram below,
- b.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Encompass the entire emissions bandwidth (EBW) ofthe signal
RBW	= 1MHz.
VBW	\geq 3MHz.
Detector	RMS
Trace	Max Hold
Sweep Time	auto

- c. Test was performed in accordance with method of KDB 789033 D02.

6.1.2 DEVIATION FROM STANDARD

No deviation.

6.1.3 TEST SETUP



6.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 4.1.5 unless otherwise a special operating condition is specified in the follows during the testing.

6.1.5 EUT TEST CONDITIONS

Temperature: 28°C Relative Humidity: 60% Test Voltage: AC 120V/60Hz

6.1.6 TEST RESULTS

Please refer to the Attachment F.

7. ANTENNA CONDUCTED SPURIOUS EMISSION

7.1 APPLIED PROCEDURES / LIMIT

FCC Part15, Subpart E/ RSS-247			
Test Item	Limit	Frequency Range (MHz)	Result
Antenna conducted Spurious Emission	Below -17dBm/MHz within 10MHz of band edge, below -27dBm/MHz beyond 10MHz of the band edge	5725-5850	PASS

7.1.1 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,

b.

Spectrum Parameter	Setting
Attenuation	Auto
RBW	1000kHz
VBW	1000kHz
Trace	Max Hold
Sweep Time	Auto

7.1.2 DEVIATION FROM STANDARD

No deviation.

7.1.3 TEST SETUP



7.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 4.1.5 unless otherwise a special operating condition is specified in the follows during the testing.

7.1.5 EUT TEST CONDITIONS

Temperature: 28°C Relative Humidity: 60% Test Voltage: AC 120V/60Hz

7.1.6 TEST RESULTS

Please refer to the Attachment G.

8. POWER SPECTRAL DENSITY TEST

8.1 APPLIED PROCEDURES / LIMIT

FCC Part15, Subpart E/ RSS-247			
Test Item	Limit	Frequency Range (MHz)	Result
Power Spectral Density	30dBm/500kHz	5725-5850	PASS

8.1.1 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,

b.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Encompass the entire emissions bandwidth (EBW) of the signal
RBW	= 1MHz.
VBW	≥ 3MHz.
Detector	RMS
Trace	Max Hold
Sweep Time	Auto

Note:

1. According to KDB publication 789033 D02 General UNII Test Procedures New Rules v01, section II.F.5., it is acceptable to set RBW at 1MHz and VBW at 3MHz if the spectrum analyzer does not have 500kHz RBW.
2. The value measured with RBW=1MHz is to be added with $10\log(500\text{kHz}/1\text{MHz})$ which is -3dB. For example, if the measured value is +10dBm using RBW=1MHz (that is +10dBm/MHz), then the converted value will be +7dBm/500kHz.

8.1.1 DEVIATION FROM STANDARD

No deviation.

8.1.2 TEST SETUP



8.1.3 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 4.1.5 unless otherwise a special operating condition is specified in the follows during the testing.

8.1.4 EUT TEST CONDITIONS

Temperature: 28°C Relative Humidity: 60% Test Voltage: AC 120V/60Hz

8.1.5 TEST RESULTS

Please refer to the Attachment H.

9. FREQUENCY STABILITY MEASUREMENT

9.1 APPLIED PROCEDURES / LIMIT

FCC Part15, Subpart E/ RSS-247			
Test Item	Limit	Frequency Range (MHz)	Result
Frequency Stability	Specified in the user's manual	5725-5850	PASS

9.1.1 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,

b.

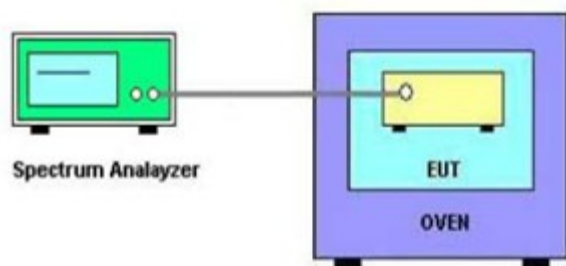
Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Entire absence of modulation emissionsbandwidth
RBW	10 kHz
VBW	10kHz
Sweep Time	Auto

- c. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value.
d. User manual temperature is 0°C~35°C.

9.1.2 DEVIATION FROM STANDARD

No deviation.

9.1.3 TEST SETUP



9.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 4.1.5 unless otherwise a special operating condition is specified in the follows during the testing.

9.1.5 EUT TEST CONDITIONS

Temperature: 25°C Relative Humidity: 55% Test Voltage: AC 120V/60Hz

9.1.6 TEST RESULTS

Please refer to the Attachment I.

10. MEASUREMENT INSTRUMENTS LIST

Conducted Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	LISN	EMCO	3816/2	00052765	Mar. 28, 2016
2	LISN	R&S	ENV216	101447	Mar. 28, 2016
3	Test Cable	N/A	C_17	N/A	Mar.13, 2016
4	EMI TEST RECEIVER	R&S	ESCS30	833364/017	Mar. 28, 2016
5	50Ω Terminator	SHX	TF2-3G-A	08122902	Mar. 28, 2016
6	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A

Radiated Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Antenna	Schwarbeck	VULB9160	9160-3232	Mar. 28, 2016
2	Amplifier	HP	8447D	2944A09673	Nov. 17, 2015
3	Receiver	AGILENT	N9038A	MY5213003 9	Sep. 30, 2015
4	Test Cable	N/A	C-01_CB03	N/A	Jul. 01, 2015
5	Controller	CT	SC100	N/A	N/A
6	Antenna	ETS	3115	00075789	Mar. 28, 2016
7	Amplifier	Agilent	8449B	3008A02274	Nov. 02, 2015
8	Receiver	AGILENT	N9038A	MY5213003 9	Sep. 30, 2015
9	Test Cable	N/A	C-68	N/A	Jul. 01, 2015
10	Controller	CT	SC100	N/A	N/A
11	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170319	Mar. 28, 2016
12	Microwave Preamplifier With Adaptor	EMC INSTRUMENT	EMC2654045	980039 & HA01	Mar. 28, 2016
13	Active Loop Antenna	R&S	HFH2-Z2	830749/020	Aug. 16, 2015
14	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A

Spectrum Bandwidth Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov. 02, 2015

Maximum Conducted Output Power Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	power Meter	ANRITSU	ML2495A	1128009	Mar. 28, 2016
2	Pulse Power Sensor	ANRITSU	MA 2411B	1027500	Mar. 28, 2016

Antenna Conducted Spurious Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov. 02, 2015

Power Spectral Density Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov. 02, 2015

Frequency Stability Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov. 02, 2015

Remark: "N/A" denotes no model name, serial no. or calibration specified.
All calibration period of equipment list is one year.

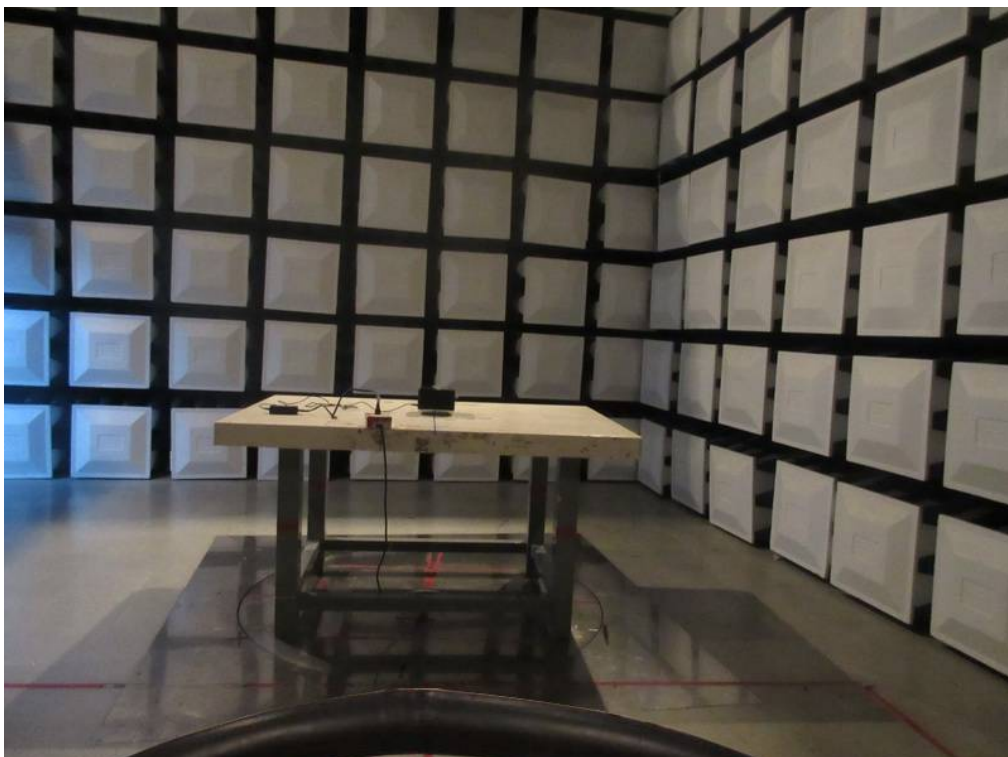
11. EUT TEST PHOTOS

Conducted Measurement Photos



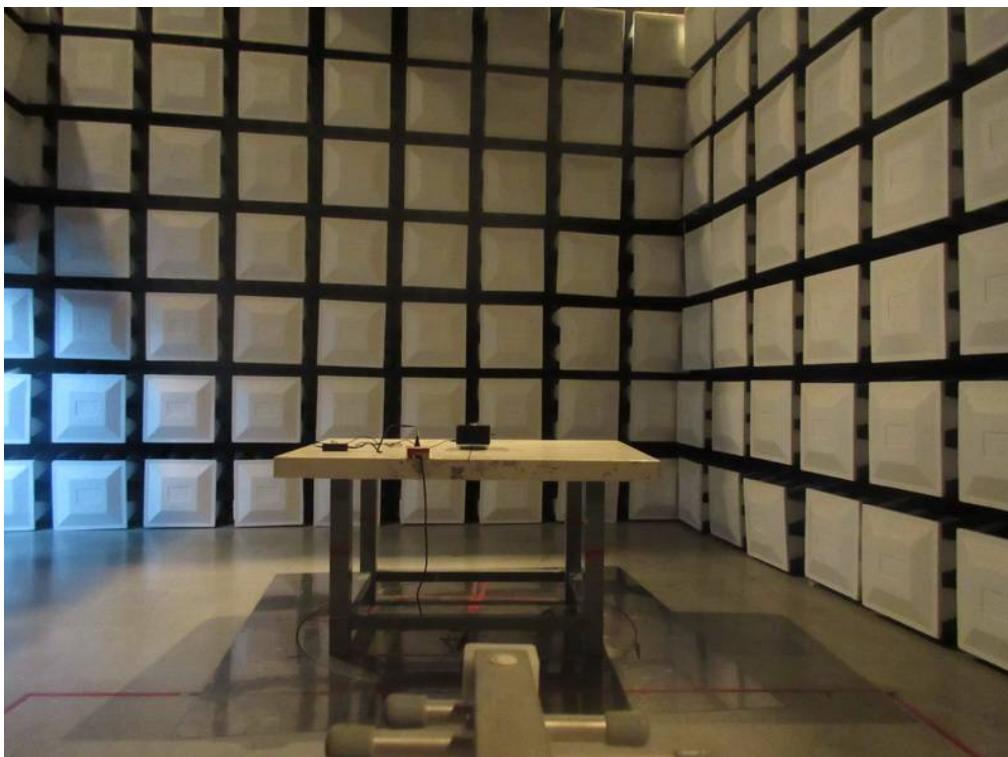
Radiated Measurement Photos

9KHz to 30MHz



Radiated Measurement Photos

30MHz to 1000MHz



Radiated Measurement Photos

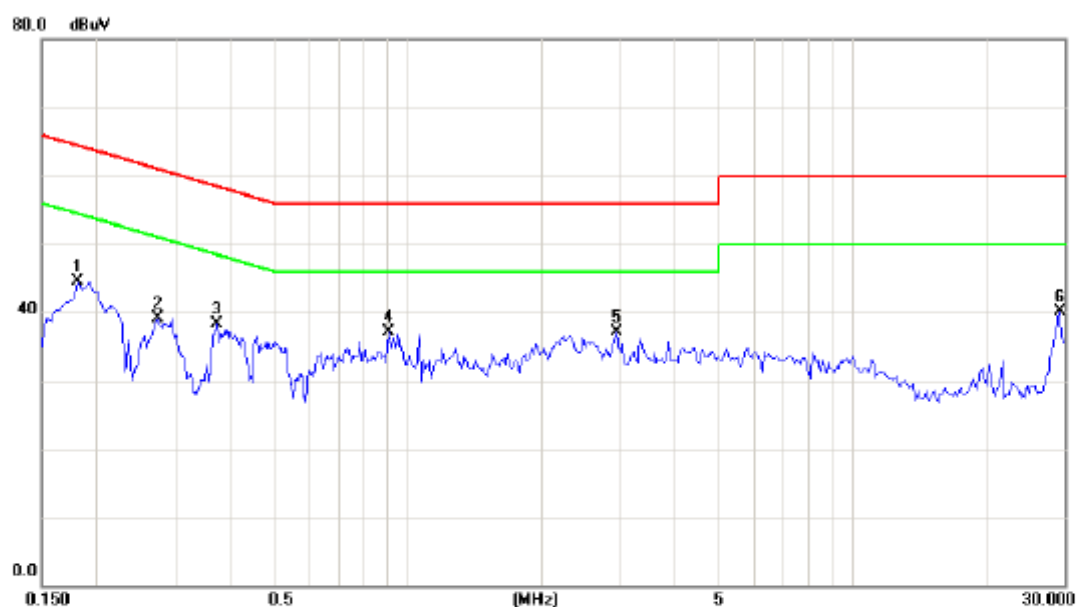
Above 1000MHz



ATTACHMENT A -CONDUCTED EMISSION

Test Mode: TX MODE

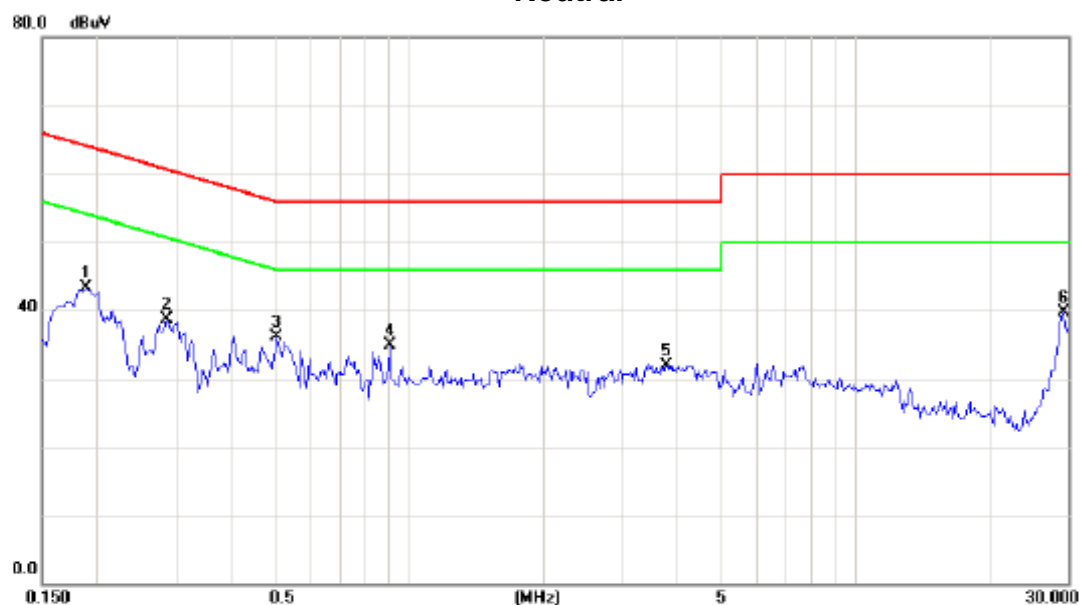
Line



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1		0.1811	34.95	9.56	44.51	64.44	-19.93	peak	
2		0.2750	29.52	9.63	39.15	60.97	-21.82	peak	
3		0.3725	28.74	9.66	38.40	58.44	-20.04	peak	
4	*	0.9078	27.30	9.78	37.08	56.00	-18.92	peak	
5		2.9506	27.05	10.03	37.08	56.00	-18.92	peak	
6		29.2303	30.00	10.05	40.05	60.00	-19.95	peak	

Test Mode: TX MODE

Neutral



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1		0.1890	33.78	9.49	43.27	64.08	-20.81	peak	
2		0.2867	29.14	9.52	38.66	60.62	-21.96	peak	
3	*	0.5054	26.49	9.56	36.05	56.00	-19.95	peak	
4		0.9078	25.24	9.59	34.83	56.00	-21.17	peak	
5		3.7851	22.06	9.89	31.95	56.00	-24.05	peak	
6		29.1914	29.58	10.05	39.63	60.00	-20.37	peak	

ATTACHMENT B -RADIATED EMISSION (9KHZ TO 30MHZ)

Test Mode:	TX MODE
------------	---------

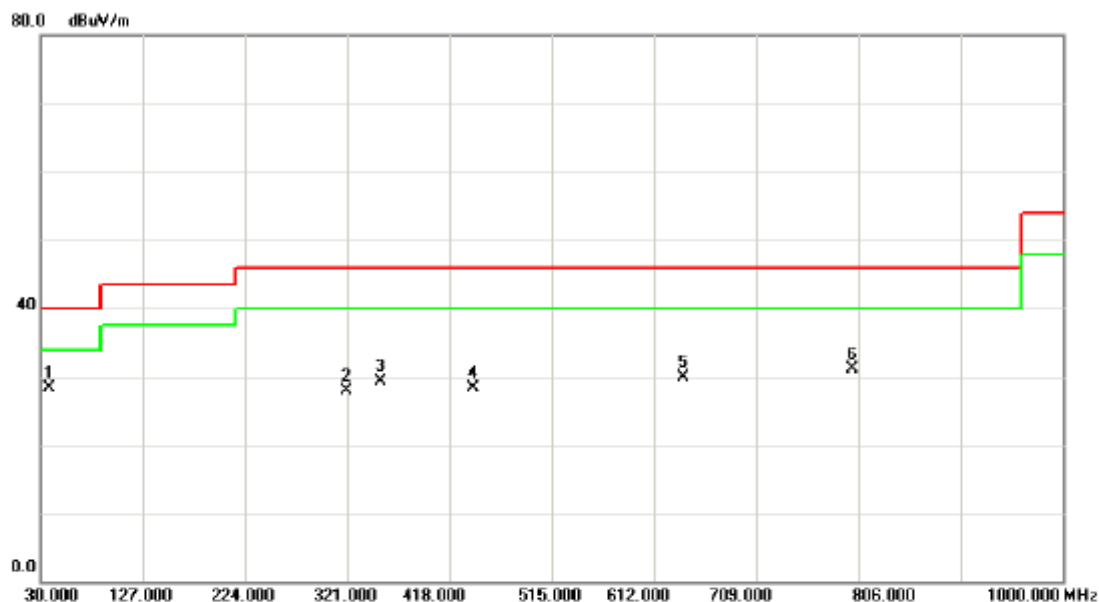
Frequency (MHz)	Ant 0°/90°	Read level dBuV/m	Factor (dB)	Measured(FS) (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Note
0.0095	0°	10.42	24.97	35.39	108.05	-72.66	AVG
0.0095	0°	12.35	24.97	37.32	128.05	-90.73	PEAK
0.0237	0°	6.79	24.07	30.86	100.11	-69.25	AVG
0.0237	0°	8.23	24.07	32.30	120.11	-87.81	PEAK
0.0375	0°	3.06	23.19	26.25	96.12	-69.87	AVG
0.0375	0°	4.75	23.19	27.94	116.12	-88.18	PEAK
0.0462	0°	-0.18	22.64	22.46	94.31	-71.85	AVG
0.0462	0°	1.56	22.64	24.20	114.31	-90.11	PEAK
0.5765	0°	19.26	20.04	39.30	72.39	-33.08	QP
1.8960	0°	25.35	19.51	44.86	69.54	-24.68	QP

Frequency (MHz)	Ant 0°/90°	Read level dBuV/m	Factor (dB)	Measured(FS) (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Note
0.0103	90°	8.52	24.30	32.82	127.35	-94.53	AVG
0.0103	90°	11.16	24.30	35.46	147.35	-111.89	PEAK
0.0288	90°	7.04	23.74	30.78	118.42	-87.63	AVG
0.0288	90°	9.35	23.74	33.09	138.42	-105.32	PEAK
0.0357	90°	4.15	23.31	27.46	116.55	-89.10	AVG
0.0357	90°	5.76	23.31	29.07	136.55	-107.49	PEAK
0.0451	90°	0.32	22.71	23.03	114.52	-91.49	AVG
0.0451	90°	1.21	22.71	23.92	134.52	-110.60	PEAK
0.6191	90°	20.76	20.18	40.94	71.77	-30.83	QP
2.1682	90°	24.18	19.40	43.58	69.54	-25.96	QP

ATTACHMENT C -RADIATED EMISSION (30MHZ TO 1000MHZ)

Test Mode: TX Mode 5736MHz

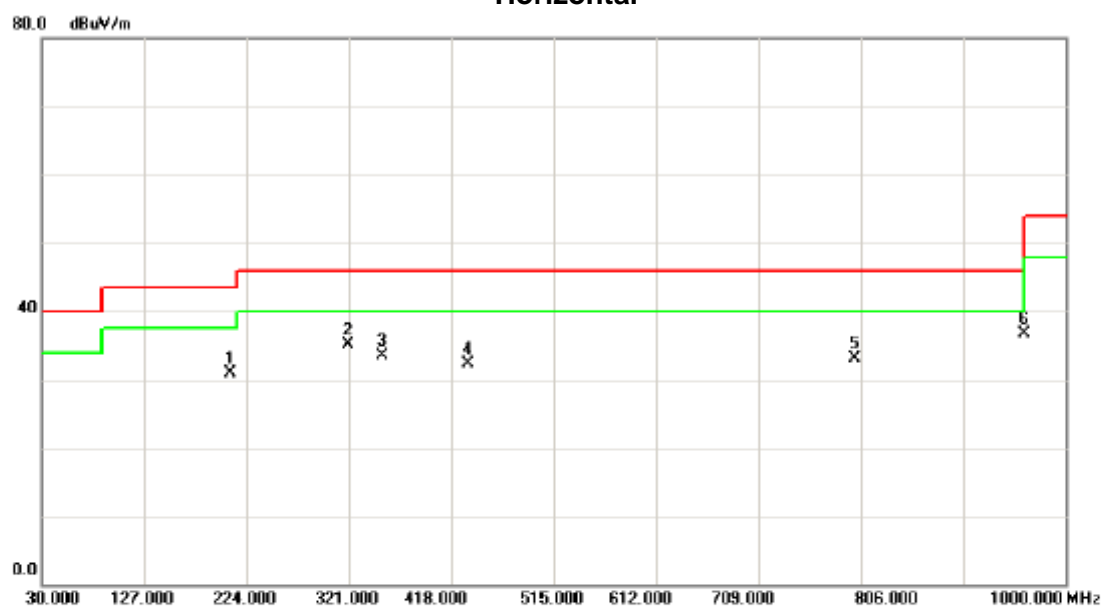
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	37.7600	42.65	-14.38	28.27	40.00	-11.73	peak	
2		320.0300	39.20	-11.31	27.89	46.00	-18.11	peak	
3		352.0400	40.91	-11.70	29.21	46.00	-16.79	peak	
4		440.3100	37.17	-8.79	28.38	46.00	-17.62	peak	
5		640.1300	35.52	-5.69	29.83	46.00	-16.17	peak	
6		800.1800	33.92	-2.89	31.03	46.00	-14.97	peak	

Test Mode: TX Mode 5736MHz

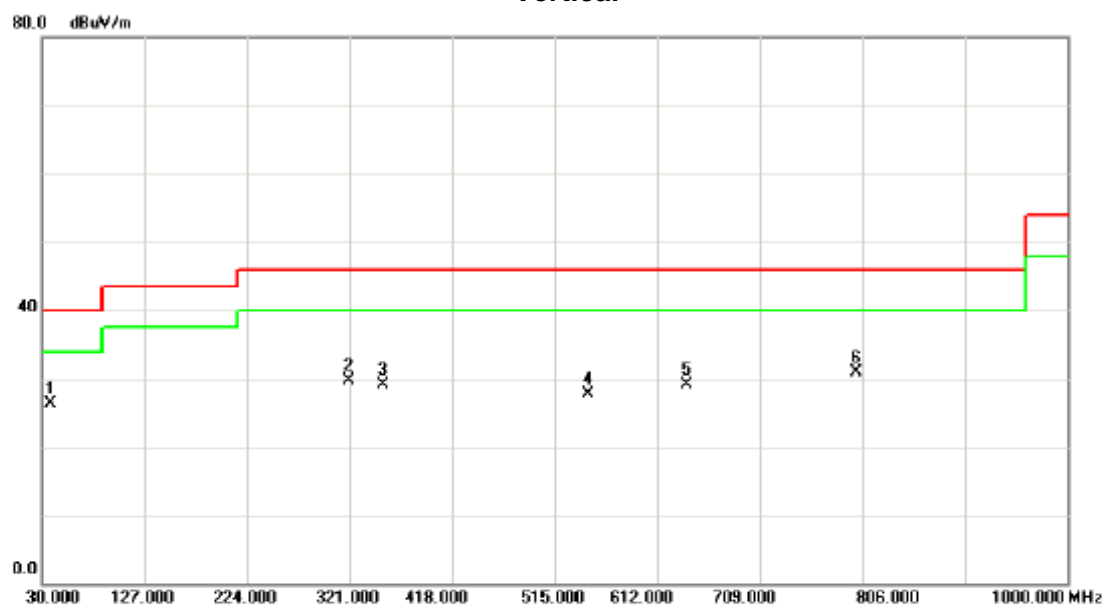
Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		209.4500	46.20	-15.37	30.83	43.50	-12.67	peak	
2	*	320.0300	46.48	-11.31	35.17	46.00	-10.83	peak	
3		352.0400	45.23	-11.70	33.53	46.00	-12.47	peak	
4		433.5200	41.23	-8.92	32.31	46.00	-13.69	peak	
5		800.1800	35.99	-2.89	33.10	46.00	-12.90	peak	
6		960.2300	36.97	-0.25	36.72	54.00	-17.28	peak	

Test Mode: TX Mode 5762MHz

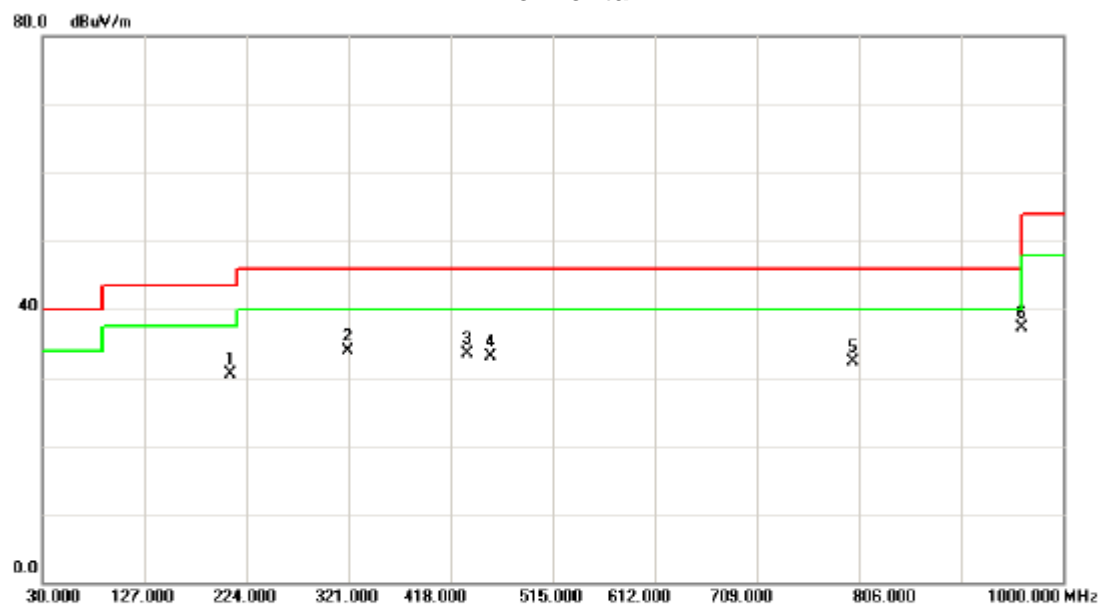
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	37.7600	40.76	-14.38	26.38	40.00	-13.62	peak	
2		320.0300	41.09	-11.31	29.78	46.00	-16.22	peak	
3		352.0400	40.76	-11.70	29.06	46.00	-16.94	peak	
4		547.0100	35.73	-8.08	27.65	46.00	-18.35	peak	
5		640.1300	34.87	-5.69	29.18	46.00	-16.82	peak	
6		800.1800	33.79	-2.89	30.90	46.00	-15.10	peak	

Test Mode: TX Mode 5762MHz

Horizontal

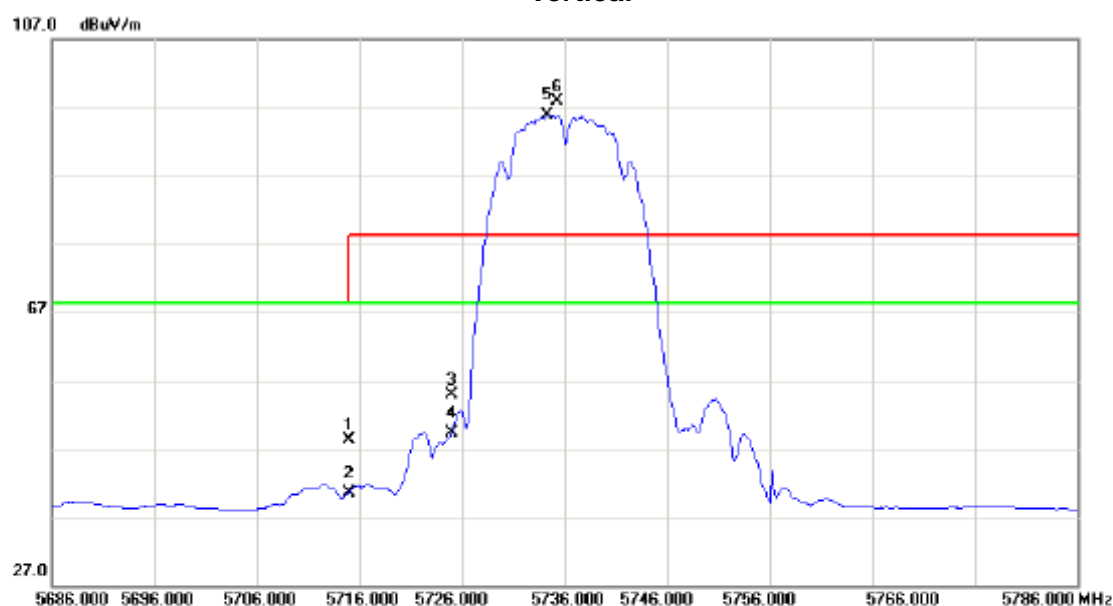


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		208.4800	45.90	-15.33	30.57	43.50	-12.93	peak	
2	*	320.0300	45.18	-11.31	33.87	46.00	-12.13	peak	
3		433.5200	42.50	-8.92	33.58	46.00	-12.42	peak	
4		455.8300	42.02	-8.84	33.18	46.00	-12.82	peak	
5		800.1800	35.14	-2.89	32.25	46.00	-13.75	peak	
6		960.2300	37.52	-0.25	37.27	54.00	-16.73	peak	

ATTACHMENT D -RADIATED EMISSION (ABOVE 1000MHZ)

Test Mode: TX Mode 5736MHz

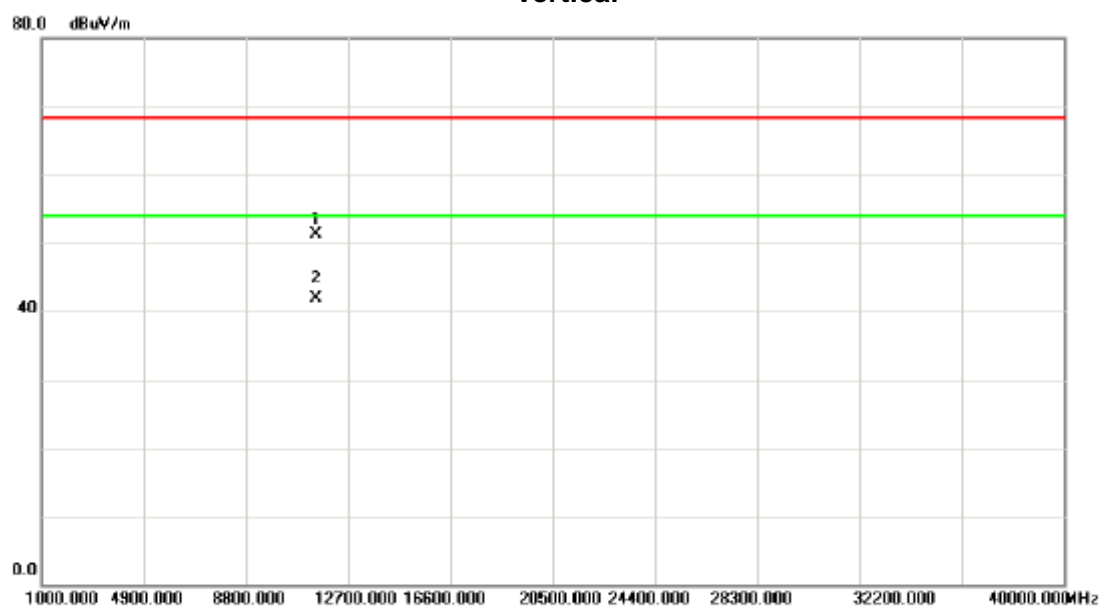
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		5715.000	7.26	41.06	48.32	68.30	-19.98	peak	
2		5715.000	-0.51	41.06	40.55	68.30	-27.75	AVG	
3		5725.000	13.79	41.10	54.89	78.30	-23.41	peak	
4		5725.000	8.17	41.10	49.27	68.30	-19.03	AVG	
5	*	5734.400	54.78	41.13	95.91	68.30	27.61	AVG	NO limit
6	X	5735.300	56.79	41.14	97.93	78.30	19.63	peak	NO limit

Test Mode:	TX Mode 5736MHz
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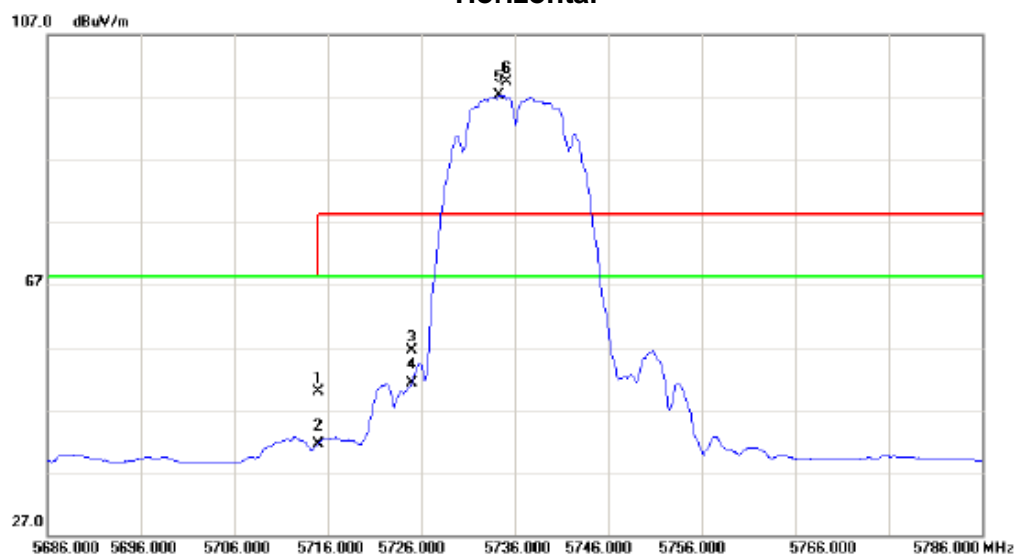
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		11472.37	38.38	12.85	51.23	68.30	-17.07	peak	
2	*	11472.58	29.07	12.85	41.92	54.00	-12.08	AVG	

Test Mode: TX Mode 5736MHz

Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		5715.000	8.94	41.06	50.00	68.30	-18.30	peak	
2		5715.000	0.43	41.06	41.49	68.30	-26.81	AVG	
3		5725.000	15.31	41.10	56.41	78.30	-21.89	peak	
4		5725.000	10.19	41.10	51.29	68.30	-17.01	AVG	
5	*	5734.400	56.20	41.13	97.33	68.30	29.03	AVG	NO limit
6	X	5735.200	58.33	41.13	99.46	78.30	21.16	peak	NO limit

Test Mode:	TX Mode 5736MHz
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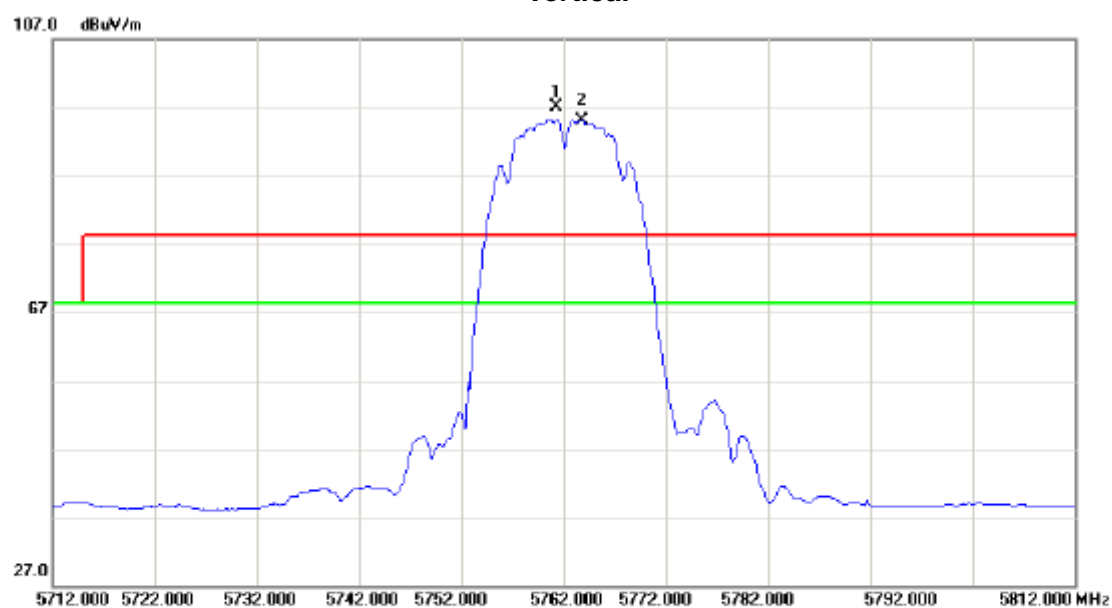
Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		11472.37	37.55	12.85	50.40	68.30	-17.90	peak	
2	*	11472.37	28.09	12.85	40.94	54.00	-13.06	AVG	

Test Mode: TX Mode 5762MHz

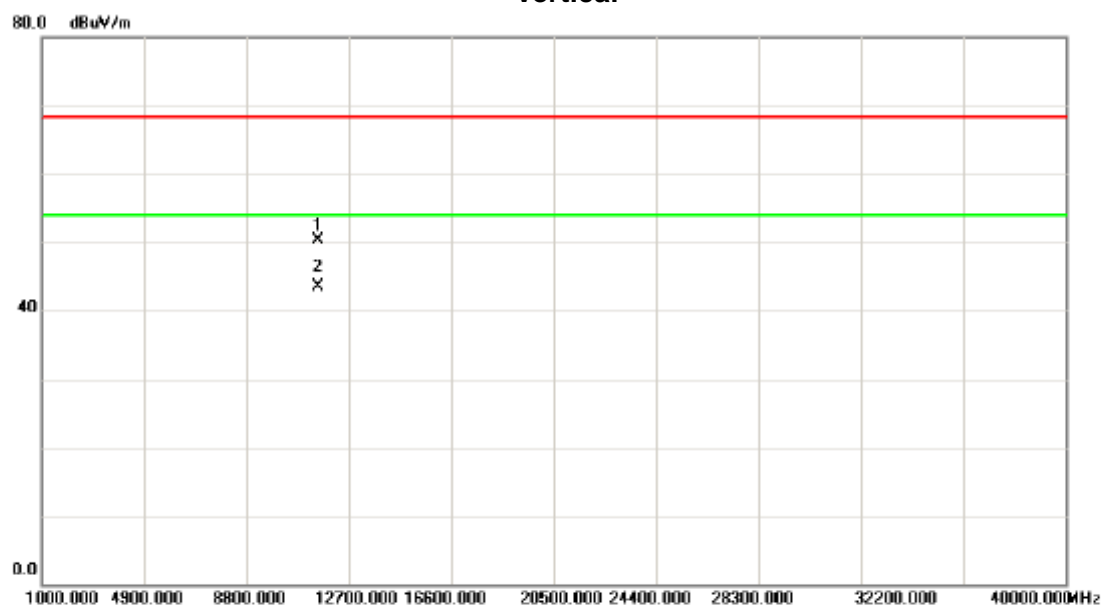
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	X	5761.300	55.82	41.25	97.07	78.30	18.77	peak	NO limit
2	*	5763.800	53.86	41.26	95.12	68.30	26.82	AVG	NO limit

Test Mode:	TX Mode 5762MHz
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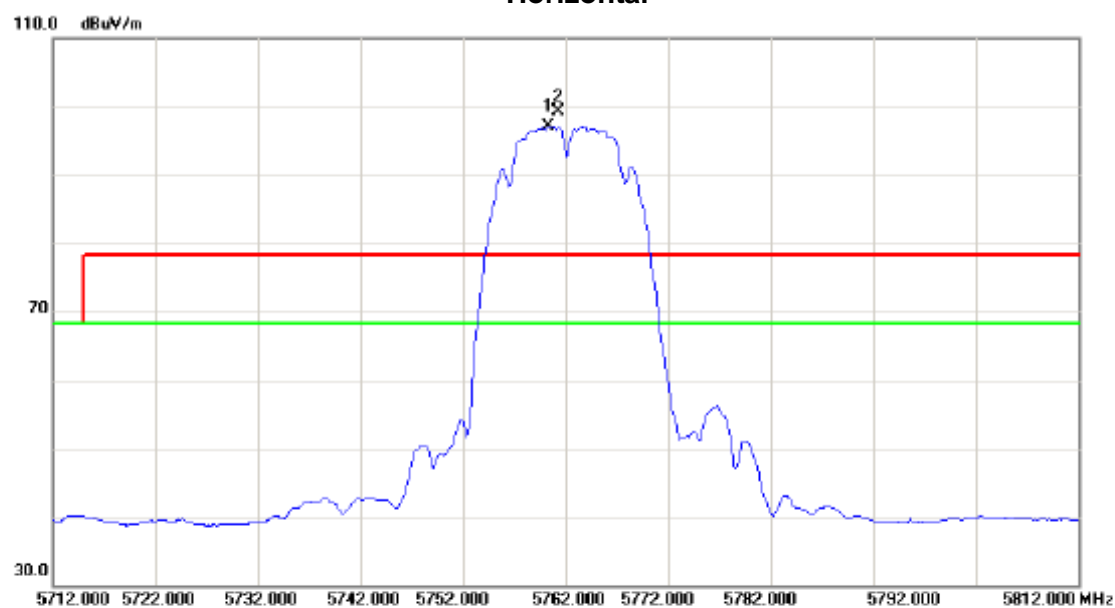
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		11524.57	37.37	12.92	50.29	68.30	-18.01	peak	
2	*	11524.57	30.59	12.92	43.51	54.00	-10.49	AVG	

Test Mode: TX Mode 5762MHz

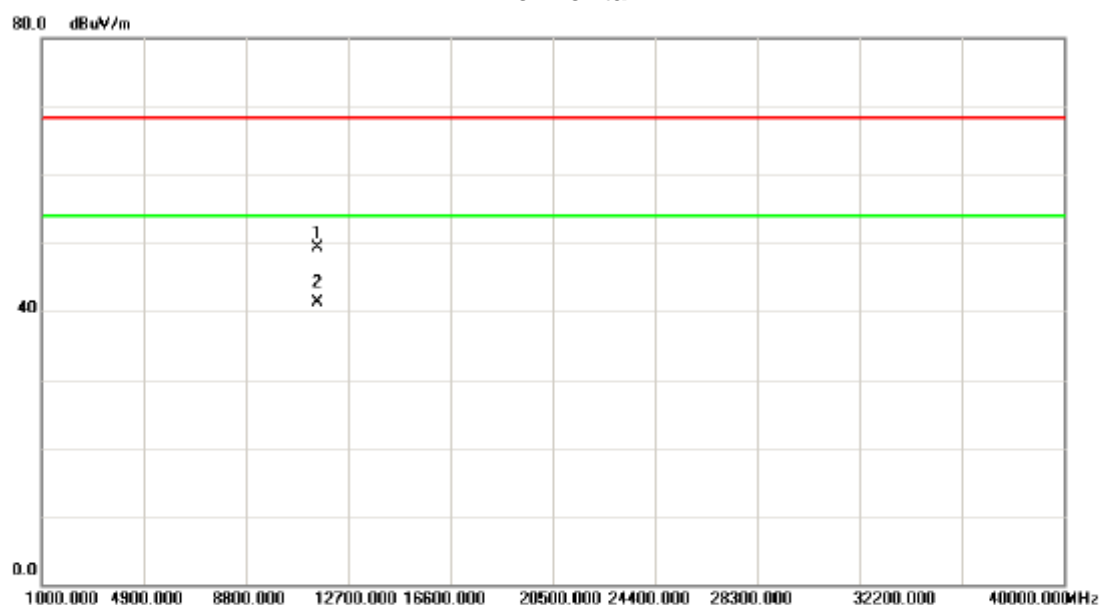
Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	5760.400	55.90	41.25	97.15	68.30	28.85	AVG	NO limit
2	X	5761.300	58.05	41.25	99.30	78.30	21.00	peak	NO limit

Test Mode:	TX Mode 5762MHz
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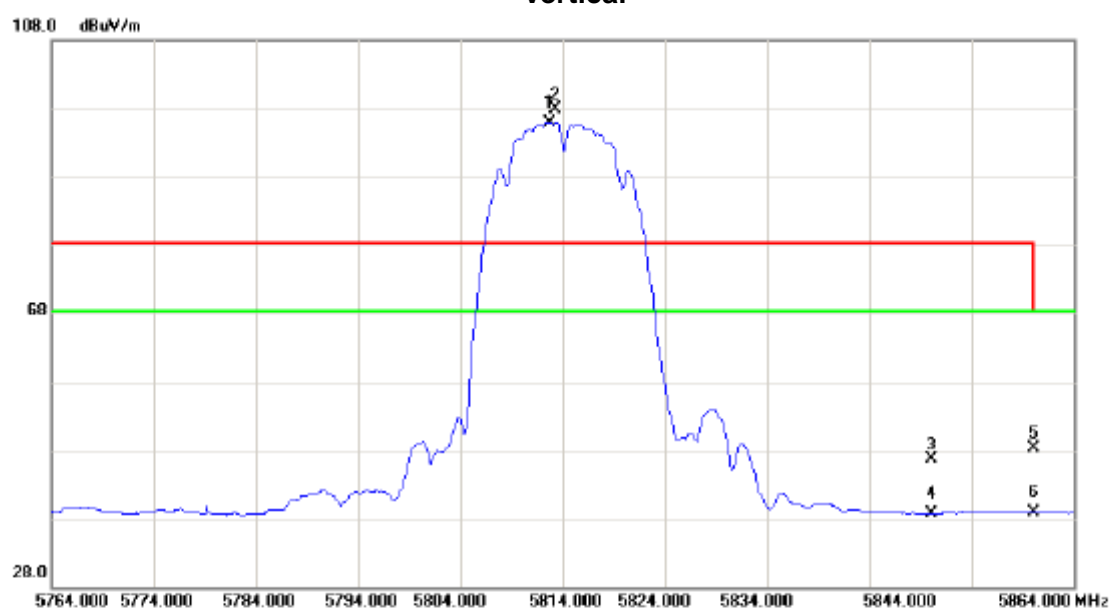
Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		11524.34	36.37	12.92	49.29	68.30	-19.01	peak	
2	*	11524.34	28.46	12.92	41.38	54.00	-12.62	AVG	

Test Mode: TX Mode 5814MHz

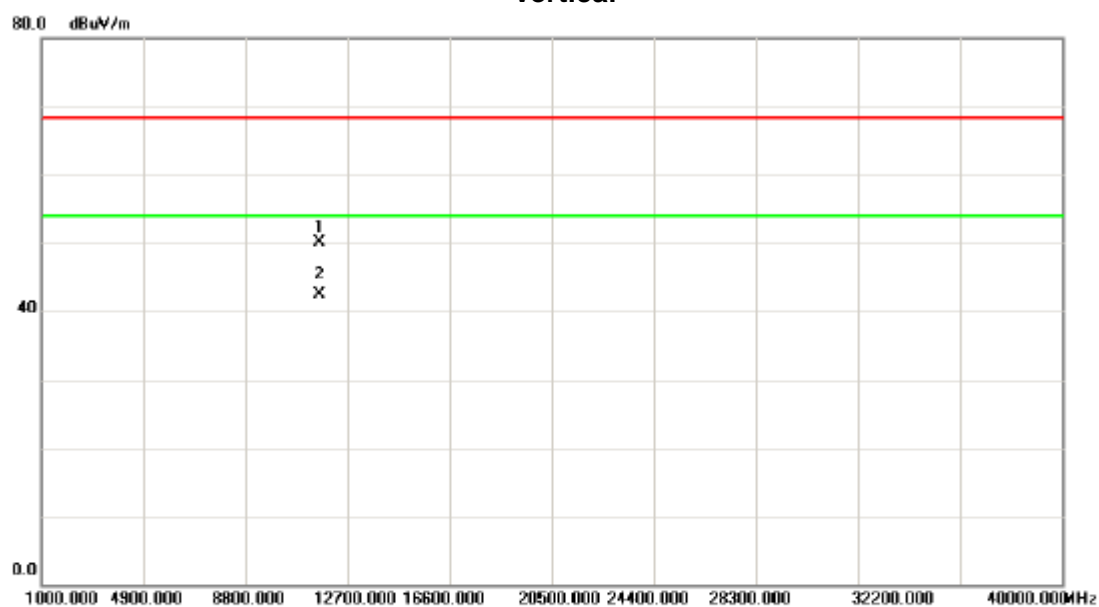
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	5812.700	54.49	41.46	95.95	68.30	27.65	AVG	NO limit
2	X	5813.300	56.41	41.46	97.87	78.30	19.57	peak	NO limit
3		5850.000	5.11	41.62	46.73	78.30	-31.57	peak	
4		5850.000	-2.89	41.62	38.73	68.30	-29.57	AVG	
5		5860.000	6.71	41.65	48.36	68.30	-19.94	peak	
6		5860.000	-2.73	41.65	38.92	68.30	-29.38	AVG	

Test Mode:	TX Mode 5814MHz
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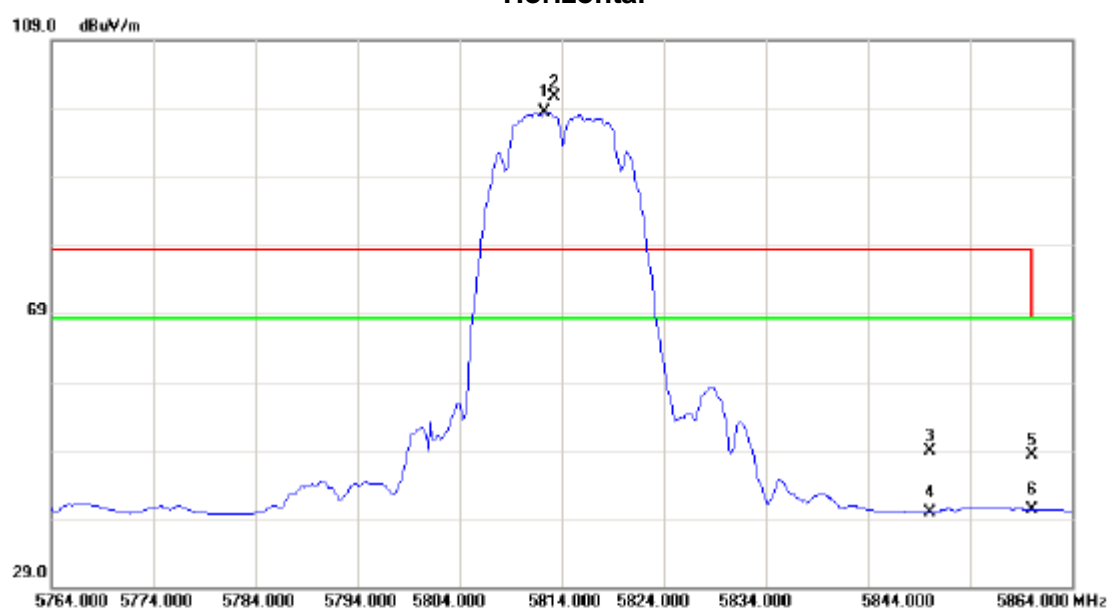
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		11628.63	37.24	12.86	50.10	68.30	-18.20	peak	
2	*	11628.63	29.57	12.86	42.43	54.00	-11.57	AVG	

Test Mode: TX Mode 5814MHz

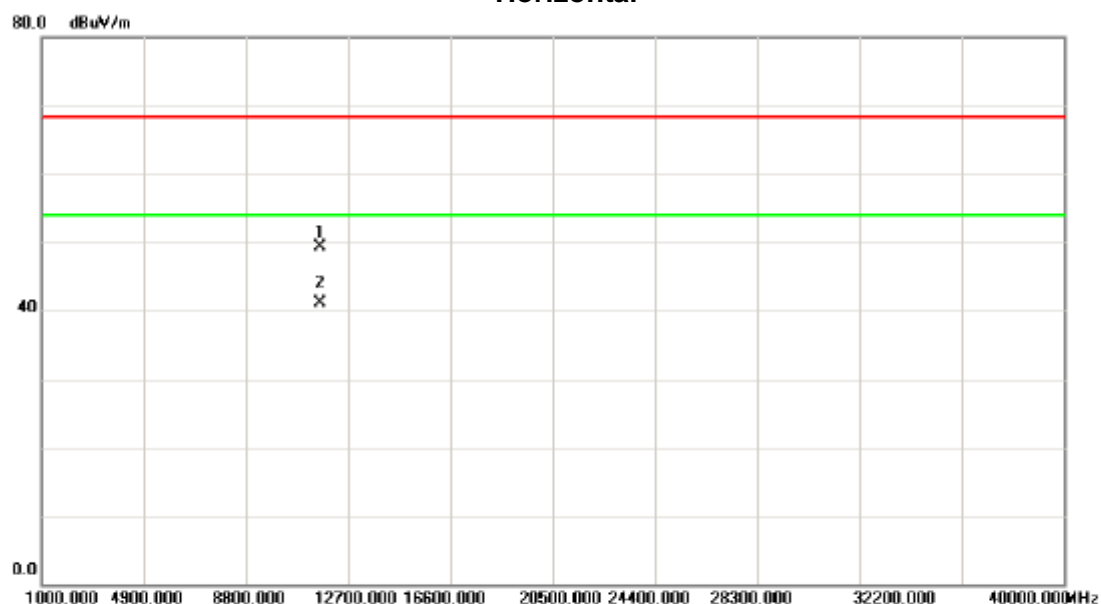
Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	5812.400	57.07	41.46	98.53	68.30	30.23	AVG	NO limit
2	X	5813.300	59.15	41.46	100.61	78.30	22.31	peak	NO limit
3		5850.000	7.34	41.62	48.96	78.30	-29.34	peak	
4		5850.000	-1.70	41.62	39.92	68.30	-28.38	AVG	
5		5860.000	6.68	41.65	48.33	68.30	-19.97	peak	
6		5860.000	-1.35	41.65	40.30	68.30	-28.00	AVG	

Test Mode:	TX Mode 5814MHz
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Horizontal



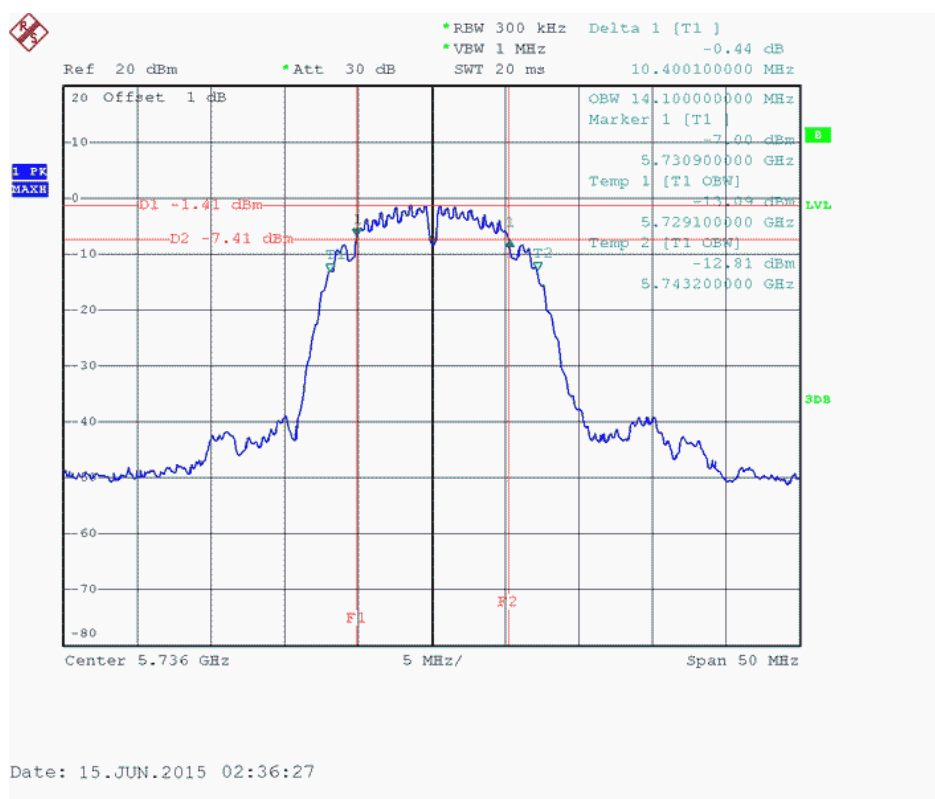
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		11628.57	36.35	12.86	49.21	68.30	-19.09	peak	
2	*	11628.57	28.31	12.86	41.17	54.00	-12.83	AVG	

ATTACHMENT E -BANDWIDTH

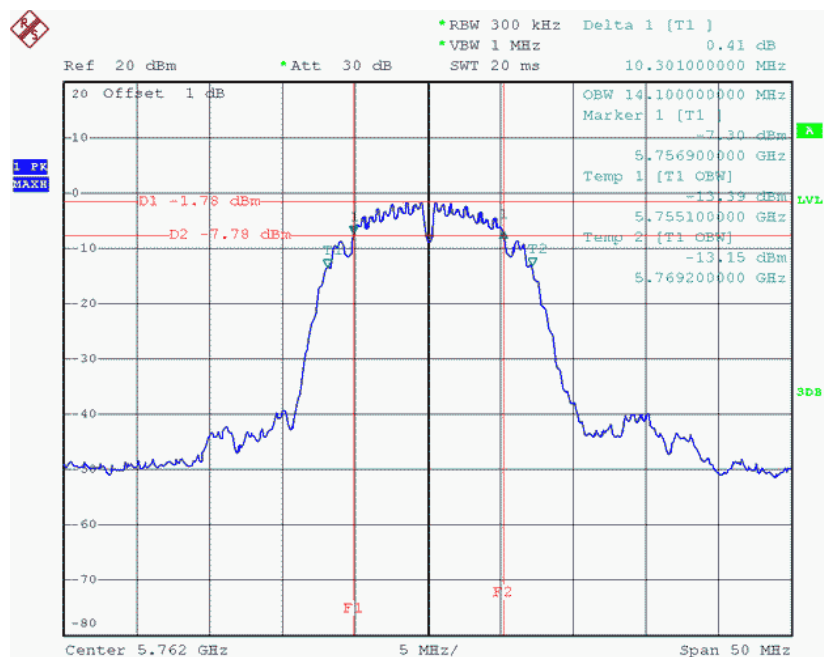
Test Mode :	TX Mode
-------------	---------

Frequency (MHz)	6dB Bandwidth (MHz)	99% Occupied BW (MHz)	Min. Limit (kHz)	Result
5736	10.40	14.10	500	Pass
5762	10.30	14.10	500	Pass
5814	10.40	14.10	500	Pass

TX CH01

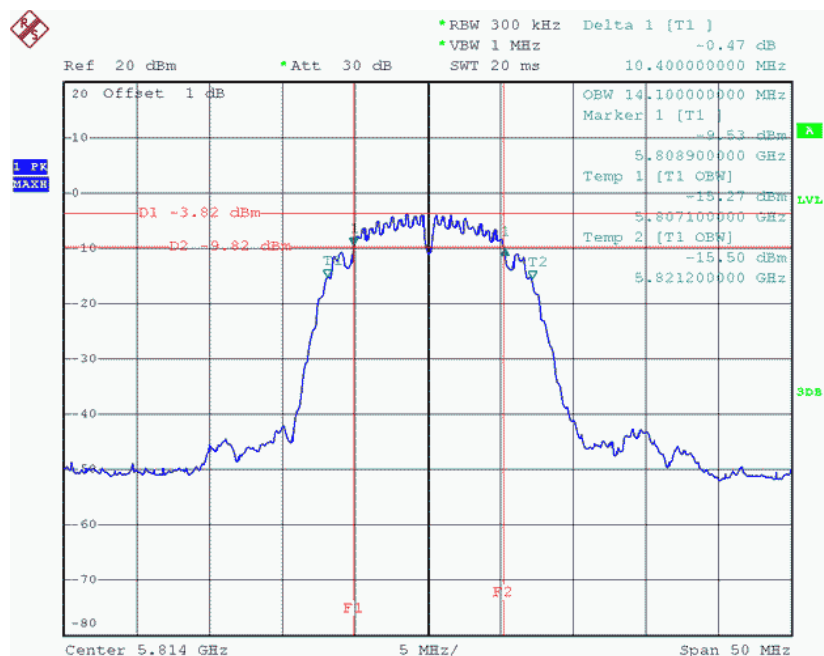


TX CH02



Date: 15.JUN.2015 02:44:31

TX CH03



Date: 15.JUN.2015 02:48:43

ATTACHMENT F - MAXIMUM OUTPUT POWER

Test Mode:	TX Mode_ANT 1
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Frequency (MHz)	Conducted Power (dBm)	Conducted Power (W)	Max. Limit (dBm)	Max. Limit (W)	Result
5736	3.27	0.0021	30.00	1.00	Pass
5762	2.65	0.0018	30.00	1.00	Pass
5814	3.02	0.0020	30.00	1.00	Pass

Test Mode:	TX Mode_ANT 2
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Frequency (MHz)	Conducted Power (dBm)	Conducted Power (W)	Max. Limit (dBm)	Max. Limit (W)	Result
5736	3.43	0.0022	30.00	1.00	Pass
5762	3.21	0.0021	30.00	1.00	Pass
5814	3.62	0.0023	30.00	1.00	Pass

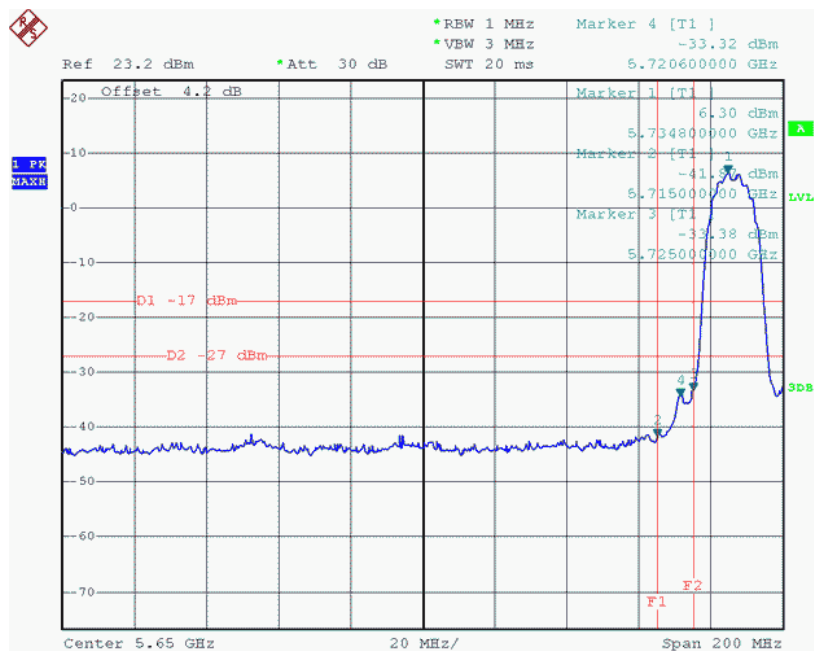
Test Mode:	TX Mode_Total
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Frequency (MHz)	Conducted Power (dBm)	Conducted Power (W)	Max. Limit (dBm)	Max. Limit (W)	Result
5736	6.36	0.0043	30.00	1.00	Pass
5762	5.95	0.0039	30.00	1.00	Pass
5814	6.34	0.0043	30.00	1.00	Pass

ATTACHMENT G - ANTENNA CONDUCTED SPURIOUS EMISSION

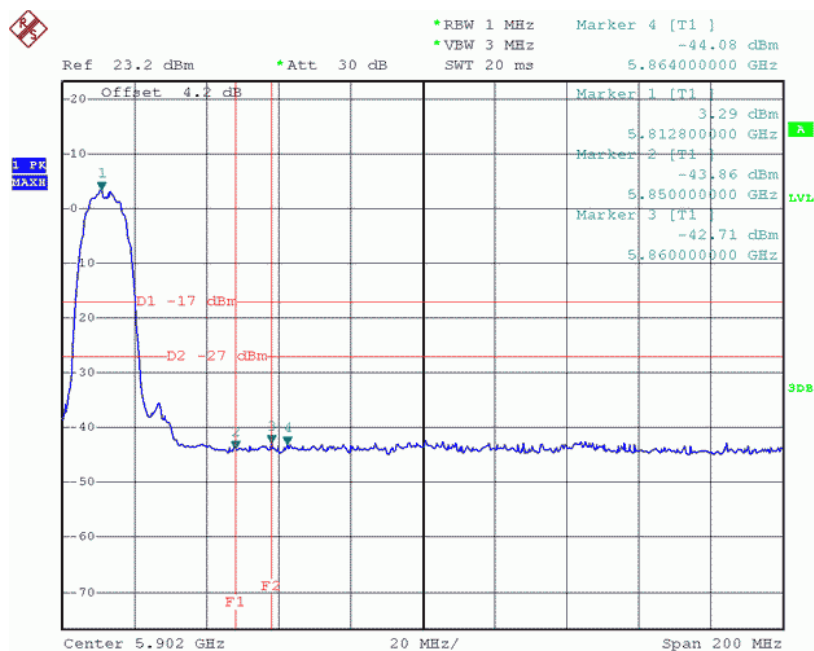
Test Mode: TX Mode_ANT 1

TX mode CH01



Date: 16.JUN.2015 02:30:11

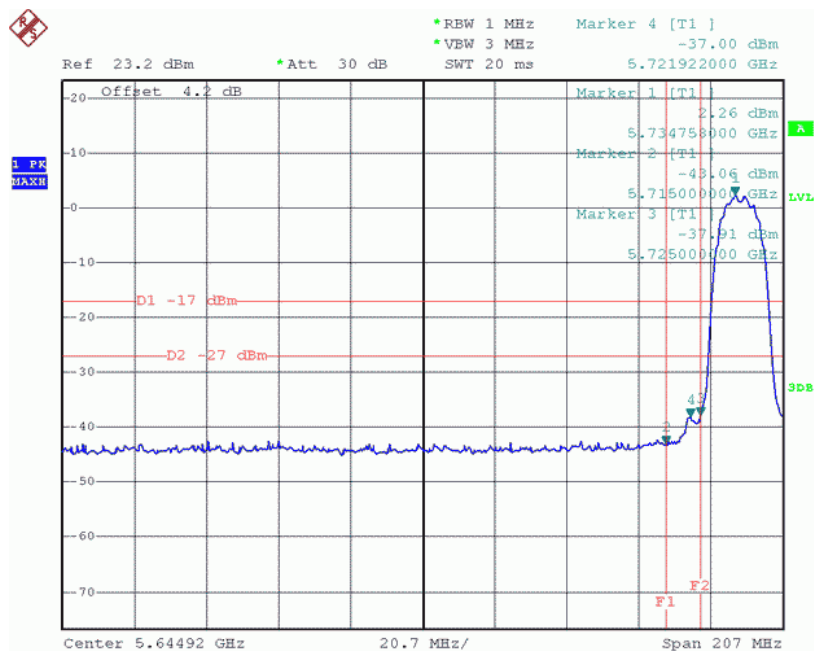
TX mode CH03



Date: 15.JUN.2015 02:51:47

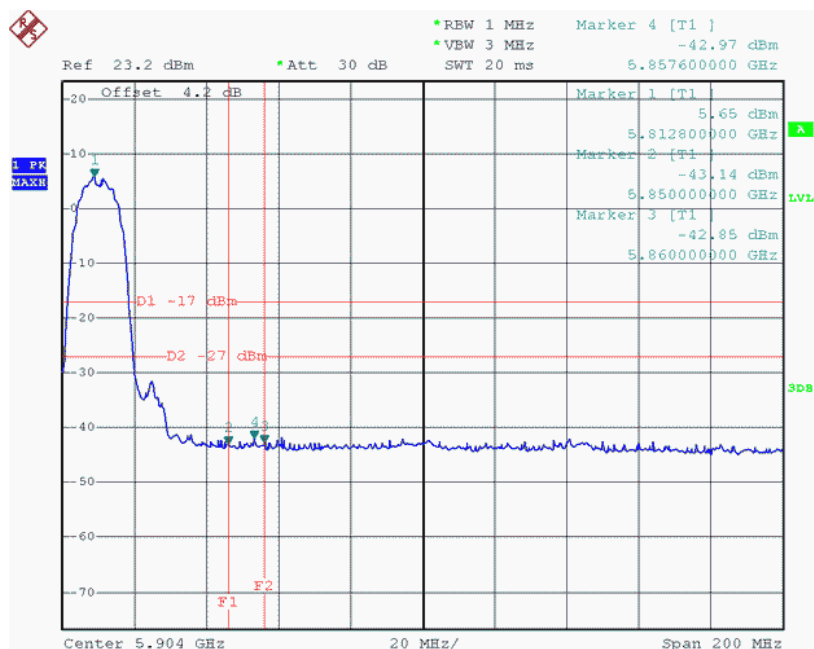
Test Mode: TX Mode_ANT 2

TX mode CH01



Date: 15.JUN.2015 03:05:54

TX mode CH03



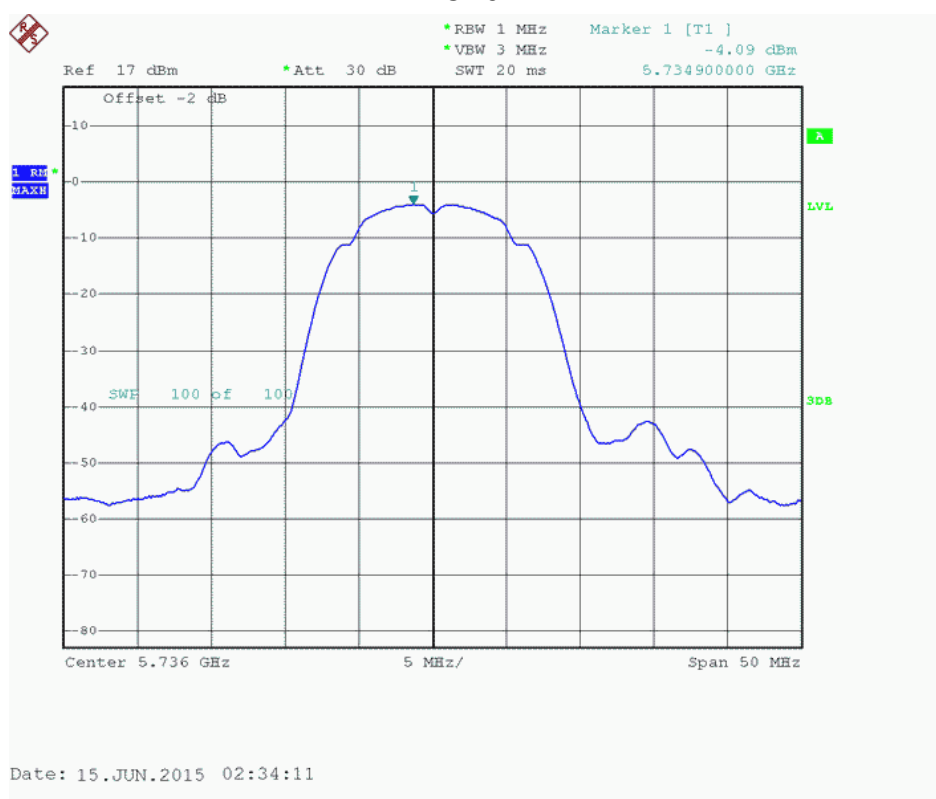
Date: 15.JUN.2015 03:35:24

ATTACHMENT H - POWER SPECTRAL DENSITY

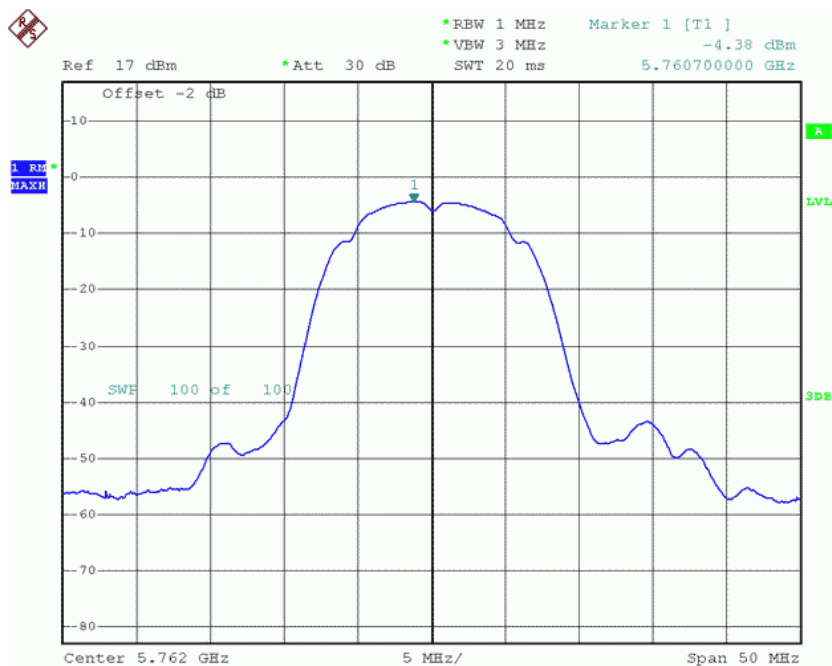
Test Mode:	TX Mode_ANT 1
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Frequency (MHz)	Power Density (dBm/3kHz)	Power Density (mW/3kHz)	Max. Limit (dBm/3kHz)	Result
5736	-4.09	0.39	8.00	Pass
5762	-4.38	0.36	8.00	Pass
5814	-6.18	0.24	8.00	Pass

CH01

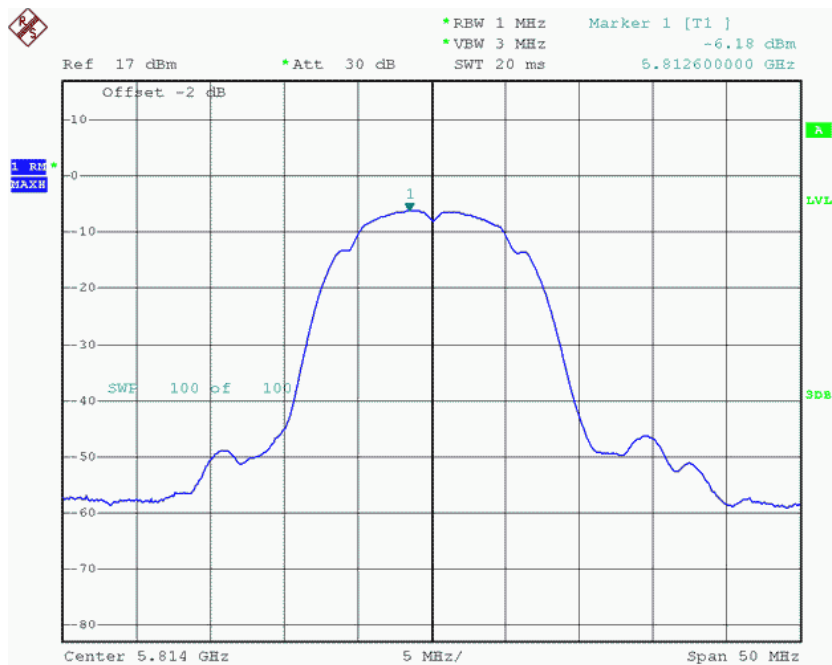


CH02



Date: 15.JUN.2015 02:40:35

CH03

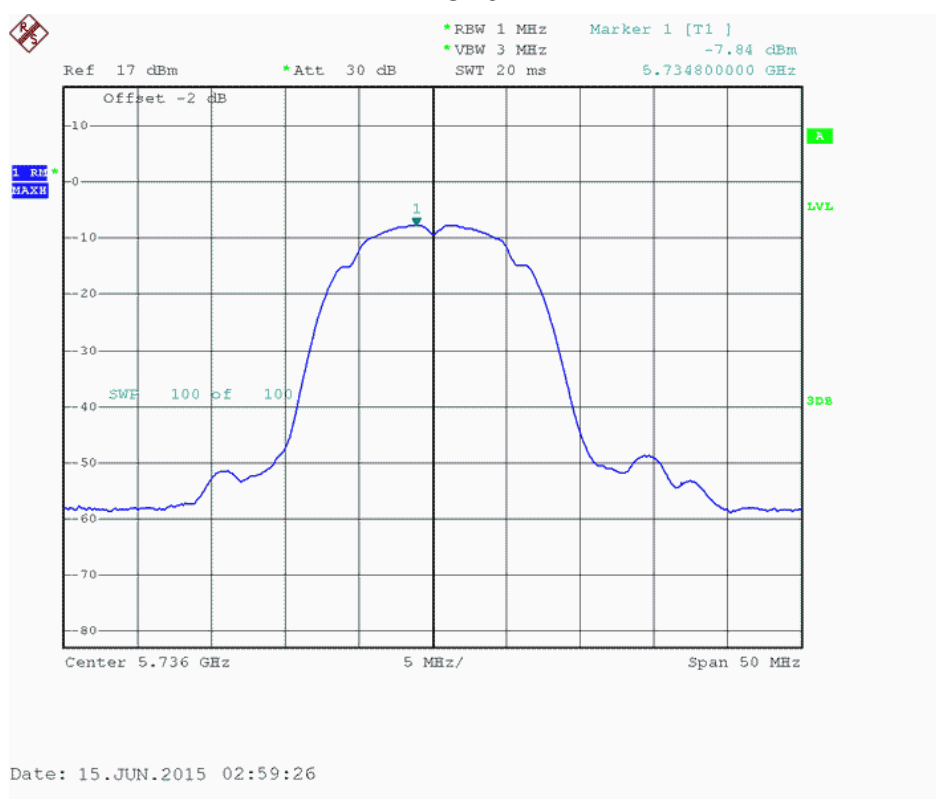


Date: 15.JUN.2015 04:13:13

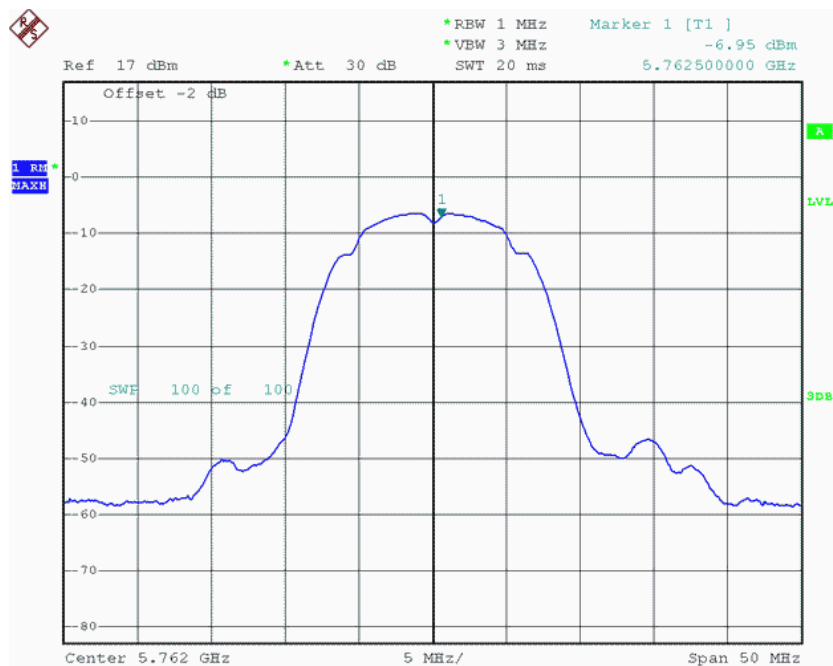
Test Mode:	TX Mode_ANT 2
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Frequency (MHz)	Power Density (dBm/3kHz)	Power Density (mW/3kHz)	Max. Limit (dBm/3kHz)	Result
5736	-7.84	0.16	8.00	Pass
5762	-6.95	0.20	8.00	Pass
5814	-4.58	0.35	8.00	Pass

CH01

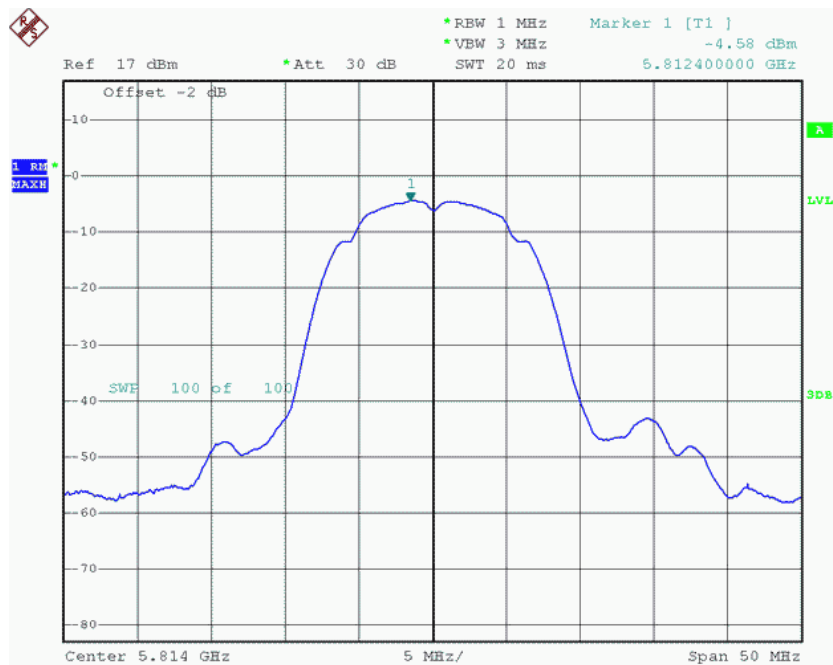


CH02



Date: 15.JUN.2015 03:21:25

CH03



Date: 15.JUN.2015 03:24:08

Test Mode:	TX Mode_Total
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Frequency (MHz)	Power Density (dBm/3kHz)	Power Density (mW/3kHz)	Max. Limit (dBm/3kHz)	Result
5736	-2.56	0.55	8.00	Pass
5762	-2.47	0.57	8.00	Pass
5814	-2.30	0.59	8.00	Pass

ATTACHMENT I-FREQUENCY STABILITY

Test Mode:	TX Mode
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Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)
(V)	5736.0000
132	5736.0672
120	5736.0572
108	5736.0571
Max. Deviation (MHz)	0.0672
Max. Deviation (ppm)	11.7155

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)
(°C)	5736.0000
0	5736.0569
5	5736.0570
15	5736.0571
25	5736.0572
35	5736.0568
Max. Deviation (MHz)	0.0572
Max. Deviation (ppm)	9.9721