FCC Radio Test Report

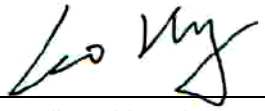
FCC ID: 2AAGJHEOS514

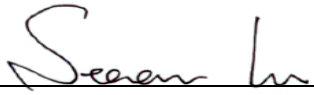
This report concerns (check one): ☒Original Grant ☐Class II Change

Project No.	:	1503C045
Equipment	:	Wireless TV Sound System
Model Name	:	SC-HHC-Bar
Applicant	:	Tymphany HK Limited
Address	:	Room 1307-8, Dominion Centre, 43-59 Queen's Road East, WanChai, Hong Kong

Date of Receipt	:	Mar. 05, 2015
Date of Test	:	Mar. 05, 2015 ~ Mar. 31, 2015
Issued Date	:	Apr. 01, 2015
Tested by	:	BTL Inc.

Testing Engineer :  (David Mao)

Technical Manager :  (Leo Hung)

Authorized Signatory :  (Steven Lu)

BTL INC.

No.3, Jinshagang 1st Road, Shixia, Dalang Town, Dongguan, Guangdong, China.

TEL: +86-769-8318-3000 FAX: +86-769-8319-6000

Declaration

BTLrepresents 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.**

BTL's reports apply only to the specific samples tested under conditions. It is manufacture's responsibility to ensure that additional production units of this model are manufactured with the identical electrical and mechanical components. **BTL**shall have no liability for any declarations, inferences or generalizations drawn by the client or others from **BTL**issued reports.

BTL's reports must not be used by the client to claim product endorsement by the authorities or any agency of the Government.

This report is the confidential property of the client. As a mutual protection to the clients, the public and **BTL-self**, extracts from the test report shall not be reproduced except in full with **BTL**'s authorized written approval.

BTL's laboratory quality assurance procedures are in compliance with the **ISO Guide 17025** requirements, and accredited by the conformity assessment authorities listed in this test report.

Limitation

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.

Table of Contents Page

1 . CERTIFICATION 7

2 . SUMMARY OF TEST RESULTS 8

2.1 TEST FACILITY 9

2.2 MEASUREMENT UNCERTAINTY 9

3 . GENERAL INFORMATION 10

3.1 GENERAL DESCRIPTION OF EUT 10

3.2 DESCRIPTION OF TEST MODES 11

3.3 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING 11

3.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED 12

3.5 DESCRIPTION OF SUPPORT UNITS 12

4 . EMC EMISSION TEST 13

4.1 CONDUCTED EMISSION MEASUREMENT 13

4.1.1 POWER LINE CONDUCTED EMISSION 13

4.1.2 TEST PROCEDURE 13

4.1.3 DEVIATION FROM TEST STANDARD 13

4.1.4 TEST SETUP 14

4.1.5 EUT OPERATING CONDITIONS 14

4.1.6 EUT TEST CONDITIONS 14

4.1.7 TEST RESULTS 14

4.2 RADIATED EMISSION MEASUREMENT 15

4.2.1 RADIATED EMISSION LIMITS 15

4.2.2 TEST PROCEDURE 16

4.2.3 DEVIATION FROM TEST STANDARD 16

4.2.4 TEST SETUP 16

4.2.5 EUT OPERATING CONDITIONS 17

4.2.6 EUT TEST CONDITIONS 17

4.2.7 TEST RESULTS (9K TO 30MHz) 18

4.2.8 TEST RESULTS (BETWEEN 30 TO 1000 MHz) 18

4.2.9 TEST RESULTS (ABOVE 1000 MHz) 18

5 . 26dB SPECTRUM BANDWIDTH 19

5.1 APPLIED PROCEDURES / LIMIT 19

5.1.1 TEST PROCEDURE 19

5.1.2 DEVIATION FROM STANDARD 19

5.1.3 TEST SETUP 19

5.1.4 EUT OPERATION CONDITIONS 19

5.1.5 EUT TEST CONDITIONS 19

5.1.6 TEST RESULTS 19

6 . MAXIMUM CONDUCTED OUTPUT POWER 20

6.1 APPLIED PROCEDURES / LIMIT 20
6.1.1 TEST PROCEDURE 20
6.1.2 DEVIATION FROM STANDARD 21
6.1.3 TEST SETUP 21
6.1.4 EUT OPERATION CONDITIONS 21
6.1.5 EUT TEST CONDITIONS 21
6.1.6 TEST RESULTS 21

7 . ANTENNA CONDUCTED SPURIOUS EMISSION 22

7.1 APPLIED PROCEDURES / LIMIT 22
7.1.1 TEST PROCEDURE 22
7.1.2 DEVIATION FROM STANDARD 22
7.1.3 TEST SETUP 22
7.1.4 EUT OPERATION CONDITIONS 22
7.1.5 EUT TEST CONDITIONS 22
7.1.6 TEST RESULTS 22

8 . POWER SPECTRAL DENSITY TEST 23

8.1 APPLIED PROCEDURES / LIMIT 23
8.1.1 TEST PROCEDURE 23
8.1.1 DEVIATION FROM STANDARD 24
8.1.2 TEST SETUP 24
8.1.3 EUT OPERATION CONDITIONS 24
8.1.4 EUT TEST CONDITIONS 24
8.1.5 TEST RESULTS 24

9 . FREQUENCY STABILITY MEASUREMENT 25

9.1 APPLIED PROCEDURES / LIMIT 25
9.1.1 TEST PROCEDURE 25
9.1.2 DEVIATION FROM STANDARD 25
9.1.3 TEST SETUP 25
9.1.4 EUT OPERATION CONDITIONS 25
9.1.5 EUT TEST CONDITIONS 25
9.1.6 TEST RESULTS 25

10 . MEASUREMENT INSTRUMENTS LIST 26

11 . EUT TEST PHOTOS 28

ATTACHMENT A - CONDUCTED EMISSION 32

ATTACHMENT B - RADIATED EMISSION (9KHZ TO 30MHZ) 35

ATTACHMENT C - RADIATED EMISSION (30MHZ TO 1000MHZ) 37

ATTACHMENT D - RADIATED EMISSION (ABOVE 1000MHZ) 40

ATTACHMENT E - BANDWIDTH 54

Table of Contents **Page**

ATTACHMENT F - MAXIMUM OUTPUT POWER **57**

ATTACHMENT G - ANTENNA CONDUCTED SPURIOUS EMISSION **59**

ATTACHMENT H - POWER SPECTRAL DENSITY **61**

ATTACHMENT I - FREQUENCY STABILITY **64**

REPORT ISSUED HISTORY

Issued No.	Description	Issued Date
BTL-FCCP-1-1503C045	Original Issue.	Apr. 01, 2015

1. CERTIFICATION

Equipment	:	Wireless TV Sound System
Brand Name	:	DENON
Model Name	:	SC-HHC-Bar
Applicant	:	Tymphany HK Limited
Manufacturer	:	D&M Holdings Inc.
Address	:	2-1 Nisshin-cho, Kawasaki-ku, Kawasaki-shi, Kanagawa, 210-8569 Japan
Factory Address	:	Premium Loudspeakers (HuiZhou) Co. Ltd Tymphany Industrial Area, Xin Lian Village, Xin Xu Town, Hui Yang District, Hui Zhou City, Guangdong, China
Date of Test	:	Mar. 05, 2015 ~ Mar. 31, 2015
Test Sample	:	ENGINEERING SAMPLE
Standard(s)	:	FCC Part15, Subpart E(15.407) / ANSI C63.4: 2009 FCC KDB 789033 D02 General UNII Test Procedures New Rules v01.

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-FCCP-1-1503C045) 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			
Standard(s) Section FCC	Test Item	Judgment	Remark
15.207	AC Power Line Conducted Emissions	PASS	
15.407(a)	26dB Spectrum Bandwidth	PASS	
15.407(a)	Maximum Conducted Output Power	PASS	
15.407(a)	Power Spectral Density	PASS	
15.407(a)	Radiated Emissions	PASS	
15.407(b)	Band Edge Emissions	PASS	
15.407(g)	Frequency Stability	PASS	
15.203	Antenna Requirements	PASS	

NOTE:

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

(2) FCC KDB 789033 D02 General UNII Test Procedures New Rules v01.

2.1 TEST FACILITY

The test facilities used to collect the test data in this report is **DG-C02/DG-CB03** at the location of No.3, Jinshagang 1st Road, Shixia, Dalang Town, Dongguan, Guangdong, China. 523792
BTL's test firm number for FCC: 319330

2.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y** ± **U**，where expended uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k=2**，providing a level of confidence of approximately **95**%。

A. Conducted Measurement:

Test Site	Method	Measurement Frequency Range	U，(dB)	NOTE
DG-C02	CISPR	150 KHz ~ 30MHz	1.94	

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	

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Equipment	Wireless TV Sound System	
Brand Name	DENON	
Model Name	SC-HHC-Bar	
Mode Different	N/A	
Product Description	Operation Frequency	5736~5814 MHz
	Modulation Type	QPSK
	Bit Rate of Transmitter	150Mbps
	Output Power (Max.)	7.72dBm
Power Source	DC Voltage supplied from AC/DC adapter Brand/model: DYS/DYS902-240375W	
Power Rating	I/P 100-240V~ 50/60Hz 1.5A MAX O/P DC24.0V 3.75A	

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)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	5736	02	5762	03	5814

3. Antenna Specification:

Ant.	Manufacturer	Model Name	Antenna Type	Connector	Gain (dBi)	Note
1	SMSC	DWHP83	Internal	N/A	3.20	TX
2	SMSC	DWHP83	Internal	N/A	3.20	RX

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
Mode 2	TX Mode

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 2	TX Mode

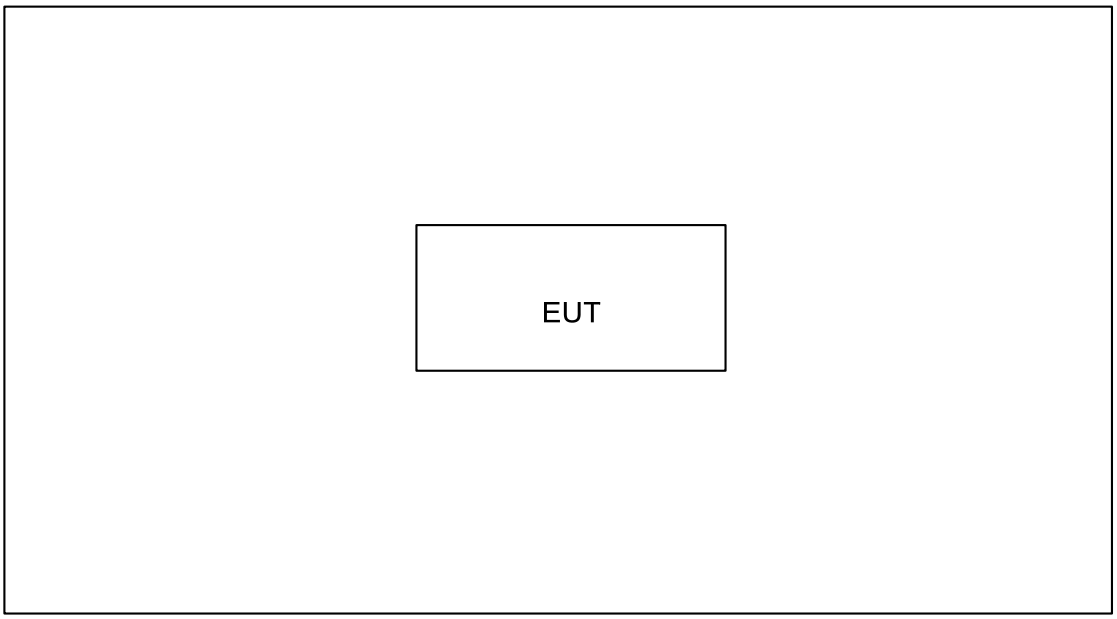
For Radiated Test	
Final Test Mode	Description
Mode 1	TX Mode / CH01, CH02, CH03

3.3 TABLE OF PARAMETERS OF TEXT 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.

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 ground plane 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.

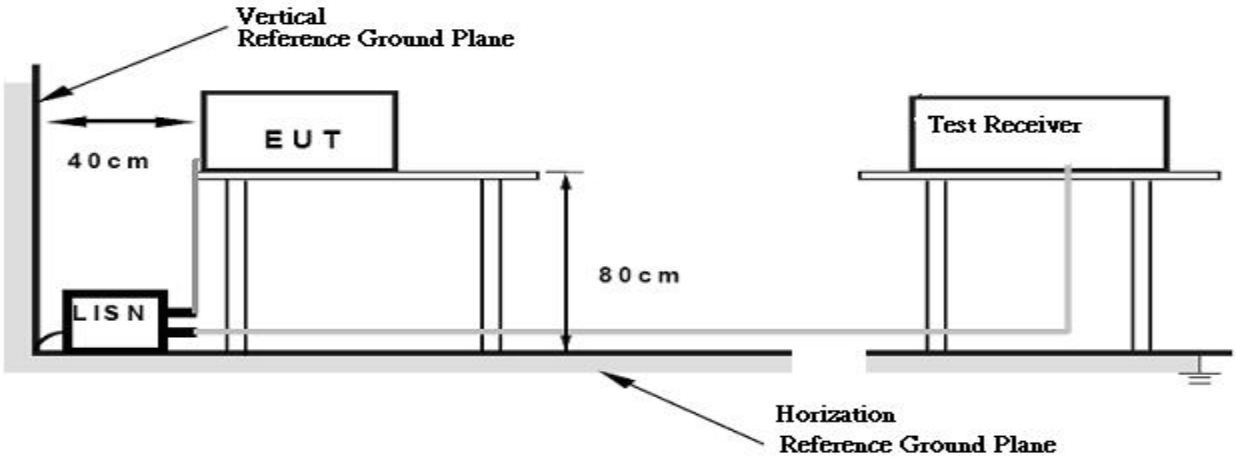
d. LISN at least 80 cm from nearest part of EUT chassis.

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: 25°C Relative Humidity: 55% 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), then the 15.209(a) 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)
5736~5814	-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: $E = \frac{1000000\sqrt{30P}}{3}$ μV/m, where P is the eirp (Watts)

4.2.2 TEST PROCEDURE

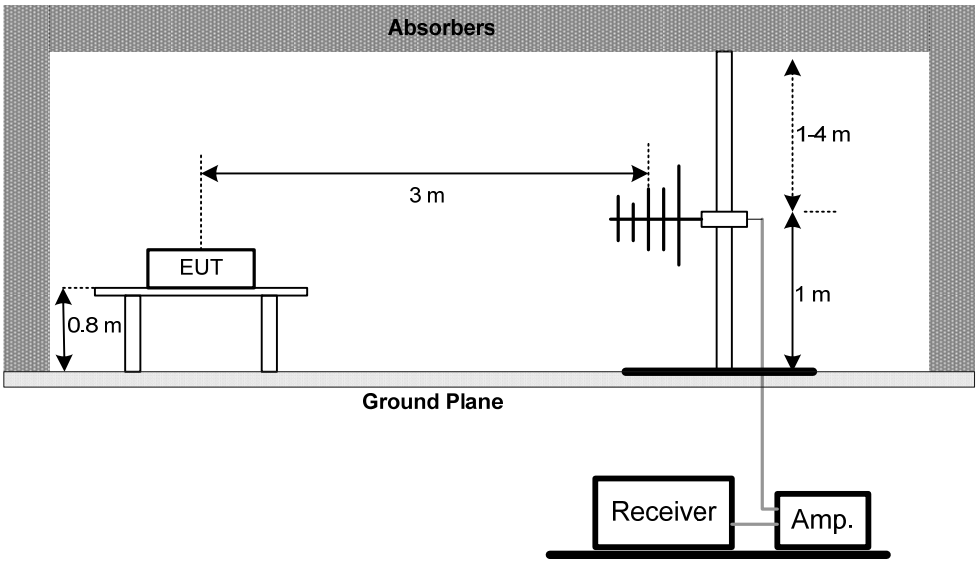
a. The measuring distance of at 3m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
c. The height of the equipment or of the substitution antenna shall be 0.8 m; 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.
d. 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.
e. 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.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.2.3 DEVIATION FROM TEST STANDARD

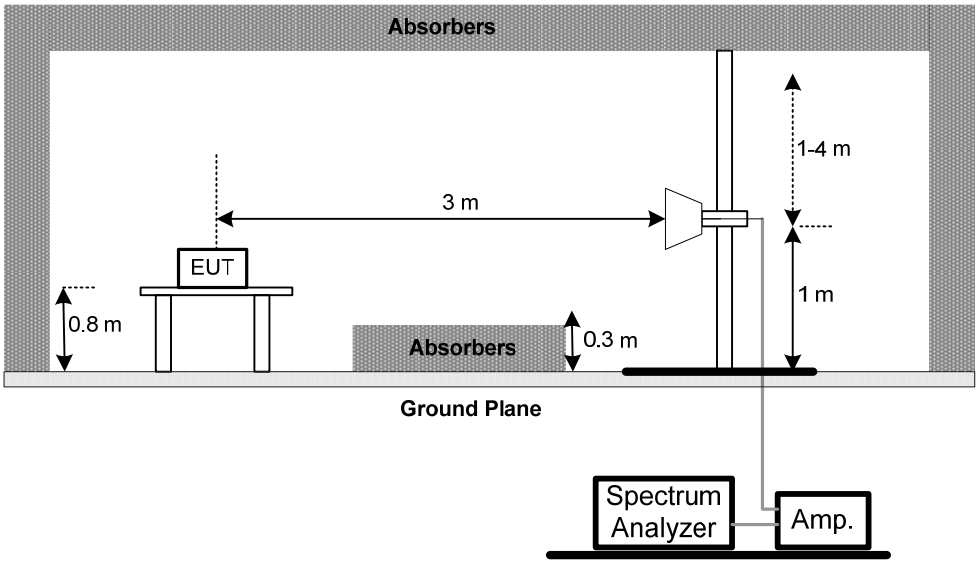
No deviation

4.2.4 TEST SETUP

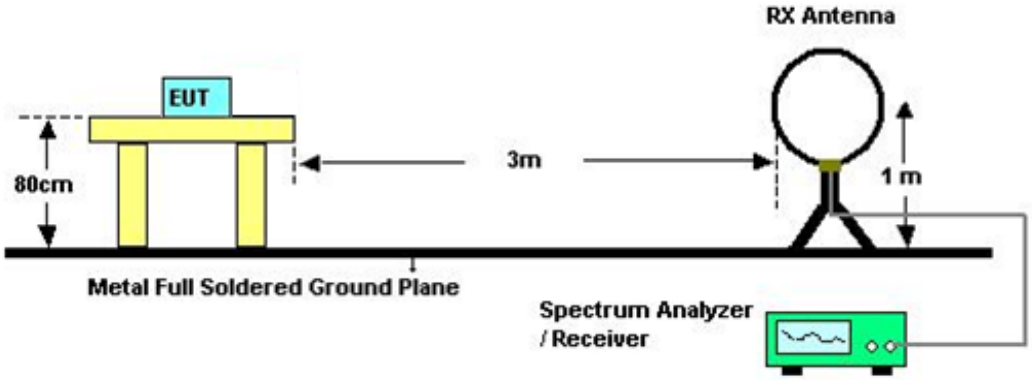
(A) Radiated Emission Test Set-Up Frequency30 - 1000MHz



(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: 25°C Relative Humidity: 55% 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 (specific distance / test distance) (dB);
(3) Limit line = specific limits (dBuV) + distance extrapolation factor.

4.2.8 TEST RESULTS (BETWEEN 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 Mode with 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 (ABOVE 1000 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. 26dB SPECTRUM BANDWIDTH

5.1 APPLIED PROCEDURES / LIMIT

FCC Part15, Subpart E			
Test Item	Limit	Frequency Range (MHz)	Result
Bandwidth	Minimum 500KHz 6dB Bandwidth	5736~5814	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.

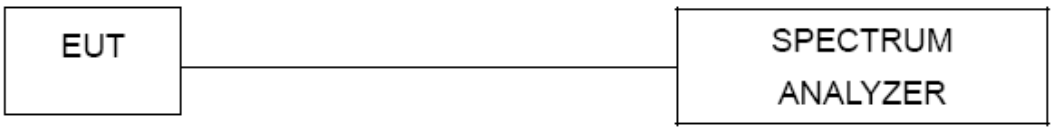
Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> 26dB Bandwidth
RBW	300 kHz
VBW	1000 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

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: 25°C Relative Humidity: 55% 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			
Test Item	Limit	Frequency Range (MHz)	Result
Conducted Output Power	1 Watt (30dBm)	5736~5814	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) of the signal
RBW	= 1MHz.
VBW	≥ 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: 25°C Relative Humidity: 55% 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			
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	5736~5814	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,

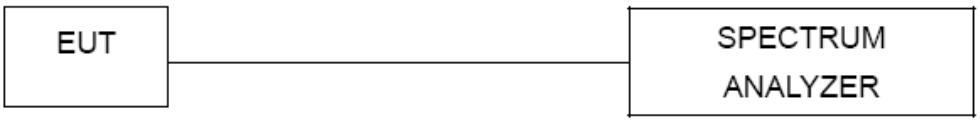
b.

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: 25°C Relative Humidity: 55% 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			
Test Item	Limit	Frequency Range (MHz)	Result
Power Spectral Density	30dBm/500KHz	5736~5814	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

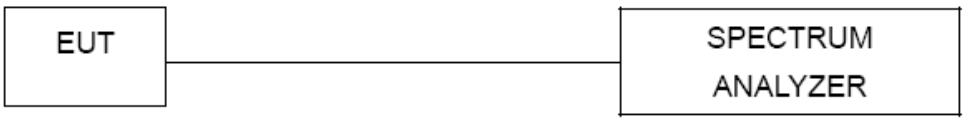
Note:

1. For UNII-3, 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 10log(500kHz/1MHz) 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: 25°C Relative Humidity: 55% 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			
Test Item	Limit	Frequency Range (MHz)	Result
Frequency Stability	Specified in the user's manual	5736~5814	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 emissions bandwidth
RBW	10 kHz
VBW	10 kHz
Sweep Time	Auto

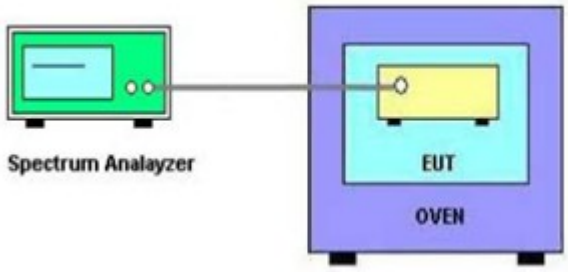
c. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value.

d. User manual temperature is 0°C~50°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	100087	Mar. 28, 2016
3	Test Cable	N/A	C_17	N/A	Mar. 13, 2016
4	EMI TEST RECEIVER	R&S	ESCS30	826547/022	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	Mar. 28, 2016
3	Receiver	AGILENT	N9038A	MY52130039	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	Mar. 28, 2016
8	Receiver	AGILENT	N9038A	MY52130039	Sep. 30, 2015
9	Test Cable	HUBER+SUHNER	C-48	N/A	Apr. 30, 2015
10	Controller	CT	SC100	N/A	N/A
11	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170319	Feb. 21, 2016
12	Microwave Preamplifier With Adaptor	EMC INSTRUMENT	EMC2654045	980039 & HA01	Feb. 21, 2016
13	Active Loop Antenna	R&S	HFH2-Z2	830749/020	Mar. 28, 2016
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	P-series Power meter	Agilent	N1911A	MY45100473	Mar. 28, 2016
2	Wireband Power sensor	Agilent	N1921A	MY51100041	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

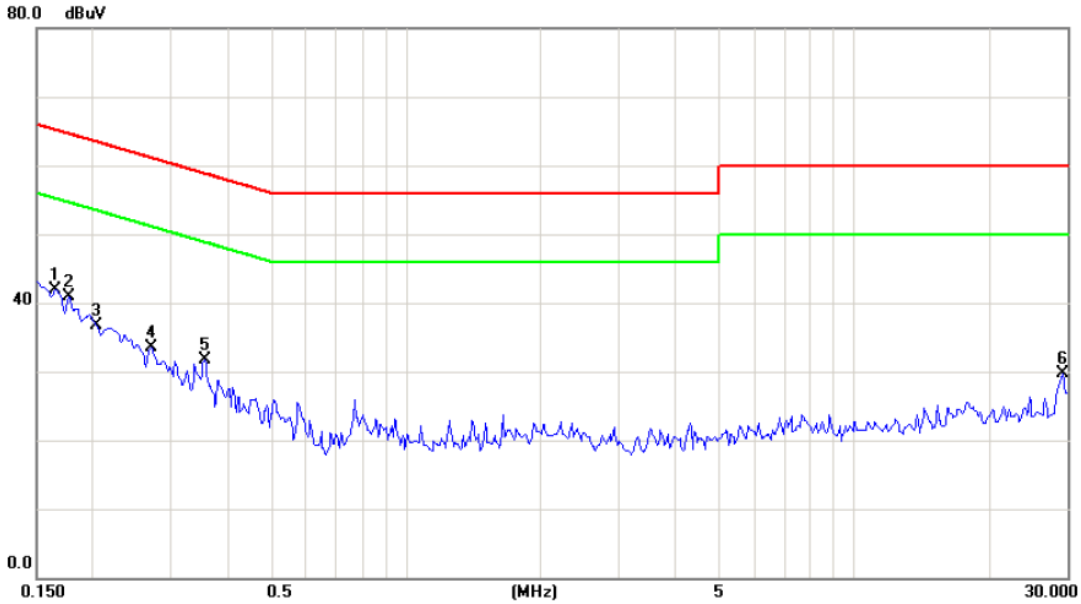
Frequency Stability Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov. 02, 2015
2	Precision Oven Tester	HOLINK	H-T-1F-D	BA03101701	May. 24, 2015

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

ATTACHMENT A - CONDUCTED EMISSION

Test Mode:	TX MODE

Line

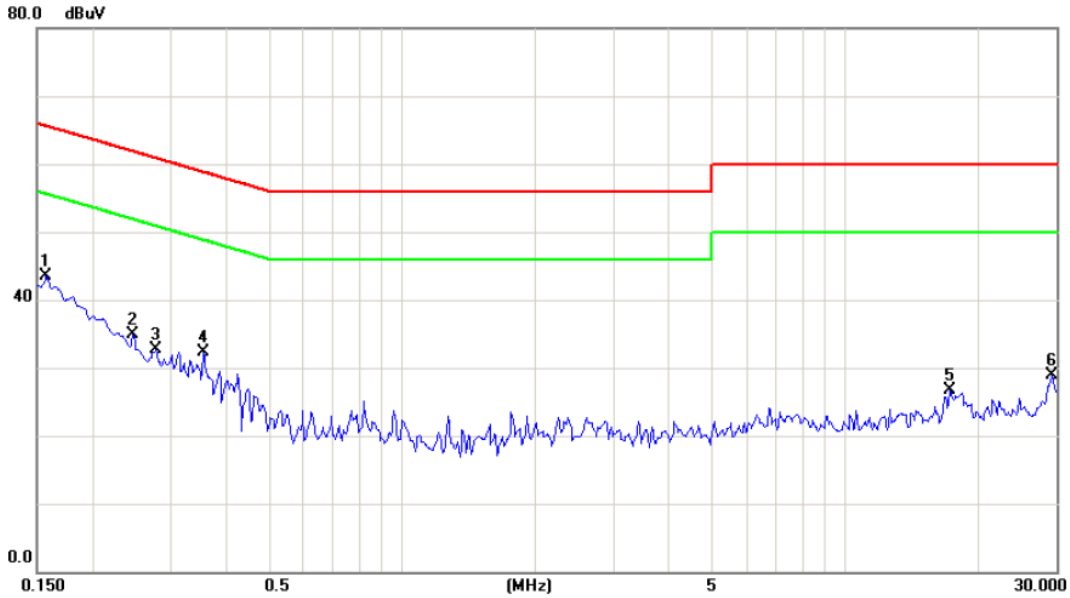


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.1655	32.53	9.46	41.99	65.18	-23.19	peak	
2		0.1773	31.51	9.46	40.97	64.61	-23.64	peak	
3		0.2047	27.14	9.47	36.61	63.42	-26.81	peak	
4		0.2711	24.01	9.50	33.51	61.08	-27.57	peak	
5		0.3570	22.21	9.54	31.75	58.80	-27.05	peak	
6		29.2344	19.75	10.03	29.78	60.00	-30.22	peak	

Note：The test result has included the cable loss.

Test Mode:	TX MODE

Neutral



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.1578	33.88	9.56	43.44	65.58	-22.14	peak	
2		0.2477	25.42	9.54	34.96	61.83	-26.87	peak	
3		0.2790	23.13	9.54	32.67	60.85	-28.18	peak	
4		0.3570	22.71	9.54	32.25	58.80	-26.55	peak	
5		17.2148	17.09	9.70	26.79	60.00	-33.21	peak	
6		29.2344	18.75	10.07	28.82	60.00	-31.18	peak	

Note：The test result has included the cable loss.

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

Test Mode:	TX MODE

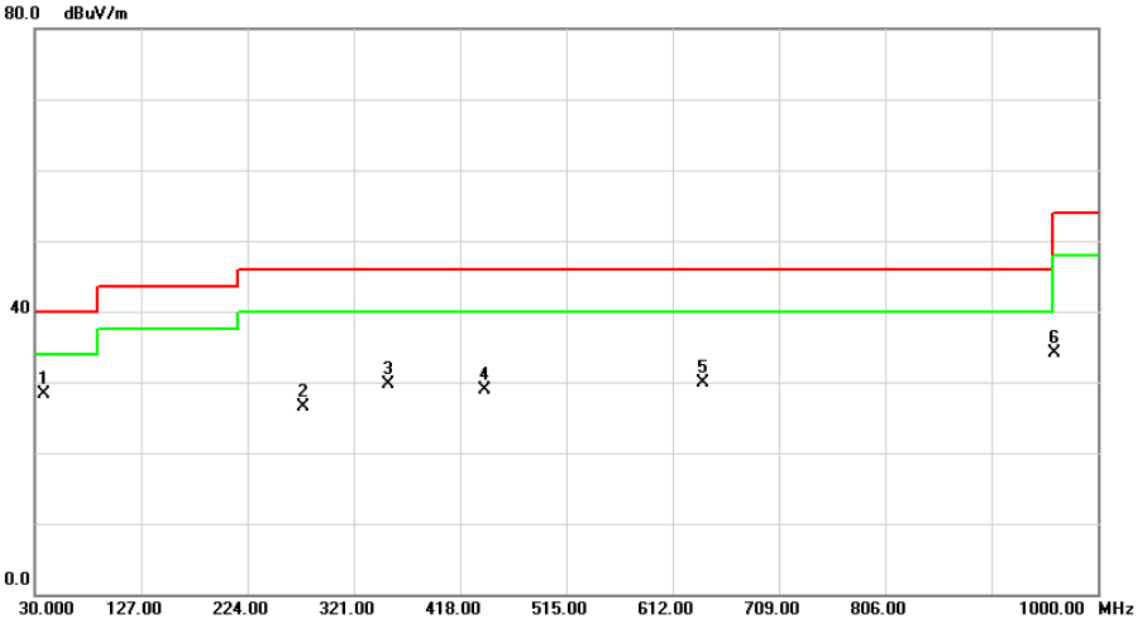
Freq. (MHz)	Ant. 0°/90°	Reading(RA) (dBuV)	Corr.Factor(CF) (dB)	Measured(FS) (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Note
0.0095	0°	10.42	24.30	34.72	128.05	-93.33	AV
0.0095	0°	12.35	24.30	36.65	148.05	-111.40	PK
0.0237	0°	6.79	24.07	30.86	120.11	-89.25	AV
0.0237	0°	8.23	24.07	32.30	140.11	-107.81	PK
0.0375	0°	3.06	23.19	26.25	116.12	-89.87	AV
0.0375	0°	4.75	23.19	27.94	136.12	-108.18	PK
0.0462	0°	-0.18	22.64	22.46	114.31	-91.85	PK
0.0462	0°	1.56	22.64	24.20	134.31	-110.11	PK
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

Freq. (MHz)	Ant. 0°/90°	Reading(RA) (dBuV)	Corr.Factor(CF) (dB)	Measured(FS) (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Note
0.0103	90°	8.52	24.30	32.82	127.35	-94.53	AV
0.0103	90°	11.16	24.30	35.46	147.35	-111.89	PK
0.0288	90°	7.04	23.74	30.78	118.42	-87.63	AV
0.0288	90°	9.35	23.74	33.09	138.42	-105.32	PK
0.0357	90°	4.15	23.31	27.46	116.55	-89.10	AV
0.0357	90°	5.76	23.31	29.07	136.55	-107.49	PK
0.0451	90°	0.32	22.71	23.03	114.52	-91.49	AV
0.0451	90°	1.21	22.71	23.92	134.52	-110.60	PK
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 5736MHz

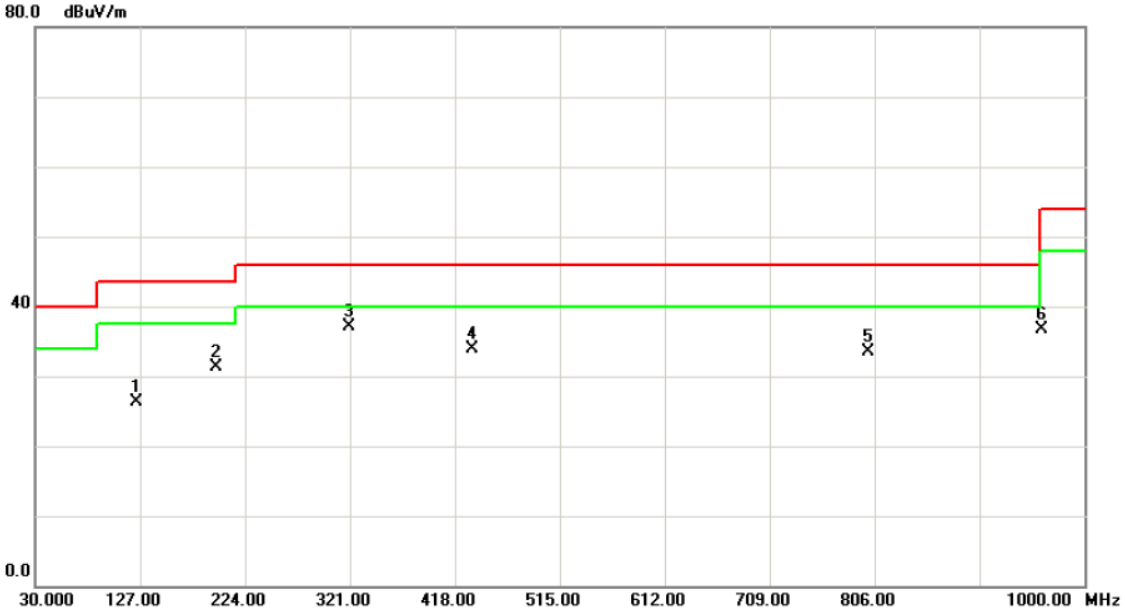
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	37.7600	42.65	-14.38	28.27	40.00	-11.73	peak	
2		275.4100	39.24	-12.72	26.52	46.00	-19.48	peak	
3		352.0400	41.41	-11.70	29.71	46.00	-16.29	peak	
4		440.3100	37.67	-8.79	28.88	46.00	-17.12	peak	
5		640.1300	35.52	-5.69	29.83	46.00	-16.17	peak	
6		960.2300	34.41	-0.25	34.16	54.00	-19.84	peak	

Test Mode:	TX 5736MHz

Horizontal

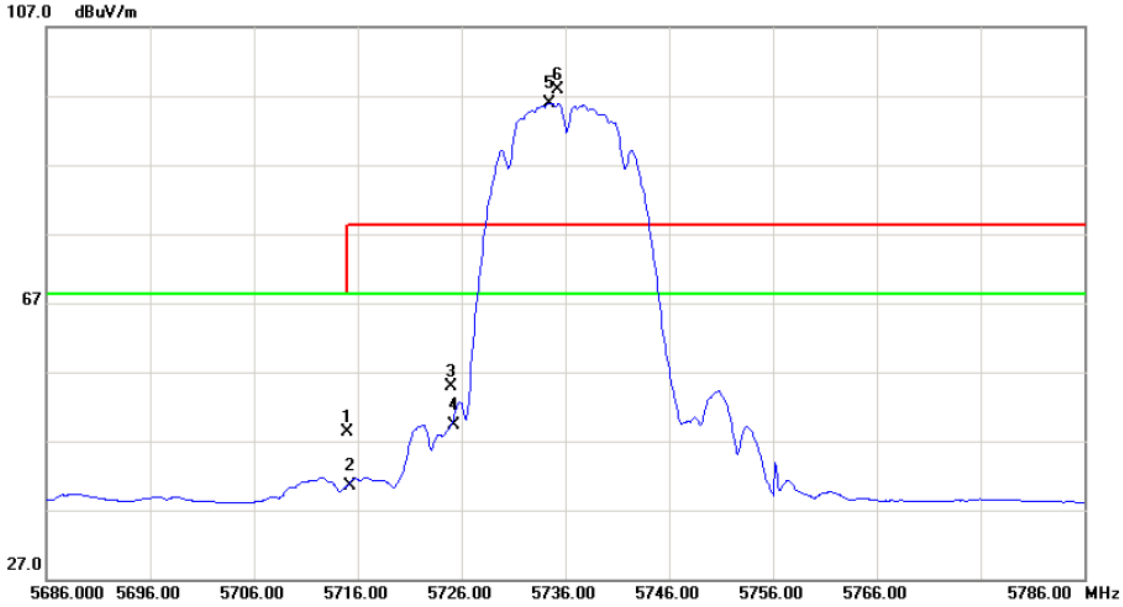


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		123.1200	40.18	-13.85	26.33	43.50	-17.17	peak	
2		196.8400	46.04	-14.79	31.25	43.50	-12.25	peak	
3	*	320.0300	48.48	-11.31	37.17	46.00	-8.83	peak	
4		433.5200	42.73	-8.92	33.81	46.00	-12.19	peak	
5		800.1800	36.49	-2.89	33.60	46.00	-12.40	peak	
6		960.2300	36.97	-0.25	36.72	54.00	-17.28	peak	

ATTACHMENT D - RADIATED EMISSION (ABOVE 1000MHZ)

Orthogonal Axis:	X
Test Mode:	TX 5736MHz

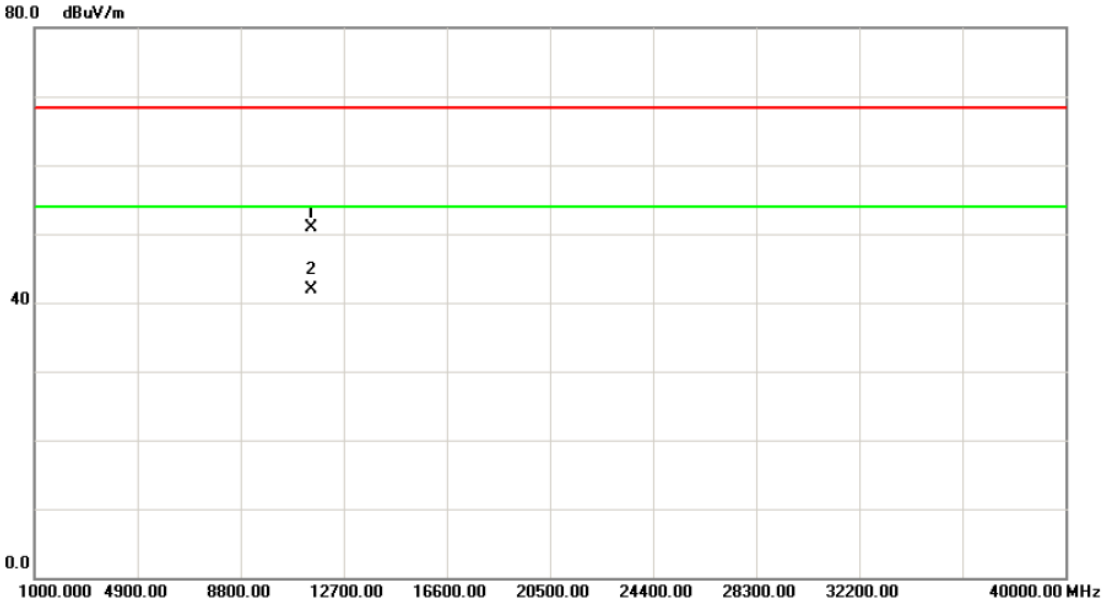
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	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

Orthogonal Axis:	X
Test Mode:	TX 5736MHz

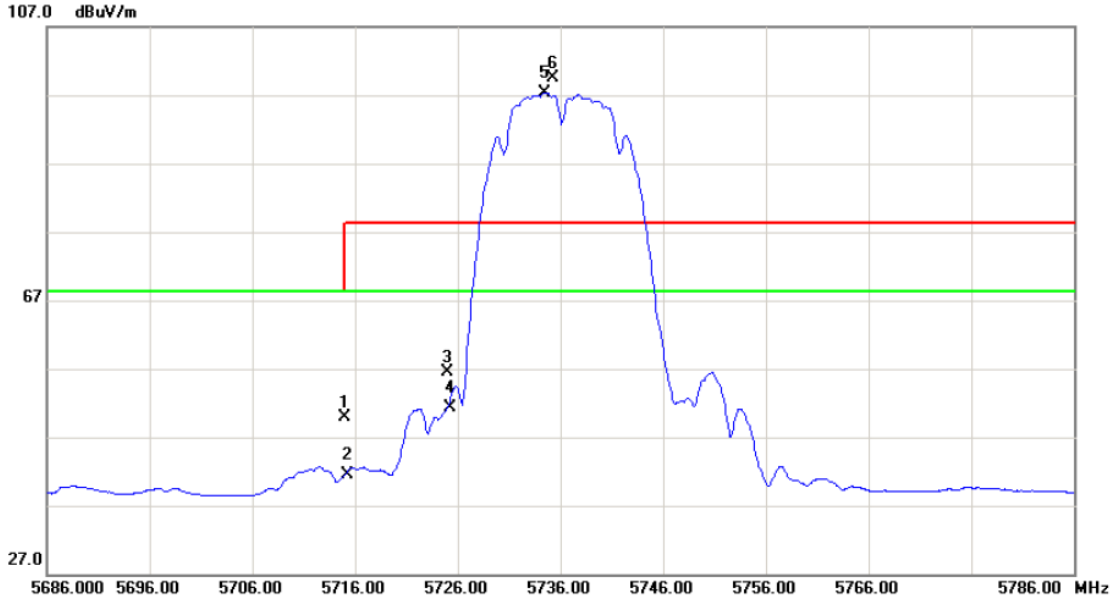
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		11472.160	38.01	12.85	50.86	68.30	-17.44	peak	
2	*	11472.160	29.07	12.85	41.92	54.00	-12.08	AVG	

Orthogonal Axis:	X
Test Mode:	TX 5736MHz

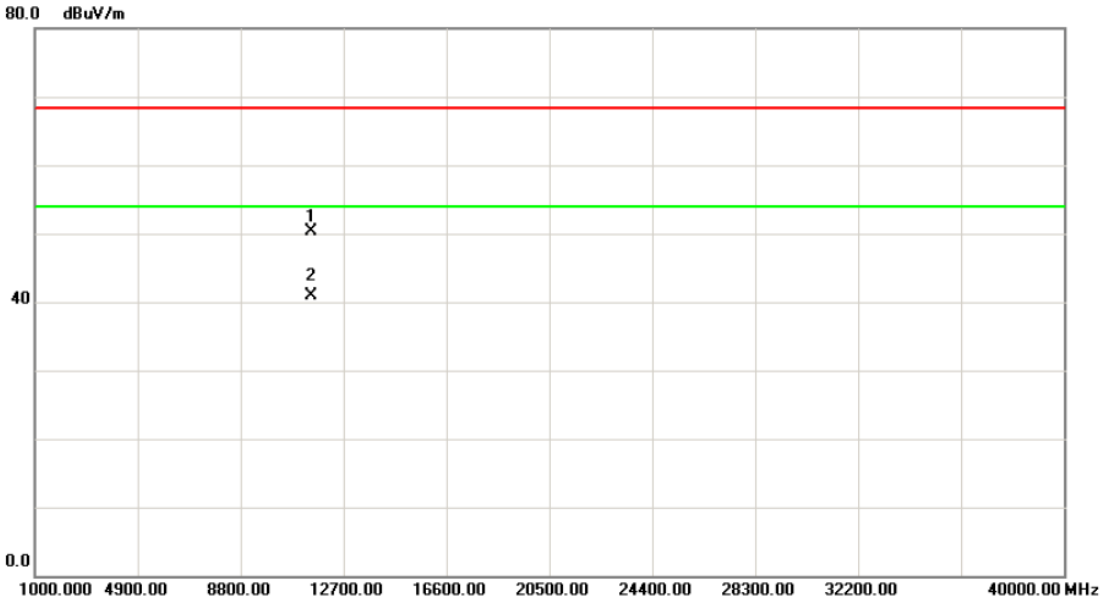
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	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

Orthogonal Axis:	X
Test Mode:	TX 5736MHz

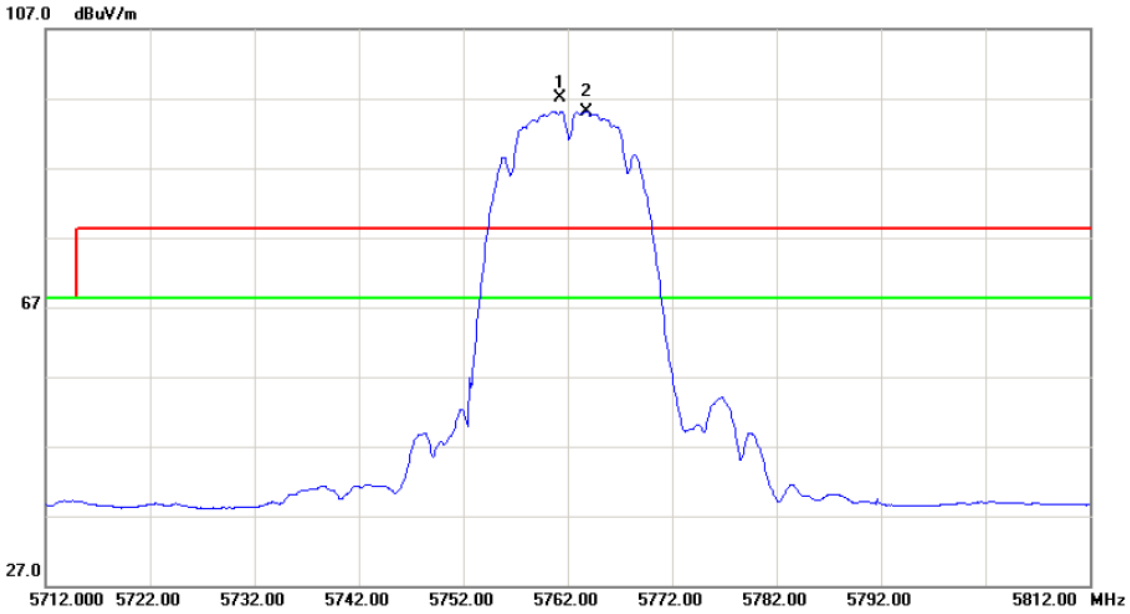
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		11472.20	37.42	12.85	50.27	68.30	-18.03	peak	
2	*	11472.28	28.09	12.85	40.94	54.00	-13.06	AVG	

Orthogonal Axis:	X
Test Mode:	TX 5762MHz

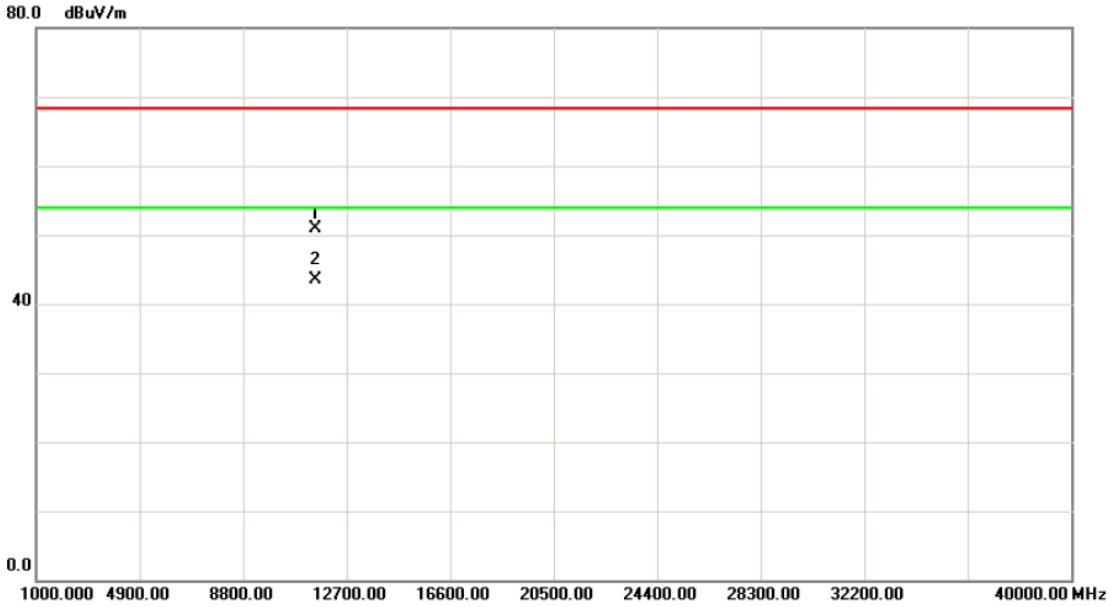
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	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

Orthogonal Axis:	X
Test Mode:	TX 5762MHz

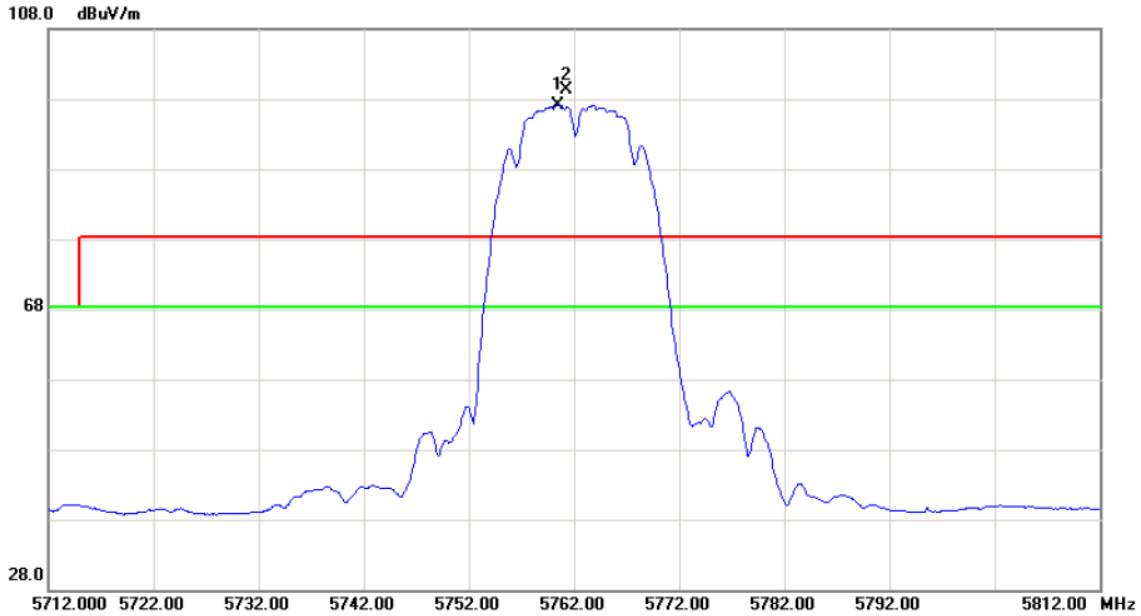
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		11524.29	37.98	12.92	50.90	68.30	-17.40	peak	
2	*	11524.29	30.59	12.92	43.51	54.00	-10.49	AVG	

Orthogonal Axis:	X
Test Mode:	TX 5762MHz

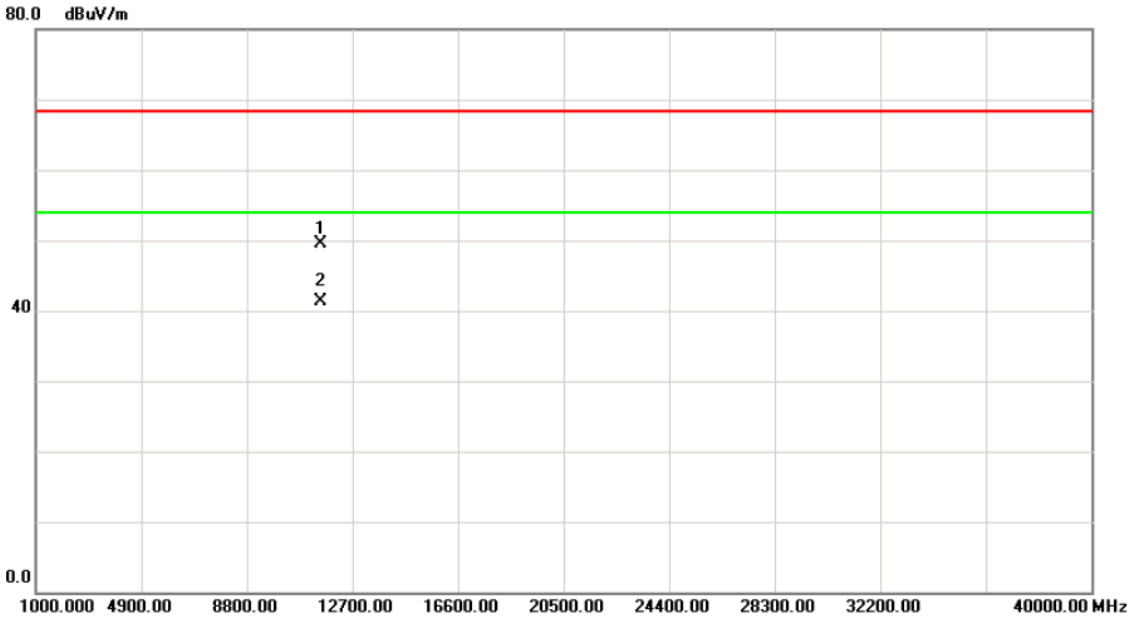
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	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

Orthogonal Axis:	X
Test Mode:	TX 5762MHz

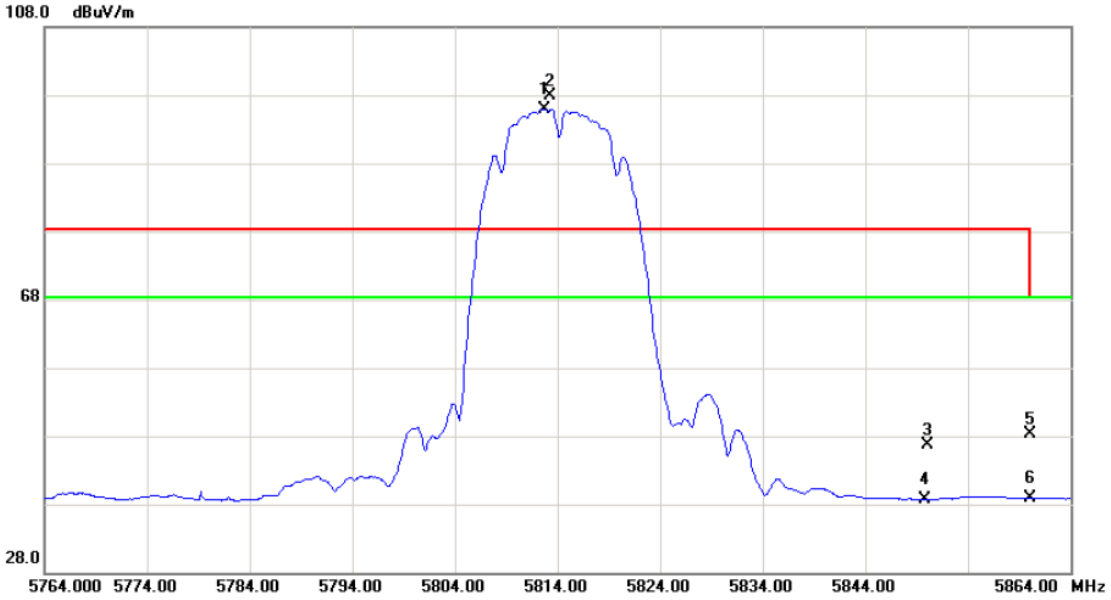
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		11524.25	36.63	12.92	49.55	68.30	-18.75	peak	
2	*	11524.25	28.46	12.92	41.38	54.00	-12.62	AVG	

Orthogonal Axis:	X
Test Mode:	TX 5814MHz

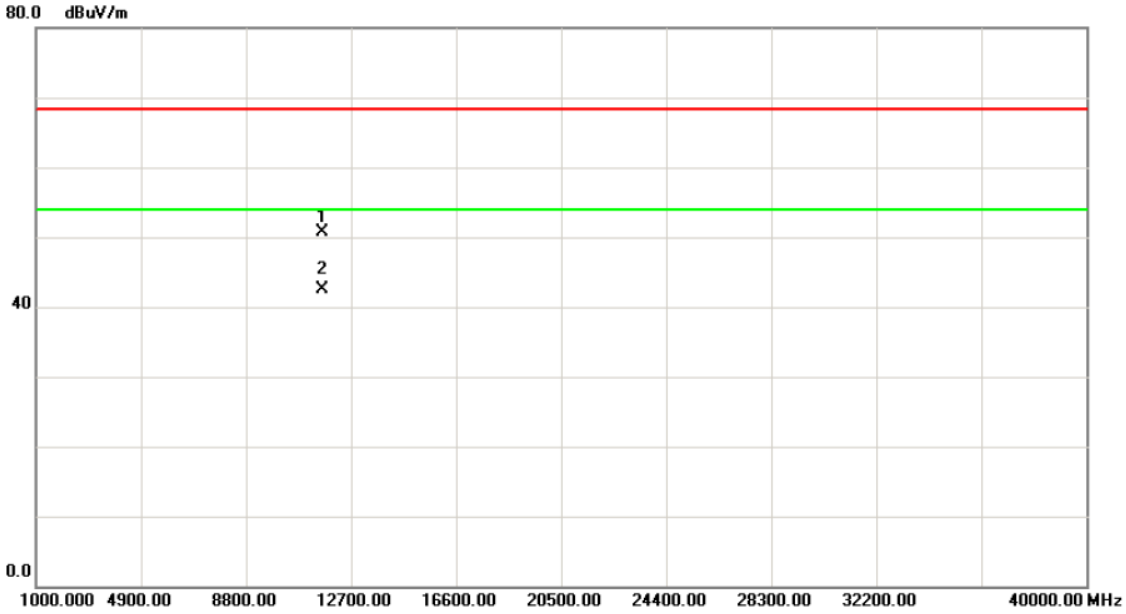
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	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	

Orthogonal Axis:	X
Test Mode:	TX 5814MHz

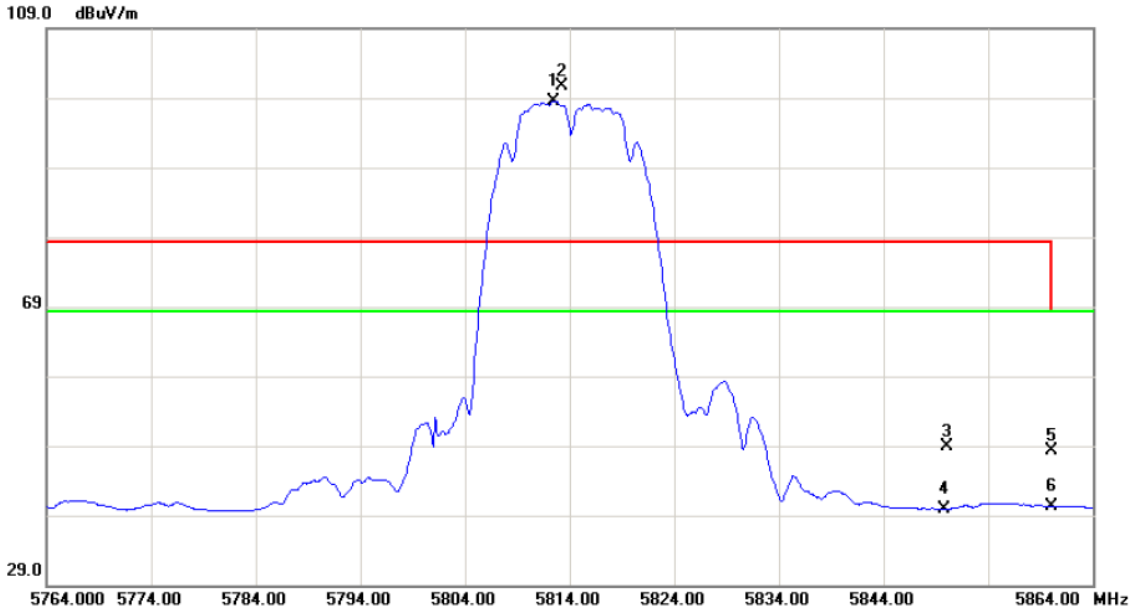
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		11628.29	37.88	12.86	50.74	68.30	-17.56	peak	
2	*	11628.29	29.57	12.86	42.43	54.00	-11.57	AVG	

Orthogonal Axis:	X
Test Mode:	TX 5814MHz

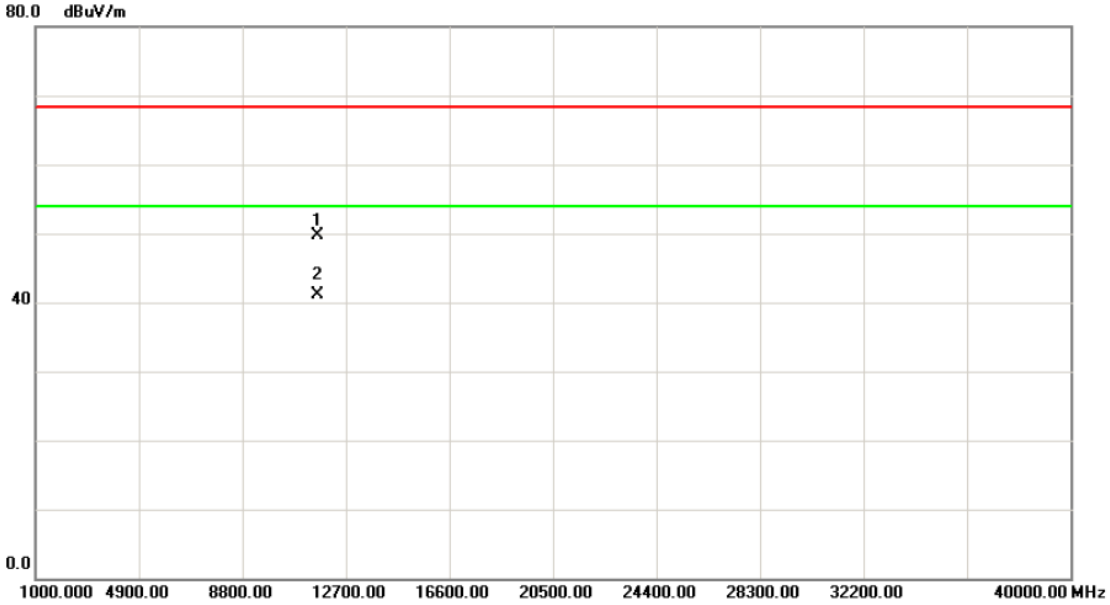
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	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	

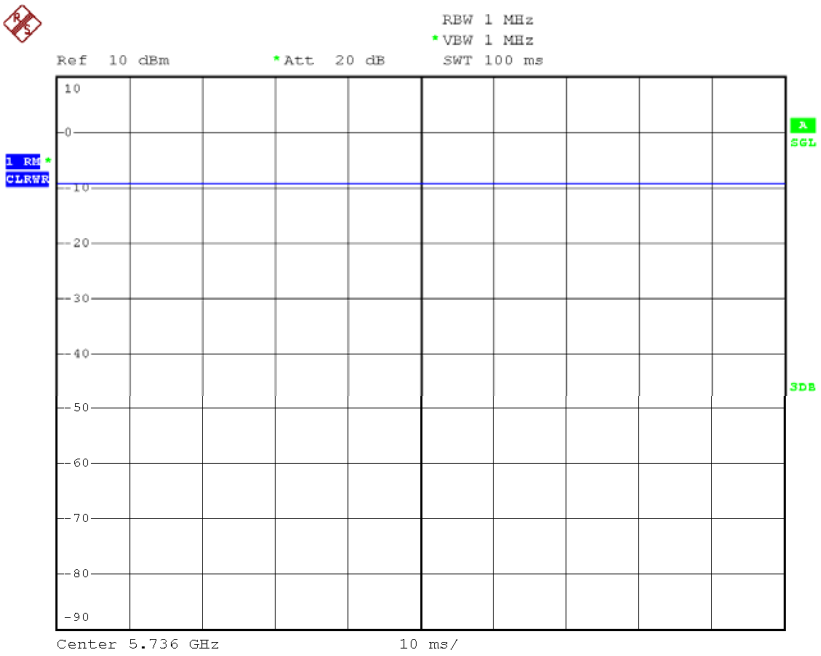
Orthogonal Axis:	X
Test Mode:	TX 5814MHz

Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		11628.28	36.81	12.86	49.67	68.30	-18.63	peak	
2	*	11628.28	28.31	12.86	41.17	54.00	-12.83	AVG	

TX _DUTY CYCLE



Date: 1.APR.2015 11:02:03

Duty cycle: TX 5736MHz

Duty cycle = T_{ON} / T_{Total}

T_{ON}: 100 msec

T_{Total}: 100 msec

Duty cycle: 1

Duty Factor = 10 log(1/Duty cycle)

Duty Factor = 0.00

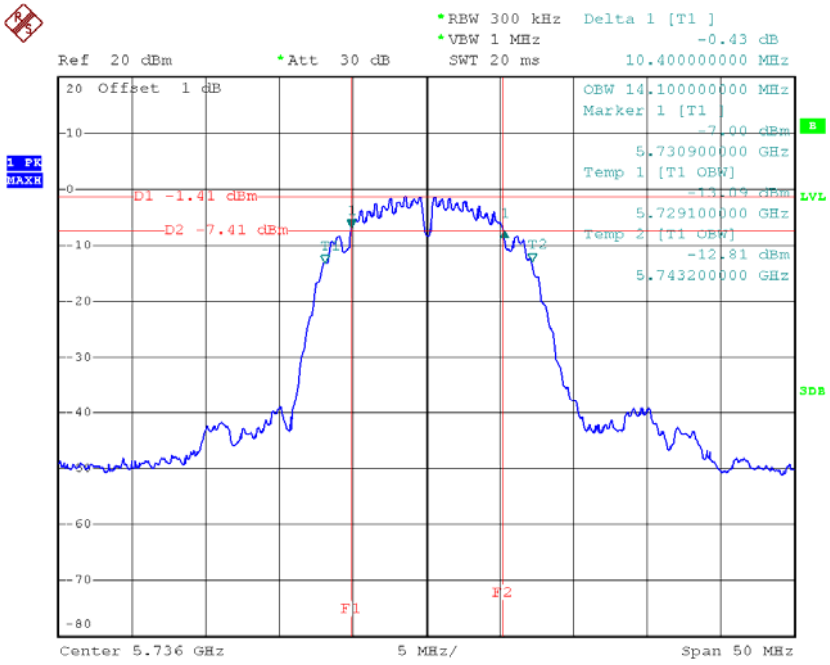
Note: The EUT was programmed to be in countinously transmitting mode and the transmit duty cycle is less than 98 %, so, the output power and power density should be cacluated as
Output Power = Measured power + Ducy factor
Power Spectral Density = Measured density + Duty factor

ATTACHMENT E - BANDWIDTH

Test Mode: TX Mode / CH01, CH02, CH03

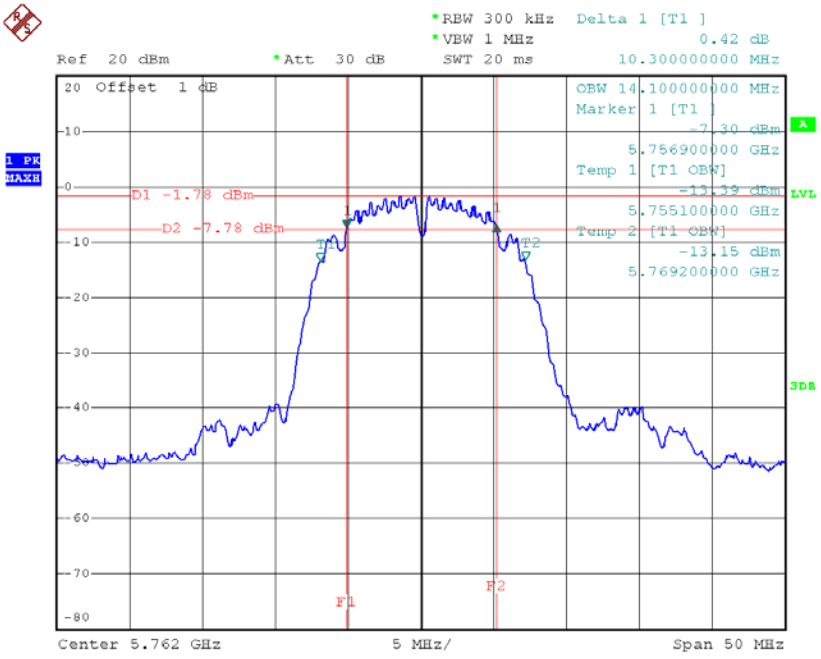
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Limit (KHz)
CH01	5736	10.40	14.10	>=500
CH02	5762	10.30	14.10	>=500
CH03	5814	10.40	14.10	>=500

TX CH01



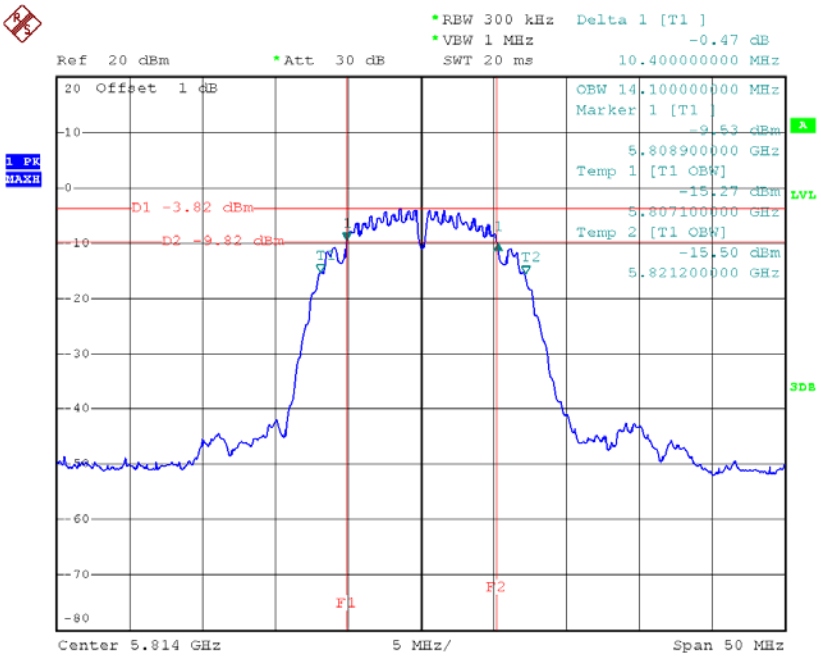
Date: 1.APR.2015 02:36:27

TX CH02



Date: 1.APR.2015 02:44:31

TX CH03



Date: 1.APR.2015 02:48:43

ATTACHMENT F - MAXIMUM OUTPUT POWER

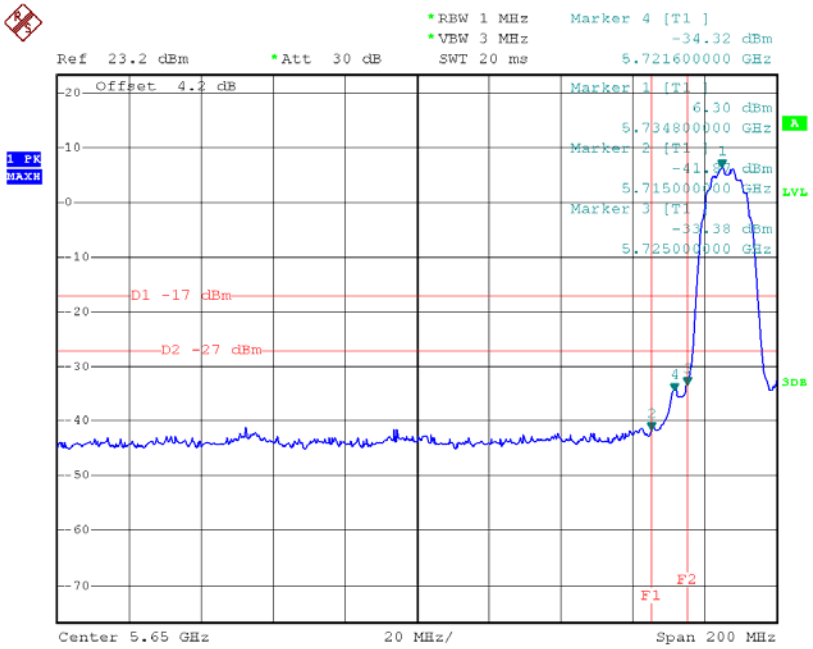
TX Mode / CH01, CH02, CH03

Channel	Frequency (MHz)	Output Power (dBm)	Duty Factor (dBm)	Output Power + Duty Factor (dBm)	Limit (dBm)	Limit (Watt)
CH01	5736	7.72	0.00	7.72	30.00	1.00
CH02	5762	7.33	0.00	7.33	30.00	1.00
CH03	5814	7.45	0.00	7.45	30.00	1.00

ATTACHMENT G - ANTENNA CONDUCTED SPURIOUS EMISSION

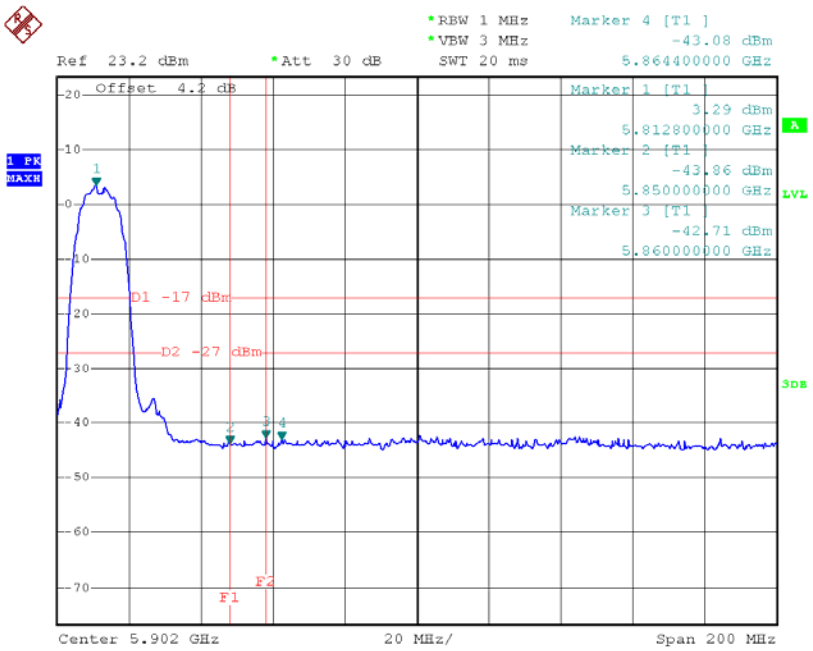
Test Mode:	CH01, CH03

TX mode CH01



Date: 1.APR.2015 02:30:11

TX mode CH03

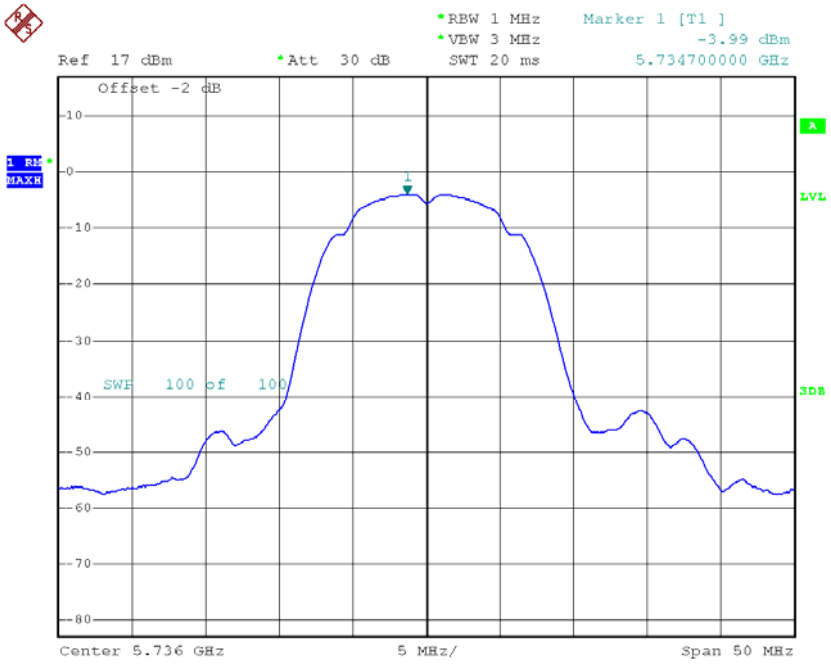


Date: 1.APR.2015 02:51:47

ATTACHMENT H - POWER SPECTRAL DENSITY

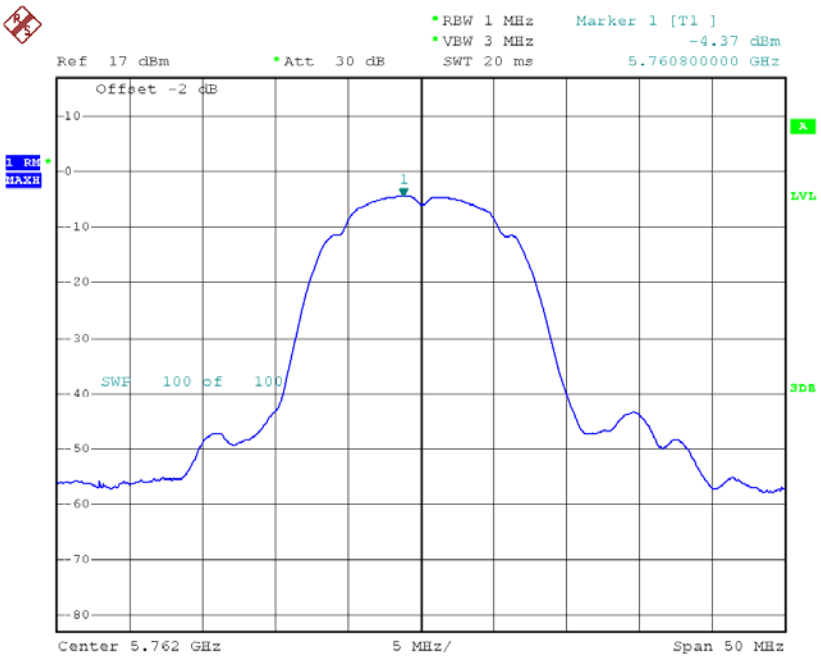
Test Mode: TX Mode / CH01, CH02, CH03					
Channel	Frequency (MHz)	Power Density (dBm/MHz)	Duty Factor (dBm/MHz)	Power Density + Duty Factor (dBm/MHz)	Limit (dBm/MHz)
CH01	5736	-3.99	0.00	-3.99	30.00
CH02	5762	-4.37	0.00	-4.37	30.00
CH03	5814	-6.19	0.00	-6.19	30.00

TX CH01



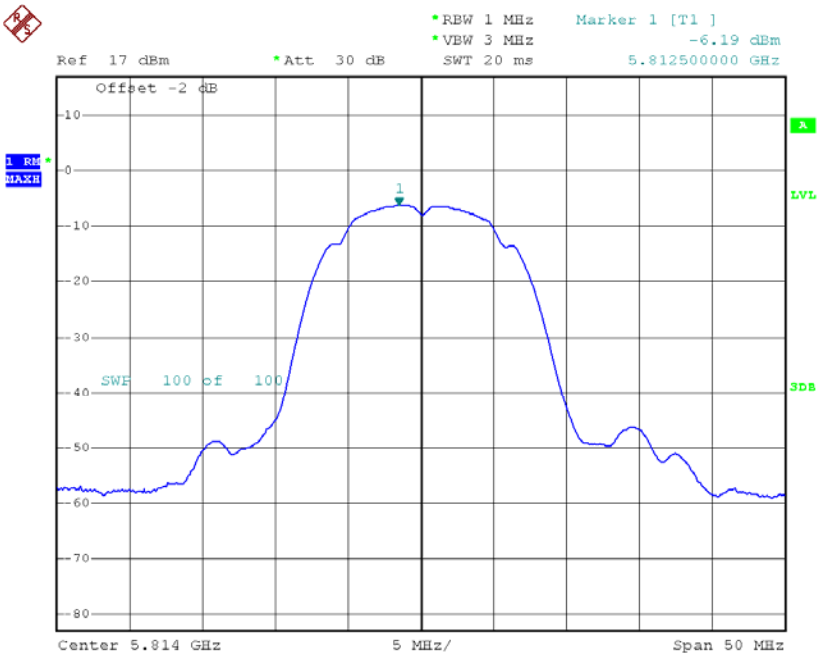
Date: 1.APR.2015 02:34:11

TX CH02



Date: 1.APR.2015 02:40:35

TX CH03



Date: 1.APR.2015 04:13:13

ATTACHMENT I - FREQUENCY STABILITY

Test Mode:	TX Mode / CH01

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)
(V)	5736.0000
132	5736.0774
120	5736.0774
108	5736.0771
Max. Deviation (MHz)	0.0774
Max. Deviation (ppm)	13.4937

Temperature vs. Frequency Stability

Voltage	Measurement Frequency (MHz)
(℃)	5736.0000
0	5736.0778
5	5736.0774
15	5736.0776
25	5736.0772
35	5736.0770
Max. Deviation (MHz)	0.0778
Max. Deviation (ppm)	13.5635