

FCC Radio Test Report

FCC ID: BEJ-SJ2

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

Project No. : 1701C176
Equipment : WIRELESS SOUND BAR
Model Name : SJ2
Applicant : LG Electronics USA
Address : 1000 Sylvan Avenue Englewood Cliffs New Jersey
 United States 07632

Date of Receipt : Jan. 17, 2017
Date of Test : Jan. 17, 2017 ~ Apr. 12, 2017
Issued Date : Apr. 12, 2017
Tested by : BTL Inc.

Testing Engineer : Shawn Xiao
(Shawn Xiao)

Technical Manager : David Mao
(David Mao)

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

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 standards traceable to international standard(s) and/or national standard(s).

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 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.

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	6
2 . SUMMARY OF TEST RESULTS	7
2.1 TEST FACILITY	8
2.2 MEASUREMENT UNCERTAINTY	8
3 . GENERAL INFORMATION	9
3.1 GENERAL DESCRIPTION OF EUT	9
3.2 DESCRIPTION OF TEST MODES	10
3.3 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING	12
3.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	13
3.5 DESCRIPTION OF SUPPORT UNITS	13
4 . EMC EMISSION TEST	14
4.1 CONDUCTED EMISSION MEASUREMENT	14
4.1.1 POWER LINE CONDUCTED EMISSION LIMITS	14
4.1.2 TEST PROCEDURE	14
4.1.3 DEVIATION FROM TEST STANDARD	14
4.1.4 TEST SETUP	15
4.1.5 EUT OPERATING CONDITIONS	15
4.1.6 EUT TEST CONDITIONS	15
4.1.7 TEST RESULTS	15
4.2 RADIATED EMISSION MEASUREMENT	16
4.2.1 RADIATED EMISSION LIMITS	16
4.2.2 TEST PROCEDURE	17
4.2.3 DEVIATION FROM TEST STANDARD	17
4.2.4 TEST SETUP	18
4.2.5 EUT OPERATING CONDITIONS	19
4.2.6 EUT TEST CONDITIONS	19
4.2.7 TEST RESULTS (9KHZ TO 30MHZ)	19
4.2.8 TEST RESULTS (30MHZ TO 1000 MHZ)	19
4.2.9 TEST RESULTS (ABOVE 1000 MHZ)	19
5 . BANDWIDTH TEST	20
5.1 APPLIED PROCEDURES	20
5.1.1 TEST PROCEDURE	20
5.1.2 DEVIATION FROM STANDARD	20
5.1.3 TEST SETUP	20
5.1.4 EUT OPERATION CONDITIONS	20
5.1.5 EUT TEST CONDITIONS	20
5.1.6 TEST RESULTS	20
6 . AVG OUTPUT POWER TEST	21

Table of Contents	Page
6.1 APPLIED PROCEDURES / LIMIT	21
6.1.1 TEST PROCEDURE	21
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
8.1.2 DEVIATION FROM STANDARD	23
8.1.3 TEST SETUP	23
8.1.4 EUT OPERATION CONDITIONS	23
8.1.5 EUT TEST CONDITIONS	23
8.1.6 TEST RESULTS	23
9 . MEASUREMENT INSTRUMENTS LIST	24
10 . EUT TEST PHOTO	26
ATTACHMENT A - CONDUCTED EMISSION	31
ATTACHMENT B - RADIATED EMISSION (9KHZ TO 30MHZ)	34
ATTACHMENT C - RADIATED EMISSION (30MHZ TO 1000MHZ)	39
ATTACHMENT D - RADIATED EMISSION (ABOVE 1000MHZ)	46
ATTACHMENT E - BANDWIDTH	59
ATTACHMENT F – AVG OUTPUT POWER	62
ATTACHMENT G - ANTENNA CONDUCTED SPURIOUS EMISSION	64
ATTACHMENT H - POWER SPECTRAL DENSITY	68

REPORT ISSUED HISTORY

Issued No.	Description	Issued Date
BTL-FCCP-2-1701C176	Original Issue.	Apr. 12, 2017

1. CERTIFICATION

Equipment : WIRELESS SOUND BAR
Brand Name : LG
Model Name : SJ2
Applicant : LG Electronics USA
Manufacturer : LG Electronics Inc.
Address : 222 LG-ro Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do, 451-713
Factory : Eastech Electronics(Hui Yang)Co.,Ltd
Address : Dong Feng District, Xinxu, HuiYang, Huizhou, Guangdong, China
Date of Test : Jan. 17, 2017 ~ Apr. 12, 2017
Test Sample : Engineering Sample
Standard(s) : FCC Part15, Subpart C:(15.247) / ANSI C63.10-2013

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-2-1701C176) 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):

Applied Standard(s): FCC Part15 (15.247) , Subpart C			
Standard(s) Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	
15.247(d)	Antenna conducted Spurious Emission	PASS	
15.247(a)(2)	6dB Bandwidth	PASS	
15.247(b)(3)	AVG Output Power	PASS	
15.247(e)	Power Spectral Density	PASS	
15.203	Antenna Requirement	PASS	
15.209/15.205	Transmitter Radiated Emissions	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

2.2 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. The BTL measurement uncertainty is less than the CISPR 16-4-2 U_{cispr} requirement.

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 %.

A. Conducted Measurement:

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

B. Radiated Measurement:

Test Site	Method	Measurement Frequency Range	Ant. H / V	U, (dB)
DG-CB03	CISPR	9KHz~30MHz	V	3.79
		9KHz~30MHz	H	3.57
		30MHz ~ 200MHz	V	3.82
		30MHz ~ 200MHz	H	3.78
		200MHz ~ 1,000MHz	V	4.10
		200MHz ~ 1,000MHz	H	4.06
		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 SOUND BAR	
Brand Name	LG	
Model Name	SJ2	
Model Difference	N/A	
Product Description	Operation Frequency	5743~5840 MHz
	Modulation Technology	QPSK
	Output Power (Max.) ANT 1	8.92dBm
	Output Power (Max.) ANT 2	6.31dBm
Power Source	AC Mains	
Power Rating	AC 120V 60Hz	

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	5743	13	5778	25	5811
02	5747	14	5779	26	5812
03	5751	15	5783	27	5815
04	5752	16	5787	28	5818
05	5755	17	5791	29	5819
06	5758	18	5792	30	5823
07	5759	19	5795	31	5831
08	5763	20	5795	32	5832
09	5767	21	5798	33	5835
10	5771	22	5799	34	5837
11	5772	23	5803	35	5840
12	5775	24	5807		

3. Table for Filed Antenna

Ant.	Manufacturer	Model Name	Antenna Type	Connector	Gain (dBi)	Note
1	N/A	N/A	Internal	N/A	2.85	TX
2	N/A	N/A	Internal	N/A	2.85	TX

Note: Only one antenna works per time. The ANT 1 is the worse case.

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 Mode	Description
Mode 1	TX Mode / CH01, CH18, CH35
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, CH18, CH35

For Band Edge Test	
Final Test Mode	Description
Mode 1	TX Mode / CH01, CH18, CH35

6dB Spectrum Bandwidth	
Final Test Mode	Description
Mode 1	TX Mode / CH01, CH18, CH35

Maximum AVG Output Power	
Final Test Mode	Description
Mode 1	TX Mode / CH01, CH18, CH35

Power Spectral Density	
Final Test Mode	Description
Mode 1	TX Mode / CH01, CH18, CH35

Note:

- (1) The measurements are performed at the high, middle, low available channels.
- (2) The EUT was programmed to be in continuously transmitting mode and the transmit duty cycle is not less than 98%.

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 power parameters of WLAN

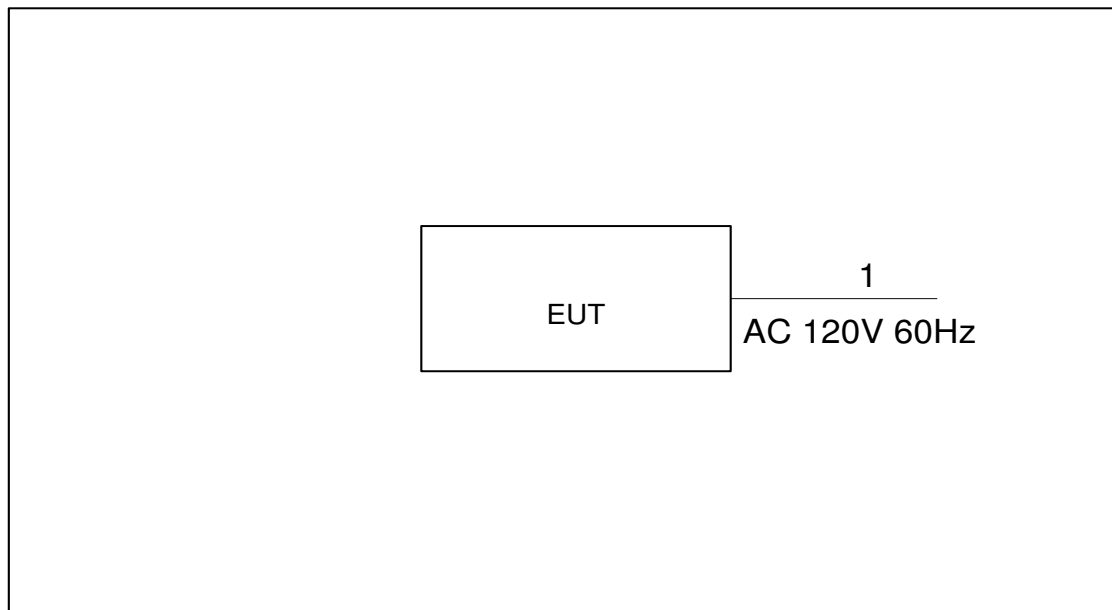
For ANT 1

Test software version	N/A		
Frequency (MHz)	5743	5792	5840
-	N/A	N/A	N/A

For ANT 2

Test software version	N/A		
Frequency (MHz)	5743	5792	5840
-	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.
-	-	-	-	-	-

Item	Shielded Type	Ferrite Core	Length	Note
-	-	-	-	-

4. EMC EMISSION TEST

4.1 CONDUCTED EMISSION MEASUREMENT

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

Frequency of Emission (MHz)	Conducted Limit (dBμV)	
	Quasi-peak	Average□
0.15 -0.50	66 to 56*	56 to 46*
0.50 -5.0	56	46
5.0 -30.0	60	50

Note:

- (1) The limit of " * " decreases with the logarithm of the frequency
- (2) 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

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 KHz

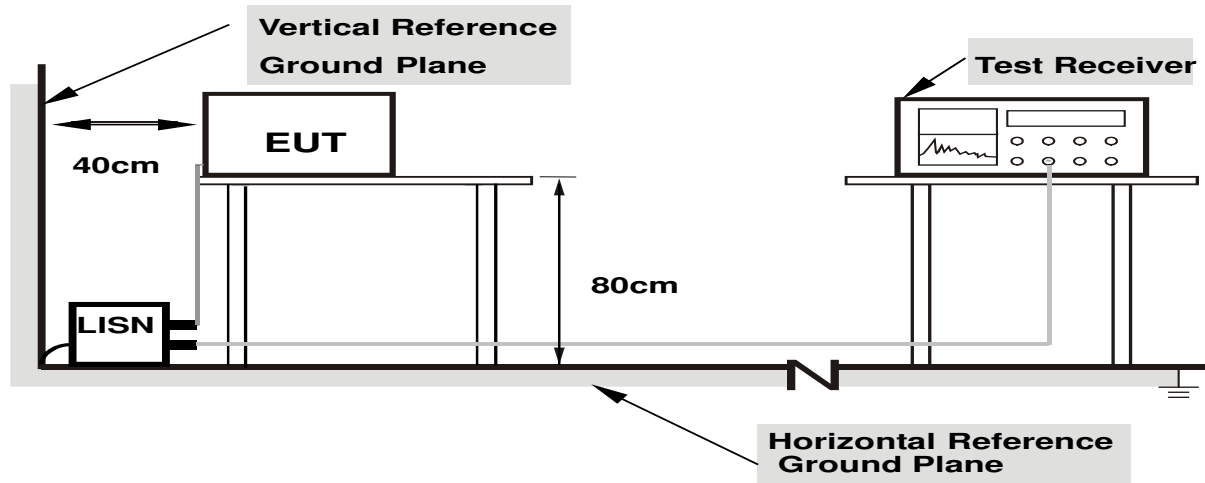
4.1.2 TEST PROCEDURE

- 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



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

4.1.5 EUT OPERATING CONDITIONS

The EUT was placed on the test table and programmed in normal function.

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.

4.2 RADIATED EMISSION MEASUREMENT

4.2.1 RADIATED EMISSION LIMITS

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.

LIMITS OF RADIATED EMISSION MEASUREMENT (9KHz-1000MHz)

Frequency (MHz)	Field Strength (microvolts/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
960~1000	500	3

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

Frequency (MHz)	(dBuV/m) (at 3 meters)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).
- (4) The test result calculated as following:
 Measurement Value = Reading Level + Correct Factor
 Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain(if use)
 Margin Level = Measurement Value - Limit Value

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RBW / VBW (Emission in restricted band)	1MHz / 3MHz for Peak, 1MHz / 1/T for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9KHz~90KHz for PK/AVG detector
Start ~ Stop Frequency	90KHz~110KHz for QP detector
Start ~ Stop Frequency	110KHz~490KHz for PK/AVG detector
Start ~ Stop Frequency	490KHz~30MHz for QP detector
Start ~ Stop Frequency	30MHz~1000MHz for QP detector

4.2.2 TEST PROCEDURE

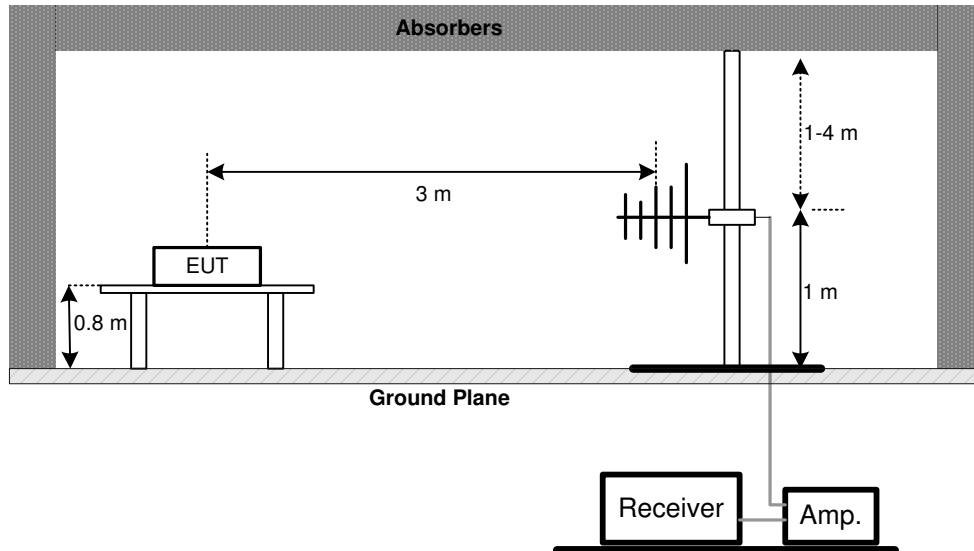
- The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
- The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 1.5 meter 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 0.8m 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.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights find the maximum reading (used Bore sight function).
- The receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1GHz.
- The initial step in collecting radiated emission data is a receiver peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- 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. (below 1GHz)
- All readings are Peak Mode value unless otherwise stated AVG in column of Note. If the Peak Mode Measured value compliance with the Peak Limits and lower than AVG Limits, the EUT shall be deemed to meet both Peak & AVG Limits and then only Peak Mode was measured, but AVG Mode didn't perform. (above 1GHz)
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.2.3 DEVIATION FROM TEST STANDARD

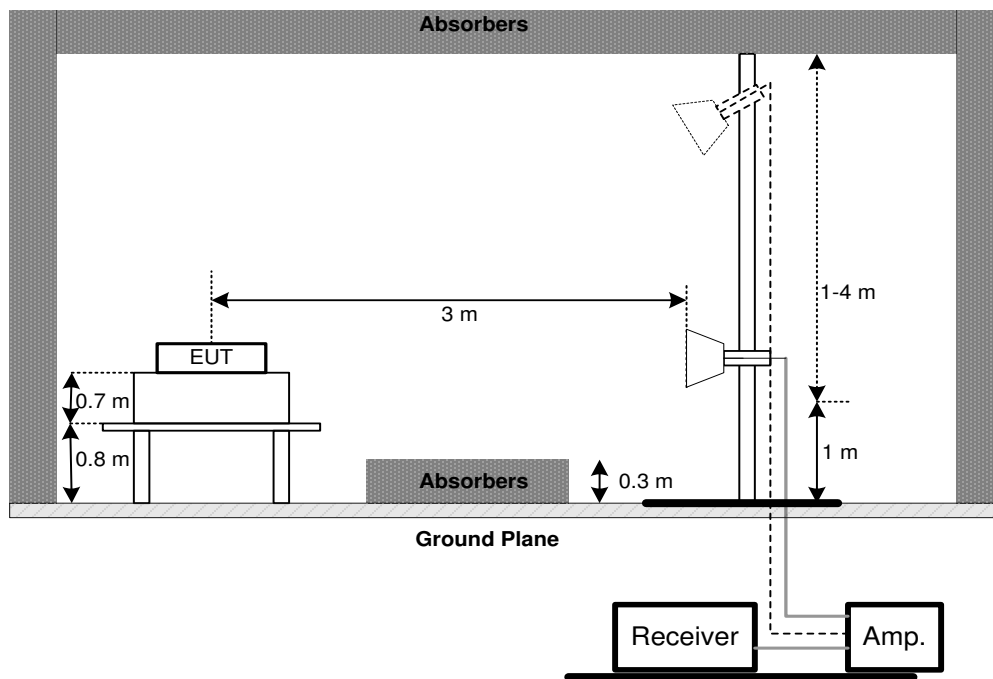
No deviation

4.2.4 TEST SETUP

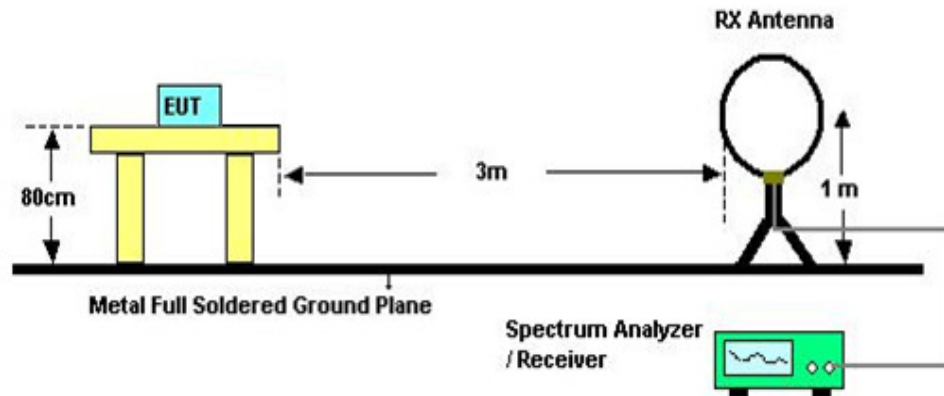
(A) Radiated Emission Test Set-Up Frequency Below 1 GHz



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



(C) For Radiated Emissions Below 30MHz



4.2.5 EUT OPERATING CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

4.2.6 EUT TEST CONDITIONS

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

4.2.7 TEST RESULTS (9KHZ 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 (30MHZ TO 1000 MHZ)

Please refer to the Attachment C.

4.2.9 TEST RESULTS (ABOVE 1000 MHZ)

Please refer to the Attachment D.

Remark:

- (1) No limit: This is fundamental signal, the judgment is not applicable.
For fundamental signal judgment was referred to Peak output test.

5. BANDWIDTH TEST

5.1 APPLIED PROCEDURES

FCC Part15 (15.247) , Subpart C			
Section	Test Item	Frequency Range (MHz)	Result
15.247(a)(2)	Bandwidth	5743~5840	PASS

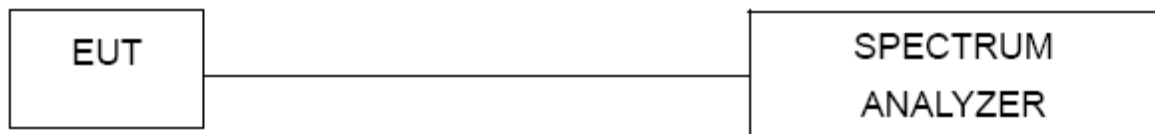
5.1.1 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- Spectrum Setting: RBW= 100KHz, VBW=300KHz, Sweep time = 2.5 ms.

5.1.2 DEVIATION FROM STANDARD

No deviation.

5.1.3 TEST SETUP



5.1.4 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

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. AVG OUTPUT POWER TEST

6.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(3)	Maximum Output Power	1 Watt or 30dBm	5743~5840	PASS

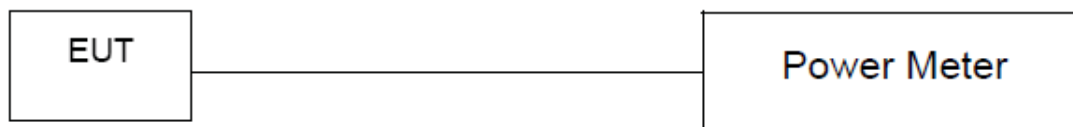
6.1.1 TEST PROCEDURE

- a. The EUT was directly connected to the power meter and antenna output port as show in the block diagram below,
- b. The maximum peak conducted output power was performed in accordance with method 9.1.2 of FCC KDB 558074 D01 DTS Meas Guidance.

6.1.2 DEVIATION FROM STANDARD

No deviation.

6.1.3 TEST SETUP



6.1.4 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

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

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits.

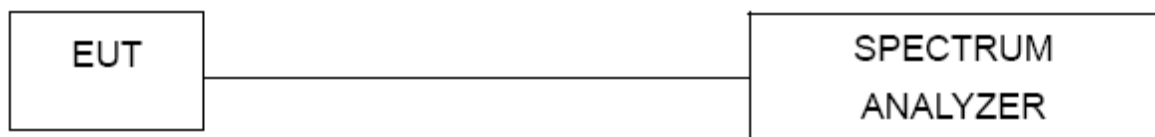
7.1.1 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- Spectrum Setting: RBW= 100KHz, VBW=300KHz, Sweep time = Auto.
- Offset=antenna gain+cable loss

7.1.2 DEVIATION FROM STANDARD

No deviation.

7.1.3 TEST SETUP



7.1.4 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

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 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(e)	Power Spectral Density	8 dBm (in any 3KHz)	5743~5840	PASS

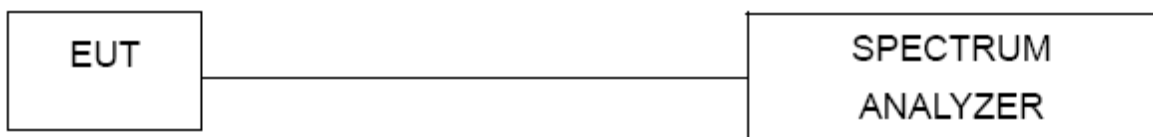
8.1.1 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- Spectrum Setting: RBW=3KHz, VBW=10KHz, Sweep time = Auto.

8.1.2 DEVIATION FROM STANDARD

No deviation.

8.1.3 TEST SETUP



8.1.4 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

8.1.5 EUT TEST CONDITIONS

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

8.1.6 TEST RESULTS

Please refer to the Attachment H.

9. MEASUREMENT INSTRUMENTS LIST

Conducted Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	50Ω Terminator	SHX	TF2-3G-A	8122901	Mar. 26, 2018
2	TWO-LINE V-NETWORK	R&S	ENV216	100526	Mar. 26, 2018
3	EMI Test Receiver	R&S	ESR3	101862	Sep. 04, 2017
4	Artificial-Mains Network	SCHWARZBECK	NSLK 8127	8127685	Sep. 04, 2017
5	Cable	N/A	RG400 12m	N/A	Mar. 09, 2018
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. 26, 2018
2	Amplifier	HP	8447D	2944A09673	Oct. 20, 2017
3	Receiver	Agilent	N9038A	MY52130039	Sep. 04, 2017
4	Cable	emci	LMR-400(30MHz-1GHz)(8m+5m)	N/A	Jun. 27, 2017
5	Controller	CT	SC100	N/A	N/A
6	Controller	MF	MF-7802	MF780208416	N/A
7	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
8	Amplifier	Agilent	8449B	3008A02274	Mar. 09, 2018
9	Receiver	Agilent	N9038A	MY52130039	Sep. 04, 2017
10	Antenna	EM	EM-6876-1	230	Jul. 08, 2017
11	Controller	CT	SC100	N/A	N/A
12	Controller	MF	MF-7802	MF780208416	N/A
13	Cable	emci	EMC104-SM-S M-12000(12m)	N/A	Jul. 06, 2017
14	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170319	Apr. 23, 2017
15	Spectrum Analyzer	R&S	FSP40	100185	Sep. 04, 2017
16	Microwave Preamplifier With Adaptor	EMC INSTRUMENT	EMC2654045	980039 & HA01	Mar. 26, 2018

6dB Bandwidth Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Sep. 04, 2017

Peak Output Power Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Power Meter	ANRITSU	ML2495A	1128009	Mar. 26, 2018
2	Pulse Power Sensor	ANRITSU	MA 2411B	1027500	Mar. 26, 2018

Antenna Conducted Spurious Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Sep. 04, 2017

Power Spectral Density Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Sep. 04, 2017

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

10. EUT TEST PHOTO

Conducted Measurement Photos



Radiated Measurement Photos

9KHz to 30MHz



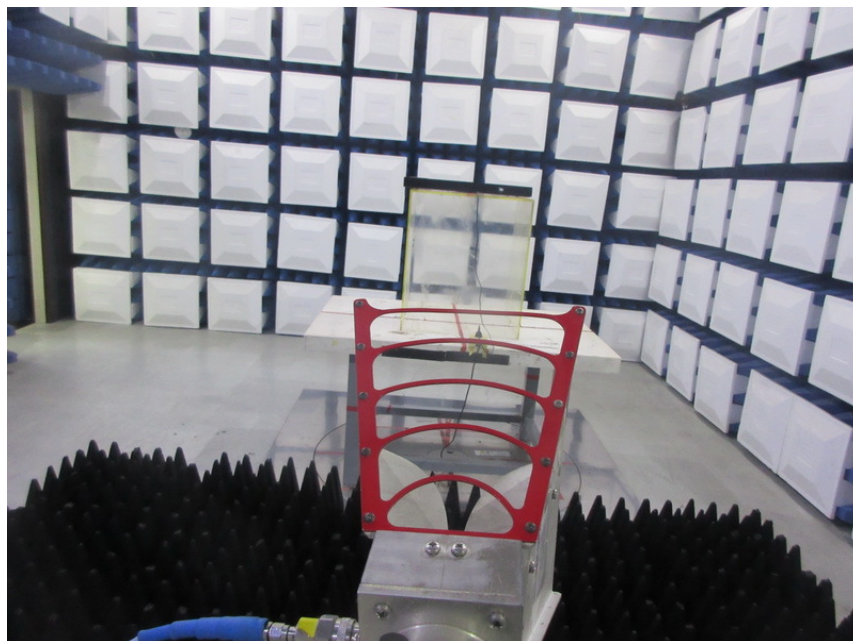
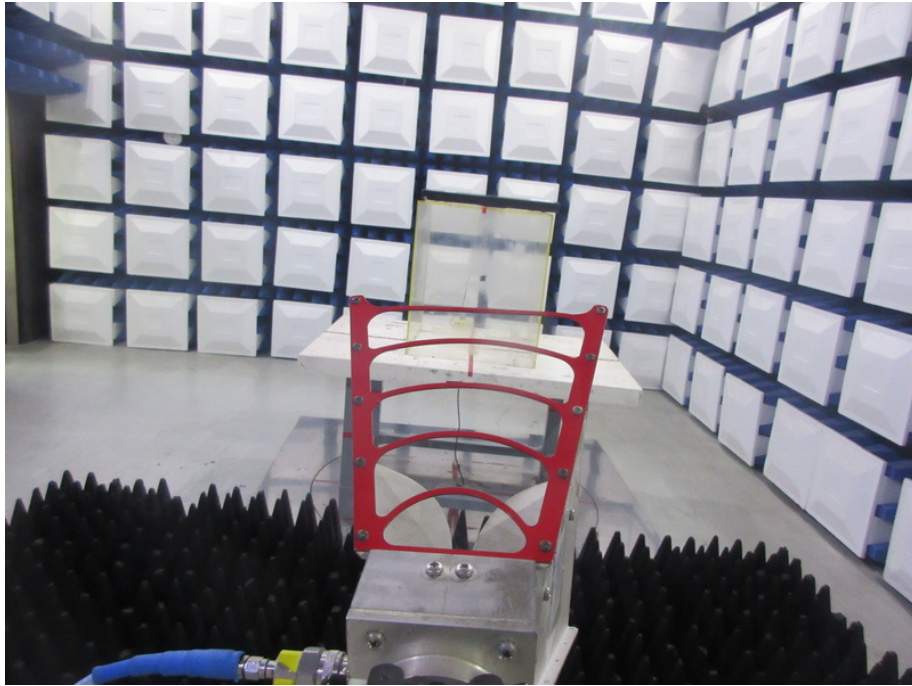
Radiated Measurement Photos

30MHz to 1000MHz



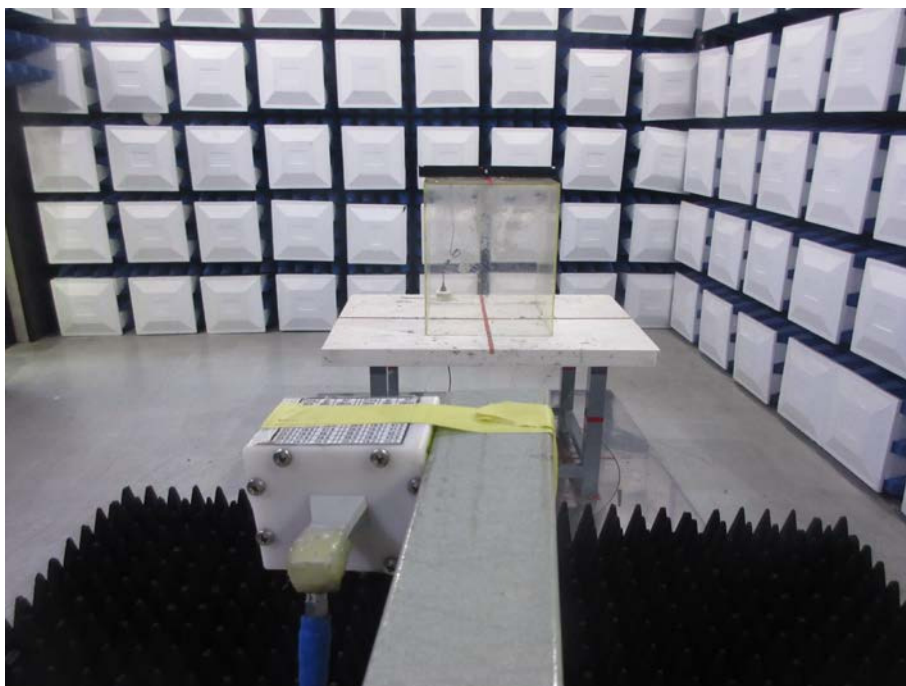
Radiated Measurement Photos

Above 1000MHz



Radiated Measurement Photos

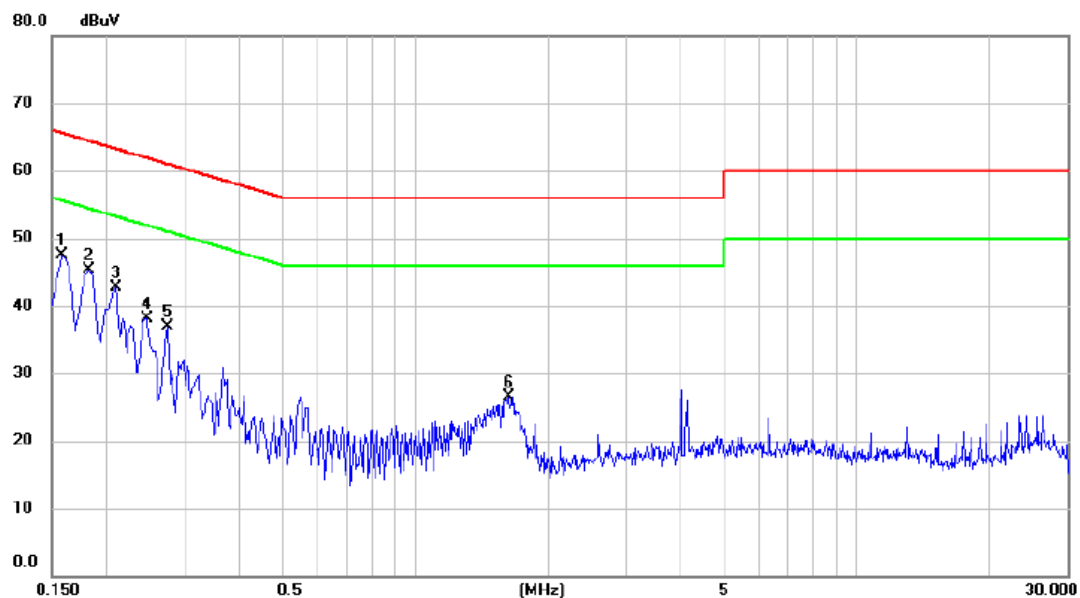
18G-40G



ATTACHMENT A - CONDUCTED EMISSION

Test Mode : TX Mode

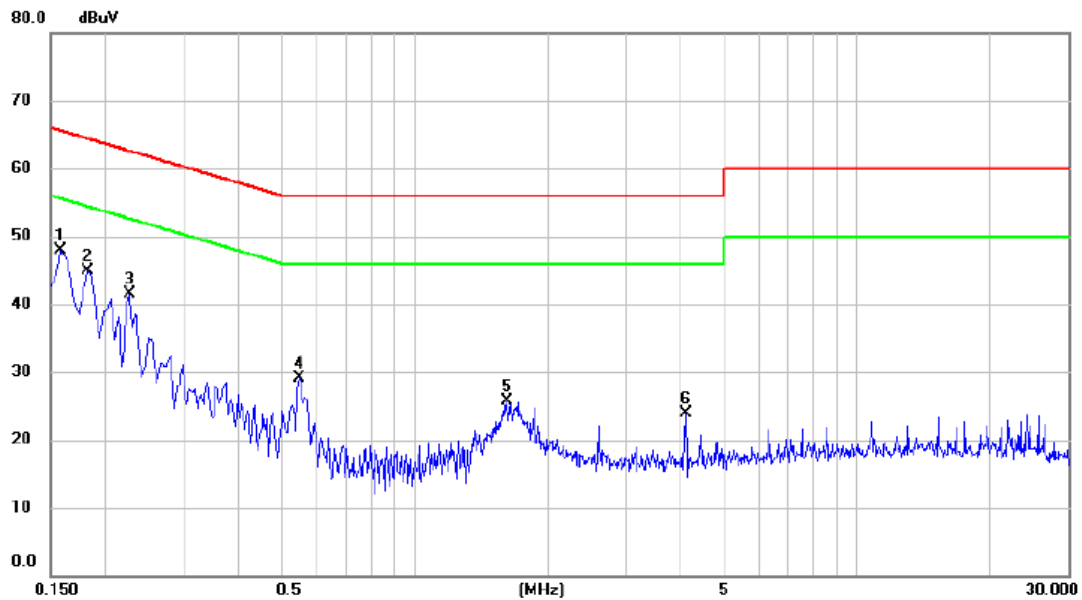
Line



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin		
		MHz	Level	Factor	ment			Detector	Comment
			dBuV	dB	dBuV	dBuV	dB		
1	*	0.158	37.89	9.57	47.46	65.57	-18.11	peak	
2		0.182	35.66	9.57	45.23	64.39	-19.16	peak	
3		0.210	33.04	9.57	42.61	63.21	-20.60	peak	
4		0.246	28.48	9.57	38.05	61.89	-23.84	peak	
5		0.274	27.39	9.57	36.96	61.00	-24.04	peak	
6		1.626	16.43	9.98	26.41	56.00	-29.59	peak	

Test Mode : TX Mode

Neutral

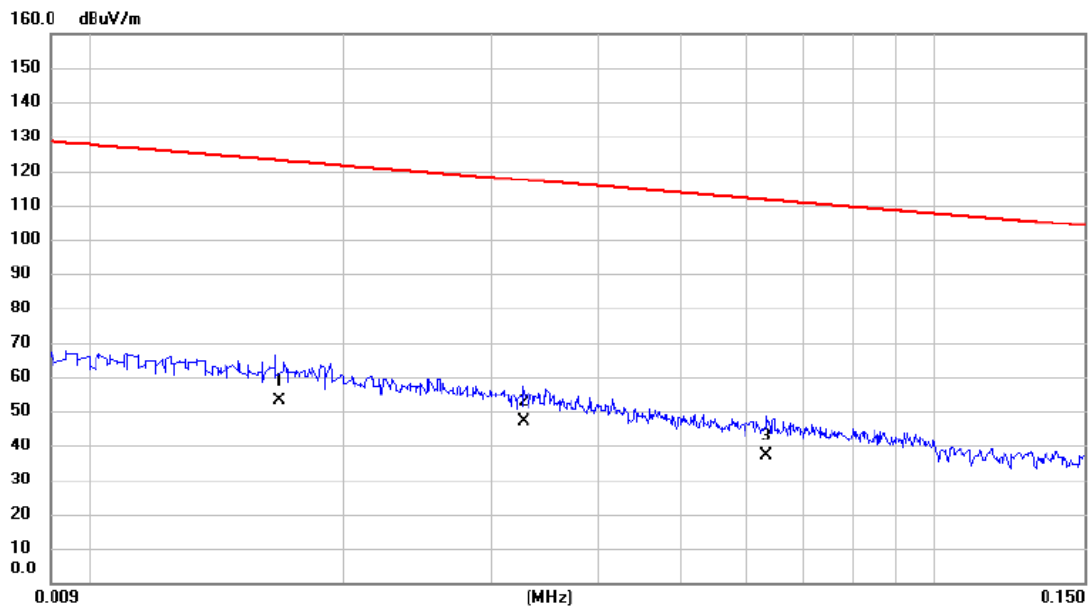


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	*	0.158	38.37	9.53	47.90	65.57	-17.67	peak	
2		0.182	35.43	9.51	44.94	64.39	-19.45	peak	
3		0.226	31.94	9.57	41.51	62.60	-21.09	peak	
4		0.550	19.58	9.50	29.08	56.00	-26.92	peak	
5		1.618	16.00	9.78	25.78	56.00	-30.22	peak	
6		4.098	13.85	10.10	23.95	56.00	-32.05	peak	

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

Test Mode: TX MODE

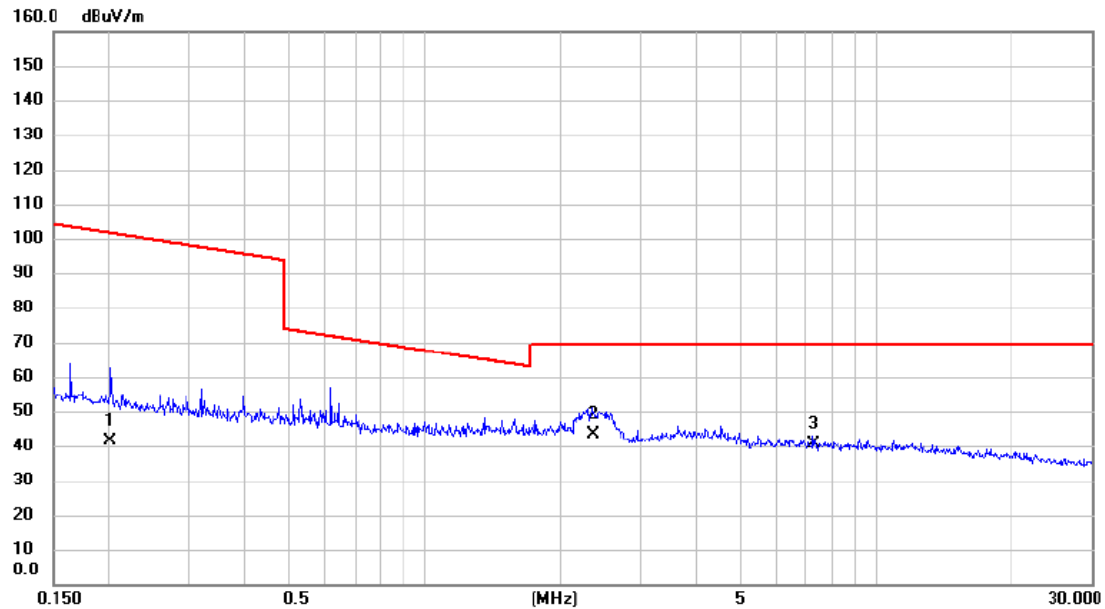
Ant 0°



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	0.017	29.30	23.71	53.01	123.10	-70.09	AVG	
2		0.033	25.18	21.97	47.15	117.34	-70.19	AVG	
3		0.063	17.20	19.67	36.87	111.59	-74.72	AVG	

Test Mode: TX MODE

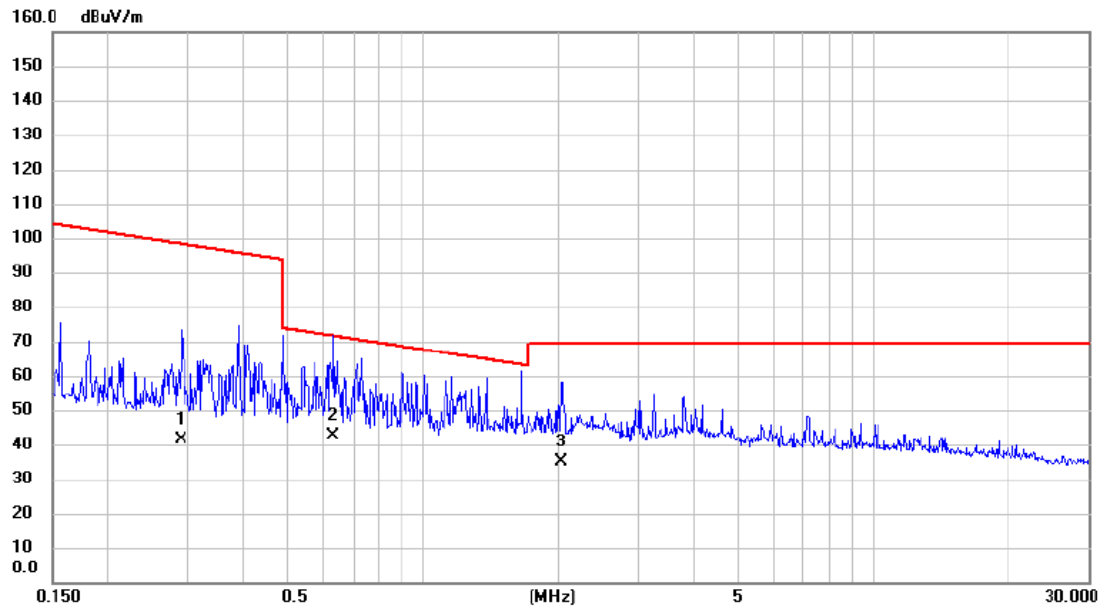
Ant 0°



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		0.202	22.60	18.69	41.29	101.51	-60.22	AVG	
2	*	2.358	25.80	17.44	43.24	69.54	-26.30	QP	
3		7.252	24.30	16.30	40.60	69.54	-28.94	QP	

Test Mode: TX MODE

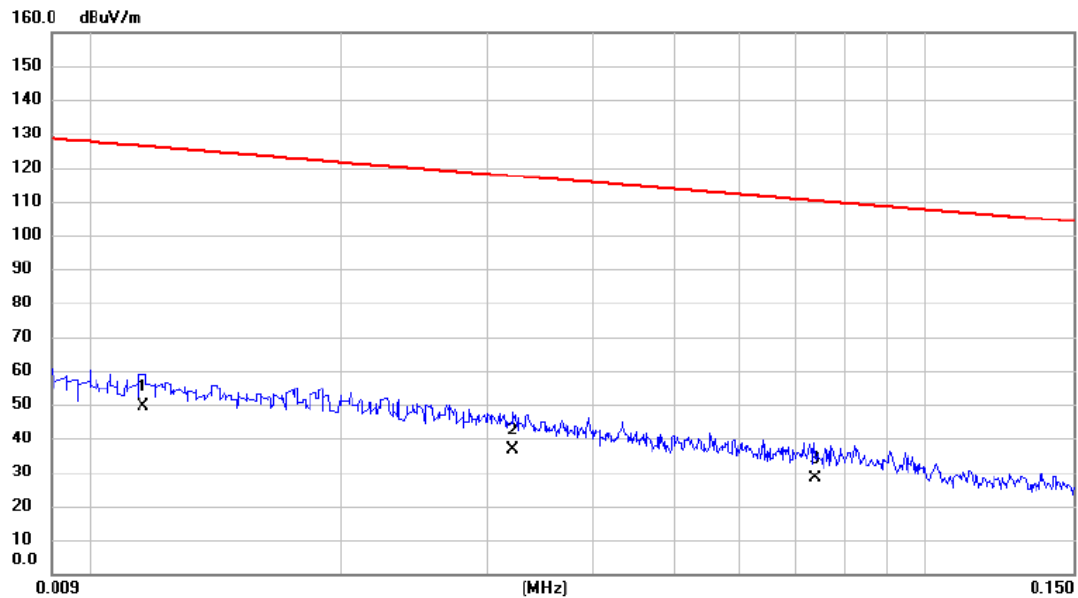
Ant 90°



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		0.291	22.80	18.60	41.40	98.33	-56.93	AVG	
2	*	0.630	24.10	18.42	42.52	71.61	-29.09	QP	
3		2.022	17.30	17.88	35.18	69.54	-34.36	QP	

Test Mode: TX MODE

Ant 90°

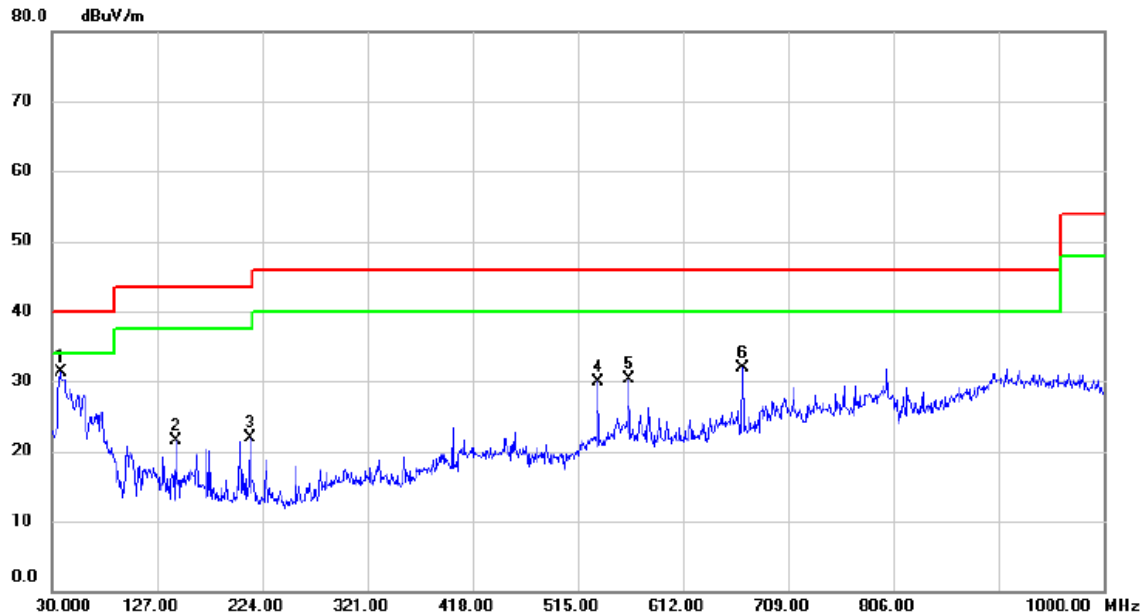


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	0.012	25.40	24.02	49.42	126.32	-76.90	AVG	
2		0.032	14.56	22.04	36.60	117.50	-80.90	AVG	
3		0.074	8.74	19.55	28.29	110.27	-81.98	AVG	

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

Test Mode: TX 5743MHz

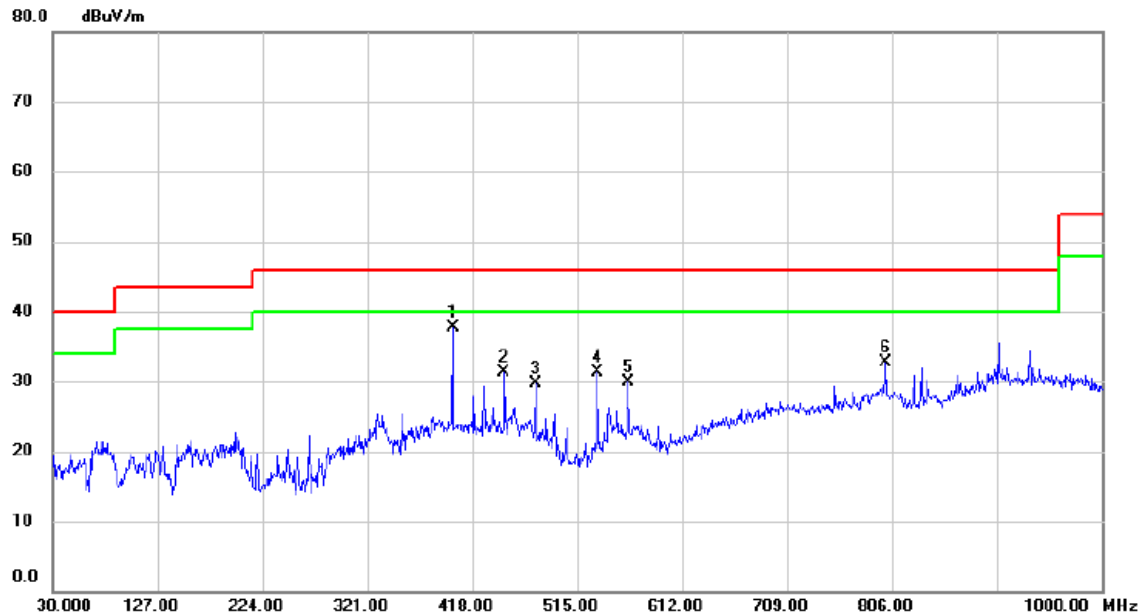
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	38.2450	45.49	-14.12	31.37	40.00	-8.63	peak	
2		143.9750	34.99	-13.43	21.56	43.50	-21.94	peak	
3		212.3600	36.47	-14.56	21.91	43.50	-21.59	peak	
4		533.4300	36.11	-6.26	29.85	46.00	-16.15	peak	
5		562.0450	35.47	-5.15	30.32	46.00	-15.68	peak	
6		666.8050	35.33	-3.49	31.84	46.00	-14.16	peak	

Test Mode: TX 5743MHz

Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	400.0550	45.39	-7.78	37.61	46.00	-8.39	peak	
2		447.1000	39.29	-7.99	31.30	46.00	-14.70	peak	
3		476.2000	38.67	-8.90	29.77	46.00	-16.23	peak	
4		533.4300	37.54	-6.26	31.28	46.00	-14.72	peak	
5		562.0450	34.97	-5.15	29.82	46.00	-16.18	peak	
6		800.1800	32.54	0.25	32.79	46.00	-13.21	peak	

Test Mode: TX 5792MHz

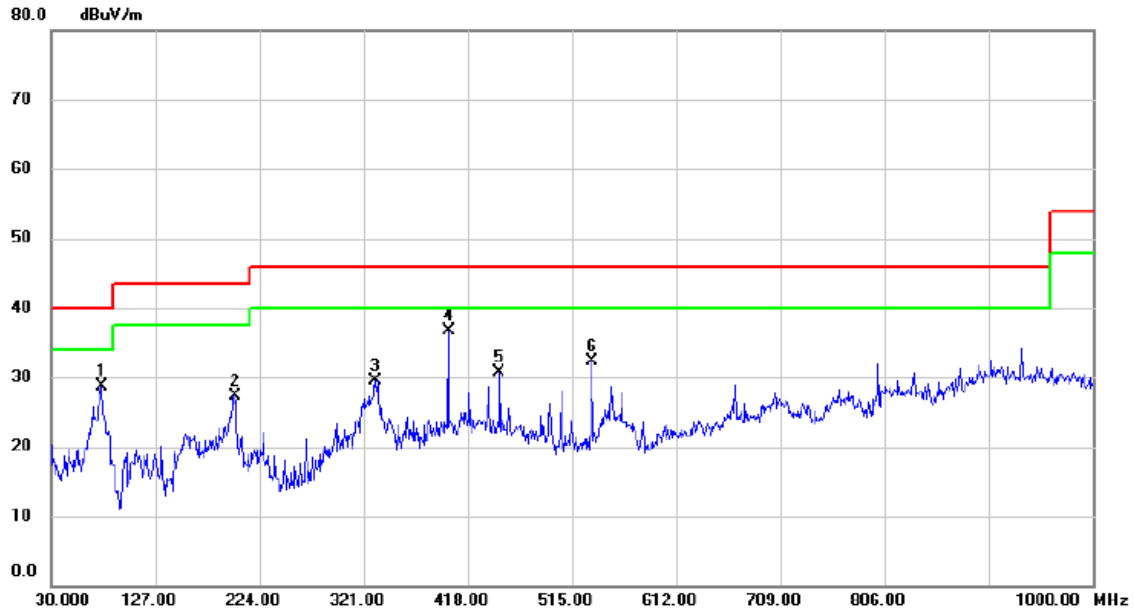
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	38.2450	42.52	-14.12	28.40	40.00	-11.60	peak	
2		147.8550	34.86	-13.12	21.74	43.50	-21.76	peak	
3		268.6200	36.30	-13.53	22.77	46.00	-23.23	peak	
4		447.1000	28.87	-7.99	20.88	46.00	-25.12	peak	
5		560.5900	29.86	-5.07	24.79	46.00	-21.21	peak	
6		791.4500	29.84	-0.11	29.73	46.00	-16.27	peak	

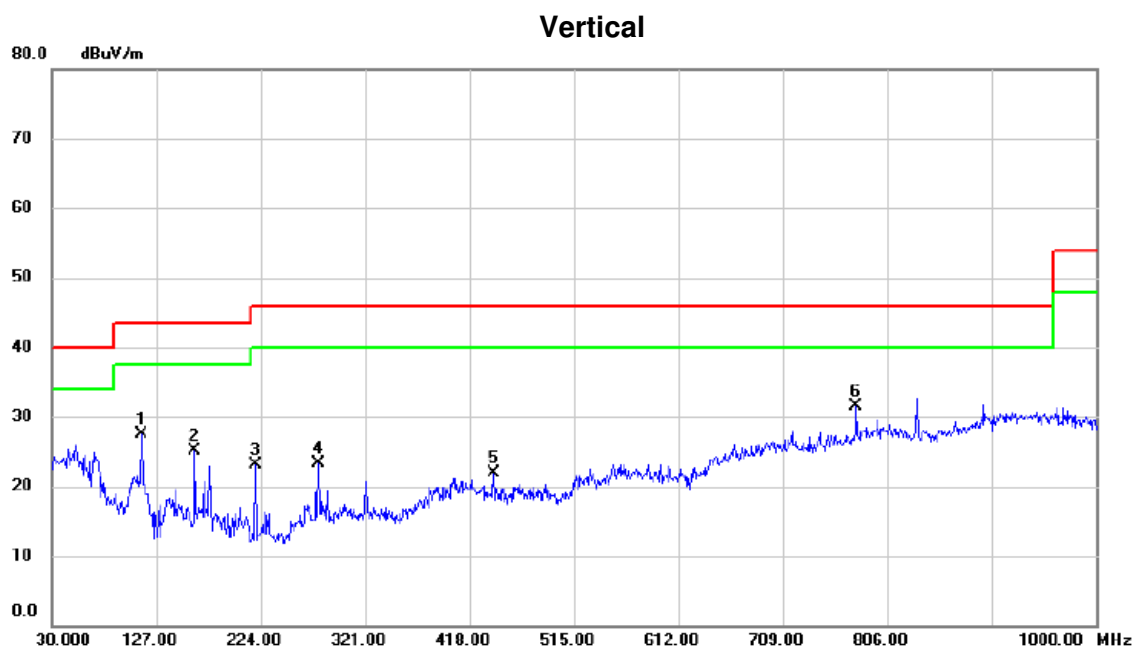
Test Mode: TX 5792MHz

Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		77.5300	45.00	-16.31	28.69	40.00	-11.31	peak	
2		201.2050	41.78	-14.46	27.32	43.50	-16.18	peak	
3		331.6700	40.35	-10.83	29.52	46.00	-16.48	peak	
4	*	400.0550	44.47	-7.78	36.69	46.00	-9.31	peak	
5		447.1000	38.64	-7.99	30.65	46.00	-15.35	peak	
6		533.4300	38.57	-6.26	32.31	46.00	-13.69	peak	

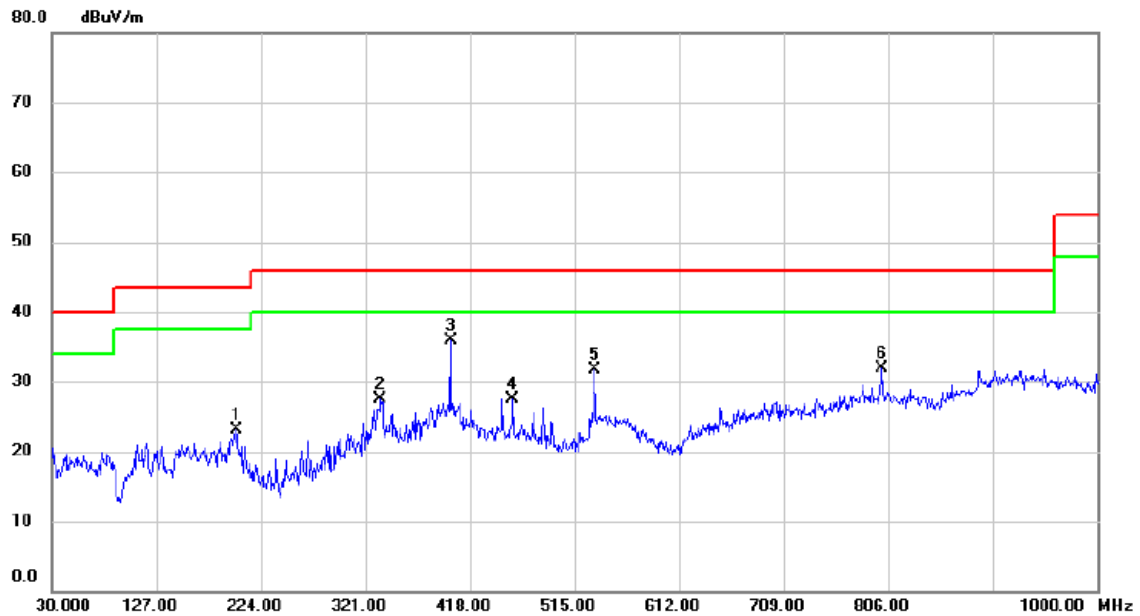
Test Mode: TX 5840MHz



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		113.4200	41.66	-14.25	27.41	43.50	-16.09	peak	
2		162.8900	37.38	-12.18	25.20	43.50	-18.30	peak	
3		219.1500	37.44	-14.29	23.15	46.00	-22.85	peak	
4		277.3500	35.70	-12.40	23.30	46.00	-22.70	peak	
5		440.7950	29.84	-7.96	21.88	46.00	-24.12	peak	
6	*	776.9000	32.23	-0.77	31.46	46.00	-14.54	peak	

Test Mode: TX 5840MHz

Horizontal

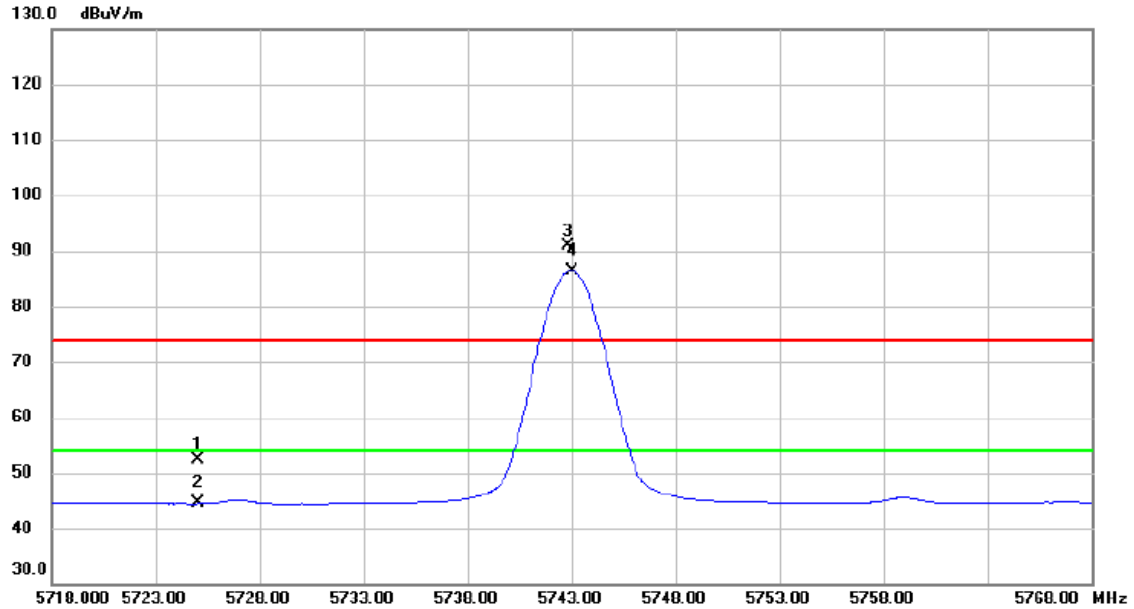


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		200.7200	37.61	-14.45	23.16	43.50	-20.34	peak	
2		334.5800	38.30	-10.89	27.41	46.00	-18.59	peak	
3	*	400.0550	43.77	-7.78	35.99	46.00	-10.01	peak	
4		457.7700	35.83	-8.26	27.57	46.00	-18.43	peak	
5		533.4300	38.06	-6.26	31.80	46.00	-14.20	peak	
6		800.1800	31.61	0.25	31.86	46.00	-14.14	peak	

ATTACHMENT D - RADIATED EMISSION (ABOVE 1000MHZ)

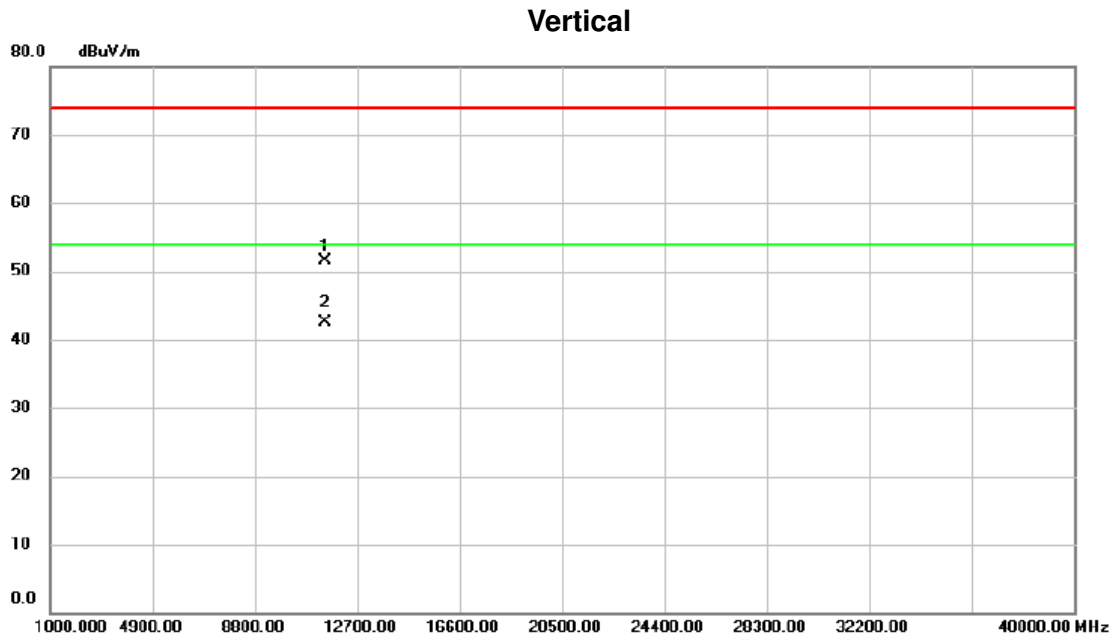
Orthogonal Axis:	X
Test Mode:	TX 5743MHz

Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		5725.000	9.59	42.73	52.32	74.00	-21.68	peak	
2		5725.000	1.78	42.73	44.51	54.00	-9.49	AVG	
3	X	5742.800	48.05	42.75	90.80	74.00	16.80	peak	No Limit
4	*	5743.000	43.67	42.75	86.42	54.00	32.42	AVG	No Limit

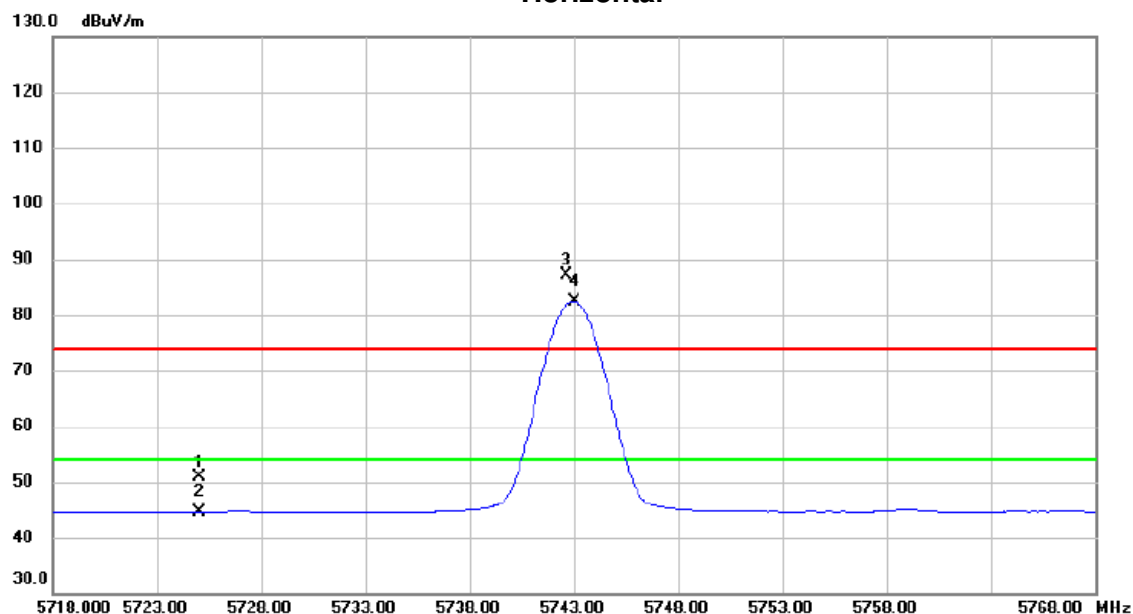
Orthogonal Axis:	X
Test Mode:	TX 5743MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		11485.000	33.72	17.88	51.60	74.00	-22.40	peak	
2	*	11486.100	24.64	17.88	42.52	54.00	-11.48	AVG	

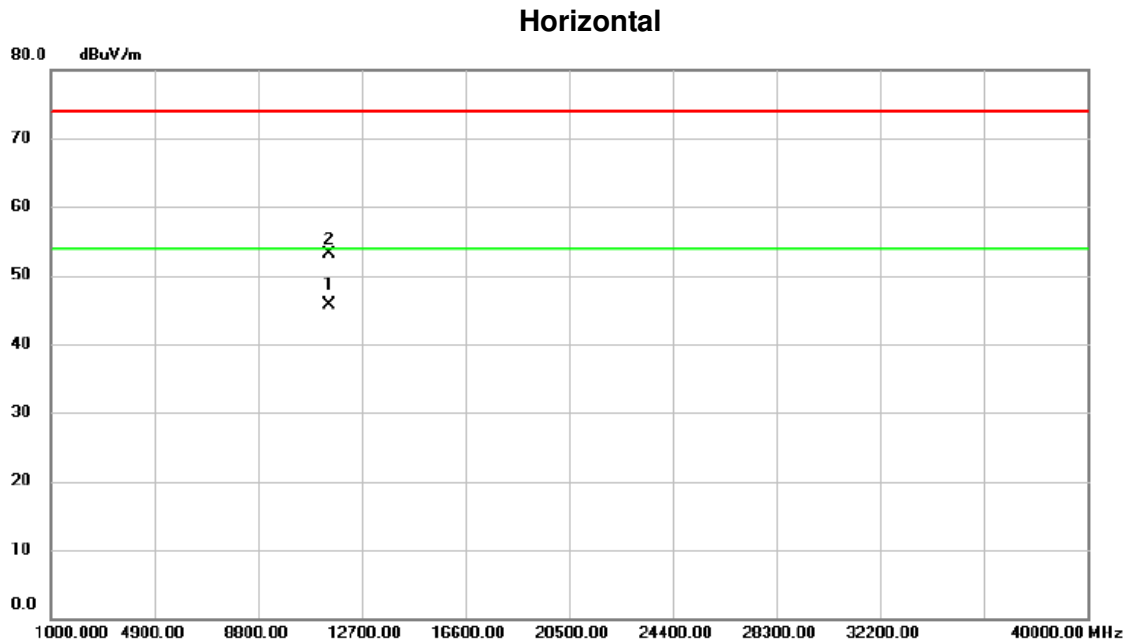
Orthogonal Axis:	X
Test Mode:	TX 5743MHz

Horizontal



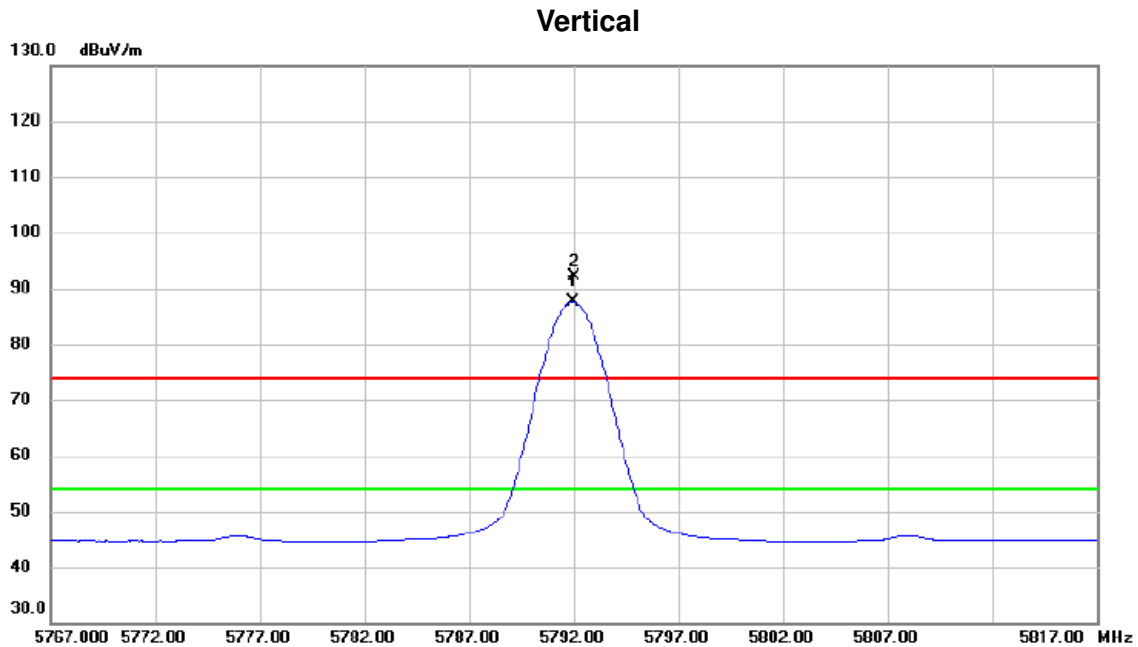
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		5725.000	8.26	42.73	50.99	74.00	-23.01	peak	
2		5725.000	1.79	42.73	44.52	54.00	-9.48	AVG	
3	X	5742.650	44.29	42.75	87.04	74.00	13.04	peak	No Limit
4	*	5743.000	39.75	42.75	82.50	54.00	28.50	AVG	No Limit

Orthogonal Axis:	X
Test Mode:	TX 5743MHz



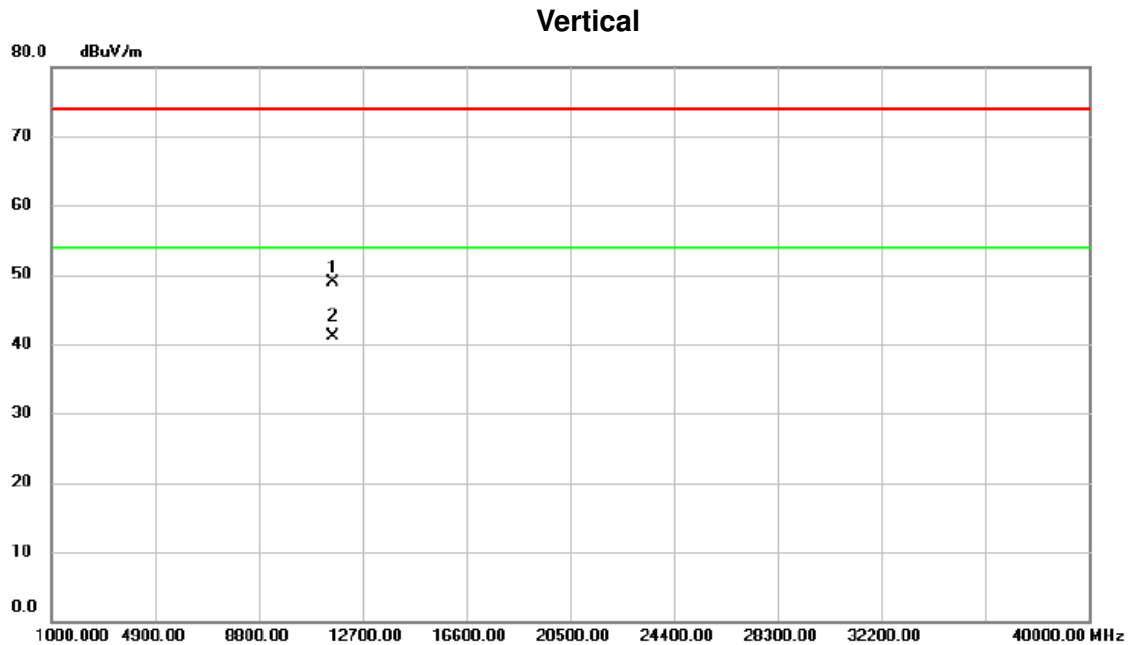
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	11485.350	27.88	17.88	45.76	54.00	-8.24	AVG	
2		11486.100	35.24	17.88	53.12	74.00	-20.88	peak	

Orthogonal Axis:	X
Test Mode:	TX 5792MHz



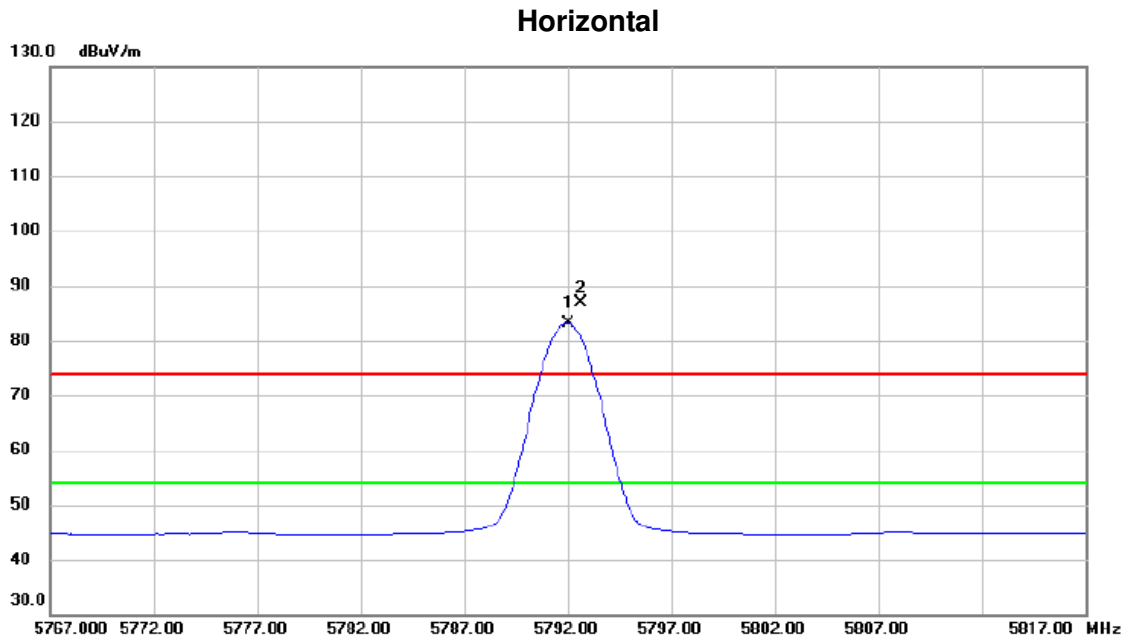
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	5791.950	44.85	42.79	87.64	54.00	33.64	AVG	No Limit
2	X	5792.000	49.31	42.79	92.10	74.00	18.10	peak	No Limit

Orthogonal Axis:	X
Test Mode:	TX 5792MHz



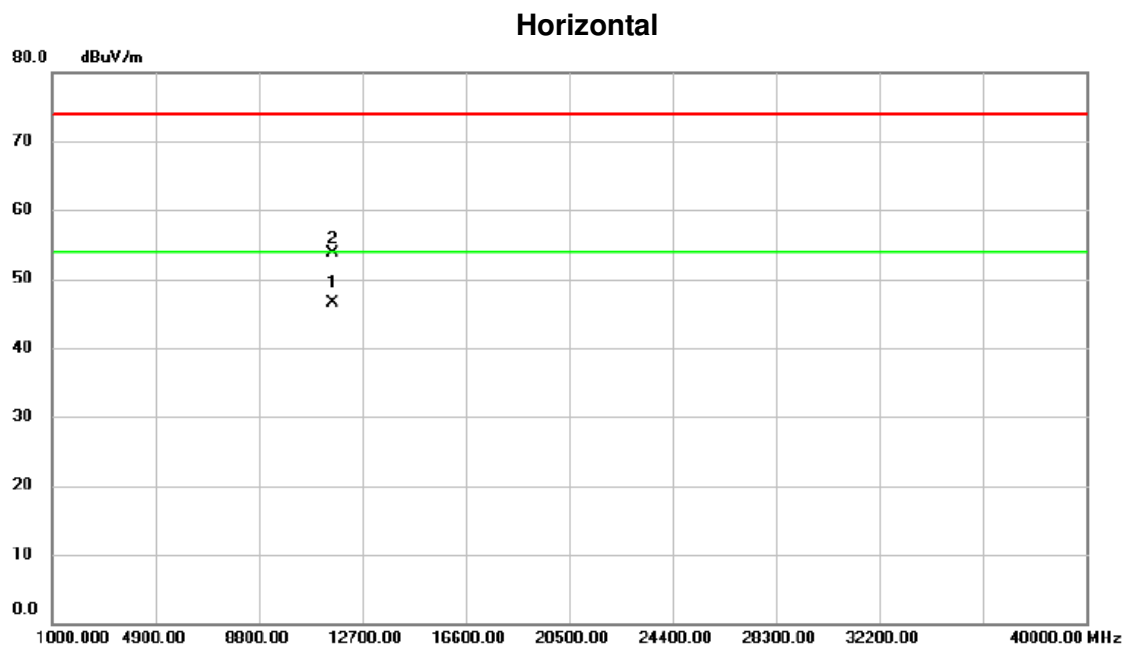
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		11582.675	31.02	17.84	48.86	74.00	-25.14	peak	
2	*	11583.925	23.17	17.84	41.01	54.00	-12.99	AVG	

Orthogonal Axis:	X
Test Mode:	TX 5792MHz



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	5792.000	40.36	42.79	83.15	54.00	29.15	AVG	No Limit
2	X	5792.650	44.20	42.79	86.99	74.00	12.99	peak	No Limit

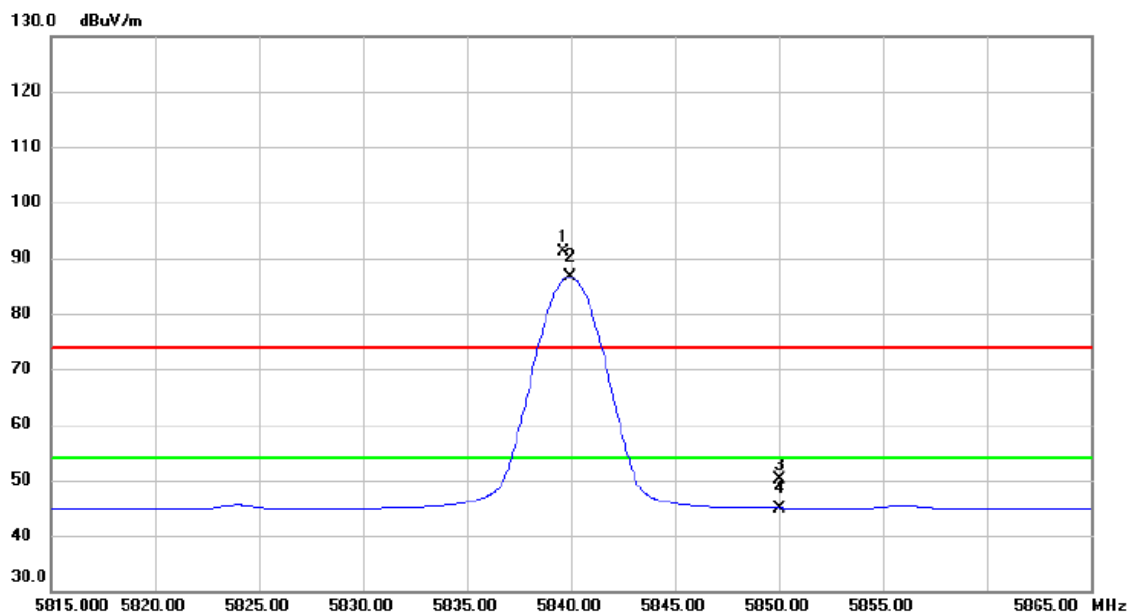
Orthogonal Axis:	X
Test Mode:	TX 5792MHz



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	11583.550	28.68	17.84	46.52	54.00	-7.48	AVG	
2		11584.300	35.86	17.84	53.70	74.00	-20.30	peak	

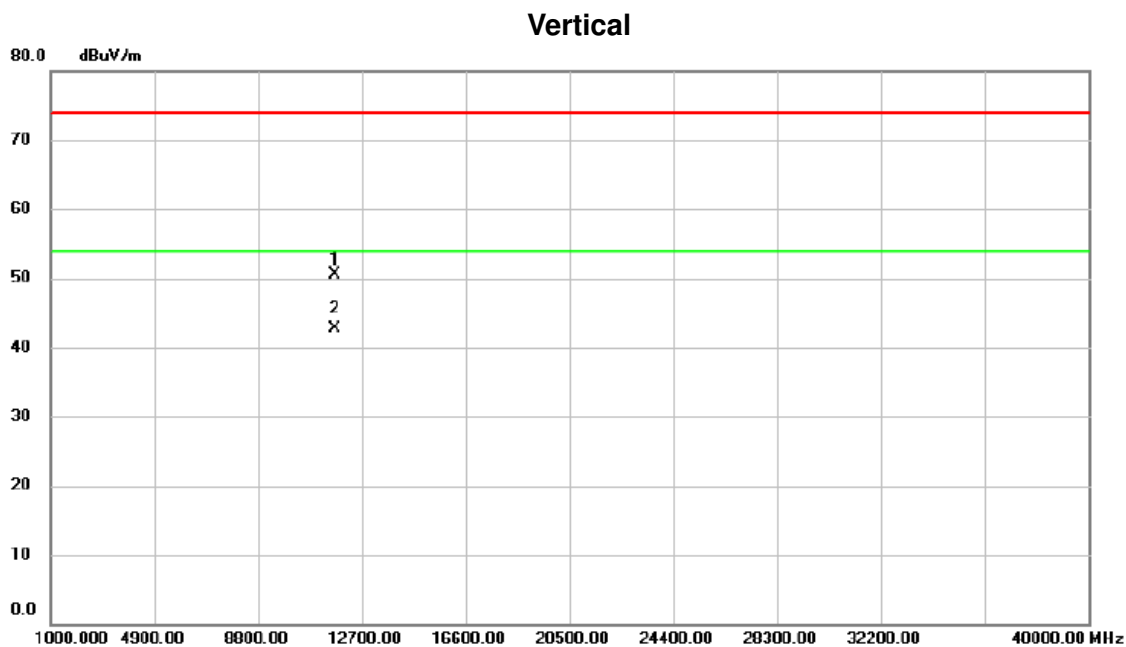
Orthogonal Axis:	X
Test Mode:	TX 5840MHz

Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	X	5839.600	48.28	42.83	91.11	74.00	17.11	peak	No Limit
2	*	5839.950	43.78	42.83	86.61	54.00	32.61	AVG	No Limit
3		5850.000	7.40	42.84	50.24	74.00	-23.76	peak	
4		5850.000	2.16	42.84	45.00	54.00	-9.00	AVG	

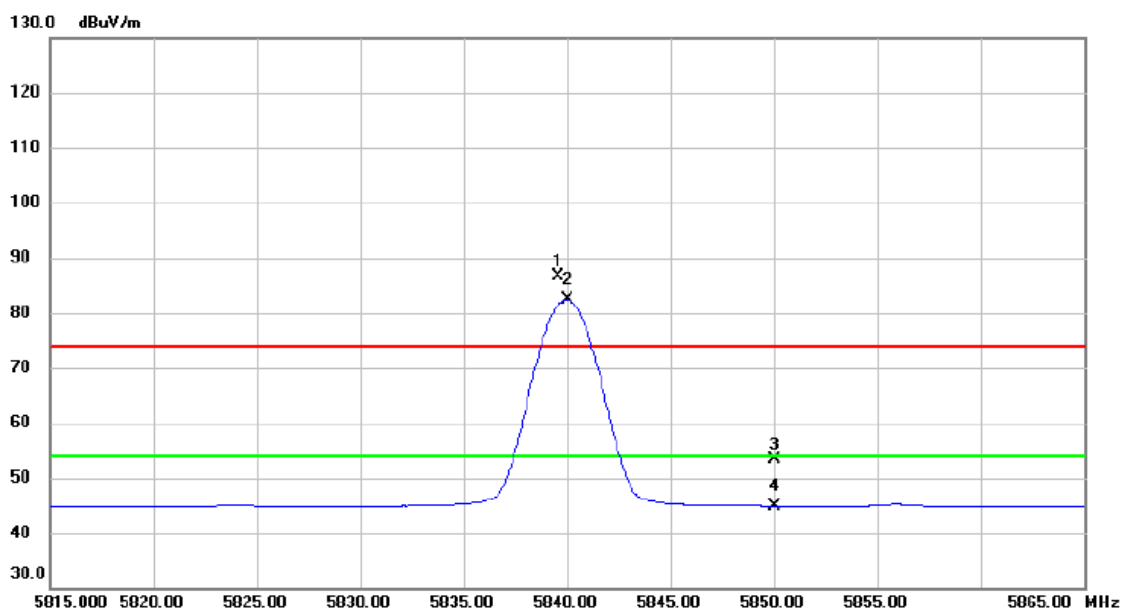
Orthogonal Axis:	X
Test Mode:	TX 5840MHz



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		11679.225	32.78	17.77	50.55	74.00	-23.45	peak	
2	*	11679.725	24.85	17.77	42.62	54.00	-11.38	AVG	

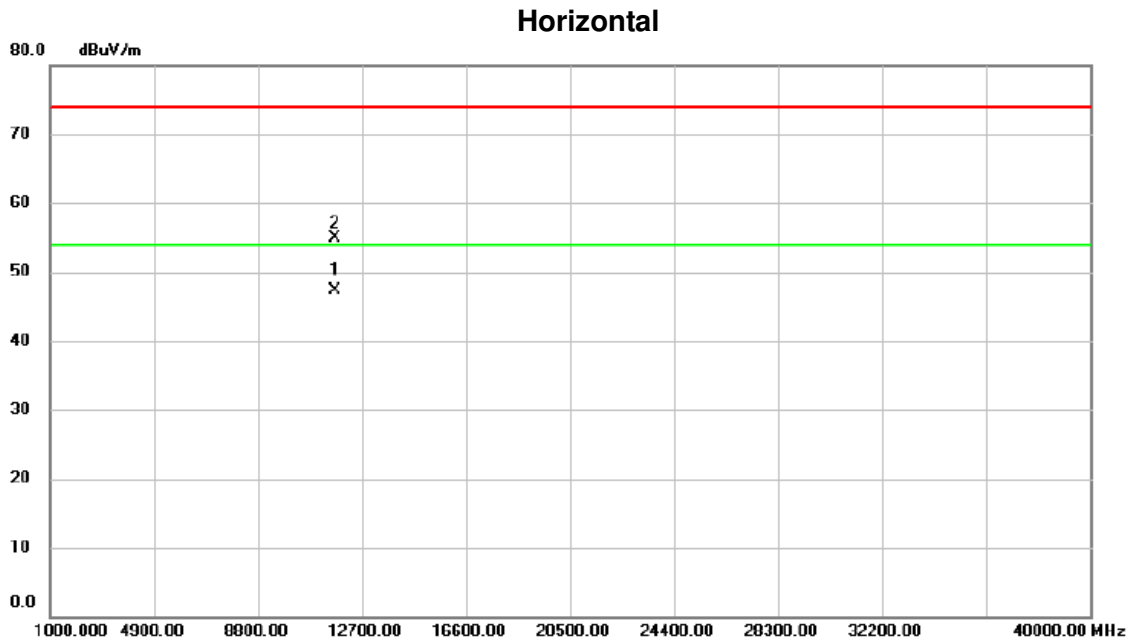
Orthogonal Axis:	X
Test Mode:	TX 5840MHz

Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	X	5839.550	43.79	42.83	86.62	74.00	12.62	peak	No Limit
2	*	5840.000	39.51	42.83	82.34	54.00	28.34	AVG	No Limit
3		5850.000	10.61	42.84	53.45	74.00	-20.55	peak	
4		5850.000	2.15	42.84	44.99	54.00	-9.01	AVG	

Orthogonal Axis:	X
Test Mode:	TX 5840MHz



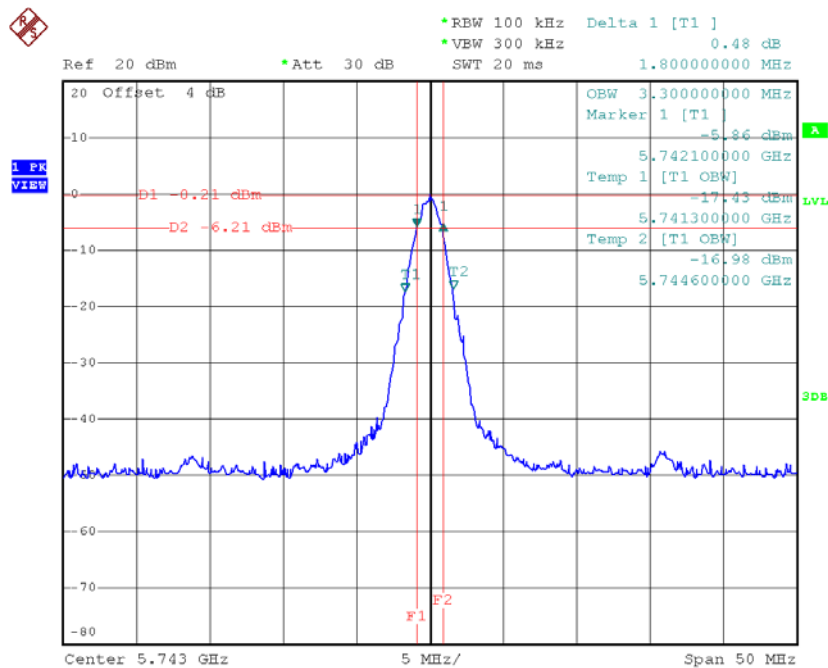
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	11679.400	29.47	17.77	47.24	54.00	-6.76	AVG	
2		11679.725	37.08	17.77	54.85	74.00	-19.15	peak	

ATTACHMENT E - BANDWIDTH

Test Mode: TX Mode / CH01, CH18, CH35_ANT 1

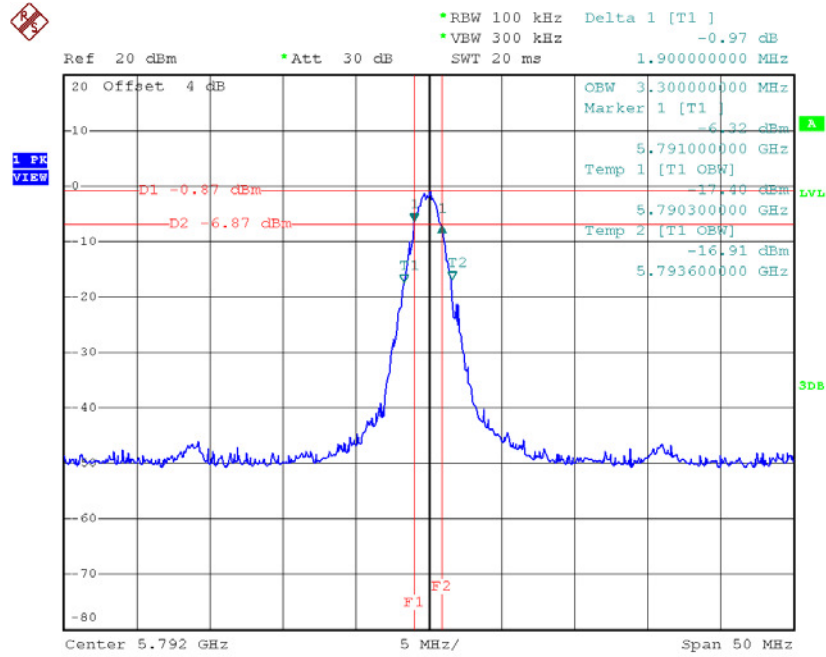
Frequency (MHz)	6dB Bandwidth (MHz)	99% Occupied BW (MHz)	Min. Limit (kHz)	Test Result
5743	1.80	3.30	500	Complies
5792	1.90	3.30	500	Complies
5840	1.70	3.30	500	Complies

TX CH01



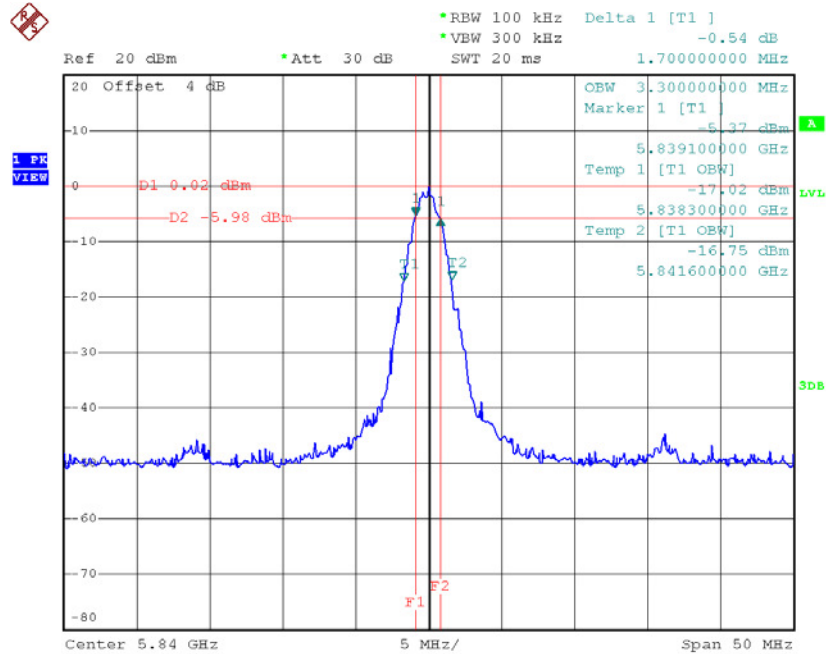
Date: 20.FEB.2017 14:43:04

TX CH18



Date: 20.FEB.2017 14:40:36

TX CH35



Date: 20.FEB.2017 14:38:35

ATTACHMENT F – AVG OUTPUT POWER

For ANT 1

TX Mode / CH01, CH18, CH35

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Limit (Watt)
CH01	5743	8.57	30.00	1.00
CH18	5792	8.70	30.00	1.00
CH35	5840	8.92	30.00	1.00

For ANT 2

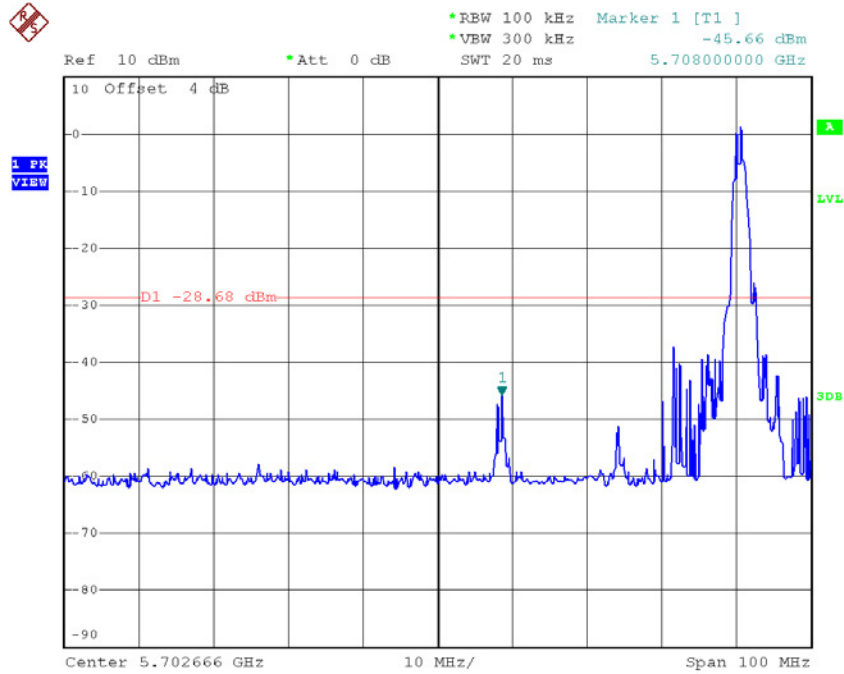
TX Mode / CH01, CH18, CH35

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Limit (Watt)
CH01	5743	6.12	30.00	1.00
CH18	5792	6.05	30.00	1.00
CH35	5840	6.31	30.00	1.00

ATTACHMENT G - ANTENNA CONDUCTED SPURIOUS EMISSION

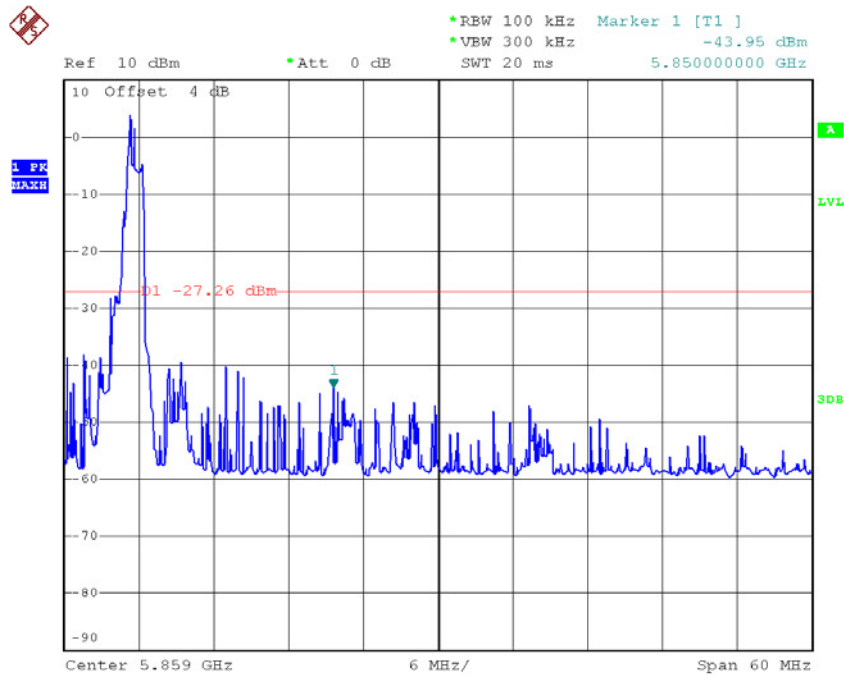
Test Mode : TX Mode_ANT 1

TX mode CH01



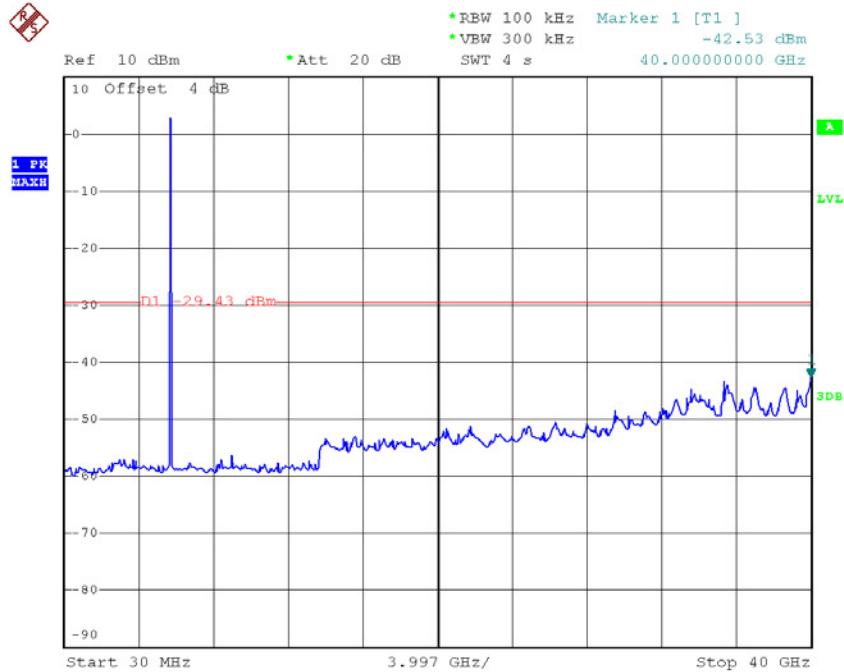
Date: 12.APR.2017 21:26:49

TX mode CH35



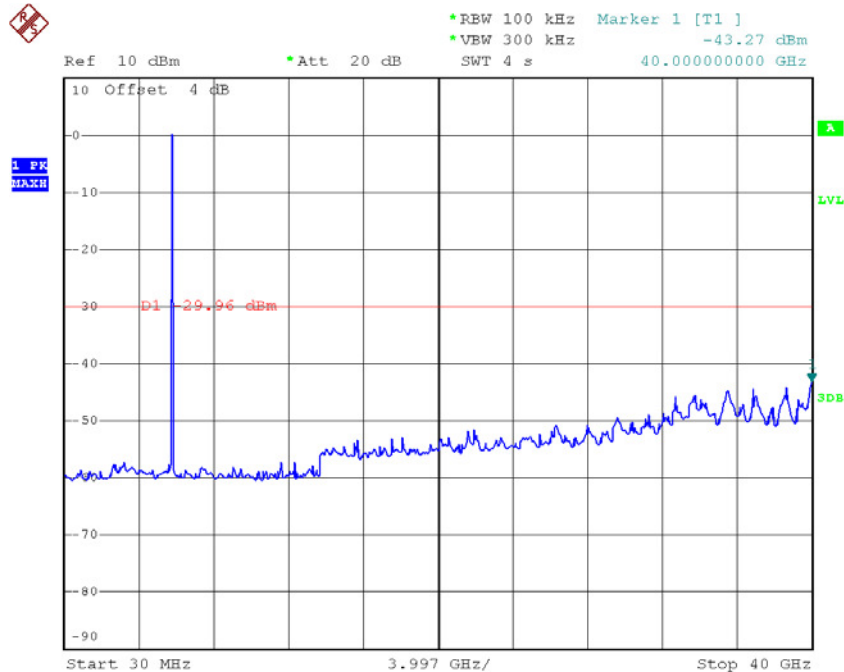
Date: 12.APR.2017 20:42:31

TX mode CH01 (10 Harmonic of the frequency)



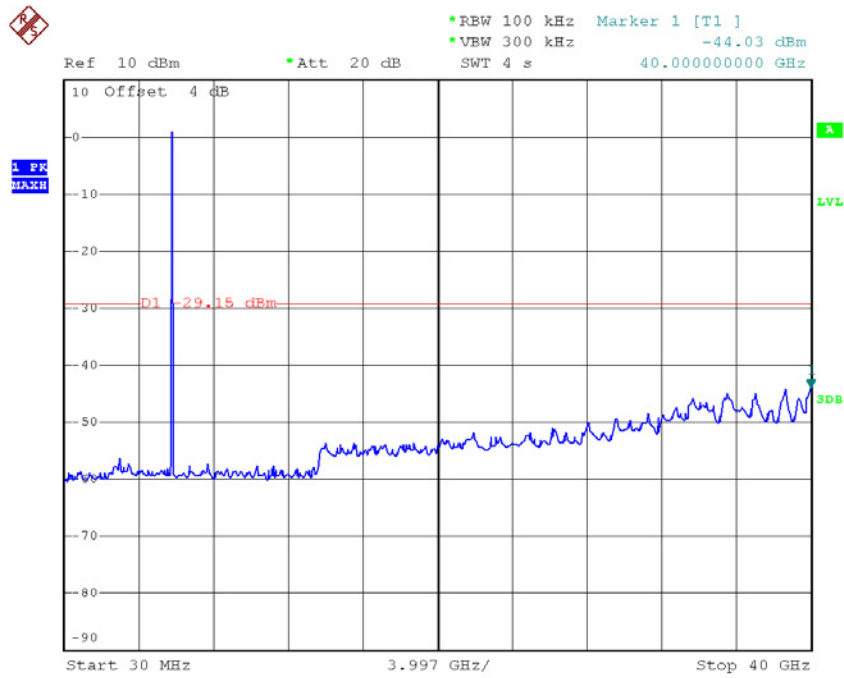
Date: 12.APR.2017 21:37:08

TX mode CH18 (10 Harmonic of the frequency)



Date: 12.APR.2017 21:39:23

TX mode CH35 (10 Harmonic of the frequency)

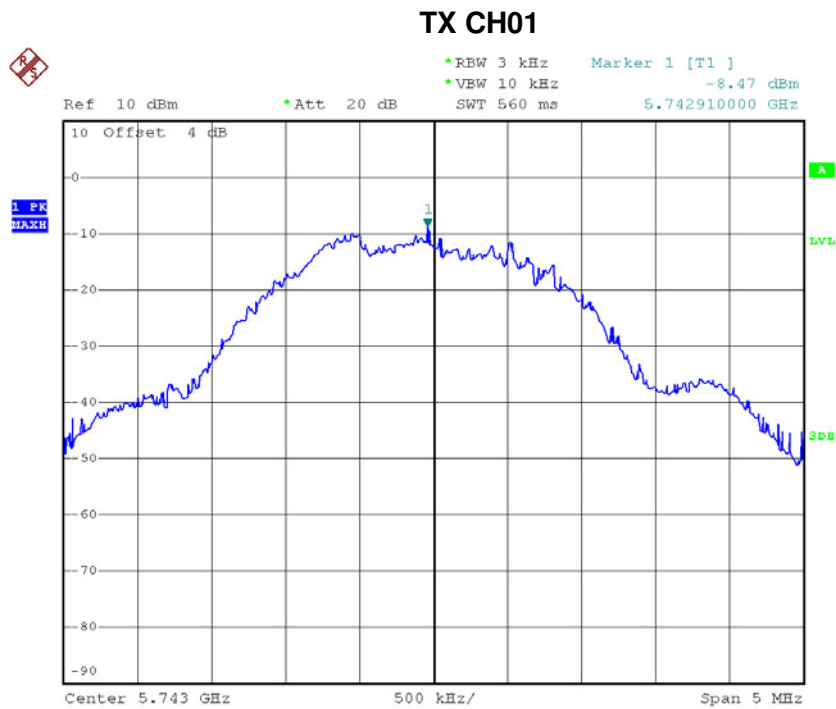


Date: 12.APR.2017 21:40:35

ATTACHMENT H - POWER SPECTRAL DENSITY

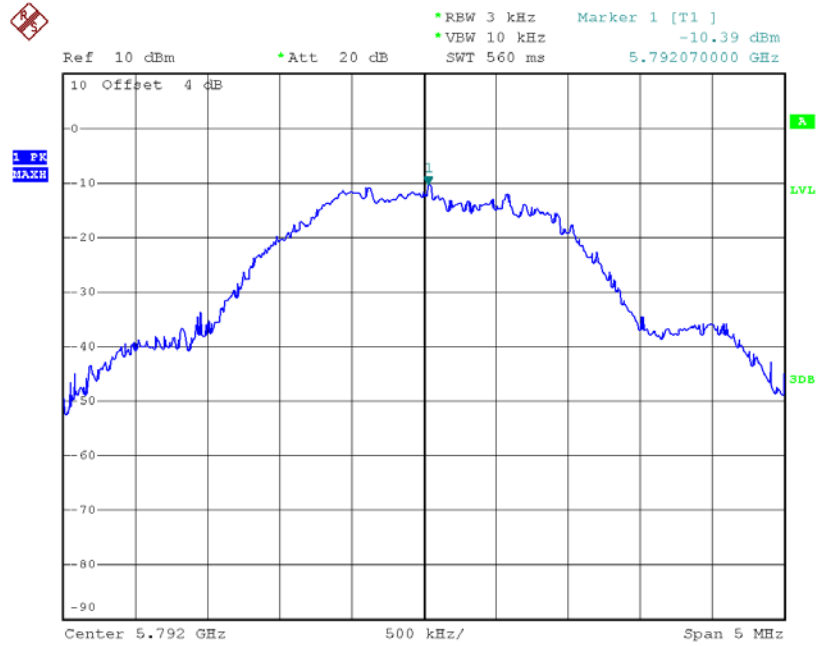
Test Mode :TX Mode_CH01/18/35_ANT 1

Frequency (MHz)	Power Density (dBm/3kHz)	Power Density (mW/3kHz)	Max. Limit (dBm/3kHz)	Result
5743	-8.47	0.14	8.00	Complies
5792	-10.39	0.09	8.00	Complies
5840	-11.72	0.07	8.00	Complies



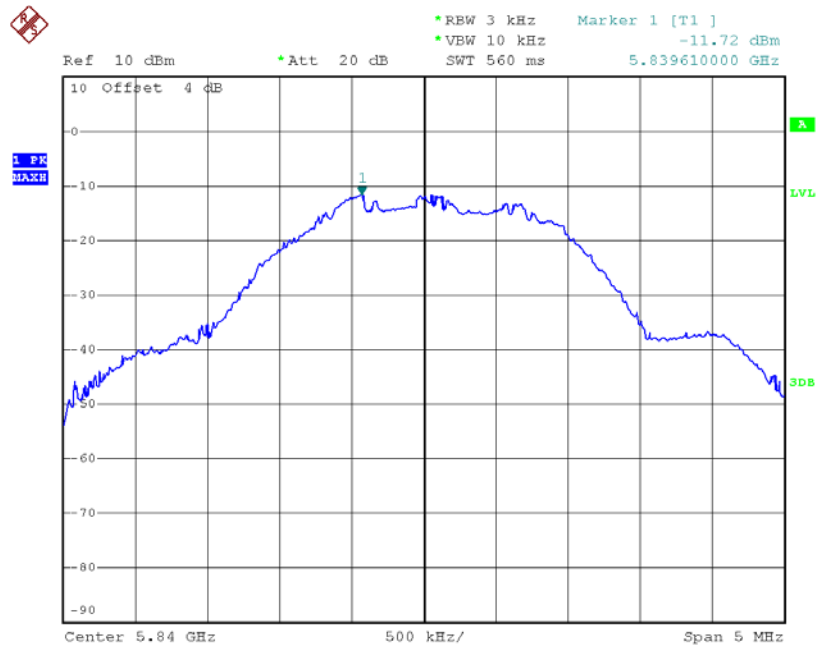
Date: 12.APR.2017 22:08:40

TX CH18



Date: 12.APR.2017 22:10:39

TX CH35



Date: 12.APR.2017 22:14:00