

FCC Radio Test Report

FCC ID: 2AN93BIKI-V1

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

Project No. : 1710C318
Equipment : Bionic Robo Fish
Model Name : BIKI V1.0
Applicant : Boya Gongdao (Beijing) Robot Technology Co.,Ltd.
Address : 3F,Unit B,Wanlin Building,No.88 Nongda South Road,Haidian District,Beijing ,China

Date of Receipt : Oct. 31, 2017
Date of Test : Oct. 31, 2017 ~ Nov. 10, 2017
Issued Date : Nov. 13, 2017
Tested by : BTL Inc.

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REPORT ISSUED HISTORY

Issued No.	Description	Issued Date
BTL-FCCP-1-1710C318	Original Issue.	Nov. 13, 2017

1. CERTIFICATION

Equipment : Bionic Robo Fish
Brand Name : ROBOSEA
Model Name : BIKI V1.0
Applicant : Boya Gongdao (Beijing) Robot Technology Co.,Ltd.
Manufacturer : Boya Gongdao (Beijing) Robot Technology Co.,Ltd..
Address : 3F,Unit B,Wanlin Building,No.88 Nongda South Road,Haidian
District,Beijing ,China
Factory : Boya Gongdao (Beijing) Robot Technology Co.,Ltd..
Address : 3F,Unit B,Wanlin Building,No.88 Nongda South Road,Haidian
District,Beijing ,China
Date of Test : Oct. 31, 2017 ~ Nov. 10, 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-1-1710C318) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of NVLAP 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)	Peak Output Power	PASS	
15.247(e)	Power Spectral Density	PASS	
15.203	Antenna Requirement	PASS	
15.247(d)/ 15.205/ 15.209	Transmitter Radiated Emissions	PASS	

NOTE:

- (1)" N/A" denotes test is not applicable in this test report.
- (2)The working principle of the Repeater is that the relay chip will connect the Hisi chip and when it receives the signal of the Hisi chip, the signal of the Hisi chip will be amplified. The Repeater is used underwater, the antenna of the Hisi module is inside the Repeater, there is no way to transmit WIFI signal underwater, and the power is lower than that of the relay module. The relay chip is on the external fins of the Repeater, therefore, the relay chip transmission is found to be the worst mode when the two chips transmit simultaneously.

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 designation number for FCC: CN5020

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	Bionic Robo Fish	
Brand Name	ROBOSEA	
Model Name	BIKI V1.0	
Model Difference	N/A	
Software version	FISH5.02.13	
Hardware version	FH5.02.4	
Product Description	Operation Frequency	2437 MHz
	Modulation Technology	802.11n:OFDM
	Bit Rate of Transmitter	802.11n up to 72 Mbps
	Output Power (Max.)-Hisi	802.11n(20MHz): 16.18dBm
	Output Power (Max.)-Repeater	802.11n(20MHz): 18.44dBm
Power Source	DC Voltage supplied from AC/DC adapter. Model:CD122	
Power Rating	I/P:100-240V~50/60Hz 500mA O/P:5V  2A 9V  2A 12V  1.5A	

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)
06	2437

3. Table for Filed Antenna

For His:

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	N/A	N/A	Internal	N/A	1.6

For Repeater:

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	N/A	N/A	Internal	N/A	2.5

3.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generated from EUT, the test system was pre-scanning tested based on the consideration of following EUT operation mode or test configuration mode which possibly 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 N-20MHZ MODE CHANNEL 06
Mode 2	Normal Link

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	Normal Link

For Radiated Test	
Final Test Mode	Description
Mode 1	TX N-20MHZ MODE CHANNEL 06

For Band Edge Test	
Final Test Mode	Description
Mode 1	TX N-20MHZ MODE CHANNEL 06

6dB Spectrum Bandwidth	
Final Test Mode	Description
Mode 1	TX N-20MHZ MODE CHANNEL 06

Maximum Conducted Output Power	
Final Test Mode	Description
Mode 1	TX N-20MHZ MODE CHANNEL 06

Power Spectral Density	
Final Test Mode	Description
Mode 1	TX N-20MHZ MODE CHANNEL 06

Note:

- (1) The measurements are performed at the high, middle, low available channels.
- (2) 802.11n HT20 mode : BPSK (13Mbps)
For radiated emission tests, the highest output powers were set for final test.
- (3) For radiated below 1G test, the 802.11 N20 is found to be the worst case and recorded.
- (4) 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

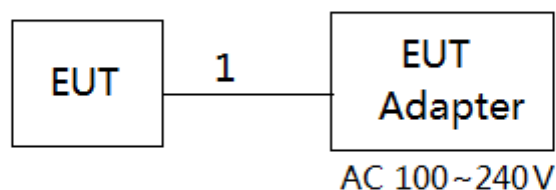
For Hisi:

Test software version	N/A
Frequency (MHz)	2437
802.11n (20MHz)	N/A

For Repeater:

Test software version	N/A
Frequency (MHz)	2437
802.11n (20MHz)	0E

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
1	NO	NO	1.5M	DC Cable

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

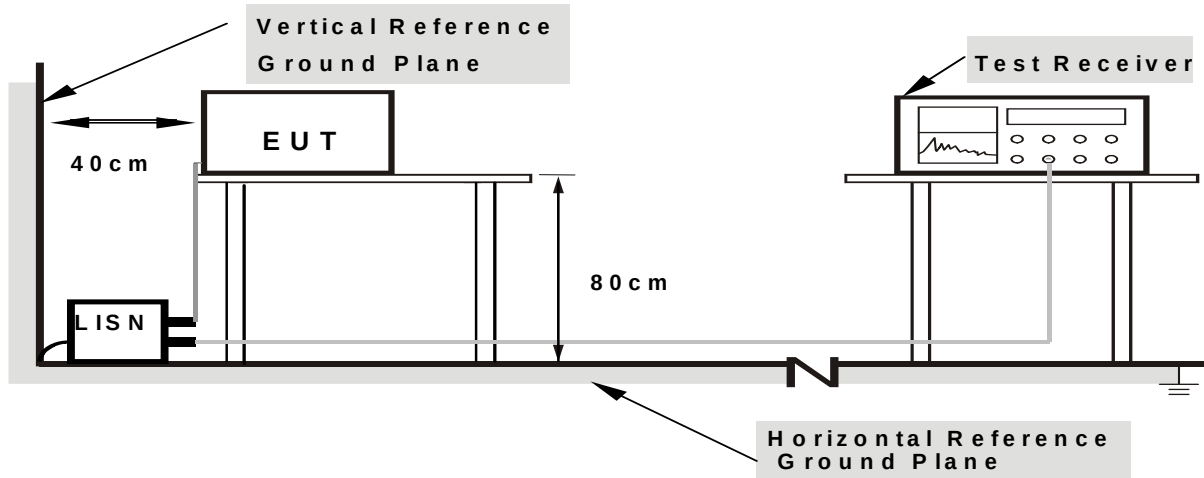
4.1.2 TEST PROCEDURE

- 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 equipment 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 Appendix 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 / 6/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

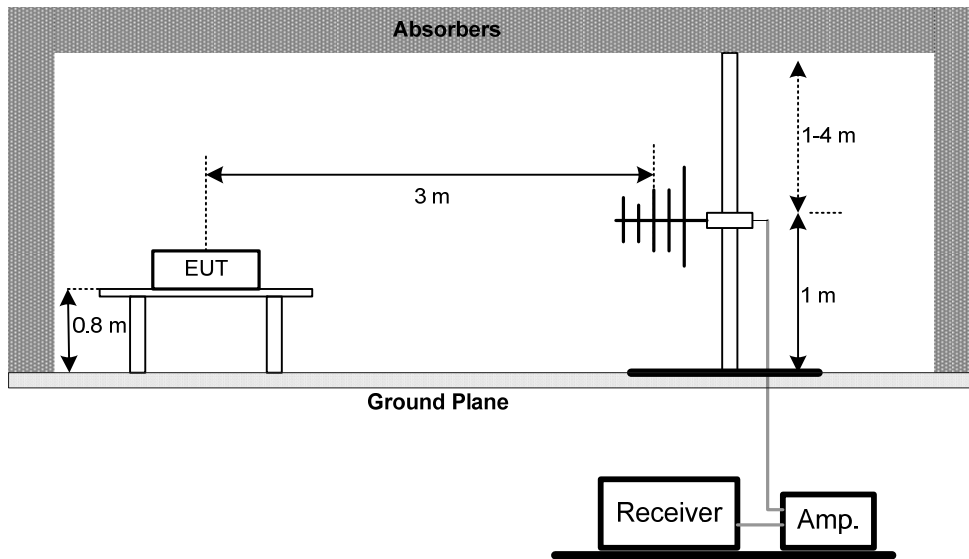
- The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
- The measuring distance of 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

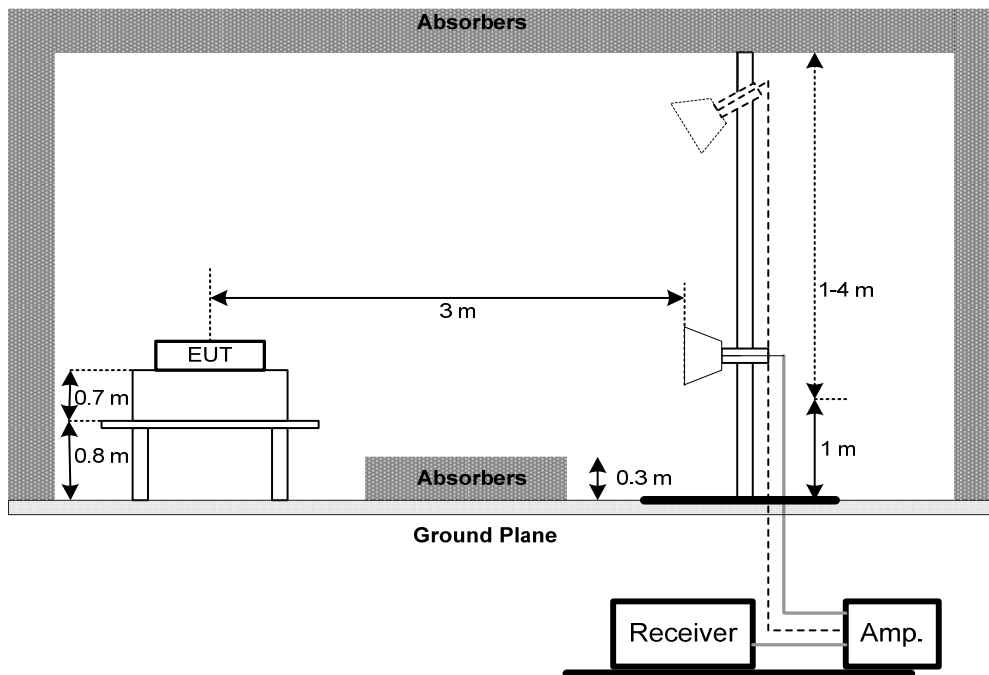
No deviation

4.2.4 TEST SETUP

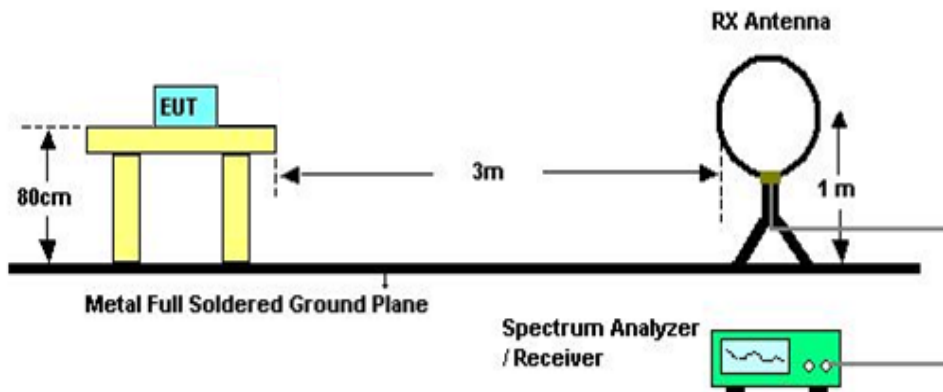
(A) Radiated Emission Test Set-Up Frequency Below 1 GHz



(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 Appendix 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 1000MHZ)

Please refer to the Appendix C.

4.2.9 TEST RESULTS (ABOVE 1000MHZ)

Please refer to the Appendix 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	2400-2483.5	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 Appendix E.

6. MAXIMUM PEAK CONDUCTED 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	2400-2483.5	PASS

6.1.1 TEST PROCEDURE

- The EUT was directly connected to the power meter and antenna output port as show in the block diagram below,
- The maximum peak conducted output power was performed in accordance with method 9.1.2 of FCC KDB 558074 D01 DTS Meas Guidance and FCC KDB 662911 D01 Multiple Transmitter Output.

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 Appendix 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 Appendix 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)	2400-2483.5	PASS

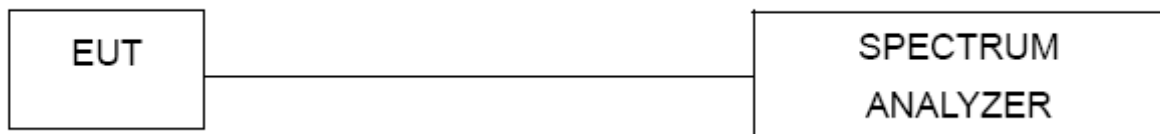
8.1.1 TEST PROCEDURE

- 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 Appendix H.

9. MEASUREMENT INSTRUMENTS LIST

Conducted Emission					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	EMI Test Receiver	R&S	ESCI	100382	Mar. 26, 2018
2	LISN	EMCO	3816/2	52765	Mar. 26, 2018
3	50Ω Terminator	SHX	TF2-3G-A	8122901	Mar. 26, 2018
4	TWO-LINE V-NETWORK	R&S	ENV216	101447	Mar. 26, 2018
5	Cable	N/A	RG223	12m	Oct. 19, 2018
6	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A

Radiated Emission Below 1GHz					
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. 19, 2018
3	Receiver	Agilent	N9038A	MY52130039	Sep. 03, 2018
4	Cable	emci	LMR-400(30MHz-1 GHz)(8m+5m)	N/A	Jun. 26, 2018
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

Radiated Emission Above 1GHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Double Ridged Guide Antenna	ETS	3115	75789	Mar. 26, 2018
2	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170319	Jun. 08, 2018
3	Amplifier	Agilent	8449B	3008A02274	May. 16, 2018
4	Microwave Preamplifier With Adaptor	EMC INSTRUMENT	EMC2654045	980039 & HA01	Mar. 26, 2018
5	Receiver	Agilent	N9038A	MY52130039	Sep. 03, 2018
6	Antenna	EM	EM-6876-1	230	Jul. 07, 2018
7	Controller	CT	SC100	N/A	N/A
8	Controller	MF	MF-7802	MF780208416	N/A
9	Cable	emci	EMC104-SM-SM-1 2000(12m)	N/A	Jun. 26, 2018
10	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A

6dB Bandwidth					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Sep. 03, 2018

Peak Output Power					
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					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Sep. 03, 2018

Power Spectral Density					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Sep. 03, 2018

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



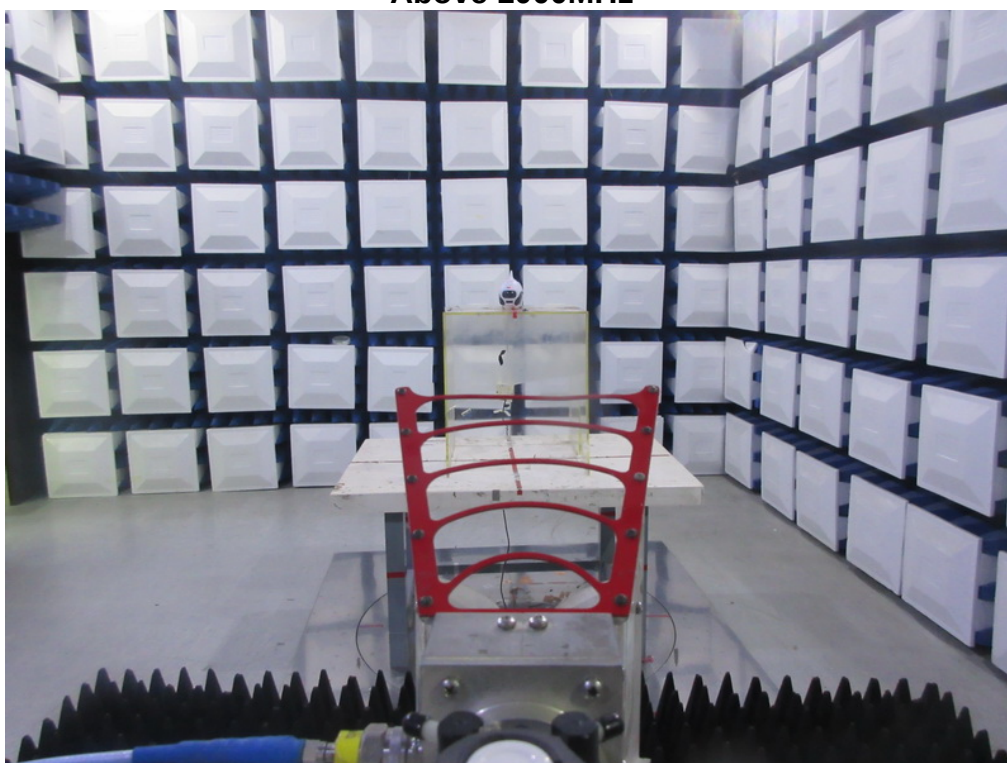
Radiated Measurement Photos

30MHz to 1000MHz



Radiated Measurement Photos

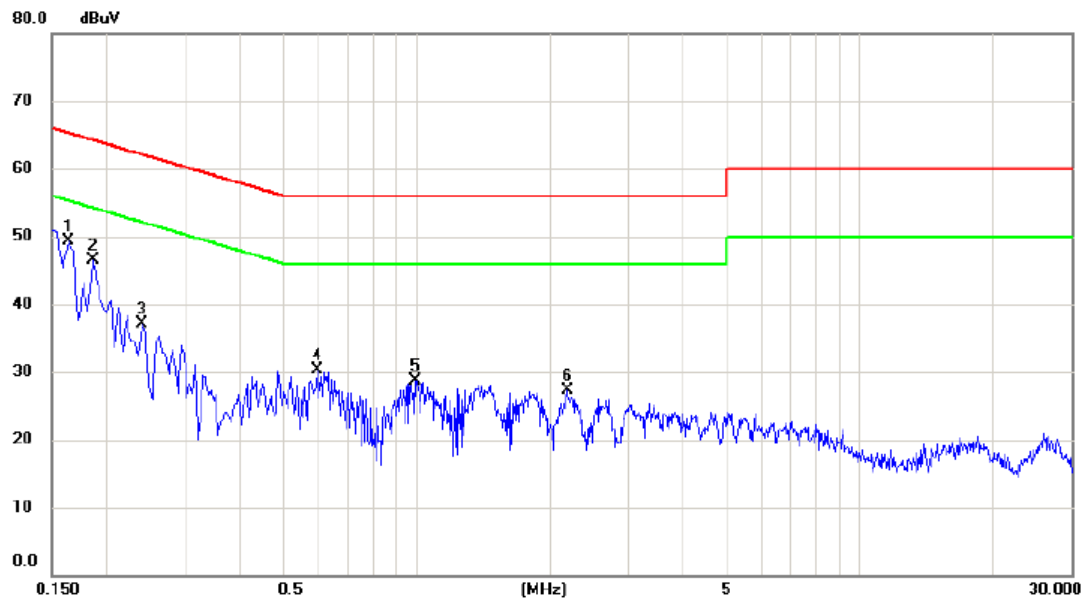
Above 1000MHz



APPENDIX A - CONDUCTED EMISSION

Test Mode : Normal Link

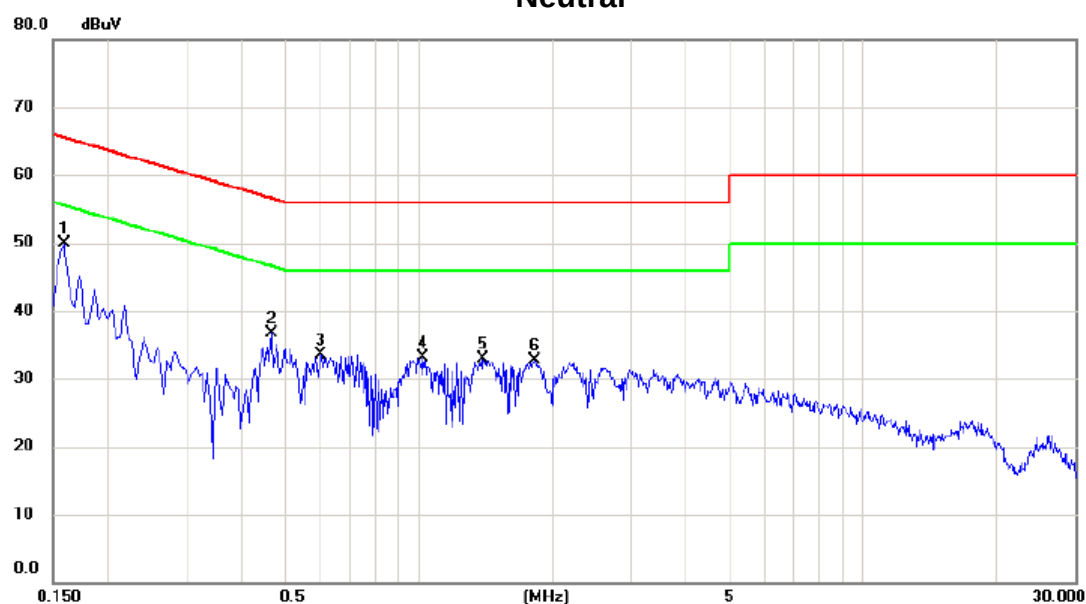
Line



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	*	0.1635	39.54	9.74	49.28	65.28	-16.00	peak	
2		0.1860	36.74	9.73	46.47	64.21	-17.74	peak	
3		0.2400	27.38	9.73	37.11	62.10	-24.99	peak	
4		0.5954	20.46	9.76	30.22	56.00	-25.78	peak	
5		0.9914	18.94	9.77	28.71	56.00	-27.29	peak	
6		2.1884	17.46	9.82	27.28	56.00	-28.72	peak	

Test Mode : Normal Link

Neutral

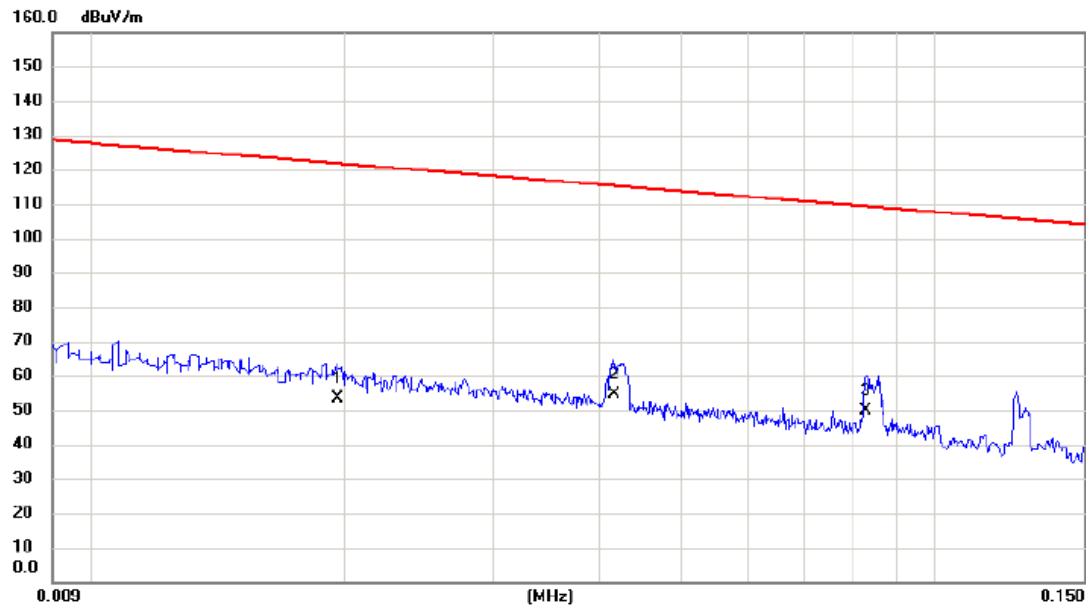


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	*	0.1590	40.33	9.64	49.97	65.52	-15.55	peak	
2		0.4650	27.14	9.66	36.80	56.60	-19.80	peak	
3		0.6000	23.89	9.66	33.55	56.00	-22.45	peak	
4		1.0184	23.38	9.68	33.06	56.00	-22.94	peak	
5		1.3965	23.18	9.69	32.87	56.00	-23.13	peak	
6		1.8240	23.05	9.72	32.77	56.00	-23.23	peak	

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

Test Mode: TX N20 MODE CHANNEL 06_Hisi

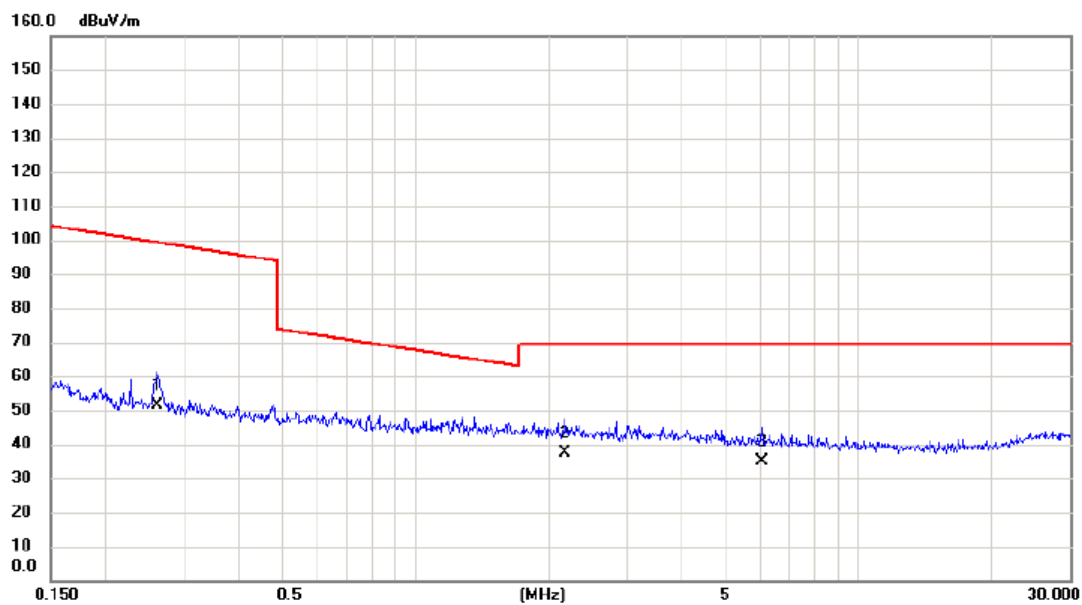
Ant 0°



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		0.0196	33.70	19.67	53.37	121.76	-68.39	AVG	
2		0.0416	35.83	18.97	54.80	115.22	-60.42	AVG	
3	*	0.0827	31.84	18.05	49.89	109.25	-59.36	AVG	

Test Mode: TX N20 MODE CHANNEL 06_Hisi

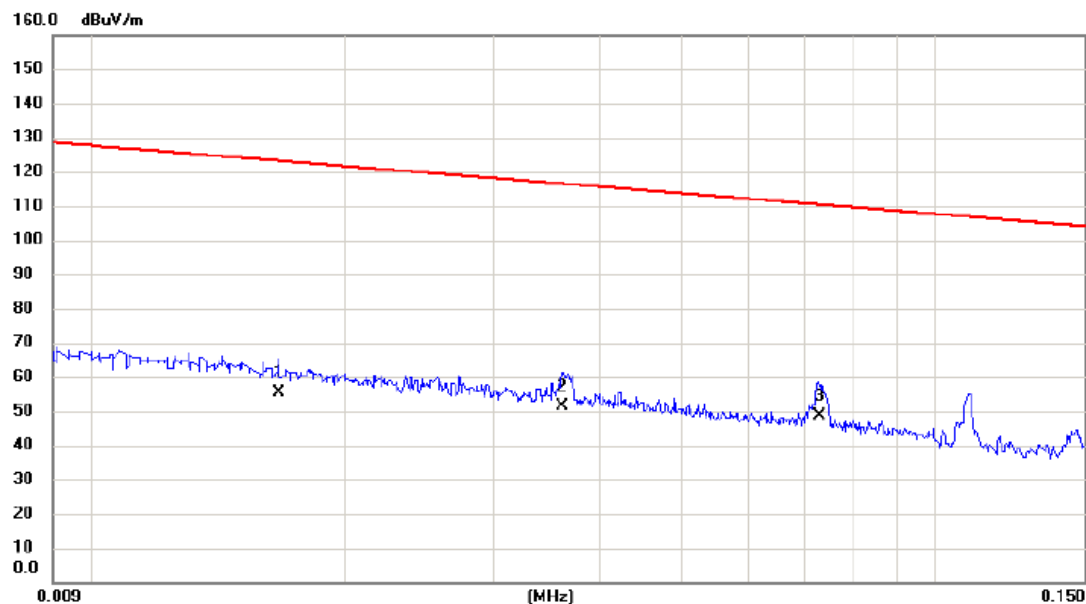
Ant 0°



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		0.2615	34.67	16.65	51.32	99.26	-47.94	AVG	
2	*	2.1783	21.76	15.46	37.22	69.54	-32.32	QP	
3		6.0562	20.67	14.24	34.91	69.54	-34.63	QP	

Test Mode: TX N20 MODE CHANNEL 06_Hisi

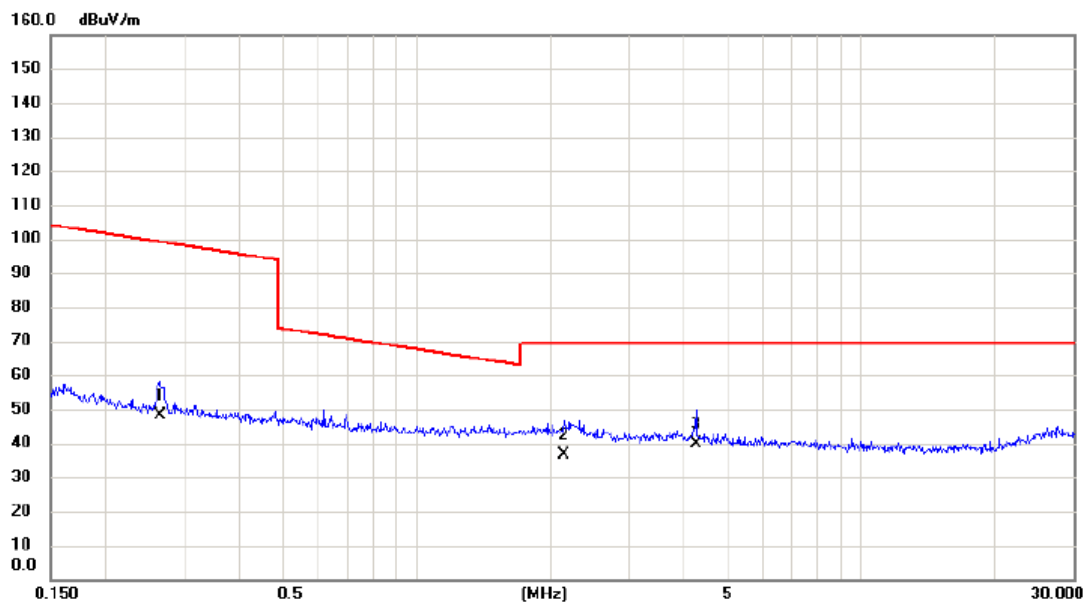
Ant 90°



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		0.0167	35.22	20.05	55.27	123.15	-67.88	AVG	
2		0.0361	32.45	19.14	51.59	116.45	-64.86	AVG	
3	*	0.0728	30.42	18.27	48.69	110.36	-61.67	AVG	

Test Mode: TX N20 MODE CHANNEL 06_Hisi

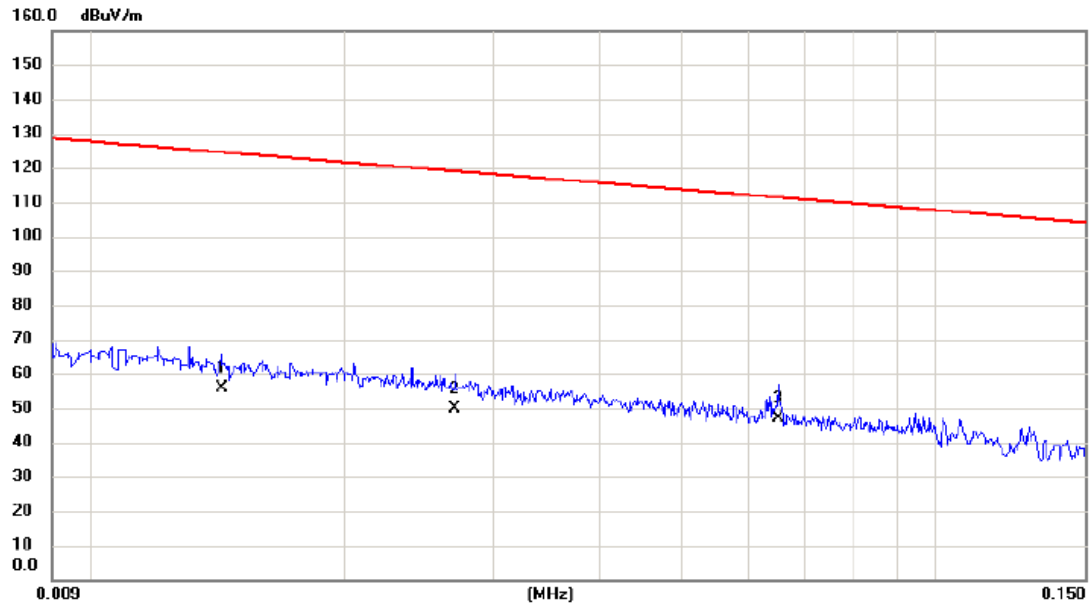
Ant 90°



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		0.2644	31.52	16.65	48.17	99.16	-50.99	AVG	
2		2.1440	21.33	15.47	36.80	69.54	-32.74	QP	
3	*	4.2466	25.12	14.80	39.92	69.54	-29.62	QP	

Test Mode: TX N20 MODE CHANNEL 06 _Repeater

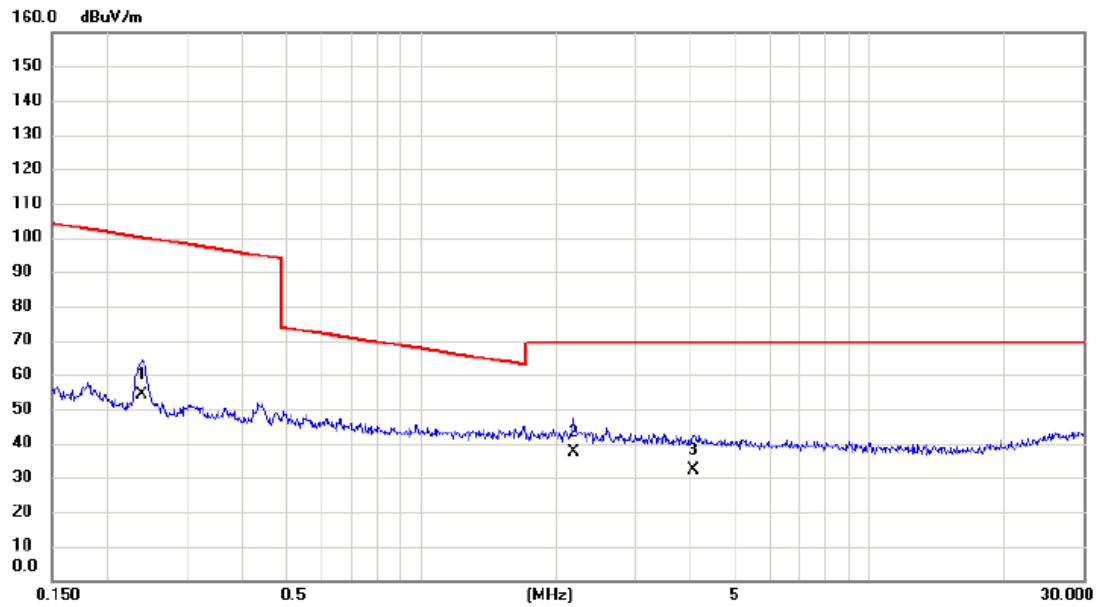
Ant 0°



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		0.0143	35.45	20.36	55.81	124.50	-68.69	AVG	
2		0.0270	30.43	19.41	49.84	118.98	-69.14	AVG	
3	*	0.0650	28.63	18.43	47.06	111.35	-64.29	AVG	

Test Mode: TX N20 MODE CHANNEL 06_Repeater

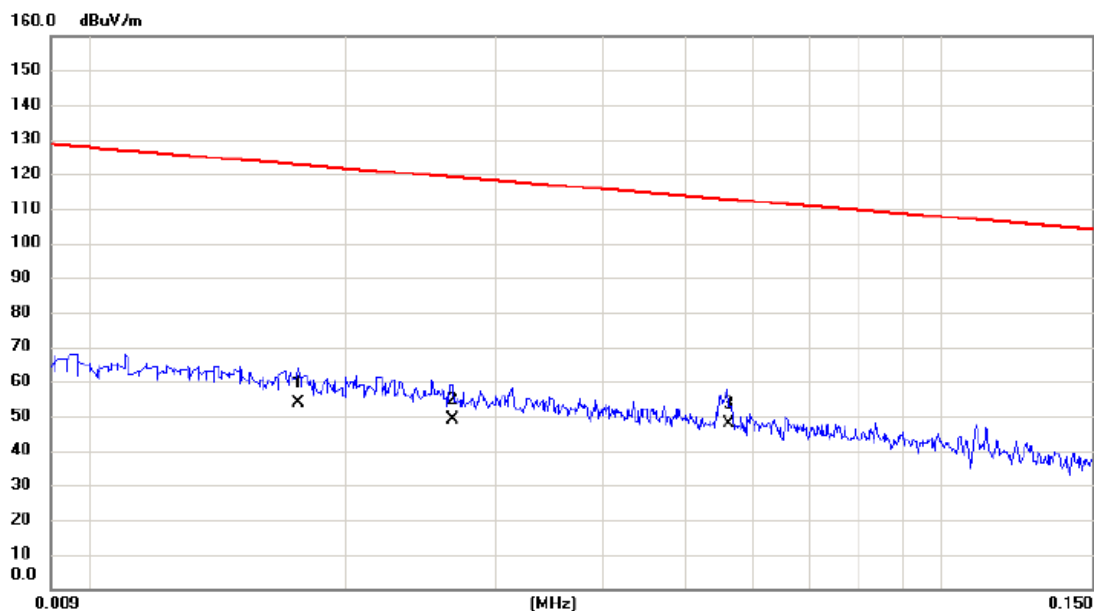
Ant 0°



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		0.2391	37.52	16.69	54.21	100.03	-45.82	AVG	
2	*	2.1898	21.92	15.45	37.37	69.54	-32.17	QP	
3		4.0488	17.27	14.92	32.19	69.54	-37.35	QP	

Test Mode:	TX N20 MODE CHANNEL 06_Repeater
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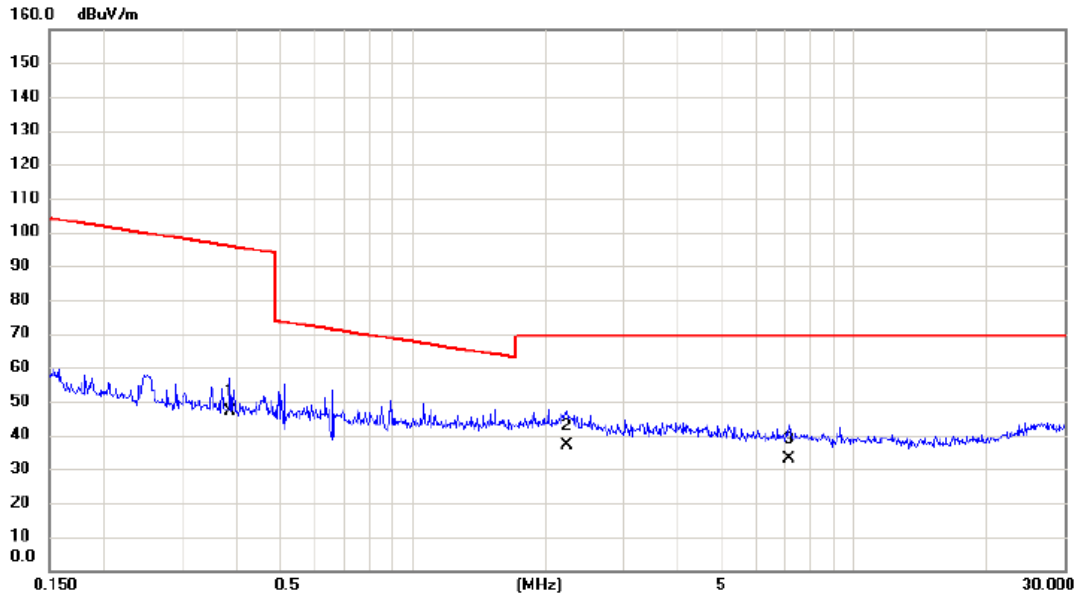
Ant 90°



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		0.0176	33.71	19.93	53.64	122.69	-69.05	AVG	
2		0.0267	29.67	19.42	49.09	119.07	-69.98	AVG	
3	*	0.0562	29.27	18.61	47.88	112.61	-64.73	AVG	

Test Mode: TX N20 MODE CHANNEL 06_Repeater

Ant 90°

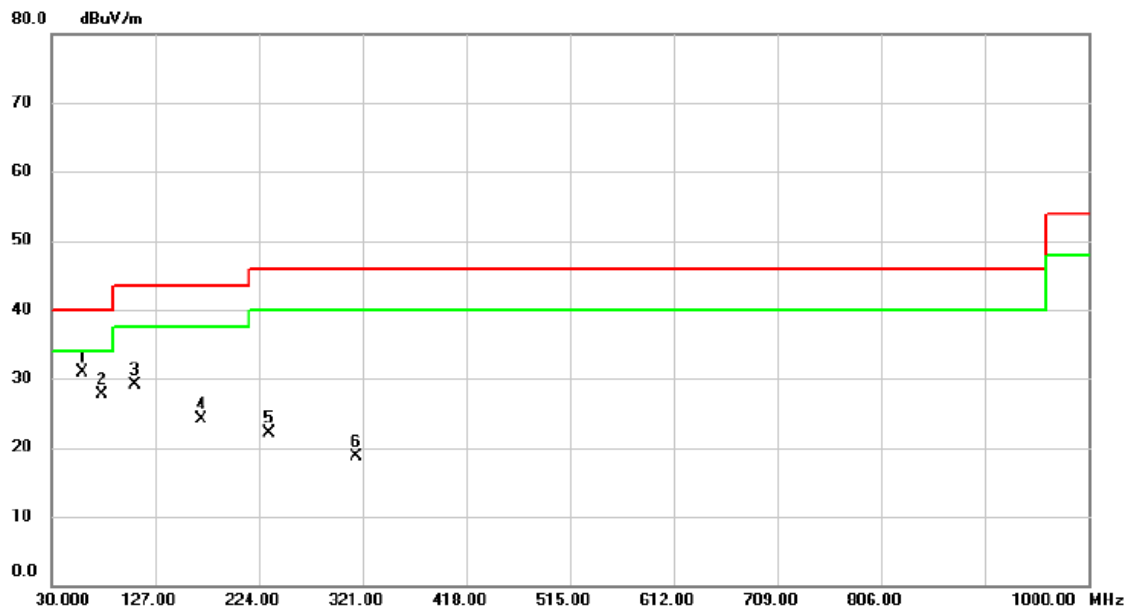


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		0.3852	30.26	16.55	46.81	95.89	-49.08	AVG	
2	*	2.2367	21.40	15.44	36.84	69.54	-32.70	QP	
3		7.1374	18.93	14.10	33.03	69.54	-36.51	QP	

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

Test Mode: TX N20 MODE CHANNEL 06 _Hisi

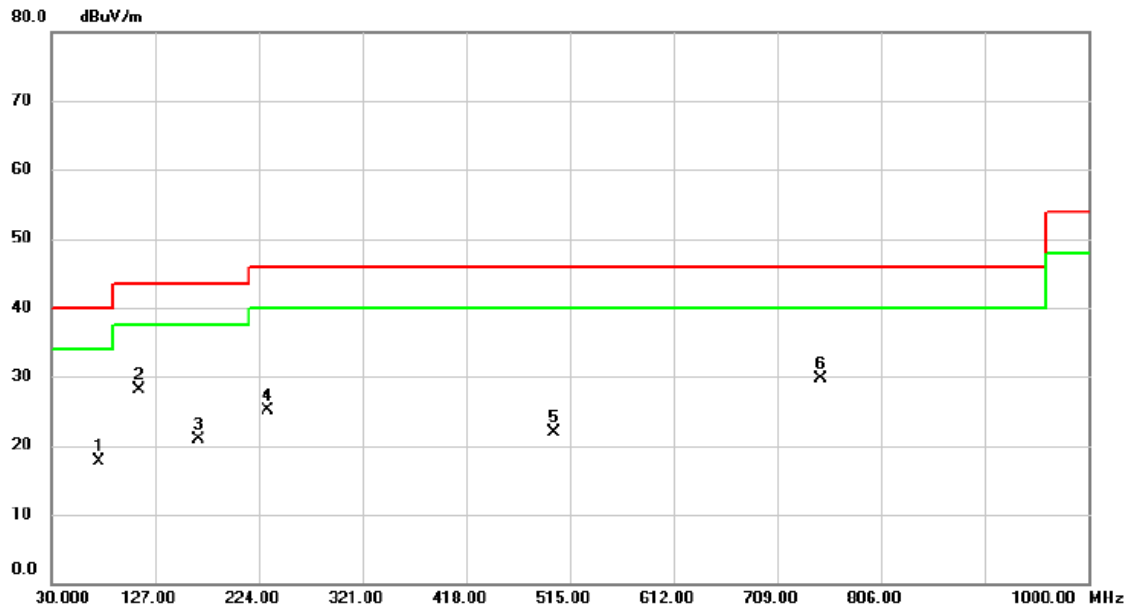
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	59.100	45.09	-14.22	30.87	40.00	-9.13	peak	
2		77.530	45.28	-17.66	27.62	40.00	-12.38	peak	
3		107.600	45.65	-16.50	29.15	43.50	-14.35	peak	
4		170.650	36.39	-12.31	24.08	43.50	-19.42	peak	
5		233.700	36.26	-14.22	22.04	46.00	-23.96	peak	
6		315.180	31.18	-12.56	18.62	46.00	-27.38	peak	

Test Mode: TX N20 MODE CHANNEL 06_Hisi

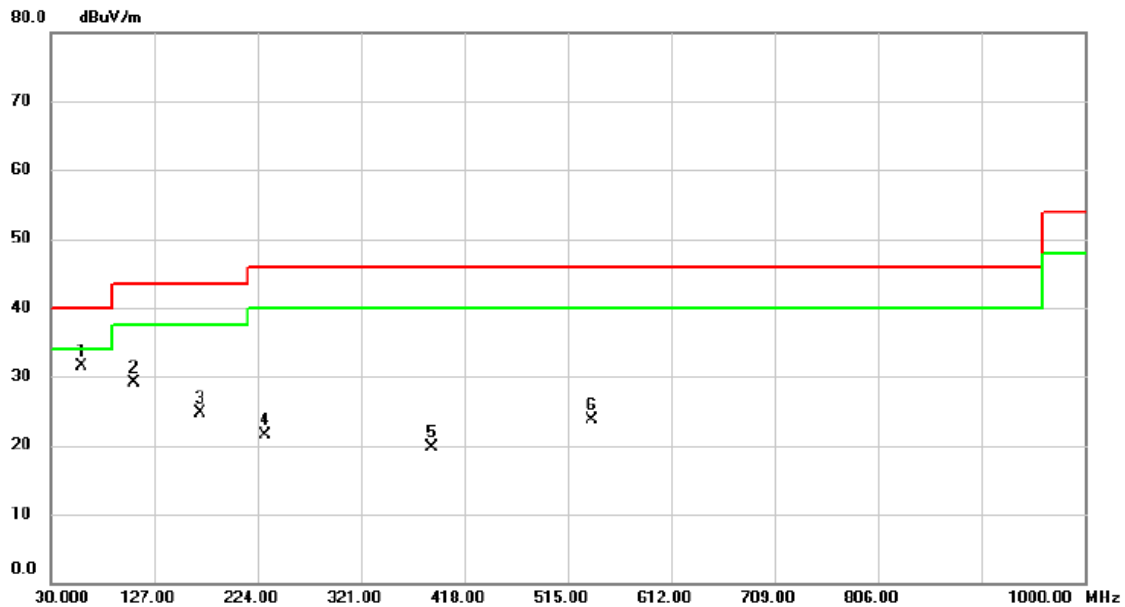
Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		74.620	34.68	-17.03	17.65	40.00	-22.35	peak	
2	*	111.480	44.10	-16.08	28.02	43.50	-15.48	peak	
3		167.740	33.38	-12.47	20.91	43.50	-22.59	peak	
4		232.730	39.28	-14.19	25.09	46.00	-20.91	peak	
5		499.480	30.57	-8.73	21.84	46.00	-24.16	peak	
6		749.740	32.13	-2.46	29.67	46.00	-16.33	peak	

Test Mode: TX N20 MODE CHANNEL 06 _Repeater

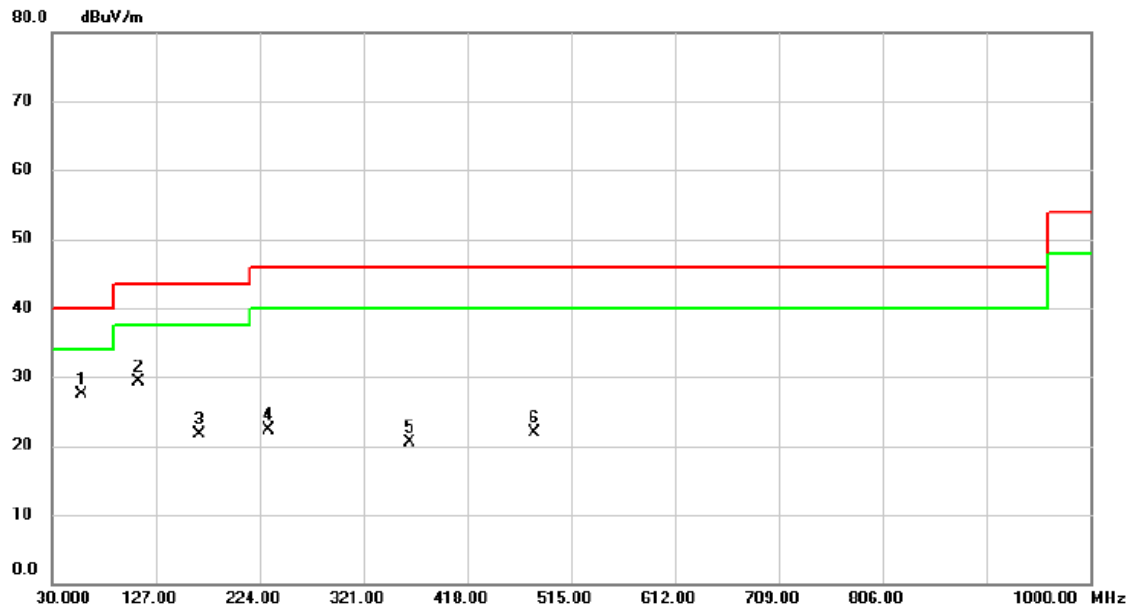
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	59.100	45.70	-14.22	31.48	40.00	-8.52	peak	
2		108.570	45.48	-16.38	29.10	43.50	-14.40	peak	
3		170.650	37.06	-12.31	24.75	43.50	-18.75	peak	
4		230.790	35.67	-14.14	21.53	46.00	-24.47	peak	
5		386.960	31.29	-11.51	19.78	46.00	-26.22	peak	
6		537.310	31.76	-7.98	23.78	46.00	-22.22	peak	

Test Mode: TX N20 MODE CHANNEL 06_Repeater

Horizontal

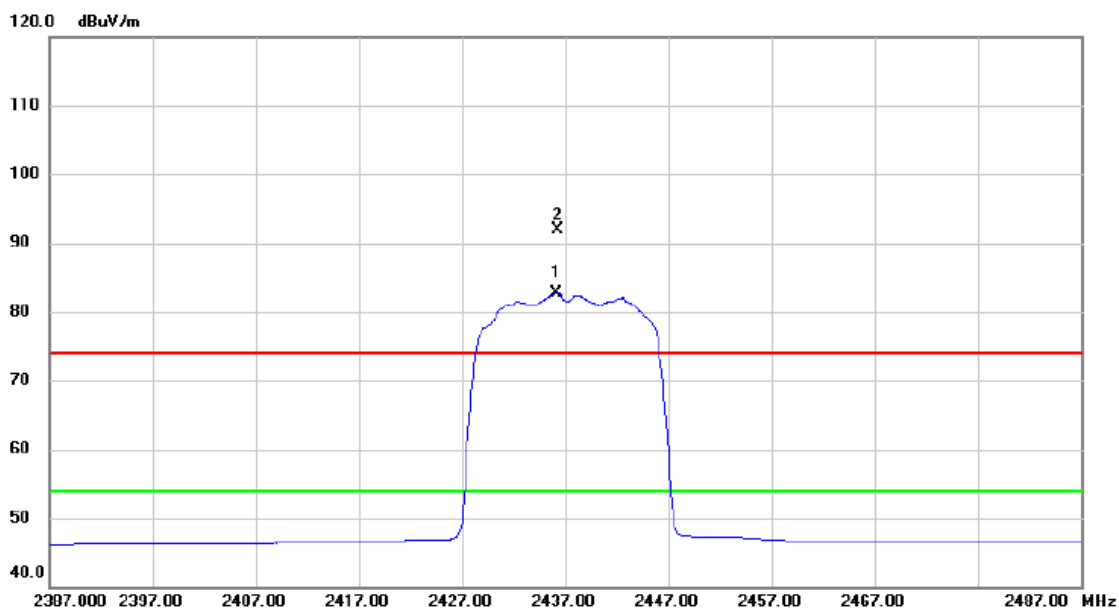


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	58.130	41.66	-14.13	27.53	40.00	-12.47	peak	
2		110.510	45.39	-16.15	29.24	43.50	-14.26	peak	
3		167.740	34.17	-12.47	21.70	43.50	-21.80	peak	
4		231.760	36.54	-14.17	22.37	46.00	-23.63	peak	
5		364.650	32.31	-11.77	20.54	46.00	-25.46	peak	
6		480.080	31.08	-9.21	21.87	46.00	-24.13	peak	

APPENDIX D - RADIATED EMISSION (ABOVE 1000MHZ)

Orthogonal Axis :	X
Test Mode :	TX N-20M MODE 2437MHz-Hisi

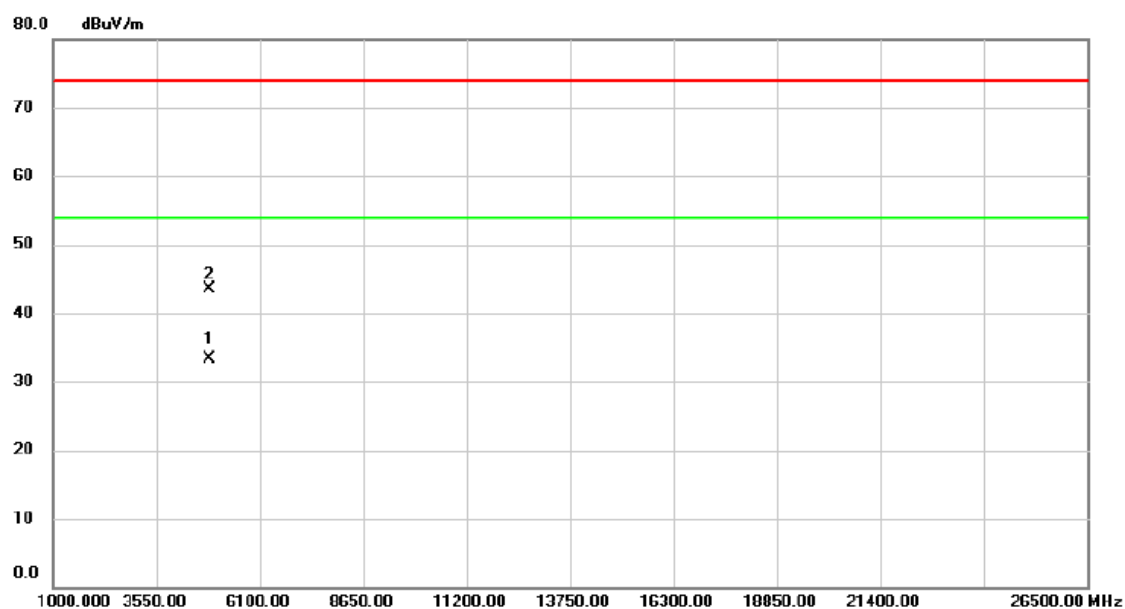
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	2436.200	49.52	33.23	82.75	54.00	28.75	AVG	No Limit
2	X	2436.324	58.73	33.23	91.96	74.00	17.96	peak	No Limit

Orthogonal Axis :	X
Test Mode :	TX N-20M MODE 2437MHz-Hisi

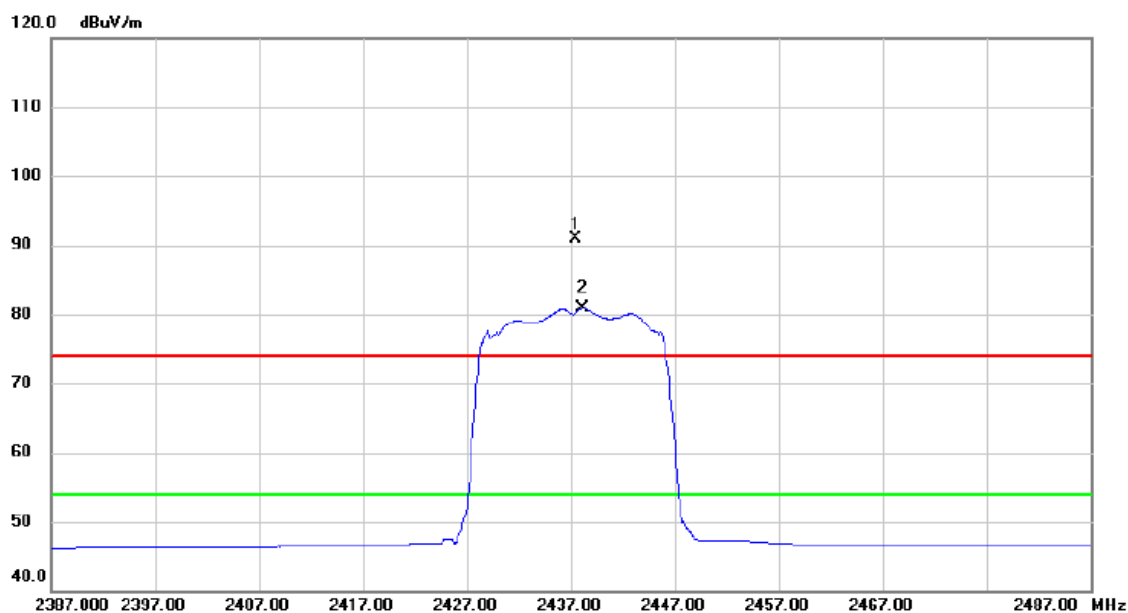
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	4874.316	26.53	6.83	33.36	54.00	-20.64	AVG	
2		4874.742	36.65	6.83	43.48	74.00	-30.52	peak	

Orthogonal Axis :	X
Test Mode :	TX N-20M MODE 2437MHz-Hisi

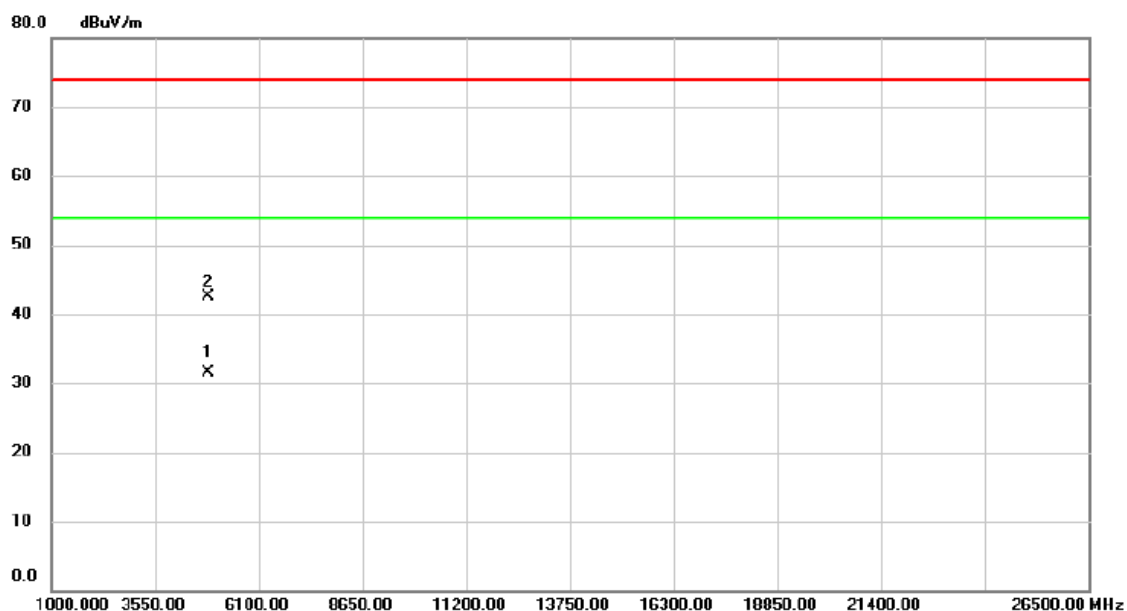
Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	X	2437.400	57.72	33.24	90.96	74.00	16.96	peak	No Limit
2	*	2438.200	47.59	33.24	80.83	54.00	26.83	AVG	No Limit

Orthogonal Axis :	X
Test Mode :	TX N-20M MODE 2437MHz-Hisi

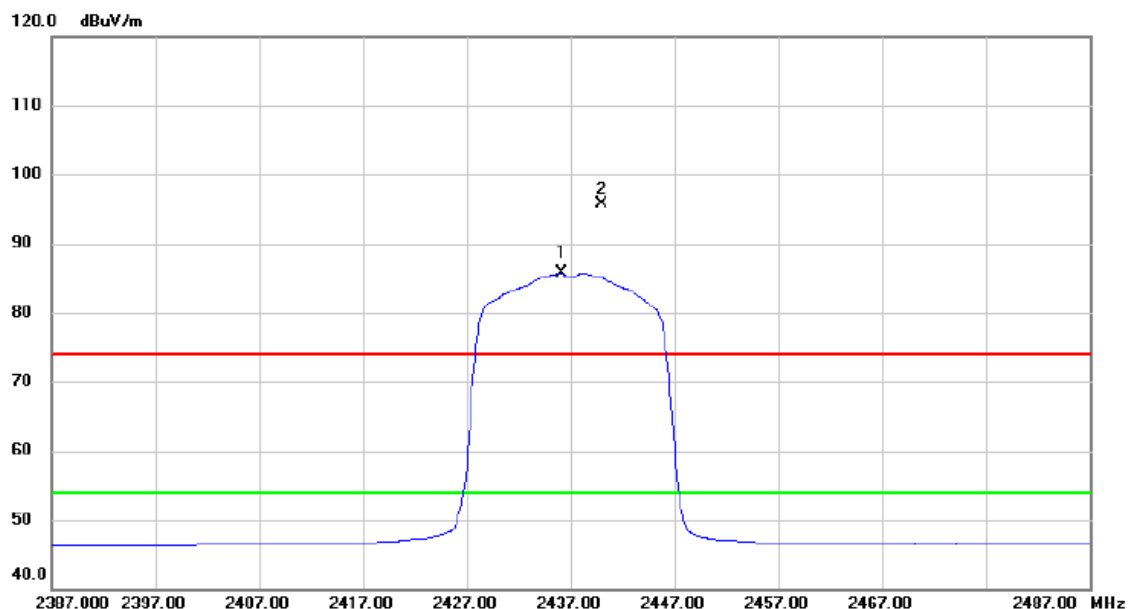
Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	4873.870	24.74	6.83	31.57	54.00	-22.43	AVG	
2		4874.615	35.67	6.83	42.50	74.00	-31.50	peak	

Orthogonal Axis :	X
Test Mode :	TX N-20M MODE 2437MHz-Repeater

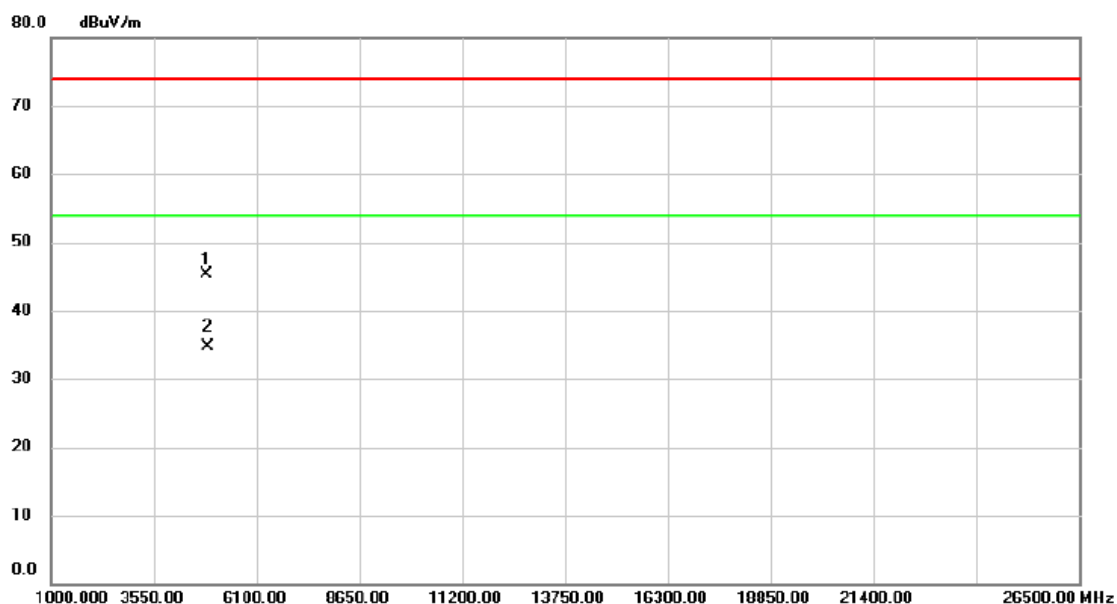
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	2436.100	52.51	33.23	85.74	54.00	31.74	AVG	No Limit
2	X	2440.000	62.40	33.24	95.64	74.00	21.64	peak	No Limit

Orthogonal Axis :	X
Test Mode :	TX N-20M MODE 2437MHz-Repeater

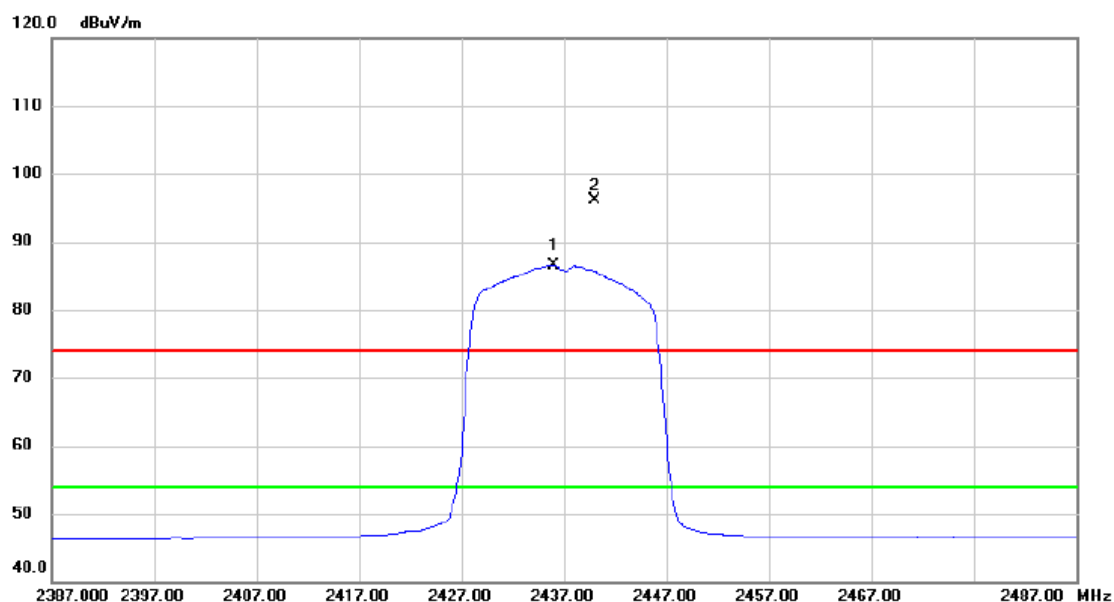
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		4874.620	38.43	6.83	45.26	74.00	-28.74	peak	
2	*	4879.460	27.81	6.86	34.67	54.00	-19.33	AVG	

Orthogonal Axis :	X
Test Mode :	TX N-20M MODE 2437MHz-Repeater

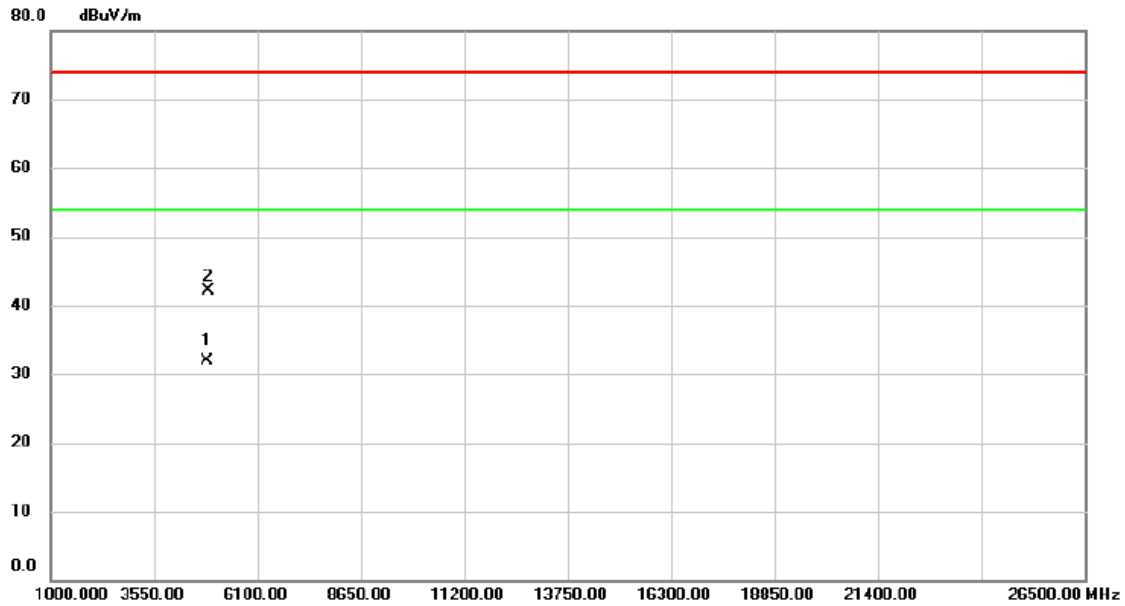
Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	2436.000	53.34	33.23	86.57	54.00	32.57	AVG	No Limit
2	X	2440.000	62.93	33.24	96.17	74.00	22.17	peak	No Limit

Orthogonal Axis :	X
Test Mode :	TX N-20M MODE 2437MHz-Repeater

Horizontal



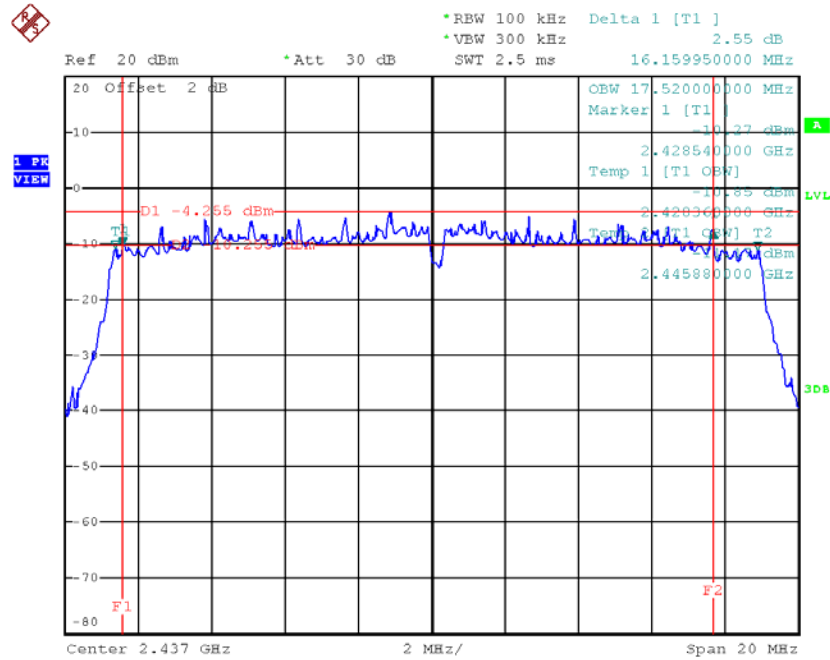
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	4874.130	25.03	6.83	31.86	54.00	-22.14	AVG	
2		4876.550	35.20	6.85	42.05	74.00	-31.95	peak	

APPENDIX E - BANDWIDTH

Test Mode : TX N-20MHz Mode_06-Hisi

Frequency (MHz)	6dB Bandwidth (MHz)	99% Occupied BW (MHz)	Min. Limit (kHz)	Test Result
2437	16.16	17.52	500	Complies

TX CH06

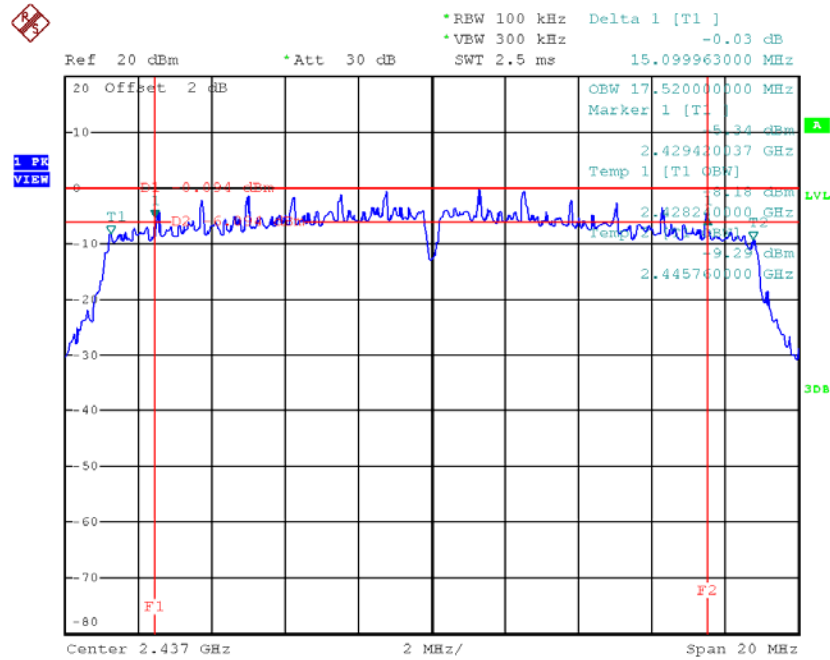


Date: 8.NOV.2017 10:25:02

Test Mode : TX N-20MHz Mode_06-Repeater

Frequency (MHz)	6dB Bandwidth (MHz)	99% Occupied BW (MHz)	Min. Limit (kHz)	Test Result
2437	15.10	17.52	500	Complies

TX CH06



Date: 8.NOV.2017 10:30:18

APPENDIX F - MAXIMUM PEAK CONDUCTED OUTPUT POWER

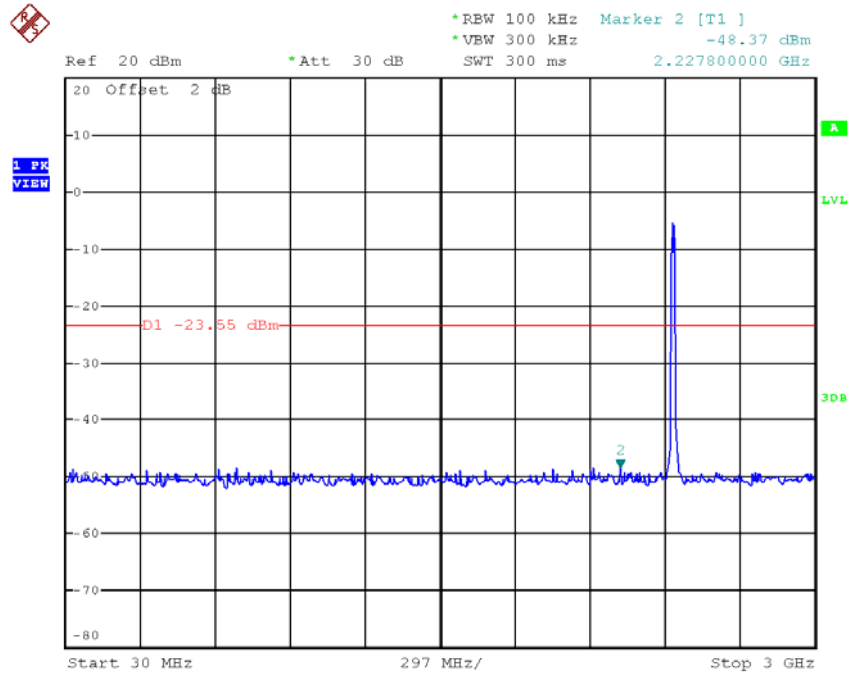
Test Mode :TX N20 Mode_06_Hisi					
Frequency (MHz)	Conducted Power (dBm)	Conducted Power (W)	Max. Limit (dBm)	Max. Limit (W)	Result
2437	16.18	0.0415	30.00	1.00	Complies

Test Mode :TX N20 Mode_06_Repeater					
Frequency (MHz)	Conducted Power (dBm)	Conducted Power (W)	Max. Limit (dBm)	Max. Limit (W)	Result
2437	18.44	0.0698	30.00	1.00	Complies

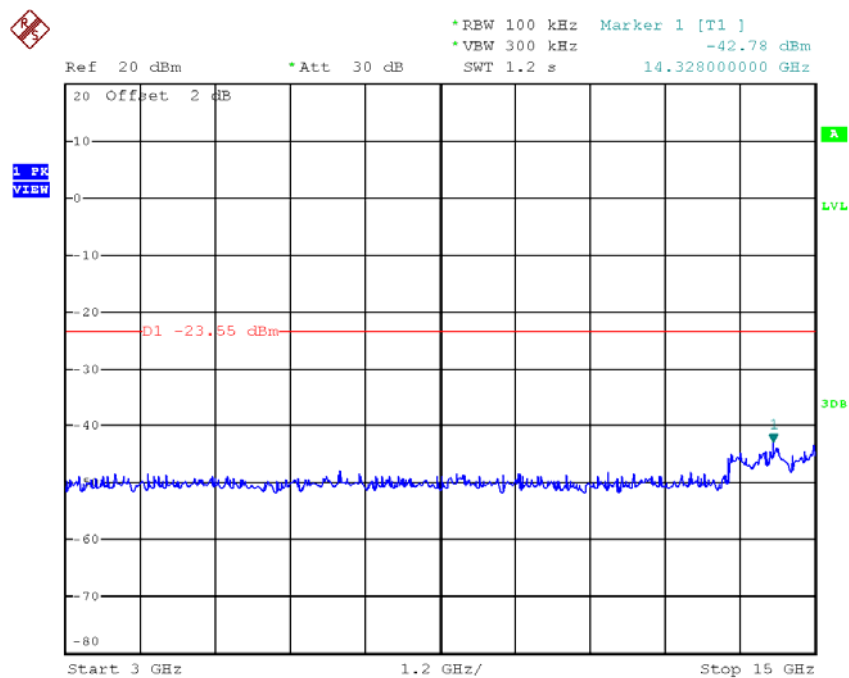
APPENDIX G - ANTENNA CONDUCTED SPURIOUS EMISSION

Test Mode : TX N-20M Mode_Hisi

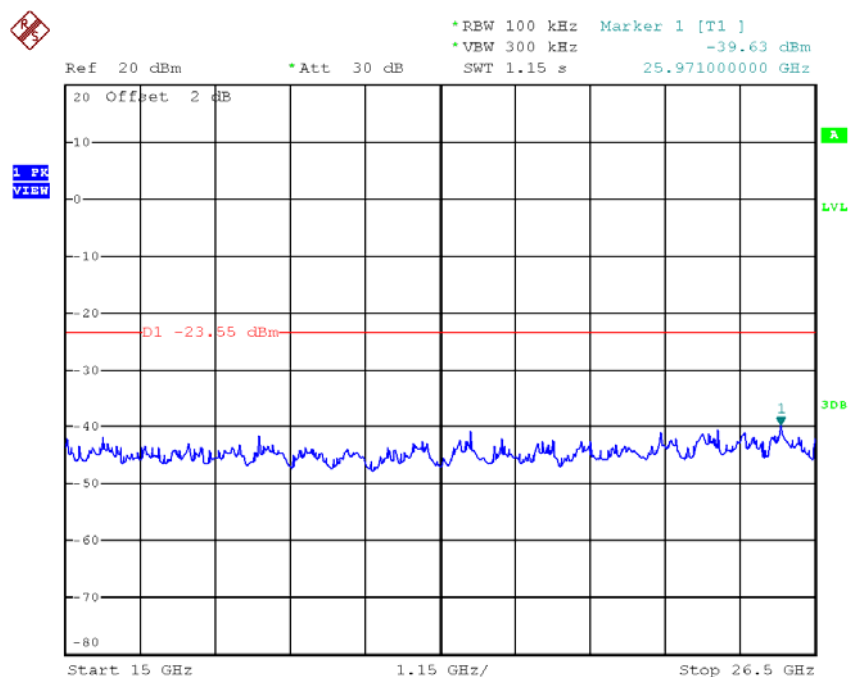
TX HT20 mode CH06 (10 Harmonic of the frequency)



Date: 8.NOV.2017 10:25:22



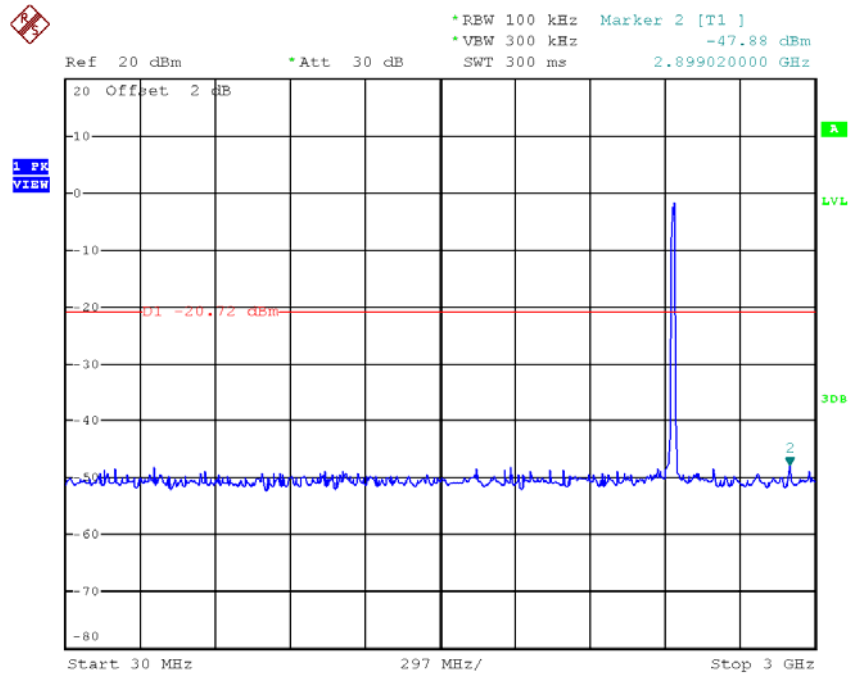
Date: 8.NOV.2017 10:25:29



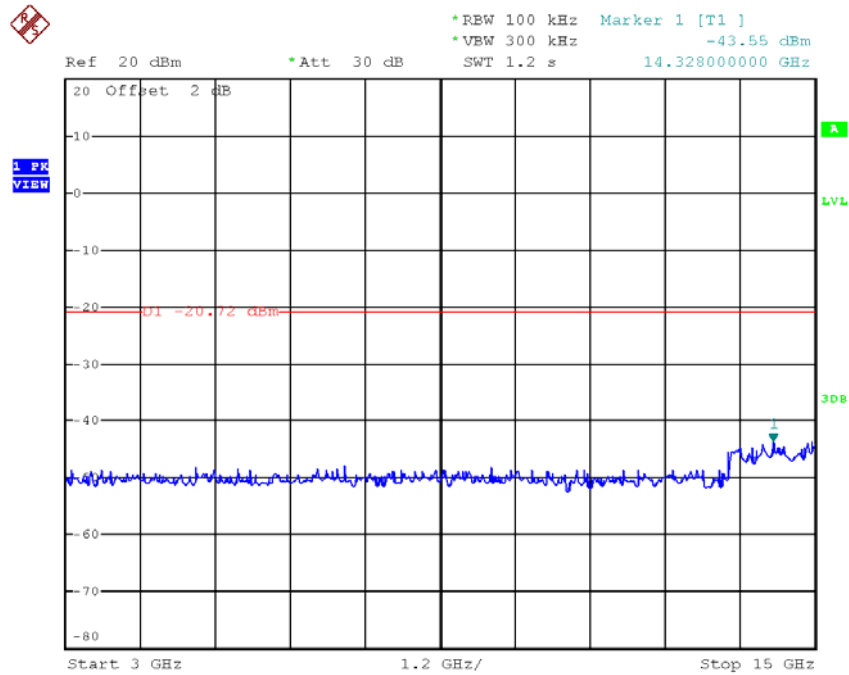
Date: 8.NOV.2017 10:25:36

Test Mode : TX N-20M Mode_Repeater

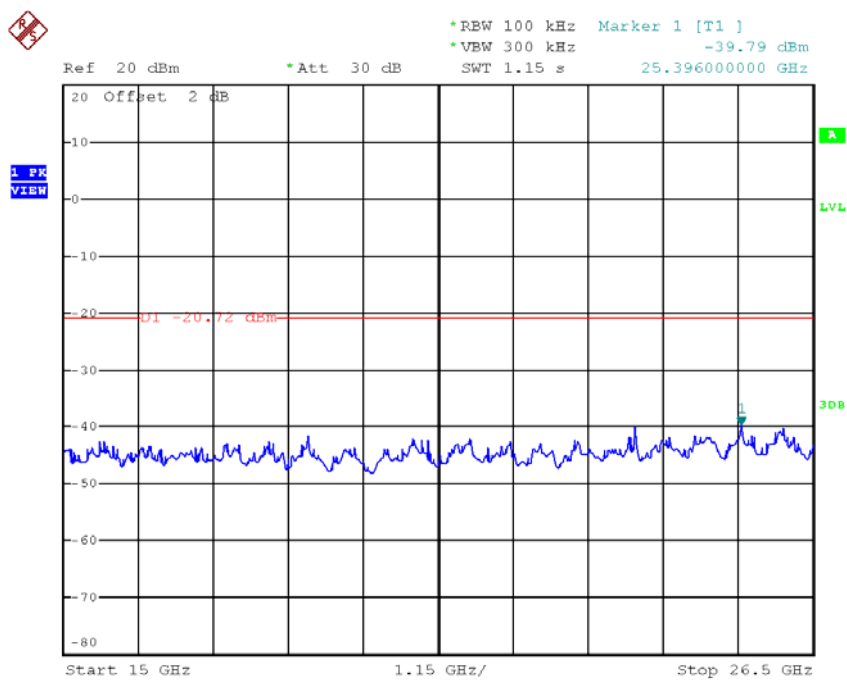
TX HT20 mode CH06 (10 Harmonic of the frequency)



Date: 8.NOV.2017 10:30:39



Date: 8.NOV.2017 10:30:46

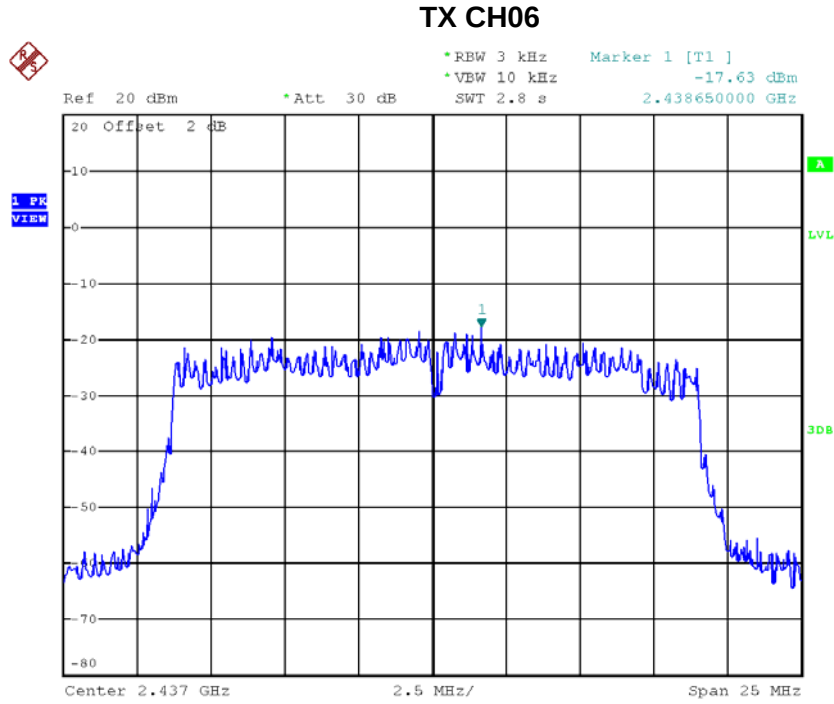


Date: 8.NOV.2017 10:30:53

APPENDIX H - POWER SPECTRAL DENSITY

Test Mode : TX N-20M Mode_06_Hisi

Frequency (MHz)	Power Density (dBm/3kHz)	Power Density (mW/3kHz)	Max. Limit (dBm/3kHz)	Result
2437	-17.63	0.02	8.00	Complies

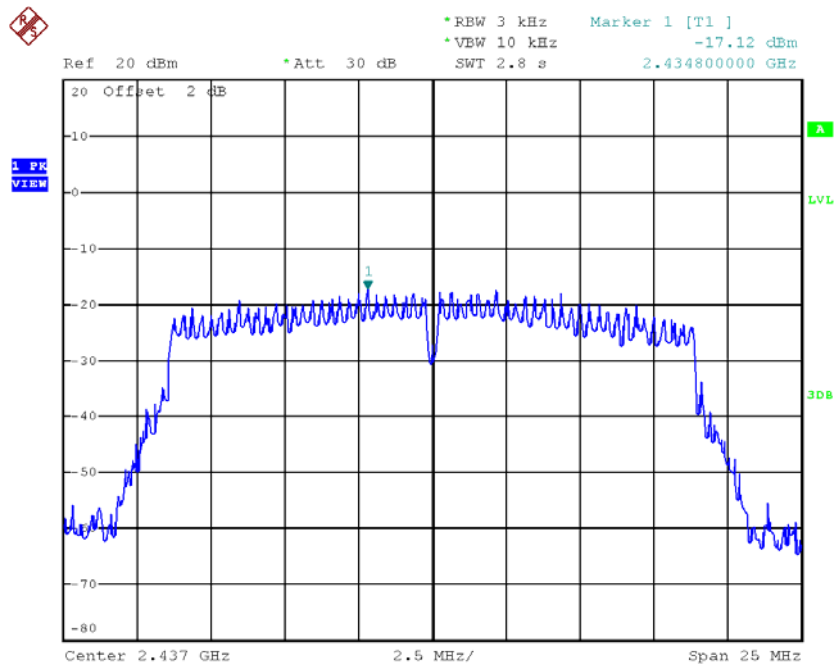


Date: 8.NOV.2017 10:25:44

Test Mode : TX N-20M Mode_06_Repeater

Frequency (MHz)	Power Density (dBm/3kHz)	Power Density (mW/3kHz)	Max. Limit (dBm/3kHz)	Result
2437	-17.12	0.02	8.00	Complies

TX CH06



Date: 8.NOV.2017 10:31:02