FCC Radio Test Report

FCC ID: 2APR6-R712W

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

Project No.	: 1805C012
Equipment	: 2.4GHz Wireless Receiver
Test Model	: R712
Series Model	: N/A
Applicant	: Shenzhen Doking Technology Co.,Ltd
Address	: 21FJiayu Building Songgang Town Baoan District Shenzhen

Date of Receipt	: May 10, 2018
Date of Test	: May 10, 2018 ~ Jun. 11, 2018
Issued Date	: Jun. 28, 2018
Tested by	: BTL Inc.

Testing Engineer : vincent.Tan
(Vincent Tan)

Technical Manager : shawn xiao
(Shawn Xiao)

Authorized Signatory : Steven Lu
(Steven Lu)

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NVLAP TESTING
NVLAP LAB CODE 200788-0

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.

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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.

BTL is not responsible for the sampling stage, so the results only apply to the sample as received.

The information, data and test plan are provided by manufacturer, so it is manufacturer's responsibility to ensure that the apparatus meets the essential requirements in all the possible configurations as representative of its intended use.

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.

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REPORT ISSUED HISTORY

Issued No.	Description	Issued Date
BTL-FCCP-1-1805C012	Original Issue.	Jun. 28, 2018

1. CERTIFICATION

Equipment	:	2.4GHz Wireless Receiver
Brand Name	:	Doking
Test Model	:	R712
Series Model	:	N/A
Applicant	:	Shenzhen Doking Technology Co.,Ltd
Manufacturer	:	Shenzhen Doking Technology Co.,Ltd
Address	:	21FJiayu Building Songgang Town Baoan District Shenzhen
Factory Address		Shenzhen Doking Technology Co.,Ltd 2/F, 3/F,BulidingA&3/F,BulidingB, Dingfeng Hi-Tech Park,Shapuwei Industrial Zone,Songgang -Town,Baoan District Shenzhen, Guangdong,China
Date of Test	:	May 10, 2018 ~ Jun. 11, 2018
Test Sample	:	Engineering Sample NO.: D180503641
Standard(s)	:	FCC Part15, Subpart C (15.249) / 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-1-1805C012) 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, Subpart C (15.249)			
Standard(s) Section	Test Item	Judgment	Remark
15.207(a)	Conducted Emission	PASS	
15.209 15.249(a)	Radiated Emissions	PASS	
15.215(c)	20dB Bandwidth Test	PASS	

NOTE:

(1)" N/A" denotes test is not applicable to this device.

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: 854385
BTL's designation number for FCC: CN5020

2.2 MEASUREMENT UNCERTAINTY

The measurement uncertainty figures shall be calculated according the methods described in the ETSI TR 100 028 and shall correspond to an expansion factor (coverage factor) k=1.96 or k=2(which provide confidence levels of respectively 90% and 95.45% in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)). Measurement Uncertainty for a Level of Confidence of 95 %, U=2xUc(y).

The BTL measurement uncertainty as below table:

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 DESCRIPTION OF EUT

Equipment	2.4GHz Wireless Receiver	
Brand Name	Doking	
Test Model	R712	
Series Model	N/A	
Model Difference	N/A	
Product Description	Operation Frequency	2410 ~ 2473 MHz
	Modulation Technology	GFSK
	Bit Rate of Transmitter	1 Mbps
	Field Strength	92.65 dBuV/m (Peak Max) 79.02 dBuV/m (AVG Max)
Power Source	Supplied from USB port.	
EUT Power Rating	DC 5V	

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	Frequenc (MHz)	Channel	Frequency (MHz)
00	2410	01	2442	02	2473

3. Table for Filed Antenna

Ant.	Brand	P/N	Antenna Type	Connector	Gain (dBi)
1	N/A	N/A	PCB	N/A	0

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

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

For Conducted Test	
Final Test Mode	Description
Mode 1	TX Mode

For Radiated Test	
Final Test Mode	Description
Mode 1	TX Mode **NOTE (1)**

Note:

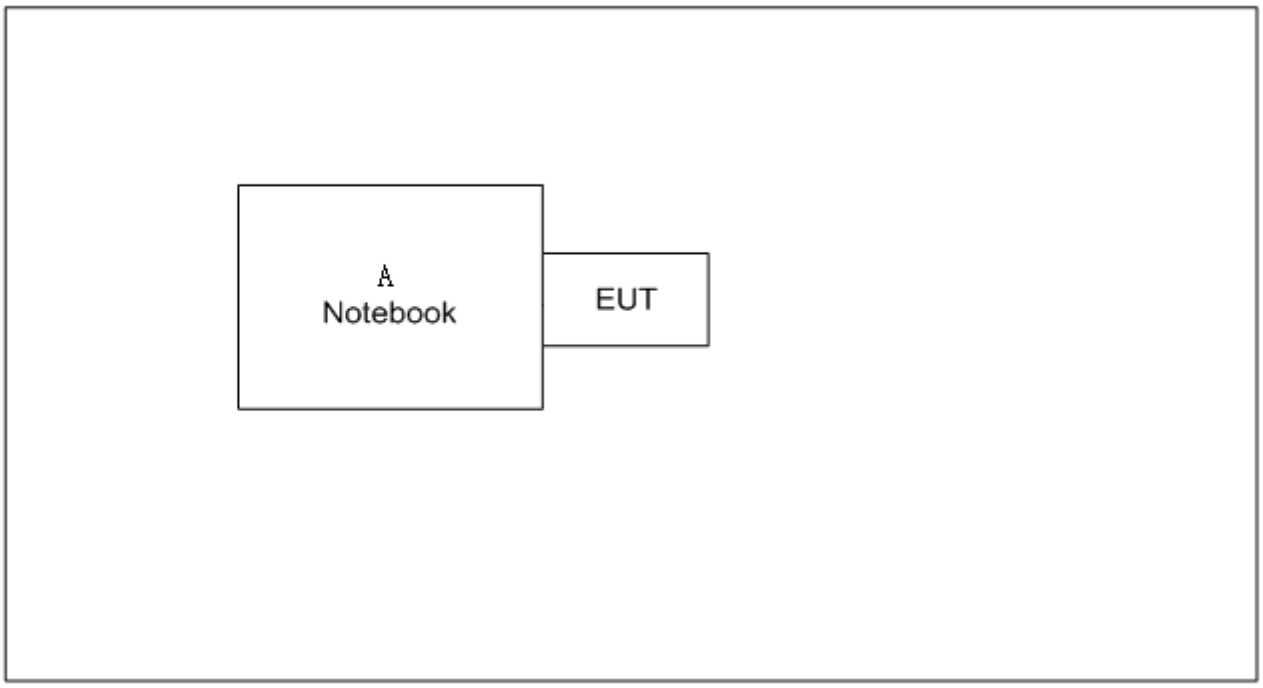
(1) The measurements are performed at the high, middle, low available channels.

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 FHSS

Test Software Version	RF Measure Tool		
Frequency (MHz)	2410	2442	2473
Parameters	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.
A	Notebook	Lenovo	E40	DOC	EB22953770

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

Note:
(1) The support equipment was authorized by Declaration of Conformity (DOC).

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 - Amplifier Gain(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

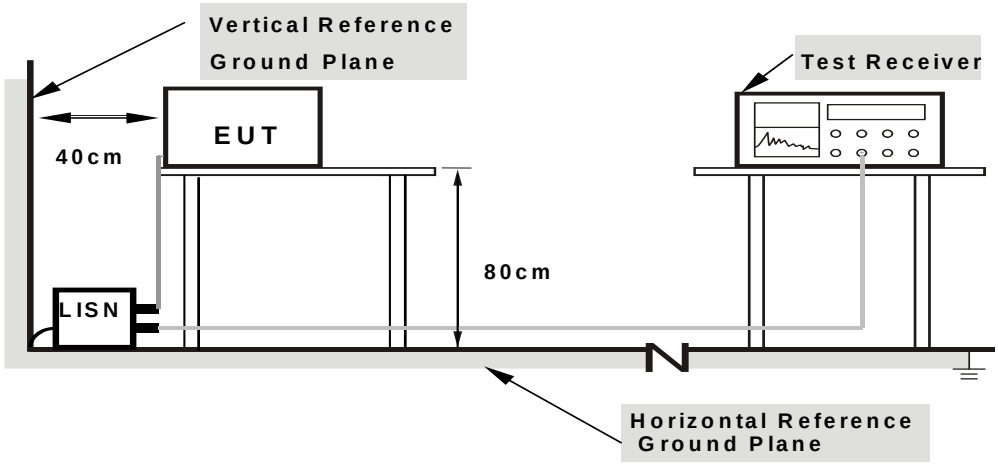
4.1.2 TEST PROCEDURE

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 configured for testing in a typical function (as a customer would normally use it), EUT was programmed to be in continuously transmitting/receiving data or hopping on mode.

4.1.6 EUT TEST CONDITIONS

Temperature: 25°C
Relative Humidity: 53%
Test Voltage: 120V

4.1.7 TEST RESULTS

Please refer to the Appendix 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.
(3) " N/A" denotes test is not applicable to this device.

4.2 RADIATED EMISSION MEASUREMENT

4.2.1 RADIATED EMISSION LIMITS (FCC 15.209)

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
960~1000	500	3

Harmonic emissions limits comply with below 54 dBuV/m at 3m. Other emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or comply with the radiated emissions limits specified in section15.209(a) limit in the table below has to be followed.

Note:

(1) The tighter limit applies at the band edges.

(2) Emission level (dBuV/m)=20log Emission level (uV/m).

LIMITS OF RADIATED EMISSION MEASUREMENT (FCC 15.209)

FREQUENCY (MHz)	(dBuV/m) (at 3m)	
	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).

LIMITS OF RADIATED EMISSION MEASUREMENT (FCC Part 15.249)

FCC Part15 (15.249) , Subpart C	
Limit	Frequency Range(MHz)
Field strength of fundamental 50000 μV/m (94 dBμV/m) @ 3 m	2400-2483.5
Field strength of harmonics 500 μV/m (54 dBμV/m) @ 3 m	Above 2483.5

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic

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

DWELL TIME OF PERIODIC OPERATION MEASUREMENT

Duty Cycle = On Time/Total Time

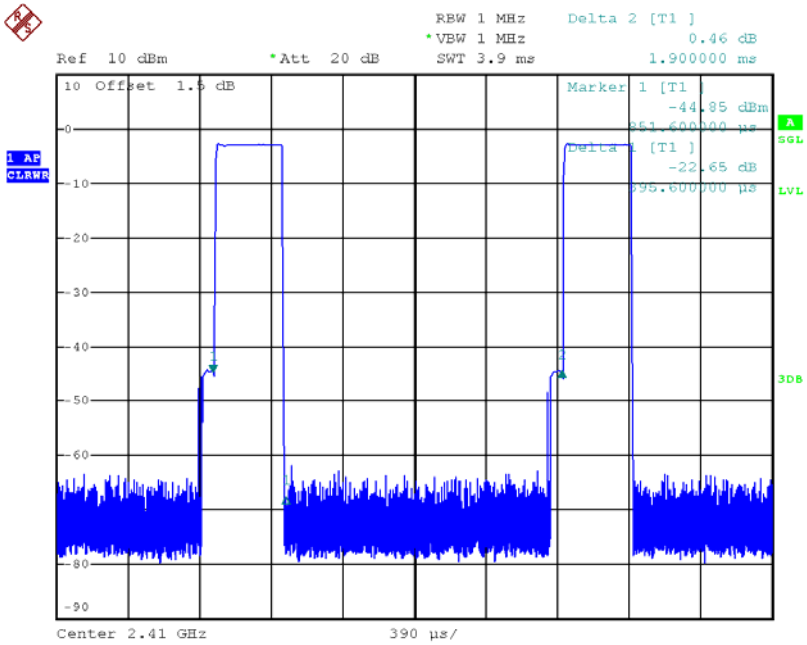
T_{ON}: 0.3956 ms

T_{TOTAL}: 1.9 ms

Duty Cycle = 0.2082/100%=20.82%

Average Reading = Peak value + 20log (Duty cycle) , AV=Peak-13.63

On Time & Total Time



4.2.2 TEST PROCEDURE

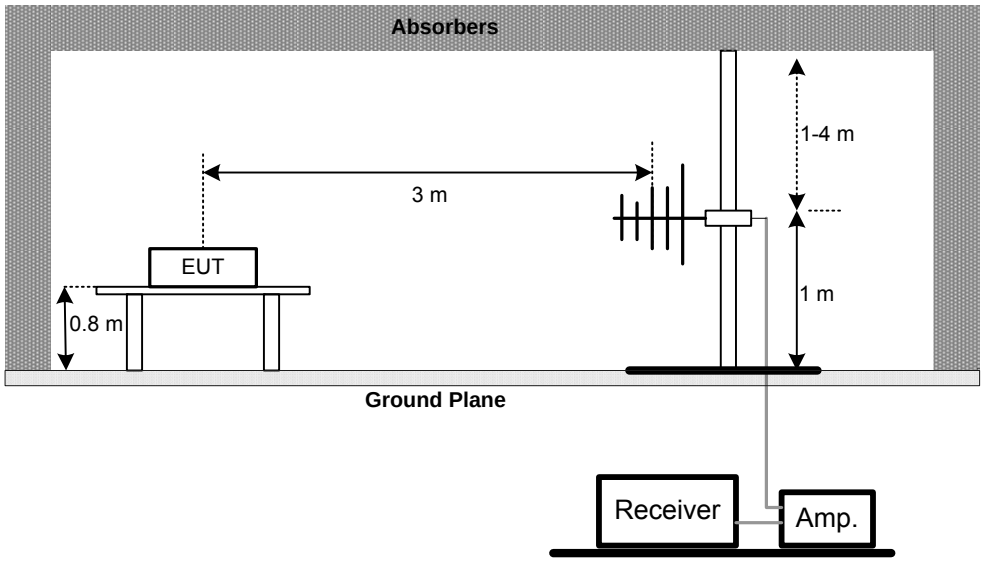
a. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
b. The measuring distance 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)
c. The height of the equipment or of the substitution antenna shall be 0.8 m or 1.5m, the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. 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).
e. 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.
f. 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.
g. 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)
h. 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)
i. For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.2.3 DEVIATION FROM TEST STANDARD

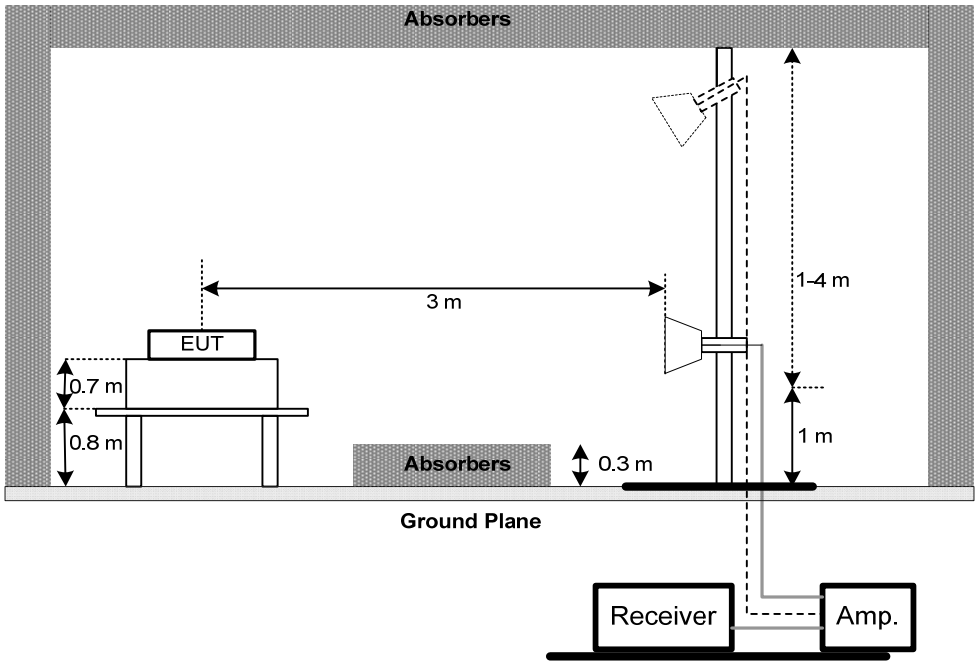
No deviation

4.2.4 TEST SETUP

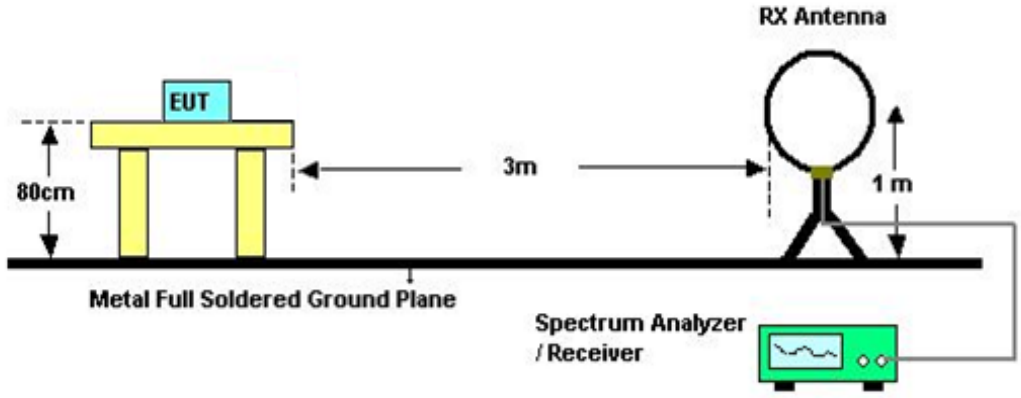
(A) Radiated Emission Test Set-Up Frequency Below 1 GHz



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



(C) For radiated emissions below 30MHz



4.2.5 EUT OPERATING CONDITIONS

The EUT 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: 60%
Test Voltage: DC 5V

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 (specific distance / 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.

Remark:

(1) Measuring frequency range from 30MHz to 1000MHz.
(2) If the peak scan value lower limit more than 20dB, then this signal data does not show in table.

4.2.9TEST RESULTS (ABOVE 1000 MHZ)

Please refer to the Appendix D.

Remark:

(1) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission

(2) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

(3) EUT Orthogonal Axis:
"X" - denotes Laid on Table, "Y" - denotes Vertical Stand, "Z" - denotes Side Stand

(4) During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna

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

5. BANDWIDTH TEST

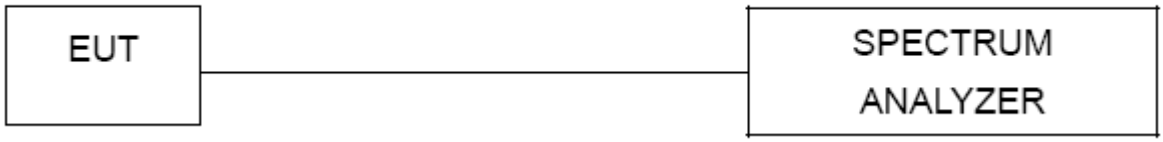
5.1 TEST PROCEDURE

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

5.2 DEVIATION FROM STANDARD

No deviation.

5.3 TEST SETUP



5.4 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

5.5 EUT TEST CONDITIONS

Temperature: 25°C
Relative Humidity: 60%
Test Voltage: DC 5V

5.6 TEST RESULTS

Please refer to the Appendix E.

6. MEASUREMENT INSTRUMENTS LIST

Conducted Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	EMI Test Receiver	R&S	ESCI	100382	Mar. 11, 2019
2	LISN	EMCO	3816/2	52765	Mar. 11, 2019
3	50Ω Terminator	SHX	TF2-3G-A	8122901	Mar. 11, 2019
4	TWO-LINE V-NETWORK	R&S	ENV216	101447	Mar. 11, 2019
5	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
6	Cable	N/A	RG223	12m	Oct. 19, 2018

Radiated Emission Below 1GHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Antenna	Schwarbeck	VULB9160	9160-3232	Mar. 11, 2019
2	Amplifier	HP	8447D	2944A09673	Oct. 19, 2018
3	Receiver	Agilent	N9038A	MY52130039	Aug. 20, 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
8	Antenna	EM	EM-6876-1	230	Mar. 05, 2019

Radiated Emission Above 1GHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Double Ridged Guide Antenna	ETS	3115	75789	Mar. 11, 2019
2	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170319	Mar. 11, 2019
3	Amplifier	Agilent	8449B	3008A02274	Mar. 11, 2019
4	Microwave Preamplifier With Adaptor	EMC INSTRUMENT	EMC2654045	980039 & HA01	Mar. 11, 2019
5	Receiver	Agilent	N9038A	MY52130039	Aug. 20, 2018
6	Antenna	EM	EM-6876-1	230	Mar. 11, 2019
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

Bandwidth Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Aug. 20, 2018

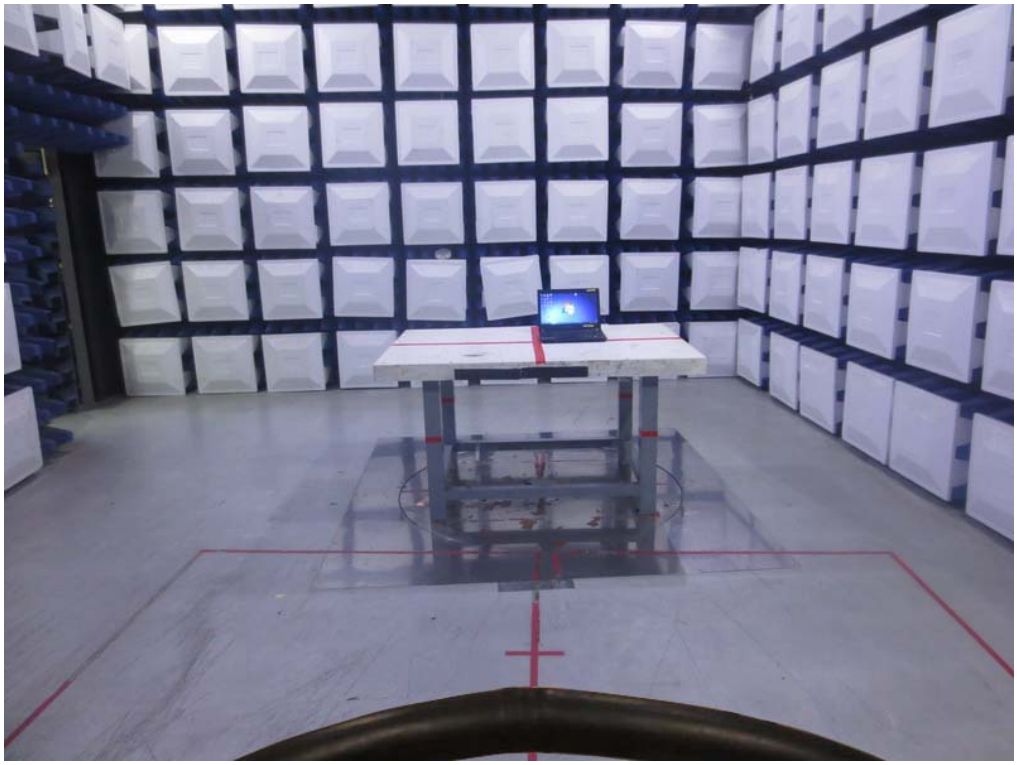
Remark: ”N/A” denotes no model name, serial no. or calibration specified.
All calibration period of equipment list is one year.

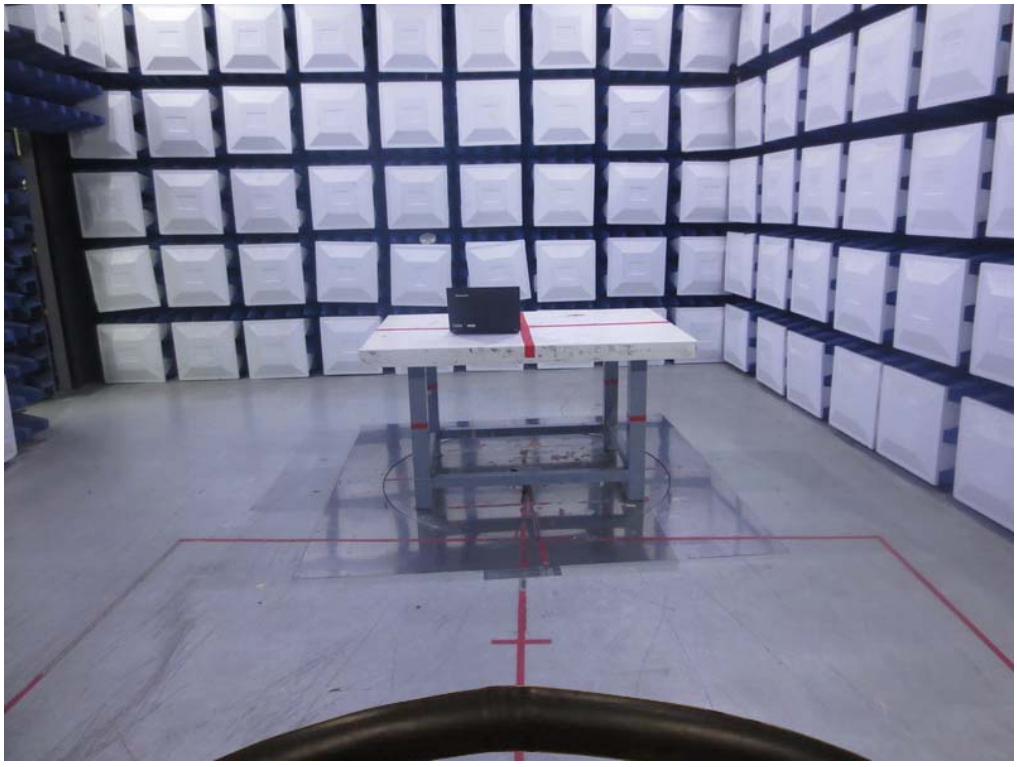
7. EUT TEST PHOTO

Conducted Measurement Photos

Radiated Measurement Photos

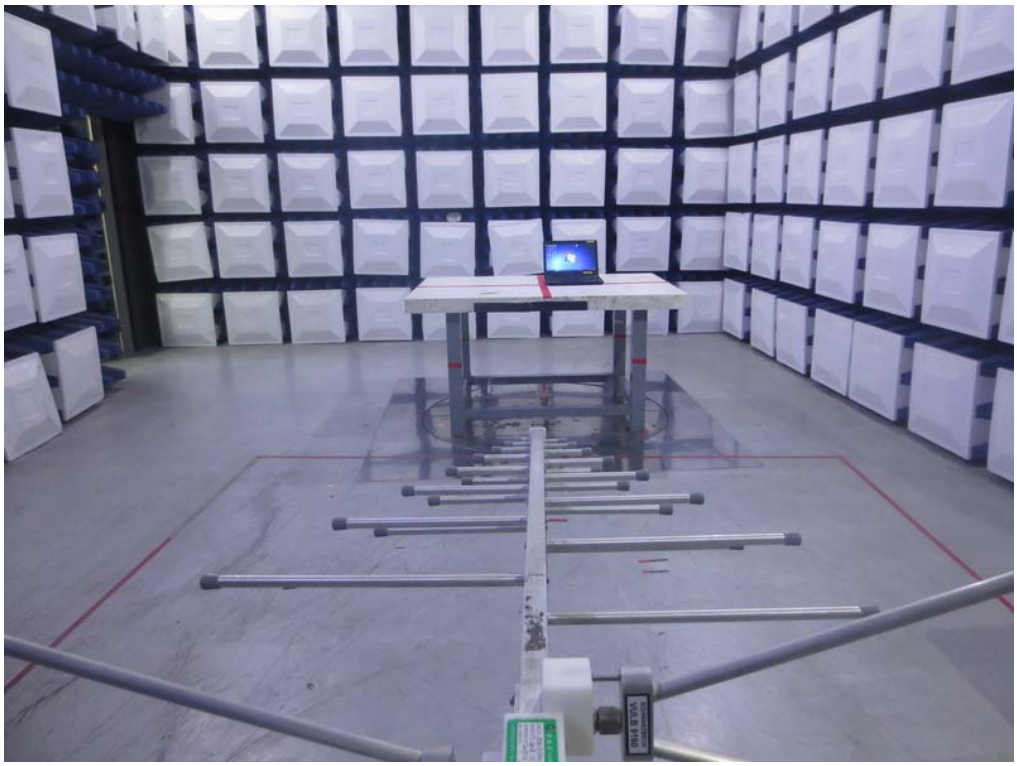
9KHz to 30MHz

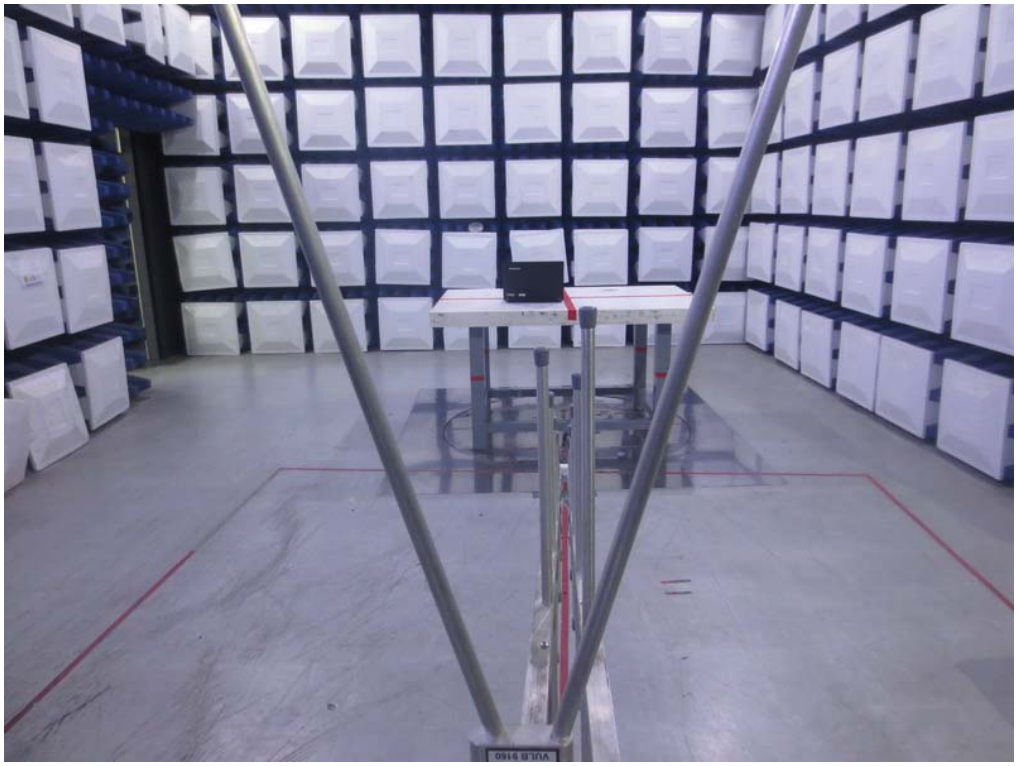




Radiated Measurement Photos

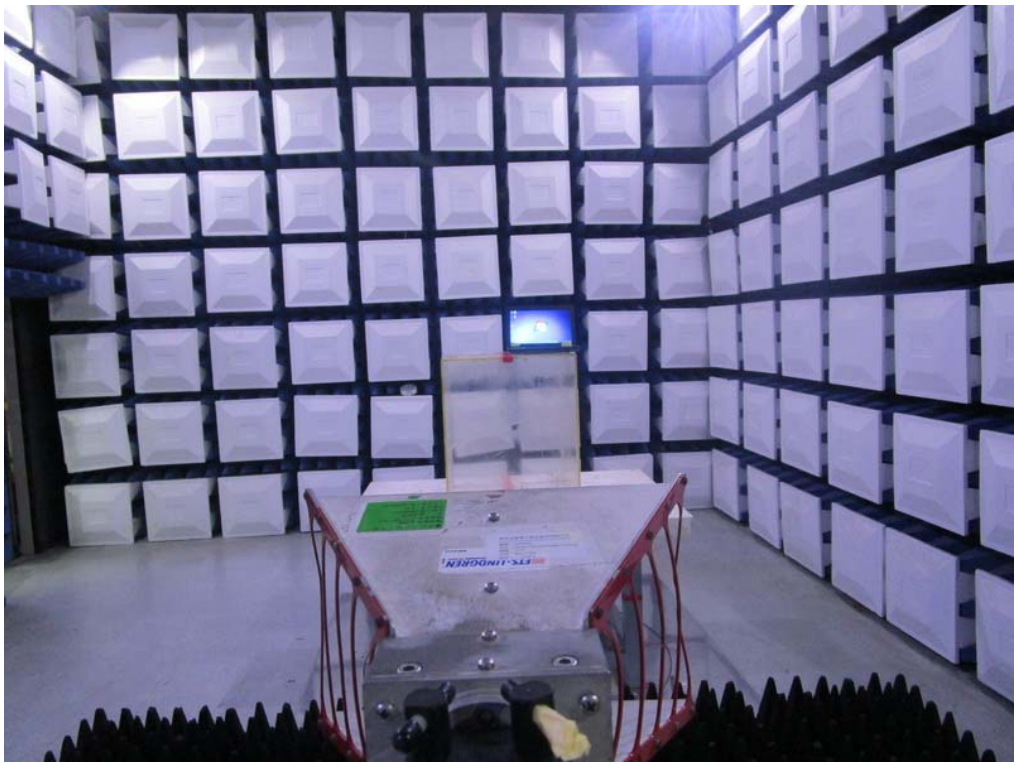
30MHz to 1000MHz

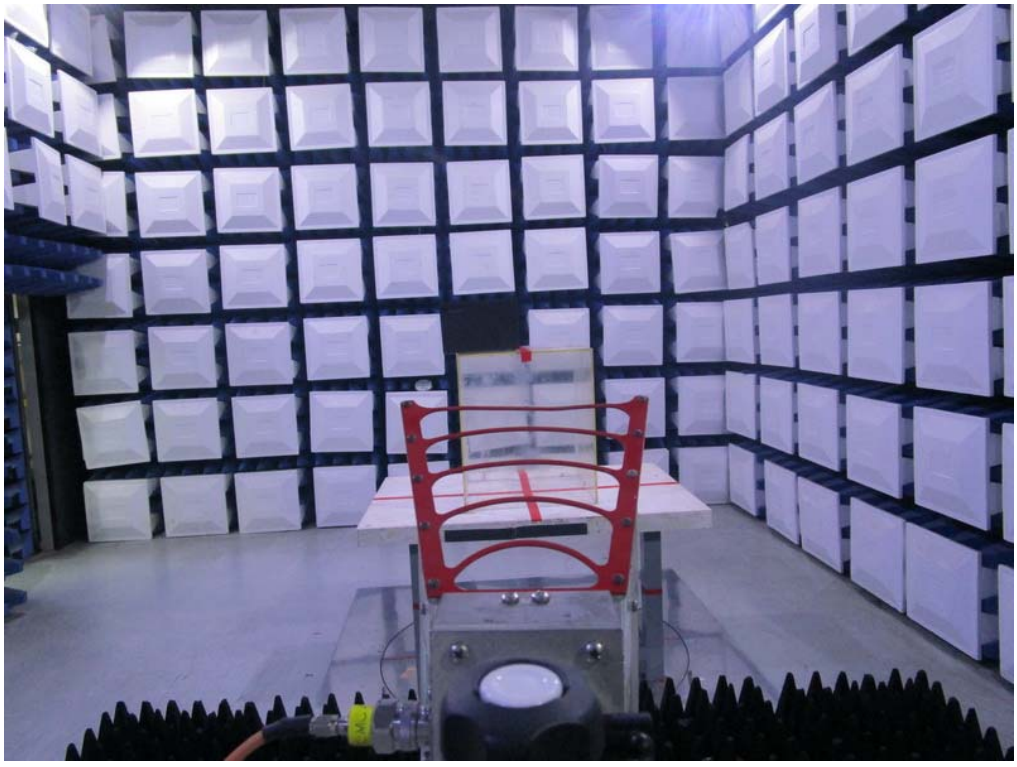




Radiated Measurement Photos

Above 1000MHz

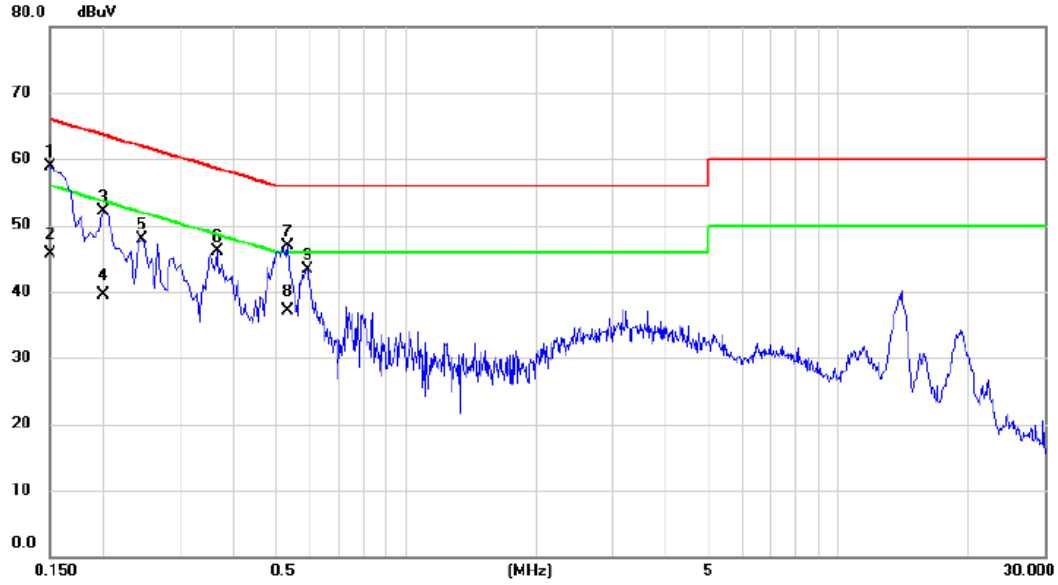




APPENDIX A - CONDUCTED EMISSION

Test Mode:	TX MODE

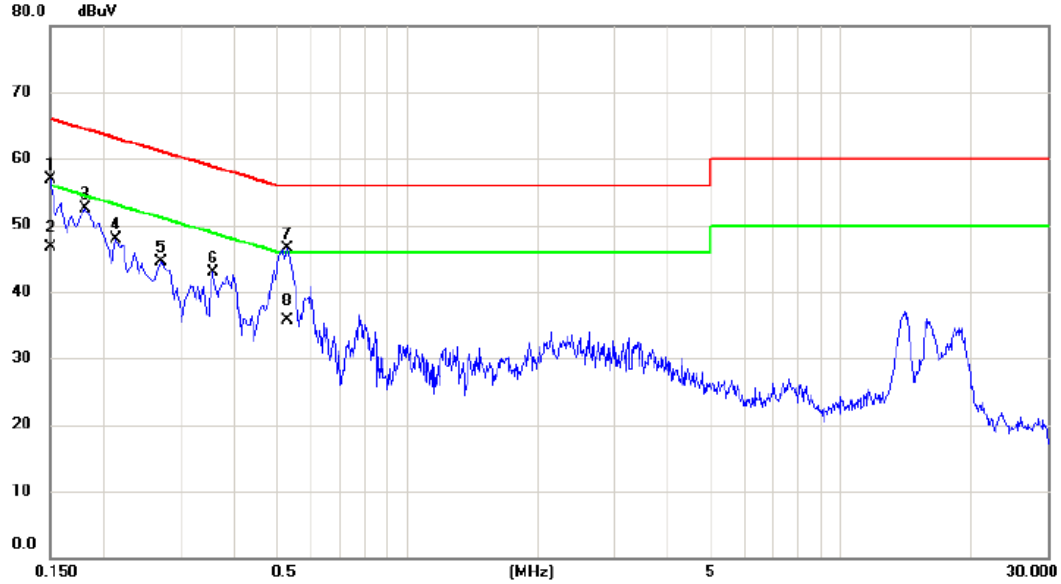
Line



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.1500	49.10	9.82	58.92	66.00	-7.08	peak	
2		0.1500	35.80	9.82	45.62	56.00	-10.38	AVG	
3		0.1995	42.23	9.82	52.05	63.63	-11.58	peak	
4		0.1995	29.70	9.82	39.52	53.63	-14.11	AVG	
5		0.2445	38.14	9.82	47.96	61.94	-13.98	peak	
6		0.3660	36.20	9.81	46.01	58.59	-12.58	peak	
7		0.5325	37.01	9.80	46.81	56.00	-9.19	peak	
8		0.5325	27.30	9.80	37.10	46.00	-8.90	AVG	
9		0.5910	33.38	9.83	43.21	56.00	-12.79	peak	

Test Mode:	TX MODE

Neutral

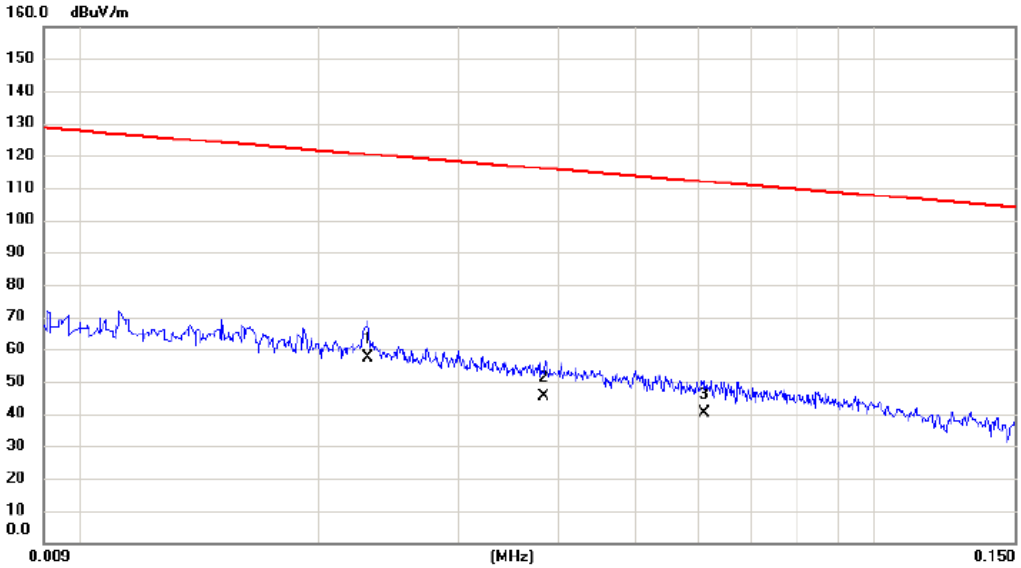


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.1500	47.02	9.91	56.93	66.00	-9.07	peak	
2		0.1500	36.80	9.91	46.71	56.00	-9.29	AVG	
3		0.1815	42.50	9.92	52.42	64.42	-12.00	peak	
4		0.2130	37.89	9.92	47.81	63.09	-15.28	peak	
5		0.2714	34.65	9.93	44.58	61.07	-16.49	peak	
6		0.3570	32.95	9.95	42.90	58.80	-15.90	peak	
7		0.5280	36.52	9.95	46.47	56.00	-9.53	peak	
8		0.5280	25.70	9.95	35.65	46.00	-10.35	AVG	

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

Test Mode:	TX MODE

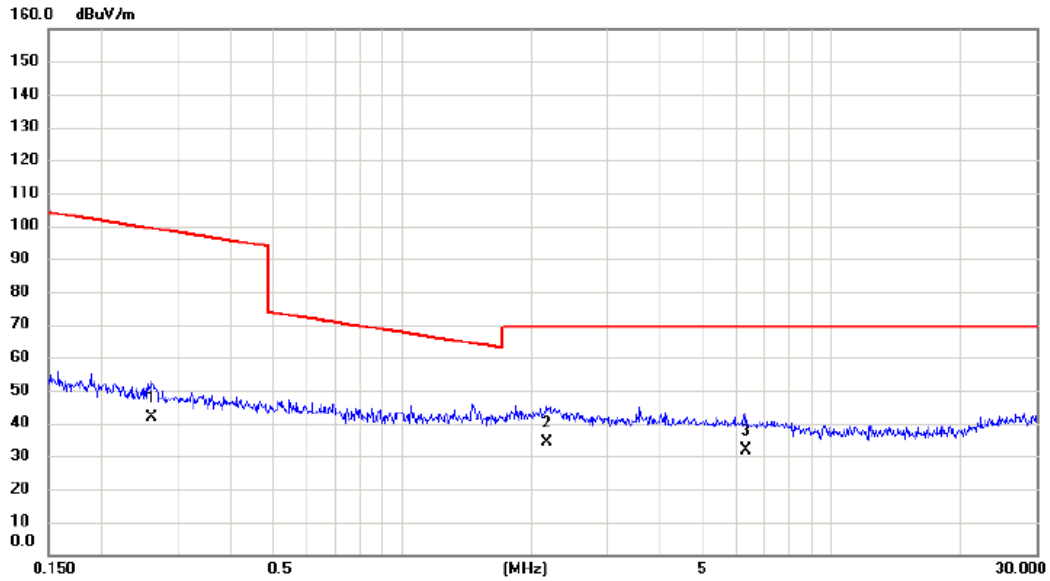
Ant 0°



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	0.0230	37.80	19.53	57.33	120.37	-63.04	AVG	
2		0.0384	26.50	19.07	45.57	115.92	-70.35	AVG	
3		0.0610	21.80	18.51	40.31	111.90	-71.59	AVG	

Test Mode:	TX MODE

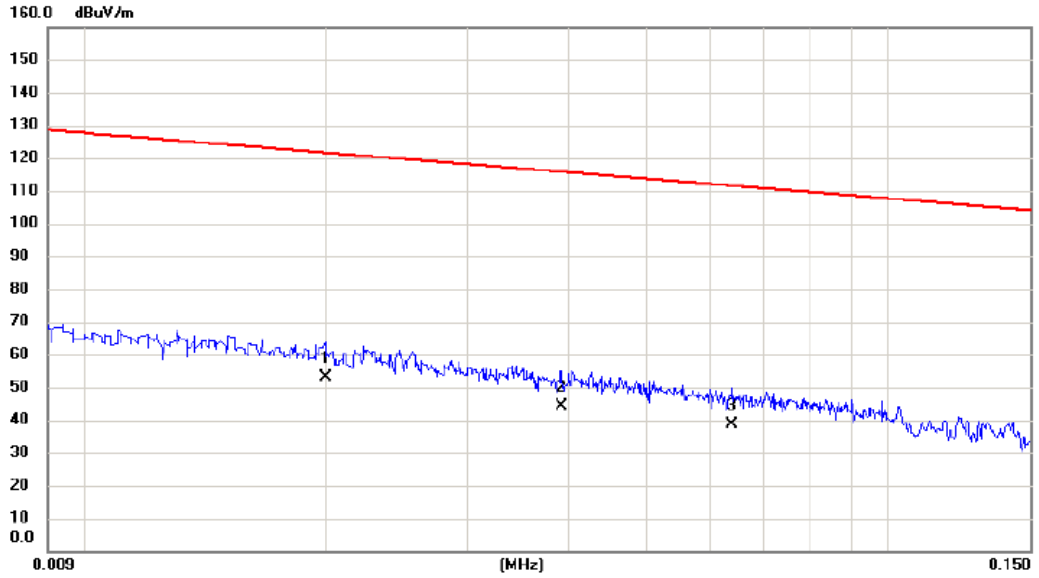
Ant 0°



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		0.2603	25.30	16.65	41.95	99.30	-57.35	AVG	
2	*	2.1783	18.80	15.46	34.26	69.54	-35.28	QP	
3		6.3186	17.50	14.21	31.71	69.54	-37.83	QP	

Test Mode:	TX MODE

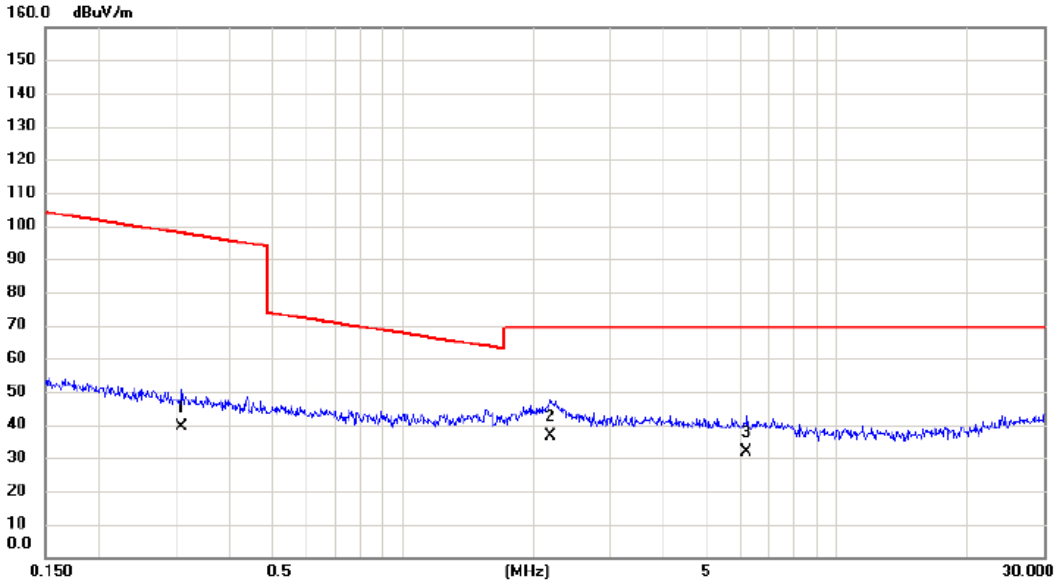
Ant 90°



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	0.0200	33.40	19.62	53.02	121.58	-68.56	AVG	
2		0.0393	25.30	19.04	44.34	115.72	-71.38	AVG	
3		0.0640	20.10	18.45	38.55	111.48	-72.93	AVG	

Test Mode:	TX MODE

Ant 90°

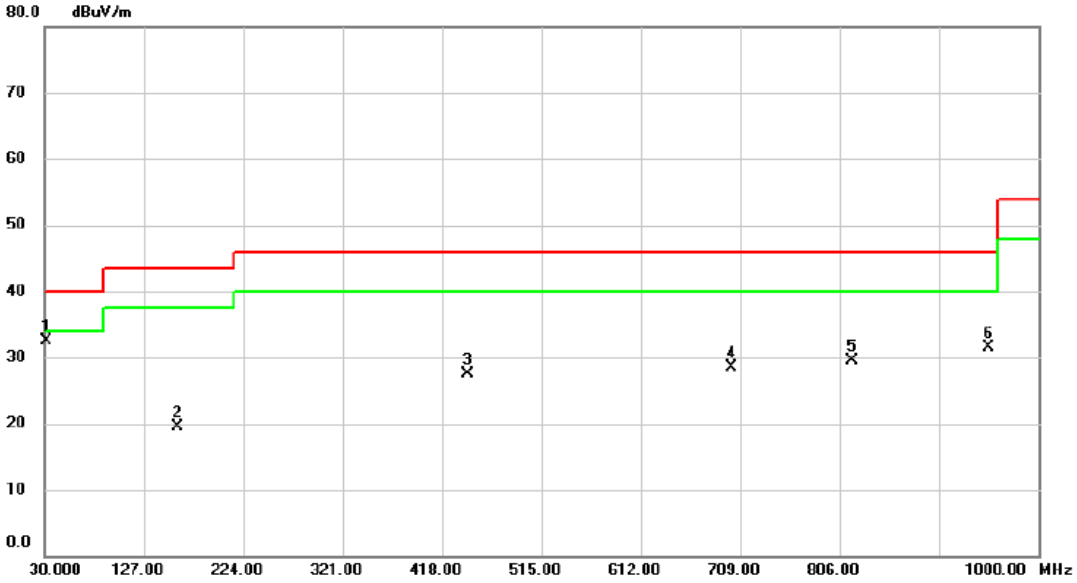


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		0.3100	22.80	16.61	39.41	97.78	-58.37	AVG	
2	*	2.1898	21.30	15.45	36.75	69.54	-32.79	QP	
3		6.1860	17.70	14.22	31.92	69.54	-37.62	QP	

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

Test Mode:	TX 2410MHz

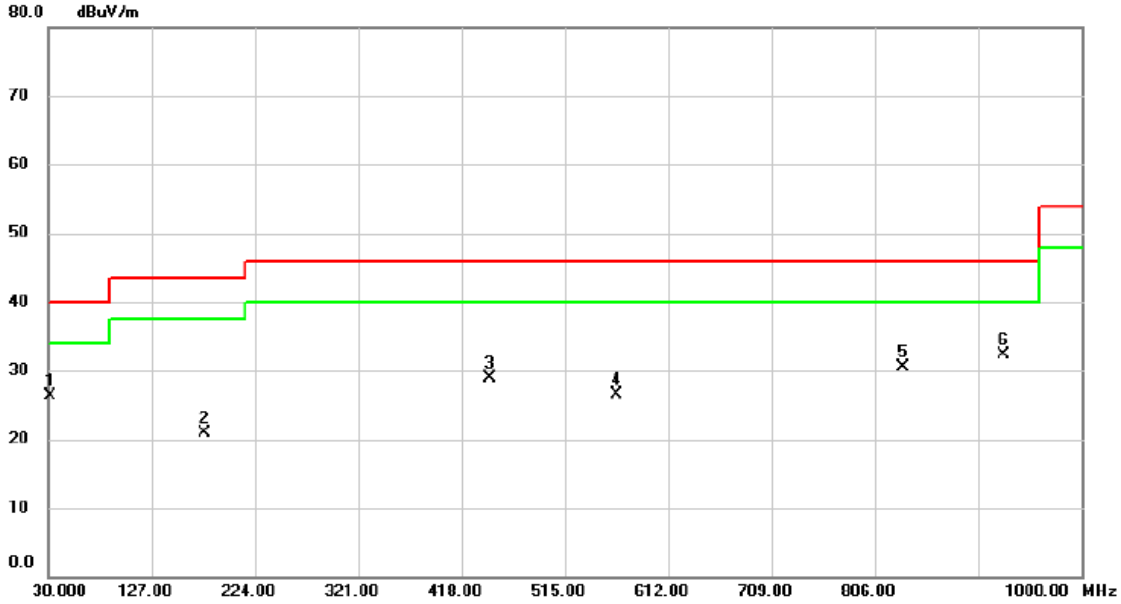
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	31.940	46.14	-13.59	32.55	40.00	-7.45	peak	
2		159.980	29.51	-10.00	19.51	43.50	-23.99	peak	
3		443.705	34.07	-6.62	27.45	46.00	-18.55	peak	
4		700.755	29.36	-0.93	28.43	46.00	-17.57	peak	
5		818.125	29.28	0.25	29.53	46.00	-16.47	peak	
6		951.500	28.90	2.55	31.45	46.00	-14.55	peak	

Test Mode:	TX 2410MHz

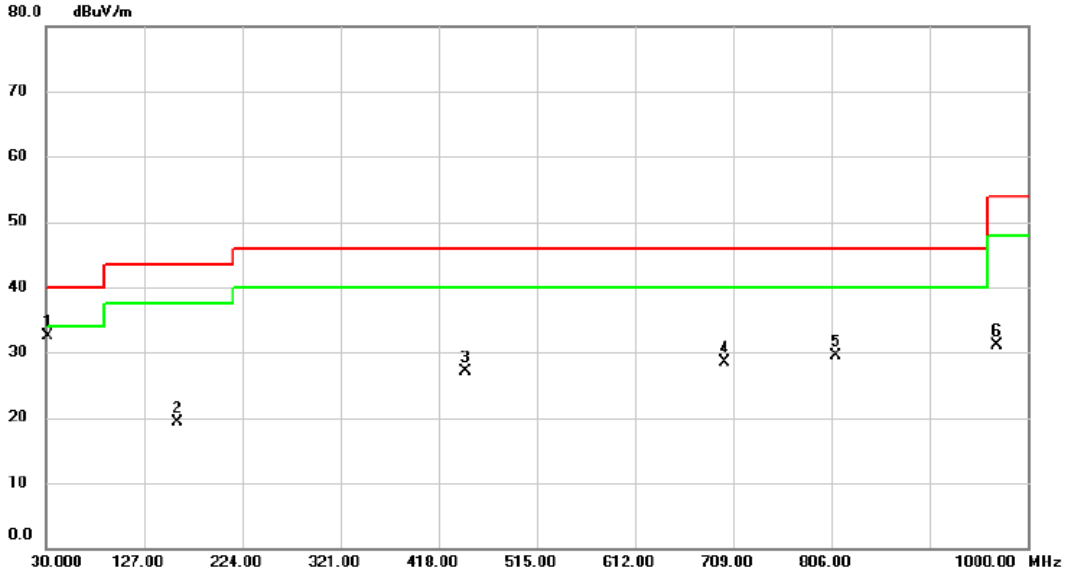
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	31.940	39.86	-13.59	26.27	40.00	-13.73	peak	
2		176.955	32.27	-11.42	20.85	43.50	-22.65	peak	
3		444.190	35.58	-6.59	28.99	46.00	-17.01	peak	
4		563.500	30.69	-4.20	26.49	46.00	-19.51	peak	
5		832.675	30.44	0.05	30.49	46.00	-15.51	peak	
6		926.280	30.65	1.58	32.23	46.00	-13.77	peak	

Test Mode:	TX 2442MHz

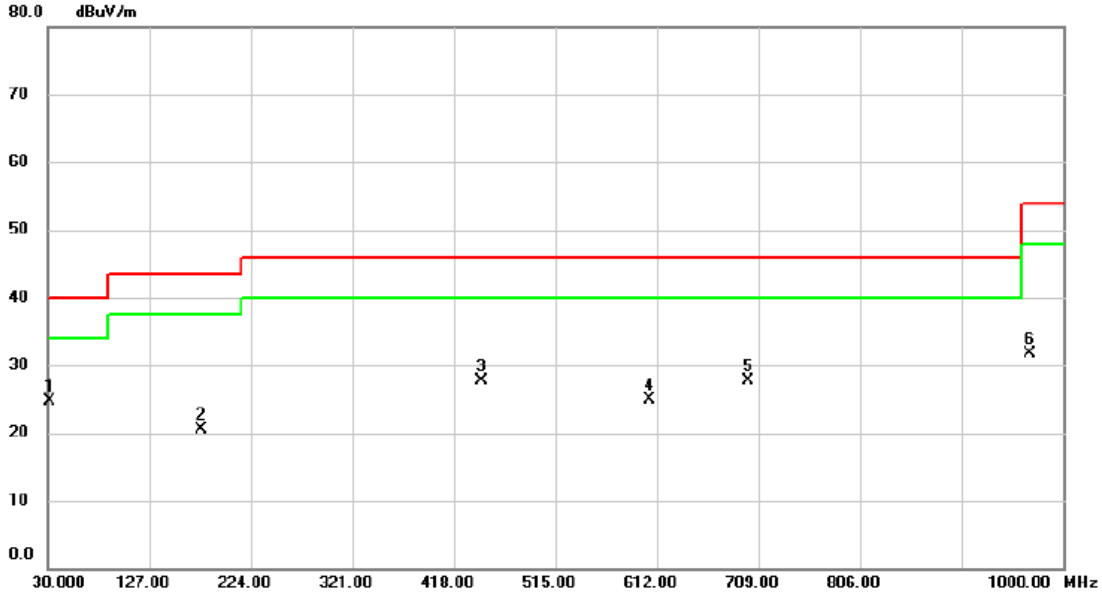
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	31.940	46.14	-13.59	32.55	40.00	-7.45	peak	
2		159.980	29.26	-10.00	19.26	43.50	-24.24	peak	
3		444.675	33.61	-6.57	27.04	46.00	-18.96	peak	
4		700.755	29.36	-0.93	28.43	46.00	-17.57	peak	
5		809.880	29.13	0.37	29.50	46.00	-16.50	peak	
6		968.960	29.01	2.18	31.19	54.00	-22.81	peak	

Test Mode:	TX 2442MHz

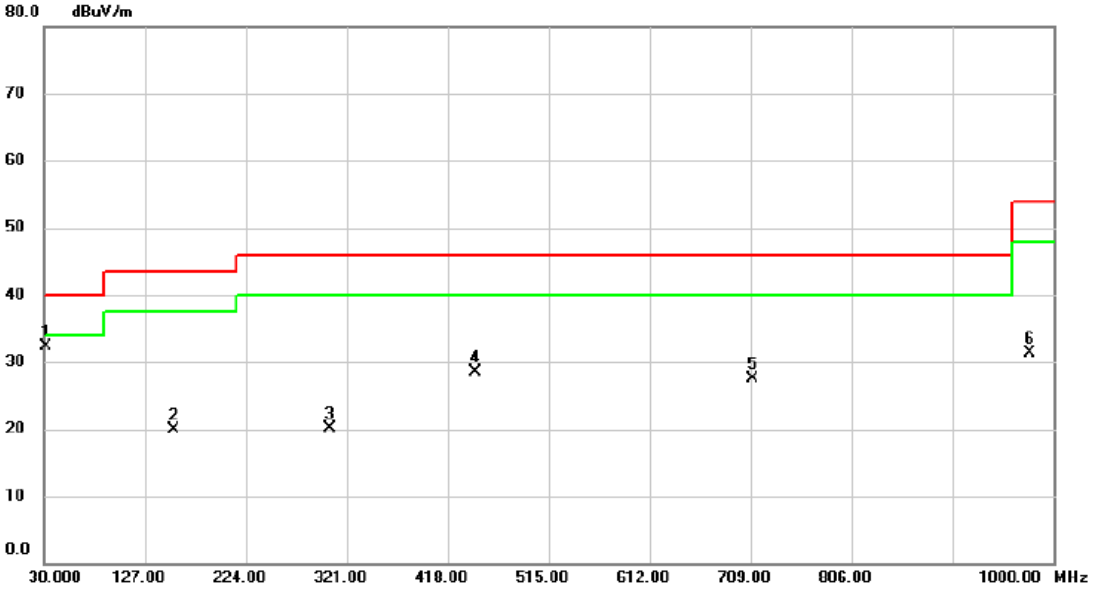
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	31.940	38.28	-13.59	24.69	40.00	-15.31	peak	
2		176.955	31.85	-11.42	20.43	43.50	-23.07	peak	
3		444.675	34.25	-6.57	27.68	46.00	-18.32	peak	
4		604.240	29.17	-4.19	24.98	46.00	-21.02	peak	
5		699.300	28.65	-0.95	27.70	46.00	-18.30	peak	
6		967.990	29.43	2.21	31.64	54.00	-22.36	peak	

Test Mode:	TX 2473MHz

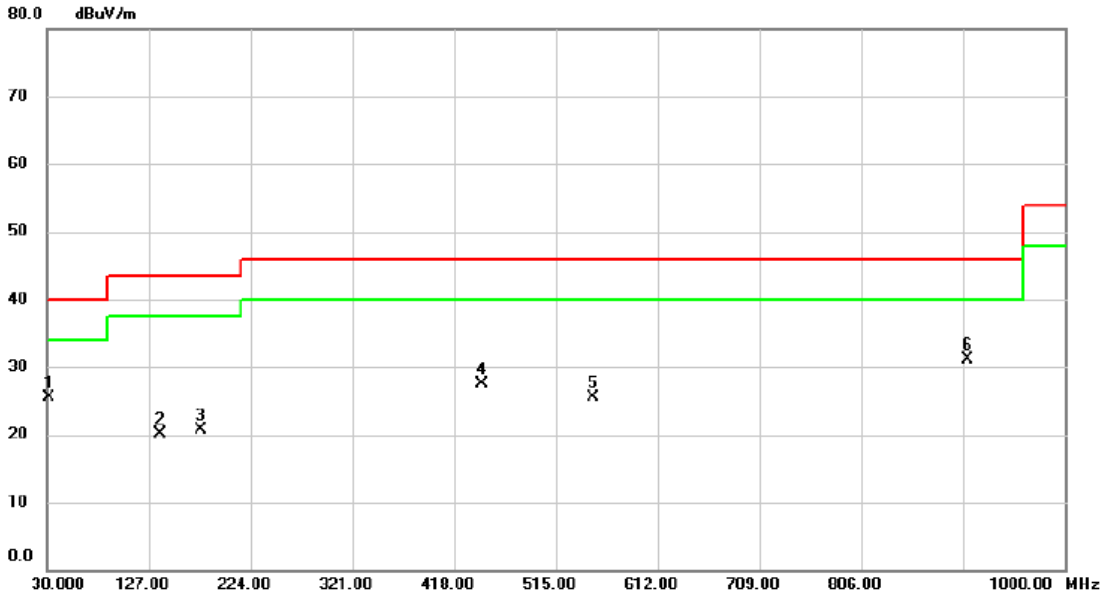
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	31.455	45.89	-13.56	32.33	40.00	-7.67	peak	
2		155.130	30.19	-10.32	19.87	43.50	-23.63	peak	
3		304.995	30.70	-10.56	20.14	46.00	-25.86	peak	
4		444.675	35.12	-6.57	28.55	46.00	-17.45	peak	
5		711.425	28.80	-1.23	27.57	46.00	-18.43	peak	
6		976.720	29.28	2.03	31.31	54.00	-22.69	peak	

Test Mode:	TX 2473MHz

Horizontal

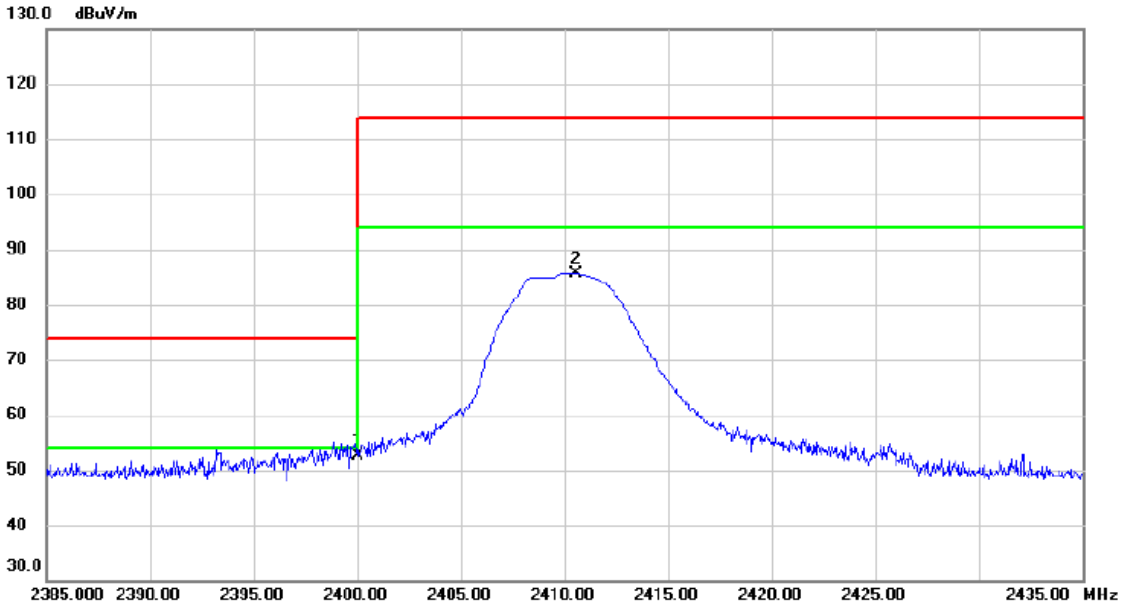


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	31.940	39.11	-13.59	25.52	40.00	-14.48	peak	
2		137.670	31.81	-11.65	20.16	43.50	-23.34	peak	
3		176.955	32.18	-11.42	20.76	43.50	-22.74	peak	
4		444.675	34.16	-6.57	27.59	46.00	-18.41	peak	
5		550.405	29.72	-4.18	25.54	46.00	-20.46	peak	
6		906.880	30.34	0.78	31.12	46.00	-14.88	peak	

APPENDIX D - RADIATED EMISSION (ABOVE 1000MHZ)

Test Mode	TX Mode_2410 MHz

Vertical



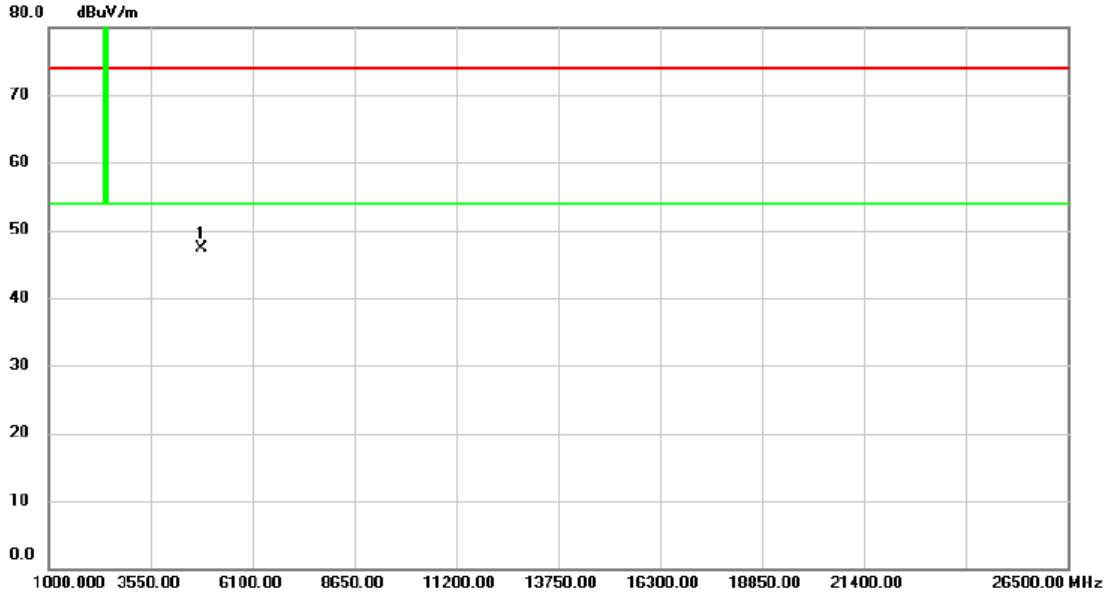
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	2400.000	43.67	9.00	52.67	74.00	-21.33	peak	
2		2410.550	76.71	9.00	85.71	114.00	-28.29	peak	

(1) The AVG value of fundamental frequency is:
Average Reading = Peak value + 20log (Duty cycle) , AV=Peak-13.63

Frequency (MHz)	Peak value (dBuV/m)	AVG value (dBuV/m)	AVG Limit (dBuV/m)	Result
2400.000	52.67	39.04	54	PASS
2410.550	85.71	72.08	94	PASS

Test Mode	TX Mode_2410 MHz

Vertical



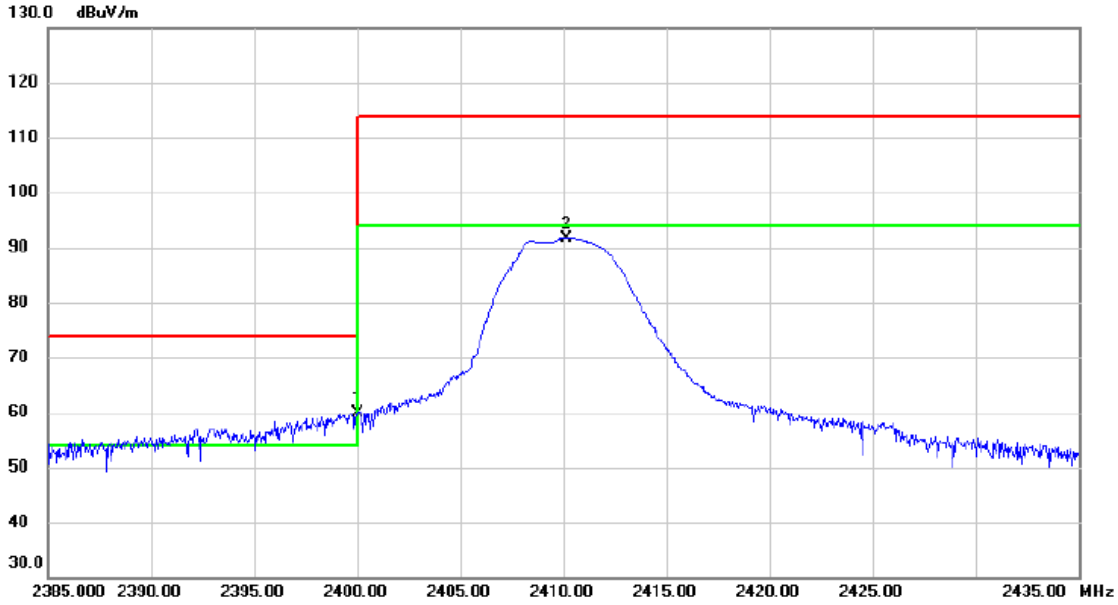
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4820.458	40.91	6.32	47.23	74.00	-26.77	peak	

(1) The AVG value of fundamental frequency is:
Average Reading = Peak value + 20log (Duty cycle) , AV=Peak-13.63

Frequency (MHz)	Peak value (dBuV/m)	AVG value (dBuV/m)	AVG Limit (dBuV/m)	Result
4820.458	47.23	33.60	54	PASS

Test Mode	TX Mode_2410 MHz

Horizontal



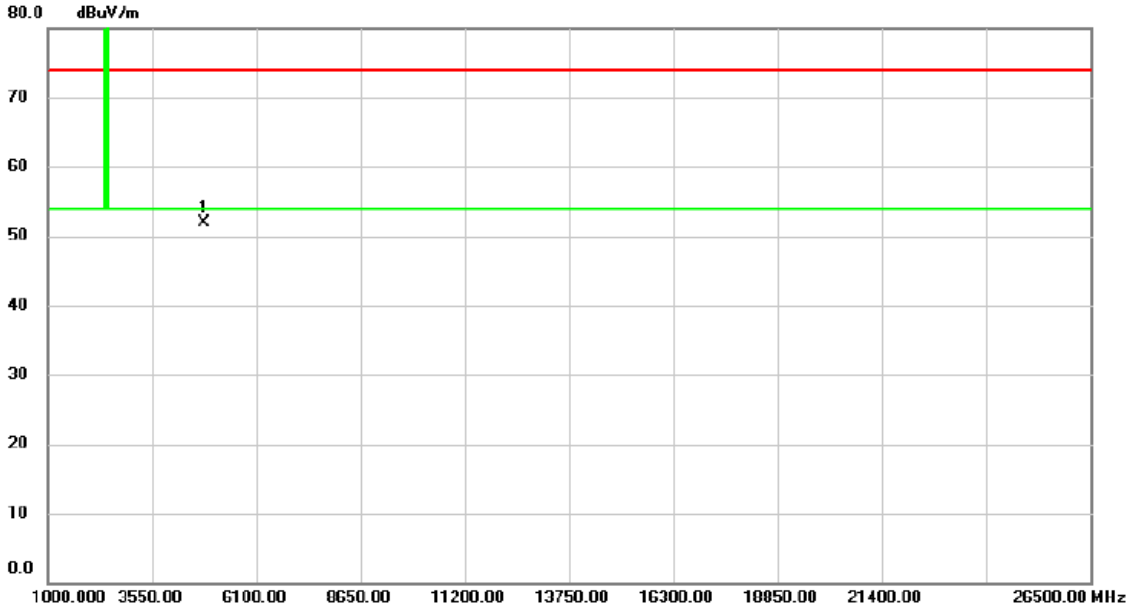
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	2400.000	50.95	9.00	59.95	74.00	-14.05	peak	
2		2410.200	82.59	9.00	91.59	114.00	-22.41	peak	

(1) The AVG value of fundamental frequency is:
Average Reading = Peak value + 20log (Duty cycle) , AV=Peak-13.63

Frequency (MHz)	Peak value (dBuV/m)	AVG value (dBuV/m)	AVG Limit (dBuV/m)	Result
2400.000	59.95	46.32	54	PASS
2410.000	91.59	77.96	94	PASS

Test Mode	TX Mode_2410 MHz

Horizontal



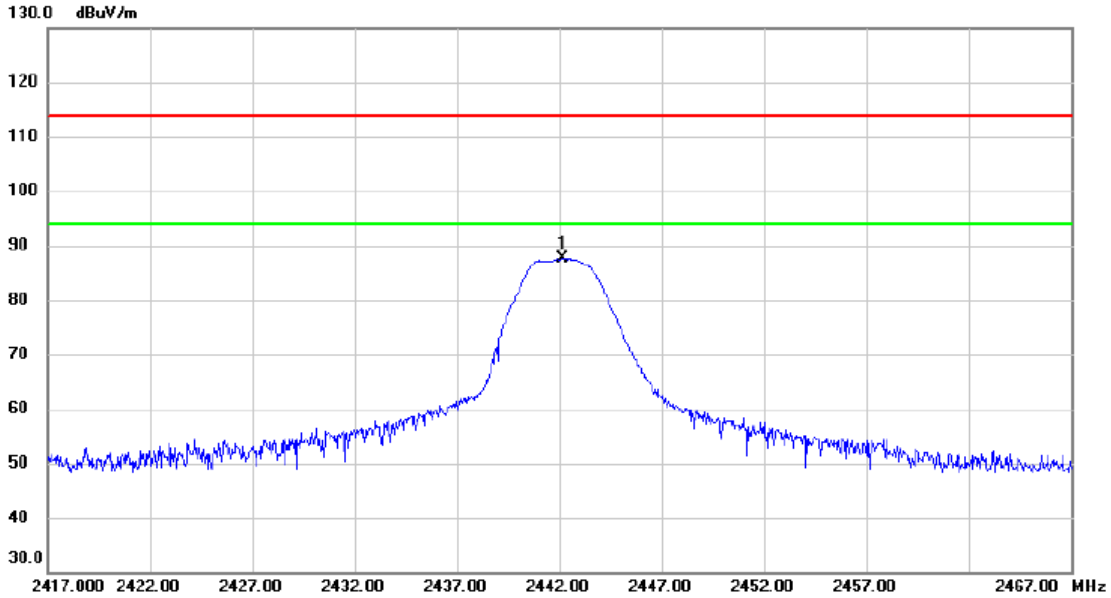
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4821.017	45.50	6.32	51.82	74.00	-22.18	peak	

(1) The AVG value of fundamental frequency is:
Average Reading = Peak value + 20log (Duty cycle) , AV=Peak-13.63

Frequency (MHz)	Peak value (dBuV/m)	AVG value (dBuV/m)	AVG Limit (dBuV/m)	Result
4821.017	51.82	38.19	54	PASS

Test Mode	TX Mode_2442 MHz

Vertical



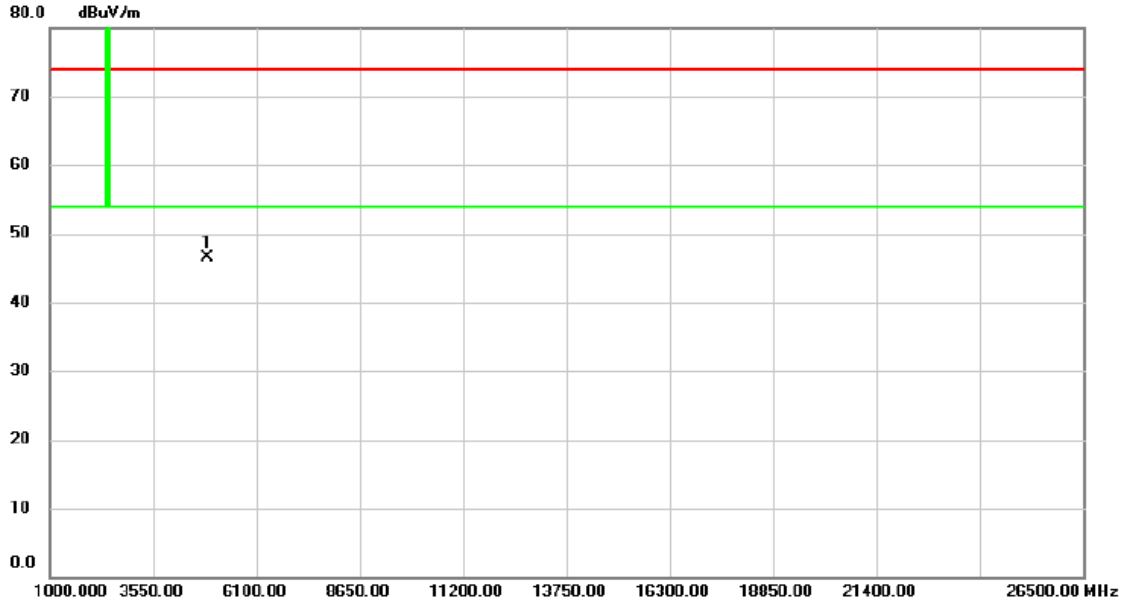
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	2442.200	78.57	8.99	87.56	114.00	-26.44	peak	

(1) The AVG value of fundamental frequency is:
Average Reading = Peak value + 20log (Duty cycle) , AV=Peak-13.63

Frequency (MHz)	Peak value (dBuV/m)	AVG value (dBuV/m)	AVG Limit (dBuV/m)	Result
2442.200	87.56	73.93	94	PASS

Test Mode	TX Mode_2442 MHz

Vertical



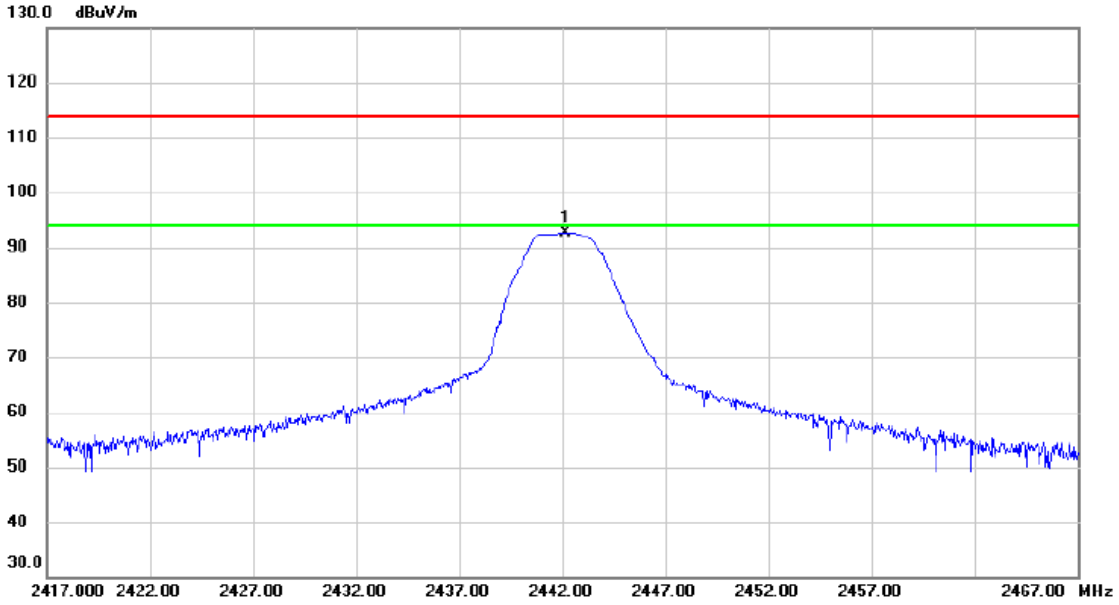
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4884.838	40.00	6.55	46.55	74.00	-27.45	peak	

(1) The AVG value of fundamental frequency is:
Average Reading = Peak value + 20log (Duty cycle) , AV=Peak-13.63

Frequency (MHz)	Peak value (dBuV/m)	AVG value (dBuV/m)	AVG Limit (dBuV/m)	Result
4884.838	46.55	32.92	54	PASS

Test Mode	TX Mode_2442 MHz

Horizontal



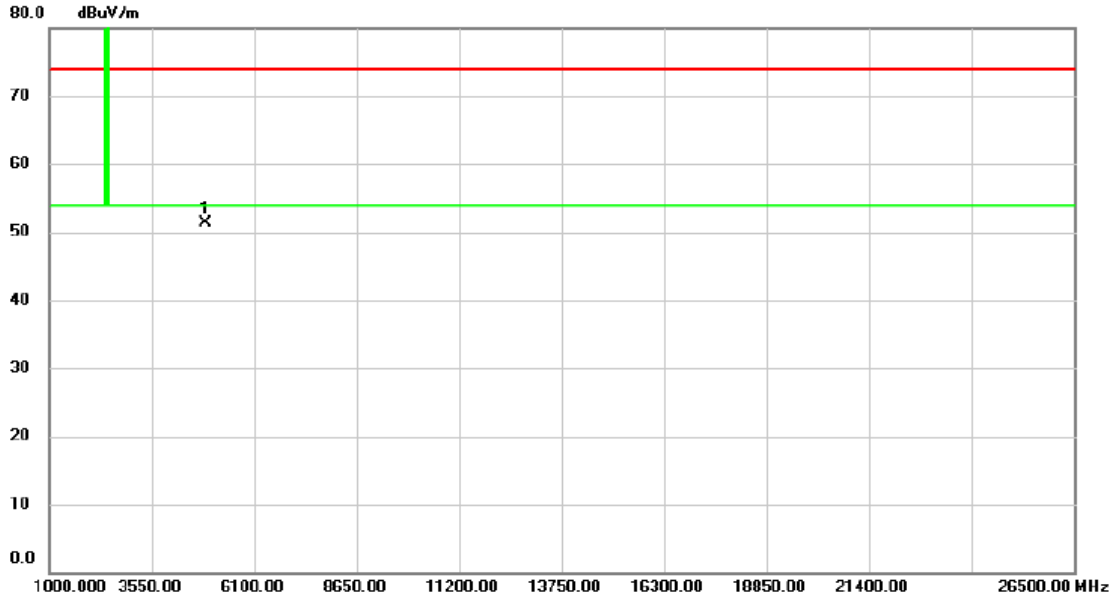
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	2442.200	83.66	8.99	92.65	114.00	-21.35	peak	

(1) The AVG value of fundamental frequency is:
Average Reading = Peak value + 20log (Duty cycle) , AV=Peak-13.63

Frequency (MHz)	Peak value (dBuV/m)	AVG value (dBuV/m)	AVG Limit (dBuV/m)	Result
2442.200	92.65	79.02	94	PASS

Test Mode	TX Mode_2442 MHz

Horizontal



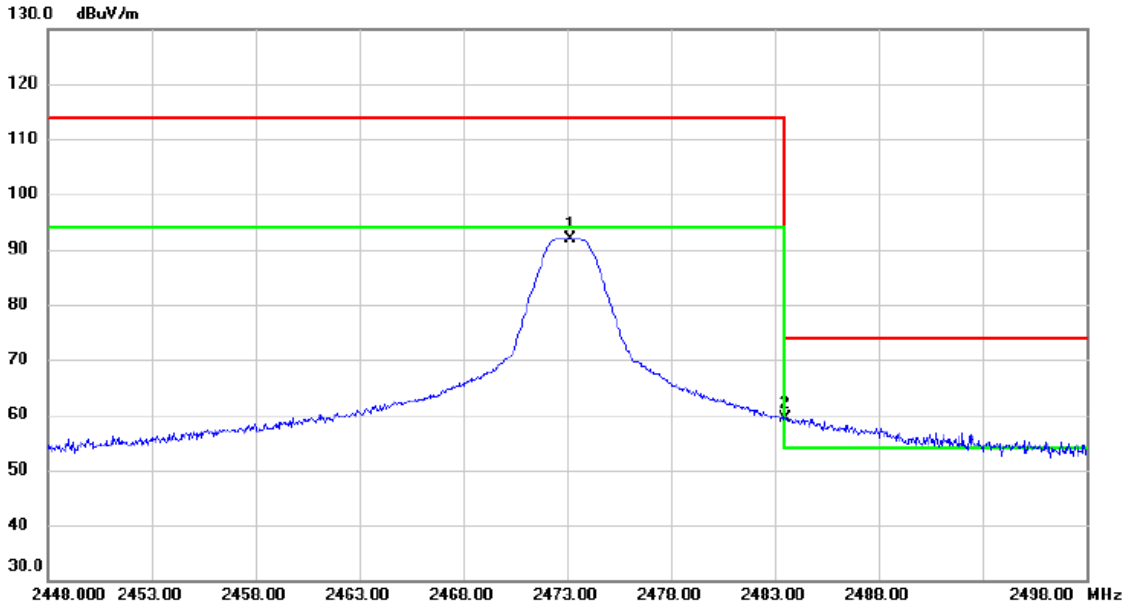
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4884.463	44.81	6.55	51.36	74.00	-22.64	peak	

(1) The AVG value of fundamental frequency is:
Average Reading = Peak value + 20log (Duty cycle) , AV=Peak-13.63

Frequency (MHz)	Peak value (dBuV/m)	AVG value (dBuV/m)	AVG Limit (dBuV/m)	Result
4884.463	51.36	37.73	54	PASS

Test Mode	TX Mode_2473 MHz

Vertical



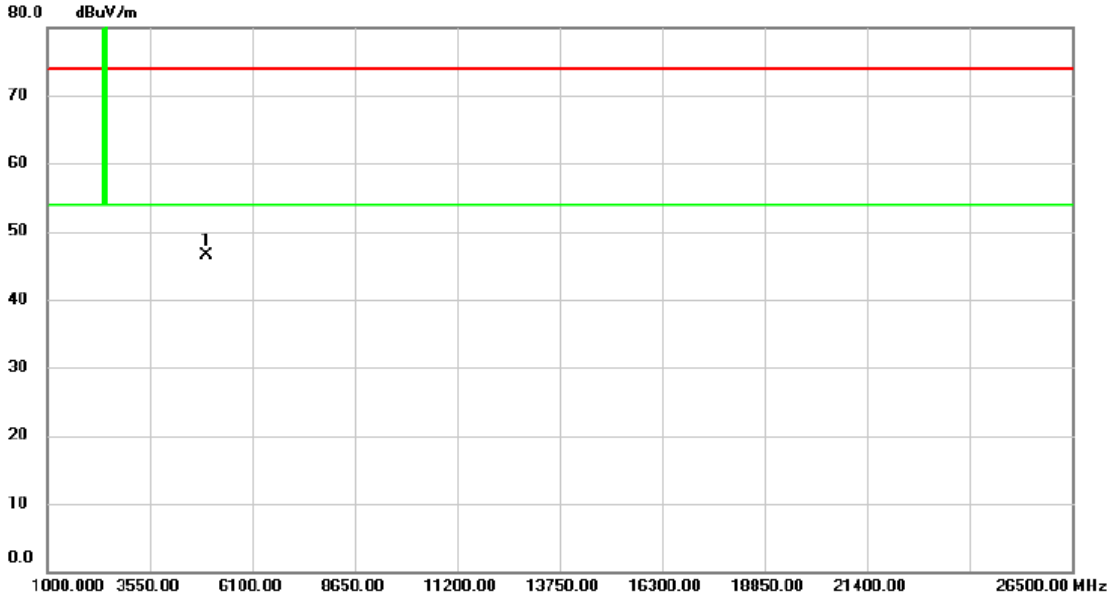
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2473.200	82.95	8.97	91.92	114.00	-22.08	peak	
2	*	2483.500	50.42	8.96	59.38	74.00	-14.62	peak	

(1) The AVG value of fundamental frequency is:
Average Reading = Peak value + 20log (Duty cycle) , AV=Peak-13.63

Frequency (MHz)	Peak value (dBuV/m)	AVG value (dBuV/m)	AVG Limit (dBuV/m)	Result
2473.200	91.92	78.29	94	PASS
2483.500	59.38	45.75	54	PASS

Test Mode	TX Mode_2473 MHz

Vertical



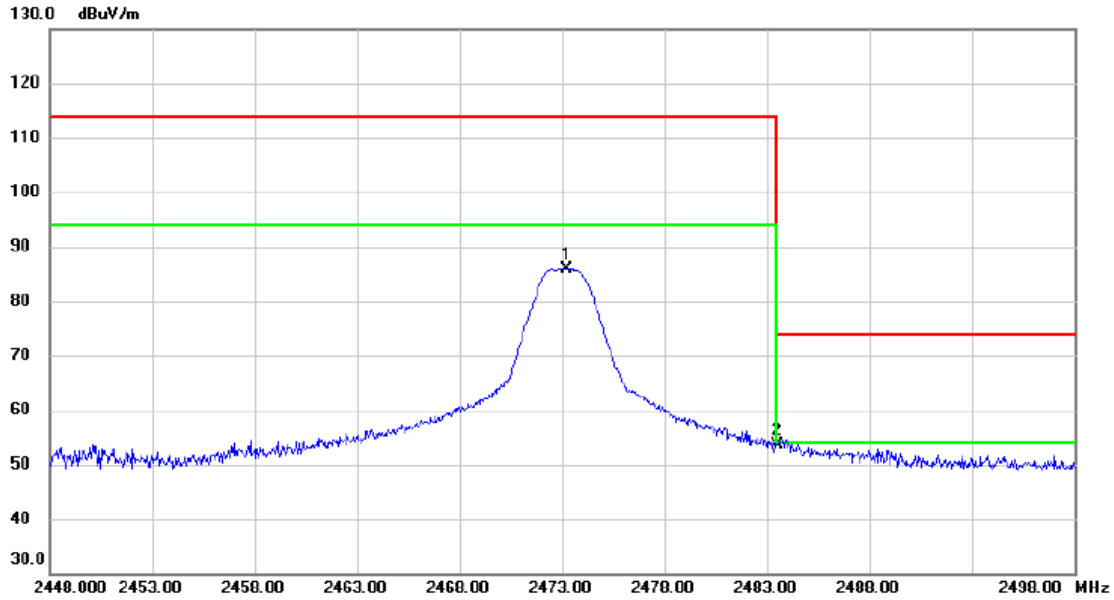
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4946.192	39.69	6.79	46.48	74.00	-27.52	peak	

(1) The AVG value of fundamental frequency is:
Average Reading = Peak value + 20log (Duty cycle) , AV=Peak-13.63

Frequency (MHz)	Peak value (dBuV/m)	AVG value (dBuV/m)	AVG Limit (dBuV/m)	Result
4946.192	46.48	32.85	54	PASS

Test Mode	TX Mode_2473 MHz

Horizontal



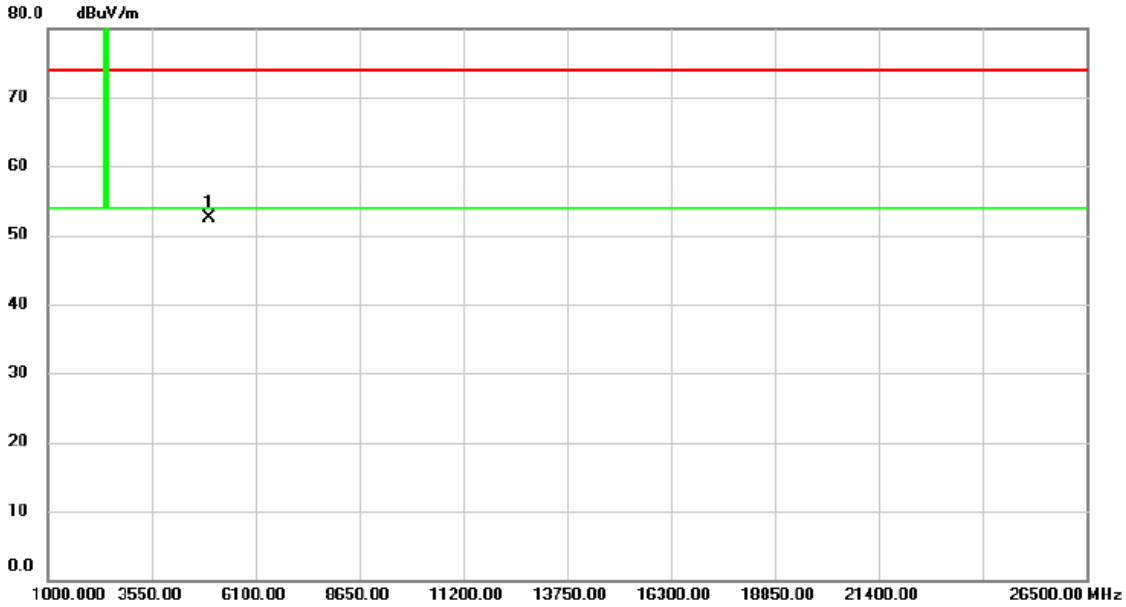
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2473.250	76.90	8.97	85.87	114.00	-28.13	peak	
2	*	2483.500	44.76	8.96	53.72	74.00	-20.28	peak	

(1) The AVG value of fundamental frequency is:
Average Reading = Peak value + 20log (Duty cycle) , AV=Peak-13.63

Frequency (MHz)	Peak value (dBuV/m)	AVG value (dBuV/m)	AVG Limit (dBuV/m)	Result
2473.250	85.87	72.24	94	PASS
2483.500	53.72	40.09	54	PASS

Test Mode	TX Mode_2473 MHz

Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4946.517	45.80	6.79	52.59	74.00	-21.41	peak	

(1) The AVG value of fundamental frequency is:
Average Reading = Peak value + 20log (Duty cycle) , AV=Peak-13.63

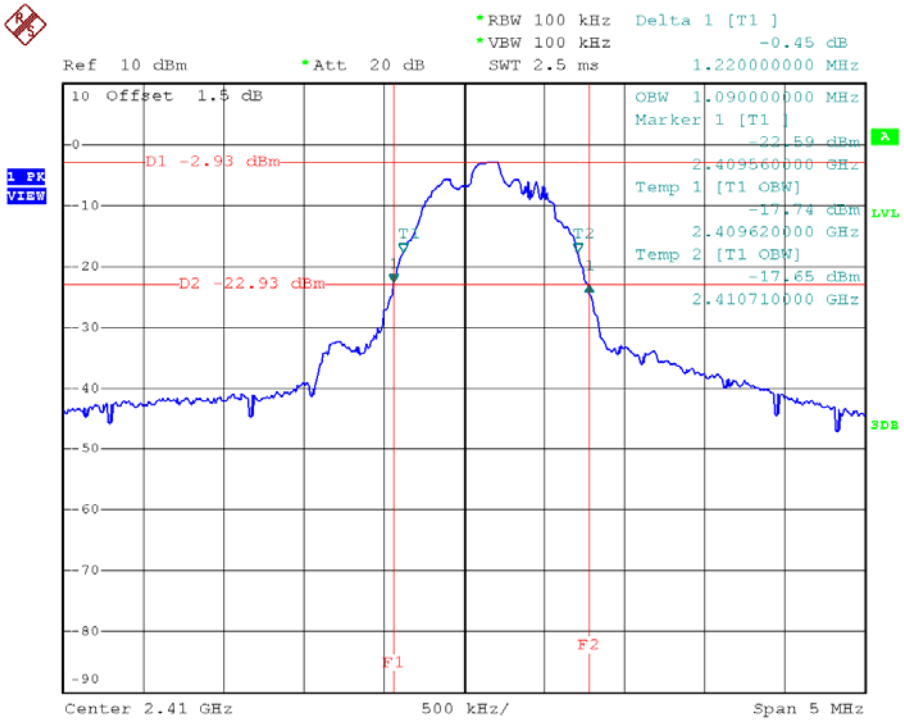
Frequency (MHz)	Peak value (dBuV/m)	AVG value (dBuV/m)	AVG Limit (dBuV/m)	Result
4946.517	52.59	38.96	54	PASS

APPENDIX E - BANDWIDTH

Test Mode:	TX Mode_2410 MHz/2442 MHz/2473 MHz

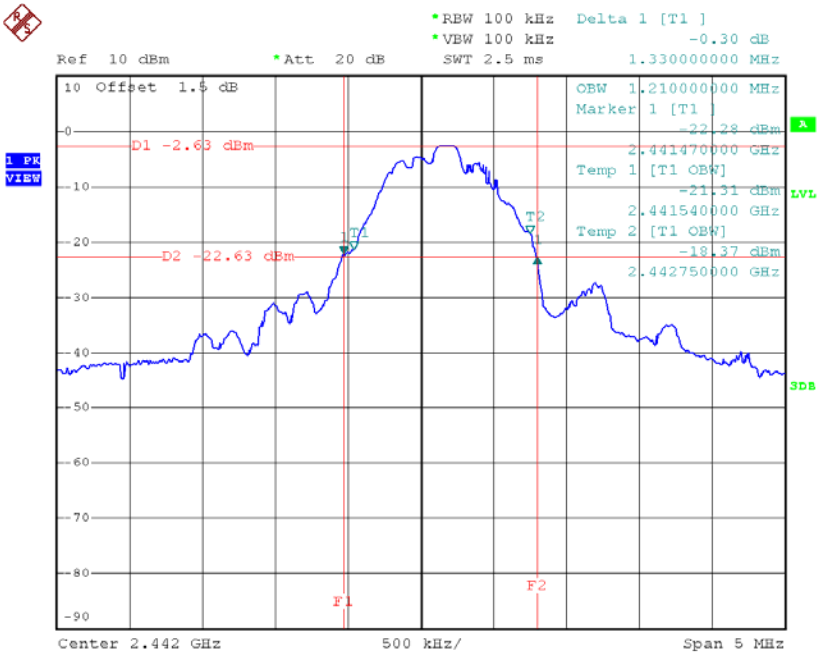
Frequency (MHz)	20dB Bandwidth (MHz)	99% Occupied BW (MHz)
2410	1.22	1.09
2442	1.33	1.21
2473	1.44	1.39

TX Mode_2410 MHz



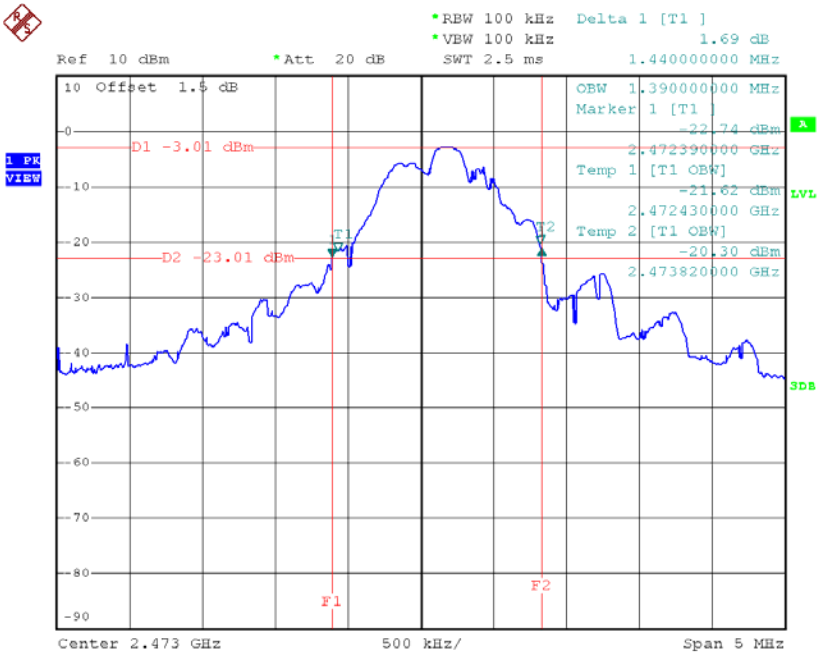
Date: 2.JUN.2018 14:14:44

TX Mode_2442 MHz



Date: 2.JUN.2018 14:19:08

TX Mode_2473 MHz



Date: 2.JUN.2018 14:20:33