

FCC Radio Test Report

FCC ID: XW3DR-3380ZM

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

Project No. : 1802C172B
Equipment : 2.4G Wireless Dongle
Test Model : DR-3380ZM
Series Model : N/A
Applicant : DongGuan Siliten Electronics Co., Ltd
Address : Sijia Yewu Industrial estate, Shijie Town, Dongguan
City, Guangdong Province, China

Date of Receipt : Feb. 28, 2018
Date of Test : Mar. 02, 2018 ~ Mar. 09, 2018
Issued Date : Apr. 09, 2018
Tested by : BTL Inc.

Testing Engineer : Chay Cai
(Chay Cai)

Technical Manager : Shawn Xiao
(Shawn Xiao)

Authorized Signatory : David Mao
(David Mao)

B T L I N C .

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 DESCRIPTION OF EUT	9
3.2 DESCRIPTION OF TEST MODES	10
3.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	11
3.5 DESCRIPTION OF SUPPORT UNITS	11
4 . EMC EMISSION TEST	12
4.1 CONDUCTED EMISSION MEASUREMENT	12
4.1.1 POWER LINE CONDUCTED EMISSION LIMITS	12
4.1.2 TEST PROCEDURE	12
4.1.3 DEVIATION FROM TEST STANDARD	12
4.1.4 TEST SETUP	13
4.1.5 EUT OPERATING CONDITIONS	13
4.1.6 EUT TEST CONDITIONS	13
4.1.7 TEST RESULTS	13
4.2 RADIATED EMISSION MEASUREMENT	14
4.2.1 RADIATED EMISSION LIMITS	14
4.2.2 TEST PROCEDURE	16
4.2.3 DEVIATION FROM TEST STANDARD	16
4.2.4 TEST SETUP	17
4.2.5 EUT OPERATING CONDITIONS	18
4.2.6 EUT TEST CONDITIONS	18
4.2.7 TEST RESULTS (9KHZ TO 30MHZ)	18
4.2.8 TEST RESULTS (30MHZ TO 1000MHZ)	18
4.2.9 TEST RESULTS (ABOVE 1000 MHZ)	19
5 . BANDWIDTH TEST	20
5.1 TEST PROCEDURE	20
5.2 DEVIATION FROM STANDARD	20
5.3 TEST SETUP	20
5.4 EUT OPERATION CONDITIONS	20
5.5 EUT TEST CONDITIONS	20
5.6 TEST RESULTS	20
6 . MEASUREMENT INSTRUMENTS LIST	21
7 . EUT TEST PHOTO	23

Table of Contents

Page

APPENDIX A - CONDUCTED EMISSION	27
APPENDIX B - RADIATED EMISSION (9KHZ TO 30MHZ)	30
APPENDIX C - RADIATED EMISSION (30MHZ TO 1000MHZ)	35
APPENDIX D - RADIATED EMISSION (ABOVE 1000MHZ)	42
APPENDIX E - BANDWIDTH	55

REPORT ISSUED HISTORY

Issued No.	Version	Description	Issued Date
BTL-FCCP-1-1802C172B	Rev.01	Original Issue.	Apr. 03, 2018
BTL-FCCP-1-1802C172B	Rev.02	Add the conduction equipment list.	Apr. 09, 2018

1. CERTIFICATION

Equipment : 2.4G Wireless Dongle
Brand Name : N/A
Test Model : DR-3380ZM
Series Model : N/A
Applicant : DongGuan Siliten Electronics Co., Ltd
Manufacturer : DongGuan Siliten Electronics Co., Ltd
Address : Sijia Yewu Industrial estate, Shijie Town, Dongguan City, Guangdong Province, China
Factory Address : DongGuan Siliten Electronics Co., Ltd
Sijia Yewu Industrial estate, Shijie Town, Dongguan City, Guangdong Province, China
Date of Test : Mar. 02, 2018 ~ Mar. 09, 2018
Test Sample : Engineering Sample
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-1-1802C172B) 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	
15.205	Restricted Band of Operation	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 %, $U=2 \times U_c(y)$.

The BTL measurement uncertainty as below table:

A. Conducted Measurement:

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

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	2.4G Wireless Dongle	
Brand Name	N/A	
Test Model	DR-3380ZM	
Series Model	N/A	
Model Difference	N/A	
Product Description	Operation Frequency	2402 MHz -2480 MHz
	Modulation Technology	GFSK
	Bit Rate of Transmitter	2 Mbps
	Field Strength	86.17 dBuV/m (Peak Max) 57.23 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	Frequency (MHz)	Channel	Frequency (MHz)
01	2402	07	2445	13	2419
02	2426	08	2466	14	2439
03	2441	09	2414	15	2453
04	2463	10	2436	16	2480
05	2407	11	2459		
06	2422	12	2473		

3. Table for Filed Antenna

Ant.	Brand	P/N	Antenna Type	Connector	Gain (dBi)
1	N/A	N/A	Printed	N/A	-0.71

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:

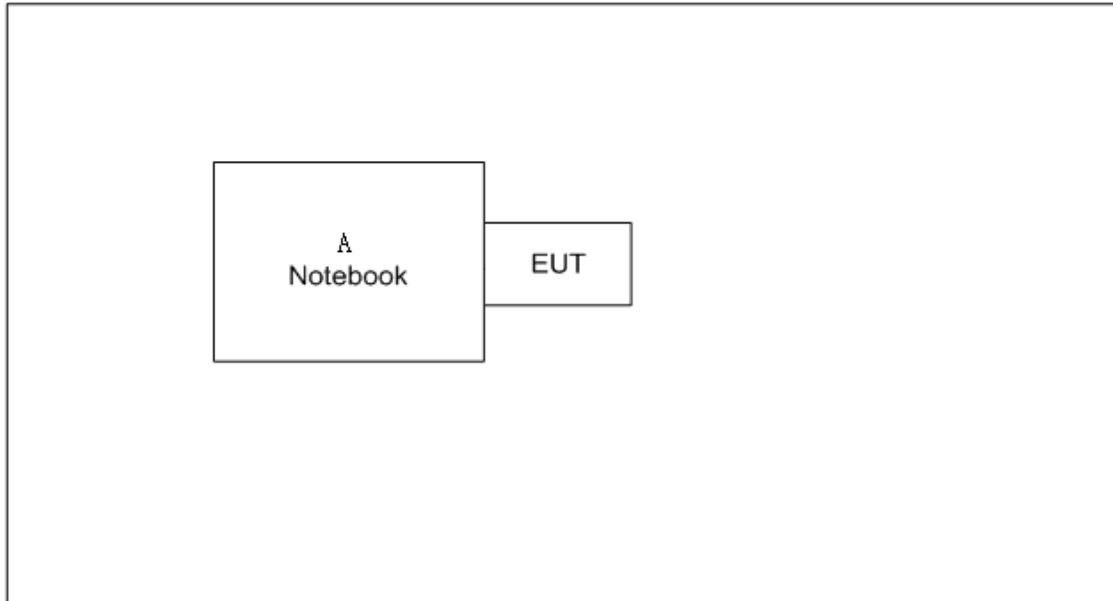
For Conducted Test	
Final Test Mode	Description
Mode 1	TX Mode

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.

3.4 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 (dB μ V)	
	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

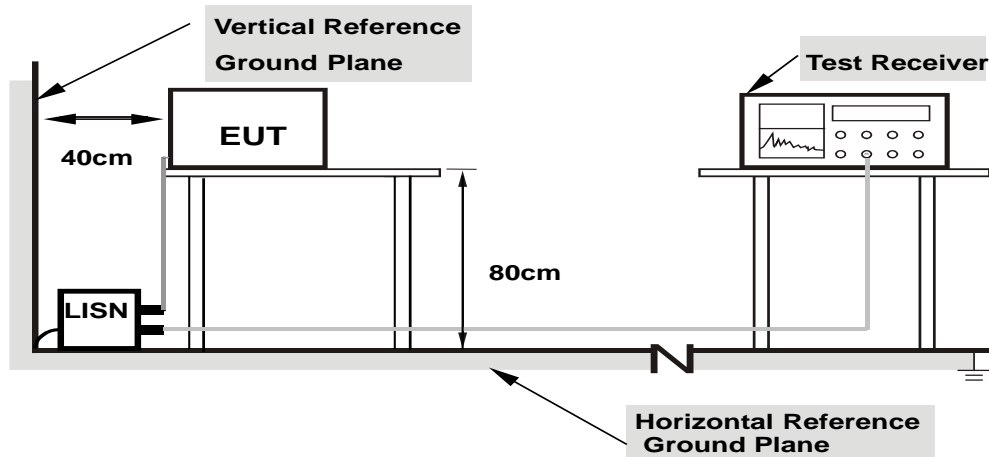
4.1.2 TEST PROCEDURE

- 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 (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

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 section 15.209(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 μ V/m (94 dB μ V/m) @ 3 m	2400-2483.5
Field strength of harmonics 500 μ V/m (54 dB μ V/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

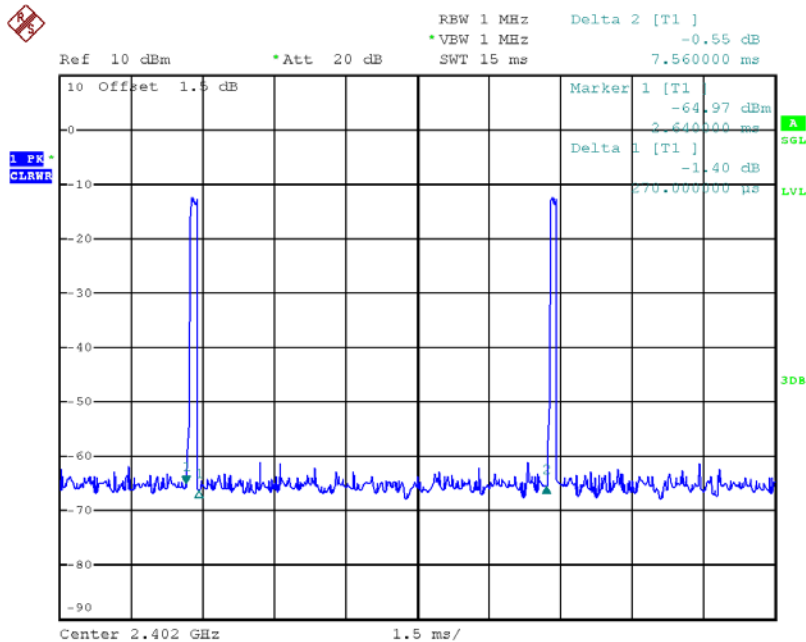
T_{ON}: 0.27 ms

T_{TOTAL}: 7.56 ms

Duty Cycle = 0.27/7.56=3.57%

Average Reading = Peak value + 20log (Duty cycle) , AV=Peak-28.94

On Time & Total Time



Date: 9.MAR.2018 09:16:34

4.2.2 TEST PROCEDURE

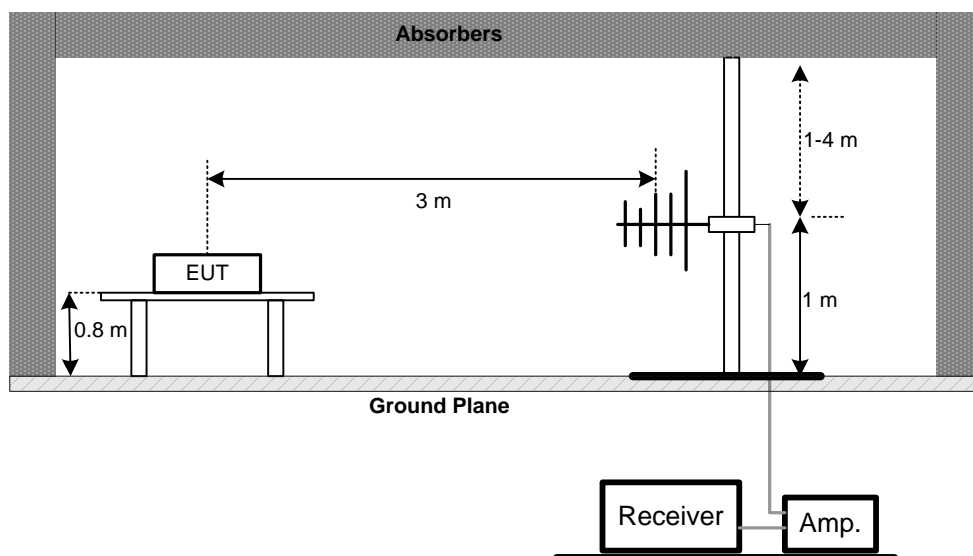
- a. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
- b. The measuring distance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

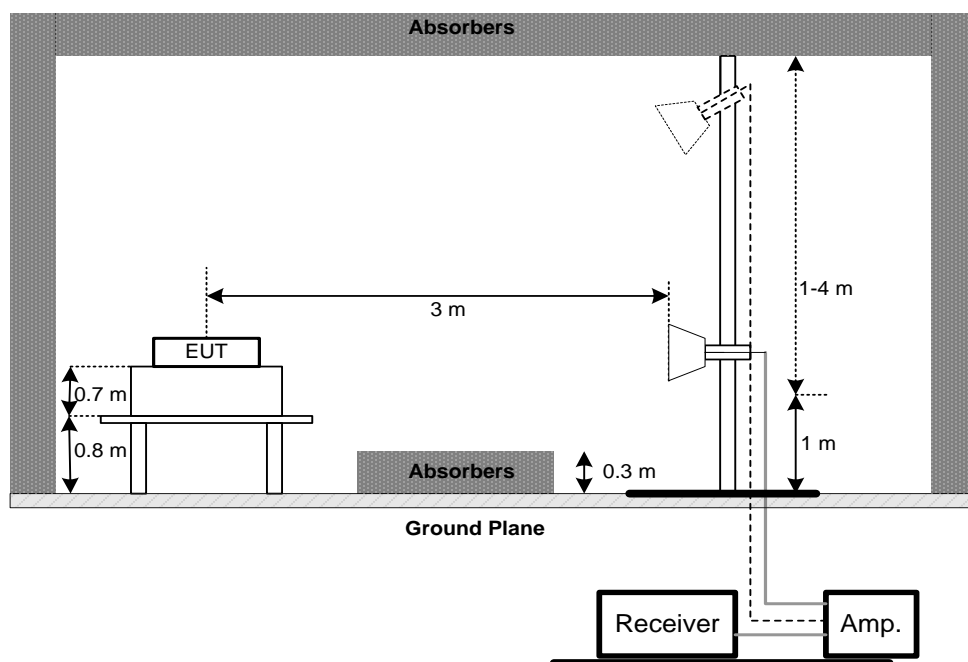
No deviation

4.2.4 TEST SETUP

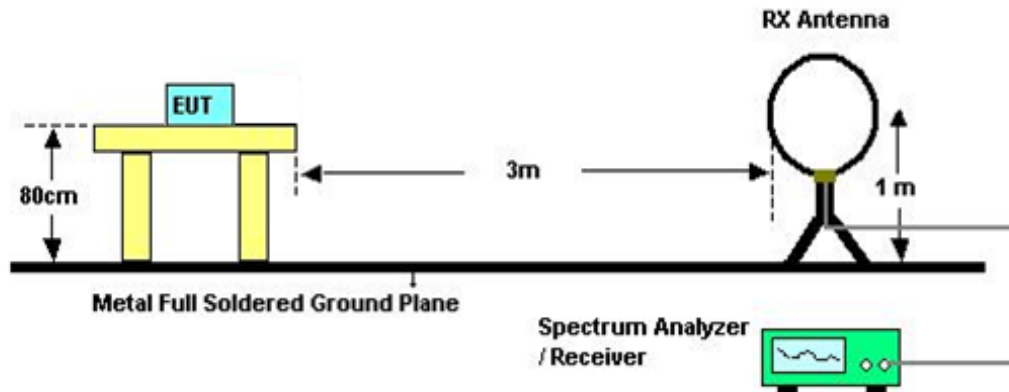
(A) Radiated Emission Test Set-Up Frequency Below 1 GHz



(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 = $40 \log(\text{specific distance} / \text{test distance})$ (dB).
- (3) Limit line = specific limits (dBuV) + distance extrapolation factor.

4.2.8 TEST RESULTS (30MHZ TO 1000MHZ)

Please refer to the Appendix C.

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.

4.2.9 TEST 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

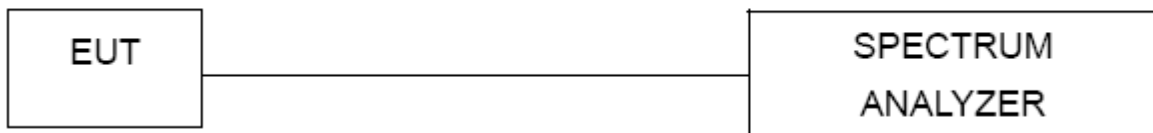
5.1 TEST PROCEDURE

- 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		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. 26, 2018
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. 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	Aug. 20, 2018
6	Antenna	EM	EM-6876-1	230	Mar. 06, 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

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



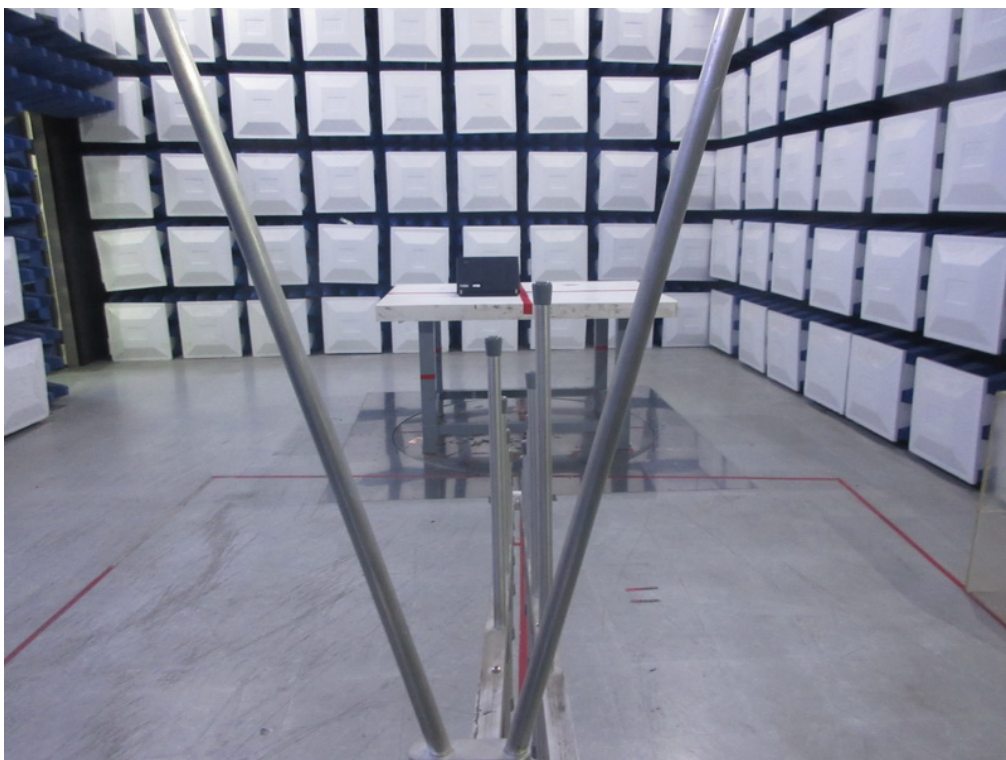
Radiated Measurement Photos

9KHz to 30MHz



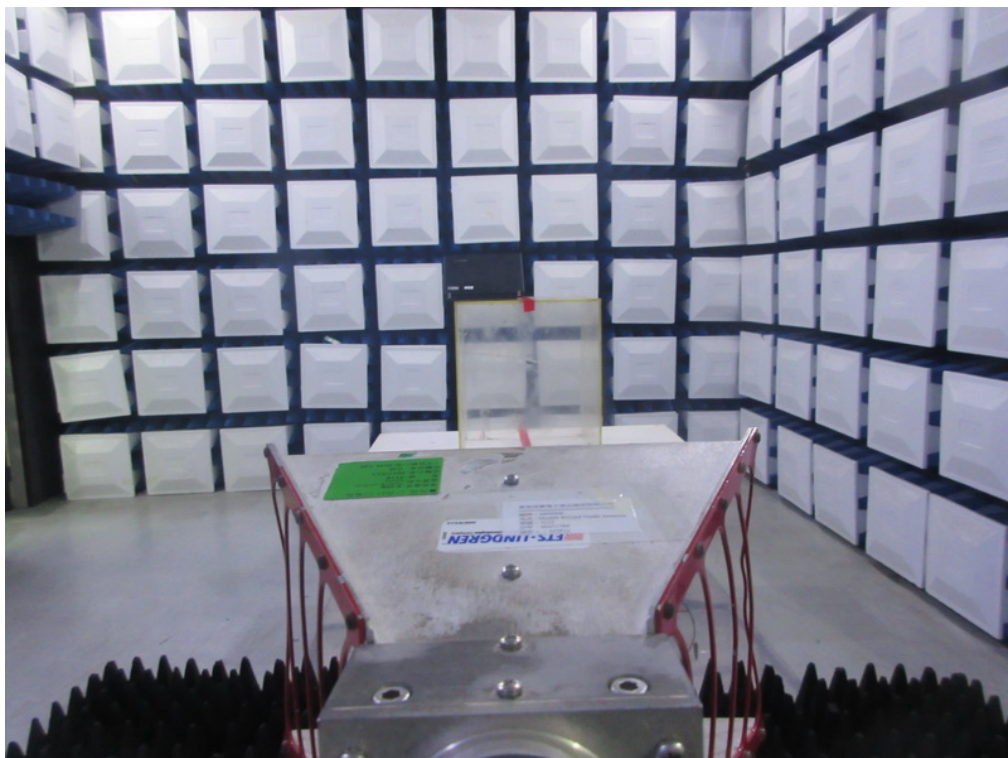
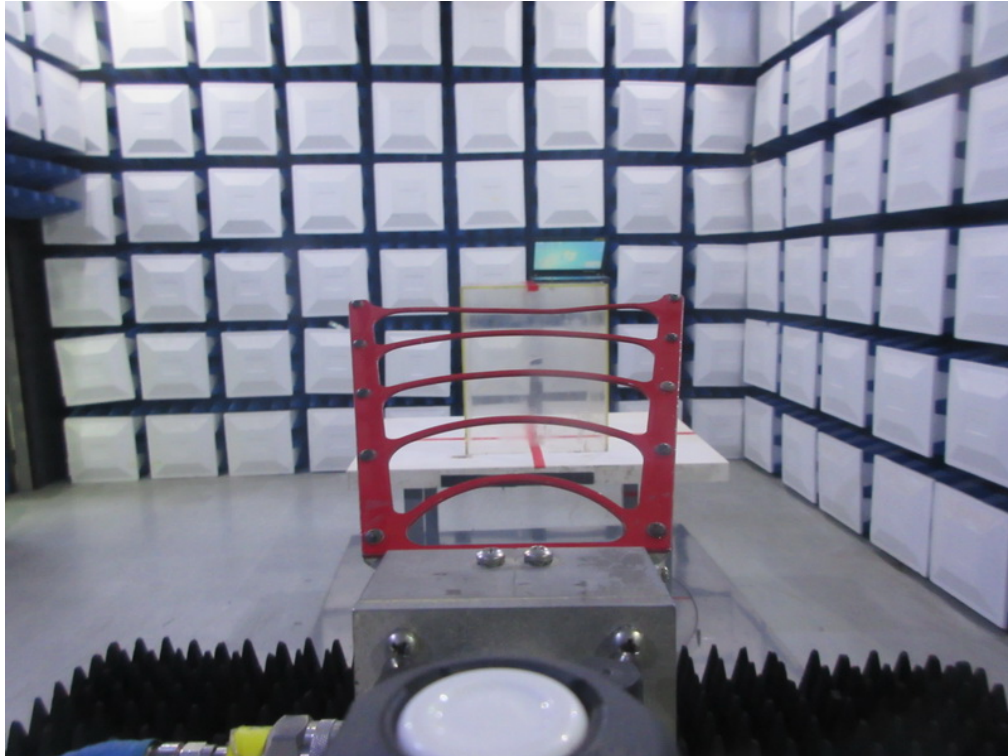
Radiated Measurement Photos

30MHz to 1000MHz



Radiated Measurement Photos

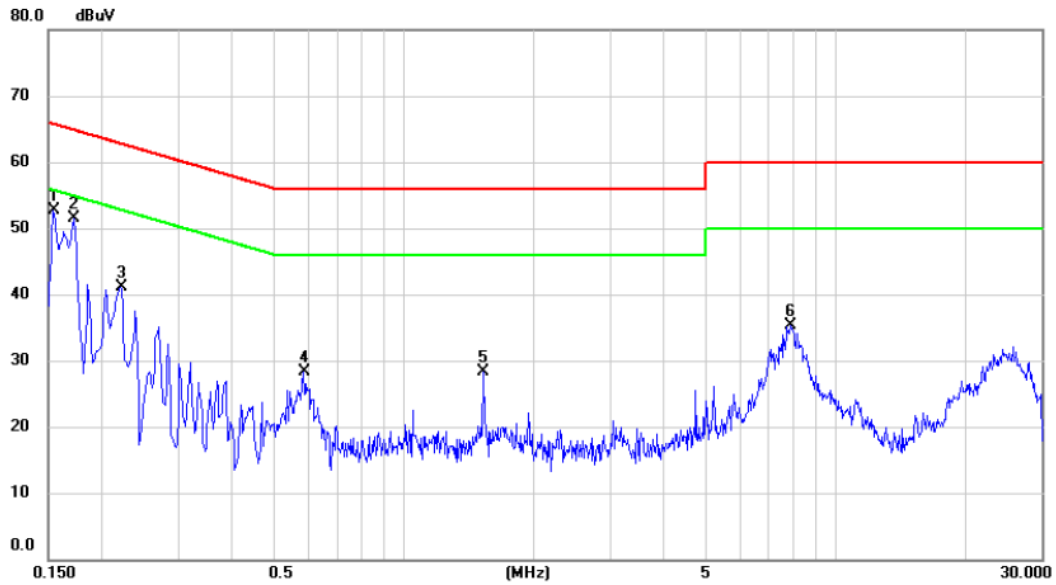
Above 1000MHz



APPENDIX A - CONDUCTED EMISSION

Test Mode: TX MODE

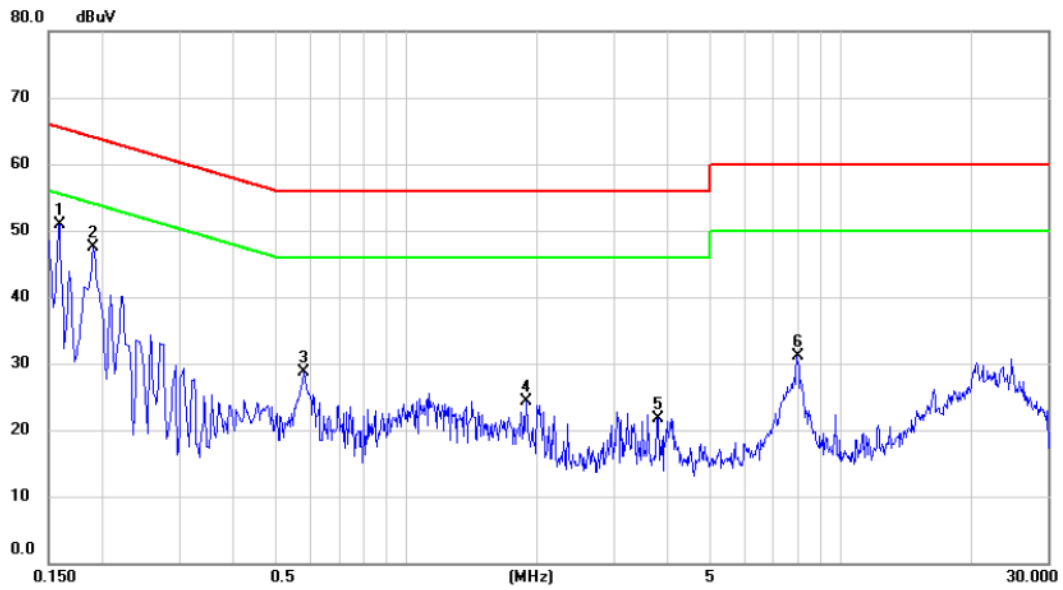
Line



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	*	0.154	42.86	9.75	52.61	65.75	-13.14	peak	
2		0.172	41.67	9.74	51.41	64.84	-13.43	peak	
3		0.222	31.29	9.72	41.01	62.74	-21.73	peak	
4		0.587	18.57	9.76	28.33	56.00	-27.67	peak	
5		1.532	18.56	9.82	28.38	56.00	-27.62	peak	
6		7.872	25.23	10.01	35.24	60.00	-24.76	peak	

Test Mode: TX MODE

Neutral

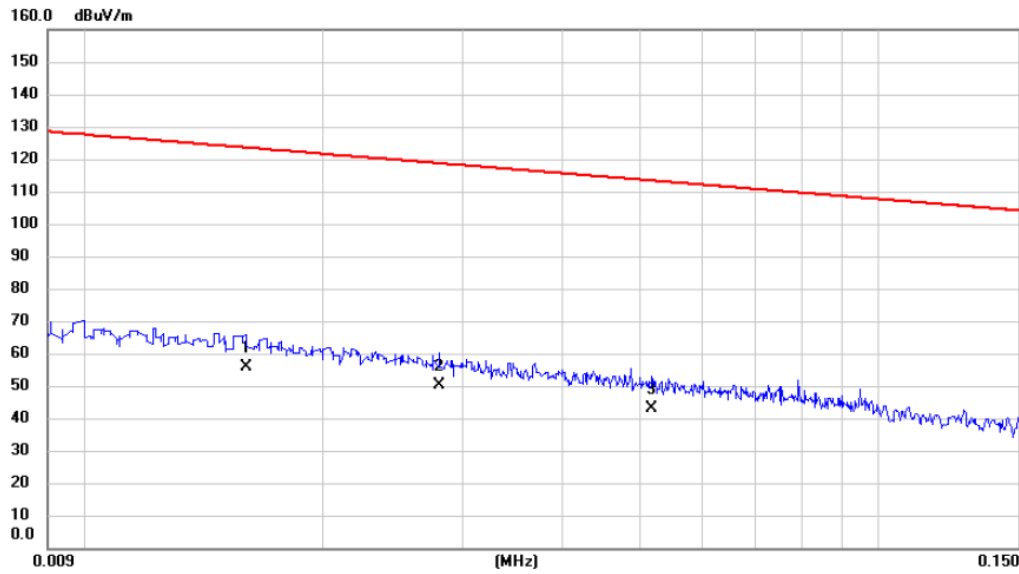


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	*	0.159	41.19	9.75	50.94	65.52	-14.58	peak	
2		0.191	37.87	9.73	47.60	64.01	-16.41	peak	
3		0.582	18.90	9.76	28.66	56.00	-27.34	peak	
4		1.891	14.39	9.82	24.21	56.00	-31.79	peak	
5		3.804	11.89	9.87	21.76	56.00	-34.24	peak	
6		7.966	20.99	10.02	31.01	60.00	-28.99	peak	

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

Test Mode: TX MODE

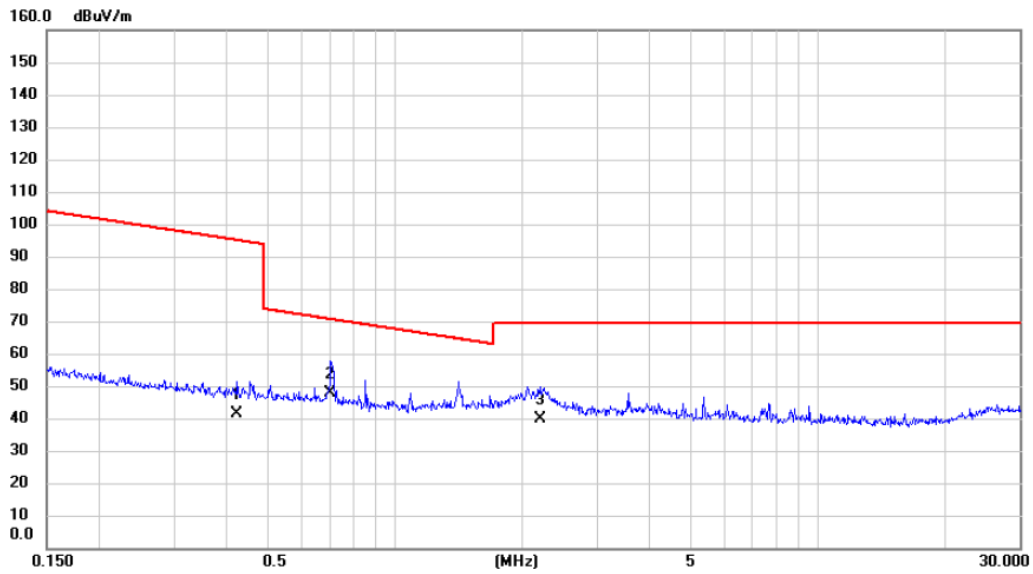
Ant 0°



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	0.0160	35.84	20.14	55.98	123.52	-67.54	AVG	
2		0.0280	30.77	19.38	50.15	118.66	-68.51	AVG	
3		0.0517	24.29	18.69	42.98	113.34	-70.36	AVG	

Test Mode: TX MODE

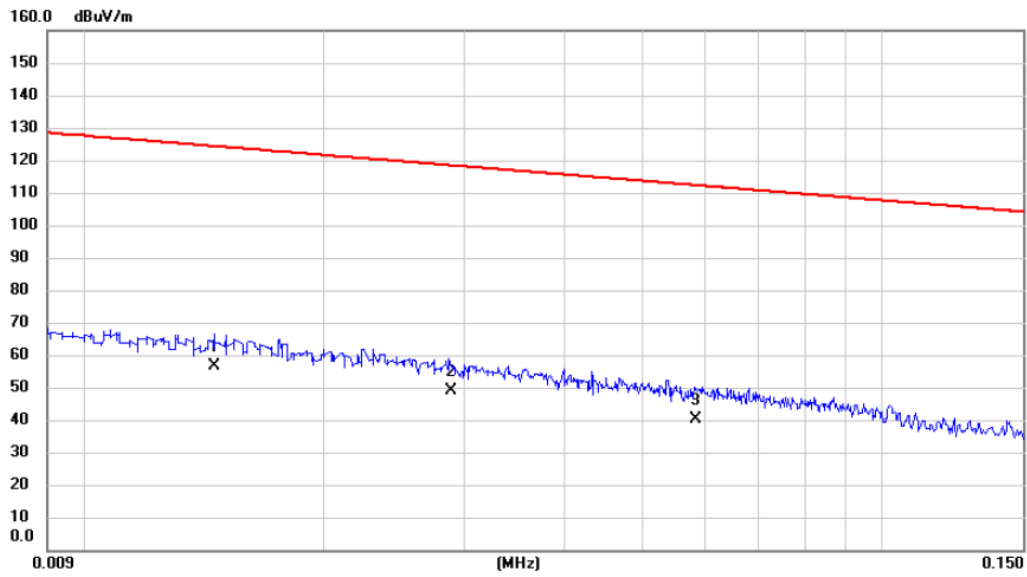
Ant 0°



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		0.4237	24.96	16.53	41.49	95.06	-53.57	AVG	
2	*	0.7046	31.68	16.23	47.91	70.65	-22.74	QP	
3		2.2130	24.50	15.45	39.95	69.54	-29.59	QP	

Test Mode: TX MODE

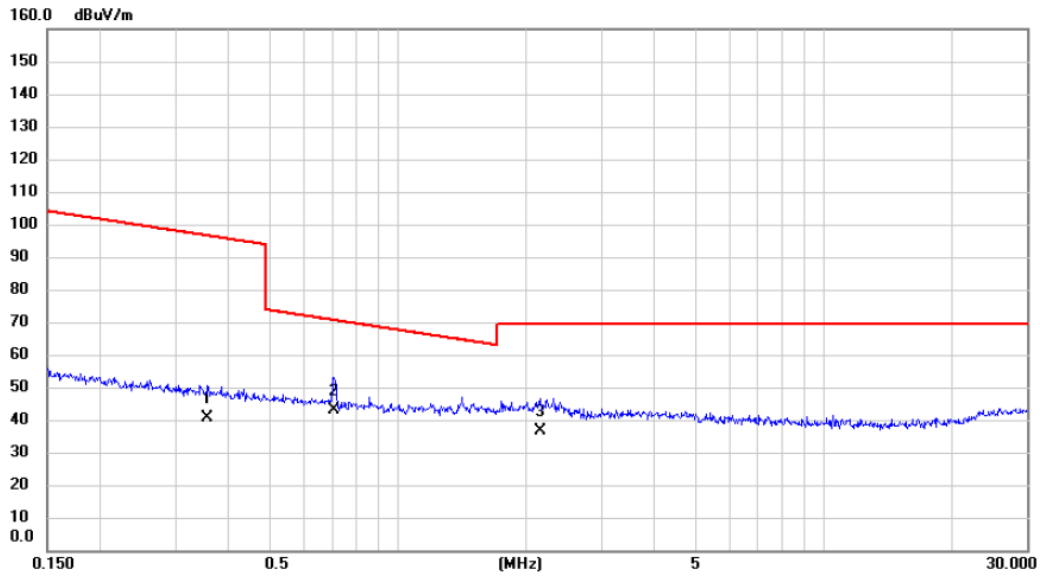
Ant 90°



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Detector	Comment
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB		
1	*	0.0146	36.32	20.32	56.64	124.32	-67.68	AVG	
2		0.0288	29.65	19.36	49.01	118.42	-69.41	AVG	
3		0.0583	21.57	18.56	40.13	112.29	-72.16	AVG	

Test Mode: TX MODE

Ant 90°

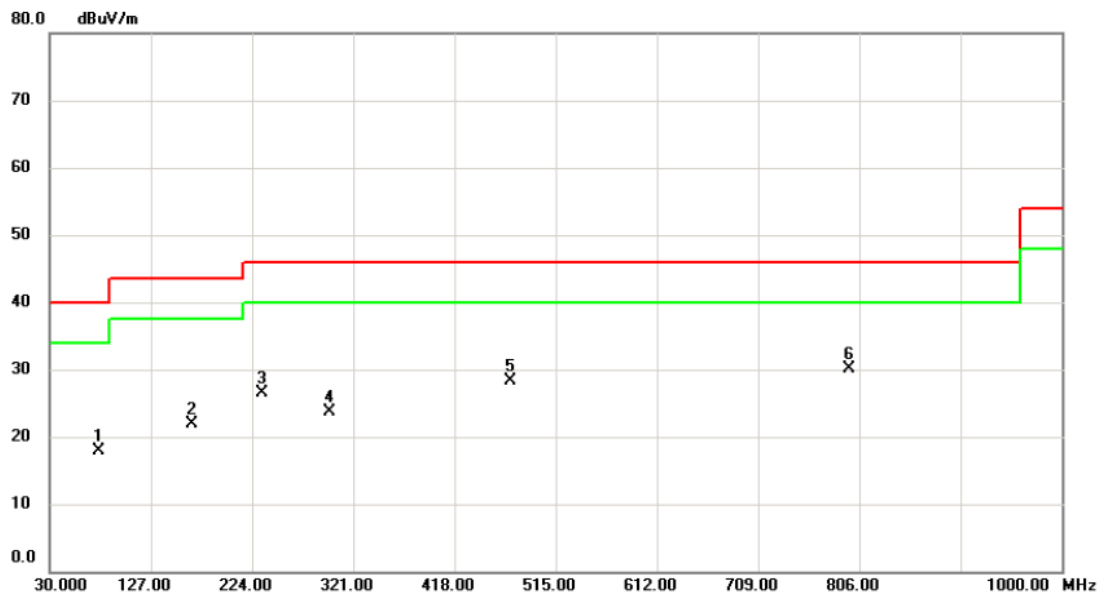


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		0.3574	24.20	16.57	40.77	96.54	-55.77	AVG	
2	*	0.7084	26.74	16.23	42.97	70.60	-27.63	QP	
3		2.1551	21.17	15.46	36.63	69.54	-32.91	QP	

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

Test Mode: TX 2402MHz

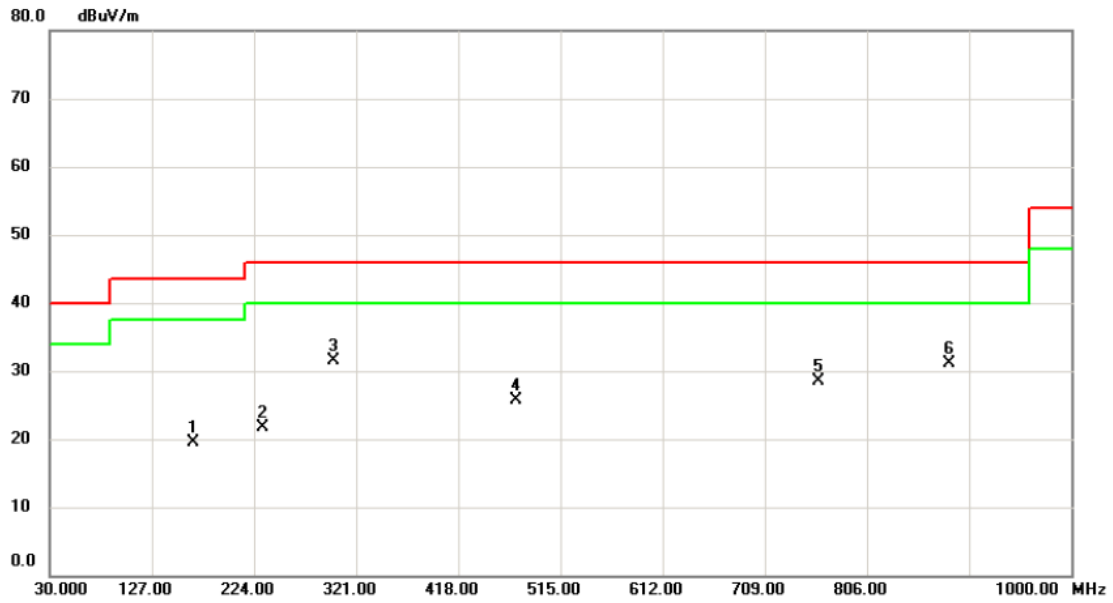
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		77.530	35.53	-17.66	17.87	40.00	-22.13	peak	
2		166.770	34.41	-12.53	21.88	43.50	-21.62	peak	
3		233.700	40.64	-14.22	26.42	46.00	-19.58	peak	
4		298.690	36.81	-13.01	23.80	46.00	-22.20	peak	
5		471.350	37.66	-9.41	28.25	46.00	-17.75	peak	
6	*	796.300	31.54	-1.44	30.10	46.00	-15.90	peak	

Test Mode: TX 2402MHz

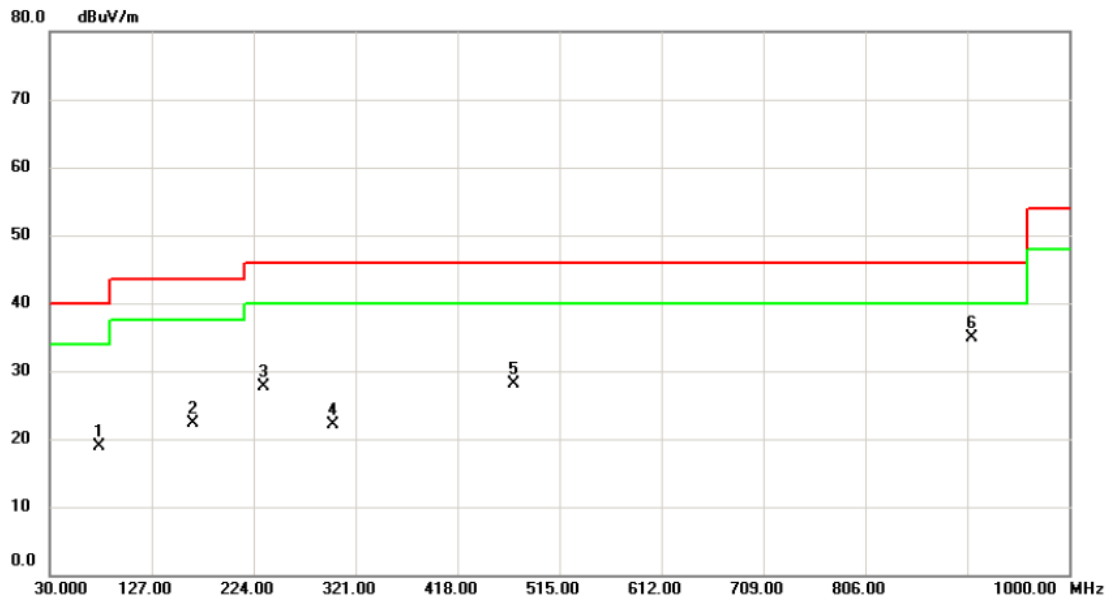
Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		166.770	32.08	-12.53	19.55	43.50	-23.95	peak	
2		232.730	35.85	-14.19	21.66	46.00	-24.34	peak	
3	*	299.660	44.35	-12.87	31.48	46.00	-14.52	peak	
4		473.290	35.01	-9.36	25.65	46.00	-20.35	peak	
5		760.410	30.74	-2.21	28.53	46.00	-17.47	peak	
6		884.570	30.34	0.71	31.05	46.00	-14.95	peak	

Test Mode: TX 2441MHz

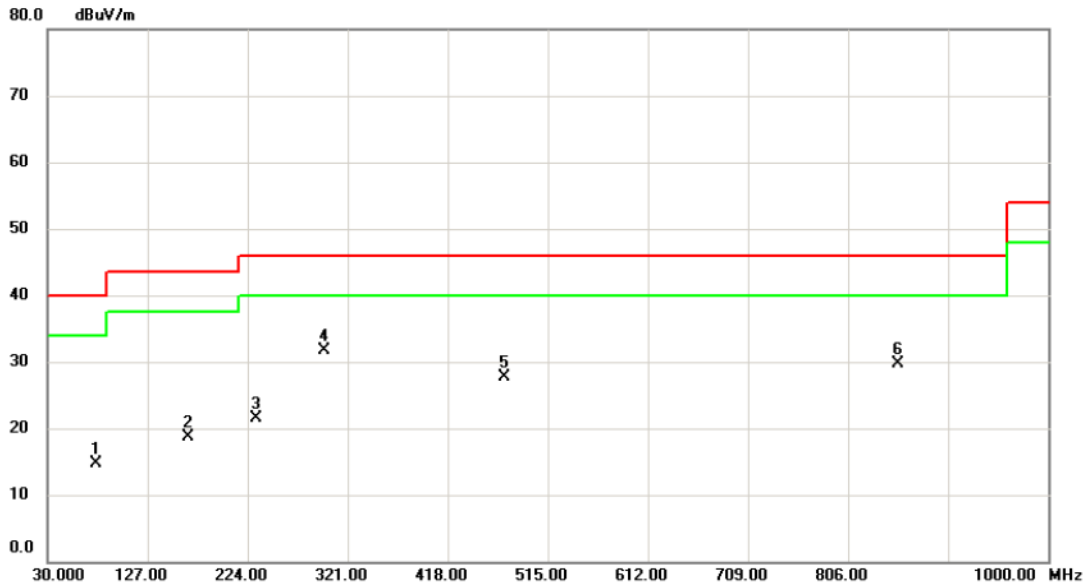
Vertical



No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measurement dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	77.530	36.62	-17.66	18.96	40.00	-21.04	peak	
2	166.770	34.89	-12.53	22.36	43.50	-21.14	peak	
3	233.700	41.92	-14.22	27.70	46.00	-18.30	peak	
4	299.660	35.04	-12.87	22.17	46.00	-23.83	peak	
5	471.350	37.44	-9.41	28.03	46.00	-17.97	peak	
6 *	906.880	33.82	1.16	34.98	46.00	-11.02	peak	

Test Mode: TX 2441MHz

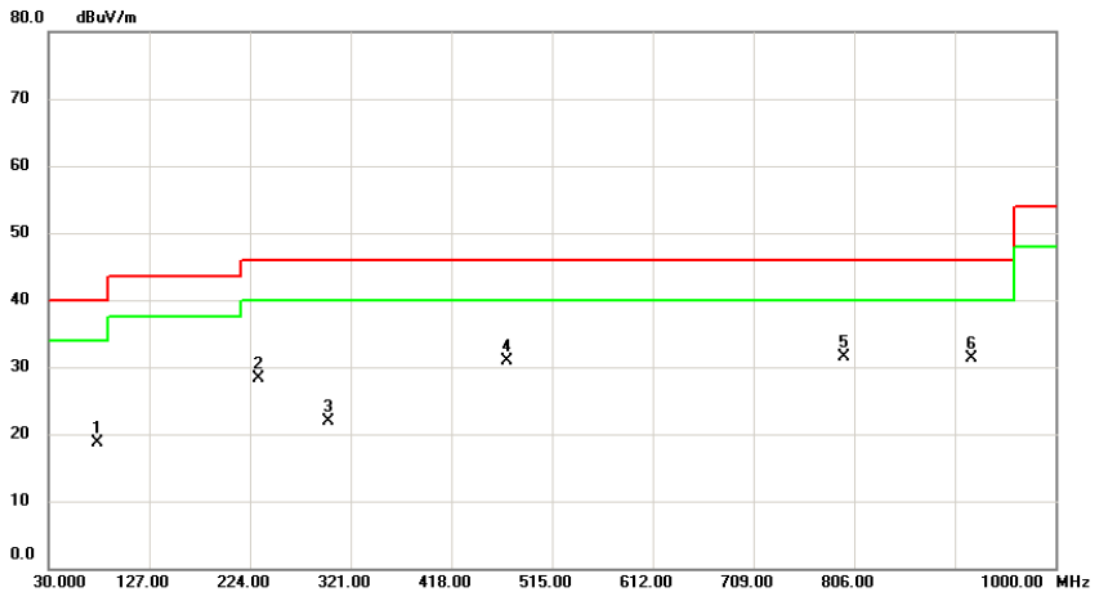
Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		77.530	32.37	-17.66	14.71	40.00	-25.29	peak	
2		165.800	31.19	-12.58	18.61	43.50	-24.89	peak	
3		232.730	35.70	-14.19	21.51	46.00	-24.49	peak	
4	*	298.690	44.79	-13.01	31.78	46.00	-14.22	peak	
5		473.290	37.04	-9.36	27.68	46.00	-18.32	peak	
6		854.500	29.53	0.09	29.62	46.00	-16.38	peak	

Test Mode: TX 2480MHz

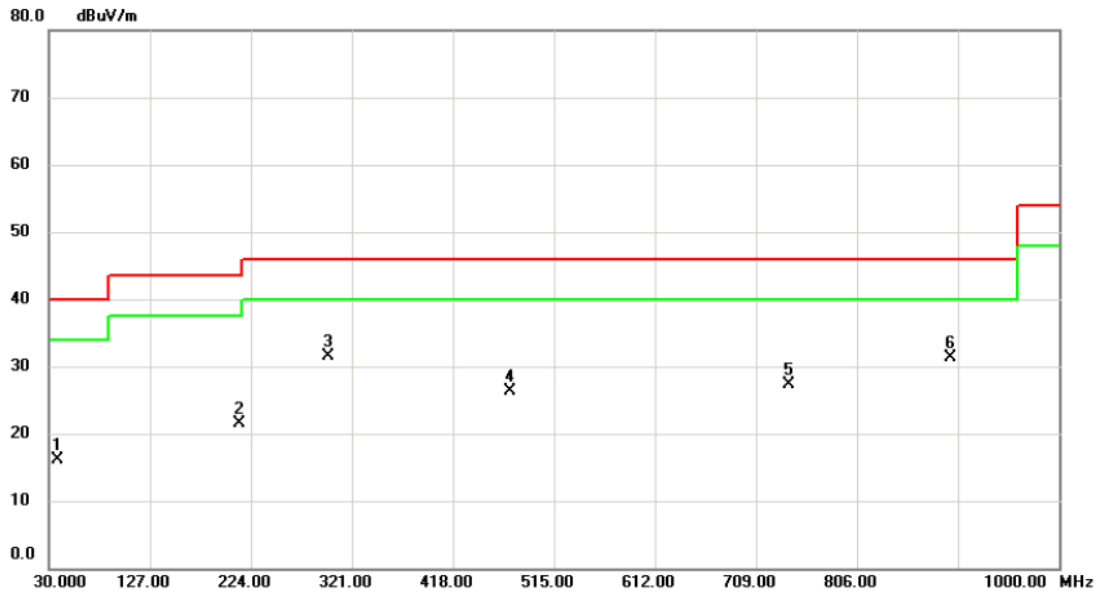
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		77.530	36.27	-17.66	18.61	40.00	-21.39	peak	
2		232.730	42.57	-14.19	28.38	46.00	-17.62	peak	
3		299.660	34.83	-12.87	21.96	46.00	-24.04	peak	
4		471.350	40.26	-9.41	30.85	46.00	-15.15	peak	
5	*	796.300	33.03	-1.44	31.59	46.00	-14.41	peak	
6		918.520	29.92	1.38	31.30	46.00	-14.70	peak	

Test Mode: TX 2480MHz

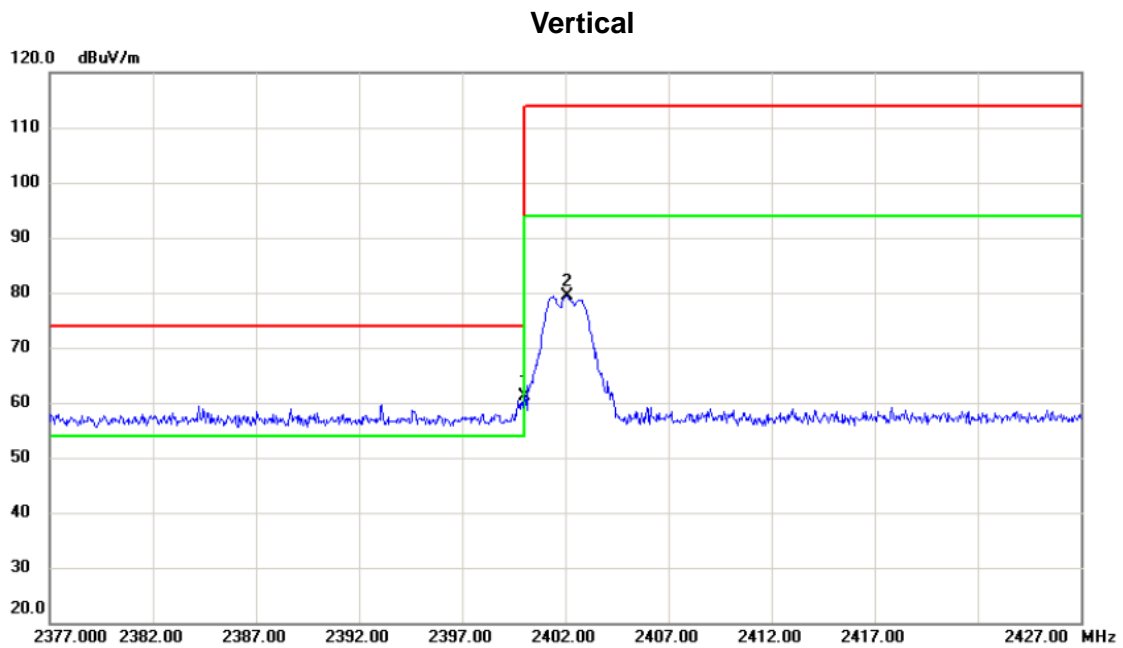
Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		37.760	30.49	-14.30	16.19	40.00	-23.81	peak	
2		213.330	35.39	-13.95	21.44	43.50	-22.06	peak	
3	*	298.690	44.54	-13.01	31.53	46.00	-14.47	peak	
4		473.290	35.69	-9.36	26.33	46.00	-19.67	peak	
5		741.010	29.93	-2.72	27.21	46.00	-18.79	peak	
6		895.240	30.41	0.93	31.34	46.00	-14.66	peak	

APPENDIX D - RADIATED EMISSION (ABOVE 1000MHZ)

Test Mode TX Mode_2402 MHz



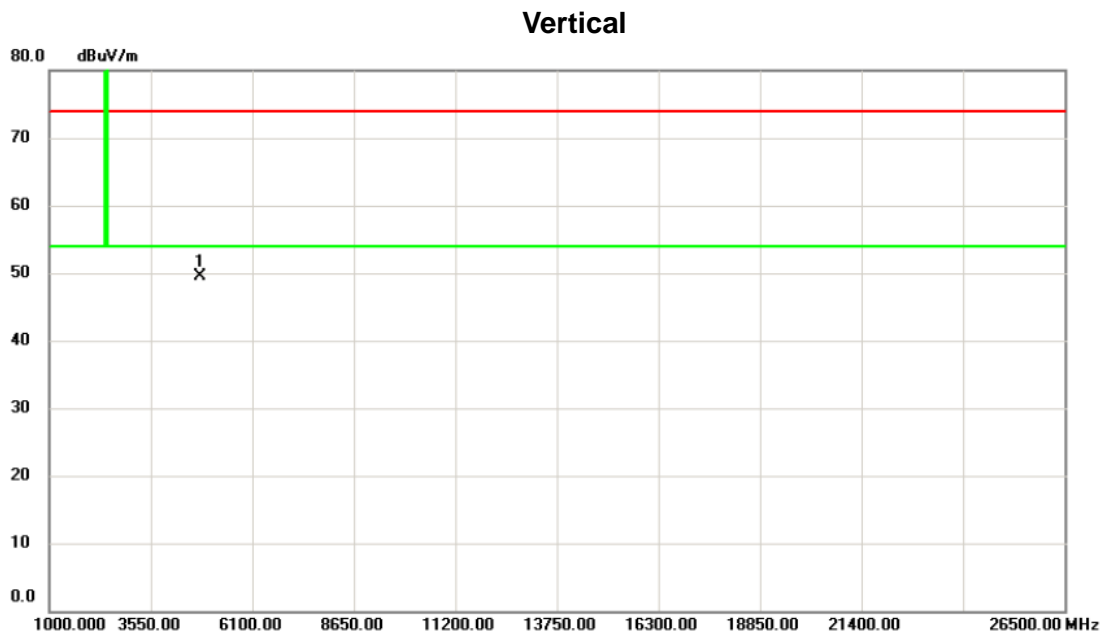
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	2400.000	28.04	33.09	61.13	74.00	-12.87	peak	
2		2402.100	46.25	33.11	79.36	114.00	-34.64	peak	

(1) The AVG value of fundamental frequency is:

Average Reading = Peak value + 20log (Duty cycle) , AV=Peak-28.94

Frequency (MHz)	Peak value (dBuV/m)	AVG value (dBuV/m)	AVG Limit (dBuV/m)	Result
2400.00	61.13	32.19	54	PASS
2402.10	79.36	50.42	94	PASS

Test Mode TX Mode_2402 MHz



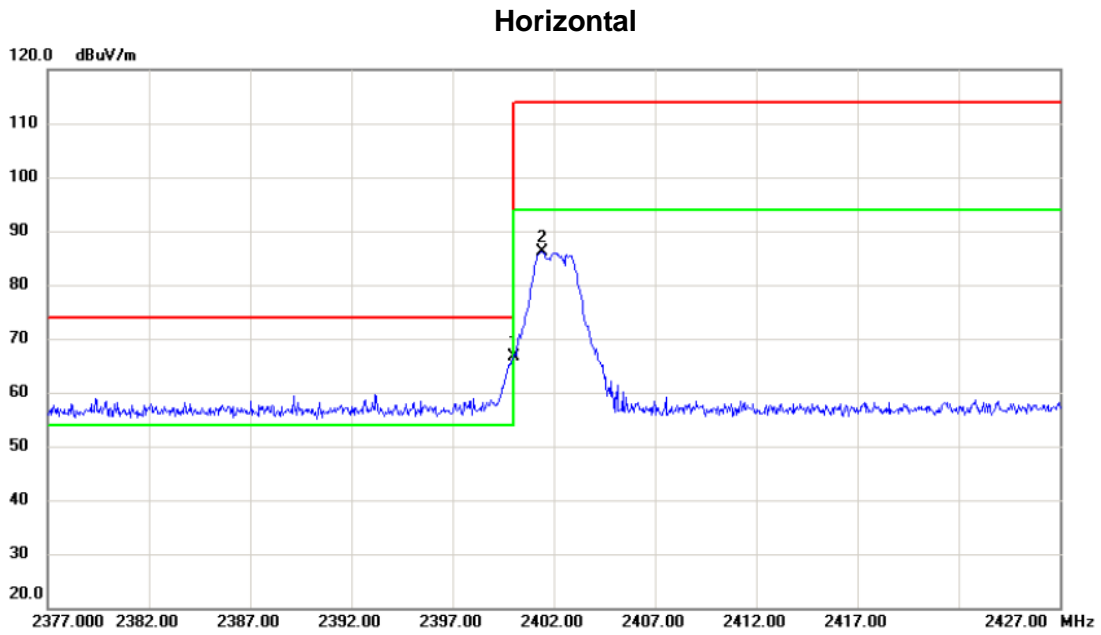
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Detector	Comment
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB		
1	*	4802.730	42.89	6.57	49.46	74.00	-24.54	peak	

(1) The AVG value of fundamental frequency is:

Average Reading = Peak value + 20log (Duty cycle) , AV=Peak-28.94

Frequency (MHz)	Peak value (dBuV/m)	AVG value (dBuV/m)	AVG Limit (dBuV/m)	Result
4802.73	49.46	20.52	54	PASS

Test Mode TX Mode_2402 MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Detector	Comment
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB		
1	*	2400.000	33.43	33.09	66.52	74.00	-7.48	peak	
2		2401.450	53.07	33.10	86.17	114.00	-27.83	peak	

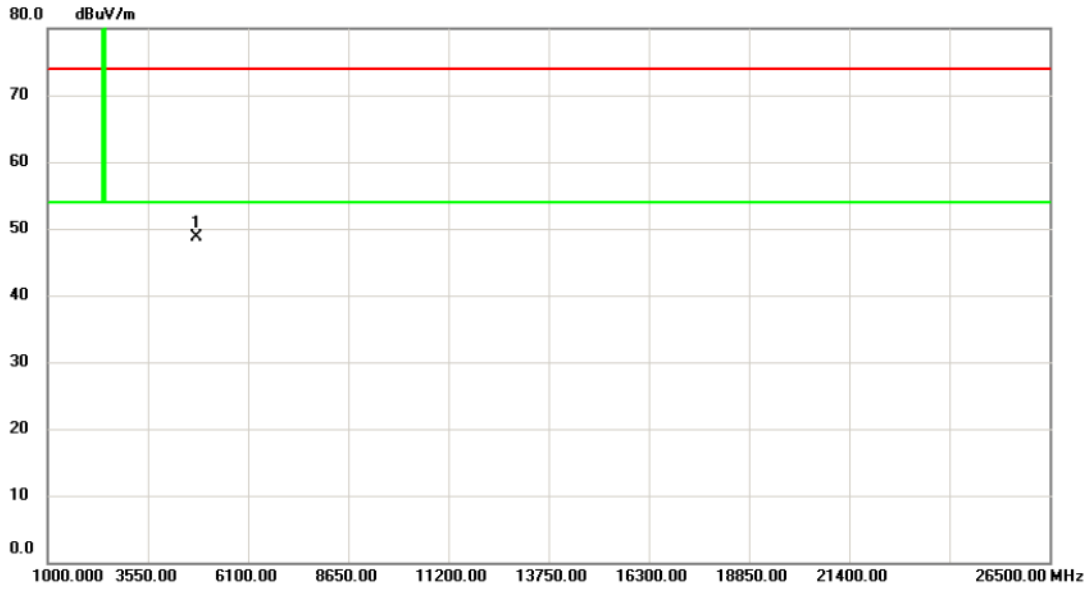
(1) The AVG value of fundamental frequency is:

Average Reading = Peak value + 20log (Duty cycle) , AV=Peak-28.94

Frequency (MHz)	Peak value (dBuV/m)	AVG value (dBuV/m)	AVG Limit (dBuV/m)	Result
2400.00	66.52	37.58	54	PASS
2401.45	86.17	57.23	94	PASS

Test Mode	TX Mode_2402 MHz
-----------	------------------

Horizontal



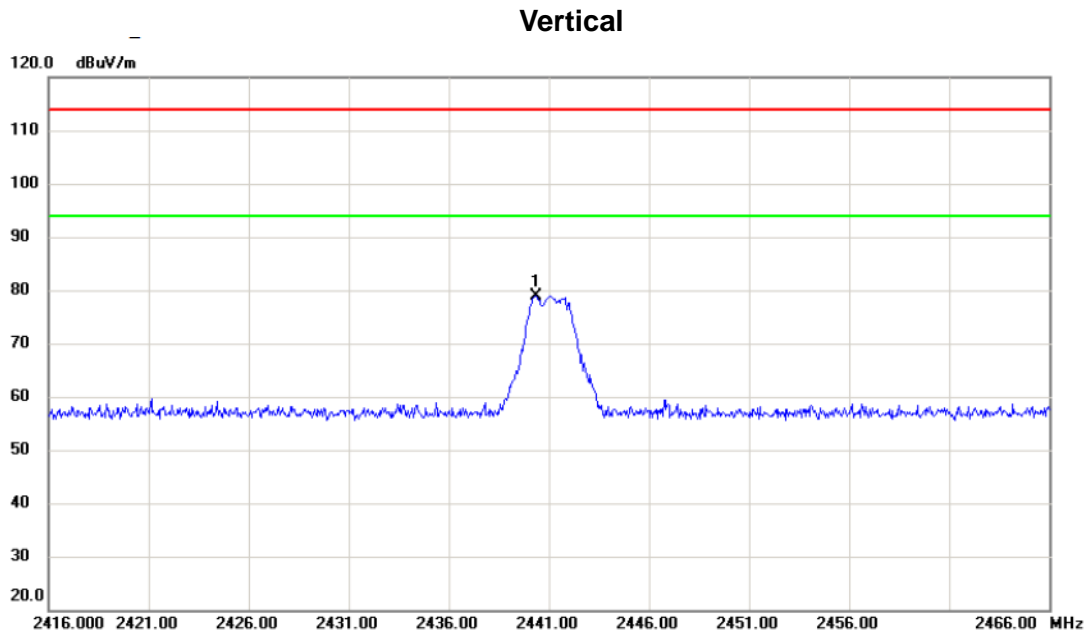
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Detector	Comment
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB		
1	*	4802.730	42.18	6.57	48.75	74.00	-25.25	peak	

(1) The AVG value of fundamental frequency is:

Average Reading = Peak value + 20log (Duty cycle) , AV=Peak-28.94

Frequency (MHz)	Peak value (dBuV/m)	AVG value (dBuV/m)	AVG Limit (dBuV/m)	Result
4802.73	48.75	19.81	54	PASS

Test Mode	TX Mode_2441 MHz
-----------	------------------



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	2440.350	45.65	33.24	78.89	114.00	-35.11	peak	

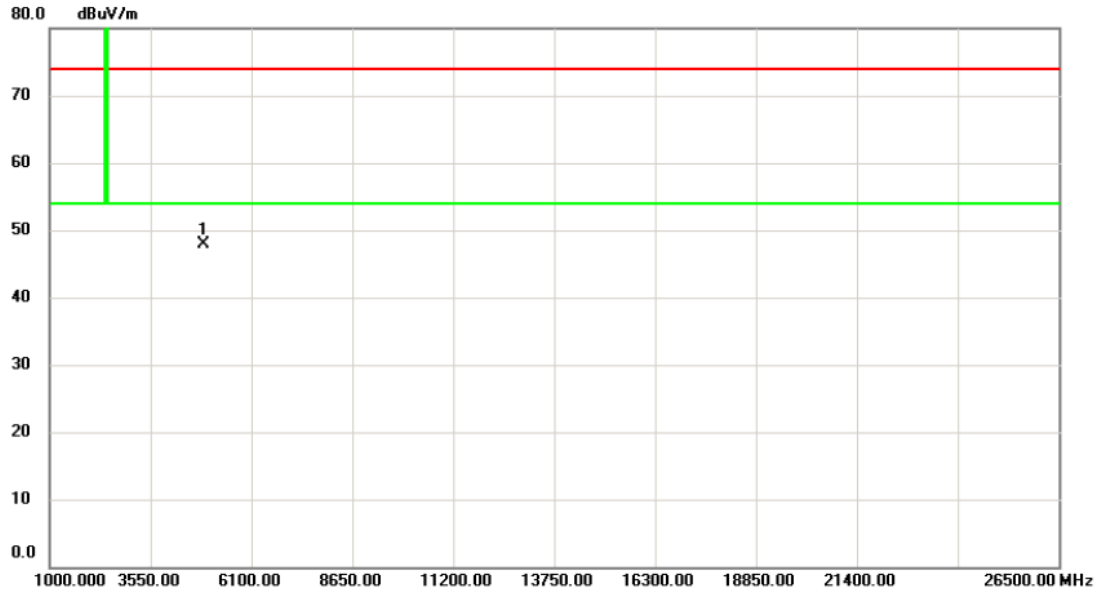
(1) The AVG value of fundamental frequency is:

Average Reading = Peak value + 20log (Duty cycle) , AV=Peak-28.94

Frequency (MHz)	Peak value (dBuV/m)	AVG value (dBuV/m)	AVG Limit (dBuV/m)	Result
2440.35	78.89	49.95	94	PASS

Test Mode	TX Mode_2441 MHz
-----------	------------------

Vertical



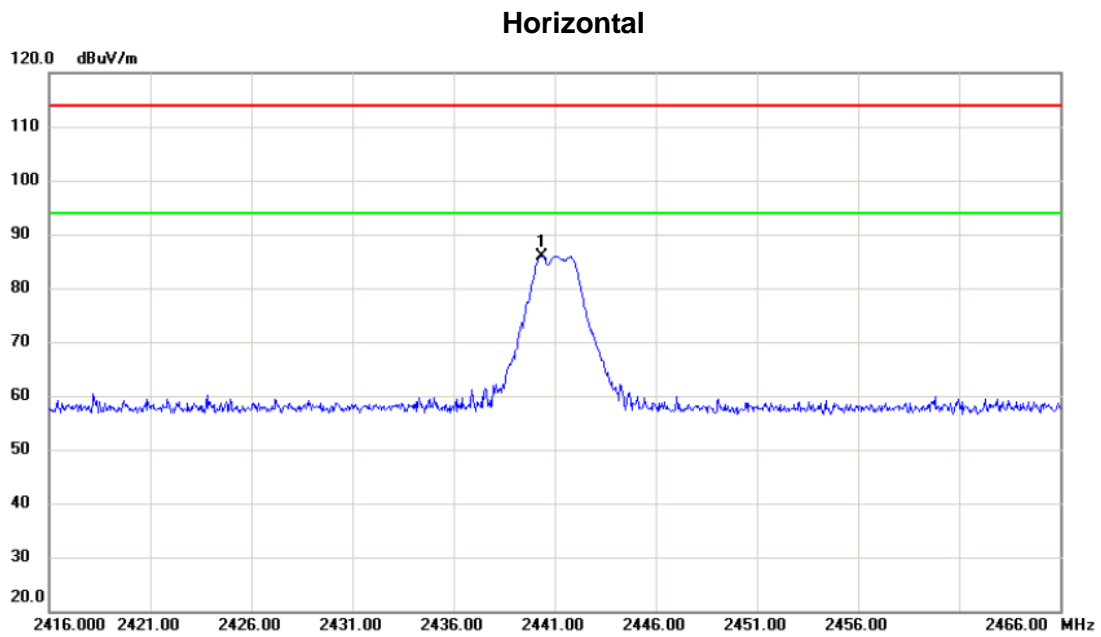
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	4880.820	41.08	6.87	47.95	74.00	-26.05	peak	

(1) The AVG value of fundamental frequency is:

Average Reading = Peak value + 20log (Duty cycle) , AV=Peak-28.94

Frequency (MHz)	Peak value (dBuV/m)	AVG value (dBuV/m)	AVG Limit (dBuV/m)	Result
4880.82	47.95	19.01	54	PASS

Test Mode	TX Mode_2441 MHz
-----------	------------------



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Detector	Comment
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB		
1	*	2440.350	52.71	33.24	85.95	114.00	-28.05	peak	

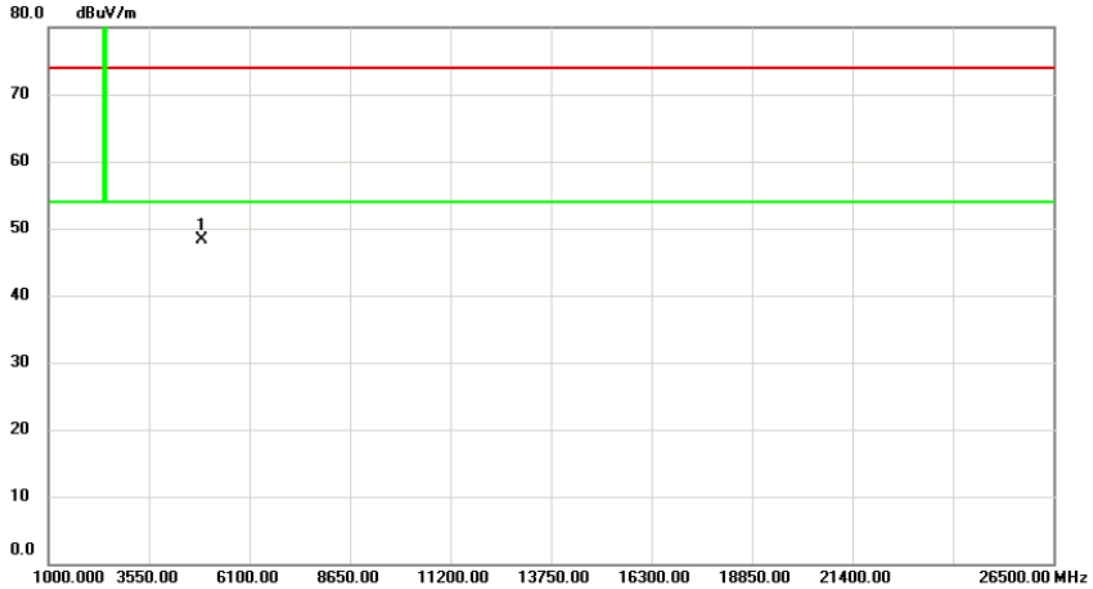
(1) The AVG value of fundamental frequency is:

Average Reading = Peak value + 20log (Duty cycle) , AV=Peak-28.94

Frequency (MHz)	Peak value (dBuV/m)	AVG value (dBuV/m)	AVG Limit (dBuV/m)	Result
2440.35	85.95	57.01	94	PASS

Test Mode	TX Mode_2441 MHz
-----------	------------------

Horizontal



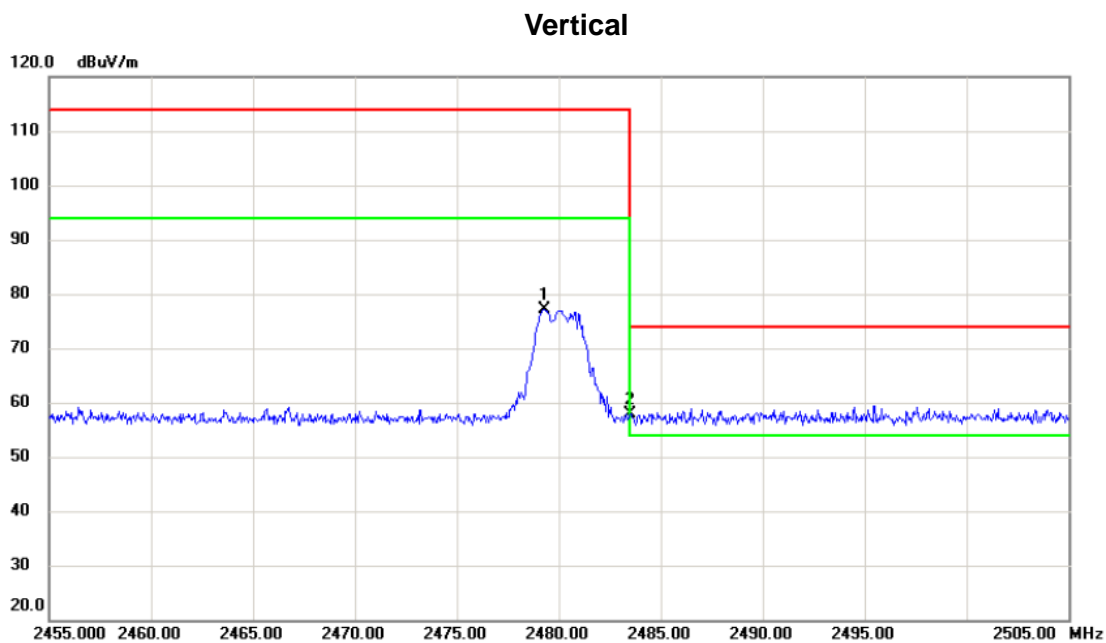
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Detector	Comment
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB		
1	*	4880.640	41.50	6.87	48.37	74.00	-25.63	peak	

(1) The AVG value of fundamental frequency is:

Average Reading = Peak value + 20log (Duty cycle) , AV=Peak-28.94

Frequency (MHz)	Peak value (dBuV/m)	AVG value (dBuV/m)	AVG Limit (dBuV/m)	Result
4880.64	48.37	19.43	54	PASS

Test Mode	TX Mode_2480 MHz
-----------	------------------



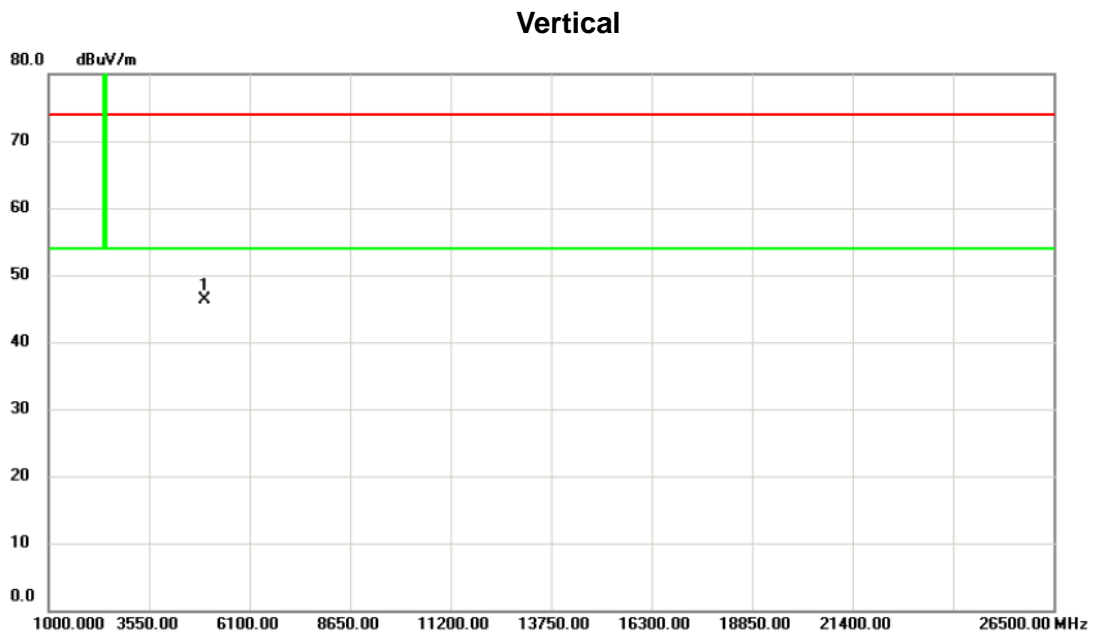
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Detector	Comment
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB		
1		2479.300	43.71	33.40	77.11	114.00	-36.89	peak	
2	*	2483.500	24.36	33.41	57.77	74.00	-16.23	peak	

(1) The AVG value of fundamental frequency is:

Average Reading = Peak value + 20log (Duty cycle) , AV=Peak-28.94

Frequency (MHz)	Peak value (dBuV/m)	AVG value (dBuV/m)	AVG Limit (dBuV/m)	Result
2479.30	77.11	48.17	94	PASS
2483.50	57.77	28.83	54	PASS

Test Mode	TX Mode_2480 MHz
-----------	------------------



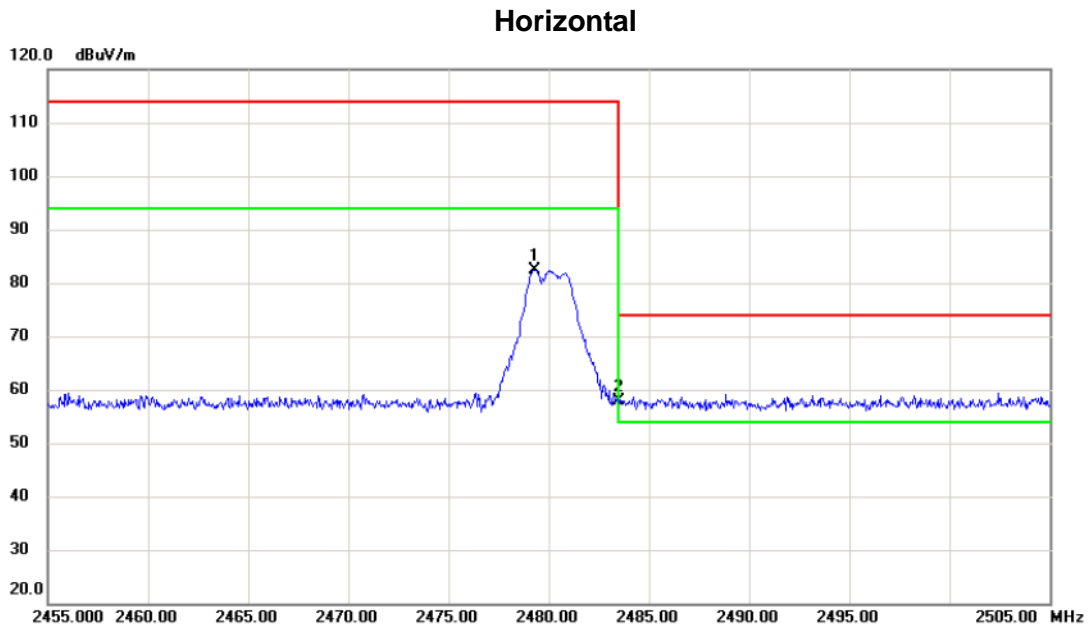
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Detector	Comment
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB		
1	*	4958.530	39.12	7.15	46.27	74.00	-27.73	peak	

(1) The AVG value of fundamental frequency is:

Average Reading = Peak value + 20log (Duty cycle) , AV=Peak-28.94

Frequency (MHz)	Peak value (dBuV/m)	AVG value (dBuV/m)	AVG Limit (dBuV/m)	Result
4958.53	46.27	17.33	54	PASS

Test Mode	TX Mode_2480 MHz
-----------	------------------



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Detector	Comment
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB		
1		2479.300	48.96	33.40	82.36	114.00	-31.64	peak	
2	*	2483.500	24.52	33.41	57.93	74.00	-16.07	peak	

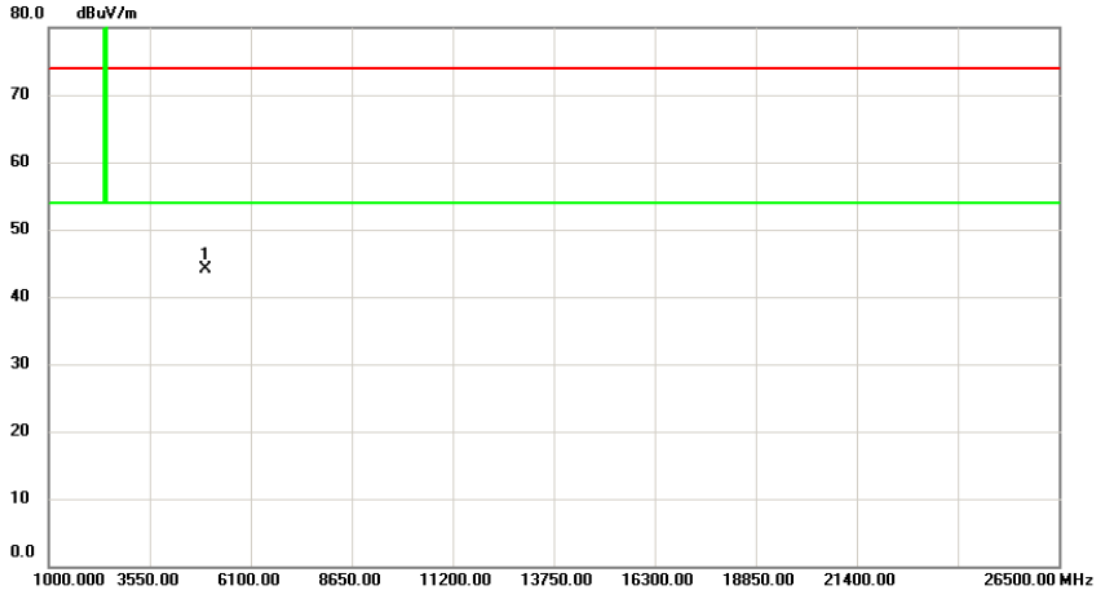
(1) The AVG value of fundamental frequency is:

Average Reading = Peak value + 20log (Duty cycle) , AV=Peak-28.94

Frequency (MHz)	Peak value (dBuV/m)	AVG value (dBuV/m)	AVG Limit (dBuV/m)	Result
2479.30	82.36	53.42	94	PASS
2483.50	57.93	28.99	54	PASS

Test Mode	TX Mode_2480 MHz
-----------	------------------

Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Detector	Comment
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB		
1	*	4958.670	36.86	7.15	44.01	74.00	-29.99	peak	

(1) The AVG value of fundamental frequency is:

Average Reading = Peak value + 20log (Duty cycle) , AV=Peak-28.94

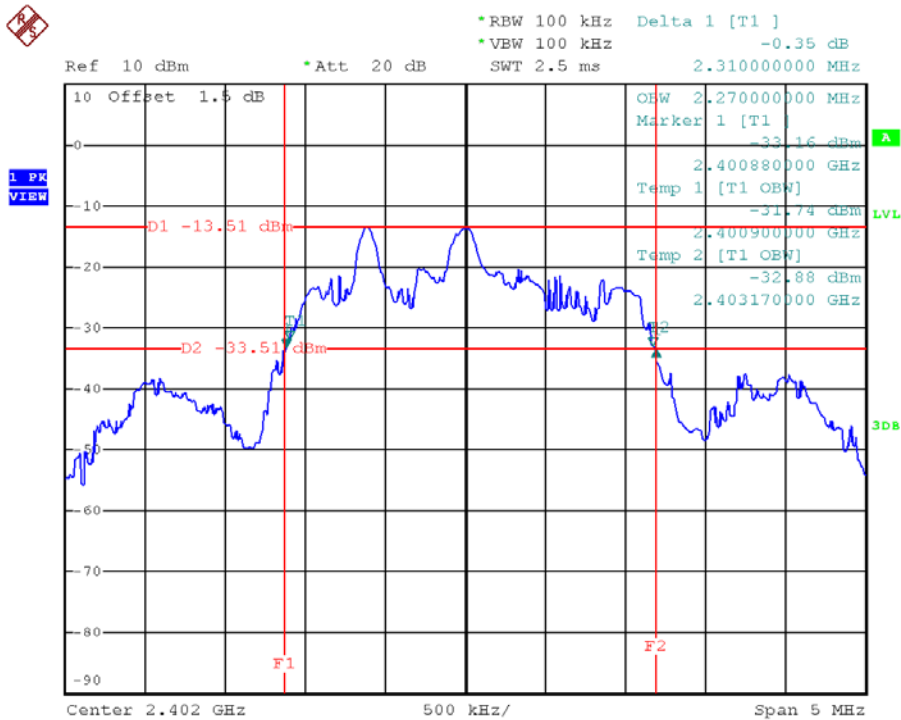
Frequency (MHz)	Peak value (dBuV/m)	AVG value (dBuV/m)	AVG Limit (dBuV/m)	Result
4958.67	44.01	15.07	54	PASS

APPENDIX E - BANDWIDTH

Test Mode: TX Mode_2402 MHz/2441 MHz/2480 MHz

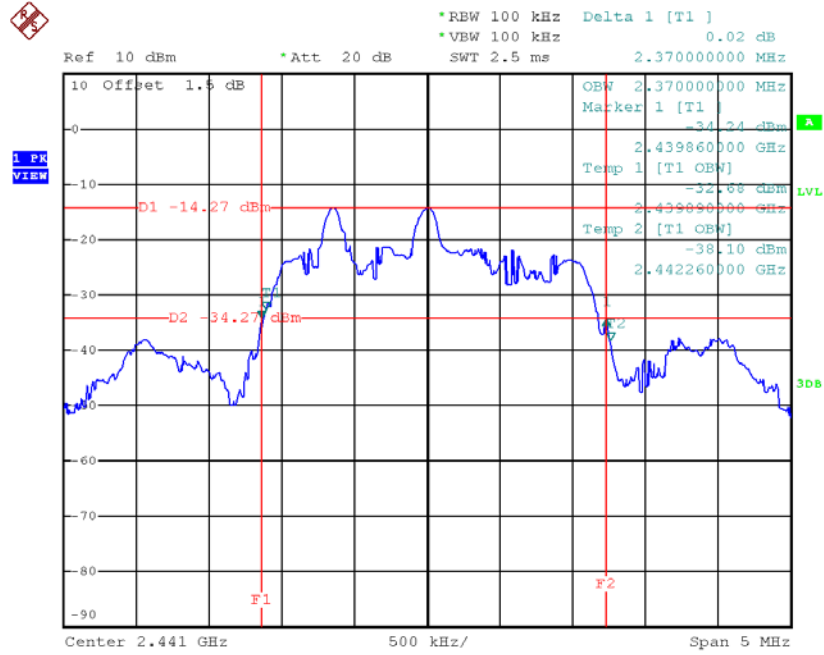
Frequency (MHz)	20dB Bandwidth (MHz)	99% Occupied BW (MHz)
2402	2.31	2.27
2441	2.37	2.37
2480	2.32	2.65

TX Mode_2402 MHz



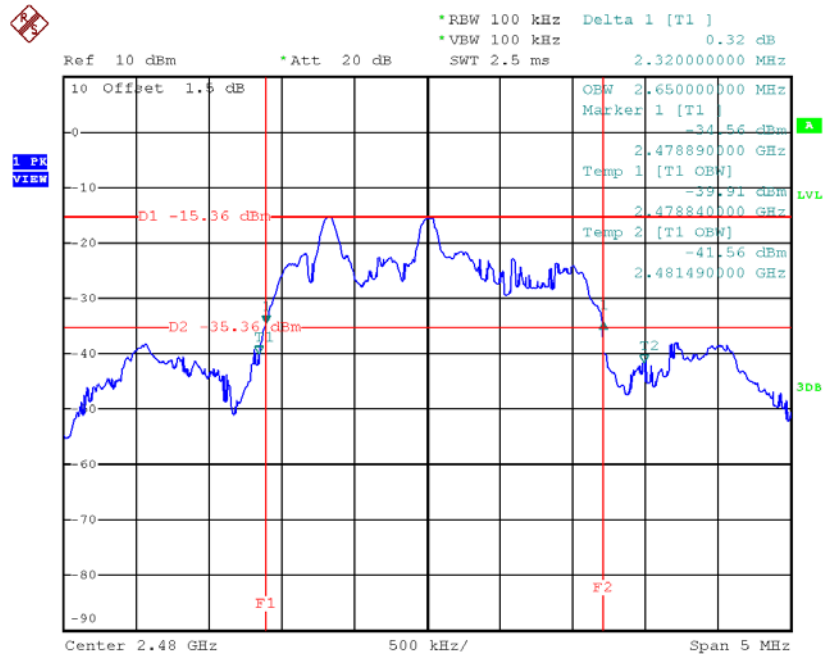
Date: 5.MAR.2018 10:43:31

TX Mode_2441 MHz



Date: 5.MAR.2018 10:47:13

TX Mode_2480 MHz



Date: 5.MAR.2018 10:56:38