FCC&ISED Radio Test Report

FCC ID: Q3N-3656CRADLE

IC: 5121A-3656CRADLE

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

Project No.	:	1804T061
Equipment	:	Cradle
Test Model	:	3656 CRADLE
Series Model	:	N/A
Applicant	:	CIPHERLAB CO., LTD.
Address	:	12F, 333, Dunhua S. Rd., Sec. 2, Taipei, Taiwan

Date of Receipt	:	May 02, 2018
Date of Test	:	May 02, 2018 ~ May 17, 2018
Issued Date	:	May 18, 2018
Tested by	:	BTL Inc.

Testing Engineer : (Kenji Lin)

Technical Manager : (James Chiu)

Authorized Signatory : (Andy Chiu)

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Testing Laboratory
0659

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-FICP-1-1804T061	Original Issue.	May 18, 2018

1. CERTIFICATION

Equipment	:	Cradle
Brand Name	:	CIPHERLAB
Test Model	:	3656 CRADLE
Series Model	:	N/A
Applicant	:	CIPHERLAB CO., LTD.
Manufacturer	:	CIPHERLAB CO., LTD.
Address	:	12F, 333, Dunhua S. Rd., Sec. 2, Taipei, Taiwan
Date of Test	:	May 02, 2018 ~ May 17, 2018
Test Sample	:	Engineering Sample
Standard(s)	:	FCC Part15, Subpart C (15.247)/ ANSI C63.10-2013 RSS-247 Issue 2, Feb. 2017 RSS-GEN Issue 4, Nov. 2014

The above equipment has been tested and found in 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-FICP-1-1804T061) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of TAF according to the ISO-17025 quality assessment standard and technical standard(s).

Test results included in this report is only for the Bluetooth EDR part.

2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

Applied Standard(s): FCC Part15, Subpart C (15.247) RSS-247 Issue 2, Feb. 2017, RSS-GEN Issue 4, Nov. 2014				
Standard(s) Section		Test Item	Judgment	Remark
FCC	IC			
15.207	RSS-GEN 8.8	Conducted Emission	PASS	
15.247(d)	RSS-247 5.5	Antenna conducted Spurious Emission	PASS	
15.247 (a)(1)	RSS-247 5.1 (b)	Hopping Channel Separation	PASS	
15.247(a)(1)	RSS-247 5.1 (a)	Bandwidth	PASS	
15.247 (b)(1)	RSS-247 5.4 (b)	Peak Output Power	PASS	
15.247(d) 15.209	RSS-247 5.5	Radiated Spurious Emission	PASS	
15.247 (a)(1)(iii)	RSS-247 5.1 (d)	Number of Hopping Frequency	PASS	
15.247 (a)(1)(iii)	RSS-247 5.1 (d)	Dwell Time	PASS	
15.205	RSS-GEN 8.10	Restricted Bands	PASS	
15.203	-	Antenna Requirement	PASS	

Note:

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

2.1 TEST FACILITY

The test facilities used to collect the test data in this report:

Conducted emission Test:

C05: (VCCI RN: C-4742; FCC RN:674415; FCC DN:TW0659)
No. 68-1, Ln. 169, Sec. 2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan (R.O.C.)

Radiated emission Test (Below 1 GHz):

CB15: (VCCI RN: R-20020; FCC RN:674415; FCC DN:TW0659; ISED Assigned Code:20088-5)
No. 68-1, Ln. 169, Sec. 2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan (R.O.C.)

Radiated emission Test (Above 1 GHz):

CB15: (VCCI RN: G-20031; FCC RN:674415; FCC DN:TW0659; ISED Assigned Code:20088-5)
No. 68-1, Ln. 169, Sec. 2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan (R.O.C.)

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 ± 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 emission test:

Test Site	Method	Measurement Frequency Range	U,(dB)
C05	CISPR	150 kHz ~ 30MHz	2.68

B. Radiated emission test:

Test Site	Method	Measurement Frequency Range	U,(dB)
CB15 (3m)	CISPR	9kHz ~ 150kHz	2.82
		150kHz ~ 30MHz	2.58

Test Site	Method	Measurement Frequency Range	Ant.	U,(dB)
CB15 (3m)	CISPR	30MHz ~ 200MHz	V	4.20
		30MHz ~ 200MHz	H	3.64
		200MHz ~ 1,000MHz	V	4.56
		200MHz ~ 1,000MHz	H	3.90

Test Site	Method	Measurement Frequency Range	Ant.	U,(dB)
CB15 (3m)	CISPR	1GHz ~ 6GHz	V	4.46
		1GHz ~ 6GHz	H	4.40
		6GHz ~ 18GHz	V	3.88
		6GHz ~ 18GHz	H	4.00

Test Site	Method	Measurement Frequency Range	U,(dB)
CB15 (1m)	CISPR	18 ~ 26.5 GHz	4.62
		26.5 ~ 40 GHz	5.12

Our calculated Measurement Instrumentation Uncertainty is shown in the tables above.
These are our U_{lab} values in CISPR 16-4-2 terminology.
Since Table 1 of CISPR 16-4-2 has values of measurement instrumentation uncertainty, called U_{CISPR}, as follows:

Conducted Disturbance (mains port) – 150 kHz – 30 MHz: 3.6 dB
Radiated Disturbance (electric field strength on an open area test site or alternative test site) – 30 MHz – 1000 MHz: 5.2 dB

It can be seen that our U_{lab} values are smaller than U_{CISPR}.
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	Cradle
Brand Name	CIPHERLAB
Test Model	3656 CRADLE
Series Model	N/A
Model Difference	N/A
Power Source	DC voltage supplied from External Power Supply. Elementech International Co., Ltd / A106-1050101U
Power Rating	I/P: 100-240V~50-60Hz, 0.2A O/P: 5V⎓1A
Products Covered	1* AC Adapter: Elementech International Co., Ltd / A106-1050101U
BT Version	2.1+EDR
Operation Frequency	2402~2480 MHz
Modulation Technology	GFSK, π/4-DQPSK, 8DPSK
Bit Rate of Transmitter	1/2/3Mbps
Output Power Max.	1 Mbps: 4.17 dBm 3 Mbps: 3.79 dBm

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)
00	2402	27	2429	54	2456
01	2403	28	2430	55	2457
02	2404	29	2431	56	2458
03	2405	30	2432	57	2459
04	2406	31	2433	58	2460
05	2407	32	2434	59	2461
06	2408	33	2435	60	2462
07	2409	34	2436	61	2463
08	2410	35	2437	62	2464
09	2411	36	2438	63	2465
10	2412	37	2439	64	2466
11	2413	38	2440	65	2467
12	2414	39	2441	66	2468
13	2415	40	2442	67	2469
14	2416	41	2443	68	2470
15	2417	42	2444	69	2471
16	2418	43	2445	70	2472
17	2419	44	2446	71	2473
18	2420	45	2447	72	2474
19	2421	46	2448	73	2475
20	2422	47	2449	74	2476
21	2423	48	2450	75	2477
22	2424	49	2451	76	2478
23	2425	50	2452	77	2479
24	2426	51	2453	78	2480
25	2427	52	2454		
26	2428	53	2455		

3. Table for Filed Antenna

Ant.	Brand	Test Model	Antenna Type	Connector	Gain (dBi)
1	CIPHERLAB	KX00000060087	PIFA	U.FL	3.66

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 **Note (1)**

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

For Conducted Emission	
Final Test Mode	Description
Mode 1	TX Mode

For Radiated Emission	
Final Test Mode	Description
Mode 1	TX Mode **Note (1)**

Note:

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

(2) The measurements for Hopping Channel Separation, Bandwidth and Peak Output Power were tested during 1Mbps, 2Mbps and 3Mbps, the worst case are 1Mbps and 3Mbps, only worst case was documented.

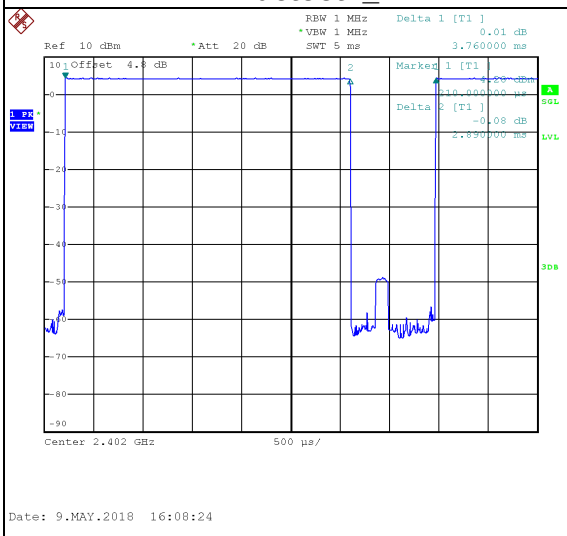
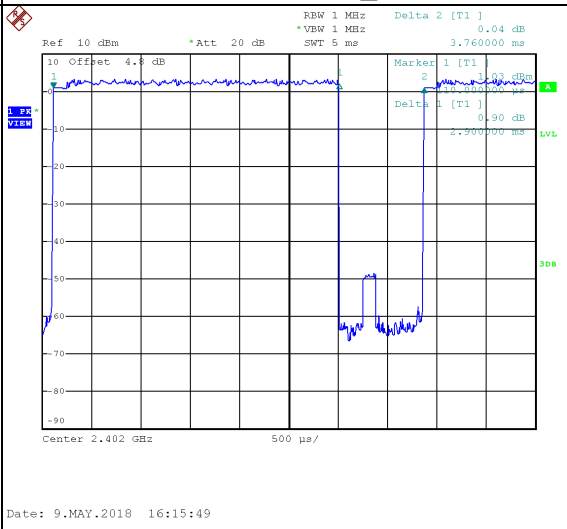
3.3 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING

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	hypertrm		
Frequency	2402 MHz	2441 MHz	2480 MHz
Parameters(1Mbps)	DEF	DEF	DEF
Parameters(3Mbps)	DEF	DEF	DEF

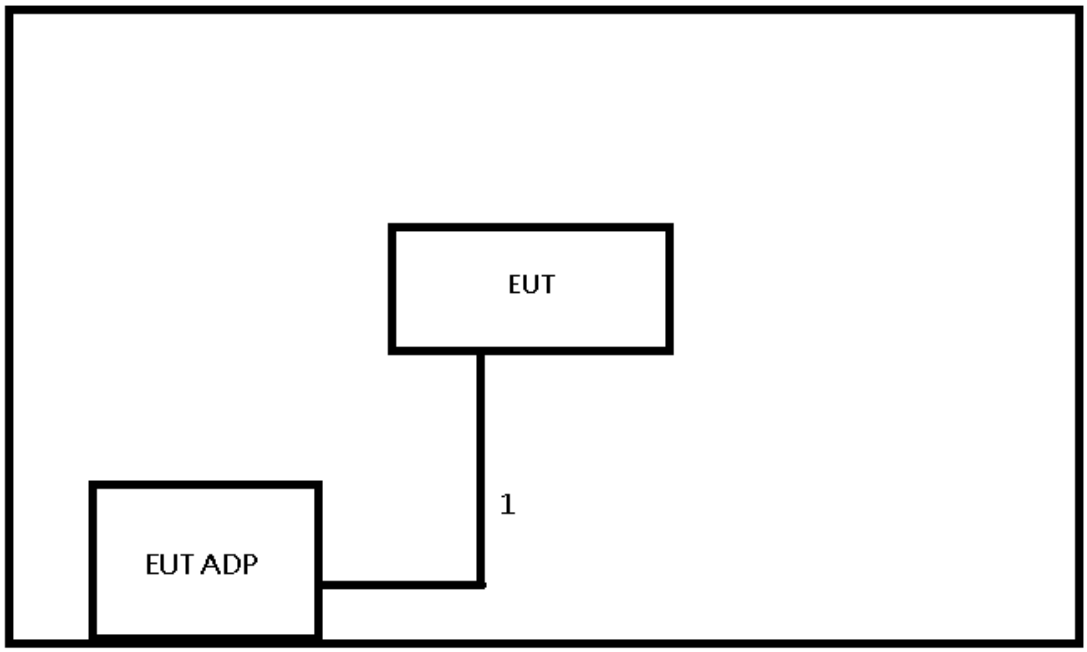
3.4 DUTY CYCLE

If duty cycle is ≥ 98 %, duty factor is not required.
If duty cycle is < 98 %, duty factor shall be considered.

Bluetooth_1M	Bluetooth_3M
	
Duty cycle = 2.890 ms / 3.760 ms = 76.86 % Duty Factor = 10 * log(1 / 0.7686) = 1.14	Duty cycle = 2.900 ms / 3.760 ms = 77.13 % Duty Factor = 10 * log(1 / 0.7713) = 1.13

Note:
For radiated emissions frequency above 1 GHz, the resolution bandwidth of test receiver/spectrum analyzer is 1/3 MHz and the video bandwidth is 3 kHz (Duty cycle < 98%).

3.5 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



3.6 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	YES	YES	1.5m	Power 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

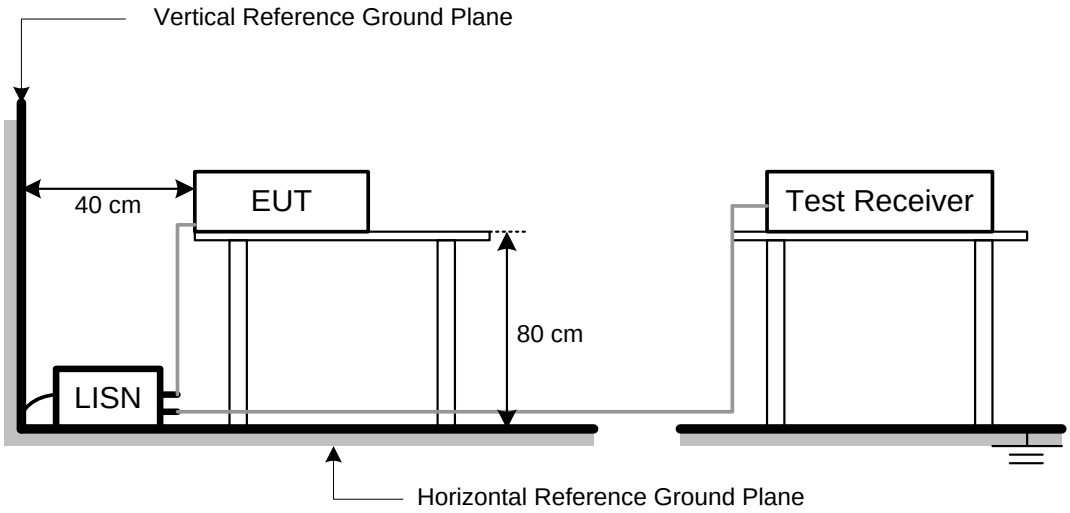
4.1.2 TEST PROCEDURE

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



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: 55%
Test Voltage: AC 120V/60Hz

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.

4.2 RADIATED EMISSION MEASUREMENT

4.2.1 RADIATED EMISSION LIMITS (Frequency Range 9KHz -1000MHz)

In case the emission fall within the restricted band specified on 15.205(a) & RSS-247 5.5, then the 15.209(a) & RSS-Gen limit in the table below has to be followed.

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/RSS-247.

(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

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

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

Spectrum 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

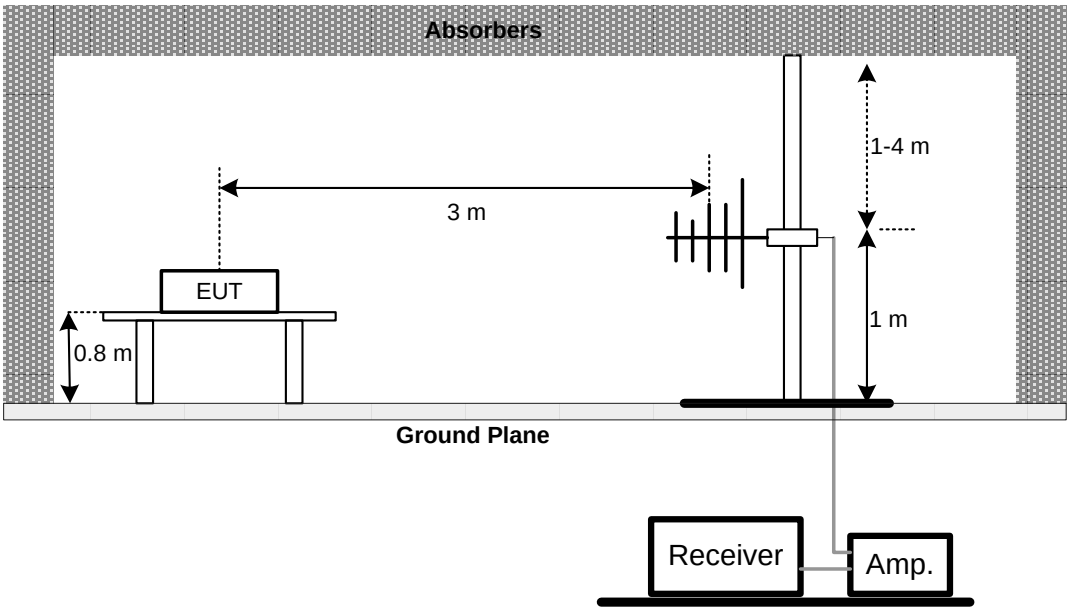
a. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
b. The measuring distance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

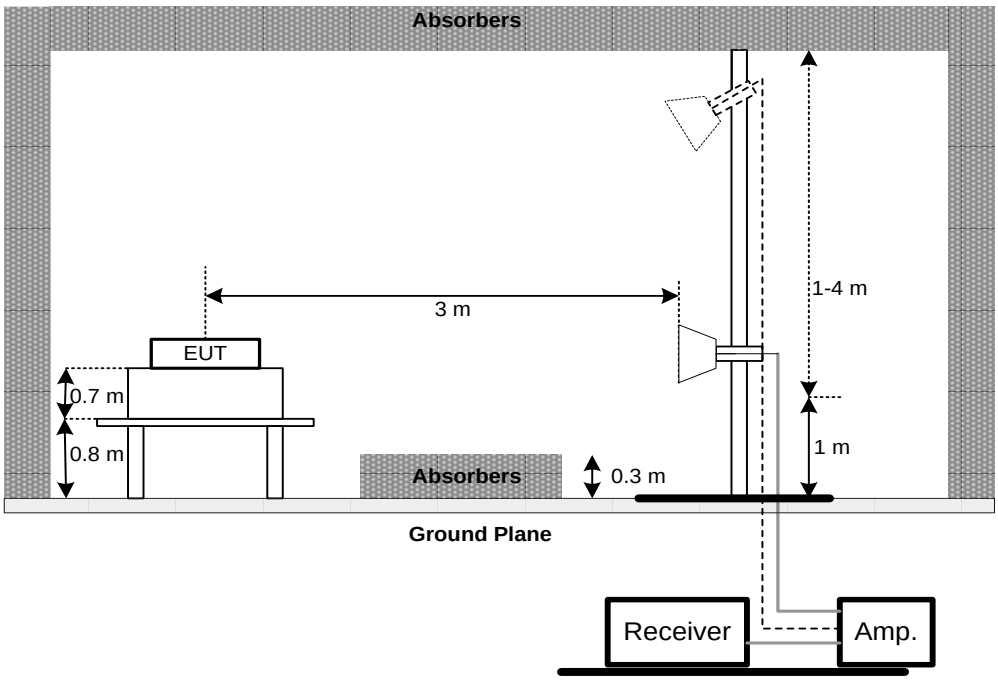
No deviation

4.2.4 TEST SETUP

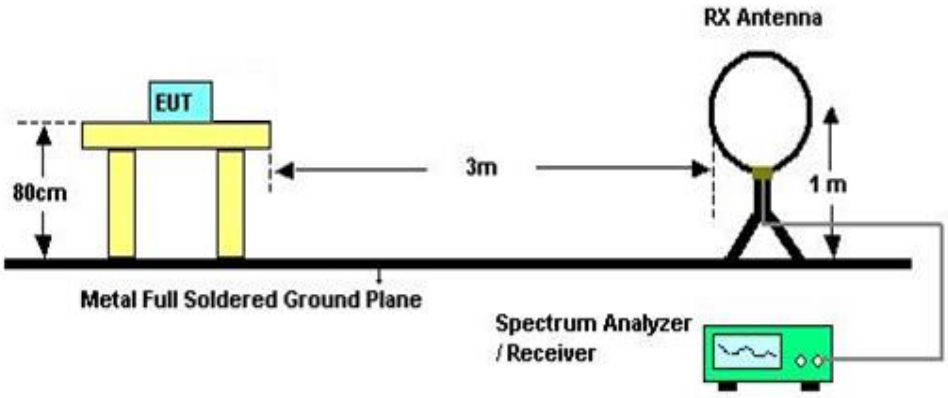
(A) Radiated Emission Test Set-Up Frequency Below 1 GHz



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



(C) For Radiated Emissions Below 30MHz



4.2.5 EUT OPERATING CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

4.2.6 EUT TEST CONDITIONS

Temperature: 23°C / 25°C
Relative Humidity: 70% / 45%
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 (specific distance / test distance) (dB).
(3) Limit line = specific limits (dBuV) + distance extrapolation factor.

4.2.7 TEST RESULTS (30MHZ TO 1000 MHZ)

Please refer to the Appendix C.

4.2.7 TEST RESULTS (ABOVE 1000 MHZ)

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. NUMBER OF HOPPING CHANNEL

5.1 APPLIED PROCEDURES

FCC Part15 (15.247) , Subpart C/ RSS-GEN and RSS-247			
Section	Test Item	Frequency Range (MHz)	Result
15.247(a)(1)(iii) RSS-247 5.1 (d)	Number of Hopping Channel	2400-2483.5	PASS

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> Operating Frequency Range
RBW	100 KHz
VBW	100 KHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

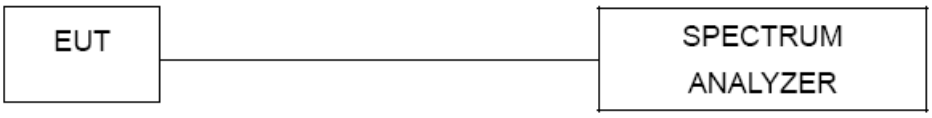
5.1.1 TEST PROCEDURE

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

5.1.2 DEVIATION FROM STANDARD

No deviation.

5.1.3 TEST SETUP



5.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 4.1.5 unless otherwise a special operating condition is specified in the follows during the testing.

5.1.5 EUT TEST CONDITIONS

Test Voltage: AC 120V/60Hz

5.1.6 TEST RESULTS

Please refer to the Appendix E

6. AVERAGE TIME OF OCCUPANCY

6.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C/ RSS-GEN and RSS-247				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(1)(iii) RSS-247 5.1 (d)	Average Time of Occupancy	0.4sec	2400-2483.5	PASS

6.1.1 TEST PROCEDURE

a. The transmitter output (antenna port) was connected to the spectrum analyzer
b. Set RBW of spectrum analyzer to 1MHz and VBW to 1MHz.
c. Use a video trigger with the trigger level set to enable triggering only on full pulses.
d. Sweep Time is more than once pulse time.
e. Set the center frequency on any frequency would be measure and set the frequency span to zero span.
f. Measure the maximum time duration of one single pulse.
g. Set the EUT for DH5, DH3 and DH1 packet transmitting.
h. Measure the maximum time duration of one single pulse.
i. Measure the maximum time duration of one single pulse.
A Period Time = (channel number)*0.4

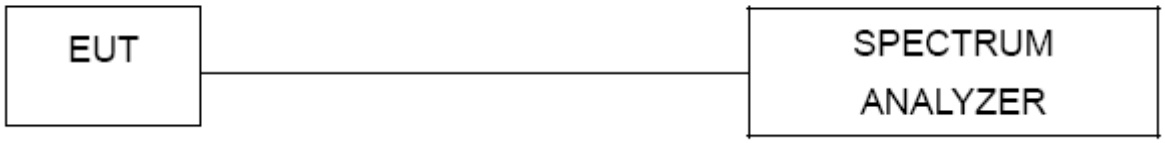
For Normal Mode (79 Channel):
DH1 Time Solt: Reading * (1600/2)*31.6/(channel number)
DH3 Time Solt: Reading * (1600/2)*31.6/(channel number)
DH5 Time Solt: Reading * (1600/2)*31.6/(channel number)

For AFH Mode (20 Channel):
DH1 Time Solt: Reading * (1600/2)*8/(channel number)
DH3 Time Solt: Reading * (1600/4)*8/(channel number)
DH5 Time Solt: Reading * (1600/6)*8/(channel number)

6.1.2 DEVIATION FROM STANDARD

No deviation.

6.1.3 TEST SETUP



6.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 4.1.5 unless otherwise a special operating condition is specified in the follows during the testing.

6.1.5 EUT TEST CONDITIONS

Test Voltage: AC 120V/60Hz

6.1.6 TEST RESULTS

Please refer to the Appendix F

7. HOPPING CHANNEL SEPARATION MEASUREMENT

7.1 APPLIED PROCEDURES / LIMIT

Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 KHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RBW	30 KHz
VBW	100 KHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

7.1.1 TEST PROCEDURE

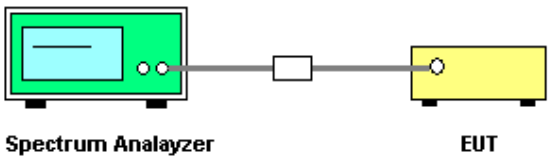
a. The EUT must have its hopping function enabled

b. Span = wide enough to capture the peaks of two adjacent channels
Resolution (or IF) Bandwidth (RBW) ≥ 1% of the span
Video (or Average) Bandwidth (VBW) ≥ RBW
Sweep = Auto
Detector function = Peak
Trace = Max Hold

7.1.2 DEVIATION FROM STANDARD

No deviation.

7.1.3 TEST SETUP



7.1.4 EUT TEST CONDITIONS

Test Voltage: AC 120V/60Hz

7.1.5 TEST RESULTS

Please refer to the Appendix G

8. BANDWIDTH TEST

8.1 APPLIED PROCEDURES

FCC Part15 (15.247) , Subpart C/ RSS-GEN and RSS-247		
Section	Test Item	Frequency Range (MHz)
15.247(a)(2) RSS-GEN 6.6 RSS-247 5.1 (a)	Bandwidth	2400-2483.5

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RBW	30 KHz (20dB Bandwidth) / 30 KHz (Channel Separation)
VBW	100 KHz (20dB Bandwidth) / 100 KHz (Channel Separation)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

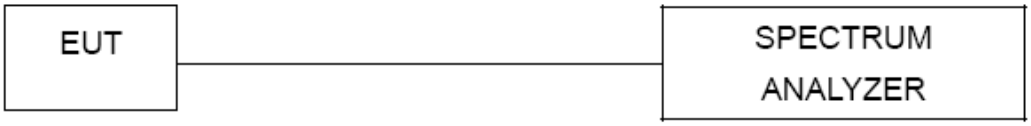
8.1.1 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
b. Spectrum Setting: RBW= 30KHz, VBW=100KHz, Sweep Time = Auto.

8.1.2 DEVIATION FROM STANDARD

No deviation.

8.1.3 TEST SETUP



8.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 4.1.5 unless otherwise a special operating condition is specified in the follows during the testing.

8.1.5 EUT TEST CONDITIONS

Test Voltage: AC 120V/60Hz

8.1.6 TEST RESULTS

Please refer to the Appendix H

9. PEAK OUTPUT POWER TEST

9.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C/ RSS-247				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(1) RSS-247 5.4 (b)	Peak Output Power	1 Watt or 30dBm (hopping channel >75) 0.125Watt or 21dBm (hopping channel <75	2400-2483.5	PASS

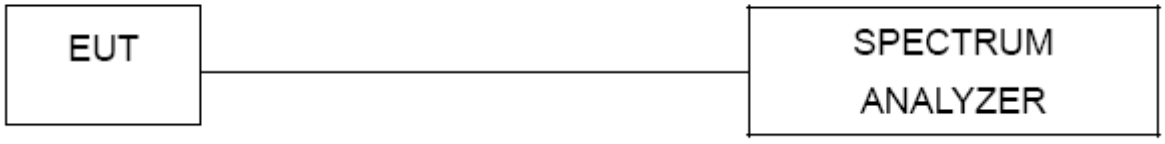
9.1.1 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
b. Spectrum Setting: RBW= 1MHz/3MHz, VBW= 1MHz/3MHz, Sweep time = Auto.

9.1.2 DEVIATION FROM STANDARD

No deviation.

9.1.3 TEST SETUP



9.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 4.1.5 unless otherwise a special operating condition is specified in the follows during the testing.

9.1.5 EUT TEST CONDITIONS

Test Voltage: AC 120V/60Hz

9.1.6 TEST RESULTS

Please refer to the Appendix I

10. ANTENNA CONDUCTED SPURIOUS EMISSION

10.1 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.

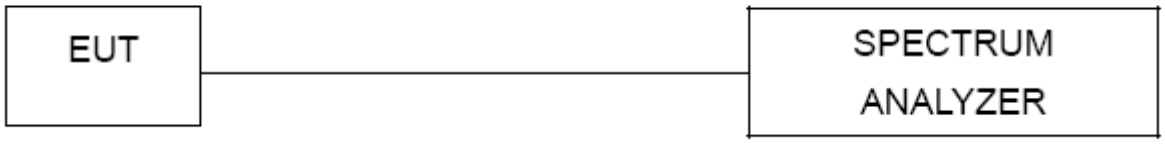
10.1.1 TEST PROCEDURE

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

10.1.2 DEVIATION FROM STANDARD

No deviation.

10.1.3 TEST SETUP



10.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 4.1.5 unless otherwise a special operating condition is specified in the follows during the testing.

10.1.5 EUT TEST CONDITIONS

Test Voltage: AC 120V/60Hz

10.1.6 TEST RESULTS

Please refer to the Appendix J

11. MEASUREMENT INSTRUMENTS LIST

Conducted Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	TWO-LINE V-NETWORK	R&S	ENV216	101050	Jan. 24, 2019
2	Test Cable	TIMES	CFD300-NL	C02	Jun. 13, 2019
3	EMI Test Receiver	R&S	ESR7	101433	Dec. 07, 2018
4	Measurement Software	EZ	EZ_EMC (Version NB-03A)	N/A	N/A

Radiated Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Preamplifier	EMCI	012645B	980267	Feb. 27, 2019
2	Preamplifier	EMCI	EMC02325	980217	Dec. 27, 2019
3	Preamplifier	EMCI	EMC2654045	980030	Feb. 13, 2019
4	Test Cable	EMCI	EMC104-SM-SM-8000	8m	Jan. 03, 2019
5	Test Cable	EMCI	EMC104-SM-SM-800	150207	Jan. 03, 2019
6	Test Cable	EMCI	EEMC104-SM-SM-3000	151205	Jan. 03, 2019
7	MXE EMI Receiver	Agilent	N9038A	MY55420127	Jan. 08, 2019
8	Signal Analyzer	Agilent	N9010A	MY52220990	Feb. 21, 2019
9	Loop Ant	EMCO	6502	42960	Nov. 23, 2018
10	Horm Ant	SCHWARZBECK	BBHA 9120D	9120D-1342	Feb. 27, 2019
11	Horm Ant	Schwarzbeck	BBHA 9170	187	Dec. 05, 2018
12	Trilog-Broadband Antenna	Schwarzbeck	VULB 9168	9168-548	Jan. 15, 2019
13	5dB Attenuator	EMCI	EMCI-N-6-05	AT-N0623	Jan. 15, 2019

Number of Hopping Channel					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	R&S/FSP30	100854	May 25, 2018

Average Time of Occupancy					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	R&S/FSP30	100854	May 25, 2018

Hopping Channel Separation Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	R&S/FSP30	100854	May 25, 2018

Bandwidth					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	R&S/FSP30	100854	May 25, 2018

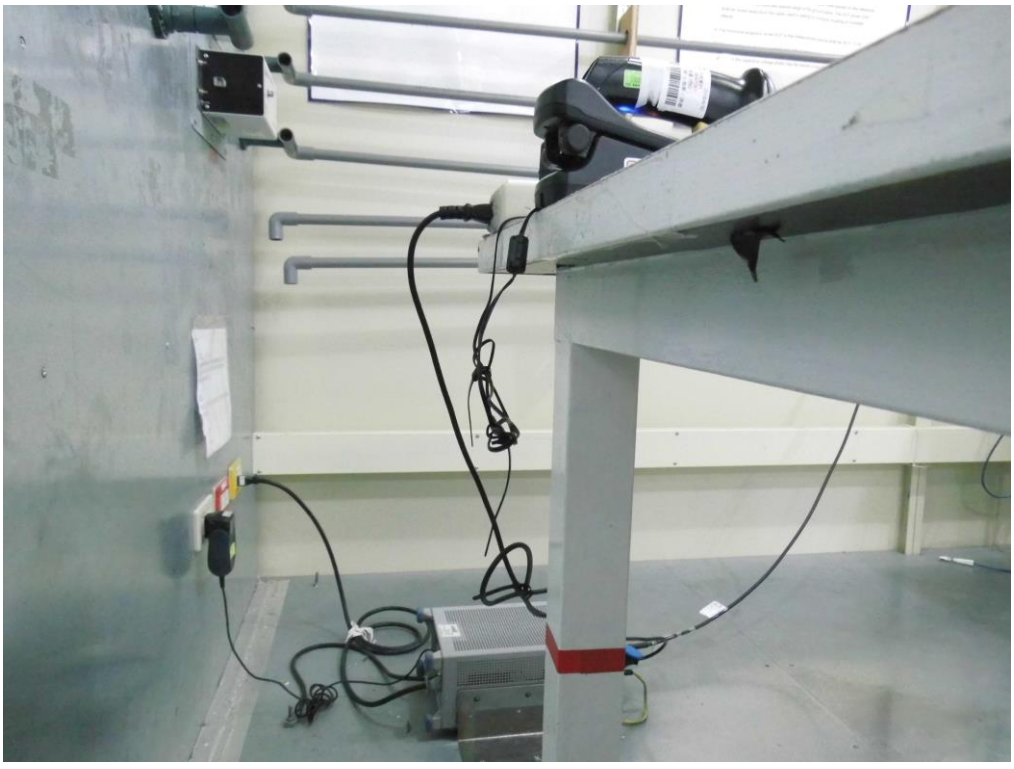
Peak Output Power					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	R&S/FSP30	100854	May 25, 2018
2	Power Meter	Anritsu	ML2495A	1128008	Aug. 16, 2018
3	Power Sensor	Anritsu	MA2411B	1126001	Aug. 16, 2018

Antenna Conducted Spurious Emission					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	R&S/FSP30	100854	May 25, 2018

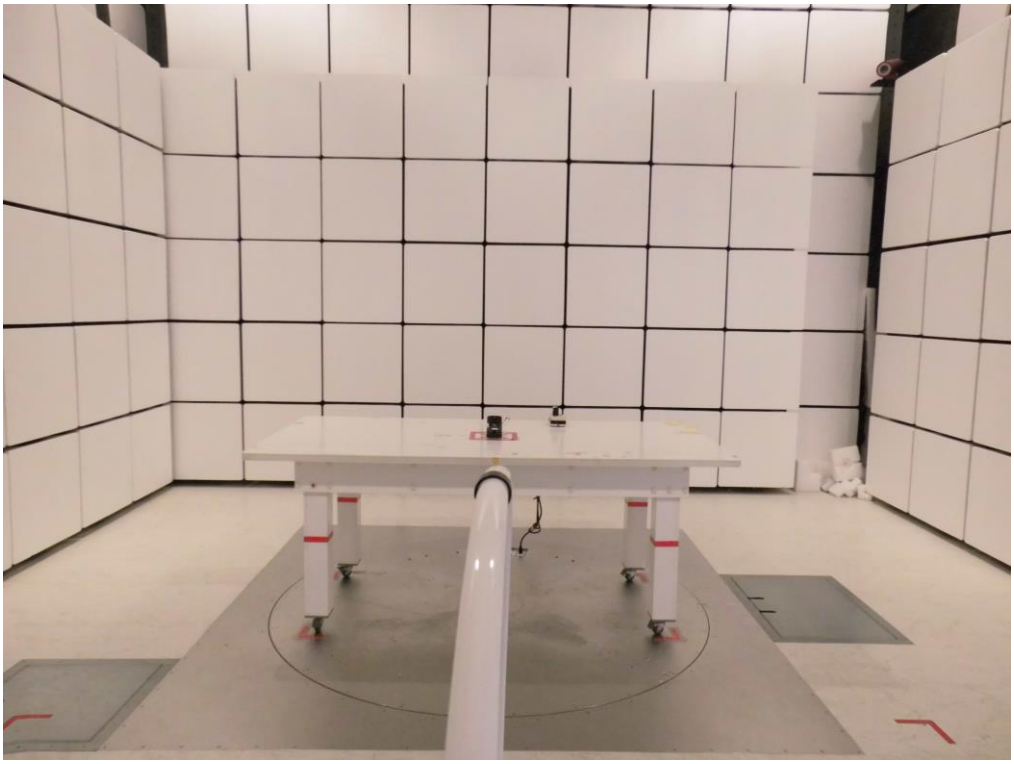
Remark: “N/A” denotes no model name, serial no. or calibration specified.
All calibration period of equipment list is one year.

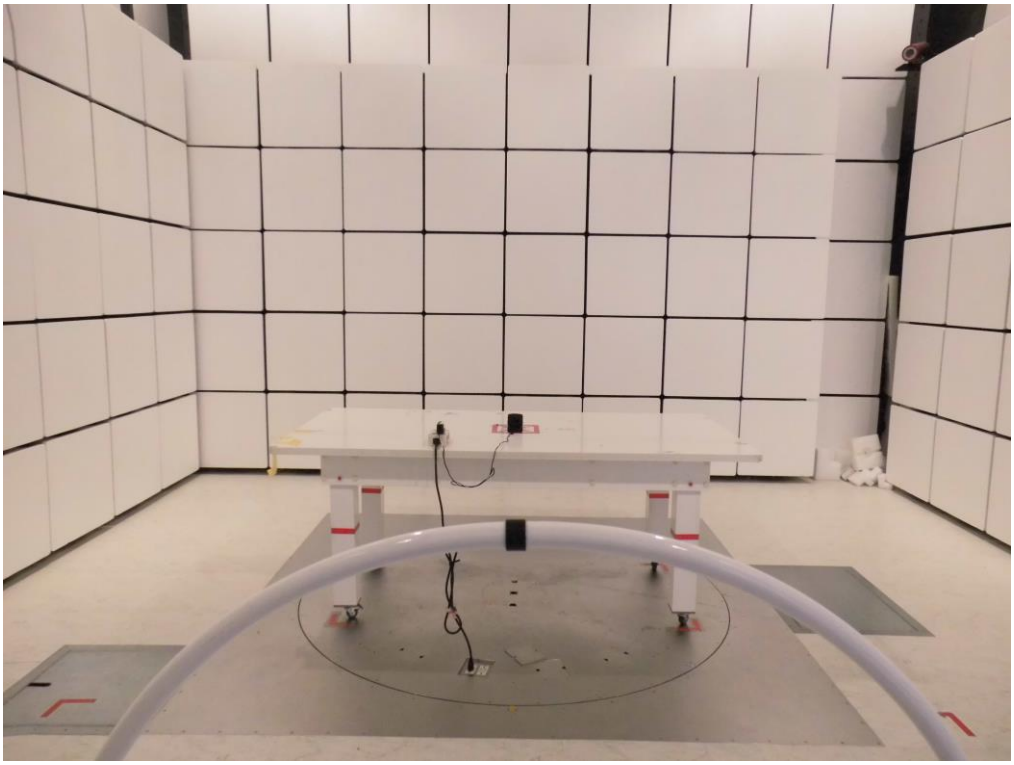
12. EUT TEST PHOTO

Conducted Measurement Photos

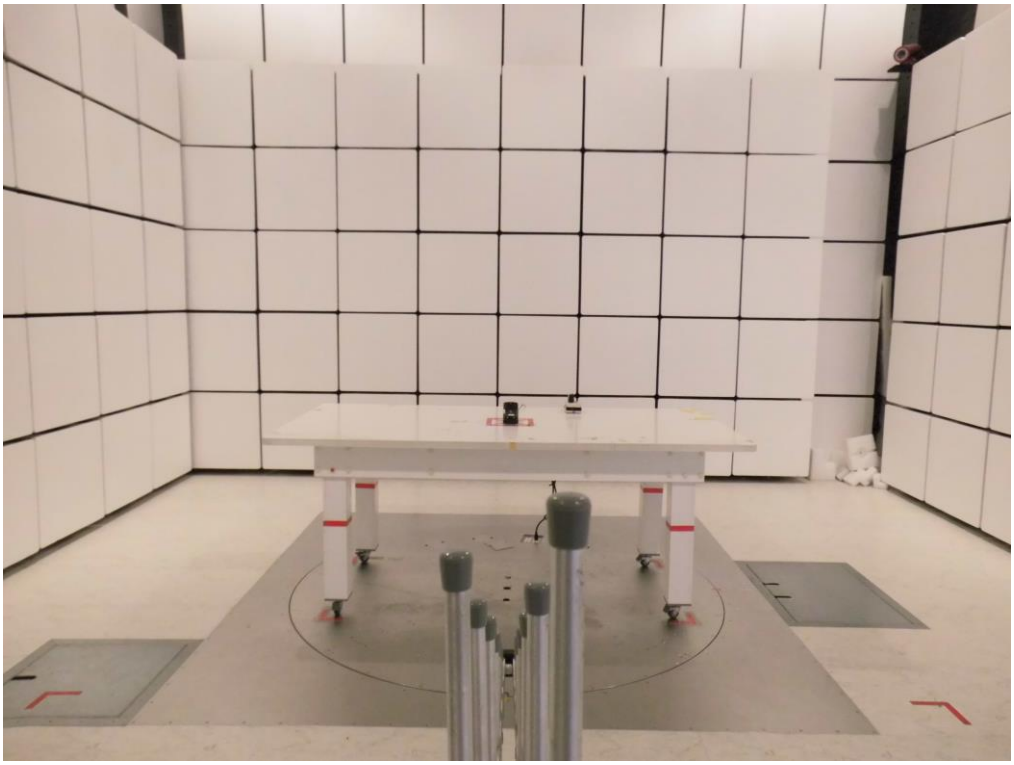


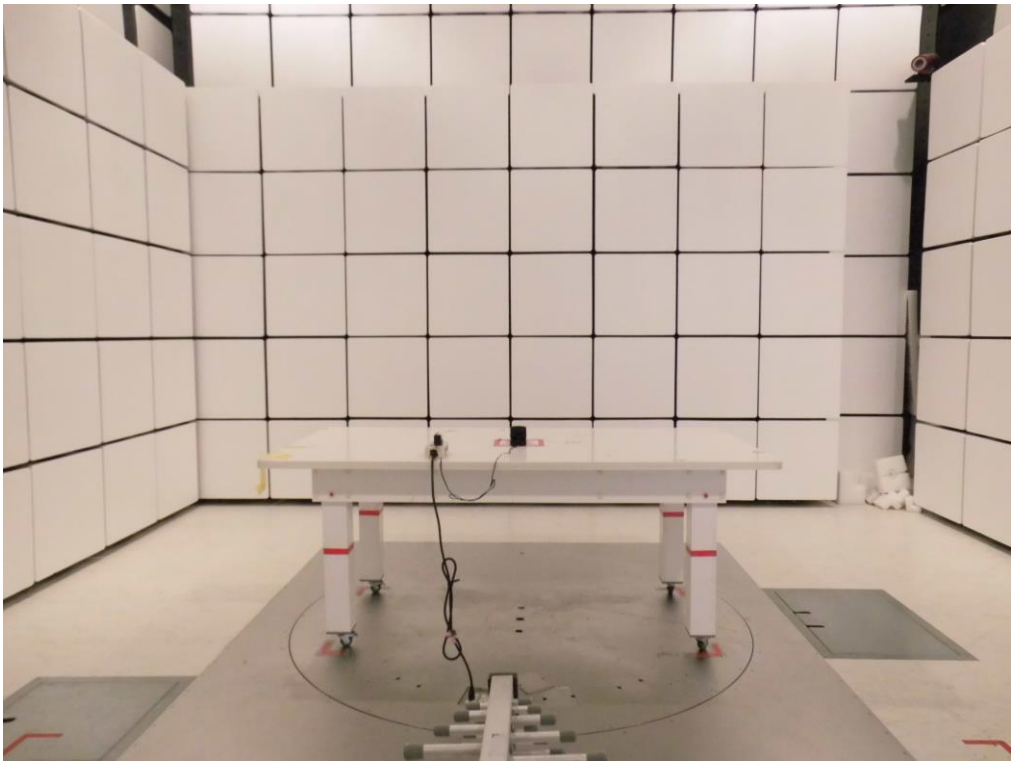
Radiated Measurement Photos
9KHz to 30MHz



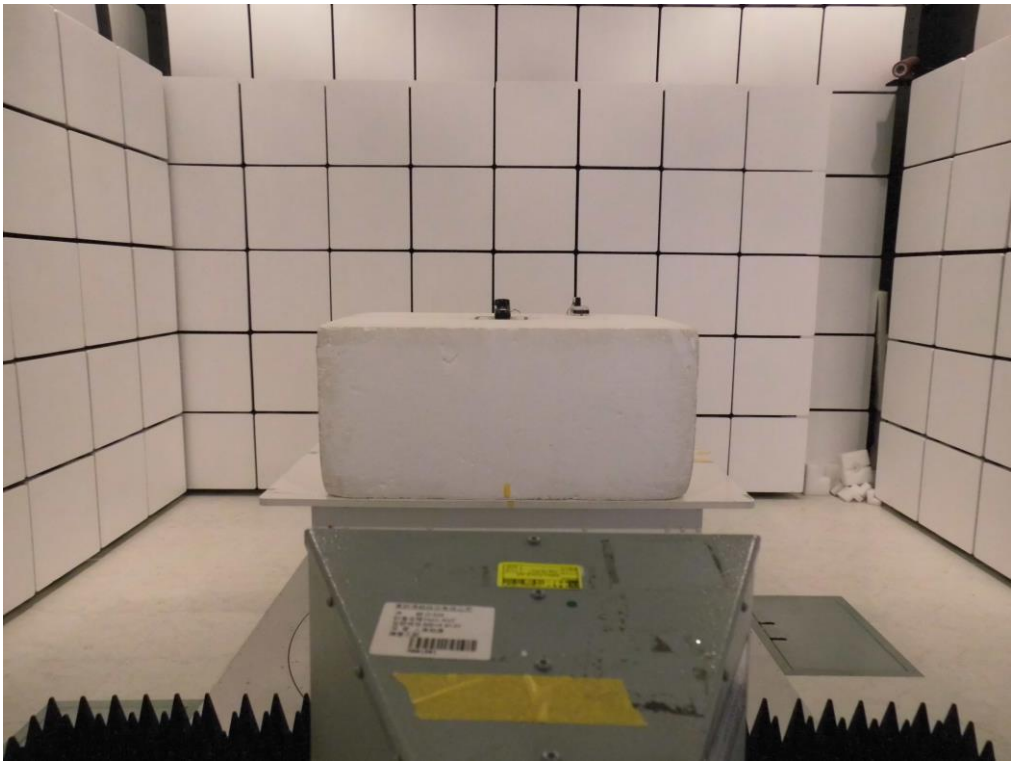


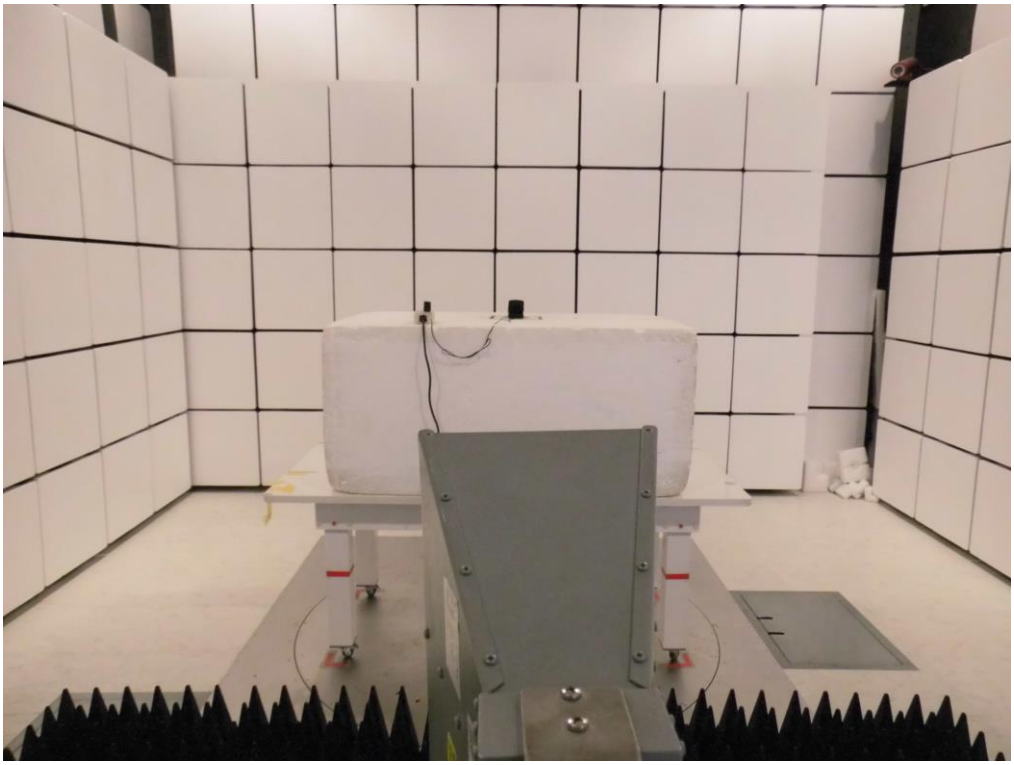
Radiated Measurement Photos
Below 1GHz





Radiated Measurement Photos
Above 1GHz

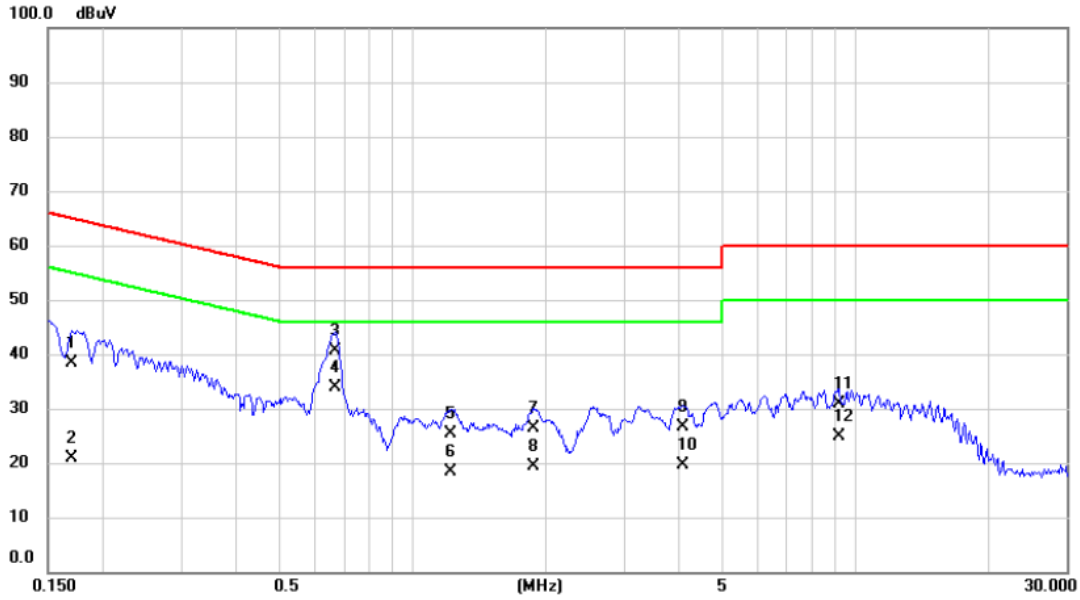




APPENDIX A - CONDUCTED EMISSION

Test Mode:	TX Mode

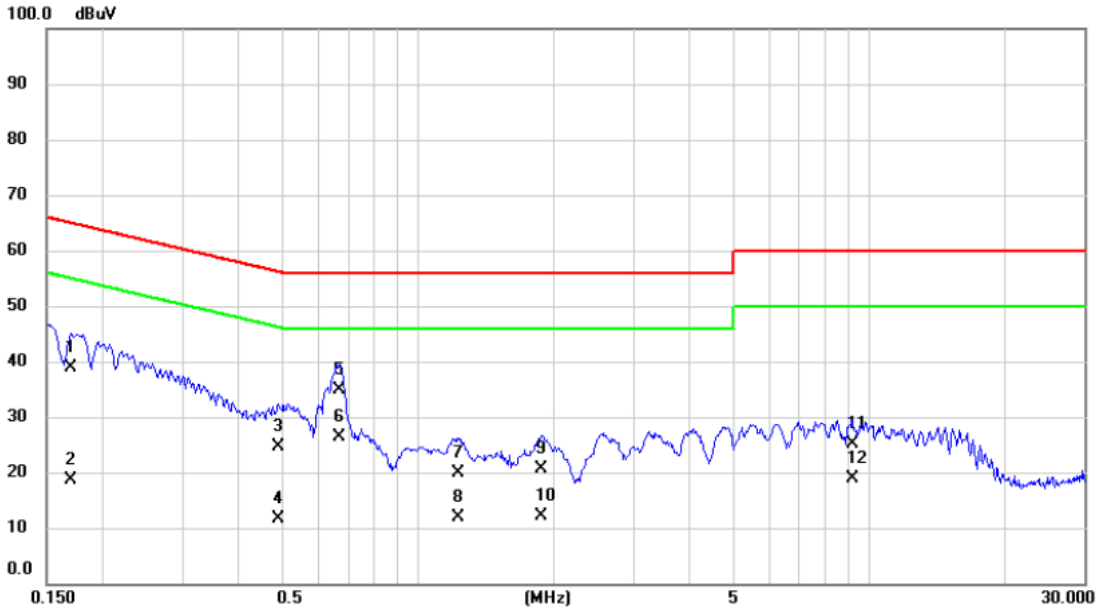
Line



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1703	28.80	9.63	38.43	64.95	-26.52	QP	
2		0.1703	11.30	9.63	20.93	54.95	-34.02	AVG	
3		0.6697	31.00	9.66	40.66	56.00	-15.34	QP	
4	*	0.6697	24.20	9.66	33.86	46.00	-12.14	AVG	
5		1.2164	15.70	9.67	25.37	56.00	-30.63	QP	
6		1.2164	8.70	9.67	18.37	46.00	-27.63	AVG	
7		1.8758	16.60	9.69	26.29	56.00	-29.71	QP	
8		1.8758	9.70	9.69	19.39	46.00	-26.61	AVG	
9		4.0785	17.00	9.74	26.74	56.00	-29.26	QP	
10		4.0785	9.90	9.74	19.64	46.00	-26.36	AVG	
11		9.1590	20.90	9.89	30.79	60.00	-29.21	QP	
12		9.1590	14.90	9.89	24.79	50.00	-25.21	AVG	

Test Mode:	TX Mode

Neutral

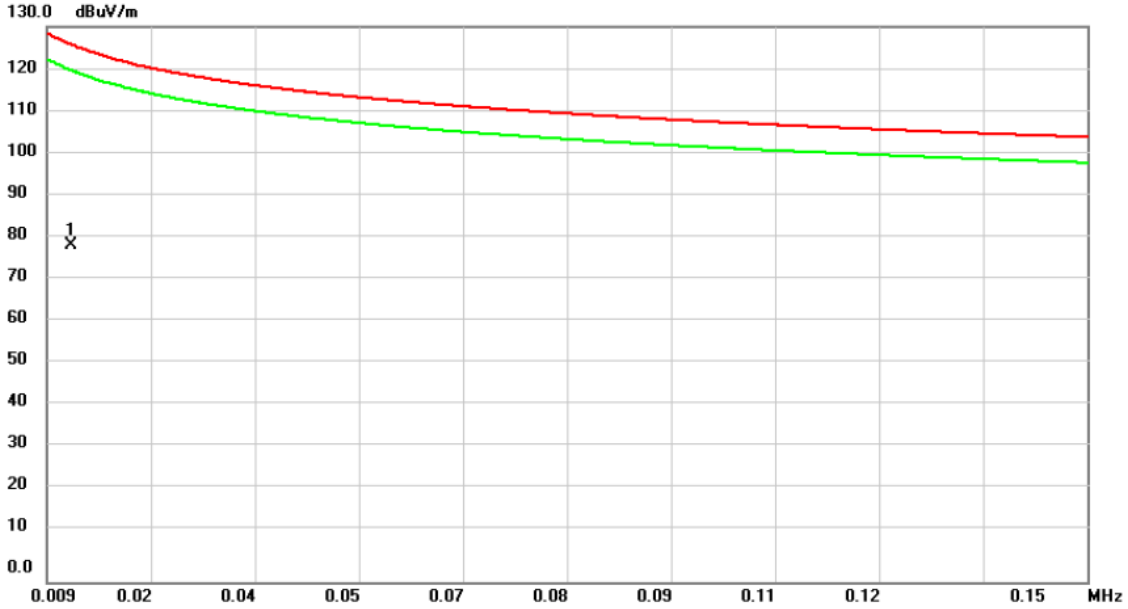


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1703	29.30	9.62	38.92	64.95	-26.03	QP	
2		0.1703	9.10	9.62	18.72	54.95	-36.23	AVG	
3		0.4897	15.10	9.65	24.75	56.17	-31.42	QP	
4		0.4897	2.00	9.65	11.65	46.17	-34.52	AVG	
5		0.6697	25.30	9.65	34.95	56.00	-21.05	QP	
6	*	0.6697	16.80	9.65	26.45	46.00	-19.55	AVG	
7		1.2232	10.30	9.66	19.96	56.00	-36.04	QP	
8		1.2232	2.20	9.66	11.86	46.00	-34.14	AVG	
9		1.8780	10.90	9.67	20.57	56.00	-35.43	QP	
10		1.8780	2.50	9.67	12.17	46.00	-33.83	AVG	
11		9.1635	15.20	9.89	25.09	60.00	-34.91	QP	
12		9.1635	9.10	9.89	18.99	50.00	-31.01	AVG	

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

Test Mode:	TX Mode

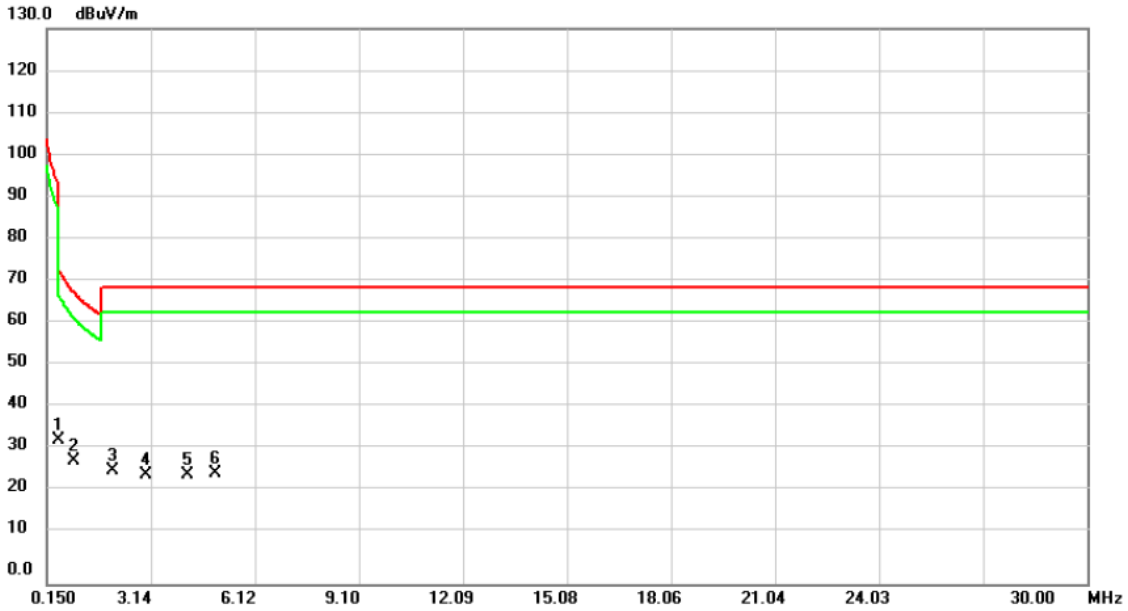
Ant 0°



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	0.0123	44.01	34.92	78.93	125.81	-46.88	peak	

Test Mode:	TX Mode

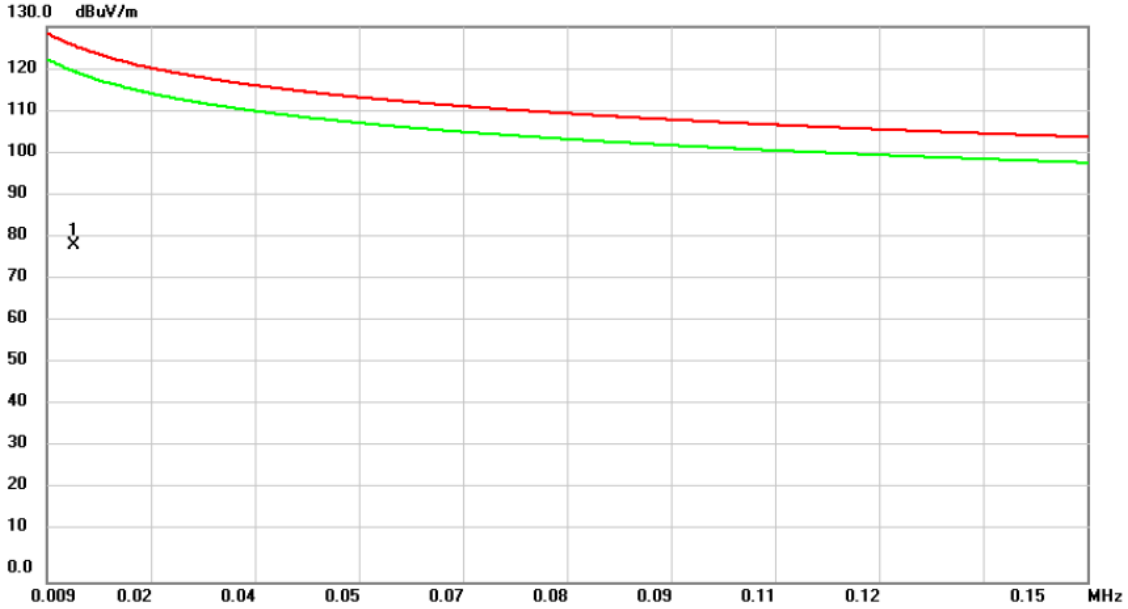
Ant 0°



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		0.4684	29.70	3.93	33.63	94.19	-60.56	peak	
2	*	0.9062	28.72	0.02	28.74	68.46	-39.72	peak	
3		2.0206	29.30	-2.95	26.35	69.54	-43.19	peak	
4		2.9758	29.09	-3.64	25.45	69.54	-44.09	peak	
5		4.1698	29.25	-3.82	25.43	69.54	-44.11	peak	
6		4.9658	29.74	-3.93	25.81	69.54	-43.73	peak	

Test Mode:	TX Mode

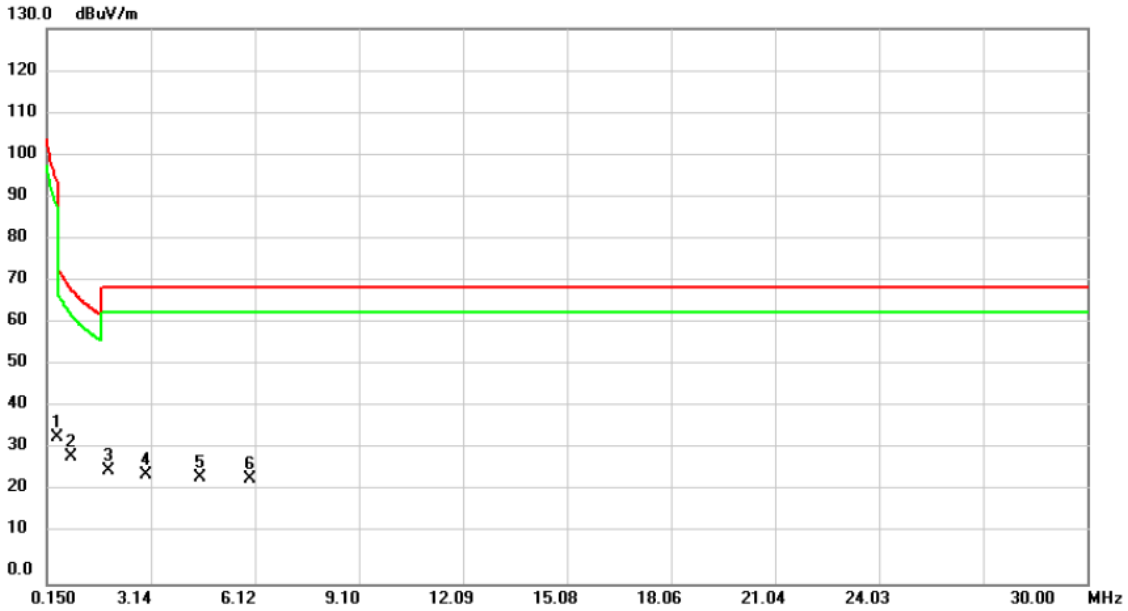
Ant 90°



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	0.0126	44.21	34.73	78.94	125.60	-46.66	peak	

Test Mode:	TX Mode

Ant 90°

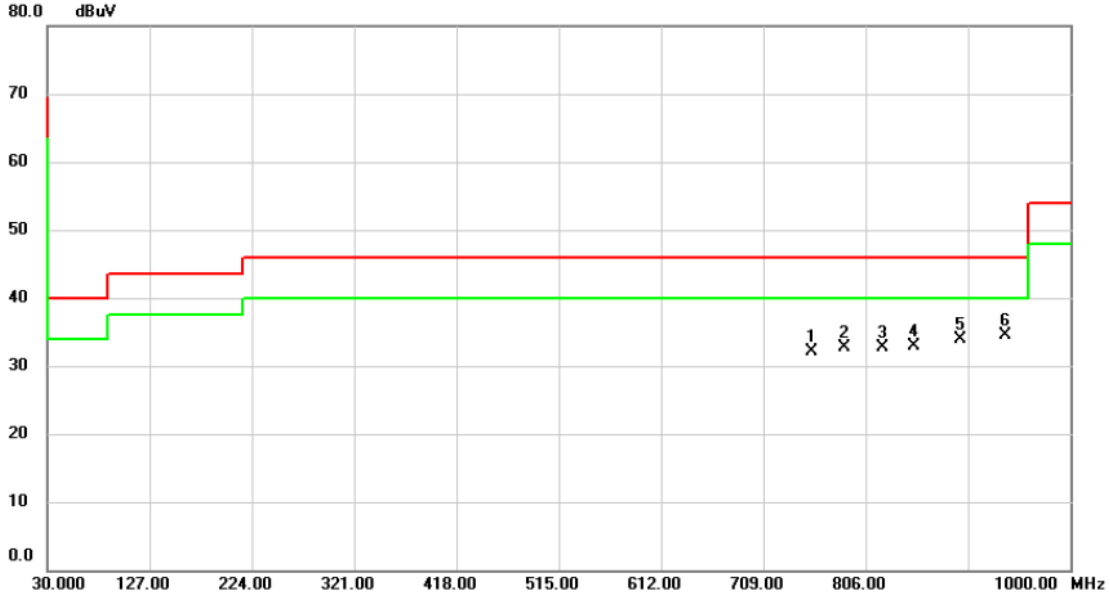


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		0.4286	29.89	4.47	34.36	94.96	-60.60	peak	
2	*	0.8266	29.36	0.40	29.76	69.26	-39.50	peak	
3		1.9012	29.02	-2.68	26.34	69.54	-43.20	peak	
4		2.9758	29.04	-3.64	25.40	69.54	-44.14	peak	
5		4.5280	28.88	-3.86	25.02	69.54	-44.52	peak	
6		5.9608	28.65	-4.02	24.63	69.54	-44.91	peak	

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

Test Mode:	TX Mode 2480MHz _CH78_1Mbps

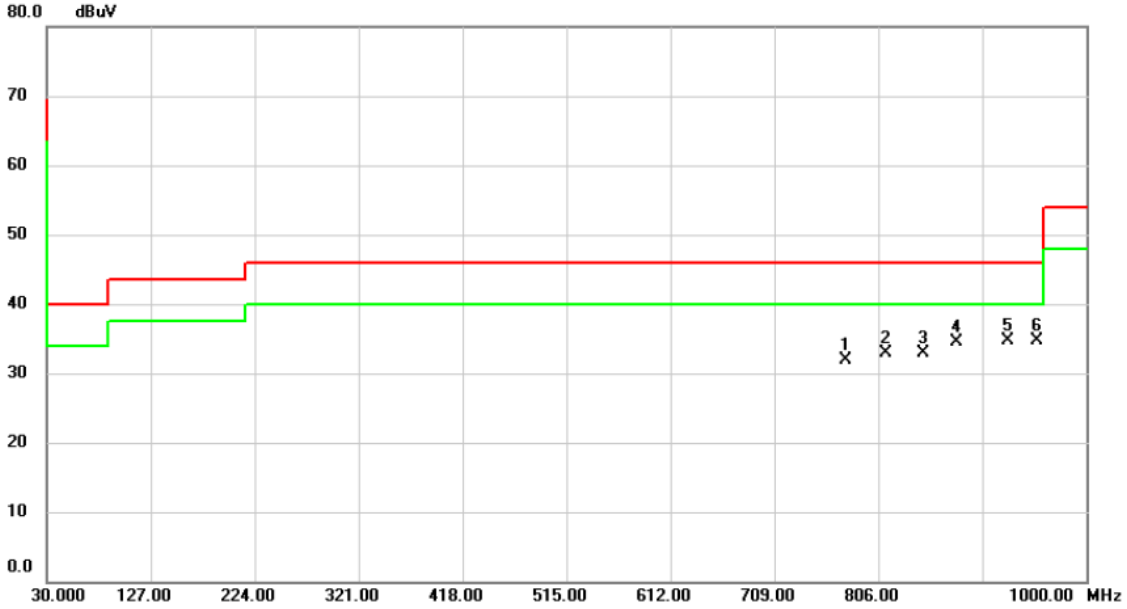
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		754.5900	29.69	2.39	32.08	46.00	-13.92	peak	
2		785.6300	29.78	2.85	32.63	46.00	-13.37	peak	
3		822.4900	29.17	3.47	32.64	46.00	-13.36	peak	
4		851.5900	28.98	4.00	32.98	46.00	-13.02	peak	
5		896.2100	28.93	4.90	33.83	46.00	-12.17	peak	
6	*	938.8900	28.84	5.62	34.46	46.00	-11.54	peak	

Test Mode:	TX Mode 2480MHz _CH78_1Mbps

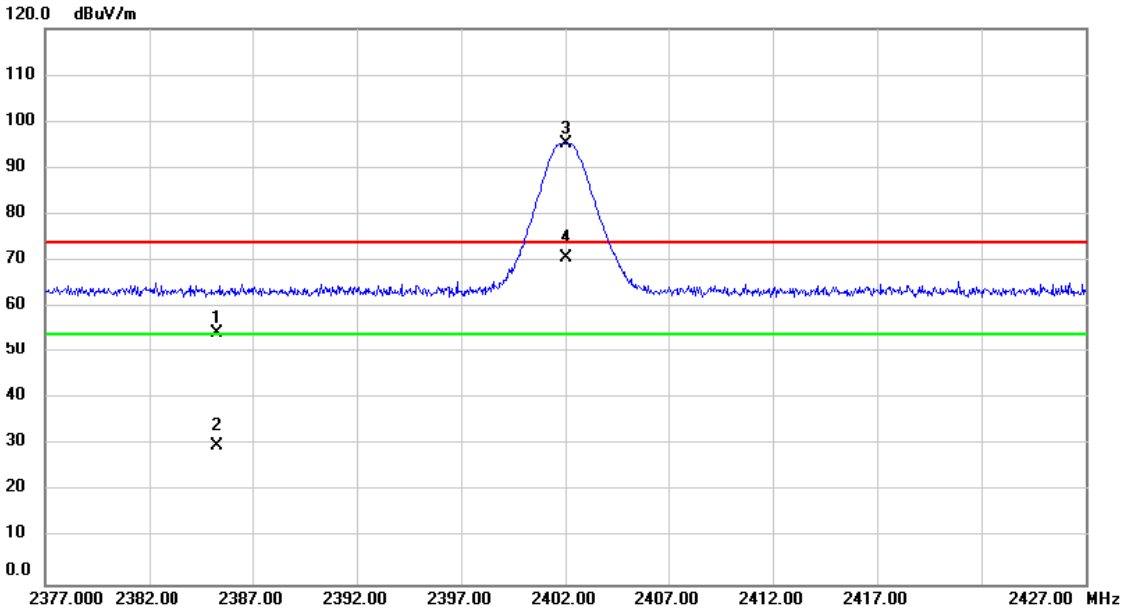
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		775.9300	29.20	2.70	31.90	46.00	-14.10	peak	
2		812.7900	29.65	3.29	32.94	46.00	-13.06	peak	
3		847.7100	28.98	3.93	32.91	46.00	-13.09	peak	
4		878.7500	29.92	4.55	34.47	46.00	-11.53	peak	
5		927.2500	29.24	5.43	34.67	46.00	-11.33	peak	
6	*	953.4400	28.95	5.82	34.77	46.00	-11.23	peak	

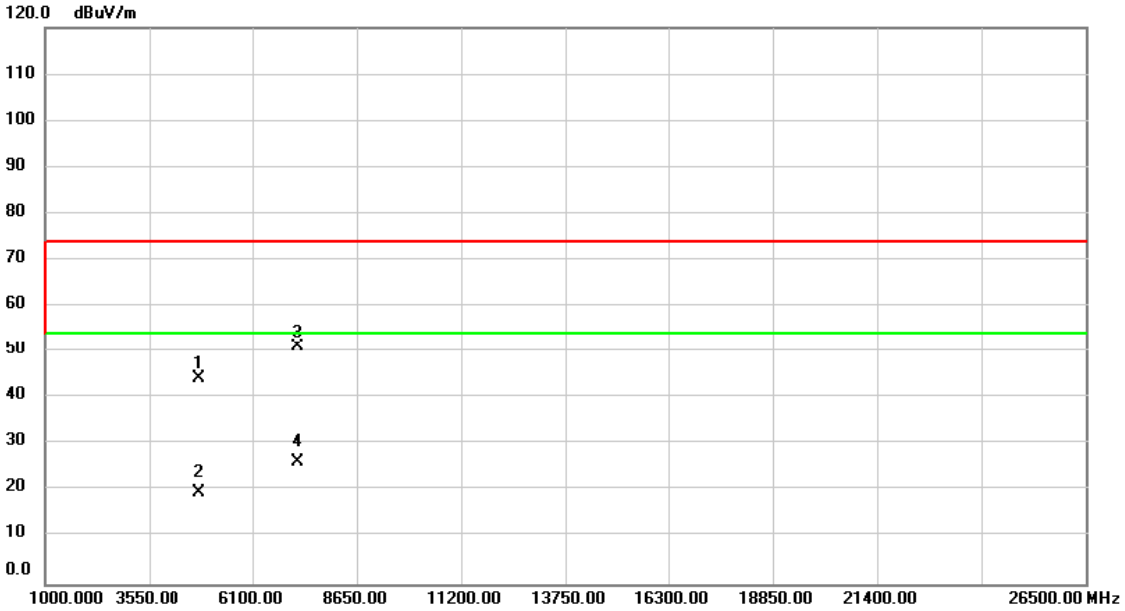
APPENDIX D - RADIATED EMISSION (ABOVE 1000MHZ)

Test Mode	TX Mode 2402MHz _CH00_1Mbps	Polarization	Vertical



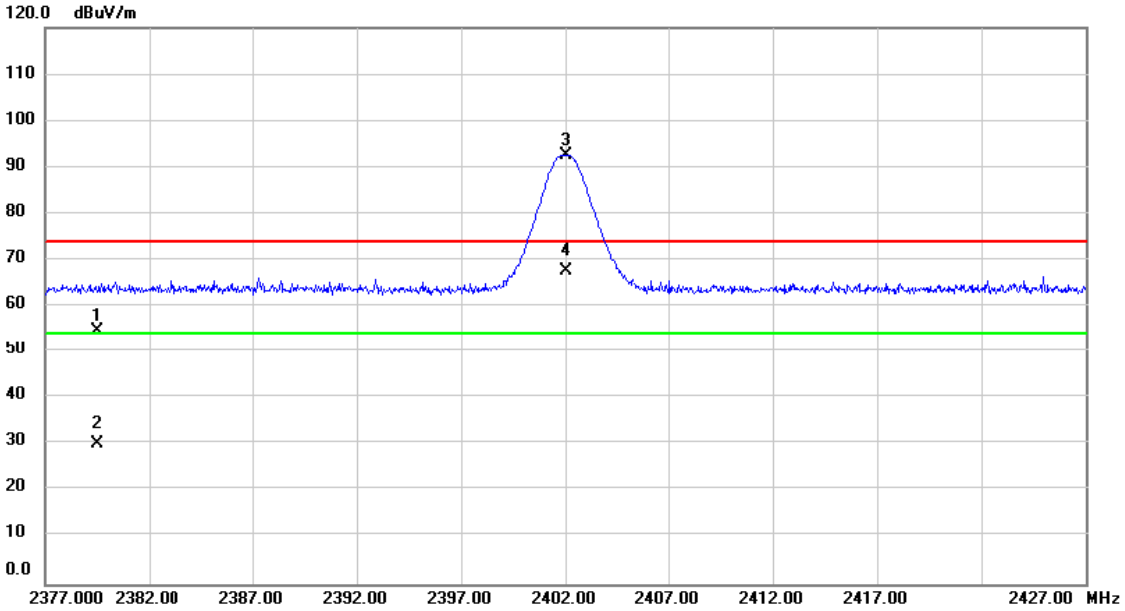
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2385.320	23.44	30.96	54.40	74.00	-19.60	peak	
2		2385.320	-1.23	30.96	29.73	54.00	-24.27	AVG	
3	*	2402.000	64.36	31.03	95.39	74.00	21.39	peak	No Limit
4	X	2402.000	39.69	31.03	70.72	54.00	16.72	AVG	No Limit

Test Mode	TX Mode 2402MHz _CH00_1Mbps	Polarization	Vertical



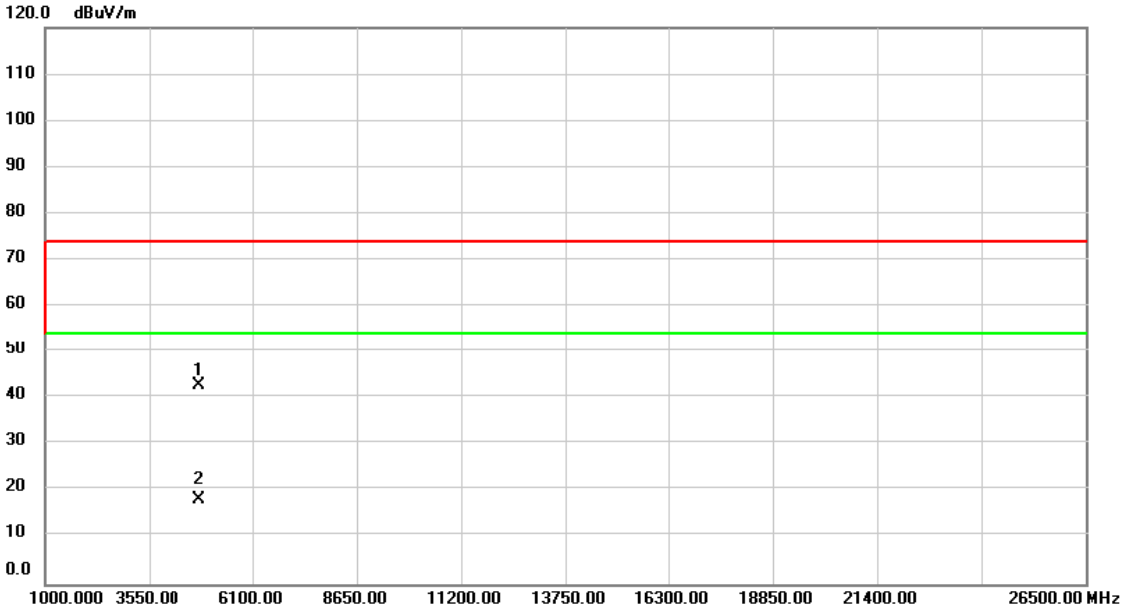
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4804.000	55.84	-11.47	44.37	74.00	-29.63	peak	
2		4804.000	31.17	-11.47	19.70	54.00	-34.30	AVG	
3	*	7206.000	55.87	-4.82	51.05	74.00	-22.95	peak	
4		7206.000	31.20	-4.82	26.38	54.00	-27.62	AVG	

Test Mode	TX Mode 2402MHz _CH00_1Mbps	Polarization	Horizontal



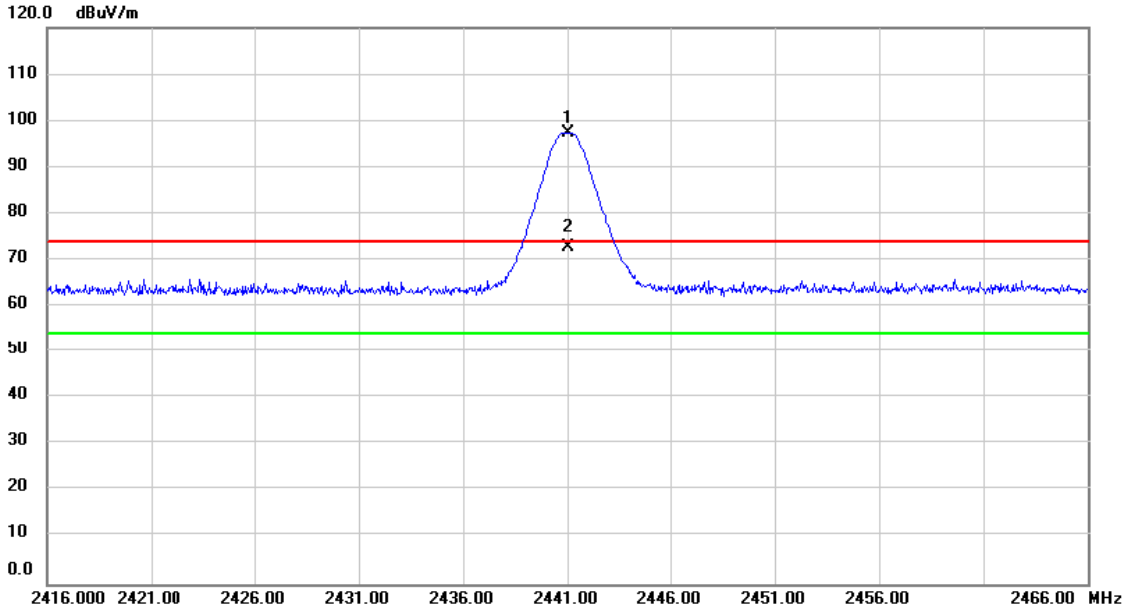
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2379.483	23.78	30.94	54.72	74.00	-19.28	peak	
2		2379.483	-0.89	30.94	30.05	54.00	-23.95	AVG	
3	*	2402.000	61.44	31.03	92.47	74.00	18.47	peak	No Limit
4	X	2402.000	36.77	31.03	67.80	54.00	13.80	AVG	No Limit

Test Mode	TX Mode 2402MHz _CH00_1Mbps	Polarization	Horizontal



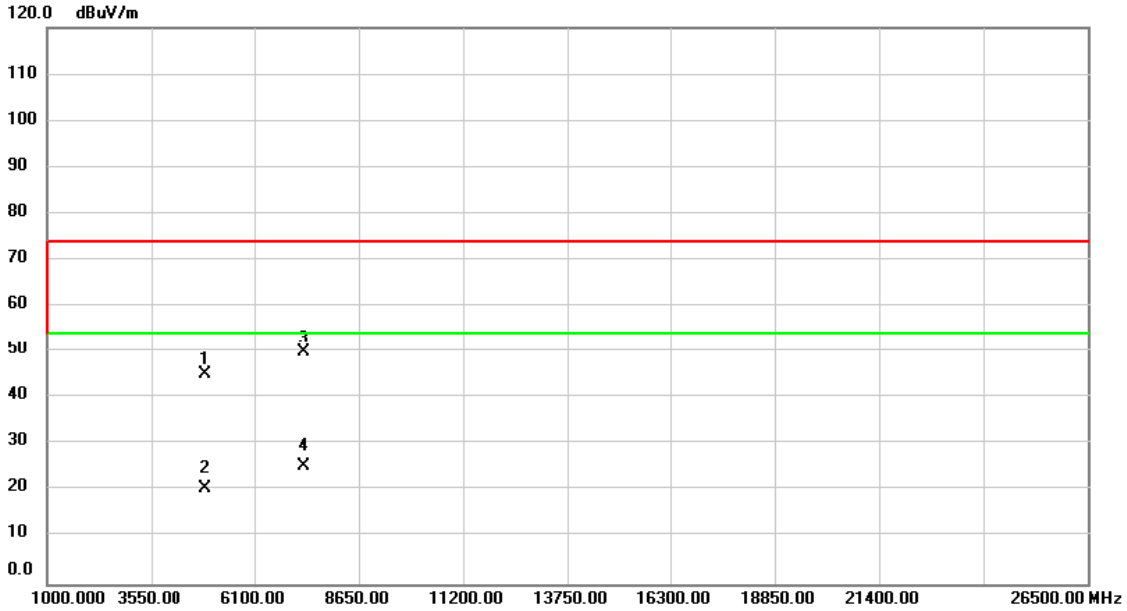
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4804.000	54.32	-11.47	42.85	74.00	-31.15	peak	
2		4804.000	29.65	-11.47	18.18	54.00	-35.82	AVG	

Test Mode	TX Mode 2441MHz _CH39_1Mbps	Polarization	Vertical



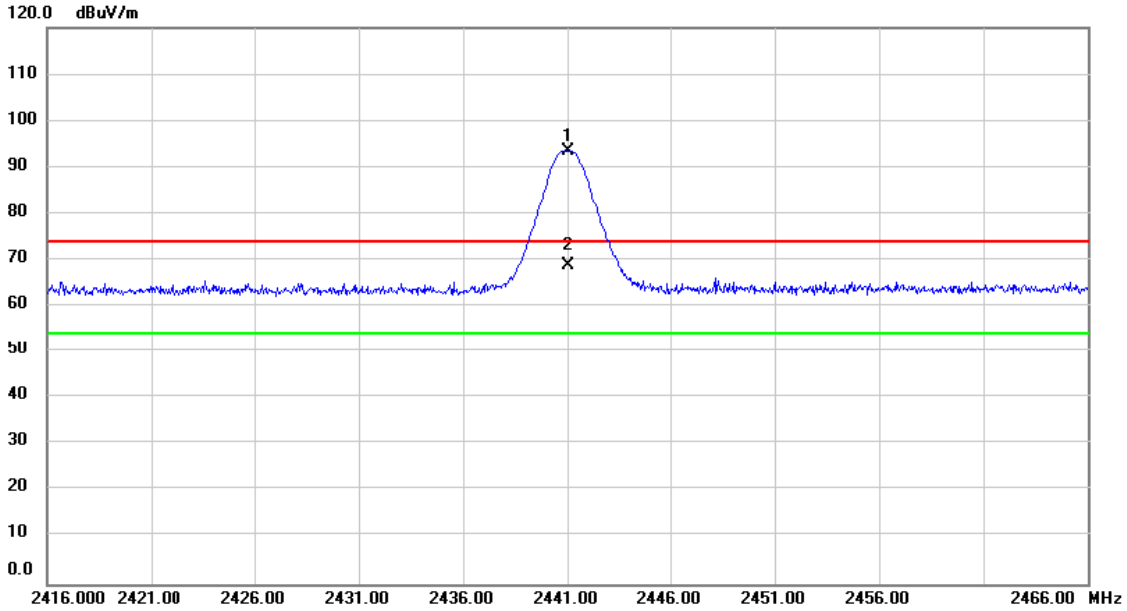
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	2441.000	66.21	31.19	97.40	74.00	23.40	peak	No Limit
2	X	2441.000	41.54	31.19	72.73	54.00	18.73	AVG	No Limit

Test Mode	TX Mode 2441MHz _CH39_1Mbps	Polarization	Vertical



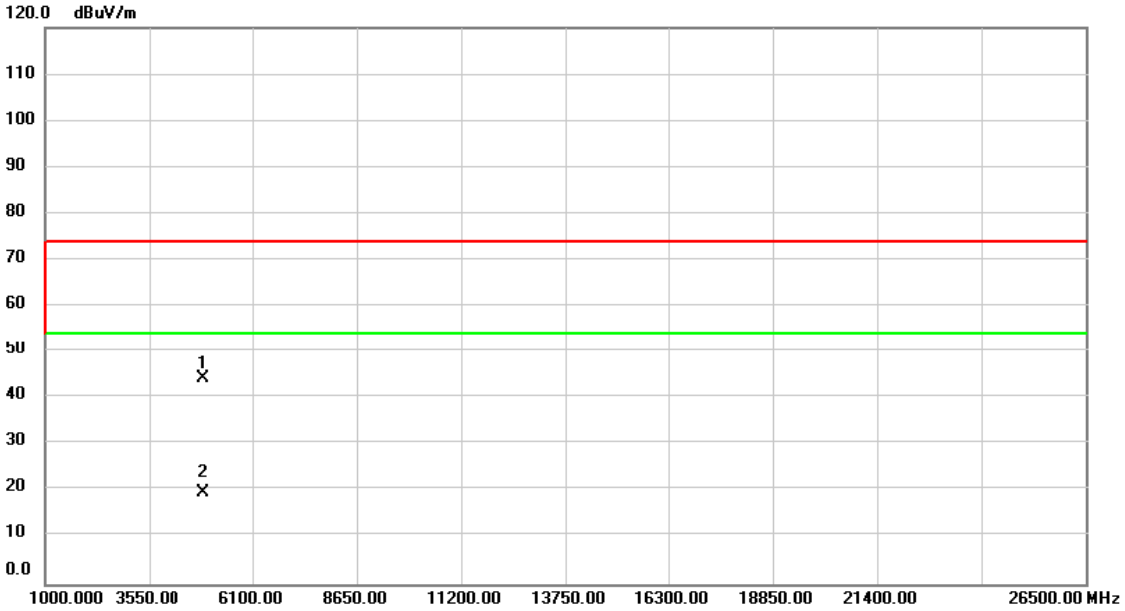
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4882.000	56.56	-11.37	45.19	74.00	-28.81	peak	
2		4882.000	31.89	-11.37	20.52	54.00	-33.48	AVG	
3	*	7323.000	54.51	-4.41	50.10	74.00	-23.90	peak	
4		7323.000	29.84	-4.41	25.43	54.00	-28.57	AVG	

Test Mode	TX Mode 2441MHz _CH39_1Mbps	Polarization	Horizontal



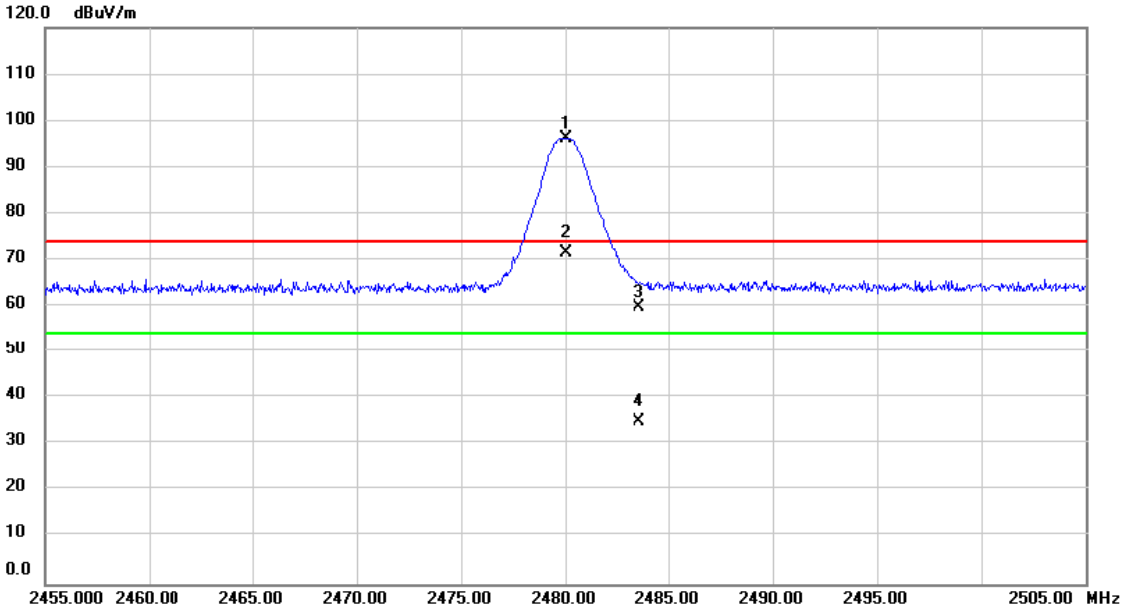
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	2441.000	62.38	31.19	93.57	74.00	19.57	peak	No Limit
2	X	2441.000	37.71	31.19	68.90	54.00	14.90	AVG	No Limit

Test Mode	TX Mode 2441MHz _CH39_1Mbps	Polarization	Horizontal



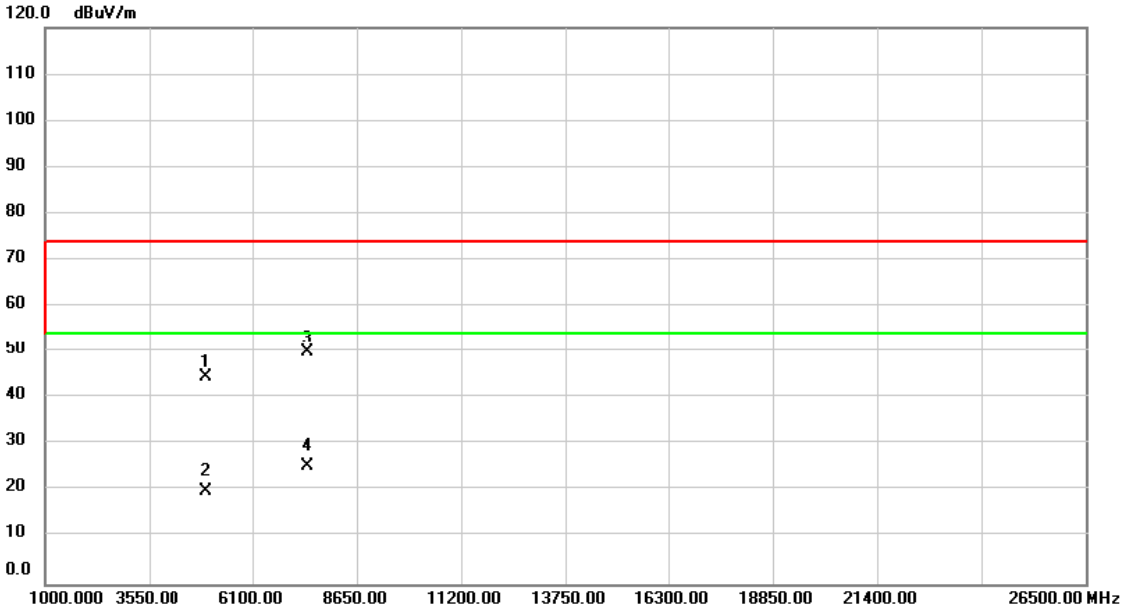
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4882.000	55.62	-11.37	44.25	74.00	-29.75	peak	
2		4882.000	30.95	-11.37	19.58	54.00	-34.42	AVG	

Test Mode	TX Mode 2480MHz _CH78_1Mbps	Polarization	Vertical



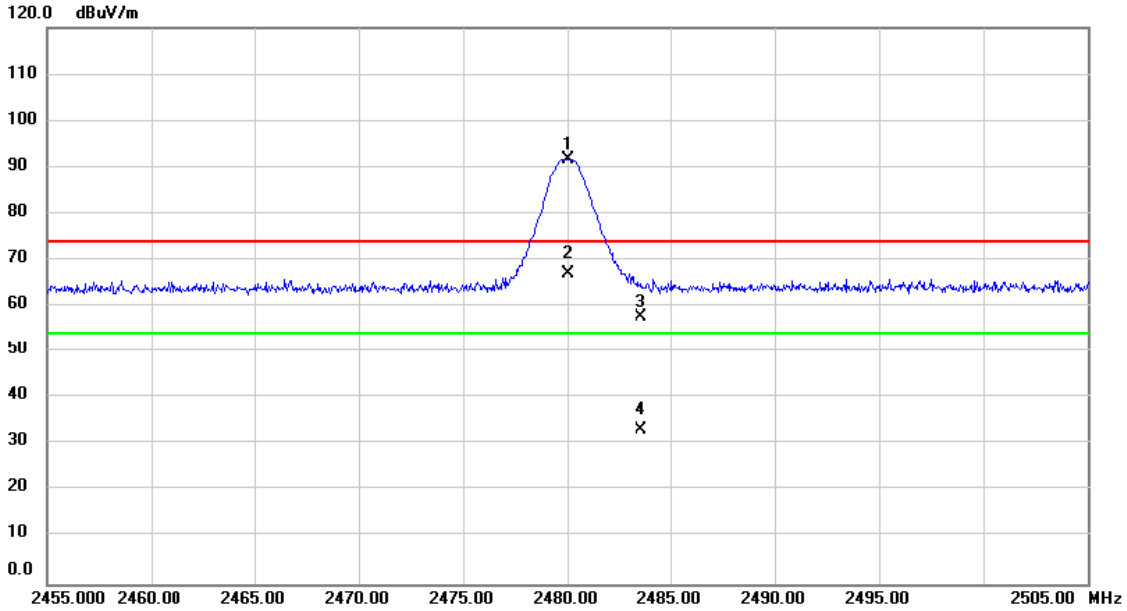
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	2480.000	64.90	31.35	96.25	74.00	22.25	peak	No Limit
2	X	2480.000	40.23	31.35	71.58	54.00	17.58	AVG	No Limit
3		2483.543	28.35	31.36	59.71	74.00	-14.29	peak	
4		2483.543	3.68	31.36	35.04	54.00	-18.96	AVG	

Test Mode	TX Mode 2480MHz _CH78_1Mbps	Polarization	Vertical



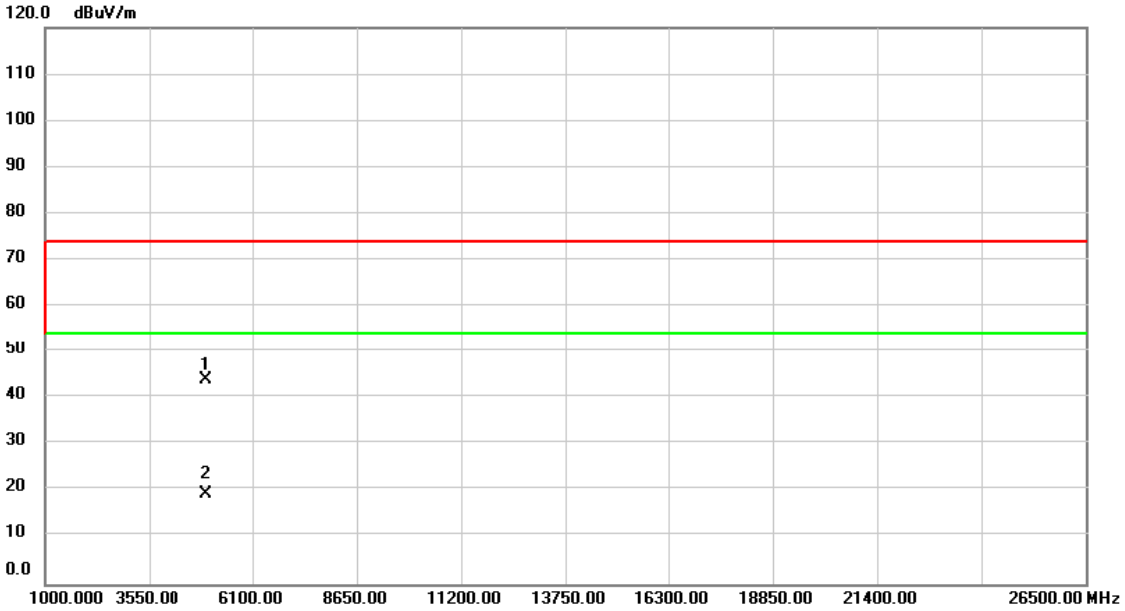
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4960.000	56.30	-11.79	44.51	74.00	-29.49	peak	
2		4960.000	31.63	-11.79	19.84	54.00	-34.16	AVG	
3	*	7440.000	54.65	-4.65	50.00	74.00	-24.00	peak	
4		7440.000	29.98	-4.65	25.33	54.00	-28.67	AVG	

Test Mode	TX Mode 2480MHz _CH78_1Mbps	Polarization	Horizontal



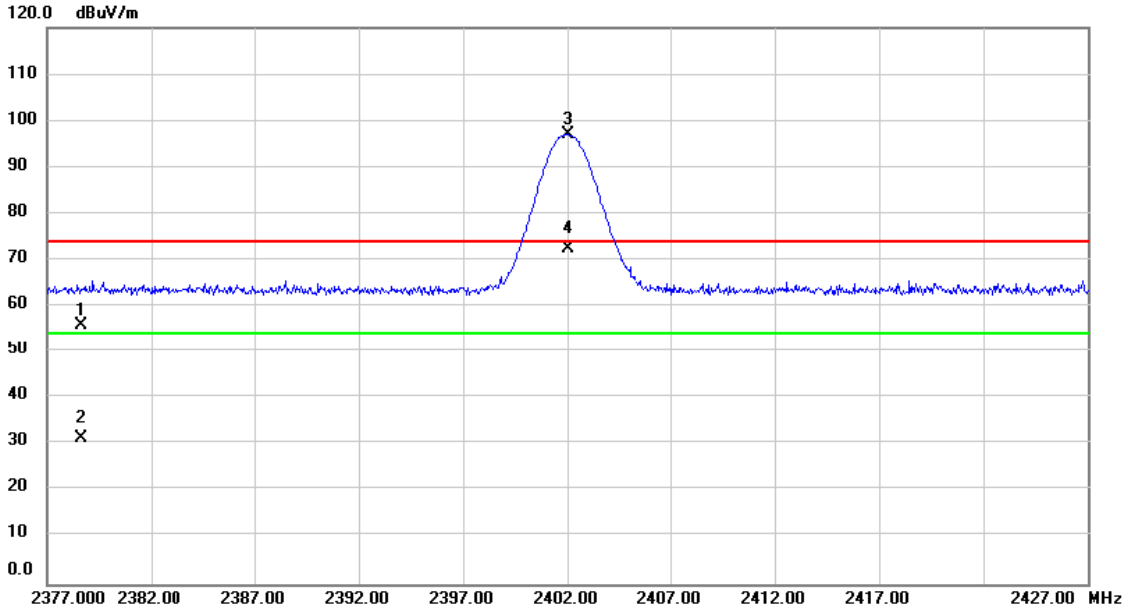
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	2480.000	60.36	31.35	91.71	74.00	17.71	peak	No Limit
2	X	2480.000	35.69	31.35	67.04	54.00	13.04	AVG	No Limit
3		2483.543	26.35	31.36	57.71	74.00	-16.29	peak	
4		2483.543	1.68	31.36	33.04	54.00	-20.96	AVG	

Test Mode	TX Mode 2480MHz _CH78_1Mbps	Polarization	Horizontal



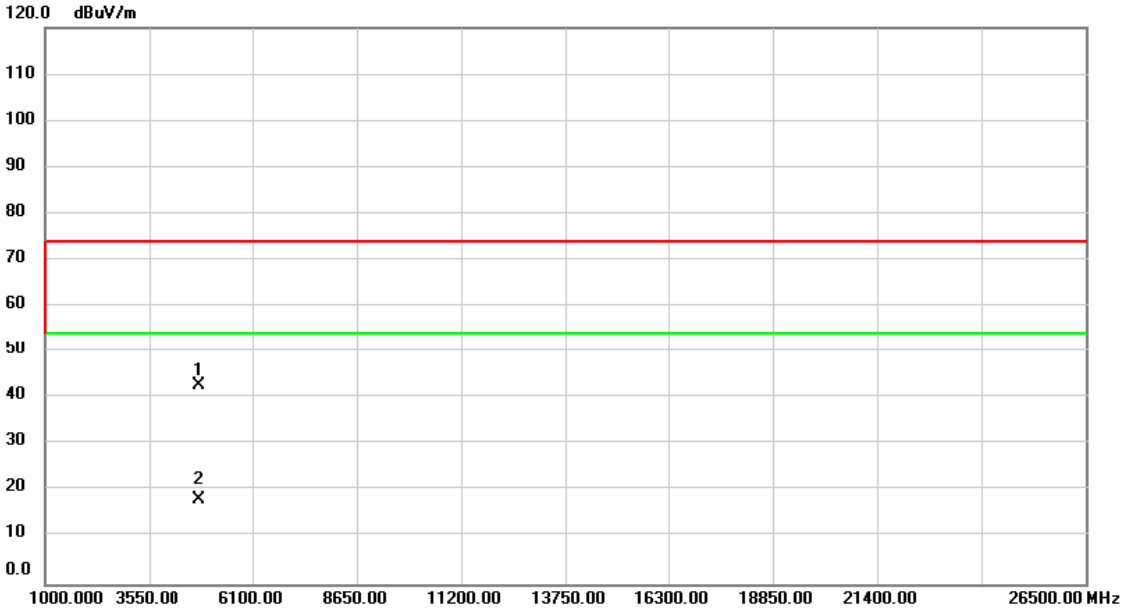
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4960.000	55.81	-11.79	44.02	74.00	-29.98	peak	
2		4960.000	31.14	-11.79	19.35	54.00	-34.65	AVG	

Test Mode	TX Mode 2402MHz _CH00_3Mbps	Polarization	Vertical



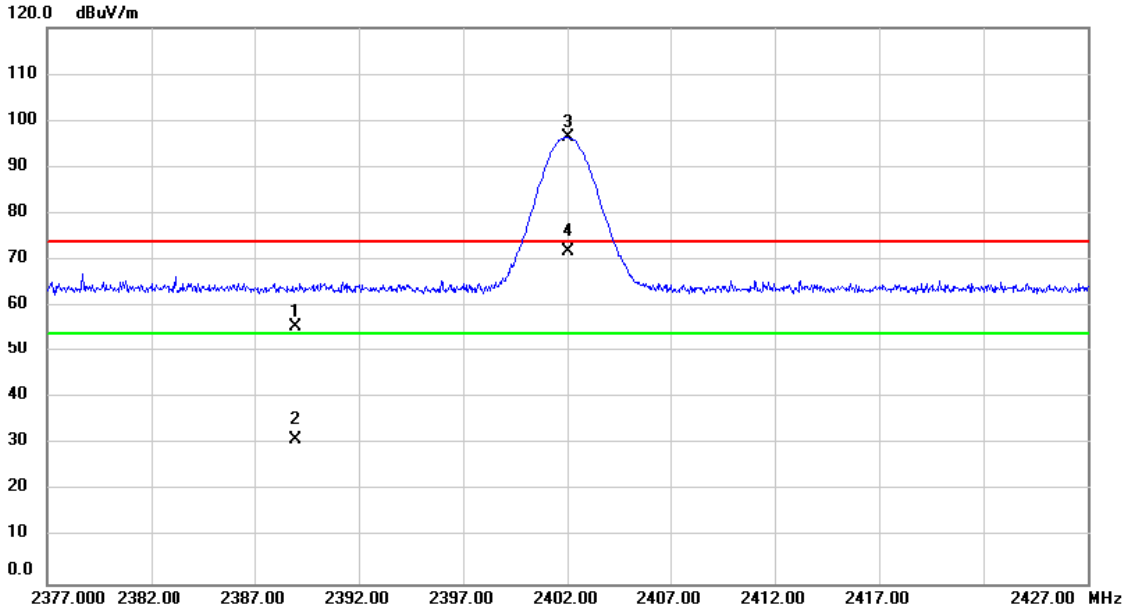
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2378.638	25.09	30.94	56.03	74.00	-17.97	peak	
2		2378.638	0.42	30.94	31.36	54.00	-22.64	AVG	
3	*	2402.000	66.06	31.03	97.09	74.00	23.09	peak	No Limit
4	X	2402.000	41.39	31.03	72.42	54.00	18.42	AVG	No Limit

Test Mode	TX Mode 2402MHz _CH00_3Mbps	Polarization	Vertical



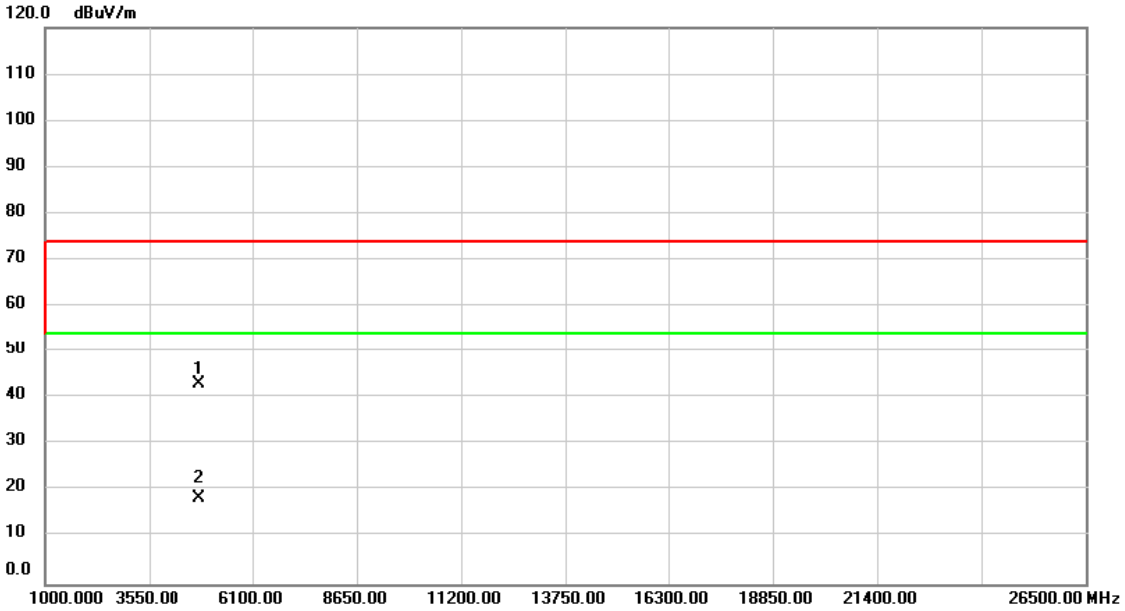
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4804.000	54.17	-11.47	42.70	74.00	-31.30	peak	
2		4804.000	29.50	-11.47	18.03	54.00	-35.97	AVG	

Test Mode	TX Mode 2402MHz _CH00_3Mbps	Polarization	Horizontal



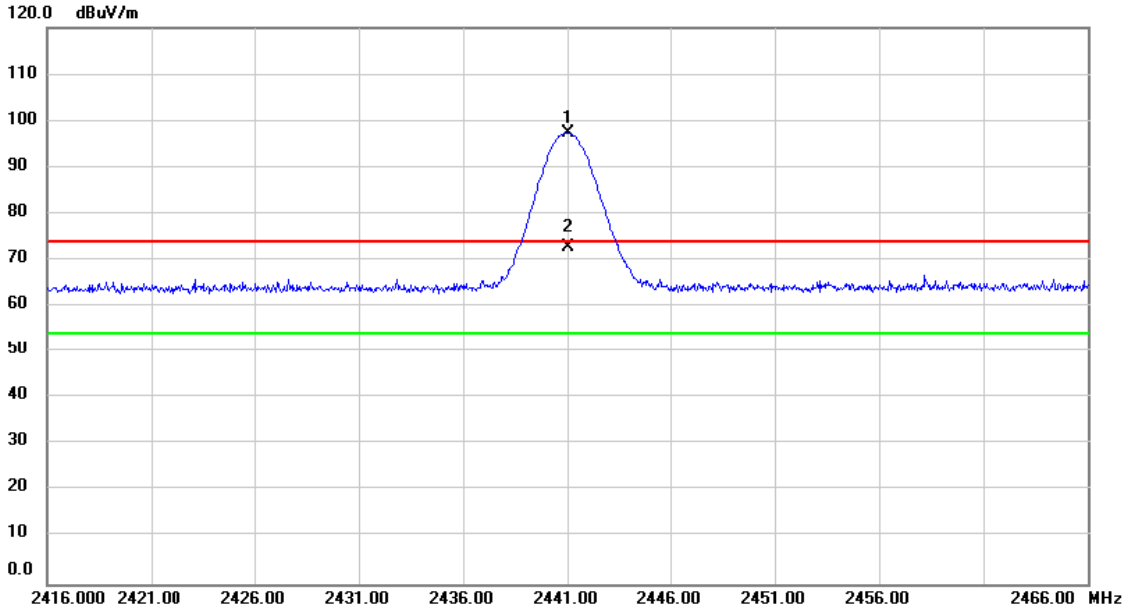
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2388.947	24.78	30.97	55.75	74.00	-18.25	peak	
2		2388.947	0.11	30.97	31.08	54.00	-22.92	AVG	
3	*	2402.000	65.47	31.03	96.50	74.00	22.50	peak	No Limit
4	X	2402.000	40.80	31.03	71.83	54.00	17.83	AVG	No Limit

Test Mode	TX Mode 2402MHz _CH00_3Mbps	Polarization	Horizontal



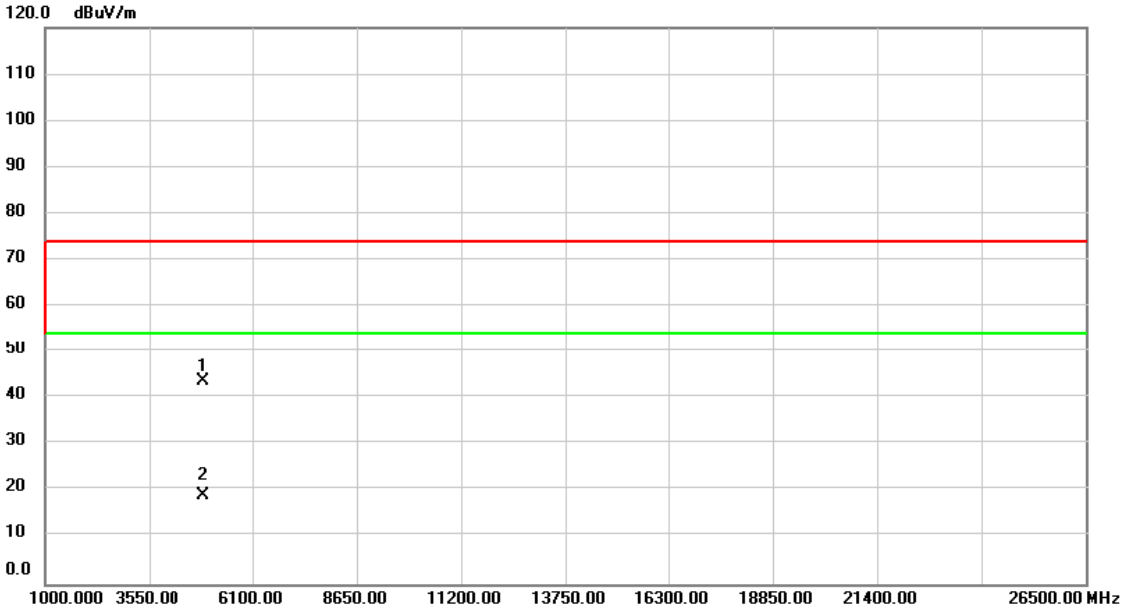
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4804.000	54.57	-11.47	43.10	74.00	-30.90	peak	
2		4804.000	29.90	-11.47	18.43	54.00	-35.57	AVG	

Test Mode	TX Mode 2441MHz _CH39_3Mbps	Polarization	Vertical



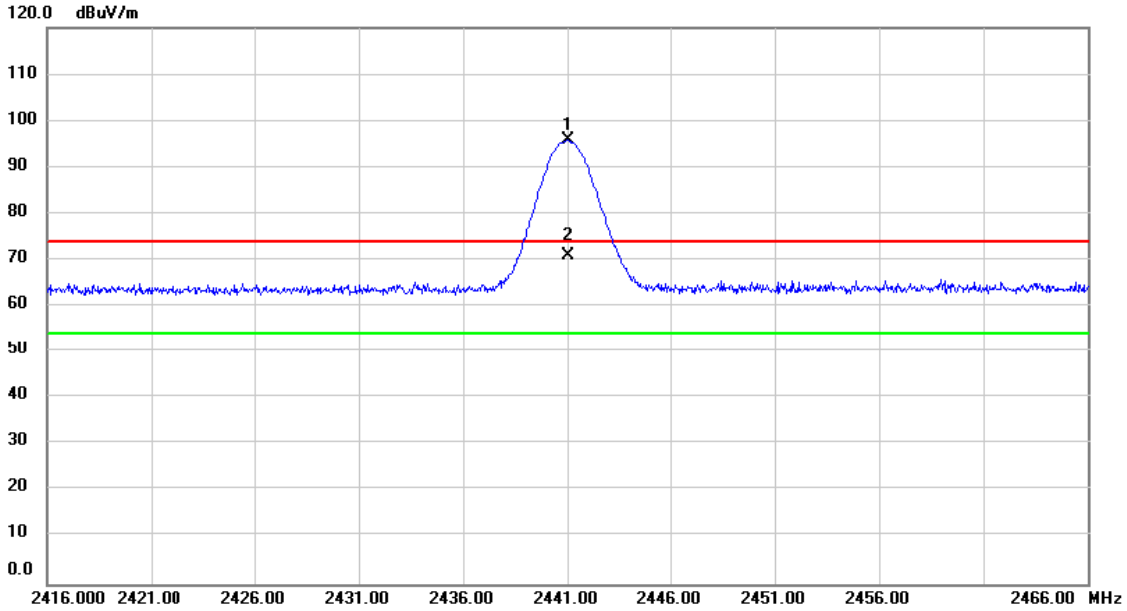
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	2441.000	66.26	31.19	97.45	74.00	23.45	peak	No Limit
2	X	2441.000	41.59	31.19	72.78	54.00	18.78	AVG	No Limit

Test Mode	TX Mode 2441MHz _CH39_3Mbps	Polarization	Vertical



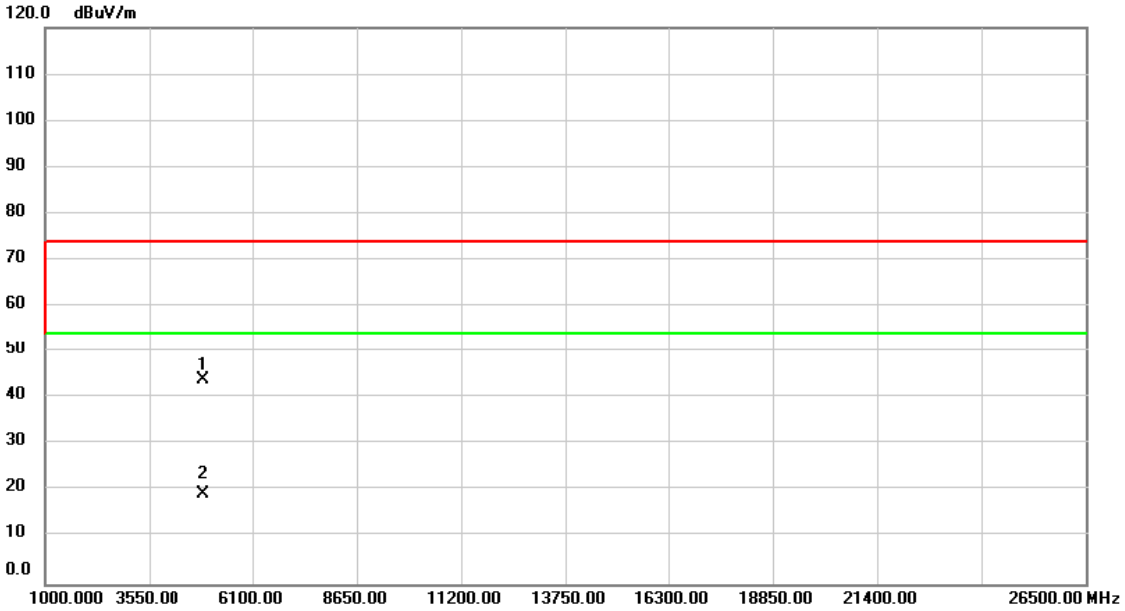
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4882.000	55.59	-11.93	43.66	74.00	-30.34	peak	
2		4882.000	30.92	-11.93	18.99	54.00	-35.01	AVG	

Test Mode	TX Mode 2441MHz _CH39_3Mbps	Polarization	Horizontal



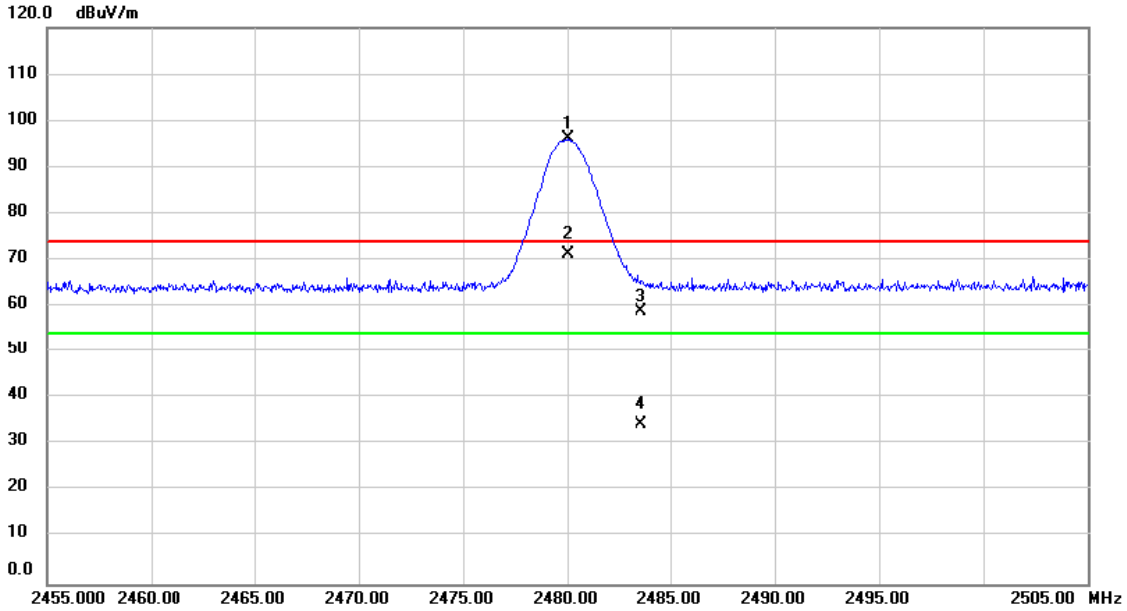
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	2441.000	64.53	31.19	95.72	74.00	21.72	peak	No Limit
2	X	2441.000	39.86	31.19	71.05	54.00	17.05	AVG	No Limit

Test Mode	TX Mode 2441MHz _CH39_3Mbps	Polarization	Horizontal



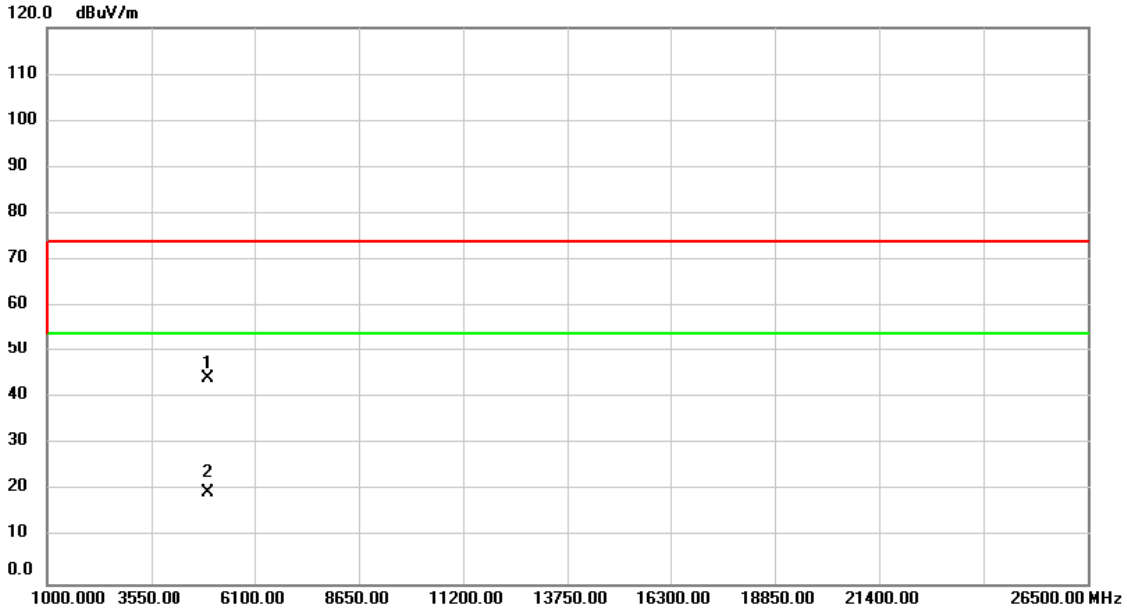
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4882.000	55.88	-11.93	43.95	74.00	-30.05	peak	
2		4882.000	31.21	-11.93	19.28	54.00	-34.72	AVG	

Test Mode	TX Mode 2480MHz _CH78_3Mbps	Polarization	Vertical



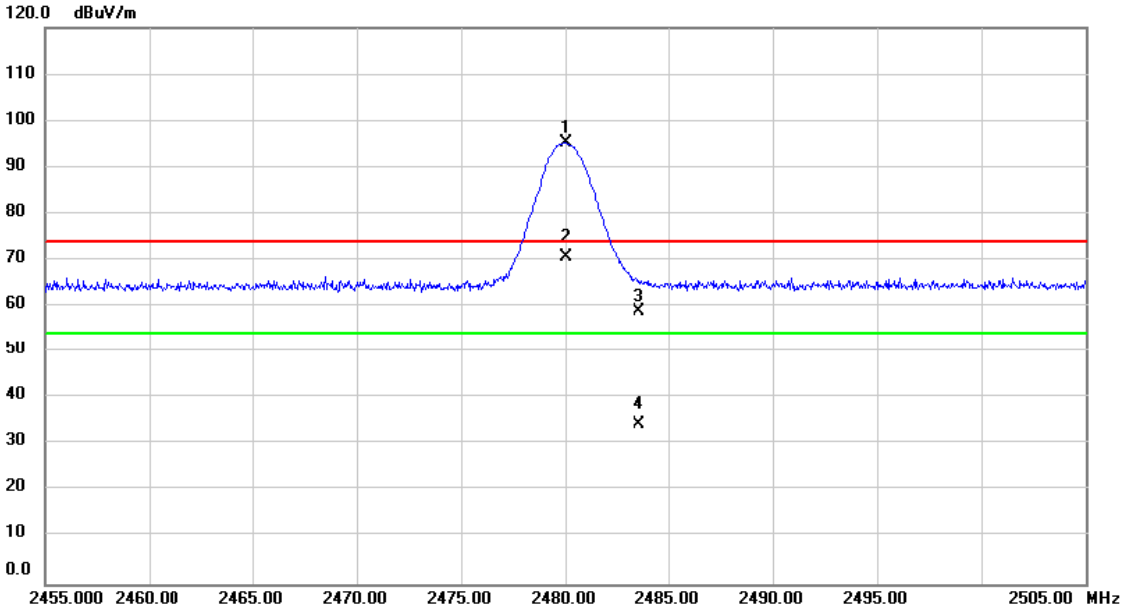
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	2480.000	64.68	31.35	96.03	74.00	22.03	peak	No Limit
2	X	2480.000	40.01	31.35	71.36	54.00	17.36	AVG	No Limit
3		2483.586	27.67	31.36	59.03	74.00	-14.97	peak	
4		2483.586	3.00	31.36	34.36	54.00	-19.64	AVG	

Test Mode	TX Mode 2480MHz _CH78_3Mbps	Polarization	Vertical



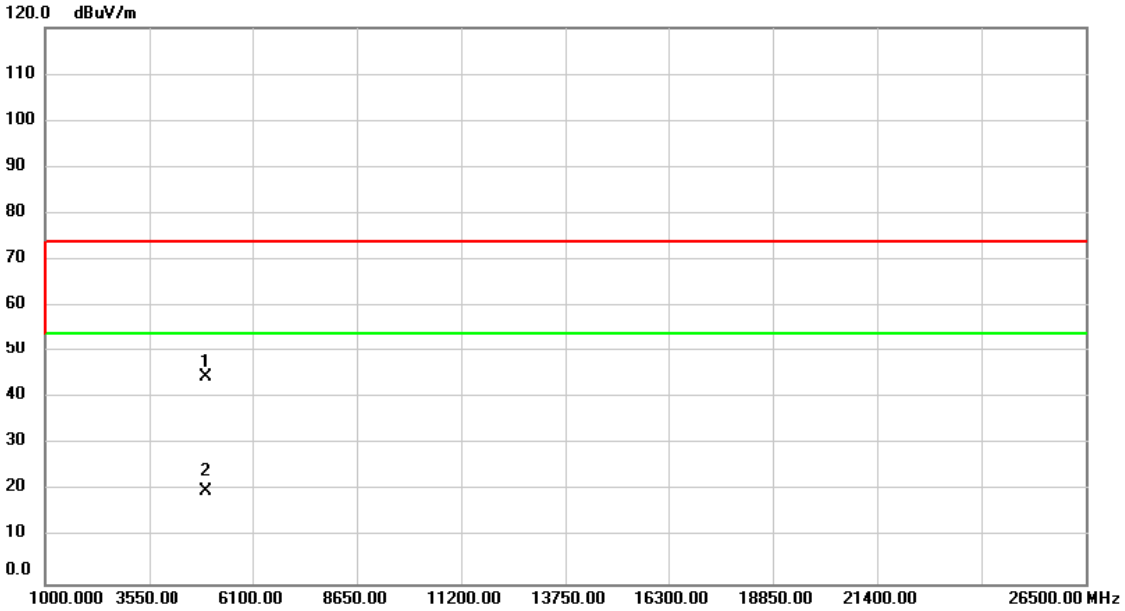
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4960.000	56.19	-11.79	44.40	74.00	-29.60	peak	
2		4960.000	31.52	-11.79	19.73	54.00	-34.27	AVG	

Test Mode	TX Mode 2480MHz _CH78_3Mbps	Polarization	Horizontal



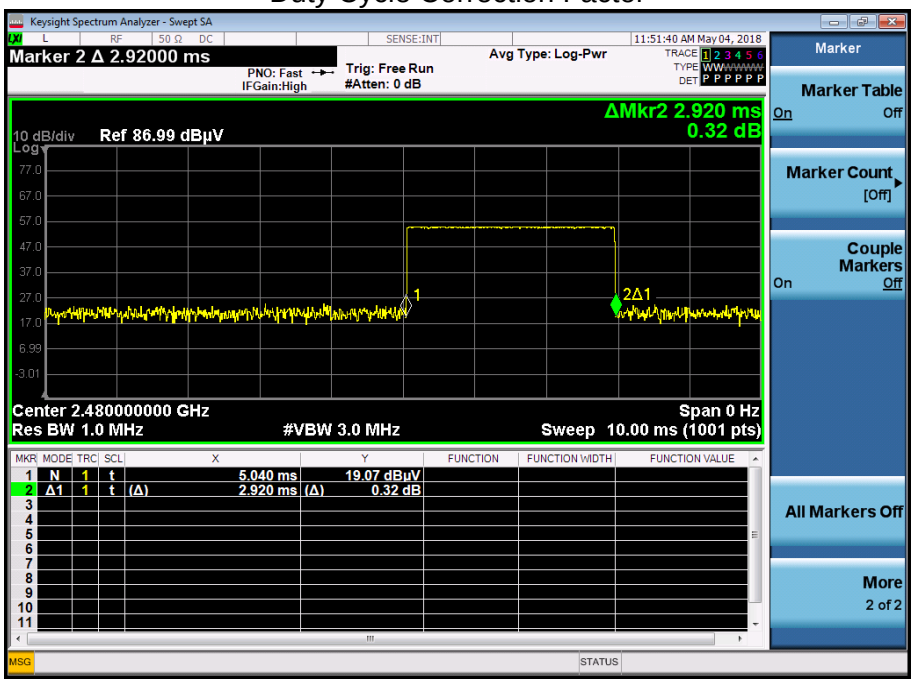
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	2480.000	63.88	31.35	95.23	74.00	21.23	peak	No Limit
2	X	2480.000	39.21	31.35	70.56	54.00	16.56	AVG	No Limit
3		2483.543	27.53	31.36	58.89	74.00	-15.11	peak	
4		2483.543	2.86	31.36	34.22	54.00	-19.78	AVG	

Test Mode	TX Mode 2480MHz _CH78_3Mbps	Polarization	Horizontal

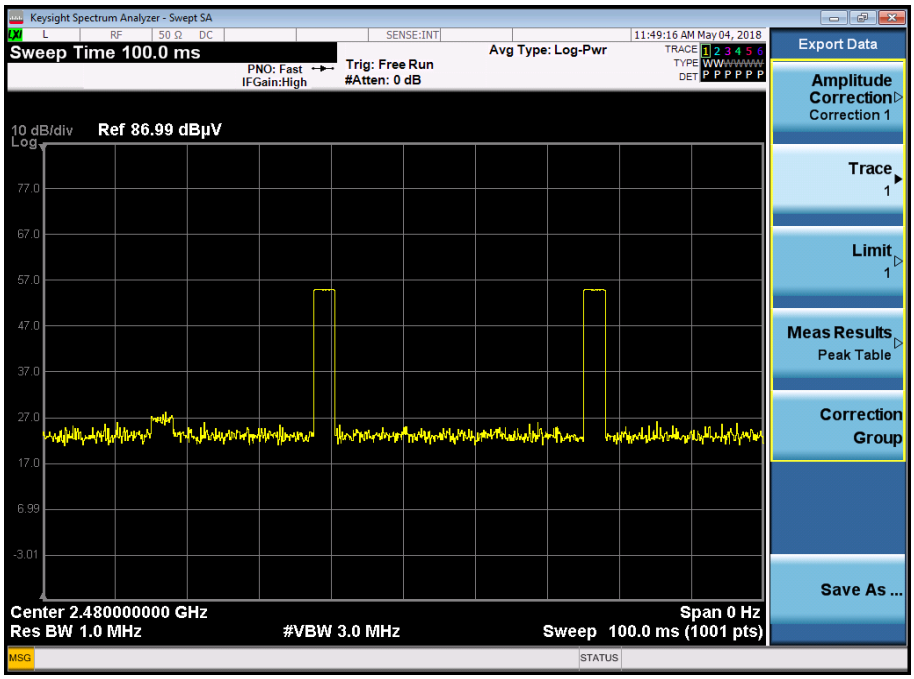


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4960.000	56.43	-11.79	44.64	74.00	-29.36	peak	
2		4960.000	31.76	-11.79	19.97	54.00	-34.03	AVG	

Duty Cycle Correction Factor



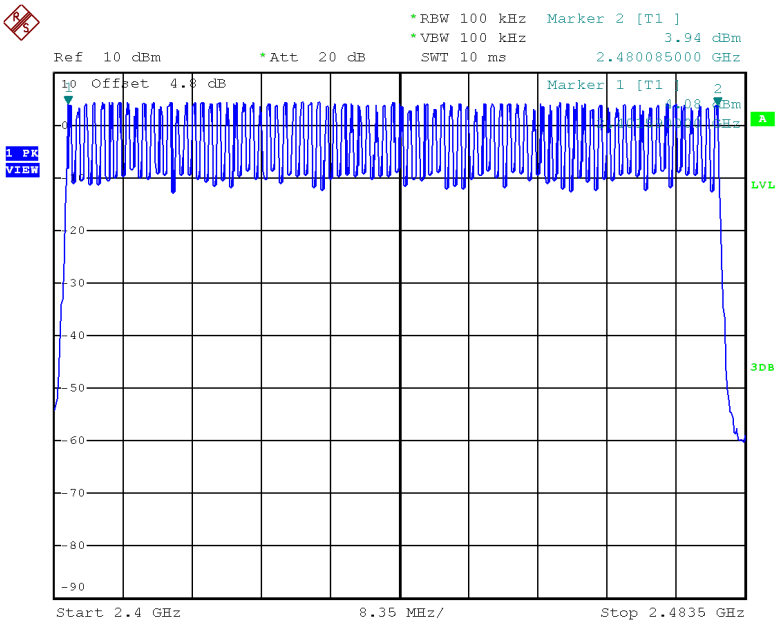
Count Pulses Plot



20log(Dwell Time/100ms)=20log(Time On*Number of hopping/100ms)			
Time On(ms)	Number of hopping	Dwell Time	20log(Dwell Time/100ms)
2.92	2	5.84	-24.67
The average values are: Average = Peak value + 20log (Dwell Time/100ms). Where the duty factor is calculated from fllowing formula: 20log (Dwell Time/100ms) = 20log (5.84/100) = -24.67 Please see as below for plotted duty.			

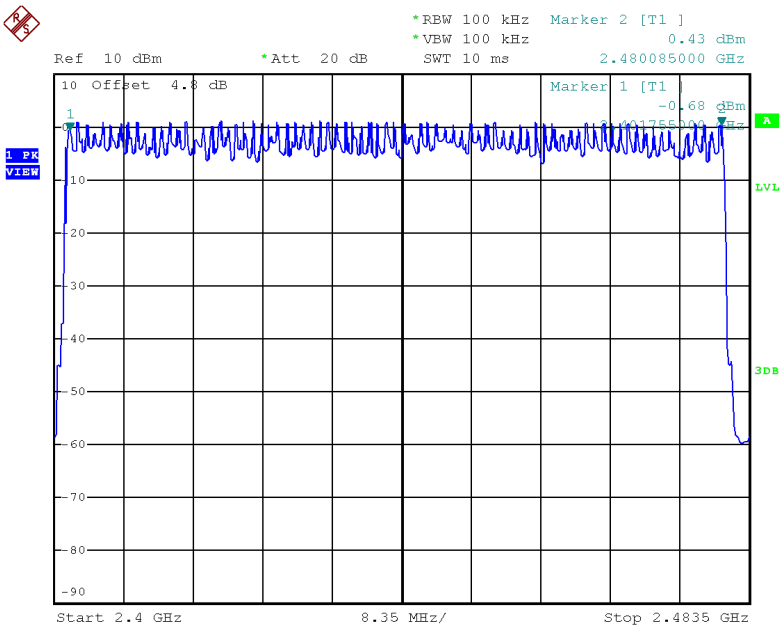
APPENDIX E - NUMBER OF HOPPING CHANNEL

Test Mode	Hopping Mode_1Mbps
Number of Hopping Channel	79



Date: 9.MAY.2018 14:42:17

Test Mode	Hopping Mode_3Mbps
Number of Hopping Channel	79



Date: 9.MAY.2018 15:13:01

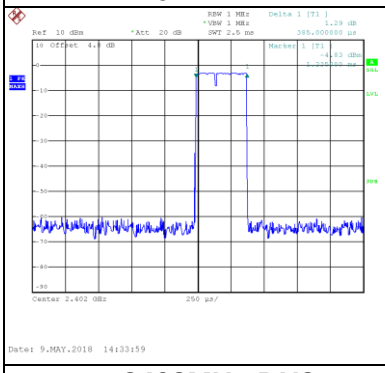
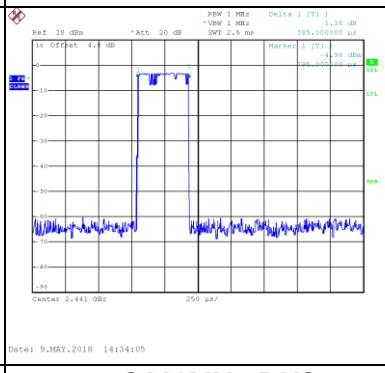
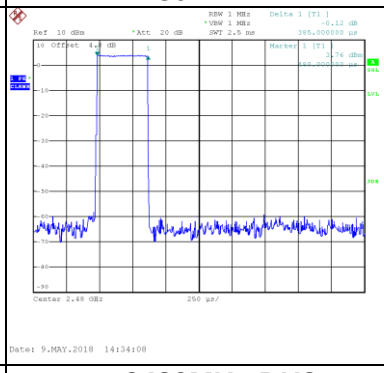
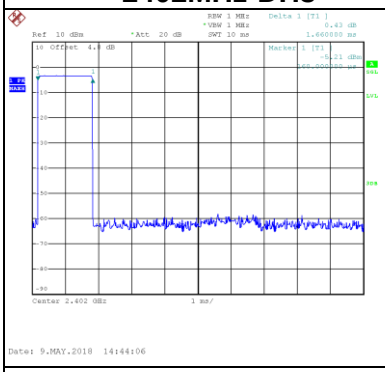
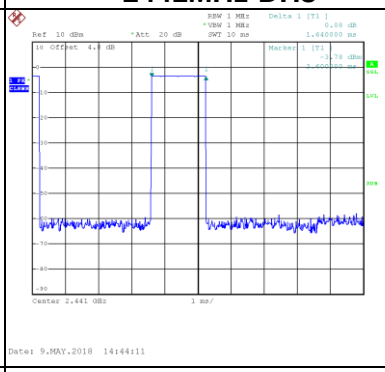
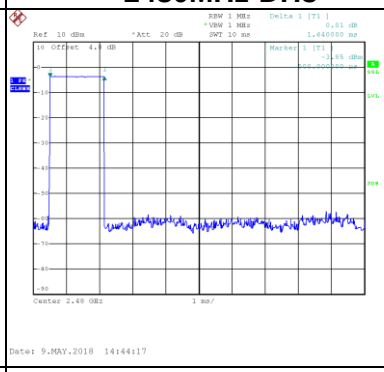
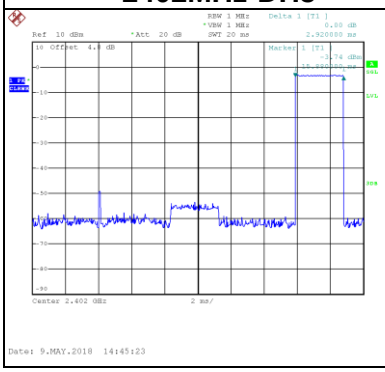
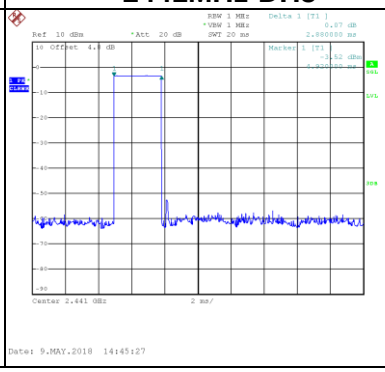
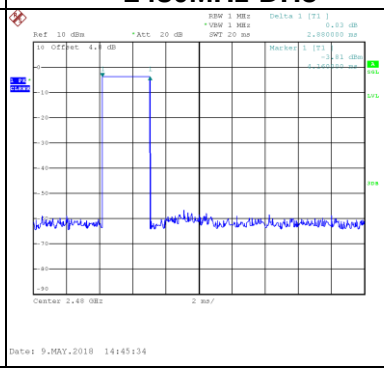
APPENDIX F - AVERAGE TIME OF OCCUPANCY

Test Mode :	TX Mode_1Mbps_ Normal Mode

Data Packet	Frequency (MHz)	Pulse Duration (ms)	Dwell Time (s)	Limits (s)	Test Result
DH5	2402 MHz	2.9200	0.3115	0.4000	Pass
DH3	2402 MHz	1.6600	0.2656	0.4000	Pass
DH1	2402 MHz	0.3850	0.1232	0.4000	Pass
DH5	2441 MHz	2.8800	0.3072	0.4000	Pass
DH3	2441 MHz	1.6400	0.2624	0.4000	Pass
DH1	2441 MHz	0.3850	0.1232	0.4000	Pass
DH5	2480 MHz	2.8800	0.3072	0.4000	Pass
DH3	2480 MHz	1.6400	0.2624	0.4000	Pass
DH1	2480 MHz	0.3850	0.1232	0.4000	Pass

Test Mode :	TX Mode_1Mbps_ AFH Mode

Data Packet	Frequency (MHz)	Pulse Duration (ms)	Dwell Time (s)	Limits (s)	Test Result
DH5	2402 MHz	2.9200	0.3115	0.4000	Pass
DH3	2402 MHz	1.6600	0.2656	0.4000	Pass
DH1	2402 MHz	0.3850	0.1232	0.4000	Pass
DH5	2441 MHz	2.8800	0.3072	0.4000	Pass
DH3	2441 MHz	1.6400	0.2624	0.4000	Pass
DH1	2441 MHz	0.3850	0.1232	0.4000	Pass
DH5	2480 MHz	2.8800	0.3072	0.4000	Pass
DH3	2480 MHz	1.6400	0.2624	0.4000	Pass
DH1	2480 MHz	0.3850	0.1232	0.4000	Pass

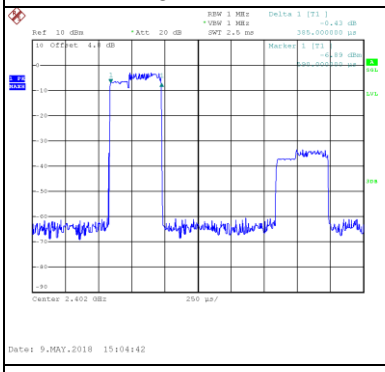
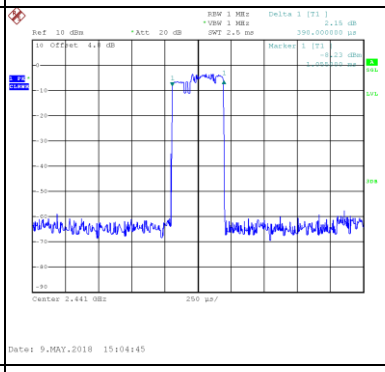
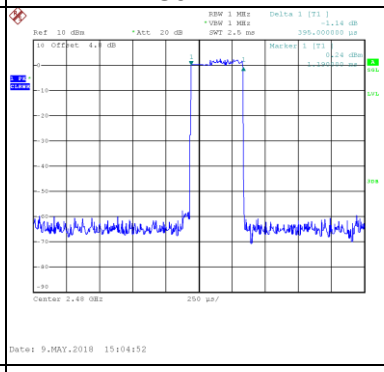
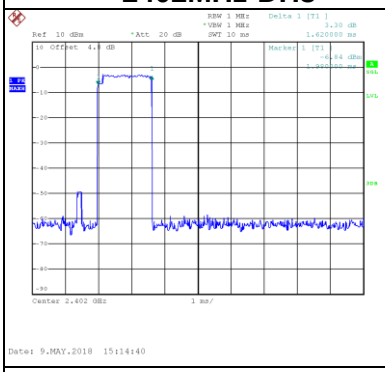
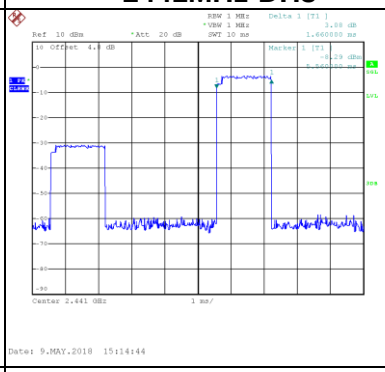
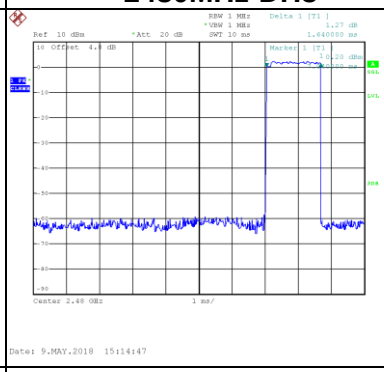
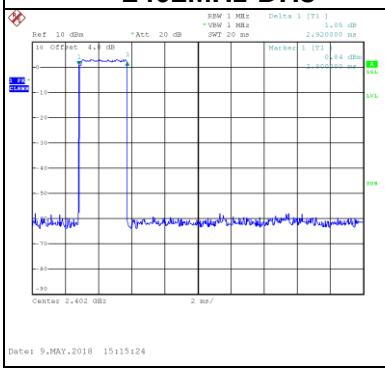
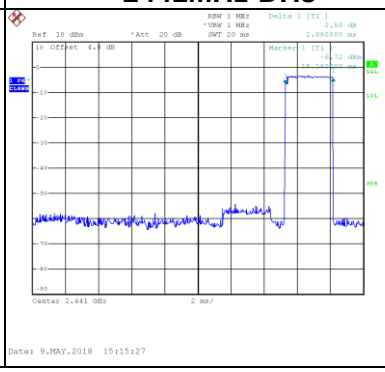
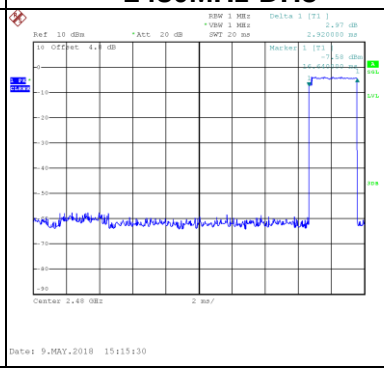
2402MHz-DH1	2441MHz-DH1	2480MHz-DH1
		
2402MHz-DH3	**2441MHz-DH3**	**2480MHz-DH3**
		
2402MHz-DH5	**2441MHz-DH5**	**2480MHz-DH5**
		

Test Mode :	TX Mode_3Mbps_ Normal Mode

Data Packet	Frequency	Pulse Duration(ms)	Dwell Time(s)	Limits(s)	Test Result
3DH5	2402 MHz	2.9200	0.3115	0.4000	Pass
3DH3	2402 MHz	1.6200	0.2592	0.4000	Pass
3DH1	2402 MHz	0.3850	0.1232	0.4000	Pass
3DH5	2441 MHz	2.8800	0.3072	0.4000	Pass
3DH3	2441 MHz	1.6600	0.2656	0.4000	Pass
3DH1	2441 MHz	0.3900	0.1248	0.4000	Pass
3DH5	2480 MHz	2.9200	0.3115	0.4000	Pass
3DH3	2480 MHz	1.6400	0.2624	0.4000	Pass
3DH1	2480 MHz	0.3950	0.1264	0.4000	Pass

Test Mode :	TX Mode_3Mbps_ AFH Mode

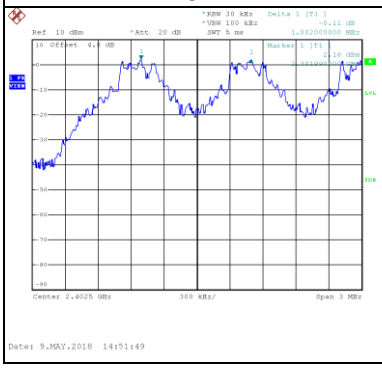
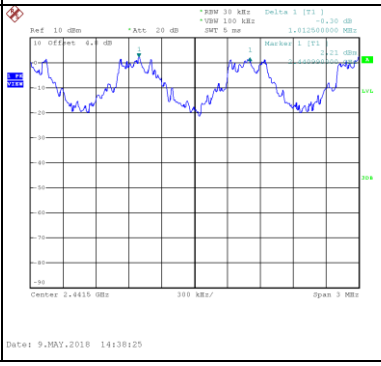
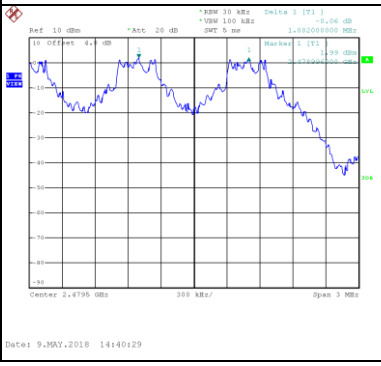
Data Packet	Frequency	Pulse Duration(ms)	Dwell Time(s)	Limits(s)	Test Result
3DH5	2402 MHz	2.9200	0.3115	0.4000	Pass
3DH3	2402 MHz	1.6200	0.2592	0.4000	Pass
3DH1	2402 MHz	0.3850	0.1232	0.4000	Pass
3DH5	2441 MHz	2.8800	0.3072	0.4000	Pass
3DH3	2441 MHz	1.6600	0.2656	0.4000	Pass
3DH1	2441 MHz	0.3900	0.1248	0.4000	Pass
3DH5	2480 MHz	2.9200	0.3115	0.4000	Pass
3DH3	2480 MHz	1.6400	0.2624	0.4000	Pass
3DH1	2480 MHz	0.3950	0.1264	0.4000	Pass

2402MHz-DH1	2441MHz-DH1	2480MHz-DH1
		
2402MHz-DH3	**2441MHz-DH3**	**2480MHz-DH3**
		
2402MHz-DH5	**2441MHz-DH5**	**2480MHz-DH5**
		

APPENDIX G - HOPPING CHANNEL SEPARATION MEASUREMENT

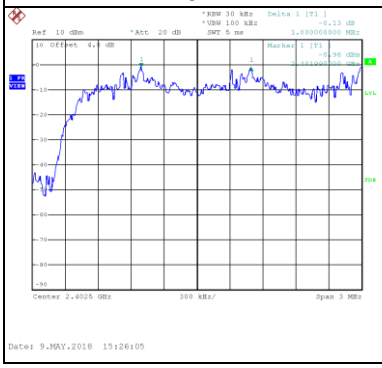
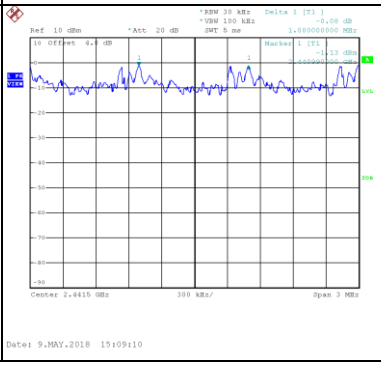
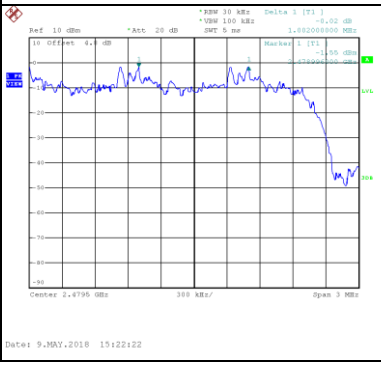
Test Mode :	Hopping on _1Mbps

Frequency (MHz)	Channel Separation (MHz)	2/3 of 20dB Bandwidth (MHz)	Test Result
2402	1.002	0.648	Pass
2441	1.013	0.655	Pass
2480	1.002	0.655	Pass

2402 MHz	2441 MHz	2480 MHz
		

Test Mode :	Hopping on _3Mbps

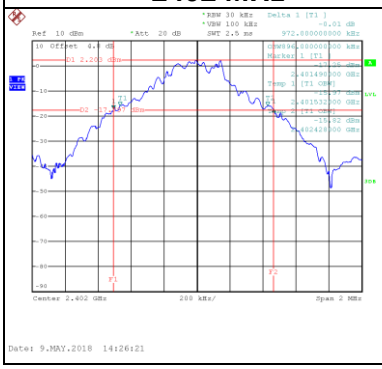
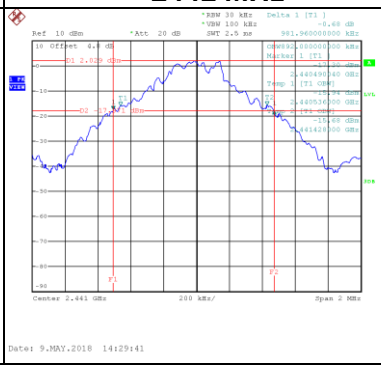
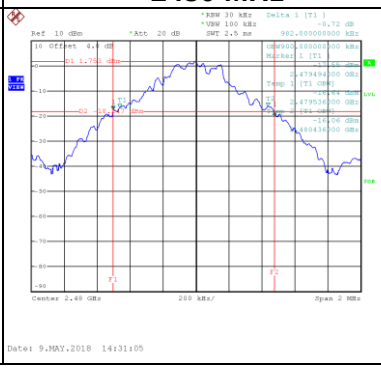
Frequency (MHz)	Channel Separation (MHz)	2/3 of 20dB Bandwidth (MHz)	Test Result
2402	1.000	0.889	Pass
2441	1.000	0.885	Pass
2480	1.002	0.885	Pass

2402 MHz	2441 MHz	2480 MHz
		

APPENDIX H - BANDWIDTH

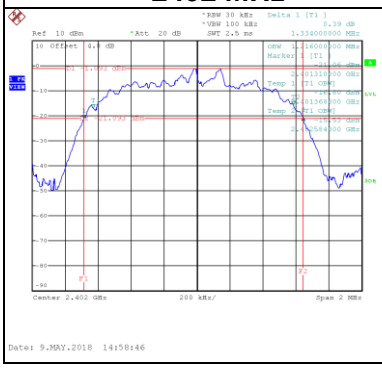
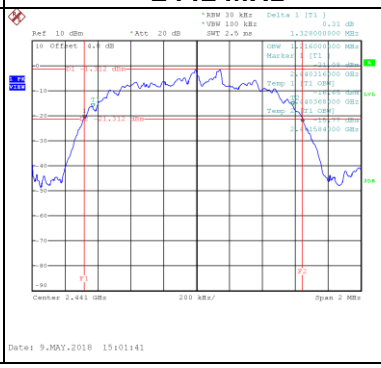
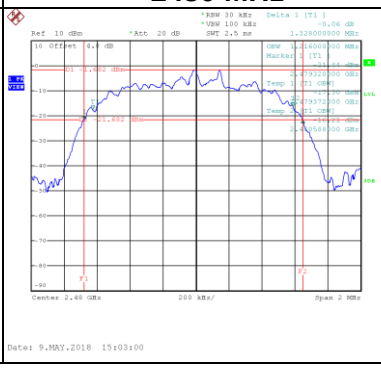
Test Mode :	TX Mode _1Mbps

Frequency (MHz)	20dB Bandwidth (MHz)	99% Occupied BW (MHz)	Test Result
2402	0.972	0.896	Pass
2441	0.982	0.892	Pass
2480	0.982	0.900	Pass

2402 MHz	2441 MHz	2480 MHz
		

Test Mode :	TX Mode _3Mbps

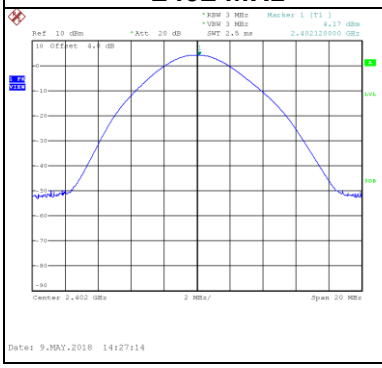
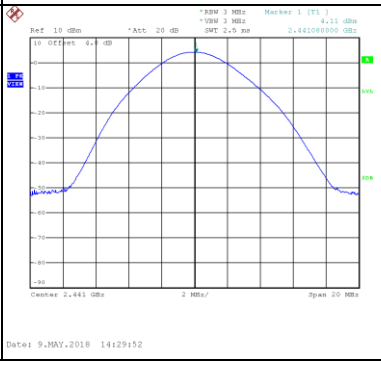
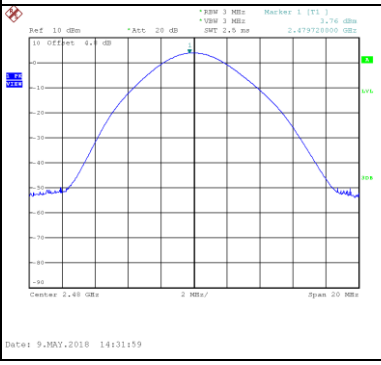
Frequency (MHz)	20dB Bandwidth (MHz)	99% Occupied BW (MHz)	Test Result
2402	1.334	1.216	Pass
2441	1.328	1.216	Pass
2480	1.328	1.216	Pass

2402 MHz	2441 MHz	2480 MHz
		

APPENDIX I - PEAK OUTPUT POWER

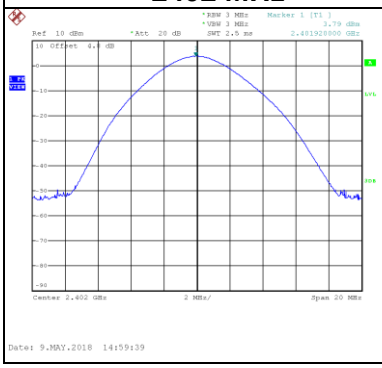
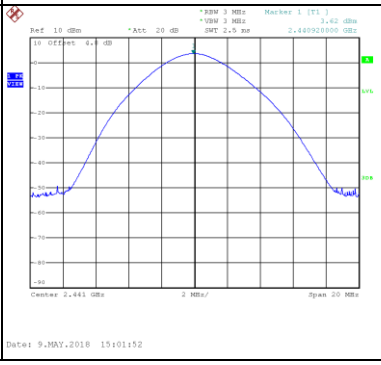
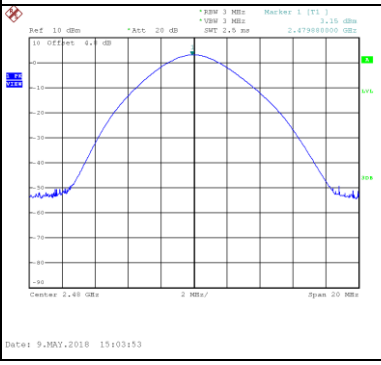
Test Mode :	TX Mode _1Mbps

Frequency (MHz)	Conducted Power (dBm)	Conducted Power (W)	Max. Limit (dBm)	Max. Limit (W)	Test Result
2402	4.17	0.0026	30.00	1.00	Pass
2441	4.11	0.0026	30.00	1.00	Pass
2480	3.76	0.0024	30.00	1.00	Pass

2402 MHz	2441 MHz	2480 MHz
		

Test Mode :	TX Mode _3Mbps

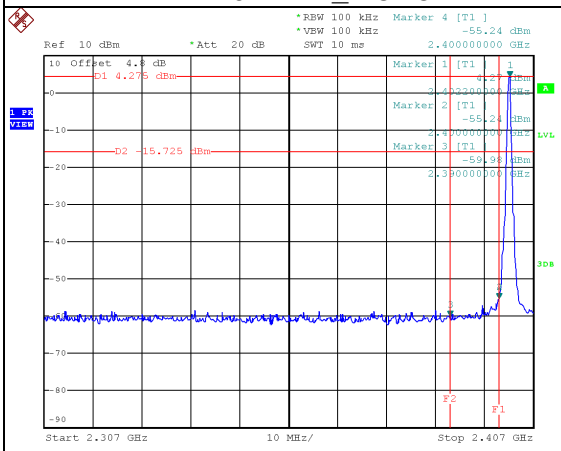
Frequency (MHz)	Conducted Power (dBm)	Conducted Power (W)	Max. Limit (dBm)	Max. Limit (W)	Test Result
2402	3.79	0.0024	30.00	1.00	Pass
2441	3.62	0.0023	30.00	1.00	Pass
2480	3.15	0.0021	30.00	1.00	Pass

2402 MHz	2441 MHz	2480 MHz
		

APPENDIX J - ANTENNA CONDUCTED SPURIOUS EMISSION

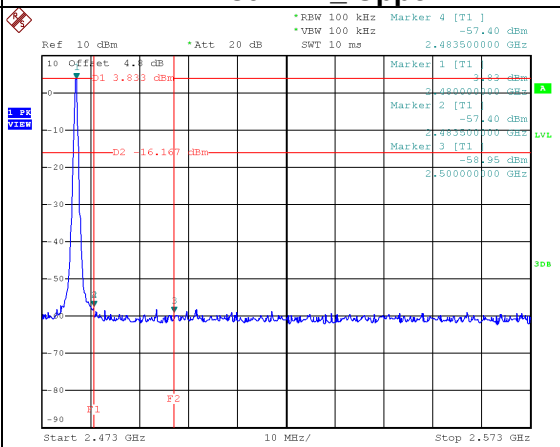
Test Mode : TX Mode _1Mbps

2402 MHz_ Lower



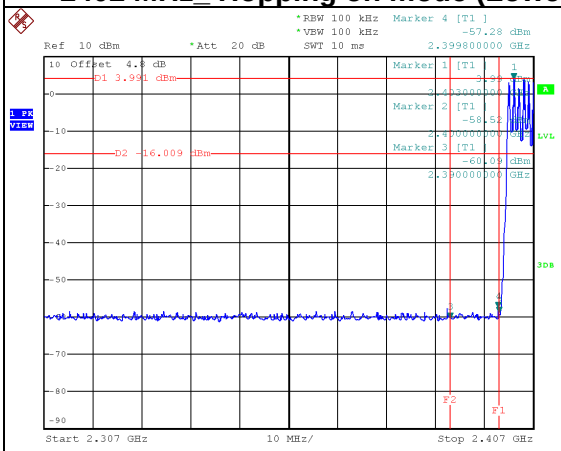
Date: 9.MAY.2018 14:25:46

2480 MHz_ Upper



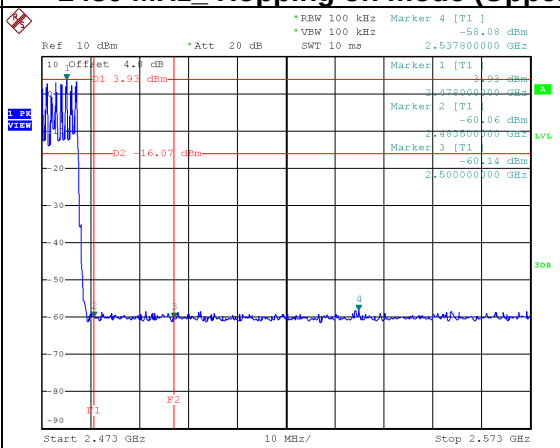
Date: 9.MAY.2018 14:30:24

2402 MHz_ Hopping on mode (Lower)



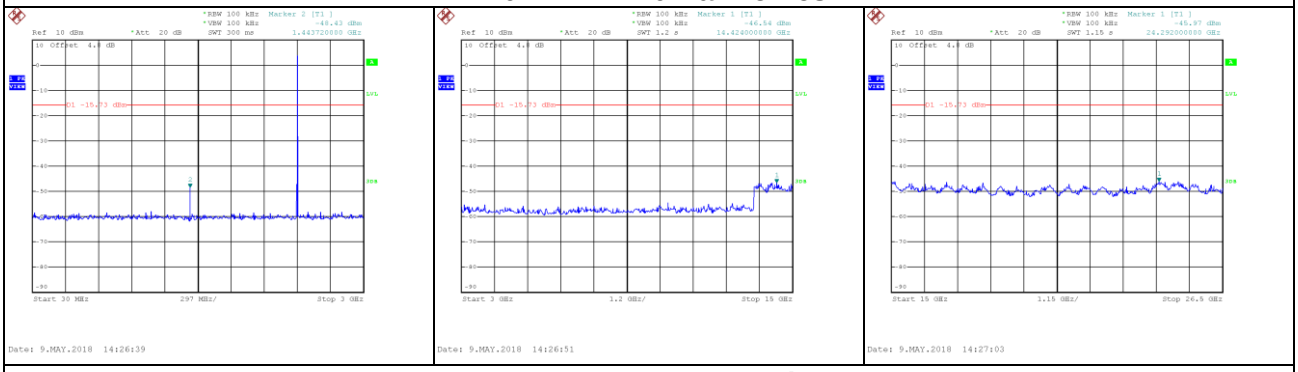
Date: 9.MAY.2018 14:42:50

2480 MHz_ Hopping on mode (Upper)

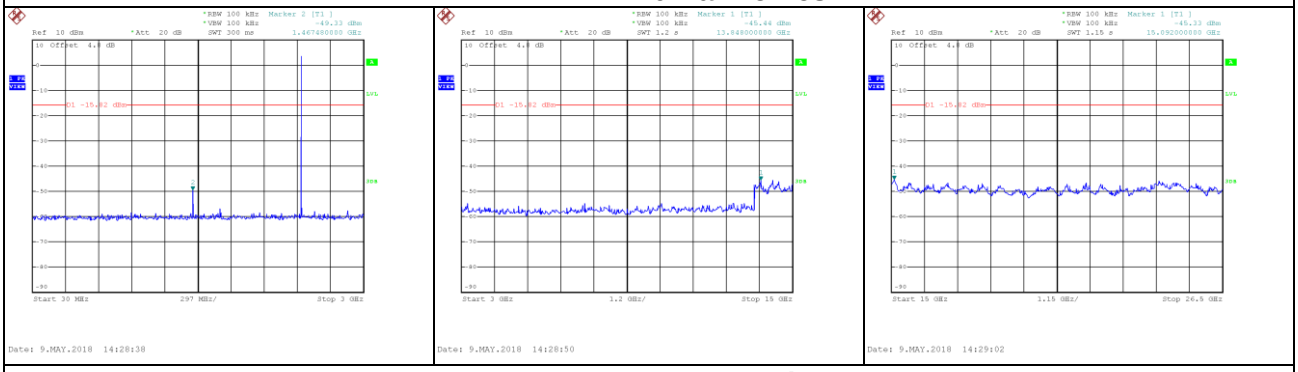


Date: 9.MAY.2018 14:43:24

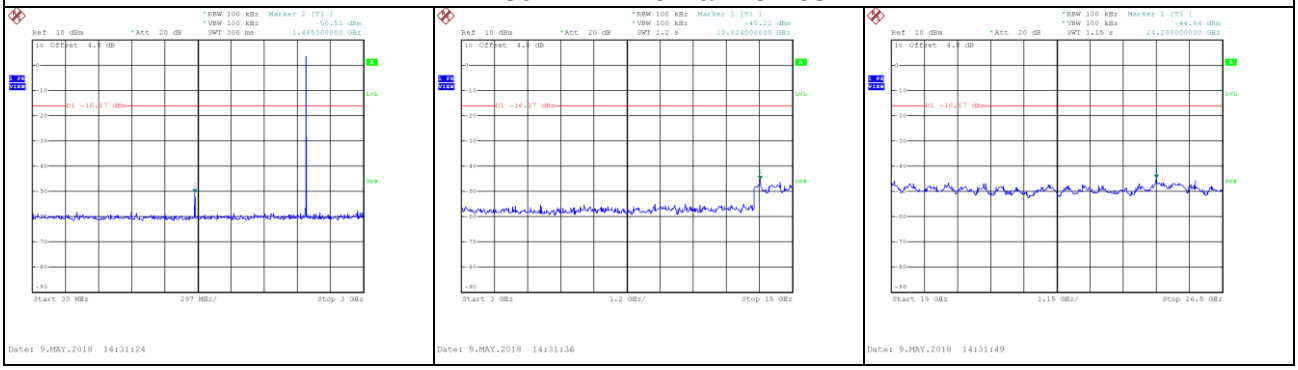
2402 MHz – 10 Harmonics



2441 MHz – 10 Harmonics

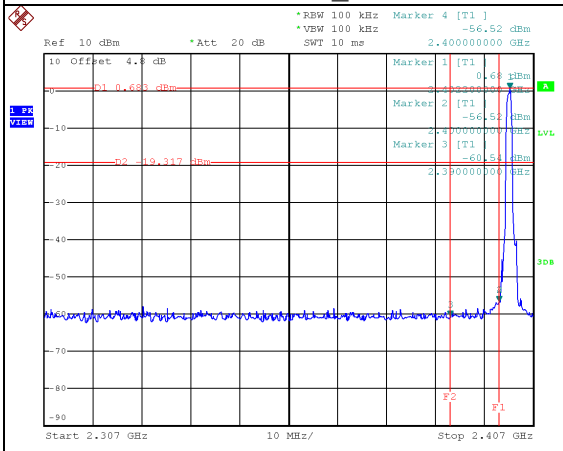


2480 MHz – 10 Harmonics



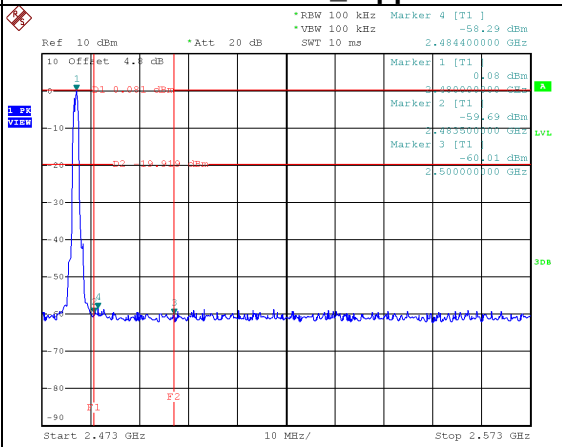
Test Mode : TX Mode _3Mbps

2402 MHz_ Lower



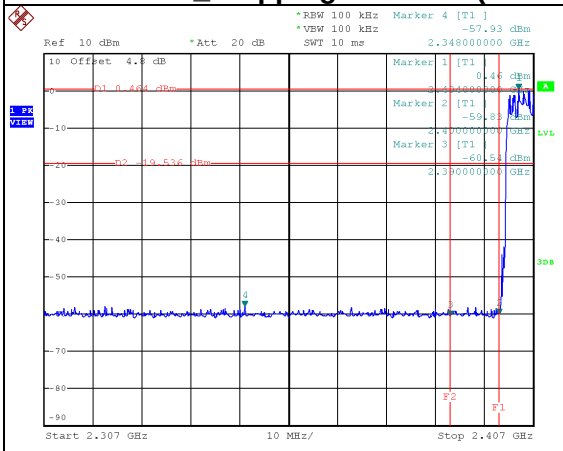
Date: 9.MAY.2018 14:58:20

2480 MHz_ Upper



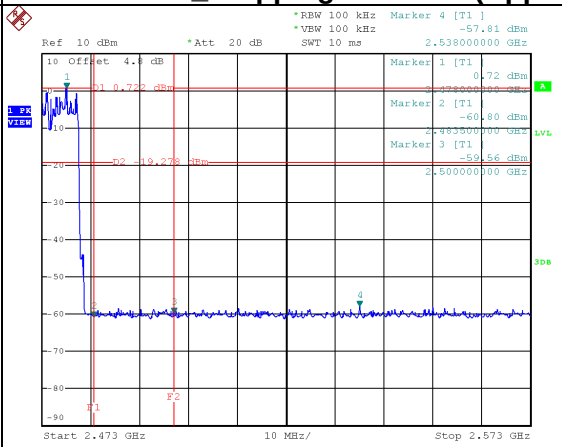
Date: 9.MAY.2018 15:02:34

2402 MHz_ Hopping on mode (Lower)



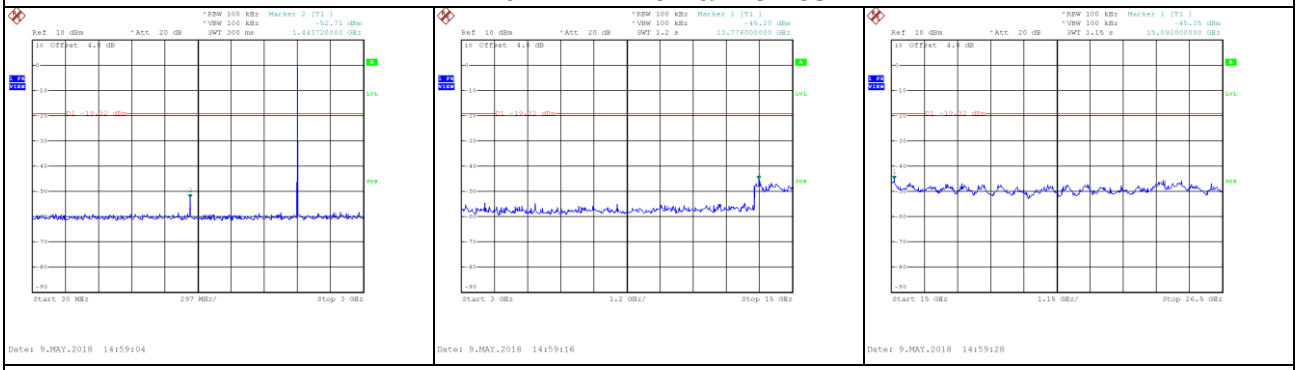
Date: 9.MAY.2018 15:13:35

2480 MHz_ Hopping on mode (Upper)

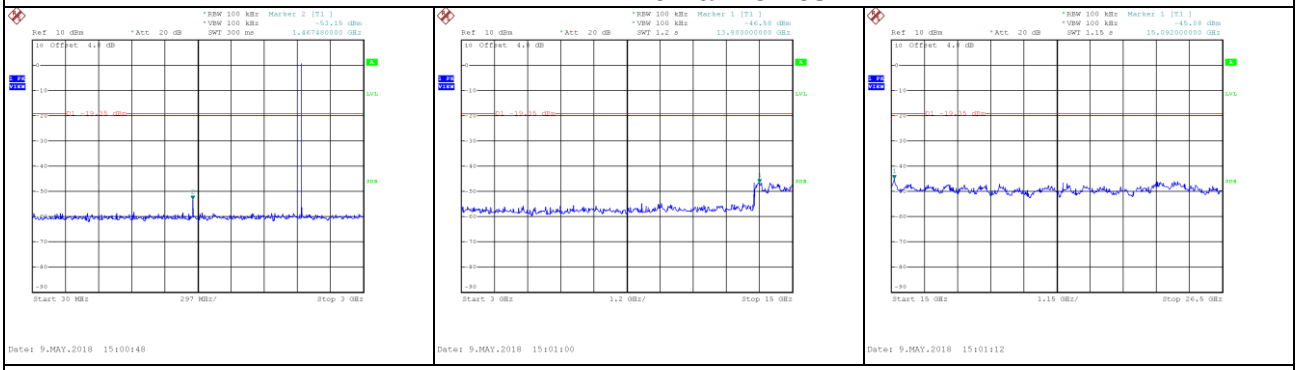


Date: 9.MAY.2018 15:14:09

2402 MHz – 10 Harmonics



2441 MHz – 10 Harmonics



2480 MHz – 10 Harmonics