FCC&IC Radio Test Report

FCC ID: Q3N-25BTBASE

IC: 5121A-25BTBASE

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

Project No.	:	1607100
Equipment	:	Bluetooth Scanner Cradle
Model Name	:	2500 BT BASE
Applicant	:	CIPHERLAB CO., LTD.
Address	:	12F, 333, Dunhua S. Rd., Sec. 2, Taipei, Taiwan

Date of Receipt	:	Jul. 19, 2016
Date of Test	:	Jul. 19, 2016 ~ Aug. 01, 2016
Issued Date	:	Aug. 03, 2016
Tested by	:	BTL Inc.

Testing Engineer : Rush Kao
(Rush Kao)

Technical Manager : Jeff Yang
(Jeff Yang)

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(Andy Chiu)

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Declaration

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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-1-1607100	Original Issue.	Aug. 03, 2016

1. CERTIFICATION

Equipment	:	Bluetooth Scanner Cradle
Brand Name	:	CIPHERLAB
Model Name	:	2500 BT BASE
Applicant	:	CIPHERLAB CO., LTD.
Manufacturer	:	CIPHERLAB CO., LTD.
Address	:	12F, 333, Dunhua S. Rd., Sec. 2, Taipei, Taiwan
Factory	:	CIPHERLAB CO., LTD. 2nd
Address	:	7 F., No. 198 and 7F., No. 196, Sec. 3, Da Tong Rd., Shiji Dist., New Taipei City 221, Taiwan.
Date of Test	:	Jul. 19, 2016 ~ Aug. 01, 2016
Test Sample	:	Engineering Sample
Standard(s)	:	FCC Part15, Subpart C (15.247) / ANSI C63.10-2013 RSS-247 Issue 1, May 2015 RSS-GEN Issue 4, Nov 2014

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-FICP-1-1607100) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of TAF according to the ISO-17025 quality assessment standard and technical standard(s).

2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

Applied Standard(s): 47 CFR Part 15, Subpart C, RSS-247 Issue 1, May 2015; 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 (2)	Hopping Channel Separation	PASS	
15.247(a)(2)	RSS-247 5.1 (1)	Bandwidth	PASS	
15.247 (b)(1)	RSS-247 5.4 (2)	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 (4)	Number of Hopping Frequency	PASS	
15.247 (a)(1)(iii)	RSS-247 5.1 (4)	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:949005; FCC DN:TW1082)
No. 68-1, Ln. 169, Sec.2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan

Radiated emission Test (Below 1GHz):

CB11: (VCCI RN: R-4260; FCC RN:949005; FCC DN:TW1082; IC Assigned Code:20088)
No. 68-1, Ln. 169, Sec.2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan

Radiated emission Test (Above 1GHz):

CB11: (VCCI RN: G-868; FCC RN:949005; FCC DN:TW1082; IC Assigned Code:20088)
No. 68-1, Ln. 169, Sec.2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan

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 Measurement :

Test Site	Method	Measurement Frequency Range	U, (dB)
C05	CISPR	150 kHz~30MHz	2.04

B. Radiated Measurement :

Test Site	Method	Measurement Frequency Range	U, (dB)
CB11 (3m)	CISPR	9kHz ~ 150kHz	4.00
		150kHz ~ 30MHz	4.00

Test Site	Method	Measurement Frequency Range	Ant. H / V	U, (dB)
CB11 (3m)	CISPR	30 MHz ~ 200 MHz	V	3.06
		30 MHz ~ 200 MHz	H	2.58
		200 MHz ~ 1, 000 MHz	V	3.50
		200 MHz ~ 1, 000 MHz	H	3.10

Test Site	Method	Measurement Frequency Range	Ant. H / V	U, (dB)
CB11 (3m)	CISPR	1GHz ~ 6GHz	V	4.14
		1GHz ~ 6GHz	H	4.14

Test Site	Method	Measurement Frequency Range	Ant. H / V	U, (dB)
CB11 (1m)	CISPR	6GHz ~ 18GHz	V	5.34
		6GHz ~ 18GHz	H	5.34

Note: Unless specifically mentioned, the uncertainty of measurement has not been taken into account to declare the compliance or non-compliance to the specification.
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}.

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Equipment	Bluetooth Scanner Cradle	
Brand Name	CIPHERLAB	
Model Name	2500 BT BASE	
Model Difference	N/A	
Output Power (Max.)	Operation Frequency	2402~2480 MHz
	Modulation Technology	GFSK(1Mbps) π/4-DQPSK(2Mbps) 8-DPSK(3Mbps)
	Bit Rate of Transmitter	
	Output Power Max.	3.02 dBm(1Mbps) 3.07 dBm(3Mbps)
Power Source	#1 Supplied from adapter. Model: A106-1050101U #2 Li-ion battery supplied. Model: BA-010800	
Power Rating	#1 I/P: 100-240V~50/60Hz 0.2A O/P: 5V⎓1A #2 DC 3.7V 8000mAh, 2.96Wh	

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:

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Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	N/A	N/A	Internal	N/A	2.95

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)**
Mode 2	Bluetooth

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 2	Bluetooth

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

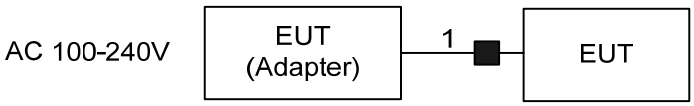
1Mbps

Test Software Version	MT8852B		
Frequency (MHz)	2402	2441	2480
Parameters	DEF	DEF	DEF

3Mbps

Test Software Version	MT8852B		
Frequency (MHz)	2402	2441	2480
Parameters	DEF	DEF	DEF

3.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



■Ferrite core

3.5 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.
-	-	-	-	-	-

Item	Shielded Type	Ferrite Core	Length	Note
1	NO	YES	1.2m	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 -0.5	66 to 56*	56 to 46*
0.50 -5.0	5	46
5.0 -30.0	60	50

Note:

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

(2) The test result calculated as following:
Measurement Value = Reading Level + Correct Factor
Correct Factor = Insertion Loss + Cable Loss + Attenuator Factor(if use)
Margin Level = Measurement Value - Limit Value

The following table is the setting of the receiver

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

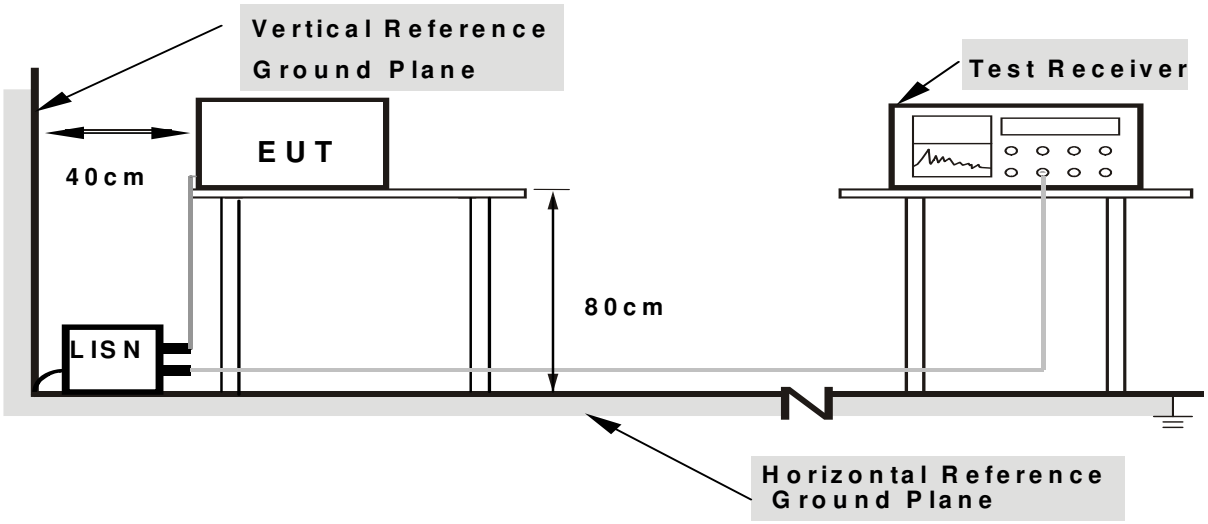
4.1.2 TEST PROCEDURE

a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipment powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
d. LISN at least 80 cm from nearest part of EUT chassis.
e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.1.3 DEVIATION FROM TEST STANDARD

No deviation

4.1.4 TEST SETUP



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

4.1.5 EUT OPERATING CONDITIONS

The EUT was 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 Attachment 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)	dB(uV/m) (at 3 meters)	
	Peak	Average
Above 1000	74	54

Notes:

(1) The limit for radiated test was performed according to FCC PART 15C.

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

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

(4) The test result calculated as following:
Measurement Value = Reading Level + Correct Factor
Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain(if use)
Margin Level = Measurement Value - Limit Value

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RBW / VBW (emission in restricted band)	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

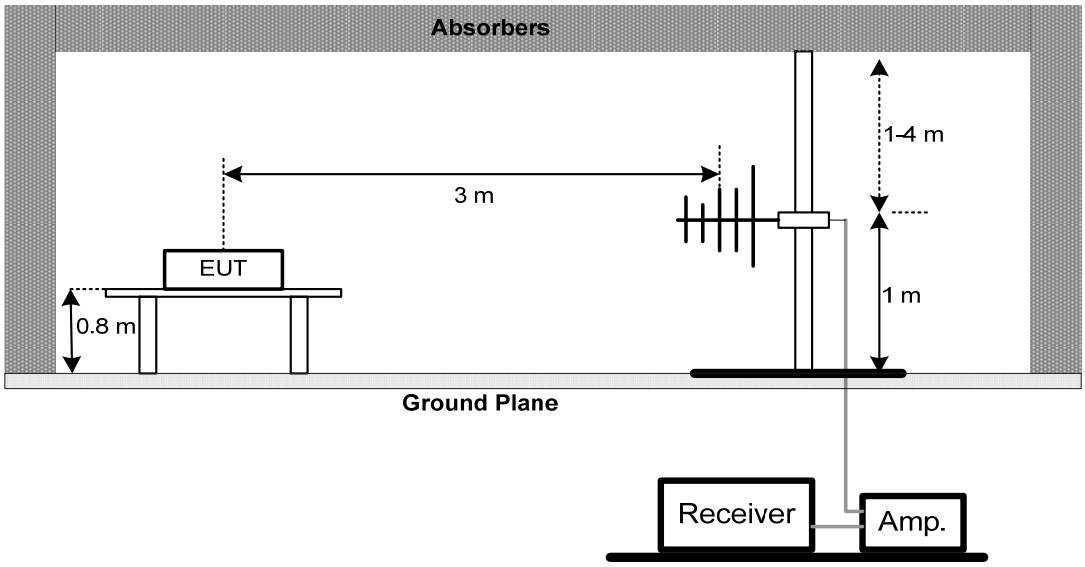
a. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
b. The measuring distance 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 0.8 m or 1.5 m, 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

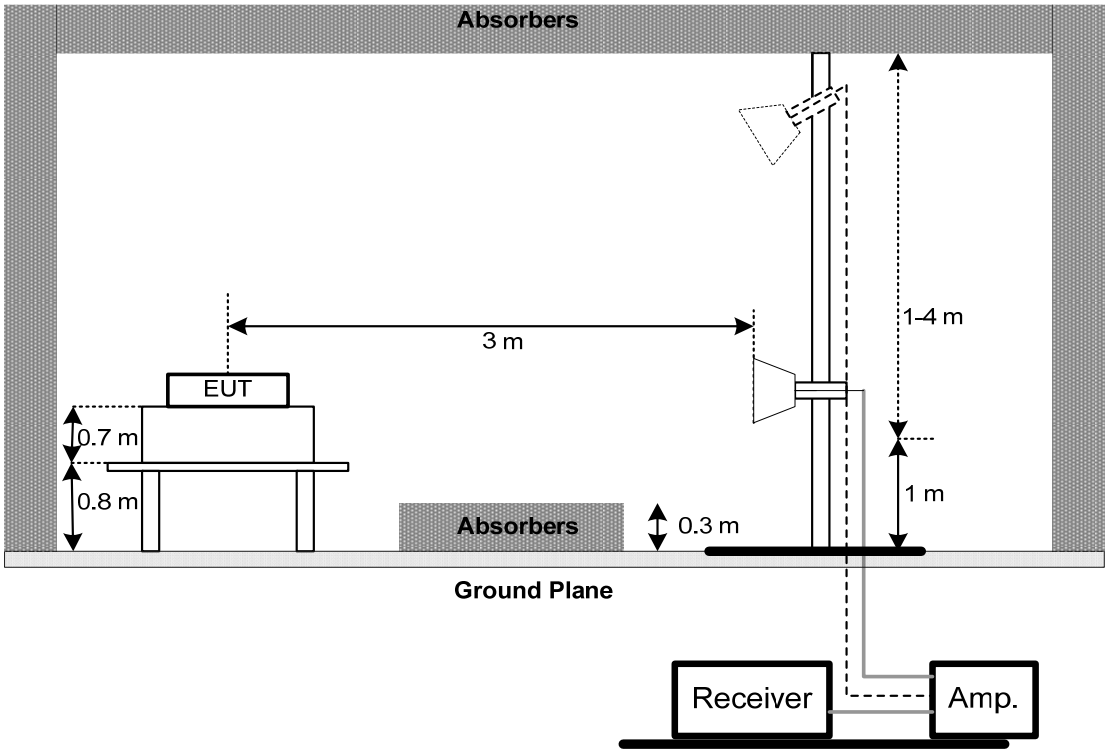
No deviation

4.2.4 TEST SETUP

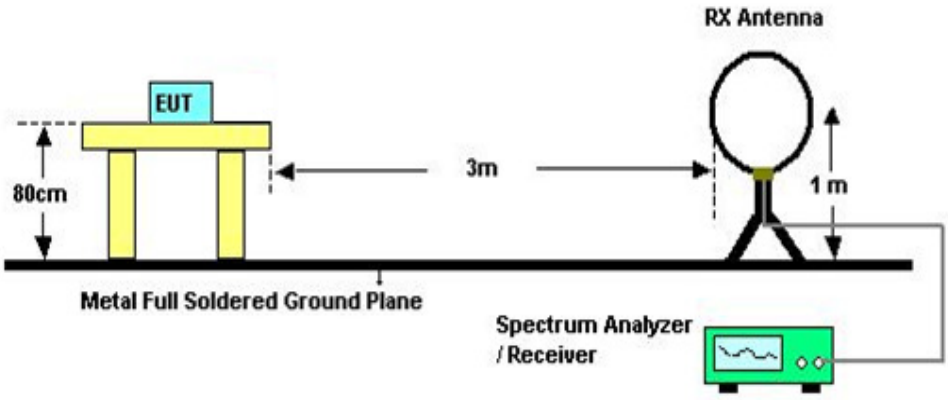
(A) Radiated Emission Test Set-Up Frequency Below 1 GHz



(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: 45%
Test Voltage: AC 120V/60Hz

4.2.7 TEST RESULTS (9KHZ TO 30MHZ)

Please refer to the Attachment B

Remark:

(1) The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.
(2) Distance extrapolation factor = 40 log (specific distance / test distance) (dB).
(3) Limit line = specific limits (dBuV) + distance extrapolation factor.

4.2.8 TEST RESULTS (30MHZ TO 1000 MHZ)

Please refer to the Attachment C.

Remark:

(1) 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.
(2) Measuring frequency range from 30MHz to 1000MHz.
(3) 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 Attachment 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. 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 (4)	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

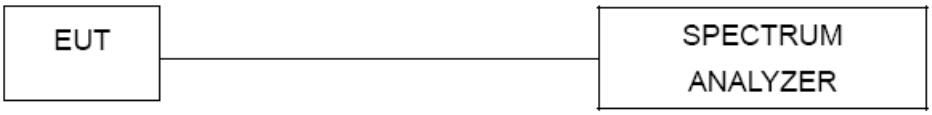
5.1.1 TEST PROCEDURE

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

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

5.1.6 TEST RESULTS

Please refer to the Attachment 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 (4)	Average Time of Occupancy	0.4sec	2400-2483.5	PASS

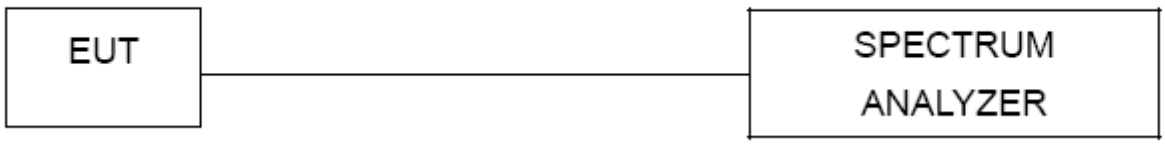
6.1.1 TEST PROCEDURE

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. DH5 Packet permit maximum 1600/ 79 / 6 = 3.37 hops per second in each channel (5 time slots TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times 3.37 x 31.6 = 106.6 within 31.6 seconds.
j. DH3 Packet permit maximum 1600 / 79 / 4 = 5.06 hops per second in each channel (3 time slots TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times 5.06 x 31.6 = 160 within 31.6 seconds.
k. DH1 Packet permit maximum 1600 / 79 /2 = 10.12 hops per second in each channel (1 time slot TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times 10.12 x 31.6 = 320 within 31.6 seconds.

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

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

6.1.6 TEST RESULTS

Please refer to the Attachment 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

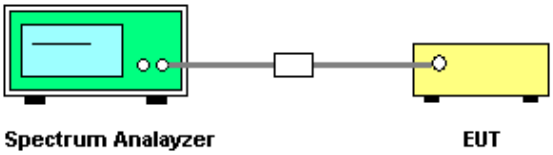
a. The EUT must have its hopping function enabled

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

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

7.1.5 TEST RESULTS

Please refer to the Attachment 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 (1)	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

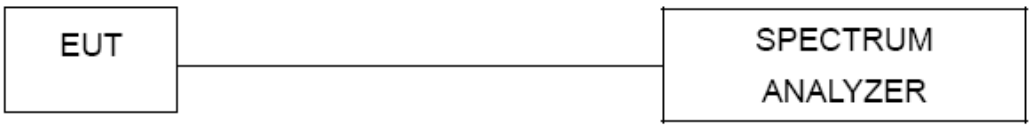
8.1.1 TEST PROCEDURE

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

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

8.1.6 TEST RESULTS

Please refer to the Attachment 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 (2)	Peak Output Power	1 Watt or 30dBm	2400-2483.5	PASS

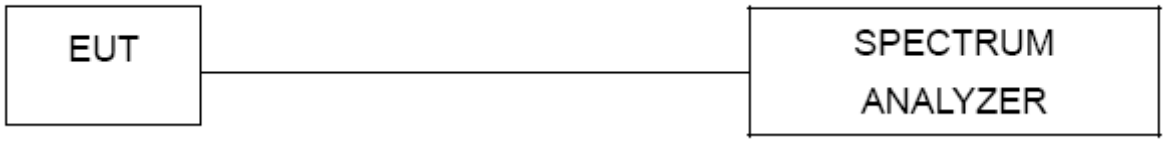
9.1.1 TEST PROCEDURE

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

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

9.1.6 TEST RESULTS

Please refer to the Attachment 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

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

10.1.6 TEST RESULTS

Please refer to the Attachment 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. 26, 2017
2	Test Cable	TIMES	CFD300-NL	C02	Jun. 13, 2017
3	EMI Test Receiver	R&S	ESR7	101433	Dec. 09, 2016
4	Power Dividers	HP	11636A	8103	May 03, 2017
5	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	Log-Bicon Antenna	Schwarzbeck	VULB9168-352	9168-352	Jul. 29, 2017
2	Horn Antenna	Schwarzbeck	BBHA 9120	D-325	Apr. 19, 2017
3	Horn Antenna	Schwarzbeck	BBHA 9120	9120D-1333	May 19, 2017
4	Pre-Amplifier	Anritsu	MH648A	M92649	Jun. 15, 2017
5	Pre-Amplifier	Agilent	8449B	3008A01714	Apr. 13, 2017
6	Test Cable	LMR	LMR-400	01(10M)	May 11, 2017
7	Test Cable	LMR	LMR-400	01(3M)	May 11, 2017
8	Test Cable	Harbour industries	27478LL142	1M	May 12, 2017
9	Test Cable	Harbour industries	27478LL142	3M	May 12, 2017
10	Test Cable	AISI	S104-SMAP-1	8M	May 12, 2017
11	Spectrum Analyzer	Agilent	N9020A	MY51160196	Aug. 01, 2017
12	EMI Test Receiver	R&S	ESCI	100080	May 12, 2017
13	Measurement Software	Farad	EZ_EMC (Version NB-03A)	N/A	N/A

Number of Hopping Channel					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP-40	100129	Jan. 17, 2017

Average Time of Occupancy					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP-40	100129	Jan. 17, 2017

Hopping Channel Separation Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP-40	100129	Jan. 17, 2017

Bandwidth					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP-40	100129	Jan. 17, 2017

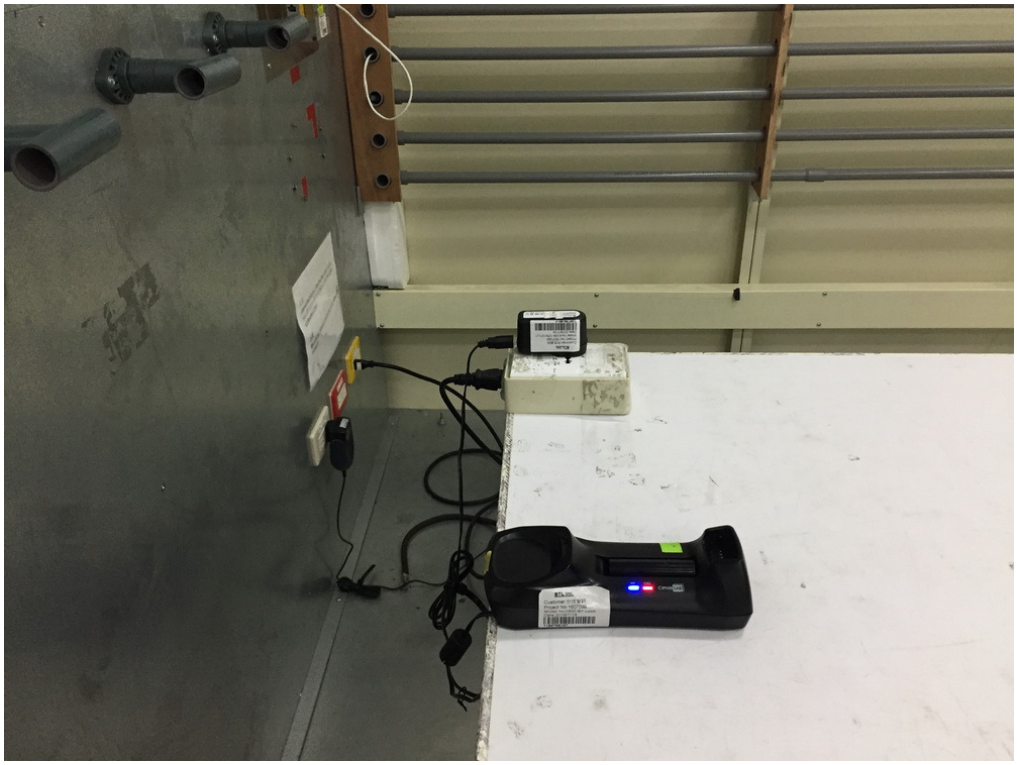
Peak Output Power					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP-40	100129	Jan. 17, 2017

Antenna Conducted Spurious Emission					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP-40	100129	Jan. 17, 2017

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

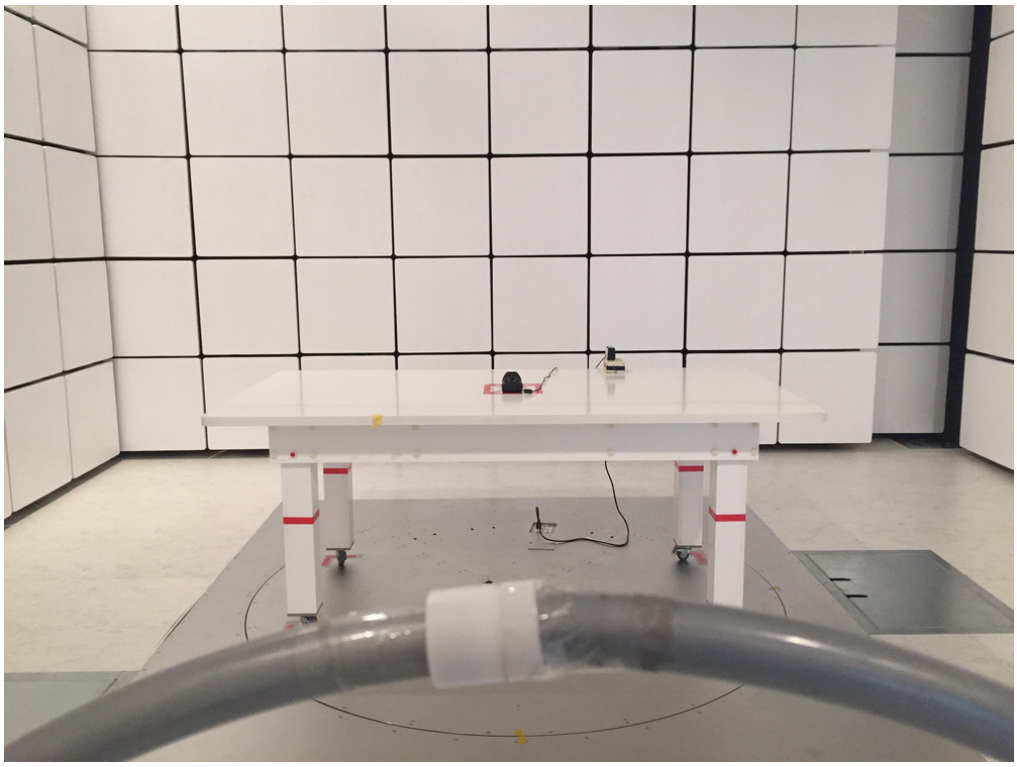
12. EUT TEST PHOTO

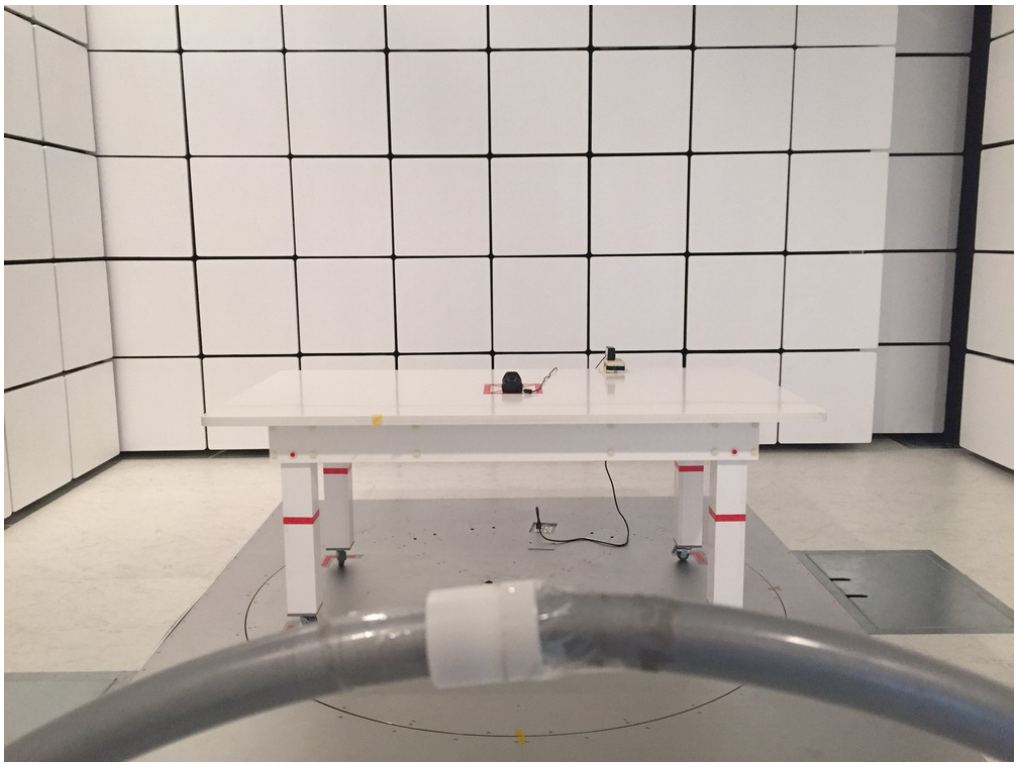
Conducted Measurement Photos



Radiated Measurement Photos

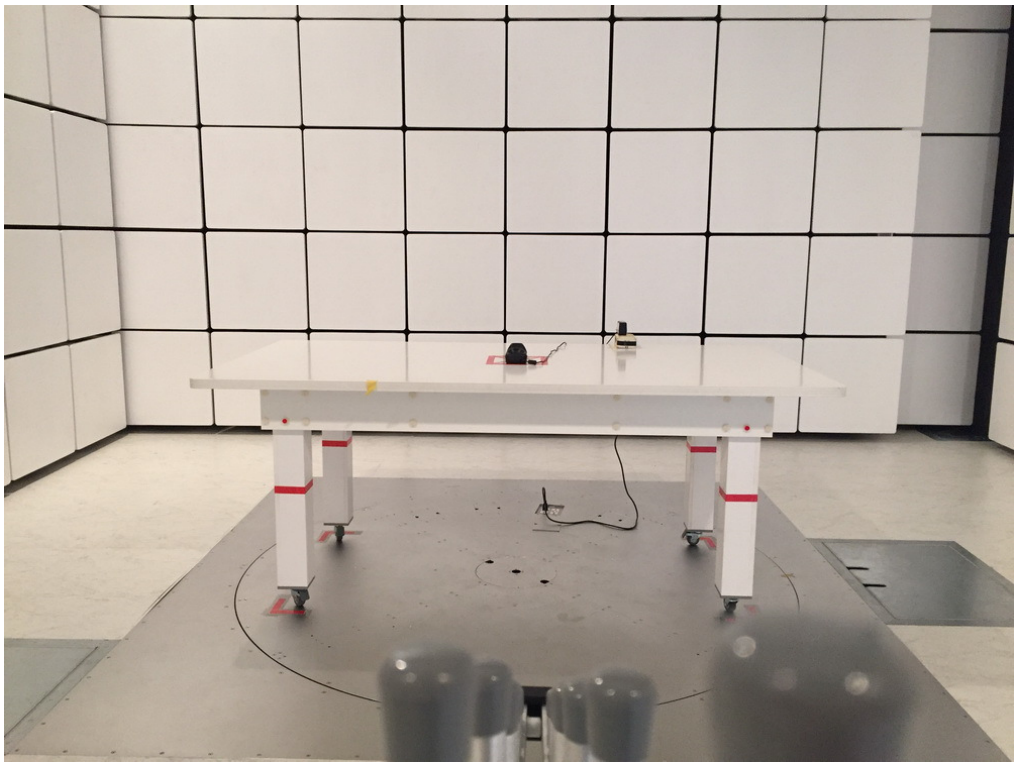
9KHz to 30MHz

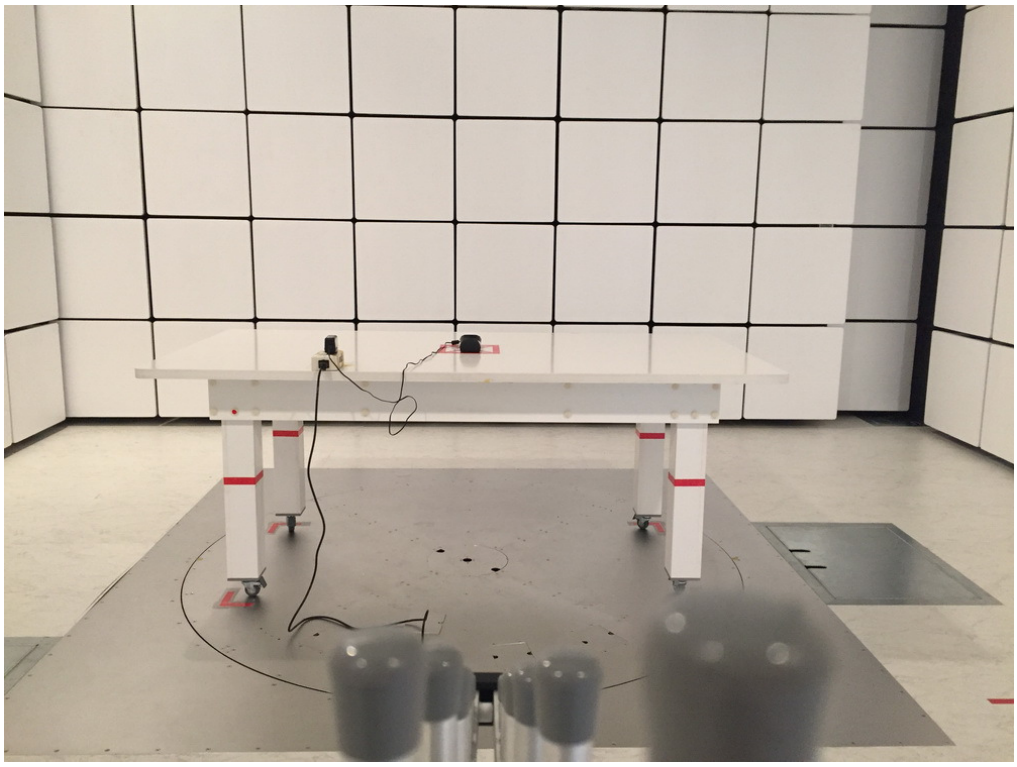




Radiated Measurement Photos

30MHz to 1000MHz





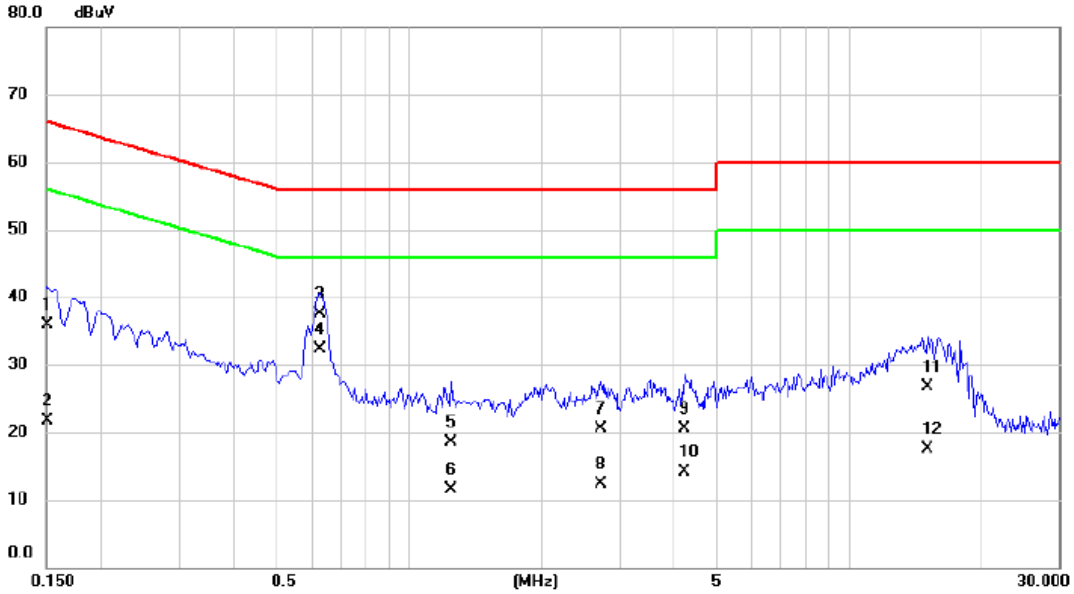
Radiated Measurement Photos

Above 1000MHz

ATTACHMENT A - CONDUCTED EMISSION

Test Mode:	Bluetooth

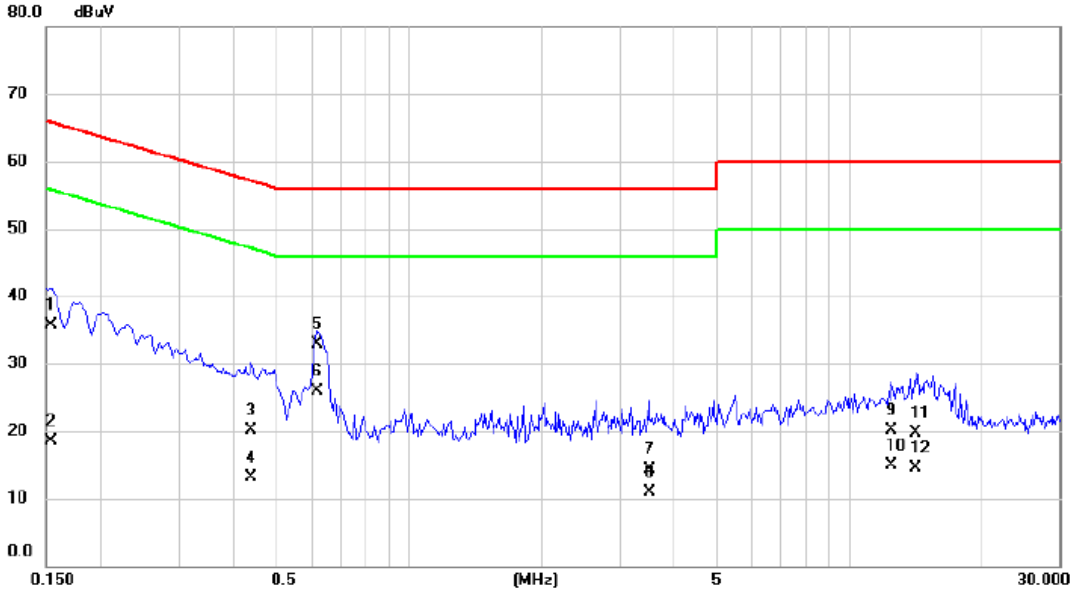
Line



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1500	26.20	9.66	35.86	66.00	-30.14	QP	
2		0.1500	12.10	9.66	21.76	56.00	-34.24	AVG	
3		0.6260	27.80	9.67	37.47	56.00	-18.53	QP	
4	*	0.6260	22.70	9.67	32.37	46.00	-13.63	AVG	
5		1.2470	8.80	9.68	18.48	56.00	-37.52	QP	
6		1.2470	1.80	9.68	11.48	46.00	-34.52	AVG	
7		2.7320	10.80	9.75	20.55	56.00	-35.45	QP	
8		2.7320	2.50	9.75	12.25	46.00	-33.75	AVG	
9		4.2260	10.80	9.79	20.59	56.00	-35.41	QP	
10		4.2260	4.40	9.79	14.19	46.00	-31.81	AVG	
11		15.1000	16.80	9.94	26.74	60.00	-33.26	QP	
12		15.1000	7.50	9.94	17.44	50.00	-32.56	AVG	

Test Mode:	Bluetooth

Neutral

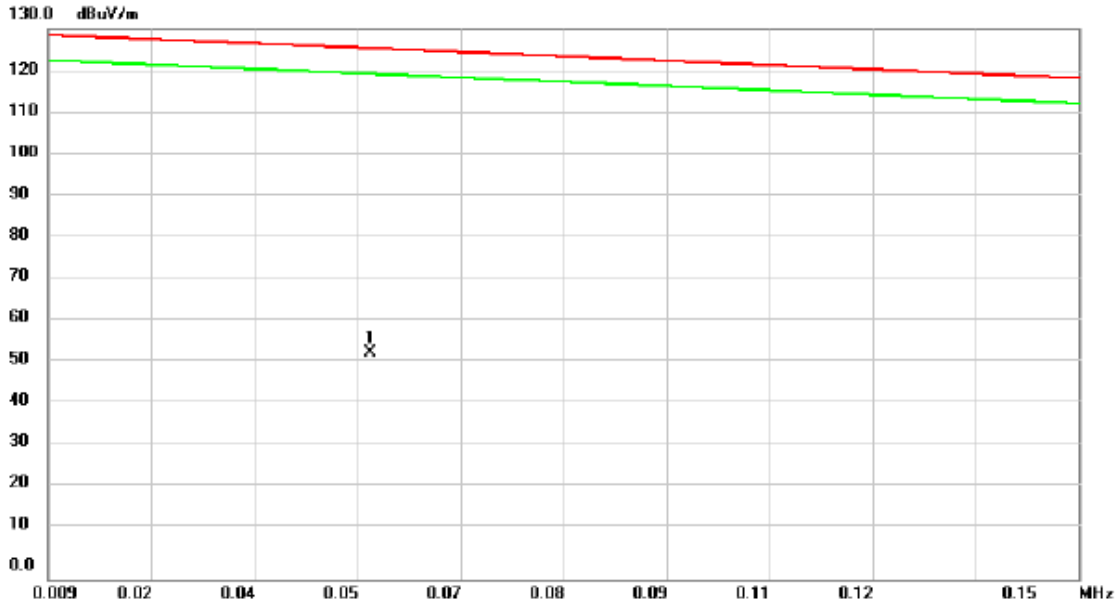


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1535	26.10	9.67	35.77	65.81	-30.04	QP	
2		0.1535	8.90	9.67	18.57	55.81	-37.24	AVG	
3		0.4370	10.40	9.67	20.07	57.12	-37.05	QP	
4		0.4370	3.40	9.67	13.07	47.12	-34.05	AVG	
5		0.6170	23.30	9.67	32.97	56.00	-23.03	QP	
6	*	0.6170	16.20	9.67	25.87	46.00	-20.13	AVG	
7		3.5060	4.50	9.78	14.28	56.00	-41.72	QP	
8		3.5060	1.20	9.78	10.98	46.00	-35.02	AVG	
9		12.4500	10.20	9.88	20.08	60.00	-39.92	QP	
10		12.4500	5.00	9.88	14.88	50.00	-35.12	AVG	
11		14.1000	9.80	9.92	19.72	60.00	-40.28	QP	
12		14.1000	4.60	9.92	14.52	50.00	-35.48	AVG	

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

Test Mode:	TX Mode

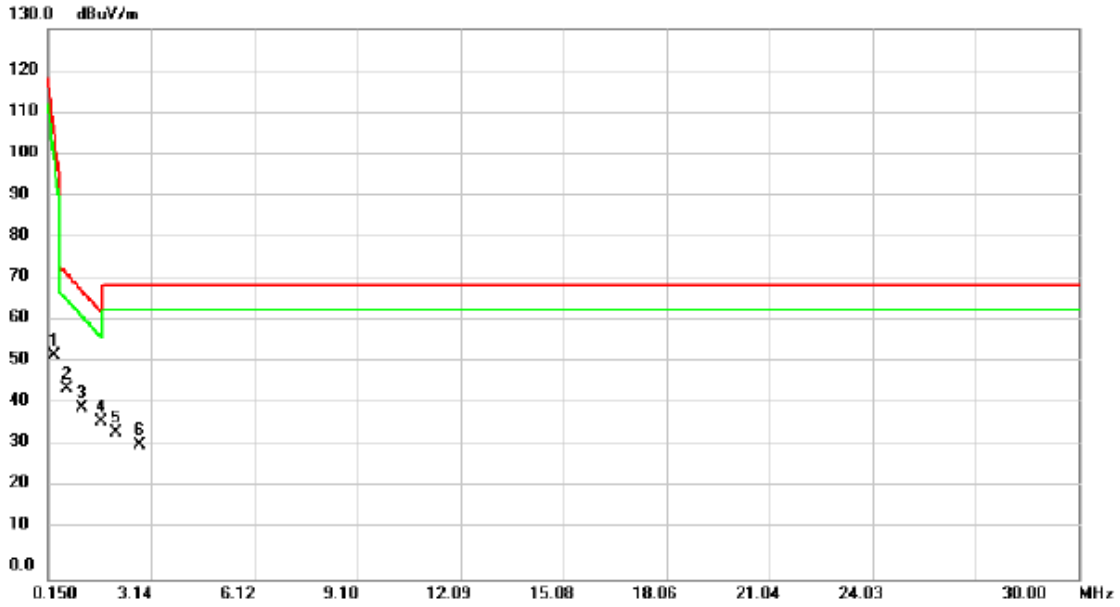
OPEN



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	0.0530	40.57	12.95	53.52	125.34	-71.82	peak	

Test Mode:	TX Mode

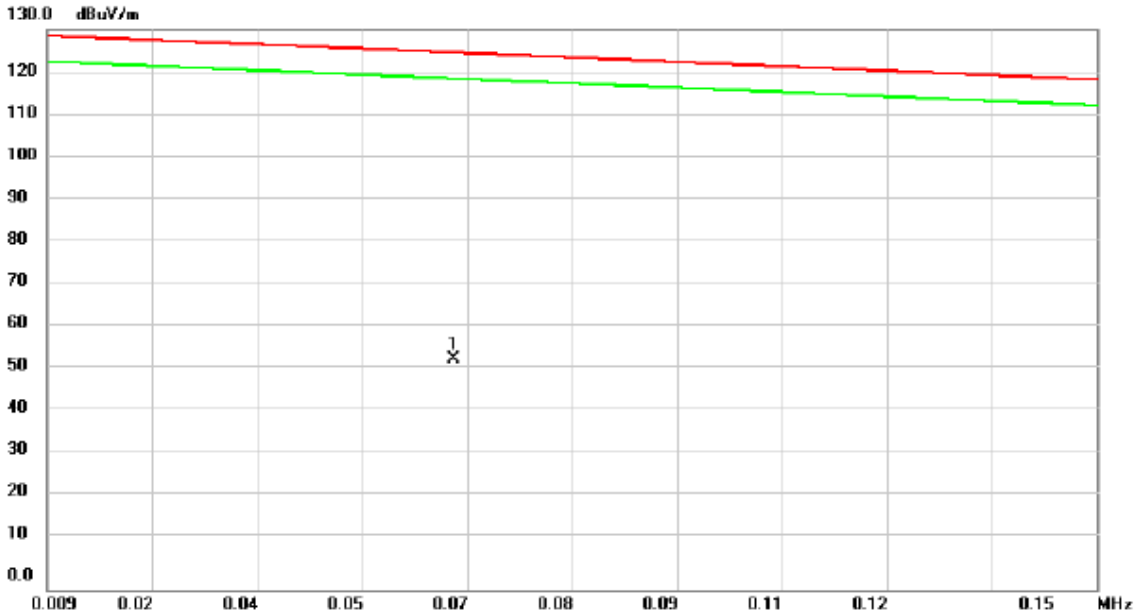
OPEN



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		0.3291	40.93	11.80	52.73	105.41	-52.68	peak	
2		0.6873	33.26	11.87	45.13	72.04	-26.91	peak	
3		1.1350	28.52	11.94	40.46	68.05	-27.59	peak	
4	*	1.7020	25.41	11.68	37.09	63.00	-25.91	peak	
5		2.1200	23.06	11.50	34.56	69.54	-34.98	peak	
6		2.8065	20.46	11.19	31.65	69.54	-37.89	peak	

Test Mode:	TX Mode

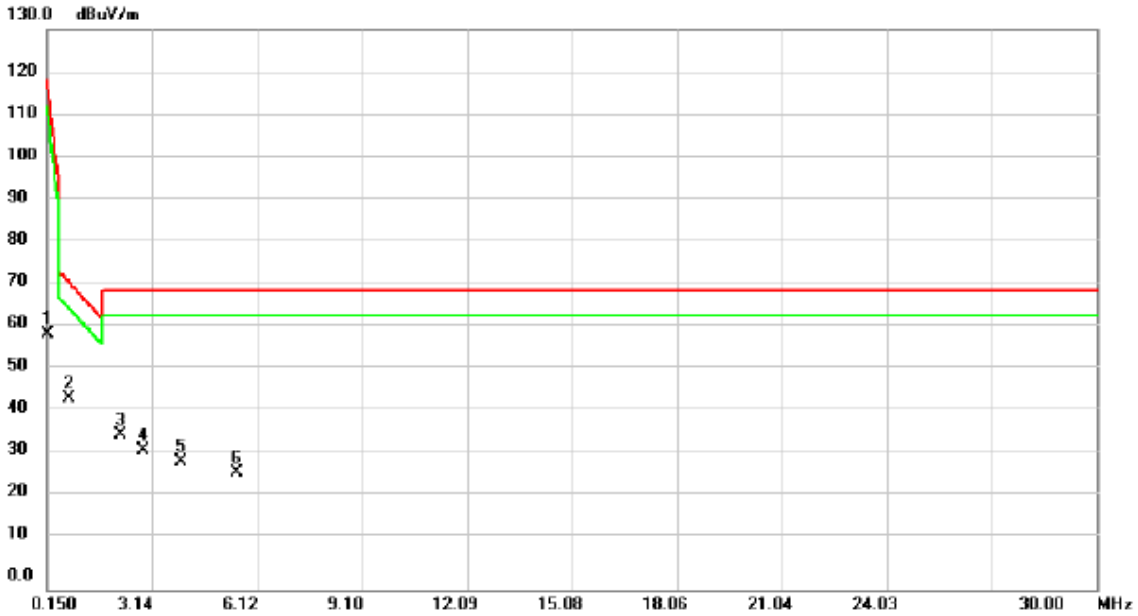
CLOSE



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	0.0637	40.61	12.75	53.36	124.57	-71.21	peak	

Test Mode:	TX Mode

CLOSE

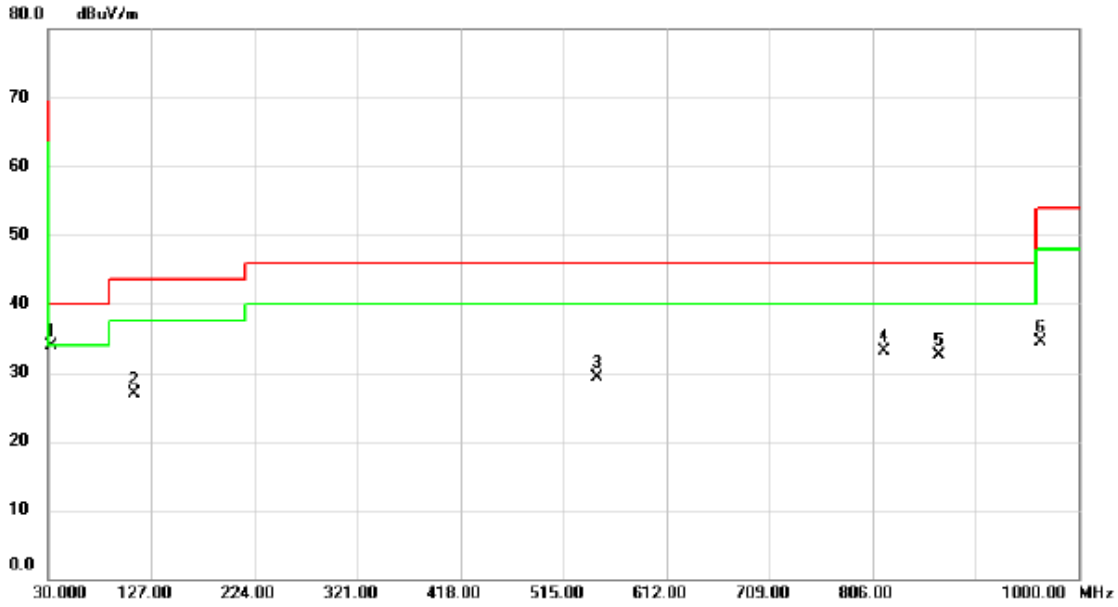


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		0.1500	47.16	12.03	59.19	118.34	-59.15	peak	
2	*	0.7470	32.44	11.90	44.34	71.51	-27.17	peak	
3		2.2395	24.62	11.44	36.06	69.54	-33.48	peak	
4		2.8664	21.25	11.16	32.41	69.54	-37.13	peak	
5		3.9410	18.34	11.24	29.58	69.54	-39.96	peak	
6		5.5530	15.80	11.39	27.19	69.54	-42.35	peak	

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

Test Mode:	TX Mode

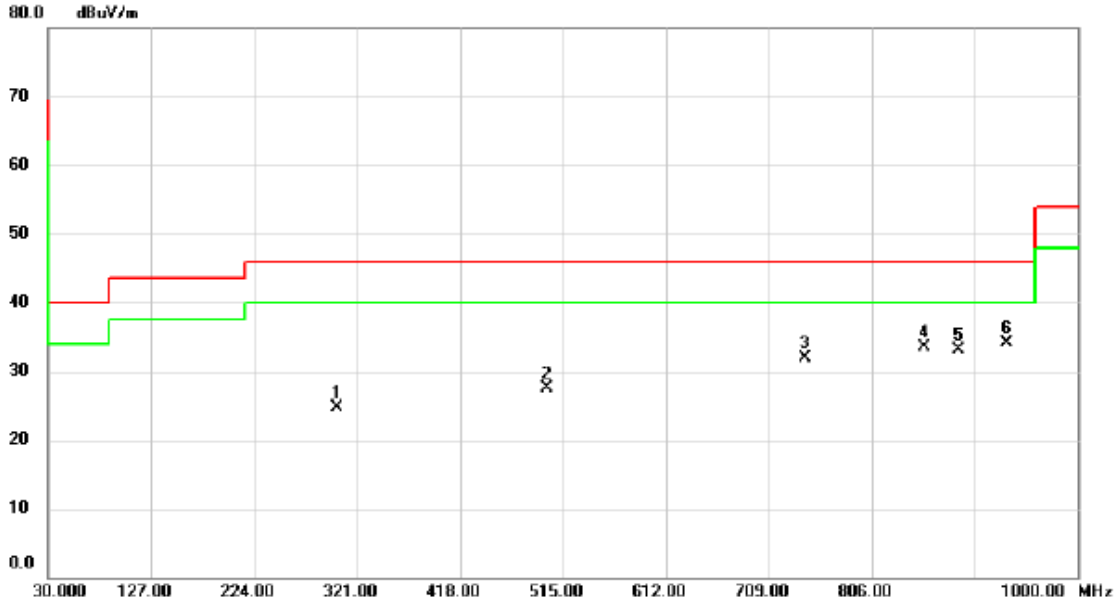
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	32.9100	42.86	-8.96	33.90	40.00	-6.10	peak	
2		110.5100	38.02	-11.05	26.97	43.50	-16.53	peak	
3		546.0400	30.85	-1.63	29.22	46.00	-16.78	peak	
4		816.6700	30.01	3.12	33.13	46.00	-12.87	peak	
5		868.0800	28.50	3.97	32.47	46.00	-13.53	peak	
6		964.1100	28.86	5.67	34.53	54.00	-19.47	peak	

Test Mode:	TX Mode

Horizontal

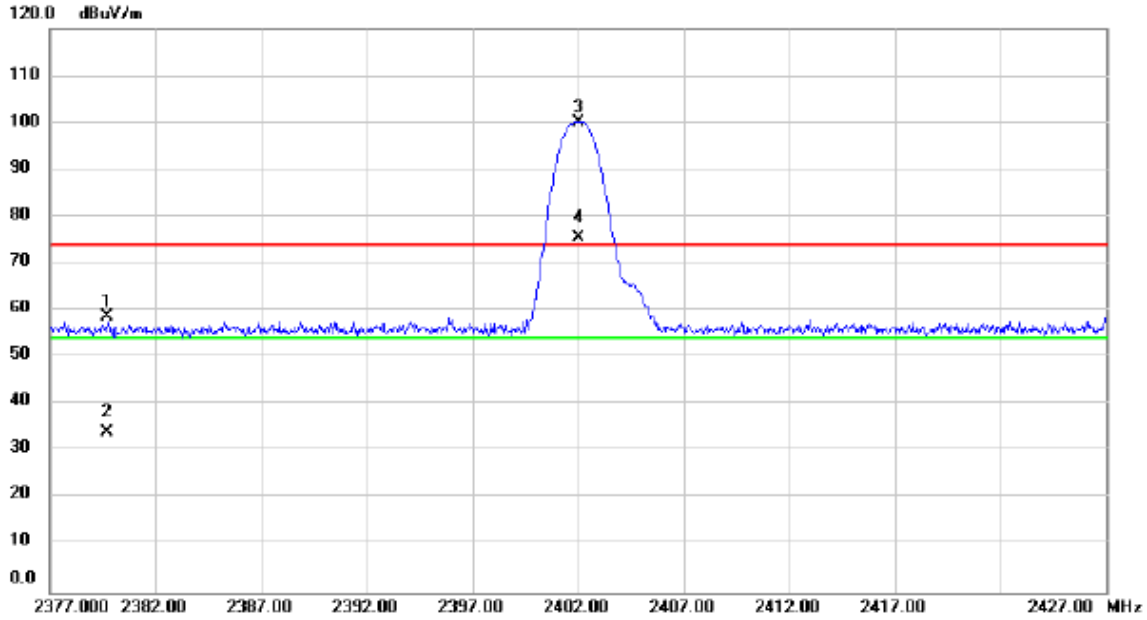


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		301.6000	32.13	-7.45	24.68	46.00	-21.32	peak	
2		499.4800	30.09	-2.66	27.43	46.00	-18.57	peak	
3		742.9500	29.69	2.19	31.88	46.00	-14.12	peak	
4		855.4700	29.86	3.70	33.56	46.00	-12.44	peak	
5		888.4500	28.68	4.38	33.06	46.00	-12.94	peak	
6	*	933.0700	28.84	5.19	34.03	46.00	-11.97	peak	

ATTACHMENT D - RADIATED EMISSION (ABOVE 1000MHZ)

Orthogonal Axis :	X
Test Mode :	TX 2402MHz _CH00_1Mbps

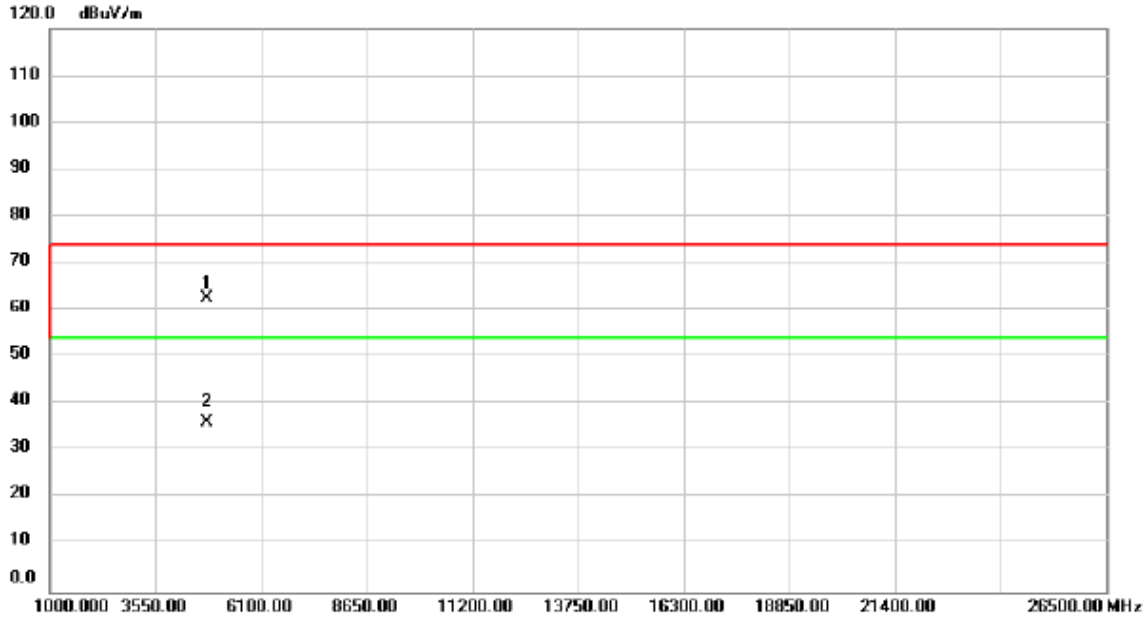
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2379.730	26.93	31.66	58.59	74.00	-15.41	peak	
2		2379.730	2.29	31.66	33.95	54.00	-20.05	AVG	
3	*	2402.000	68.40	31.76	100.16	74.00	26.16	peak	No Limit
4	X	2402.000	43.76	31.76	75.52	54.00	21.52	AVG	No Limit

Orthogonal Axis :	X
Test Mode :	TX 2402MHz _CH00_1Mbps

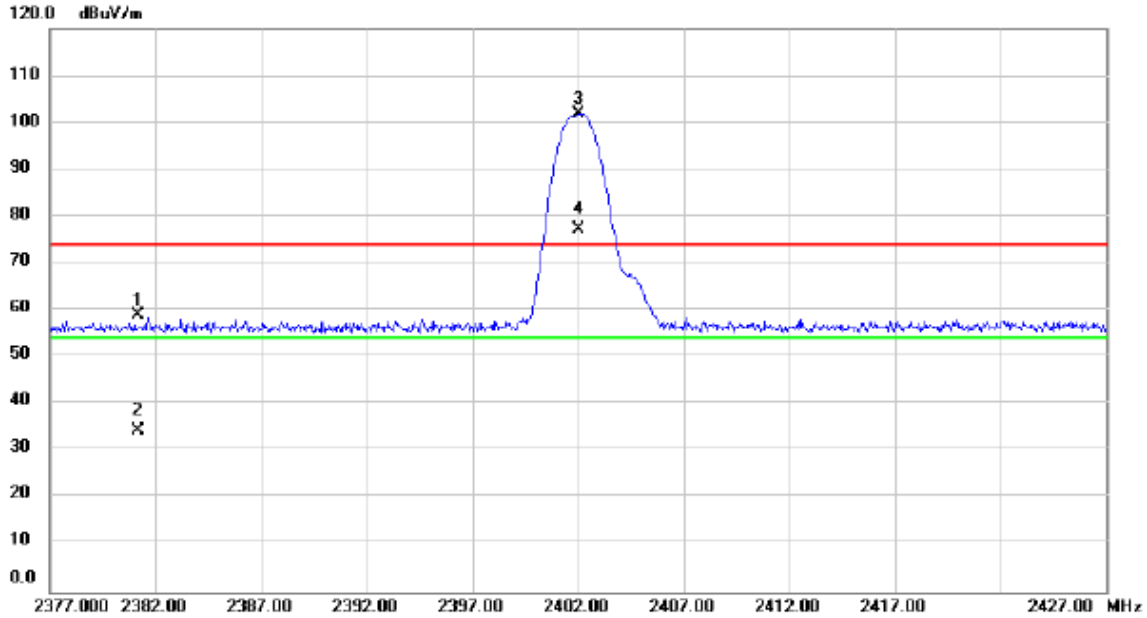
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4804.000	73.09	-10.51	62.58	74.00	-11.42	peak	
2		4804.000	46.79	-10.51	36.28	54.00	-17.72	AVG	

Orthogonal Axis :	X
Test Mode :	TX 2402MHz _CH00_1Mbps

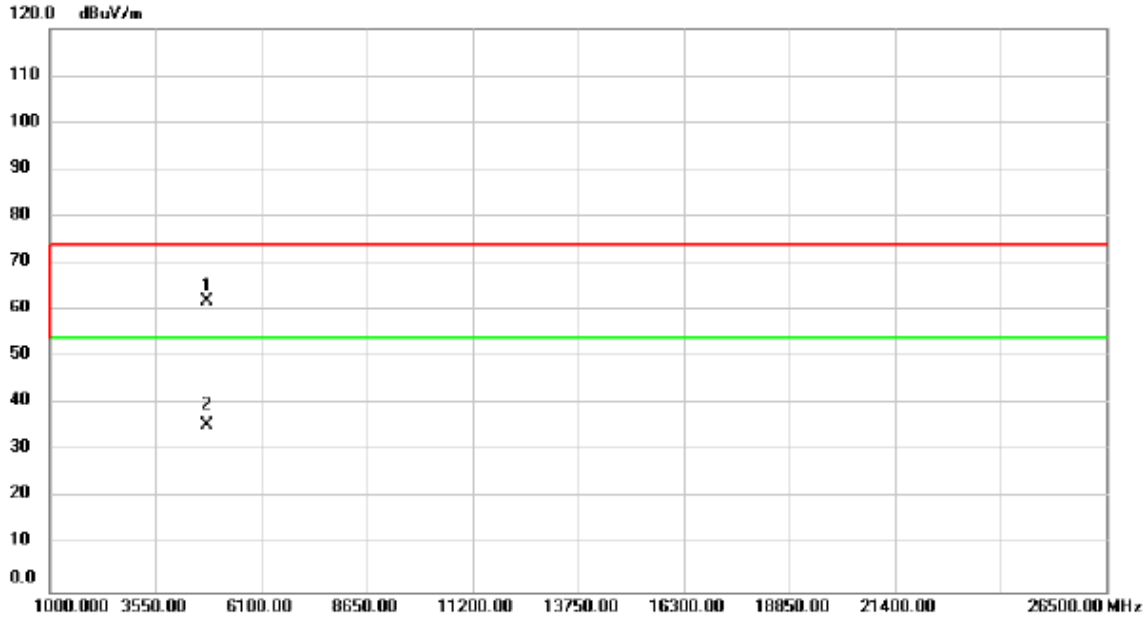
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2381.134	27.20	31.67	58.87	74.00	-15.13	peak	
2		2381.134	2.56	31.67	34.23	54.00	-19.77	AVG	
3	*	2402.000	70.12	31.76	101.88	74.00	27.88	peak	No Limit
4	X	2402.000	45.48	31.76	77.24	54.00	23.24	AVG	No Limit

Orthogonal Axis :	X
Test Mode :	TX 2402MHz _CH00_1Mbps

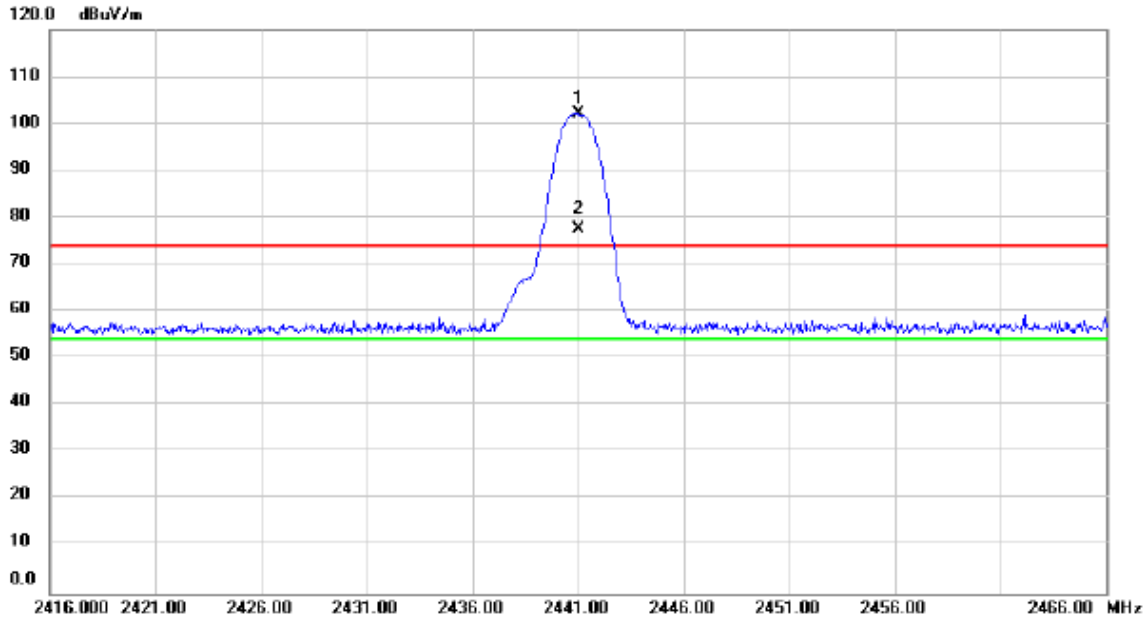
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4804.000	72.53	-10.51	62.02	74.00	-11.98	peak	
2		4804.000	45.97	-10.51	35.46	54.00	-18.54	AVG	

Orthogonal Axis :	X
Test Mode :	TX 2441MHz _CH39_1Mbps

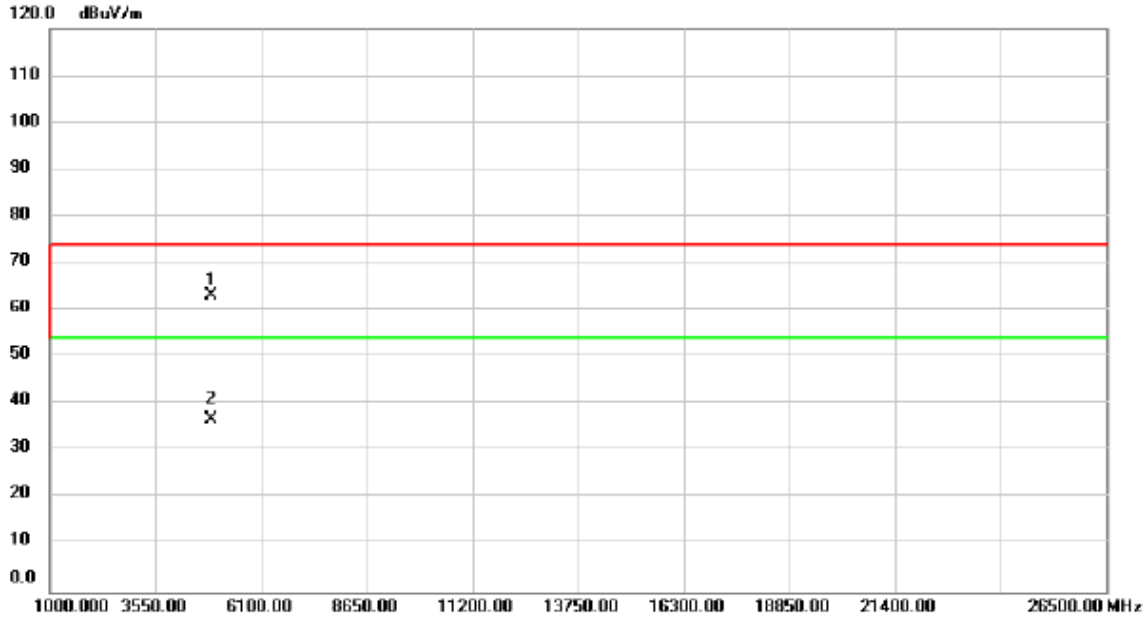
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	2441.000	70.22	31.90	102.12	74.00	28.12	peak	No Limit
2	X	2441.000	45.58	31.90	77.48	54.00	23.48	AVG	No Limit

Orthogonal Axis :	X
Test Mode :	TX 2441MHz _CH39_1Mbps

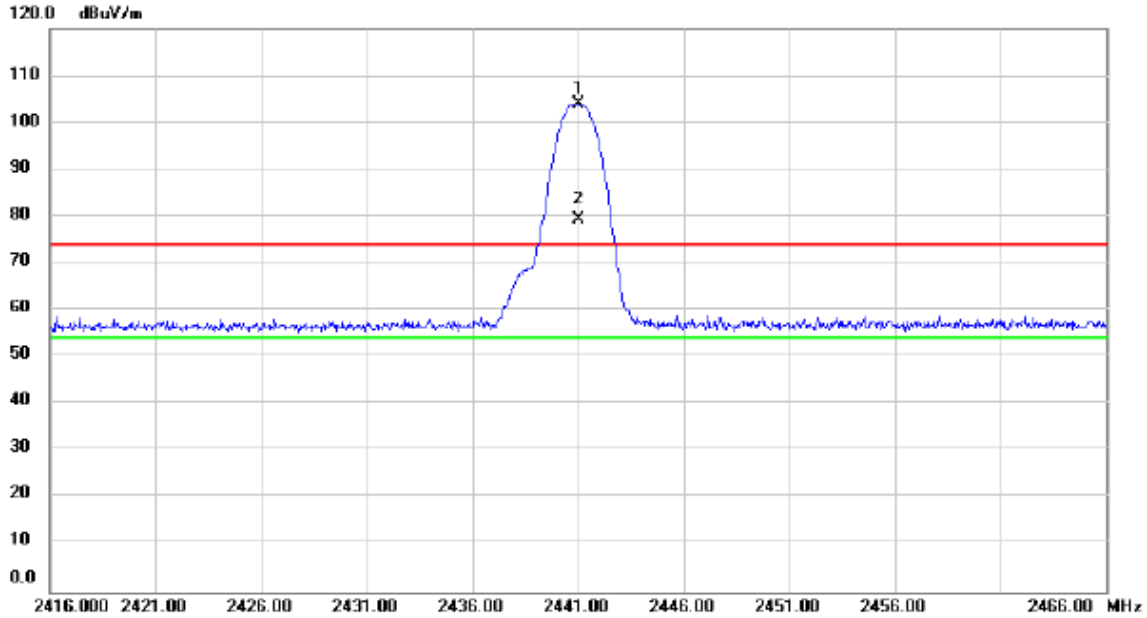
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4882.000	73.51	-10.39	63.12	74.00	-10.88	peak	
2		4882.000	47.05	-10.39	36.66	54.00	-17.34	AVG	

Orthogonal Axis :	X
Test Mode :	TX 2441MHz _CH39_1Mbps

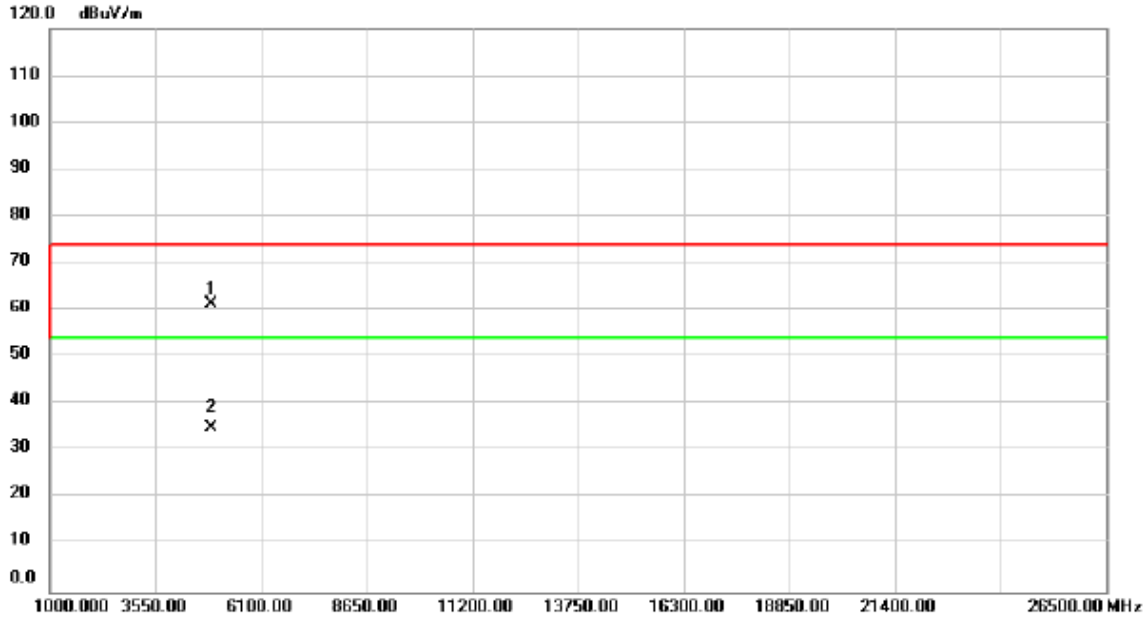
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	2441.000	72.06	31.90	103.96	74.00	29.96	peak	No Limit
2	X	2441.000	47.42	31.90	79.32	54.00	25.32	AVG	No Limit

Orthogonal Axis :	X
Test Mode :	TX 2441MHz _CH39_1Mbps

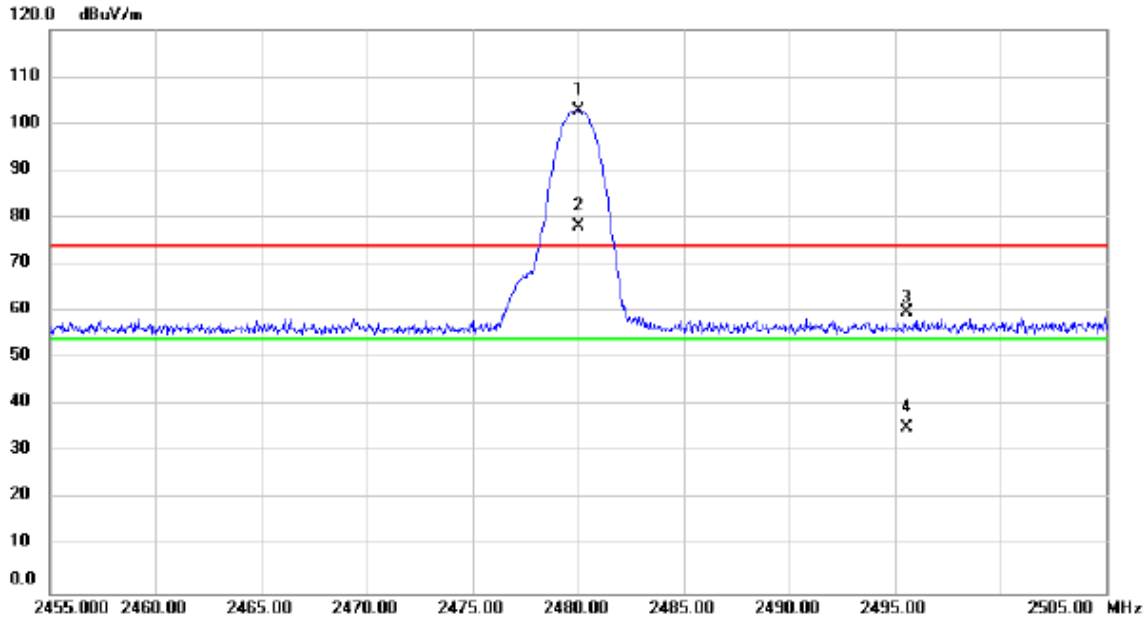
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4882.000	71.75	-10.39	61.36	74.00	-12.64	peak	
2		4882.000	45.26	-10.39	34.87	54.00	-19.13	AVG	

Orthogonal Axis :	X
Test Mode :	TX 2480MHz _CH78_1Mbps

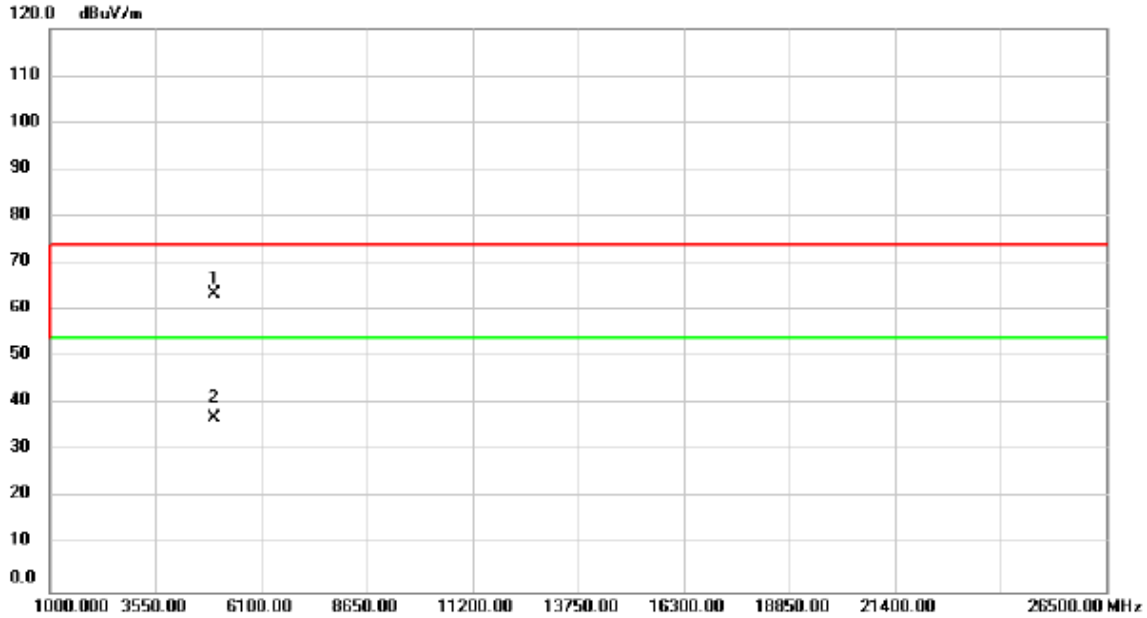
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	2480.000	70.66	32.05	102.71	54.00	48.71	AVG	No Limit
2	X	2480.000	46.02	32.05	78.07	54.00	24.07	AVG	No Limit
3		2495.561	27.72	32.12	59.84	74.00	-14.16	peak	
4		2495.561	3.08	32.12	35.20	54.00	-18.80	AVG	

Orthogonal Axis :	X
Test Mode :	TX 2480MHz _CH78_1Mbps

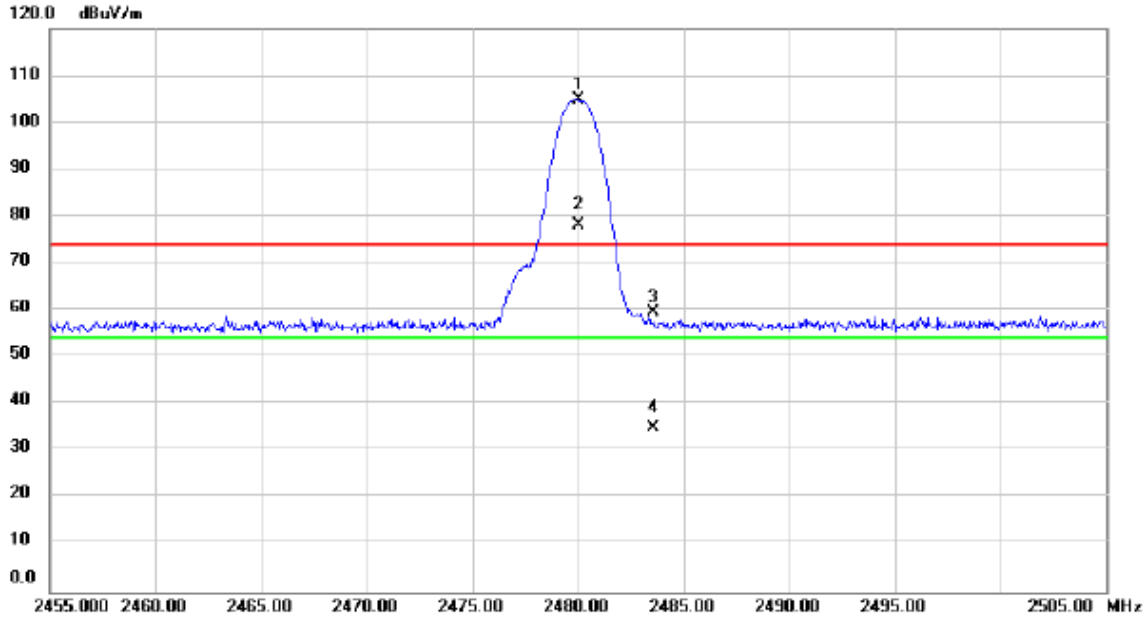
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4960.000	73.61	-10.26	63.35	74.00	-10.65	peak	
2		4960.000	47.29	-10.26	37.03	54.00	-16.97	AVG	

Orthogonal Axis :	X
Test Mode :	TX 2480MHz _CH78_1Mbps

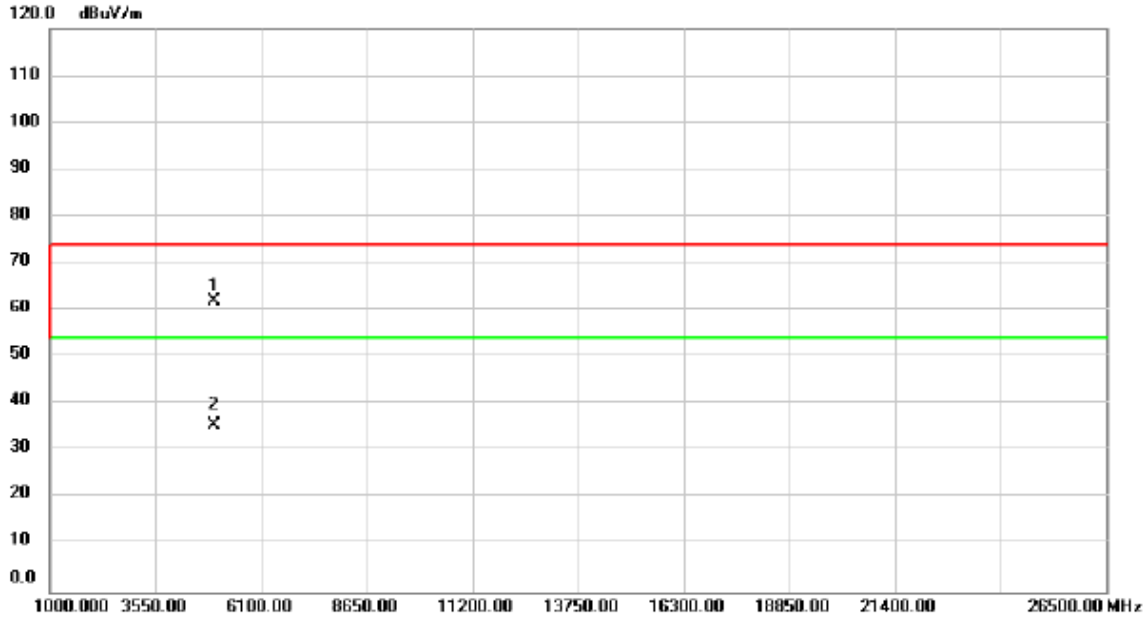
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	2480.000	72.76	32.05	104.81	74.00	30.81	peak	No Limit
2	X	2480.000	46.12	32.05	78.17	54.00	24.17	AVG	No Limit
3		2483.543	27.57	32.06	59.63	74.00	-14.37	peak	
4		2483.543	2.93	32.06	34.99	54.00	-19.01	AVG	

Orthogonal Axis :	X
Test Mode :	TX 2480MHz _CH78_1Mbps

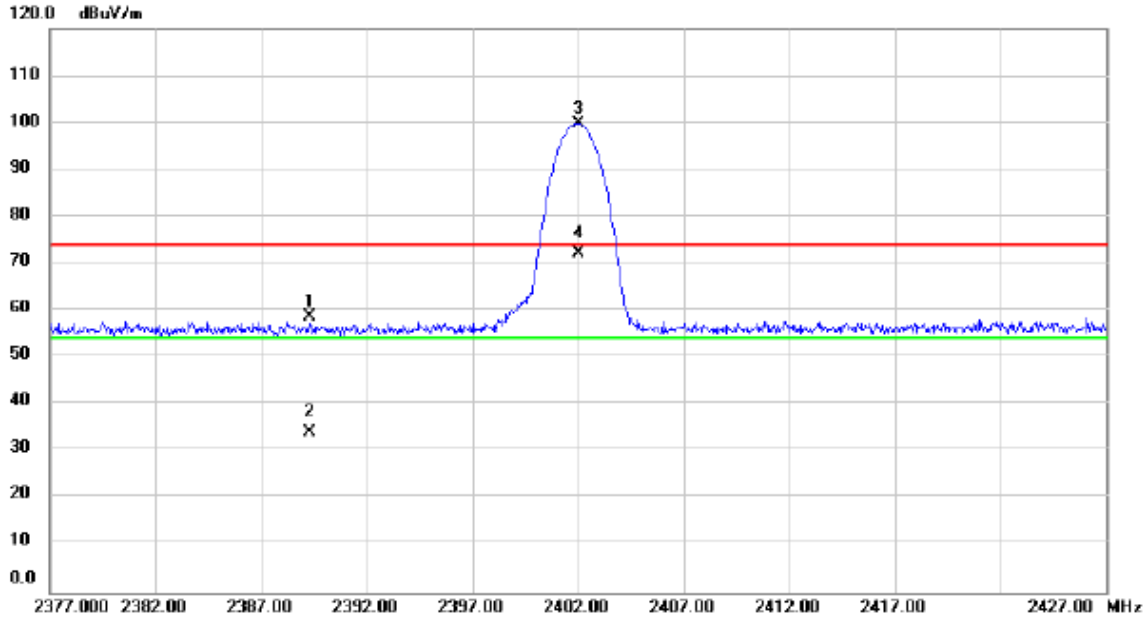
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4960.000	72.27	-10.26	62.01	74.00	-11.99	peak	
2		4960.000	45.72	-10.26	35.46	54.00	-18.54	AVG	

Orthogonal Axis :	X
Test Mode :	TX 2402MHz _CH00_3Mbps

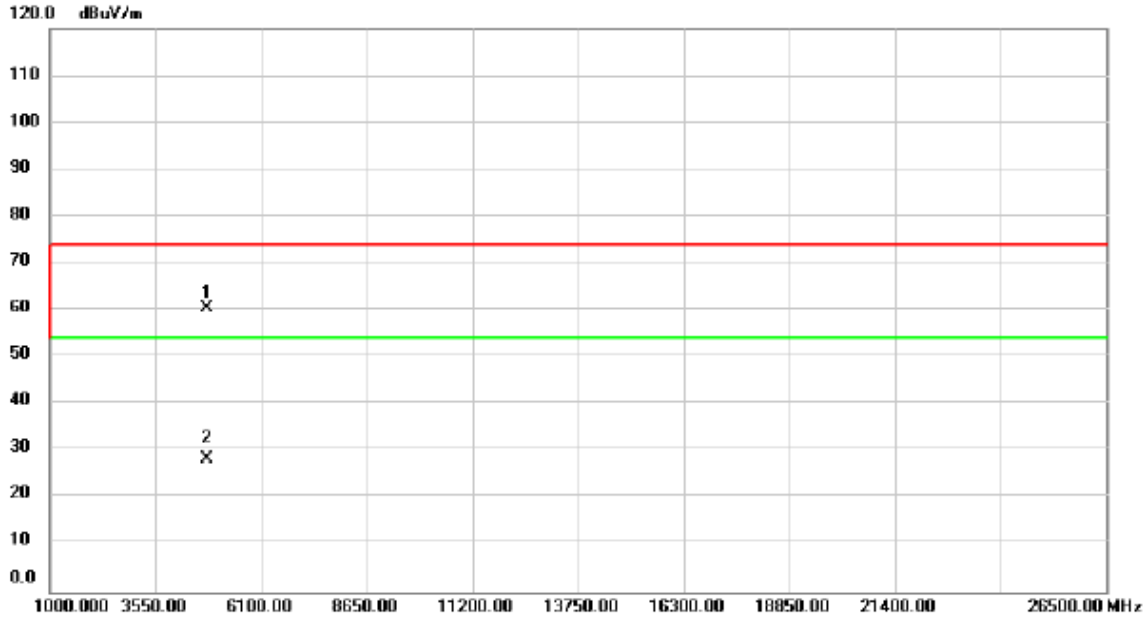
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2389.298	26.94	31.70	58.64	74.00	-15.36	peak	
2		2389.298	2.27	31.70	33.97	54.00	-20.03	AVG	
3	*	2402.000	68.04	31.76	99.80	74.00	25.80	peak	No Limit
4	X	2402.000	40.37	31.76	72.13	54.00	18.13	AVG	No Limit

Orthogonal Axis :	X
Test Mode :	TX 2402MHz _CH00_3Mbps

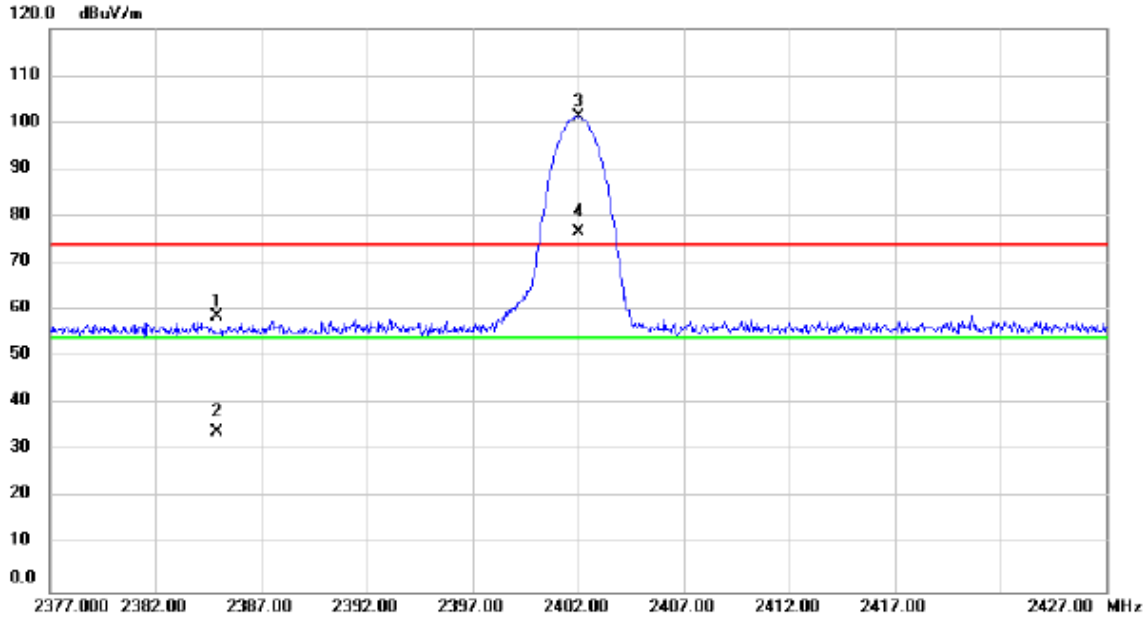
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4804.000	70.84	-10.51	60.33	74.00	-13.67	peak	
2		4804.000	38.89	-10.51	28.38	54.00	-25.62	AVG	

Orthogonal Axis :	X
Test Mode :	TX 2402MHz _CH00_3Mbps

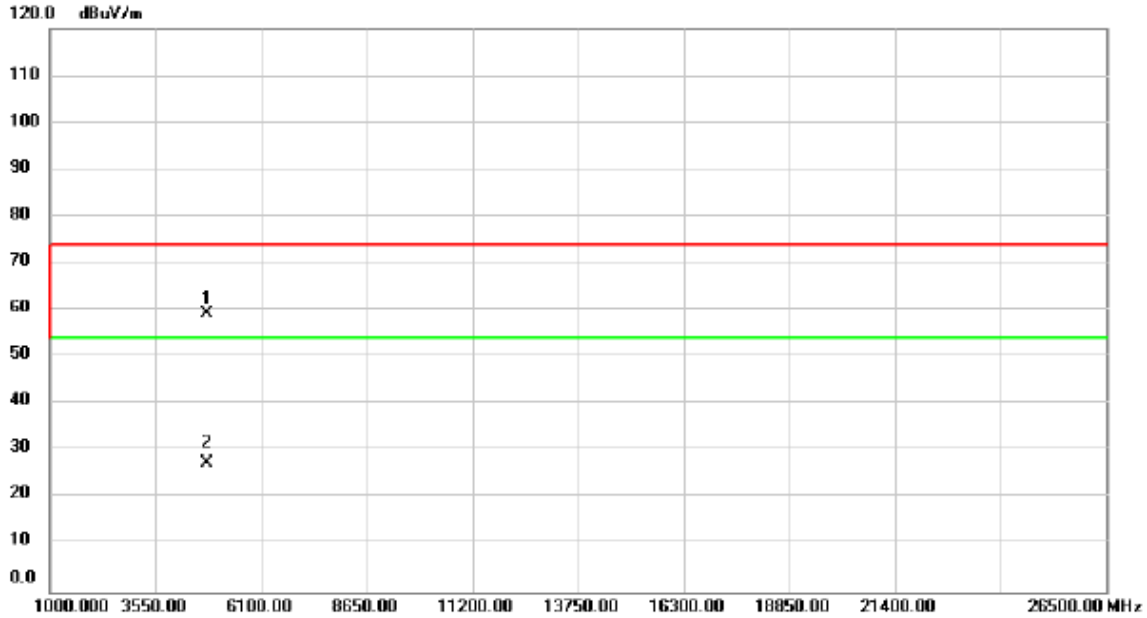
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2384.878	27.09	31.69	58.78	74.00	-15.22	peak	
2		2384.878	2.42	31.69	34.11	54.00	-19.89	AVG	
3	*	2402.000	69.53	31.76	101.29	74.00	27.29	peak	No Limit
4	X	2402.000	44.86	31.76	76.62	54.00	22.62	AVG	No Limit

Orthogonal Axis :	X
Test Mode :	TX 2402MHz _CH00_3Mbps

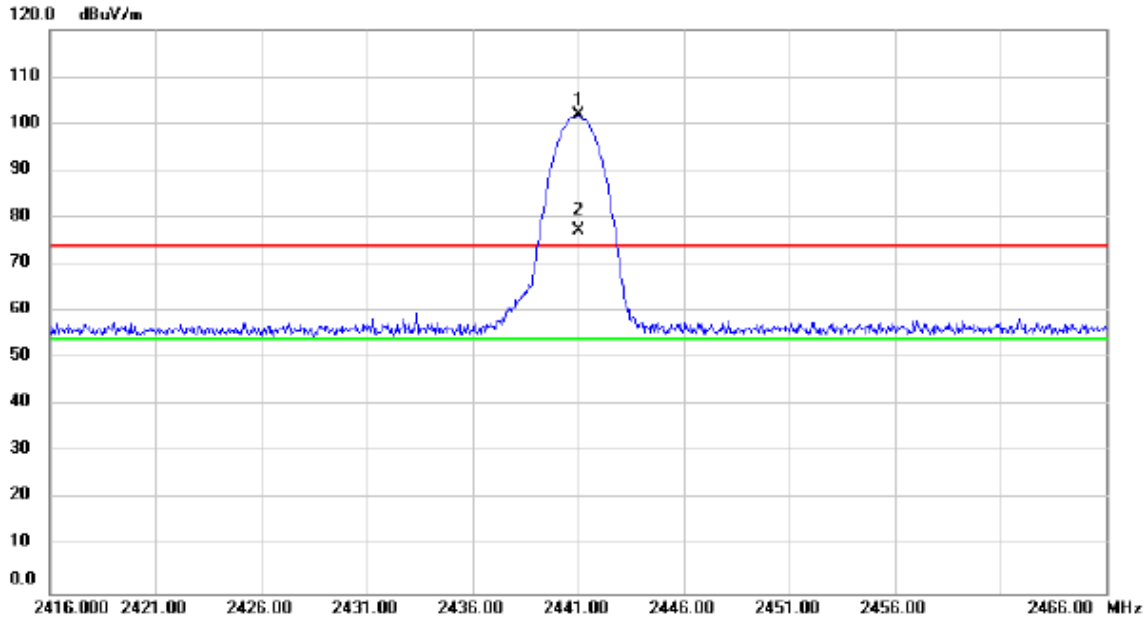
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4804.000	69.72	-10.51	59.21	74.00	-14.79	peak	
2		4804.000	37.87	-10.51	27.36	54.00	-26.64	AVG	

Orthogonal Axis :	X
Test Mode :	TX 2441MHz _CH39_3Mbps

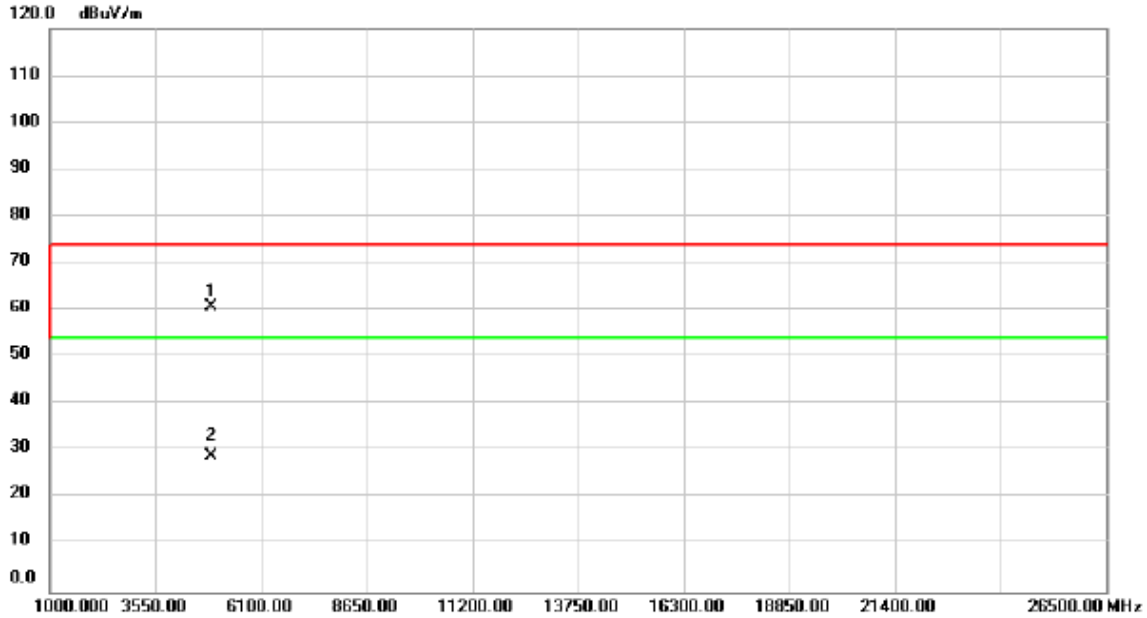
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	2441.000	69.91	31.90	101.81	74.00	27.81	peak	No Limit
2	X	2441.000	45.24	31.90	77.14	54.00	23.14	AVG	No Limit

Orthogonal Axis :	X
Test Mode :	TX 2441MHz _CH39_3Mbps

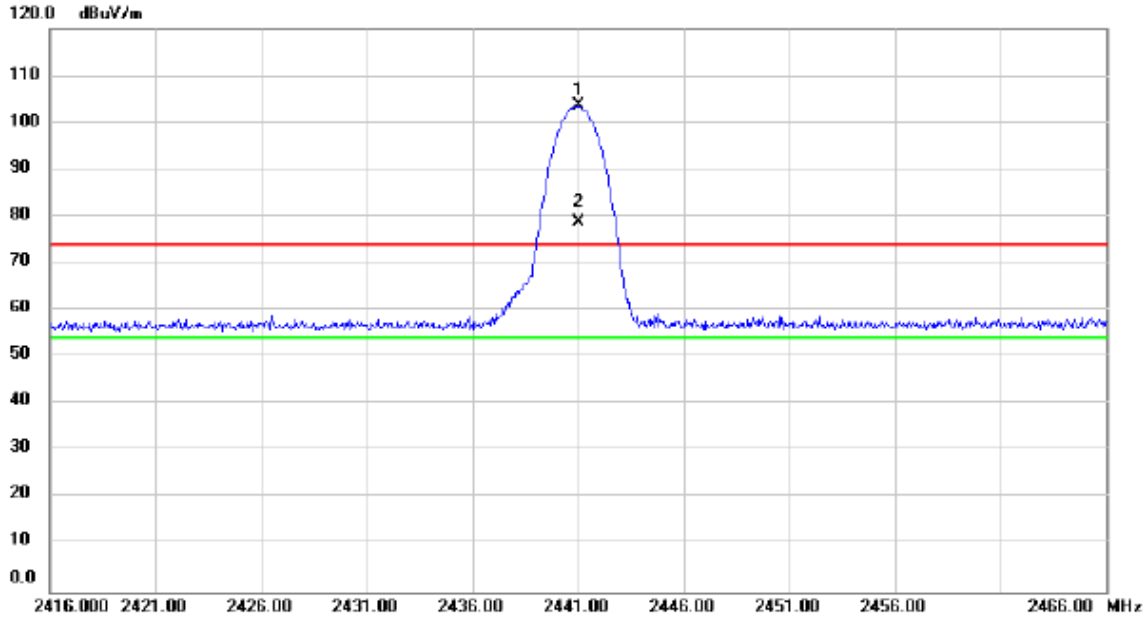
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4882.000	71.21	-10.39	60.82	74.00	-13.18	peak	
2		4882.000	39.41	-10.39	29.02	54.00	-24.98	AVG	

Orthogonal Axis :	X
Test Mode :	TX 2441MHz _CH39_3Mbps

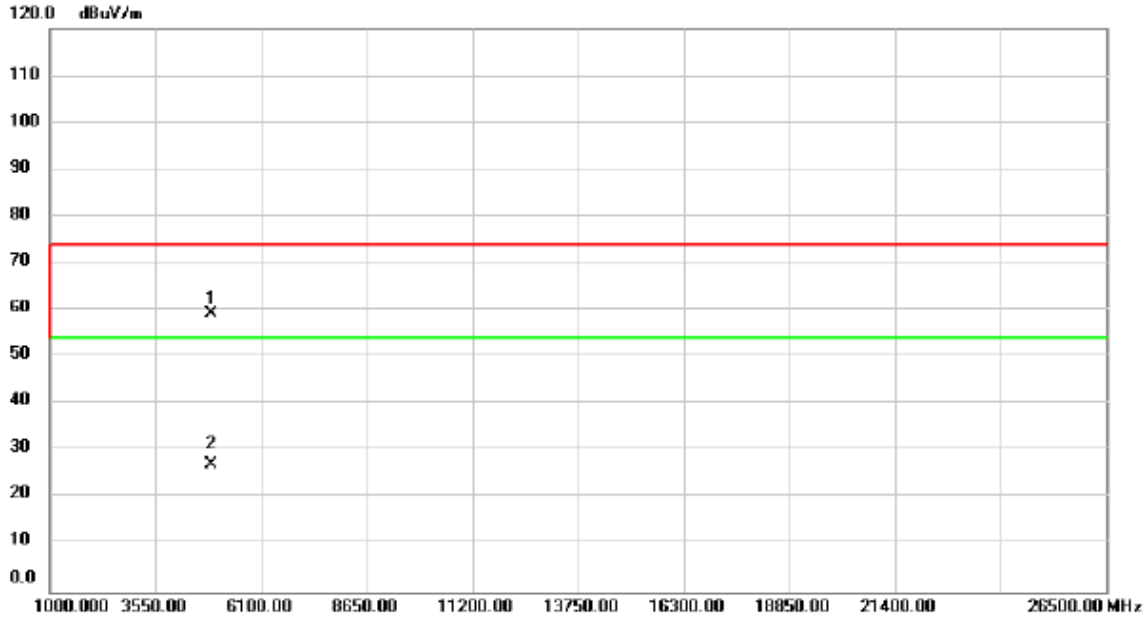
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	2441.000	71.63	31.90	103.53	74.00	29.53	peak	No Limit
2	X	2441.000	46.96	31.90	78.86	54.00	24.86	AVG	No Limit

Orthogonal Axis :	X
Test Mode :	TX 2441MHz _CH39_3Mbps

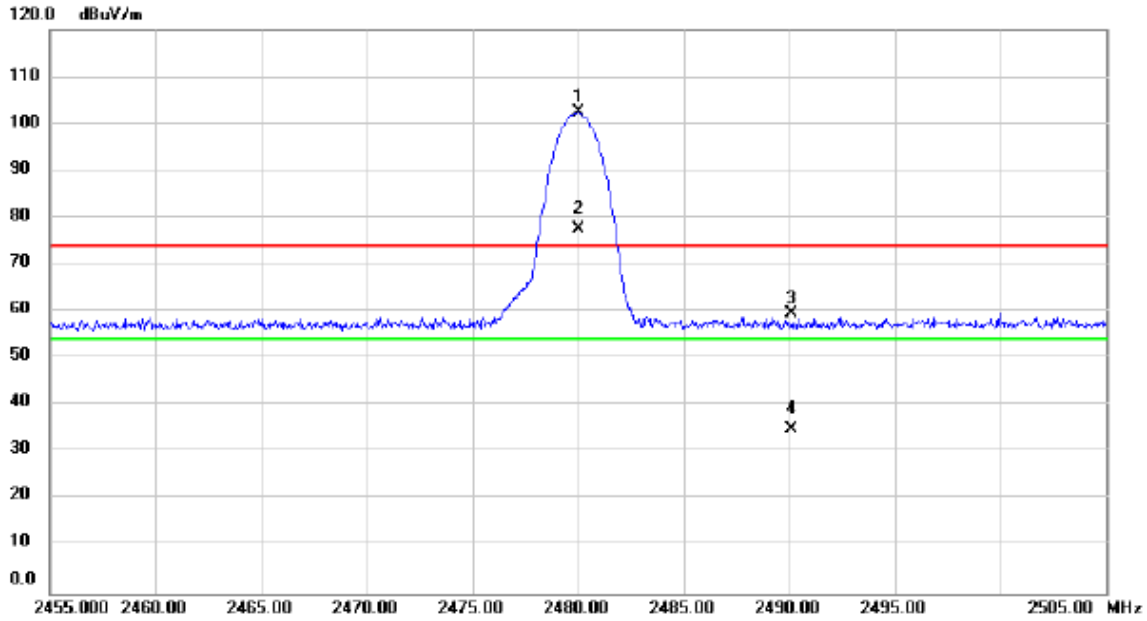
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4882.000	69.57	-10.39	59.18	74.00	-14.82	peak	
2		4882.000	37.45	-10.39	27.06	54.00	-26.94	AVG	

Orthogonal Axis :	X
Test Mode :	TX 2480MHz _CH78_3Mbps

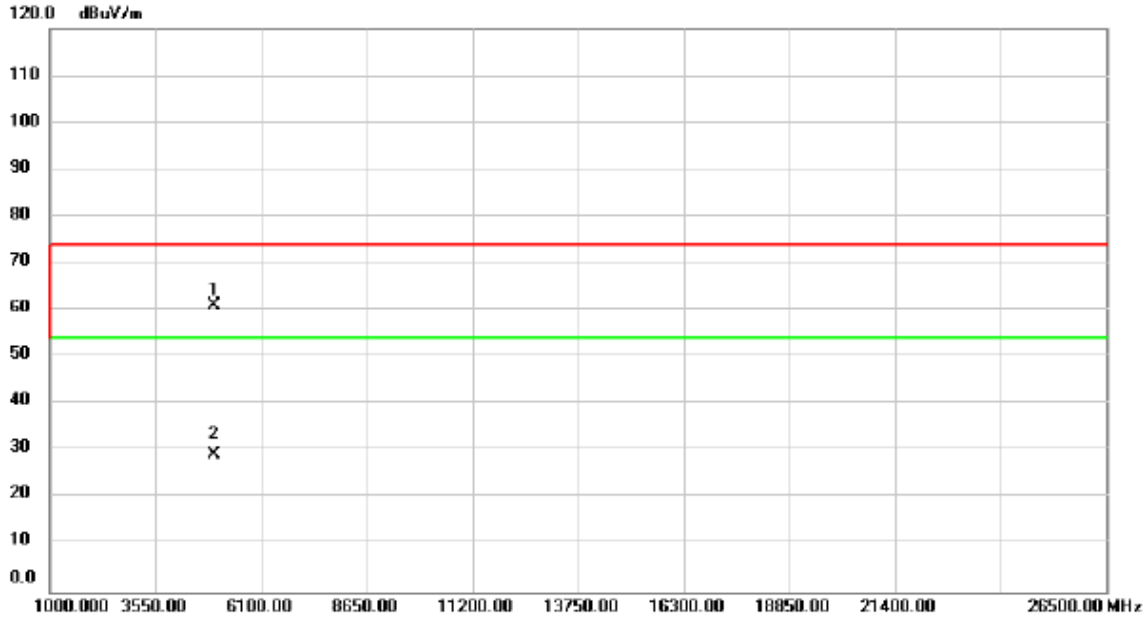
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	2480.000	70.28	32.05	102.33	74.00	28.33	peak	No Limit
2	X	2480.000	45.61	32.05	77.66	54.00	23.66	AVG	No Limit
3		2490.133	27.41	32.09	59.50	74.00	-14.50	peak	
4		2490.133	2.74	32.09	34.83	54.00	-19.17	AVG	

Orthogonal Axis :	X
Test Mode :	TX 2480MHz _CH78_3Mbps

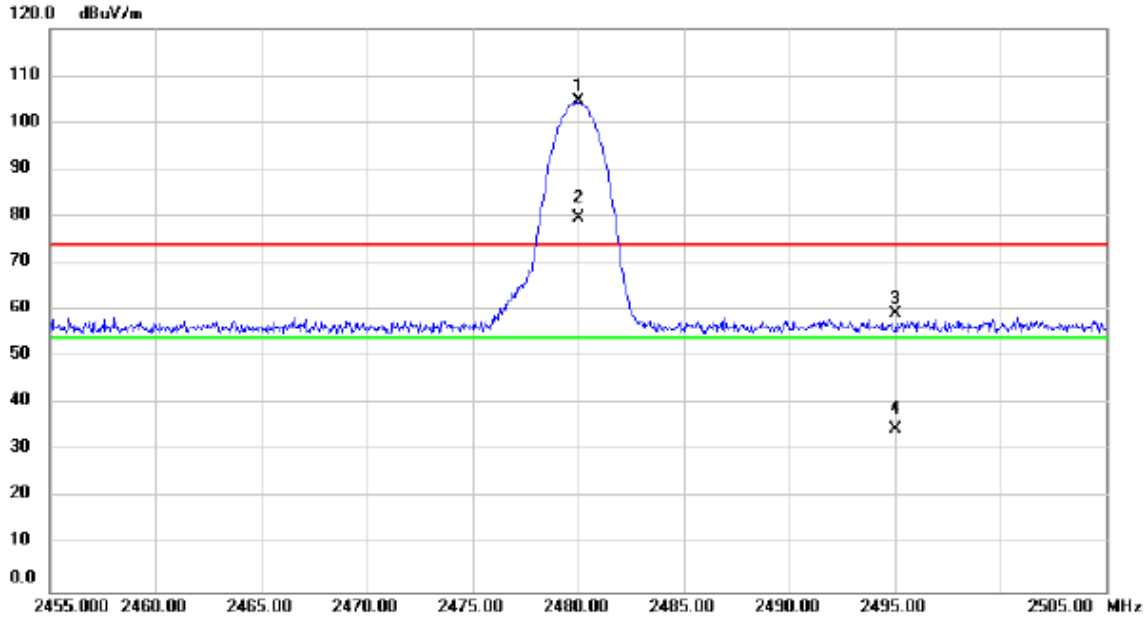
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4960.000	71.17	-10.26	60.91	74.00	-13.09	peak	
2		4960.000	39.55	-10.26	29.29	54.00	-24.71	AVG	

Orthogonal Axis :	X
Test Mode :	TX 2480MHz _CH78_3Mbps

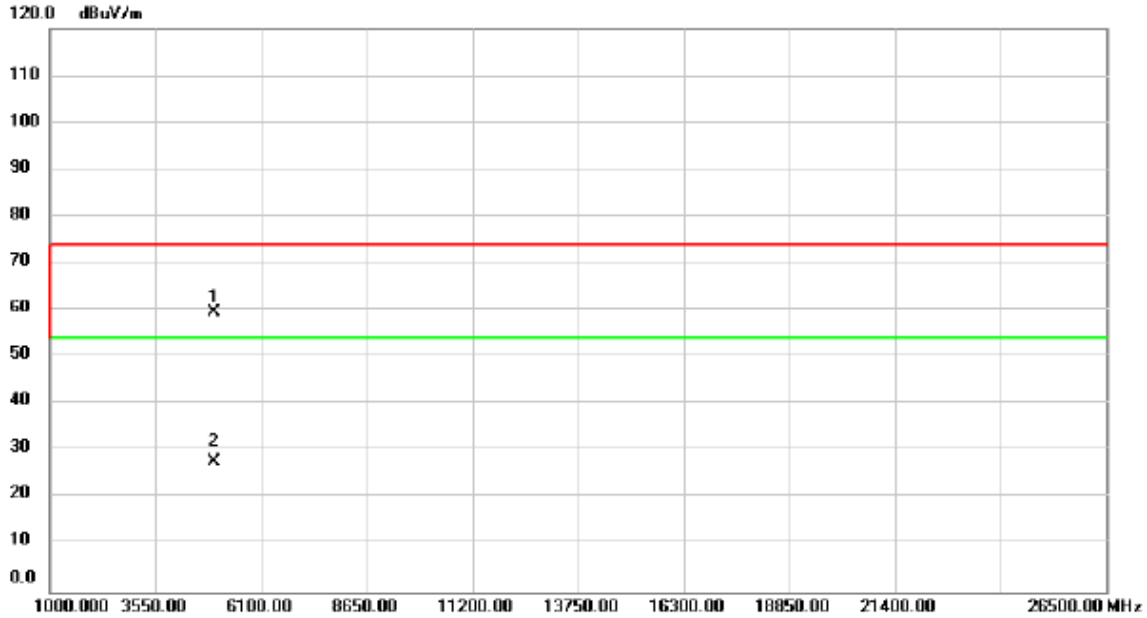
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	2480.000	72.35	32.05	104.40	74.00	30.40	peak	No Limit
2	X	2480.000	47.68	32.05	79.73	54.00	25.73	AVG	No Limit
3		2495.046	27.19	32.11	59.30	74.00	-14.70	peak	
4		2495.046	2.52	32.11	34.63	54.00	-19.37	AVG	

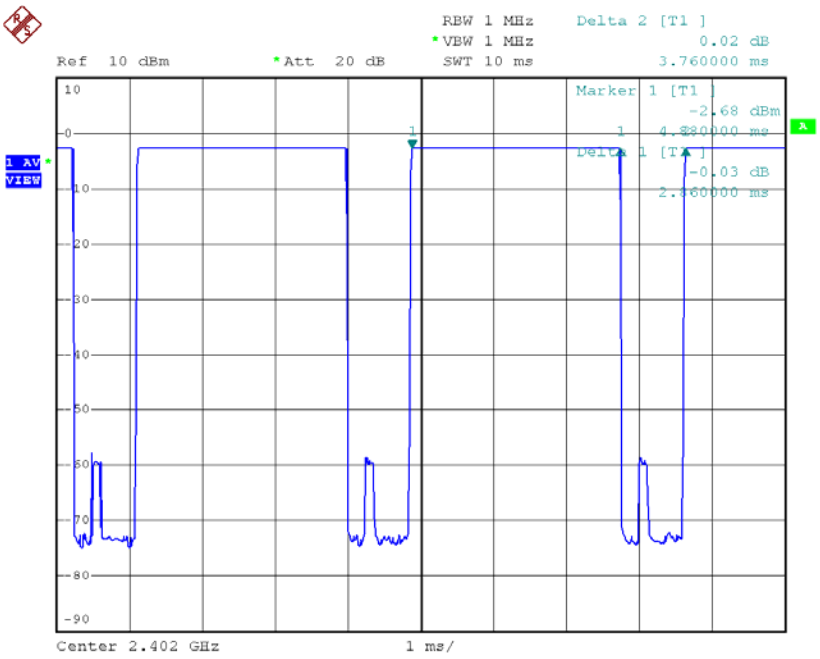
Orthogonal Axis :	X
Test Mode :	TX 2480MHz _CH78_3Mbps

Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4960.000	69.72	-10.26	59.46	74.00	-14.54	peak	
2		4960.000	37.92	-10.26	27.66	54.00	-26.34	AVG	

TX Mode_1Mbps _DUTY CYCLE



Date: 14.JUL.2016 15:38:46

Duty cycle: TX 2402 DUTYMHz

Duty cycle = T_{ON} / T_{Total}

T_{ON}: 2.86 msec

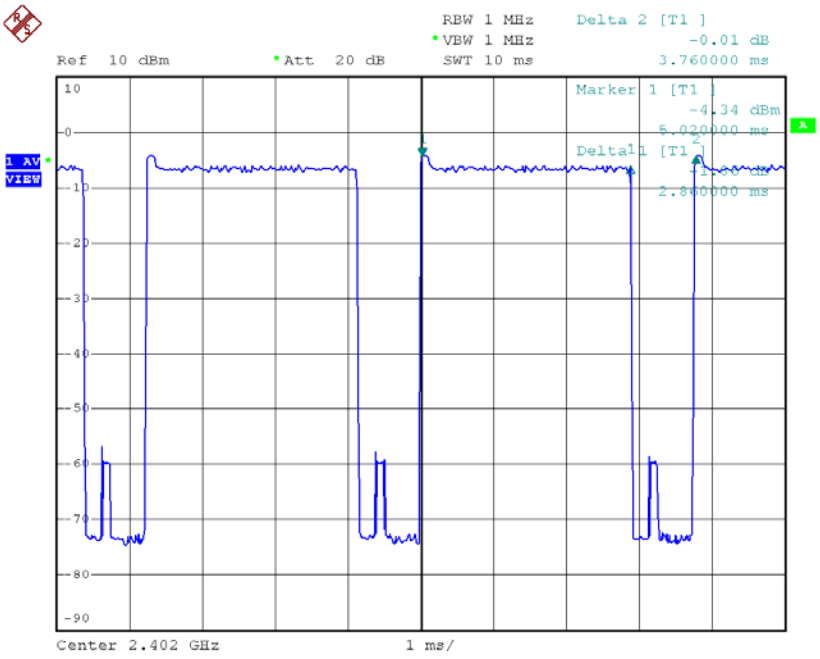
T_{Total}: 3.76 msec

Duty cycle: 76.06%

Duty Factor = 10 log(1/Duty cycle)

Duty Factor = 1.19

TX Mode_3Mbps _DUTY CYCLE



Duty cycle: TX 2402 DUTYMHz

Duty cycle = T_{ON} / T_{Total}

T_{ON}: 2.86 msec

T_{Total}: 3.76 msec

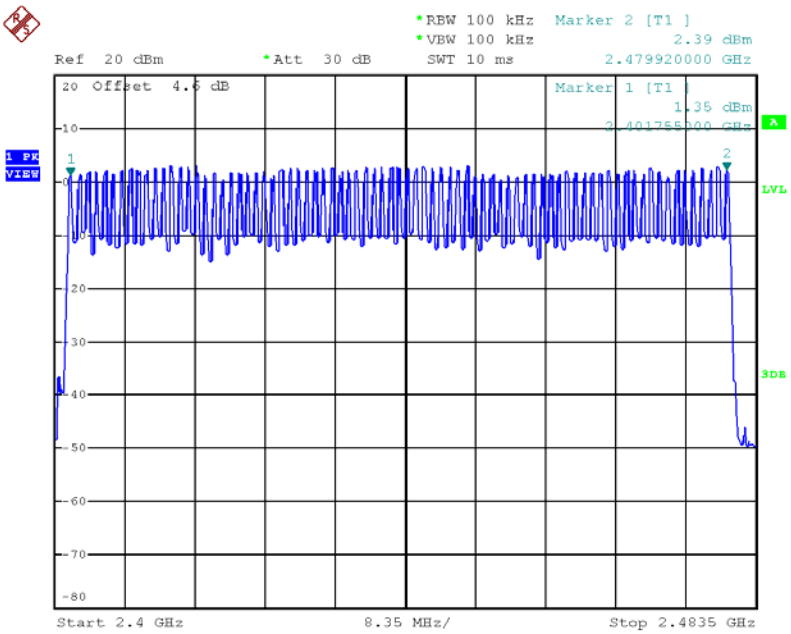
Duty cycle: 76.06%

Duty Factor = 10 log(1/Duty cycle)

Duty Factor = 1.19

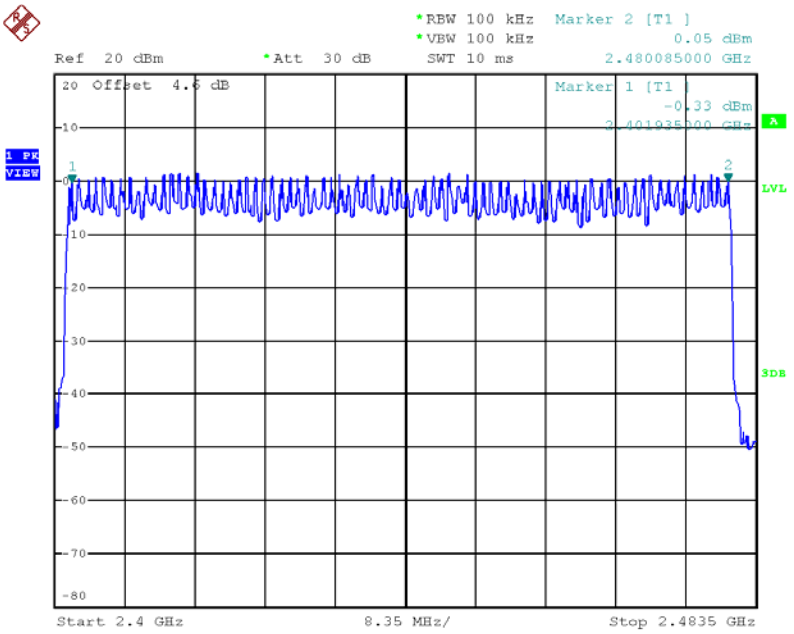
ATTACHMENT E - NUMBER OF HOPPING CHANNEL

Test Mode	Hopping Mode_1Mbps
Number of Hopping Channel	79



Date: 1.AUG.2016 14:28:58

Test Mode	Hopping Mode_3Mbps
Number of Hopping Channel	79



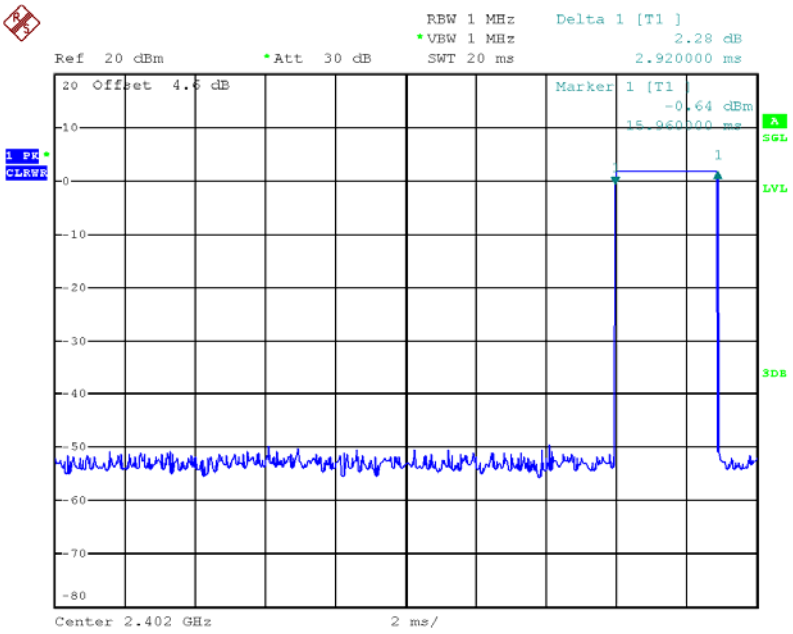
Date: 1.AUG.2016 14:45:46

ATTACHMENT F - AVERAGE TIME OF OCCUPANCY

Test Mode :	TX Mode_1Mbps

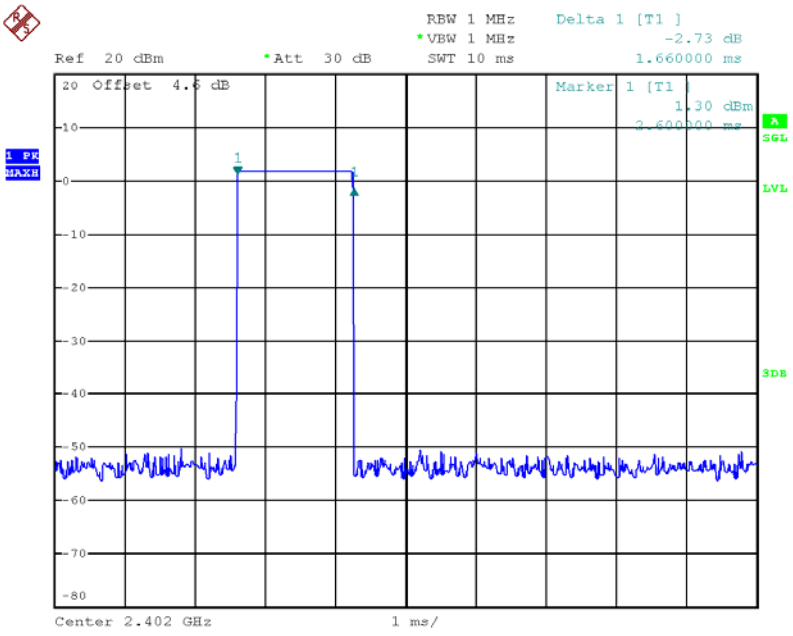
Data Packet	Frequency (MHz)	Pulse Duration (ms)	Dwell Time (s)	Limits (s)	Test Result
DH5	2402	2.9200	0.3115	0.4000	Complies
DH3	2402	1.6600	0.2656	0.4000	Complies
DH1	2402	0.3850	0.1232	0.4000	Complies
DH5	2441	2.9200	0.3115	0.4000	Complies
DH3	2441	1.6400	0.2624	0.4000	Complies
DH1	2441	0.3850	0.1232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

CH00-DH5



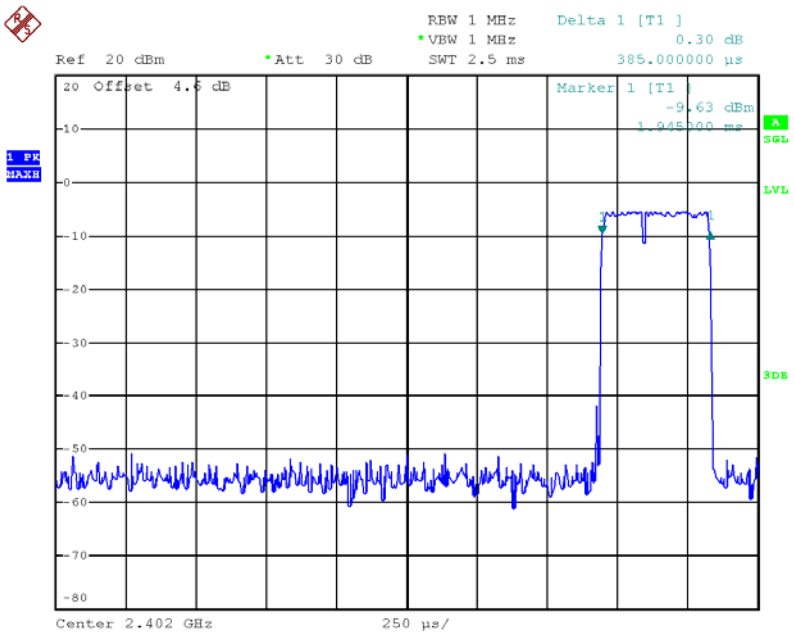
Date: 1.AUG.2016 14:31:31

CH00-DH3



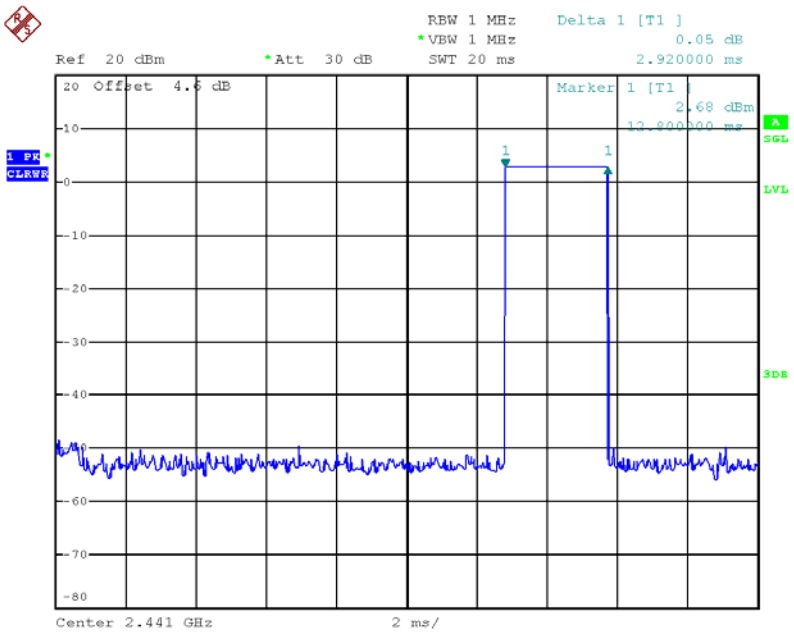
Date: 1.AUG.2016 14:30:50

CH00-DH1



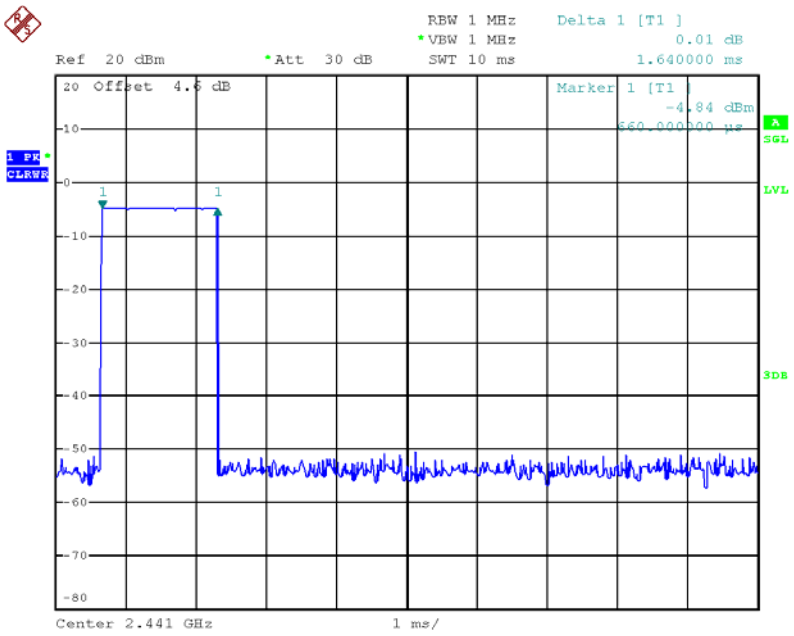
Date: 1.AUG.2016 14:26:08

CH39-DH5



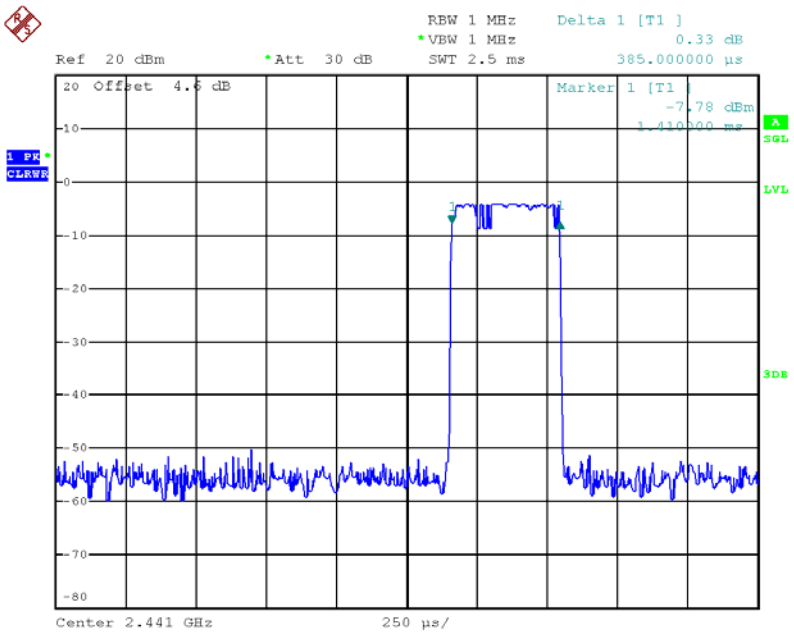
Date: 1.AUG.2016 14:31:34

CH39-DH3



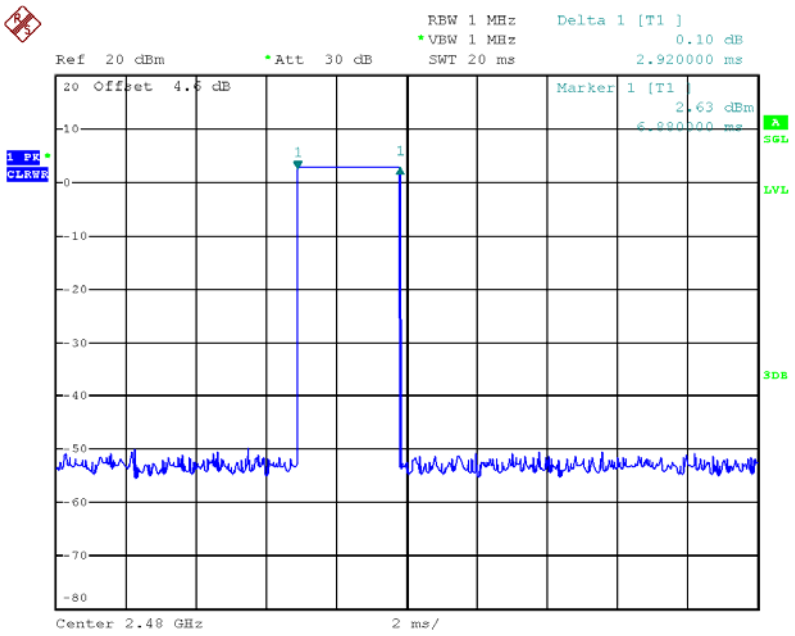
Date: 1.AUG.2016 14:31:11

CH39-DH



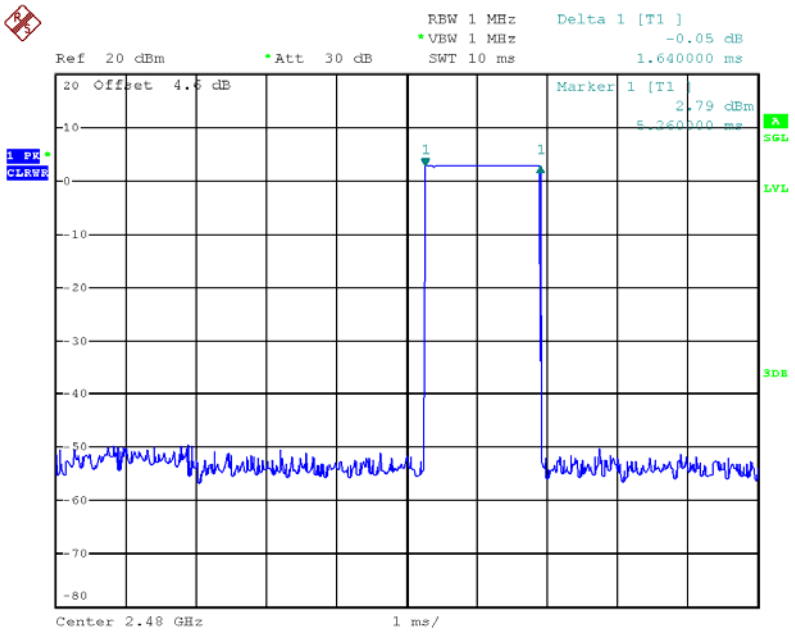
Date: 1.AUG.2016 14:26:29

CH78-DH5



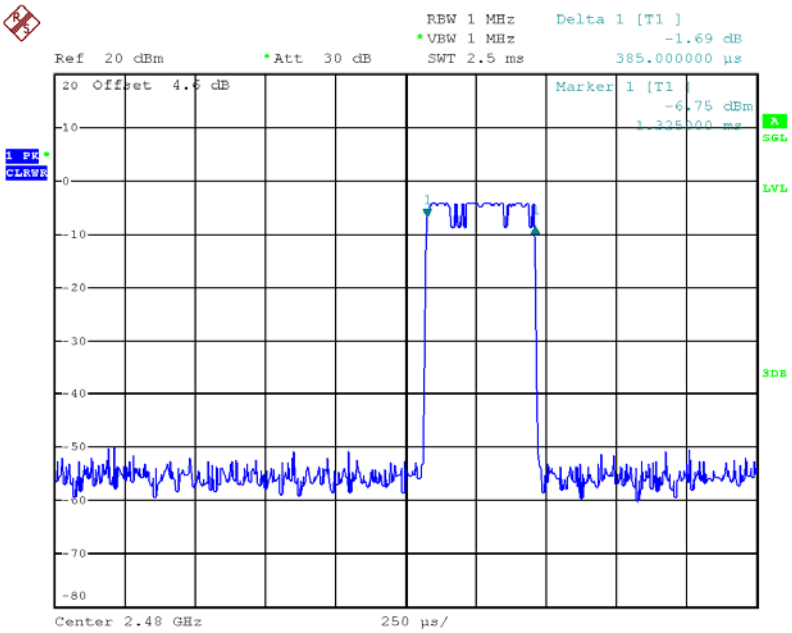
Date: 1.AUG.2016 14:31:54

CH78-DH3



Date: 1.AUG.2016 14:31:14

CH78-DH1

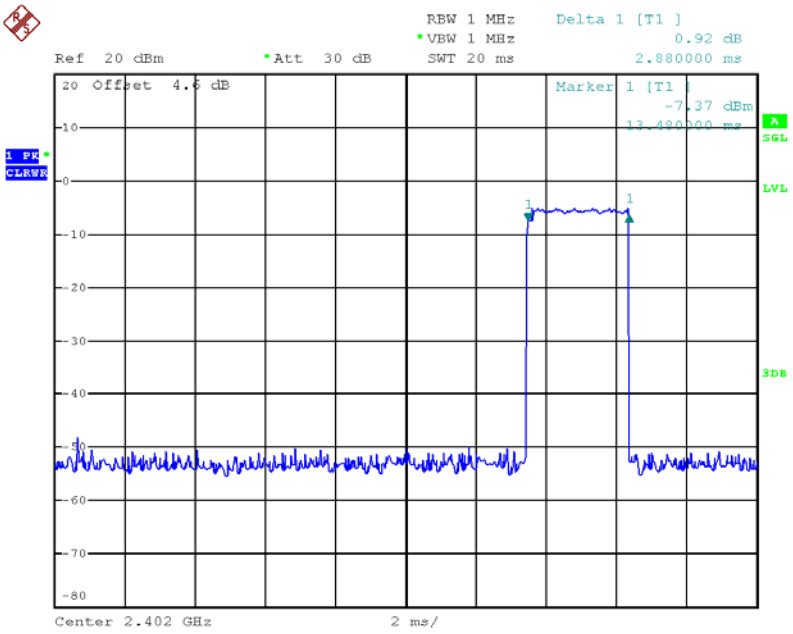


Date: 1.AUG.2016 14:26:32

Test Mode :	TX Mode_3Mbps

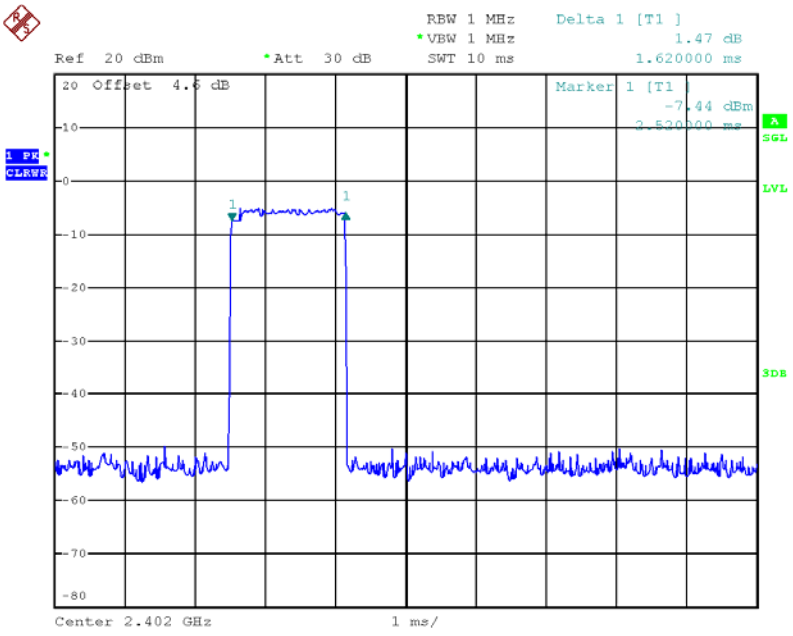
Data Packet	Frequency (MHz)	Pulse Duration (ms)	Dwell Time (s)	Limits (s)	Test Result
DH5	2402	2.8800	0.3072	0.4000	Complies
DH3	2402	1.6200	0.2592	0.4000	Complies
DH1	2402	0.4000	0.1280	0.4000	Complies
DH5	2441	2.9200	0.3115	0.4000	Complies
DH3	2441	1.6400	0.2624	0.4000	Complies
DH1	2441	0.4000	0.1280	0.4000	Complies
DH5	2480	2.9200	0.3115	0.4000	Complies
DH3	2480	1.6600	0.2656	0.4000	Complies
DH1	2480	0.4000	0.1280	0.4000	Complies

CH00-DH5



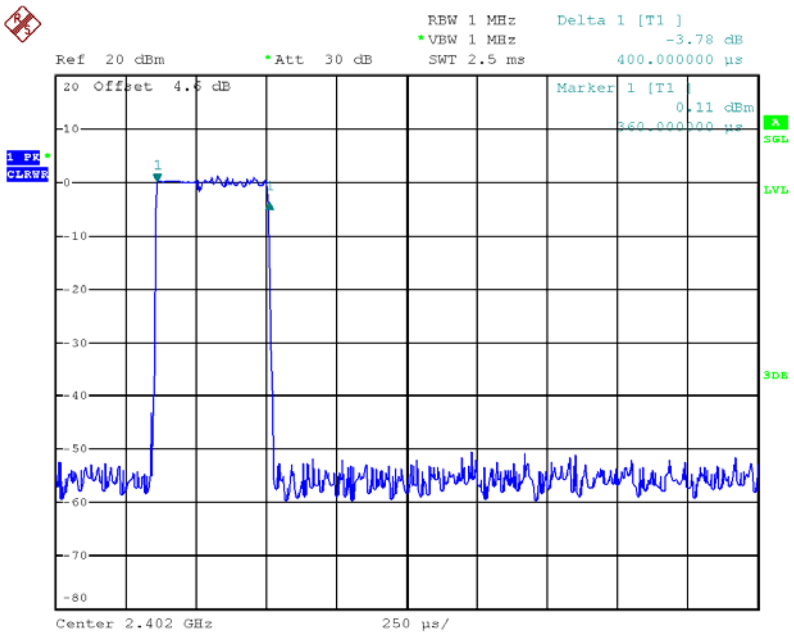
Date: 1.AUG.2016 14:52:44

CH00-DH3



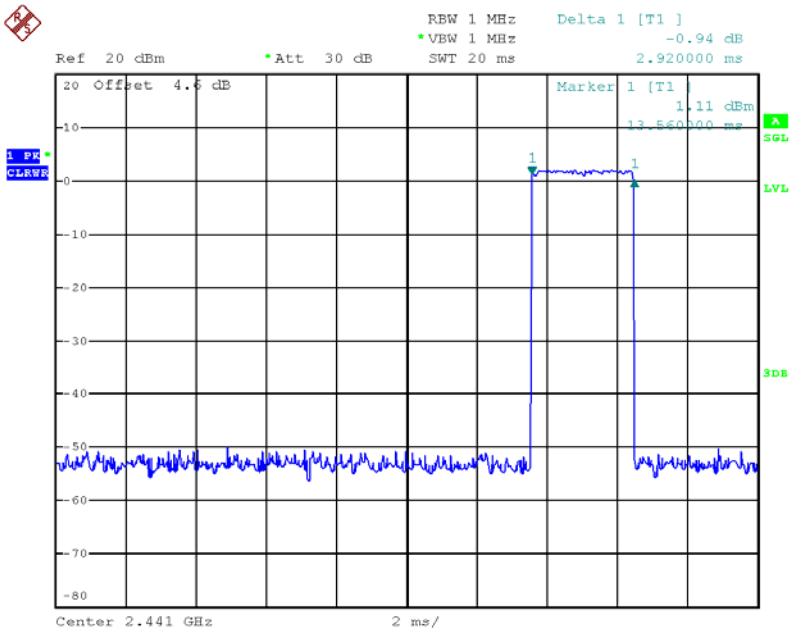
Date: 1.AUG.2016 14:52:01

CH00-DH1



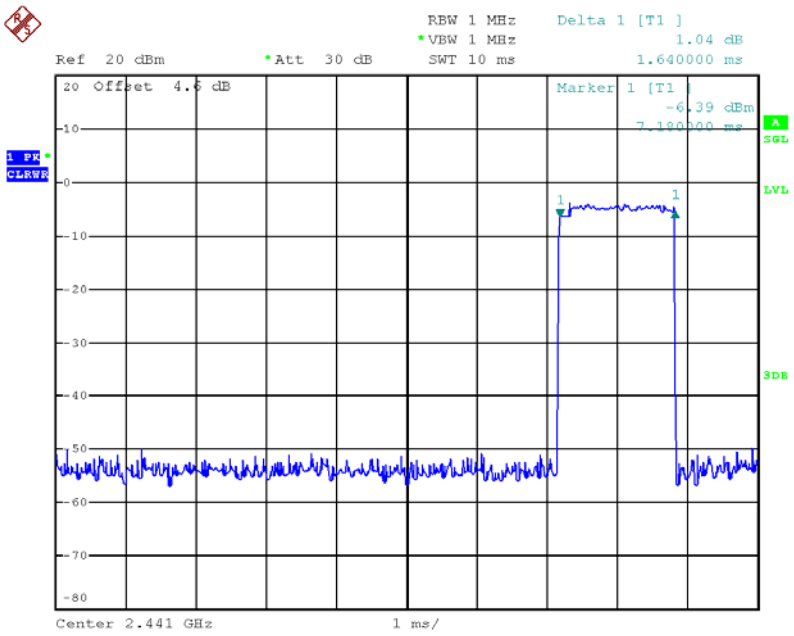
Date: 1.AUG.2016 14:51:32

CH39-DH5



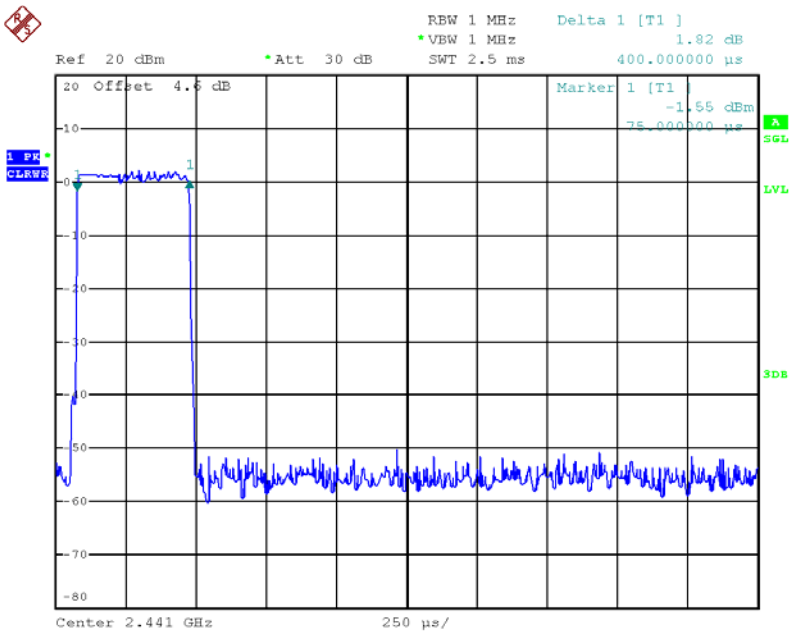
Date: 1.AUG.2016 14:52:48

CH39-DH3



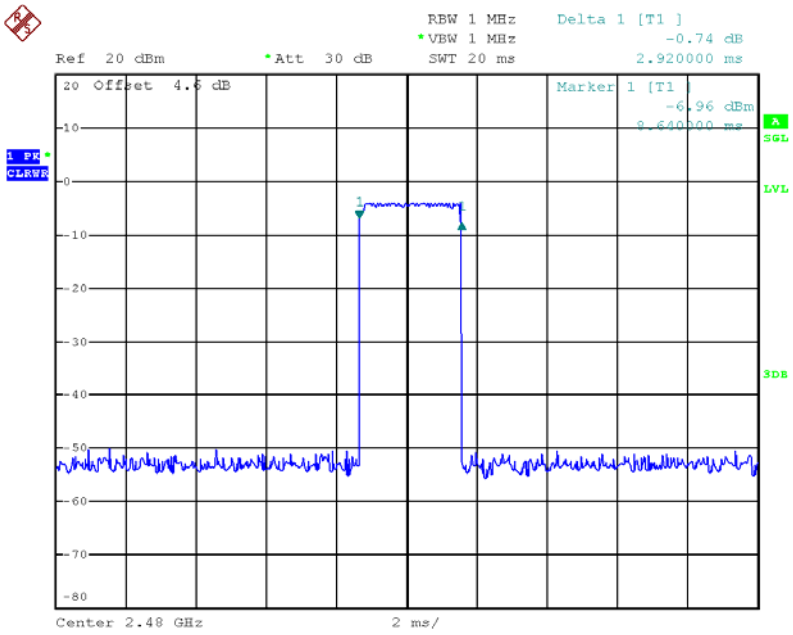
Date: 1.AUG.2016 14:52:05

CH39-DH1



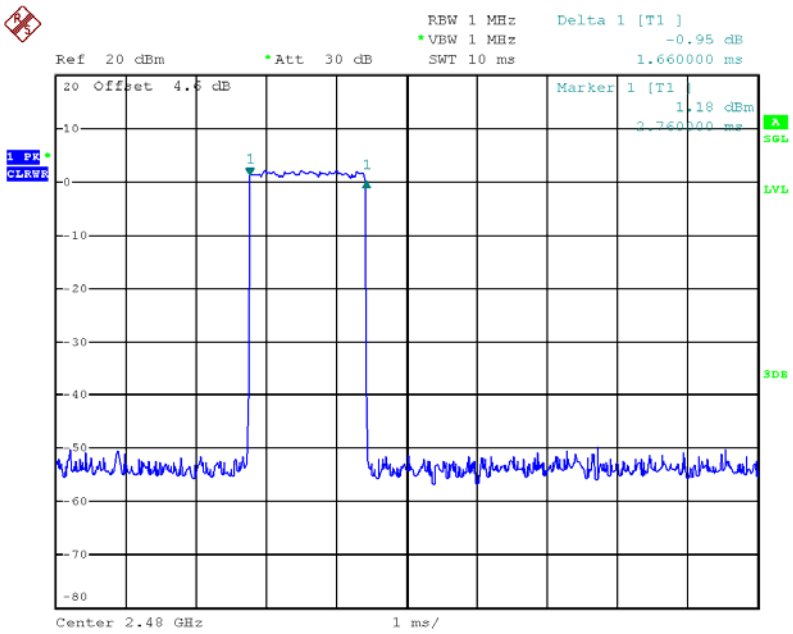
Date: 1.AUG.2016 14:51:37

CH78-DH5



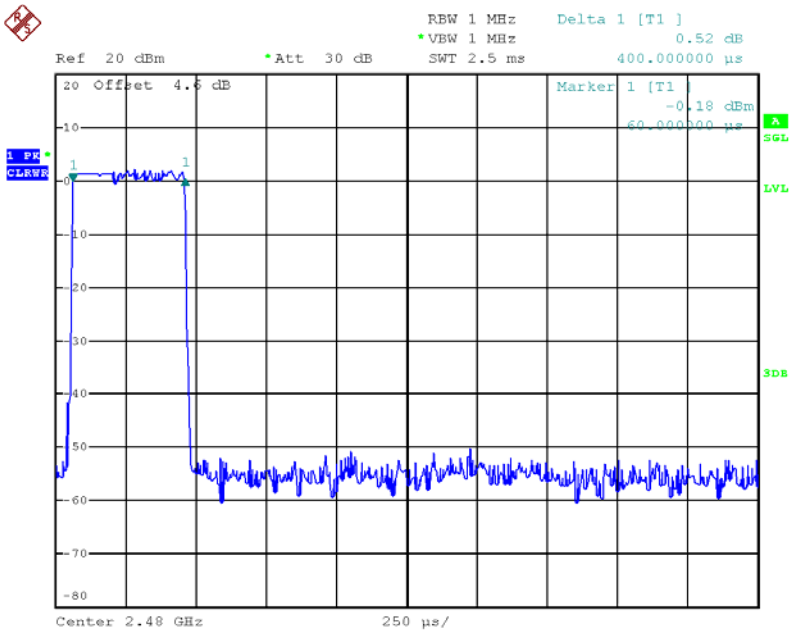
Date: 1.AUG.2016 14:52:52

CH78-DH3



Date: 1.AUG.2016 14:53:55

CH78-DH1



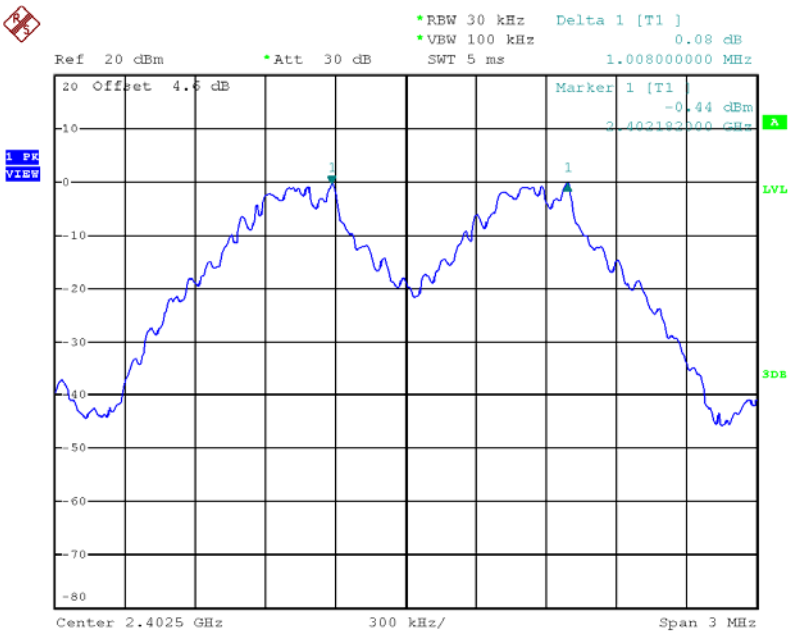
Date: 1.AUG.2016 14:51:43

ATTACHMENT G - HOPPING CHANNEL SEPARATION MEASUREMENT

Test Mode :	Hopping on _1Mbps

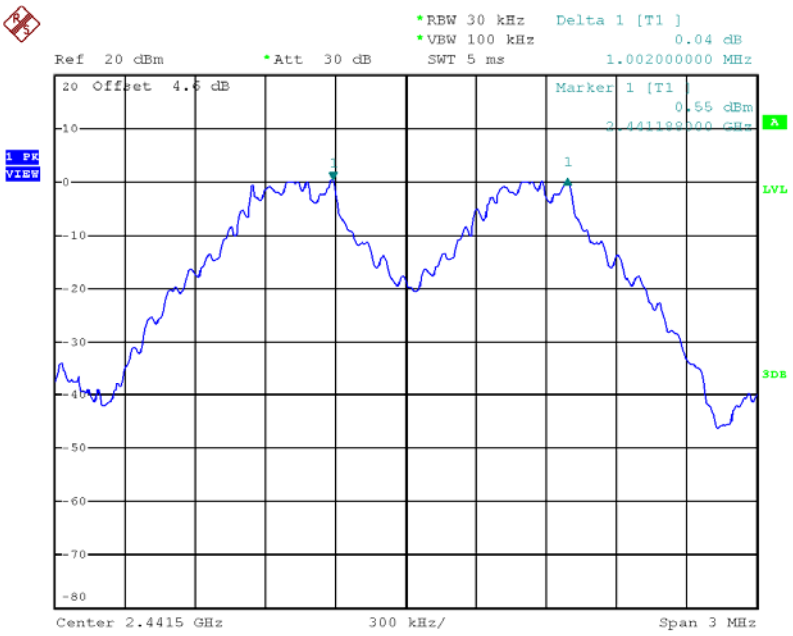
Frequency (MHz)	Channel Separation (MHz)	2/3 of 20dB Bandwidth (MHz)	Test Result
2402	1.008	0.636	Complies
2441	1.002	0.636	Complies
2480	1.002	0.661	Complies

CH00



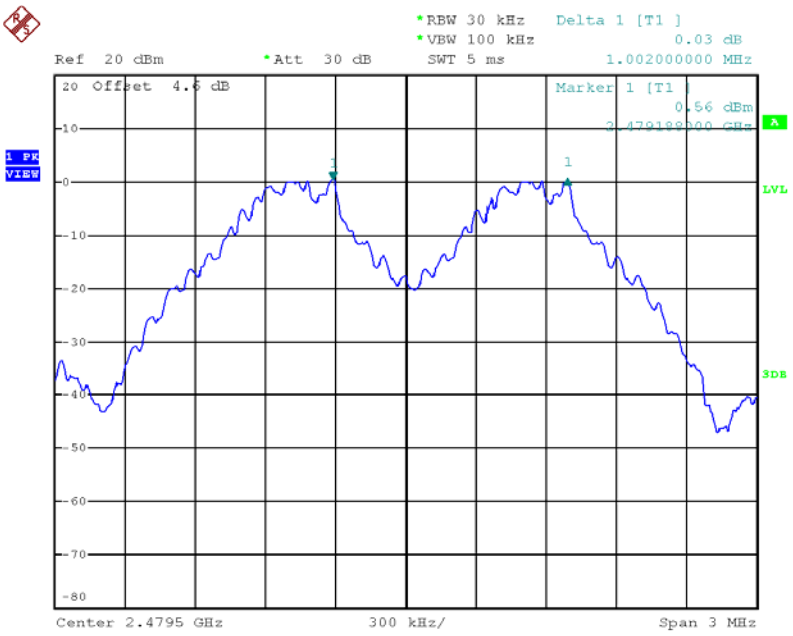
Date: 1.AUG.2016 14:33:42

CH39



Date: 1.AUG.2016 14:35:21

CH78

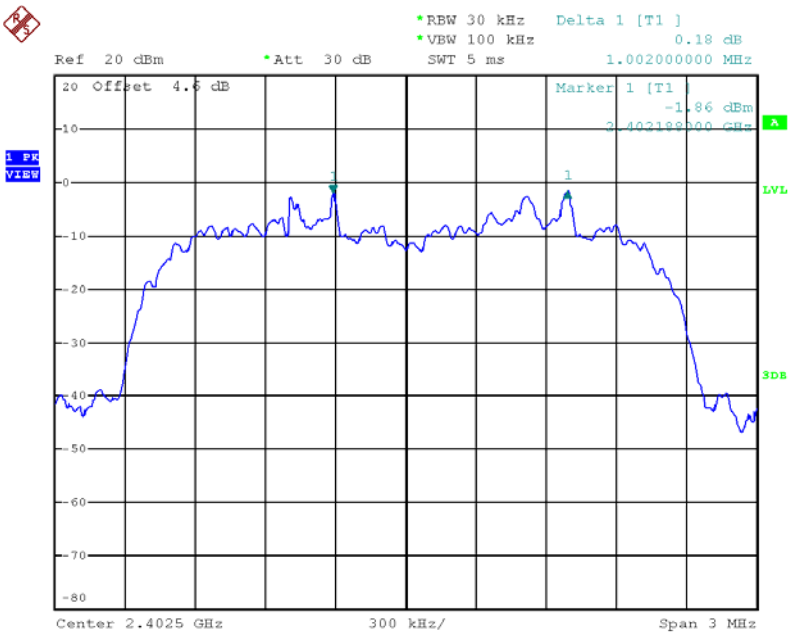


Date: 1.AUG.2016 14:37:45

Test Mode :	Hopping on _3Mbps

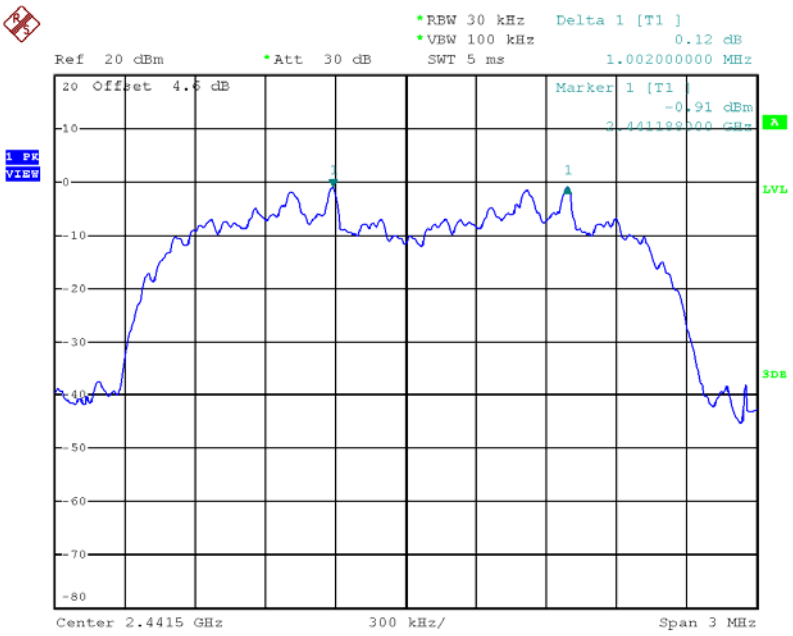
Frequency (MHz)	Channel Separation (MHz)	2/3 of 20dB Bandwidth (MHz)	Test Result
2402	1.002	0.877	Complies
2441	1.002	0.871	Complies
2480	0.996	0.873	Complies

CH00



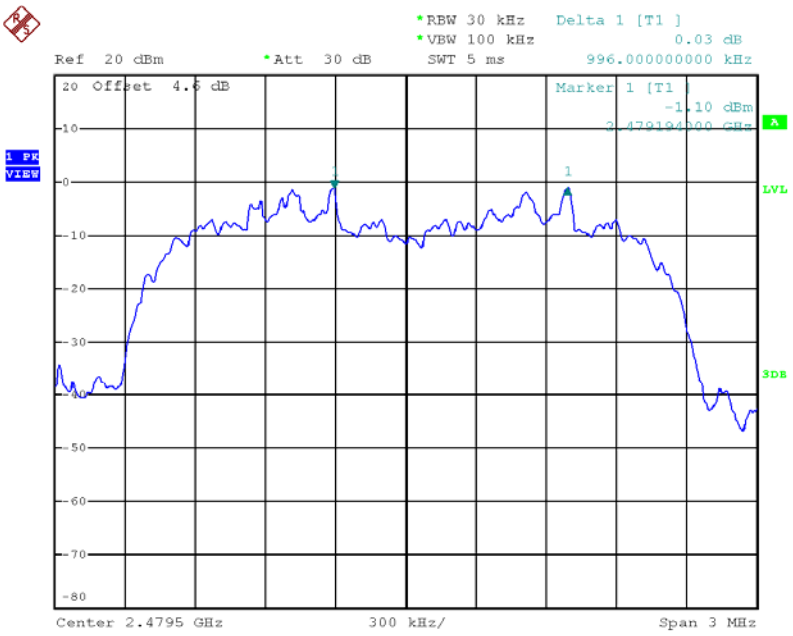
Date: 1.AUG.2016 15:07:26

CH39



Date: 1.AUG.2016 15:14:45

CH78



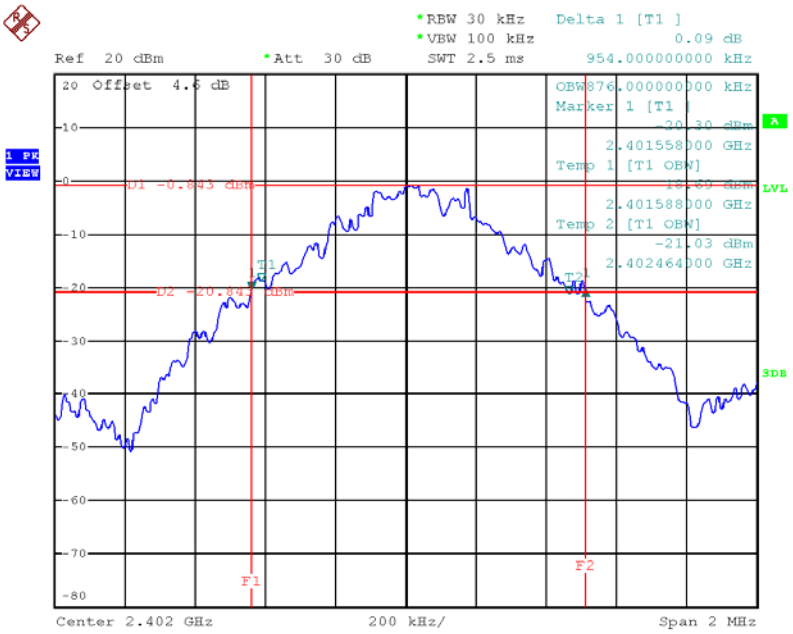
Date: 1.AUG.2016 15:16:19

ATTACHMENT H - BANDWIDTH

Test Mode :	TX Mode _1Mbps

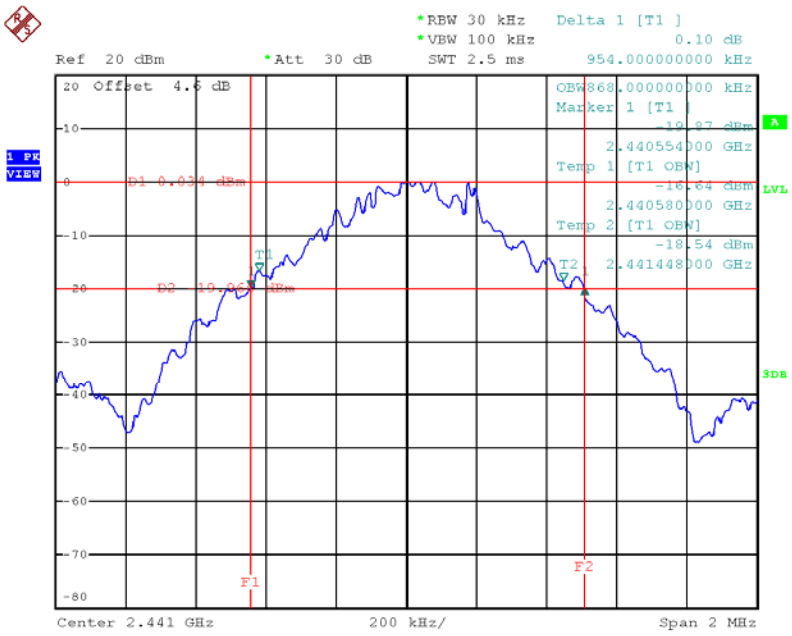
Frequency (MHz)	20dB Bandwidth (MHz)	99% Occupied BW (MHz)	Test Result
2402	0.954	0.876	Complies
2441	0.954	0.868	Complies
2480	0.992	0.872	Complies

CH00



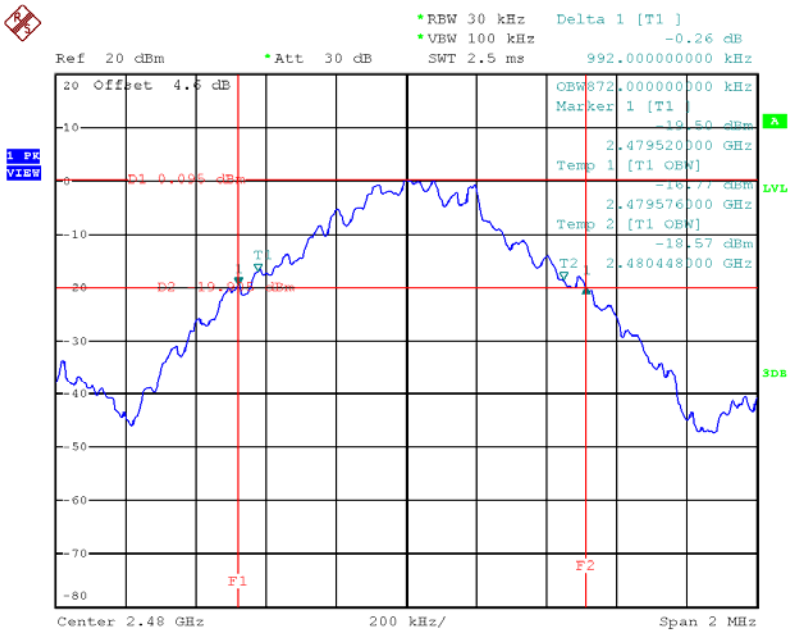
Date: 1.AUG.2016 14:23:07

CH39



Date: 1.AUG.2016 14:24:26

CH78

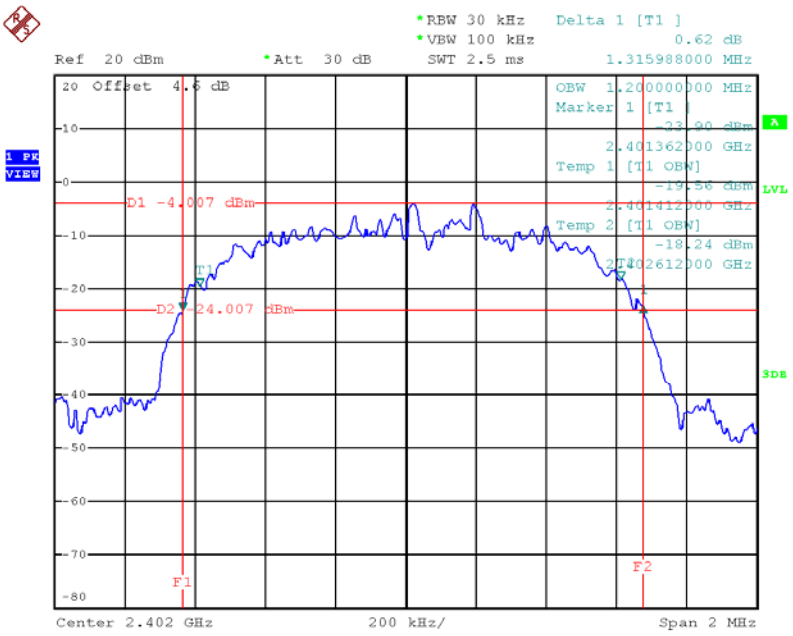


Date: 1.AUG.2016 14:25:29

Test Mode :	TX Mode _3Mbps

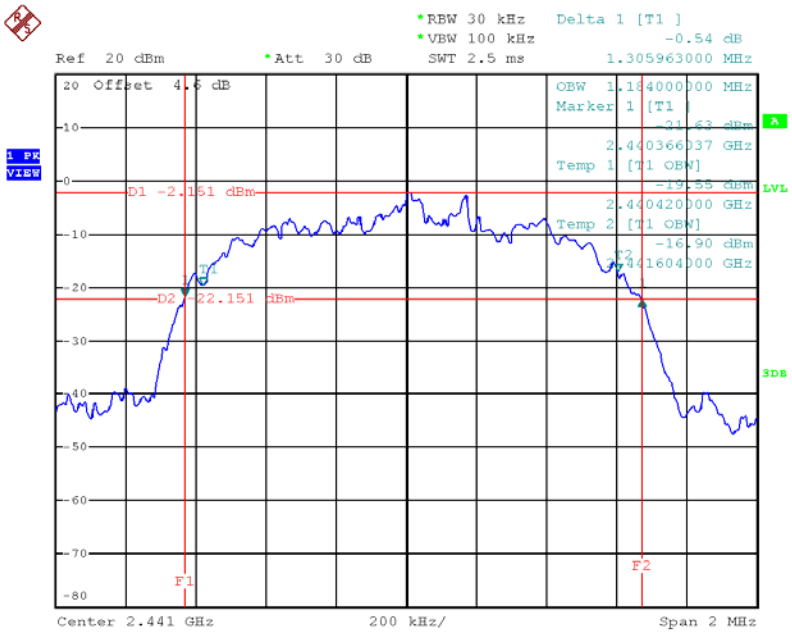
Frequency (MHz)	20dB Bandwidth (MHz)	99% Occupied BW (MHz)	Test Result
2402	1.316	1.200	Complies
2441	1.306	1.184	Complies
2480	1.310	1.192	Complies

CH00



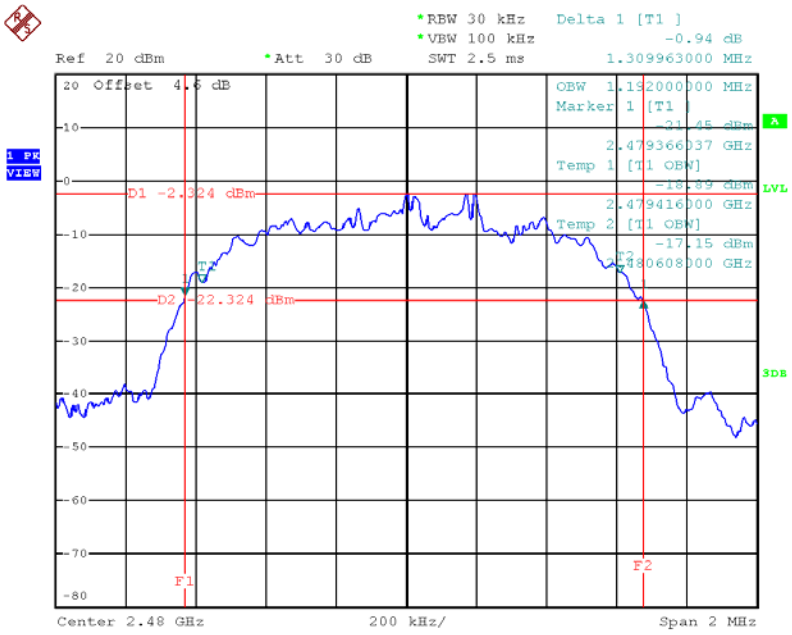
Date: 1.AUG.2016 14:40:06

CH39



Date: 1.AUG.2016 14:41:32

CH78



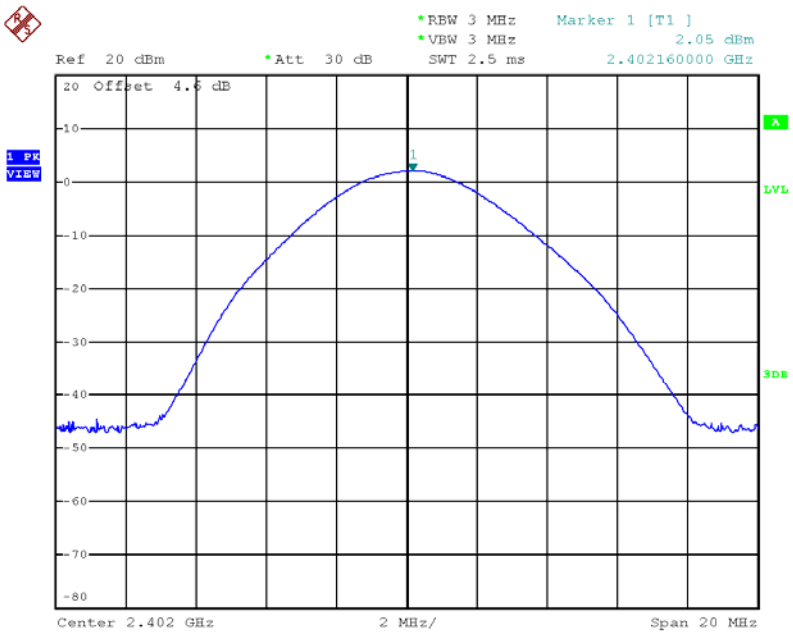
Date: 1.AUG.2016 14:42:46

ATTACHMENT I - PEAK OUTPUT POWER

Test Mode :	TX Mode _1Mbps

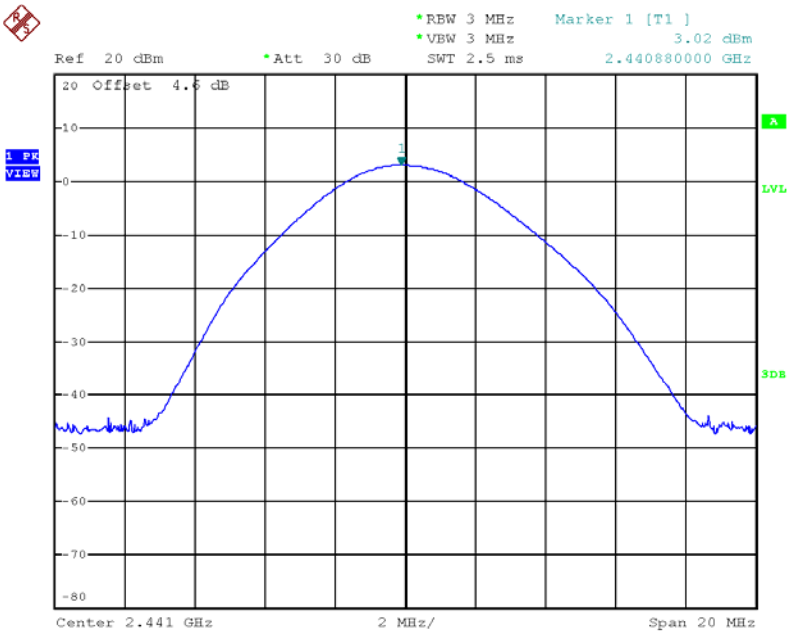
Frequency (MHz)	Conducted Power (dBm)	Conducted Power (Watt)	Max. Limit (dBm)	Max. Limit (Watt)	Test Result
2402	2.05	0.0016	30.00	1.0000	Complies
2441	3.02	0.0020	30.00	1.0000	Complies
2480	3.02	0.0020	30.00	1.0000	Complies

CH00



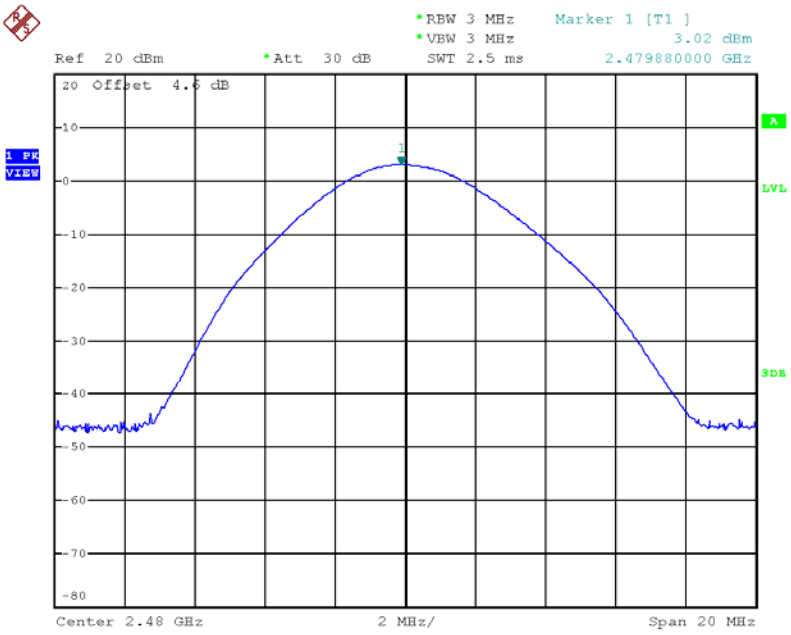
Date: 1.AUG.2016 14:23:26

CH39



Date: 1.AUG.2016 14:24:32

CH78

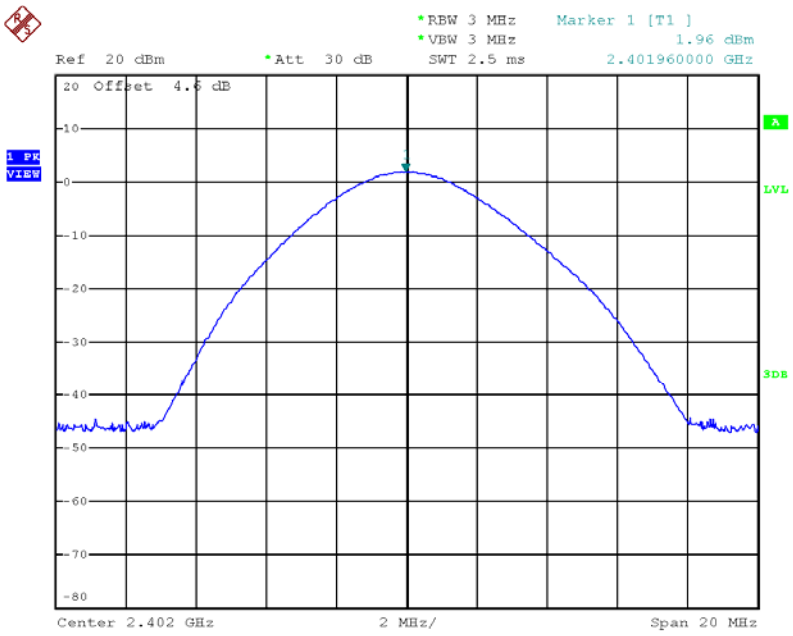


Date: 1.AUG.2016 14:25:48

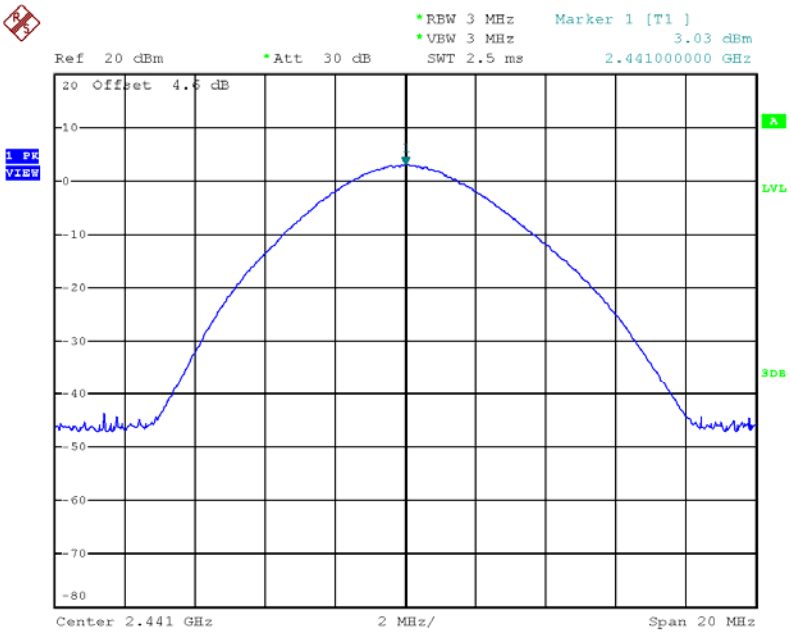
Test Mode :	TX Mode _3Mbps

Frequency (MHz)	Conducted Power (dBm)	Conducted Power (Watt)	Max. Limit (dBm)	Max. Limit (Watt)	Test Result
2402	1.96	0.0016	30.00	1.0000	Complies
2441	3.03	0.0020	30.00	1.0000	Complies
2480	3.07	0.0020	30.00	1.0000	Complies

CH00

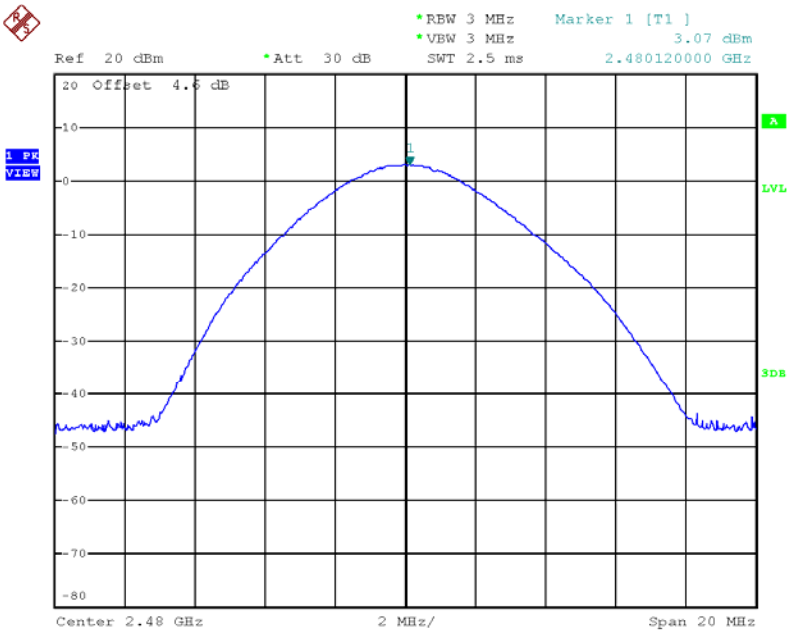


CH39



Date: 1.AUG.2016 14:41:37

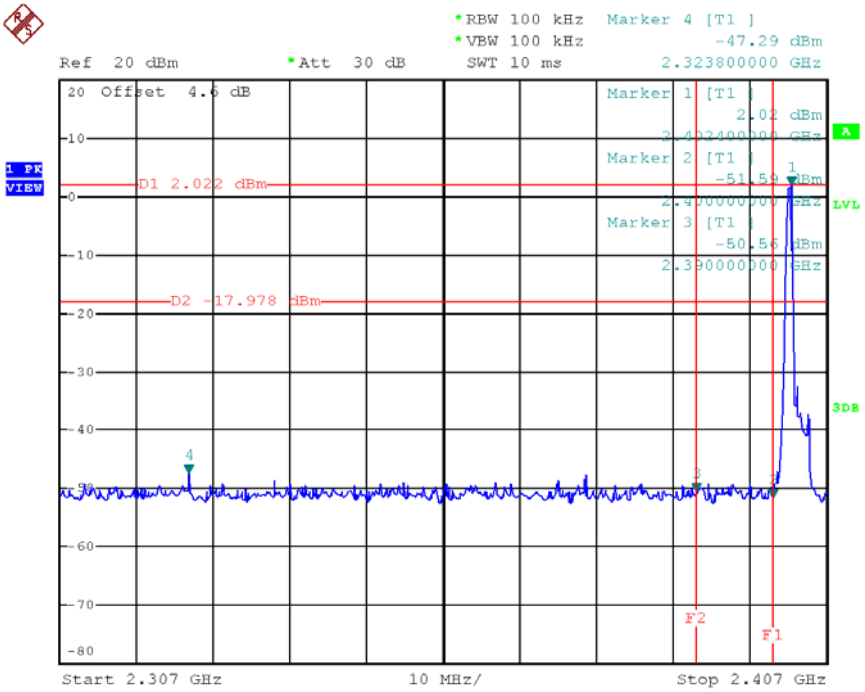
CH78



Date: 1.AUG.2016 14:43:05

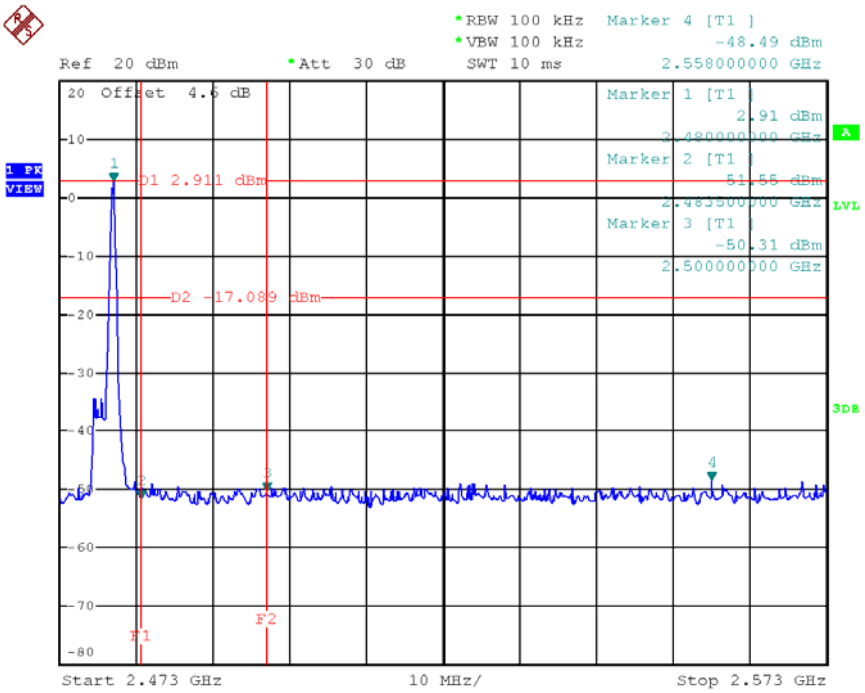
ATTACHMENT J - ANTENNA CONDUCTED SPURIOUS EMISSION

CH00 (Lower)_1Mbps



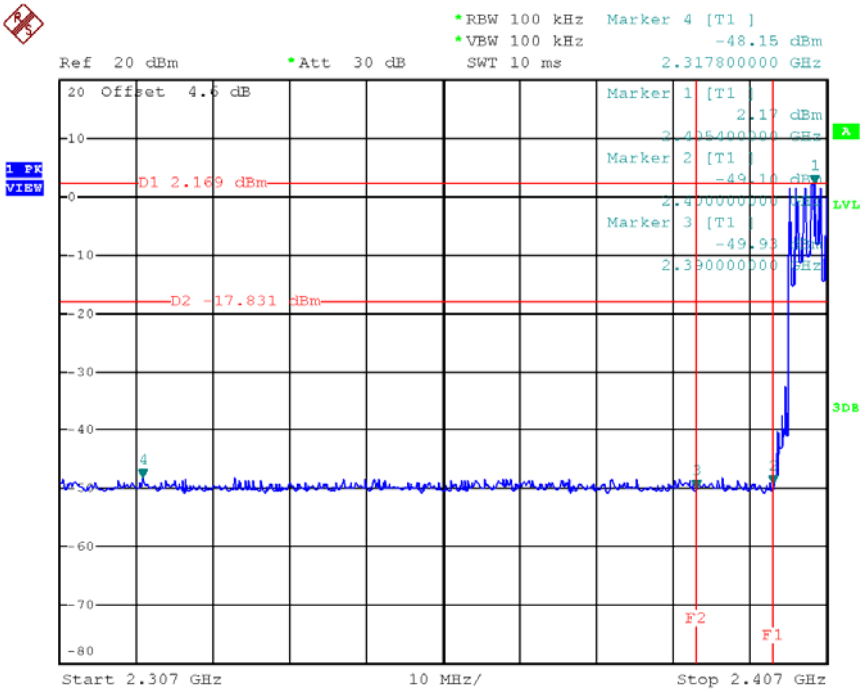
Date: 1.AUG.2016 14:22:35

CH78 (Upper) _1Mbps



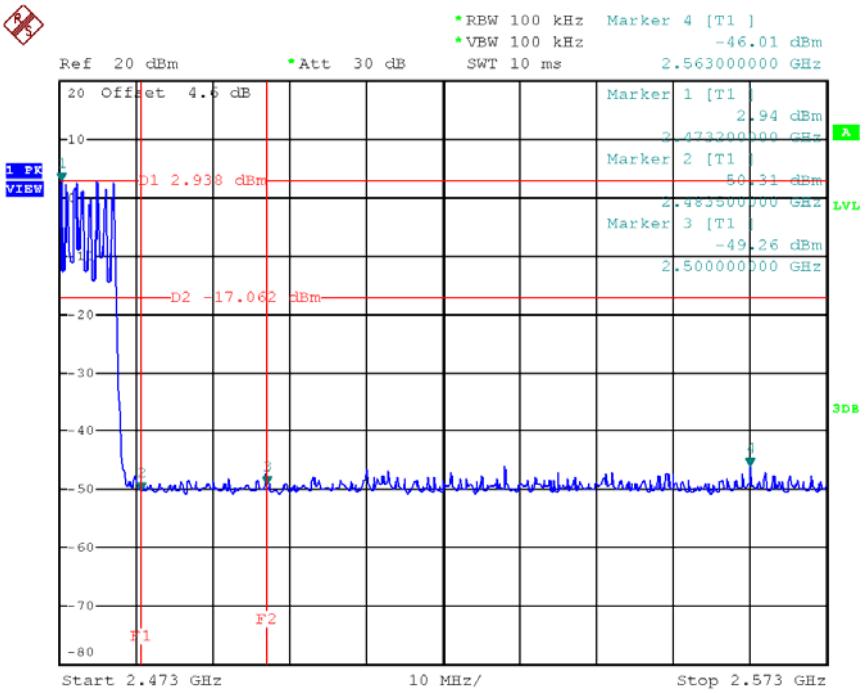
Date: 1.AUG.2016 14:24:49

CH00 Hopping on mode (Lower)_1Mbps



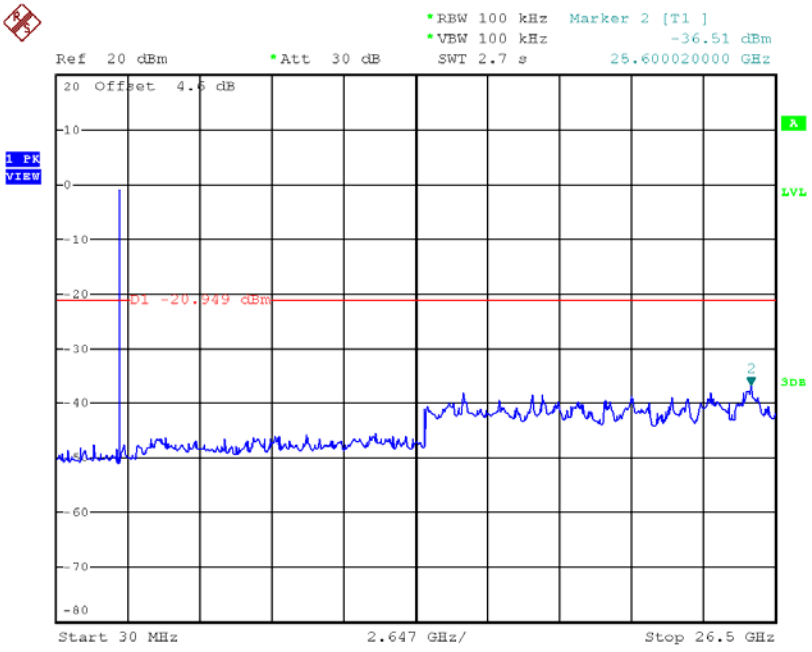
Date: 1.AUG.2016 14:29:49

CH78 Hopping on mode (Upper) _1Mbps



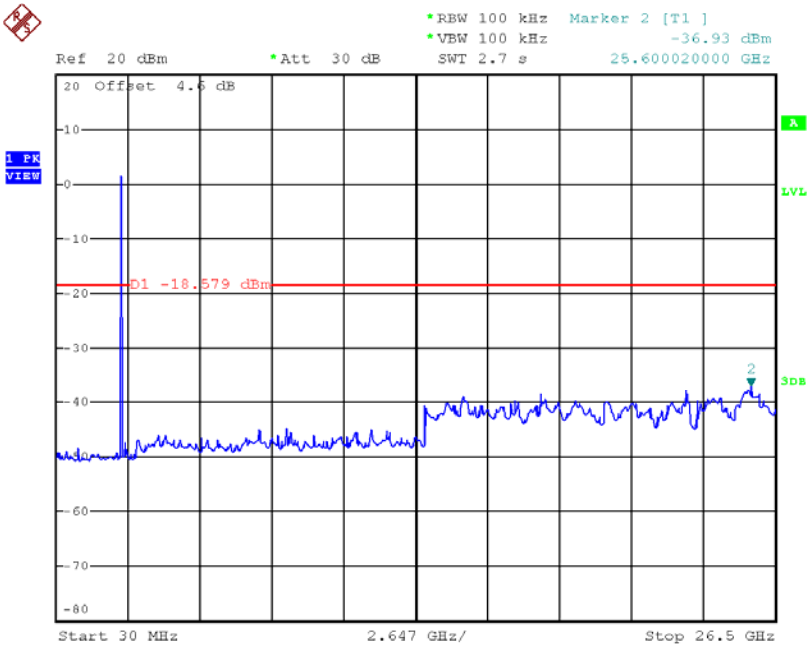
Date: 1.AUG.2016 14:30:23

CH00 (10 Harmonic of the frequency) _1Mbps



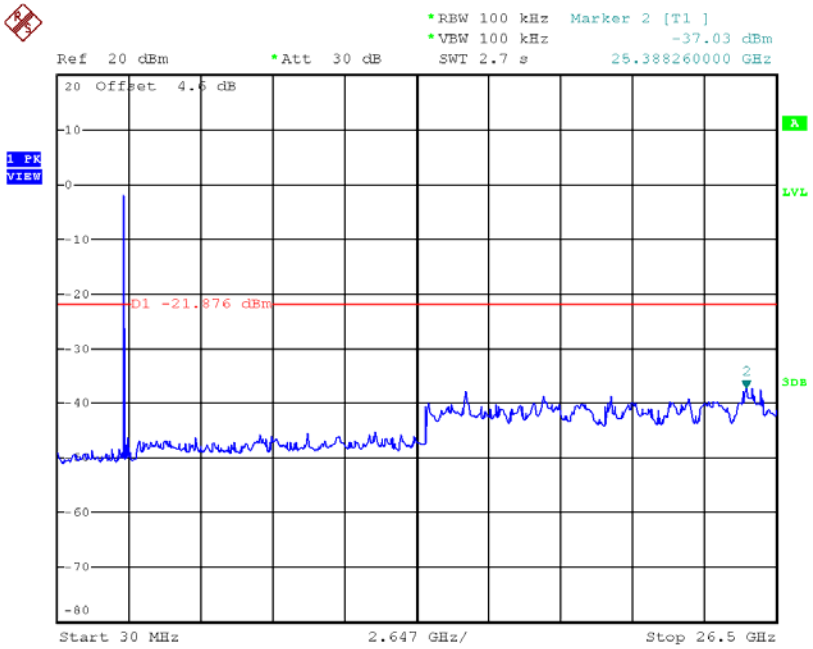
Date: 1.AUG.2016 14:23:20

CH39 (10 Harmonic of the frequency) _1Mbps



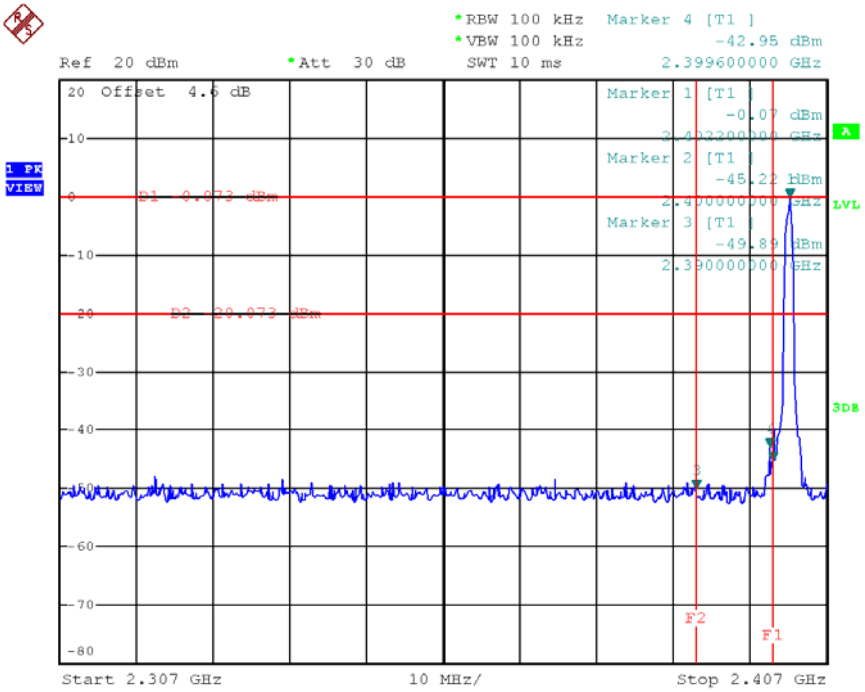
Date: 1.AUG.2016 14:23:54

CH78 (10 Harmonic of the frequency) _1Mbps



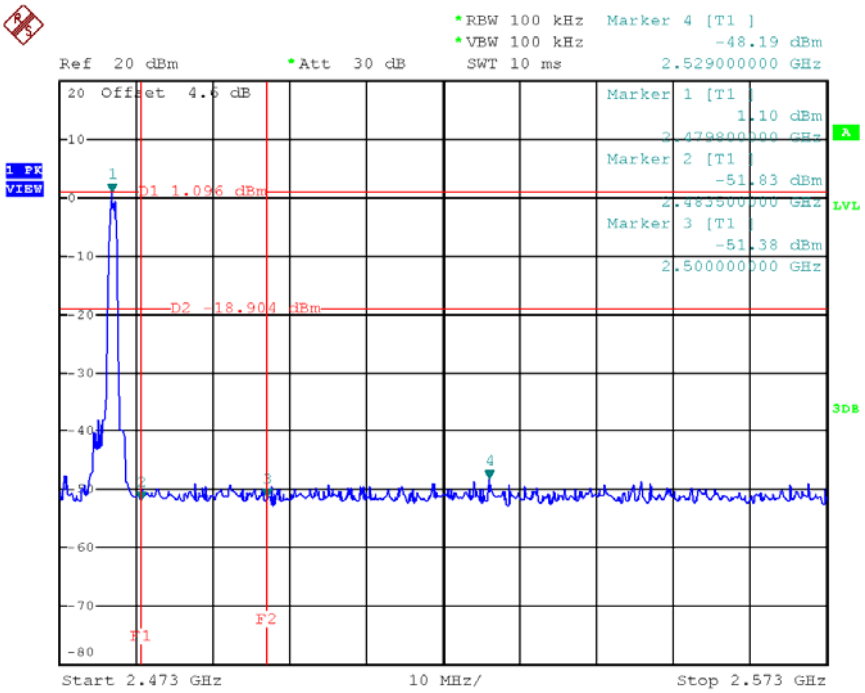
Date: 1.AUG.2016 14:25:42

CH00 (Lower) _3Mbps



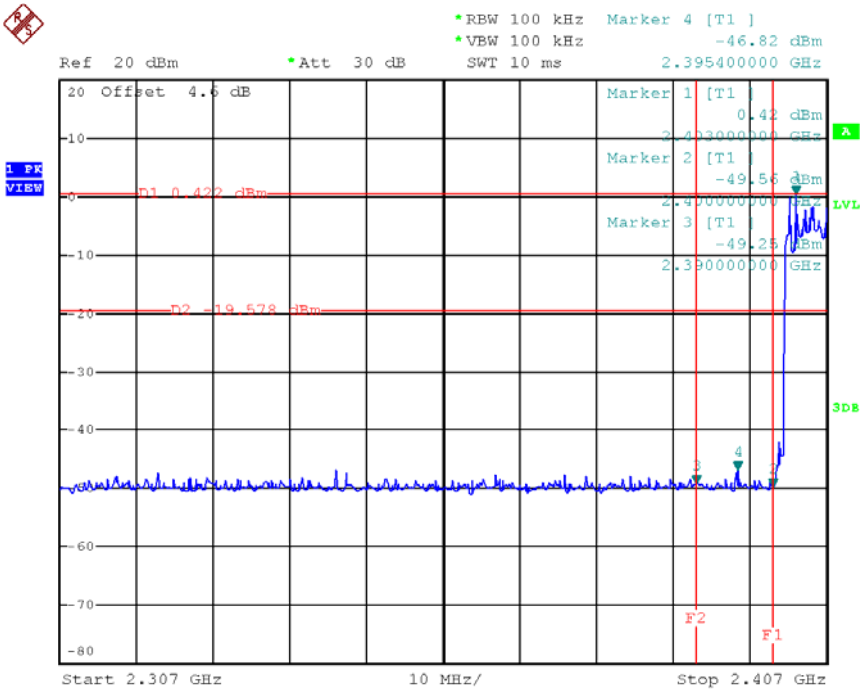
Date: 1.AUG.2016 14:39:42

CH78 (Upper) _3Mbps



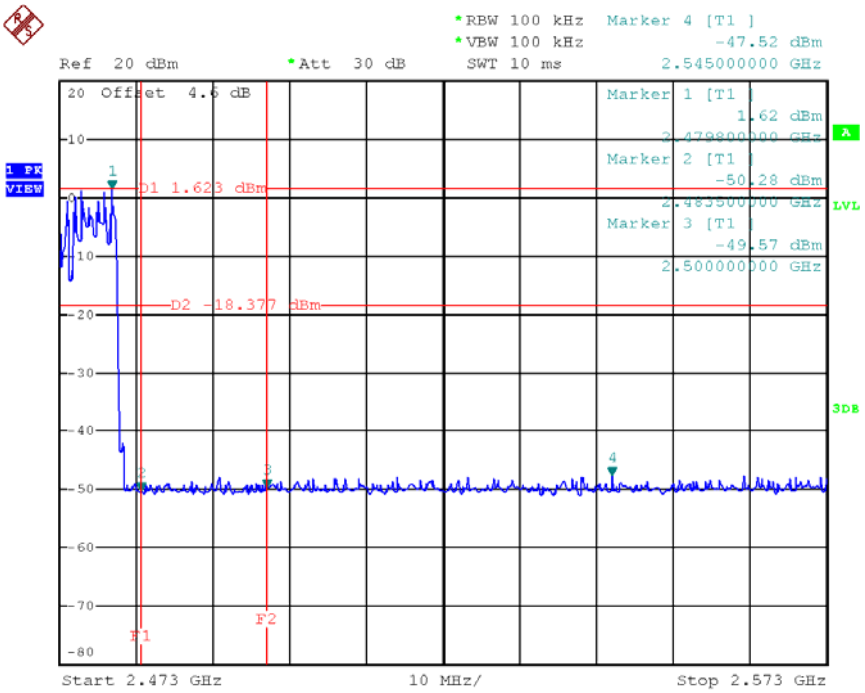
Date: 1.AUG.2016 14:42:23

CH00 Hopping on mode (Lower)_3Mbps



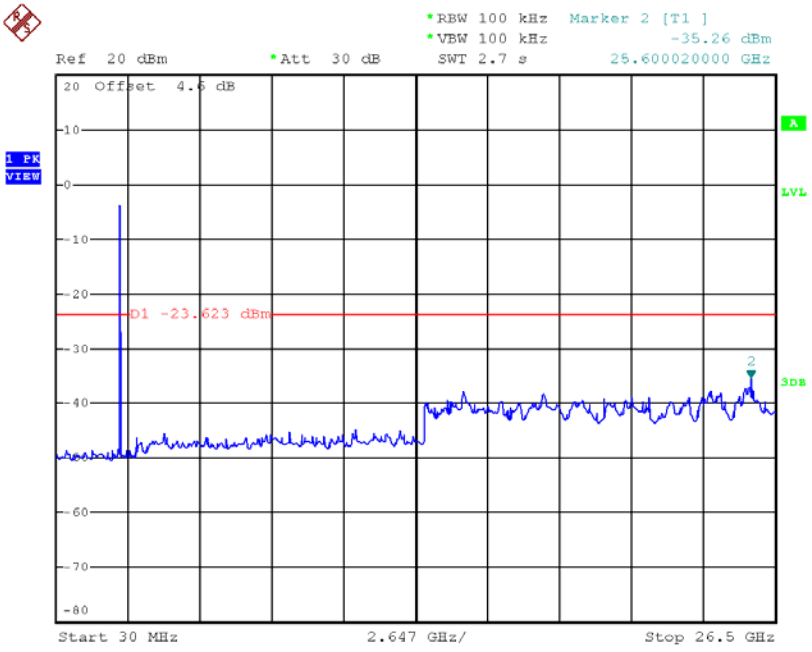
Date: 1.AUG.2016 14:46:38

CH78 Hopping on mode (Upper) _3Mbps



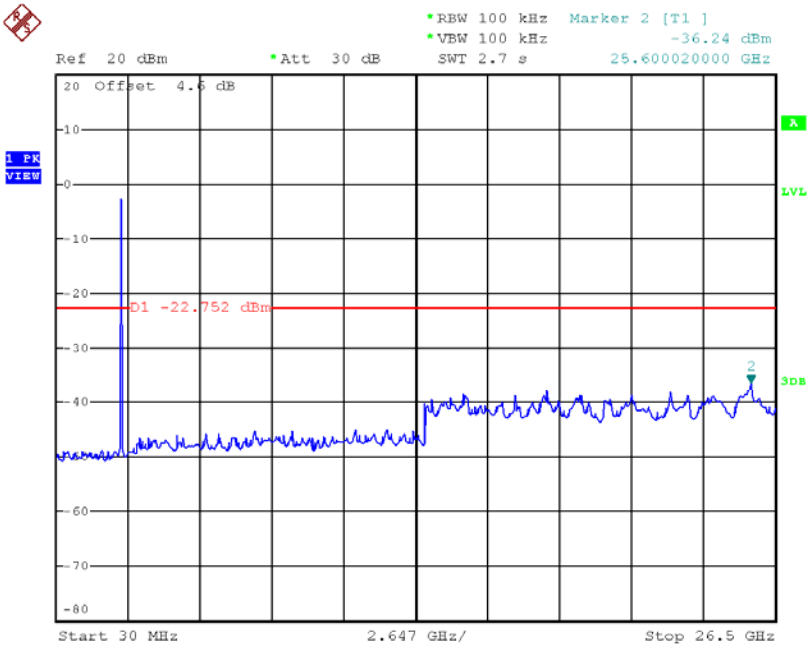
Date: 1.AUG.2016 14:47:12

CH00 (10 Harmonic of the frequency) _3Mbps



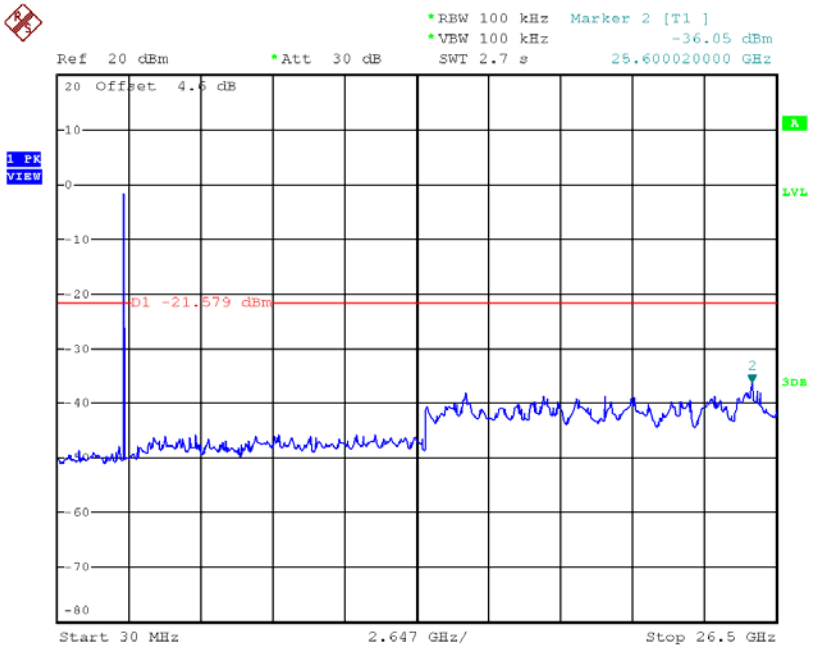
Date: 1.AUG.2016 14:40:30

CH39 (10 Harmonic of the frequency) _3Mbps



Date: 1.AUG.2016 14:41:07

CH78 (10 Harmonic of the frequency) _3Mbps



Date: 1.AUG.2016 14:43:00