FCC&IC Radio Test Report

FCC ID: SEP-CORE

IC: 20477-CORE

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

Project No.	:	1503C019
Equipment	:	Wireless Speaker System
Model Name	:	Core
Applicant for FCC	:	MASS FIDELITY
Address for FCC	:	326 Adeliade Street West suite 400 Toronto ON M5V 1R3 Canada
Applicant for IC	:	Mass Fidelity Inc.
Address for IC	:	326 Adeliade Street West Toronto ON M5V 1R3 Canada

Date of Receipt	:	Mar. 05, 2015
Date of Test	:	Mar. 05, 2015 ~ Jun. 25, 2015
Issued Date	:	Jun. 26, 2015
Tested by	:	BTL Inc.

Testing Engineer : (David Mao)

Technical Manager : (Leo Hung)

Authorized Signatory : (Steven Lu)

BTL INC.

No.3, Jinshagang 1st Road, Shixia, Dalang Town, Dongguan, Guangdong, China.

TEL: +86-769-8318-3000 FAX: +86-769-8319-6000

Declaration

BTL represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with the standards traceable to National Measurement Laboratory (**NML**) of **CHINA**, or National Institute of Standards and Technology (**NIST**) of **U.S.A.**

BTL's reports apply only to the specific samples tested under conditions. It is manufacture's responsibility to ensure that additional production units of this model are manufactured with the identical electrical and mechanical components. **BTL** shall have no liability for any declarations, inferences or generalizations drawn by the client or others from **BTL** issued reports.

BTL's report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

This report is the confidential property of the client. As a mutual protection to the clients, the public and **BTL-self**, extracts from the test report shall not be reproduced except in full with **BTL**'s authorized written approval.

BTL's laboratory quality assurance procedures are in compliance with the **ISO Guide 17025** requirements, and accredited by the conformity assessment authorities listed in this test report.

Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

Table of Contents Page

1 . CERTIFICATION 7

2 . SUMMARY OF TEST RESULTS 8

2.1 TEST FACILITY 9

2.2 MEASUREMENT UNCERTAINTY 9

3 . GENERAL INFORMATION 10

3.1 GENERAL DESCRIPTION OF EUT 10

3.2 DESCRIPTION OF TEST MODES 12

3.3 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING 12

3.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED 13

3.5 DESCRIPTION OF SUPPORT UNITS 14

4 . EMC EMISSION TEST 15

4.1 CONDUCTED EMISSION MEASUREMENT 15

4.1.1 POWER LINE CONDUCTED EMISSION LIMITS 15

4.1.2 TEST PROCEDURE 15

4.1.3 DEVIATION FROM TEST STANDARD 15

4.1.4 TEST SETUP 16

4.1.5 EUT OPERATING CONDITIONS 16

4.1.6 EUT TEST CONDITIONS 16

4.1.7 TEST RESULTS 16

4.2 RADIATED EMISSION MEASUREMENT 17

4.2.1 RADIATED EMISSION LIMITS 17

4.2.2 TEST PROCEDURE 18

4.2.3 DEVIATION FROM TEST STANDARD 18

4.2.4 TEST SETUP 19

4.2.5 EUT OPERATING CONDITIONS 20

4.2.6 EUT TEST CONDITIONS 20

4.2.7 TEST RESULTS (9KHZ TO 30MHZ) 20

4.2.8 TEST RESULTS (BETWEEN 30MHZ TO 1000 MHZ) 21

4.2.9 TEST RESULTS (ABOVE 1000 MHZ) 21

5 . NUMBER OF HOPPING CHANNEL 22

5.1 APPLIED PROCEDURES 22

5.1.1 TEST PROCEDURE 22

5.1.2 DEVIATION FROM STANDARD 22

5.1.3 TEST SETUP 22

5.1.4 EUT OPERATION CONDITIONS 22

5.1.5 EUT TEST CONDITIONS 22

5.1.6 TEST RESULTS 22

Table of Contents Page

6 . AVERAGE TIME OF OCCUPANCY 23
6.1 APPLIED PROCEDURES / LIMIT 23
6.1.1 TEST PROCEDURE 23
6.1.2 DEVIATION FROM STANDARD 23
6.1.3 TEST SETUP 23
6.1.4 EUT OPERATION CONDITIONS 24
6.1.5 EUT TEST CONDITIONS 24
6.1.6 TEST RESULTS 24
7 . HOPPING CHANNEL SEPARATION MEASUREMENT 25
7.1 APPLIED PROCEDURES / LIMIT 25
7.1.1 TEST PROCEDURE 25
7.1.2 DEVIATION FROM STANDARD 25
7.1.3 TEST SETUP 25
7.1.4 EUT TEST CONDITIONS 25
7.1.5 TEST RESULTS 25
8 . BANDWIDTH TEST 26
8.1 APPLIED PROCEDURES 26
8.1.1 TEST PROCEDURE 26
8.1.2 DEVIATION FROM STANDARD 26
8.1.3 TEST SETUP 26
8.1.4 EUT OPERATION CONDITIONS 26
8.1.5 EUT TEST CONDITIONS 26
8.1.6 TEST RESULTS 26
9 . PEAK OUTPUT POWER TEST 27
9.1 APPLIED PROCEDURES / LIMIT 27
9.1.1 TEST PROCEDURE 27
9.1.2 DEVIATION FROM STANDARD 27
9.1.3 TEST SETUP 27
9.1.4 EUT OPERATION CONDITIONS 27
9.1.5 EUT TEST CONDITIONS 27
9.1.6 TEST RESULTS 27
10 . ANTENNA CONDUCTED SPURIOUS EMISSION 28
10.1 APPLIED PROCEDURES / LIMIT 28
10.1.1 TEST PROCEDURE 28
10.1.2 DEVIATION FROM STANDARD 28
10.1.3 TEST SETUP 28
10.1.4 EUT OPERATION CONDITIONS 28
10.1.5 EUT TEST CONDITIONS 28
10.1.6 TEST RESULTS 28
11 . MEASUREMENT INSTRUMENTS LIST 29

Table of Contents Page

12 . EUT TEST PHOTO	31
ATTACHMENT A - CONDUCTED EMISSION	35
ATTACHMENT B - RADIATED EMISSION (9KHZ-30MHZ)	38
ATTACHMENT C - RADIATED EMISSION (30MHZ TO 1000MHZ)	40
ATTACHMENT D - RADIATED EMISSION (ABOVE 1000MHZ)	47
ATTACHMENT E - NUMBER OF HOPPING CHANNEL	72
ATTACHMENT F - AVERAGE TIME OF OCCUPANCY	74
ATTACHMENT G - HOPPING CHANNEL SEPARATION MEASUREMENT	87
ATTACHMENT H - BANDWIDTH	92
ATTACHMENT I - PEAK OUTPUT POWER	97
ATTACHMENT J - ANTENNA CONDUCTED SPURIOUS EMISSION	102

REPORT ISSUED HISTORY

Issued No.	Description	Issued Date
BTL-FICP-1-1503C019	Original Issue.	Jun. 26, 2015

1. CERTIFICATION

Equipment	:	Wireless Speaker System
Brand Name	:	massFIDELITY
Model Name	:	Core
Applicant for FCC	:	MASS FIDELITY
Applicant for IC	:	Mass Fidelity Inc.
Manufacturer for FCC	:	MASS FIDELITY
Address for FCC	:	326 Adeliade Street West suite 400 Toronto ON M5V 1R3 Canada
Manufacturer for IC	:	Mass Fidelity Inc.
Address for IC	:	326 Adeliade Street West Toronto ON M5V 1R3 Canada
Factory	:	ZHONG SHAN CITY LI TAI ELECTRONIC INSTUDRIAL CO.,LTD
Address	:	No.3 Industrial Park, Wuguishan Town, Zhongshan, Guangdong, China
Date of Test	:	Mar. 05, 2015 ~ Jun. 25, 2015
Test Sample	:	Engineering Sample
Standard(s)	:	FCC Part15, Subpart C: 2014 (15.247) / ANSI C63.10-2013 / FCC Public Notice DA 00-705, March 30, 2000. 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-1-1503C019) 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: 2014; 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)(1)	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) According to FCC Public Notice DA 00-705, March 30, 2000.

2.1 TEST FACILITY

The test facilities used to collect the test data in this report is at the location of No.3, Jinshagang 1st Road, Shixia, Dalang Town, Dongguan, Guangdong, China.
BTL's test firm number for FCC: 319330
BTL's test firm number for IC: 4428B-1

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)	Note
DG-C02	CISPR	150 KHz ~ 30MHz	1.94	

B. Radiated Measurement :

Test Site	Method	Measurement Frequency Range	Ant. H / V	U, (dB)	Note
DG-CB03	CISPR	9KHz~30MHz	V	3.79	
		9KHz~30MHz	H	3.57	
		30MHz ~ 200MHz	V	3.82	
		30MHz ~ 200MHz	H	3.60	
		200MHz ~ 1,000MHz	V	3.86	
		200MHz ~ 1,000MHz	H	3.94	
		1GHz~18GHz	V	3.12	
		1GHz~18GHz	H	3.68	
		18GHz~40GHz	V	4.15	
		18GHz~40GHz	H	4.14	

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

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Equipment	Wireless Speaker System	
Brand Name	massFIDELITY	
Model Name	Core	
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.	3.59 dBm(1Mbps) 3.70 dBm(3Mbps)
Power Source	DC Voltage supplied from AC/DC adapter. Brand/ Model: massFIDELITY/ ADS-65SI-19-2 18045G	
Power Rating	I/P: 100-240V~ 50/60Hz 1.5A max O/P: 18VDC 2.5A	

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.

2.

Channel List					
Channel	Frequency (MHz)	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	Model Name	Antenna Type	Connector	Gain (dBi)
1	N/A	N/A	PIFA	N/A	2.12

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

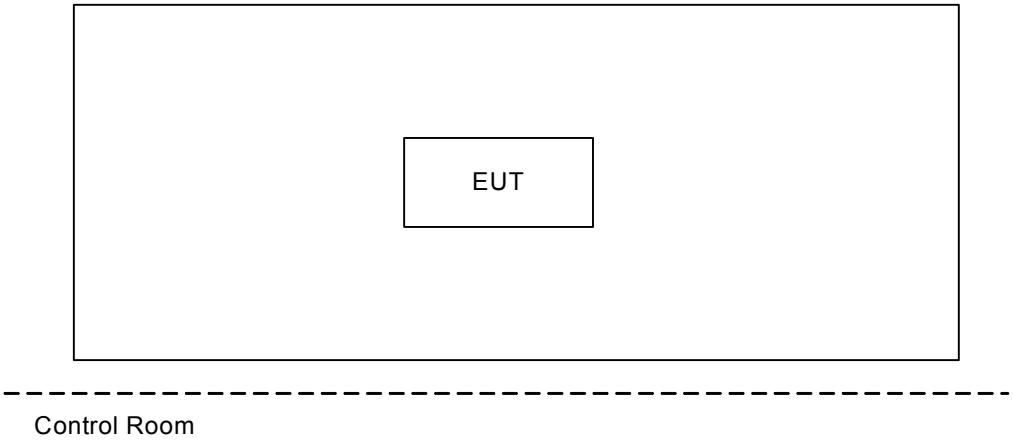
1Mbps

Test Software Version	CSR		
Frequency (MHz)	2402	2441	2480
Parameters	60	60	60

3Mbps

Test Software Version	CSR		
Frequency (MHz)	2402	2441	2480
Parameters	60	60	60

3.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



3.5 DESCRIPTION OF SUPPORT UNITS

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

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

Item	Shielded Type	Ferrite Core	Length	Note
-	-	-	-	

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	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

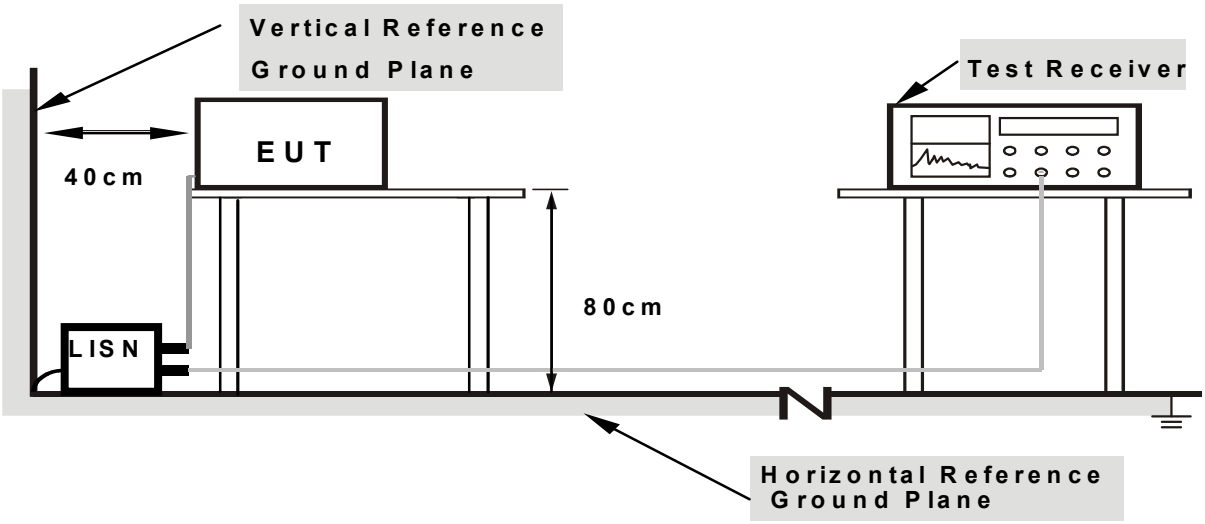
4.1.2 TEST PROCEDURE

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

4.1.3 DEVIATION FROM TEST STANDARD

No deviation

4.1.4 TEST SETUP



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

4.1.5 EUT OPERATING CONDITIONS

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

4.1.6 EUT TEST CONDITIONS

Temperature: 25°C
Relative Humidity: 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)

20dB in any 100 KHz bandwidth outside the operating frequency band. 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

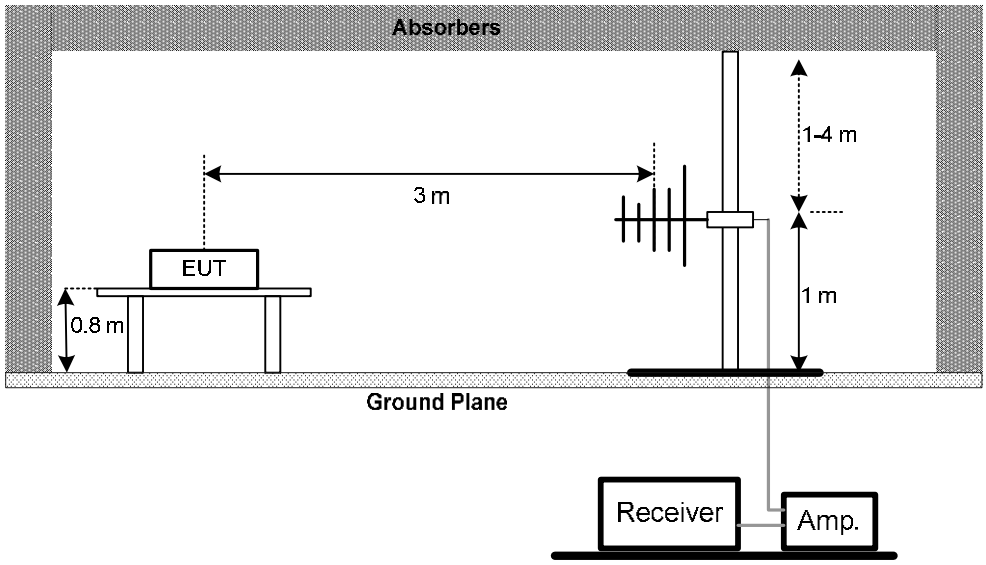
a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
b. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 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 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. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.2.3 DEVIATION FROM TEST STANDARD

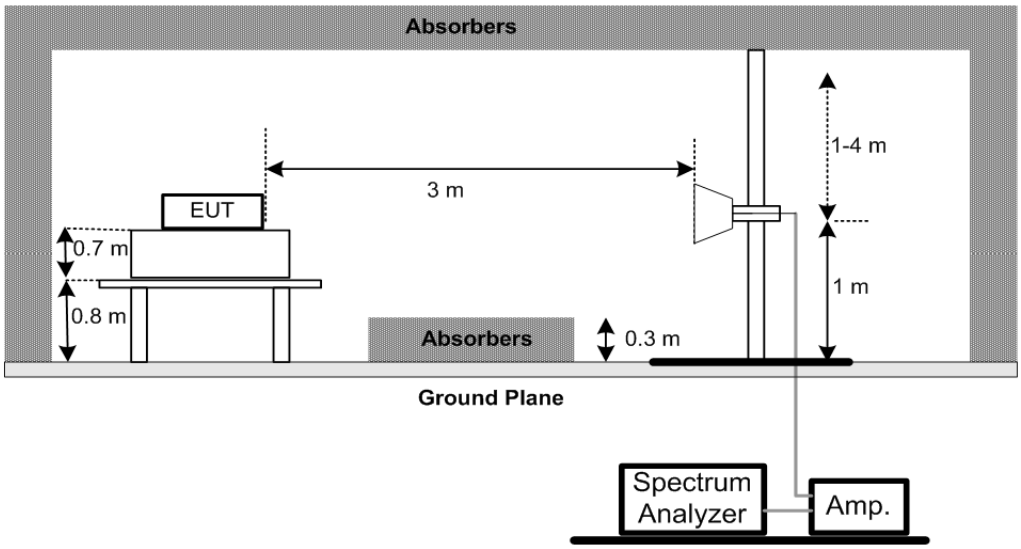
No deviation

4.2.4 TEST SETUP

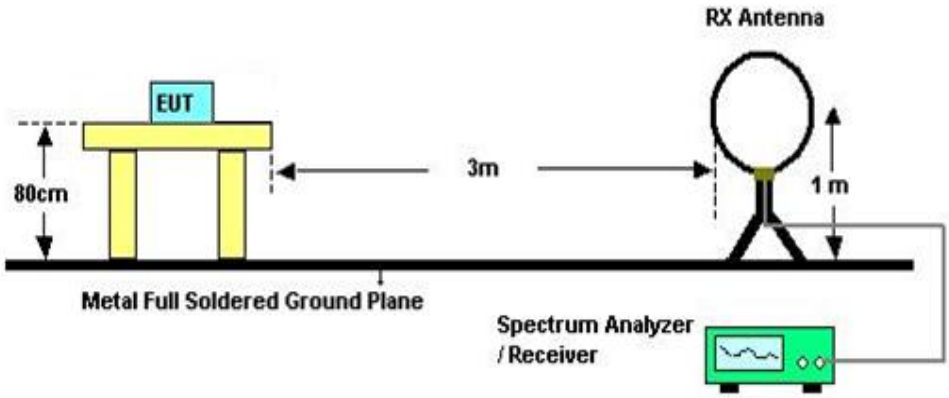
(A) Radiated Emission Test Set-Up Frequency Below 1 GHz



(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: 55%
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 (BETWEEN 30MHZ TO 1000 MHZ)

Please refer to the Attachment C.

Remark:

(1) Reading in which marked as QP or Peak means measurements by using are Quasi-Peak Mode or Peak Mode with Detector BW=120KHz; SPA setting in RBW=120KHz, VBW =120KHz, Swp. Time = 0.3 sec./MHz.

(2) 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.

(3) Measuring frequency range from 30MHz to 1000MHz.

(4) 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

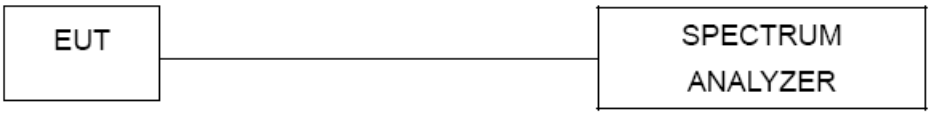
5.1.1 TEST PROCEDURE

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: 55%
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

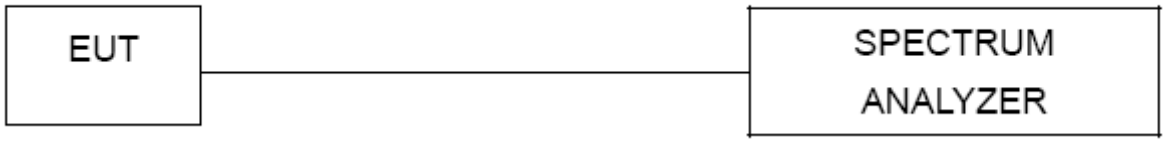
6.1.1 TEST PROCEDURE

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: 55%
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

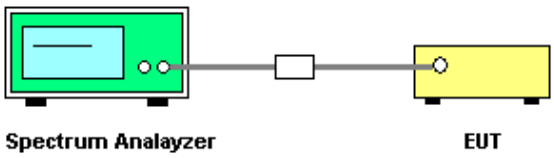
7.1.1 TEST PROCEDURE

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: 55%
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

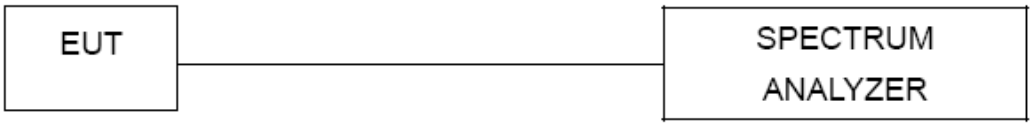
8.1.1 TEST PROCEDURE

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: 55%
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-GEN and 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

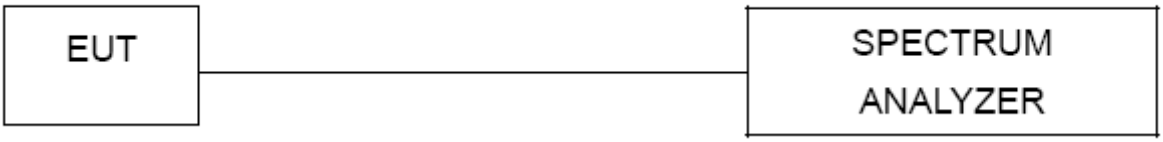
9.1.1 TEST PROCEDURE

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: 55%
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.

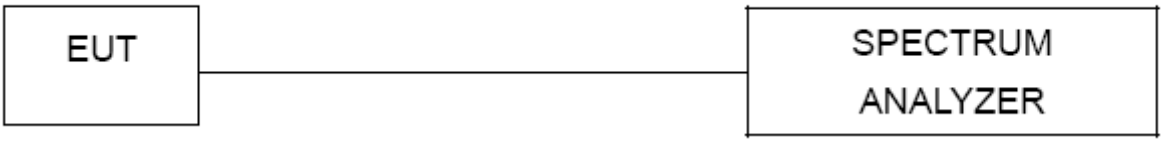
10.1.1 TEST PROCEDURE

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.

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: 55%
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	LISN	EMCO	3816/2	00052765	Mar. 28, 2016
2	LISN	R&S	ENV216	101447	Mar. 28, 2016
3	Test Cable	emci	RG223(9KHz-30MHz)	C_17	Mar. 13, 2016
4	EMI TEST RECEIVER	R&S	ESCS30	833364/017	Mar. 28, 2016
5	50Ω Terminator	SHX	TF2-3G-A	08122902	Mar. 28, 2016
6	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A

Radiated Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Antenna	Schwarbeck	VULB9160	9160-3232	Mar. 28, 2016
2	Amplifier	HP	8447D	2944A09673	Nov. 17, 2015
3	Receiver	AGILENT	N9038A	MY52130039	Sep. 30, 2015
4	Test Cable	emci	LMR-400(30MHz-1GHz)	C-01	Jul. 01, 2015
5	Controller	CT	SC100	N/A	N/A
6	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
7	Antenna	ETS	3115	00075789	Mar. 28, 2016
8	Amplifier	Agilent	8449B	3008A02274	Nov. 02, 2015
9	Receiver	AGILENT	N9038A	MY52130039	Sep. 30, 2015
10	Test Cable	emci	EMC104-SM-SM-10000(1GHz－26.5GHz)	C-68	Jul. 01, 2015
11	Controller	CT	SC100	N/A	N/A
12	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170319	Mar. 28, 2016
13	Microwave Preamplifier With Adaptor	EMC INSTRUMENT	EMC2654045	980039 & HA01	Mar. 28, 2016
14	Active Loop Antenna	R&S	HFH2-Z2	830749/020	Aug. 16, 2015

Number of Hopping Channel					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov. 02, 2015

Average Time of Occupancy					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov. 02, 2015

Hopping Channel Separation Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov. 02, 2015

Bandwidth					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov. 02, 2015

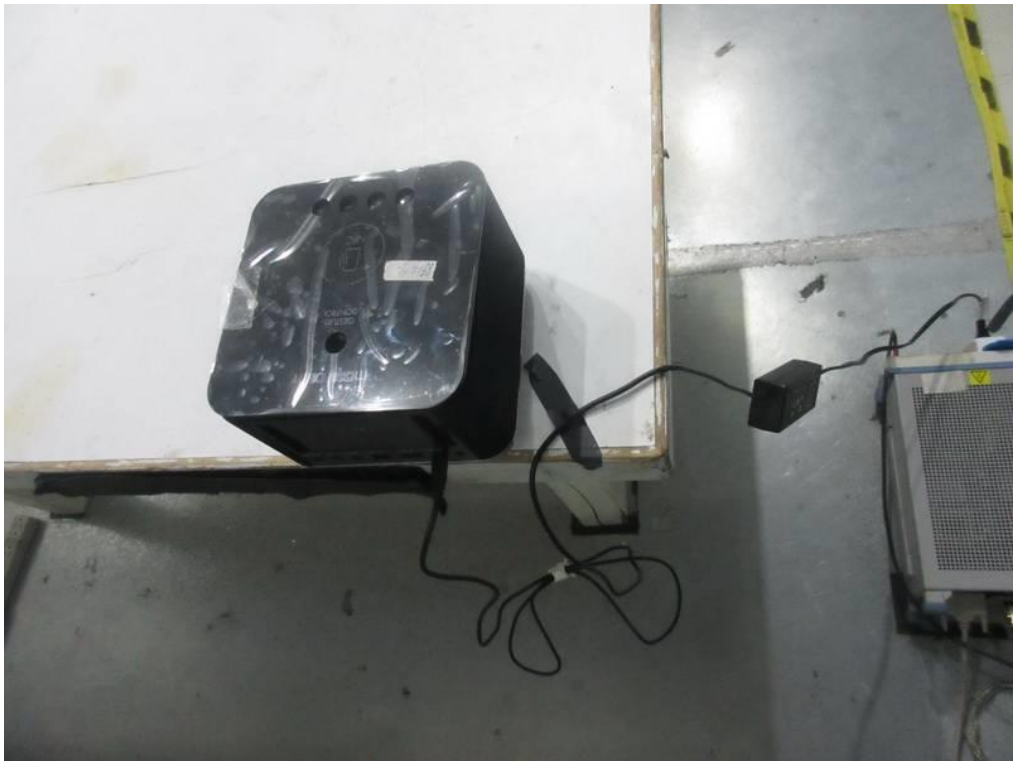
Peak Output Power					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov. 02, 2015

Antenna Conducted Spurious Emission					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov. 02, 2015

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

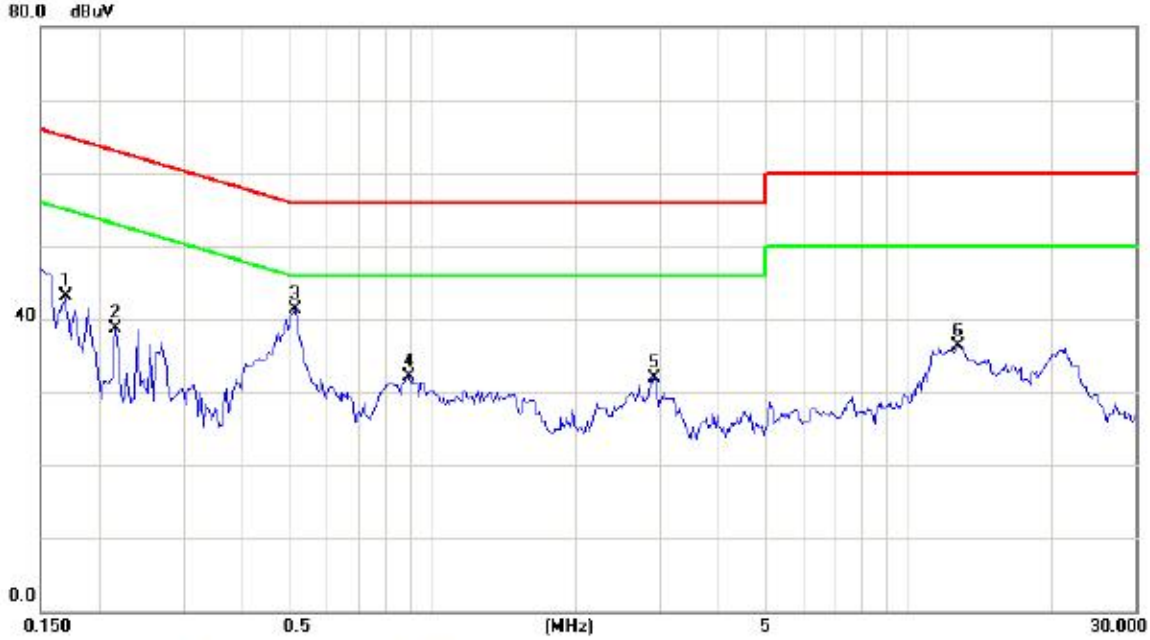
Test Mode:	TX Mode

Line

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1811	29.04	9.53	38.57	64.44	-25.87	peak	
2		0.2553	24.31	9.57	33.88	61.58	-27.70	peak	
3	*	0.5092	31.27	9.70	40.97	56.00	-15.03	peak	
4		0.8842	23.72	9.67	33.39	56.00	-22.61	peak	
5		1.7360	26.50	9.71	36.21	56.00	-19.79	peak	
6		2.8256	23.90	9.76	33.66	56.00	-22.34	peak	

Test Mode:	TX Mode

Neutral



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1695	33.41	9.62	43.03	64.98	-21.95	peak	
2		0.2164	29.09	9.61	38.70	62.96	-24.26	peak	
3	*	0.5131	31.66	9.64	41.30	56.00	-14.70	peak	
4		0.8921	22.39	9.67	32.06	56.00	-23.94	peak	
5		2.9350	22.19	9.78	31.97	56.00	-24.03	peak	
6		12.7030	26.06	10.20	36.26	60.00	-23.74	peak	

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

Test Mode:	TX Mode

Frequency (MHz)	Ant 0°/90°	Read level dBuV/m	Factor (dB)	Measured(FS) (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Note
0.0175	0°	62.75	24.30	87.05	122.74	-35.69	AVG
0.0175	0°	71.35	24.30	95.65	142.74	-47.09	PEAK
0.0253	0°	65.28	23.96	89.24	119.54	-30.30	AVG
0.0253	0°	73.15	23.96	97.11	139.54	-42.43	PEAK
0.0296	0°	63.56	23.69	87.25	118.18	-30.93	AVG
0.0296	0°	69.18	23.69	92.87	138.18	-45.31	PEAK
0.0331	0°	53.26	23.47	76.73	117.21	-40.48	AVG
0.0331	0°	63.48	23.47	86.95	137.21	-50.26	PEAK
0.5720	0°	22.62	20.03	42.65	72.46	-29.81	QP
1.7629	0°	21.75	19.52	41.27	69.54	-28.27	QP

Frequency (MHz)	Ant 0°/90°	Read level dBuV/m	Factor (dB)	Measured(FS) (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Note
0.0181	90°	69.18	24.30	93.48	122.45	-28.97	AVG
0.0181	90°	75.36	24.30	99.66	142.45	-42.79	PEAK
0.0257	90°	61.38	23.94	85.32	119.41	-34.09	AVG
0.0257	90°	68.45	23.94	92.39	139.41	-47.02	PEAK
0.0361	90°	65.35	23.28	88.63	116.45	-27.82	AVG
0.0361	90°	73.15	23.28	96.43	136.45	-40.02	PEAK
0.0432	90°	58.30	22.83	81.13	114.89	-33.76	AVG
0.0432	90°	66.75	22.83	89.58	134.89	-45.31	PEAK
0.4627	90°	18.55	19.89	38.44	94.30	-55.86	QP
1.7569	90°	22.95	19.52	42.47	69.54	-27.07	QP

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

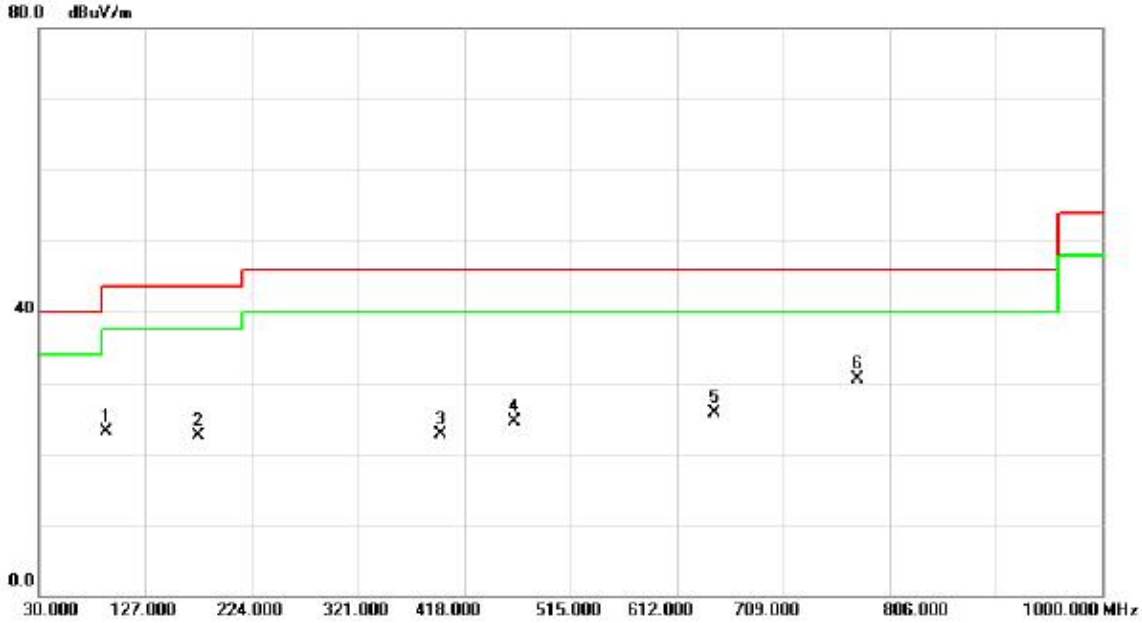
Test Mode:	TX 2402MHz _CH00_1Mbps

Vertical

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		78.5000	42.45	-17.17	25.28	40.00	-14.72	peak	
2		240.4900	36.16	-14.06	22.10	46.00	-23.90	peak	
3		450.9800	30.75	-8.70	22.05	46.00	-23.95	peak	
4		571.2600	34.51	-8.10	26.41	46.00	-19.59	peak	
5		663.4100	30.85	-5.13	25.72	46.00	-20.28	peak	
6	*	917.5500	32.95	-1.16	31.79	46.00	-14.21	peak	

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		91.1100	40.61	-17.59	23.02	43.50	-20.48	peak	
2		175.5000	35.42	-12.96	22.46	43.50	-21.04	peak	
3		396.6600	32.56	-9.82	22.74	46.00	-23.26	peak	
4		463.5900	33.63	-9.17	24.46	46.00	-21.54	peak	
5		646.9200	30.98	-5.37	25.61	46.00	-20.39	peak	
6	*	776.9000	34.17	-3.73	30.44	46.00	-15.56	peak	

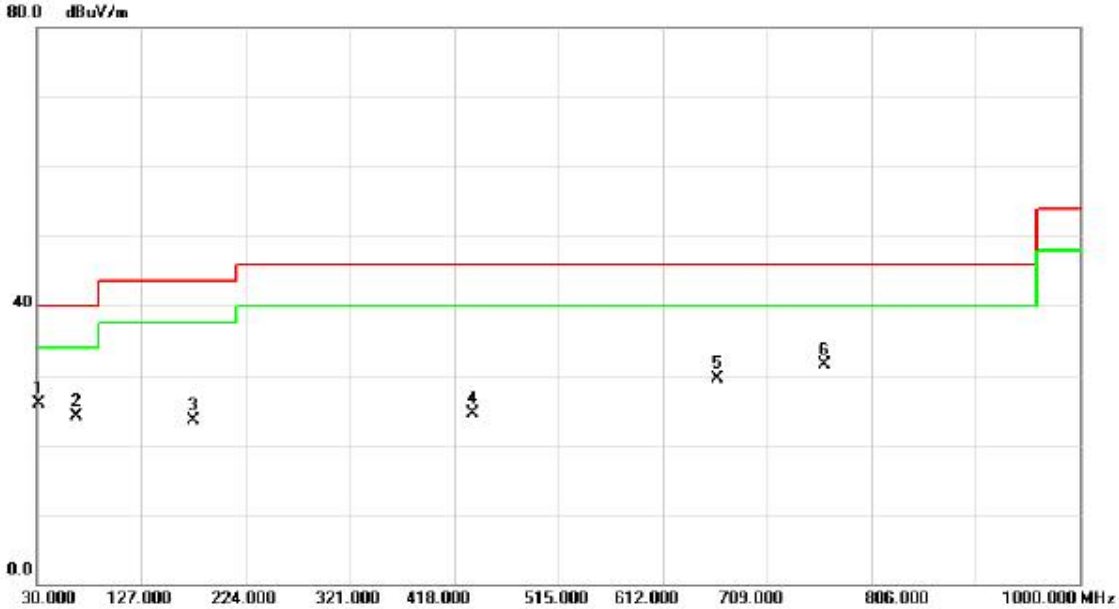
Test Mode:	TX 2441MHz _CH39_1Mbps

Vertical

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	30.0000	40.16	-15.79	24.37	40.00	-15.63	peak	
2		94.9900	42.09	-17.25	24.84	43.50	-18.66	peak	
3		170.6500	36.47	-12.78	23.69	43.50	-19.81	peak	
4		240.4900	38.16	-14.06	24.10	46.00	-21.90	peak	
5		357.8600	36.67	-11.47	25.20	46.00	-20.80	peak	
6		745.8600	34.99	-4.71	30.28	46.00	-15.72	peak	

Test Mode:	TX 2441MHz _CH39_1Mbps

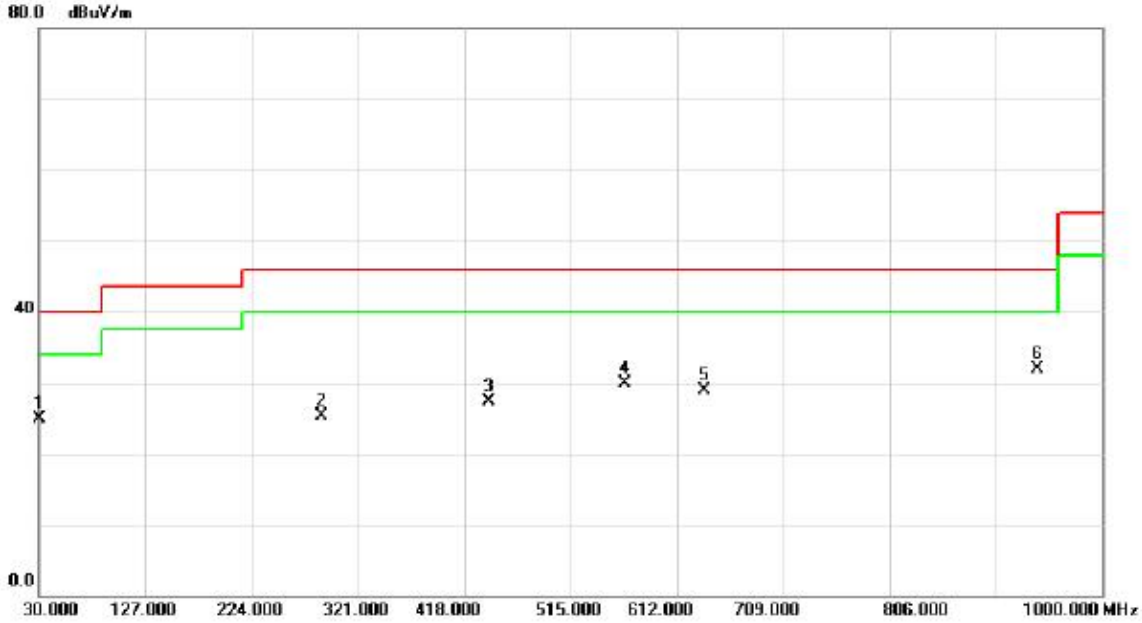
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	31.9400	41.45	-15.48	25.97	40.00	-14.03	peak	
2		66.8600	40.13	-15.98	24.15	40.00	-15.85	peak	
3		175.5000	36.42	-12.96	23.46	43.50	-20.04	peak	
4		435.4600	33.47	-8.95	24.52	46.00	-21.48	peak	
5		663.4100	34.63	-5.13	29.50	46.00	-16.50	peak	
6		762.3500	35.69	-4.24	31.45	46.00	-14.55	peak	

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		30.0000	40.66	-15.79	24.87	40.00	-15.13	peak	
2		288.0200	36.85	-11.46	25.39	46.00	-20.61	peak	
3		440.3100	36.10	-8.85	27.25	46.00	-18.75	peak	
4		564.4700	38.09	-8.10	29.99	46.00	-16.01	peak	
5		637.2200	34.85	-5.94	28.91	46.00	-17.09	peak	
6	*	940.8300	32.37	-0.54	31.83	46.00	-14.17	peak	

Test Mode:	TX 2480MHz _CH78_1Mbps

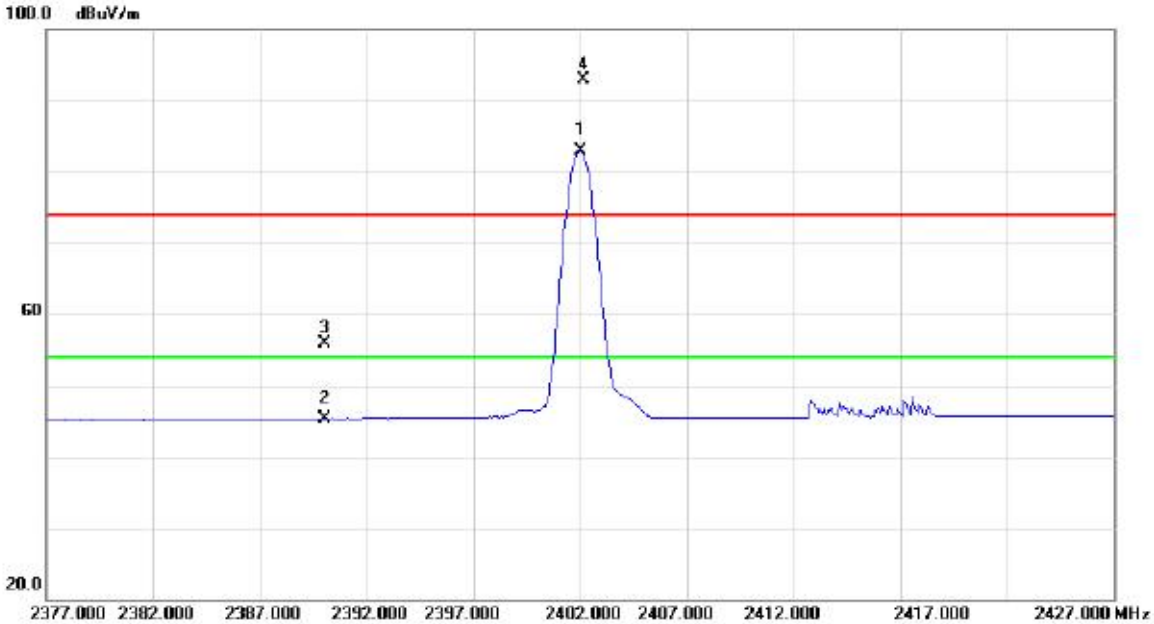
Horizontal

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		31.9400	37.95	-15.48	22.47	40.00	-17.53	peak	
2		175.5000	35.92	-12.96	22.96	43.50	-20.54	peak	
3		369.5000	34.60	-10.98	23.62	46.00	-22.38	peak	
4		549.9200	33.80	-8.10	25.70	46.00	-20.30	peak	
5		663.4100	34.13	-5.13	29.00	46.00	-17.00	peak	
6	*	935.9800	34.43	-0.67	33.76	46.00	-12.24	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	*	2402.000	49.54	33.41	82.95	54.00	28.95	AVG	NO LIMIT
2		2390.000	11.98	33.38	45.36	54.00	-8.64	AVG	
3		2390.000	22.61	33.38	55.99	74.00	-18.01	peak	
4	X	2402.200	59.59	33.41	93.00	74.00	19.00	peak	NO LIMIT

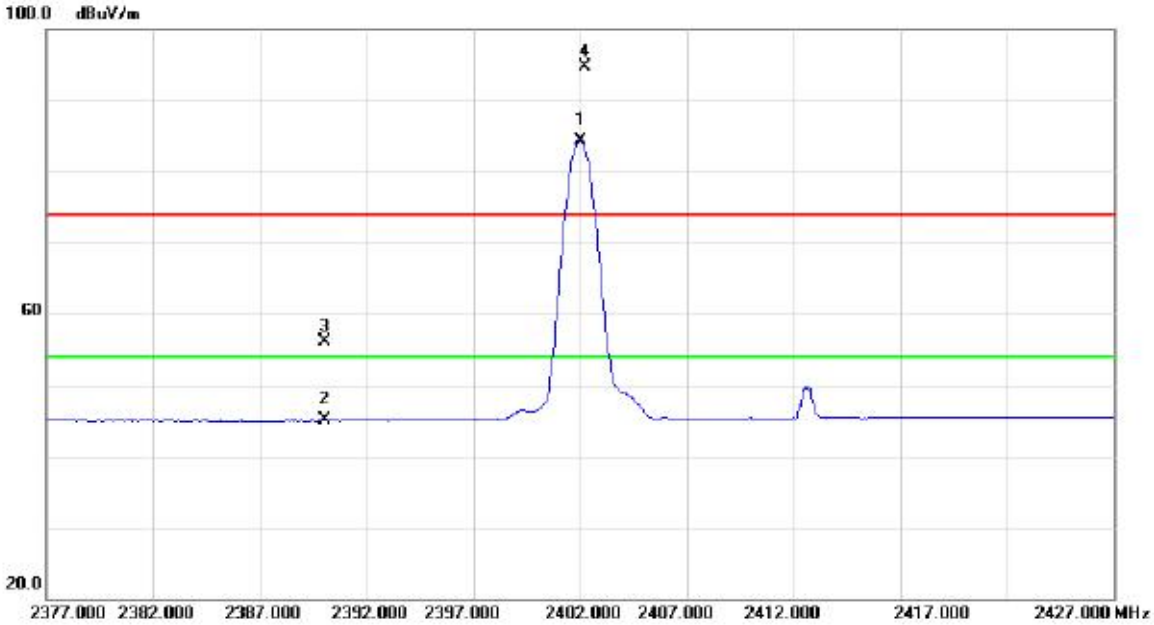
Orthogonal Axis :	X
Test Mode :	TX 2402MHz _CH00_1Mbps

Vertical

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4803.870	42.72	6.39	49.11	74.00	-24.89	peak	
2	*	4803.560	30.26	6.39	36.65	54.00	-17.35	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	*	2402.000	50.83	33.41	84.24	54.00	30.24	AVG	NO LIMIT
2		2390.000	11.64	33.38	45.02	54.00	-8.98	AVG	
3		2390.000	22.72	33.38	56.10	74.00	-17.90	peak	
4	X	2402.250	61.22	33.41	94.63	74.00	20.63	peak	NO LIMIT

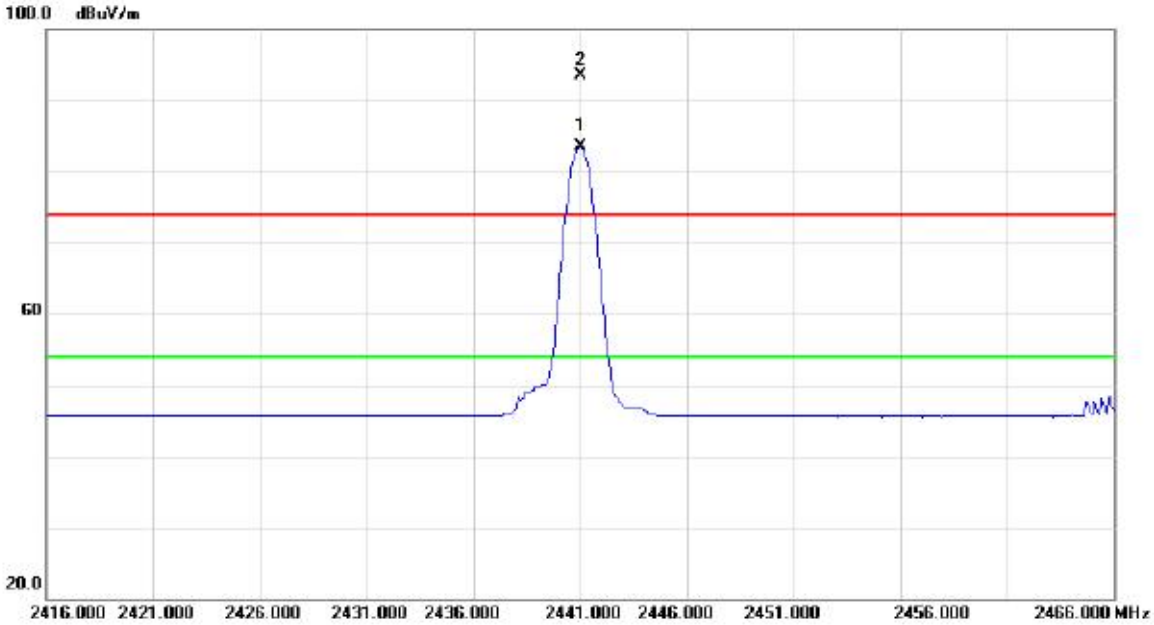
Orthogonal Axis :	X
Test Mode :	TX 2402MHz _CH00_1Mbps

Horizontal

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4803.930	28.92	6.39	35.31	54.00	-18.69	AVG	
2		4804.350	39.69	6.39	46.08	74.00	-27.92	peak	

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	49.99	33.51	83.50	54.00	29.50	AVG	NO LIMIT
2	X	2441.000	59.92	33.51	93.43	74.00	19.43	peak	NO LIMIT

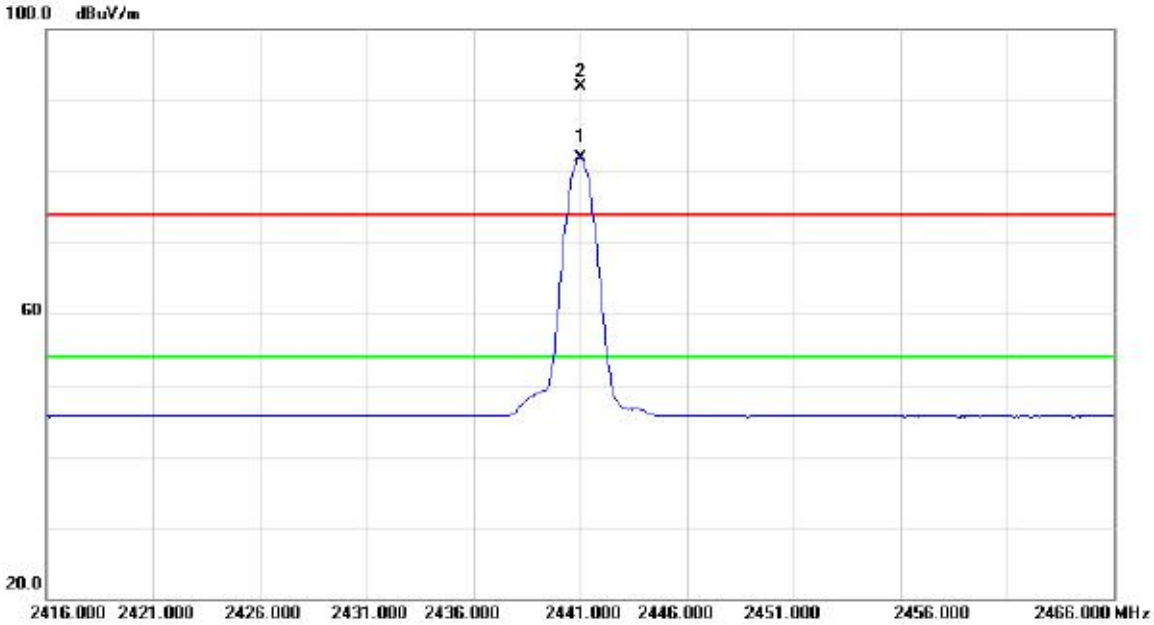
Orthogonal Axis :	X
Test Mode :	TX 2441MHz _CH39_1Mbps

Vertical

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4881.725	42.68	6.57	49.25	74.00	-24.75	peak	
2	*	4881.762	33.72	6.57	40.29	54.00	-13.71	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	48.46	33.51	81.97	54.00	27.97	AVG	NO LIMIT
2	X	2441.000	58.41	33.51	91.92	74.00	17.92	peak	NO LIMIT

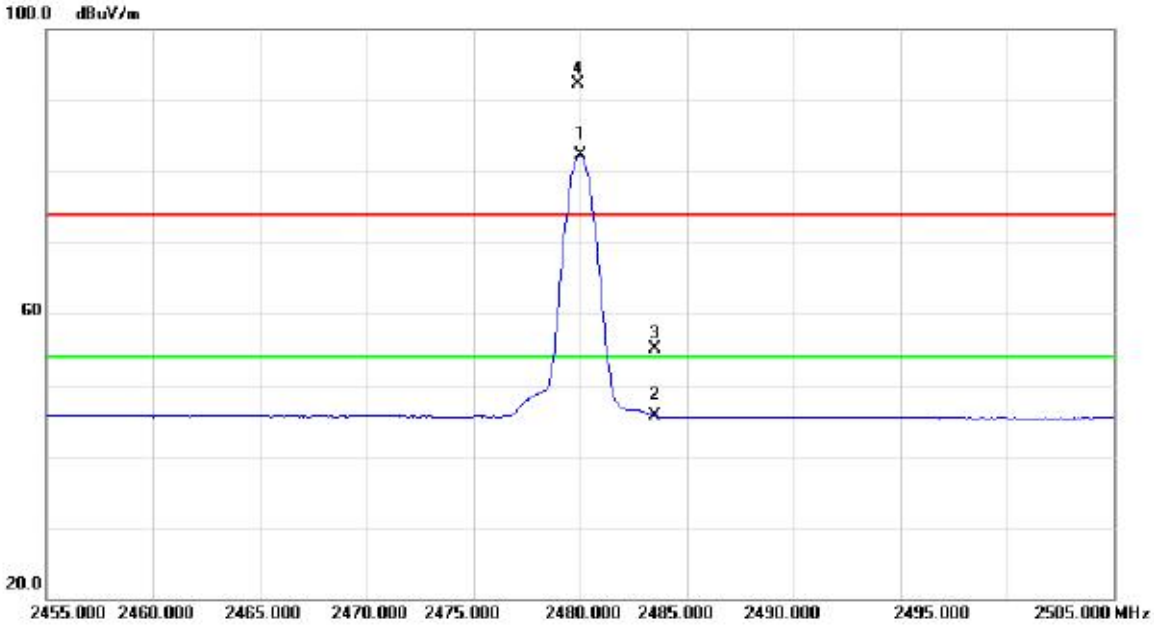
Orthogonal Axis :	X
Test Mode :	TX 2441MHz _CH39_1Mbps

Horizontal

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4881.880	28.23	6.57	34.80	54.00	-19.20	AVG	
2		4882.100	40.06	6.57	46.63	74.00	-27.37	peak	

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	48.68	33.61	82.29	54.00	28.29	AVG	NO LIMIT
2		2483.500	12.00	33.62	45.62	54.00	-8.38	AVG	
3		2483.500	21.48	33.62	55.10	74.00	-18.90	peak	
4	X	2479.900	58.69	33.61	92.30	74.00	18.30	peak	NO LIMIT

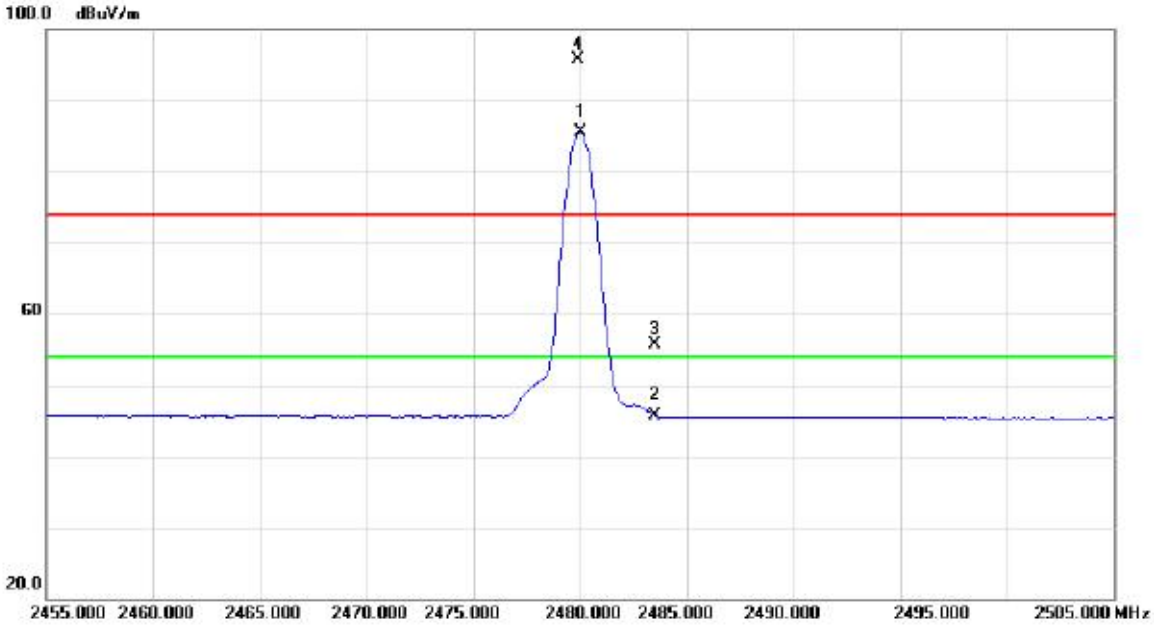
Orthogonal Axis :	X
Test Mode :	TX 2480MHz _CH78_1Mbps

Vertical

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4959.931	43.53	6.74	50.27	74.00	-23.73	peak	
2	*	4959.770	31.61	6.74	38.35	54.00	-15.65	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	51.89	33.61	85.50	54.00	31.50	AVG	NO LIMIT
2		2483.500	12.12	33.62	45.74	54.00	-8.26	AVG	
3		2483.500	22.15	33.62	55.77	74.00	-18.23	peak	
4	X	2479.900	62.04	33.61	95.65	74.00	21.65	peak	NO LIMIT

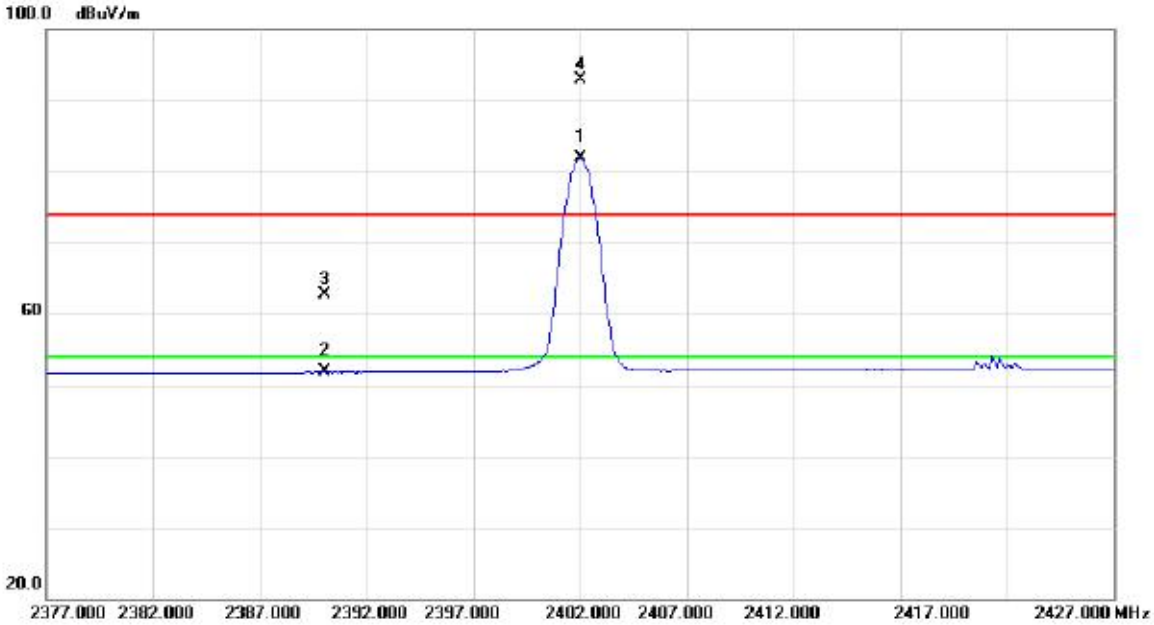
Orthogonal Axis :	X
Test Mode :	TX 2480MHz _CH78_1Mbps

Horizontal

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4959.910	27.37	6.74	34.11	54.00	-19.89	AVG	
2		4960.030	37.64	6.74	44.38	74.00	-29.62	peak	

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	*	2402.000	48.43	33.41	81.84	54.00	27.84	AVG	NO LIMIT
2		2390.000	18.43	33.38	51.81	54.00	-2.19	AVG	
3		2390.000	29.35	33.38	62.73	74.00	-11.27	peak	
4	X	2402.050	59.57	33.41	92.98	74.00	18.98	peak	NO LIMIT

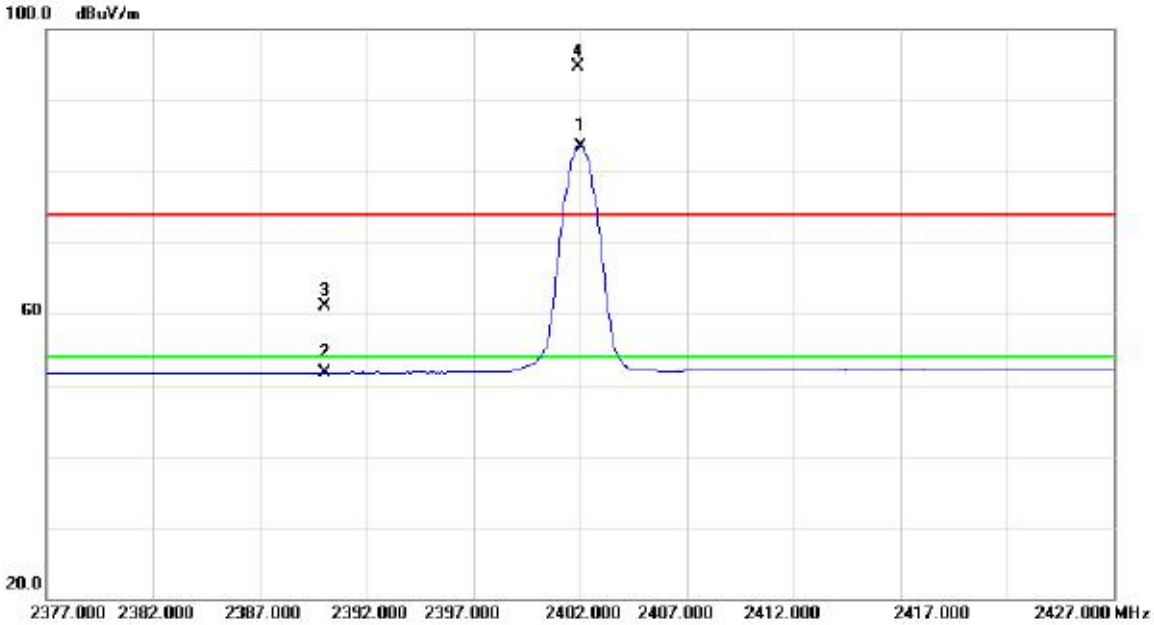
Orthogonal Axis :	X
Test Mode :	TX 2402MHz _CH00_3Mbps

Vertical

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4803.947	38.36	6.39	44.75	74.00	-29.25	peak	
2	*	4804.743	27.83	6.39	34.22	54.00	-19.78	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	*	2402.000	50.10	33.41	83.51	54.00	29.51	AVG	NO LIMIT
2		2390.000	18.33	33.38	51.71	54.00	-2.29	AVG	
3		2390.000	27.65	33.38	61.03	74.00	-12.97	peak	
4	X	2401.900	61.31	33.41	94.72	74.00	20.72	peak	NO LIMIT

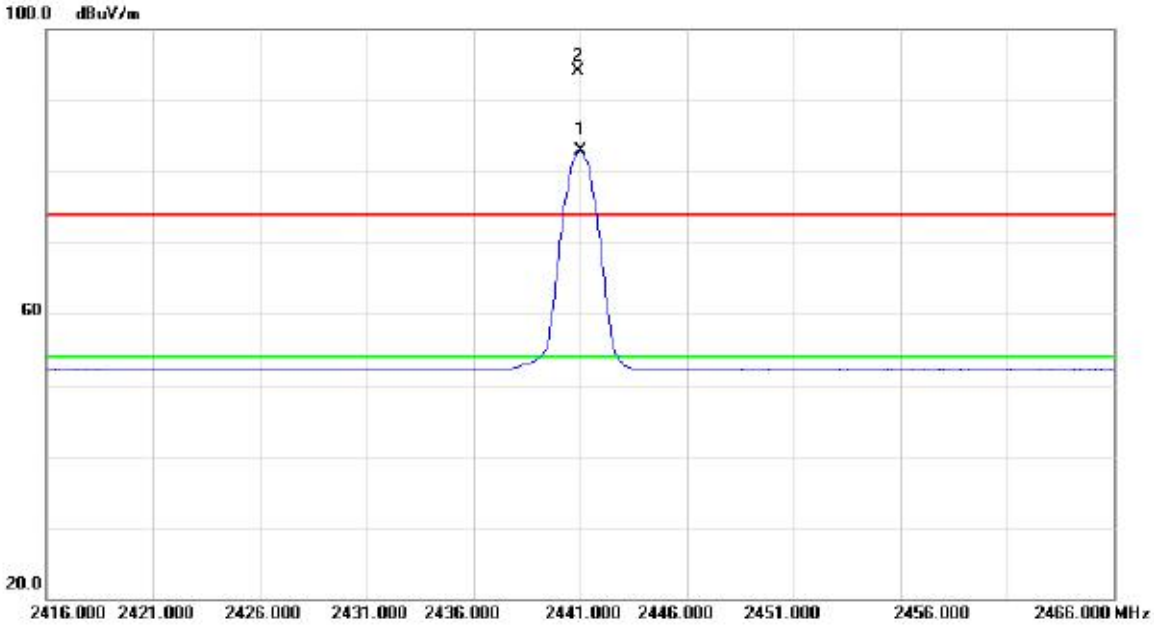
Orthogonal Axis :	X
Test Mode :	TX 2402MHz _CH00_3Mbps

Horizontal

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4804.437	27.33	6.39	33.72	54.00	-20.28	AVG	
2		4804.040	38.36	6.39	44.75	74.00	-29.25	peak	

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	49.33	33.51	82.84	54.00	28.84	AVG	NO LIMIT
2	X	2440.900	60.58	33.51	94.09	74.00	20.09	peak	NO LIMIT

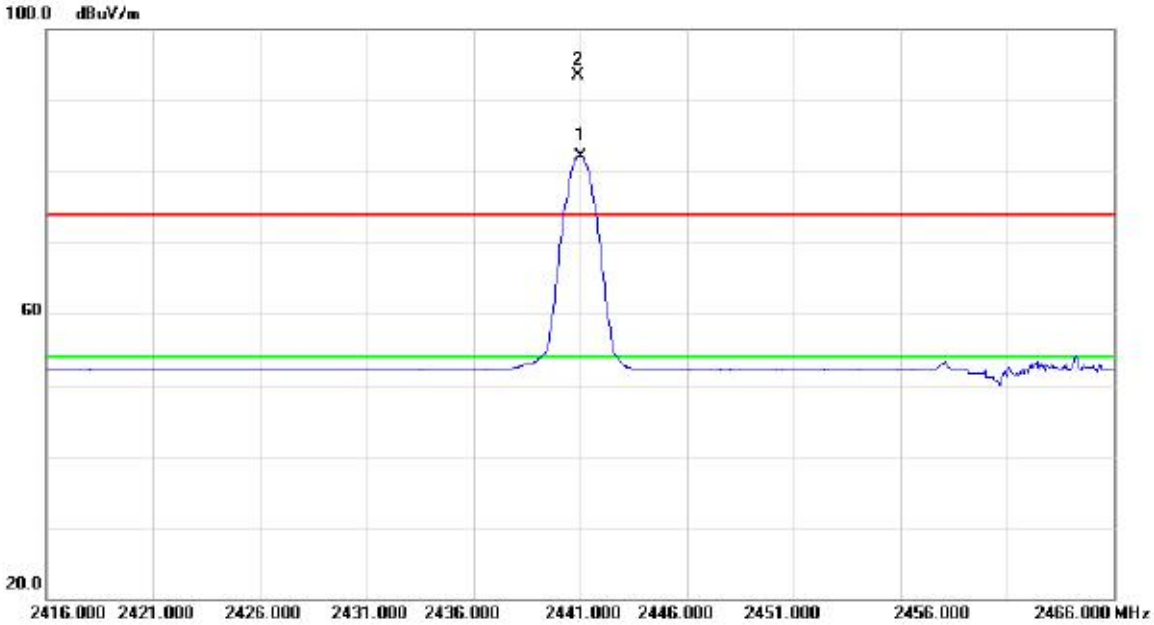
Orthogonal Axis :	X
Test Mode :	TX 2441MHz _CH39_3Mbps

Vertical

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4881.910	40.46	6.57	47.03	74.00	-26.97	peak	
2	*	4881.910	28.63	6.57	35.20	54.00	-18.80	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	48.66	33.51	82.17	54.00	28.17	AVG	NO LIMIT
2	X	2440.900	59.90	33.51	93.41	74.00	19.41	peak	NO LIMIT

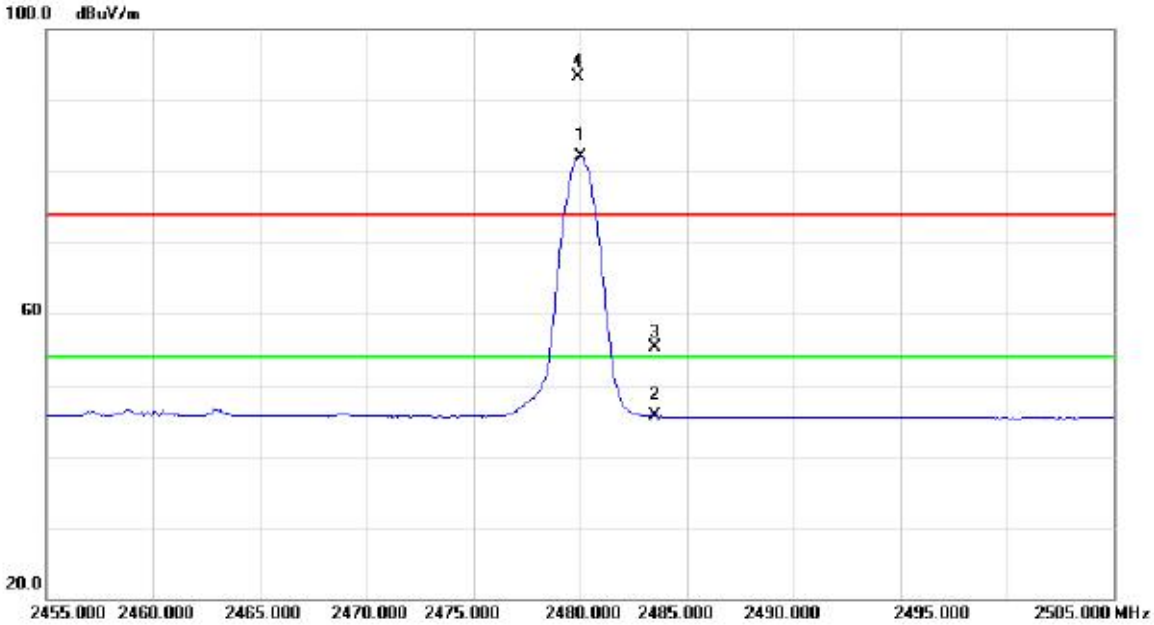
Orthogonal Axis :	X
Test Mode :	TX 2441MHz _CH39_3Mbps

Horizontal

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4882.735	27.83	6.57	34.40	54.00	-19.60	AVG	
2		4882.376	37.37	6.57	43.94	74.00	-30.06	peak	

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	48.49	33.61	82.10	54.00	28.10	AVG	NO LIMIT
2		2483.500	11.99	33.62	45.61	54.00	-8.39	AVG	
3		2483.500	21.69	33.62	55.31	74.00	-18.69	peak	
4	X	2479.900	59.75	33.61	93.36	74.00	19.36	peak	NO LIMIT

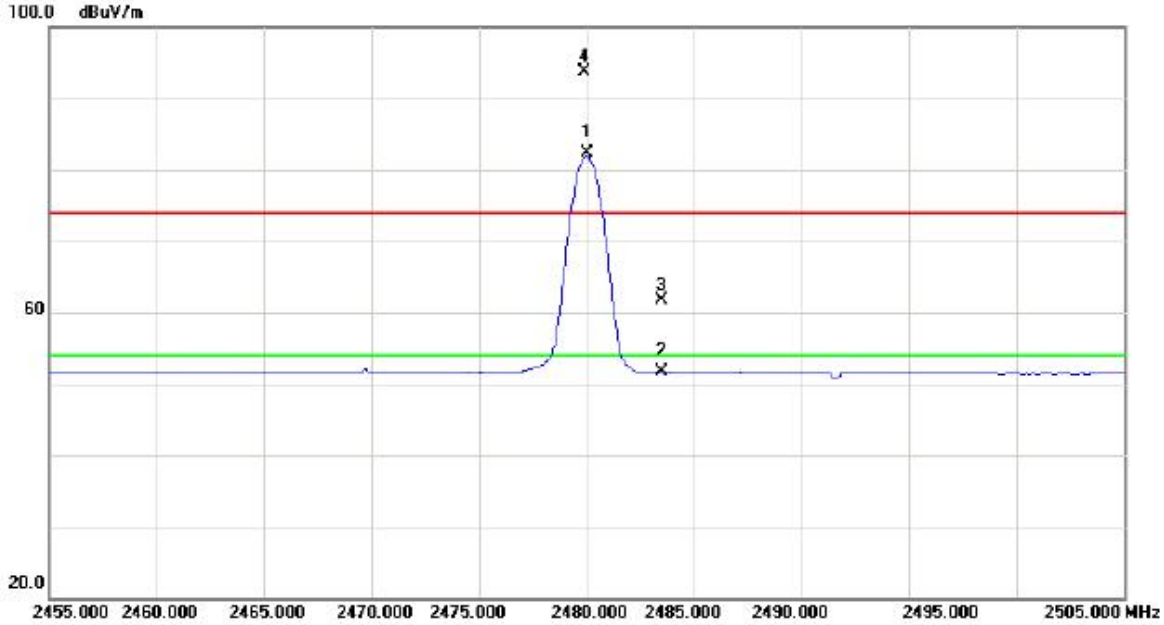
Orthogonal Axis :	X
Test Mode :	TX 2480MHz _CH78_3Mbps

Vertical

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4959.970	27.67	6.74	34.41	54.00	-19.59	AVG	
2		4959.980	38.68	6.74	45.42	74.00	-28.58	peak	

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	48.75	33.61	82.36	54.00	28.36	AVG	NO LIMIT
2		2483.500	18.11	33.62	51.73	54.00	-2.27	AVG	
3		2483.500	28.07	33.62	61.69	74.00	-12.31	peak	
4	X	2479.900	60.07	33.61	93.68	74.00	19.68	peak	NO LIMIT

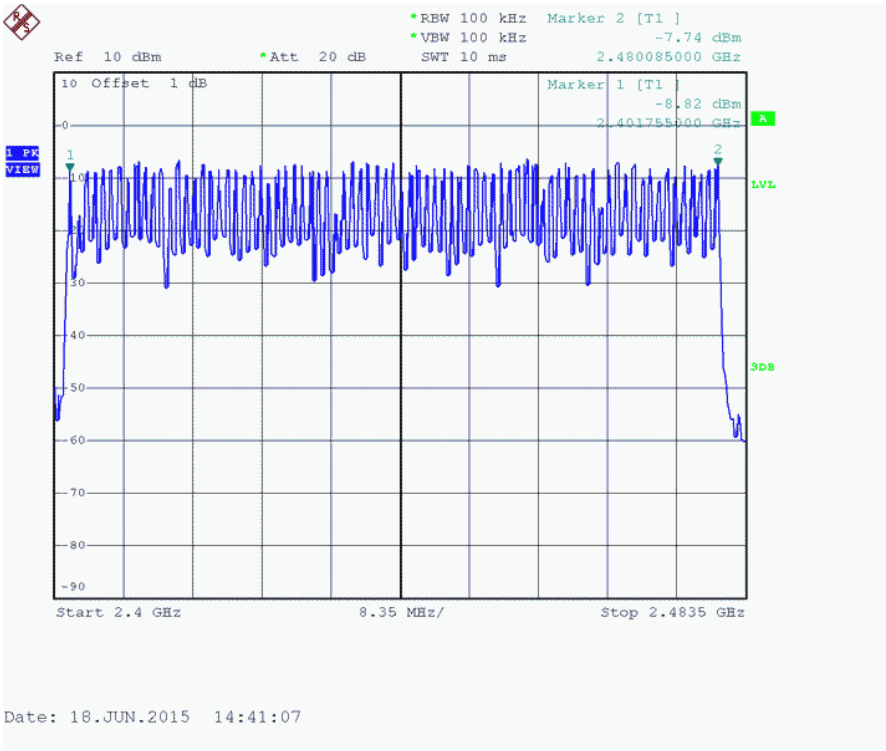
Orthogonal Axis :	X
Test Mode :	TX 2480MHz _CH78_3Mbps

Horizontal

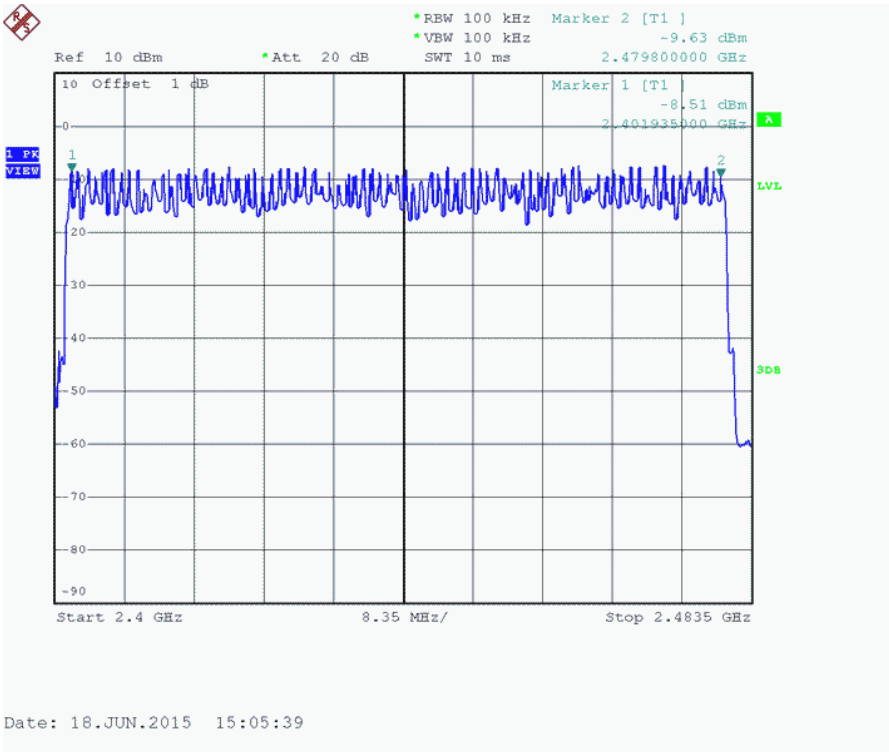
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4959.697	28.30	6.74	35.04	54.00	-18.96	AVG	
2		4960.272	37.38	6.74	44.12	74.00	-29.88	peak	

ATTACHMENT E - NUMBER OF HOPPING CHANNEL

Test Mode	Hopping Mode_1Mbps
Number of Hopping Channel	79



Test Mode	Hopping Mode_3Mbps
Number of Hopping Channel	79

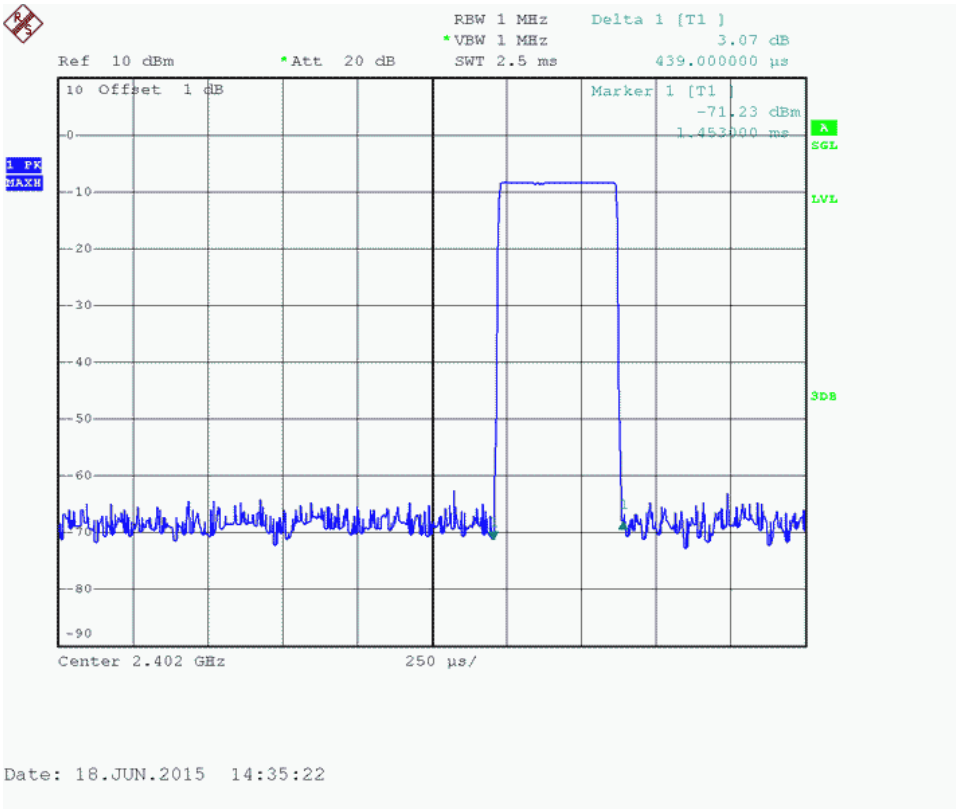


ATTACHMENT F - AVERAGE TIME OF OCCUPANCY

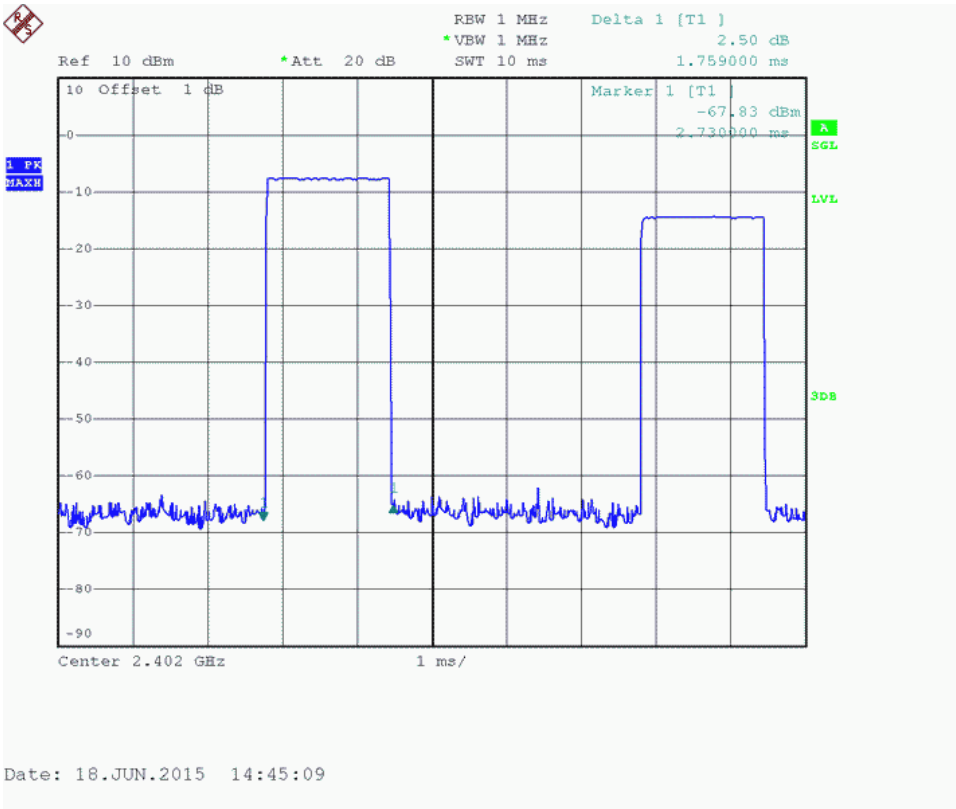
Test Mode :	TX Mode_1Mbps

Data Packet	Frequency (MHz)	Pulse Duration (ms)	Dwell Time (s)	Limits (s)	Test Result
DH5	2402	3.1190	0.3327	0.4000	Complies
DH3	2402	1.7590	0.2814	0.4000	Complies
DH1	2402	0.4390	0.1405	0.4000	Complies
DH5	2441	3.0380	0.3241	0.4000	Complies
DH3	2441	1.7390	0.2782	0.4000	Complies
DH1	2441	0.4490	0.1437	0.4000	Complies
DH5	2480	3.1180	0.3326	0.4000	Complies
DH3	2480	1.8000	0.2880	0.4000	Complies
DH1	2480	0.4490	0.1437	0.4000	Complies

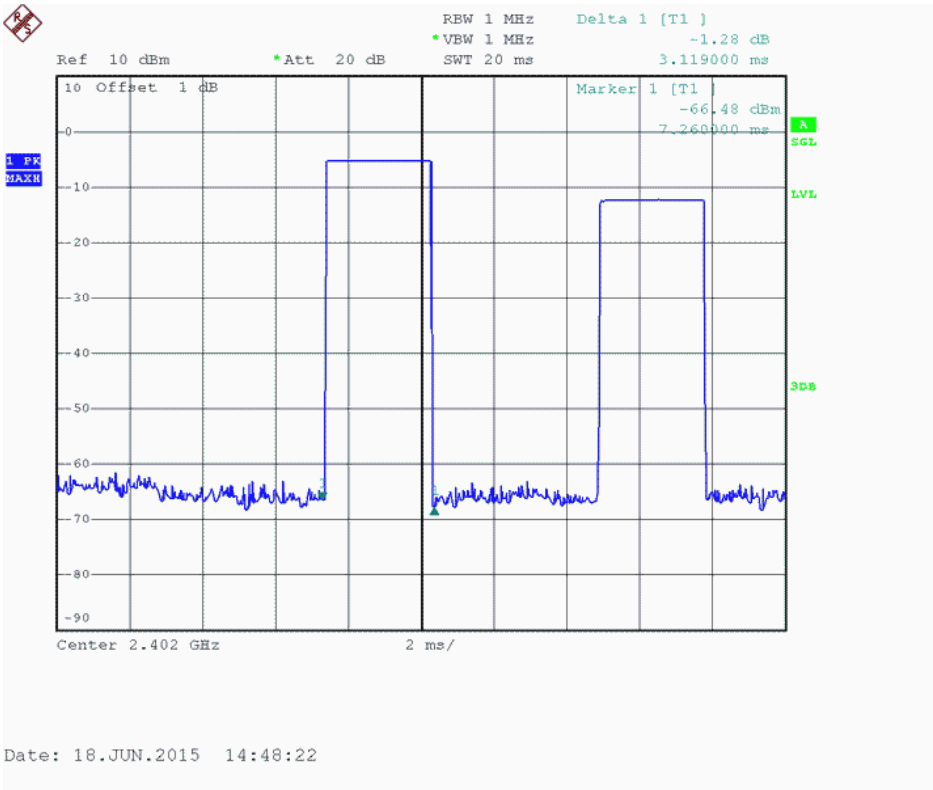
CH00-DH1



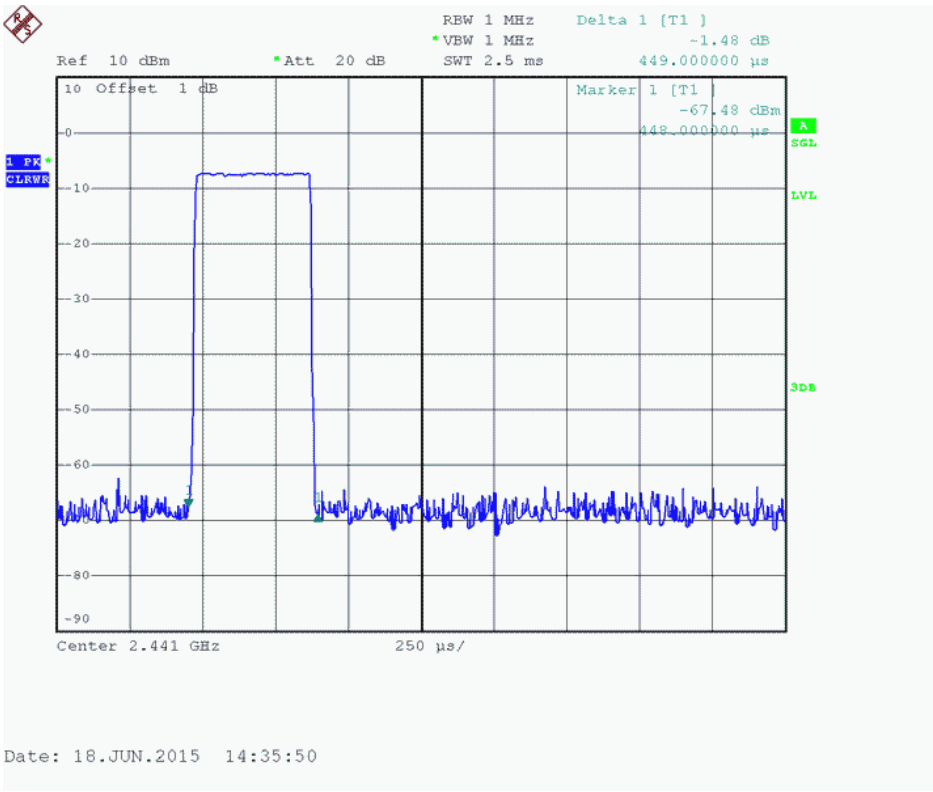
CH00-DH3



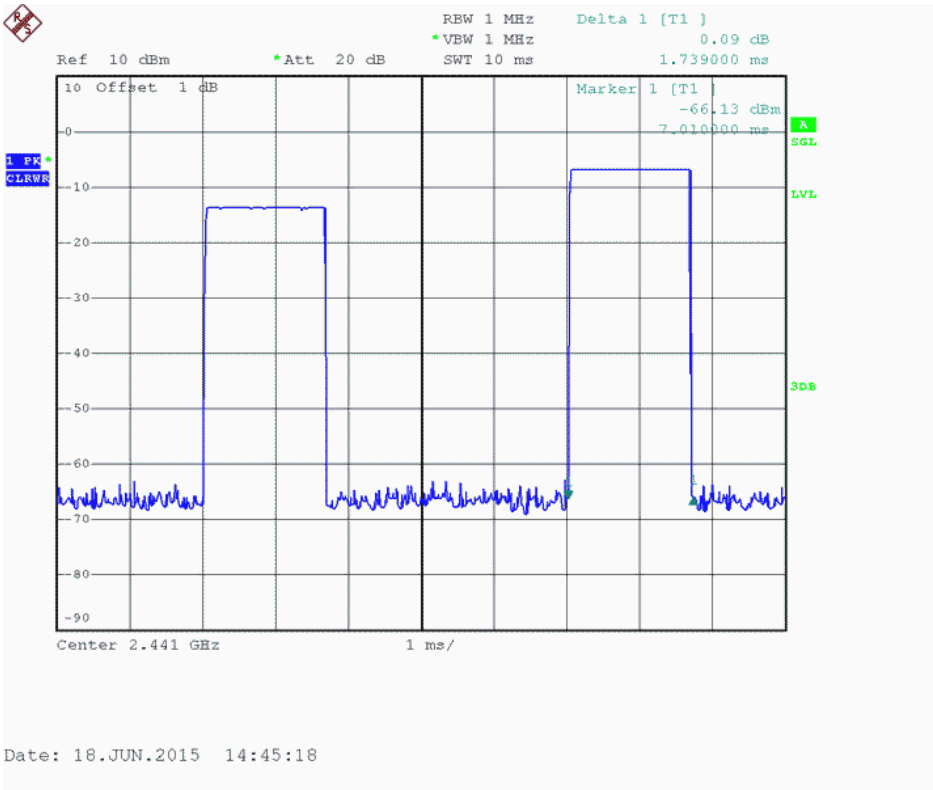
CH00-DH5



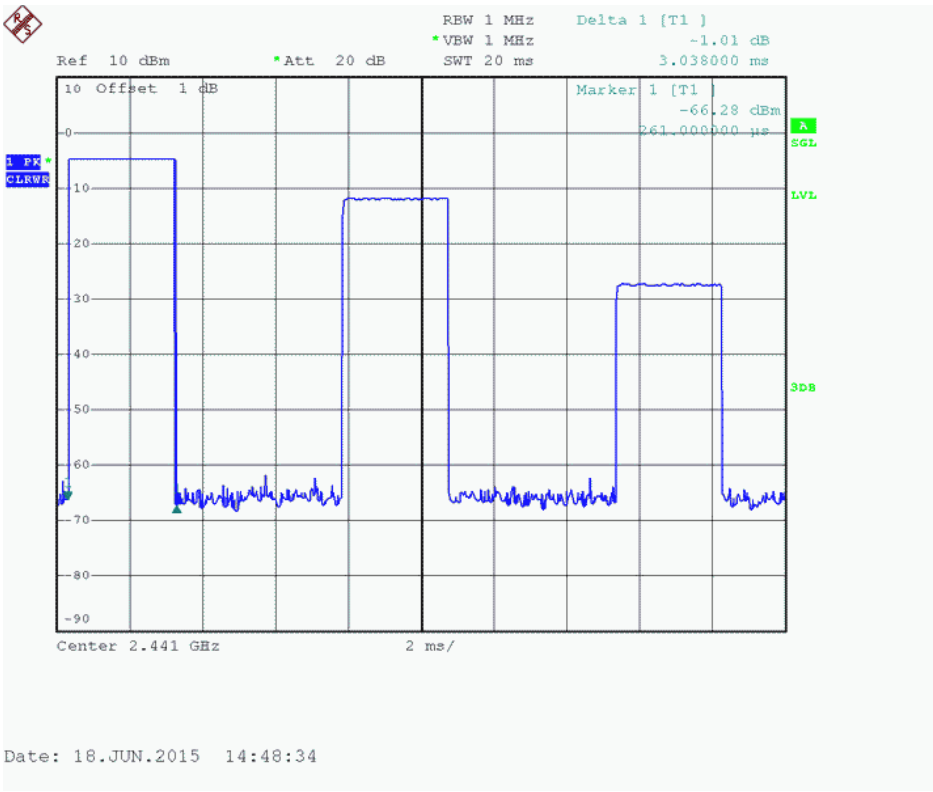
CH39-DH1



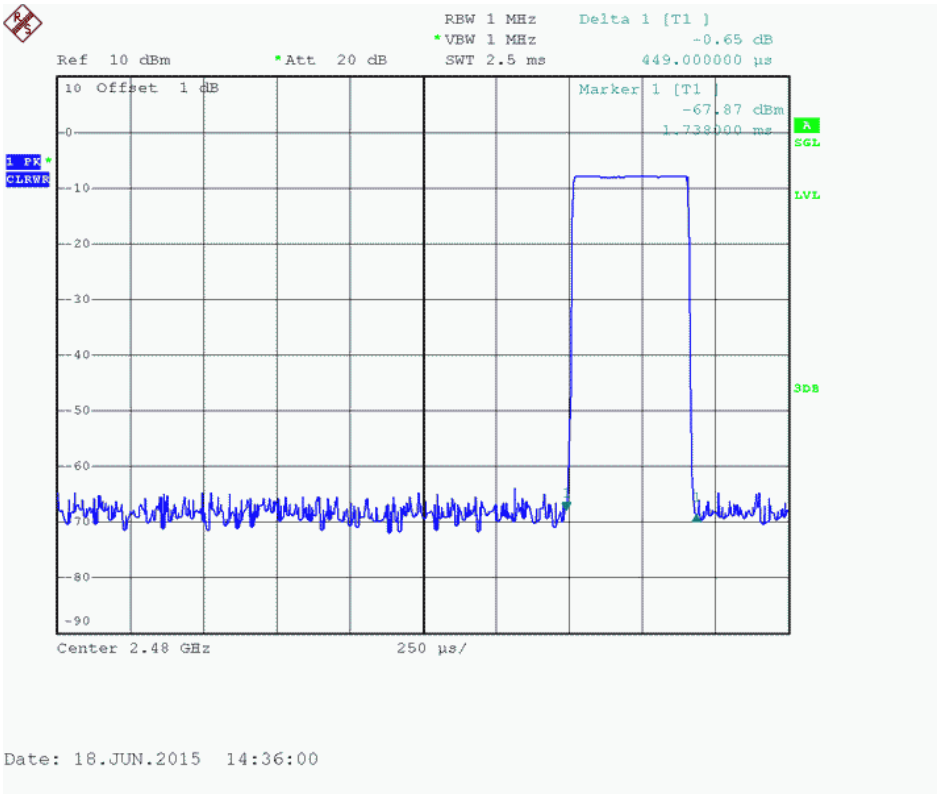
CH39-DH3



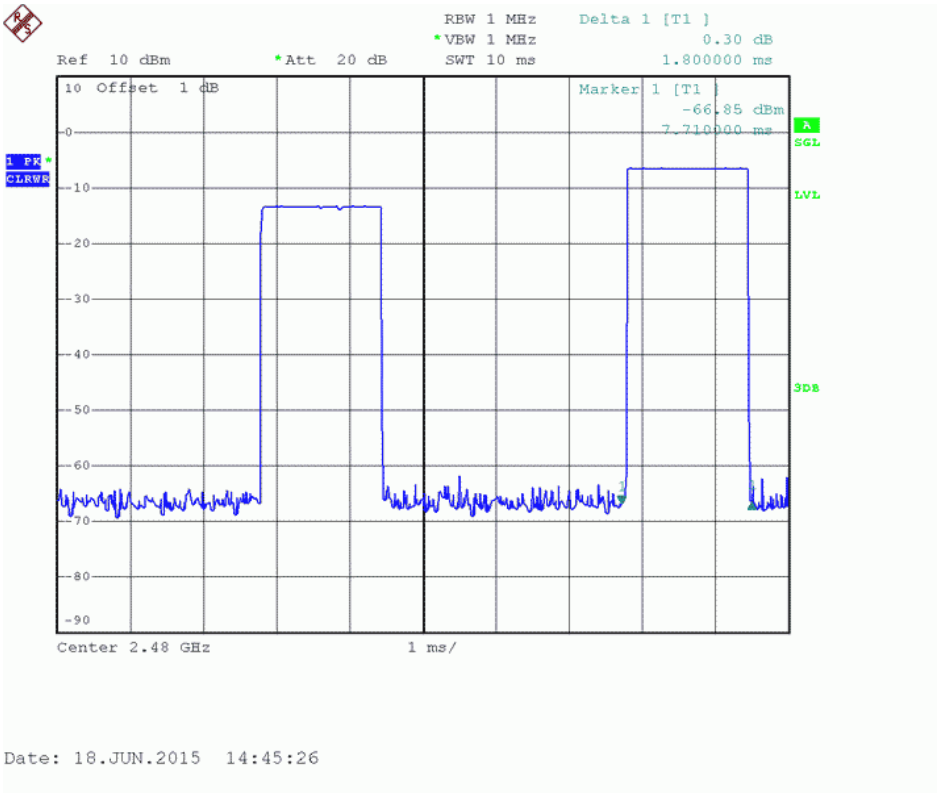
CH39-DH5



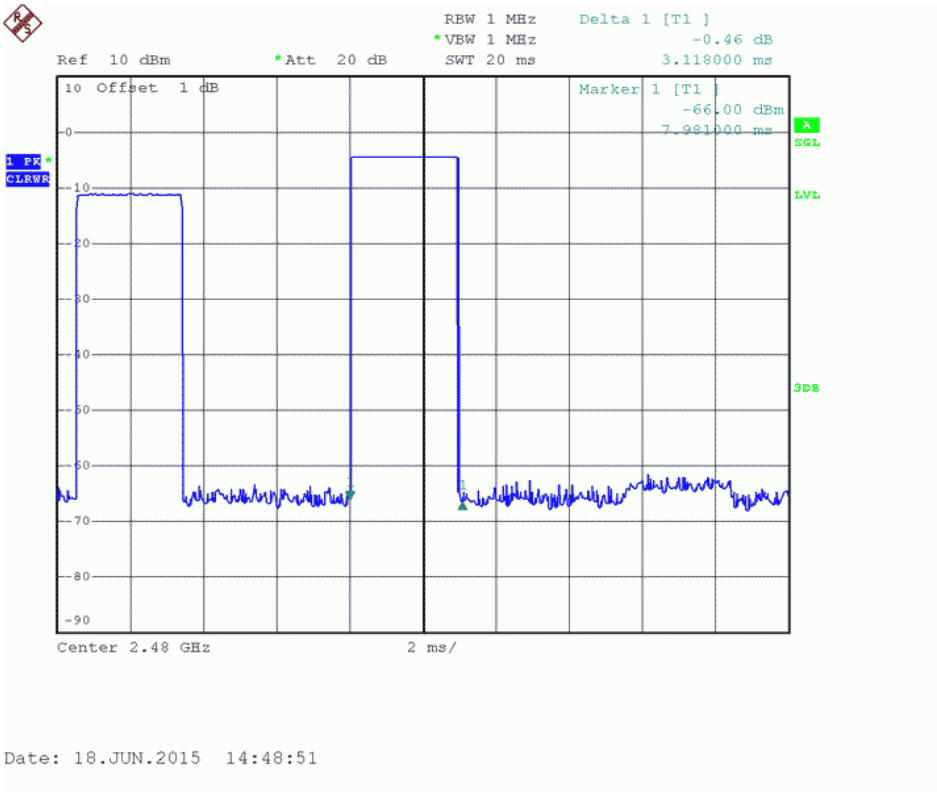
CH78-DH1



CH78-DH3



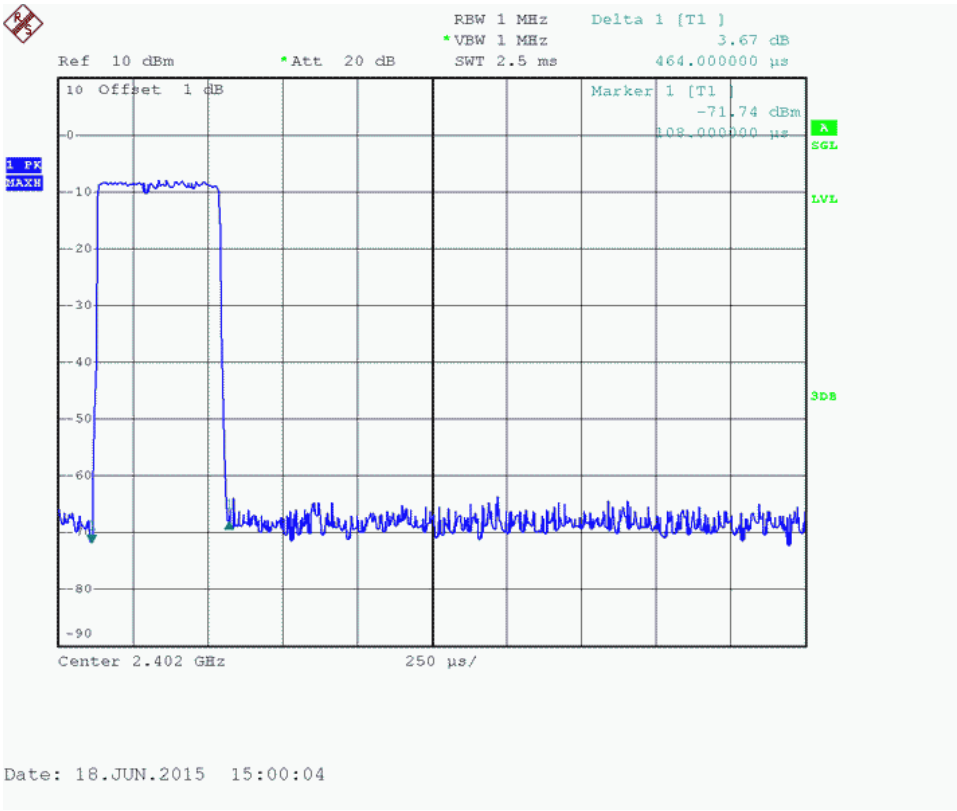
CH78-DH5


RBW 1 MHz
*VBW 1 MHz
SWT 20 ms
Delta 1 [T1]
-0.46 dB
3.118000 ms
Ref 10 dBm
*Att 20 dB
10 Offset 1 dB
Marker 1 [T1]
-66.00 dBm
7.981000 ms
1 PK
CLRWR
A
SGL
LVL
3DB
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Center 2.48 GHz
2 ms/
Date: 18.JUN.2015 14:48:51

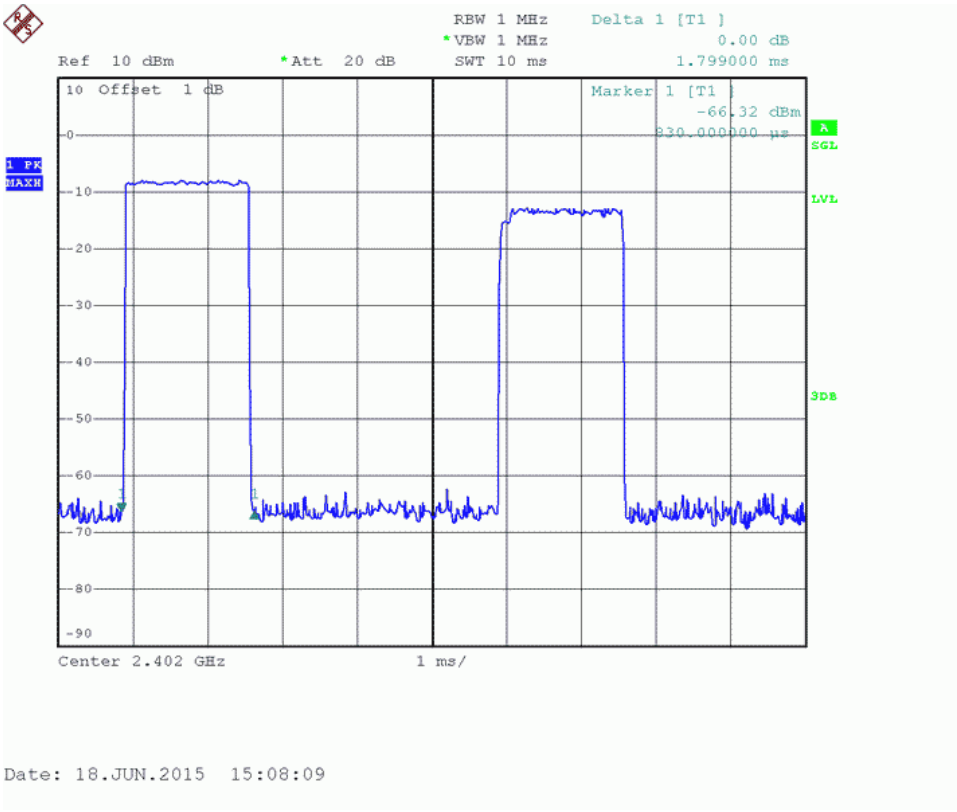
Test Mode :	TX Mode_3Mbps

Data Packet	Frequency (MHz)	Pulse Duration (ms)	Dwell Time (s)	Limits (s)	Test Result
DH5	2402	3.1590	0.3370	0.4000	Complies
DH3	2402	1.7990	0.2878	0.4000	Complies
DH1	2402	0.4640	0.1485	0.4000	Complies
DH5	2441	3.1590	0.3370	0.4000	Complies
DH3	2441	1.7790	0.2846	0.4000	Complies
DH1	2441	0.4590	0.1469	0.4000	Complies
DH5	2480	3.1180	0.3326	0.4000	Complies
DH3	2480	1.7590	0.2814	0.4000	Complies
DH1	2480	0.4590	0.1469	0.4000	Complies

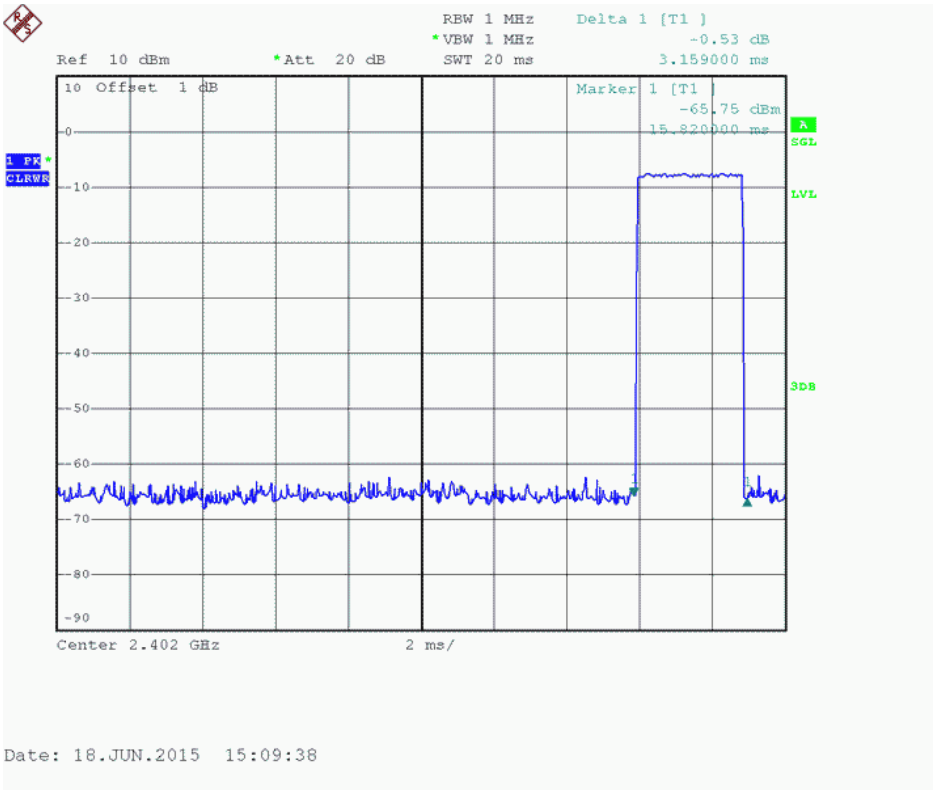
CH00-DH1



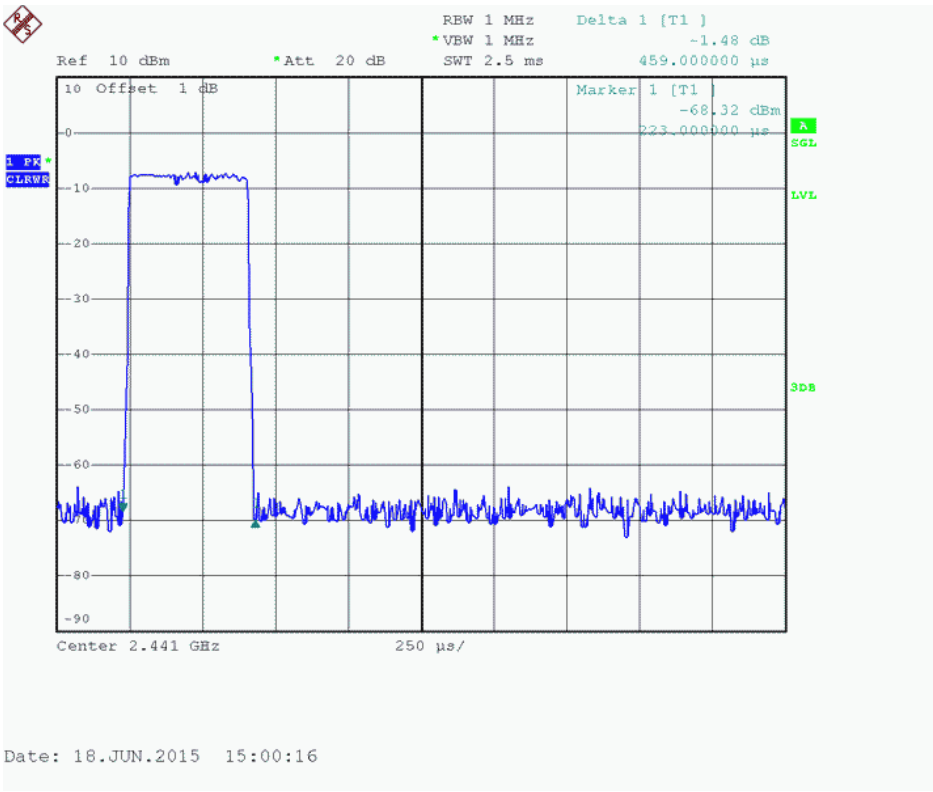
CH00-DH3



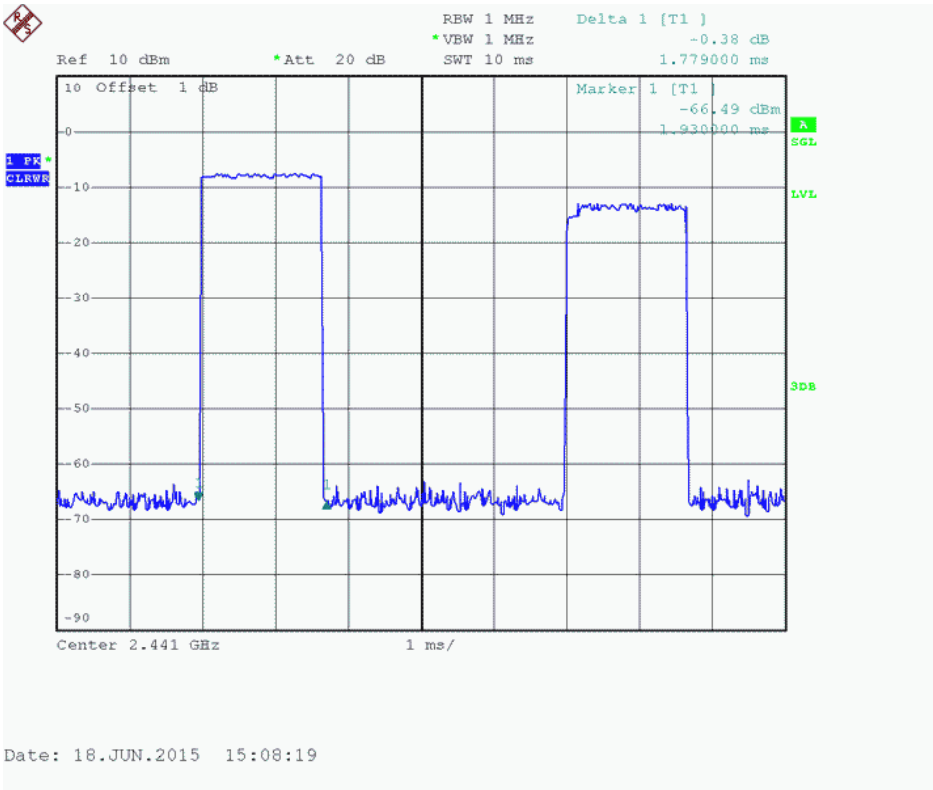
CH00-DH5



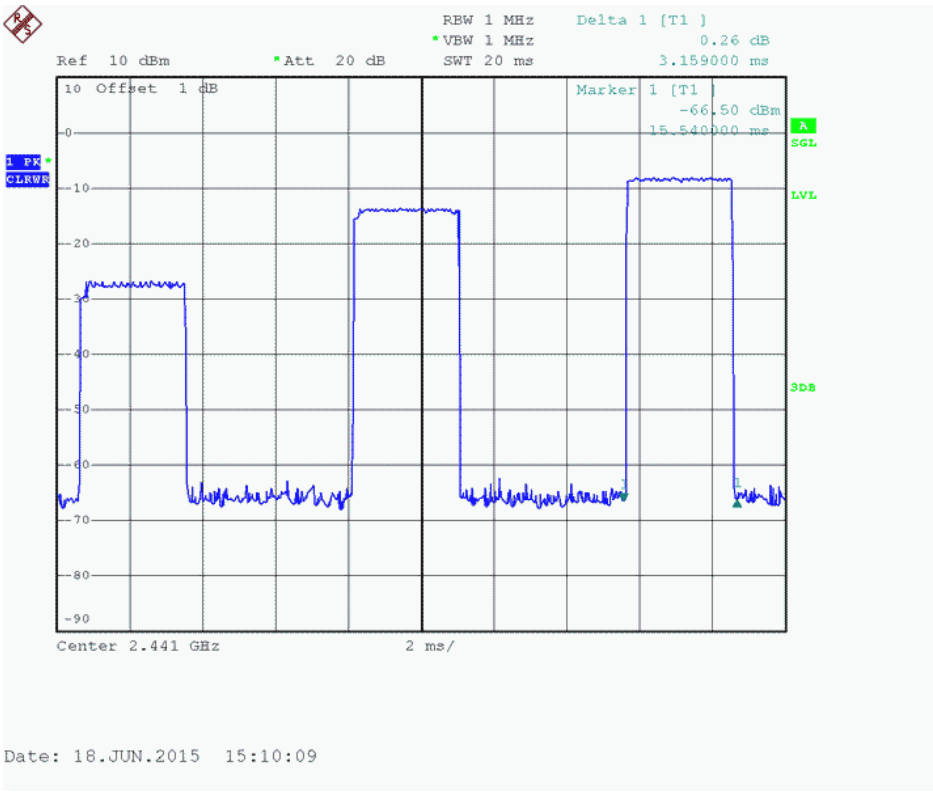
CH39-DH1



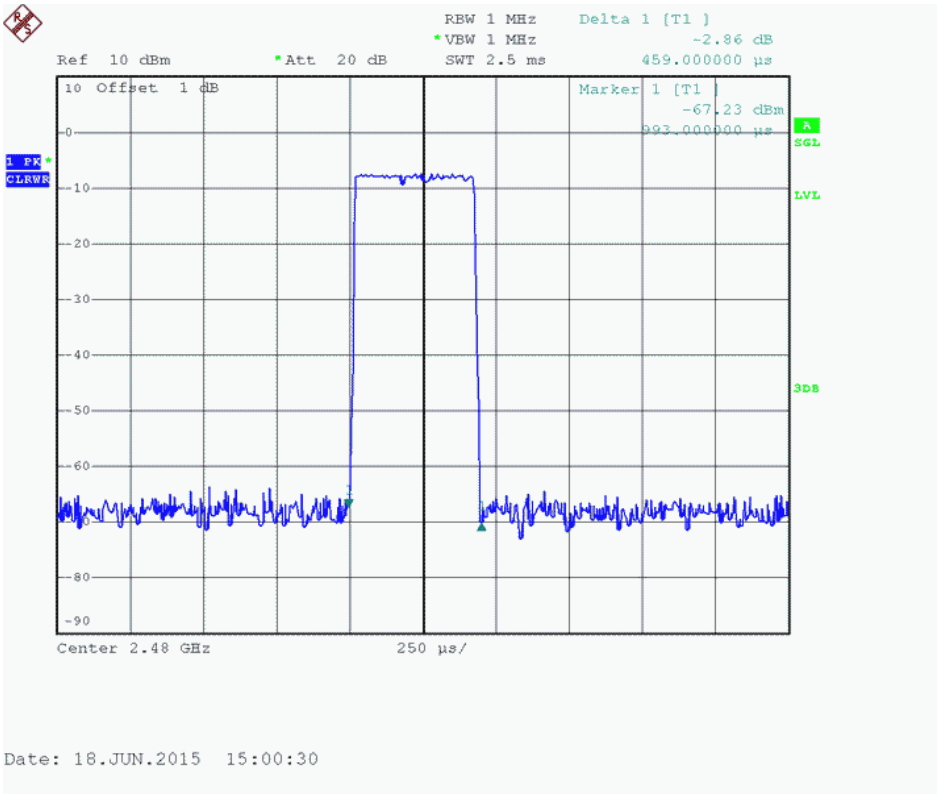
CH39-DH3



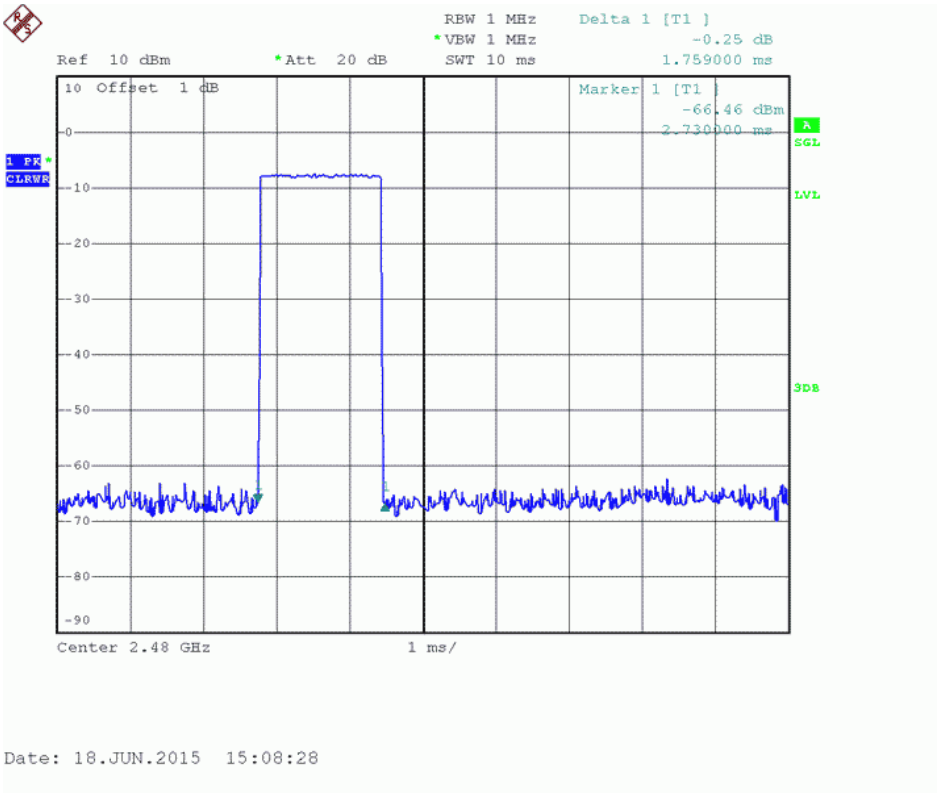
CH39-DH5



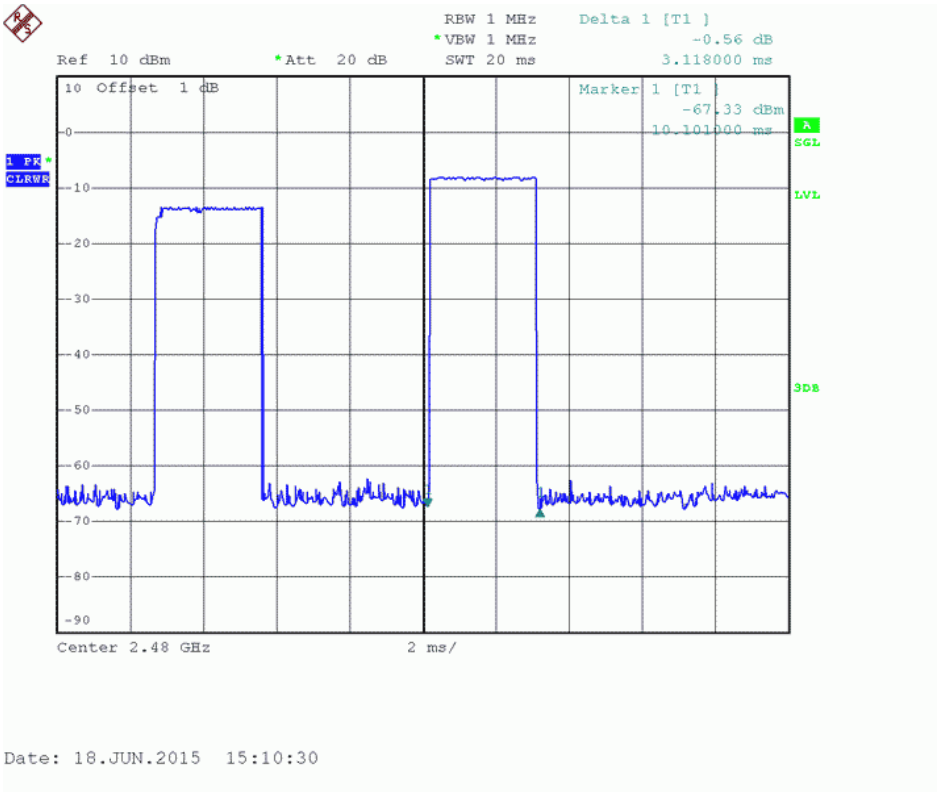
CH78-DH1



CH78-DH3



CH78-DH5


RBW 1 MHz
VBW 1 MHz
SWT 20 ms
Delta 1 [T1]
-0.56 dB
3.118000 ms
Ref 10 dBm
Att 20 dB
10 Offset 1 dB
Marker 1 [T1]
-67.33 dBm
10.101000 ms
1 PK
CLRWR
A
SGL
LVL
3DB
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Center 2.48 GHz
2 ms/
Date: 18.JUN.2015 15:10:30

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	1.170	0.625	Complies
2441	1.185	0.543	Complies
2480	1.032	0.564	Complies

CH00

CH39

RBW 30 kHz
VBW 100 kHz
SWT 5 ms
Delta 1 [T1]
1.28 dB
1.185000000 MHz
Ref 10 dBm
Att 20 dB
10 Offset 1 dB
Marker 1 [T1]
-9.71 dBm
2.440825000 GHz
1 PK VIEW
LVL
3DB
Center 2.4415 GHz
300 kHz/
Span 3 MHz
Date: 18.JUN.2015 14:38:13

CH78

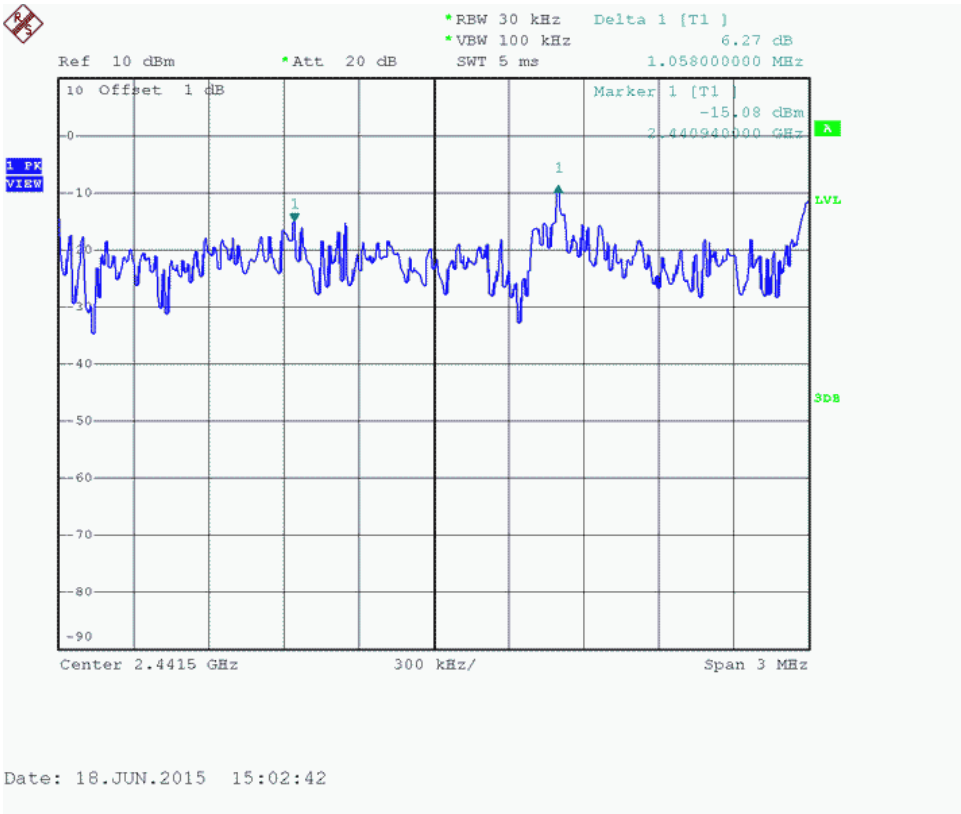
RBW 30 kHz
VBW 100 kHz
SWT 5 ms
Delta 1 [T1]
1.84 dB
1.032000000 MHz
Ref 10 dBm
Att 20 dB
10 Offset 1 dB
Marker 1 [T1]
-10.06 dBm
2.478972000 GHz
1 PK VIEW
LVL
3DB
Center 2.4795 GHz
300 kHz/
Span 3 MHz
Date: 18.JUN.2015 14:39:18

Test Mode :	Hopping on _3Mbps

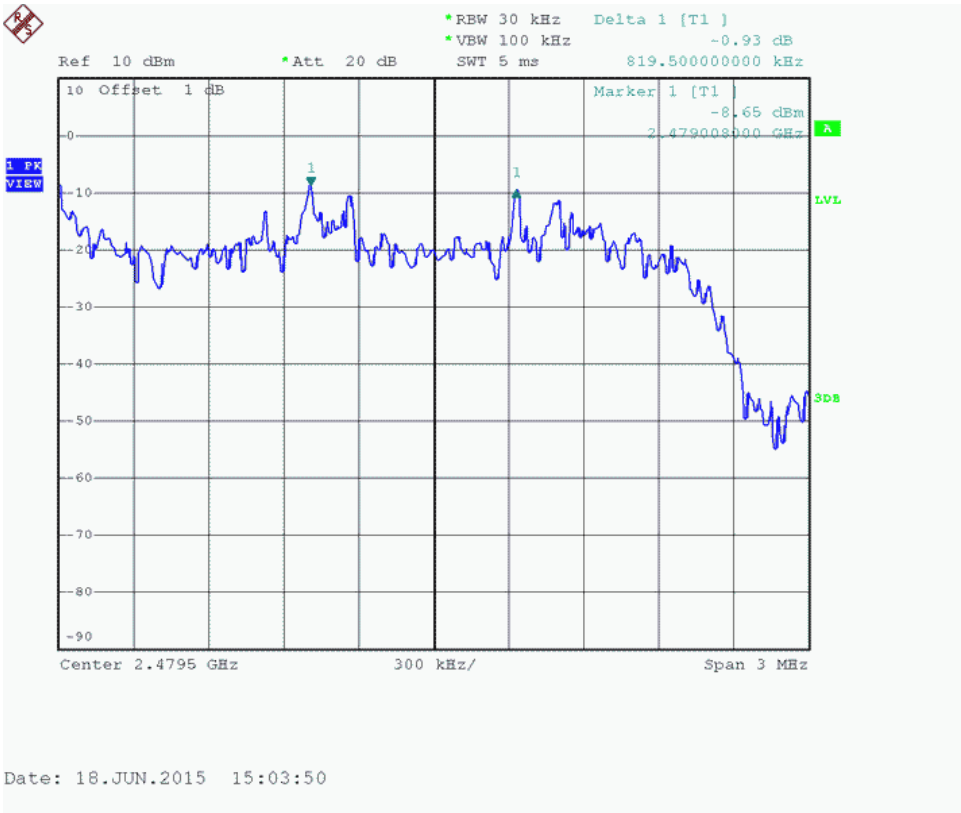
Frequency (MHz)	Channel Separation (MHz)	2/3 of 20dB Bandwidth (MHz)	Test Result
2402	0.990	0.805	Complies
2441	1.058	0.804	Complies
2480	0.820	0.803	Complies

CH00

CH39


*RBW 30 kHz
*VBW 100 kHz
SWT 5 ms
Delta 1 [T1]
6.27 dB
1.058000000 MHz
Ref 10 dBm
*Att 20 dB
10 Offset 1 dB
Marker 1 [T1]
-15.08 dBm
2.440940000 GHz
1 PK
VIEW
LVL
3DB
Center 2.4415 GHz
300 kHz/
Span 3 MHz
Date: 18.JUN.2015 15:02:42

CH78

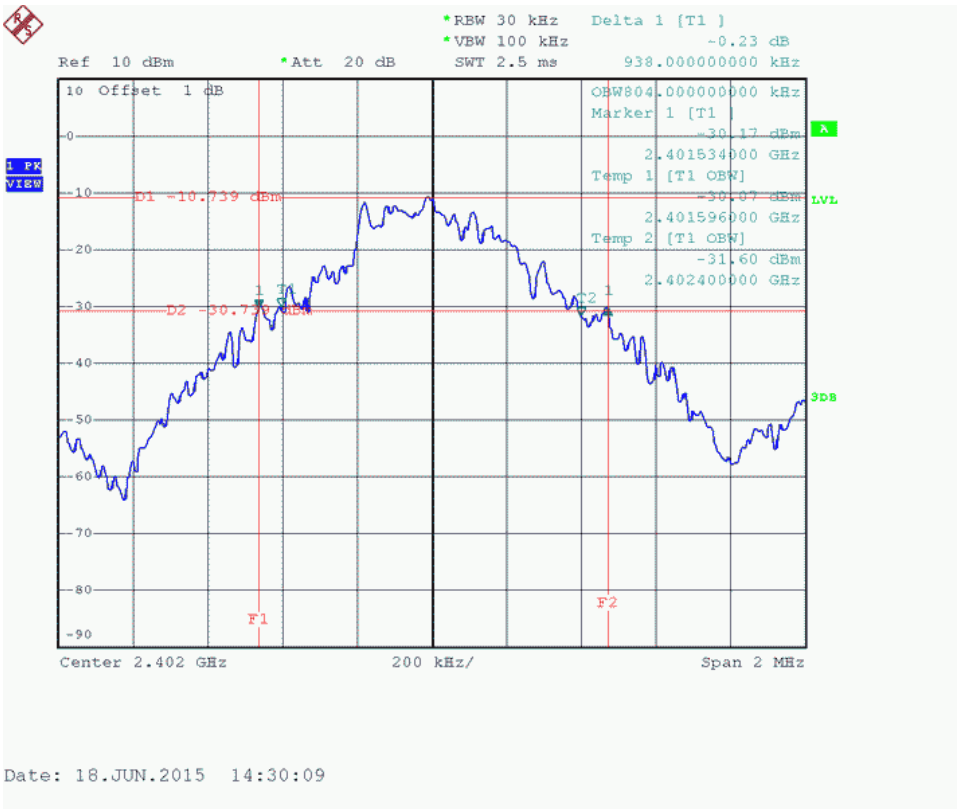

*RBW 30 kHz
*VBW 100 kHz
SWT 5 ms
Delta 1 [T1]
-0.93 dB
819.500000000 kHz
Ref 10 dBm
*Att 20 dB
10 Offset 1 dB
Marker 1 [T1]
-8.65 dBm
2.479008000 GHz
1 PK
VIEW
LVL
3DB
Center 2.4795 GHz
300 kHz/
Span 3 MHz
Date: 18.JUN.2015 15:03:50

ATTACHMENT H - BANDWIDTH

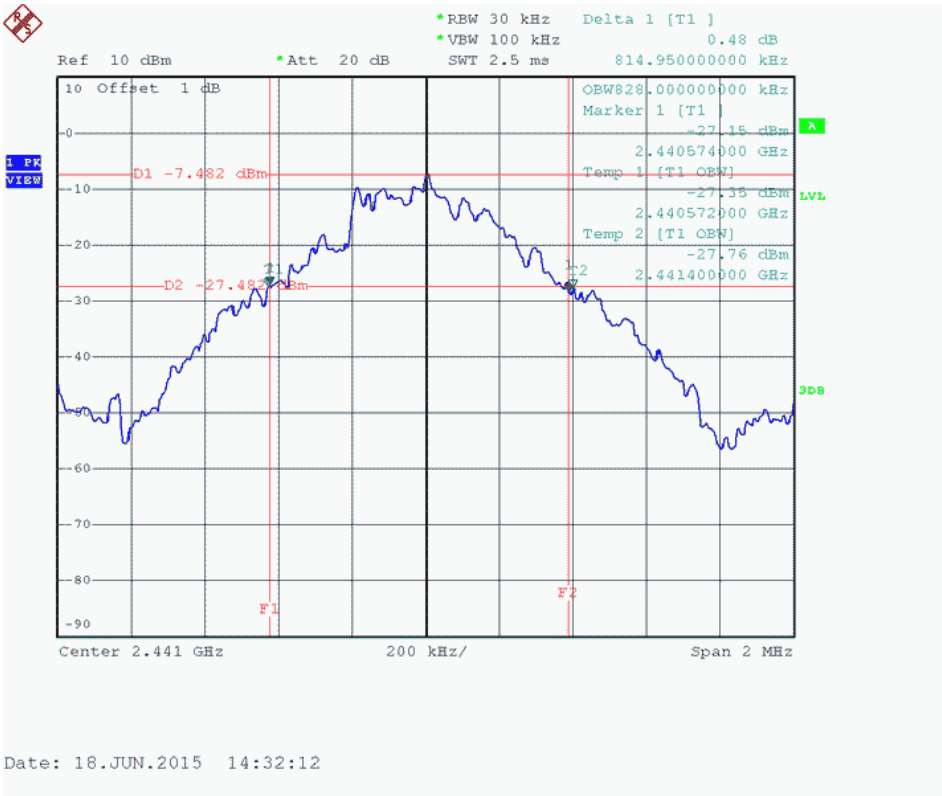
Test Mode :	TX Mode _1Mbps

Frequency (MHz)	20dB Bandwidth (MHz)	99% Occupied BW (MHz)	Test Result
2402	0.938	0.804	Complies
2441	0.814	0.828	Complies
2480	0.846	0.840	Complies

CH00



CH39


*RBW 30 kHz
*VBW 100 kHz
SWT 2.5 ms
Delta 1 [T1]
0.48 dB
814.950000000 kHz
Ref 10 dBm
*Att 20 dB
10 Offset 1 dB
OBW828.000000000 kHz
Marker 1 [T1]
-27.15 dBm
2.440574000 GHz
Temp 1 [T1 OBW]
-27.35 dBm
2.440572000 GHz
Temp 2 [T1 OBW]
-27.76 dBm
2.441400000 GHz
D1 -7.482 dBm
D2 -27.482 dBm
1 PK VIEW
A
LVL
3DB
F1
F2
Center 2.441 GHz
200 kHz/
Span 2 MHz
Date: 18.JUN.2015 14:32:12

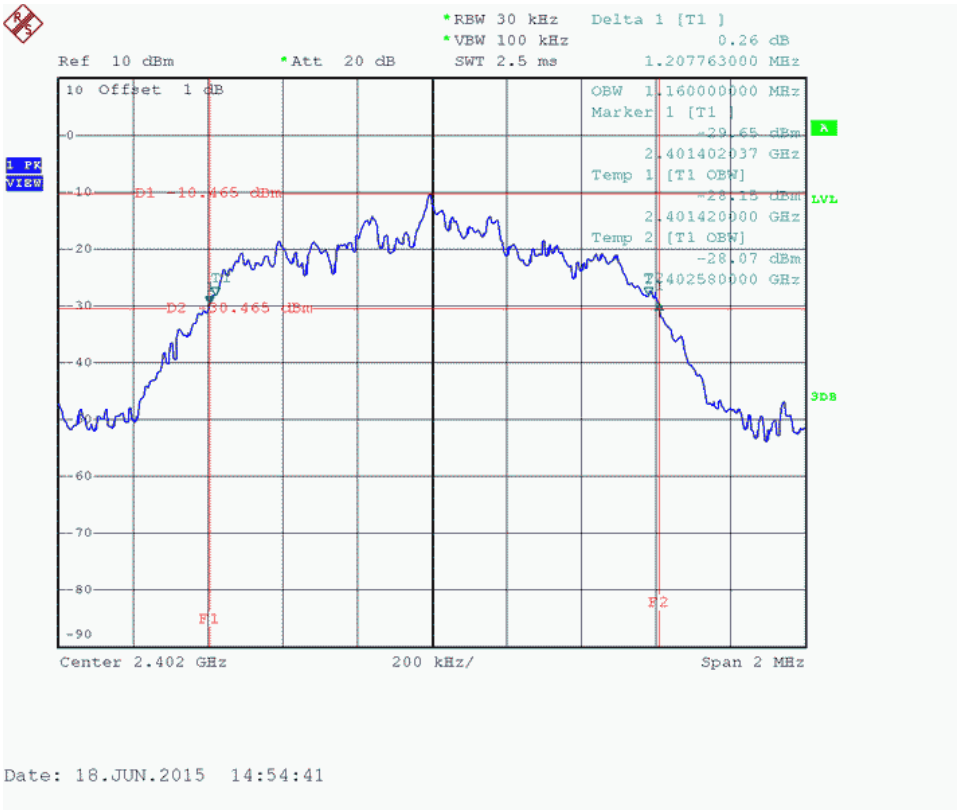
CH78

*RBW 30 kHz
*VBW 100 kHz
SWT 2.5 ms
Delta 1 [T1]
0.44 dB
846.100000000 kHz
Ref 10 dBm
*Att 20 dB
10 Offset 1 dB
OBW840.000000000 kHz
Marker 1 [T1]
-27.48 dBm
2.479649900 GHz
Temp 1 [T1 OBW]
-28.63 dBm
2.479568000 GHz
Temp 2 [T1 OBW]
-27.81 dBm
2.480408000 GHz
D1 -7.35 dBm
D2 -27.35 dBm
1 PK VIEW
A
LVL
3DB
F1
F2
Center 2.48 GHz
200 kHz/
Span 2 MHz
Date: 18.JUN.2015 14:33:36

Test Mode :	TX Mode _3Mbps

Frequency (MHz)	20dB Bandwidth (MHz)	99% Occupied BW (MHz)	Test Result
2402	1.208	1.160	Complies
2441	1.206	1.152	Complies
2480	1.205	1.160	Complies

CH00



CH39

*RBW 30 kHz
*VBW 100 kHz
SWT 2.5 ms
Delta 1 [T1]
-0.17 dB
1.206000000 MHz
Ref 10 dBm
*Att 20 dB
10 Offset 1 dB
OBW 1.152000000 MHz
Marker 1 [T1]
-28.95 dBm
2.440402000 GHz
Temp 1 [T1 OBW]
-26.76 dBm
2.440424000 GHz
Temp 2 [T1 OBW]
-28.26 dBm
2.441576000 GHz
D1 -9.601 dBm
D2 -29.601 dBm
F1
F2
Center 2.441 GHz
200 kHz/
Span 2 MHz
Date: 18.JUN.2015 14:57:02

CH78

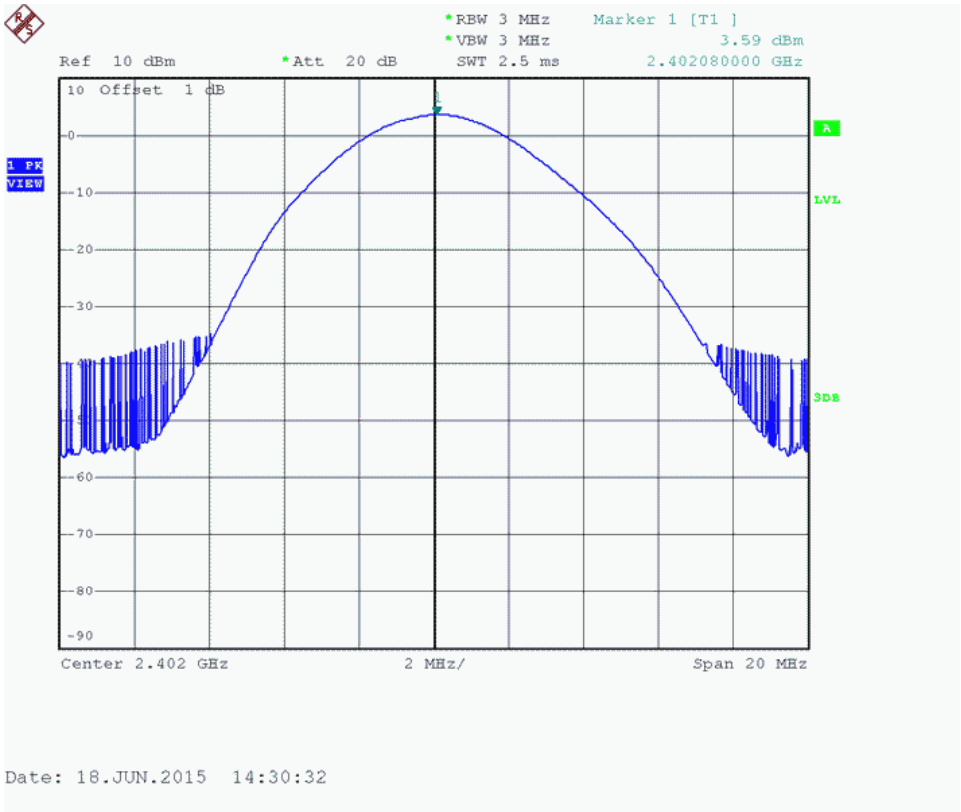
*RBW 30 kHz
*VBW 100 kHz
SWT 2.5 ms
Delta 1 [T1]
0.10 dB
1.204913000 MHz
Ref 10 dBm
*Att 20 dB
10 Offset 1 dB
OBW 1.160000000 MHz
Marker 1 [T1]
-28.47 dBm
2.479402037 GHz
Temp 1 [T1 OBW]
-27.24 dBm
2.479420000 GHz
Temp 2 [T1 OBW]
-27.30 dBm
2.480580000 GHz
D1 -9.26 dBm
D2 -29.26 dBm
F1
F2
Center 2.48 GHz
200 kHz/
Span 2 MHz
Date: 18.JUN.2015 14:58:10

ATTACHMENT I - PEAK OUTPUT POWER

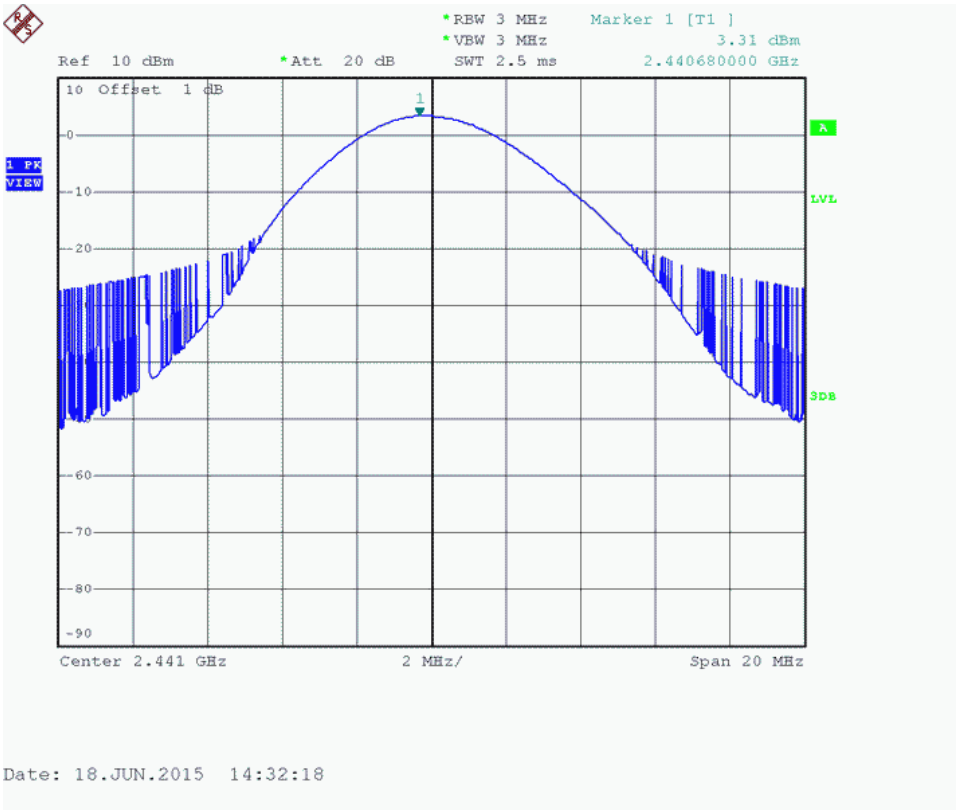
Test Mode :	TX Mode _1Mbps

Frequency (MHz)	Conducted Power (dBm)	Conducted Power (Watt)	Max. Limit (dBm)	Max. Limit (Watt)	Test Result
2402	3.59	0.0023	30.00	1.0000	Complies
2441	3.31	0.0021	30.00	1.0000	Complies
2480	3.53	0.0023	30.00	1.0000	Complies

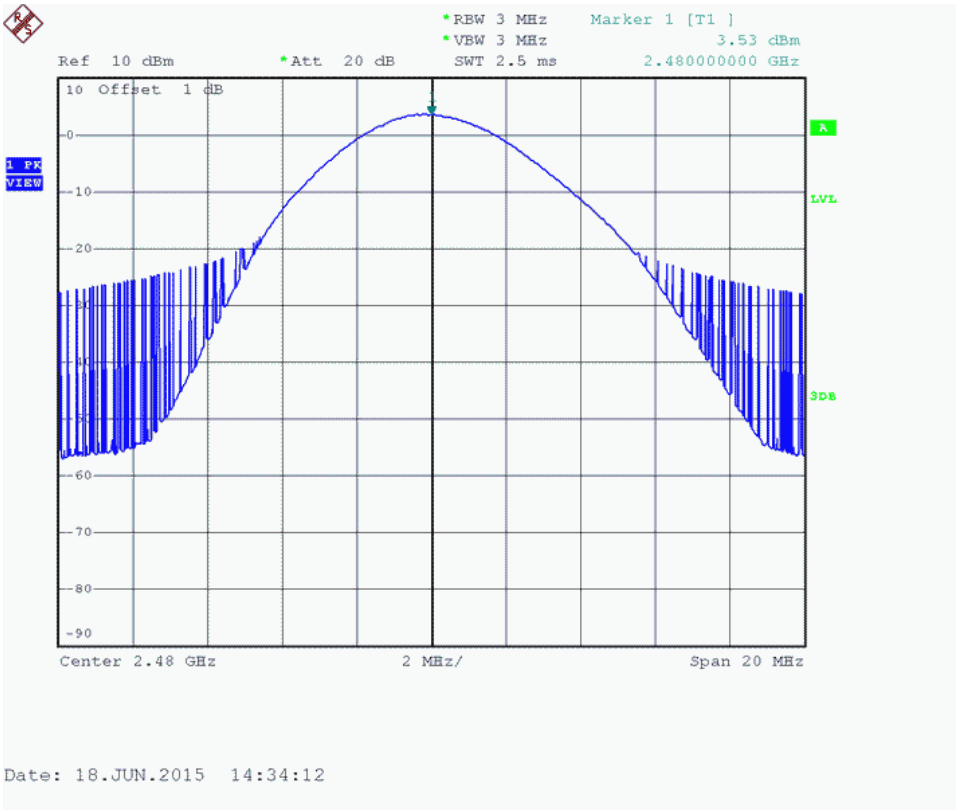
CH00



CH39


*RBW 3 MHz
Marker 1 [T1]
*VBW 3 MHz
3.31 dBm
Ref 10 dBm
*Att 20 dB
SWT 2.5 ms
2.440680000 GHz
10 Offset 1 dB
1 PK VIEW
A
LVL
3DB
0
-10
-20
-60
-70
-80
-90
Center 2.441 GHz
2 MHz/
Span 20 MHz
Date: 18.JUN.2015 14:32:18

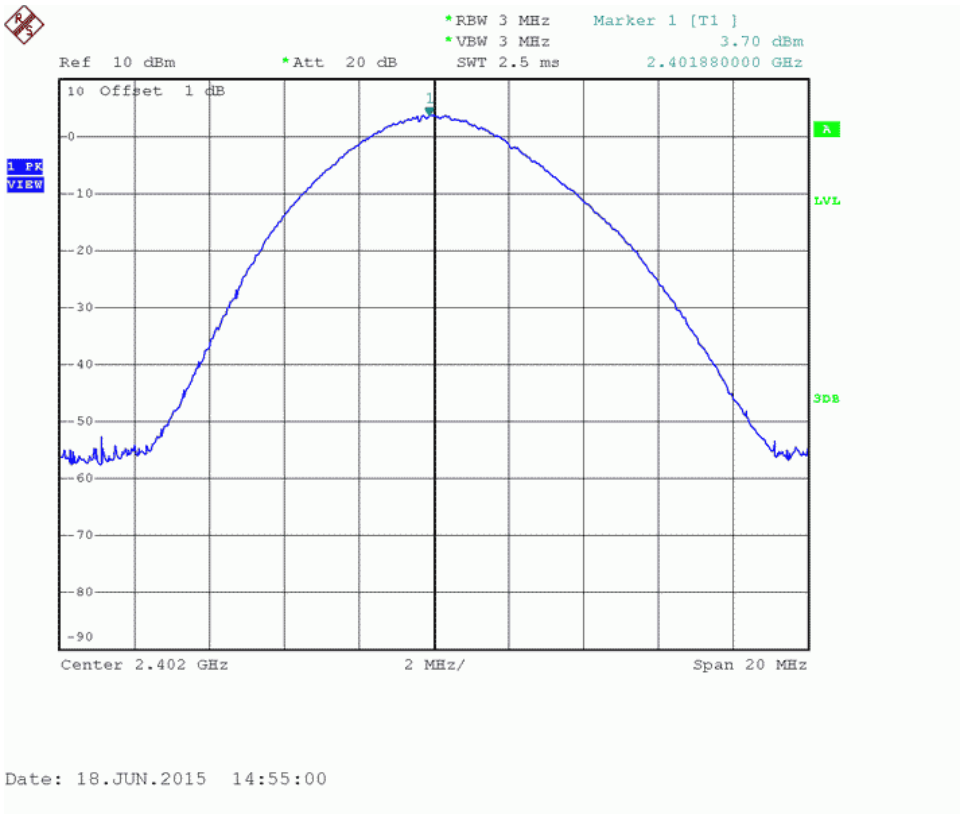
CH78


*RBW 3 MHz
Marker 1 [T1]
*VBW 3 MHz
3.53 dBm
Ref 10 dBm
*Att 20 dB
SWT 2.5 ms
2.480000000 GHz
10 Offset 1 dB
1 PK VIEW
A
LVL
3DB
0
-10
-20
-60
-70
-80
-90
Center 2.48 GHz
2 MHz/
Span 20 MHz
Date: 18.JUN.2015 14:34:12

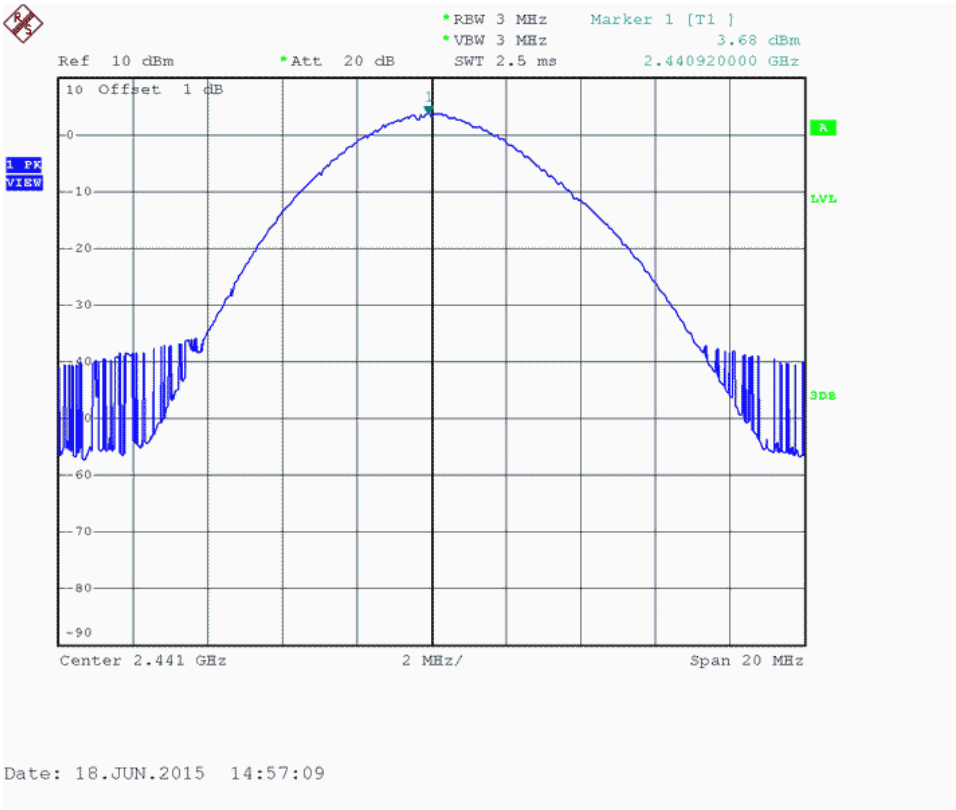
Test Mode :	TX Mode _3Mbps

Frequency (MHz)	Conducted Power (dBm)	Conducted Power (Watt)	Max. Limit (dBm)	Max. Limit (Watt)	Test Result
2402	3.70	0.0023	30.00	1.0000	Complies
2441	3.68	0.0023	30.00	1.0000	Complies
2480	3.64	0.0023	30.00	1.0000	Complies

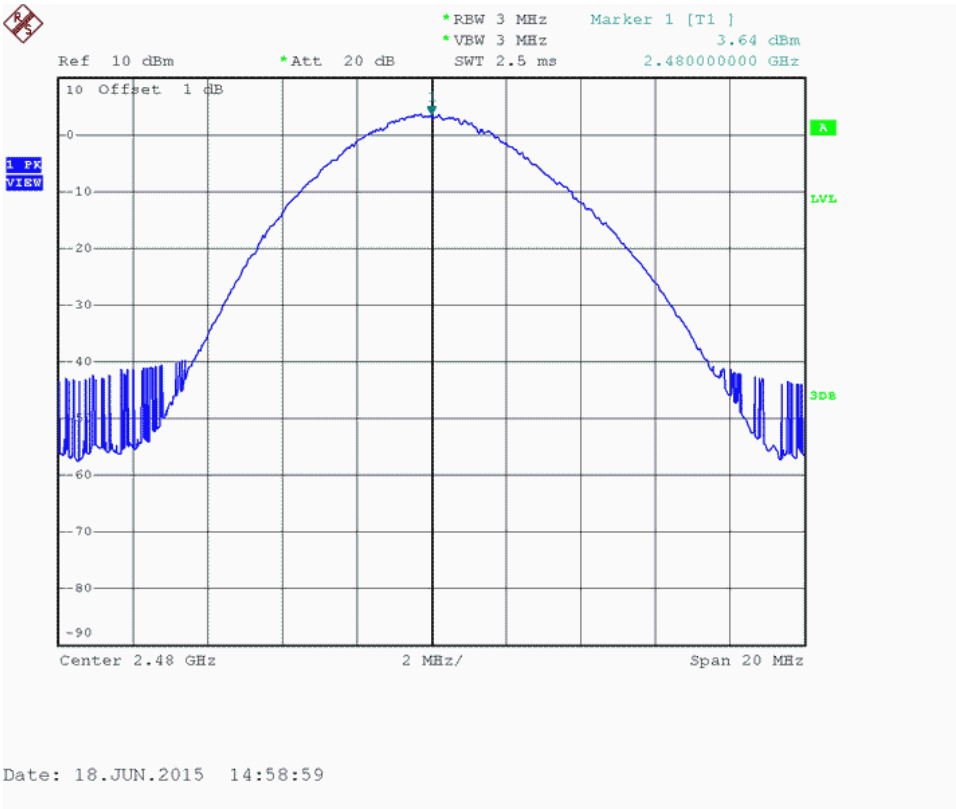
CH00



CH39

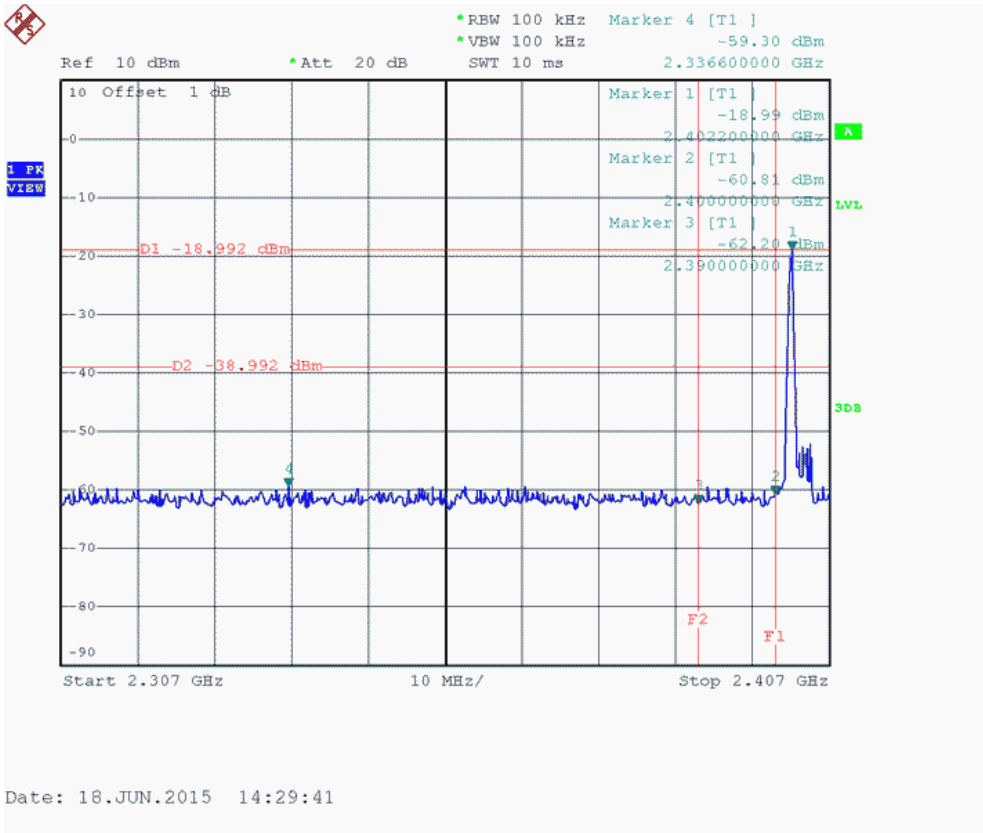

*RBW 3 MHz
*VBW 3 MHz
SWT 2.5 ms
Marker 1 [T1]
3.68 dBm
2.440920000 GHz
Ref 10 dBm
*Att 20 dB
10 Offset 1 dB
1 PK
VIEW
A
LVL
3DB
Center 2.441 GHz
2 MHz/
Span 20 MHz
Date: 18.JUN.2015 14:57:09

CH78

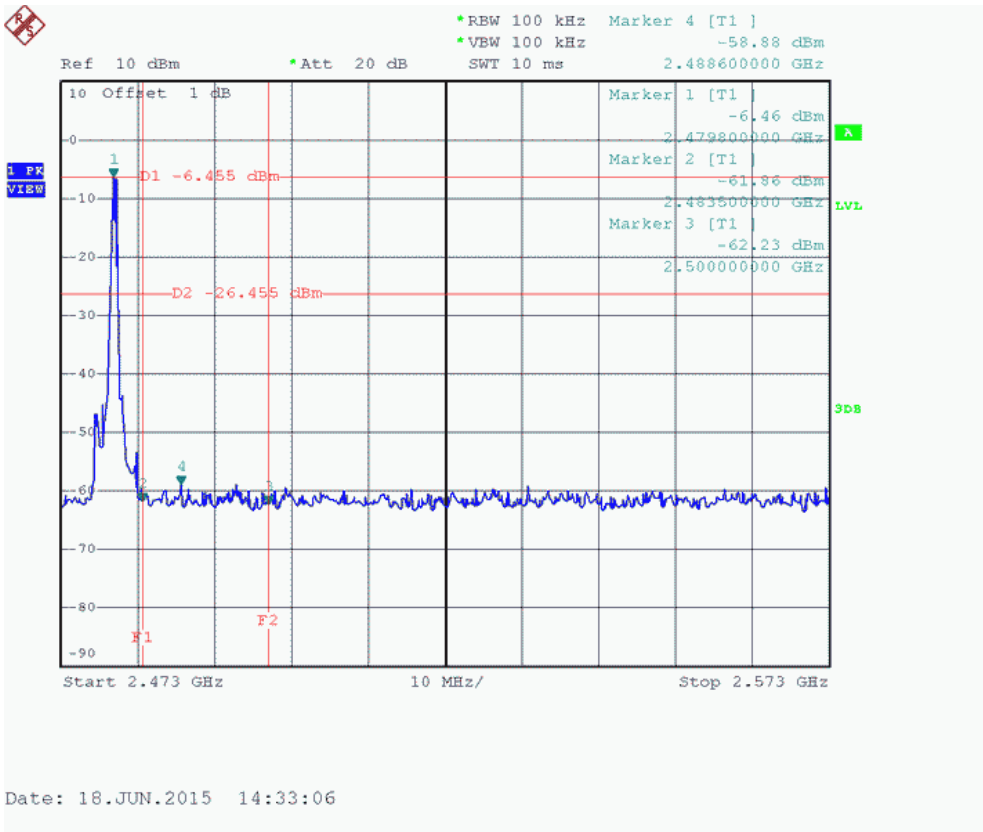

*RBW 3 MHz
*VBW 3 MHz
SWT 2.5 ms
Marker 1 [T1]
3.64 dBm
2.480000000 GHz
Ref 10 dBm
*Att 20 dB
10 Offset 1 dB
1 PK
VIEW
A
LVL
3DB
Center 2.48 GHz
2 MHz/
Span 20 MHz
Date: 18.JUN.2015 14:58:59

ATTACHMENT J - ANTENNA CONDUCTED SPURIOUS EMISSION

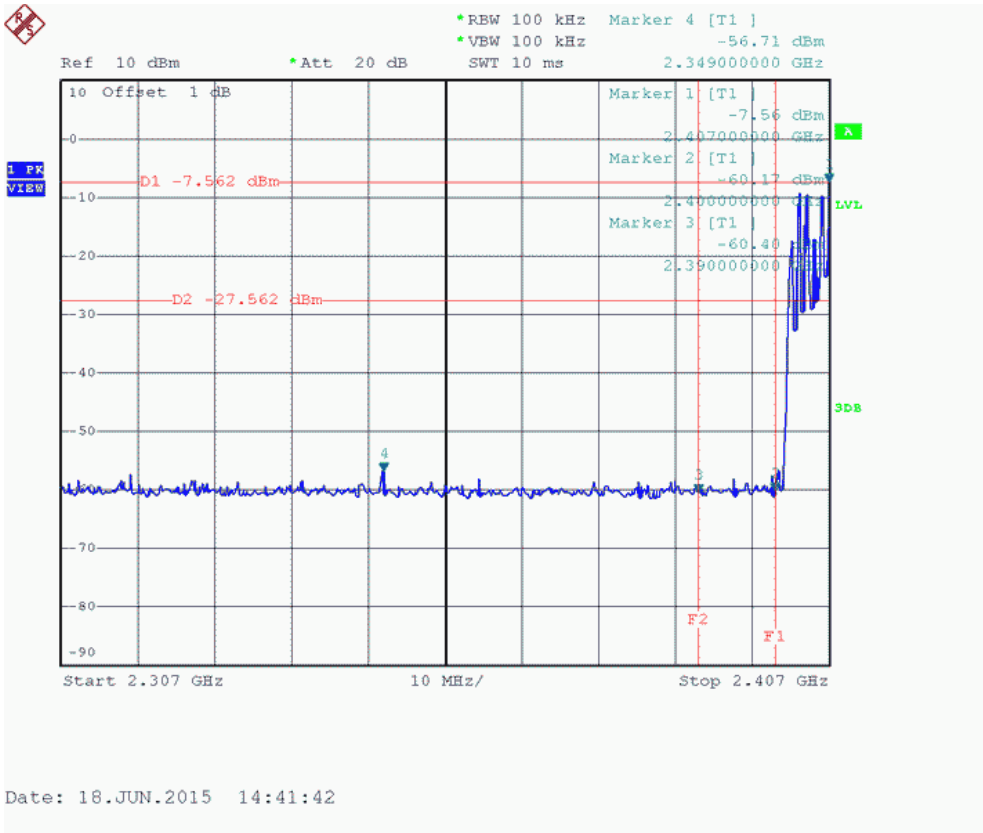
CH00 (Lower)_1Mbps



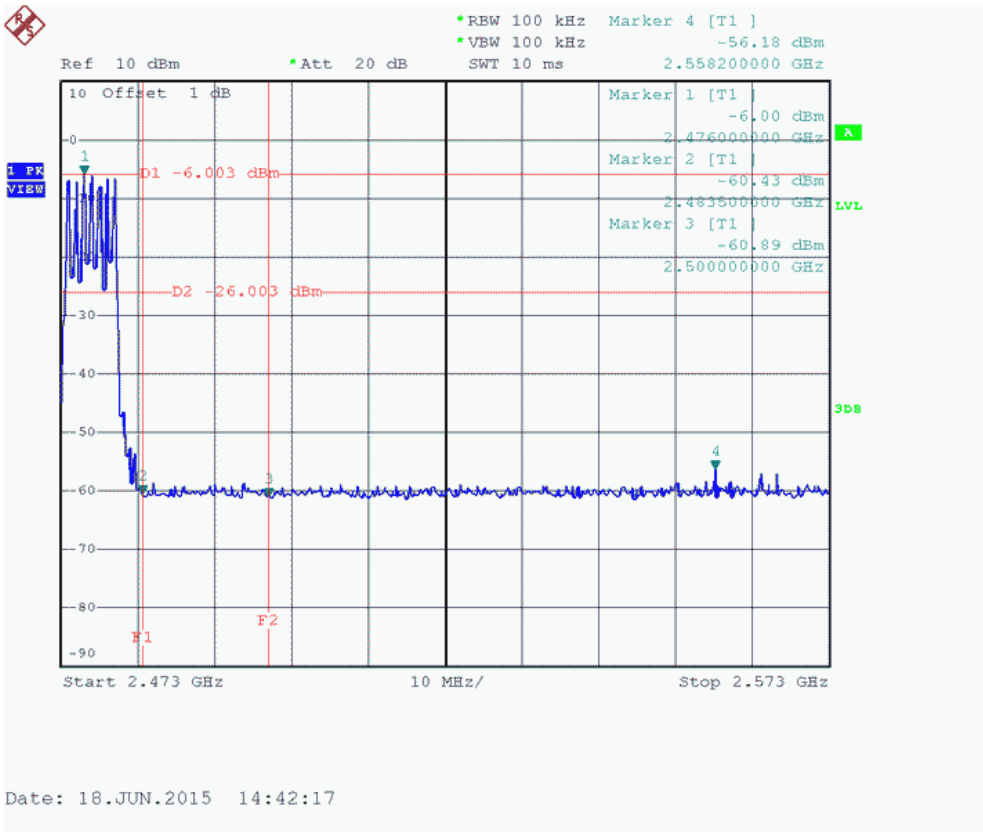
CH78 (Upper) _1Mbps



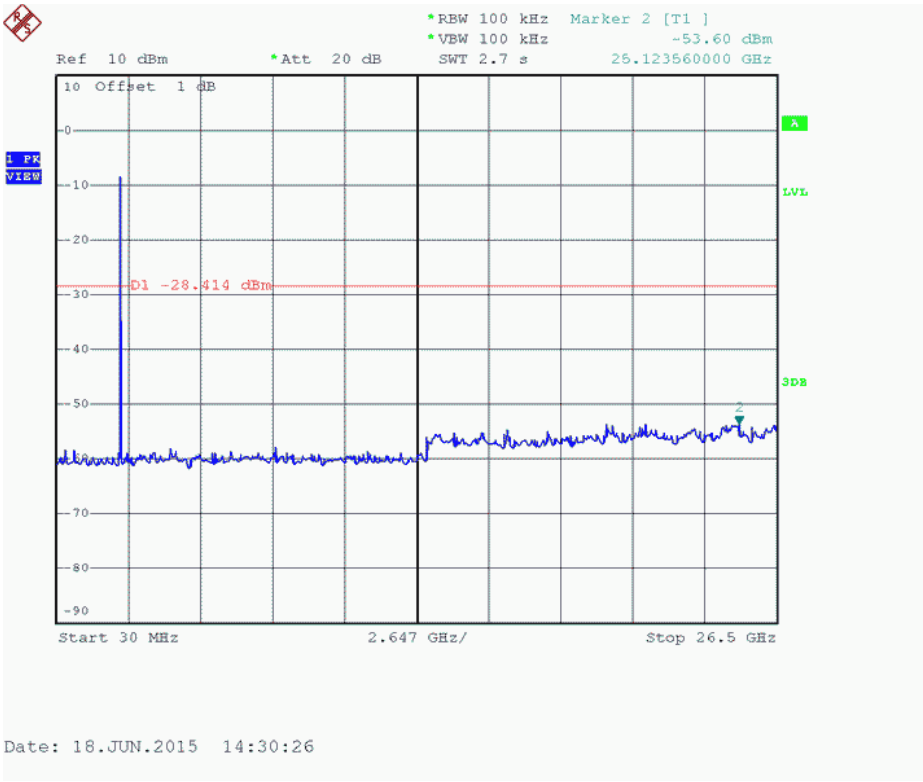
CH00 Hopping on mode (Lower)_1Mbps



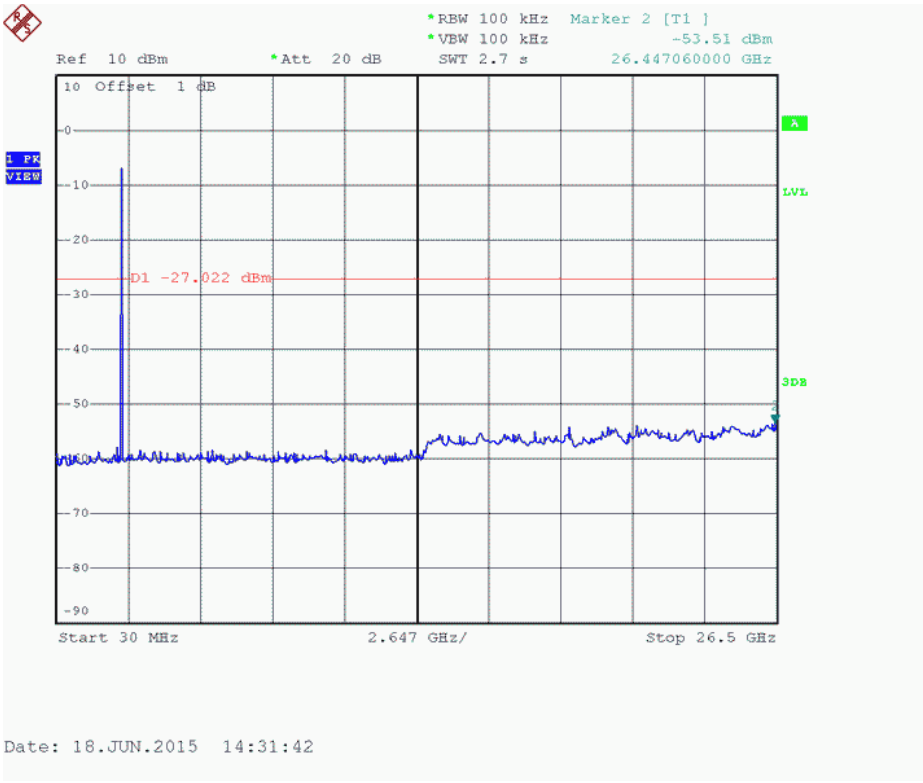
CH78 Hopping on mode (Upper) _1Mbps



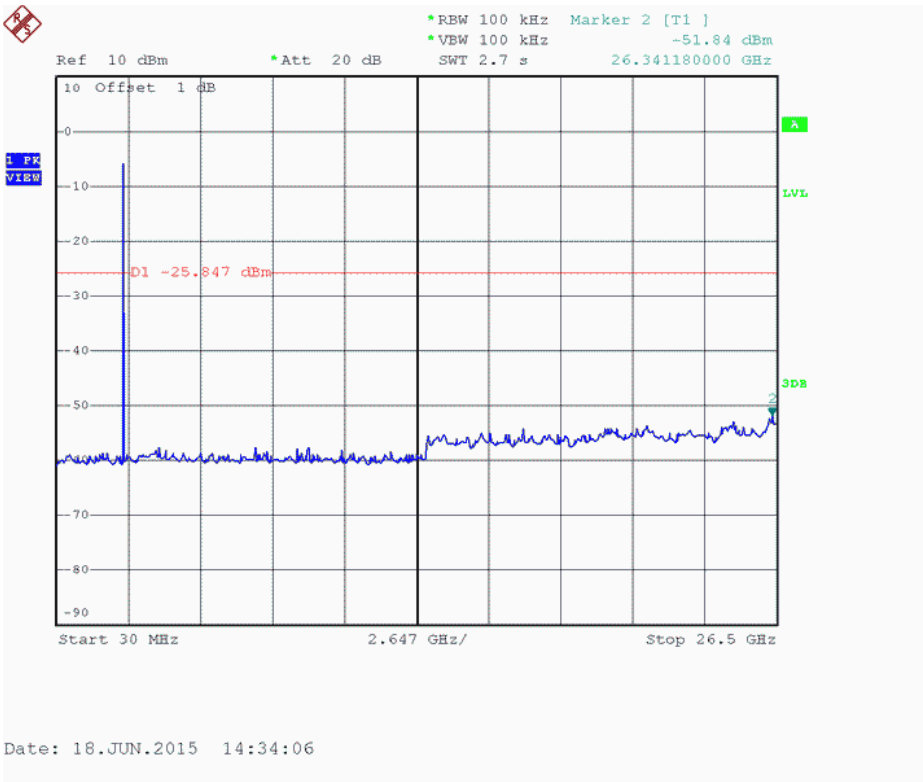
CH00 (10 Harmonic of the frequency) _1Mbps



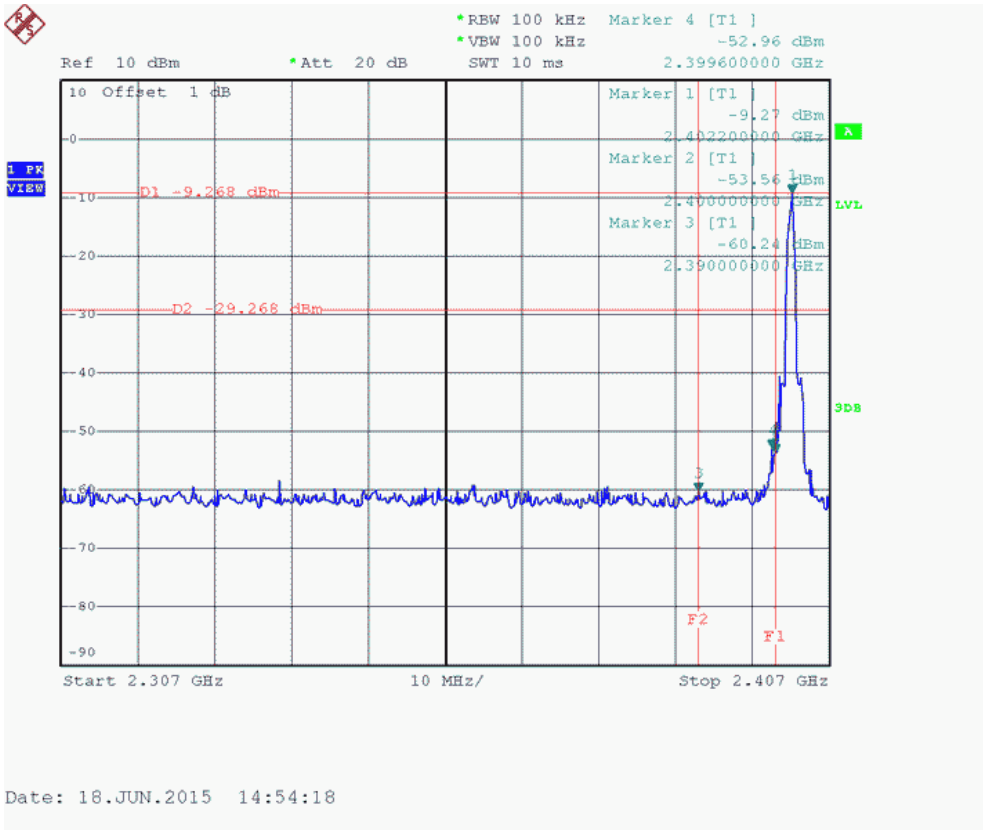
CH39 (10 Harmonic of the frequency) _1Mbps



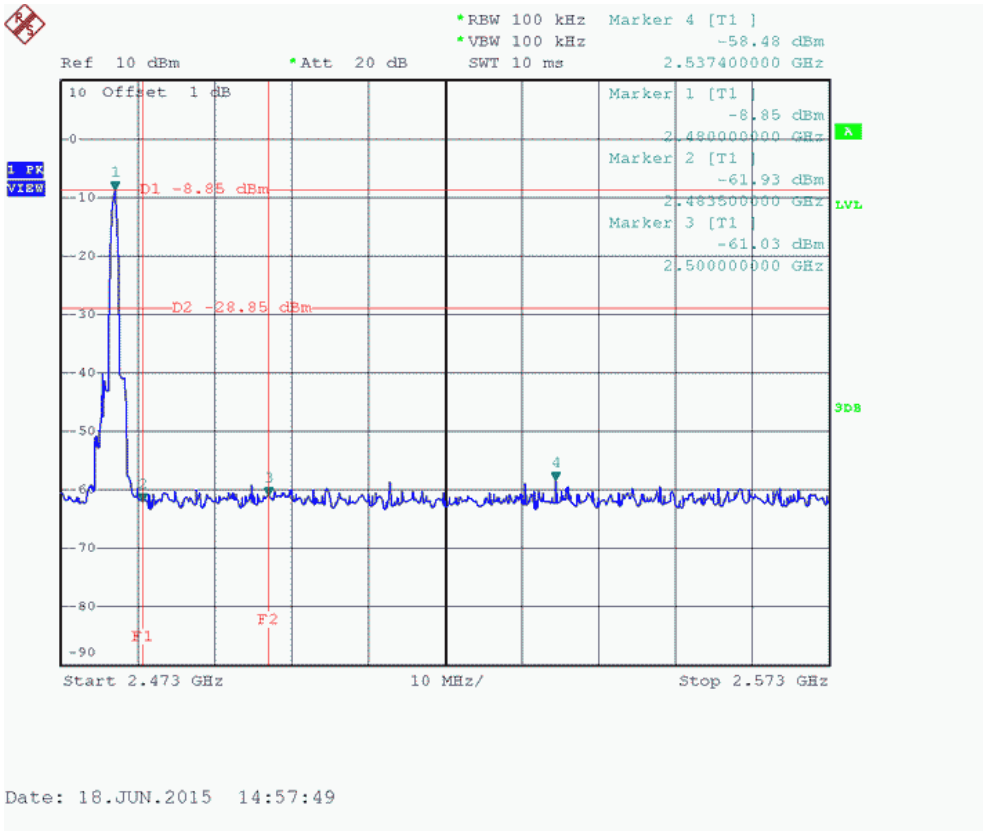
CH78 (10 Harmonic of the frequency) _1Mbps



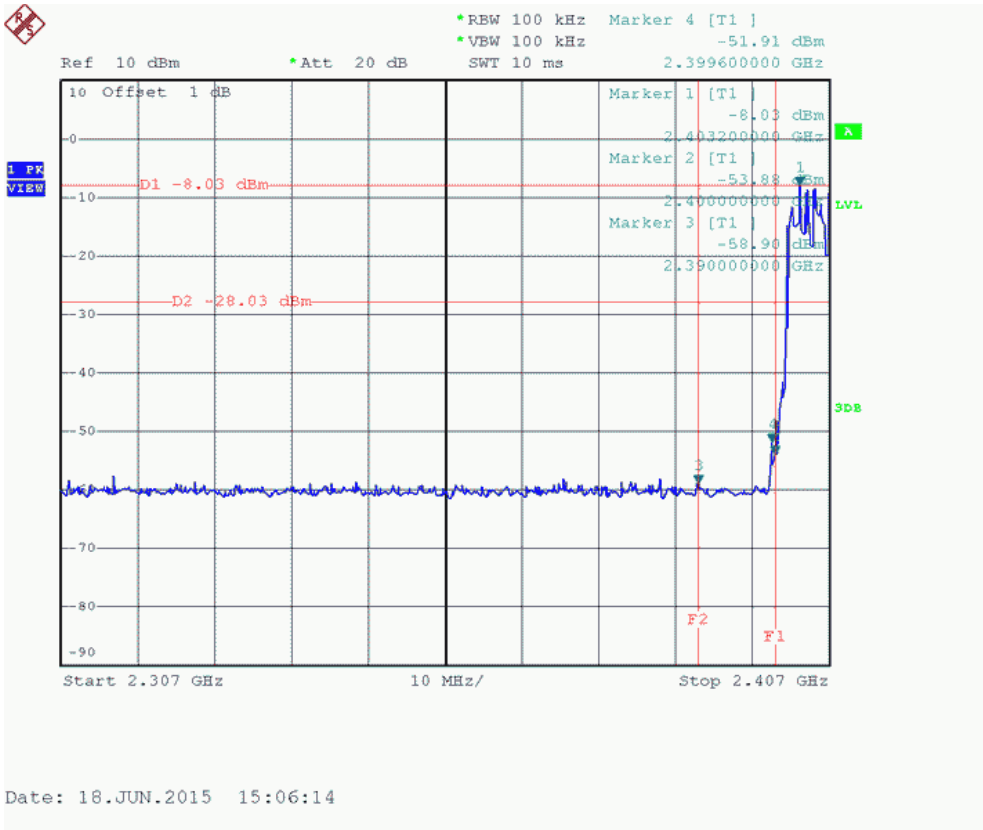
CH00 (Lower) _3Mbps



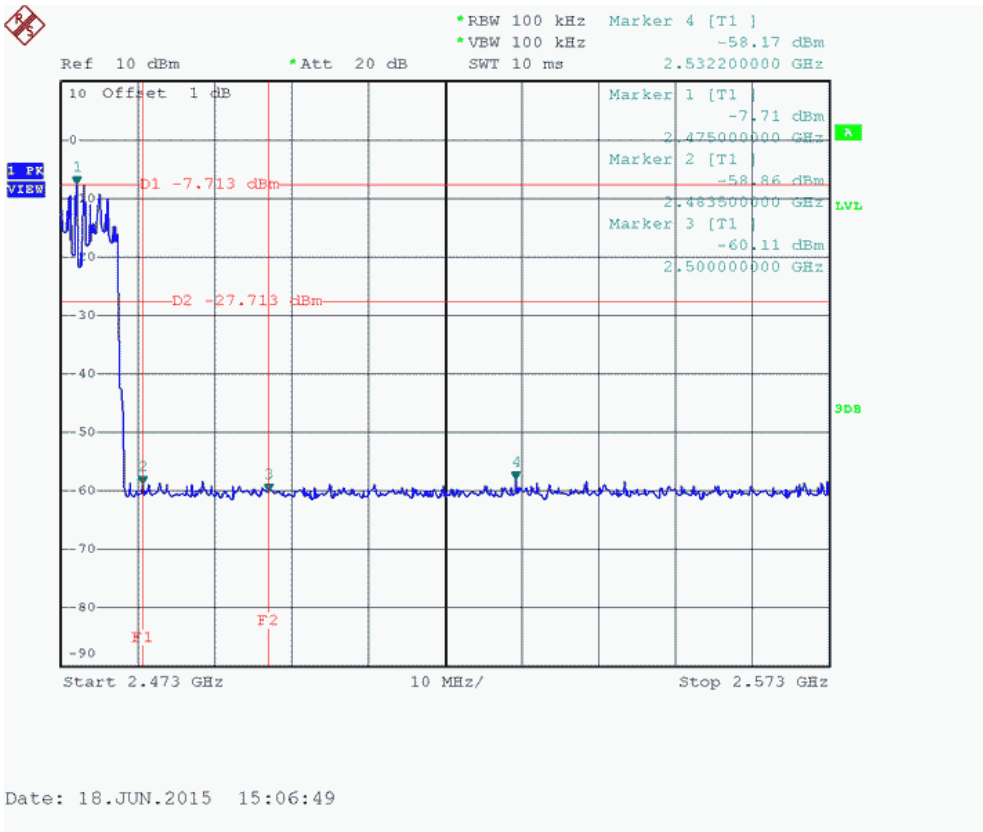
CH78 (Upper) _3Mbps



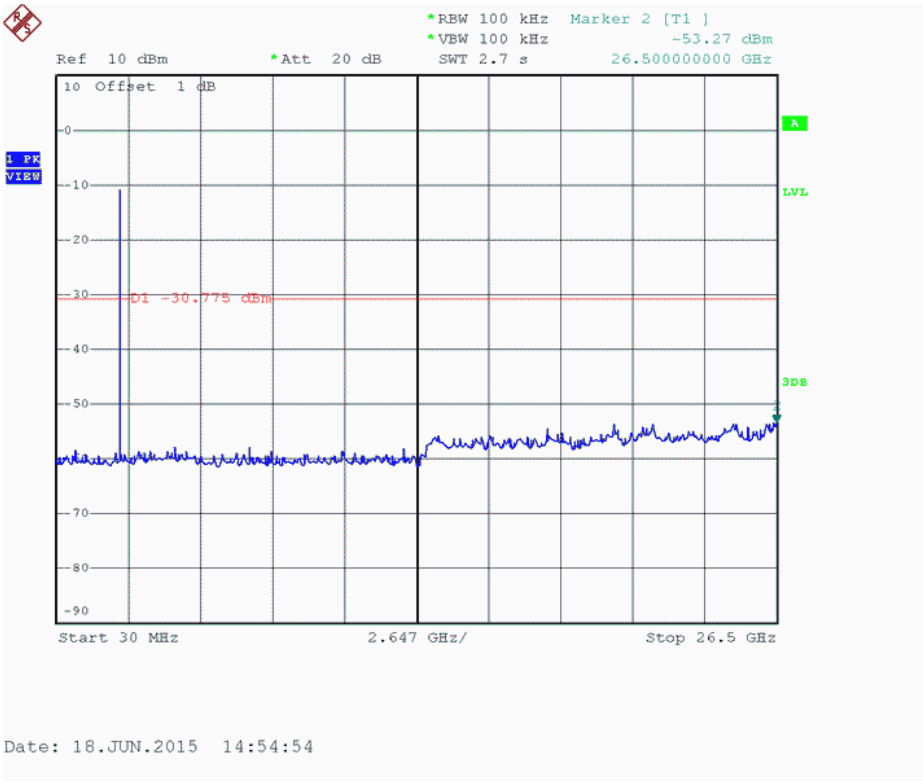
CH00 Hopping on mode (Lower)_3Mbps



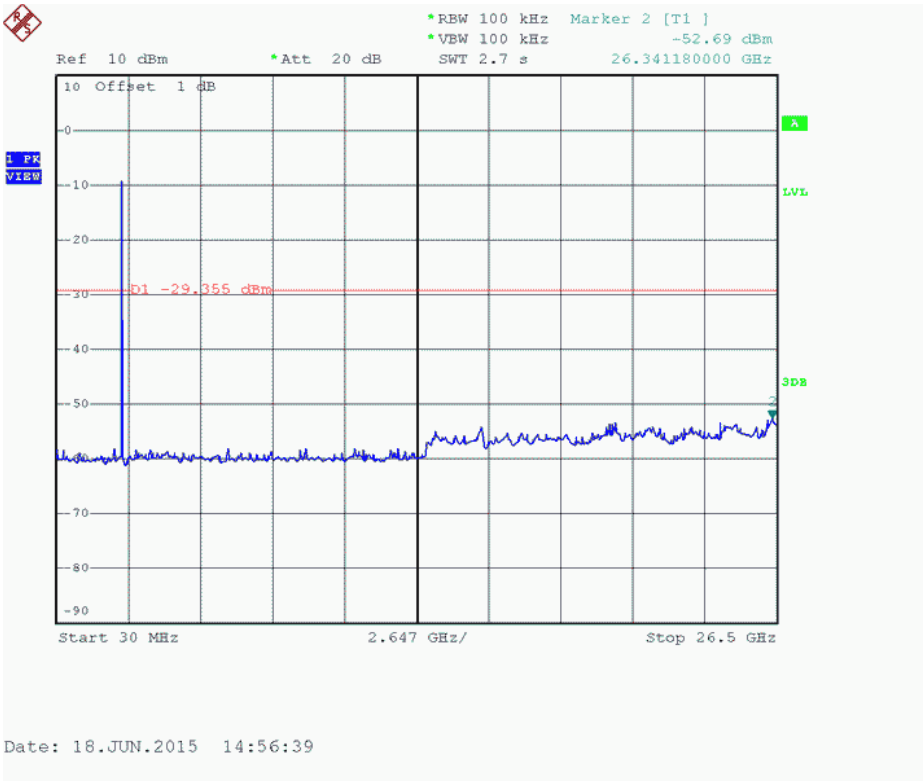
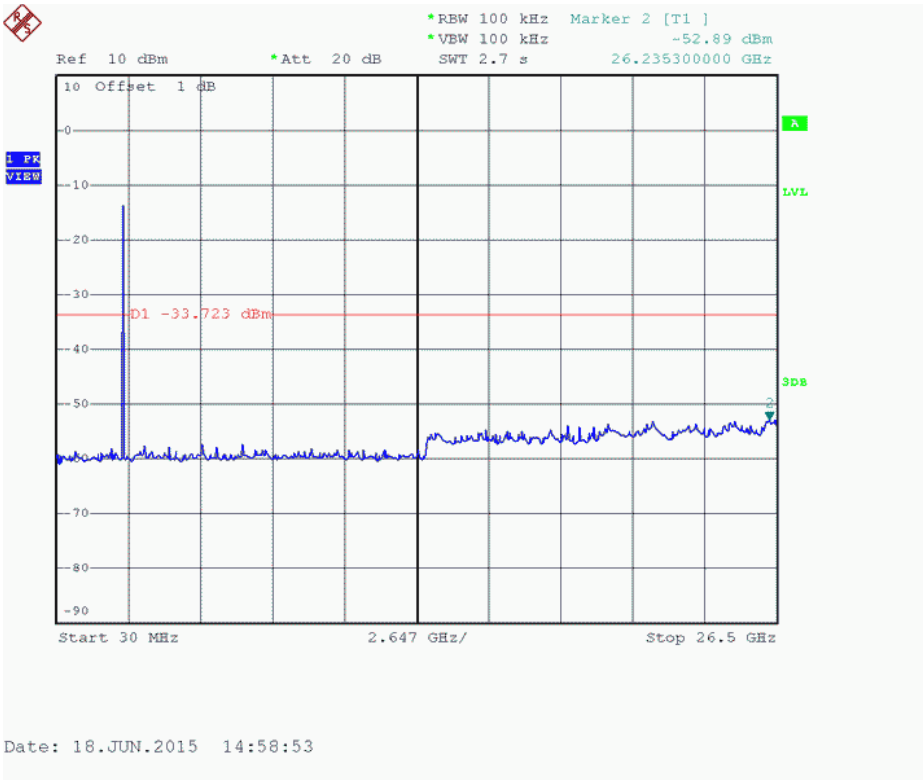
CH78 Hopping on mode (Upper) _3Mbps



CH00 (10 Harmonic of the frequency) _3Mbps



CH39 (10 Harmonic of the frequency) _3Mbps



CH78 (10 Harmonic of the frequency) _3Mbps