

FCC Radio Test Report

FCC ID: VIXSP260

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

Project No. : 1412113

Equipment: Bluetooth Wireless Speaker

Model Name : SP260

Applicant: Voxx Accessories Corp.

Address : 3502 Woodview Trace, Suite 220 Indianapolis,

IN 46268 USA

Date of Receipt : Dec. 11, 2014

Date of Test : Dec. 11, 2014~Dec. 29, 2014

Issued Date : Dec. 30, 2014

Tested by : BTL Inc.

Testing Engineer : Savid Man

(David Mao)

Technical Manager :

(Leo Hung)

Authorized Signatory

(Steven Lu)

BTLINC.

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

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

Report No.: BTL-FCCP-1-1412113 Page 1 of 109



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 reports must not be used by the client to claim product endorsement by the authorities or any agency of the 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.

Report No.: BTL-FCCP-1-1412113 Page 2 of 109



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 TEST	ED 13
3.5 DESCRIPTION OF SUPPORT UNITS	13
4 . EMC EMISSION TEST	14
4.1 CONDUCTED EMISSION MEASUREMENT	14
4.1.1 POWER LINE CONDUCTED EMISSION LIMITS 4.1.2 TEST PROCEDURE	14 14
4.1.3 DEVIATION FROM TEST STANDARD	14
4.1.4 TEST SETUP	15
4.1.5 EUT OPERATING CONDITIONS 4.1.6 EUT TEST CONDITIONS	15 15
4.1.7 TEST RESULTS	15
4.2 RADIATED EMISSION MEASUREMENT	16
4.2.1 RADIATED EMISSION LIMITS 4.2.2 TEST PROCEDURE	16 17
4.2.3 DEVIATION FROM TEST STANDARD	17
4.2.4 TEST SETUP	18
4.2.5 EUT OPERATING CONDITIONS 4.2.6 EUT TEST CONDITIONS	19 19
4.2.7 TEST RESULTS (9KHZ TO 30MHZ)	19
4.2.8 TEST RESULTS (BETWEEN 30MHZ TO 1000 MHZ)	20
4.2.9 TEST RESULTS (ABOVE 1000 MHZ)	20
5 . NUMBER OF HOPPING CHANNEL	21
5.1 APPLIED PROCEDURES 5.1.1 TEST PROCEDURE	21 21
5.1.2 DEVIATION FROM STANDARD	21
5.1.3 TEST SETUP	21
5.1.4 EUT OPERATION CONDITIONS 5.1.5 EUT TEST CONDITIONS	21 21
5.1.6 TEST RESULTS	21

Report No.: BTL-FCCP-1-1412113 Page 3 of 109



Table of Contents	Page
6 . AVERAGE TIME OF OCCUPANCY	22
6.1 APPLIED PROCEDURES / LIMIT	22
6.1.1 TEST PROCEDURE	22
6.1.2 DEVIATION FROM STANDARD	22
6.1.3 TEST SETUP	22
6.1.4 EUT OPERATION CONDITIONS 6.1.5 EUT TEST CONDITIONS	23 23
6.1.6 TEST RESULTS	23
7. HOPPING CHANNEL SEPARATION MEASUREMENT	24
7.1 APPLIED PROCEDURES / LIMIT	24
7.1.1 TEST PROCEDURE	24
7.1.2 DEVIATION FROM STANDARD	24
7.1.3 TEST SETUP	24
7.1.4 EUT TEST CONDITIONS	24
7.1.5 TEST RESULTS	24
8 . BANDWIDTH TEST	25
8.1 APPLIED PROCEDURES	25
8.1.1 TEST PROCEDURE	25
8.1.2 DEVIATION FROM STANDARD	25
8.1.3 TEST SETUP 8.1.4 EUT OPERATION CONDITIONS	25 25
8.1.5 EUT TEST CONDITIONS	25 25
8.1.6 TEST RESULTS	25
9 . PEAK OUTPUT POWER TEST	26
9.1 APPLIED PROCEDURES / LIMIT	26
9.1.1 TEST PROCEDURE	26
9.1.2 DEVIATION FROM STANDARD	26
9.1.3 TEST SETUP	26
9.1.4 EUT OPERATION CONDITIONS	26
9.1.5 EUT TEST CONDITIONS 9.1.6 TEST RESULTS	26 26
10 . ANTENNA CONDUCTED SPURIOUS EMISSION	27
10.1 APPLIED PROCEDURES / LIMIT 10.1.1 TEST PROCEDURE	27 27
10.1.1 TEST PROCEDURE 10.1.2 DEVIATION FROM STANDARD	27 27
10.1.2 DEVIATION FROM STANDARD	27 27
10.1.4 EUT OPERATION CONDITIONS	27
10.1.5 EUT TEST CONDITIONS	27
10.1.6 TEST RESULTS	27
11 . MEASUREMENT INSTRUMENTS LIST	28

Report No.: BTL-FCCP-1-1412113 Page 4 of 109



Table of Contents	Page
12 . EUT TEST PHOTO	30
ATTACHMENT A - CONDUCTED EMISSION	34
ATTACHMENT B - RADIATED EMISSION (9KHZ-30MHZ)	37
ATTACHMENT C - RADIATED EMISSION (30MHZ TO 1000MHZ)	39
ATTACHMENT D - RADIATED EMISSION (ABOVE 1000MHZ)	46
ATTACHMENT E - NUMBER OF HOPPING CHANNEL	71
ATTACHMENT F - AVERAGE TIME OF OCCUPANCY	73
ATTACHMENT G - HOPPING CHANNEL SEPARATION MEASUREMENT	86
ATTACHMENT H - BANDWIDTH	91
ATTACHMENT I - PEAK OUTPUT POWER	96
ATTACHMENT J - ANTENNA CONDUCTED SPURIOUS EMISSION	101

Report No.: BTL-FCCP-1-1412113 Page 5 of 109



REPORT ISSUED HISTORY

Issued No.	Description	Issued Date
BTL-FCCP-1-1412113	Original Issue.	Dec. 30, 2014

Report No.: BTL-FCCP-1-1412113 Page 6 of 109



1. CERTIFICATION

Equipment : Bluetooth Wireless Speaker

Brand Name: 808 Model Name: SP260

Applicant Voxx Accessories Corp.

Manufacturer: Dong Guan Lightion Electronics Co., LTD

Address : Meilin District 523823, Dalingshan, Dongguan City, Guangdong Province,

China

Factory : Dong Guan Lightion Electronics Co., LTD

Address Meilin District 523823, Dalingshan, Dongguan City, Guangdong Province,

China

Date of Test : Dec. 11, 2014~Dec. 29, 2014 Test Sample : ENGINEERING SAMPLE

Standard(s) : FCC Part15, Subpart C : 2013 (15.247) / ANSI C63.4 : 2009 /

FCC Public Notice DA 00-705, March 30, 2000.

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.

The test data, data evaluation, and equipment configuration contained in our test report (Ref No. BTL-FCCP-1-1412113) 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).

Report No.: BTL-FCCP-1-1412113 Page 7 of 109



2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

Applied Standard(s): 47 CFR Part 15, Subpart C: 2013				
Standard(s) Section FCC	Test Item	Judgment	Remark	
15.207	Conducted Emission	PASS		
15.247(d)	Antenna conducted Spurious Emission	PASS		
15.247 (a)(1)	Hopping Channel Separation	PASS		
15.247 (b)(1)	Peak Output Power	PASS		
15.247(d) 15.209	Radiated Spurious Emission	PASS		
15.247 (a)(1)(iii)	Number of Hopping Frequency	PASS		
15.247 (a)(1)(iii)	Dwell Time	PASS		
15.205	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.

Report No.: BTL-FCCP-1-1412113 Page 8 of 109



2.1 TEST FACILITY

The test facilities used to collect the test data in this report is **DG-C02/DG-CB03** at the location of No.3, Jinshagang 1st Road, Shixia, Dalang Town, Dong Guan, Guangdong, China.523792 BTL's test firm number for FCC: 319330

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 reported uncertainty of measurement $\mathbf{y} \pm \mathbf{U}$, where expended uncertainty \mathbf{U} is based on a standard uncertainty multiplied by a coverage factor of $\mathbf{k=2}$, 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
		9KHz~30MHz	V	3.79	
		9KHz~30MHz	Н	3.57	
		30MHz ~ 200MHz	V	3.82	
		30MHz ~ 200MHz	Н	3.60	
DG-CB03	CISPR	200MHz ~ 1,000MHz	V	3.86	
DG-CD03	CISEIX	200MHz ~ 1,000MHz	Н	3.94	
		1GHz~18GHz	V	3.12	
		1GHz~18GHz	Н	3.68	
		18GHz~40GHz	V	4.15	
		18GHz~40GHz	Н	4.14	

Report No.: BTL-FCCP-1-1412113 Page 9 of 109



3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Equipment	Bluetooth Wireless Speaker		
Brand Name	808		
Model Name	SP260		
Model Difference	N/A		
	Operation Frequency	2402~2480 MHz	
	Modulation Technology	GFSK(1Mbps)	
Output Power (Max.)	Bit Rate of Transmitter	π /4-DQPSK(2Mbps) 8-DPSK(3Mbps)	
	Output Power Max. 0.59 dBm(1Mbps) 0.63 dBm(3Mbps)		
Power Source	#1 Supplied from Li-ion battery Model: MLP901953 #2 Supplied from USB port #3 DC Voltage supplied from AC/DC adapter.(supplied unit)		
Power Rating	#1 DC 3.7V 950mAh 3.515Wh #2 DC 5V #3 I/P:AC 100-240V 50/60Hz 0.1A O/P: DC 5V 1A		

Note:

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

Report No.: BTL-FCCP-1-1412113 Page 10 of 109



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 PCB N/A -1.88

Report No.: BTL-FCCP-1-1412113 Page 11 of 109



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	Normal Link

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	Normal Link

	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) The battery is worst for radiated emission test.

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	BK3256 RF Test_V1.3		
Frequency (MHz)	2402	2441	2480
Parameters	3	3	3

3Mbps

Test Software Version	BK3256 RF Test_V1.3		
Frequency (MHz)	2402	2441	2480
Parameters	3	3	3

Report No.: BTL-FCCP-1-1412113 Page 12 of 109



3.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED **EUT** 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 Shielded Type Item Ferrite Core Length Note

Report No.: BTL-FCCP-1-1412113 Page 13 of 109



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.

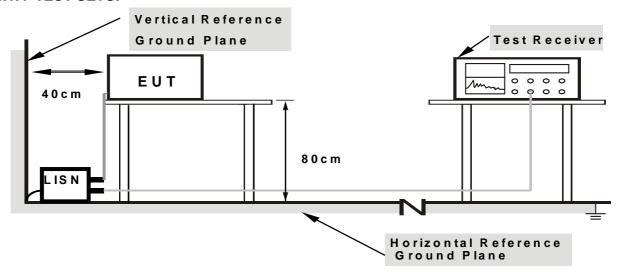
4.1.3 DEVIATION FROM TEST STANDARD

No deviation

Report No.: BTL-FCCP-1-1412113 Page 14 of 109



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 I 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.

Report No.: BTL-FCCP-1-1412113 Page 15 of 109



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, then the 15.209(a) limit in the table below has to be followed.

Frequency	Field Strength	Measurement Distance
(MHz)	(microvolts/meter)	(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)

Fraguency (MHz)	dB(uV/m) (at 3 meters)		
Frequency (MHz)	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	4 MHz / 4 MHz for Dook 4 MHz / 40Hz for Average	
(emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average	

Report No.: BTL-FCCP-1-1412113 Page 16 of 109



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 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.(above 1GHz)
- c. The height of the equipment or of the substitution antenna shall be 0.8 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. 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

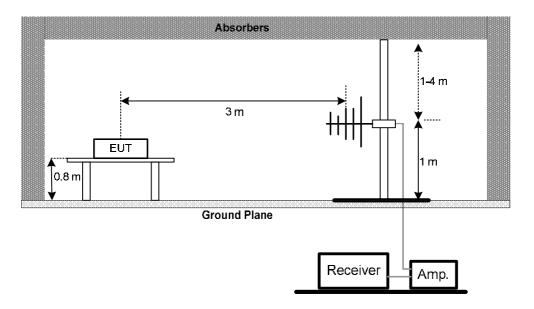
No deviation

Report No.: BTL-FCCP-1-1412113 Page 17 of 109

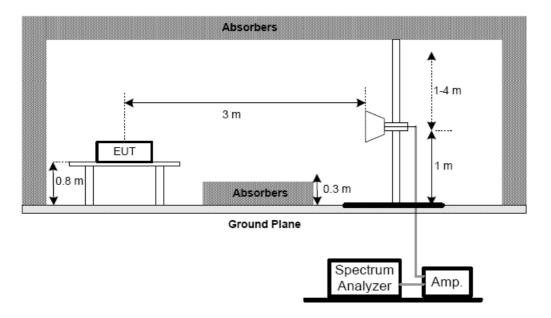


4.2.4 TEST SETUP

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



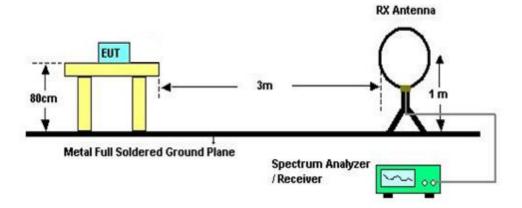
(B) Radiated Emission Test Set-Up Frequency Above 1 GHz



Report No.: BTL-FCCP-1-1412113 Page 18 of 109



(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: DC 3.7V

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.

Report No.: BTL-FCCP-1-1412113 Page 19 of 109



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.

Report No.: BTL-FCCP-1-1412113 Page 20 of 109



5. NUMBER OF HOPPING CHANNEL

5.1 APPLIED PROCEDURES

FCC Part15 (15.247) , Subpart C			
Section Test Item		Frequency Range (MHz)	Result
15.247(a)(1)(iii)	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

EUT	SPECTRUM
	ANALYZER

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: DC 3.7V

5.1.6 TEST RESULTS

Please refer to the Attachment E

Report No.: BTL-FCCP-1-1412113 Page 21 of 109



6. AVERAGE TIME OF OCCUPANCY

6.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(1)(iii)	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 $3.37 \times 31.6 = 106.6$ 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

EUT	SPECTRUM
	ANALYZER

Report No.: BTL-FCCP-1-1412113 Page 22 of 109



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: DC 3.7V

6.1.6 TEST RESULTS

Please refer to the Attachment F

Report No.: BTL-FCCP-1-1412113 Page 23 of 109



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

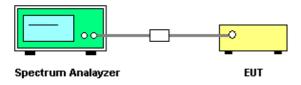
Detector function = Peak

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: DC 3.7V

7.1.5 TEST RESULTS

Please refer to the Attachment G

Page 24 of 109 Report No.: BTL-FCCP-1-1412113



8. BANDWIDTH TEST

8.1 APPLIED PROCEDURES

FCC Part15 (15.247), Subpart C					
Section	Test Item	Frequency Range (MHz)			
15.247(a)(2)	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

EUT	SPECTRUM
	ANALYZER

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: DC 3.7V

8.1.6 TEST RESULTS

Please refer to the Attachment H

Report No.: BTL-FCCP-1-1412113 Page 25 of 109



9. PEAK OUTPUT POWER TEST

9.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247), Subpart C					
Section	Test Item	Limit	Frequency Range (MHz)	Result	
15.247(b)(1)	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

EUT	SPECTRUM
	ANALYZER

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: DC 3.7V

9.1.6 TEST RESULTS

Please refer to the Attachment I

Report No.: BTL-FCCP-1-1412113 Page 26 of 109



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 intentional radiator is operating, the radio frequency power that is produced by the intentional radiator 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 measurement, provided 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

EUT	SPECTRUM
	ANALYZER

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: DC 3.7V

10.1.6 TEST RESULTS

Please refer to the Attachment J

Report No.: BTL-FCCP-1-1412113 Page 27 of 109



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. 29, 2015		
2	LISN	R&S	ENV216	101447	Mar. 29, 2015		
3	Test Cable	N/A	C_17	N/A	Mar. 14, 2015		
4	EMI TEST RECEIVER	R&S	ESCS30	833364/017	Mar. 29, 2015		
5	50Ω Terminator	SHX	TF2-3G-A	08122902	Mar. 29, 2015		

	Radiated Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until	
1	Antenna	Schwarbeck	VULB9160	9160-3232	Mar. 29, 2015	
2	Amplifier	HP	8447D	2944A09673	Mar. 29, 2015	
3	Test Receiver	R&S	ESCI	100382	Mar. 29, 2015	
4	Test Cable	N/A	C-01_CB03	N/A	Jul. 01, 2015	
5	Antenna	ETS	3115	00075789	Mar. 29, 2015	
6	Amplifier	Agilent	8449B	3008A02274	Mar. 29, 2015	
7	Spectrum	Agilent	E4408B	US39240143	Nov. 08, 2015	
8	Test Cable	HUBER+SUHNER	C-45	N/A	Mar. 29, 2015	
9	Controller	СТ	SC100	N/A	N/A	
10	Horn Antenna	EMCO	3115	9605-4803	Mar. 29, 2015	
11	Active Loop Antenna	R&S	HFH2-Z2	830749/020	Mar. 29, 2015	

Report No.: BTL-FCCP-1-1412113 Page 28 of 109



	Number of Hopping Channel					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until	
1	Spectrum Analyzer	R&S	FSP 40	100185	Oct. 22, 2015	

Average Time of Occupancy					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Oct. 22, 2015

	Hopping Channel Separation Measurement				
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Oct. 22, 2015

Bandwidth					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Oct. 22, 2015

Peak Output Power					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Oct. 22, 2015

Antenna Conducted Spurious Emission					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Oct. 22, 2015

Remark: "N/A" denotes no model name, serial no. or calibration specified.

All calibration period of equipment list is one year.

Report No.: BTL-FCCP-1-1412113 Page 29 of 109



12. EUT TEST PHOTO







Report No.: BTL-FCCP-1-1412113 Page 30 of 109



Radiated Measurement Photos

9KHz to 30MHz





Report No.: BTL-FCCP-1-1412113 Page 31 of 109



Radiated Measurement Photos

30MHz to 1000MHz





Report No.: BTL-FCCP-1-1412113 Page 32 of 109



Radiated Measurement Photos

Above 1000MHz





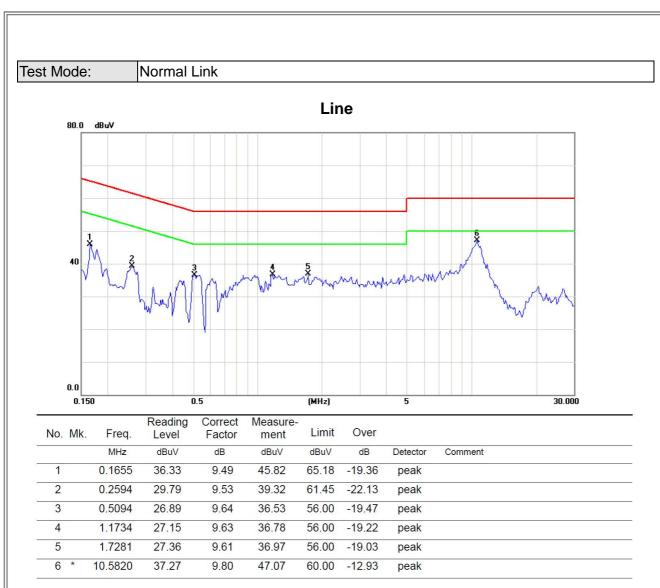
Report No.: BTL-FCCP-1-1412113 Page 33 of 109



ATTACHMENT A - CONDUCTED EMISSION

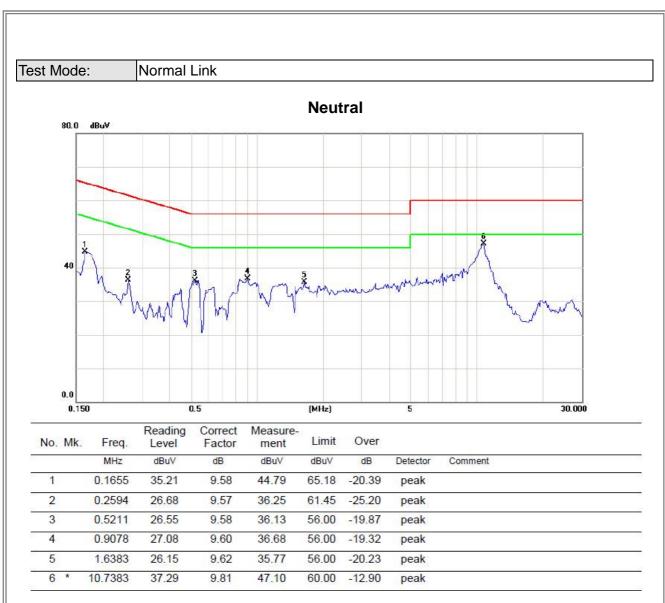
Report No.: BTL-FCCP-1-1412113 Page 34 of 109





Report No.: BTL-FCCP-1-1412113 Page 35 of 109





Report No.: BTL-FCCP-1-1412113 Page 36 of 109



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

Report No.: BTL-FCCP-1-1412113 Page 37 of 109



Test Mode: TX Mode

Freq.	Ant.	Reading(RA)	Corr.Factor(CF)	Measured(FS)	Limits(QP)	Margin	Note
(MHz)	0°/90°	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	NOLE
0.0174	0°	3.15	24.47	27.62	102.81	-75.20	AVG
0.0174	0°	4.28	24.47	28.75	122.81	-94.07	PEAK
0.0255	0°	1.27	23.95	25.22	99.47	-74.25	AVG
0.0255	0°	2.08	23.95	26.03	119.47	-93.44	PEAK
0.0403	0°	0.35	23.01	23.36	95.50	-72.13	AVG
0.0403	0°	1.23	23.01	24.24	115.50	-91.25	PEAK
0.0451	0°	0.15	22.71	22.86	94.52	-71.66	AVG
0.0451	0°	1.18	22.71	23.89	114.52	-90.63	PEAK
0.8613	0°	21.36	20.15	41.51	68.90	-27.39	QP
2.3716	0°	26.49	19.28	45.77	69.54	-23.77	QP

Freq.	Ant.	Reading(RA)	Corr.Factor(CF)	Measured(FS)	Limits(QP)	Margin	Note
(MHz)	0°/90°	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	Note
0.0157	90°	8.14	24.30	32.44	123.71	-91.27	AVG
0.0157	90°	9.32	24.30	33.62	143.71	-110.09	PEAK
0.0255	90°	3.72	23.95	27.67	119.47	-91.80	AVG
0.0255	90°	4.53	23.95	28.48	139.47	-110.99	PEAK
0.0311	90°	2.13	23.60	25.73	117.75	-92.02	AVG
0.0311	90°	2.86	23.60	26.46	137.75	-111.29	PEAK
0.0472	90°	1.32	22.58	23.90	114.13	-90.23	AVG
0.0472	90°	2.08	22.58	24.66	134.13	-109.47	PEAK
0.8620	90°	19.63	20.15	39.78	68.89	-29.11	QP
2.1672	90°	25.37	19.40	44.77	69.54	-24.77	QP

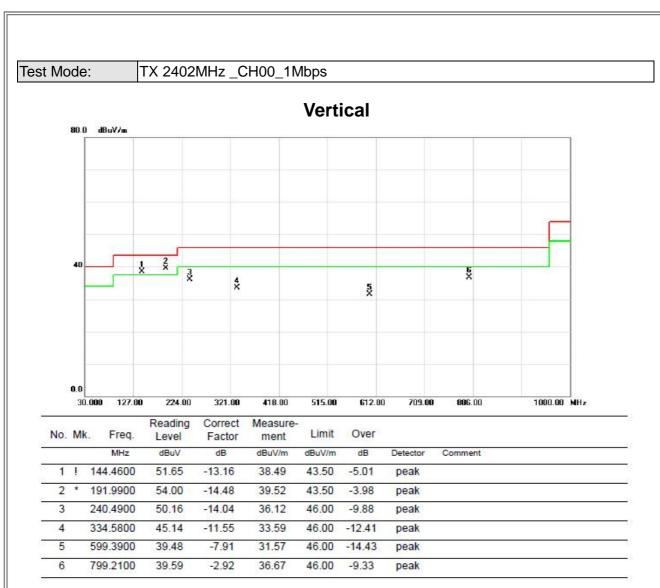
Report No.: BTL-FCCP-1-1412113 Page 38 of 109



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

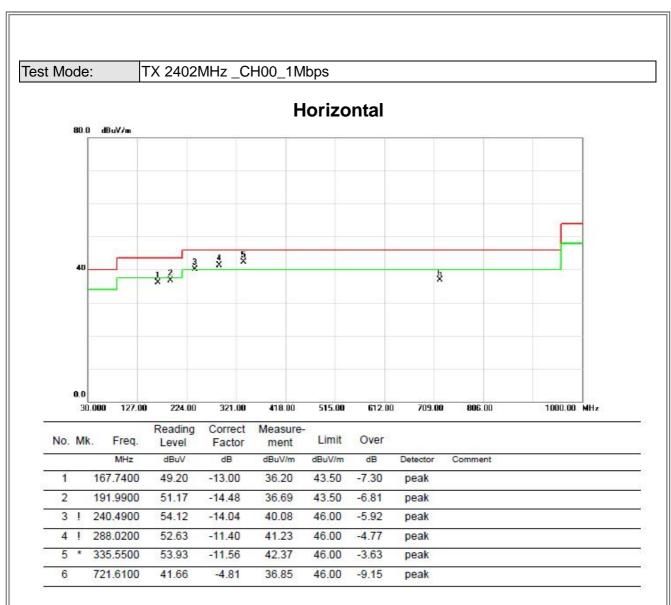
Report No.: BTL-FCCP-1-1412113 Page 39 of 109





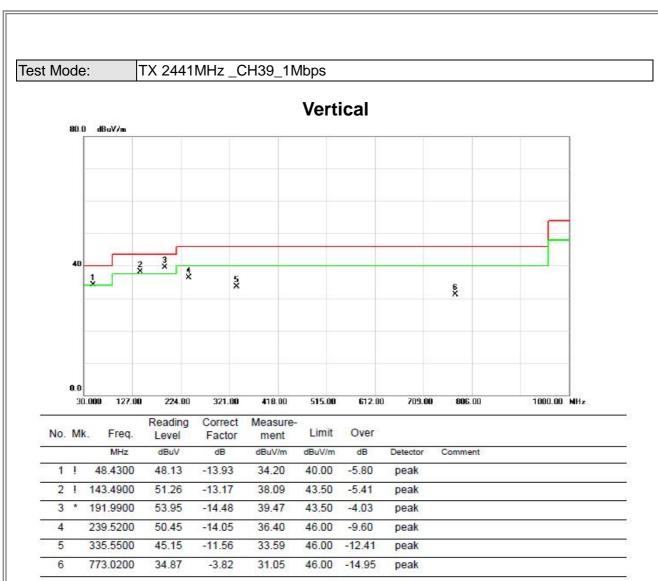
Report No.: BTL-FCCP-1-1412113 Page 40 of 109





Report No.: BTL-FCCP-1-1412113 Page 41 of 109





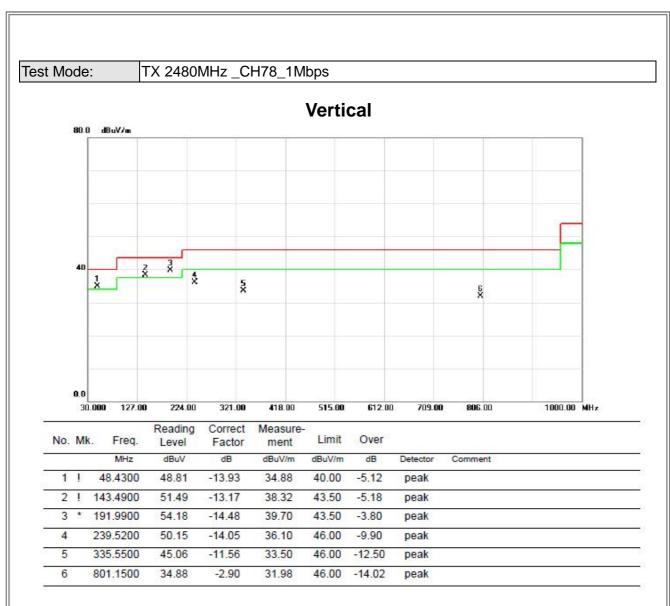
Report No.: BTL-FCCP-1-1412113 Page 42 of 109





Report No.: BTL-FCCP-1-1412113 Page 43 of 109





Report No.: BTL-FCCP-1-1412113 Page 44 of 109





Report No.: BTL-FCCP-1-1412113 Page 45 of 109



ATTACHMENT D - RADIATED EMISSION (ABOVE 1000MHZ)	

Report No.: BTL-FCCP-1-1412113 Page 46 of 109



Orthogonal Axis: X
Test Mode: TX 2402MHz _CH00_1Mbps

No.	Mk	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over			
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment	
1		2390.000	23.05	31.88	54.93	74.00	-19.07	peak		
2		2390.000	13.52	31.88	45.40	54.00	-8.60	AVG		
3	*	2401.800	42.27	31.89	74.16	54.00	20.16	AVG	NO limit	
4	X	2401.850	52.29	31.89	84.18	74.00	10.18	peak	NO limit	

Report No.: BTL-FCCP-1-1412113 Page 47 of 109



Orthogonal Axis: X
Test Mode: TX 2402MHz _CH00_1Mbps

Vertical 80.0 dBuV/m 2 X 1 X

No.	Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over			
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment	
1	*	4803.940	36.79	3.58	40.37	54.00	-13.63	AVG		
2		4804.195	46.84	3.58	50.42	74.00	-23.58	peak		

13750.00

16300.00 18850.00 21400.00

26500.00 MHz

11200.00

0.0

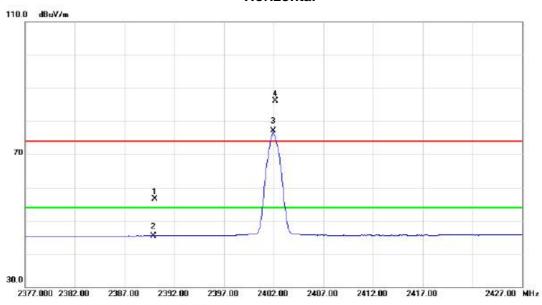
1000.000 3550.00

Report No.: BTL-FCCP-1-1412113 Page 48 of 109



Orthogonal Axis: X
Test Mode: TX 2402MHz _CH00_1Mbps

Horizontal



No.	Mk	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over			
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment	
1		2390.000	24.53	31.88	56.41	74.00	-17.59	peak		
2		2390.000	13.52	31.88	45.40	54.00	-8.60	AVG		
3	*	2401.950	45.14	31.89	77.03	54.00	23.03	AVG	NO limit	
4	Χ	2402.150	54.28	31.89	86.17	74.00	12.17	peak	NO limit	

Report No.: BTL-FCCP-1-1412113 Page 49 of 109



Test Mode: TX 2402MHz _CH00_1Mbps

Horizontal



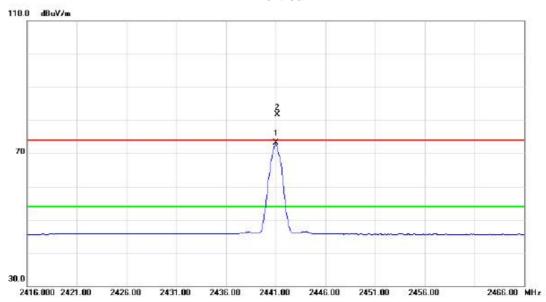
No.	Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over			
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment	
1	*	4803.870	31.96	3.58	35.54	54.00	-18.46	AVG		
2		4804.130	43.00	3.58	46.58	74.00	-27.42	peak		

Report No.: BTL-FCCP-1-1412113 Page 50 of 109



Test Mode: TX 2441MHz _CH39_1Mbps

Vertical



No.	Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over			
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment	
1	*	2441.000	41.08	31.95	73.03	54.00	19.03	AVG	NO limit	
2	Х	2441.150	49.81	31.95	81.76	74.00	7.76	peak	NO limit	

Report No.: BTL-FCCP-1-1412113 Page 51 of 109



Orthogonal Axis: X
Test Mode: TX 2441MHz _CH39_1Mbps

Vertical ### Property of the content of the co

No.	Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over			
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment	
1	*	4882.060	31.96	3.73	35.69	54.00	-18.31	AVG		
2		4882.090	42.85	3.73	46.58	74.00	-27.42	peak		

13750.00

16300.00 18850.00 21400.00

26500.00 MHz

11200.00

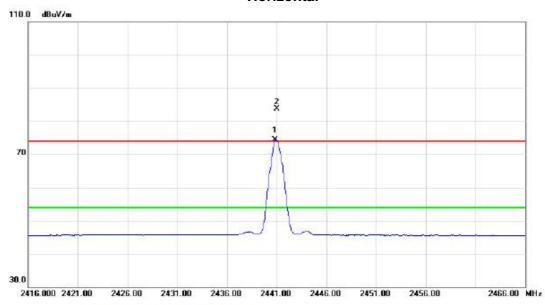
1000.000 3550.00

Report No.: BTL-FCCP-1-1412113 Page 52 of 109



Test Mode: TX 2441MHz _CH39_1Mbps

Horizontal



No.	Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over			
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment	
1	*	2440.800	42.38	31.95	74.33	54.00	20.33	AVG	NO limit	
2	Х	2441.050	51.85	31.95	83.80	74.00	9.80	peak	NO limit	

Report No.: BTL-FCCP-1-1412113 Page 53 of 109



Test Mode: TX 2441MHz _CH39_1Mbps

Horizontal



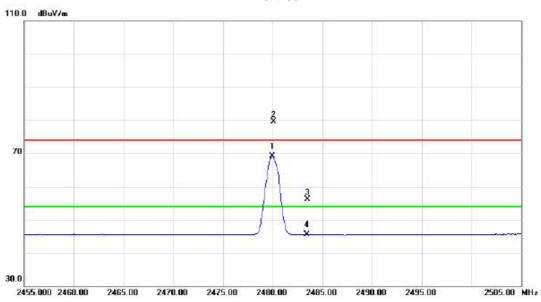
No.	Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over			
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment	
1	*	4881.820	30.24	3.73	33.97	54.00	-20.03	AVG		
2		4881.955	41.05	3.73	44.78	74.00	-29.22	peak		

Report No.: BTL-FCCP-1-1412113 Page 54 of 109



Test Mode: TX 2480MHz _CH78_1Mbps

Vertical



Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over			
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment	
*	2479.950	37.15	32.00	69.15	54.00	15.15	AVG	NO limit	
Х	2480.100	47.60	32.00	79.60	74.00	5.60	peak	NO limit	
	2483.500	24.19	32.01	56.20	74.00	-17.80	peak		
	2483.500	13.48	32.01	45.49	54.00	-8.51	AVG		
	*	MHz * 2479.950 X 2480.100 2483.500	Mk. Freq. Level MHz dBuV * 2479.950 37.15 X 2480.100 47.60 2483.500 24.19	Mk. Freq. Level Factor MHz dBuV dB * 2479.950 37.15 32.00 X 2480.100 47.60 32.00 2483.500 24.19 32.01	Mk. Freq. Level Factor ment MHz dBuV dB dBuV/m * 2479.950 37.15 32.00 69.15 X 2480.100 47.60 32.00 79.60 2483.500 24.19 32.01 56.20	Mk. Freq. Level Factor ment Limit MHz dBuV dB dBuV/m dBuV/m * 2479.950 37.15 32.00 69.15 54.00 X 2480.100 47.60 32.00 79.60 74.00 2483.500 24.19 32.01 56.20 74.00	Mk. Freq. Level Factor ment Limit Over MHz dBuV dB dBuV/m dBuV/m dB * 2479.950 37.15 32.00 69.15 54.00 15.15 X 2480.100 47.60 32.00 79.60 74.00 5.60 2483.500 24.19 32.01 56.20 74.00 -17.80	Mk. Freq. Level Factor ment Limit Over MHz dBuV dB dBuV/m dBuV/m dB Detector * 2479.950 37.15 32.00 69.15 54.00 15.15 AVG X 2480.100 47.60 32.00 79.60 74.00 5.60 peak 2483.500 24.19 32.01 56.20 74.00 -17.80 peak	Mk. Freq. Level Factor ment Limit Over MHz dBuV dB dBuV/m dB uV/m dB Detector Comment * 2479.950 37.15 32.00 69.15 54.00 15.15 AVG NO limit X 2480.100 47.60 32.00 79.60 74.00 5.60 peak NO limit 2483.500 24.19 32.01 56.20 74.00 -17.80 peak

Report No.: BTL-FCCP-1-1412113 Page 55 of 109



Orthogonal Axis: X
Test Mode: TX 2480MHz _CH78_1Mbps

Vertical



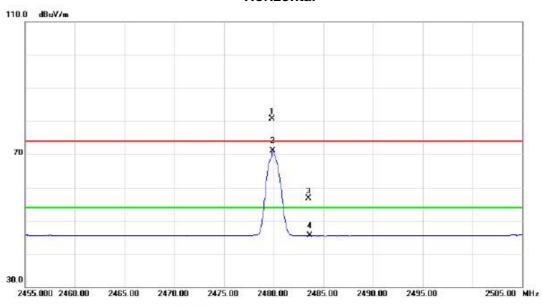
No.	Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4959.880	31.83	3.88	35.71	54.00	-18.29	AVG	
2		4960.155	42.65	3.88	46.53	74.00	-27.47	peak	

Report No.: BTL-FCCP-1-1412113 Page 56 of 109



Test Mode: TX 2480MHz _CH78_1Mbps

Horizontal



No.	Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over			
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment	
1	X	2479.850	48.65	32.00	80.65	74.00	6.65	peak	NO limit	
2	*	2479.900	39.10	32.00	71.10	54.00	17.10	AVG	NO limit	
3		2483.500	24.65	32.01	56.66	74.00	-17.34	peak		
4		2483.500	13.41	32.01	45.42	54.00	-8.58	AVG		

Report No.: BTL-FCCP-1-1412113 Page 57 of 109



Orthogonal Axis: X
Test Mode: TX 2480MHz _CH78_1Mbps

Horizontal



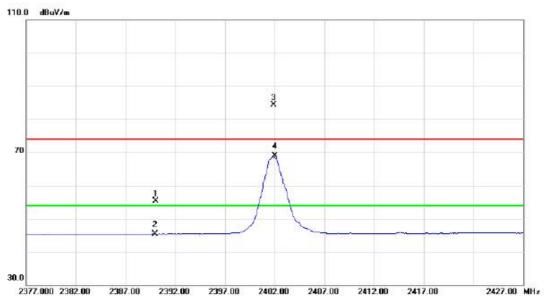
No.	Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over			
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment	
1	*	4960.025	29.97	3.88	33.85	54.00	-20.15	AVG		
2		4960.190	41.58	3.88	45.46	74.00	-28.54	peak		

Report No.: BTL-FCCP-1-1412113 Page 58 of 109



Test Mode: TX 2402MHz _CH00_3Mbps

Vertical



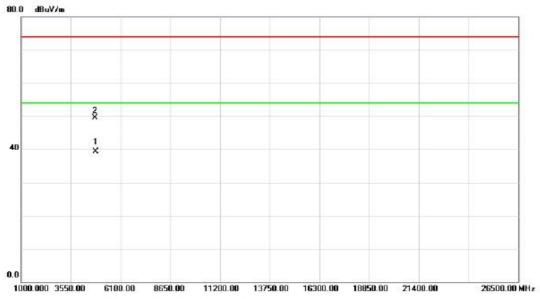
No.	Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over			
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment	
1		2390.000	23.34	31.88	55.22	74.00	-18.78	peak		
2		2390.000	13.49	31.88	45.37	54.00	-8.63	AVG		
3	X	2401.900	52.46	31.89	84.35	74.00	10.35	peak	NO limit	
4	*	2402.000	36.93	31.89	68.82	54.00	14.82	AVG	NO limit	

Report No.: BTL-FCCP-1-1412113 Page 59 of 109



Orthogonal Axis: X
Test Mode: TX 2402MHz _CH00_3Mbps

Vertical



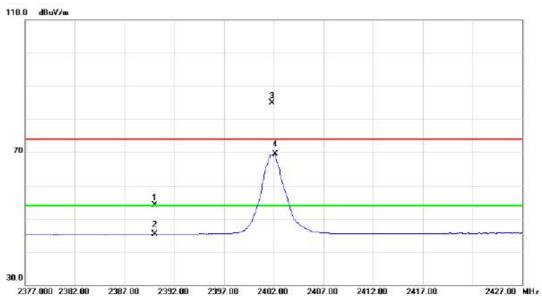
No.	Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over			
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment	
1	*	4803.960	35.63	3.58	39.21	54.00	-14.79	AVG		
2		4804.050	45.96	3.58	49.54	74.00	-24.46	peak		

Report No.: BTL-FCCP-1-1412113 Page 60 of 109



Orthogonal Axis: X
Test Mode: TX 2402MHz _CH00_3Mbps

Horizontal



No.	Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over			
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment	
1		2390.000	22.20	31.88	54.08	74.00	-19.92	peak		
2		2390.000	13.49	31.88	45.37	54.00	-8.63	AVG		
3	X	2401.800	52.95	31.89	84.84	74.00	10.84	peak	NO limit	
4	*	2402.150	37.58	31.89	69.47	54.00	15.47	AVG	NO limit	

Report No.: BTL-FCCP-1-1412113 Page 61 of 109



Test Mode: TX 2402MHz _CH00_3Mbps

Horizontal



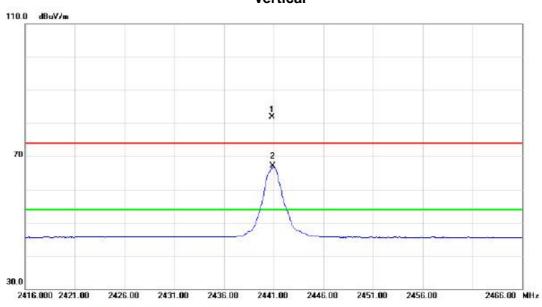
No.	Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over			
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment	
1	*	4804.060	32.18	3.58	35.76	54.00	-18.24	AVG		
2		4804.170	43.75	3.58	47.33	74.00	-26.67	peak		

Report No.: BTL-FCCP-1-1412113 Page 62 of 109



Test Mode: TX 2441MHz _CH39_3Mbps

Vertical



No.	Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over			
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment	
1	X	2440.850	49.95	31.95	81.90	74.00	7.90	peak	NO limit	
2	*	2440.900	35.14	31.95	67.09	54.00	13.09	AVG	NO limit	

Report No.: BTL-FCCP-1-1412113 Page 63 of 109



Orthogonal Axis: X
Test Mode: TX 2441MHz _CH39_3Mbps

Vertical



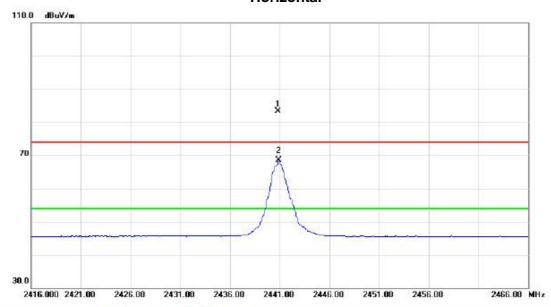
No.	Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4882.010	32.53	3.73	36.26	54.00	-17.74	AVG	
2		4882.065	43.18	3.73	46.91	74.00	-27.09	peak	

Report No.: BTL-FCCP-1-1412113 Page 64 of 109



Test Mode: TX 2441MHz _CH39_3Mbps

Horizontal



No.	Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over			
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment	
1	X	2440.800	51.26	31.95	83.21	74.00	9.21	peak	NO limit	
2	*	2440.900	36.49	31.95	68.44	54.00	14.44	AVG	NO limit	

Report No.: BTL-FCCP-1-1412113 Page 65 of 109



Test Mode: TX 2441MHz _CH39_3Mbps

Horizontal



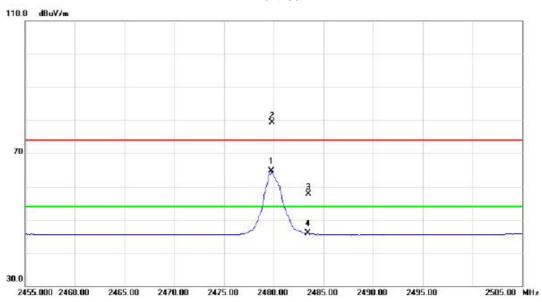
No.	Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over			
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment	
1		4881.970	42.71	3.73	46.44	74.00	-27.56	peak		
2	*	4882.020	31.05	3.73	34.78	54.00	-19.22	AVG		

Report No.: BTL-FCCP-1-1412113 Page 66 of 109



Test Mode: TX 2480MHz _CH78_3Mbps

Vertical



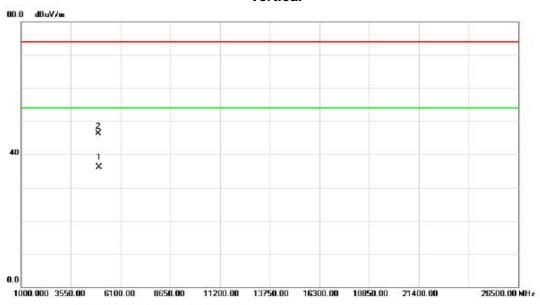
No.	Mk	c. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over			
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment	
1	*	2479.750	32.64	32.00	64.64	54.00	10.64	AVG	NO limit	
2	Х	2479.850	47.28	32.00	79.28	74.00	5.28	peak	NO limit	
3		2483.500	25.63	32.01	57.64	74.00	-16.36	peak		
4		2483.500	13.83	32.01	45.84	54.00	-8.16	AVG		

Report No.: BTL-FCCP-1-1412113 Page 67 of 109



Orthogonal Axis: X
Test Mode: TX 2480MHz _CH78_3Mbps

Vertical



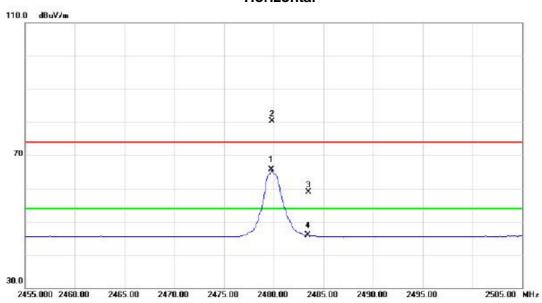
No.	Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4959.930	32.15	3.88	36.03	54.00	-17.97	AVG	
2		4960.025	42.37	3.88	46.25	74.00	-27.75	peak	

Report No.: BTL-FCCP-1-1412113 Page 68 of 109



Orthogonal Axis: X
Test Mode: TX 2480MHz _CH78_3Mbps

Horizontal



No.	Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over			
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment	
1	*	2479.750	33.64	32.00	65.64	54.00	11.64	AVG	NO limit	
2	Х	2479.800	48.27	32.00	80.27	74.00	6.27	peak	NO limit	
3		2483.500	26.83	32.01	58.84	74.00	-15.16	peak		
4		2483.500	13.82	32.01	45.83	54.00	-8.17	AVG		

Report No.: BTL-FCCP-1-1412113 Page 69 of 109



Orthogonal Axis: X
Test Mode: TX 2480MHz _CH78_3Mbps

Horizontal



No.	Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4960.072	29.33	3.88	33.21	54.00	-20.79	AVG	
2		4960.110	42.15	3.88	46.03	74.00	-27.97	peak	

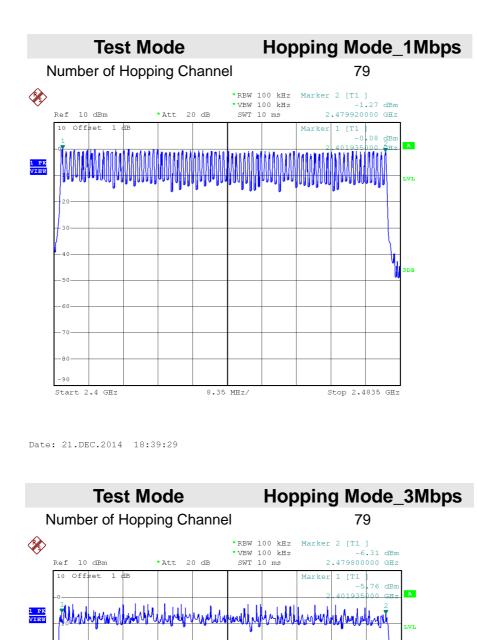
Report No.: BTL-FCCP-1-1412113 Page 70 of 109

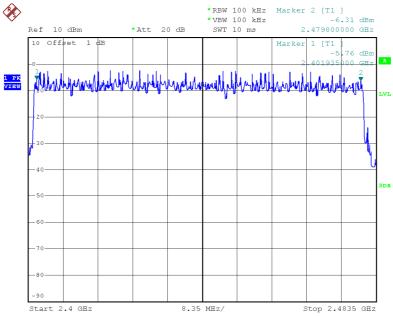


ATTACHMENT E - NUMBER OF HOPPING CHANNEL

Report No.: BTL-FCCP-1-1412113 Page 71 of 109







Date: 21.DEC.2014 19:07:04



ATTACHMENT F - AVERAGE TIME OF OCCUPANCY					

Report No.: BTL-FCCP-1-1412113 Page 73 of 109

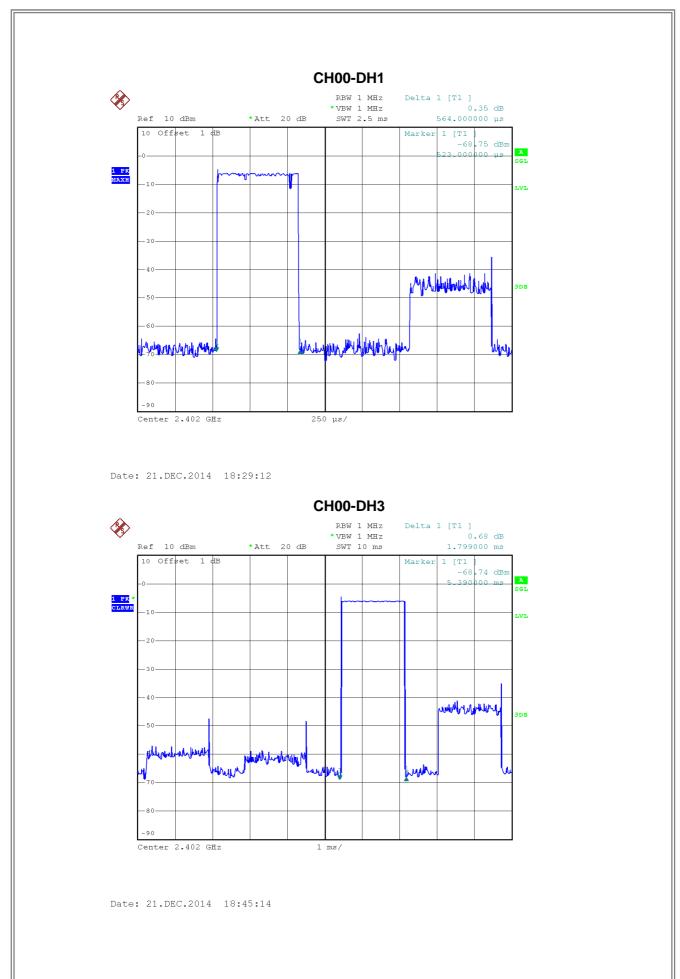


Test Mode : TX Mode_1Mbps

Data Packet	Frequency	Pulse Duration	Dwell Time	Limits	Test
Data Packet	(MHz)	(ms)	(s)	(s)	Result
DH5	2402	2.9590	0.3156	0.4000	Complies
DH3	2402	1.7990	0.2878	0.4000	Complies
DH1	2402	0.5640	0.1805	0.4000	Complies
DH5	2441	2.9990	0.3199	0.4000	Complies
DH3	2441	1.7590	0.2814	0.4000	Complies
DH1	2441	0.5690	0.1821	0.4000	Complies
DH5	2480	2.9600	0.3157	0.4000	Complies
DH3	2480	1.7390	0.2782	0.4000	Complies
DH1	2480	0.3690	0.1181	0.4000	Complies

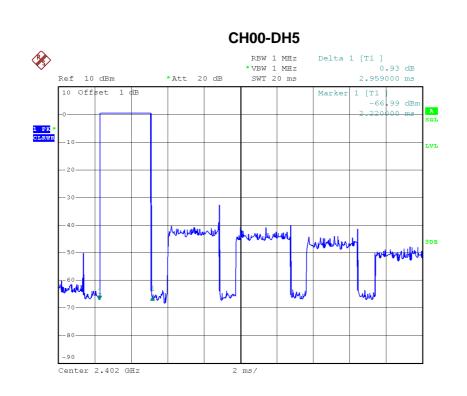
Report No.: BTL-FCCP-1-1412113 Page 74 of 109





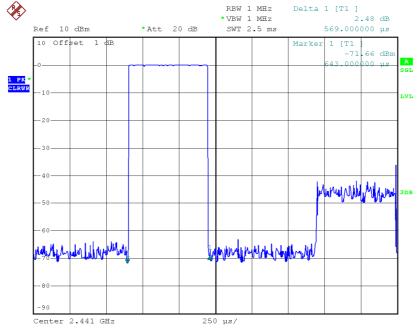
Report No.: BTL-FCCP-1-1412113 Page 75 of 109





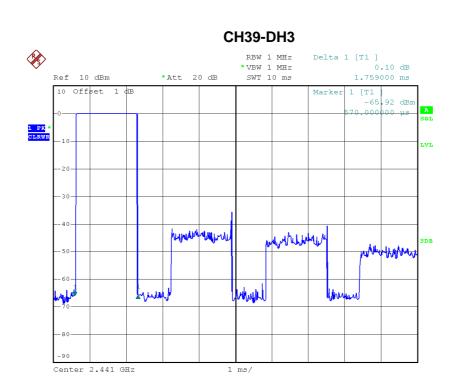
Date: 21.DEC.2014 18:47:06

CH39-DH1

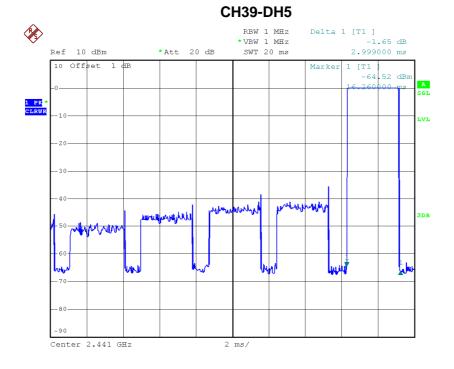


Date: 21.DEC.2014 18:29:25



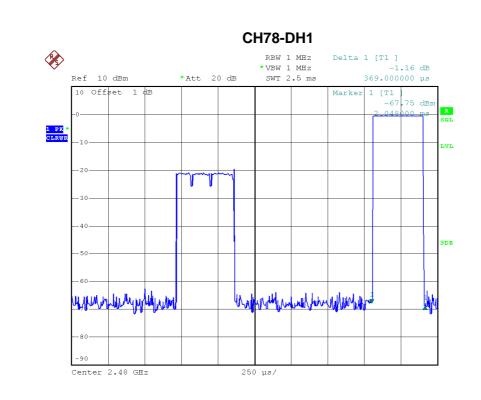


Date: 21.DEC.2014 18:45:29

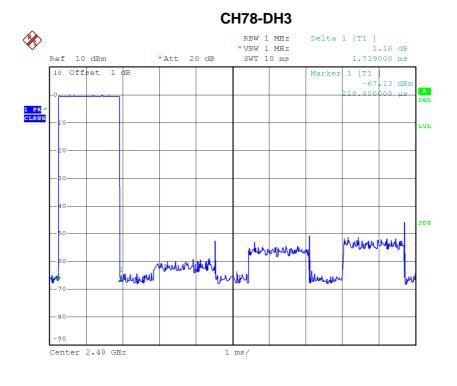


Date: 21.DEC.2014 18:47:49



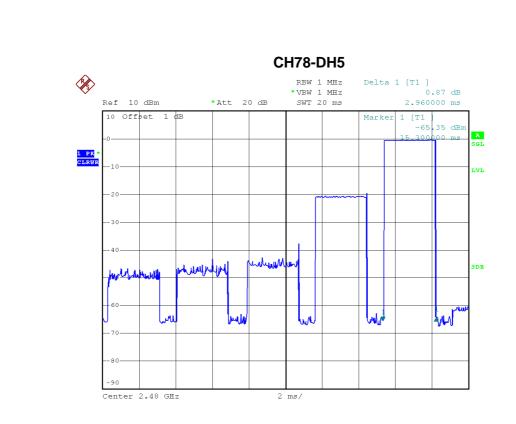


Date: 21.DEC.2014 18:29:34



Date: 21.DEC.2014 18:45:41





Date: 21.DEC.2014 18:49:53

Report No.: BTL-FCCP-1-1412113 Page 79 of 109

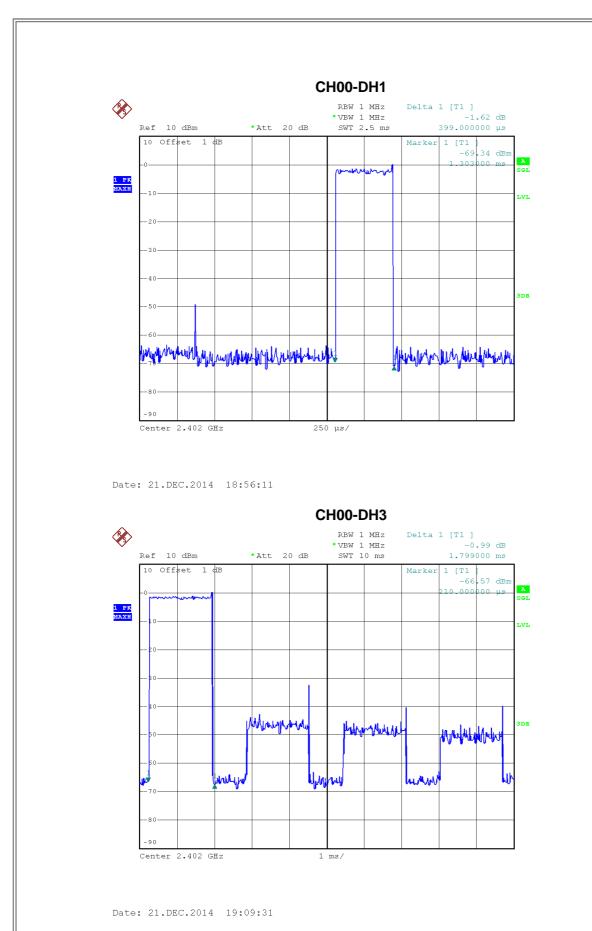


Test Mode : TX Mode_3Mbps

Data Packet	Frequency	Pulse Duration	Dwell Time	Limits	Test
Dala Packel	(MHz)	(ms)	(s)	(s)	Result
DH5	2402	3.1190	0.3327	0.4000	Complies
DH3	2402	1.7990	0.2878	0.4000	Complies
DH1	2402	0.3990	0.1277	0.4000	Complies
DH5	2441	3.1190	0.3327	0.4000	Complies
DH3	2441	1.7990	0.2878	0.4000	Complies
DH1	2441	0.3690	0.1181	0.4000	Complies
DH5	2480	3.0390	0.3242	0.4000	Complies
DH3	2480	1.7600	0.2816	0.4000	Complies
DH1	2480	0.3740	0.1197	0.4000	Complies

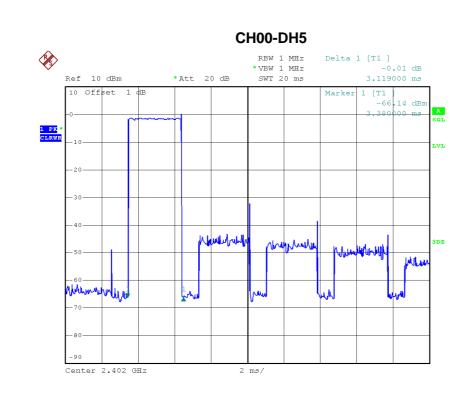
Report No.: BTL-FCCP-1-1412113 Page 80 of 109





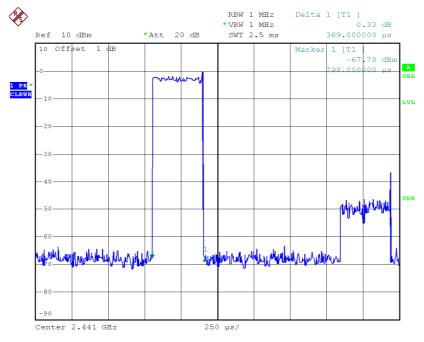
Report No.: BTL-FCCP-1-1412113 Page 81 of 109





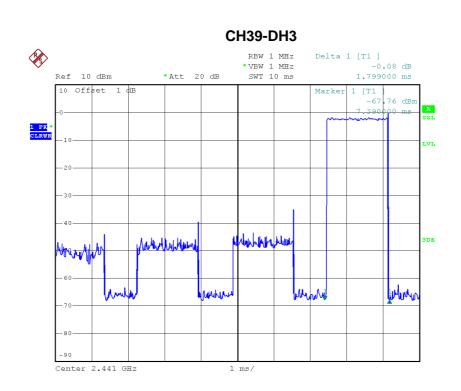
Date: 21.DEC.2014 19:10:36

CH39-DH1

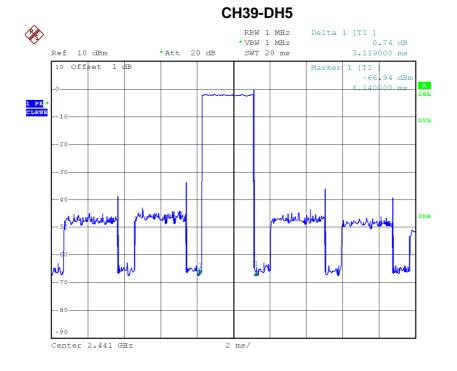


Date: 21.DEC.2014 18:56:19



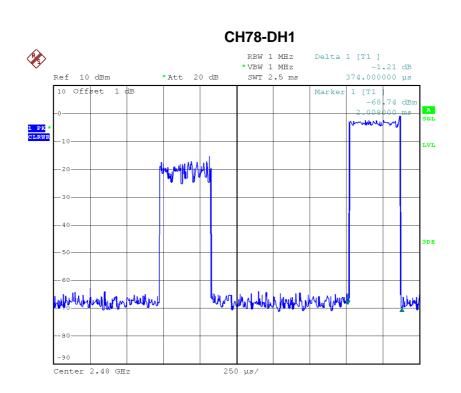


Date: 21.DEC.2014 19:09:58



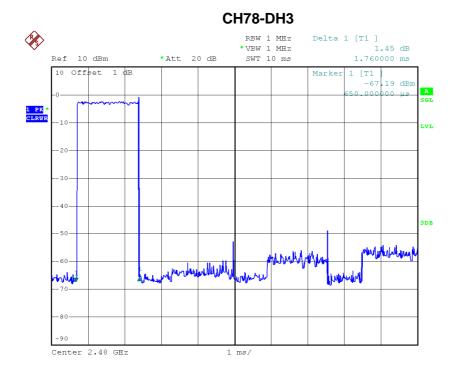
Date: 21.DEC.2014 19:10:54





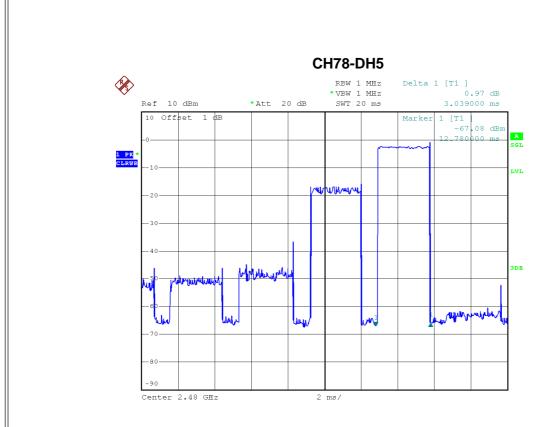
Date: 21.DEC.2014 18:56:26

Date: 21.DEC.2014 19:10:09



Report No.: BTL-FCCP-1-1412113





Date: 21.DEC.2014 19:11:08



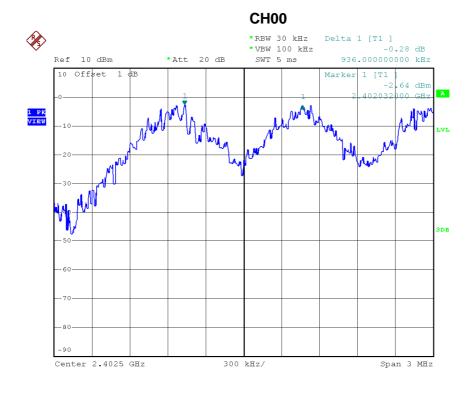
ATTACHMENT G - HOPPING CHANNEL SEPARATION MEASUREMENT

Report No.: BTL-FCCP-1-1412113 Page 86 of 109



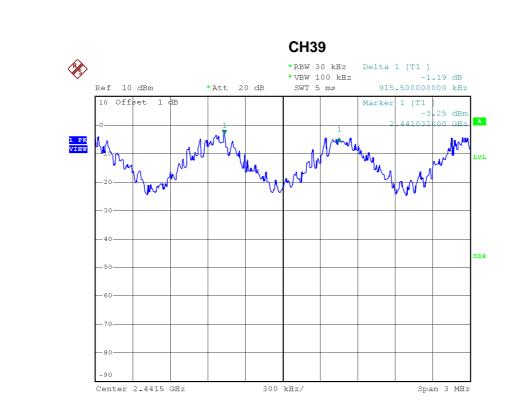
Test Mode : Hopping on _1Mbps

Frequency (MHz)	Channel Separation (MHz)	2/3 of 20dB Bandwidth (MHz)	Test Result
2402	0.936	0.641	Complies
2441	0.915	0.630	Complies
2480	0.964	0.604	Complies

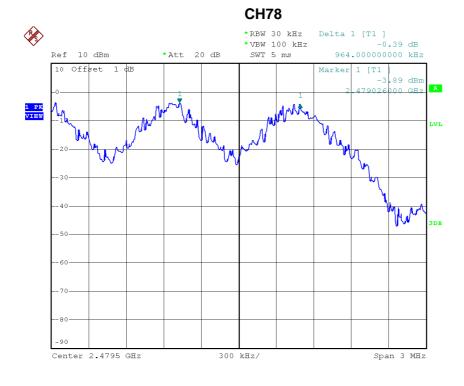


Date: 21.DEC.2014 18:30:39





Date: 21.DEC.2014 18:31:47



Date: 21.DEC.2014 18:32:54



Test Mode : Hopping on _3Mbps

Frequency	•	2/3 of 20dB Bandwidth	Test Result
(MHz)	(MHz)	(MHz)	1 oot 1 toodit
2402	1.305	0.913	Complies
2441	0.978	0.904	Complies
2480	1.068	0.884	Complies

300 kHz/

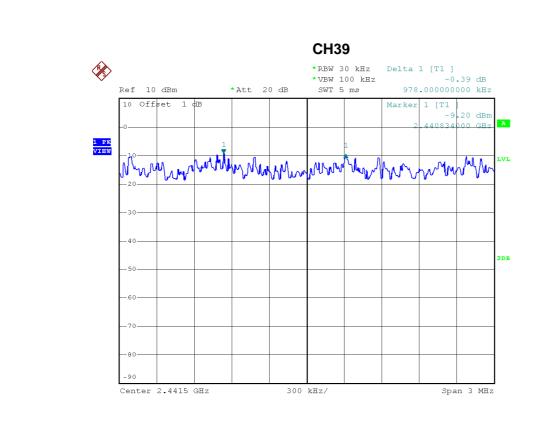
Span 3 MHz

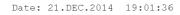
Date: 21.DEC.2014 18:57:36

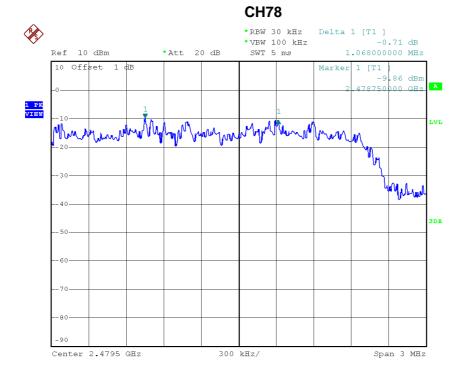
Center 2.4025 GHz

Report No.: BTL-FCCP-1-1412113 Page 89 of 109









Date: 21.DEC.2014 19:02:40



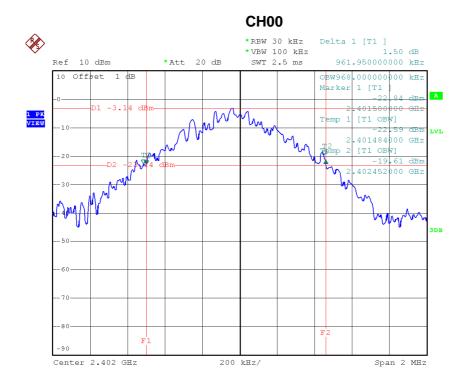
ATTACHMENT H - BANDWIDTH

Report No.: BTL-FCCP-1-1412113 Page 91 of 109



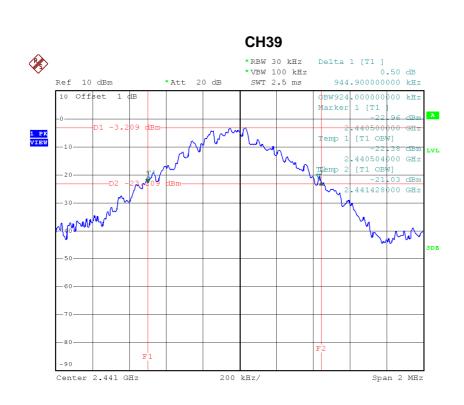
Test Mode : TX Mode _1Mbps

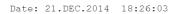
Frequency (MHz)	20dB Bandwidth (MHz)	99% Occupied BW (MHz)	Test Result
2402	0.962	0.968	Complies
2441	0.945	0.924	Complies
2480	0.906	0.908	Complies

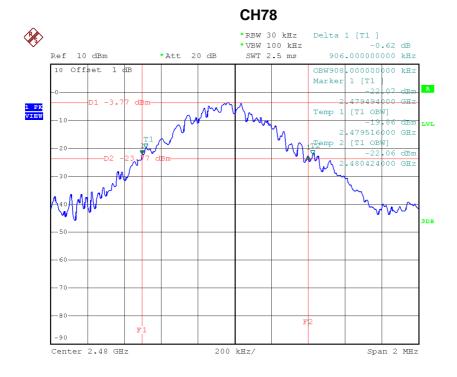


Date: 21.DEC.2014 18:23:41









Date: 21.DEC.2014 18:27:04



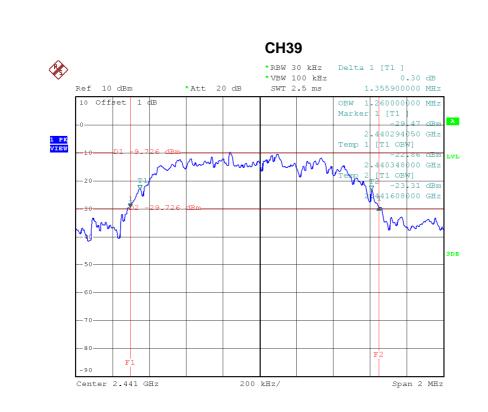
Test Mode : TX Mode _3Mbps

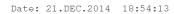
Frequency (MHz)	20dB Bandwidth (MHz)	99% Occupied BW (MHz)	Test Result
2402	1.370	1.248	Complies
2441	1.356	1.260	Complies
2480	1.326	1.260	Complies

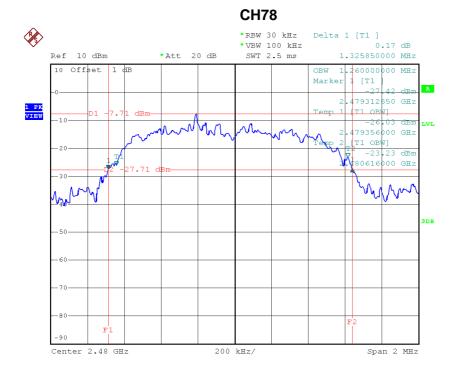
Date: 21.DEC.2014 18:51:36

Report No.: BTL-FCCP-1-1412113 Page 94 of 109









Date: 21.DEC.2014 18:54:48



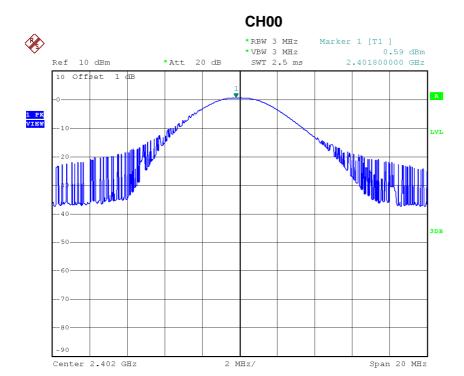
ATTACHMENT I - PEAK OUTPUT POWER	

Report No.: BTL-FCCP-1-1412113 Page 96 of 109



Test Mode :	TX Mode 1Mbps
	117 Mode _ 1 Mbpc

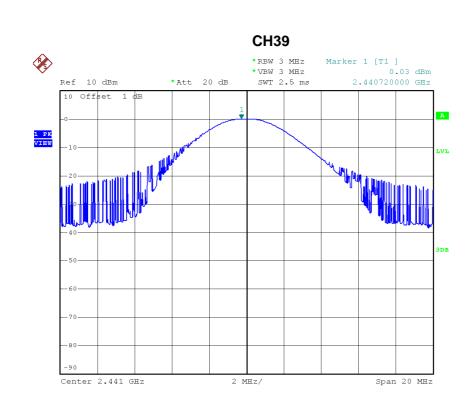
Frequency	Conducted Power	Conducted Power	Max. Limit	Max. Limit	Test
(MHz)	(dBm)	(Watt)	(dBm)	(Watt)	Result
2402	0.59	0.0011	30.00	1.0000	Complies
2441	0.03	0.0010	30.00	1.0000	Complies
2480	-0.35	0.0009	30.00	1.0000	Complies



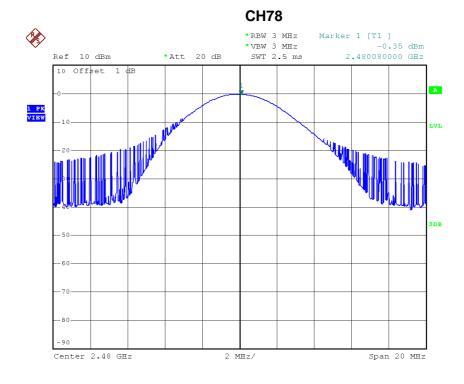
Date: 21.DEC.2014 18:25:03

Report No.: BTL-FCCP-1-1412113 Page 97 of 109









Date: 21.DEC.2014 18:27:23



Test Mode : TX Mode _3Mbps

Frequency	Conducted Power	Conducted Power	Max. Limit	Max. Limit	Test
(MHz)	(dBm)	(Watt)	(dBm)	(Watt)	Result
2402	0.63	0.0012	30.00	1.0000	Complies
2441	0.07	0.0010	30.00	1.0000	Complies
2480	-0.30	0.0009	30.00	1.0000	Complies

2 MHz/

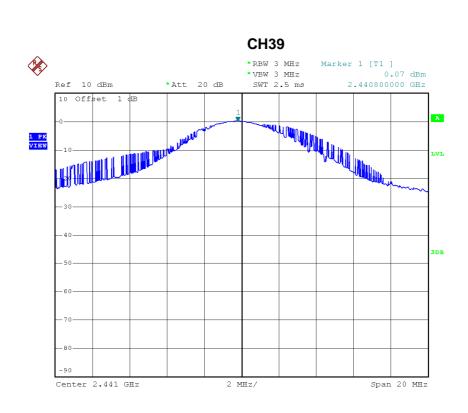
Date: 21.DEC.2014 19:22:31

Center 2.402 GHz

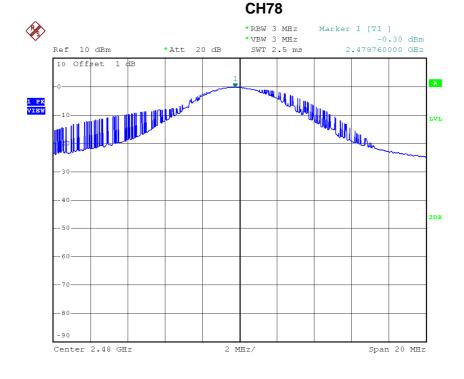
Report No.: BTL-FCCP-1-1412113 Page 99 of 109

Span 20 MHz





Date: 21.DEC.2014 19:23:19



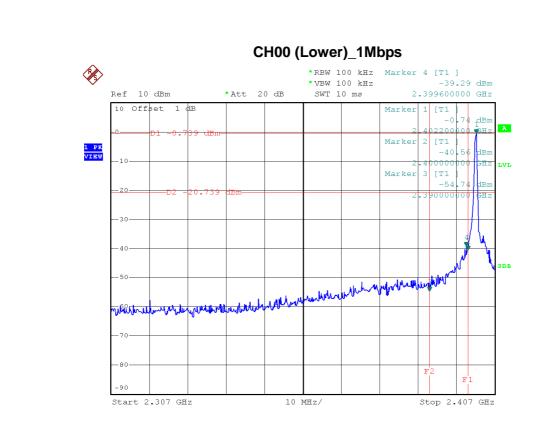
Date: 21.DEC.2014 19:24:10

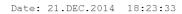


ATTACHMENT J - ANTENNA CONDUCTED SPURIOUS EMISSION

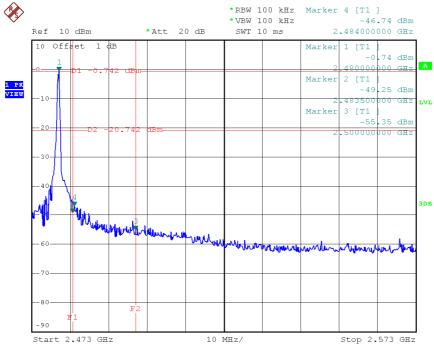
Report No.: BTL-FCCP-1-1412113 Page 101 of 109





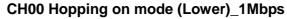


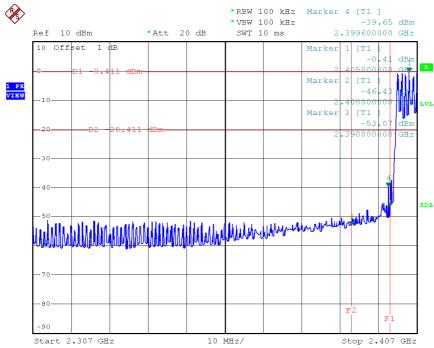
CH78 (Upper) _1Mbps *RBW 100 kHz Marker 4 [T1]



Date: 21.DEC.2014 18:26:57

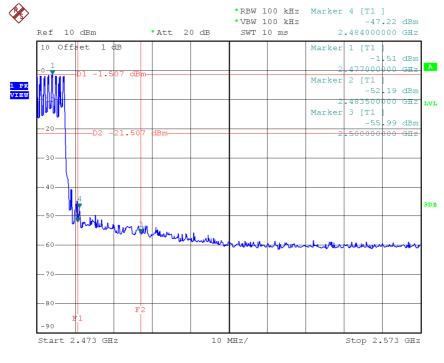






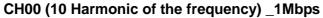
Date: 21.DEC.2014 18:40:21

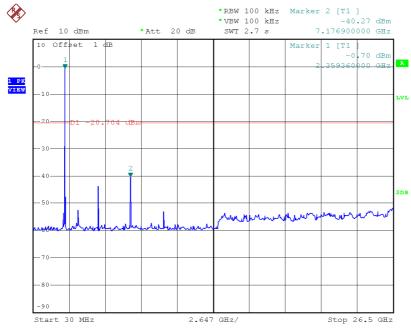
CH78 Hopping on mode (Upper) _1Mbps



Date: 21.DEC.2014 18:40:56

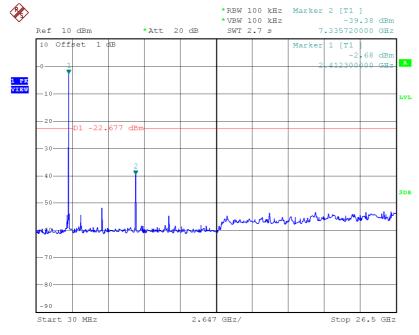






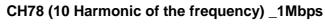
Date: 21.DEC.2014 18:24:57

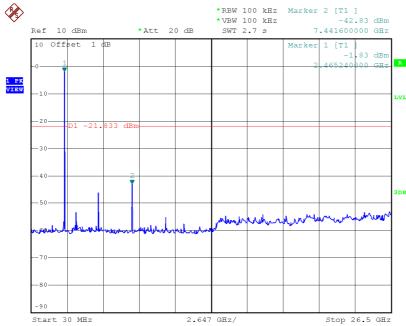
CH39 (10 Harmonic of the frequency) _1Mbps



Date: 21.DEC.2014 18:25:56



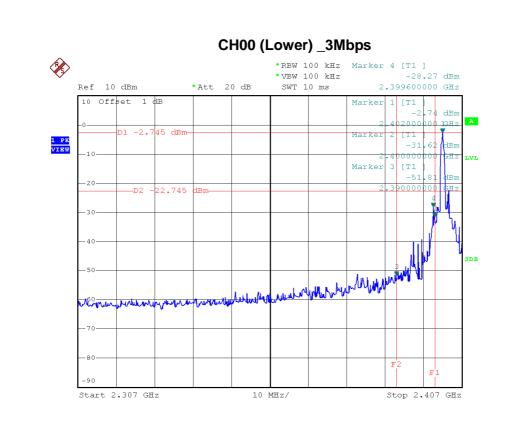


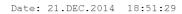


Date: 21.DEC.2014 18:27:17

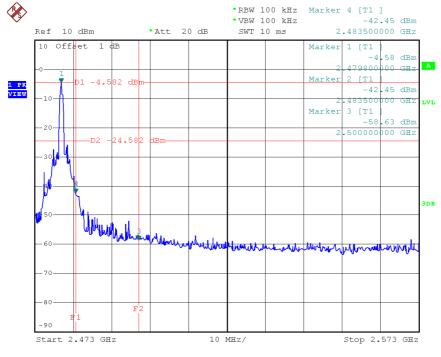
Report No.: BTL-FCCP-1-1412113 Page 105 of 109





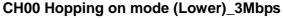


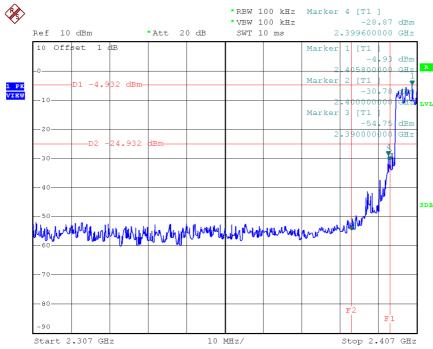
CH78 (Upper) _3Mbps *RBW 100 kHz Marker 4 [T1]



Date: 21.DEC.2014 18:54:42

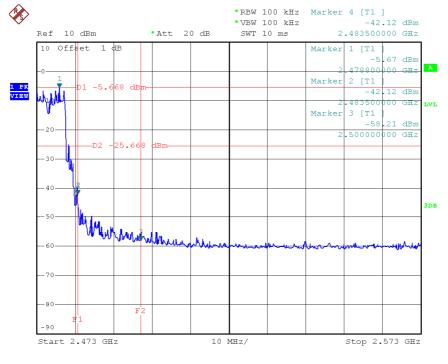






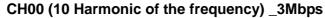
Date: 21.DEC.2014 19:17:22

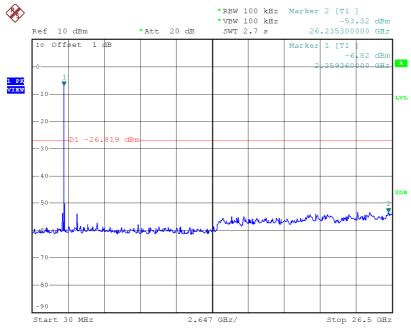
CH78 Hopping on mode (Upper) _3Mbps



Date: 21.DEC.2014 19:14:28

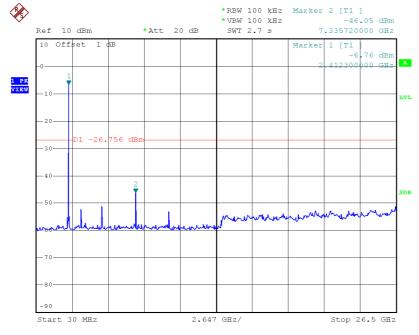






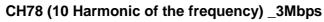
Date: 21.DEC.2014 18:51:50

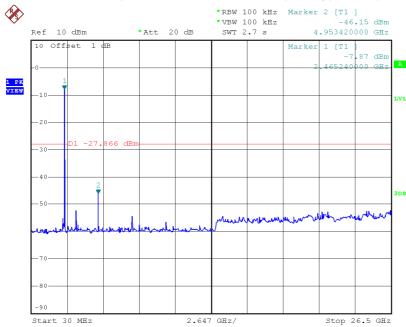
CH39 (10 Harmonic of the frequency) _3Mbps



Date: 21.DEC.2014 18:54:05







Date: 21.DEC.2014 18:55:31

Report No.: BTL-FCCP-1-1412113 Page 109 of 109