



FCC RF Test Report

APPLICANT : NUVIZ Inc.
EQUIPMENT : NUVIZ HUD
BRAND NAME : NUVIZ
MODEL NAME : N-101
FCC ID : 2AKND-N101
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : (DSS) Spread Spectrum Transmitter

The product was received on Sep. 07, 2016 and testing was completed on Mar. 27, 2017. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by: Joseph Lin / Supervisor

Approved by: Jones Tsai / Manager



SPORTON INTERNATIONAL INC.

No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C.

SPORTON INTERNATIONAL INC.

TEL : 886-3-327-3456

FAX : 886-3-328-4978

FCC ID : 2AKND-N101

Page Number : 1 of 98

Report Issued Date : Apr. 24, 2017

Report Version : Rev. 01

Report Template No.: BU5-FR15CBT Version 2.0



TABLE OF CONTENTS

REVISION HISTORY.....	3
SUMMARY OF TEST RESULT	4
1 GENERAL DESCRIPTION.....	5
1.1 Applicant.....	5
1.2 Manufacturer.....	5
1.3 Product Feature of Equipment Under Test.....	5
1.4 Modification of EUT	5
1.5 Testing Location	6
1.6 Applicable Standards.....	6
2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST.....	7
2.1 Carrier Frequency Channel	7
2.2 Test Mode.....	8
2.3 Connection Diagram of Test System.....	9
2.4 Support Unit used in test configuration and system	10
2.5 EUT Operation Test Setup	10
2.6 Measurement Results Explanation Example.....	10
3 TEST RESULT	11
3.1 Number of Channel Measurement	11
3.2 Hopping Channel Separation Measurement	14
3.3 Dwell Time Measurement.....	27
3.4 20dB and 99% Bandwidth Measurement	30
3.5 Peak Output Power Measurement	55
3.6 Conducted Band Edges Measurement.....	58
3.7 Conducted Spurious Emission Measurement	71
3.8 Radiated Band Edges and Spurious Emission Measurement	90
3.9 AC Conducted Emission Measurement.....	94
3.10 Antenna Requirements.....	96
4 LIST OF MEASURING EQUIPMENT.....	97
5 UNCERTAINTY OF EVALUATION.....	98
APPENDIX A. AC CONDUCTED EMISSION TEST RESULT	
APPENDIX B. RADIATED SPURIOUS EMISSION	
APPENDIX C. RADIATED SPURIOUS EMISSION PLOTS	
APPENDIX D. DUTY CYCLE PLOTS	
APPENDIX E. SETUP PHOTOGRAPHS	



REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR683024-01A	Rev. 01	Initial issue of report	Apr. 24, 2017



SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(1)	Number of Channels	$\geq 15\text{Chs}$	Pass	-
3.2	15.247(a)(1)	Hopping Channel Separation	$\geq 2/3$ of 20dB BW	Pass	-
3.3	15.247(a)(1)	Dwell Time of Each Channel	$\leq 0.4\text{sec}$ in 31.6sec period	Pass	-
3.4	15.247(a)(1)	20dB Bandwidth	NA	Pass	-
3.4	-	99% Bandwidth	-	Pass	-
3.5	15.247(b)(1)	Peak Output Power	$\leq 125\text{ mW}$	Pass	-
3.6	15.247(d)	Conducted Band Edges	$\leq 20\text{dBc}$	Pass	-
3.7	15.247(d)	Conducted Spurious Emission	$\leq 20\text{dBc}$	Pass	-
3.8	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 6.27 dB at 123.960 MHz for Quasi-Peak
3.9	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 12.30 dB at 0.158 MHz
3.10	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-



1 General Description

1.1 Applicant

NUVIZ Inc.

1620 5th Ave., Suite 550, San Diego, CA 92101

1.2 Manufacturer

NUVIZ Inc.

1620 5th Ave., Suite 550, San Diego, CA 92101

1.3 Product Feature of Equipment Under Test

Bluetooth, Wi-Fi 2.4GHz 802.11b/g/n, FM Receiver, and GPS.

Product Specification subjective to this standard	
Antenna Type	WLAN: Chip Antenna Bluetooth (for BC127-EXT Chip): Sheet element Antenna Bluetooth (for WCN3620 Chip): Chip Antenna GPS: Chip Antenna

1.4 Modification of EUT

No modifications are made to the EUT during all test items.

1.5 Testing Location

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No. TW0007 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC Test.

Test Site	SPORTON INTERNATIONAL INC.	
Test Site Location	No. 52, Hwa Ya 1 st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978	
Test Site No.	Sporton Site No.	
	TH05-HY	CO05-HY

Note: The test site complies with ANSI C63.4 2014 requirement.

Test Site	SPORTON INTERNATIONAL INC.	
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd Rd. Guishan Dist, Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855	
Test Site No.	Sporton Site No.	
	03CH12-HY	

Note: The test site complies with ANSI C63.4 2014 requirement.

1.6 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15 Subpart C §15.247
- ANSI C63.10-2013

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.



2 Test Configuration of Equipment Under Test

2.1 Carrier Frequency Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
2400-2483.5 MHz	0	2402	27	2429	54	2456
	1	2403	28	2430	55	2457
	2	2404	29	2431	56	2458
	3	2405	30	2432	57	2459
	4	2406	31	2433	58	2460
	5	2407	32	2434	59	2461
	6	2408	33	2435	60	2462
	7	2409	34	2436	61	2463
	8	2410	35	2437	62	2464
	9	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	-	-

2.2 Test Mode

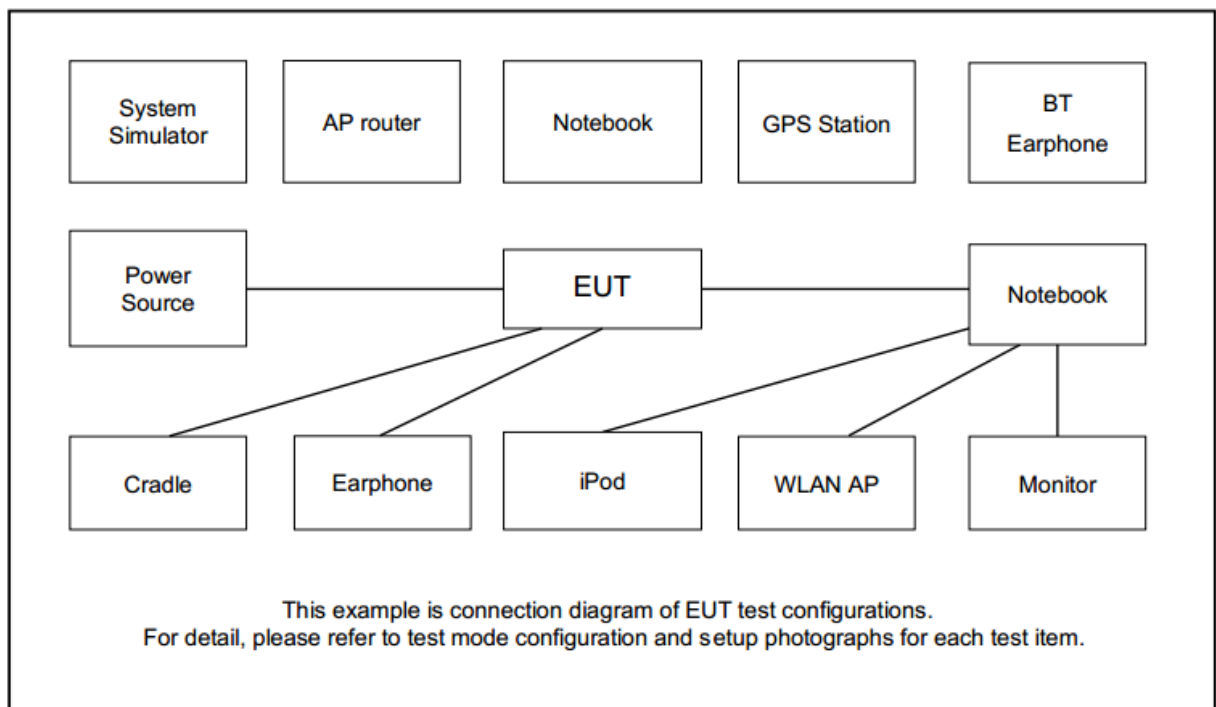
- The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (X plane) were recorded in this report.
- For BC127-EXT Chip, the worst mode of radiated spurious emissions is Bluetooth 1Mbps mode, and recorded in this report.
- For WCN3620 Chip, the worst mode of radiated spurious emissions is Bluetooth 3Mbps mode, and recorded in this report.
- AC power line Conducted Emission was tested under maximum output power.

The following summary table is showing all test modes to demonstrate in compliance with the standard.

Summary table of Test Cases			
Test Item	Data Rate / Modulation		
	Bluetooth BR 1Mbps GFSK	Bluetooth EDR 2Mbps $\pi/4$ -DQPSK	Bluetooth EDR 3Mbps 8-DPSK
Conducted Test Cases	<For BC127-EXT Chip>		
	Mode 1: CH00_2402 MHz	Mode 4: CH00_2402 MHz	Mode 7: CH00_2402 MHz
	Mode 2: CH39_2441 MHz	Mode 5: CH39_2441 MHz	Mode 8: CH39_2441 MHz
	Mode 3: CH78_2480 MHz	Mode 6: CH78_2480 MHz	Mode 9: CH78_2480 MHz
	<For WCN3620 Chip>		
	Mode 1: CH00_2402 MHz	Mode 4: CH00_2402 MHz	Mode 7: CH00_2402 MHz
	Mode 2: CH39_2441 MHz	Mode 5: CH39_2441 MHz	Mode 8: CH39_2441 MHz
Radiated Test Cases	Bluetooth BR 1Mbps GFSK for BC127-EXT Chip		
	Mode 1: CH00_2402 MHz		
	Mode 2: CH39_2441 MHz		
	Mode 3: CH78_2480 MHz		
	Bluetooth EDR 3Mbps 8-DPSK for WCN3620 Chip		
	Mode 1: CH00_2402 MHz		
	Mode 2: CH39_2441 MHz		
	Mode 3: CH78_2480 MHz		

Summary table of Test Cases	
AC Conducted Emission	Mode 1: Bluetooth Link (BC127-EXT Chip) + Bluetooth Link (WCN3620 Chip) + WLAN Link + SD Card + GPS Rx + Earphone + USB Cable (Data Link with Notebook)
Remark: <ol style="list-style-type: none"> 1. For BC, radiated test cases, the worst mode data rate 1Mbps was reported only, because this data rate has the highest RF output power at preliminary tests, and the conducted spurious emissions and conducted band edge measurement for each data rate are no worse than 1Mbps, and no other significantly frequencies found in conducted spurious emission. 2. For WCN, radiated test cases, the worst mode data rate 3Mbps was reported only, because this data rate has the highest RF output power at preliminary tests, and the conducted spurious emissions and conducted band edge measurement for each data rate are no worse than 3Mbps, and no other significantly frequencies found in conducted spurious emission. 	

2.3 Connection Diagram of Test System



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	Bluetooth Base Station	R&S	CBT32	N/A	N/A	Unshielded, 1.8 m
2.	GPS Station	Pendulum	GSG-54	N/A	N/A	Unshielded, 1.8 m
3.	WLAN AP	ASUS	RT-AC66U	MSQ-RTAC66U	N/A	Unshielded, 1.8 m
4.	NoteBook	ASUS	K42J	N/A	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
5.	Notebook	DELL	Latitude E6320	FCC DoC/ Contains FCC ID: QDS-BRCM1054	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
6.	Notebook	DELL	Latitude E3340	FCC DoC/ Contains FCC ID: PD97260NGU	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
7.	Mobile Phone	Acer	Z200	HLZDMZ200	N/A	N/A
8.	iPod	Apple	A1285	FCC DoC	Shielded, 1.0 m	N/A
9.	SD Card	SanDisk	MicroSD HC	FCC DoC	N/A	N/A

2.5 EUT Operation Test Setup

The RF test items, programmed RF utility, "CMD" installed in the notebook make the EUT get into the engineering modes to contact with base station for continuous transmitting and receiving signals.

2.6 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 4.2 dB and 10dB attenuator.

$$\begin{aligned} \text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)}. \\ &= 4.2 + 10 = 14.2 \text{ (dB)} \end{aligned}$$

3 Test Result

3.1 Number of Channel Measurement

3.1.1 Limits of Number of Hopping Frequency

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

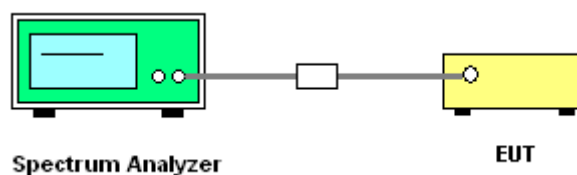
3.1.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.1.3 Test Procedure

1. The testing follows ANSI C63.10-2013 clause 7.8.3.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Enable the EUT hopping function.
5. Use the following spectrum analyzer settings: Span = the frequency band of operation;
RBW = 300kHz; VBW \geq RBW; Sweep = auto; Detector function = peak; Trace = max hold.
6. The number of hopping frequency used is defined as the number of total channel.
7. Record the measurement data derived from spectrum analyzer.

3.1.4 Test Setup



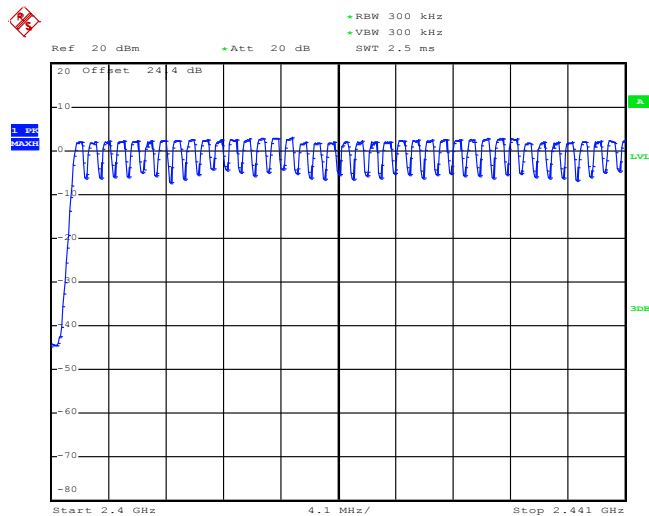


3.1.5 Test Result of Number of Hopping Frequency

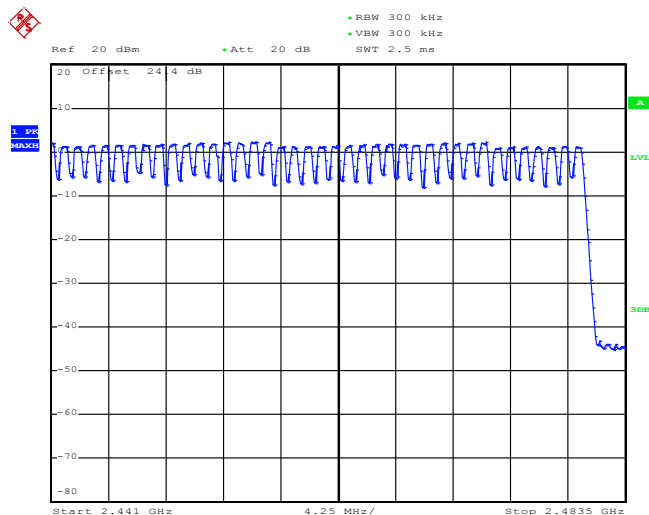
<For BC127-EXT Chip>

Test Mode :	1Mbps	Temperature :	24~26℃
Test Engineer :	Shiming Liu	Relative Humidity :	48~51%

Number of Hopping (Channel)	Adaptive Frequency Hopping (Channel)	Limits (Channel)	Pass/Fail
79	20	> 15	Pass

Number of Hopping Channel Plot on Channel 00 - 78

Date: 25.MAR.2017 01:13:56



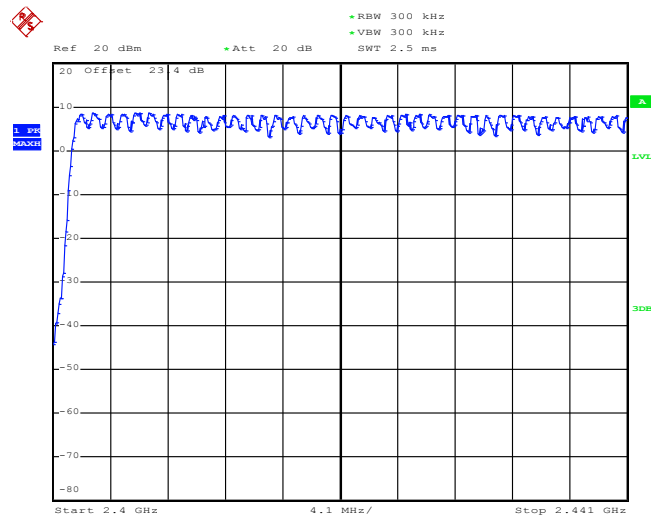
Date: 25.MAR.2017 01:15:00



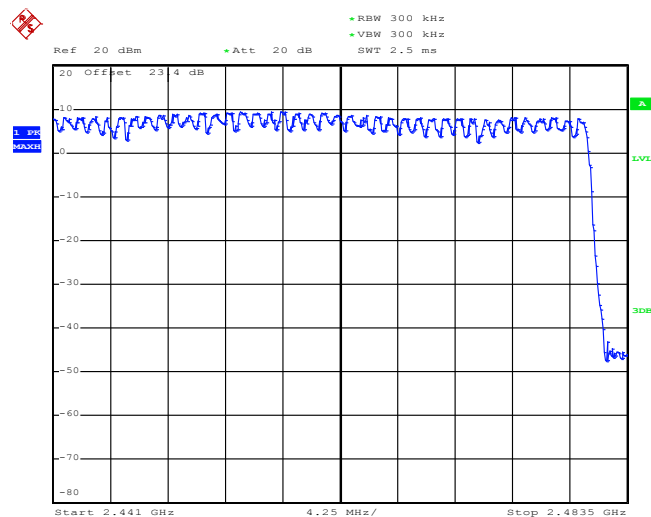
<For WCN3620 Chip>

Test Mode :	3Mbps	Temperature :	24~26°C
Test Engineer :	Shiming Liu	Relative Humidity :	48~51%

Number of Hopping (Channel)	Adaptive Frequency Hopping (Channel)	Limits (Channel)	Pass/Fail
79	20	> 15	Pass

Number of Hopping Channel Plot on Channel 00 - 78

Date: 24.MAR.2017 11:00:15



Date: 24.MAR.2017 11:01:00

3.2 Hopping Channel Separation Measurement

3.2.1 Limit of Hopping Channel Separation

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.

3.2.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.2.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 7.8.2.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Enable the EUT hopping function.
5. Use the following spectrum analyzer settings:
Span = wide enough to capture the peaks of two adjacent channels;
RBW = 300kHz; VBW \geq RBW; Sweep = auto; Detector function = peak; Trace = max hold.
6. Measure and record the results in the test report.

3.2.4 Test Setup



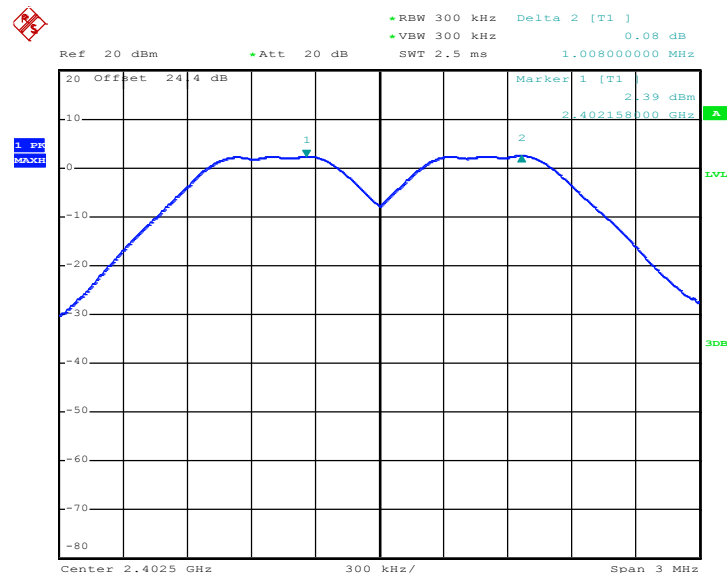


3.2.5 Test Result of Hopping Channel Separation

<For BC127-EXT Chip>

Test Mode :	1Mbps	Temperature :	24~26℃
Test Engineer :	Shiming Liu	Relative Humidity :	48~51%

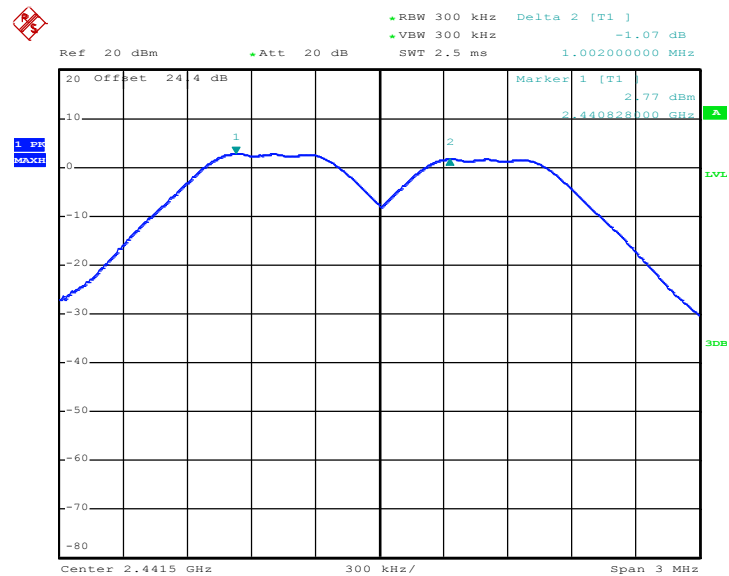
Channel	Frequency (MHz)	Frequency Separation (MHz)	(2/3 of 20dB BW) Limits (MHz)	Pass/Fail
00	2402	1.008	0.5920	Pass
39	2441	1.002	0.5947	Pass
78	2480	1.002	0.5973	Pass

Channel Separation Plot on Channel 00 - 01

Date: 25.MAR.2017 01:28:12

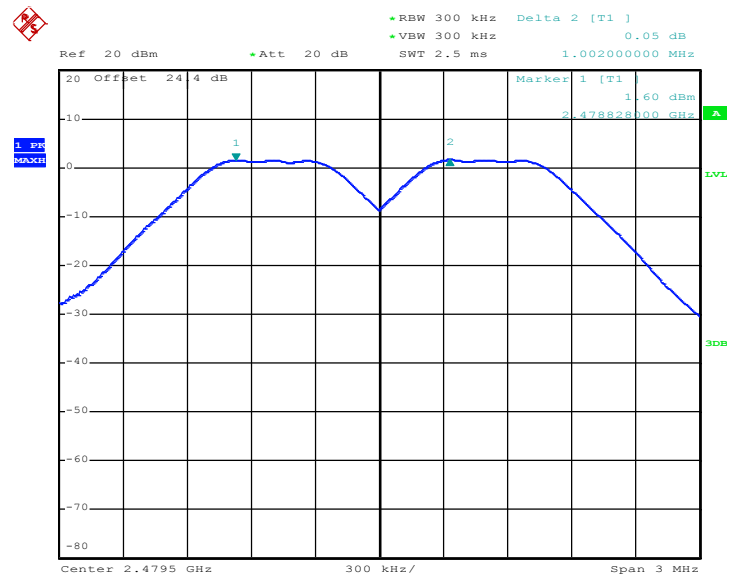


Channel Separation Plot on Channel 39 - 40



Date: 25.MAR.2017 01:29:08

Channel Separation Plot on Channel 77 - 78

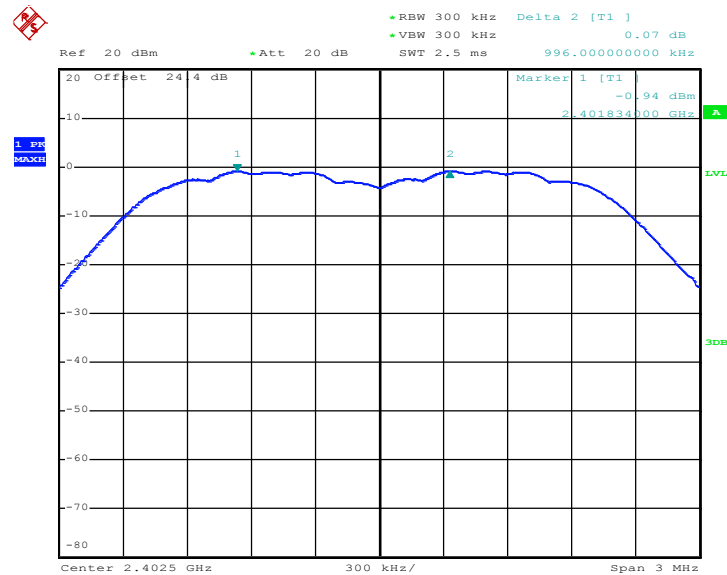


Date: 25.MAR.2017 01:30:00



Test Mode :	2Mbps	Temperature :	24~26°C
Test Engineer :	Shiming Liu	Relative Humidity :	48~51%

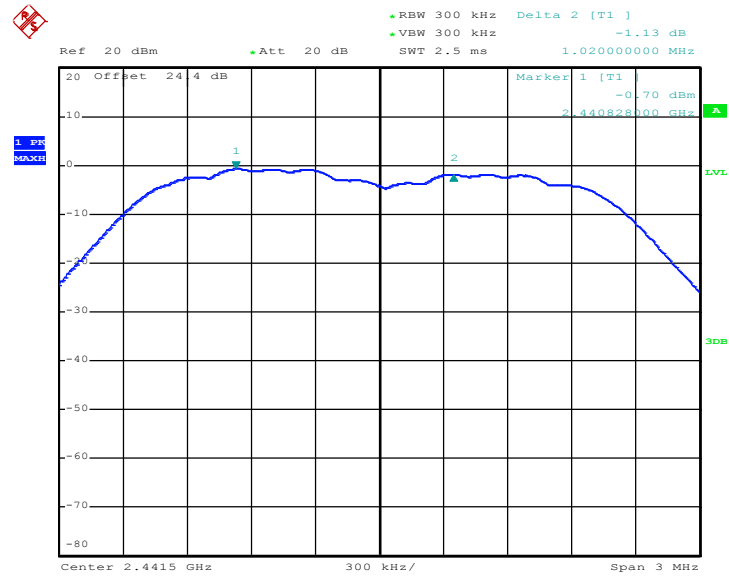
Channel	Frequency (MHz)	Frequency Separation (MHz)	(2/3 of 20dB BW) Limits (MHz)	Pass/Fail
00	2402	0.996	0.8240	Pass
39	2441	1.020	0.8280	Pass
78	2480	0.996	0.8280	Pass

Channel Separation Plot on Channel 00 - 01

Date: 27.MAR.2017 20:08:40

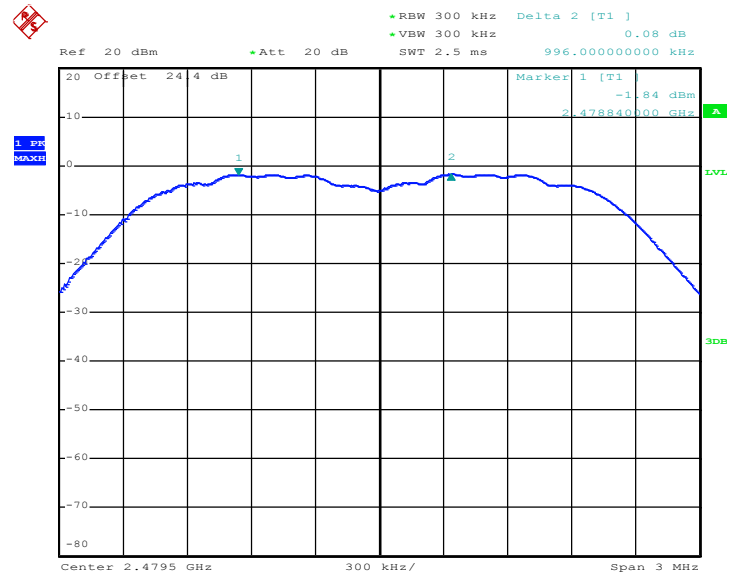


Channel Separation Plot on Channel 39 - 40



Date: 27.MAR.2017 20:33:41

Channel Separation Plot on Channel 77 - 78

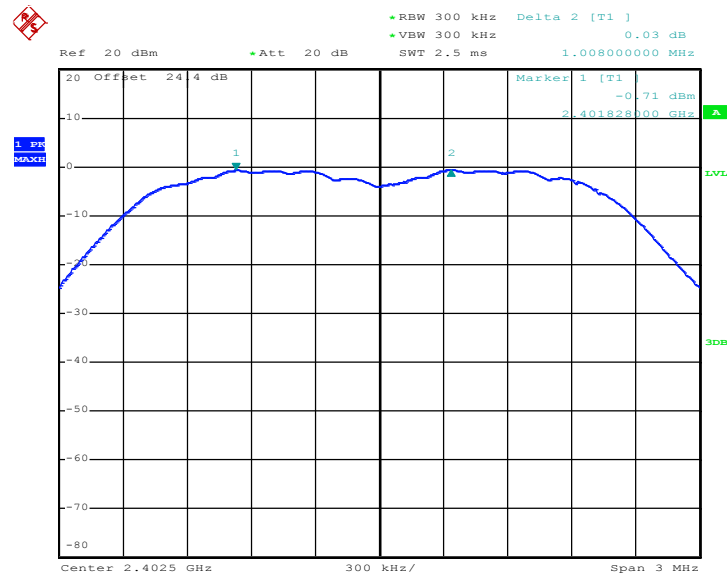


Date: 27.MAR.2017 20:52:03



Test Mode :	3Mbps	Temperature :	24~26°C
Test Engineer :	Shiming Liu	Relative Humidity :	48~51%

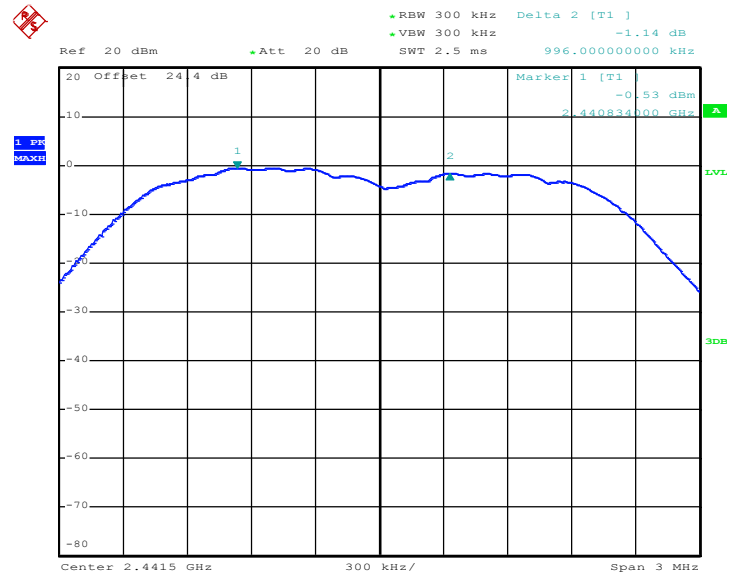
Channel	Frequency (MHz)	Frequency Separation (MHz)	(2/3 of 20dB BW) Limits (MHz)	Pass/Fail
00	2402	1.008	0.8120	Pass
39	2441	0.996	0.8160	Pass
78	2480	1.014	0.8120	Pass

Channel Separation Plot on Channel 00 - 01

Date: 27.MAR.2017 21:02:49

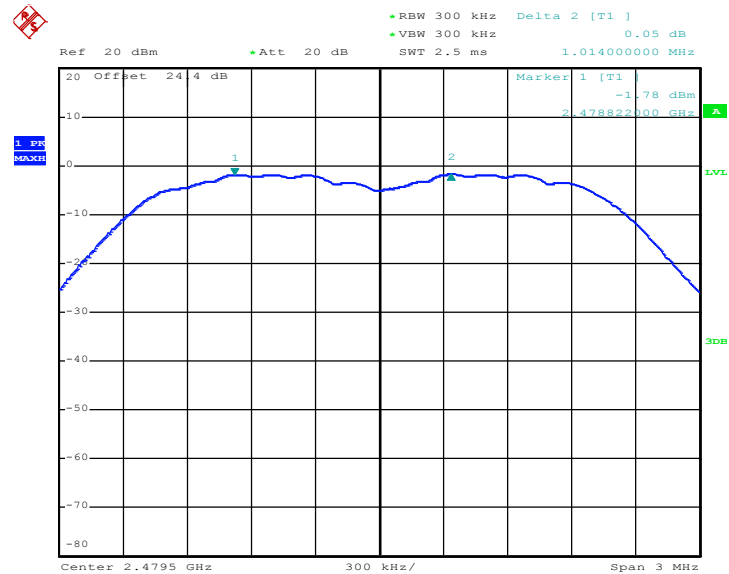


Channel Separation Plot on Channel 39 - 40



Date: 27.MAR.2017 21:09:26

Channel Separation Plot on Channel 77 - 78

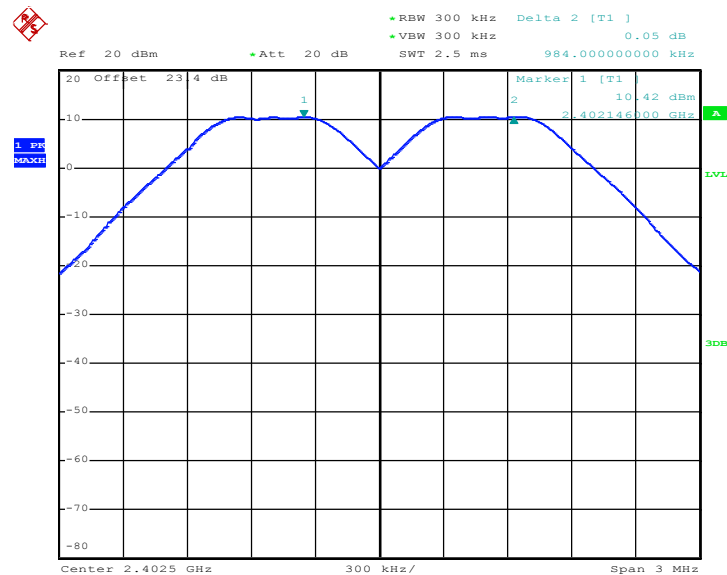


Date: 27.MAR.2017 21:15:46

**<For WCN3620 Chip>**

Test Mode :	1Mbps	Temperature :	24~26°C
Test Engineer :	Shiming Liu	Relative Humidity :	48~51%

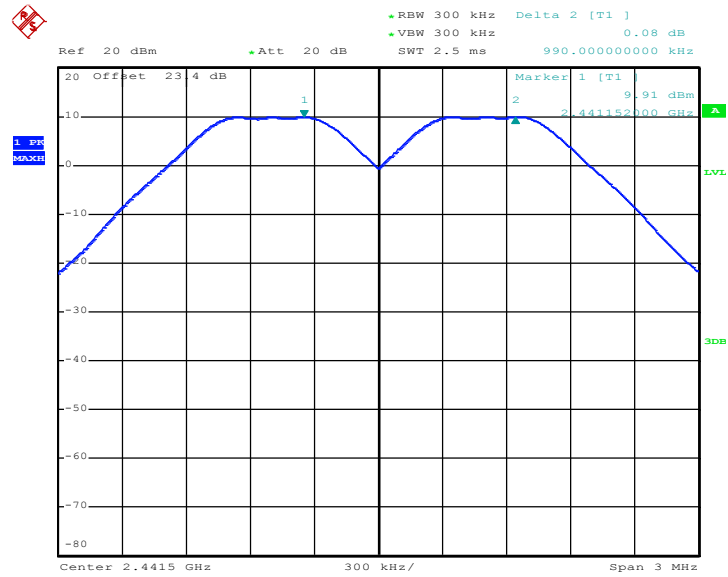
Channel	Frequency (MHz)	Frequency Separation (MHz)	(2/3 of 20dB BW) Limits (MHz)	Pass/Fail
00	2402	0.984	0.6267	Pass
39	2441	0.990	0.6213	Pass
78	2480	1.002	0.6213	Pass

Channel Separation Plot on Channel 00 - 01

Date: 24.MAR.2017 11:20:19

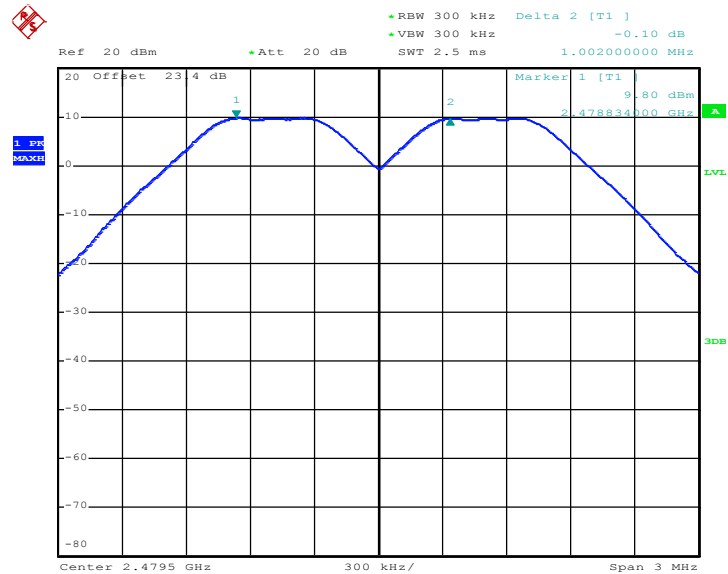


Channel Separation Plot on Channel 39 - 40



Date: 24.MAR.2017 11:22:43

Channel Separation Plot on Channel 77 - 78

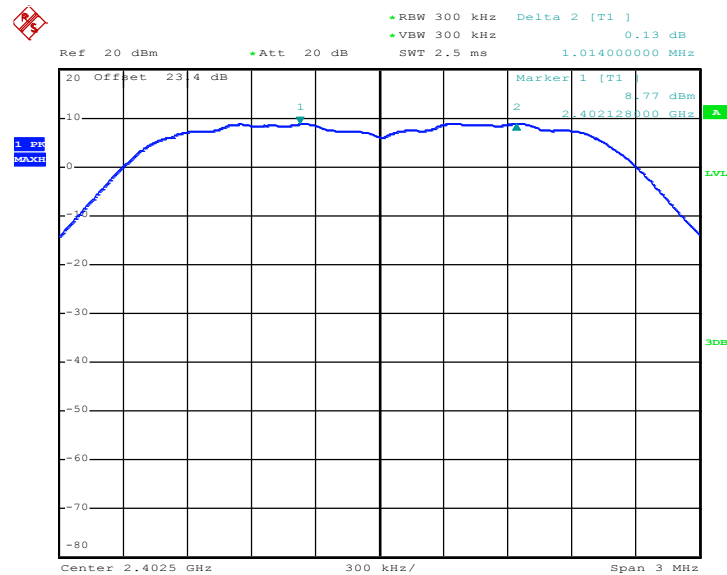


Date: 24.MAR.2017 11:25:27



Test Mode :	2Mbps	Temperature :	24~26°C
Test Engineer :	Shiming Liu	Relative Humidity :	48~51%

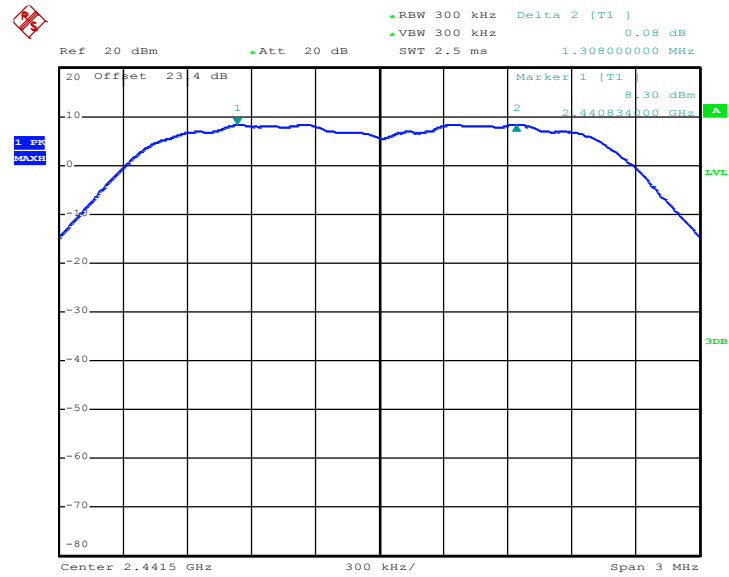
Channel	Frequency (MHz)	Frequency Separation (MHz)	(2/3 of 20dB BW) Limits (MHz)	Pass/Fail
00	2402	1.014	0.8440	Pass
39	2441	1.308	0.8440	Pass
78	2480	1.002	0.8440	Pass

Channel Separation Plot on Channel 00 - 01

Date: 24.MAR.2017 12:10:38

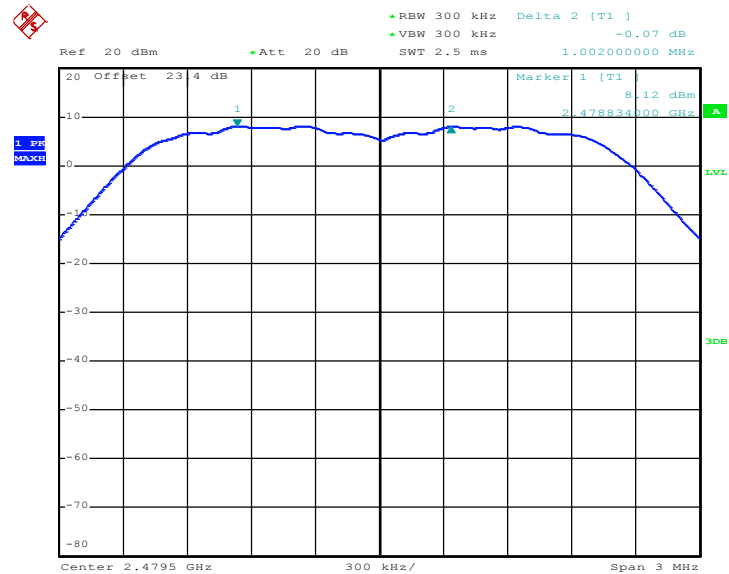


Channel Separation Plot on Channel 39 - 40



Date: 24.MAR.2017 12:12:16

Channel Separation Plot on Channel 77 - 78

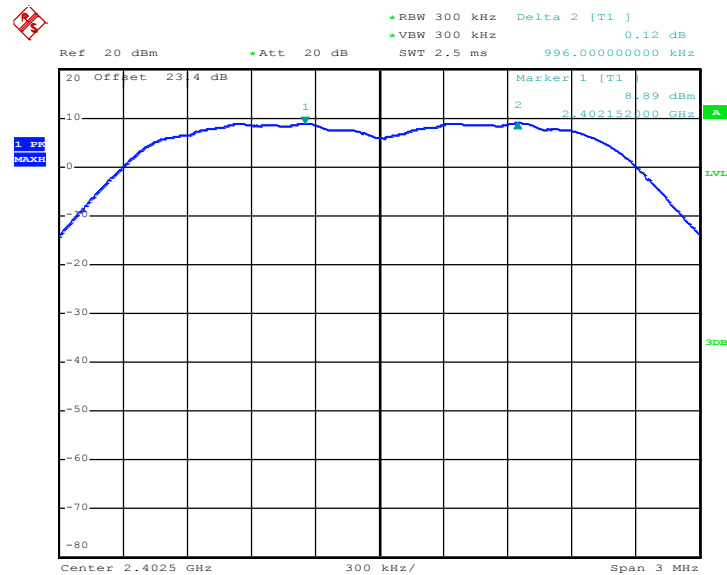


Date: 24.MAR.2017 12:14:38



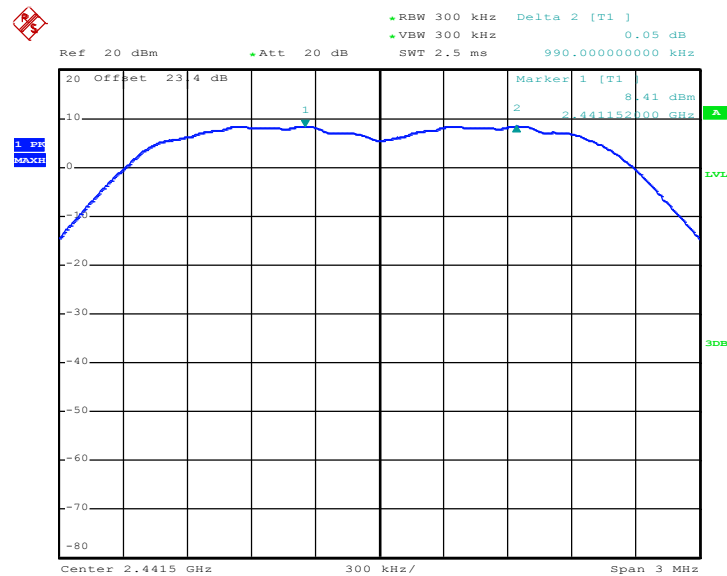
Test Mode :	3Mbps	Temperature :	24~26°C
Test Engineer :	Shiming Liu	Relative Humidity :	48~51%

Channel	Frequency (MHz)	Frequency Separation (MHz)	(2/3 of 20dB BW) Limits (MHz)	Pass/Fail
00	2402	0.996	0.8240	Pass
39	2441	0.990	0.8200	Pass
78	2480	1.008	0.8240	Pass

Channel Separation Plot on Channel 00 - 01

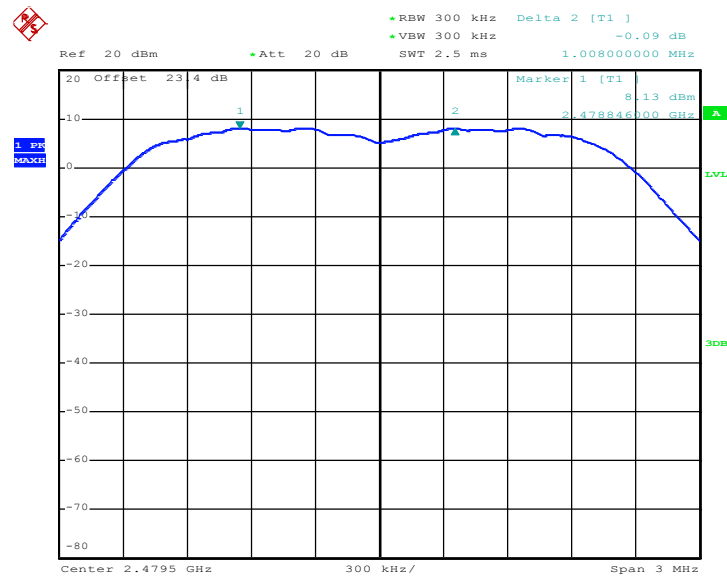
Date: 24.MAR.2017 12:44:11

Channel Separation Plot on Channel 39 - 40



Date: 24.MAR.2017 12:45:21

Channel Separation Plot on Channel 77 - 78



Date: 24.MAR.2017 12:48:31

3.3 Dwell Time Measurement

3.3.1 Limit of Dwell Time

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

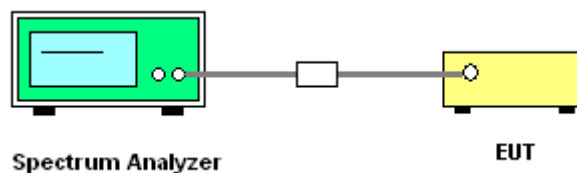
3.3.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.3.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 7.8.4.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Enable the EUT hopping function.
5. Use the following spectrum analyzer settings: Span = zero span, centered on a hopping channel; RBW = 1 MHz; VBW \geq RBW; Sweep = as necessary to capture the entire dwell time per hopping channel; Detector function = peak; Trace = max hold.
6. Measure and record the results in the test report.

3.3.4 Test Setup



3.3.5 Test Result of Dwell Time

<For BC127-EXT Chip>

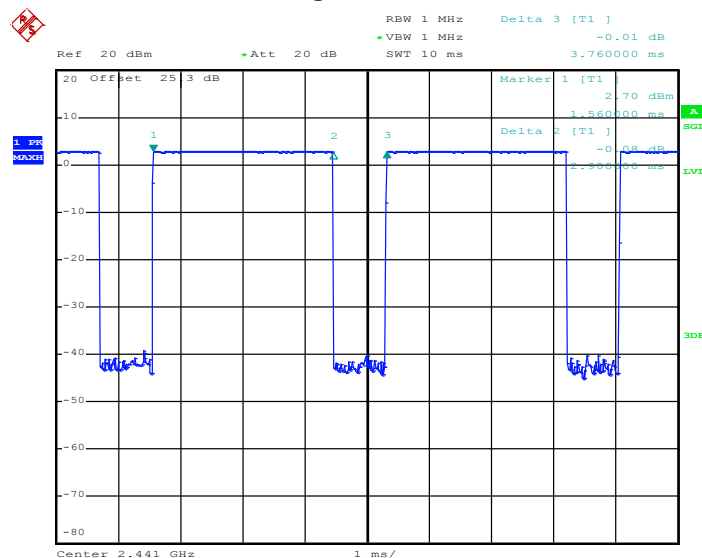
Test Mode :	DH5	Temperature :	24~26℃
Test Engineer :	Shiming Liu	Relative Humidity :	48~51%

Mode	Hopping Channel Number	Hops Over Occupancy Time(hops)	Package Transfer Time (msec)	Dwell Time (sec)	Limits (sec)	Pass/Fail
Normal	79	106.67	2.90	0.31	0.4	Pass
AFH	20	53.33	2.90	0.15	0.4	Pass

Remark:

1. In normal mode, hopping rate is 1600 hops/s with 6 slots in 79 hopping channels.
With channel hopping rate (1600 / 6 / 79) in Occupancy Time Limit (0.4 x 79) (s),
Hops Over Occupancy Time comes to (1600 / 6 / 79) x (0.4 x 79) = 106.67 hops.
2. In AFH mode, hopping rate is 800 hops/s with 6 slots in 20 hopping channels.
With channel hopping rate (800 / 6 / 20) in Occupancy Time Limit (0.4 x 20) (s),
Hops Over Occupancy Time comes to (800 / 6 / 20) x (0.4 x 20) = 53.33 hops.
3. Dwell Time(s) = Hops Over Occupancy Time (hops) x Package Transfer Time

Package Transfer Time Plot



Date: 18.MAR.2017 02:23:09

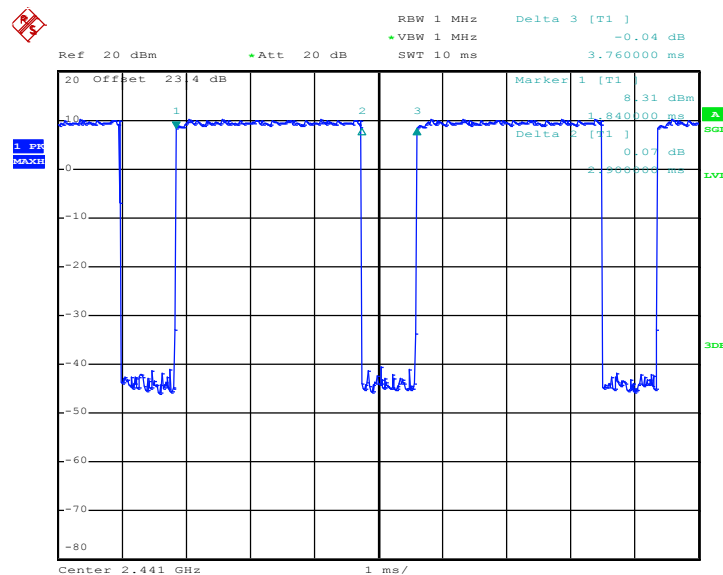
<For WCN3620 Chip>

Test Mode :	3DH5	Temperature :	24~26°C
Test Engineer :	Shiming Liu	Relative Humidity :	48~51%

Mode	Hopping Channel Number	Hops Over Occupancy Time(hops)	Package Transfer Time (msec)	Dwell Time (sec)	Limits (sec)	Pass/Fail
Normal	79	106.67	2.90	0.31	0.4	Pass
AFH	20	53.33	2.90	0.15	0.4	Pass

Remark:

1. In normal mode, hopping rate is 1600 hops/s with 6 slots in 79 hopping channels.
With channel hopping rate (1600 / 6 / 79) in Occupancy Time Limit (0.4 x 79) (s),
Hops Over Occupancy Time comes to (1600 / 6 / 79) x (0.4 x 79) = 106.67 hops.
2. In AFH mode, hopping rate is 800 hops/s with 6 slots in 20 hopping channels.
With channel hopping rate (800 / 6 / 20) in Occupancy Time Limit (0.4 x 20) (s),
Hops Over Occupancy Time comes to (800 / 6 / 20) x (0.4 x 20) = 53.33 hops.
3. Dwell Time(s) = Hops Over Occupancy Time (hops) x Package Transfer Time

Package Transfer Time Plot


Date: 15.MAR.2017 20:58:50

3.4 20dB and 99% Bandwidth Measurement

3.4.1 Limit of 20dB and 99% Bandwidth

Reporting only

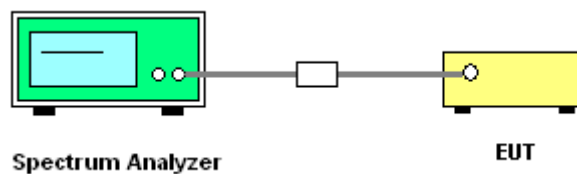
3.4.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.4.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 6.9.2 and 6.9.3.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Use the following spectrum analyzer settings for 20dB Bandwidth measurement.
Span = approximately 2 to 5 times the 20 dB bandwidth, centered on a hopping channel;
RBW \geq 1% of the 20 dB bandwidth; VBW \geq RBW; Sweep = auto; Detector function = peak;
Trace = max hold.
5. Use the following spectrum analyzer settings for 99 % Bandwidth measurement.
Span = approximately 1.5 to 5 times the 99% bandwidth, centered on a hopping channel;
RBW \geq 1% of the 99% bandwidth; VBW \geq RBW; Sweep = auto; Detector function = peak;
Trace = max hold.
6. Measure and record the results in the test report.

3.4.4 Test Setup





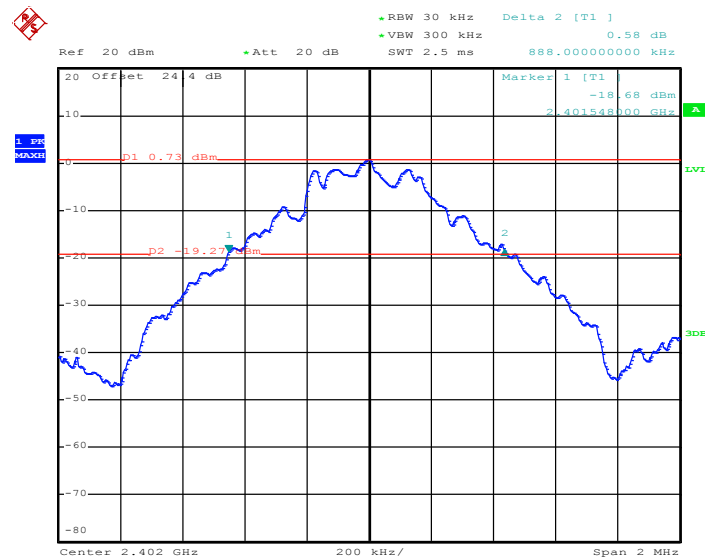
3.4.5 Test Result of 20dB Bandwidth

<For BC127-EXT Chip>

Test Mode :	1Mbps	Temperature :	24~26℃
Test Engineer :	Shiming Liu	Relative Humidity :	48~51%

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	0.888
39	2441	0.892
78	2480	0.896

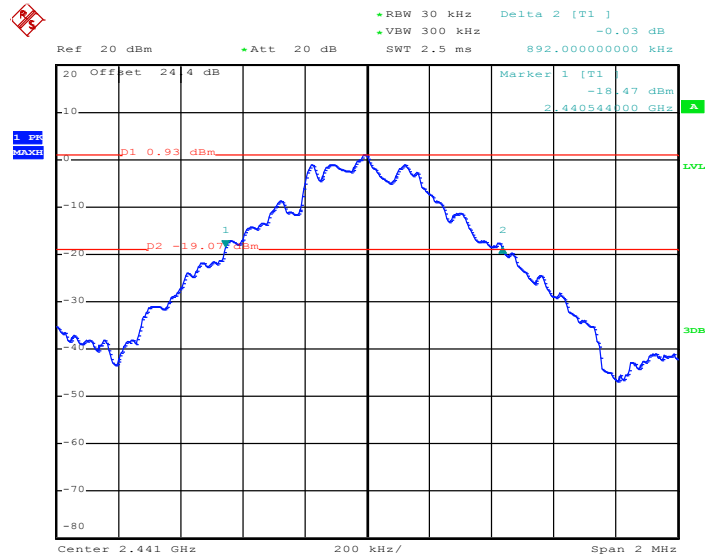
20 dB Bandwidth Plot on Channel 00



Date: 25.MAR.2017 01:31:41

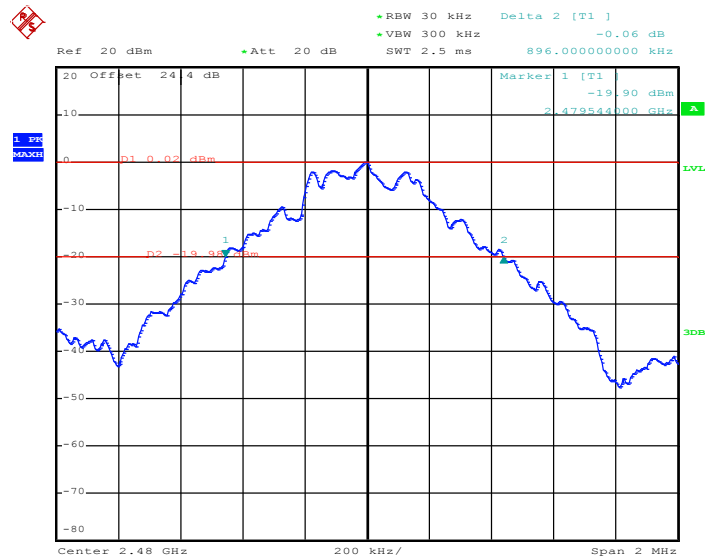


20 dB Bandwidth Plot on Channel 39



Date: 25.MAR.2017 01:33:44

20 dB Bandwidth Plot on Channel 78

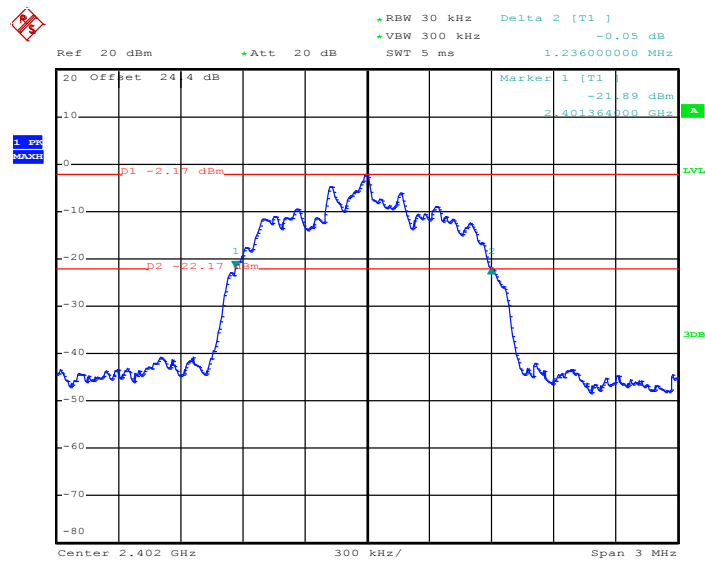


Date: 25.MAR.2017 01:36:18



Test Mode :	2Mbps	Temperature :	24~26°C
Test Engineer :	Shiming Liu	Relative Humidity :	48~51%

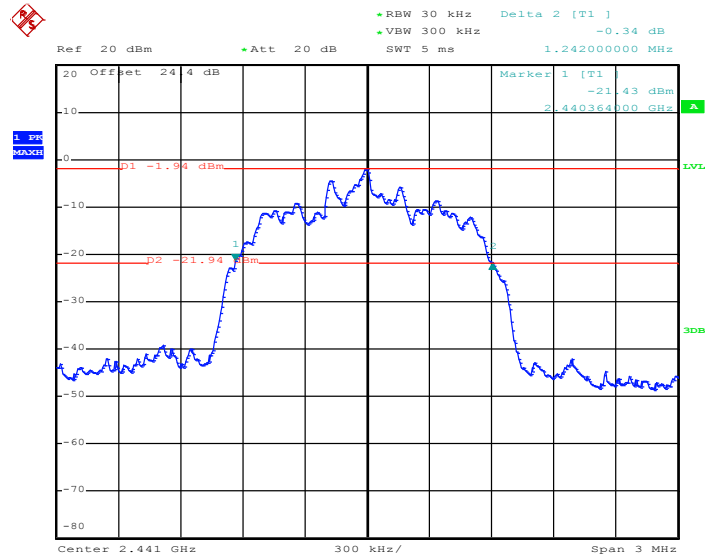
Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	1.236
39	2441	1.242
78	2480	1.242

20 dB Bandwidth Plot on Channel 00

Date: 27.MAR.2017 20:43:13

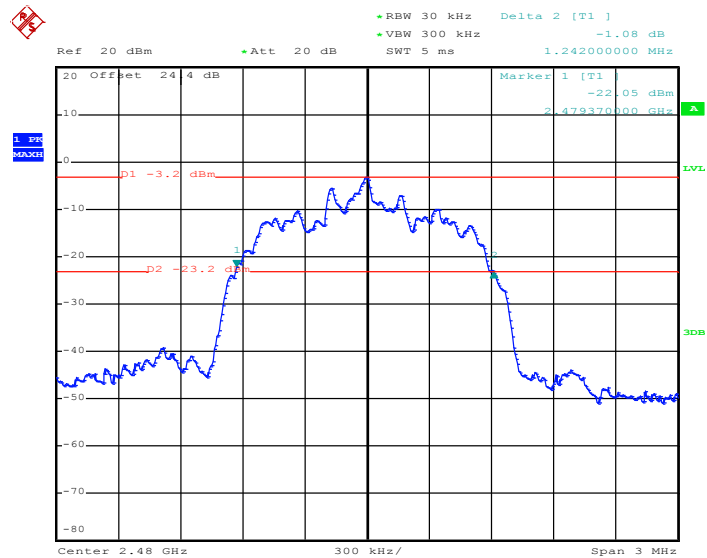


20 dB Bandwidth Plot on Channel 39



Date: 27.MAR.2017 20:47:42

20 dB Bandwidth Plot on Channel 78

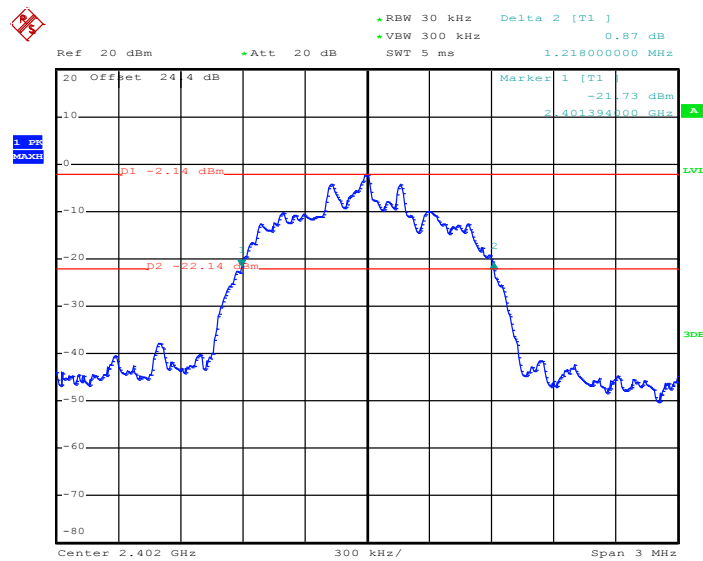


Date: 27.MAR.2017 20:54:17



Test Mode :	3Mbps	Temperature :	24~26°C
Test Engineer :	Shiming Liu	Relative Humidity :	48~51%

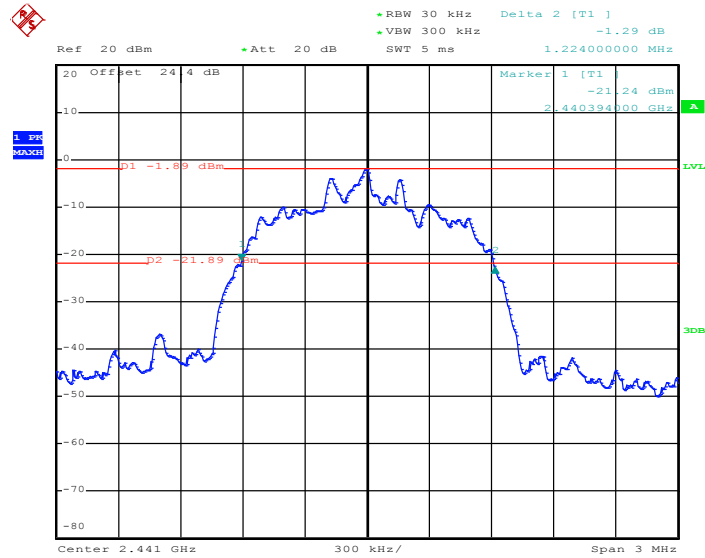
Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	1.218
39	2441	1.224
78	2480	1.218

20 dB Bandwidth Plot on Channel 00

Date: 27.MAR.2017 21:04:29

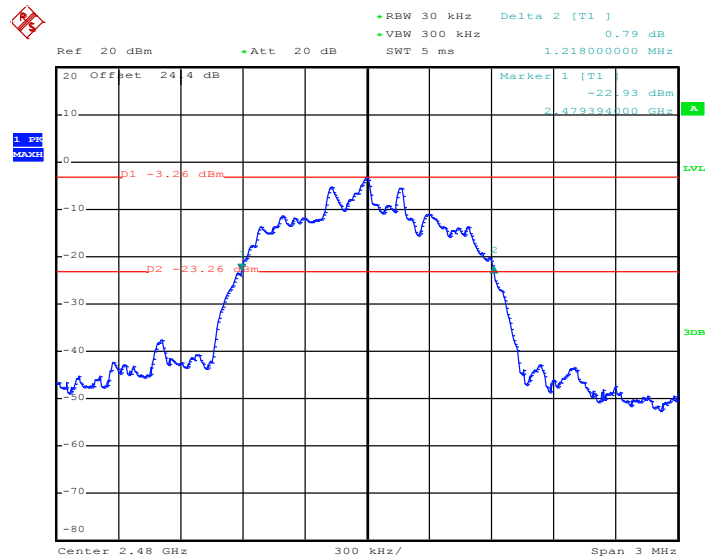


20 dB Bandwidth Plot on Channel 39



Date: 27.MAR.2017 21:11:17

20 dB Bandwidth Plot on Channel 78

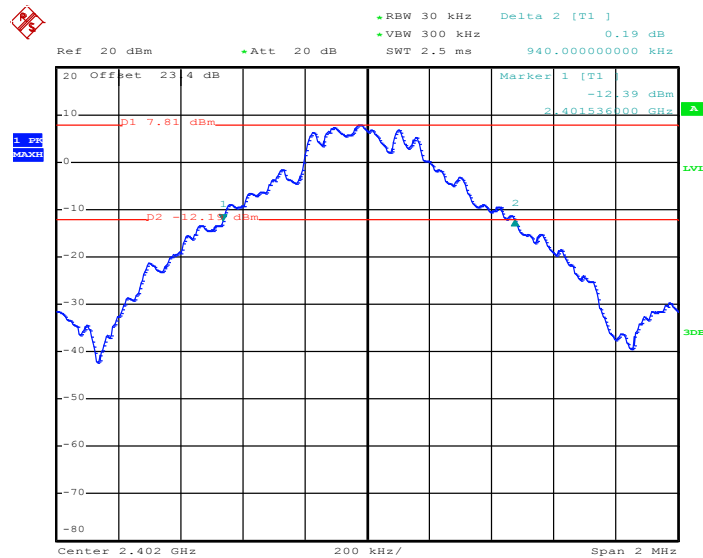


Date: 27.MAR.2017 21:17:16

**<For WCN3620 Chip>**

Test Mode :	1Mbps	Temperature :	24~26°C
Test Engineer :	Shiming Liu	Relative Humidity :	48~51%

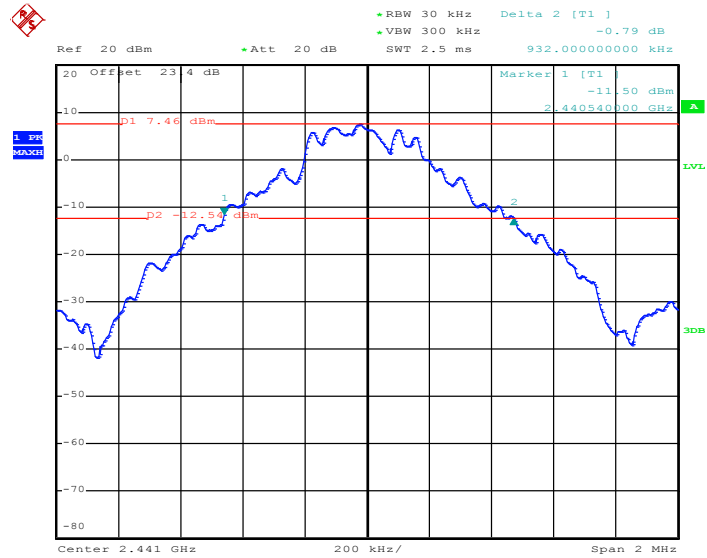
Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	0.940
39	2441	0.932
78	2480	0.932

20 dB Bandwidth Plot on Channel 00

Date: 24.MAR.2017 11:39:05

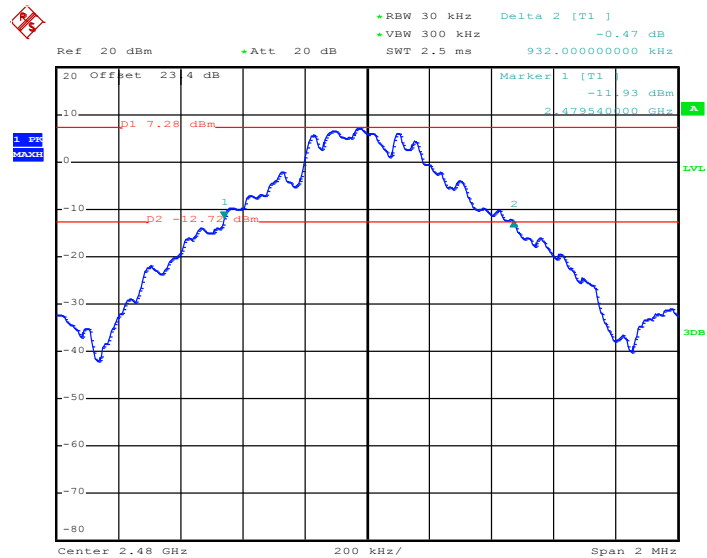


20 dB Bandwidth Plot on Channel 39



Date: 24.MAR.2017 11:43:51

20 dB Bandwidth Plot on Channel 78

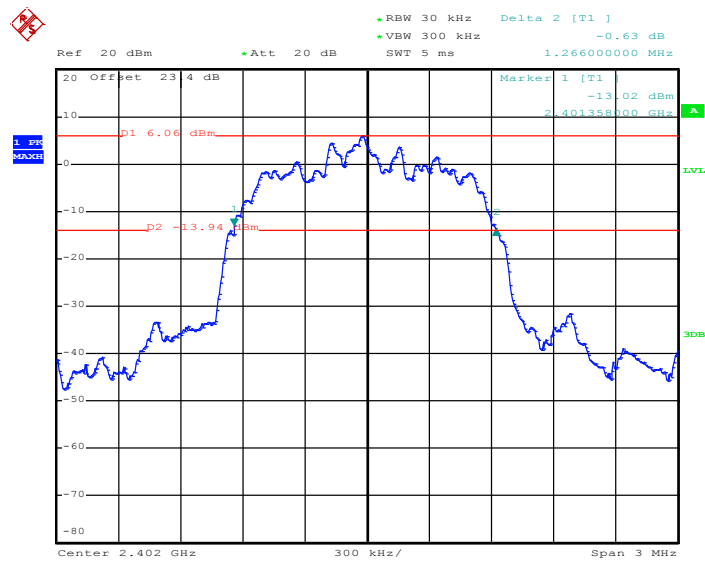


Date: 24.MAR.2017 11:46:37



Test Mode :	2Mbps	Temperature :	24~26°C
Test Engineer :	Shiming Liu	Relative Humidity :	48~51%

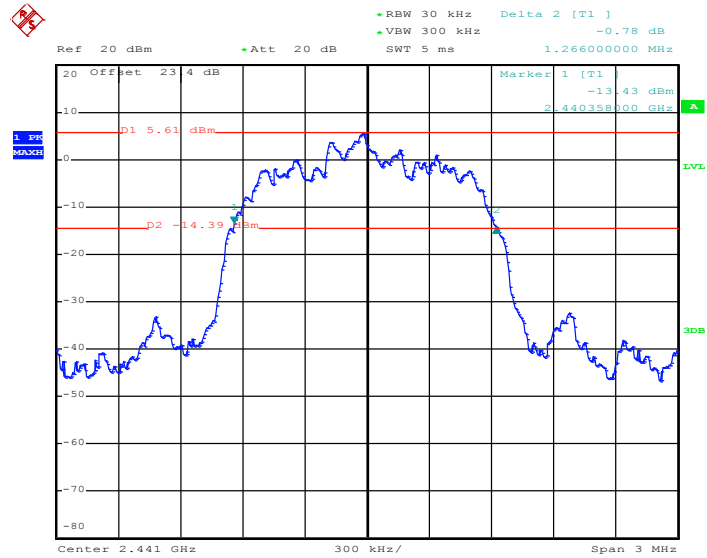
Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	1.266
39	2441	1.266
78	2480	1.266

20 dB Bandwidth Plot on Channel 00

Date: 24.MAR.2017 12:17:34

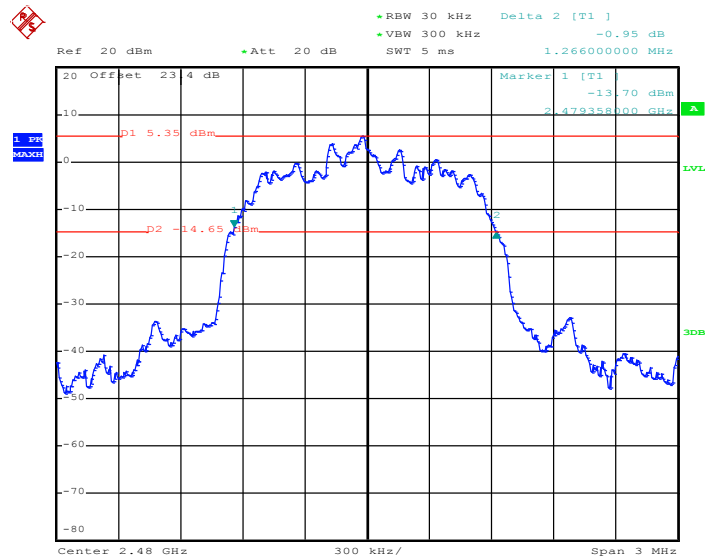


20 dB Bandwidth Plot on Channel 39



Date: 24.MAR.2017 12:20:15

20 dB Bandwidth Plot on Channel 78

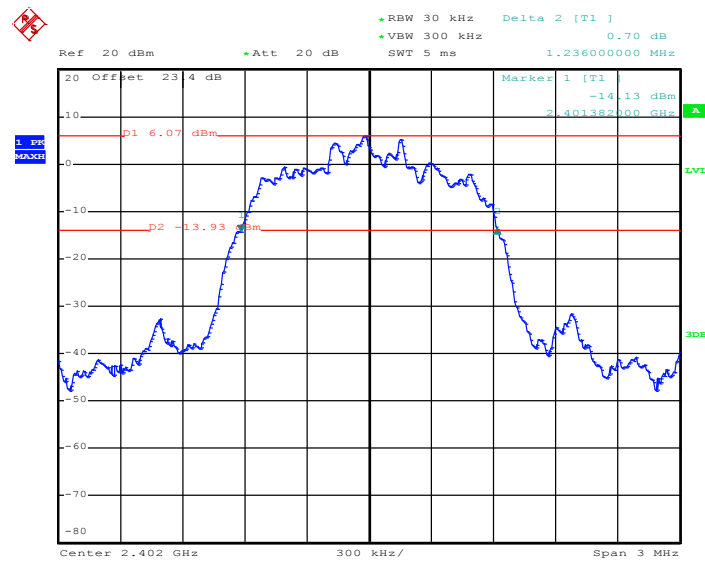


Date: 24.MAR.2017 12:22:32



Test Mode :	3Mbps	Temperature :	24~26°C
Test Engineer :	Shiming Liu	Relative Humidity :	48~51%

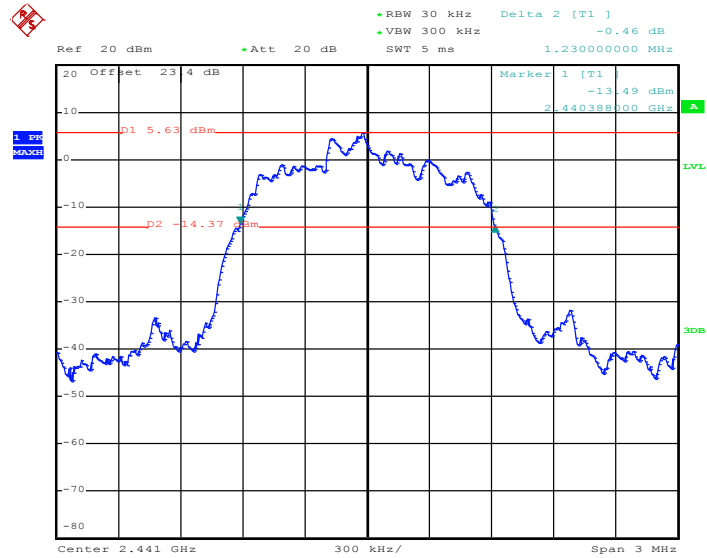
Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	1.236
39	2441	1.230
78	2480	1.236

20 dB Bandwidth Plot on Channel 00

Date: 24.MAR.2017 12:55:00

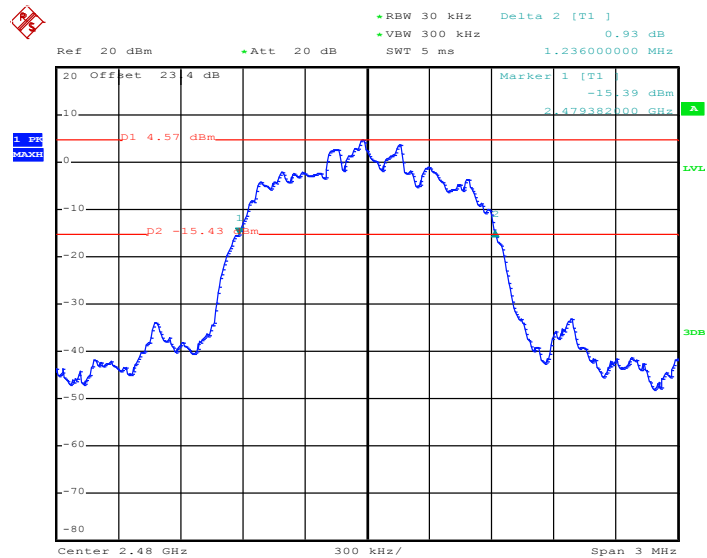


20 dB Bandwidth Plot on Channel 39



Date: 24.MAR.2017 12:56:53

20 dB Bandwidth Plot on Channel 78



Date: 25.MAR.2017 00:44:03

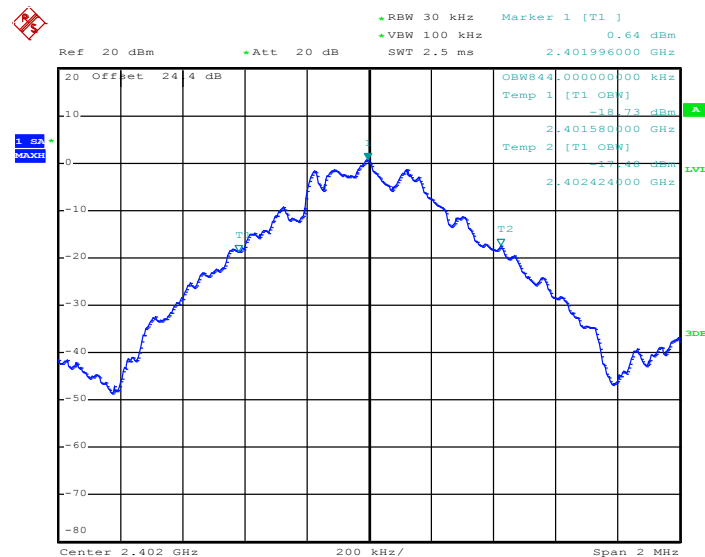
3.4.6 Test Result of 99% Occupied Bandwidth

<For BC127-EXT Chip>

Test Mode :	1Mbps	Temperature :	24~26℃
Test Engineer :	Shiming Liu	Relative Humidity :	48~51%

Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
00	2402	0.844
39	2441	0.840
78	2480	0.844

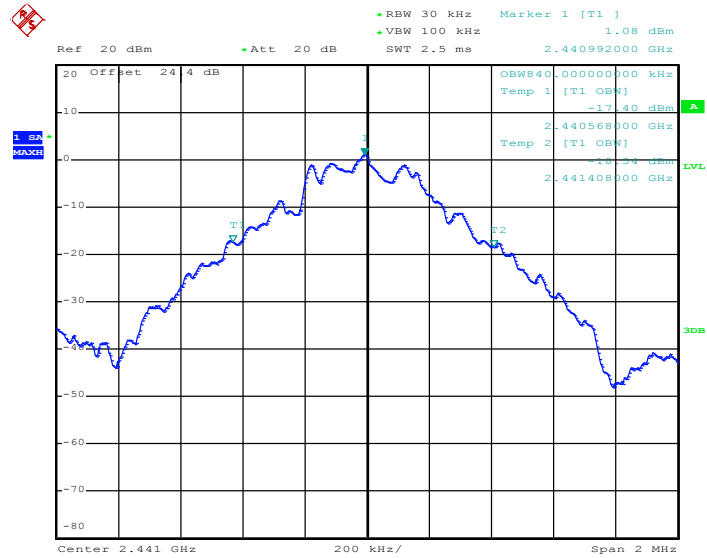
99% Occupied Bandwidth Plot on Channel 00



Date: 25.MAR.2017 01:40:08

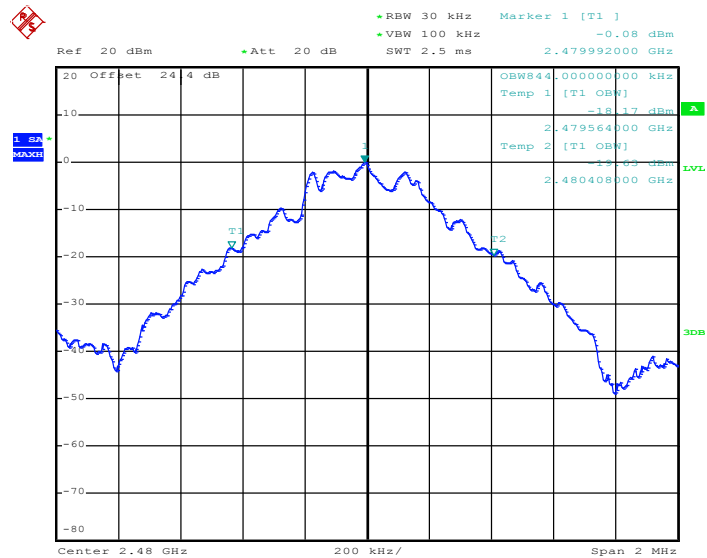


99% Occupied Bandwidth Plot on Channel 39



Date: 25.MAR.2017 01:40:57

99% Occupied Bandwidth Plot on Channel 78

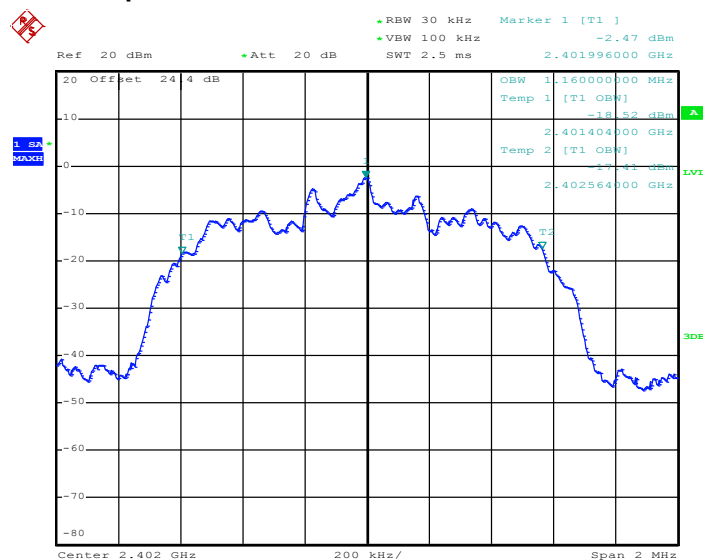


Date: 25.MAR.2017 01:41:40

Test Mode :	2Mbps	Temperature :	24~26℃
Test Engineer :	Shiming Liu	Relative Humidity :	48~51%

Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
00	2402	1.160
39	2441	1.160
78	2480	1.160

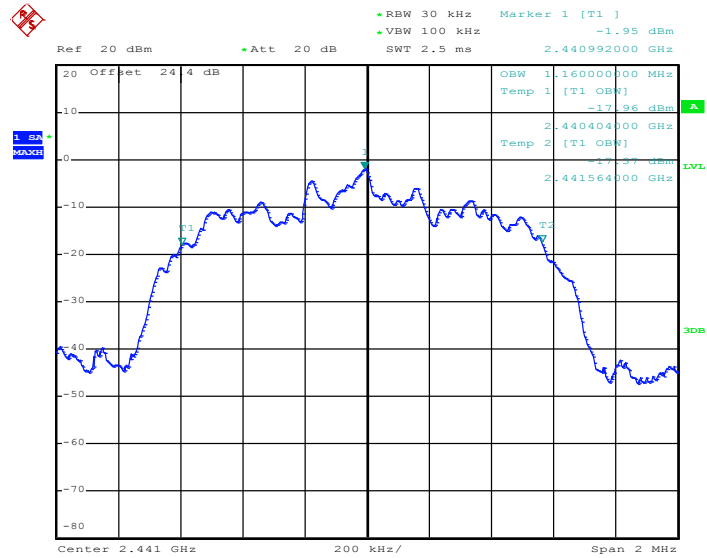
99% Occupied Bandwidth Plot on Channel 00



Date: 27.MAR.2017 20:13:43

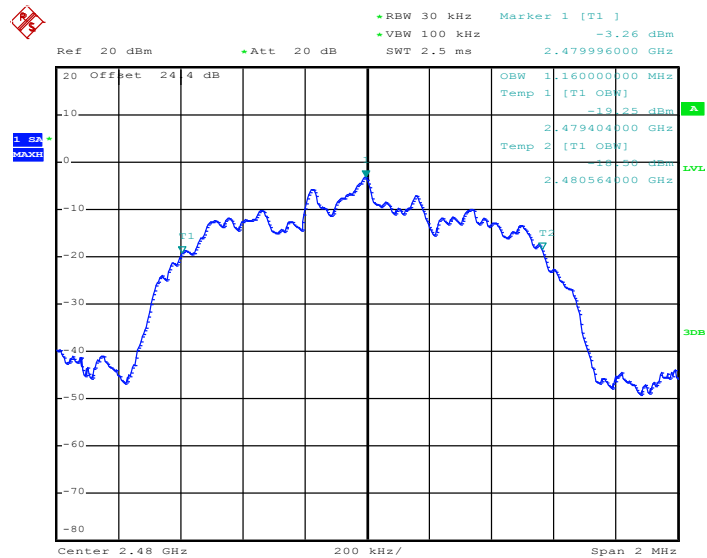


99% Occupied Bandwidth Plot on Channel 39



Date: 27.MAR.2017 20:48:52

99% Occupied Bandwidth Plot on Channel 78

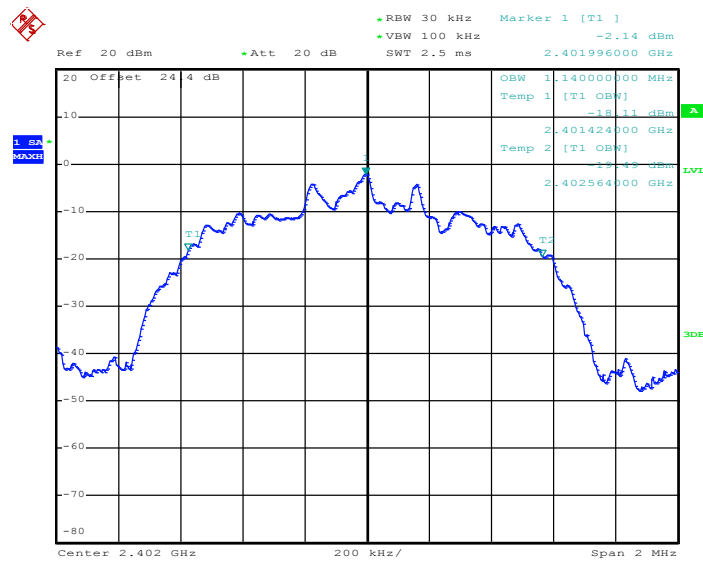


Date: 27.MAR.2017 20:55:08



Test Mode :	3Mbps	Temperature :	24~26°C
Test Engineer :	Shiming Liu	Relative Humidity :	48~51%

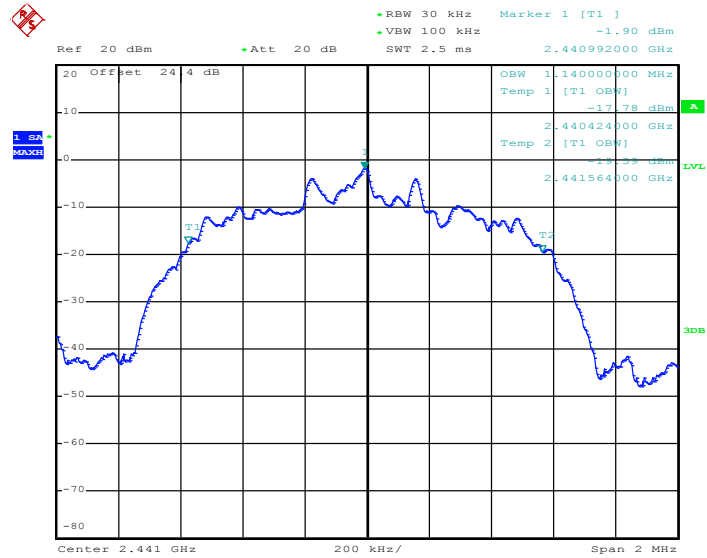
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
00	2402	1.140
39	2441	1.140
78	2480	1.140

99% Occupied Bandwidth Plot on Channel 00

Date: 27.MAR.2017 21:05:37

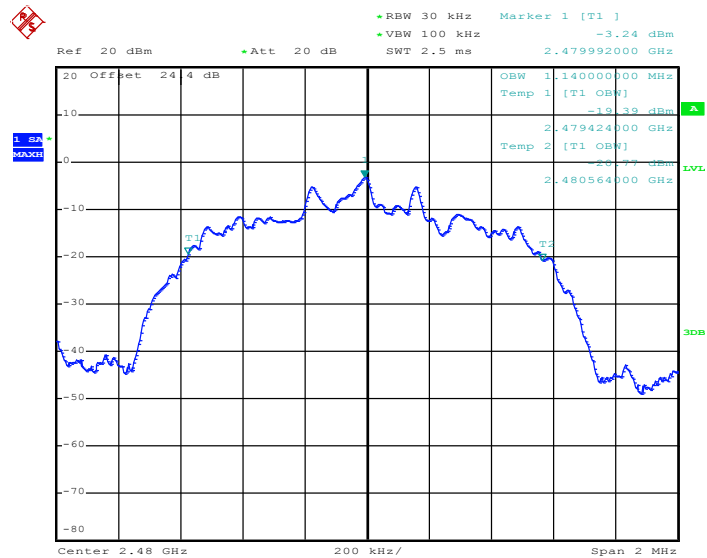


99% Occupied Bandwidth Plot on Channel 39



Date: 27.MAR.2017 21:12:03

99% Occupied Bandwidth Plot on Channel 78



Date: 27.MAR.2017 21:18:08

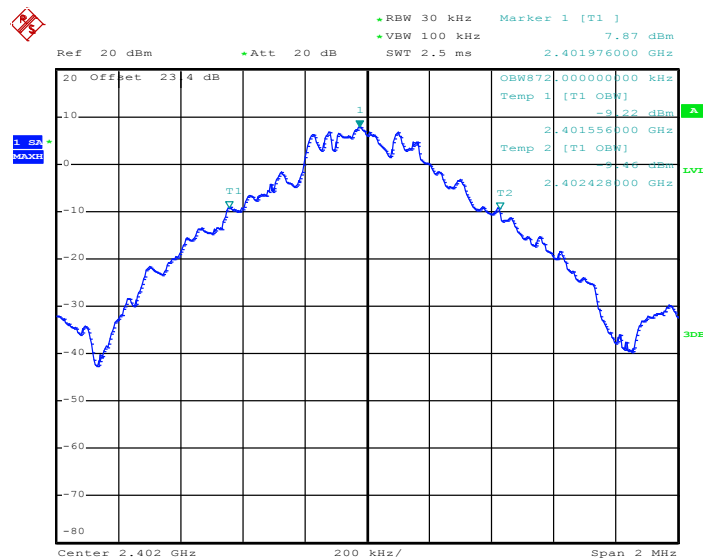
Note : The occupied channel bandwidth is maintained within the band of operation for all of the modulations.



<For WCN3620 Chip>

Test Mode :	1Mbps	Temperature :	24~26°C
Test Engineer :	Shiming Liu	Relative Humidity :	48~51%

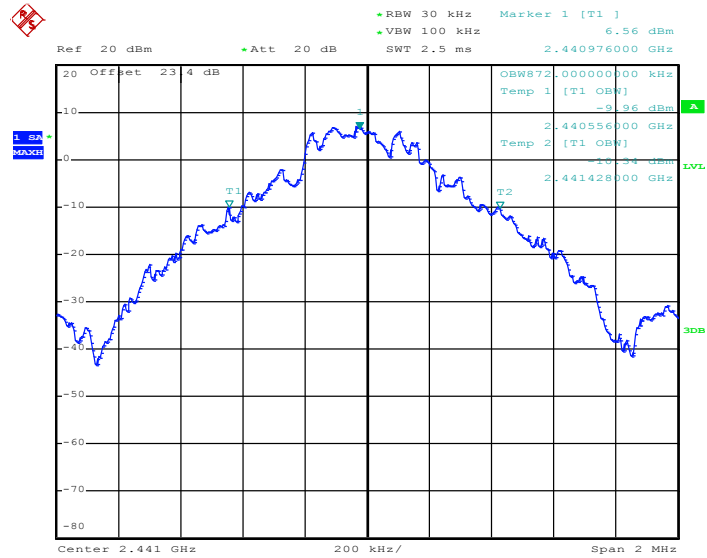
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
00	2402	0.872
39	2441	0.872
78	2480	0.876

99% Occupied Bandwidth Plot on Channel 00

Date: 24.MAR.2017 11:49:00

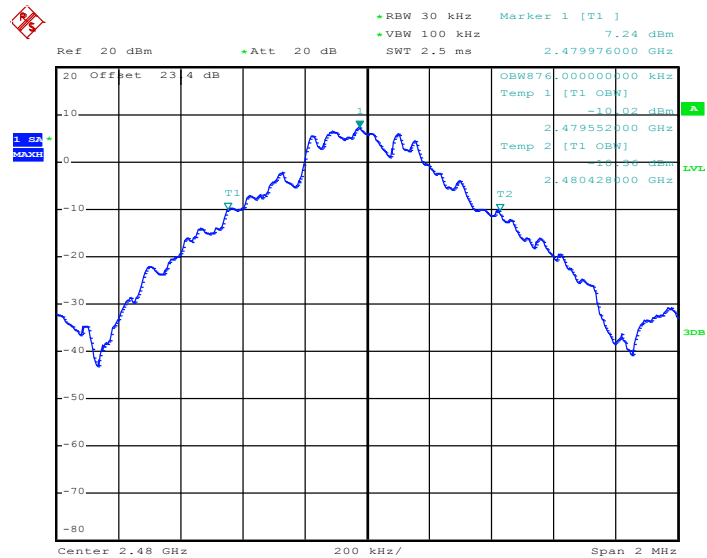


99% Occupied Bandwidth Plot on Channel 39



Date: 24.MAR.2017 11:50:22

99% Occupied Bandwidth Plot on Channel 78

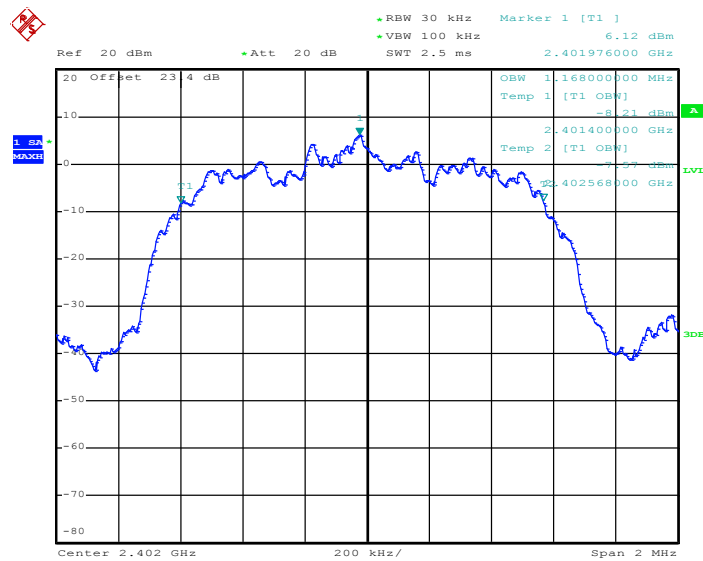


Date: 24.MAR.2017 11:53:08



Test Mode :	2Mbps	Temperature :	24~26°C
Test Engineer :	Shiming Liu	Relative Humidity :	48~51%

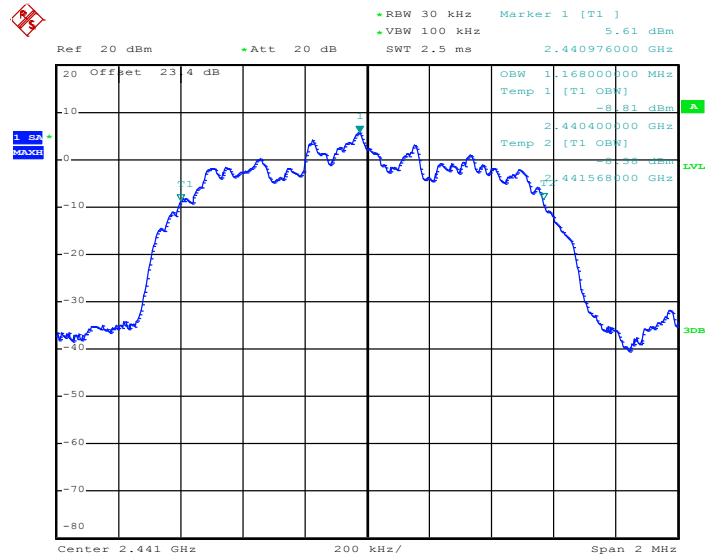
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
00	2402	1.168
39	2441	1.168
78	2480	1.168

99% Occupied Bandwidth Plot on Channel 00

Date: 24.MAR.2017 12:25:00

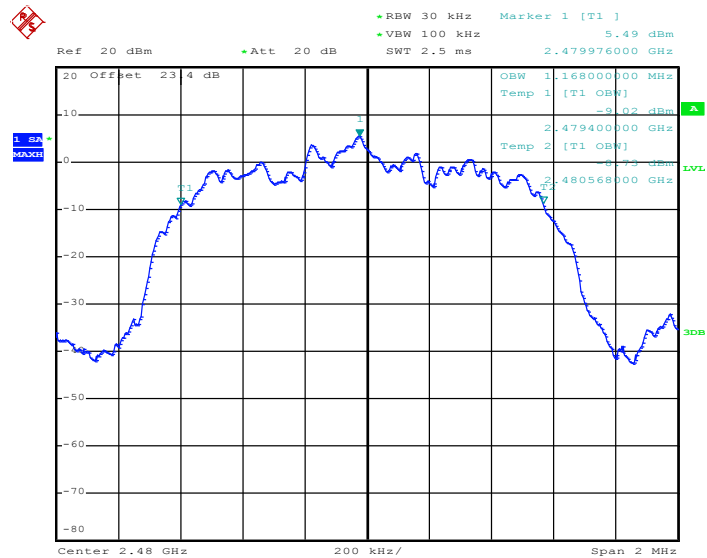


99% Occupied Bandwidth Plot on Channel 39



Date: 24.MAR.2017 12:26:44

99% Occupied Bandwidth Plot on Channel 78

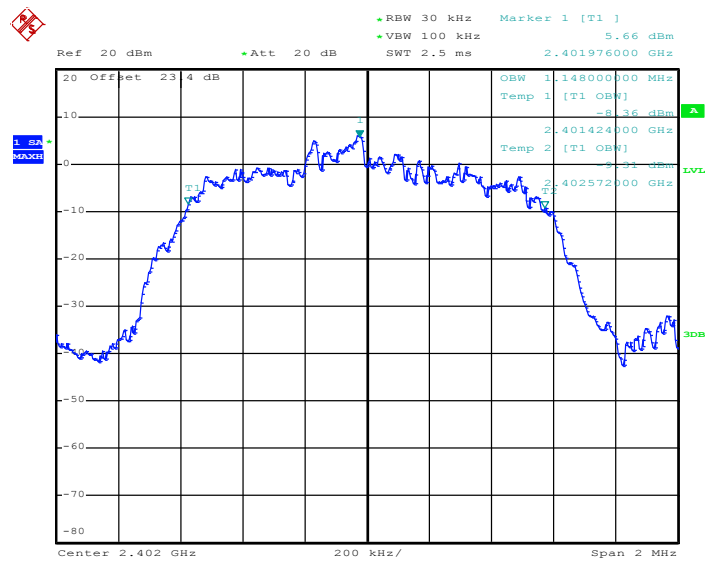


Date: 24.MAR.2017 12:28:11



Test Mode :	3Mbps	Temperature :	24~26°C
Test Engineer :	Shiming Liu	Relative Humidity :	48~51%

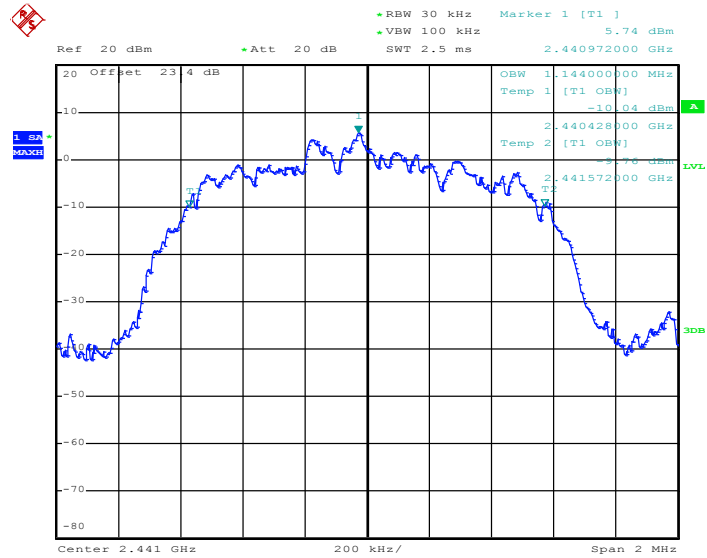
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
00	2402	1.148
39	2441	1.144
78	2480	1.144

99% Occupied Bandwidth Plot on Channel 00

Date: 24.MAR.2017 13:00:37

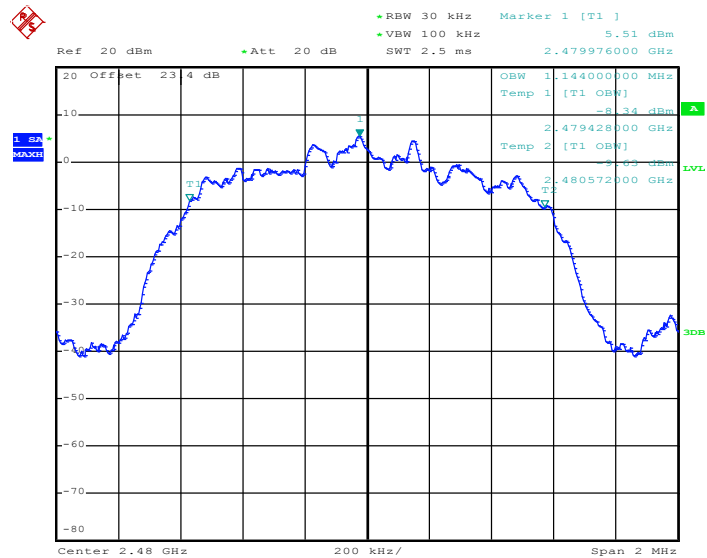


99% Occupied Bandwidth Plot on Channel 39



Date: 24.MAR.2017 13:01:53

99% Occupied Bandwidth Plot on Channel 78



Date: 24.MAR.2017 13:03:30

Note : The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

3.5 Peak Output Power Measurement

3.5.1 Limit of Peak Output Power

Section 15.247 (b) The maximum peak conducted output power of the intentional radiator shall not exceed the following: (1) For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band 0.125 watts. The power limit for 1Mbps, 2Mbps, 3Mbps and AFH modes are 0.125 watts.

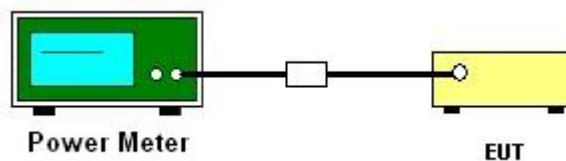
3.5.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.5.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 7.8.5.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power with cable loss and record the results in the test report.
5. Measure and record the results in the test report.

3.5.4 Test Setup





3.5.5 Test Result of Peak Output Power

<For BC127-EXT Chip>

Test Mode :	1Mbps	Temperature :	24~26°C
Test Engineer :	Shiming Liu	Relative Humidity :	48~51%

Channel	Frequency (MHz)	RF Power (dBm)		
		GFSK	Max. Limits (dBm)	Pass/Fail
		1 Mbps		
00	2402	3.07	20.97	Pass
39	2441	3.42	20.97	Pass
78	2480	2.55	20.97	Pass

Note: For AFH mode using 20 hopping channels, the maximum output power limit is 20.97dBm.

Test Mode :	2Mbps	Temperature :	24~26°C
Test Engineer :	Shiming Liu	Relative Humidity :	48~51%

Channel	Frequency (MHz)	RF Power (dBm)		
		$\pi/4$ -DQPSK	Max. Limits (dBm)	Pass/Fail
		2 Mbps		
00	2402	0.93	20.97	Pass
39	2441	1.17	20.97	Pass
78	2480	0.20	20.97	Pass

Test Mode :	3Mbps	Temperature :	24~26°C
Test Engineer :	Shiming Liu	Relative Humidity :	48~51%

Channel	Frequency (MHz)	RF Power (dBm)		
		8-DPSK	Max. Limits (dBm)	Pass/Fail
		3 Mbps		
00	2402	1.30	20.97	Pass
39	2441	1.64	20.97	Pass
78	2480	0.60	20.97	Pass

**<For WCN3620 Chip>**

Test Mode :	1Mbps	Temperature :	24~26°C
Test Engineer :	Shiming Liu	Relative Humidity :	48~51%

Channel	Frequency (MHz)	RF Power (dBm)		
		GFSK	Max. Limits (dBm)	Pass/Fail
		1 Mbps		
00	2402	11.03	20.97	Pass
39	2441	10.41	20.97	Pass
78	2480	10.46	20.97	Pass

Note: For AFH mode using 20 hopping channels, the maximum output power limit is 20.97dBm.

Test Mode :	2Mbps	Temperature :	24~26°C
Test Engineer :	Shiming Liu	Relative Humidity :	48~51%

Channel	Frequency (MHz)	RF Power (dBm)		
		$\pi/4$ -DQPSK	Max. Limits (dBm)	Pass/Fail
		2 Mbps		
00	2402	11.19	20.97	Pass
39	2441	10.53	20.97	Pass
78	2480	10.55	20.97	Pass

Test Mode :	3Mbps	Temperature :	24~26°C
Test Engineer :	Shiming Liu	Relative Humidity :	48~51%

Channel	Frequency (MHz)	RF Power (dBm)		
		8-DPSK	Max. Limits (dBm)	Pass/Fail
		3 Mbps		
00	2402	11.40	20.97	Pass
39	2441	10.65	20.97	Pass
78	2480	10.70	20.97	Pass

3.6 Conducted Band Edges Measurement

3.6.1 Limit of Band Edges

In any 100 kHz bandwidth outside the intentional radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. In addition, radiated emissions which fall in the restricted bands must also comply with the radiated emission limits.

3.6.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.6.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 7.8.6.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. Set RBW = 100kHz, VBW = 300kHz. Band edge emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100kHz RBW. The attenuation shall be 30 dB instead of 20 dB when RMS conducted output power procedure is used.
4. Enable hopping function of the EUT and then repeat step 2. and 3.
5. Measure and record the results in the test report.

3.6.4 Test Setup



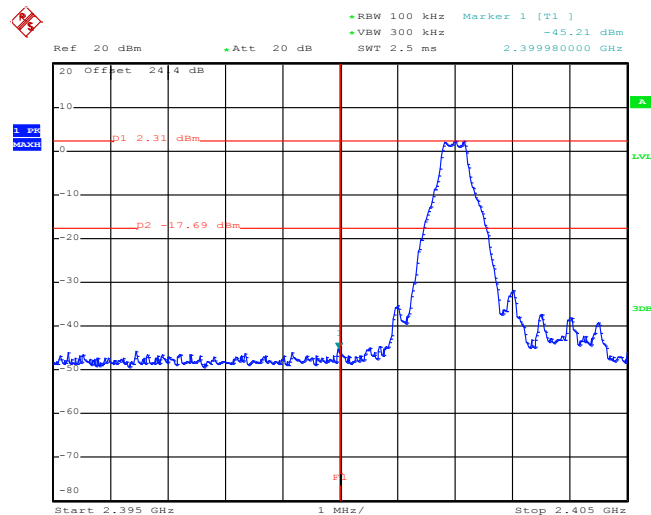


3.6.5 Test Result of Conducted Band Edges

<For BC127-EXT Chip>

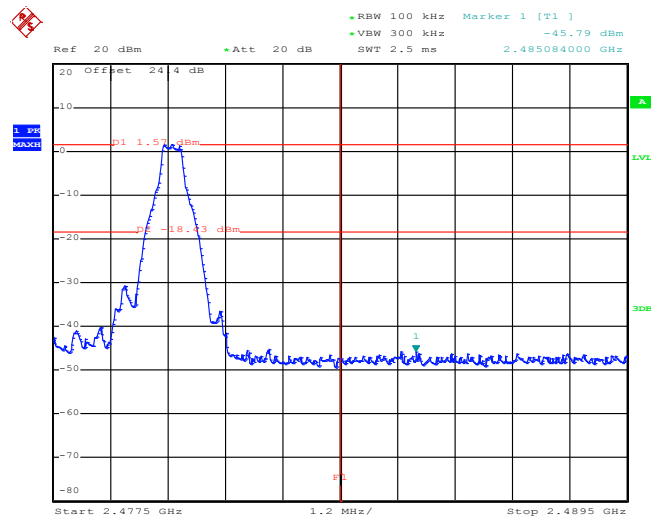
Test Mode :	1Mbps	Temperature :	24~26℃
Test Channel :	00 and 78	Relative Humidity :	48~51%
		Test Engineer :	Shiming Liu

Low Band Edge Plot on Channel 00



Date: 25.MAR.2017 01:51:06

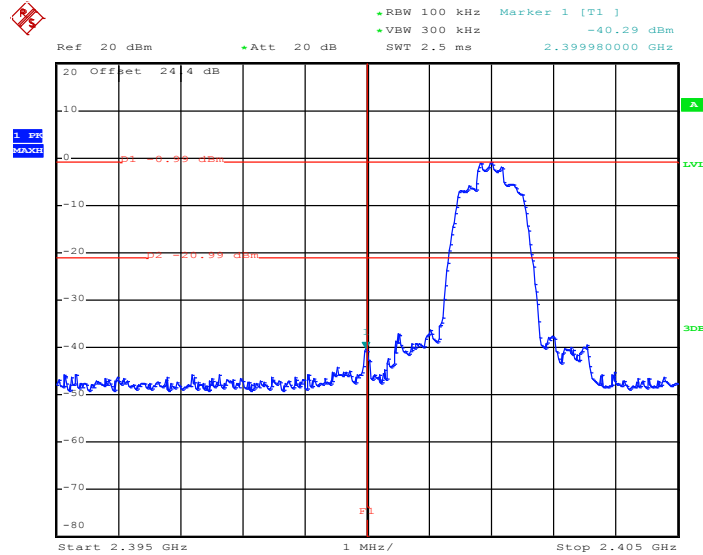
High Band Edge Plot on Channel 78



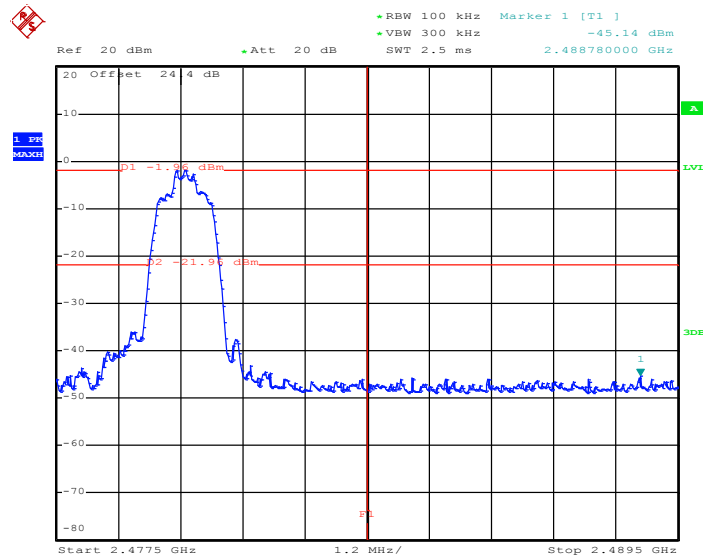
Date: 25.MAR.2017 01:51:36



Test Mode :	2Mbps	Temperature :	24~26°C
Test Channel :	00 and 78	Relative Humidity :	48~51%
		Test Engineer :	Shiming Liu

Low Band Edge Plot on Channel 00

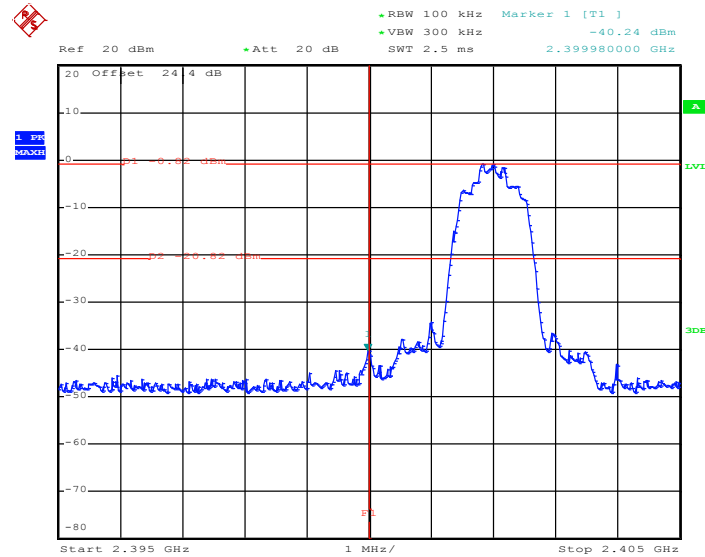
Date: 27.MAR.2017 20:29:19

High Band Edge Plot on Channel 78

Date: 27.MAR.2017 20:59:21

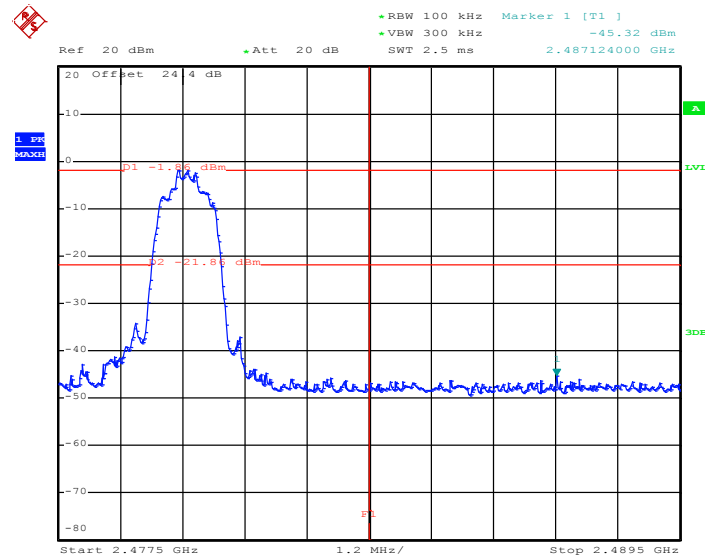
Test Mode :	3Mbps	Temperature :	24~26℃
Test Channel :	00 and 78	Relative Humidity :	48~51%
		Test Engineer :	Shiming Liu

Low Band Edge Plot on Channel 00



Date: 27.MAR.2017 21:07:55

High Band Edge Plot on Channel 78

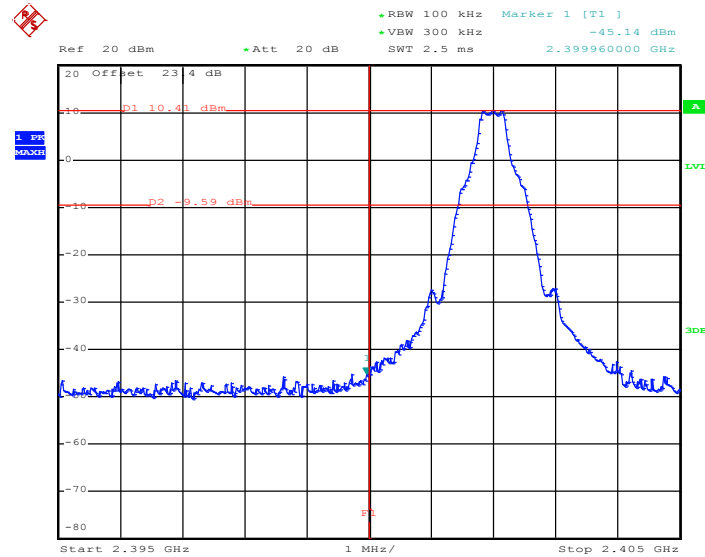


Date: 27.MAR.2017 21:19:48

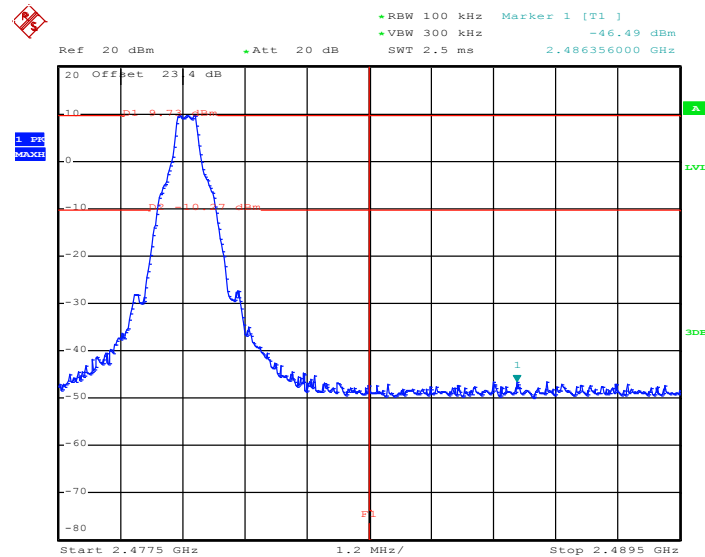


<For WCN3620 Chip>

Test Mode :	1Mbps	Temperature :	24~26℃
Test Channel :	00 and 78	Relative Humidity :	48~51%
		Test Engineer :	Shiming Liu

Low Band Edge Plot on Channel 00

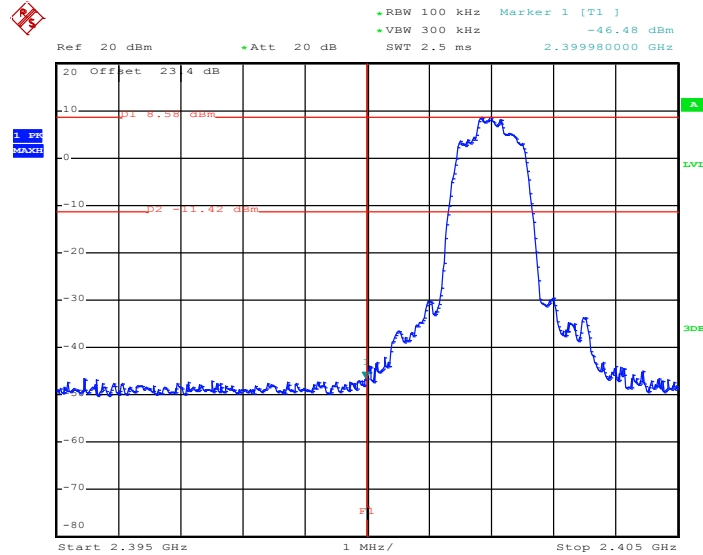
Date: 24.MAR.2017 12:00:36

High Band Edge Plot on Channel 78

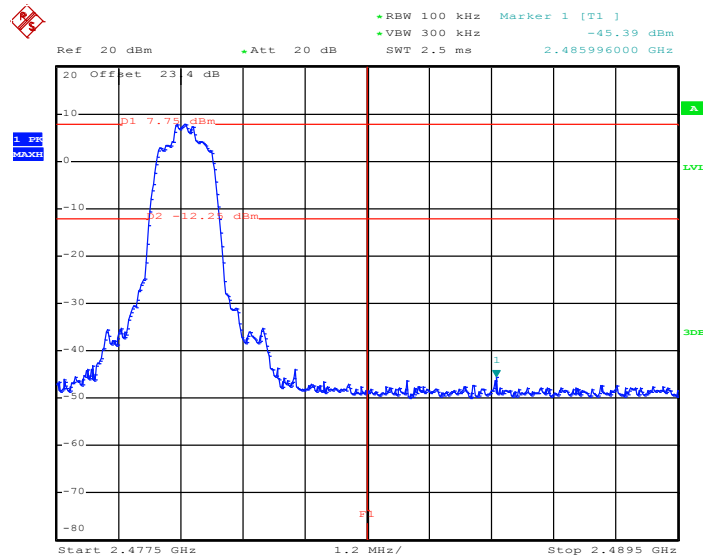
Date: 24.MAR.2017 12:01:19



Test Mode :	2Mbps	Temperature :	24~26℃
Test Channel :	00 and 78	Relative Humidity :	48~51%
		Test Engineer :	Shiming Liu

Low Band Edge Plot on Channel 00

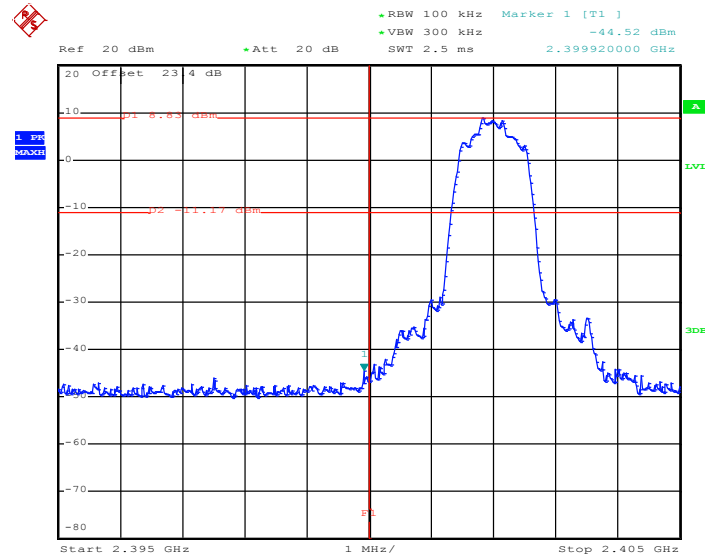
Date: 24.MAR.2017 12:41:29

High Band Edge Plot on Channel 78

Date: 24.MAR.2017 12:42:00

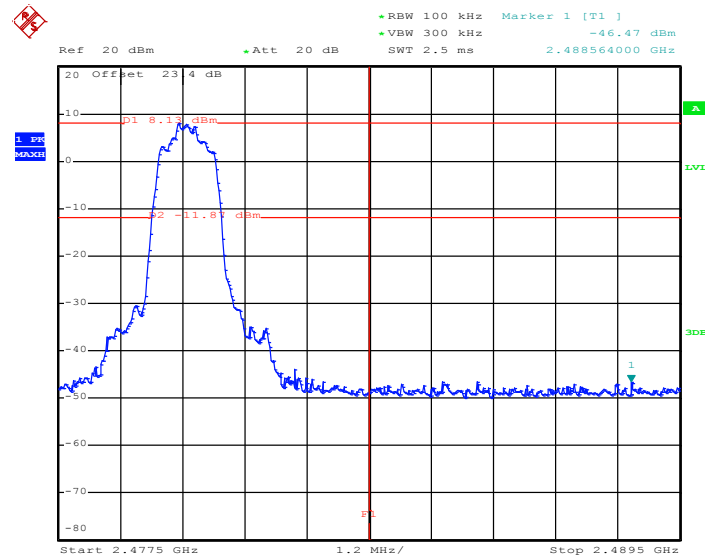
Test Mode :	3Mbps	Temperature :	24~26℃
Test Channel :	00 and 78	Relative Humidity :	48~51%
		Test Engineer :	Shiming Liu

Low Band Edge Plot on Channel 00



Date: 24.MAR.2017 13:10:29

High Band Edge Plot on Channel 78



Date: 24.MAR.2017 13:10:58

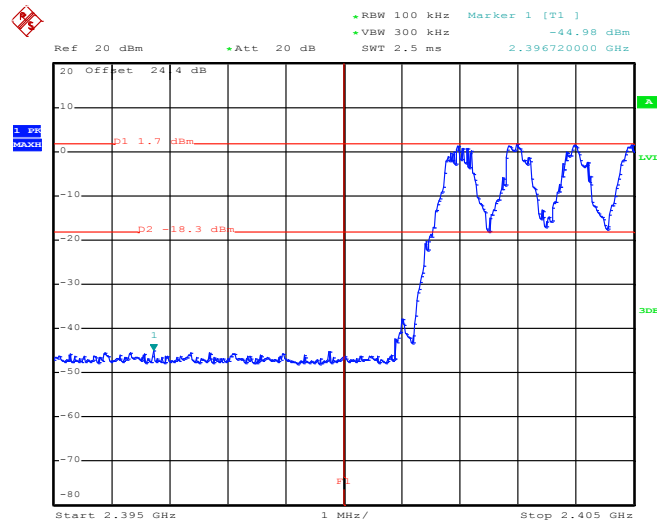


3.6.6 Test Result of Conducted Hopping Mode Band Edges

<For BC127-EXT Chip>

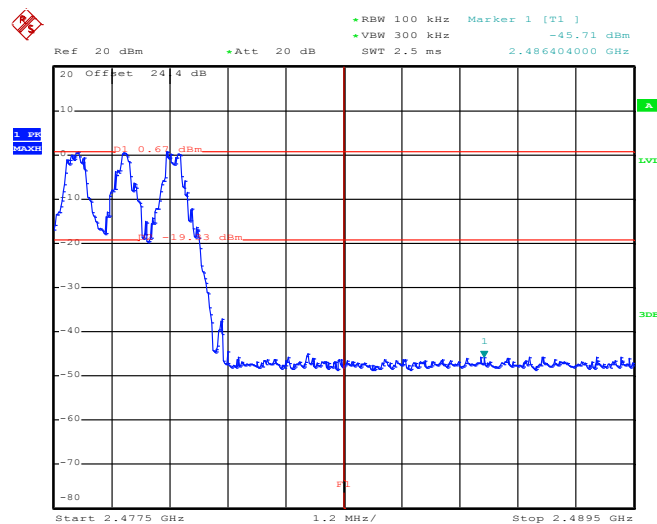
Test Mode :	1Mbps	Temperature :	24~26℃
Test Engineer :	Shiming Liu	Relative Humidity :	48~51%

1Mbps Hopping Mode Low Band Edge Plot



Date: 25.MAR.2017 01:17:08

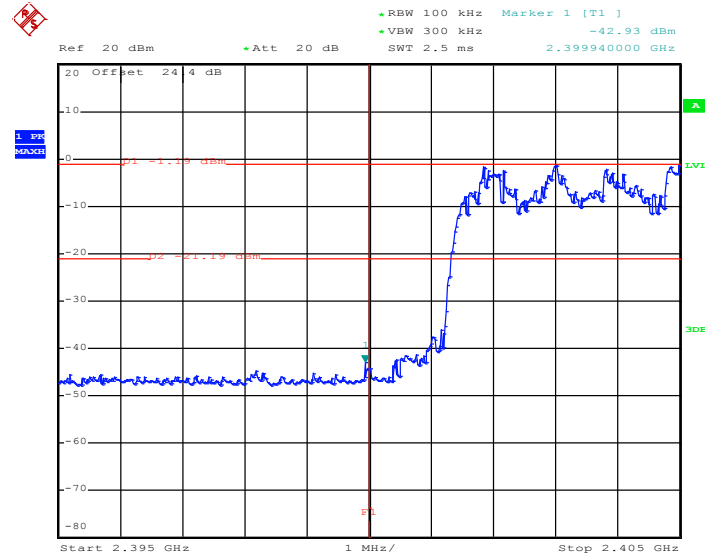
1Mbps Hopping Mode High Band Edge Plot



Date: 25.MAR.2017 01:20:34

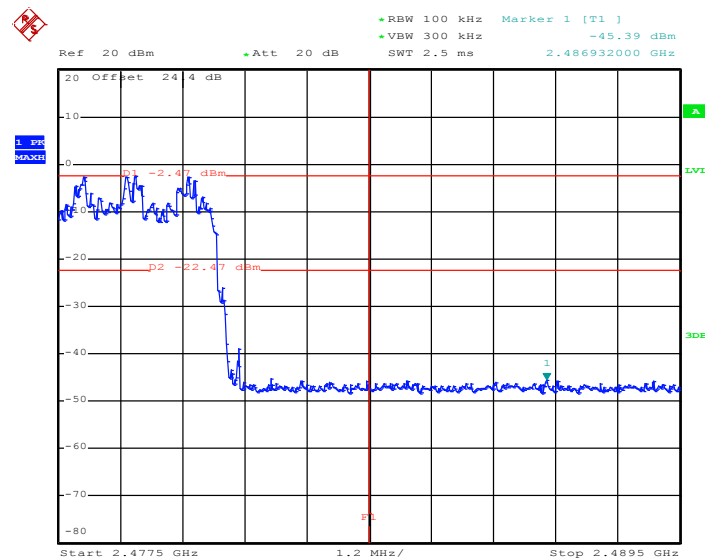
Test Mode :	2Mbps	Temperature :	24~26℃
Test Engineer :	Shiming Liu	Relative Humidity :	48~51%

2Mbps Hopping Mode Low Band Edge Plot



Date: 25.MAR.2017 01:23:10

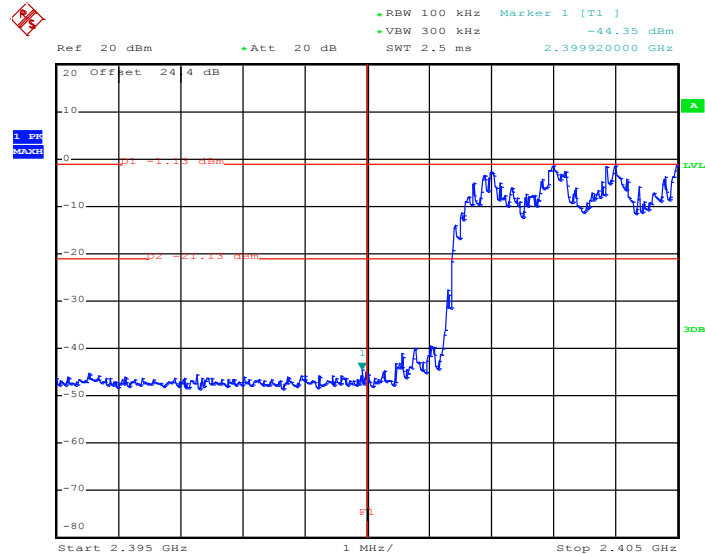
2Mbps Hopping Mode High Band Edge Plot



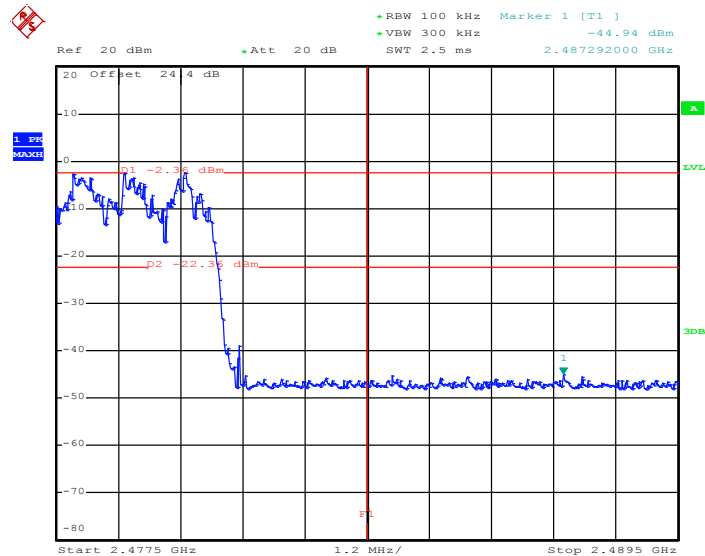
Date: 25.MAR.2017 01:24:30



Test Mode :	3Mbps	Temperature :	24~26°C
Test Engineer :	Shiming Liu	Relative Humidity :	48~51%

3Mbps Hopping Mode Low Band Edge Plot

Date: 25.MAR.2017 01:26:00

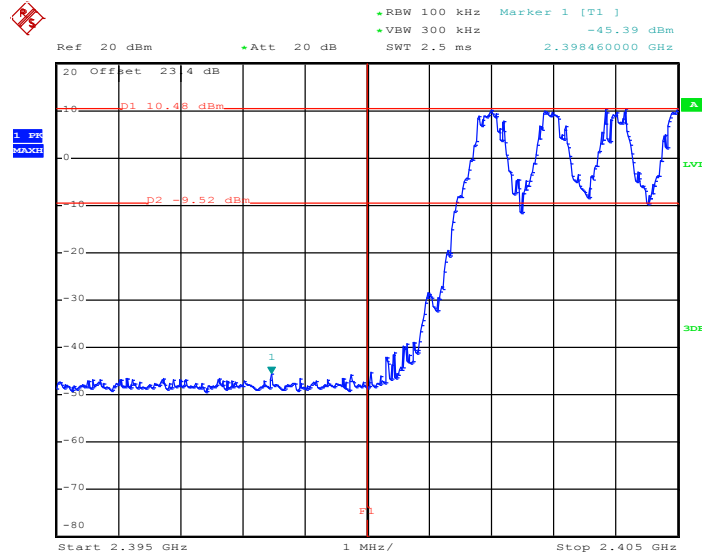
3Mbps Hopping Mode High Band Edge Plot

Date: 25.MAR.2017 01:26:55

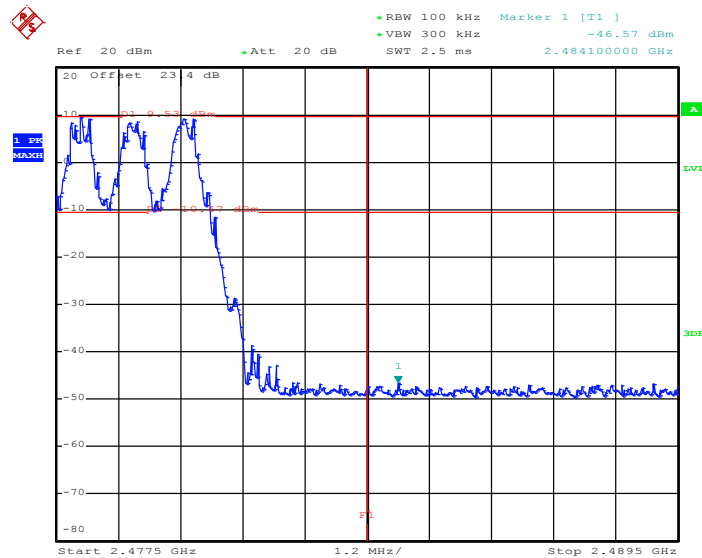


<For WCN3620 Chip>

Test Mode :	1Mbps	Temperature :	24~26°C
Test Engineer :	Shiming Liu	Relative Humidity :	48~51%

1Mbps Hopping Mode Low Band Edge Plot

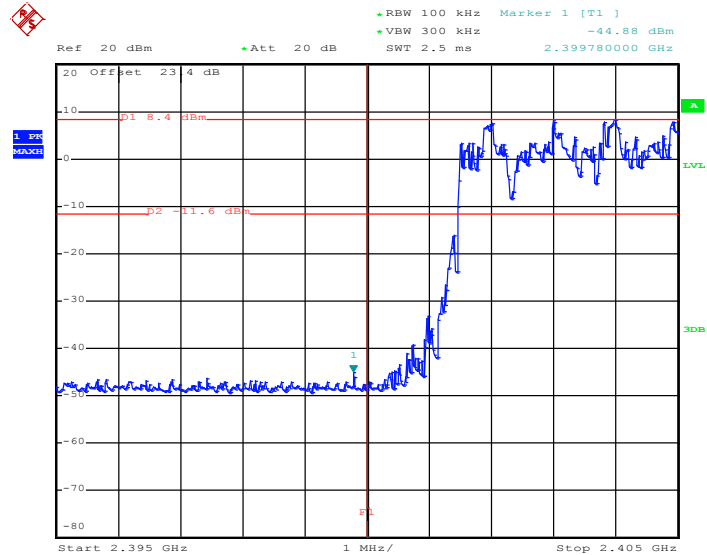
Date: 24.MAR.2017 11:17:44

1Mbps Hopping Mode High Band Edge Plot

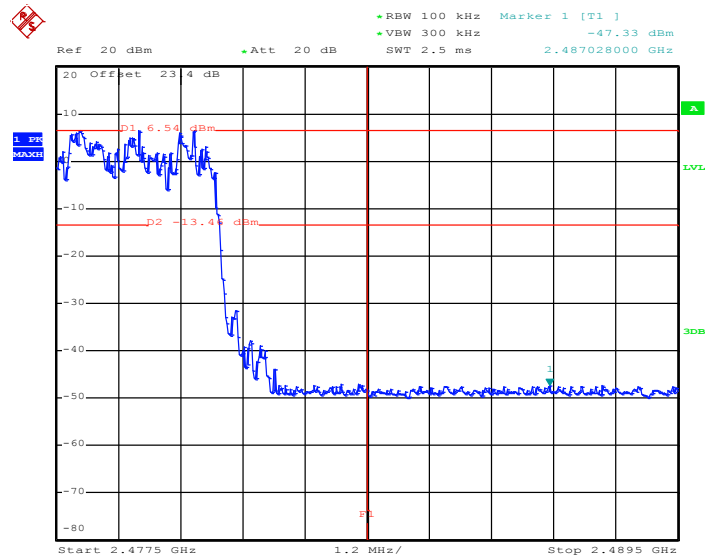
Date: 24.MAR.2017 11:18:17



Test Mode :	2Mbps	Temperature :	24~26°C
Test Engineer :	Shiming Liu	Relative Humidity :	48~51%

2Mbps Hopping Mode Low Band Edge Plot

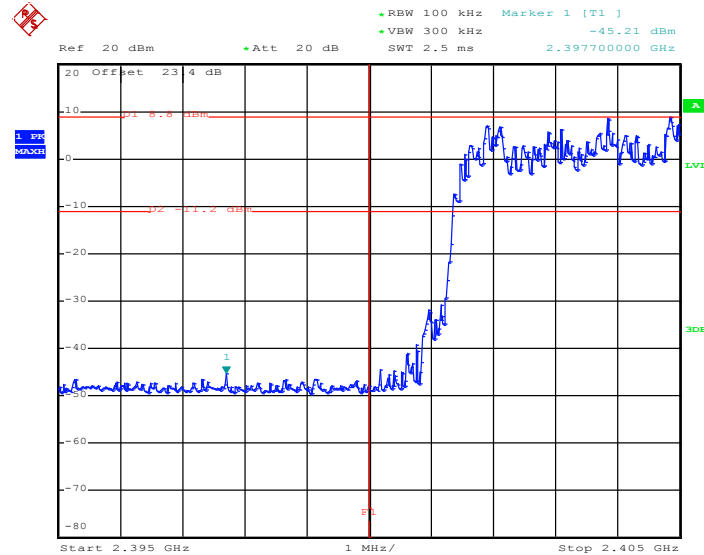
Date: 24.MAR.2017 11:14:45

2Mbps Hopping Mode High Band Edge Plot

Date: 24.MAR.2017 11:15:17

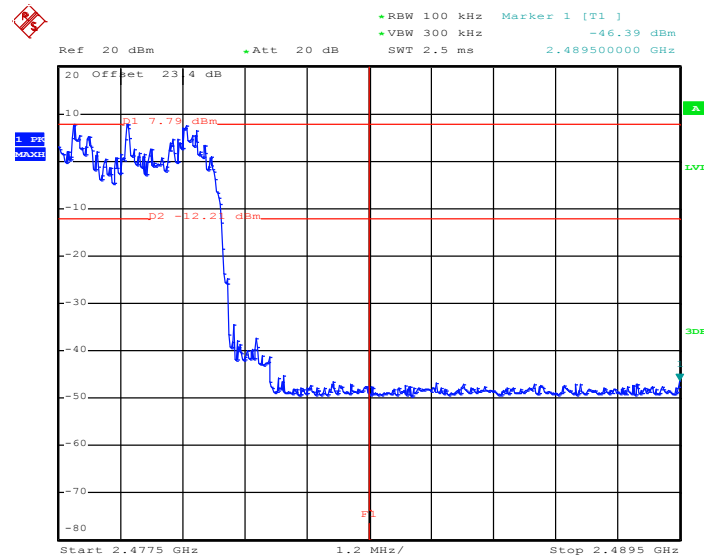
Test Mode :	3Mbps	Temperature :	24~26℃
Test Engineer :	Shiming Liu	Relative Humidity :	48~51%

3Mbps Hopping Mode Low Band Edge Plot



Date: 24.MAR.2017 11:08:44

3Mbps Hopping Mode High Band Edge Plot



Date: 24.MAR.2017 11:09:39

3.7 Conducted Spurious Emission Measurement

3.7.1 Limit of Spurious Emission Measurement

In any 100 kHz bandwidth outside the intentional radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. In addition, radiated emissions which fall in the restricted bands must also comply with the radiated emission limits.

3.7.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.7.3 Test Procedure

1. The testing follows ANSI C63.10-2013 clause 7.8.8.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Set RBW = 100 kHz, VBW = 300kHz, scan up through 10th harmonic. All harmonics / spurs must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW.
5. Measure and record the results in the test report.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

3.7.4 Test Setup



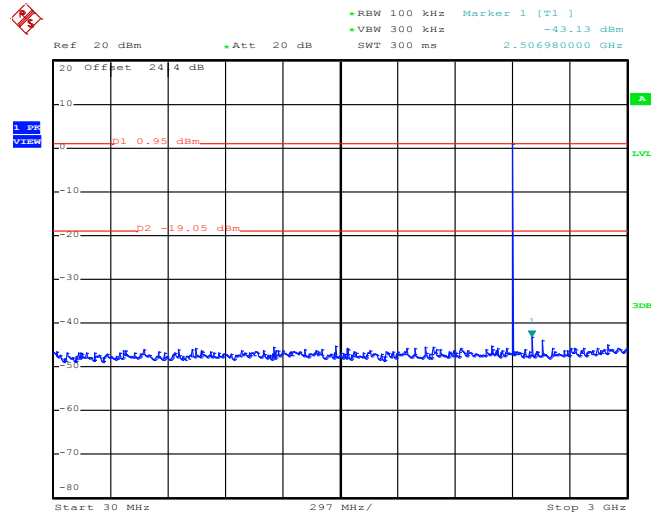


3.7.5 Test Result of Conducted Spurious Emission

<For BC127-EXT Chip>

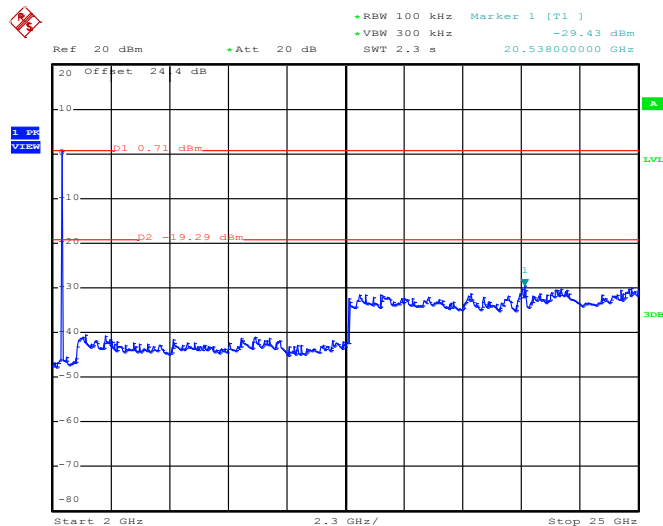
Test Mode :	1Mbps	Temperature :	24~26℃
Test Channel :	00	Relative Humidity :	48~51%
		Test Engineer :	Shiming Liu

1Mbps CSE Plot on Ch 00 between 30MHz ~ 3 GHz



Date: 25.MAR.2017 01:48:09

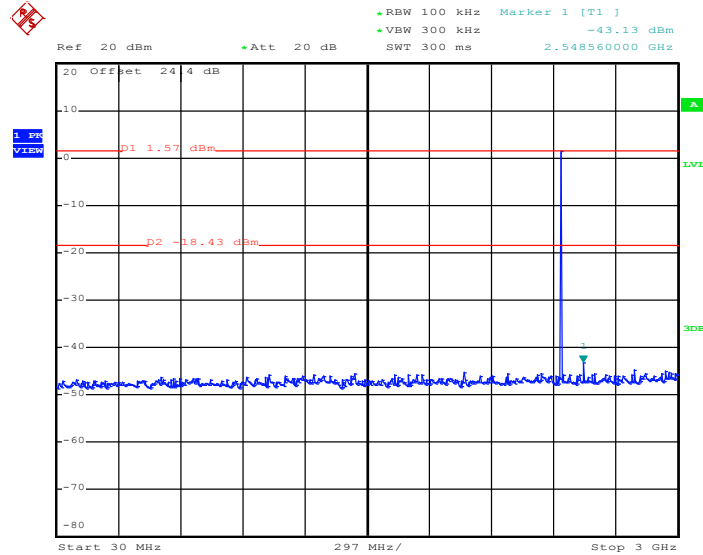
1Mbps CSE Plot on Ch 00 between 2 GHz ~ 25 GHz



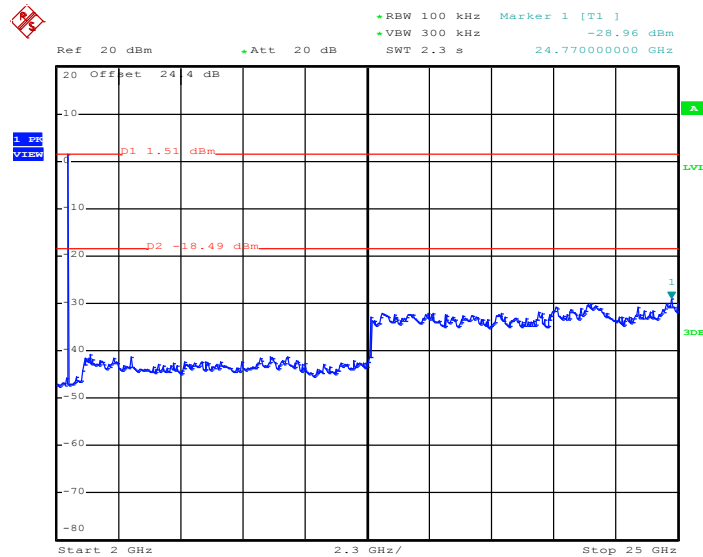
Date: 25.MAR.2017 01:48:31



Test Mode :	1Mbps	Temperature :	24~26°C
Test Channel :	39	Relative Humidity :	48~51%
		Test Engineer :	Shiming Liu

1Mbps CSE Plot on Ch 39 between 30MHz ~ 3 GHz

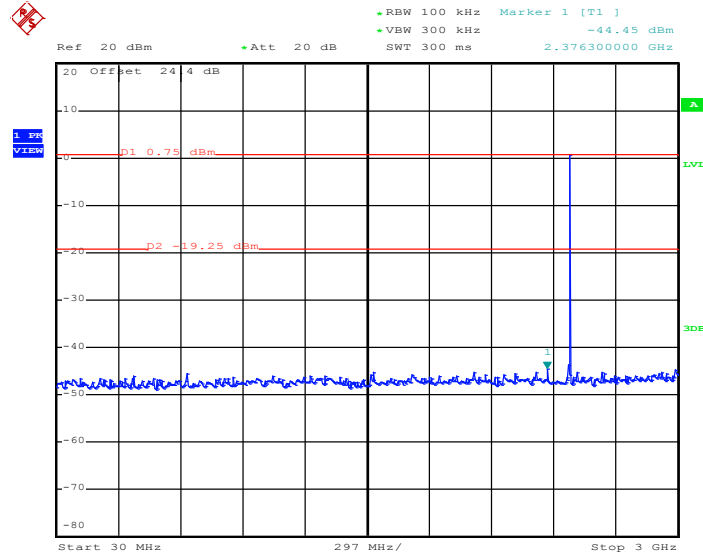
Date: 25.MAR.2017 01:49:07

1Mbps CSE Plot on Ch 39 between 2 GHz ~ 25 GHz

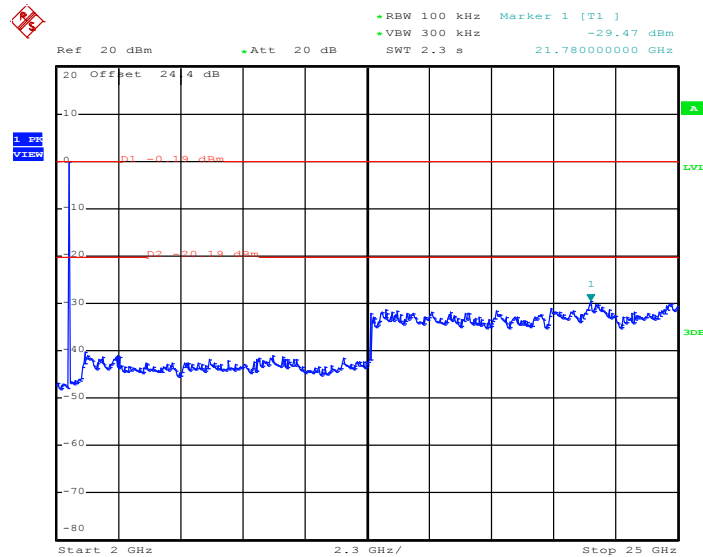
Date: 25.MAR.2017 01:49:28



Test Mode :	1Mbps	Temperature :	24~26°C
Test Channel :	78	Relative Humidity :	48~51%
		Test Engineer :	Shiming Liu

1Mbps CSE Plot on Ch 78 between 30MHz ~ 3 GHz

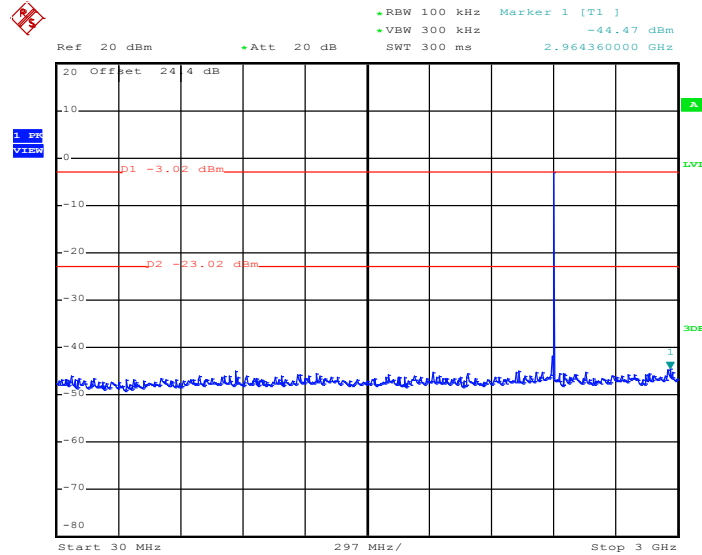
Date: 25.MAR.2017 01:50:04

1Mbps CSE Plot on Ch 78 between 2 GHz ~ 25 GHz

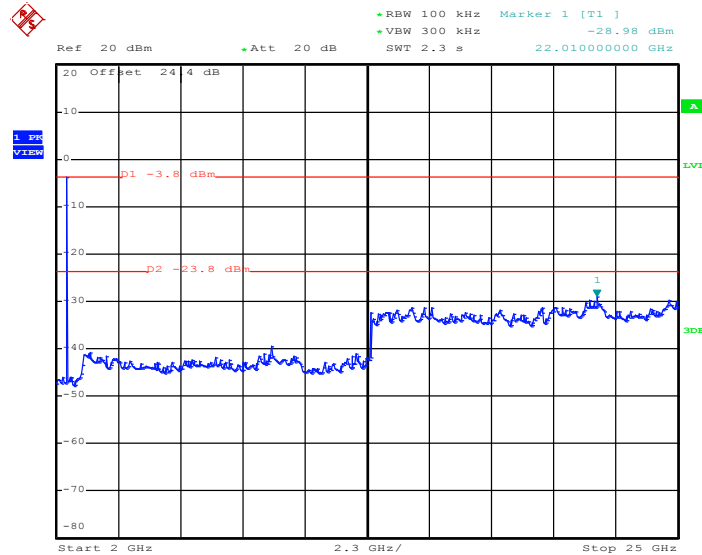
Date: 25.MAR.2017 01:50:25



Test Mode :	2Mbps	Temperature :	24~26°C
Test Channel :	00	Relative Humidity :	48~51%
		Test Engineer :	Shiming Liu

2Mbps CSE Plot on Ch 00 between 30MHz ~ 3 GHz

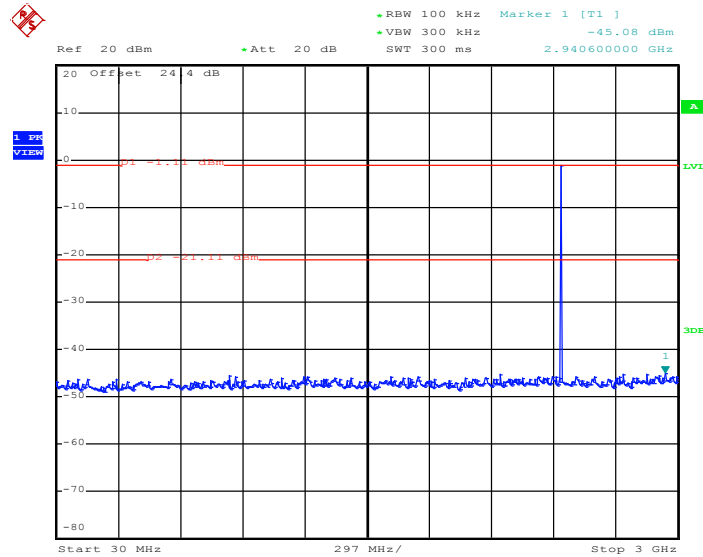
Date: 27.MAR.2017 20:27:38

2Mbps CSE Plot on Ch 00 between 2 GHz ~ 25 GHz

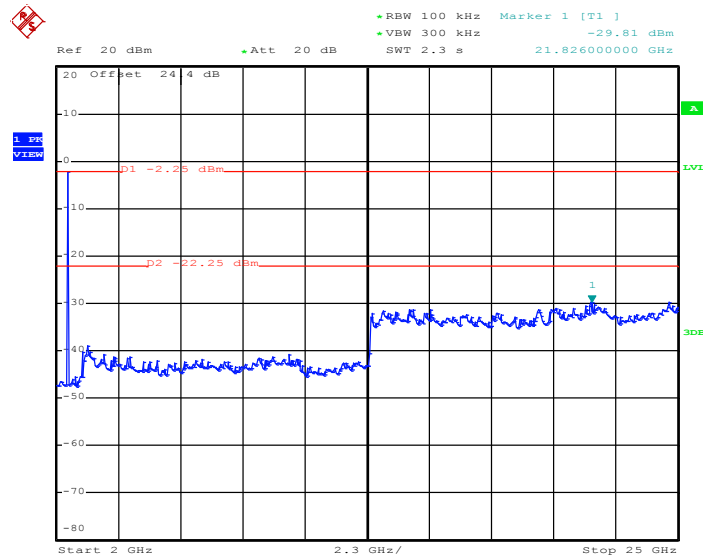
Date: 27.MAR.2017 20:27:59



Test Mode :	2Mbps	Temperature :	24~26°C
Test Channel :	39	Relative Humidity :	48~51%
		Test Engineer :	Shiming Liu

2Mbps CSE Plot on Ch 39 between 30MHz ~ 3 GHz

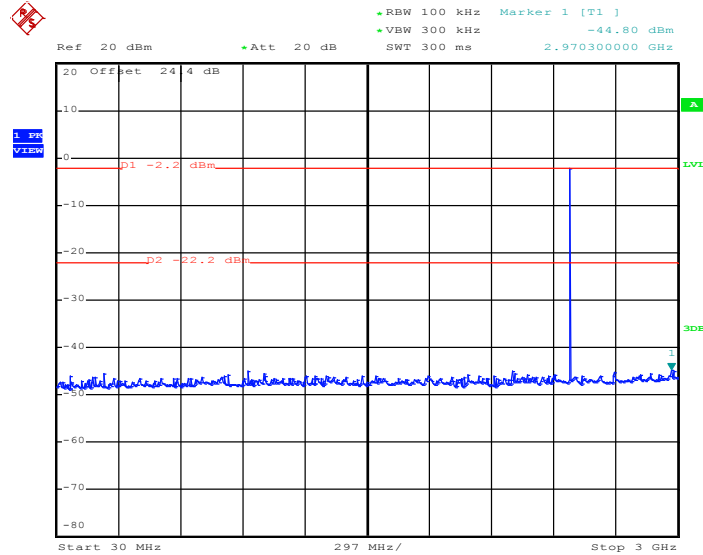
Date: 27.MAR.2017 20:49:22

2Mbps CSE Plot on Ch 39 between 2 GHz ~ 25 GHz

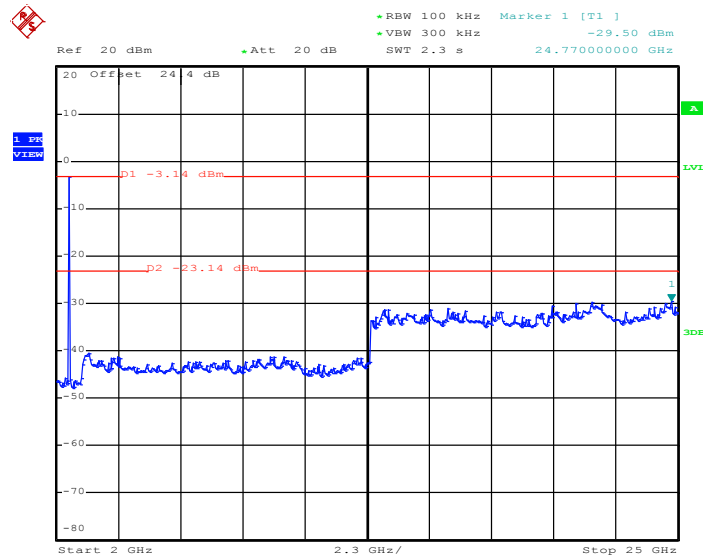
Date: 27.MAR.2017 20:49:44



Test Mode :	2Mbps	Temperature :	24~26°C
Test Channel :	78	Relative Humidity :	48~51%
		Test Engineer :	Shiming Liu

2Mbps CSE Plot on Ch 78 between 30MHz ~ 3 GHz

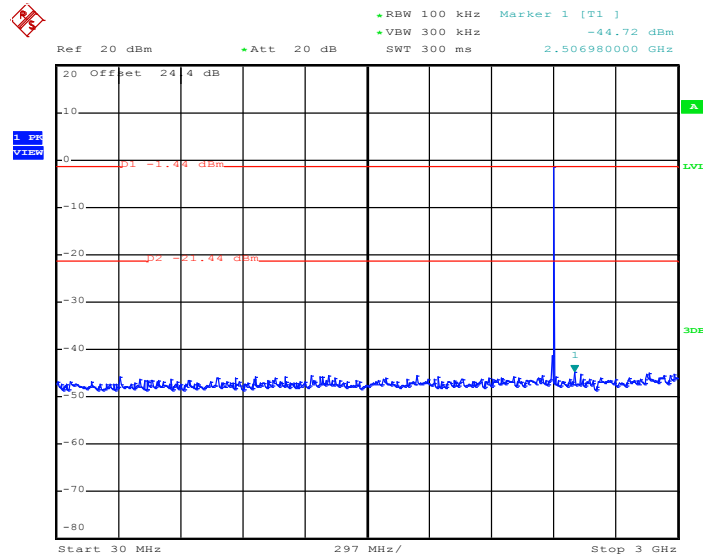
Date: 27.MAR.2017 20:58:25

2Mbps CSE Plot on Ch 78 between 2 GHz ~ 25 GHz

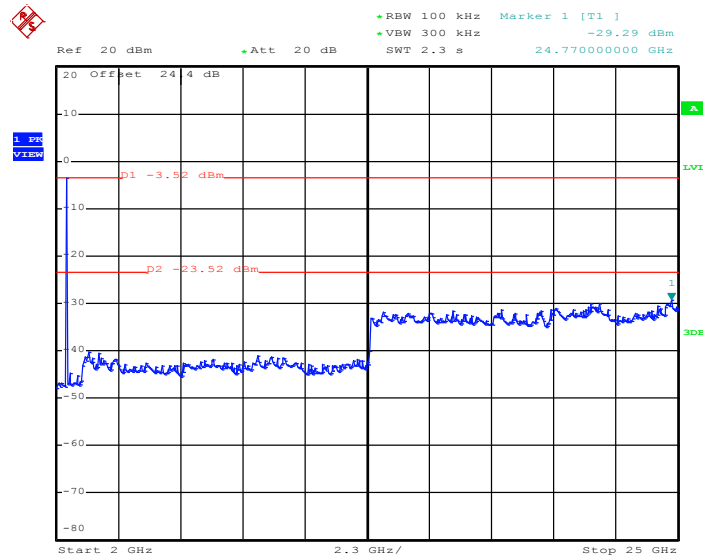
Date: 27.MAR.2017 20:58:46



Test Mode :	3Mbps	Temperature :	24~26°C
Test Channel :	00	Relative Humidity :	48~51%
		Test Engineer :	Shiming Liu

3Mbps CSE Plot on Ch 00 between 30MHz ~ 3 GHz

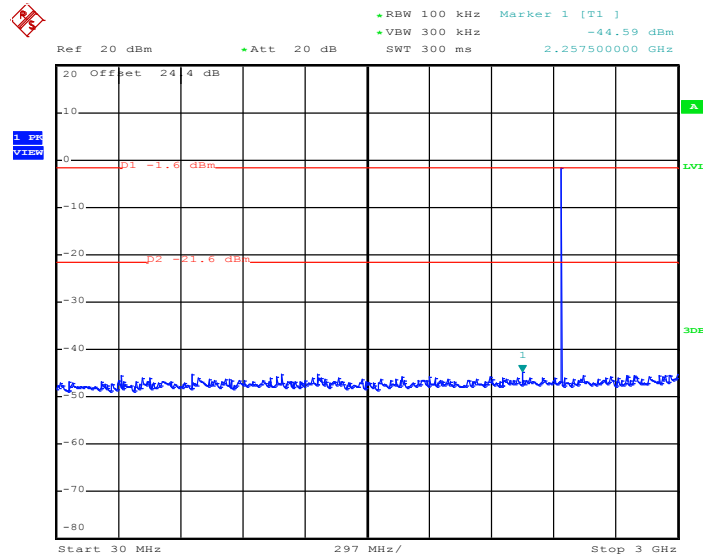
Date: 27.MAR.2017 21:06:36

3Mbps CSE Plot on Ch 00 between 2 GHz ~ 25 GHz

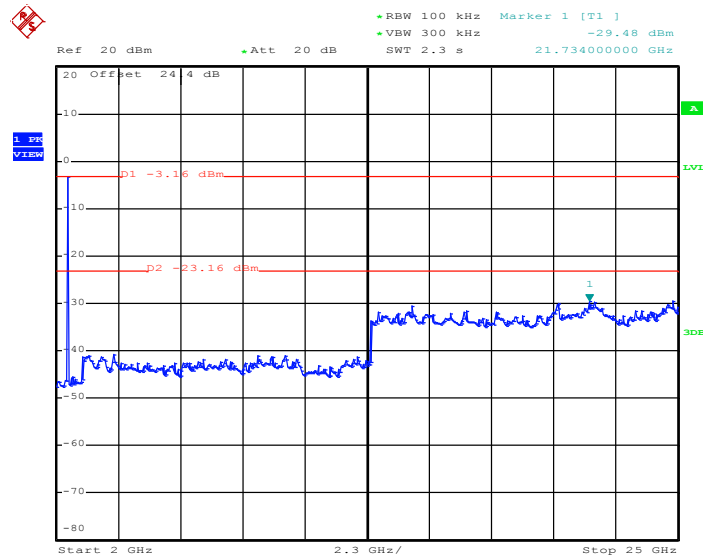
Date: 27.MAR.2017 21:06:57



Test Mode :	3Mbps	Temperature :	24~26°C
Test Channel :	39	Relative Humidity :	48~51%
		Test Engineer :	Shiming Liu

3Mbps CSE Plot on Ch 39 between 30MHz ~ 3 GHz

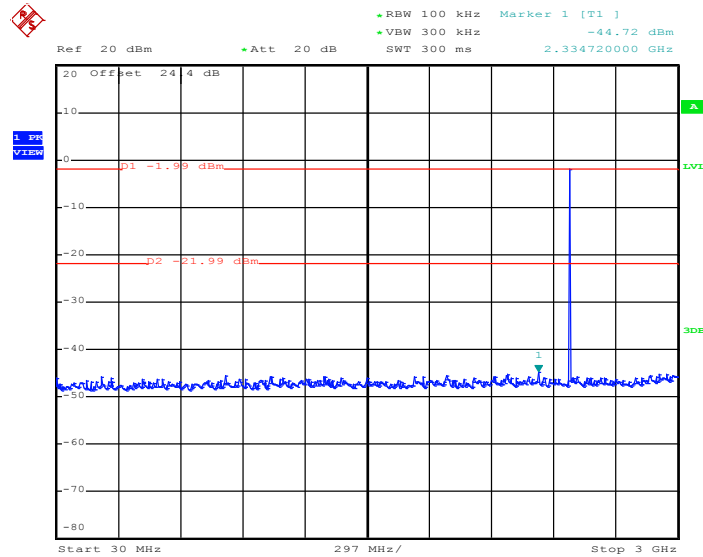
Date: 27.MAR.2017 21:12:32

3Mbps CSE Plot on Ch 39 between 2 GHz ~ 25 GHz

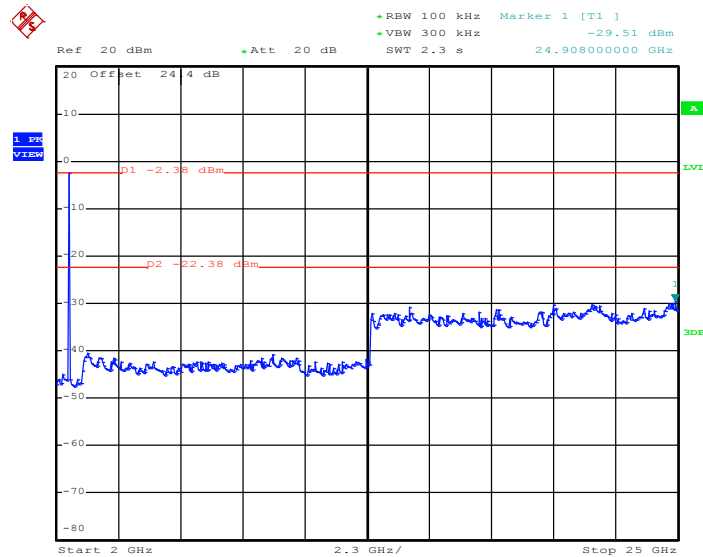
Date: 27.MAR.2017 21:12:54



Test Mode :	3Mbps	Temperature :	24~26°C
Test Channel :	78	Relative Humidity :	48~51%
		Test Engineer :	Shiming Liu

3Mbps CSE Plot on Ch 78 between 30MHz ~ 3 GHz

Date: 27.MAR.2017 21:18:32

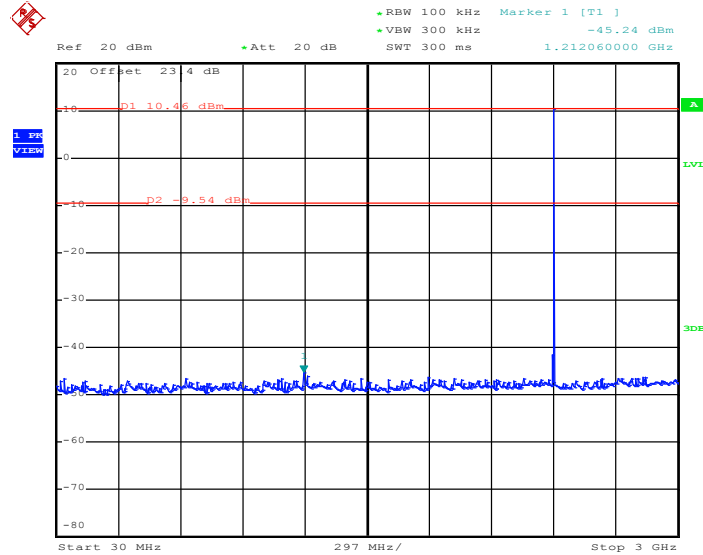
3Mbps CSE Plot on Ch 78 between 2 GHz ~ 25 GHz

Date: 27.MAR.2017 21:18:54

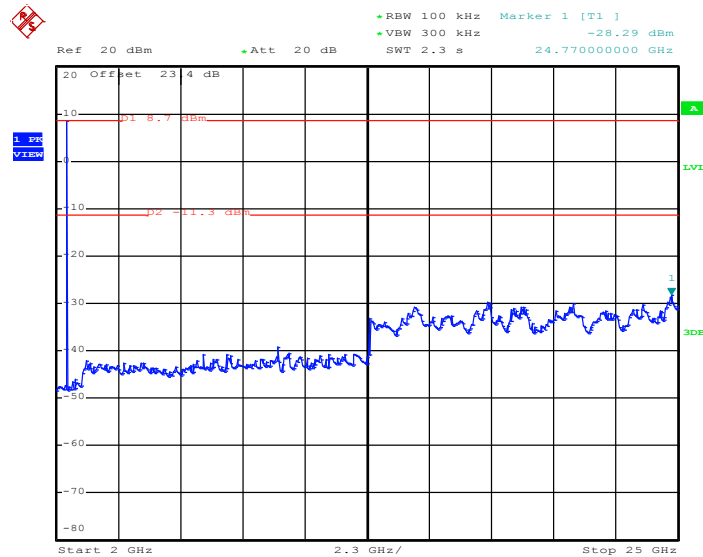


<For WCN3620 Chip>

Test Mode :	1Mbps	Temperature :	24~26°C
Test Channel :	00	Relative Humidity :	48~51%
		Test Engineer :	Shiming Liu

1Mbps CSE Plot on Ch 00 between 30MHz ~ 3 GHz

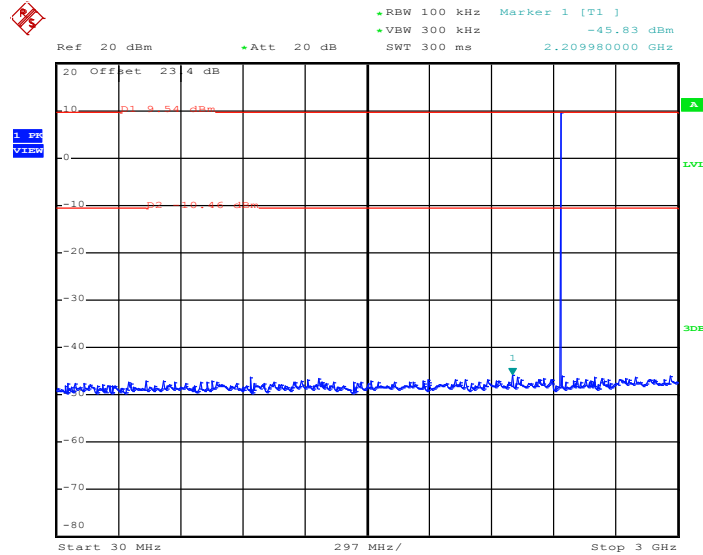
Date: 24.MAR.2017 11:55:21

1Mbps CSE Plot on Ch 00 between 2 GHz ~ 25 GHz

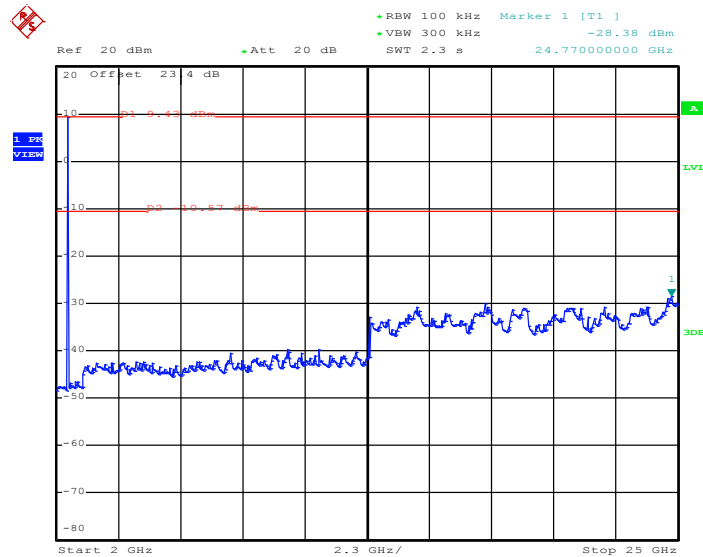
Date: 24.MAR.2017 11:55:42



Test Mode :	1Mbps	Temperature :	24~26°C
Test Channel :	39	Relative Humidity :	48~51%
		Test Engineer :	Shiming Liu

1Mbps CSE Plot on Ch 39 between 30MHz ~ 3 GHz

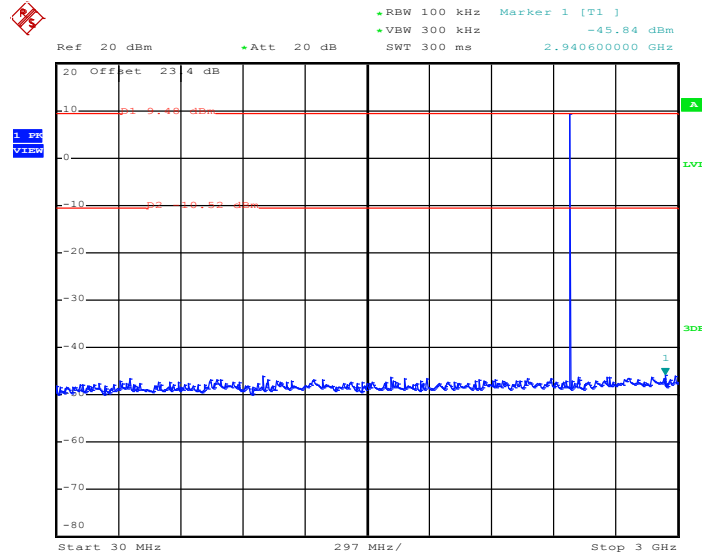
Date: 24.MAR.2017 11:56:39

1Mbps CSE Plot on Ch 39 between 2 GHz ~ 25 GHz

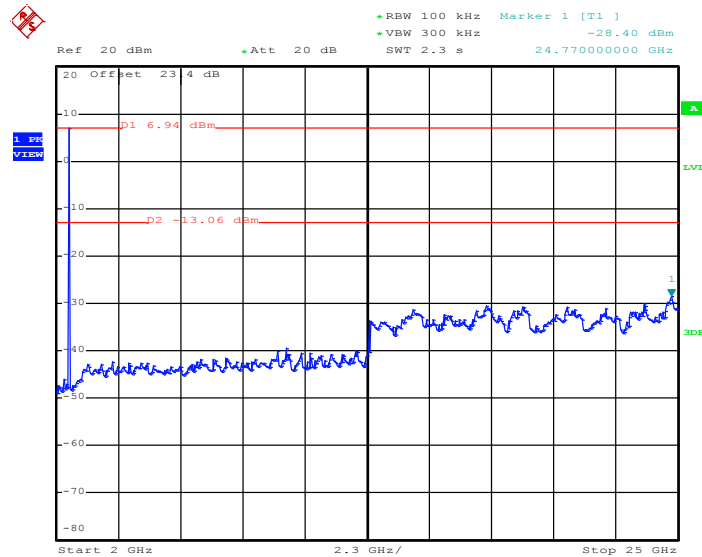
Date: 24.MAR.2017 11:57:01



Test Mode :	1Mbps	Temperature :	24~26°C
Test Channel :	78	Relative Humidity :	48~51%
		Test Engineer :	Shiming Liu

1Mbps CSE Plot on Ch 78 between 30MHz ~ 3 GHz

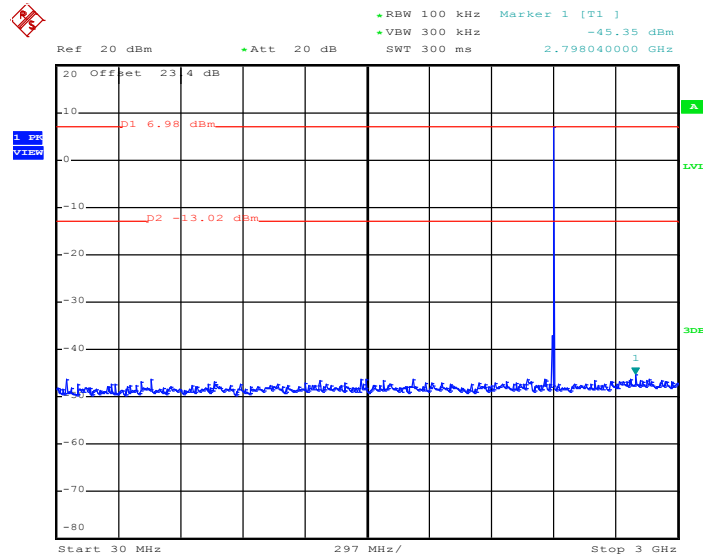
Date: 24.MAR.2017 11:58:04

1Mbps CSE Plot on Ch 78 between 2 GHz ~ 25 GHz

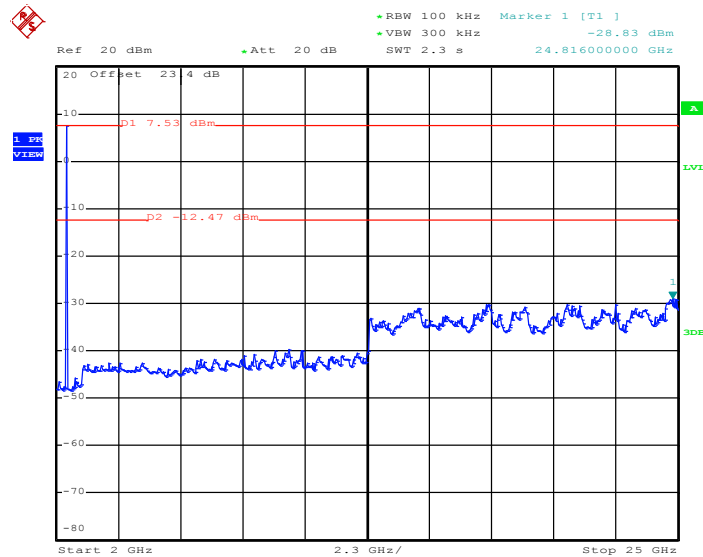
Date: 24.MAR.2017 11:58:25



Test Mode :	2Mbps	Temperature :	24~26°C
Test Channel :	00	Relative Humidity :	48~51%
		Test Engineer :	Shiming Liu

2Mbps CSE Plot on Ch 00 between 30MHz ~ 3 GHz

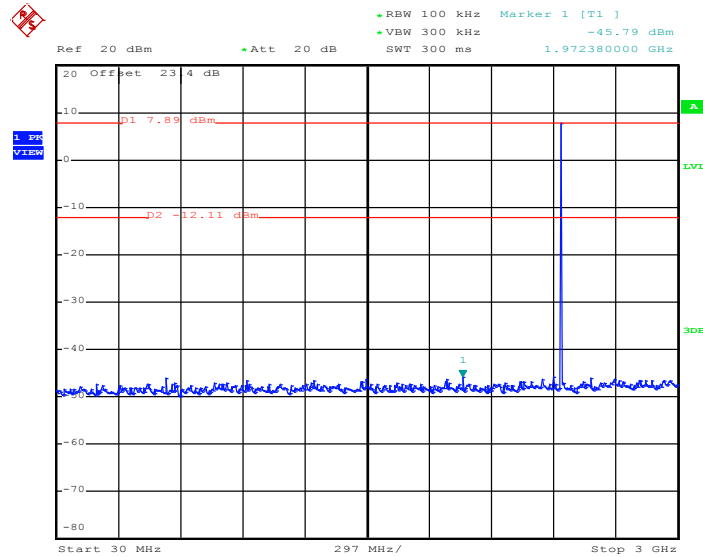
Date: 24.MAR.2017 12:31:37

2Mbps CSE Plot on Ch 00 between 2 GHz ~ 25 GHz

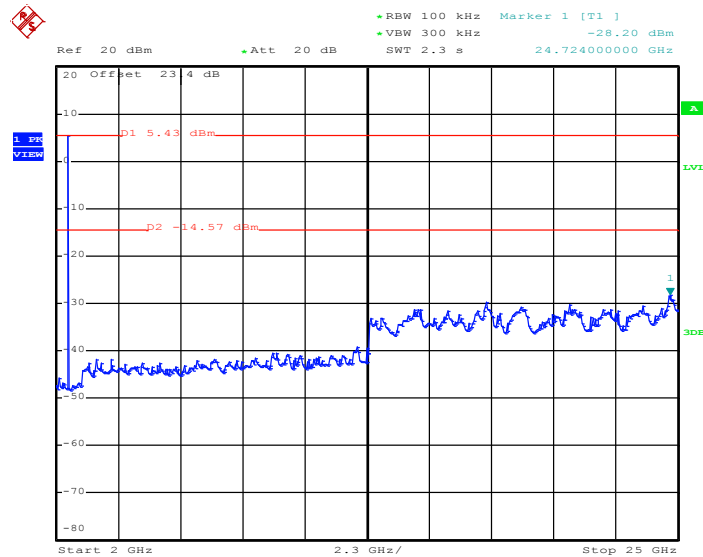
Date: 24.MAR.2017 12:31:58



Test Mode :	2Mbps	Temperature :	24~26°C
Test Channel :	39	Relative Humidity :	48~51%
		Test Engineer :	Shiming Liu

2Mbps CSE Plot on Ch 39 between 30MHz ~ 3 GHz

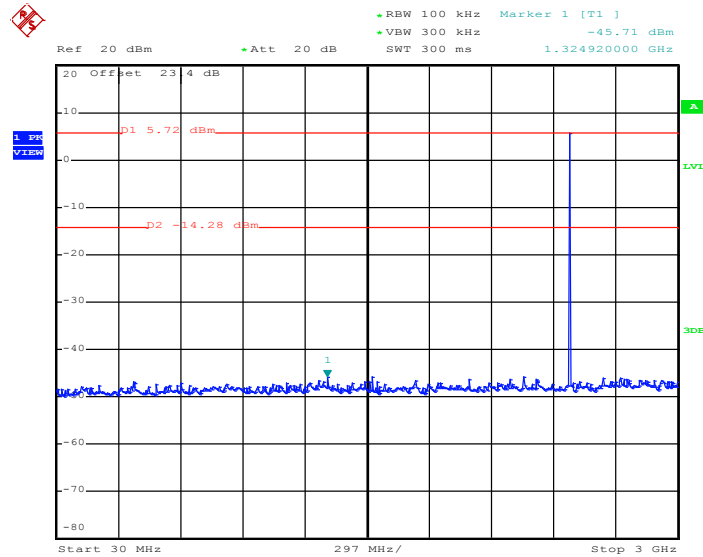
Date: 24.MAR.2017 12:36:08

2Mbps CSE Plot on Ch 39 between 2 GHz ~ 25 GHz

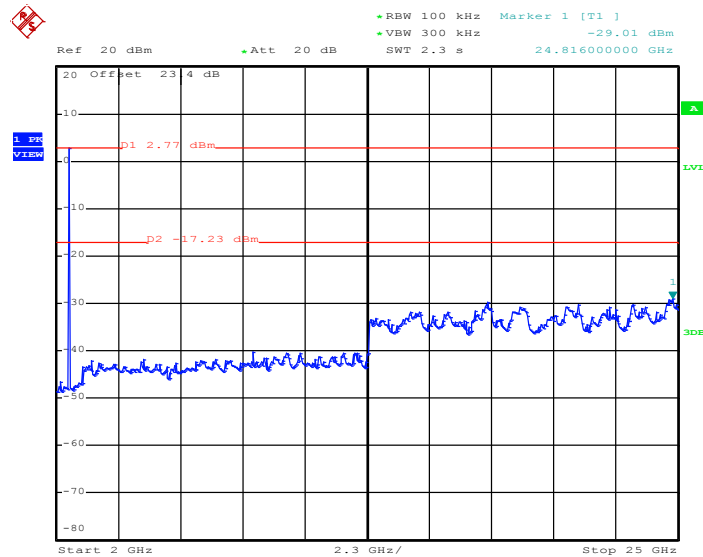
Date: 24.MAR.2017 12:36:30



Test Mode :	2Mbps	Temperature :	24~26°C
Test Channel :	78	Relative Humidity :	48~51%
		Test Engineer :	Shiming Liu

2Mbps CSE Plot on Ch 78 between 30MHz ~ 3 GHz

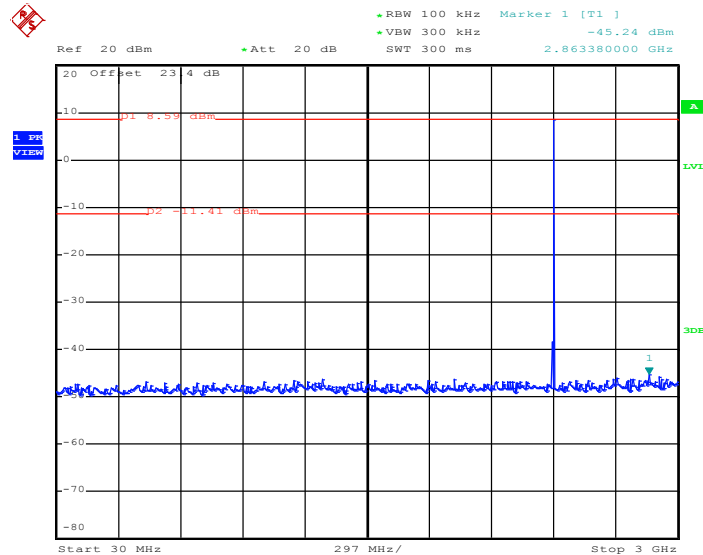
Date: 24.MAR.2017 12:39:26

2Mbps CSE Plot on Ch 78 between 2 GHz ~ 25 GHz

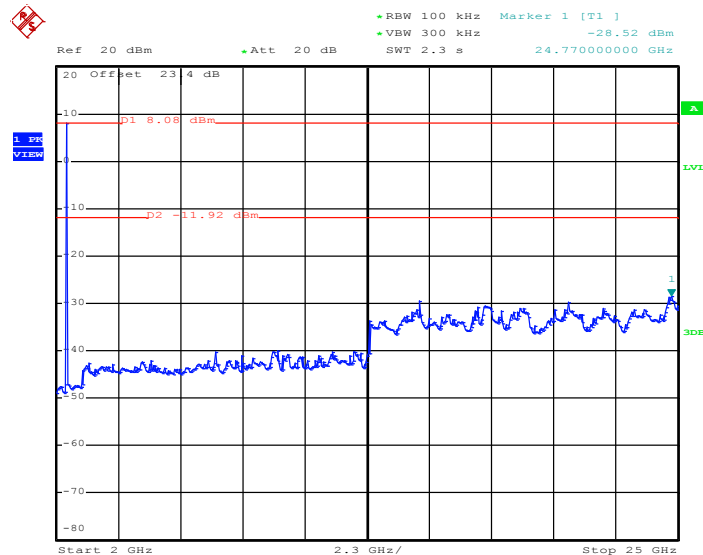
Date: 24.MAR.2017 12:39:48



Test Mode :	3Mbps	Temperature :	24~26°C
Test Channel :	00	Relative Humidity :	48~51%
		Test Engineer :	Shiming Liu

3Mbps CSE Plot on Ch 00 between 30MHz ~ 3 GHz

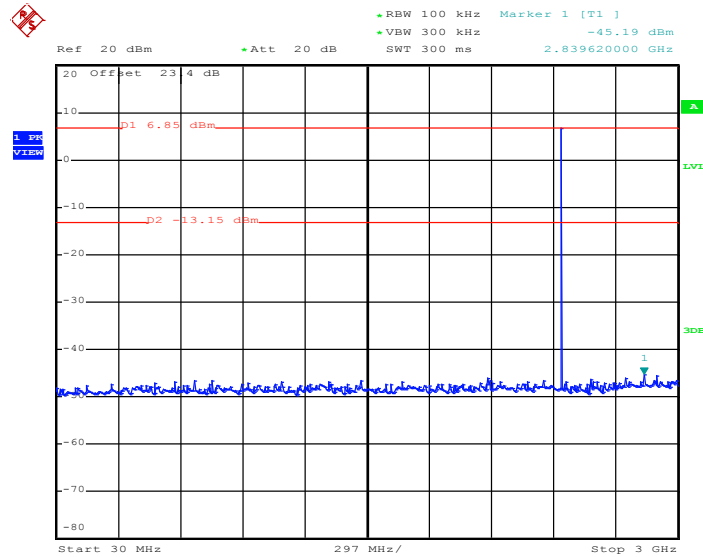
Date: 24.MAR.2017 13:05:56

3Mbps CSE Plot on Ch 00 between 2 GHz ~ 25 GHz

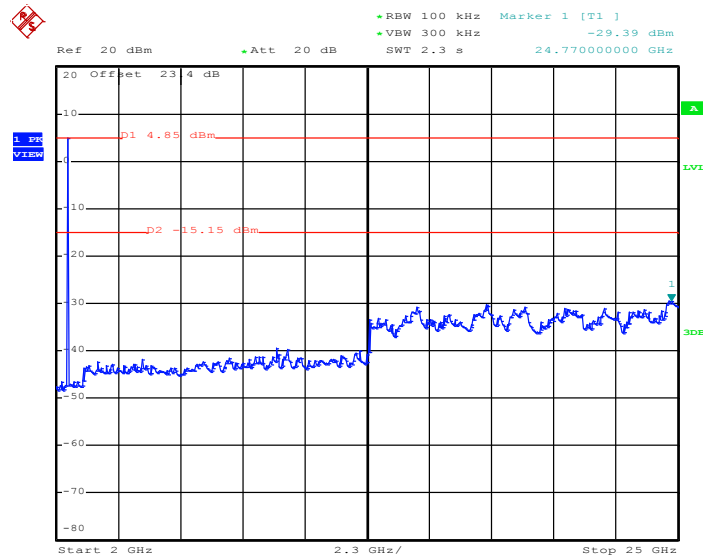
Date: 24.MAR.2017 13:06:18



Test Mode :	3Mbps	Temperature :	24~26°C
Test Channel :	39	Relative Humidity :	48~51%
		Test Engineer :	Shiming Liu

3Mbps CSE Plot on Ch 39 between 30MHz ~ 3 GHz

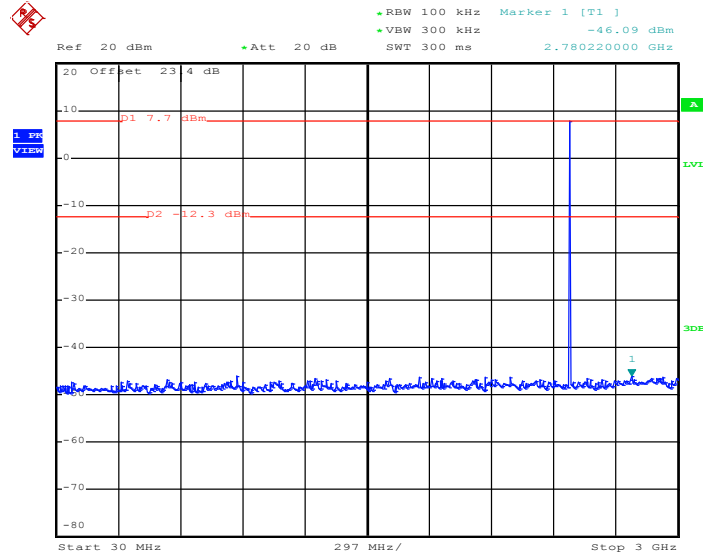
Date: 24.MAR.2017 13:07:14

3Mbps CSE Plot on Ch 39 between 2 GHz ~ 25 GHz

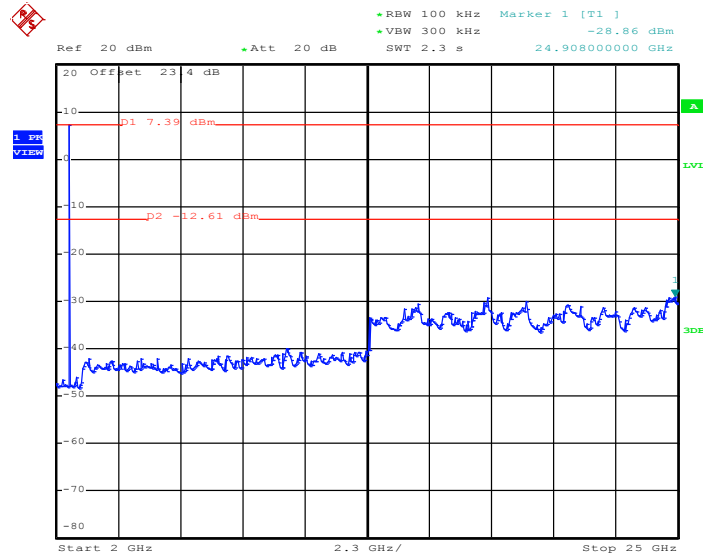
Date: 24.MAR.2017 13:07:35



Test Mode :	3Mbps	Temperature :	24~26°C
Test Channel :	78	Relative Humidity :	48~51%
		Test Engineer :	Shiming Liu

3Mbps CSE Plot on Ch 78 between 30MHz ~ 3 GHz

Date: 24.MAR.2017 13:09:10

3Mbps CSE Plot on Ch 78 between 2 GHz ~ 25 GHz

Date: 24.MAR.2017 13:09:32



3.8 Radiated Band Edges and Spurious Emission Measurement

3.8.1 Limit of Radiated Band Edges and Spurious Emission

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. In addition, radiated emissions which fall in the restricted bands must also comply with the limits as below.

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
Above 960	500	3

3.8.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.



3.8.3 Test Procedures

1. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
4. Set to the maximum power setting and enable the EUT transmit continuously.
5. Use the following spectrum analyzer settings:
 - (1) Span shall wide enough to fully capture the emission being measured;
 - (2) Set RBW=100 kHz for $f < 1 \text{ GHz}$, RBW=1MHz for $f > 1 \text{ GHz}$; VBW \geq RBW; Sweep = auto; Detector function = peak; Trace = max hold for peak
 - (3) For average measurement: use duty cycle correction factor method per 15.35(c).
Duty cycle = On time/100 milliseconds
On time = $N_1 * L_1 + N_2 * L_2 + \dots + N_{n-1} * L_{n-1} + N_n * L_n$
Where N_1 is number of type 1 pulses, L_1 is length of type 1 pulses, etc.
Average Emission Level = Peak Emission Level + $20 * \log(\text{Duty cycle})$
6. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

<For BC127-EXT Chip>

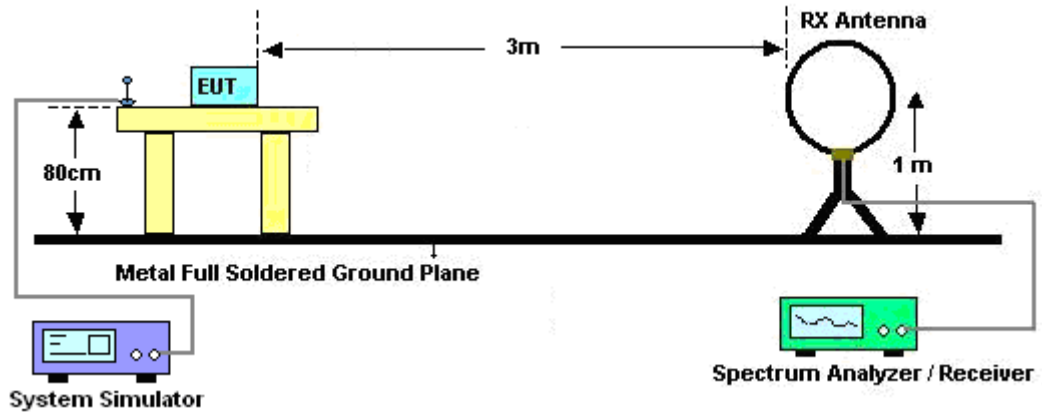
Note: The average levels were calculated from the peak level corrected with duty cycle correction factor (24.71dB) derived from $20 \log(\text{dwell time}/100\text{ms})$. This correction is only for signals that hop with the fundamental signal, such as band-edge and harmonic. Other spurious signals that are independent of the hopping signal would not use this correction.

<For WCN3620 Chip>

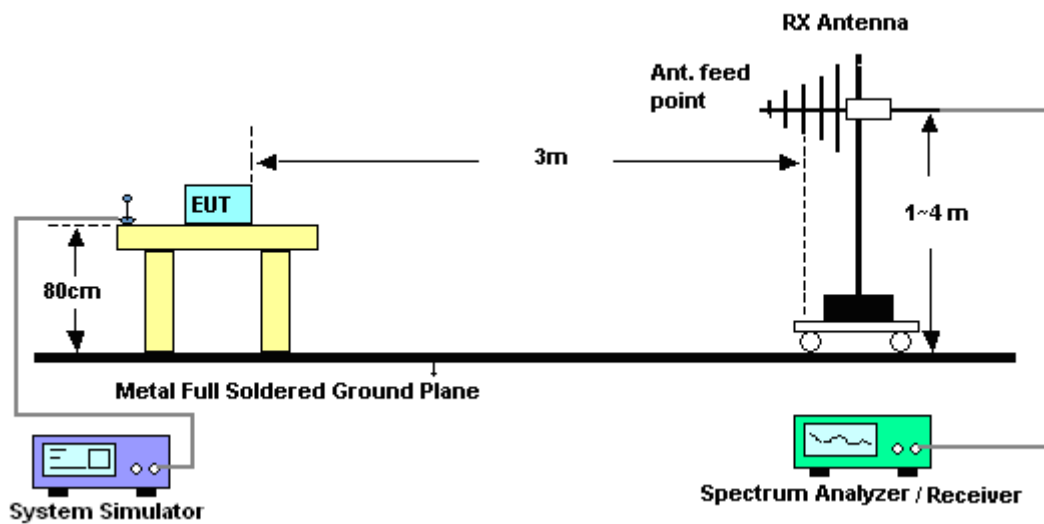
Note: The average levels were calculated from the peak level corrected with duty cycle correction factor (24.78dB) derived from $20 \log(\text{dwell time}/100\text{ms})$. This correction is only for signals that hop with the fundamental signal, such as band-edge and harmonic. Other spurious signals that are independent of the hopping signal would not use this correction.

3.8.4 Test Setup

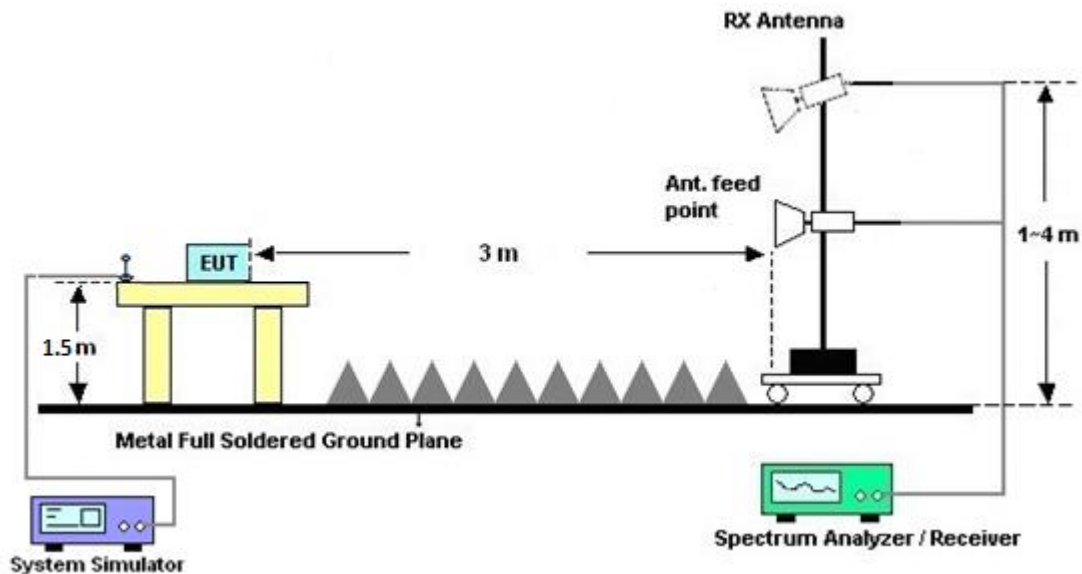
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.8.5 Test Results of Radiated Spurious Emissions (9 kHz ~ 30 MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

3.8.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix B and C.

3.8.7 Duty Cycle

Please refer to Appendix D.

3.8.8 Test Result of Radiated Spurious Emission (30MHz ~ 10th Harmonic)

Please refer to Appendix B and C.

3.9 AC Conducted Emission Measurement

3.9.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

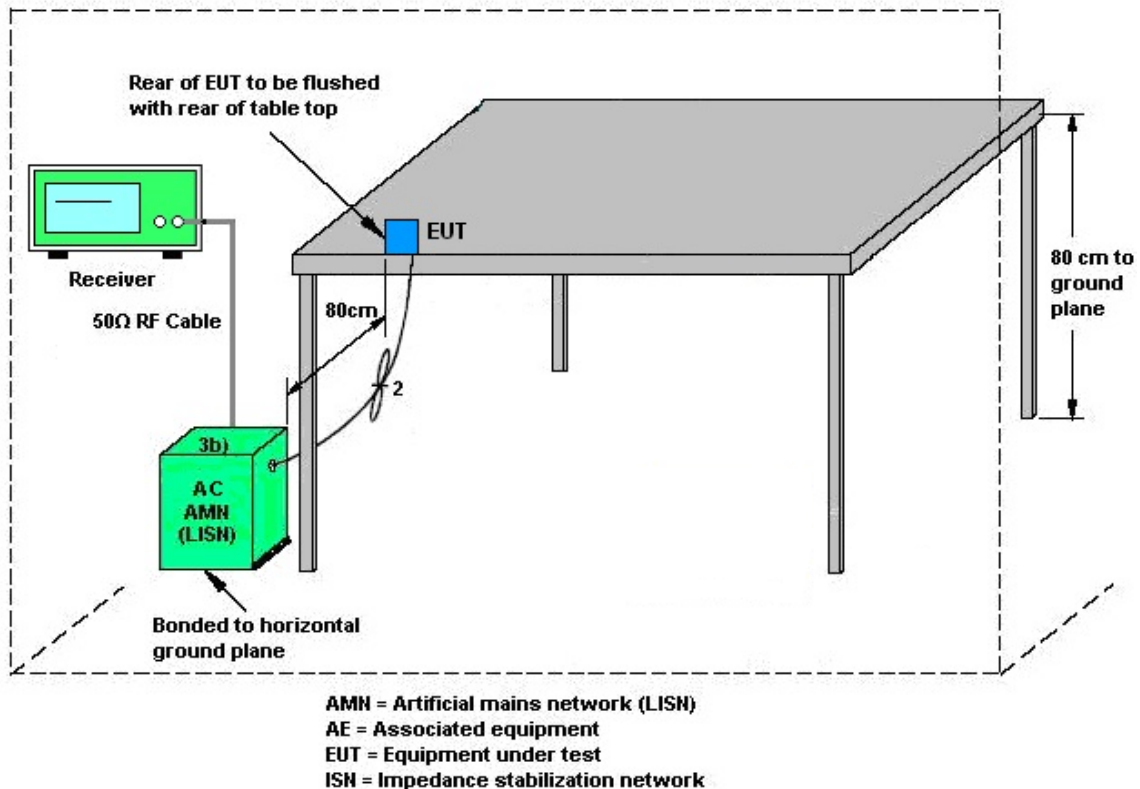
3.9.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.9.3 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

3.9.4 Test Setup



3.9.5 Test Result of AC Conducted Emission

Please refer to Appendix A.



3.10 Antenna Requirements

3.10.1 Standard Applicable

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the rule.

3.10.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.10.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.



4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Power Meter	Agilent	E4416A	GB41292344	300MHz~40GHz	Dec. 26, 2016	Mar. 15, 2017 ~ Mar. 27, 2017	Dec. 25, 2017	Conducted (TH05-HY)
Power Sensor	Agilent	E9327A	US40441548	300MHz~40GHz	Dec. 26, 2016	Mar. 15, 2017 ~ Mar. 27, 2017	Dec. 25, 2017	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP40	100055	9kHz-40GHz	Jul. 17, 2016	Mar. 15, 2017 ~ Mar. 27, 2017	Jul. 16, 2017	Conducted (TH05-HY)
BT Base Station (Measure)	Rohde & Schwarz	CBT	101136	BT 3.0	Sep. 21, 2016	Mar. 15, 2017 ~ Mar. 27, 2017	Sep. 20, 2017	Conducted (TH05-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Mar. 23, 2017	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESCI 7	100724	9kHz~7GHz	Aug. 30, 2016	Mar. 23, 2017	Aug. 29, 2017	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Nov. 29, 2016	Mar. 23, 2017	Nov. 28, 2017	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100081	9kHz~30MHz	Dec. 06, 2016	Mar. 23, 2017	Dec. 05, 2017	Conduction (CO05-HY)
Amplifier	SONOMA	310N	187312	9kHz~1GHz	Nov. 10, 2016	Mar. 23, 2017 ~ Mar. 27, 2017	Nov. 09, 2017	Radiation (03CH12-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Oct. 20, 2016	Mar. 23, 2017 ~ Mar. 27, 2017	Oct. 19, 2018	Radiation (03CH12-HY)
Bilog Antenna	TESEQ	CBL 6111D&00800 N1D01N-06	37059&01	30MHz~1GHz	Oct. 15, 2016	Mar. 23, 2017 ~ Mar. 27, 2017	Oct. 14, 2017	Radiation (03CH12-HY)
EMI Test Receiver	Rohde & Schwarz	ESU26	100390	20Hz~26.5GHz	Dec. 23, 2016	Mar. 23, 2017 ~ Mar. 27, 2017	Dec. 22, 2017	Radiation (03CH12-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1328	1GHz ~ 18GHz	Oct. 25, 2016	Mar. 23, 2017 ~ Mar. 27, 2017	Oct. 24, 2017	Radiation (03CH12-HY)
Preamplifier	MITEQ	AMF-7D-0010 1800-30-10P	1815698	1GHz~18GHz	Dec. 01, 2016	Mar. 23, 2017 ~ Mar. 27, 2017	Nov. 30, 2017	Radiation (03CH12-HY)
Preamplifier	Keysight	83017A	MY53270148	1GHz~26.5GHz	Jan. 12, 2017	Mar. 23, 2017 ~ Mar. 27, 2017	Jan. 11, 2018	Radiation (03CH12-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1m~4m	N/A	Mar. 23, 2017 ~ Mar. 27, 2017	N/A	Radiation (03CH12-HY)
Turn Table	EMEC	TT2000	N/A	0~360 Degree	N/A	Mar. 23, 2017 ~ Mar. 27, 2017	N/A	Radiation (03CH12-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170576	18GHz ~ 40GHz	Apr. 15, 2016	Mar. 23, 2017 ~ Mar. 27, 2017	Apr. 14, 2017	Radiation (03CH12-HY)
Preamplifier	MITEQ	JS44-180040 00-33-8P	1840917	18GHz ~ 40GHz	Jun. 14, 2016	Mar. 23, 2017 ~ Mar. 27, 2017	Jun. 13, 2017	Radiation (03CH12-HY)

5 Uncertainty of Evaluation

Uncertainty of Conducted Emission Measurement (150 kHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.7
---	-----

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.1
---	-----

Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.2
---	-----

Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.7
---	-----



Appendix A. AC Conducted Emission Test Results

Test Engineer :	Kai-Chun Chu	Temperature :	23~24℃
		Relative Humidity :	52~53%

EUT Information

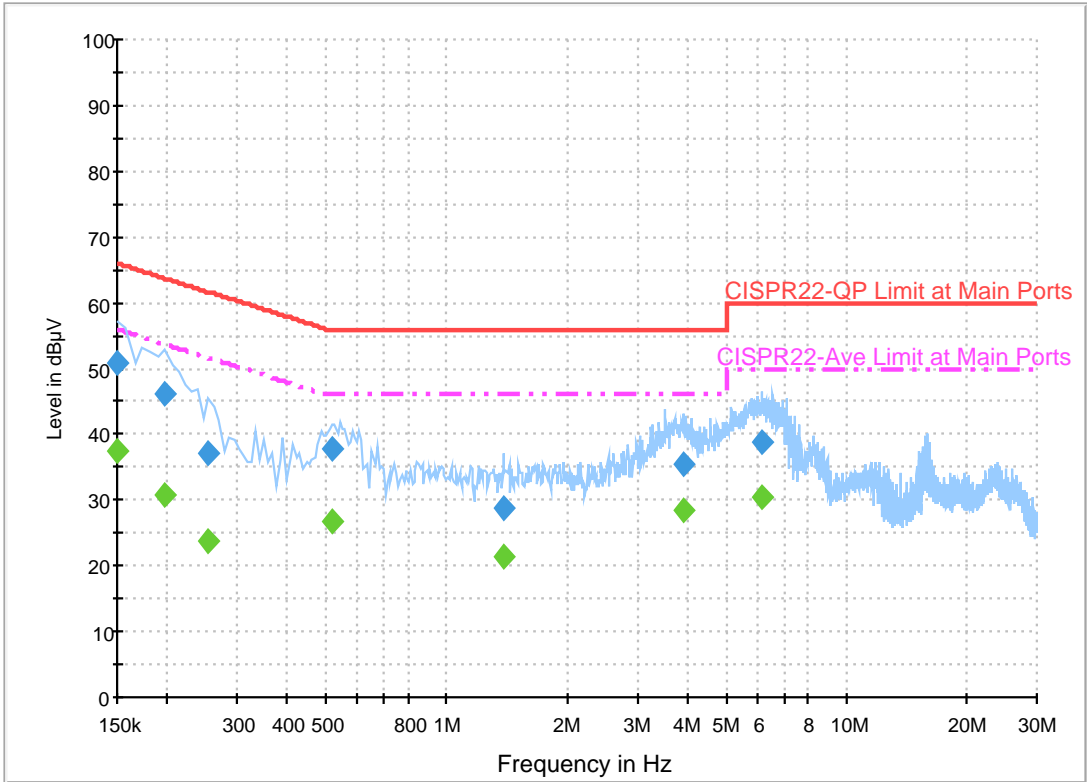
Report NO :683024-01

Test Mode :Mode 1

Test Voltage :Power Form System

Phase :Line

ENV216 Auto Test-L



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	50.7	Off	L1	19.6	15.3	66.0
0.198000	46.0	Off	L1	19.5	17.7	63.7
0.254000	37.2	Off	L1	19.5	24.4	61.6
0.518000	37.7	Off	L1	19.5	18.3	56.0
1.390000	28.7	Off	L1	19.5	27.3	56.0
3.926000	35.3	Off	L1	19.6	20.7	56.0
6.166000	38.8	Off	L1	19.6	21.2	60.0

Final Result 2

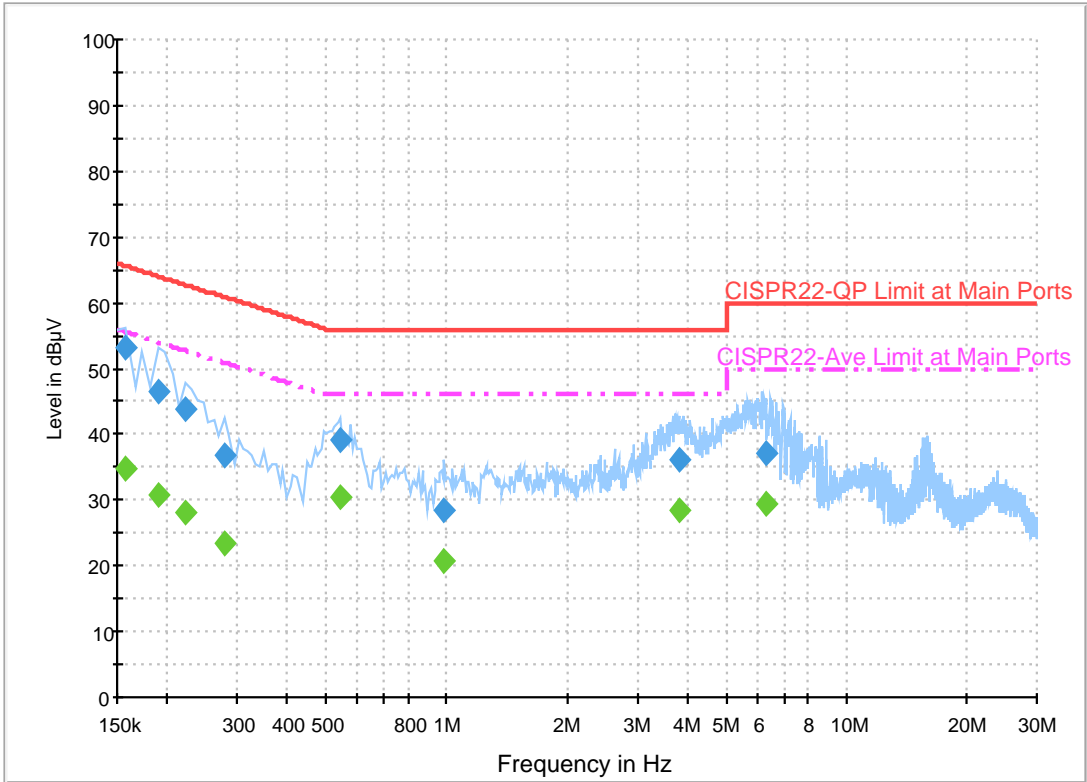
Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	37.6	Off	L1	19.6	18.4	56.0
0.198000	30.8	Off	L1	19.5	22.9	53.7
0.254000	23.8	Off	L1	19.5	27.8	51.6
0.518000	26.7	Off	L1	19.5	19.3	46.0
1.390000	21.4	Off	L1	19.5	24.6	46.0
3.926000	28.5	Off	L1	19.6	17.5	46.0
6.166000	30.5	Off	L1	19.6	19.5	50.0

EUT Information

Report NO :
Test Mode :
Test Voltage :
Phase :

683024-01
Mode 1
Power Form System
Neutral

ENV216 Auto Test-N



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.158000	53.3	Off	N	19.5	12.3	65.6
0.190000	46.4	Off	N	19.5	17.6	64.0
0.222000	43.9	Off	N	19.5	18.8	62.7
0.278000	36.8	Off	N	19.5	24.1	60.9
0.542000	39.3	Off	N	19.5	16.7	56.0
0.990000	28.3	Off	N	19.5	27.7	56.0
3.806000	36.0	Off	N	19.6	20.0	56.0
6.310000	37.1	Off	N	19.6	22.9	60.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.158000	34.8	Off	N	19.5	20.8	55.6
0.190000	30.7	Off	N	19.5	23.3	54.0
0.222000	28.0	Off	N	19.5	24.7	52.7
0.278000	23.3	Off	N	19.5	27.6	50.9
0.542000	30.3	Off	N	19.5	15.7	46.0
0.990000	20.8	Off	N	19.5	25.2	46.0
3.806000	28.5	Off	N	19.6	17.5	46.0
6.310000	29.3	Off	N	19.6	20.7	50.0



Appendix B. Radiated Spurious Emission

Test Engineer :	Peter Liao, Karl Hou, and Nick Yu	Temperature :	21~22°C
		Relative Humidity :	55~57%

<For BC127-EXT Chip>

2.4GHz 2400~2483.5MHz

BT (Band Edge @ 3m)

BT	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BT CH00 2402MHz		2334.57	50.48	-23.52	74	47.79	26.9	7.3	31.51	111	8	P	H
		2334.57	25.77	-28.23	54	-	-	-	-	-	-	A	H
	*	2402	94.12	-	-	91.05	27.11	7.45	31.49	111	8	P	H
	*	2402	69.41	-	-	-	-	-	-	-	-	A	H
													H
													H
		2323.125	51.58	-22.42	74	48.92	26.87	7.3	31.51	336	81	P	V
		2323.125	26.87	-27.13	54	-	-	-	-	-	-	A	V
	*	2402	92.84	-	-	89.77	27.11	7.45	31.49	336	81	P	V
	*	2402	68.13	-	-	-	-	-	-	-	-	A	V
													V
													V



BT CH 39 2441MHz		2355.36	50.65	-23.35	74	47.81	26.97	7.37	31.5	108	15	P	H
		2355.36	25.94	-28.06	54	-	-	-	-	-	-	A	H
	*	2441	94.28	-	-	91.04	27.22	7.49	31.47	108	15	P	H
	*	2441	69.57	-	-	-	-	-	-	-	-	A	H
		2485.3	51.01	-22.99	74	47.59	27.36	7.53	31.47	108	15	P	H
		2485.3	26.3	-27.7	54	-	-	-	-	-	-	A	H
		2362.36	50.83	-23.17	74	47.97	26.99	7.37	31.5	320	83	P	V
		2362.36	26.12	-27.88	54	-	-	-	-	-	-	A	V
	*	2441	92.51	-	-	89.27	27.22	7.49	31.47	320	83	P	V
	*	2441	67.8	-	-	-	-	-	-	-	-	A	V
		2484.67	50.84	-23.16	74	47.43	27.35	7.53	31.47	320	83	P	V
		2484.67	26.13	-27.87	54	-	-	-	-	-	-	A	V
BT CH 78 2480MHz	*	2480	92.76	-	-	89.36	27.34	7.53	31.47	131	16	P	H
	*	2480	68.05	-	-	-	-	-	-	-	-	A	H
		2486.24	51.73	-22.27	74	48.31	27.36	7.53	31.47	131	16	P	H
		2486.24	27.02	-26.98	54	-	-	-	-	-	-	A	H
													H
													H
	*	2480	89.84	-	-	86.44	27.34	7.53	31.47	315	84	P	V
	*	2480	65.13	-	-	-	-	-	-	-	-	A	V
		2498.76	51.52	-22.48	74	48.05	27.4	7.53	31.46	315	84	P	V
		2498.76	26.81	-27.19	54	-	-	-	-	-	-	A	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

BT (Harmonic @ 3m)

BT	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
BT CH 00 2402MHz		4804	38.02	-35.98	74	53.61	32.15	10.59	58.33	100	0	P	H
		4804	13.31	-40.69	54	-	-	-	-	-	-	A	H
													H
													H
		4804	38.96	-35.04	74	54.55	32.15	10.59	58.33	100	0	P	V
		4804	14.25	-39.75	54	-	-	-	-	-	-	A	V
													V
													V
BT CH 39 2441MHz		4882	38.89	-35.11	74	53.95	32.29	10.89	58.24	100	0	P	H
		4882	14.18	-39.82	54	-	-	-	-	-	-	A	H
		7323	43.15	-30.85	74	51.07	37	14.18	59.1	100	0	P	H
		7323	18.44	-35.56	54	-	-	-	-	-	-	A	H
		4882	38.98	-35.02	74	54.04	32.29	10.89	58.24	100	0	P	V
		4882	14.27	-39.73	54	-	-	-	-	-	-	A	V
		7323	43.71	-30.29	74	51.63	37	14.18	59.1	100	0	P	V
		7323	19	-35	54	-	-	-	-	-	-	A	V
BT CH 78 2480MHz		4960	39.35	-34.65	74	53.87	32.43	11.19	58.14	100	0	P	H
		4960	14.64	-39.36	54	-	-	-	-	-	-	A	H
		7440	44.64	-29.36	74	52.16	37.33	14.32	59.17	100	0	P	H
		7440	19.93	-34.07	54	-	-	-	-	-	-	A	H
		4960	39.02	-34.98	74	53.54	32.43	11.19	58.14	100	0	P	V
		4960	14.31	-39.69	54	-	-	-	-	-	-	A	V
		7440	43.57	-30.43	74	51.09	37.33	14.32	59.17	100	0	P	V
		7440	18.86	-35.14	54	-	-	-	-	-	-	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission below 1GHz

2.4GHz BT (LF)

[illegible]



Note symbol

*	Fundamental Frequency which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
!	Test result is over limit line.
P/A	Peak or Average
H/V	Horizontal or Vertical



A calculation example for radiated spurious emission is shown as below:

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
CH 01													
2412MHz		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Level(dBμV/m) =

Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

2. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 42.6(dBμV) – 35.86 (dB)

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

= -10.46(dB)

Both peak and average measured complies with the limit line, so test result is “PASS”.



<For WCN3620 Chip>

2.4GHz 2400~2483.5MHz

BT (Band Edge @ 3m)

BT	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
BT CH00 2402MHz		2388.645	51.42	-22.58	74	48.39	27.07	7.45	31.49	198	16	P	H
		2388.645	26.64	-27.36	54	-	-	-	-	-	-	A	H
	*	2402	105.94	-	-	102.87	27.11	7.45	31.49	198	16	P	H
	*	2402	81.16	-	-	-	-	-	-	-	-	A	H
													H
													H
		2383.92	51.53	-22.47	74	48.52	27.05	7.45	31.49	342	132	P	V
		2383.92	26.75	-27.25	54	-	-	-	-	-	-	A	V
	*	2402	101.25	-	-	98.18	27.11	7.45	31.49	342	132	P	V
	*	2402	76.47	-	-	-	-	-	-	-	-	A	V
													V
													V
BT CH 39 2441MHz		2348.64	51.1	-22.9	74	48.28	26.95	7.37	31.5	197	17	P	H
		2348.64	26.32	-27.68	54	-	-	-	-	-	-	A	H
	*	2441	107.32	-	-	104.08	27.22	7.49	31.47	197	17	P	H
	*	2441	82.54	-	-	-	-	-	-	-	-	A	H
		2493.7	52.44	-21.56	74	48.99	27.38	7.53	31.46	197	17	P	H
		2493.7	27.66	-26.34	54	-	-	-	-	-	-	A	H
		2368.1	51.25	-22.75	74	48.37	27	7.37	31.49	369	129	P	V
		2368.1	26.47	-27.53	54	-	-	-	-	-	-	A	V
	*	2441	102.07	-	-	98.83	27.22	7.49	31.47	369	129	P	V
	*	2441	77.29	-	-	-	-	-	-	-	-	A	V
		2498.39	51.65	-22.35	74	48.18	27.4	7.53	31.46	369	129	P	V
		2498.39	26.87	-27.13	54	-	-	-	-	-	-	A	V



BT CH 78 2480MHz	*	2480	103.32	-	-	99.92	27.34	7.53	31.47	191	18	P	H
	*	2480	78.54	-	-	-	-	-	-	-	-	A	H
		2494.6	52.11	-21.89	74	48.66	27.38	7.53	31.46	191	18	P	H
		2494.6	27.33	-26.67	54	-	-	-	-	-	-	A	H
													H
													H
	*	2480	98.6	-	-	95.2	27.34	7.53	31.47	322	128	P	V
	*	2480	73.82	-	-	-	-	-	-	-	-	A	V
		2489.92	52.17	-21.83	74	48.74	27.37	7.53	31.47	322	128	P	V
		2489.92	27.39	-26.61	54	-	-	-	-	-	-	A	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

BT (Harmonic @ 3m)

BT	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BT CH 00 2402MHz		4804	38.06	-35.94	74	53.65	32.15	10.59	58.33	100	0	P	H
		4804	13.28	-40.72	54	-	-	-	-	-	-	A	H
													H
													H
		4804	38.45	-35.55	74	54.04	32.15	10.59	58.33	100	0	P	V
		4804	13.67	-40.33	54	-	-	-	-	-	-	A	V
													V
													V
BT CH 39 2441MHz		4882	38.19	-35.81	74	53.25	32.29	10.89	58.24	100	0	P	H
		4882	13.41	-40.59	54	-	-	-	-	-	-	A	H
		7323	43.85	-30.15	74	51.77	37	14.18	59.1	100	0	P	H
		7323	19.07	-34.93	54	-	-	-	-	-	-	A	H
		4882	38.66	-35.34	74	53.72	32.29	10.89	58.24	100	0	P	V
		4882	13.88	-40.12	54	-	-	-	-	-	-	A	V
		7323	43.45	-30.55	74	51.37	37	14.18	59.1	100	0	P	V
		7323	18.67	-35.33	54	-	-	-	-	-	-	A	V
BT CH 78 2480MHz		4960	38.69	-35.31	74	53.21	32.43	11.19	58.14	100	0	P	H
		4960	13.91	-40.09	54	-	-	-	-	-	-	A	H
		7440	43.54	-30.46	74	51.06	37.33	14.32	59.17	100	0	P	H
		7440	18.76	-35.24	54	-	-	-	-	-	-	A	H
		4960	38.74	-35.26	74	53.26	32.43	11.19	58.14	100	0	P	V
		4960	13.96	-40.04	54	-	-	-	-	-	-	A	V
		7440	43.07	-30.93	74	50.59	37.33	14.32	59.17	100	0	P	V
		7440	18.29	-35.71	54	-	-	-	-	-	-	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Emission below 1GHz

2.4GHz BT (LF)

BT	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
2.4GHz BT LF		99.12	31.36	-12.14	43.5	46.85	15.88	1.06	32.43	-	-	P	H
		123.96	36.05	-7.45	43.5	49.29	17.76	1.43	32.43	187	97	QP	H
	*	123.96	44.1	0.6	43.5	57.34	17.76	1.43	32.43	187	97	P	H
		253.56	28.76	-17.24	46	40.44	18.8	1.83	32.31	-	-	P	H
		479.9	31.69	-14.31	46	37.36	23.64	3.08	32.39	-	-	P	H
		495.3	32.63	-13.37	46	38.04	23.91	3.08	32.4	-	-	P	H
		922.3	34.3	-11.7	46	31.55	29.53	4.6	31.38	-	-	P	H
													H
													H
													H
													H
													H
		123.96	35.34	-8.16	43.5	48.58	17.76	1.43	32.43	100	0	P	V
		233.85	26.16	-19.84	46	39.62	17.06	1.83	32.35	-	-	P	V
		275.43	25.53	-20.47	46	36.46	19.1	2.25	32.28	-	-	P	V
		385.4	26.49	-19.51	46	34.31	21.85	2.68	32.35	-	-	P	V
		495.3	32.08	-13.92	46	37.49	23.91	3.08	32.4	-	-	P	V
		922.3	34.23	-11.77	46	31.48	29.53	4.6	31.38	-	-	P	V
													V
													V
													V
													V
													V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												



Note symbol

*	Fundamental Frequency which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
!	Test result is over limit line.
P/A	Peak or Average
H/V	Horizontal or Vertical



A calculation example for radiated spurious emission is shown as below:

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
CH 01													
2412MHz		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Level(dBμV/m) =

Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

2. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 42.6(dBμV) – 35.86 (dB)

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

= -10.46(dB)

Both peak and average measured complies with the limit line, so test result is “PASS”.



Appendix C. Radiated Spurious Emission Plots

Test Engineer :	Peter Liao, Karl Hou, and Nick Yu	Temperature :	21~22°C
		Relative Humidity :	55~57%

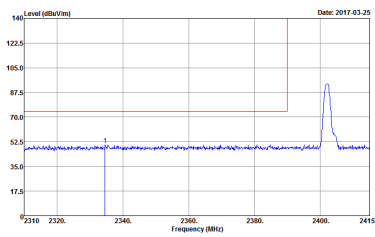
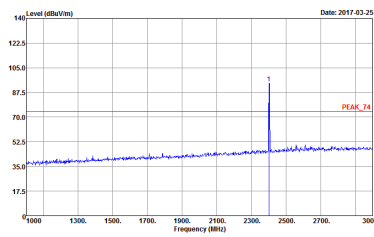
Note symbol

-L	Low channel location
-R	High channel location

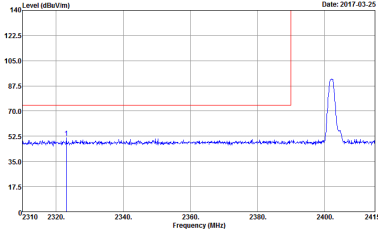
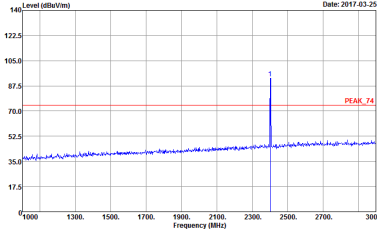
<For BC127-EXT Chip>

2.4GHz 2400~2483.5MHz

BT (Band Edge @ 3m)

BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH00 2402MHz	
1	Horizontal	Fundamental
Peak	 <p>Site : 03CH12-HY Condition : PEAK, BE, 74.3m HORN, 9120D, 1328 HORIZONTAL RBW: 1000.000KHz VBW: 3000.000KHz SWT: Auto Detector : Peak Project : 683024-01 Mode : 7</p>	 <p>Site : 03CH12-HY Condition : PEAK, 74.3m HORN, 9120D, 1328 HORIZONTAL RBW: 1000.000KHz VBW: 3000.000KHz SWT: Auto Detector : Peak Project : 683024-01 Mode : 7</p>

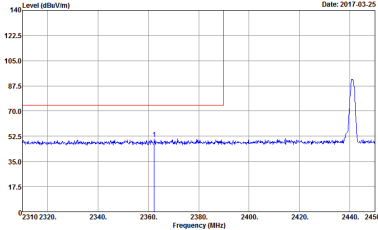
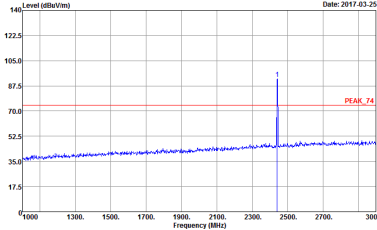
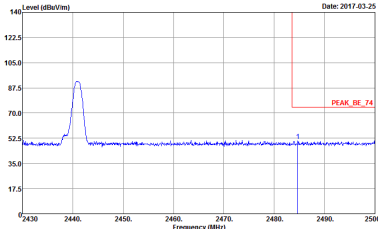


BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH00 2402MHz	
1	Vertical	Fundamental
Peak	<div><p>Site : 03CH12-HY Condition : PEAK_RE_74 3m HORN_9120D_1328 VERTICAL Detector : RBW:1000.000KHz YBW:3000.000KHz SWT:Auto Project : Peak Mode : 683024-01 : 7</p></div>	<div><p>Site : 03CH12-HY Condition : PEAK_74 3m HORN_9120D_1328 VERTICAL Detector : RBW:1000.000KHz YBW:3000.000KHz SWT:Auto Project : Peak Mode : 683024-01 : 7</p></div>

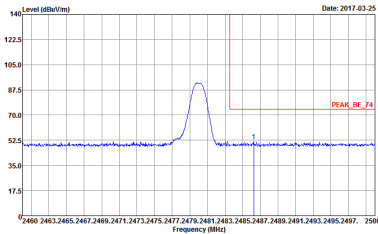
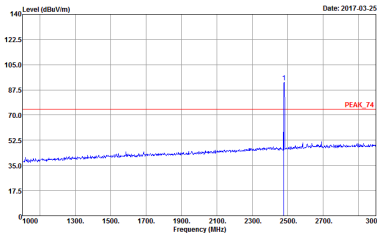


BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH39 2441MHz	
1	Horizontal	Fundamental
Peak	<p>Site : 03CH12-HY Condition : PEAK_RE_74 3m HORN_9120D_1328 HORIZONTAL Detector : RBW:1000.000KHz YBW:3000.000KHz SWT:Auto Project : Peak Mode : 683024-01 : 8</p>	<p>Site : 03CH12-HY Condition : PEAK_RE_74 3m HORN_9120D_1328 HORIZONTAL Detector : RBW:1000.000KHz YBW:3000.000KHz SWT:Auto Project : Peak Mode : 683024-01 : 8</p>
	<p>Site : 03CH12-HY Condition : PEAK_RE_74 3m HORN_9120D_1328 HORIZONTAL Detector : RBW:1000.000KHz YBW:3000.000KHz SWT:Auto Project : Peak Mode : 683024-01 : 8</p>	Left blank

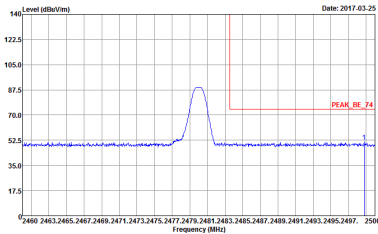
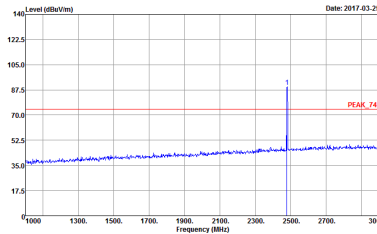


BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH39 2441MHz	
1	Vertical	Fundamental
Peak	<div><p>Site : 03CH12-HY Condition : PEAK_BE_74 3m HORN_9120D_1328 VERTICAL Detector : RBW:1000.000KHz YBW:3000.000KHz SWT:Auto Project : Peak Mode : 683024-01 : 8</p></div>	<div><p>Site : 03CH12-HY Condition : PEAK_BE_74 3m HORN_9120D_1328 VERTICAL Detector : RBW:1000.000KHz YBW:3000.000KHz SWT:Auto Project : Peak Mode : 683024-01 : 8</p></div>
	<div><p>Site : 03CH12-HY Condition : PEAK_BE_74 3m HORN_9120D_1328 VERTICAL Detector : RBW:1000.000KHz YBW:3000.000KHz SWT:Auto Project : Peak Mode : 683024-01 : 8</p></div>	Left blank

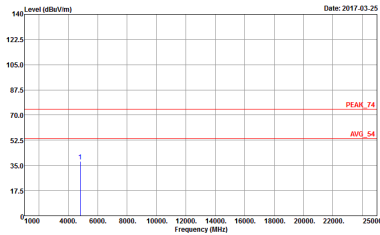
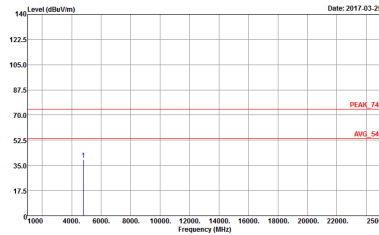


BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH78 2480MHz	
1	Horizontal	Fundamental
Peak	<div><p>Site : 03CH12-HY Condition : PEAK_BE_74 3m HORN_9120D_1328 HORIZONTAL Detector : RBW:1000.000KHz YBW:3000.000KHz SWT:Auto Project : Peak Mode : 683024-01 Date: 2017.03.25</p></div>	<div><p>Site : 03CH12-HY Condition : PEAK_74 3m HORN_9120D_1328 HORIZONTAL Detector : RBW:1000.000KHz YBW:3000.000KHz SWT:Auto Project : Peak Mode : 683024-01 Date: 2017.03.25</p></div>

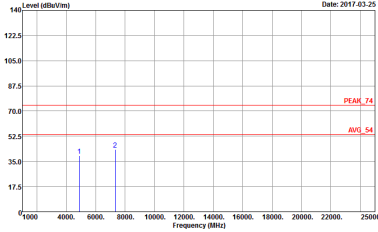
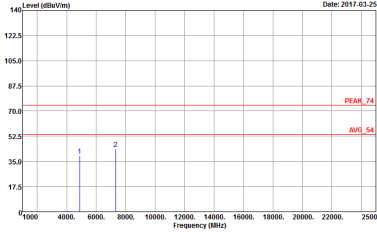


BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH78 2480MHz	
1	Vertical	Fundamental
Peak	 <p>Site : 03CH12-HY Condition : PEAK_BE_74 3m HORN_9120D_1328 VERTICAL Detector : RBW:1000.000KHz YBW:3000.000KHz SWT:Auto Project : Peak Mode : 683024-01 : 9</p>	 <p>Site : 03CH12-HY Condition : PEAK_74 3m HORN_9120D_1328 VERTICAL Detector : RBW:1000.000KHz YBW:3000.000KHz SWT:Auto Project : Peak Mode : 683024-01 : 9</p>

2.4GHz 2400~2483.5MHz
BT (Harmonic @ 3m)

BT	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BT CH00 2402MHz	
1	Horizontal	Vertical
Peak Avg.	 <p>Site : 03C812-RY Condition : PEAK_74 3m HORN_9120D_1328 HORIZONTAL Detector : Peak Project : 683024-01 Mode : 7</p>	 <p>Site : 03C812-RY Condition : PEAK_74 3m HORN_9120D_1328 VERTICAL Detector : Peak Project : 683024-01 Mode : 7</p>



BT	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BT CH39 2441MHz	
1	Horizontal	Vertical
Peak Avg.	 <p>Site : 03CH12-HY Condition : PEAK_74 3m HORN_9120D_1328 HORIZONTAL Detector : Peak Project : 683024-01 Mode : B</p>	 <p>Site : 03CH12-HY Condition : PEAK_74 3m HORN_9120D_1328 VERTICAL Detector : Peak Project : 683024-01 Mode : B</p>

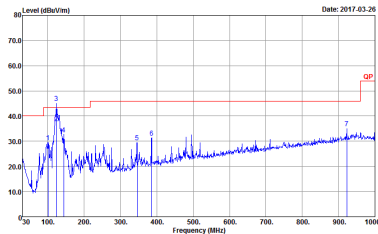
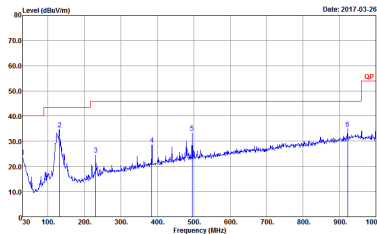


BT	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BT CH78 2480MHz	
1	Horizontal	Vertical
Peak Avg.	<div><p>Level (dBuV/m)</p><p>Date: 2017-03-25</p><p>Frequency (MHz)</p><p>Site : 03CH12-HY Condition : PEAK_74 3m HORN_9120D_1328 HORIZONTAL Detector : Peak Project : 683024-01 Mode : 9</p></div>	<div><p>Level (dBuV/m)</p><p>Date: 2017-03-25</p><p>Frequency (MHz)</p><p>Site : 03CH12-HY Condition : PEAK_74 3m HORN_9120D_1328 VERTICAL Detector : Peak Project : 683024-01 Mode : 9</p></div>



Emission below 1GHz

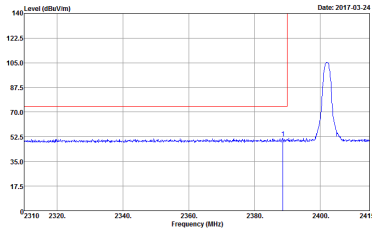
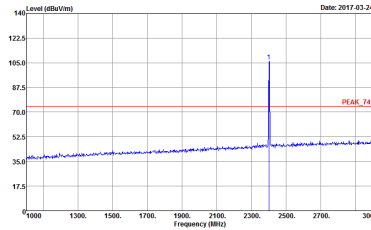
2.4GHz BT (LF)

BT	2.4GHz 2400~2483.5MHz	
ANT	BT LF	
1	Horizontal	Vertical
QP / Peak	 <p>Site : 03CH12-HY Condition : QP 3m BILOG 6111D_37059 HORIZONTAL Project : 683024-01 Mode : 21</p>	 <p>Site : 03CH12-HY Condition : QP 3m BILOG 6111D_37059 VERTICAL Project : 683024-01 Mode : 21</p>

<For WCN3620 Chip>

2.4GHz 2400~2483.5MHz

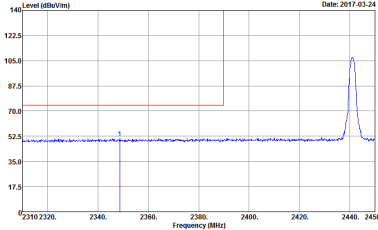
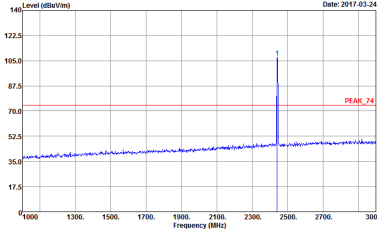
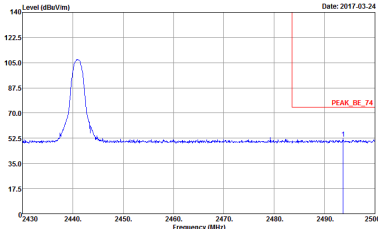
BT (Band Edge @ 3m)

BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH00 2402MHz	
1	Horizontal	Fundamental
Peak	 <p>Site : 03CH12-HY Condition : PEAK_BE_74 3m HORN_9120D_1328 HORIZONTAL Detector : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : Peak Mode : 683024-01 1</p>	 <p>Site : 03CH12-HY Condition : PEAK_74 3m HORN_9120D_1328 HORIZONTAL Detector : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : Peak Mode : 683024-01 1</p>

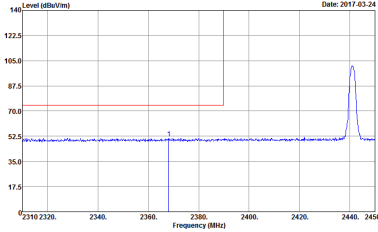
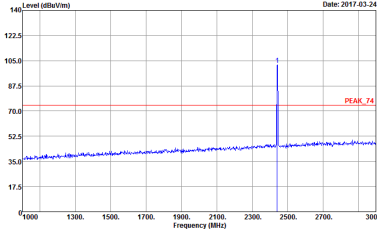
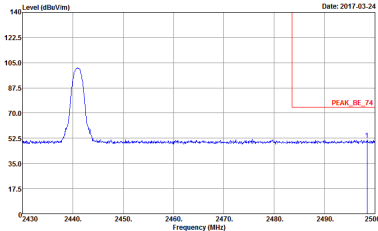


BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH00 2402MHz	
1	Vertical	Fundamental
Peak	<div><p>Level (dBuV/m)</p><p>Date: 2017.03.24</p><p>Frequency (MHz)</p><p>Site : 03CH12-HY Condition : PEAK_RE_74 3m HORN_9120D_1328 VERTICAL Detector : RBW:1000.000KHz YBW:3000.000KHz SWT:Auto Project : Peak Mode : 683024-01 : 1</p></div>	<div><p>Level (dBuV/m)</p><p>Date: 2017.03.24</p><p>Frequency (MHz)</p><p>Site : 03CH12-HY Condition : PEAK_74 3m HORN_9120D_1328 VERTICAL Detector : RBW:1000.000KHz YBW:3000.000KHz SWT:Auto Project : Peak Mode : 683024-01 : 1</p></div>



BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH39 2441MHz	
1	Horizontal	Fundamental
Peak	 <p>Site : 03CH12-HY Condition : PEAK_BE_74 3m HORN_9120D_1328 HORIZONTAL Detector : RBW:1000.000KHz YBW:3000.000KHz SWT:Auto Project : Peak Mode : 683024-01 : 2</p>	 <p>Site : 03CH12-HY Condition : PEAK_BE_74 3m HORN_9120D_1328 HORIZONTAL Detector : RBW:1000.000KHz YBW:3000.000KHz SWT:Auto Project : Peak Mode : 683024-01 : 2</p>
	 <p>Site : 03CH12-HY Condition : PEAK_BE_74 3m HORN_9120D_1328 HORIZONTAL Detector : RBW:1000.000KHz YBW:3000.000KHz SWT:Auto Project : Peak Mode : 683024-01 : 2</p>	Left blank

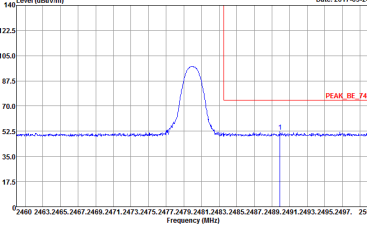
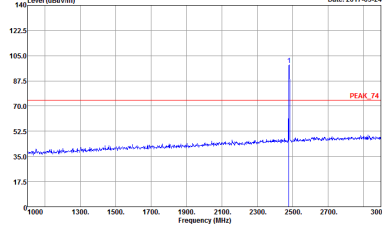


BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH39 2441MHz	
1	Vertical	Fundamental
Peak	<div><p>Site : 03CH12-HY Condition : PEAK_RE_74 3m HORN_9120D_1328 VERTICAL Detector : RBW:1000.000KHz YBW:3000.000KHz SWT:Auto Project : Peak Mode : 683024-01 : 2</p></div>	<div><p>Site : 03CH12-HY Condition : PEAK_RE_74 3m HORN_9120D_1328 VERTICAL Detector : RBW:1000.000KHz YBW:3000.000KHz SWT:Auto Project : Peak Mode : 683024-01 : 2</p></div>
	<div><p>Site : 03CH12-HY Condition : PEAK_RE_74 3m HORN_9120D_1328 VERTICAL Detector : RBW:1000.000KHz YBW:3000.000KHz SWT:Auto Project : Peak Mode : 683024-01 : 2</p></div>	Left blank



BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH78 2480MHz	
1	Horizontal	Fundamental
Peak	<div><p>Level (dBm/Vm)</p><p>Date: 2017.03.24</p><p>PEAK_BE_74</p><p>Site : 03CH12-HY Condition : PEAK_BE_74 3m HORN_9120D_1328 HORIZONTAL Detector : RBW:1000.000KHz YBW:3000.000KHz SWT:Auto Project : Peak Mode : 683024-01 : 3</p></div>	<div><p>Level (dBm/Vm)</p><p>Date: 2017.03.24</p><p>PEAK_74</p><p>Site : 03CH12-HY Condition : PEAK_74 3m HORN_9120D_1328 HORIZONTAL Detector : RBW:1000.000KHz YBW:3000.000KHz SWT:Auto Project : Peak Mode : 683024-01 : 3</p></div>

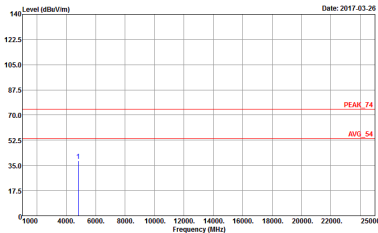
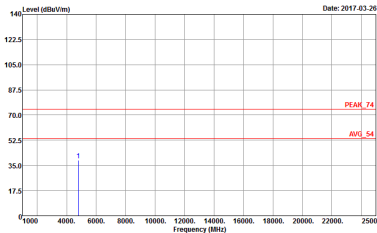


BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH78 2480MHz	
1	Vertical	Fundamental
Peak	<div><p>Site : 03CH12-HY Condition : PEAK_BE_74 3m HORN_9120D_1328 VERTICAL Detector : RBW:1000.000KHz YBW:3000.000KHz SWT:Auto Project : Peak Mode : 683024-01 : 3</p></div>	<div><p>Site : 03CH12-HY Condition : PEAK_74 3m HORN_9120D_1328 VERTICAL Detector : RBW:1000.000KHz YBW:3000.000KHz SWT:Auto Project : Peak Mode : 683024-01 : 3</p></div>



2.4GHz 2400~2483.5MHz

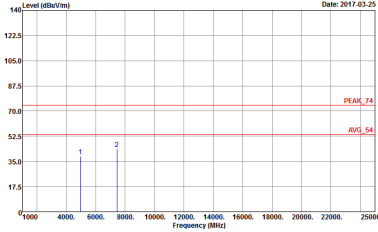
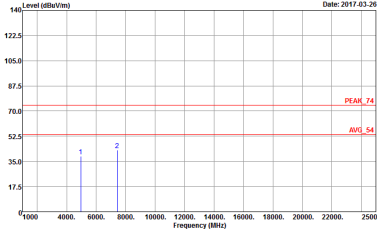
BT (Harmonic @ 3m)

BT	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BT CH00 2402MHz	
1	Horizontal	Vertical
Peak Avg.	 <p>Site : 03C812-RY Condition : PEAK_74 3m HORN_9120D_1328 HORIZONTAL Detector : Peak Project : 683024-01 Mode : 1</p>	 <p>Site : 03C812-RY Condition : PEAK_74 3m HORN_9120D_1328 VERTICAL Detector : Peak Project : 683024-01 Mode : 1</p>



BT	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BT CH39 2441MHz	
1	Horizontal	Vertical
Peak Avg.	<div><p>Level (dBuV/m)</p><p>Date: 2017-03-26</p><p>Frequency (MHz)</p><p>Site : 03CH12-HY Condition : PEAK_74 3m HORN_9120D_1328 HORIZONTAL Detector : Peak Project : 683024-01 Mode : 2</p></div>	<div><p>Level (dBuV/m)</p><p>Date: 2017-03-26</p><p>Frequency (MHz)</p><p>Site : 03CH12-HY Condition : PEAK_74 3m HORN_9120D_1328 VERTICAL Detector : Peak Project : 683024-01 Mode : 2</p></div>

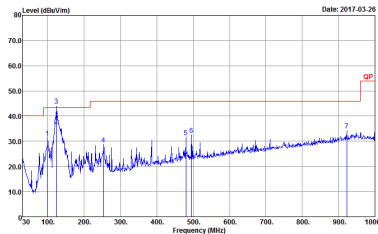
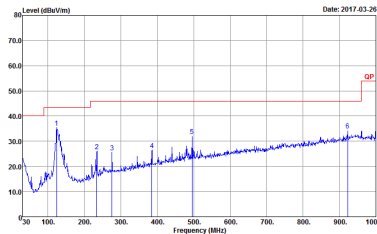


BT	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BT CH78 2480MHz	
1	Horizontal	Vertical
Peak Avg.	 <p>Site : 03CH12-HY Condition : PEAK_74 3m HORN_9120D_1328 HORIZONTAL Detector : Peak Project : 683024-01 Mode : 3</p>	 <p>Site : 03CH12-HY Condition : PEAK_74 3m HORN_9120D_1328 VERTICAL Detector : Peak Project : 683024-01 Mode : 3</p>



Emission below 1GHz

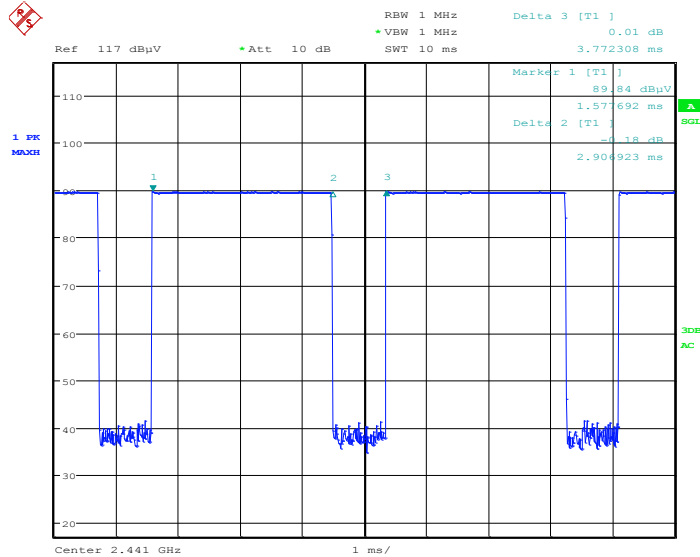
2.4GHz BT (LF)

BT	2.4GHz 2400~2483.5MHz	
ANT	BT LF	
1	Horizontal	Vertical
QP / Peak	 <p>Site : 03CH12-HY Condition : QP 3m B1LOG 6111D_37059 HORIZONTAL Project : 683024-01 Mode : 19</p>	 <p>Site : 03CH12-HY Condition : QP 3m B1LOG 6111D_37059 VERTICAL Project : 683024-01 Mode : 19</p>

Appendix D. Duty Cycle Plots

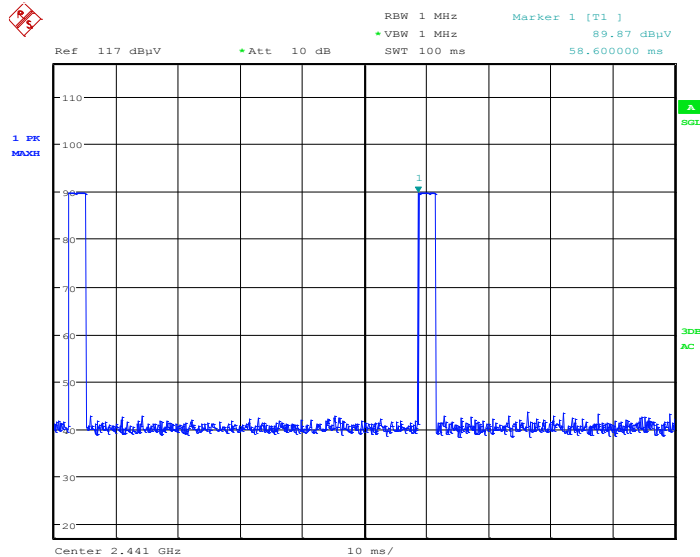
<For BC127-EXT Chip>

DH5 on time (One Pulse) Plot on Channel 39



Date: 25.MAR.2017 18:03:59

on time (Count Pulses) Plot on Channel 39



Date: 25.MAR.2017 18:06:24

Note:

1. Worst case Duty cycle = on time/100 milliseconds = $2 * 2.91 / 100 = 5.81\%$
2. Worst case Duty cycle correction factor = $20 * \log(\text{Duty cycle}) = -24.71 \text{ dB}$
3. DH5 has the highest duty cycle worst case and is reported.

Duty Cycle Correction Factor Consideration for AFH mode:

Bluetooth normal hopping rate is 1600Hz and reduced to 800Hz in AFH mode; due to the reduced number of hopping frequencies, with the same packet configuration the dwell time in each channel frequency within 100msec period is longer in AFH mode than normal mode.

In AFH mode, the minimum hopping frequencies are 20, to get the longest dwell time DH5 packet is observed; the period to have DH5 packet completing one hopping sequence is

$$2.91 \text{ ms} \times 20 \text{ channels} = 58.1 \text{ ms}$$

There cannot be 2 complete hopping sequences within 100ms period, considering the random hopping behavior, maximum 2 hops can be possibly observed within the period. $[100\text{ms} / 57.6\text{ms}] = 2$ hops

Thus, the maximum possible ON time:

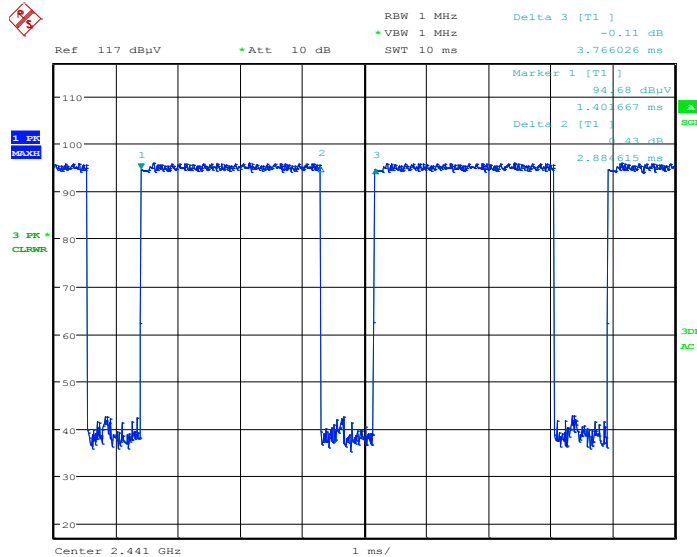
$$2.91 \text{ ms} \times 2 = 5.81 \text{ ms}$$

Worst case Duty Cycle Correction factor, which is derived from the maximum possible ON time,

$$20 \times \log(5.81 \text{ ms}/100\text{ms}) = -24.71 \text{ dB}$$

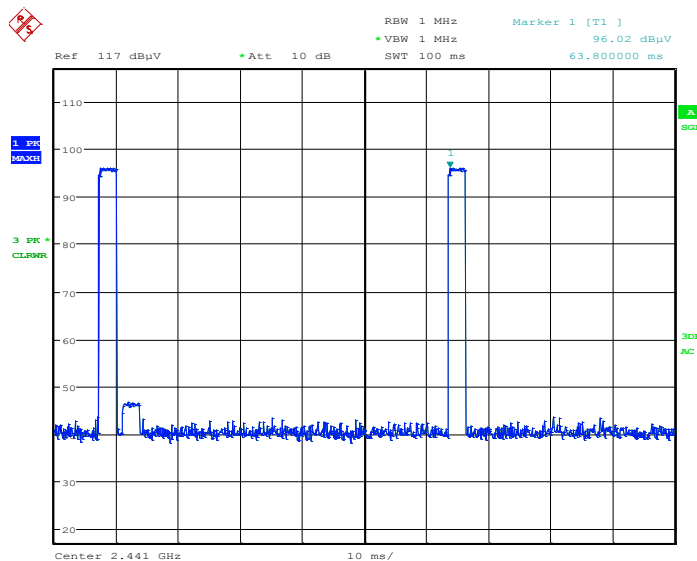
<For WCN3620 Chip>

DH5 on time (One Pulse) Plot on Channel 39



Date: 24.MAR.2017 08:21:23

on time (Count Pulses) Plot on Channel 39



Date: 24.MAR.2017 08:17:17

Note:

1. Worst case Duty cycle = on time/100 milliseconds = $2 * 2.88 / 100 = 5.77\%$
2. Worst case Duty cycle correction factor = $20 * \log(\text{Duty cycle}) = -24.78 \text{ dB}$
3. DH5 has the highest duty cycle worst case and is reported.

Duty Cycle Correction Factor Consideration for AFH mode:

Bluetooth normal hopping rate is 1600Hz and reduced to 800Hz in AFH mode; due to the reduced number of hopping frequencies, with the same packet configuration the dwell time in each channel frequency within 100msec period is longer in AFH mode than normal mode.

In AFH mode, the minimum hopping frequencies are 20, to get the longest dwell time DH5 packet is observed; the period to have DH5 packet completing one hopping sequence is

$$2.88 \text{ ms} \times 20 \text{ channels} = 57.7 \text{ ms}$$

There cannot be 2 complete hopping sequences within 100ms period, considering the random hopping behavior, maximum 2 hops can be possibly observed within the period. $[100\text{ms} / 57.6\text{ms}] = 2 \text{ hops}$

Thus, the maximum possible ON time:

$$2.88 \text{ ms} \times 2 = 5.77 \text{ ms}$$

Worst case Duty Cycle Correction factor, which is derived from the maximum possible ON time,

$$20 \times \log(5.77 \text{ ms}/100\text{ms}) = -24.78 \text{ dB}$$