

Report on the RF Testing of:

KYOCERA Corporation
Mobile Phone, Model: EB1065
FCC ID: JOYEB1065

In accordance with FCC Part 27 Subpart C
and FCC Part 27 Subpart H

Prepared for: KYOCERA Corporation
Yokohama Office 2-1-1 Kagahara, Tsuzuki-ku
Yokohama-shi, Kanagawa, Japan
Phone: +81-45-943-6253 Fax: +81-45-943-6314



COMMERCIAL-IN-CONFIDENCE

Document Number: JPD-TR-20237-0

SIGNATURE

NAME	JOB TITLE	RESPONSIBLE FOR	ISSUE DATE
Hiroaki Suzuki	Deputy Manager of RF Group	Approved Signatory	25 JAN 2021

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD Japan Ltd. document control rules.

EXECUTIVE SUMMARY

A sample(s) of this product was tested and found to be compliant with FCC Part 27 Subpart C and FCC Part 27 Subpart H.



Certificate #3686.03

DISCLAIMER AND COPYRIGHT

The results in this report are applicable only to the equipment tested.
This report shall not be re-produced except in full without the written approval of TÜV SÜD Japan Ltd.

We assume no responsibility for damage occurred from error in the information provided by the applicant.

ACCREDITATION

This test report must not be used by the client to claim product certification, approval, or endorsement by A2LA or any agency of the U.S. Government.

TÜV SÜD Japan Ltd.
Yonezawa Testing Center
5-4149-7 Hachimanpara,
Yonezawa-shi, Yamagata,
992-1128 Japan

Phone: +81 (0) 238 28 2881
Fax: +81 (0) 238 28 2888
www.tuv-sud.jp

TÜV SÜD Japan Ltd.

TÜV®

Contents

1	Summary of Test	3
1.1	Modification history of the test report	3
1.2	Standards	3
1.3	Test methods.....	3
1.4	Deviation from standards	3
1.5	List of applied test(s) of the EUT	3
1.6	Test information.....	3
1.7	Test set up.....	3
1.8	Test period	3
2	Equipment Under Test.....	4
2.1	EUT information	4
2.2	Modification to the EUT	5
2.3	Variation of family model(s).....	5
2.4	Description of test mode	5
3	Configuration of Equipment.....	6
3.1	Equipment used	6
3.2	System configuration	6
4	Test Result	7
4.1	Effective Radiated Power	7
4.2	Peak to Average Ratio	11
4.3	Occupied Bandwidth	19
4.4	Band Edge Spurious and Harmonic at Antenna Terminals	33
4.5	Radiated Emissions and Harmonic Emissions	60
4.6	Frequency Stability.....	66
5	Measurement Uncertainty	68
6	Laboratory Information.....	69
	Appendix A. Test Equipment.....	70

1 Summary of Test

1.1 Modification history of the test report

Document Number	Modification History	Issue Date
JPD-TR-20237-0	First Issue	Refer to the cover page

1.2 Standards

CFR47 FCC Part 27 Subpart C
CFR47 FCC Part 27 Subpart H

1.3 Test methods

KDB 971168 D01 Power Meas License Digital Systems v03r01
ANSI/TIA-603-E-2016

1.4 Deviation from standards

None

1.5 List of applied test(s) of the EUT

Test item section	Test item	Condition	Result	Remark
2.1046	Conducted Output Power	Conducted	PASS	*1
27.50	Effective Radiated Power	Radiated	PASS	-
27.50	Peak to Average Ratio	Conducted	PASS	-
2.1049	Occupied Bandwidth	Conducted	PASS	-
27.53 2.1051	Band Edge Spurious and Harmonic at Antenna Terminal	Conducted	PASS	-
27.53 2.1053	Radiated emissions and Harmonic Emissions	Radiated	PASS	-
27.54 2.1055	Frequency Stability	Conducted	PASS	-

*1: Refer to RF Exposure Report (Test Report_SAR)

1.6 Test information

None

1.7 Test set up

Table-top

1.8 Test period

08-December-2020 - 13-January-2021

2 Equipment Under Test

All information in this chapter was provided by the applicant.

2.1 EUT information

Applicant	KYOCERA Corporation Yokohama Office 2-1-1 Kagahara, Tsuzuki-ku Yokohama-shi, Kanagawa, Japan Phone: +81-45-943-6253 Fax: +81-45-943-6314
Equipment Under Test (EUT)	Mobile Phone
Model number	EB1065
Serial number	359787710020651, 359787710020677
Trade name	Kyocera
Number of sample(s)	2
EUT condition	Pre-Production
Power rating	Battery: DC 3.85 V
Size	(W) 80 mm × (D) 20 mm × (H) 168 mm
Environment	Indoor and Outdoor use
Terminal limitation	-20°C to 60°C
Hardware version	DMT2
Software version	0.070VE
Firmware version	Not applicable
RF Specification	
Frequency of Operation	Up Link LTE Band XII: 699.0-716.0 MHz Down Link LTE Band XII: 729.0-746.0 MHz
Modulation type	LTE Band XII: QPSK, 16QAM, 64QAM
Emission designator	LTE Band XII: BW 1.4M QPSK: 1M10G7D, 16QAM: 1M09W7D, 64QAM: 1M08W7D BW 3M QPSK: 2M70G7D, 16QAM: 2M71W7D, 64QAM: 2M71W7D BW 5M QPSK: 4M55G7D, 16QAM: 4M51W7D, 64QAM: 4M53W7D BW 10M QPSK: 8M97G7D, 16QAM: 8M97W7D, 64QAM: 8M98W7D
Effective Radiated Power (E.R.P.)	LTE Band XII: 0.195 W (22.9 dBm)
Antenna type	Internal antenna
Antenna gain	LTE Band XII: -4.9 dBi

2.2 Modification to the EUT

The table below details modifications made to the EUT during the test project.

Modification State	Description of Modification	Modification fitted by	Date of Modification
Model: EB1065, Serial Number: 359787710020651, 359787710020677			
0	As supplied by the applicant	Not Applicable	Not Applicable

2.3 Variation of family model(s)

2.3.1 List of family model(s)

Not applicable

2.3.2 Reason for selection of EUT

Not applicable

2.4 Description of test mode

The EUT had been tested under operating condition.
There are three channels have been tested as following:

Band	Modulation	Bandwidth [MHz]	Channel	Frequency [MHz]
LTE Band XII	QPSK, 16QAM, 64QAM	1.4	23017, 23095, 23173	699.7, 707.5, 715.3
		3	23025, 23095, 23165	700.5, 707.5, 714.5
		5	23035, 23095, 23155	701.5, 707.5, 713.5
		10	23060, 23095, 23130	704.0, 707.5, 711.0

The field strength of spurious emissions was measured at each position of all three axis X, Y and Z to compare the level, and the maximum noise.
The worst emission was found in X-axis and the worst case recorded.
Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports.

3 Configuration of Equipment

Numbers assigned to equipment on the diagram in “3.2 System configuration” correspond to the list in “3.1 Equipment used”.

This test configuration is based on the manufacture’s instruction.

Cabling and setup(s) were taken into consideration and test data was taken under worse case condition.

3.1 Equipment used

No.	Equipment	Company	Model No.	Serial No.	FCC ID/DoC	Comment
1	Mobile Phone	KYOCERA	EB1065	359787710020651, 359787710020677	JOYEB1065	EUT

3.2 System configuration

1. Mobile Phone
(EUT)

4 Test Result

4.1 Effective Radiated Power

4.1.1 Measurement procedure

[FCC 27.50]

<Step 1>

The EUT and support equipment are placed on a 1 meter x 1 meter surface, 0.8 meter height styrene foam table. Radiated emission measurements are performed at 3 meter distance with the broadband antenna (Log periodic antenna). The antenna is positioned both the horizontal and vertical planes of polarization and height is varied 1 to 4 meters and stopped at height producing the maximum emission. The bandwidth of the spectrum analyzer is set to 1 MHz. The turntable is rotated by 360 degrees and stopped at azimuth of producing the maximum emission.

<Step 2>

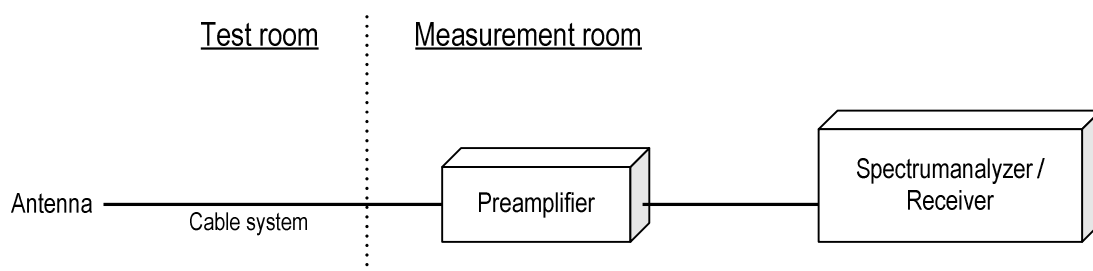
The substitution antenna is replaced by the transmitter antenna (EUT).
The frequency of the signal generator is adjusted to the measurement frequency.
Level of the signal generator is adjusted to the level that is obtained from step 1, and record the emission level of signal generator.

The spectrum analyzer is set to;

- Span = 1.5 times the OBW
- RBW = 1-5% of the expected OBW, not to exceed 1 MHz
- VBW $\geq 3 \times$ RBW
- Number of sweep points $\geq 2 \times$ span / RBW
- Sweep time = auto-couple
- Detector = RMS (power averaging)
- If the EUT can be configured to transmit continuously (i.e., burst duty cycle $\geq 98\%$), then set the trigger to free run.
- If the EUT cannot be configured to transmit continuously (i.e., burst duty cycle $< 98\%$), then use a sweep trigger with the level set to enable triggering only on full power bursts and configure the EUT to transmit at full power for the entire duration of each sweep. Ensure that the sweep time is less than or equal to the transmission burst duration.
- Trace average at least 100 traces in power averaging (i.e., RMS) mode.
- Compute the power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function, with the band limits set equal to the OBW band edges.

If the instrument does not have a band power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

- Test configuration



4.1.2 Calculation method

Result (ERP) = S.G Reading - Cable loss + Antenna Gain
Margin = Limit – Result (ERP)

Example:

Limit @ 707.5 MHz : 34.7 dBm
Ant. Input = 15.0 dBm Cable loss = 1.1 dB Ant. Gain = 8.0 dBd
Result = 15.0 – 1.1 + 8.0 = 21.9 dBm
Margin = 34.7 – 21.9 = 8.1 dB

4.1.3 Limit

3 W (34.7 dBm)

4.1.4 Test data

Date : 8-December-2020
Temperature : 23.1 [°C]
Humidity : 27.9 [%]
Test place : 3m Semi-anechoic chamber

Test engineer : Tadahiro Seino

Date : 10-December-2020
Temperature : 22.9 [°C]
Humidity : 34.8 [%]
Test place : 3m Semi-anechoic chamber

Test engineer : Chiaki Kanno

**[LTE Band XII]
QPSK, BW 1.4MHz**

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
H	699.7	-15.0	26.3	0.7	-5.7	19.9	34.7	14.8
H	707.5	-14.2	27.9	0.7	-5.8	21.5	34.7	13.2
H	715.3	-14.9	28.3	0.7	-5.8	21.8	34.7	12.9

16QAM, BW 1.4MHz

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
H	699.7	-15.9	25.4	0.7	-5.7	19.0	34.7	15.7
H	707.5	-15.3	26.8	0.7	-5.8	20.4	34.7	14.3
H	715.3	-15.9	27.3	0.7	-5.8	20.8	34.7	13.9

64QAM, BW 1.4MHz

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
H	699.7	-16.7	24.6	0.7	-5.7	18.2	34.7	16.5
H	707.5	-16.4	25.7	0.7	-5.8	19.3	34.7	15.4
H	715.3	-16.5	26.7	0.7	-5.8	20.2	34.7	14.5

QPSK, BW 3MHz

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
H	700.5	-14.8	26.6	0.7	-5.7	20.2	34.7	14.5
H	707.5	-14.6	27.5	0.7	-5.8	21.1	34.7	13.6
H	714.5	-14.8	28.3	0.7	-5.8	21.8	34.7	12.9

16QAM, BW 3MHz

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
H	700.5	-15.7	25.7	0.7	-5.7	19.3	34.7	15.4
H	707.5	-15.3	26.8	0.7	-5.8	20.4	34.7	14.3
H	714.5	-15.5	27.6	0.7	-5.8	21.1	34.7	13.6

64QAM, BW 3MHz

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
H	700.5	-15.8	24.6	0.7	-5.7	18.2	34.7	16.5
H	707.5	-16.3	25.8	0.7	-5.8	19.4	34.7	15.3
H	714.5	-16.2	26.9	0.7	-5.8	20.4	34.7	14.3

QPSK, BW 5MHz

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
H	701.5	-13.6	27.9	0.7	-5.7	21.5	34.7	13.2
H	707.5	-12.8	29.3	0.7	-5.8	22.9	34.7	11.8
H	713.5	-13.7	29.2	0.7	-5.8	22.7	34.7	12.0

16QAM, BW 5MHz

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
H	701.5	-14.2	27.3	0.7	-5.7	20.9	34.7	13.8
H	707.5	-14.0	28.1	0.7	-5.8	21.7	34.7	13.0
H	713.5	-14.4	28.4	0.7	-5.8	21.9	34.7	12.8

64QAM, BW 5MHz

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
H	701.5	-15.6	25.9	0.7	-5.7	19.5	34.7	15.2
H	707.5	-14.9	27.2	0.7	-5.8	20.8	34.7	13.9
H	713.5	-15.3	27.6	0.7	-5.8	21.1	34.7	13.6

QPSK, BW 10MHz

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
H	704.0	-13.4	28.3	0.7	-5.7	21.9	34.7	12.8
H	707.5	-13.2	28.9	0.7	-5.8	22.5	34.7	12.2
H	711.0	-13.4	29.1	0.7	-5.8	22.6	34.7	12.1

16QAM, BW 10MHz

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
H	704.0	-14.1	27.5	0.7	-5.7	21.1	34.7	13.6
H	707.5	-13.8	28.3	0.7	-5.8	21.9	34.7	12.8
H	711.0	-13.9	28.6	0.7	-5.8	22.1	34.7	12.6

64QAM, BW 10MHz

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
H	704.0	-14.9	26.7	0.7	-5.7	20.3	34.7	14.4
H	707.5	-14.6	27.5	0.7	-5.8	21.1	34.7	13.6
H	711.0	-14.8	27.7	0.7	-5.8	21.2	34.7	13.5

4.2 Peak to Average Ratio

4.2.1 Measurement procedure

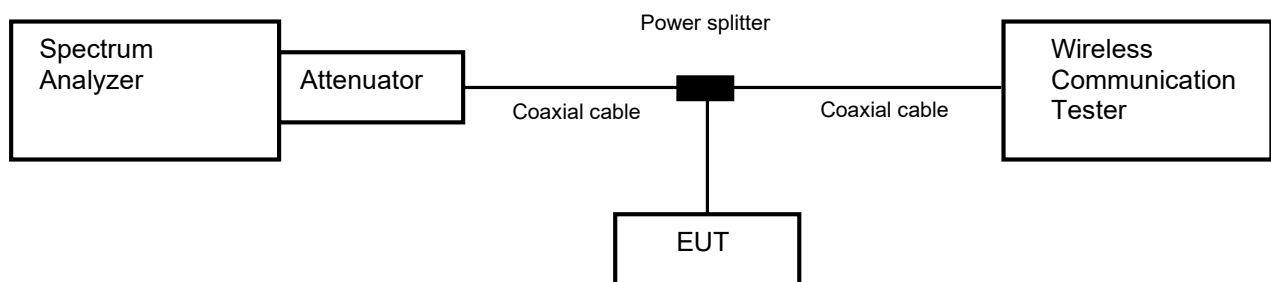
[FCC 27.50]

The peak to average ratio was measured with a spectrum analyzer connected to the antenna terminal.

The spectrum analyzer is set to;

- a) Power Stat CCDF mode
- b) Set resolution / measurement bandwidth $\geq$ signal's occupied bandwidth.
- c) Set the number of counts to a value that stabilizes the measured CCDF curve.
- d) Set the measurement interval as follows:
 - 1) For continuous transmissions, set to 1ms.
 - 2) For burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst duration.
- e) Record the maximum PAPR level associated with a probability of 0.1%.

- Test configuration



4.2.2 Limit

13 dB or less

4.2.3 Measurement result

Date : 12-January-2021

Temperature : 22.1 [°C]

Humidity : 30.5 [%]

Test place : Shielded room No.4

Test engineer :

Taiki Watanabe

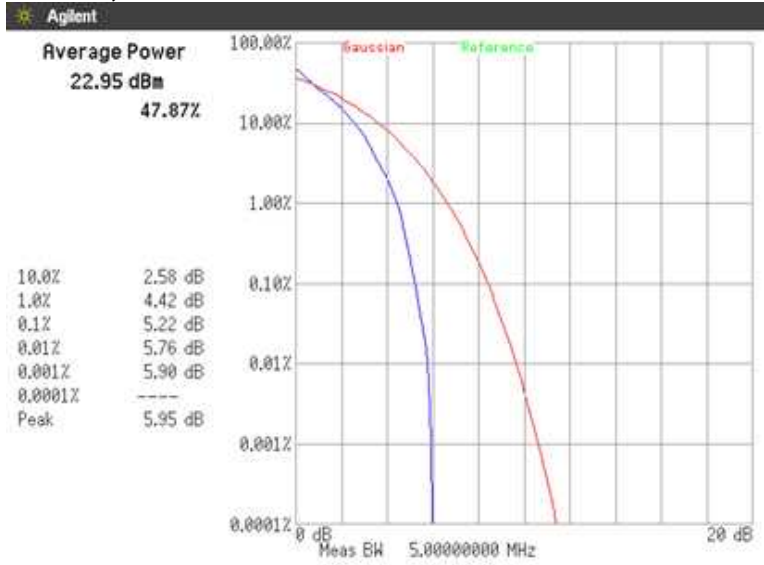
Band	Channel	Frequency [MHz]	Modulation	Bandwidth [MHz]	RB	Peak to Average Power Ratio [dB]	Limit [dB]
LTE Band XII	23095	707.5	QPSK	1.4	6-0	5.22	13.0
				3	15-0	5.14	
				5	25-0	5.13	
				10	50-0	4.54	
			16QAM	1.4	6-0	5.25	
				3	15-0	6.02	
				5	25-0	5.91	
				10	50-0	6.06	
			64QAM	1.4	6-0	6.56	
				3	15-0	6.61	
				5	25-0	6.55	
				10	50-0	6.38	

4.2.4 Trace data

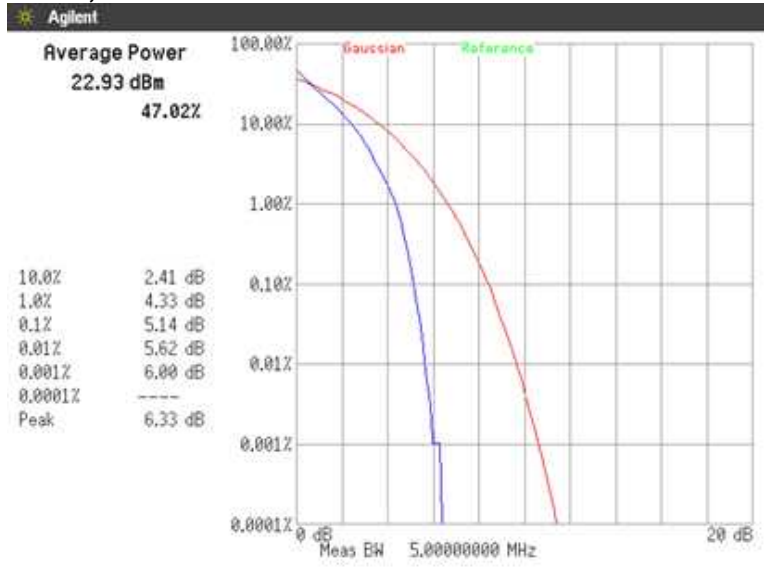
[LTE Band XII]

Channel: 23095

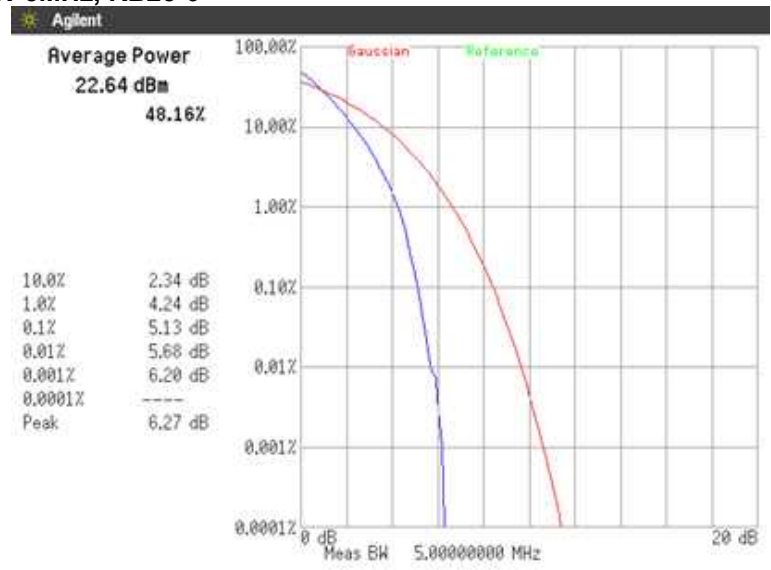
QPSK, BW 1.4MHz, RB6-0



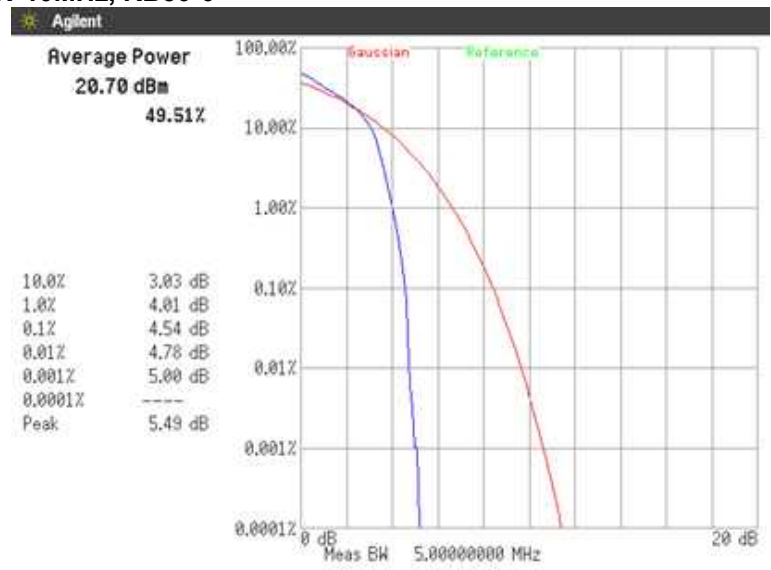
QPSK, BW 3MHz, RB15-0



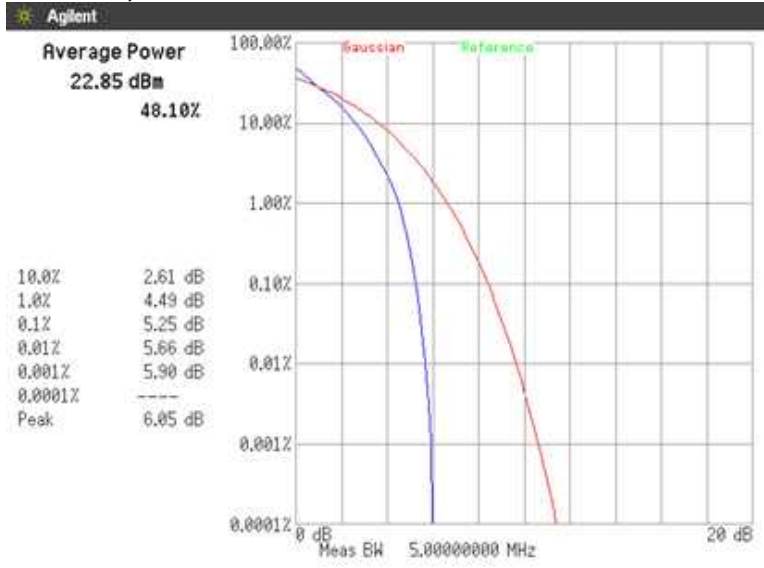
Channel: 23095
QPSK, BW 5MHz, RB25-0



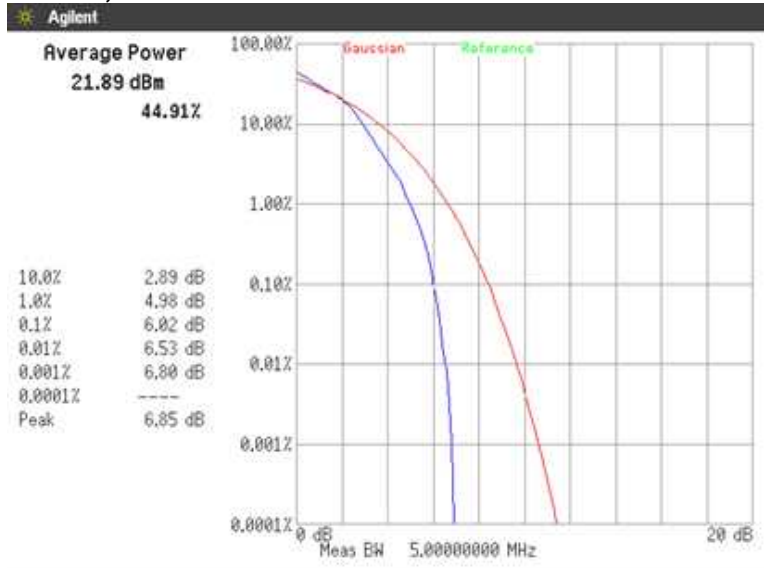
QPSK, BW 10MHz, RB50-0



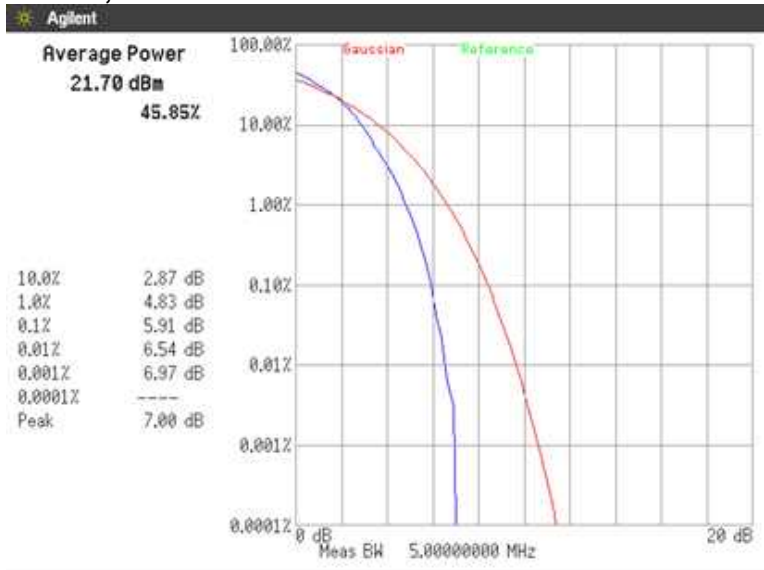
Channel: 23095
16QAM, BW 1.4MHz, RB6-0



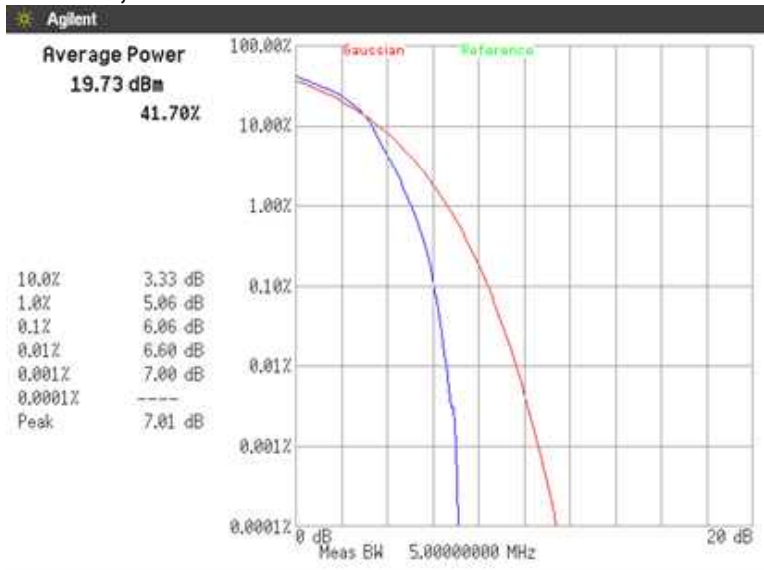
16QAM, BW 3MHz, RB15-0



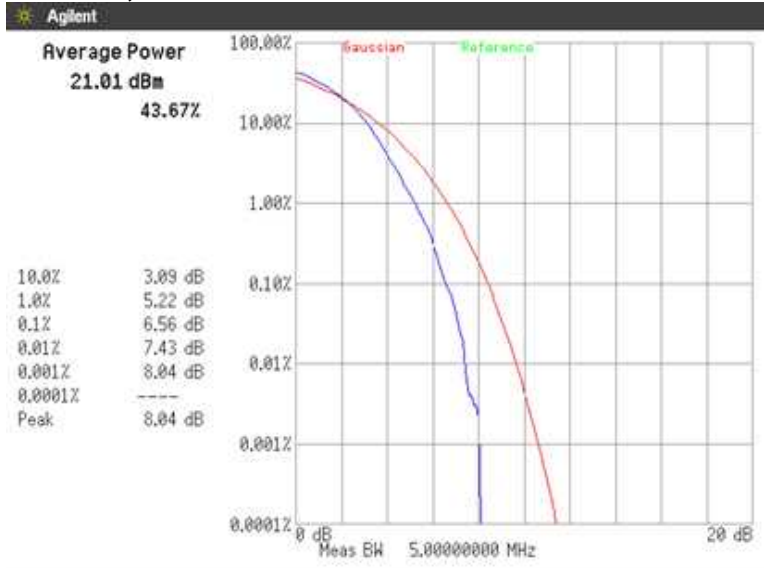
Channel: 23095
16QAM, BW 5MHz, RB25-0



16QAM, BW 10MHz, RB50-0



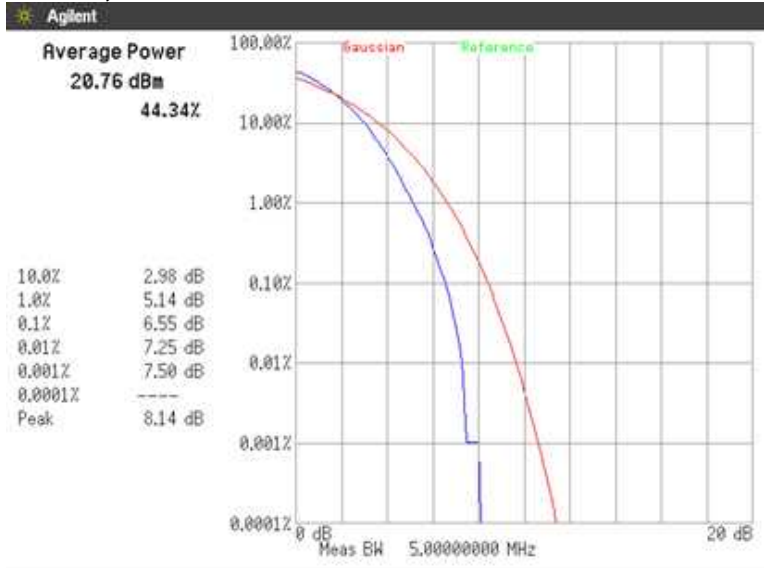
Channel: 23095
64QAM, BW 1.4MHz, RB6-0



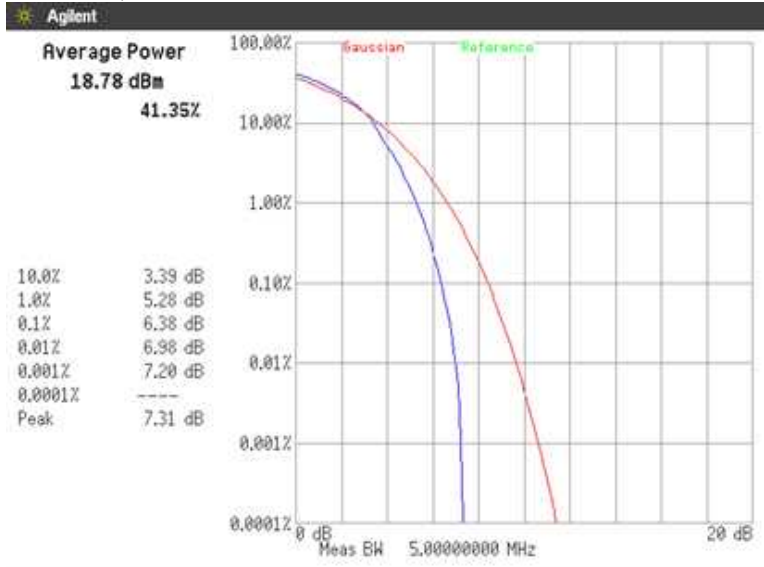
64QAM, BW 3MHz, RB15-0



Channel: 23095
64QAM, BW 5MHz, RB25-0



64QAM, BW 10MHz, RB50-0



4.3 Occupied Bandwidth

4.3.1 Measurement procedure

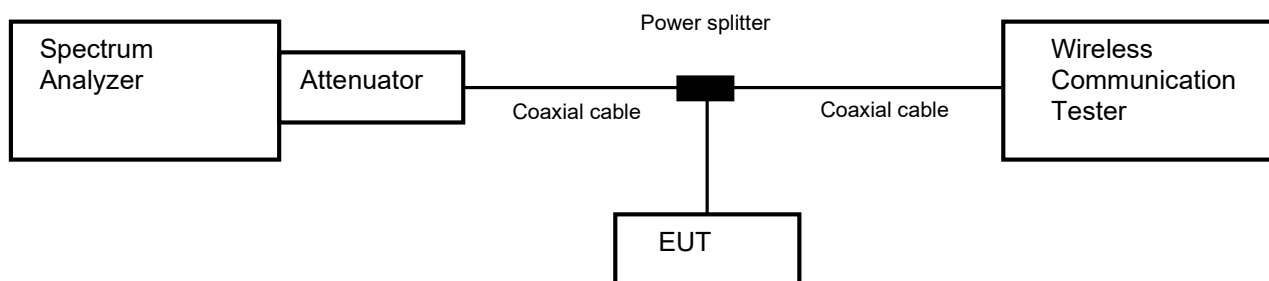
[FCC 2.1049]

The Occupied bandwidth was measured with a spectrum analyzer connected to the antenna terminal.

The spectrum analyzer is set to;

- a) RBW = 1-5% of the expected OBW & VBW $\geq 3 \times$ RBW
- b) Detector = Peak
- c) Trace mode = Max hold
- d) Sweep time = auto-couple

- Test configuration



4.3.2 Limit

None

4.3.3 Measurement result

Date : 12-January-2021
Temperature : 22.1 [°C]
Humidity : 30.5 [%]
Test place : Shielded room No.4

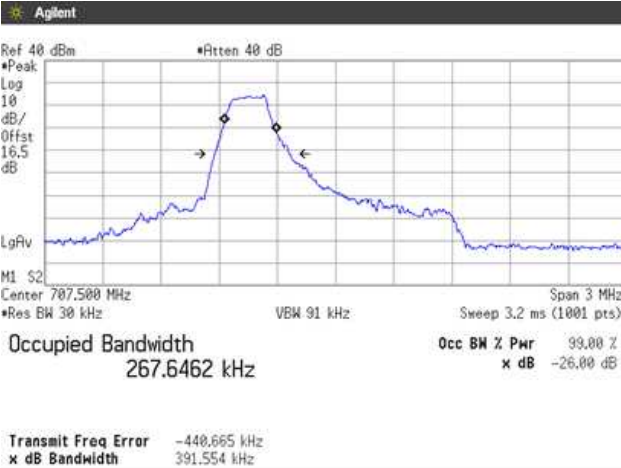
Test engineer : Taiki Watanabe

Band	Channel	Frequency [MHz]	Bandwidth [MHz]	Modulation	RB	Test Result [MHz]
LTE Band XII	23095	707.5	1.4	QPSK	1-0	0.2676
					1-5	0.2694
					3-1	0.6037
					6-0	1.0963
				16QAM	1-0	0.2648
					1-5	0.2633
					3-1	0.6129
					6-0	1.0930
				64QAM	1-0	0.2590
					1-5	0.2657
					3-1	0.5988
					6-0	1.0834
			3	QPSK	1-0	0.3572
					1-14	0.3509
					8-4	1.5385
					15-0	2.7011
				16QAM	1-0	0.3411
					1-14	0.3484
					8-4	1.5411
					15-0	2.7053
				64QAM	1-0	0.3220
					1-14	0.3329
					8-4	1.5160
					15-0	2.7099
			5	QPSK	1-0	0.4806
					1-24	0.4930
					12-7	2.3033
					25-0	4.5457
				16QAM	1-0	0.4590
					1-24	0.4774
					12-7	2.2936
					25-0	4.5138
				64QAM	1-0	0.4546
					1-24	0.4545
					12-7	2.2842
					25-0	4.5316
			10	QPSK	1-0	0.7508
					1-49	0.7254
					25-12	4.6533
					50-0	8.9736
				16QAM	1-0	0.7013
					1-49	0.6905
					25-12	4.6695
					50-0	8.9670
				64QAM	1-0	0.6819
					1-49	0.6587
					25-12	4.6200
					50-0	8.9670

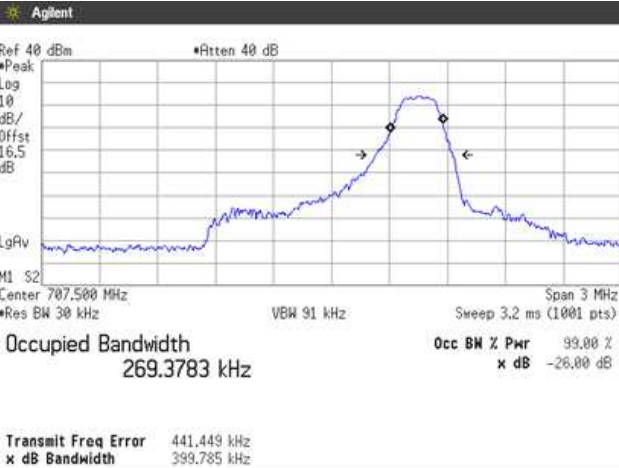
4.3.4 Trace data

[LTE Band XII]
Channel: 23095

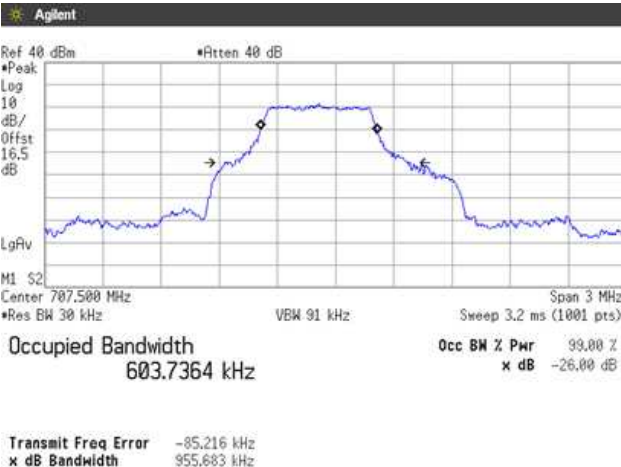
QPSK, BW 1.4MHz
RB1-0



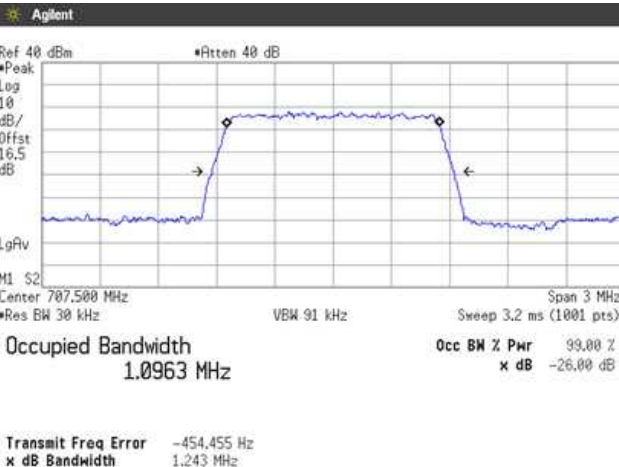
RB1-5



RB3-1

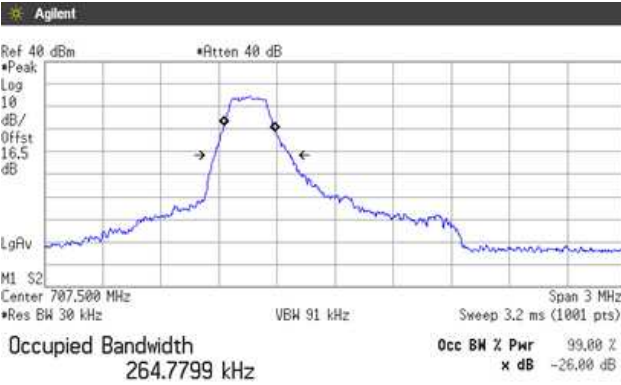


RB6-0



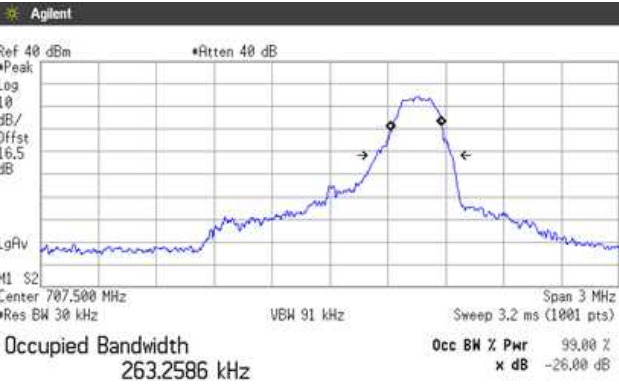
16QAM, BW 1.4MHz

RB1-0



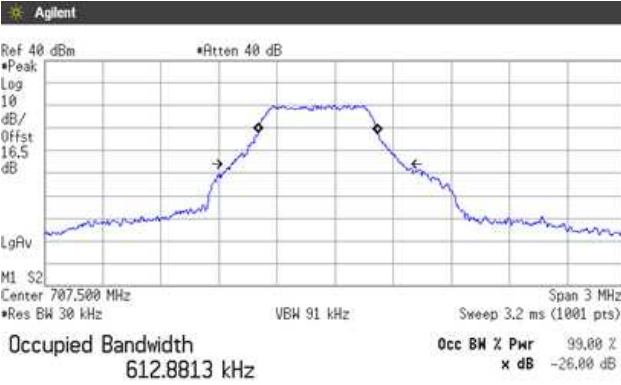
Transmit Freq Error
x dB Bandwidth -440.107 kHz
385.275 kHz

RB1-5



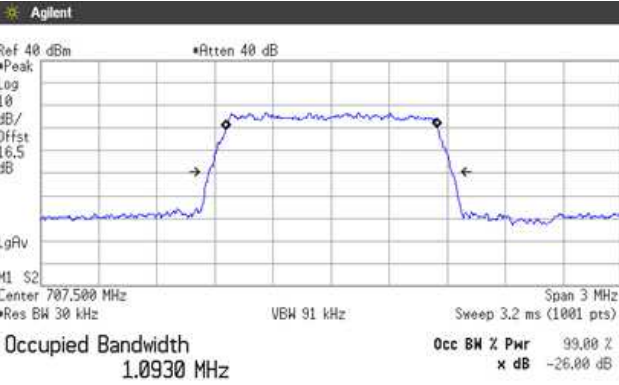
Transmit Freq Error
x dB Bandwidth 446.359 kHz
383.935 kHz

RB3-1



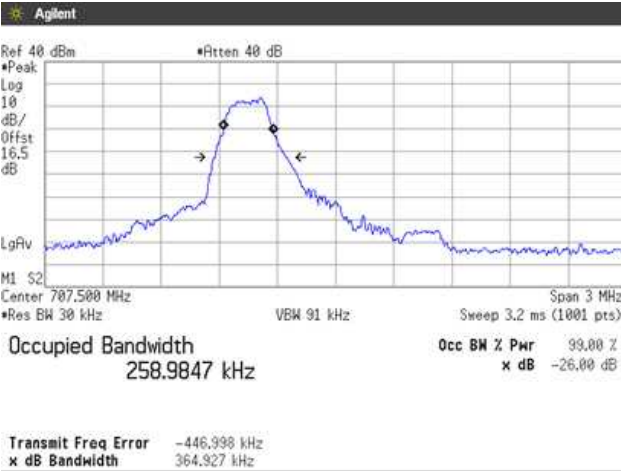
Transmit Freq Error
x dB Bandwidth -88.768 kHz
879.095 kHz

RB6-0

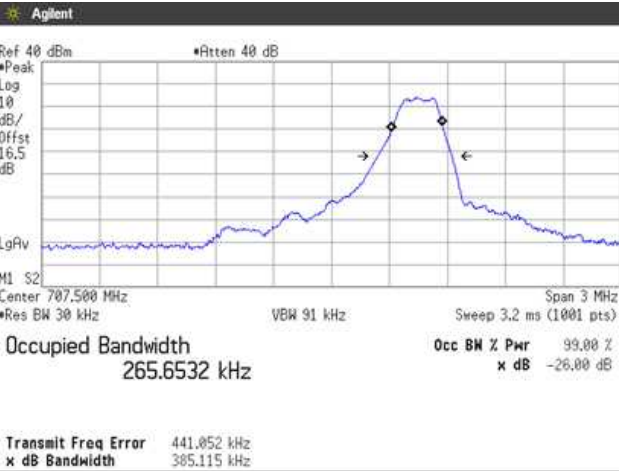


Transmit Freq Error
x dB Bandwidth 2.418 kHz
1.256 MHz

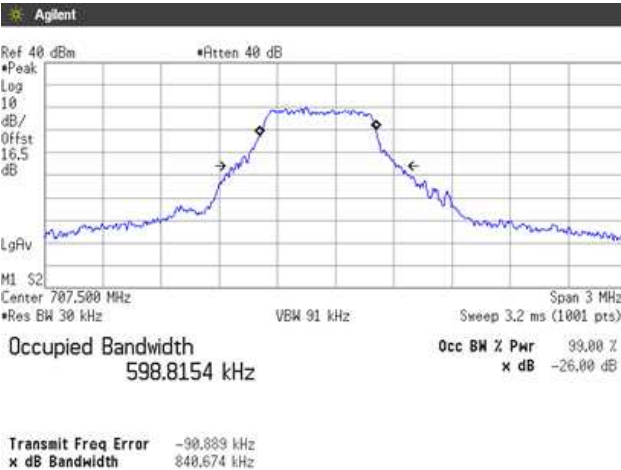
64QAM, BW 1.4MHz
RB1-0



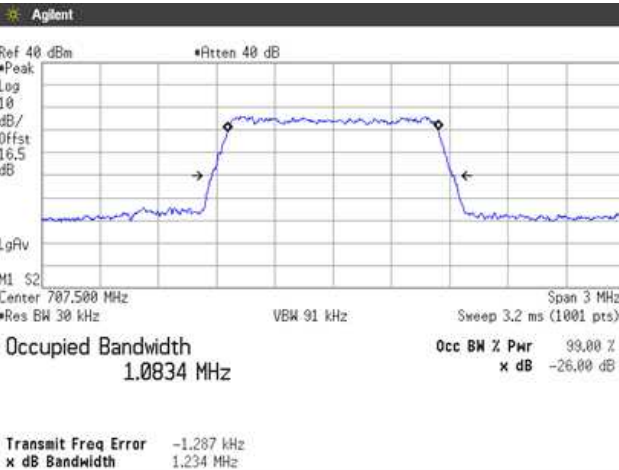
RB1-5

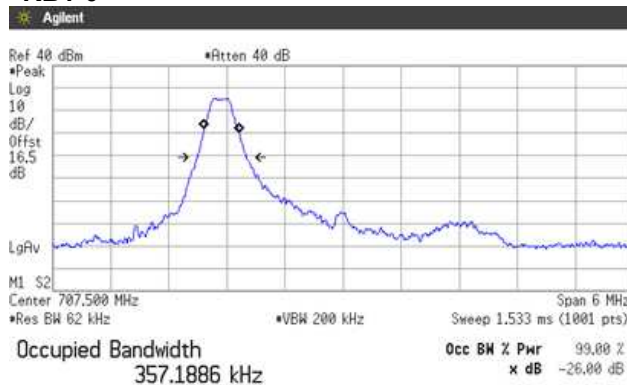


RB3-1

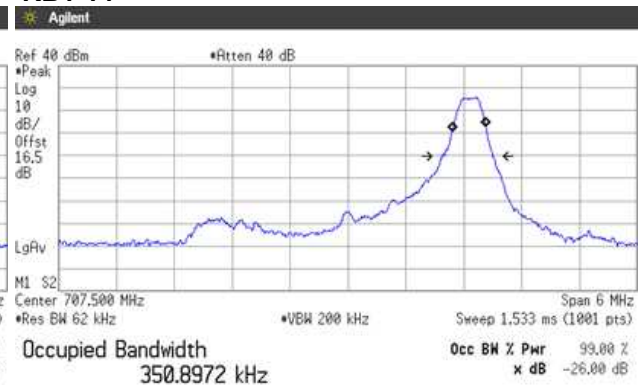


RB6-0

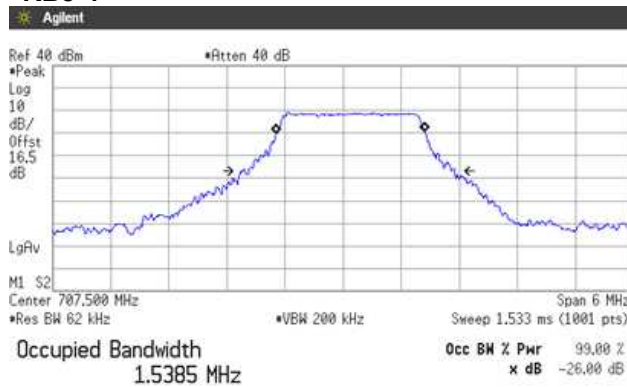


QPSK, BW 3MHz**RB1-0**

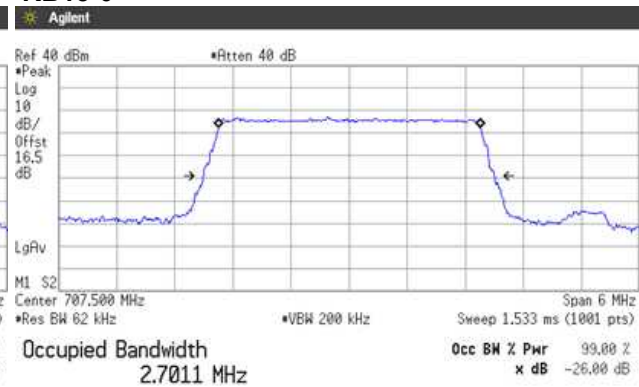
Transmit Freq Error
x dB Bandwidth -1.253 MHz
499.804 kHz

RB1-14

Transmit Freq Error
x dB Bandwidth 1.255 MHz
532.078 kHz

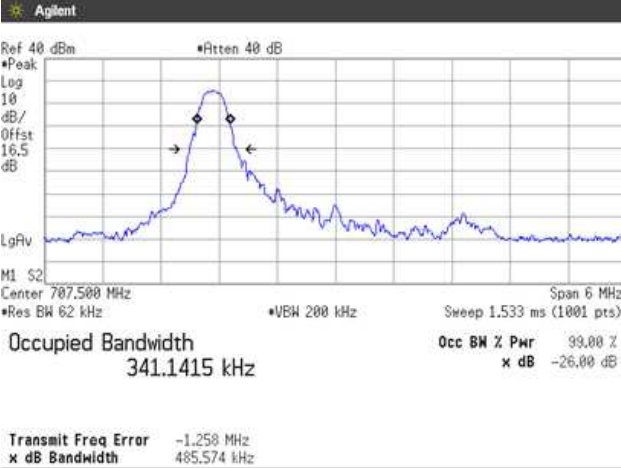
RB8-4

Transmit Freq Error
x dB Bandwidth 78.497 kHz
2.188 MHz

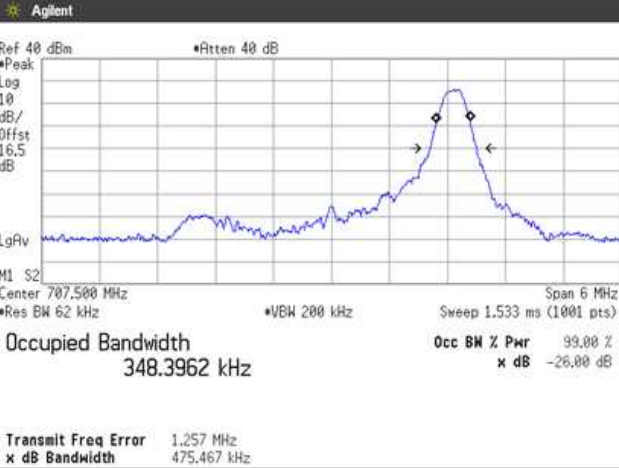
RB15-0

Transmit Freq Error
x dB Bandwidth 5.521 kHz
3.001 MHz

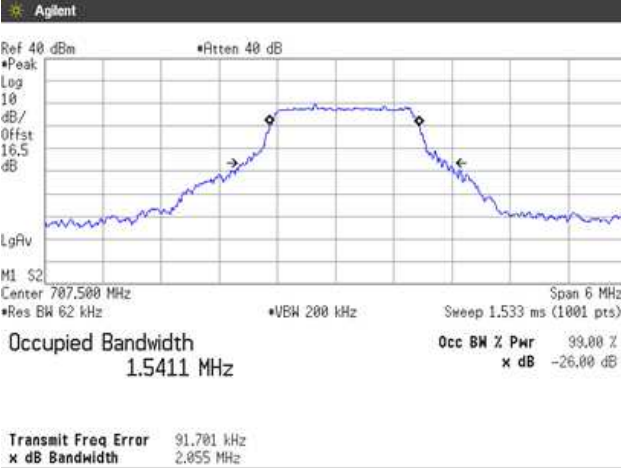
16QAM, BW 3MHz
RB1-0



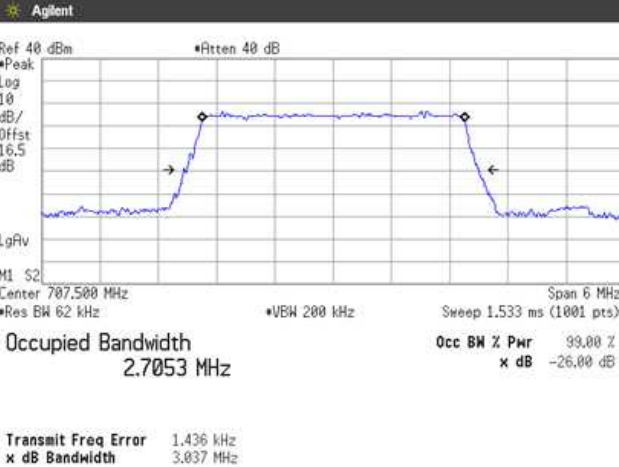
RB1-14



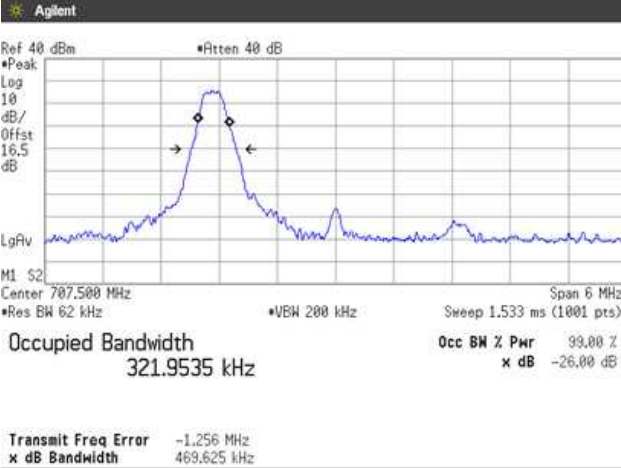
RB8-4



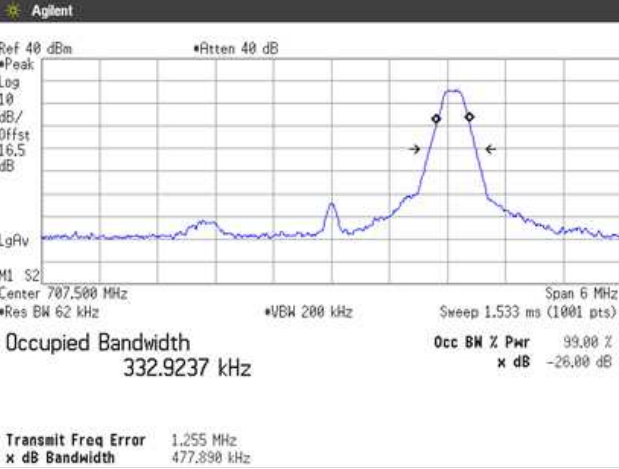
RB15-0



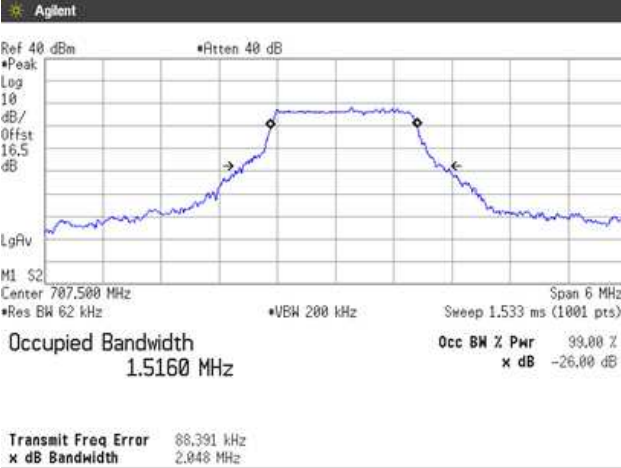
64QAM, BW 3MHz
RB1-0



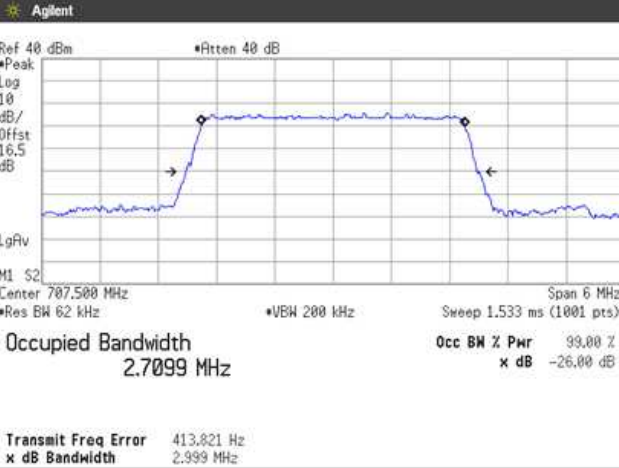
RB1-14



RB8-4

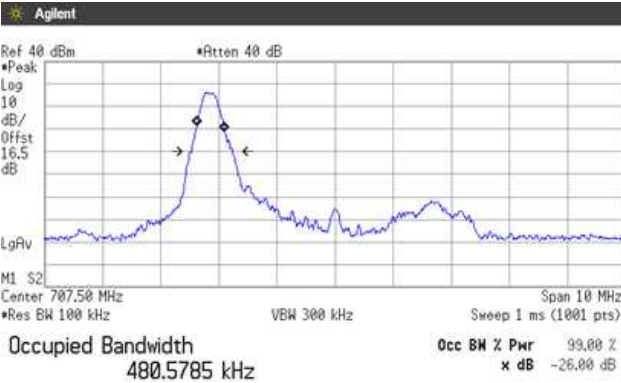


RB15-0



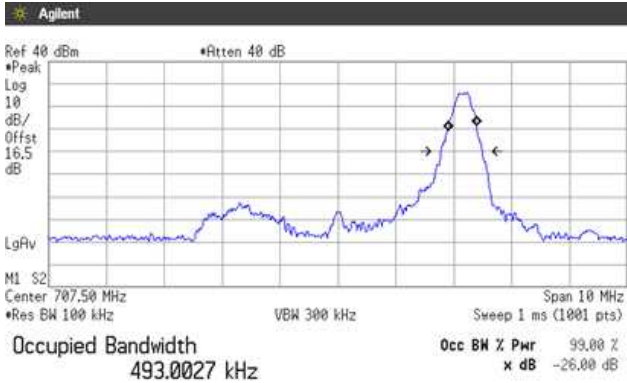
QPSK, BW 5MHz

RB1-0



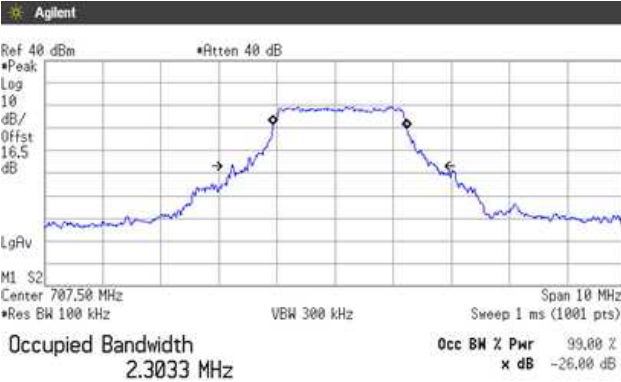
Transmit Freq Error -2.141 MHz
x dB Bandwidth 705.825 kHz

RB1-24



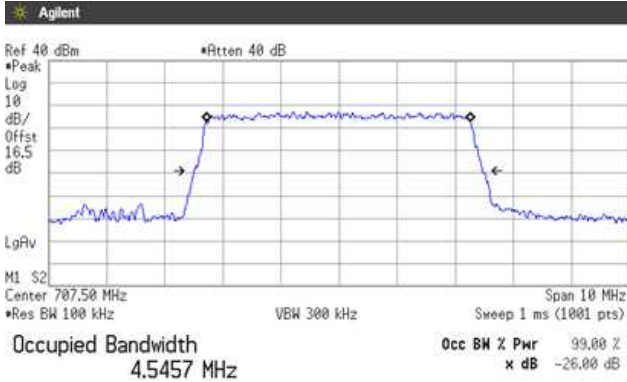
Transmit Freq Error 2.142 MHz
x dB Bandwidth 707.482 kHz

RB12-7



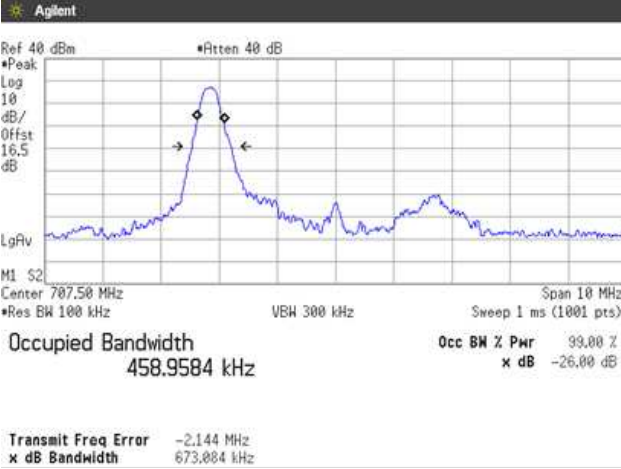
Transmit Freq Error 89.854 kHz
x dB Bandwidth 3.501 MHz

RB25-0

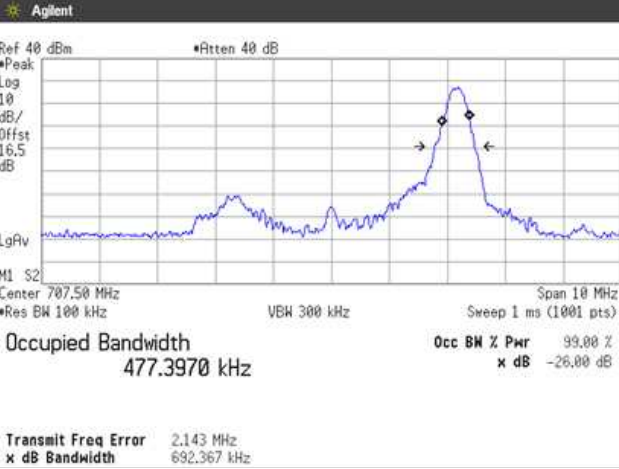


Transmit Freq Error -11.498 kHz
x dB Bandwidth 4.960 MHz

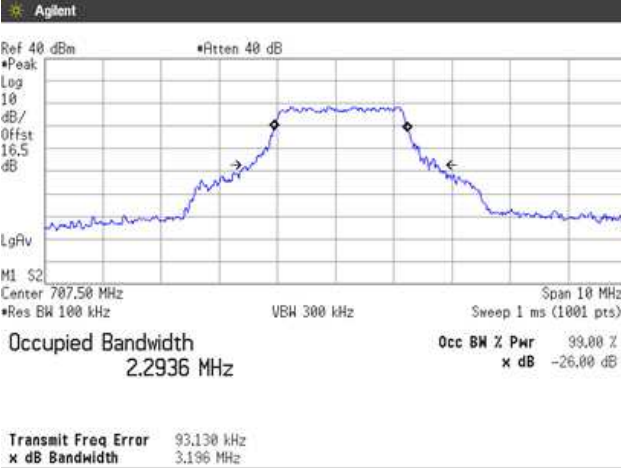
16QAM, BW 5MHz
RB1-0



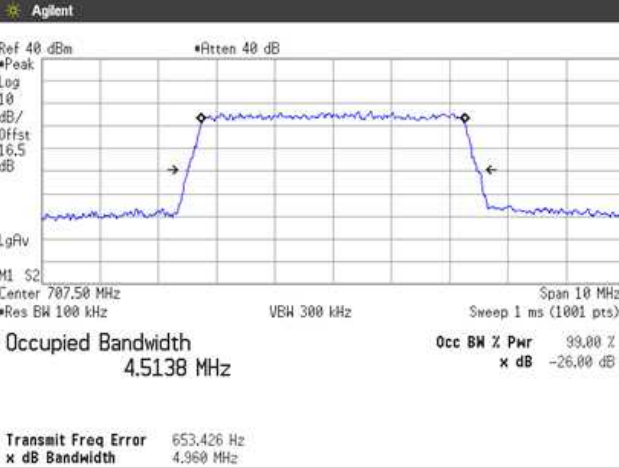
RB1-24



RB12-7

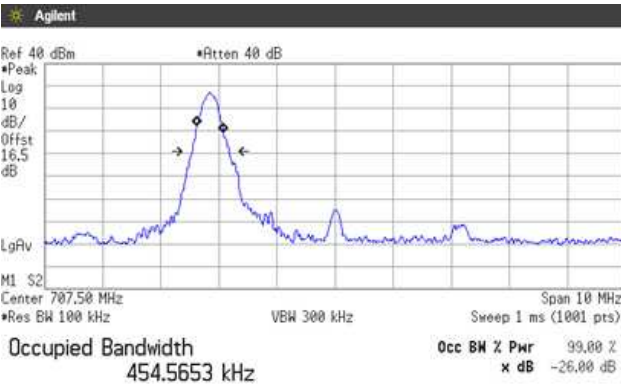


RB25-0



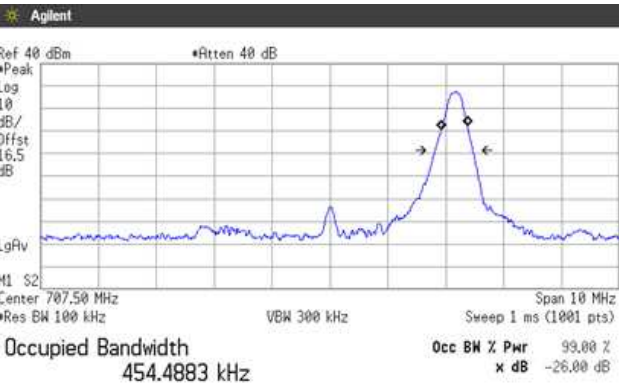
64QAM, BW 5MHz

RB1-0



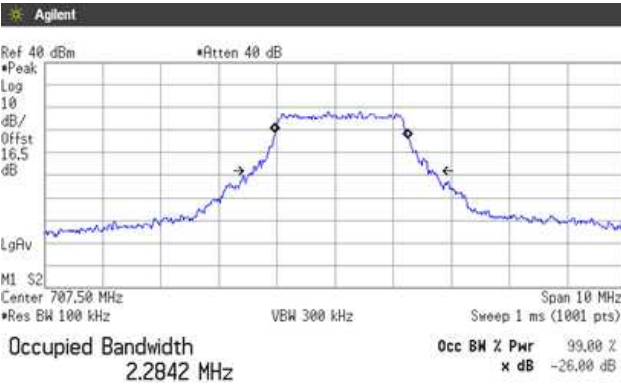
Transmit Freq Error
x dB Bandwidth -2.150 MHz
635.397 kHz

RB1-24



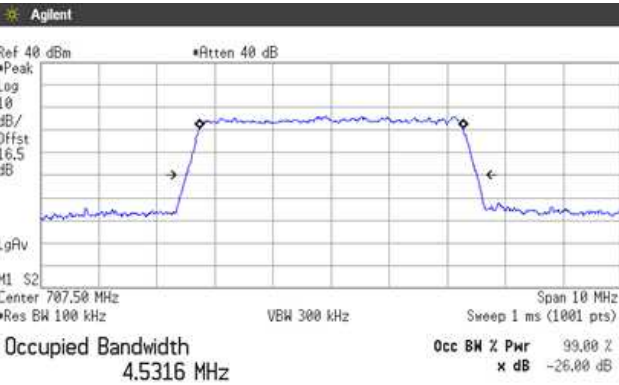
Transmit Freq Error
x dB Bandwidth 2.147 MHz
654.277 kHz

RB12-7

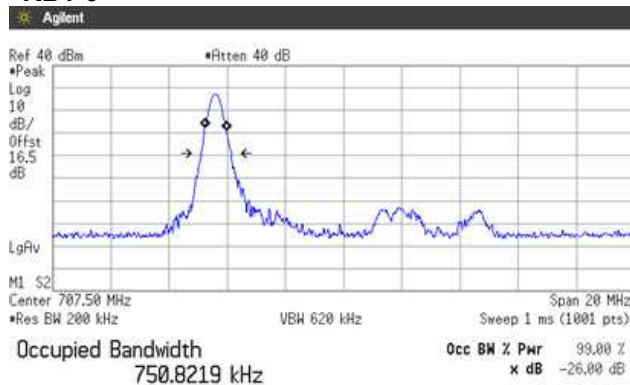


Transmit Freq Error
x dB Bandwidth 109.118 kHz
3.096 MHz

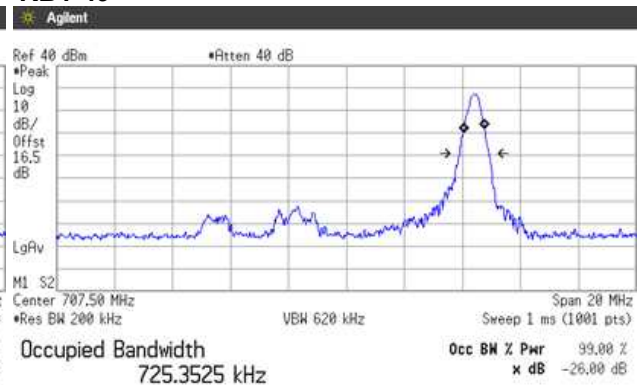
RB25-0



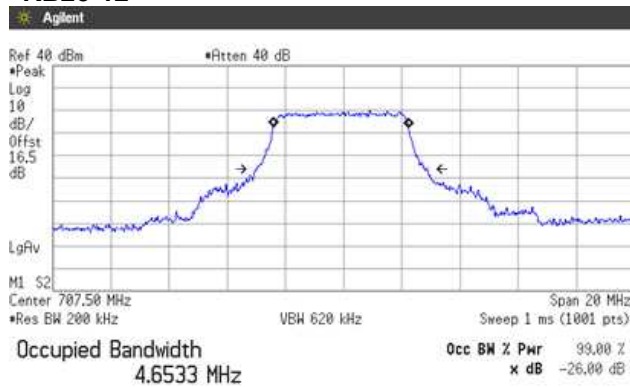
Transmit Freq Error
x dB Bandwidth 4.473 kHz
5.009 MHz

QPSK, BW 10MHz**RB1-0**

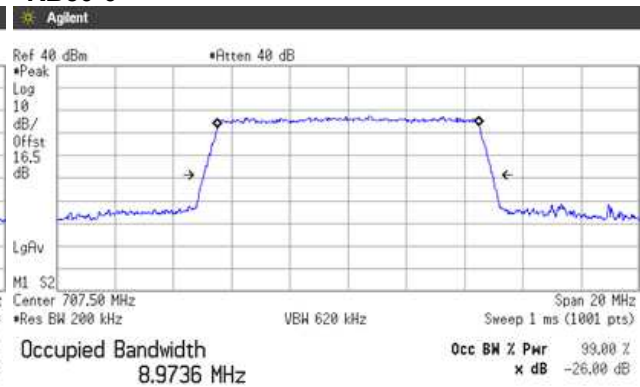
Transmit Freq Error -4.388 MHz
x dB Bandwidth 1.026 MHz

RB1-49

Transmit Freq Error 4.394 MHz
x dB Bandwidth 1.013 MHz

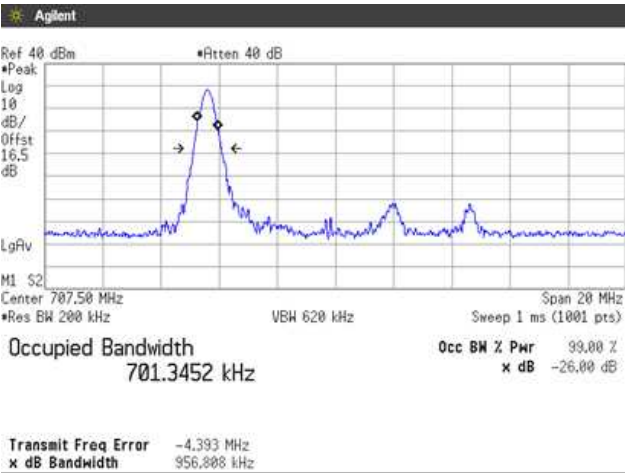
RB25-12

Transmit Freq Error -91.830 kHz
x dB Bandwidth 5.887 MHz

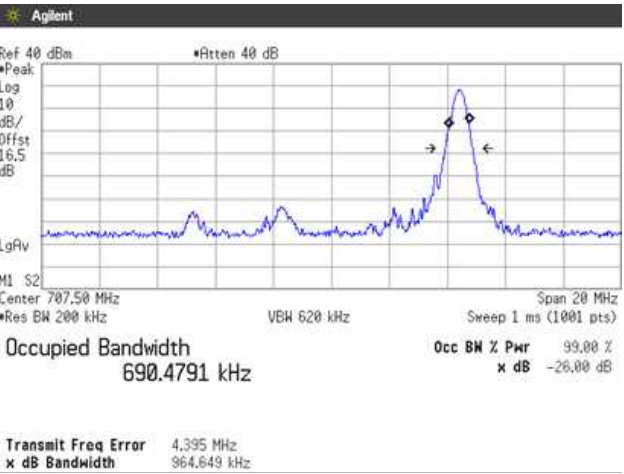
RB50-0

Transmit Freq Error 12.209 kHz
x dB Bandwidth 9.921 MHz

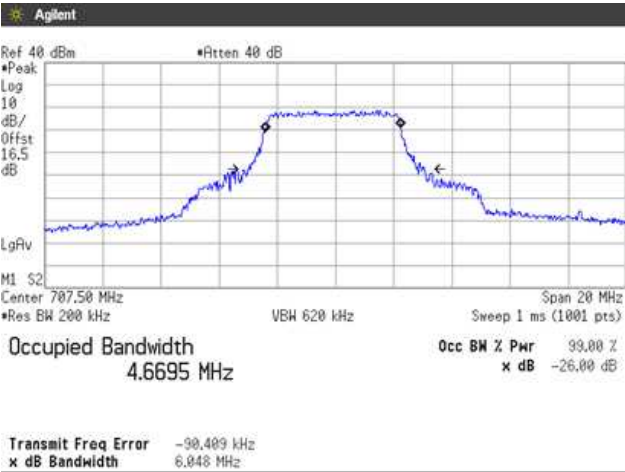
16QAM, BW 10MHz
RB1-0



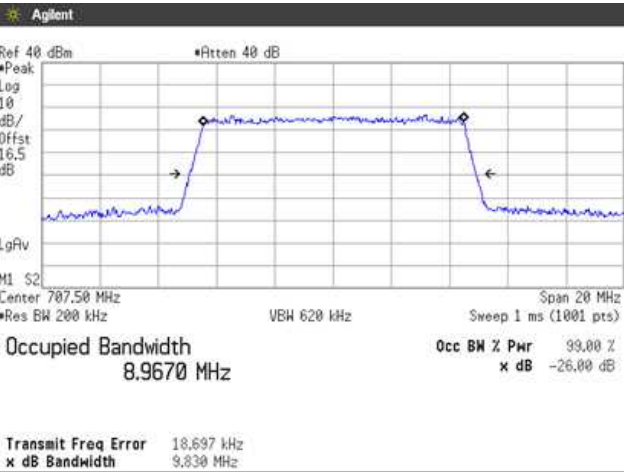
RB1-49



RB25-12

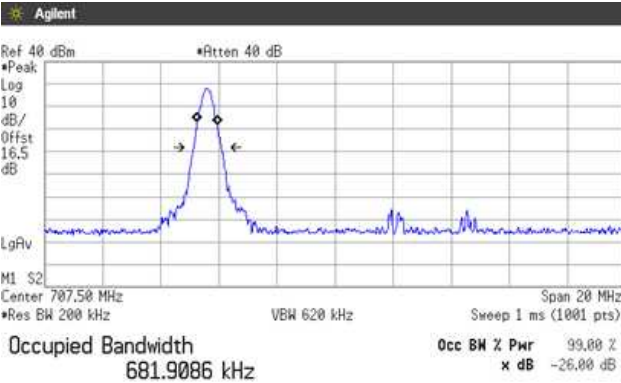


RB50-0

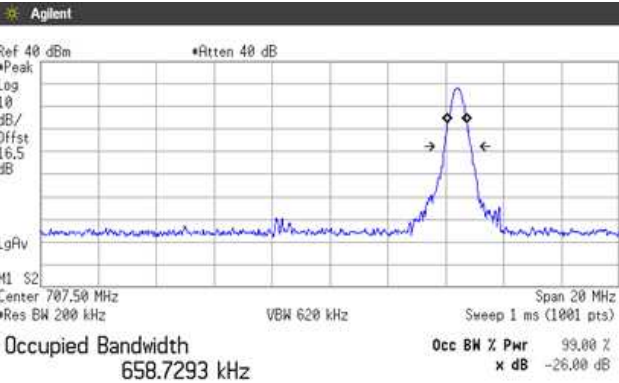


64QAM, BW 10MHz

RB1-0



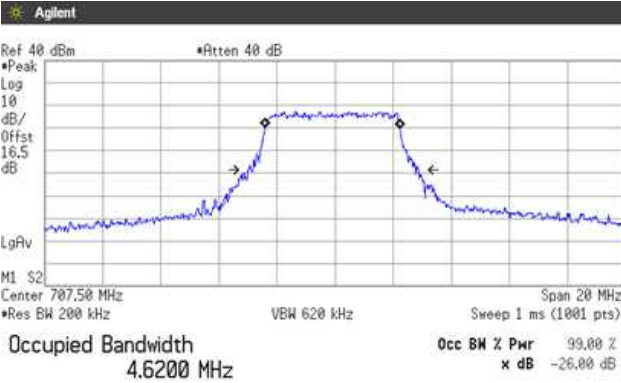
RB1-49



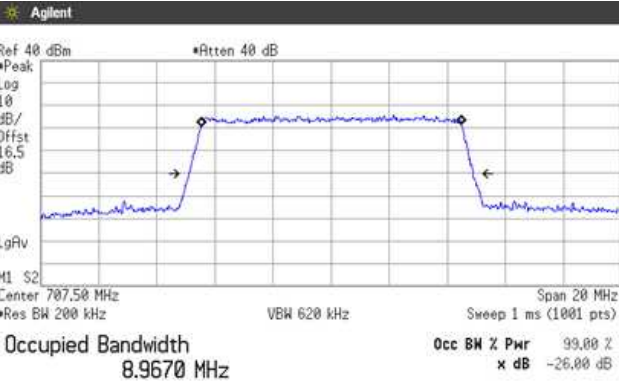
Transmit Freq Error
x dB Bandwidth -4.393 MHz
972.144 kHz

Transmit Freq Error
x dB Bandwidth 4.397 MHz
910.669 kHz

RB25-12



RB50-0



Transmit Freq Error
x dB Bandwidth -86.453 kHz
5.821 MHz

Transmit Freq Error
x dB Bandwidth 15.082 kHz
9.770 MHz

4.4 Band Edge Spurious and Harmonic at Antenna Terminals

4.4.1 Measurement procedure

[FCC 27.53, 2.1051]

The band edge spurious and harmonic was measured with a spectrum analyzer connected to the antenna terminal.

The spectrum analyzer is set to;

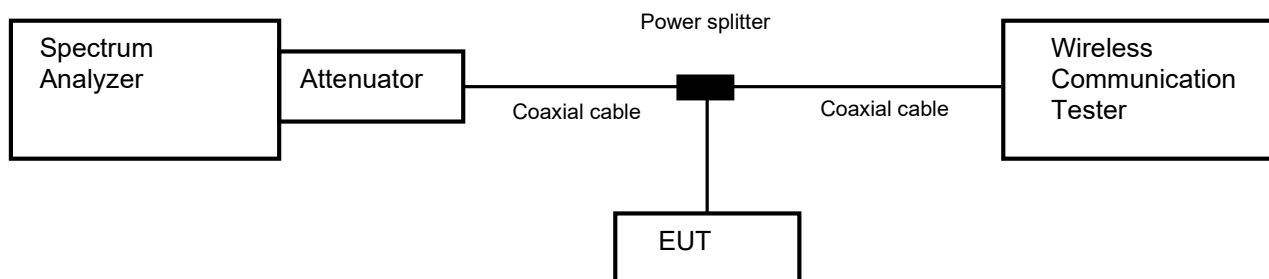
<Band Edge>

- a) Span was set large enough so as to capture all out of band emissions near the band edge
- b) $RBW \geq 1\%$ of the emission bandwidth or 2% of the emission bandwidth
- c) $VBW \geq 3 \times RBW$
- d) Detector = RMS
- e) Trace mode = Max hold
- f) Sweep time = auto-couple
- g) Number of sweep point $\geq 2 \times \text{span} / RBW$

<Spurious Emissions>

- a) $RBW = 1\text{MHz}$ & $VBW \geq 3 \times RBW$
- b) Detector = Peak
- c) Trace mode = Max hold
- d) Sweep time = auto-couple
- e) Number of sweep point $\geq 2 \times \text{span} / RBW$

- Test configuration



4.4.2 Limit

-13 dB or less

4.4.3 Measurement result

Date : 12-January-2021
 Temperature : 22.1 [°C]
 Humidity : 30.5 [%]
 Test place : Shielded room No.4

Test engineer : Taiki Watanabe

Date : 13-January-2021
 Temperature : 21.9 [°C]
 Humidity : 31.2 [%]
 Test place : Shielded room No.4

Test engineer : Taiki Watanabe

Band	Modulation	Bandwidth [MHz]	Channel	Frequency [MHz]	Limit [dB]	Results	
LTE Band XII	QPSK, 16QAM, 64QAM	1.4	23017	699.7	-13.0	See the trace data	PASS
			23173	715.3	-13.0	See the trace data	PASS
		3	23025	700.5	-13.0	See the trace data	PASS
			23165	714.5	-13.0	See the trace data	PASS
		5	23035	701.5	-13.0	See the trace data	PASS
			23155	713.5	-13.0	See the trace data	PASS
		10	23060	704.0	-13.0	See the trace data	PASS
			23130	711.0	-13.0	See the trace data	PASS

4.4.4 Trace data

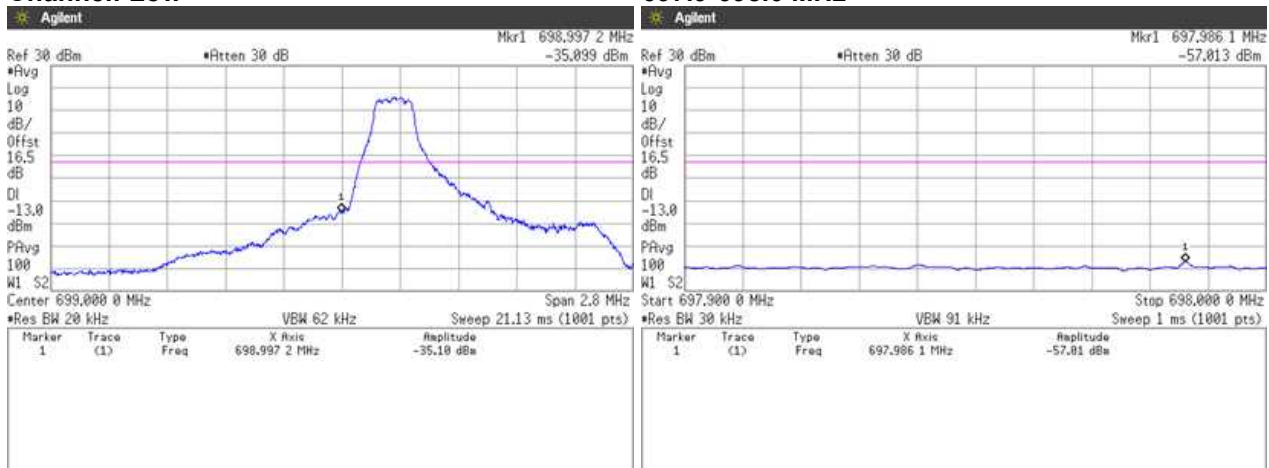
[LTE Band XII]

(Band Edge)

QPSK, BW 1.4MHz, RB1-0

Channel: Low

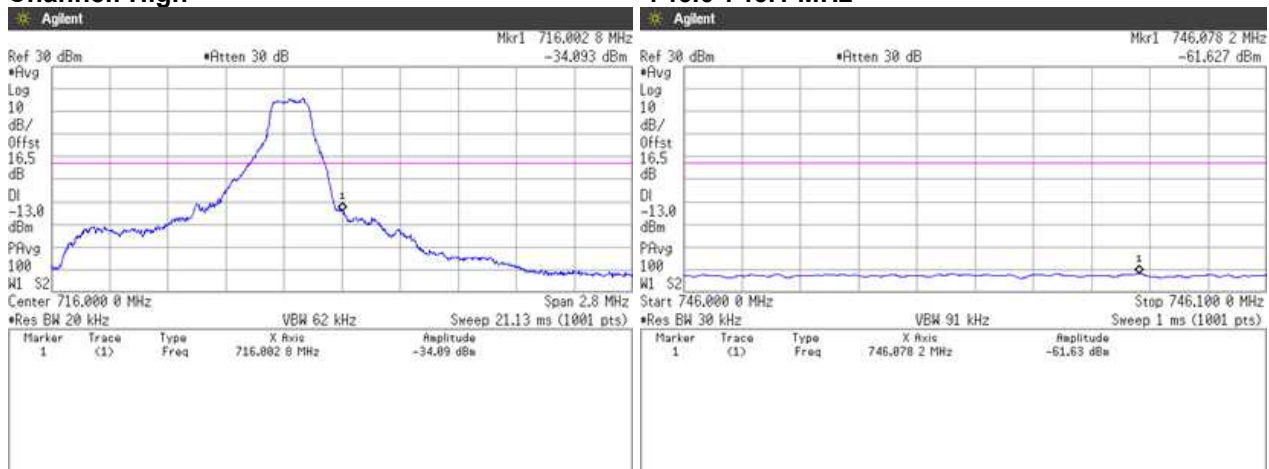
697.9-698.0 MHz

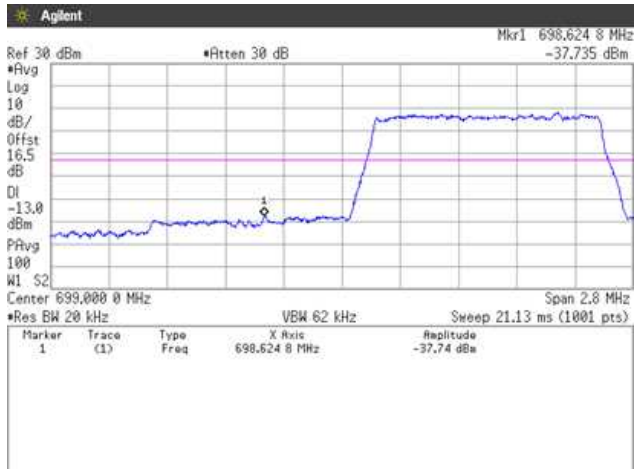
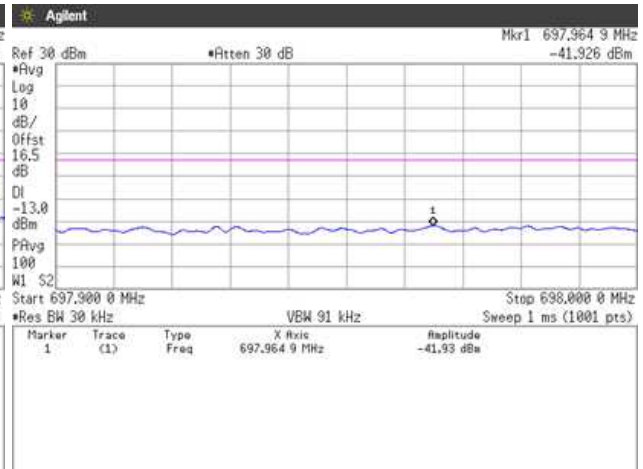
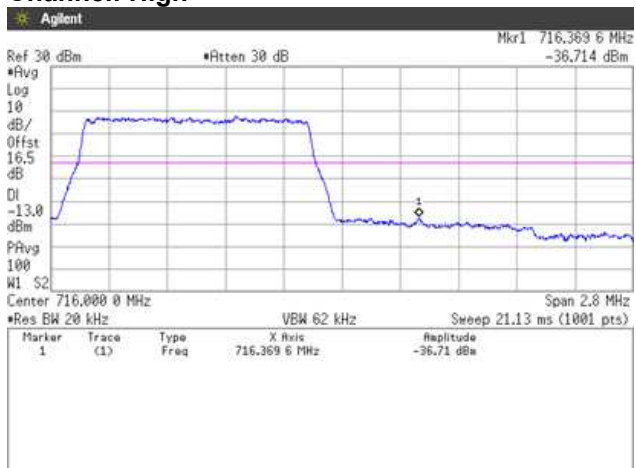
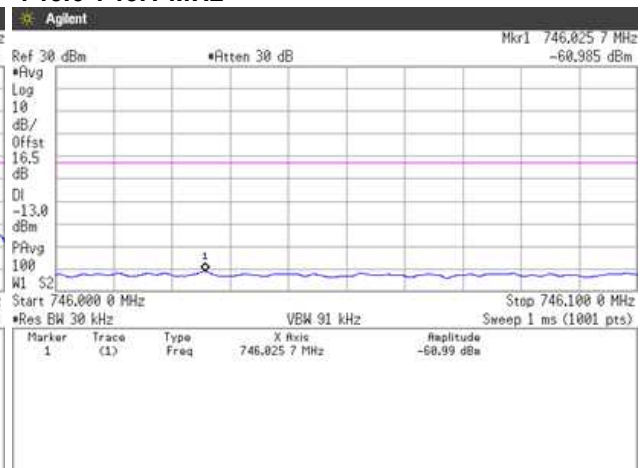


QPSK, BW 1.4MHz, RB1-5

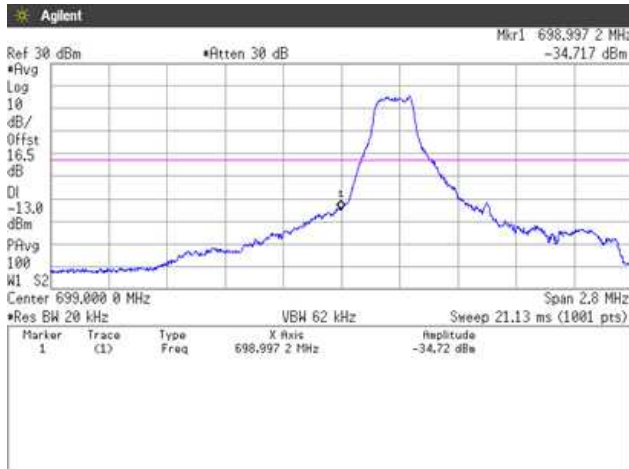
Channel: High

746.0-746.1 MHz

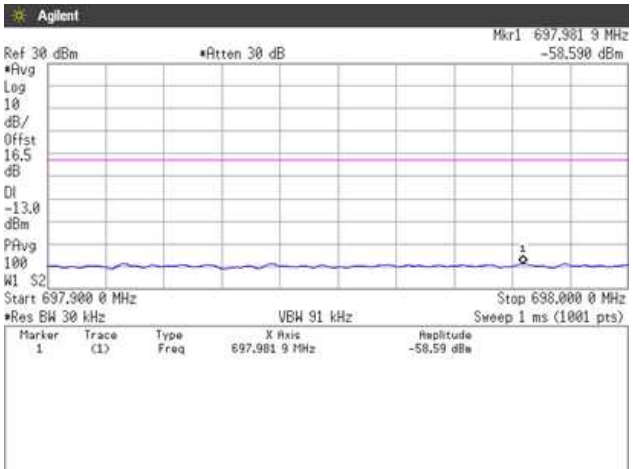


QPSK, BW 1.4MHz, RB6-0**Channel: Low****697.9-698.0 MHz****QPSK, BW 1.4MHz, RB6-0****Channel: High****746.0-746.1 MHz**

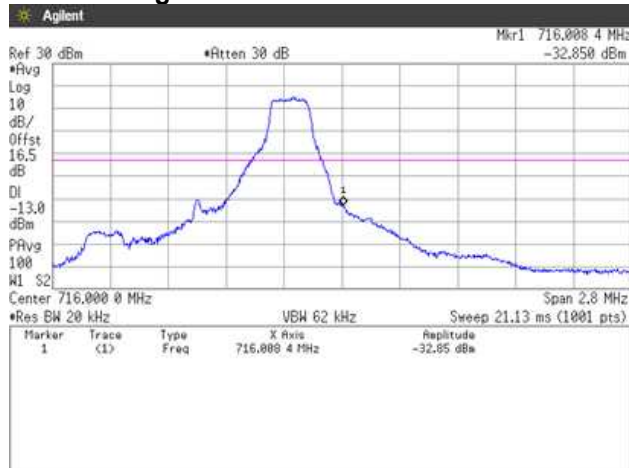
16QAM, BW 1.4MHz, RB1-0
Channel: Low



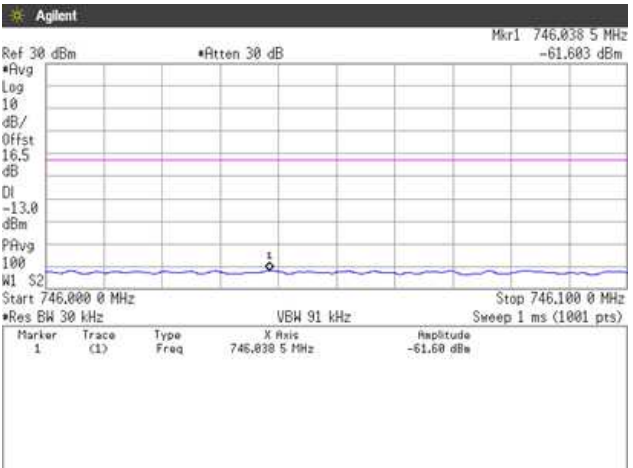
697.9-698.0 MHz

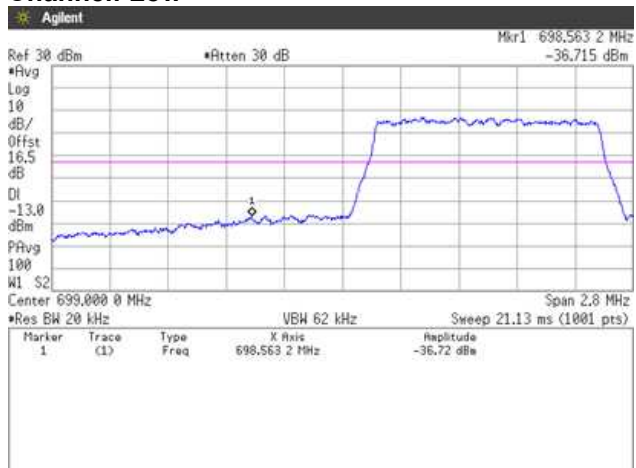
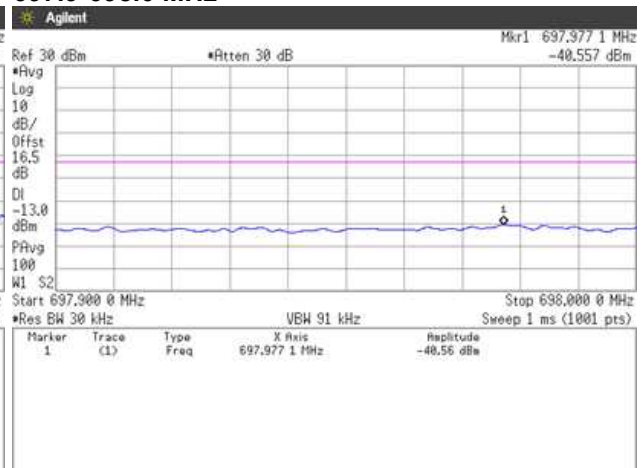
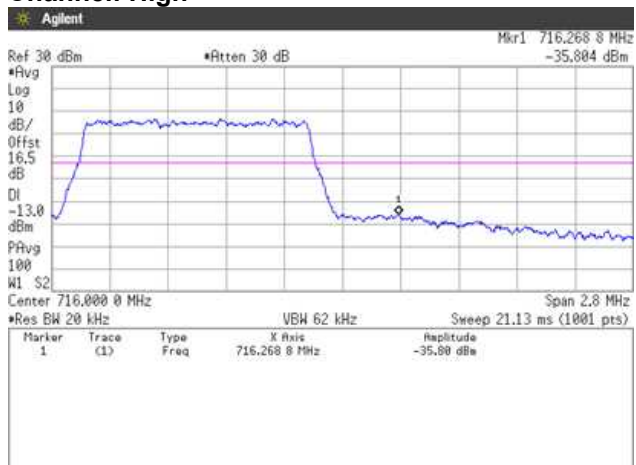
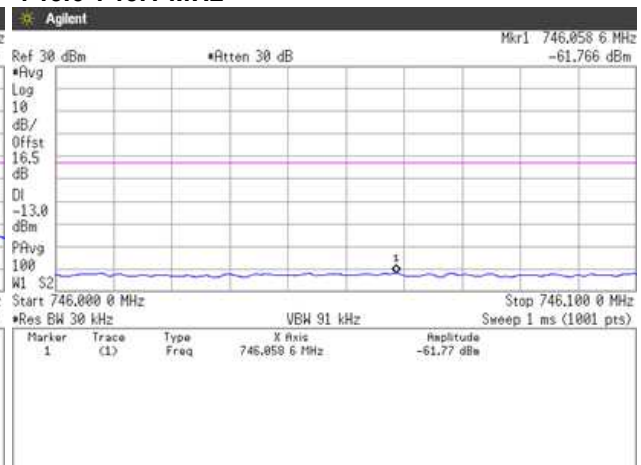


16QAM, BW 1.4MHz, RB1-5
Channel: High

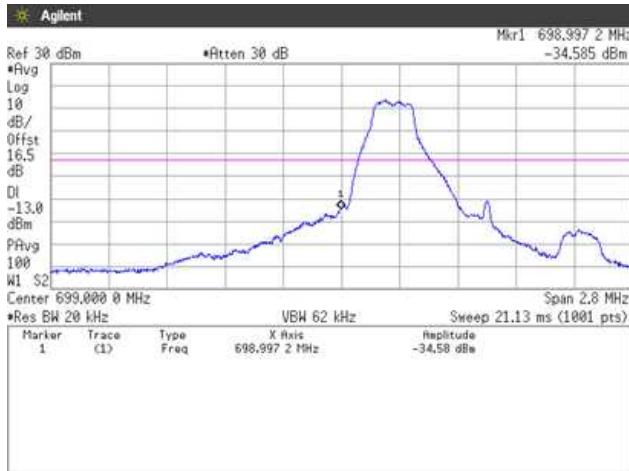


746.0-746.1 MHz

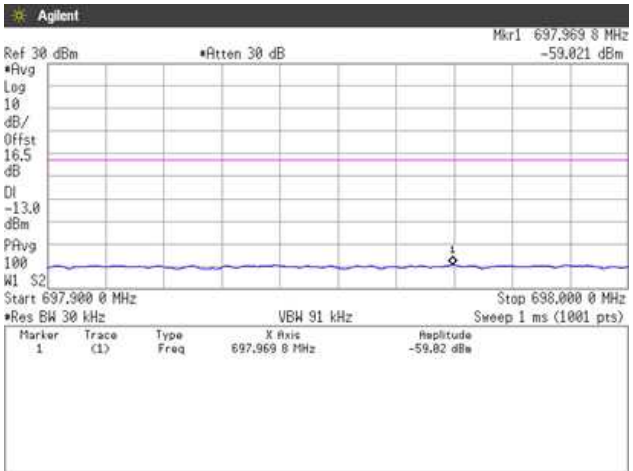


16QAM, BW 1.4MHz, RB6-0**Channel: Low****697.9-698.0 MHz****16QAM, BW 1.4MHz, RB6-0****Channel: High****746.0-746.1 MHz**

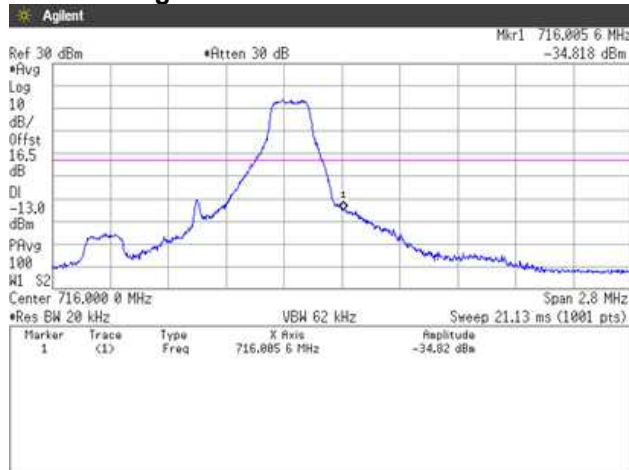
64QAM, BW 1.4MHz, RB1-0
Channel: Low



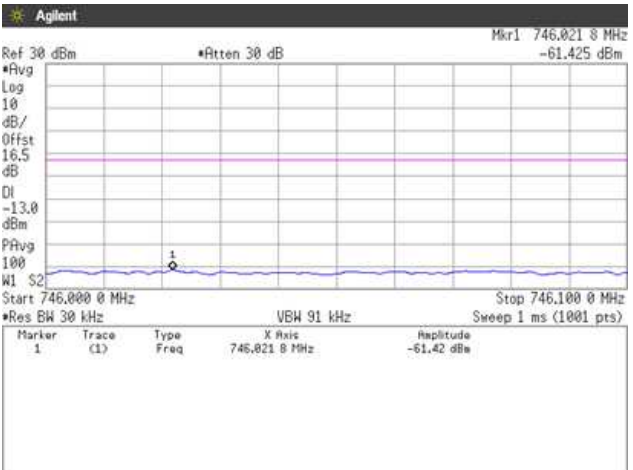
697.9-698.0 MHz

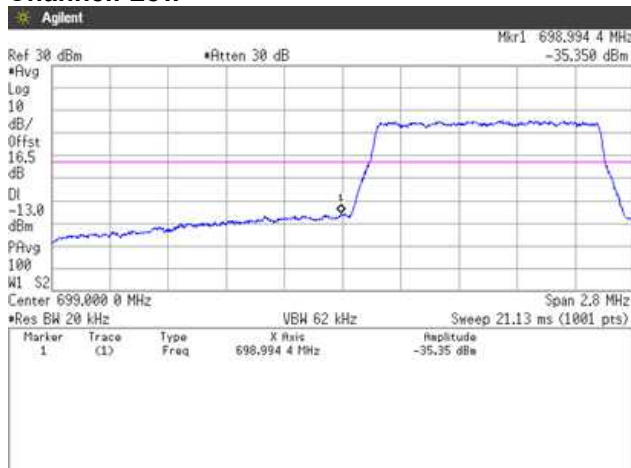
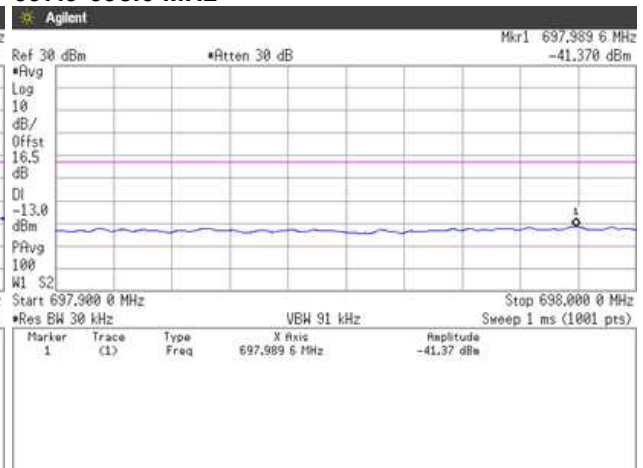
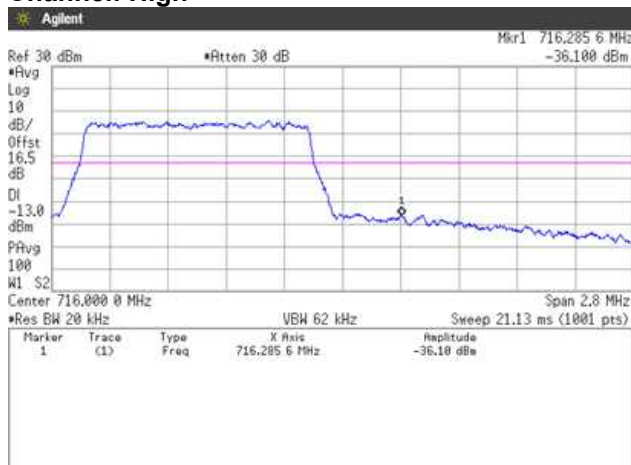
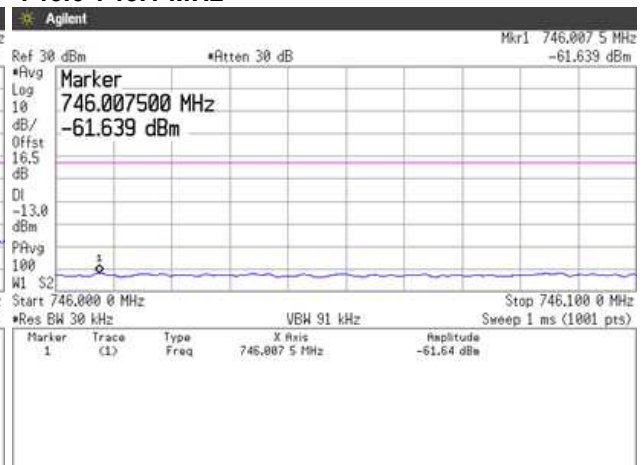


64QAM, BW 1.4MHz, RB1-5
Channel: High



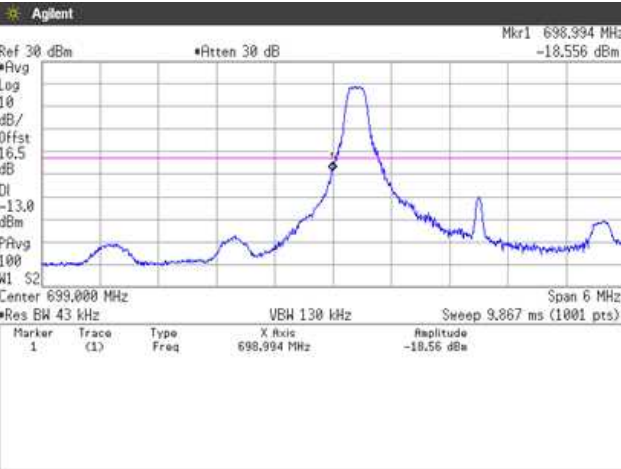
746.0-746.1 MHz



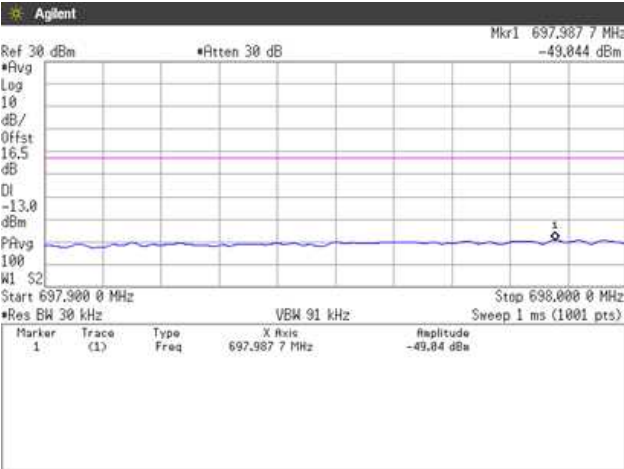
64QAM, BW 1.4MHz, RB6-0**Channel: Low****697.9-698.0 MHz****64QAM, BW 1.4MHz, RB6-0****Channel: High****746.0-746.1 MHz**

QPSK, BW 3MHz, RB1-0

Channel: Low

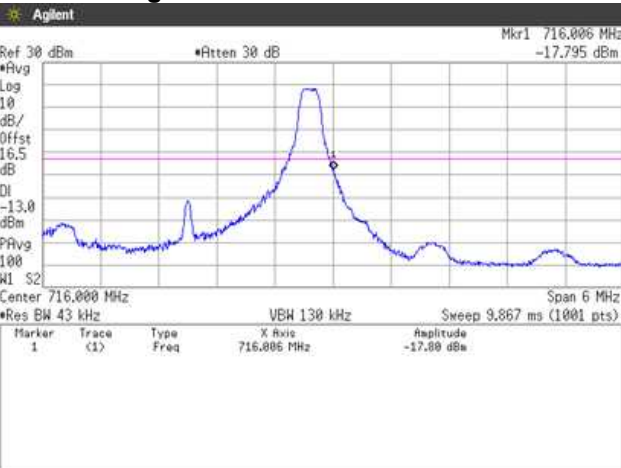


697.9-698.0 MHz

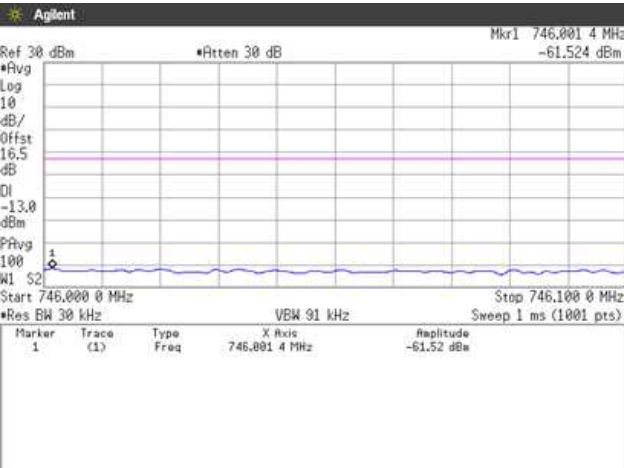


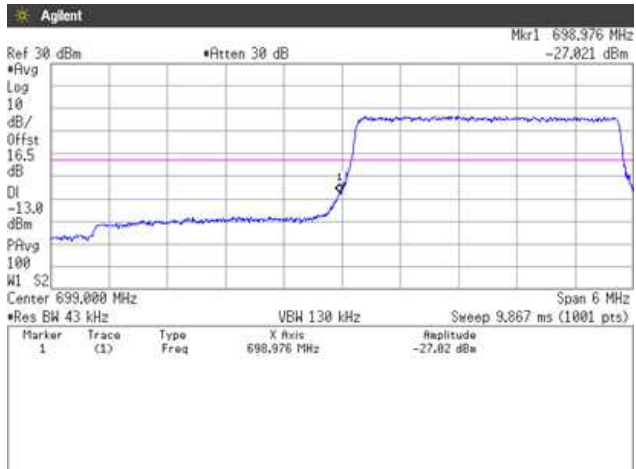
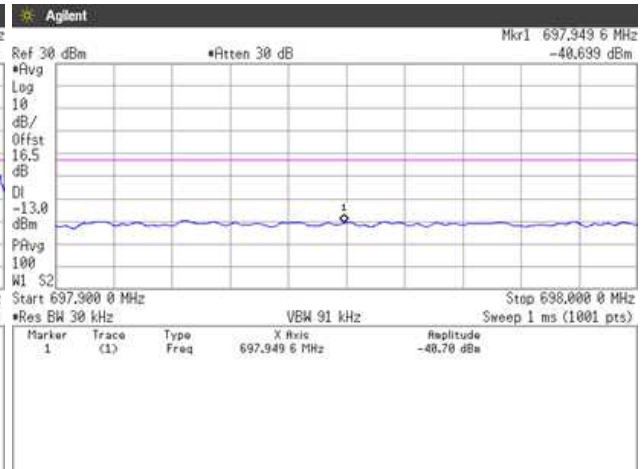
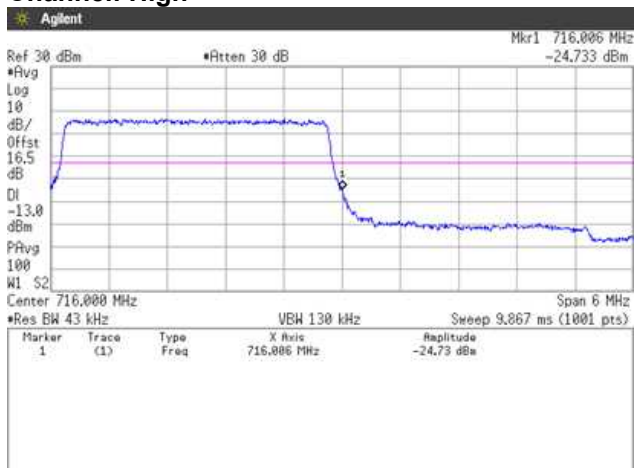
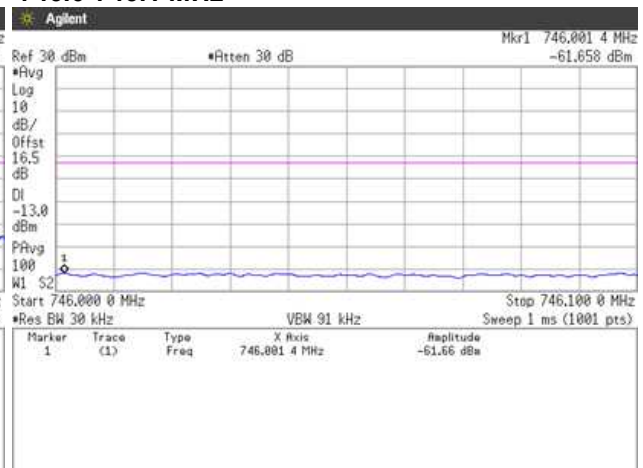
QPSK, BW 3MHz, RB1-14

Channel: High



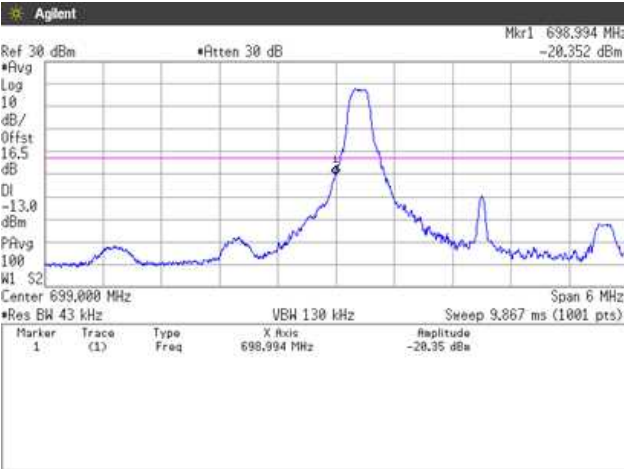
746.0-746.1 MHz



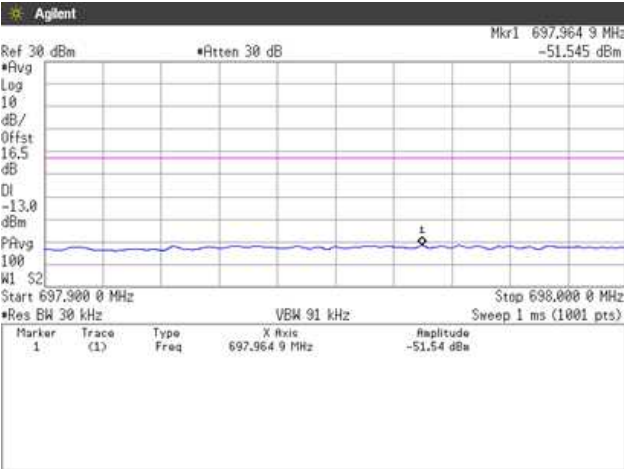
QPSK, BW 3MHz, RB15-0**Channel: Low****697.9-698.0 MHz****QPSK, BW 3MHz, RB15-0****Channel: High****746.0-746.1 MHz**

16QAM, BW 3MHz, RB1-0

Channel: Low

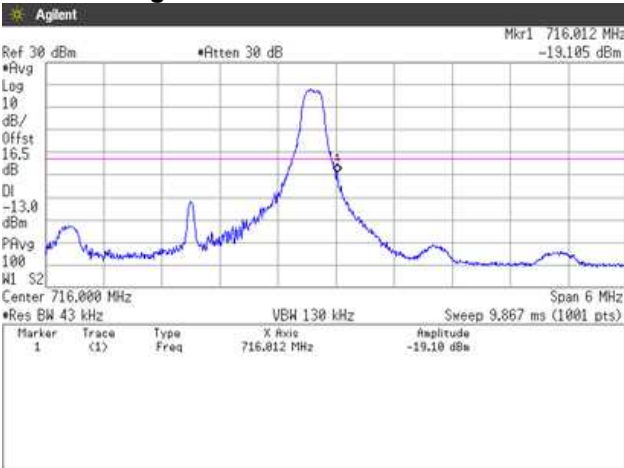


697.9-698.0 MHz

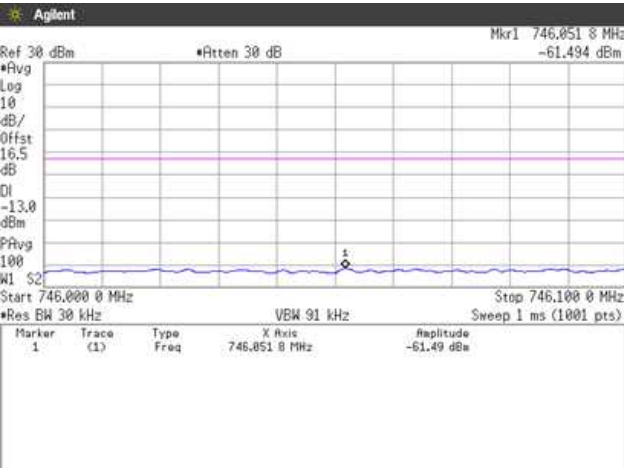


16QAM, BW 3MHz, RB1-14

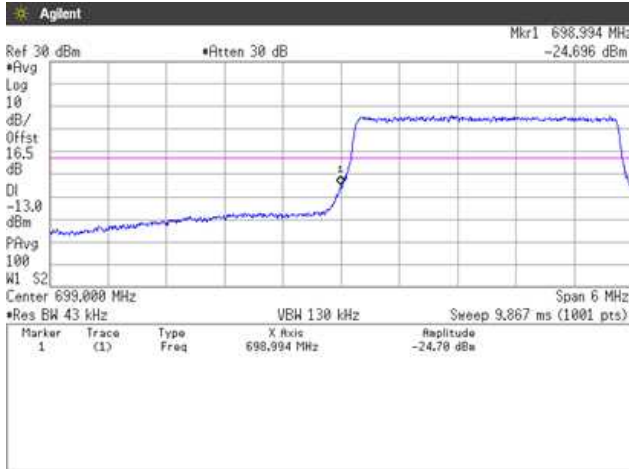
Channel: High



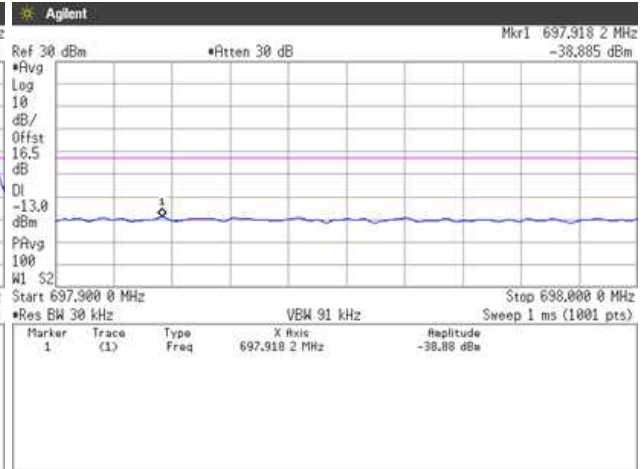
746.0-746.1 MHz



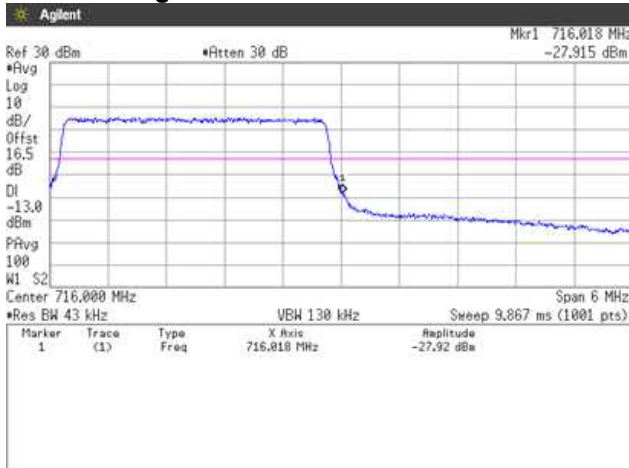
16QAM, BW 3MHz, RB15-0
Channel: Low



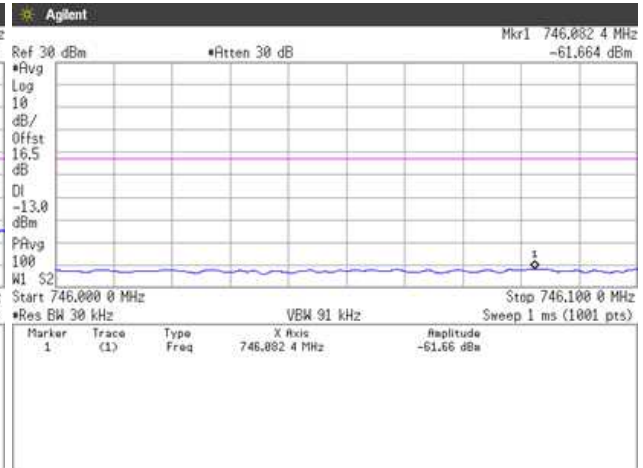
697.9-698.0 MHz

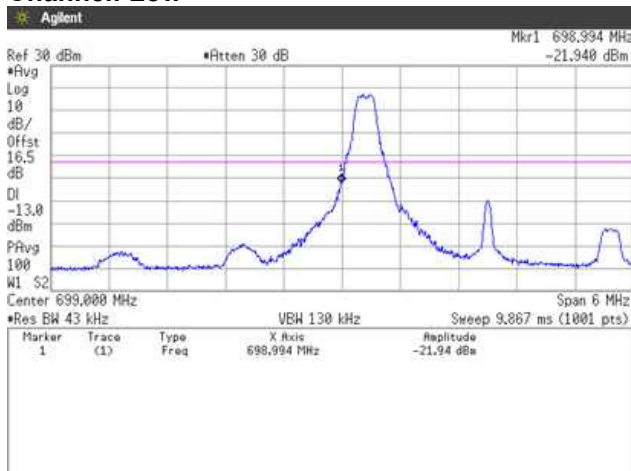
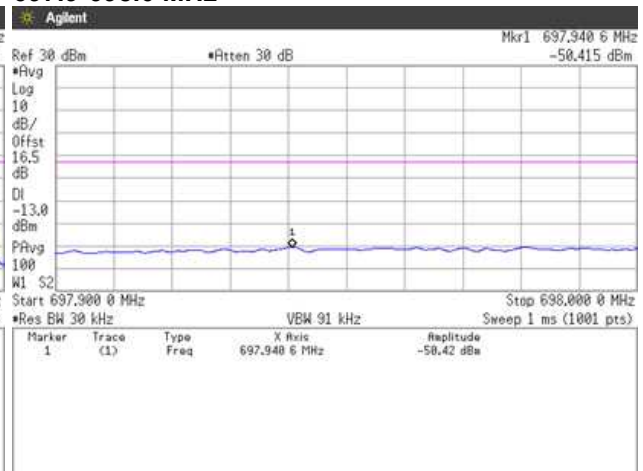
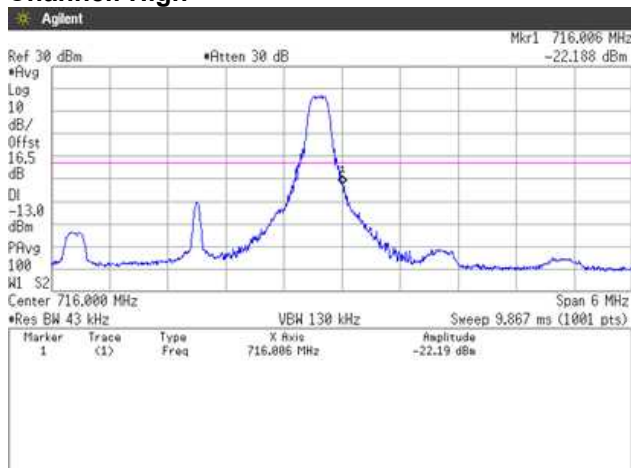
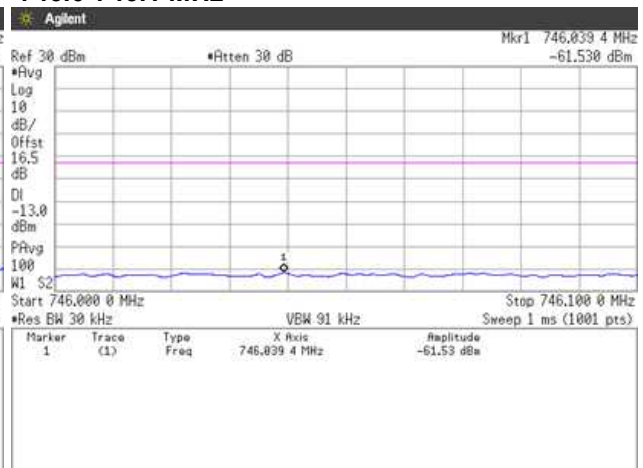


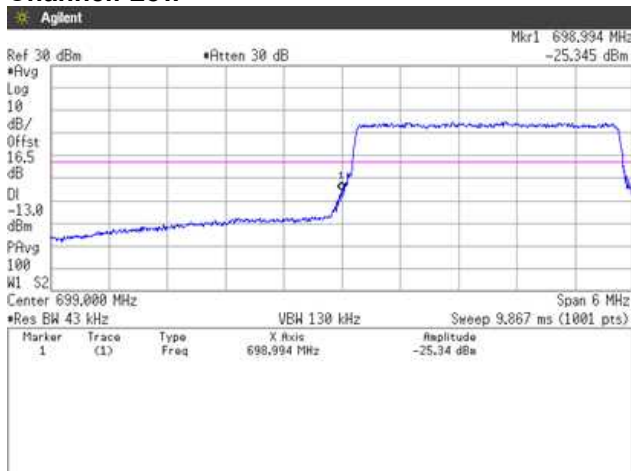
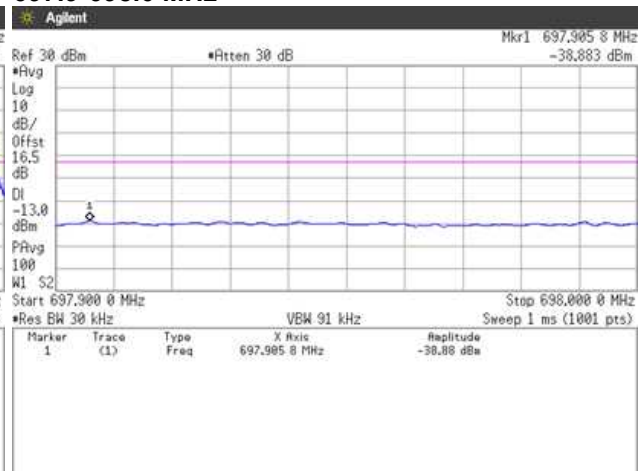
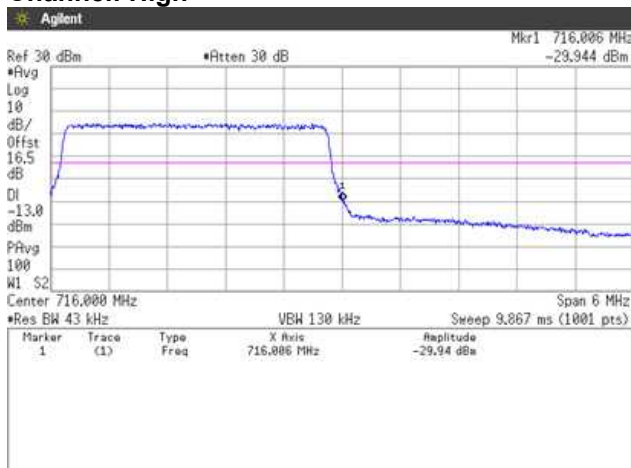
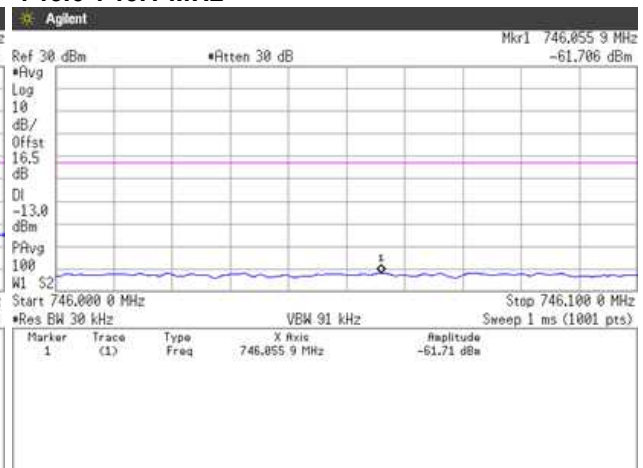
16QAM, BW 3MHz, RB15-0
Channel: High

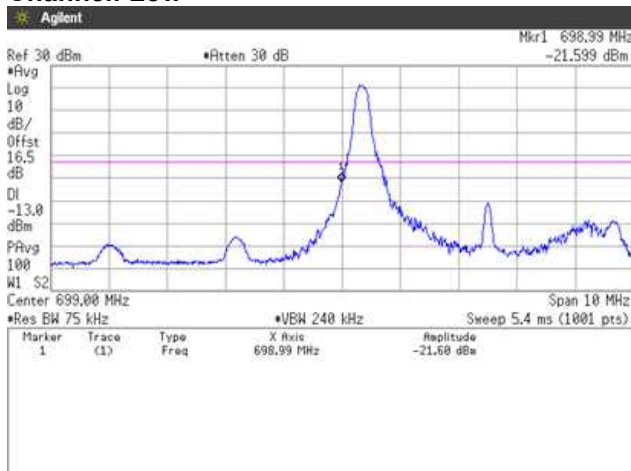
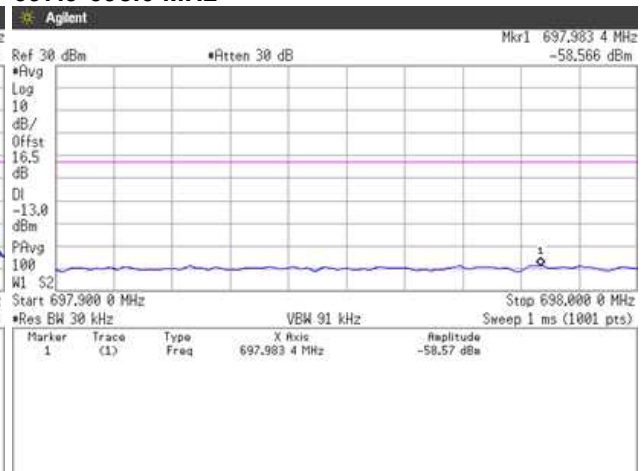
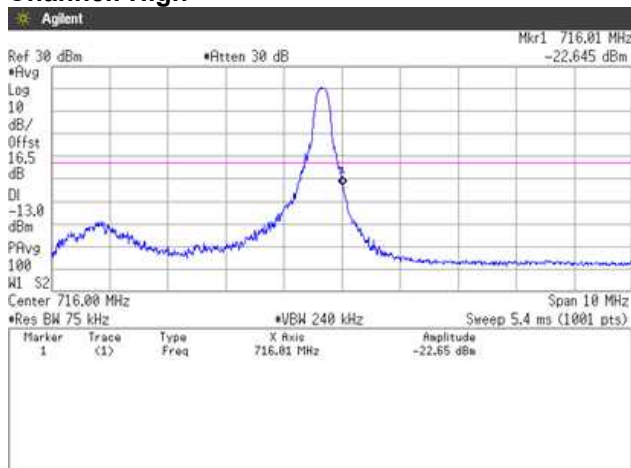
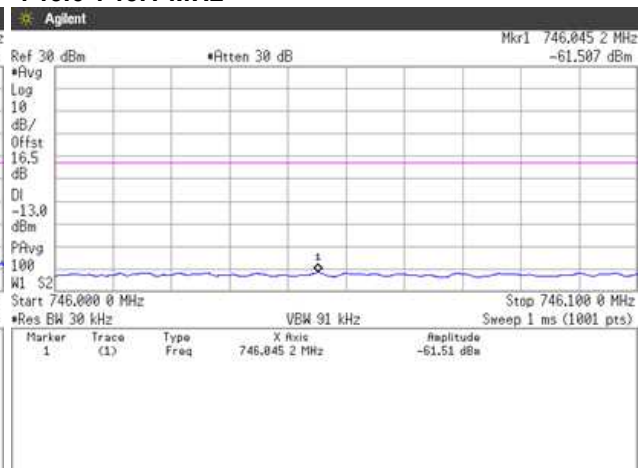


746.0-746.1 MHz



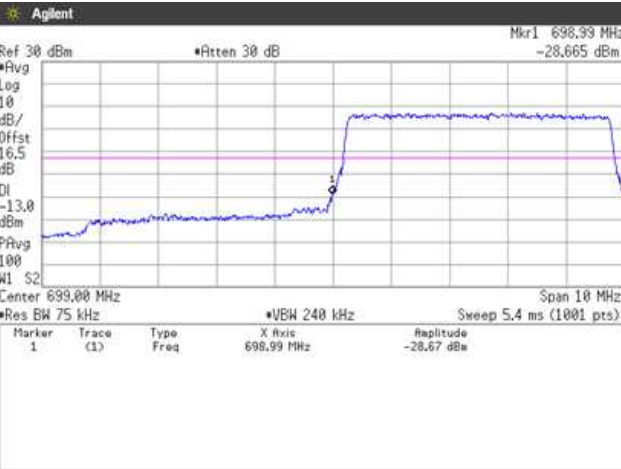
64QAM, BW 3MHz, RB1-0**Channel: Low****697.9-698.0 MHz****64QAM, BW 3MHz, RB1-14****Channel: High****746.0-746.1 MHz**

64QAM, BW 3MHz, RB15-0**Channel: Low****697.9-698.0 MHz****64QAM, BW 3MHz, RB15-0****Channel: High****746.0-746.1 MHz**

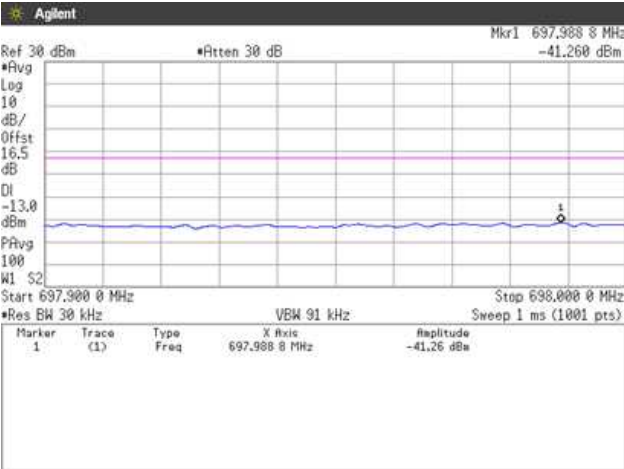
QPSK, BW 5MHz, RB1-0**Channel: Low****697.9-698.0 MHz****QPSK, BW 5MHz, RB1-24****Channel: High****746.0-746.1 MHz**

QPSK, BW 5MHz, RB25-0

Channel: Low

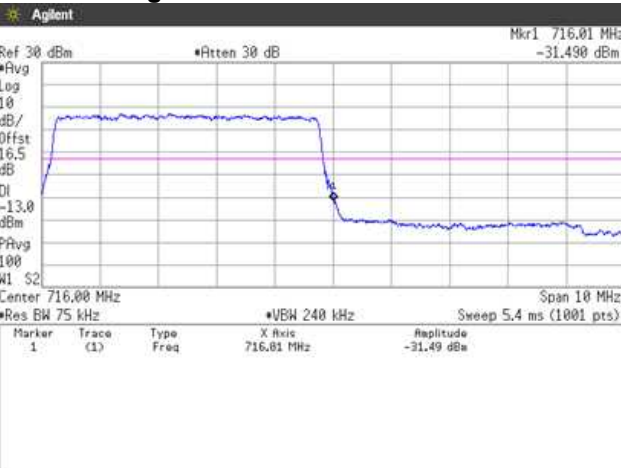


697.9-698.0 MHz

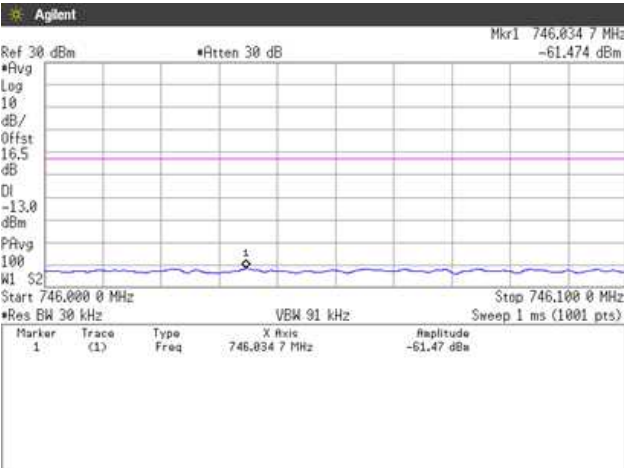


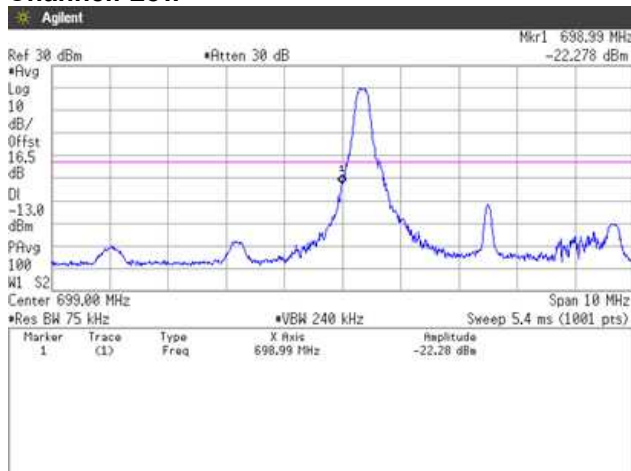
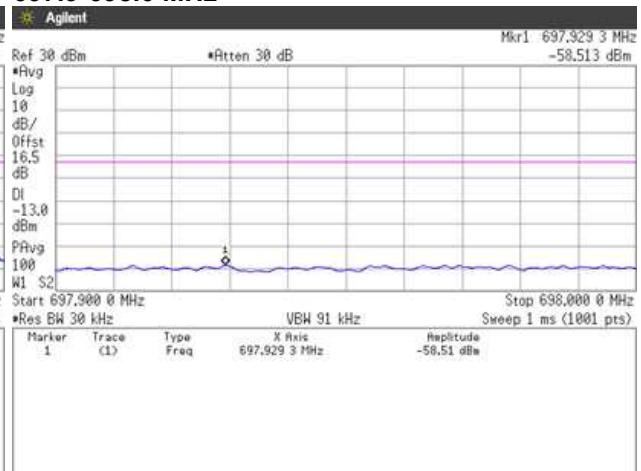
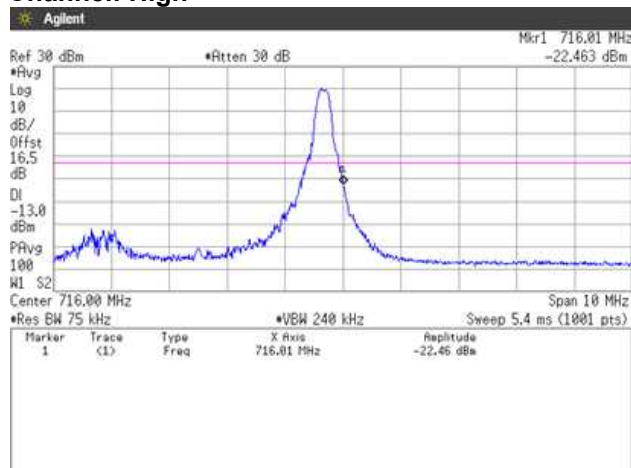
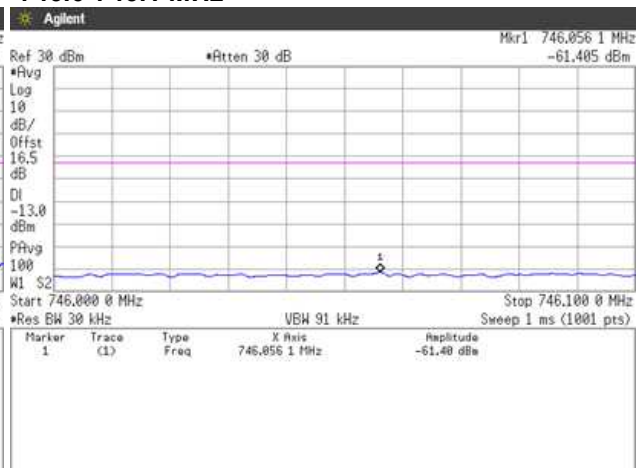
QPSK, BW 5MHz, RB25-0

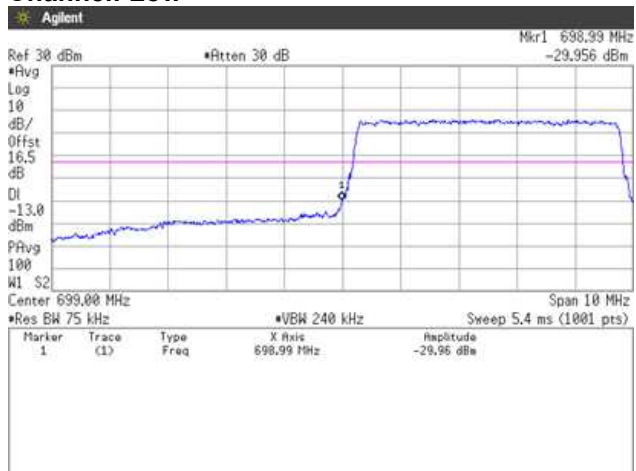
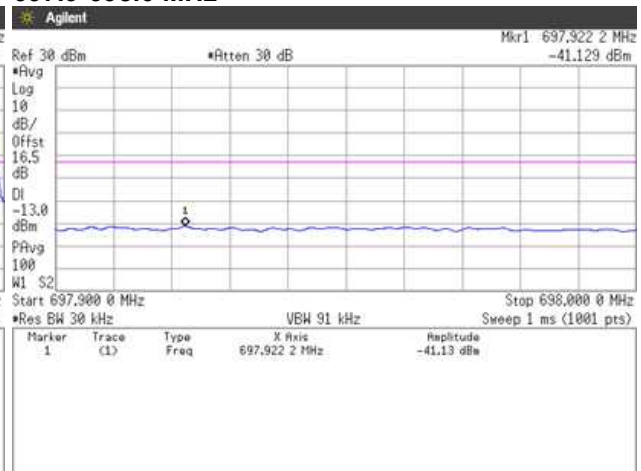
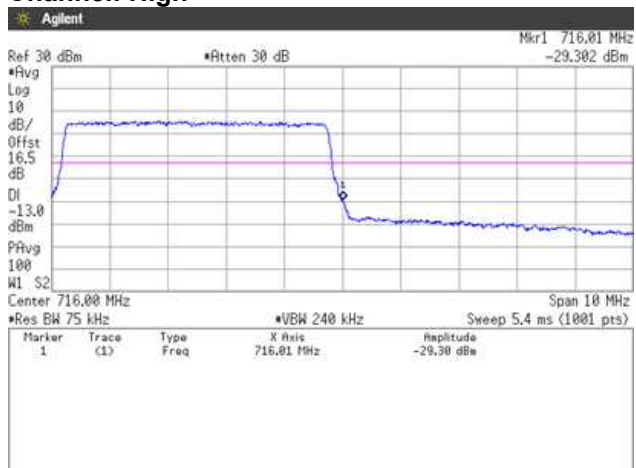
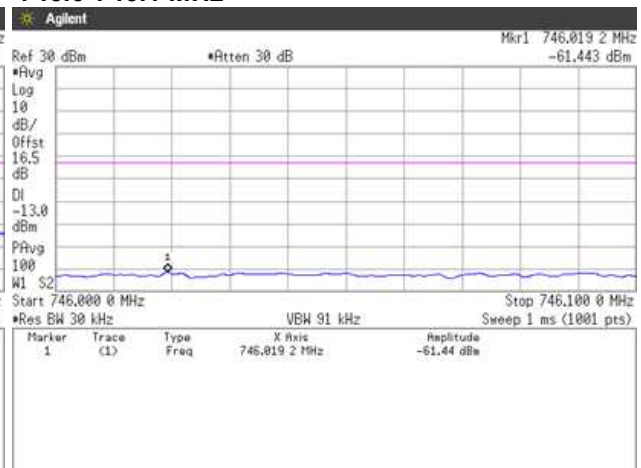
Channel: High

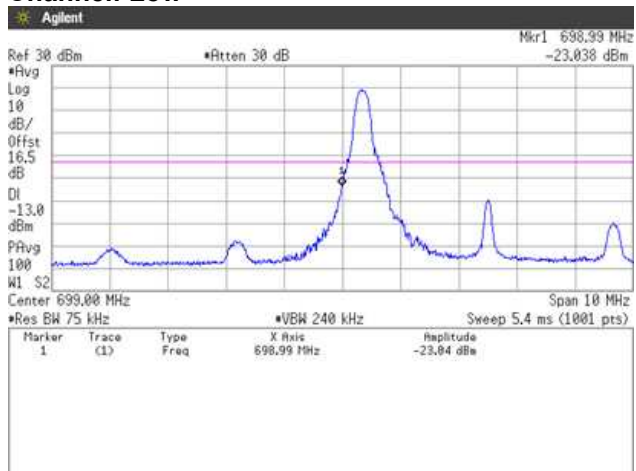
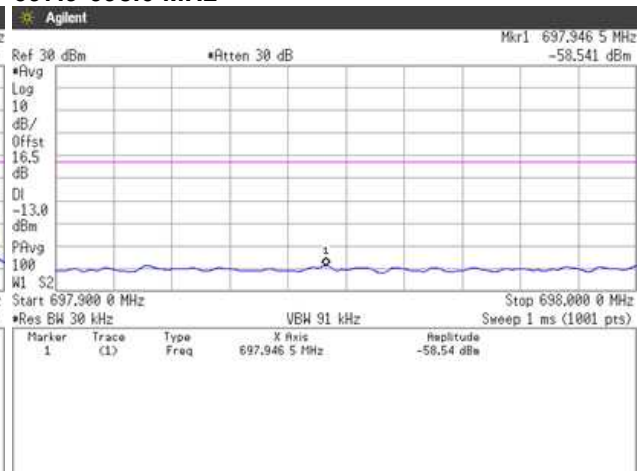
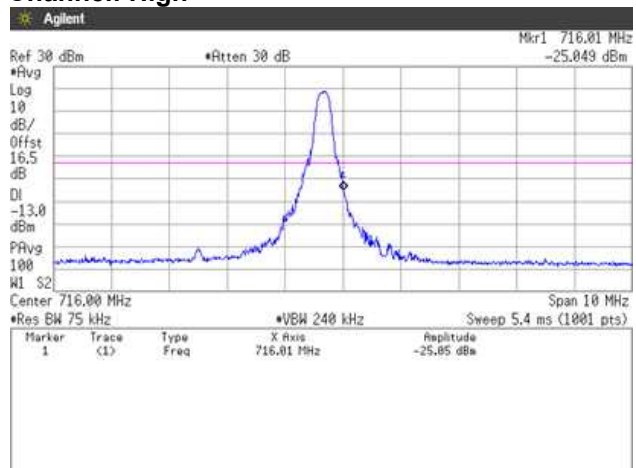
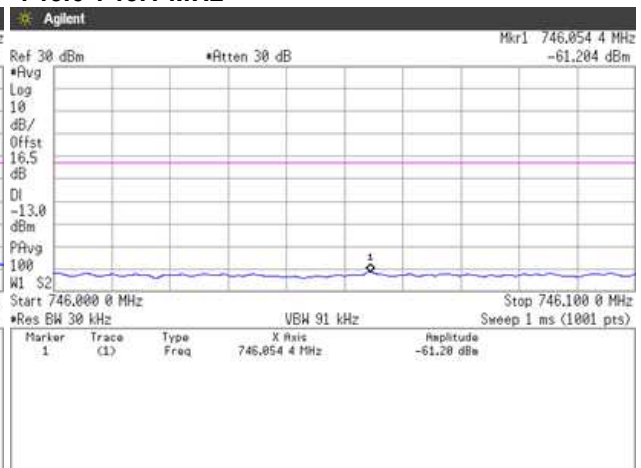


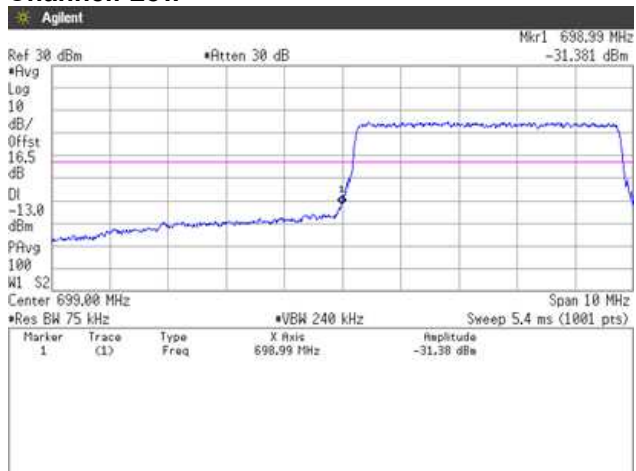
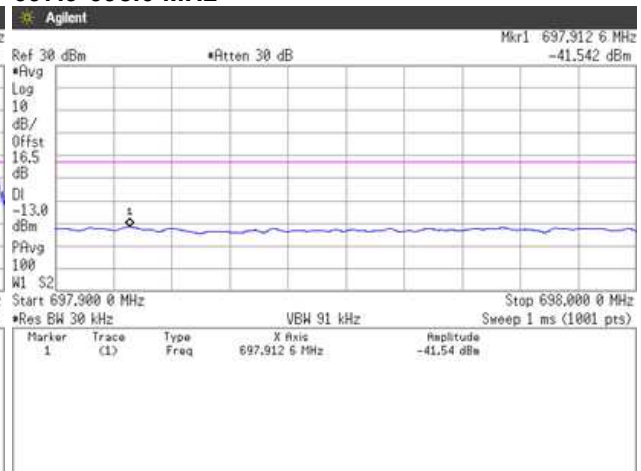
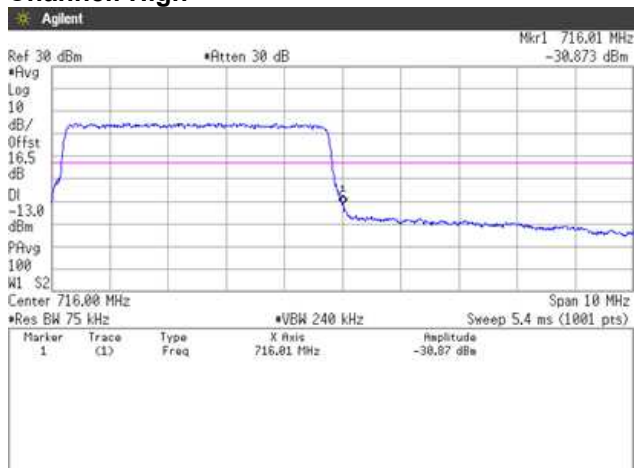
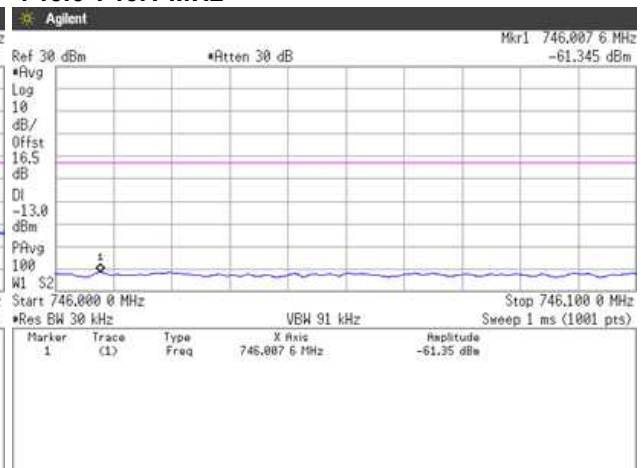
746.0-746.1 MHz

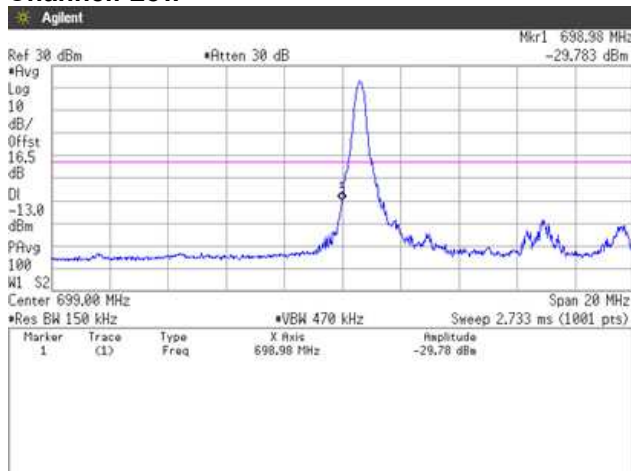
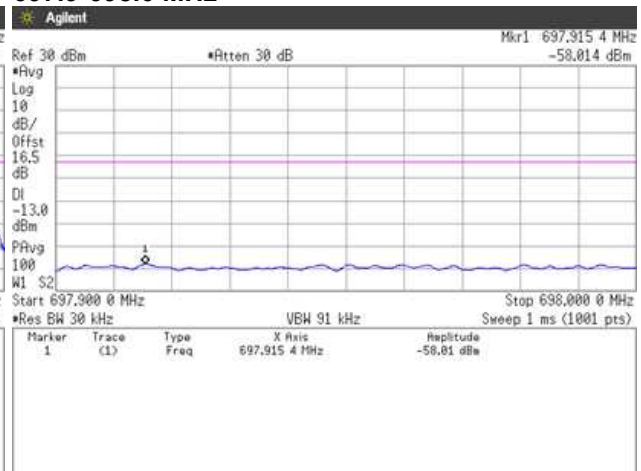
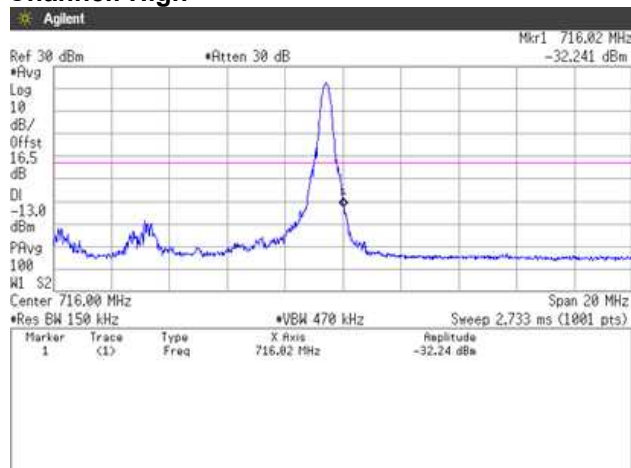
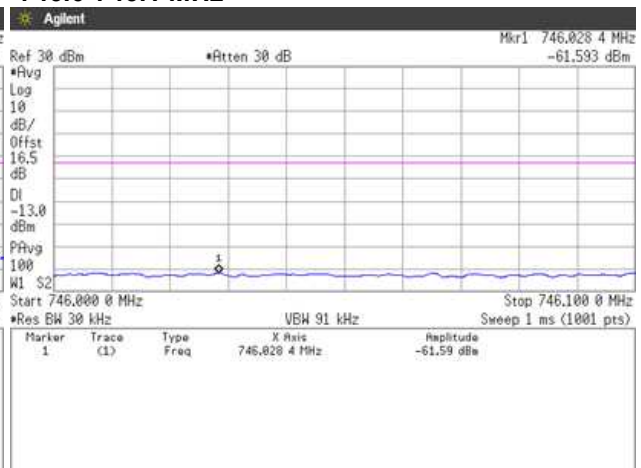


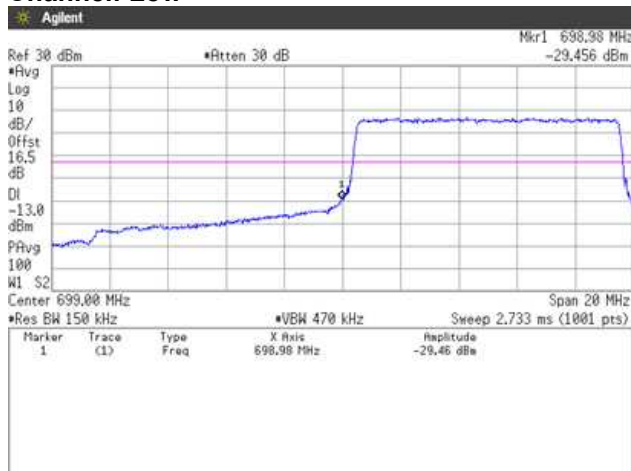
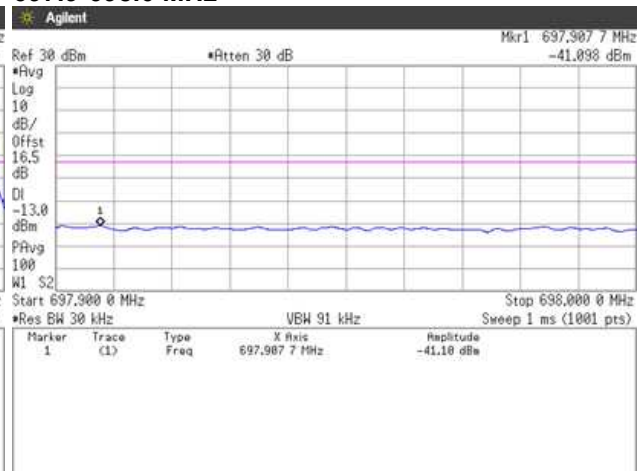
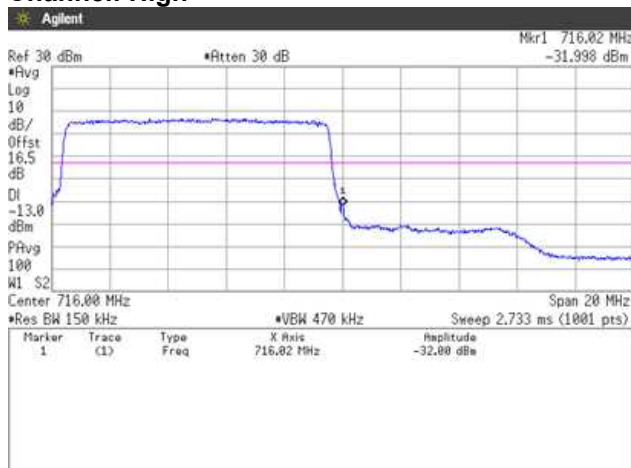
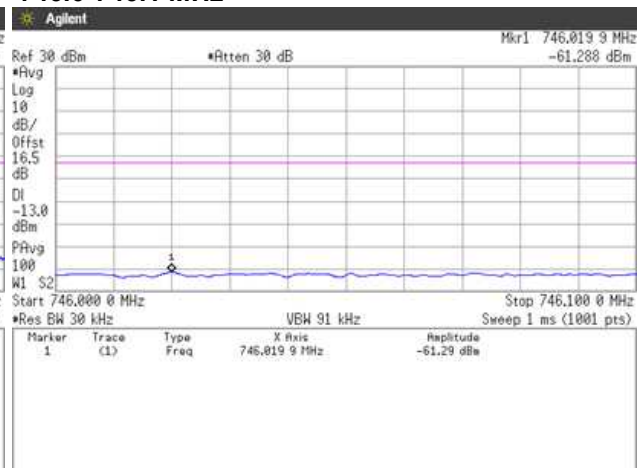
16QAM, BW 5MHz, RB1-0**Channel: Low****697.9-698.0 MHz****16QAM, BW 5MHz, RB1-24****Channel: High****746.0-746.1 MHz**

16QAM, BW 5MHz, RB25-0**Channel: Low****697.9-698.0 MHz****16QAM, BW 5MHz, RB25-0****Channel: High****746.0-746.1 MHz**

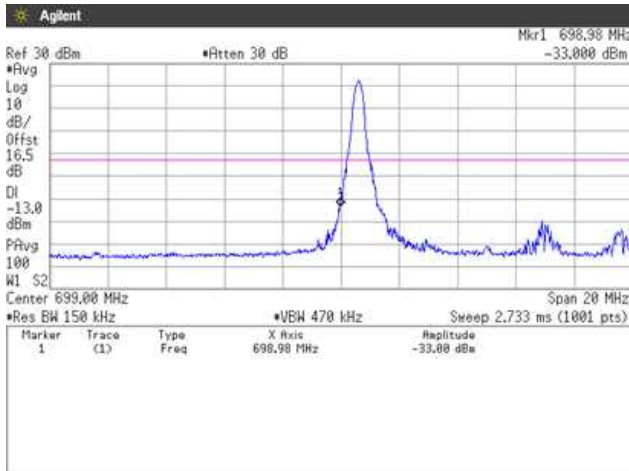
64QAM, BW 5MHz, RB1-0**Channel: Low****697.9-698.0 MHz****64QAM, BW 5MHz, RB1-24****Channel: High****746.0-746.1 MHz**

64QAM, BW 5MHz, RB25-0**Channel: Low****697.9-698.0 MHz****64QAM, BW 5MHz, RB25-0****Channel: High****746.0-746.1 MHz**

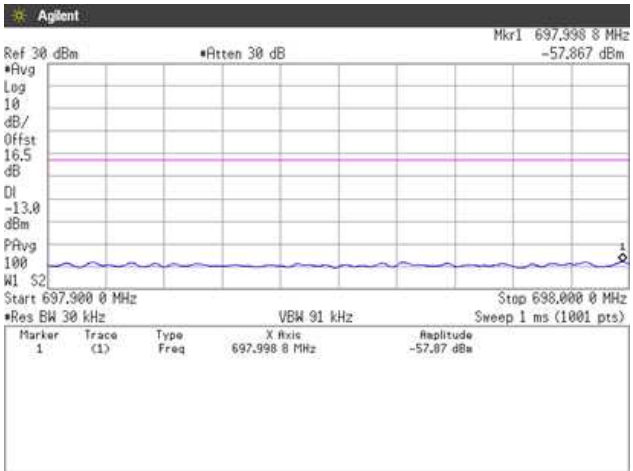
QPSK, BW 10MHz, RB1-0**Channel: Low****697.9-698.0 MHz****QPSK, BW 10MHz, RB1-49****Channel: High****746.0-746.1 MHz**

QPSK, BW 10MHz, RB50-0**Channel: Low****697.9-698.0 MHz****QPSK, BW 10MHz, RB50-0****Channel: High****746.0-746.1 MHz**

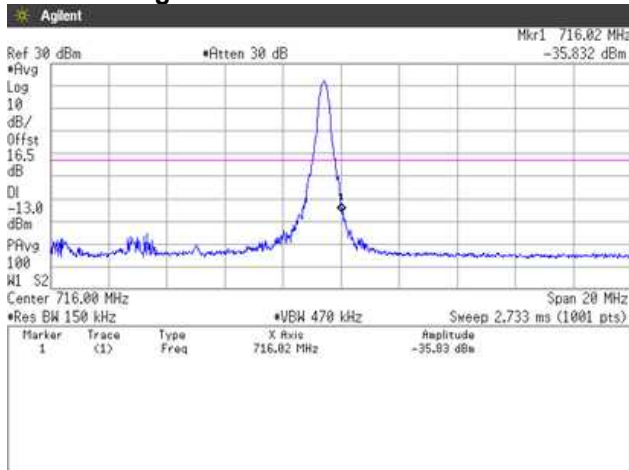
16QAM, BW 10MHz, RB1-0
Channel: Low



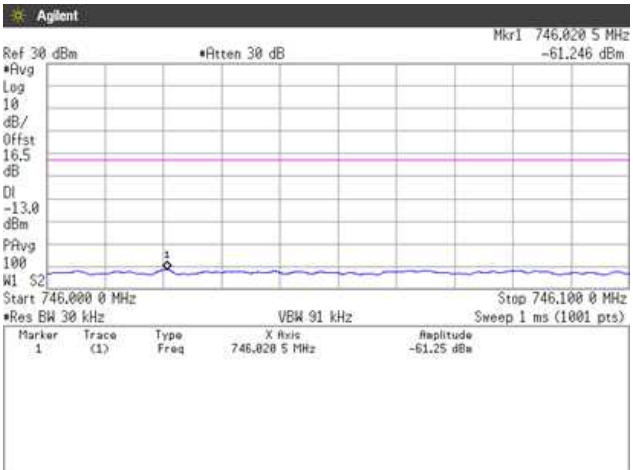
697.9-698.0 MHz



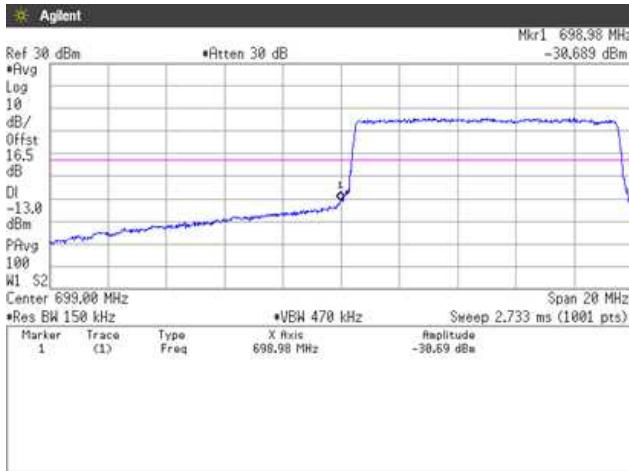
16QAM, BW 10MHz, RB1-49
Channel: High



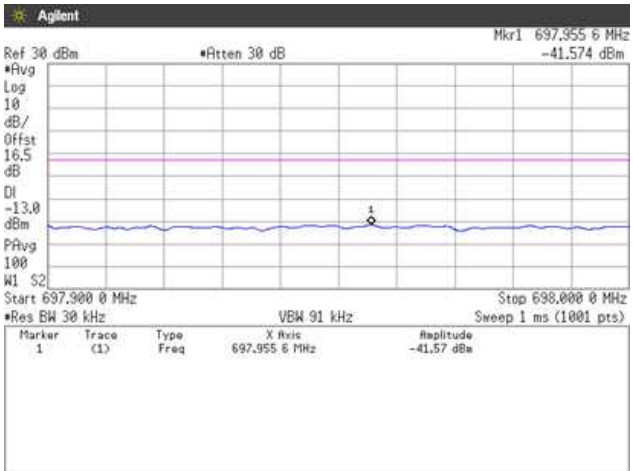
746.0-746.1 MHz



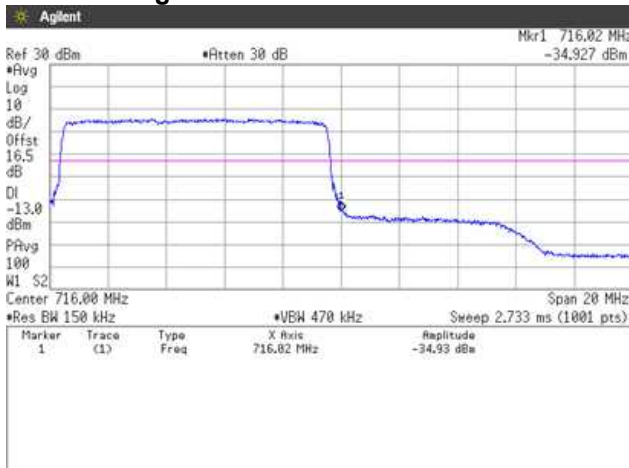
16QAM, BW 10MHz, RB50-0
Channel: Low



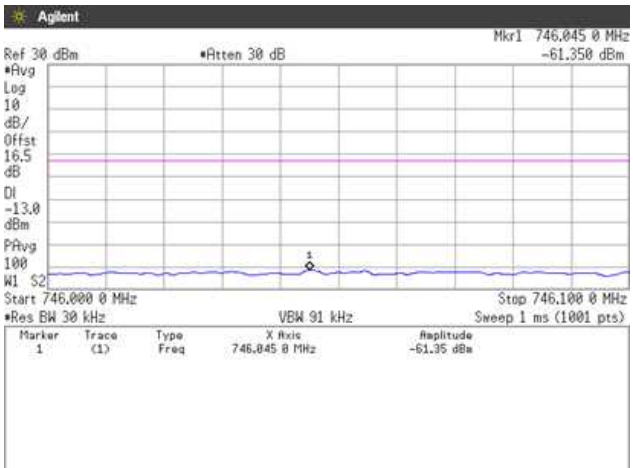
697.9-698.0 MHz

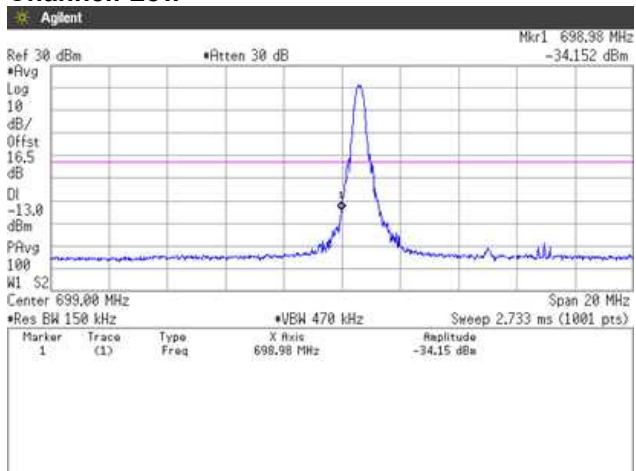
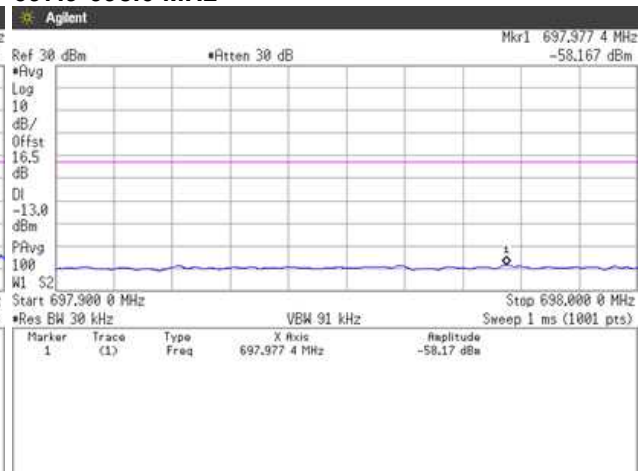
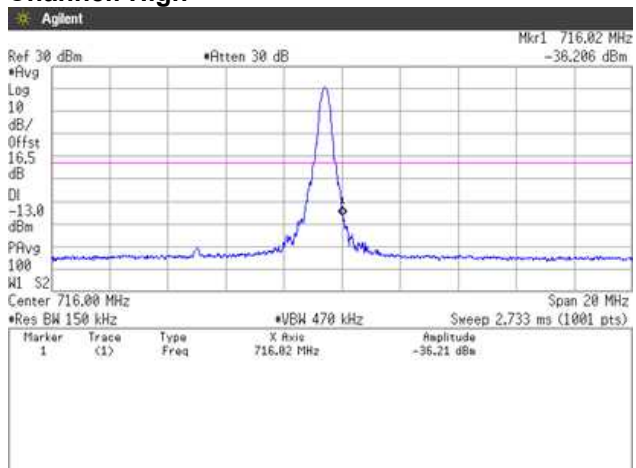
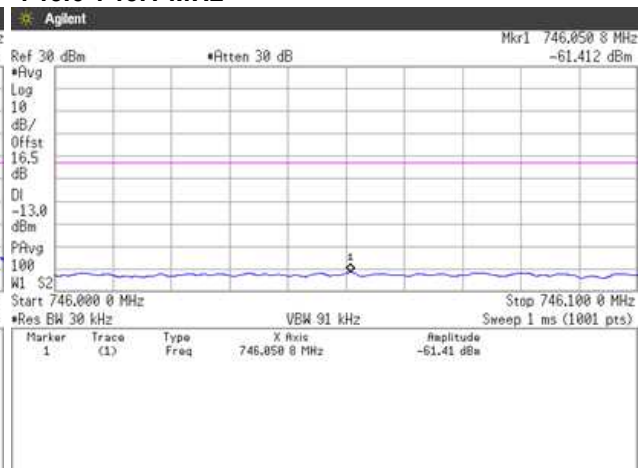


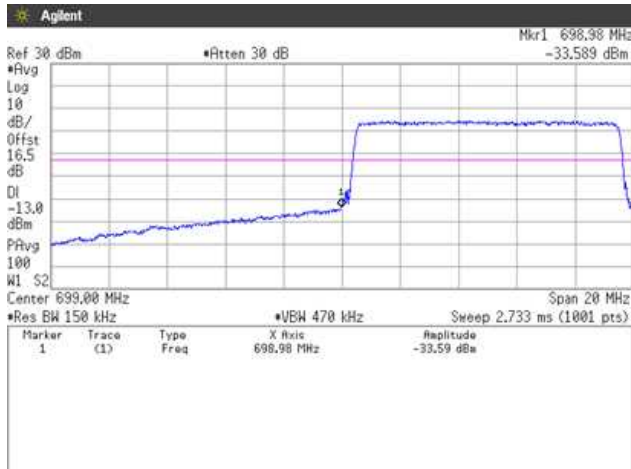
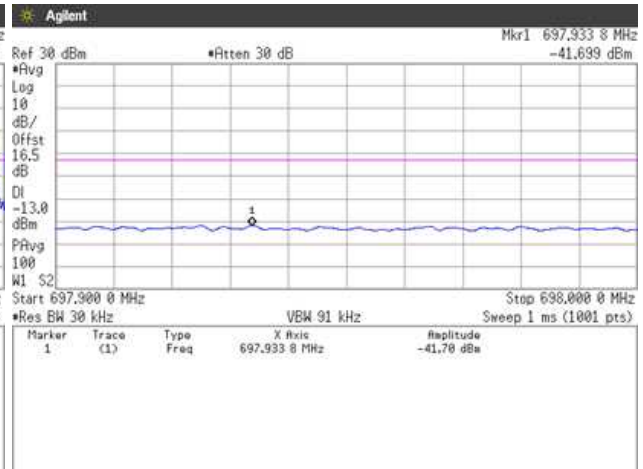
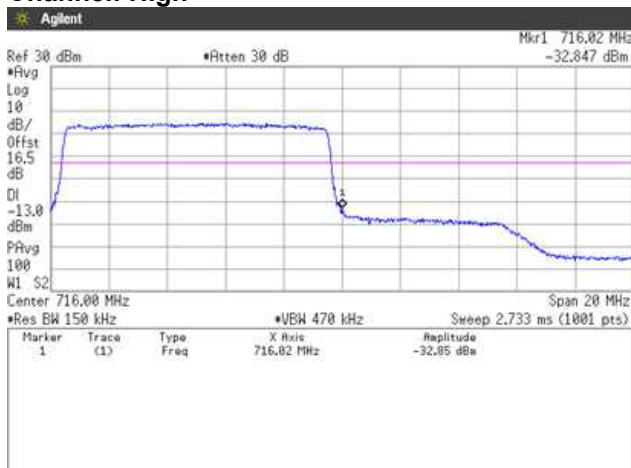
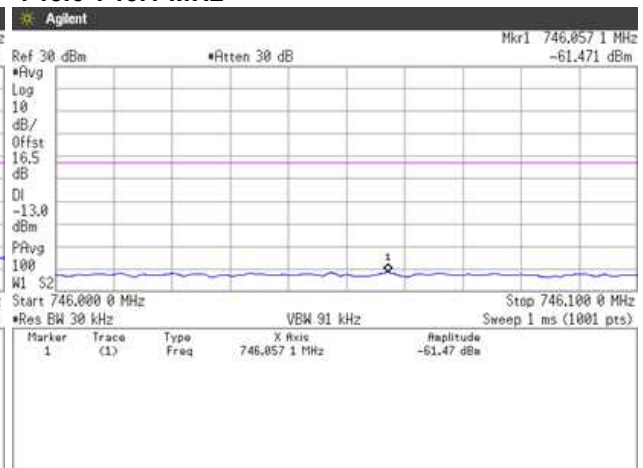
16QAM, BW 10MHz, RB50-0
Channel: High



746.0-746.1 MHz



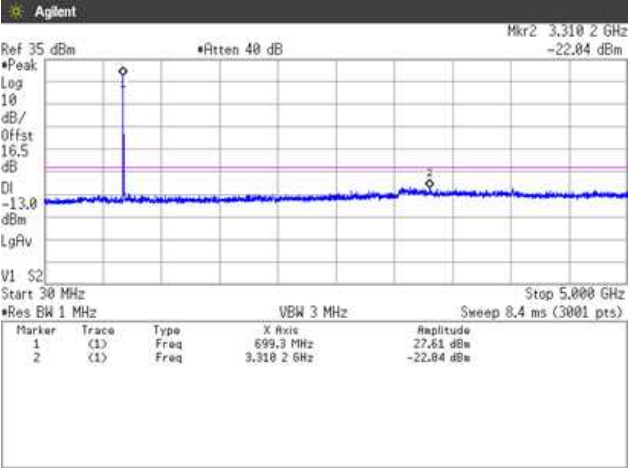
64QAM, BW 10MHz, RB1-0**Channel: Low****697.9-698.0 MHz****64QAM, BW 10MHz, RB1-49****Channel: High****746.0-746.1 MHz**

64QAM, BW 10MHz, RB50-0**Channel: Low****697.9-698.0 MHz****64QAM, BW 10MHz, RB50-0****Channel: High****746.0-746.1 MHz**

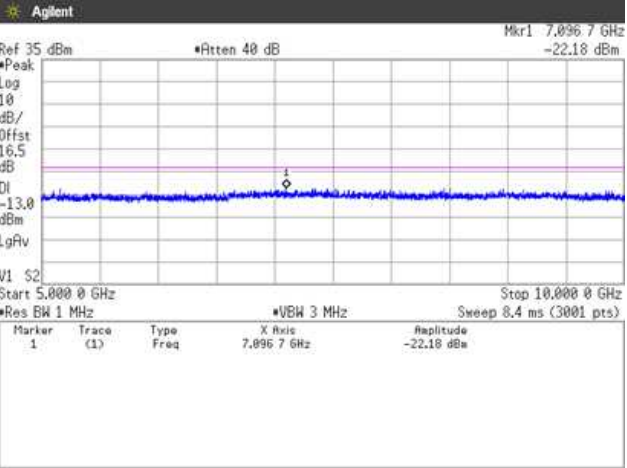
(Spurious Emissions)

Note: Conducted spurious test was measured in the worst case of conducted output power.

QPSK, BW 10MHz
Channel: 23060
30MHz-5GHz



5GHz-10GHz



4.5 Radiated Emissions and Harmonic Emissions

4.5.1 Measurement procedure

[FCC 27.53, 2.1053]

<Step 1>

The EUT and support equipment are placed on a 1 meter x 1 meter surface, 0.8 meter height styrene foam table. Radiated emission measurements are performed at 3 meter distance with the broadband antenna (Biconical antenna, Log periodic antenna and double ridged guide antenna). The antenna is positioned both the horizontal and vertical planes of polarization and height is varied 1 to 4 meters and stopped at height producing the maximum emission.

The bandwidth of the spectrum analyzer is set to 1 MHz. The turntable is rotated by 360 degrees and stopped at azimuth of producing the maximum emission. The frequency is investigated up to 20GHz.

<Step 2>

The substitution antenna is replaced by the transmitter antenna (EUT).

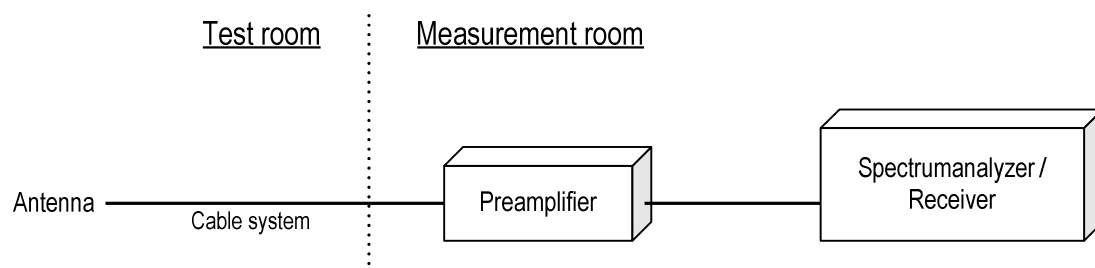
The frequency of the signal generator is adjusted to the measurement frequency.

Level of the signal generator is adjusted to the level that is obtained from step 1, and record the emission level of signal generator.

The spectrum analyzer is set to;

- a) RBW = 100 kHz for below 1GHz and 1MHz for above 1GHz / VBW $\geq 3 \times$ RBW
- b) Detector = Peak
- c) Trace mode = Max hold
- d) Sweep time = auto-couple

- Test configuration



4.5.2 Calculation method

Result (EIRP) = Ant. Input - Cable loss + Antenna Gain

Margin = Limit – Result (EIRP)

Example:

Limit @ 3465.0 MHz : -13.0 dBm

Ant. Input = -50.7 dBm Cable loss = 1.6 dB Ant. Gain = 9.1 dBi

Result = -50.7 - 1.6 + 9.1 = -43.2 dBm

Margin = -13.0 - (-43.2) = 30.2 dB

4.5.3 Limit

-13 dBm or less

4.5.4 Test data

Date : 8-December-2020
Temperature : 22.8 [°C]
Humidity : 32.3 [%]
Test place : 3m Semi-anechoic chamber

Test engineer : Chiaki Kanno

Date : 11-December-2020
Temperature : 22.6 [°C]
Humidity : 37.0 [%]
Test place : 3m Semi-anechoic chamber

Test engineer : Chiaki Kanno

**[LTE Band XII]
QPSK, BW 1.4MHz
Channel: 23017**

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1399.4	-56.0	-54.7	1.0	4.6	-51.1	-13.0	38.1

Channel: 23095

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1415.0	-56.2	-55.4	1.0	4.7	-51.6	-13.0	38.6

Channel: 23173

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1430.6	-56.2	-55.0	1.0	4.9	-51.1	-13.0	38.1

**16QAM, BW 1.4MHz
Channel: 23017**

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1399.4	-56.3	-55.0	1.0	4.6	-51.4	-13.0	38.4

Channel: 23095

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1415.0	-56.6	-55.8	1.0	4.7	-52.0	-13.0	39.0

Channel: 23173

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1430.6	-56.5	-55.3	1.0	4.9	-51.4	-13.0	38.4

**64QAM, BW 1.4MHz
Channel: 23017**

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1399.4	-56.5	-55.2	1.0	4.6	-51.6	-13.0	38.6

Channel: 23095

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1415.0	-56.4	-55.6	1.0	4.7	-51.8	-13.0	38.8

Channel: 23173

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1430.6	-56.3	-55.1	1.0	4.9	-51.2	-13.0	38.2

QPSK, BW 3MHz**Channel: 23025**

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1401.0	-56.1	-55.1	1.0	4.6	-51.5	-13.0	38.5

Channel: 23095

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1415.0	-56.5	-55.7	1.0	4.7	-51.9	-13.0	38.9

Channel: 23165

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1429.0	-56.4	-55.1	1.0	4.9	-51.2	-13.0	38.2

16QAM, BW 3MHz**Channel: 23025**

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1401.0	-56.4	-55.4	1.0	4.6	-51.8	-13.0	38.8

Channel: 23095

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1415.0	-56.6	-55.8	1.0	4.7	-52.0	-13.0	39.0

Channel: 23165

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1429.0	-56.5	-55.2	1.0	4.9	-51.3	-13.0	38.3

64QAM, BW 3MHz**Channel: 23025**

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1401.0	-56.4	-55.4	1.0	4.6	-51.8	-13.0	38.8

Channel: 23095

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1415.0	-56.4	-55.6	1.0	4.7	-51.8	-13.0	38.8

Channel: 23165

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1429.0	-56.7	-55.4	1.0	4.9	-51.5	-13.0	38.5

QPSK, BW 5MHz**Channel: 23035**

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1403.0	-56.4	-55.2	1.0	4.6	-51.6	-13.0	38.6

Channel: 23095

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1415.0	-56.0	-55.2	1.0	4.7	-51.4	-13.0	38.4

Channel: 23155

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1427.0	-56.4	-55.3	1.0	4.9	-51.4	-13.0	38.4

16QAM, BW 5MHz**Channel: 23035**

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1403.0	-56.3	-55.1	1.0	4.6	-51.5	-13.0	38.5

Channel: 23095

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1415.0	-56.4	-55.6	1.0	4.7	-51.8	-13.0	38.8

Channel: 23155

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1427.0	-56.6	-55.5	1.0	4.9	-51.6	-13.0	38.6

64QAM, BW 5MHz**Channel: 23035**

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1403.0	-56.6	-55.4	1.0	4.6	-51.8	-13.0	38.8

Channel: 23095

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1415.0	-56.5	-55.7	1.0	4.7	-51.9	-13.0	38.9

Channel: 23155

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1427.0	-56.7	-55.6	1.0	4.9	-51.7	-13.0	38.7

QPSK, BW 10MHz**Channel: 23060**

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1408.0	-56.2	-55.8	1.0	4.7	-52.1	-13.0	39.1

Channel: 23095

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1415.0	-56.3	-55.5	1.0	4.7	-51.7	-13.0	38.7

Channel: 23130

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1422.0	-56.2	-55.5	1.0	4.8	-51.7	-13.0	38.7

16QAM, BW 10MHz**Channel: 23060**

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1408.0	-56.0	-55.6	1.0	4.7	-51.9	-13.0	38.9

Channel: 23095

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1415.0	-56.3	-55.5	1.0	4.7	-51.7	-13.0	38.7

Channel: 23130

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1422.0	-56.4	-55.7	1.0	4.8	-51.9	-13.0	38.9

64QAM, BW 10MHz**Channel: 23060**

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1408.0	-56.4	-56.0	1.0	4.7	-52.3	-13.0	39.3

Channel: 23095

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1415.0	-56.6	-55.8	1.0	4.7	-52.0	-13.0	39.0

Channel: 23130

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1422.0	-56.4	-55.7	1.0	4.8	-51.9	-13.0	38.9

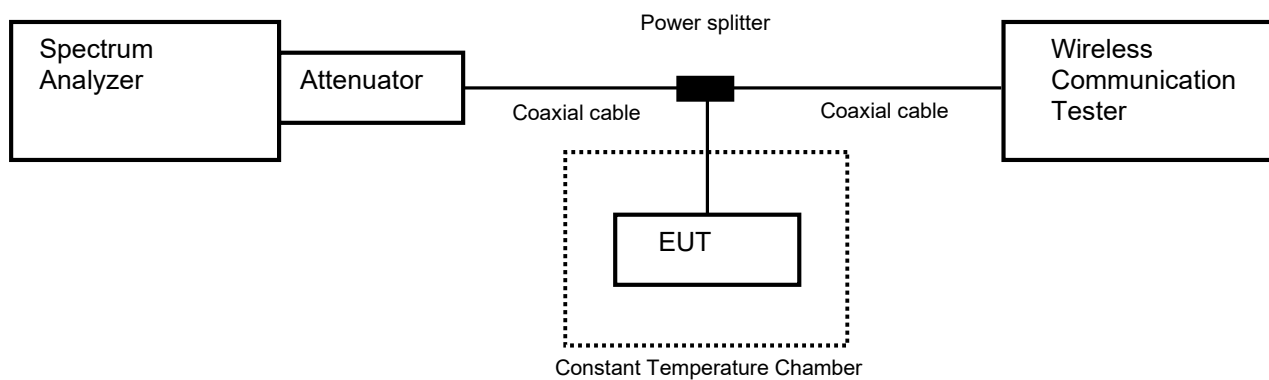
4.6 Frequency Stability

4.6.1 Measurement procedure

[FCC 27.54, 2.1055]

The EUT was placed of an inside of an constant temperature chamber as the temperature in the chamber was varied between -30°C and +50°C. The temperature was incremented by 10°C intervals and the unit was allowed to stabilize at each measurement. The frequency drift was measured with the normal Temperature and voltage tolerance and it is presented as the ppm unit.

- Test configuration



4.6.2 Limit

±2.5 ppm

4.6.3 Measurement result

Date : 13-January-2021
Temperature : 21.9 [°C]
Humidity : 31.2 [%]
Test place : Shielded room No.4

Test engineer : Taiki Watanabe

**[LTE Band XII]
QPSK, BW 10MHz
Channel: 23095**

Limit: $\pm 0.00025\% = \pm 2.5\text{ppm}$					
Power Supply	Temperature	Measurements Frequency	Frequency Tolerance	Limit	Result
[V]	[°C]	[Hz]	[ppm]	[ppm]	
3.85	25(Ref.)	707,500,002	0.00000	± 2.5	Pass
	50	707,500,003	0.00052	± 2.5	Pass
	40	707,499,995	-0.01001	± 2.5	Pass
	30	707,500,003	0.00141	± 2.5	Pass
	20	707,500,005	0.00457	± 2.5	Pass
	10	707,500,005	0.00348	± 2.5	Pass
	0	707,500,004	0.00226	± 2.5	Pass
	-10	707,500,006	0.00469	± 2.5	Pass
	-20	707,500,003	0.00180	± 2.5	Pass
	-30	707,499,993	-0.01319	± 2.5	Pass
3.27	25	707,499,994	-0.01187	± 2.5	Pass
4.43	25	707,499,996	-0.00831	± 2.5	Pass

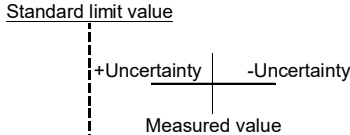
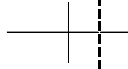
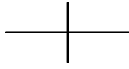
Calculation;

Frequency Tolerance (ppm) = $\frac{\text{Measurements Frequency (Hz)} - \text{Reference Frequency (Hz)}}{\text{Reference Frequency (Hz)}} \times 1000000$

5 Measurement Uncertainty

Expanded uncertainties stated are calculated with a coverage Factor $k=2$.
Please note that these results are not taken into account when measurement uncertainty considerations contained in ETSI TR 100 028 Parts 1 and 2 determining compliance or non-compliance with test result.

Test item	Measurement uncertainty
Conducted emission, AMN (9 kHz – 150 kHz)	± 3.7 dB
Conducted emission, AMN (150 kHz – 30 MHz)	± 3.3 dB
Radiated emission (9kHz – 30 MHz)	± 3.7 dB
Radiated emission (30 MHz – 1000 MHz)	± 5.3 dB
Radiated emission (1 GHz – 6 GHz)	± 4.4 dB
Radiated emission (6 GHz – 18 GHz)	± 4.7 dB
Radiated emission (18 GHz – 40 GHz)	± 5.8 dB
Radio Frequency	$\pm 1.4 \cdot 10^{-8}$
RF power, conducted	± 0.8 dB
Temperature	± 0.6 °C
Humidity	± 1.2 %
Voltage (DC)	± 0.4 %
Voltage (AC, <10kHz)	± 0.2 %

Judge	Measured value and standard limit value	
PASS	Case1  Even if it takes uncertainty into consideration, a standard limit value is fulfilled.	
	Case2  Although measured value is in a standard limit value, a limit value won't be fulfilled if uncertainty is taken into consideration.	
FAIL	Case3  Although measured value exceeds a standard limit value, a limit value will be fulfilled if uncertainty is taken into consideration.	
	Case4  Even if it takes uncertainty into consideration, a standard limit value isn't fulfilled.	

6 Laboratory Information

Testing was performed and the report was issued at:

TÜV SÜD Japan Ltd. Yonezawa Testing Center

Address: 5-4149-7 Hachimanpara, Yonezawa-shi, Yamagata, 992-1128 Japan
Phone: +81-238-28-2881
Fax: +81-238-28-2888

Accreditation and Registration

A2LA

Certificate #3686.03

VLAC

Accreditation No.: VLAC-013

BSMI

Laboratory Code: SL2-IN-E-6018, SL2-A1-E-6018

Innovation, Science and Economic Development Canada
ISED#: 4224A

VCCI Council

Registration number	Expiration date
A-0166	03-July-2021

Appendix A. Test Equipment

Antenna port conducted test

Equipment	Company	Model No.	Serial No.	Cal. Due	Cal. Date
Spectrum analyzer	Agilent Technologies	E4440A	US44302655	31-Aug-2021	20-Aug-2020
Attenuator	Weinschel	56-10	J4180	31-Jul-2021	21-Jul-2020
Microwave cable	HUBER+SUHNER	SUCOFLEX104/1m	199120/4	31-Dec-2021	14-Dec-2020
Microwave cable	HUBER+SUHNER	SUCOFELX102/2m	802897/2	31-Dec-2021	14-Dec-2020
Power divider	ANRITSU	K240B	020205	31-Jul-2021	21-Jul-2020
Wideband Radio Frequency Tester	ROHDE&SCHWARZ	CMW500	126079	31-Oct-2021	21-Oct-2020
Wideband Radio Frequency Tester	ROHDE&SCHWARZ	CMW500	116338	30-Sep-2021	02-Sep-2020
Temperature and humidity chamber	ESPEC	PL1KP	14007261	30-Sep-2021	02-Sep-2020

Radiated emission

Equipment	Company	Model No.	Serial No.	Cal. Due	Cal. Date
EMI Receiver	ROHDE&SCHWARZ	ESCI	100765	30-Sep-2021	28-Sep-2020
Spectrum analyzer	Agilent Technologies	E4440A	US40420937	31-Dec-2021	11-Dec-2020
Spectrum analyzer	Agilent Technologies	E4440A	US44302655	31-Aug-2021	20-Aug-2020
Preamplifier	SONOMA	310	372170	30-Sep-2021	29-Sep-2020
Biconical antenna	Schwarzbeck	VHBB9124/BBA9106	1344	31-Dec-2020	04-Dec-2019
Log periodic antenna	Schwarzbeck	VUSLP9111B	344	30-Apr-2021	17-Apr-2020
Attenuator	TAMAGAWA.ELEC	CFA-01/6dB	N/A(S275)	30-Jun-2021	04-Jun-2020
Attenuator	TAMAGAWA.ELEC	CFA-10/3dB	N/A(S503)	31-Jul-2021	20-Jul-2020
Preamplifier	TSJ	MLA-100M18-B02-40	1929118	31-Jan-2021	08-Jan-2020
Attenuator	AEROFLEX	26A-10	081217-08	31-Jan-2021	10-Jan-2020
Double ridged guide antenna	ETS LINDGREN	3117	00052315	30-Apr-2021	08-Apr-2020
Attenuator	HUBER+SUHNER	6803.17.B	N/A(2341)	31-Dec-2020	18-Dec-2019
Double ridged guide antenna	A.H.Systems Inc.	SAS-574	469	30-Sep-2021	02-Sep-2020
Preamplifier	TSJ	MLA-1840-B03-35	1240332	30-Sep-2021	02-Sep-2020
Band rejection filter	Micro-Tronics	BRC50719	014	31-Dec-2020	18-Dec-2019
Signal generator	ROHDE&SCHWARZ	SMB100A	177525	31-Jul-2021	14-Jul-2020
RF power amplifier	R&K	CGA020M602-2633R	B40240	31-May-2021	15-May-2020
Microwave cable	HUBER+SUHNER	SUCOFELX102/2m	31648	31-Mar-2021	26-Mar-2020
Double ridged guide antenna	ETS LINDGREN	3117	00218815	31-Dec-2021	07-Dec-2020
Wideband Radio Frequency Tester	ROHDE&SCHWARZ	CMW500	126079	31-Oct-2021	21-Oct-2020
Wideband Radio Frequency Tester	ROHDE&SCHWARZ	CMW500	116338	30-Sep-2021	02-Sep-2020
Microwave cable	HUBER+SUHNER	SUCOFLEX104/9m	MY30037/4	31-Jan-2021	08-Jan-2020
		SUCOFLEX104/1m	my24610/4	31-Jan-2021	08-Jan-2020
		SUCOFLEX104/8m	SN MY30031/4	31-Jan-2021	09-Jan-2020
		SUCOFLEX104	MY32976/4	31-Jan-2021	08-Jan-2020
		SUCOFLEX104/1.5m	SN MY19309/4	31-Jan-2021	08-Jan-2020
		SUCOFLEX104/7m	41625/6	31-Jan-2021	08-Jan-2020
PC	DELL	DIMENSION E521	75465BX	N/A	N/A
Software	TOYO Corporation	EP5/RE-AJ	0611193/V5.6.0	N/A	N/A
Absorber	RIKEN	PFP30	N/A	N/A	N/A
3m Semi an-echoic Chamber	TOKIN	N/A	N/A(9002-NSA)	31-May-2021	29-May-2020
3m Semi an-echoic Chamber	TOKIN	N/A	N/A(9002-SVSWR)	31-May-2021	28-May-2020

*: The calibrations of the above equipment are traceable to NIST or equivalent standards of the reference organizations.