

TEST REPORT

Applicant : SHARP CORPORATION, Consumer Electronics Company,
Communication Systems Division

Address : 2-13-1, Iida Hachihonmatsu, Higashi-Hiroshima City, Hiroshima,
739-0192, Japan

Products : Smart Phone

Model No. : 506SH

Serial No. : 004401/11/570737/0
004401/11/570738/8

FCC ID : APYHRO00233

Test Standard : CFR 47 FCC Rules and Regulations Part 27

Test Results : **Passed**

Date of Test : March 21 ~ April 7, 2016



A handwritten signature in black ink, appearing to read 'K. Shibata'.

Kousei Shibata

Manager

Japan Quality Assurance Organization

KITA-KANSAI Testing Center

SAITO EMC Branch

7-3-10, Saito-asagi, Ibaraki-shi, Osaka 567-0085, Japan

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- The measurement values stated in Test Report was made with traceable to National Institute of Advanced Industrial Science and Technology (AIST) of Japan and National Institute of Information and Communications Technology (NICT) of Japan.
 - The applicable standard, testing condition and testing method which were used for the tests are based on the request of the applicant.
 - The test results presented in this report relate only to the offered test sample.
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 - VLAC does not approve, certify or warrant the product by this test report.

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DEFINITIONS FOR ABBREVIATION AND SYMBOLS USED IN THIS TEST REPORT

EUT : Equipment Under Test

AE : Associated Equipment

N/A : Not Applicable

N/T : Not Tested

EMC : Electromagnetic Compatibility

EMI : Electromagnetic Interference

EMS : Electromagnetic Susceptibility

☒ - indicates that the listed condition, standard or equipment is applicable for this report.

☐ - indicates that the listed condition, standard or equipment is not applicable for this report.

1 Description of the Equipment Under Test

1. Manufacturer : SHARP CORPORATION, Consumer Electronics Company,
Communication Systems Division
2-13-1, Iida Hachihonmatsu, Higashi-Hiroshima City, Hiroshima,
739-0192, Japan
2. Products : Smart Phone
3. Model No. : 506SH
4. Serial No. : 004401/11/570737/0
004401/11/570738/8
5. Product Type : Pre-production
6. Date of Manufacture : February, 2016
7. Power Rating : 4.0VDC (Lithium-ion Battery UBATIA269AFN1 3000mAh)
8. Grounding : None
9. Transmitting Frequency : Band 4 (1710 MHz – 1755 MHz)
10. Receiving Frequency : Band 4 (2110 MHz – 2155 MHz)
11. Emission Designations :

BW (MHz)	QPSK	16QAM
1.4	1M08G7D	1M08D7W
3	2M69G7D	2M68D7W
5	4M48G7D	4M47D7W
10	8M94G7D	8M94D7W
15	13M4G7D	13M4D7W
20	17M9G7D	17M8D7W

12. Max. RF Output Power :

BW (MHz)	QPSK (W ERP)	16QAM (W ERP)
1.4	0.174	0.141
3	0.182	0.148
5	0.178	0.145
10	0.174	0.145
15	0.166	0.138
20	0.170	0.141

13. Category : LTE FDD (Band 4)

14. EUT Authorization : Certification

15. Received Date of EUT : March 18, 2016

16. Channel Plan

The carrier spacing is 100 kHz.

The carrier frequency is designated by the absolute frequency channel number (ARFCN).

The carrier frequency is expressed in the equation shown as follows:

Transmitting Frequency (in MHz) = $1710.7 + 0.1 \times (n - 19957)$

where, n : channel number ($19957 \leq n \leq 20393$)

Receiving Frequency (in MHz) = $2110.7 + 0.1 \times (n - 1957)$

where, n : channel number ($1957 \leq n \leq 2393$)

2 Summary of Test Results

Applied Standard : CFR 47 FCC Rules and Regulations Part 27

Subpart L — 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 2110-2155 MHz, 2155-2180 MHz, 2180-2200 MHz Bands

The EUT described in clause 1 was tested according to the applied standard shown above.

Details of the test configuration is shown in clause 6.

The conclusion for the test items of which are required by the applied standard is indicated under the test result.

☒ - The test result was **passed** for the test requirements of the applied standard.

☐ - The test result was **failed** for the test requirements of the applied standard.

☐ - The test result was **not judged** the test requirements of the applied standard.

In the approval of test results,

- Determining compliance with the limits in this report was based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
- No deviations were employed from the applied standard.
- No modifications were conducted by JQA to achieve compliance to the limitations.

Reviewed by:

Tested by:



Shigeru Kinoshita
Assistant Manager
JQA KITA-KANSAI Testing Center
SAITO EMC Branch



Shigeru Osawa
Deputy Manager
JQA KITA-KANSAI Testing Center
SAITO EMC Branch

3 Test Procedure

Test Requirements : CFR 47 FCC Rules and Regulations Part 2
§2.1046, §2.1047, §2.1049, §2.1051, §2.1053, §2.1055 and §2.1057

Test Procedure : ANSI C63.4–2014, ANSI/TIA–603-D-2010
FCC KDB 971168 D01 Power Meas License Digital Systems v02r02,
released October 17, 2014

4 Test Location

Japan Quality Assurance Organization (JQA)
KITA-KANSAI Testing Center
7-7, Ishimaru, 1-chome, Minoh-shi, Osaka, 562-0027, Japan
SAITO EMC Branch
7-3-10, Saito-asagi, Ibaraki-shi, Osaka 567-0085, Japan

5 Recognition of Test Laboratory

JQA KITA-KANSAI Testing Center SAITO EMC Branch is accredited under ISO/IEC 17025 by following accreditation bodies and the test facility is registered by the following bodies.

VLAC Accreditation No. : VLAC-001-2 (Expiry date : March 30, 2018)
VCCI Registration No. : A-0002 (Expiry date : March 30, 2018)
BSMI Registration No. : SL2-IS-E-6006, SL2-IN-E-6006, SL2-R1/R2-E-6006, SL2-A1-E-6006
(Expiry date : September 14, 2016)
IC Registration No. : 2079E-3, 2079E-4 (Expiry date : July 16, 2017)

Accredited as conformity assessment body for Japan electrical appliances and material law by METI.
(Expiry date : February 22, 2019)

6 Description of Test Setup

6.1 Test Configuration

The equipment under test (EUT) consists of :

	Item	Manufacturer	Model No.	Serial No.	FCC ID
A	Smart Phone	Sharp	506SH	004401/11/570737/0 *1) 004401/11/570738/8 *2)	APYHRO00233
B	AC Adapter	Sharp	SHCEJ1	--	N/A
C	Earphone	Softbank	ZTCAA1	--	N/A
D	DTV Antenna	Sharp	--	--	N/A

*1) Used for Field Strength of Spurious Emission

*2) Used for Antenna Conducted Emission and Frequency Stability

The auxiliary equipment used for testing :

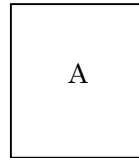
None

Type of Cable:

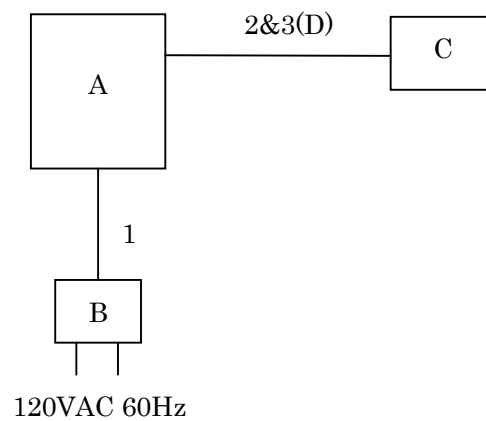
No.	Description	Identification (Manu. etc.)	Connector Shielded	Cable Shielded	Ferrite Core	Length (m)
1	USB conversion cable	--	--	NO	NO	1.5
2	Earphone Cable	--	--	NO	NO	0.5
3	DTV Antenna Cable	--	--	NO	NO	0.1

6.2 Test Arrangement (Drawings)

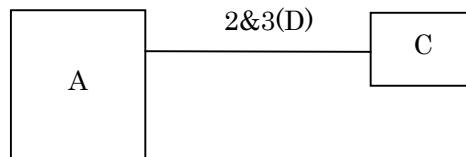
a) Single Unit



b) AC Adapter used



c) Earphone used



6.3 Operating Condition

Power Supply Voltage : 4.0 VDC (for Battery)
120 VAC, 60 Hz (For AC Adapter)

1. Bandwidth: 1.4 MHz/3 MHz/5 MHz/10 MHz/15 MHz/20 MHz
2. Modulation Type: QPSK/16QAM

The tests were carried under worst condition shown as follows:

Test Item	Bandwidth (MHz)	Modulation	RB Size
RF Power Output	1.4/3/5/10/15/20	QPSK/16QAM	1
ERP / EIRP RF Power Output	1.4/3/5/10/15/20	QPSK/16QAM	1
Occupied Bandwidth	1.4/3/5/10/15/20	QPSK/16QAM	Full
Spurious Emissions at Antenna Terminals	1.4/3/5/10/15/20	QPSK	1
Band-Edge Emission	1.4/3/5/10/15/20	QPSK/16QAM	1/Full
Field Strength of Spurious Radiation	1.4/3/5/10/15/20	QPSK	1

The Radiated Emission test were carried under 3 test configurations shown in clause 6.2.
In all tests, the fully charged battery is used for the EUT.

Other Clock Frequency
19.2MHz, 48MHz, 12MHz, 27.12MHz

The EUT was rotated through three orthogonal axis (X, Y and Z axis) in radiated measurement.
The EUT with temporary antenna port was used in conducted measurement.

RF Output Verification

The tests were conducted at the middle channel.

CH	Frequency (MHz)	BW (MHz)	Mode	RB Allocation	RB Offset	Target MPR	Conducted Average Power (dBm)
20175	1732.5	1.4	QPSK	1	0	0	22.80
				1	3	0	22.89
				1	5	0	22.80
				3	0	0	22.85
				3	2	0	22.88
				3	3	0	22.86
				6	0	1	21.85
			16QAM	1	0	1	21.95
				1	3	1	21.99
				1	5	1	21.95
				3	0	1	21.72
				3	2	1	21.78
				3	3	1	21.73
				6	0	2	20.87

CH	Frequency (MHz)	BW (MHz)	Mode	RB Allocation	RB Offset	Target MPR	Conducted Average Power (dBm)
20175	1732.5	3	QPSK	1	0	0	22.95
				1	8	0	22.86
				1	14	0	22.80
				8	0	1	21.93
				8	4	1	21.95
				8	7	1	21.90
				15	0	1	21.92
			16QAM	1	0	1	22.12
				1	8	1	22.06
				1	14	1	21.98
				8	0	2	21.07
				8	4	2	21.03
				8	7	2	21.05
				15	0	2	20.92

CH	Frequency (MHz)	BW (MHz)	Mode	RB Allocation	RB Offset	Target MPR	Conducted Average Power (dBm)
20175	1732.5	5	QPSK	1	0	0	22.98
				1	13	0	22.93
				1	24	0	22.79
				12	0	1	22.01
				12	7	1	21.98
				12	13	1	21.93
				25	0	1	21.92
			16QAM	1	0	1	22.19
				1	13	1	22.13
				1	24	1	22.05
				12	0	2	21.04
				12	7	2	21.01
				12	13	2	20.94
				25	0	2	20.97

CH	Frequency (MHz)	BW (MHz)	Mode	RB Allocation	RB Offset	Target MPR	Conducted Average Power (dBm)
20175	1732.5	10	QPSK	1	0	0	23.03
				1	25	0	22.87
				1	49	0	23.11
				25	0	1	21.94
				25	13	1	21.99
				25	25	1	22.03
				50	0	1	22.00
			16QAM	1	0	1	22.20
				1	25	1	22.09
				1	49	1	22.34
				25	0	2	20.96
				25	13	2	21.04
				25	25	2	21.07
				50	0	2	21.01

CH	Frequency (MHz)	BW (MHz)	Mode	RB Allocation	RB Offset	Target MPR	Conducted Average Power (dBm)
20175	1732.5	15	QPSK	1	0	0	22.92
				1	38	0	22.87
				1	74	0	23.07
				36	0	1	22.05
				36	20	1	21.98
				36	39	1	22.01
				75	0	1	21.96
			16QAM	1	0	1	22.14
				1	38	1	22.11
				1	74	1	22.31
				36	0	2	21.02
				36	20	2	21.01
				36	39	2	20.99
				75	0	2	20.97

CH	Frequency (MHz)	BW (MHz)	Mode	RB Allocation	RB Offset	Target MPR	Conducted Average Power (dBm)
20175	1732.5	20	QPSK	1	0	0	22.87
				1	50	0	22.88
				1	99	0	22.91
				50	0	1	21.93
				50	25	1	21.95
				50	50	1	22.08
				100	0	1	22.05
			16QAM	1	0	1	22.07
				1	50	1	22.11
				1	99	1	22.13
				50	0	2	20.92
				50	25	2	20.96
				50	50	2	21.08
				100	0	2	21.07

7 Test Requirements

7.0 Summary of the Test Results

Test Item	FCC Specification	Reference of the Test Report	Results	Remarks
RF Power Output	Section 27.50(d)	Section 7.1	Passed	-
ERP / EIRP RF Power Output	Section 27.50(d)	Section 7.2	Passed	-
Modulation Characteristics	-	-	-	-
Occupied Bandwidth	Section 27.53(h)	Section 7.4	Passed	-
Spurious Emissions at Antenna Terminals	Section 27.53(h)	Section 7.5	Passed	-
Band-Edge Emission	Section 27.53(h)	Section 7.6	Passed	-
Field Strength of Spurious Radiation	Section 27.53(h)	Section 7.7	Passed	-
Frequency Stability	Section 27.54	Section 7.8	Passed	-

7.1 RF Power Output (§2.1046)

For the requirements, ☒ - Applicable [☒ - Tested. ☐ - Not tested by applicant request.]
☐ - Not Applicable

7.1.1 Test Results

For the standard, ☒ - Passed ☐ - Failed ☐ - Not judged

Transmitter Power of BW: 1.4 MHz(QPSK) is	194.5	mW	at	1732.500	MHz
Transmitter Power of BW: 1.4 MHz(16QAM) is	159.2	mW	at	1710.700	MHz
Transmitter Power of BW: 3 MHz(QPSK) is	197.2	mW	at	1732.500	MHz
Transmitter Power of BW: 3 MHz(16QAM) is	162.9	mW	at	1732.500	MHz
Transmitter Power of BW: 5 MHz(QPSK) is	200.9	mW	at	1712.500	MHz
Transmitter Power of BW: 5 MHz(16QAM) is	167.1	mW	at	1712.500	MHz
Transmitter Power of BW: 10 MHz(QPSK) is	204.6	mW	at	1732.500	MHz
Transmitter Power of BW: 10 MHz(16QAM) is	171.4	mW	at	1732.500	MHz
Transmitter Power of BW: 15 MHz(QPSK) is	202.8	mW	at	1732.500	MHz
Transmitter Power of BW: 15 MHz(16QAM) is	170.2	mW	at	1732.500	MHz
Transmitter Power of BW: 20 MHz(QPSK) is	200.0	mW	at	1720.000	MHz
Transmitter Power of BW: 20 MHz(16QAM) is	167.1	mW	at	1720.000	MHz

Uncertainty of Measurement Results ± 0.9 dB(2σ)

Remarks : _____

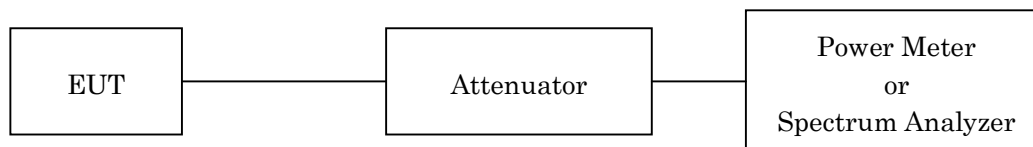
7.1.2 Test Instruments

Shielded Room S4				
Type	Model	Serial No. (ID)	Manufacturer	Cal. Due
Power Meter	N1911A	GB45100291 (B-63)	Agilent	2016/07/16
Power Sensor	N1921A	US44510470 (B-64)	Agilent	2016/07/16
Attenuator	43KC-20	1418003 (D-41)	Anritsu	2016/07/05
RF Cable	SUCOFLEX102	14253/2 (C-52)	HUBER+SUHNER	2016/08/16

NOTE : The calibration interval of the above test instruments is 12 months.

7.1.3 Test Method and Test Setup (Diagrammatic illustration)

The Conducted RF Power Output and CCDF were measured with a power meter ,a spectrum analyzer, one attenuator and a short, low loss cable.



7.1.4 Test Data

1-1) BW 1.4MHz(1RB)

Mode: QPSK

(LTE 1.4MHz)QPSK

Test Date: April 2, 2016
Temp.: 22 °C, Humi: 50 %

Transmitting Frequency CH	[MHz]	Correction Factor [dB]	Meter Reading (Average) [dBm]	Results (Average) [dBm]	[mW]
19957	1710.700	20.31	2.51	22.82	191.4
20175	1732.500	20.31	2.58	22.89	194.5
20393	1754.300	20.31	2.47	22.78	189.7

Calculated result at 1732.500 MHz, as the maximum level point shown on underline:

Correction Factor	=	20.31	dB
+) Meter Reading	=	2.58	dBm
Result	=	22.89	dBm = 194.5 mW

NOTE : The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.

Mode: 16QAM

(LTE 1.4MHz)16QAM

Test Date: April 2, 2016
Temp.: 22 °C, Humi: 50 %

Transmitting Frequency CH	[MHz]	Correction Factor [dB]	Meter Reading (Average) [dBm]	Results (Average) [dBm]	[mW]
19957	1710.700	20.31	1.71	22.02	159.2
20175	1732.500	20.31	1.68	21.99	158.1
20393	1754.300	20.31	1.68	21.99	158.1

Calculated result at 1710.700 MHz, as the maximum level point shown on underline:

Correction Factor	=	20.31	dB
+) Meter Reading	=	1.71	dBm
Result	=	22.02	dBm = 159.2 mW

NOTE : The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.

1-2) BW 3MHz(1RB)

Mode: QPSK

(LTE 3MHz)QPSK

Test Date: April 2, 2016
Temp.: 22 °C, Humi: 50 %

Transmitting Frequency CH	[MHz]	Correction Factor [dB]	Meter Reading (Average) [dBm]	Results (Average) [dBm]	[mW]
19965	1711.500	20.31	2.63	22.94	196.8
20175	1732.500	20.31	2.64	22.95	197.2
20385	1753.500	20.31	2.58	22.89	194.5

Calculated result at 1732.500 MHz, as the maximum level point shown on underline:

Correction Factor	=	20.31	dB
+) Meter Reading	=	2.64	dBm
Result	=	22.95	dBm = 197.2 mW

NOTE : The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.

Mode: 16QAM

(LTE 3MHz)16QAM

Test Date: April 2, 2016
Temp.: 22 °C, Humi: 50 %

Transmitting Frequency CH	[MHz]	Correction Factor [dB]	Meter Reading (Average) [dBm]	Results (Average) [dBm]	[mW]
19965	1711.500	20.31	1.78	22.09	161.8
20175	1732.500	20.31	1.81	22.12	162.9
20385	1753.500	20.31	1.72	22.03	159.6

Calculated result at 1732.500 MHz, as the maximum level point shown on underline:

Correction Factor	=	20.31	dB
+) Meter Reading	=	1.81	dBm
Result	=	22.12	dBm = 162.9 mW

NOTE : The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.

1-3) BW 5MHz(1RB)

Mode: QPSK

(LTE 5MHz)QPSK

Test Date: April 2, 2016
Temp.: 22 °C, Humi: 50 %

Transmitting Frequency CH	[MHz]	Correction Factor [dB]	Meter Reading (Average) [dBm]	Results (Average) [dBm]	[mW]
19975	1712.500	20.31	2.72	23.03	200.9
20175	1732.500	20.31	2.67	22.98	198.6
20375	1752.500	20.31	2.65	22.96	197.7

Calculated result at 1712.500 MHz, as the maximum level point shown on underline:

Correction Factor	=	20.31	dB
+) Meter Reading	=	2.72	dBm
Result	=	23.03	dBm = 200.9 mW

NOTE : The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.

Mode: 16QAM

(LTE 5MHz)16QAM

Test Date: April 2, 2016
Temp.: 22 °C, Humi: 50 %

Transmitting Frequency CH	[MHz]	Correction Factor [dB]	Meter Reading (Average) [dBm]	Results (Average) [dBm]	[mW]
19975	1712.500	20.31	1.92	22.23	167.1
20175	1732.500	20.31	1.88	22.19	165.6
20375	1752.500	20.31	1.86	22.17	164.8

Calculated result at 1712.500 MHz, as the maximum level point shown on underline:

Correction Factor	=	20.31	dB
+) Meter Reading	=	1.92	dBm
Result	=	22.23	dBm = 167.1 mW

NOTE : The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.

1-4) BW 10MHz(1RB)

Mode: QPSK

(LTE 10MHz)QPSK

Test Date: April 2, 2016
Temp.: 22 °C, Humi: 50 %

Transmitting Frequency CH	[MHz]	Correction Factor [dB]	Meter Reading (Average) [dBm]	Results (Average) [dBm]	[mW]
20000	1715.000	20.31	2.79	23.10	204.2
20175	1732.500	20.31	2.80	23.11	204.6
20350	1750.000	20.31	2.65	22.96	197.7

Calculated result at 1732.500 MHz, as the maximum level point shown on underline:

Correction Factor	=	20.31	dB
+) Meter Reading	=	2.80	dBm
Result	=	23.11	dBm = 204.6 mW

NOTE : The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.

Mode: 16QAM

(LTE 10MHz)16QAM

Test Date: April 2, 2016
Temp.: 22 °C, Humi: 50 %

Transmitting Frequency CH	[MHz]	Correction Factor [dB]	Meter Reading (Average) [dBm]	Results (Average) [dBm]	[mW]
20000	1715.000	20.31	1.92	22.23	167.1
20175	1732.500	20.31	2.03	22.34	171.4
20350	1750.000	20.31	1.84	22.15	164.1

Calculated result at 1732.500 MHz, as the maximum level point shown on underline:

Correction Factor	=	20.31	dB
+) Meter Reading	=	2.03	dBm
Result	=	22.34	dBm = 171.4 mW

NOTE : The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.

1-5) BW 15MHz(1RB)

Mode: QPSK

(LTE 15MHz)QPSK

Test Date: April 2, 2016
Temp.: 22 °C, Humi: 50 %

Transmitting Frequency CH	[MHz]	Correction Factor [dB]	Meter Reading (Average) [dBm]	Results (Average) [dBm]	[mW]
20025	1717.500	20.31	2.70	23.01	200.0
20175	1732.500	20.31	2.76	23.07	202.8
20325	1747.500	20.31	2.54	22.85	192.8

Calculated result at 1732.500 MHz, as the maximum level point shown on underline:

Correction Factor	=	20.31	dB
+) Meter Reading	=	2.76	dBm
Result	=	23.07	dBm = 202.8 mW

NOTE : The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.

Mode: 16QAM

(LTE 15MHz)16QAM

Test Date: April 2, 2016
Temp.: 22 °C, Humi: 50 %

Transmitting Frequency CH	[MHz]	Correction Factor [dB]	Meter Reading (Average) [dBm]	Results (Average) [dBm]	[mW]
20025	1717.500	20.31	1.90	22.21	166.3
20175	1732.500	20.31	2.00	22.31	170.2
20325	1747.500	20.31	1.74	22.05	160.3

Calculated result at 1732.500 MHz, as the maximum level point shown on underline:

Correction Factor	=	20.31	dB
+) Meter Reading	=	2.00	dBm
Result	=	22.31	dBm = 170.2 mW

NOTE : The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.

1-6) BW 20MHz(1RB)

Mode: QPSK

(LTE 20MHz)QPSK

Test Date: April 2, 2016
Temp.: 22 °C, Humi: 50 %

Transmitting Frequency CH	[MHz]	Correction Factor [dB]	Meter Reading (Average) [dBm]	Results (Average) [dBm]	[mW]
20050	1720.000	20.31	2.70	23.01	200.0
20175	1732.500	20.31	2.60	22.91	195.4
20300	1745.000	20.31	2.53	22.84	192.3

Calculated result at 1720.000 MHz, as the maximum level point shown on underline:

Correction Factor	=	20.31	dB
+) Meter Reading	=	2.70	dBm
Result	=	23.01	dBm = 200.0 mW

NOTE : The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.

Mode: 16QAM

(LTE 20MHz)16QAM

Test Date: April 2, 2016
Temp.: 22 °C, Humi: 50 %

Transmitting Frequency CH	[MHz]	Correction Factor [dB]	Meter Reading (Average) [dBm]	Results (Average) [dBm]	[mW]
20050	1720.000	20.31	1.92	22.23	167.1
20175	1732.500	20.31	1.82	22.13	163.3
20300	1745.000	20.31	1.76	22.07	161.1

Calculated result at 1720.000 MHz, as the maximum level point shown on underline:

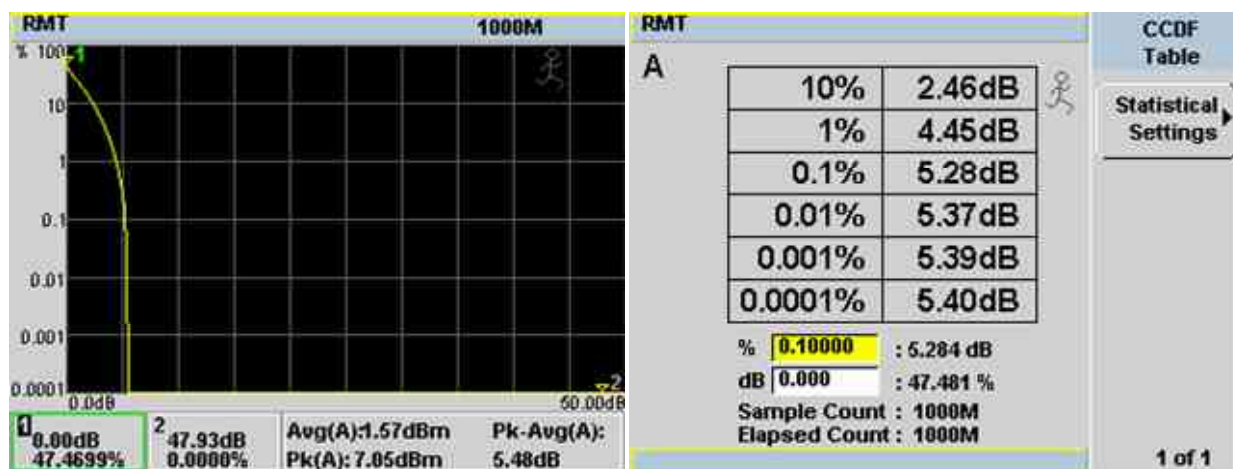
Correction Factor	=	20.31	dB
+) Meter Reading	=	1.92	dBm
Result	=	22.23	dBm = 167.1 mW

NOTE : The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.

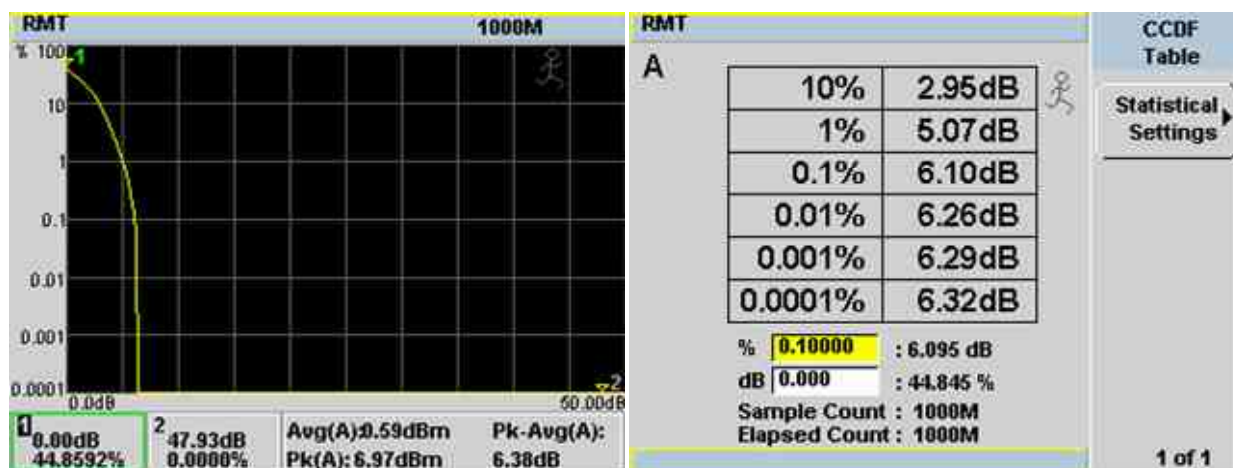
2) CCDF

Channel	Frequency (MHz)	BW (MHz)	Peak to Average Factor(CCDF 0.1%) [dB]		
			QPSK	16QAM	Limit
20175	1732.50	1.4	5.28	6.10	13
20175	1732.50	3	5.18	6.05	13
20175	1732.50	5	5.14	5.99	13
20175	1732.50	10	4.97	5.93	13
20175	1732.50	15	5.04	5.93	13
20175	1732.50	20	4.92	5.80	13

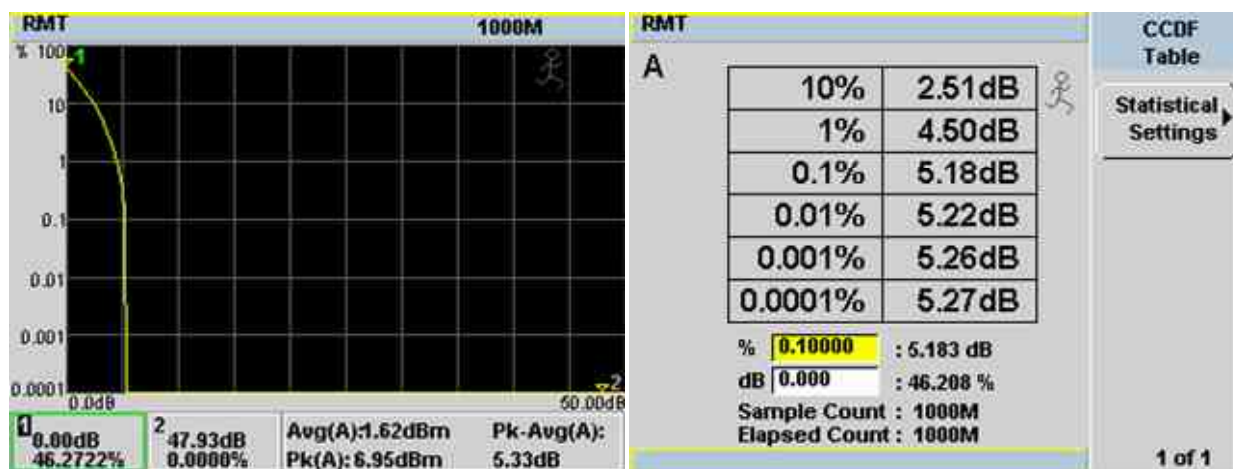
BW 1.4MHz QPSK



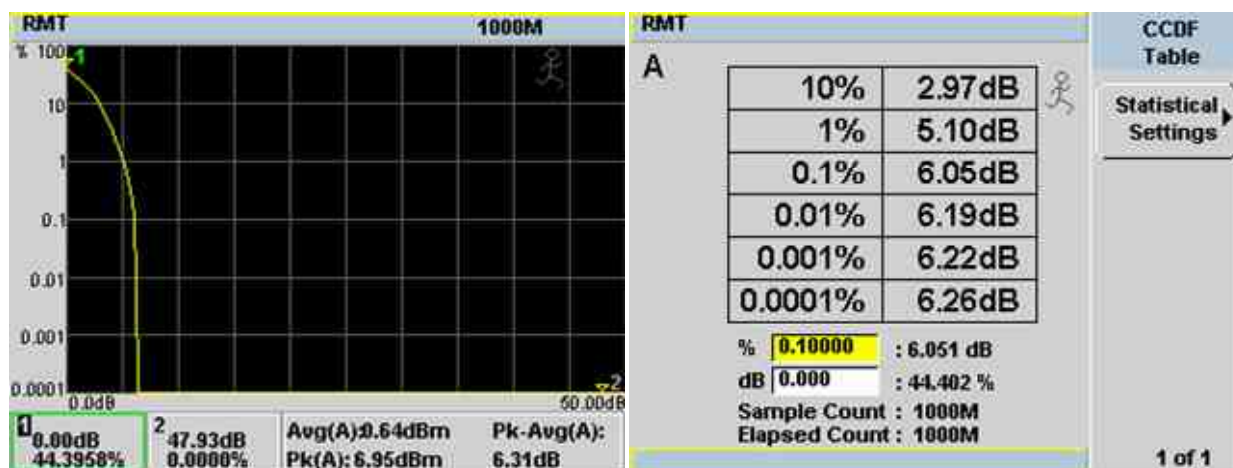
BW 1.4MHz 16QAM



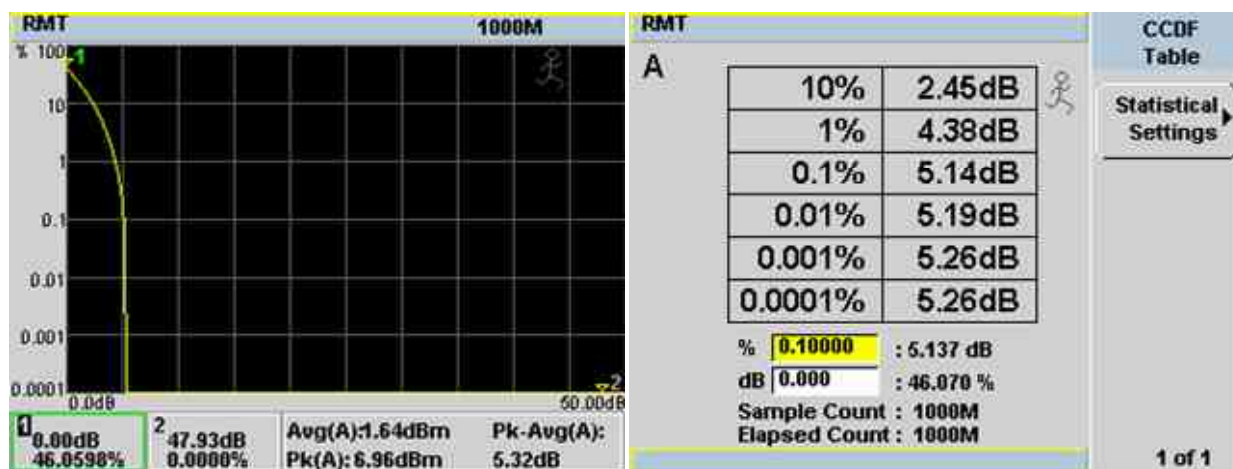
BW 3MHz QPSK



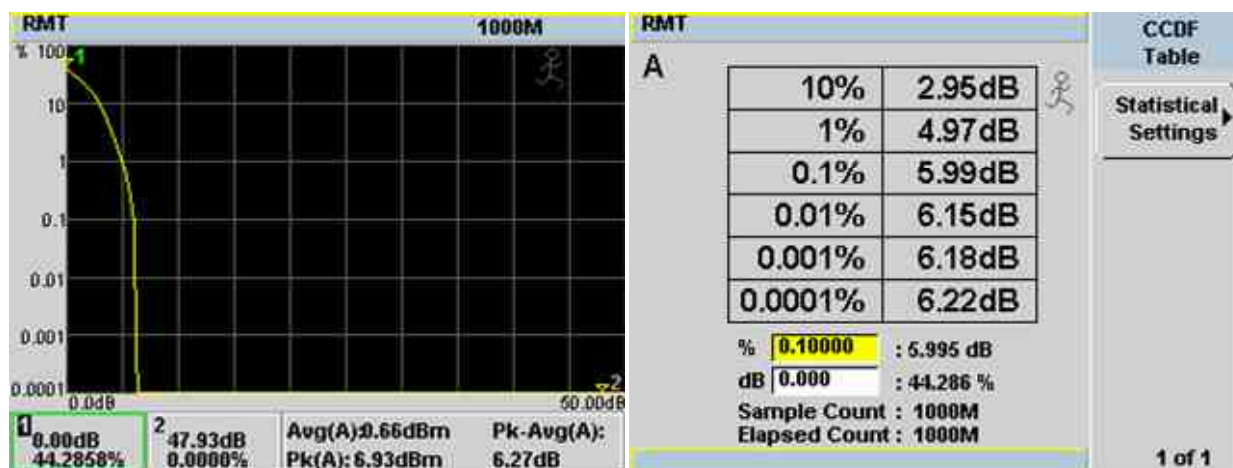
BW 3MHz 16QAM



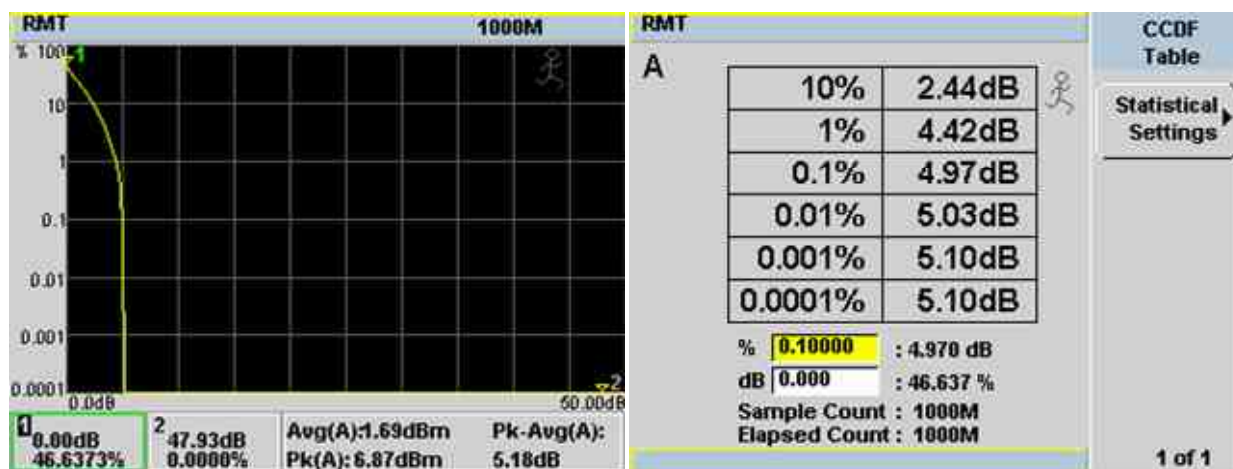
BW 5MHz QPSK



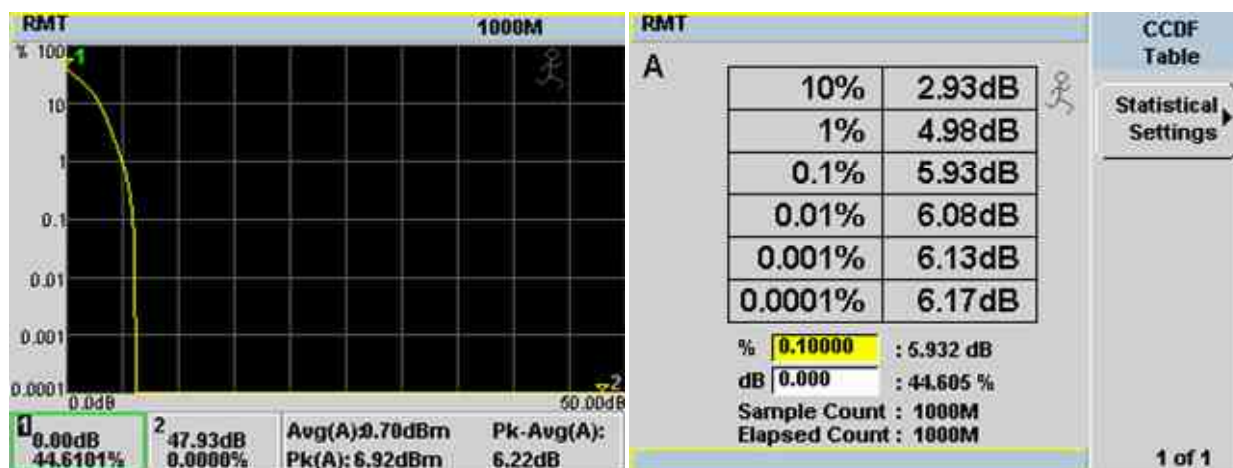
BW 5MHz 16QAM



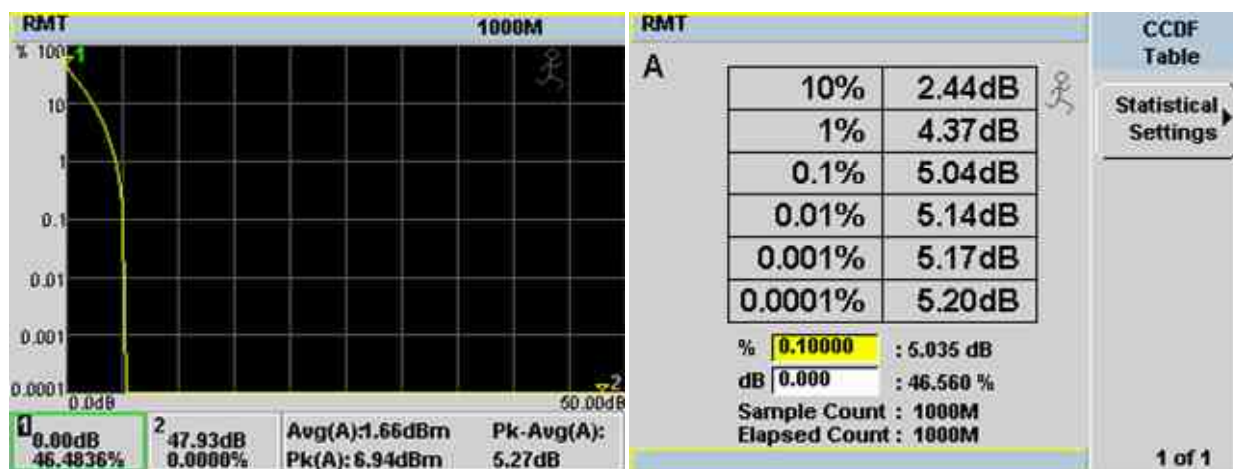
BW 10MHz QPSK



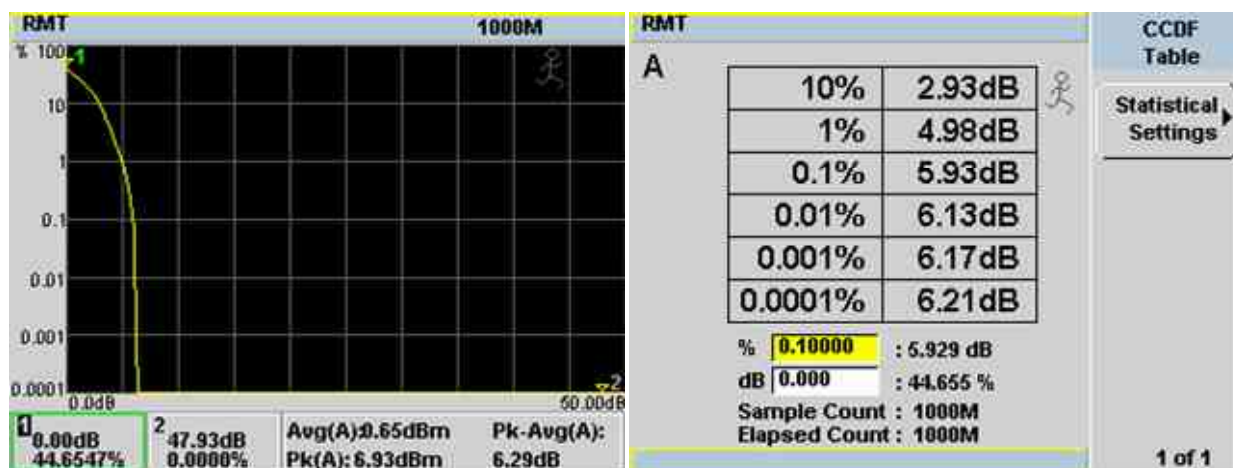
BW 10MHz 16QAM



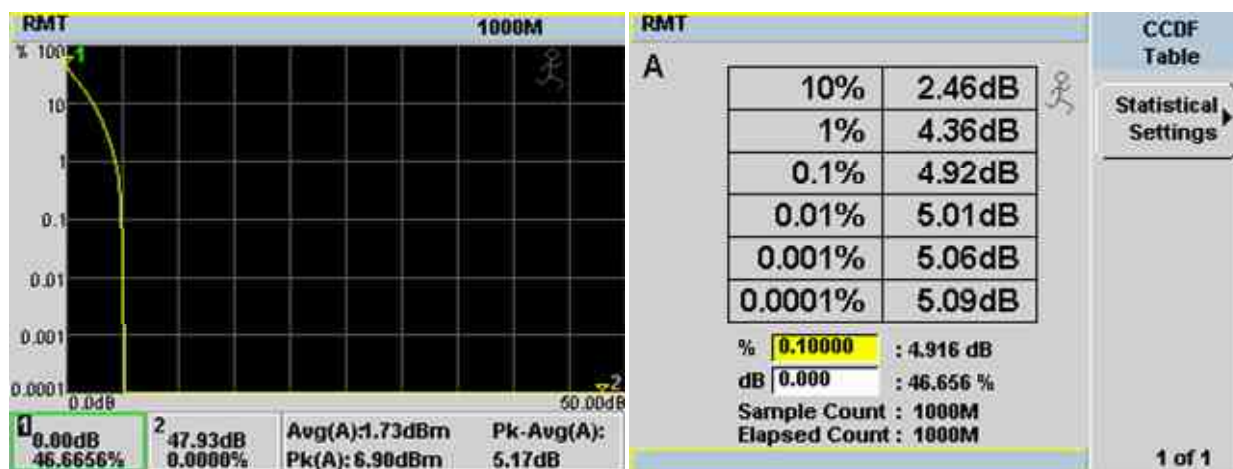
BW 15MHz QPSK



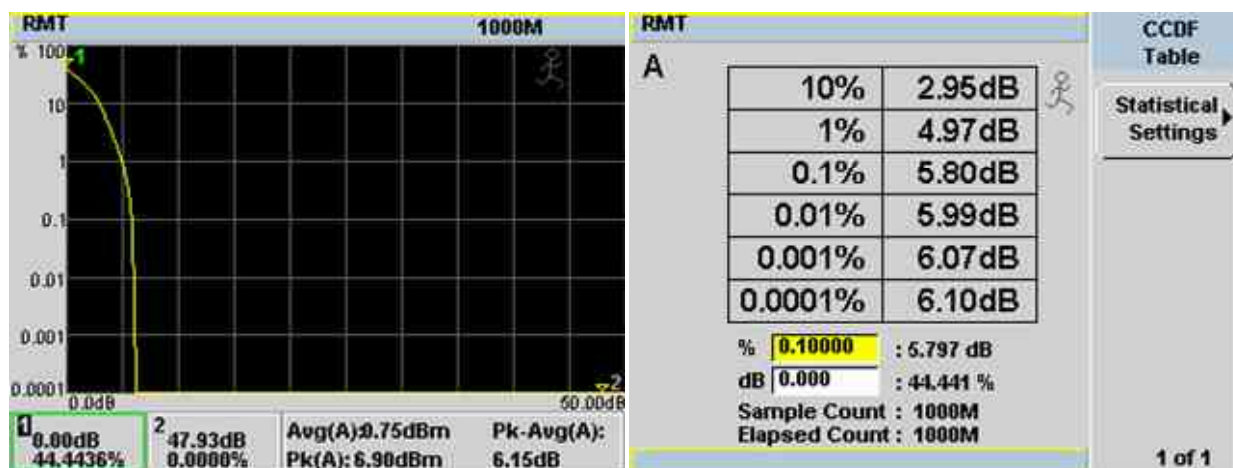
BW 15MHz 16QAM



BW 20MHz QPSK



BW 20MHz 16QAM



7.2 ERP / EIRP RF Power Output

For the requirements, ☒ - Applicable [☒ - Tested. ☐ - Not tested by applicant request.]
☐ - Not Applicable

7.2.1 Test Results

For the standard, ☒ - Passed ☐ - Failed ☐ - Not judged

Min. Limit Margin 7.4 dB at 1711.500 MHz

Uncertainty of Measurement Results ± 1.8 dB(2σ)

Remarks : The maximum EIRP is 0.182 W at 1711.500 MHz (BW 3MHz, QPSK). Xaxis position.

7.2.2 Test Instruments

Anechoic Chamber A2				
Type	Model	Serial No. (ID)	Manufacturer	Cal. Due
Test Receiver	ESU 26	100170 (A-6)	Rohde & Schwarz	2016/04/25
Signal Generator	E8257D	MY45140309 (B-39)	Agilent	2016/08/10
Power Meter	N1911A	GB45100291 (B-63)	Agilent	2016/07/16
Power Sensor	N1921A	US44510470 (B-64)	Agilent	2016/07/16
Horn Antenna (TX)	91888-2	560 (C-40-1)	EATON	2016/06/25
Horn Antenna (RX)	91888-2	562 (C-41-1)	EATON	2016/06/16
Attenuator (TX)	2-10	BA6214 (D-79)	Weinschel	2016/11/19
Attenuator (RX)	2-10	BF7557 (D-80)	Weinschel	2016/11/19
RF Cable (RX)	SUCOFLEX104	267479/4 (C-66)	HUBER+SUHNER	2017/01/06
RF Cable (TX)	SUCOFLEX102E	6683/2E (C-70)	HUBER+SUHNER	2016/11/19

NOTE : The calibration interval of the above test instruments is 12 months.

7.2.3 Test Method and Test Setup (Diagrammatic illustration)

Step 1:

In order to obtain the maximum emission, the EUT was placed at the height 1.5 m on the non-conducted support and was varying at three orthogonal axes, at the distance 3 m from the receiving antenna and rotated around 360 degrees.

The receiving antenna height was varied from 1 m to 4 m.

The EUT on the table was placed to be maximum emission against at the receiving antenna polarized (vertical and horizontal).

Then the meter reading of the spectrum analyzer at the maximum emission was A dB(μV).

Step 2:

The EUT was replaced to substitution antenna at the same polarized under the same condition as step 1.

The RF power was fed to the transmitting antenna through the RF amplifier from the signal generator.

In order to obtain the maximum emission level, the height of the receiving antenna was varied from 1 m to 4 m.

The level of maximum emission was A dB(μV), same as the recorded level in the step 1.

Then the RF power into the substitution horn antenna was P (dBm).

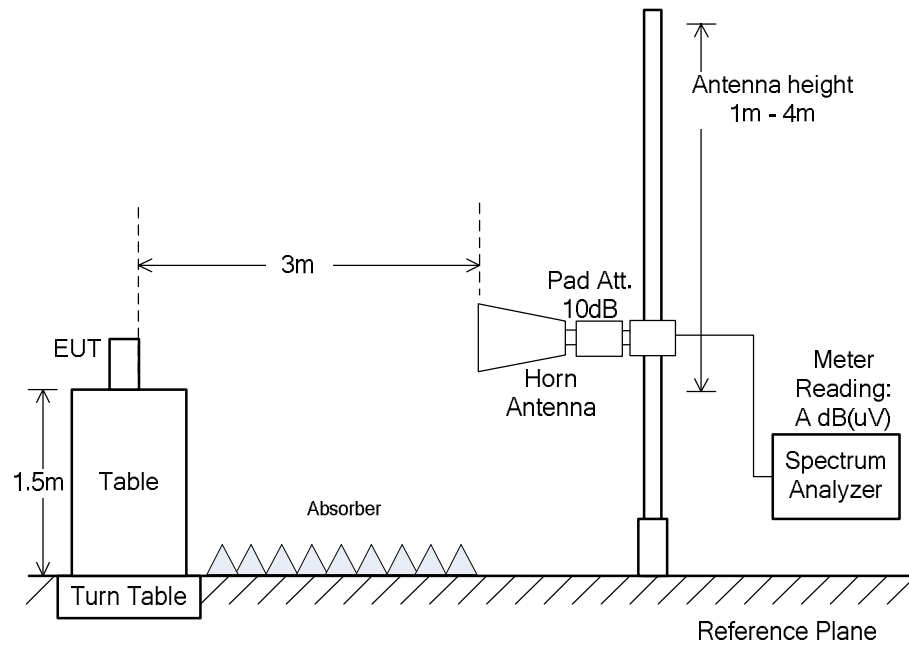
The ERP/EIRP output power was calculated in the following equation.

$$\text{ERP (dBm)} = \text{P (dBm)} - \text{Balun loss of the tuned dipole antenna (dB)} + \text{Cable loss (dB)}$$

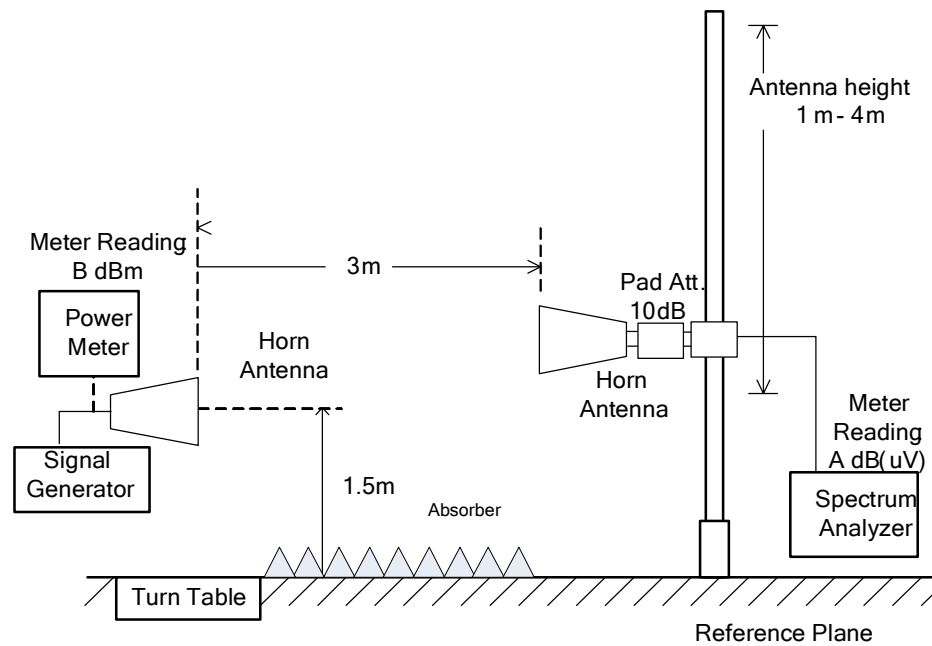
$$\text{EIRP (dBm)} = \text{P (dBm)} + \text{Gh (dBi)}$$

where, Gh (dBi) : Gain of the substitution horn antenna.

– Side View –



(a)EUT



(b) Substitution Horn Antenna

7.2.4 Test Data

1-1) BW 1.4MHz(1RB)

Mode: QPSK

(LTE 1.4MHz)QPSK

Test Date: March 21, 2016

Temp: 22 °C, Humi: 35 %

1. Measurement Results

CH	Transmitting Frequency [MHz]	Emission Measurement [dB(uV)]		Substitution Measurement [dB(uV)]		Supplied Power to Substitution Antenna [dBm]	Gain of Substitution Antenna [dBi]
		Hori. (Mh)	Vert. (Mv)	Hori. (Msh)	Vert. (Msv)		
19957	1710.700	86.2	85.9	72.8	72.7	- 5.0	13.9
20175	1732.500	85.8	85.4	72.6	72.5	- 5.0	13.8
20393	1754.300	86.0	85.5	72.3	72.5	- 5.0	13.7

2. Calculation Results

CH	Transmitting Frequency [MHz]	Average EIRP [dBm]		Maximum Average EIRP [W]	Limits [dBm]	Margin [dB]
		Hori. (EIRPh)	Vert. (EIRPv)			
19957	1710.700	22.3	22.1	0.170	30.0	+ 7.7
20175	1732.500	22.0	21.7	0.158	30.0	+ 8.0
20393	1754.300	22.4	21.7	0.174	30.0	+ 7.6

Calculated result at 1754.300 MHz, as the worst point shown on underline:

Emission Measurement (Mh)	=	86.0 dB(uV)
Substitution Measurement (Msh)	=	-72.3 dB(uV)
Supplied Power to Substitution Antenna	=	-5.0 dBm
+) Gain of Substitution Antenna	=	13.7 dB
Result (EIRPh)	=	22.4 dBm = 0.174 W

Minimum Margin: 30.0 - 22.4 = 7.6 (dB)

NOTE : Setting of measuring instrument(s) :

Detector Function
RMS

1-2) BW 1.4MHz(1RB)

Mode: 16QAM

(LTE 1.4MHz)16QAM

Test Date: March 21, 2016
Temp.: 22 °C, Humi: 35 %

1. Measurement Results

CH	Transmitting Frequency [MHz]	Emission Measurement [dB(uV)]		Substitution Measurement [dB(uV)]		Supplied Power to Substitution Antenna [dBm]	Gain of Substitution Antenna [dBi]
		Hori. (Mh)	Vert. (Mv)	Hori. (Msh)	Vert. (Msv)		
19957	1710.700	85.3	85.0	72.8	72.7	- 5.0	13.9
20175	1732.500	85.0	84.6	72.6	72.5	- 5.0	13.8
20393	1754.300	85.1	84.7	72.3	72.5	- 5.0	13.7

2. Calculation Results

CH	Transmitting Frequency [MHz]	Average EIRP [dBm]		Maximum Average EIRP [W]	Limits [dBm]	Margin [dB]
		Hori. (EIRPh)	Vert. (EIRPv)			
19957	1710.700	21.4	21.2	0.138	30.0	+ 8.6
20175	1732.500	21.2	20.9	0.132	30.0	+ 8.8
20393	1754.300	21.5	20.9	0.141	30.0	+ 8.5

Calculated result at 1754.300 MHz, as the worst point shown on underline:

Emission Measurement (Mh)	=	85.1 dB(uV)
Substitution Measurement (Msh)	=	-72.3 dB(uV)
Supplied Power to Substitution Antenna	=	-5.0 dBm
+) Gain of Substitution Antenna	=	13.7 dB
Result (EIRPh)	=	21.5 dBm = 0.141 W

Minimum Margin: 30.0 - 21.5 = 8.5 (dB)

NOTE : Setting of measuring instrument(s) :

Detector Function
RMS

2-1) BW 3MHz(1RB)

Mode: QPSK

(LTE 3MHz)QPSK

Test Date: March 21, 2016
Temp.: 22 °C, Humi: 35 %

1. Measurement Results

CH	Transmitting Frequency [MHz]	Emission Measurement [dB(uV)]		Substitution Measurement [dB(uV)]		Supplied Power to Substitution Antenna [dBm]	Gain of Substitution Antenna [dBi]
		Hori. (Mh)	Vert. (Mv)	Hori. (Msh)	Vert. (Msv)		
19965	1711.500	86.4	85.8	72.7	72.7	- 5.0	13.9
20175	1732.500	86.0	85.4	72.6	72.5	- 5.0	13.8
20385	1753.500	85.5	85.6	72.3	72.5	- 5.0	13.7

2. Calculation Results

CH	Transmitting Frequency [MHz]	Average EIRP [dBm]		Maximum Average EIRP [W]	Limits [dBm]	Margin [dB]
		Hori. (EIRPh)	Vert. (EIRPv)			
19965	1711.500	22.6	22.0	0.182	30.0	+ 7.4
20175	1732.500	22.2	21.7	0.166	30.0	+ 7.8
20385	1753.500	21.9	21.8	0.155	30.0	+ 8.1

Calculated result at 1711.500 MHz, as the worst point shown on underline:

Emission Measurement (Mh)	=	86.4 dB(uV)
Substitution Measurement (Msh)	=	-72.7 dB(uV)
Supplied Power to Substitution Antenna	=	-5.0 dBm
+) Gain of Substitution Antenna	=	13.9 dB
Result (EIRPh)	=	22.6 dBm = 0.182 W

Minimum Margin: 30.0 - 22.6 = 7.4 (dB)

NOTE : Setting of measuring instrument(s) :

Detector Function
RMS

2-2) BW 3MHz(1RB)

Mode: 16QAM

(LTE 3MHz)16QAM

Test Date: March 21, 2016
Temp.: 22 °C, Humi: 35 %

1. Measurement Results

CH	Transmitting Frequency [MHz]	Emission Measurement [dB(uV)]		Substitution Measurement [dB(uV)]		Supplied Power to Substitution Antenna [dBm]	Gain of Substitution Antenna [dBi]
		Hori. (Mh)	Vert. (Mv)	Hori. (Msh)	Vert. (Msv)		
19965	1711.500	85.5	85.0	72.7	72.7	- 5.0	13.9
20175	1732.500	85.2	84.5	72.6	72.5	- 5.0	13.8
20385	1753.500	84.7	84.7	72.3	72.5	- 5.0	13.7

2. Calculation Results

CH	Transmitting Frequency [MHz]	Average EIRP [dBm]		Maximum Average EIRP [W]	Limits [dBm]	Margin [dB]
		Hori. (EIRPh)	Vert. (EIRPv)			
19965	1711.500	21.7	21.2	0.148	30.0	+ 8.3
20175	1732.500	21.4	20.8	0.138	30.0	+ 8.6
20385	1753.500	21.1	20.9	0.129	30.0	+ 8.9

Calculated result at 1711.500 MHz, as the worst point shown on underline:

Emission Measurement (Mh)	=	85.5 dB(uV)
Substitution Measurement (Msh)	=	-72.7 dB(uV)
Supplied Power to Substitution Antenna	=	-5.0 dBm
+) Gain of Substitution Antenna	=	13.9 dB
Result (EIRPh)	=	21.7 dBm = 0.148 W

Minimum Margin: 30.0 - 21.7 = 8.3 (dB)

NOTE : Setting of measuring instrument(s) :

Detector Function
RMS

3-1) BW 5MHz(1RB)

Mode: QPSK

(LTE 5MHz)QPSK

Test Date: March 21, 2016
Temp.: 22 °C, Humi: 35 %

1. Measurement Results

CH	Transmitting Frequency [MHz]	Emission Measurement [dB(uV)]		Substitution Measurement [dB(uV)]		Supplied Power to Substitution Antenna [dBm]	Gain of Substitution Antenna [dBi]
		Hori. (Mh)	Vert. (Mv)	Hori. (Msh)	Vert. (Msv)		
19975	1712.500	86.4	86.0	72.8	72.7	- 5.0	13.9
20175	1732.500	86.1	85.5	72.6	72.5	- 5.0	13.8
20375	1752.500	85.6	85.7	72.3	72.5	- 5.0	13.7

2. Calculation Results

CH	Transmitting Frequency [MHz]	Average EIRP [dBm]		Maximum Average EIRP [W]	Limits [dBm]	Margin [dB]
		Hori. (EIRPh)	Vert. (EIRPv)			
19975	1712.500	22.5	22.2	0.178	30.0	+ 7.5
20175	1732.500	22.3	21.8	0.170	30.0	+ 7.7
20375	1752.500	22.0	21.9	0.158	30.0	+ 8.0

Calculated result at 1712.500 MHz, as the worst point shown on underline:

Emission Measurement (Mh)	=	86.4 dB(uV)
Substitution Measurement (Msh)	=	-72.8 dB(uV)
Supplied Power to Substitution Antenna	=	-5.0 dBm
+) Gain of Substitution Antenna	=	13.9 dB
Result (EIRPh)	=	22.5 dBm = 0.178 W

Minimum Margin: 30.0 - 22.5 = 7.5 (dB)

NOTE : Setting of measuring instrument(s) :

Detector Function
RMS

3-2) BW 5MHz(1RB)

Mode: 16QAM

(LTE 5MHz)16QAM

Test Date: March 21, 2016
Temp.: 22 °C, Humi: 35 %

1. Measurement Results

CH	Transmitting Frequency [MHz]	Emission Measurement [dB(uV)]		Substitution Measurement [dB(uV)]		Supplied Power to Substitution Antenna [dBm]	Gain of Substitution Antenna [dBi]
		Hori. (Mh)	Vert. (Mv)	Hori. (Msh)	Vert. (Msv)		
19975	1712.500	85.5	85.1	72.8	72.7	- 5.0	13.9
20175	1732.500	85.3	84.7	72.6	72.5	- 5.0	13.8
20375	1752.500	84.8	84.9	72.3	72.5	- 5.0	13.7

2. Calculation Results

CH	Transmitting Frequency [MHz]	Average EIRP [dBm]		Maximum Average EIRP [W]	Limits [dBm]	Margin [dB]
		Hori. (EIRPh)	Vert. (EIRPv)			
19975	1712.500	21.6	21.3	0.145	30.0	+ 8.4
20175	1732.500	21.5	21.0	0.141	30.0	+ 8.5
20375	1752.500	21.2	21.1	0.132	30.0	+ 8.8

Calculated result at 1712.500 MHz, as the worst point shown on underline:

Emission Measurement (Mh)	=	85.5 dB(uV)
Substitution Measurement (Msh)	=	-72.8 dB(uV)
Supplied Power to Substitution Antenna	=	-5.0 dBm
+) Gain of Substitution Antenna	=	13.9 dB
Result (EIRPh)	=	21.6 dBm = 0.145 W

Minimum Margin: 30.0 - 21.6 = 8.4 (dB)

NOTE : Setting of measuring instrument(s) :

Detector Function
RMS

4-1) BW 10MHz(1RB)

Mode: QPSK

(LTE 10MHz)QPSK

Test Date: March 21, 2016
Temp.: 22 °C, Humi: 35 %

1. Measurement Results

CH	Transmitting Frequency [MHz]	Emission Measurement [dB(uV)]		Substitution Measurement [dB(uV)]		Supplied Power to Substitution Antenna [dBm]	Gain of Substitution Antenna [dBi]
		Hori. (Mh)	Vert. (Mv)	Hori. (Msh)	Vert. (Msv)		
20000	1715.000	86.4	86.0	72.8	72.7	- 5.0	13.8
20175	1732.500	86.1	85.5	72.6	72.5	- 5.0	13.8
20350	1750.000	85.6	85.6	72.3	72.5	- 5.0	13.7

2. Calculation Results

CH	Transmitting Frequency [MHz]	Average EIRP [dBm]		Maximum Average EIRP [W]	Limits [dBm]	Margin [dB]
		Hori. (EIRPh)	Vert. (EIRPv)			
20000	1715.000	22.4	22.1	0.174	30.0	+ 7.6
20175	1732.500	22.3	21.8	0.170	30.0	+ 7.7
20350	1750.000	22.0	21.8	0.158	30.0	+ 8.0

Calculated result at 1715.000 MHz, as the worst point shown on underline:

Emission Measurement (Mh)	=	86.4 dB(uV)
Substitution Measurement (Msh)	=	-72.8 dB(uV)
Supplied Power to Substitution Antenna	=	-5.0 dBm
+) Gain of Substitution Antenna	=	13.8 dB
Result (EIRPh)	=	22.4 dBm = 0.174 W

Minimum Margin: 30.0 - 22.4 = 7.6 (dB)

NOTE : Setting of measuring instrument(s) :

Detector Function
RMS

4-2) BW 10MHz(1RB)

Mode: 16QAM

(LTE 10MHz) 16QAM

Test Date: March 21, 2016
Temp.: 22 °C, Humi: 35 %

1. Measurement Results

CH	Transmitting Frequency [MHz]	Emission Measurement [dB(uV)]		Substitution Measurement [dB(uV)]		Supplied Power to Substitution Antenna [dBm]	Gain of Substitution Antenna [dBi]
		Hori. (Mh)	Vert. (Mv)	Hori. (Msh)	Vert. (Msv)		
20000	1715.000	85.6	85.1	72.8	72.7	- 5.0	13.8
20175	1732.500	85.3	84.6	72.6	72.5	- 5.0	13.8
20350	1750.000	84.8	84.7	72.3	72.5	- 5.0	13.7

2. Calculation Results

CH	Transmitting Frequency [MHz]	Average EIRP [dBm]		Maximum Average EIRP [W]	Limits [dBm]	Margin [dB]
		Hori. (EIRPh)	Vert. (EIRPv)			
20000	1715.000	21.6	21.2	0.145	30.0	+ 8.4
20175	1732.500	21.5	20.9	0.141	30.0	+ 8.5
20350	1750.000	21.2	20.9	0.132	30.0	+ 8.8

Calculated result at 1715.000 MHz, as the worst point shown on underline:

Emission Measurement (Mh)	=	85.6 dB(uV)
Substitution Measurement (Msh)	=	-72.8 dB(uV)
Supplied Power to Substitution Antenna	=	-5.0 dBm
+) Gain of Substitution Antenna	=	13.8 dB
Result (EIRPh)	=	21.6 dBm = 0.145 W

Minimum Margin: 30.0 - 21.6 = 8.4 (dB)

NOTE : Setting of measuring instrument(s) :

Detector Function
RMS

5-1) BW 15MHz(1RB)

Mode: QPSK

(LTE 15MHz)QPSK

Test Date: March 21, 2016
Temp.: 22 °C, Humi: 35 %

1. Measurement Results

CH	Transmitting Frequency [MHz]	Emission Measurement [dB(uV)]		Substitution Measurement [dB(uV)]		Supplied Power to Substitution Antenna [dBm]	Gain of Substitution Antenna [dBi]
		Hori. (Mh)	Vert. (Mv)	Hori. (Msh)	Vert. (Msv)		
20025	1717.500	86.1	85.7	72.7	72.6	- 5.0	13.8
20175	1732.500	86.0	85.3	72.6	72.5	- 5.0	13.8
20325	1747.500	85.6	85.7	72.4	72.4	- 5.0	13.7

2. Calculation Results

CH	Transmitting Frequency [MHz]	Average EIRP [dBm]		Maximum Average EIRP [W]	Limits [dBm]	Margin [dB]
		Hori. (EIRPh)	Vert. (EIRPv)			
20025	1717.500	22.2	21.9	0.166	30.0	+ 7.8
20175	1732.500	22.2	21.6	0.166	30.0	+ 7.8
20325	1747.500	21.9	22.0	0.158	30.0	+ 8.0

Calculated result at 1717.500 MHz, as the worst point shown on underline:

Emission Measurement (Mh)	=	86.1 dB(uV)
Substitution Measurement (Msh)	=	-72.7 dB(uV)
Supplied Power to Substitution Antenna	=	-5.0 dBm
+) Gain of Substitution Antenna	=	13.8 dB
Result (EIRPh)	=	22.2 dBm = 0.166 W

Minimum Margin: 30.0 - 22.2 = 7.8 (dB)

NOTE : Setting of measuring instrument(s) :

Detector Function
RMS

5-2) BW 15MHz(1RB)

Mode: 16QAM

(LTE 15MHz) 16QAM

Test Date: March 21, 2016
Temp.: 22 °C, Humi: 35 %

1. Measurement Results

CH	Transmitting Frequency [MHz]	Emission Measurement [dB(uV)]		Substitution Measurement [dB(uV)]		Supplied Power to Substitution Antenna [dBm]	Gain of Substitution Antenna [dBi]
		Hori. (Mh)	Vert. (Mv)	Hori. (Msh)	Vert. (Msv)		
20025	1717.500	85.3	84.8	72.7	72.6	- 5.0	13.8
20175	1732.500	85.1	84.4	72.6	72.5	- 5.0	13.8
20325	1747.500	84.7	84.9	72.4	72.4	- 5.0	13.7

2. Calculation Results

CH	Transmitting Frequency [MHz]	Average EIRP [dBm]		Maximum Average EIRP [W]	Limits [dBm]	Margin [dB]
		Hori. (EIRPh)	Vert. (EIRPv)			
20025	1717.500	21.4	21.0	0.138	30.0	+ 8.6
20175	1732.500	21.3	20.7	0.135	30.0	+ 8.7
20325	1747.500	21.0	21.2	0.132	30.0	+ 8.8

Calculated result at 1717.500 MHz, as the worst point shown on underline:

Emission Measurement (Mh)	=	85.3 dB(uV)
Substitution Measurement (Msh)	=	-72.7 dB(uV)
Supplied Power to Substitution Antenna	=	-5.0 dBm
+) Gain of Substitution Antenna	=	13.8 dB
Result (EIRPh)	=	21.4 dBm = 0.138 W

Minimum Margin: 30.0 - 21.4 = 8.6 (dB)

NOTE : Setting of measuring instrument(s) :

Detector Function
RMS

6-1) BW 20MHz(1RB)

Mode: QPSK

(LTE 20MHz)QPSK

Test Date: March 21, 2016
Temp.: 22 °C, Humi: 35 %

1. Measurement Results

CH	Transmitting Frequency [MHz]	Emission Measurement [dB(uV)]		Substitution Measurement [dB(uV)]		Supplied Power to Substitution Antenna [dBm]	Gain of Substitution Antenna [dBi]
		Hori. (Mh)	Vert. (Mv)	Hori. (Msh)	Vert. (Msv)		
20050	1720.000	86.1	85.7	72.6	72.6	- 5.0	13.8
20175	1732.500	85.9	85.3	72.6	72.5	- 5.0	13.8
20300	1745.000	85.6	85.6	72.5	72.4	- 5.0	13.7

2. Calculation Results

CH	Transmitting Frequency [MHz]	Average EIRP [dBm]		Maximum Average EIRP [W]	Limits [dBm]	Margin [dB]
		Hori. (EIRPh)	Vert. (EIRPv)			
20050	1720.000	22.3	21.9	0.170	30.0	+ 7.7
20175	1732.500	22.1	21.6	0.162	30.0	+ 7.9
20300	1745.000	21.8	21.9	0.155	30.0	+ 8.1

Calculated result at 1720.000 MHz, as the worst point shown on underline:

Emission Measurement (Mh)	=	86.1 dB(uV)
Substitution Measurement (Msh)	=	-72.6 dB(uV)
Supplied Power to Substitution Antenna	=	-5.0 dBm
+) Gain of Substitution Antenna	=	13.8 dB
Result (EIRPh)	=	22.3 dBm = 0.170 W

Minimum Margin: 30.0 - 22.3 = 7.7 (dB)

NOTE : Setting of measuring instrument(s) :

Detector Function
RMS

6-2) BW 20MHz(1RB)

Mode: 16QAM

(LTE 20MHz) 16QAM

Test Date: March 21, 2016
Temp.: 22 °C, Humi: 35 %

1. Measurement Results

CH	Transmitting Frequency [MHz]	Emission Measurement [dB(uV)]		Substitution Measurement [dB(uV)]		Supplied Power to Substitution Antenna [dBm]	Gain of Substitution Antenna [dBi]
		Hori. (Mh)	Vert. (Mv)	Hori. (Msh)	Vert. (Msv)		
20050	1720.000	85.3	84.9	72.6	72.6	- 5.0	13.8
20175	1732.500	85.0	84.5	72.6	72.5	- 5.0	13.8
20300	1745.000	84.8	84.8	72.5	72.4	- 5.0	13.7

2. Calculation Results

CH	Transmitting Frequency [MHz]	Average EIRP [dBm]		Maximum Average EIRP [W]	Limits [dBm]	Margin [dB]
		Hori. (EIRPh)	Vert. (EIRPv)			
20050	1720.000	21.5	21.1	0.141	30.0	+ 8.5
20175	1732.500	21.2	20.8	0.132	30.0	+ 8.8
20300	1745.000	21.0	21.1	0.129	30.0	+ 8.9

Calculated result at 1720.000 MHz, as the worst point shown on underline:

Emission Measurement (Mh)	=	85.3 dB(uV)
Substitution Measurement (Msh)	=	-72.6 dB(uV)
Supplied Power to Substitution Antenna	=	-5.0 dBm
+) Gain of Substitution Antenna	=	13.8 dB
Result (EIRPh)	=	21.5 dBm = 0.141 W

Minimum Margin: 30.0 - 21.5 = 8.5 (dB)

NOTE : Setting of measuring instrument(s) :

Detector Function
RMS

7.3 Modulation Characteristics (§2.1047)

For the requirements, ☐ - Applicable [☐ - Tested. ☐ - Not tested by applicant request.]
☒ - Not Applicable

7.4 Occupied Bandwidth (§2.1049)

For the requirements, ☒ - Applicable [☒ - Tested. ☐ - Not tested by applicant request.]
☐ - Not Applicable

7.4.1 Test Results

For the standard, ☒ - Passed ☐ - Failed ☐ - Not judged

The 99% Bandwidth of BW: 1.4 MHz(QPSK) is	<u>1.08</u>	MHz	at	<u>1710.7/1732.5/1754.3</u> MHz
The 99% Bandwidth of BW: 1.4 MHz(16QAM) is	<u>1.08</u>	MHz	at	<u>1710.7/1732.5/1754.3</u> MHz
The 99% Bandwidth of BW: 3 MHz(QPSK) is	<u>2.69</u>	MHz	at	<u>1711.5/1732.5/1753.5</u> MHz
The 99% Bandwidth of BW: 3 MHz(16QAM) is	<u>2.68</u>	MHz	at	<u>1711.5/1732.5/1753.5</u> MHz
The 99% Bandwidth of BW: 5 MHz(QPSK) is	<u>4.48</u>	MHz	at	<u>1712.5/1732.5</u> MHz
The 99% Bandwidth of BW: 5 MHz(16QAM) is	<u>4.47</u>	MHz	at	<u>1712.5/1752.5</u> MHz
The 99% Bandwidth of BW: 10 MHz(QPSK) is	<u>8.94</u>	MHz	at	<u>1715</u> MHz
The 99% Bandwidth of BW: 10 MHz(16QAM) is	<u>8.94</u>	MHz	at	<u>1750</u> MHz
The 99% Bandwidth of BW: 15 MHz(QPSK) is	<u>13.4</u>	MHz	at	<u>1717.5/1732.5/1747.5</u> MHz
The 99% Bandwidth of BW: 15 MHz(16QAM) is	<u>13.4</u>	MHz	at	<u>1717.5/1732.5/1747.5</u> MHz
The 99% Bandwidth of BW: 20 MHz(QPSK) is	<u>17.9</u>	MHz	at	<u>1720/1732.5/1745</u> MHz
The 99% Bandwidth of BW: 20 MHz(16QAM) is	<u>17.8</u>	MHz	at	<u>1720/1732.5/1745</u> MHz

The 26dB Bandwidth of BW: 1.4 MHz(QPSK) is	<u>1.22</u>	MHz	at	<u>1710.7/1732.5/1754.3</u> MHz
The 26dB Bandwidth of BW: 1.4 MHz(16QAM) is	<u>1.23</u>	MHz	at	<u>1710.7/1732.5/1754.3</u> MHz
The 26dB Bandwidth of BW: 3 MHz(QPSK) is	<u>2.99</u>	MHz	at	<u>1753.5</u> MHz
The 26dB Bandwidth of BW: 3 MHz(16QAM) is	<u>2.95</u>	MHz	at	<u>1753.5</u> MHz
The 26dB Bandwidth of BW: 5 MHz(QPSK) is	<u>4.89</u>	MHz	at	<u>1732.5</u> MHz
The 26dB Bandwidth of BW: 5 MHz(16QAM) is	<u>4.89</u>	MHz	at	<u>1732.5</u> MHz
The 26dB Bandwidth of BW: 10 MHz(QPSK) is	<u>9.66</u>	MHz	at	<u>1732.5/1750</u> MHz
The 26dB Bandwidth of BW: 10 MHz(16QAM) is	<u>9.69</u>	MHz	at	<u>1732.5</u> MHz
The 26dB Bandwidth of BW: 15 MHz(QPSK) is	<u>14.4</u>	MHz	at	<u>1717.5/1747.5</u> MHz
The 26dB Bandwidth of BW: 15 MHz(16QAM) is	<u>14.3</u>	MHz	at	<u>1717.5/1732.5/1747.5</u> MHz
The 26dB Bandwidth of BW: 20 MHz(QPSK) is	<u>19.2</u>	MHz	at	<u>1745</u> MHz
The 26dB Bandwidth of BW: 20 MHz(16QAM) is	<u>19.0</u>	MHz	at	<u>1720/1745</u> MHz

Uncertainty of Measurement Results ± 0.9 %(2σ)

Remarks : _____

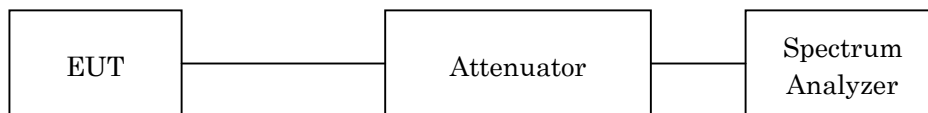
7.4.2 Test Instruments

Shielded Room S4				
Type	Model	Serial No. (ID)	Manufacturer	Cal. Due
Spectrum Analyzer	E4446A	US44300388 (A-39)	Agilent	2016/08/11
Attenuator	43KC-20	1418003 (D-41)	Anritsu	2016/07/05
RF Cable	SUCOFLEX102	14253/2 (C-52)	HUBER+SUHNER	2016/08/16

NOTE : The calibration interval of the above test instruments is 12 months.

7.4.3 Test Method and Test Setup (Diagrammatic illustration)

The test system is shown as follows:



The setting of the spectrum analyzer are shown as follows:

LTE Bandwidth	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Res. Bandwidth	20 kHz	30 kHz	51 kHz	100 kHz	150 kHz	200 kHz
Video Bandwidth	62 kHz	100 kHz	160 kHz	300 kHz	470 kHz	620 kHz
Span	3 MHz	6 MHz	10 MHz	20 MHz	30 MHz	40 MHz
Sweep Time	AUTO	AUTO	AUTO	AUTO	AUTO	AUTO
Trace	Maxhold	Maxhold	Maxhold	Maxhold	Maxhold	Maxhold

7.4.4 Test Data

The resolution bandwidth was set to about 1 – 5 % of emission bandwidth, -26dBc display line was placed on the screen (or 99% bandwidth), the occupied bandwidth is the delta frequency between the two points where the display line intersects the signal trace.

Test Date : April 5, 2016

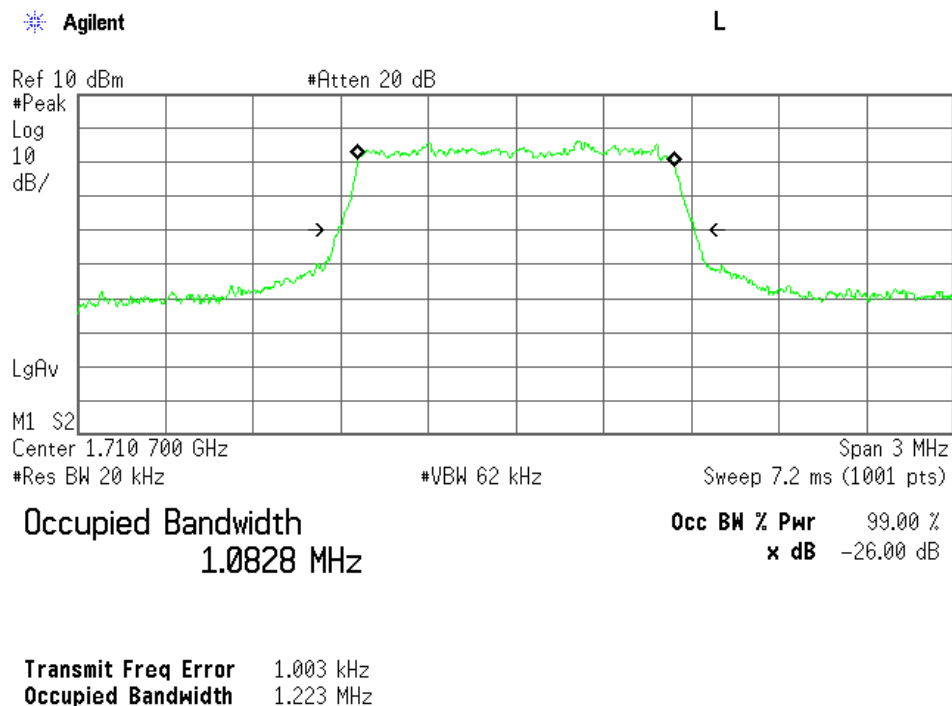
Temp.:22°C, Humi:42%

1-1) BW 1.4MHz(Full RB)

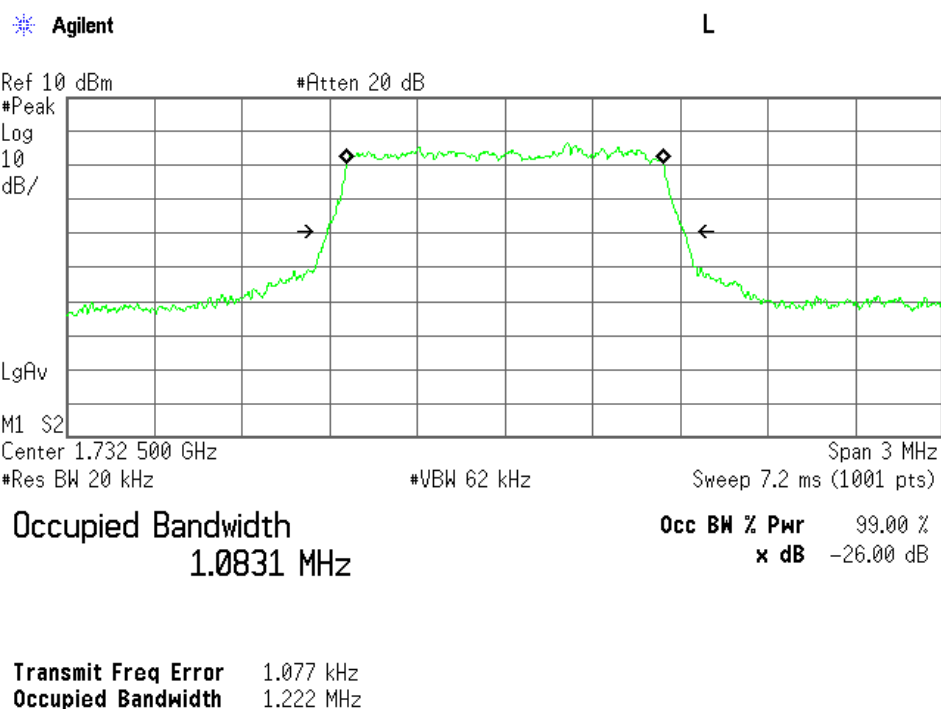
Mode: QPSK

Channel	Frequency (MHz)	99% Bandwidth (MHz)	-26dBc Bandwidth (MHz)
19957	1710.70	1.08	1.22
20175	1732.50	1.08	1.22
20393	1754.30	1.08	1.22

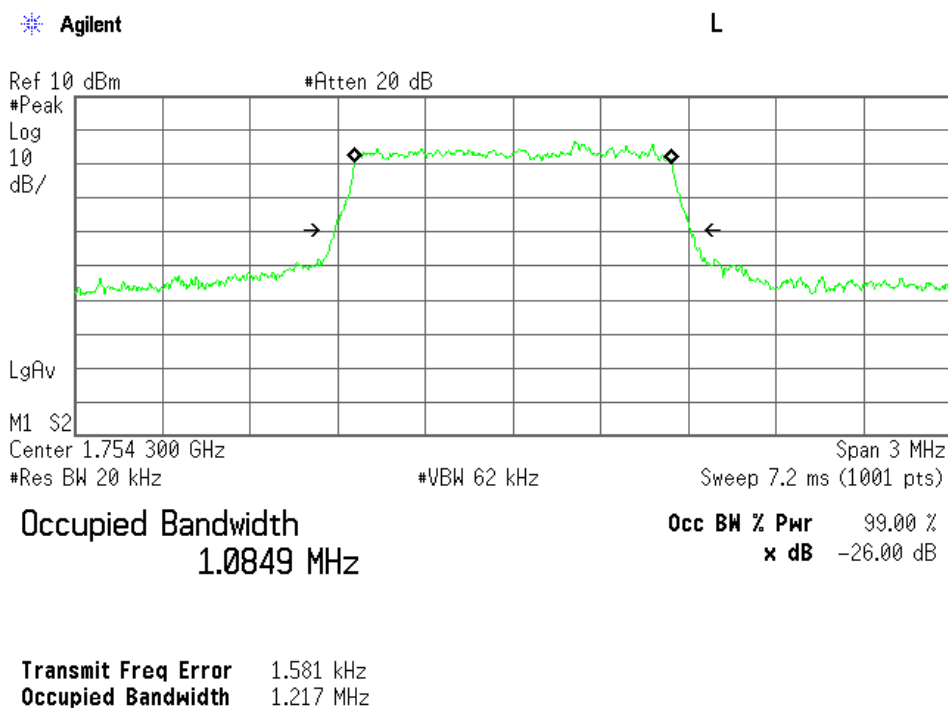
Low Channel



Middle Channel



High Channel



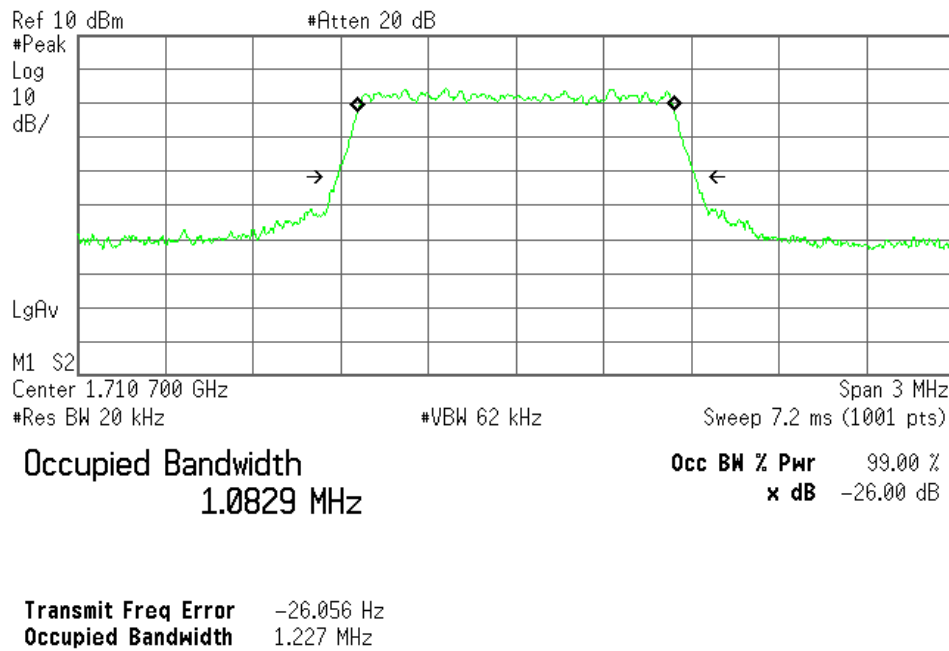
1-2) BW 1.4MHz(Full RB)

Mode: 16QAM

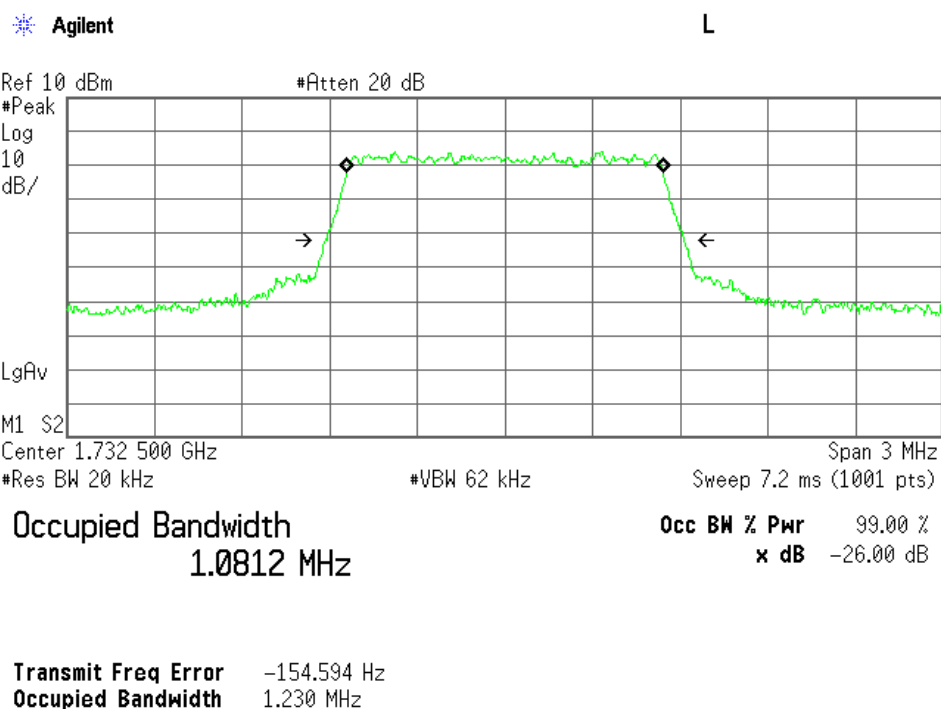
Channel	Frequency (MHz)	99% Bandwidth (MHz)	-26dBc Bandwidth (MHz)
19957	1710.70	1.08	1.23
20175	1732.50	1.08	1.23
20393	1754.30	1.08	1.23

Low Channel

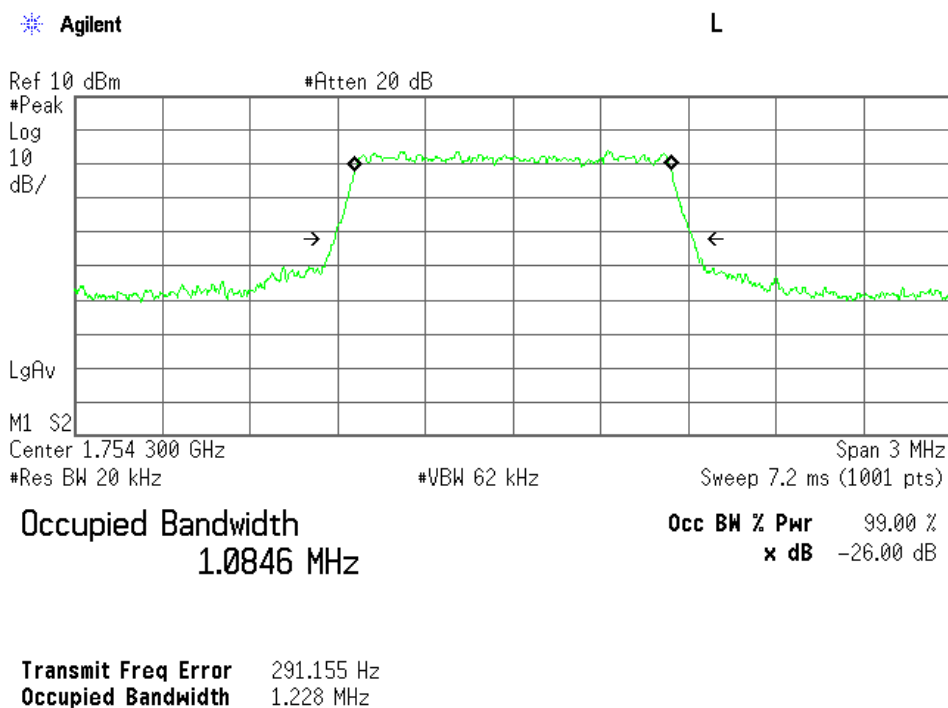
* Agilent



Middle Channel



High Channel



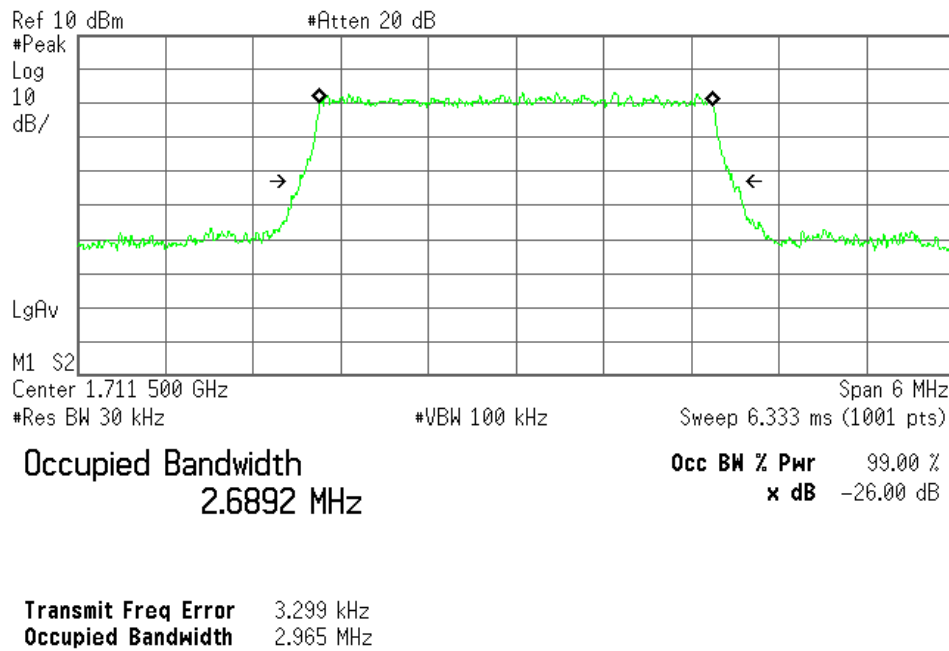
2-1) BW 3MHz(Full RB)

Mode: QPSK

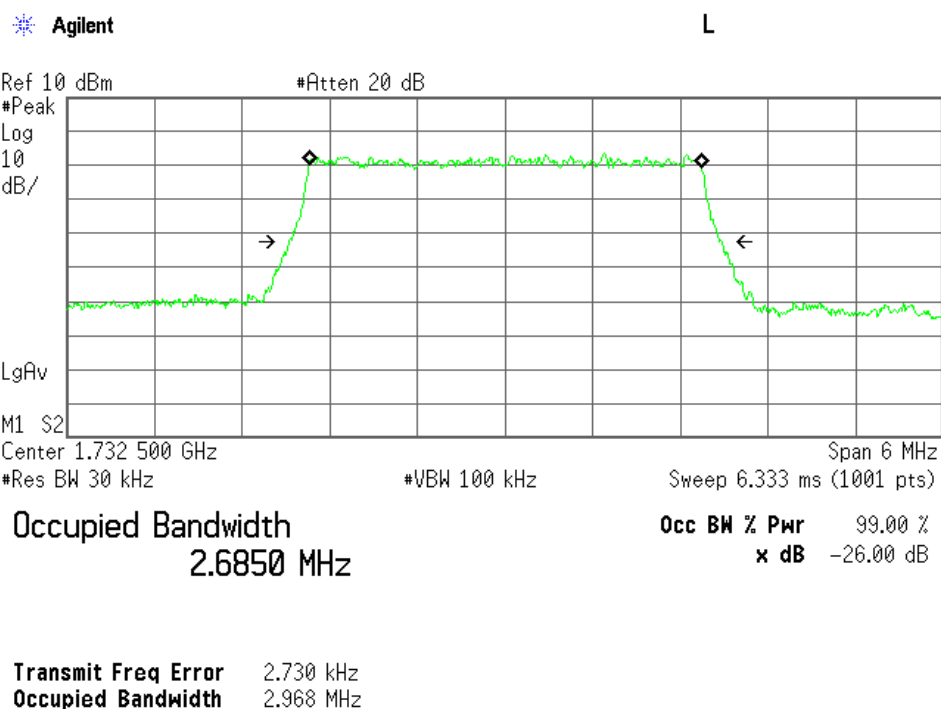
Channel	Frequency (MHz)	99% Bandwidth (MHz)	-26dBc Bandwidth (MHz)
19965	1711.50	2.69	2.97
20175	1732.50	2.69	2.97
20385	1753.50	2.69	2.99

Low Channel

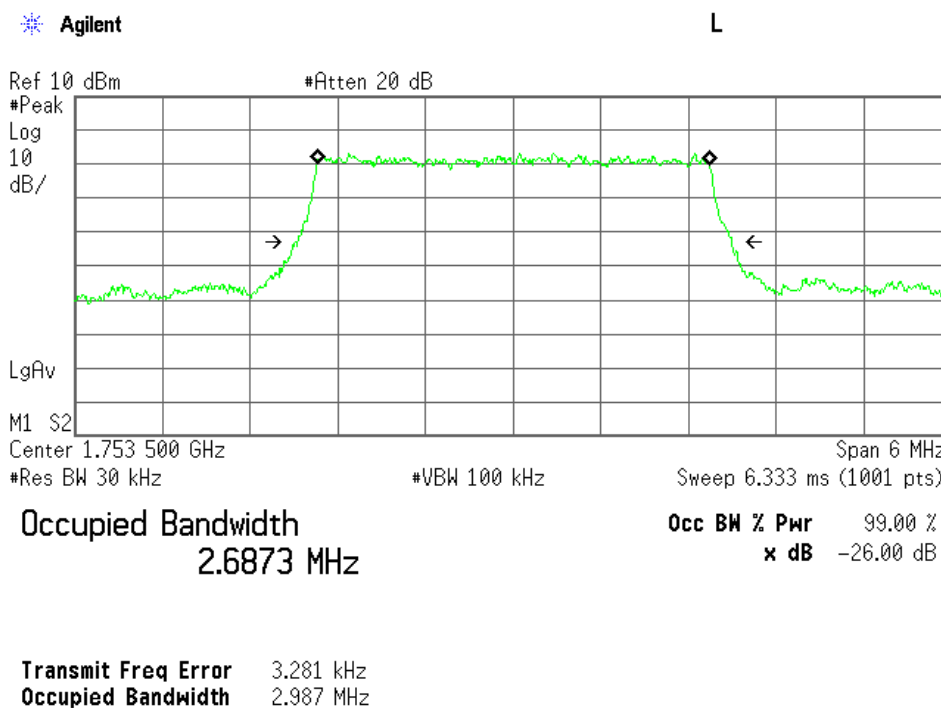
* Agilent



Middle Channel



High Channel



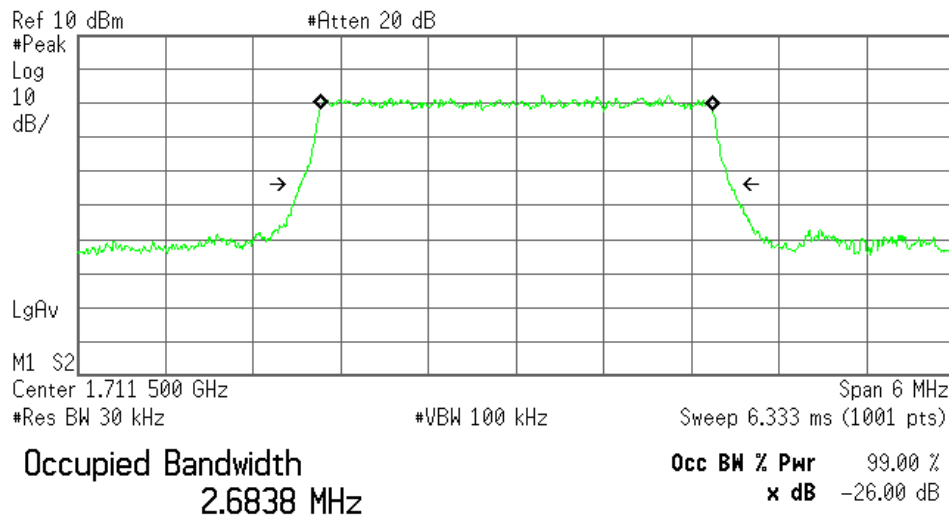
2-2) BW 3MHz(Full RB)

Mode: 16QAM

Channel	Frequency (MHz)	99% Bandwidth (MHz)	-26dBc Bandwidth (MHz)
19965	1711.50	2.68	2.94
20175	1732.50	2.68	2.94
20385	1753.50	2.68	2.95

Low Channel

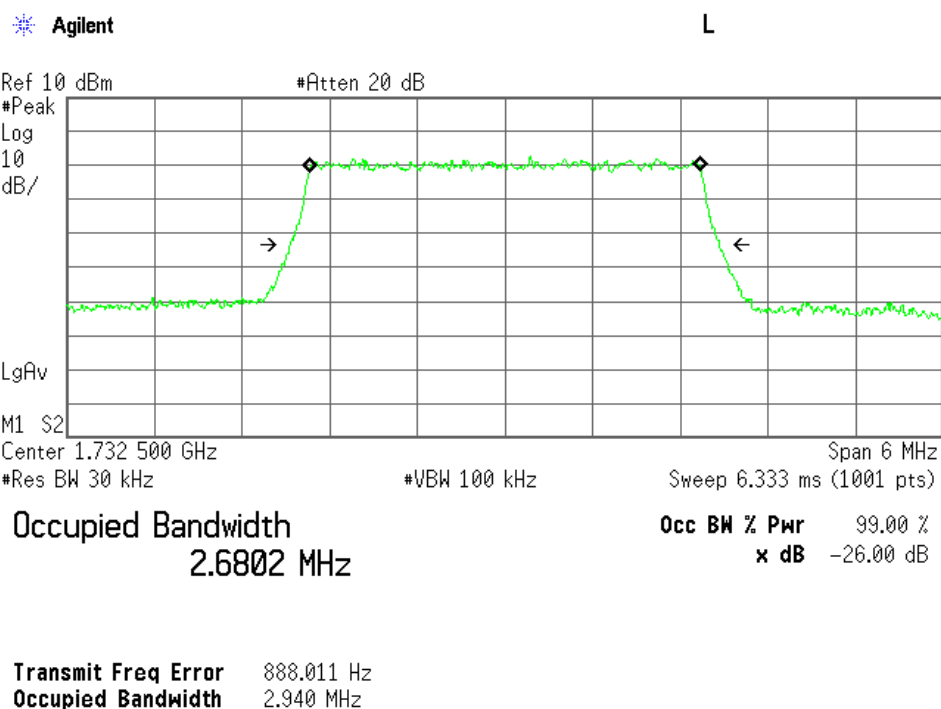
* Agilent



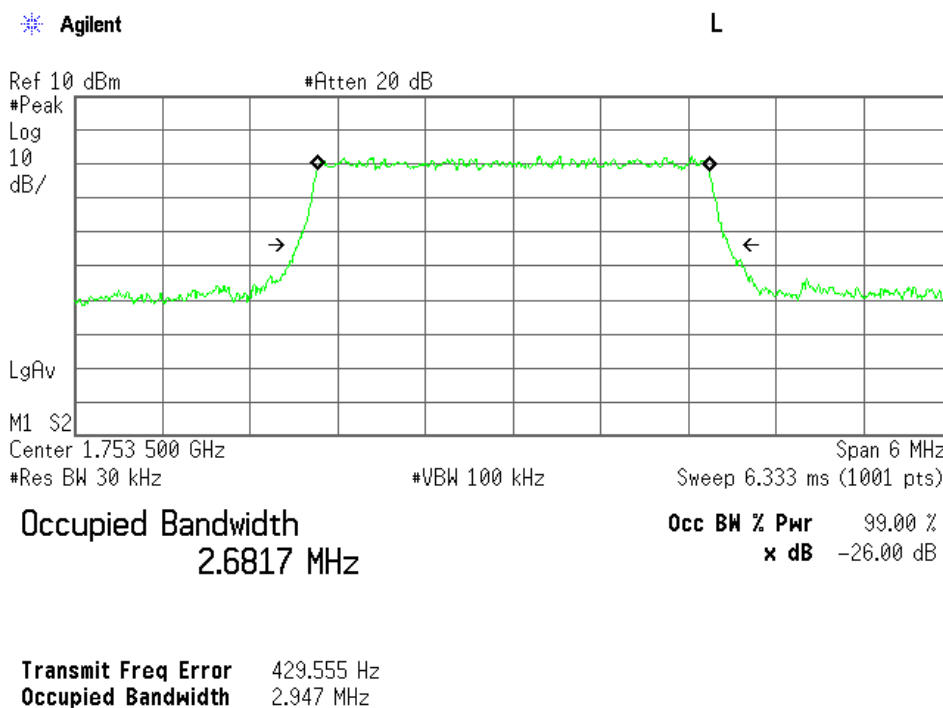
Transmit Freq Error 1.674 kHz

Occupied Bandwidth 2.936 MHz

Middle Channel



High Channel

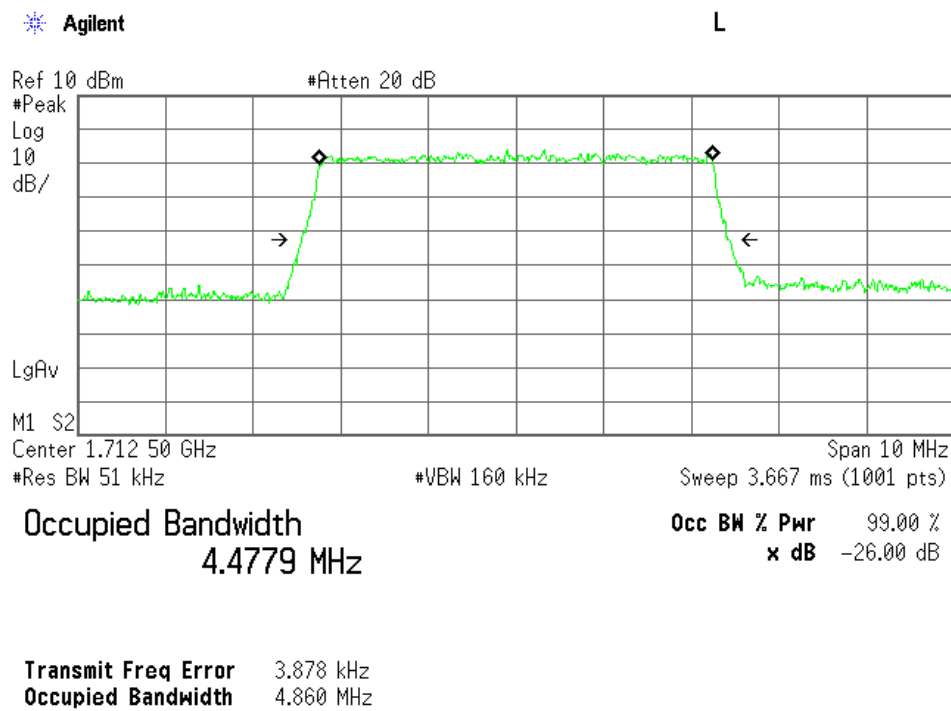


3-1) BW 5MHz(Full RB)

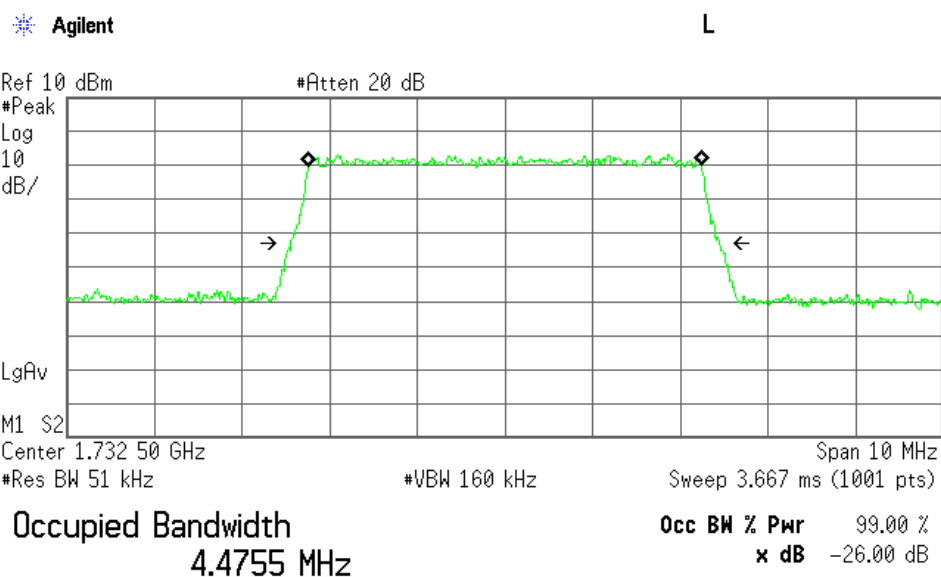
Mode: QPSK

Channel	Frequency (MHz)	99% Bandwidth (MHz)	-26dBc Bandwidth (MHz)
19975	1712.50	4.48	4.86
20175	1732.50	4.48	4.89
20375	1752.50	4.47	4.85

Low Channel

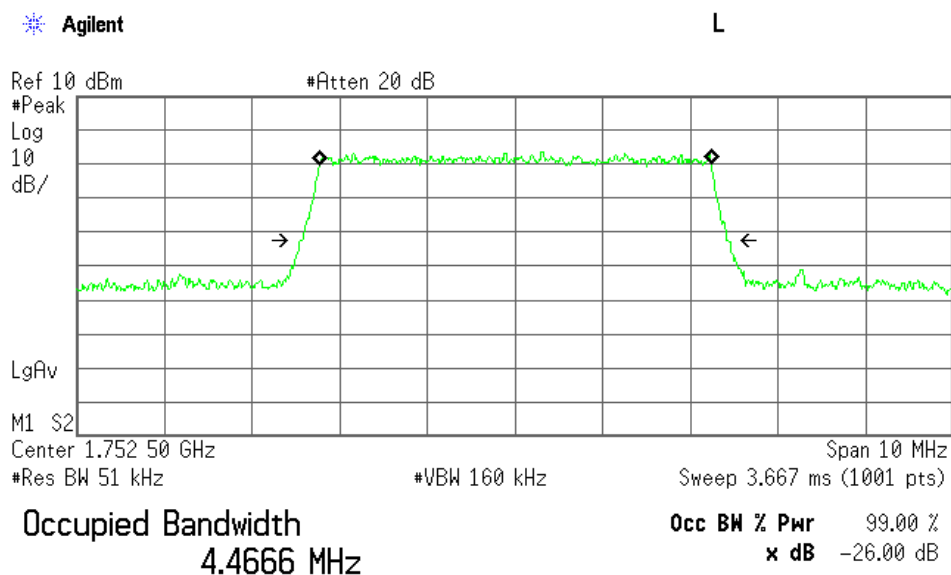


Middle Channel



Transmit Freq Error 1.316 kHz
Occupied Bandwidth 4.888 MHz

High Channel



Transmit Freq Error 2.524 kHz
Occupied Bandwidth 4.847 MHz

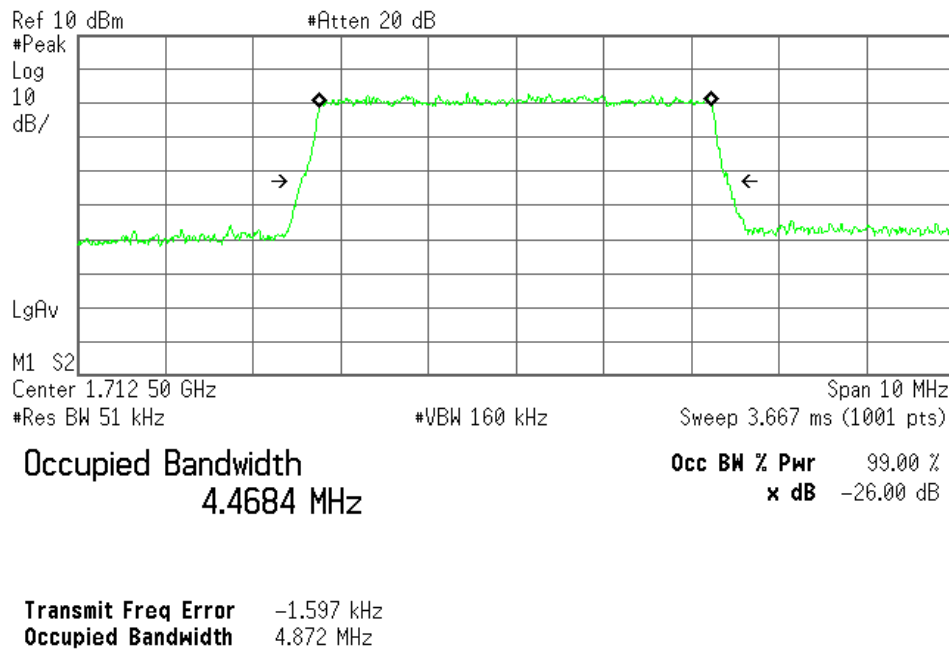
3-2) BW 5MHz(Full RB)

Mode: 16QAM

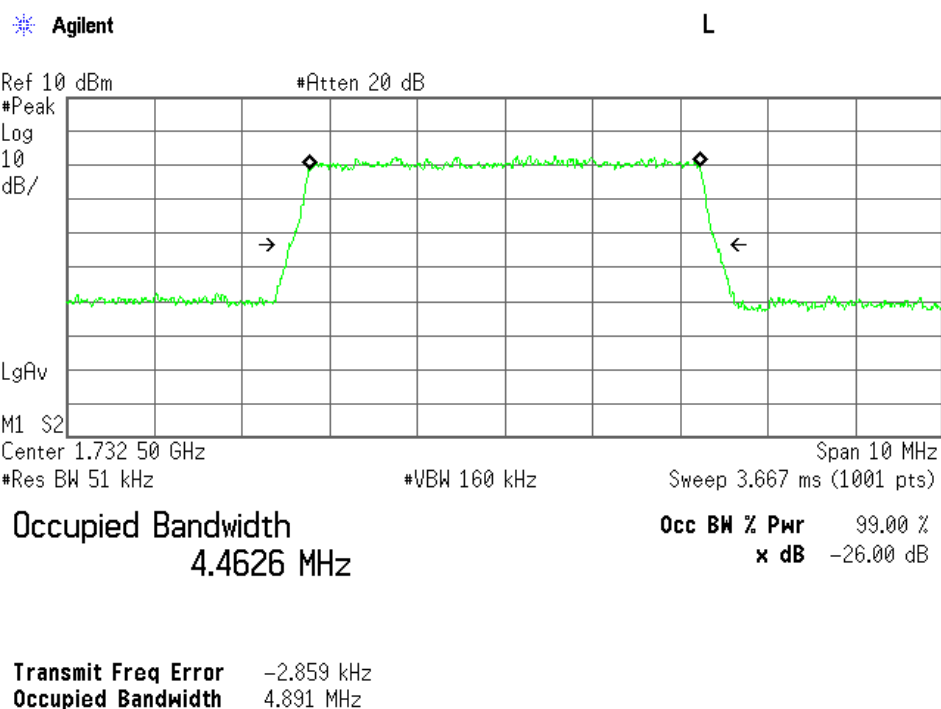
Channel	Frequency (MHz)	99% Bandwidth (MHz)	-26dBc Bandwidth (MHz)
19975	1712.50	4.47	4.87
20175	1732.50	4.46	4.89
20375	1752.50	4.47	4.85

Low Channel

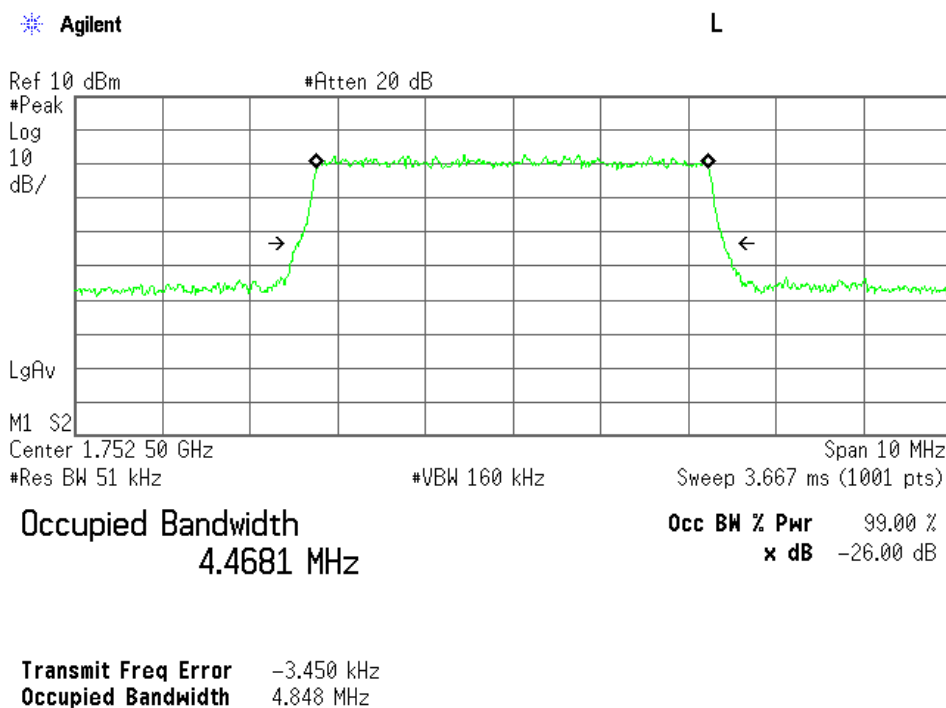
* Agilent



Middle Channel



High Channel

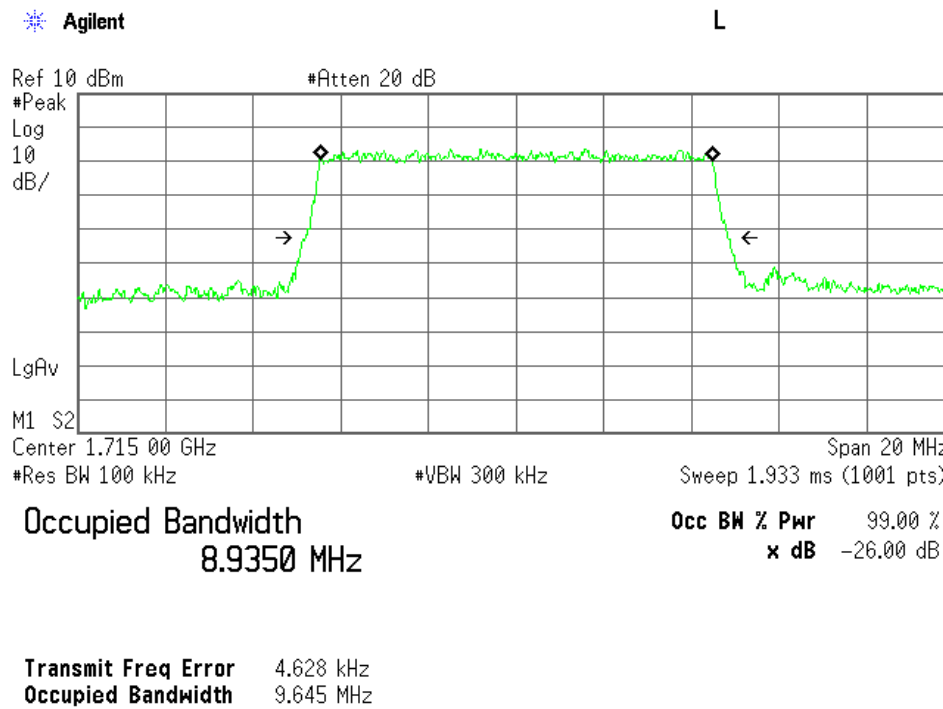


4-1) BW 10MHz(Full RB)

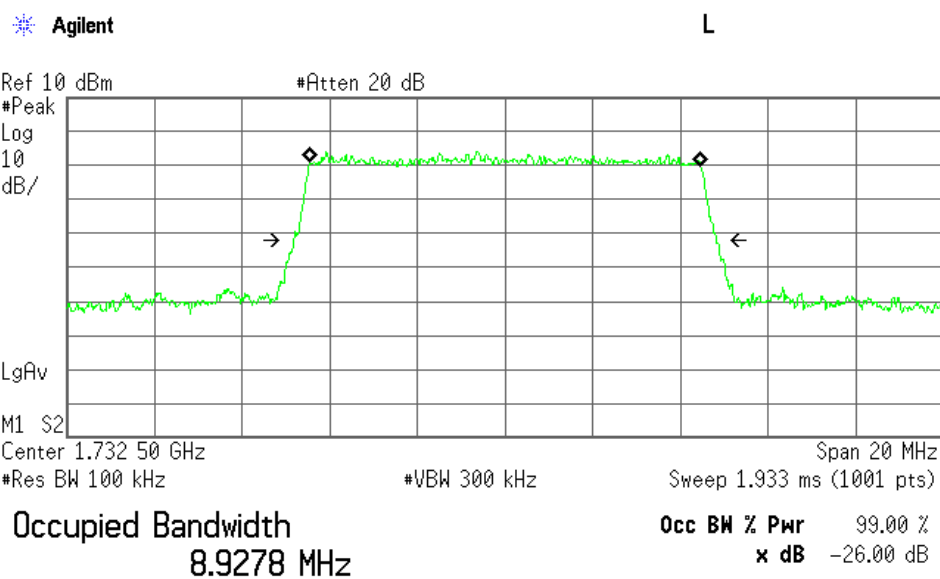
Mode: QPSK

Channel	Frequency (MHz)	99% Bandwidth (MHz)	-26dBc Bandwidth (MHz)
20000	1715.00	8.94	9.65
20175	1732.50	8.93	9.66
20350	1750.00	8.92	9.66

Low Channel

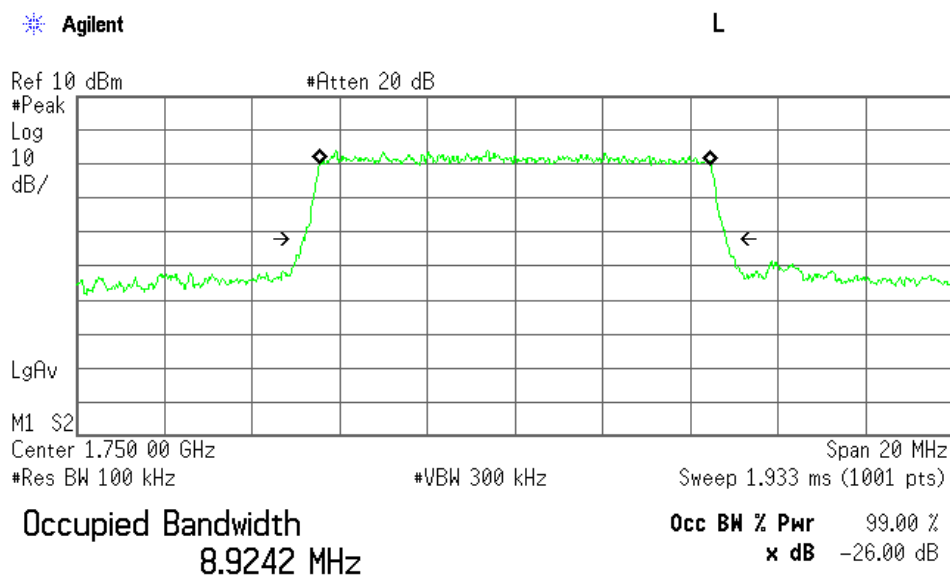


Middle Channel



Transmit Freq Error 4.690 kHz
Occupied Bandwidth 9.655 MHz

High Channel



Transmit Freq Error 4.524 kHz
Occupied Bandwidth 9.661 MHz

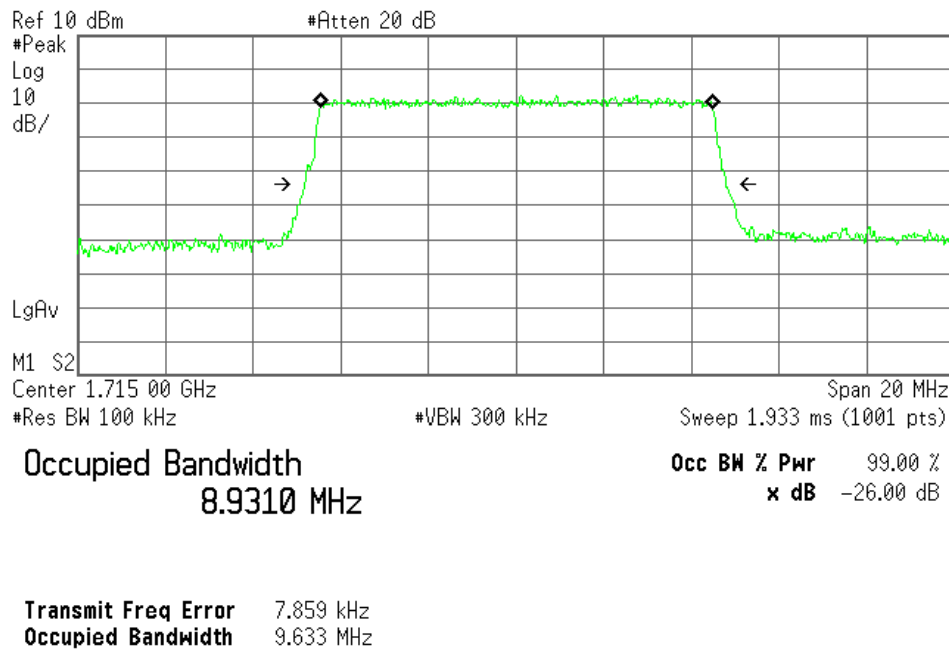
4-2) BW 10MHz(Full RB)

Mode: 16QAM

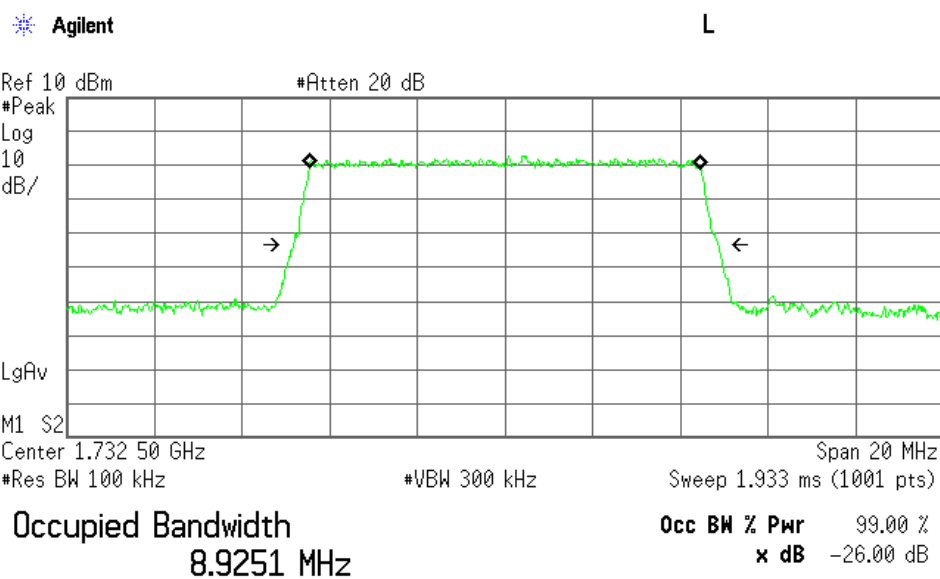
Channel	Frequency (MHz)	99% Bandwidth (MHz)	-26dBc Bandwidth (MHz)
20000	1715.00	8.93	9.63
20175	1732.50	8.93	9.69
20350	1750.00	8.94	9.65

Low Channel

* Agilent

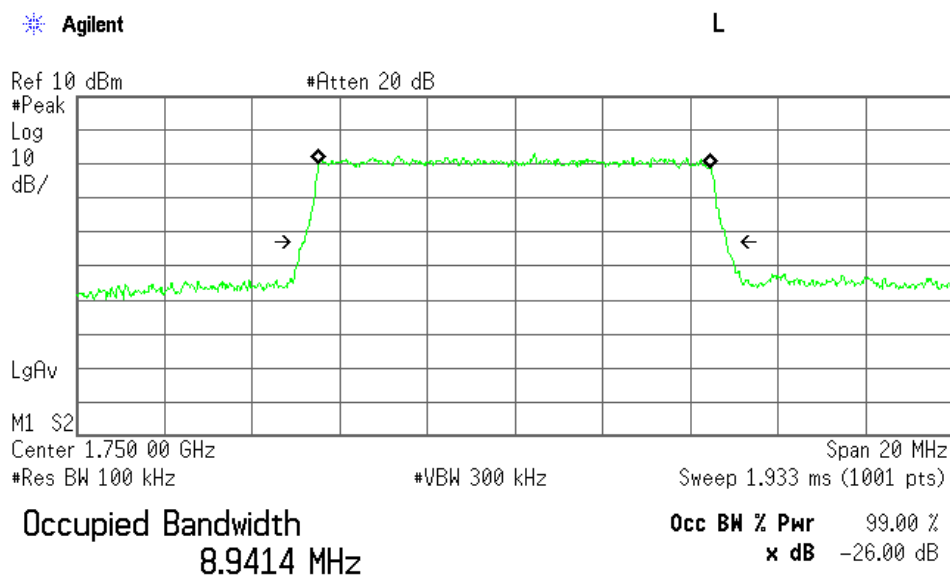


Middle Channel



Transmit Freq Error 3.198 kHz
Occupied Bandwidth 9.686 MHz

High Channel



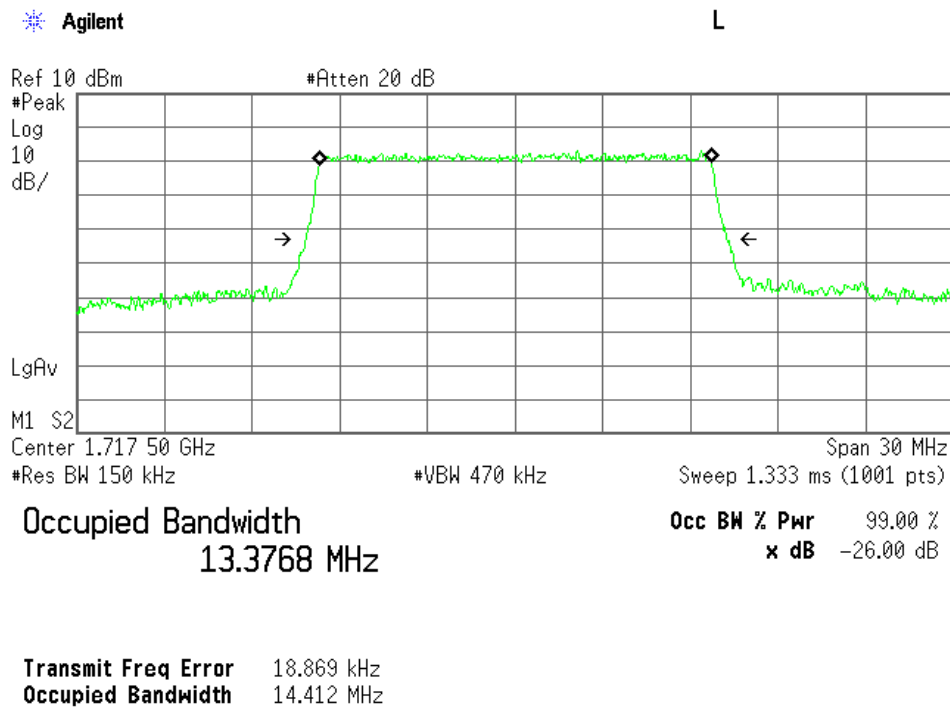
Transmit Freq Error -2.404 kHz
Occupied Bandwidth 9.649 MHz

5-1) BW 15MHz(Full RB)

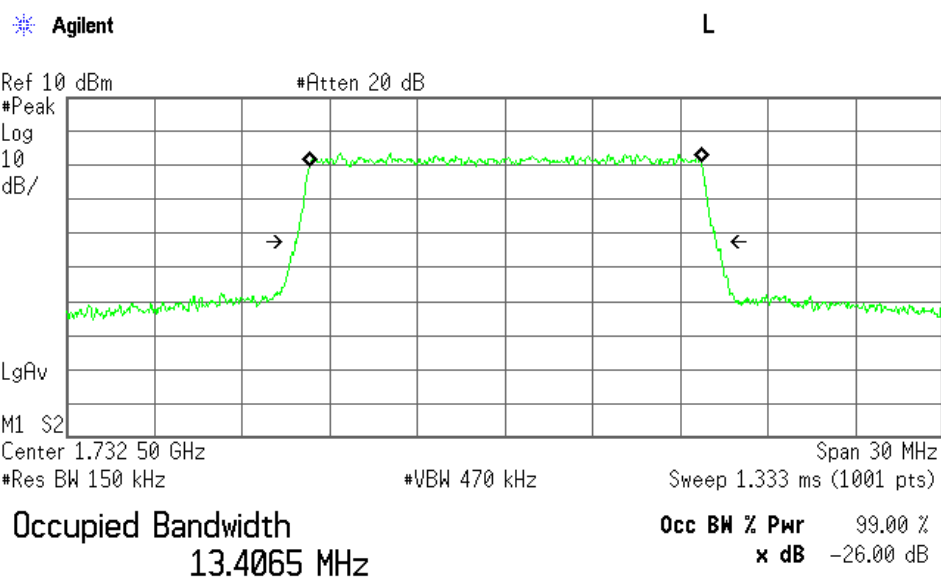
Mode: QPSK

Channel	Frequency (MHz)	99% Bandwidth (MHz)	-26dBc Bandwidth (MHz)
20025	1717.50	13.4	14.4
20175	1732.50	13.4	14.3
20325	1747.50	13.4	14.4

Low Channel

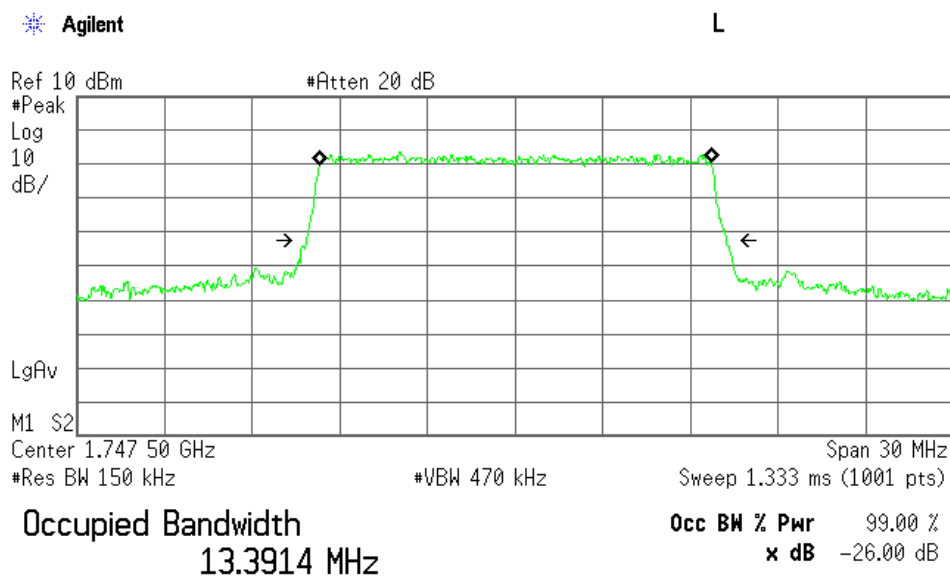


Middle Channel



Transmit Freq Error 21.025 kHz
Occupied Bandwidth 14.330 MHz

High Channel



Transmit Freq Error 21.114 kHz
Occupied Bandwidth 14.371 MHz

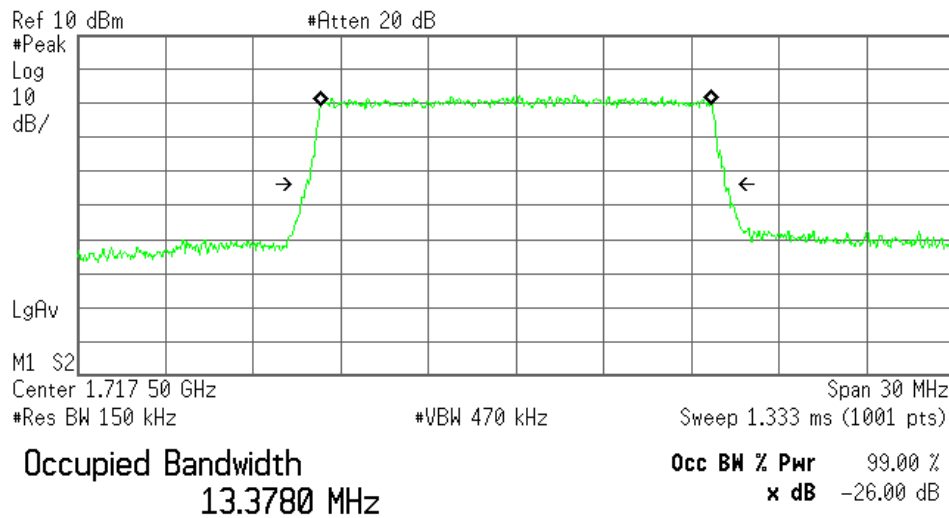
5-2) BW 15MHz(Full RB)

Mode: 16QAM

Channel	Frequency (MHz)	99% Bandwidth (MHz)	-26dBc Bandwidth (MHz)
20025	1717.50	13.4	14.3
20175	1732.50	13.4	14.3
20325	1747.50	13.4	14.3

Low Channel

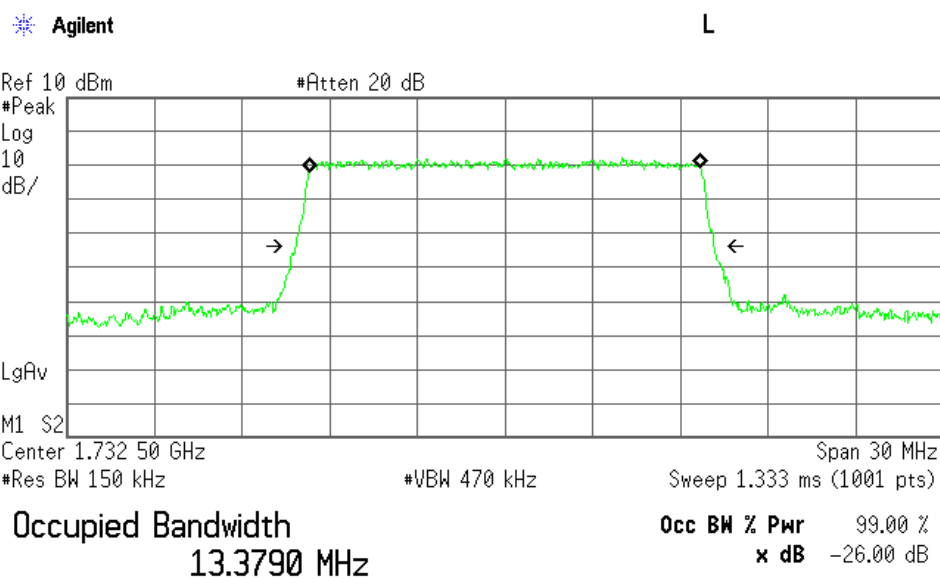
* Agilent



Transmit Freq Error 12.668 kHz

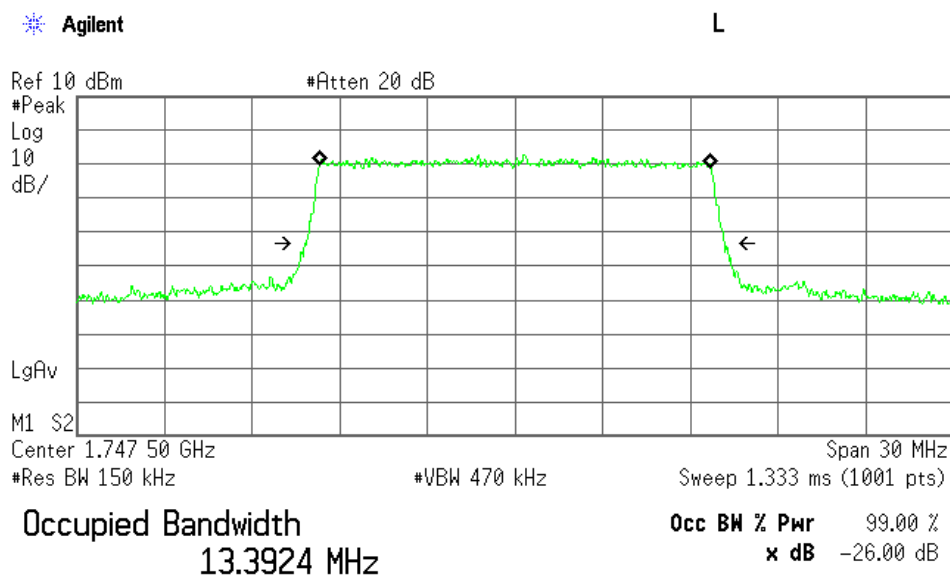
Occupied Bandwidth 14.307 MHz

Middle Channel



Transmit Freq Error 14.442 kHz
Occupied Bandwidth 14.292 MHz

High Channel



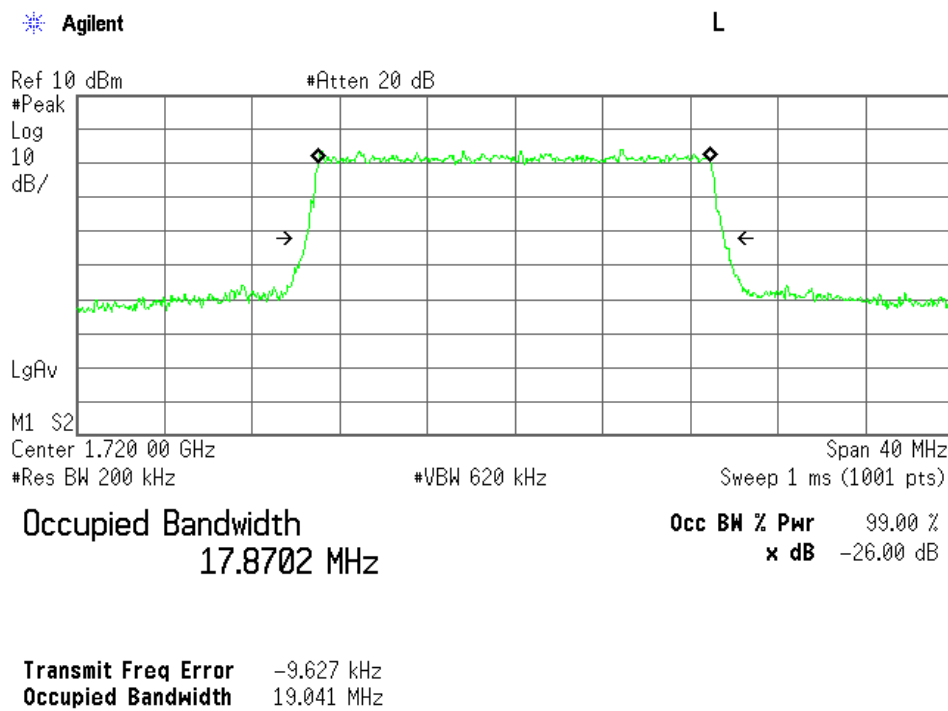
Transmit Freq Error 6.511 kHz
Occupied Bandwidth 14.329 MHz

6-1) BW 20MHz(Full RB)

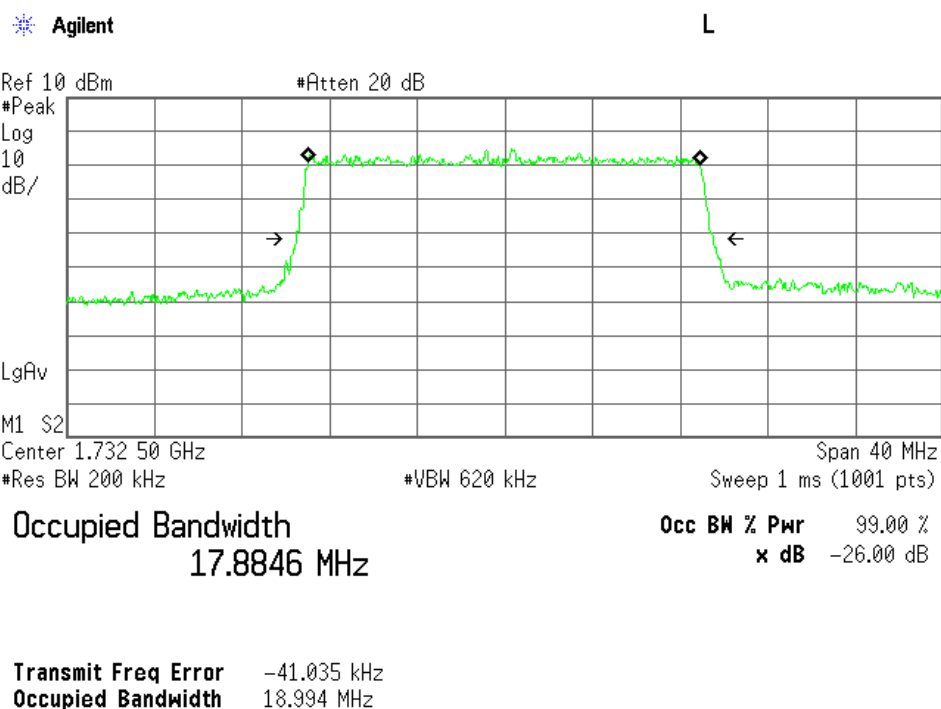
Mode: QPSK

Channel	Frequency (MHz)	99% Bandwidth (MHz)	-26dBc Bandwidth (MHz)
20050	1720.00	17.9	19.0
20175	1732.50	17.9	19.0
20300	1745.00	17.9	19.2

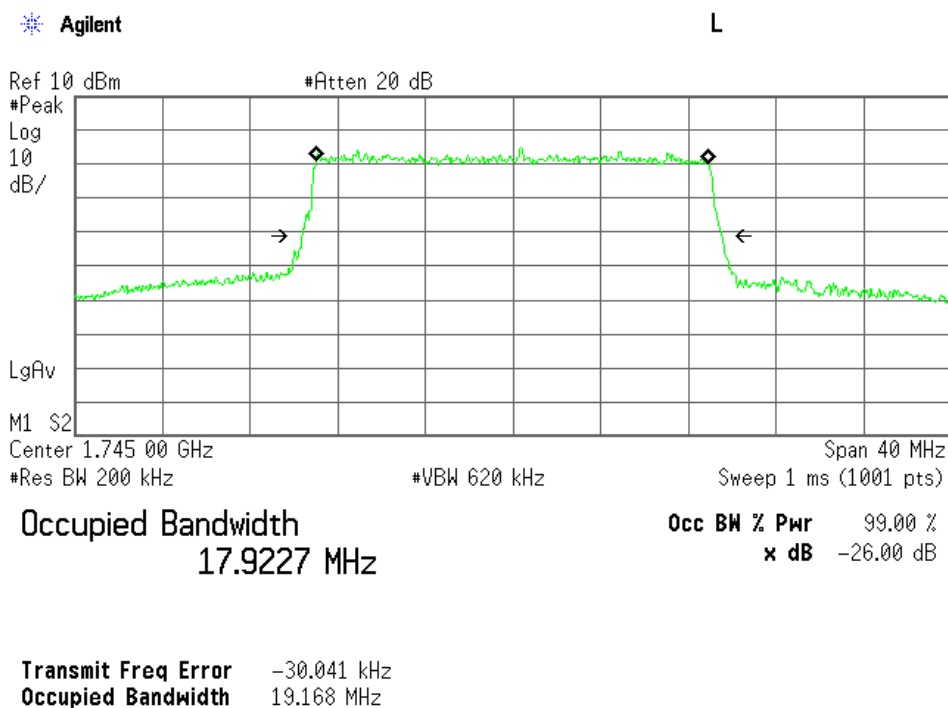
Low Channel



Middle Channel



High Channel



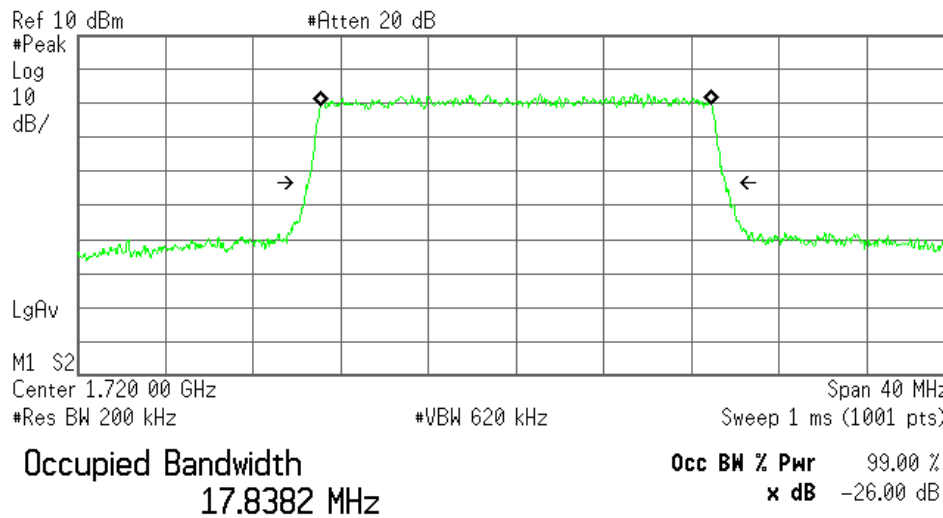
6-2) BW 20MHz(Full RB)

Mode: 16QAM

Channel	Frequency (MHz)	99% Bandwidth (MHz)	-26dBc Bandwidth (MHz)
20050	1720.00	17.8	19.0
20175	1732.50	17.8	18.9
20300	1745.00	17.8	19.0

Low Channel

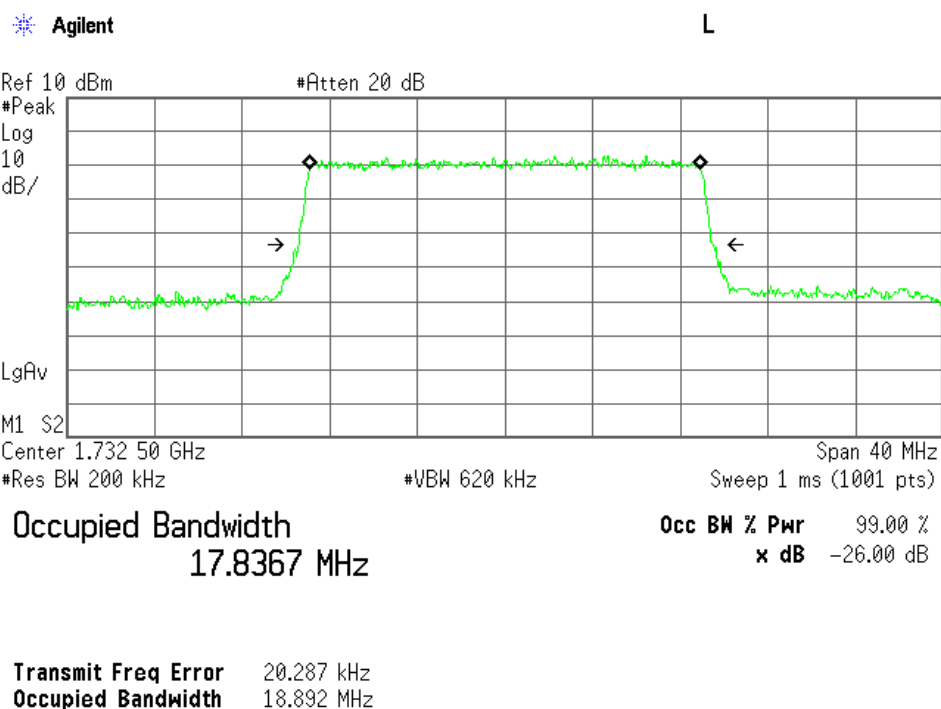
Agilent



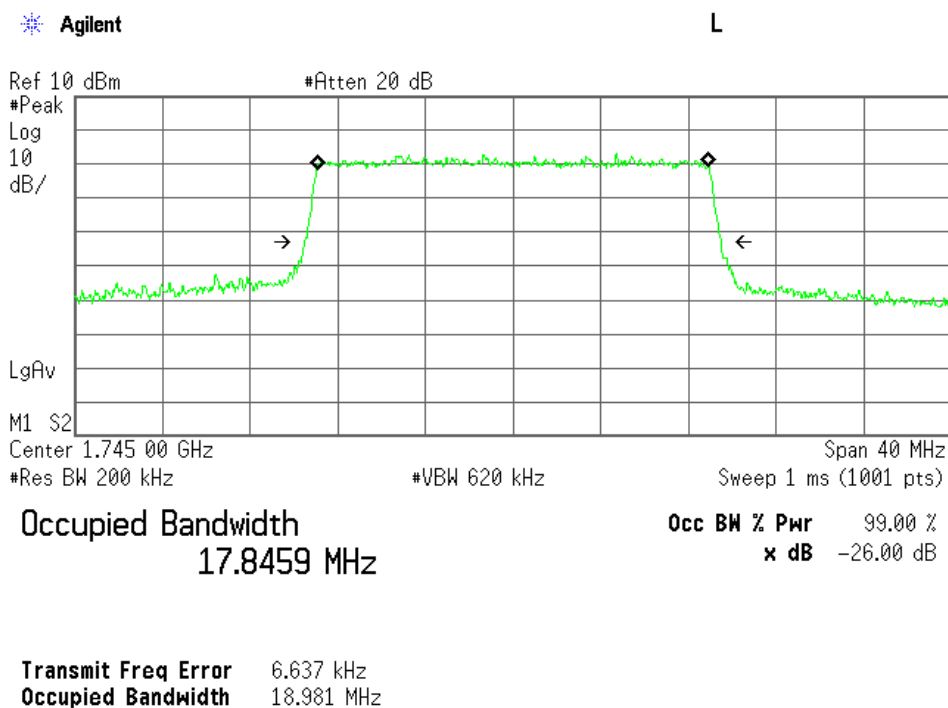
Transmit Freq Error 11.485 kHz

Occupied Bandwidth 19.005 MHz

Middle Channel



High Channel



7.5 Spurious Emissions at Antenna Terminals (§2.1051)

For the requirements, ☒ - Applicable [☒ - Tested. ☐ - Not tested by applicant request.]
☐ - Not Applicable

7.5.1 Test Results

For the standard, ☒ - Passed ☐ - Failed ☐ - Not judged

Min. Limit Margin 28.5 dB at 5267.500 MHz

Uncertainty of Measurement Results
9 kHz – 1 GHz ± 1.4 dB(2σ)
1 GHz – 18 GHz ± 1.7 dB(2σ)
18 GHz – 40 GHz ± 2.3 dB(2σ)

Remarks : BW 5.0 MHz

7.5.2 Test Instruments

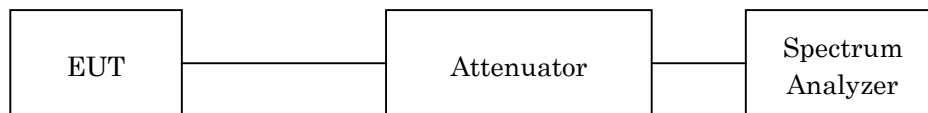
Shielded Room S4				
Type	Model	Serial No. (ID)	Manufacturer	Cal. Due
Spectrum Analyzer	E4446A	US44300388 (A-39)	Agilent	2016/08/11
Attenuator	43KC-20	1418003 (D-41)	Anritsu	2016/07/05
RF Cable	SUCOFLEX102	14253/2 (C-52)	HUBER+SUHNER	2016/08/16
High Pass Filter	HPM13899	001 (D-96)	MICRO-TRONICS	2016/02/08

NOTE : The calibration interval of the above test instruments is 12 months.

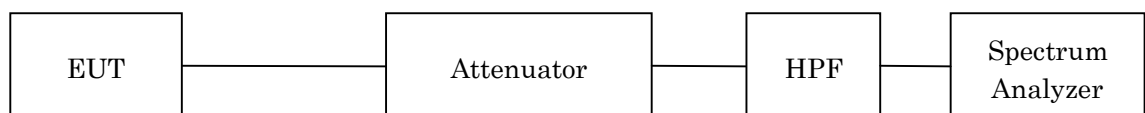
7.5.3 Test Method and Test Setup (Diagrammatic illustration)

The Antenna Conducted Emission was measured with a spectrum analyzer. The test system is shown as follows:

- a) Frequency Range: 9 kHz – 2 GHz



- b) Frequency Range: 2 GHz – 20 GHz



The setting of the spectrum analyzer are shown as follows:

Frequency Range	9 kHz - 150 kHz	150 kHz - 30 MHz	30 MHz - 20 GHz
Res. Bandwidth	200 Hz	10 kHz	1 MHz
Video Bandwidth	1 kHz	30 kHz	3 MHz
Sweep Time	AUTO	AUTO	AUTO
Trace	Maxhold	Maxhold	Maxhold

7.5.4 Test Data

1) BW 1.4MHz(1RB)

(LTE 1.4MHz)

Test Date: April 5, 2016
Temp.: 22 °C, Humi: 42 %

CH	Transmitting Frequency [MHz]	Measured Frequency [MHz]	Corr. Factor [dB]	Meter Readings [dBm]	Limits [dBm]	Results [dBm]	Margin [dB]	Remarks
19957	1710.700	3421.400	20.9	< -70.0	-13.0	< -49.1	> +36.1	C
		5132.100	21.1	< -70.0	-13.0	< -48.9	> +35.9	C
		6842.800	21.2	< -70.0	-13.0	< -48.8	> +35.8	C
		8553.500	21.5	< -70.0	-13.0	< -48.5	> +35.5	C
		10264.200	21.7	< -70.0	-13.0	< -48.3	> +35.3	C
		11974.900	21.9	< -70.0	-13.0	< -48.1	> +35.1	C
		13685.600	22.2	< -70.0	-13.0	< -47.8	> +34.8	C
		15396.300	22.4	< -70.0	-13.0	< -47.6	> +34.6	C
		17107.000	22.7	< -70.0	-13.0	< -47.3	> +34.3	C
20175	1732.500	3465.000	20.9	< -70.0	-13.0	< -49.1	> +36.1	C
		5197.500	21.1	-68.1	-13.0	-47.0	+34.0	C
		6930.000	21.2	< -70.0	-13.0	< -48.8	> +35.8	C
		8662.500	21.5	< -70.0	-13.0	< -48.5	> +35.5	C
		10395.000	21.7	< -70.0	-13.0	< -48.3	> +35.3	C
		12127.500	22.0	< -70.0	-13.0	< -48.0	> +35.0	C
		13860.000	22.2	< -70.0	-13.0	< -47.8	> +34.8	C
		15592.500	22.4	< -70.0	-13.0	< -47.6	> +34.6	C
		17325.000	22.7	< -70.0	-13.0	< -47.3	> +34.3	C
20393	1754.300	3508.600	20.9	< -70.0	-13.0	< -49.1	> +36.1	C
		5262.900	21.1	-63.1	-13.0	-42.0	+29.0	C
		7017.200	21.2	< -70.0	-13.0	< -48.8	> +35.8	C
		8771.500	21.5	< -70.0	-13.0	< -48.5	> +35.5	C
		10525.800	21.7	< -70.0	-13.0	< -48.3	> +35.3	C
		12280.100	22.0	< -70.0	-13.0	< -48.0	> +35.0	C
		14034.400	22.2	< -70.0	-13.0	< -47.8	> +34.8	C
		15788.700	22.5	< -70.0	-13.0	< -47.5	> +34.5	C
		17543.000	22.7	< -70.0	-13.0	< -47.3	> +34.3	C

Calculated result at 5262.9 MHz, as the worst point shown on underline:

Corr. Factor	=	21.1 dB
+) <u>Meter Reading</u>	=	<u>-63.1 dBm</u>
Result	=	-42.0 dBm

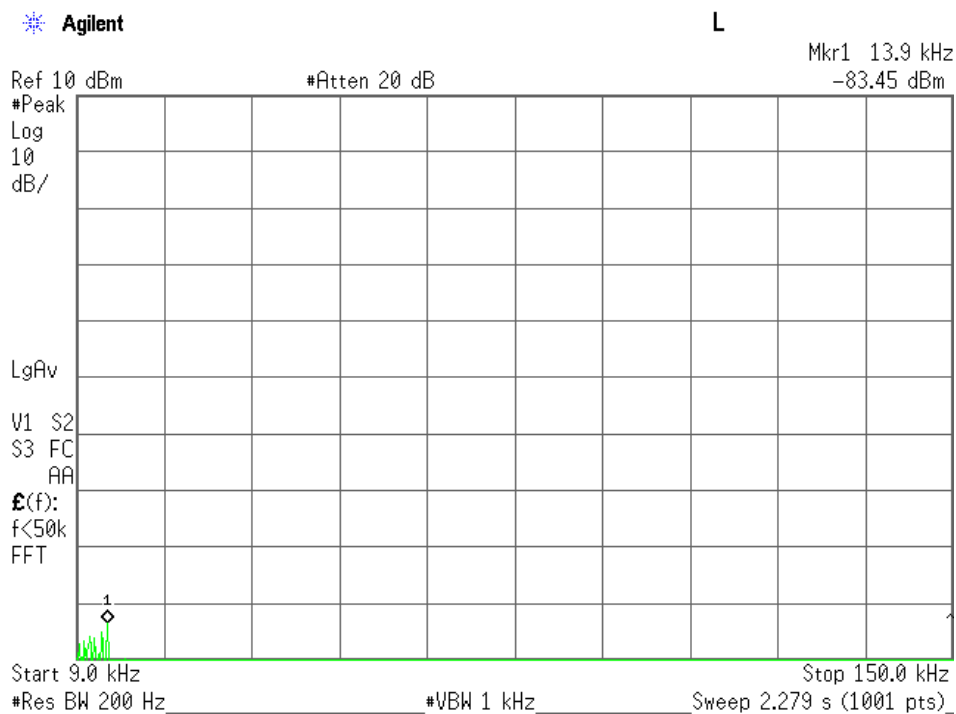
Minimum Margin: -13.0 - (-42.0) = 29.0 (dB)

NOTES

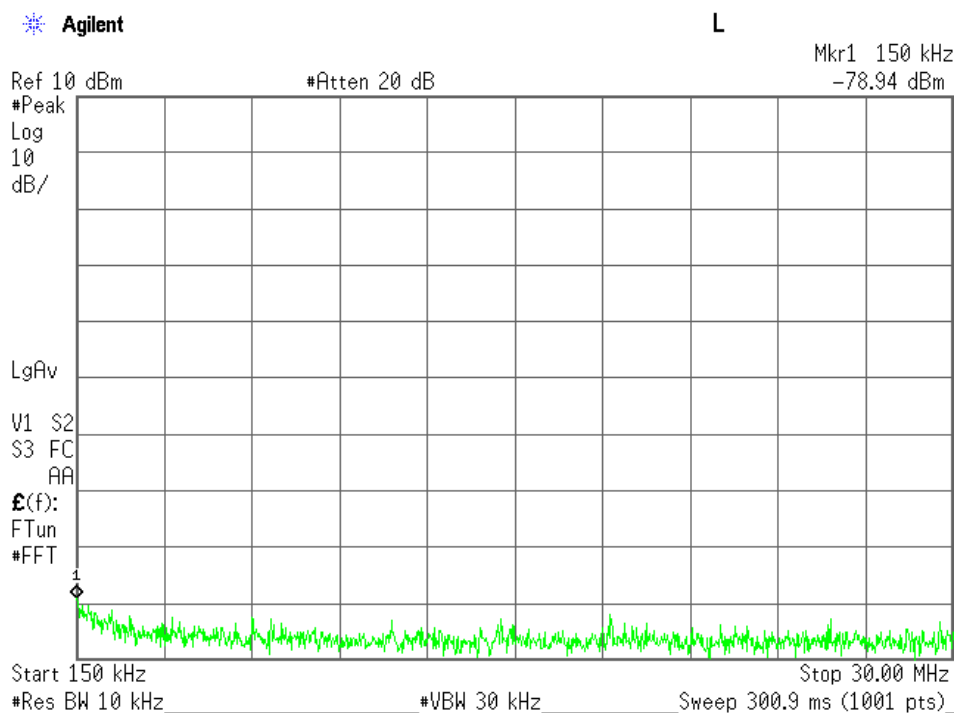
- The spectrum was checked from 9 kHz to 20 GHz.
- Applied limits : $-13.0 \text{ [dBm]} = 10\log(\text{TP[mW]}) - (43 + 10\log(\text{tp[W]})) = 10\log(\text{TP[mW]}) - (43 + (10 \log(\text{TP[mW]}) - 30))$
where, $\text{tp[W]} = \text{TP[mW]} / 1000$: Transmitter power at antenna terminal
- The correction factor is shown as follows:
Corr. Factor [dB] = Cable Loss + Pad Att. [dB] (9 kHz - 2 GHz)
Corr. Factor [dB] = Cable Loss + Pad Att. + High Pass Filter Loss [dB] (over 2 GHz)
- The symbol of "<" means "or less".
- The symbol of ">" means "more than".
- Setting of measuring instrument(s) :

	Detector Function	RES B.W.	V.B.W.	Sweep Time
A	Peak	200 Hz	1 kHz	AUTO
B	Peak	10 kHz	30 kHz	AUTO
C	Peak	1 MHz	3 MHz	AUTO

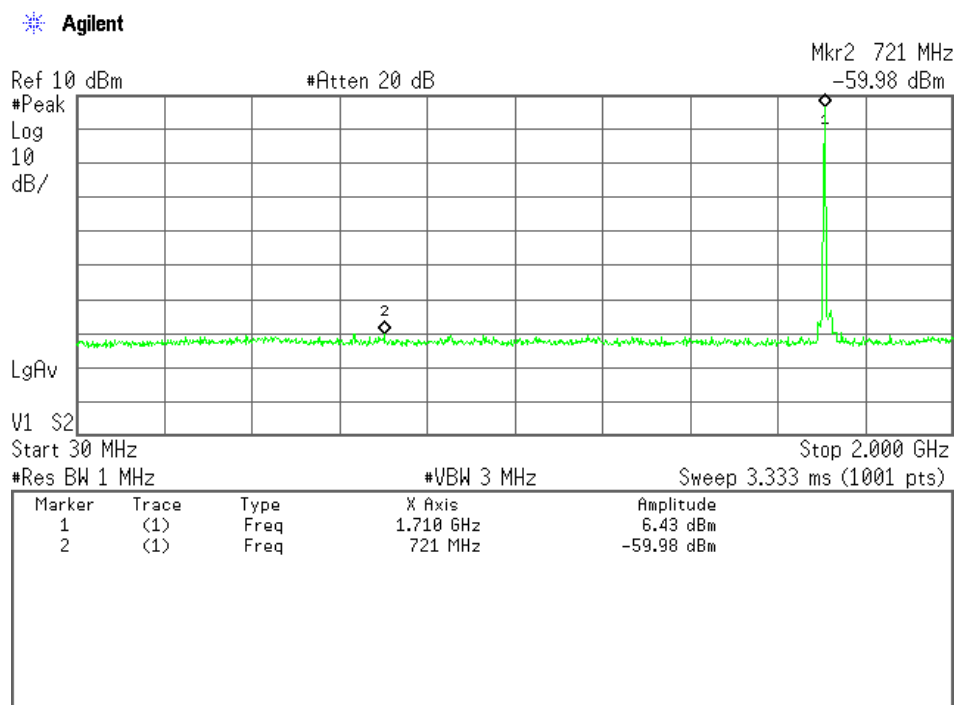
Low Channel, Out-Of-Band Emissions (9 kHz – 150 kHz)



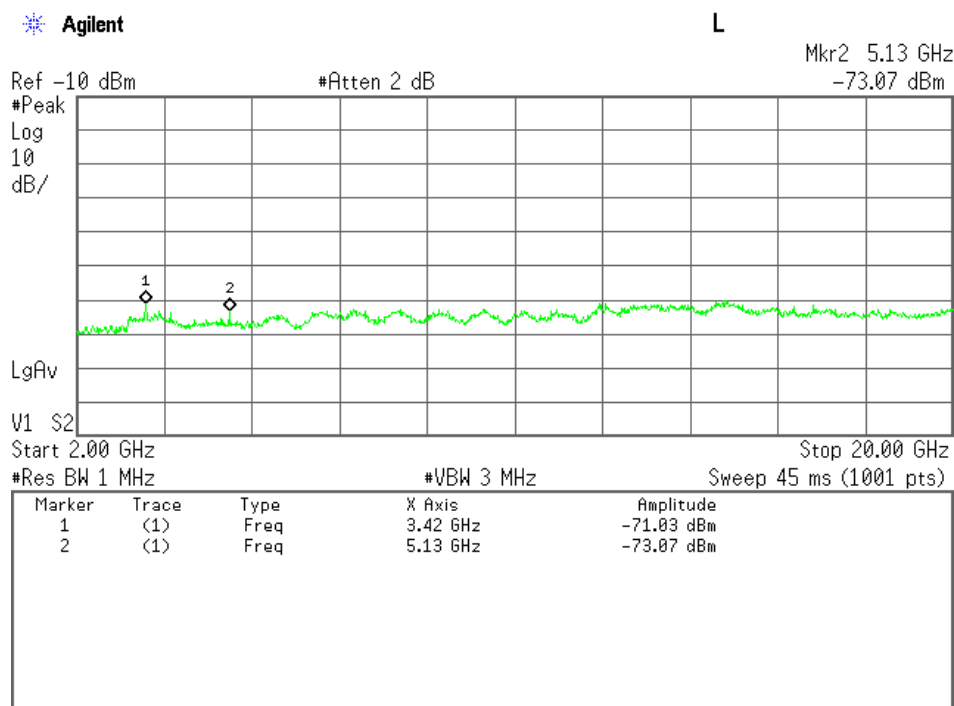
Low Channel, Out-Of-Band Emissions (150 kHz – 30 MHz)



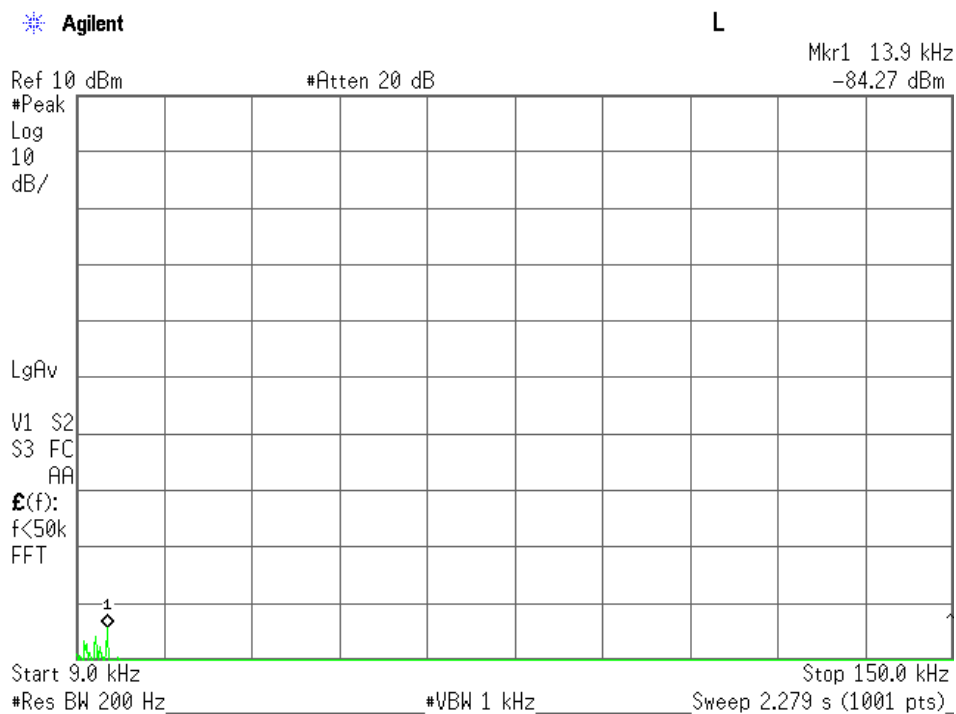
Low Channel, Out-Of-Band Emissions (30 MHz – 2 GHz)



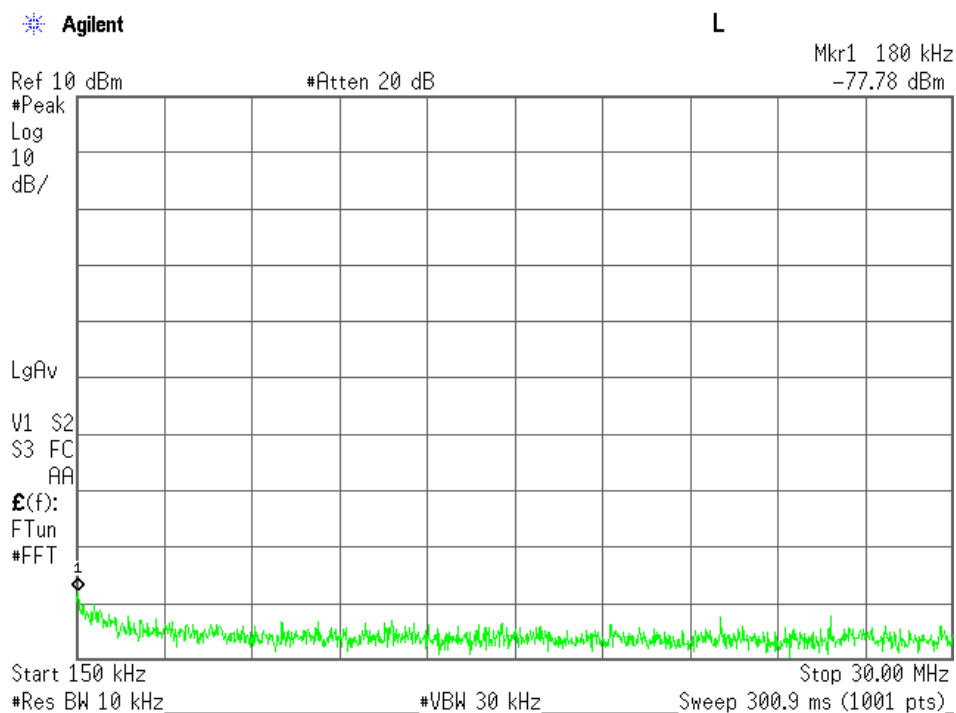
Low Channel, Out-Of-Band Emissions (2 GHz – 20 GHz)



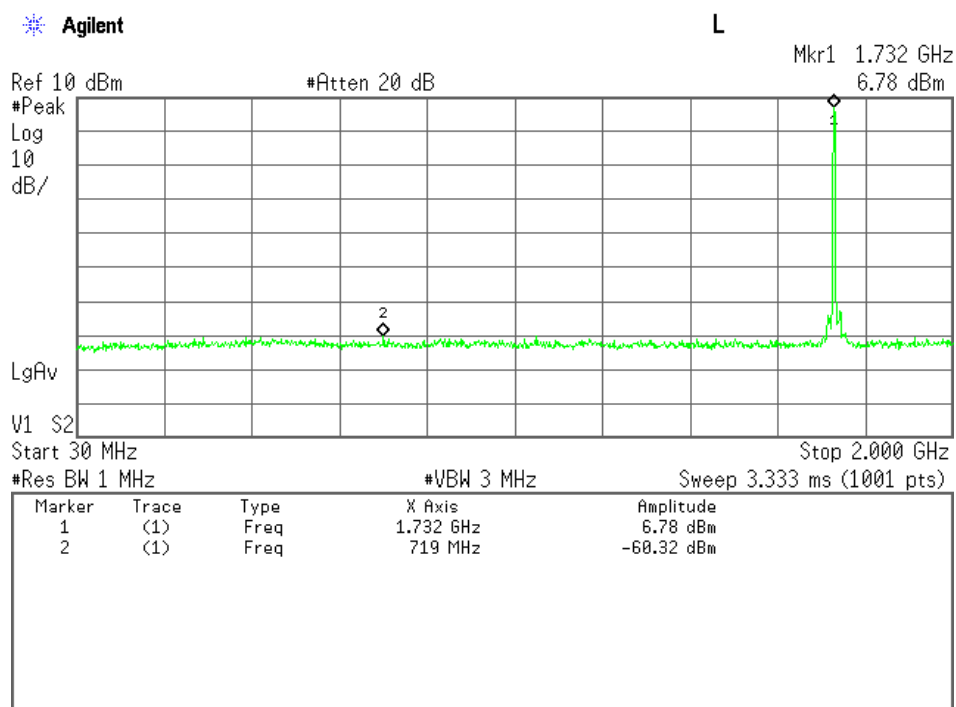
Middle Channel, Out-Of-Band Emissions (9 kHz – 150 kHz)



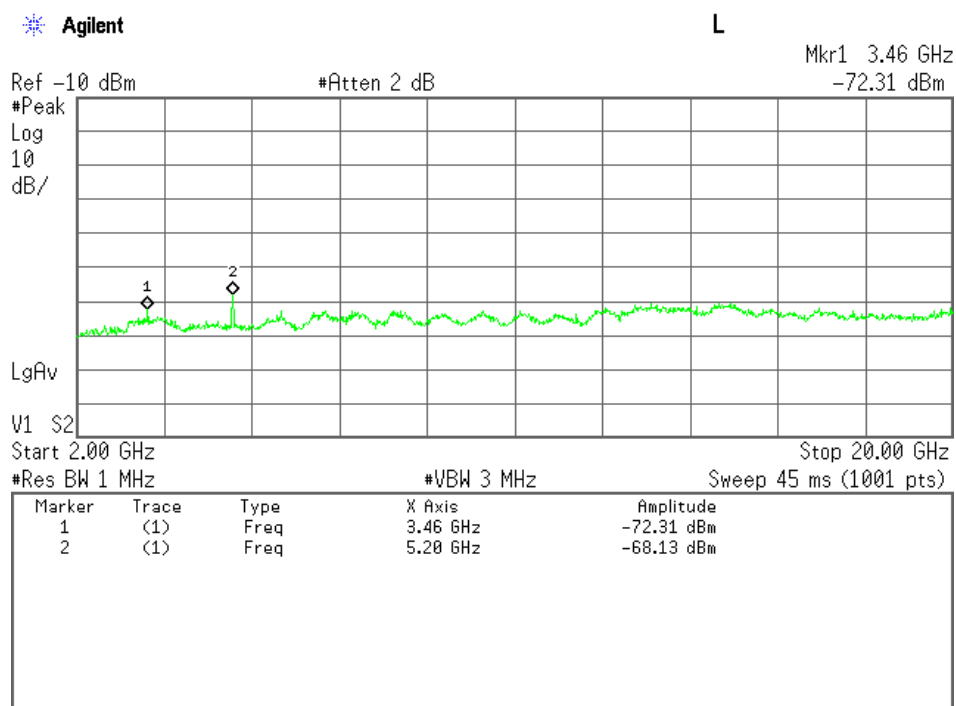
Middle Channel, Out-Of-Band Emissions (150 kHz – 30 MHz)



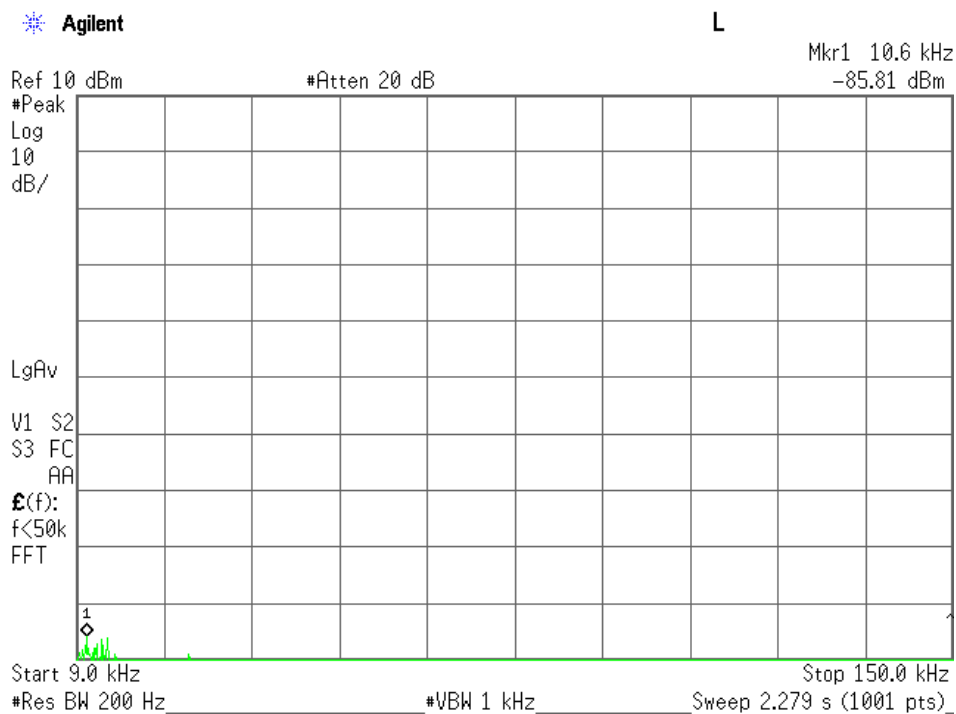
Middle Channel, Out-Of-Band Emissions (30 MHz – 2 GHz)



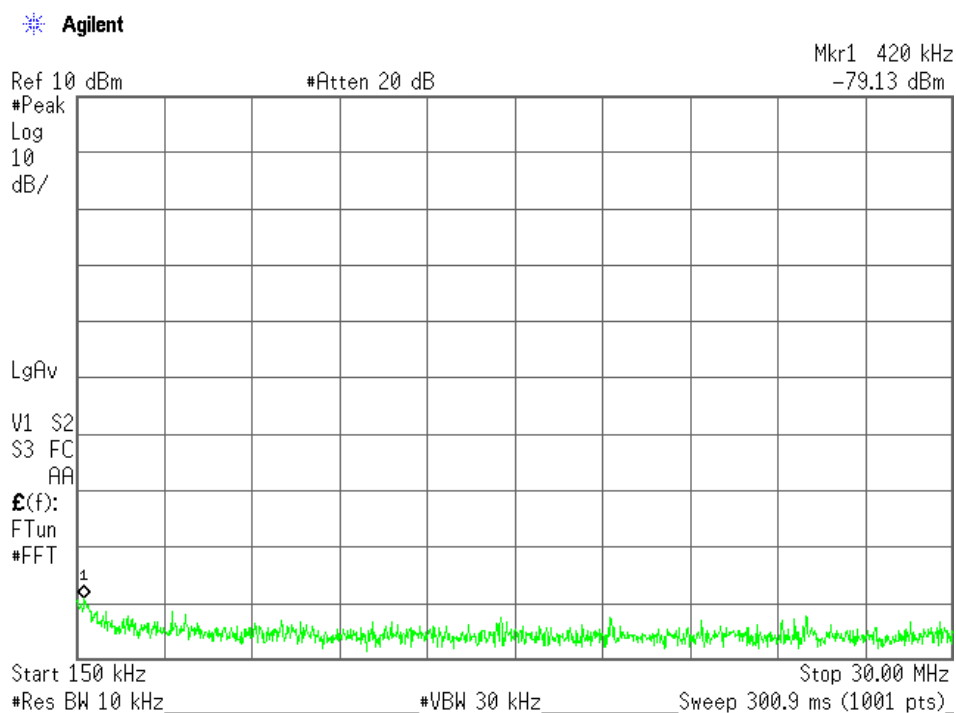
Middle Channel, Out-Of-Band Emissions (2 GHz – 20 GHz)



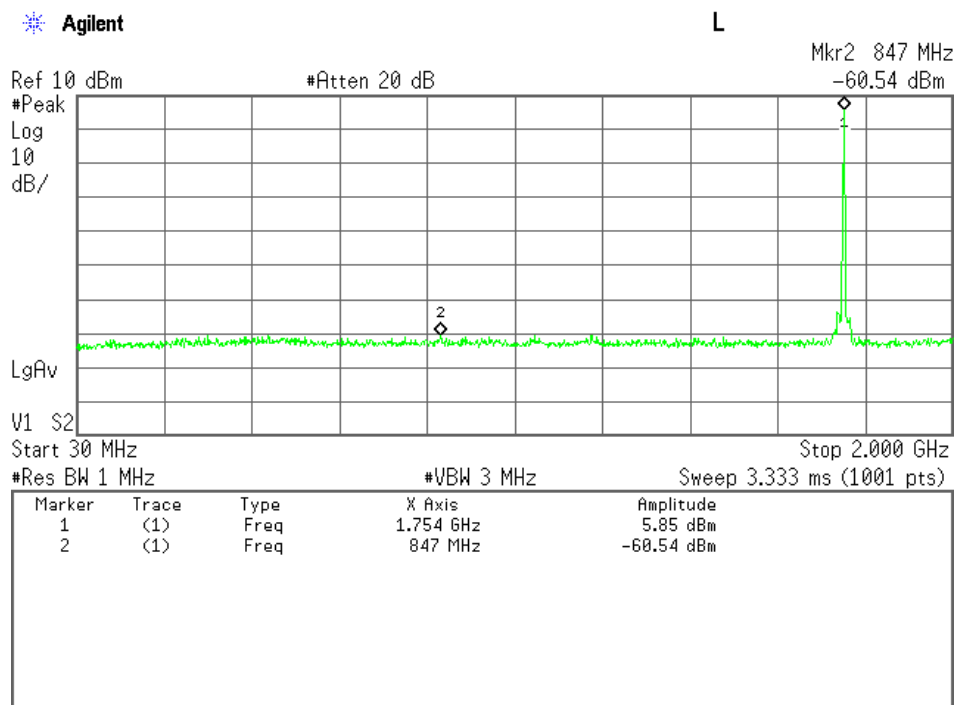
High Channel, Out-Of-Band Emissions (9 kHz – 150 kHz)



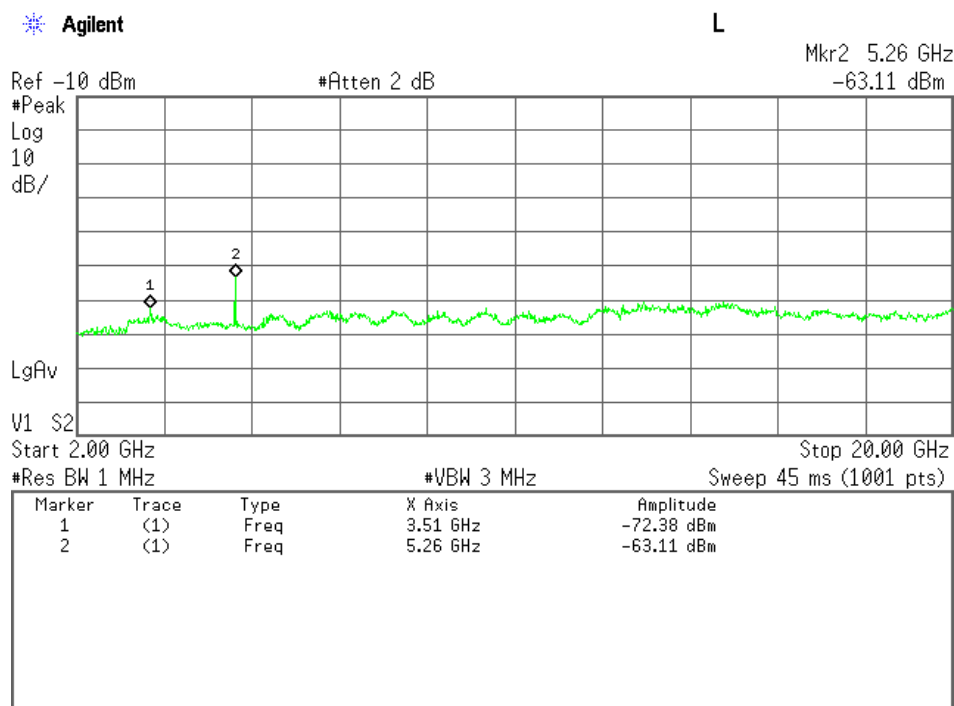
High Channel, Out-Of-Band Emissions (150 kHz – 30 MHz)



High Channel, Out-Of-Band Emissions (30 MHz – 2 GHz)



High Channel, Out-Of-Band Emissions (2 GHz – 20 GHz)



2) BW 3MHz(1RB)

(LTE 3MHz)

Test Date: April 5, 2016

Temp.: 22 °C, Humi: 42 %

Transmitting Frequency CH [MHz]		Measured Frequency [MHz]	Corr. Factor [dB]	Meter Readings [dBm]	Limits [dBm]	Results [dBm]	Margin [dB]	Remarks
19965	1711.500	3423.000	20.9	< -70.0	-13.0	< -49.1	> +36.1	C
		5134.500	21.1	< -70.0	-13.0	< -48.9	> +35.9	C
		6846.000	21.2	< -70.0	-13.0	< -48.8	> +35.8	C
		8557.500	21.5	< -70.0	-13.0	< -48.5	> +35.5	C
		10269.000	21.7	< -70.0	-13.0	< -48.3	> +35.3	C
		11980.500	21.9	< -70.0	-13.0	< -48.1	> +35.1	C
		13692.000	22.2	< -70.0	-13.0	< -47.8	> +34.8	C
		15403.500	22.4	< -70.0	-13.0	< -47.6	> +34.6	C
		17115.000	22.7	< -70.0	-13.0	< -47.3	> +34.3	C
20175	1732.500	3465.000	20.9	< -70.0	-13.0	< -49.1	> +36.1	C
		5197.500	21.1	-68.5	-13.0	-47.4	+34.4	C
		6930.000	21.2	< -70.0	-13.0	< -48.8	> +35.8	C
		8662.500	21.5	< -70.0	-13.0	< -48.5	> +35.5	C
		10395.000	21.7	< -70.0	-13.0	< -48.3	> +35.3	C
		12127.500	22.0	< -70.0	-13.0	< -48.0	> +35.0	C
		13860.000	22.2	< -70.0	-13.0	< -47.8	> +34.8	C
		15592.500	22.4	< -70.0	-13.0	< -47.6	> +34.6	C
		17325.000	22.7	< -70.0	-13.0	< -47.3	> +34.3	C
20385	1753.500	3507.000	20.9	< -70.0	-13.0	< -49.1	> +36.1	C
		5260.500	21.1	-62.9	-13.0	-41.8	+28.8	C
		7014.000	21.2	< -70.0	-13.0	< -48.8	> +35.8	C
		8767.500	21.5	< -70.0	-13.0	< -48.5	> +35.5	C
		10521.000	21.7	< -70.0	-13.0	< -48.3	> +35.3	C
		12274.500	22.0	< -70.0	-13.0	< -48.0	> +35.0	C
		14028.000	22.2	< -70.0	-13.0	< -47.8	> +34.8	C
		15781.500	22.5	< -70.0	-13.0	< -47.5	> +34.5	C
		17535.000	22.7	< -70.0	-13.0	< -47.3	> +34.3	C

Calculated result at 5260.5 MHz, as the worst point shown on underline:

Corr. Factor	=	21.1 dB
+) <u>Meter Reading</u>	=	<u>-62.9 dBm</u>
Result	=	-41.8 dBm

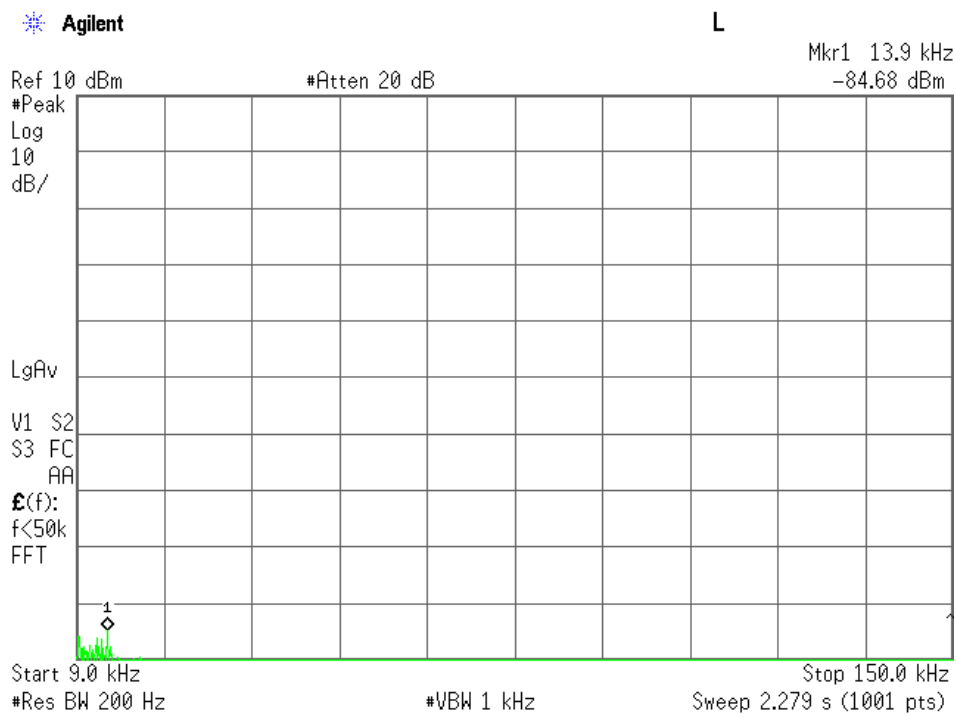
Minimum Margin: -13.0 - (-41.8) = 28.8 (dB)

NOTES

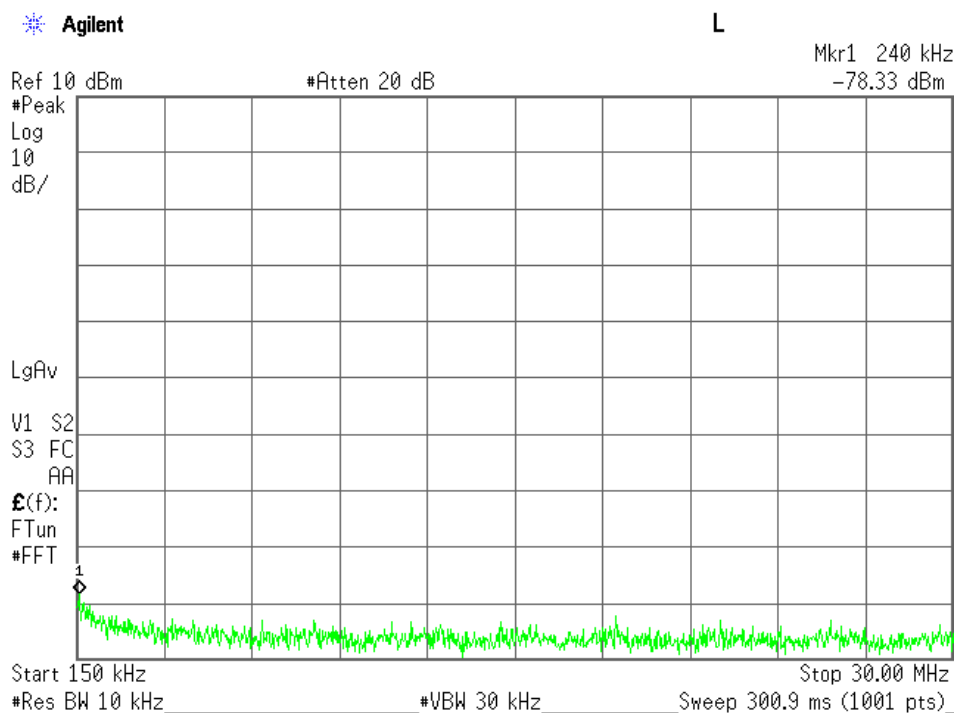
- The spectrum was checked from 9 kHz to 20 GHz.
- Applied limits : $-13.0 \text{ [dBm]} = 10\log(\text{TP[mW]}) - (43 + 10\log(\text{tp[W]})) = 10\log(\text{TP[mW]}) - (43 + (10 \log(\text{TP[mW]}) - 30))$
where, $\text{tp[W]} = \text{TP[mW]} / 1000$: Transmitter power at antenna terminal
- The correction factor is shown as follows:
Corr. Factor [dB] = Cable Loss + Pad Att. [dB] (9 kHz - 2 GHz)
Corr. Factor [dB] = Cable Loss + Pad Att. + High Pass Filter Loss [dB] (over 2 GHz)
- The symbol of "<" means "or less".
- The symbol of ">" means "more than".
- Setting of measuring instrument(s) :

	Detector Function	RES B.W.	V.B.W.	Sweep Time
A	Peak	200 Hz	1 kHz	AUTO
B	Peak	10 kHz	30 kHz	AUTO
C	Peak	1 MHz	3 MHz	AUTO

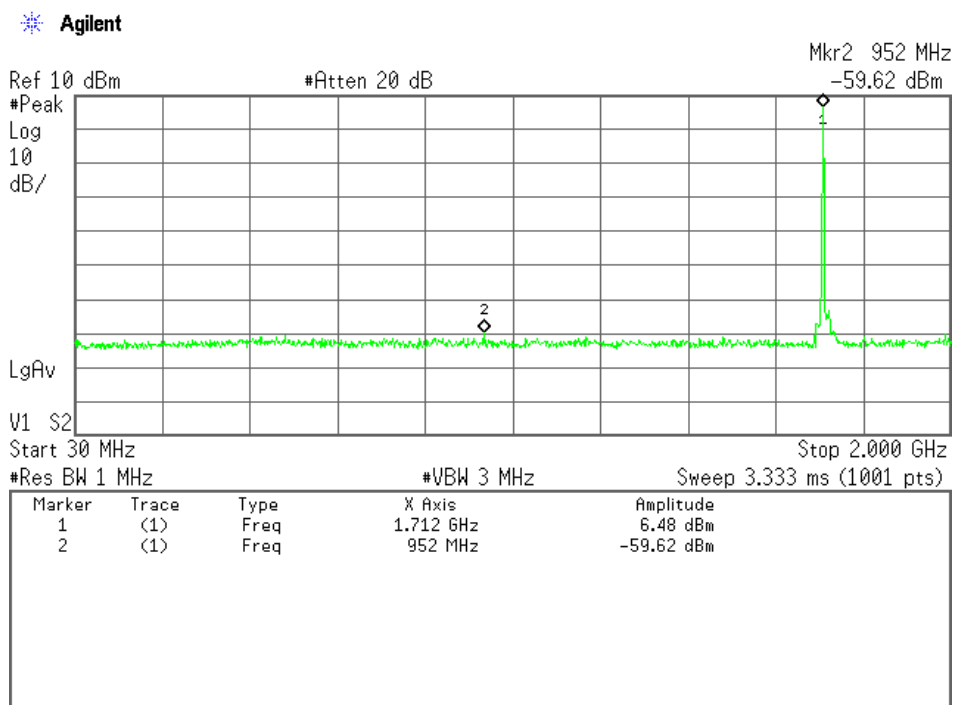
Low Channel, Out-Of-Band Emissions (9 kHz – 150 kHz)



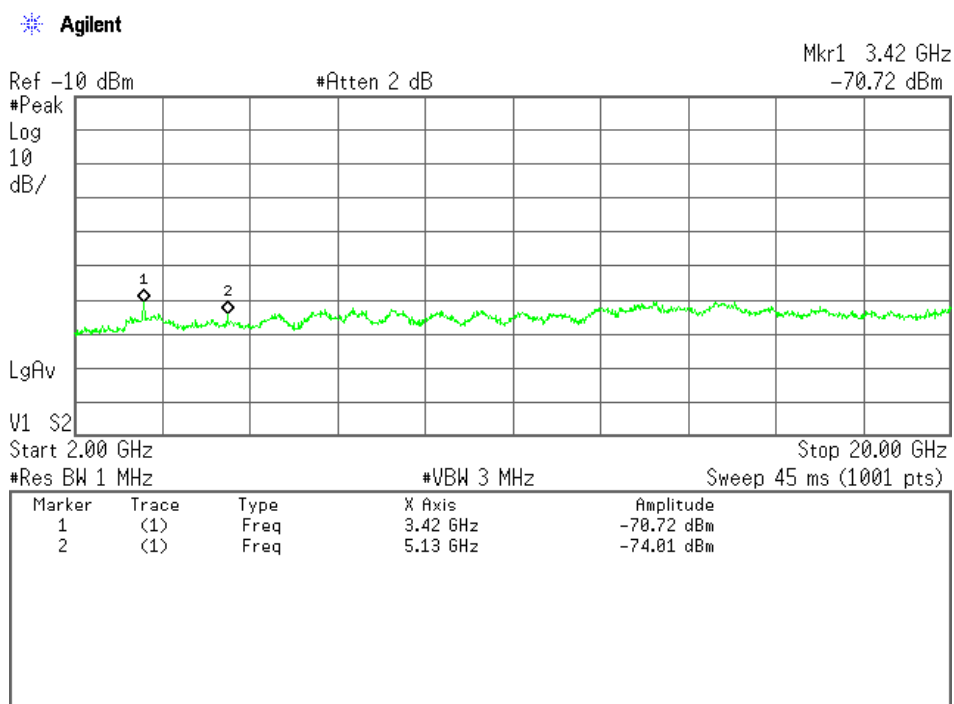
Low Channel, Out-Of-Band Emissions (150 kHz – 30 MHz)



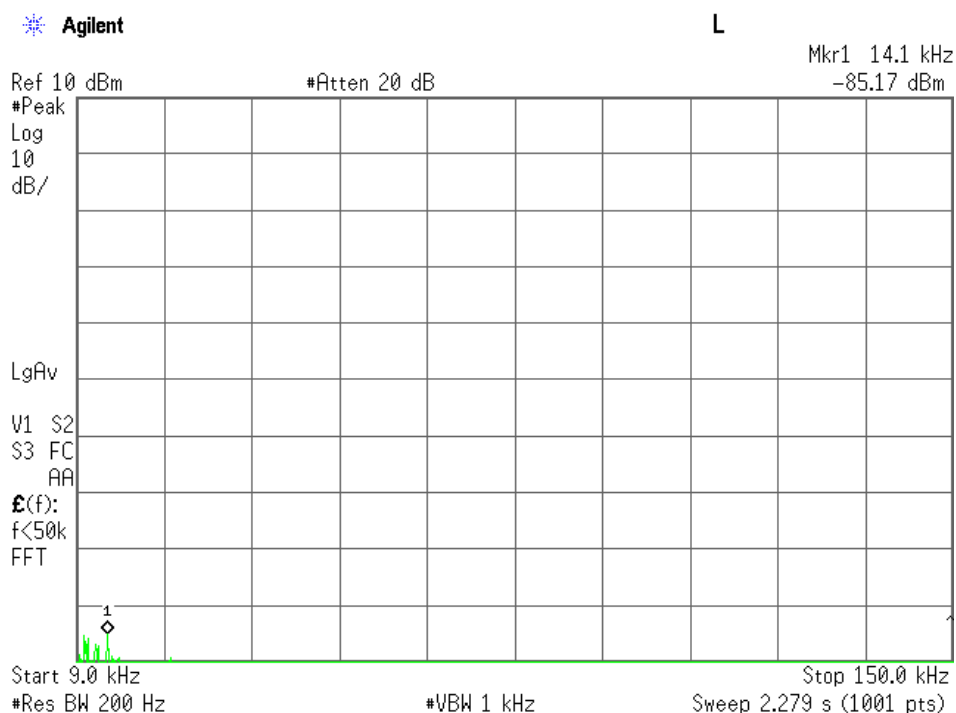
Low Channel, Out-Of-Band Emissions (30 MHz – 2 GHz)



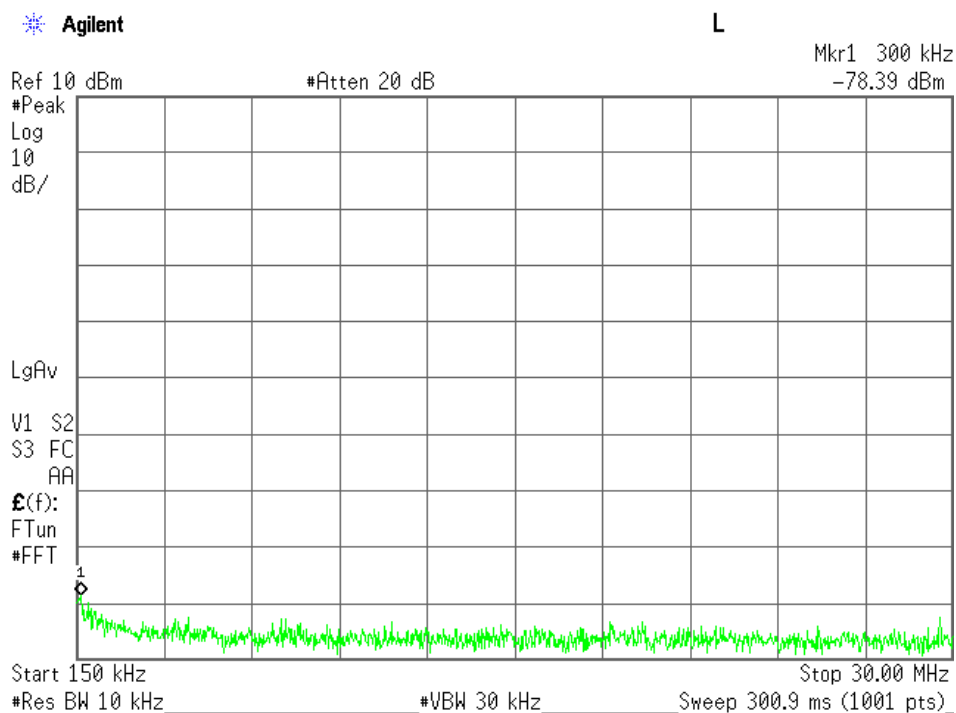
Low Channel, Out-Of-Band Emissions (2 GHz – 20 GHz)



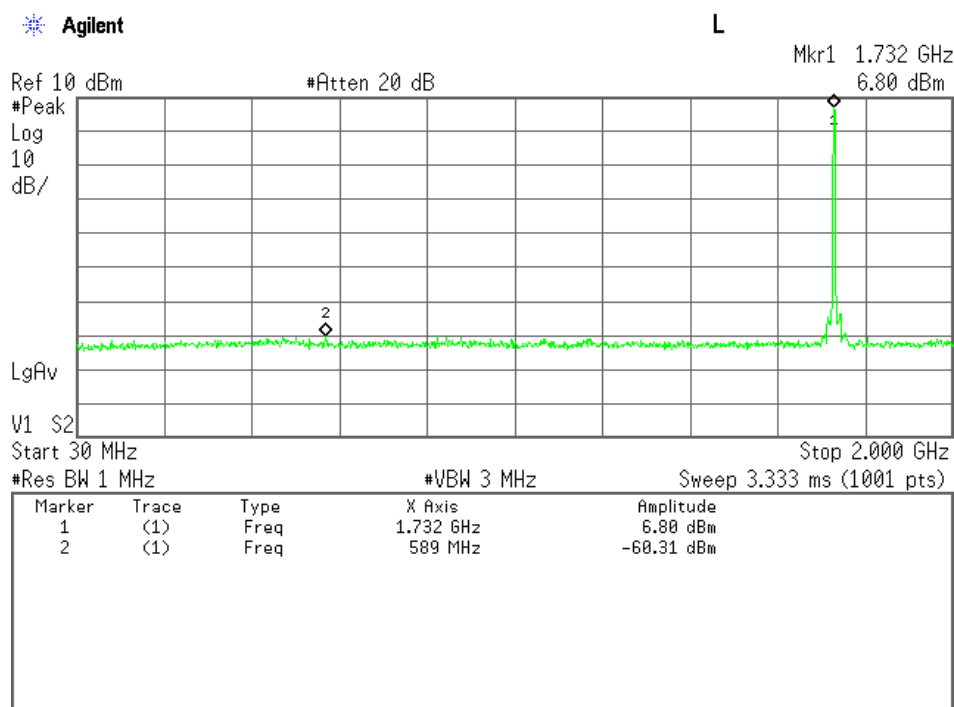
Middle Channel, Out-Of-Band Emissions (9 kHz – 150 kHz)



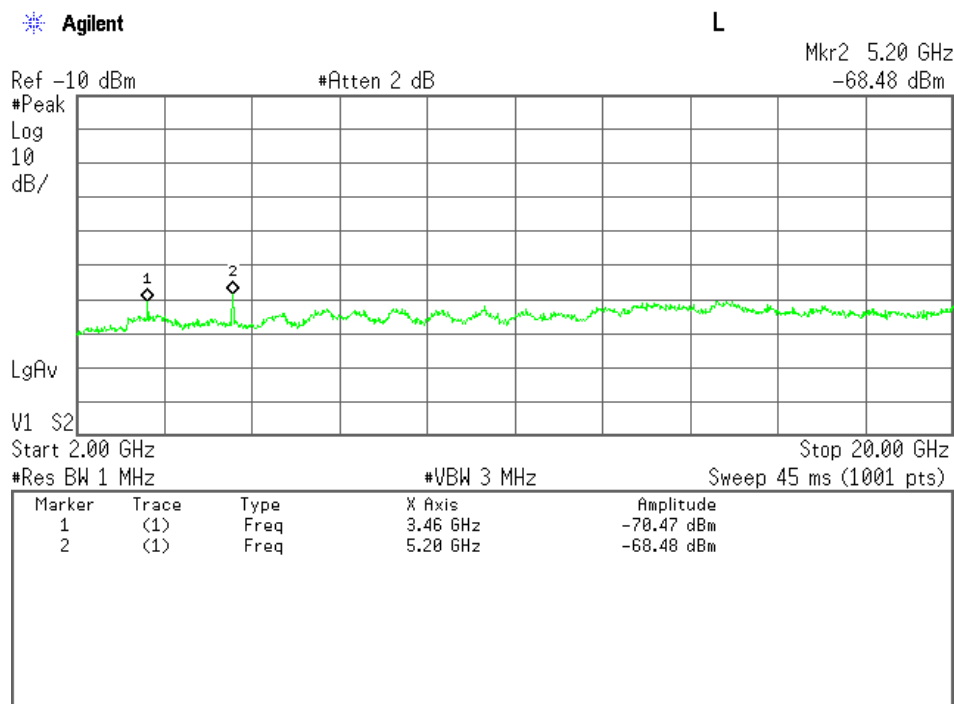
Middle Channel, Out-Of-Band Emissions (150 kHz – 30 MHz)



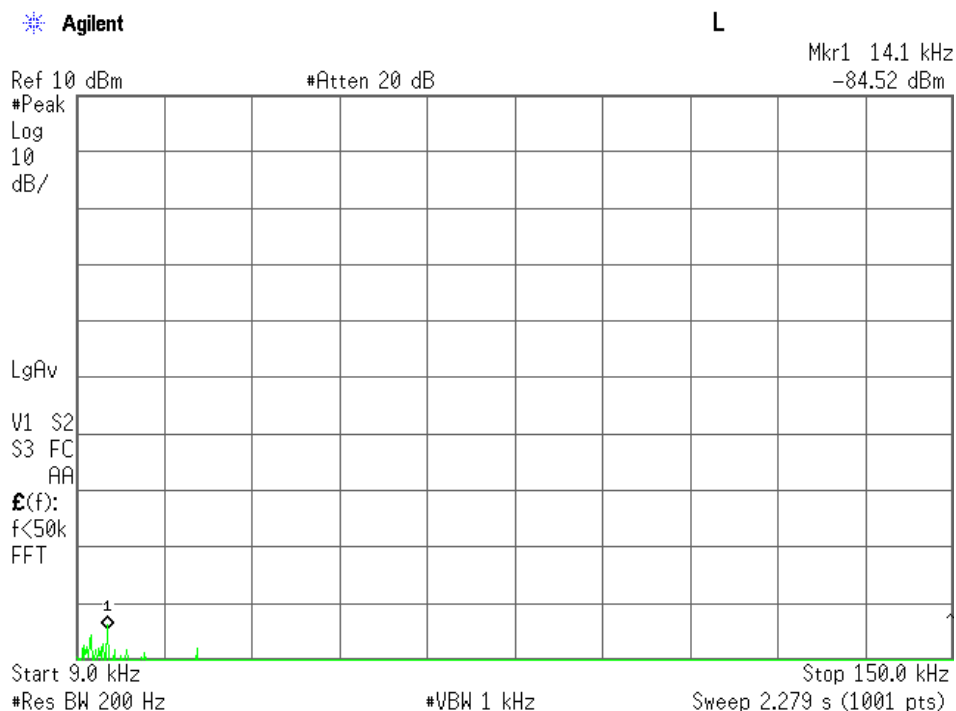
Middle Channel, Out-Of-Band Emissions (30 MHz – 2 GHz)



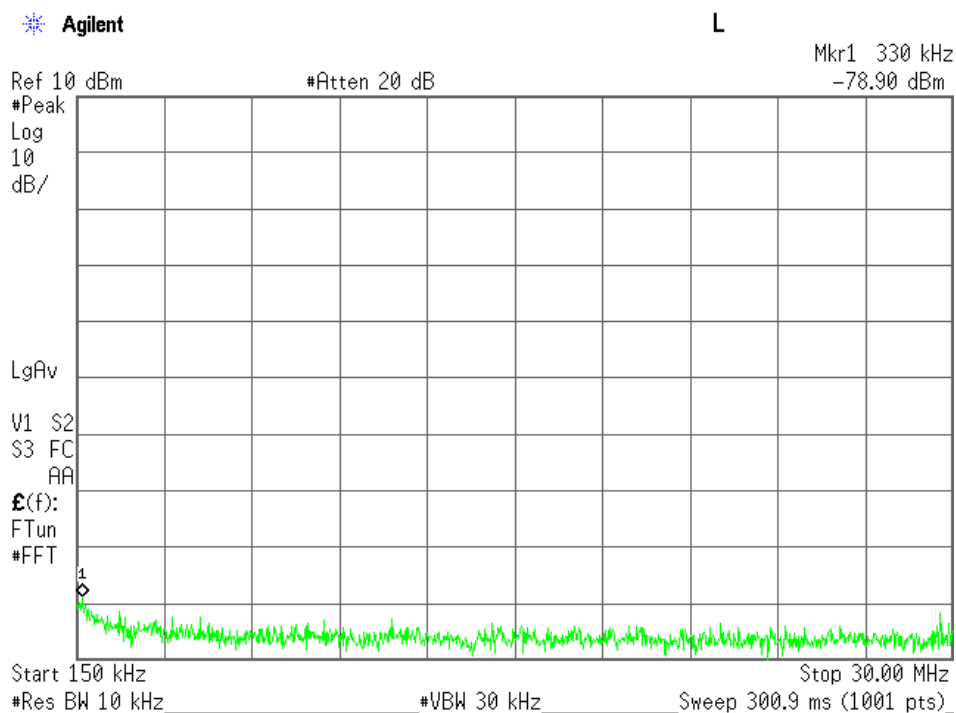
Middle Channel, Out-Of-Band Emissions (2 GHz – 20 GHz)



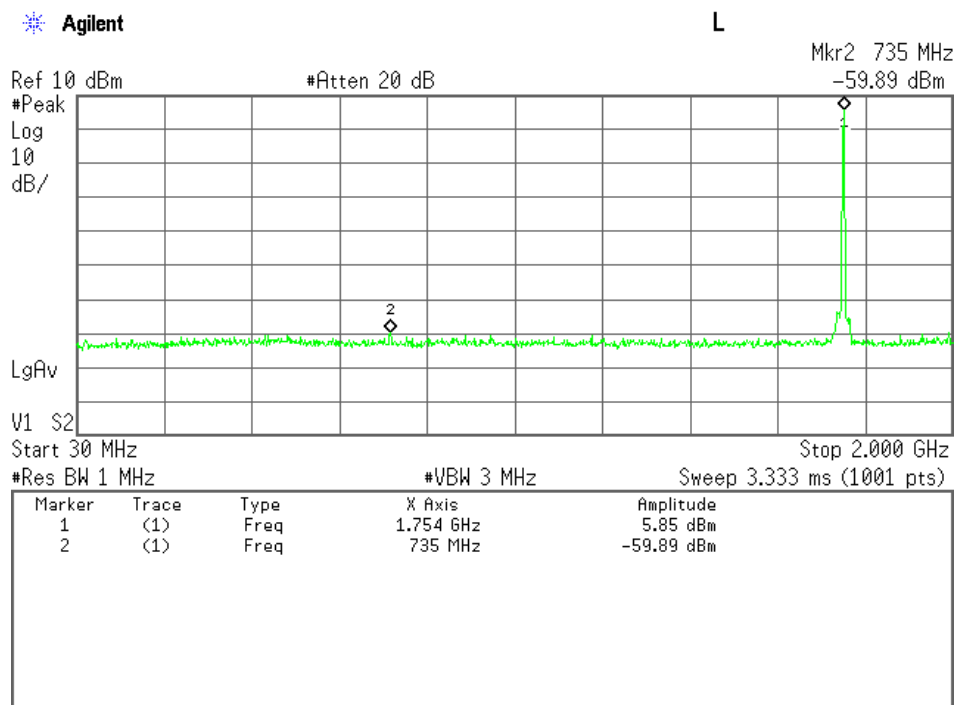
High Channel, Out-Of-Band Emissions (9 kHz – 150 kHz)



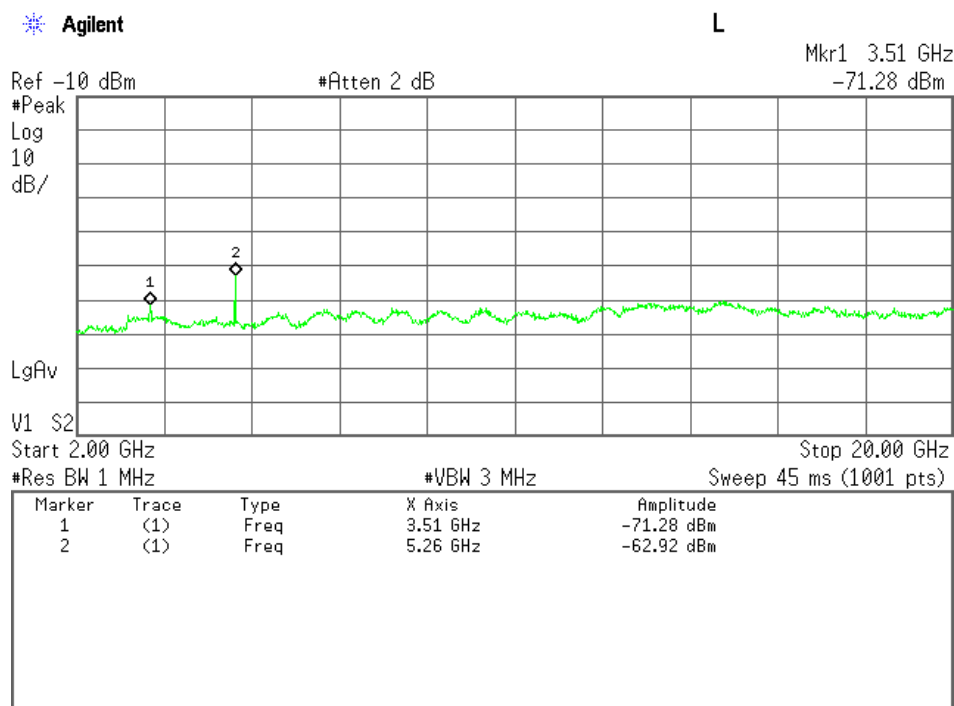
High Channel, Out-Of-Band Emissions (150 kHz – 30 MHz)



High Channel, Out-Of-Band Emissions (30 MHz – 2 GHz)



High Channel, Out-Of-Band Emissions (2 GHz – 20 GHz)



3) BW 5MHz(1RB)

(LTE 5MHz)

Test Date: April 5, 2016

Temp.: 22 °C, Humi: 42 %

Transmitting Frequency CH [MHz]		Measured Frequency [MHz]	Corr. Factor [dB]	Meter Readings [dBm]	Limits [dBm]	Results [dBm]	Margin [dB]	Remarks
19975	1712.500	3425.000	20.9	< -70.0	-13.0	< -49.1	> +36.1	C
		5137.500	21.1	< -70.0	-13.0	< -48.9	> +35.9	C
		6850.000	21.2	< -70.0	-13.0	< -48.8	> +35.8	C
		8562.500	21.5	< -70.0	-13.0	< -48.5	> +35.5	C
		10275.000	21.7	< -70.0	-13.0	< -48.3	> +35.3	C
		11987.500	21.9	< -70.0	-13.0	< -48.1	> +35.1	C
		13700.000	22.2	< -70.0	-13.0	< -47.8	> +34.8	C
		15412.500	22.4	< -70.0	-13.0	< -47.6	> +34.6	C
		17125.000	22.7	< -70.0	-13.0	< -47.3	> +34.3	C
20175	1732.500	3465.000	20.9	< -70.0	-13.0	< -49.1	> +36.1	C
		5197.500	21.1	-67.8	-13.0	-46.7	+33.7	C
		6930.000	21.2	< -70.0	-13.0	< -48.8	> +35.8	C
		8662.500	21.5	< -70.0	-13.0	< -48.5	> +35.5	C
		10395.000	21.7	< -70.0	-13.0	< -48.3	> +35.3	C
		12127.500	22.0	< -70.0	-13.0	< -48.0	> +35.0	C
		13860.000	22.2	< -70.0	-13.0	< -47.8	> +34.8	C
		15592.500	22.4	< -70.0	-13.0	< -47.6	> +34.6	C
		17325.000	22.7	< -70.0	-13.0	< -47.3	> +34.3	C
20375	1752.500	3505.000	20.9	< -70.0	-13.0	< -49.1	> +36.1	C
		5257.500	21.1	-62.6	-13.0	-41.5	+28.5	C
		7010.000	21.2	< -70.0	-13.0	< -48.8	> +35.8	C
		8762.500	21.5	< -70.0	-13.0	< -48.5	> +35.5	C
		10515.000	21.7	< -70.0	-13.0	< -48.3	> +35.3	C
		12267.500	22.0	< -70.0	-13.0	< -48.0	> +35.0	C
		14020.000	22.2	< -70.0	-13.0	< -47.8	> +34.8	C
		15772.500	22.5	< -70.0	-13.0	< -47.5	> +34.5	C
		17525.000	22.7	< -70.0	-13.0	< -47.3	> +34.3	C

Calculated result at 5257.5 MHz, as the worst point shown on underline:

Corr. Factor	=	21.1 dB
+) <u>Meter Reading</u>	=	<u>-62.6 dBm</u>
Result	=	-41.5 dBm

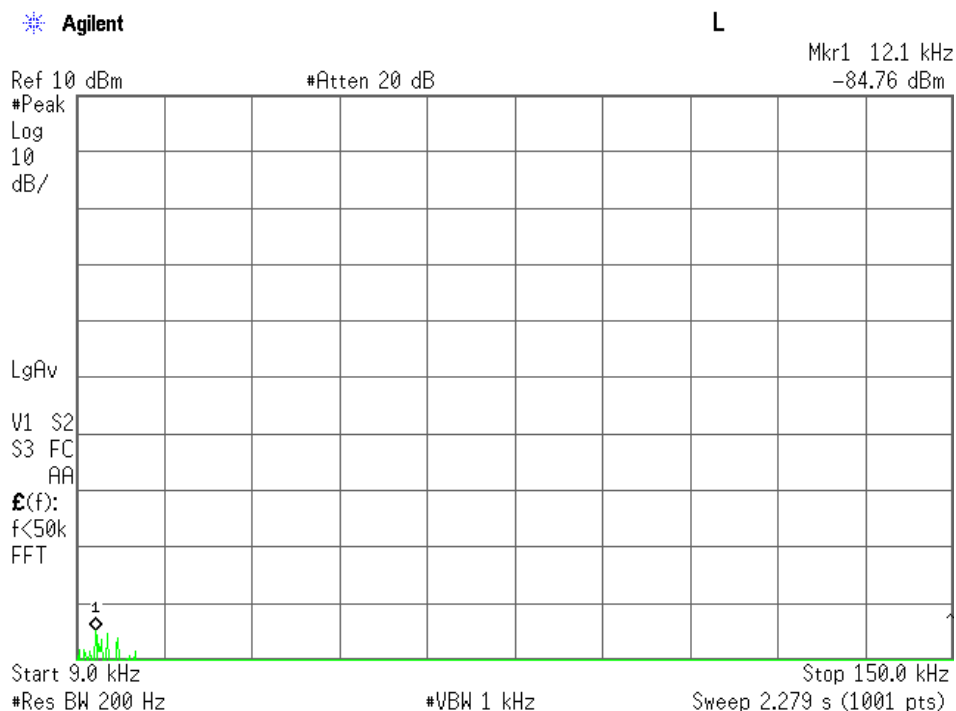
Minimum Margin: -13.0 - (-41.5) = 28.5 (dB)

NOTES

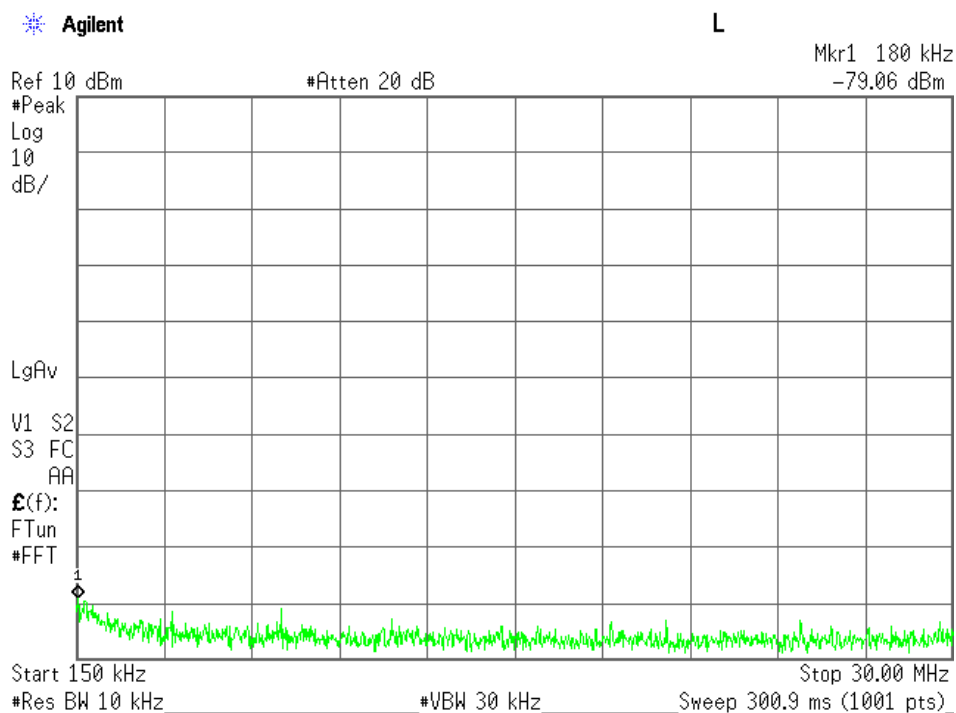
- The spectrum was checked from 9 kHz to 20 GHz.
- Applied limits : $-13.0 \text{ [dBm]} = 10\log(\text{TP[mW]}) - (43 + 10\log(\text{tp[W]})) = 10\log(\text{TP[mW]}) - (43 + (10 \log(\text{TP[mW]}) - 30))$
where, $\text{tp[W]} = \text{TP[mW]} / 1000$: Transmitter power at antenna terminal
- The correction factor is shown as follows:
Corr. Factor [dB] = Cable Loss + Pad Att. [dB] (9 kHz - 2 GHz)
Corr. Factor [dB] = Cable Loss + Pad Att. + High Pass Filter Loss [dB] (over 2 GHz)
- The symbol of "<" means "or less".
- The symbol of ">" means "more than".
- Setting of measuring instrument(s) :

	Detector Function	RES B.W.	V.B.W.	Sweep Time
A	Peak	200 Hz	1 kHz	AUTO
B	Peak	10 kHz	30 kHz	AUTO
C	Peak	1 MHz	3 MHz	AUTO

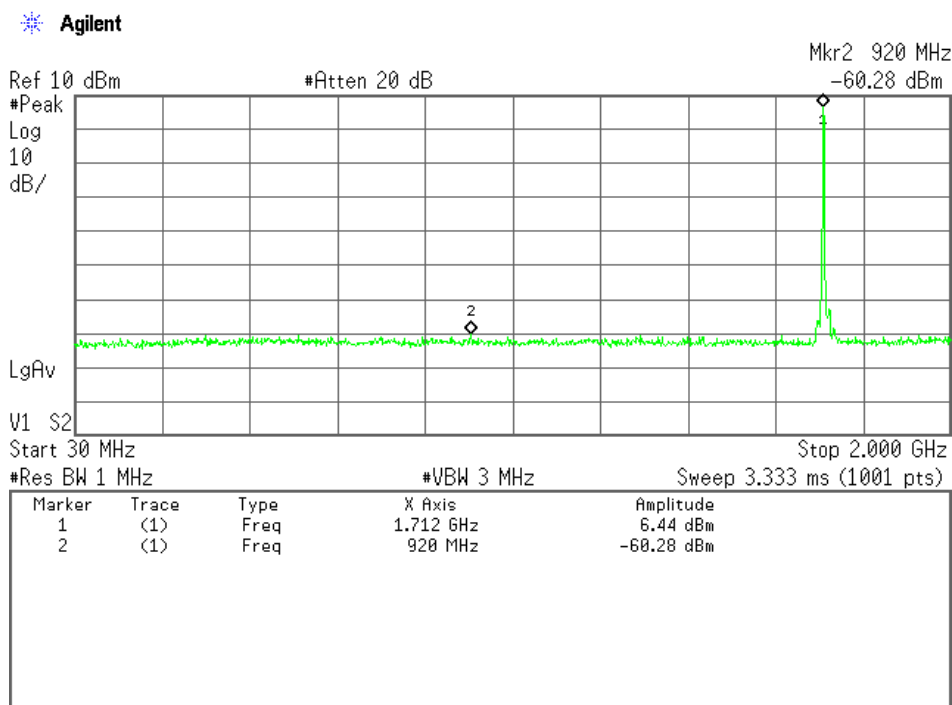
Low Channel, Out-Of-Band Emissions (9 kHz – 150 kHz)



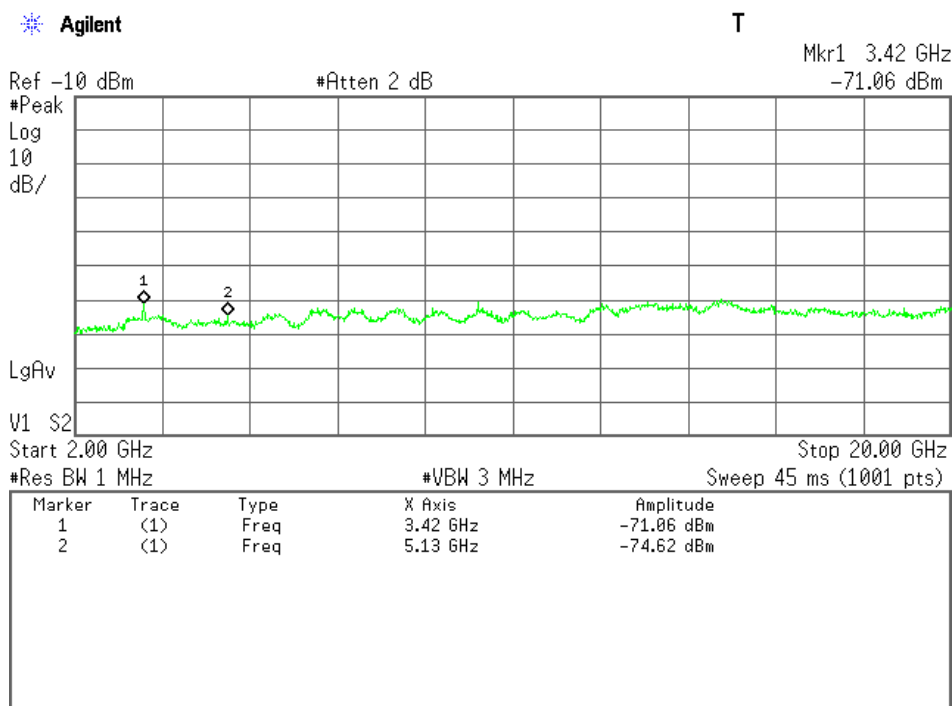
Low Channel, Out-Of-Band Emissions (150 kHz – 30 MHz)



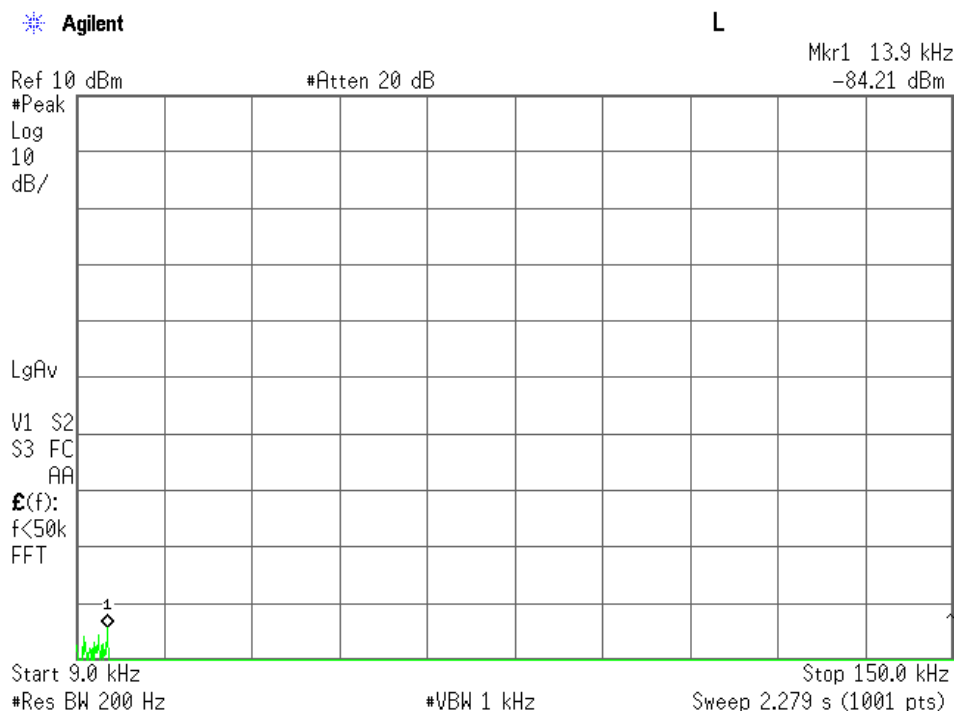
Low Channel, Out-Of-Band Emissions (30 MHz – 2 GHz)



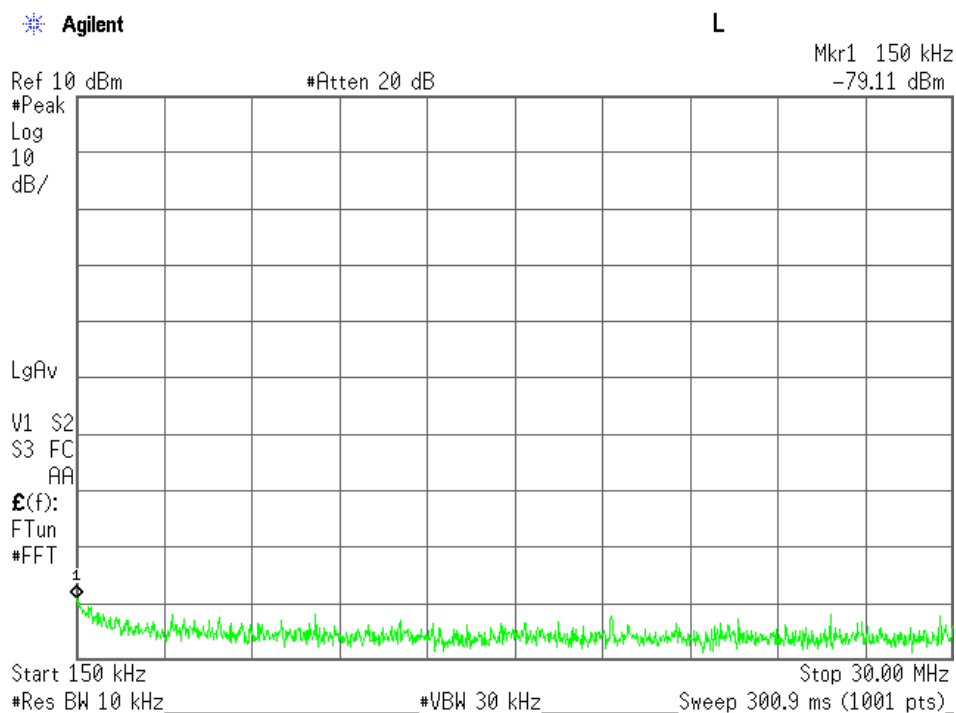
Low Channel, Out-Of-Band Emissions (2 GHz – 20 GHz)



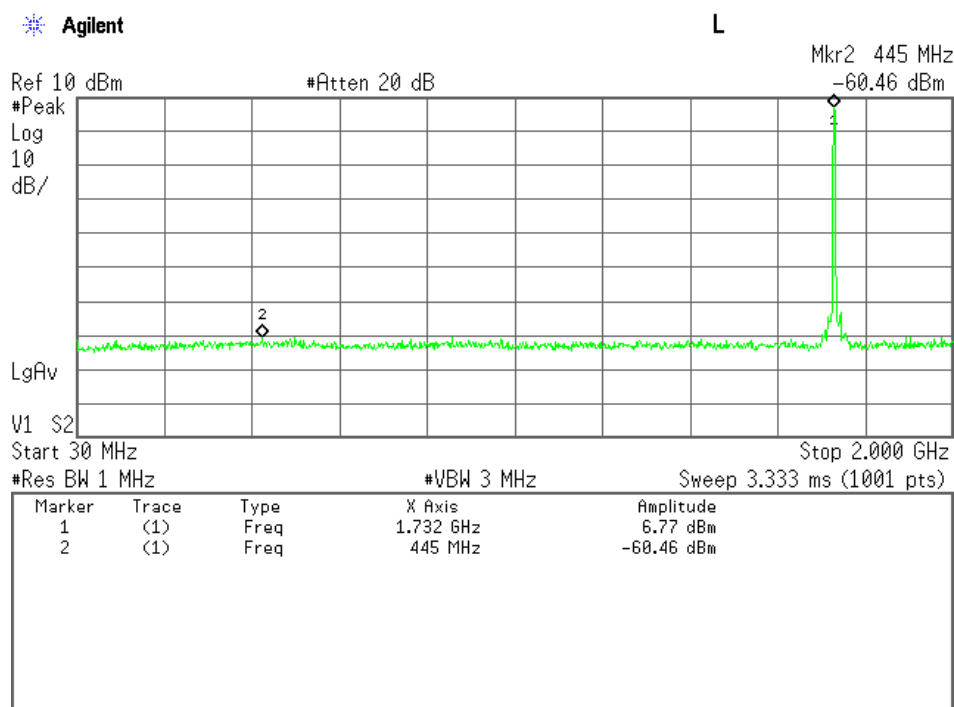
Middle Channel, Out-Of-Band Emissions (9 kHz – 150 kHz)



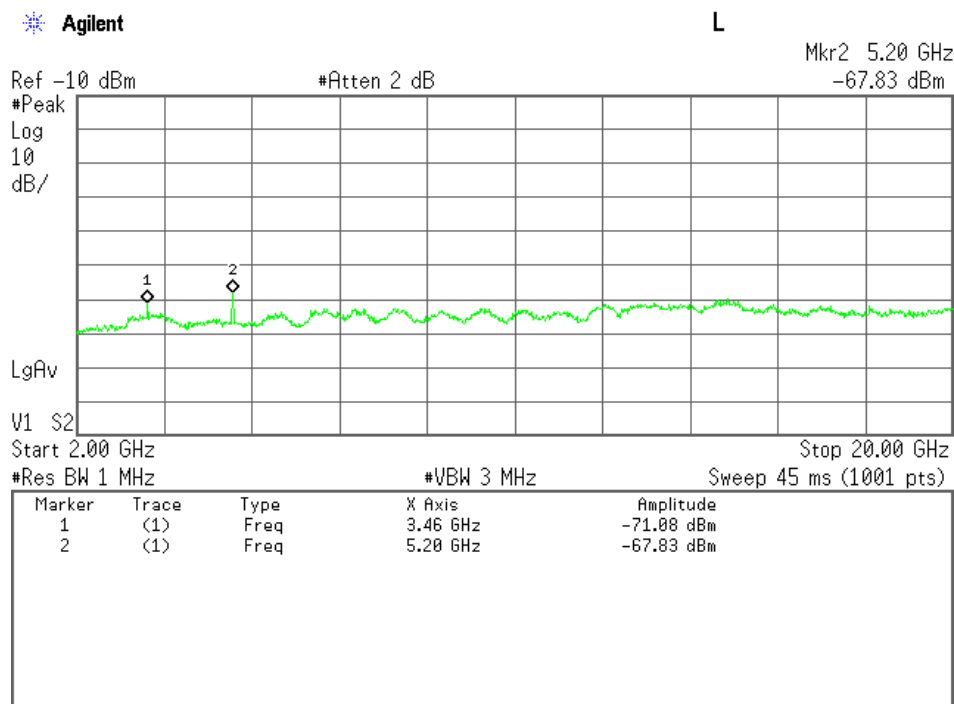
Middle Channel, Out-Of-Band Emissions (150 kHz – 30 MHz)



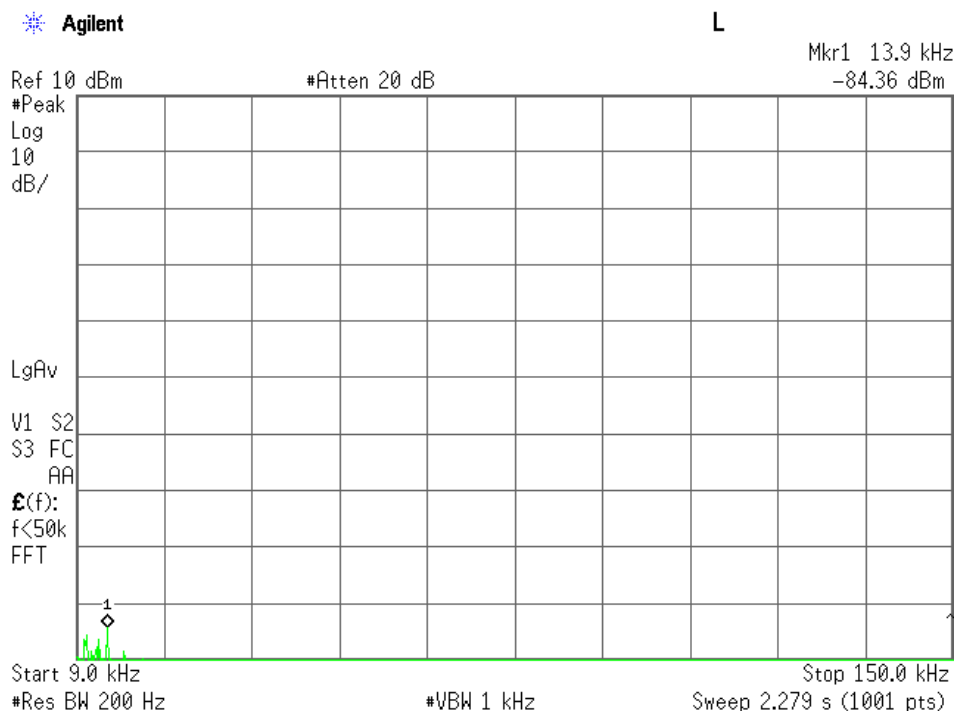
Middle Channel, Out-Of-Band Emissions (30 MHz – 2 GHz)



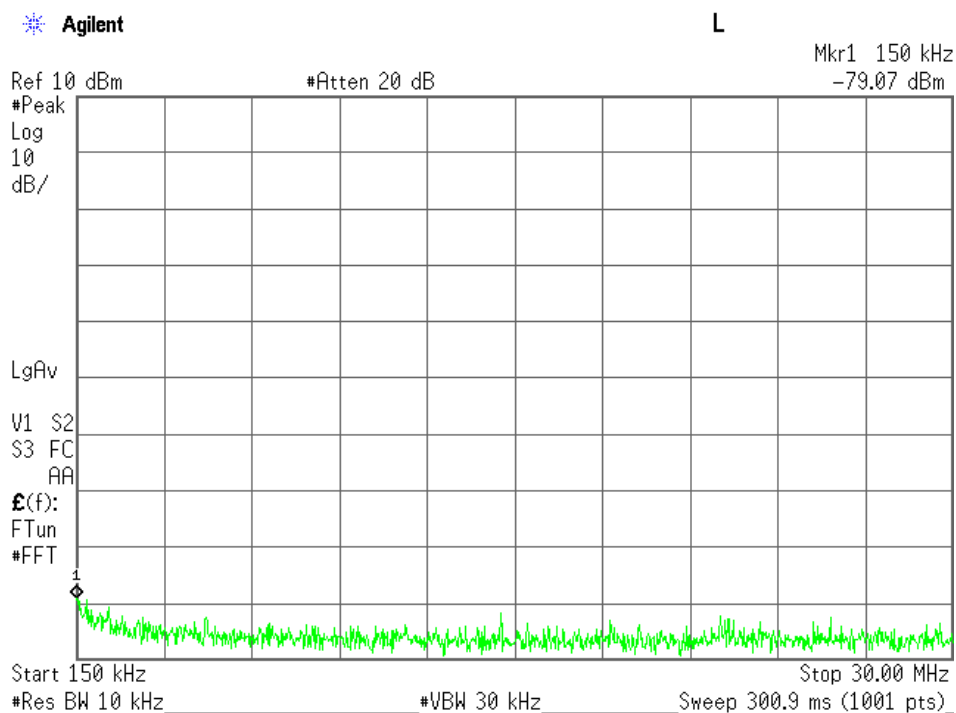
Middle Channel, Out-Of-Band Emissions (2 GHz – 20 GHz)



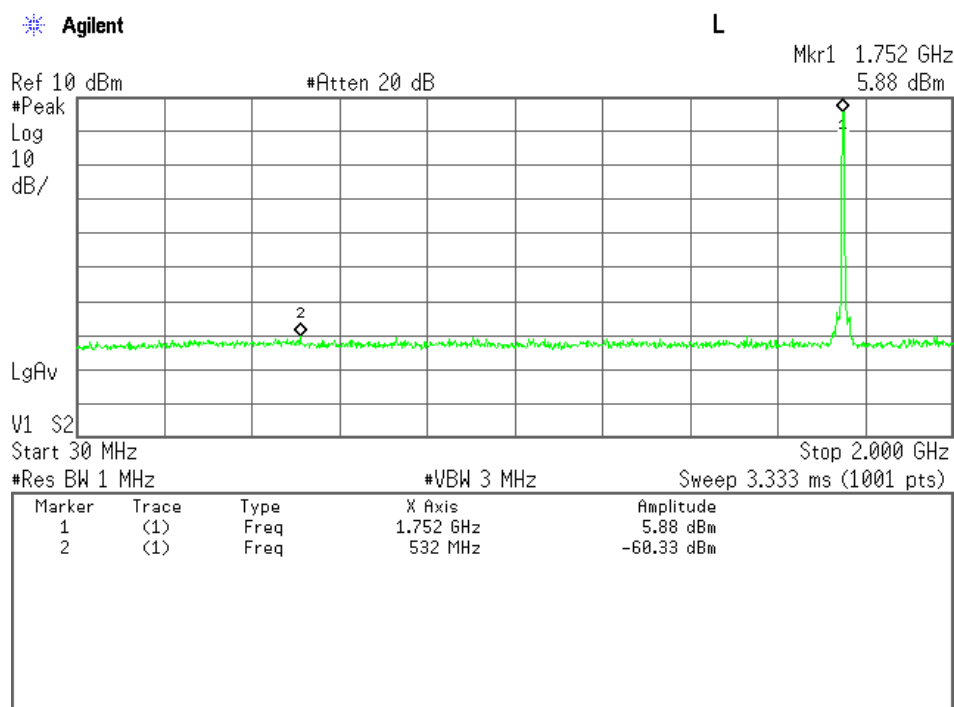
High Channel, Out-Of-Band Emissions (9 kHz – 150 kHz)



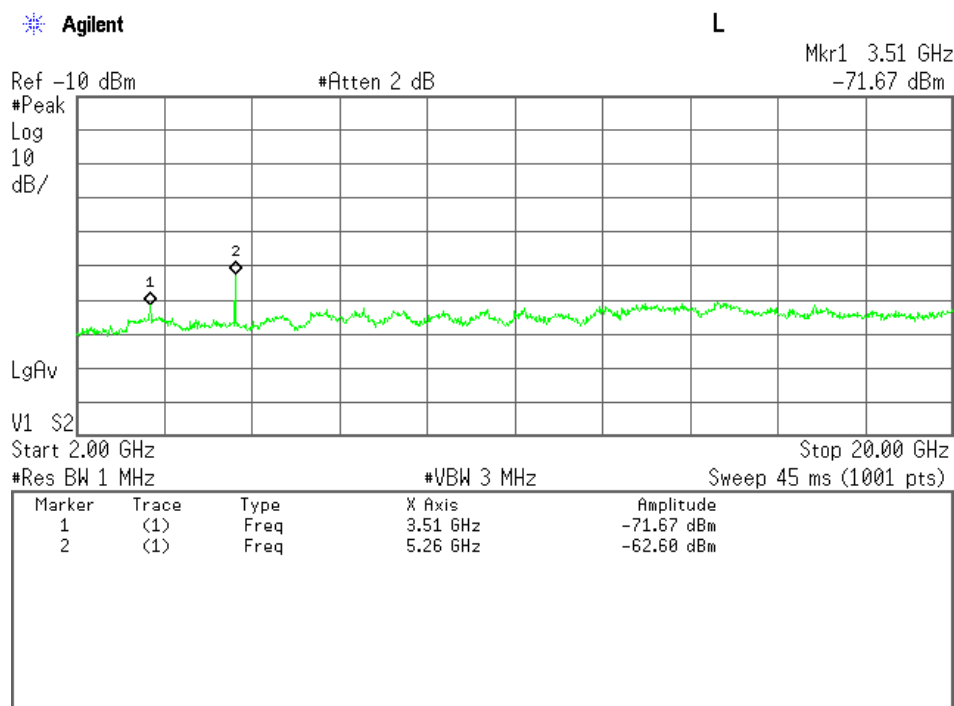
High Channel, Out-Of-Band Emissions (150 kHz – 30 MHz)



High Channel, Out-Of-Band Emissions (30 MHz – 2 GHz)



High Channel, Out-Of-Band Emissions (2 GHz – 20 GHz)



4) BW 10MHz(1RB)

(LTE 10MHz)

Test Date: April 5, 2016

Temp.: 22 °C, Humi: 42 %

Transmitting Frequency CH [MHz]		Measured Frequency [MHz]	Corr. Factor [dB]	Meter Readings [dBm]	Limits [dBm]	Results [dBm]	Margin [dB]	Remarks
20000	1715.000	3430.000	20.9	< -70.0	-13.0	< -49.1	> +36.1	C
		5145.000	21.1	< -70.0	-13.0	< -48.9	> +35.9	C
		6860.000	21.2	< -70.0	-13.0	< -48.8	> +35.8	C
		8575.000	21.5	< -70.0	-13.0	< -48.5	> +35.5	C
		10290.000	21.7	< -70.0	-13.0	< -48.3	> +35.3	C
		12005.000	22.0	< -70.0	-13.0	< -48.0	> +35.0	C
		13720.000	22.2	< -70.0	-13.0	< -47.8	> +34.8	C
		15435.000	22.4	< -70.0	-13.0	< -47.6	> +34.6	C
		17150.000	22.7	< -70.0	-13.0	< -47.3	> +34.3	C
20175	1732.500	3465.000	20.9	< -70.0	-13.0	< -49.1	> +36.1	C
		5197.500	21.1	-67.7	-13.0	-46.6	+33.6	C
		6930.000	21.2	< -70.0	-13.0	< -48.8	> +35.8	C
		8662.500	21.5	< -70.0	-13.0	< -48.5	> +35.5	C
		10395.000	21.7	< -70.0	-13.0	< -48.3	> +35.3	C
		12127.500	22.0	< -70.0	-13.0	< -48.0	> +35.0	C
		13860.000	22.2	< -70.0	-13.0	< -47.8	> +34.8	C
		15592.500	22.4	< -70.0	-13.0	< -47.6	> +34.6	C
		17325.000	22.7	< -70.0	-13.0	< -47.3	> +34.3	C
20350	1750.000	3500.000	20.9	< -70.0	-13.0	< -49.1	> +36.1	C
		5250.000	21.1	-62.8	-13.0	-41.7	+28.7	C
		7000.000	21.2	< -70.0	-13.0	< -48.8	> +35.8	C
		8750.000	21.5	< -70.0	-13.0	< -48.5	> +35.5	C
		10500.000	21.7	< -70.0	-13.0	< -48.3	> +35.3	C
		12250.000	22.0	< -70.0	-13.0	< -48.0	> +35.0	C
		14000.000	22.2	< -70.0	-13.0	< -47.8	> +34.8	C
		15750.000	22.5	< -70.0	-13.0	< -47.5	> +34.5	C
		17500.000	22.7	< -70.0	-13.0	< -47.3	> +34.3	C

Calculated result at 5250.0 MHz, as the worst point shown on underline:

Corr. Factor	=	21.1 dB
+) <u>Meter Reading</u>	=	<u>-62.8 dBm</u>
Result	=	-41.7 dBm

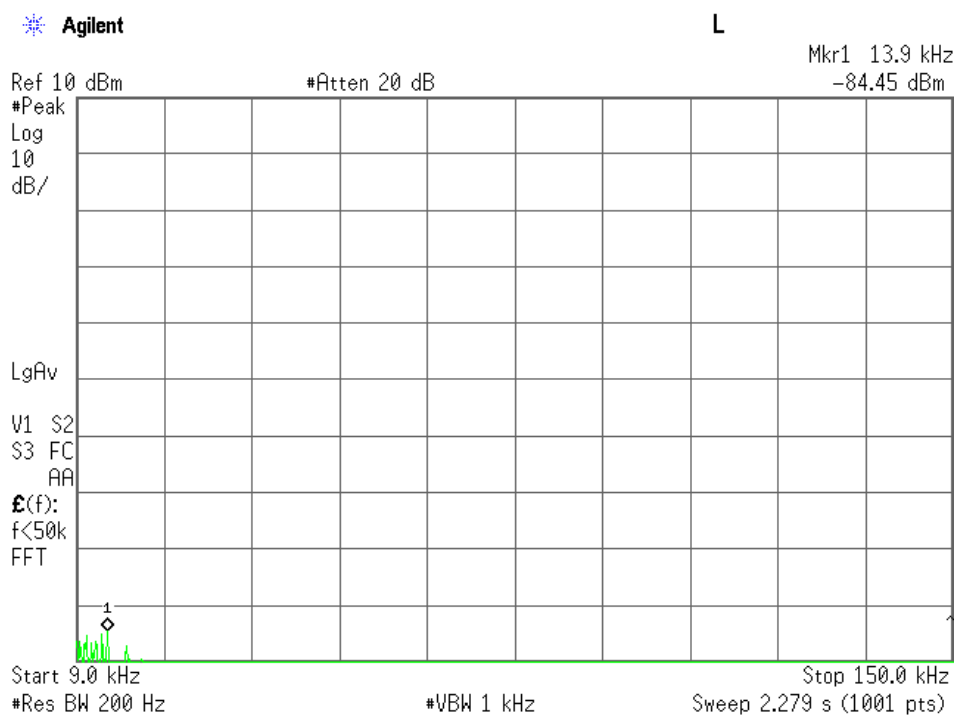
Minimum Margin: -13.0 - (-41.7) = 28.7 (dB)

NOTES

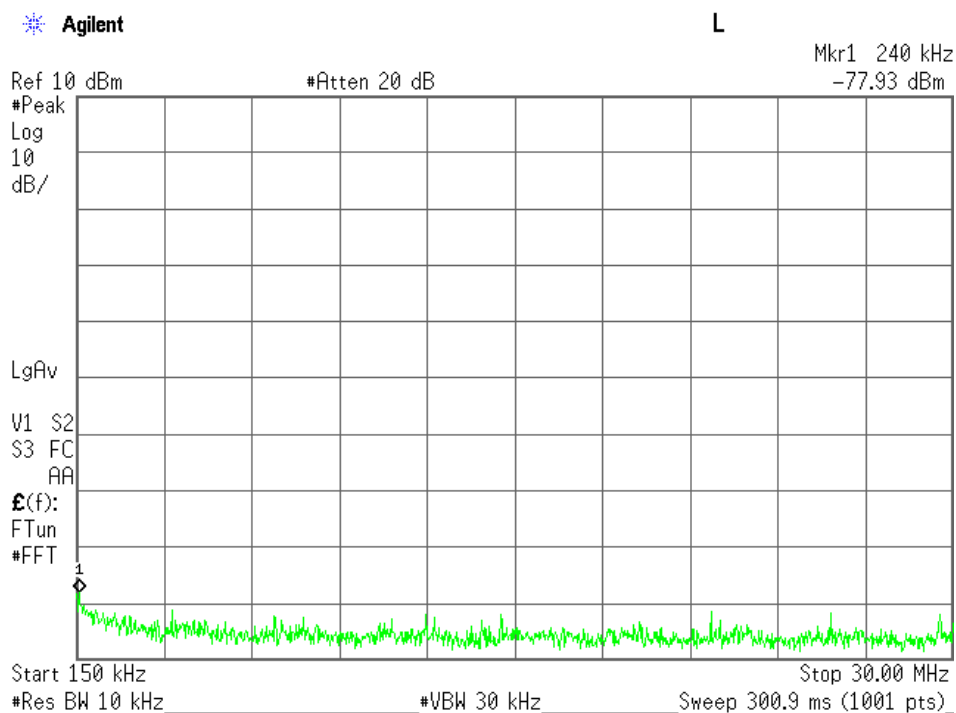
- The spectrum was checked from 9 kHz to 20 GHz.
- Applied limits : $-13.0 \text{ [dBm]} = 10\log(\text{TP[mW]}) - (43 + 10\log(\text{tp[W]})) = 10\log(\text{TP[mW]}) - (43 + (10 \log(\text{TP[mW]}) - 30))$
where, $\text{tp[W]} = \text{TP[mW]} / 1000$: Transmitter power at antenna terminal
- The correction factor is shown as follows:
Corr. Factor [dB] = Cable Loss + Pad Att. [dB] (9 kHz - 2 GHz)
Corr. Factor [dB] = Cable Loss + Pad Att. + High Pass Filter Loss [dB] (over 2 GHz)
- The symbol of "<" means "or less".
- The symbol of ">" means "more than".
- Setting of measuring instrument(s) :

	Detector Function	RES B.W.	V.B.W.	Sweep Time
A	Peak	200 Hz	1 kHz	AUTO
B	Peak	10 kHz	30 kHz	AUTO
C	Peak	1 MHz	3 MHz	AUTO

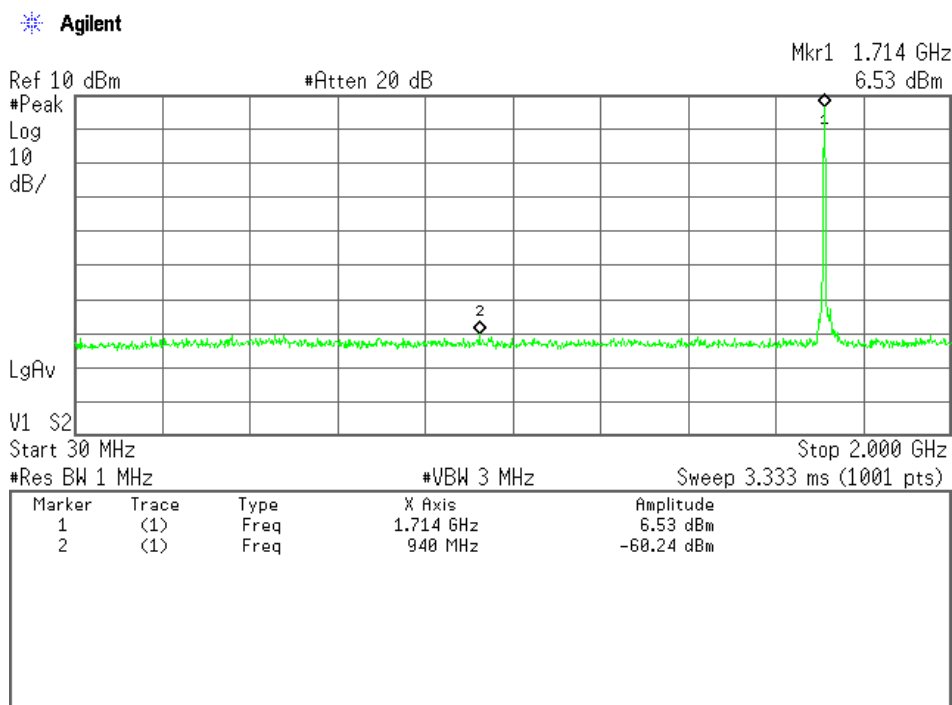
Low Channel, Out-Of-Band Emissions (9 kHz – 150 kHz)



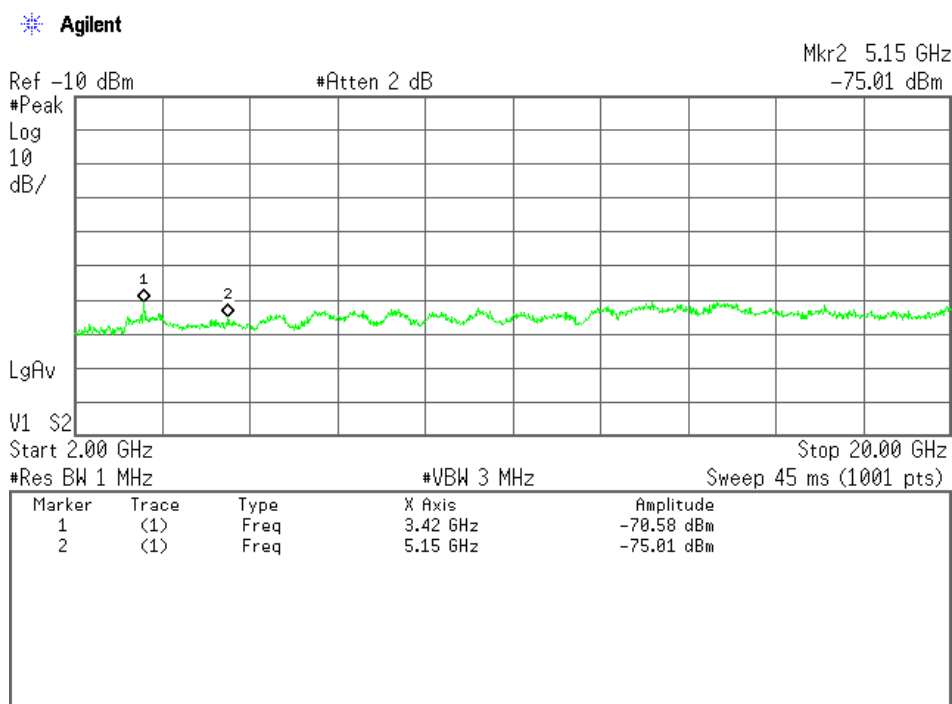
Low Channel, Out-Of-Band Emissions (150 kHz – 30 MHz)



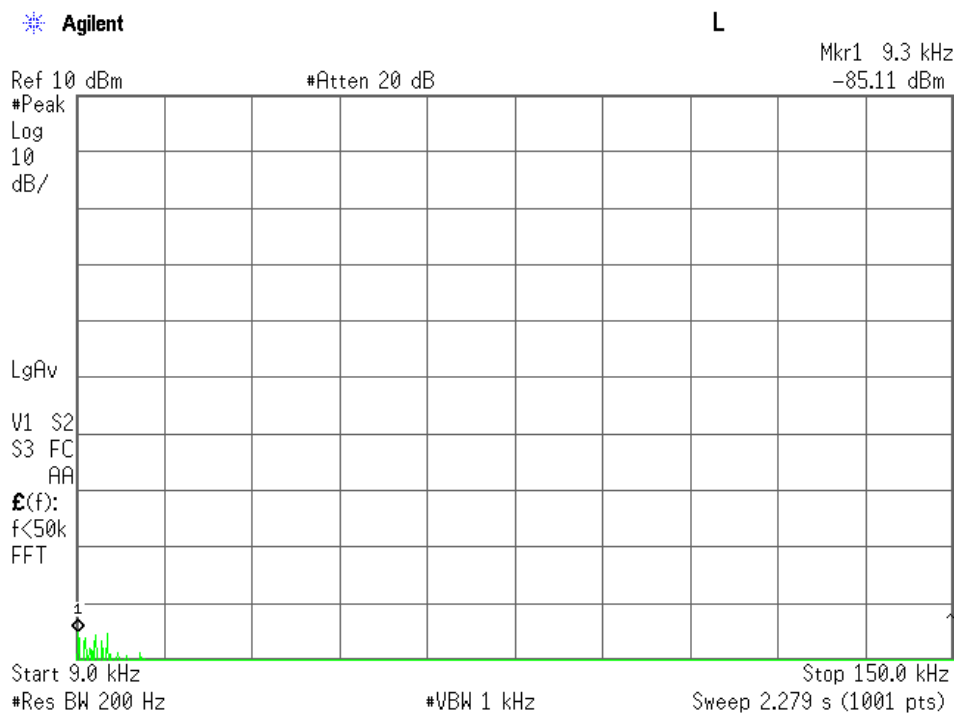
Low Channel, Out-Of-Band Emissions (30 MHz – 2 GHz)



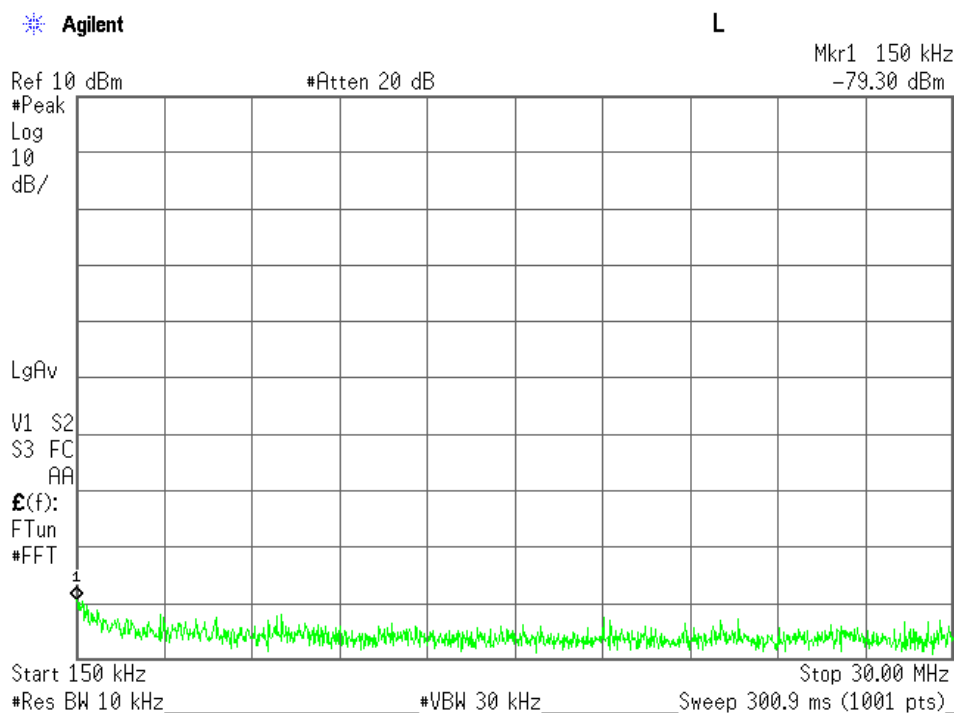
Low Channel, Out-Of-Band Emissions (2 GHz – 20 GHz)



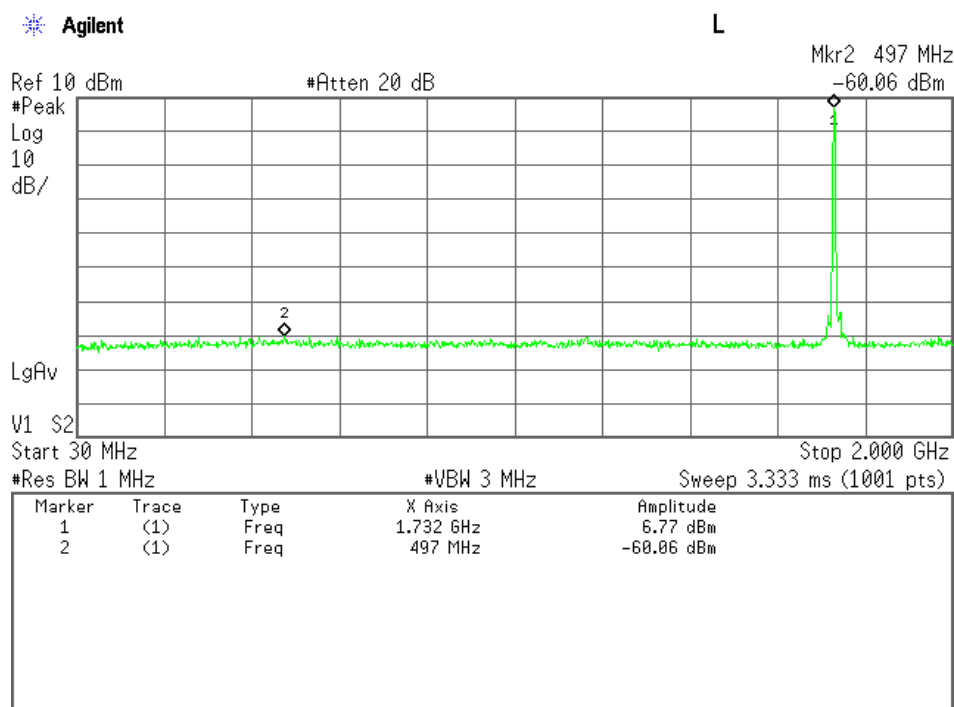
Middle Channel, Out-Of-Band Emissions (9 kHz – 150 kHz)



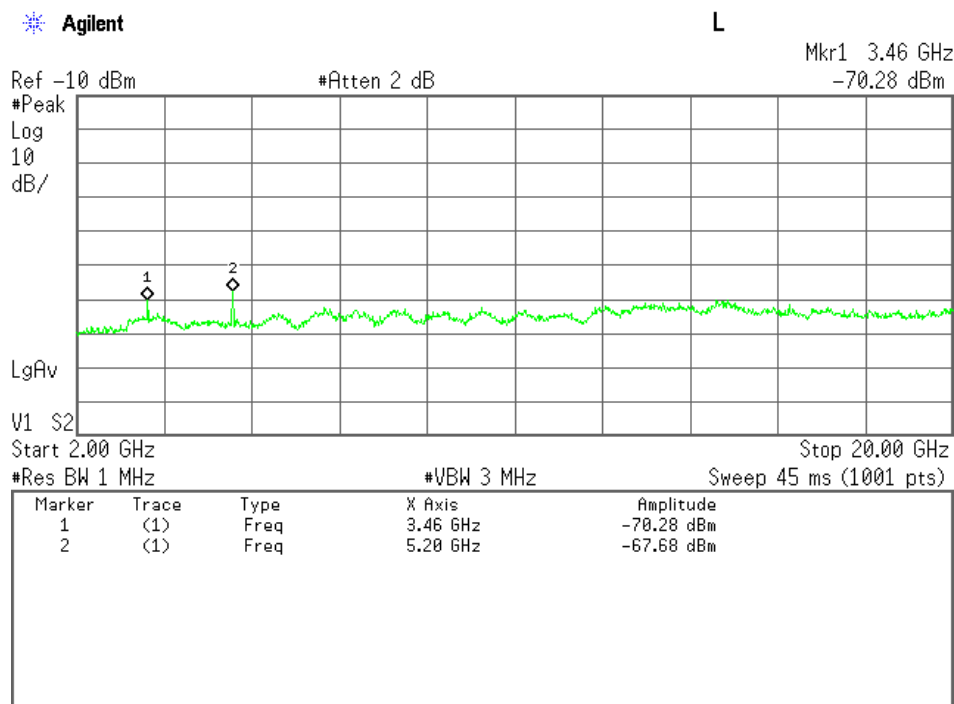
Middle Channel, Out-Of-Band Emissions (150 kHz – 30 MHz)



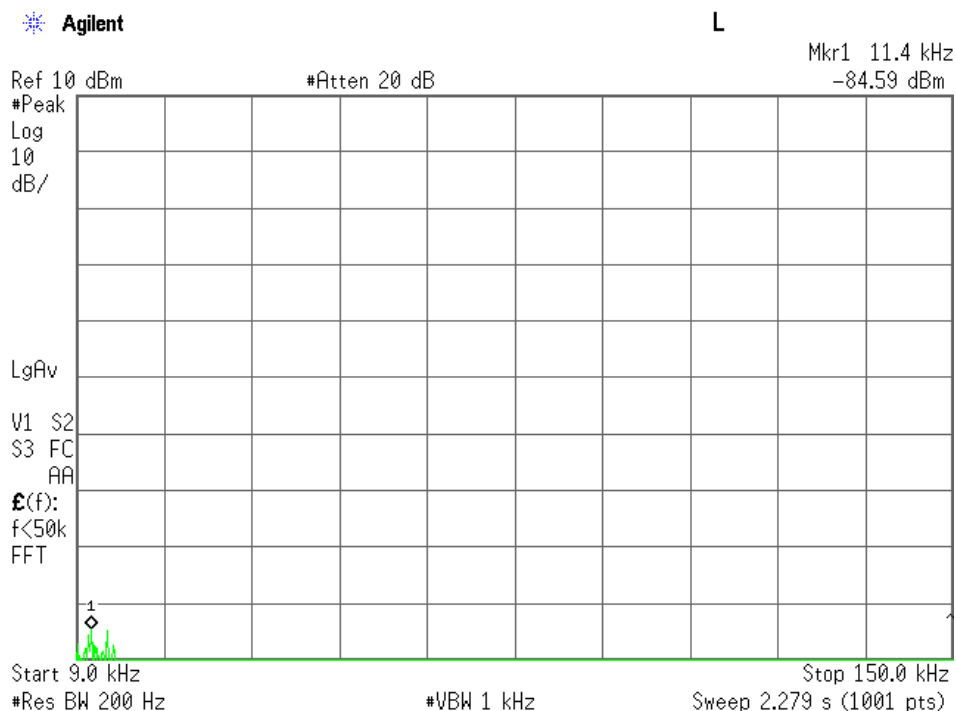
Middle Channel, Out-Of-Band Emissions (30 MHz – 2 GHz)



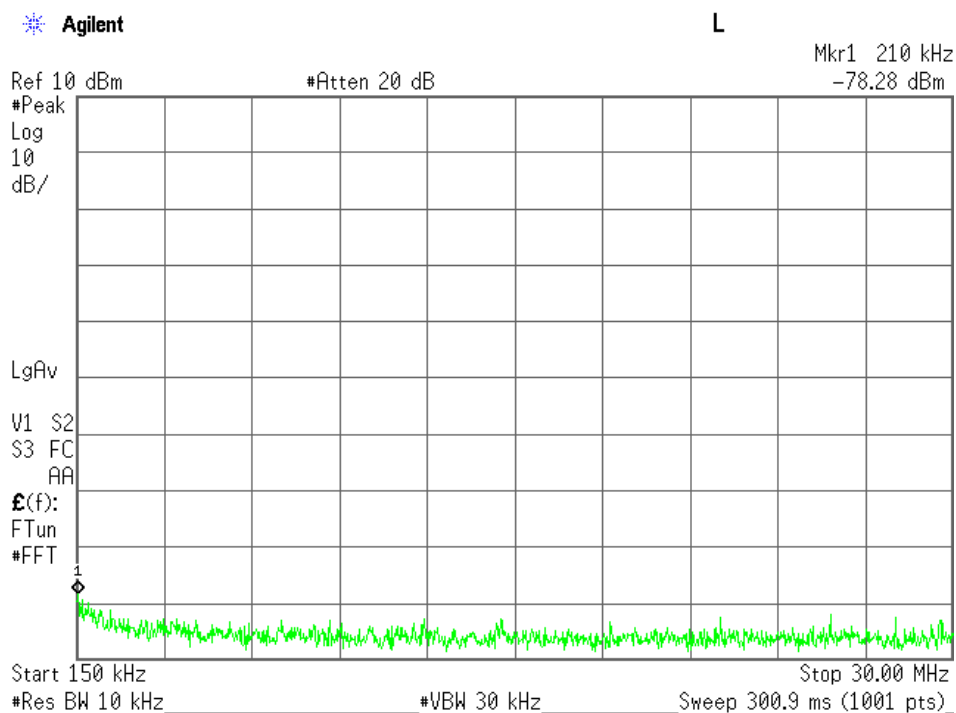
Middle Channel, Out-Of-Band Emissions (2 GHz – 20 GHz)



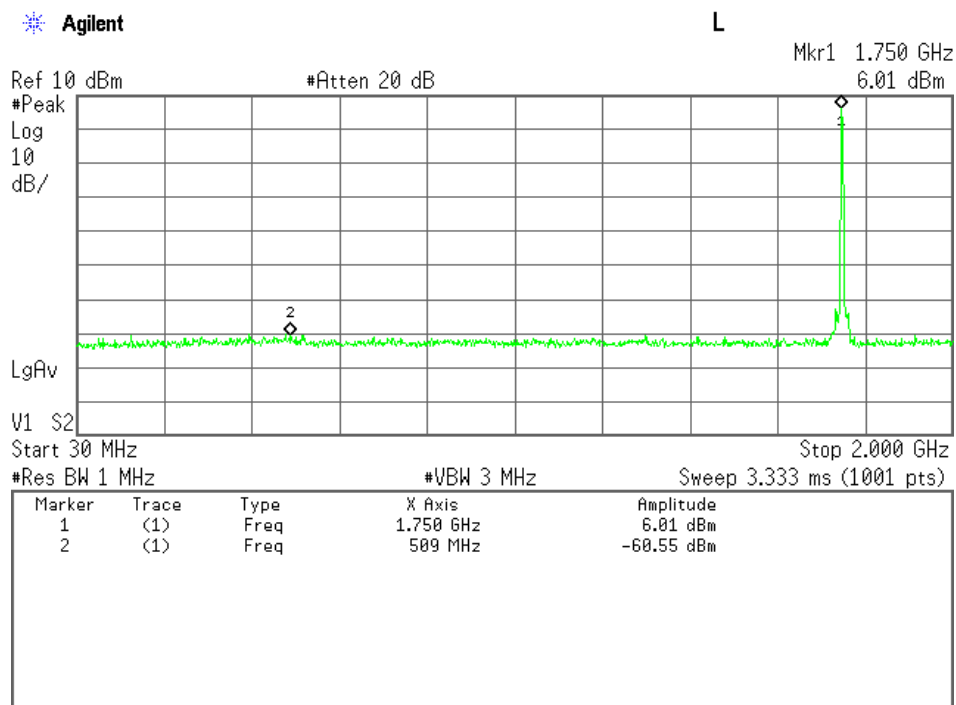
High Channel, Out-Of-Band Emissions (9 kHz – 150 kHz)



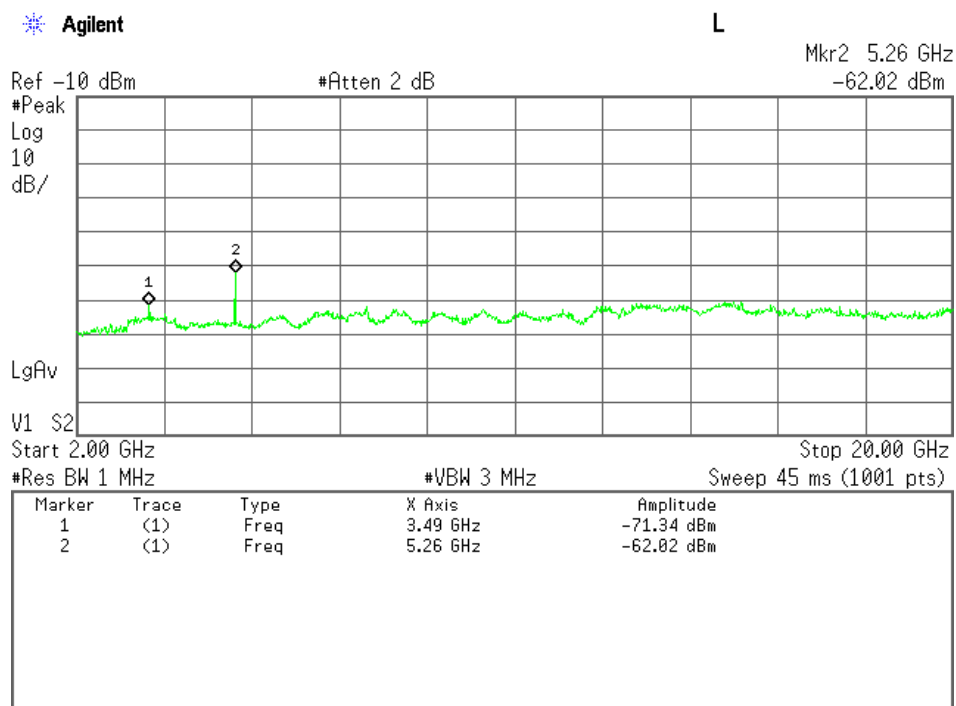
High Channel, Out-Of-Band Emissions (150 kHz – 30 MHz)



High Channel, Out-Of-Band Emissions (30 MHz – 2 GHz)



High Channel, Out-Of-Band Emissions (2 GHz – 20 GHz)



5) BW 15MHz(1RB)

(LTE 15MHz)

Test Date: April 5, 2016

Temp.: 22 °C, Humi: 42 %

Transmitting Frequency CH [MHz]		Measured Frequency [MHz]	Corr. Factor [dB]	Meter Readings [dBm]	Limits [dBm]	Results [dBm]	Margin [dB]	Remarks
20025	1717.500	3435.000	20.9	< -70.0	-13.0	< -49.1	> +36.1	C
		5152.500	21.1	< -70.0	-13.0	< -48.9	> +35.9	C
		6870.000	21.2	< -70.0	-13.0	< -48.8	> +35.8	C
		8587.500	21.5	< -70.0	-13.0	< -48.5	> +35.5	C
		10305.000	21.7	< -70.0	-13.0	< -48.3	> +35.3	C
		12022.500	22.0	< -70.0	-13.0	< -48.0	> +35.0	C
		13740.000	22.2	< -70.0	-13.0	< -47.8	> +34.8	C
		15457.500	22.4	< -70.0	-13.0	< -47.6	> +34.6	C
		17175.000	22.7	< -70.0	-13.0	< -47.3	> +34.3	C
20175	1732.500	3465.000	20.9	< -70.0	-13.0	< -49.1	> +36.1	C
		5197.500	21.1	< -70.0	-13.0	< -48.9	> +35.9	C
		6930.000	21.2	< -70.0	-13.0	< -48.8	> +35.8	C
		8662.500	21.5	< -70.0	-13.0	< -48.5	> +35.5	C
		10395.000	21.7	< -70.0	-13.0	< -48.3	> +35.3	C
		12127.500	22.0	< -70.0	-13.0	< -48.0	> +35.0	C
		13860.000	22.2	< -70.0	-13.0	< -47.8	> +34.8	C
		15592.500	22.4	< -70.0	-13.0	< -47.6	> +34.6	C
		17325.000	22.7	< -70.0	-13.0	< -47.3	> +34.3	C
20325	1747.500	3495.000	20.9	-69.0	-13.0	-48.1	+35.1	C
		5242.500	21.1	-63.0	-13.0	-41.9	+28.9	C
		6990.000	21.2	< -70.0	-13.0	< -48.8	> +35.8	C
		8737.500	21.5	< -70.0	-13.0	< -48.5	> +35.5	C
		10485.000	21.7	< -70.0	-13.0	< -48.3	> +35.3	C
		12232.500	22.0	< -70.0	-13.0	< -48.0	> +35.0	C
		13980.000	22.2	< -70.0	-13.0	< -47.8	> +34.8	C
		15727.500	22.4	< -70.0	-13.0	< -47.6	> +34.6	C
		17475.000	22.7	< -70.0	-13.0	< -47.3	> +34.3	C

Calculated result at 5242.5 MHz, as the worst point shown on underline:

Corr. Factor	=	21.1 dB
+) <u>Meter Reading</u>	=	<u>-63.0 dBm</u>
Result	=	-41.9 dBm

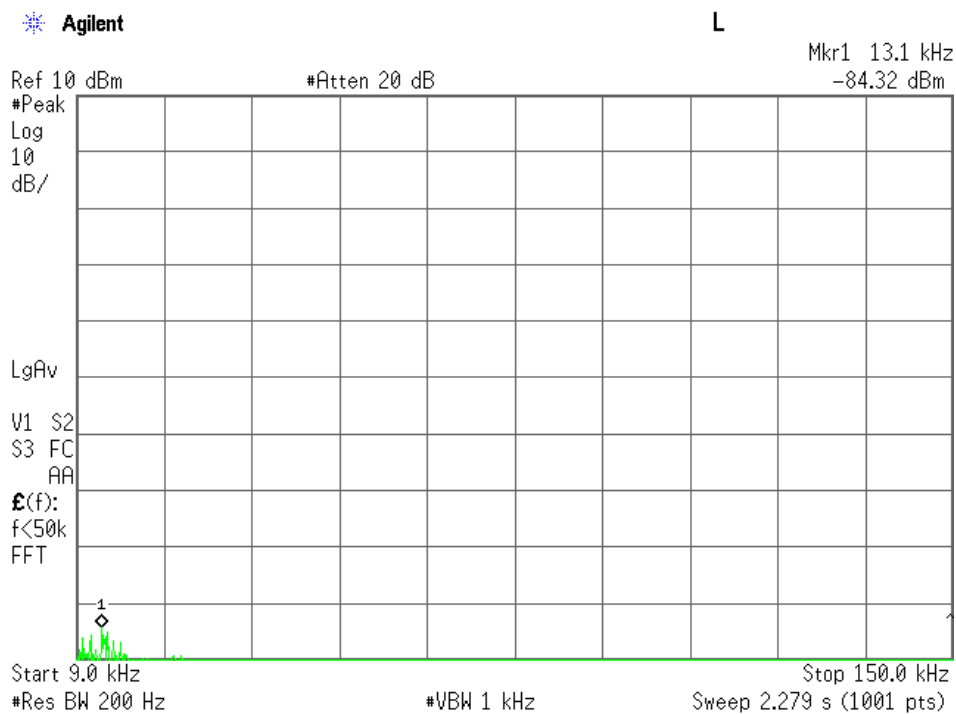
Minimum Margin: -13.0 - (-41.9) = 28.9 (dB)

NOTES

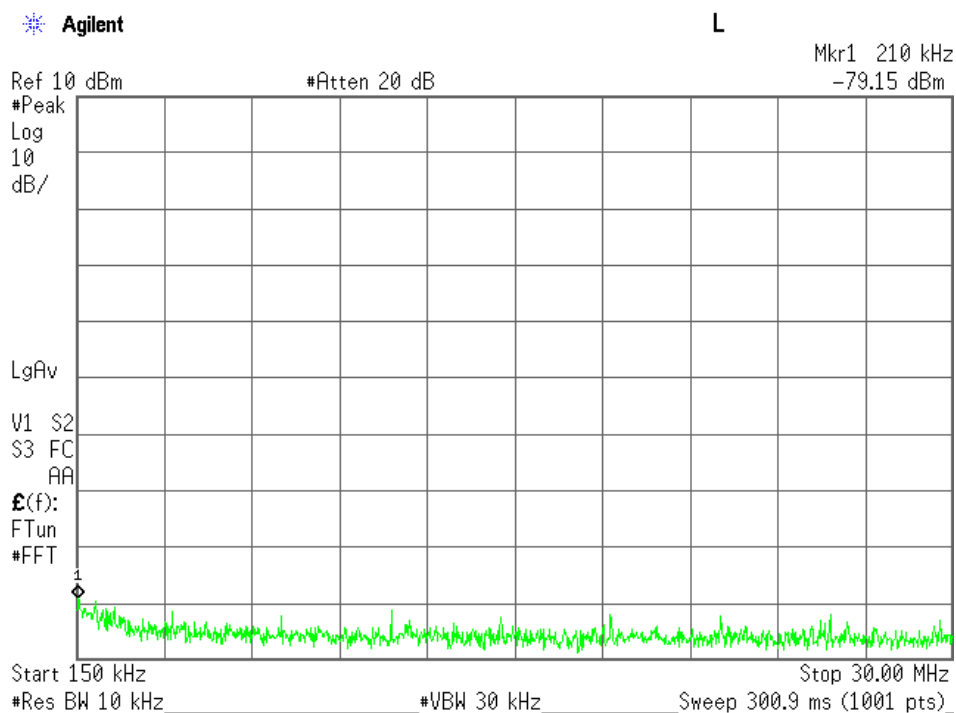
- The spectrum was checked from 9 kHz to 20 GHz.
- Applied limits : $-13.0 \text{ [dBm]} = 10\log(\text{TP[mW]}) - (43 + 10\log(\text{tp[W]})) = 10\log(\text{TP[mW]}) - (43 + (10 \log(\text{TP[mW]}) - 30))$
where, $\text{tp[W]} = \text{TP[mW]} / 1000$: Transmitter power at antenna terminal
- The correction factor is shown as follows:
Corr. Factor [dB] = Cable Loss + Pad Att. [dB] (9 kHz - 2 GHz)
Corr. Factor [dB] = Cable Loss + Pad Att. + High Pass Filter Loss [dB] (over 2 GHz)
- The symbol of "<" means "or less".
- The symbol of ">" means "more than".
- Setting of measuring instrument(s) :

	Detector Function	RES B.W.	V.B.W.	Sweep Time
A	Peak	200 Hz	1 kHz	AUTO
B	Peak	10 kHz	30 kHz	AUTO
C	Peak	1 MHz	3 MHz	AUTO

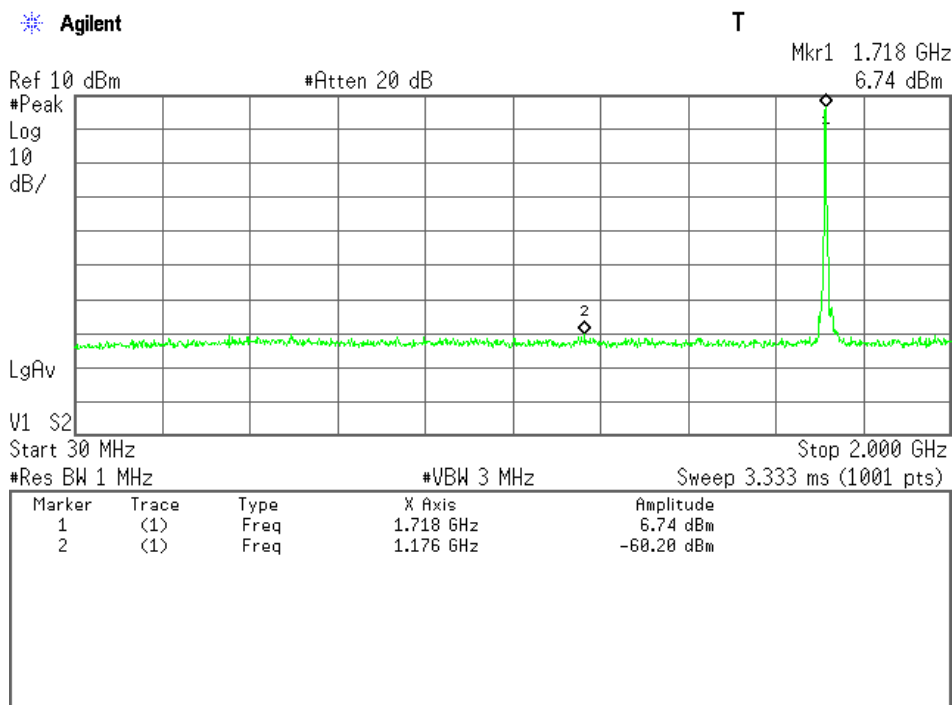
Low Channel, Out-Of-Band Emissions (9 kHz – 150 kHz)



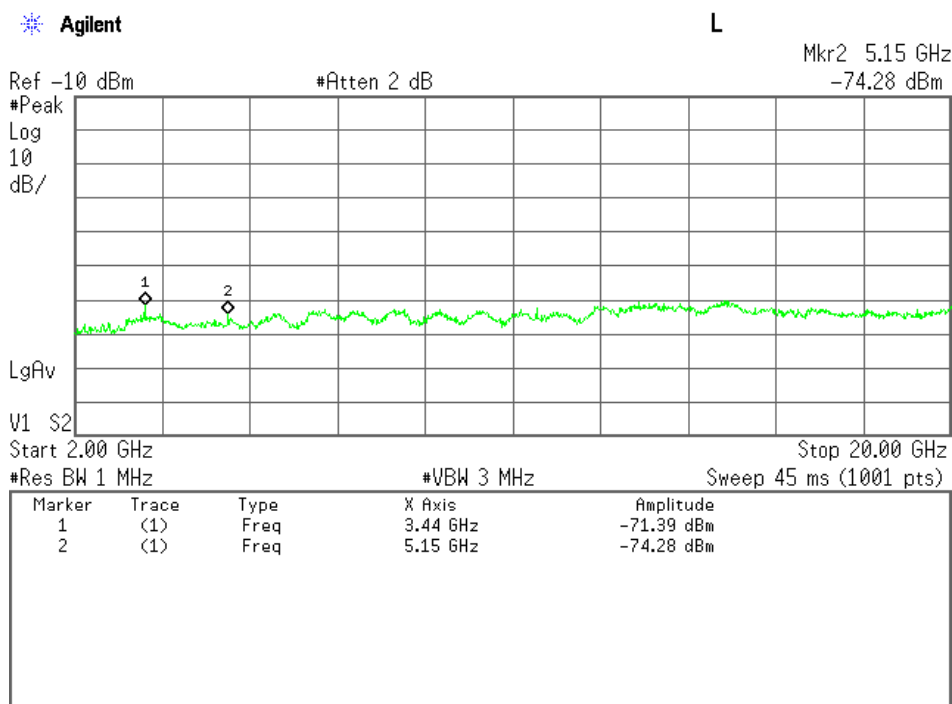
Low Channel, Out-Of-Band Emissions (150 kHz – 30 MHz)



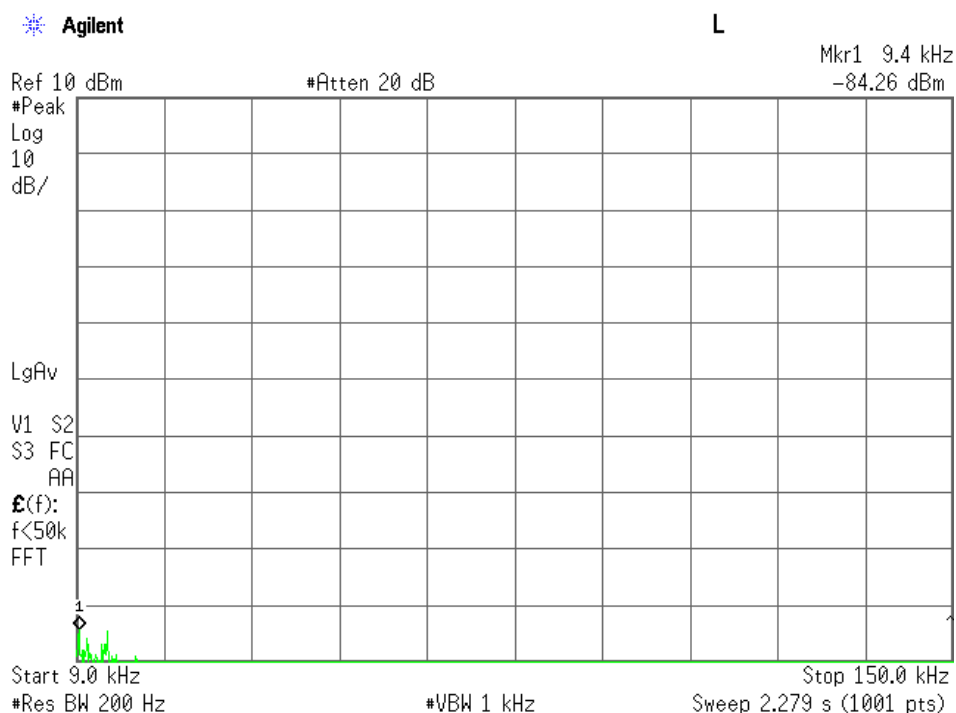
Low Channel, Out-Of-Band Emissions (30 MHz – 2 GHz)



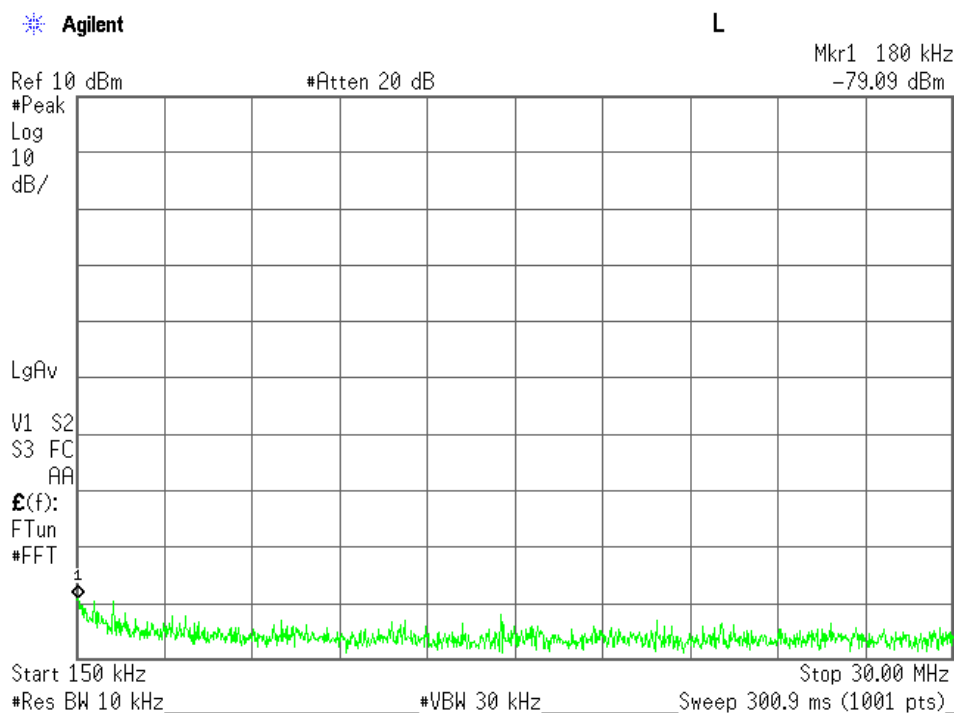
Low Channel, Out-Of-Band Emissions (2 GHz – 20 GHz)



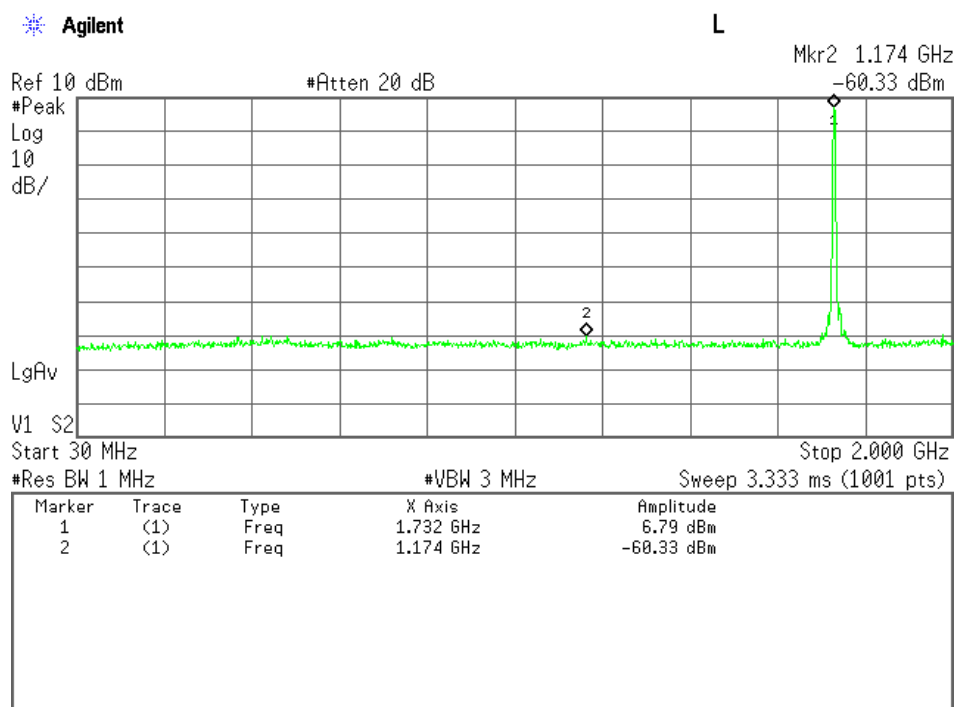
Middle Channel, Out-Of-Band Emissions (9 kHz – 150 kHz)



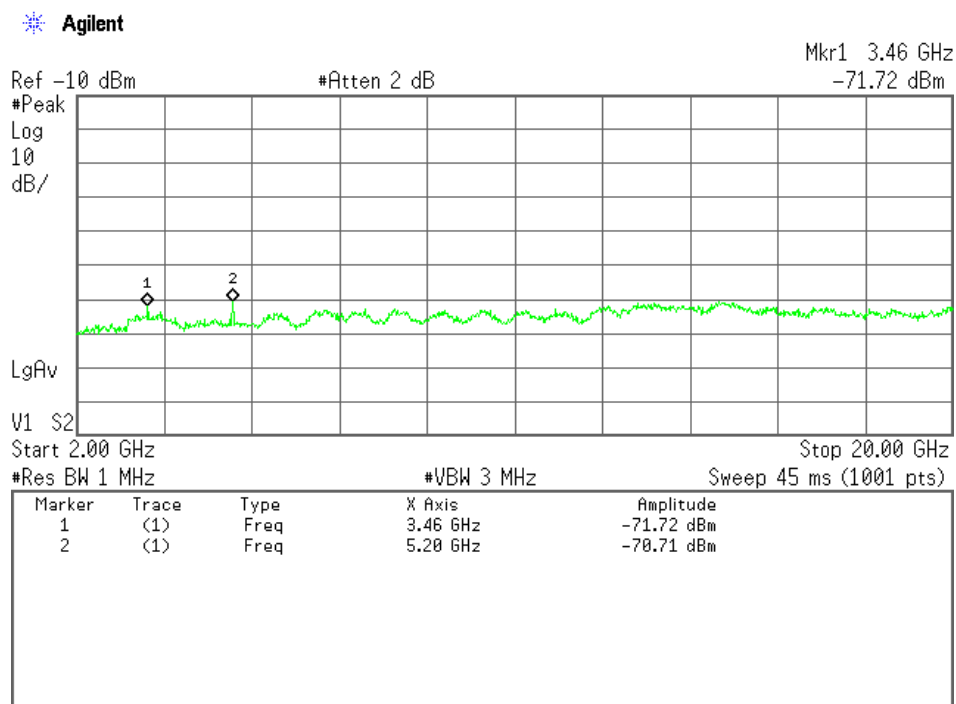
Middle Channel, Out-Of-Band Emissions (150 kHz – 30 MHz)



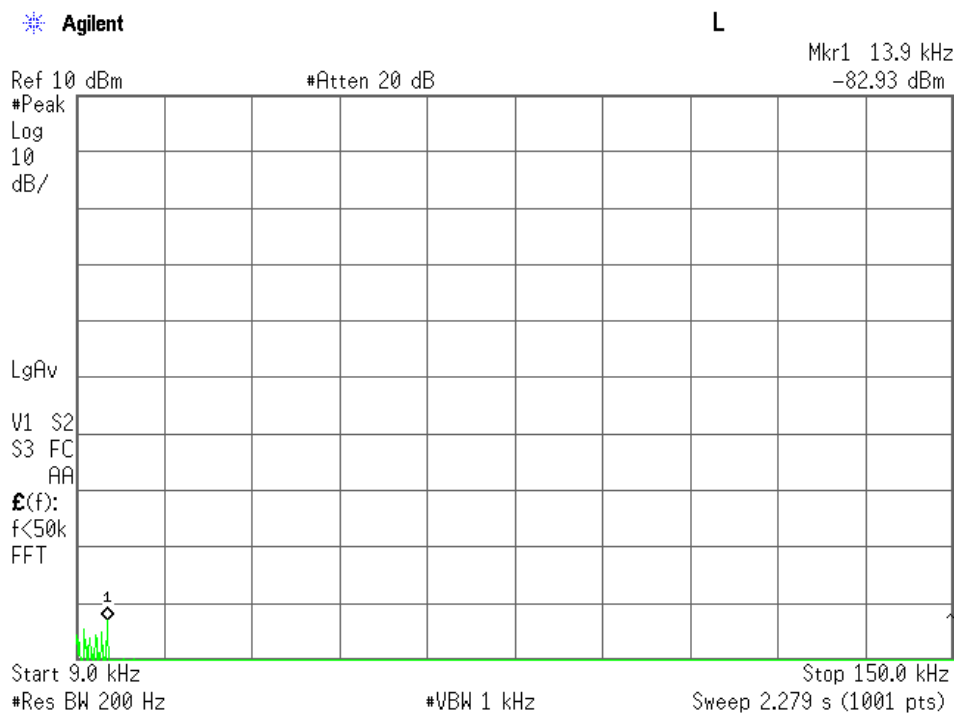
Middle Channel, Out-Of-Band Emissions (30 MHz – 2 GHz)



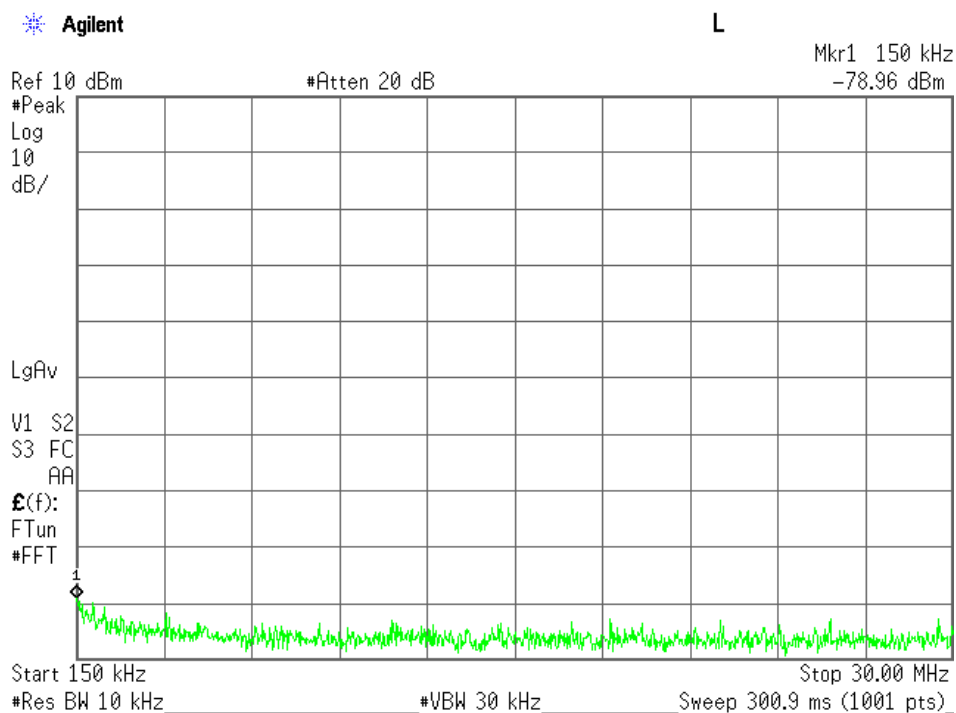
Middle Channel, Out-Of-Band Emissions (2 GHz – 20 GHz)



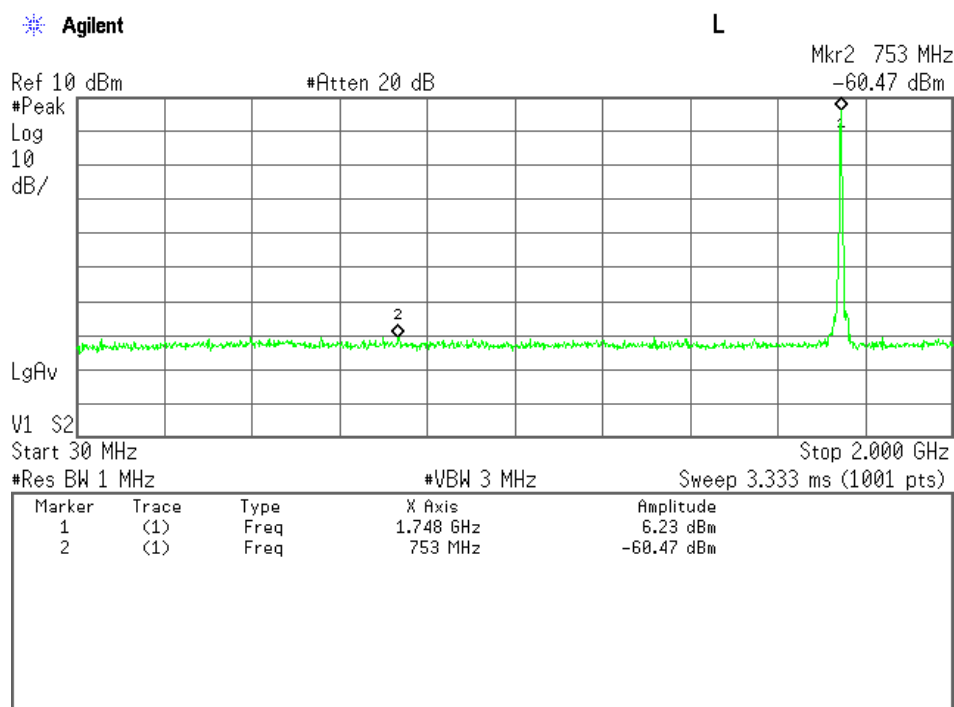
High Channel, Out-Of-Band Emissions (9 kHz – 150 kHz)



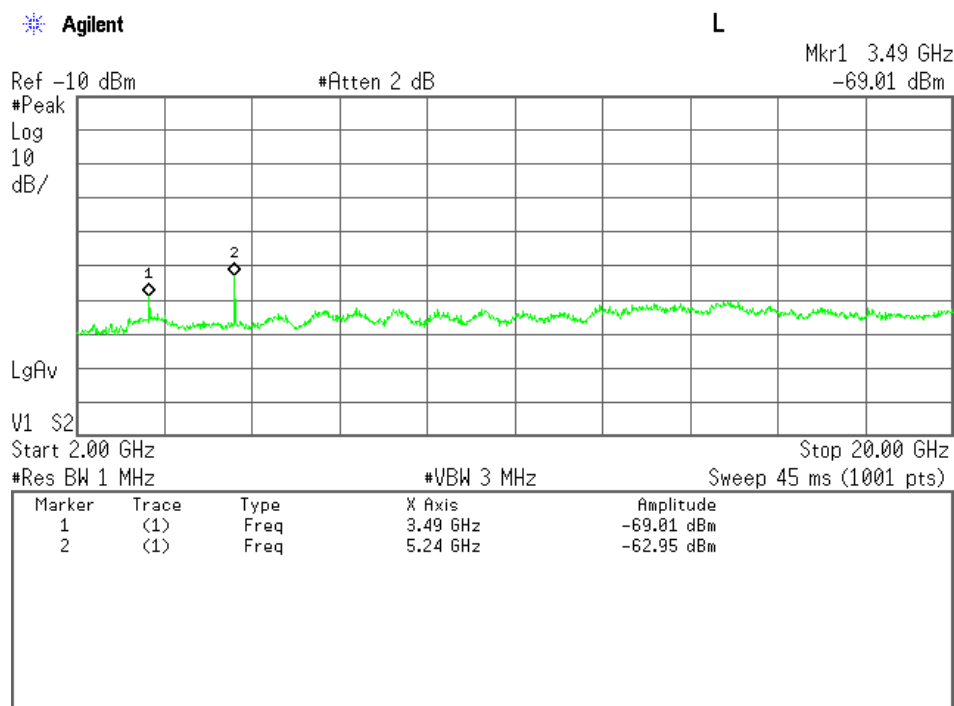
High Channel, Out-Of-Band Emissions (150 kHz – 30 MHz)



High Channel, Out-Of-Band Emissions (30 MHz – 2 GHz)



High Channel, Out-Of-Band Emissions (2 GHz – 20 GHz)



6) BW 20MHz(1RB)

(LTE 20MHz)

Test Date: April 5, 2016

Temp.: 22 °C, Humi: 42 %

Transmitting Frequency CH [MHz]		Measured Frequency [MHz]	Corr. Factor [dB]	Meter Readings [dBm]	Limits [dBm]	Results [dBm]	Margin [dB]	Remarks
20050	1720.000	3440.000	20.9	< -70.0	-13.0	< -49.1	> +36.1	C
		5160.000	21.1	< -70.0	-13.0	< -48.9	> +35.9	C
		6880.000	21.2	< -70.0	-13.0	< -48.8	> +35.8	C
		8600.000	21.5	< -70.0	-13.0	< -48.5	> +35.5	C
		10320.000	21.7	< -70.0	-13.0	< -48.3	> +35.3	C
		12040.000	22.0	< -70.0	-13.0	< -48.0	> +35.0	C
		13760.000	22.2	< -70.0	-13.0	< -47.8	> +34.8	C
		15480.000	22.4	< -70.0	-13.0	< -47.6	> +34.6	C
		17200.000	22.7	< -70.0	-13.0	< -47.3	> +34.3	C
20175	1732.500	3465.000	20.9	< -70.0	-13.0	< -49.1	> +36.1	C
		5197.500	21.1	-69.3	-13.0	-48.2	+35.2	C
		6930.000	21.2	< -70.0	-13.0	< -48.8	> +35.8	C
		8662.500	21.5	< -70.0	-13.0	< -48.5	> +35.5	C
		10395.000	21.7	< -70.0	-13.0	< -48.3	> +35.3	C
		12127.500	22.0	< -70.0	-13.0	< -48.0	> +35.0	C
		13860.000	22.2	< -70.0	-13.0	< -47.8	> +34.8	C
		15592.500	22.4	< -70.0	-13.0	< -47.6	> +34.6	C
		17325.000	22.7	< -70.0	-13.0	< -47.3	> +34.3	C
20300	1745.000	3490.000	20.9	< -70.0	-13.0	< -49.1	> +36.1	C
		5235.000	21.1	-63.8	-13.0	-42.7	+29.7	C
		6980.000	21.2	< -70.0	-13.0	< -48.8	> +35.8	C
		8725.000	21.5	< -70.0	-13.0	< -48.5	> +35.5	C
		10470.000	21.7	< -70.0	-13.0	< -48.3	> +35.3	C
		12215.000	22.0	< -70.0	-13.0	< -48.0	> +35.0	C
		13960.000	22.2	< -70.0	-13.0	< -47.8	> +34.8	C
		15705.000	22.4	< -70.0	-13.0	< -47.6	> +34.6	C
		17450.000	22.7	< -70.0	-13.0	< -47.3	> +34.3	C

Calculated result at 5235.0 MHz, as the worst point shown on underline:

Corr. Factor	=	21.1 dB
+) <u>Meter Reading</u>	=	<u>-63.8 dBm</u>
Result	=	-42.7 dBm

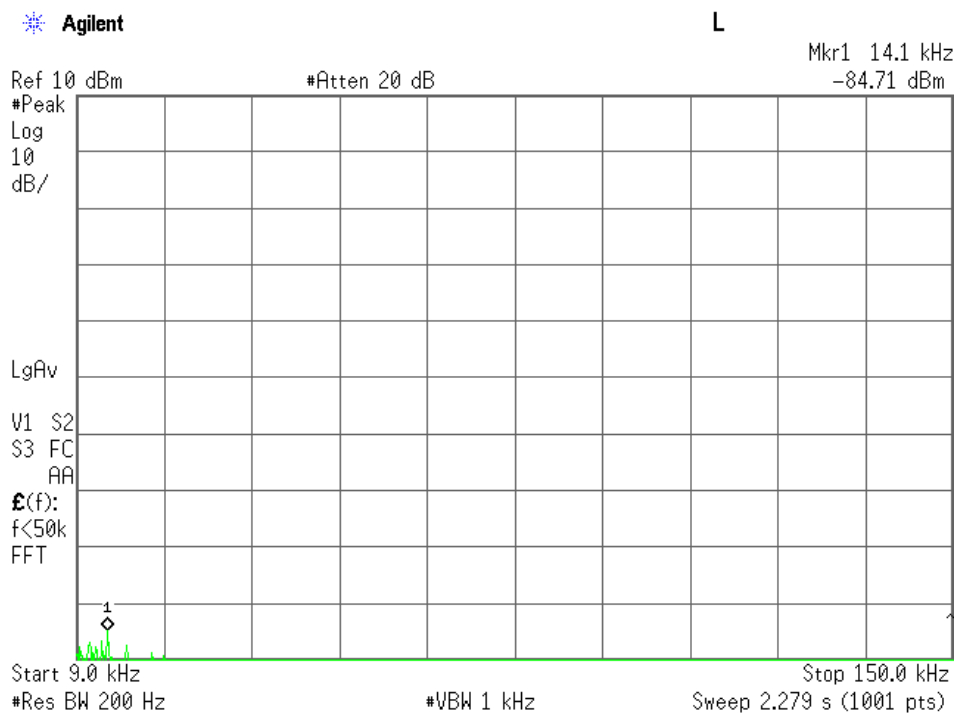
Minimum Margin: -13.0 - (-42.7) = 29.7 (dB)

NOTES

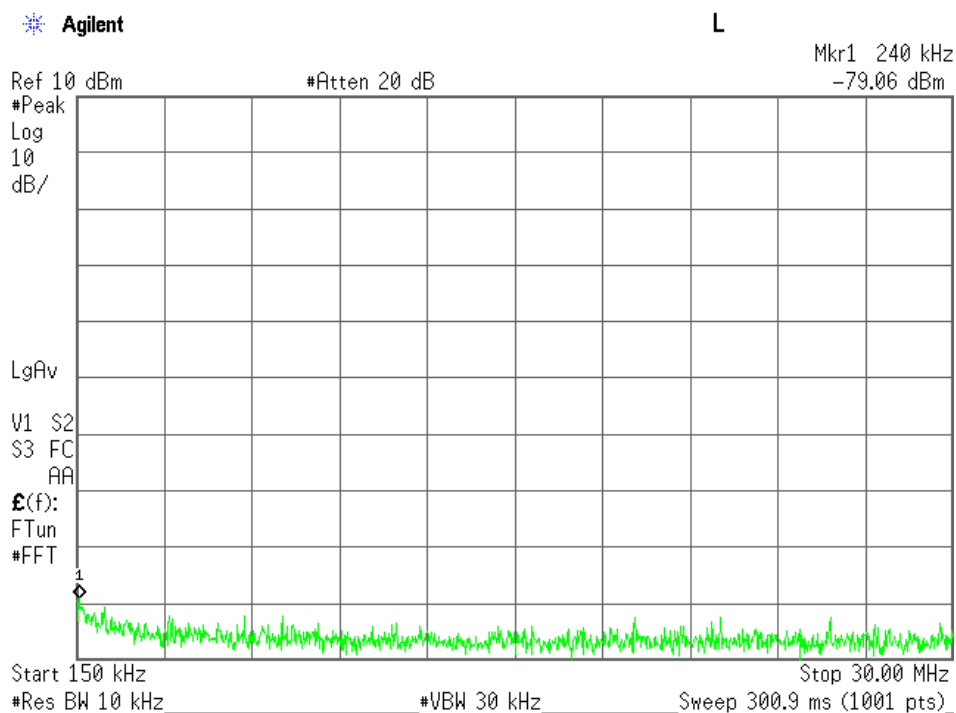
- The spectrum was checked from 9 kHz to 20 GHz.
- Applied limits : $-13.0 \text{ [dBm]} = 10\log(\text{TP[mW]}) - (43 + 10\log(\text{tp[W]})) = 10\log(\text{TP[mW]}) - (43 + (10\log(\text{TP[mW]}) - 30))$
where, $\text{tp[W]} = \text{TP[mW]} / 1000$: Transmitter power at antenna terminal
- The correction factor is shown as follows:
Corr. Factor [dB] = Cable Loss + Pad Att. [dB] (9 kHz - 2 GHz)
Corr. Factor [dB] = Cable Loss + Pad Att. + High Pass Filter Loss [dB] (over 2 GHz)
- The symbol of "<" means "or less".
- The symbol of ">" means "more than".
- Setting of measuring instrument(s) :

	Detector Function	RES B.W.	V.B.W.	Sweep Time
A	Peak	200 Hz	1 kHz	AUTO
B	Peak	10 kHz	30 kHz	AUTO
C	Peak	1 MHz	3 MHz	AUTO

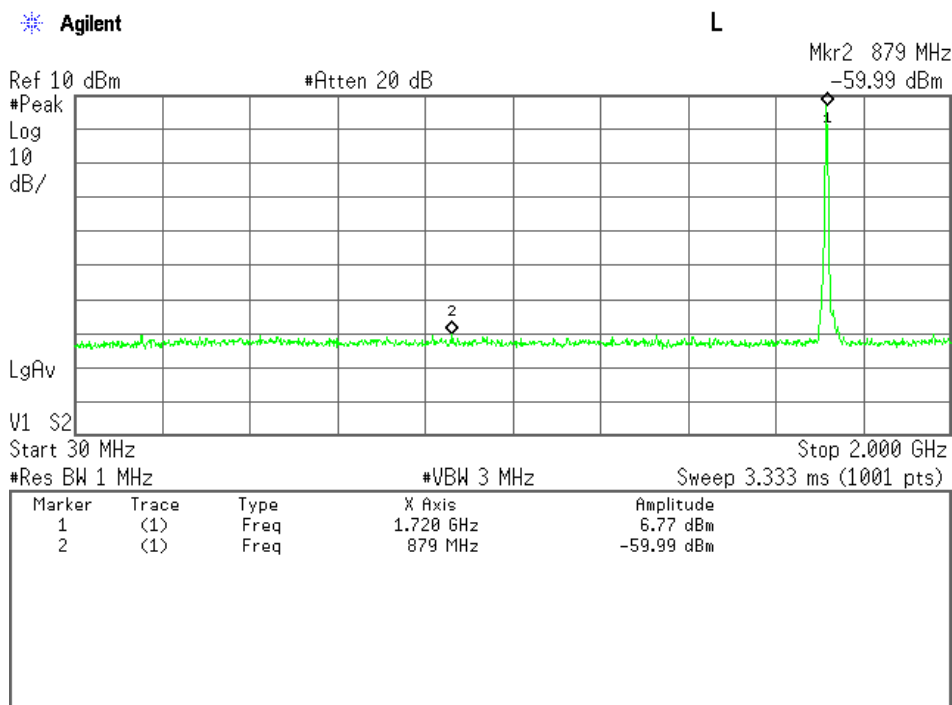
Low Channel, Out-Of-Band Emissions (9 kHz – 150 kHz)



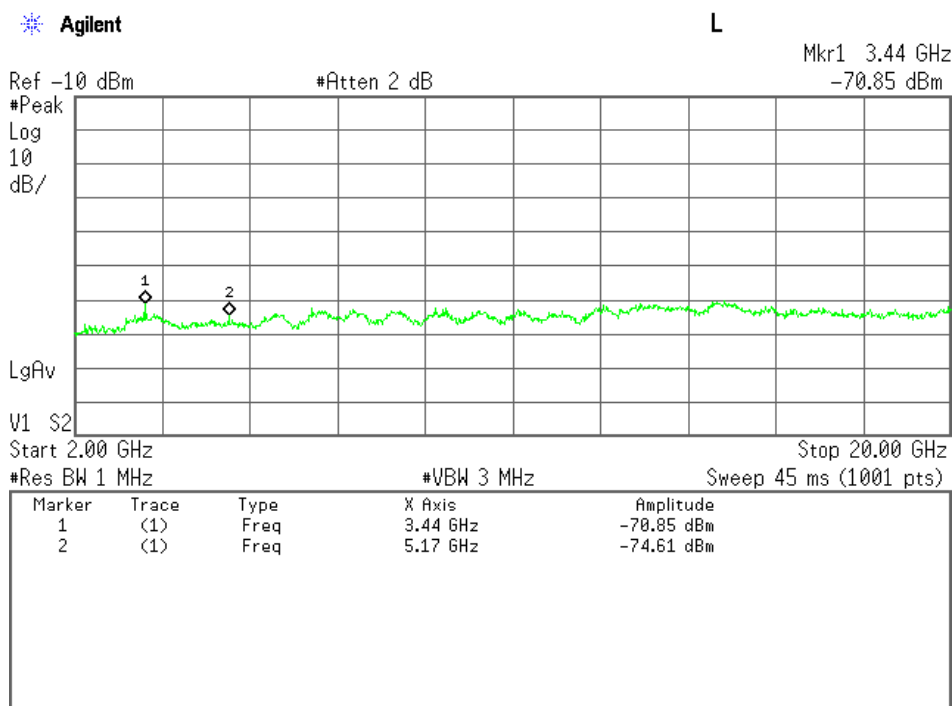
Low Channel, Out-Of-Band Emissions (150 kHz – 30 MHz)



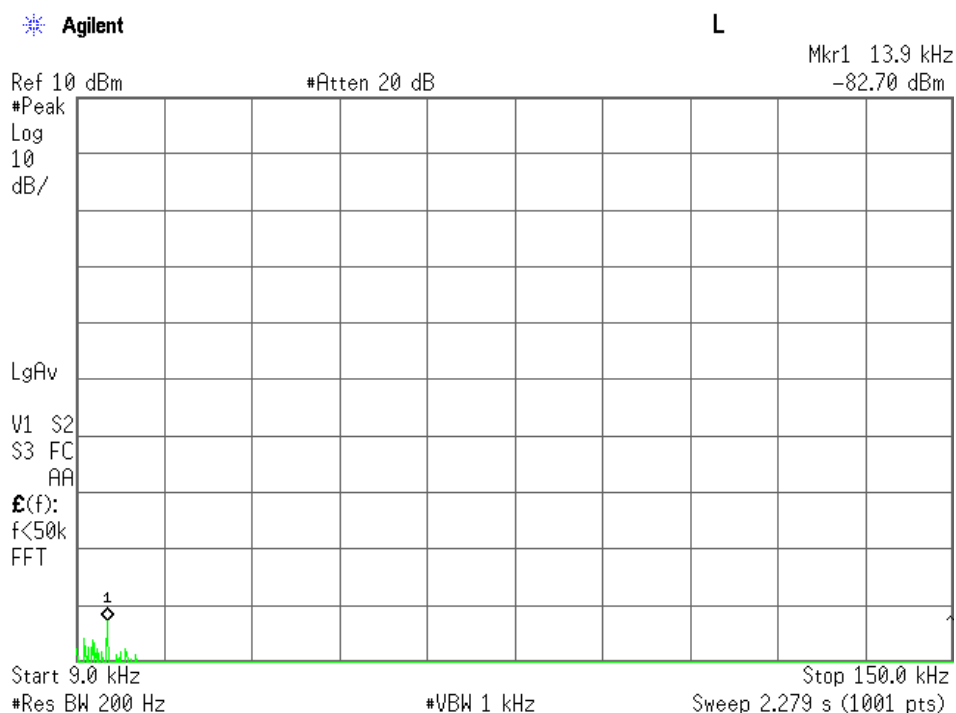
Low Channel, Out-Of-Band Emissions (30 MHz – 2 GHz)



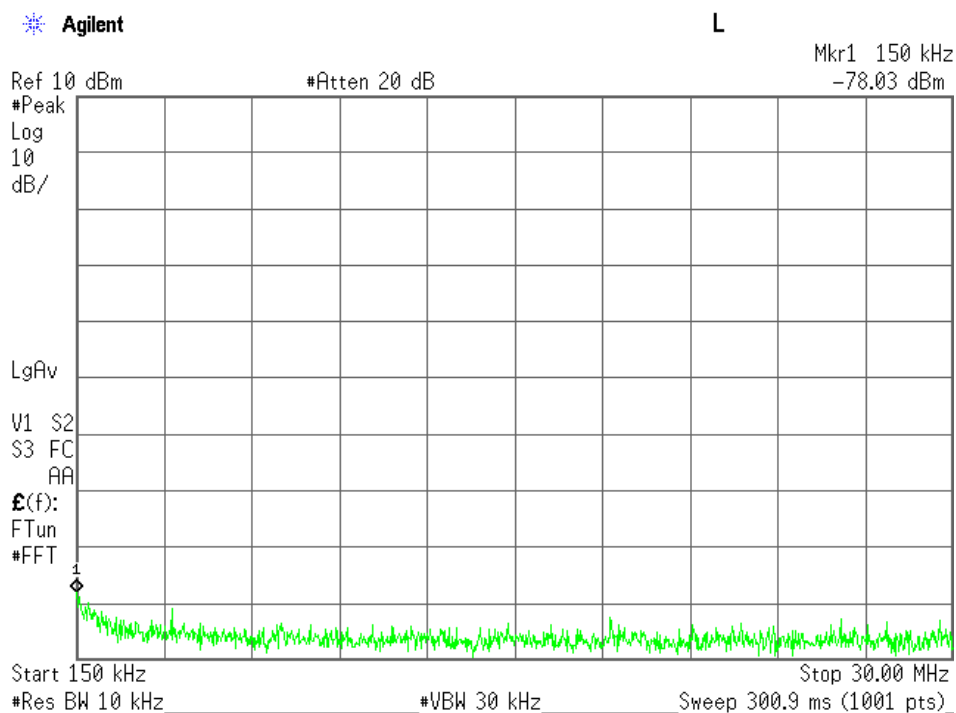
Low Channel, Out-Of-Band Emissions (2 GHz – 20 GHz)



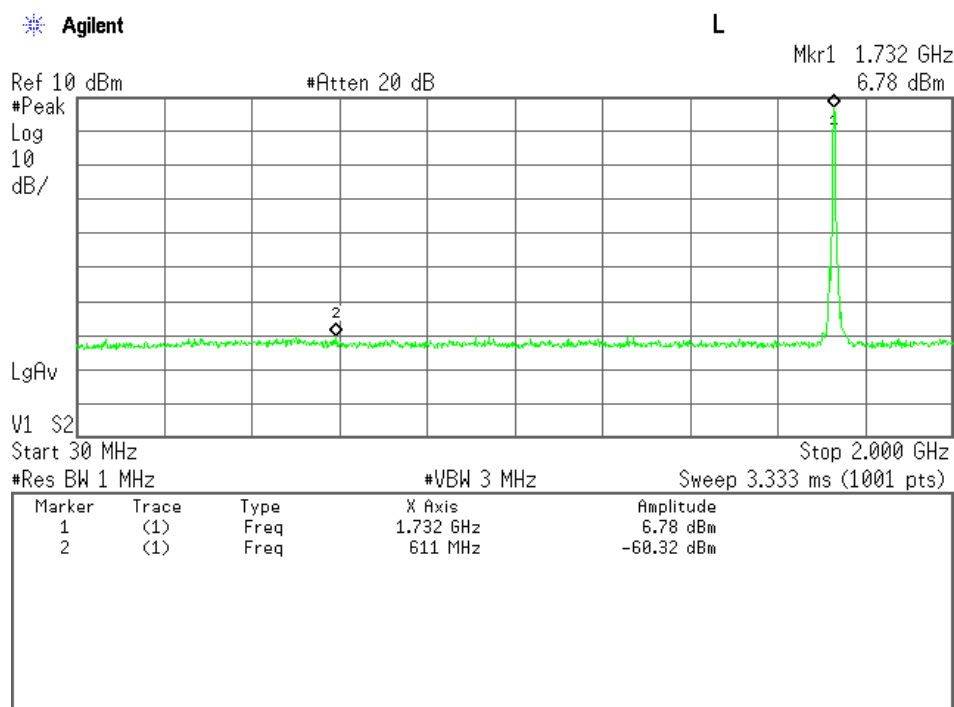
Middle Channel, Out-Of-Band Emissions (9 kHz – 150 kHz)



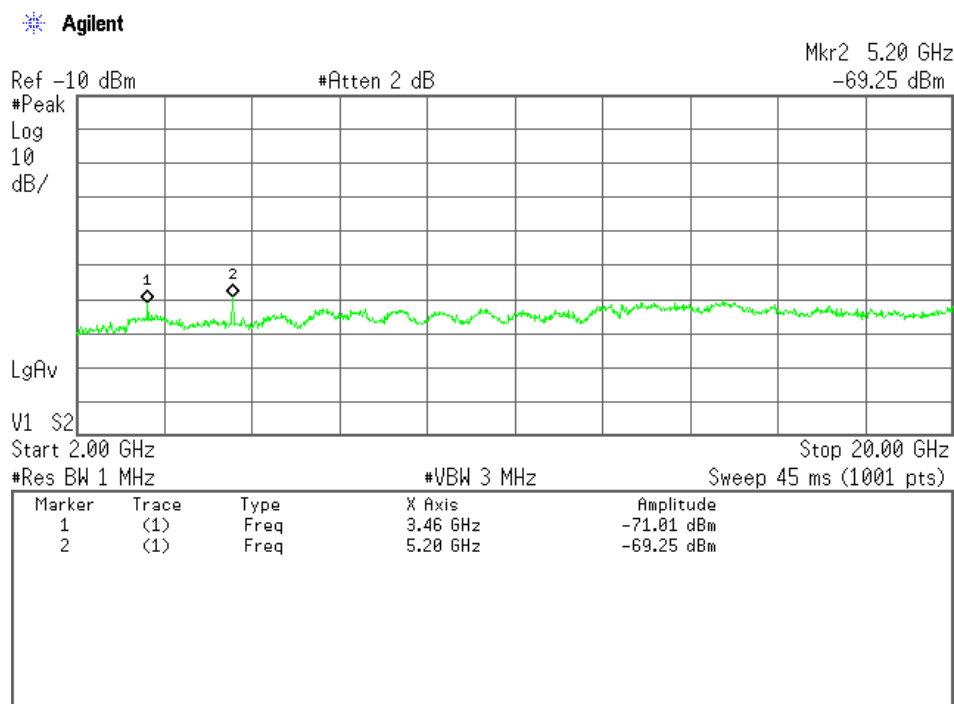
Middle Channel, Out-Of-Band Emissions (150 kHz – 30 MHz)



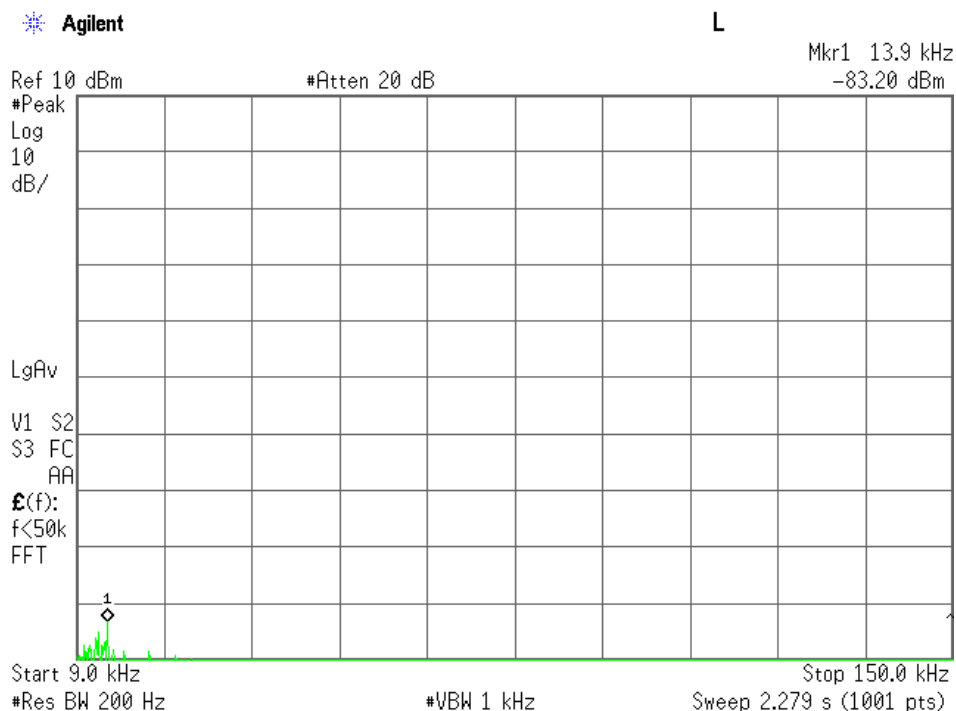
Middle Channel, Out-Of-Band Emissions (30 MHz – 2 GHz)



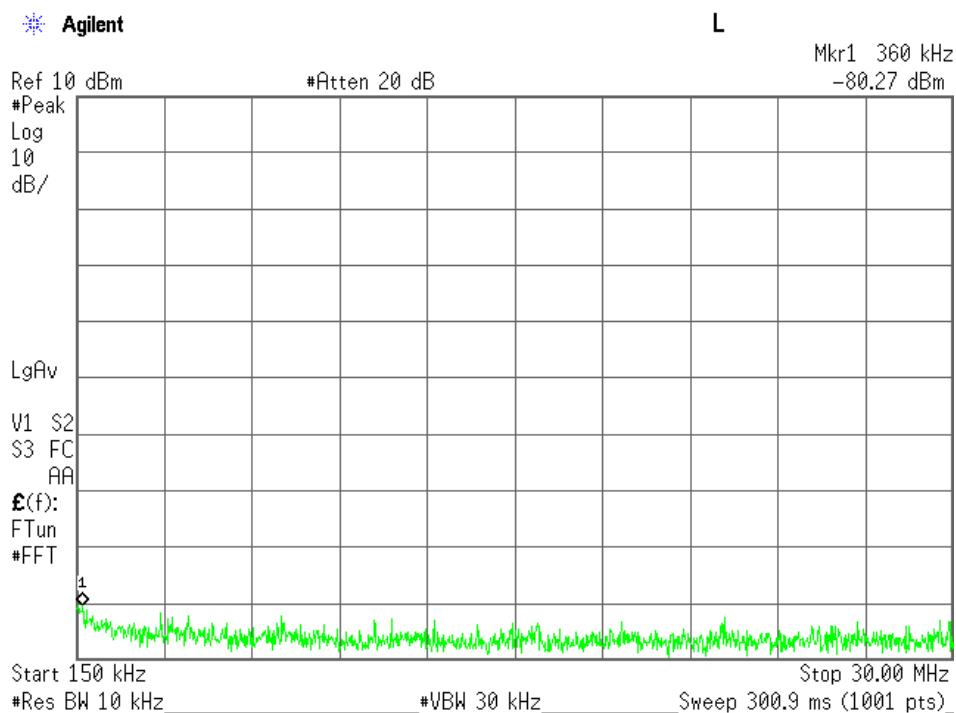
Middle Channel, Out-Of-Band Emissions (2 GHz – 20 GHz)



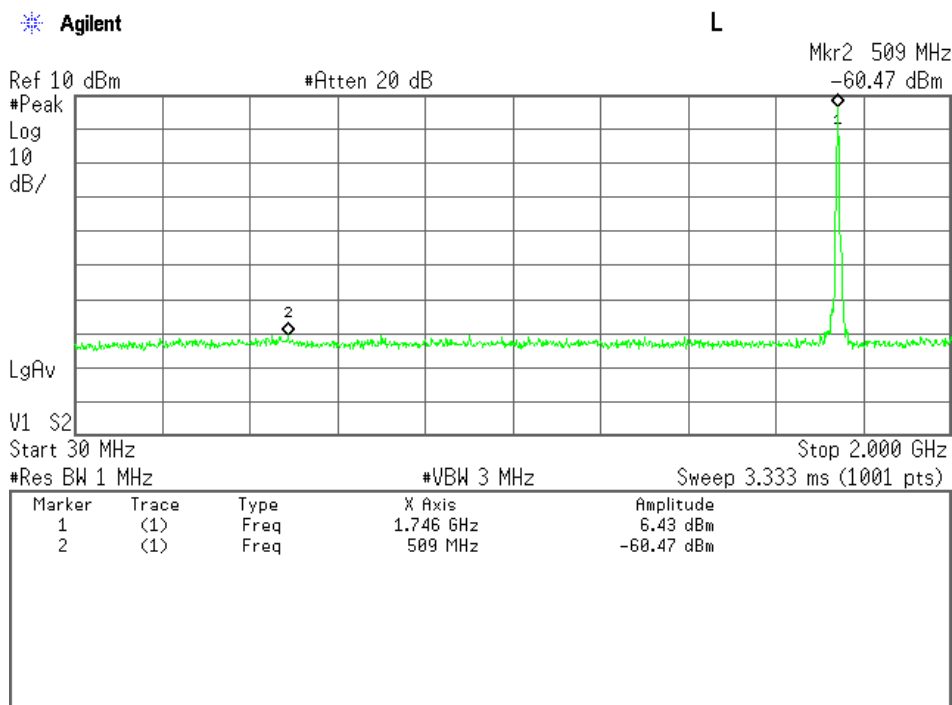
High Channel, Out-Of-Band Emissions (9 kHz – 150 kHz)



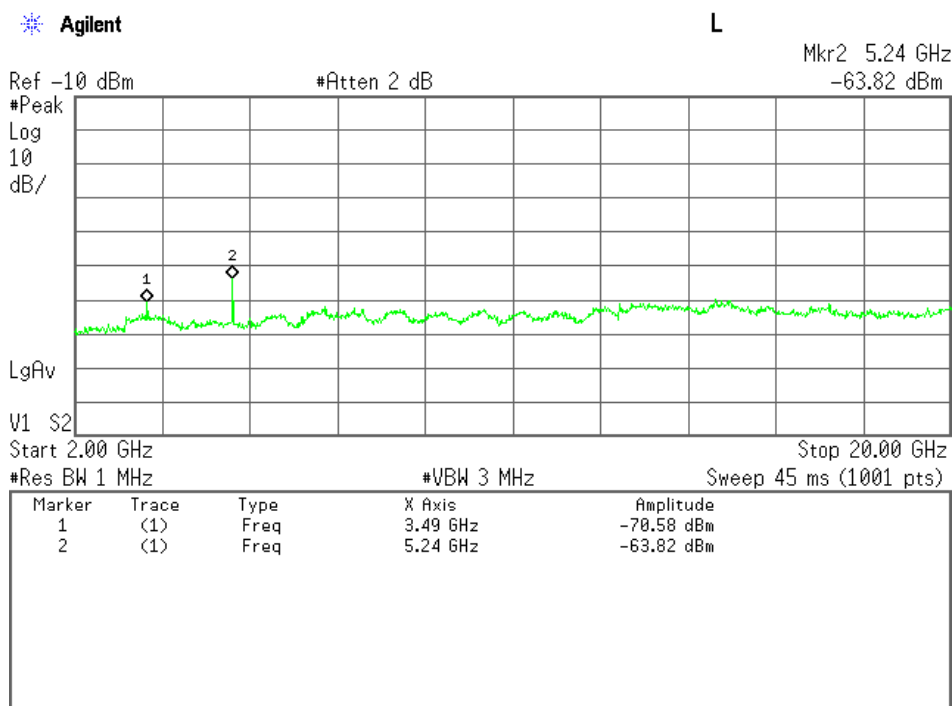
High Channel, Out-Of-Band Emissions (150 kHz – 30 MHz)



High Channel, Out-Of-Band Emissions (30 MHz – 2 GHz)



High Channel, Out-Of-Band Emissions (2 GHz – 20 GHz)



7.6 Band-Edge Emission (§2.1051)

For the requirements, ☒ - Applicable [☒ - Tested. ☐ - Not tested by applicant request.]
☐ - Not Applicable

7.6.1 Test Results

For the standard, ☒ - Passed ☐ - Failed ☐ - Not judged

Min. Limit Margin 5.2 dB at 1710.0 MHz

The Band-Edge level is -18.2 dBm at 1710.0 MHz

Uncertainty of Measurement Results ± 1.7 dB(2 σ)

Remarks : BW 3MHz QPSK

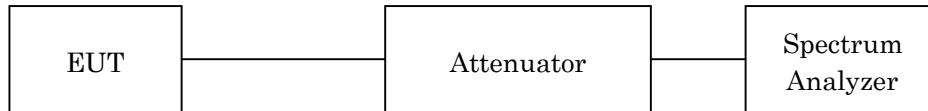
7.6.2 Test Instruments

Shielded Room S4				
Type	Model	Serial No. (ID)	Manufacturer	Cal. Due
Spectrum Analyzer	E4446A	US44300388 (A-39)	Agilent	2016/08/11
Attenuator	43KC-20	1418003 (D-41)	Anritsu	2016/07/05
RF Cable	SUCOFLEX102	14253/2 (C-52)	HUBER+SUHNER	2016/08/16

NOTE : The calibration interval of the above test instruments is 12 months.

7.6.3 Test Method and Test Setup (Diagrammatic illustration)

The test system is shown as follows:



The setting of the spectrum analyzer are shown as follows:

LTE Bandwidth	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Band-Edge Frequency	1850 MHz / 1910 MHz					
Res. Bandwidth	20 kHz	30 kHz	51 kHz	100 kHz	150 kHz	200 kHz
Video Bandwidth	62 kHz	100 kHz	160 kHz	300 kHz	470 kHz	620 kHz
Span	5 MHz	10 MHz	20 MHz	20 MHz	30 MHz	40 MHz
Sweep Time	AUTO					
Detector	Power Average(RMS)					
Trace	Average					

7.6.4 Test Data

Test Date :April 5, 2016

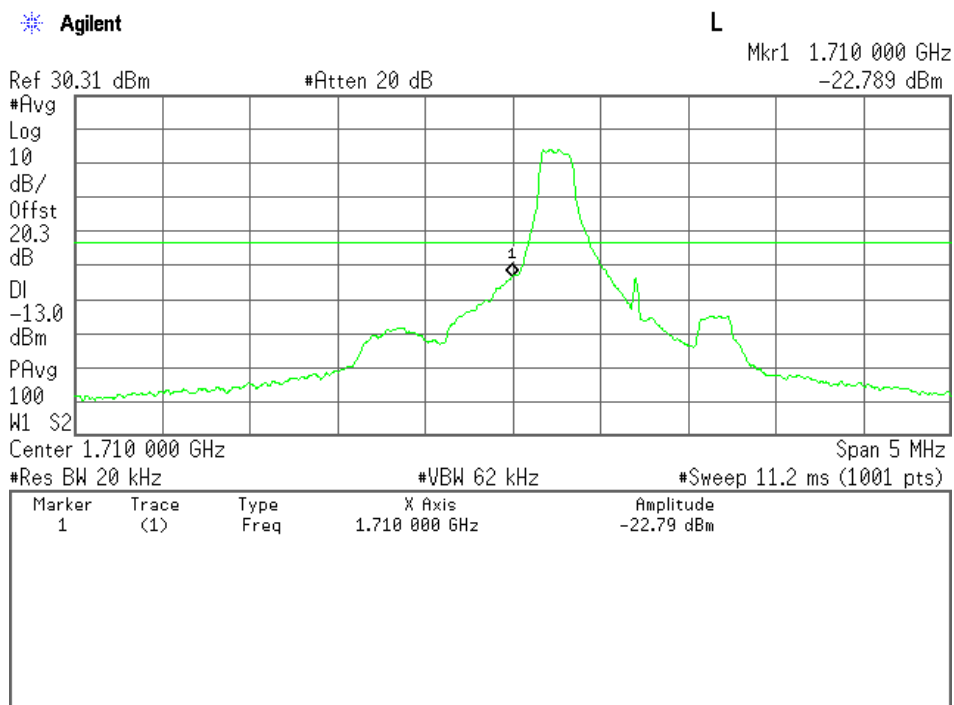
Temp.:22°C, Humi:42%

1-1) BW 1.4MHz

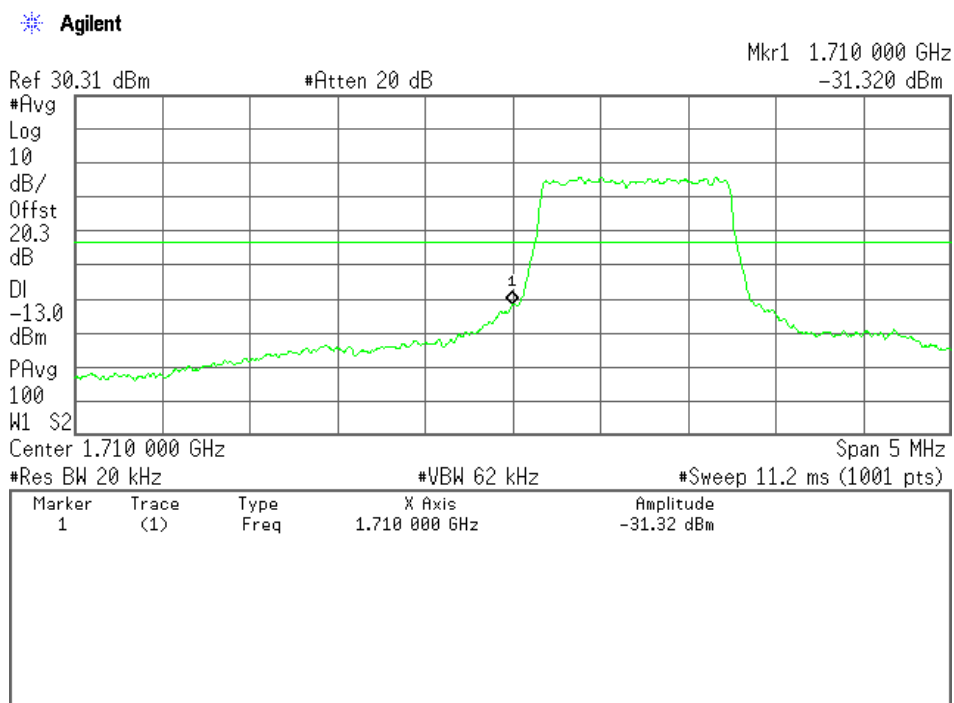
Mode: QPSK

Channel	Frequency (MHz)	Band-Edge Frequency (MHz)	Level (dBm)	Limits (dBm)	Margin (dB)
19957	1710.70	1710.0	-22.8 (at 1710.0 MHz)	-13.0	+9.8
20393	1754.30	1755.0	-23.6 (at 1755.0 MHz)	-13.0	+10.6

Low Channel(1RB Offset 0), Band-Edge Emission

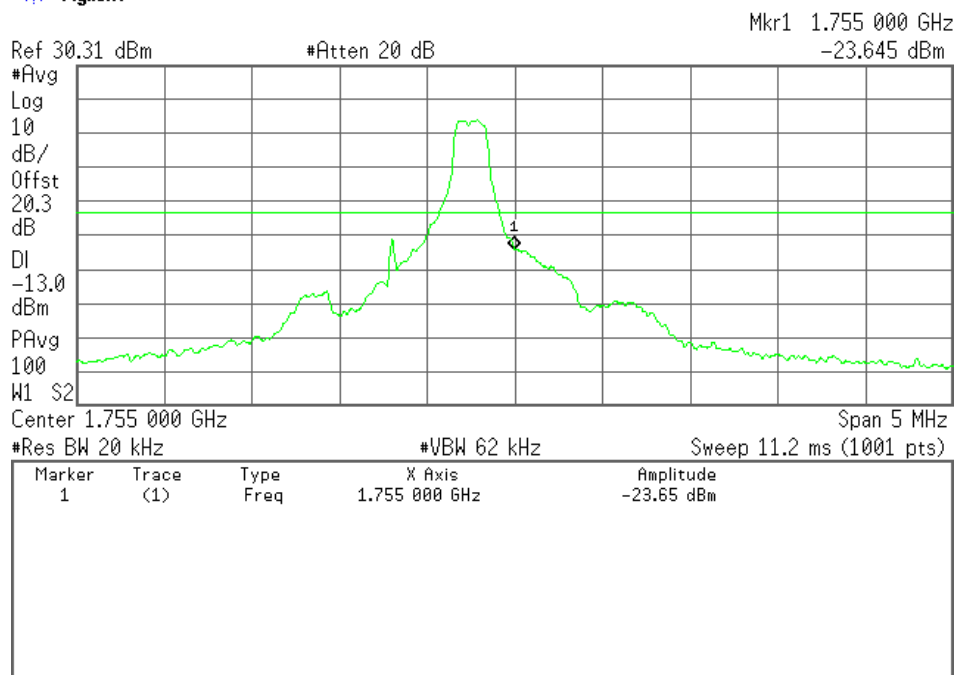


Low Channel(Full RB), Band-Edge Emission



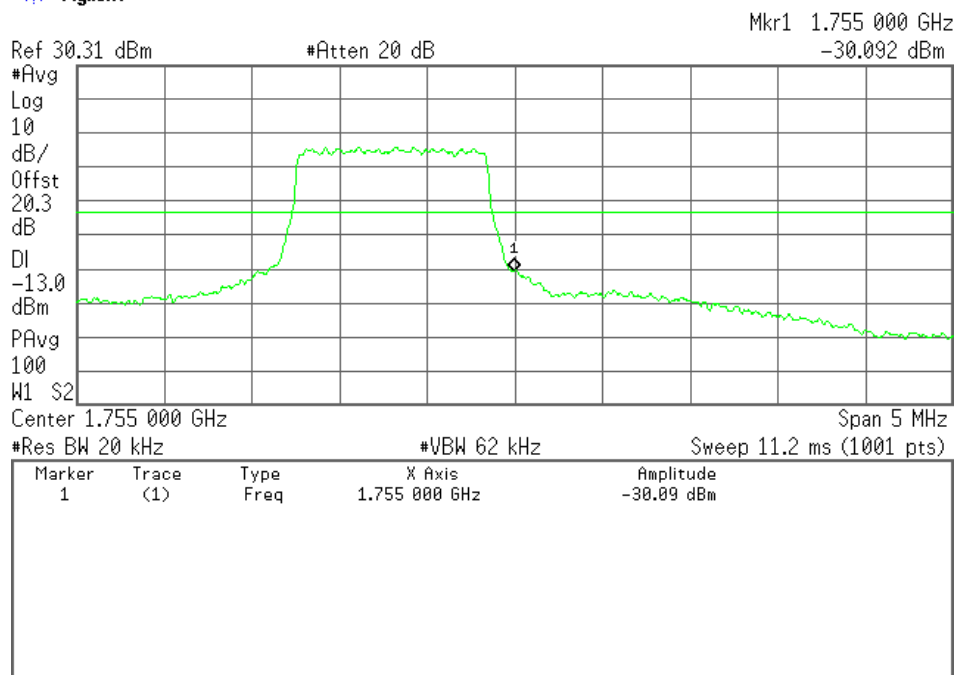
High Channel(1RB Offset Max), Band-Edge Emission

Agilent



High Channel(Full RB), Band-Edge Emission

Agilent

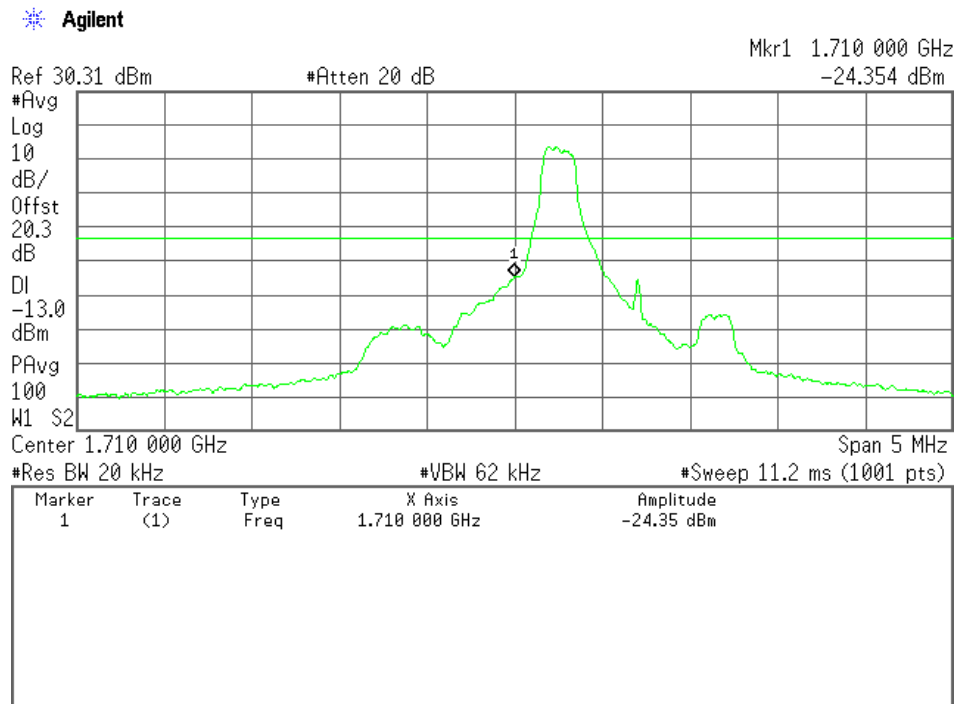


1-2) BW 1.4MHz

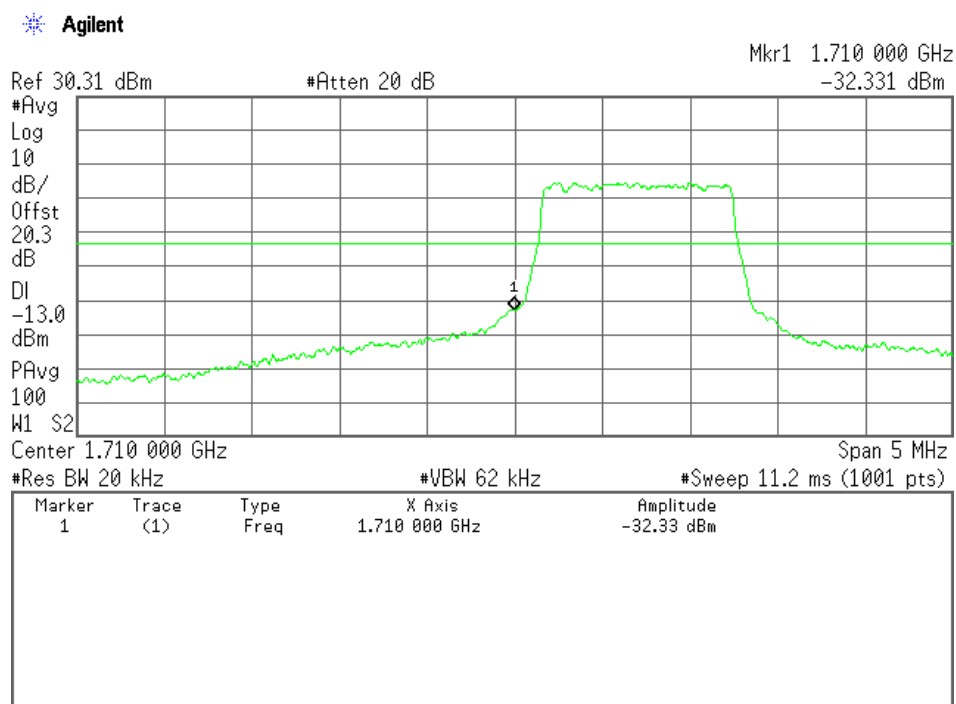
Mode:16 QAM

Channel	Frequency (MHz)	Band-Edge Frequency (MHz)	Level (dBm)	Limits (dBm)	Margin (dB)
19957	1710.70	1710.0	-24.4 (at 1710.0 MHz)	-13.0	+11.4
20393	1754.30	1755.0	-23.0 (at 1755.0 MHz)	-13.0	+10.0

Low Channel(1RB Offset 0), Band-Edge Emission

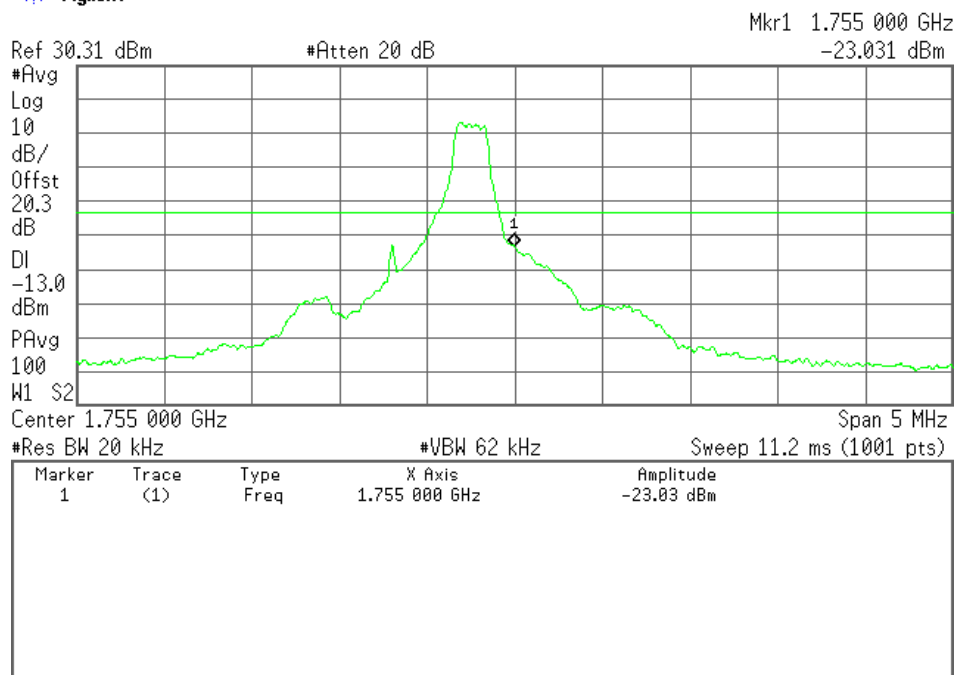


Low Channel(Full RB), Band-Edge Emission



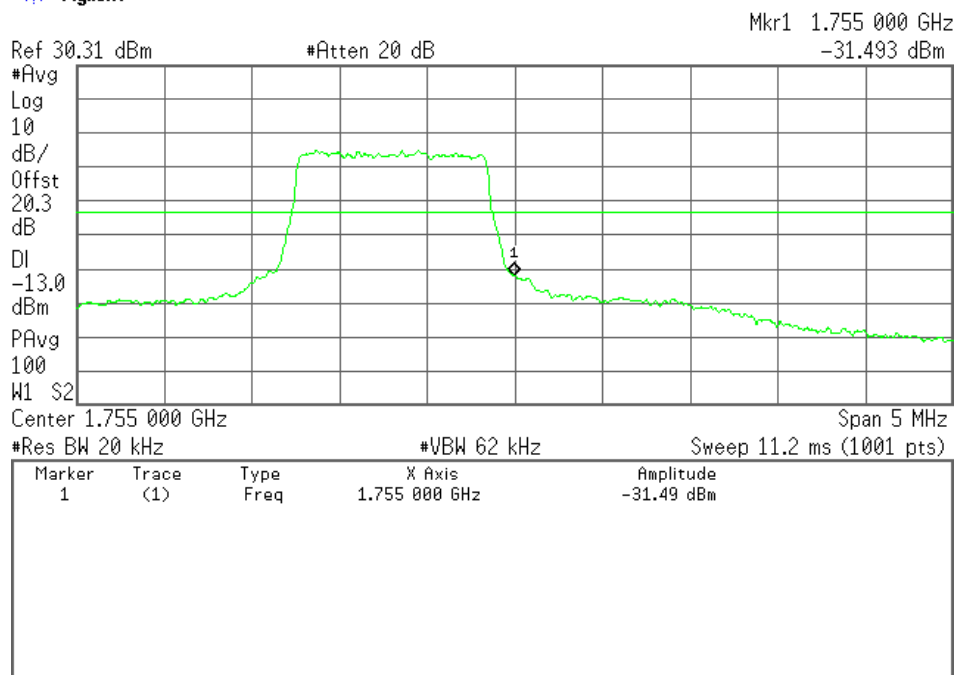
High Channel(1RB Offset Max), Band-Edge Emission

Agilent



High Channel(Full RB), Band-Edge Emission

Agilent

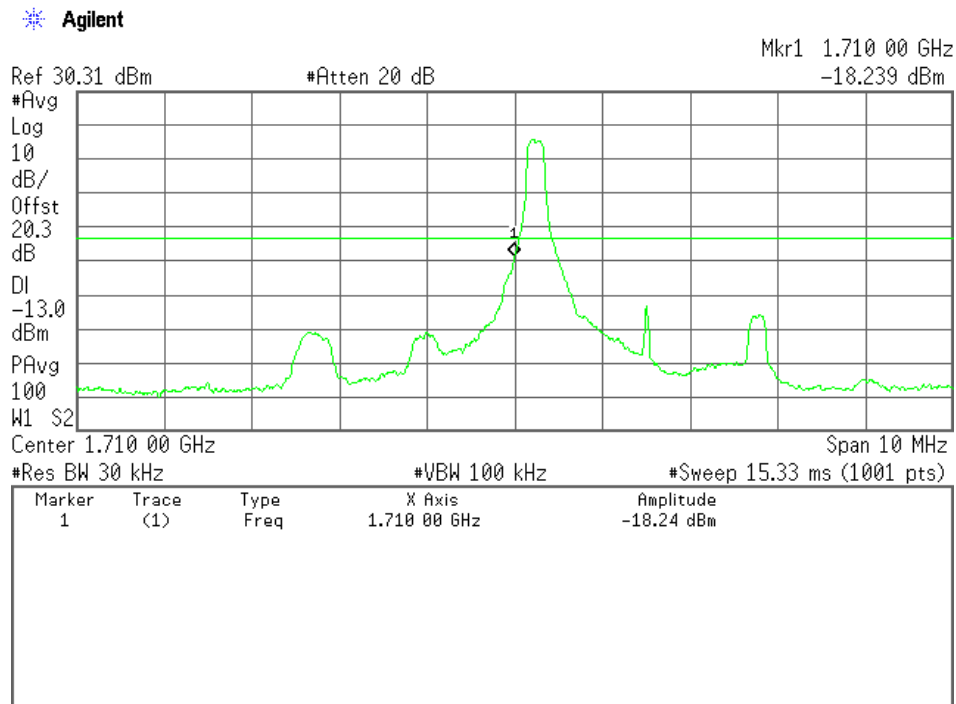


2-1) BW 3MHz

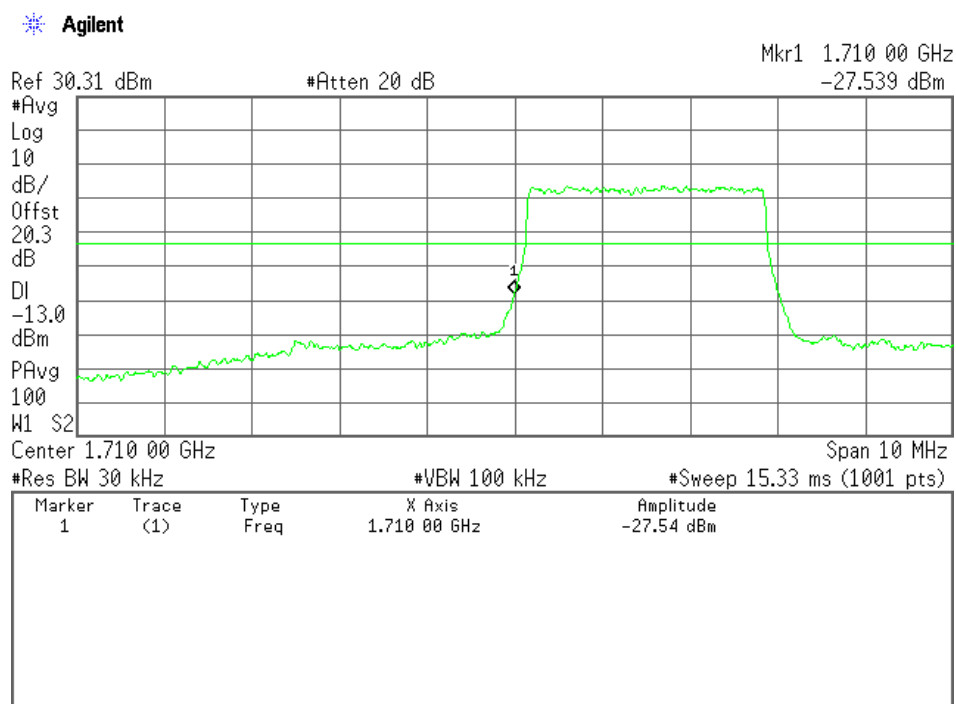
Mode: QPSK

Channel	Frequency (MHz)	Band-Edge Frequency (MHz)	Level (dBm)	Limits (dBm)	Margin (dB)
19965	1711.50	1710.0	-18.2 (at 1710.0 MHz)	-13.0	+5.2
20385	1753.50	1755.0	-18.3 (at 1755.0 MHz)	-13.0	+5.3

Low Channel(1RB Offset 0), Band-Edge Emission

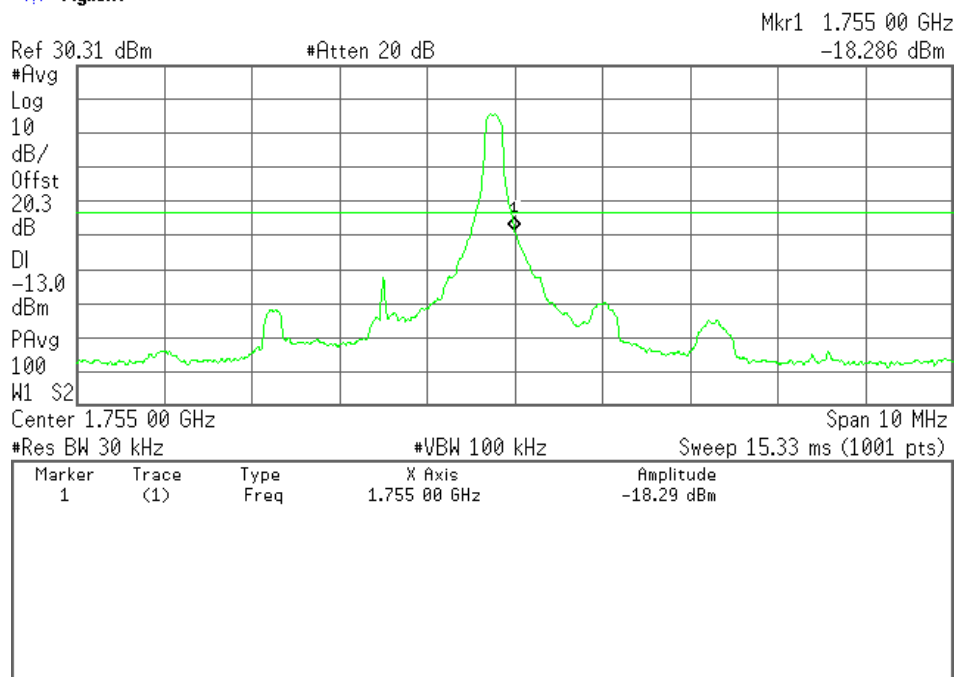


Low Channel(Full RB), Band-Edge Emission



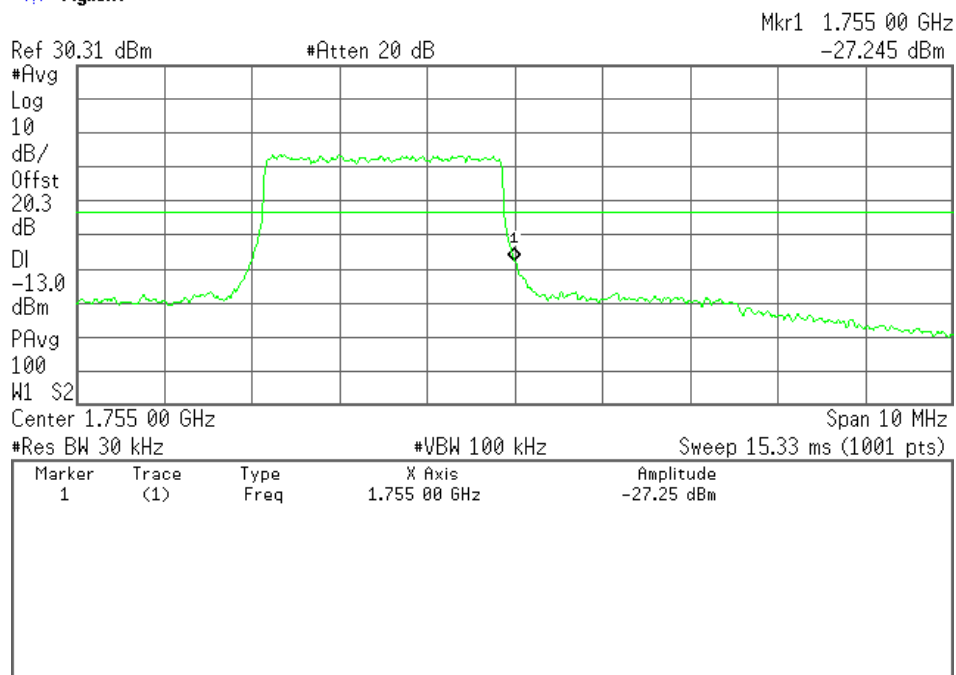
High Channel(1RB Offset Max), Band-Edge Emission

Agilent



High Channel(Full RB), Band-Edge Emission

Agilent

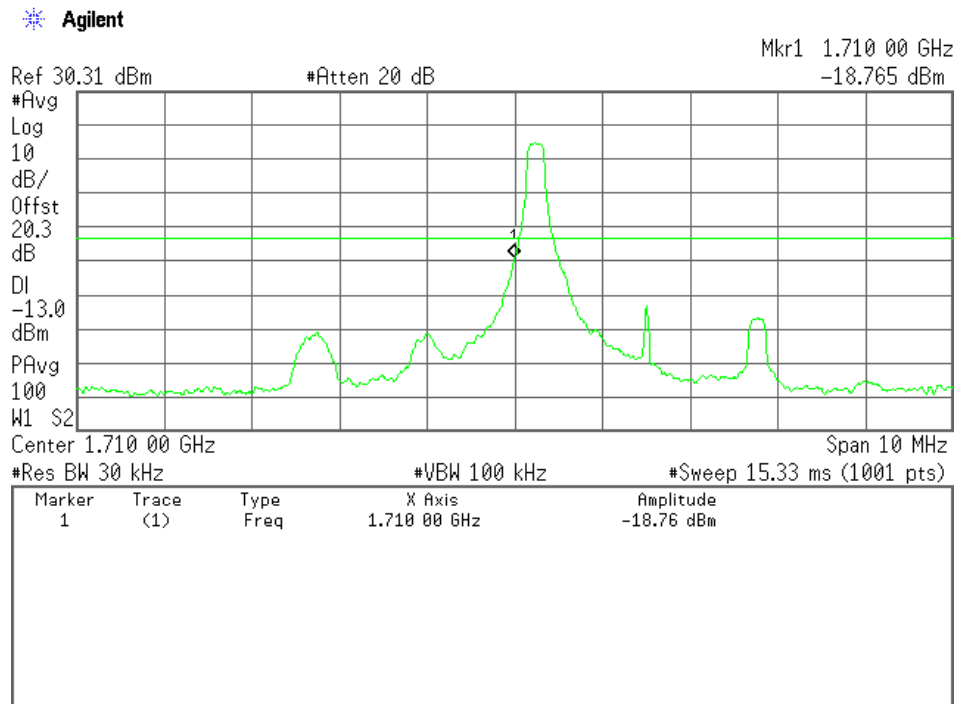


2-2) BW 3MHz

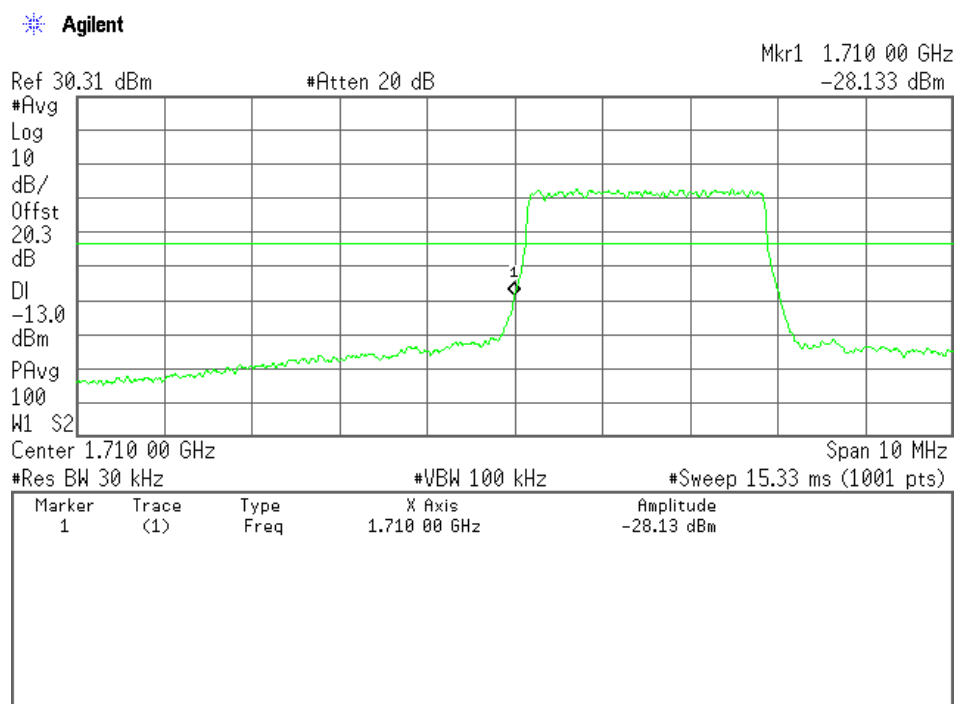
Mode:16 QAM

Channel	Frequency (MHz)	Band-Edge Frequency (MHz)	Level (dBm)	Limits (dBm)	Margin (dB)
19965	1711.50	1710.0	-18.8 (at 1710.0 MHz)	-13.0	+5.8
20385	1753.50	1755.0	-18.6 (at 1755.0 MHz)	-13.0	+5.6

Low Channel(1RB Offset 0), Band-Edge Emission

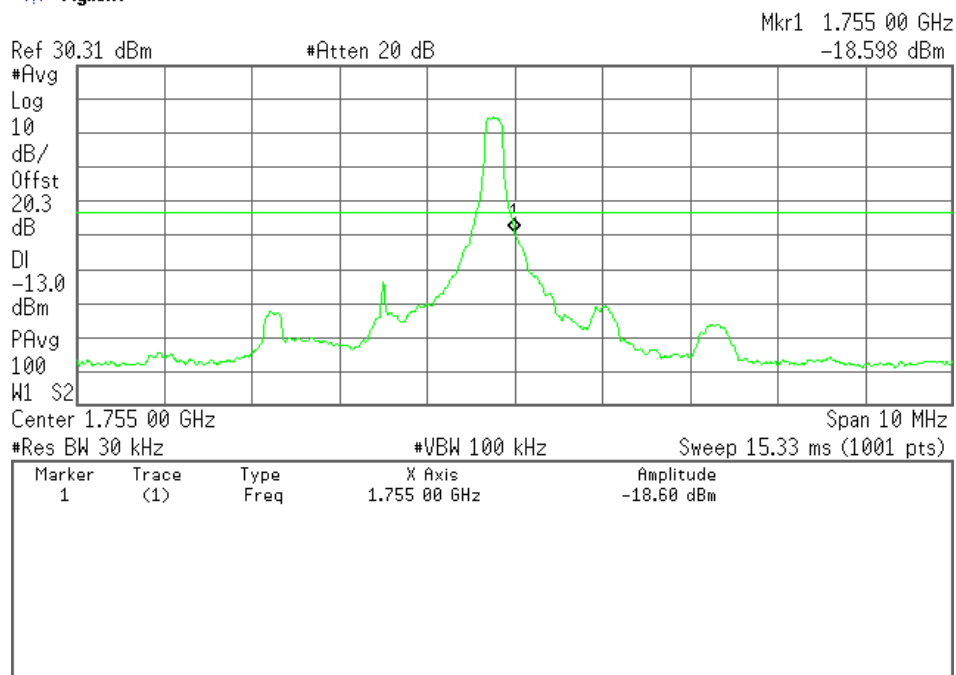


Low Channel(Full RB), Band-Edge Emission



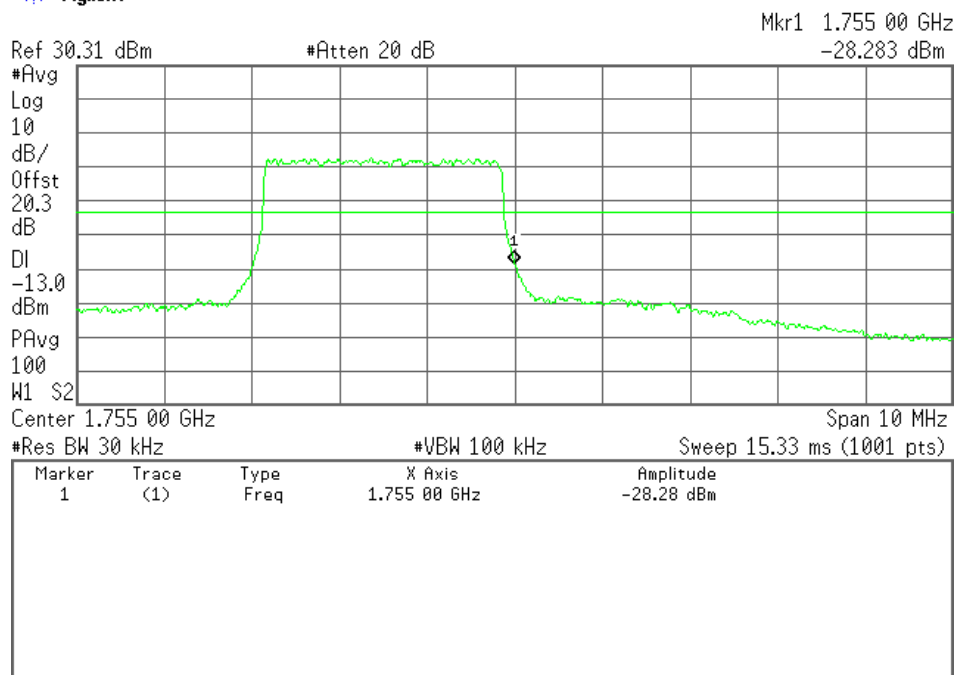
High Channel(1RB Offset Max), Band-Edge Emission

Agilent



High Channel(Full RB), Band-Edge Emission

Agilent

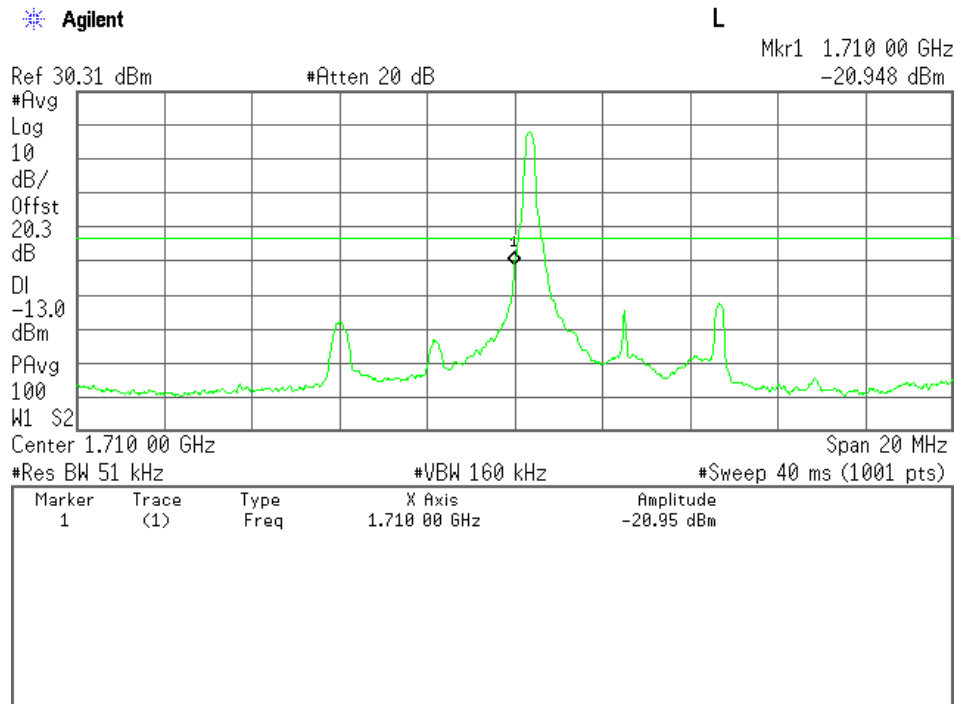


3-1) BW 5MHz

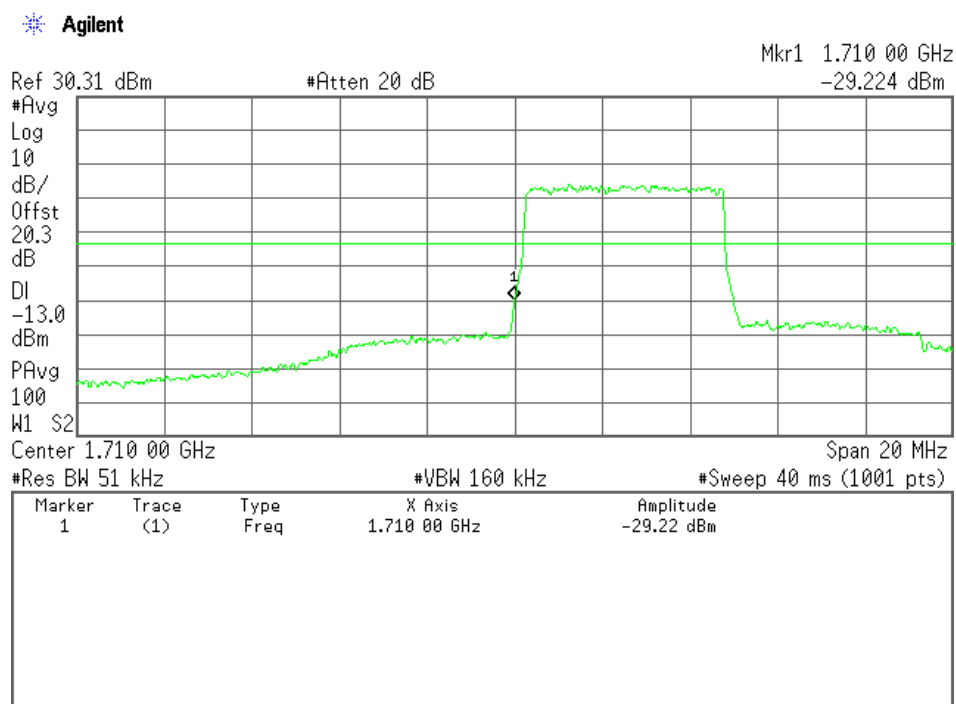
Mode: QPSK

Channel	Frequency (MHz)	Band-Edge Frequency (MHz)	Level (dBm)	Limits (dBm)	Margin (dB)
19975	1712.50	1710.0	-21.0 (at 1710.0 MHz)	-13.0	+8.0
20375	1752.50	1755.0	-20.0 (at 1755.0 MHz)	-13.0	+7.0

Low Channel(1RB Offset 0), Band-Edge Emission

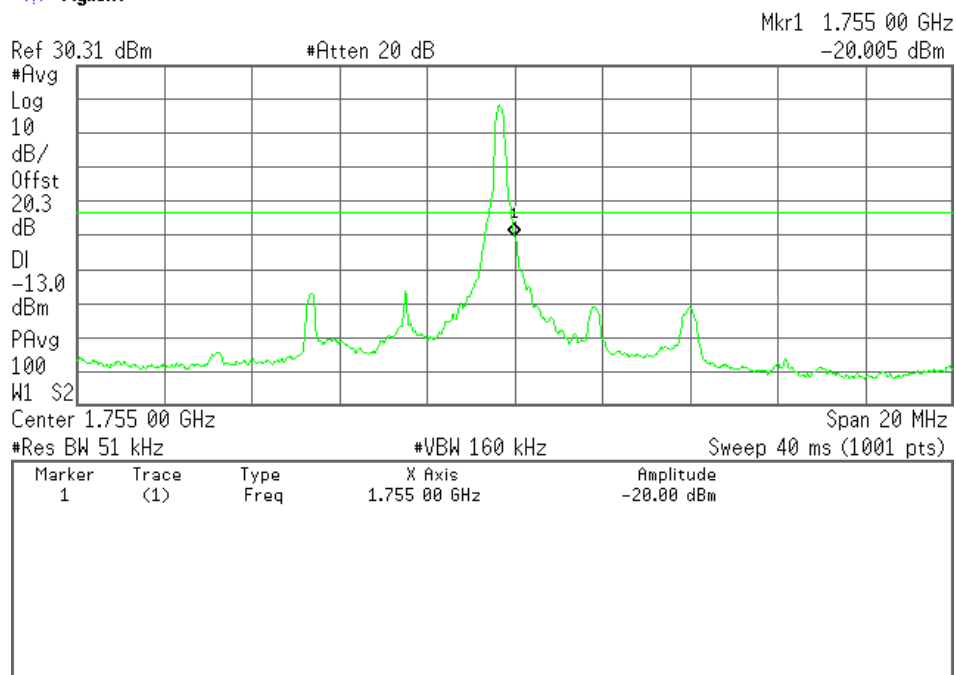


Low Channel(Full RB), Band-Edge Emission



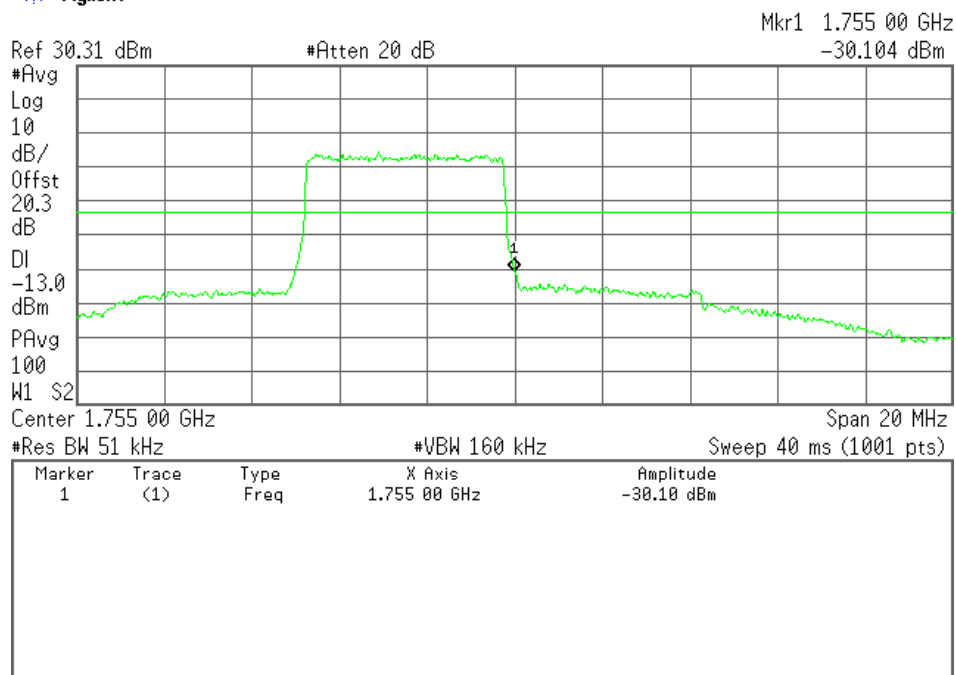
High Channel(1RB Offset Max), Band-Edge Emission

Agilent



High Channel(Full RB), Band-Edge Emission

Agilent

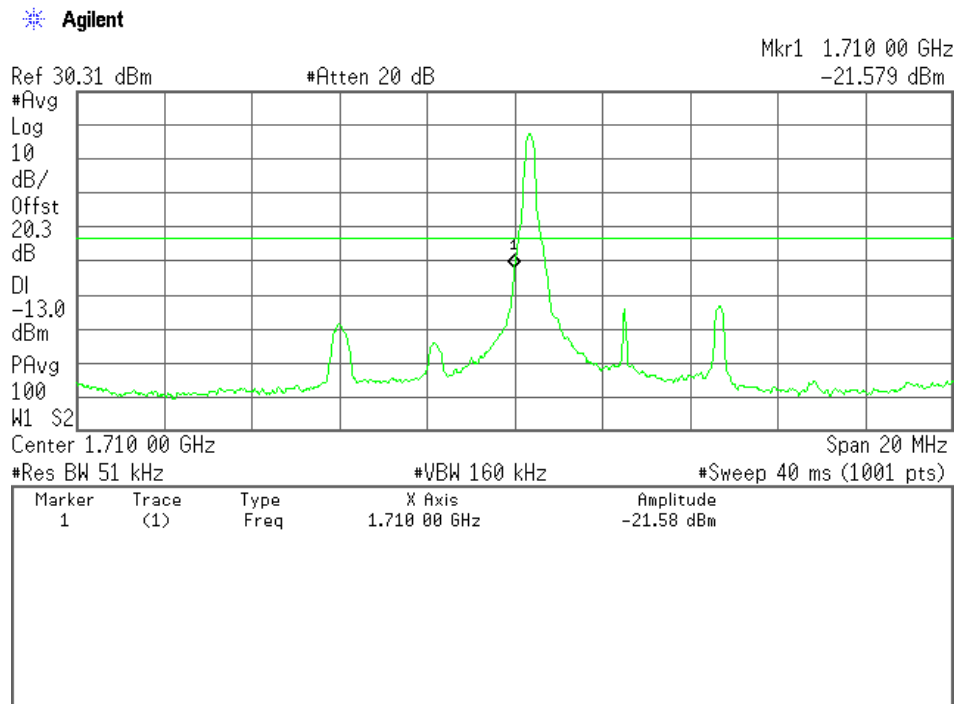


3-2) BW 5MHz

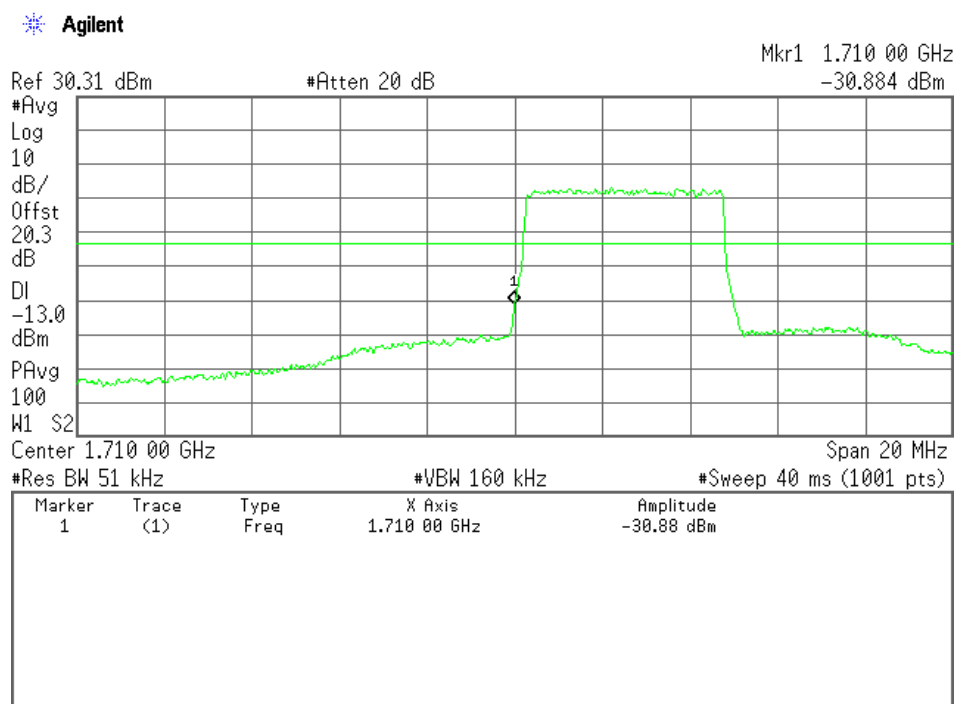
Mode:16 QAM

Channel	Frequency (MHz)	Band-Edge Frequency (MHz)	Level (dBm)	Limits (dBm)	Margin (dB)
19975	1712.50	1710.0	-21.6 (at 1710.0 MHz)	-13.0	+8.6
20375	1752.50	1755.0	-20.7 (at 1755.0 MHz)	-13.0	+7.7

Low Channel(1RB Offset 0), Band-Edge Emission

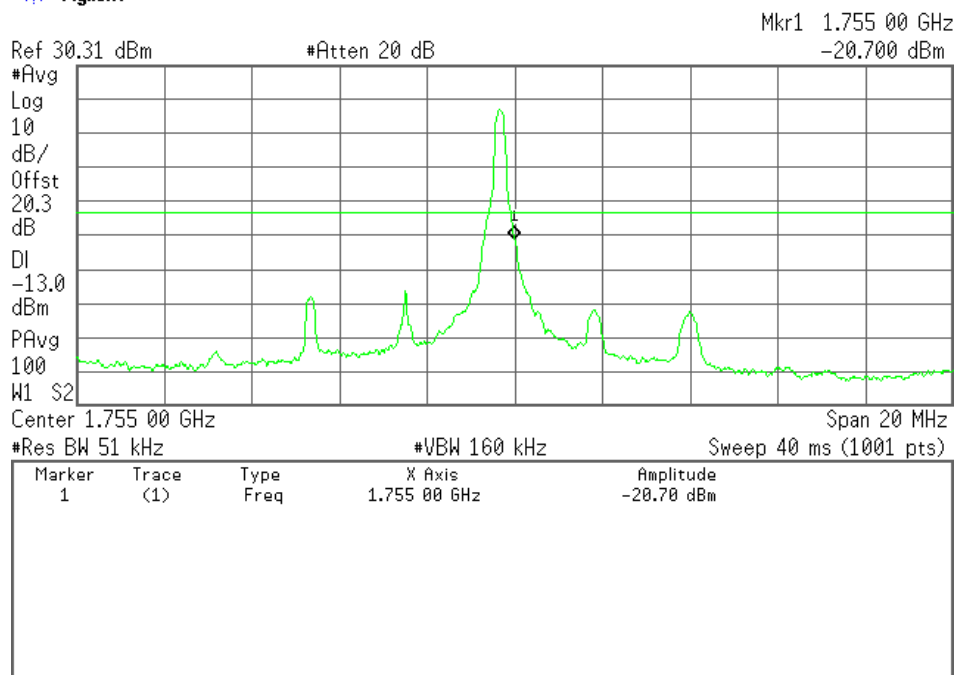


Low Channel(Full RB), Band-Edge Emission



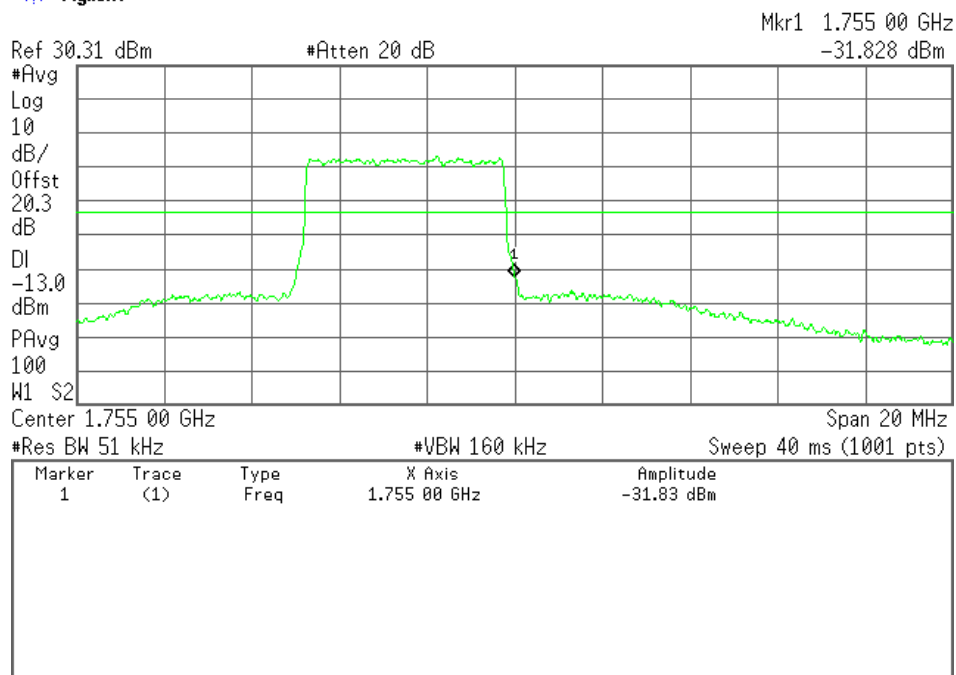
High Channel(1RB Offset Max), Band-Edge Emission

Agilent



High Channel(Full RB), Band-Edge Emission

Agilent

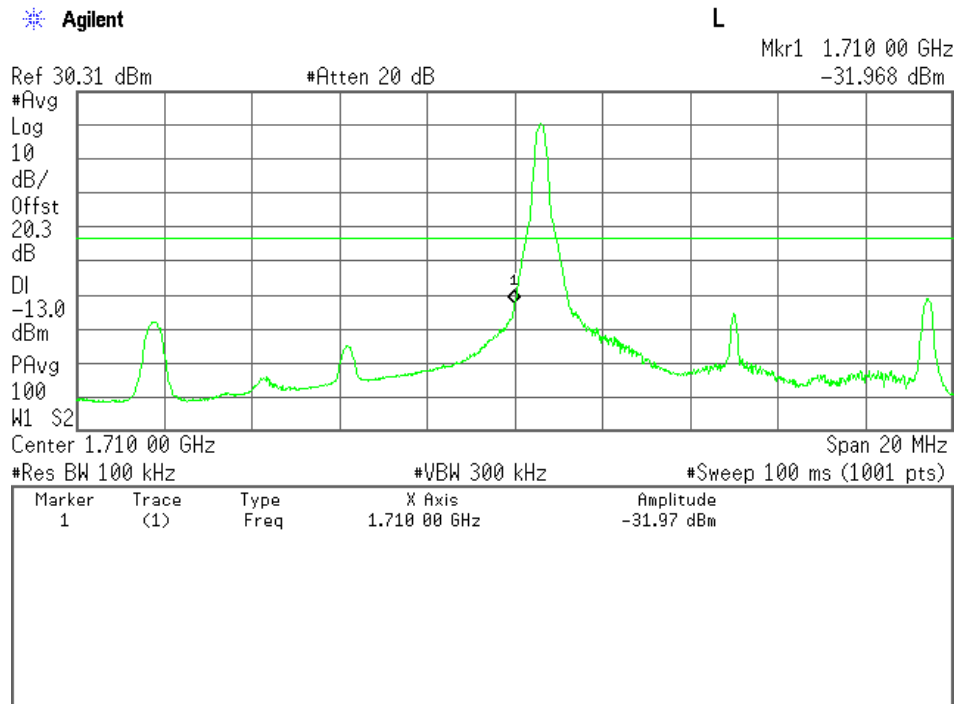


4-1) BW 10MHz

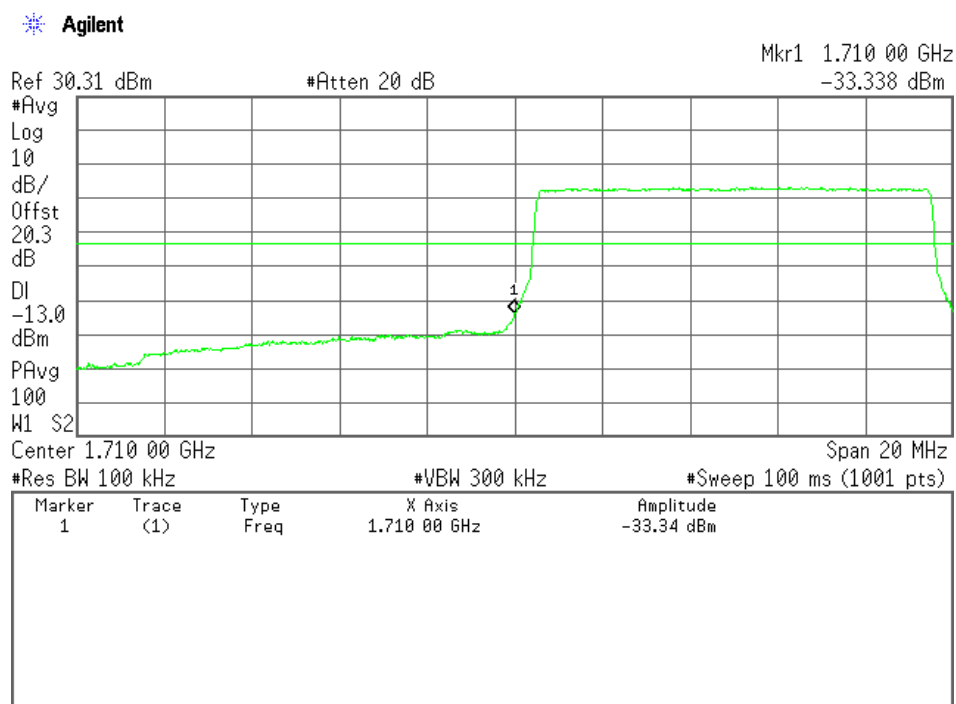
Mode: QPSK

Channel	Frequency (MHz)	Band-Edge Frequency (MHz)	Level (dBm)	Limits (dBm)	Margin (dB)
20000	1715.00	1710.0	-32.0 (at 1710.0 MHz)	-13.0	+19.0
20350	1750.00	1755.0	-30.3 (at 1755.0 MHz)	-13.0	+17.3

Low Channel(1RB Offset 0), Band-Edge Emission

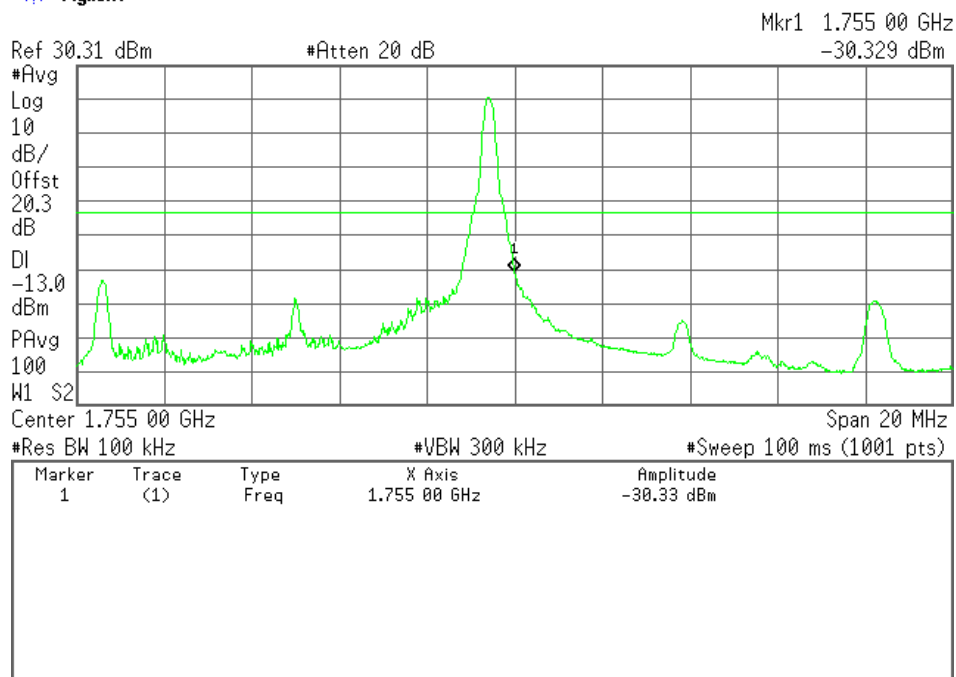


Low Channel(Full RB), Band-Edge Emission



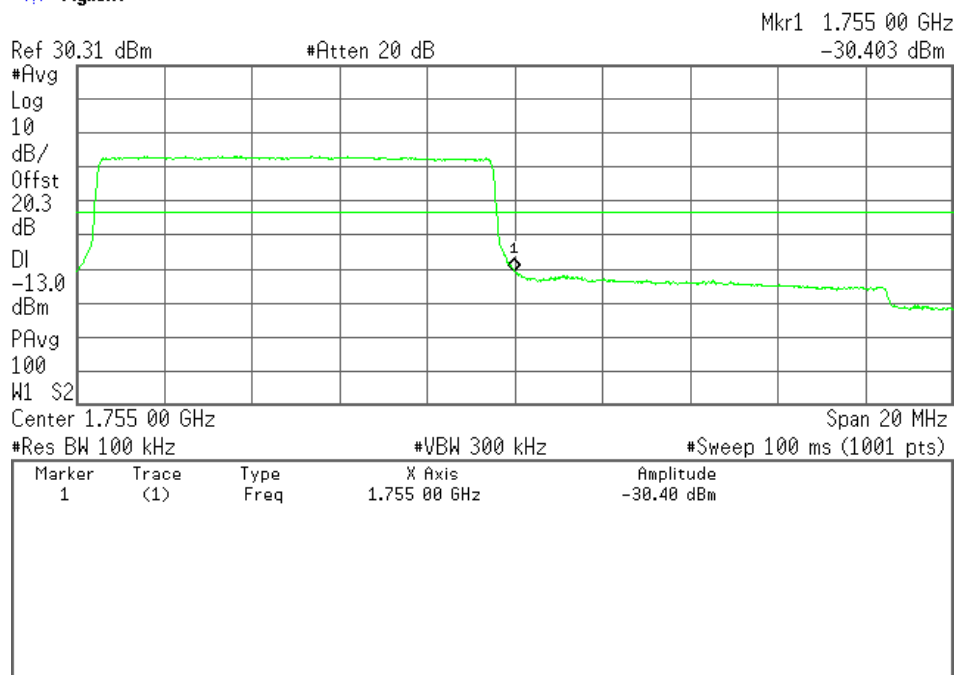
High Channel(1RB Offset Max), Band-Edge Emission

Agilent



High Channel(Full RB), Band-Edge Emission

Agilent

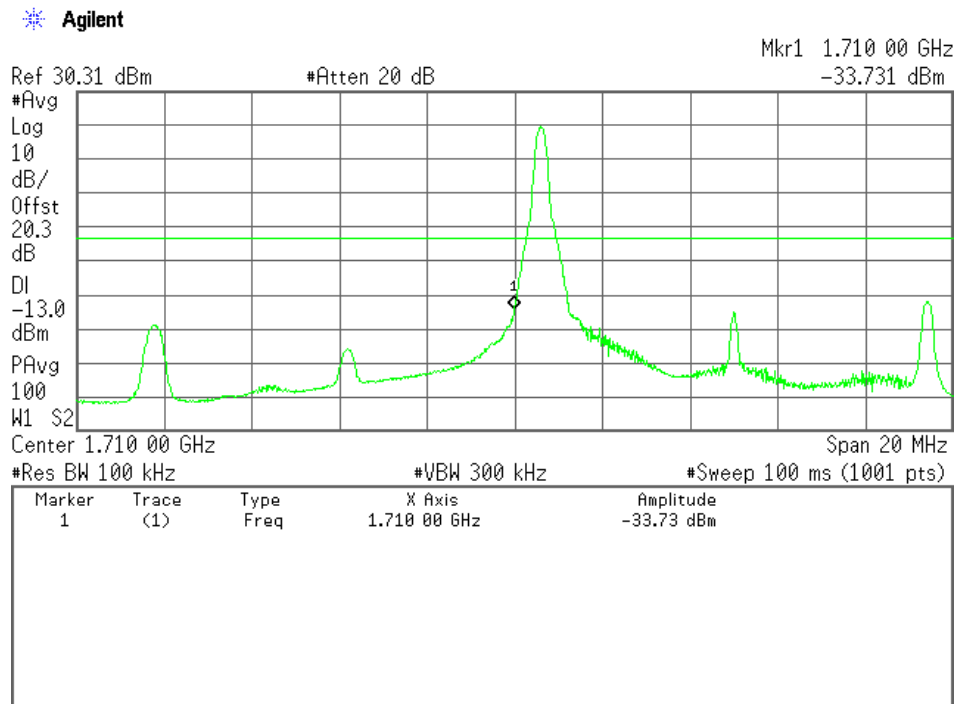


4-2) BW 10MHz

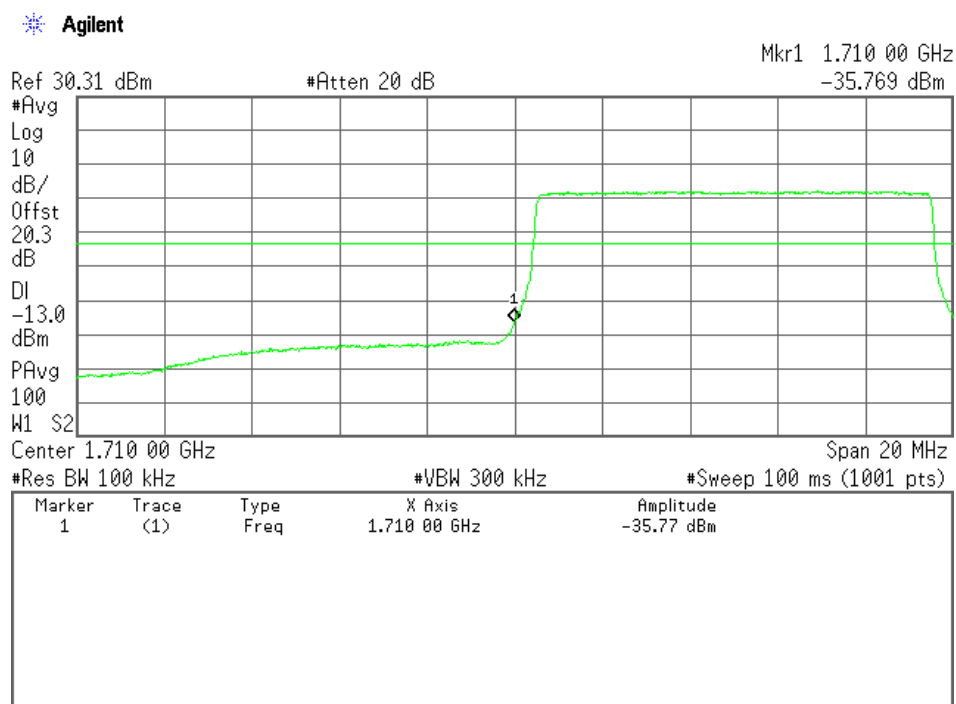
Mode:16 QAM

Channel	Frequency (MHz)	Band-Edge Frequency (MHz)	Level (dBm)	Limits (dBm)	Margin (dB)
20000	1715.00	1710.0	-33.7 (at 1710.0 MHz)	-13.0	+20.7
20350	1750.00	1755.0	-30.9 (at 1755.0 MHz)	-13.0	+17.9

Low Channel(1RB Offset 0), Band-Edge Emission

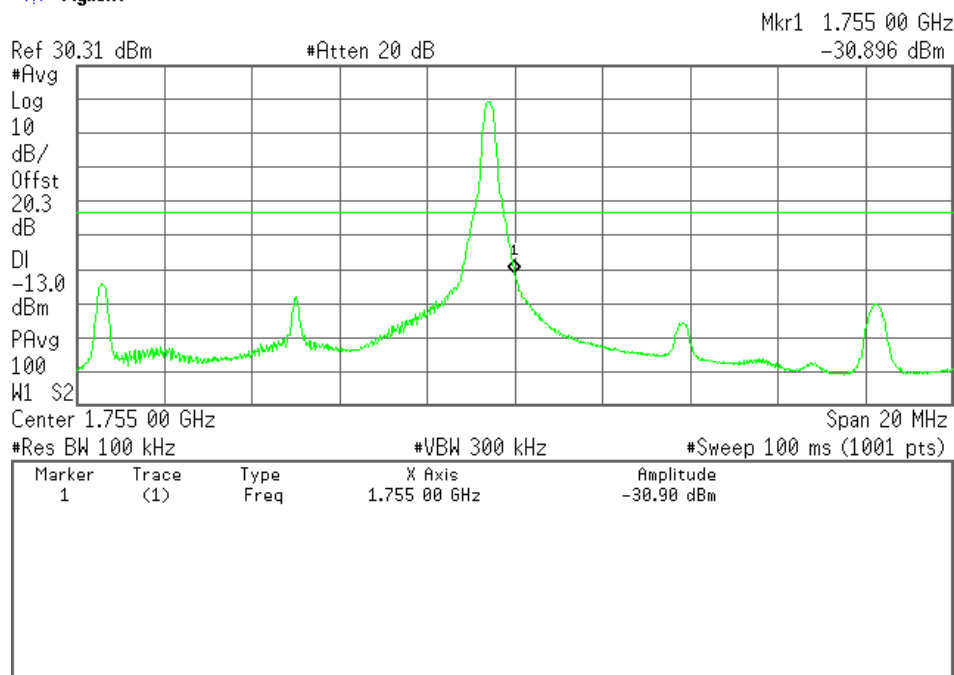


Low Channel(Full RB), Band-Edge Emission



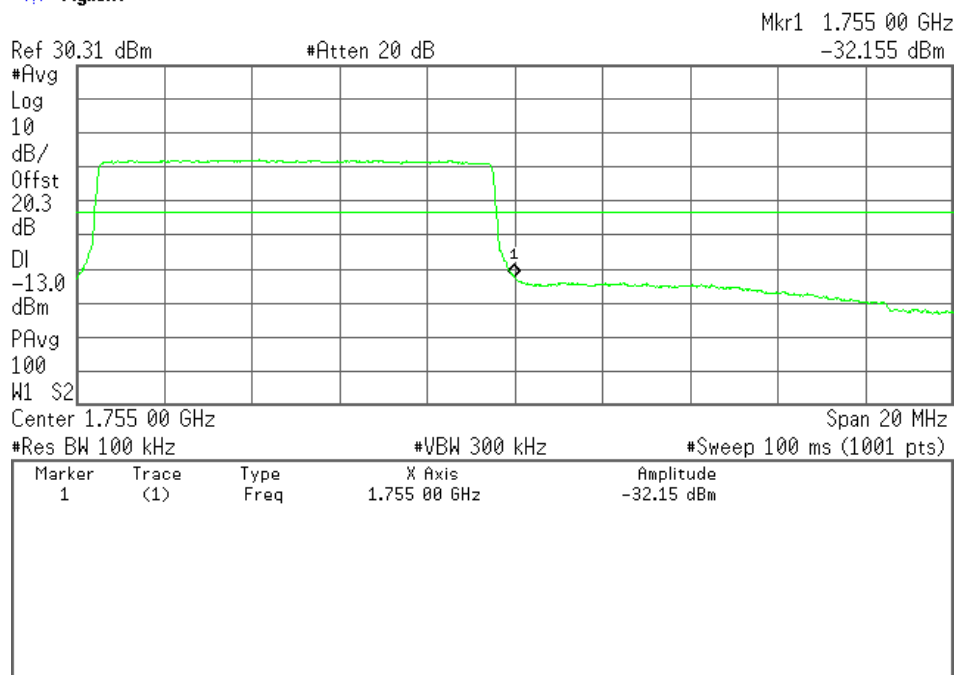
High Channel(1RB Offset Max), Band-Edge Emission

Agilent



High Channel(Full RB), Band-Edge Emission

Agilent

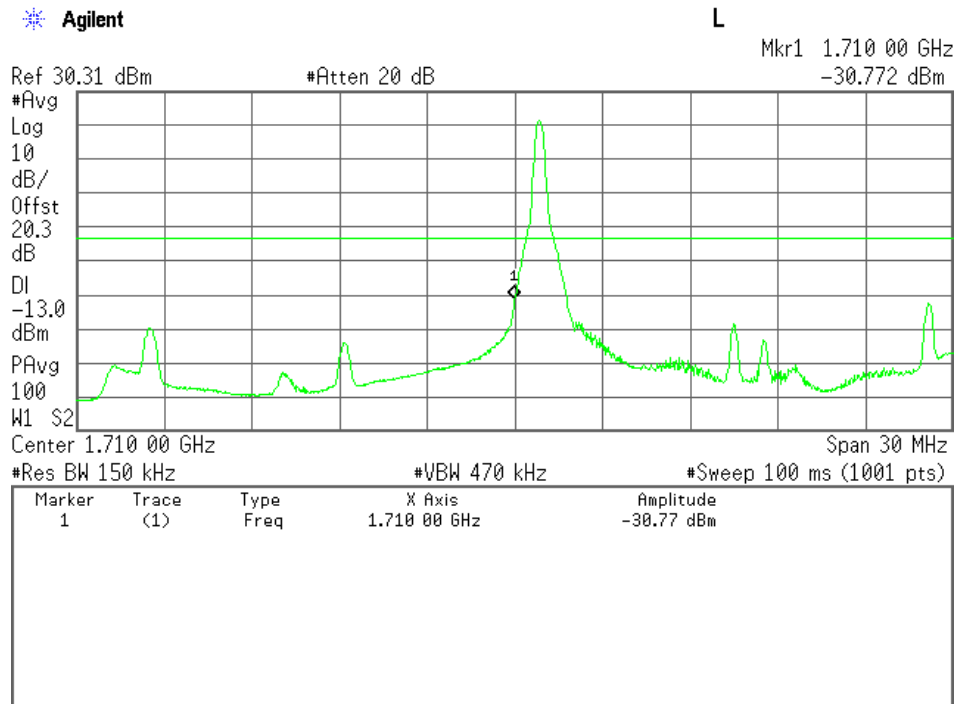


5-1) BW 15MHz

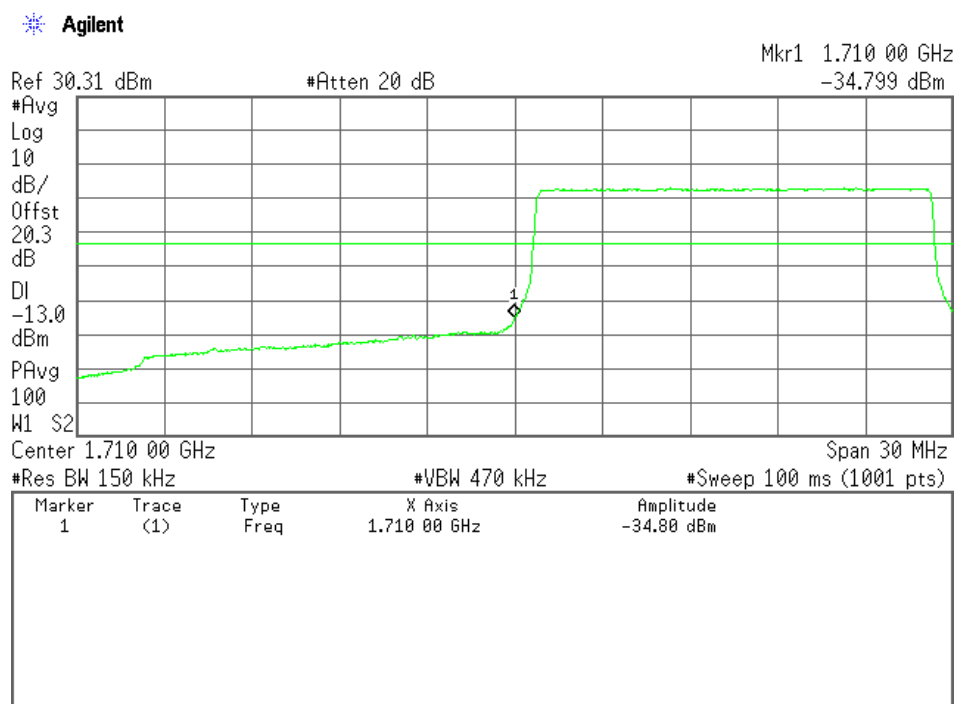
Mode: QPSK

Channel	Frequency (MHz)	Band-Edge Frequency (MHz)	Level (dBm)	Limits (dBm)	Margin (dB)
20025	1717.50	1710.0	-30.8 (at 1710.0 MHz)	-13.0	+17.8
20325	1747.50	1755.0	-30.6 (at 1755.0 MHz)	-13.0	+17.6

Low Channel(1RB Offset 0), Band-Edge Emission

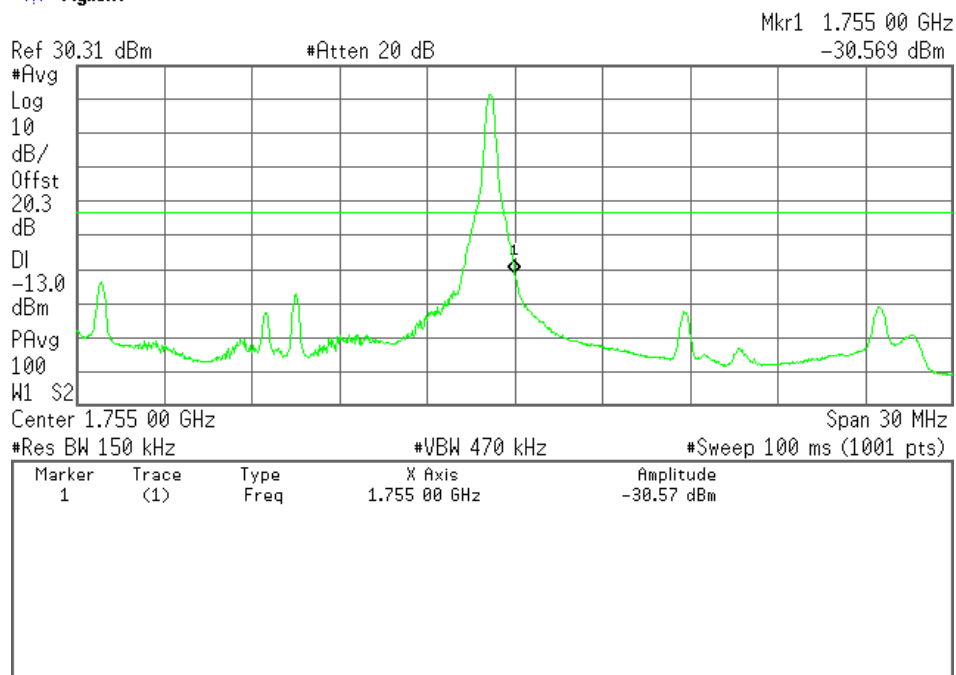


Low Channel(Full RB), Band-Edge Emission



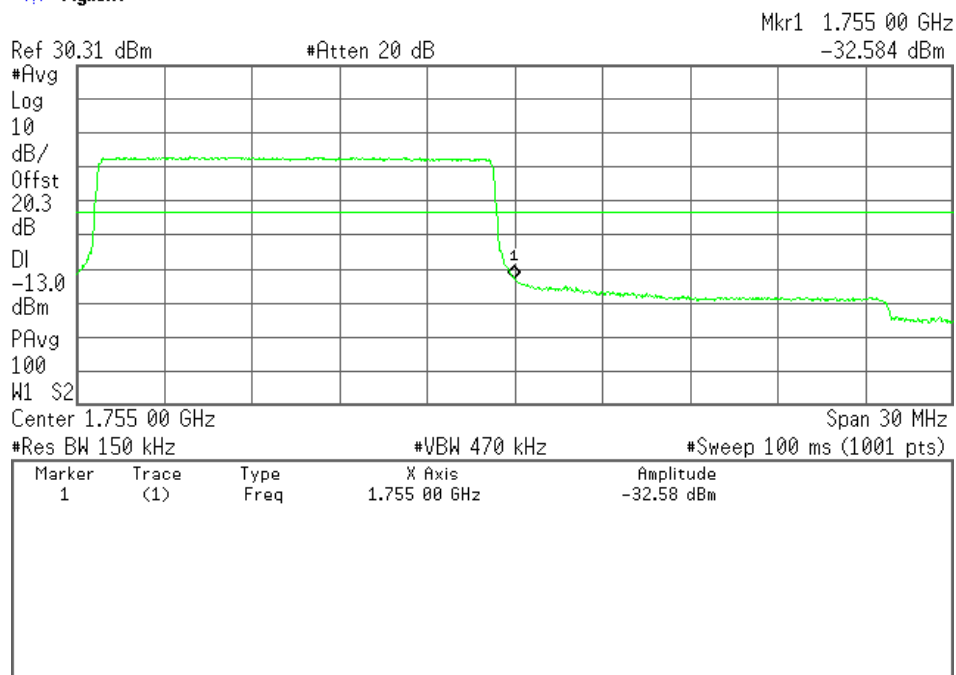
High Channel(1RB Offset Max), Band-Edge Emission

Agilent



High Channel(Full RB), Band-Edge Emission

Agilent

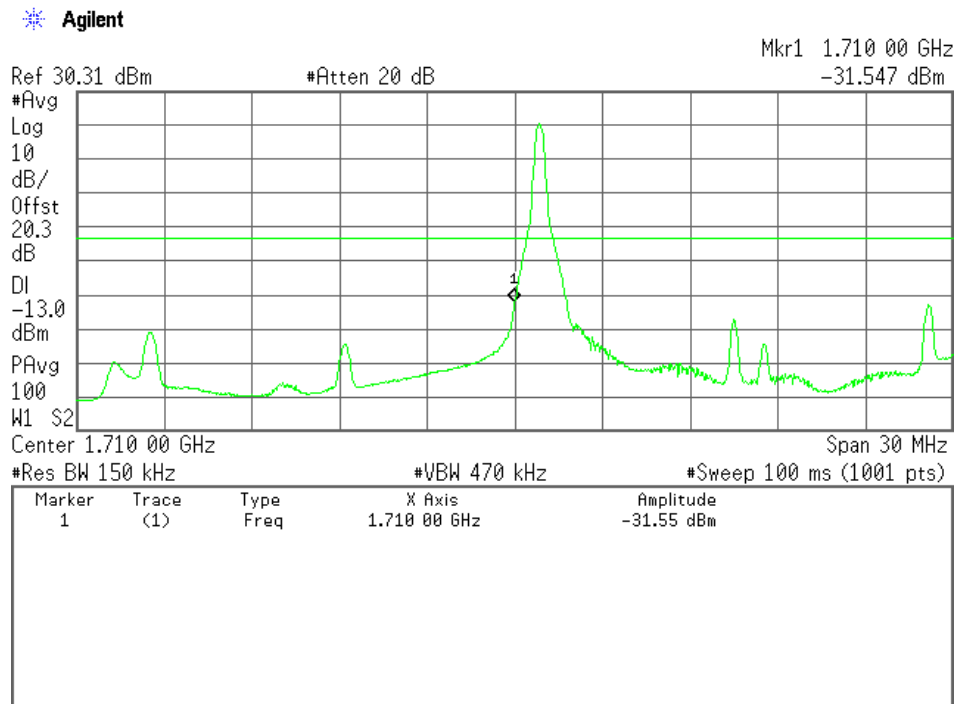


5-2) BW 15MHz

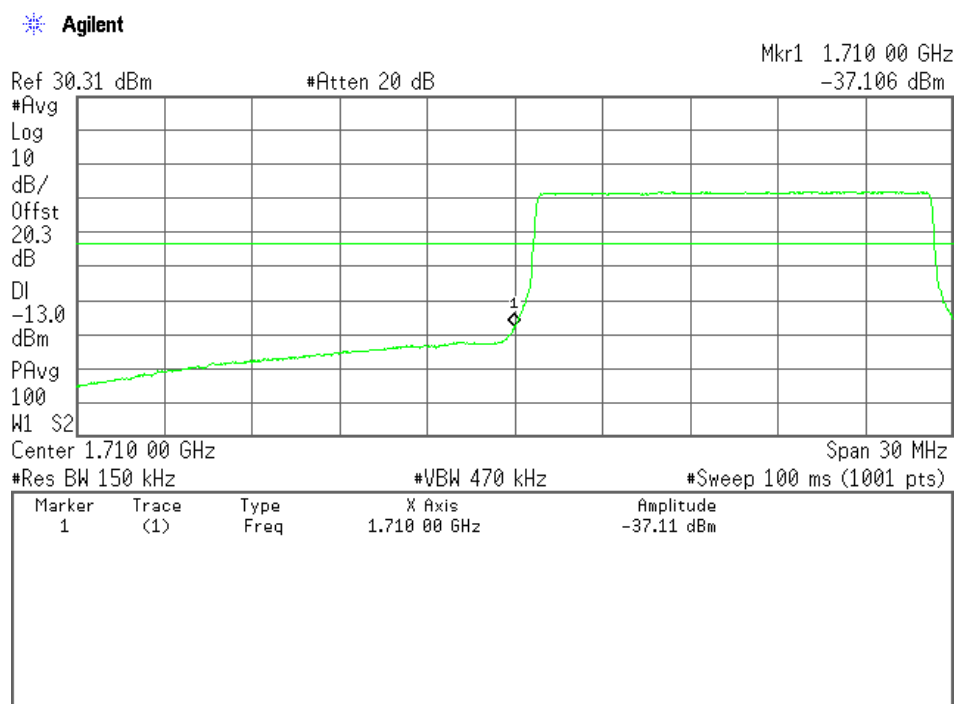
Mode:16 QAM

Channel	Frequency (MHz)	Band-Edge Frequency (MHz)	Level (dBm)	Limits (dBm)	Margin (dB)
20025	1717.50	1710.0	-31.6 (at 1710.0 MHz)	-13.0	+18.6
20325	1747.50	1755.0	-30.5 (at 1755.0 MHz)	-13.0	+17.5

Low Channel(1RB Offset 0), Band-Edge Emission

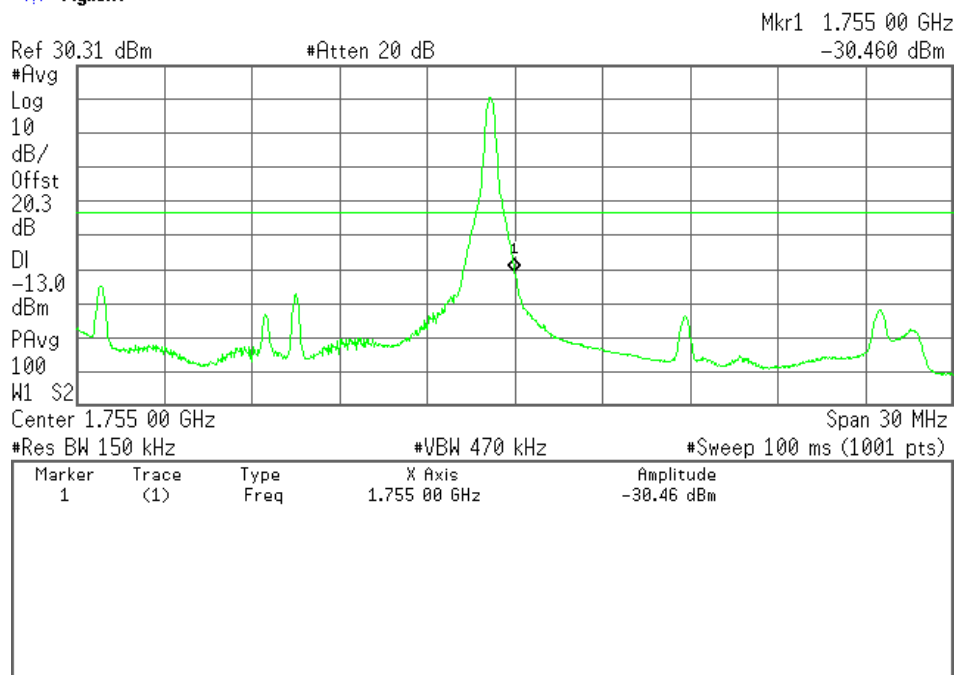


Low Channel(Full RB), Band-Edge Emission



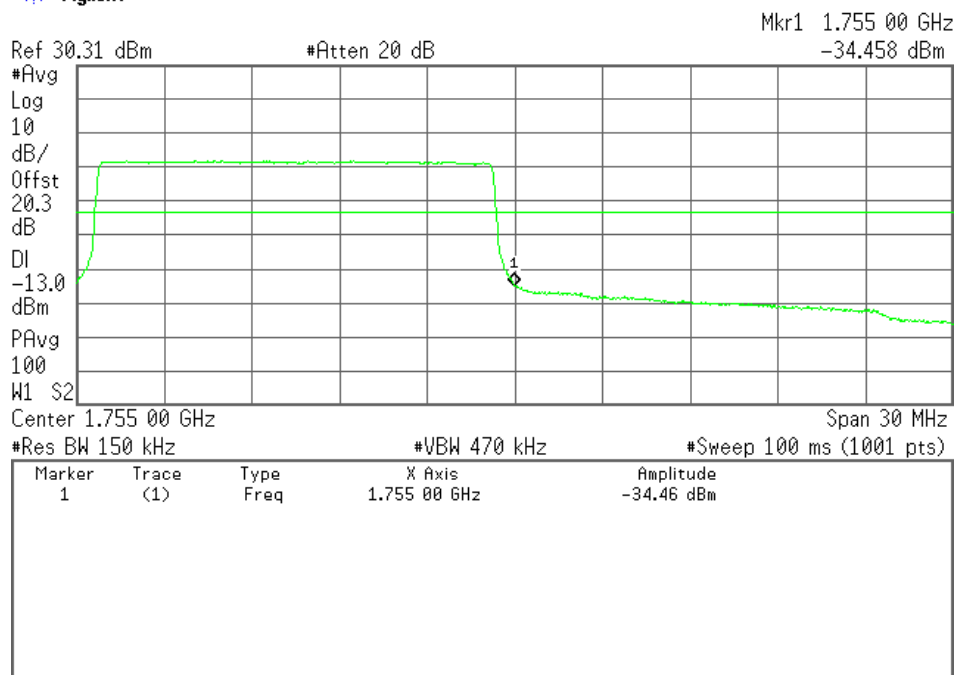
High Channel(1RB Offset Max), Band-Edge Emission

Agilent



High Channel(Full RB), Band-Edge Emission

Agilent

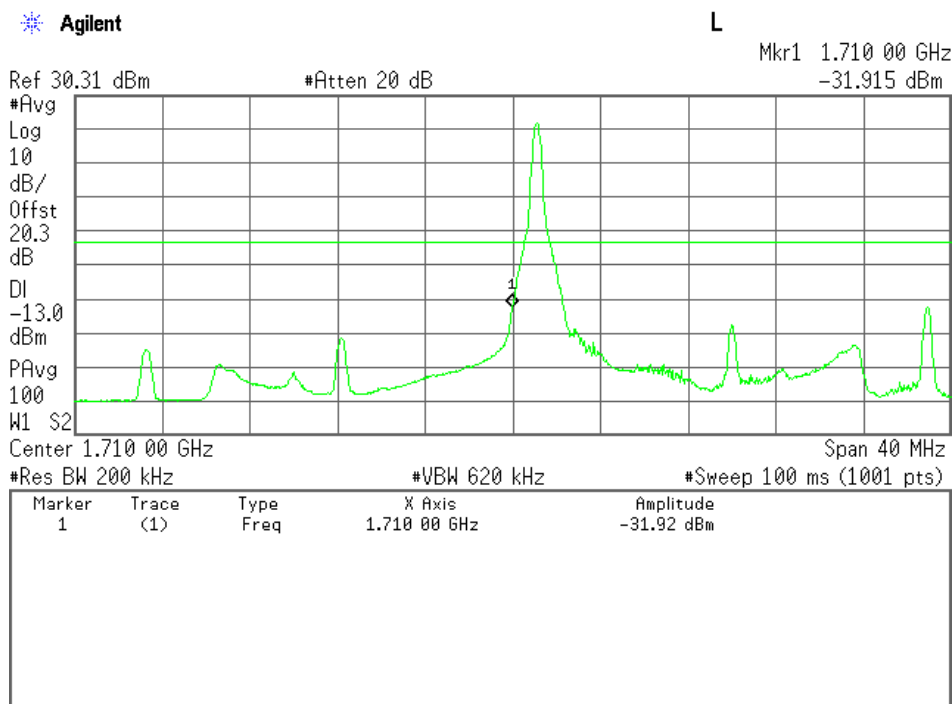


6-1) BW 20MHz

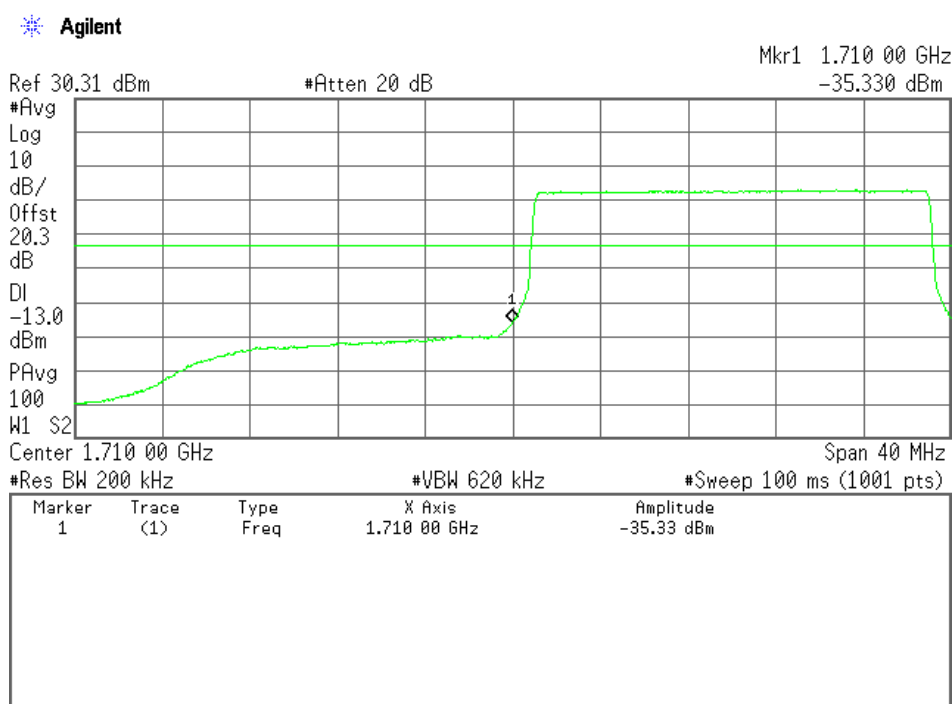
Mode: QPSK

Channel	Frequency (MHz)	Band-Edge Frequency (MHz)	Level (dBm)	Limits (dBm)	Margin (dB)
20050	1720.00	1710.0	-31.9 (at 1710.0 MHz)	-13.0	+18.9
20300	1745.00	1755.0	-30.9 (at 1755.0 MHz)	-13.0	+17.9

Low Channel(1RB Offset 0), Band-Edge Emission

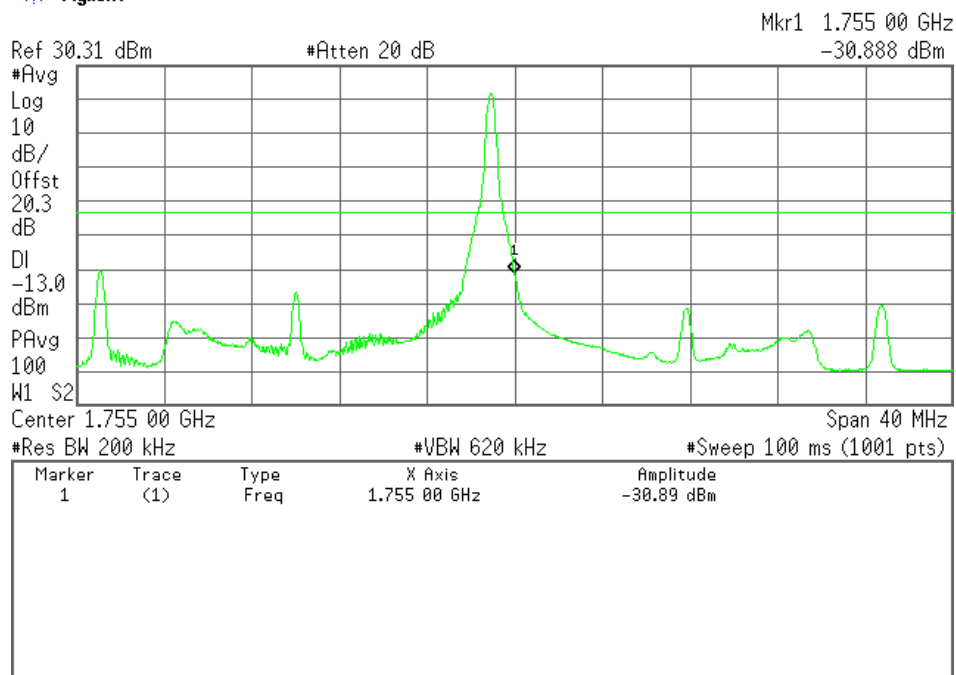


Low Channel(Full RB), Band-Edge Emission



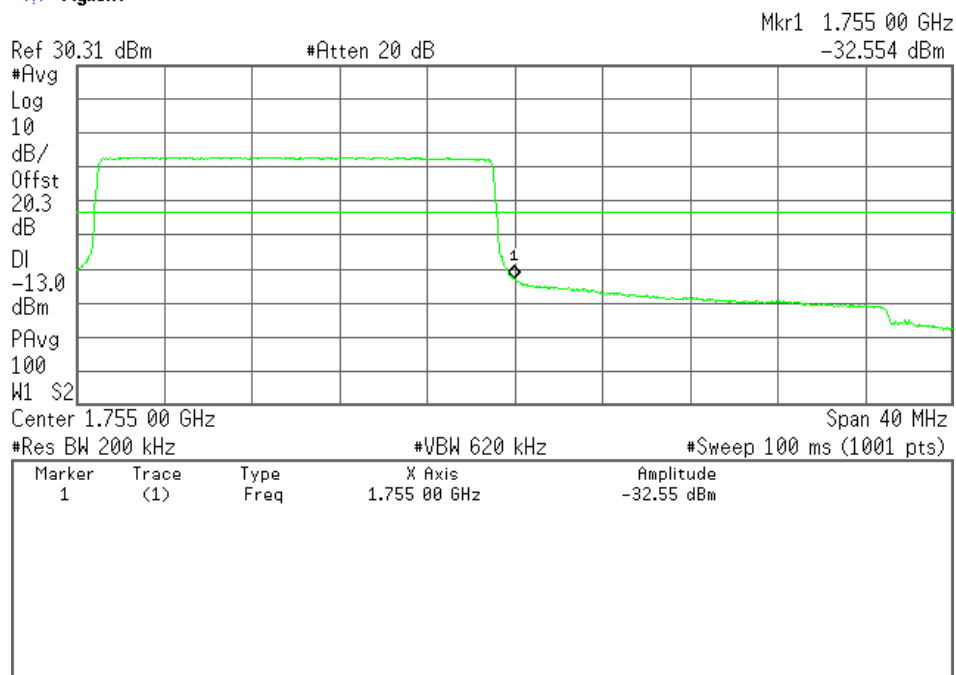
High Channel(1RB Offset Max), Band-Edge Emission

Agilent



High Channel(Full RB), Band-Edge Emission

Agilent

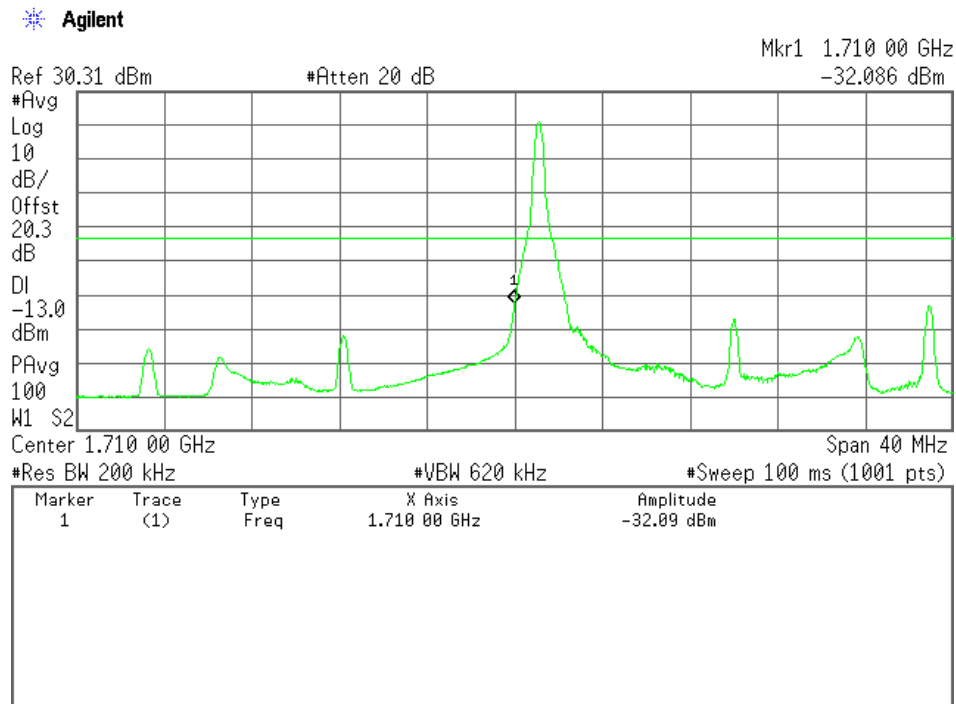


6-2) BW 20MHz

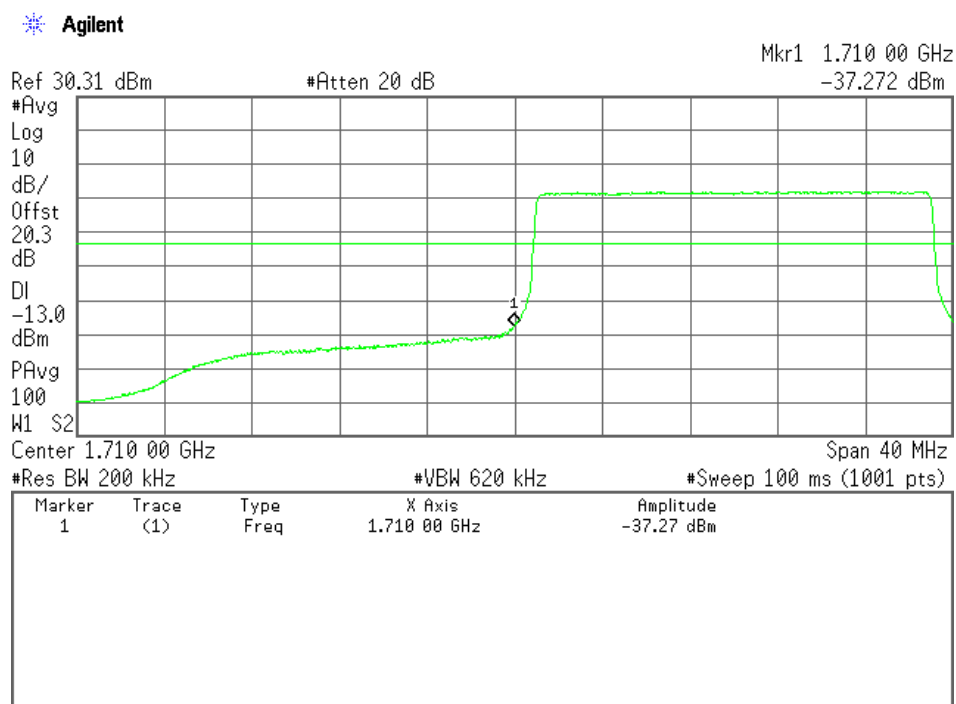
Mode:16 QAM

Channel	Frequency (MHz)	Band-Edge Frequency (MHz)	Level (dBm)	Limits (dBm)	Margin (dB)
18700	1860.00	1710.0	-32.1 (at 1710.0 MHz)	-13.0	+19.1
19100	1900.00	1755.0	-32.4 (at 1755.0 MHz)	-13.0	+19.4

Low Channel(1RB Offset 0), Band-Edge Emission

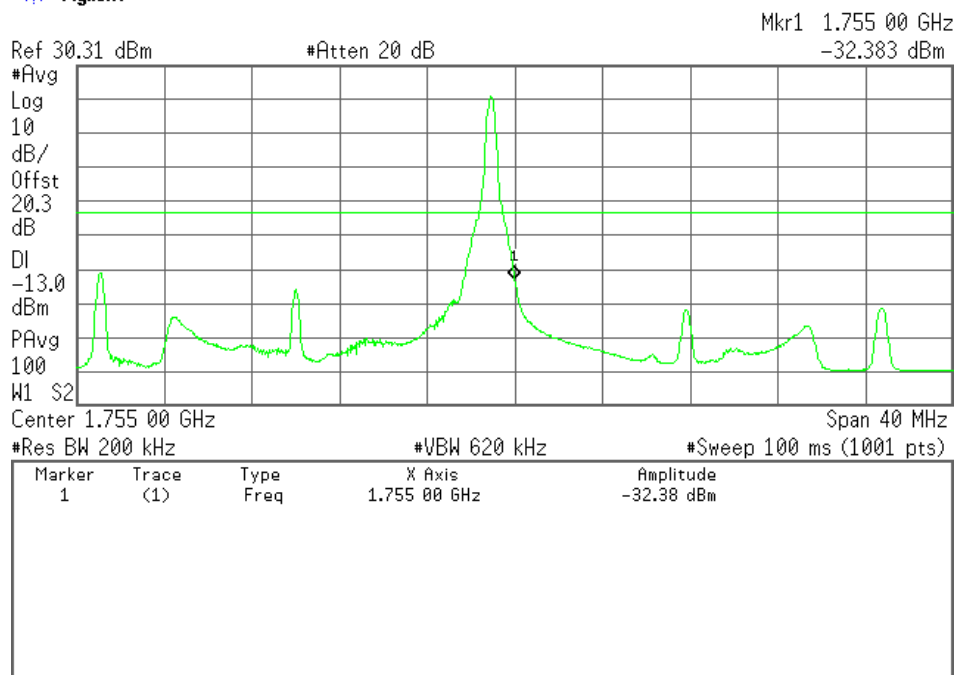


Low Channel(Full RB), Band-Edge Emission



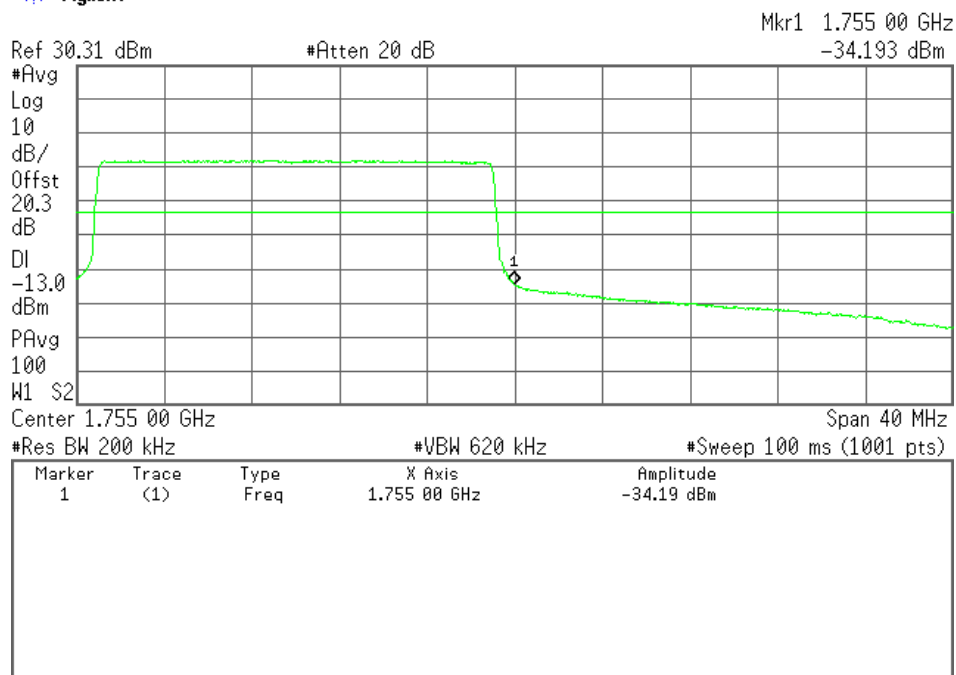
High Channel(1RB Offset Max), Band-Edge Emission

Agilent



High Channel(Full RB), Band-Edge Emission

Agilent



7.7 Field Strength of Spurious Radiation (§2.1053)

For the requirements, ☒ - Applicable [☒ - Tested. ☐ - Not tested by applicant request.]
☐ - Not Applicable

7.7.1 Test Results

For the standard, ☒ - Passed ☐ - Failed ☐ - Not judged

Min. Limit Margin >20.1 dB at 17543/17535 MHz

Uncertainty of Measurement Results	30 MHz – 1000 MHz	<u>± 1.6</u>	dB(2 σ)
	1 GHz – 18 GHz	<u>± 1.8</u>	dB(2 σ)
	18 GHz – 40 GHz	<u>± 2.7</u>	dB(2 σ)

Remarks : _____

7.7.2 Test Instruments

Anechoic Chamber A2				
Type	Model	Serial No. (ID)	Manufacturer	Cal. Due
Test Receiver	ESU 26	100170 (A-6)	Rohde & Schwarz	2016/04/25
Signal Generator	E8257D	MY45140309 (B-39)	Agilent	2016/08/10
Power Meter	N1911A	GB45100291 (B-63)	Agilent	2016/07/16
Power Sensor	N1921A	US44510470 (B-64)	Agilent	2016/07/16
Biconical Antenna	VHA9103/BBA9106	2355 (C-30)	Schwarzbeck	2016/05/24
Log-periodic Antenna	UHALP9108-A1	0694 (C-31)	Schwarzbeck	2016/05/24
Dipole Antenna (TX)	KBA-511A	0-273-2 (C-17)	Kyoritsu	2016/05/20
Dipole Antenna (TX)	KBA-611	0-248-2 (C-20)	Kyoritsu	2016/05/20
RF Cable	S 10162 B-11 etc.	--- (H-4)	HUBER+SUHNER	2016/04/15
Pre-Amplifier	TPA0118-36	1010 (A-37)	TOYO	2016/05/11
Horn Antenna	91888-2	562 (C-41-1)	EATON	2016/06/16
Horn Antenna	91889-2	568 (C-41-2)	EATON	2016/06/16
Horn Antenna	3160-04	9903-1053 (C-55)	EMCO	2016/06/29
Horn Antenna	3160-05	9902-1061 (C-56)	EMCO	2016/06/29
Horn Antenna	3160-06	9712-1045 (C-57)	EMCO	2016/06/29
Horn Antenna	3160-07	9902-1113 (C-58)	EMCO	2016/06/29
Horn Antenna	3160-08	9904-1099 (C-59)	EMCO	2016/06/29
Horn Antenna	3160-09	9808-1117 (C-48)	EMCO	2016/06/28
Attenuator	2-10	AW7937 (D-40)	Weinschel	2016/10/12
Attenuator	54A-10	W5713 (D-29)	Weinschel	2016/08/16
Attenuator	2-10	BA6214 (D-79)	Weinschel	2016/11/19
RF Cable	SUCOFLEX102E	6683/2E (C-70)	HUBER+SUHNER	2016/11/19
RF Cable	SUCOFLEX104	267479/4 (C-66)	HUBER+SUHNER	2017/01/06
RF Cable	SUCOFLEX104	267414/4 (C-67)	HUBER+SUHNER	2017/01/06
RF Cable	SUCOFLEX102EA	3041/2EA (C-69)	HUBER+SUHNER	2017/01/06
High Pass Filter	HPM13899	001 (D-96)	MICRO-TRONICS	2017/02/17

NOTE : The calibration interval of the above test instruments is 12 months.

7.7.3 Test Method and Test Setup (Diagrammatic illustration)

Step 1) The spurious radiation for transmitter were measured at the distance 3 m away from the EUT which was placed on a non-conducted support 0.8 m in height and was varying at three orthogonal axes. The receiving antenna was oriented for vertical polarization and varied from 1 m to 4 m until the maximum emission level was detected on the measuring instrument. The EUT was rotated 360 degrees until the maximum emission was received. The measurement was also repeated with the receiving antenna in the horizontal polarization.

This test was carried out using the half-wave dipole antenna for up to 1GHz and using the horn antenna for above 1 GHz.

Step 2)

A) Up to 1 GHz

The ERP measurement was carried out with according to Step 2 in Clause 7.2.3. Then the RF power in the substitution antenna half-wave dipole antenna for up to 1 GHz and the substitution horn antenna for above 1 GHz.

The ERP is calculated in the following equation.

$$\text{ERP(dBm)} = P(\text{dBm}) - (\text{Balun Loss of the half-wave dipole Ant. (dB)}) + \text{Cable Loss(dB)}$$

B) Above 1 GHz

The ERP is calculated from the maximum emission level by the following formula.

$$\frac{e^2}{120\pi} = \frac{\text{eirp}}{4\pi d^2} \quad \text{---(Eq.1)}$$

$$\text{erp} = \text{eirp} - Gd \quad \text{---(Eq.2)}$$

Where, $e[V/m]$: Field Strength at measuring distance($d=3m$)

$\text{eirp}[W]$: Equivalent Isotropic Radiated Power

$\text{erp}[W]$: Effective Radiated Power

$Gd(dBi)$: Gain of the substitution half-wave dipole antenna(2.15dBi)

$$\text{eirp} = \frac{(de)^2}{30} = \frac{3}{10}e^2$$

$$\therefore 10\log(\text{eirp}) = 20\log(e) + 10\log(3/10) = 20\log(e) - 5.23$$

$$10\log(\text{eirp}) = \text{EIRP[dBm]} - 30$$

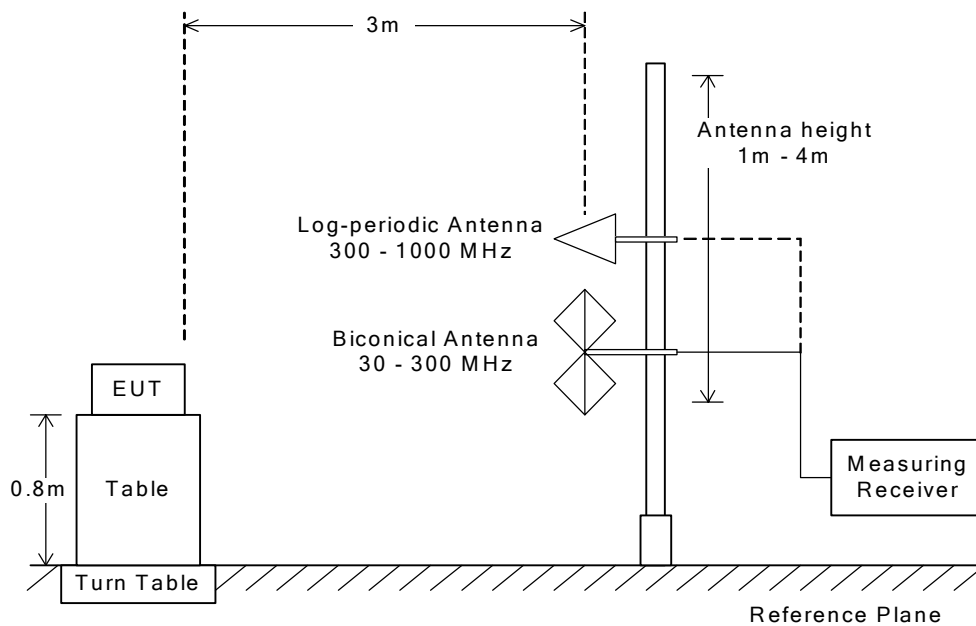
$$20\log(e) = E[dB(\mu V/m)] - 120$$

$$\therefore \text{EIRP} = E - 120 + 30 - 5.23 = E - 95.23$$

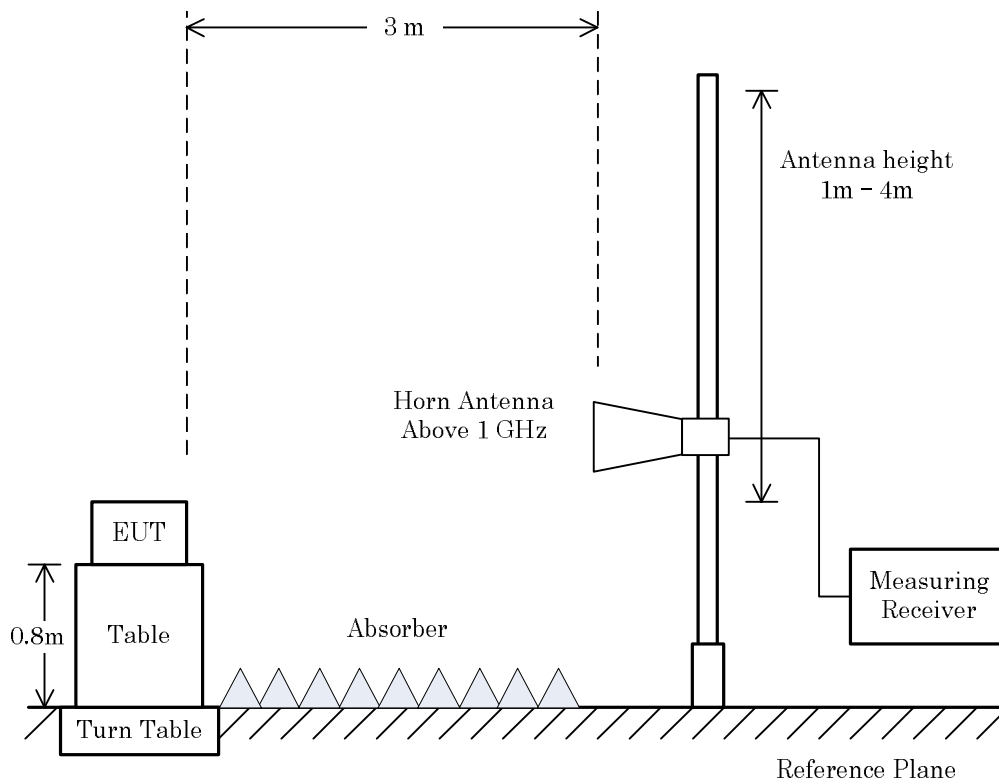
$$\therefore \text{ERP[dBm]} = \text{EIRP} - 2.15 = E - 97.38$$

The respective calculated ERP of the spurious and harmonics were compared with the ERP of fundamental frequency by specified attenuation limits, $43+10\log_{10}(TP \text{ in watt})[dB]$. Where, TP = Transmitter power at the ANT OUT under test configuration as the hands free unit used.

Radiated Emission 30 MHz to 1000 MHz



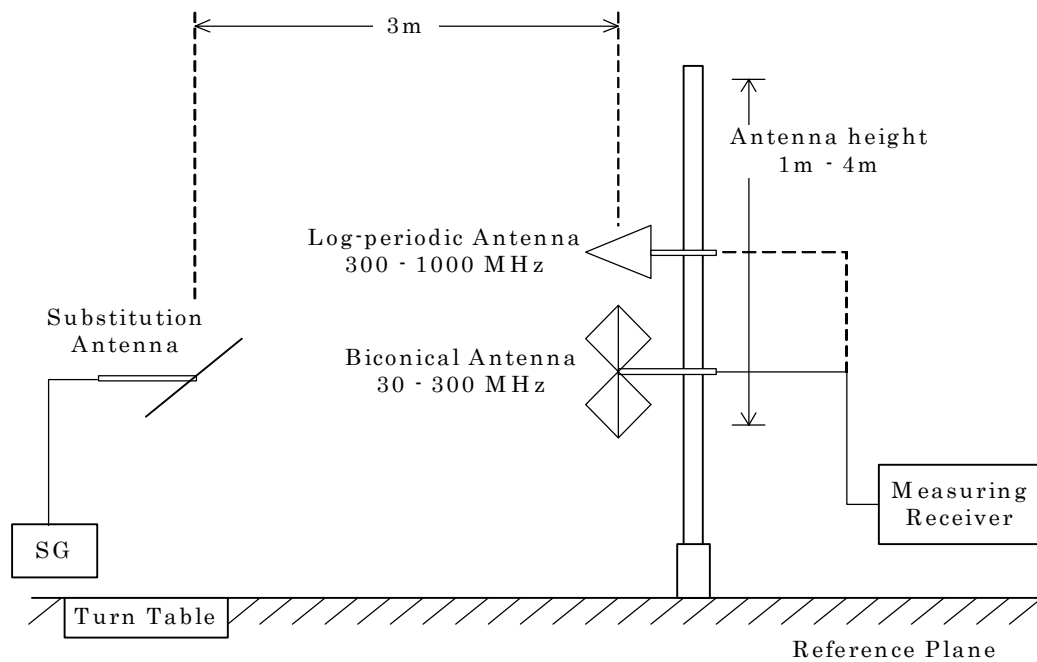
Radiated Emission above 1 GHz



NOTE

The antenna height is scanned depending on the EUT's size and mounting height.

Radiated Emission 30 to 1000 MHz – Substitution Method



7.7.4 Test Data

1) BW 1.4MHz(1RB)

(LTE 1.4MHz)

Test Configuration : Single Unit

Test Date: March 22, 2016

Temp.: 22 °C, Humi: 35 %

CH	Transmitting Frequency [MHz]	Measured Frequency [MHz]	ERP [dBm]		Limits [dBm]	Margin [dB]	Remarks
			Hori.	Vert.			
19957	1710.700	3421.400	-52.5	-51.9	-13.0	+38.9	C
		5132.100	< -47.3	< -47.3	-13.0	> +34.3	C
		6842.800	< -45.4	< -45.4	-13.0	> +32.4	C
		8553.500	< -42.3	< -42.3	-13.0	> +29.3	C
		10264.200	< -41.2	< -41.2	-13.0	> +28.2	C
		11974.900	< -40.5	< -40.5	-13.0	> +27.5	C
		13685.600	< -38.6	< -38.6	-13.0	> +25.6	C
		15396.300	< -37.8	< -37.8	-13.0	> +24.8	C
		17107.000	< -34.3	< -34.3	-13.0	> +21.3	C
20175	1732.500	3465.000	-50.5	-49.8	-13.0	+36.8	C
		5197.500	< -47.4	< -47.4	-13.0	> +34.4	C
		6930.000	< -45.5	< -45.5	-13.0	> +32.5	C
		8662.500	< -42.3	< -42.3	-13.0	> +29.3	C
		10395.000	< -40.9	< -40.9	-13.0	> +27.9	C
		12127.500	< -40.9	< -40.9	-13.0	> +27.9	C
		13860.000	< -38.5	< -38.5	-13.0	> +25.5	C
		15592.500	< -37.7	< -37.7	-13.0	> +24.7	C
		17325.000	< -33.5	< -33.5	-13.0	> +20.5	C
20393	1754.300	3508.600	-52.4	-51.7	-13.0	+38.7	C
		5262.900	< -47.2	< -47.2	-13.0	> +34.2	C
		7017.200	< -45.6	< -45.6	-13.0	> +32.6	C
		8771.500	< -42.3	< -42.3	-13.0	> +29.3	C
		10525.800	< -40.7	< -40.7	-13.0	> +27.7	C
		12280.100	< -41.4	< -41.4	-13.0	> +28.4	C
		14034.400	< -38.3	< -38.3	-13.0	> +25.3	C
		15788.700	< -37.5	< -37.5	-13.0	> +24.5	C
		17543.000	< -33.1	< -33.1	-13.0	> +20.1	C

Calculated result at 17543.0 MHz, as the worst point shown on underline:

Minimum Margin: $-13.0 - (<-33.1) = >20.1$ (dB)

NOTES

1. Test Distance : 3 m
2. The spectrum was checked from 30 MHz to the tenth harmonic of the highest fundamental frequency.
3. All emissions not reported were more than 20 dB below the applied limits.
4. Applied limits : -13.0 [dBm] = $10\log(TP[mW]) - (43 + 10\log(tp[W])) = 10\log(TP[mW]) - (43 + (10\log(TP[mW]) - 30))$
where, $tp[W] = TP[mW] / 1000$: Transmitter power at antenna terminal
5. The symbol of "<" means "or less".
6. The symbol of ">" means "more than".
7. Setting of measuring instrument(s) :

	Detector Function	RES B.W.	V.B.W.	Sweep Time
A	Peak	10 kHz	30 kHz	20 msec.
B	Peak	100 kHz	300 kHz	20 msec.
C	Peak	1 MHz	3 MHz	20 msec.

2) BW 3MHz(1RB)

(LTE 3MHz)

Test Configuration : Single Unit

Test Date: March 22, 2016

Temp.: 22 °C, Humi: 35 %

CH	Transmitting Frequency [MHz]	Measured Frequency [MHz]	ERP [dBm]		Limits [dBm]	Margin [dB]	Remarks
			Hori.	Vert.			
19965	1711.500	3423.000	-52.8	-52.2	-13.0	+39.2	C
		5134.500	< -47.3	< -47.3	-13.0	> +34.3	C
		6846.000	< -45.4	< -45.4	-13.0	> +32.4	C
		8557.500	< -42.3	< -42.3	-13.0	> +29.3	C
		10269.000	< -41.2	< -41.2	-13.0	> +28.2	C
		11980.500	< -40.5	< -40.5	-13.0	> +27.5	C
		13692.000	< -38.6	< -38.6	-13.0	> +25.6	C
		15403.500	< -37.8	< -37.8	-13.0	> +24.8	C
		17115.000	< -34.3	< -34.3	-13.0	> +21.3	C
20175	1732.500	3465.000	-50.8	-50.2	-13.0	+37.2	C
		5197.500	< -47.4	< -47.4	-13.0	> +34.4	C
		6930.000	< -45.5	< -45.5	-13.0	> +32.5	C
		8662.500	< -42.3	< -42.3	-13.0	> +29.3	C
		10395.000	< -40.9	< -40.9	-13.0	> +27.9	C
		12127.500	< -40.9	< -40.9	-13.0	> +27.9	C
		13860.000	< -38.5	< -38.5	-13.0	> +25.5	C
		15592.500	< -37.7	< -37.7	-13.0	> +24.7	C
		17325.000	< -33.5	< -33.5	-13.0	> +20.5	C
20385	1753.500	3507.000	-52.5	-52.3	-13.0	+39.3	C
		5260.500	< -47.2	< -47.2	-13.0	> +34.2	C
		7014.000	< -45.6	< -45.6	-13.0	> +32.6	C
		8767.500	< -42.3	< -42.3	-13.0	> +29.3	C
		10521.000	< -40.7	< -40.7	-13.0	> +27.7	C
		12274.500	< -41.4	< -41.4	-13.0	> +28.4	C
		14028.000	< -38.3	< -38.3	-13.0	> +25.3	C
		15781.500	< -37.5	< -37.5	-13.0	> +24.5	C
		17535.000	< -33.1	< -33.1	-13.0	> +20.1	C

Calculated result at 17535.0 MHz, as the worst point shown on underline:

Minimum Margin: $-13.0 - (<-33.1) = >20.1$ (dB)

NOTES

1. Test Distance : 3 m
2. The spectrum was checked from 30 MHz to the tenth harmonic of the highest fundamental frequency.
3. All emissions not reported were more than 20 dB below the applied limits.
4. Applied limits : -13.0 [dBm] = $10\log(TP[mW]) - (43 + 10\log(tp[W])) = 10\log(TP[mW]) - (43 + (10\log(TP[mW]) - 30))$
where, $tp[W] = TP[mW] / 1000$: Transmitter power at antenna terminal
5. The symbol of "<" means "or less".
6. The symbol of ">" means "more than".
7. Setting of measuring instrument(s) :

	Detector Function	RES B.W.	V.B.W.	Sweep Time
A	Peak	10 kHz	30 kHz	20 msec.
B	Peak	100 kHz	300 kHz	20 msec.
C	Peak	1 MHz	3 MHz	20 msec.

3) BW 5MHz(1RB)

(LTE 5MHz)

Test Configuration : Single Unit

Test Date: March 22, 2016

Temp.: 22 °C, Humi: 35 %

CH	Transmitting Frequency [MHz]	Measured Frequency [MHz]	ERP [dBm]		Limits [dBm]	Margin [dB]	Remarks
			Hori.	Vert.			
19975	1712.500	3425.000	-53.0	-52.5	-13.0	+39.5	C
		5137.500	< -47.3	< -47.3	-13.0	> +34.3	C
		6850.000	< -45.4	< -45.4	-13.0	> +32.4	C
		8562.500	< -42.2	< -42.2	-13.0	> +29.2	C
		10275.000	< -41.2	< -41.2	-13.0	> +28.2	C
		11987.500	< -40.5	< -40.5	-13.0	> +27.5	C
		13700.000	< -38.5	< -38.5	-13.0	> +25.5	C
		15412.500	< -37.8	< -37.8	-13.0	> +24.8	C
		17125.000	< -34.3	< -34.3	-13.0	> +21.3	C
20175	1732.500	3465.000	-50.6	-50.2	-13.0	+37.2	C
		5197.500	< -47.4	< -47.4	-13.0	> +34.4	C
		6930.000	< -45.5	< -45.5	-13.0	> +32.5	C
		8662.500	< -42.3	< -42.3	-13.0	> +29.3	C
		10395.000	< -40.9	< -40.9	-13.0	> +27.9	C
		12127.500	< -40.9	< -40.9	-13.0	> +27.9	C
		13860.000	< -38.5	< -38.5	-13.0	> +25.5	C
		15592.500	< -37.7	< -37.7	-13.0	> +24.7	C
		17325.000	< -33.5	< -33.5	-13.0	> +20.5	C
20375	1752.500	3505.000	-52.7	-52.1	-13.0	+39.1	C
		5257.500	< -47.2	< -47.2	-13.0	> +34.2	C
		7010.000	< -45.6	< -45.6	-13.0	> +32.6	C
		8762.500	< -42.3	< -42.3	-13.0	> +29.3	C
		10515.000	< -40.7	< -40.7	-13.0	> +27.7	C
		12267.500	< -41.3	< -41.3	-13.0	> +28.3	C
		14020.000	< -38.3	< -38.3	-13.0	> +25.3	C
		15772.500	< -37.5	< -37.5	-13.0	> +24.5	C
		17525.000	< -33.2	< -33.2	-13.0	> +20.2	C

Calculated result at 17525.0 MHz, as the worst point shown on underline:

Minimum Margin: $-13.0 - (<-33.2) = >20.2$ (dB)

NOTES

1. Test Distance : 3 m
2. The spectrum was checked from 30 MHz to the tenth harmonic of the highest fundamental frequency.
3. All emissions not reported were more than 20 dB below the applied limits.
4. Applied limits : -13.0 [dBm] = $10\log(TP[mW]) - (43 + 10\log(tp[W])) = 10\log(TP[mW]) - (43 + (10\log(TP[mW]) - 30))$
where, $tp[W] = TP[mW] / 1000$: Transmitter power at antenna terminal
5. The symbol of "<" means "or less".
6. The symbol of ">" means "more than".
7. Setting of measuring instrument(s) :

	Detector Function	RES B.W.	V.B.W.	Sweep Time
A	Peak	10 kHz	30 kHz	20 msec.
B	Peak	100 kHz	300 kHz	20 msec.
C	Peak	1 MHz	3 MHz	20 msec.

4) BW 10MHz(1RB)

(LTE 10MHz)

Test Configuration : Single Unit

Test Date: March 22, 2016

Temp.: 22 °C, Humi: 35 %

CH	Transmitting Frequency [MHz]	Measured Frequency [MHz]	ERP [dBm]		Limits [dBm]	Margin [dB]	Remarks
			Hori.	Vert.			
20000	1715.000	3430.000	-53.0	-52.9	-13.0	+39.9	C
		5145.000	< -47.3	< -47.3	-13.0	> +34.3	C
		6860.000	< -45.4	< -45.4	-13.0	> +32.4	C
		8575.000	< -42.3	< -42.3	-13.0	> +29.3	C
		10290.000	< -41.1	< -41.1	-13.0	> +28.1	C
		12005.000	< -40.6	< -40.6	-13.0	> +27.6	C
		13720.000	< -38.5	< -38.5	-13.0	> +25.5	C
		15435.000	< -37.7	< -37.7	-13.0	> +24.7	C
		17150.000	< -34.2	< -34.2	-13.0	> +21.2	C
20175	1732.500	3465.000	-50.5	-50.6	-13.0	+37.5	C
		5197.500	< -47.4	< -47.4	-13.0	> +34.4	C
		6930.000	< -45.5	< -45.5	-13.0	> +32.5	C
		8662.500	< -42.3	< -42.3	-13.0	> +29.3	C
		10395.000	< -40.9	< -40.9	-13.0	> +27.9	C
		12127.500	< -40.9	< -40.9	-13.0	> +27.9	C
		13860.000	< -38.5	< -38.5	-13.0	> +25.5	C
		15592.500	< -37.7	< -37.7	-13.0	> +24.7	C
		17325.000	< -33.5	< -33.5	-13.0	> +20.5	C
20350	1750.000	3500.000	-52.9	-52.6	-13.0	+39.6	C
		5250.000	< -47.2	< -47.2	-13.0	> +34.2	C
		7000.000	< -45.6	< -45.6	-13.0	> +32.6	C
		8750.000	< -42.3	< -42.3	-13.0	> +29.3	C
		10500.000	< -40.7	< -40.7	-13.0	> +27.7	C
		12250.000	< -41.3	< -41.3	-13.0	> +28.3	C
		14000.000	< -38.4	< -38.4	-13.0	> +25.4	C
		15750.000	< -37.6	< -37.6	-13.0	> +24.6	C
		17500.000	< -33.2	< -33.2	-13.0	> +20.2	C

Calculated result at 17500.0 MHz, as the worst point shown on underline:

Minimum Margin: $-13.0 - (<-33.2) = >20.2$ (dB)

NOTES

1. Test Distance : 3 m
2. The spectrum was checked from 30 MHz to the tenth harmonic of the highest fundamental frequency.
3. All emissions not reported were more than 20 dB below the applied limits.
4. Applied limits : -13.0 [dBm] = $10\log(TP[mW]) - (43 + 10\log(tp[W])) = 10\log(TP[mW]) - (43 + (10\log(TP[mW]) - 30))$
where, $tp[W] = TP[mW] / 1000$: Transmitter power at antenna terminal
5. The symbol of "<" means "or less".
6. The symbol of ">" means "more than".
7. Setting of measuring instrument(s) :

	Detector Function	RES B.W.	V.B.W.	Sweep Time
A	Peak	10 kHz	30 kHz	20 msec.
B	Peak	100 kHz	300 kHz	20 msec.
C	Peak	1 MHz	3 MHz	20 msec.

5) BW 15MHz(1RB)

(LTE 15MHz)

Test Configuration : Single Unit

Test Date: March 22, 2016

Temp.: 22 °C, Humi: 35 %

CH	Transmitting Frequency [MHz]	Measured Frequency [MHz]	ERP [dBm]		Limits [dBm]	Margin [dB]	Remarks
			Hori.	Vert.			
20025	1717.500	3435.000	-52.9	-52.7	-13.0	+39.7	C
		5152.500	< -47.3	< -47.3	-13.0	> +34.3	C
		6870.000	< -45.4	< -45.4	-13.0	> +32.4	C
		8587.500	< -42.3	< -42.3	-13.0	> +29.3	C
		10305.000	< -41.1	< -41.1	-13.0	> +28.1	C
		12022.500	< -40.7	< -40.7	-13.0	> +27.7	C
		13740.000	< -38.5	< -38.5	-13.0	> +25.5	C
		15457.500	< -37.7	< -37.7	-13.0	> +24.7	C
		17175.000	< -34.0	< -34.0	-13.0	> +21.0	C
20175	1732.500	3465.000	-50.7	-50.1	-13.0	+37.1	C
		5197.500	< -47.4	< -47.4	-13.0	> +34.4	C
		6930.000	< -45.5	< -45.5	-13.0	> +32.5	C
		8662.500	< -42.3	< -42.3	-13.0	> +29.3	C
		10395.000	< -40.9	< -40.9	-13.0	> +27.9	C
		12127.500	< -40.9	< -40.9	-13.0	> +27.9	C
		13860.000	< -38.5	< -38.5	-13.0	> +25.5	C
		15592.500	< -37.7	< -37.7	-13.0	> +24.7	C
		17325.000	< -33.5	< -33.5	-13.0	> +20.5	C
20325	1747.500	3495.000	-53.0	-52.4	-13.0	+39.4	C
		5242.500	< -47.3	< -47.3	-13.0	> +34.3	C
		6990.000	< -45.6	< -45.6	-13.0	> +32.6	C
		8737.500	< -42.3	< -42.3	-13.0	> +29.3	C
		10485.000	< -40.7	< -40.7	-13.0	> +27.7	C
		12232.500	< -41.2	< -41.2	-13.0	> +28.2	C
		13980.000	< -38.4	< -38.4	-13.0	> +25.4	C
		15727.500	< -37.6	< -37.6	-13.0	> +24.6	C
		17475.000	< -33.2	< -33.2	-13.0	> +20.2	C

Calculated result at 17475.0 MHz, as the worst point shown on underline:

Minimum Margin: $-13.0 - (<-33.2) = >20.2$ (dB)

NOTES

1. Test Distance : 3 m
2. The spectrum was checked from 30 MHz to the tenth harmonic of the highest fundamental frequency.
3. All emissions not reported were more than 20 dB below the applied limits.
4. Applied limits : -13.0 [dBm] = $10\log(TP[mW]) - (43 + 10\log(tp[W])) = 10\log(TP[mW]) - (43 + (10\log(TP[mW]) - 30))$
where, $tp[W] = TP[mW] / 1000$: Transmitter power at antenna terminal
5. The symbol of "<" means "or less".
6. The symbol of ">" means "more than".
7. Setting of measuring instrument(s) :

	Detector Function	RES B.W.	V.B.W.	Sweep Time
A	Peak	10 kHz	30 kHz	20 msec.
B	Peak	100 kHz	300 kHz	20 msec.
C	Peak	1 MHz	3 MHz	20 msec.

6) BW 20MHz(1RB)

(LTE 20MHz)

Test Configuration : Single Unit

Test Date: March 22, 2016

Temp.: 22 °C, Humi: 35 %

CH	Transmitting Frequency [MHz]	Measured Frequency [MHz]	ERP [dBm]		Limits [dBm]	Margin [dB]	Remarks
			Hori.	Vert.			
20050	1720.000	3440.000	-53.3	-52.5	-13.0	+39.5	C
		5160.000	< -47.3	< -47.3	-13.0	> +34.3	C
		6880.000	< -45.4	< -45.4	-13.0	> +32.4	C
		8600.000	< -42.3	< -42.3	-13.0	> +29.3	C
		10320.000	< -41.0	< -41.0	-13.0	> +28.0	C
		12040.000	< -40.8	< -40.8	-13.0	> +27.8	C
		13760.000	< -38.5	< -38.5	-13.0	> +25.5	C
		15480.000	< -37.7	< -37.7	-13.0	> +24.7	C
		17200.000	< -34.0	< -34.0	-13.0	> +21.0	C
20175	1732.500	3465.000	-50.7	-50.6	-13.0	+37.6	C
		5197.500	< -47.4	< -47.4	-13.0	> +34.4	C
		6930.000	< -45.5	< -45.5	-13.0	> +32.5	C
		8662.500	< -42.3	< -42.3	-13.0	> +29.3	C
		10395.000	< -40.9	< -40.9	-13.0	> +27.9	C
		12127.500	< -40.9	< -40.9	-13.0	> +27.9	C
		13860.000	< -38.5	< -38.5	-13.0	> +25.5	C
		15592.500	< -37.7	< -37.7	-13.0	> +24.7	C
		17325.000	< -33.5	< -33.5	-13.0	> +20.5	C
20300	1745.000	3490.000	-52.4	-52.2	-13.0	+39.2	C
		5235.000	< -47.3	< -47.3	-13.0	> +34.3	C
		6980.000	< -45.6	< -45.6	-13.0	> +32.6	C
		8725.000	< -42.3	< -42.3	-13.0	> +29.3	C
		10470.000	< -40.7	< -40.7	-13.0	> +27.7	C
		12215.000	< -41.2	< -41.2	-13.0	> +28.2	C
		13960.000	< -38.4	< -38.4	-13.0	> +25.4	C
		15705.000	< -37.6	< -37.6	-13.0	> +24.6	C
		17450.000	< -33.3	< -33.3	-13.0	> +20.3	C

Calculated result at 17450.0 MHz, as the worst point shown on underline:

Minimum Margin: $-13.0 - (<-33.3) = >20.3$ (dB)

NOTES

1. Test Distance : 3 m
2. The spectrum was checked from 30 MHz to the tenth harmonic of the highest fundamental frequency.
3. All emissions not reported were more than 20 dB below the applied limits.
4. Applied limits : -13.0 [dBm] = $10\log(TP[mW]) - (43 + 10\log(tp[W])) = 10\log(TP[mW]) - (43 + (10\log(TP[mW]) - 30))$
where, $tp[W] = TP[mW] / 1000$: Transmitter power at antenna terminal
5. The symbol of "<" means "or less".
6. The symbol of ">" means "more than".
7. Setting of measuring instrument(s) :

	Detector Function	RES B.W.	V.B.W.	Sweep Time
A	Peak	10 kHz	30 kHz	20 msec.
B	Peak	100 kHz	300 kHz	20 msec.
C	Peak	1 MHz	3 MHz	20 msec.

7.8 Frequency Stability (§2.1055)

For the requirements, ☒ - Applicable [☒ - Tested. ☐ - Not tested by applicant request.]
☐ - Not Applicable

7.8.1 Test Results

For the standard, ☒ - Passed ☐ - Failed ☐ - Not judged

The Frequency Stability level is +0.01 ppm at 1732.500 MHz

Uncertainty of Measurement Results ± 0.03 ppm(2σ)

Remarks : _____

7.8.2 Test Instruments

Shielded Room S4				
Type	Model	Serial No. (ID)	Manufacturer	Cal. Due
Base Station Simulator	MT8820C	6200918329 (B-5)	Anritsu	2016/03/02
Environmental Chamber	SH-641	92010990 (F-32)	ESPEC	2016/07/06
DC Voltage Meter	2011	02247S (B-33)	YOKOGAWA	2016/04/07
DC Power Supply	NL035-10	35883293 (F-4)	TAKASAGO	N/A

NOTE : The calibration interval of the above test instruments is 12 months.

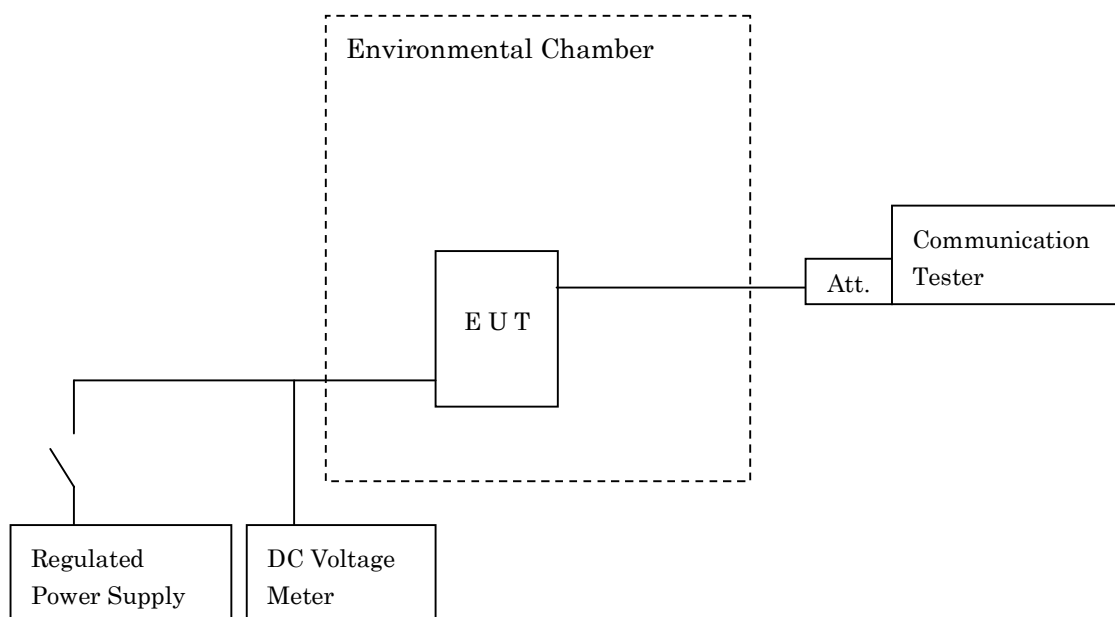
7.8.3 Test Method and Test Setup (Diagrammatic illustration)

Frequency Stability versus Temperature

The EUT was placed in an environmental chamber and was tested in the range from –30 to +50 degrees Celsius. The EUT was stabilized at each temperature. The power (4.0VDC) supplied was applied to the transmitter and allowed to stabilize for 10 minutes. The transmitting frequency was measured at startup and 2 minutes, 5 minutes and 10 minutes after startup. This procedure was repeated from –30 to +50 degrees Celsius at the interval of 10 degrees.

Frequency Stability versus Power Supply Voltage

The EUT was placed in an environmental chamber and was tested at the temperature of +20 degrees Celsius. The EUT was stabilized at the temperature. The power (4.0VDC) and the power (3.7VDC, the ending voltage) was applied to the EUT allowed to stabilize for 10 minutes. The transmitting frequency was measured at startup and 2 minutes, 5 minutes and 10 minutes after startup.



7.8.4 Test Data

(LTE)

Test Date: April 6, 2016
- April 7, 2016

1. Frequency Stability Measurement versus Temperature

Transmitting Frequency : 1732.500 MHz (20175 ch)
DC Supply Voltage : 4.0 VDC

Ambient Temperature [°C]	Startup	Deviation [ppm]			Limits [ppm]	Margin [ppm]
		2 minutes	5 minutes	10 minutes		
-30	+ 0.00	+ 0.00	+ 0.00	+ 0.00	N/A	N/A
-20	+ 0.00	+ 0.00	+ 0.00	+ 0.00	N/A	N/A
-10	+ 0.00	+ 0.00	+ 0.00	+ 0.00	N/A	N/A
0	<u>+ 0.01</u>	+ 0.00	+ 0.00	+ 0.00	N/A	N/A
10	+ 0.00	+ 0.00	+ 0.00	+ 0.00	N/A	N/A
20	+ 0.00	+ 0.00	+ 0.00	+ 0.00	N/A	N/A
30	+ 0.00	+ 0.00	+ 0.00	+ 0.00	N/A	N/A
40	+ 0.00	+ 0.00	+ 0.00	+ 0.00	N/A	N/A
50	+ 0.00	+ 0.00	+ 0.00	+ 0.00	N/A	N/A

2. Frequency Stability Measurement versus Power Supply Voltage

Transmitting Frequency : 1732.500 MHz (20175 ch)
Ambient Temperature: : 20 °C

DC Supply Voltage [V]	Startup	Deviation [ppm]			Limits [ppm]	Margin [ppm]
		2 minutes	5 minutes	10 minutes		
4.0	+ 0.00	+ 0.00	+ 0.00	+ 0.00	N/A	N/A
3.7(Ending)	+ 0.00	+ 0.00	+ 0.00	+ 0.00	N/A	N/A

Test condition example as the maximum deviation point shown on underline:

Ambient Temperature : 0 °C / Startup

DC Supply Voltage : 4 VDC

NOTE : The measurement were made after all of components of the oscillator sufficiently stabilized at each temperature.