RF TEST REPORT

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Report No.: 16050014-FCC-R2

Supersede Report No.: N/A

Applicant	Quectel Wireless Solutions Co., Ltd.
Product Name	Multi-mode LTE module
Model No.	EC20
Serial No.	EC20 MiniPCIe
Test Standard	FCC Part 22(H), FCC Part 24(E), FCC Part 27: 2014; ANSI/TIA-603-D: 2010
Test Date	March 17 to April 11, 2016
Issue Date	May 09, 2016
Test Result	☑ Pass ☐ Fail
Equipment complied with the specification	☑
Equipment did not comply with the specification	☐

Winnie Zhang	David Huang	
Winnie Zhang Test Engineer	David Huang Checked By	

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Test result presented in this test report is applicable to the tested sample only

Issued by:

SIEMIC (SHENZHEN-CHINA) LABORATORIES

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Laboratories Introduction

SIEMIC, headquartered in the heart of Silicon Valley, with superior facilities in US and Asia, is one of the leading independent testing and certification facilities providing customers with one-stop shop services for Compliance Testing and Global Certifications.

In addition to testing and certification, SIEMIC provides initial design reviews and compliance management throughout a project. Our extensive experience with China, Asia Pacific, North America, European, and International compliance requirements, assures the fastest, most cost effective way to attain regulatory compliance for the global markets.

Accreditations for Conformity Assessment

Country/Region	Scope
USA	EMC, RF/Wireless, SAR, Telecom
Canada	EMC, RF/Wireless, SAR, Telecom
Taiwan	EMC, RF, Telecom, SAR, Safety
Hong Kong	RF/Wireless, SAR, Telecom
Australia	EMC, RF, Telecom, SAR, Safety
Korea	EMI, EMS, RF, SAR, Telecom, Safety
Japan	EMI, RF/Wireless, SAR, Telecom
Singapore	EMC, RF, SAR, Telecom
Europe	EMC, RF, SAR, Telecom, Safety

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1. Report Revision History

Report No.	Report Version	Description	Issue Date
16050014-FCC-R2	NONE	Original	May 09, 2016

2. Customer information

Applicant Name	Quectel Wireless Solutions Co., Ltd.
Applicant Add	Room501,Building 13,No.99 TianZhou Road,Xuhui District,Shanghai,China
Manufacturer	Quectel Wireless Solutions Co., Ltd.
Manufacturer Add	Room501,Building 13,No.99 TianZhou Road,Xuhui District,Shanghai,China

3. Test site information

Lab performing tests	SIEMIC (Shenzhen-China) LABORATORIES
Lab Address	Zone A, Floor 1, Building 2 Wan Ye Long Technology Park South Side of Zhoushi Road, Bao' an District, Shenzhen, Guangdong China 518108
FCC Test Site No.	718246
IC Test Site No.	4842E-1
Test Software	Radiated Emission Program-To Shenzhen v2.0

4. Equipment under Test (EUT) Information

Description of EUT:	Multi-mode LTE module
Main Model:	EC20
Serial Model:	EC20 MiniPCIe
Date EUT received:	March 16, 2016
Test Date(s):	March 17 to April 11, 2016
Equipment Category：	PCB
Antenna Gain:	GSM850: 1dBi PCS1900: 1dBi UMTS-FDD Band 5:: 1dBi UMTS-FDD Band 4: 1dBi UMTS-FDD Band 2: 1dBi LTE Band 2: 1dBi LTE Band 4: 1dBi LTE Band 5: 1dBi LTE Band 12: 1dBi LTE Band 17: 1dBi **(Note: The radio module will be sold without antenna, this antenna only used limited to ERP/EIRP or radiated spurious emission test.)**
Type of Modulation:	GSM / GPRS: GMSK EGPRS: GMSK,8PSK UMTS-FDD: QPSK,16QAM, 64QAM **(Note: 16QAM and 64QAM only support UMTS downlink)** LTE Band: QPSK,16QAM,64QAM **(Note: LTE downlink only support 64QAM)**

RF Operating Frequency (ies):	GSM850 TX: 824.2 ~ 848.8 MHz; RX: 869.2 ~ 893.8 MHz PCS1900 TX: 1850.2 ~ 1909.8 MHz; RX: 1930.2 ~ 1989.8 MHz UMTS-FDD Band 5 TX: 826.4 ~ 846.6 MHz; RX: 871.4 ~ 891.6 MHz UMTS-FDD Band 4 TX:1712.4 ~ 1752.6 MHz; RX : 2112.4 ~ 2152.6 MHz UMTS-FDD Band 2 TX:1852.4 ~ 1907.6 MHz; RX: 1932.4 ~ 1987.6 MHz LTE Band 2 TX: 1852.5 ~ 1907.5 MHz; RX : 1932.5 ~ 1987.5 MHz LTE Band 4 TX: 1712.5 ~ 1752.5 MHz; RX : 2112.5 ~ 2152.5 MHz LTE Band 5 TX: 826.5 ~ 846.5 MHz; RX : 871.5 ~ 891.5 MHz LTE Band 12 TX:699.7 ~ 715.3 MHz; RX : 729.7~ 745.3MHz LTE Band 17 TX: 706.5 ~ 713.5 MHz; RX : 736.5 ~ 743.5 MHz
Maximum Conducted AV Power to Antenna:	LTE Band 2: 22.10 dBm LTE Band 4: 22.21 dBm LTE Band 5: 22.91 dBm LTE Band 12: 22.59 dBm LTE Band 17: 22.46 dBm
Port:	N/A
Input Power:	Spec: DC 3.8V
Trade Name :	Quectel
GPRS/EGPRS Multi-slot class	8/10/12
FCC ID:	XMR201603EC20

5. Test Summary

The product was tested in accordance with the following specifications.

All testing has been performed according to below product classification:

FCC Rules	Description of Test	Result
§ 1.1307; § 2.1093	RF Exposure (SAR)	Compliance
§2.1046; § 22.913(a); § 24.232(c); § 27.50(c.10); § 27.50(d.4)	RF Output Power	Compliance
§ 24.232 (d); § 27.50(d)	Peak-Average Ratio	Compliance
§ 2.1047	Modulation Characteristics	N/A
§ 2.1049; § 22.905; § 22.917; § 24.238; § 27.53(a.5)	99% & -26 dB Occupied Bandwidth	Compliance
§ 2.1051; § 22.917(a); § 24.238(a); § 27.53(h)	Spurious Emissions at Antenna Terminal	Compliance
§ 2.1053; § 22.917(a); § 24.238(a); § 27.53(h)	Field Strength of Spurious Radiation	Compliance
§ 22.917(a); § 24.238(a);	Out of band emission, Band Edge	Compliance
§ 27.53(m)	Band Edge 27.53(m)	Compliance
§ 2.1055; § 22.355; § 24.235; § 27.5(h); § 27.54	Frequency stability vs. temperature Frequency stability vs. voltage	Compliance

Note: Testing was performed by configuring EUT to maximum output power status, the declared output power class for different

Measurement Uncertainty

Emissions		
Test Item	**Description**	**Uncertainty**
Band Edge and Radiated Spurious Emissions	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	+5.6dB/-4.5dB
-	-	-

6. MEASUREMENTS, EXAMINATION AND DERIVED RESULTS

6.1 RF Exposure (SAR)

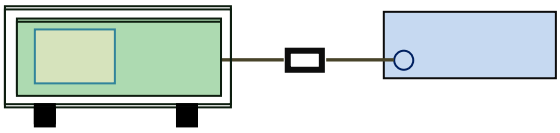
Test Result: Pass

The EUT is a mobile device, thus requires MPE evaluation;
Please refer to RF Exposure Evaluation Report: 16050014-FCC-H.

6.2 RF Output Power

Temperature	23℃
Relative Humidity	59%
Atmospheric Pressure	1026mbar
Test date :	March 26, 2016
Tested By :	Winnie Zhang

Requirement(s):

Spec	Item	Requirement	Applicable
§22.913 (a)	a)	ERP:38.45dBm	☑
§24.232 (c)	b)	EIRP:33dBm	☑
§27.50 (c)	c)	EIRP: 30dBm	☑
Test Setup			
Test Procedure	For Conducted Power: - The transmitter output port was connected to base station. - Set EUT at maximum power through base station. - Select lowest, middle, and highest channels for each band and different test mode. For ERP/EIRP: - The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable. - The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis. - The frequency range up to tenth harmonic of the fundamental		

	frequency was investigated. - Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution. - Spurious emissions in dB = 10 log (TX power in Watts/0.001) – the absolute level - Spurious attenuation limit in dB = 43 + 10 Log10 (power out in Watts.
Remark	
Result	☑ Pass ☐ Fail

Test Data ☑ Yes ☐ N/A

Test Plot ☐ Yes (See below) ☑ N/A

Conducted Power

LTE Band 2:

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)	Tune up Power tolerant
20MHz	18700	1860.0	QPSK	1	0	0	21.98	22.5±1
				1	49	0	22.00	22.5±1
				1	99	0	22.05	22.5±1
				50	0	1	20.91	21.5±1
				50	24	1	20.94	21.5±1
				50	49	1	20.93	21.5±1
				100	0	1	20.88	21.5±1
			16QAM	1	0	1	20.76	21.5±1
				1	49	1	20.85	21.5±1
				1	99	1	20.86	21.5±1
				50	0	2	20.56	21.5±1
				50	24	2	20.59	21.5±1
				50	49	2	20.56	21.5±1
				100	0	2	20.89	21.5±1
	18900	1880.0	QPSK	1	0	0	22.00	21.5±1
				1	49	0	22.06	21.5±1
				1	99	0	**22.10**	21.5±1
				50	0	1	20.89	21.5±1
				50	24	1	20.88	21.5±1
				50	49	1	21.02	21.5±1
				100	0	1	20.87	21.5±1
			16QAM	1	0	1	21.46	21.5±1
				1	49	1	21.45	21.5±1
				1	99	1	21.52	21.5±1
				50	0	2	20.69	21.5±1
				50	24	2	20.86	21.5±1
				50	49	2	20.87	21.5±1
				100	0	2	21.91	21.5±1
	19100	1900.0	QPSK	1	0	0	22.06	21.5±1
				1	49	0	22.00	21.5±1
				1	99	0	21.75	21.5±1
				50	0	1	20.86	21.5±1
				50	24	1	20.85	21.5±1
				50	49	1	20.88	21.5±1
				100	0	1	20.85	21.5±1
			16QAM	1	0	1	21.28	21.5±1
				1	49	1	21.15	21.5±1
				1	99	1	21.04	21.5±1
				50	0	2	20.98	21.5±1
				50	24	2	20.95	21.5±1
				50	49	2	20.89	21.5±1
				100	0	2	20.63	21.5±1

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)	Tune up Power tolerant
15MHz	18675	1857.5	QPSK	1	0	0	21.75	22.5±1
				1	37	0	21.76	22.5±1
				1	74	0	21.79	22.5±1
				36	0	1	20.77	21.5±1
				36	16	1	20.75	21.5±1
				36	35	1	20.76	21.5±1
				75	0	1	20.64	21.5±1
			16QAM	1	0	1	21.42	21.3±1
				1	37	1	21.45	21.3±1
				1	74	1	21.50	21.3±1
				36	0	2	20.87	21.3±1
				36	16	2	20.86	21.3±1
				36	35	2	20.89	21.3±1
				75	0	2	20.68	21.3±1
	18900	1880.0	QPSK	1	0	0	21.64	21.3±1
				1	37	0	21.70	21.3±1
				1	74	0	21.73	21.3±1
				36	0	1	20.80	21.3±1
				36	16	1	20.79	21.3±1
				36	35	1	20.81	21.3±1
				75	0	1	20.65	21.3±1
			16QAM	1	0	1	21.36	21.3±1
				1	37	1	21.31	21.3±1
				1	74	1	21.27	21.3±1
				36	0	2	20.86	21.3±1
				36	16	2	20.89	21.3±1
				36	35	2	20.89	21.3±1
				75	0	2	20.77	21.3±1
	19125	1902.5	QPSK	1	0	0	21.76	21.3±1
				1	37	0	21.71	21.3±1
				1	74	0	21.62	21.3±1
				36	0	1	20.85	21.3±1
				36	16	1	20.87	21.3±1
				36	35	1	20.88	21.3±1
				75	0	1	20.83	21.3±1
			16QAM	1	0	1	20.76	20.3±1
				1	37	1	20.65	20.3±1
				1	74	1	20.48	20.3±1
				36	0	2	20.16	20.3±1
				36	16	2	20.18	20.3±1
				36	35	2	20.15	20.3±1
				75	0	2	20.82	20.3±1

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)	Tune up Power tolerant
10MHz	18650	1855	QPSK	1	0	0	21.95	22.5±1
				1	24	0	21.99	22.5±1
				1	49	0	22.02	22.5±1
				25	0	1	20.92	21.3±1
				25	12	1	20.95	21.3±1
				25	24	1	20.93	21.3±1
				50	0	1	20.81	21.3±1
			16QAM	1	0	1	20.54	21.3±1
				1	24	1	20.56	21.3±1
				1	49	1	20.66	21.3±1
				25	0	2	20.46	21.3±1
				25	12	2	20.43	21.3±1
				25	24	2	20.48	21.3±1
				50	0	2	20.88	21.3±1
	18900	1880.0	QPSK	1	0	0	21.79	21.3±1
				1	24	0	21.93	21.3±1
				1	49	0	21.93	21.3±1
				25	0	1	20.89	21.3±1
				25	12	1	20.88	21.3±1
				25	24	1	21.01	21.3±1
				50	0	1	20.81	21.3±1
			16QAM	1	0	1	20.58	20.3±1
				1	24	1	20.60	20.3±1
				1	49	1	20.64	20.3±1
				25	0	2	20.15	20.3±1
				25	12	2	20.19	20.3±1
				25	24	2	20.27	20.3±1
				50	0	2	20.86	20.3±1
	19150	1905	QPSK	1	0	0	21.99	21.3±1
				1	24	0	21.86	21.3±1
				1	49	0	21.61	21.3±1
				25	0	1	20.95	21.3±1
				25	12	1	20.96	21.3±1
				25	24	1	20.96	21.3±1
				50	0	1	20.76	21.3±1
			16QAM	1	0	1	21.64	21.3±1
				1	24	1	21.35	21.3±1
				1	49	1	21.16	21.3±1
				25	0	2	20.54	21.3±1
				25	12	2	20.65	21.3±1
				25	24	2	20.45	21.3±1
				50	0	2	20.87	21.3±1

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)	Tune up Power tolerant
5MHz	18625	1852.5	QPSK	1	0	0	21.98	22.5±1
				1	12	0	21.99	22.5±1
				1	24	0	22.10	22.5±1
				12	0	1	20.94	21.3±1
				12	6	1	20.95	21.3±1
				12	11	1	20.93	21.3±1
				25	0	1	20.93	21.3±1
			16QAM	1	0	1	20.98	21.3±1
				1	12	1	21.03	21.3±1
				1	24	1	21.06	21.3±1
				12	0	2	20.78	21.3±1
				12	6	2	20.76	21.3±1
				12	11	2	20.78	21.3±1
				25	0	2	20.82	21.3±1
	18900	1880.0	QPSK	1	0	0	21.64	21.3±1
				1	12	0	21.68	21.3±1
				1	24	0	21.80	21.3±1
				12	0	1	20.94	21.3±1
				12	6	1	20.96	21.3±1
				12	11	1	20.93	21.3±1
				25	0	1	20.88	21.3±1
			16QAM	1	0	1	20.91	21.3±1
				1	12	1	20.99	21.3±1
				1	24	1	21.00	21.3±1
				12	0	2	20.56	21.3±1
				12	6	2	20.59	21.3±1
				12	11	2	20.58	21.3±1
				25	0	2	20.94	21.3±1
	19175	1907.5	QPSK	1	0	0	21.91	21.3±1
				1	12	0	21.84	21.3±1
				1	24	0	21.66	21.3±1
				12	0	1	20.97	21.3±1
				12	6	1	20.96	21.3±1
				12	11	1	20.93	21.3±1
				25	0	1	20.88	21.3±1
			16QAM	1	0	1	20.52	21.3±1
				1	12	1	20.46	21.3±1
				1	24	1	20.44	21.3±1
				12	0	2	20.75	21.3±1
				12	6	2	20.56	21.3±1
				12	11	2	20.69	21.3±1
				25	0	2	20.40	21.3±1

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)	Tune up Power tolerant
3MHz	18625	1852.5	QPSK	1	0	0	21.93	22.5±1
				1	7	0	21.96	22.5±1
				1	14	0	21.90	22.5±1
				8	0	1	20.98	21.3±1
				8	4	1	20.95	21.3±1
				8	7	1	20.96	21.3±1
				15	0	1	20.91	21.3±1
			16QAM	1	0	1	20.51	21.3±1
				1	7	1	20.53	21.3±1
				1	14	1	20.56	21.3±1
				8	0	2	20.87	21.3±1
				8	4	2	20.53	21.3±1
				8	7	2	20.72	21.3±1
				15	0	2	20.93	21.3±1
	18900	1880.0	QPSK	1	0	0	21.88	21.3±1
				1	7	0	21.89	21.3±1
				1	14	0	21.88	21.3±1
				8	0	1	20.92	21.3±1
				8	4	1	20.96	21.3±1
				8	7	1	20.95	21.3±1
				15	0	1	21.01	21.3±1
			16QAM	1	0	1	20.60	21.3±1
				1	7	1	20.50	21.3±1
				1	14	1	20.40	21.3±1
				8	0	2	20.88	21.3±1
				8	4	2	20.98	21.3±1
				8	7	2	20.54	21.3±1
				15	0	2	20.47	21.3±1
	19175	1907.5	QPSK	1	0	0	21.78	21.3±1
				1	7	0	21.65	21.3±1
				1	14	0	21.55	21.3±1
				8	0	1	20.84	21.3±1
				8	4	1	20.83	21.3±1
				8	7	1	20.82	21.3±1
				15	0	1	20.87	21.3±1
			16QAM	1	0	1	21.18	21.3±1
				1	7	1	21.11	21.3±1
				1	14	1	21.16	21.3±1
				8	0	2	20.86	21.3±1
				8	4	2	20.88	21.3±1
				8	7	2	20.83	21.3±1
				15	0	2	20.48	21.3±1

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)	Tune up Power tolerant
1.4MHz	18607	1850.7	QPSK	1	0	0	21.85	22.5±1
				1	2	0	21.88	22.5±1
				1	5	0	21.89	22.5±1
				3	0	0	21.99	21.3±1
				3	1	0	21.95	21.3±1
				3	2	0	21.96	21.3±1
				6	0	1	20.89	21.3±1
			16QAM	1	0	1	20.35	21.3±1
				1	2	1	20.34	21.3±1
				1	5	1	20.36	21.3±1
				3	0	1	20.86	21.3±1
				3	1	1	20.58	21.3±1
				3	2	1	20.49	21.3±1
				6	0	2	20.89	21.3±1
	18900	1880.0	QPSK	1	0	0	21.97	21.3±1
				1	2	0	21.96	21.3±1
				1	5	0	21.91	21.3±1
				3	0	0	22.07	21.3±1
				3	1	0	22.03	21.3±1
				3	2	0	22.08	21.3±1
				6	0	1	21.00	21.3±1
			16QAM	1	0	1	20.57	21.3±1
				1	2	1	20.56	21.3±1
				1	5	1	20.59	21.3±1
				3	0	1	20.74	21.3±1
				3	1	1	20.88	21.3±1
				3	2	1	20.56	21.3±1
				6	0	2	20.85	21.3±1
	19193	1909.3	QPSK	1	0	0	21.76	21.3±1
				1	2	0	21.73	21.3±1
				1	5	0	21.78	21.3±1
				3	0	0	21.73	21.3±1
				3	1	0	21.76	21.3±1
				3	2	0	21.74	21.3±1
				6	0	1	20.86	21.3±1
			16QAM	1	0	1	20.58	21.3±1
				1	2	1	20.56	21.3±1
				1	5	1	20.54	21.3±1
				3	0	1	20.35	21.3±1
				3	1	1	20.39	21.3±1
				3	2	1	20.34	21.3±1
				6	0	2	20.81	21.3±1

LTE Band 4:

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)	Tune up Power tolerant
20MHz	20050	1720.0	QPSK	1	0	0	21.55	21.3±1
				1	49	0	21.68	21.3±1
				1	99	0	21.89	21.3±1
				50	0	1	20.68	21.3±1
				50	24	1	20.79	21.3±1
				50	49	1	20.56	21.3±1
				100	0	1	20.31	21.3±1
			16QAM	1	0	1	20.35	21.3±1
				1	49	1	20.49	21.3±1
				1	99	1	20.86	21.3±1
				50	0	2	20.74	21.3±1
				50	24	2	20.58	21.3±1
				50	49	2	20.49	21.3±1
				100	0	2	20.36	21.3±1
	20175	1732.5	QPSK	1	0	0	21.55	21.3±1
				1	49	0	21.69	21.3±1
				1	99	0	21.81	21.3±1
				50	0	1	20.73	21.3±1
				50	24	1	20.75	21.3±1
				50	49	1	20.74	21.3±1
				100	0	1	20.73	21.3±1
			16QAM	1	0	1	20.88	21.3±1
				1	49	1	20.96	21.3±1
				1	99	1	21.09	21.3±1
				50	0	2	20.68	21.3±1
				50	24	2	20.86	21.3±1
				50	49	2	20.87	21.3±1
				100	0	2	20.76	21.3±1
	20300	1745.0	QPSK	1	0	0	21.94	21.3±1
				1	49	0	21.88	21.3±1
				1	99	0	21.62	21.3±1
				50	0	1	20.33	21.3±1
				50	24	1	20.43	21.3±1
				50	49	1	20.36	21.3±1
				100	0	1	20.39	21.3±1
			16QAM	1	0	1	21.31	21.3±1
				1	49	1	21.15	21.3±1
				1	99	1	20.89	21.3±1
				50	0	2	20.87	21.3±1
				50	24	2	20.86	21.3±1
				50	49	2	20.84	21.3±1
				100	0	2	20.51	21.3±1

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)	Tune up Power tolerant
15MHz	20025	1717.5	QPSK	1	0	0	21.55	21.3±1
				1	37	0	21.56	21.3±1
				1	74	0	21.76	21.3±1
				36	0	1	20.37	21.3±1
				36	16	1	20.36	21.3±1
				36	35	1	20.39	21.3±1
				75	0	1	20.87	21.3±1
			16QAM	1	0	1	20.76	21.3±1
				1	37	1	20.55	21.3±1
				1	74	1	20.42	21.3±1
				36	0	2	20.56	21.3±1
				36	16	2	20.78	21.3±1
				36	35	2	20.59	21.3±1
				75	0	2	20.45	21.3±1
	20175	1732.5	QPSK	1	0	0	21.68	21.3±1
				1	37	0	21.78	21.3±1
				1	74	0	21.95	21.3±1
				36	0	1	20.67	21.3±1
				36	16	1	20.65	21.3±1
				36	35	1	20.68	21.3±1
				75	0	1	20.75	21.3±1
			16QAM	1	0	1	20.66	21.3±1
				1	37	1	20.74	21.3±1
				1	74	1	21.05	21.3±1
				36	0	2	20.46	21.3±1
				36	16	2	20.49	21.3±1
				36	35	2	20.48	21.3±1
				75	0	2	20.73	21.3±1
	20325	1747.5	QPSK	1	0	0	21.78	21.3±1
				1	37	0	21.64	21.3±1
				1	74	0	21.59	21.3±1
				36	0	1	20.50	21.3±1
				36	16	1	20.53	21.3±1
				36	35	1	20.54	21.3±1
				75	0	1	20.42	21.3±1
			16QAM	1	0	1	21.44	21.3±1
				1	37	1	21.36	21.3±1
				1	74	1	21.15	21.3±1
				36	0	2	20.98	21.3±1
				36	16	2	20.92	21.3±1
				36	35	2	20.95	21.3±1
				75	0	2	20.48	21.3±1

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)	Tune up Power tolerant
10MHz	20000	1715.0	QPSK	1	0	0	21.59	21.3±1
				1	24	0	21.50	21.3±1
				1	49	0	21.42	21.3±1
				25	0	1	20.42	21.3±1
				25	12	1	20.45	21.3±1
				25	24	1	20.43	21.3±1
				50	0	1	20.55	21.3±1
			16QAM	1	0	1	20.71	21.3±1
				1	24	1	20.46	21.3±1
				1	49	1	20.88	21.3±1
				25	0	2	20.66	21.3±1
				25	12	2	20.45	21.3±1
				25	24	2	20.63	21.3±1
				50	0	2	20.50	21.3±1
	20175	1732.5	QPSK	1	0	0	21.87	21.3±1
				1	24	0	21.94	21.3±1
				1	49	0	21.88	21.3±1
				25	0	1	20.95	21.3±1
				25	12	1	20.96	21.3±1
				25	24	1	20.93	21.3±1
				50	0	1	20.82	21.3±1
			16QAM	1	0	1	20.57	20.3±1
				1	24	1	20.66	20.3±1
				1	49	1	20.75	20.3±1
				25	0	2	20.16	20.3±1
				25	12	2	20.13	20.3±1
				25	24	2	20.11	20.3±1
				50	0	2	20.93	20.3±1
	20350	1750.0	QPSK	1	0	0	21.42	21.3±1
				1	24	0	21.55	21.3±1
				1	49	0	21.68	21.3±1
				25	0	1	20.55	21.3±1
				25	12	1	20.56	21.3±1
				25	24	1	20.58	21.3±1
				50	0	1	20.42	21.3±1
			16QAM	1	0	1	21.14	21.3±1
				1	24	1	21.16	21.3±1
				1	49	1	21.20	21.3±1
				25	0	2	20.98	21.3±1
				25	12	2	20.95	21.3±1
				25	24	2	20.93	21.3±1
				50	0	2	20.51	21.3±1

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)	Tune up Power tolerant
5MHz	20000	1715.0	QPSK	1	0	0	21.72	21.3±1
				1	12	0	21.68	21.3±1
				1	24	0	21.60	21.3±1
				12	0	1	20.60	21.3±1
				12	6	1	20.63	21.3±1
				12	11	1	20.65	21.3±1
				25	0	1	20.52	21.3±1
			16QAM	1	0	1	20.73	21.3±1
				1	12	1	20.64	21.3±1
				1	24	1	20.55	21.3±1
				12	0	2	20.35	21.3±1
				12	6	2	20.36	21.3±1
				12	11	2	20.38	21.3±1
				25	0	2	20.59	21.3±1
	20175	1732.5	QPSK	1	0	0	21.99	21.3±1
				1	12	0	21.99	21.3±1
				1	24	0	22.03	21.3±1
				12	0	1	21.07	21.3±1
				12	6	1	21.03	21.3±1
				12	11	1	20.55	21.3±1
				25	0	1	20.93	21.3±1
			16QAM	1	0	1	20.61	21.3±1
				1	12	1	20.70	21.3±1
				1	24	1	20.77	21.3±1
				12	0	2	20.45	21.3±1
				12	6	2	20.48	21.3±1
				12	11	2	20.43	21.3±1
				25	0	2	20.83	21.3±1
	20350	1750.0	QPSK	1	0	0	21.40	21.3±1
				1	12	0	21.56	21.3±1
				1	24	0	21.74	21.3±1
				12	0	1	20.57	21.3±1
				12	6	1	20.56	21.3±1
				12	11	1	20.58	21.3±1
				25	0	1	20.59	21.3±1
			16QAM	1	0	1	20.66	21.3±1
				1	12	1	20.78	21.3±1
				1	24	1	20.91	21.3±1
				12	0	2	20.76	21.3±1
				12	6	2	20.75	21.3±1
				12	11	2	20.77	21.3±1
				25	0	2	20.56	21.3±1

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)	Tune up Power tolerant
3MHz	19965	1711.5	QPSK	1	0	0	21.64	21.3±1
				1	7	0	21.53	21.3±1
				1	14	0	21.48	21.3±1
				8	0	1	20.57	21.3±1
				8	4	1	20.53	21.3±1
				8	7	1	20.58	21.3±1
				15	0	1	20.53	21.3±1
			16QAM	1	0	1	20.77	21.3±1
				1	7	1	20.56	21.3±1
				1	14	1	20.42	21.3±1
				8	0	2	20.48	21.3±1
				8	4	2	20.46	21.3±1
				8	7	2	20.44	21.3±1
				15	0	2	20.53	21.3±1
	20175	1732.5	QPSK	1	0	0	22.07	21.3±1
				1	7	0	22.05	21.3±1
				1	14	0	22.02	21.3±1
				8	0	1	21.03	21.3±1
				8	4	1	21.01	21.3±1
				8	7	1	20.98	21.3±1
				15	0	1	21.02	21.3±1
			16QAM	1	0	1	20.74	21.3±1
				1	7	1	20.73	21.3±1
				1	14	1	20.72	21.3±1
				8	0	2	20.93	21.3±1
				8	4	2	20.96	21.3±1
				8	7	2	20.95	21.3±1
				15	0	2	20.52	21.3±1
	20385	1753.5	QPSK	1	0	0	21.46	21.3±1
				1	7	0	21.55	21.3±1
				1	14	0	21.66	21.3±1
				8	0	1	20.60	21.3±1
				8	4	1	20.64	21.3±1
				8	7	1	20.63	21.3±1
				15	0	1	20.64	21.3±1
			16QAM	1	0	1	21.06	21.3±1
				1	7	1	21.11	21.3±1
				1	14	1	21.19	21.3±1
				8	0	2	20.60	21.3±1
				8	4	2	20.64	21.3±1
				8	7	2	20.63	21.3±1
				15	0	2	20.83	21.3±1

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)	Tune up Power tolerant
1.4MHz	19957	1710.7	QPSK	1	0	0	21.67	21.3±1
				1	2	0	21.65	21.3±1
				1	5	0	21.63	21.3±1
				3	0	0	21.69	21.3±1
				3	1	0	21.65	21.3±1
				3	2	0	21.63	21.3±1
				6	0	1	20.69	21.3±1
			16QAM	1	0	1	21.24	21.3±1
				1	2	1	21.26	21.3±1
				1	5	1	21.28	21.3±1
				3	0	1	21.15	21.3±1
				3	1	1	20.46	21.3±1
				3	2	1	20.58	21.3±1
				6	0	2	20.62	21.3±1
	20175	1732.5	QPSK	1	0	0	**22.21**	21.3±1
				1	2	0	22.15	21.3±1
				1	5	0	22.02	21.3±1
				3	0	0	21.94	21.3±1
				3	1	0	21.93	21.3±1
				3	2	0	21.96	21.3±1
				6	0	1	21.12	21.3±1
			16QAM	1	0	1	20.78	21.3±1
				1	2	1	20.77	21.3±1
				1	5	1	20.74	21.3±1
				3	0	1	20.56	21.3±1
				3	1	1	20.59	21.3±1
				3	2	1	20.54	21.3±1
				6	0	2	20.68	21.3±1
	20393	1754.3	QPSK	1	0	0	21.58	21.3±1
				1	2	0	21.68	21.3±1
				1	5	0	21.80	21.3±1
				3	0	0	21.62	21.3±1
				3	1	0	21.64	21.3±1
				3	2	0	21.65	21.3±1
				6	0	1	20.76	21.3±1
			16QAM	1	0	1	20.61	21.3±1
				1	2	1	20.76	21.3±1
				1	5	1	20.44	21.3±1
				3	0	1	20.75	21.3±1
				3	1	1	20.59	21.3±1
				3	2	1	20.89	21.3±1
				6	0	2	20.74	21.3±1

LTE Band 5:

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)	Tune up Power tolerant
10MHz	20450	829	QPSK	1	0	0	22.78	22±1
				1	24	0	22.65	22±1
				1	49	0	22.48	22±1
				25	0	1	21.62	22±1
				25	12	1	21.63	22±1
				25	24	1	21.64	22±1
				50	0	1	21.26	22±1
			16QAM	1	0	1	21.34	21.3±1
				1	24	1	21.25	21.3±1
				1	49	1	21.02	21.3±1
				25	0	2	20.76	21.3±1
				25	12	2	20.72	21.3±1
				25	24	2	20.73	21.3±1
				50	0	2	20.35	21.3±1
	20525	836.5	QPSK	1	0	0	22.36	22±1
				1	24	0	22.46	22±1
				1	49	0	22.71	22±1
				25	0	1	21.29	22±1
				25	12	1	21.25	22±1
				25	24	1	21.26	22±1
				50	0	1	21.30	22±1
			16QAM	1	0	1	21.02	21.3±1
				1	24	1	21.15	21.3±1
				1	49	1	21.36	21.3±1
				25	0	2	20.68	21.3±1
				25	12	2	20.69	21.3±1
				25	24	2	20.65	21.3±1
				50	0	2	20.38	21.3±1
	20600	844	QPSK	1	0	0	22.47	22±1
				1	24	0	22.36	22±1
				1	49	0	22.27	22±1
				25	0	1	21.53	22±1
				25	12	1	21.56	22±1
				25	24	1	21.54	22±1
				50	0	1	21.39	22±1
			16QAM	1	0	1	22.08	21.3±1
				1	24	1	21.99	21.3±1
				1	49	1	21.92	21.3±1
				25	0	2	20.85	21.3±1
				25	12	2	20.83	21.3±1
				25	24	2	20.81	21.3±1
				50	0	2	20.43	21.3±1

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)	Tune up Power tolerant
5MHz	20425	826.5	QPSK	1	0	0	**22.91**	22±1
				1	12	0	22.85	22±1
				1	24	0	22.70	22±1
				12	0	1	21.74	22±1
				12	6	1	21.76	22±1
				12	11	1	21.72	22±1
				25	0	1	21.68	22±1
			16QAM	1	0	1	21.78	21.3±1
				1	12	1	21.75	21.3±1
				1	24	1	21.68	21.3±1
				12	0	2	20.84	21.3±1
				12	6	2	20.82	21.3±1
				12	11	2	20.83	21.3±1
				25	0	2	20.70	21.3±1
	20525	836.5	QPSK	1	0	0	22.39	22±1
				1	12	0	22.42	22±1
				1	24	0	22.57	22±1
				12	0	1	21.46	22±1
				12	6	1	21.45	22±1
				12	11	1	21.48	22±1
				25	0	1	21.34	22±1
			16QAM	1	0	1	21.59	21.3±1
				1	12	1	21.65	21.3±1
				1	24	1	21.70	21.3±1
				12	0	2	20.76	21.3±1
				12	6	2	20.72	21.3±1
				12	11	2	20.75	21.3±1
				25	0	2	20.38	21.3±1
	20625	846.5	QPSK	1	0	0	22.69	22±1
				1	12	0	22.59	22±1
				1	24	0	22.22	22±1
				12	0	1	21.74	22±1
				12	6	1	21.75	22±1
				12	11	1	21.76	22±1
				25	0	1	21.45	22±1
			16QAM	1	0	1	21.38	21.3±1
				1	12	1	21.25	21.3±1
				1	24	1	21.18	21.3±1
				12	0	2	20.78	21.3±1
				12	6	2	20.85	21.3±1
				12	11	2	20.83	21.3±1
				25	0	2	20.62	21.3±1

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)	Tune up Power tolerant
3MHz	20415	825.5	QPSK	1	0	0	22.79	22±1
				1	7	0	22.78	22±1
				1	14	0	22.70	22±1
				8	0	1	21.73	22±1
				8	4	1	21.74	22±1
				8	7	1	21.71	22±1
				15	0	1	21.70	22±1
			16QAM	1	0	1	21.36	21.3±1
				1	7	1	21.30	21.3±1
				1	14	1	20.98	21.3±1
				8	0	2	20.62	21.3±1
				8	4	2	20.65	21.3±1
				8	7	2	20.63	21.3±1
				15	0	2	20.71	21.3±1
	20525	836.5	QPSK	1	0	0	22.39	22±1
				1	7	0	22.45	22±1
				1	14	0	22.45	22±1
				8	0	1	21.40	22±1
				8	4	1	21.43	22±1
				8	7	1	21.45	22±1
				15	0	1	21.33	22±1
			16QAM	1	0	1	21.09	21.3±1
				1	7	1	21.10	21.3±1
				1	14	1	21.14	21.3±1
				8	0	2	20.27	20.3±1
				8	4	2	20.23	20.3±1
				8	7	2	20.25	20.3±1
				15	0	2	20.39	20.3±1
	20635	847.5	QPSK	1	0	0	22.32	22±1
				1	7	0	22.26	22±1
				1	14	0	22.16	22±1
				8	0	1	21.62	22±1
				8	4	1	21.65	22±1
				8	7	1	21.65	22±1
				15	0	1	21.49	22±1
			16QAM	1	0	1	22.07	21.3±1
				1	7	1	21.98	21.3±1
				1	14	1	21.82	21.3±1
				8	0	2	20.58	21.3±1
				8	4	2	20.56	21.3±1
				8	7	2	20.59	21.3±1
				15	0	2	20.63	21.3±1

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)	Tune up Power tolerant
1.4MHz	20407	824.7	QPSK	1	0	0	22.72	22±1
				1	2	0	22.70	22±1
				1	5	0	22.66	22±1
				3	0	0	22.85	22±1
				3	1	0	22.84	22±1
				3	2	0	22.82	22±1
				6	0	1	21.78	22±1
			16QAM	1	0	1	21.17	21.3±1
				1	2	1	21.16	21.3±1
				1	5	1	21.12	21.3±1
				3	0	1	20.88	21.3±1
				3	1	1	20.89	21.3±1
				3	2	1	20.86	21.3±1
				6	0	2	20.72	21.3±1
	20525	836.5	QPSK	1	0	0	22.48	22±1
				1	2	0	22.49	22±1
				1	5	0	22.52	22±1
				3	0	0	22.54	22±1
				3	1	0	22.56	22±1
				3	2	0	22.53	22±1
				6	0	1	21.47	22±1
			16QAM	1	0	1	21.12	21.3±1
				1	2	1	21.11	21.3±1
				1	5	1	21.10	21.3±1
				3	0	1	20.88	21.3±1
				3	1	1	20.89	21.3±1
				3	2	1	20.85	21.3±1
				6	0	2	20.36	21.3±1
	20643	848.3	QPSK	1	0	0	22.39	22±1
				1	2	0	22.30	22±1
				1	5	0	22.28	22±1
				3	0	0	22.41	22±1
				3	1	0	22.45	22±1
				3	2	0	22.43	22±1
				6	0	1	21.38	22±1
			16QAM	1	0	1	21.05	21.3±1
				1	2	1	21.04	21.3±1
				1	5	1	21.03	21.3±1
				3	0	1	20.87	21.3±1
				3	1	1	20.84	21.3±1
				3	2	1	20.82	21.3±1
				6	0	2	20.33	21.3±1

LTE Band 12:

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)	Tune up Power tolerant
10MHz	23060	704	QPSK	1	0	0	22.57	22±1
				1	24	0	22.46	22±1
				1	49	0	22.29	22±1
				25	0	1	21.35	22±1
				25	12	1	21.34	22±1
				25	24	1	21.39	22±1
				50	0	1	21.22	22±1
			16QAM	1	0	1	21.05	20.3±1
				1	24	1	20.98	20.3±1
				1	49	1	20.88	20.3±1
				25	0	2	20.65	20.3±1
				25	12	2	20.64	20.3±1
				25	24	2	20.63	20.3±1
				50	0	2	20.27	20.3±1
	23095	707.5	QPSK	1	0	0	22.29	22±1
				1	24	0	22.30	22±1
				1	49	0	22.38	22±1
				25	0	1	21.21	22±1
				25	12	1	21.19	22±1
				25	24	1	21.10	22±1
				50	0	1	21.07	22±1
			16QAM	1	0	1	20.93	21.3±1
				1	24	1	21.02	21.3±1
				1	49	1	21.09	21.3±1
				25	0	2	20.65	21.3±1
				25	12	2	20.63	21.3±1
				25	24	2	20.68	21.3±1
				50	0	2	20.42	21.3±1
	23130	711	QPSK	1	0	0	22.04	21.3±1
				1	24	0	21.85	21.3±1
				1	49	0	21.65	21.3±1
				25	0	1	21.30	21.3±1
				25	12	1	21.36	21.3±1
				25	24	1	21.42	21.3±1
				50	0	1	21.01	21.3±1
			16QAM	1	0	1	21.65	21.3±1
				1	24	1	21.47	21.3±1
				1	49	1	21.25	21.3±1
				25	0	2	20.77	21.3±1
				25	12	2	20.74	21.3±1
				25	24	2	20.73	21.3±1
				50	0	2	20.82	21.3±1

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)	Tune up Power tolerant
5MHz	23035	701.5	QPSK	1	0	0	22.47	22±1
				1	12	0	22.45	22±1
				1	24	0	22.41	22±1
				12	0	1	21.61	22±1
				12	6	1	21.53	22±1
				12	11	1	21.64	22±1
				25	0	1	21.32	22±1
			16QAM	1	0	1	21.41	21.3±1
				1	12	1	21.35	21.3±1
				1	24	1	21.30	21.3±1
				12	0	2	20.76	21.3±1
				12	6	2	20.75	21.3±1
				12	11	2	20.74	21.3±1
				25	0	2	20.34	21.3±1
	23095	707.5	QPSK	1	0	0	22.21	22±1
				1	12	0	22.26	22±1
				1	24	0	22.31	22±1
				12	0	1	21.16	22±1
				12	6	1	21.19	22±1
				12	11	1	21.15	22±1
				25	0	1	21.23	22±1
			16QAM	1	0	1	21.39	21.3±1
				1	12	1	21.46	21.3±1
				1	24	1	21.50	21.3±1
				12	0	2	20.85	21.3±1
				12	6	2	20.83	21.3±1
				12	11	2	20.81	21.3±1
				25	0	2	20.67	21.3±1
	23155	713.5	QPSK	1	0	0	22.43	22±1
				1	12	0	22.06	22±1
				1	24	0	21.81	22±1
				12	0	1	21.37	22±1
				12	6	1	21.56	22±1
				12	11	1	21.39	22±1
				25	0	1	21.13	22±1
			16QAM	1	0	1	21.03	21.3±1
				1	12	1	20.88	21.3±1
				1	24	1	20.51	21.3±1
				12	0	2	20.53	21.3±1
				12	6	2	20.62	21.3±1
				12	11	2	20.64	21.3±1
				25	0	2	20.56	21.3±1

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)	Tune up Power tolerant
3MHz	23025	700.5	QPSK	1	0	0	22.46	22±1
				1	7	0	22.50	22±1
				1	14	0	22.51	22±1
				8	0	1	21.57	22±1
				8	4	1	21.56	22±1
				8	7	1	21.53	22±1
				15	0	1	21.47	22±1
			16QAM	1	0	1	21.12	21.3±1
				1	7	1	21.06	21.3±1
				1	14	1	21.06	21.3±1
				8	0	2	20.46	21.3±1
				8	4	2	20.45	21.3±1
				8	7	2	20.43	21.3±1
				15	0	2	20.54	21.3±1
	23095	707.5	QPSK	1	0	0	22.19	22±1
				1	7	0	22.20	22±1
				1	14	0	22.30	22±1
				8	0	1	21.31	22±1
				8	4	1	21.35	22±1
				8	7	1	21.36	22±1
				15	0	1	21.26	22±1
			16QAM	1	0	1	20.84	20.3±1
				1	7	1	20.88	20.3±1
				1	14	1	20.95	20.3±1
				8	0	2	20.24	20.3±1
				8	4	2	20.23	20.3±1
				8	7	2	20.25	20.3±1
				15	0	2	20.29	20.3±1
	23025	714.5	QPSK	1	0	0	22.06	21.3±1
				1	7	0	22.00	21.3±1
				1	14	0	21.60	21.3±1
				8	0	1	20.98	21.3±1
				8	4	1	20.95	21.3±1
				8	7	1	20.93	21.3±1
				15	0	1	20.98	21.3±1
			16QAM	1	0	1	21.72	21.3±1
				1	7	1	21.70	21.3±1
				1	14	1	21.26	21.3±1
				8	0	2	20.92	21.3±1
				8	4	2	20.96	21.3±1
				8	7	2	20.95	21.3±1
				15	0	2	20.79	21.3±1

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)	Tune up Power tolerant
1.4MHz	23017	699.7	QPSK	1	0	0	22.47	22±1
				1	2	0	22.46	22±1
				1	5	0	22.00	22±1
				3	0	0	22.54	22±1
				3	1	0	**22.59**	22±1
				3	2	0	22.53	22±1
				6	0	1	21.65	22±1
			16QAM	1	0	1	20.98	21.3±1
				1	2	1	21.16	21.3±1
				1	5	1	21.12	21.3±1
				3	0	1	20.75	21.3±1
				3	1	1	20.73	21.3±1
				3	2	1	20.78	21.3±1
				6	0	2	20.46	21.3±1
	23095	707.5	QPSK	1	0	0	22.10	21.3±1
				1	2	0	22.05	21.3±1
				1	5	0	22.03	21.3±1
				3	0	0	22.11	21.3±1
				3	1	0	22.15	21.3±1
				3	2	0	22.13	21.3±1
				6	0	1	21.18	21.3±1
			16QAM	1	0	1	20.79	21.3±1
				1	2	1	20.76	21.3±1
				1	5	1	20.78	21.3±1
				3	0	1	20.78	21.3±1
				3	1	1	20.79	21.3±1
				3	2	1	20.76	21.3±1
				6	0	2	20.57	21.3±1
	23173	715.3	QPSK	1	0	0	21.84	21.3±1
				1	2	0	21.79	21.3±1
				1	5	0	21.74	21.3±1
				3	0	0	21.91	21.3±1
				3	1	0	21.93	21.3±1
				3	2	0	21.86	21.3±1
				6	0	1	20.91	21.3±1
			16QAM	1	0	1	20.32	21.3±1
				1	2	1	21.24	21.3±1
				1	5	1	21.19	21.3±1
				3	0	1	20.52	21.3±1
				3	1	1	21.13	21.3±1
				3	2	1	21.13	21.3±1
				6	0	2	20.92	21.3±1

LTE Band 17:

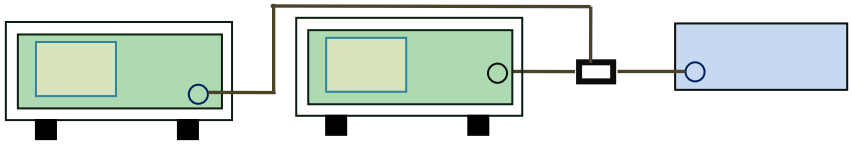
BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)	Tune up Power tolerant
10MHz	23780	709.0	QPSK	1	0	0	22.27	22±1
				1	24	0	22.25	22±1
				1	49	0	22.25	22±1
				25	0	1	21.06	22±1
				25	12	1	21.05	22±1
				25	24	1	21.03	22±1
				50	0	1	21.05	22±1
			16QAM	1	0	1	20.77	21.3±1
				1	24	1	20.77	21.3±1
				1	49	1	20.78	21.3±1
				25	0	2	20.46	21.3±1
				25	12	2	20.48	21.3±1
				25	24	2	20.43	21.3±1
				50	0	2	21.07	21.3±1
	23790	701.0	QPSK	1	0	0	22.05	21.3±1
				1	24	0	22.09	21.3±1
				1	49	0	22.11	21.3±1
				25	0	1	21.21	21.3±1
				25	12	1	21.22	21.3±1
				25	24	1	21.23	21.3±1
				50	0	1	21.10	21.3±1
			16QAM	1	0	1	20.64	21.3±1
				1	24	1	20.66	21.3±1
				1	49	1	20.73	21.3±1
				25	0	2	20.48	21.3±1
				25	12	2	20.48	21.3±1
				25	24	2	20.41	21.3±1
				50	0	2	21.19	21.3±1
	23800	711.0	QPSK	1	0	0	22.10	21.3±1
				1	24	0	21.96	21.3±1
				1	49	0	21.68	21.3±1
				25	0	1	21.10	21.3±1
				25	12	1	21.14	21.3±1
				25	24	1	21.45	21.3±1
				50	0	1	20.98	21.3±1
			16QAM	1	0	1	21.71	21.3±1
				1	24	1	21.56	21.3±1
				1	49	1	21.30	21.3±1
				25	0	2	20.59	21.3±1
				25	12	2	20.56	21.3±1
				25	24	2	20.51	21.3±1
				50	0	2	21.14	21.3±1

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)	Tune up Power tolerant
5MHz	23755	706.5	QPSK	1	0	0	22.36	22±1
				1	12	0	22.35	22±1
				1	24	0	22.35	22±1
				12	0	1	21.13	22±1
				12	6	1	21.15	22±1
				12	11	1	21.14	22±1
				25	0	1	21.06	22±1
			16QAM	1	0	1	21.28	21.3±1
				1	12	1	21.26	21.3±1
				1	24	1	21.27	21.3±1
				12	0	2	20.58	21.3±1
				12	6	2	20.56	21.3±1
				12	11	2	20.57	21.3±1
				25	0	2	21.11	21.3±1
	23790	710.0	QPSK	1	0	0	22.11	21.3±1
				1	12	0	22.16	21.3±1
				1	24	0	22.30	21.3±1
				12	0	1	21.21	21.3±1
				12	6	1	21.23	21.3±1
				12	11	1	21.24	21.3±1
				25	0	1	21.32	21.3±1
			16QAM	1	0	1	21.76	21.3±1
				1	12	1	21.65	21.3±1
				1	24	1	21.55	21.3±1
				12	0	2	20.56	21.3±1
				12	6	2	20.53	21.3±1
				12	11	2	20.54	21.3±1
				25	0	2	21.31	21.3±1
	23825	713.5	QPSK	1	0	0	**22.46**	21.3±1
				1	12	0	22.26	21.3±1
				1	24	0	21.73	21.3±1
				12	0	1	21.32	21.3±1
				12	6	1	21.35	21.3±1
				12	11	1	21.36	21.3±1
				25	0	1	21.07	21.3±1
			16QAM	1	0	1	21.03	21.3±1
				1	12	1	20.78	21.3±1
				1	24	1	20.49	21.3±1
				12	0	2	20.45	21.3±1
				12	6	2	20.48	21.3±1
				12	11	2	20.43	21.3±1
				25	0	2	21.20	21.3±1

6.3 Peak-Average Ratio

Temperature	23℃
Relative Humidity	59%
Atmospheric Pressure	1026mbar
Test date :	March 26, 2016
Tested By :	Winnie Zhang

Requirement(s):

Spec	Item	Requirement	Applicable
§24.232(d) § 27.50(d)	a)	The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.	☑
Test Setup			
Test Procedure	**According with KDB 971168** 1. The signal analyzer' s CCDF measurement profile is enabled 2. Frequency = carrier center frequency 3. Measurement BW > Emission bandwidth of signal 4. The signal analyzer was set to collect one million samples to generate the CCDF curve 5. The measurement interval was set depending on the type of signal analyzed. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms. For burst transmissions, the spectrum analyzer is set to use an internal " RF Burst" trigger that is synced with an incoming pulse and the measurement interval is set to less than the duration of the " on time" of one burst to ensure that energy is only captured during a time in which the transmitter is operating at maximum power		
Remark			
Result	☑ Pass ☐ Fail		

Test Data ☑ Yes ☐ N/A

Test Plot ☐ Yes (See below) ☑ N/A

LTE Band 2 (part 24E)

BW(MHz)	Frequency (MHz)	Mode	Modulation	Conducted Power (dBm)		Peak-Average Ratio (PAR)
				Peak	Average	
1.4	1880	RB 1/0	QPSK	25.43	21.97	2.30
			16QAM	25.53	20.57	2.31
3	1880	RB 1/0	QPSK	25.34	21.88	1.77
			16QAM	25.24	20.6	3.03
5	1880	RB 1/0	QPSK	25	21.64	2.01
			16QAM	47	20.91	2.71
10	1880	RB 1/0	QPSK	25.43	21.79	2.22
			16QAM	25.36	20.58	3.52
15	1880	RB 1/0	QPSK	25.36	21.64	2.37
			16QAM	25.39	21.36	3.37
20	1880	RB 1/0	QPSK	25.43	22.00	2.03
			16QAM	25.46	21.46	3.17

LTE Band 4 (part 27)

BW(MHz)	Frequency (MHz)	Mode	Modulation	Conducted Power (dBm)		Peak-Average Ratio (PAR)
				Peak	Average	
1.4	1732.5	RB 1/0	QPSK	25.63	22.21	2.96
			16QAM	25.34	20.78	3.44
3	1732.5	RB 1/0	QPSK	25.46	22.07	3.06
			16QAM	25.42	20.74	3.37
5	1732.5	RB 1/0	QPSK	25.39	21.72	3.23
			16QAM	25.38	20.73	2.75
10	1732.5	RB 1/0	QPSK	25.48	21.87	3.85
			16QAM	25.47	20.57	3.22
15	1732.5	RB 1/0	QPSK	25.41	21.68	2.9
			16QAM	25.39	20.66	3.17
20	1732.5	RB 1/0	QPSK	25.46	21.55	3.86
			16QAM	25.43	20.88	3.98

LTE Band 5 (part 27)

BW(MHz)	Frequency (MHz)	Mode	Modulation	Conducted Power (dBm)		Peak-Average Ratio (PAR)
				Peak	Average	
1.4	836.5	RB 1/0	QPSK	25.36	22.48	1.89
			16QAM	25.46	21.12	2.78
3	836.5	RB 1/0	QPSK	25.44	22.39	1.91
			16QAM	25.42	21.09	2.97
5	836.5	RB 1/0	QPSK	25.42	22.39	1.74
			16QAM	25.48	21.59	2.32
10	836.5	RB 1/0	QPSK	25.44	22.36	1.74
			16QAM	25.35	21.02	2.39

LTE Band 12 (part 27)

BW(MHz)	Frequency (MHz)	Mode	Modulation	Conducted Power (dBm)		Peak-Average Ratio (PAR)
				Peak	Average	
1.4	707.5	RB 1/0	QPSK	25.63	22.1	1.89
			16QAM	25.46	20.79	2.78
3	707.5	RB 1/0	QPSK	25.62	22.19	1.91
			16QAM	25.53	20.87	2.97
5	707.5	RB 1/0	QPSK	25.13	22.21	1.74
			16QAM	25.47	21.39	2.32
10	707.5	RB 1/0	QPSK	25.64	22.29	1.74
			16QAM	25.39	20.93	2.39

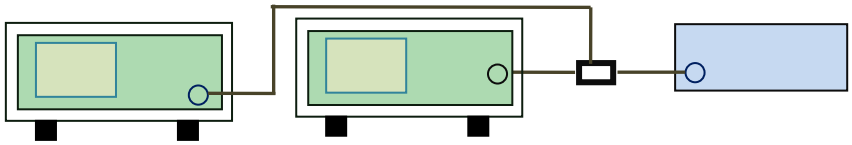
LTE Band 17 (part 27)

BW(MHz)	Frequency (MHz)	Mode	Modulation	Conducted Power (dBm)		Peak-Average Ratio (PAR)
				Peak	Average	
5	710	RB 1/0	QPSK	25.45	22.11	1.63
			16QAM	25.48	21.76	2.85
10	710	RB 1/0	QPSK	25.35	22.05	2.14
			16QAM	25.47	20.64	2.95

6.4 Occupied Bandwidth

Temperature	23℃
Relative Humidity	59%
Atmospheric Pressure	1026mbar
Test date :	March 26&28&29, 2016
Tested By :	Winnie Zhang

Requirement(s):

Spec	Item	Requirement	Applicable
§2.1049, §22.917, §22.905 §24.238 §27.53(a)	a)	99% Occupied Bandwidth(kHz)	☑
	b)	26 dB Bandwidth(kHz)	☑
Test Setup			
Test Procedure	- The EUT was connected to Spectrum Analyzer and Base Station via power divider. - The 99% and 26 dB occupied bandwidth (BW) of the middle channel for the highest RF powers.		
Remark			
Result	☑ Pass ☐ Fail		

Test Data ☑ Yes ☐ N/A

Test Plot ☑ Yes (See below) ☐ N/A

LTE Band 2 (Part 24E)

BW(MHz)	Channel	Frequency (MHz)	Modulation	99% Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
1.4	18607	1850.7	16QAM	1.1067	1.327
			QPSK	1.1045	1.335
1.4	18900	1880	16QAM	1.1036	1.321
			QPSK	1.1018	1.318
1.4	19193	1909.3	16QAM	1.1077	1.342
			QPSK	1.1011	1.353
3	18615	1851.5	16QAM	2.7400	3.141
			QPSK	2.7424	3.114
3	18900	1880	16QAM	2.7308	3.113
			QPSK	2.7349	3.123
3	19185	1908.5	16QAM	2.7560	3.183
			QPSK	2.7502	3.140
5	18625	1852.5	16QAM	4.5083	5.073
			QPSK	4.5012	5.056
5	18900	1880	16QAM	4.4945	5.079
			QPSK	4.5059	5.060
5	19175	1907.5	16QAM	4.5078	5.081
			QPSK	4.5010	5.023
10	18650	1855	16QAM	9.0460	10.084
			QPSK	9.0257	9.980
10	18900	1880	16QAM	9.0542	10.121
			QPSK	9.0054	10.134
10	19150	1905	16QAM	9.0465	10.240
			QPSK	9.0936	10.227
15	18675	1857.5	16QAM	13.4096	14.830
			QPSK	13.4439	14.852
15	18900	1880	16QAM	13.4171	14.903
			QPSK	13.4114	14.890
15	19125	1902.5	16QAM	13.4732	14.914
			QPSK	13.4590	14.904

20	18700	1860	16QAM	17.8284	19.505
			QPSK	17.8631	19.350
20	18900	1880	16QAM	17.8888	19.486
			QPSK	17.8471	19.587
20	19100	1900	16QAM	17.8447	19.271
			QPSK	17.8308	19.370

LTE Band 4 (Part 27)

BW(MHz)	Channel	Frequency (MHz)	Modulation	99% Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
1.4	19957	1710.7	16QAM	1.0971	1.315
			QPSK	1.0921	1.296
1.4	20175	1732.5	16QAM	1.0955	1.347
			QPSK	1.0968	1.308
1.4	20393	1754.3	16QAM	1.1021	1.301
			QPSK	1.1045	1.313
3	19965	1711.5	16QAM	2.7400	3.127
			QPSK	2.7312	3.154
3	20175	1732.5	16QAM	2.7545	3.171
			QPSK	2.7438	3.164
3	20385	1753.5	16QAM	2.7620	3.140
			QPSK	2.7740	3.144
5	19975	1712.5	16QAM	4.5011	5.105
			QPSK	4.5142	5.063
5	20175	1732.5	16QAM	4.5034	4.994
			QPSK	4.5060	5.129
5	20375	1752.5	16QAM	4.5091	5.077
			QPSK	4.5101	5.061
10	20000	1715	16QAM	9.0387	10.156
			QPSK	9.0401	10.227
10	20175	1732.5	16QAM	9.0716	10.179
			QPSK	9.0657	9.995
10	20350	1750	16QAM	9.0534	10.135
			QPSK	9.0569	10.036

15	20025	1717.5	16QAM	13.4216	14.757
			QPSK	13.4175	14.837
15	20175	1732.5	16QAM	13.4854	14.808
			QPSK	13.4634	14.958
15	20325	1747.5	16QAM	13.4535	14.886
			QPSK	13.4296	14.631
20	20050	1720	16QAM	17.8573	19.273
			QPSK	17.8518	19.389
20	20175	1732.5	16QAM	17.9143	19.561
			QPSK	17.8965	19.278
20	20300	1745	16QAM	17.8461	19.219
			QPSK	17.8308	19.209

LTE Band 5 (Part 22H)

BW(MHz)	Channel	Frequency (MHz)	Modulation	99% Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
1.4	20407	824.7	16QAM	1.1094	1.312
			QPSK	1.0936	1.322
1.4	20525	936.5	16QAM	1.0962	1.326
			QPSK	1.1000	1.341
1.4	20643	949.3	16QAM	1.0950	1.311
			QPSK	1.0933	1.320
3	20415	825.5	16QAM	2.7339	3.170
			QPSK	2.7412	3.128
3	20525	936.5	16QAM	2.7356	3.176
			QPSK	2.7369	3.150
3	20635	847.5	16QAM	2.7398	3.152
			QPSK	2.7323	3.104
5	20425	826.5	16QAM	4.5002	5.019
			QPSK	4.4968	5.032
5	20525	936.5	16QAM	4.4929	5.100
			QPSK	4.4990	5.064
5	20625	846.5	16QAM	4.5106	5.034
			QPSK	4.5021	4.987

10	20450	829	16QAM	9.0440	9.998
			QPSK	9.0553	10.192
10	20525	936.5	16QAM	9.0572	10.054
			QPSK	9.0476	10.058
10	20800	844	16QAM	9.0381	9.977
			QPSK	8.9961	10.030

LTE Band 12 (Part 27)

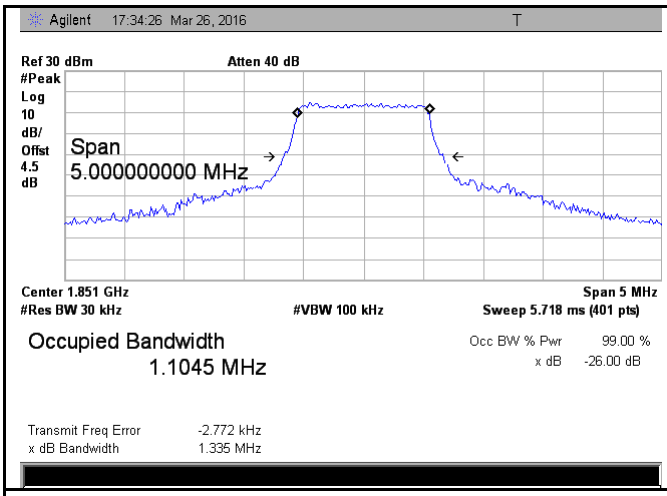
BW(MHz)	Channel	Frequency (MHz)	Modulation	99% Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
1.4	23017	699.7	16QAM	1.0959	1.296
			QPSK	1.1059	1.318
1.4	23095	707.5	16QAM	1.1036	1.325
			QPSK	1.1044	1.342
1.4	23173	715.3	16QAM	1.0905	1.316
			QPSK	1.0912	1.311
3	23025	700.5	16QAM	2.7581	3.155
			QPSK	2.7488	3.154
3	23095	707.5	16QAM	2.7409	3.150
			QPSK	2.7515	3.126
3	23165	714.5	16QAM	2.7354	3.144
			QPSK	2.7332	3.126
5	23035	701.5	16QAM	4.5286	4.992
			QPSK	4.5383	5.157
5	23095	707.5	16QAM	4.4922	4.972
			QPSK	4.4786	5.039
5	23055	713.5	16QAM	4.5311	5.071
			QPSK	4.5075	5.048
10	23060	704	16QAM	8.9806	10.109
			QPSK	9.0203	10.104
10	23095	707.5	16QAM	9.0303	10.199
			QPSK	9.0150	9.934
10	23130	711	16QAM	9.1300	10.291
			QPSK	9.1449	10.078

LTE Band 17 (Part 27)

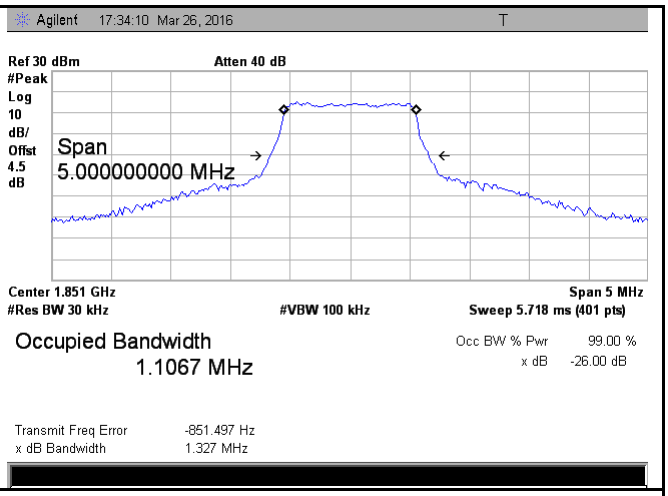
BW(MHz)	Channel	Frequency (MHz)	Modulation	99% Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
5	23755	706.5	16QAM	4.4856	5.034
			QPSK	4.4902	4.980
5	23790	710	16QAM	4.5115	5.001
			QPSK	4.5241	5.143
5	23825	713.5	16QAM	4.5188	5.099
			QPSK	4.5245	5.085
10	23780	709	16QAM	9.0279	9.957
			QPSK	9.0642	10.047
10	23790	710	16QAM	9.0662	10.053
			QPSK	9.1003	10.145
10	23800	711	16QAM	9.1217	10.106
			QPSK	9.1435	9.977

Test Plots

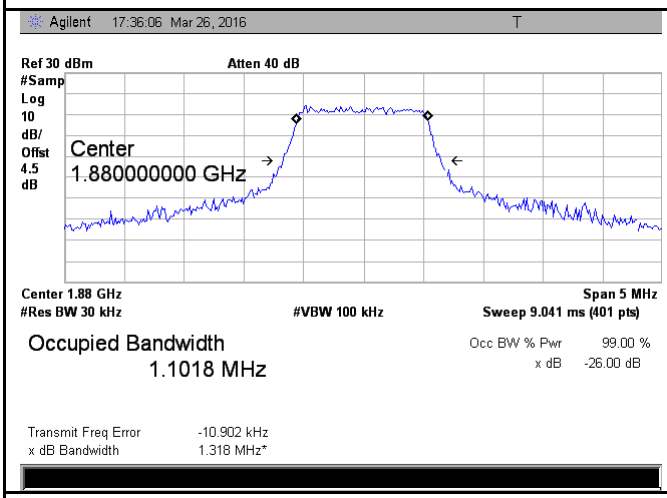
LTE Band 2 (Part 24E)



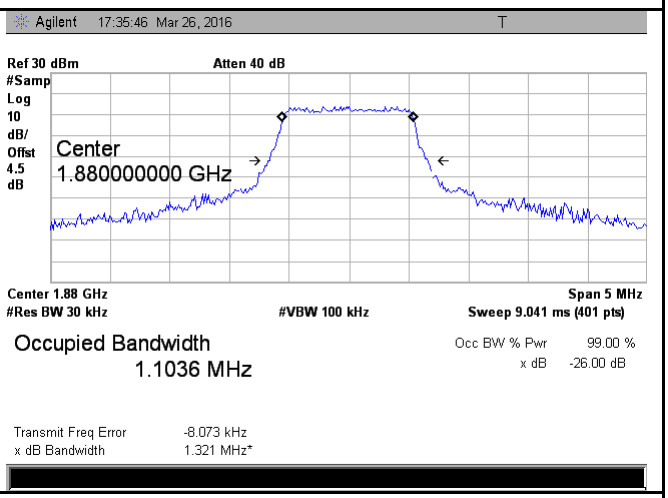
LTE band 2 - Low CH QPSK-1.4



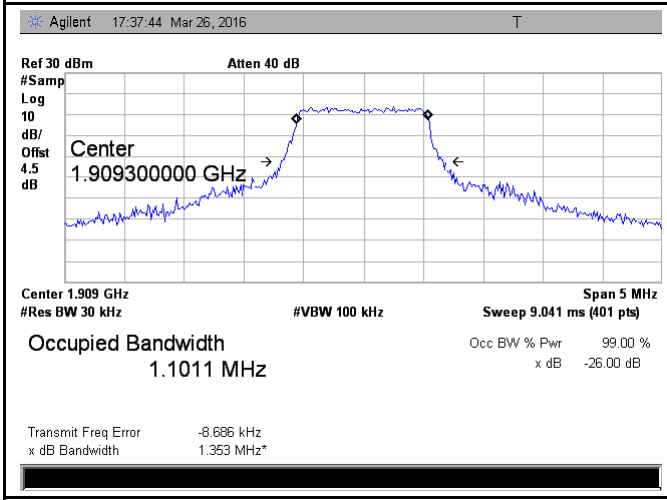
LTE band 2 - Low CH 16QAM-1.4



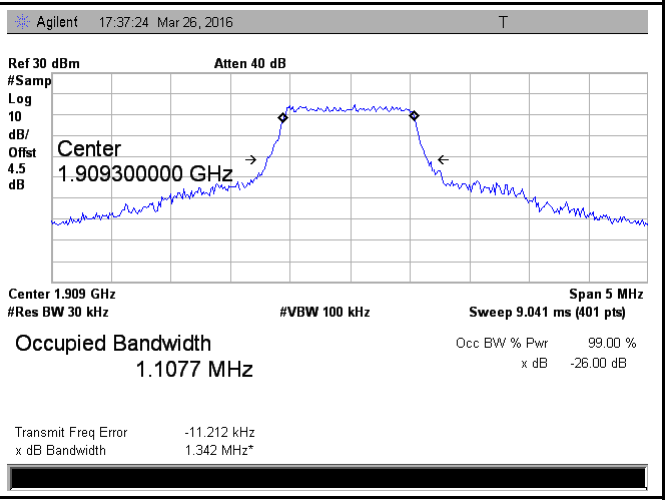
LTE band 2 - Middle CH QPSK-1.4



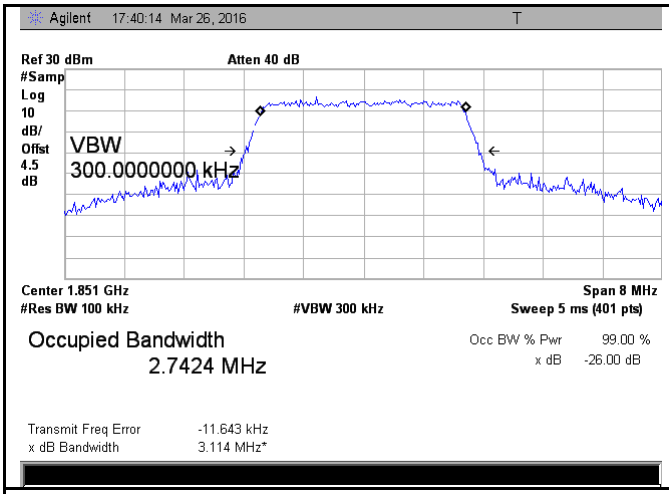
LTE band 2 - Middle CH 16QAM-1.4



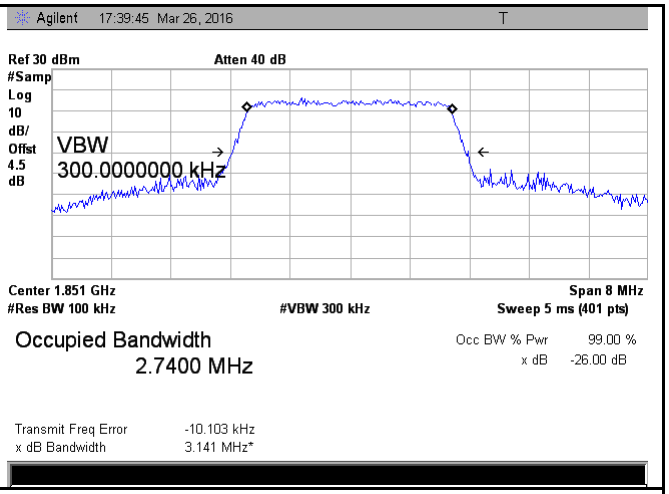
LTE band 2 - High CH QPSK-1.4



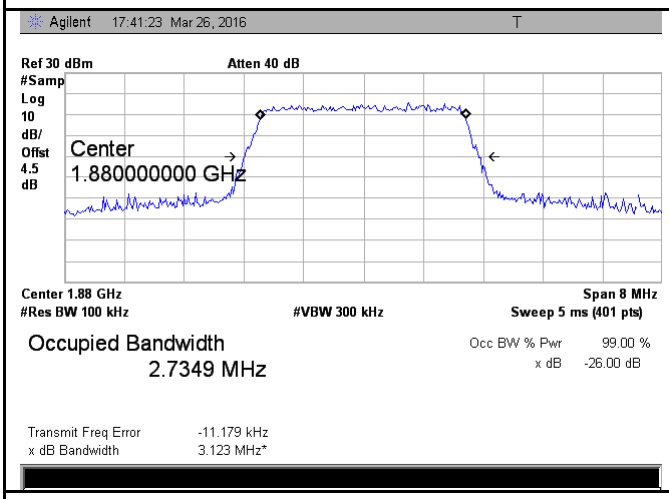
LTE band 2 - High CH 16QAM-1.4



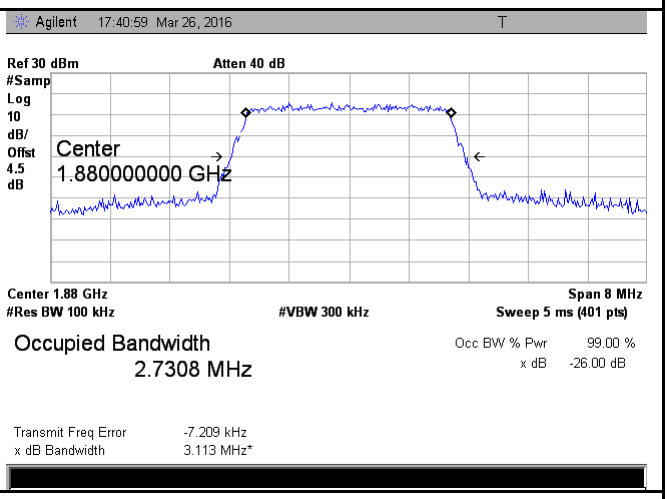
LTE band 2 - Low CH QPSK-3



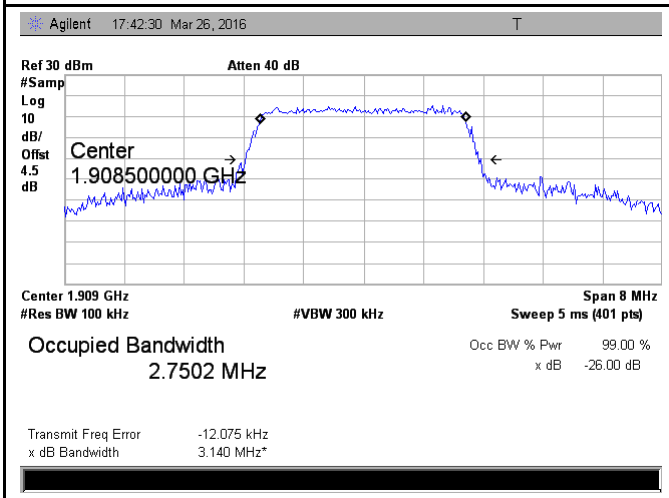
LTE band 2 - Low CH 16QAM-3



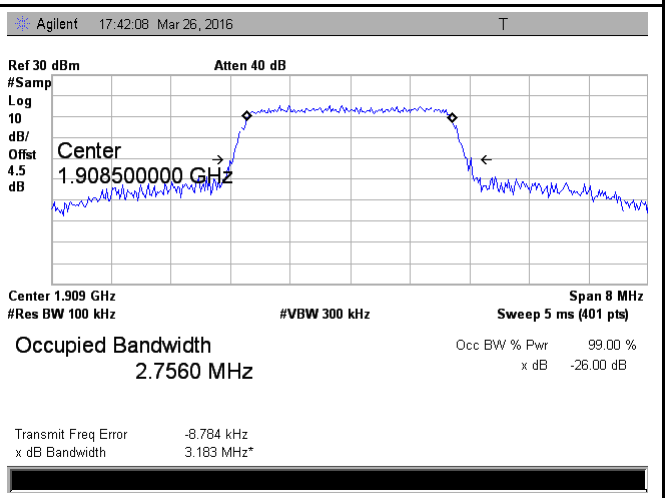
LTE band 2 - Middle CH QPSK-3



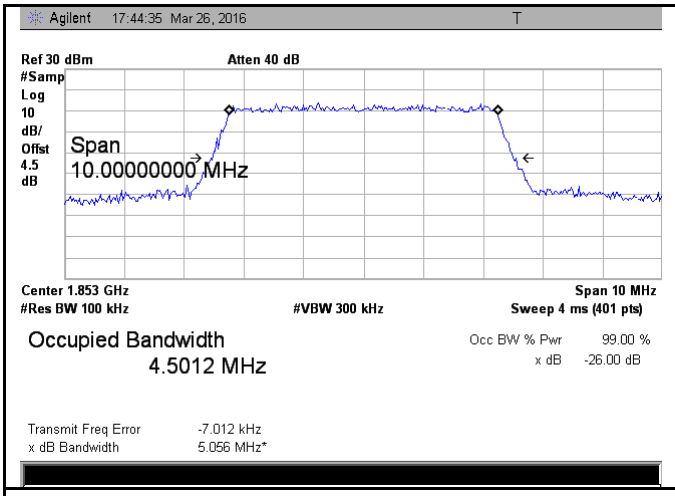
LTE band 2 - Middle CH 16QAM-3



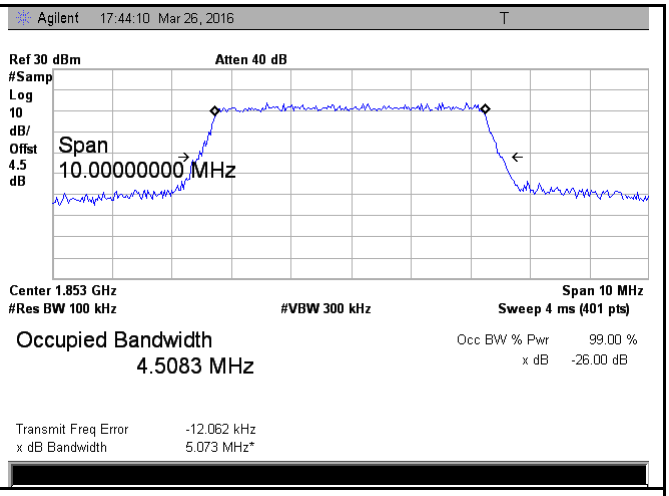
LTE band 2 - High CH QPSK-3



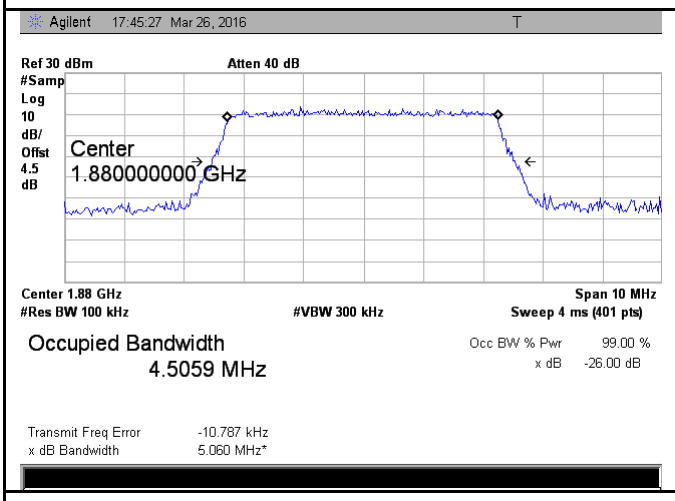
LTE band 2 - High CH 16QAM-3



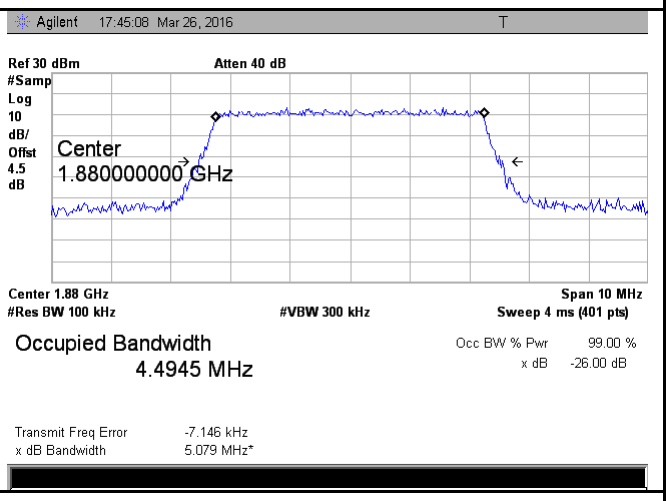
LTE band 2 - Low CH QPSK-5



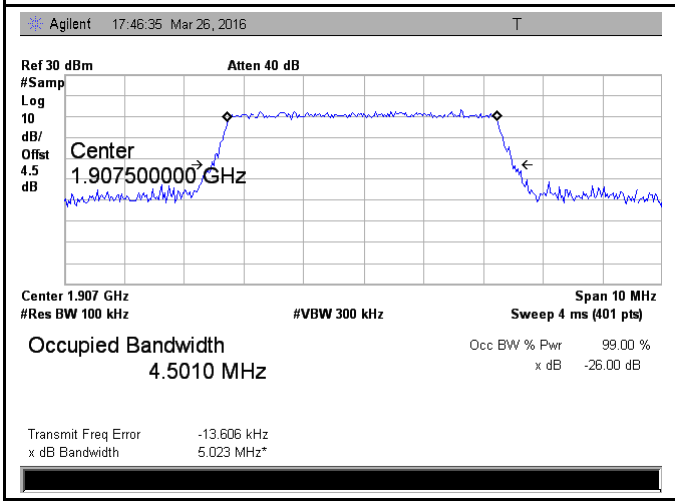
LTE band 2 - Low CH 16QAM-5



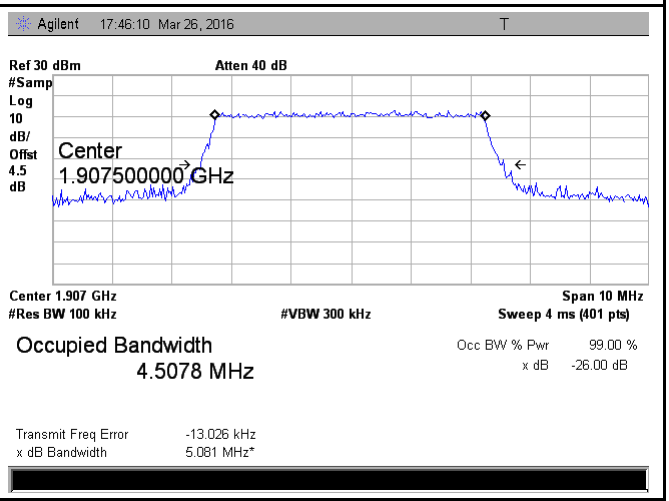
LTE band 2 - Middle CH QPSK-5



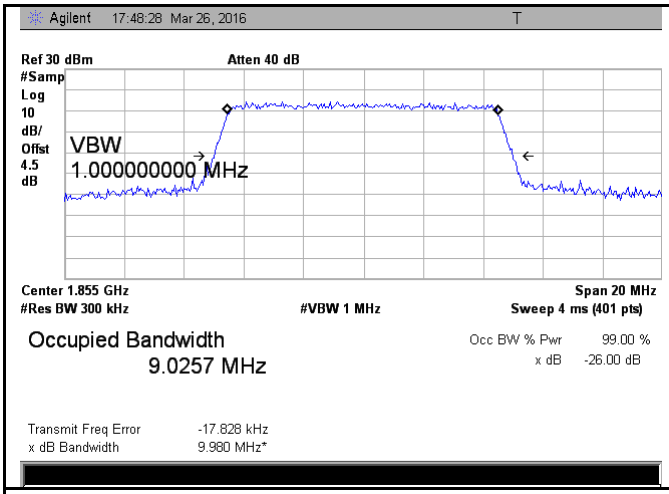
LTE band 2 - Middle CH 16QAM-5



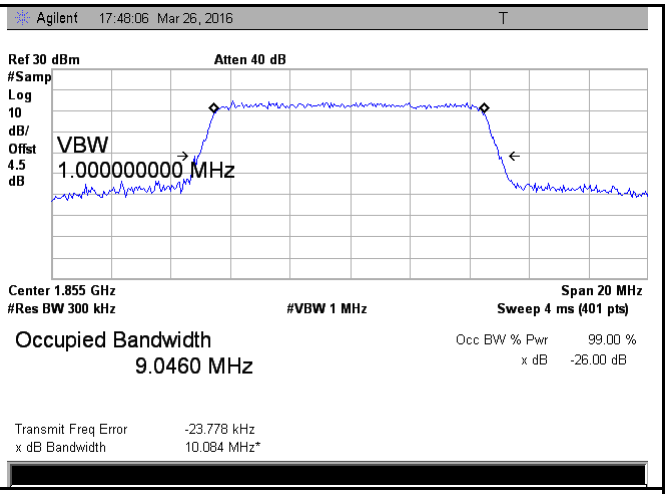
LTE band 2 - High CH QPSK-5



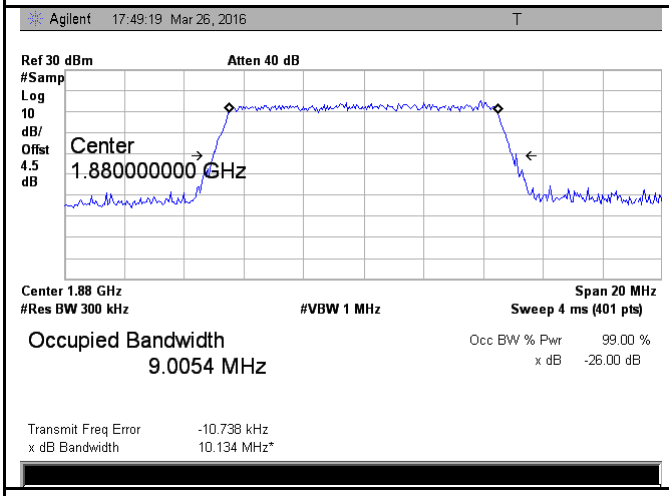
LTE band 2 - High CH 16QAM-5



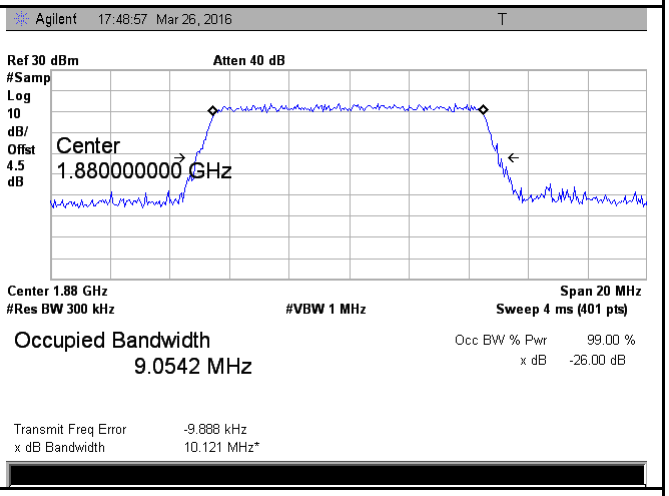
LTE band 2 - Low CH QPSK-10



LTE band 2 - Low CH 16QAM-10



LTE band 2 - Middle CH QPSK-10



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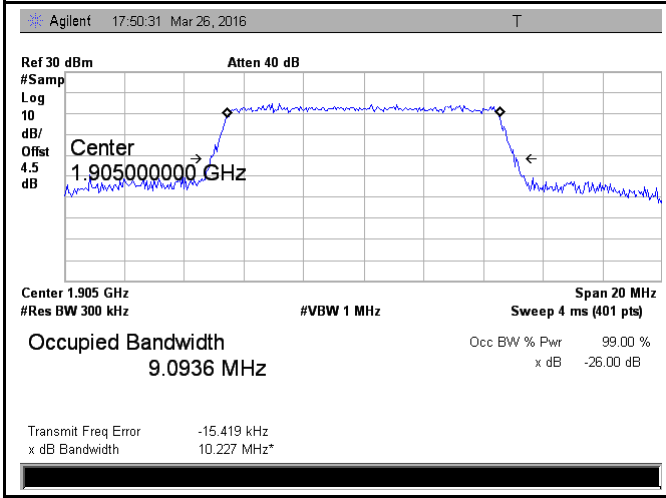
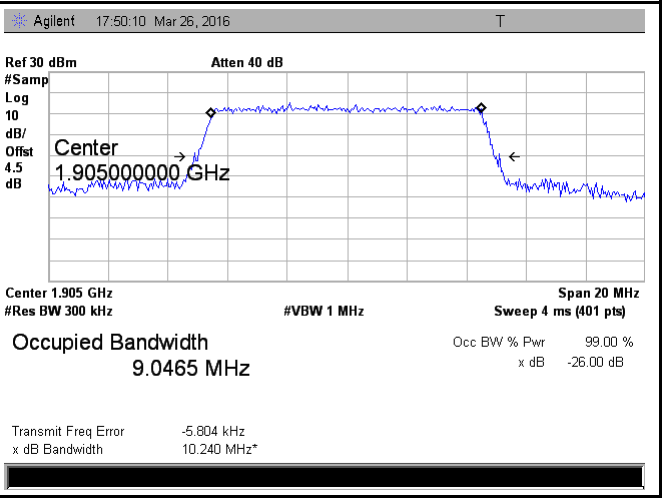


LTE band 2 - High CH QPSK-10



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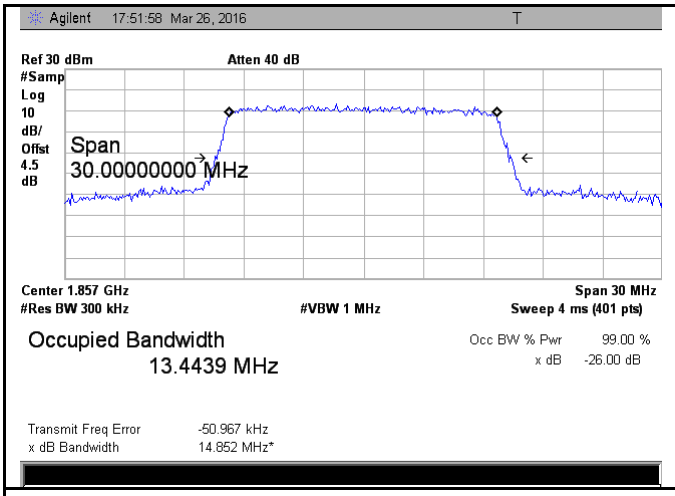
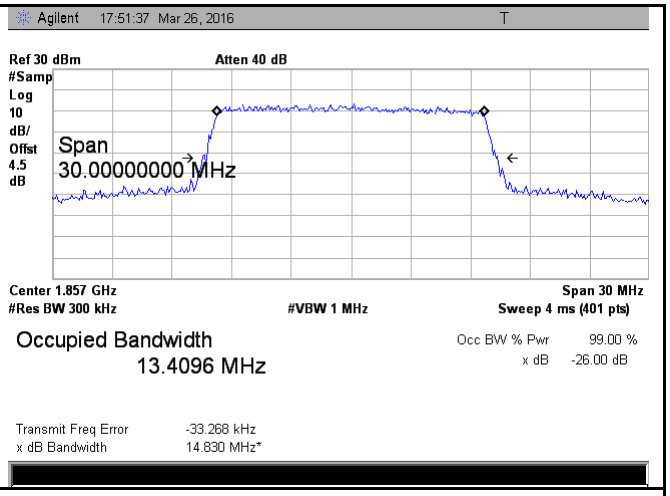
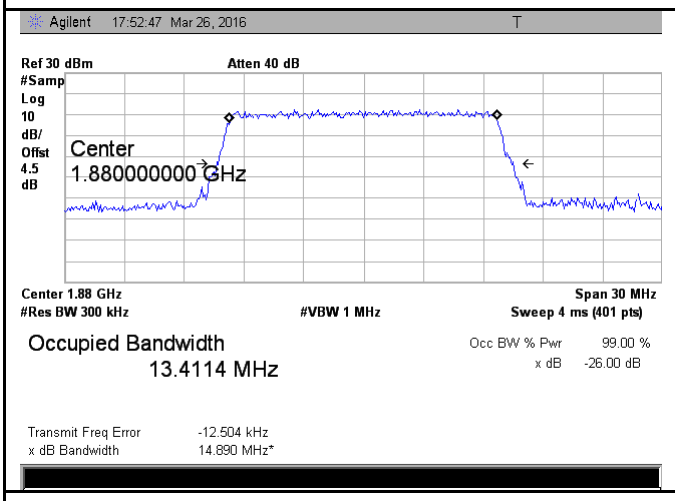


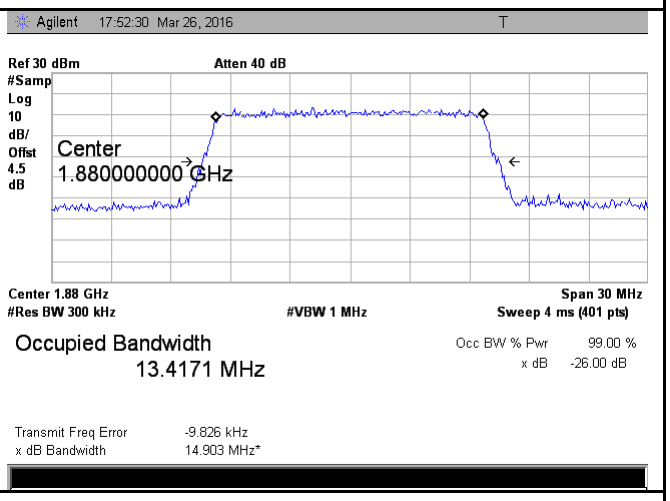
LTE band 2 - Low CH QPSK-15



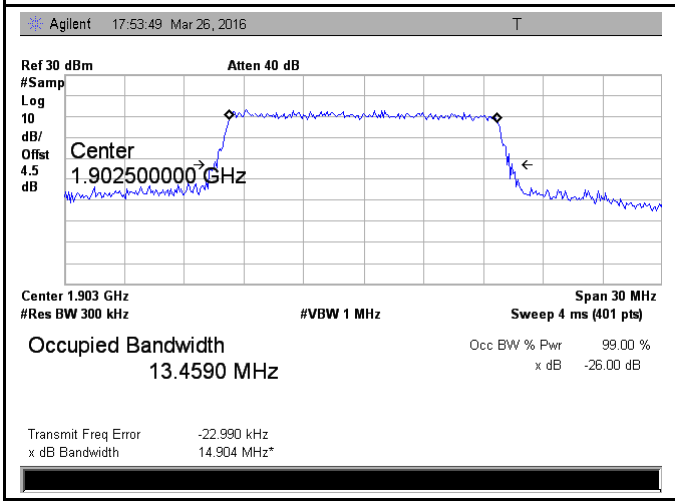
LTE band 2 - Low CH 16QAM-15



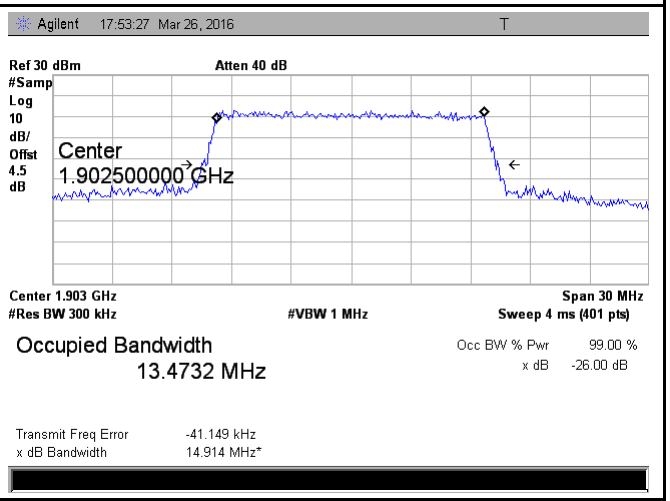
LTE band 2 - Middle CH QPSK-15



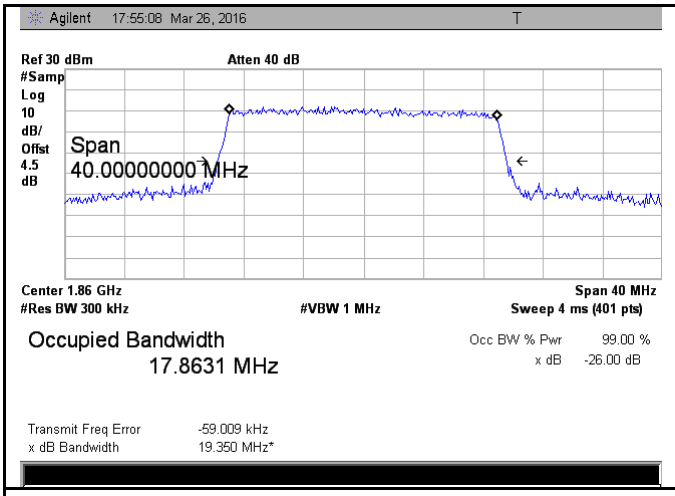
LTE band 2 - Middle CH 16QAM-15



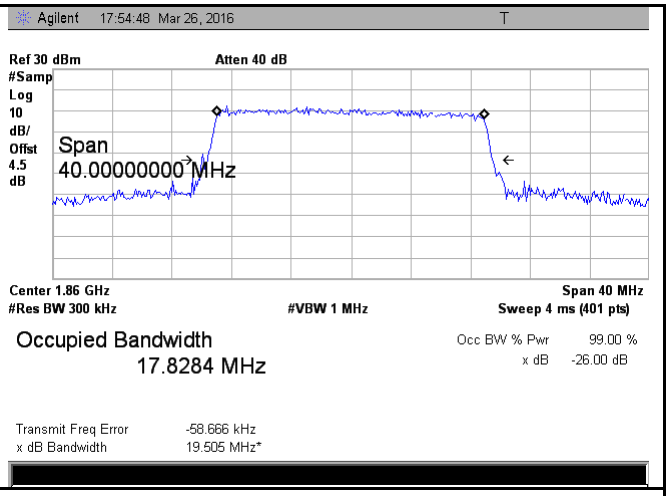
LTE band 2 - High CH QPSK-15



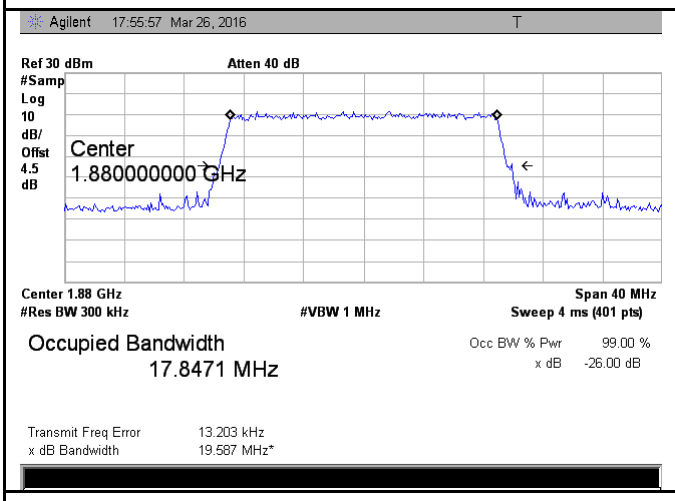
LTE band 2 - High CH 16QAM-15



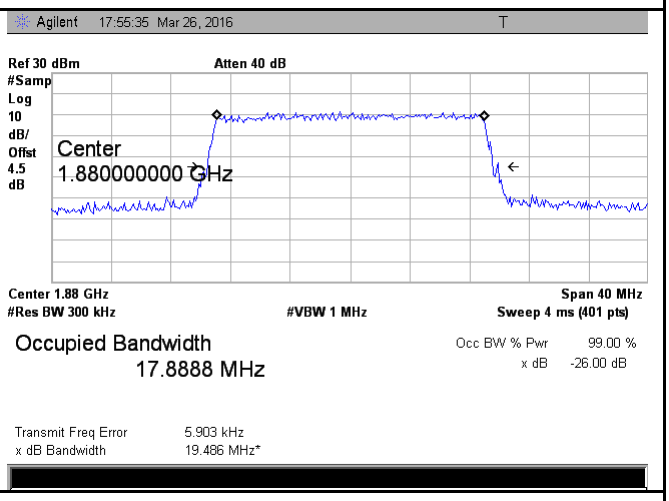
LTE band 2 - Low CH QPSK-20



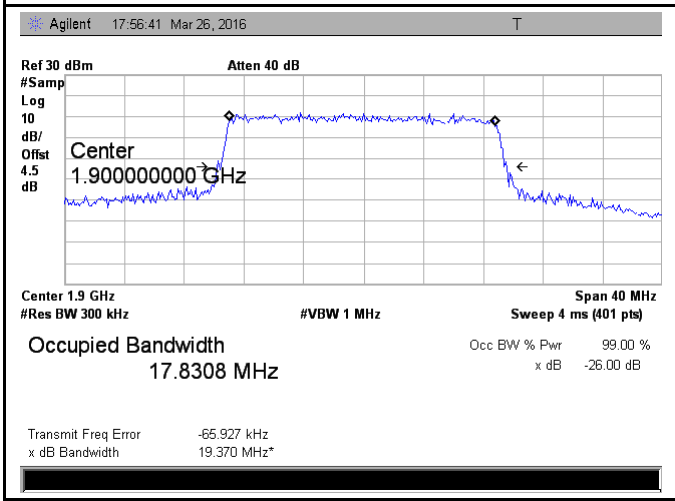
LTE band 2 - Low CH 16QAM-20



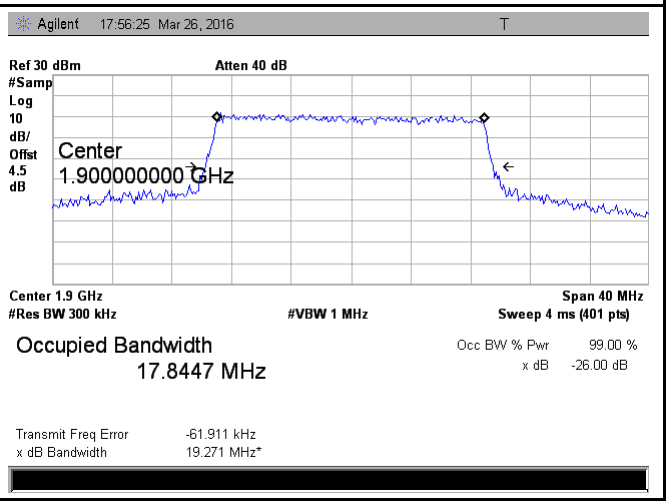
LTE band 2 - Middle CH QPSK-20



LTE band 2 - Middle CH 16QAM-20

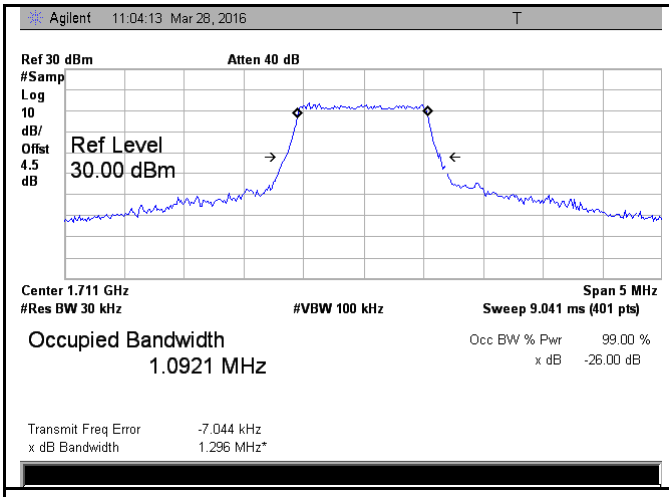


LTE band 2 - High CH QPSK-20

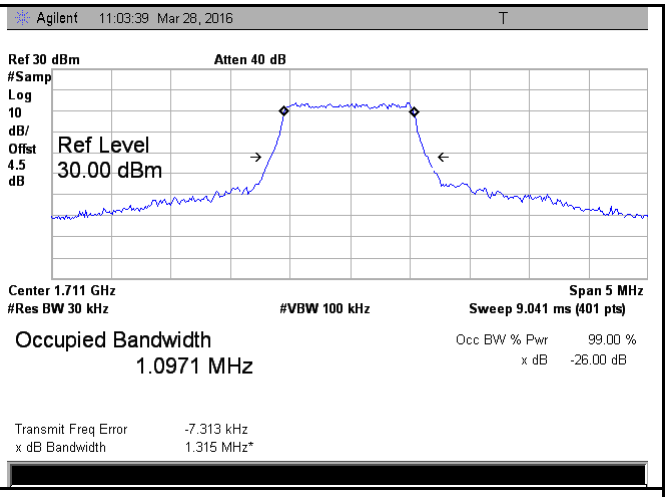


LTE band 2 - High CH 16QAM-20

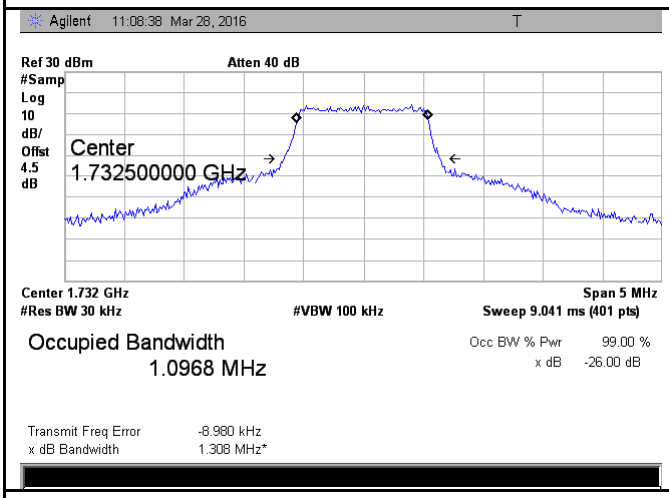
LTE Band 4 (Part 27)



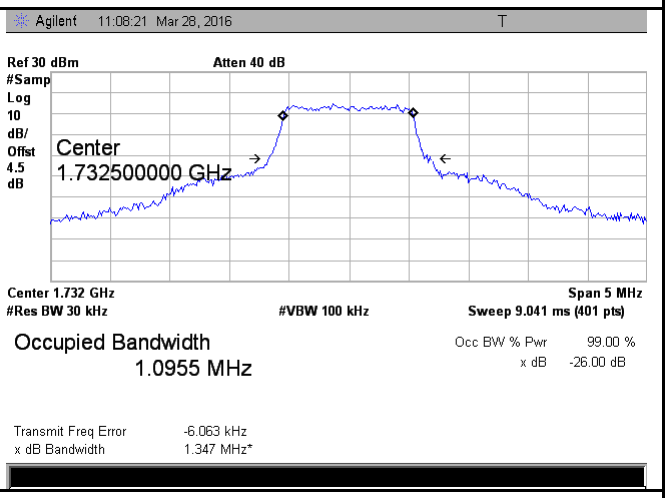
LTE band 4 - Low CH QPSK-1.4



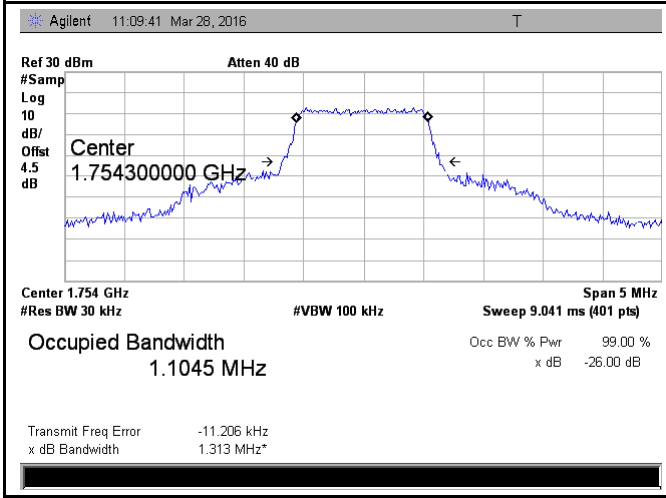
LTE band 4 - Low CH 16QAM-1.4



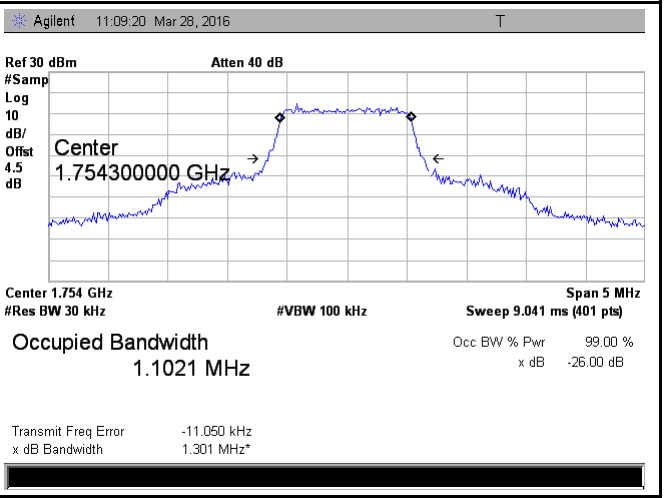
LTE band 4 - Middle CH QPSK-1.4



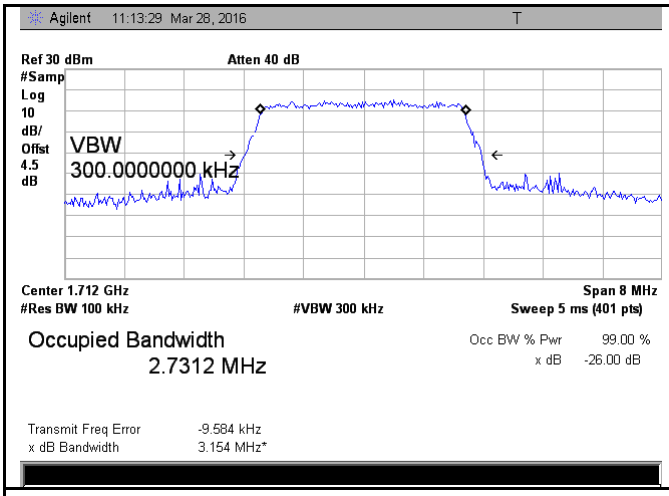
LTE band 4 - Middle CH 16QAM-1.4



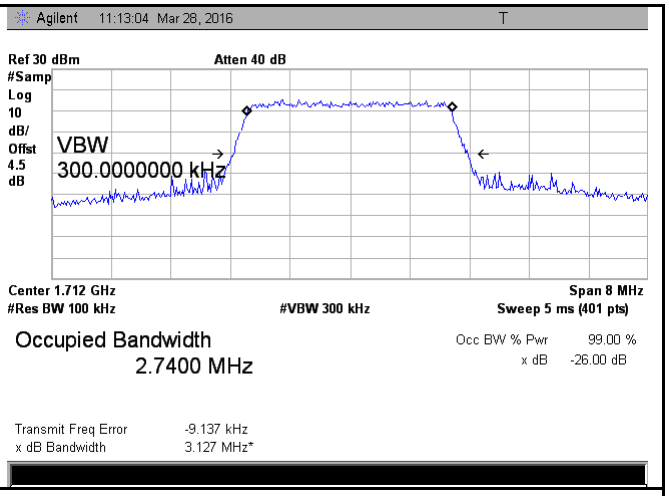
LTE band 4 - High CH QPSK-1.4



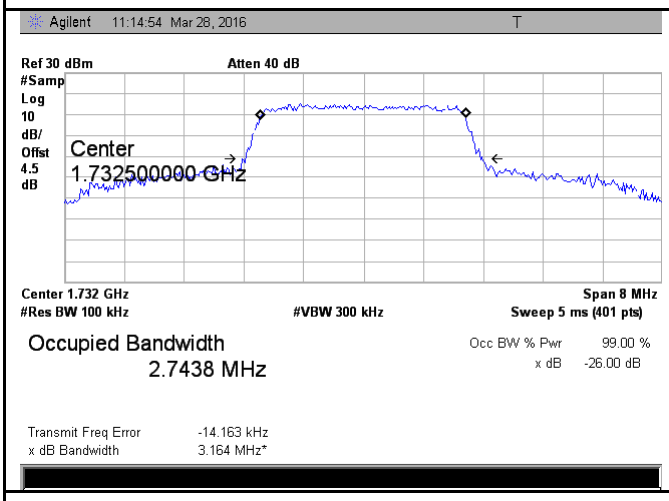
LTE band 4 - High CH 16QAM-1.4



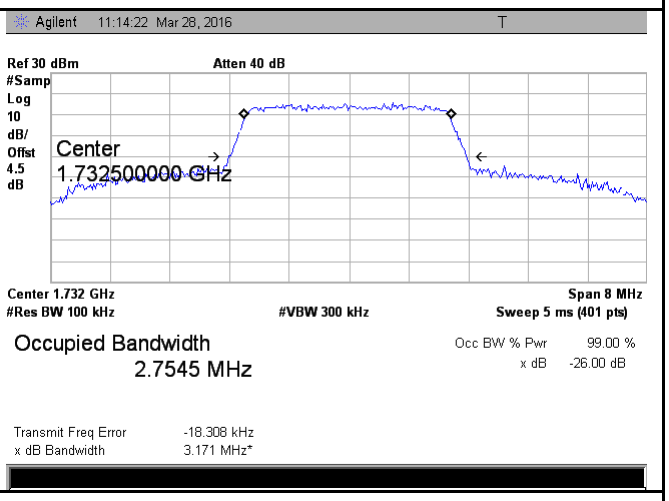
LTE band 4 - Low CH QPSK-3



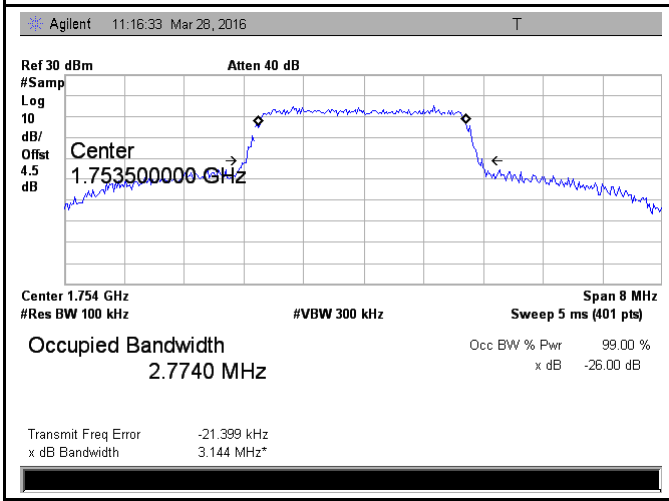
LTE band 4 - Low CH 16QAM-3



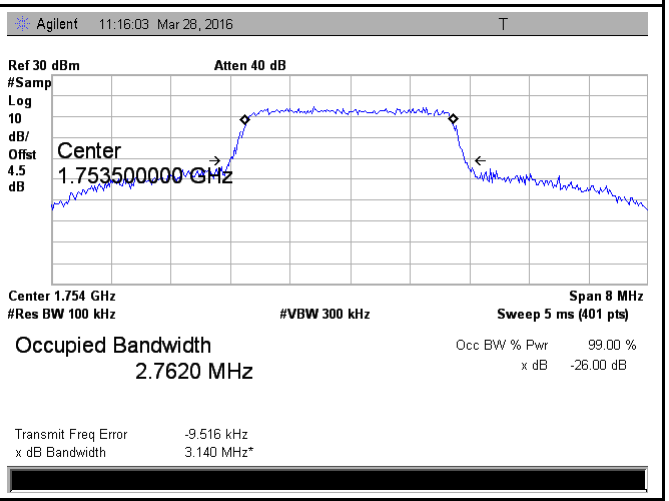
LTE band 4 - Middle CH QPSK-3



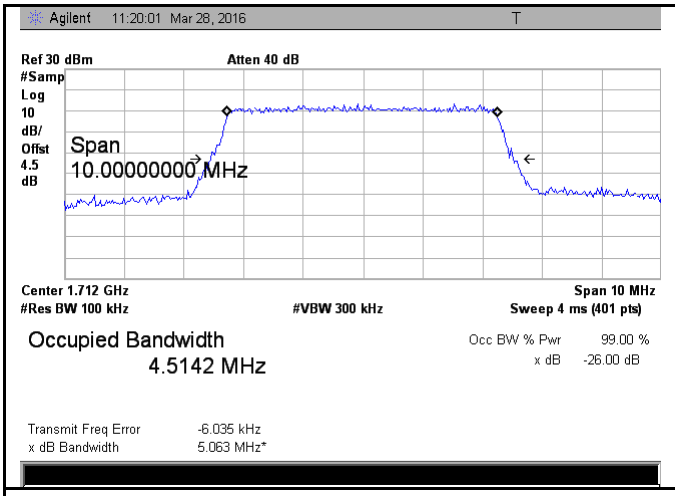
LTE band 4 - Middle CH 16QAM-3



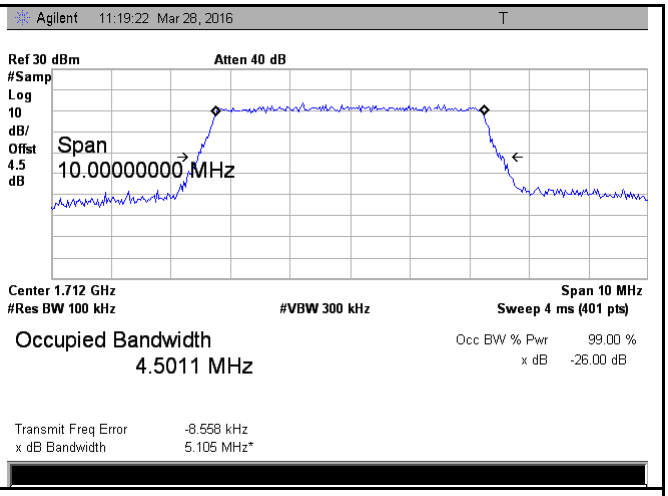
LTE band 4 - High CH QPSK-3



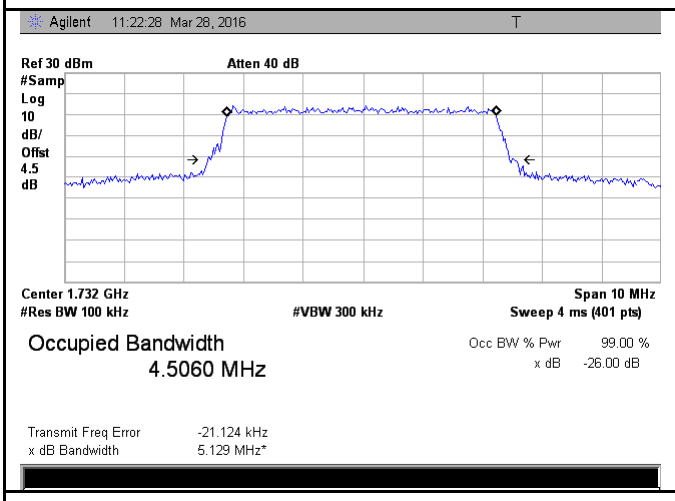
LTE band 4 - High CH 16QAM-3



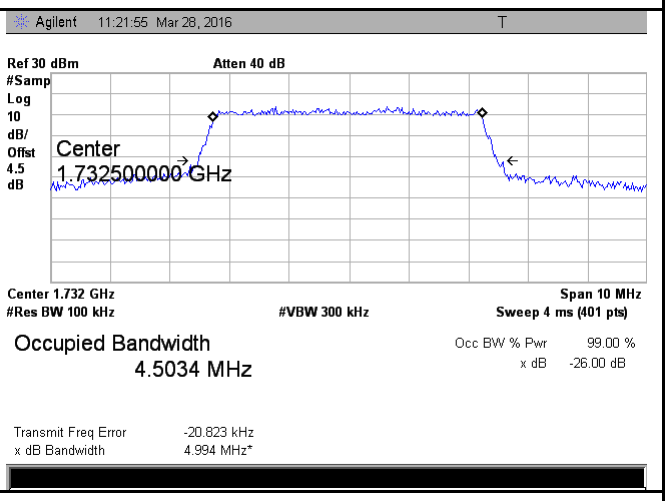
LTE band 4 - Low CH QPSK-5



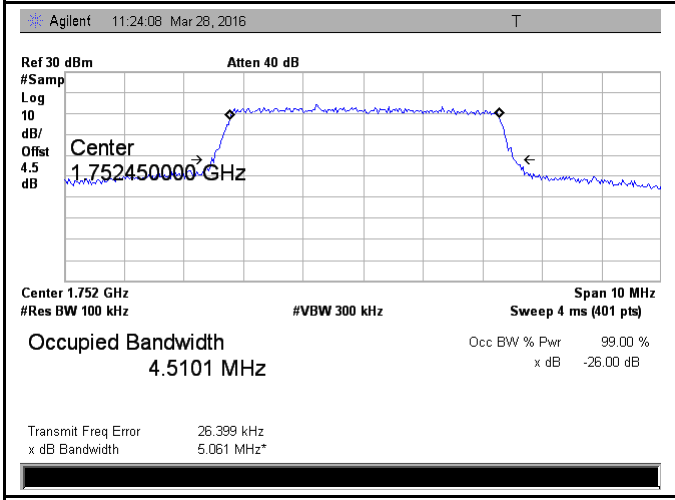
LTE band 4 - Low CH 16QAM-5



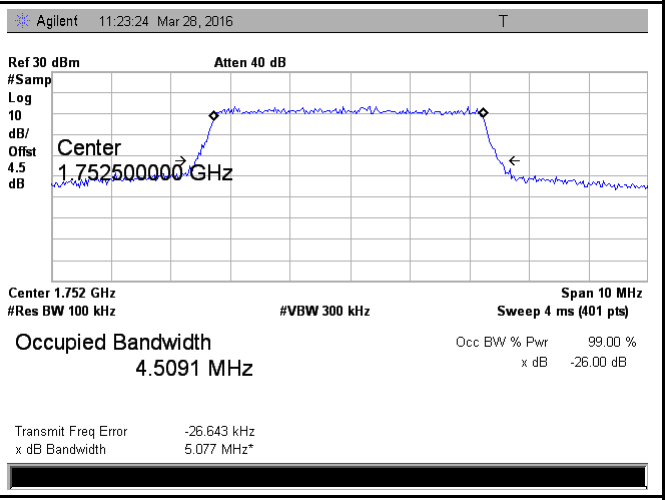
LTE band 4 - Middle CH QPSK-5



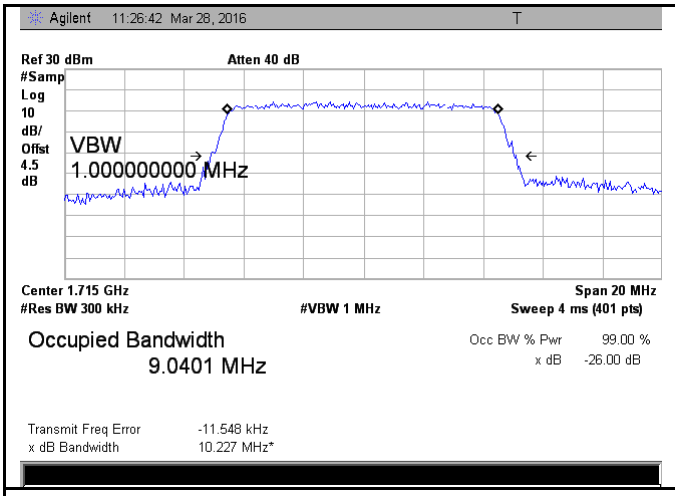
LTE band 4 - Middle CH 16QAM-5



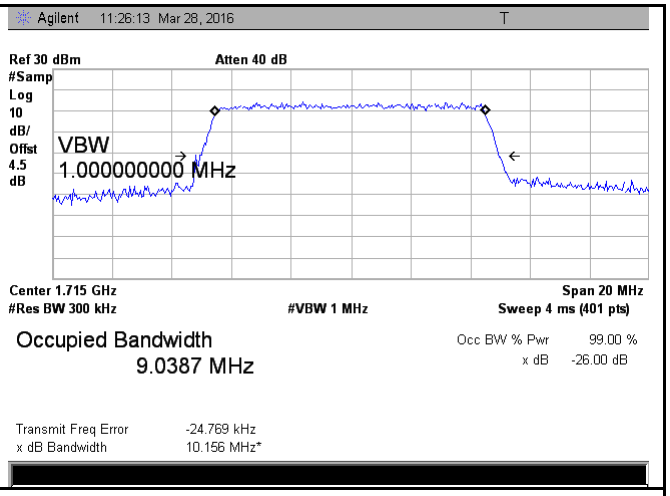
LTE band 4 - High CH QPSK-5



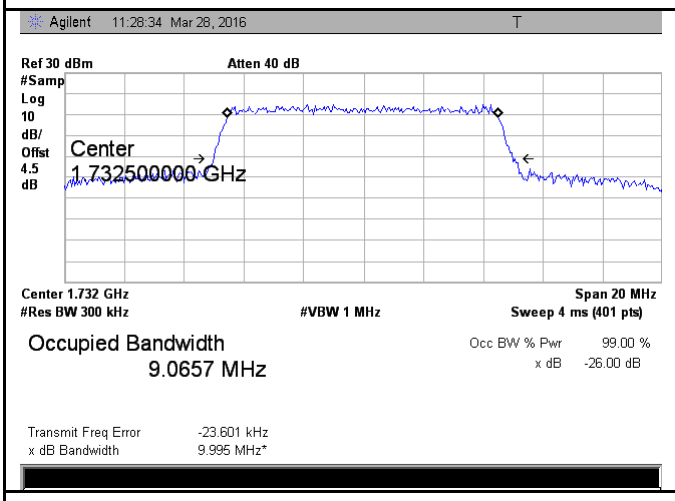
LTE band 4 - High CH 16QAM-5



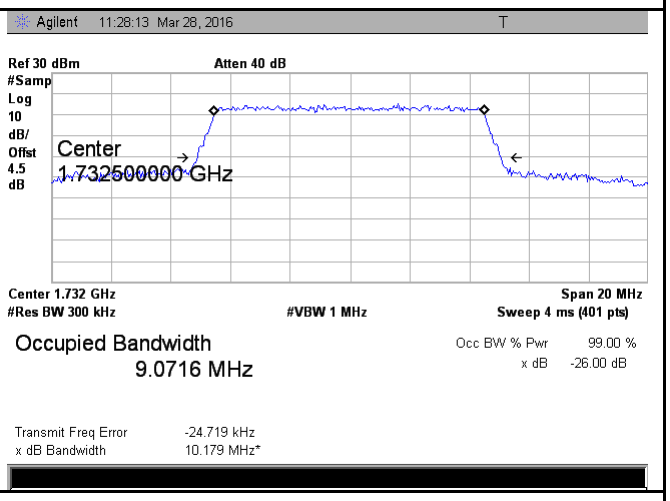
LTE band 4 - Low CH QPSK-10



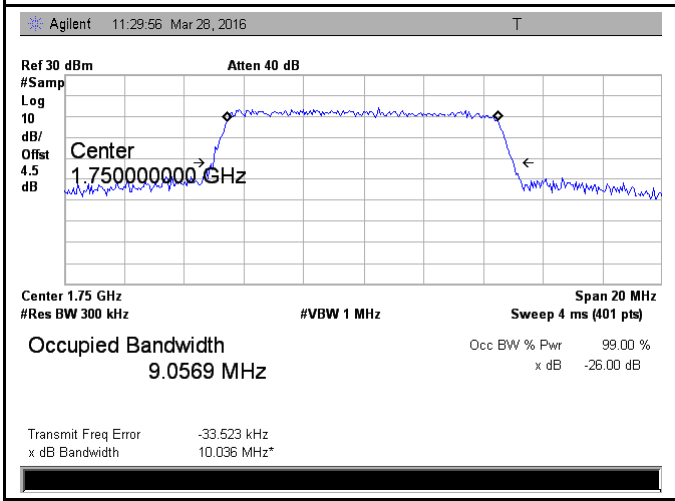
LTE band 4 - Low CH 16QAM-10



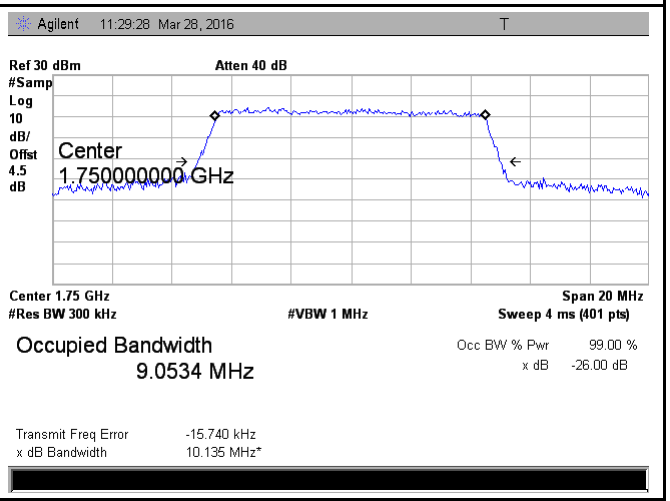
LTE band 4 - Middle CH QPSK-10



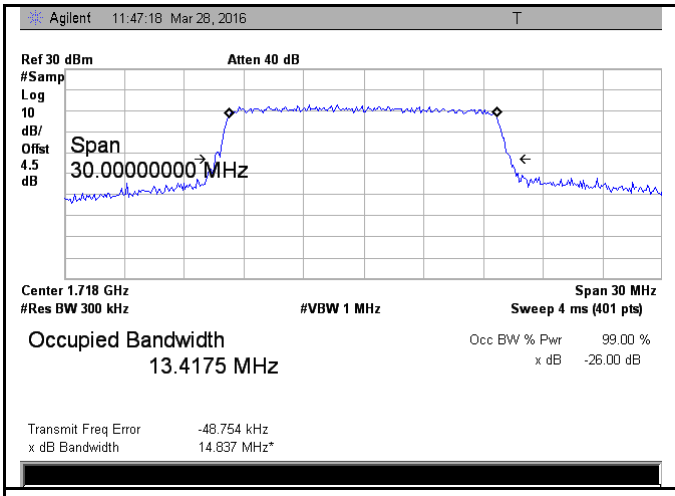
LTE band 4 - Middle CH 16QAM-10



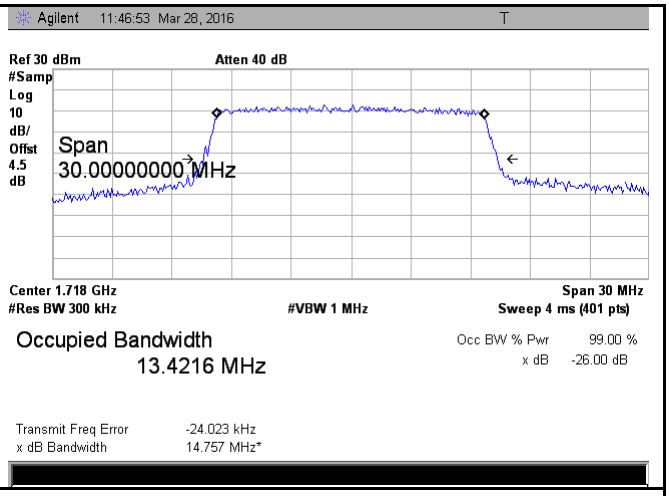
LTE band 4 - High CH QPSK-10



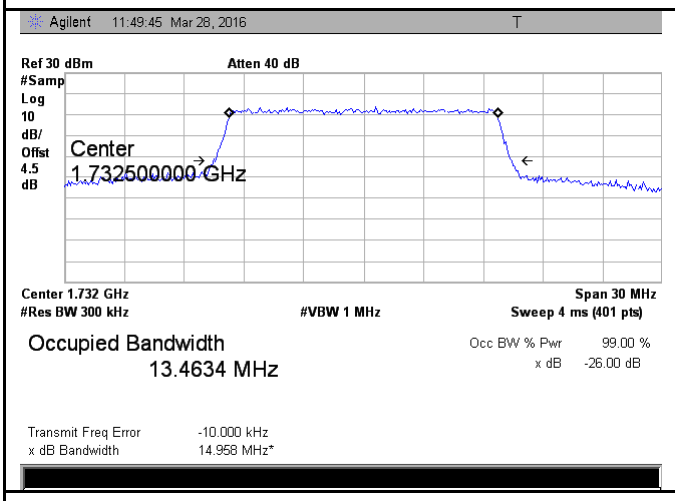
LTE band 4 - High CH 16QAM-10



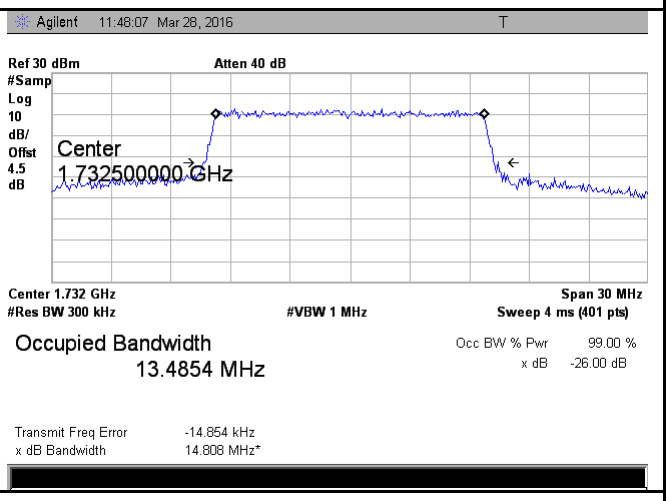
LTE band 4 - Low CH QPSK-15



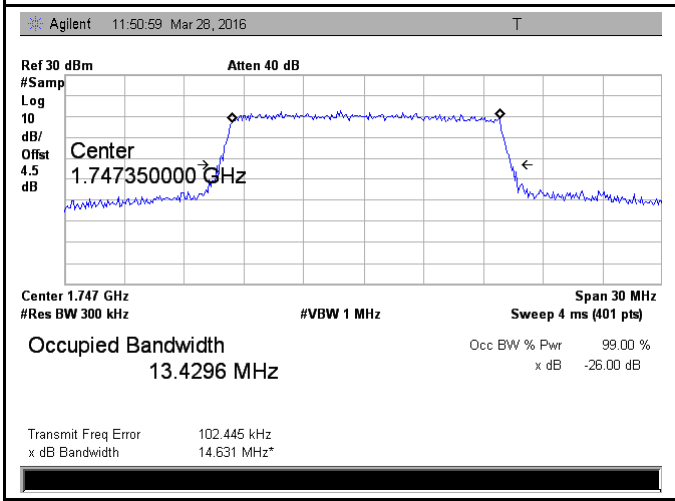
LTE band 4 - Low CH 16QAM-15



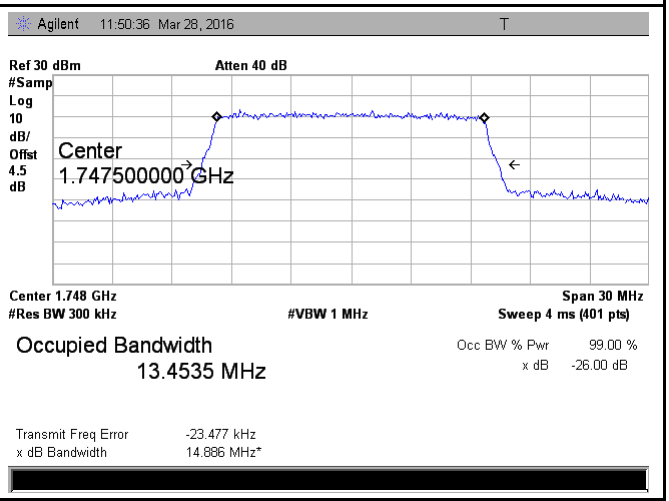
LTE band 4 - Middle CH QPSK-15



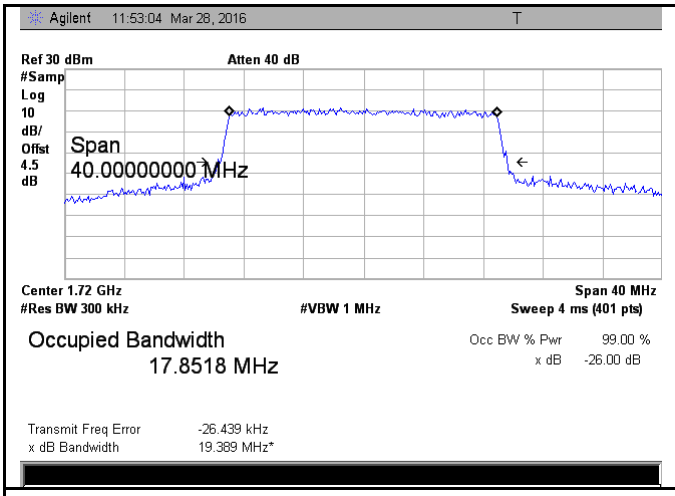
LTE band 4 - Middle CH 16QAM-15



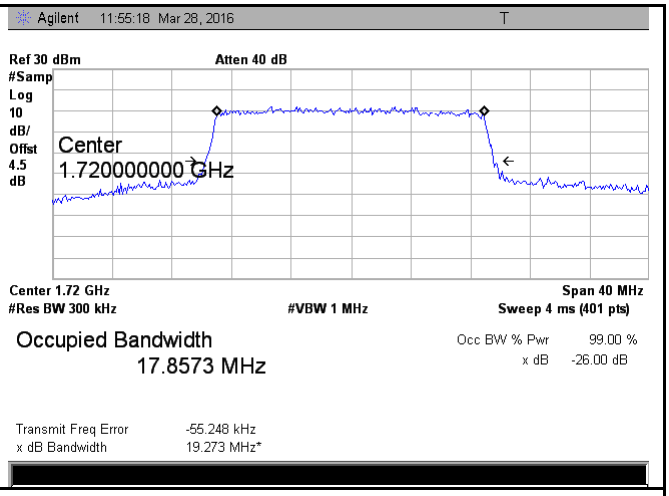
LTE band 4 - High CH QPSK-15



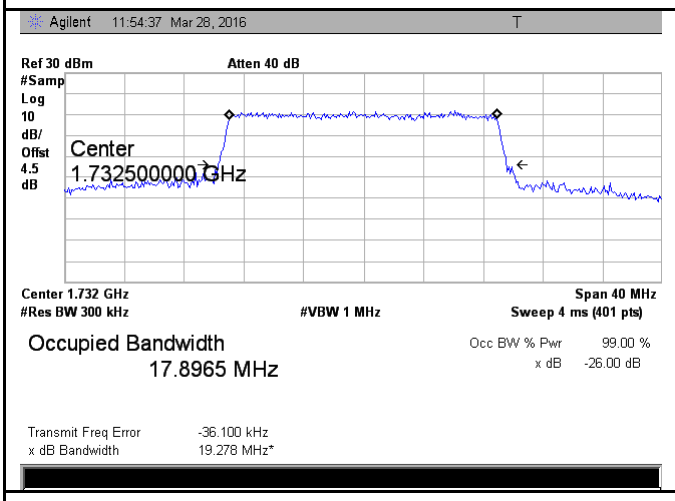
LTE band 4 - High CH 16QAM-15



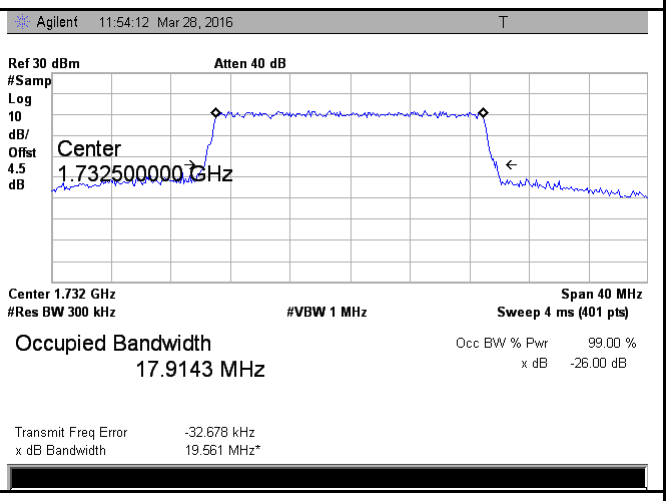
LTE band 4 - Low CH QPSK-20



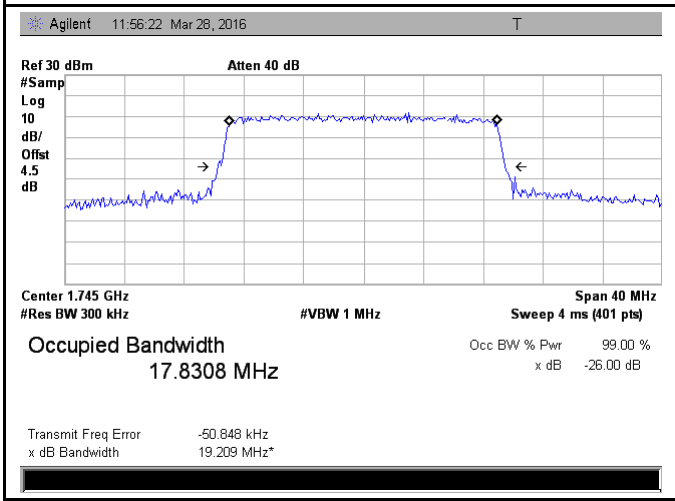
LTE band 4 - Low CH 16QAM-20



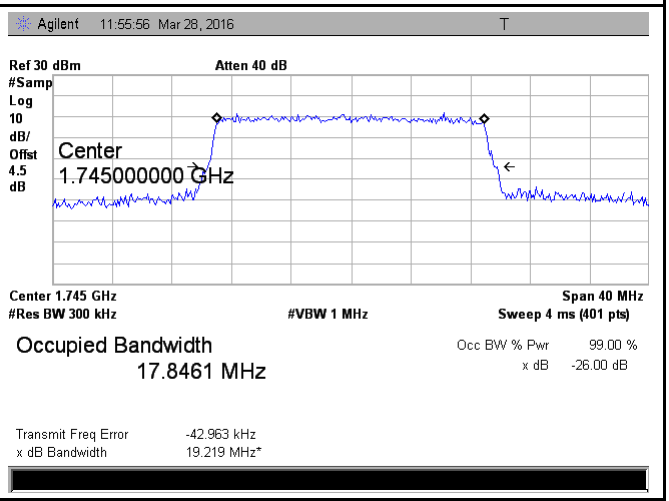
LTE band 4 - Middle CH QPSK-20



LTE band 4 - Middle CH 16QAM-20

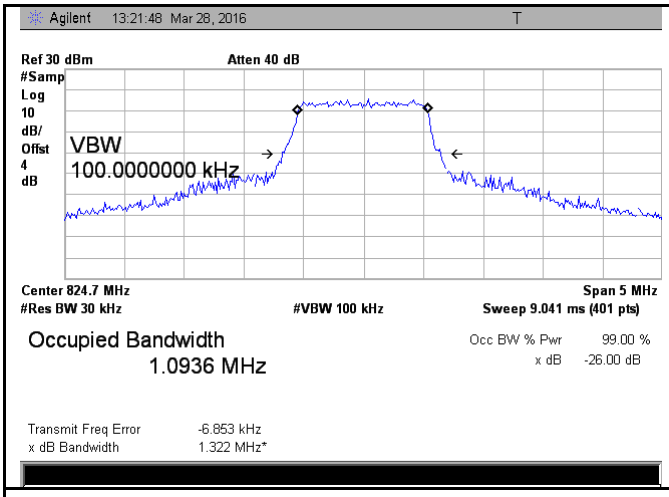


LTE band 4 - High CH QPSK-20

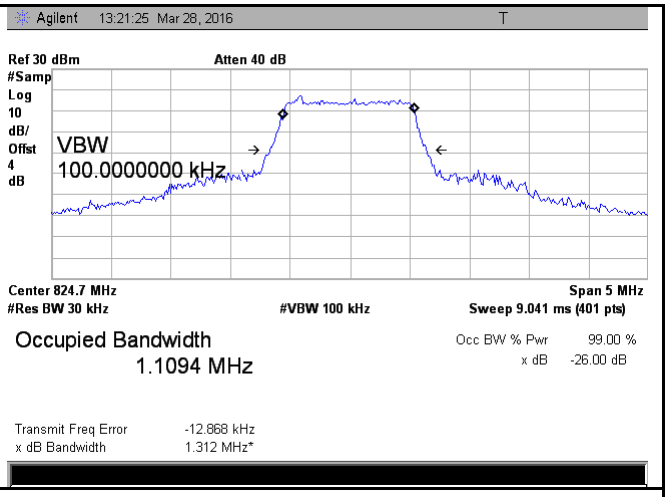


LTE band 4 - High CH 16QAM-20

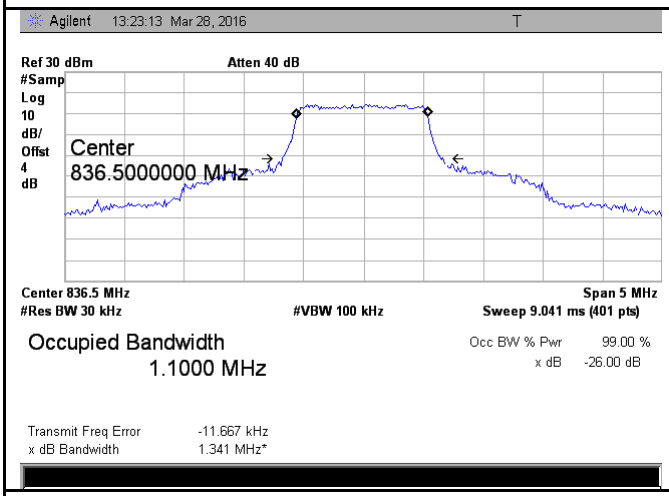
LTE Band 5 (Part 22H)



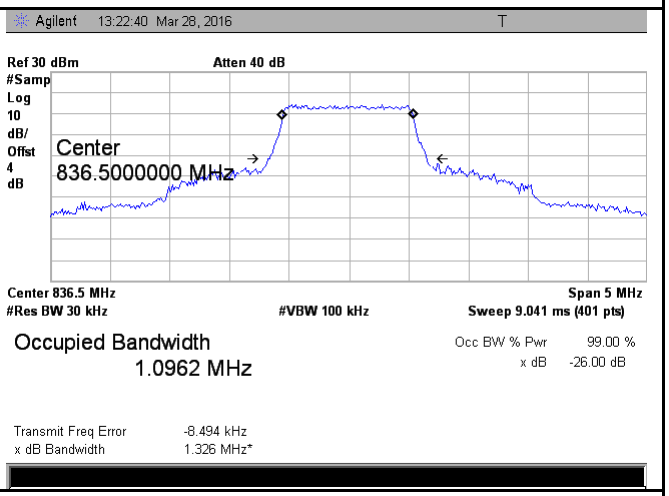
LTE band 5 - Low CH QPSK-1.4



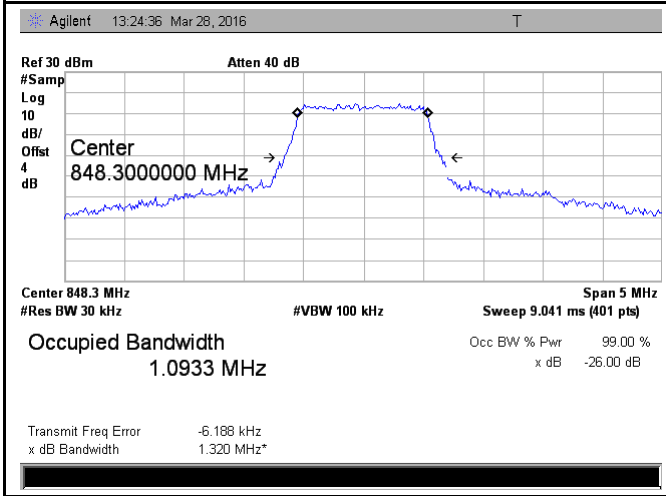
LTE band 5 - Low CH 16QAM-1.4



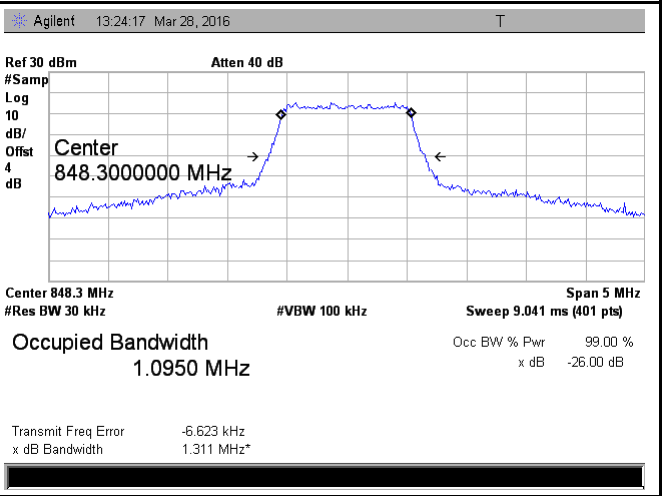
LTE band 5 - Middle CH QPSK-1.4



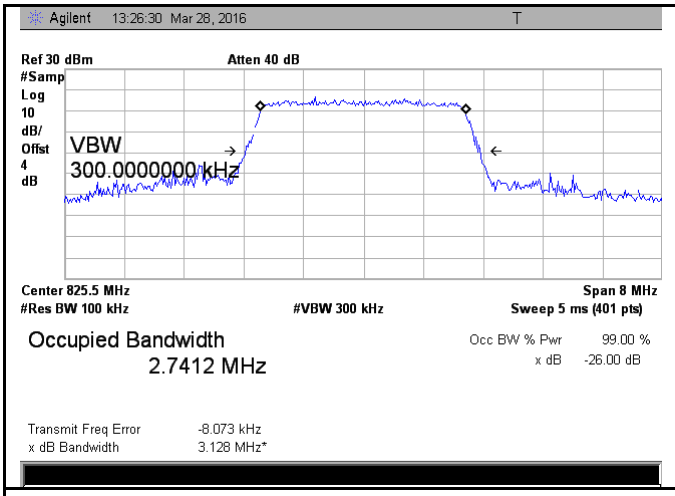
LTE band 5 - Middle CH 16QAM-1.4



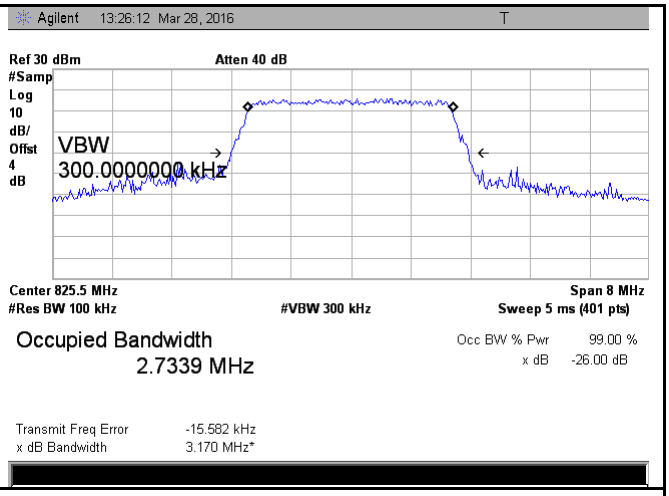
LTE band 5 - High CH QPSK-1.4



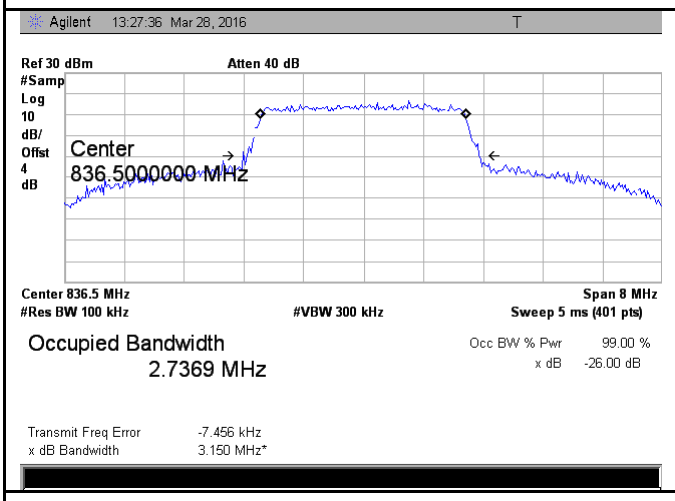
LTE band 5 - High CH 16QAM-1.4



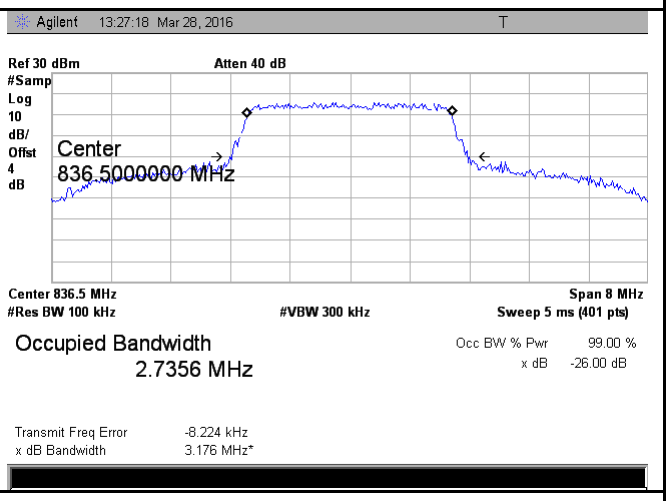
LTE band 5 - Low CH QPSK-3



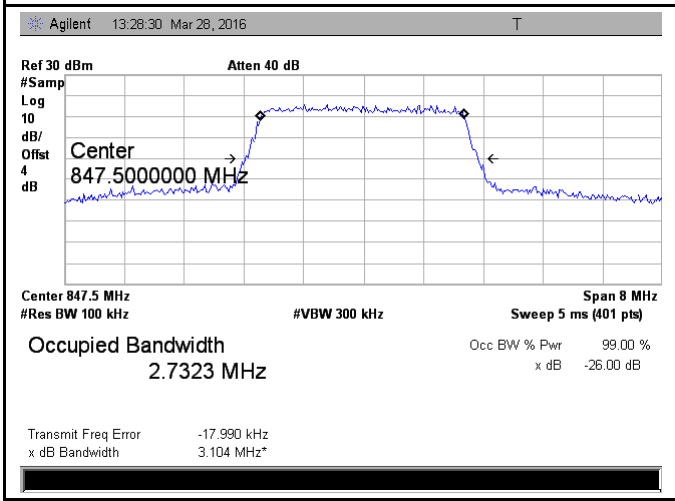
LTE band 5 - Low CH 16QAM-3



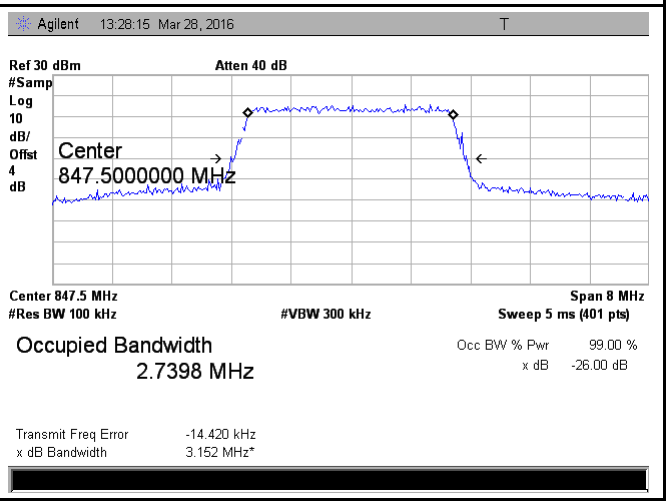
LTE band 5 - Middle CH QPSK-3



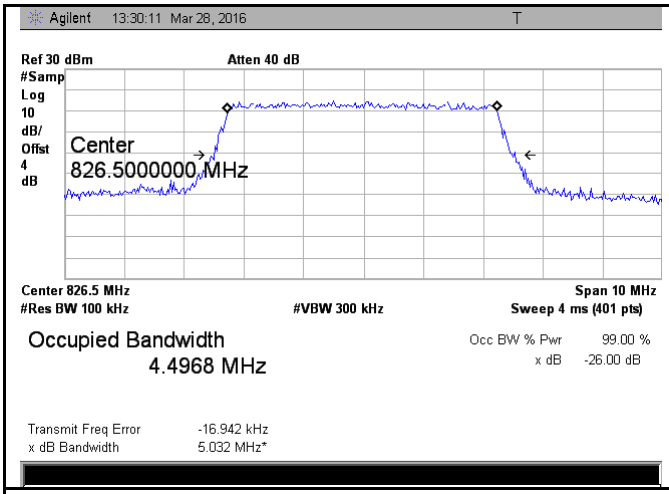
LTE band 5 - Middle CH 16QAM-3



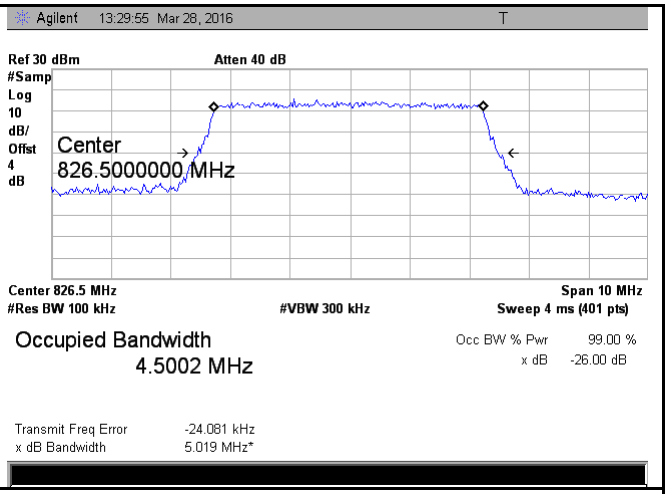
LTE band 5 - High CH QPSK-3



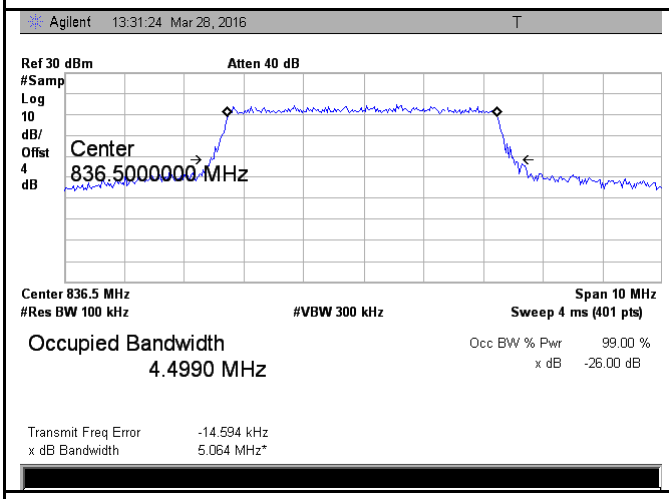
LTE band 5 - High CH 16QAM-3



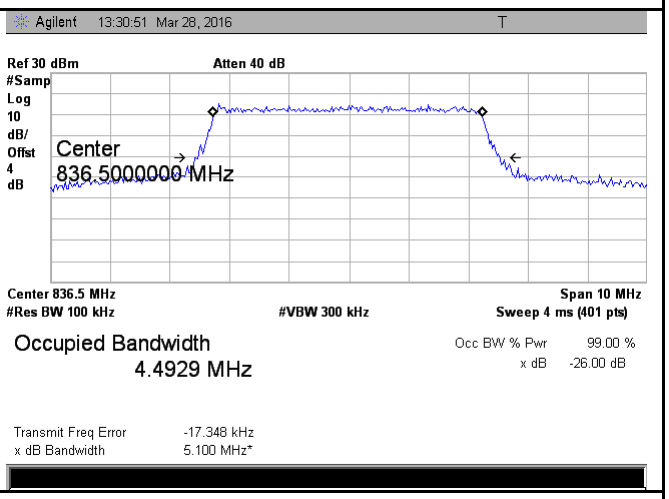
LTE band 5 - Low CH QPSK-5



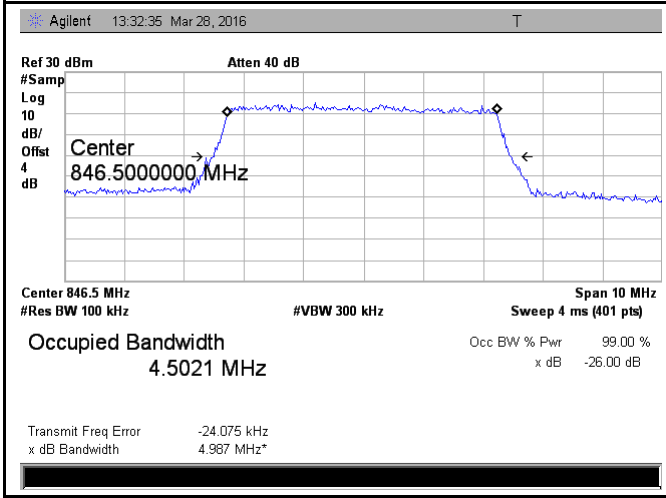
LTE band 5 - Low CH 16QAM-5



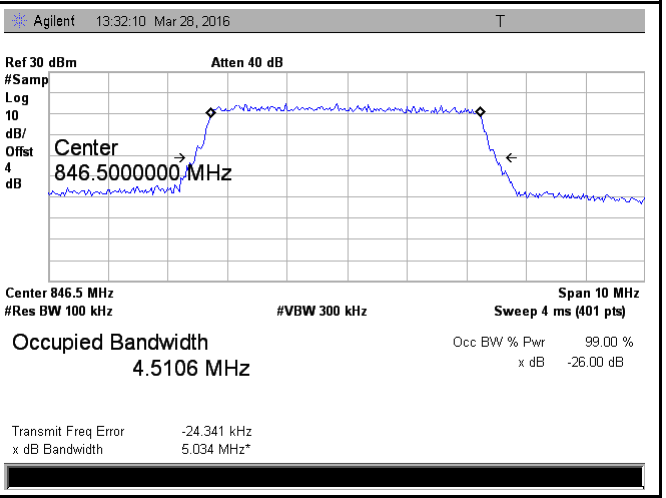
LTE band 5 - Middle CH QPSK-5



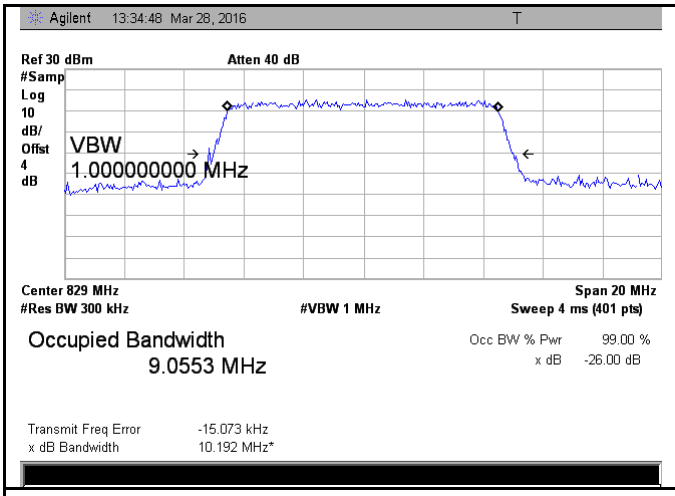
LTE band 5 - Middle CH 16QAM-5



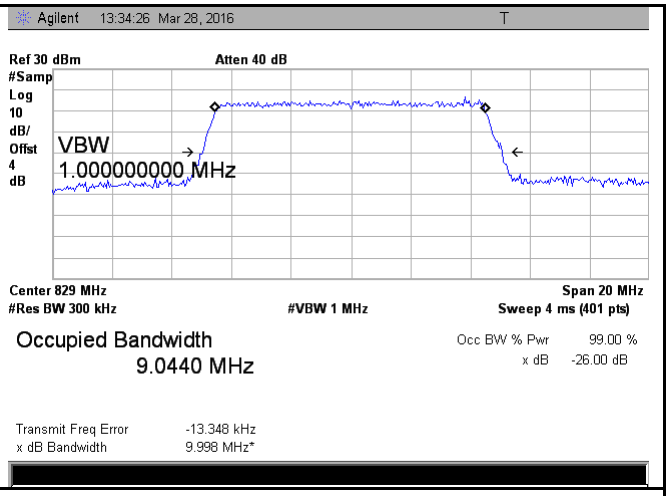
LTE band 5 - High CH QPSK-5



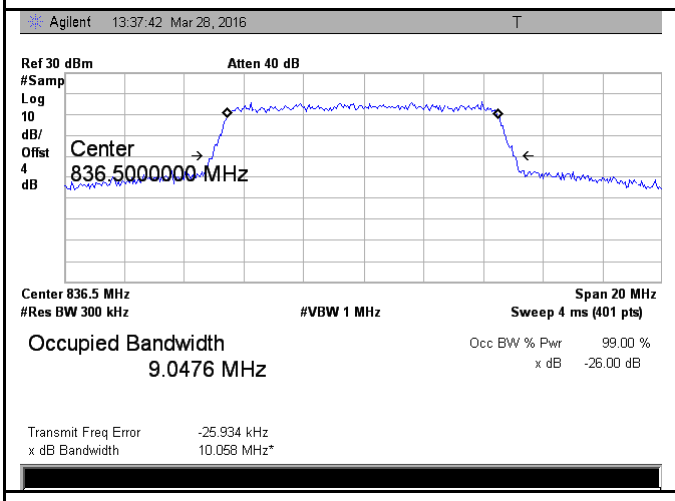
LTE band 5 - High CH 16QAM-5



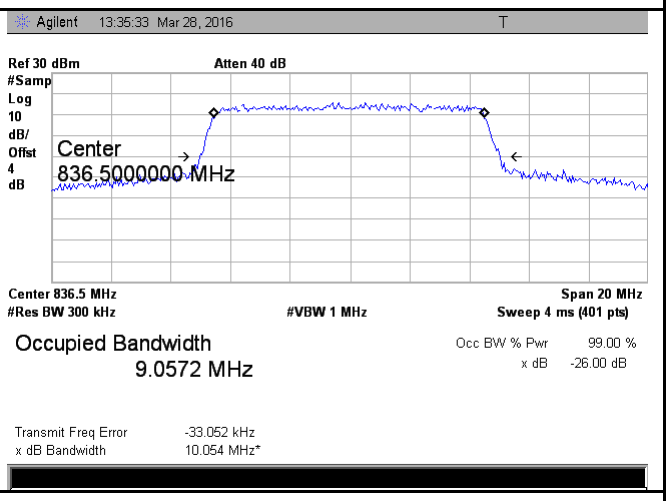
LTE band 5 - Low CH QPSK-10



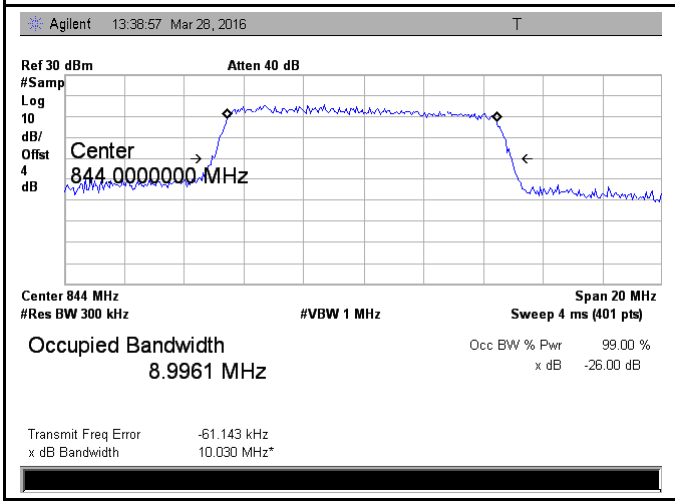
LTE band 5 - Low CH 16QAM-10



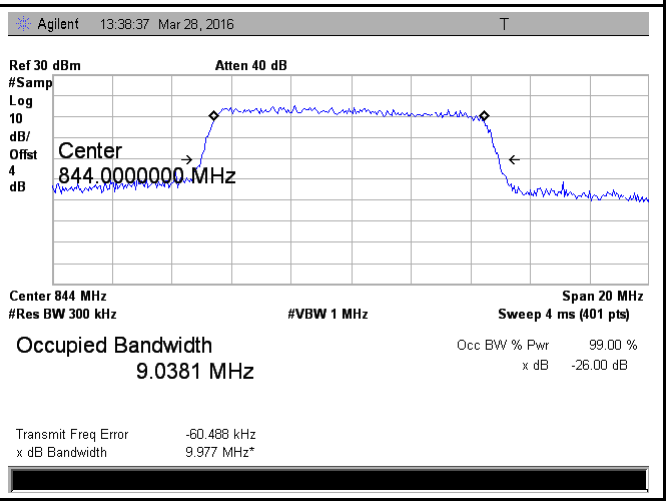
LTE band 5 - Middle CH QPSK-10



LTE band 5 - Middle CH 16QAM-10

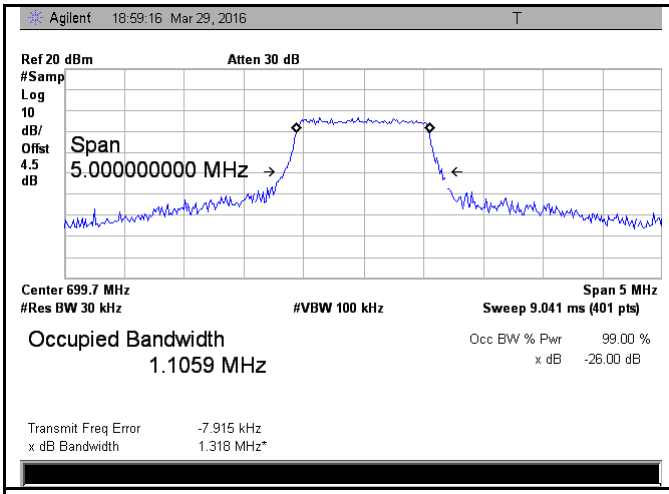


LTE band 5 - High CH QPSK-10

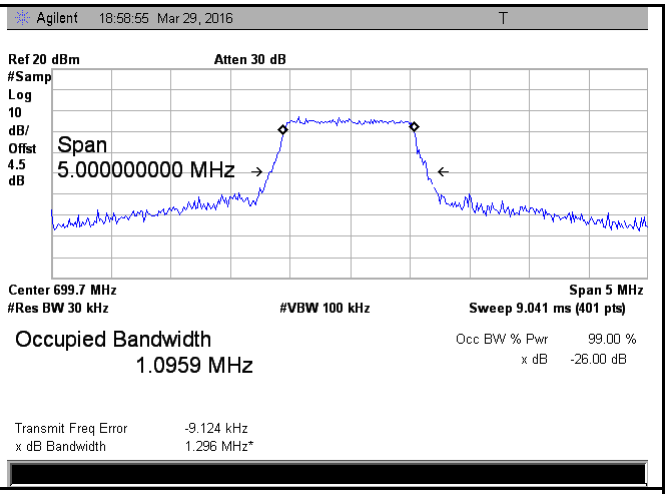


LTE band 5 - High CH 16QAM-10

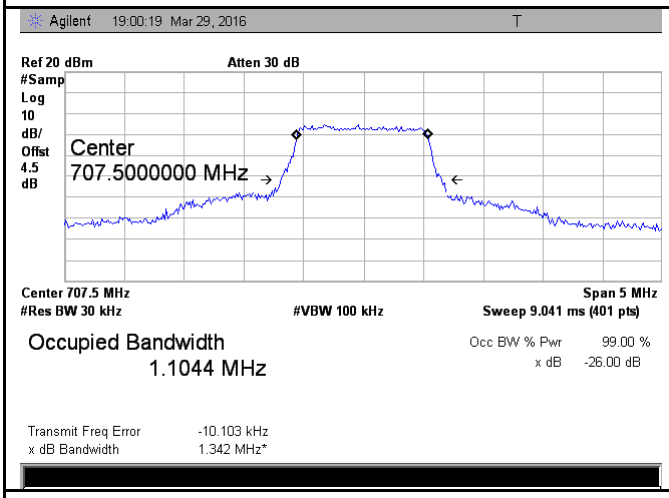
LTE Band 12 (Part 27)



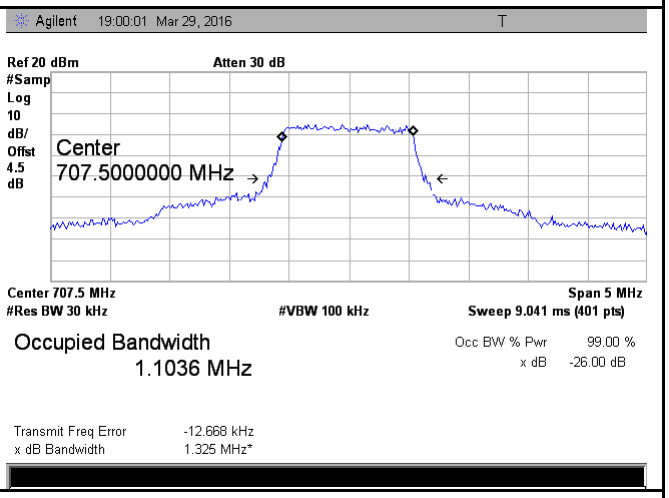
LTE band 12 - Low CH QPSK-1.4



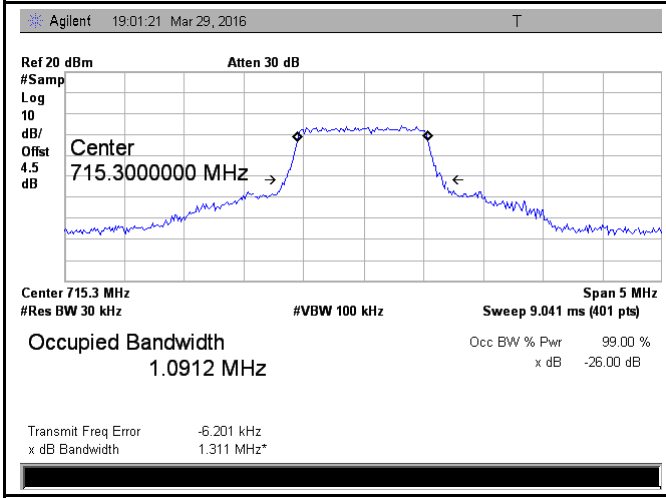
LTE band 12 - Low CH 16QAM-1.4



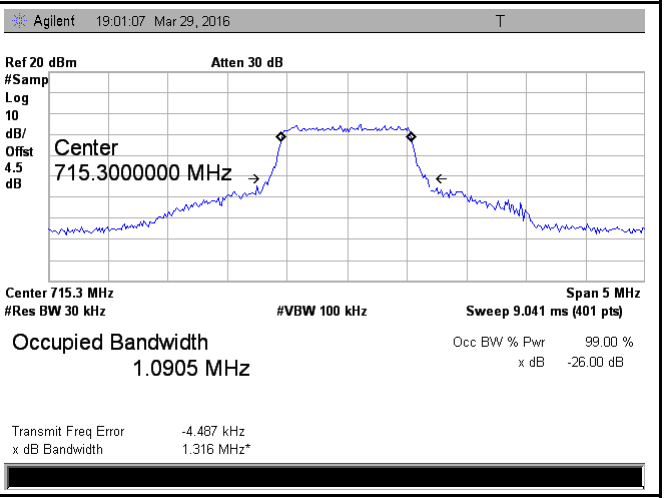
LTE band 12 - Middle CH QPSK-1.4



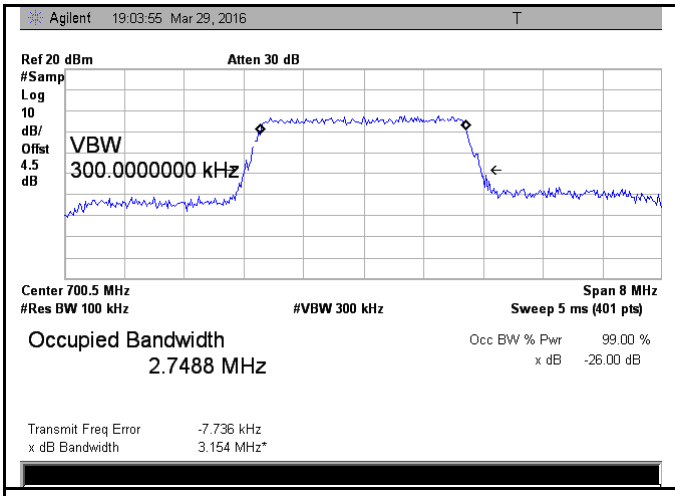
LTE band 12 - Middle CH 16QAM-1.4



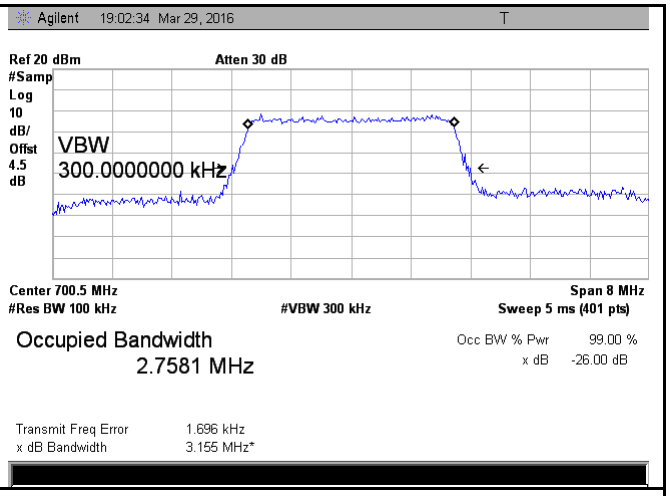
LTE band 12 - High CH QPSK-1.4



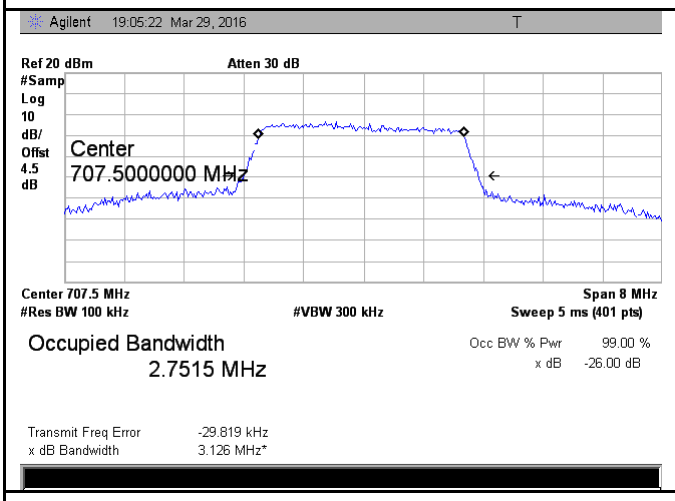
LTE band 12 - High CH 16QAM-1.4



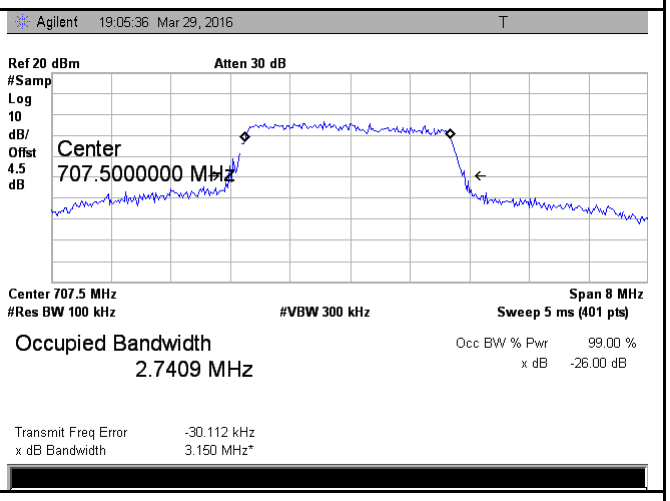
LTE band 12 - Low CH QPSK-3



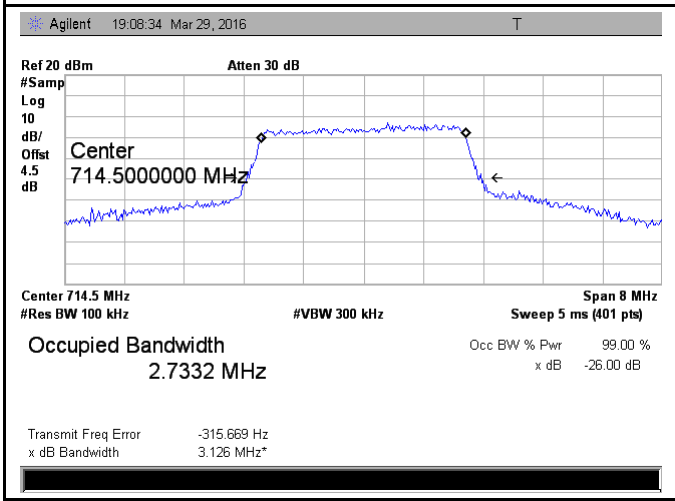
LTE band 12 - Low CH 16QAM-3



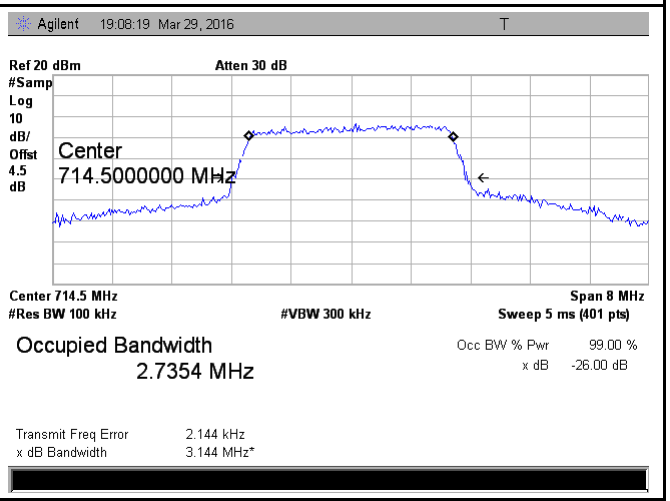
LTE band 12 - Middle CH QPSK-3



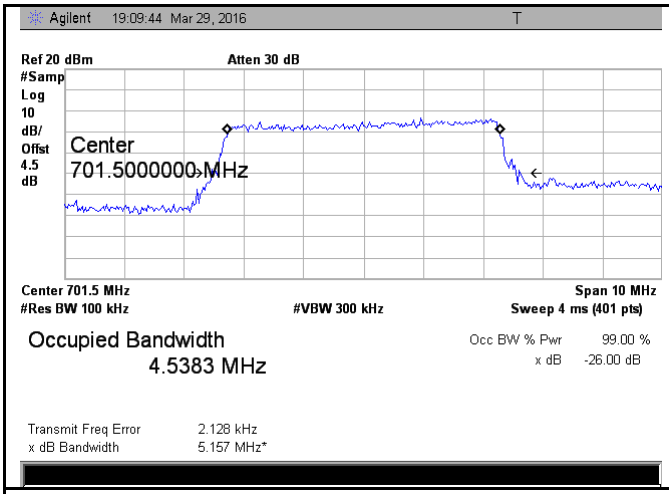
LTE band 12 - Middle CH 16QAM-3



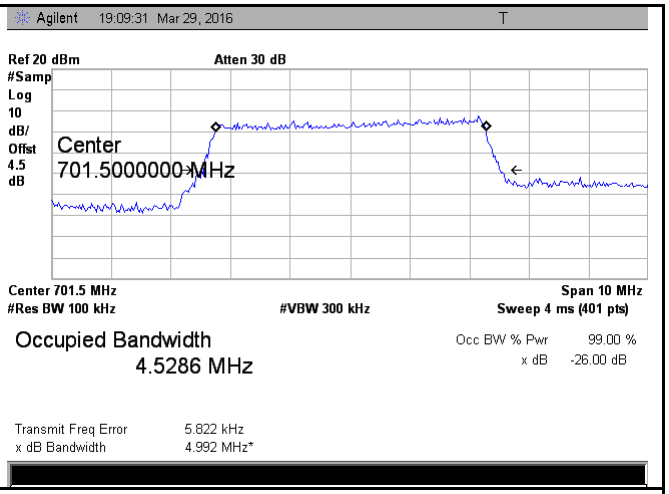
LTE band 12 - High CH QPSK-3



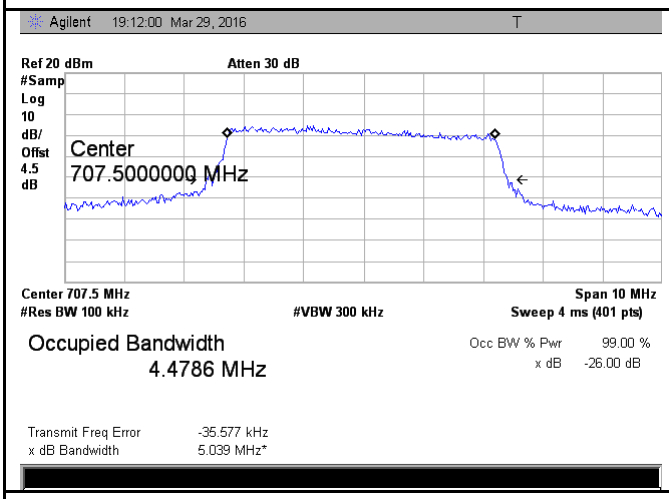
LTE band 12 - High CH 16QAM-3



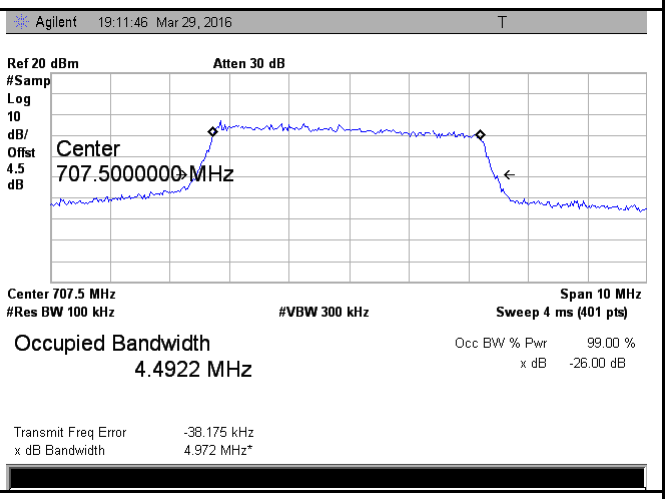
LTE band 12 - Low CH QPSK-5



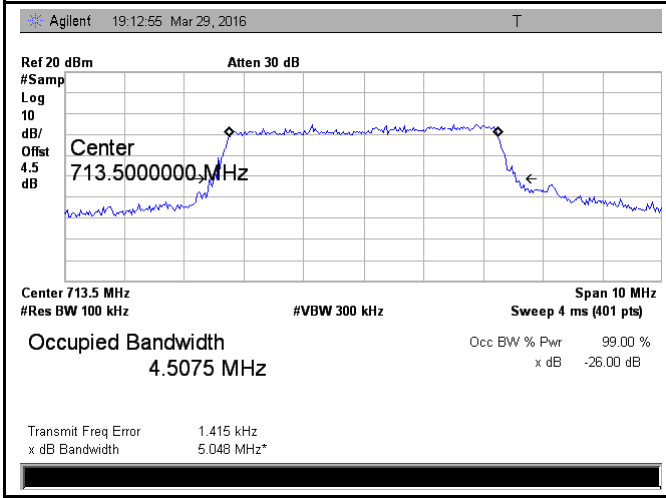
LTE band 12 - Low CH 16QAM-5



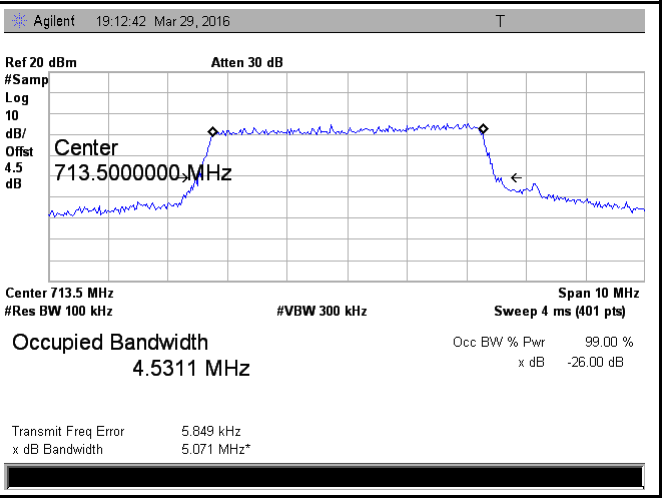
LTE band 12 - Middle CH QPSK-5



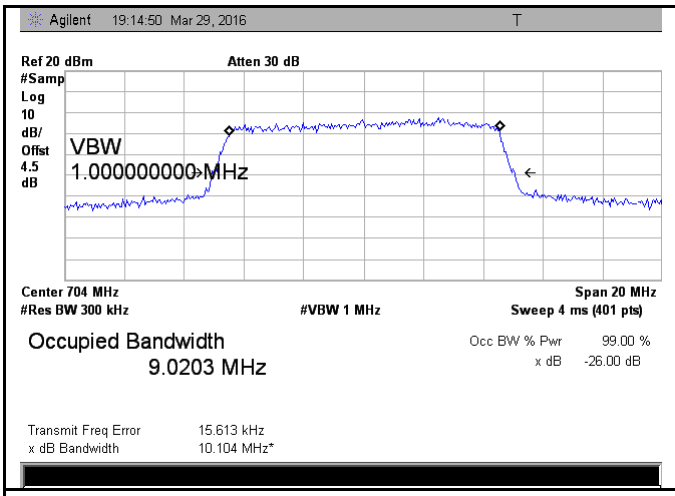
LTE band 12 - Middle CH 16QAM-5



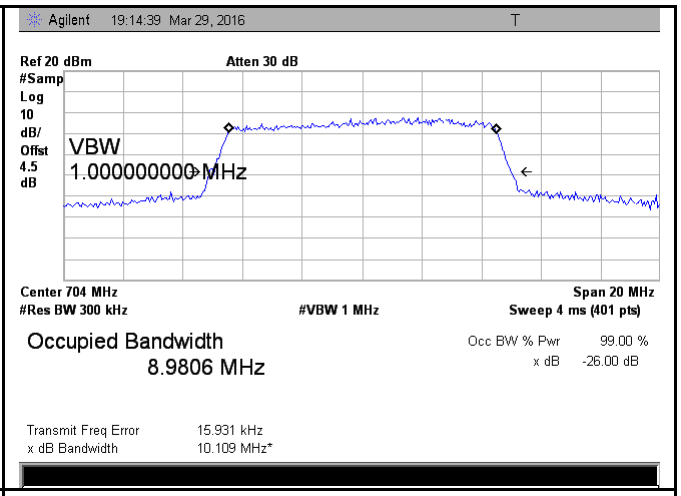
LTE band 12 - High CH QPSK-5



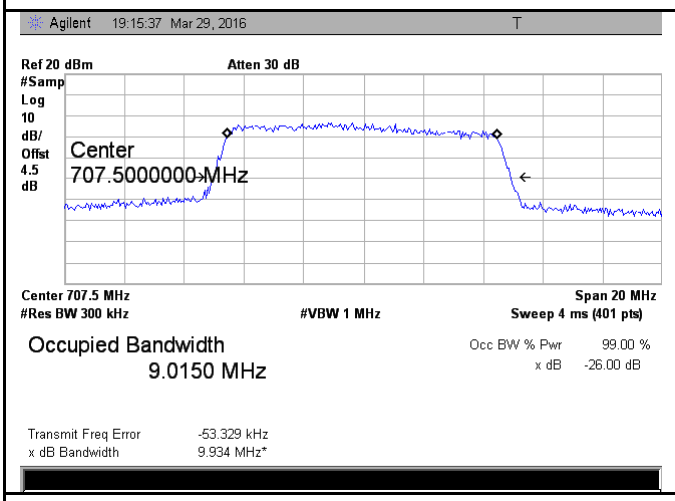
LTE band 12 - High CH 16QAM-5



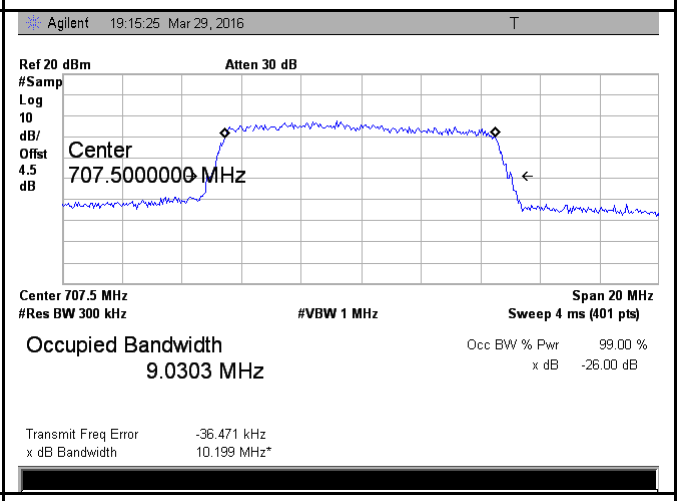
LTE band 12 - Low CH QPSK-10



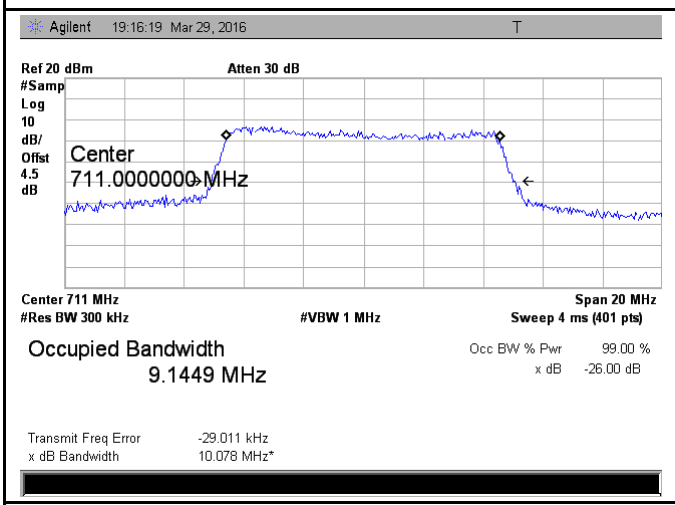
LTE band 12 - Low CH 16QAM-10



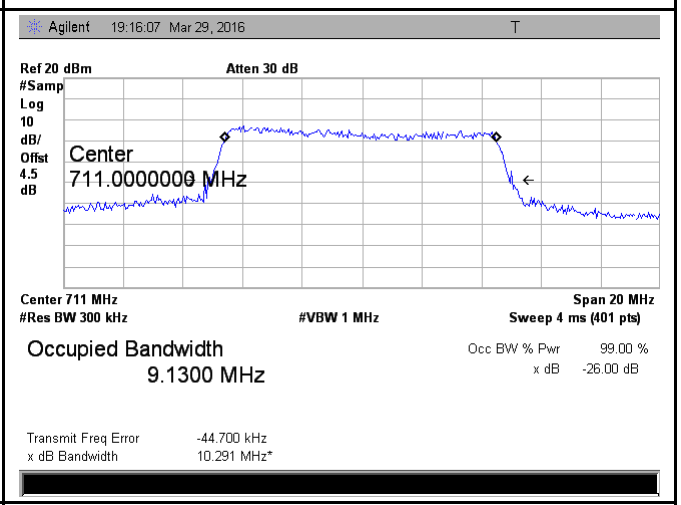
LTE band 12 - Middle CH QPSK-10



LTE band 12 - Middle CH 16QAM-10

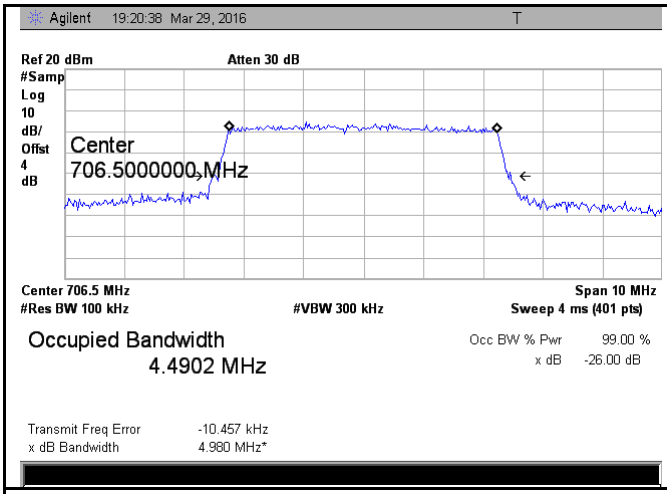


LTE band 12 - High CH QPSK-10

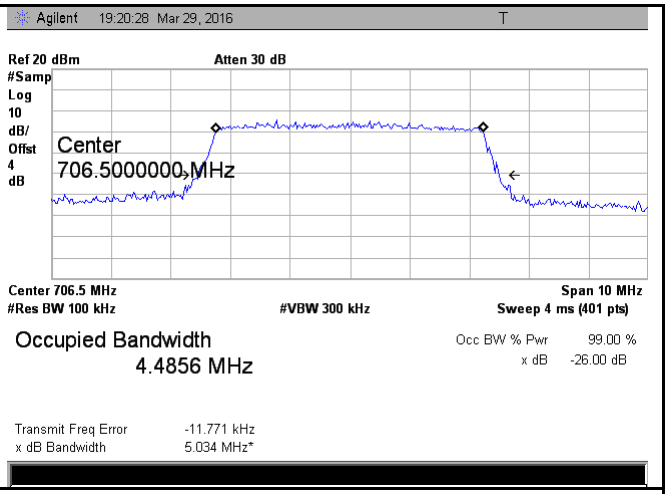


LTE band 12 - High CH 16QAM-10

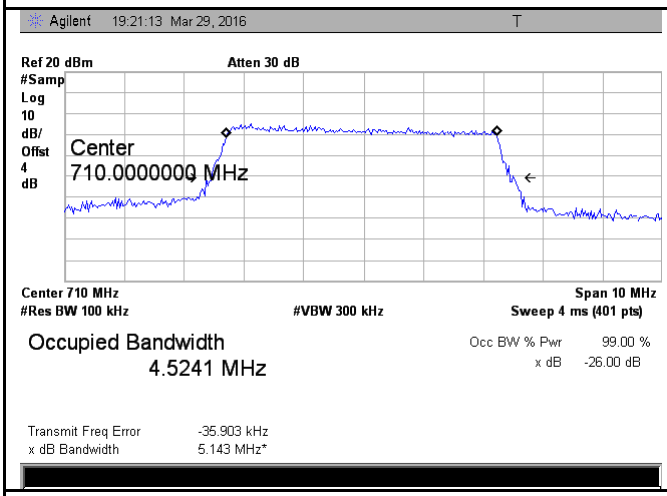
LTE Band 17 (Part 27)



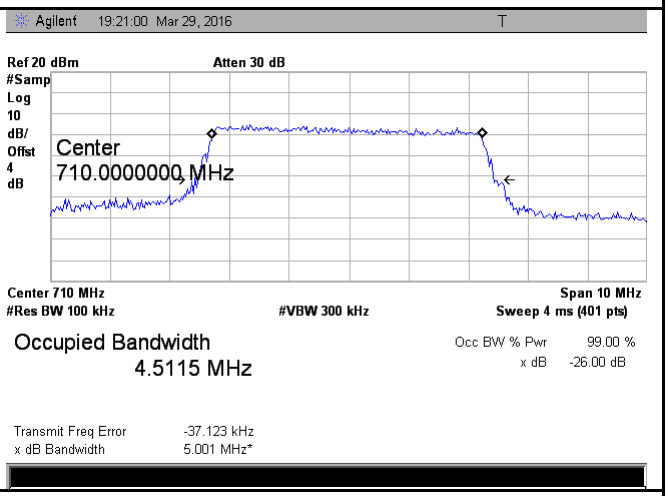
LTE band 17 - Low CH QPSK-5



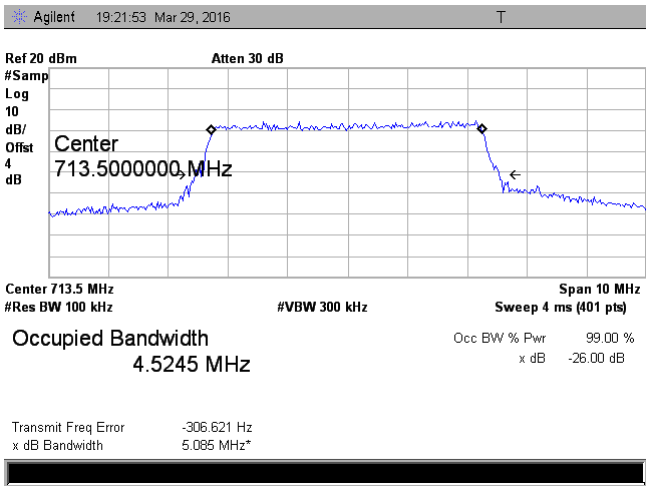
LTE band 17 - Low CH 16QAM-5



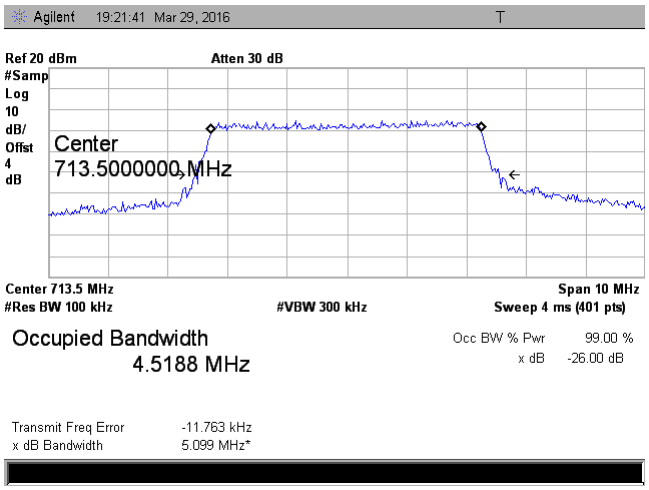
LTE band 17 - Middle CH QPSK-5



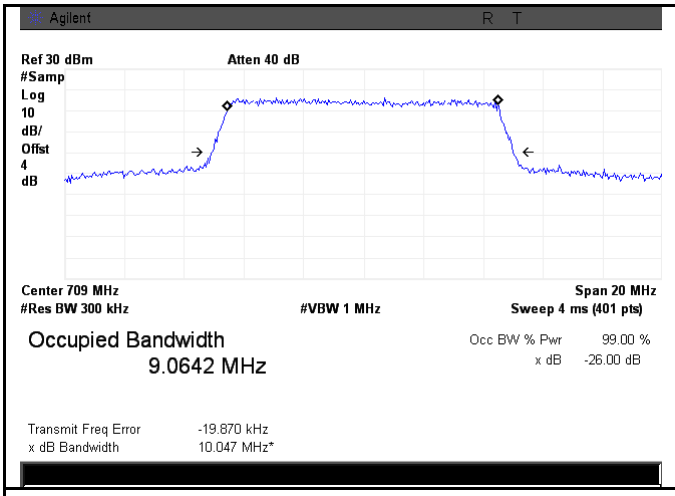
LTE band 17 - Middle CH 16QAM-5



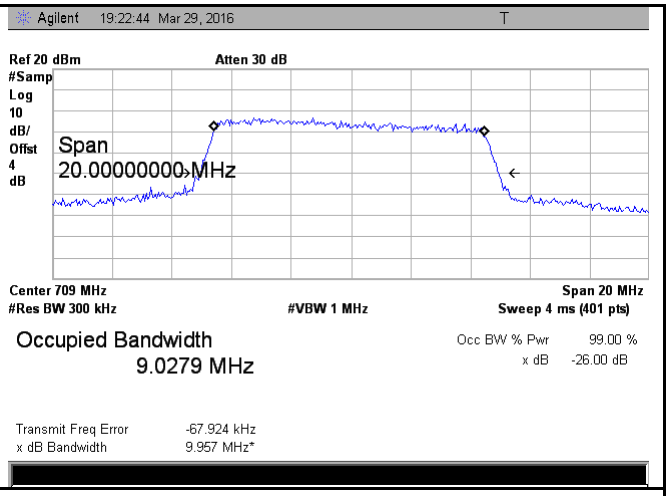
LTE band 17 - High CH QPSK-5



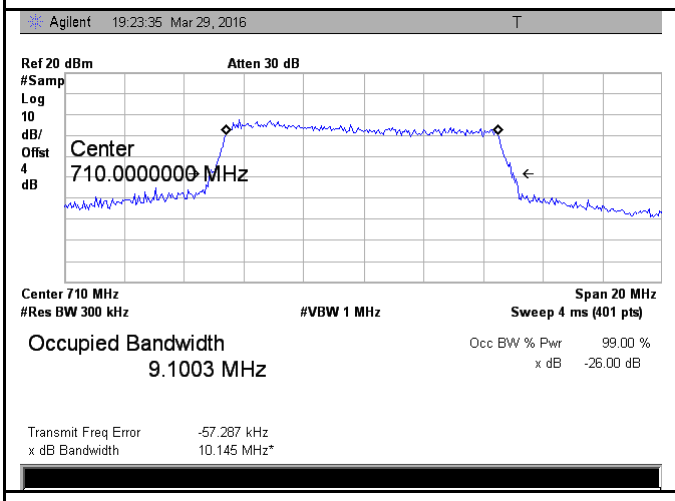
LTE band 17 - High CH 16QAM-5



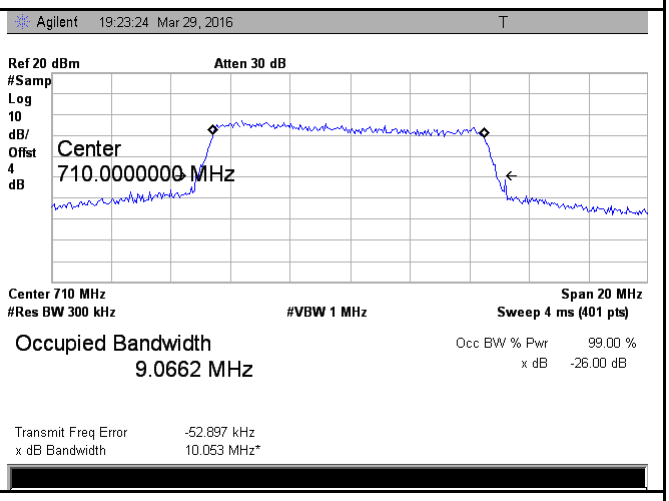
LTE band 17 - Low CH QPSK-10



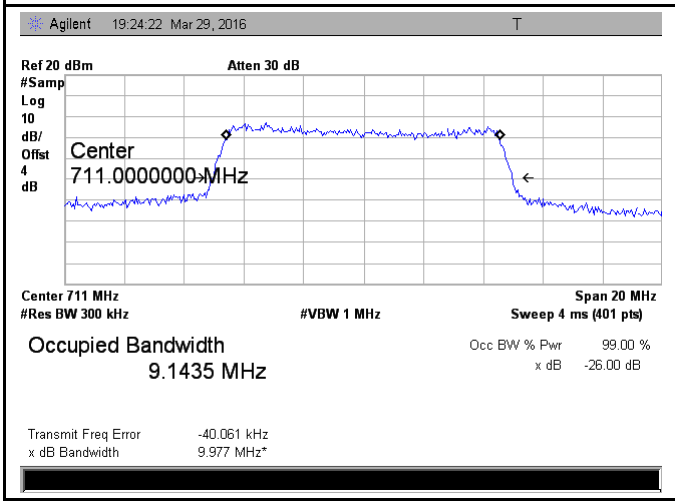
LTE band 17 - Low CH 16QAM-10



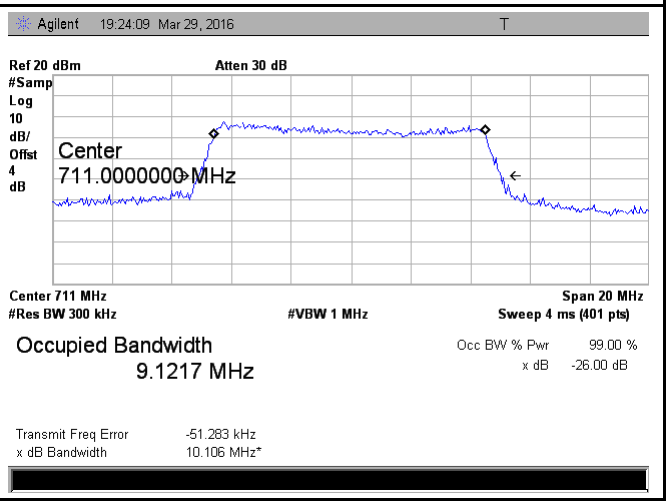
LTE band 17 - Middle CH QPSK-10



LTE band 17 - Middle CH 16QAM-10



LTE band 17 - High CH QPSK-10

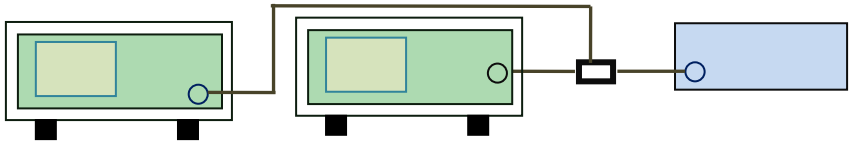


LTE band 17 - High CH 16QAM-10

6.5 Spurious Emissions at Antenna Terminals

Temperature	22℃
Relative Humidity	53%
Atmospheric Pressure	1029mbar
Test date :	March 29, 2016
Tested By :	Winnie Zhang

Requirement(s):

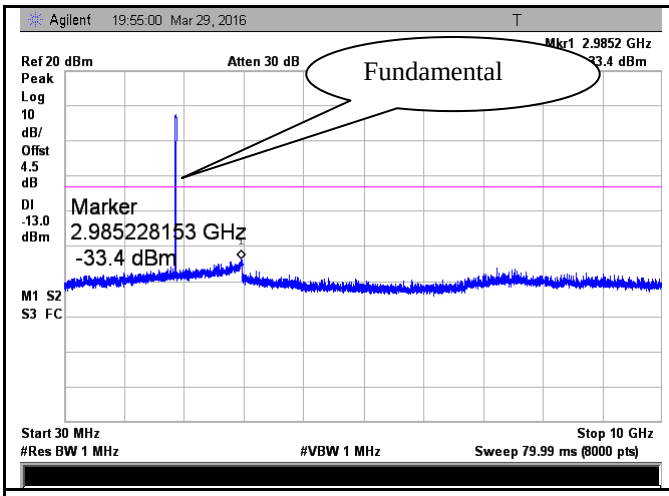
Spec	Item	Requirement	Applicable
§2.1051, §22.917(a)& §24.238(a) § 27.53(h)	a)	The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least 43 + 10 log (P) dB	☑
Test Setup			
Test Procedure	- The EUT was connected to Spectrum Analyzer and Base Station via power divider. - The Band Edges of low and high channels for the highest RF powers were measured. - Setting RBW as roughly BW/100.		
Remark			
Result	☑ Pass ☐ Fail		

Test Data ☑ Yes ☐ N/A

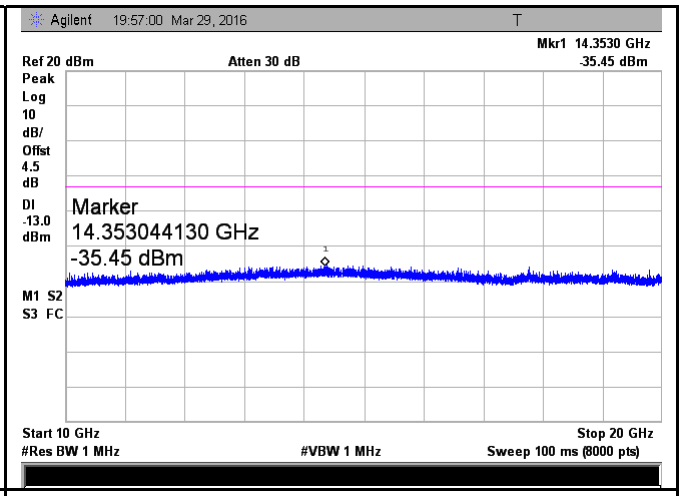
Test Plot ☑ Yes (See below) ☐ N/A

Test Plots 30MHz-5GHz

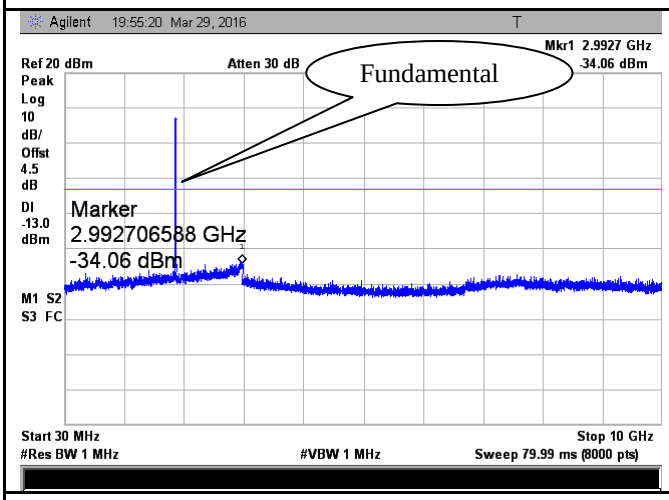
LTE Band 2 (Part 24E)



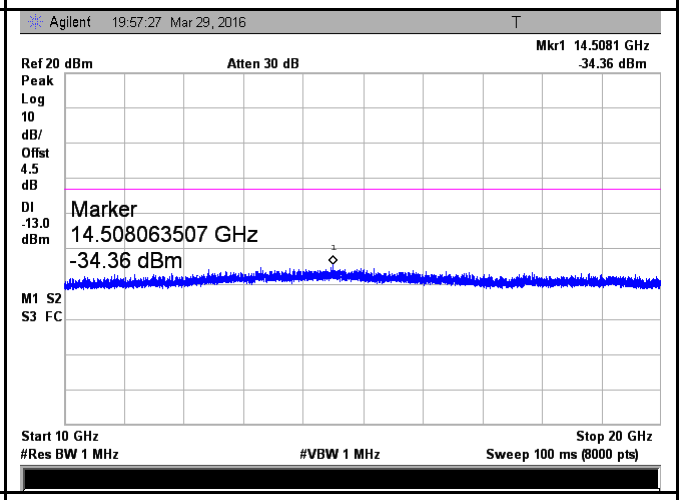
LTE Band 2 - Low Channel-1



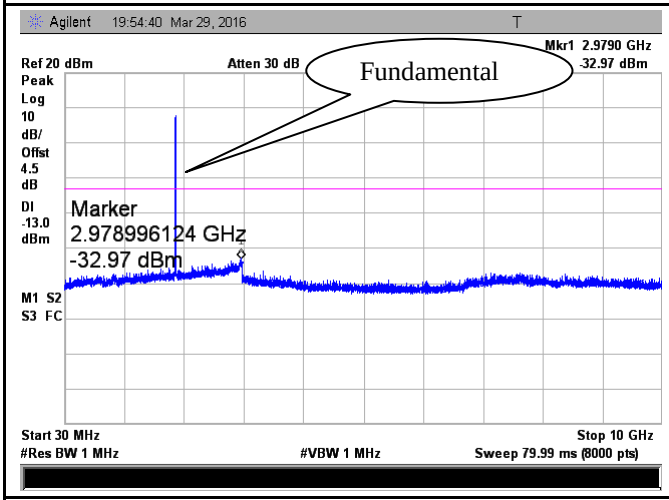
LTE Band 2 - Low Channel-2



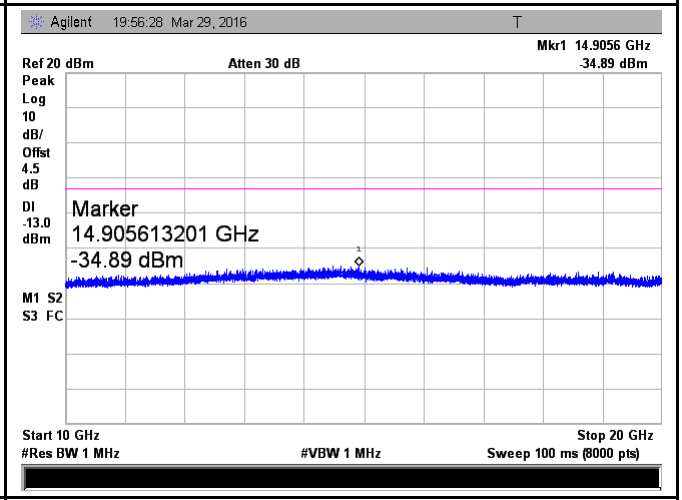
LTE Band 2 Middle Channel-1



LTE Band 2 Middle Channel-2

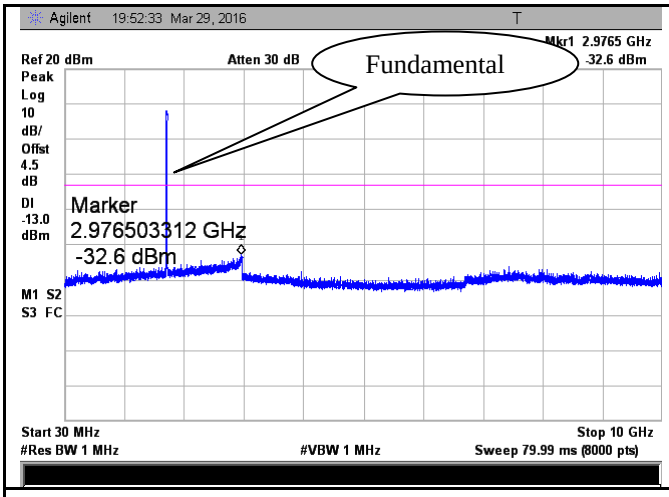


LTE Band 2 - High Channel-1

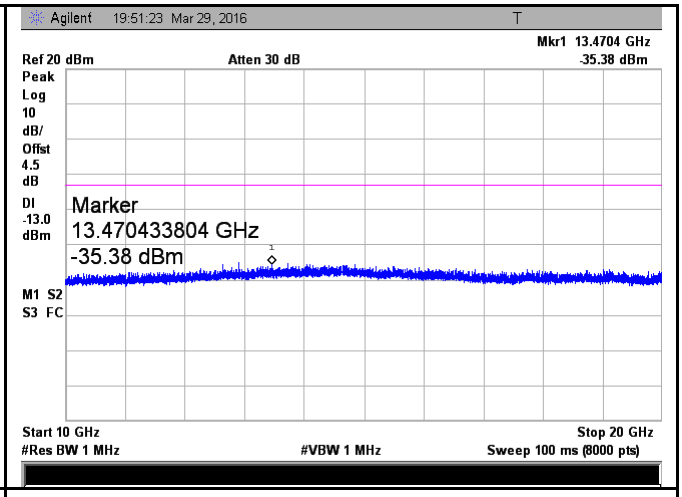


LTE Band 2 - High Channel-2

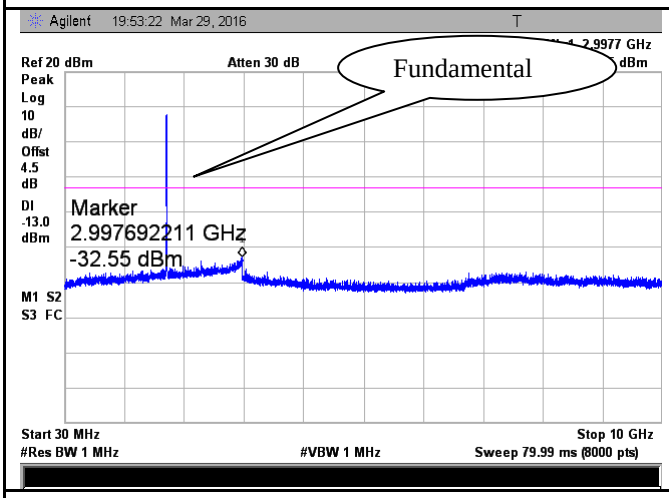
LTE Band 4 (Part27) result



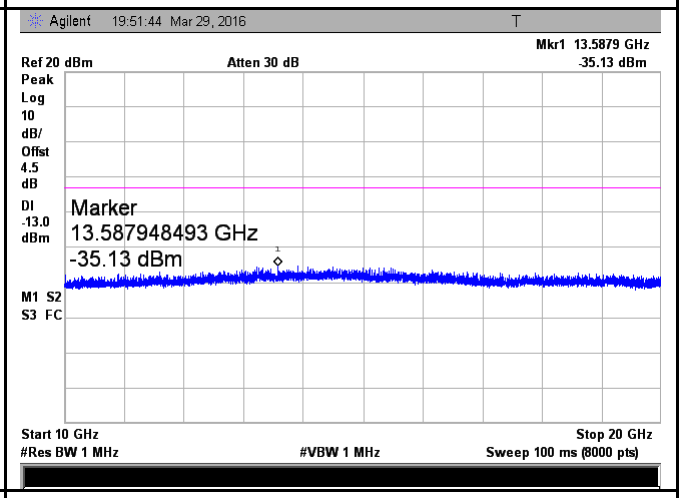
LTE Band 4 - Low Channel-1



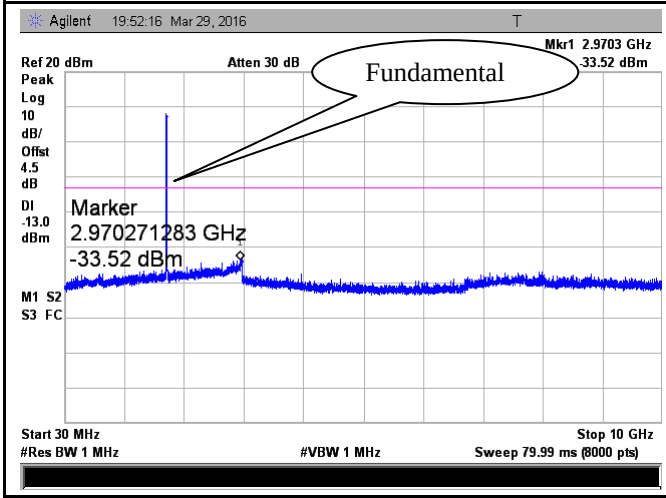
LTE Band 4 - Low Channel-2



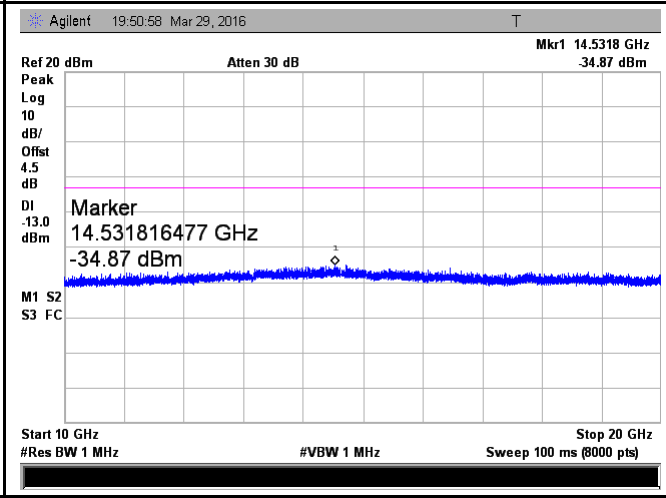
LTE Band 4 - Middle Channel-1



LTE Band 4 - Middle Channel-2

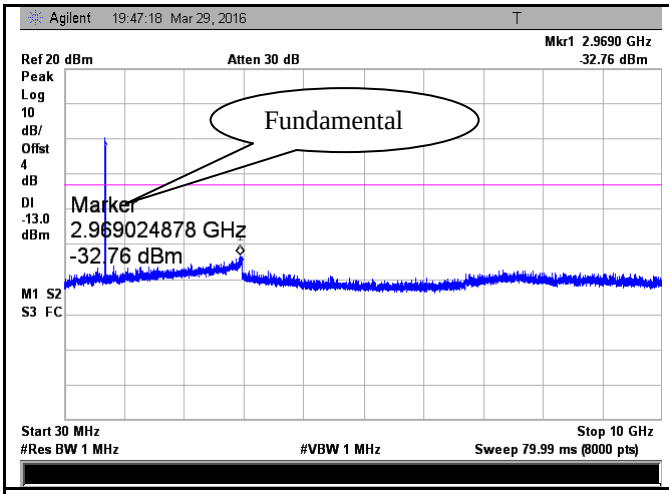


LTE Band 4 - High Channel-1

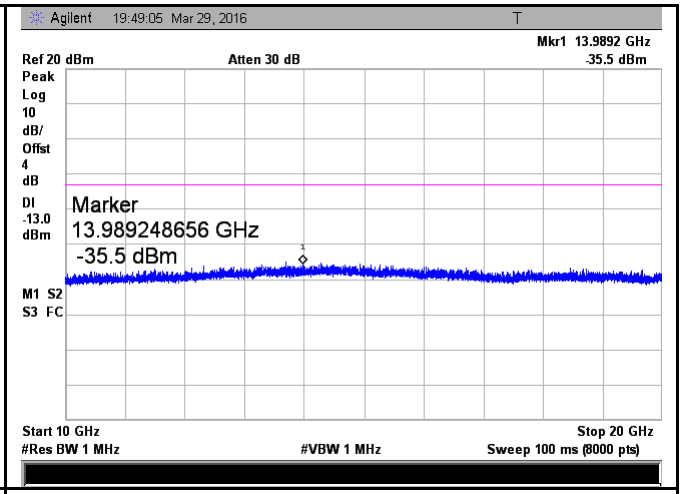


LTE Band 4 - High Channel-2

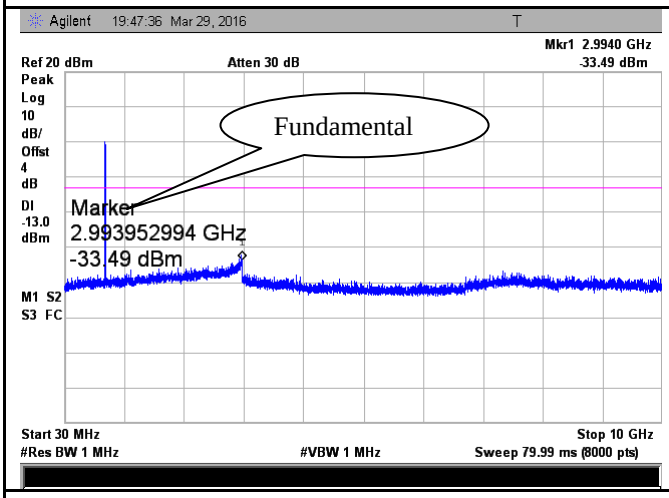
LTE Band 5 (Part 22H)



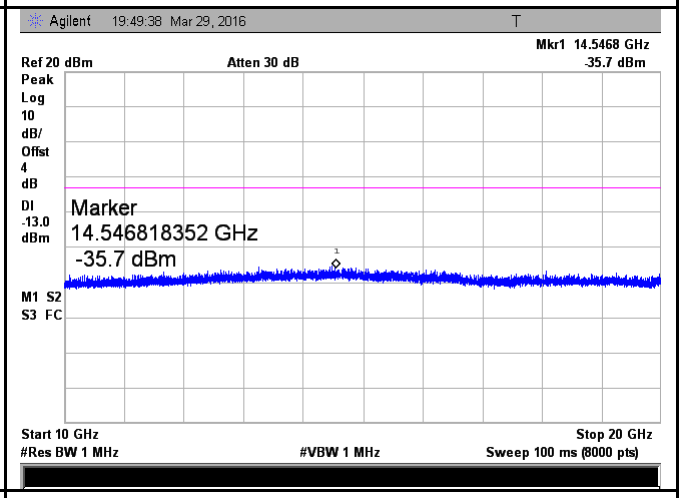
LTE Band 5 - Low Channel-1



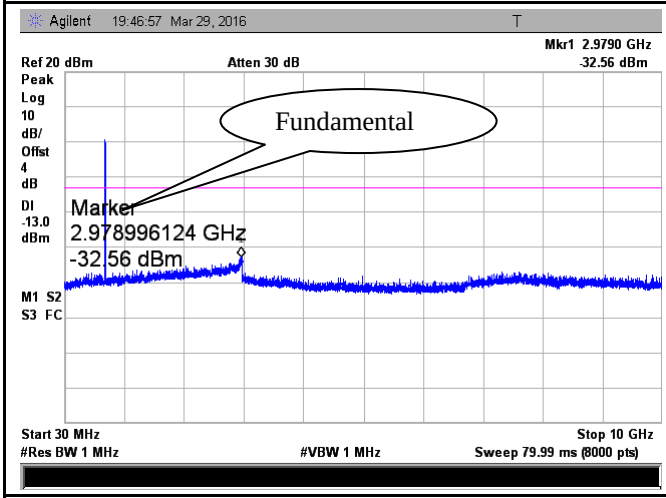
LTE Band 5 - Low Channel-2



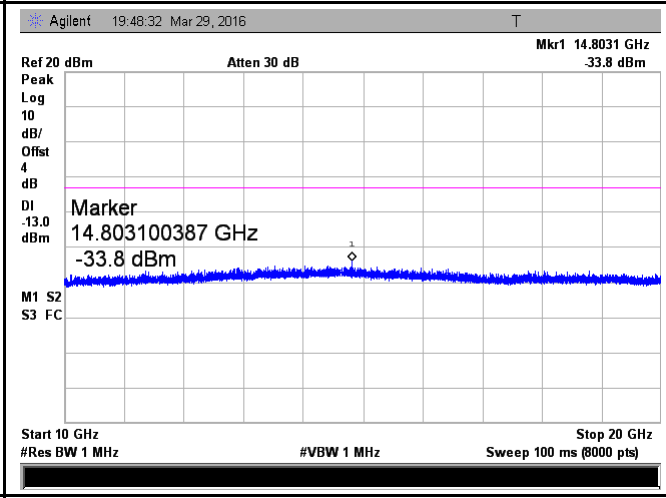
LTE Band 5- Middle Channel-1



LTE Band 5 - Middle Channel-2

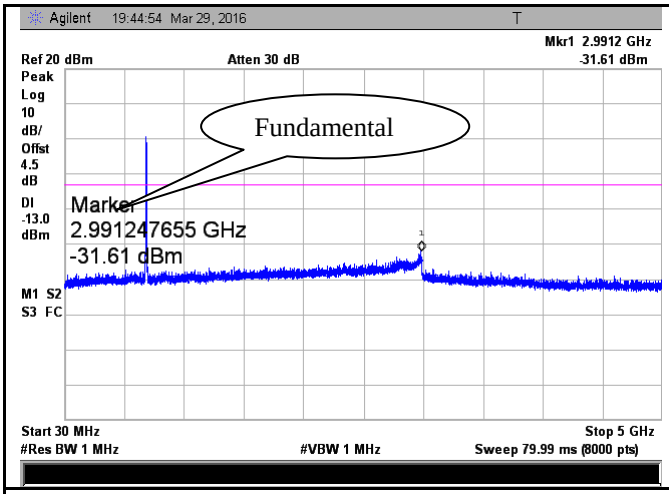


LTE Band 5 - High Channel-1

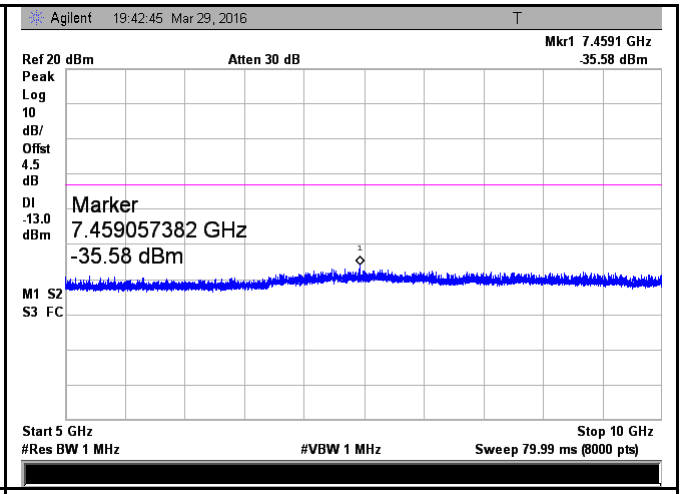


LTE Band 5 - High Channel-2

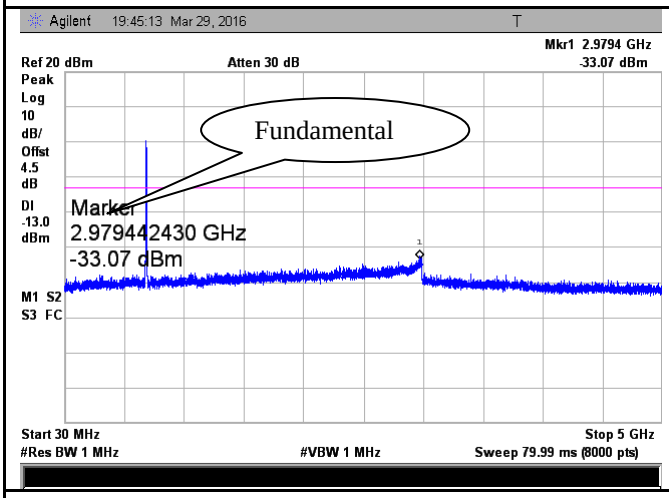
LTE Band 12 (Part 27)



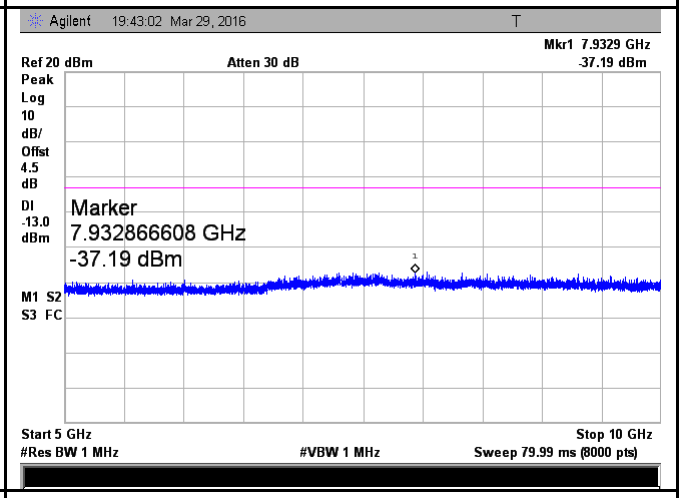
LTE Band 12 - Low Channel-1



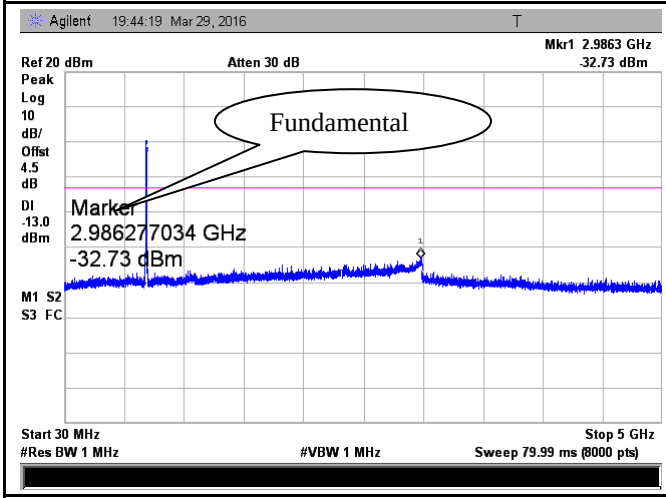
LTE Band 12 - Low Channel-2



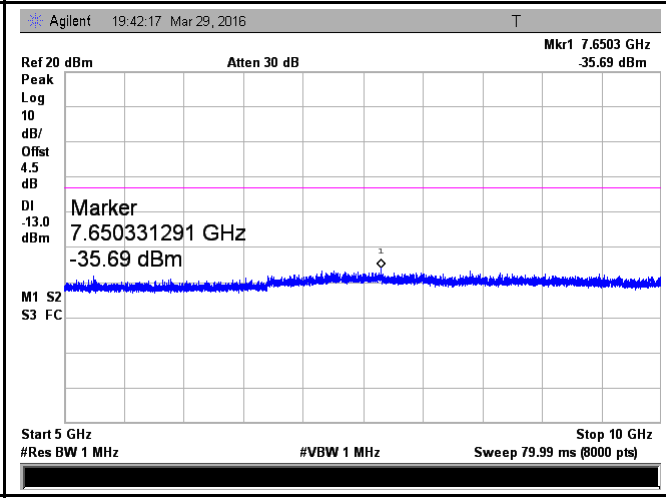
LTE Band 12- Middle Channel-1



LTE Band 12 - Middle Channel-2

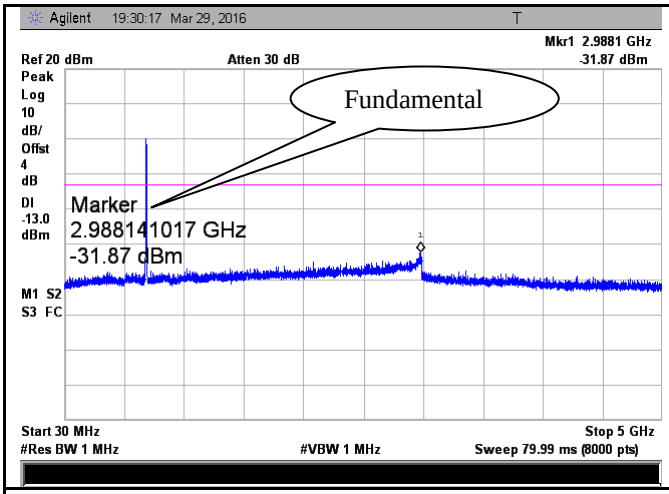


LTE Band 12 - High Channel-1

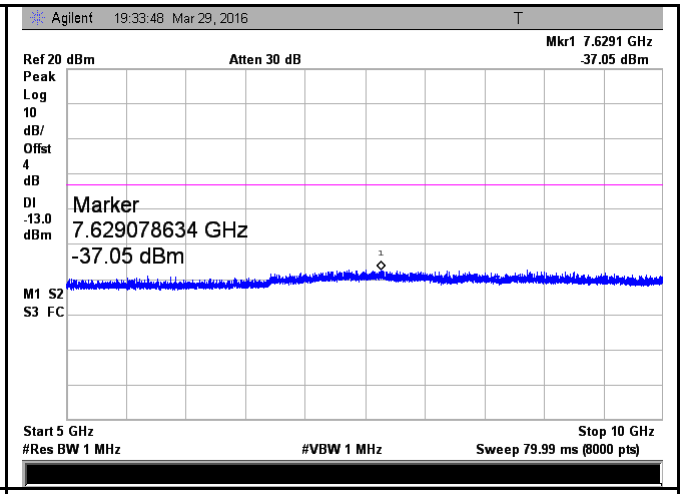


LTE Band 12 - High Channel-2

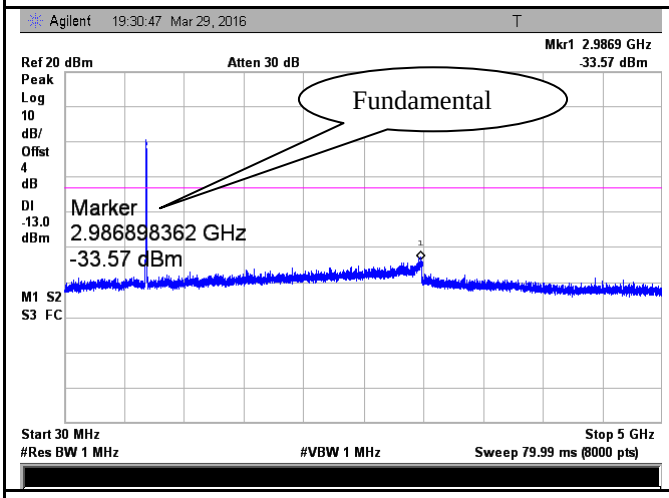
LTE Band 17 (Part 27)



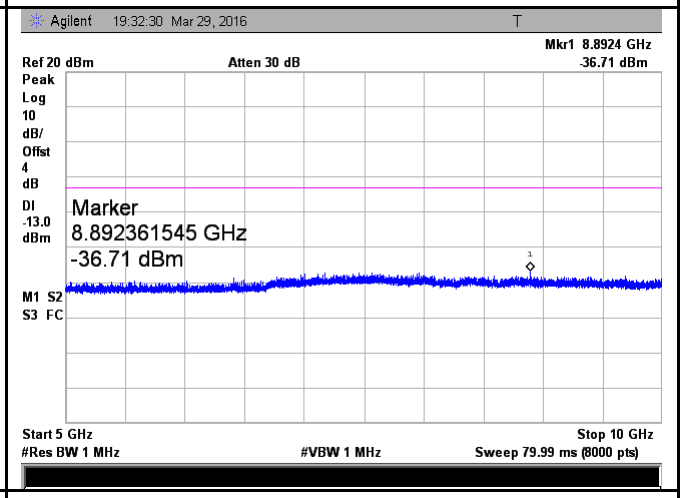
LTE Band 17 - Low Channel-1



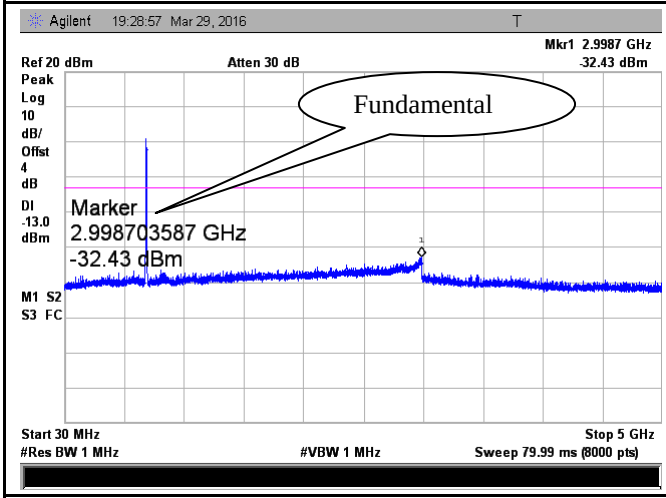
LTE Band 17 - Low Channel-2



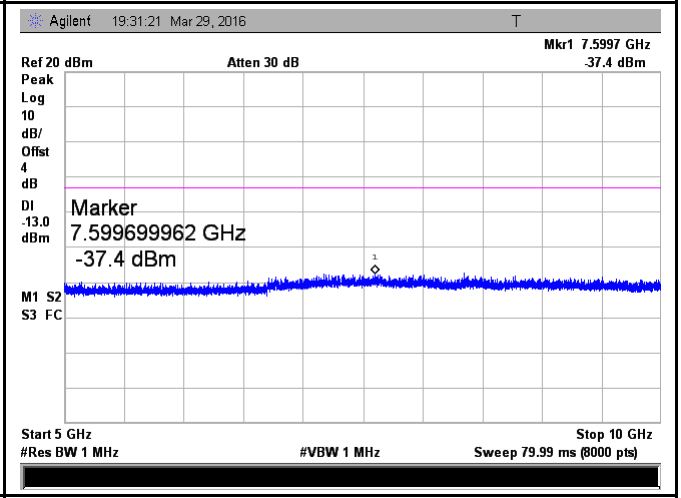
LTE Band 17- Middle Channel-1



LTE Band 17 - Middle Channel-2



LTE Band 17 - High Channel-1

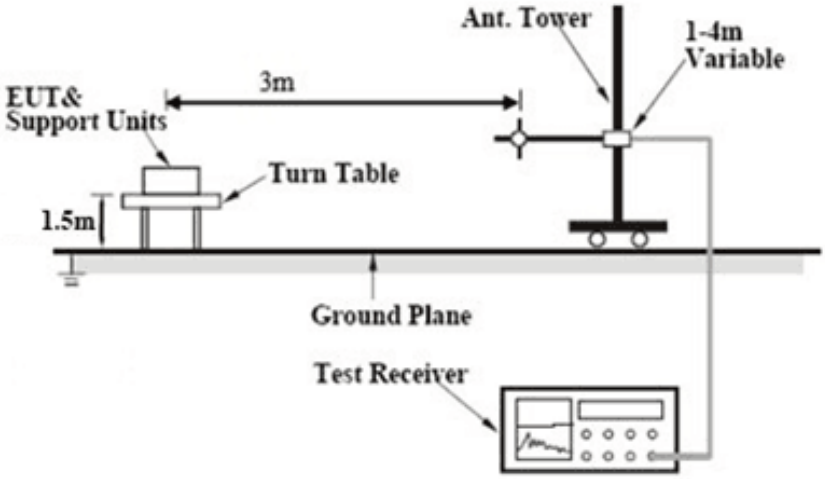


LTE Band 17 - High Channel-2

6.6 Spurious Radiated Emissions

Temperature	22℃
Relative Humidity	53%
Atmospheric Pressure	1029mbar
Test date :	March 29, 2016
Tested By :	Winnie Zhang

Requirement(s):

Spec	Item	Requirement	Applicable
§2.1053, §22.917 & §24.238 § 27.53(h)	a)	The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least 43 + 10 log (P) dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.	☑
Test setup			
Test Procedure	1. The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable. 2. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis. 3. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution. Sample Calculation: EUT Field Strength = Raw Amplitude (dBμV/m) – Amplifier Gain (dB) + Antenna Factor (dB) + Cable Loss (dB) + Filter Attenuation (dB, if used)		

Remark	
Result	☑ Pass ☐ Fail

Test Data ☑ Yes ☐ N/A

Test Plot ☐ Yes (See below) ☑ N/A

LTE Band 2 (Part 24E) result

Low channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3720	-46.13	V	10.25	2.73	-38.61	-13	-25.61
3720	-46.21	H	10.25	2.73	-38.69	-13	-25.69
60.3	-40.01	V	-4.2	0.11	-44.32	-13	-31.32
225.4	-47.95	H	4.6	0.18	-43.53	-13	-30.53

Middle channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3760	-46.47	V	10.25	2.73	-38.95	-13	-25.95
3760	-47.21	H	10.25	2.73	-39.69	-13	-26.69
60.5	-40.32	V	-4.2	0.11	-44.63	-13	-31.63
225.1	-48.26	H	4.6	0.18	-43.84	-13	-30.84

High channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3800	-45.79	V	10.36	2.73	-38.16	-13	-25.16
3800	-46.62	H	10.36	2.73	-38.99	-13	-25.99
60.7	-40.23	V	-4.2	0.11	-44.54	-13	-31.54
225.5	-46.79	H	4.6	0.18	-42.37	-13	-29.37

Note:

*1, The testing has been conformed to 10*1907.5MHz=19,075MHz*
2, All other emissions more than 30 dB below the limit

LTE Band 4(Part27) result

Low channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3440	-45.22	V	10.06	2.52	-37.68	-13	-24.68
3440	-47.84	H	10.06	2.52	-40.3	-13	-27.30
60.8	-40.16	V	-4.2	0.11	-44.47	-13	-31.47
225.9	-47.39	H	4.6	0.18	-42.97	-13	-29.97

Middle channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3465	-46.11	V	10.09	2.52	-38.54	-13	-25.54
3465	-46.97	H	10.09	2.52	-39.4	-13	-26.40
60.6	-39.84	V	-4.2	0.11	-44.15	-13	-31.15
225.3	-48.69	H	4.6	0.18	-44.27	-13	-31.27

High channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3490	-45.29	V	10.09	2.52	-37.72	-13	-24.72
3490	-47.91	H	10.09	2.52	-40.34	-13	-27.34
60.4	-40.67	V	-4.2	0.11	-44.98	-13	-31.98
225.7	-48.12	H	4.6	0.18	-43.7	-13	-30.70

Note:

*1, The testing has been conformed to 10*1752.5MHz=17,525MHz*
2, All other emissions more than 30 dB below the limit

LTE Band 5(Part22H) result

Low channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1658	-45.35	V	7.95	0.78	-38.18	-13	-25.18
1658	-46.24	H	7.95	0.78	-39.07	-13	-26.07
60.7	-41.31	V	-4.2	0.11	-45.62	-13	-32.62
225.1	-48.57	H	4.6	0.18	-44.15	-13	-31.15

Middle channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1673	-44.84	V	7.95	0.78	-37.67	-13	-24.67
1673	-45.79	H	7.95	0.78	-38.62	-13	-25.62
60.9	-41.18	V	-4.2	0.11	-45.49	-13	-32.49
225.2	-48.67	H	4.6	0.18	-44.25	-13	-31.25

High channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1688	-45.05	V	7.95	0.78	-37.88	-13	-24.88
1688	-46.22	H	7.95	0.78	-39.05	-13	-26.05
60.1	-40.37	V	-4.2	0.11	-44.68	-13	-31.68
225.6	-49.03	H	4.6	0.18	-44.61	-13	-31.61

Note:

*1, The testing has been conformed to 10*846.5MHz=8,465MHz*
2, All other emissions more than 30 dB below the limit

LTE Band 12(Part27) result

Low channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1408	-48.12	V	7.65	0.75	-41.22	-13	-28.22
1408	-46.32	H	7.65	0.75	-39.42	-13	-26.42
602.3	-50.89	V	6.5	0.36	-44.75	-13	-31.75
759.8	-50.17	H	6.8	0.44	-43.81	-13	-30.81

Middle channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1415	-47.69	V	7.65	0.75	-40.79	-13	-27.79
1415	-45.89	H	7.65	0.75	-38.99	-13	-25.99
602.6	-50.05	V	6.5	0.36	-43.91	-13	-30.91
759.3	-50.43	H	6.8	0.44	-44.07	-13	-31.07

High channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1422	-46.79	V	7.65	0.75	-39.89	-13	-26.89
1422	-47.88	H	7.65	0.75	-40.98	-13	-27.98
602.5	-50.37	V	6.5	0.36	-44.23	-13	-31.23
759.4	-50.21	H	6.8	0.44	-43.85	-13	-30.85

Note:

*1, The testing has been conformed to 10*715.3MHz=7,153MHz*
2, All other emissions more than 30 dB below the limit

LTE Band 17(Part27) result

Low channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1418	-44.23	V	7.65	0.75	-37.33	-13	-24.33
1418	-45.17	H	7.65	0.75	-38.27	-13	-25.27
60.1	-41.35	V	-4.2	0.11	-45.66	-13	-32.66
225.6	-47.29	H	4.6	0.18	-42.87	-13	-29.87

Middle channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1420	-44.05	V	7.65	0.75	-37.15	-13	-24.15
1420	-45.64	H	7.65	0.75	-38.74	-13	-25.74
60.6	-40.96	V	-4.2	0.11	-45.27	-13	-32.27
225.3	-47.88	H	4.6	0.18	-43.46	-13	-30.46

High channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1422	-43.87	V	7.65	0.75	-36.97	-13	-23.97
1422	-45.62	H	7.65	0.75	-38.72	-13	-25.72
60.5	-41.47	V	-4.20	0.11	-45.78	-13	-32.78
225.8	-49.03	H	4.60	0.18	-44.61	-13	-31.61

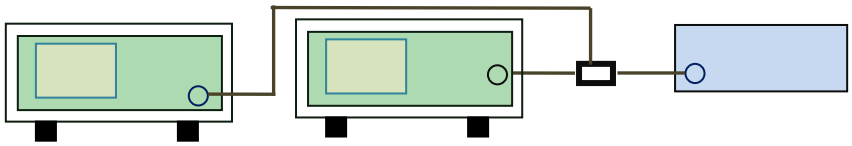
Note:

*1, The testing has been conformed to 10*713.5MHz=7,135MHz*
2, All other emissions more than 30 dB below the limit

6.7 Band Edge

Temperature	23℃
Relative Humidity	54%
Atmospheric Pressure	1030mbar
Test date :	March 30, 2016
Tested By :	Winnie Zhang

Requirement(s):

Spec	Item	Requirement	Applicable
§22.917(a) §24.238(a) § 27.53(h)	a)	The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least 43 + 10 log (P) dB.	☑
Test setup			
Procedure	- The EUT was connected to Spectrum Analyzer and Base Station via power divider. - The Band Edges of low and high channels for the highest RF powers were measured. Setting RBW as roughly BW/100.		
Remark			
Result	☑ Pass ☐ Fail		

Test Data ☑ Yes ☐ N/A

Test Plot ☑ Yes (See below) ☐ N/A

LTE Band 2 (Part 24E) result

BW(MHz)	Channel	Frequency (MHz)	Mode	Emission (dBm)	Limit (dBm)
1.4	18607	1850.7	QPSK	-20.00	-13
			16QAM	-27.13	-13
1.4	18900	1909.3	QPSK	-19.92	-13
			16QAM	-20.19	-13
3	18615	1851.5	QPSK	-15.60	-13
			16QAM	-14.42	-13
3	19185	1908.5	QPSK	-14.41	-13
			16QAM	-16.92	-13
5	18625	1852.5	QPSK	-15.69	-13
			16QAM	-16.40	-13
5	19175	1907.5	QPSK	-18.29	-13
			16QAM	-18.62	-13
10	18650	1855	QPSK	-30.08	-13
			16QAM	-29.00	-13
10	19150	1905	QPSK	-31.28	-13
			16QAM	-28.75	-13
15	18675	1857.5	QPSK	-22.06	-13
			16QAM	-22.43	-13
15	19125	1902.5	QPSK	-22.59	-13
			16QAM	-21.91	-13
20	18700	1860	QPSK	-23.14	-13
			16QAM	-23.89	-13
20	19100	1900	QPSK	-23.81	-13
			16QAM	-24.52	-13

LTE Band 4 (Part 27) result

BW(MHz)	Channel	Frequency (MHz)	Mode	Emission (dBm)	Limit (dBm)
1.4	19957	1710.7	QPSK	-24.99	-13
			16QAM	-26.45	-13
1.4	20393	1754.3	QPSK	-20.90	-13
			16QAM	-21.69	-13
3	19965	1711.5	QPSK	-16.30	-13
			16QAM	-20.11	-13
3	20385	1753.5	QPSK	-16.97	-13
			16QAM	-16.52	-13
5	19975	1712.5	QPSK	-17.87	-13
			16QAM	-18.52	-13
5	20375	1752.5	QPSK	-18.38	-13
			16QAM	-18.63	-13
10	20000	1715	QPSK	-20.71	-13
			16QAM	-18.00	-13
10	20350	1750	QPSK	-20.62	-13
			16QAM	-20.62	-13
15	20025	1717.5	QPSK	-18.34	-13
			16QAM	-22.03	-13
15	20325	1747.5	QPSK	-25.30	-13
			16QAM	-24.41	-13
20	20050	1720	QPSK	-24.50	-13
			16QAM	-19.58	-13
20	20300	1745	QPSK	-29.67	-13
			16QAM	-26.46	-13

LTE Band 5 (Part 22H) result

BW(MHz)	Channel	Frequency (MHz)	Mode	Emission (dBm)	Limit (dBm)
1.4	20407	824.7	QPSK	-19.95	-13
			16QAM	-20.37	-13
1.4	20643	848.3	QPSK	-21.75	-13
			16QAM	-25.33	-13
3	20415	825.5	QPSK	-13.77	-13
			16QAM	-14.85	-13
3	20635	847.5	QPSK	-16.83	-13
			16QAM	-15.16	-13
5	20425	826.5	QPSK	-16.68	-13
			16QAM	-15.76	-13
5	20625	846.5	QPSK	-22.74	-13
			16QAM	-21.02	-13
10	20450	829	QPSK	-14.48	-13
			16QAM	-17.00	-13
10	20800	844	QPSK	-21.74	-13
			16QAM	-21.68	-13

LTE Band 12 (Part 27) result

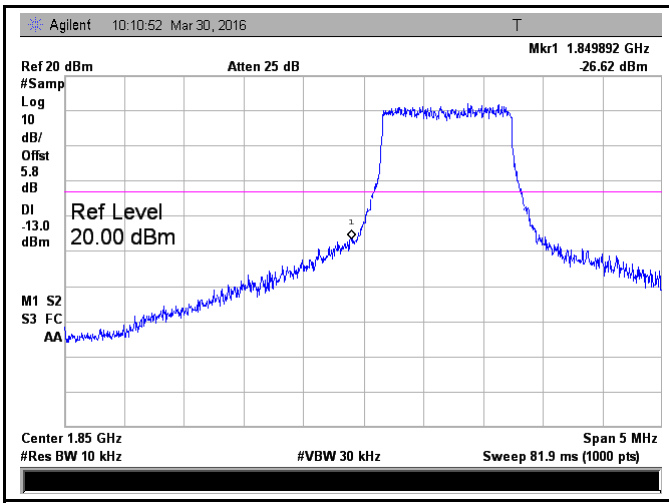
BW(MHz)	Channel	Frequency (MHz)	Mode	Emission (dBm)	Limit (dBm)
1.4	23017	699.7	QPSK	-22.16	-13
			16QAM	-22.44	-13
1.4	23173	715.3	QPSK	-24.39	-13
			16QAM	-24.85	-13
3	23025	700.5	QPSK	-13.79	-13
			16QAM	-14.23	-13
3	23165	714.5	QPSK	-16.62	-13
			16QAM	-16.50	-13
5	23035	701.5	QPSK	-16.35	-13
			16QAM	-18.03	-13
5	23155	713.5	QPSK	-17.19	-13
			16QAM	-16.77	-13
10	23060	704	QPSK	-17.62	-13
			16QAM	-19.09	-13
10	23130	711	QPSK	-21.19	-13
			16QAM	-21.05	-13

LTE Band 17 (Part 27) result

BW(MHz)	Channel	Frequency (MHz)	Mode	Emission (dBm)	Limit (dBm)
5	23755	706.5	QPSK	-17.65	-13
			16QAM	-19.35	-13
5	23825	713.5	QPSK	-18.86	-13
			16QAM	-18.03	-13
10	23780	709	QPSK	-19.04	-13
			16QAM	-18.89	-13
10	23800	711	QPSK	-20.00	-13
			16QAM	-19.66	-13

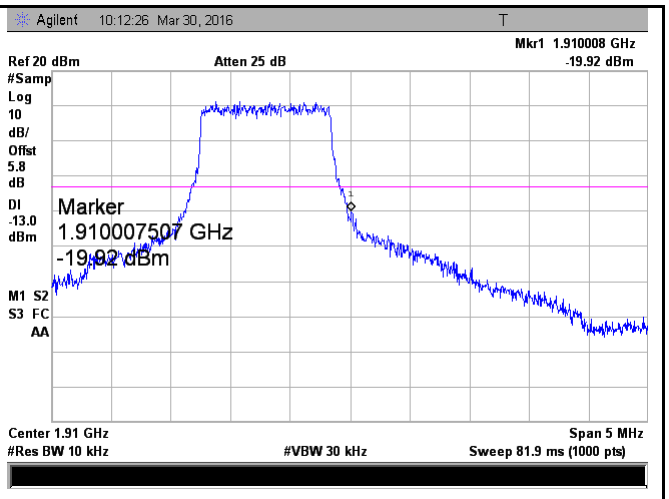
Test Plots

LTE Band 2 (Part 24E)



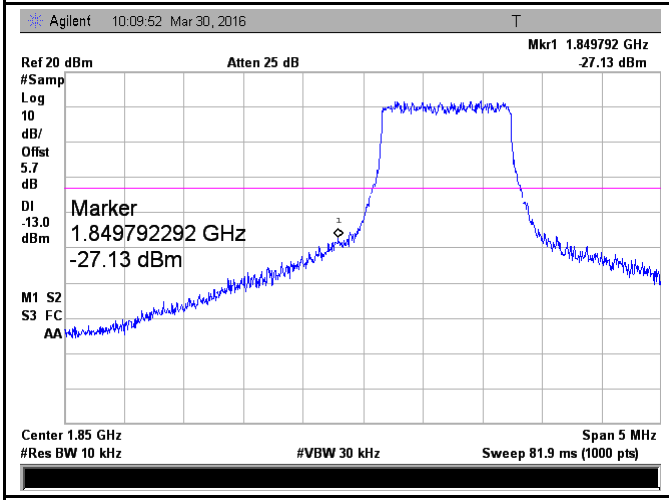
LTE Band 2 - Low Channel QPSK-1.4

Note: Offset=Cable loss (4.5) + 10log (13.35/10)=4.5+1.3=5.8dB



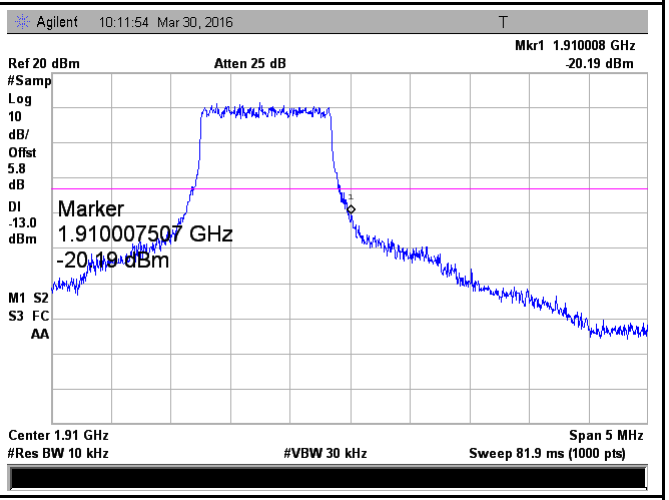
LTE Band 2 - High Channel QPSK-1.4

Note: Offset=Cable loss (4.5) + 10log (13.53/10)=4.5+1.3=5.8dB



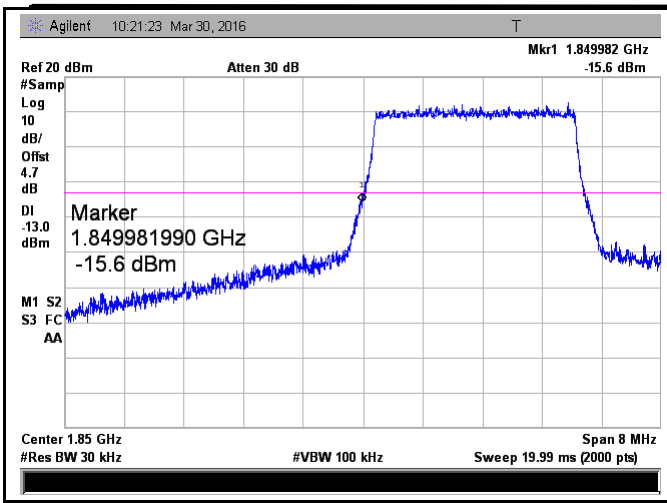
LTE Band 2 - Low Channel 16QAM-1.4

Note: Offset=Cable loss (4.5) + 10log (13.27/10)=4.5+1.2=5.7 dB



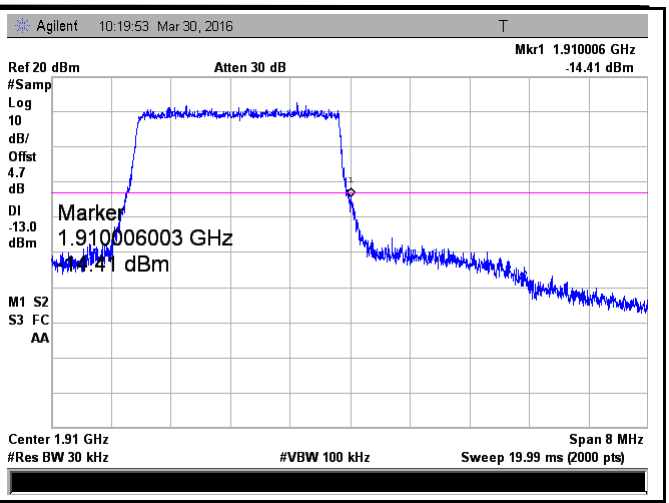
LTE Band 2 - High Channel 16QAM-1.4

Note: Offset=Cable loss (4.5) + 10log (13.42/10)=4.5+1.3=5.8 dB



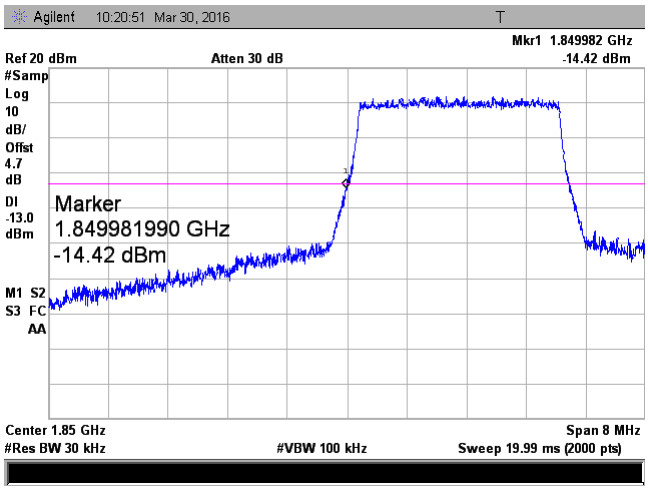
LTE Band 2 - Low Channel QPSK-3

Note: Offset=Cable loss (4.5) + 10log (31.14/30)=4.5+0.2=4.7 dB



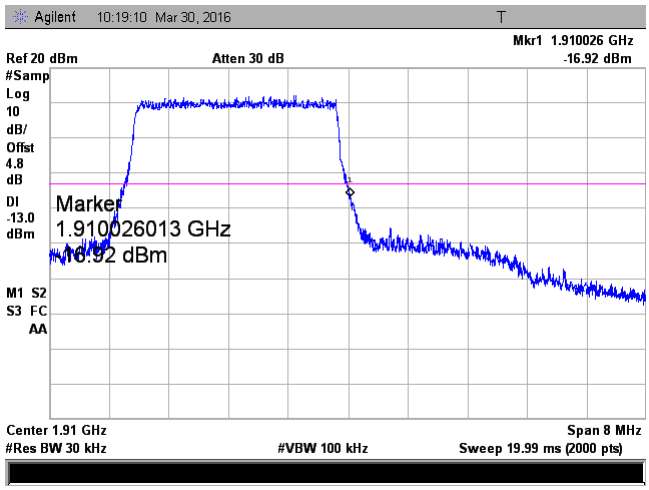
LTE Band 2 - High Channel QPSK-3

Note: Offset=Cable loss (4.5) + 10log (31.40/30)=4.5+0.2=4.7 dB



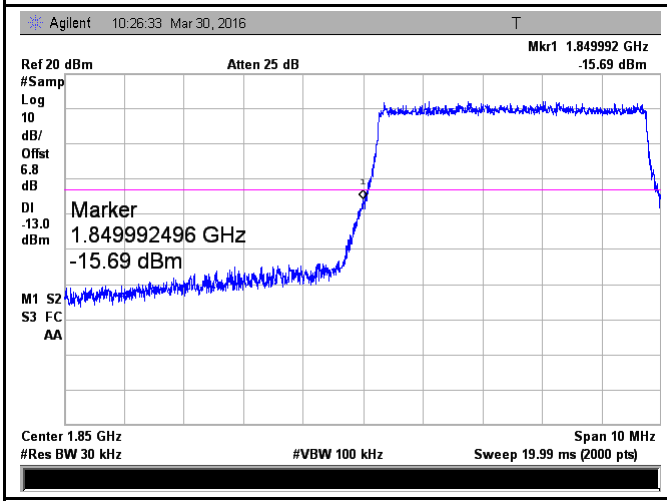
LTE Band 2 - Low Channel 16QAM-3

Note: Offset=Cable loss (4.5) + 10log (31.41/30)=4.5+0.2=4.7 dB

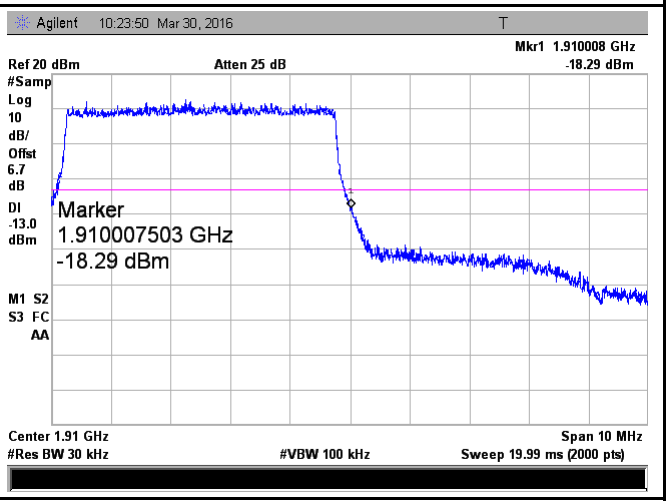


LTE Band 2 - High Channel 16QAM-3

Note: Offset=Cable loss (4.5) + 10log (31.83/30)=4.5+0.3=4.8 dB

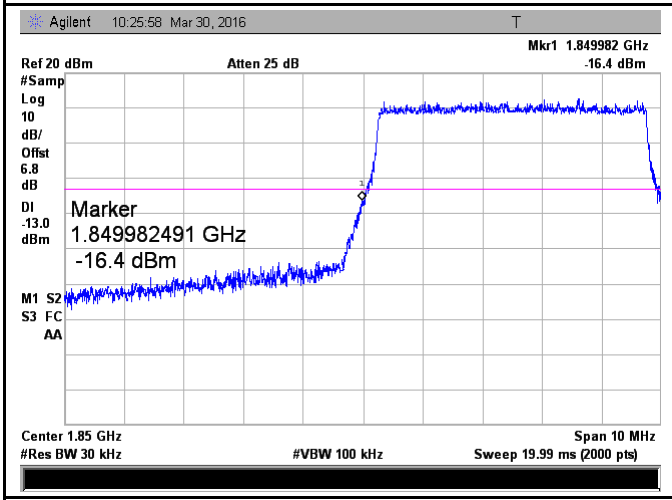


LTE Band 2 - Low Channel QPSK-5



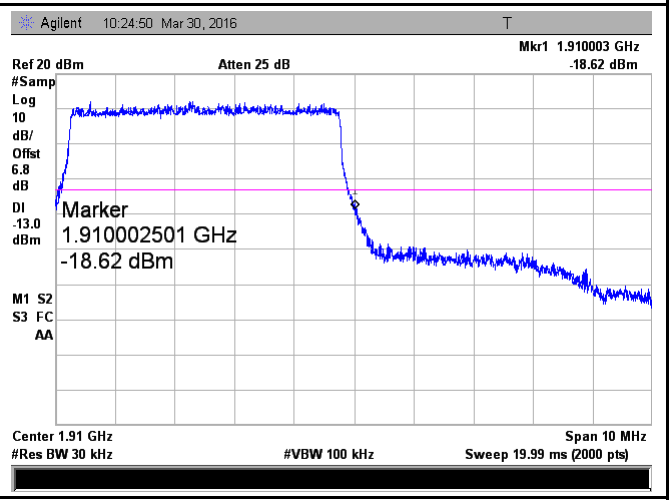
LTE Band 2 - High Channel QPSK-5

Note: Offset=Cable loss (4.5) + 10log (50.56/30)=4.5+2.3=6.8 dB



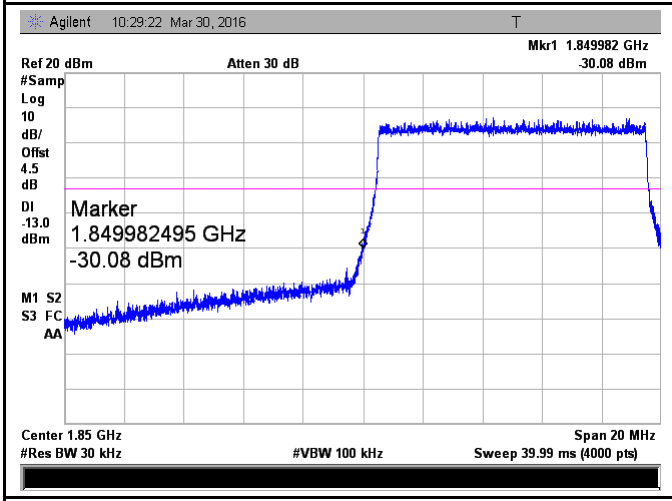
LTE Band 2 - Low Channel 16QAM-5

Note: Offset=Cable loss (4.5) + 10log (50.23/30)=4.5+2.2=6.7dB



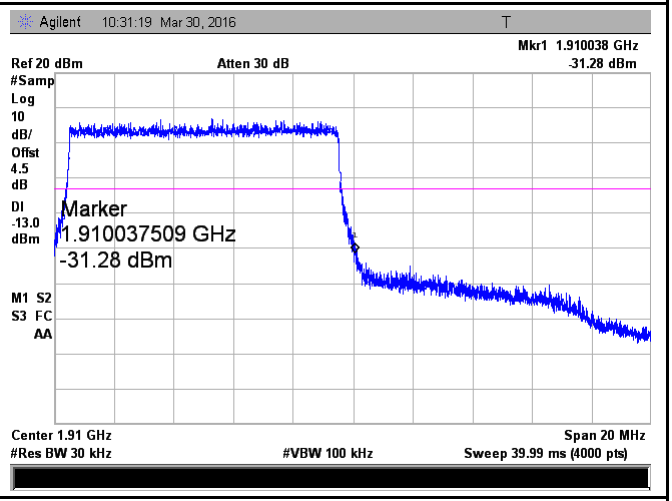
LTE Band 2 - High Channel 16QAM-5

Note: Offset=Cable loss (4.5) + 10log (50.73/30)=4.5+2.3=6.8 dB

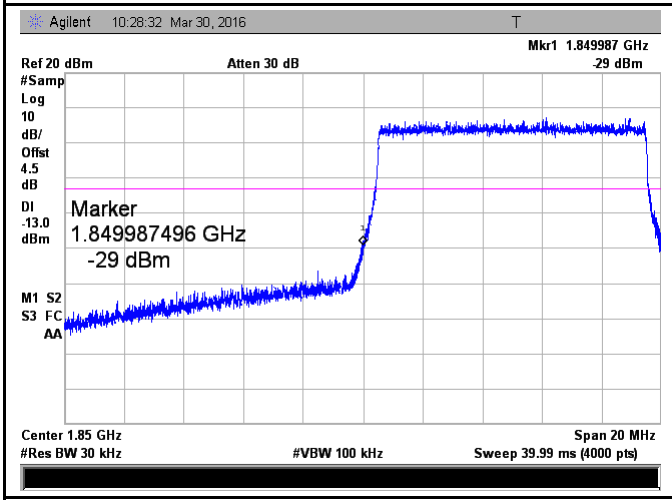


LTE Band 2 - Low Channel QPSK-10

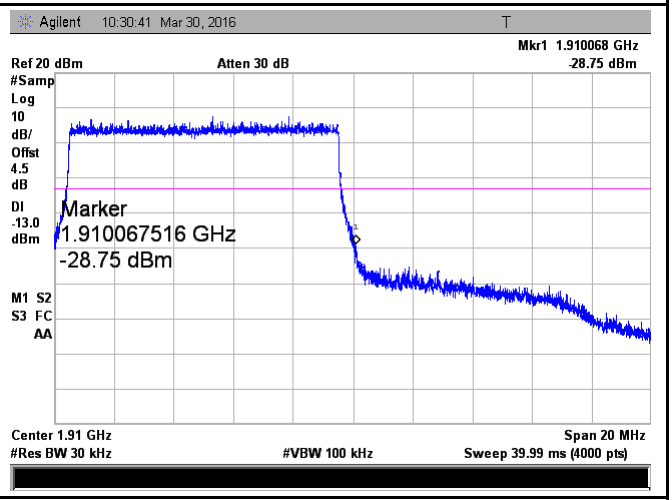
Note: Offset=Cable loss (4.5) + 10log (50.81/30)=4.5+2.3=6.8 dB



LTE Band 2 - High Channel QPSK-10

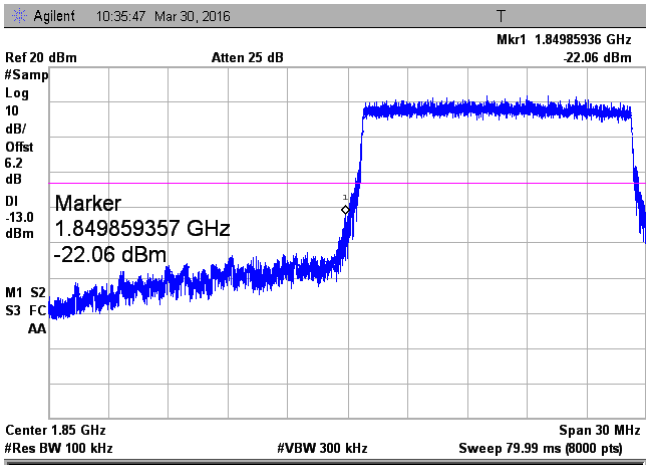


LTE Band 2 - Low Channel 16QAM-10



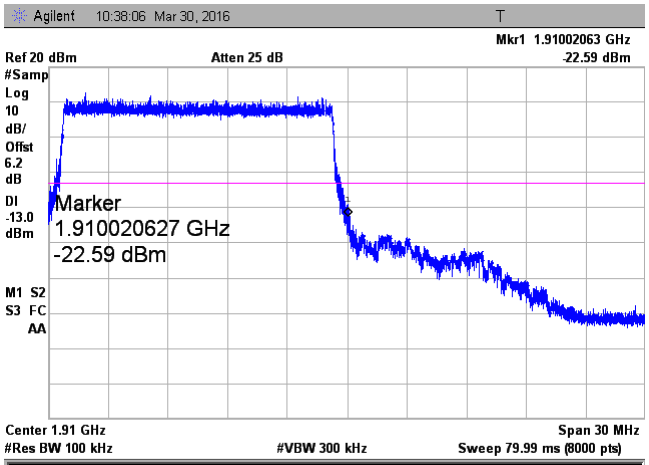
LTE Band 2 - High Channel 16QAM-10

Note: Offset=Cable loss (4.5) + 10log (100.8/100)=4.5+0.0=4.5 dB



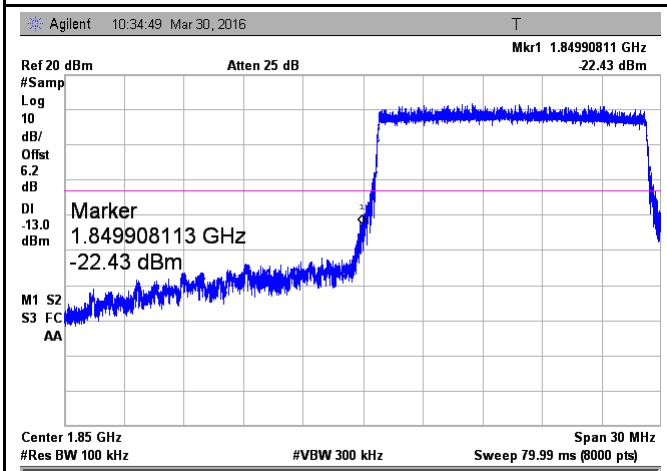
LTE Band 2 - Low Channel QPSK-15

Note: Offset=Cable loss (4.5) + 10log (102.4/100)=4.5+0.0=4.5 dB



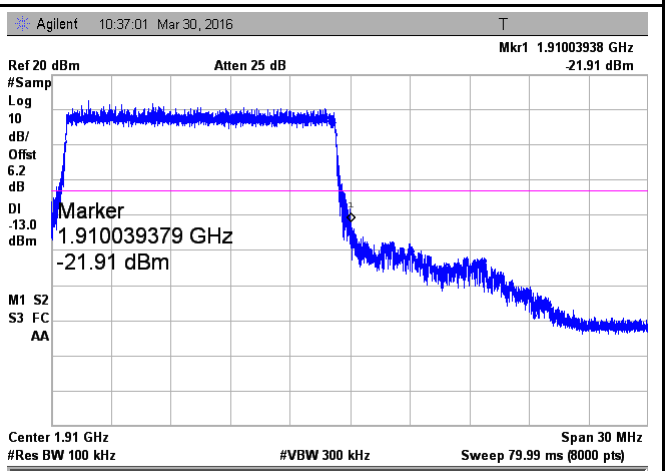
LTE Band 2 - High Channel QPSK-15

Note: Offset=Cable loss (4.5) + 10log (148.52/100)=4.5+1.7=6.2dB



LTE Band 2 - Low Channel 16QAM-15

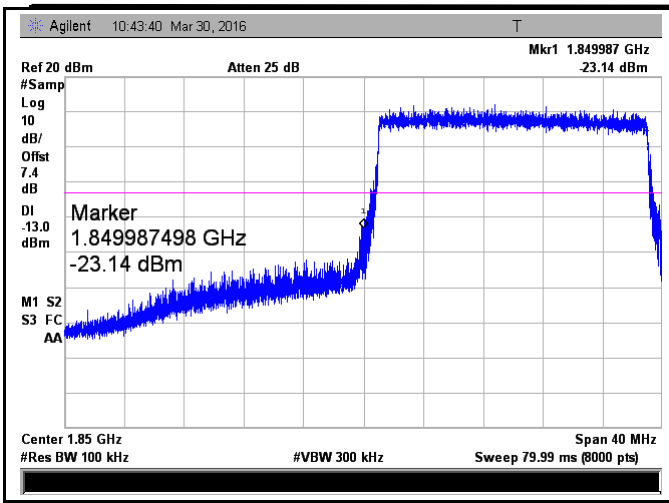
Note: Offset=Cable loss (4.5) + 10log (149.04/100)=4.5+1.7=6.2 dB



LTE Band 2 - High Channel 16QAM-15

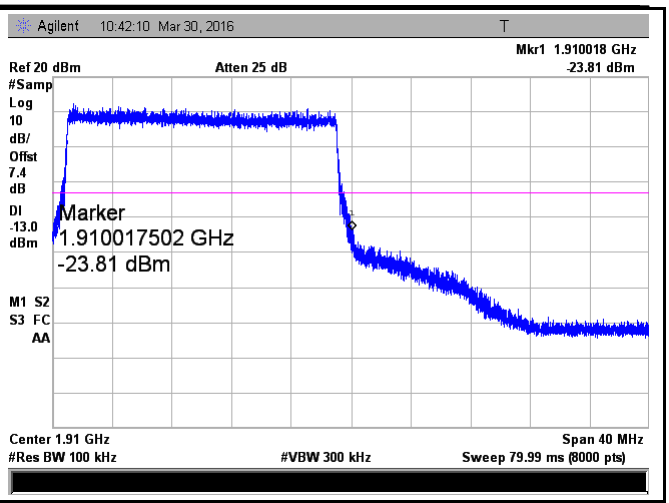
Note: Offset=Cable loss (4.5) + 10log (148.3/100)=4.5+1.7=6.2 dB

Note: Offset=Cable loss (4.5) + 10log (149.14/100)=4.5+1.7=6.2 dB



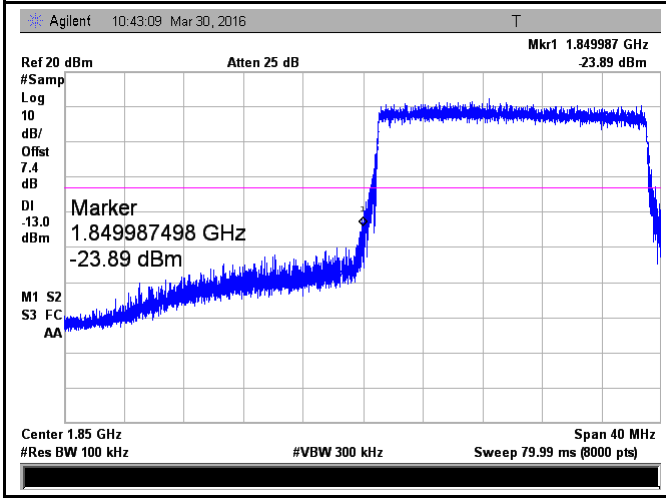
LTE Band 2 - Low Channel QPSK-20

Note: Offset=Cable loss (4.5) + 10log (193.5/100)=4.5+2.9=7.4 dB



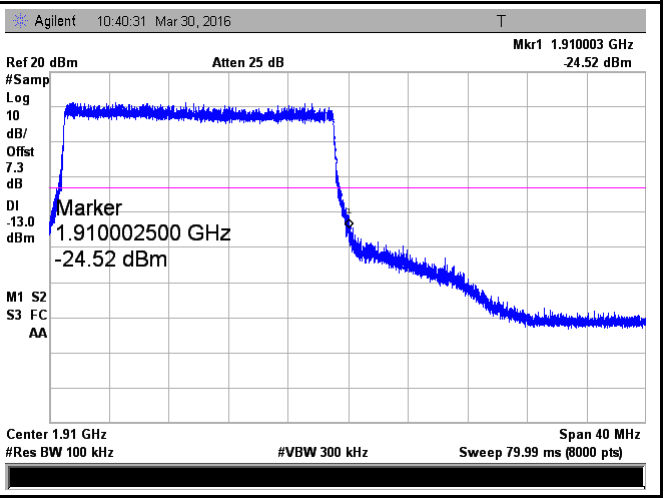
LTE Band 2 - High Channel QPSK-20

Note: Offset=Cable loss (4.5) + 10log (193.7/100)=4.5+2.9=7.4 dB



LTE Band 2 - Low Channel 16QAM-20

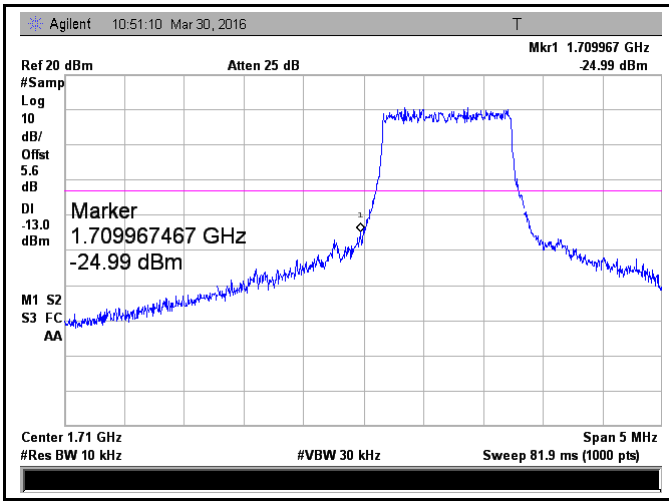
Note: Offset=Cable loss (4.5) + 10log (195.05/100)=4.5+2.9=7.4 dB



LTE Band 2 - High Channel 16QAM-20

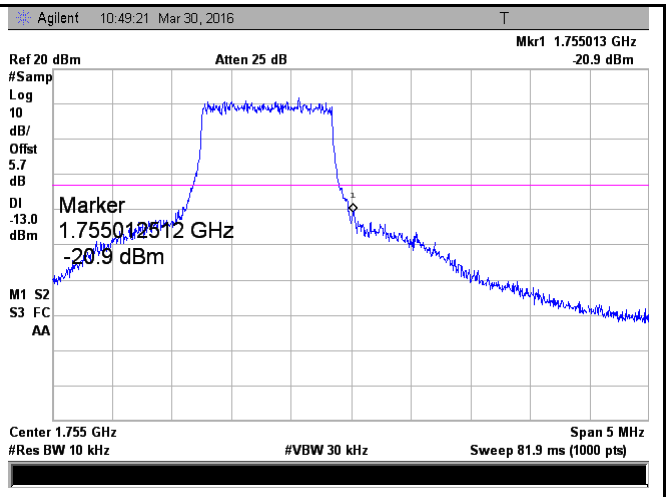
Note: Offset=Cable loss (4.5) + 10log (192.71/100)=4.5+2.8=7.3 dB

LTE Band 4 (Part 27)



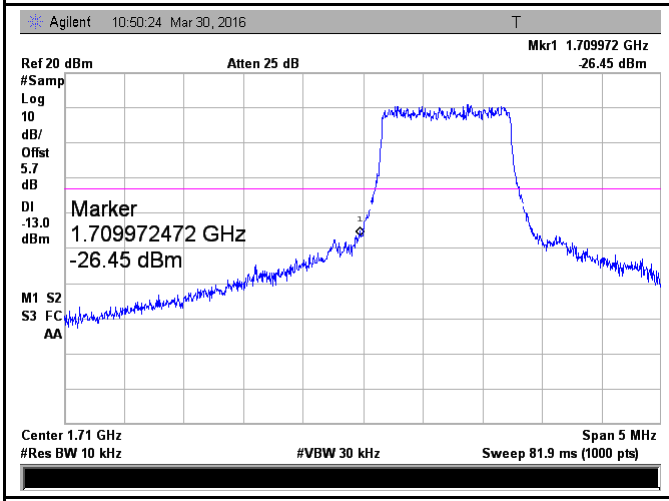
LTE Band 4 - Low Channel QPSK-1.4

Note: Offset=Cable loss (4.5) + 10log (12.96/10)=4.5+1.1=5.6dB



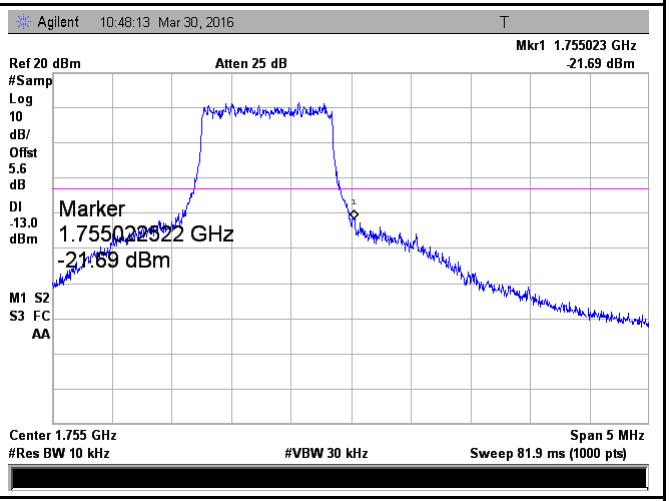
LTE Band 4 - High Channel QPSK-1.4

Note: Offset=Cable loss (4.5) + 10log (13.13/10)=4.5+1.2=5.7dB



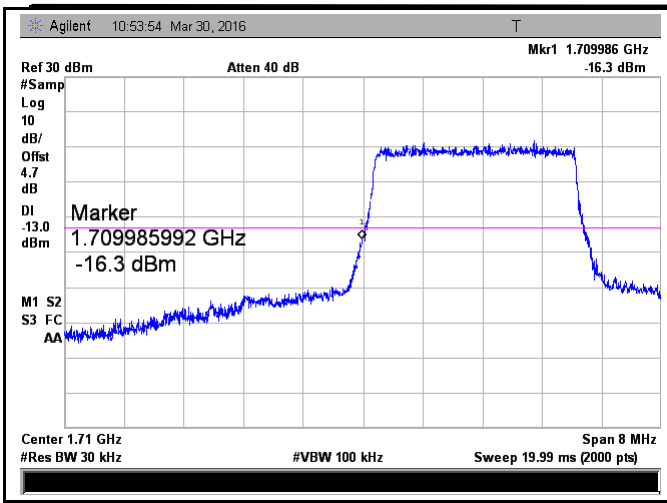
LTE Band 4 - Low Channel 16QAM-1.4

Note: Offset=Cable loss (4.5) + 10log (13.15/10)=4.5+1.2=5.7dB



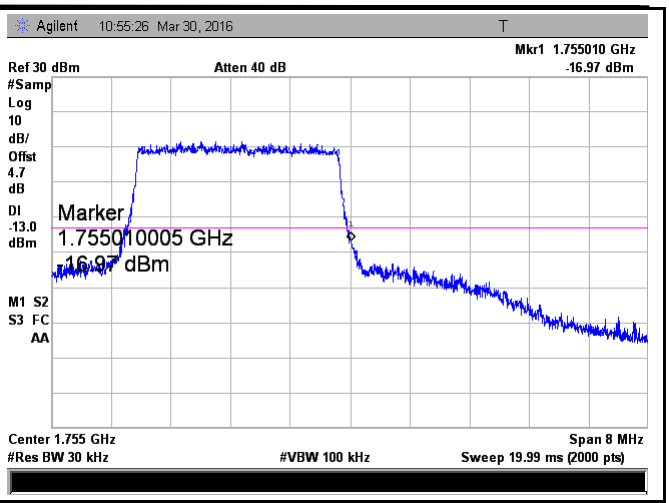
LTE Band 4 - High Channel 16QAM-1.4

Note: Offset=Cable loss (4.5) + 10log (13.01/10)=4.5+1.1=5.6 dB



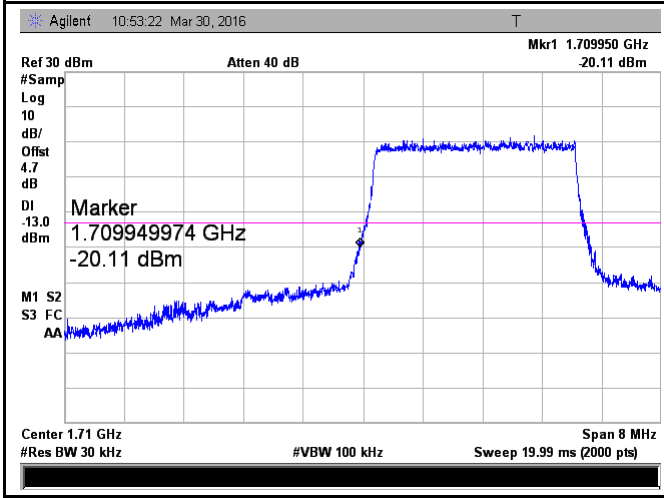
LTE Band 4 - Low Channel QPSK-3

Note: Offset=Cable loss (4.5) + 10log (31.54/30)=4.5+0.2=4.7 dB



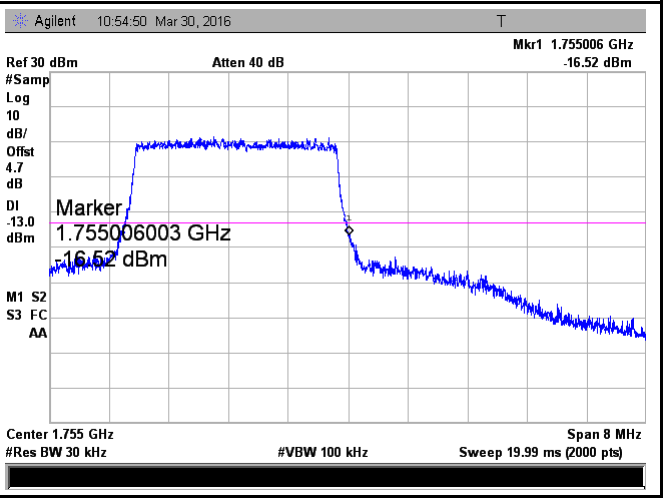
LTE Band 4 - High Channel QPSK-3

Note: Offset=Cable loss (4.5) + 10log (31.44/30)=4.5+0.2=4.7 dB



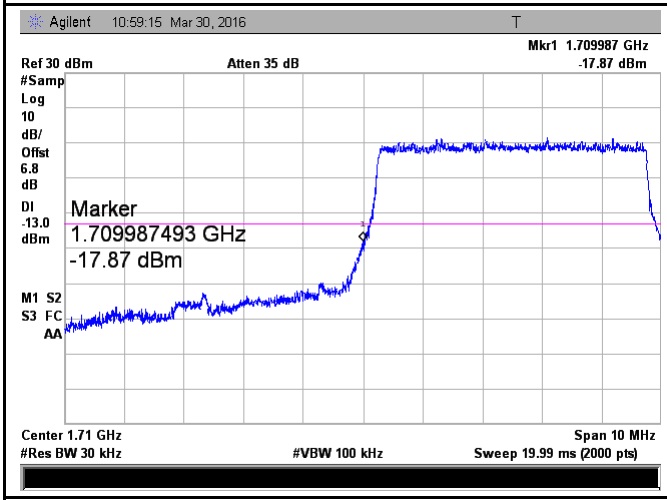
LTE Band 4 - Low Channel 16QAM-3

Note: Offset=Cable loss (4.5) + 10log (31.27/30)=4.5+0.2=4.7 dB

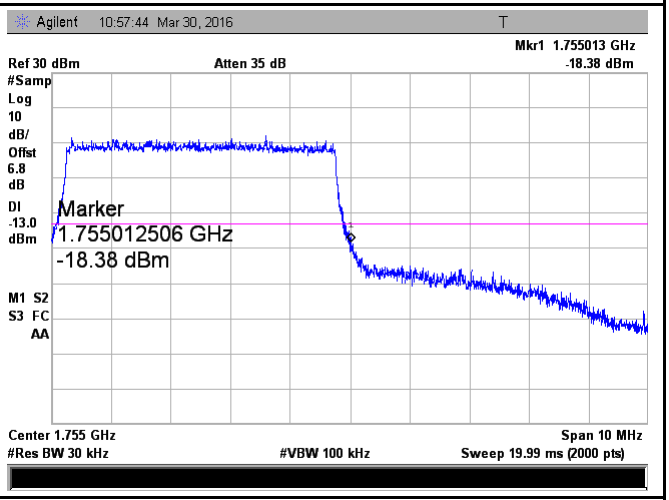


LTE Band 4 - High Channel 16QAM-3

Note: Offset=Cable loss (4.5) + 10log (31.4/30)=4.5+0.2=4.7 dB

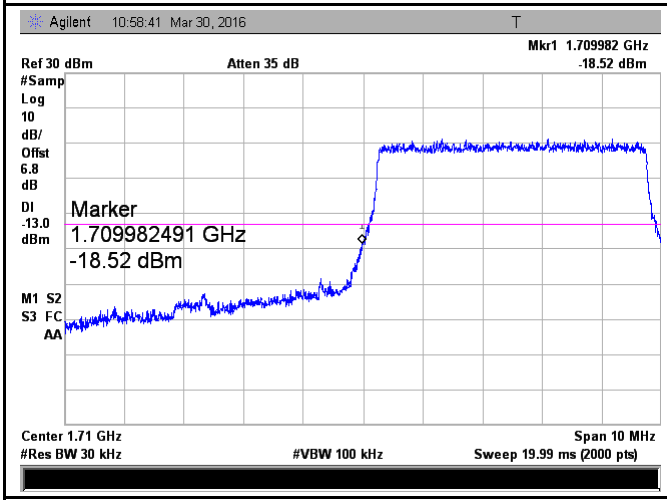


LTE Band 4 - Low Channel QPSK-5



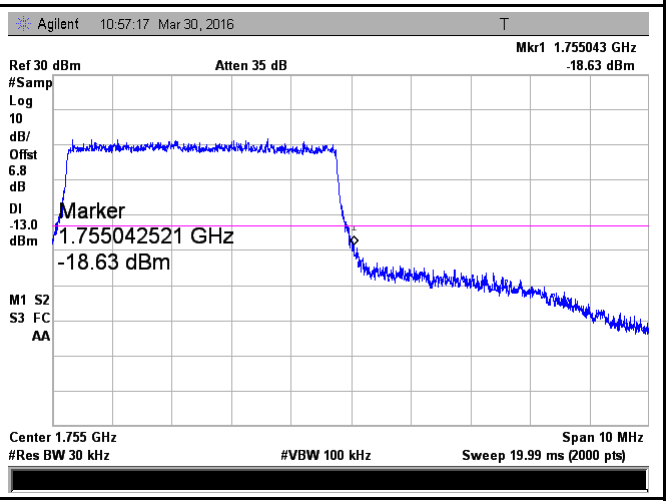
LTE Band 4 - High Channel QPSK-5

Note: Offset=Cable loss (4.5) + 10log (50.63/30)=4.5+2.3=6.8dB



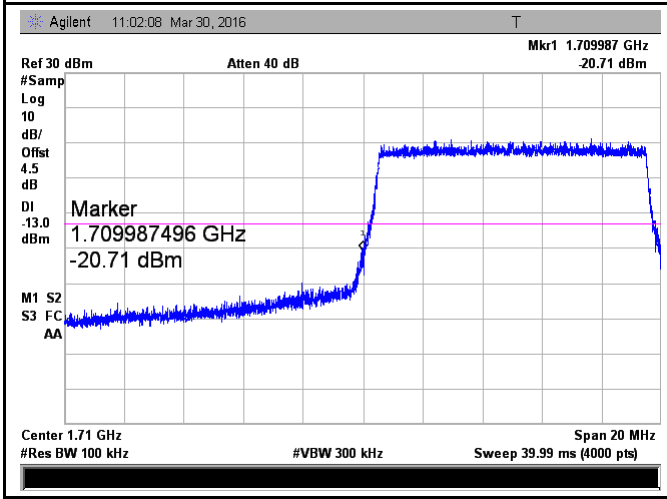
LTE Band 4 - Low Channel 16QAM-5

Note: Offset=Cable loss (4.5) + 10log (50.61/30)=4.5+2.3=6.8 dB



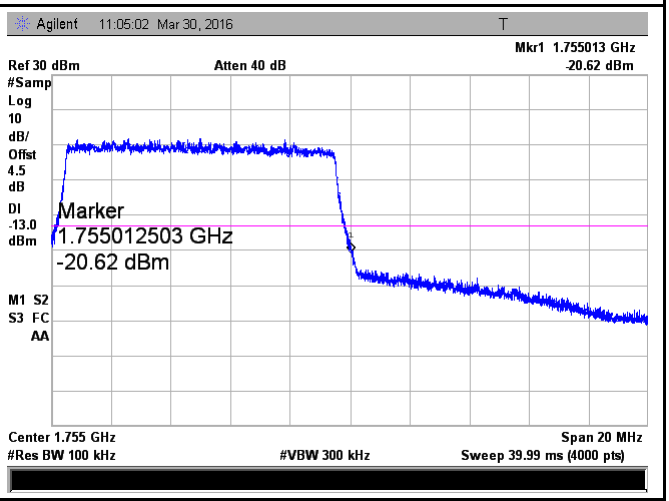
LTE Band 4 - High Channel 16QAM-5

Note: Offset=Cable loss (4.5) + 10log (51.05/30)=4.5+2.3=6.8 dB

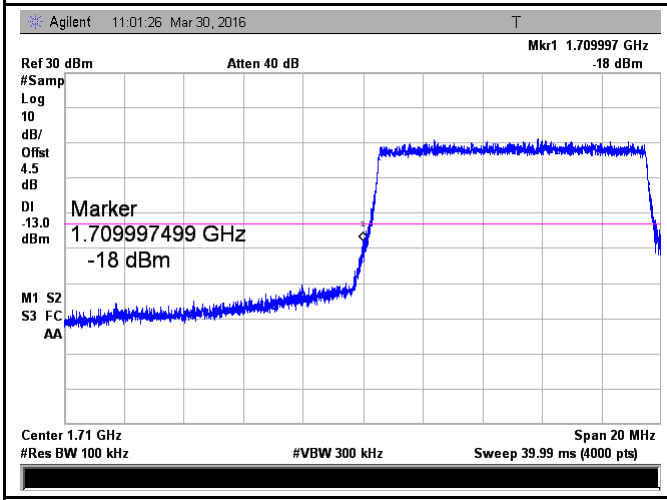


LTE Band 4 - Low Channel QPSK-10

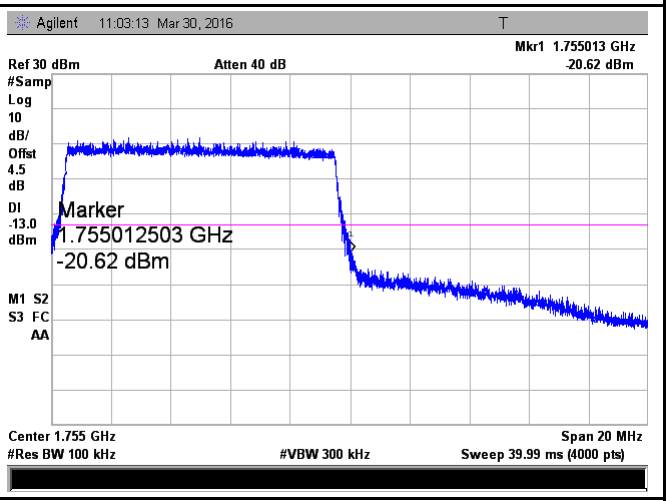
Note: Offset=Cable loss (4.5) + 10log (50.77/30)=4.5+2.3=6.8dB



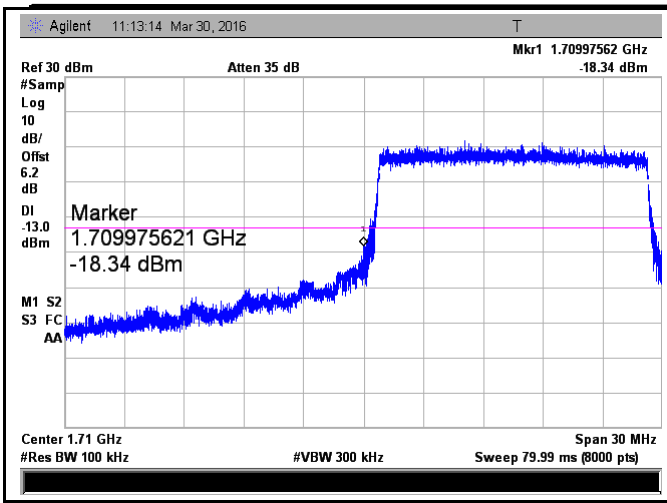
LTE Band 4 - High Channel QPSK-10



LTE Band 4 - Low Channel 16QAM-10

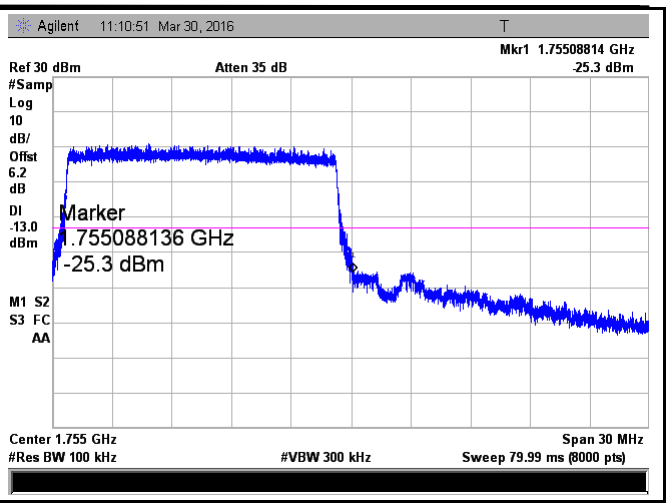


LTE Band 4 - High Channel 16QAM-10



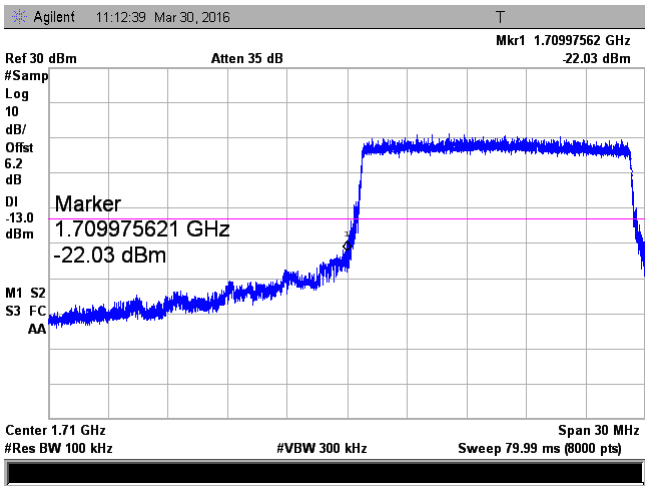
LTE Band 4 - Low Channel QPSK-15

Note: Offset=Cable loss (4.5) + 10log (148.37/100)=4.5+1.7=6.2 dB



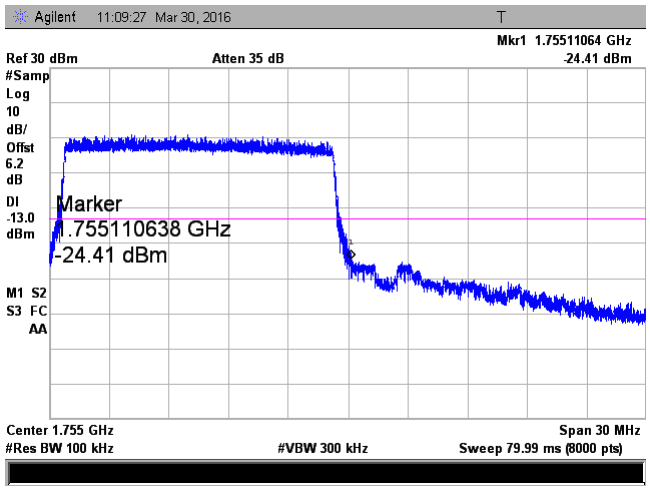
LTE Band 4 - High Channel QPSK-15

Note: Offset=Cable loss (4.5) + 10log (146.31/100)=4.5+1.7=6.2 dB



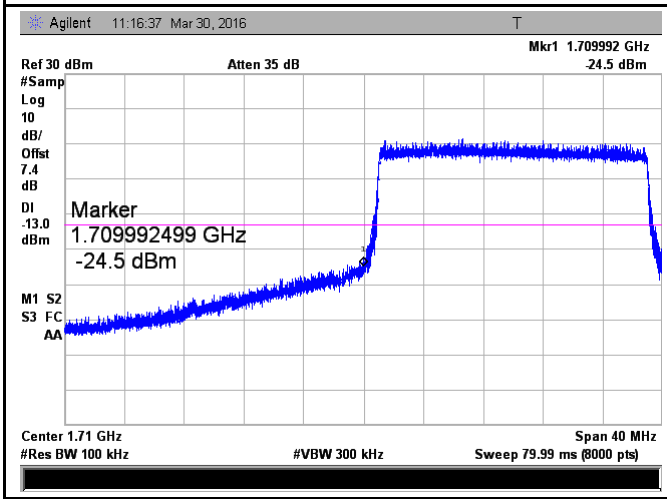
LTE Band 4 - Low Channel 16QAM-15

Note: Offset=Cable loss (4.5) + 10log (147.57/100)=4.5+1.7=6.2 dB

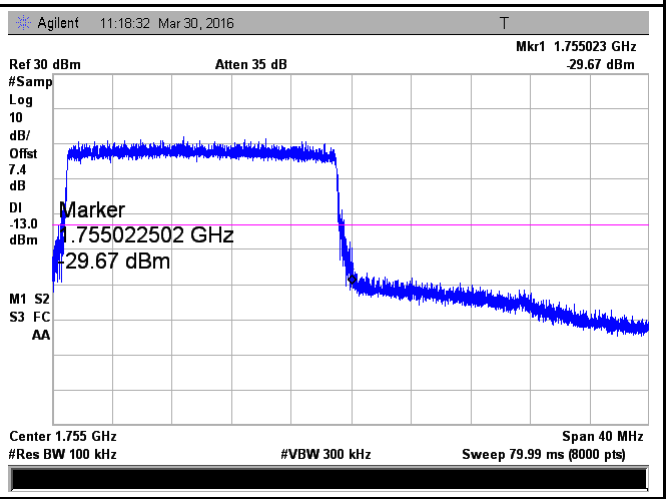


LTE Band 4 - High Channel 16QAM-15

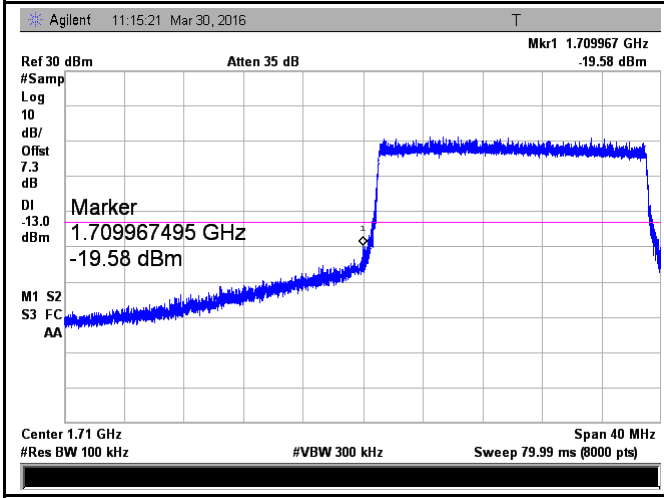
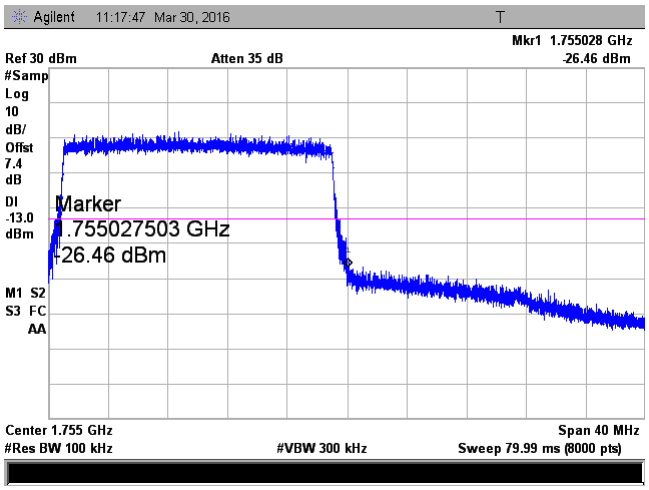
Note: Offset=Cable loss (4.5) + 10log (148.86/100)=4.5+1.7=6.2 dB



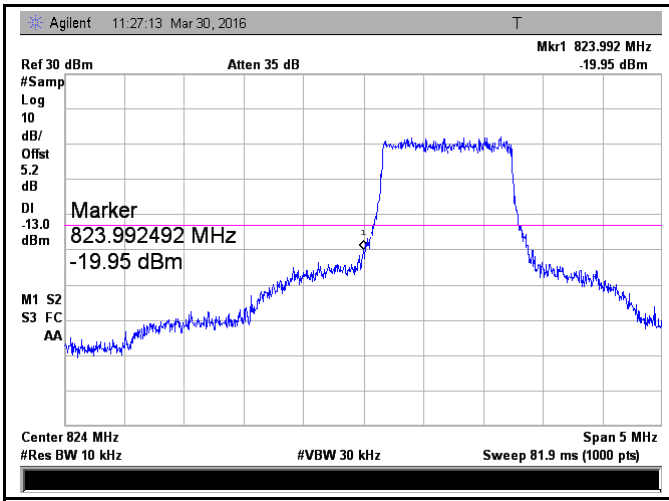
LTE Band 4 - Low Channel QPSK-20



LTE Band 4 - High Channel QPSK-20

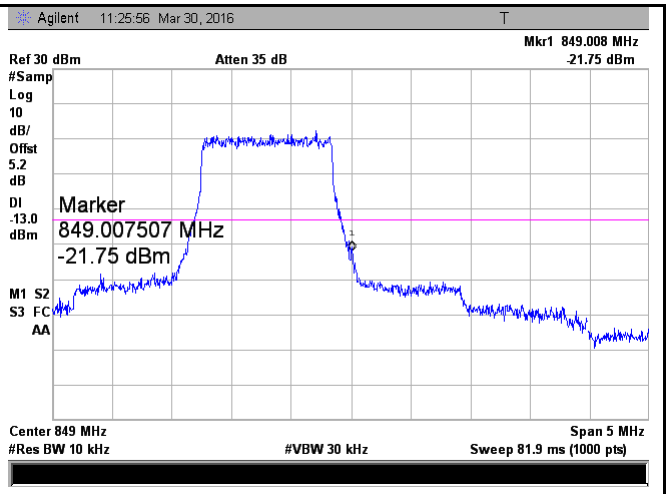
Note: Offset=Cable loss (4.5) + 10log (193.89/100)=4.5+2.9=7.4 dB	Note: Offset=Cable loss (4.5) + 10log (192.09/100)=4.5+2.9=7.4dB
	
LTE Band 4 - Low Channel 16QAM-20	LTE Band 4 - High Channel 16QAM-20
Note: Offset=Cable loss (4.5) + 10log (192.73/100)=4.5+2.8=7.3dB	Note: Offset=Cable loss (4.5) + 10log (192.19/100)=4.5+2.9=7.4 dB

LTE Band 5 (Part 22H)



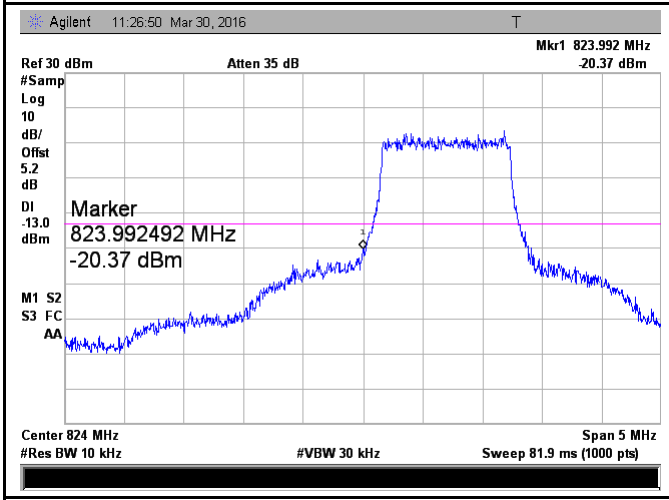
LTE Band 5 - Low Channel QPSK-1.4

Note: Offset=Cable loss (4.5) + 10log (13.22/10)=4.0+1.2=5.2dB



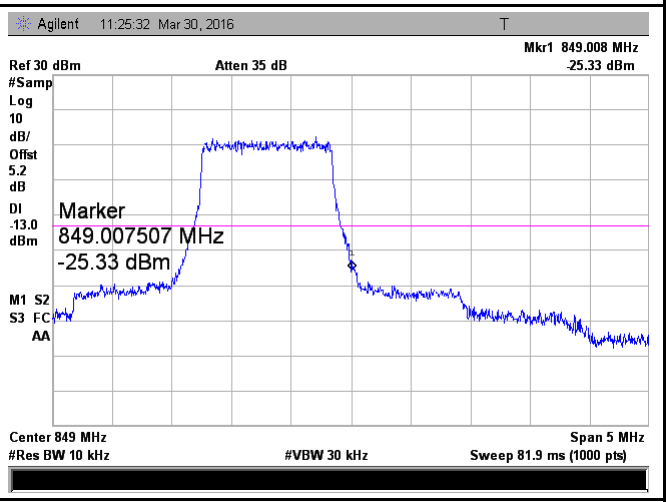
LTE Band 5 - High Channel QPSK-1.4

Note: Offset=Cable loss (4.5) + 10log (13.20/10)=4.0+1.2=5.2 dB



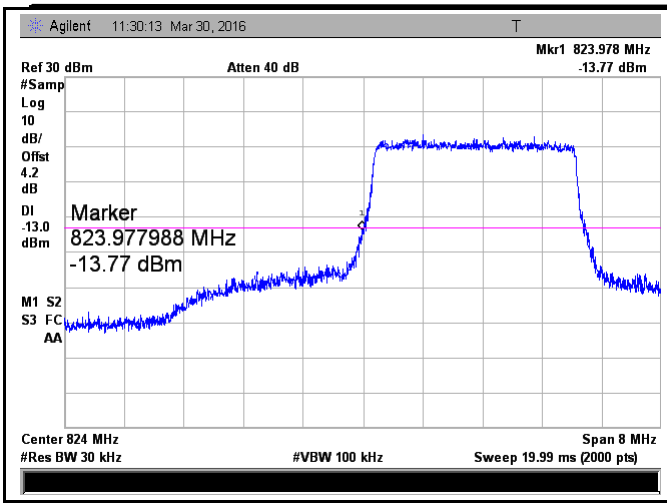
LTE Band 5 - Low Channel 16QAM-1.4

Note: Offset=Cable loss (4.5) + 10log (13.12/10)=4.0+1.2=5.2 dB



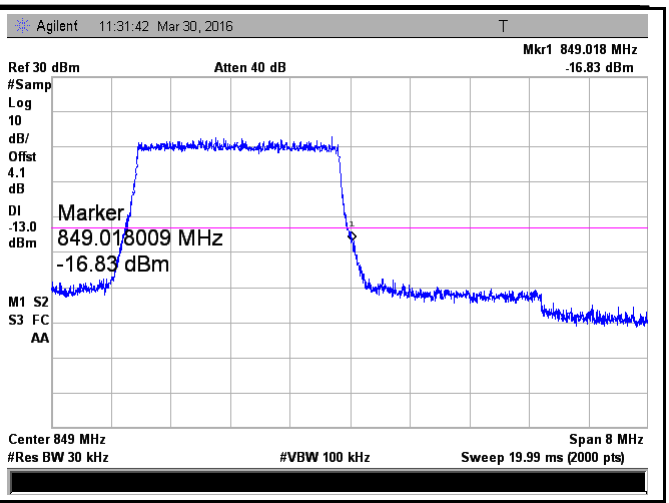
LTE Band 5 - High Channel 16QAM-1.4

Note: Offset=Cable loss (4.5) + 10log (13.11/10)=4.0+1.2=5.2 dB



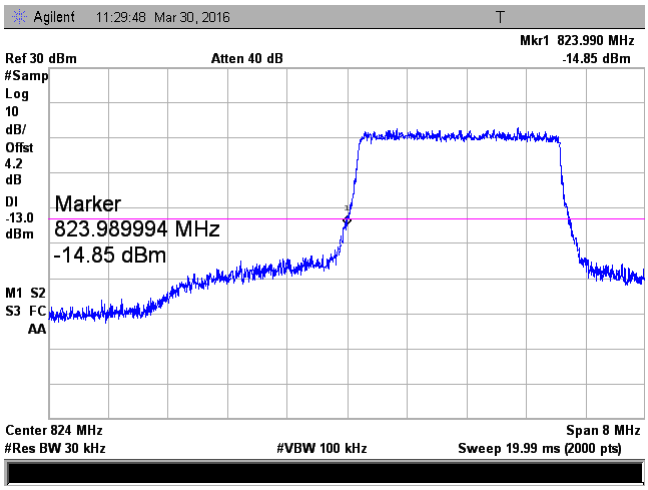
LTE Band 5 - Low Channel QPSK-3

Note: Offset=Cable loss (4.5) + 10log (31.28/30)=4.0+0.2=4.2dB



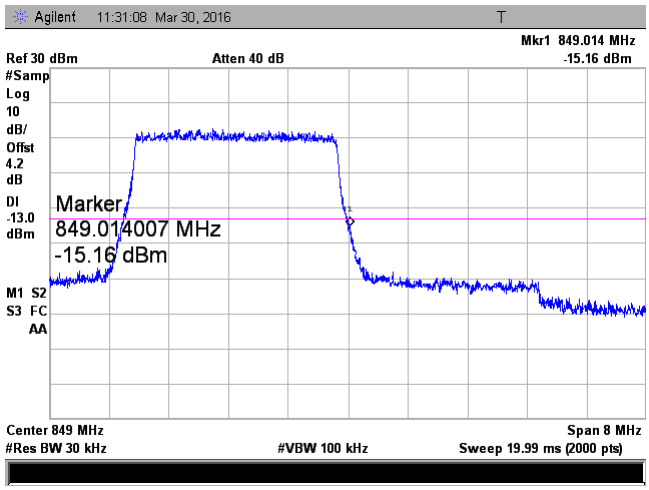
LTE Band 5 - High Channel QPSK-3

Note: Offset=Cable loss (4.5) + 10log (31.04/30)=4.0+0.1=4.1dB



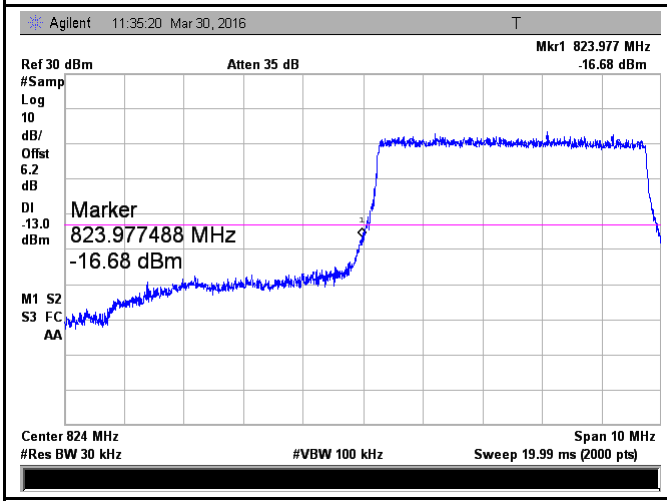
LTE Band 5 - Low Channel 16QAM-3

Note: Offset=Cable loss (4.5) + 10log (31.7/30)=4.0+0.2=4.2 dB

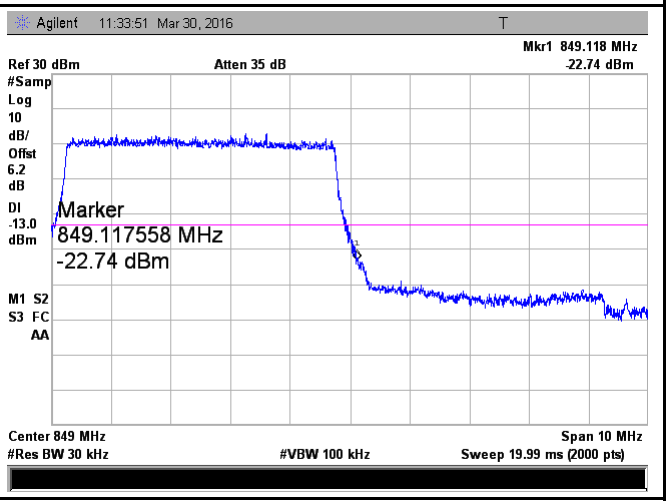


LTE Band 5 - High Channel 16QAM-3

Note: Offset=Cable loss (4.5) + 10log (31.52/30)=4.0+0.2=4.2 dB

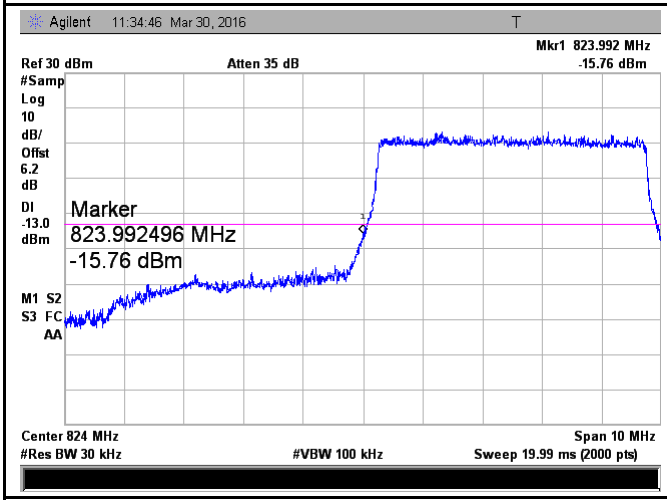


LTE Band 5 - Low Channel QPSK-5



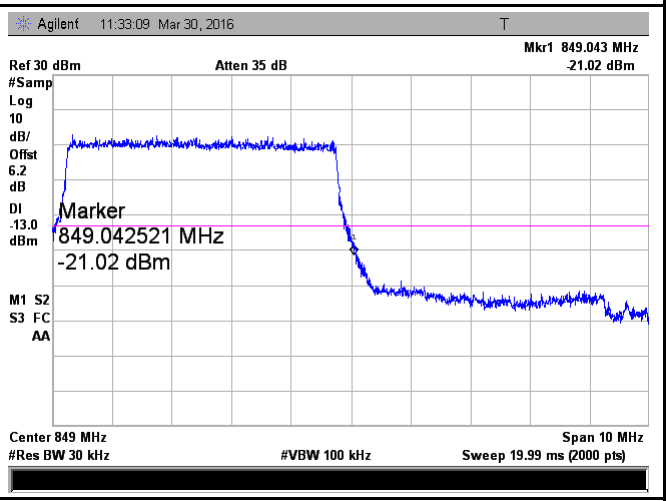
LTE Band 5 - High Channel QPSK-5

Note: Offset=Cable loss (4.5) + 10log (50.32/30)=4.0+2.2=6.2 dB



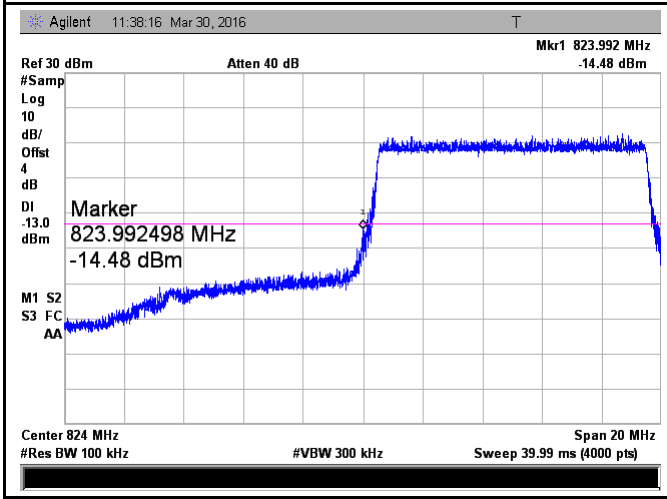
LTE Band 5 - Low Channel 16QAM-5

Note: Offset=Cable loss (4.5) + 10log (49.87/30)=4.0+2.2=6.2 dB



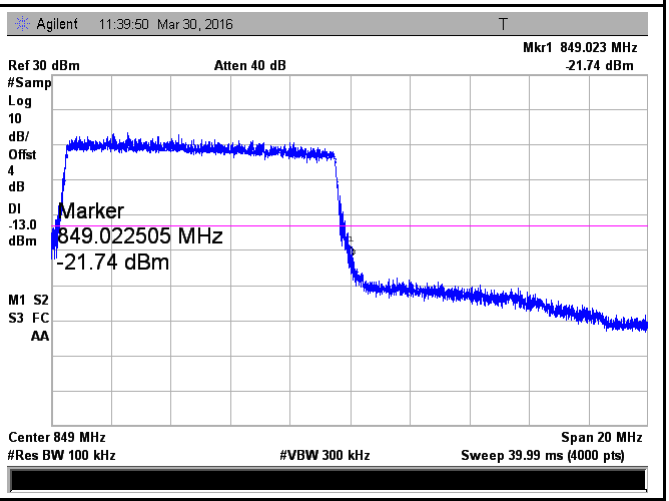
LTE Band 5 - High Channel 16QAM-5

Note: Offset=Cable loss (4.5) + 10log (50.19/30)=4.0+2.2=6.2 dB

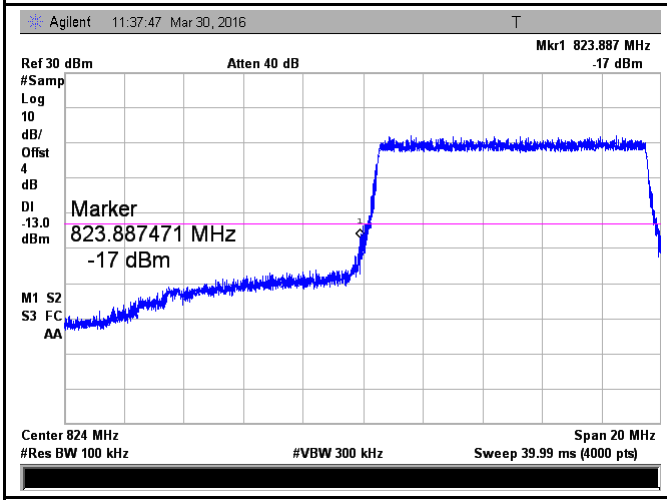


LTE Band 5 - Low Channel QPSK-10

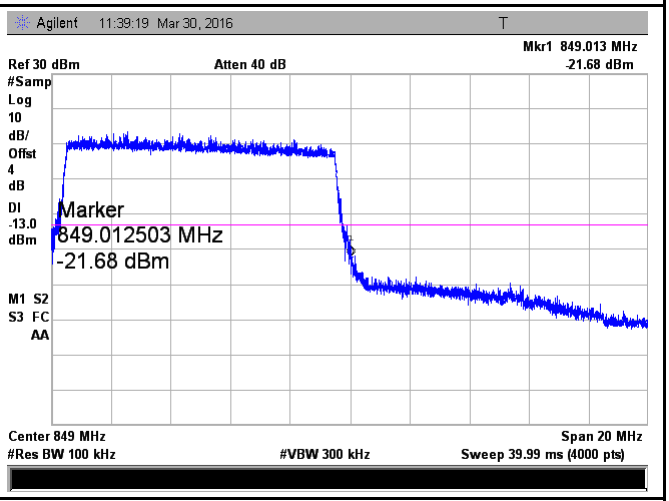
Note: Offset=Cable loss (4.5) + 10log (50.34/30)=4.0+2.2=6.2dB



LTE Band 5 - High Channel QPSK-10

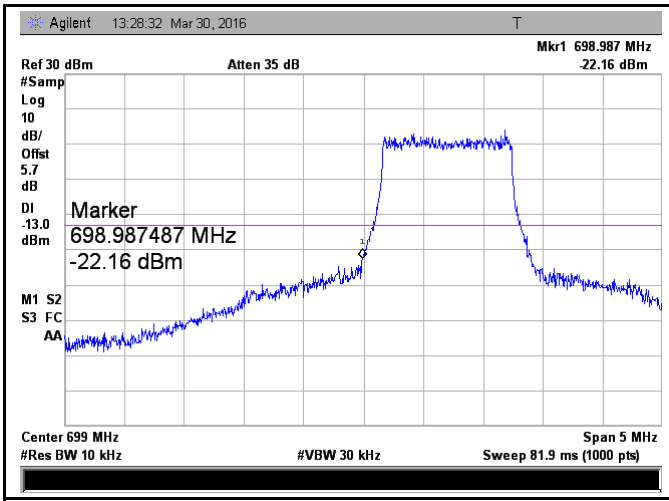


LTE Band 5 - Low Channel 16QAM-10



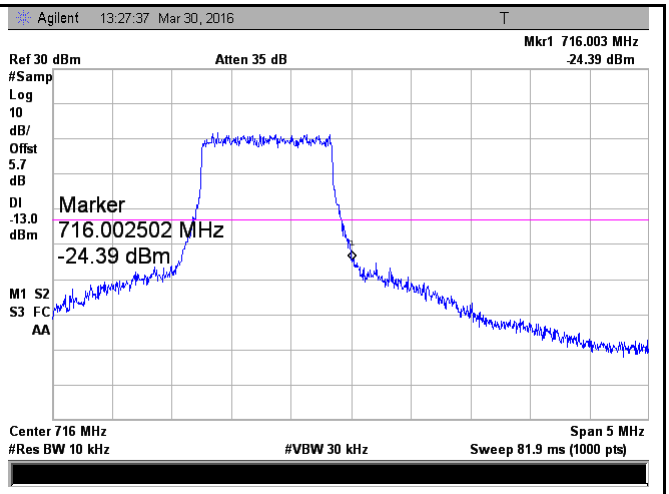
LTE Band 5 - High Channel 16QAM-10

LTE Band 12 (Part 27)



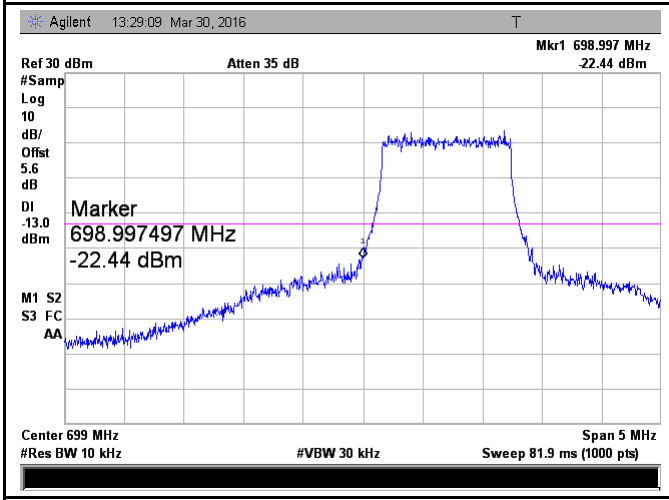
LTE Band 12 - Low Channel QPSK-1.4

Note: Offset=Cable loss (4.5) + 10log (13.18/10)=4.5+1.2=5.7 dB



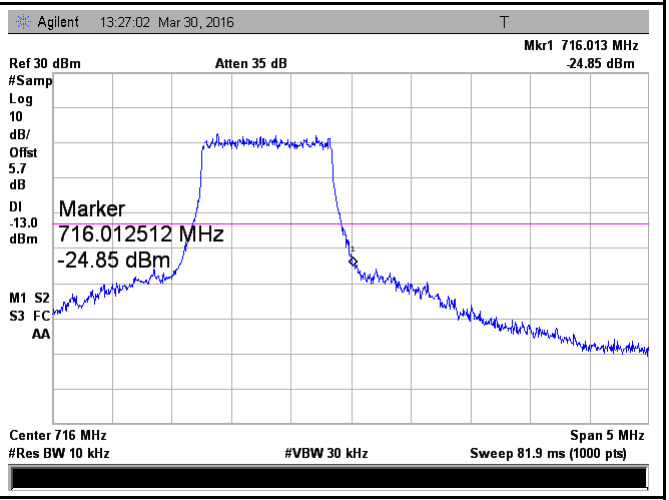
LTE Band 12 - High Channel QPSK-1.4

Note: Offset=Cable loss (4.5) + 10log (13.11/10)=4.5+1.2=5.7 dB



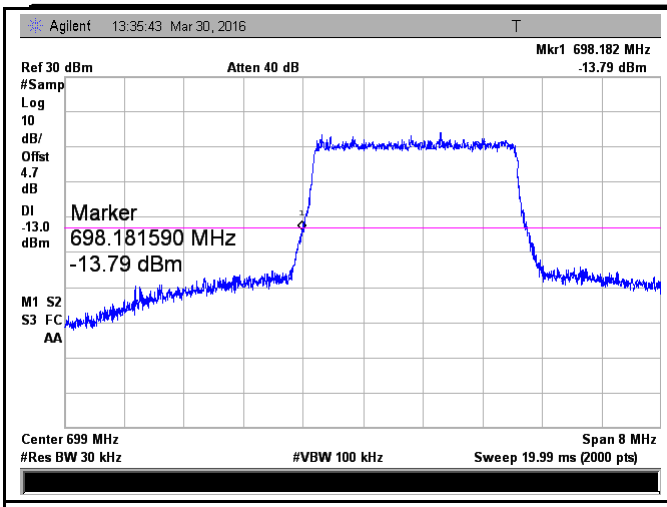
LTE Band 12 - Low Channel 16QAM-1.4

Note: Offset=Cable loss (4.5) + 10log (12.96/10)=4.5+1.1=5.6 dB



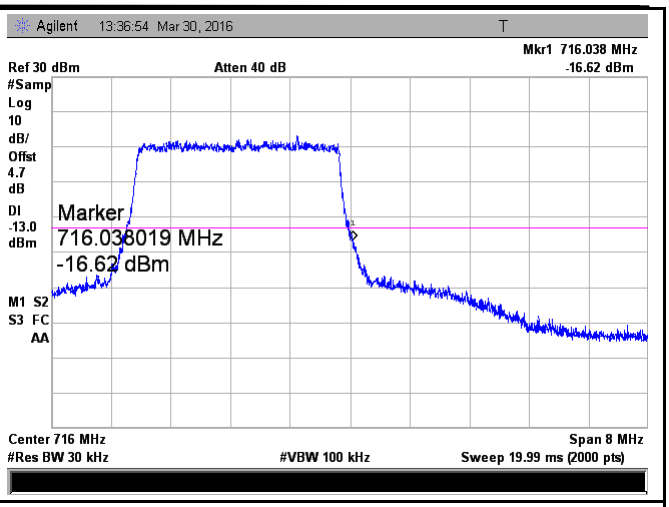
LTE Band 12 - High Channel 16QAM-1.4

Note: Offset=Cable loss (4.5) + 10log (13.16/10)=4.5+1.2=5.7dB



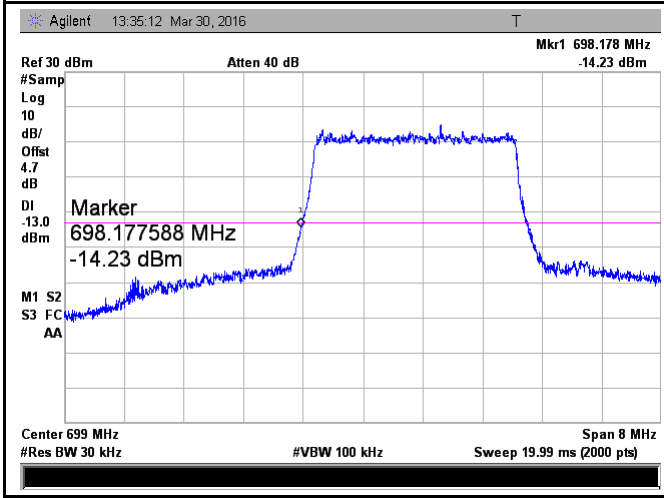
LTE Band 12 - Low Channel QPSK-3

Note: Offset=Cable loss (4.5) + 10log (31.54/30)=4.5+0.2=4.7 dB



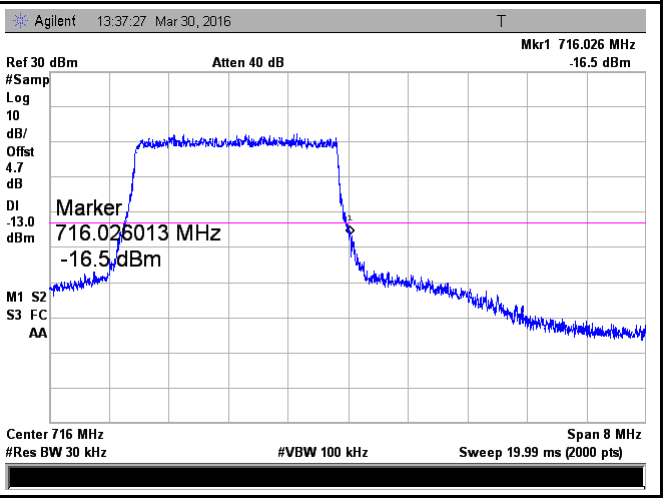
LTE Band 12 - High Channel QPSK-3

Note: Offset=Cable loss (4.5) + 10log (31.26/30)=4.5+0.2=4.7 dB



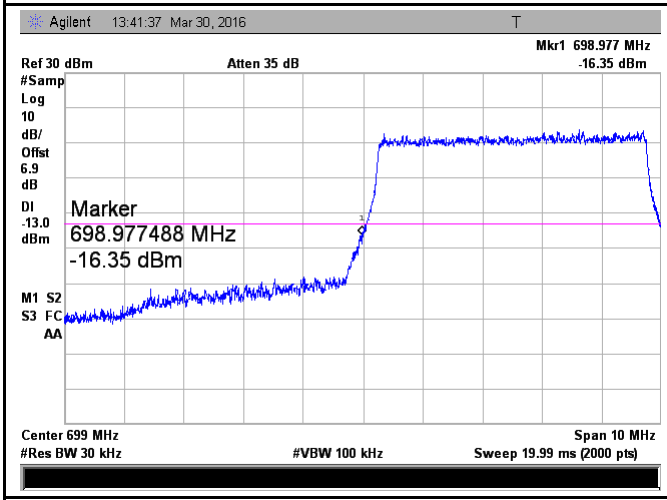
LTE Band 12 - Low Channel 16QAM-3

Note: Offset=Cable loss (4.5) + 10log (31.55/30)=4.5+0.2=4.7 dB

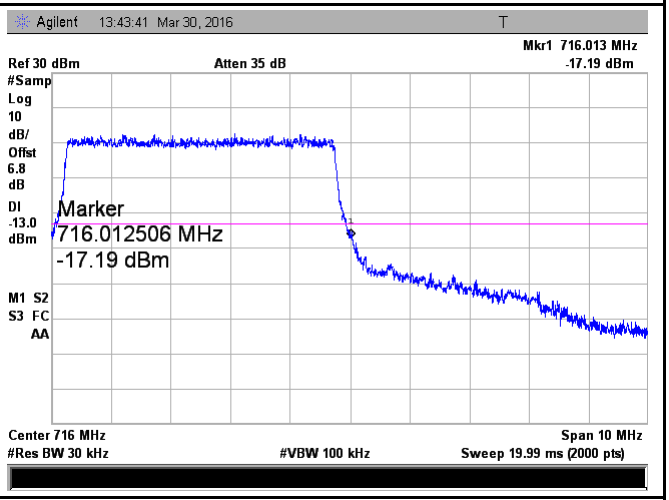


LTE Band 12 - High Channel 16QAM-3

Note: Offset=Cable loss (4.5) + 10log (31.44/30)=4.5+0.2=4.7 dB

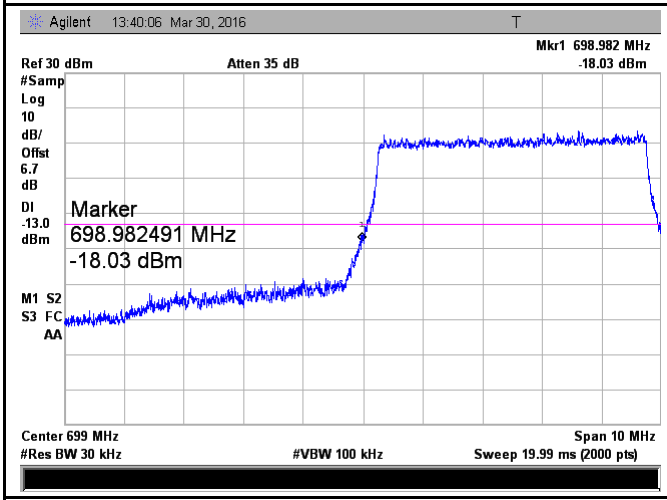


LTE Band 12 - Low Channel QPSK-5



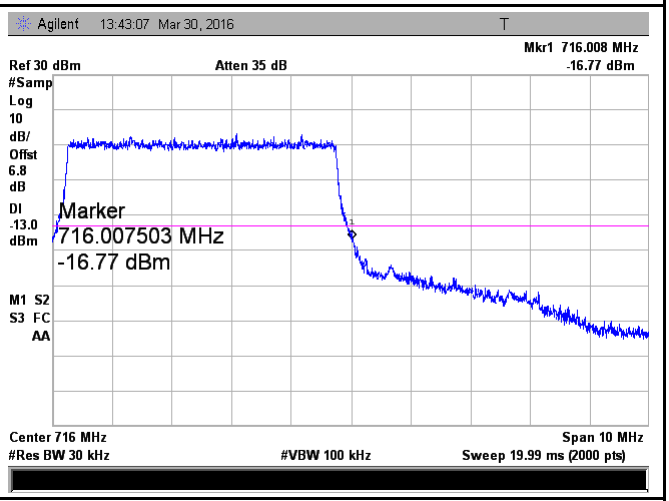
LTE Band 12 - High Channel QPSK-5

Note: Offset=Cable loss (4.5) + 10log (51.57/30)=4.5+2.4=6.9dB



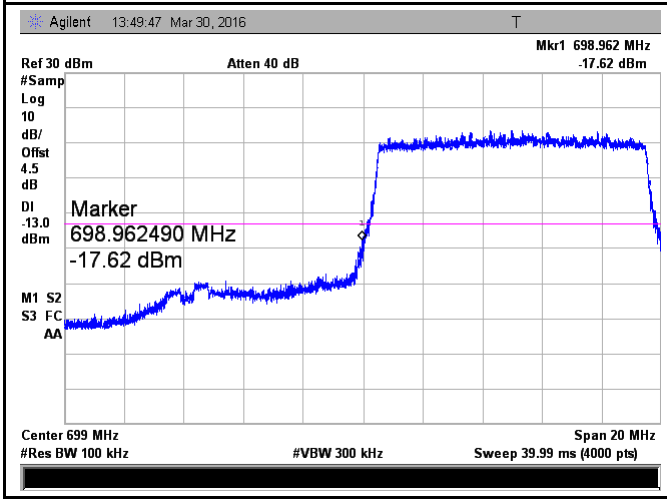
LTE Band 12 - Low Channel 16QAM-5

Note: Offset=Cable loss (4.5) + 10log (50.48/30)=4.5+2.3=6.8 dB



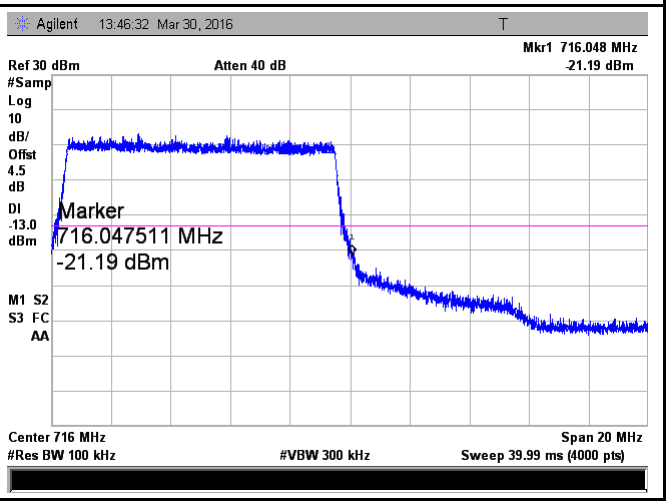
LTE Band 12 - High Channel 16QAM-5

Note: Offset=Cable loss (4.5) + 10log (49.92/30)=4.5+2.2=6.7 dB

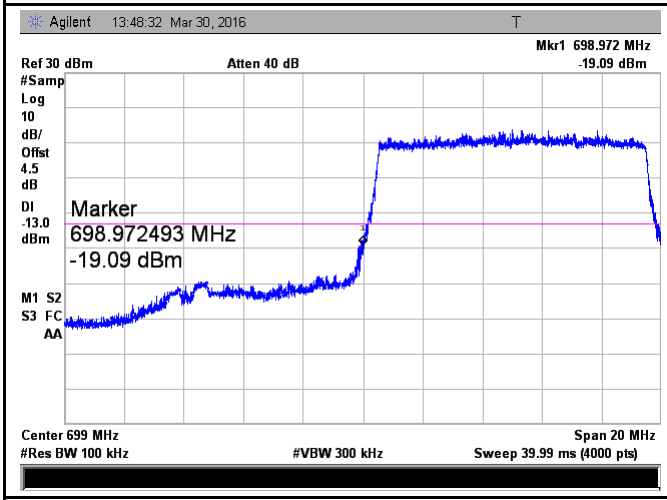


LTE Band 12 - Low Channel QPSK-10

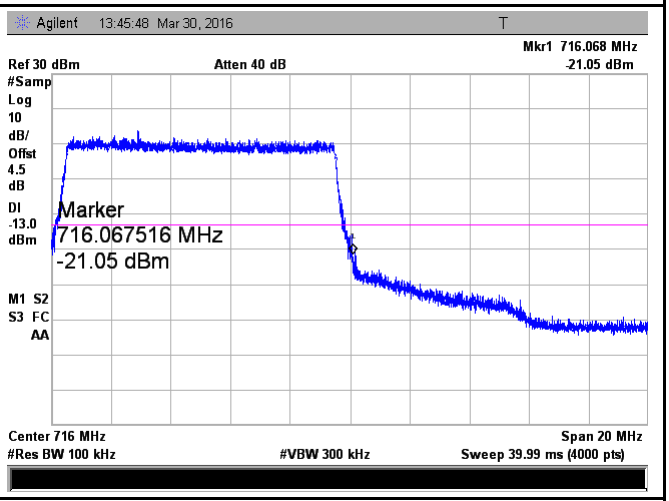
Note: Offset=Cable loss (4.5) + 10log (50.71/30)=4.5+2.3=6.8dB



LTE Band 12 - High Channel QPSK-10

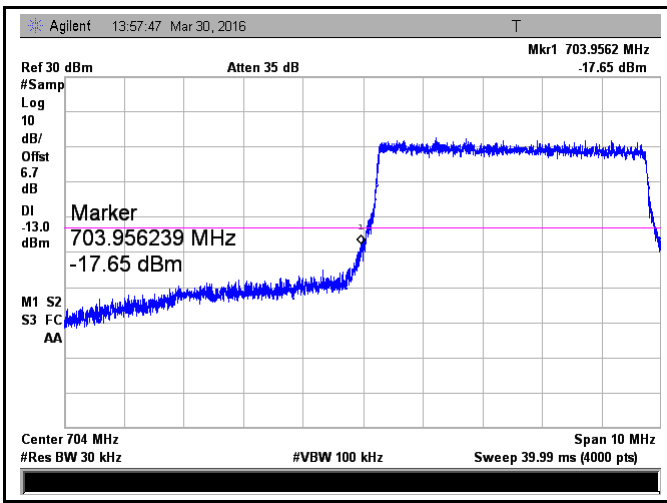


LTE Band 12 - Low Channel 16QAM-10



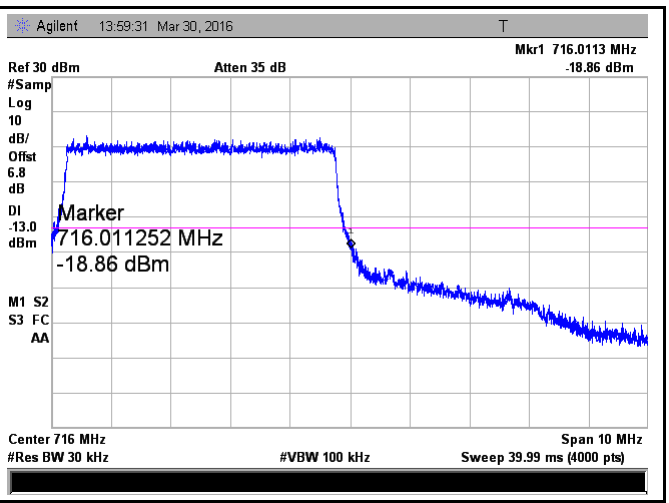
LTE Band 12 - High Channel 16QAM-10

LTE Band 17 (Part 27)



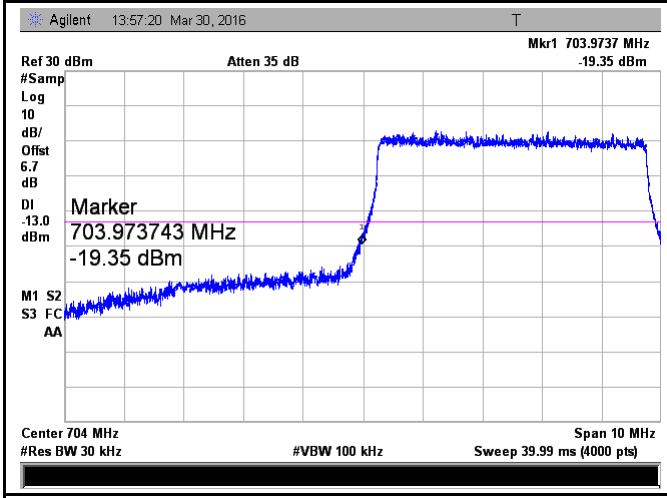
LTE Band 17 - Low Channel QPSK-5

Note: Offset=Cable loss (4.0) + 10log (49.8/30)=4.5+2.2=6.7 dB



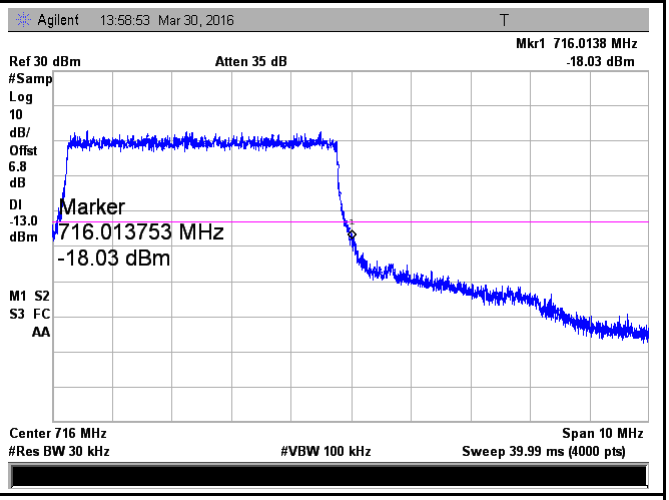
LTE Band 17 - High Channel QPSK-5

Note: Offset=Cable loss (4.0) + 10log (50.85/30)=4.5+2.3=6.8 dB



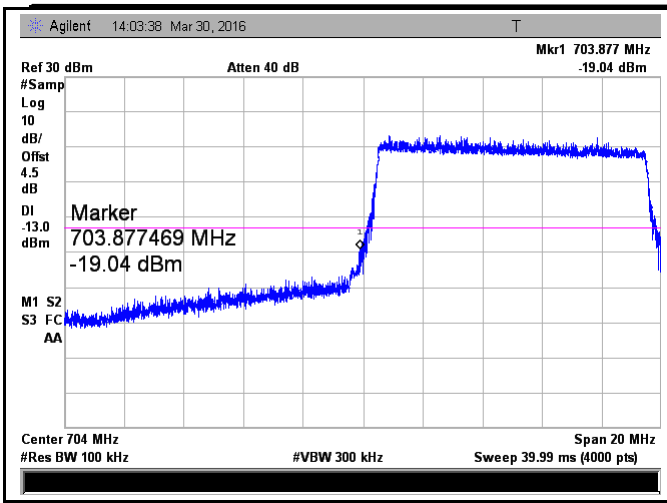
LTE Band 17 - Low Channel 16QAM-5

Note: Offset=Cable loss (4.0) + 10log (50.34/30)=4.5+2.2=6.7 dB

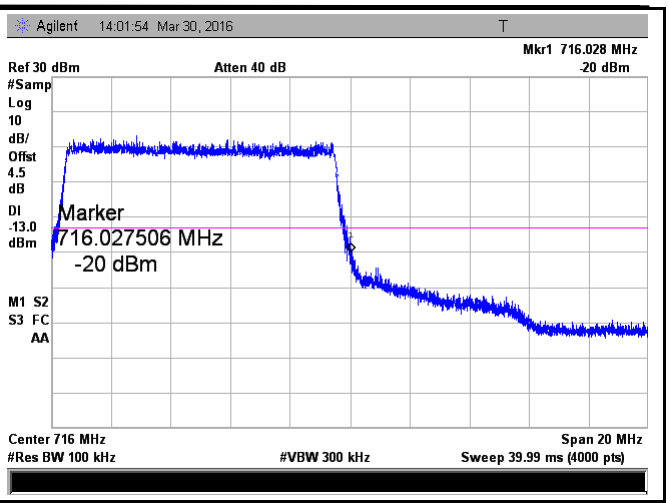


LTE Band 17 - High Channel 16QAM-5

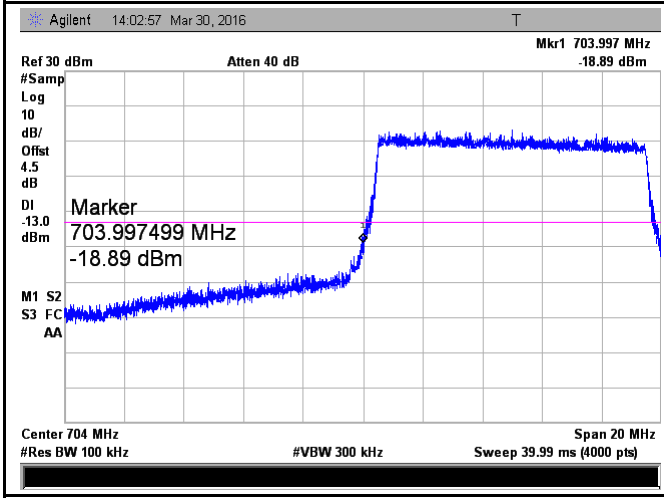
Note: Offset=Cable loss (4.0) + 10log (50.99/30)=4.5+2.3=6.8 dB



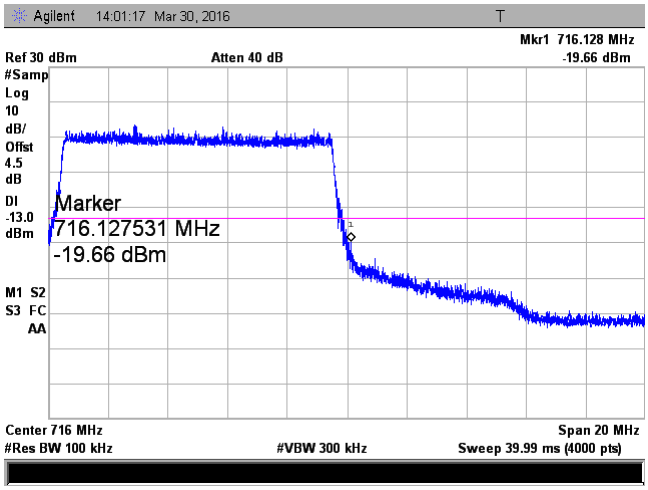
LTE Band 17 - Low Channel QPSK-10



LTE Band 17 - High Channel QPSK-10



LTE Band 17 - Low Channel 16QAM-10



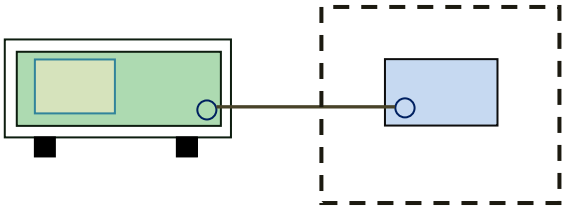
LTE Band 17 - High Channel 16QAM-10

6.8 Frequency Stability

Temperature	23℃
Relative Humidity	54%
Atmospheric Pressure	1030mbar
Test date :	March 30, 2016
Tested By :	Winnie Zhang

Requirement(s):

<table>
<tr><th>Spec</th><th>Item</th><th>Requirement</th><th>Applicable</th></tr>
<tr><td>§2.1055, §22.355 & §24.235 § 27.5(h); § 27.54</td><td>a)</td><td>According to §22.355, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table below:
Frequency Tolerance for Transmitters in the Public Mobile Services
<table>
<tr><th>Frequency Range (MHz)</th><th>Base, fixed (ppm)</th><th>Mobile ≤ 3 watts (ppm)</th><th>Mobile ≤ 3 watts (ppm)</th></tr>
<tr><td>25 to 50</td><td>20.0</td><td>20.0</td><td>50.0</td></tr>
<tr><td>to 450</td><td>5.0</td><td>5.0</td><td>50.0</td></tr>
<tr><td>450 to 512</td><td>2.5</td><td>5.0</td><td>5 0</td></tr>
<tr><td>821 to 896</td><td>1.5</td><td>2.5</td><td>2.5</td></tr>
<tr><td>928 to 929.</td><td>5.0</td><td>N/A</td><td>N/A</td></tr>
<tr><td>929 to 960.</td><td>1.5</td><td>N/A</td><td>N/A</td></tr>
<tr><td>2110 to 2220</td><td>10.0</td><td>N/A</td><td>N/A</td></tr>
</table>
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized frequency block.
According to §27.54, The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.</td><td>☑</td></tr>
</table>

Test setup	
Procedure	A communication link was established between EUT and base station. The frequency error was monitored and measured by base station under variation of ambient temperature and variation of primary supply voltage. Limit: The frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5ppm) of the center frequency.
Remark	Frequency Stability versus Temperature: The Frequency tolerance of the carrier signal shall be maintained within 2.5ppm of the operating frequency over a temperature variation of -10ºC to +55ºC at normal supply voltage.
Result	☑ Pass ☐ Fail

Test Data ☑ Yes ☐ N/A

Test Plot ☐ Yes (See below) ☑ N/A

LTE Band 2 (Part 24E) result

Middle Channel, f_o = 1880 MHz				
Temperature (°C)	Power Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10	3.7	-6	0.0027	2.5
0		-12	0.0059	2.5
10		-8	0.0037	2.5
20		-11	0.0053	2.5
30		-11	0.0064	2.5
40		-10	0.0048	2.5
50		-11	0.0064	2.5
55		-7	0.0032	2.5
25	4.2	-10	0.0059	2.5
	3.5	-9	0.0053	2.5

LTE Band 4 (Part 27) result

Middle Channel, f_o = 1732.5 MHz				
Temperature (°C)	Power Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10	3.7	-13	0.0087	2.5
0		-14	0.0092	2.5
10		-10	0.0063	2.5
20		-10	0.0063	2.5
30		-11	0.0058	2.5
40		-11	0.0069	2.5
50		-12	0.0075	2.5
55		-12	0.0069	2.5
25	4.2	-14	0.0087	2.5
	3.5	-15	0.0092	2.5

LTE Band 5 (Part 22H) result

Middle Channel, f_o = 836.5 MHz				
Temperature (℃)	Power Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10	3.7	8	0.0084	2.5
0		7	0.0072	2.5
10		6	0.0084	2.5
20		8	0.0108	2.5
30		11	0.0120	2.5
40		12	0.0155	2.5
50		10	0.0108	2.5
55		11	0.0120	2.5
25	4.2	9	0.0096	2.5
	3.5	12	0.0132	2.5

LTE Band 12 (Part 27) result

Middle Channel, f_o = 1880MHz				
Temperature (℃)	Power Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10	3.7	-8	0.0027	2.5
0		-11	0.0059	2.5
10		-10	0.0037	2.5
20		-12	0.0053	2.5
30		-10	0.0064	2.5
40		-9	0.0048	2.5
50		-10	0.0064	2.5
55		-8	0.0032	2.5
25	4.2	-11	0.0059	2.5
	3.5	-10	0.0053	2.5

LTE Band 17 (Part 27) result

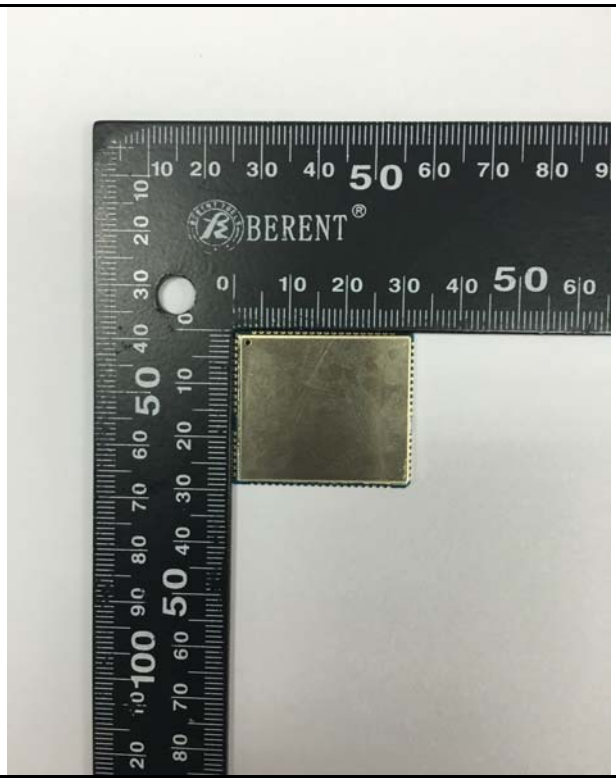
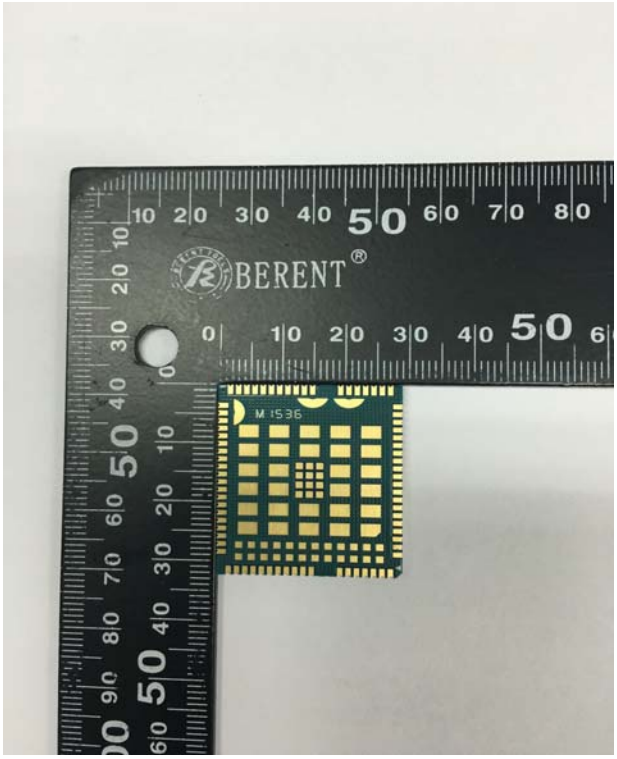
Middle Channel, f_o = 710 MHz				
Temperature (°C)	Power Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10	3.7	8	0.0099	2.5
0		8	0.0099	2.5
10		4	0.0042	2.5
20		5	0.0085	2.5
30		5	0.0056	2.5
40		6	0.0070	2.5
50		10	0.0155	2.5
55		9	0.0113	2.5
25	4.2	9	0.0127	2.5
	3.5	12	0.0155	2.5

Annex A. TEST INSTRUMENT

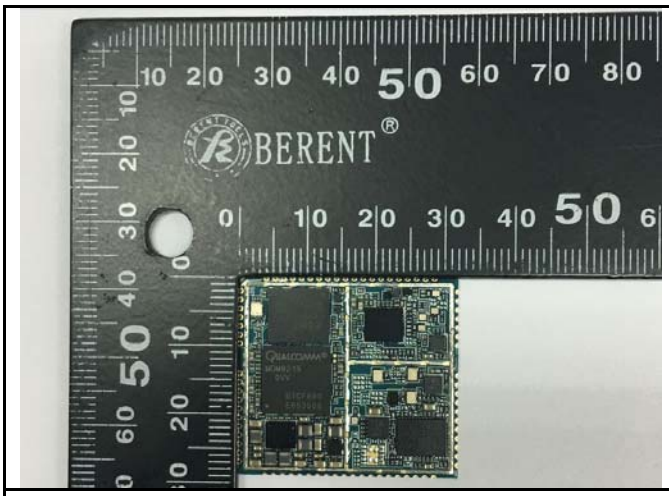
Instrument	Model	Serial #	Cal Date	Cal Due	In use
RF Conducted Test					
Agilent ESA-E SERIES SPECTRUM ANALYZER	E4407B	MY45108319	09/16/2015	09/15/2016	☑
Power Splitter	1#	1#	09/01/2015	08/31/2016	☑
Universal Radio Communication Tester	CMU200	121393	09/25/2015	09/24/2016	☑
Wideband Radio Communication Tester	CMW500	120906	03/28/2015	03/27/2016	☑
Temperature/Humidity Chamber	UHL-270	001	10/09/2015	10/08/2016	☑
DC Power Supply	E3640A	MY40004013	09/17/2015	09/16/2016	☑
Radiated Emissions					
EMI test receiver	ESL6	100262	09/17/2015	09/16/2016	☑
OPT 010 AMPLIFIER (0.1-1300MHz)	8447E	2727A02430	09/01/2015	08/31/2016	☑
Microwave Preamplifier (0.5 ~ 18GHz)	PAM-118	443008	09/01/2015	08/31/2016	☑
Bilog Antenna (30MHz~6GHz)	JB6	A110712	09/21/2015	09/20/2016	☑
Bilog Antenna (30MHz~2GHz)	JB1	A112017	09/21/2015	09/20/2016	☑
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	71259	09/24/2015	09/23/2016	☑
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	71283	09/24/2015	09/23/2016	☑
SYNTHESIZED SIGNAL GENERATOR	8665B	3744A01293	09/17/2015	09/16/2016	☑
Tunable Notch Filter	3NF-800/1000-S	AA4	09/01/2015	08/31/2016	☑
Tunable Notch Filter	3NF-1000/2000-S	AM 4	09/01/2015	08/31/2016	☑

Annex B. EUT And Test Setup Photographs

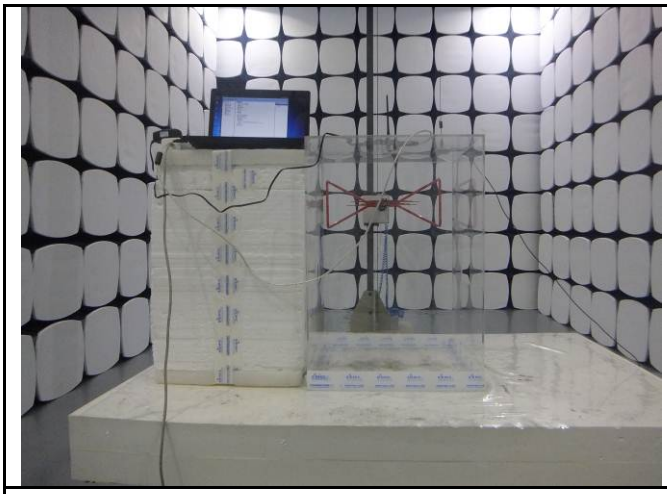
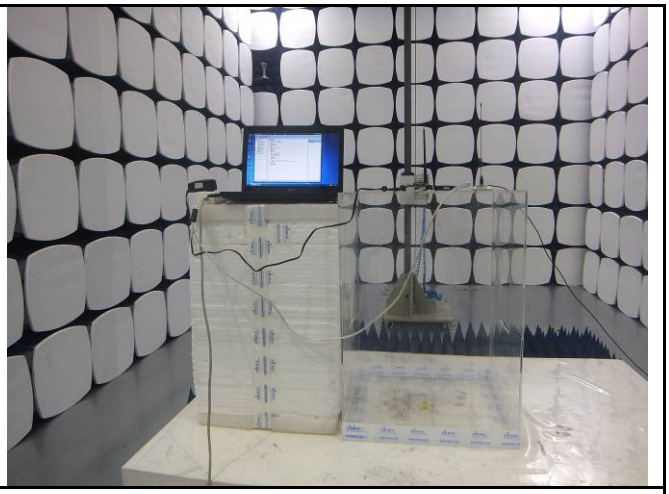
Annex B.i. Photograph: EUT External Photo

	
EUT- Front View	EUT -Rear Side

Annex B.ii. Photograph: EUT Internal Photo

	
EUT- without Shielding – Front View	

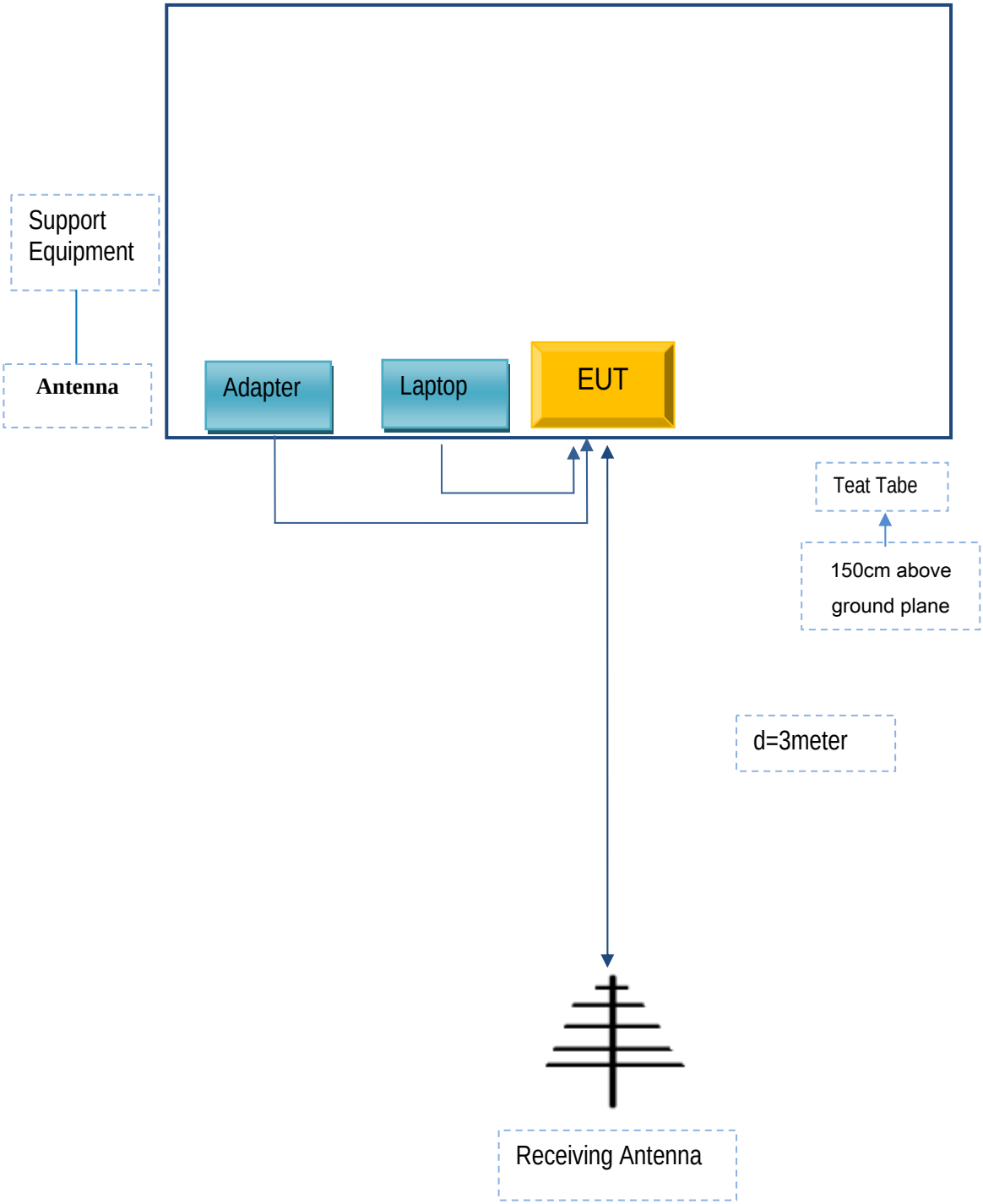
Annex B.iii. Photograph: Test Setup Photo

	
Radiated Spurious Emissions Test Setup Below 1GHz	Radiated Spurious Emissions Test Setup Above 1GHz

Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

Annex C.ii. TEST SET UP BLOCK

Block Configuration Diagram for Radiated Emissions



Annex C. il. SUPPORTING EQUIPMENT DESCRIPTION

The following is a description of supporting equipment and details of cables used with the EUT.

Supporting Equipment:

Manufacturer	Equipment Description	Model	Serial No
Lenvo	Laptop	N40	LR-1EHRX

Supporting Cable:

Cable type	Shield Type	Ferrite Core	Length	Serial No
USB Cable	Un-shielding	No	0.8m	ST22100

Annex C.ii. EUT OPERATING CONKITIONS

N/A

Annex D. User Manual / Block Diagram / Schematics / Partlist

N/A

Annex E. DECLARATION OF SIMILARITY

Quectel Wireless Solutions Co., Ltd

Statement

We Quectel Wireless Solutions Co., Ltd declare the following models as series application.

Name: Multi-mode LTE Module
Model number:EC20-A/EC20-A Mini PCIe

EC20-A and EC20-A Mini PCIe Module are both Multi-mode LTE modules. EC20-A Mini PCIe Module makes up of EC20-A module and PCIe transferred board. The transferred board switches EC20-A module to follow PCI Express Mini Card 1.2 standard connector protocol. No any other internal changes in EC20-A module.

We hereby state that two models are identical in interior structure and components, and just connector interface is different for the marketing requirement.

Your assistance on this matter is highly appreciated.

Sincerely,
Name: Johnny
Title: Test Engineer

Signature: