FCC & IC TEST REPORT

FCC ID: SY4-A01020

On Behalf of

Shanghai Huace Navigation Technology LTD.

Geodetic GNSS Receiver

Model No.: i90, i90 Pro

Prepared for	:	Shanghai Huace Navigation Technology LTD.
Address	:	599 Gaojing Road, Building D, Shanghai 201702, China

Prepared By	:	Shenzhen Alpha Product Testing Co., Ltd.
Address	:	Building i, No.2, Lixin Road, Fuyong Street, Bao'an District, 518103, Shenzhen, Guangdong, China

Report Number	:	A1907162-C01-R05
Date of Receipt	:	August 15, 2019
Date of Test	:	August 15, 2019 – September 10, 2019
Date of Report	:	September 10, 2019
Version Number	:	V0

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TEST REPORT DECLARATION

Applicant	:	Shanghai Huace Navigation Technology LTD.
Address	:	599 Gaojing Road, Building D, Shanghai 201702, China
Manufacturer	:	Shanghai Huace Navigation Technology LTD.
Address	:	599 Gaojing Road, Building D, Shanghai 201702, China
EUT Description	:	Geodetic GNSS Receiver
		(A) Model No. : i90, i90 Pro
		(B) Trademark : CHCNAV

Measurement Standard Used:

FCC CFR Title 47 Part 2
FCC CFR Title 47 Part22 Subpart H
FCC CFR Title 47 Part24 Subpart E
FCC CFR Title 47 Part27
ANSI C63.26:2015

RSS-132 issue 3 January 2013
RSS-133 issue 6 January 2018
RSS-139 Issue 3, July 2015
RSS-199 issue 3 December 2016
RSS-Gen Issue5, April 2018
TIA/EIA-603-E:2016

The device described above is tested by Shenzhen Alpha Product Testing Co., Ltd. to determine the maximum emission levels emanating from the device. The test results are contained in this test report and Shenzhen Alpha Product Testing Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

After the test, our opinion is that EUT compliance with the requirement of the above standards.

This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Shenzhen Alpha Product Testing Co., Ltd.

Tested by (name + signature).........: Reak Yang
Project Engineer ....

Approved by (name + signature)….....: Simple Guan
Project Manager ....

Date of issue…… …………………..: September 10, 2019

Revision History

Revision	Issue Date	Revisions	Revised By
V0	September 10, 2019	Initial released Issue	Simple Guan

1 Test Summary

Test Item	Section in CFR 47	Result
RF Exposure (SAR)	Part 2.1310 Part 2.1091 RSS-102 Issue 5	Pass* (Please refer to SAR Report)
RF Output Power	Part 2.1046 part22.913(a) Part 24.232 (c) Part 27.50 (d)(4) RSS-132 (5.4) RSS-133 (6.4) RSS-139(6.5) RSS-199(4.4)	Pass
Peak-To-Average Ratio	Part 2.1046 ANSI/TIA-603-E	Pass
Modulation Characteristics	Part 2.1047 ANSI/TIA-603-E RSS-132 (5.2) RSS-133 (6.2) RSS-139(6.2) RSS-199(4.1)	Pass
99% & -26 dB Occupied Bandwidth	Part 2.1049 part22.913(a) Part 24.238 Part 27.53(a) RSS-132 (3.1) RSS-133 (3.1) RSS-139(3.1) RSS-199(4.2)	Pass
Spurious Emissions at Antenna Terminal	Part 2.1051 part22.913(a) Part 24.238 (a) Part 27.53 (h) RSS-132 (5.5) RSS-133 (6.5.1) RSS-139(6.6) RSS-199(4.5)	Pass

Field Strength of Spurious Radiation	Part 2.1053 part22.913(a) Part 24.238 (a) Part 27.53 (h) RSS-132 (5.5) RSS-133 (6.5.1) RSS-139(6.6) RSS-199(4.5)	Pass
Out of band emission, Band Edge	part22.913(a) Part 24.238 (a) Part 27.53(h) RSS-132 (5.5) RSS-133 (6.5.1) RSS-139(6.6) RSS-1994.5()	Pass
Frequency stability vs. temperature	Part 2.1055(a)(1)(b) RSS-132 (5.3) RSS-133 (6.3) RSS-139(6.4) RSS-199(4.3)	Pass
Frequency stability vs. voltage	Part 2.1055(d)(1)(2) RSS-132 (5.3) RSS-133 (6.3) RSS-139(6.4) RSS-199(4.3)	Pass

Pass: The EUT complies with the essential requirements in the standard.

2 General Information

2.1 General Description of EUT

Description/PMN:	Geodetic GNSS Receiver
Model Number /HVIN(s):	i90, i90 Pro
DIFF.:	Both models are the same, only the GPS modules inside are different, the result of this report belongs to i90.
Trademark	CHCNAV
Support Networks:	LTE
Support Bands:	LTE Band 2, LTE Band 4, LTE Band 5, LTE Band 7
Channel Bandwidth:	LTE Band 2: 5MHz, 10MHz, 15MHz, 20MHz LTE Band 4: 5MHz, 10MHz, 15MHz, 20MHz LTE Band 5: 5MHz, 10MHz LTE Band 7: 5MHz, 10MHz, 15MHz, 20MHz
TX Frequency:	LTE Band 2: 1850.7 MHz ~ 1909.3 MHz LTE Band 4: 1710.7 MHz ~ 1754.3 MHz LTE Band 5: 824.7 MHz ~ 848.3 MHz LTE Band 7: 2502.5MHz-2567.5MHz
Modulation type:	QPSK, 16QAM
Antenna type:	Internal antenna
Antenna gain:	0.5dBi(max.) For LTE
Power supply:	DC 7.4V from battery or 9-28VDC, DC 12V From adapter
Software version:	2.0.7
Hardware version/FVIN:	V1.2
Remark 1: The worst-case simultaneous transmission configuration was evaluated with no non-compliance found. Results in this report are only for 4G function, and there is no other transmitter involved.	

2.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is filing to comply with Section Part 22 subpart H, Part 24 subpart E, Part 27 of the FCC CFR 47 Rules and RSS-132, RSS-133, RSS-139 and RSS-199 Rules.

2.3 Test Facility

Shenzhen Alpha Product Testing Co., Ltd

Building i, No.2, Lixin Road, Fuyong Street, Bao'an District, 518103, Shenzhen, Guangdong, China

June 21, 2018 File on Federal Communication Commission

Registration Number: 293961

Designation Number: CN1236

July 15, 2019 Certificated by IC

Registration Number: 12135A

2.4 Measurement Uncertainty

Item	Uncertainty
Uncertainty for Power point Conducted Emissions Test	2.74dB
Uncertainty for Radiation Emission test in 3m chamber (below 30MHz)	2.13 dB(Polarize: V)
	2.57dB(Polarize: H)
Uncertainty for Radiation Emission test in 3m chamber (30MHz to 1GHz)	3.77dB(Polarize: V)
	3.80dB(Polarize: H)
Uncertainty for Radiation Emission test in 3m chamber (1GHz to 25GHz)	4.16dB(Polarize: H)
	4.13dB(Polarize: V)
Uncertainty for radio frequency	5.4×10-8
Uncertainty for conducted RF Power	0.37dB
Uncertainty for temperature	0.2℃
Uncertainty for humidity	1%
Uncertainty for DC and low frequency voltages	0.06%

3 Test Instruments list

Equipment	Manufacturer	Model No.	Serial No.	Last cal.	Cal Interval
Bilog Antenna	Schwarzbeck	VULB 9168	VULB9168-438	2018.04.13	2Year
Horn Antenna	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D(1201)	2018.04.13	2Year
Loop Antenna	SCHWARZBECK	FMZB 1519B	00059	2018.09.26	2Year
Filter	KANGMAI	ZLPF-LDC-1000-1959	1209002075	2018.09.21	1Year
Filter	WAINWRIGHT	WHKX2.80/18G-12SS	SN1	2018.09.21	1Year
Filter	WAINWRIGHT	WHKX1.0G/15G-10SS	SN40	2018.09.21	1Year
RF Cable	Resenberger	Cable 4	N/A	2018.09.21	1Year
CMU200	ROHDE&SCHWARZ	CMU200	116785	2018.09.11	1Year
CMW500	ROHDE&SCHWARZ	CMW500	1201.0002K50-117239-sM	2018.09.21	1Year
Signal Analyzer	Agilent	N9020A	MY499100060	2018.09.11	1Year
vector Signal Generator	Agilent	N5182A	MY49060042	2018.09.11	1Year
vector Signal Generator	Agilent	E4438C	US44271917	2018.09.11	1Year
Amplifier	Agilent	8449B	3008A02664	2018.09.21	1Year
Test Receiver	ROHDE&SCHWARZ	ESR	1316.3003K03-102082-Wa	2018.09.21	1Year
9*6*6 anechoic	CHENYU	9*6*6	N/A	/	/
RF Cable	Resenberger	Cable 1	N/A	2018.09.21	1Year
RF Cable	Resenberger	Cable 2	N/A	2018.09.21	1Year
RF Cable	Resenberger	Cable 3	N/A	2018.09.21	1Year
Power Sensor	Power Radio	RPR3006W	15100041SNO91	2018.09.21	1Year
20dB Attenuator	ICPROBING	IATS1	82347	2018.09.21	1Year
POWER DIVIDER	Mini-circuits	PD-2SF-0010	N/A	2018.09.21	1Year
POWER DIVIDER	Mini-circuits	PD-2SF-0010	N/A	2018.09.21	1Year
Temperature& Humidity test chamber	GZGONGWEN	GDS-250	080821	2018.10.21	1Year
Horn Antenna	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D(1207)	2018.04.13	2Year
Bilog Antenna	Schwarzbeck	VULB 9168	VULB9168-627	2018.09.24	2Year

Spectrum analyzer	Agilent	E4407B	MY49510055	2019.09.05	1Year
Signal Analyzer	Agilent	N9020A	MY499100060	2019.09.05	1Year
Horm Antenna	SCHWARZBECK	BBHA 9170	00946	2019.09.07	1Year

4 System test configuration

4.1 Test mode

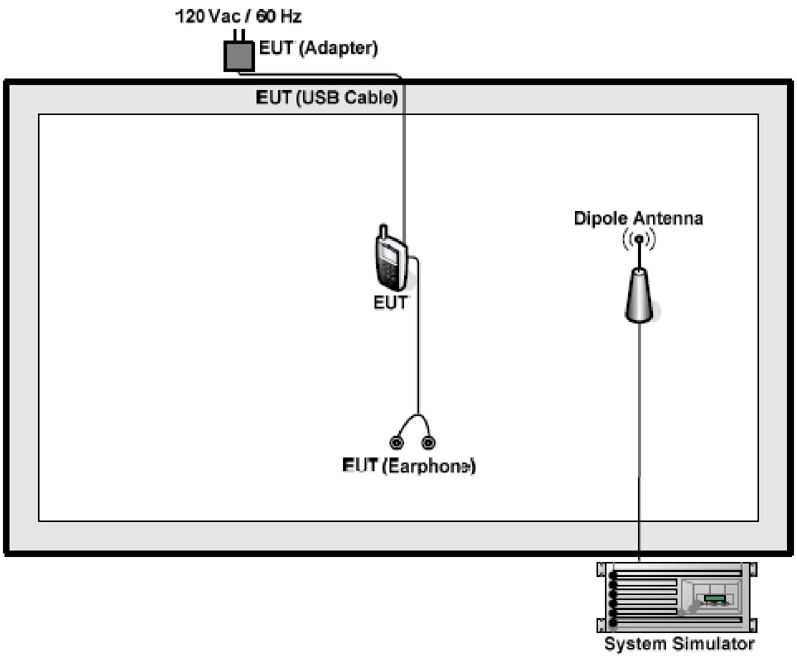
During all testing, EUT is in link mode with base station emulator at maximum power level. The spurious emission measurements were carried out in semi-anechoic chamber with 3-meter test range, and EUT is rotated on three test planes to find out the worst emission.

Test modes		
Band	Radiated	Conducted
LTE Band 2	■ QPSK link, 16QAM link	■ QPSK link, 16QAM link
LTE Band 4	■ QPSK link, 16QAM link	■ QPSK link, 16QAM link
LTE Band 5	■ QPSK link, 16QAM link	■ QPSK link, 16QAM link
LTE Band 7	■ QPSK link, 16QAM link	■ QPSK link, 16QAM link

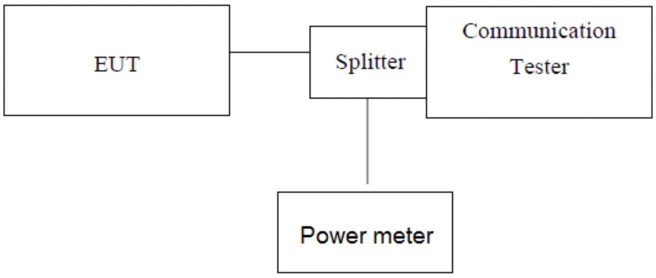
Note: Antenna port conducted and radiated test items were performed according to KDB 971168 D01 Power Meas License Digital Systems v03r1 with maximum output power.

Radiated measurements were performed with rotating EUT in different three orthogonal test planes to find the maximum emission.

4.2 Configuration of Tested System



4.3 Conducted Output Power

Test Requirement:	FCC part22.913(a), FCC part24.232(b), FCC part 27.50 and RSS-132 (5.4), RSS-133 (6.4), RSS-139(6.5) and RSS-199(4.4)
Test Method:	KDB 971168 D01 v03r1 clause 5.1, FCC part2.1046, ANSI/TIA-603-E, ANSI C63.26 clause 5.2.3
Test setup:	 *Note: Measurement setup for testing on Antenna connector*
Test Procedure:	1. The transmitter output port was connected to base station. 2. The RF output of EUT was connected to the power meter by RF cable and attenuator, the path loss was compensated to the results for each measurement. 3. Set EUT at maximum power through base station. 4. Select lowest, middle, and highest channels for each band and different modulation. 5. Measure the maximum burst average power.
Test Instruments:	Refer to section 3 for details
Test mode:	Refer to section 4.1 for details
Test results:	Pass

Measurement Data

LTE Band2

BW (MHz)	Frequency (MHz)	RB Configuration		Average Power [dBm]	
		Size	Offset	QPSK	16QAM
5	1852.5	1	0	23.36	23.25
		1	12	23.66	22.96
		1	24	23.03	23.56
		12	0	22.53	22.28
		12	6	23.06	22.00
		12	13	22.68	21.49
		25	0	22.28	22.09
	1880.0	1	0	24.11	22.67
		1	12	23.30	22.82
		1	24	22.67	21.79
		12	0	21.34	21.31
		12	6	20.70	21.62
		12	13	21.18	20.83
		25	0	21.83	21.77
	1907.5	1	0	23.01	22.20
		1	12	22.52	22.02
		1	24	22.56	21.49
		12	0	22.58	22.04
		12	6	21.48	22.59
		12	13	21.74	22.17
		25	0	22.94	21.44
10	1855.0	1	0	23.60	22.59
		1	24	23.42	23.06
		1	49	23.82	23.32
		25	0	21.87	22.48
		25	12	22.48	21.49
		25	25	22.22	22.58
		50	0	22.27	21.94
	1880.0	1	0	22.80	23.56
		1	24	23.09	22.86
		1	49	21.62	21.44
		25	0	22.37	21.40
		25	12	20.87	20.89
		25	25	21.04	21.30
		50	0	20.82	21.01
	1905.0	1	0	22.92	22.17
		1	24	21.65	22.07
		1	49	23.06	22.59
		25	0	22.74	21.85
		25	12	23.09	21.71
		25	25	22.45	22.17
		50	0	21.65	21.93
15	1857.5	1	0	22.40	23.84
		1	37	22.99	22.82
		1	74	22.93	23.30

		37	0	22.72	21.85
		37	18	21.75	22.32
		37	38	22.24	22.13
		75	0	21.85	21.98
	1880.0	1	0	22.94	22.73
		1	37	24.33	23.50
		1	74	23.01	22.42
		37	0	21.80	20.99
		37	18	22.57	21.64
		37	38	22.78	22.11
		75	0	22.14	21.72
	1902.5	1	0	21.98	22.30
		1	37	22.95	21.34
		1	74	22.53	22.75
		37	0	21.38	21.18
		37	18	21.12	21.68
		37	38	21.60	21.25
		75	0	21.21	21.62
20	1860.0	1	0	24.14	22.96
		1	49	23.27	22.95
		1	99	22.87	23.32
		50	0	23.09	22.10
		50	25	22.87	22.69
		50	50	21.72	21.04
		100	0	22.74	21.50
	1880.0	1	0	22.96	23.45
		1	49	23.62	22.51
		1	99	21.99	22.47
		50	0	21.27	21.29
		50	25	22.44	22.11
		50	50	21.64	21.93
		100	0	22.34	22.28
	1900.0	1	0	22.16	22.19
		1	49	23.08	22.55
		1	99	21.72	21.72
		50	0	22.32	21.36
		50	25	21.29	21.22
		50	50	21.30	19.99
		100	0	22.06	20.30

LTE Band4

BW (MHz)	Frequency (MHz)	RB Configuration		Average Power [dBm]	
		Size	Offset	QPSK	16QAM
5	1712.5	1	0	24.10	23.23
		1	12	24.15	23.47
		1	24	23.98	23.07
		12	0	23.98	23.96
		12	6	23.59	23.37
		12	13	24.02	24.38
		25	0	23.67	23.16
	1732.5	1	0	23.96	22.83
		1	12	23.65	23.09
		1	24	21.84	21.55
		12	0	21.03	21.05
		12	6	20.97	21.04
		12	13	22.35	22.25
		25	0	21.46	21.41
	1752.5	1	0	22.00	21.89
		1	12	23.39	22.51
		1	24	22.34	22.39
		12	0	21.87	20.96
		12	6	21.69	21.24
		12	13	22.05	22.46
		25	0	21.86	21.32
10	1715.0	1	0	23.43	23.97
		1	24	24.25	23.57
		1	49	24.12	24.10
		25	0	22.47	22.30
		25	12	22.10	21.84
		25	25	22.75	23.43
		50	0	23.16	22.39
	1732.5	1	0	23.91	24.09
		1	24	24.01	23.43
		1	49	21.48	22.23
		25	0	21.43	21.25
		25	12	21.97	21.99
		25	25	22.21	21.25
		50	0	22.42	21.38
	1750.0	1	0	22.37	21.56
		1	24	22.19	22.33
		1	49	23.22	22.49
		25	0	21.73	21.57
		25	12	22.32	21.59
		25	25	21.51	20.67
		50	0	21.61	21.09
15	1717.5	1	0	24.55	24.34
		1	37	23.39	23.50

		1	74	24.39	24.14
		37	0	23.06	23.46
		37	18	23.77	23.02
		37	38	23.05	22.71
		75	0	22.34	21.77
	1732.5	1	0	24.59	23.45
		1	37	23.82	23.42
		1	74	22.30	21.48
		37	0	21.47	21.28
		37	18	22.07	21.28
		37	38	21.61	21.52
		75	0	21.65	21.27
	1747.5	1	0	22.54	22.26
		1	37	22.47	21.93
		1	74	23.13	22.29
		37	0	21.49	21.60
		37	18	21.65	21.61
		37	38	21.91	21.02
		75	0	21.63	20.92
20	1720.0	1	0	24.33	23.37
		1	49	24.00	23.77
		1	99	24.11	23.22
		50	0	23.71	22.91
		50	25	23.11	22.80
		50	50	23.18	22.09
		100	0	23.47	22.73
	1732.5	1	0	23.48	24.06
		1	49	24.16	23.16
		1	99	21.99	20.94
		50	0	22.10	21.95
		50	25	21.28	21.18
		50	50	20.99	21.18
		100	0	21.63	21.31
	1745.0	1	0	21.66	22.08
		1	49	22.69	22.41
		1	99	22.86	22.78
		50	0	22.52	21.93
		50	25	21.32	20.82
		50	50	21.19	21.39
		100	0	22.10	21.37

LTE Band5

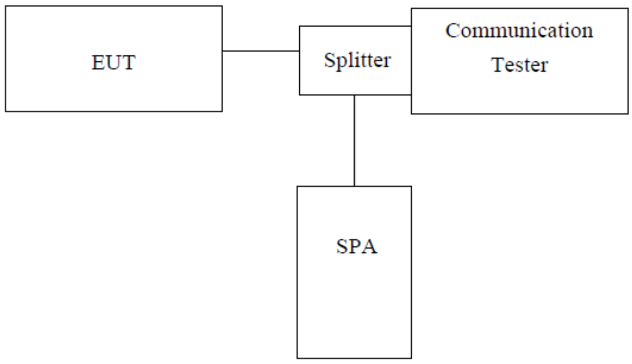
BW (MHz)	Frequency (MHz)	RB Configuration		Average Power [dBm]	
		Size	Offset	QPSK	16QAM
5	826.5	1	0	22.50	23.15
		1	12	23.15	22.25
		1	24	22.76	22.44
		12	0	22.04	22.58
		12	6	22.81	22.49
		12	13	22.87	21.95
		25	0	24.21	22.70
	836.5	1	0	22.59	22.83
		1	12	22.93	22.91
		1	24	22.39	22.39
		12	0	22.14	22.26
		12	6	22.18	22.37
		12	13	22.18	21.81
		25	0	21.56	21.52
	846.5	1	0	21.20	21.21
		1	12	20.93	21.60
		1	24	22.02	22.15
		12	0	21.45	22.00
		12	6	22.39	21.34
		12	13	21.23	21.32
		25	0	21.87	21.54
10	829.0	1	0	22.84	22.86
		1	24	23.13	23.25
		1	49	23.93	22.96
		25	0	23.59	22.84
		25	12	23.23	22.49
		25	25	23.56	22.87
		50	0	23.41	23.33
	836.5	1	0	24.19	23.19
		1	24	23.27	22.62
		1	49	22.18	21.73
		25	0	22.72	22.56
		25	12	22.46	22.12
		25	25	23.11	21.81
		50	0	21.49	21.40
	844.0	1	0	22.89	22.92
		1	24	23.15	22.16
		1	49	21.79	22.05
		25	0	21.26	21.87
		25	12	22.04	21.90
		25	25	22.34	21.71
		50	0	22.24	21.74

LTE Band7

BW (MHz)	Frequency (MHz)	RB Configuration		Average Power [dBm]	
		Size	Offset	QPSK	16QAM
5	2502.5	1	0	23.29	23.31
		1	12	23.09	22.51
		1	24	22.63	21.26
		12	0	23.50	23.66
		12	6	23.63	22.79
		12	13	22.51	21.83
		25	0	23.88	22.33
	2535.0	1	0	22.94	22.51
		1	12	23.41	22.53
		1	24	21.55	20.56
		12	0	22.50	21.38
		12	6	22.04	22.26
		12	13	21.97	21.04
		25	0	21.87	20.69
	2567.5	1	0	21.85	21.03
		1	12	21.91	22.20
		1	24	21.60	19.94
		12	0	22.59	21.44
		12	6	22.65	21.40
		12	13	22.34	20.50
		25	0	22.12	20.26
10	2505.0	1	0	23.59	23.96
		1	24	22.89	22.03
		1	49	23.11	22.66
		25	0	23.53	22.33
		25	12	23.88	23.00
		25	25	23.32	22.27
		50	0	23.98	22.61
	2535.0	1	0	22.88	23.88
		1	24	23.81	22.46
		1	49	22.55	23.14
		25	0	23.05	22.49
		25	12	22.39	22.07
		25	25	22.26	20.64
		50	0	22.31	22.30
	2565.0	1	0	22.91	22.05
		1	24	22.60	22.69
		1	49	22.42	23.05
		25	0	21.99	22.48
		25	12	22.56	22.28
		25	25	23.27	22.31
		50	0	21.83	21.28
15	2507.5	1	0	22.44	22.79
		1	37	23.46	22.93
		1	74	22.55	23.09

		37	0	22.66	22.51
		37	18	22.87	22.27
		37	38	22.93	22.42
		75	0	23.33	22.37
	2535.0	1	0	22.74	22.58
		1	37	23.05	22.66
		1	74	20.85	21.62
		37	0	22.09	21.73
		37	18	22.06	21.92
		37	38	21.59	21.76
		75	0	21.81	21.87
	2562.5	1	0	22.57	21.50
		1	37	21.27	20.84
		1	74	22.16	21.04
		37	0	20.99	20.10
		37	18	22.36	20.09
		37	38	21.74	22.44
		75	0	21.74	20.33
20	2510.0	1	0	23.37	23.57
		1	49	22.58	22.31
		1	99	22.90	21.83
		50	0	23.89	21.99
		50	25	23.44	21.25
		50	50	22.10	21.72
		100	0	22.70	22.00
	2535.0	1	0	22.73	22.58
		1	49	23.07	22.33
		1	99	21.65	20.57
		50	0	21.48	20.84
		50	25	21.92	21.01
		50	50	22.96	21.07
		100	0	22.10	21.74
	2560	1	0	21.94	21.02
		1	49	22.16	21.54
		1	99	22.19	21.04
		50	0	21.60	21.47
		50	25	22.15	20.96
		50	50	20.66	21.37
		100	0	22.07	20.37

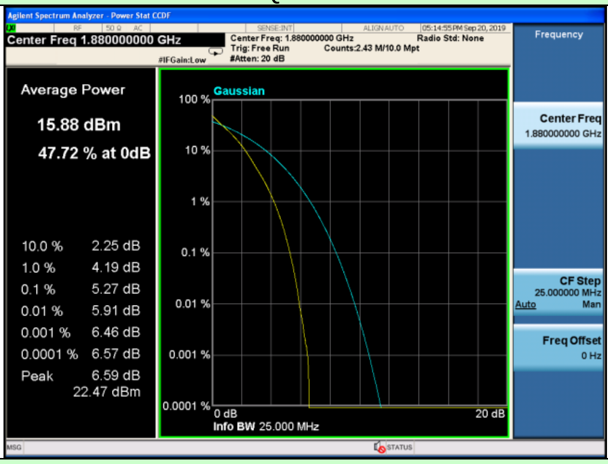
4.4 Peak-to-Average Ratio

Test Requirement:	Part 22.913(d), FCC part24.232(d), FCC part27.50(d)(5), RSS-132 (5.4), RSS-133 (6.4), RSS-139(6.5), RSS-199(4.4)
Test Method:	FCC part2.1046, ANSI/TIA-603-E, ANSI C63.26 Clause 5.2.3.4 FCC KDB971168 D01 v03r01 Section 5.7
Test Limit:	Used complementary cumulative distribution function (CCDF) of analyzer to determine that PAPR will not exceed 13 dB for more than 0.1 percent of the time
Test setup:	 *Note: Measurement setup for testing on Antenna connector*
Test Procedure:	1. The testing follows FCC KDB 971168 D01 v03r01 Section 5.7.. 2. The EUT was connected to spectrum and system simulator via a power divider 3. Using the CCDF measurement of spectrum analyzer; 4. Set RBW≥OBW or specified reference bandwidth; 5. Set the number of counts to a value that stabilizes the measured CCDF curve; 6. Set the measurement interval as 1ms 7. Record the maximum PAPR level associated with a probability of 0.1%.
Test Instruments:	Refer to section 3 for details
Test mode:	Refer to section 4.1 for details
Test results:	Pass

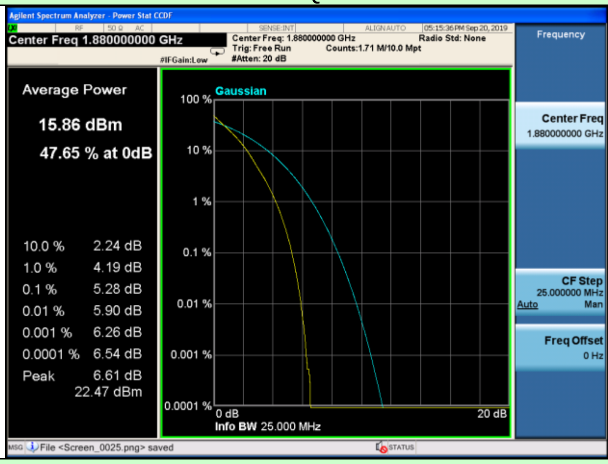
Test plots are listed as below:

Test mode	Peak to Average Ratio （dB）	Limit （dB）	Result
LTE Band 2 Middle channel/20MHz/QPSK	5.27	13	PASS
LTE Band 2 Middle channel/20MHz/16-QAM	5.28	13	PASS
LTE Band 4 Middle channel/20MHz/QPSK	5.39	13	PASS
LTE Band 4 Middle channel/20MHz/16-QAM	5.39	13	PASS
LTE Band 5 Middle channel/10MHz/QPSK	5.79	13	PASS
LTE Band 5 Middle channel/10MHz/16-QAM	5.79	13	PASS
LTE Band 7 Middle channel/20MHz/QPSK	5.48	13	PASS
LTE Band 7 Middle channel/20MHz/16-QAM	5.48	13	PASS

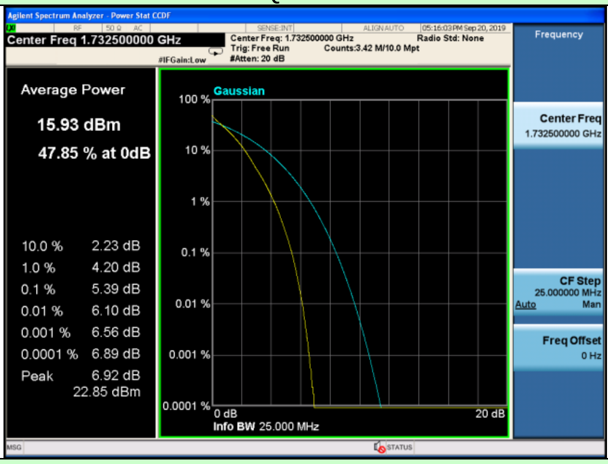
Test Mode: LTE Band 2
Middle channel/20MHz/QPSK



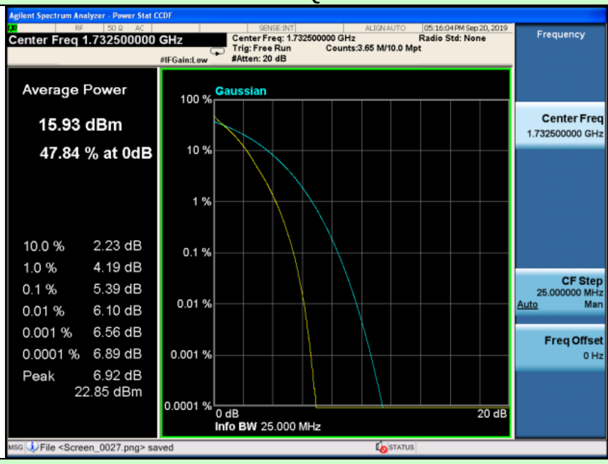
Test Mode: LTE Band 2
Middle channel/20MHz/16-QAM



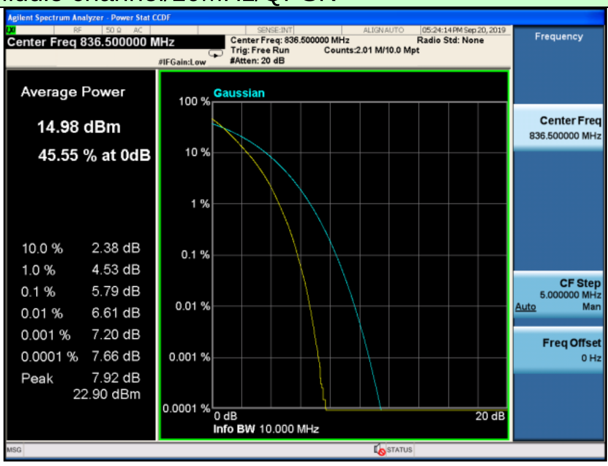
Test Mode: LTE Band 4
Middle channel/20MHz/QPSK



Test Mode: LTE Band 4
Middle channel/20MHz/16-QAM

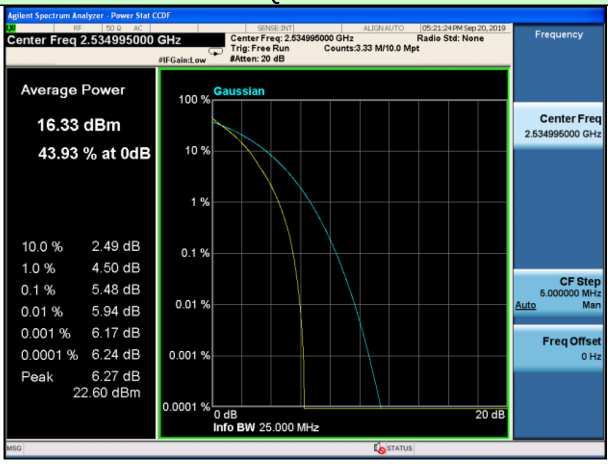


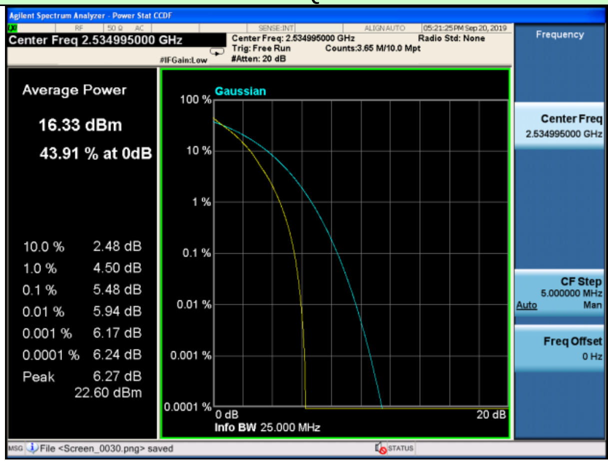
Test Mode: LTE Band 5
Middle channel/10MHz/QPSK



Test Mode: LTE Band 5
Middle channel/10MHz/16-QAM

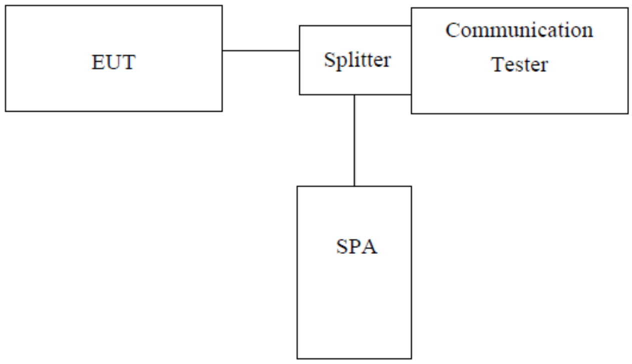
Test Mode: LTE Band 7 Middle channel/20MHz/QPSK	Test Mode: LTE Band 7 Middle channel/20MHz/16-QAM





Note: All bandwidth and modulation are tested, only the worst results are reported.

4.5 Occupy Bandwidth

Test Requirement:	FCC Part 2.1049, FCC part22.913(a), FCC part24.232(b) and FCC part27.53(a), RSS-132 (3.1), RSS-133 (3.1), RSS-139(3.1) and RSS-199(4.2)
Test Method:	KDB 971168 D01 v03r1 clause 4, FCC part2.1049, ANSI/TIA-603-E, ANSI C63.26 clause 5.4, RSS-Gen Section 6.7.
Test setup:	 *Note: Measurement setup for testing on Antenna connector*
Test Procedure:	1.The EUT's output RF connector was connected with a short cable to the spectrum analyzer, set center frequency to channel center frequency. 2.RBW was set to about 1%-5% of emission OBW, VBW⩾ 3 X RBW. 3.Set spectrum analyzer detection mode to peak, and the trace mode to max hold. 4. Use the 99% OBW function, The 99% power OBW can be found on the plot, determine the "-26dB amplitude" as equal to reference value -26dB.
Test Instruments:	Refer to section 3 for details
Test mode:	Refer to section 4.1 for details
Test results:	Pass

Measurement Data

EUT Mode	Channel Bandwidth	Mode	RB Configure		99% Occupy bandwidth (KHz)	-26dB bandwidth (KHz)
			RB Size	RB Offset		
LTE Band 2	5MHz	QPSK	25	0	4518.4	4986
		16-QAM	25	0	4526.1	5044
	10MHz	QPSK	50	0	9100.6	10267
		16-QAM	50	0	9110.6	10275
	15MHz	QPSK	75	0	13584.8	15317
		16-QAM	75	0	13538.2	15190
	20MHz	QPSK	100	0	17934.5	19637
		16-QAM	100	0	17920.9	19660

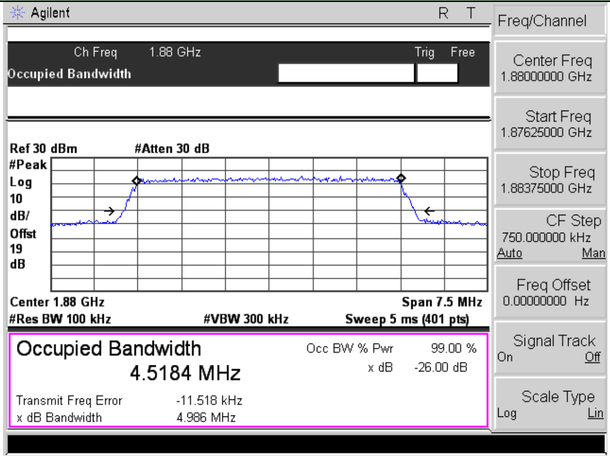
EUT Mode	Channel Bandwidth	Mode	RB Configure		99% Occupy bandwidth (KHz)	-26dB bandwidth (KHz)
			RB Size	RB Offset		
LTE Band 4	5MHz	QPSK	25	0	4516.4	5011
		16-QAM	25	0	4516.4	5030
	10MHz	QPSK	50	0	8960.8	9717
		16-QAM	50	0	8942.4	9804
	15MHz	QPSK	75	0	13471.6	15039
		16-QAM	75	0	13491.3	15046
	20MHz	QPSK	100	0	17942.9	19673
		16-QAM	100	0	17899.4	19628

EUT Mode	Channel Bandwidth	Mode	RB Configure		99% Occupy bandwidth (KHz)	-26dB bandwidth (KHz)
			RB Size	RB Offset		
LTE Band 5	5MHz	QPSK	25	0	4507.9	5041
		16-QAM	25	0	4509.7	5013
	10MHz	QPSK	50	0	8959.2	9787
		16-QAM	50	0	8939.2	9704

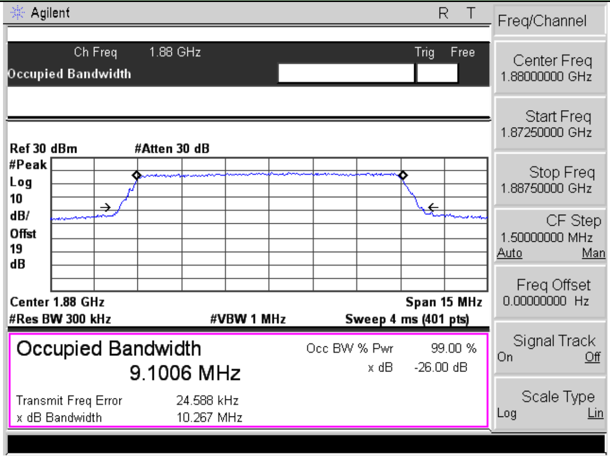
EUT Mode	Channel Bandwidth	Mode	RB Configure		99% Occupy bandwidth (KHz)	-26dB bandwidth (KHz)
			RB Size	RB Offset		
LTE Band 7	5MHz	QPSK	25	0	4515.9	5025
		16-QAM	25	0	4511.0	4995
	10MHz	QPSK	50	0	8942.9	9751
		16-QAM	50	0	8950.9	9854
	15MHz	QPSK	75	0	13475.4	15098
		16-QAM	75	0	13509.6	15026
	20MHz	QPSK	100	0	17890.0	19666
		16-QAM	100	0	17872.8	19696

Test plot as follows:

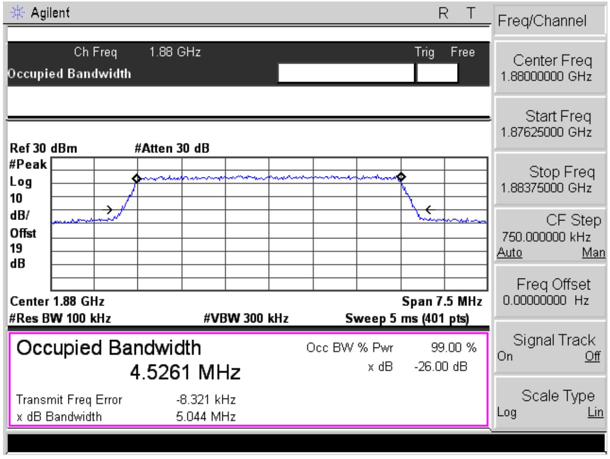
Test Mode: LTE Band 2 Channel Bandwidth: 5MHz	Test Mode: LTE Band 2 Channel Bandwidth: 10MHz



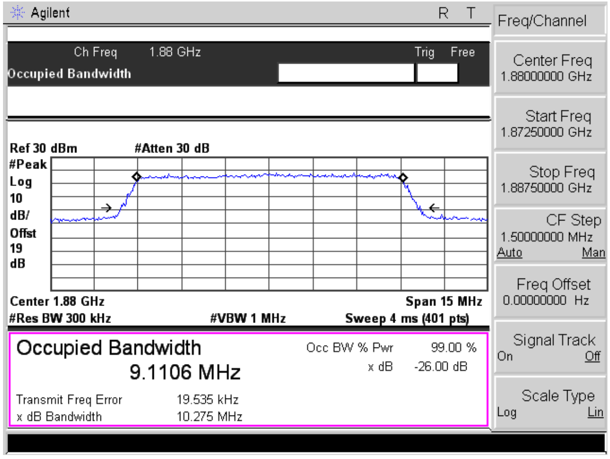
QPSK



QPSK

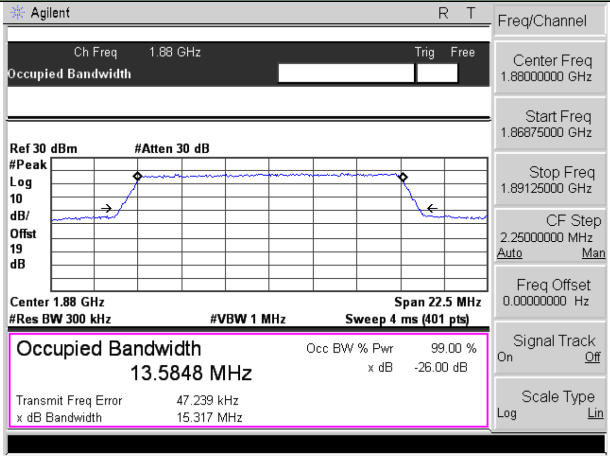


16-QAM

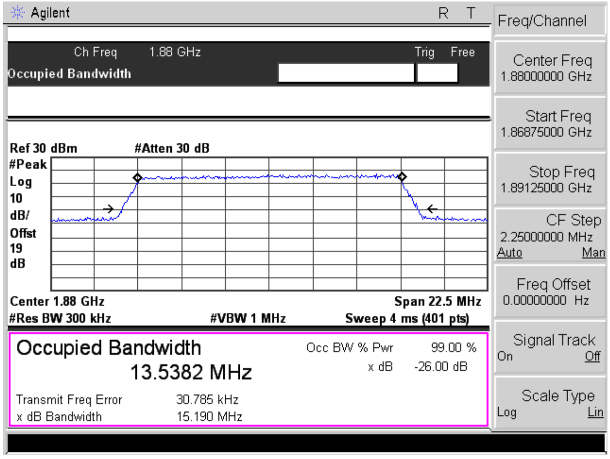


16-QAM

Test Mode: LTE Band 2
Channel Bandwidth: 15MHz

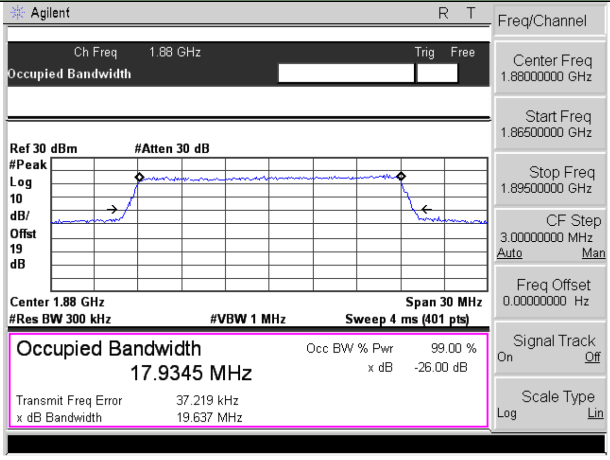


QPSK

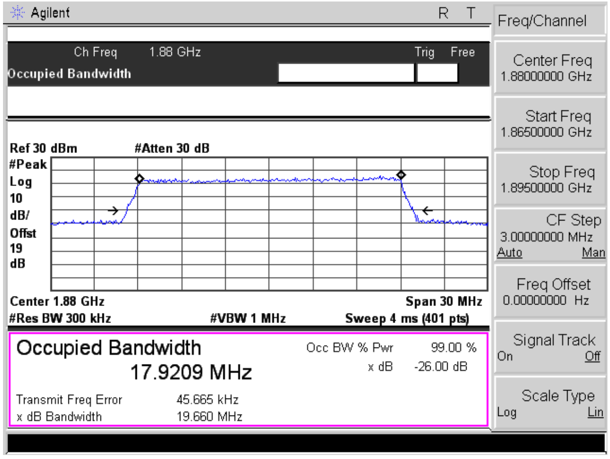


16-QAM

Test Mode: LTE Band 2
Channel Bandwidth: 20MHz

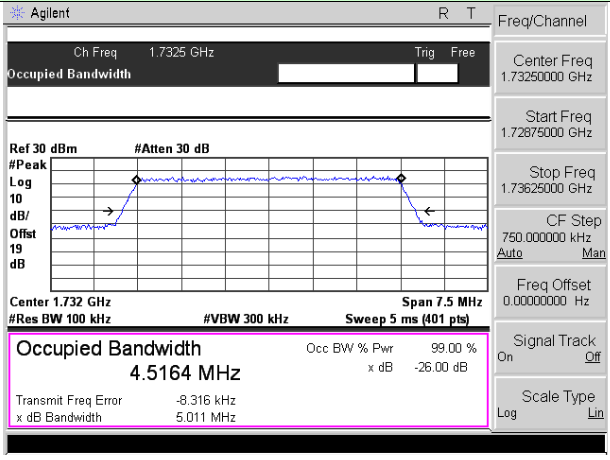


QPSK

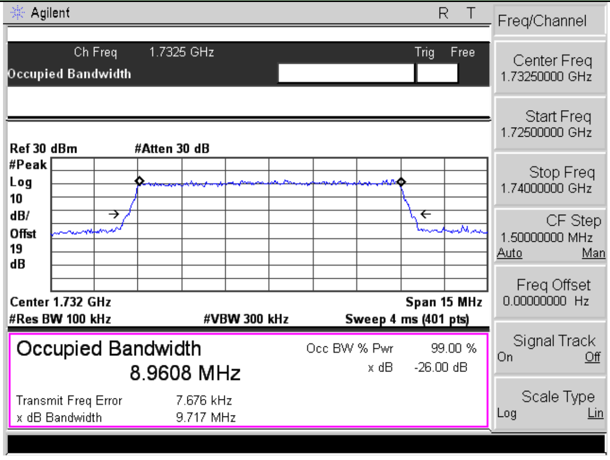


16-QAM

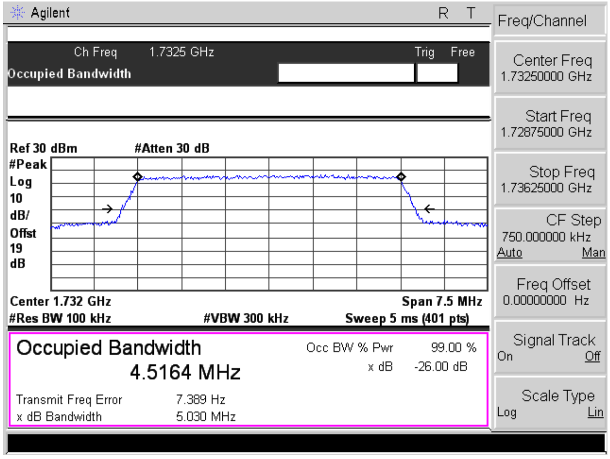
Test Mode: LTE Band 4 Channel Bandwidth: 5MHz	Test Mode: LTE Band 4 Channel Bandwidth: 10MHz



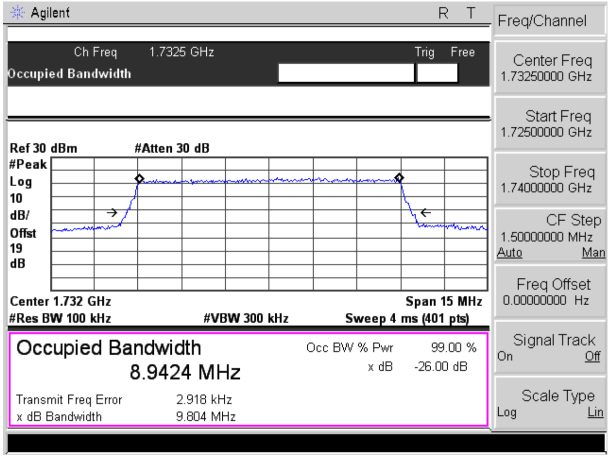
QPSK



QPSK

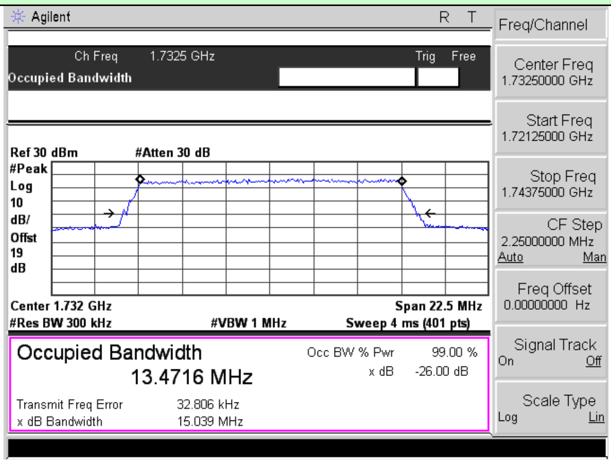


16-QAM

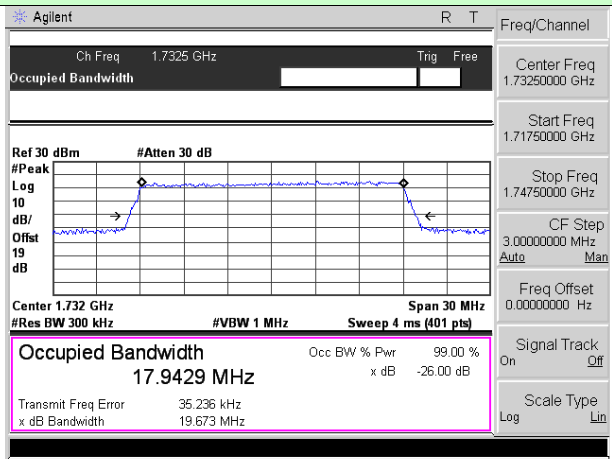


16-QAM

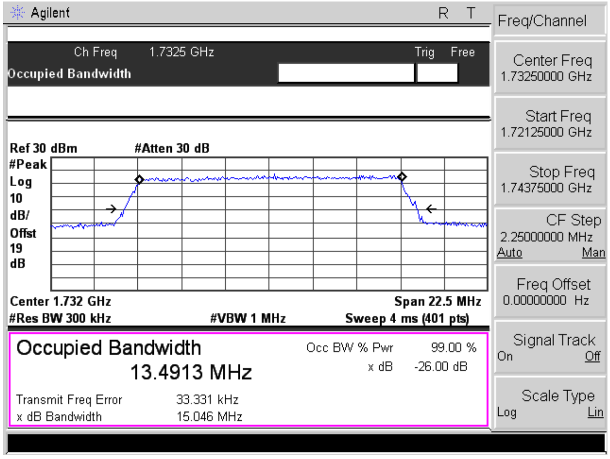
Test Mode: LTE Band 4 Channel Bandwidth: 15MHz	Test Mode: LTE Band 4 Channel Bandwidth: 20MHz



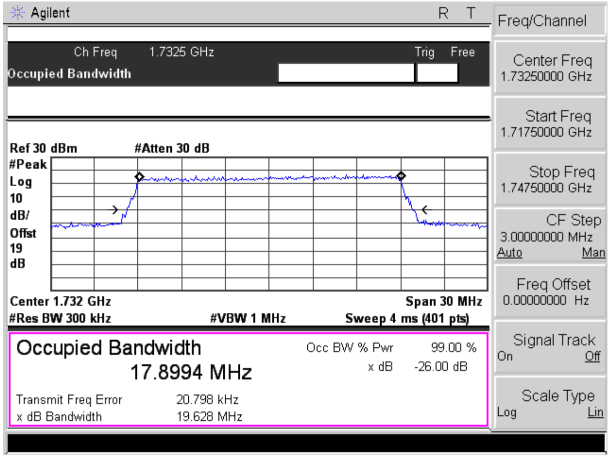
QPSK



QPSK



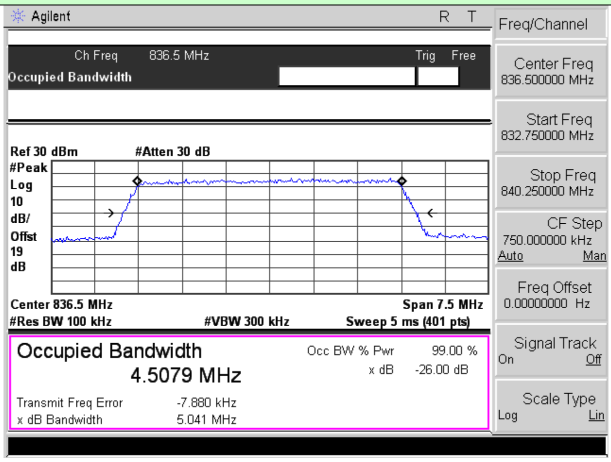
16-QAM



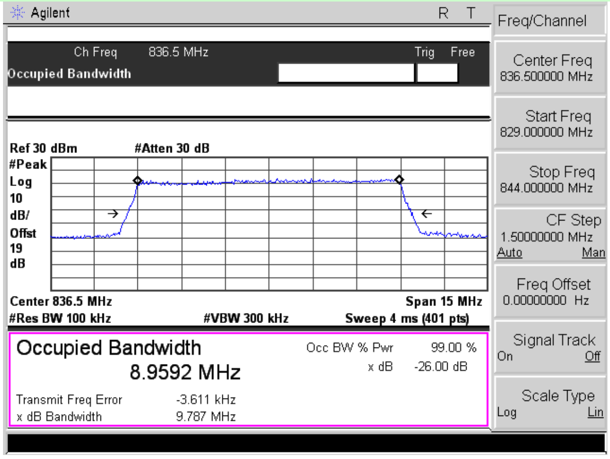
16-QAM

Test Mode: LTE Band 5
Channel Bandwidth: 5MHz

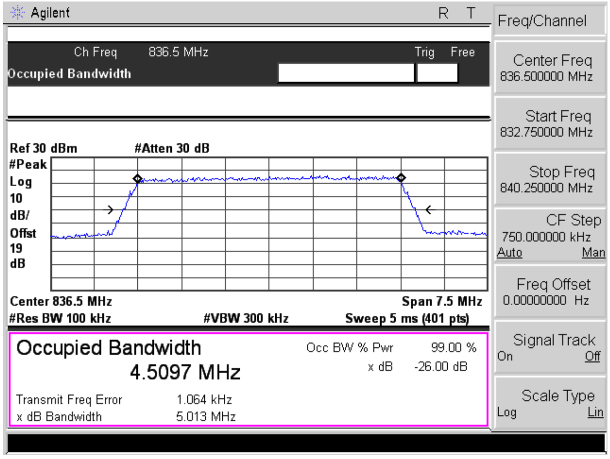
Test Mode: LTE Band 5
Channel Bandwidth: 10MHz



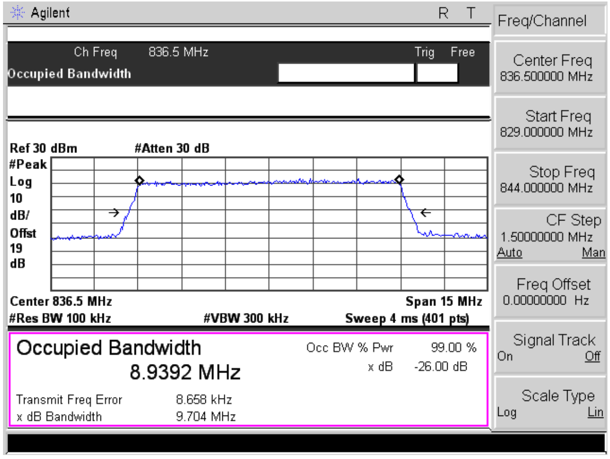
QPSK



QPSK

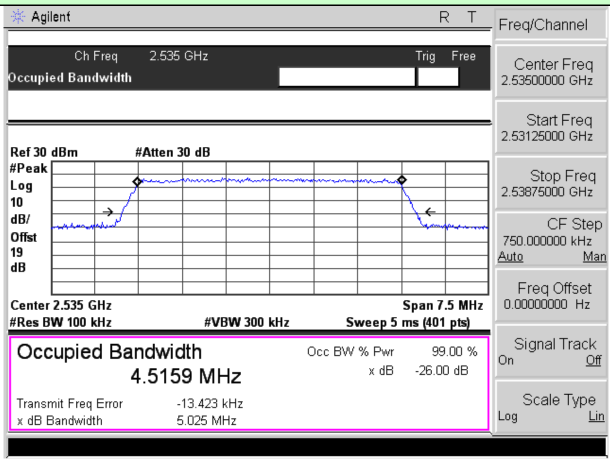


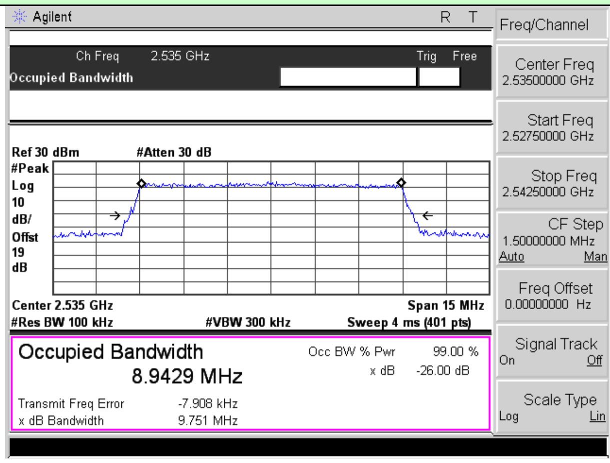
16-QAM



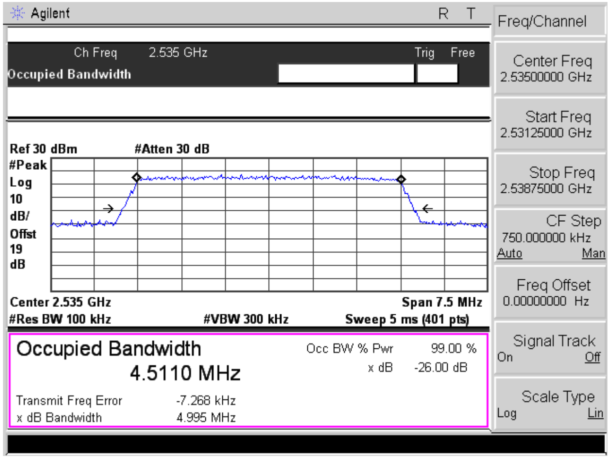
16-QAM

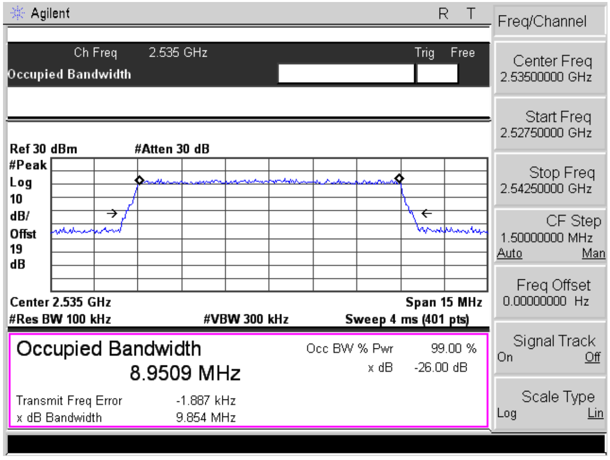
Test Mode: LTE Band 7 Channel Bandwidth: 5MHz	Test Mode: LTE Band 7 Channel Bandwidth: 10MHz





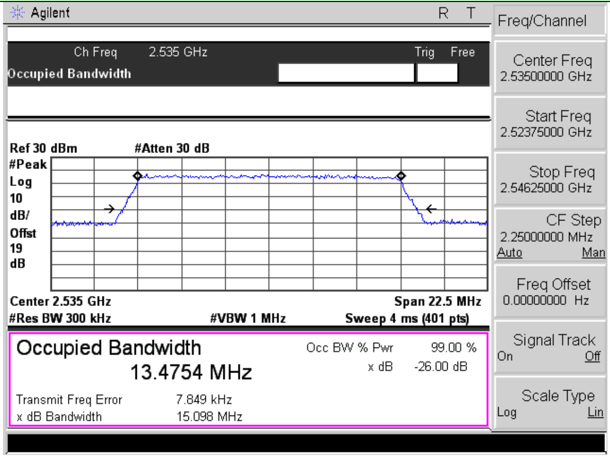
QPSK QPSK



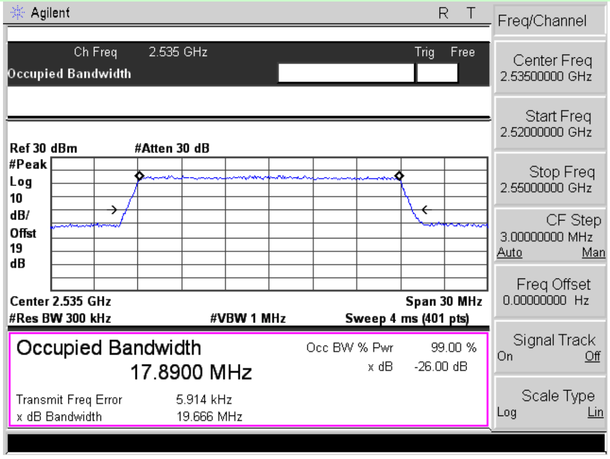


16-QAM 16-QAM

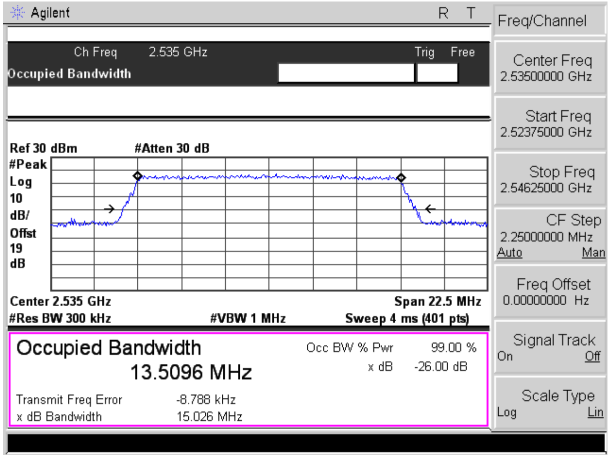
Test Mode: LTE Band 7 Channel Bandwidth: 15MHz	Test Mode: LTE Band 7 Channel Bandwidth: 20MHz



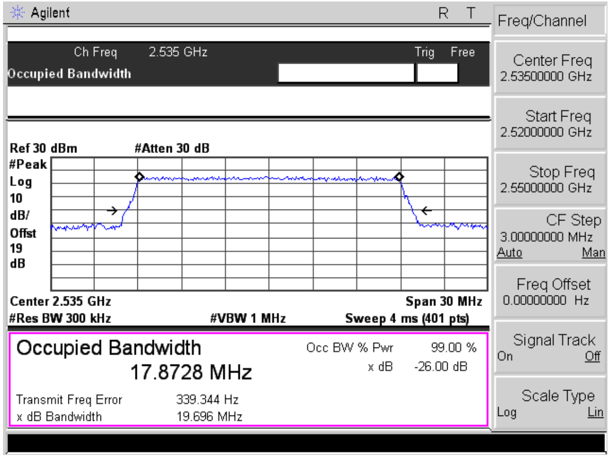
QPSK



QPSK



16-QAM



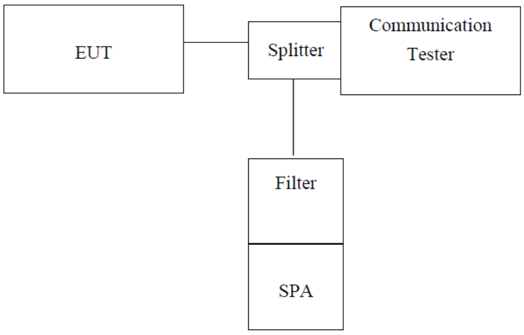
16-QAM

Note: All bandwidth and modulation are tested, only the worst results are reported.

4.6 MODULATION CHARACTERISTIC

According to FCC § 2.1047(d), Part 22H, Part 24E, Part 27 there is no specific requirement for digital modulation, therefore modulation characteristic is not presented.
According to RSS-132, RSS-133, RSS-139, RSS-199 the equipment certified under these standards shall employ digital modulation, but there is no specific requirement for digital modulation, therefore modulation characteristic is not presented.

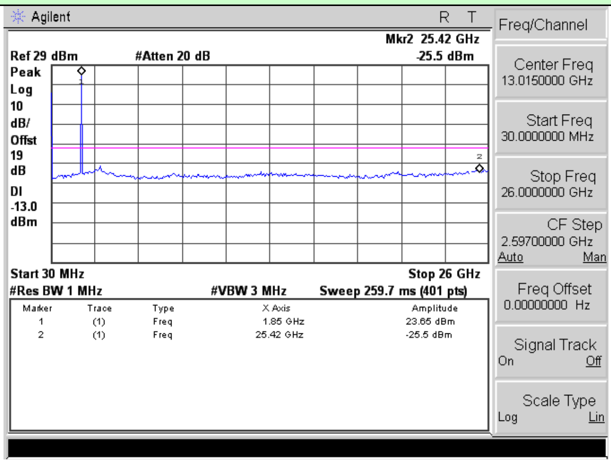
4.7 Out of band emission at antenna terminals

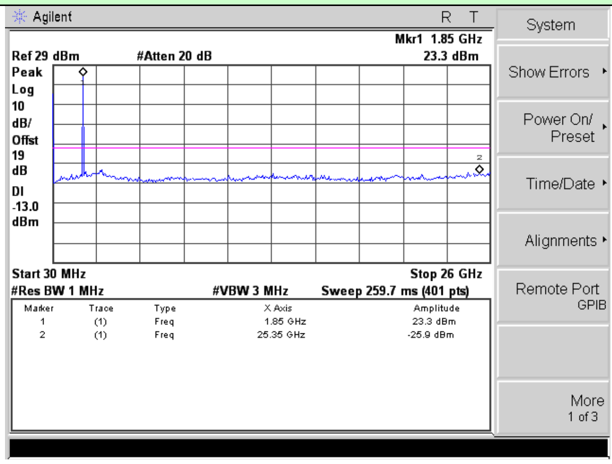
Test Requirement:	FCC part22.913(a), FCC part24.238(a), FCC part27.53(h) and RSS-132 (5.5), RSS-133 (6.5.1), RSS-139(6.6) and RSS-199(4.5)
Test Method:	KDB 971168 D01 v03r1 clause 6, FCC part2.1051, ANSI/TIA-603-E, ANSI C63.26 clause 5.7
Limit:	-13dBm(Band 7/13/26 request additional limit) Band 7 Additional Limit refer to RSS-199(4.5) and FCC part 27.53 Band 13 Additional Limit refer to FCC part 27.53
Test setup:	 *Note: Measurement setup for testing on Antenna connector*
Test Procedure:	1 The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. 2 The resolution bandwidth of the spectrum analyzer was set at 1MHz, sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic. 3 For the out of band: Set the RBW=1MHz, VBW = 3MHz, Start=30MHz, Stop= 10th harmonic. 4 Band Edge Requirements: In the 1 MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 1 percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to measure the out of band Emissions.
Test Instruments:	Refer to section 3 for details
Test mode:	Refer to section 4.1 for details
Test results:	Pass

Test plot as follows:

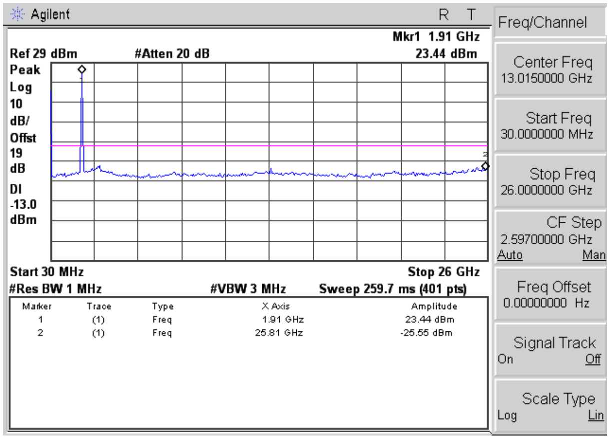
Conducted Spurious Emission:

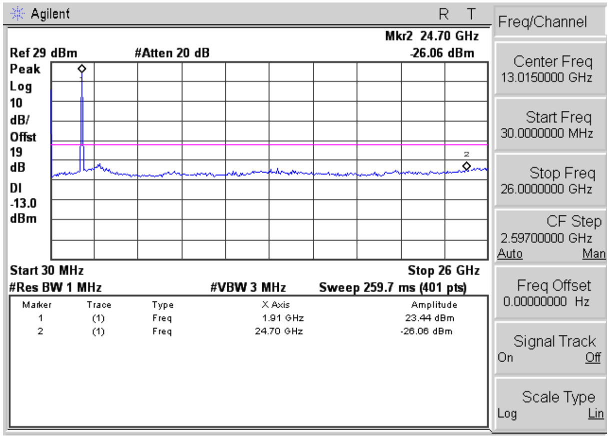
Test Mode: LTE Band 2 / 5MHz /1RB	Test Mode: LTE Band 2 / 5MHz /25RB



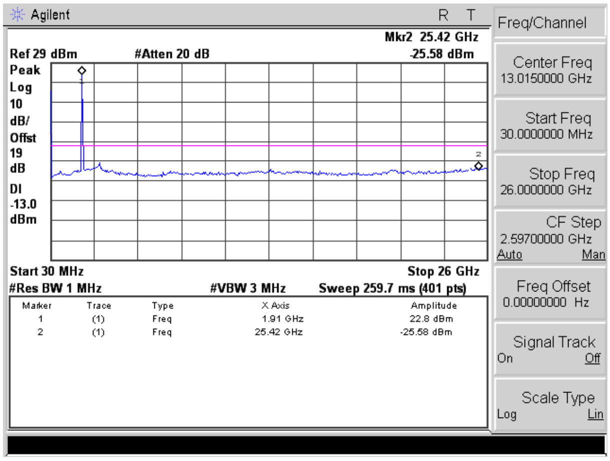


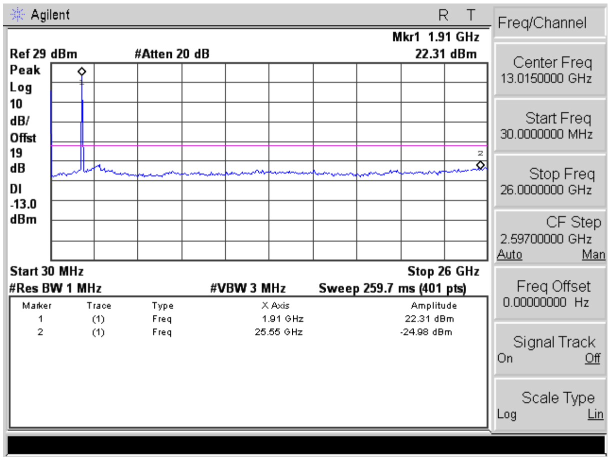
Lowest channel





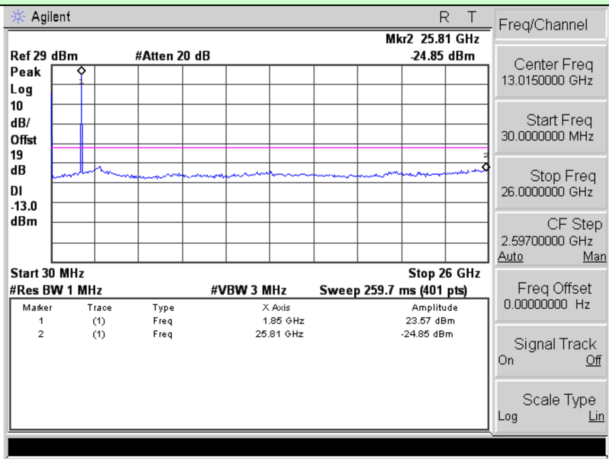
Middle channel

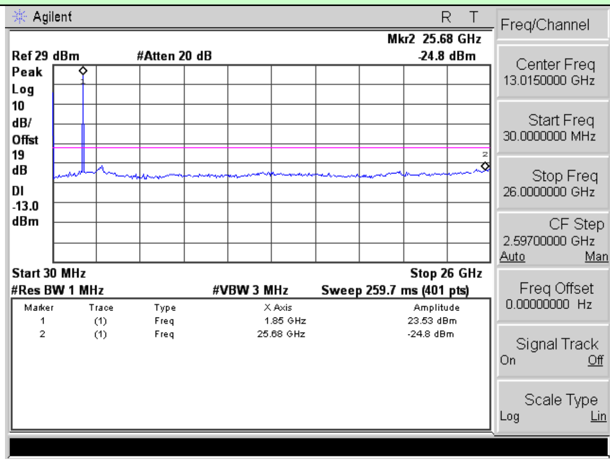




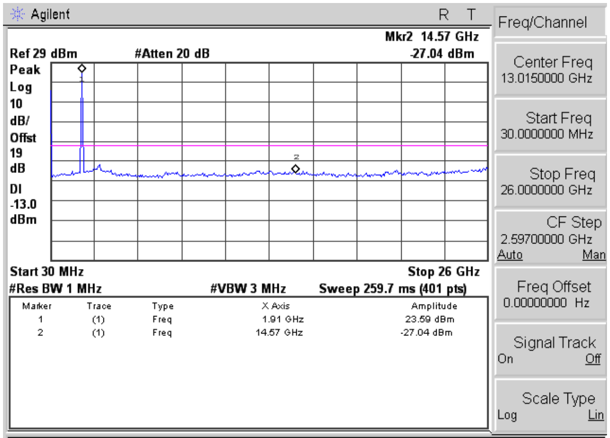
Highest channel

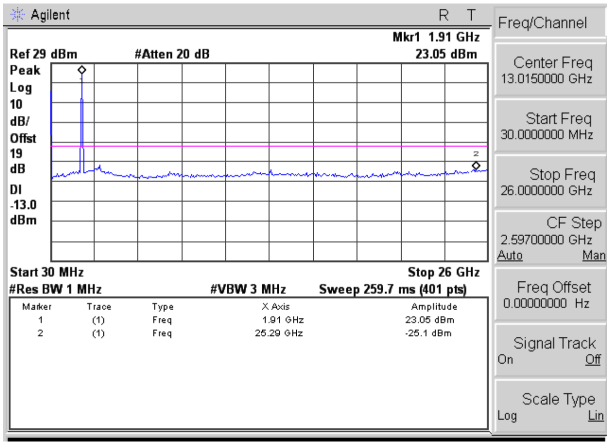
Test Mode: LTE Band 2 / 10MHz /1RB	Test Mode: LTE Band 2 / 10MHz /50RB



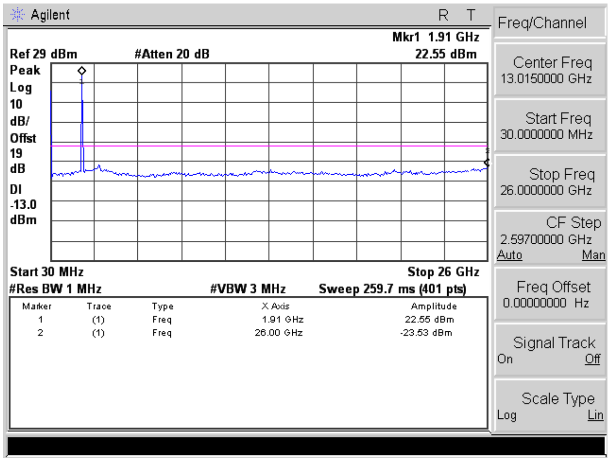


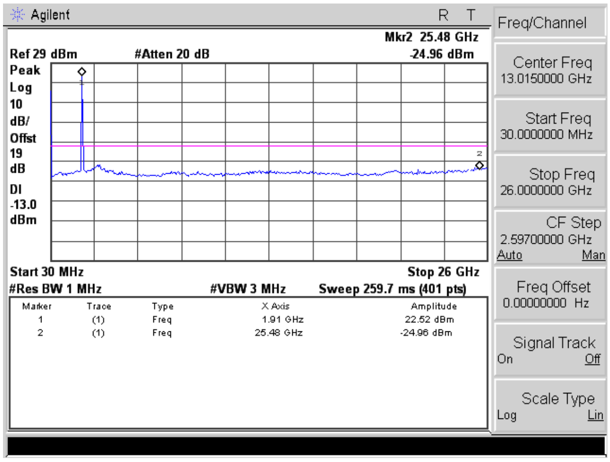
Lowest channel





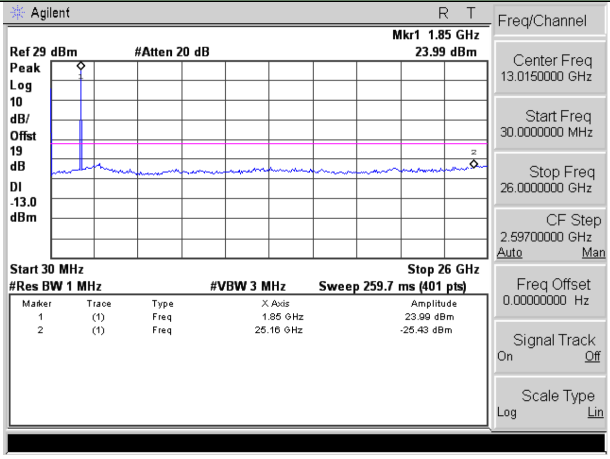
Middle channel

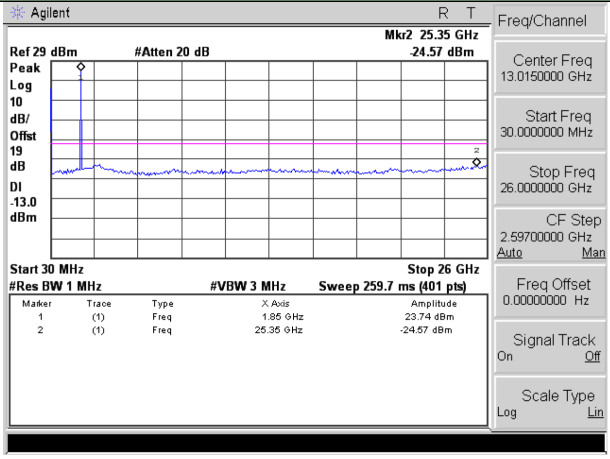




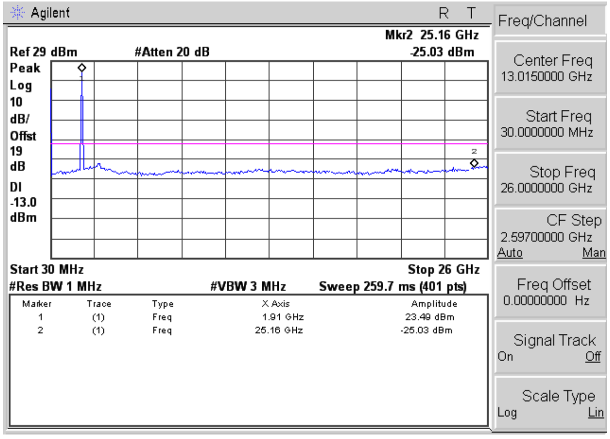
Highest channel

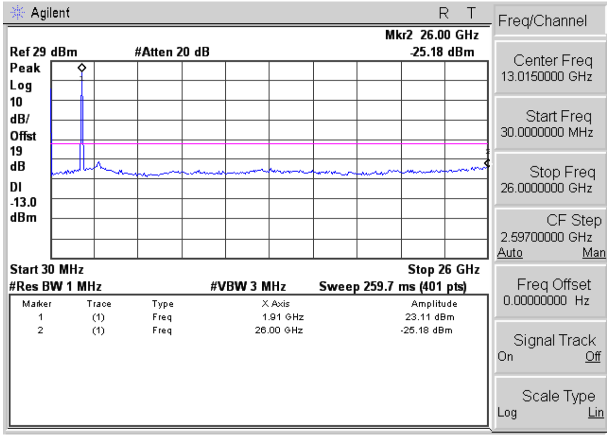
Test Mode: LTE Band 2 / 15MHz /1RB	Test Mode: LTE Band 2 / 15MHz /75RB



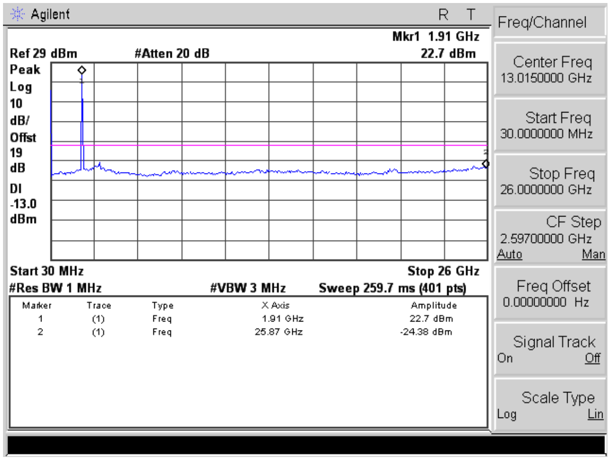


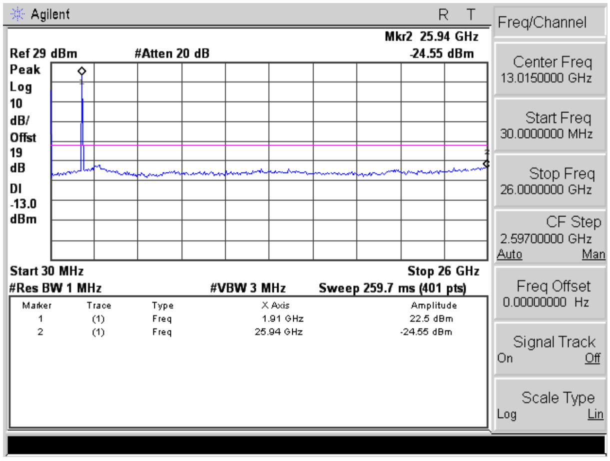
Lowest channel





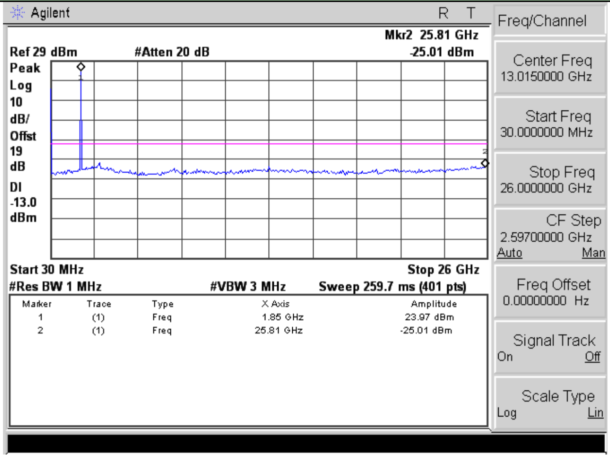
Middle channel

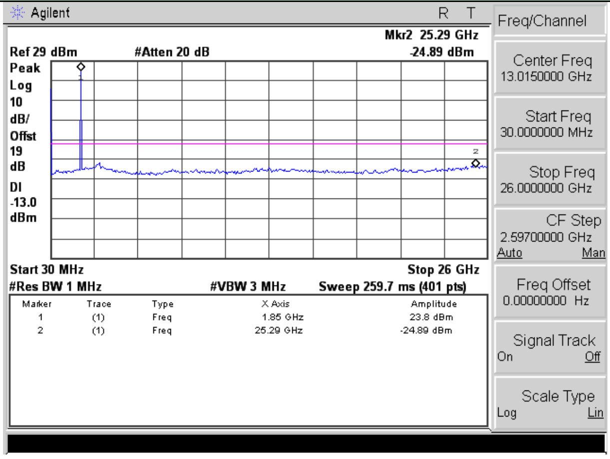




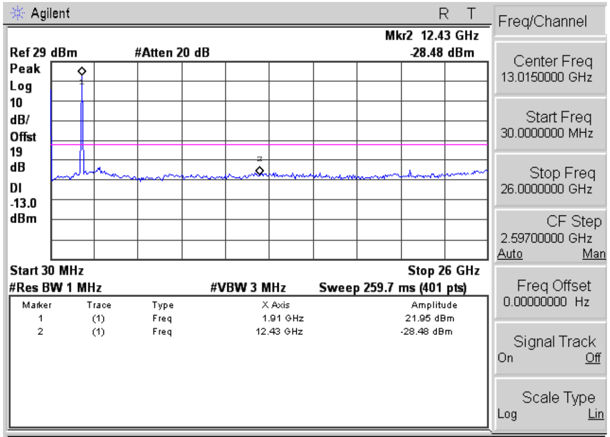
Highest channel

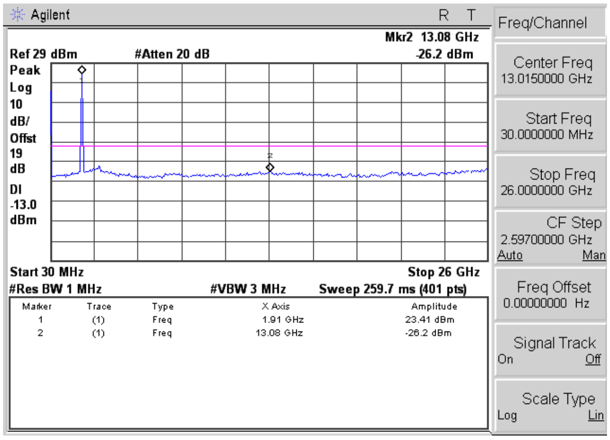
Test Mode: LTE Band 2 / 20MHz /1RB	Test Mode: LTE Band 2 / 20MHz /100RB



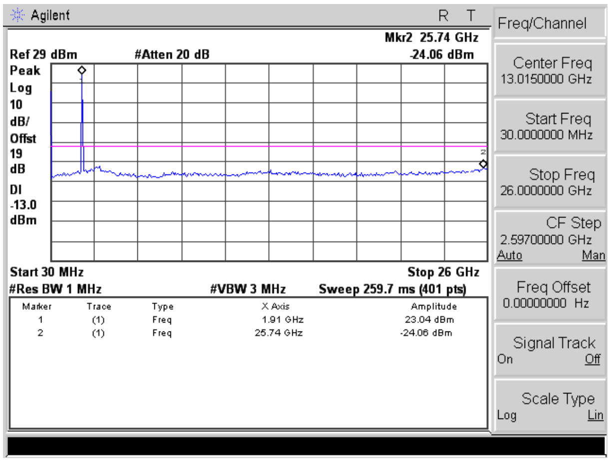


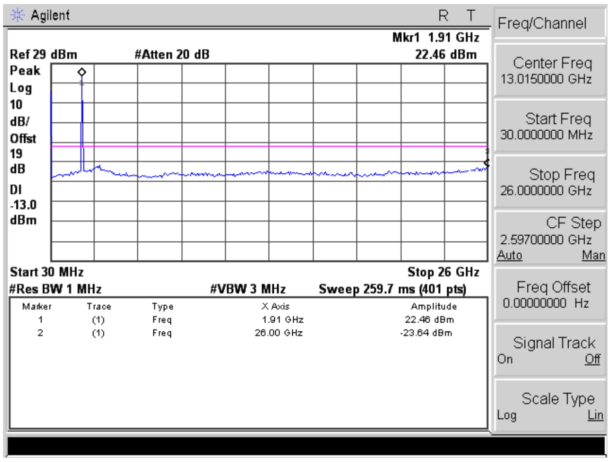
Lowest channel





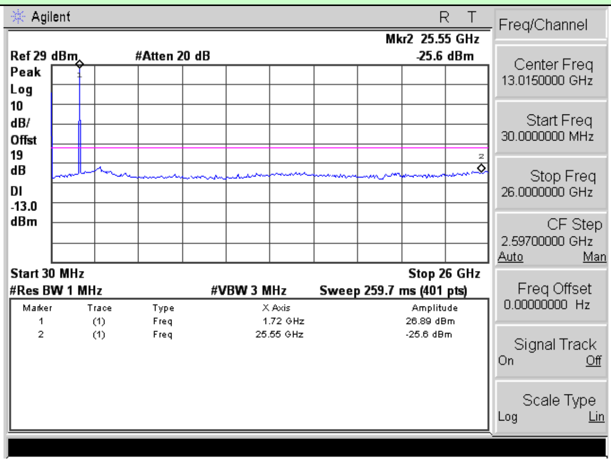
Middle channel

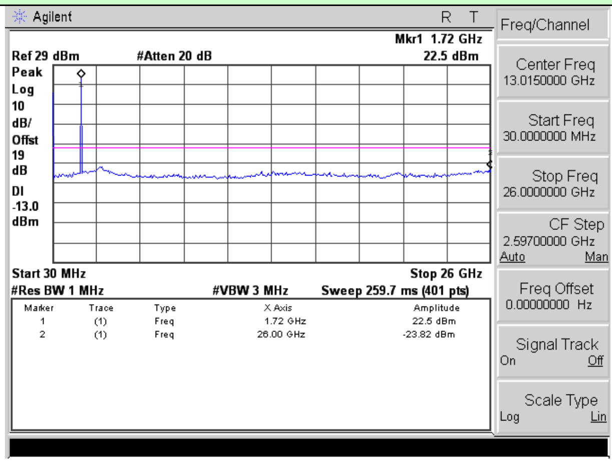




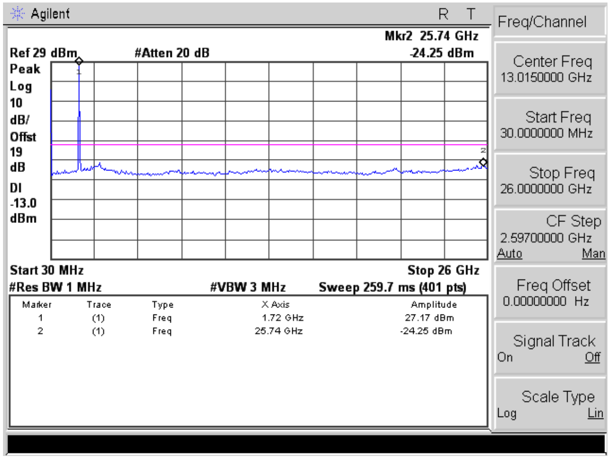
Highest channel

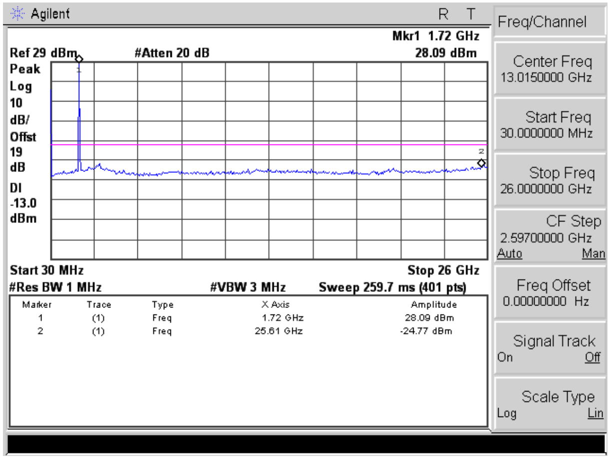
Test Mode: LTE Band 4 / 5MHz /1RB	Test Mode: LTE Band 4 / 5MHz /25RB



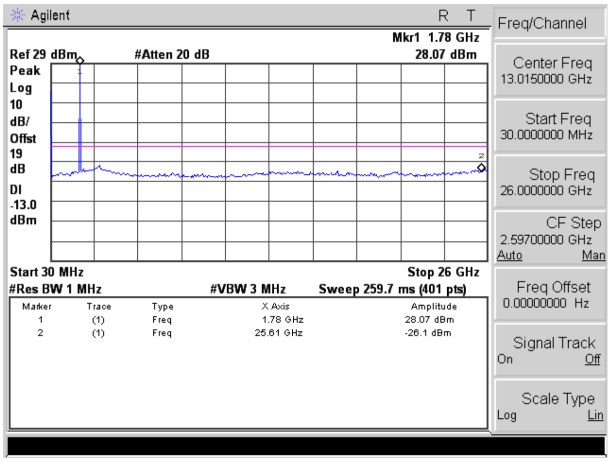


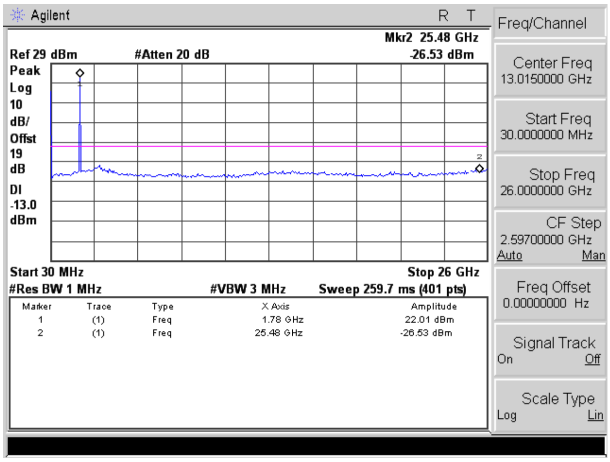
Lowest channel





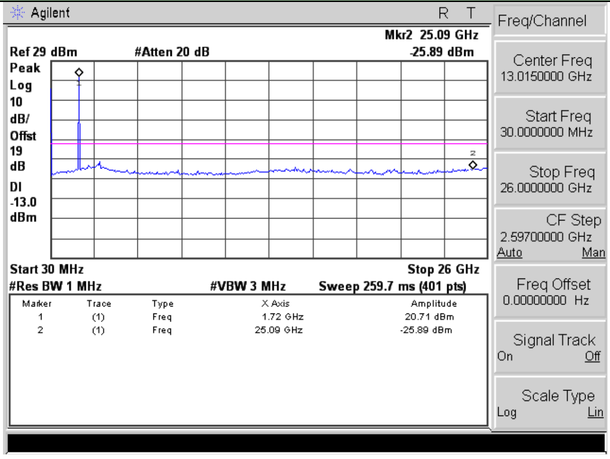
Middle channel

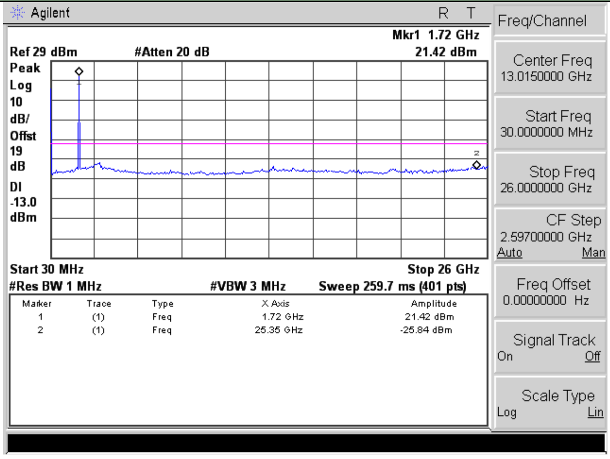




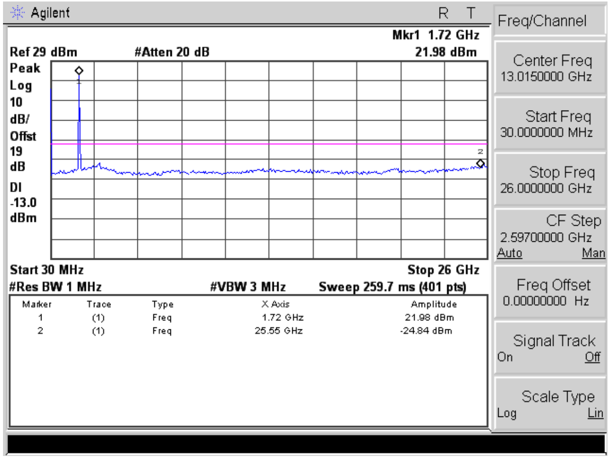
Highest channel

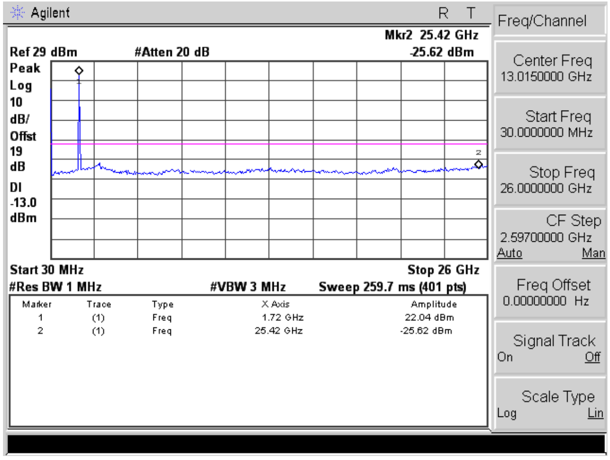
Test Mode: LTE Band 4 / 10MHz /1RB	Test Mode: LTE Band 4 / 10MHz /50RB



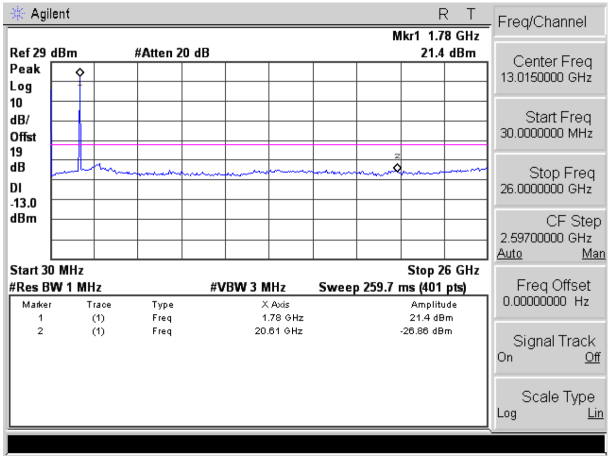


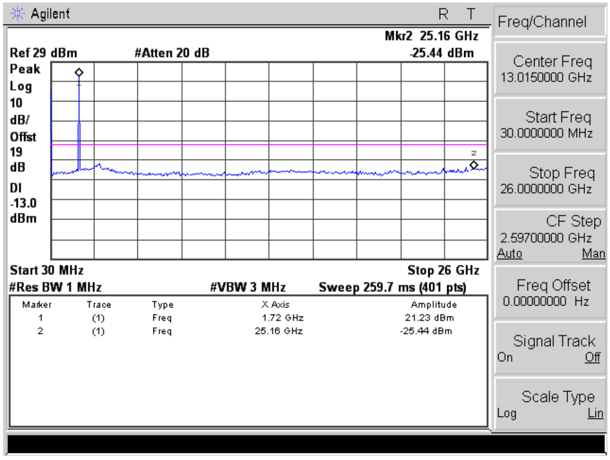
Lowest channel





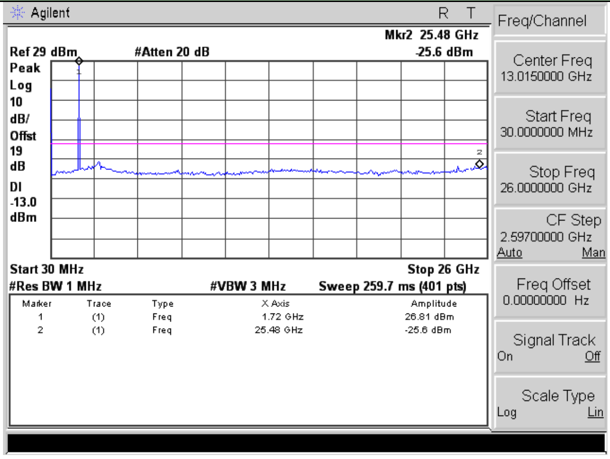
Middle channel

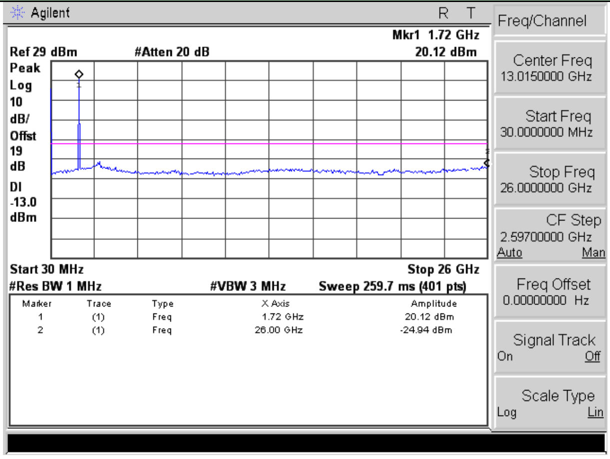




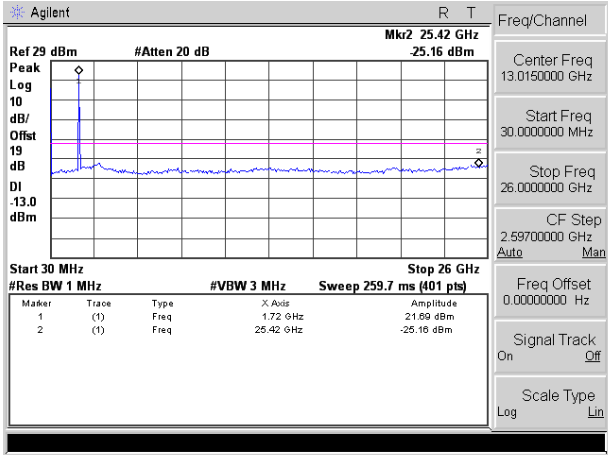
Highest channel

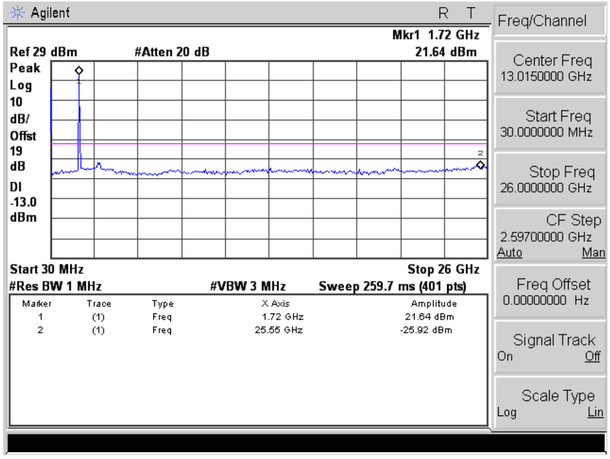
Test Mode: LTE Band 4 / 15MHz /1RB	Test Mode: LTE Band 4 / 15MHz /75RB



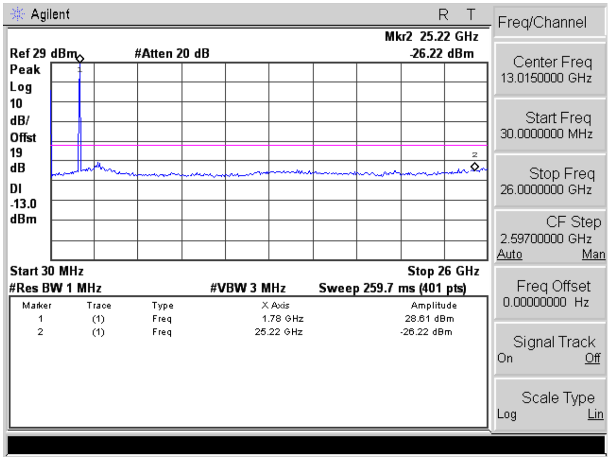


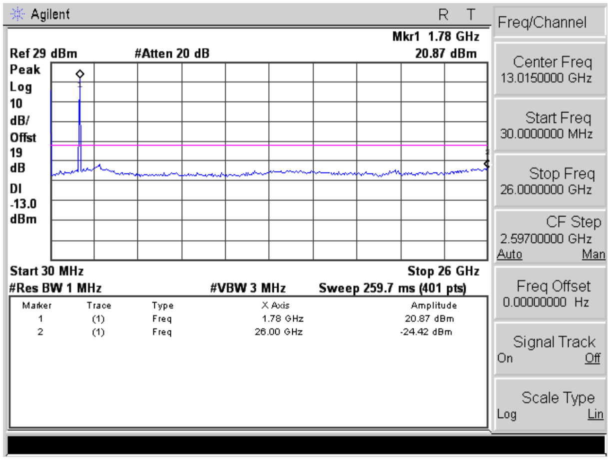
Lowest channel





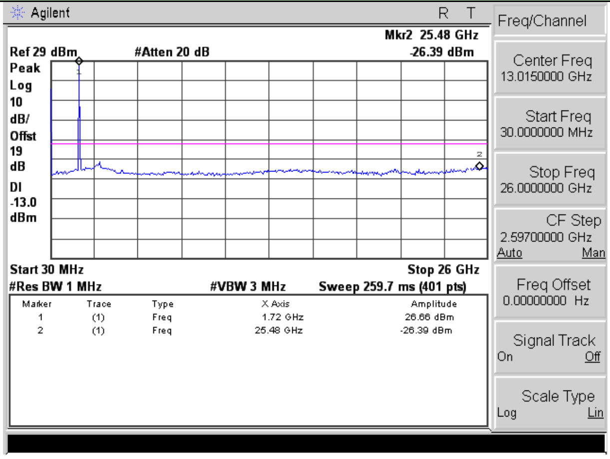
Middle channel

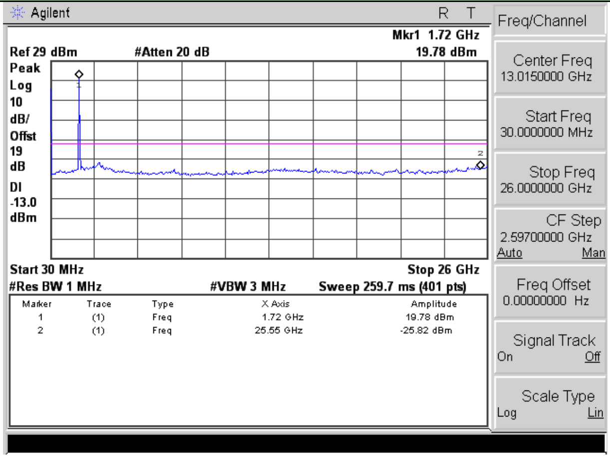




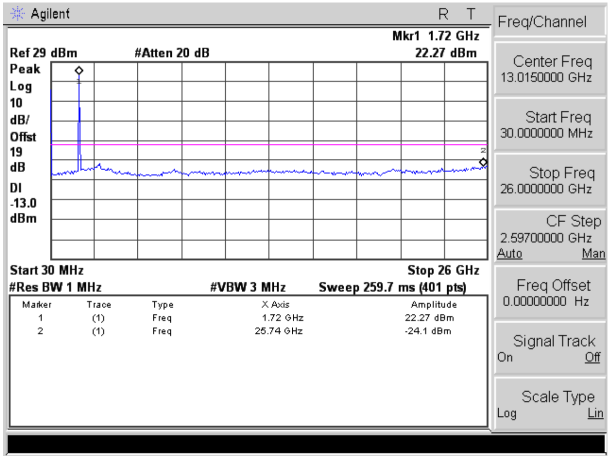
Highest channel

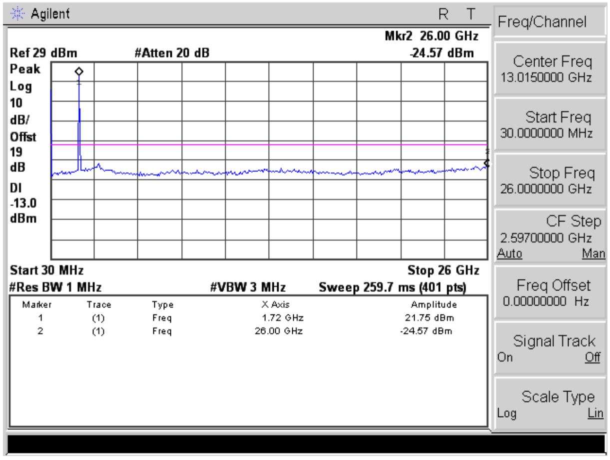
Test Mode: LTE Band 4 / 20MHz /1RB	Test Mode: LTE Band 4 / 20MHz /100RB



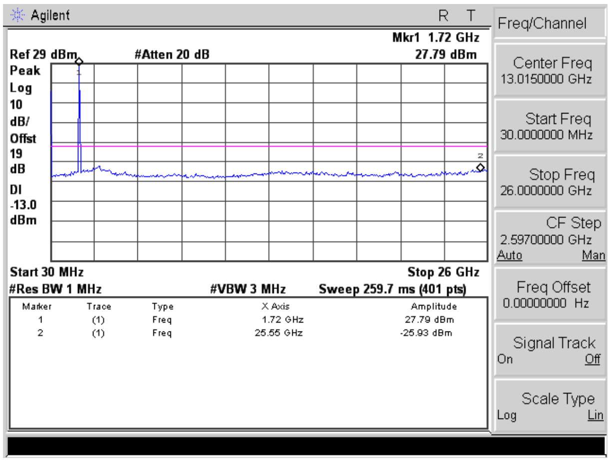


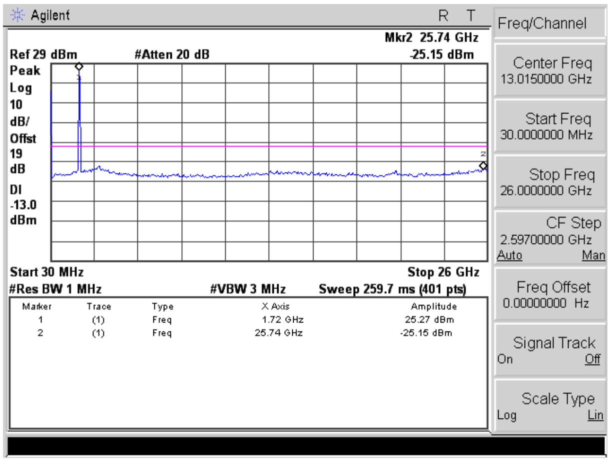
Lowest channel





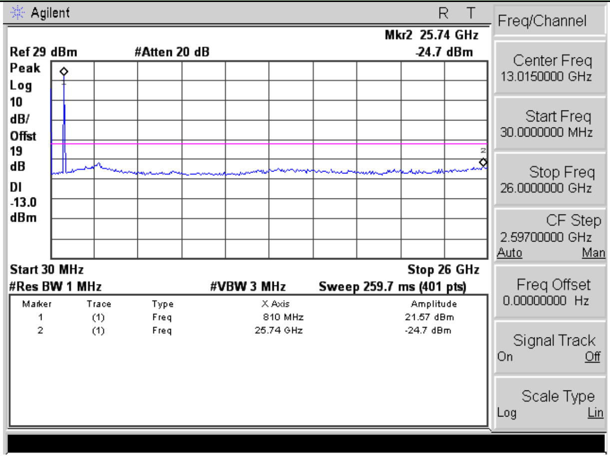
Middle channel

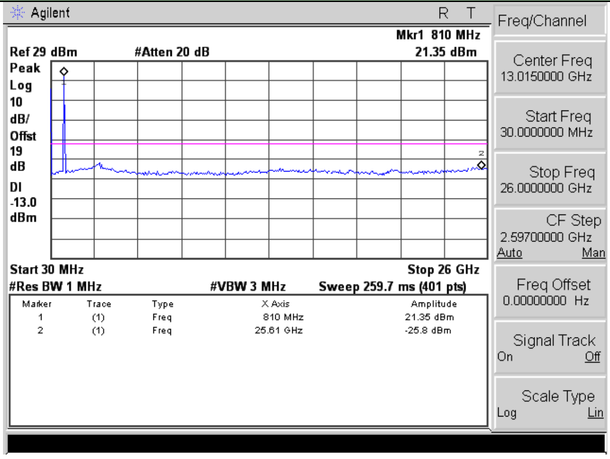




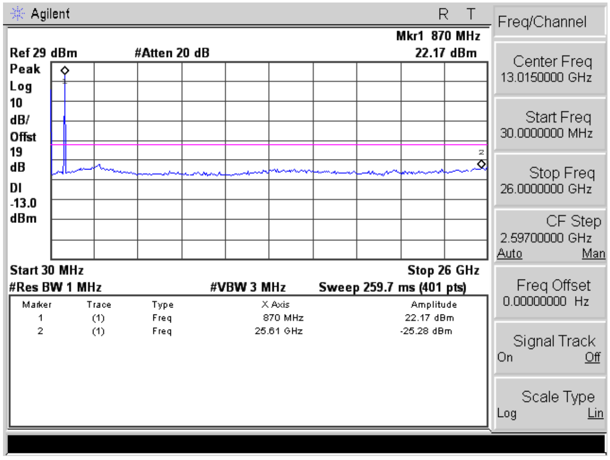
Highest channel

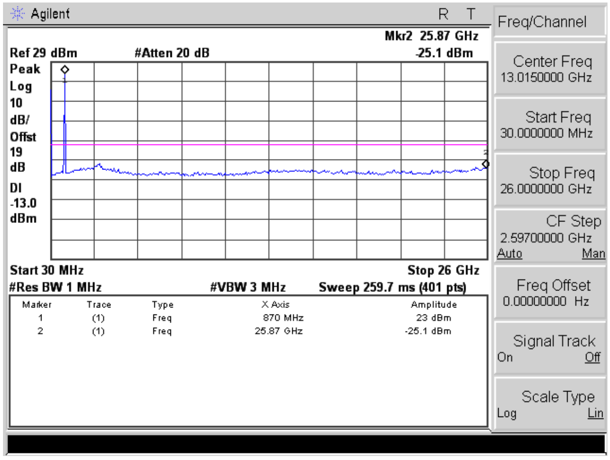
Test Mode: LTE Band 5/ 5MHz /1RB	Test Mode: LTE Band 5 / 5MHz /25RB



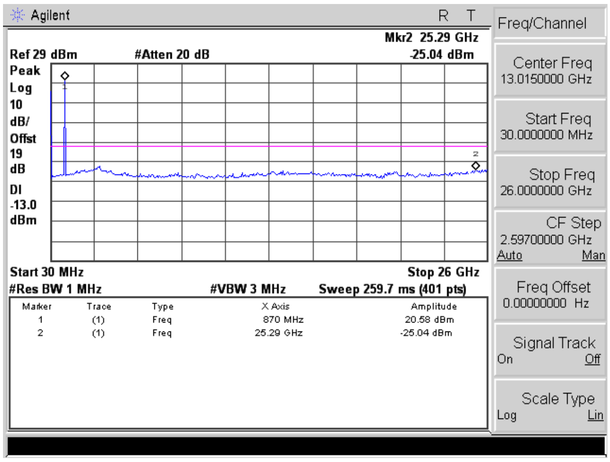


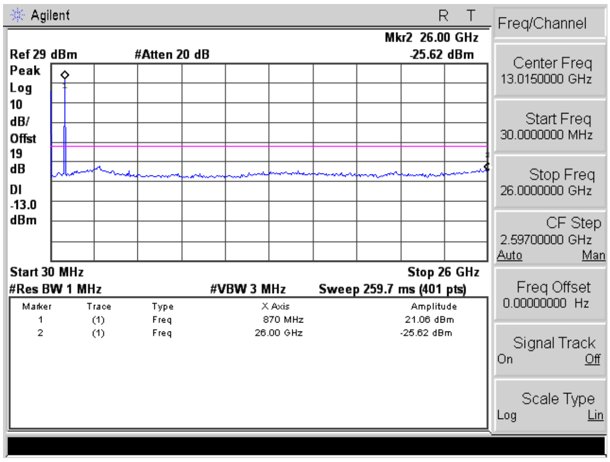
Lowest channel





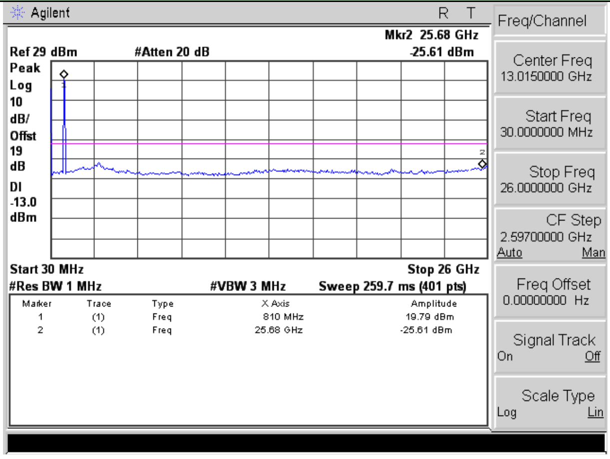
Middle channel

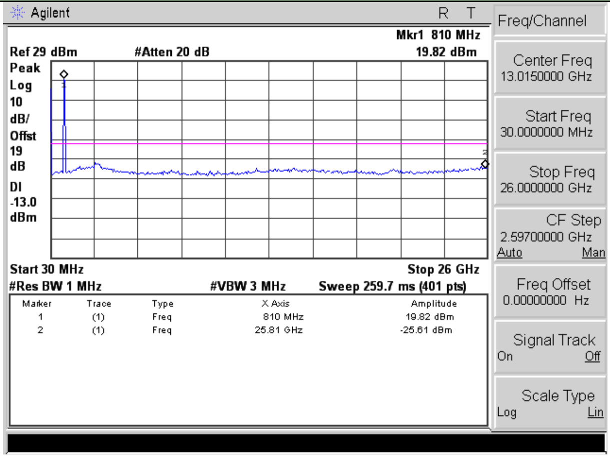




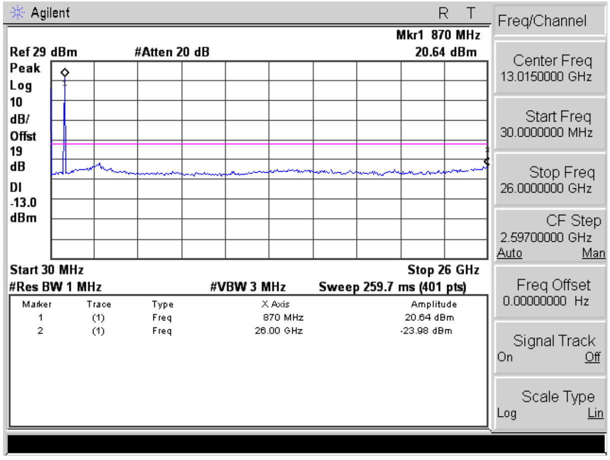
Highest channel

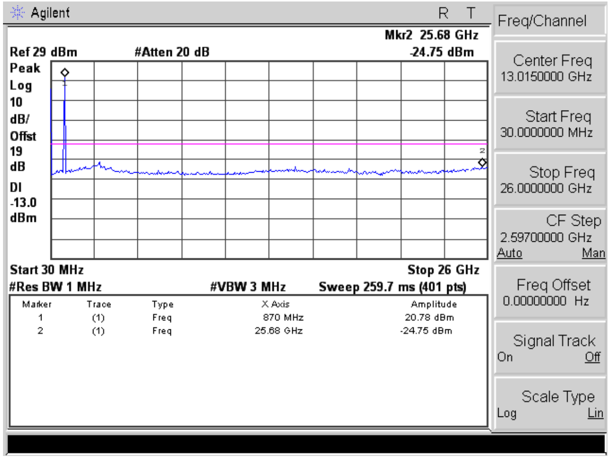
Test Mode: LTE Band 5/ 10MHz /1RB	Test Mode: LTE Band 5/ 10MHz /50RB



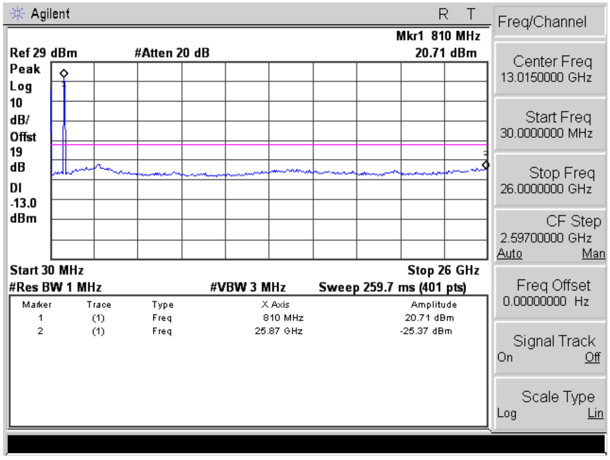


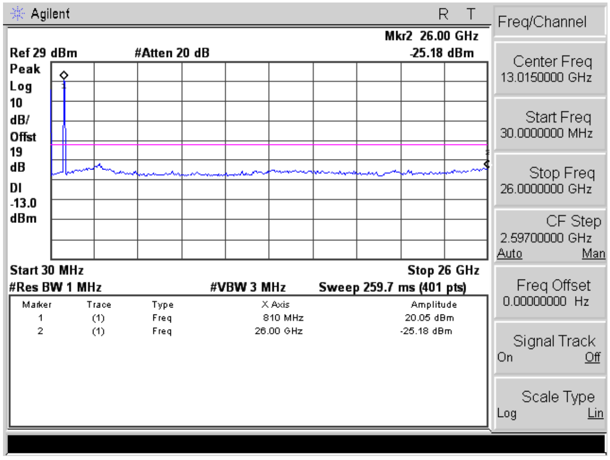
Lowest channel





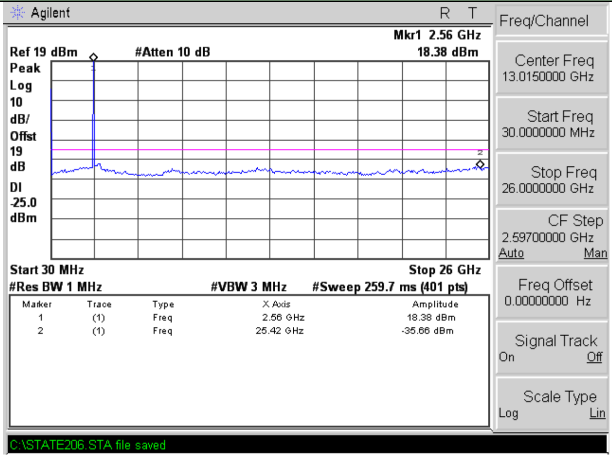
Middle channel

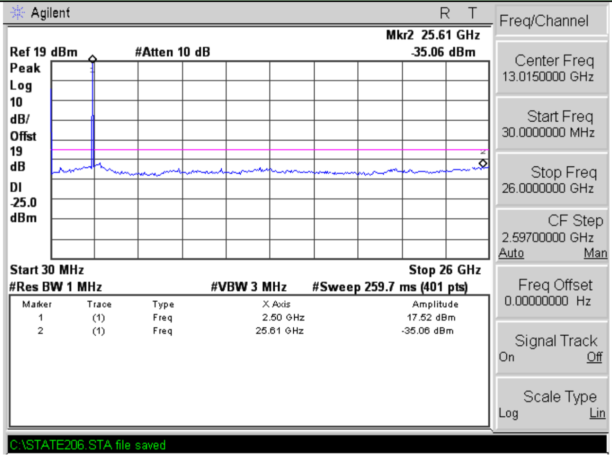




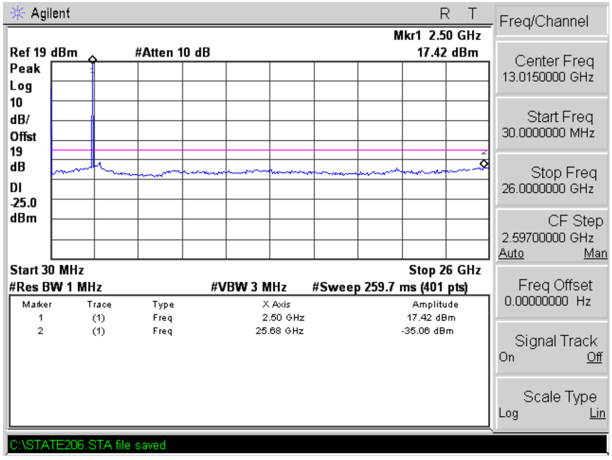
Highest channel

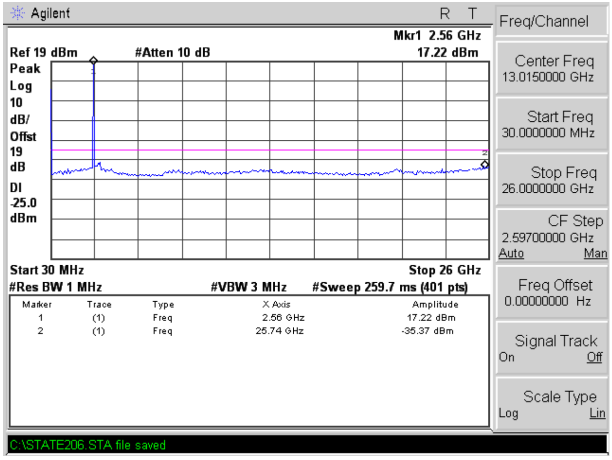
Test Mode: LTE Band 7 / 5MHz /1RB	Test Mode: LTE Band 7 / 5MHz /25RB



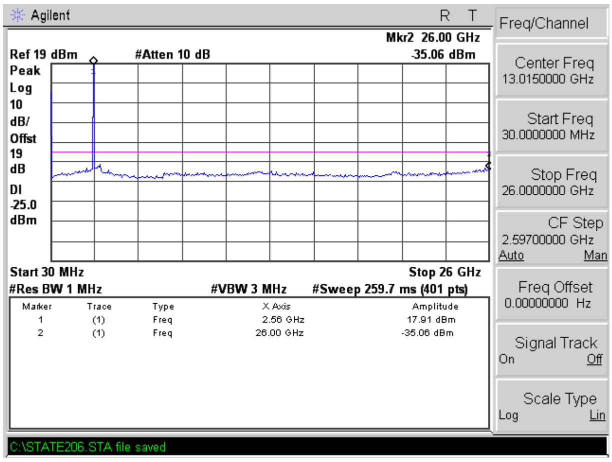


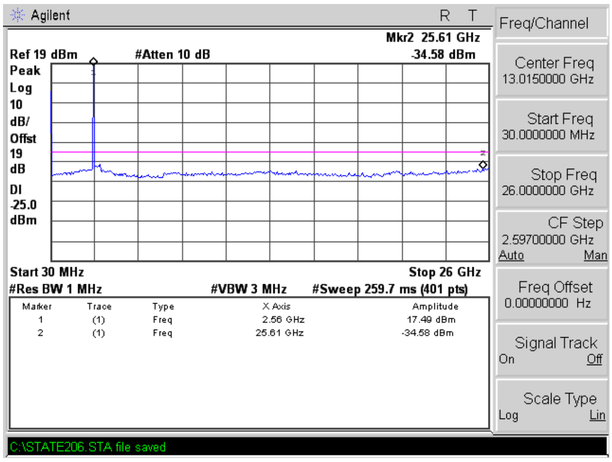
Lowest channel





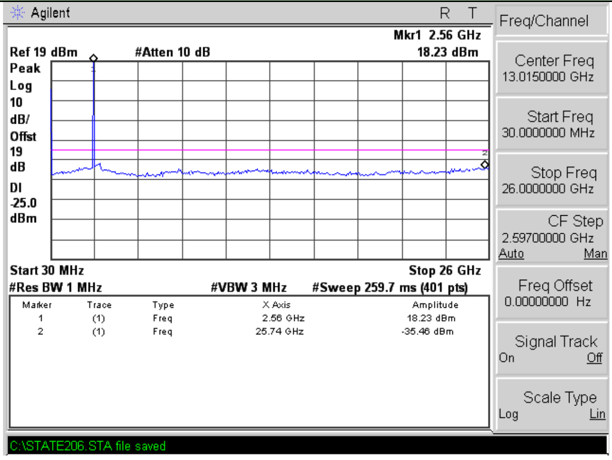
Middle channel

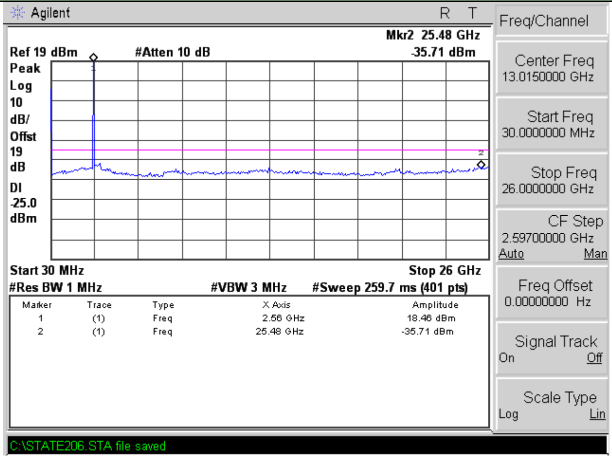




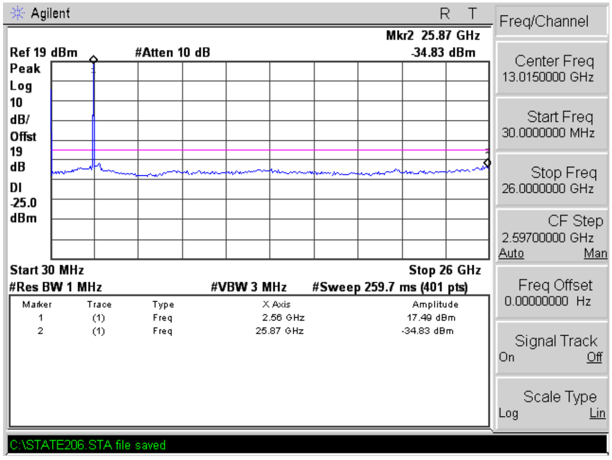
Highest channel

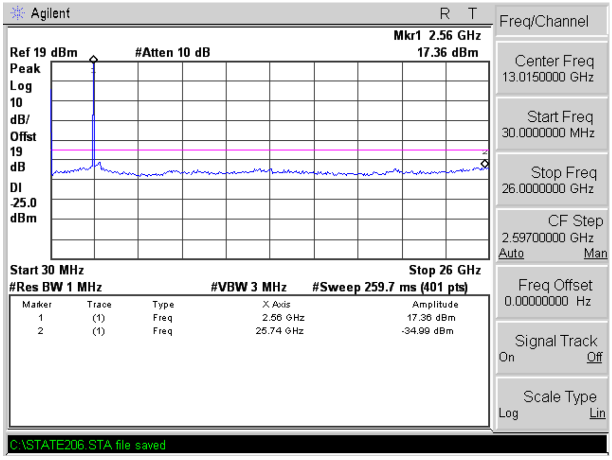
Test Mode: LTE Band 7 / 10MHz /1RB	Test Mode: LTE Band 7 / 10MHz /50RB



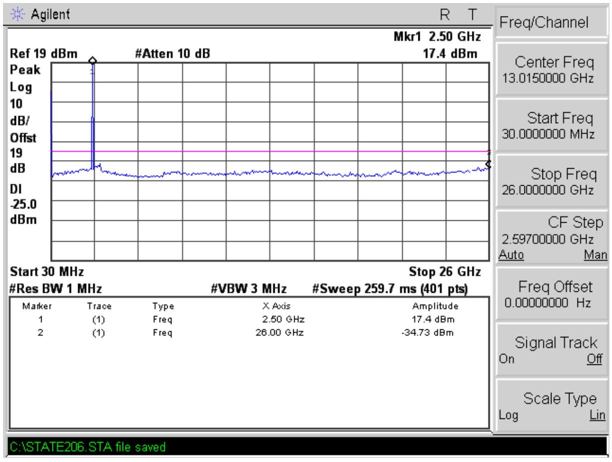


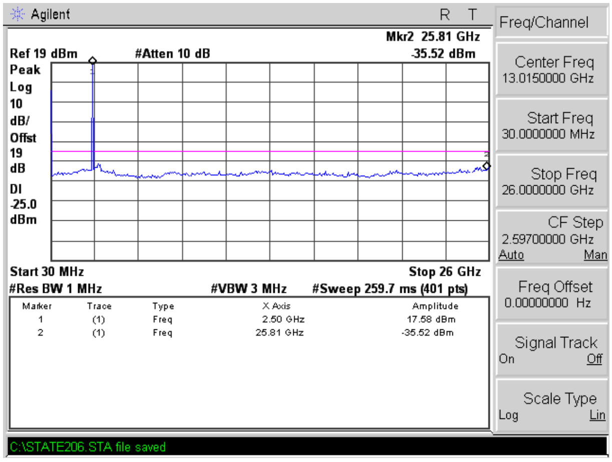
Lowest channel





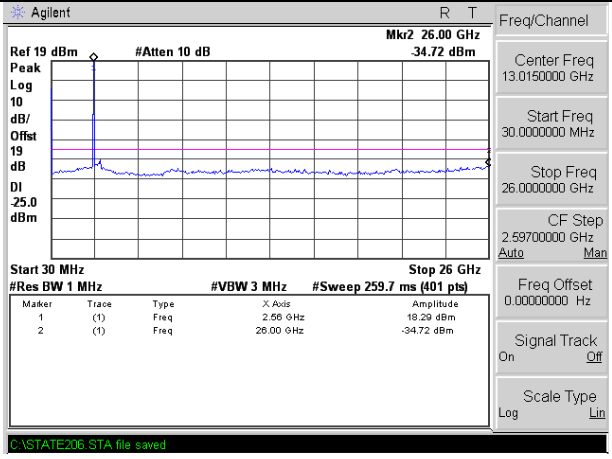
Middle channel

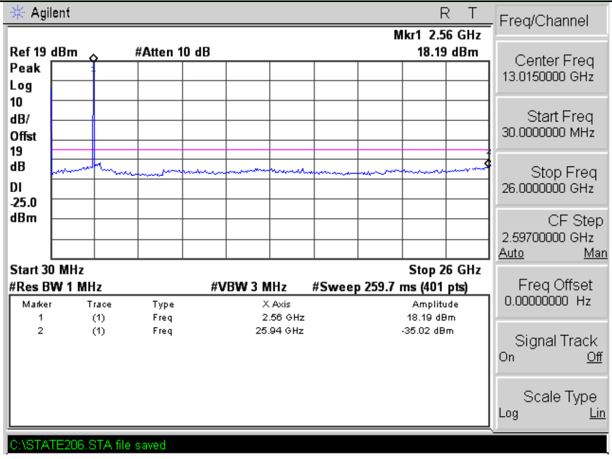




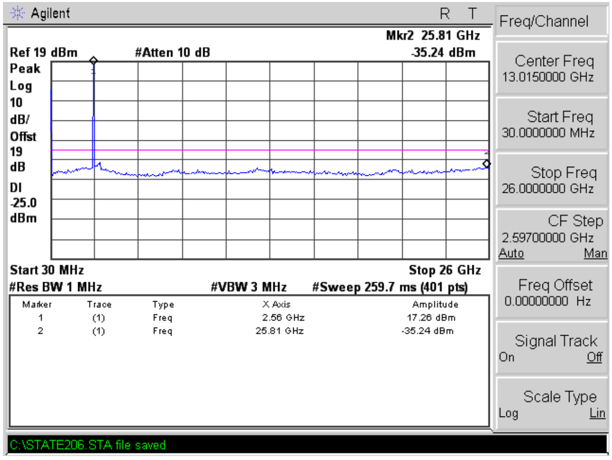
Highest channel

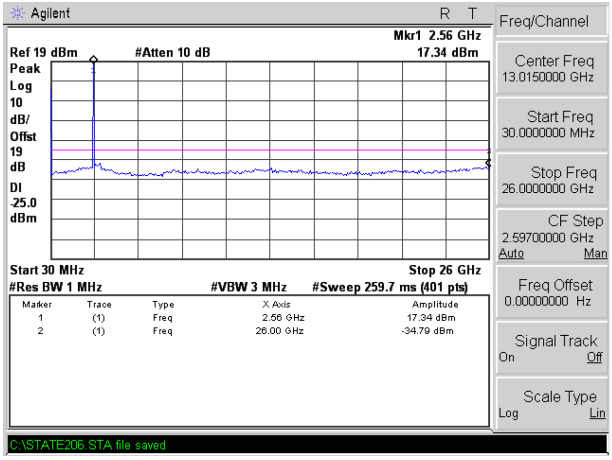
Test Mode: LTE Band 7 / 15MHz /1RB	Test Mode: LTE Band 7 / 15MHz /75RB



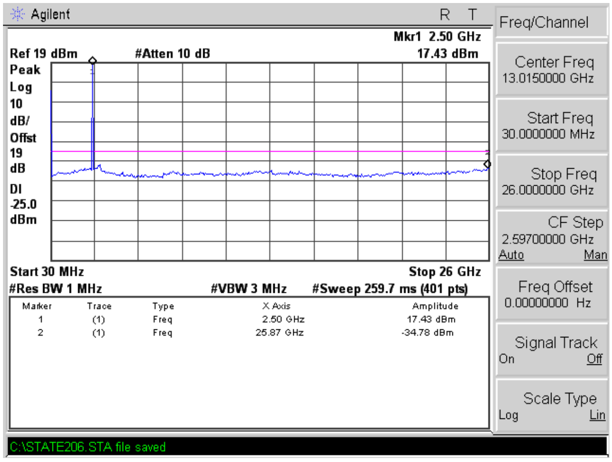


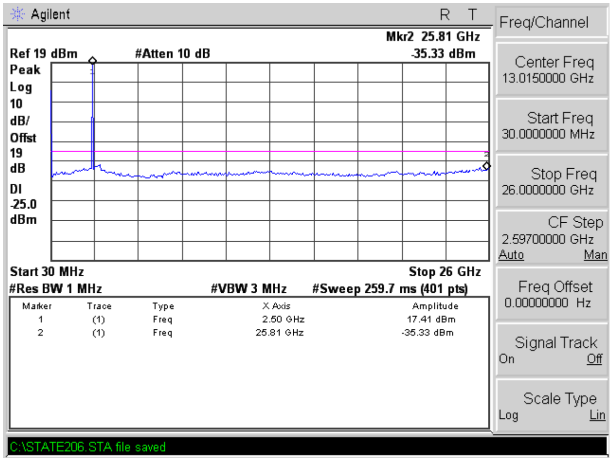
Lowest channel





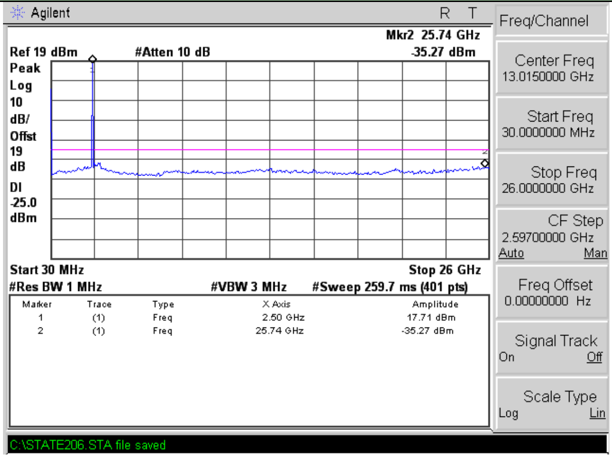
Middle channel

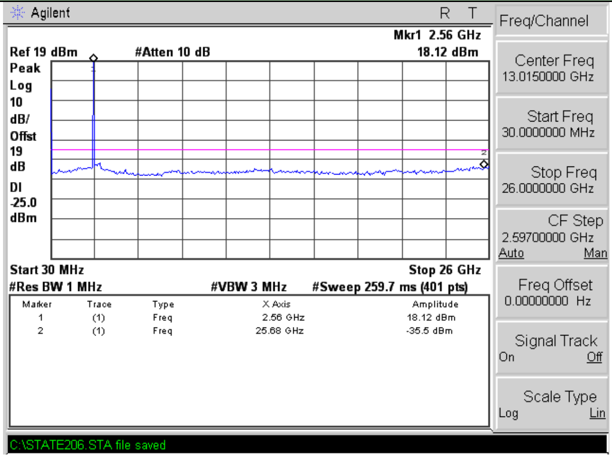




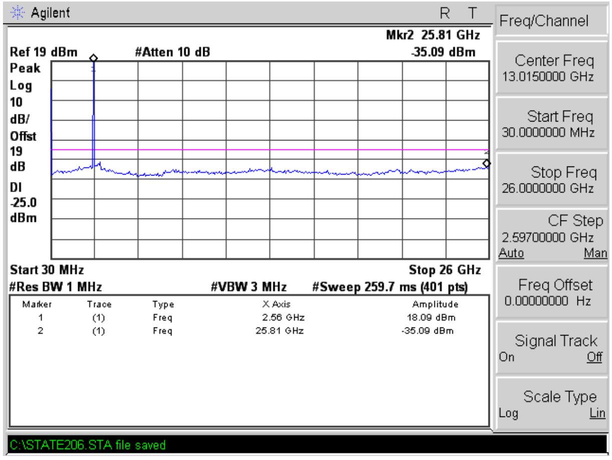
Highest channel

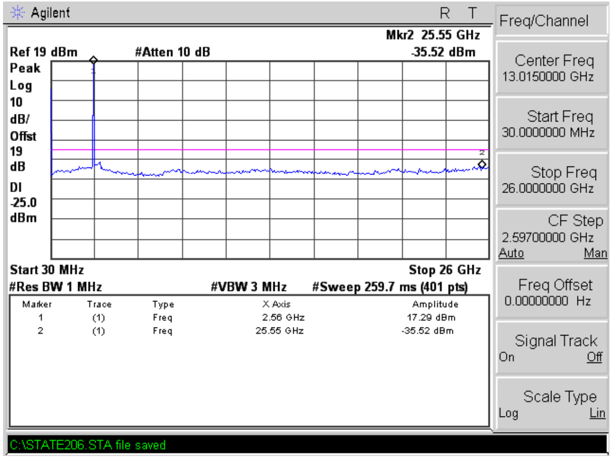
Test Mode: LTE Band 7 / 20MHz /1RB	Test Mode: LTE Band 7 / 20MHz /100RB



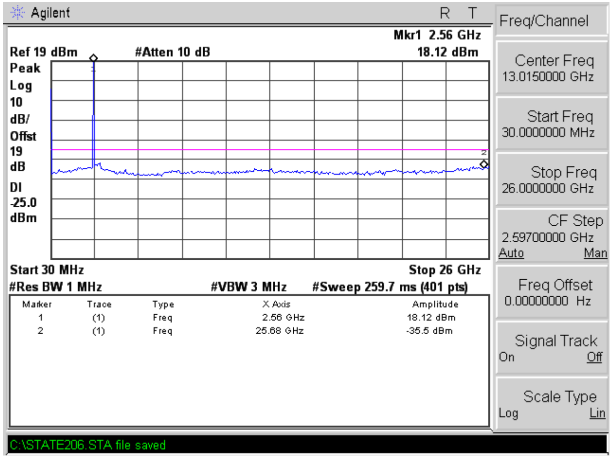


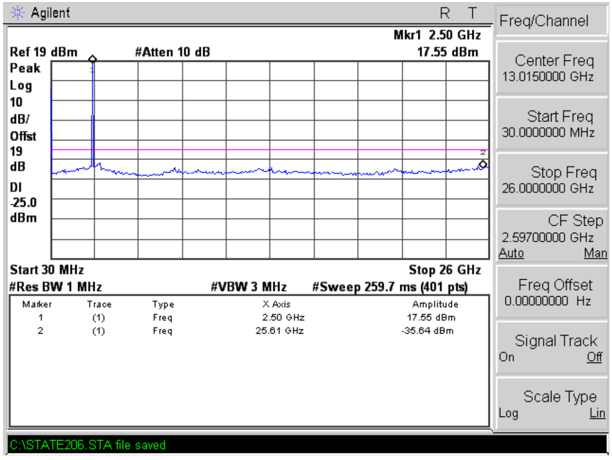
Lowest channel





Middle channel

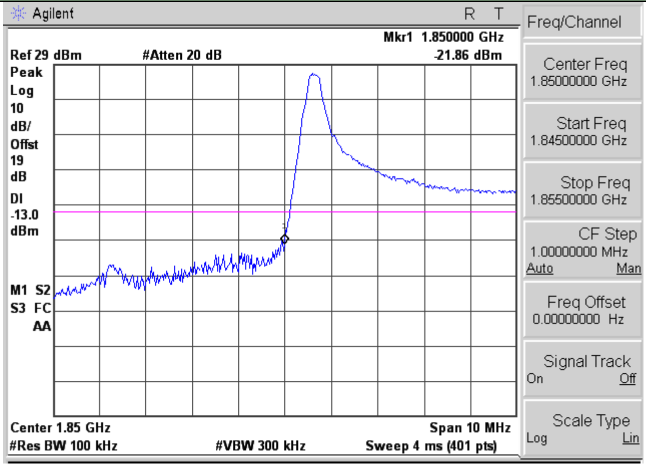




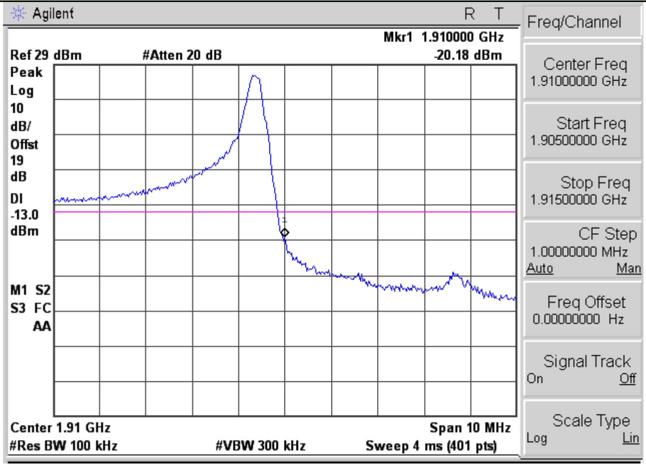
Highest channel

Band Edge

Test Mode: LTE Band 2 / 5MHz / 1RB / QPSK

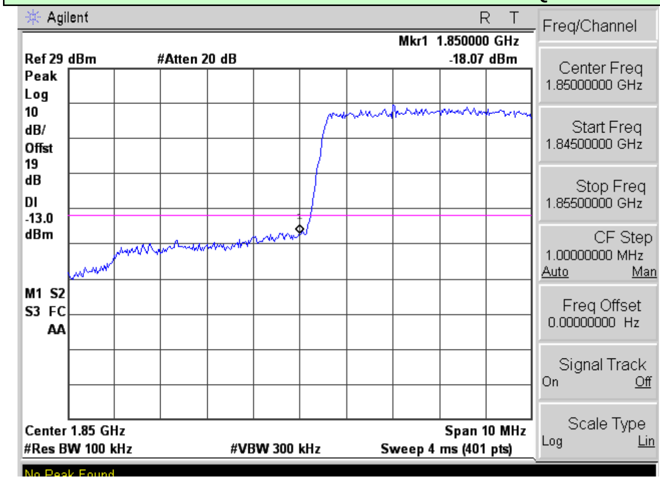


Lowest channel

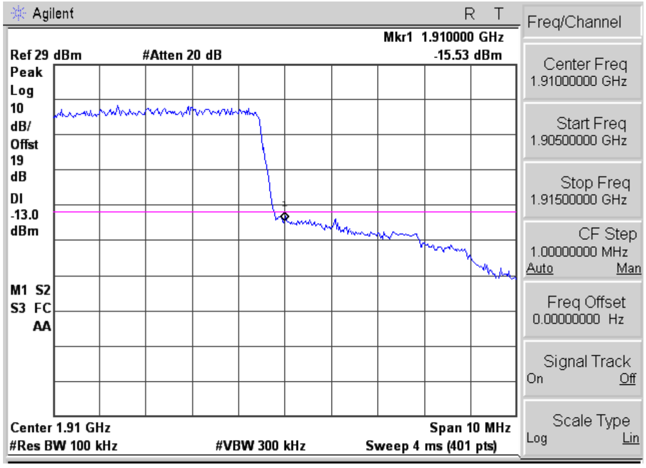


Highest channel

Test Mode: LTE Band 2 / 5MHz / 25RB / QPSK

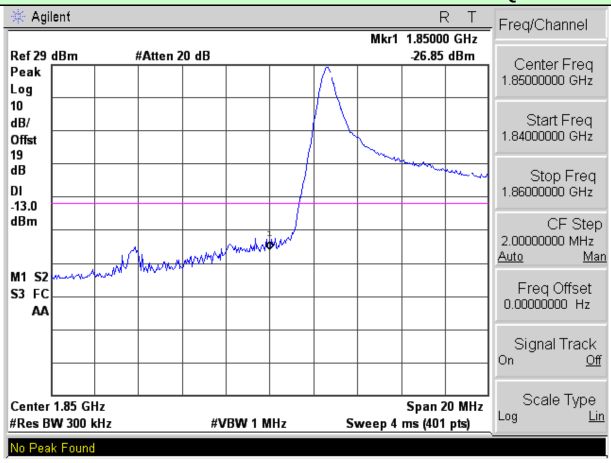


Lowest channel

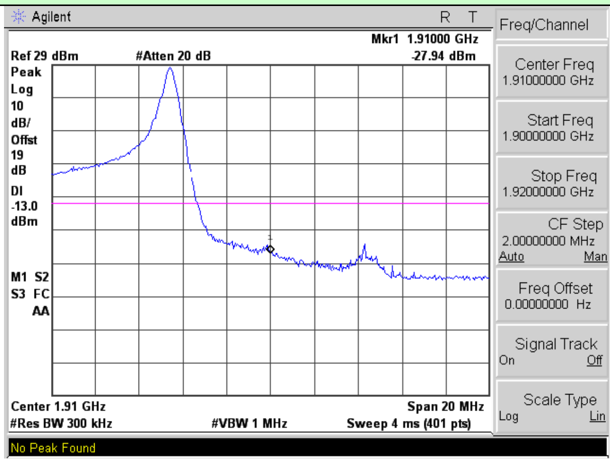


Highest channel

Test Mode: LTE Band 2 / 10MHz / 1RB / QPSK

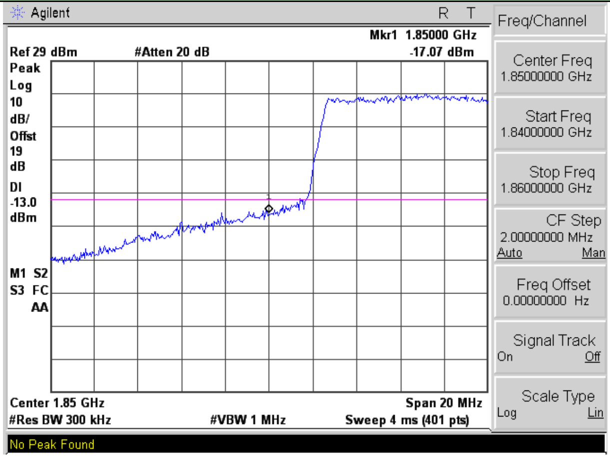


Lowest channel

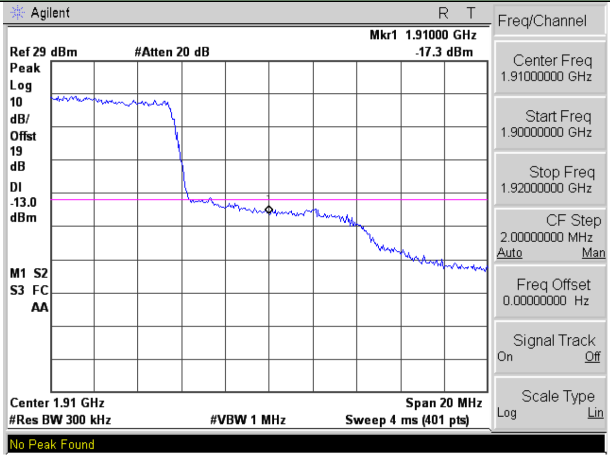


Highest channel

Test Mode: LTE Band 2 / 10MHz / 50RB / QPSK

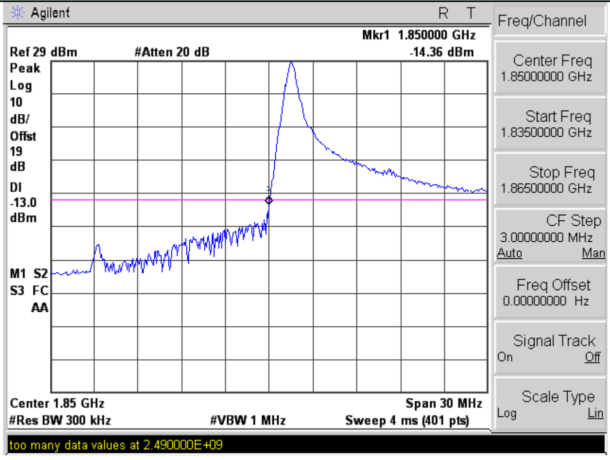


Lowest channel

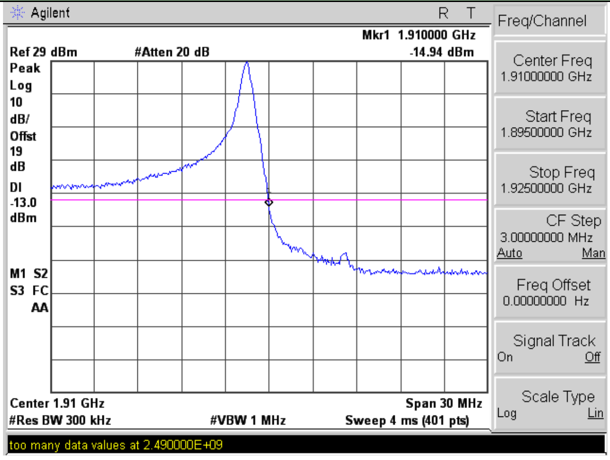


Highest channel

Test Mode: LTE Band 2 / 15MHz / 1RB / QPSK

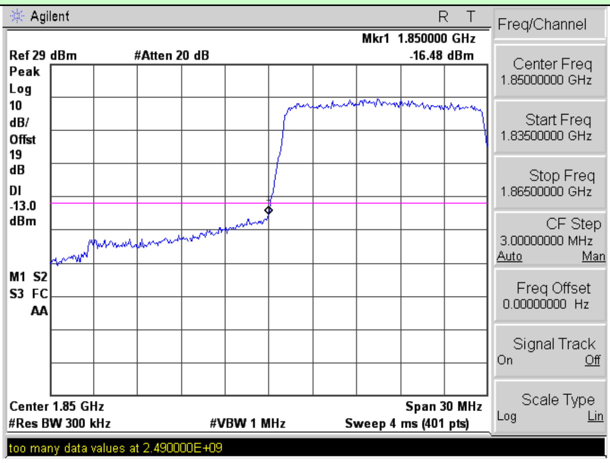


Lowest channel

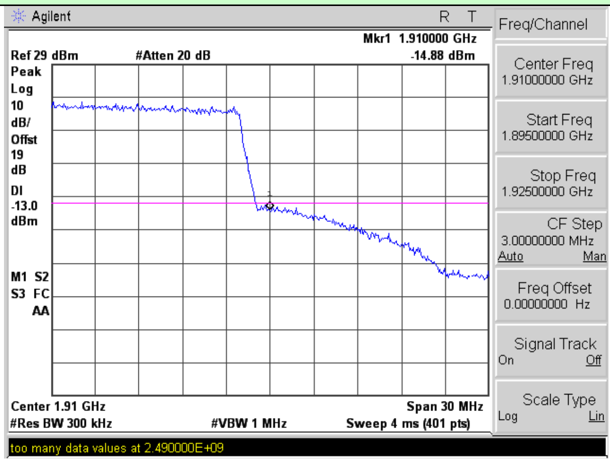


Highest channel

Test Mode: LTE Band 2 / 15MHz / 75RB / QPSK

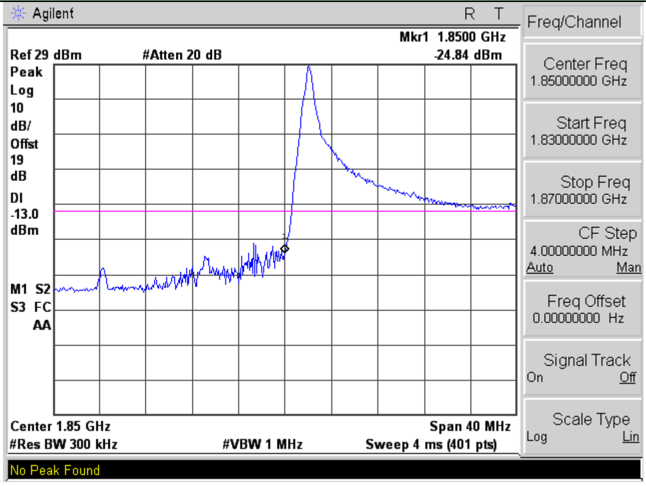


Lowest channel

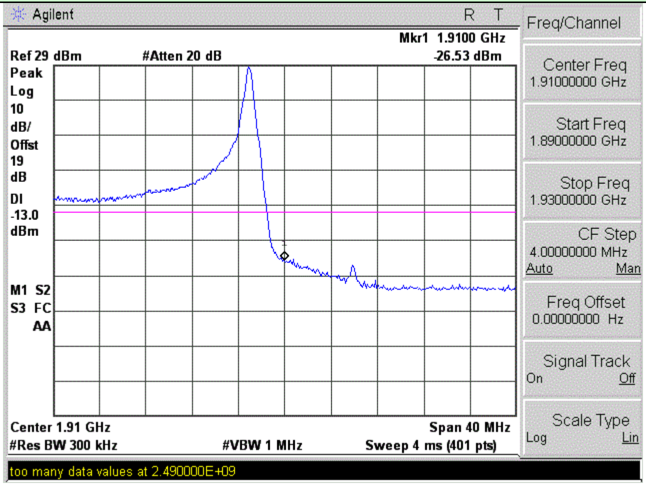


Highest channel

Test Mode: LTE Band 2 / 20MHz / 1RB / QPSK



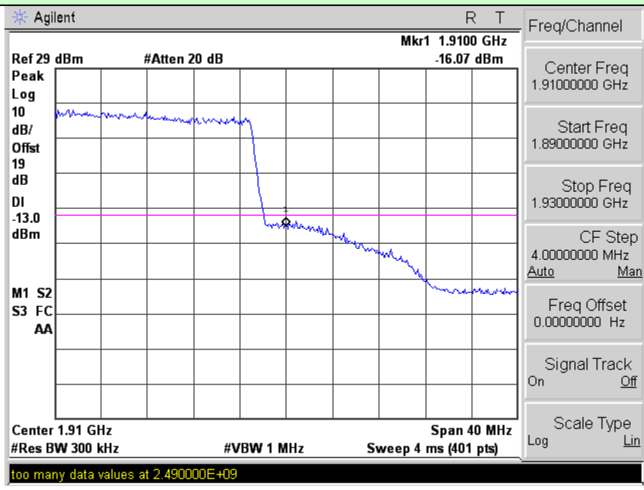
Lowest channel



Highest channel

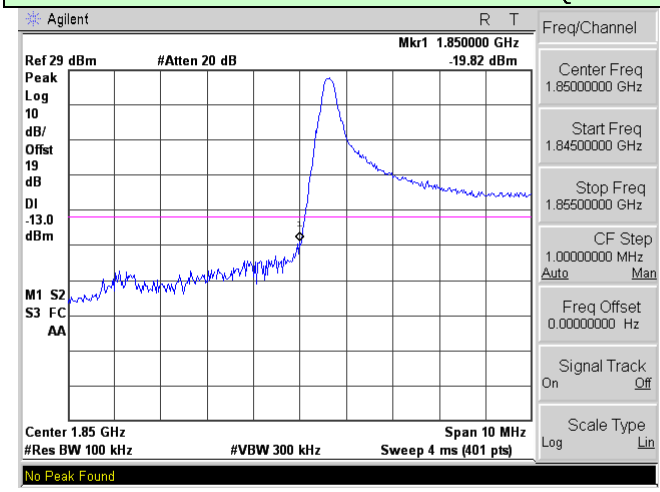
Test Mode: LTE Band 2 / 20MHz / 100RB / QPSK

Lowest channel

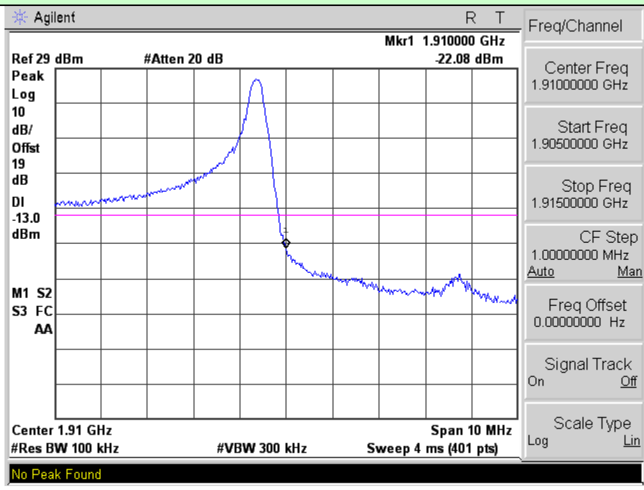


Highest channel

Test Mode: LTE Band 2 / 5MHz / 1RB / 16-QAM

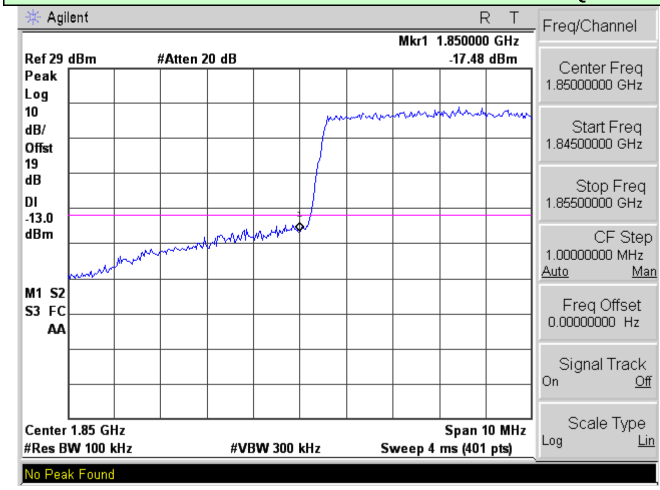


Lowest channel

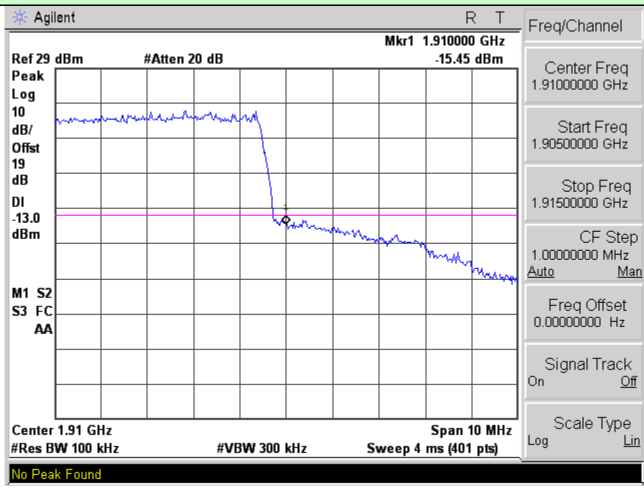


Highest channel

Test Mode: LTE Band 2 / 5MHz / 25RB / 16-QAM

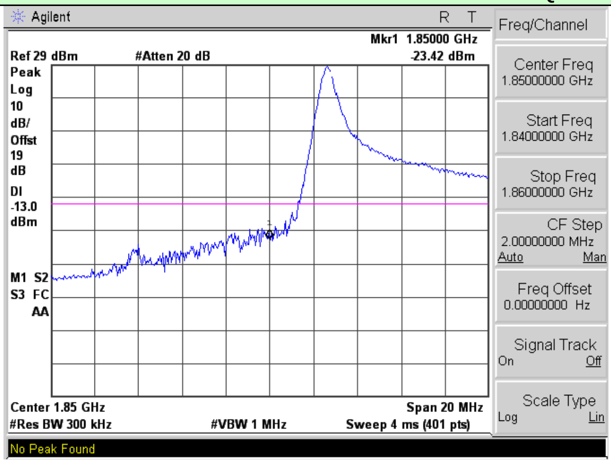


Lowest channel

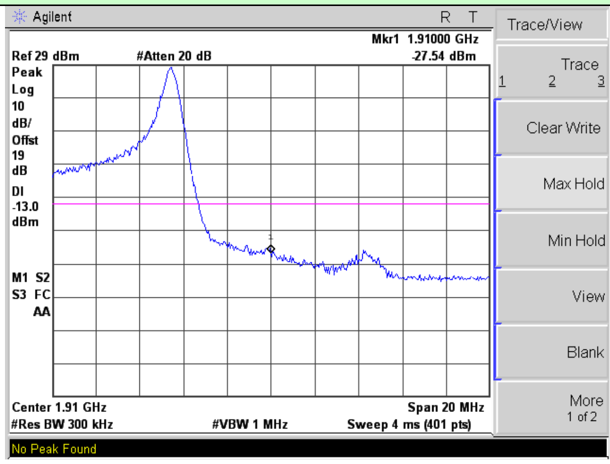


Highest channel

Test Mode: LTE Band 2 / 10MHz / 1RB / 16-QAM

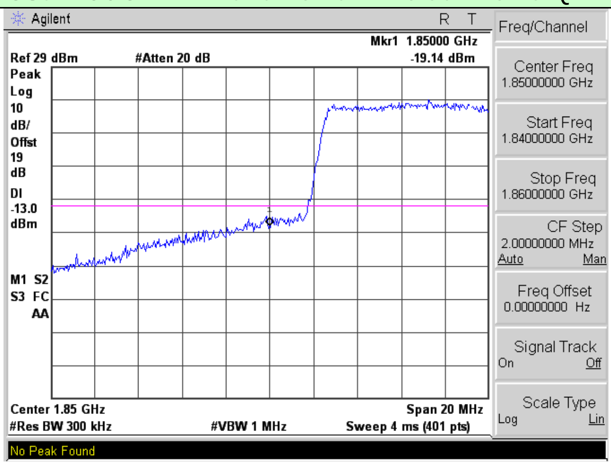


Lowest channel

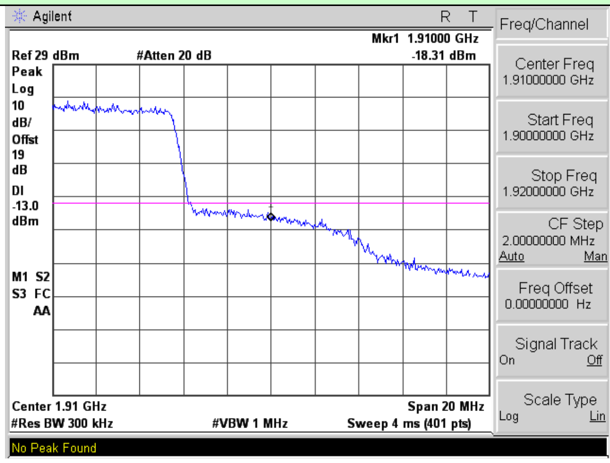


Highest channel

Test Mode: LTE Band 2 / 10MHz / 50RB / 16-QAM

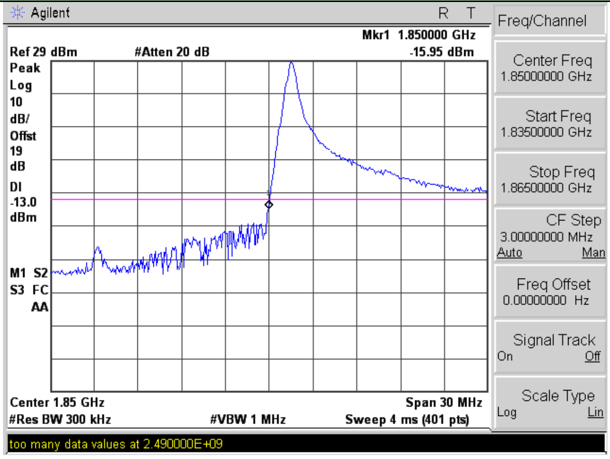


Lowest channel

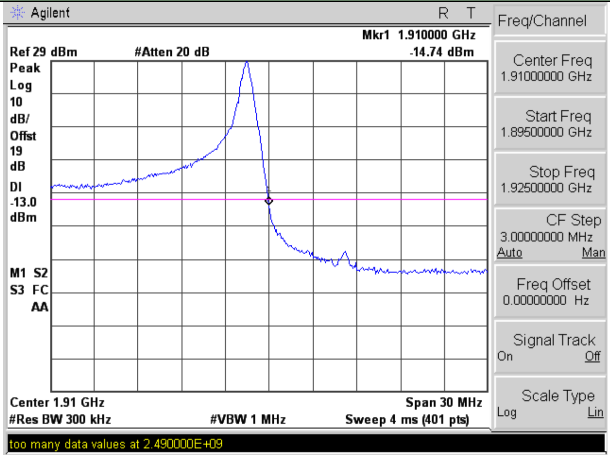


Highest channel

Test Mode: LTE Band 2 / 15MHz / 1RB / 16-QAM

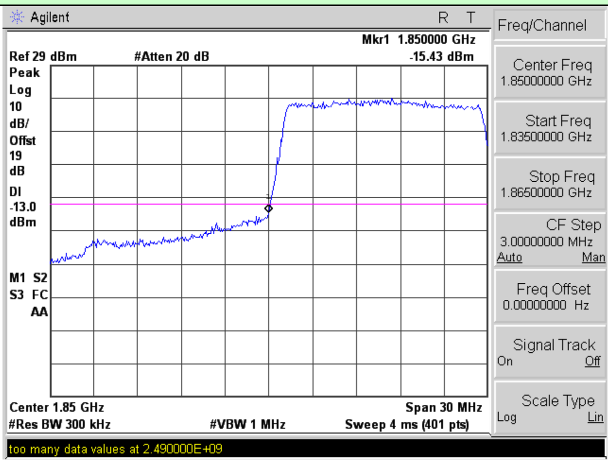


Lowest channel

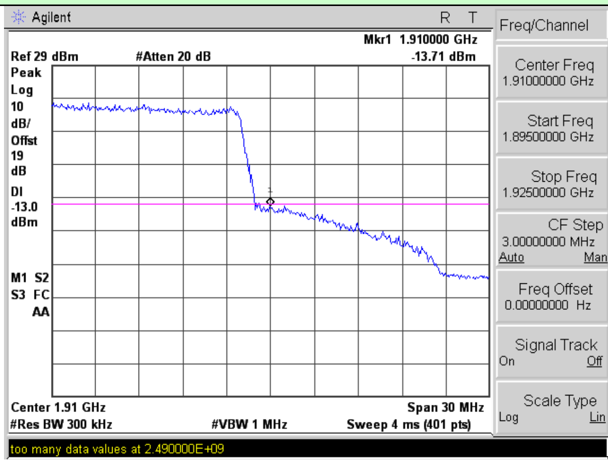


Highest channel

Test Mode: LTE Band 2 / 15MHz / 75RB / 16-QAM

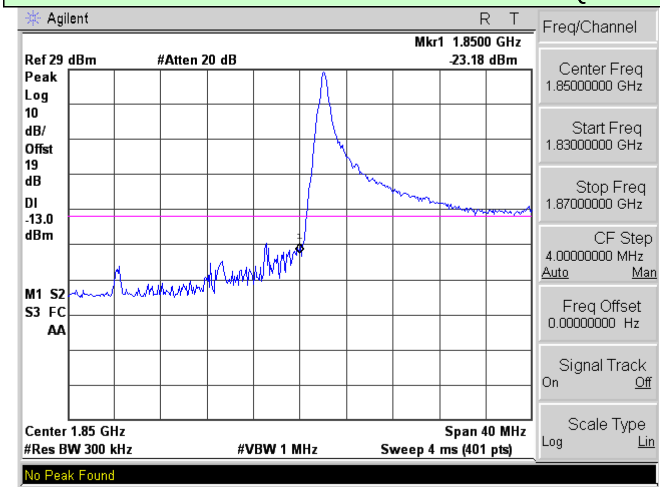


Lowest channel

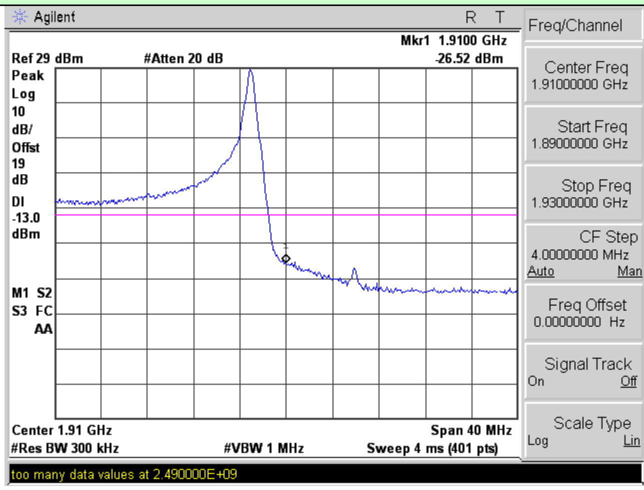


Highest channel

Test Mode: LTE Band 2 / 20MHz / 1RB / 16-QAM

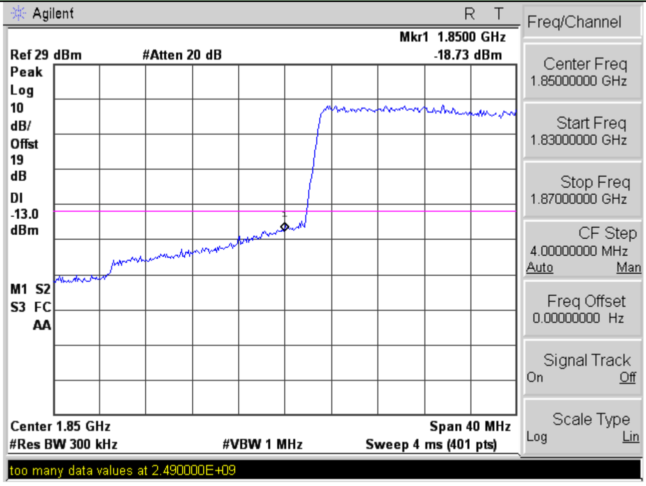


Lowest channel

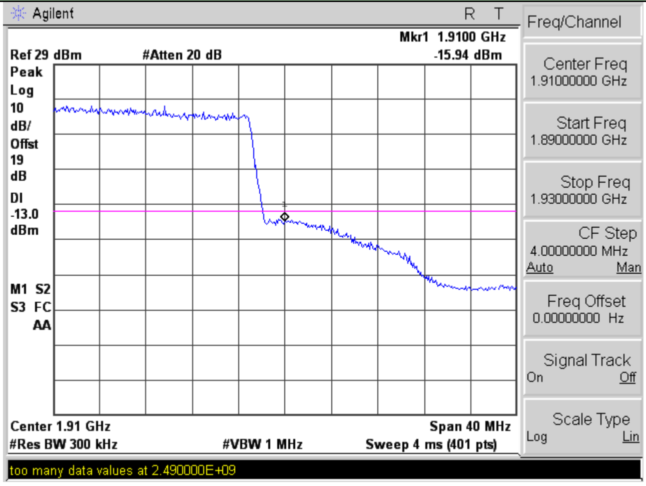


Highest channel

Test Mode: LTE Band 2 / 20MHz / 100RB / 16-QAM

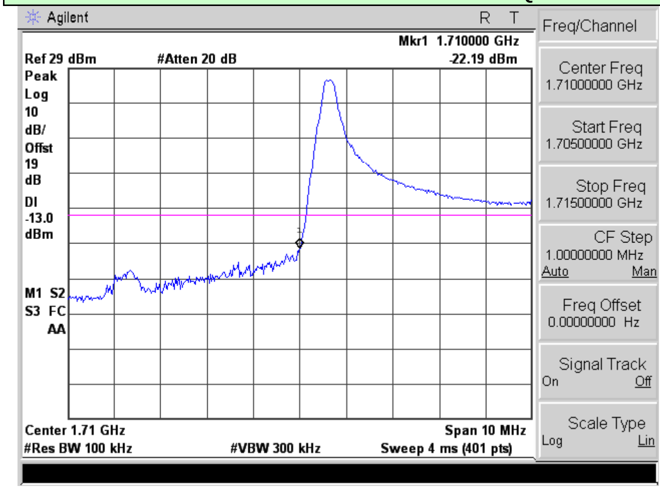


Lowest channel

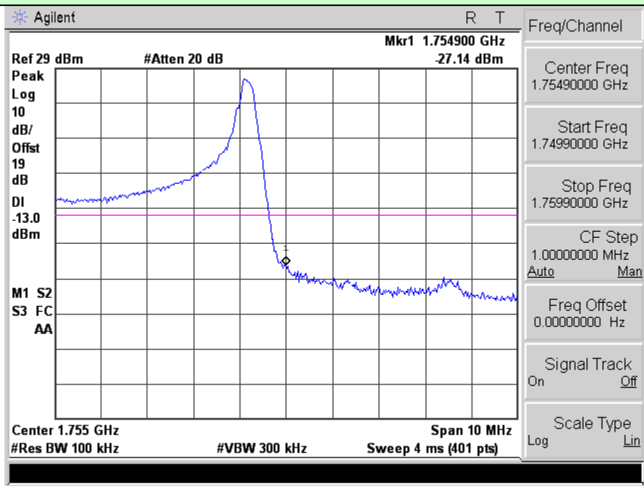


Highest channel

Test Mode: LTE Band 4 / 5MHz / 1RB / QPSK

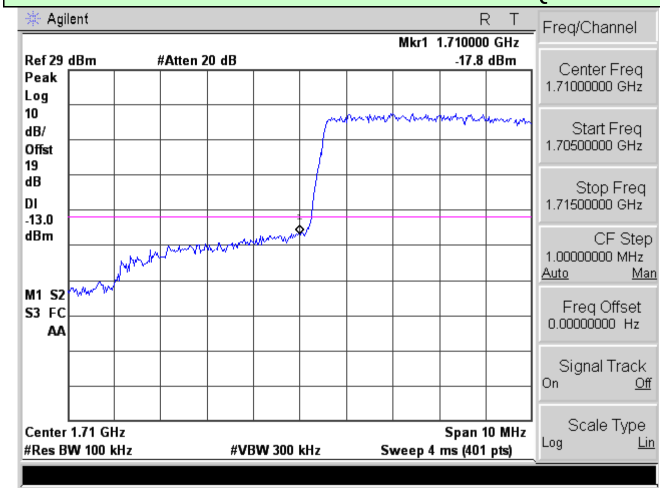


Lowest channel

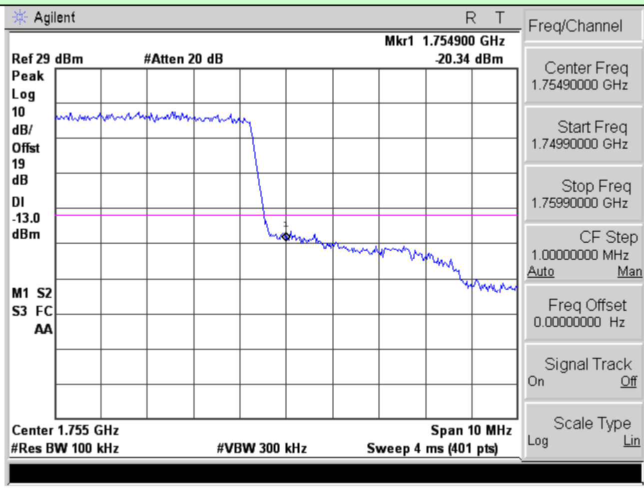


Highest channel

Test Mode: LTE Band 4 / 5MHz / 25RB / QPSK

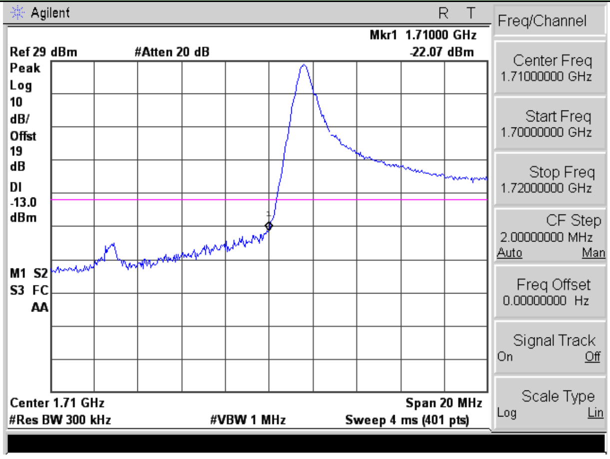


Lowest channel

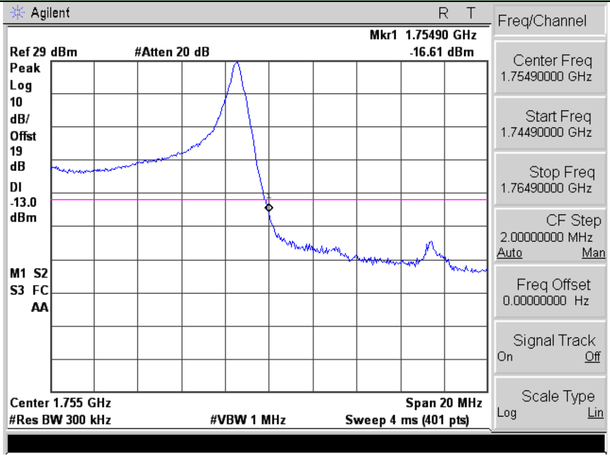


Highest channel

Test Mode: LTE Band 4 / 10MHz / 1RB / QPSK

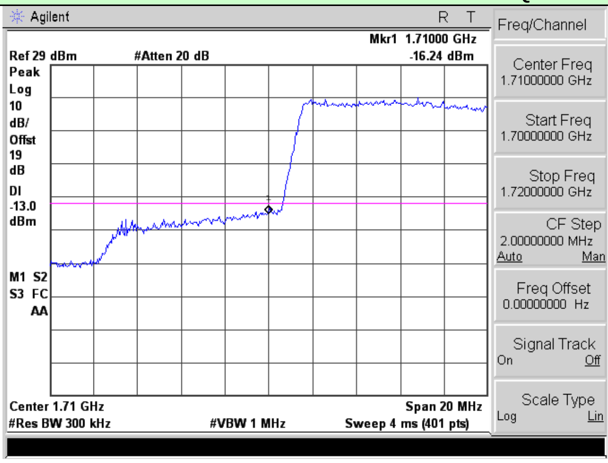


Lowest channel

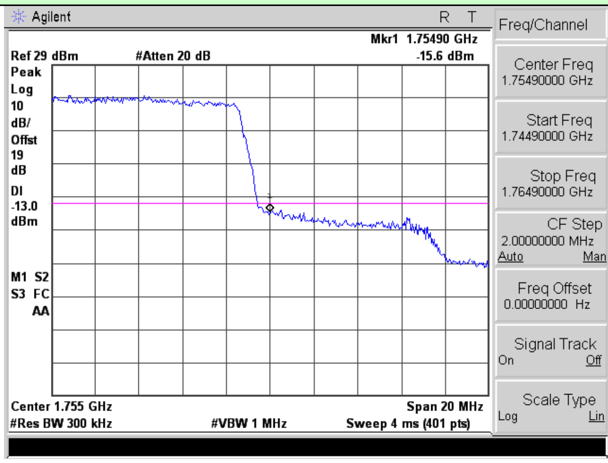


Highest channel

Test Mode: LTE Band 4 / 10MHz / 50RB / QPSK

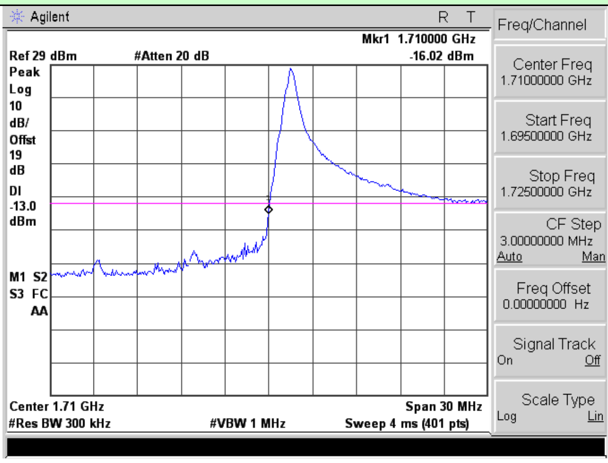


Lowest channel

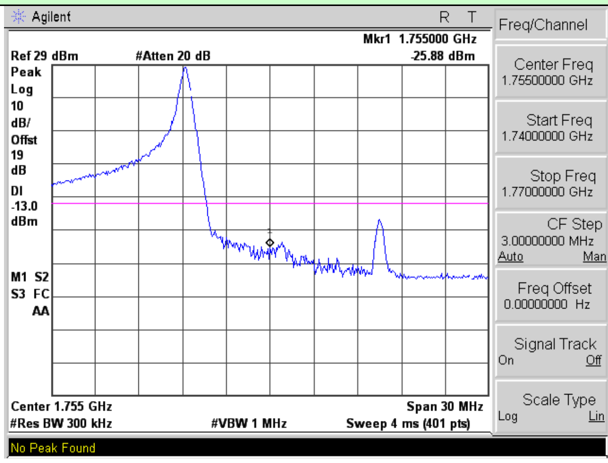


Highest channel

Test Mode: LTE Band 4 / 15MHz / 1RB / QPSK

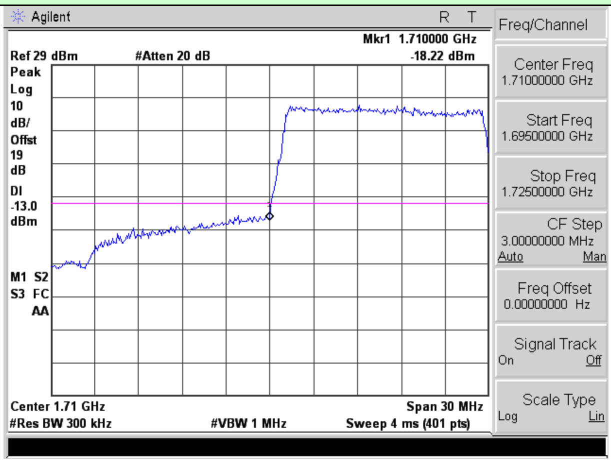


Lowest channel

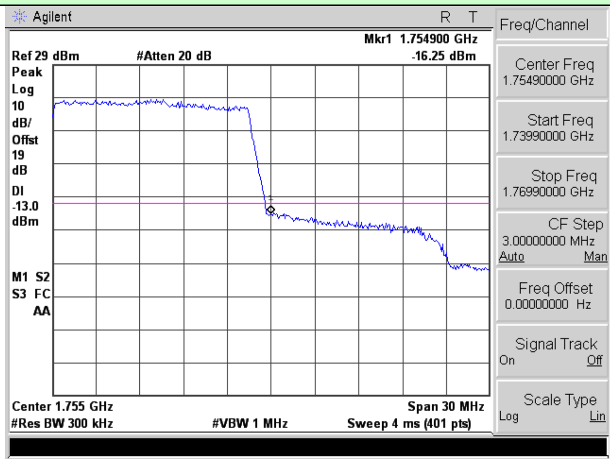


Highest channel

Test Mode: LTE Band 4 / 15MHz / 75RB / QPSK

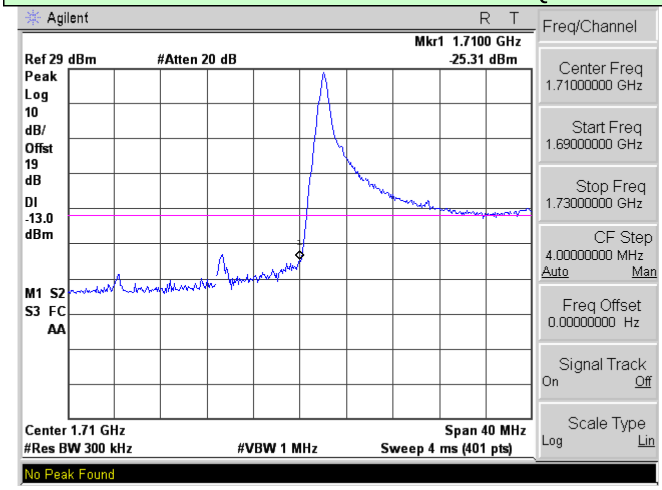


Lowest channel

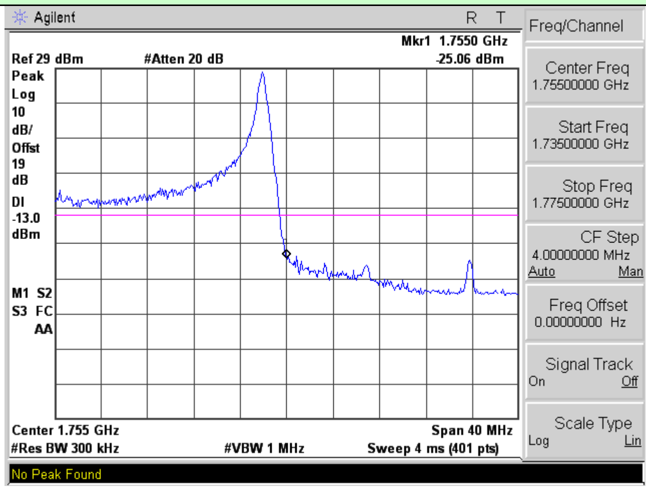


Highest channel

Test Mode: LTE Band 4 / 20MHz / 1RB / QPSK

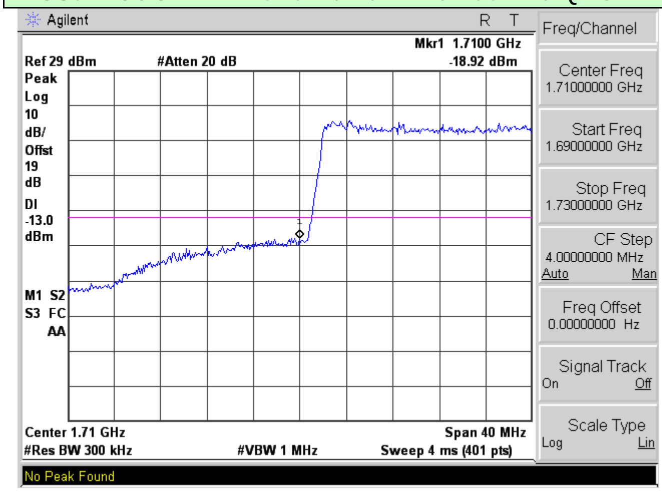


Lowest channel

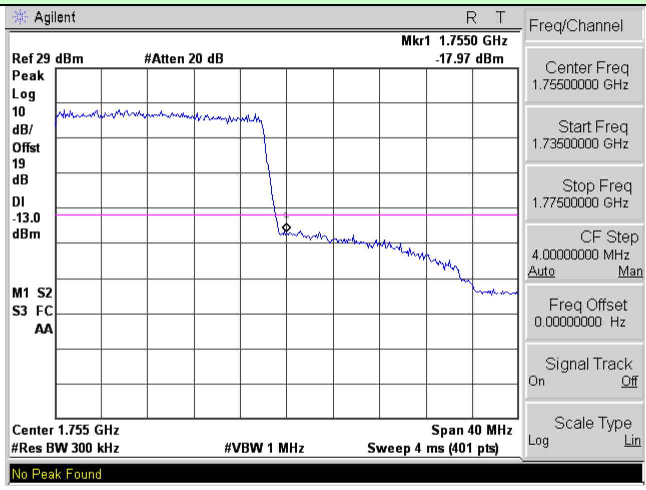


Highest channel

Test Mode: LTE Band 4 / 20MHz / 100RB / QPSK

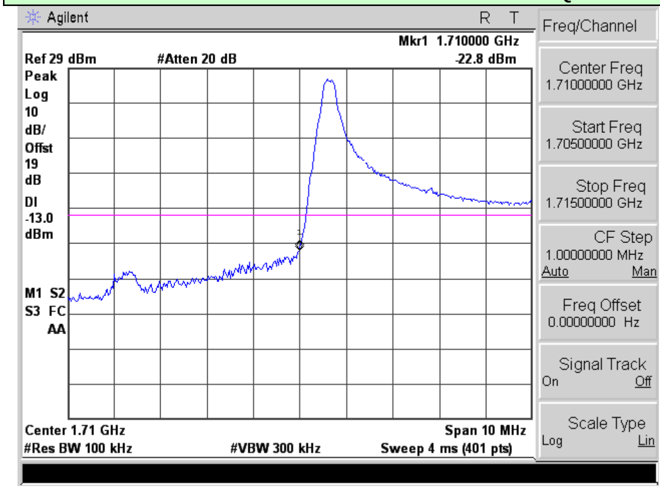


Lowest channel

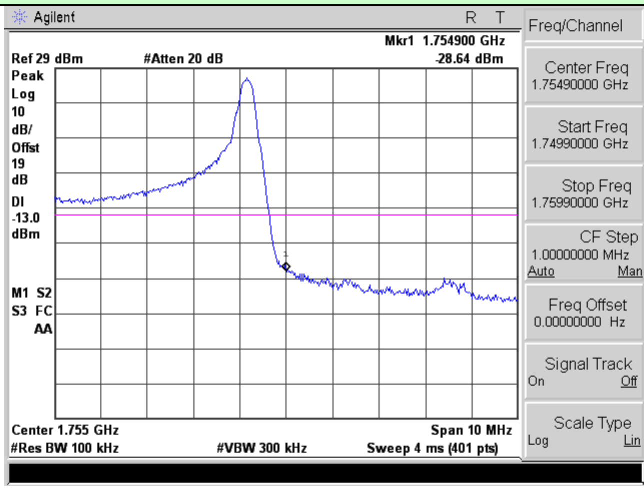


Highest channel

Test Mode: LTE Band 4 / 5MHz / 1RB / 16-QAM

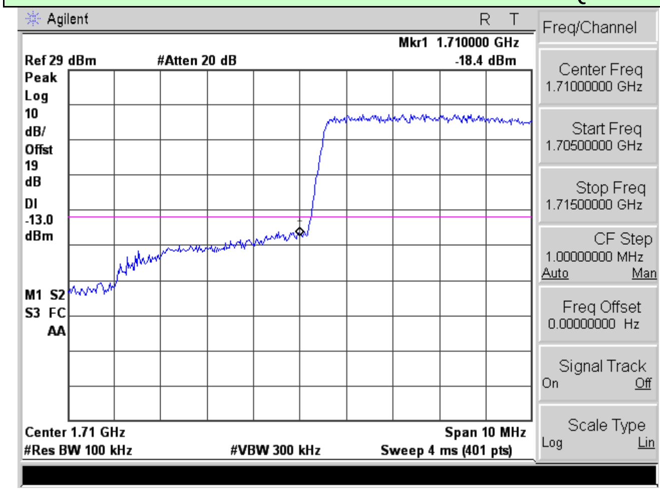


Lowest channel

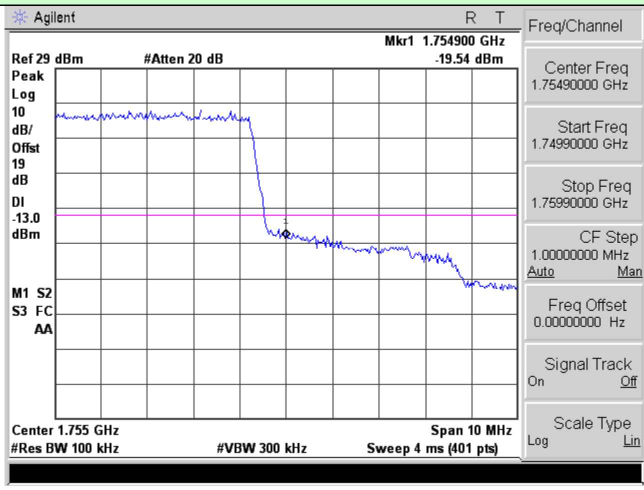


Highest channel

Test Mode: LTE Band 4 / 5MHz / 25RB / 16-QAM

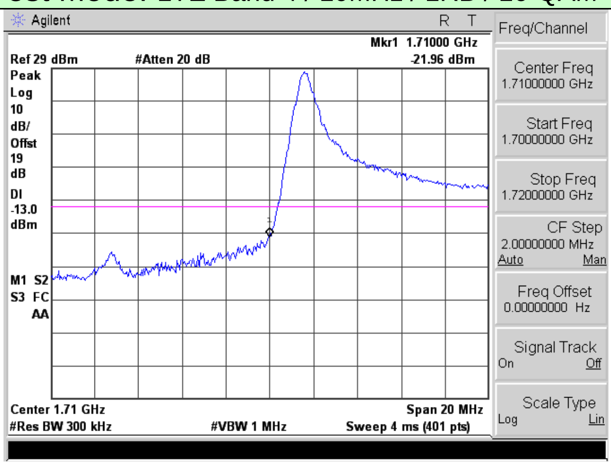


Lowest channel

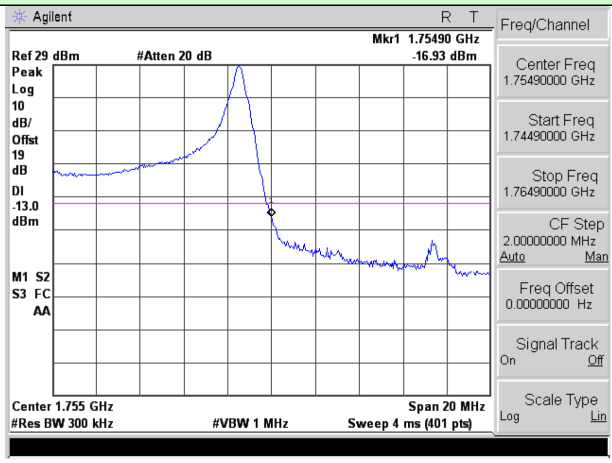


Highest channel

Test Mode: LTE Band 4 / 10MHz / 1RB / 16-QAM

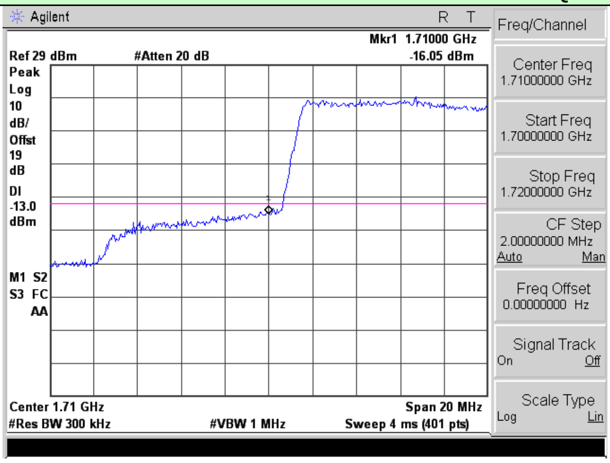


Lowest channel

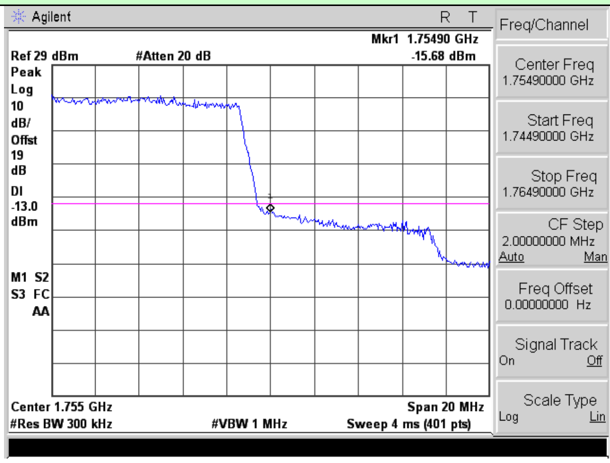


Highest channel

Test Mode: LTE Band 4 / 10MHz / 50RB / 16-QAM

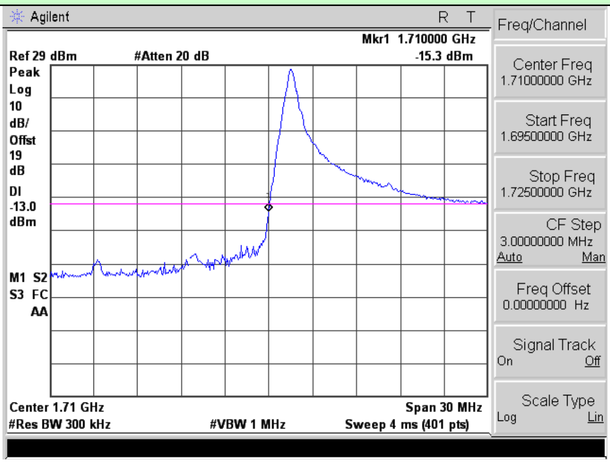


Lowest channel

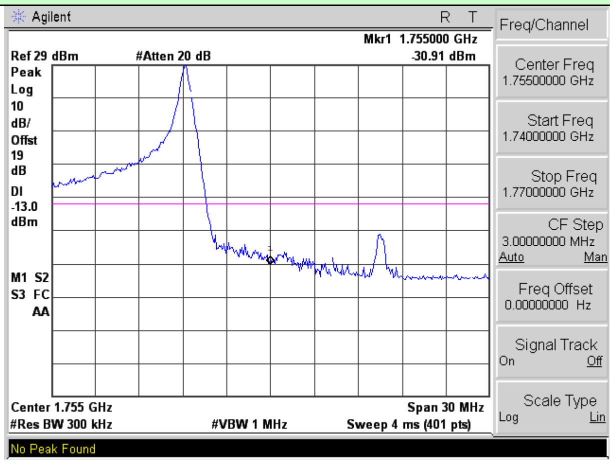


Highest channel

Test Mode: LTE Band 4 / 15MHz / 1RB / 16-QAM

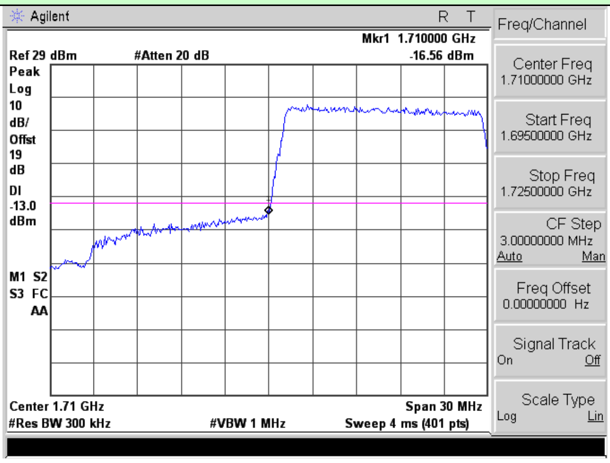


Lowest channel

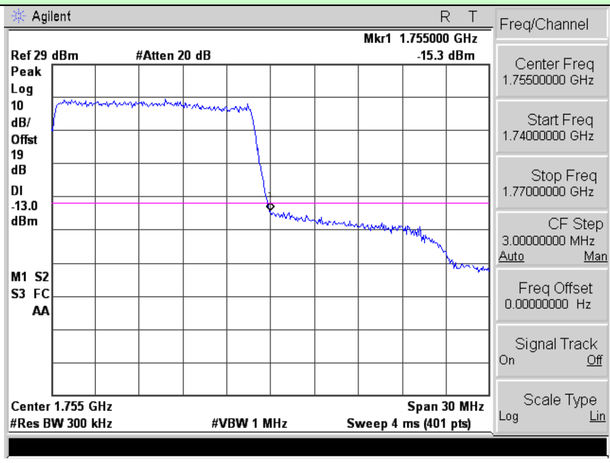


Highest channel

Test Mode: LTE Band 4 / 15MHz / 75RB / 16-QAM

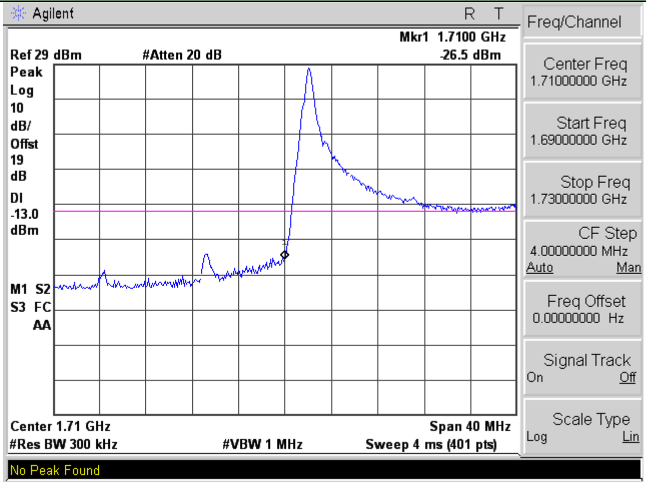


Lowest channel

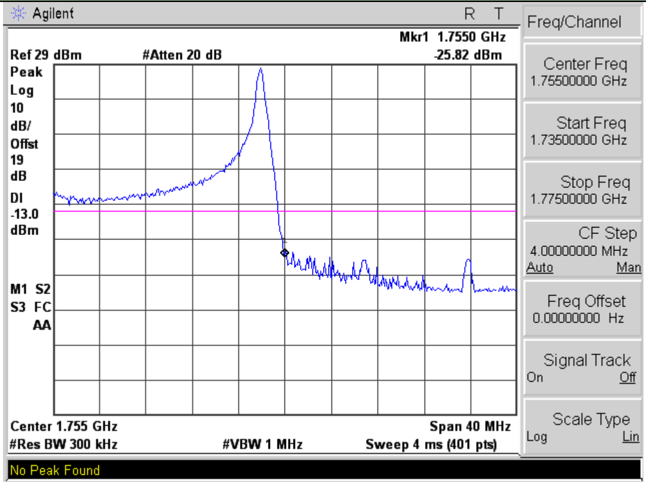


Highest channel

Test Mode: LTE Band 4 / 20MHz / 1RB / 16-QAM



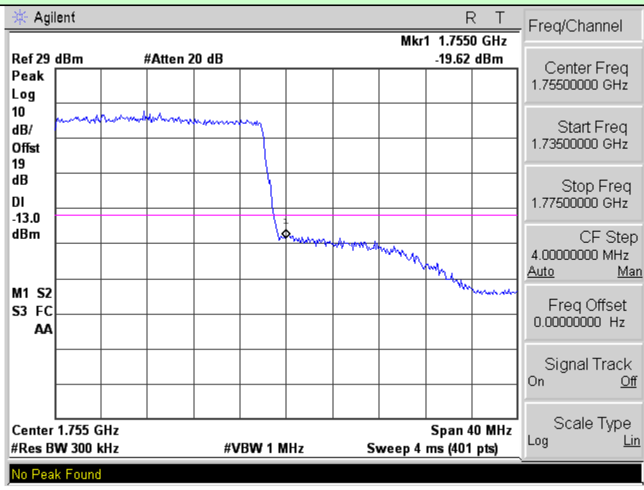
Lowest channel



Highest channel

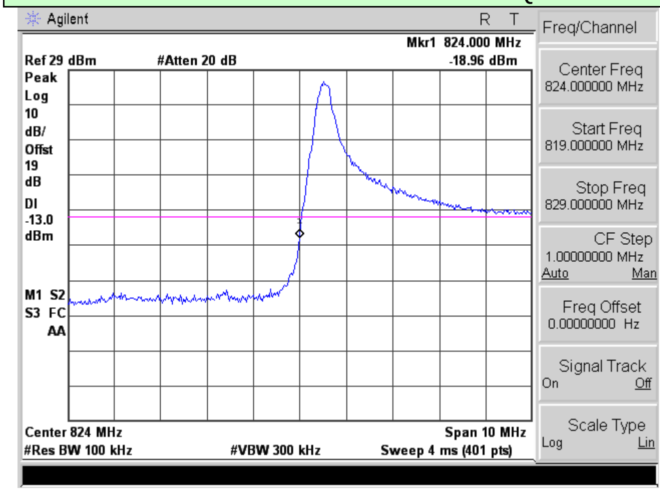
Test Mode: LTE Band 4 / 20MHz / 100RB / 16-QAM

Lowest channel

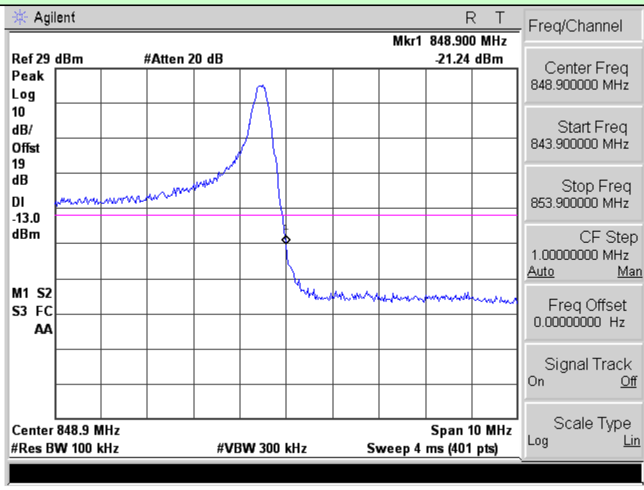


Highest channel

Test Mode: LTE Band 5 / 5MHz / 1RB / QPSK

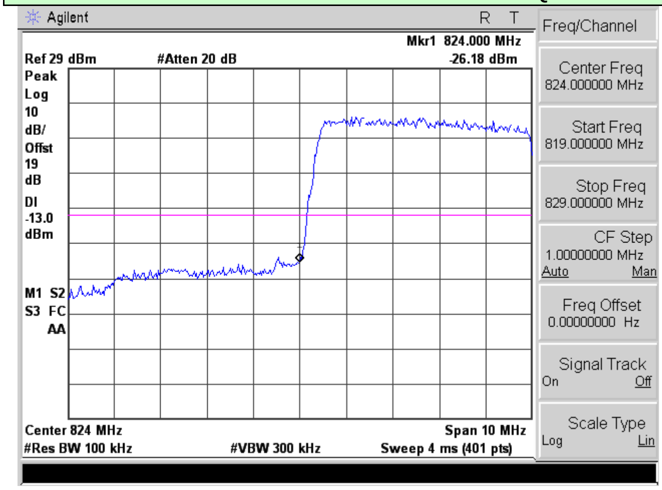


Lowest channel

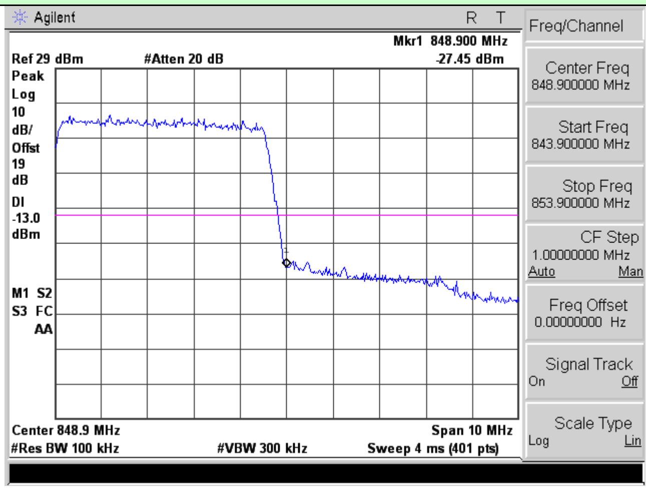


Highest channel

Test Mode: LTE Band 5 / 5MHz / 25RB / QPSK

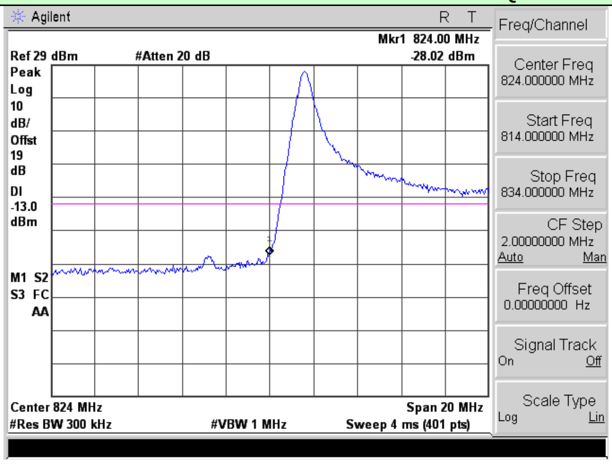


Lowest channel

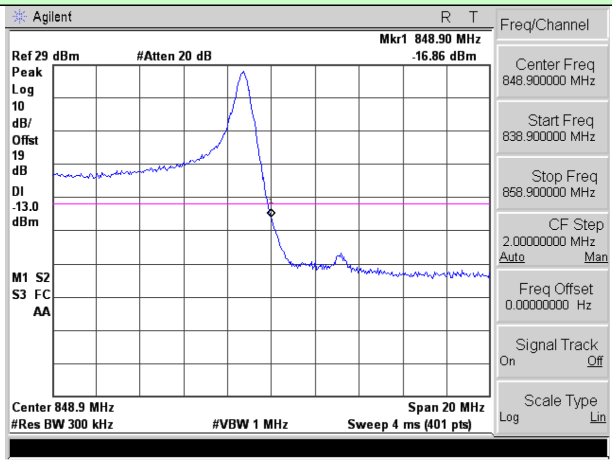


Highest channel

Test Mode: LTE Band 5 / 10MHz / 1RB / QPSK

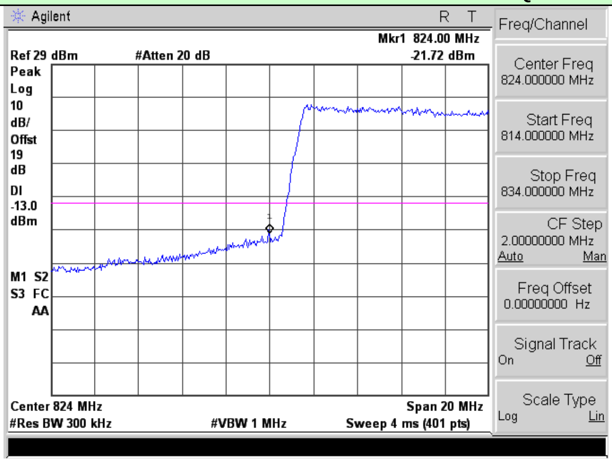


Lowest channel

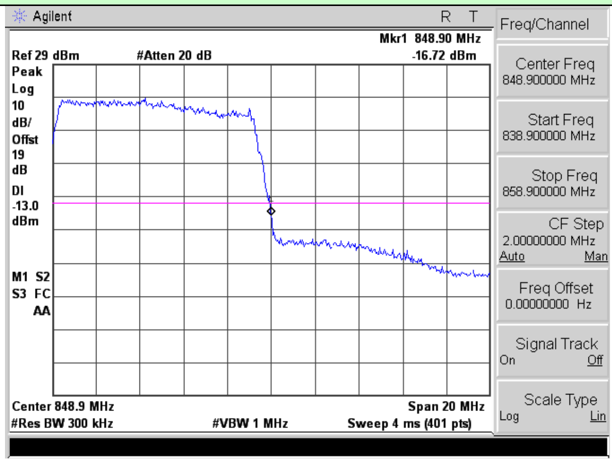


Highest channel

Test Mode: LTE Band 5 / 10MHz / 50RB / QPSK

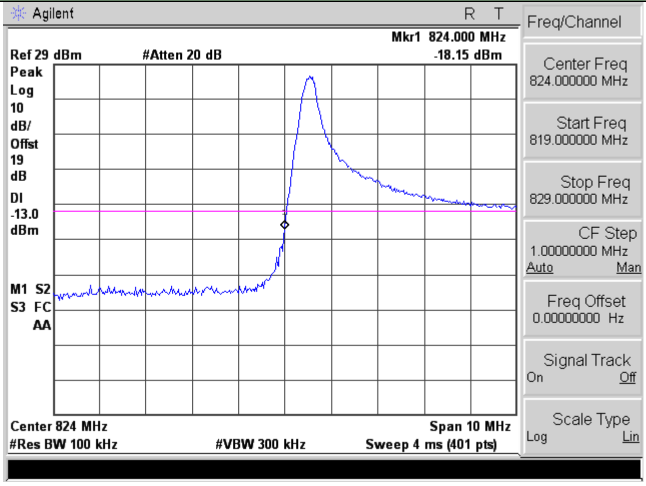


Lowest channel

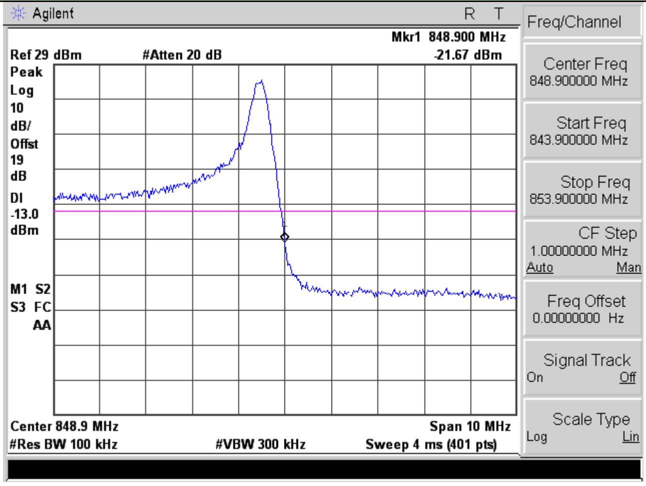


Highest channel

Test Mode: LTE Band 5 / 5MHz / 1RB / 16-QAM

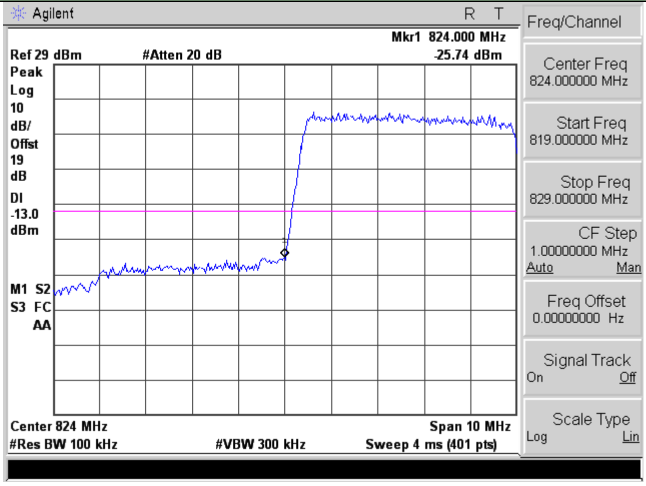


Lowest channel

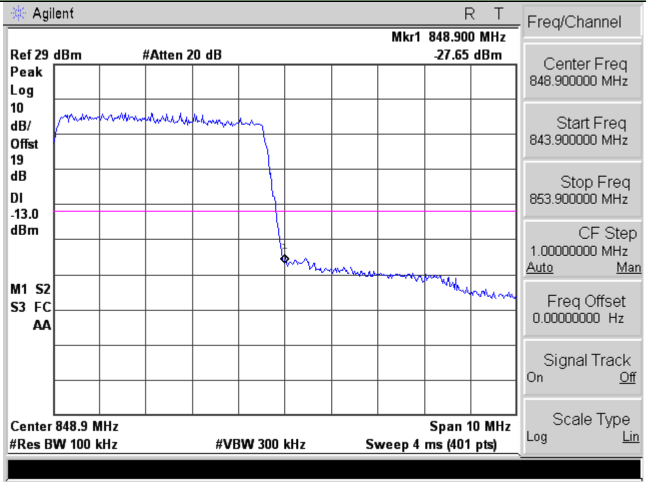


Highest channel

Test Mode: LTE Band 5 / 5MHz / 25RB / 16-QAM

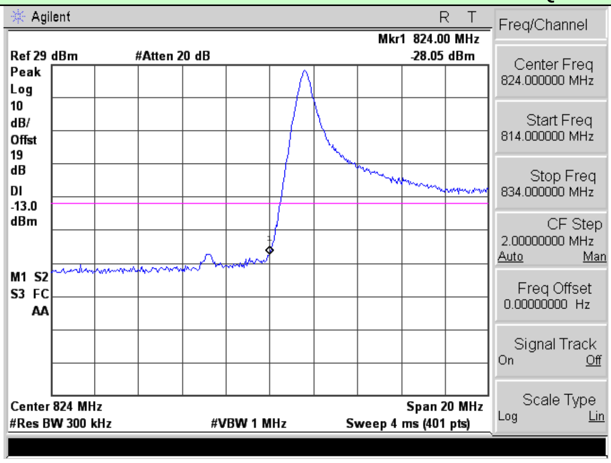


Lowest channel

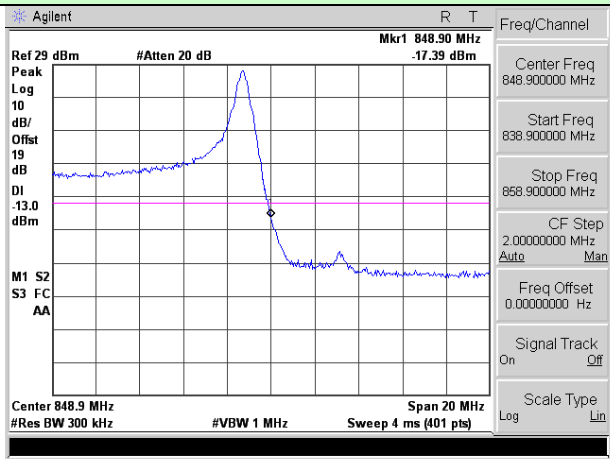


Highest channel

Test Mode: LTE Band 5 / 10MHz / 1RB / 16-QAM

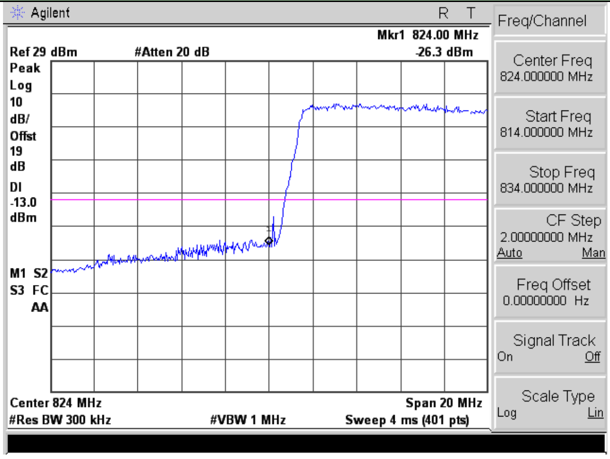


Lowest channel

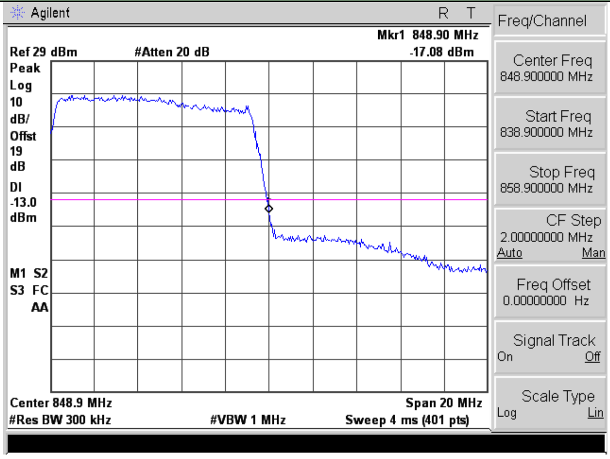


Highest channel

Test Mode: LTE Band 5 / 10MHz / 50RB / 16-QAM

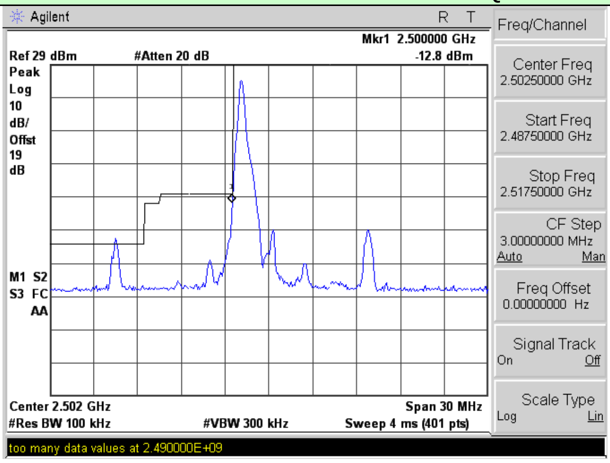


Lowest channel

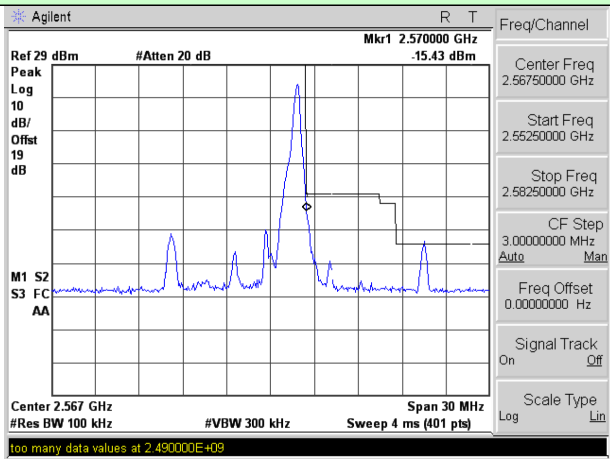


Highest channel

Test Mode: LTE Band 7 / 5MHz / 1RB / QPSK

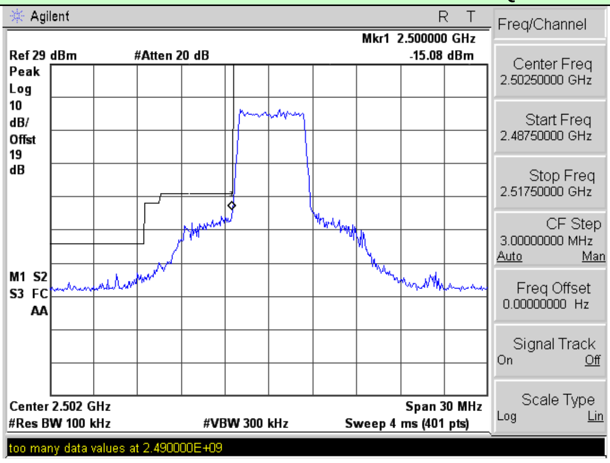


Lowest channel

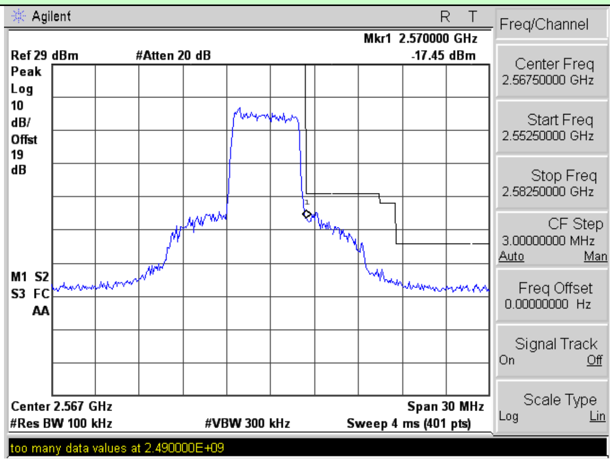


Highest channel

Test Mode: LTE Band 7 / 5MHz / 25RB / QPSK

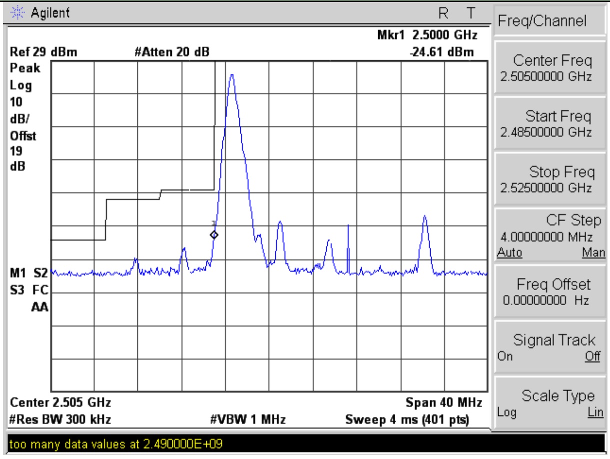


Lowest channel

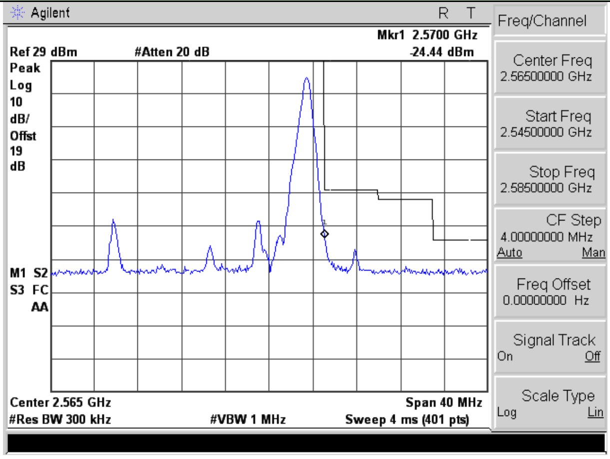


Highest channel

Test Mode: LTE Band 7 / 10MHz / 1RB / QPSK

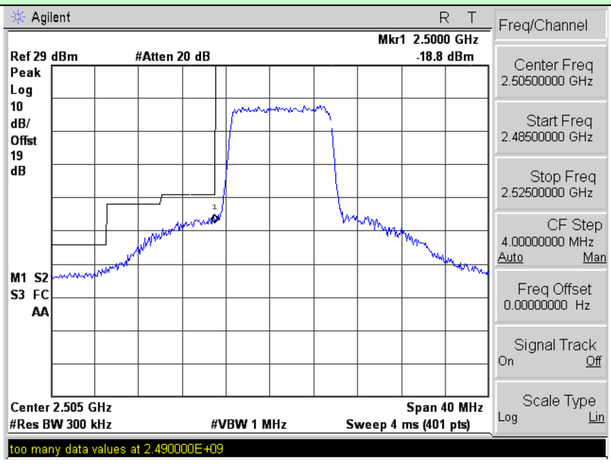


Lowest channel

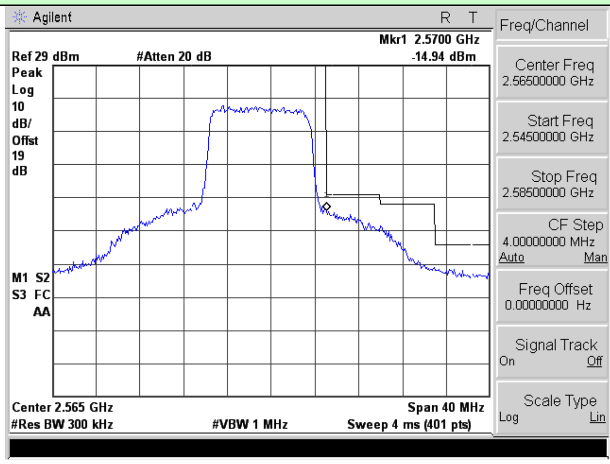


Highest channel

Test Mode: LTE Band 7 / 10MHz / 50RB / QPSK

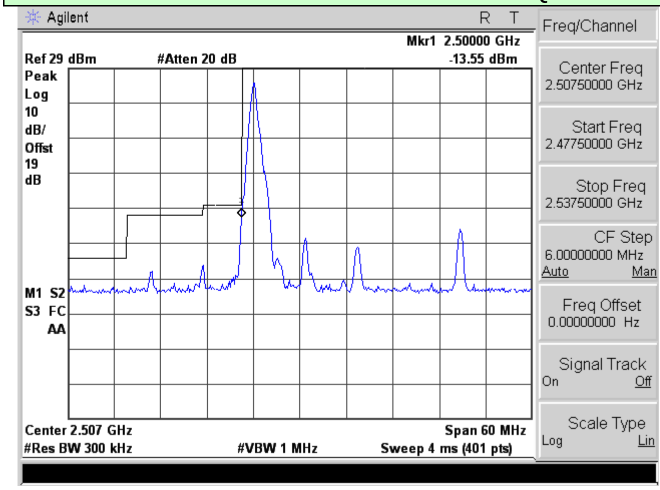


Lowest channel

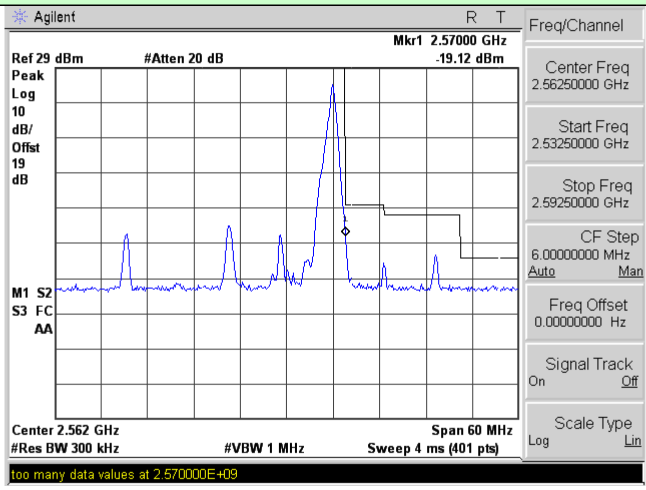


Highest channel

Test Mode: LTE Band 7 / 15MHz / 1RB / QPSK

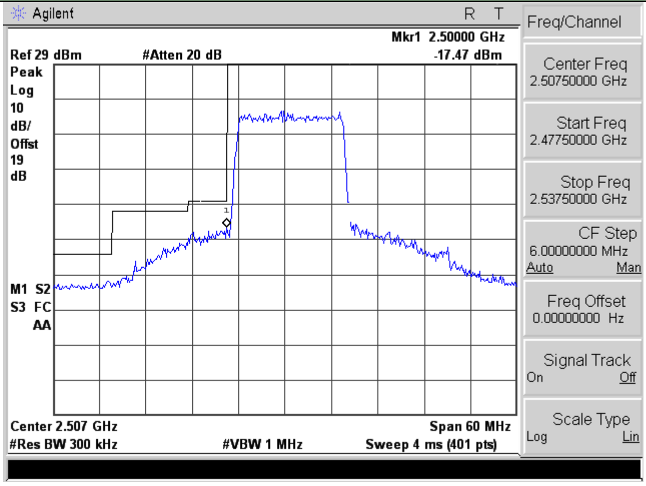


Lowest channel

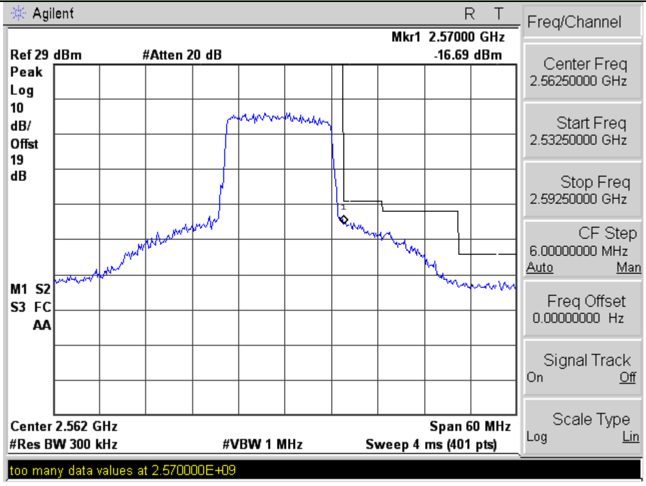


Highest channel

Test Mode: LTE Band 7 / 15MHz / 75RB / QPSK

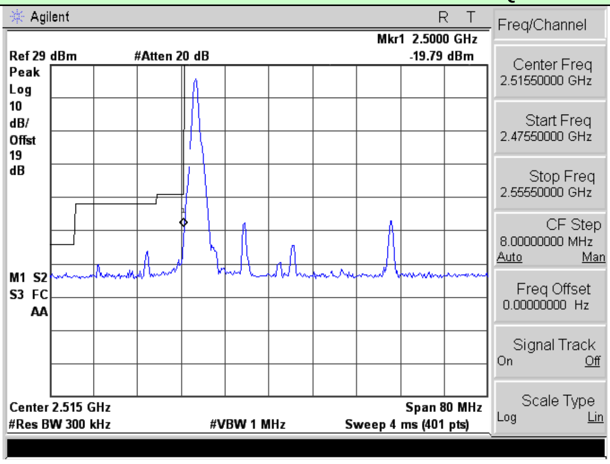


Lowest channel

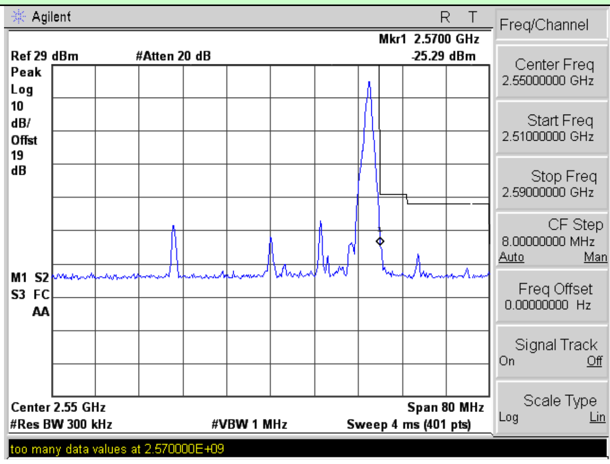


Highest channel

Test Mode: LTE Band 7 / 20MHz / 1RB / QPSK

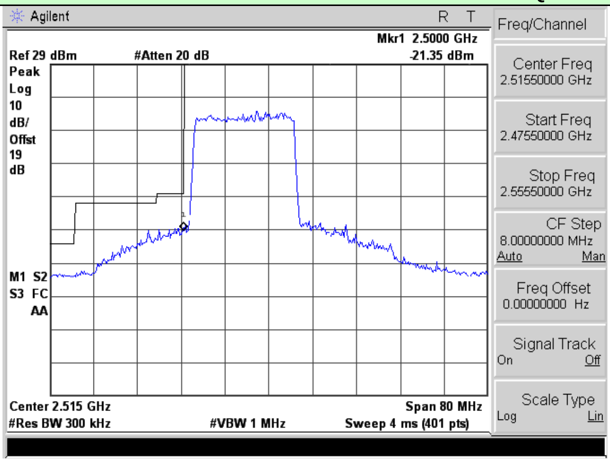


Lowest channel

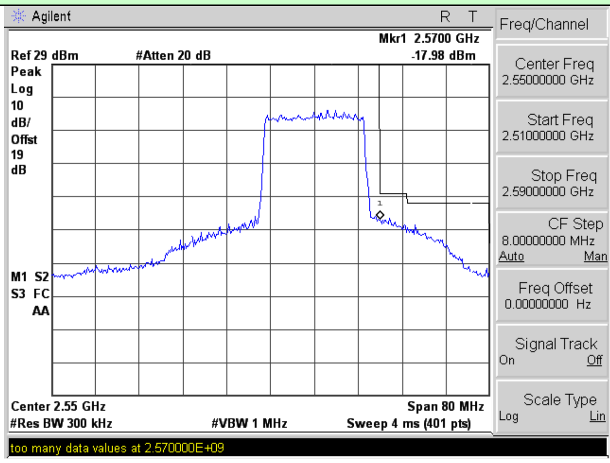


Highest channel

Test Mode: LTE Band 7 / 20MHz / 100RB / QPSK

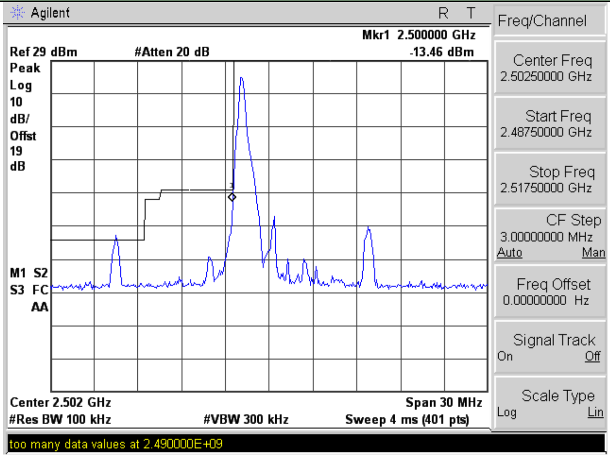


Lowest channel

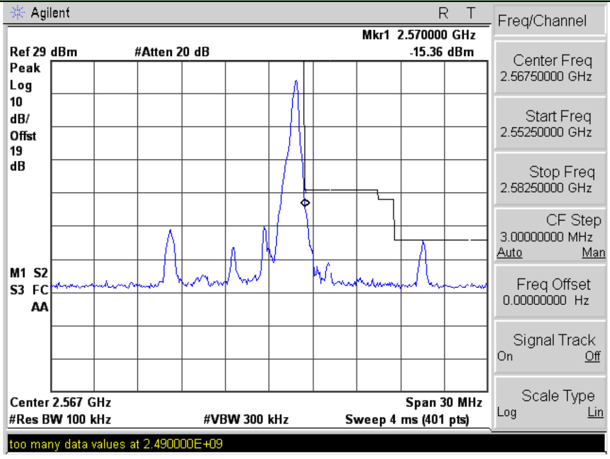


Highest channel

Test Mode: LTE Band 7 / 5MHz / 1RB / 16-QAM

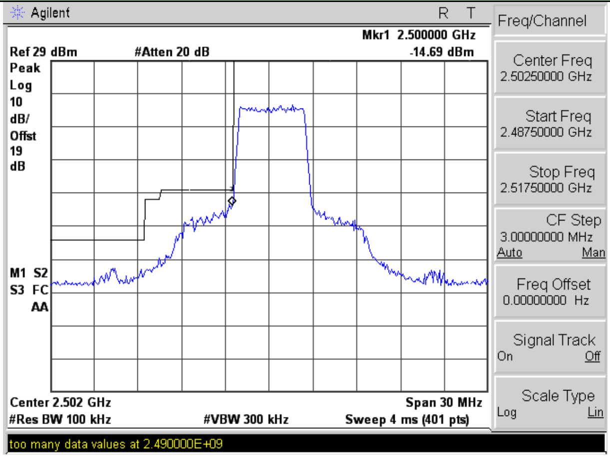


Lowest channel

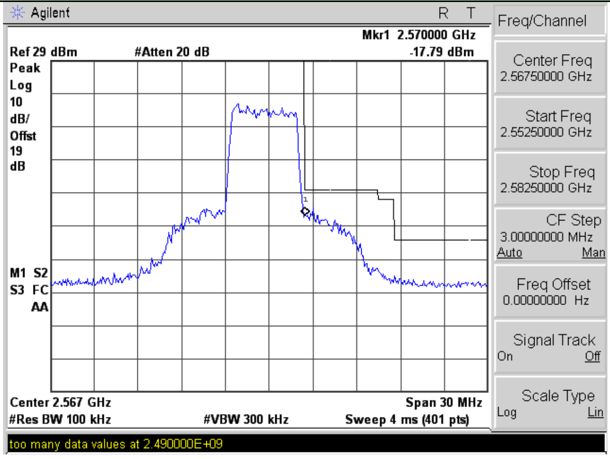


Highest channel

Test Mode: LTE Band 7 / 5MHz / 25RB / 16-QAM

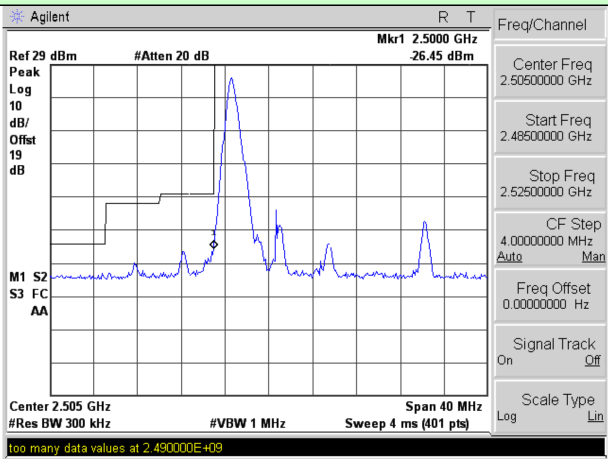


Lowest channel

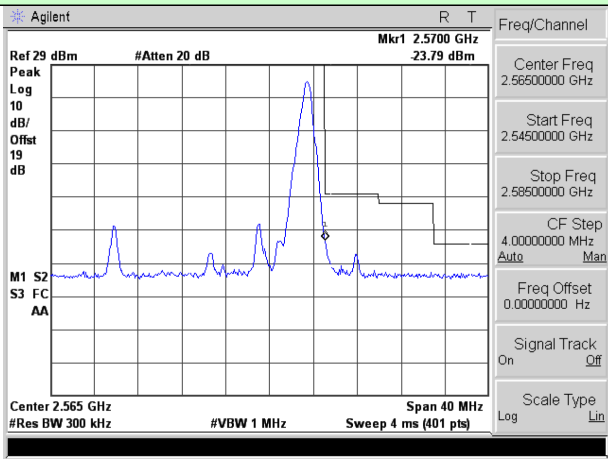


Highest channel

Test Mode: LTE Band 7 / 10MHz / 1RB / 16-QAM

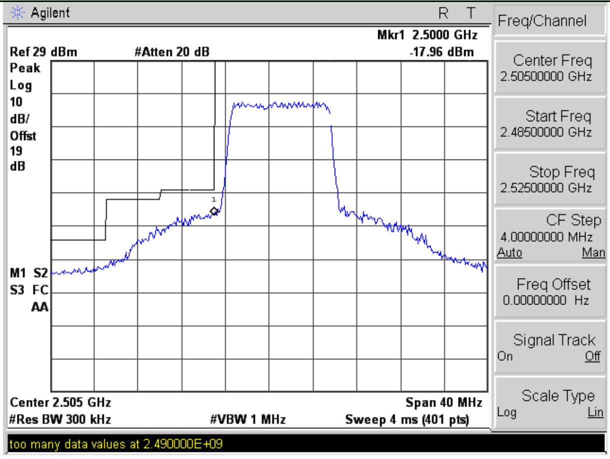


Lowest channel

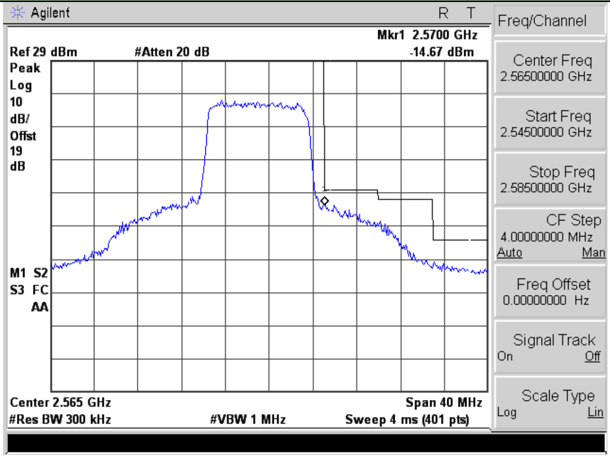


Highest channel

Test Mode: LTE Band 7 / 10MHz / 50RB / 16-QAM

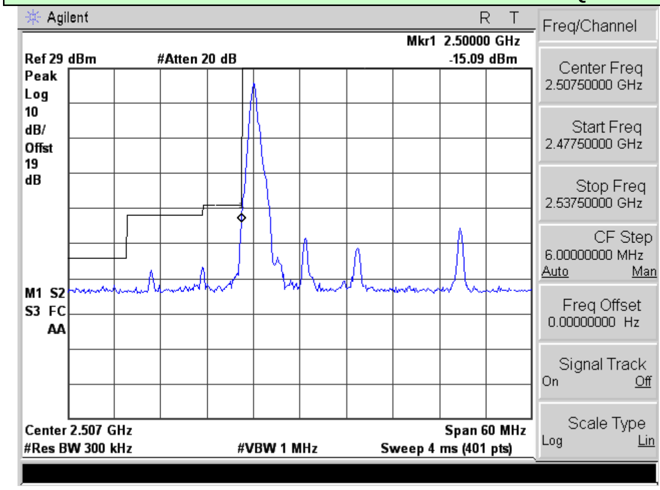


Lowest channel

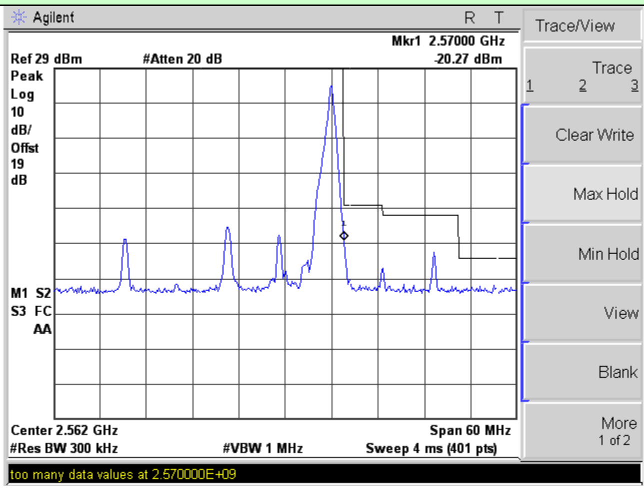


Highest channel

Test Mode: LTE Band 7 / 15MHz / 1RB / 16-QAM

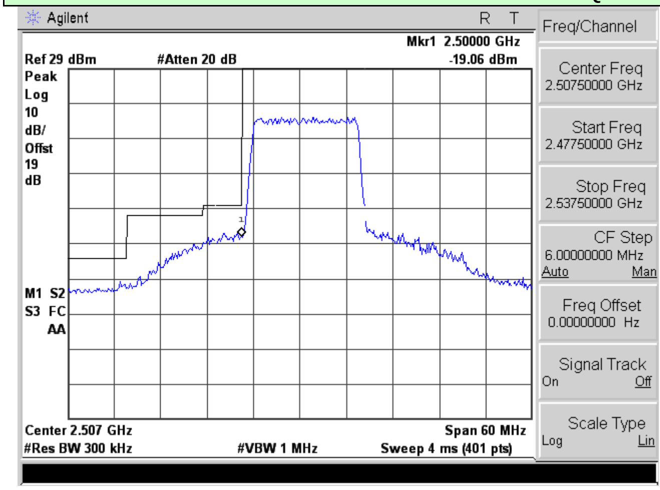


Lowest channel

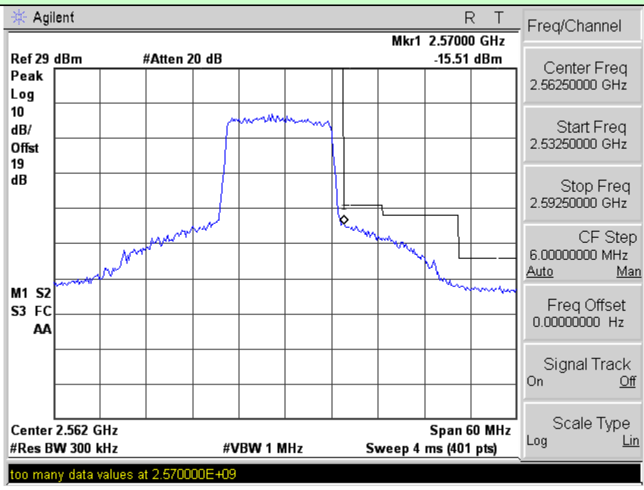


Highest channel

Test Mode: LTE Band 7 / 15MHz / 75RB / 16-QAM

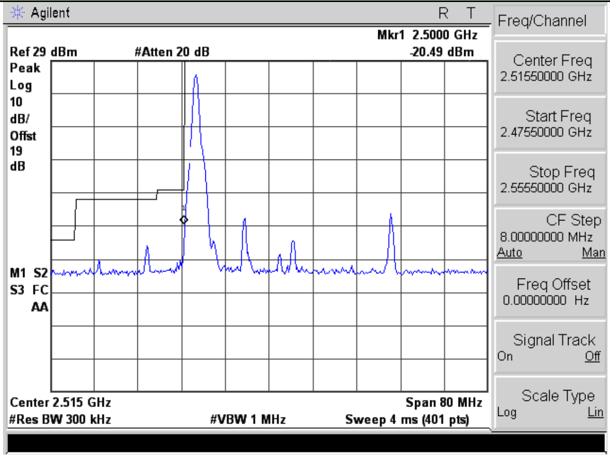


Lowest channel

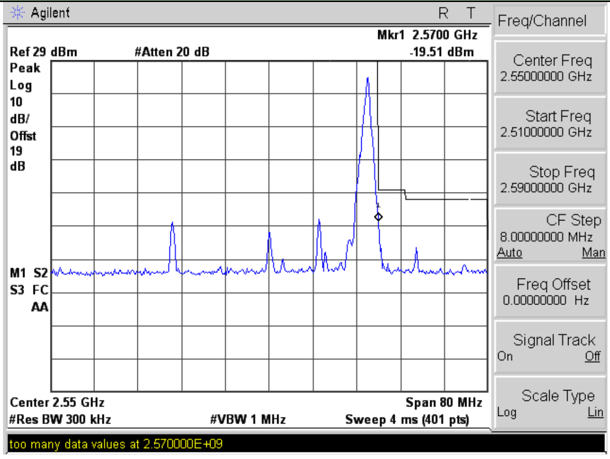


Highest channel

Test Mode: LTE Band 7 / 20MHz / 1RB / 16-QAM

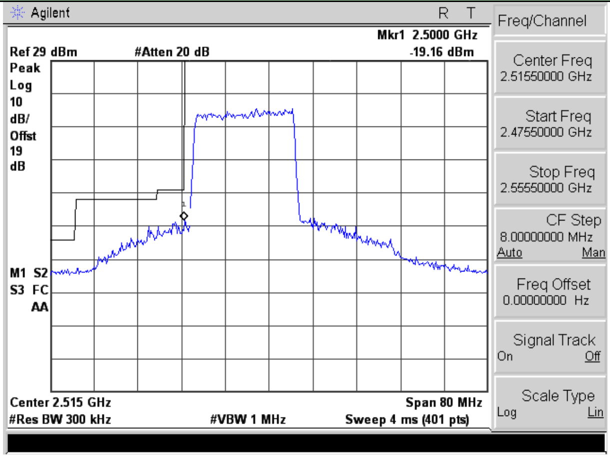


Lowest channel

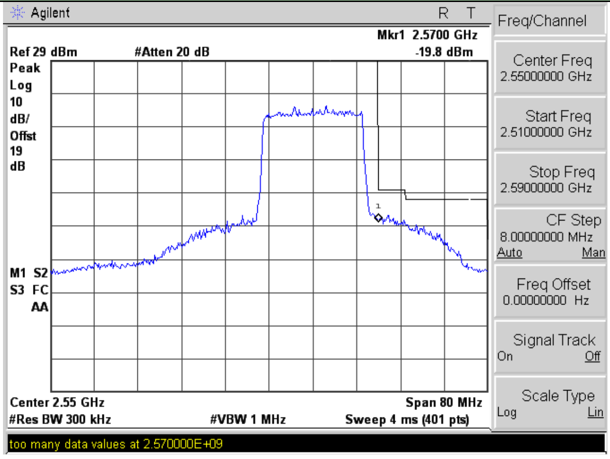


Highest channel

Test Mode: LTE Band 7 / 20MHz / 100RB / 16-QAM



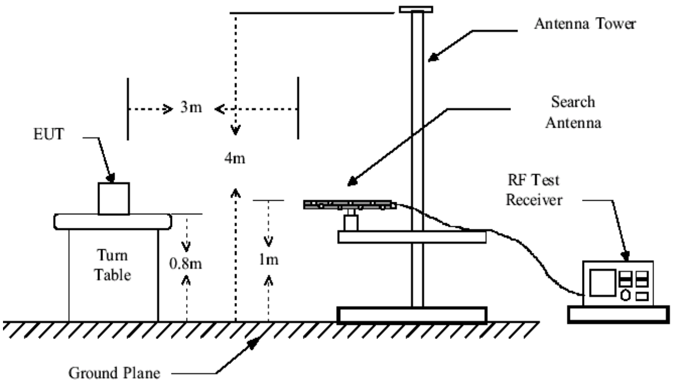
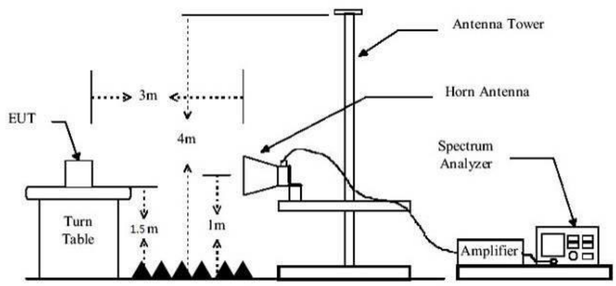
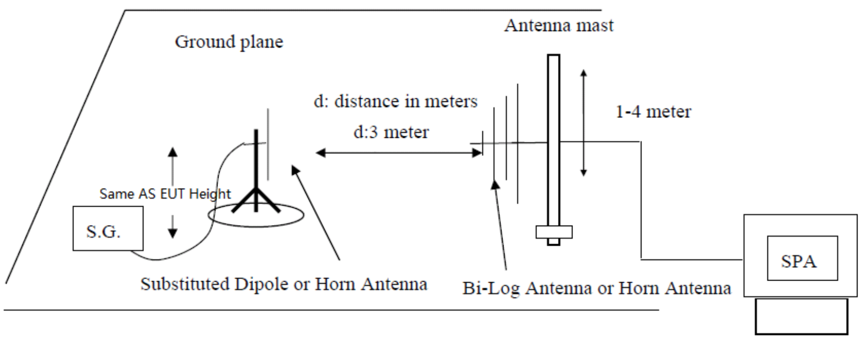
Lowest channel



Highest channel

Note: All bandwidth and modulation are tested, only the worst result is reported.

4.8 ERP, EIRP Measurement

Test Requirement:	FCC part22.913(a), FCC part24.232(b), FCC part 27.53, and RSS-132 (5.4), RSS-133 (6.4), RSS-139(6.5) and RSS-199(4.4)
Test Method:	KDB 971168 D01 v03r1 clause 5.8, FCC part2.1051, ANSI/TIA-603-E, ANSI C63.26 clause 5.7
Limit:	LTE Band 2: 2W (EIRP) LTE Band 4: 1W (EIRP) LTE Band 5(Upper Band): [7W (ERP) for FCC, 11.5W(EIRP) for ISED] LTE Band 7: 2W (EIRP)
Test setup:	Below 1GHz  Above 1GHz  Substituted method: 

Test Procedure:	1. The EUT was placed on an non-conductive turntable using a non-conductive support. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and EMI spectrum analyzer. 2. During the measurement, the EUT was communication with the station. The highest emission was recorded with the rotation of the turntable and the lowering of the test antenna from 4m to 1m. The reading was recorded and the field strength (E in dBuV/m) was calculated. 3. ERP were measured using a substitution method. The EUT was replaced by dipole antenna connected, the S.G. output was recorded and ERP was calculated asfollows: ERP = S.G. output (dBm) + Antenna Gain (dBd) – Cable Loss (dB) 4. EIRP were measured using a substitution method. The EUT was replaced by or horn antenna connected, the S.G. output was recorded and EIRP was calculated as follows: EIRP = S.G. output (dBm) + Antenna Gain (dBi) – Cable Loss (dB)
Test Instruments:	Refer to section 3 for details
Test mode:	Refer to section 4.1 for details
Test results:	Pass
Remark:	H,E1,E2 mean for EUT polarization of X, Y, Z

Measurement Data

EUT mode	Channel	RB Size	RB Offset	EUT Pol.	Antenna Pol.	EIRP(dBm)	Limit (dBm)	Result
LTE Band 2 (5MHz) QPSK	Lowest	25	0	H	V	20.21	33.00	Pass
					H	15.86		
				E1	V	20.73		
					H	16.25		
				E2	V	21.10		
					H	16.93		
	Middle	25	0	H	V	20.70	33.00	Pass
					H	16.69		
				E1	V	20.03		
					H	15.77		
				E2	V	20.82		
					H	17.58		
	Highest	25	0	H	V	20.26	33.00	Pass
					H	17.79		
				E1	V	19.97		
					H	19.12		
				E2	V	20.75		
					H	16.74		

EUT mode	Channel	RB Size	RB Offset	EUT Pol.	Antenna Pol.	EIRP(dBm)	Limit (dBm)	Result
LTE Band 2 (10MHz) QPSK	Lowest	50	0	H	V	20.25	33.00	Pass
					H	15.77		
				E1	V	20.49		
					H	15.70		
				E2	V	19.64		
					H	16.76		
	Middle	50	0	H	V	21.13	33.00	Pass
					H	16.74		
				E1	V	21.02		
					H	17.55		
				E2	V	20.86		
					H	16.46		
	Highest	50	0	H	V	20.54	33.00	Pass
					H	16.78		
				E1	V	20.48		
					H	16.01		
				E2	V	19.72		
					H	15.32		

EUT mode	Channel	RB Size	RB Offset	EUT Pol.	Antenna Pol.	EIRP(dBm)	Limit (dBm)	Result
LTE Band 2 (15MHz) QPSK	Lowest	75	0	H	V	19.90	33.00	Pass
					H	16.72		
				E1	V	20.51		
					H	16.39		
				E2	V	20.27		
					H	16.08		
	Middle	75	0	H	V	20.34	33.00	Pass
					H	15.92		
				E1	V	19.30		
					H	15.45		
				E2	V	19.16		
					H	14.52		
	Highest	75	0	H	V	19.59	33.00	Pass
					H	13.80		
				E1	V	19.16		
					H	14.37		
				E2	V	19.00		
					H	14.11		

EUT mode	Channel	RB Size	RB Offset	EUT Pol.	Antenna Pol.	EIRP(dBm)	Limit (dBm)	Result
LTE Band 2 (20MHz) QPSK	Lowest	100	0	H	V	18.72	33.00	Pass
					H	14.93		
				E1	V	18.10		
					H	13.96		
				E2	V	19.08		
					H	13.91		
	Middle	100	0	H	V	18.25	33.00	Pass
					H	14.56		
				E1	V	19.09		
					H	14.64		
				E2	V	18.17		
					H	14.84		
	Highest	100	0	H	V	18.29	33.00	Pass
					H	15.08		
				E1	V	18.58		
					H	14.72		
				E2	V	18.90		
					H	13.98		

EUT mode	Channel	RB Size	RB Offset	EUT Pol.	Antenna Pol.	EIRP(dBm)	Limit (dBm)	Result
LTE Band 2 (5MHz) 16 QAM	Lowest	25	0	H	V	19.85	33.00	Pass
					H	15.82		
				E1	V	20.81		
					H	16.34		
				E2	V	20.71		
					H	17.33		
	Middle	25	0	H	V	20.28	33.00	Pass
					H	17.42		
				E1	V	19.86		
					H	16.25		
				E2	V	20.33		
					H	17.46		
	Highest	25	0	H	V	19.81	33.00	Pass
					H	17.22		
				E1	V	20.41		
					H	19.96		
				E2	V	20.51		
					H	17.07		

EUT mode	Channel	RB Size	RB Offset	EUT Pol.	Antenna Pol.	EIRP(dBm)	Limit (dBm)	Result
LTE Band 2 (10MHz) 16 QAM	Lowest	50	0	H	V	20.57	33.00	Pass
					H	16.28		
				E1	V	20.04		
					H	16.45		
				E2	V	19.79		
					H	16.46		
	Middle	50	0	H	V	20.95	33.00	Pass
					H	16.60		
				E1	V	20.62		
					H	17.42		
				E2	V	20.72		
					H	16.94		
	Highest	50	0	H	V	20.93	33.00	Pass
					H	16.63		
				E1	V	20.08		
					H	16.23		
				E2	V	20.46		
					H	15.04		

EUT mode	Channel	RB Size	RB Offset	EUT Pol.	Antenna Pol.	EIRP(dBm)	Limit (dBm)	Result
LTE Band 2 (15MHz) 16 QAM	Lowest	75	0	H	V	20.02	33.00	Pass
					H	17.06		
				E1	V	20.74		
					H	16.82		
				E2	V	19.88		
					H	15.78		
	Middle	75	0	H	V	19.78	33.00	Pass
					H	16.46		
				E1	V	18.95		
					H	15.78		
				E2	V	19.38		
					H	14.50		
	Highest	75	0	H	V	19.12	33.00	Pass
					H	14.05		
				E1	V	19.99		
					H	13.65		
				E2	V	18.82		
					H	14.77		

EUT mode	Channel	RB Size	RB Offset	EUT Pol.	Antenna Pol.	EIRP(dBm)	Limit (dBm)	Result
LTE Band 2 (20MHz) 16 QAM	Lowest	100	0	H	V	18.54	33.00	Pass
					H	14.63		
				E1	V	17.72		
					H	13.75		
				E2	V	18.90		
					H	14.31		
	Middle	100	0	H	V	18.70	33.00	Pass
					H	14.54		
				E1	V	18.55		
					H	15.10		
				E2	V	18.93		
					H	14.33		
	Highest	100	0	H	V	17.99	33.00	Pass
					H	14.32		
				E1	V	19.53		
					H	14.68		
				E2	V	18.49		
					H	14.14		

EUT mode	Channel	RB Size	RB Offset	EUT Pol.	Antenna Pol.	EIRP(dBm)	Limit (dBm)	Result
LTE Band 4 (5MHz) QPSK	Lowest	25	0	H	V	20.13	30.00	Pass
					H	15.25		
				E1	V	20.68		
					H	15.00		
				E2	V	20.63		
					H	16.18		
	Middle	25	0	H	V	19.79	30.00	Pass
					H	15.62		
				E1	V	20.44		
					H	15.22		
				E2	V	20.46		
					H	15.42		
	Highest	25	0	H	V	20.47	30.00	Pass
					H	15.29		
				E1	V	19.60		
					H	14.79		
				E2	V	20.66		
					H	14.80		

EUT mode	Channel	RB Size	RB Offset	EUT Pol.	Antenna Pol.	EIRP(dBm)	Limit (dBm)	Result
LTE Band 4 (10MHz) QPSK	Lowest	50	0	H	V	19.67	30.00	Pass
					H	14.59		
				E1	V	19.31		
					H	14.89		
				E2	V	19.60		
					H	14.56		
	Middle	50	0	H	V	20.14	30.00	Pass
					H	14.62		
				E1	V	19.73		
					H	15.12		
				E2	V	19.98		
					H	14.58		
	Highest	50	0	H	V	19.44	30.00	Pass
					H	14.68		
				E1	V	18.86		
					H	15.18		
				E2	V	18.58		
					H	13.89		

EUT mode	Channel	RB Size	RB Offset	EUT Pol.	Antenna Pol.	EIRP(dBm)	Limit (dBm)	Result
LTE Band 4 (15MHz) QPSK	Lowest	75	0	H	V	20.28	30.00	Pass
					H	15.20		
				E1	V	19.14		
					H	14.58		
				E2	V	20.23		
					H	14.61		
	Middle	75	0	H	V	19.78	30.00	Pass
					H	14.25		
				E1	V	19.34		
					H	14.47		
				E2	V	18.93		
					H	15.02		
	Highest	75	0	H	V	19.06	30.00	Pass
					H	15.32		
				E1	V	19.24		
					H	13.95		
				E2	V	19.29		
					H	14.30		

EUT mode	Channel	RB Size	RB Offset	EUT Pol.	Antenna Pol.	EIRP(dBm)	Limit (dBm)	Result
LTE Band 4 (20MHz) QPSK	Lowest	100	0	H	V	18.90	30.00	Pass
					H	13.00		
				E1	V	18.70		
					H	13.35		
				E2	V	19.18		
					H	13.48		
	Middle	100	0	H	V	18.31	30.00	Pass
					H	12.95		
				E1	V	18.29		
					H	13.59		
				E2	V	18.64		
					H	13.82		
	Highest	100	0	H	V	18.95	30.00	Pass
					H	13.78		
				E1	V	18.49		
					H	13.72		
				E2	V	18.22		
					H	13.41		

EUT mode	Channel	RB Size	RB Offset	EUT Pol.	Antenna Pol.	EIRP(dBm)	Limit (dBm)	Result
LTE Band 4 (5MHz) 16 QAM	Lowest	25	0	H	V	20.59	30.00	Pass
					H	15.54		
				E1	V	20.40		
					H	14.54		
				E2	V	20.19		
					H	15.81		
	Middle	25	0	H	V	20.36	30.00	Pass
					H	15.51		
				E1	V	20.46		
					H	15.65		
				E2	V	20.12		
					H	14.94		
	Highest	25	0	H	V	20.34	30.00	Pass
					H	15.08		
				E1	V	20.09		
					H	15.62		
				E2	V	20.54		
					H	14.48		

EUT mode	Channel	RB Size	RB Offset	EUT Pol.	Antenna Pol.	EIRP(dBm)	Limit (dBm)	Result
LTE Band 4 (10MHz) 16 QAM	Lowest	50	0	H	V	19.97	30.00	Pass
					H	14.57		
				E1	V	19.14		
					H	14.53		
				E2	V	18.82		
					H	14.64		
	Middle	50	0	H	V	20.13	30.00	Pass
					H	14.00		
				E1	V	19.40		
					H	14.55		
				E2	V	19.52		
					H	14.40		
	Highest	50	0	H	V	19.54	30.00	Pass
					H	14.28		
				E1	V	19.10		
					H	15.59		
				E2	V	18.86		
					H	14.10		

EUT mode	Channel	RB Size	RB Offset	EUT Pol.	Antenna Pol.	EIRP(dBm)	Limit (dBm)	Result
LTE Band 4 (15MHz) 16 QAM	Lowest	75	0	H	V	20.30	30.00	Pass
					H	14.82		
				E1	V	19.37		
					H	14.96		
				E2	V	19.47		
					H	14.99		
	Middle	75	0	H	V	19.76	30.00	Pass
					H	13.62		
				E1	V	20.00		
					H	14.46		
				E2	V	19.08		
					H	15.39		
	Highest	75	0	H	V	19.48	30.00	Pass
					H	14.73		
				E1	V	19.10		
					H	13.98		
				E2	V	18.94		
					H	14.75		

EUT mode	Channel	RB Size	RB Offset	EUT Pol.	Antenna Pol.	EIRP(dBm)	Limit (dBm)	Result
LTE Band 4 (20MHz) 16 QAM	Lowest	100	0	H	V	19.03	30.00	Pass
					H	13.74		
				E1	V	19.10		
					H	13.57		
				E2	V	18.81		
					H	13.25		
	Middle	100	0	H	V	18.90	30.00	Pass
					H	13.42		
				E1	V	18.39		
					H	13.70		
				E2	V	18.68		
					H	13.71		
	Highest	100	0	H	V	18.99	30.00	Pass
					H	13.36		
				E1	V	17.58		
					H	13.85		
				E2	V	17.75		
					H	12.80		

EUT mode	Channel	RB Size	RB Offset	EUT Pol.	Antenna Pol.	ERP(dBm)	Limit (dBm)	Result
LTE Band 5 (5MHz) QPSK	Lowest	25	0	H	V	20.27	38.45	Pass
					H	17.21		
				E1	V	20.36		
					H	16.82		
				E2	V	20.36		
					H	16.71		
	Middle	25	0	H	V	20.67	38.45	Pass
					H	17.26		
				E1	V	20.67		
					H	16.95		
				E2	V	20.63		
					H	16.19		
	Highest	25	0	H	V	20.55	38.45	Pass
					H	16.03		
				E1	V	21.11		
					H	15.88		
				E2	V	20.63		
					H	17.09		

EUT mode	Channel	RB Size	RB Offset	EUT Pol.	Antenna Pol.	ERP(dBm)	Limit (dBm)	Result
LTE Band 5 (10MHz) QPSK	Lowest	50	0	H	V	19.28	38.45	Pass
					H	15.14		
				E1	V	19.85		
					H	15.62		
				E2	V	18.73		
					H	15.47		
	Middle	50	0	H	V	19.58	38.45	Pass
					H	14.94		
				E1	V	19.88		
					H	14.54		
				E2	V	19.13		
					H	15.36		
	Highest	50	0	H	V	19.27	38.45	Pass
					H	13.89		
				E1	V	19.59		
					H	15.73		
				E2	V	19.04		
					H	14.55		

EUT mode	Channel	RB Size	RB Offset	EUT Pol.	Antenna Pol.	ERP(dBm)	Limit (dBm)	Result
LTE Band 5 (5MHz) 16 QAM	Lowest	25	0	H	V	20.15	38.45	Pass
					H	16.62		
				E1	V	20.12		
					H	16.51		
				E2	V	19.97		
					H	16.71		
	Middle	25	0	H	V	20.11	38.45	Pass
					H	16.73		
				E1	V	19.84		
					H	16.44		
				E2	V	20.22		
					H	16.06		
	Highest	25	0	H	V	20.11	38.45	Pass
					H	16.40		
				E1	V	20.76		
					H	15.96		
				E2	V	20.16		
					H	17.28		

EUT mode	Channel	RB Size	RB Offset	EUT Pol.	Antenna Pol.	ERP(dBm)	Limit (dBm)	Result
LTE Band 5 (10MHz) 16 QAM	Lowest	50	0	H	V	19.39	38.45	Pass
					H	15.10		
				E1	V	19.64		
					H	15.91		
				E2	V	18.89		
					H	15.82		
	Middle	50	0	H	V	19.29	38.45	Pass
					H	14.47		
				E1	V	19.42		
					H	14.83		
				E2	V	19.54		
					H	15.31		
	Highest	50	0	H	V	18.63	38.45	Pass
					H	14.02		
				E1	V	19.54		
					H	15.06		
				E2	V	18.98		
					H	14.56		

EUT mode	Channel	RB Size	RB Offset	EUT Pol.	Antenna Pol.	EIRP(dBm)	Limit (dBm)	Result
LTE Band 7 (5MHz) QPSK	Lowest	25	0	H	V	20.89	33.00	Pass
					H	17.70		
				E1	V	21.66		
					H	18.17		
				E2	V	21.29		
					H	16.89		
	Middle	25	0	H	V	21.49	33.00	Pass
					H	18.67		
				E1	V	22.17		
					H	18.72		
				E2	V	21.97		
					H	16.77		
	Highest	25	0	H	V	20.85	33.00	Pass
					H	17.05		
				E1	V	21.19		
					H	17.62		
				E2	V	21.54		
					H	17.48		

EUT mode	Channel	RB Size	RB Offset	EUT Pol.	Antenna Pol.	EIRP(dBm)	Limit (dBm)	Result
LTE Band 7 (10MHz) QPSK	Lowest	50	0	H	V	20.06	33.00	Pass
					H	16.50		
				E1	V	20.10		
					H	16.33		
				E2	V	21.01		
					H	17.10		
	Middle	50	0	H	V	20.24	33.00	Pass
					H	16.74		
				E1	V	20.87		
					H	16.42		
				E2	V	20.91		
					H	17.27		
	Highest	50	0	H	V	20.27	33.00	Pass
					H	16.21		
				E1	V	20.52		
					H	16.41		
				E2	V	20.30		
					H	16.24		

EUT mode	Channel	RB Size	RB Offset	EUT Pol.	Antenna Pol.	EIRP(dBm)	Limit (dBm)	Result
fLTE Band 7 (15MHz) QPSK	Lowest	75	0	H	V	19.40	33.00	Pass
					H	15.73		
				E1	V	19.04		
					H	15.40		
				E2	V	19.33		
					H	15.50		
	Middle	75	0	H	V	20.44	33.00	Pass
					H	15.67		
				E1	V	19.00		
					H	15.06		
				E2	V	19.47		
					H	15.71		
	Highest	75	0	H	V	19.04	33.00	Pass
					H	15.28		
				E1	V	18.83		
					H	15.62		
				E2	V	19.14		
					H	15.44		

EUT mode	Channel	RB Size	RB Offset	EUT Pol.	Antenna Pol.	EIRP(dBm)	Limit (dBm)	Result
LTE Band 7 (20MHz) QPSK	Lowest	100	0	H	V	18.80	33.00	Pass
					H	14.83		
				E1	V	18.60		
					H	14.00		
				E2	V	18.58		
					H	14.00		
	Middle	100	0	H	V	18.65	33.00	Pass
					H	14.38		
				E1	V	17.83		
					H	15.24		
				E2	V	18.65		
					H	13.81		
	Highest	100	0	H	V	18.81	33.00	Pass
					H	14.68		
				E1	V	17.76		
					H	14.19		
				E2	V	18.52		
					H	15.01		

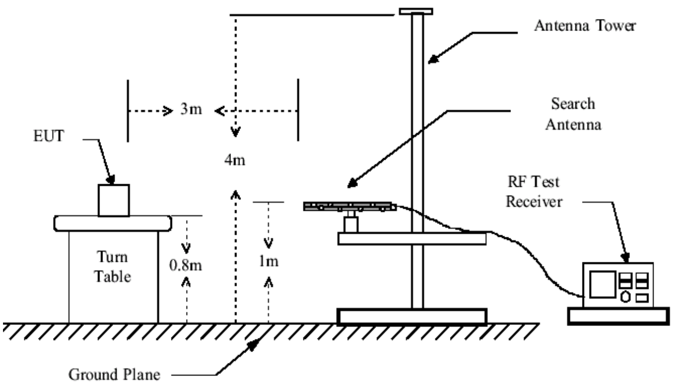
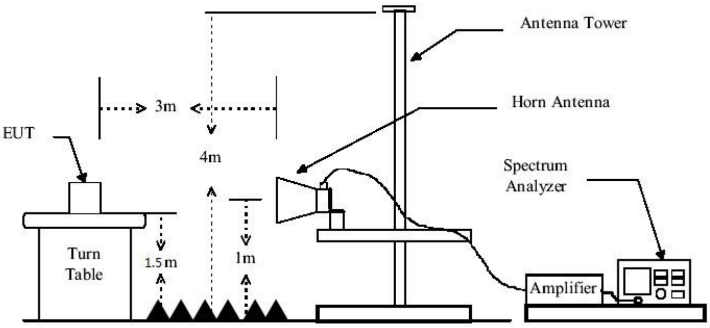
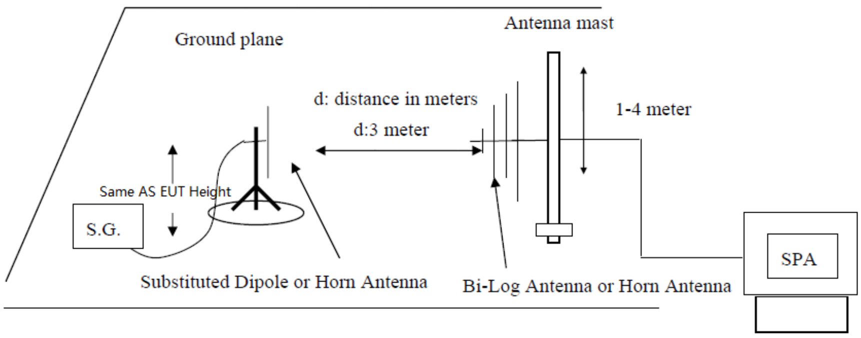
EUT mode	Channel	RB Size	RB Offset	EUT Pol.	Antenna Pol.	EIRP(dBm)	Limit (dBm)	Result
LTE Band 7 (5MHz) 16 QAM	Lowest	25	0	H	V	21.03	33.00	Pass
					H	17.43		
				E1	V	21.72		
					H	18.00		
				E2	V	21.72		
					H	17.06		
	Middle	25	0	H	V	21.64	33.00	Pass
					H	18.73		
				E1	V	21.57		
					H	18.23		
				E2	V	22.16		
					H	16.92		
	Highest	25	0	H	V	20.73	33.00	Pass
					H	17.27		
				E1	V	20.70		
					H	17.77		
				E2	V	20.81		
					H	17.17		

EUT mode	Channel	RB Size	RB Offset	EUT Pol.	Antenna Pol.	EIRP(dBm)	Limit (dBm)	Result
LTE Band 7 (10MHz) 16 QAM	Lowest	50	0	H	V	20.27	33.00	Pass
					H	16.98		
				E1	V	20.43		
					H	16.44		
				E2	V	19.99		
					H	17.16		
	Middle	50	0	H	V	20.08	33.00	Pass
					H	16.72		
				E1	V	20.13		
					H	16.04		
				E2	V	20.53		
					H	16.82		
	Highest	50	0	H	V	20.17	33.00	Pass
					H	16.53		
				E1	V	20.37		
					H	16.42		
				E2	V	20.21		
					H	16.14		

EUT mode	Channel	RB Size	RB Offset	EUT Pol.	Antenna Pol.	EIRP(dBm)	Limit (dBm)	Result
LTE Band 7 (15MHz) 16 QAM	Lowest	75	0	H	V	19.15	33.00	Pass
					H	15.27		
				E1	V	19.35		
					H	15.59		
				E2	V	18.80		
					H	15.32		
	Middle	75	0	H	V	20.35	33.00	Pass
					H	16.01		
				E1	V	19.46		
					H	15.09		
				E2	V	19.86		
					H	15.35		
	Highest	75	0	H	V	18.91	33.00	Pass
					H	15.12		
				E1	V	19.30		
					H	15.19		
				E2	V	19.52		
					H	15.07		

EUT mode	Channel	RB Size	RB Offset	EUT Pol.	Antenna Pol.	EIRP(dBm)	Limit (dBm)	Result
LTE Band 7 (20MHz) 16 QAM	Lowest	100	0	H	V	18.10	33.00	Pass
					H	14.44		
				E1	V	18.30		
					H	14.01		
				E2	V	18.47		
					H	14.22		
	Middle	100	0	H	V	17.93	33.00	Pass
					H	14.56		
				E1	V	17.79		
					H	15.26		
				E2	V	19.27		
					H	14.43		
	Highest	100	0	H	V	18.81	33.00	Pass
					H	14.55		
				E1	V	17.77		
					H	13.66		
				E2	V	18.37		
					H	15.02		

4.9 Field strength of spurious radiation measurement

Test Requirement:	FCC part22.913(a), FCC part24.238(a), FCC part27.53 and RSS-132 (5.5), RSS-133 (6.5.1), RSS-139(6.6) and RSS-199(4.5)
Test Method:	KDB 971168 D01 v03r1 clause 7, FCC part2.1051, ANSI/TIA-603-E, ANSI C63.26 clause 5.5
Limit:	Band 2/4/5/12/13/25:-13dBm Band 7:-25dBm
Test setup:	Below 1GHz  Above 1GHz  Substituted method: 

Test Procedure:	1. The EUT was placed on an non-conductive turntable using a non-conductive support. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and EMI spectrum analyzer. 2. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations. 3. The frequency range up to tenth harmonic was investigated for each of three fundamental frequency (low, middle and high channels). Once spurious emission was identified, the power of the emission was determined using the substitution method. 4. The spurious emissions attenuation was calculated as the difference between radiated power at the fundamental frequency and the spurious emissions frequency. ERP / EIRP = S.G. output (dBm) + Antenna Gain(dB/dBi) – Cable Loss (dB)
Test Instruments:	Refer to section 3 for details
Test mode:	Refer to section 4.1 for details
Test results:	Pass

Measurement Data

QPSK Mode:

Test mode:	LTE Band 2(5MHz)		Test channel:	Lowest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3701.40	Vertical	-36.08	-13.00	Pass
5552.10	V	-39.54		
7402.80	V	-39.12		
9253.50	V	-43.48		
11104.20	V	--		
3701.40	Horizontal	-39.96	-13.00	Pass
5552.10	H	-45.30		
7402.80	H	-46.79		
9253.50	H	-49.24		
11104.20	H	---		
Test mode:	LTE Band 2(5MHz)		Test channel:	Middle
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3760.00	Vertical	-36.75	-13.00	Pass
5640.00	V	-39.26		
7520.00	V	-39.81		
9400.00	V	-42.48		
11280.00	V	--		
3760.00	Horizontal	-40.38	-13.00	Pass
5640.00	H	-43.64		
7520.00	H	-46.01		
9400.00	H	-49.61		
11280.00	H	---		
Test mode:	LTE Band 2(5MHz)		Test channel:	Highest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3818.60	Vertical	-36.54	-13.00	Pass
5727.90	V	-38.77		
7637.20	V	-40.23		
9546.50	V	-42.28		
11455.80	V	--		
3818.60	Horizontal	-41.21	-13.00	Pass
5727.90	H	-43.95		
7637.20	H	-45.17		
9546.50	H	-48.21		
11455.80	H	---		

Remark：

1. The emission behaviour belongs to narrowband spurious emission, all modes investigated and only worst case is reported.
2. Remark”---“ means that the emission level is too low (20dB lower than the limit) to be measured
3. The emission levels of below 1 GHz are very lower (20dB lower than the limit) than the limit and not show in test report.

Test mode:	LTE Band 4(5MHz)		Test channel:	Lowest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3421.40	Vertical	-35.33	-13.00	Pass
5132.10	V	-37.83		
6842.80	V	-39.00		
8553.50	V	-41.49		
10264.20	V	--		
3421.40	Horizontal	-38.92	-13.00	Pass
5132.10	H	-43.08		
6842.80	H	-43.94		
8553.50	H	-46.77		
10264.20	H	---		
Test mode:	**LTE Band 4(5MHz)**		**Test channel:**	**Middle**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3465.00	Vertical	-32.47	-13.00	Pass
5197.50	V	-34.80		
6930.00	V	-37.91		
8662.50	V	-38.98		
10395.00	V	--		
3465.00	Horizontal	-37.81	-13.00	Pass
5197.50	H	-42.22		
6930.00	H	-42.45		
8662.50	H	-45.03		
10395.00	H	---		
Test mode:	**LTE Band 4(5MHz)**		**Test channel:**	**Highest**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3508.60	Vertical	-32.97	-13.00	Pass
5262.90	V	-37.40		
7017.20	V	-39.32		
8771.50	V	-41.55		
10525.80	V	--		
3508.60	Horizontal	-37.59	-13.00	Pass
5262.90	H	-42.35		
7017.20	H	-43.48		
8771.50	H	-46.75		
10525.80	H	---		

Remark：
1. The emission behaviour belongs to narrowband spurious emission, all modes investigated and only worst case is reported.
2. Remark”---“ means that the emission level is too low (20dB lower than the limit) to be measured
3. The emission levels of below 1 GHz are very lower (20dB lower than the limit) than the limit and not show in test report.

Test mode:	LTE Band 5(5MHz)		Test channel:	Lowest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1649.40	Vertical	-36.00	-13.00	Pass
2474.10	V	-39.69		
3298.80	V	-39.44		
4123.50	V	-42.61		
4948.20	V	--		
1649.40	Horizontal	-40.98	-13.00	Pass
2474.10	H	-44.42		
3298.80	H	-46.43		
4123.50	H	-50.27		
4948.20	H	---		
Test mode:	**LTE Band 5(5MHz)**		**Test channel:**	**Middle**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1673.00	Vertical	-34.86	-13.00	Pass
2509.50	V	-40.35		
3346.00	V	-40.26		
4182.50	V	-41.91		
5019.00	V	--		
1673.00	Horizontal	-41.33	-13.00	Pass
2509.50	H	-44.59		
3346.00	H	-46.21		
4182.50	H	-46.66		
5019.00	H	---		
Test mode:	**LTE Band 5(5MHz)**		**Test channel:**	**Highest**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1696.60	Vertical	-36.29	-13.00	Pass
2544.90	V	-38.53		
3393.20	V	-40.18		
4241.50	V	-42.49		
5089.80	V	--		
1696.60	Horizontal	-40.33	-13.00	Pass
2544.90	H	-42.25		
3393.20	H	-45.15		
4241.50	H	-48.40		
5089.80	H	---		

Remark：

4. The emission behaviour belongs to narrowband spurious emission, all modes investigated and only worst case is reported.
5. Remark”---“ means that the emission level is too low (20dB lower than the limit) to be measured
4. The emission levels of below 1 GHz are very lower (20dB lower than the limit) than the limit and not show in test report.

Test mode:	**LTE Band 7(5MHz)**		**Test channel:**	**Lowest**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
5005.00	Vertical	-35.06	-25.00	Pass
7507.50	V	-39.11		
10010.00	V	-42.37		
12512.50	V	-43.28		
15015.00	V	--		
5005.00	Horizontal	-42.02	-25.00	Pass
7507.50	H	-46.52		
10010.00	H	-48.41		
12512.50	H	-50.83		
15015.00	H	---		
Test mode:	**LTE Band 7(5MHz)**		**Test channel:**	**Middle**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
5070.00	Vertical	-36.49	-25.00	Pass
7605.00	V	-39.13		
10140.00	V	-43.33		
12675.00	V	-44.79		
15210.00	V	--		
5070.00	Horizontal	-41.64	-25.00	Pass
7605.00	H	-45.61		
10140.00	H	-47.57		
12675.00	H	-52.41		
15210.00	H	---		
Test mode:	**LTE Band 7(5MHz)**		**Test channel:**	**Highest**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
5135.00	Vertical	-35.79	-25.00	Pass
7702.50	V	-37.84		
10270.00	V	-40.99		
12837.50	V	-43.43		
15405.00	V	--		
5135.00	Horizontal	-39.82	-25.00	Pass
7702.50	H	-45.66		
10270.00	H	-47.73		
12837.50	H	-49.20		
15405.00	H	---		

Remark：

1. The emission behaviour belongs to narrowband spurious emission, all modes investigated and only worst case is reported.
2. Remark”---“ means that the emission level is too low (20dB lower than the limit) to be measured
3. The emission levels of below 1 GHz are very lower (20dB lower than the limit) than the limit and not show in test report.

16 QAM Mode:

Test mode:	**LTE Band 2 (1.4MHz)**		**Test channel:**	**Lowest**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3701.40	Vertical	-36.83	-13.00	Pass
5552.10	V	-38.53		
7402.80	V	-40.73		
9253.50	V	-43.09		
11104.20	V	--		
3701.40	Horizontal	-41.32	-13.00	Pass
5552.10	H	-43.01		
7402.80	H	-45.32		
9253.50	H	-47.12		
11104.20	H	---		
Test mode:	**LTE Band 2 (1.4MHz)**		**Test channel:**	**Middle**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3760.00	Vertical	-36.41	-13.00	Pass
5640.00	V	-37.88		
7520.00	V	-40.11		
9400.00	V	-42.81		
11280.00	V	--		
3760.00	Horizontal	-41.05	-13.00	Pass
5640.00	H	-44.23		
7520.00	H	-44.45		
9400.00	H	-48.21		
11280.00	H	---		
Test mode:	**LTE Band 2 (1.4MHz)**		**Test channel:**	**Highest**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3818.60	Vertical	-35.80	-13.00	Pass
5727.90	V	-37.69		
7637.20	V	-40.88		
9546.50	V	-42.75		
11455.80	V	--		
3818.60	Horizontal	-39.80	-13.00	Pass
5727.90	H	-44.36		
7637.20	H	-44.91		
9546.50	H	-47.96		
11455.80	H	---		

Remark：

1 The emission behaviour belongs to narrowband spurious emission, all modes investigated and only worst case is reported.

2 Remark”---“ means that the emission level is too low (20dB lower than the limit) to be measured

3 The emission levels of below 1 GHz are very lower (20dB lower than the limit) than the limit and not show in test report.

Test mode:	LTE Band 4(1.4MHz)		Test channel:	Lowest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3421.40	Vertical	-35.67	-13.00	Pass
5132.10	V	-38.94		
6842.80	V	-39.97		
8553.50	V	-41.35		
10264.20	V	--		
3421.40	Horizontal	-40.64	-13.00	Pass
5132.10	H	-44.67		
6842.80	H	-44.40		
8553.50	H	-48.39		
10264.20	H	---		
Test mode:	**LTE Band 4(1.4MHz)**		**Test channel:**	**Middle**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3465.00	Vertical	-34.74	-13.00	Pass
5197.50	V	-38.62		
6930.00	V	-39.86		
8662.50	V	-42.94		
10395.00	V	--		
3465.00	Horizontal	-41.38	-13.00	Pass
5197.50	H	-44.30		
6930.00	H	-45.36		
8662.50	H	-47.82		
10395.00	H	---		
Test mode:	**LTE Band 4(1.4MHz)**		**Test channel:**	**Highest**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3508.60	Vertical	-34.75	-13.00	Pass
5262.90	V	-38.69		
7017.20	V	-41.50		
8771.50	V	-43.28		
10525.80	V	--		
3508.60	Horizontal	-40.45	-13.00	Pass
5262.90	H	-44.90		
7017.20	H	-45.22		
8771.50	H	-47.72		
10525.80	H	---		

Remark：
1 The emission behaviour belongs to narrowband spurious emission, all modes investigated and only worst case is reported.
2 Remark"---" means that the emission level is too low (20dB lower than the limit) to be measured
3 The emission levels of below 1 GHz are very lower (20dB lower than the limit) than the limit and not show in test report.

Test mode:	**LTE Band 5(1.4MHz)**		**Test channel:**	**Lowest**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1649.40	Vertical	-35.61	-13.00	Pass
2474.10	V	-38.14		
3298.80	V	-39.42		
4123.50	V	-43.40		
4948.20	V	--		
1649.40	Horizontal	-41.33	-13.00	Pass
2474.10	H	-43.70		
3298.80	H	-44.22		
4123.50	H	-49.60		
4948.20	H	---		
Test mode:	**LTE Band 5(1.4MHz)**		**Test channel:**	**Middle**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1673.00	Vertical	-34.97	-13.00	Pass
2509.50	V	-38.84		
3346.00	V	-40.10		
4182.50	V	-43.02		
5019.00	V	--		
1673.00	Horizontal	-40.96	-13.00	Pass
2509.50	H	-44.85		
3346.00	H	-44.32		
4182.50	H	-47.18		
5019.00	H	---		
Test mode:	**LTE Band 5(1.4MHz)**		**Test channel:**	**Highest**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1696.60	Vertical	-36.69	-13.00	Pass
2544.90	V	-37.74		
3393.20	V	-39.96		
4241.50	V	-42.92		
5089.80	V	--		
1696.60	Horizontal	-41.43	-13.00	Pass
2544.90	H	-44.34		
3393.20	H	-43.72		
4241.50	H	-47.47		
5089.80	H	---		

Remark：

1 The emission behaviour belongs to narrowband spurious emission, all modes investigated and only worst case is reported.

2 Remark”---“ means that the emission level is too low (20dB lower than the limit) to be measured

3 The emission levels of below 1 GHz are very lower (20dB lower than the limit) than the limit and not show in test report.

Test mode:	**LTE Band 7(5MHz)**		**Test channel:**	**Lowest**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
5005.00	Vertical	-35.57	-25.00	Pass
7507.50	V	-37.61		
10010.00	V	-40.20		
12512.50	V	-43.74		
15015.00	V	--		
5005.00	Horizontal	-41.46	-25.00	Pass
7507.50	H	-44.67		
10010.00	H	-45.53		
12512.50	H	-49.02		
15015.00	H	---		
Test mode:	**LTE Band 7(5MHz)**		**Test channel:**	**Middle**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
5070.00	Vertical	-34.65	-25.00	Pass
7605.00	V	-38.48		
10140.00	V	-40.07		
12675.00	V	-42.38		
15210.00	V	--		
5070.00	Horizontal	-40.81	-25.00	Pass
7605.00	H	-43.79		
10140.00	H	-45.87		
12675.00	H	-49.07		
15210.00	H	---		
Test mode:	**LTE Band 7(5MHz)**		**Test channel:**	**Highest**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
5135.00	Vertical	-35.38	-25.00	Pass
7702.50	V	-39.12		
10270.00	V	-39.91		
12837.50	V	-43.07		
15405.00	V	--		
5135.00	Horizontal	-40.48	-25.00	Pass
7702.50	H	-43.87		
10270.00	H	-45.30		
12837.50	H	-48.45		
15405.00	H	---		

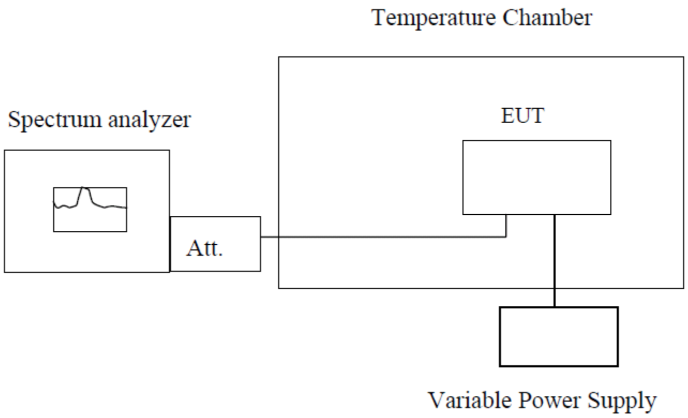
Remark：

1 The emission behaviour belongs to narrowband spurious emission, all modes investigated and only worst case is reported.

2 Remark”---“ means that the emission level is too low (20dB lower than the limit) to be measured

3 The emission levels of below 1 GHz are very lower (20dB lower than the limit) than the limit and not show in test report.

4.10 Frequency stability V.S. Temperature measurement

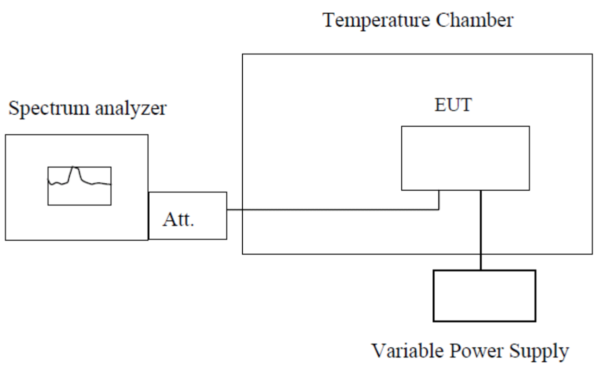
Test Requirement:	FCC Part2.1055(a)(1)(b), Part 22.355, Part 24.235, Part 27.54, RSS-132 (5.3), RSS-133 (6.3), RSS-139(6.4) and RSS-199(4.3)
Test Method:	FCC Part2.1055(a)(1)(b), ANSI/TIA-603-E FCC KDB971168 D01 v03r01 Section 8, ANSI C63.26 clause 5.6.
Limit:	2.5ppm(Part 22) Within the authorized bands of operation(Part 24, Part 27)
Test setup:	 **Note :** Measurement setup for testing on Antenna connector
Test procedure:	1. The equipment under test was connected to an external DC power supply and input rated voltage. 2. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. 3. The EUT was placed inside the temperature chamber. 4. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 25°C operating frequency as reference frequency. 5. Turn EUT off and set the chamber temperature to –20°C. After the temperature stabilized for approximately 30 minutes recorded the frequency. 6. Repeat step measure with 10°C increased per stage until the highest temperature of +50°C reached.
Test Instruments:	Refer to section 3 for details
Test mode:	Refer to section 4.1 for details
Test results:	Pass
Remark:	If all frequencies stability are comply with the lower limit, then all results can be considered qualified

Measurement Data

Reference Frequency: LTE Band 2 Middle channel=18900 channel=1880MHz					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
7.2	-20	18	0.0094	2.5	Pass
	-10	-23	-0.0122		
	0	21	0.0113		
	10	-27	-0.0144		
	20	17	0.0093		
	30	12	0.0066		
	40	-4	-0.0020		
	50	9	0.0049		
Reference Frequency: LTE Band 4 Middle channel=20175 channel=1732.5MHz					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
7.2	-20	18	0.0104	2.5	Pass
	-10	-22	-0.0128		
	0	25	0.0144		
	10	-25	-0.0146		
	20	13	0.0076		
	30	14	0.0084		
	40	-8	-0.0044		
	50	9	0.0053		
Reference Frequency: LTE Band 5 Middle channel=20175 channel=836.5MHz					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
7.2	-20	26	0.0313	2.5	Pass
	-10	-17	-0.0198		
	0	11	0.0130		
	10	-29	-0.0347		
	20	19	0.0221		
	30	14	0.0169		
	40	15	0.0175		
	50	-23	-0.0278		

Reference Frequency: LTE Band 7 Middle channel=21100 channel=2535MHz					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
7.2	-20	15	0.0057	2.5	Pass
	-10	-23	-0.0089		
	0	26	0.0104		
	10	-26	-0.0105		
	20	16	0.0065		
	30	14	0.0055		
	40	-5	-0.0020		
	50	10	0.0040		

4.11 Frequency stability V.S. Voltage measurement

Test Requirement:	FCC Part2.1055(d)(1)(2), Part 22.355, Part 24.235, Part 27.54, RSS-132 (5.3), RSS-133 (6.3), RSS-139(6.4) and RSS-199(4.3)
Test Method:	FCC Part2.1055(d)(1)(2), ANSI/TIA-603-E FCC KDB971168 D01 v03r01 Section 8, ANSI C63.26 clause 5.6.
Limit:	2.5ppm
Test setup:	 **Note :** Measurement setup for testing on Antenna connector
Test procedure:	1. Set chamber temperature to 20°C. Use a variable DC power source to power the EUT and set the voltage to rated voltage. 2. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency. 3. Reduce the input voltage to specified extreme voltage variation (+/- 15%) and endpoint, record the maximum frequency change.
Test Instruments:	Refer to section 3 for details
Test mode:	Refer to section 4.1 for details
Test results:	Pass
Remark:	1. Manufacturer specified the battery operating end point voltage is 6.1VDC, max voltage is 8.3VDC. 2. If all frequencies stability are comply with the lower limit, then all results can be considered qualified

Measurement Data

Reference Frequency: LTE Band 2 Middle channel=18900 channel=1880MHz					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
20	8.3	18	0.0095	2.5	Pass
	7.2	11	0.0059		
	6.1	-9	-0.0048		
Reference Frequency: LTE Band 4 Middle channel=20175 channel=1732.5MHz					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
20	8.3	17	0.0097	2.5	Pass
	7.2	-5	-0.0030		
	6.1	9	0.0051		
Reference Frequency: LTE Band 5 Middle channel=20175 channel=836.5MHz					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
20	8.3	7	0.0087	2.5	Pass
	7.2	-26	-0.0312		
	6.1	20	0.0244		
Reference Frequency: LTE Band 7 Middle channel=21100 channel=2535MHz					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
20	8.3	-8	-0.0030	2.5	Pass
	7.2	6	0.0025		
	6.1	7	0.0028		

---------THE END OF REPORT-------