FCC TEST REPORT

FCC ID: SY4-A02026

On Behalf of

Shanghai Huace Navigation Technology LTD.

Geodetic GNSS Receiver

Model No.: i50

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	:	A2006165-C01-R05
Date of Receipt	:	June 18, 2020
Date of Test	:	June 18, 2020 – July 15, 2020
Date of Report	:	July 15, 2020
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.	:	i50
(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

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…… ……..:	July 15, 2020	

Revision History

Revision	Issue Date	Revisions	Revised By
V0	July 15, 2020	Initial released Issue	Reak Yang

1 Test Summary

Test Item	Section in CFR 47	Result
RF Exposure (SAR)	Part 1.1307 Part 2.1093	Pass* (Please refer to SAR Report)
RF Output Power	Part 2.1046 part22.913(a) (5) Part 24.232 (c) Part 27.50 (d)(4)	Pass
Peak-To-Average Ratio	Part 2.1046 Part 22.913(d) Part 24.232 (d) Part 27.50(d)	Pass
Modulation Characteristics	Part 2.1047	N/A
99% & -26 dB Occupied Bandwidth	Part 2.1049 Part 22.917 Part 24.238 Part 27.53(a)	Pass
Spurious Emissions at Antenna Terminal	Part 2.1051 Part 22.917 (a) Part 24.238 (a) Part 27.53 (h)	Pass
Field Strength of Spurious Radiation	Part 2.1053 Part 22.917 (a) Part 24.238 (a) Part 27.53 (h)	Pass
Out of band emission, Band Edge	Part 22.917 (a) Part 24.238 (a) Part 27.53(h)	Pass
Frequency stability vs. temperature	Part 2.1055(a)(1)(b)	Pass
Frequency stability vs. voltage	Part 2.1055(d)(1)(2)	Pass

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

2 General Information

2.1 General Description of EUT

Description of Device (EUT)

Description	:	Geodetic GNSS Receiver
Trademark	:	CHCNAV
Model Number	:	i50
DIFF.	:	N/A
Test Voltage	:	DC 12-36V, 2A (for DC port) or DC 7.4V, 3400mAh (for replaceable lithium battery)
Support Networks	:	LTE
Support Bands		LTE Band 2/4/5/7
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 ~ 1910 MHz LTE Band 4: 1710 ~ 1755 MHz LTE Band 5: 824 ~ 849 MHz LTE Band 7: 2500 ~ 2570 MHz
Modulation type		QPSK, 16QAM
Antenna Type	:	Internal antenna, Maximum Gain is 0.775dBi
Software version	:	V1.0
Hardware version	:	i50_MAIN_V2.1

Remark: 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 and Part 24 subpart E of the FCC CFR 47 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: CN0085

2.4 Accessories of Device (EUT)

Accessories1	:	/
Manufacturer	:	/
Model	:	/
Input	:	/
Output	:	/

2.5 Tested Supporting System Details

No.	Description	Manufacturer	Model	Serial Number	Certification or DOC
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2.6 Test Conditions

Items	Required	Actual
Temperature range:	15-35℃	24℃
Humidity range:	25-75%	56%
Pressure range:	86-106kPa	98kPa

2.7 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	2019.09.07	2Year
Horn Antenna	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D(1201)	2020.04.12	2Year
Loop Antenna	SCHWARZBECK	FMZB 1519B	00059	2019.09.07	2Year
Filter	KANGMAI	ZLPF-LDC-1000-1959	1209002075	2019.09.06	1Year
Filter	WAINWRIGHT	WHKX2.80 /18G-12SS	SN1	2019.09.06	1Year
Filter	WAINWRIGHT	WHKX1.0G/15G-10SS	SN40	2019.09.06	1Year
RF Cable	Resenberger	Cable 4	N/A	2019.09.05	1Year
CMU200	ROHDE&SCHWARZ	CMU200	116785	2019.09.05	1Year
CMW500	ROHDE&SCHWARZ	CMW500	1201.0002K50-117239-sM	2019.09.05	1Year
Signal Analyzer	Agilent	E4407B	MY49510055	2019.09.05	1Year
Signal Analyzer	Agilent	N9020A	MY499100060	2019.09.05	1Year
vector Signal Generator	Agilent	N5182A	MY49060042	2019.09.05	1Year
vector Signal Generator	Agilent	E4438C	US44271917	2019.09.06	1Year
Amplifier	Agilent	8449B	3008A02664	2019.09.05	1Year
Test Receiver	ROHDE&SCHWARZ	ESR	1316.3003K03-102082-Wa	2019.09.06	1Year
9*6*6 anechoic chamber	CHENYU	9*6*6	N/A	/	/
RF Cable	Resenberger	Cable 1	N/A	2019.09.05	1Year
RF Cable	Resenberger	Cable 2	N/A	2019.09.06	1Year
RF Cable	Resenberger	Cable 3	N/A	2019.09.06	1Year
Power Sensor	Power Radio	RPR3006W	15100041SNO91	2019.09.06	1Year
20dB Attenuator	ICPROBING	IATS1	82347	2019.09.20	1Year
POWER DIVIDER	Mini-circuits	PD-2SF-0010	N/A	2019.09.20	1Year
POWER DIVIDER	Mini-circuits	PD-2SF-0010	N/A	2019.09.20	1Year
Temperature& Humidity test chamber	GZGONGWEN	GDS-250	080821	2019.10.20	1Year
Horn Antenna	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D(1207)	2019.09.07	2Year
Bilog Antenna	Schwarzbeck	VULB 9168	VULB9168-627	2020.04.12	2Year

4 System test configuration

4.1 Test mode

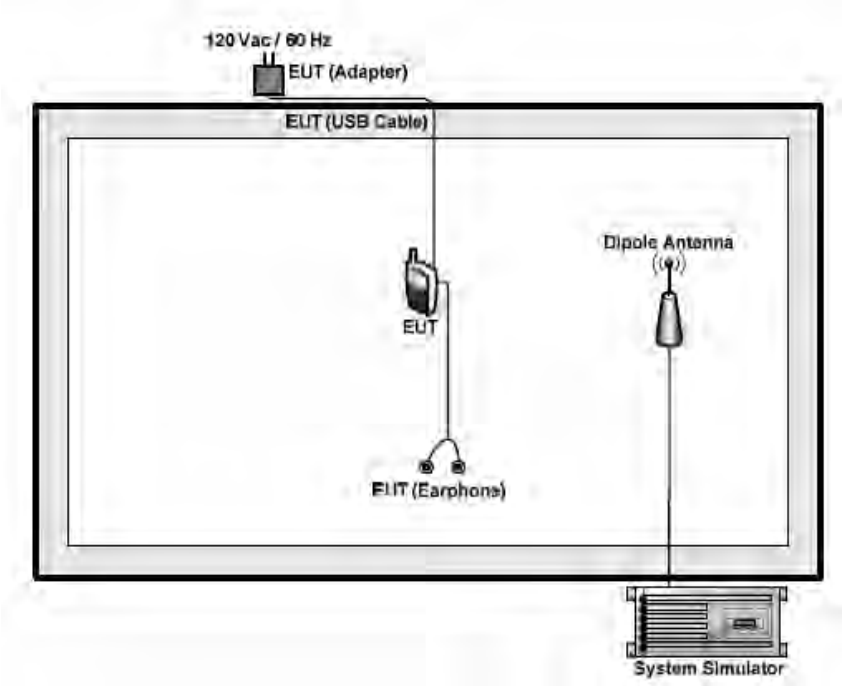
During all testing, EUT is in link mode with base station emulator at maximum power level. The spurious emission measurements were carried out in semi-anechoic chamber with 3-meter test range, and EUT is rotated on three test planes to find out the worst emission.

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

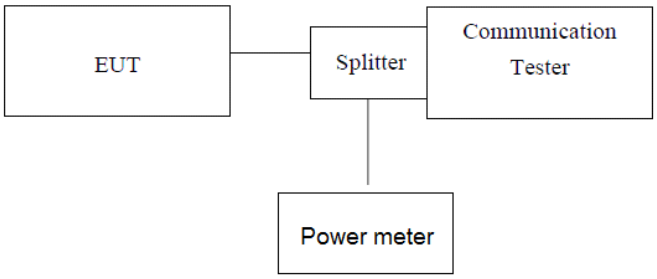
Note: Antenna port conducted and radiated test items were performed according to KDB 971168 D01 Power Meas License Digital Systems v03r1 with maximum output power.

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) (5), FCC part24.232(b) and FCC Part 27.50 (d)(4)
Test Method:	ANSI C63.26:2015
Limit:	LTE Band 2: 2W LTE Band 4: 1W LTE Band 5: 7W LTE Band 7: 2W
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	21.89	22.09
		1	12	21.92	22.12
		1	24	21.93	22.13
		12	0	20.64	20.84
		12	6	20.54	20.74
		12	13	21.23	21.43
		25	0	20.78	20.98
	1880.0	1	0	22.99	23.19
		1	12	20.18	20.38
		1	24	20.55	20.75
		12	0	20.38	20.58
		12	6	19.76	19.96
		12	13	19.40	19.60
		25	0	21.55	21.75
	1907.5	1	0	21.49	21.69
		1	12	21.41	21.61
		1	24	21.88	22.08
		12	0	21.29	21.49
		12	6	20.92	21.12
		12	13	20.76	20.96
		25	0	21.51	21.71
10	1855.0	1	0	21.72	21.92
		1	24	22.36	22.56
		1	49	21.34	21.54
		25	0	21.68	21.88
		25	12	21.50	21.70
		25	25	22.07	22.27
		50	0	22.42	22.62
	1880.0	1	0	21.13	21.33
		1	24	21.59	21.79
		1	49	20.32	20.52
		25	0	20.42	20.62
		25	12	20.98	21.18
		25	25	18.79	18.99
		50	0	19.07	19.27
	1905.0	1	0	22.73	22.93
		1	24	20.53	20.73
		1	49	21.01	21.21
		25	0	21.20	21.40
		25	12	20.92	21.12
		25	25	22.30	22.50
		50	0	21.27	21.47
15	1857.5	1	0	22.78	22.98
		1	37	21.34	21.54
		1	74	21.37	21.57

		37	0	21.51	21.71
		37	18	20.75	20.95
		37	38	20.34	20.54
		75	0	21.39	21.59
	1880.0	1	0	21.66	21.86
		1	37	22.49	22.69
		1	74	22.44	22.64
		37	0	20.62	20.82
		37	18	20.49	20.69
		37	38	20.82	21.02
		75	0	22.23	22.43
	1902.5	1	0	21.56	21.76
		1	37	20.15	20.35
		1	74	21.06	21.26
		37	0	19.07	19.27
		37	18	21.48	21.68
		37	38	21.24	21.44
		75	0	20.41	20.61
20	1860.0	1	0	22.02	22.22
		1	49	21.61	21.81
		1	99	21.01	21.21
		50	0	21.72	21.92
		50	25	20.96	21.16
		50	50	19.04	19.24
		100	0	22.03	22.23
	1880.0	1	0	21.55	21.75
		1	49	**23.34**	**23.54**
		1	99	20.86	21.06
		50	0	20.15	20.35
		50	25	19.72	19.92
		50	50	20.50	20.70
		100	0	19.40	19.60
	1900.0	1	0	20.41	20.61
		1	49	20.55	20.75
		1	99	21.31	21.51
		50	0	21.96	22.16
		50	25	20.86	21.06
		50	50	19.38	19.58
		100	0	20.86	21.06

LTE Band4

BW (MHz)	Frequency (MHz)	RB Configuration		Average Power [dBm]	
		Size	Offset	QPSK	16QAM
5	1712.5	1	0	22.39	22.59
		1	12	22.17	22.37
		1	24	23.17	23.37
		12	0	23.25	23.35
		12	6	22.80	23.00
		12	13	22.89	23.09
		25	0	22.87	23.07
	1732.5	1	0	22.54	22.74
		1	12	22.67	22.87
		1	24	21.91	22.11
		12	0	19.33	19.53
		12	6	20.77	20.97
		12	13	21.12	21.32
		25	0	20.51	20.71
	1752.5	1	0	21.21	21.41
		1	12	22.74	22.94
		1	24	21.70	21.90
		12	0	20.11	20.31
		12	6	20.07	20.27
		12	13	20.34	20.54
		25	0	21.92	22.12
10	1715.0	1	0	21.72	21.92
		1	24	22.30	22.50
		1	49	**23.68**	**23.88**
		25	0	22.37	22.57
		25	12	20.75	20.95
		25	25	21.79	21.99
		50	0	22.39	22.59
	1732.5	1	0	21.35	21.55
		1	24	21.90	22.10
		1	49	20.79	20.99
		25	0	21.82	22.02
		25	12	21.72	21.92
		25	25	20.68	20.88
		50	0	21.32	21.52
	1750.0	1	0	21.85	22.05
		1	24	22.04	22.24
		1	49	22.40	22.60
		25	0	19.64	19.84
		25	12	21.02	21.22
		25	25	20.03	20.23
		50	0	19.20	19.40
15	1717.5	1	0	22.69	22.89
		1	37	22.76	22.96
		1	74	21.58	21.78

		37	0	21.89	22.09
		37	18	21.83	22.03
		37	38	23.07	23.27
		75	0	21.83	22.03
	1732.5	1	0	23.64	23.84
		1	37	22.71	22.91
		1	74	21.59	21.79
		37	0	22.19	22.39
		37	18	21.28	21.48
		37	38	20.18	20.38
		75	0	20.29	20.49
	1747.5	1	0	22.67	22.87
		1	37	22.37	22.57
		1	74	21.53	21.73
		37	0	20.98	21.18
		37	18	20.11	20.31
		37	38	20.80	21.00
		75	0	21.28	21.48
20	1720.0	1	0	22.95	23.15
		1	49	23.10	23.30
		1	99	23.50	23.70
		50	0	23.10	23.30
		50	25	22.15	22.35
		50	50	21.55	21.75
		100	0	22.07	22.27
	1732.5	1	0	22.21	22.41
		1	49	23.50	23.70
		1	99	19.77	19.97
		50	0	21.18	21.38
		50	25	20.22	20.42
		50	50	20.31	20.51
		100	0	19.92	20.12
	1745.0	1	0	21.08	21.28
		1	49	22.14	22.34
		1	99	21.10	21.30
		50	0	20.67	20.87
		50	25	21.12	21.32
		50	50	19.66	19.86
		100	0	22.95	23.15

LTE Band5

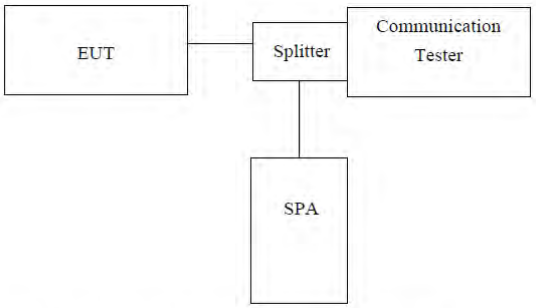
BW (MHz)	Frequency (MHz)	RB Configuration		Average Power [dBm]	
		Size	Offset	QPSK	16QAM
5	826.5	1	0	22.47	21.43
		1	12	22.26	21.02
		1	24	23.04	22.65
		12	0	22.93	22.64
		12	6	21.48	20.28
		12	13	21.63	20.54
		25	0	23.36	22.61
	836.5	1	0	22.12	20.89
		1	12	21.37	20.59
		1	24	22.14	21.30
		12	0	20.55	19.67
		12	6	22.75	22.18
		12	13	22.13	21.29
		25	0	20.92	19.81
	846.5	1	0	20.07	19.04
		1	12	20.92	20.52
		1	24	22.25	21.74
		12	0	20.49	19.24
		12	6	21.86	20.99
		12	13	20.69	20.20
		25	0	22.47	21.43
10	829.0	1	0	22.81	22.03
		1	24	22.45	21.89
		1	49	22.62	21.66
		25	0	22.59	22.12
		25	12	22.75	21.74
		25	25	23.09	23.40
		50	0	23.14	**23.47**
	836.5	1	0	**23.54**	22.86
		1	24	23.47	23.21
		1	49	21.89	21.56
		25	0	22.43	21.24
		25	12	21.30	20.44
		25	25	22.08	20.86
		50	0	20.86	19.87
	844.0	1	0	22.19	21.81
		1	24	21.73	20.48
		1	49	22.16	21.80
		25	0	20.59	19.94
		25	12	22.34	21.94
		25	25	22.40	21.33
		50	0	21.30	20.68

LTE Band7

BW (MHz)	Frequency (MHz)	RB Configuration		Average Power [dBm]	
		Size	Offset	QPSK	16QAM
5	2502.5	1	0	21.92	20.68
		1	12	22.51	21.47
		1	24	21.68	20.81
		12	0	23.26	22.42
		12	6	23.10	**23.59**
		12	13	23.14	22.86
		25	0	23.24	22.67
	2535.0	1	0	23.39	22.64
		1	12	22.97	22.29
		1	24	21.26	20.47
		12	0	22.39	21.51
		12	6	21.30	20.80
		12	13	22.50	21.89
		25	0	21.52	20.65
	2567.5	1	0	20.80	19.62
		1	12	21.29	20.38
		1	24	19.88	18.99
		12	0	21.42	20.88
		12	6	22.36	21.87
		12	13	20.56	19.56
		25	0	22.08	21.71
10	2505.0	1	0	23.00	22.15
		1	24	22.38	21.63
		1	49	22.27	21.59
		25	0	23.34	22.11
		25	12	23.60	22.45
		25	25	23.00	22.65
		50	0	23.46	22.33
	2535.0	1	0	23.11	22.85
		1	24	23.04	22.50
		1	49	22.96	22.51
		25	0	22.68	21.82
		25	12	21.75	21.29
		25	25	21.41	21.10
		50	0	21.94	20.99
	2565.0	1	0	23.15	22.89
		1	24	22.44	21.83
		1	49	21.90	21.38
		25	0	21.72	20.76
		25	12	22.00	21.50
		25	25	22.75	22.15
		50	0	20.83	19.70
15	2507.5	1	0	21.36	20.30
		1	37	22.04	20.90
		1	74	22.85	22.51

		37	0	22.83	22.14
		37	18	21.82	21.07
		37	38	22.27	21.61
		75	0	22.67	22.15
	2535.0	1	0	22.37	21.85
		1	37	22.79	22.51
		1	74	20.18	19.66
		37	0	21.91	21.37
		37	18	21.34	20.63
		37	38	21.46	20.68
		75	0	21.74	21.44
	2562.5	1	0	22.33	21.73
		1	37	21.89	21.58
		1	74	20.57	19.33
		37	0	21.03	20.21
		37	18	23.11	22.57
		37	38	21.05	20.10
		75	0	20.16	19.38
20	2510.0	1	0	23.40	23.06
		1	49	22.51	21.53
		1	99	22.54	21.62
		50	0	22.28	21.21
		50	25	**23.73**	23.45
		50	50	21.87	20.73
		100	0	22.27	21.18
	2535.0	1	0	21.73	20.74
		1	49	21.98	21.25
		1	99	22.20	21.91
		50	0	20.31	19.37
		50	25	21.10	20.18
		50	50	21.75	21.03
		100	0	21.55	20.66
	2560	1	0	22.11	21.69
		1	49	22.05	21.68
		1	99	21.80	21.43
		50	0	21.42	21.09
		50	25	21.68	21.14
		50	50	20.14	19.11
		100	0	23.40	23.06

4.4 Peak-to-Average Ratio

Test Requirement:	Part 22.913(d), FCC part24.232(d) and FCC part27.50(d)(5)
Test Method:	ANSI C63.26:2015
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	5.57	13	PASS
LTE Band 2 Middle channel/20MHz/16-QAM	5.56	13	PASS
LTE Band 4 Middle channel/20MHz/QPSK	5.22	13	PASS
LTE Band 4 Middle channel/20MHz/16-QAM	5.81	13	PASS
LTE Band 5 Middle channel/10MHz/QPSK	5.68	13	PASS
LTE Band 5 Middle channel/10MHz/16-QAM	6.39	13	PASS
LTE Band 7 Middle channel/20MHz/QPSK	5.32	13	PASS
LTE Band 7 Middle channel/20MHz/16-QAM	6.43	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

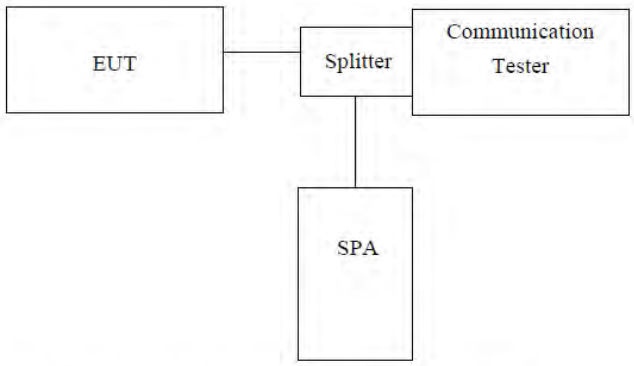
Test Mode: LTE Band 5
Middle channel/10MHz/QPSK

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 part22.913(a), FCC part24.232(b) and FCC part27.53(a)
Test Method:	ANSI C63.26:2015
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	4510.9	4972
		16-QAM	25	0	4507.7	4949
	10MHz	QPSK	50	0	9087.6	10050
		16-QAM	50	0	9099.6	10100
	15MHz	QPSK	75	0	13533	15030
		16-QAM	75	0	13505	14830
	20MHz	QPSK	100	0	17962	19610
		16-QAM	100	0	17998	19480

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	4499.1	4971
		16-QAM	25	0	4505.6	4978
	10MHz	QPSK	50	0	9053.3	9948
		16-QAM	50	0	9059.8	9965
	15MHz	QPSK	75	0	13520	15070
		16-QAM	75	0	13469	14950
	20MHz	QPSK	100	0	17941	19530
		16-QAM	100	0	17927	19380

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	4523.9	4922
		16-QAM	25	0	4508.2	4945
	10MHz	QPSK	50	0	9078.0	9984
		16-QAM	50	0	9048.5	9998

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	4500.5	4934
		16-QAM	25	0	4511.8	4952
	10MHz	QPSK	50	0	9059.2	10010
		16-QAM	50	0	9050.2	10030
	15MHz	QPSK	75	0	13470	15070
		16-QAM	75	0	13538	14810
	20MHz	QPSK	100	0	17929	19570
		16-QAM	100	0	17885	19480

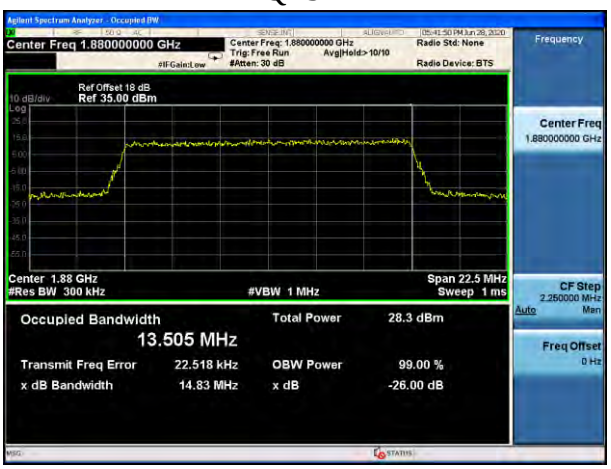
Test plot as follows:

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	Test Mode: LTE Band 2 Channel Bandwidth: 20MHz

QPSK

QPSK



16-QAM

16-QAM

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

QPSK

QPSK

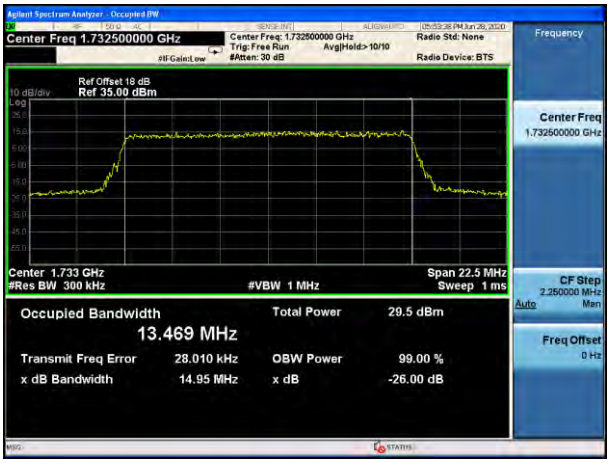
16-QAM

16-QAM

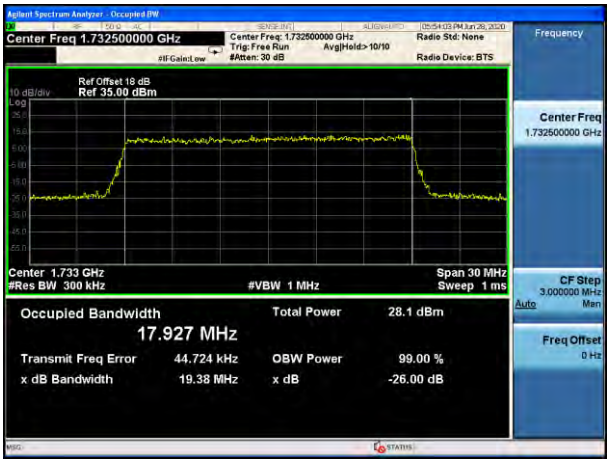
Test Mode: LTE Band 4 Channel Bandwidth: 15MHz	Test Mode: LTE Band 4 Channel Bandwidth: 20MHz

QPSK

QPSK

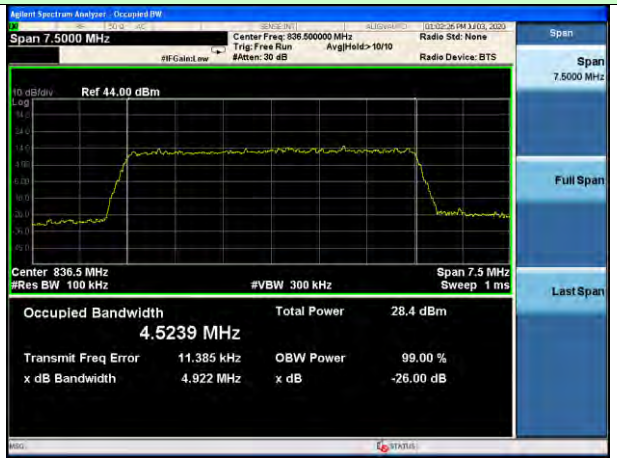


16-QAM



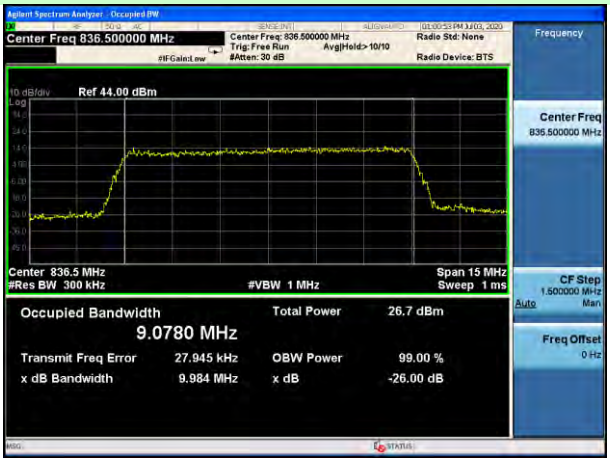
16-QAM

Test Mode: LTE Band 5
Channel Bandwidth: 5MHz

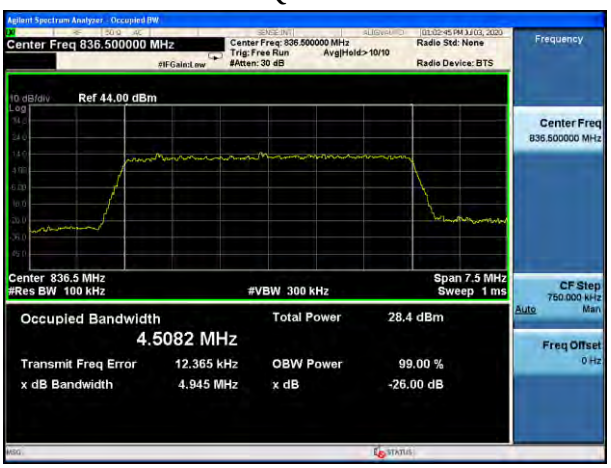


QPSK

Test Mode: LTE Band 5
Channel Bandwidth: 10MHz



QPSK



16-QAM

16-QAM

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

QPSK

QPSK

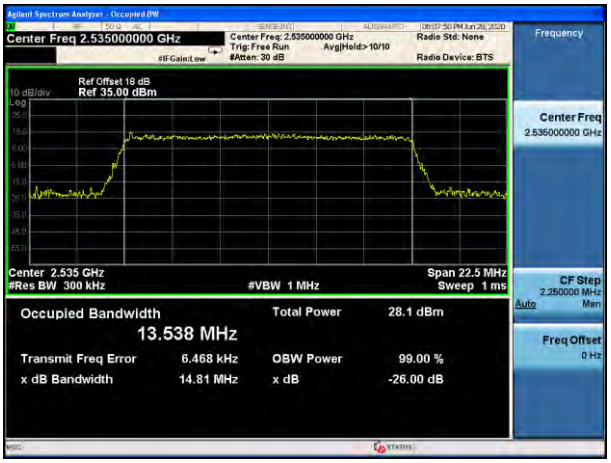
16-QAM

16-QAM

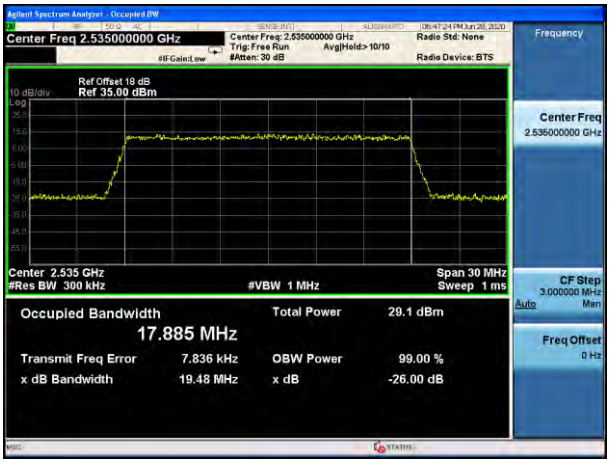
Test Mode: LTE Band 7 Channel Bandwidth: 15MHz	Test Mode: LTE Band 7 Channel Bandwidth: 20MHz

QPSK

QPSK



16-QAM



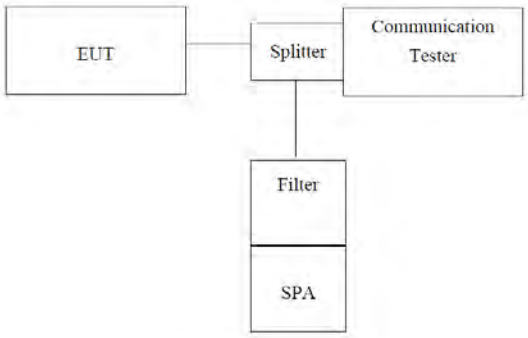
16-QAM

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

4.6 MODULATION CHARACTERISTIC

According to FCC §2.1047(d), Part 24E & Part 27 there is no specific requirement for digital modulation, therefore modulation characteristic is not presented.

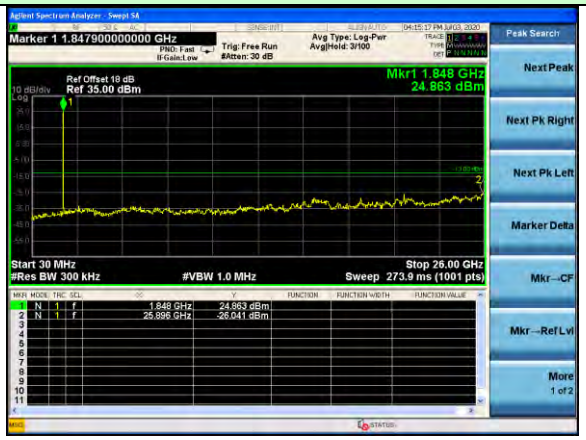
4.7 Out of band emission at antenna terminals

Test Requirement:	FCC part22.913(a), FCC part24.238(a) and FCC part27.53(h)
Test Method:	ANSI C63.26:2015
Limit:	-13dBm Band 7: -26dBm
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

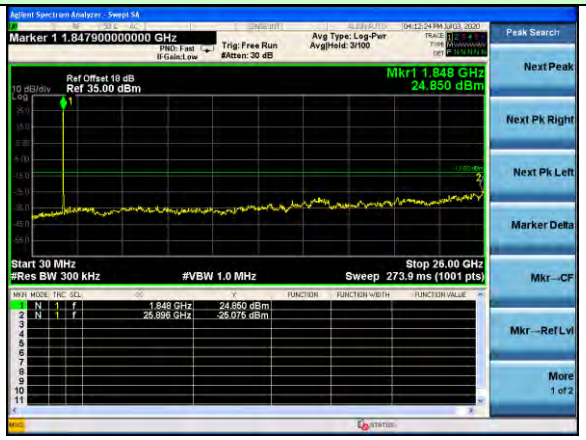


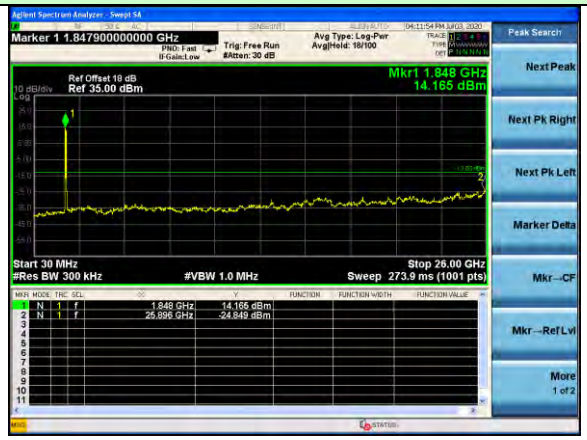
Lowest channel

Middle channel

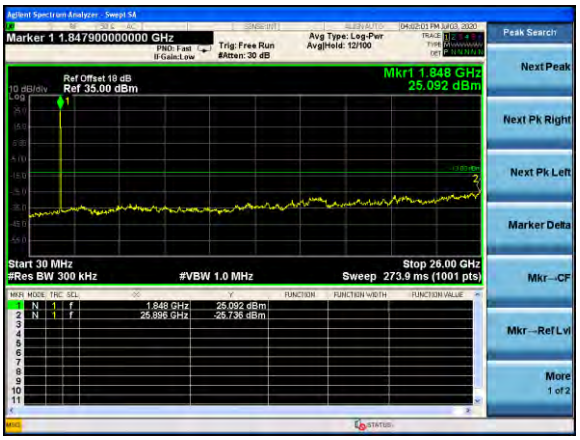
Highest channel

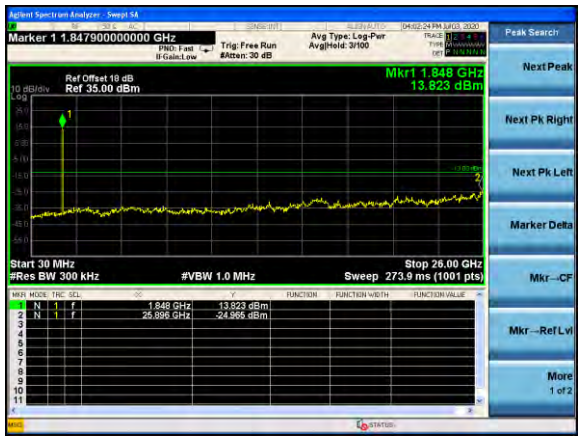
Test Mode: LTE Band 2 / 10MHz /1RB	Test Mode: LTE Band 2 / 10MHz /50RB



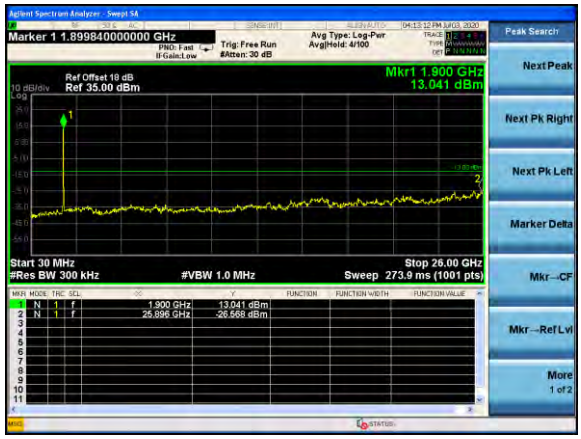


Lowest channel



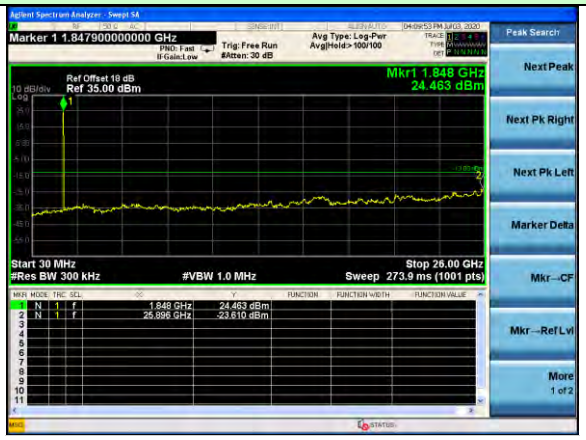


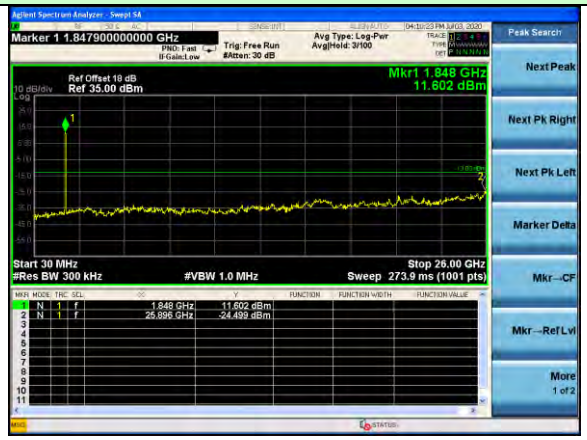
Middle channel



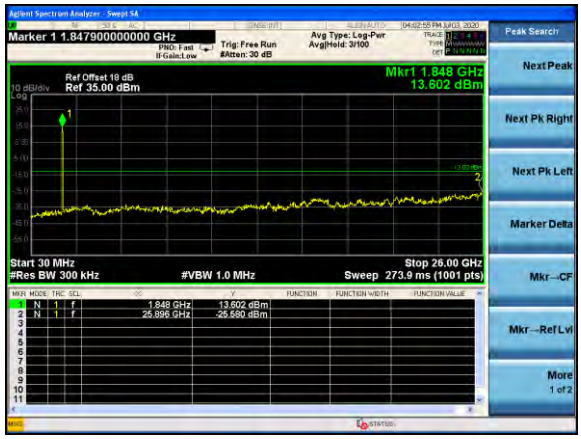
Highest channel

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

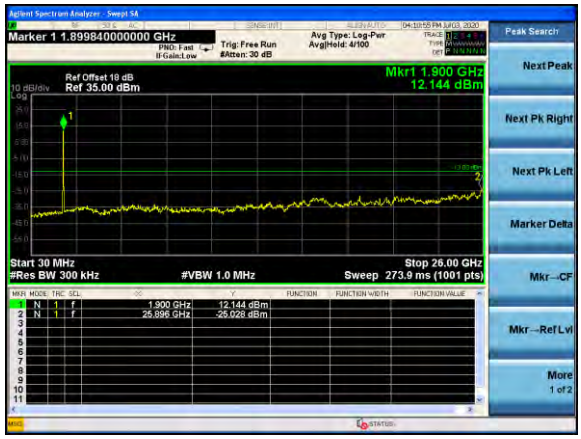




Lowest channel

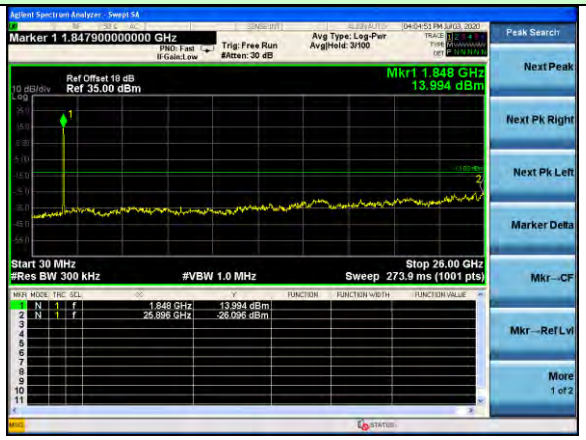


Middle channel

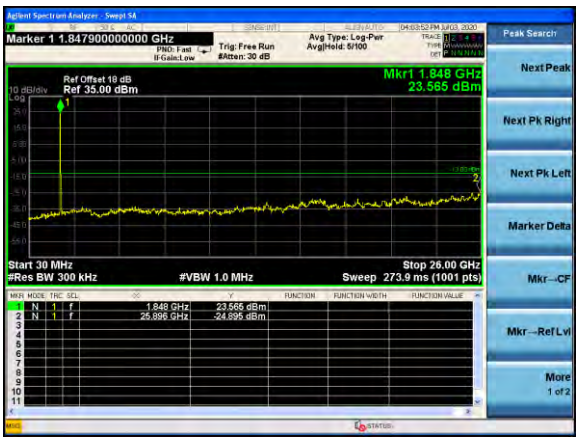


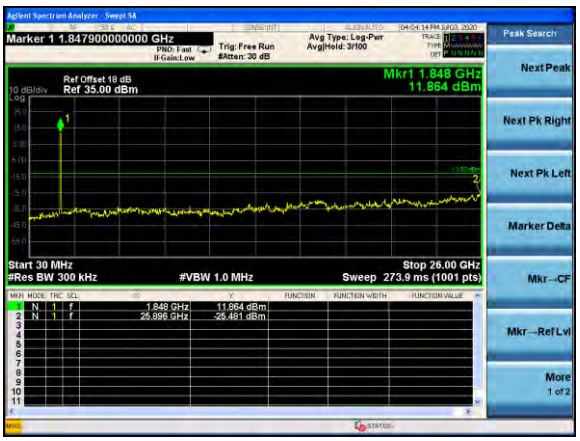
Highest channel

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

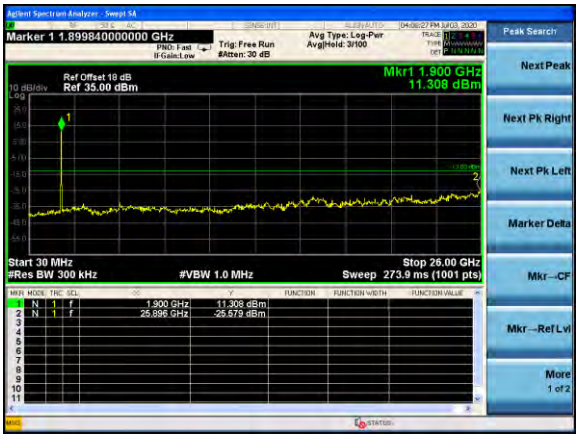


Lowest channel



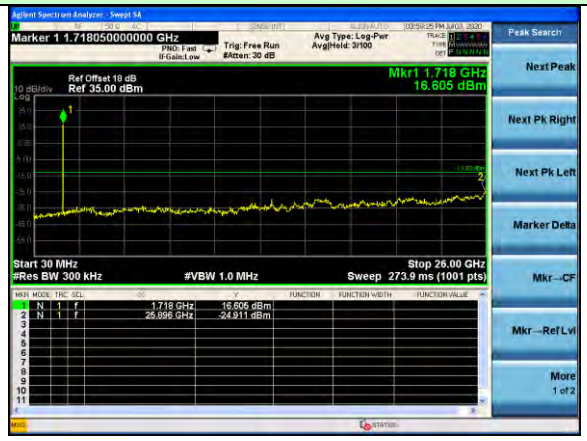


Middle channel

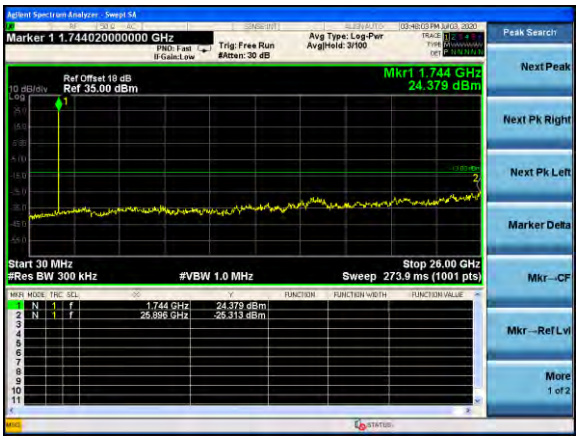


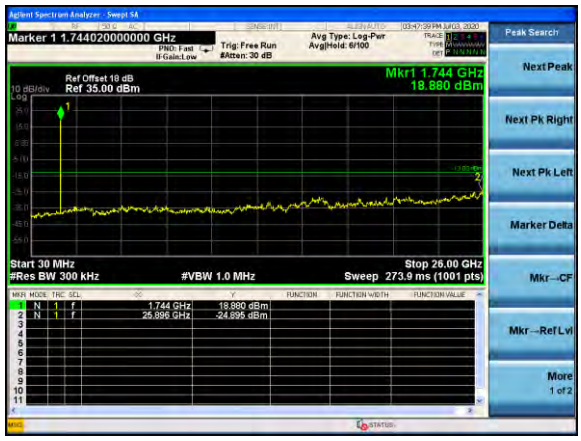
Highest channel

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

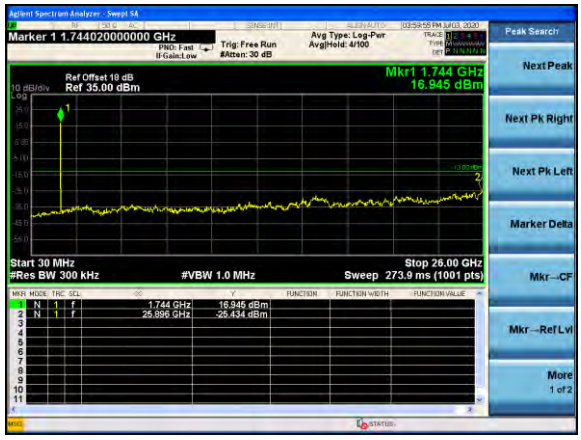


Lowest channel



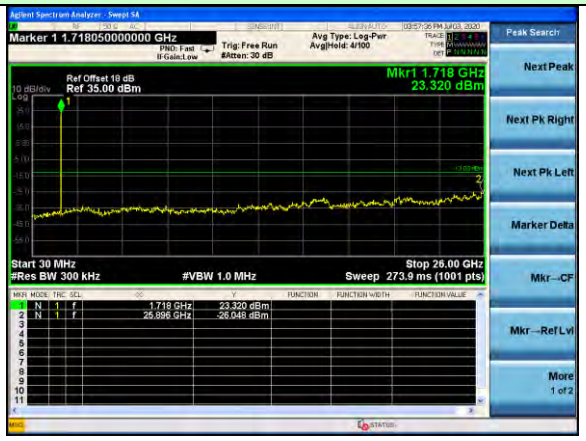


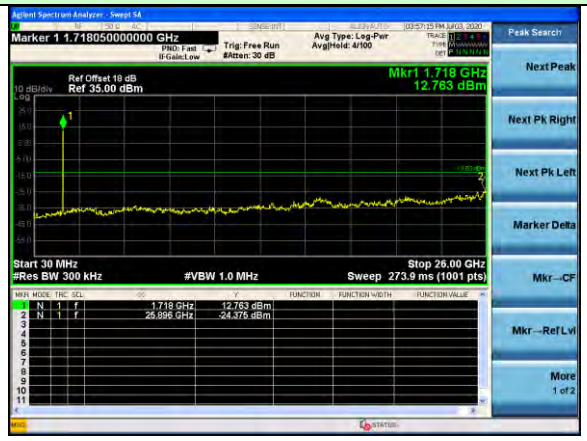
Middle channel



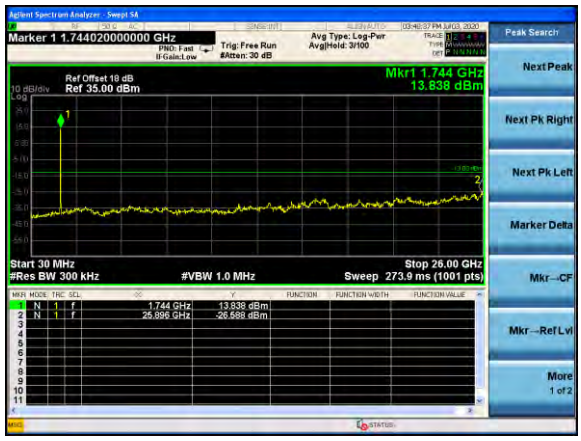
Highest channel

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

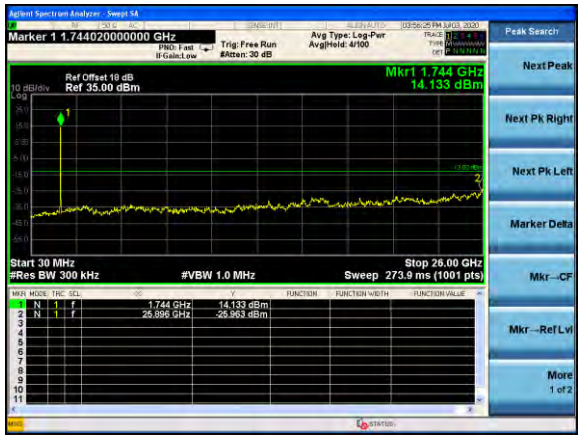




Lowest channel

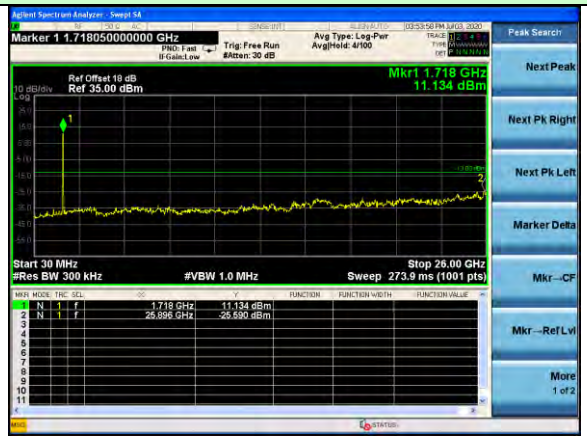


Middle channel

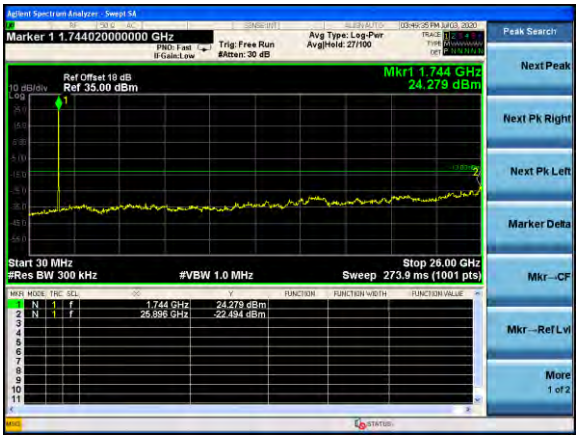


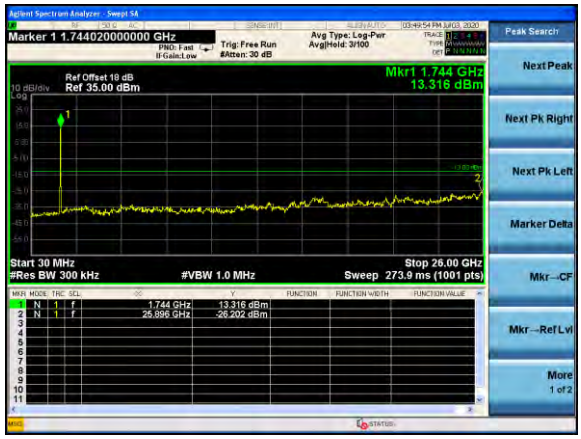
Highest channel

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

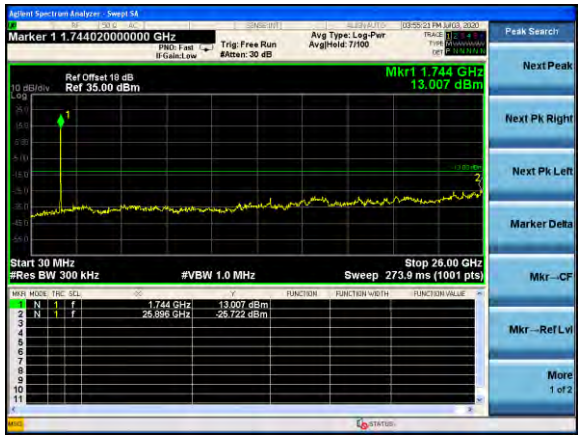


Lowest channel



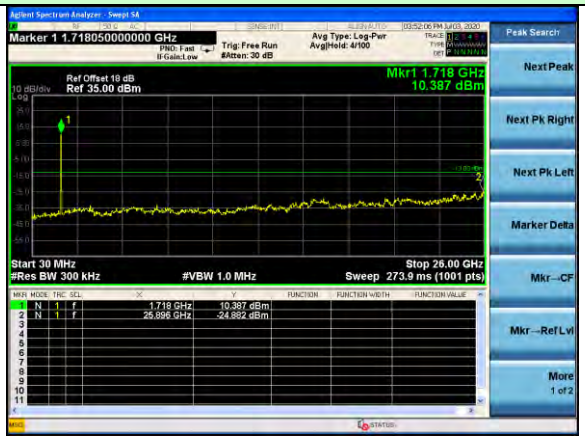


Middle channel

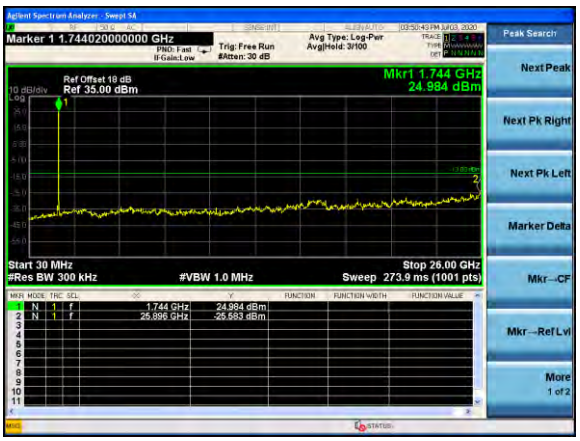


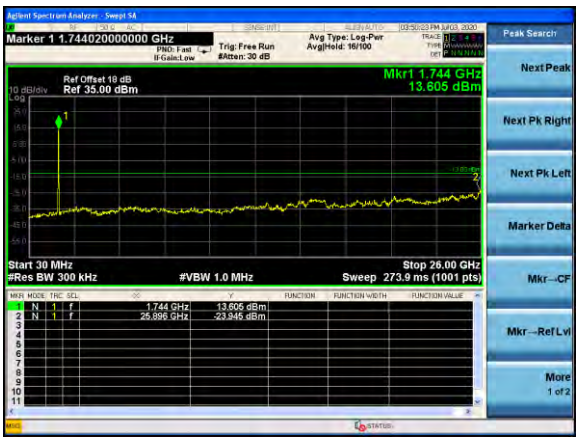
Highest channel

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

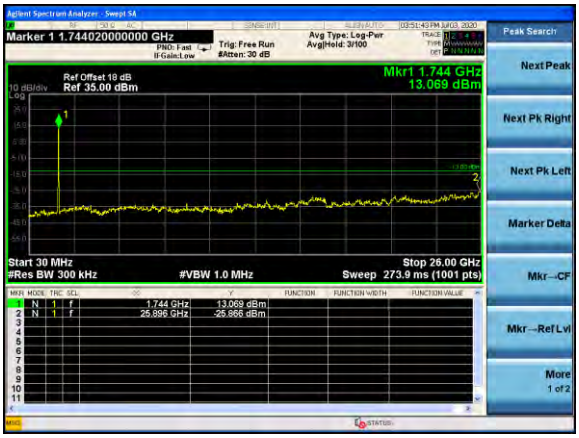


Lowest channel



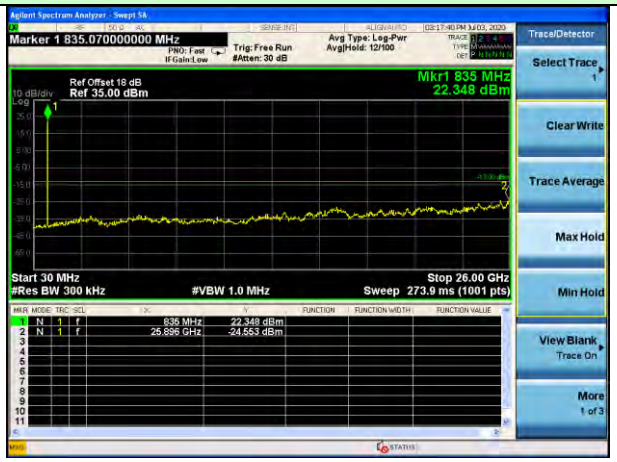


Middle channel

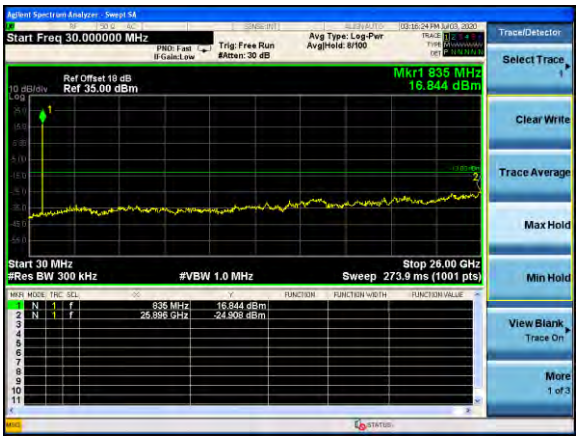


Highest channel

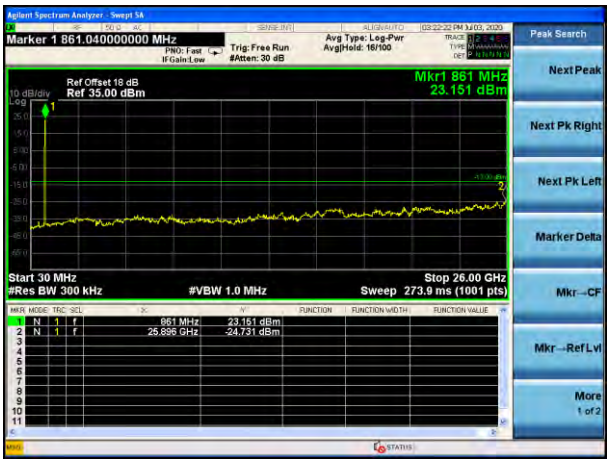
Test Mode: LTE Band 5/ 5MHz /1RB	Test Mode: LTE Band 5 / 5MHz /25RB

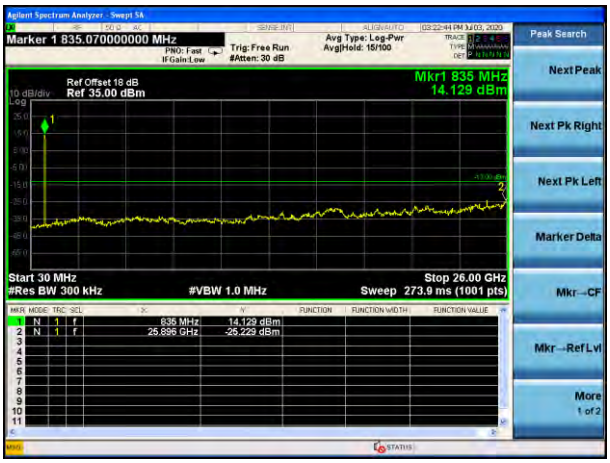


Lowest channel



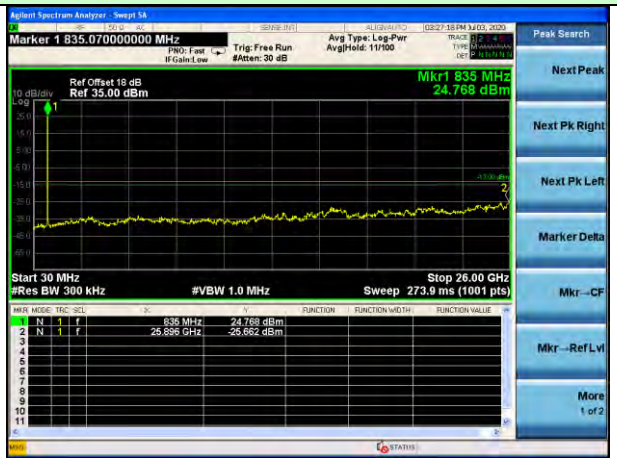
Middle channel

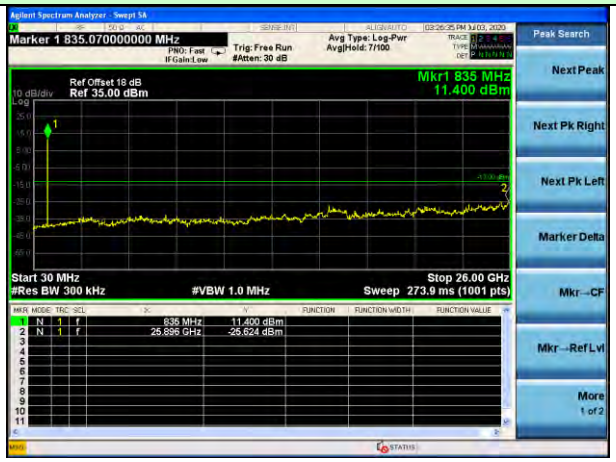




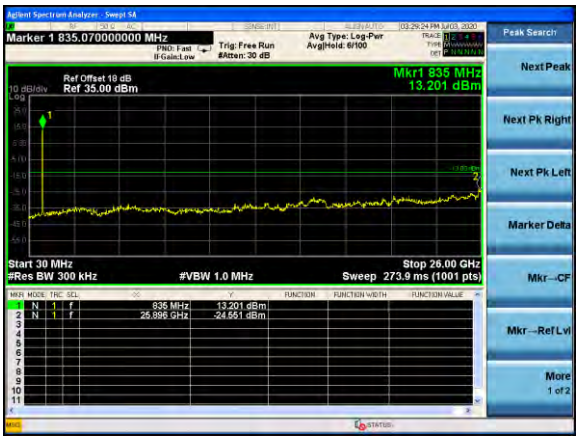
Highest channel

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

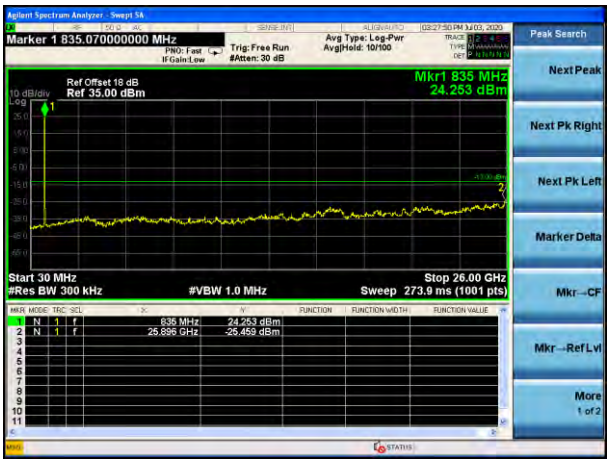


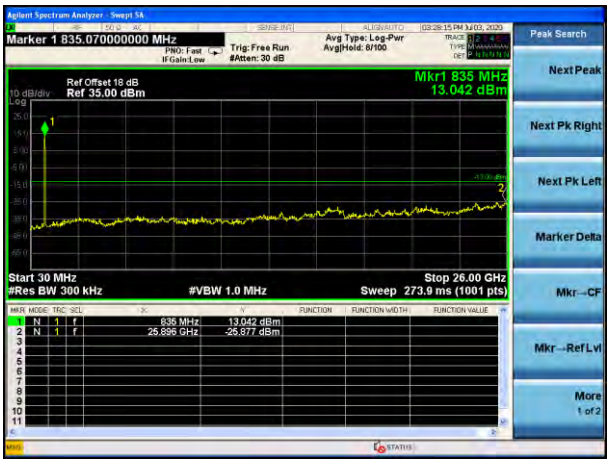


Lowest channel



Middle channel

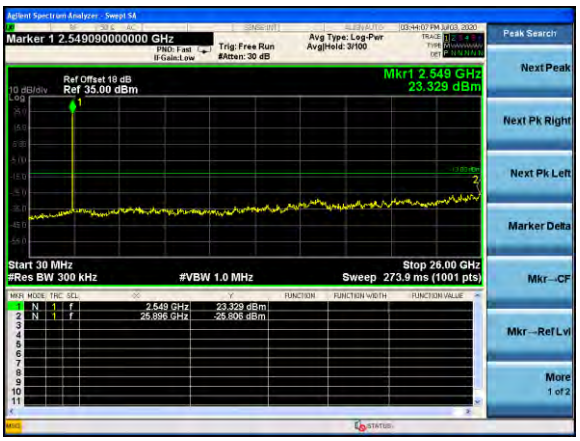




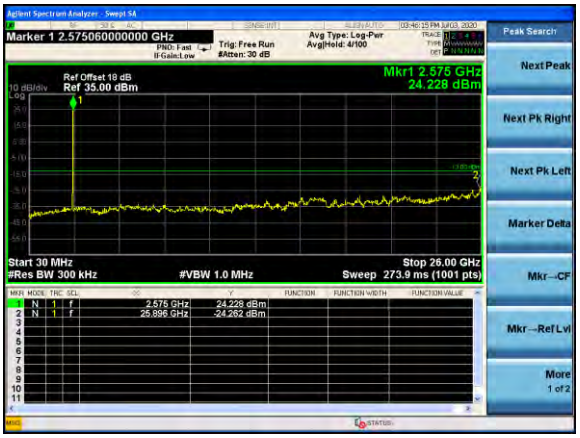
Highest channel

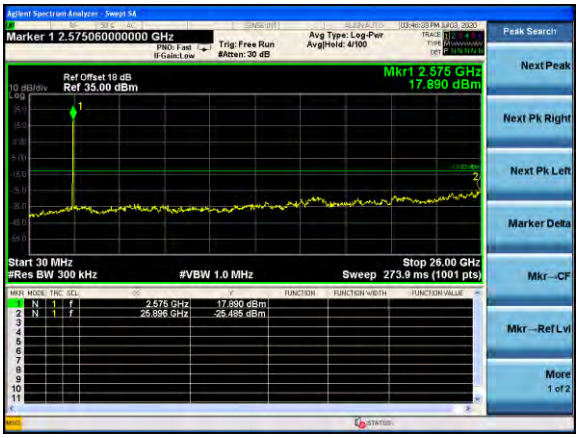
Test Mode: LTE Band 7 / 5MHz /1RB	Test Mode: LTE Band 7 / 5MHz /25RB

Lowest channel



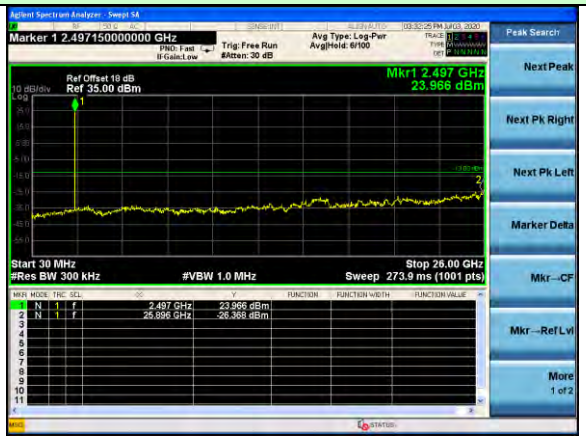
Middle channel

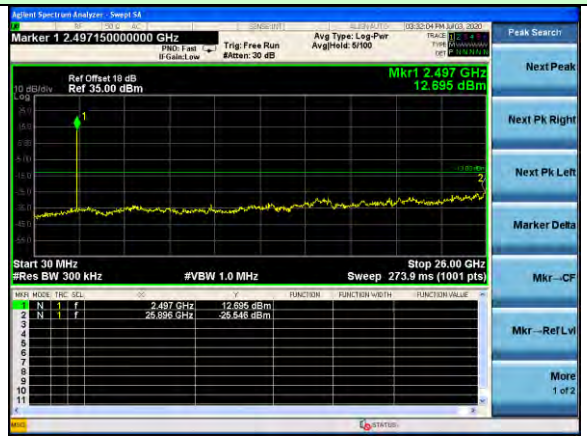




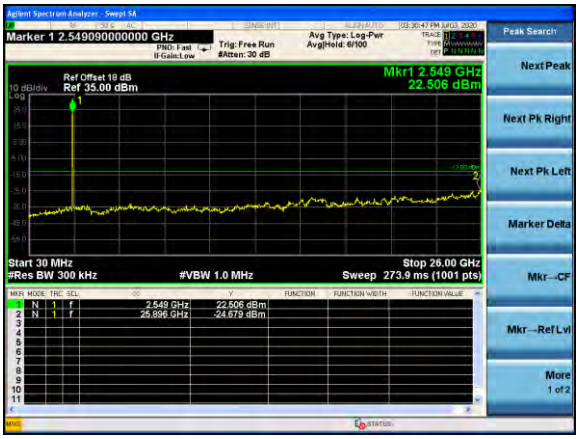
Highest channel

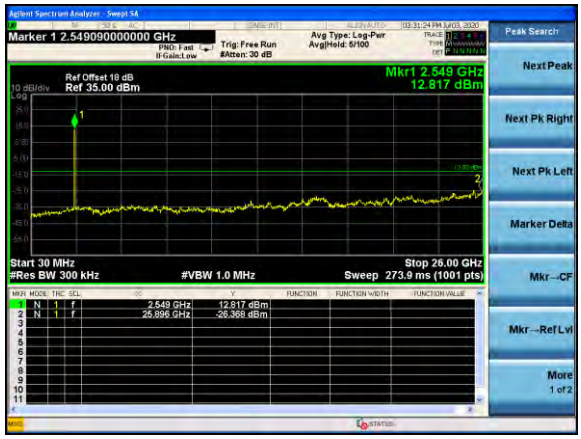
Test Mode: LTE Band 7 / 10MHz /1RB	Test Mode: LTE Band 7 / 10MHz /50RB



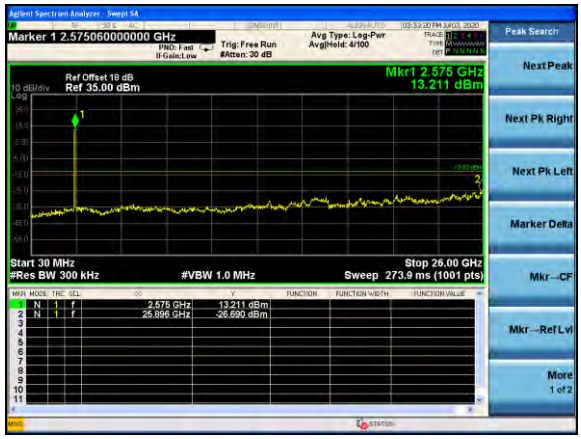


Lowest channel



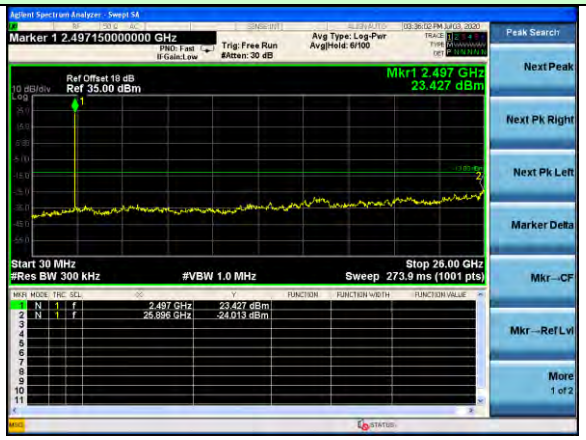


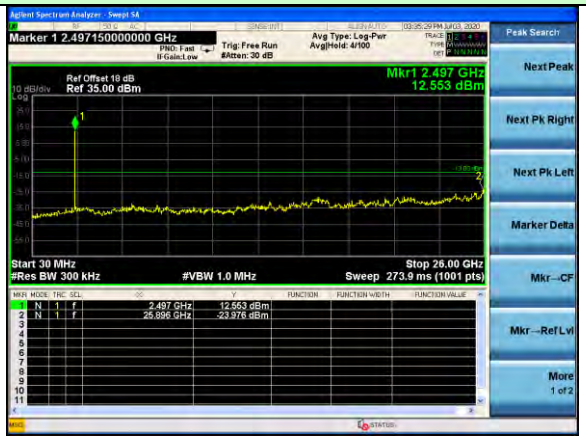
Middle channel



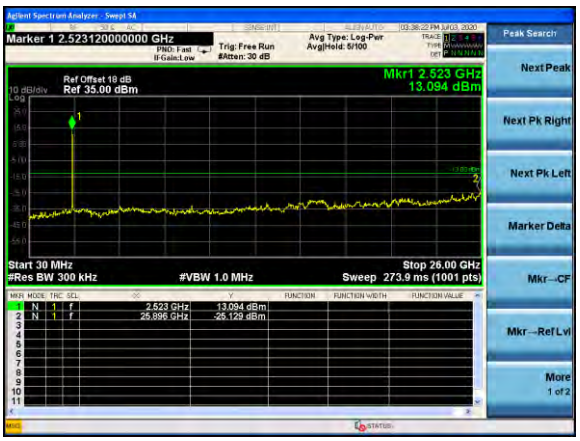
Highest channel

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

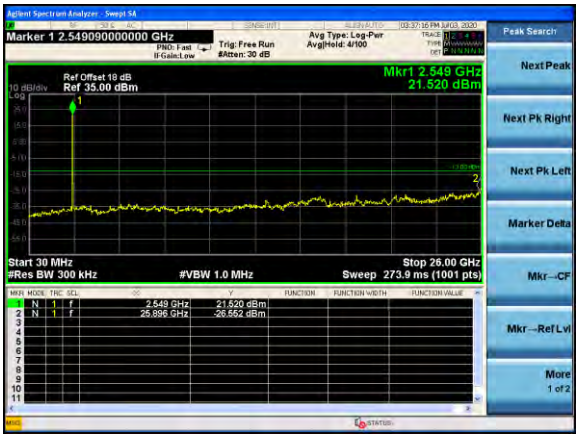




Lowest channel

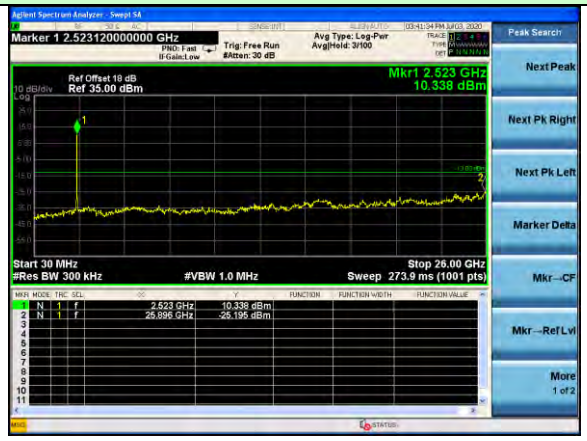


Middle channel

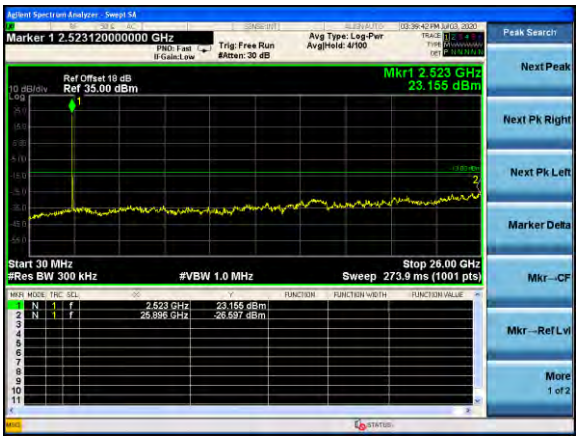


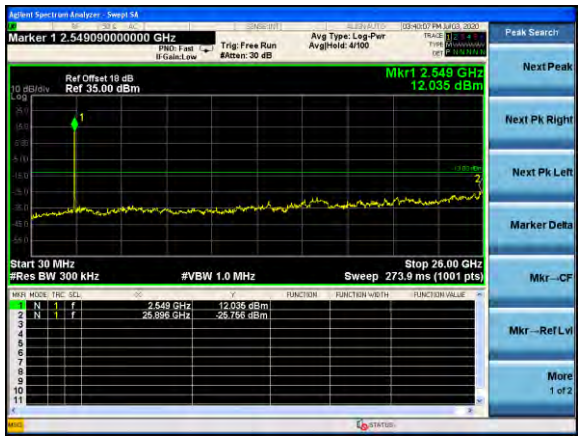
Highest channel

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

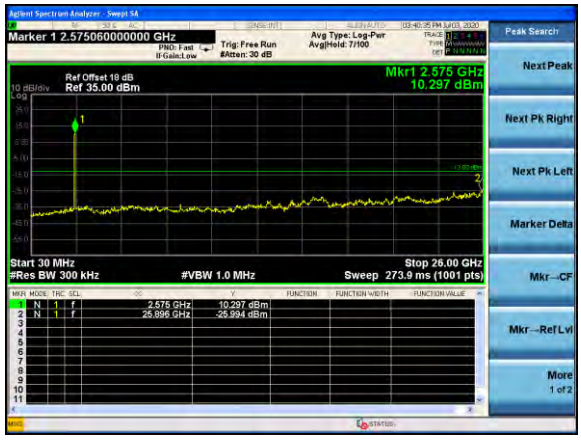


Lowest channel





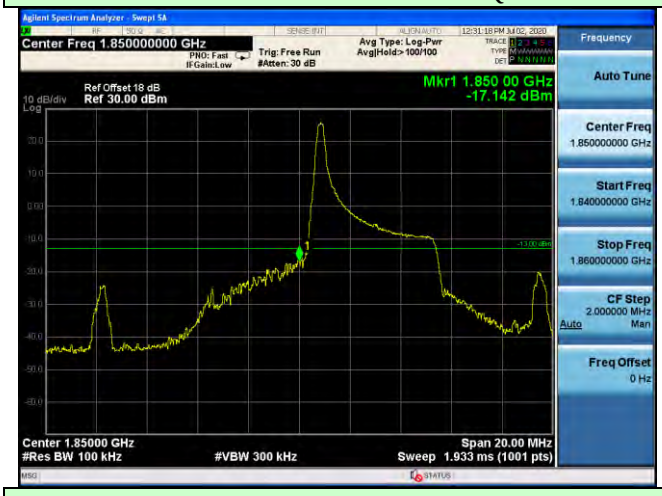
Middle channel



Highest channel

Band Edge

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



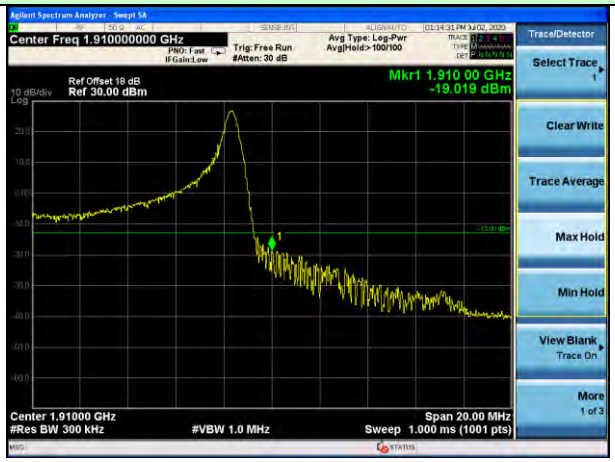
Test Mode: LTE Band 2 / 5MHz / 25RB / QPSK

Lowest channel

Highest channel

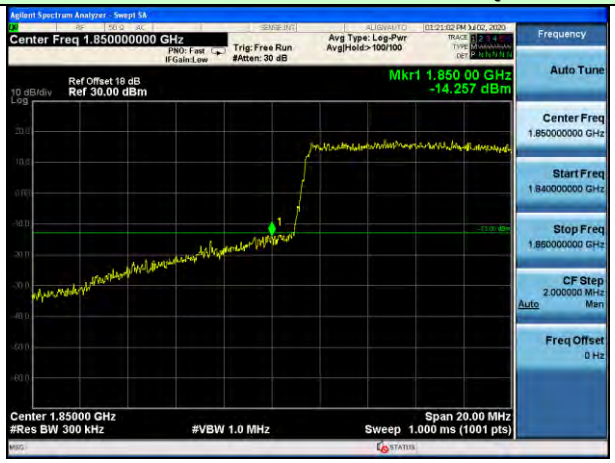
Test Mode: LTE Band 2 / 10MHz / 1RB / QPSK

Lowest channel



Highest channel

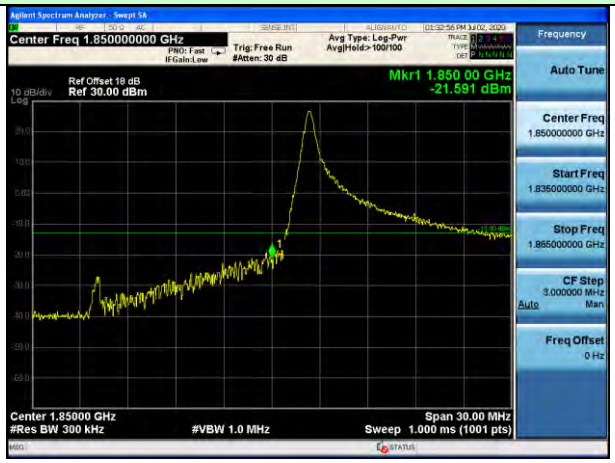
Test Mode: LTE Band 2 / 10MHz / 50RB / QPSK



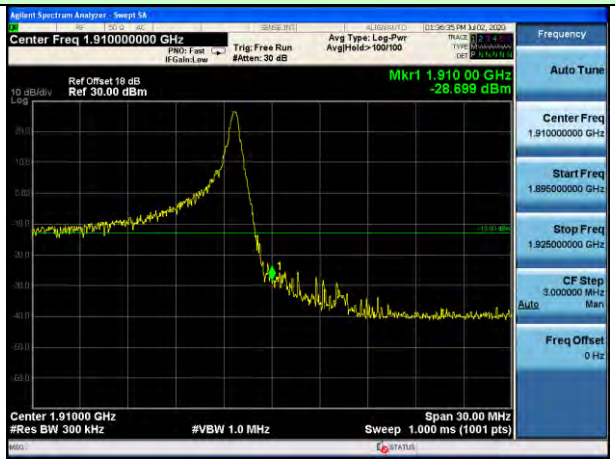
Lowest channel

Highest channel

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



Lowest channel



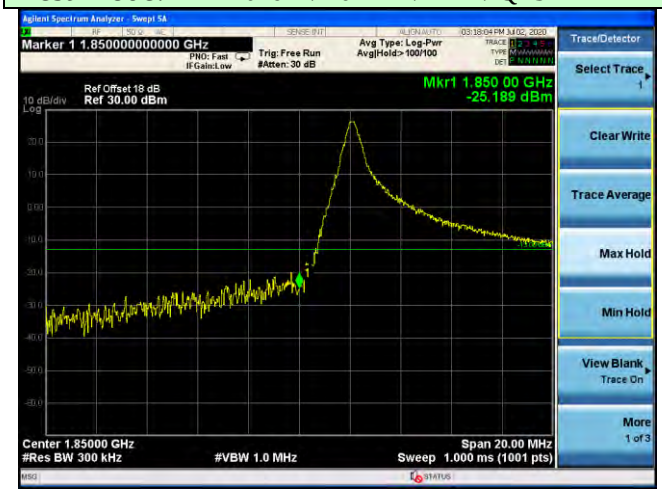
Highest channel

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

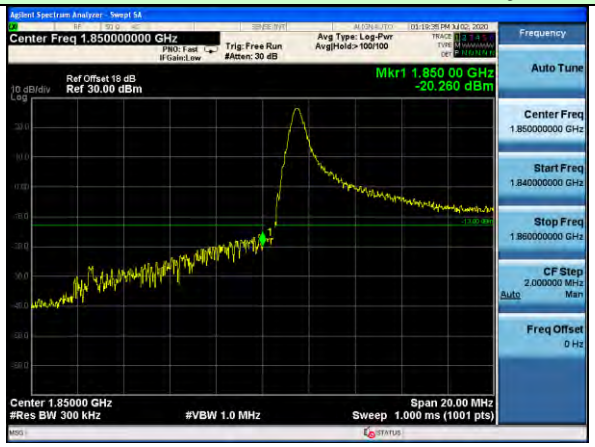
Highest channel

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

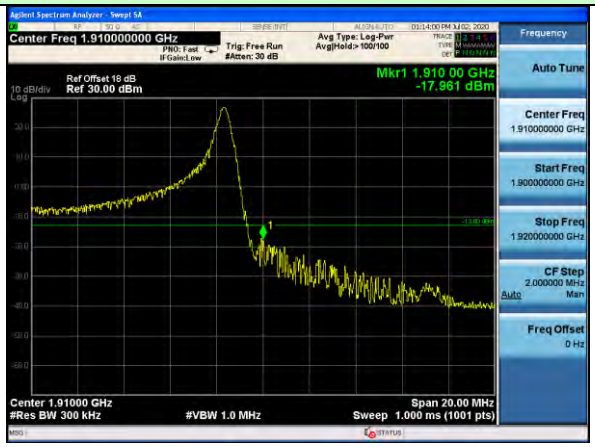
Lowest channel

Highest channel

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

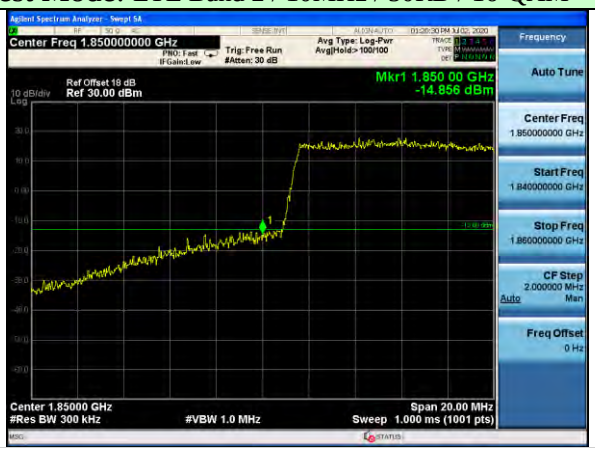


Lowest channel



Highest channel

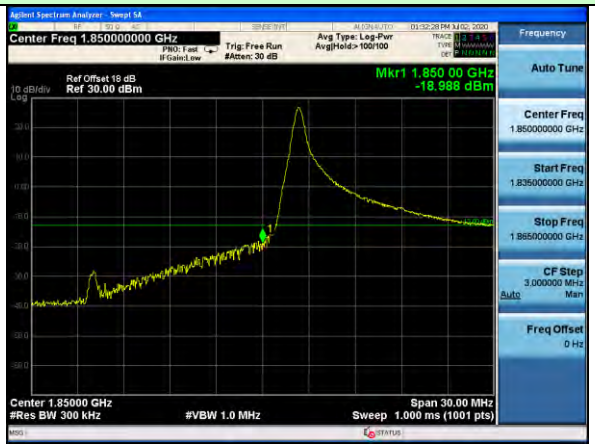
Test Mode: LTE Band 2 / 10MHz / 50RB / 16-QAM



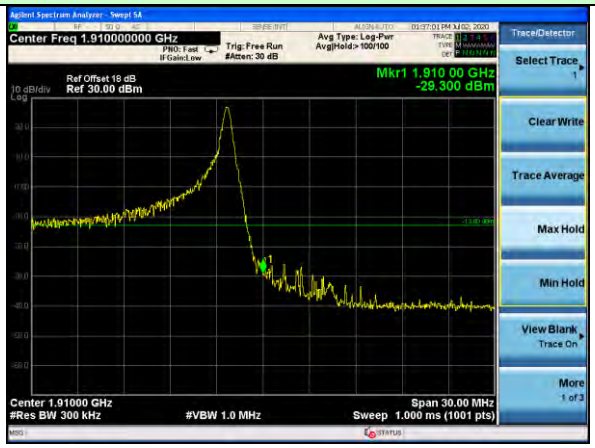
Lowest channel

Highest channel

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



Lowest channel



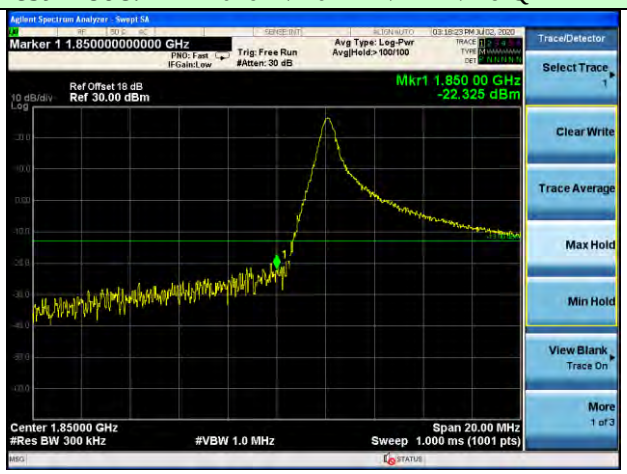
Highest channel

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

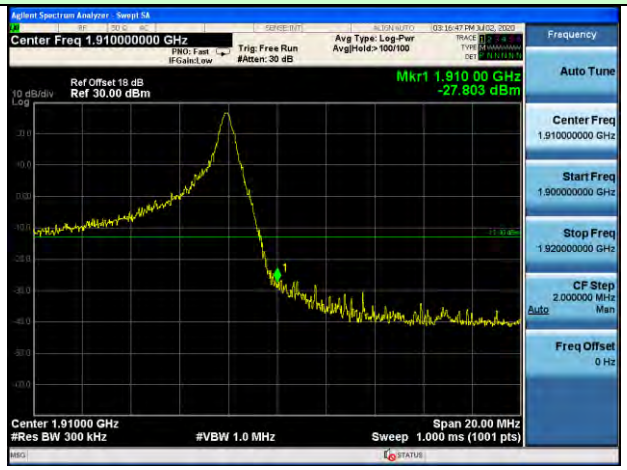
Lowest channel

Highest channel

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

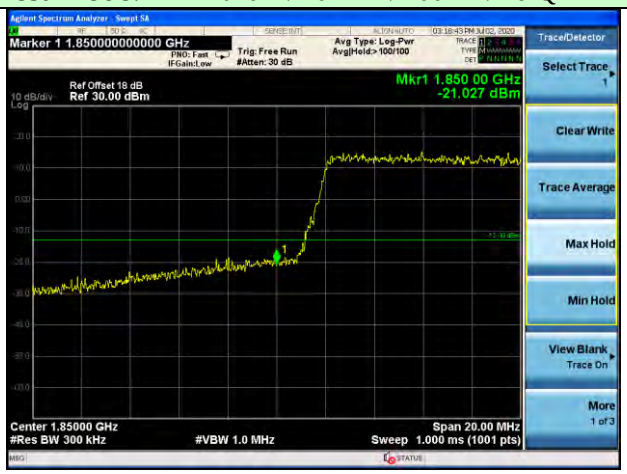


Lowest channel



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

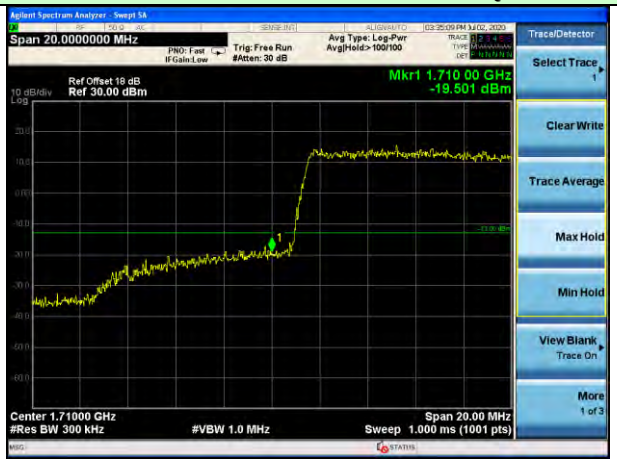
Highest channel

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

Lowest channel

Highest channel

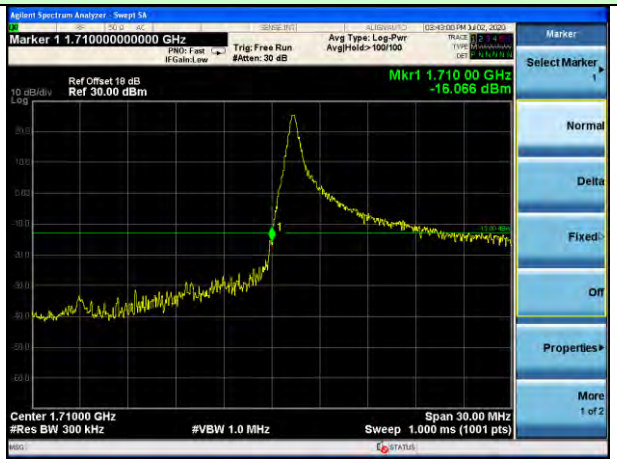
Test Mode: LTE Band 4 / 10MHz / 50RB / QPSK



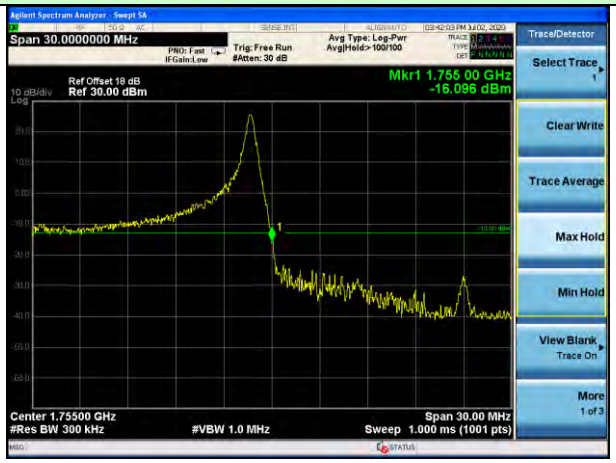
Lowest channel

Highest channel

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

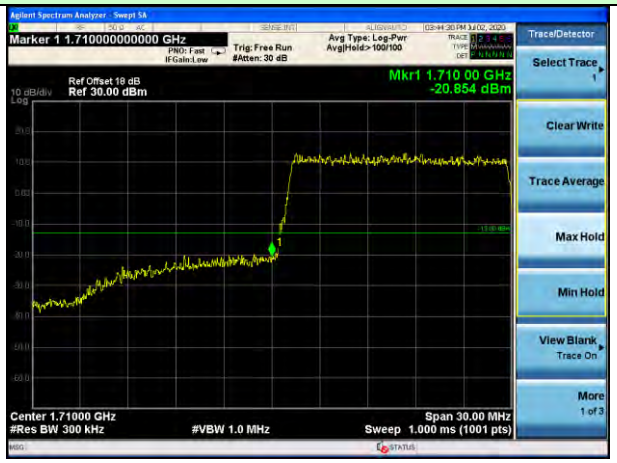


Lowest channel



Highest channel

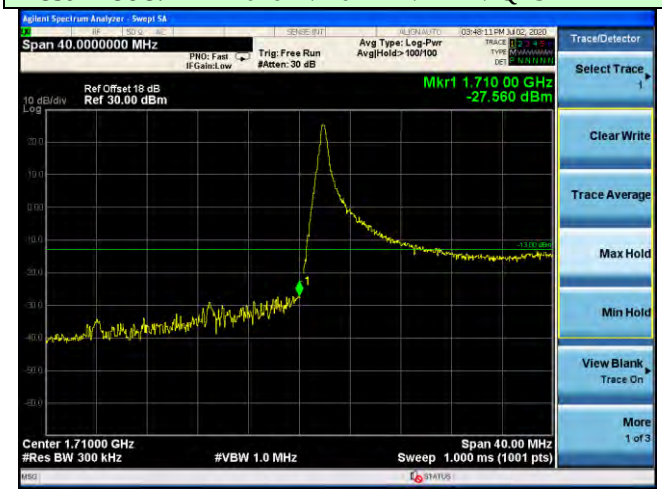
Test Mode: LTE Band 4 / 15MHz / 75RB / QPSK



Lowest channel

Highest channel

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



Lowest channel

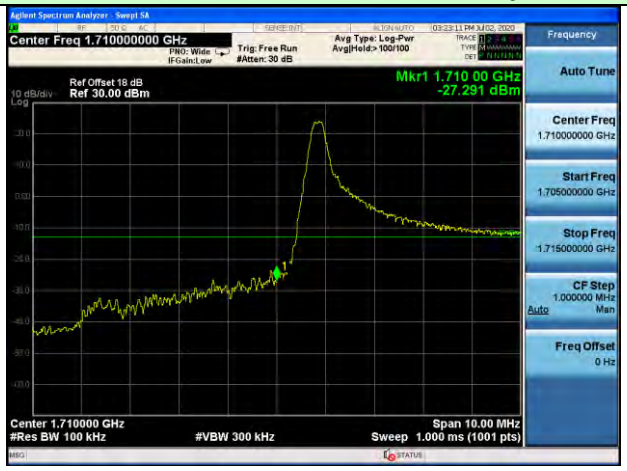
Highest channel

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

Lowest channel

Highest channel

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



Lowest channel

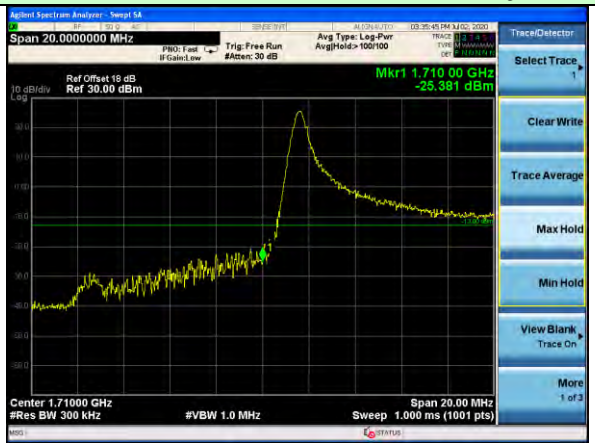
Highest channel

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

Lowest channel

Highest channel

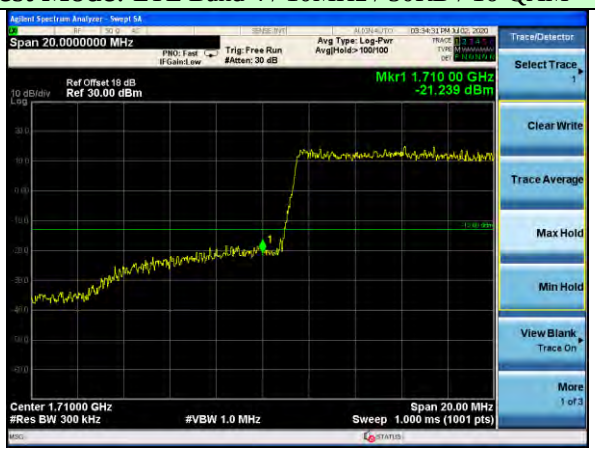
Test Mode: LTE Band 4 / 10MHz / 1RB / 16-QAM



Lowest channel

Highest channel

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

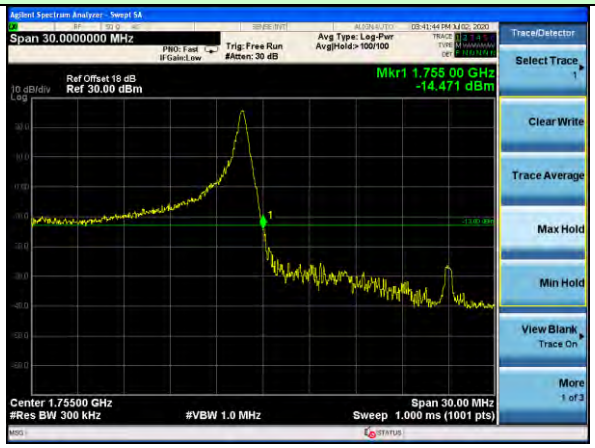


Lowest channel

Highest channel

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

Lowest channel



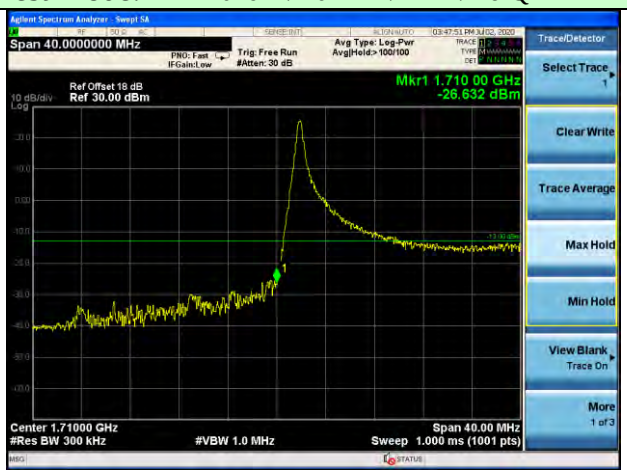
Highest channel

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

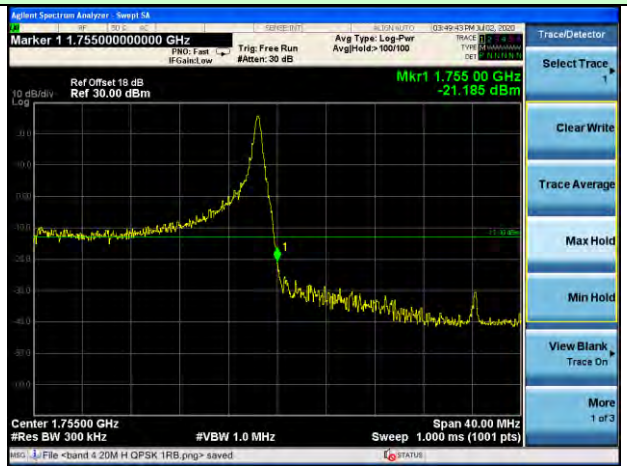
Lowest channel

Highest channel

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



Lowest channel



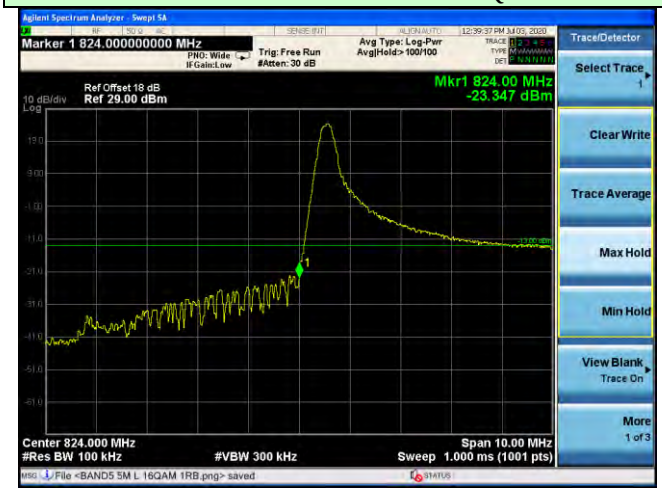
Highest channel

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

Lowest channel

Highest channel

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



Lowest channel

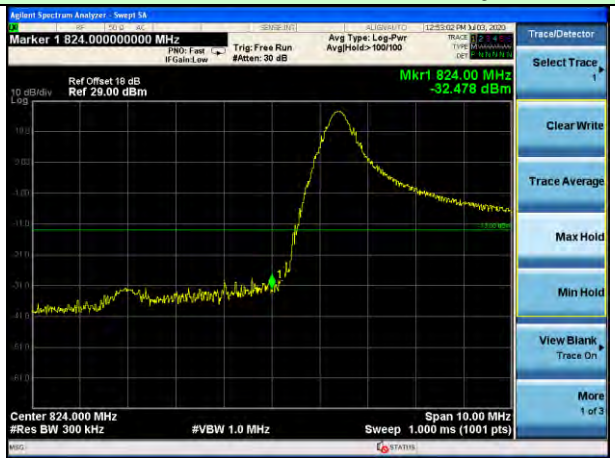
Highest channel

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

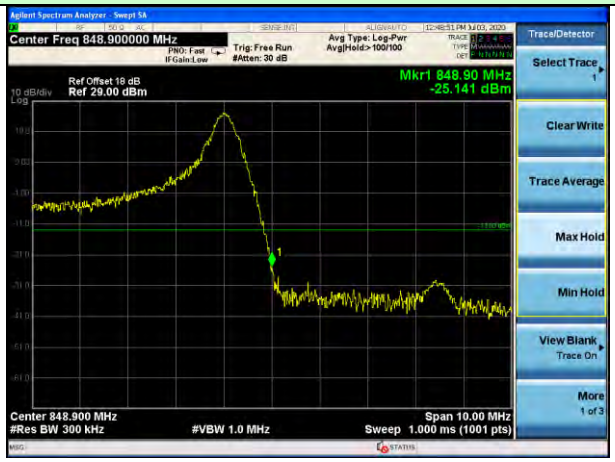
Lowest channel

Highest channel

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

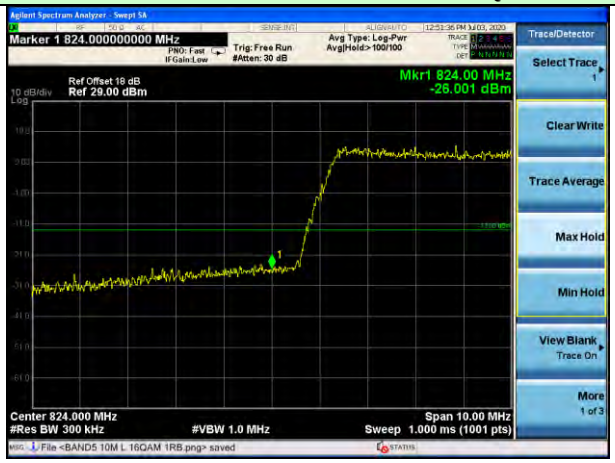


Lowest channel



Highest channel

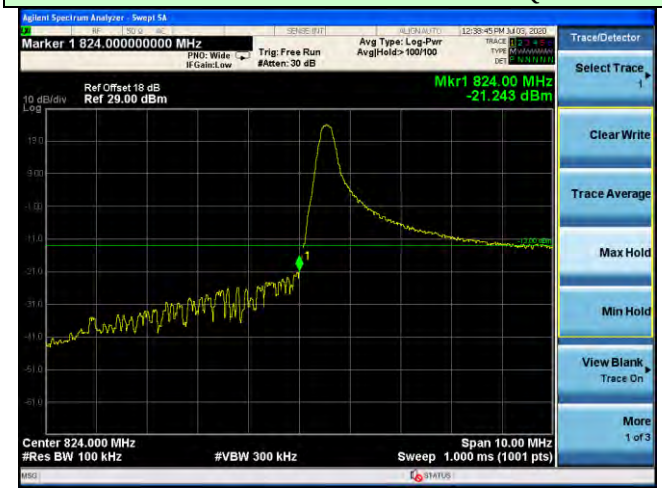
Test Mode: LTE Band 5 / 10MHz / 50RB / QPSK



Lowest channel

Highest channel

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



Lowest channel

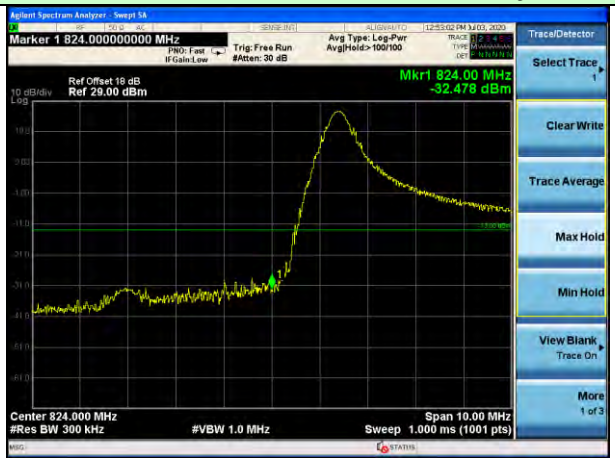
Highest channel

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

Lowest channel

Highest channel

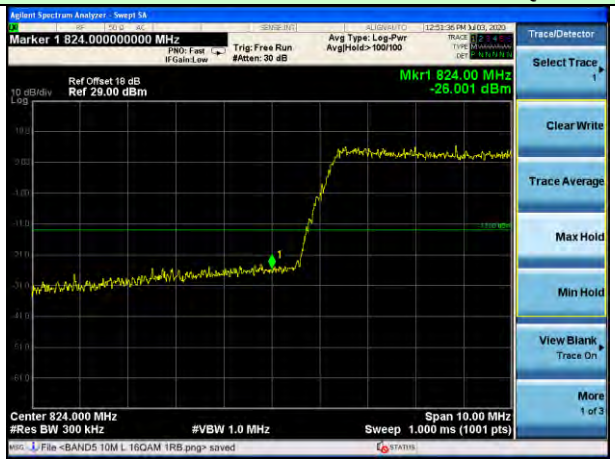
Test Mode: LTE Band 5 / 10MHz / 1RB / 16-QAM



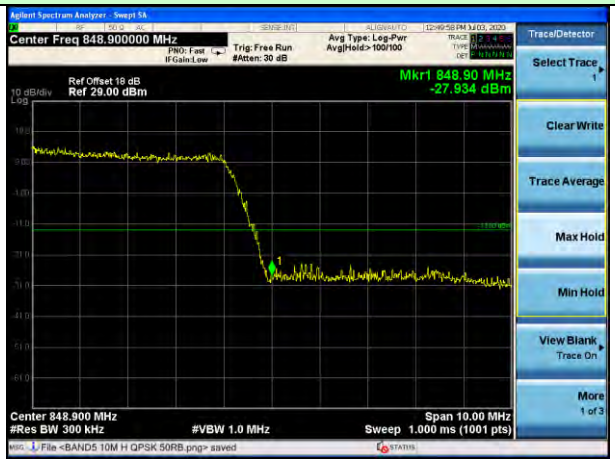
Lowest channel

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