



FCC TEST REPORT

FCC ID: SY4-B01014

On Behalf of

Shanghai Huace Navigation Technology LTD.

Handheld GNSS Data Collector

Model No.: LT700H

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

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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 : Handheld GNSS Data Collector
(A) Model No. : LT700H
(B) Trademark : 

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

The device described above is tested by Shenzhen Alpha Product Testing Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C limits both conducted and radiated emissions. 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).....: Lucas Pang
Project Engineer 
Approved by (name + signature).....: Simple Guan
Project Manager 
Date of issue.....: April 6, 2021

Revision History

Revision	Issue Date	Revisions	Revised By
V0	April 6, 2021	Initial released Issue	Simple Guan

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) Part 24.232 (c) Part 27.50 (d)(4)	Pass
Modulation Characteristics	Part 2.1047	Pass
99% & -26 dB Occupied Bandwidth	Part 2.1049 part22.913(a) Part 24.238 Part 27.53(a)	Pass
Spurious Emissions at Antenna Terminal	Part 2.1051 part22.913(a) Part 24.238 (a) Part 27.53 (h)	Pass
Field Strength of Spurious Radiation	Part 2.1053 part22.913(a) Part 24.238 (a) Part 27.53 (h)	Pass
Out of band emission, Band Edge	part22.913(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

Product Name:	Handheld GNSS Data Collector
Model No.:	LT700H
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: 2502.50MHz-2567.50MHz
Modulation type:	QPSK, 16QAM
Antenna type:	Internal antenna
Antenna gain:	1.95dBi(max.) For LTE Band 2 4 7; -1.66dBi(max.) For LTE Band 5;
Power supply:	DC 3.8V by battery or DC 5V from adapter input AC 120V, 60Hz

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 Methodology

Both conducted and radiated testing were performed according to the procedures document on TIA/EIA 603 and FCC CFR 47.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055 and 2.1057

2.4 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

July 25, 2017 Certificated by IC
Registration Number: CN0085

3 Test Instruments list

Equipment	Manufacture	Model No.	Serial No.	Last cal.	Cal Interval
9*6*6 anechoic chamber	CHENYU	9*6*6	N/A	2019.09.06	3Year
Spectrum analyzer	ROHDE&SCHWARZ	FSV40-N	102137	2020.09.02	1Year
Spectrum analyzer	Agilent	N9020A	MY499100060	2020.09.02	1Year
Receiver	ROHDE&SCHWARZ	ESR	1316.3003K03-102082-Wa	2020.09.02	1Year
Receiver	R&S	ESCI	101165	2020.09.02	1Year
Bilog Antenna	Schwarzbeck	VULB 9168	VULB9168-438	2020.04.12	2Year
Horn Antenna	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D(1201)	2020.04.12	2Year
Active Loop Antenna	SCHWARZBECK	FMZB 1519B	00059	2019.09.07	2Year
Cable	Resenberger	N/A	No.1	2020.09.02	1Year
Cable	Resenberger	N/A	No.2	2020.09.02	1Year
Cable	Resenberger	N/A	No.3	2020.09.02	1Year
Pre-amplifier	HP	HP8347A	2834A00455	2020.09.02	1Year
Pre-amplifier	Agilent	8449B	3008A02664	2020.09.02	1Year
L.I.S.N.#1	Schwarzbeck	NSLK8126	8126466	2020.09.02	1Year
L.I.S.N.#2	ROHDE&SCHWARZ	ENV216	101043	2020.09.02	1 Year
20db Attenuator	ICPROBING	IATS1	82347	2020.09.02	1 Year
Horn Antenna	SCHWARZBECK	BBHA9170	00946	2019.09.07	2 Year
Preamplifier	SKET	LNPA_1840-50	SK2018101801	2020.09.02	1 Year
Power Meter	Agilent	E9300A	MY41496625	2020.09.02	1 Year
Temp. &Humid. Chamber	Weihuang	WHTH-1000-40-880	100631	2020.09.02	1 Year
Switching Mode Power Supply	JUNKE	JK12010S	20140927-6	2020.09.02	1 Year

4 System test configuration

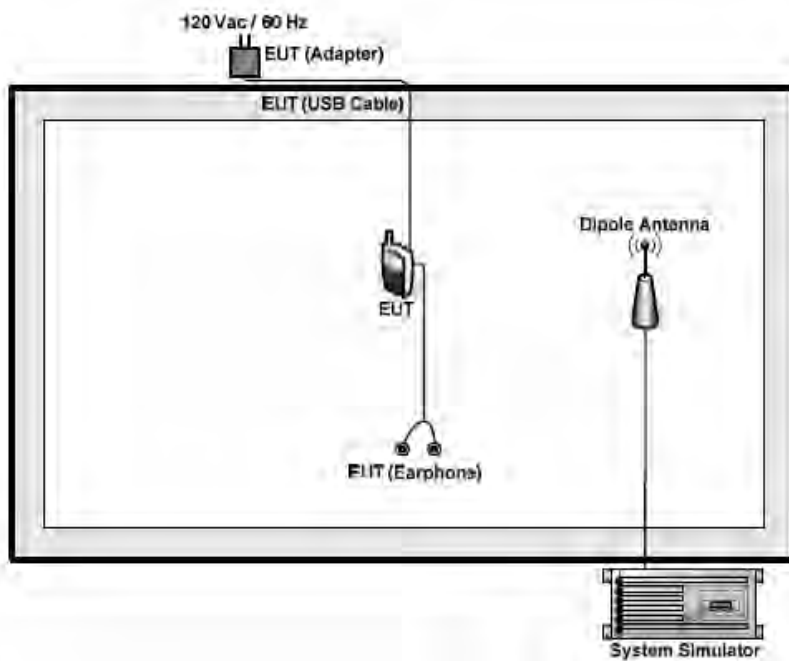
4.1 Test mode

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.

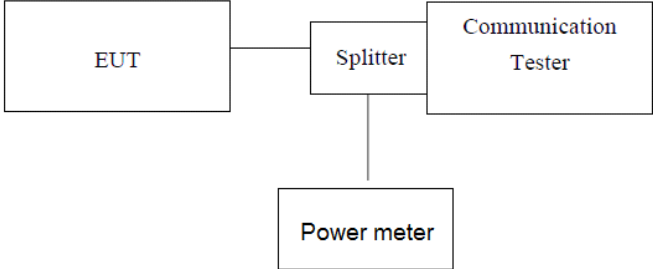
Test modes		
Band	Radiated	Conducted
LTE Band 2	■ QPSK link	■ QPSK link
LTE Band 4	■ QPSK link	■ QPSK link
LTE Band 5	■ QPSK link	■ QPSK link
LTE Band 7	■ QPSK link	■ QPSK link

Note: The maximum power levels are LTE mode for QPSK link. Only these modes were used for all tests.

4.2 Configuration of Tested System



4.3 Conducted Peak Output Power

Test Requirement:	FCC part22.913(a), FCC part24.232(b) and FCC part 27.50
Test Method:	FCC part2.1046
Limit:	LTE Band 2: 2W LTE Band 4: 1W LTE Band 5: 7W LTE Band 7: 2W
Test setup:	 <i>Note: Measurement setup for testing on Antenna connector</i>
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 6.0 for details
Test mode:	Refer to section 7.1 for details
Test results:	Pass

Measurement Data

Band 2						
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 18625 1852.5MHz	Channel 18900 1880.0MHz	Channel 19175 1907.5MHz
5MHz	QPSK	1	0	23.67	22.26	22.19
		1	13	21.30	20.18	20.58
		1	24	20.85	21.29	22.12
		12	0	19.70	22.05	20.71
		12	6	20.99	21.52	21.57
		12	13	23.01	20.37	21.93
		25	0	22.54	22.37	20.46
	16QAM	1	0	22.17	23.85	22.03
		1	13	21.53	21.20	21.14
		1	24	20.49	20.32	22.67
		12	0	21.22	20.67	19.84
		12	6	20.64	21.42	20.91
		12	13	19.35	22.50	21.03
		25	0	21.93	21.91	20.81
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 18650 1855.0MHz	Channel 18900 1880.0MHz	Channel 19150 1905.0MHz
10MHz	QPSK	1	0	21.16	21.93	20.09
		1	25	19.75	21.75	21.03
		1	49	23.18	21.78	22.87
		25	0	19.82	19.05	20.45
		25	13	22.59	20.27	21.07
		25	25	20.97	20.45	21.36
		50	0	20.59	23.21	20.52
	16QAM	1	0	21.78	21.06	21.83
		1	25	20.20	21.48	22.71
		1	49	21.43	20.24	20.41
		25	0	21.74	20.67	21.50
		25	13	19.92	22.80	22.09
		25	25	22.44	22.81	20.89
		50	0	21.66	22.09	20.90

Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 18675 1857.5MHz	Channel 18900 1880.0MHz	Channel 19125 1902.5MHz
15MHz	QPSK	1	0	22.98	22.66	21.74
		1	38	19.61	21.65	21.76
		1	74	20.51	19.56	21.07
		36	0	23.59	22.73	22.27
		36	18	23.52	22.50	22.88
		36	39	20.06	21.36	21.90
		75	0	21.05	22.92	21.06
	16QAM	1	0	21.83	21.19	22.81
		1	38	20.93	20.04	19.79
		1	74	23.78	20.28	22.55
		36	0	20.17	22.93	22.18
		36	18	22.07	21.37	19.89
		36	39	22.82	22.58	20.38
		75	0	20.92	23.60	22.13
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 18700 1860.0MHz	Channel 18900 1880.0MHz	Channel 19100 1900.0MHz
20MHz	QPSK	1	0	21.03	23.11	21.82
		1	50	23.02	22.65	21.14
		1	99	21.69	21.33	20.83
		50	0	22.22	20.27	22.18
		50	25	21.05	21.76	20.37
		50	50	21.07	21.27	21.80
		100	0	20.75	23.15	22.01
	16QAM	1	0	22.33	21.54	22.68
		1	50	20.49	19.83	22.44
		1	99	22.51	22.96	23.21
		50	0	21.18	22.38	22.74
		50	25	23.30	21.92	22.66
		50	50	20.87	20.15	21.84
		100	0	20.10	20.59	22.23

Band 4						
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 19975 1712.5MHz	Channel 20175 1732.5MHz	Channel 20375 1752.5MHz
5MHz	QPSK	1	0	22.78	22.09	21.77
		1	13	22.84	22.29	22.29
		1	24	21.31	21.56	21.52
		12	0	23.88	21.90	21.27
		12	6	21.02	21.61	20.61
		12	13	21.74	21.94	21.53
		25	0	22.03	21.89	21.41
	16QAM	1	0	21.54	23.39	21.34
		1	13	21.83	22.06	22.32
		1	24	23.12	22.59	21.19
		12	0	22.92	23.73	21.95
		12	6	21.41	21.08	20.67
		12	13	21.18	22.15	21.96
		25	0	21.98	23.77	20.38
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 20000 1715.0MHz	Channel 20175 1732.5MHz	Channel 20350 1750.0MHz
10MHz	QPSK	1	0	21.13	21.54	21.12
		1	25	21.22	22.57	22.02
		1	49	20.48	22.38	22.06
		25	0	22.97	21.90	22.34
		25	13	21.80	21.86	21.97
		25	25	22.19	23.17	20.96
		50	0	22.09	22.54	22.08
	16QAM	1	0	21.82	22.16	21.52
		1	25	22.01	20.71	22.26
		1	49	22.13	22.16	21.82
		25	0	22.93	22.53	23.29
		25	13	21.20	21.93	22.54
		25	25	22.14	21.72	20.47
		50	0	21.77	21.88	21.61

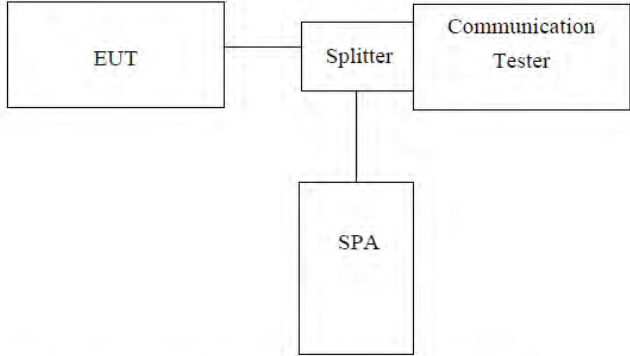
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 20025 1717.5MHz	Channel 20175 1732.5MHz	Channel 20325 1747.5MHz
15MHz	QPSK	1	0	23.34	23.33	23.14
		1	38	21.46	22.70	21.12
		1	74	22.41	21.95	23.58
		36	0	22.51	22.19	22.42
		36	18	22.20	22.65	21.97
		36	39	21.97	20.85	21.74
		75	0	21.27	21.01	21.81
	16QAM	1	0	21.36	23.18	22.97
		1	38	22.15	22.07	21.83
		1	74	22.71	23.13	21.78
		36	0	21.24	23.31	21.91
		36	18	22.45	22.87	21.83
		36	39	21.10	22.14	20.25
		75	0	23.60	21.89	22.06
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 20050 1720.0MHz	Channel 20175 1732.5MHz	Channel 20300 1745.0MHz
20MHz	QPSK	1	0	23.00	21.44	23.12
		1	50	21.92	22.14	21.82
		1	99	21.48	20.74	20.34
		50	0	21.43	21.36	21.39
		50	25	22.53	20.53	22.08
		50	50	22.13	22.74	22.79
		100	0	21.86	21.36	23.12
	16QAM	1	0	23.01	20.62	21.23
		1	50	21.98	21.25	22.71
		1	99	22.25	21.62	22.55
		50	0	22.41	22.81	22.21
		50	25	22.67	21.63	22.13
		50	50	23.04	21.92	21.29
		100	0	21.59	22.74	22.07

Band 5						
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 20425 826.5MHz	Channel 20525 836.5MHz	Channel 20625 846.5MHz
5MHz	QPSK	1	0	22.59	20.69	22.16
		1	13	21.97	21.06	20.83
		1	24	21.73	23.04	22.08
		12	0	23.54	23.03	20.94
		12	6	21.55	21.67	20.00
		12	13	22.14	22.26	21.88
		25	0	21.14	21.46	23.33
	16QAM	1	0	22.51	24.16	21.51
		1	13	23.03	22.39	22.38
		1	24	23.03	22.65	21.32
		12	0	22.65	22.52	20.78
		12	6	20.65	22.33	21.15
		12	13	22.05	21.77	22.52
		25	0	22.57	22.71	21.59
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 20450 829MHz	Channel 20525 836.5MHz	Channel 20600 844.0MHz
10MHz	QPSK	1	0	21.20	20.93	21.41
		1	25	21.71	22.86	22.29
		1	49	22.10	22.22	22.24
		25	0	22.39	21.16	21.76
		25	13	21.17	20.92	21.91
		25	25	21.36	23.09	21.85
		50	0	21.23	22.14	21.38
	16QAM	1	0	21.18	21.34	21.55
		1	25	21.73	21.81	20.78
		1	49	21.38	23.51	22.70
		25	0	22.53	20.79	22.39
		25	13	22.72	23.20	22.88
		25	25	21.14	21.31	20.75
		50	0	22.07	21.80	21.27

Band 7						
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 20775 2502.5MHz	Channel 21100 2535MHz	Channel 21425 2567.5MHz
5MHz	QPSK	1	0	23.67	22.53	22.23
		1	13	20.89	23.10	21.38
		1	24	20.79	21.77	21.93
		12	0	22.10	21.88	22.50
		12	6	22.38	23.10	21.37
		12	13	22.24	21.78	20.86
		25	0	23.13	21.83	22.53
	16QAM	1	0	22.33	22.63	23.78
		1	13	21.91	21.67	22.04
		1	24	21.63	22.46	21.52
		12	0	22.68	23.66	22.34
		12	6	21.07	20.93	22.37
		12	13	22.55	21.53	22.41
		25	0	23.21	22.65	21.18
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 20800 2505MHz	Channel 21100 2535MHz	Channel 21400 2565MHz
10MHz	QPSK	1	0	21.33	22.06	22.38
		1	25	20.95	22.97	21.86
		1	49	20.88	21.29	21.73
		25	0	21.75	21.68	22.01
		25	13	22.08	22.82	21.75
		25	25	22.41	22.11	20.63
		50	0	23.19	22.04	22.29
	16QAM	1	0	22.13	22.93	22.06
		1	25	22.07	21.34	22.01
		1	49	21.21	22.70	21.48
		25	0	22.57	23.23	22.83
		25	13	20.99	20.68	21.95
		25	25	22.28	21.71	22.22
		50	0	23.18	23.15	20.17

Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 20825 2507.5MHz	Channel 21100 2535MHz	Channel 21375 2562.5MHz
15MHz	QPSK	1	0	23.24	23.11	22.46
		1	38	22.20	22.45	23.02
		1	74	21.46	21.54	21.29
		36	0	21.47	22.99	20.63
		36	18	23.43	21.60	23.17
		36	39	21.94	20.49	20.46
		75	0	22.04	22.40	21.64
	16QAM	1	0	21.66	22.70	22.80
		1	38	22.56	21.29	21.99
		1	74	22.87	22.95	22.09
		36	0	21.79	22.78	21.28
		36	18	22.18	23.10	22.53
		36	39	22.61	21.41	21.79
		75	0	21.65	22.83	22.20
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 20850 2510MHz	Channel 21100 2535MHz	Channel 21350 2560MHz
20MHz	QPSK	1	0	21.83	21.15	22.43
		1	50	21.03	22.56	22.21
		1	99	21.75	21.25	22.91
		50	0	20.92	20.68	23.10
		50	25	23.24	20.94	21.98
		50	50	20.44	20.19	22.69
		100	0	21.91	20.97	21.77
	16QAM	1	0	21.96	22.43	21.30
		1	50	22.33	20.49	20.73
		1	99	22.51	21.98	22.49
		50	0	23.29	20.54	21.72
		50	25	21.26	23.48	22.01
		50	50	22.52	21.32	22.82
		100	0	22.03	22.90	21.14

4.4 Occupy Bandwidth

Test Requirement:	FCC part22.913(a), FCC part24.232(b) and FCC part27.53(a)
Test Method:	FCC part2.1049
Test setup:	 <i>Note: Measurement setup for testing on Antenna connector</i>
Test Procedure:	1. The EUT's output RF connector was connected with a short cable to the spectrum analyzer 2. RBW was set to about 1% of emission BW, VBW= 3 times RBW. 3. -26dBc display line was placed on the screen (or 99% bandwidth), the occupied bandwidth is the delta frequency between the two points where the display line intersects the signal trace.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 7.1 for details
Test results:	Pass

QPSK Measurement Data

EUT Mode	Channel Bandwidth	Channel	RB Configure		99% Occupy bandwidth (KHz)	-26dB bandwidth (KHz)
			RB Size	RB Offset		
LTE Band 2	5MHz	Low range	25	0	4511.4	5049
		Mid range	25	0	4493.2	4973
		High range	25	0	4507.6	5014
	10MHz	Low range	50	0	9012.0	9994
		Mid range	50	0	9006.0	10040
		High range	50	0	9006.8	10040
	15MHz	Low range	75	0	13418.0	14840
		Mid range	75	0	13403.0	14620
		High range	75	0	13403.0	14570
	20MHz	Low range	100	0	17865.0	19330
		Mid range	100	0	17896.0	19260
		High range	100	0	17815.0	19220

EUT Mode	Channel Bandwidth	Channel	RB Configure		99% Occupy bandwidth (KHz)	-26dB bandwidth (KHz)
			RB Size	RB Offset		
LTE Band 4	5MHz	Low range	25	0	4507.7	5010
		Mid range	25	0	4487.2	4970
		High range	25	0	4487.8	4999
	10MHz	Low range	50	0	9019.0	10060
		Mid range	50	0	9015.5	10120
		High range	50	0	9039.4	10060
	15MHz	Low range	75	0	13441.0	14660
		Mid range	75	0	13389.0	14660
		High range	75	0	13441.0	14680
	20MHz	Low range	100	0	17856.0	19280
		Mid range	100	0	17823.0	19250
		High range	100	0	17858.0	19320

EUT Mode	Channel Bandwidth	Channel	RB Configure		99% Occupy bandwidth (KHz)	-26dB bandwidth (KHz)
			RB Size	RB Offset		
LTE Band 5	5MHz	Low range	25	0	4503.7	4978
		Mid range	25	0	4487.9	4497
		High range	25	0	4492.7	4966
	10MHz	Low range	50	0	9017.5	10010
		Mid range	50	0	9045.6	10200
		High range	50	0	9006.8	10100

EUT Mode	Channel Bandwidth	Channel	RB Configure		99% Occupy bandwidth (KHz)	-26dB bandwidth (KHz)
			RB Size	RB Offset		
LTE Band 7	5MHz	Low range	25	0	4504.8	4986
		Mid range	25	0	4488.7	4975
		High range	25	0	4492.8	4975
	10MHz	Low range	50	0	8992.6	10100
		Mid range	50	0	9031.1	10070
		High range	50	0	9012.6	10010
	15MHz	Low range	75	0	13441.0	14560
		Mid range	75	0	13420.0	14660
		High range	75	0	13437.0	14640
	20MHz	Low range	100	0	17868.0	19270
		Mid range	100	0	17857.0	19230
		High range	100	0	17885.0	19290

Test plot as follows:

Test Mode: LTE Band 2
Channel Bandwidth: 5MHz



Lowest channel

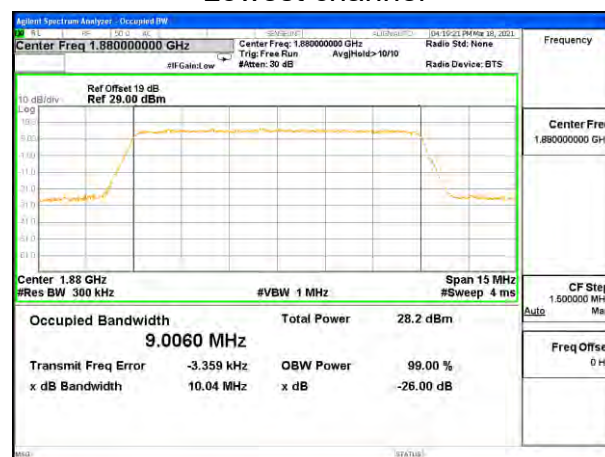
Test Mode: LTE Band 2
Channel Bandwidth: 10MHz



Lowest channel



Middle channel



Middle channel

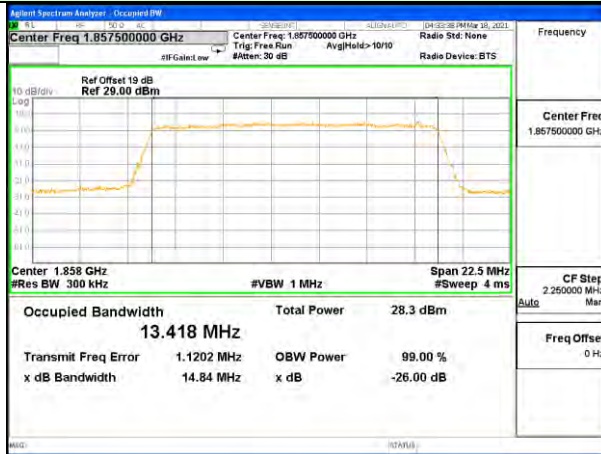


Highest channel



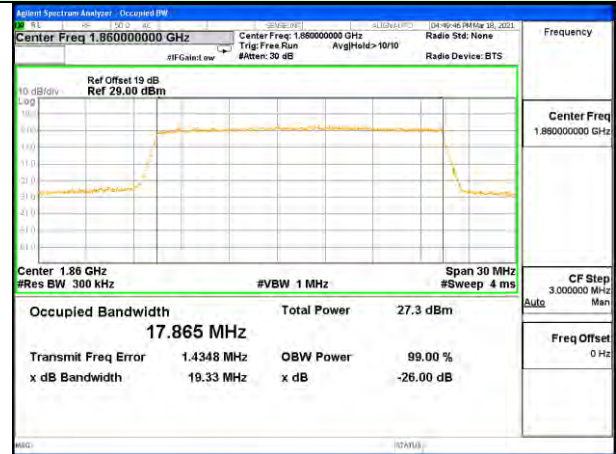
Highest channel

Test Mode: LTE Band 2
Channel Bandwidth: 15MHz

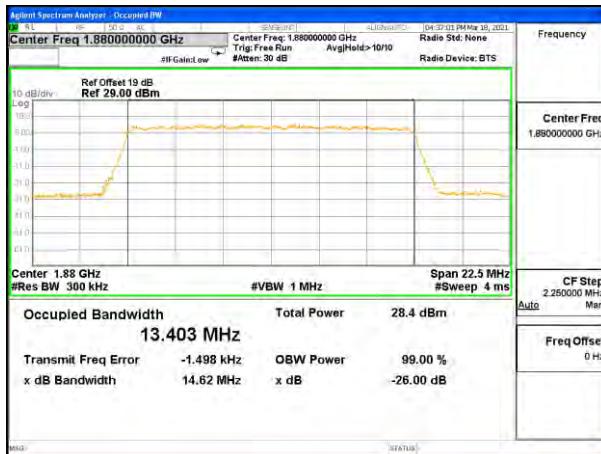


Lowest channel

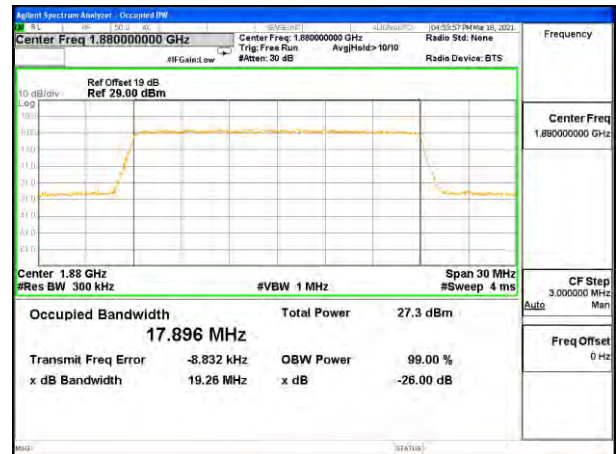
Test Mode: LTE Band 2
Channel Bandwidth: 20MHz



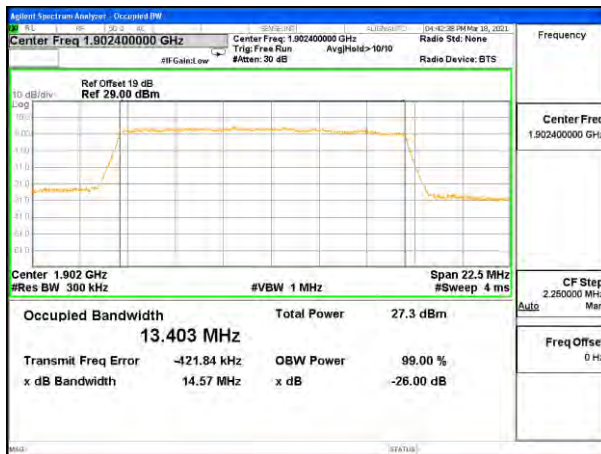
Lowest channel



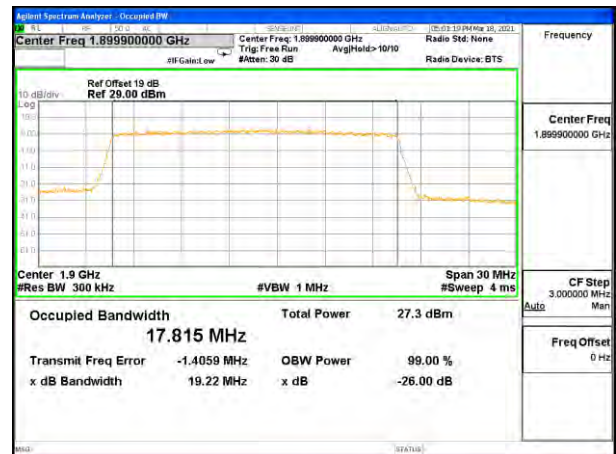
Middle channel



Middle channel

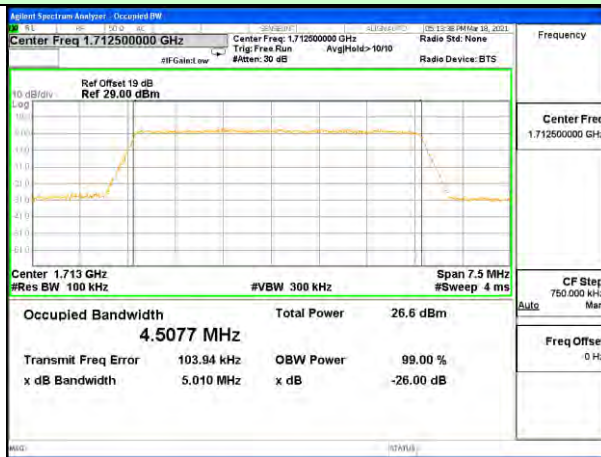


Highest channel

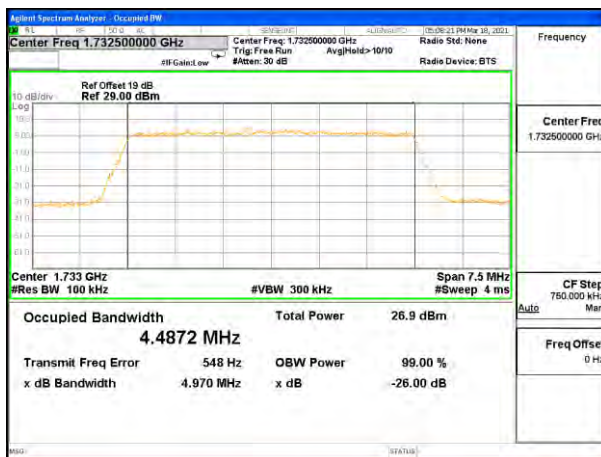


Highest channel

Test Mode: LTE Band 4
Channel Bandwidth: 5MHz



Lowest channel

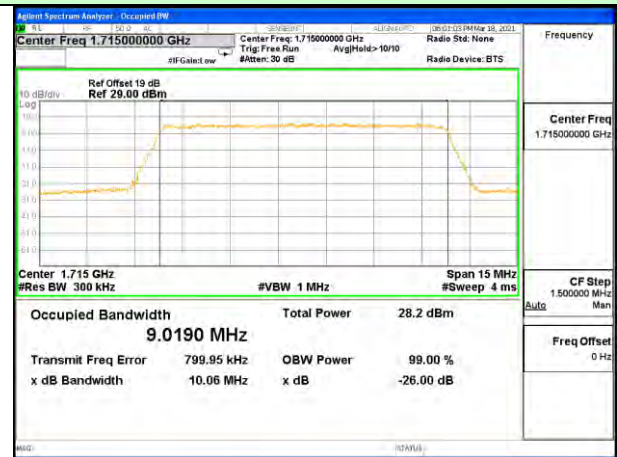


Middle channel

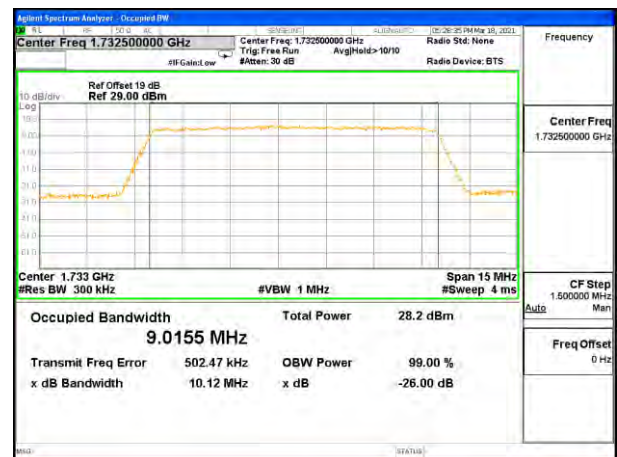


Highest channel

Test Mode: LTE Band 4
Channel Bandwidth: 10MHz



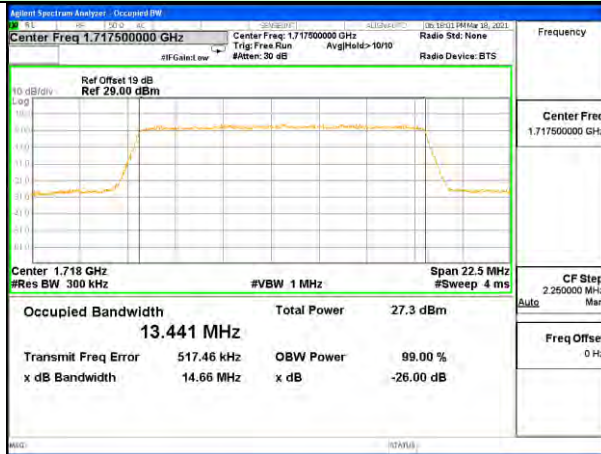
Lowest channel



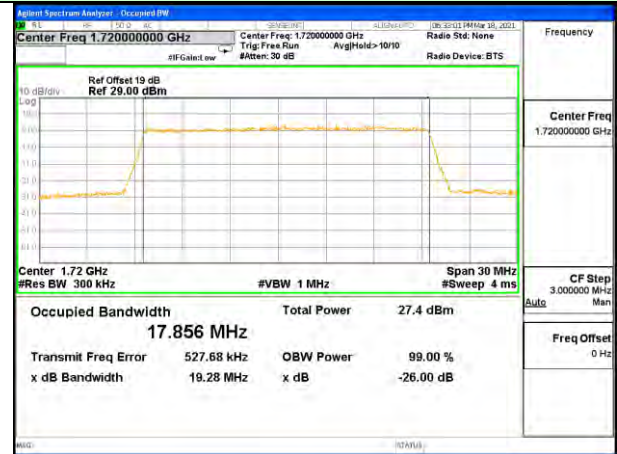
Middle channel



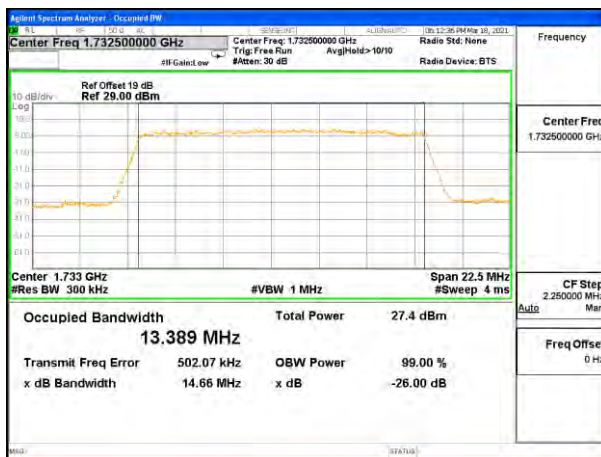
Highest channel

Test Mode: LTE Band 4
Channel Bandwidth: 15MHz

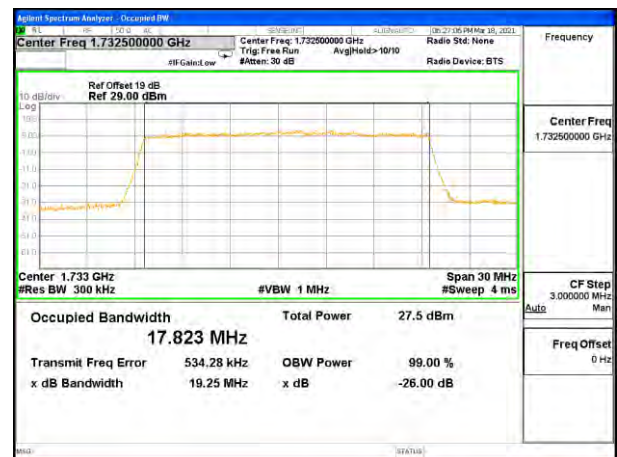
Lowest channel

Test Mode: LTE Band 4
Channel Bandwidth: 20MHz

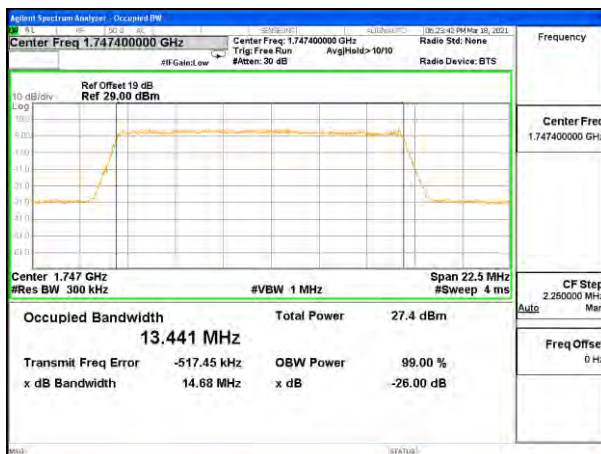
Lowest channel



Middle channel



Middle channel

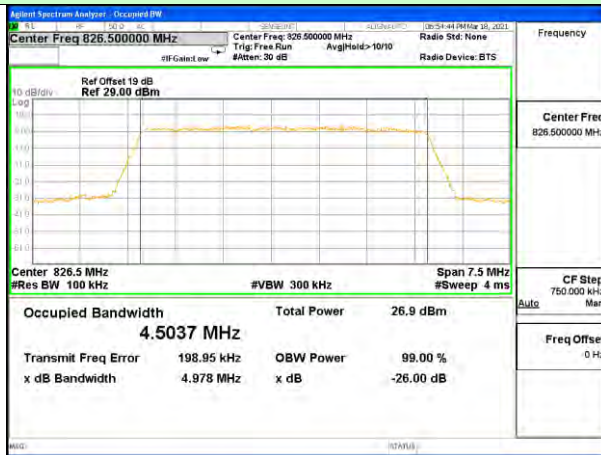


Highest channel

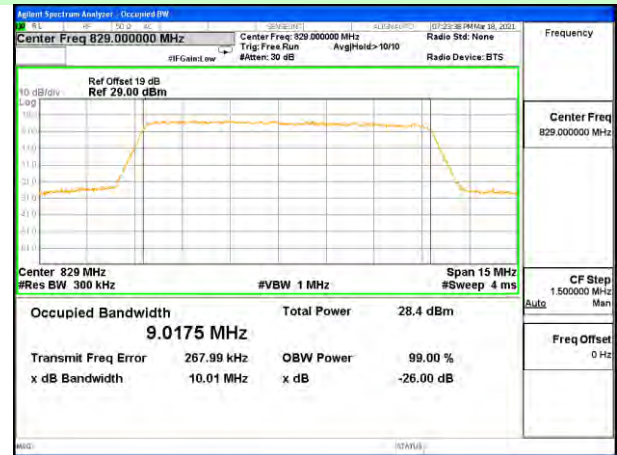


Highest channel

Test Mode: LTE Band 5
Channel Bandwidth: 5MHz



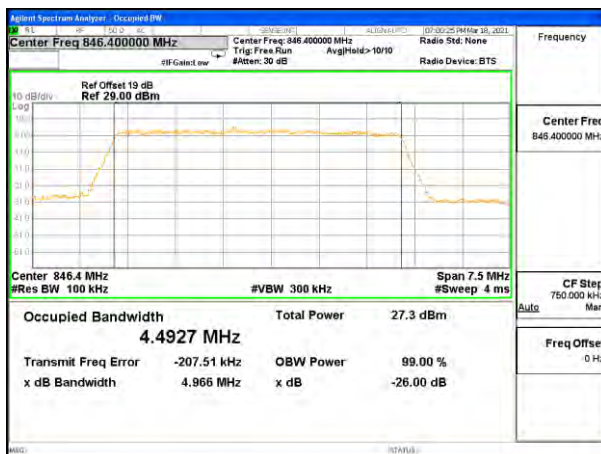
Test Mode: LTE Band 5
Channel Bandwidth: 10MHz



Lowest channel

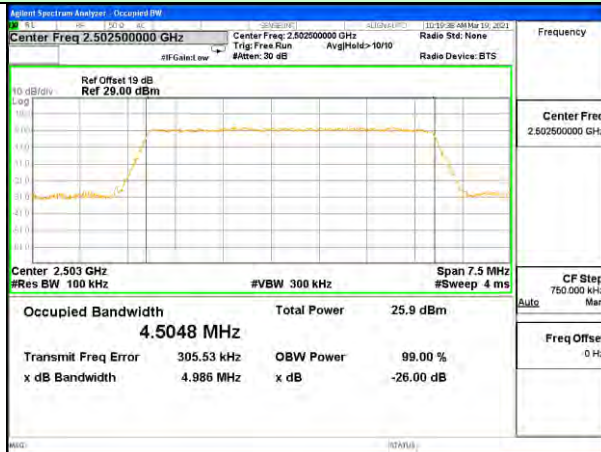


Middle channel



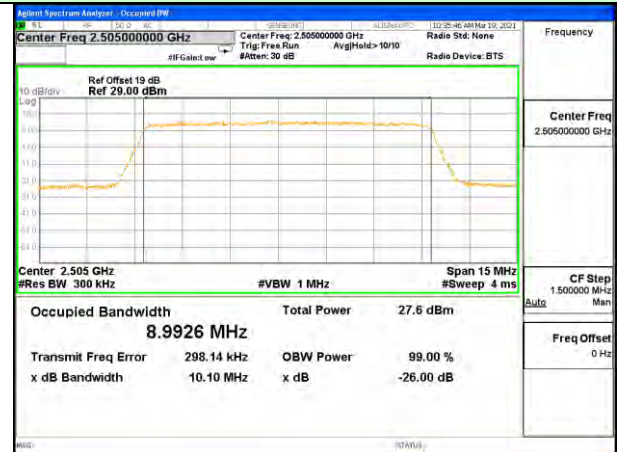
Highest channel

Test Mode: LTE Band 7
Channel Bandwidth: 5MHz

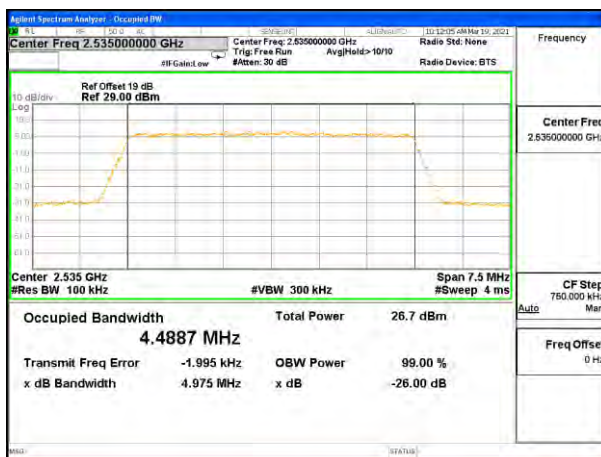


Lowest channel

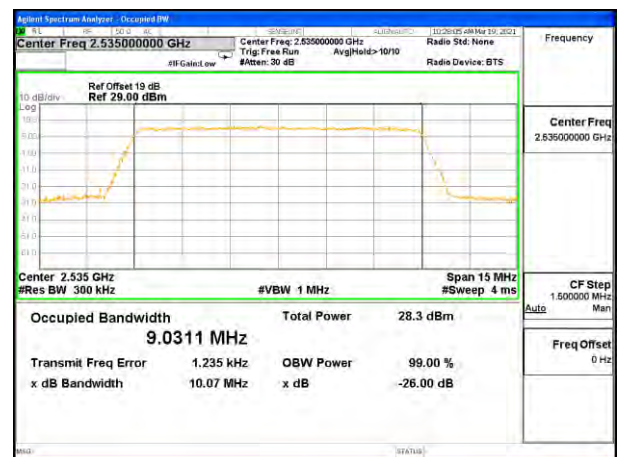
Test Mode: LTE Band 7
Channel Bandwidth: 10MHz



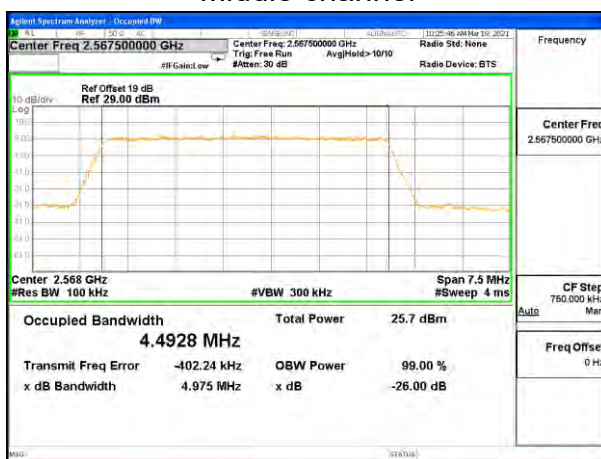
Lowest channel



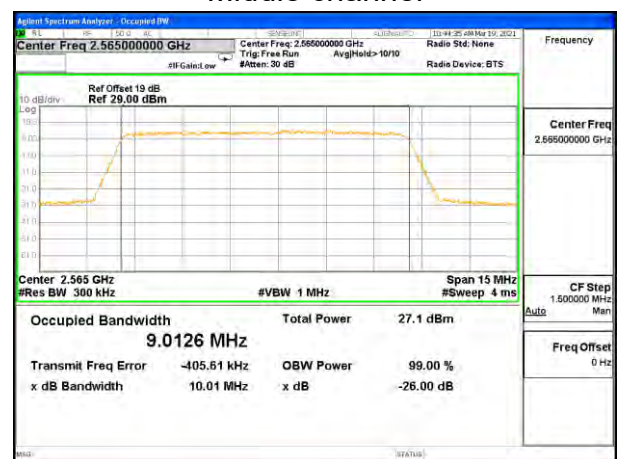
Middle channel



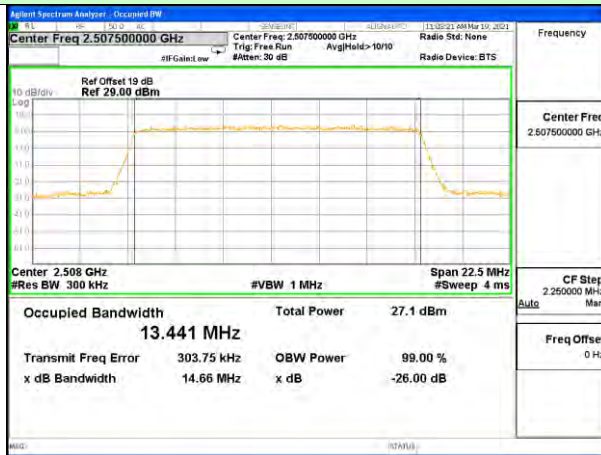
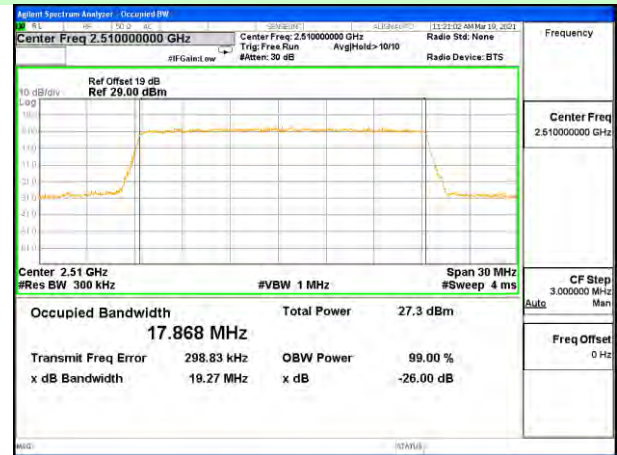
Middle channel



Highest channel



Highest channel

Test Mode: LTE Band 7
Channel Bandwidth: 15MHz**Test Mode: LTE Band 7**
Channel Bandwidth: 20MHz**Lowest channel****Middle channel****Highest channel**

16QAM Measurement Data

EUT Mode	Channel Bandwidth	Channel	RB Configure		99% Occupy bandwidth (KHz)	-26dB bandwidth (KHz)
			RB Size	RB Offset		
LTE Band 2	5MHz	Low range	25	0	4515.5	4997
		Mid range	25	0	4503.9	5016
		High range	25	0	4492.2	4998
	10MHz	Low range	50	0	9024.7	10080
		Mid range	50	0	9002.5	10010
		High range	50	0	9017.3	10020
	15MHz	Low range	75	0	13412.0	14710
		Mid range	75	0	13401.0	14680
		High range	75	0	13408.0	14650
	20MHz	Low range	100	0	17872.0	19210
		Mid range	100	0	17897.0	19260
		High range	100	0	17806.0	19190

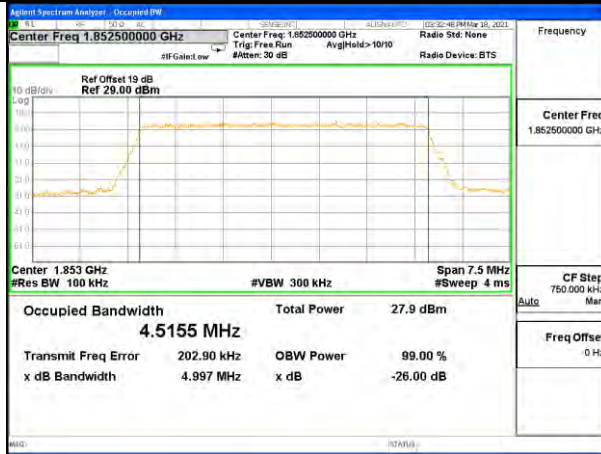
EUT Mode	Channel Bandwidth	Channel	RB Configure		99% Occupy bandwidth (KHz)	-26dB bandwidth (KHz)
			RB Size	RB Offset		
LTE Band 4	5MHz	Low range	25	0	4506.1	5006
		Mid range	25	0	4490.5	4974
		High range	25	0	4492.3	4999
	10MHz	Low range	50	0	9009.1	10090
		Mid range	50	0	9028.3	10060
		High range	50	0	9035.7	10060
	15MHz	Low range	75	0	13450.0	14680
		Mid range	75	0	13408.0	14640
		High range	75	0	13420.0	14680
	20MHz	Low range	100	0	17880.0	19230
		Mid range	100	0	17836.0	19200
		High range	100	0	17858.0	19230

EUT Mode	Channel Bandwidth	Channel	RB Configure		99% Occupy bandwidth (KHz)	-26dB bandwidth (KHz)
			RB Size	RB Offset		
LTE Band 5	5MHz	Low range	25	0	4504.8	4988
		Mid range	25	0	4495.7	4993
		High range	25	0	4487.4	4971
	10MHz	Low range	50	0	9020.4	10070
		Mid range	50	0	9049.5	10230
		High range	50	0	8992.4	9975

EUT Mode	Channel Bandwidth	Channel	RB Configure		99% Occupy bandwidth (KHz)	-26dB bandwidth (KHz)
			RB Size	RB Offset		
LTE Band 7	5MHz	Low range	25	0	4504.8	5000
		Mid range	25	0	4491.1	4921
		High range	25	0	4487.4	4972
	10MHz	Low range	50	0	9000.3	9983
		Mid range	50	0	9023.4	10070
		High range	50	0	9016.2	10050
	15MHz	Low range	75	0	13441.0	14600
		Mid range	75	0	13428.0	14640
		High range	75	0	13441.0	14650
	20MHz	Low range	100	0	17880.0	19340
		Mid range	100	0	17845.0	19310
		High range	100	0	17863.0	19340

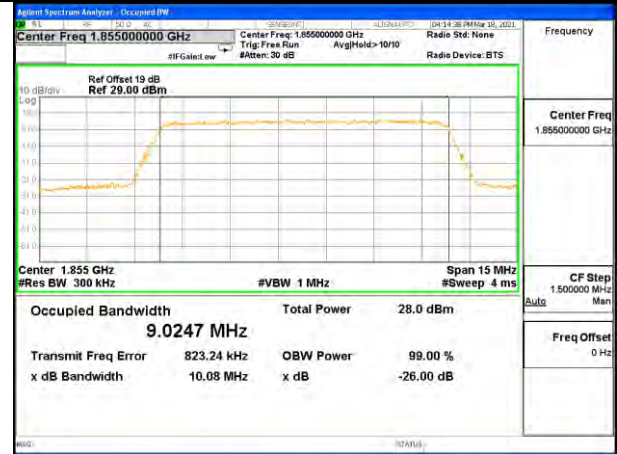
Test plot as follows:

Test Mode: LTE Band 2
Channel Bandwidth: 5MHz

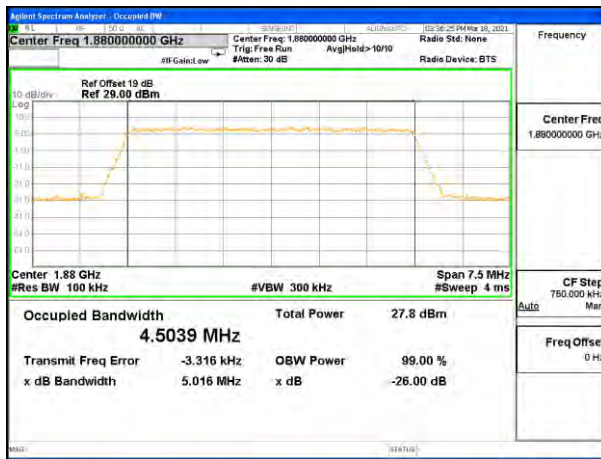


Lowest channel

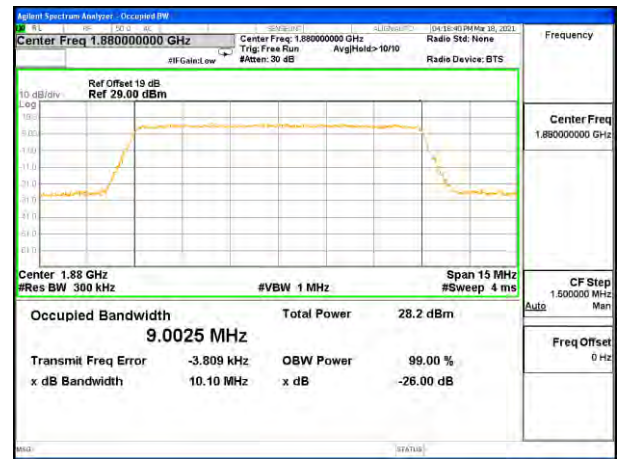
Test Mode: LTE Band 2
Channel Bandwidth: 10MHz



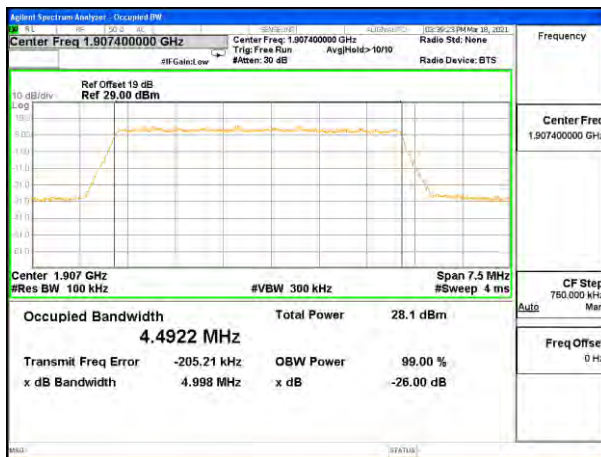
Lowest channel



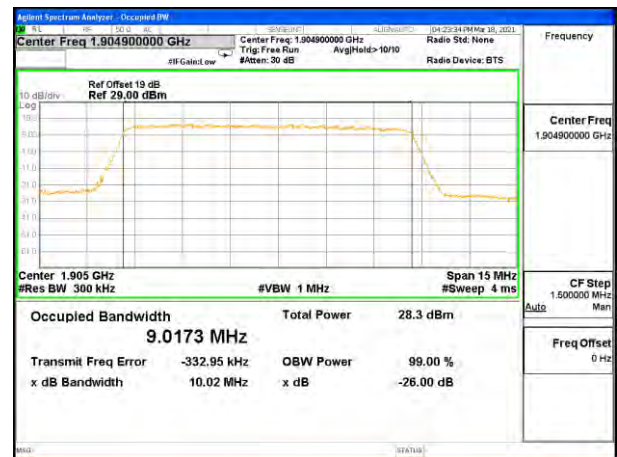
Middle channel



Middle channel

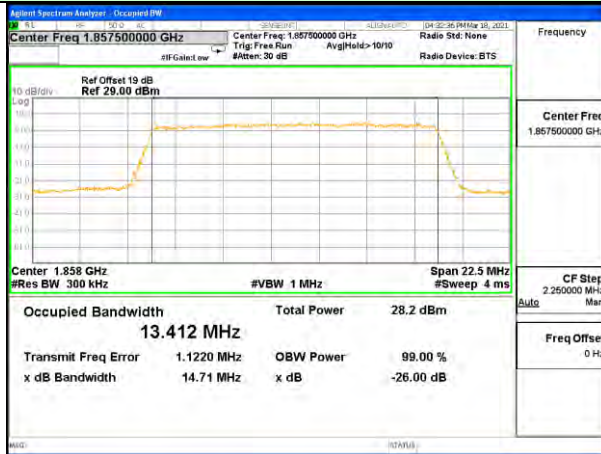


Highest channel



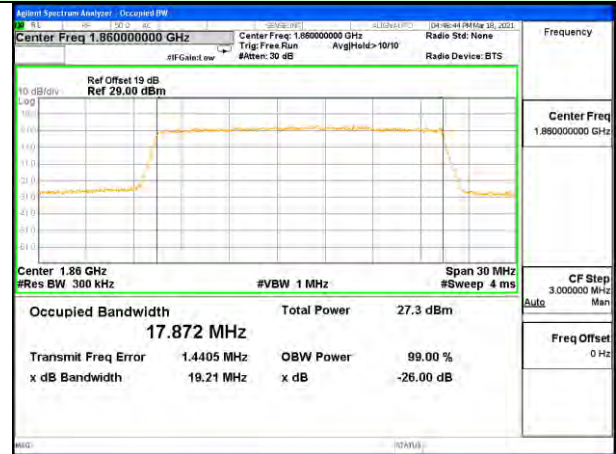
Highest channel

Test Mode: LTE Band 2
Channel Bandwidth: 15MHz

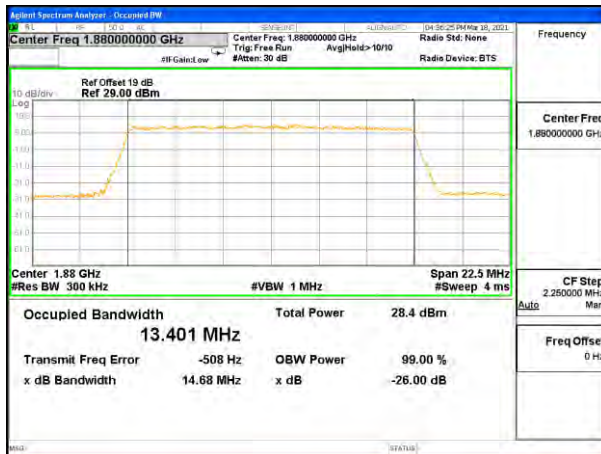


Lowest channel

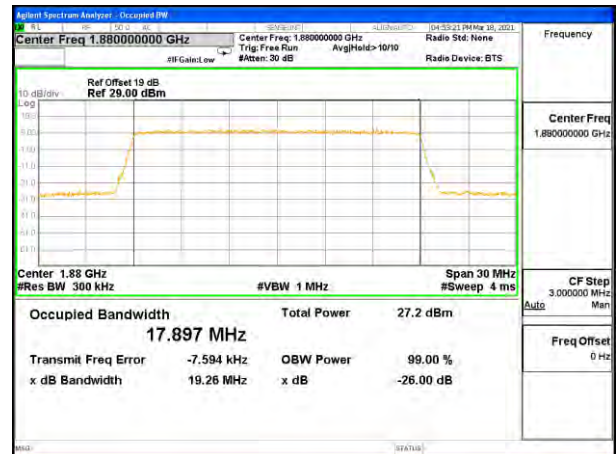
Test Mode: LTE Band 2
Channel Bandwidth: 20MHz



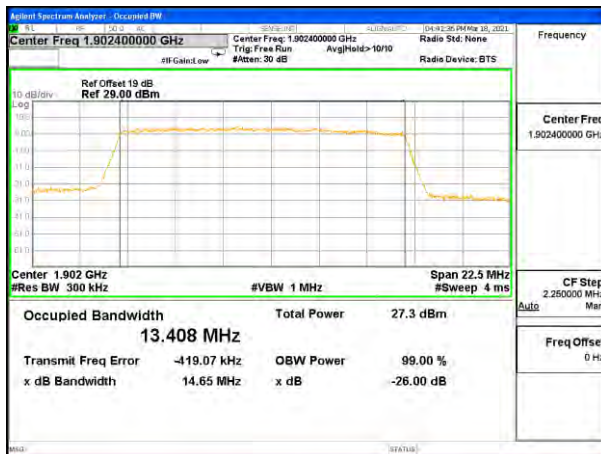
Lowest channel



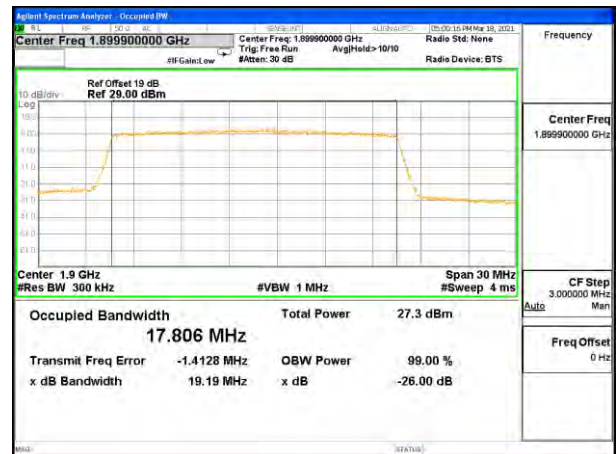
Middle channel



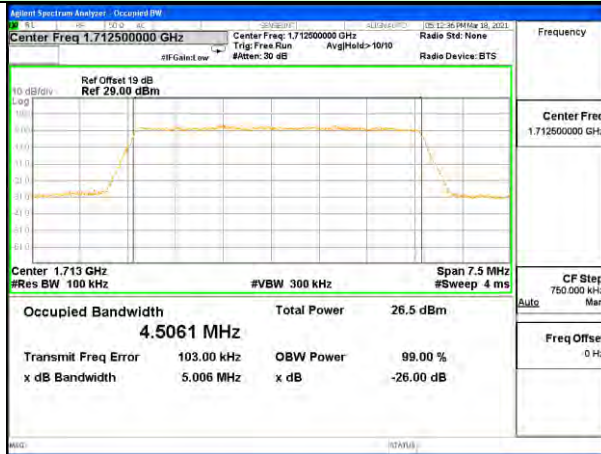
Middle channel



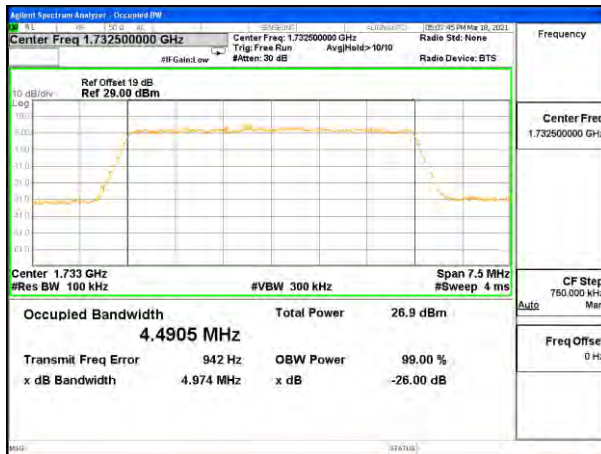
Highest channel



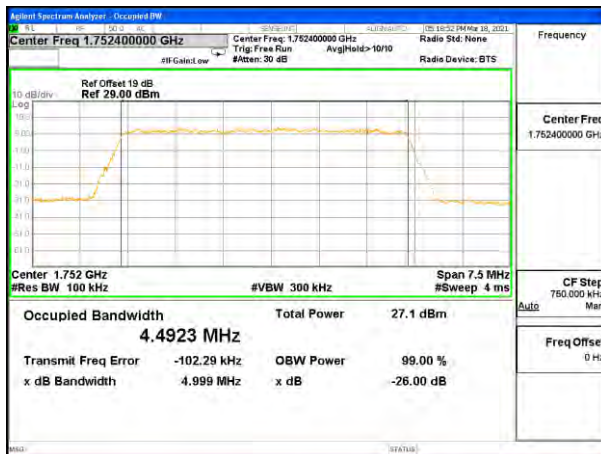
Highest channel

Test Mode: LTE Band 4
Channel Bandwidth: 5MHz

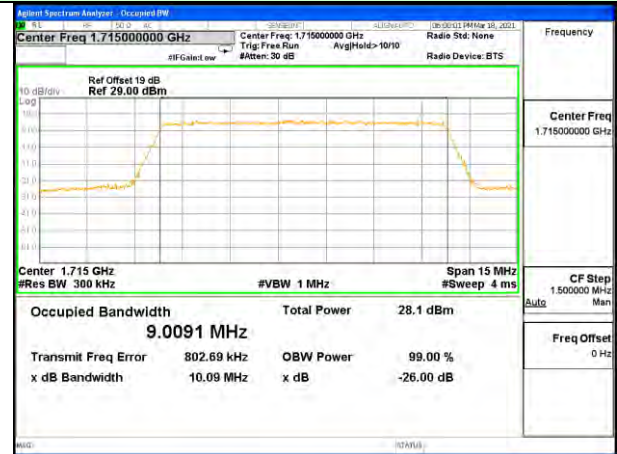
Lowest channel



Middle channel



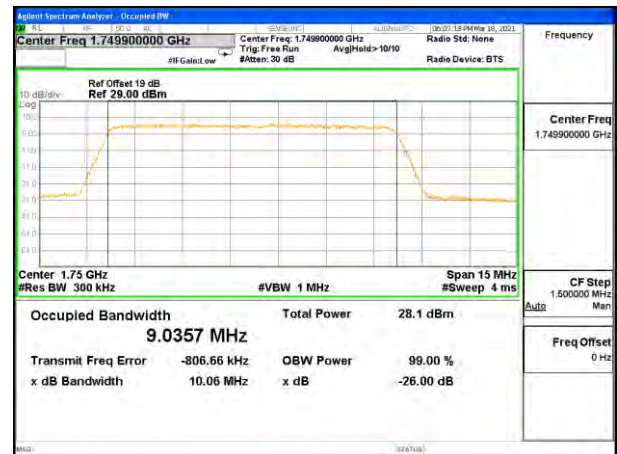
Highest channel

Test Mode: LTE Band 4
Channel Bandwidth: 10MHz

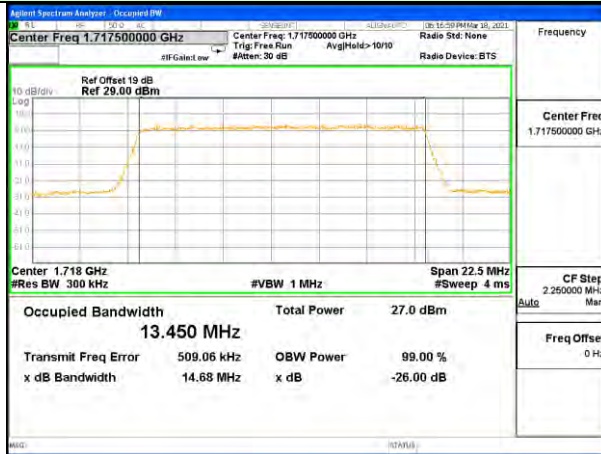
Lowest channel



Middle channel



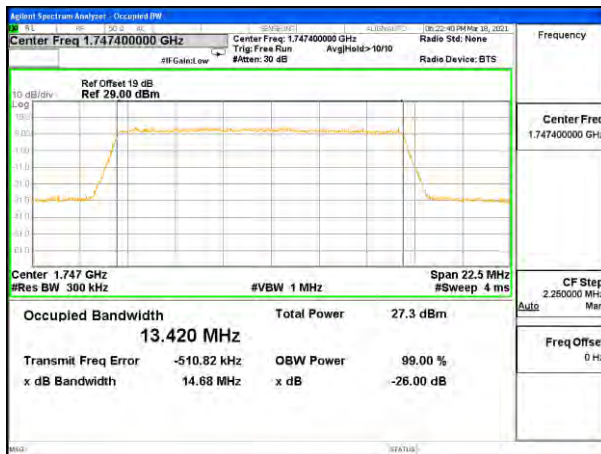
Highest channel

Test Mode: LTE Band 4
Channel Bandwidth: 15MHz

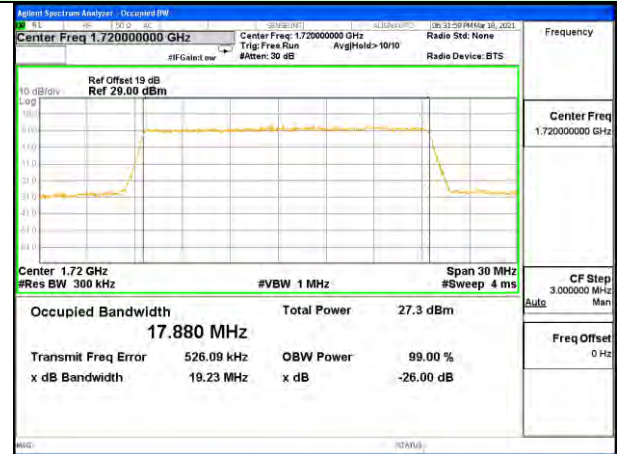
Lowest channel



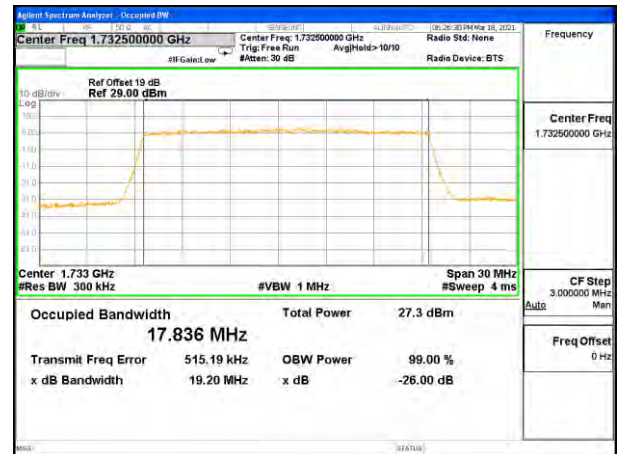
Middle channel



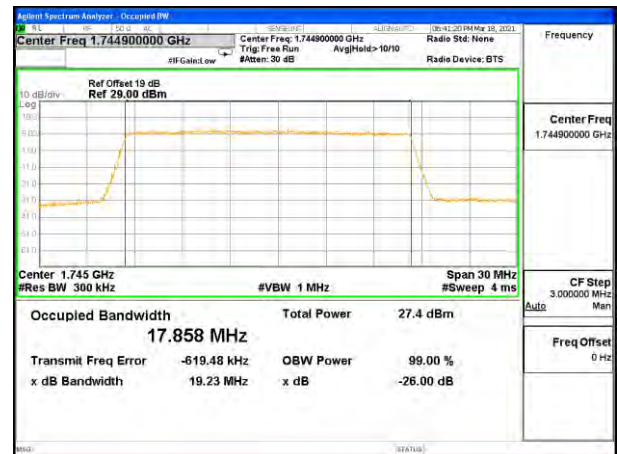
Highest channel

Test Mode: LTE Band 4
Channel Bandwidth: 20MHz

Lowest channel

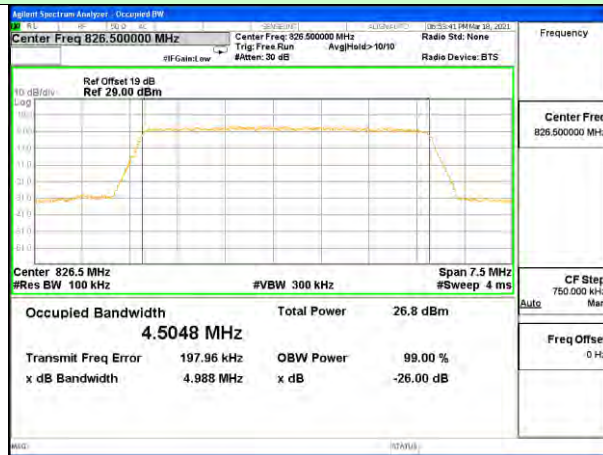


Middle channel



Highest channel

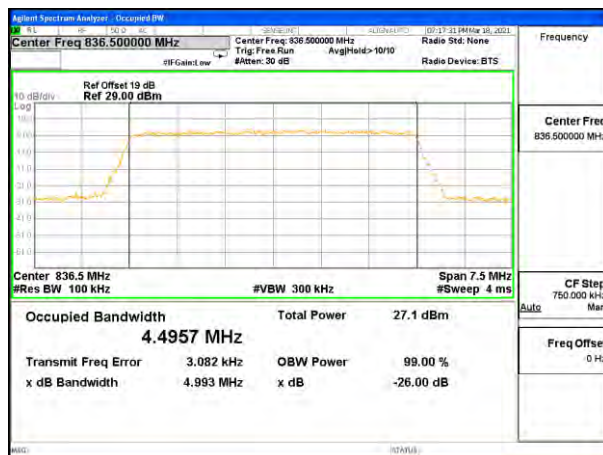
Test Mode: LTE Band 5
Channel Bandwidth: 5MHz



Test Mode: LTE Band 5
Channel Bandwidth: 10MHz



Lowest channel

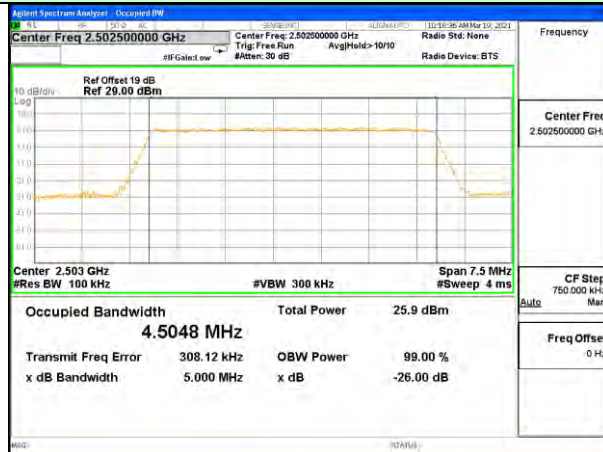


Middle channel



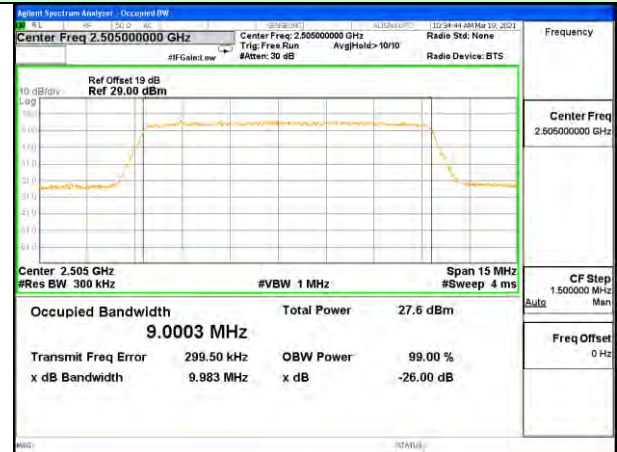
Highest channel

Test Mode: LTE Band 7
Channel Bandwidth: 5MHz

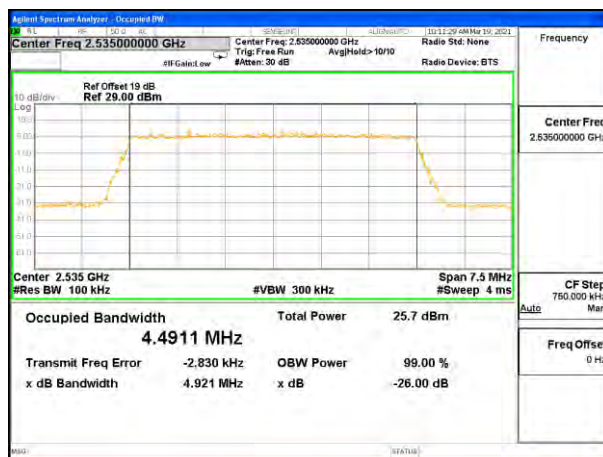


Lowest channel

Test Mode: LTE Band 7
Channel Bandwidth: 10MHz



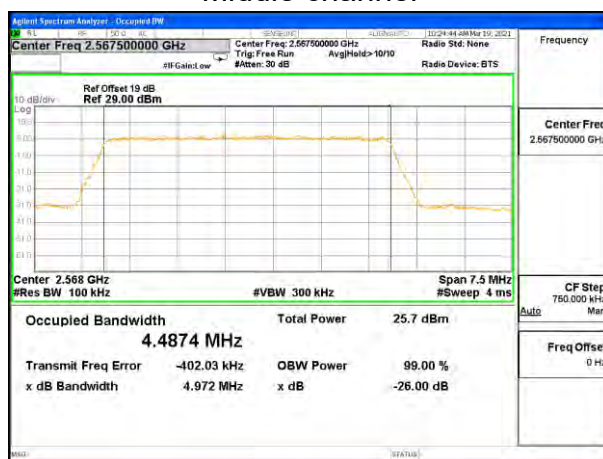
Lowest channel



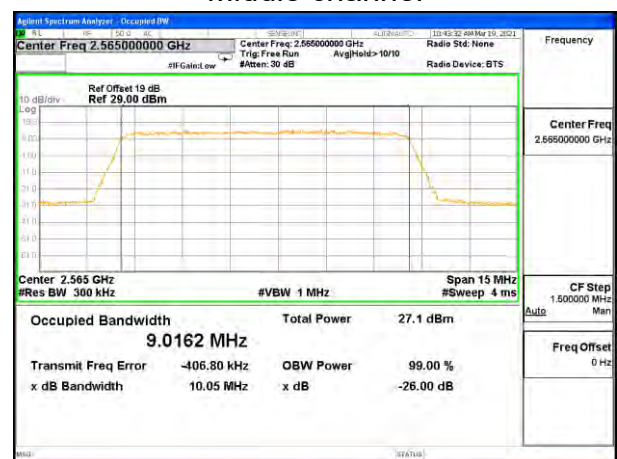
Middle channel



Middle channel

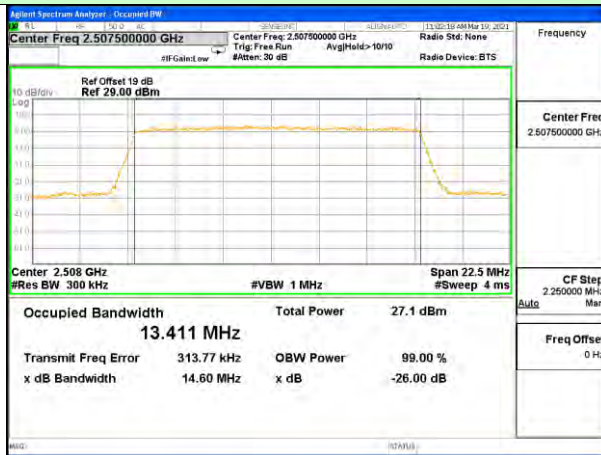


Highest channel



Highest channel

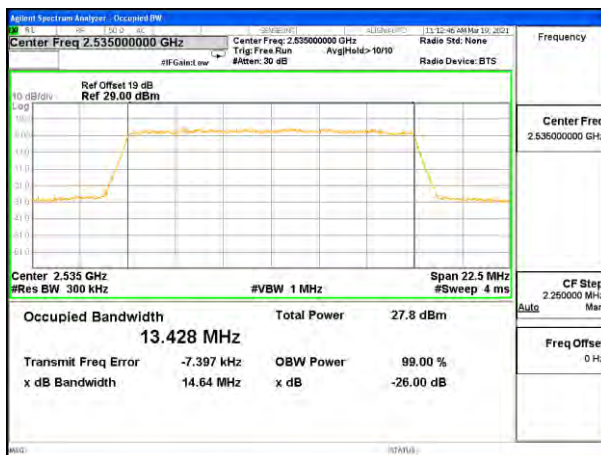
Test Mode: LTE Band 7
Channel Bandwidth: 15MHz



Test Mode: LTE Band 7
Channel Bandwidth: 20MHz



Lowest channel



Middle channel



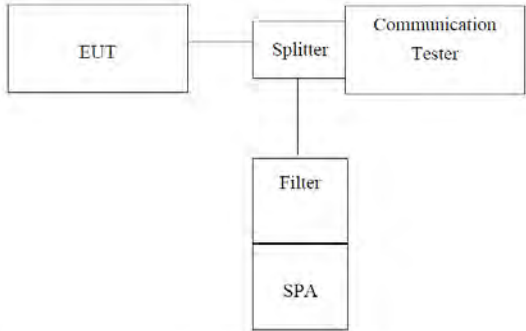
Highest channel

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

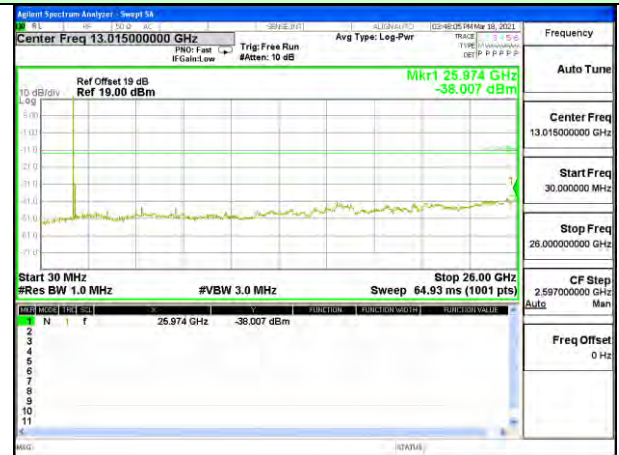
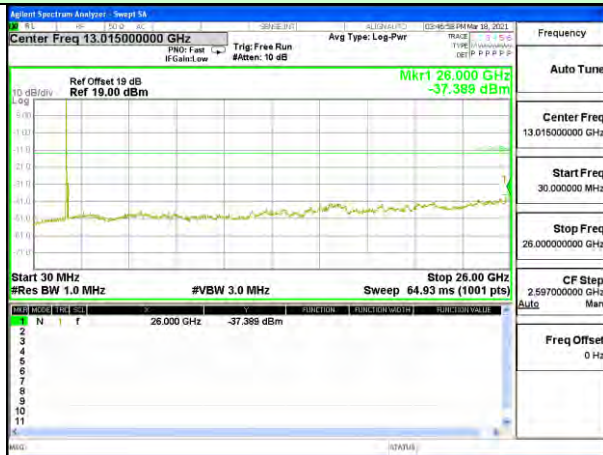
4.5 MODULATION CHARACTERISTIC

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

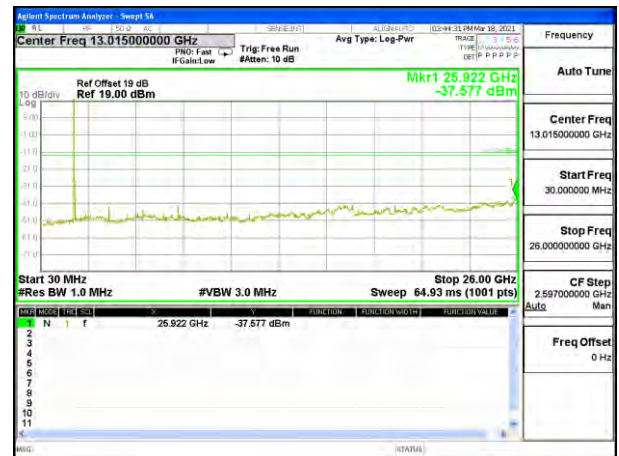
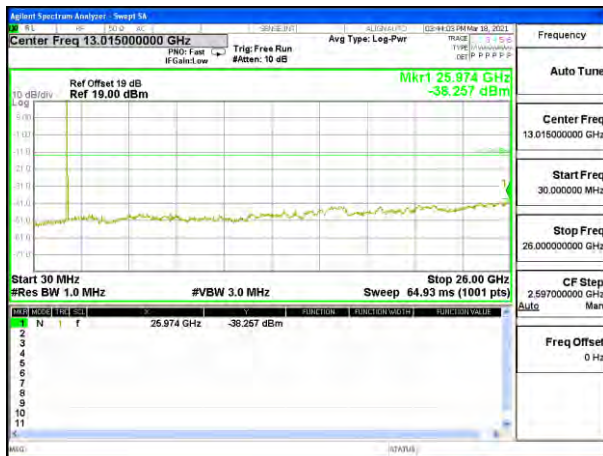
4.6 Out of band emission at antenna terminals

Test Requirement:	FCC part22.913(a), FCC part24.238(a) and FCC part27.53(h)
Test Method:	FCC part2.1051
Limit:	-13dBm
Test setup:	 <i>Note: Measurement setup for testing on Antenna connector</i>
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, VBW = 1MHz, 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 6.0 for details
Test mode:	Refer to section 7.1 for details
Test results:	Pass

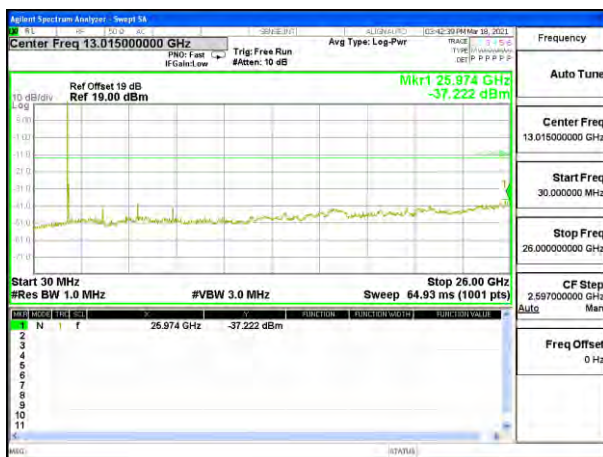
Test plot as follows:

Conducted Spurious Emission:**Test Mode: LTE Band 2 / 5MHz /1RB****Test Mode: LTE Band 2 / 5MHz /25RB**

Lowest channel

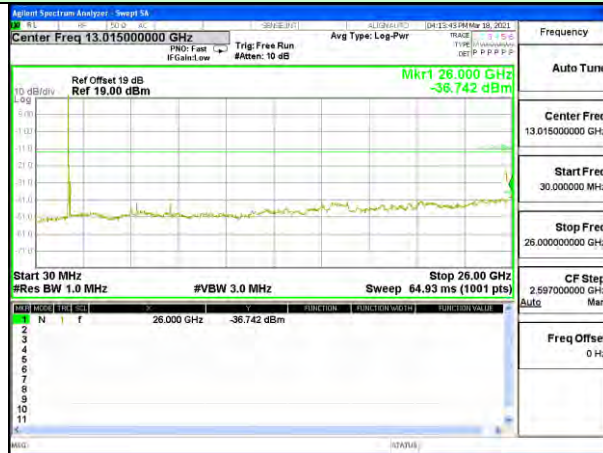


Middle channel



Highest channel

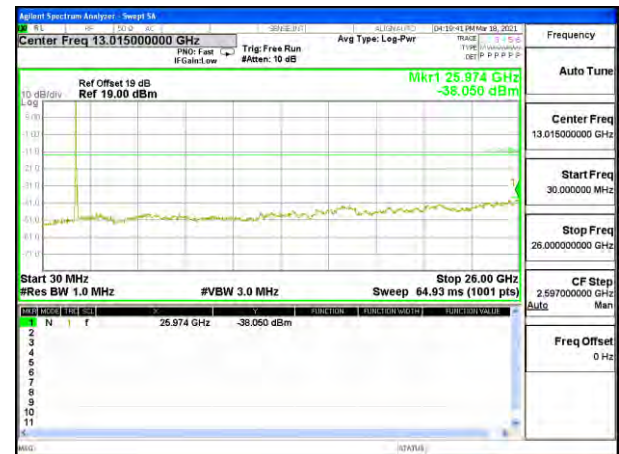
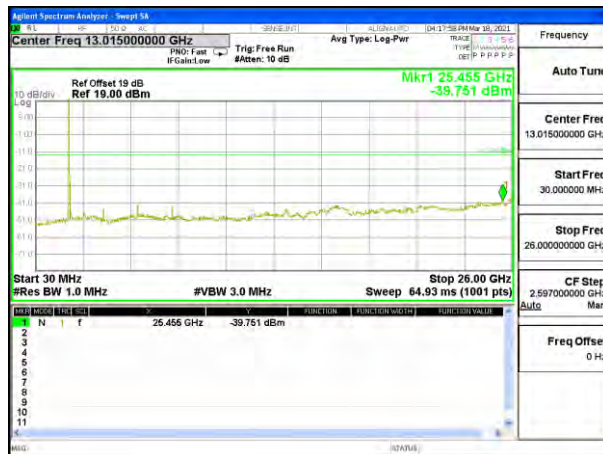
Test Mode: LTE Band 2 / 10MHz /1RB



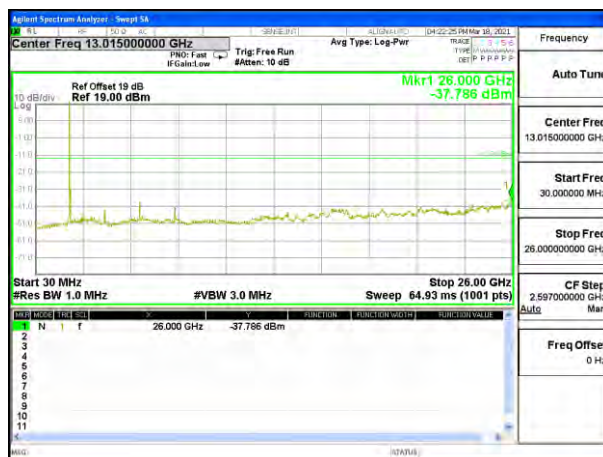
Test Mode: LTE Band 2 / 10MHz /50RB



Lowest channel

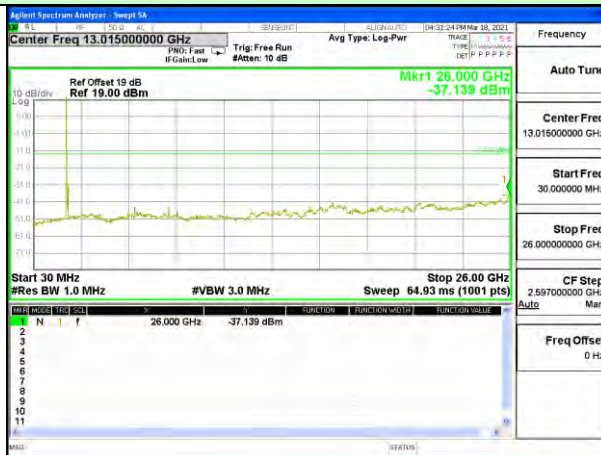


Middle channel

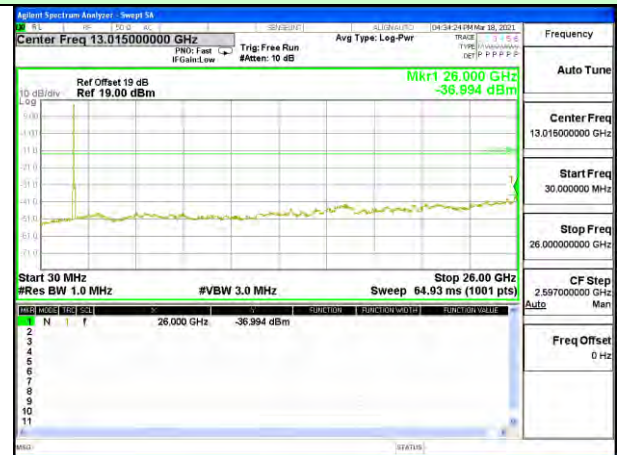


Highest channel

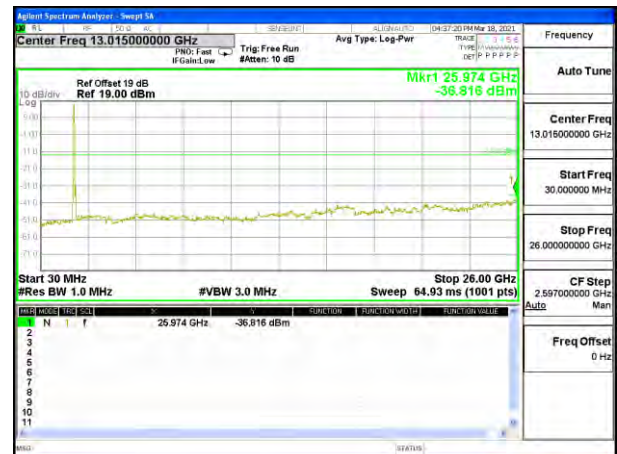
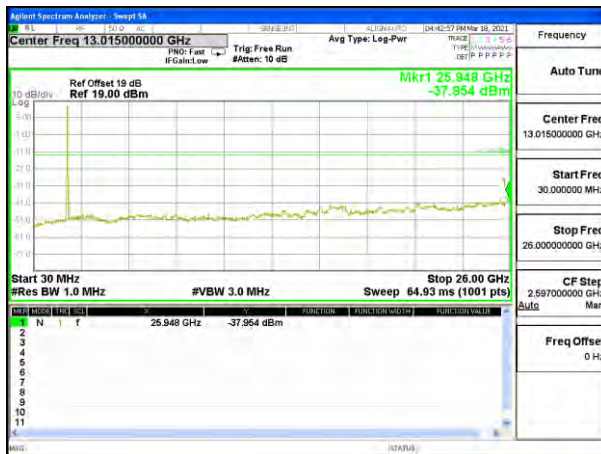
Test Mode: LTE Band 2 / 15MHz /1RB



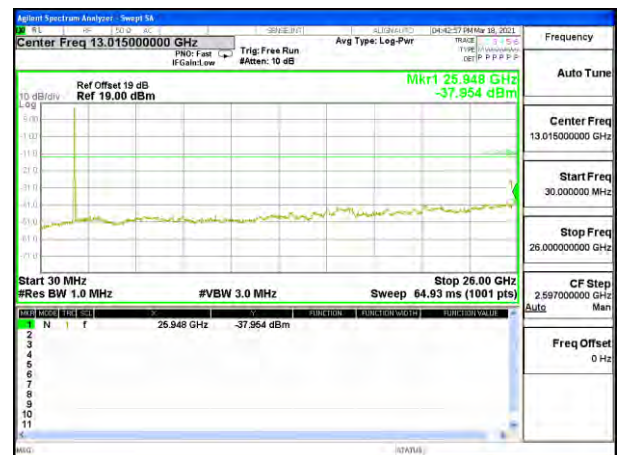
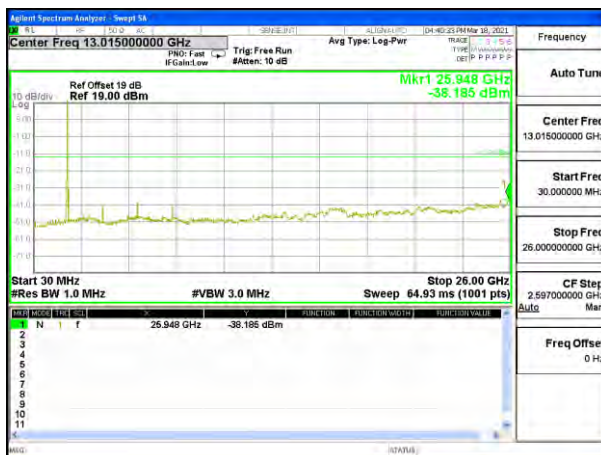
Test Mode: LTE Band 2 / 15MHz /75RB



Lowest channel

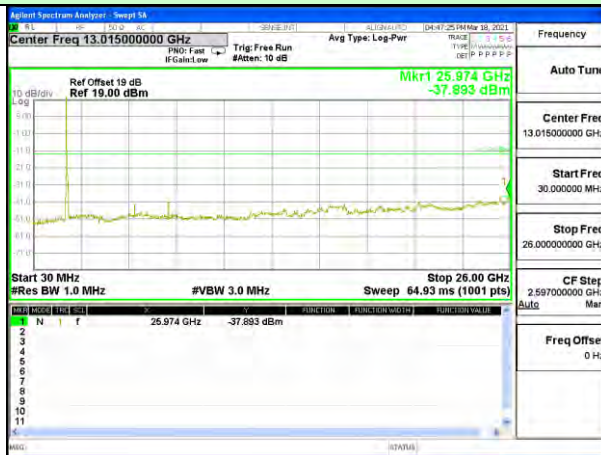


Middle channel

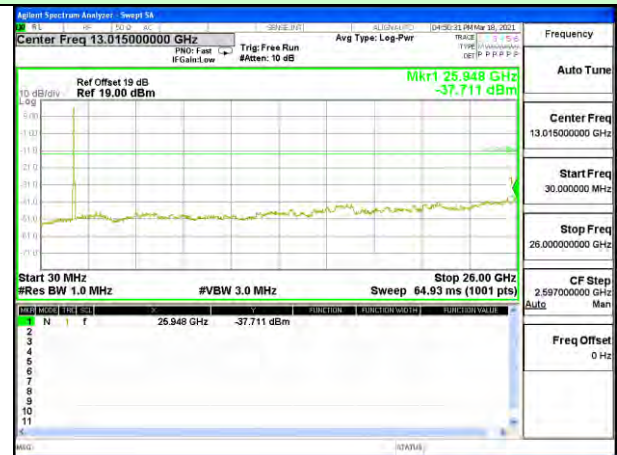


Highest channel

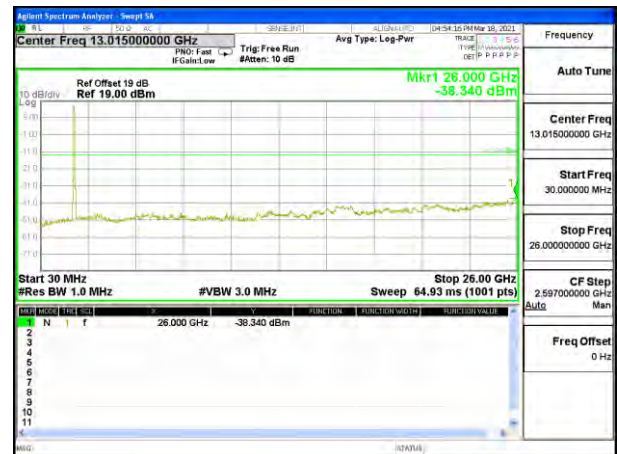
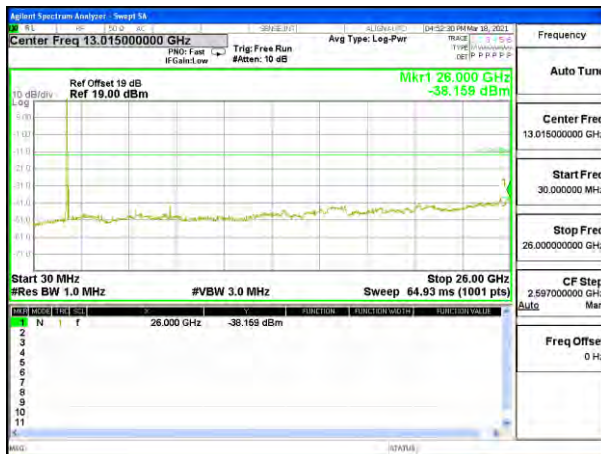
Test Mode: LTE Band 2 / 20MHz /1RB



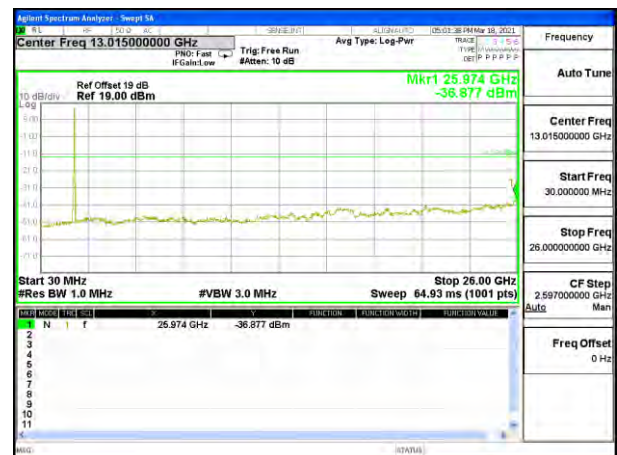
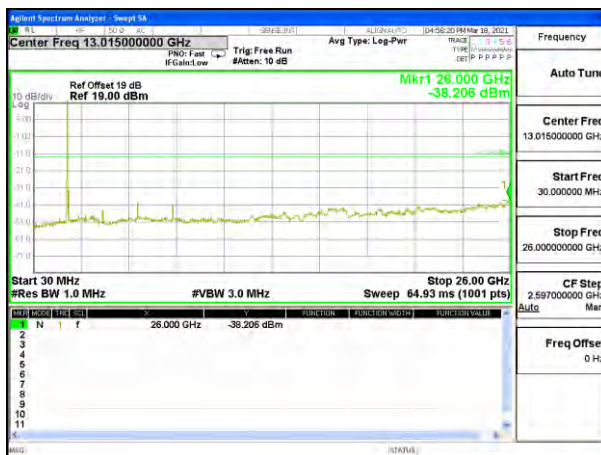
Test Mode: LTE Band 2 / 20MHz /100RB



Lowest channel

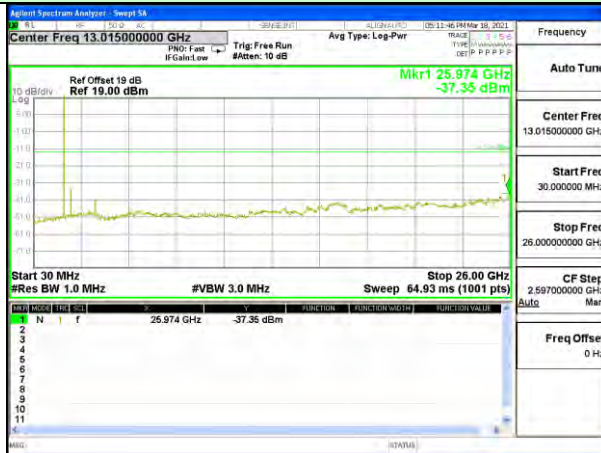


Middle channel

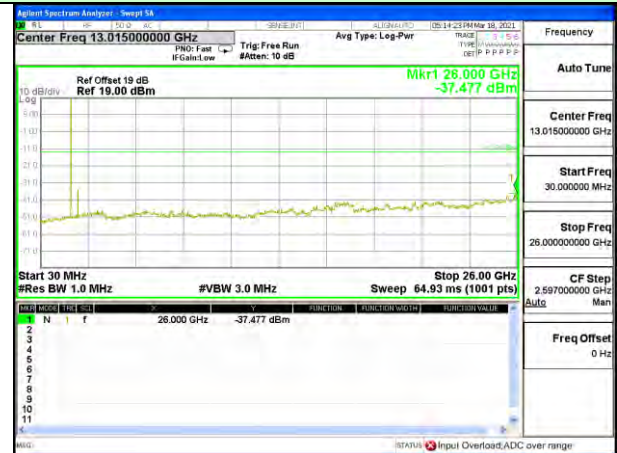


Highest channel

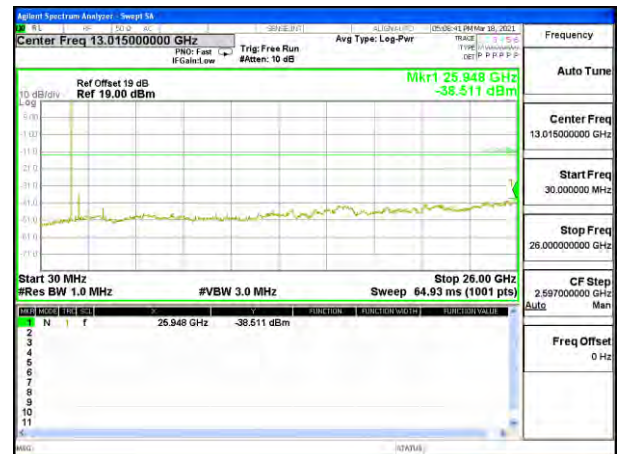
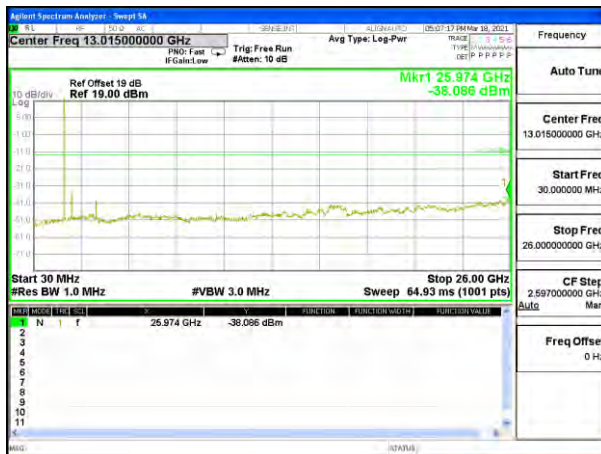
Test Mode: LTE Band 4 / 5MHz /1RB



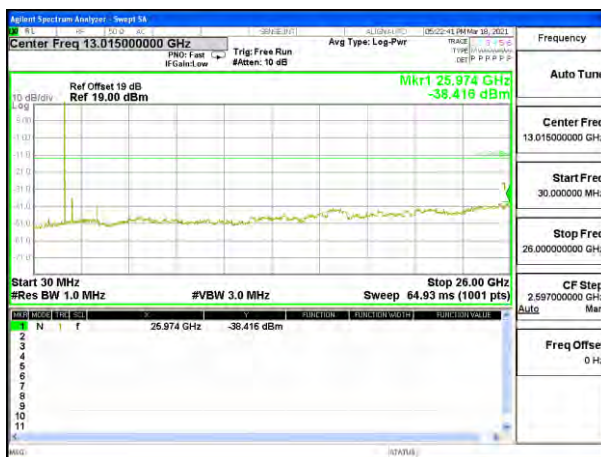
Test Mode: LTE Band 4 / 5MHz /25RB



Lowest channel

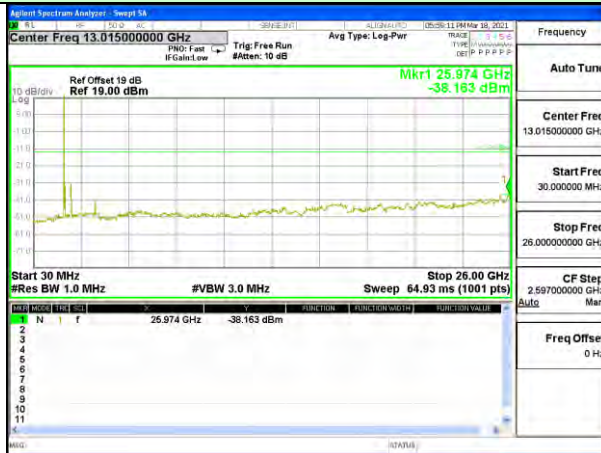


Middle channel

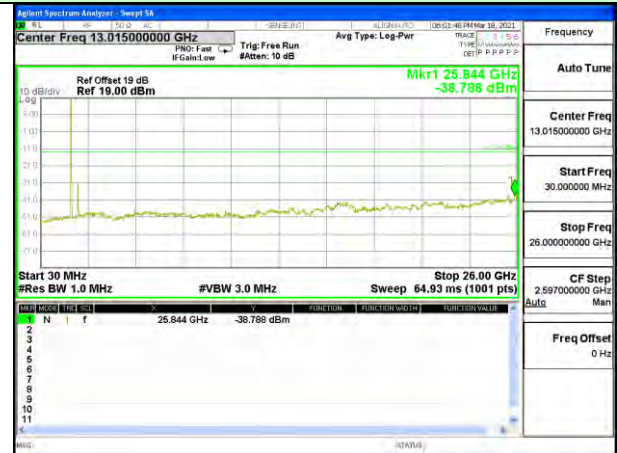


Highest channel

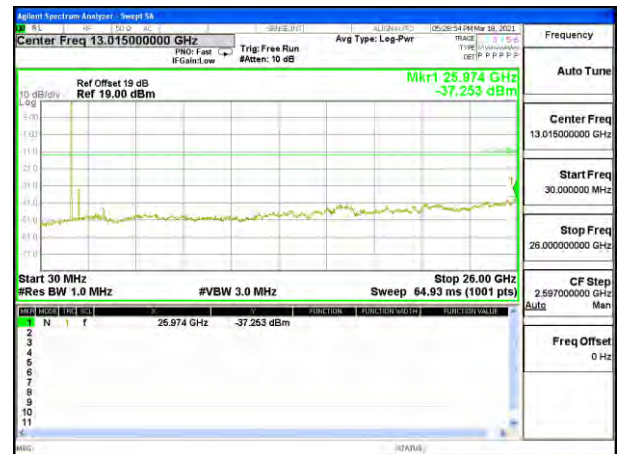
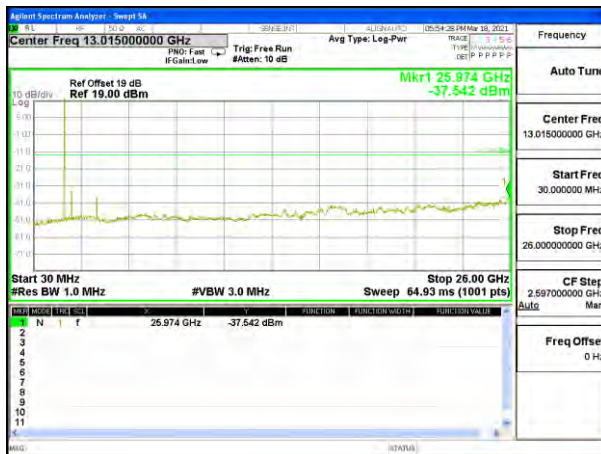
Test Mode: LTE Band 4 / 10MHz /1RB



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



Lowest channel

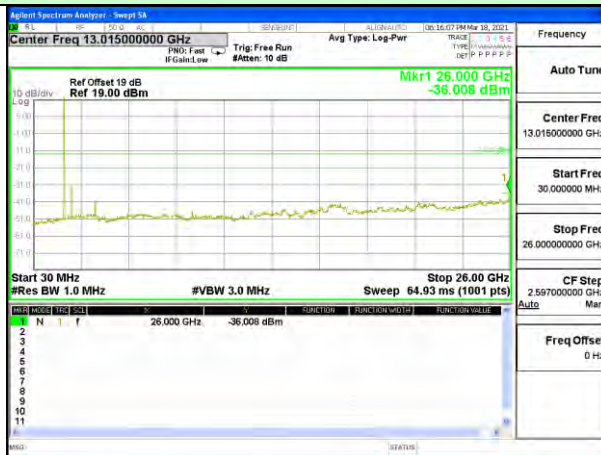


Middle channel

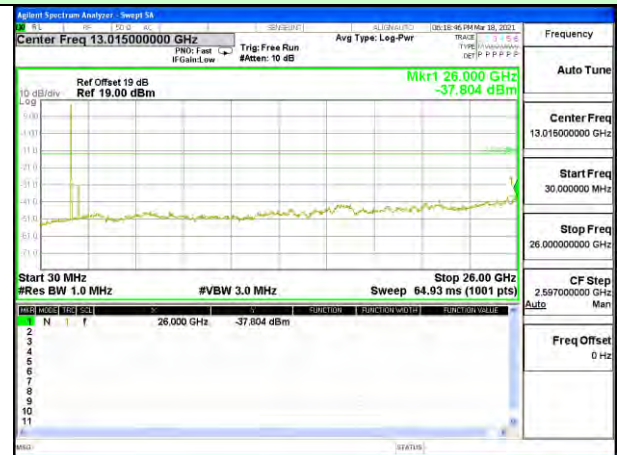


Highest channel

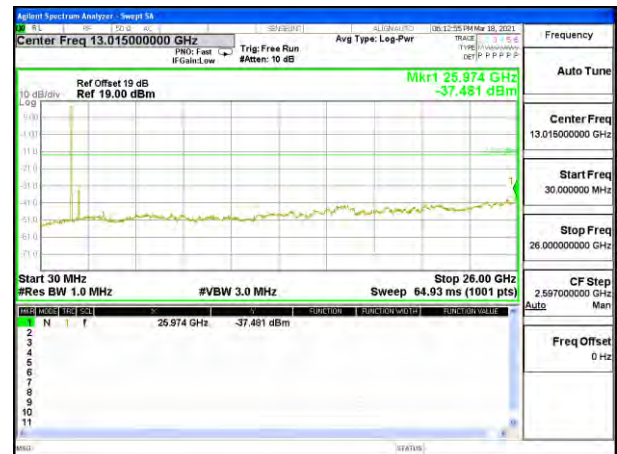
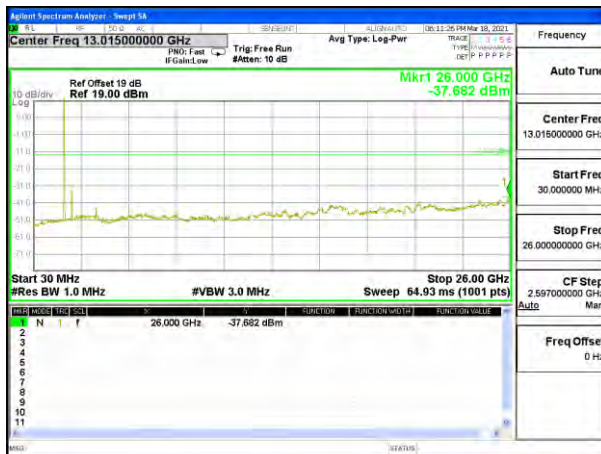
Test Mode: LTE Band 4 / 15MHz /1RB



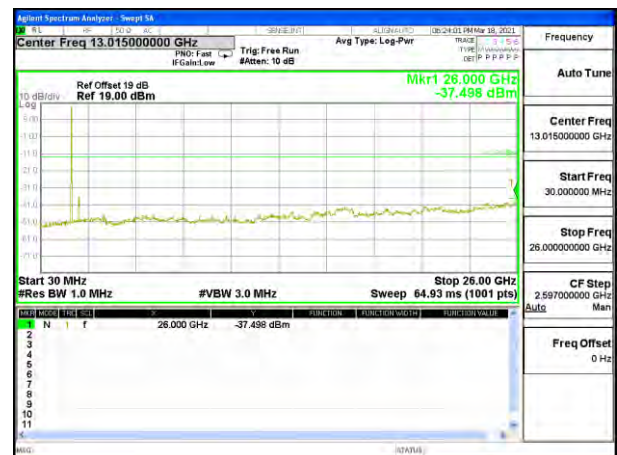
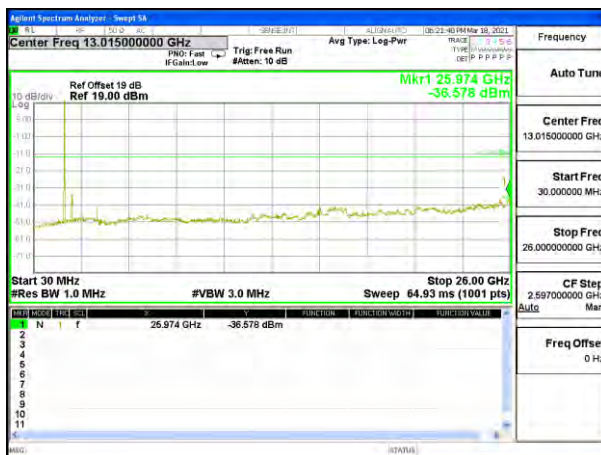
Test Mode: LTE Band 4 / 15MHz /75RB



Lowest channel

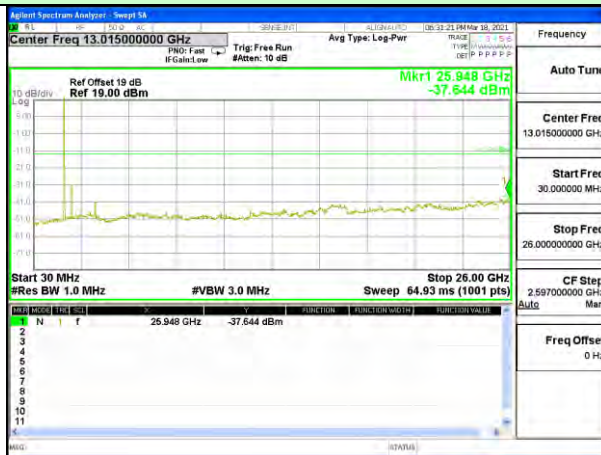


Middle channel



Highest channel

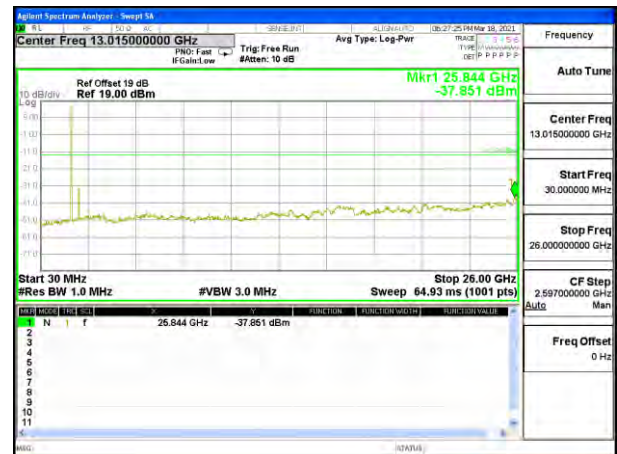
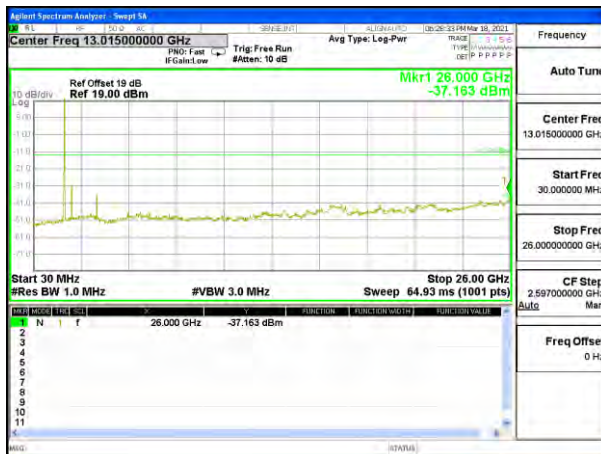
Test Mode: LTE Band 4 / 20MHz /1RB



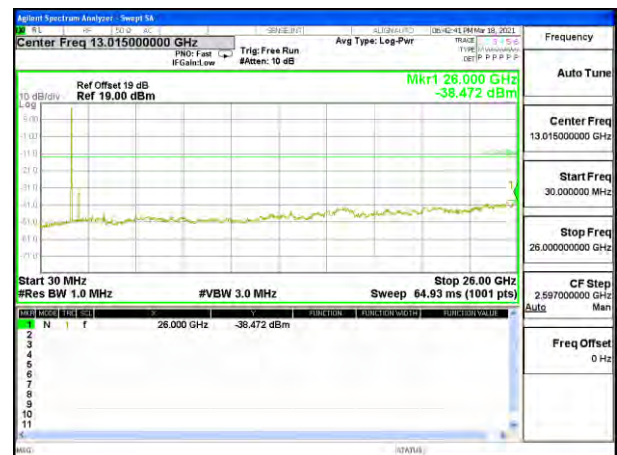
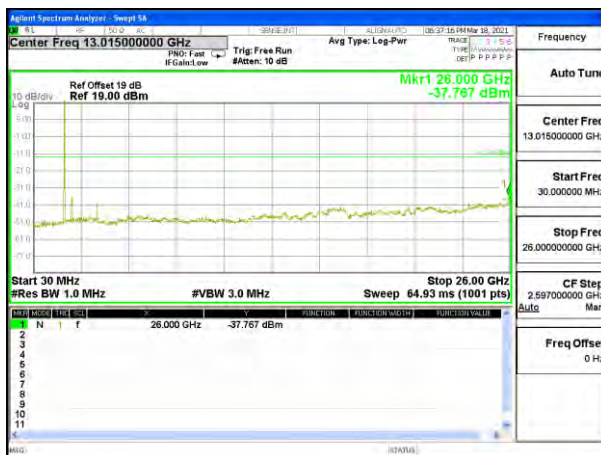
Test Mode: LTE Band 4 / 20MHz /100RB



Lowest channel

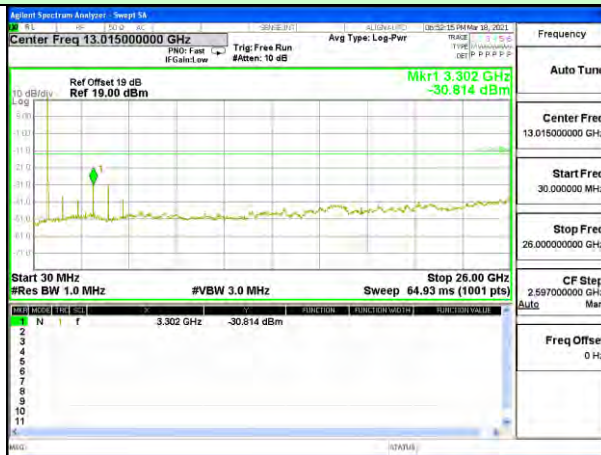


Middle channel

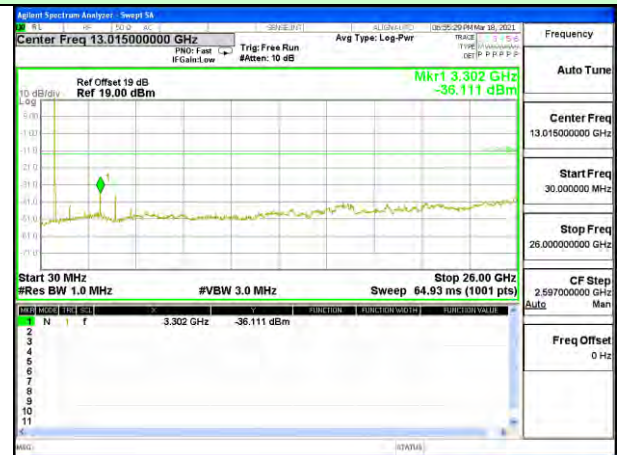


Highest channel

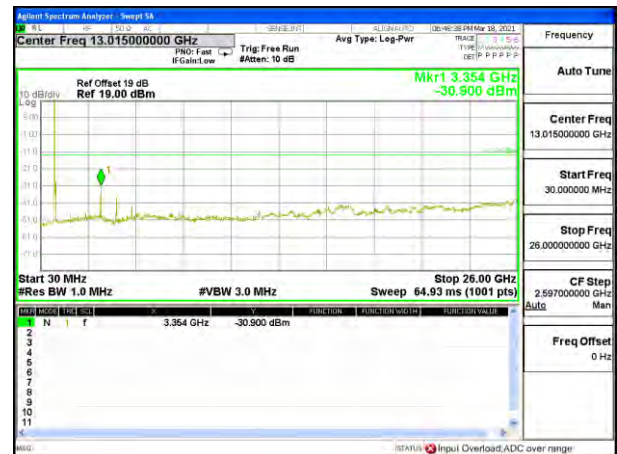
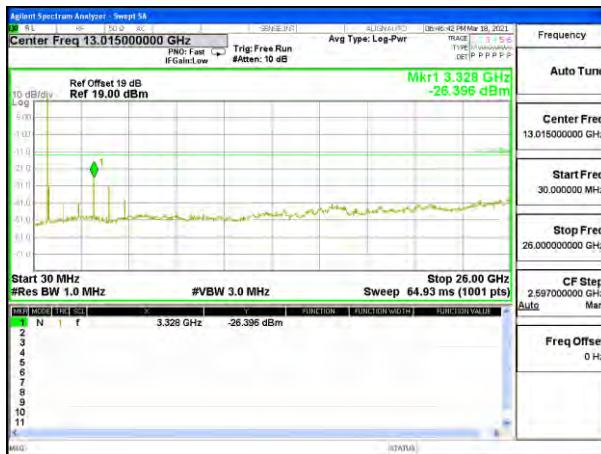
Test Mode: LTE Band 5 / 5MHz /1RB



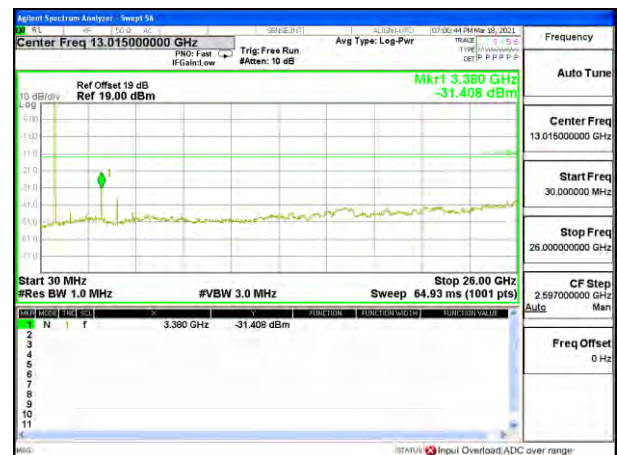
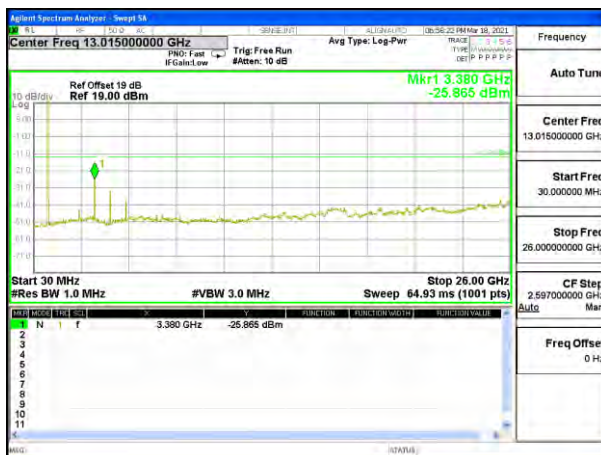
Test Mode: LTE Band 5 / 5MHz /25RB



Lowest channel

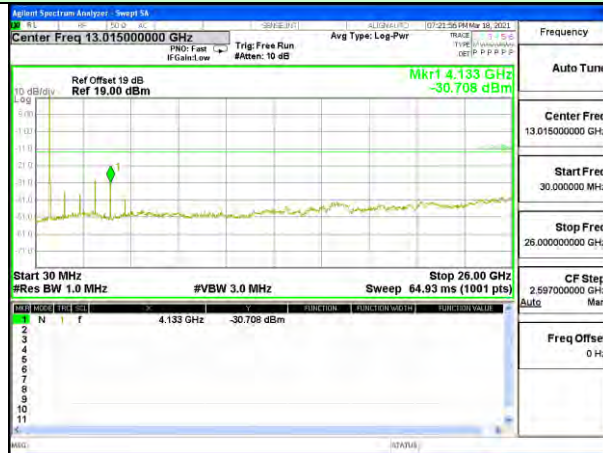


Middle channel

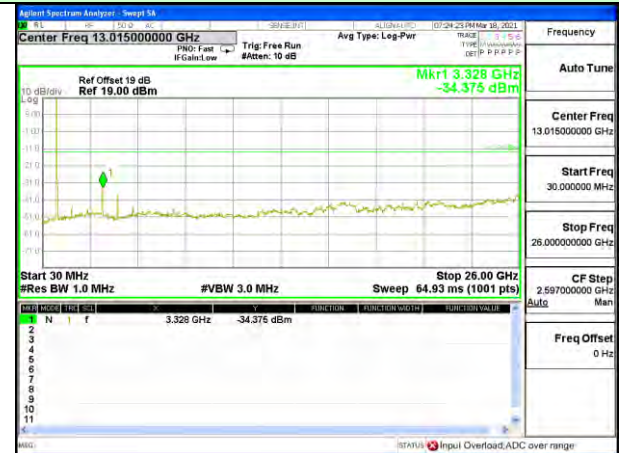


Highest channel

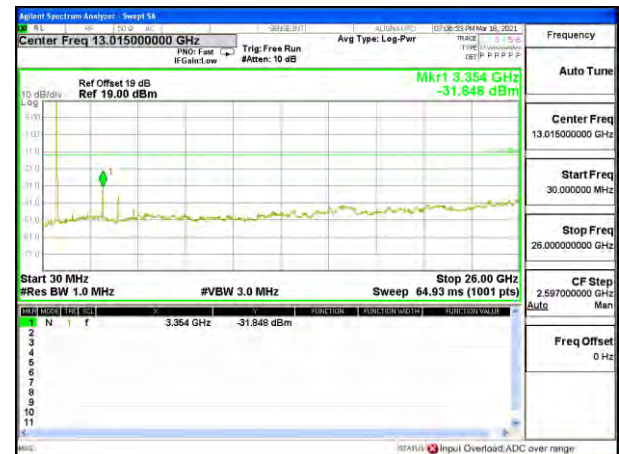
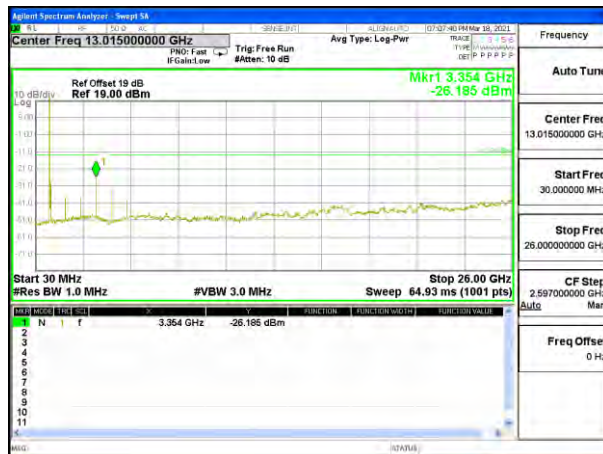
Test Mode: LTE Band 5 / 10MHz /1RB



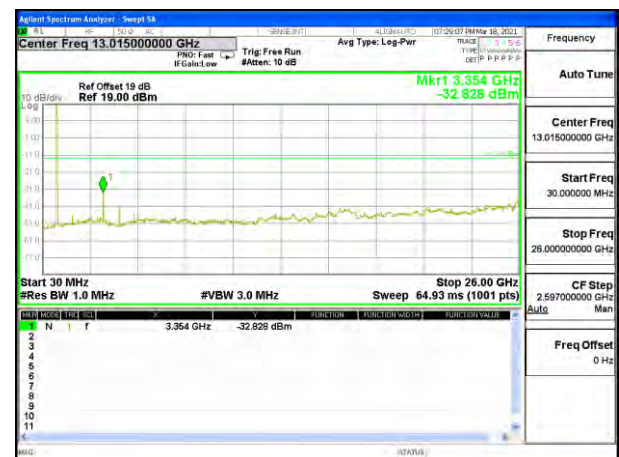
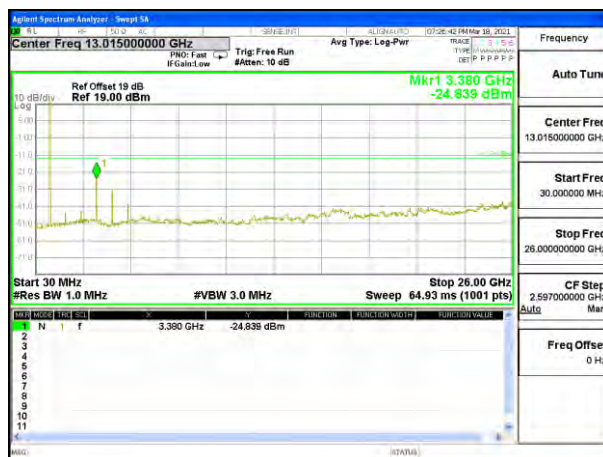
Test Mode: LTE Band 5 / 10MHz /50RB



Lowest channel

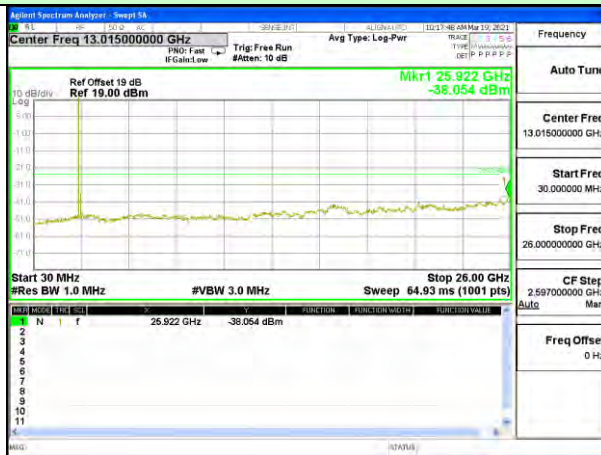


Middle channel

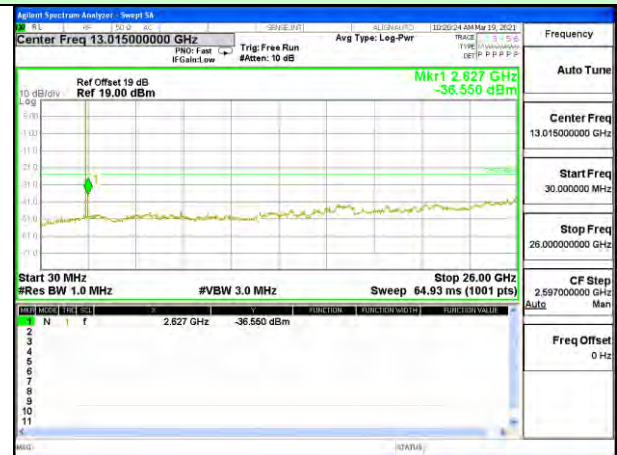


Highest channel

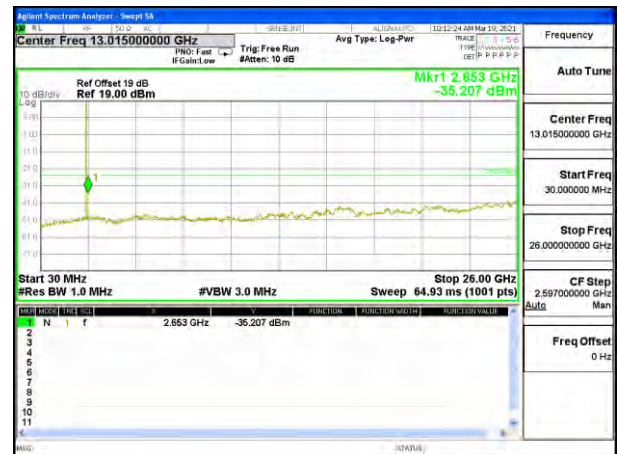
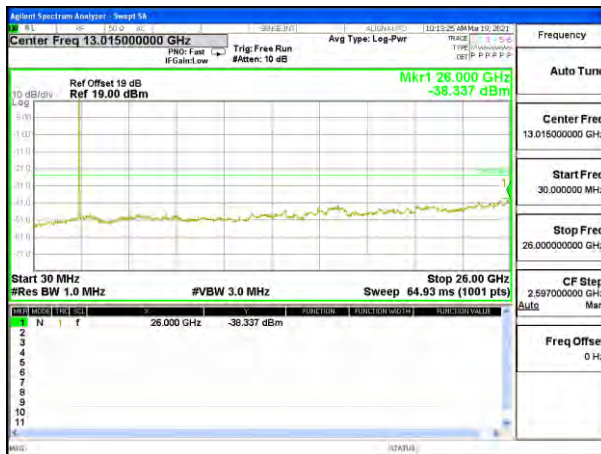
Test Mode: LTE Band 7 / 5MHz /1RB



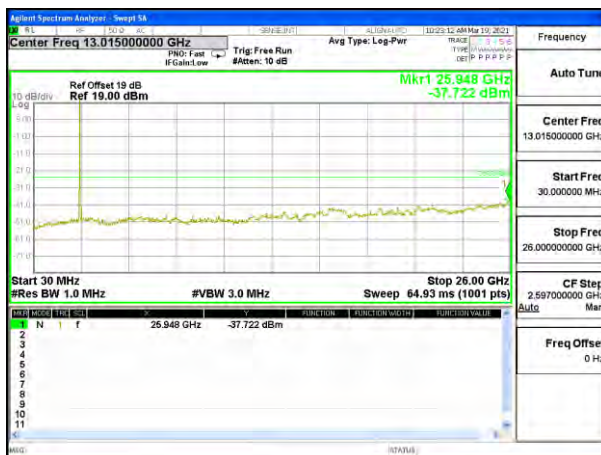
Test Mode: LTE Band 7 / 5MHz /25RB



Lowest channel

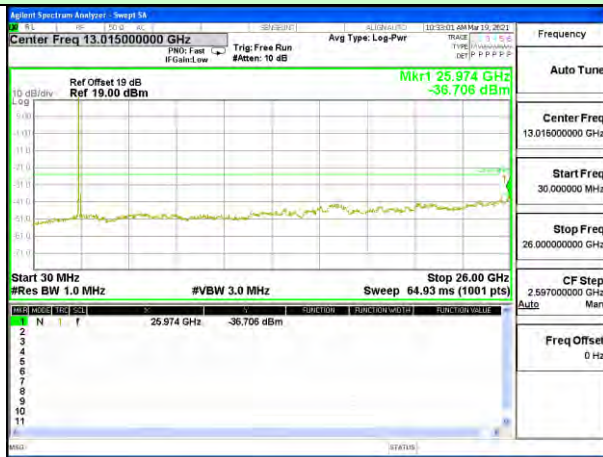


Middle channel

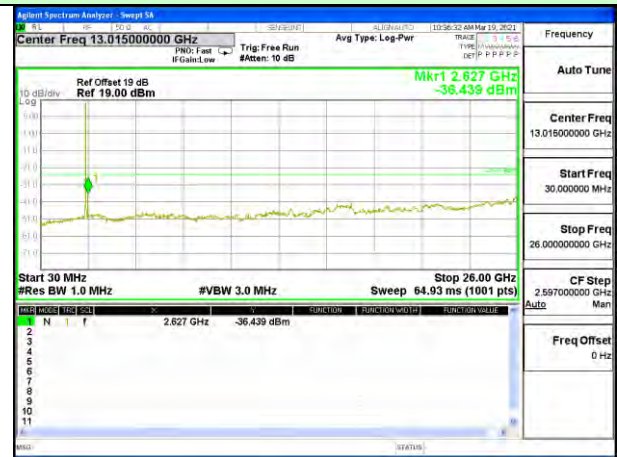


Highest channel

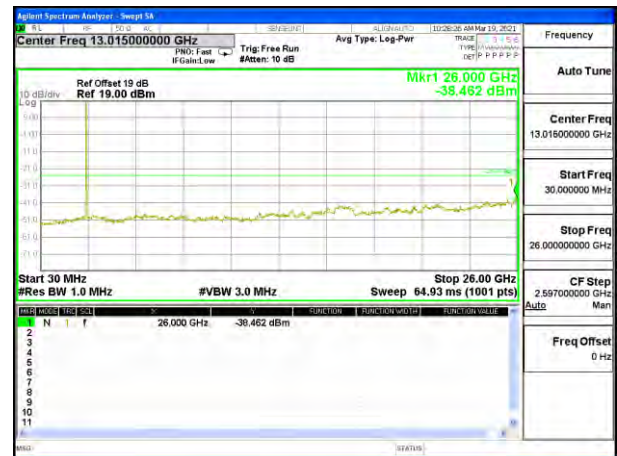
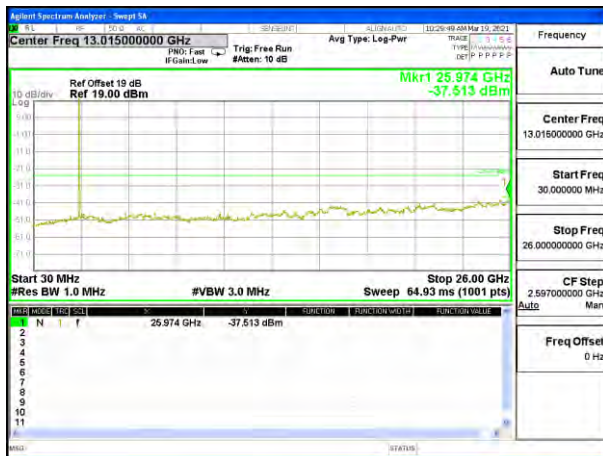
Test Mode: LTE Band 7 / 10MHz /1RB



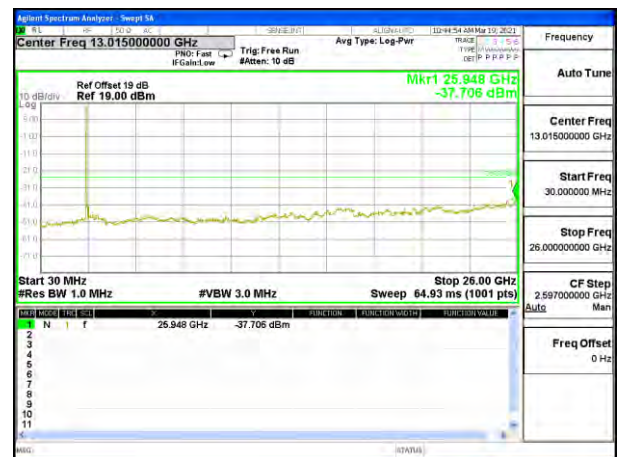
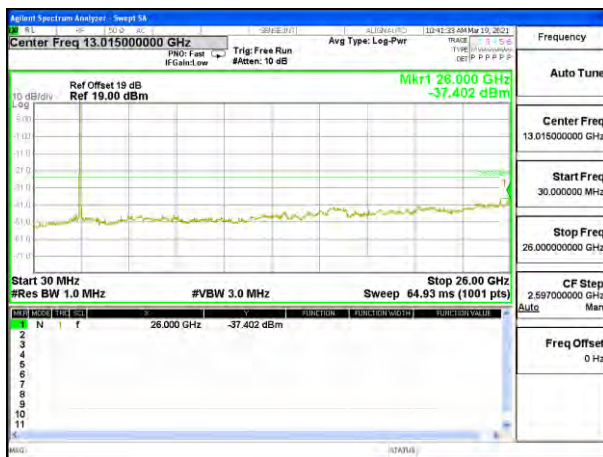
Test Mode: LTE Band 7 / 10MHz /50RB



Lowest channel

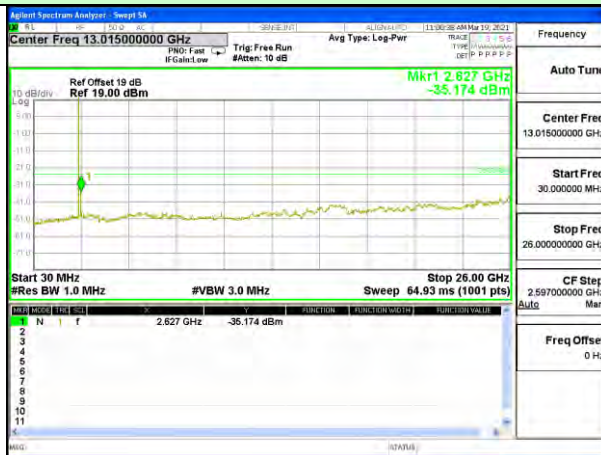


Middle channel

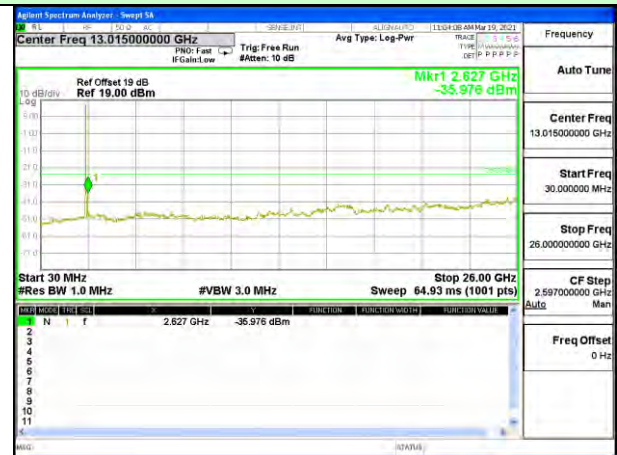


Highest channel

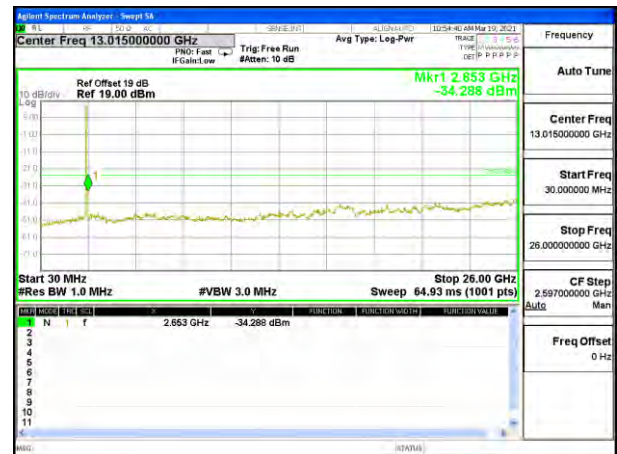
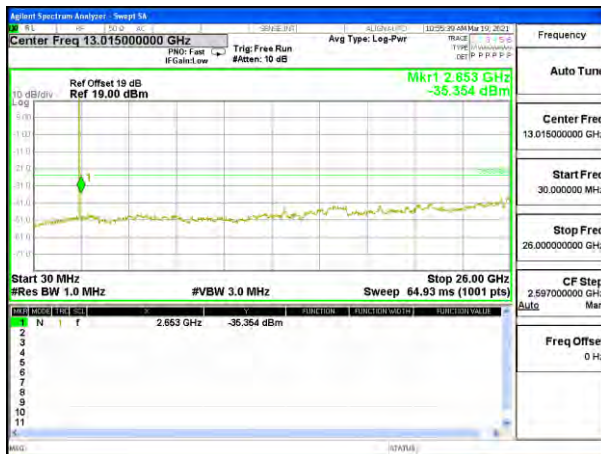
Test Mode: LTE Band 7 / 15MHz /1RB



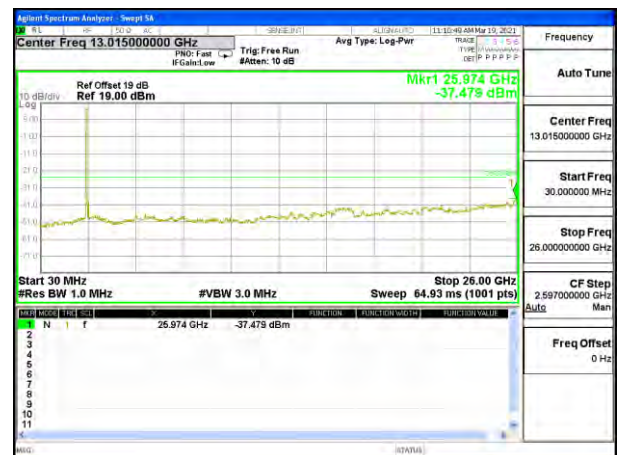
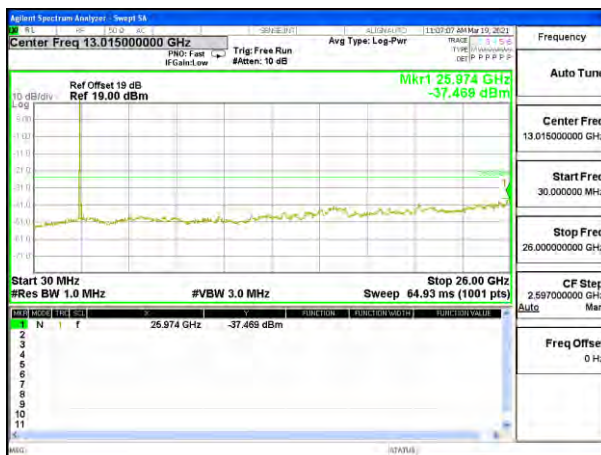
Test Mode: LTE Band 7 / 15MHz /75RB



Lowest channel



Middle channel



Highest channel

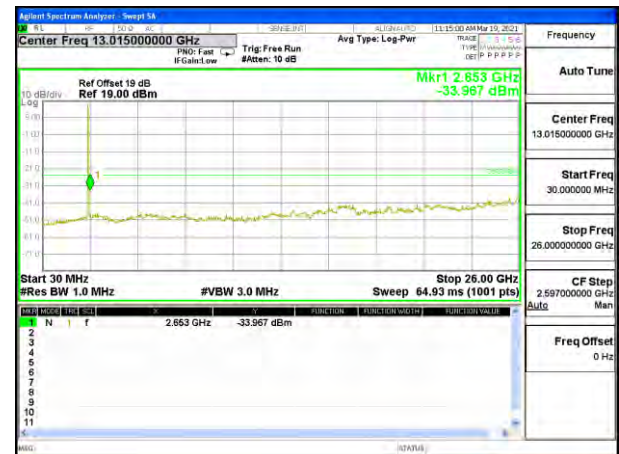
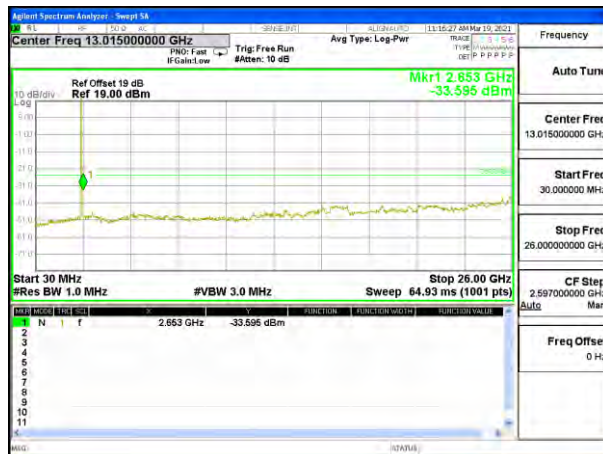
Test Mode: LTE Band 7 / 20MHz /1RB



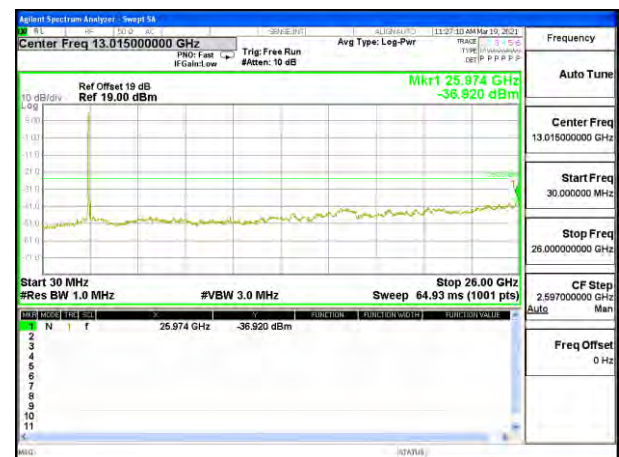
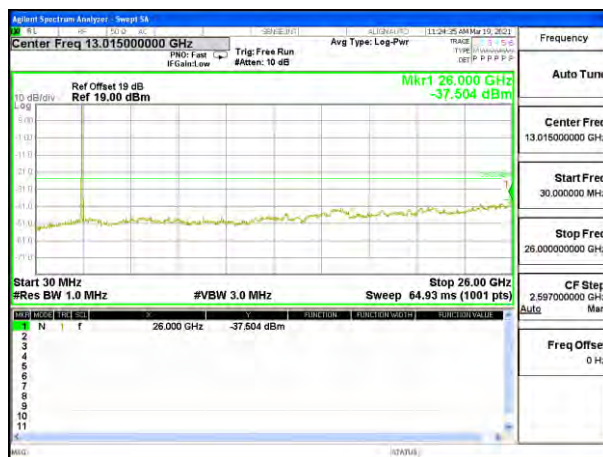
Test Mode: LTE Band 7 / 20MHz /100RB



Lowest channel



Middle channel



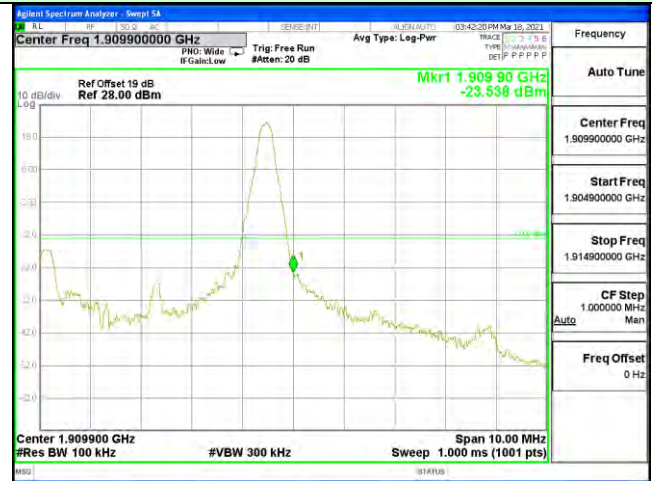
Highest channel

Band Edge

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



Lowest channel



Highest channel

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

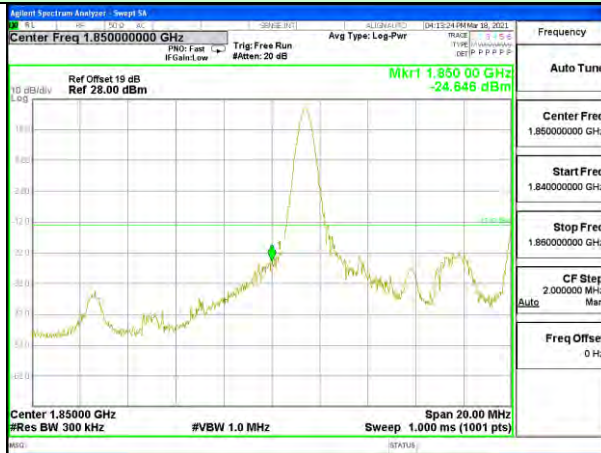


Lowest channel

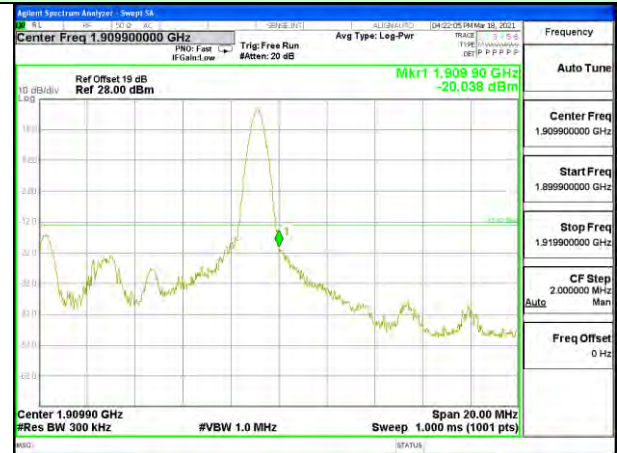


Highest channel

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

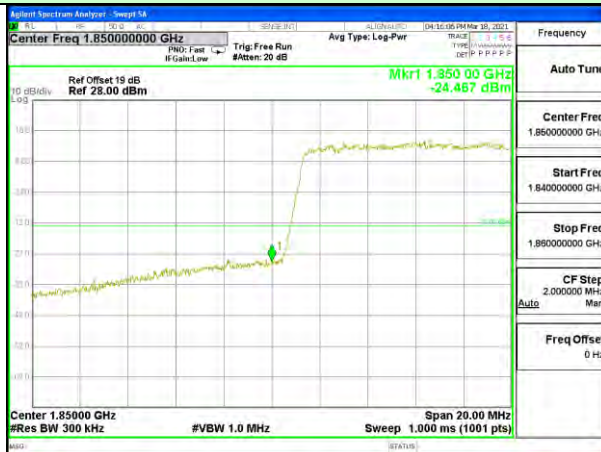


Lowest channel



Highest channel

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

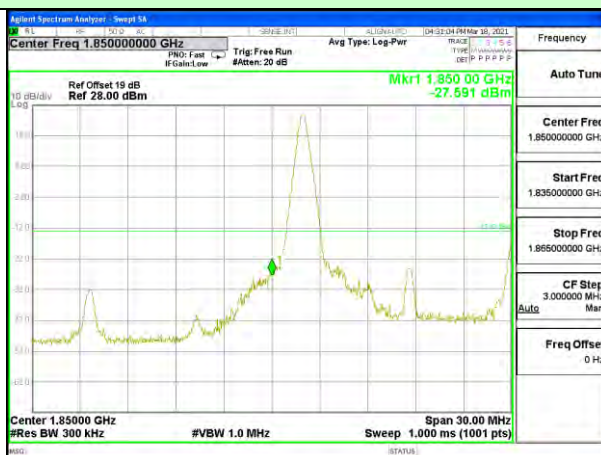


Lowest channel

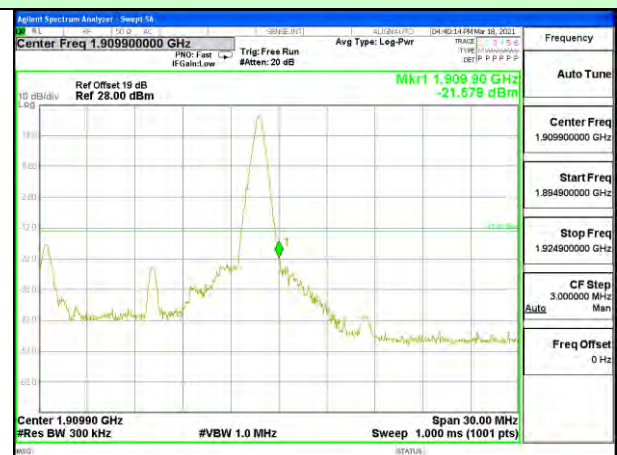


Highest channel

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



Lowest channel



Highest channel

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

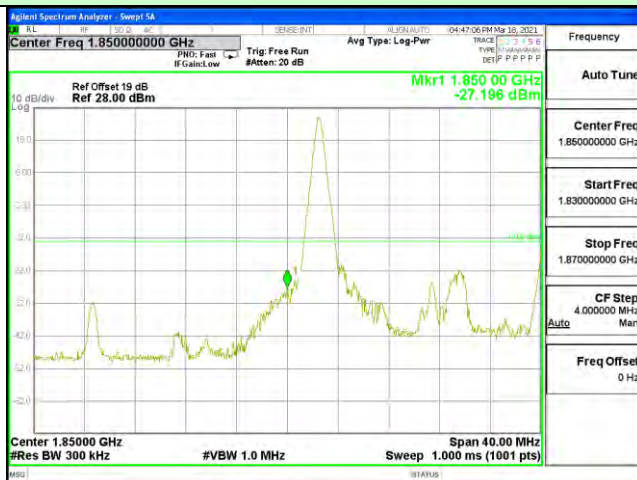


Lowest channel

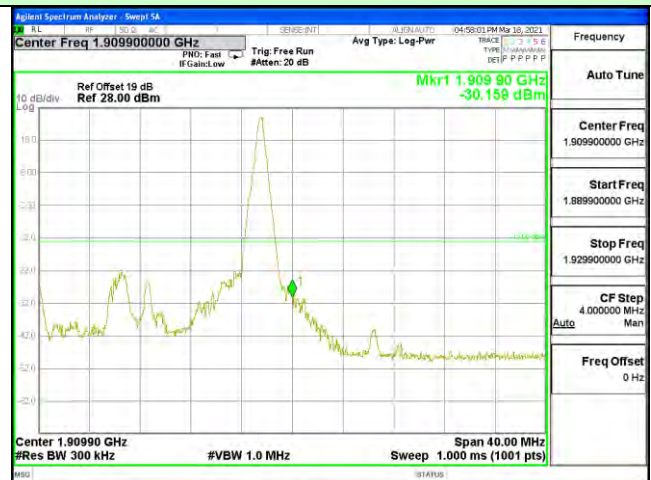


Highest channel

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

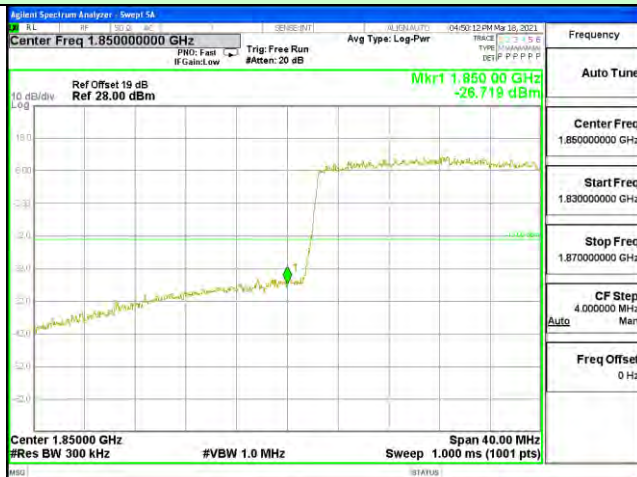


Lowest channel

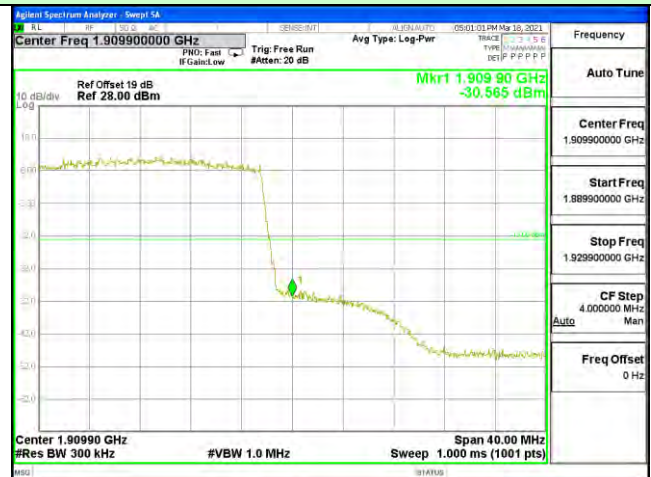


Highest channel

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

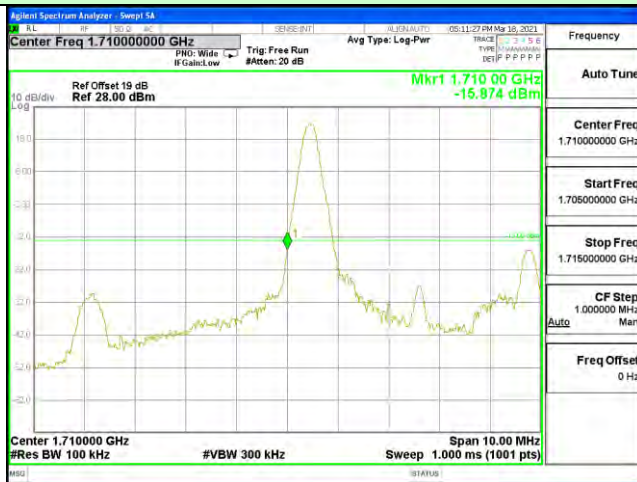


Lowest channel

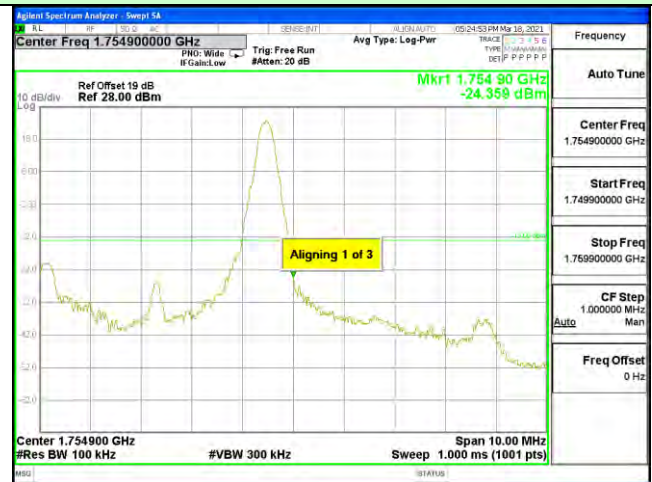


Highest channel

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



Lowest channel



Highest channel

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

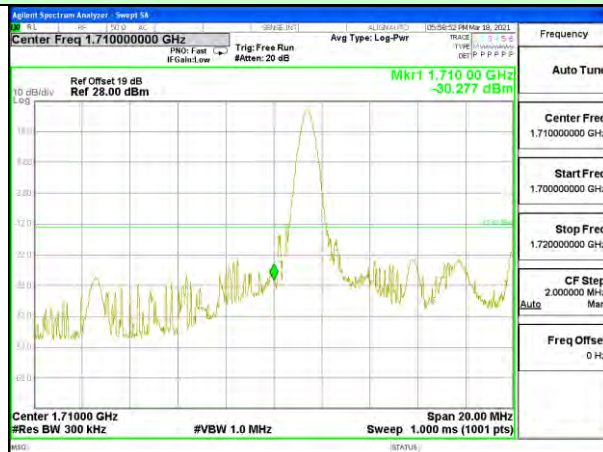


Lowest channel



Highest channel

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

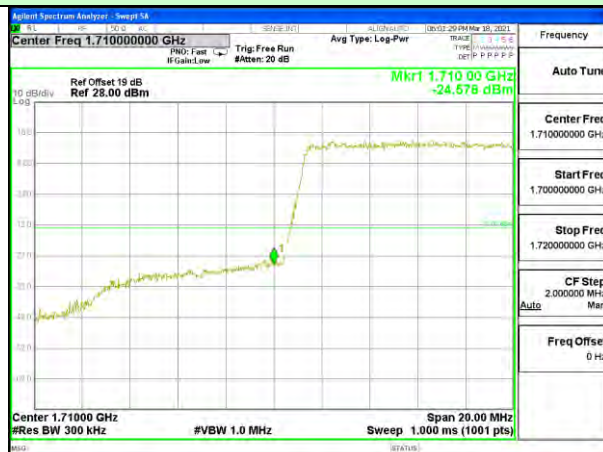


Lowest channel

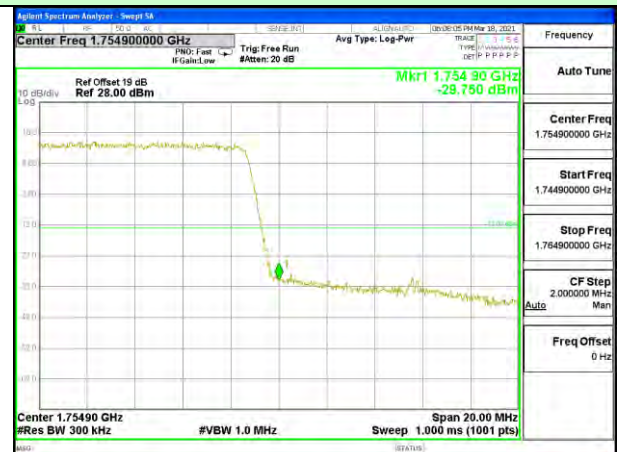


Highest channel

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

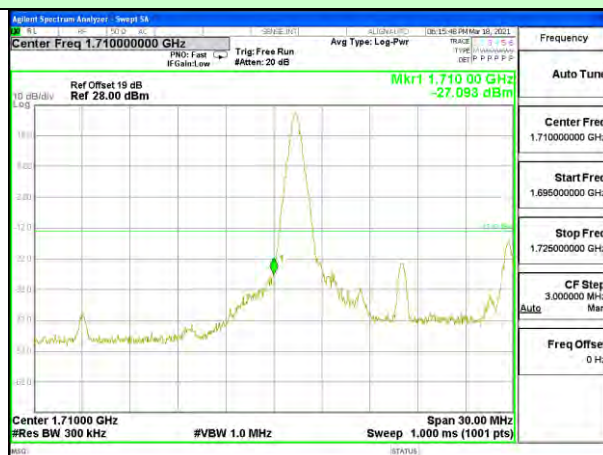


Lowest channel

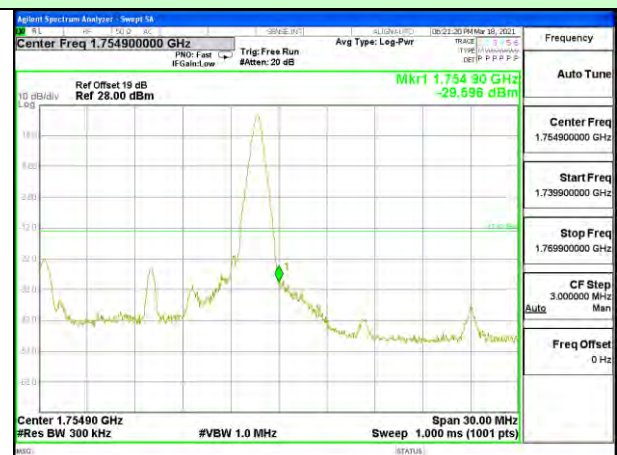


Highest channel

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



Lowest channel



Highest channel

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

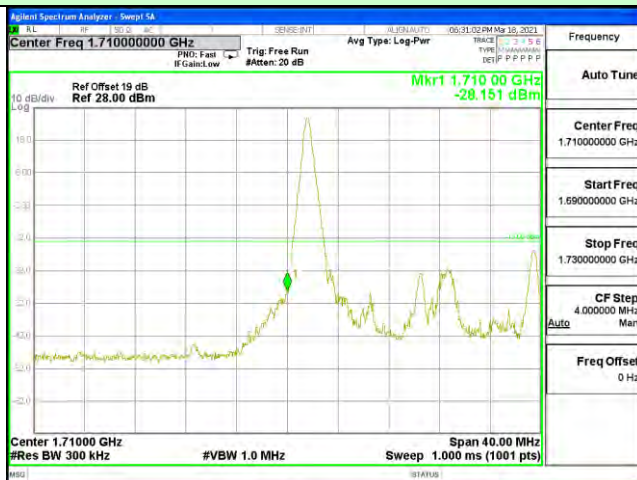


Lowest channel

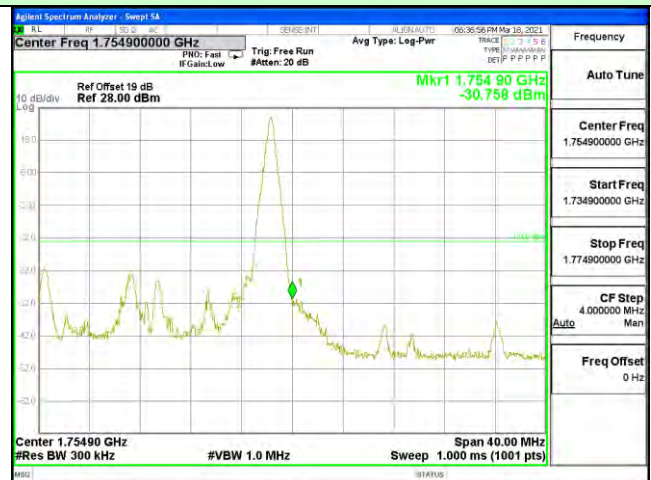


Highest channel

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



Lowest channel



Highest channel

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



Lowest channel

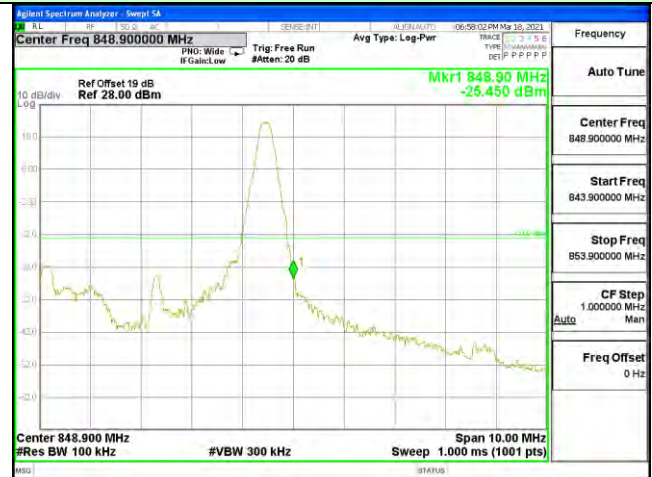


Highest channel

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

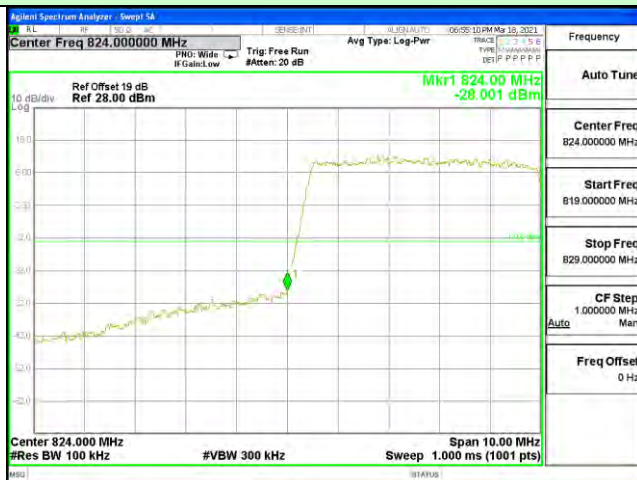


Lowest channel



Highest channel

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

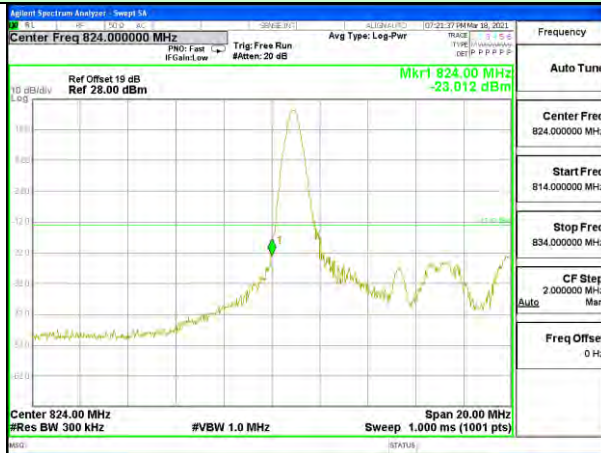


Lowest channel

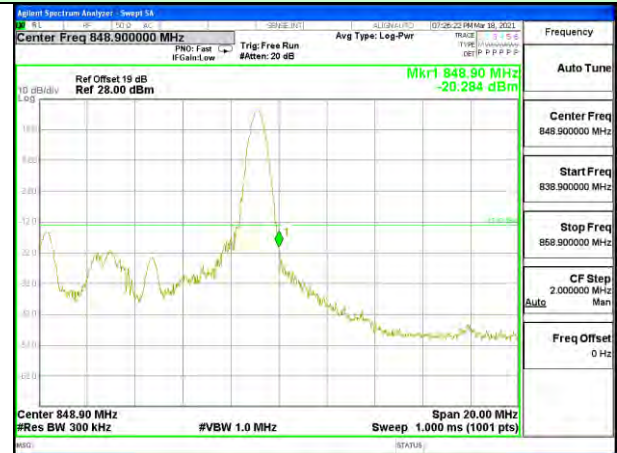


Highest channel

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

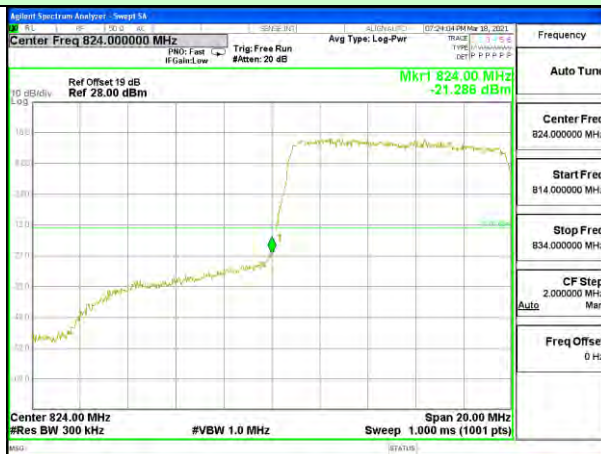


Lowest channel

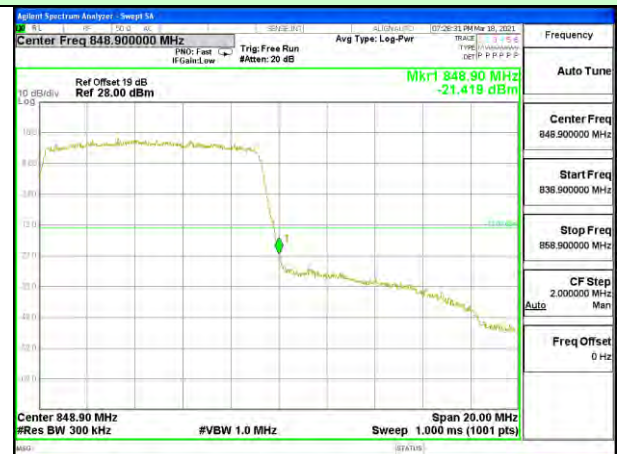


Highest channel

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

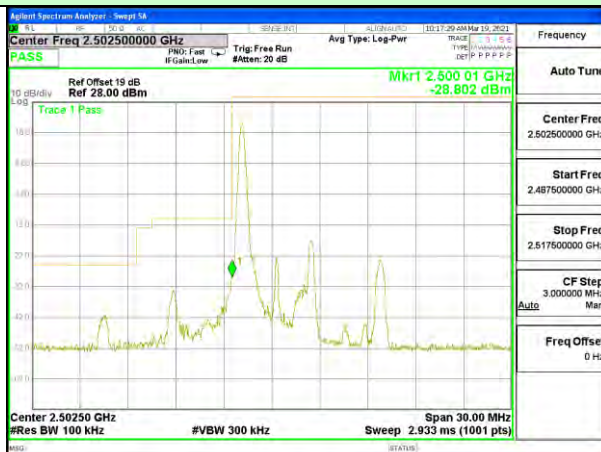


Lowest channel

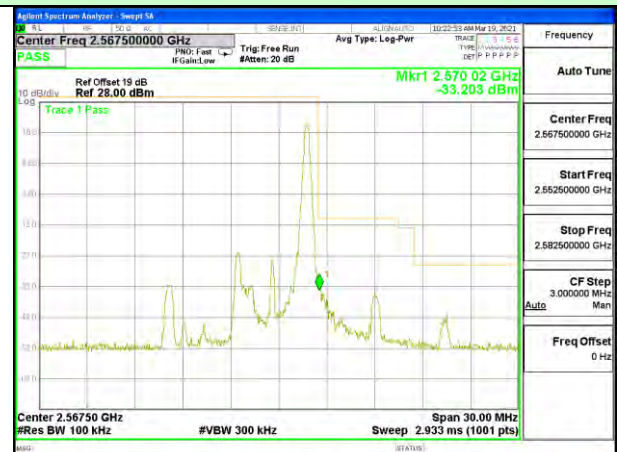


Highest channel

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



Lowest channel

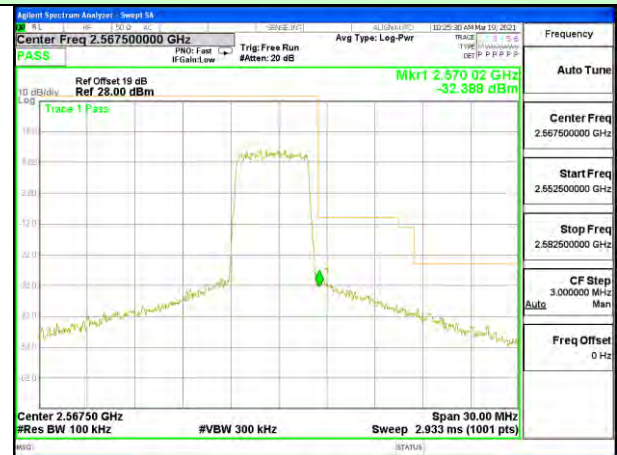


Highest channel

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

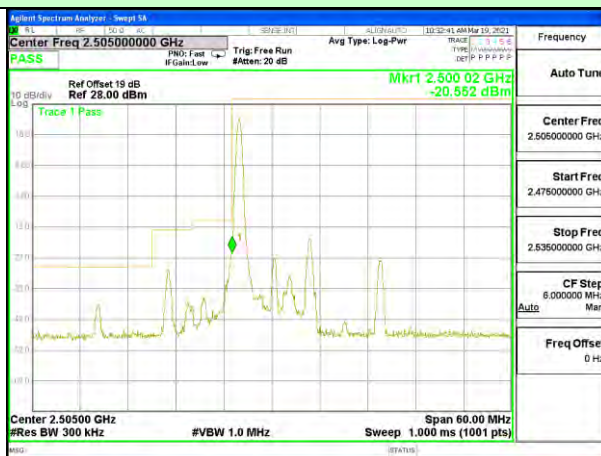


Lowest channel

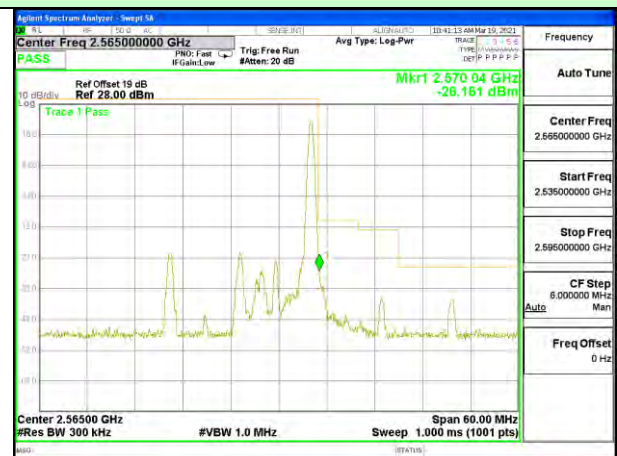


Highest channel

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

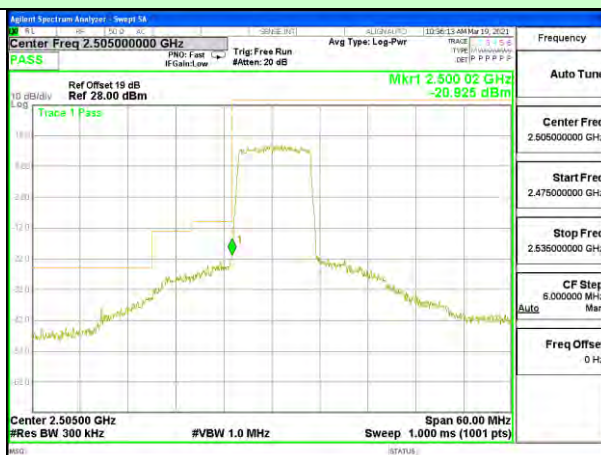


Lowest channel



Highest channel

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

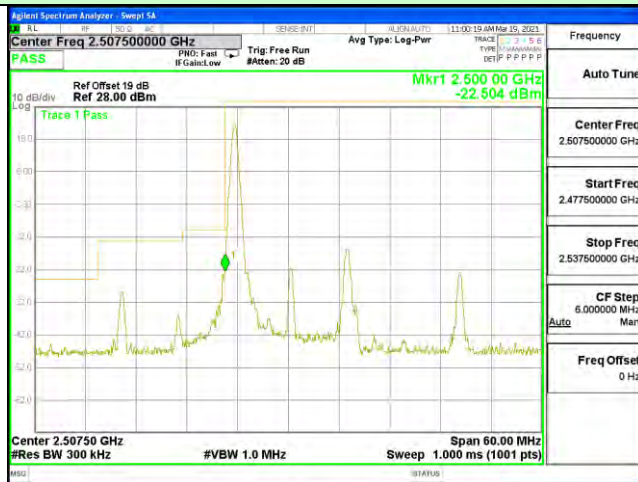


Lowest channel

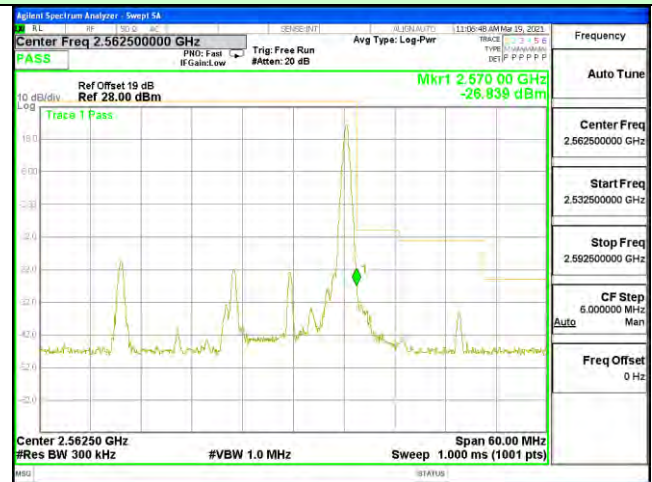


Highest channel

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



Lowest channel



Highest channel

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

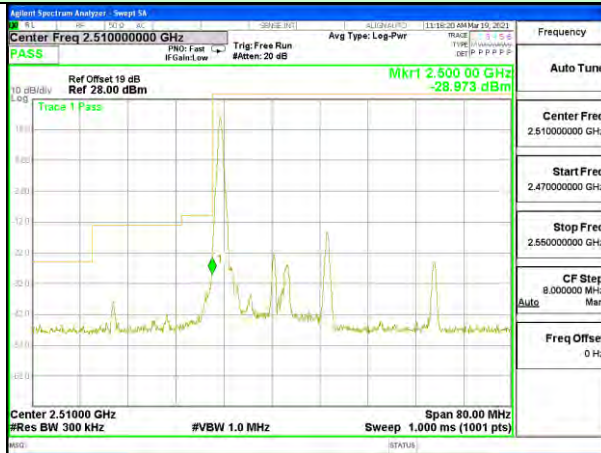


Lowest channel

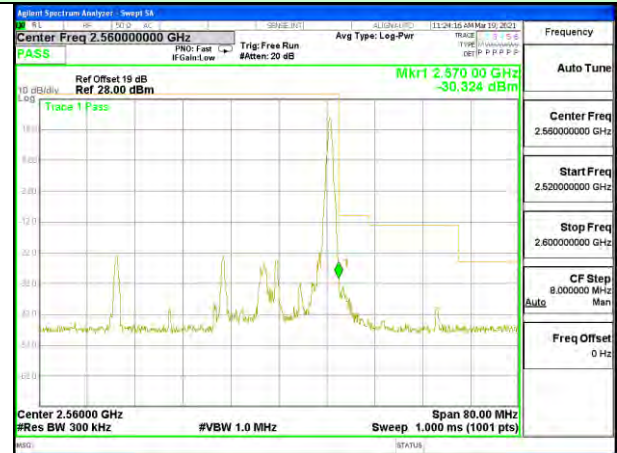


Highest channel

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



Lowest channel



Highest channel

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



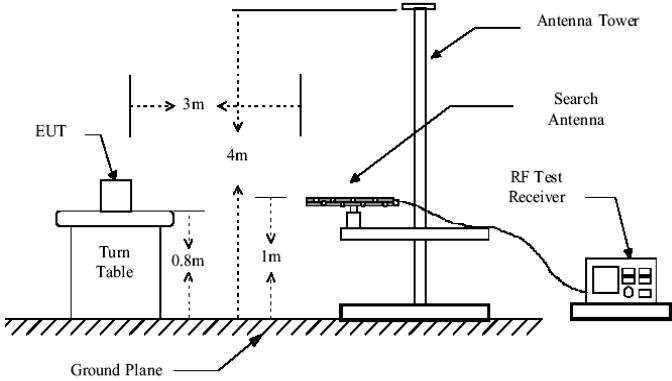
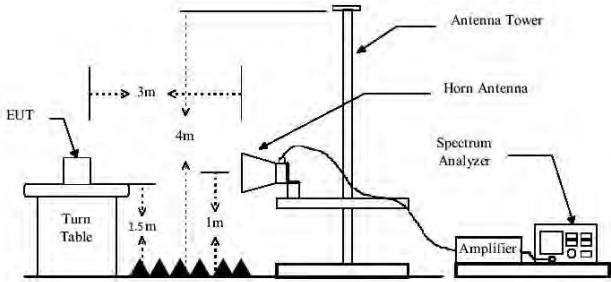
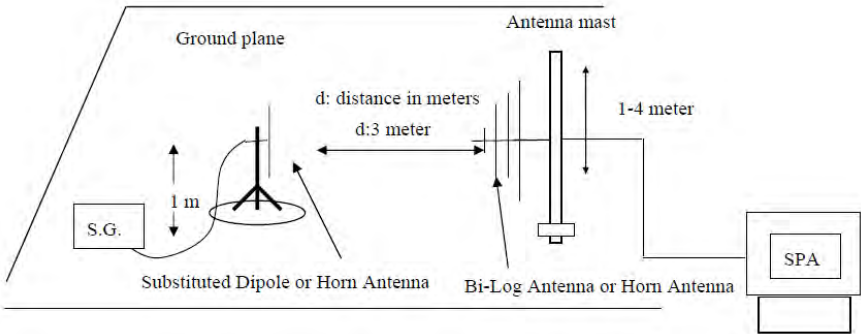
Lowest channel



Highest channel

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

4.7 ERP, EIRP Measurement

Test Requirement:	FCC part22.913(a), FCC part24.232(b) and FCC part 27.53
Test Method:	FCC part2.1046
Limit:	LTE Band 2: 2W (EIRP) LTE Band 4/7: 1W (EIRP) LTE Band 5: 7W (ERP) LTE Band 17: 3W (ERP)
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 in frequency band 824.2 –848.80.8MHz were measured using a substitution method. The EUT was replaced by dipole antenna connected, the S.G. output was recorded and ERP was calculated as follows: $\text{ERP} = \text{S.G. output (dBm)} + \text{Antenna Gain (dBd)} - \text{Cable Loss (dB)}$ 4. EIRP in frequency band 1850.2 –1909.8MHz 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: $\text{EIRP} = \text{S.G. output (dBm)} + \text{Antenna Gain (dBi)} - \text{Cable Loss (dB)}$
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 7.1 for details
Test results:	Pass

Measurement Data

EUT mode	Channel	RB Size	RB Offset	EUT Pol.	Antenna Pol.	EIRP(dBm)	Limit (dBm)	Result
LTE Band 2 (5MHz)	Lowest	25	0	H	V	21.47	33.00	Pass
					H	20.84		
				E1	V	22.16		
					H	20.14		
				E2	V	21.59		
					H	17.63		
	Middle	25	0	H	V	23.33	33.00	Pass
					H	19.22		
				E1	V	23.04		
					H	19.57		
				E2	V	22.73		
					H	19.38		
	Highest	25	0	H	V	22.81	33.00	Pass
					H	20.74		
				E1	V	21.86		
					H	19.54		
				E2	V	21.27		
					H	19.87		

EUT mode	Channel	RB Size	RB Offset	EUT Pol.	Antenna Pol.	EIRP(dBm)	Limit (dBm)	Result
LTE Band 2 (10MHz)	Lowest	50	0	H	V	22.31	33.00	Pass
					H	20.99		
				E1	V	22.33		
					H	19.74		
				E2	V	20.75		
					H	18.55		
	Middle	50	0	H	V	21.75	33.00	Pass
					H	20.14		
				E1	V	21.92		
					H	19.75		
				E2	V	21.66		
					H	20.09		
	Highest	50	0	H	V	22.49	33.00	Pass
					H	19.48		
				E1	V	22.36		
					H	20.15		
				E2	V	21.69		
					H	20.82		

EUT mode	Channel	RB Size	RB Offset	EUT Pol.	Antenna Pol.	EIRP(dBm)	Limit (dBm)	Result
LTE Band 2 (15MHz)	Lowest	75	0	H	V	22.04	33.00	Pass
					H	19.83		
				E1	V	22.24		
					H	20.21		
				E2	V	20.79		
					H	19.05		
	Middle	75	0	H	V	22.93	33.00	Pass
					H	19.82		
				E1	V	21.54		
					H	20.21		
				E2	V	20.61		
					H	20.37		
	Highest	75	0	H	V	21.98	33.00	Pass
					H	19.60		
				E1	V	22.29		
					H	20.58		
				E2	V	21.65		
					H	21.21		

EUT mode	Channel	RB Size	RB Offset	EUT Pol.	Antenna Pol.	EIRP(dBm)	Limit (dBm)	Result
LTE Band 2 (20MHz)	Lowest	100	0	H	V	22.29	33.00	Pass
					H	20.12		
				E1	V	22.20		
					H	20.29		
				E2	V	21.01		
					H	20.42		
	Middle	100	0	H	V	22.59	33.00	Pass
					H	19.85		
				E1	V	22.05		
					H	20.28		
				E2	V	23.05		
					H	20.94		
	Highest	100	0	H	V	23.39	33.00	Pass
					H	19.81		
				E1	V	22.56		
					H	20.00		
				E2	V	22.01		
					H	19.74		

EUT mode	Channel	RB Size	RB Offset	EUT Pol.	Antenna Pol.	EIRP(dBm)	Limit (dBm)	Result
LTE Band 4 (5MHz)	Lowest	25	0	H	V	22.36	30.00	Pass
					H	19.97		
				E1	V	21.59		
					H	20.07		
				E2	V	21.21		
					H	17.35		
	Middle	25	0	H	V	21.50	30.00	Pass
					H	20.59		
				E1	V	21.41		
					H	19.42		
				E2	V	21.81		
					H	18.25		
	Highest	25	0	H	V	22.01	30.00	Pass
					H	20.50		
				E1	V	22.36		
					H	19.94		
				E2	V	22.74		
					H	19.72		

EUT mode	Channel	RB Size	RB Offset	EUT Pol.	Antenna Pol.	EIRP(dBm)	Limit (dBm)	Result
LTE Band 4 (10MHz)	Lowest	50	0	H	V	21.05	30.00	Pass
					H	19.59		
				E1	V	22.50		
					H	20.86		
				E2	V	21.05		
					H	17.95		
	Middle	50	0	H	V	22.31	30.00	Pass
					H	20.13		
				E1	V	20.87		
					H	19.55		
				E2	V	21.27		
					H	18.44		
	Highest	50	0	H	V	21.21	30.00	Pass
					H	20.01		
				E1	V	20.22		
					H	19.96		
				E2	V	21.79		
					H	18.72		

EUT mode	Channel	RB Size	RB Offset	EUT Pol.	Antenna Pol.	EIRP(dBm)	Limit (dBm)	Result
LTE Band 4 (15MHz)	Lowest	75	0	H	V	21.20	30.00	Pass
					H	20.51		
				E1	V	21.80		
					H	20.90		
				E2	V	20.85		
					H	17.21		
	Middle	75	0	H	V	21.70	30.00	Pass
					H	19.75		
				E1	V	20.97		
					H	18.47		
				E2	V	21.03		
					H	18.09		
	Highest	75	0	H	V	21.24	30.00	Pass
					H	20.19		
				E1	V	21.28		
					H	19.82		
				E2	V	21.67		
					H	18.99		

EUT mode	Channel	RB Size	RB Offset	EUT Pol.	Antenna Pol.	EIRP(dBm)	Limit (dBm)	Result
LTE Band 4 (20MHz)	Lowest	100	0	H	V	22.62	30.00	Pass
					H	20.76		
				E1	V	22.25		
					H	19.31		
				E2	V	22.30		
					H	19.54		
	Middle	100	0	H	V	22.28	30.00	Pass
					H	19.50		
				E1	V	22.68		
					H	20.57		
				E2	V	22.42		
					H	19.90		
	Highest	100	0	H	V	22.81	30.00	Pass
					H	20.83		
				E1	V	22.72		
					H	19.89		
				E2	V	21.71		
					H	19.83		

EUT mode	Channel	RB Size	RB Offset	EUT Pol.	Antenna Pol.	ERP(dBm)	Limit (dBm)	Result
LTE Band 5 (5MHz)	Lowest	25	0	H	V	21.49	38.00	Pass
					H	21.29		
				E1	V	23.05		
					H	19.52		
				E2	V	20.83		
					H	17.55		
	Middle	25	0	H	V	22.31	38.00	Pass
					H	19.64		
				E1	V	22.03		
					H	19.56		
				E2	V	21.81		
					H	19.58		
	Highest	25	0	H	V	22.07	38.00	Pass
					H	20.62		
				E1	V	21.83		
					H	20.23		
				E2	V	22.25		
					H	20.25		

EUT mode	Channel	RB Size	RB Offset	EUT Pol.	Antenna Pol.	ERP(dBm)	Limit (dBm)	Result
LTE Band 5 (10MHz)	Lowest	50	0	H	V	22.34	38.00	Pass
					H	20.39		
				E1	V	22.32		
					H	20.60		
				E2	V	21.52		
					H	18.34		
	Middle	50	0	H	V	21.94	38.00	Pass
					H	20.15		
				E1	V	22.37		
					H	20.60		
				E2	V	22.38		
					H	19.88		
	Highest	50	0	H	V	22.21	38.00	Pass
					H	19.90		
				E1	V	22.67		
					H	19.71		
				E2	V	21.08		
					H	20.29		

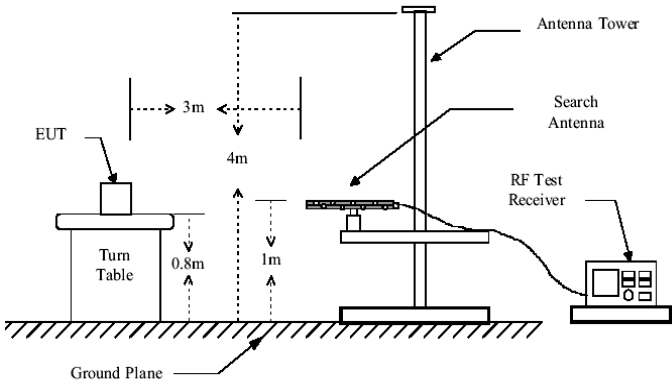
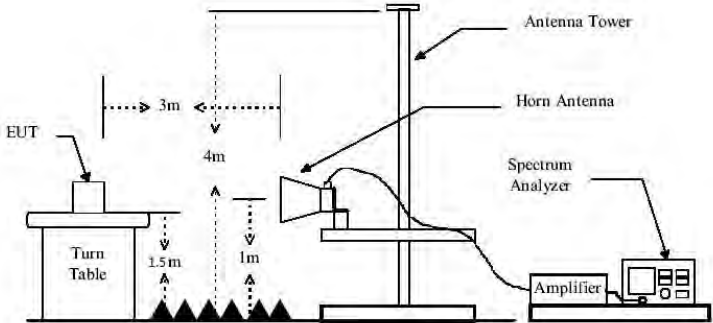
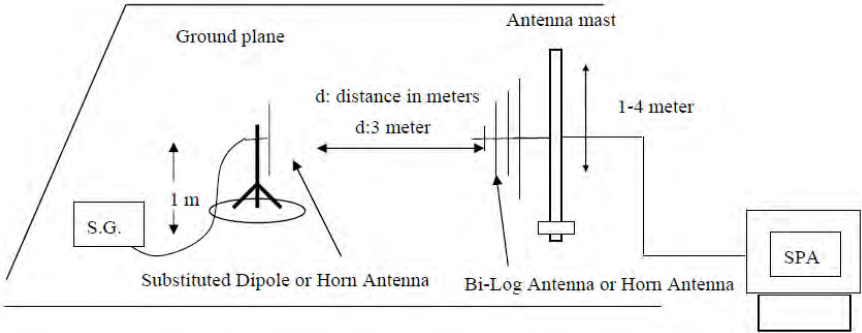
EUT mode	Channel	RB Size	RB Offset	EUT Pol.	Antenna Pol.	EIRP(dBm)	Limit (dBm)	Result
LTE Band 7 (5MHz)	Lowest	25	0	H	V	22.39	30.00	Pass
					H	20.52		
				E1	V	21.60		
					H	20.05		
				E2	V	22.37		
					H	18.32		
	Middle	25	0	H	V	22.04	30.00	Pass
					H	19.50		
				E1	V	22.71		
					H	19.64		
				E2	V	22.87		
					H	20.05		
	Highest	25	0	H	V	22.43	30.00	Pass
					H	19.57		
				E1	V	22.33		
					H	20.67		
				E2	V	21.27		
					H	20.94		

EUT mode	Channel	RB Size	RB Offset	EUT Pol.	Antenna Pol.	EIRP(dBm)	Limit (dBm)	Result
LTE Band 7 (10MHz)	Lowest	50	0	H	V	22.31	30.00	Pass
					H	20.49		
				E1	V	22.99		
					H	19.64		
				E2	V	21.41		
					H	19.10		
	Middle	50	0	H	V	22.23	30.00	Pass
					H	20.30		
				E1	V	21.61		
					H	19.29		
				E2	V	21.46		
					H	20.30		
	Highest	50	0	H	V	22.14	30.00	Pass
					H	20.53		
				E1	V	22.62		
					H	19.43		
				E2	V	22.38		
					H	20.78		

EUT mode	Channel	RB Size	RB Offset	EUT Pol.	Antenna Pol.	EIRP(dBm)	Limit (dBm)	Result
LTE Band 7 (15MHz)	Lowest	75	0	H	V	22.24	30.00	Pass
					H	20.80		
				E1	V	22.79		
					H	20.49		
				E2	V	21.81		
					H	20.52		
	Middle	75	0	H	V	22.36	30.00	Pass
					H	20.50		
				E1	V	22.09		
					H	20.41		
				E2	V	22.21		
					H	20.47		
	Highest	75	0	H	V	22.44	30.00	Pass
					H	19.99		
				E1	V	22.33		
					H	20.31		
				E2	V	21.17		
					H	20.20		

EUT mode	Channel	RB Size	RB Offset	EUT Pol.	Antenna Pol.	EIRP(dBm)	Limit (dBm)	Result
LTE Band 7 (20MHz)	Lowest	100	0	H	V	22.07	30.00	Pass
					H	20.90		
				E1	V	21.77		
					H	20.09		
				E2	V	21.56		
					H	19.90		
	Middle	100	0	H	V	22.36	30.00	Pass
					H	20.13		
				E1	V	22.26		
					H	20.87		
				E2	V	22.36		
					H	19.79		
	Highest	100	0	H	V	21.48	30.00	Pass
					H	19.60		
				E1	V	21.47		
					H	20.38		
				E2	V	21.89		
					H	19.99		

4.8 Field strength of spurious radiation measurement

Test Requirement:	FCC part22.913(a), FCC part24.238(a) and FCC part27.53
Test Method:	FCC part2.1053
Limit:	Band 2/4/5/17:-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. $\text{ERP / EIRP} = \text{S.G. output (dBm)} + \text{Antenna Gain(dB/dBi)} - \text{Cable Loss (dB)}$
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 7.1 for details
Test results:	Pass

Measurement Data

Test mode:	LTE Band 2(1.4MHz)		Test channel:	Lowest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3701.40	Vertical	-38.70	-13.00	Pass
5552.10	V	-41.50		
7402.80	V	-43.77		
9253.50	V	-46.51		
11104.20	V	---		
3701.40	Horizontal	-44.30	-13.00	Pass
5552.10	H	-48.53		
7402.80	H	-50.24		
9253.50	H	-53.96		
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	-34.63	-13.00	Pass
5640.00	V	-38.17		
7520.00	V	-39.75		
9400.00	V	-41.98		
11280.00	V	---		
3760.00	Horizontal	-39.85	-13.00	Pass
5640.00	H	-43.82		
7520.00	H	-44.47		
9400.00	H	-46.62		
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	-35.85	-13.00	Pass
5727.90	V	-36.68		
7637.20	V	-39.06		
9546.50	V	-41.02		
11455.80	V	---		
3818.60	Horizontal	-40.56	-13.00	Pass
5727.90	H	-41.20		
7637.20	H	-43.67		
9546.50	H	-46.03		
11455.80	H	---		

Remark :

1. The emission behaviour belongs to narrowband spurious emission.
2. Remark"---" means that the emission level is too low to be measured
3. The emission levels of below 1 GHz are very lower 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	-35.44	-13.00	Pass
5132.10	V	-36.96		
6842.80	V	-39.14		
8553.50	V	-40.76		
10264.20	V	---		
3421.40	Horizontal	-40.52	-13.00	Pass
5132.10	H	-41.09		
6842.80	H	-43.64		
8553.50	H	-45.57		
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	-35.63	-13.00	Pass
5197.50	V	-36.80		
6930.00	V	-39.60		
8662.50	V	-41.61		
10395.00	V	---		
3465.00	Horizontal	-40.37	-13.00	Pass
5197.50	H	-41.92		
6930.00	H	-43.68		
8662.50	H	-46.14		
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	-35.39	-13.00	Pass
5262.90	V	-37.12		
7017.20	V	-39.12		
8771.50	V	-40.92		
10525.80	V	---		
3508.60	Horizontal	-40.04	-13.00	Pass
5262.90	H	-41.97		
7017.20	H	-43.19		
8771.50	H	-46.43		
10525.80	H	---		

Remark:

1. The emission behaviour belongs to narrowband spurious emission.
2. Remark"---" means that the emission level is too low to be measured
3. The emission levels of below 1 GHz are very lower 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	-35.54	-13.00	Pass
2474.10	V	-36.97		
3298.80	V	-39.44		
4123.50	V	-41.24		
4948.20	V	---		
1649.40	Horizontal	-40.1	-13.00	Pass
2474.10	H	-41.53		
3298.80	H	-43.33		
4123.50	H	-46.03		
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	-34.64	-13.00	Pass
2509.50	V	-37.70		
3346.00	V	-39.50		
4182.50	V	-40.53		
5019.00	V	---		
1673.00	Horizontal	-39.67	-13.00	Pass
2509.50	H	-43.51		
3346.00	H	-44.13		
4182.50	H	-46.05		
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	-34.91	-13.00	Pass
2544.90	V	-37.85		
3393.20	V	-39.62		
4241.50	V	-40.74		
5089.80	V	---		
1696.60	Horizontal	-39.76	-13.00	Pass
2544.90	H	-41.45		
3393.20	H	-43.19		
4241.50	H	-46.26		
5089.80	H	---		

Remark :

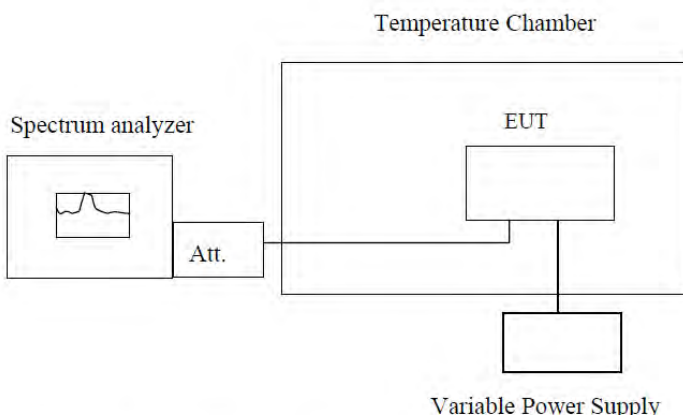
4. The emission behaviour belongs to narrowband spurious emission.
5. Remark"---" means that the emission level is too low to be measured
4. The emission levels of below 1 GHz are very lower than the limit and not show in test report.

Test mode:	LTE Band 7(5MHz)		Test channel:	Lowest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
5005.00	Vertical	-32.97	-25.00	Pass
7507.50	V	-37.58		
10010.00	V	-40.25		
12512.50	V	-42.04		
15015.00	V	---		
5005.00	Horizontal	-40.49	-25.00	Pass
7507.50	H	-44.79		
10010.00	H	-46.62		
12512.50	H	-50.34		
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	-34.71	-25.00	Pass
7605.00	V	-37.95		
10140.00	V	-40.96		
12675.00	V	-42.69		
15210.00	V	---		
5070.00	Horizontal	-40.36	-25.00	Pass
7605.00	H	-44.68		
10140.00	H	-46.33		
12675.00	H	-50.46		
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	-33.41	-25.00	Pass
7702.50	V	-36.91		
10270.00	V	-38.96		
12837.50	V	-41.09		
15405.00	V	---		
5135.00	Horizontal	-38.33	-25.00	Pass
7702.50	H	-42.74		
10270.00	H	-46.10		
12837.50	H	-48.86		
15405.00	H	---		

Remark :

1. The emission behaviour belongs to narrowband spurious emission.
2. Remark"---" means that the emission level is too low to be measured
3. The emission levels of below 1 GHz are very lower than the limit and not show in test report.

4.9 Frequency stability V.S. Temperature measurement

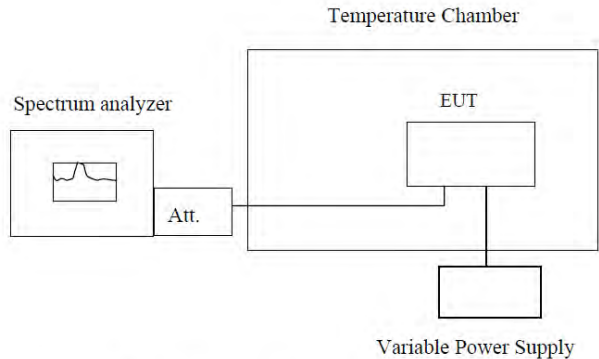
Test Requirement:	FCC Part2.1055(a)(1)(b)
Test Method:	FCC Part2.1055(a)(1)(b)
Limit:	2.5ppm
Test setup:	 Note : Measurement setup for testing on Antenna connector
Test procedure:	1. The equipment under test was connected to an external DC power supply and input rated voltage. 2. RF output was connected 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 6.0 for details
Test mode:	Refer to section 7.1 for details
Test results:	Pass

Measurement Data

Reference Frequency: LTE Band 2 Middle channel=18900 channel=1880MHz					
Power supplied (Vdc)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.80	-30	32	0.0171	2.5	Pass
	-20	23	0.0122		
	-10	31	0.0167		
	0	27	0.0144		
	10	35	0.0188		
	20	29	0.0154		
	30	37	0.0195		
	40	36	0.0190		
	50	34	0.0180		
Reference Frequency: LTE Band 4 Middle channel=20175 channel=1732.5MHz					
Power supplied (Vdc)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.80	-30	34	0.0196	2.5	Pass
	-20	23	0.0133		
	-10	33	0.0190		
	0	27	0.0154		
	10	34	0.0199		
	20	27	0.0153		
	30	36	0.0207		
	40	39	0.0224		
	50	35	0.0200		
Reference Frequency: LTE Band 5 Middle channel=20175 channel=836.5MHz					
Power supplied (Vdc)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.80	-30	38	0.0453	2.5	Pass
	-20	23	0.0275		
	-10	35	0.0414		
	0	30	0.0353		
	10	36	0.0432		
	20	28	0.0339		
	30	39	0.0470		
	40	36	0.0426		
	50	34	0.0409		

Reference Frequency: LTE Band 7 Middle channel=21100 channel=2535MHz					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.80	-30	37	0.0147	2.5	Pass
	-20	23	0.0091		
	-10	34	0.0132		
	0	32	0.0126		
	10	32	0.0127		
	20	29	0.0114		
	30	38	0.0149		
	40	36	0.0142		
	50	33	0.0132		

4.10 Frequency stability V.S. Voltage measurement

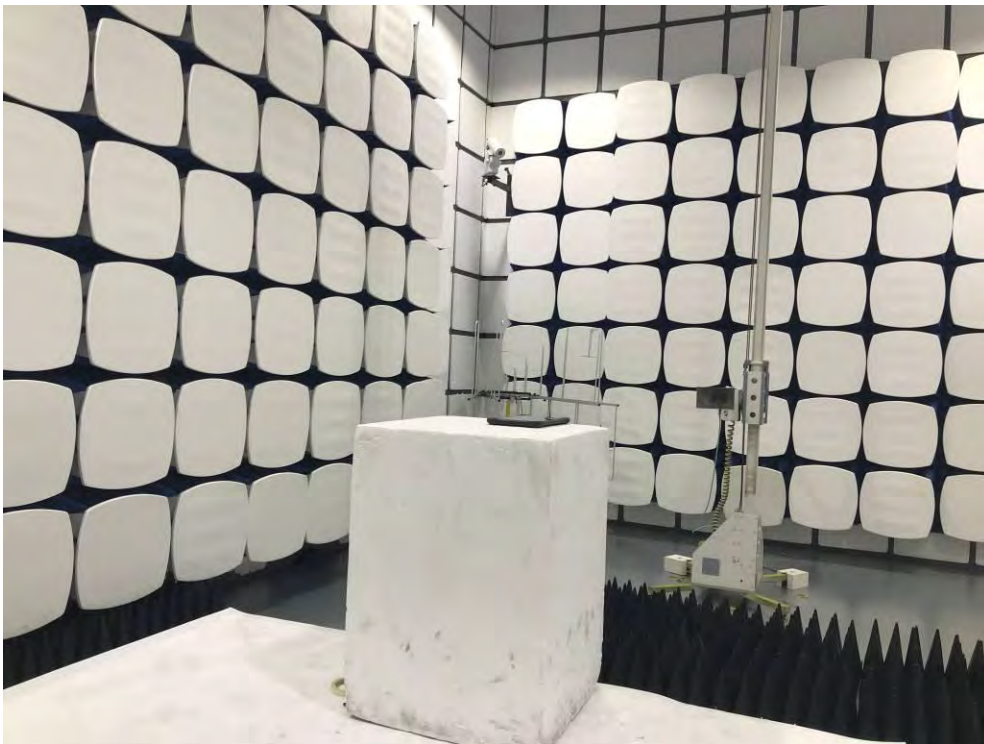
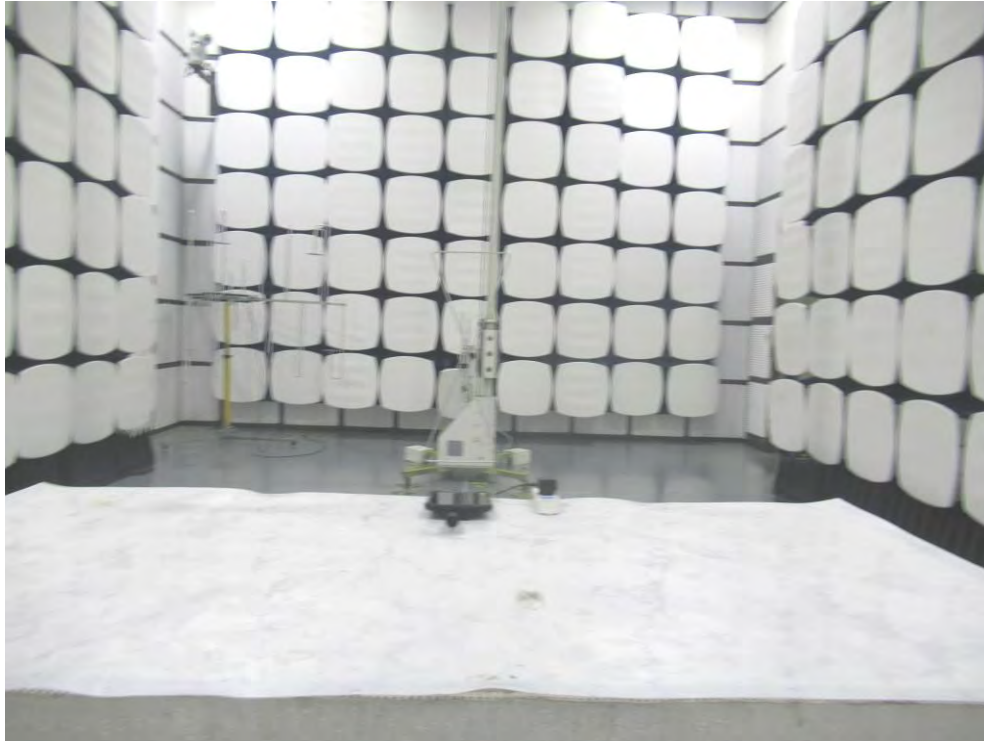
Test Requirement:	FCC Part2.1055(d)(1)(2)
Test Method:	FCC Part2.1055(d)(1)(2)
Limit:	2.5ppm
Test setup:	 Note : Measurement setup for testing on Antenna connector
Test procedure:	1. Set chamber temperature to 25°C . Use a variable DC power source to power the EUT and set the voltage to rated voltage. 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 6.0 for details
Test mode:	Refer to section 7.1 for details
Test results:	Pass

Measurement Data

Reference Frequency: LTE Band 2 Middle channel=18900 channel=1880MHz					
Temperature (℃)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	4.38	34	0.0180	2.5	Pass
	3.80	26	0.0139		
	3.23	41	0.0217		
Reference Frequency: LTE Band 4 Middle channel=20175 channel=1732.5MHz					
Temperature (℃)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	4.38	23	0.0133	2.5	Pass
	3.80	35	0.0204		
	3.23	29	0.0167		
Reference Frequency: LTE Band 5 Middle channel=20175 channel=836.5MHz					
Temperature (℃)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	4.38	36	0.0431	2.5	Pass
	3.80	28	0.0330		
	3.23	37	0.0441		
Reference Frequency: LTE Band 7 Middle channel=21100 channel=2535MHz					
Temperature (℃)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	4.38	33	0.0130	2.5	Pass
	3.80	23	0.0091		
	3.23	34	0.0133		

5 Test Setup Photo

Radiated Emission



6 EUT Constructional Details

Reference to the test report No. A2102055-C01-R01

-----End-----