RF TEST REPORT

Report No.: SET2018-05564

Product: Smart POS Payment Terminal

FCC ID: SWSI9000S

Model No.: i9000S

Applicant: Shenzhen Urovo Technology Co., Ltd.

Address: A7, Zondy Cyber Building, Nanshan, Shenzhen, China

Dates of Testing: 05/7/2018 — 05/17/2018

Issued by: CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd.

Lab Location: Building 28/29, East of Shigu Xili Industrial Zone, Nanshan District Shenzhen, Guangdong 518055, China

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Test Report

Product..... :	Smart POS Payment Terminal
Brand Name ..... :	UROVO
Trade Name..... :	N.A
Applicant..... :	Shenzhen Urovo Technology Co., Ltd.
Applicant Address..... :	A7, Zondy Cyber Building, Nanshan, Shenzhen, China
Manufacturer..... :	Shenzhen Urovo Technology Co., Ltd.
Manufacturer Address ..... :	A7, Zondy Cyber Building, Nanshan, Shenzhen, China
Test Standards..... :	47 CFR Part 2: Frequency Allocations and Radio Treaty Matters; General Rules and Regulations 47 CFR FCC Part 22(H): Cellular Radiotelephone Service 47 CFR Part 24(E): Personal Communications Services 47 CFR Part 27(L) 27(H) 27(M): Miscellaneous wireless communications services
Test Result .....:	PASS
Tested by ..... :	Shallwe Yang 2018. 05.23 Shallwe Yang，Test Engineer
Reviewed by ..... :	Zhu Qi 2018. 05.23 Zhu Qi, Senior Egineer
Approved by……:	Smartli 2018. 05.23 Smart Li, Manager

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Change History		
Issue	Date	Reason for change
1.0	2018.05.23	First edition

1. GENERAL INFORMATION

1.1 EUT Description

EUT Type	Smart POS Payment Terminal
Hardware Version	SQ27TW_MB_V01
Software Version	3.10.49
Frequency Range	LTE Band 2 Tx: 1850.7MHz~1909.3MHz Rx: 1930.7MHz~1989.3MHz LTE Band 4 Tx: 1710.7MHz~1754.3MHz Rx: 2110.7MHz~2154.3MHz LTE Band 5 Tx: 824.7MHz~848.3MHz Rx: 869.7MHz~893.3MHz LTE Band 7 Tx: 2502.5MHz~2567.5MHz Rx: 2622.5MHz~2687.5MHz
Maximum Output Power to Antenna	LTE Band 2：23.30dBm LTE Band 4：22.99dBm LTE Band 5：22.98dBm LTE Band 7：22.97dBm
Bandwidth	LTE Band 2：1.4MHz/3MHz/5MHz/10MHz/15MHz/20MHz LTE Band 4：1.4MHz/3MHz/5MHz/10MHz/15MHz/20MHz LTE Band 5：1.4MHz/3MHz/5MHz/10MHz LTE Band 7：5MHz/10MHz/15MHz/20MHz
Modulation Type	QPSK/16QAM
Antenna Type	Internal Antenna
Antenna Gain	LTE Band 2：2.3dBi LTE Band 4：1.9dBi LTE Band 5：-2.2dBi LTE Band 7：-1.8dBi

1.2 Maximum ERP/EIRP Power, Frequency Tolerance, and Emission Designator

FCC Rule	System	Type of Modulation	BW (MHz)	Emission Designator	Frequency Tolerance (ppm)	Maximum ERP/EIRP(W)
Part 24	LTE Band 2	QPSK	1.4	1M10G7D	—	0.209
Part 24	LTE Band 2	16QAM	1.4	1M10W7D	—	0.144
Part 24	LTE Band 2	QPSK	3	2M75G7D	—	0.205
Part 24	LTE Band 2	16QAM	3	2M76W7D	—	0.151
Part 24	LTE Band 2	QPSK	5	4M54G7D	—	0.205
Part 24	LTE Band 2	16QAM	5	4M51W7D	—	0.148
Part 24	LTE Band 2	QPSK	10	8M97G7D	0.003	0.206
Part 24	LTE Band 2	16QAM	10	8M95W7D	0.003	0.146
Part 24	LTE Band 2	QPSK	15	13M5G7D	—	0.204
Part 24	LTE Band 2	16QAM	15	13M5W7D	—	0.151
Part 24	LTE Band 2	QPSK	20	18M5G7D	—	0.214
Part 24	LTE Band 2	16QAM	20	18M5W7D	—	0.158
Part 27	LTE Band 4	QPSK	1.4	1M10G7D	—	0.209
Part 27	LTE Band 4	16QAM	1.4	1M10W7D	—	0.146
Part 27	LTE Band 4	QPSK	3	2M74G7D	—	0.202
Part 27	LTE Band 4	16QAM	3	2M76W7D	—	0.144
Part 27	LTE Band 4	QPSK	5	4M53G7D	—	0.204
Part 27	LTE Band 4	16QAM	5	4M51W7D	—	0.145
Part 27	LTE Band 4	QPSK	10	8M97G7D	0.003	0.200
Part 27	LTE Band 4	16QAM	10	8M96W7D	0.003	0.142
Part 27	LTE Band 4	QPSK	15	13M5G7D	—	0.203
Part 27	LTE Band 4	16QAM	15	13M5W7D	—	0.144
Part 27	LTE Band 4	QPSK	20	18M4G7D	—	0.202
Part 27	LTE Band 4	16QAM	20	18M5W7D	—	0.141

Part 22	LTE Band 5	QPSK	1.4	1M10G7D	__	0.167
Part 22	LTE Band 5	16QAM	1.4	1M10W7D	__	0.117
Part 22	LTE Band 5	QPSK	3	2M75G7D	__	0.168
Part 22	LTE Band 5	16QAM	3	2M76W7D	—	0.112
Part 22	LTE Band 5	QPSK	5	4M54G7D	__	0.166
Part 22	LTE Band 5	16QAM	5	4M52W7D	—	0.115
Part 22	LTE Band 5	QPSK	10	8M99G7D	0.004	0.170
Part 22	LTE Band 5	16QAM	10	8M97W7D	0.004	0.110
Part 27	LTE Band 7	QPSK	5	4M53G7D	—	0.179
Part 27	LTE Band 7	16QAM	5	4M52W7D	—	0.115
Part 27	LTE Band 7	QPSK	10	8M96G7D	0.009	0.177
Part 27	LTE Band 7	16QAM	10	8M95W7D	0.004	0.117
Part 27	LTE Band 7	QPSK	15	13M5G7D	—	0.176
Part 27	LTE Band 7	16QAM	15	13M5W7D	—	0.116
Part 27	LTE Band 7	QPSK	20	18M4G7D	—	0.176
Part 27	LTE Band 7	16QAM	20	18M3W7D	—	0.118

1.3 Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 2, Part 24, and Part27 for the EUT FCC ID Certification:

1.47 CFR Part 2, 22(H), 24(E), 27(L) 27(M)

2. ANSI/TIA/EIA-603-D-2010

3. FCC KDB 971168 D01 Power Meas. License Digital Systems v03r01

Test detailed items/section required by FCC rules and results are as below:

No.	Section	Description	Limit	Result
1	2.1046	Conducted RF Output Power	Reporting Only	PASS
2	24.232(d) 27.50(d)(5)	Peak to Average Radio	＜13dB	PASS
3	27.50(h)(2) 24.232(c)	Effective Radiated Power(Band 2/7)	EIRP＜2Watt	PASS PASS
	27.50(d)(4)	Effective Radiated Power(Band 4)	EIRP＜1Watt	PASS
	22.913(a)(2)	Effective Radiated Power(Band 5)	ERP＜7Watt	PASS
4	2.1049 22.917(b) 24.238(b) 27.53(h)(3) 27.53(g)(3) 27.53(i)(6)	Occupied Bandwidth	Reporting Only	PASS
5	2.1051 22.917(a) 24.238(b) 27.53(g) 27.53(h)	Conducted Band Edge(Band 2/4/5)	＜43+10log10(P[watt])	PASS
	2.1051 27.53(i)(4)	Conducted Band Edge(Band 7)	＜5.5MHz: -13dBm ⩾5.5MHz: -25dBm	PASS
6	2.1051 22.917(a) 24.238(a) 27.53(g)	Conducted Spurious Emission (Band 2/4/5)	＜43+10log10(P[watt])	PASS

	27.53(h)			
	2.1051 27.53(i)(4)	Conducted Spurious Emission (Band 7)	＜55+10log10(P[watt])	PASS
7	2.1053 22.917(a) 24.238(a) 27.53(g) 27.53(h)	Radiated Spurious Emission (Band 2/4/5)	＜43+10log10(P[watt])	PASS
	2.1053 27.53(i)(4)	Radiated Spurious Emission (Band 7)	＜55+10log10(P[watt])	PASS
8	2.1055, 22.355 24.235 27.54	Frequency Stability	＜2.5ppm	PASS

Remark：

1. All test items were verified and recorded according to the standards and without any deviation during the test.

2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

1.4 Test Configuration of Equipment Under Test

1.4.1 Test Mode

Antenna port conducted and radiated test items listed below are performed according to KDB 971168 D01 Power Meas. License Digital Systems v03r01 with maximum output power.

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

Test Items	Band	Bandwidth(MHz)						Modulation		RB#			Test Channel		
		1.4	3	5	10	15	20	QPSK	16QAM	1	Half	Full	L	M	H
Max. Output Power	2	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	4	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	5	√	√	√	√			√	√	√	√	√	√	√	√
	7			√	√	√	√	√	√	√	√	√	√	√	√
Peak-to-Average Ratio	2						√		√	√		√	√	√	√
	4						√		√	√		√	√	√	√
	5				√				√	√		√	√	√	√
	7						√		√	√		√	√	√	√
26dB and 99% Bandwidth	2	√	√	√	√	√	√	√	√			√		√	
	4	√	√	√	√	√	√	√	√			√		√	
	5	√	√	√	√			√	√			√		√	
	7			√	√	√	√	√	√			√		√	
Conducted Band Edge	2	√	√	√	√	√	√	√	√	√		√	√		√
	4	√	√	√	√	√	√	√	√	√		√	√		√
	5	√	√	√	√			√	√	√		√	√		√
	7			√	√	√	√	√	√	√		√	√		√
Conducted Spurious Emission	2	√	√	√	√	√	√	√	√	√			√	√	√
	4	√	√	√	√	√	√	√	√	√			√	√	√
	5	√	√	√	√			√	√	√			√	√	√
	7			√	√	√	√	√	√	√			√	√	√
Frequency Stability	2				√			√	√			√		√	
	4				√			√	√			√		√	
	5				√			√	√			√		√	
	7				√			√	√			√		√	
ERP/EIRP	2	√	√	√	√	√	√	√	√	√			√	√	√
	4	√	√	√	√	√	√	√	√	√			√	√	√
	5	√	√	√	√			√	√	√			√	√	√

	7			√	√	√	√	√	√	√			√	√	√
Radiated Spurious Emission	**2**	√	√	√	√	√	√	√		√			√	√	√
	4	√	√	√	√	√	√	√		√			√	√	√
	5	√	√	√	√			√		√			√	√	√
	7			√	√	√	√	√		√			√	√	√
Note	**1. The mark “ √ ” means that this configuration is chosen for testing.** **2. The device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test under different RB size/offset and modulations in exploratory test. Subsequently, only the worst case emissions are reported.** **3. For E.R.P/E.I.R.P. measurement, the widest bandwidth and the bandwidth with the highest conducted power of each band is chosen for testing. Besides, the lowest bandwidth of each band is also measured for reporting only.**														

1.5 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.
Following shows an offset computation example with cable loss 7dB and 10dB attenuator.

Example:

Offset (dB) = RF cable loss(dB) + attenuator factor(dB).
= 7 + 10 = 17(dB)

1.6 Facilities and Accreditations

1.6.1 Test Facilities

CNAS-Lab Code: L1659

CCIC-SET is a third party testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L1659.

FCC-Registration No.: CN5031

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Designation Number: CN5031, valid time is until December 31, 2018.

ISED Registration: 11185A-1

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. EMC Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 11185A-1 on Aug. 04, 2016, valid time is until Aug. 03, 2019.

NVLAP Lab Code: 201008-0

CCIC-SET is a third party testing organization accredited by NVLAP according to ISO/IEC 17025. The accreditation certificate number is 201008-0.

1.6.2 Test Environment Conditions

During the measurement, the environmental conditions were within the listed ranges:

Temperature (°C):	15℃- 35℃
Relative Humidity (%):	30% -60%
Atmospheric Pressure (kPa):	86KPa-106KPa

2. 47 CFR PART 2, PART 27H REQUIREMENTS

2.1 Conducted RF Output Power

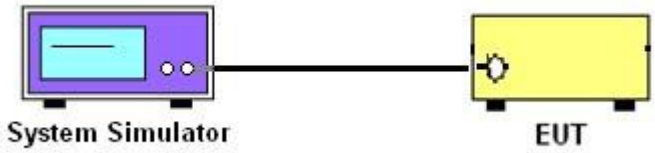
2.1.1 Requirement

According to FCC section 2.1046(a), for transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in FCC section 2.1033(c)(8).

2.1.2 Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.1.3 Test Setup



2.1.4 Test Procedures

1. The transmitter output port was connected to the system simulator.
2. Set EUT at maximum power through system simulator.
3. Select lowest, middle, and highest channels for each band and different modulation.
4. Measure and record the power level from the system simulator.

2.1.5 Test Results

1. LTE Band 2 Conducted Power Test Verdict:

BW(MHz)	Modulation	RB Size	RB Offset	Power(dBm) Low Ch./Freq.	Power(dBm) Middle Ch./Freq.	Power(dBm) High Ch./Freq.
Channel				18700	18900	19100
Frequency(MHz)				1860	1880	1900
20	QPSK	1	0	22.67	22.57	22.47
20	QPSK	1	49	22.13	22.44	22.60
20	QPSK	1	99	22.68	**23.30**	22.46
20	QPSK	50	0	21.41	21.73	21.52
20	QPSK	50	24	21.64	21.54	21.44
20	QPSK	50	49	21.40	21.71	22.02
20	QPSK	100	0	21.49	21.37	21.60
20	16QAM	1	0	21.27	21.49	21.28
20	16QAM	1	49	21.24	21.46	21.35
20	16QAM	1	99	21.00	21.12	21.01
20	16QAM	50	0	20.04	20.24	20.05
20	16QAM	50	24	20.42	20.54	20.43
20	16QAM	50	49	20.63	20.75	20.64
20	16QAM	100	0	20.42	20.54	20.43
Channel				18675	18900	19125
Frequency(MHz)				1857.5	1880	1902.5
15	QPSK	1	0	22.84	22.96	22.85
15	QPSK	1	37	22.83	22.95	22.84
15	QPSK	1	74	22.14	22.26	22.15
15	QPSK	36	0	21.04	21.16	21.05
15	QPSK	36	18	21.37	21.49	21.58
15	QPSK	36	37	21.32	21.44	21.33
15	QPSK	75	0	21.56	21.88	21.57
15	16QAM	1	0	21.39	21.61	21.40
15	16QAM	1	37	21.13	21.25	21.14
15	16QAM	1	74	21.26	21.38	21.27
15	16QAM	36	0	20.54	20.66	20.55
15	16QAM	36	18	20.00	20.12	20.01
15	16QAM	36	37	20.76	20.88	20.77
15	16QAM	75	0	20.73	20.85	20.74

BW(MHz)	Modulation	RB Size	RB Offset	Power(dBm) Low Ch./Freq.	Power(dBm) Middle Ch./Freq.	Power(dBm) High Ch./Freq.
Channel				18650	18900	19150
Frequency(MHz)				1855	1880	1905
10	QPSK	1	0	22.43	22.74	22.90
10	QPSK	1	24	22.68	23.29	22.46
10	QPSK	1	49	22.59	22.91	22.70
10	QPSK	25	0	21.47	21.37	21.27
10	QPSK	25	12	21.53	21.84	22.15
10	QPSK	25	24	21.47	21.35	21.58
10	QPSK	50	0	21.46	21.68	21.47
10	16QAM	1	0	21.35	21.57	21.46
10	16QAM	1	24	21.15	21.27	21.16
10	16QAM	1	49	21.14	21.34	21.15
10	16QAM	25	0	20.54	20.66	20.55
10	16QAM	25	12	20.53	20.65	20.54
10	16QAM	25	24	20.12	20.24	20.13
10	16QAM	50	0	20.49	20.61	20.50
Channel				18625	18900	19175
Frequency(MHz)				1852.5	1880	1907.5
5	QPSK	1	0	22.23	22.43	22.24
5	QPSK	1	12	22.65	22.77	22.66
5	QPSK	1	24	22.46	22.58	22.47
5	QPSK	12	0	21.13	21.25	21.14
5	QPSK	12	6	21.32	21.44	21.33
5	QPSK	12	11	21.16	21.28	21.17
5	QPSK	25	0	21.13	21.25	21.14
5	16QAM	1	0	21.25	21.37	21.26
5	16QAM	1	12	21.33	21.45	21.54
5	16QAM	1	24	21.47	21.59	21.48
5	16QAM	12	0	20.76	21.08	20.77
5	16QAM	12	6	20.56	20.78	20.57
5	16QAM	12	11	20.66	20.78	20.67
5	16QAM	25	0	20.57	20.69	20.58

BW(MHz)	Modulation	RB Size	RB Offset	Power(dBm) Low Ch./Freq.	Power(dBm) Middle Ch./Freq.	Power(dBm) High Ch./Freq.
Channel				18615	18900	19185
Frequency(MHz)				1851.5	1880	1908.5
3	QPSK	1	0	22.53	22.29	22.46
3	QPSK	1	7	22.34	22.14	22.91
3	QPSK	1	14	22.46	22.52	22.76
3	QPSK	8	0	21.51	21.45	21.93
3	QPSK	8	4	21.11	21.51	21.56
3	QPSK	8	7	21.09	21.07	21.88
3	QPSK	15	0	21.45	21.16	21.05
3	16QAM	1	0	21.27	21.45	21.81
3	16QAM	1	7	21.91	21.56	21.27
3	16QAM	1	14	21.36	21.11	21.34
3	16QAM	8	0	20.56	20.67	20.09
3	16QAM	8	4	20.50	20.70	20.67
3	16QAM	8	7	20.46	20.28	20.00
3	16QAM	15	0	20.11	20.50	20.28
Channel				18607	18900	19193
Frequency(MHz)				1850.7	1732.5	1909.3
1.4	QPSK	1	0	22.75	22.73	22.87
1.4	QPSK	1	2	22.24	22.33	22.74
1.4	QPSK	1	5	22.34	22.78	22.87
1.4	QPSK	3	0	21.13	21.43	21.05
1.4	QPSK	3	1	21.45	21.68	21.41
1.4	QPSK	3	2	21.69	21.19	21.78
1.4	QPSK	6	0	21.16	21.90	21.51
1.4	16QAM	1	0	21.60	21.81	21.61
1.4	16QAM	1	2	21.67	21.11	21.55
1.4	16QAM	1	5	21.65	21.94	21.05
1.4	16QAM	3	0	20.07	20.69	20.69
1.4	16QAM	3	1	20.74	20.06	20.59
1.4	16QAM	3	2	20.52	20.86	20.87
1.4	16QAM	6	0	20.76	20.01	20.71

2. LTE Band 4 Conducted Power Test Verdict:

BW(MHz)	Modulation	RB Size	RB Offset	Power(dBm) Low Ch./Freq.	Power(dBm) Middle Ch./Freq.	Power(dBm) High Ch./Freq.
Channel				20050	20175	20300
Frequency(MHz)				1720	1732.5	1745
20	QPSK	1	0	22.23	22.27	22.55
20	QPSK	1	49	22.67	22.72	22.41
20	QPSK	1	99	22.81	22.63	**22.99**
20	QPSK	50	0	21.65	21.43	21.65
20	QPSK	50	24	21.09	21.92	21.82
20	QPSK	50	49	21.72	21.13	21.69
20	QPSK	100	0	21.10	21.08	21.26
20	16QAM	1	0	21.41	21.73	21.79
20	16QAM	1	49	21.50	21.11	21.30
20	16QAM	1	99	21.90	21.07	21.67
20	16QAM	50	0	20.95	20.71	20.50
20	16QAM	50	24	20.86	20.04	20.93
20	16QAM	50	49	20.10	20.11	20.69
20	16QAM	100	0	20.20	20.95	20.94
Channel				20025	20175	20325
Frequency(MHz)				1717.5	1732.5	1747.5
15	QPSK	1	0	22.87	22.90	22.82
15	QPSK	1	37	22.73	22.81	22.74
15	QPSK	1	74	22.80	22.77	22.83
15	QPSK	36	0	21.72	21.77	21.81
15	QPSK	36	18	21.68	21.76	21.71
15	QPSK	36	37	21.66	21.74	21.80
15	QPSK	75	0	21.59	21.56	21.62
15	16QAM	1	0	21.76	21.67	21.73
15	16QAM	1	37	21.70	21.65	21.59
15	16QAM	1	74	21.47	21.52	21.58
15	16QAM	36	0	20.66	20.73	20.74
15	16QAM	36	18	20.49	20.53	20.57
15	16QAM	36	37	20.59	20.70	20.63
15	16QAM	75	0	20.78	20.71	20.81

BW(MHz)	Modulation	RB Size	RB Offset	Power(dBm) Low Ch./Freq.	Power(dBm) Middle Ch./Freq.	Power(dBm) High Ch./Freq.
Channel				20000	20175	20350
Frequency(MHz)				1715	1732.5	1750
10	QPSK	1	0	22.82	22.80	22.75
10	QPSK	1	24	22.71	22.82	22.73
10	QPSK	1	49	22.72	22.69	22.66
10	QPSK	25	0	21.74	21.76	21.85
10	QPSK	25	12	21.72	21.69	21.80
10	QPSK	25	24	21.71	21.80	21.85
10	QPSK	50	0	21.66	21.82	21.71
10	16QAM	1	0	21.67	21.75	21.64
10	16QAM	1	24	21.61	21.72	21.65
10	16QAM	1	49	21.68	21.59	21.56
10	16QAM	25	0	20.80	20.93	20.90
10	16QAM	25	12	20.68	20.70	20.72
10	16QAM	25	24	20.62	20.65	20.54
10	16QAM	50	0	20.82	20.76	20.79
Channel				19975	20175	20375
Frequency(MHz)				1712.5	1732.5	1752.5
5	QPSK	1	0	22.78	22.81	22.87
5	QPSK	1	12	22.75	22.68	22.72
5	QPSK	1	24	22.81	22.73	22.78
5	QPSK	12	0	21.81	21.77	21.82
5	QPSK	12	6	21.51	21.60	21.58
5	QPSK	12	11	21.61	21.73	21.77
5	QPSK	25	0	21.59	21.68	21.65
5	16QAM	1	0	21.67	21.76	21.60
5	16QAM	1	12	21.61	21.57	21.49
5	16QAM	1	24	21.49	21.51	21.55
5	16QAM	12	0	20.61	20.71	20.76
5	16QAM	12	6	20.76	20.62	20.69
5	16QAM	12	11	20.65	20.75	20.72
5	16QAM	25	0	20.73	20.78	20.70

BW(MHz)	Modulation	RB Size	RB Offset	Power(dBm) Low Ch./Freq.	Power(dBm) Middle Ch./Freq.	Power(dBm) High Ch./Freq.
Channel				19965	20175	20385
Frequency(MHz)				1711.5	1732.5	1753.5
3	QPSK	1	0	22.86	22.74	22.78
3	QPSK	1	7	22.81	22.80	22.83
3	QPSK	1	14	22.72	22.75	22.77
3	QPSK	8	0	21.67	21.71	21.76
3	QPSK	8	4	21.70	21.75	21.78
3	QPSK	8	7	21.79	21.72	21.81
3	QPSK	15	0	21.67	21.64	21.71
3	16QAM	1	0	21.51	21.55	21.49
3	16QAM	1	7	21.57	21.65	21.63
3	16QAM	1	14	21.58	21.60	21.56
3	16QAM	8	0	20.73	20.80	20.82
3	16QAM	8	4	20.64	20.68	20.78
3	16QAM	8	7	20.53	20.52	20.65
3	16QAM	15	0	20.72	20.66	20.78
Channel				19957	20175	20393
Frequency(MHz)				1710.7	1732.5	1754.3
1.4	QPSK	1	0	22.75	22.79	22.82
1.4	QPSK	1	2	22.91	22.82	22.78
1.4	QPSK	1	5	22.77	22.69	22.73
1.4	QPSK	3	0	21.81	21.78	21.72
1.4	QPSK	3	1	21.57	21.47	21.52
1.4	QPSK	3	2	21.46	21.37	21.41
1.4	QPSK	6	0	21.57	21.46	21.53
1.4	16QAM	1	0	21.72	21.77	21.69
1.4	16QAM	1	2	21.63	21.74	21.71
1.4	16QAM	1	5	21.41	21.51	21.44
1.4	16QAM	3	0	20.75	20.74	20.85
1.4	16QAM	3	1	20.57	20.63	20.61
1.4	16QAM	3	2	20.50	20.51	20.67
1.4	16QAM	6	0	20.49	20.52	20.63

3. LTE Band 5 Conducted Power Test Verdict:

BW(MHz)	Modulation	RB Size	RB Offset	Power(dBm) Low Ch./Freq.	Power(dBm) Middle Ch./Freq.	Power(dBm) High Ch./Freq.
Channel				20450	20525	20600
Frequency(MHz)				829	836.5	844
10	QPSK	1	0	22.84	**23.12**	22.76
10	QPSK	1	24	22.98	22.32	22.54
10	QPSK	1	49	22.98	22.44	22.97
10	QPSK	25	0	21.43	21.56	21.62
10	QPSK	25	12	21.38	21.24	21.58
10	QPSK	25	24	21.04	21.66	21.20
10	QPSK	50	0	21.38	21.78	21.97
10	16QAM	1	0	21.00	21.36	21.20
10	16QAM	1	24	21.52	21.67	21.49
10	16QAM	1	49	21.12	21.17	21.67
10	16QAM	25	0	20.64	20.24	20.97
10	16QAM	25	12	20.80	20.06	20.33
10	16QAM	25	24	20.91	20.00	20.70
10	16QAM	50	0	20.83	20.85	20.49
Channel				20425	20525	20625
Frequency(MHz)				826.5	836.5	846.5
5	QPSK	1	0	22.86	22.70	22.78
5	QPSK	1	12	22.75	22.03	22.56
5	QPSK	1	24	22.42	22.42	22.20
5	QPSK	12	0	21.52	21.56	21.41
5	QPSK	12	6	21.88	21.04	21.14
5	QPSK	12	11	21.93	21.89	21.71
5	QPSK	25	0	21.83	21.84	21.76
5	16QAM	1	0	21.38	21.17	21.67
5	16QAM	1	12	21.70	21.77	21.74
5	16QAM	1	24	21.29	21.54	21.85
5	16QAM	12	0	20.55	20.34	20.09
5	16QAM	12	6	20.16	20.58	20.91
5	16QAM	12	11	20.06	20.52	20.12
5	16QAM	25	0	20.92	20.40	20.43

BW(MHz)	Modulation	RB Size	RB Offset	Power(dBm) Low Ch./Freq.	Power(dBm) Middle Ch./Freq.	Power(dBm) High Ch./Freq.
Channel				20415	20525	20635
Frequency(MHz)				825.5	836.5	847.5
3	QPSK	1	0	22.39	22.57	22.98
3	QPSK	1	7	22.64	22.22	22.54
3	QPSK	1	14	22.37	22.97	22.49
3	QPSK	8	0	21.63	21.69	21.20
3	QPSK	8	4	21.68	21.39	21.78
3	QPSK	8	7	21.31	21.71	21.09
3	QPSK	15	0	21.31	21.73	21.67
3	16QAM	1	0	21.74	21.79	21.40
3	16QAM	1	7	21.28	21.35	21.24
3	16QAM	1	14	21.68	21.05	21.40
3	16QAM	8	0	20.71	20.89	20.23
3	16QAM	8	4	20.12	20.25	20.44
3	16QAM	8	7	20.97	20.78	20.67
3	16QAM	15	0	20.25	20.83	20.92
Channel				20407	20525	20643
Frequency(MHz)				824.7	836.5	848.3
1.4	QPSK	1	0	22.42	22.70	22.19
1.4	QPSK	1	2	22.78	22.10	22.35
1.4	QPSK	1	5	22.40	22.06	22.54
1.4	QPSK	3	0	21.37	21.32	21.90
1.4	QPSK	3	1	21.84	21.81	21.36
1.4	QPSK	3	2	21.11	21.27	21.57
1.4	QPSK	6	0	21.57	21.82	21.76
1.4	16QAM	1	0	21.86	21.42	21.38
1.4	16QAM	1	2	21.79	21.06	21.93
1.4	16QAM	1	5	21.91	21.36	21.82
1.4	16QAM	3	0	20.37	20.30	20.85
1.4	16QAM	3	1	20.91	20.84	20.19
1.4	16QAM	3	2	20.40	20.19	20.75
1.4	16QAM	6	0	20.37	20.96	20.31

4. LTE Band 7 Conducted Power Test Verdict:

BW(MHz)	Modulation	RB Size	RB Offset	Power(dBm) Low Ch./Freq.	Power(dBm) Middle Ch./Freq.	Power(dBm) High Ch./Freq.
Channel				20850	21100	21350
Frequency(MHz)				2510	2535	2560
20	QPSK	1	0	22.69	**22.97**	22.55
20	QPSK	1	49	22.67	22.70	22.16
20	QPSK	1	99	22.86	22.26	22.69
20	QPSK	50	0	21.79	21.57	21.92
20	QPSK	50	24	21.73	21.01	21.59
20	QPSK	50	49	21.64	21.10	21.59
20	QPSK	100	0	21.92	21.60	21.25
20	16QAM	1	0	21.19	21.13	21.46
20	16QAM	1	49	21.89	21.69	21.68
20	16QAM	1	99	21.30	21.69	21.16
20	16QAM	50	0	20.65	20.61	20.87
20	16QAM	50	24	20.26	20.83	20.15
20	16QAM	50	49	20.10	20.49	20.54
20	16QAM	100	0	20.16	20.77	20.28
Channel				20825	21100	21375
Frequency(MHz)				2507.5	2535	2562.5
15	QPSK	1	0	22.23	22.65	22.88
15	QPSK	1	37	22.60	22.52	22.42
15	QPSK	1	74	22.53	22.69	22.78
15	QPSK	36	0	21.67	21.36	21.16
15	QPSK	36	18	21.44	21.26	21.01
15	QPSK	36	37	21.48	21.79	21.73
15	QPSK	75	0	21.96	21.25	21.51
15	16QAM	1	0	21.85	21.38	21.44
15	16QAM	1	37	21.08	21.09	21.52
15	16QAM	1	74	21.52	21.33	21.69
15	16QAM	36	0	20.06	20.29	20.77
15	16QAM	36	18	20.23	20.87	20.63
15	16QAM	36	37	20.79	20.53	20.40
15	16QAM	75	0	20.69	20.80	20.80

BW(MHz)	Modulation	RB Size	RB Offset	Power(dBm) Low Ch./Freq.	Power(dBm) Middle Ch./Freq.	Power(dBm) High Ch./Freq.
Channel				20800	21100	21400
Frequency(MHz)				2505	2535	2565
10	QPSK	1	0	22.45	22.33	22.57
10	QPSK	1	24	22.90	22.69	22.30
10	QPSK	1	49	22.77	22.49	22.11
10	QPSK	25	0	21.34	21.31	21.25
10	QPSK	25	12	21.58	21.04	21.69
10	QPSK	25	24	21.63	21.84	21.23
10	QPSK	50	0	21.61	21.60	21.06
10	16QAM	1	0	21.03	21.44	21.50
10	16QAM	1	24	21.71	21.49	21.24
10	16QAM	1	49	21.76	21.94	21.87
10	16QAM	25	0	20.44	20.64	20.48
10	16QAM	25	12	20.03	20.12	20.24
10	16QAM	25	24	20.58	20.92	20.42
10	16QAM	50	0	20.50	20.61	20.89
Channel				20775	21100	21425
Frequency(MHz)				2502.5	2535	2567.5
5	QPSK	1	0	22.48	22.74	22.77
5	QPSK	1	12	22.34	22.01	22.13
5	QPSK	1	24	22.34	22.64	22.48
5	QPSK	12	0	21.50	21.45	21.73
5	QPSK	12	6	21.21	21.99	21.85
5	QPSK	12	11	21.89	21.30	21.02
5	QPSK	25	0	21.86	21.93	21.17
5	16QAM	1	0	21.66	21.10	21.19
5	16QAM	1	12	21.47	21.86	21.88
5	16QAM	1	24	21.35	21.86	21.69
5	16QAM	12	0	20.66	20.77	20.69
5	16QAM	12	6	20.56	20.44	20.16
5	16QAM	12	11	20.69	20.58	20.25
5	16QAM	25	0	20.97	20.62	21.00

2.2 Peak to Average Radio

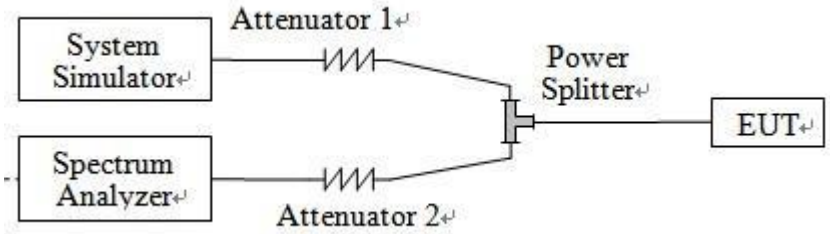
2.2.1 Definition

Power Complementary Cumulative Distribution Function (CCDF) curves provide a means for characterizing the power peaks of a digitally modulated signal on a statistical basis. A CCDF curve depicts the probability of the peak signal amplitude exceeding the average power level. Most contemporary measurement instrumentation include the capability to produce CCDF curves for an input signal provided that the instrument's resolution bandwidth can be set wide enough to accommodate the entire input signal bandwidth. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

2.2.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

2.2.3 Test Description



2.2.4 Test Procedures

1. The EUT was connected to spectrum and system simulator via a power divider.
2. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
3. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.
4. Record the deviation as Peak to Average Ratio.

2.2.5 Test Results of Peak-to-Average Ratio

1. Test Result of LTE Band 2 Peak-to-Average Ratio:

BW (MHz)	Modulation	Channel	Frequency (MHz)	RB Size	RB Offset	Peak to Average radio		Limit	Verdict
						dBm	Refer to Plot	dBm	
20	16QAM	18700	1860	1	0	5.86	Plot A1 to A6	13	PASS
				100	0	4.20			
	16QAM	18900	1880	1	0	5.98			PASS
				100	0	4.12			
	16QAM	19100	1900	1	0	6.07			PASS
				100	0	4.41			

2. Test Result of LTE Band 4 Peak-to-Average Ratio:

BW (MHz)	Modulation	Channel	Frequency (MHz)	RB Size	RB Offset	Peak to Average radio		Limit	Verdict
						dBm	Refer to Plot	dBm	
20	16QAM	20050	1720	1	0	4.44	Plot B1 to B6	13	PASS
				100	0	5.72			
	16QAM	20175	1732.5	1	0	3.96			PASS
				100	0	5.75			
	16QAM	20300	1745	1	0	4.50			PASS
				100	0	6.07			

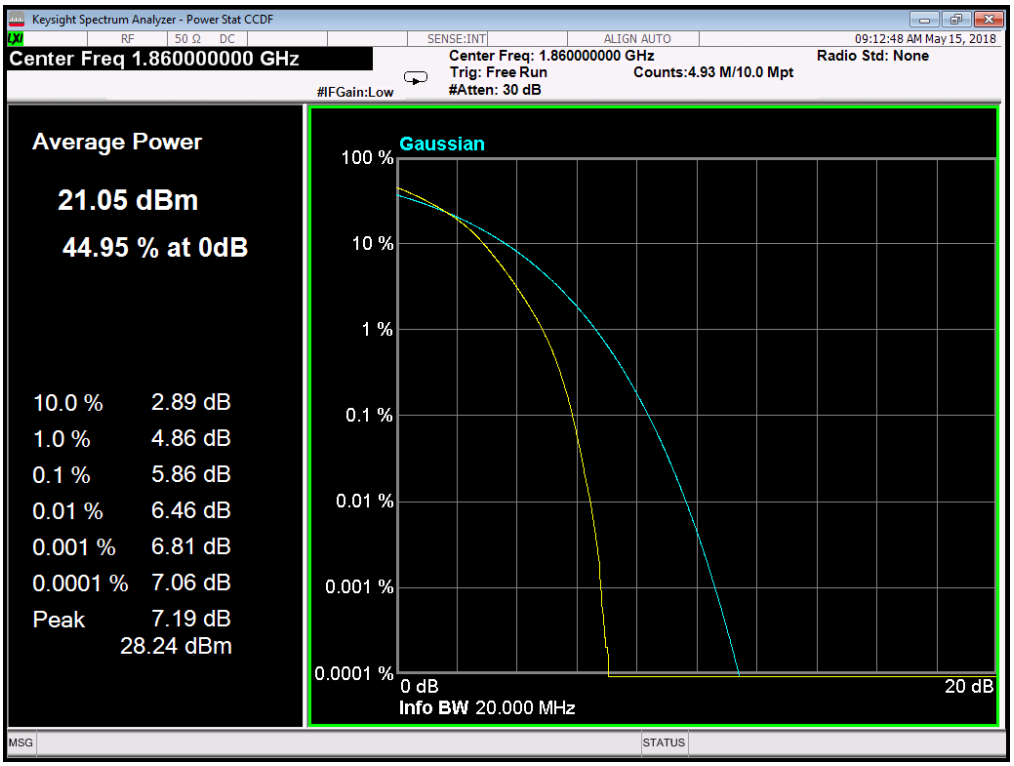
3. Test Result of LTE Band 5 Peak-to-Average Ratio:

BW (MHz)	Modulation	Channel	Frequency (MHz)	RB Size	RB Offset	Peak to Average radio		Limit	Verdict
						dBm	Refer to Plot	dBm	
10	16QAM	20450	829	1	0	4.57	Plot C1 to C6	13	PASS
				50	0	6.37			
	16QAM	20525	836.5	1	0	5.02			PASS
				50	0	6.53			
	16QAM	20600	844	1	0	4.53			PASS
				50	0	6.34			

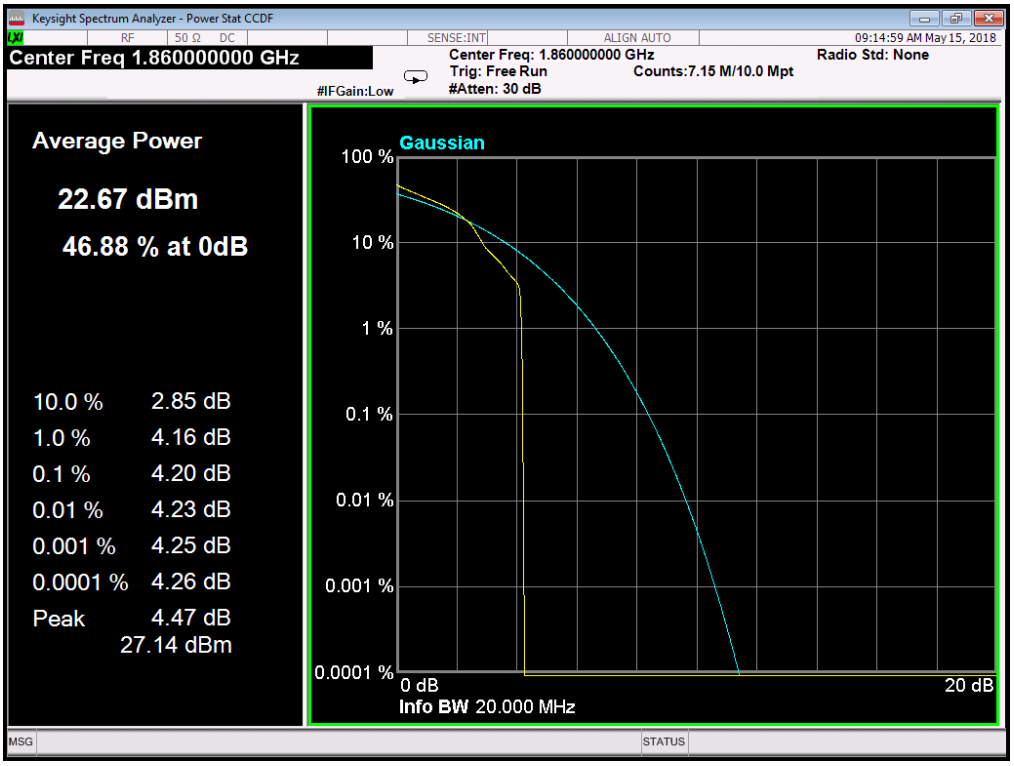
4. Test Result of LTE Band 7 Peak-to-Average Ratio:

BW (MHz)	Modulation	Channel	Frequency (MHz)	RB Size	RB Offset	Peak to Average radio		Limit	Verdict
						dBm	Refer to Plot	dBm	
20	16QAM	20850	2510	1	0	3.76	Plot D1 to D6	13	PASS
				100	0	5.35			
	16QAM	21100	2535	1	0	3.09			PASS
				100	0	5.42			
	16QAM	21350	2560	1	0	3.28			PASS
				100	0	5.12			

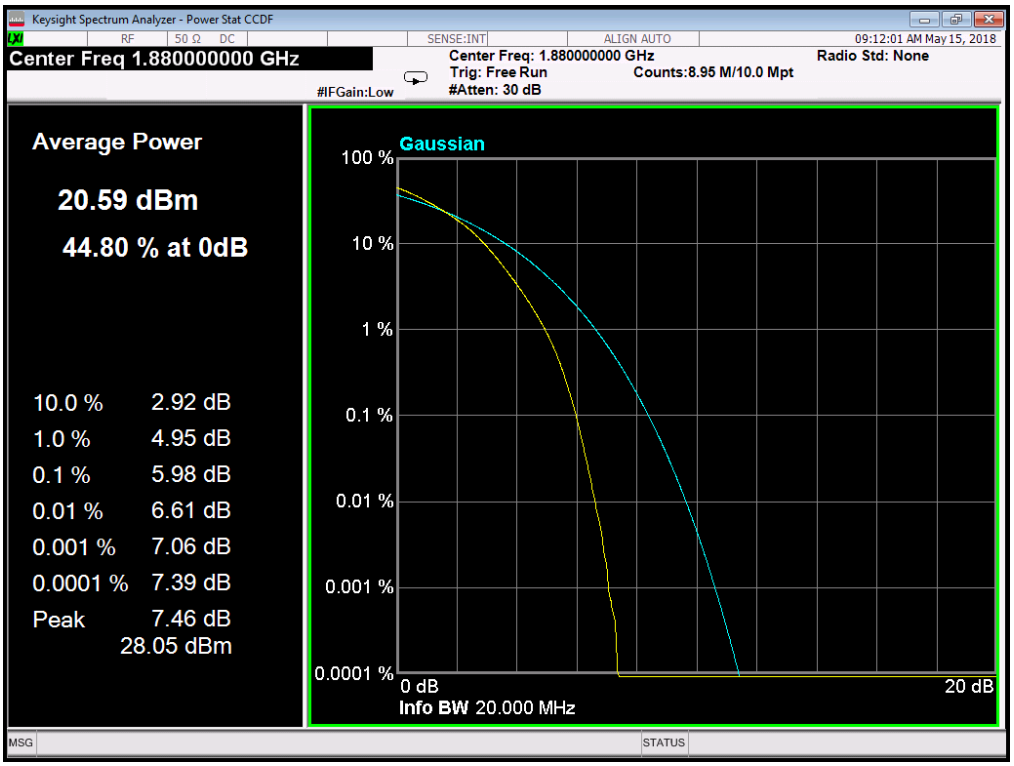
2.2.6 Test Results (Plots) of Peak-to-Average Ratio



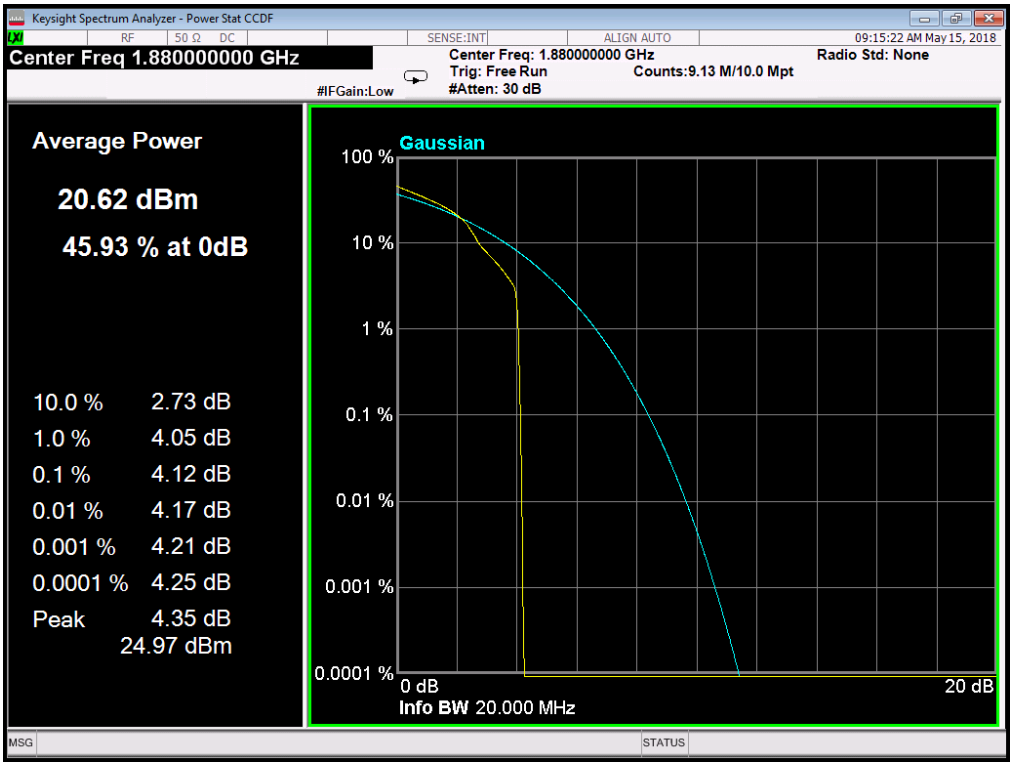
(Plot A1: Band 2/20MHz/16QAM in Ch. 18700 1RB Size)



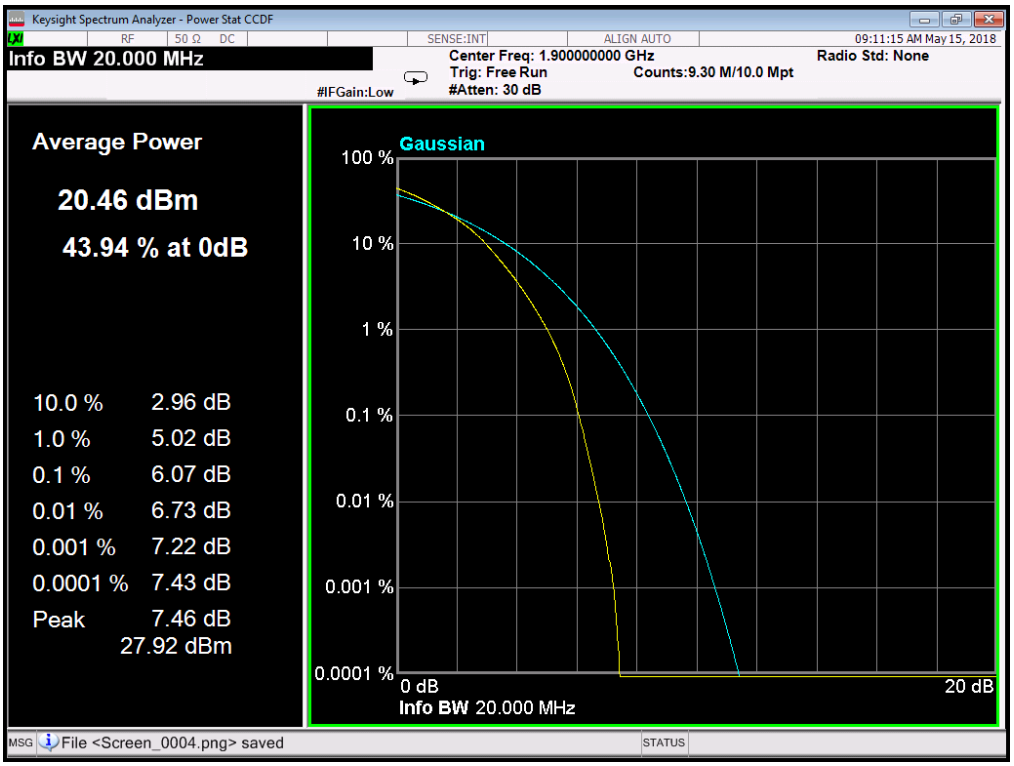
(Plot A2: Band 2/20MHz/16QAM in Ch. 18700 100RB Size)



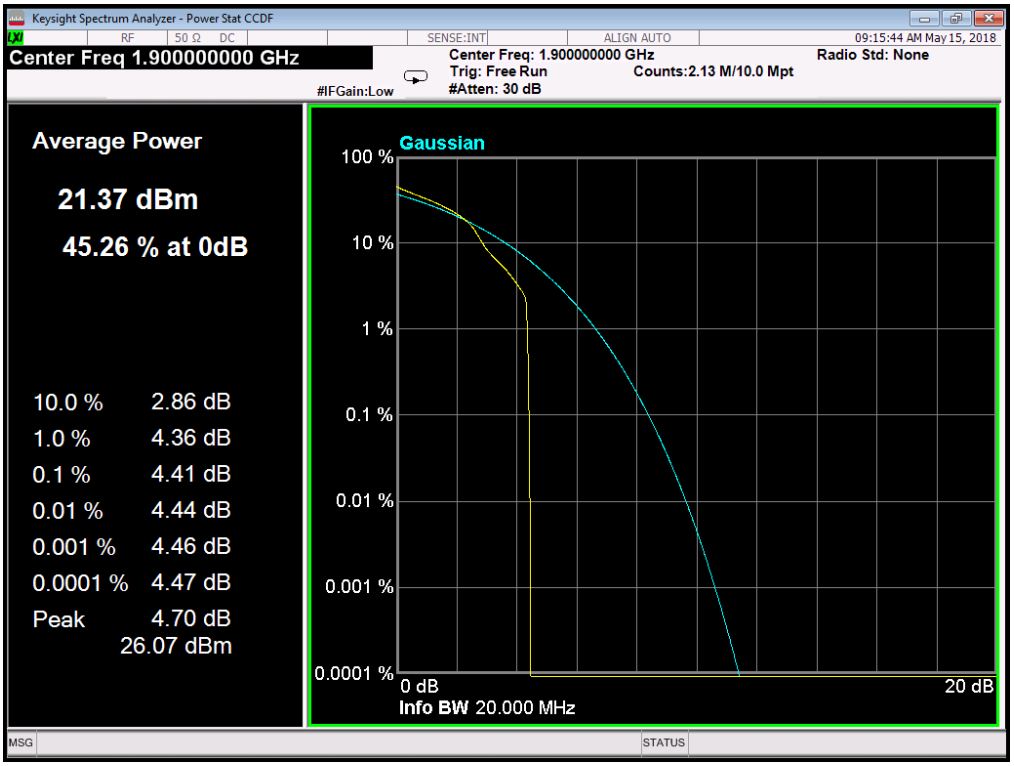
(Plot A3: Band 2/20MHz/16QAM in Ch.18900 1RB Size)



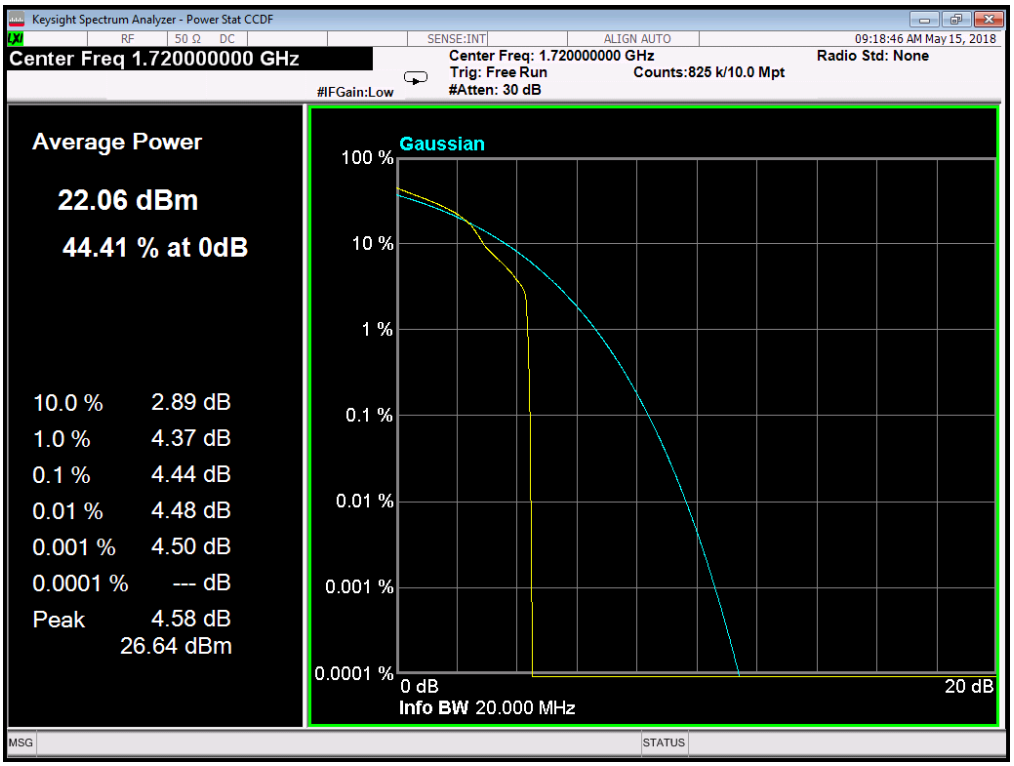
(Plot A4: Band 2/20MHz/16QAM in Ch.18900 100RB Size)



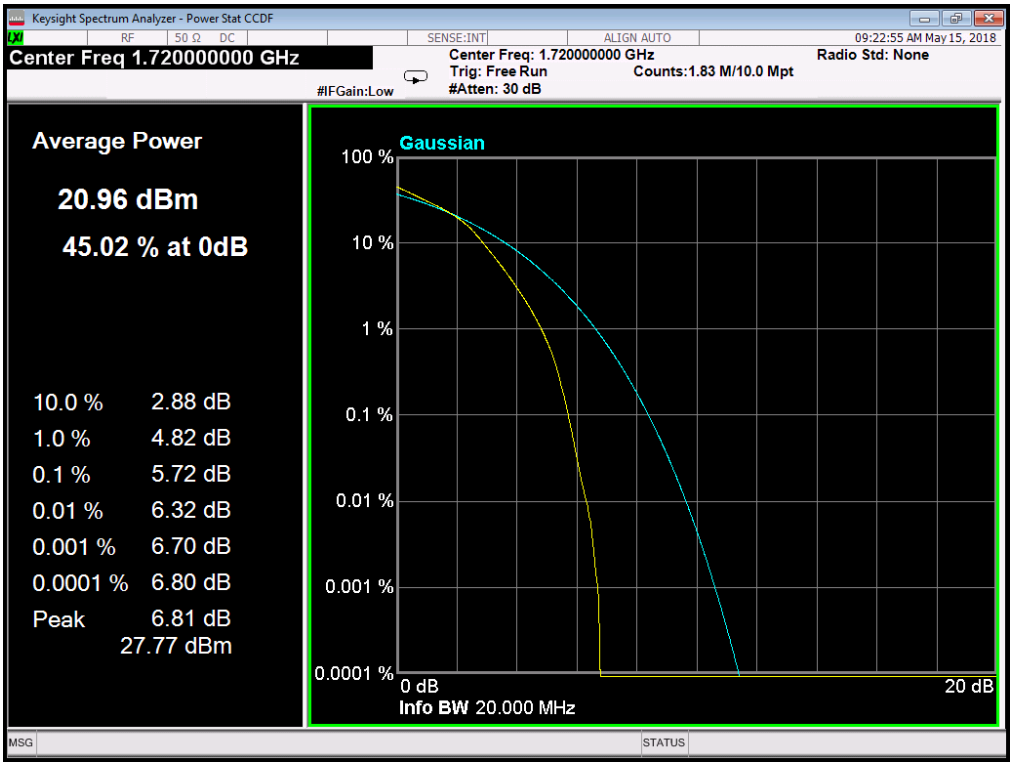
(Plot A5: Band 2/20MHz/16QAM in Ch.19100 1RB Size)



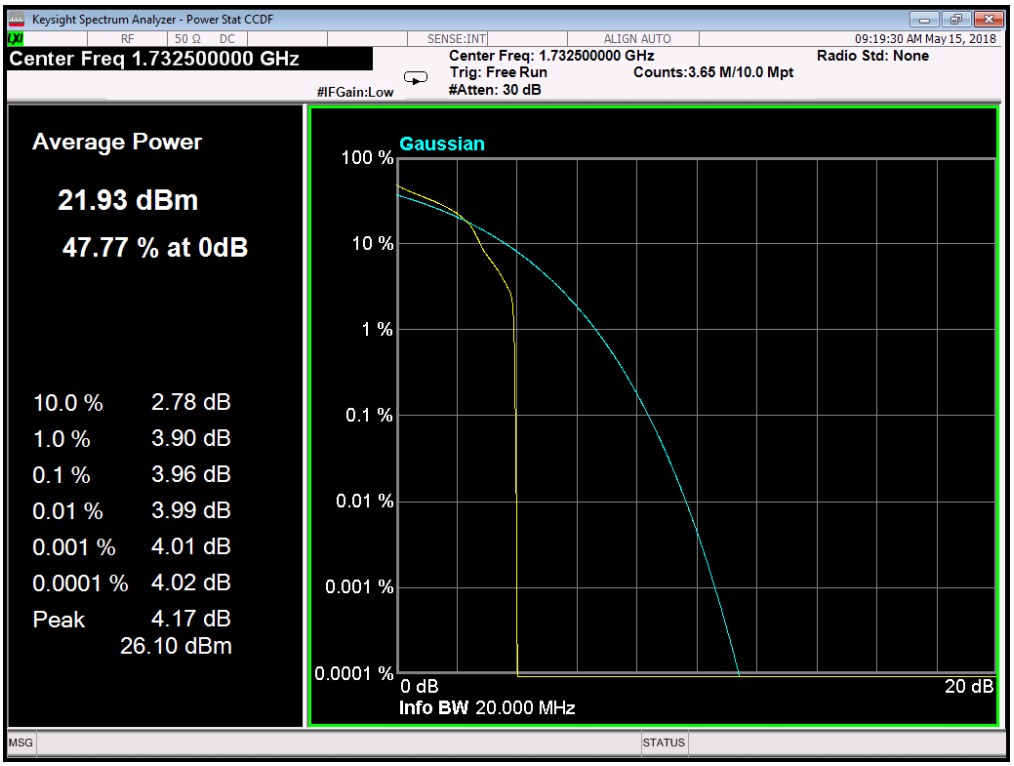
(Plot A6: Band 2/20MHz/16QAM in Ch.19100 100RB Size)



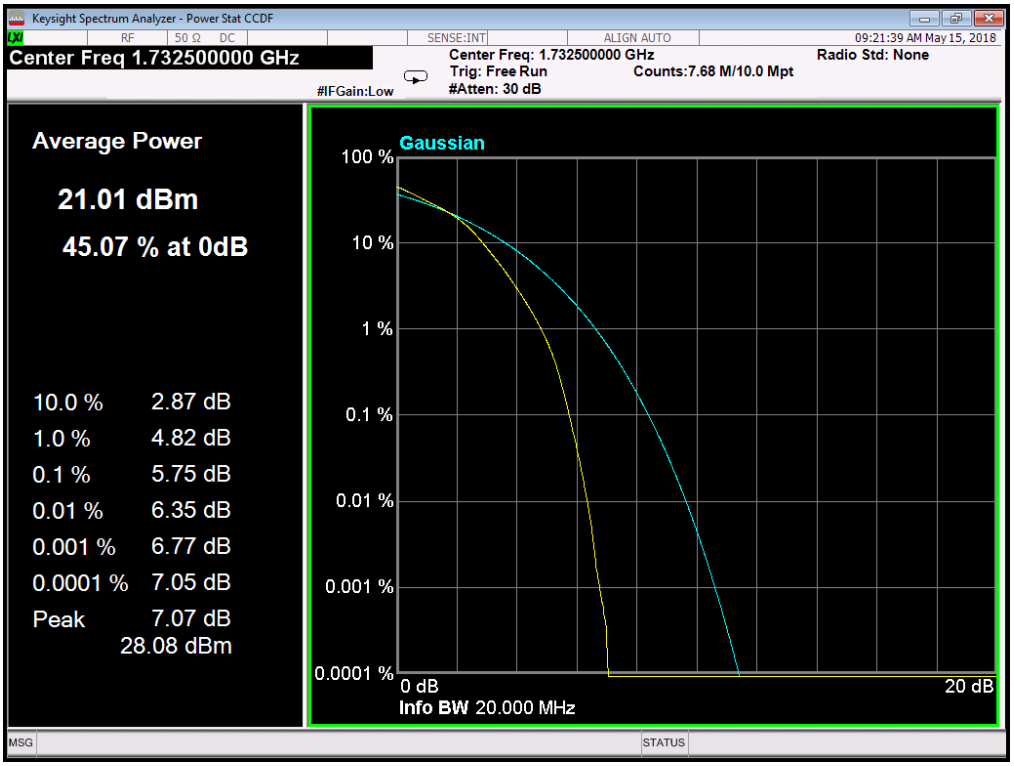
(Plot B1: Band 4/20MHz/16QAM in Ch.20050 1RB Size)



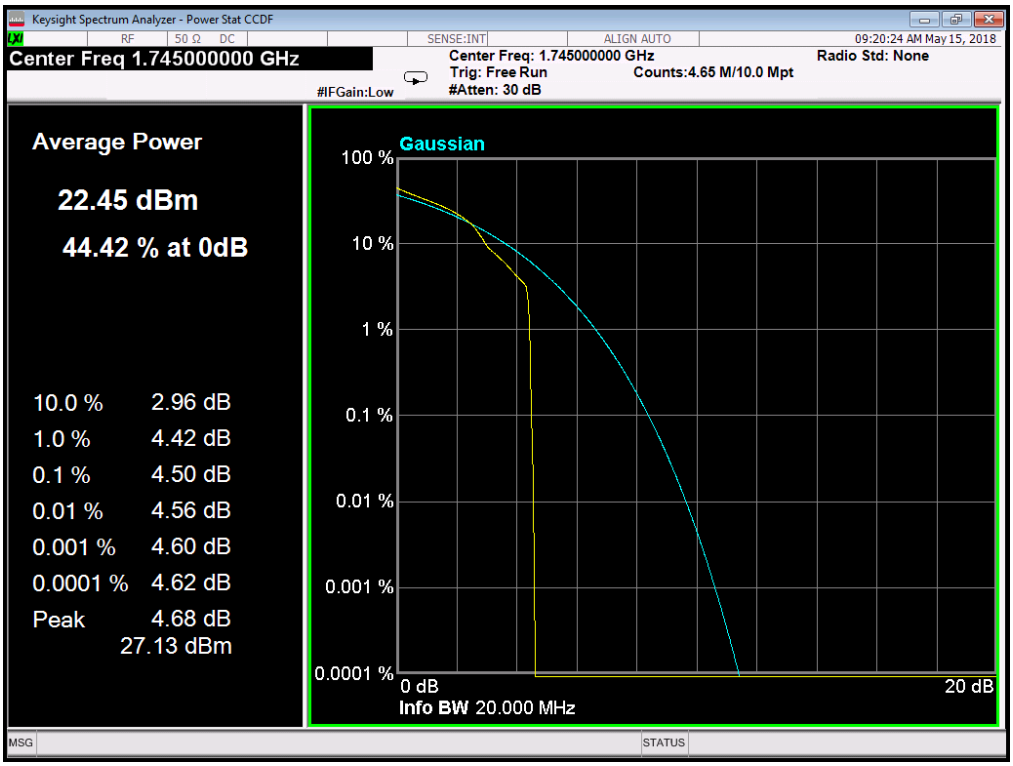
(Plot B2: Band 4/20MHz/16QAM in Ch.20050 100RB Size)



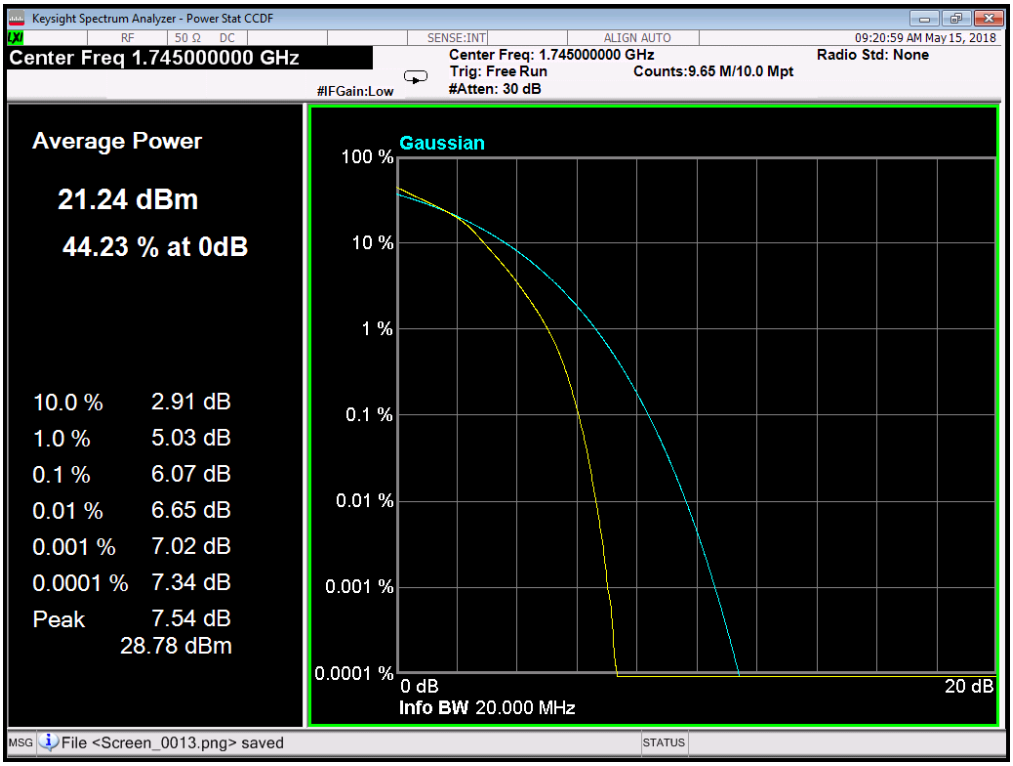
(Plot B3: Band 4/20MHz/16QAM in Ch.20175 1RB Size)



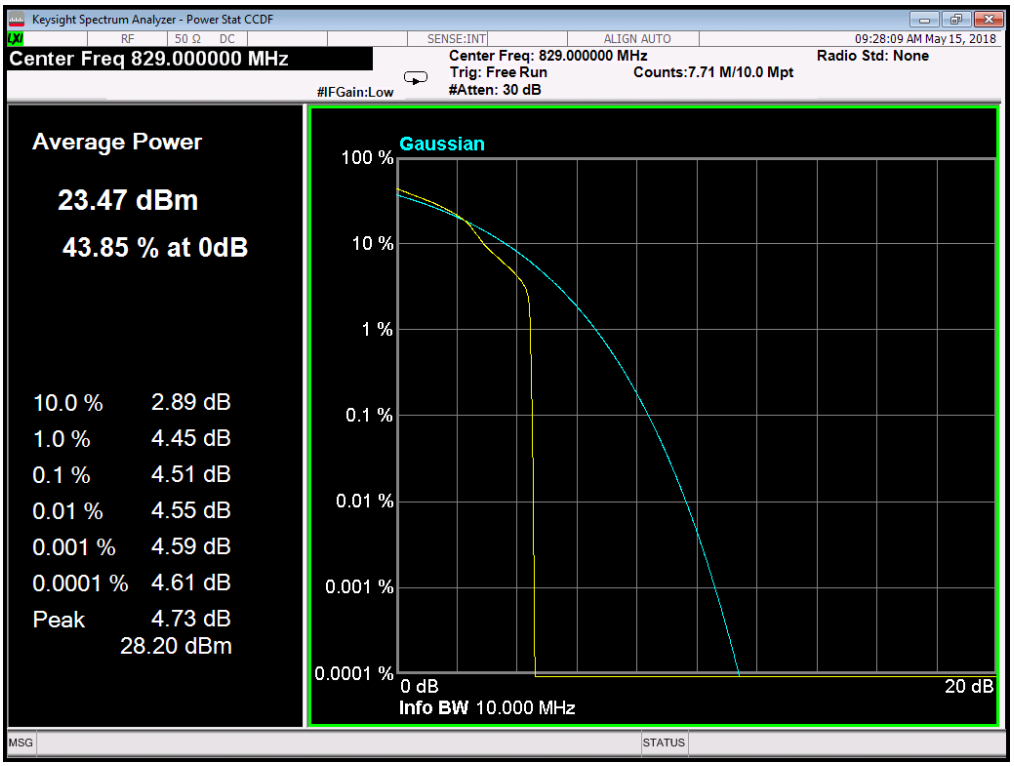
(Plot B4: Band 4/20MHz/16QAM in Ch.20175 100RB Size)



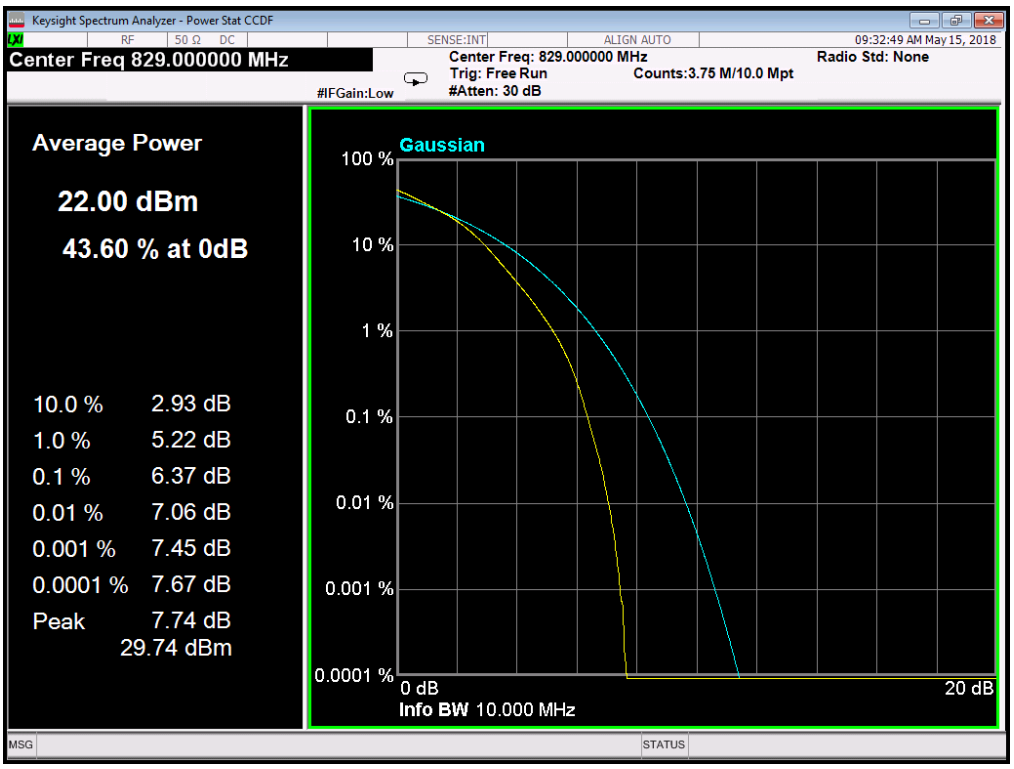
(Plot B5: Band 4/20MHz/16QAM in Ch.20300 1RB Size)



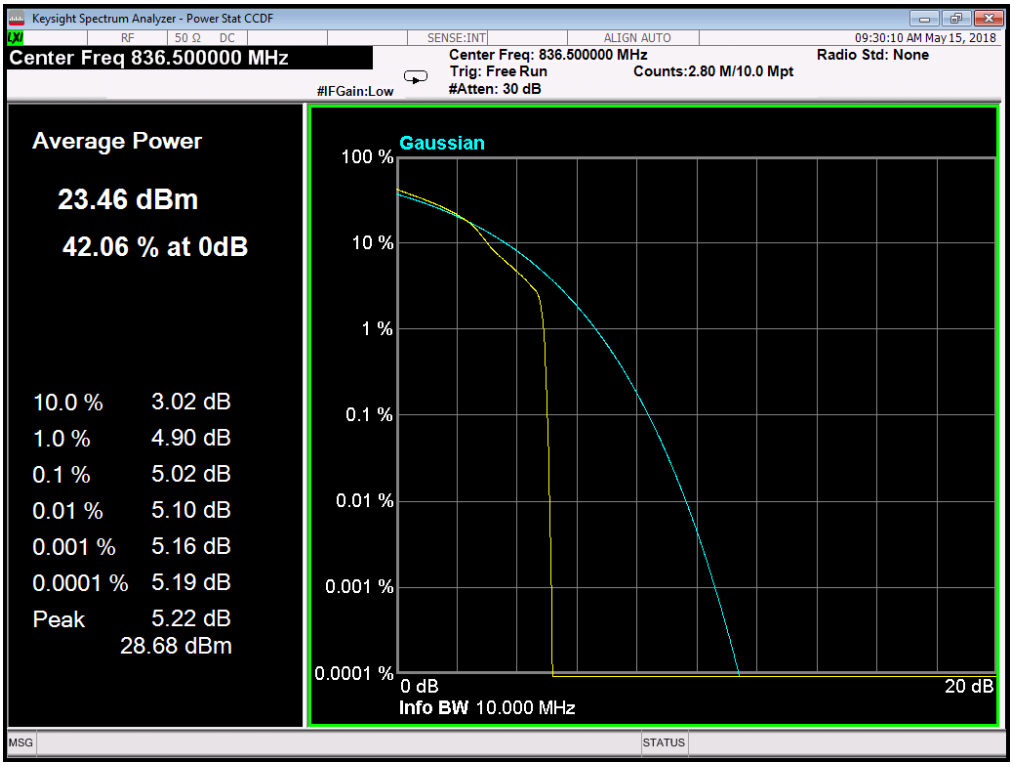
(Plot B6: Band 4/20MHz/16QAM in Ch.20300 100RB Size)



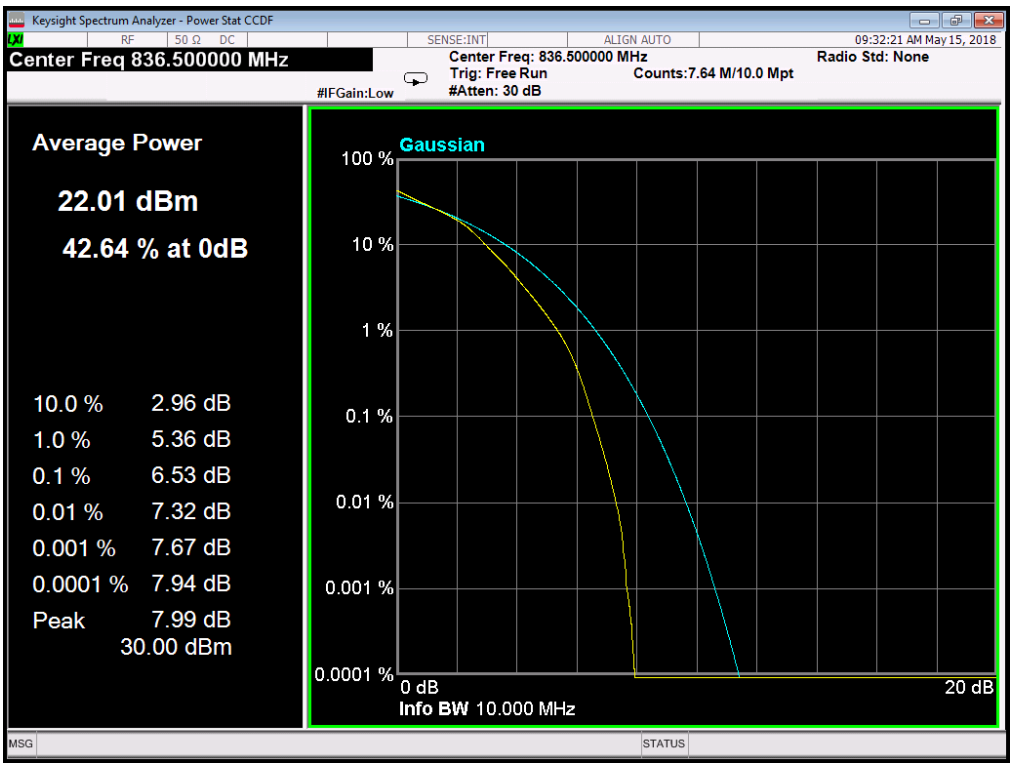
(Plot C1: Band 5/10MHz/16QAM in Ch.20450 1RB Size)



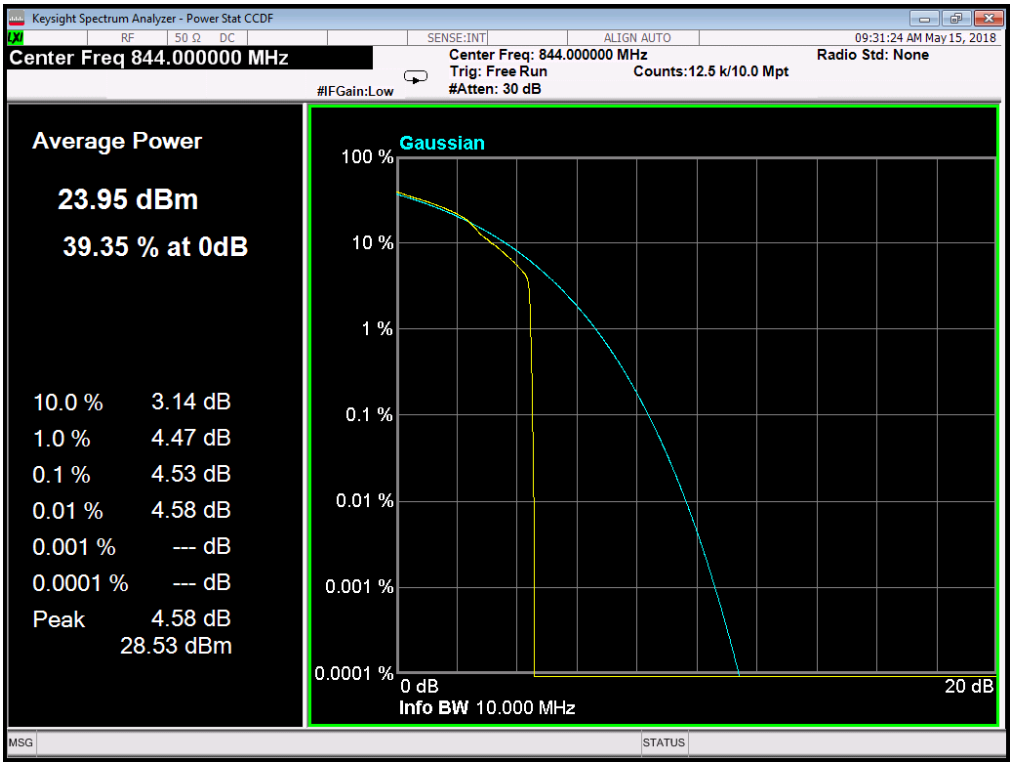
(Plot C2: Band 5/10MHz/16QAM in Ch.20450 50RB Size)



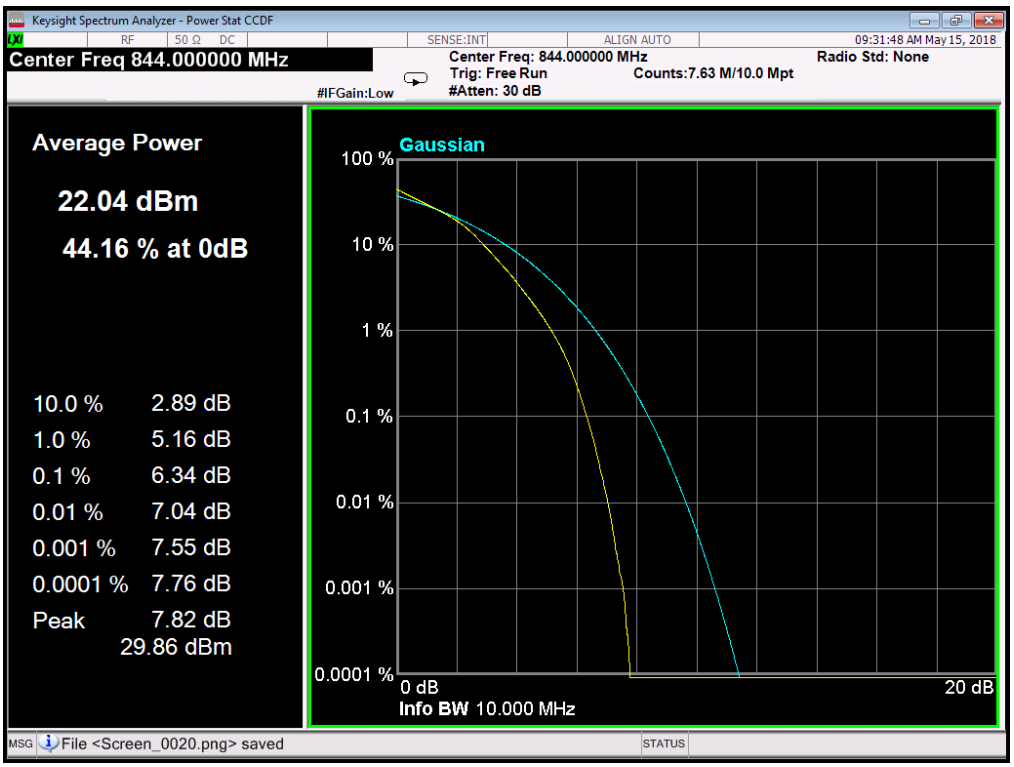
(Plot C3: Band 5/10MHz/16QAM in Ch.20525 1RB Size)



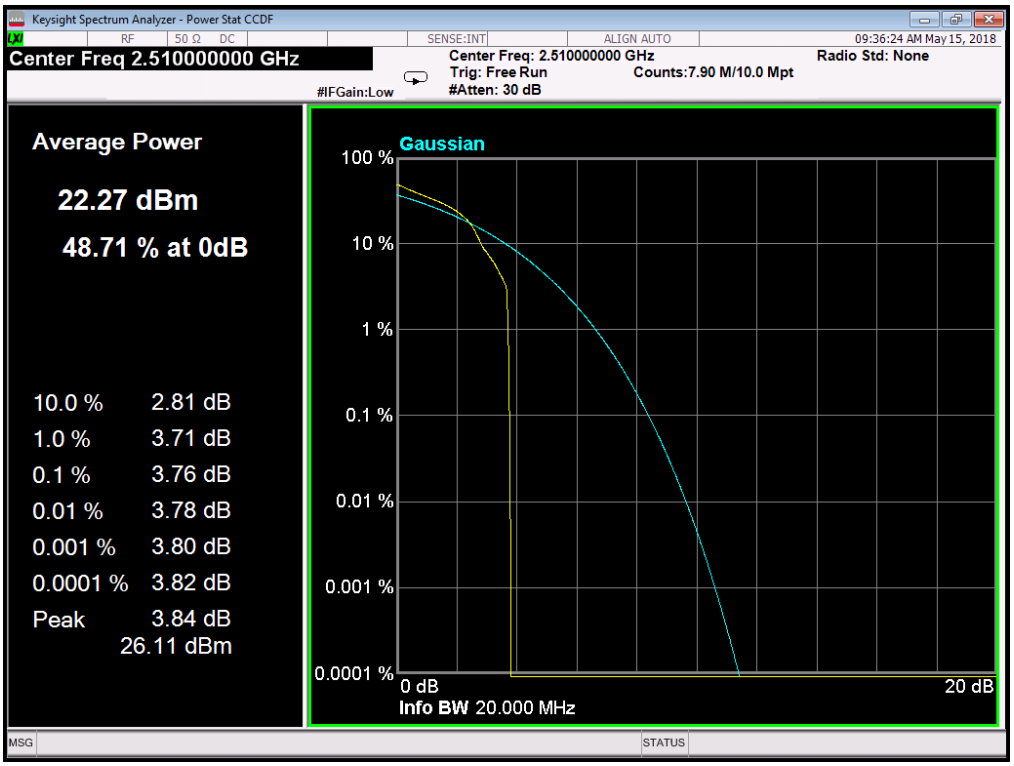
(Plot C4: Band 5/10MHz/16QAM in Ch.20525 50RB Size)



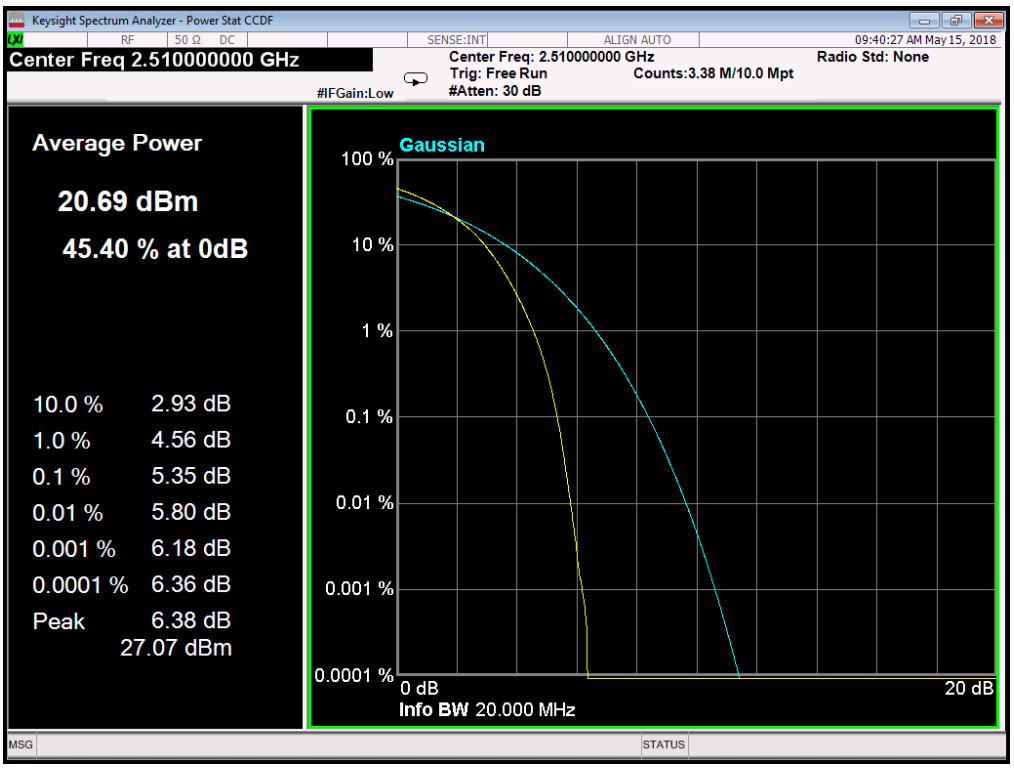
(Plot C5: Band 5/10MHz/16QAM in Ch.20600 1RB Size)



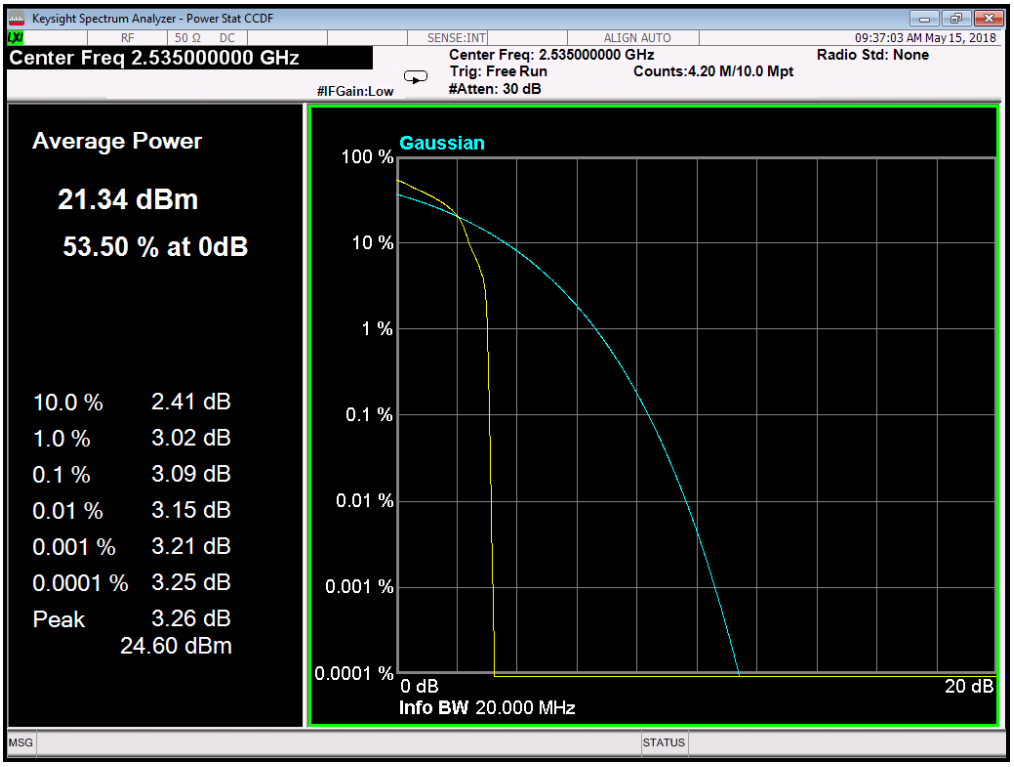
(Plot C6: Band 5/10MHz/16QAM in Ch.20600 50RB Size)



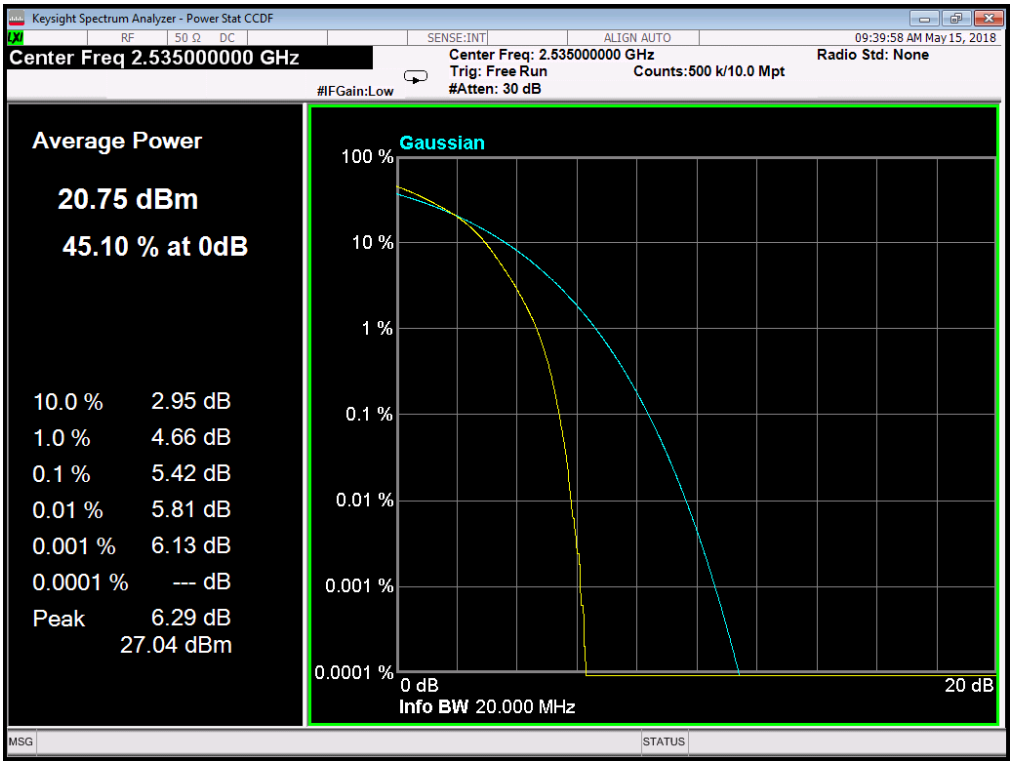
(Plot D1: Band 7/20MHz/16QAM in Ch.20850 1RB Size)



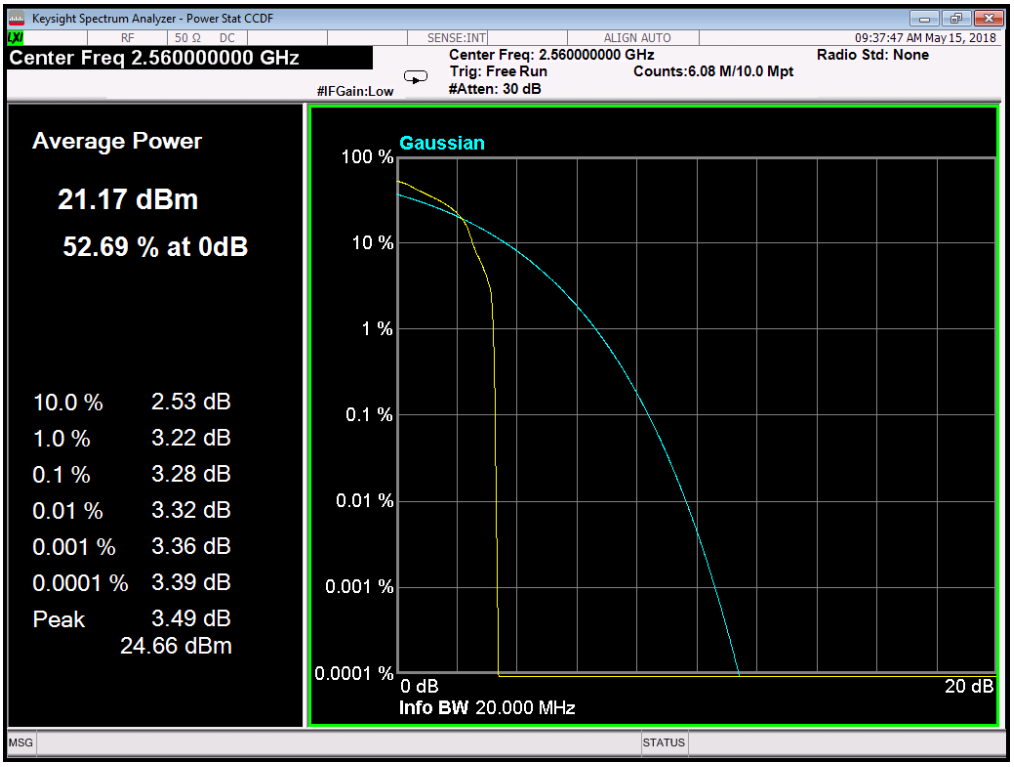
(Plot D2: Band 7/20MHz/16QAM in Ch.20850 100RB Size)



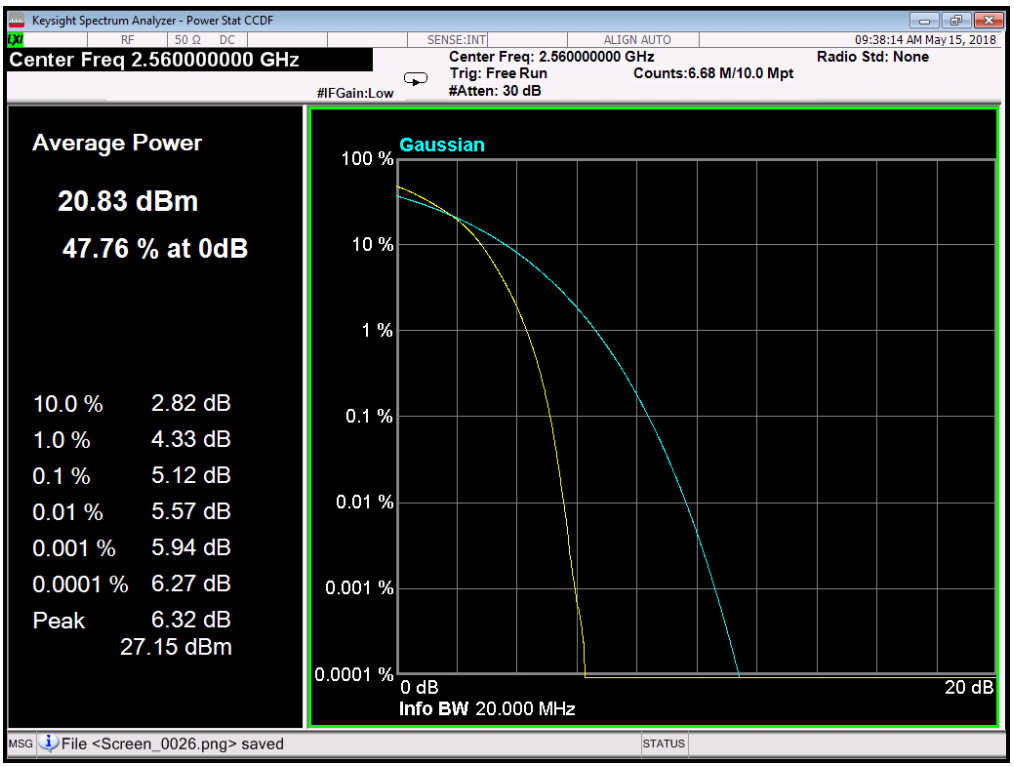
(Plot D3: Band 7/20MHz/16QAM in Ch.21100 1RB Size)



(Plot D4: Band 7/20MHz/16QAM in Ch.21100 100RB Size)



(Plot D5: Band 7/20MHz/16QAM in Ch.21350 1RB Size)



(Plot D6: Band 7/20MHz/16QAM in Ch.21350 100RB Size)

2.3 99% Occupied Bandwidth and 26dB Bandwidth

2.3.1 Definition

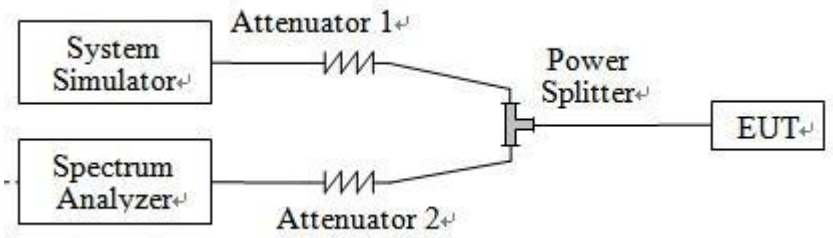
According to FCC section 2.1049, the occupied bandwidth is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5% of the total mean transmitted power.

The 26 dB emission bandwidth is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated 26 dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth equal to approximately 1.0% of the emission bandwidth.

2.3.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

2.3.3 Test Setup



2.3.4 Test Procedures

1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. The 26dB and 99% occupied bandwidth (BW) of the middle channel for the highest RF power with full RB sizes were measured.

2.3.5 Test Result of 99% Occupied Bandwidth and 26dB Bandwidth

LTE Band 2						
BW (MHz)	Channel	Frequency (MHz)	Mode	99% Occupied Bandwidth(MHz)	26dBBandwidth (MHz)	Refer to Plot
1.4	18900	1880	QPSK	1.10	1.33	Plot A1 to A2
			16QAM	1.10	1.33	Plot A3 to A4
3	18900	1880	QPSK	2.75	3.06	Plot B1 to B2
			16QAM	2.76	3.07	Plot B3 to B4
5	18900	1880	QPSK	4.54	5.03	Plot C1 to C2
			16QAM	4.51	5.01	Plot C3 to C4
10	18900	1880	QPSK	8.97	9.84	Plot D1 to D2
			16QAM	8.95	9.60	Plot D3 to D4
15	18900	1880	QPSK	13.54	14.84	Plot E1 to E2
			16QAM	13.51	14.78	Plot E3 to E4
20	18900	1880	QPSK	18.45	20.60	Plot F1 to F2
			16QAM	18.52	20.61	Plot F3 to F4

LTE Band 4						
BW (MHz)	Channel	Frequency (MHz)	Mode	99% Occupied Bandwidth(MHz)	26dBBandwidth (MHz)	Refer to Plot
1.4	20175	1732.5	QPSK	1.10	1.32	Plot G1 to G2
			16QAM	1.10	1.29	Plot G3 to G4
3	20175	1732.5	QPSK	2.74	3.05	Plot H1 to H2
			16QAM	2.76	3.07	Plot H3 to H4
5	20175	1732.5	QPSK	4.53	5.04	Plot I1 to I2
			16QAM	4.51	5.00	Plot I3 to I4
10	20175	1732.5	QPSK	8.97	9.81	Plot J1 to J2
			16QAM	8.96	9.69	Plot J3 to J4
15	20175	1732.5	QPSK	13.51	14.87	Plot K1 to K2
			16QAM	13.51	14.71	Plot K3 to K4
20	20175	1732.5	QPSK	18.40	20.44	Plot L1 to L2
			16QAM	18.45	20.45	Plot L3 to L4

LTE Band 5						
BW (MHz)	Channel	Frequency (MHz)	Mode	99% Occupied Bandwidth(MHz)	26dBBandwidth (MHz)	Refer to Plot
1.4	20525	836.5	QPSK	1.10	1.31	Plot M1 to M2
			16QAM	1.10	1.29	Plot M3 to M4
3	20525	836.5	QPSK	2.75	3.07	Plot N1 to N2
			16QAM	2.76	3.04	Plot N3 to N4
5	20525	836.5	QPSK	4.54	5.06	Plot O1 to O2
			16QAM	4.52	5.01	Plot O3 to O4
10	20525	836.5	QPSK	8.99	9.82	Plot P1 to P2
			16QAM	8.97	9.66	Plot P3 to P4

LTE Band 7						
BW (MHz)	Channel	Frequency (MHz)	Mode	99% Occupied Bandwidth(MHz)	26dBBandwidth (MHz)	Refer to Plot
5	21100	2535	QPSK	4.53	5.01	Plot Q1 to Q2
			16QAM	4.52	5.00	Plot Q3 to Q4
10	21100	2535	QPSK	8.96	9.85	Plot R1 to R2
			16QAM	8.95	9.65	Plot R3 to R4
15	21100	2535	QPSK	13.51	14.79	Plot S1 to S2
			16QAM	13.48	14.76	Plot S3 to S4
20	21100	2535	QPSK	18.39	20.43	Plot T1 to T2
			16QAM	18.31	20.52	Plot T3 to T4

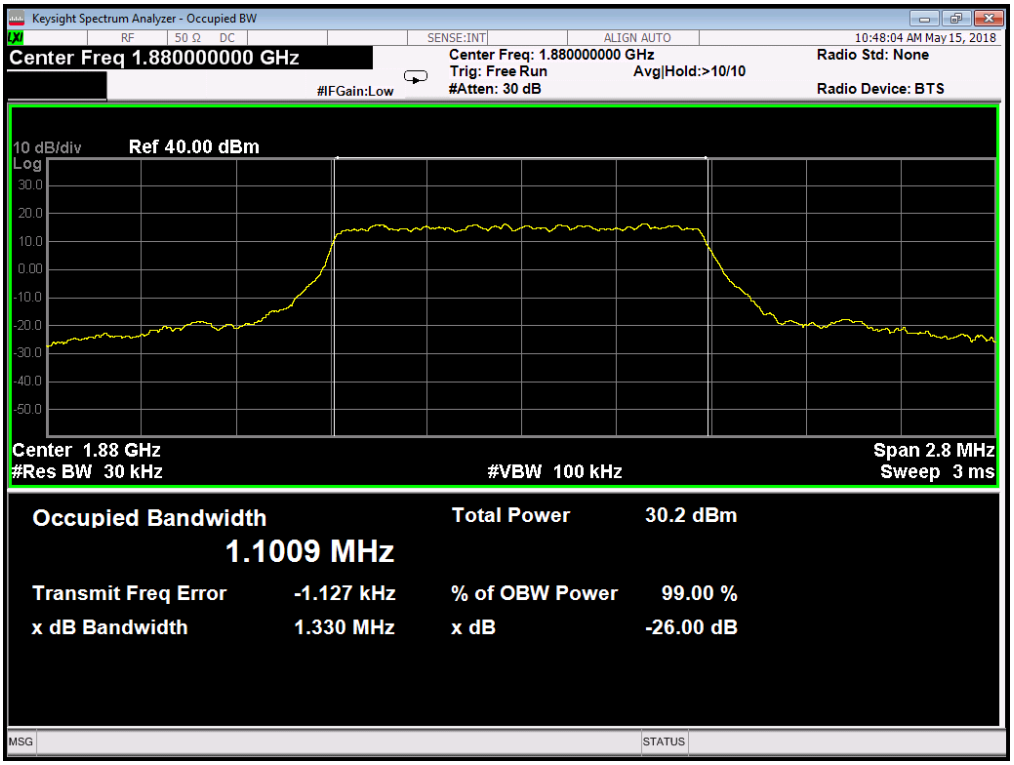
Note: The maximum RB configurations of the 99% Occupied Bandwidth and 26dB Bandwidth summary as below:

BW1.4MHz RB setting: RB Size 6,RB Offset 0 BW3MHz RB setting: RB Size 15,RB Offset 0

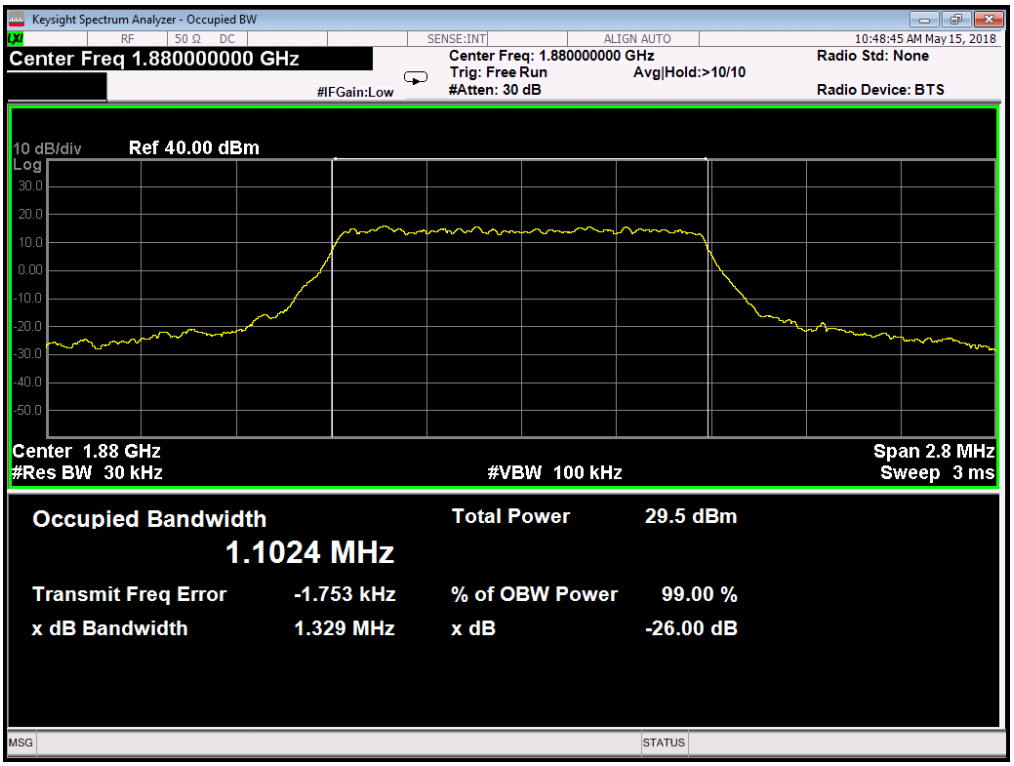
BW5MHz RB setting: RB Size 25,RB Offset 0 BW10MHz RB setting: RB Size 50,RB Offset 0

BW15MHz RB setting: RB Size 75,RB Offset 0 BW20MHz RB setting: RB Size 100,RB Offset 0

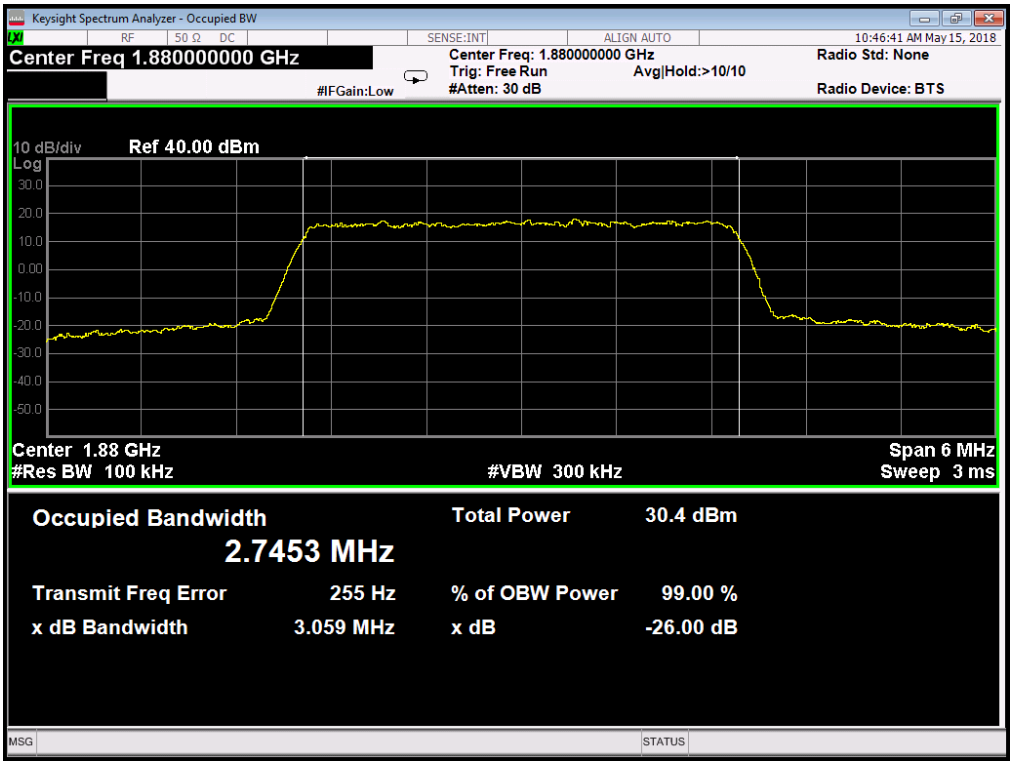
2.3.6 Test Result (Plots) of 99% Occupied Bandwidth and 26dB Bandwidth



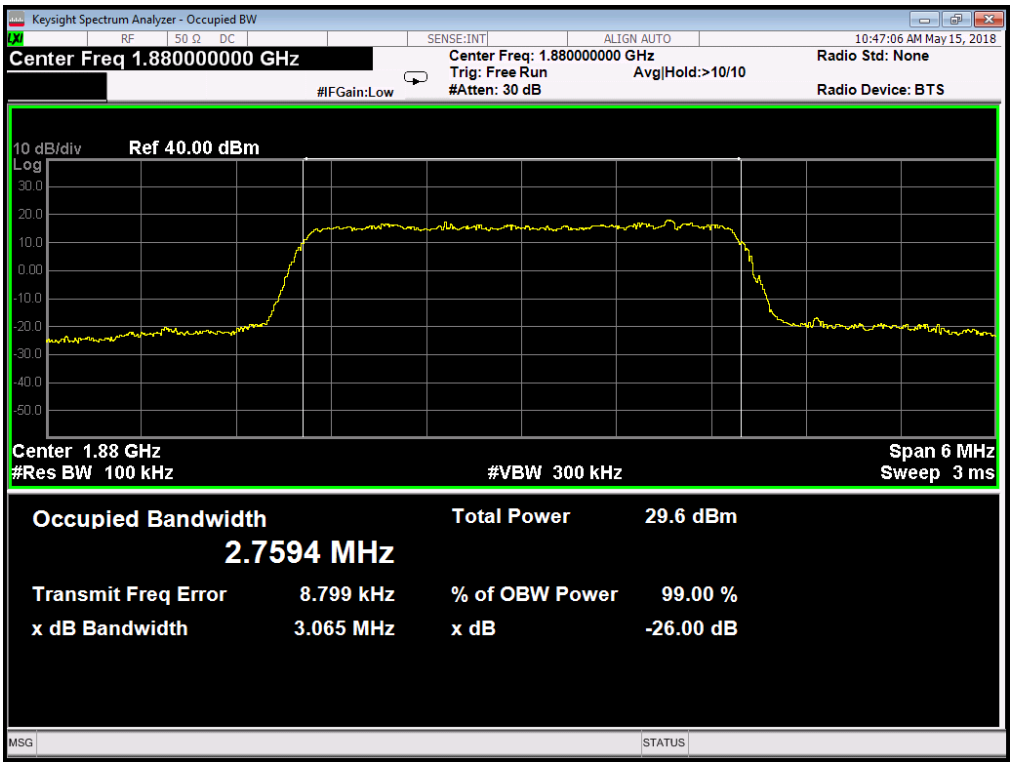
(Plot A1: 99% & 26dB Occupied Bandwidth LTE Band 2 1.4MHz/QPSK)



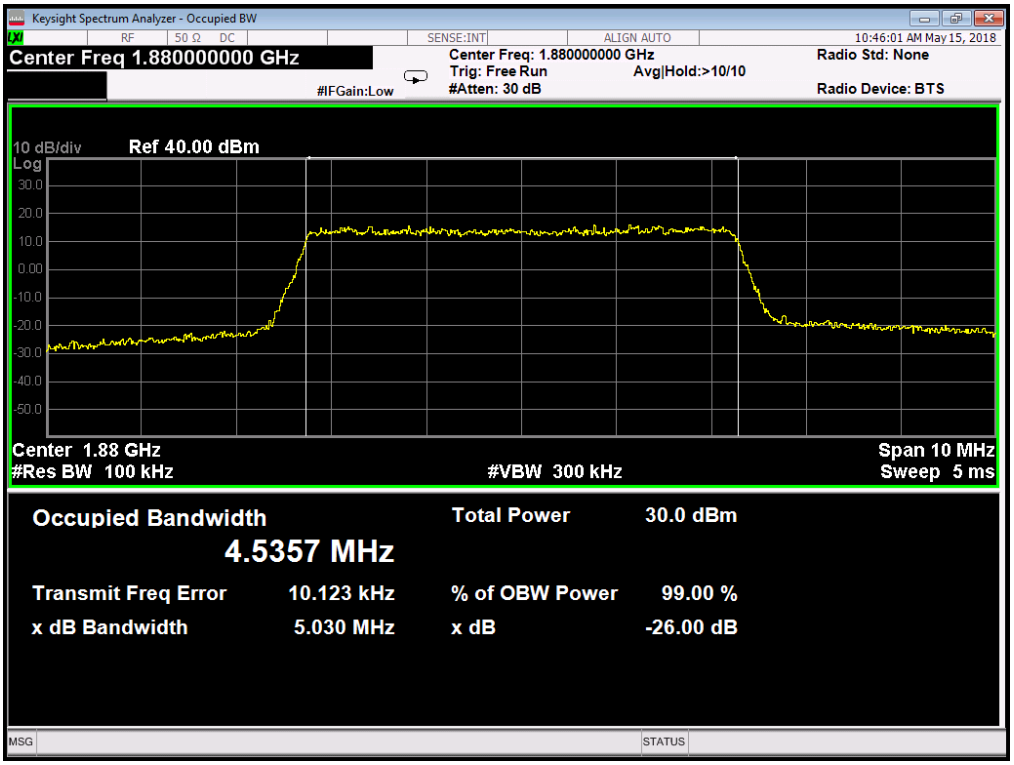
(Plot A3: 99%& 26dB Occupied Bandwidth LTE Band 2 1.4MHz/16QAM)



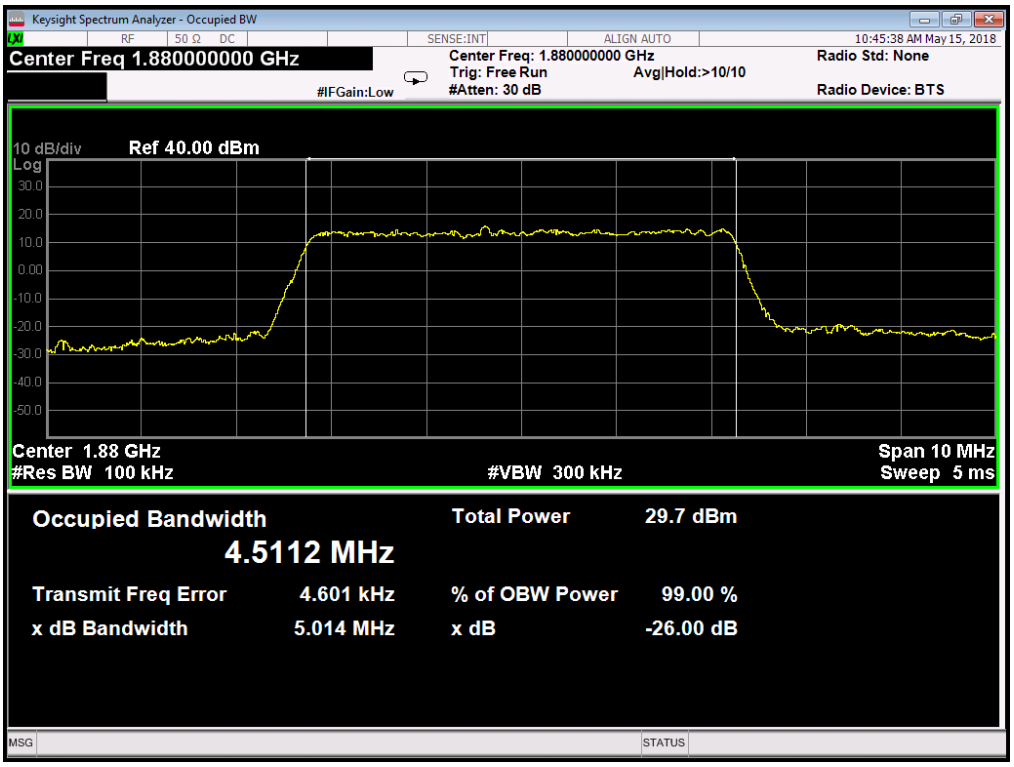
(Plot B1: 99% & 26dB Occupied Bandwidth LTE Band 2/3MHz/QPSK)



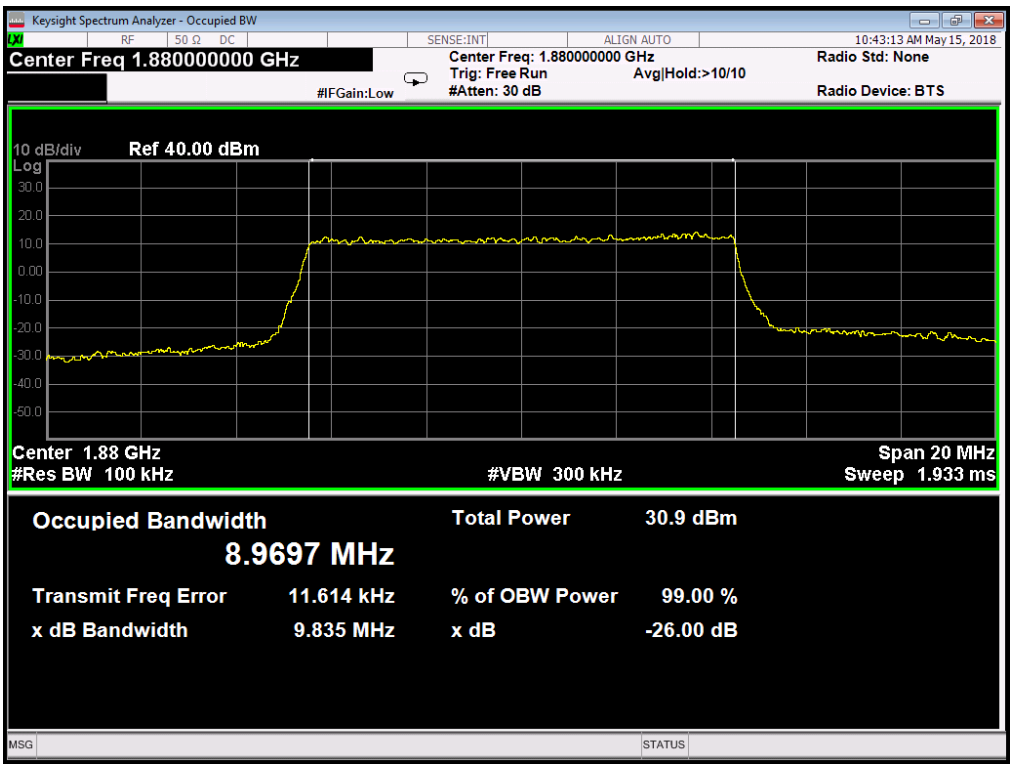
(Plot B3: 99% & 26dB Occupied Bandwidth LTE Band 2/3MHz/16QAM)



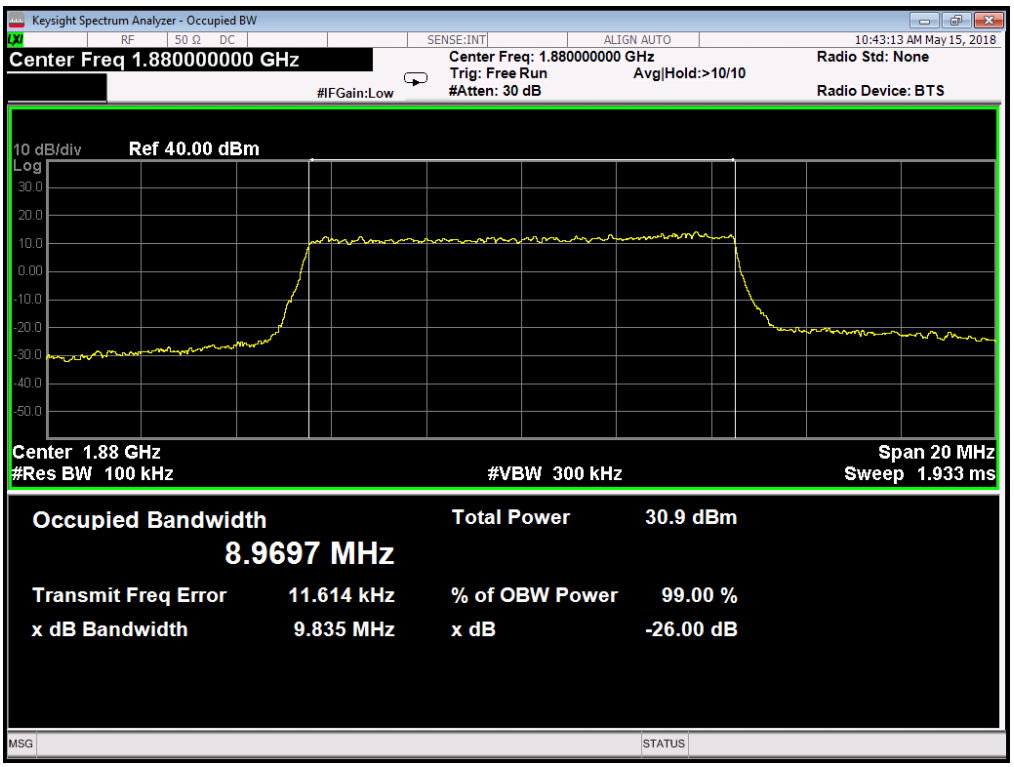
(Plot C1: 99% & 26dB Occupied Bandwidth LTE Band 2/5MHz/QPSK)



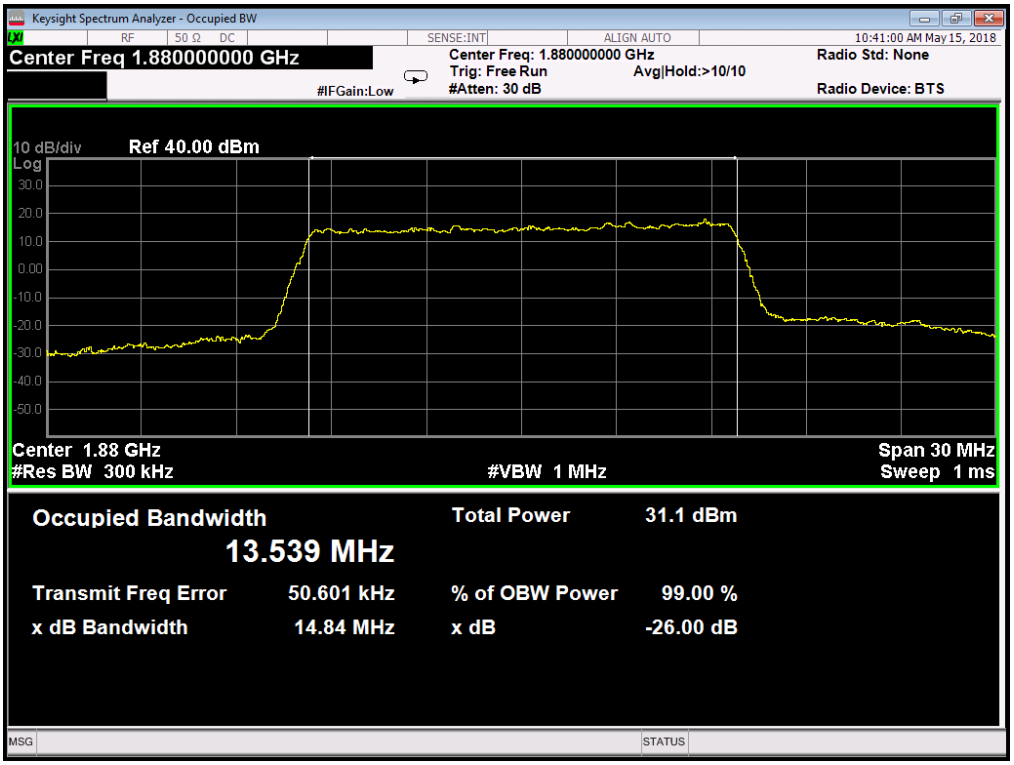
(Plot C3: 99% & 26dB Occupied Bandwidth LTE Band 2/5MHz/16QAM)



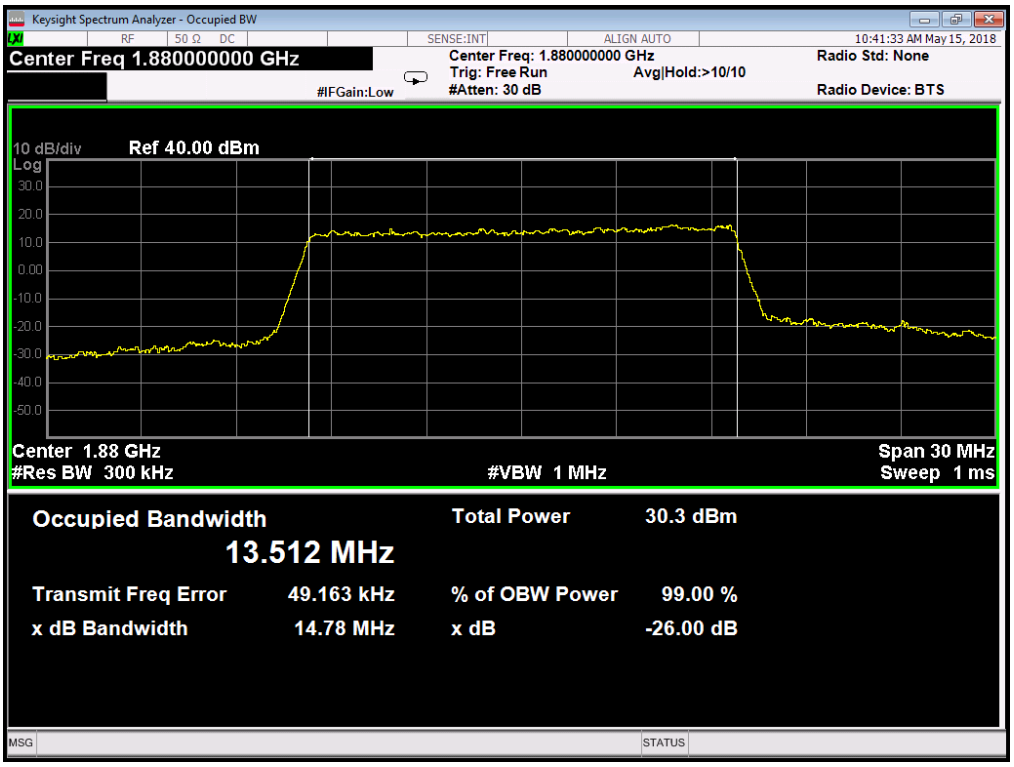
(Plot D1: 99% & 26dB Occupied Bandwidth LTE Band 2/10MHz/QPSK)



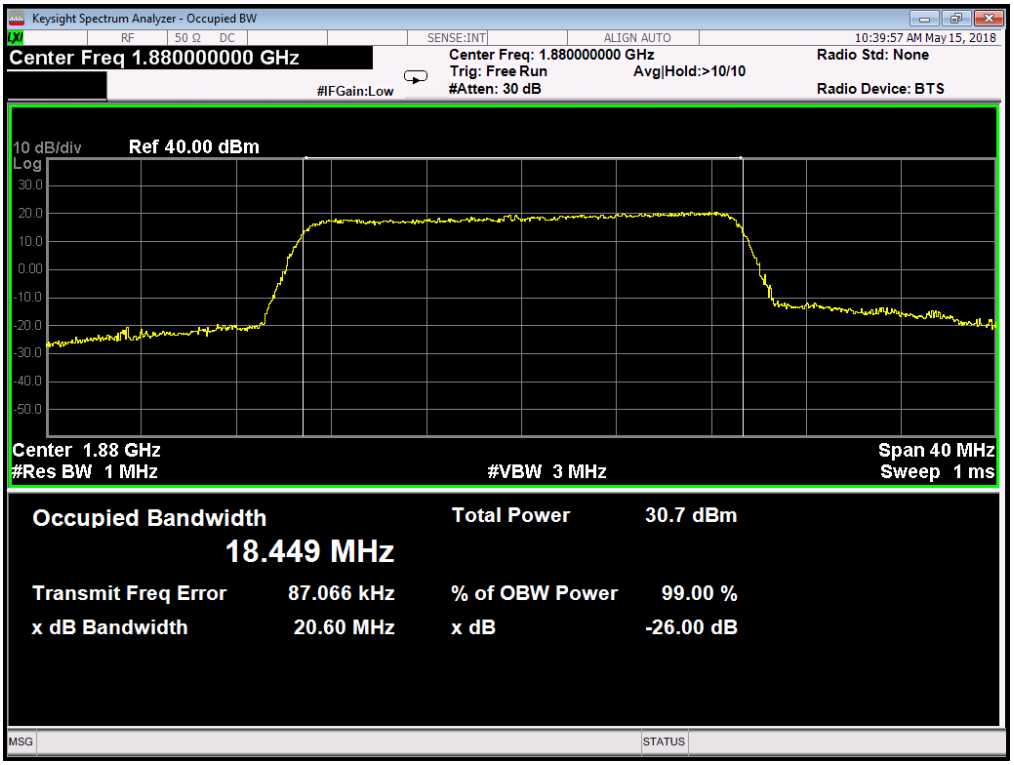
(Plot D3: 99% & 26dB Occupied Bandwidth LTE Band 2/10MHz/16QAM)



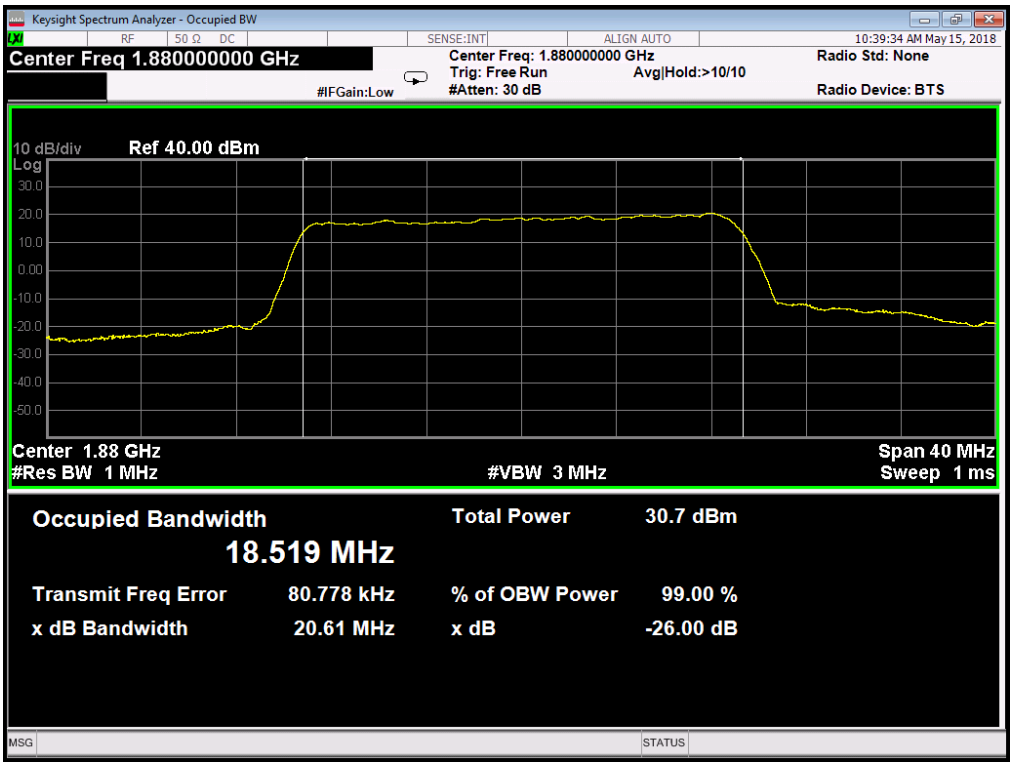
(Plot E1: 99% & 26dB Occupied Bandwidth LTE Band 2/15MHz/QPSK)



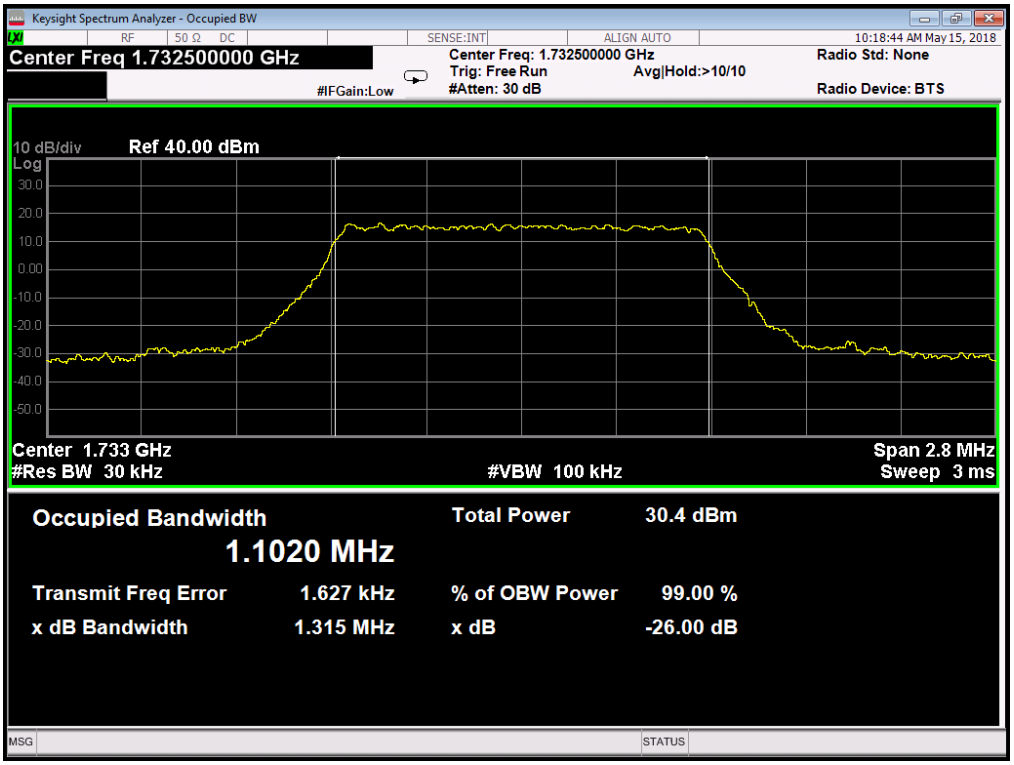
(Plot E3: 99% & 26dB Occupied Bandwidth LTE Band 2/15MHz/16QAM)



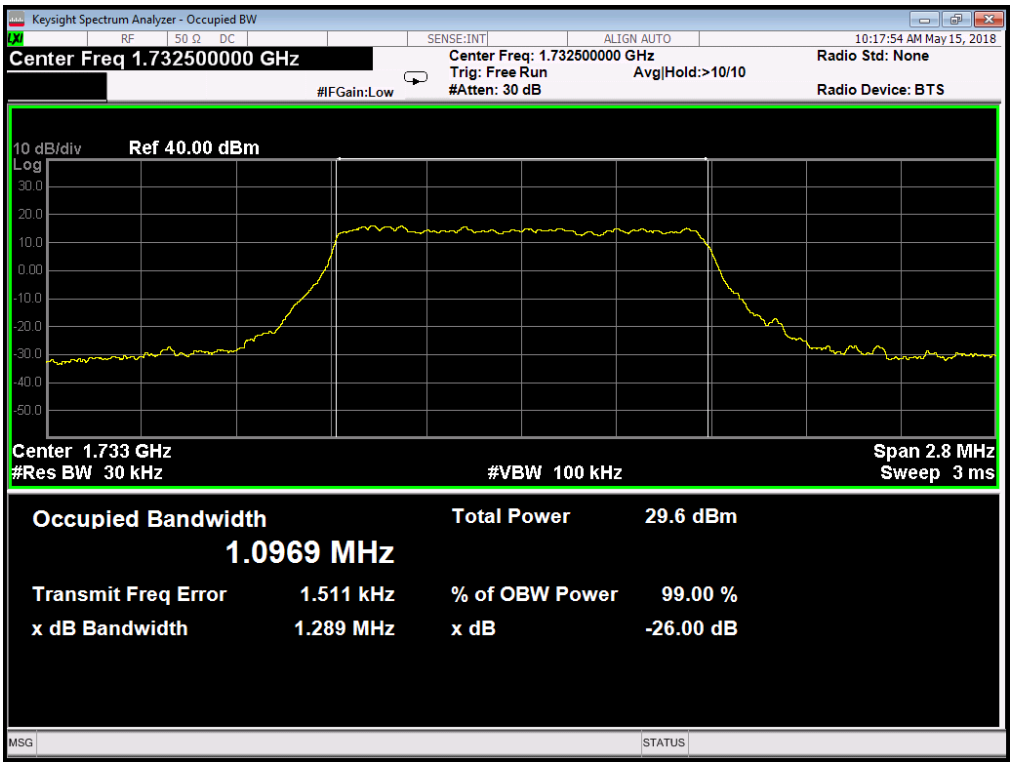
(Plot F1: 99% & 26dB Occupied Bandwidth LTE Band 2/20MHz/QPSK)



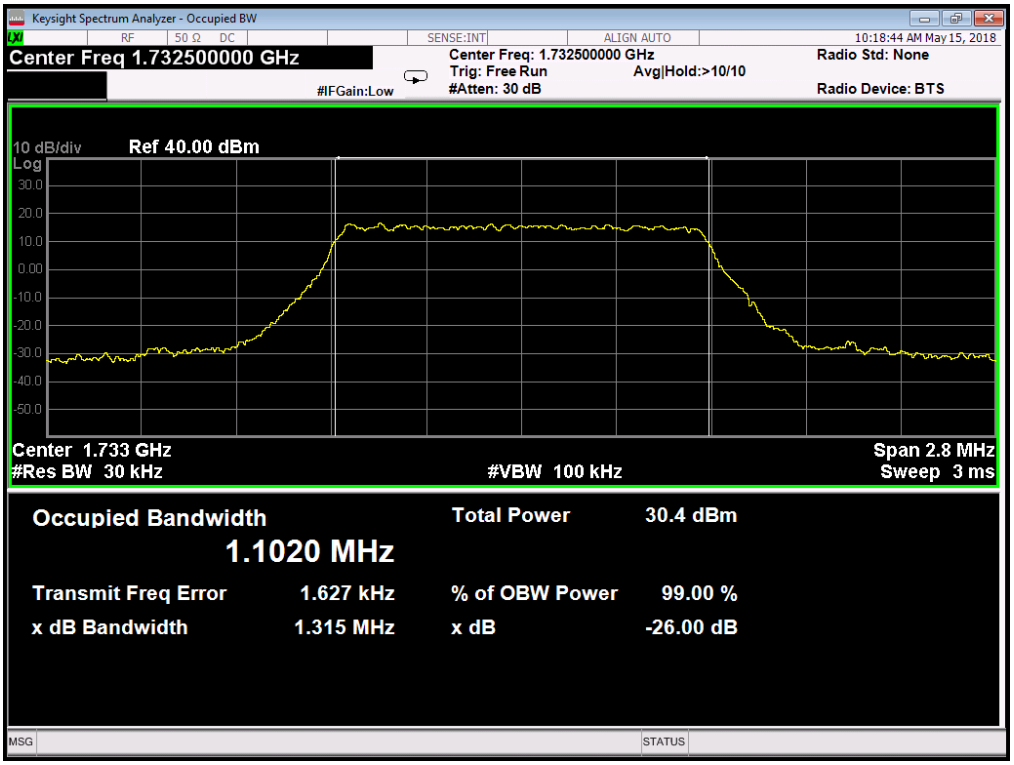
(Plot F3: 99% & 26dB Occupied Bandwidth LTE Band 2/20MHz/16QAM)



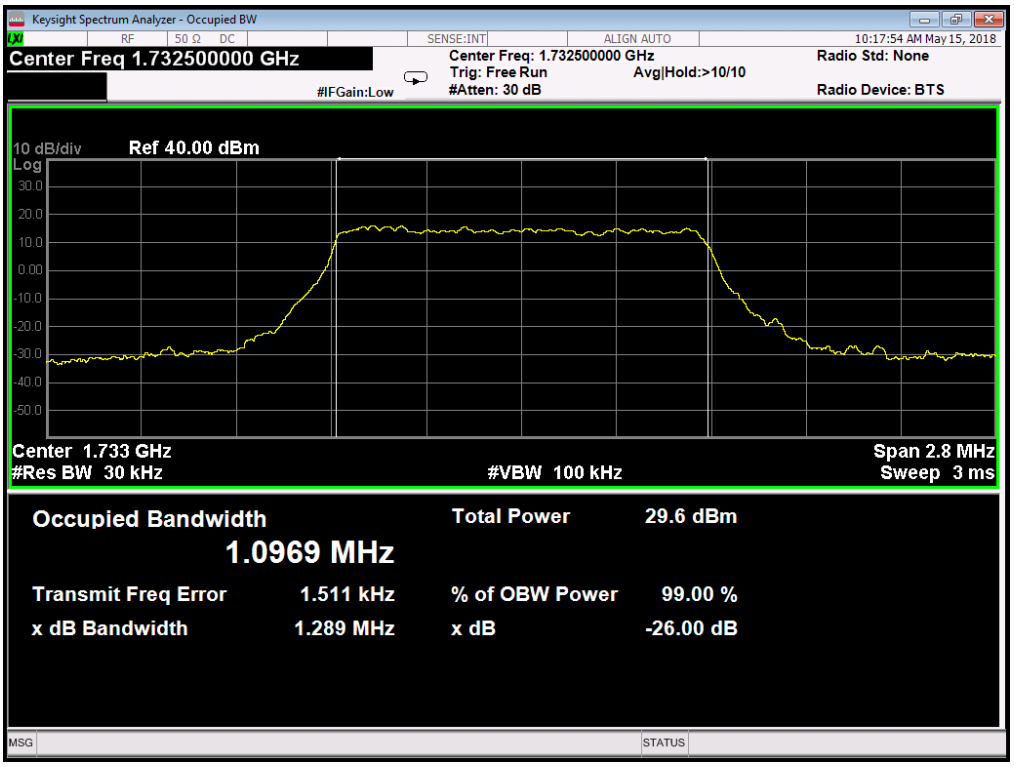
(Plot G1: 99% & 26dB Occupied Bandwidth LTE Band 4/1.4MHz/QPSK)



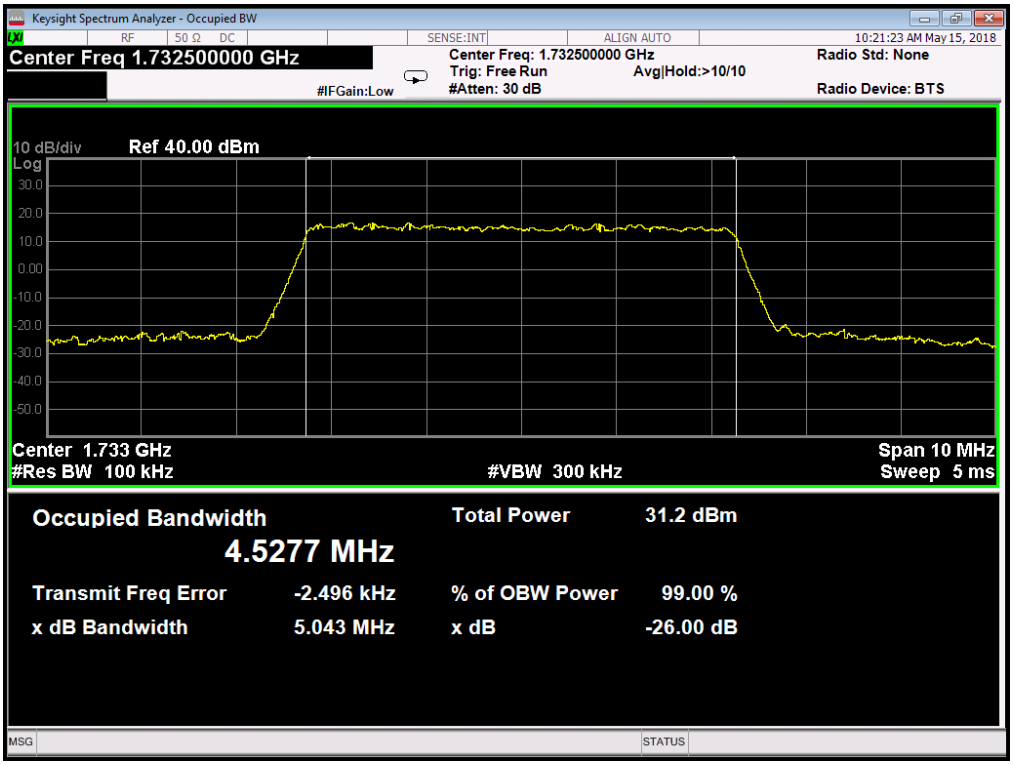
(Plot G3: 99% & 26dB Occupied Bandwidth LTE Band 4/1.4MHz/16QAM)



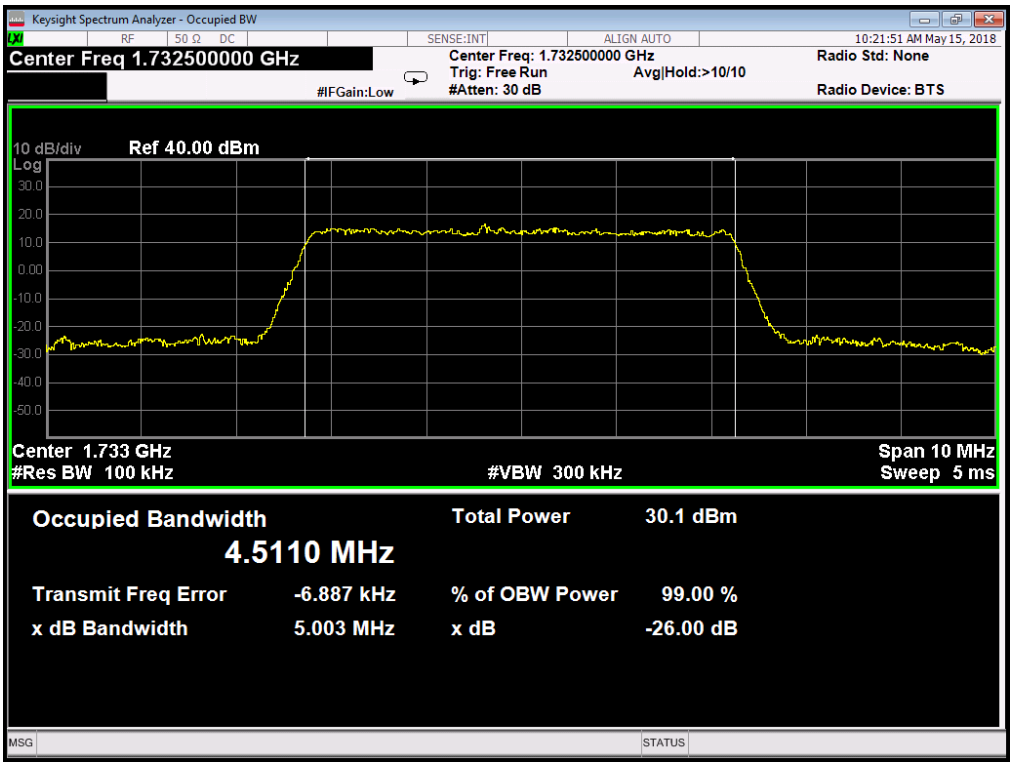
(Plot H1: 99% & 26dB Occupied Bandwidth LTE Band 4/3MHz/QPSK)



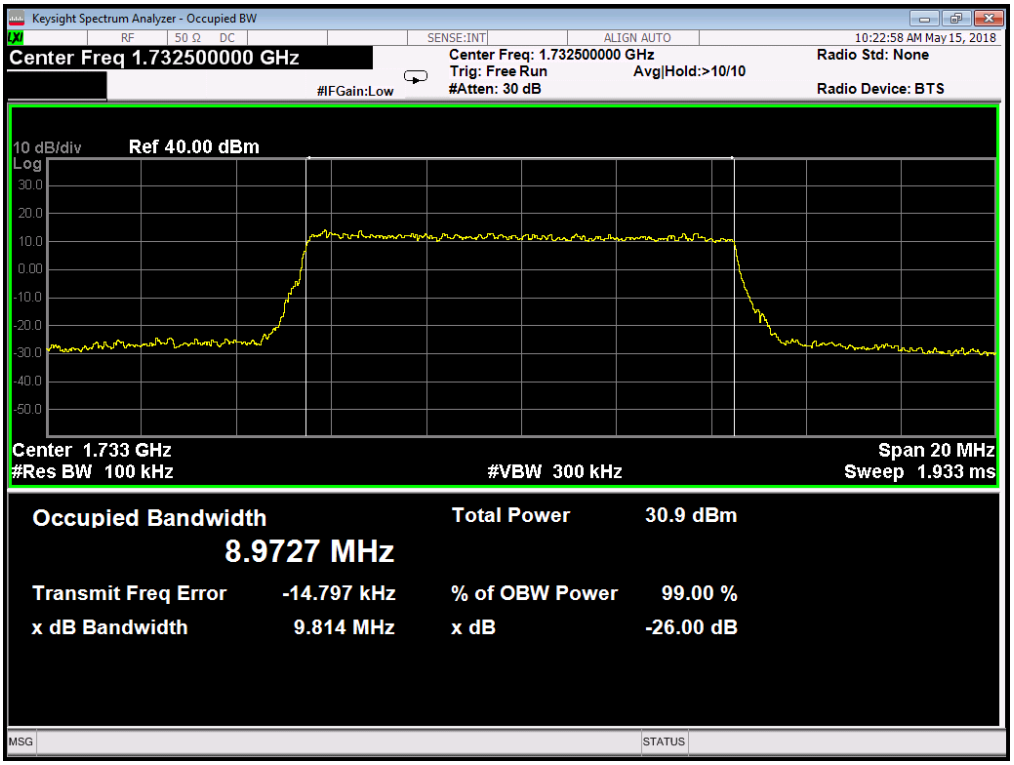
(Plot H3: 99% & 26dB Occupied Bandwidth LTE Band 4/3MHz/16QAM)



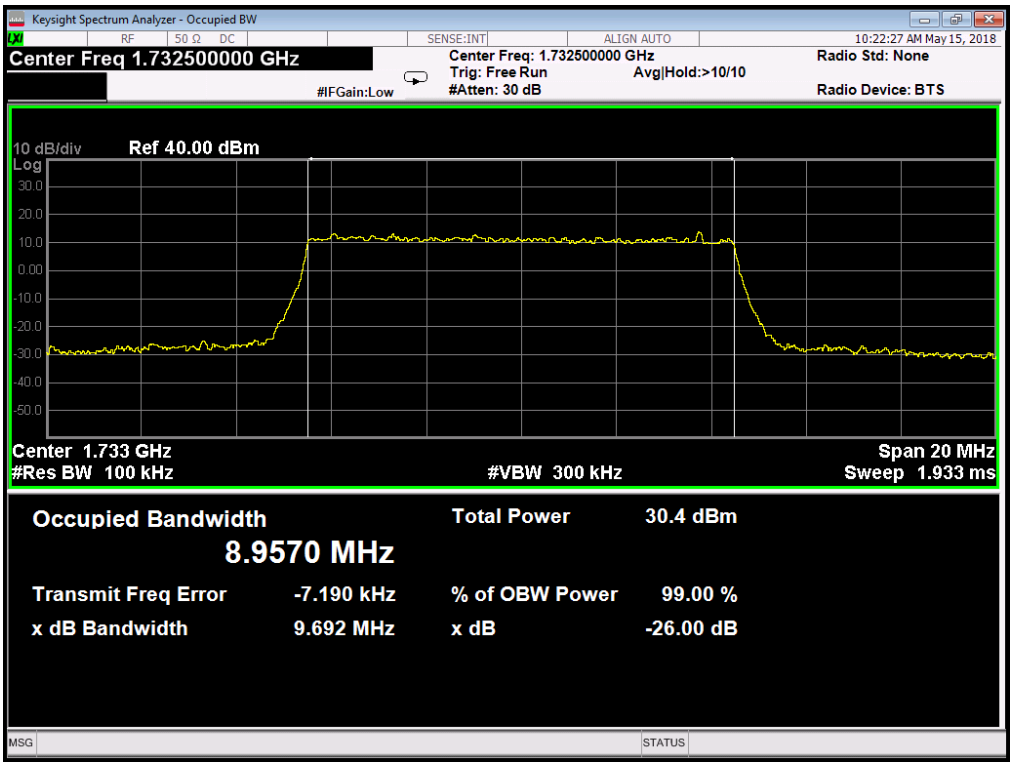
(Plot I1: 99% & 26dB Occupied Bandwidth LTE Band 4/5MHz/QPSK)



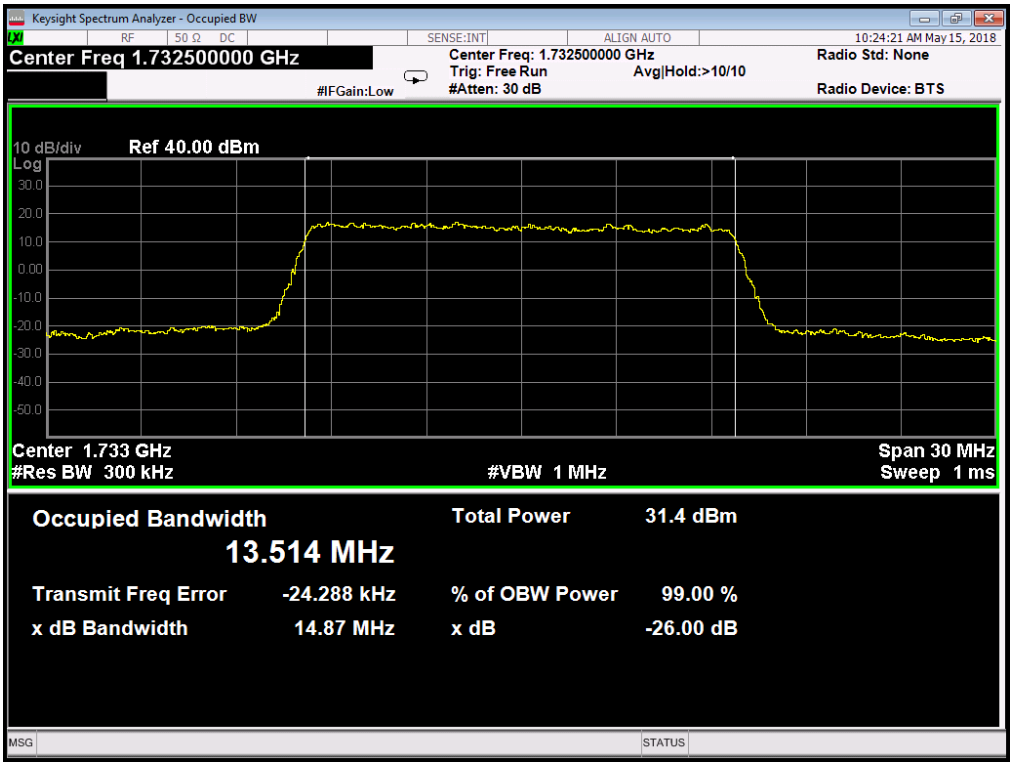
(Plot I3: 99% & 26dB Occupied Bandwidth LTE Band 4/5MHz/16QAM)



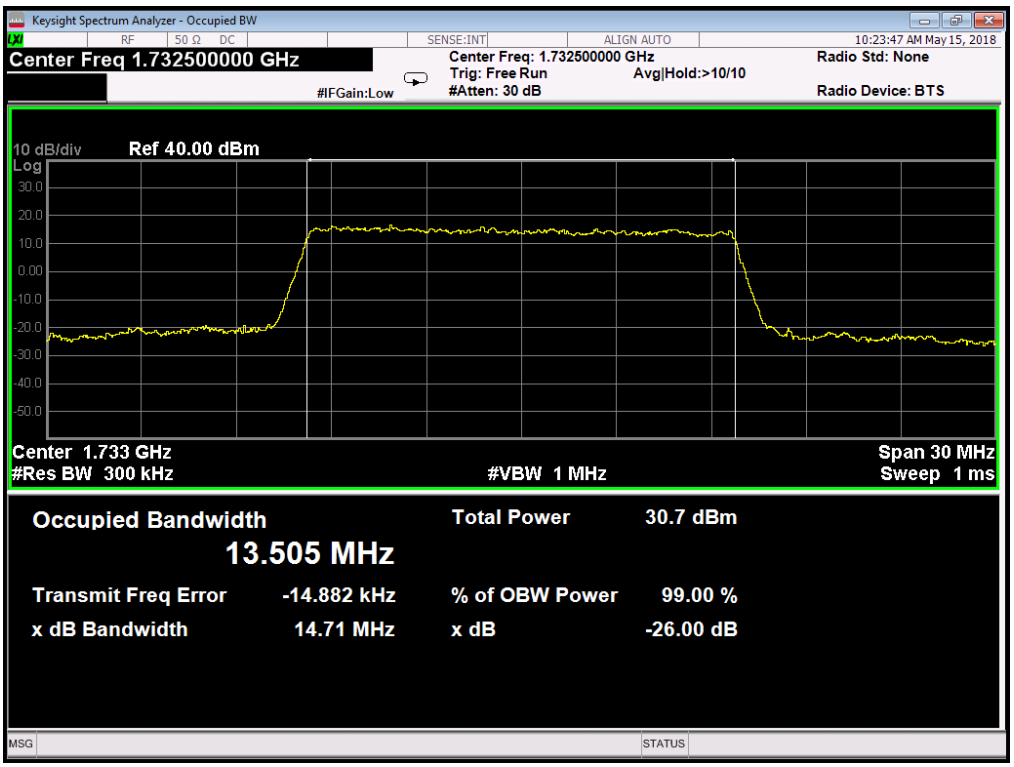
(Plot J1: 99% & 26dB Occupied Bandwidth LTE Band 4/10MHz/QPSK)



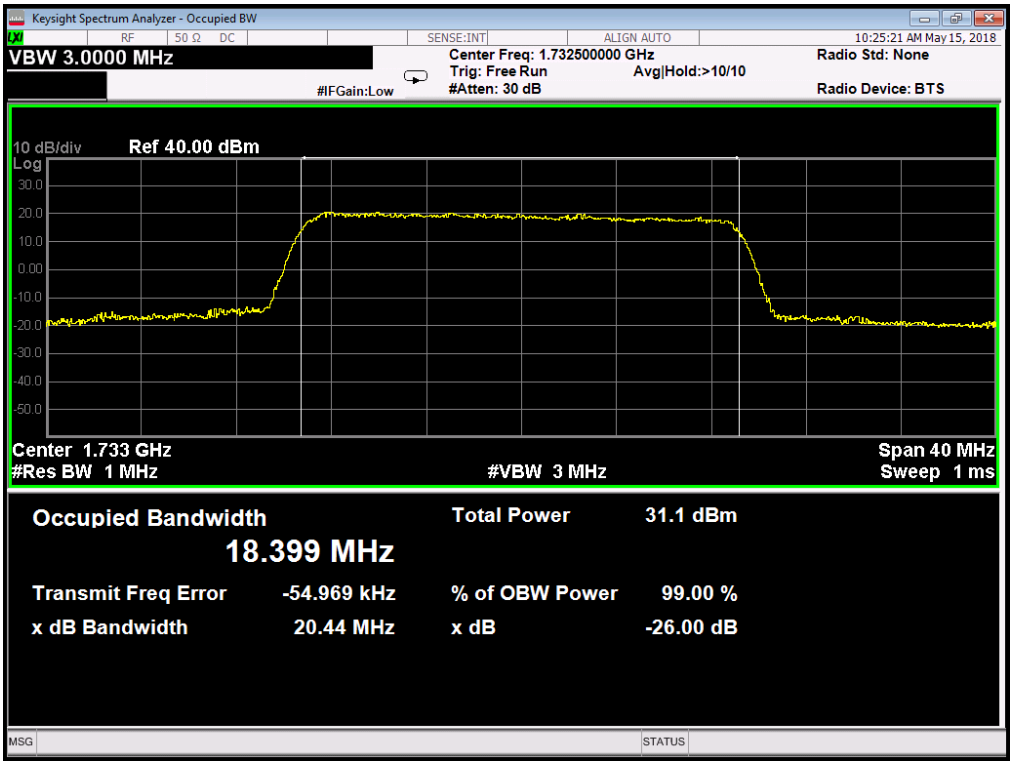
(Plot J3: 99% & 26dB Occupied Bandwidth LTE Band 4/10MHz/16QAM)



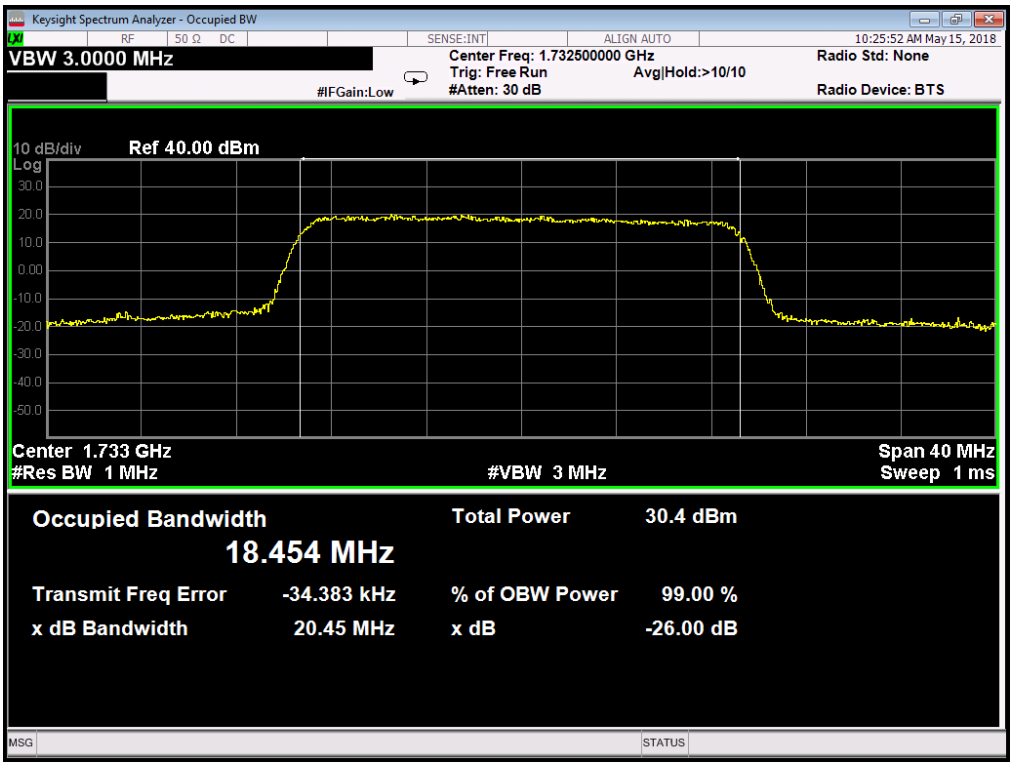
(Plot K1: 99% & 26dB Occupied Bandwidth LTE Band 4/15MHz/QPSK)



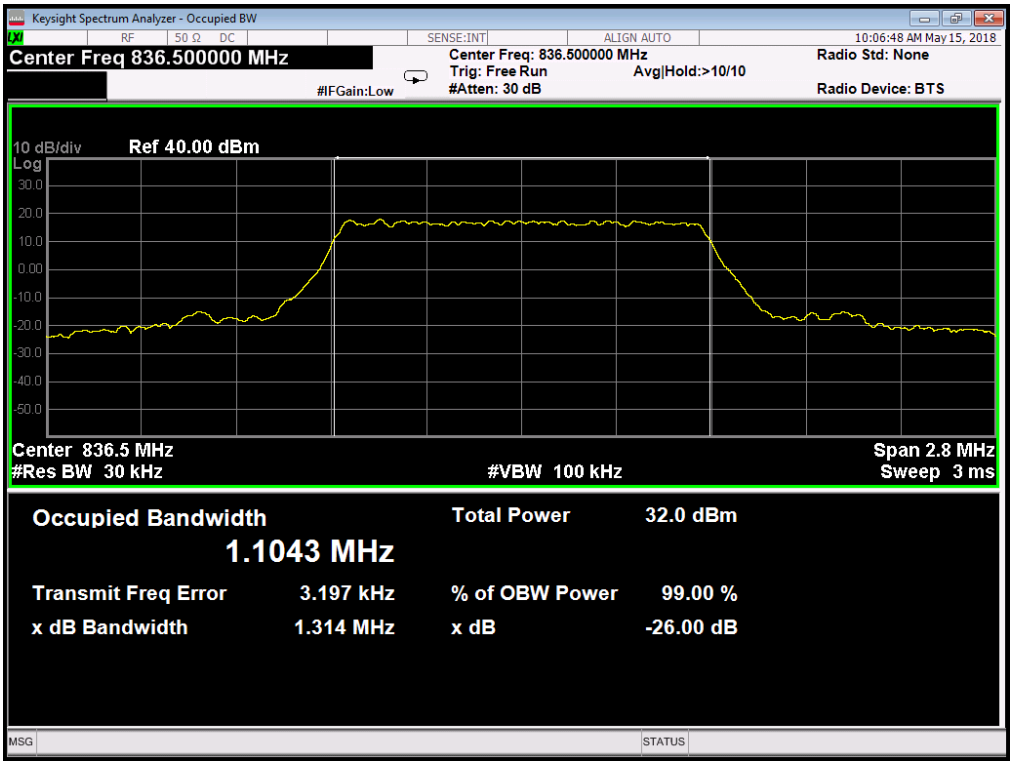
(Plot K3: 99% & 26dB Occupied Bandwidth LTE Band 4/15MHz/16QAM)



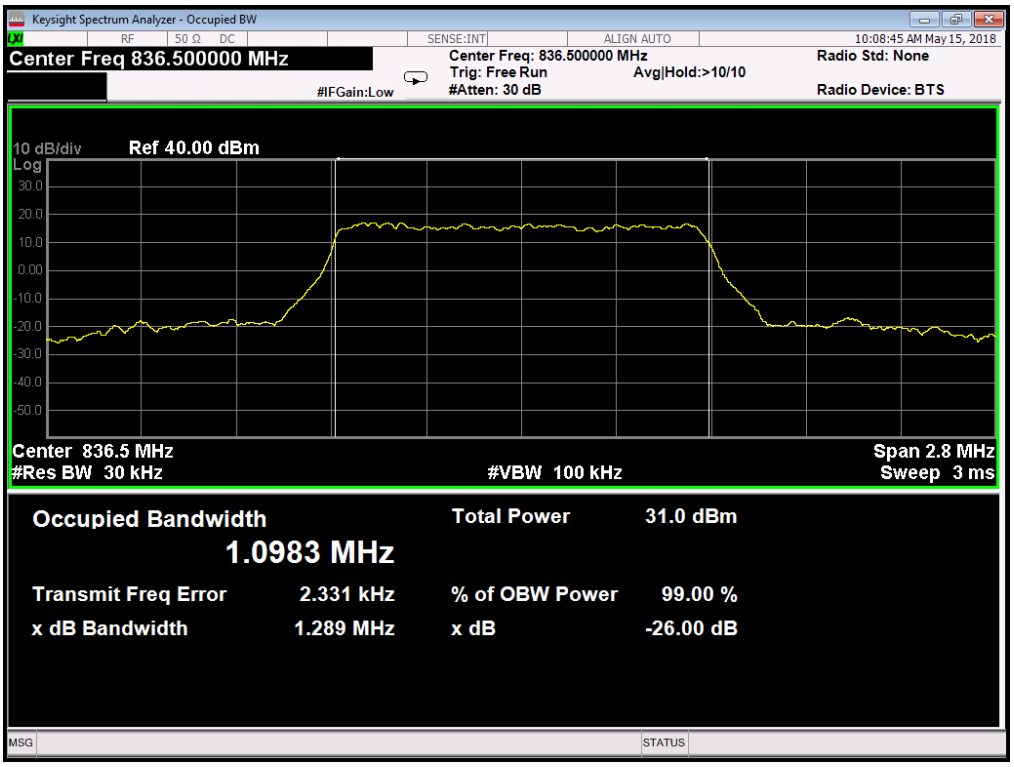
(Plot L1: 99% & 26dB Occupied Bandwidth LTE Band 4/20MHz/QPSK)



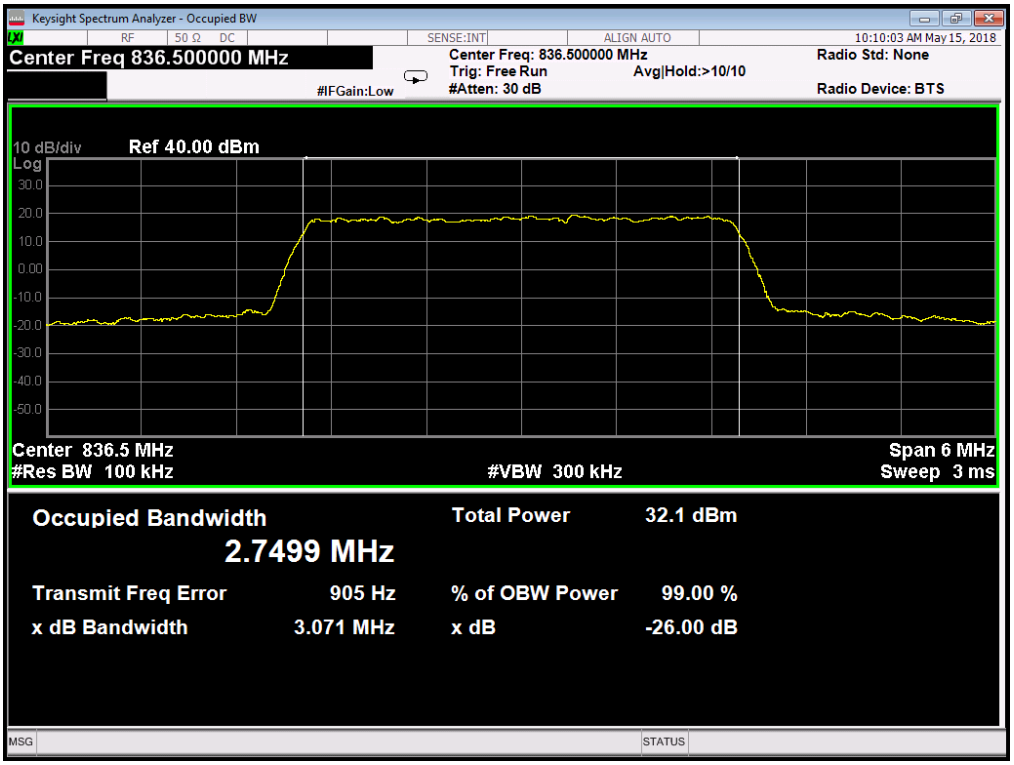
(Plot L3: 99% & 26dB Occupied Bandwidth LTE Band 4/20MHz/16QAM)



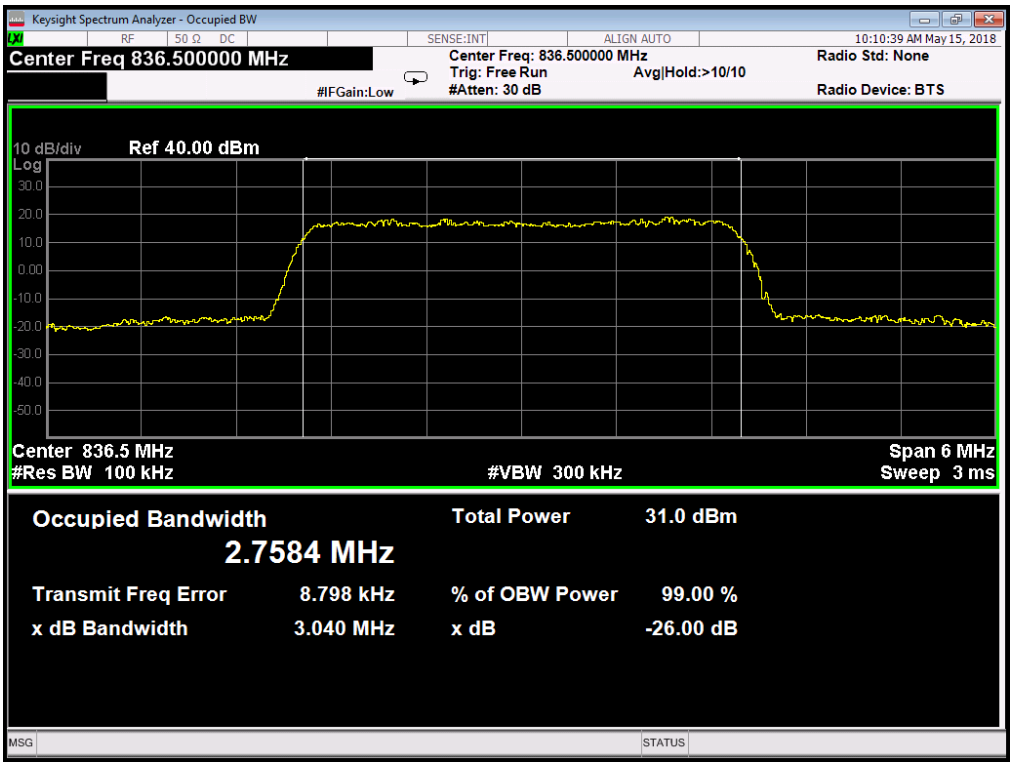
(Plot M1: 99% & 26dB Occupied Bandwidth LTE Band 5/1.4MHz/QPSK)



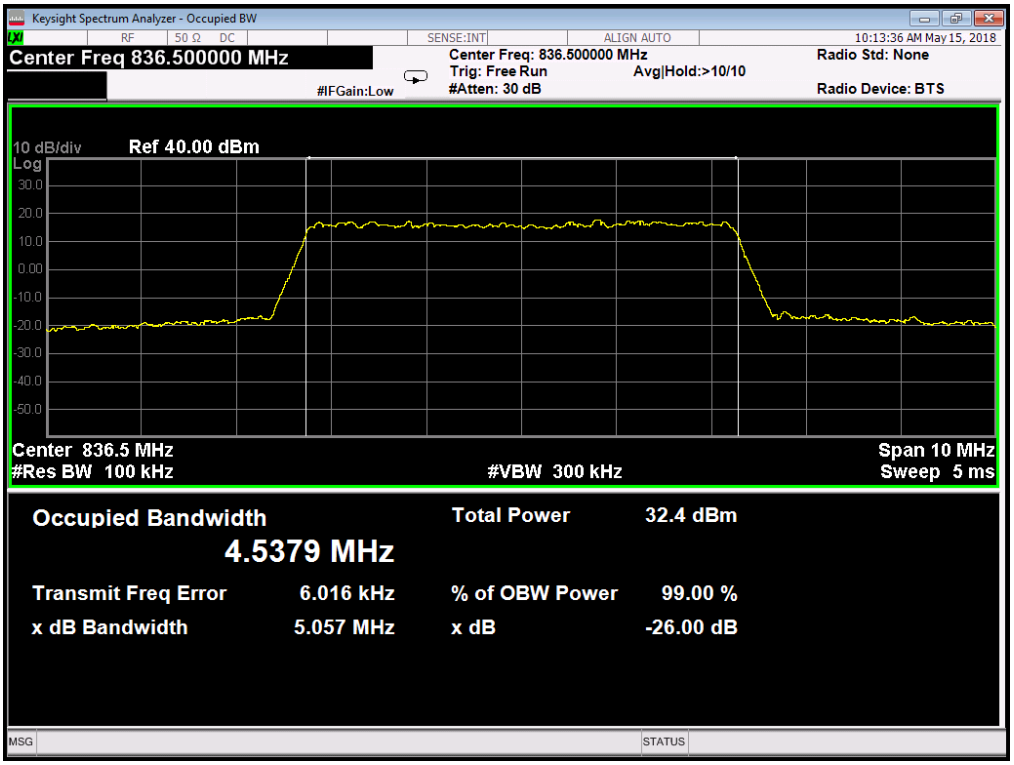
(Plot M3: 99% & 26dB Occupied Bandwidth LTE Band 5/1.4MHz/16QAM)



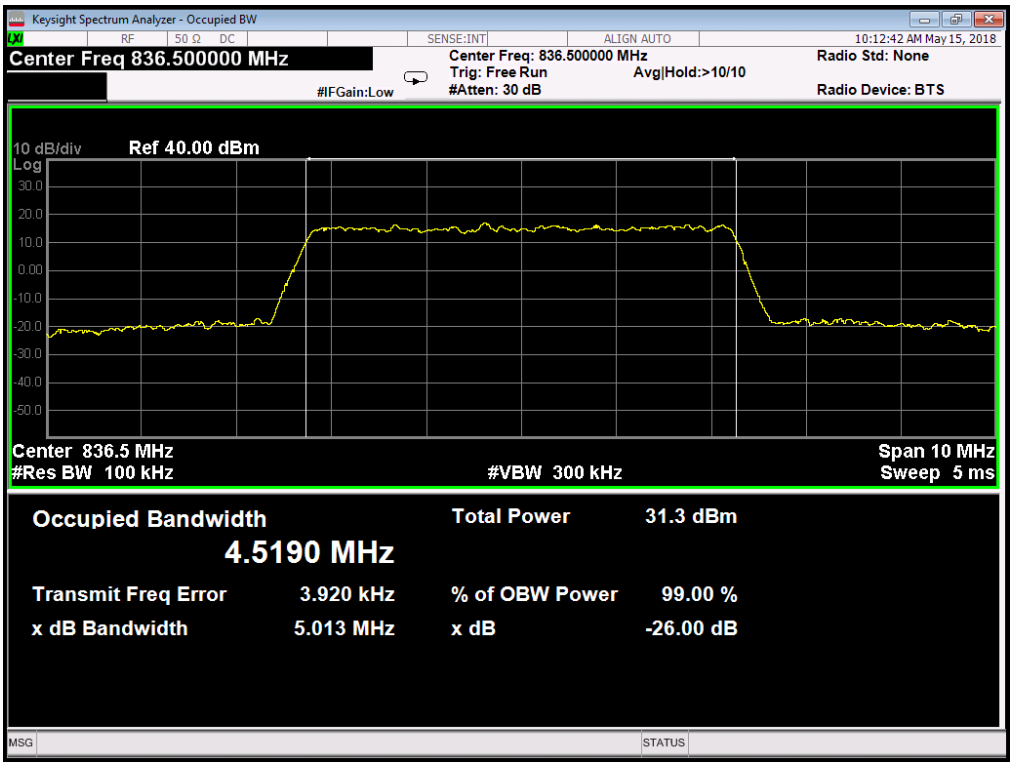
(Plot N1: 99% & 26dB Occupied Bandwidth LTE Band 5/3MHz/QPSK)



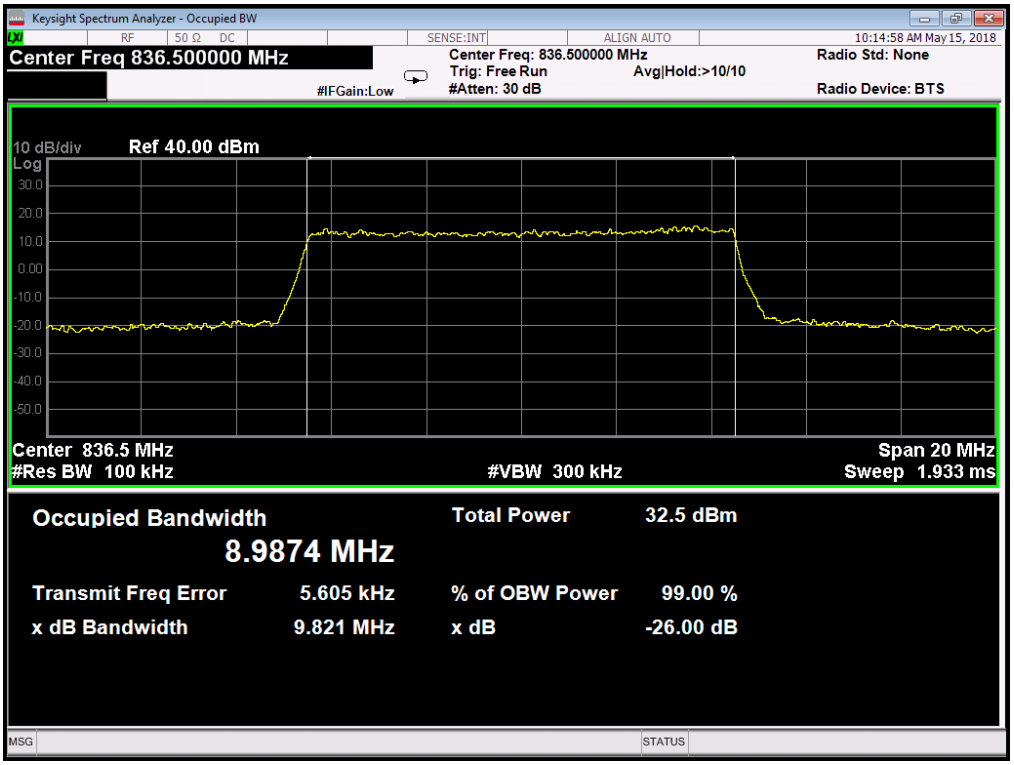
(Plot N3: 99% & 26dB Occupied Bandwidth LTE Band 5/3MHz/16QAM)



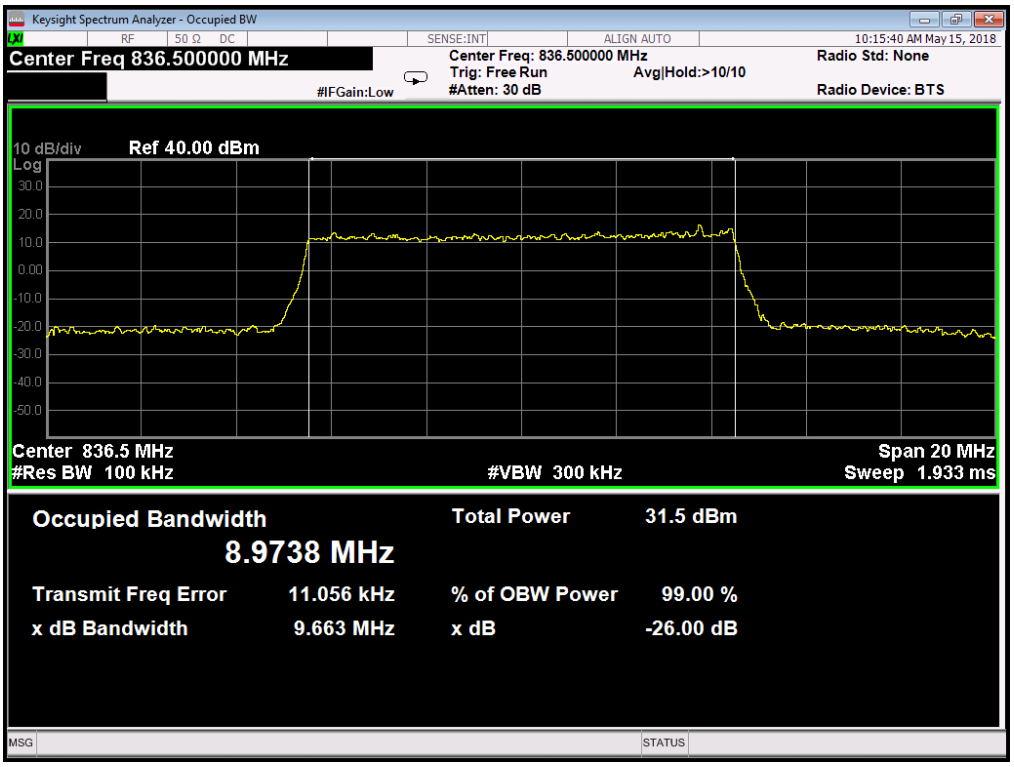
(Plot O1: 99% & 26dB Occupied Bandwidth LTE Band 5/5MHz/QPSK)



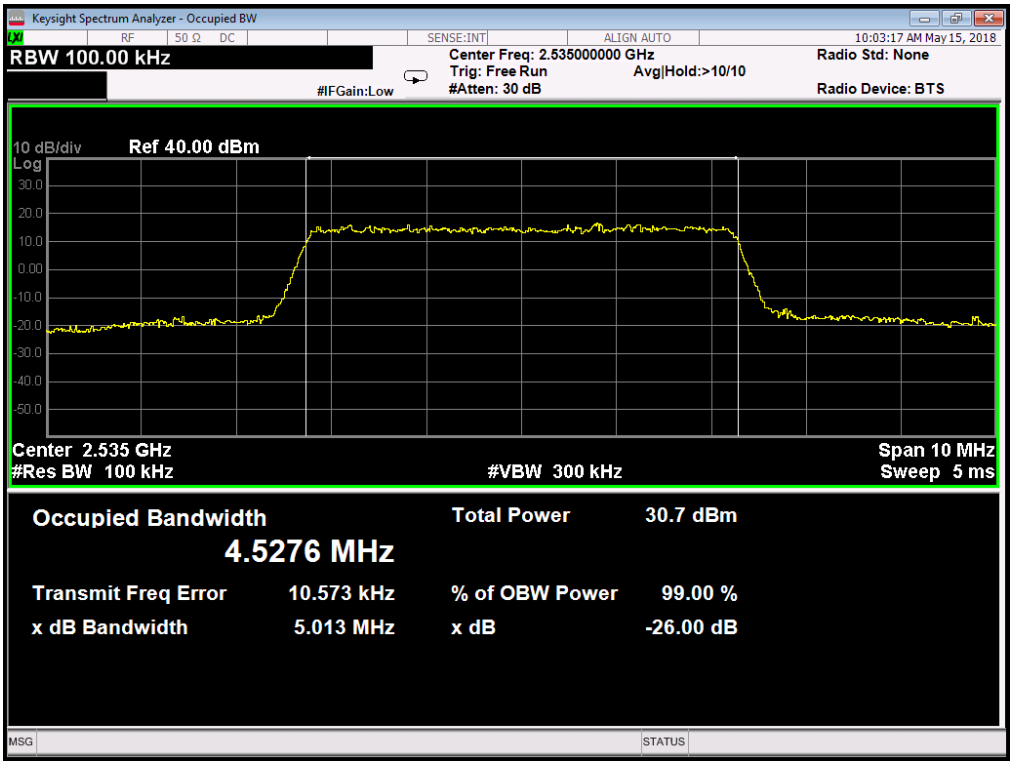
(Plot O3: 99% & 26dB Occupied Bandwidth LTE Band 5/5MHz/16QAM)



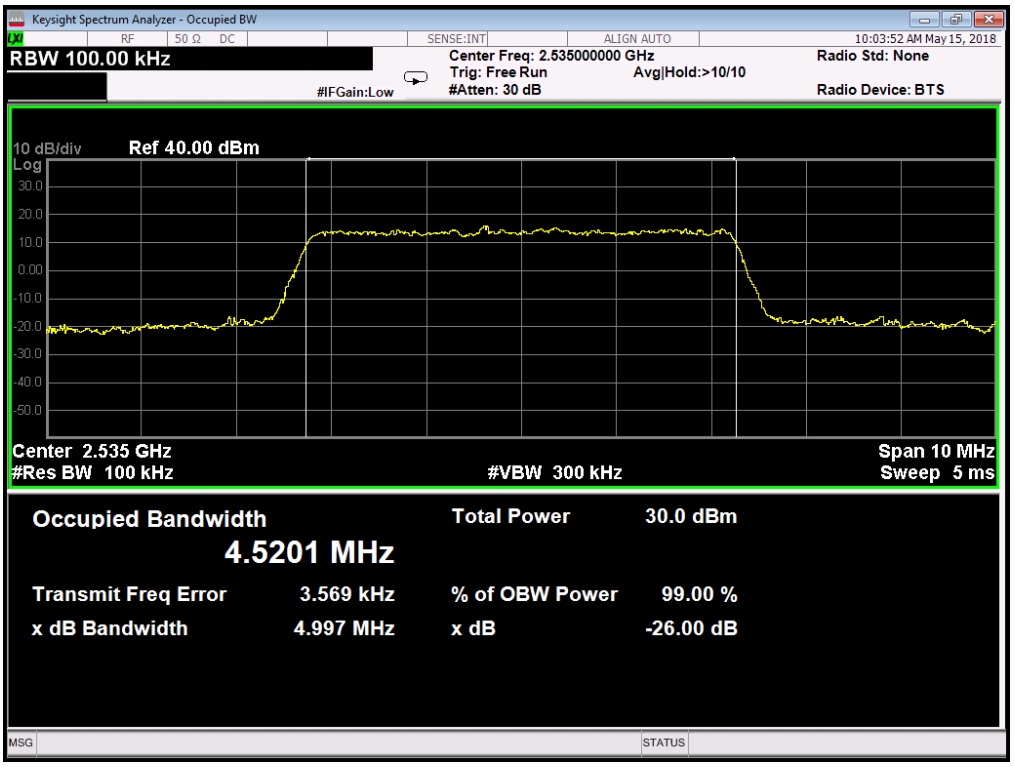
(Plot P1: 99% & 26dB Occupied Bandwidth LTE Band 5/10MHz/QPSK)



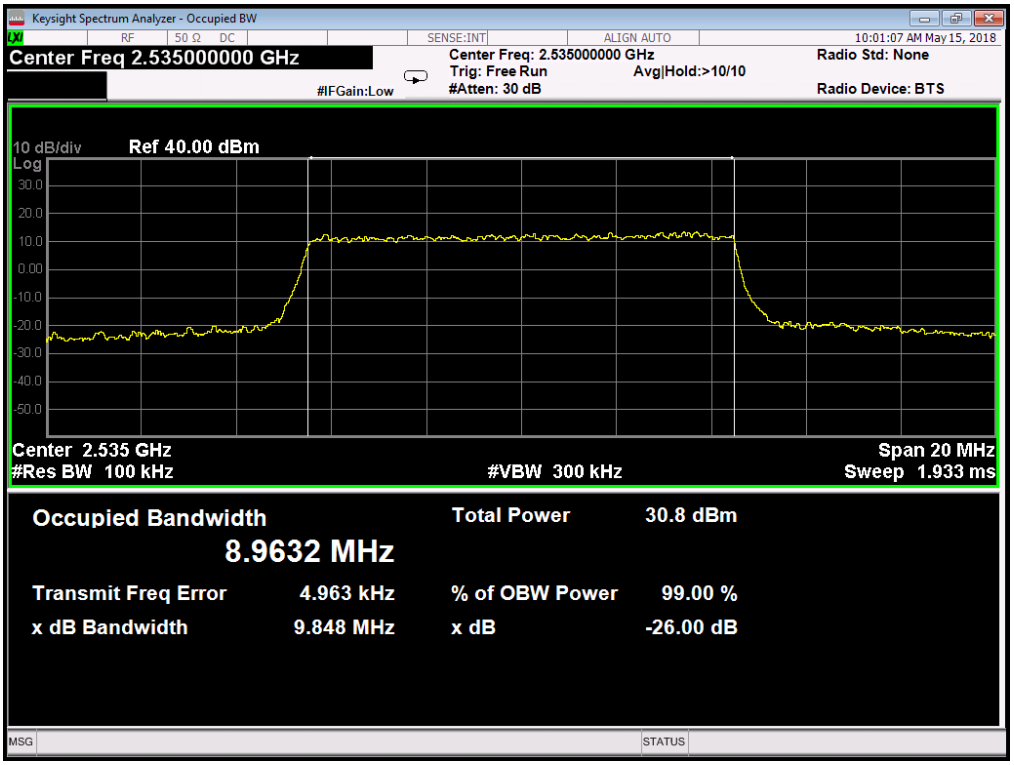
(Plot P3: 99% & 26dB Occupied Bandwidth LTE Band 5/10MHz/16QAM)



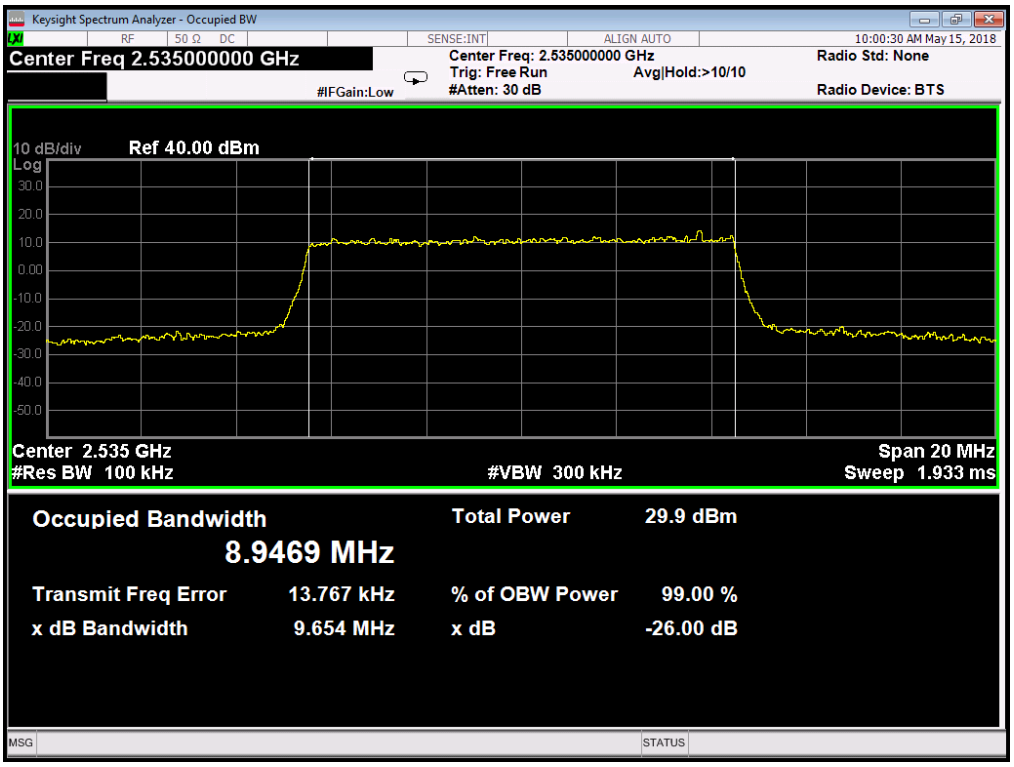
(Plot Q1: 99% & 26dB Occupied Bandwidth LTE Band 7/5MHz/QPSK)



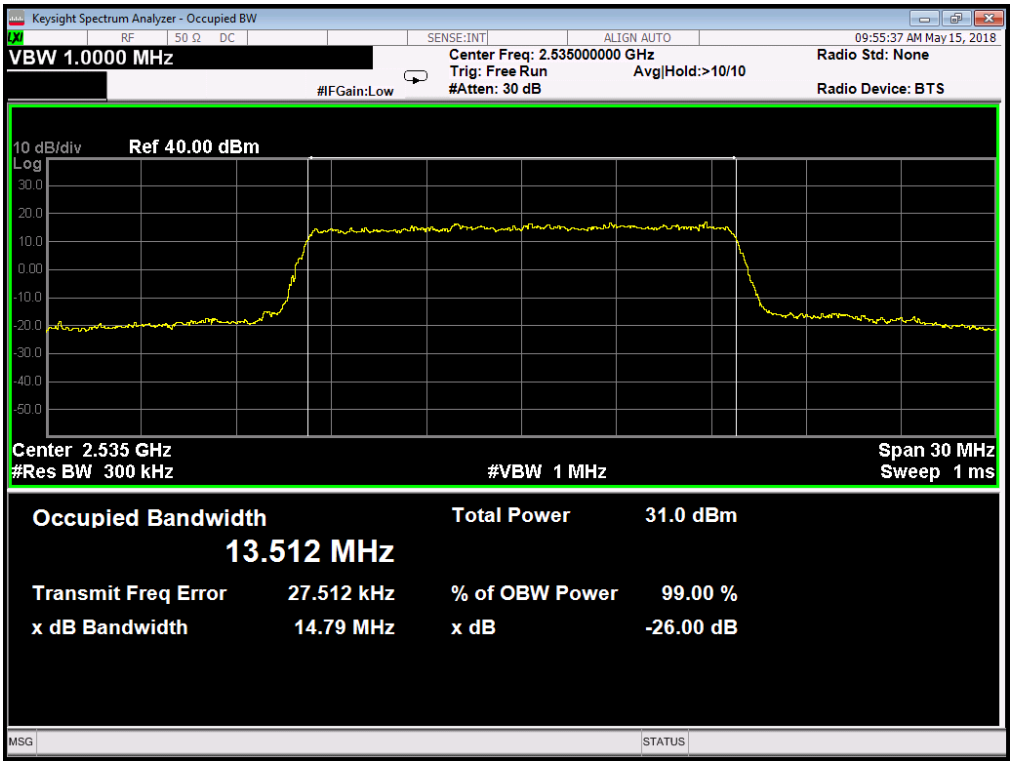
(Plot Q3: 99% & 26dB Occupied Bandwidth LTE Band 7/5MHz/16QAM)



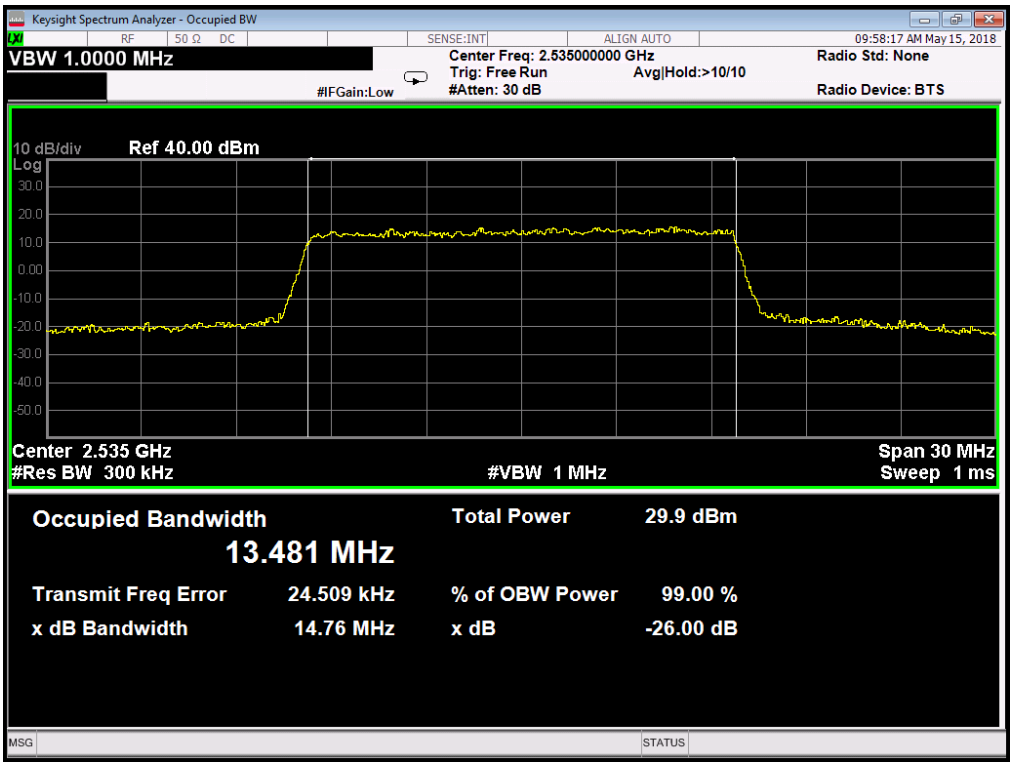
(Plot R1: 99% & 26dB Occupied Bandwidth LTE Band 7/10MHz/QPSK)



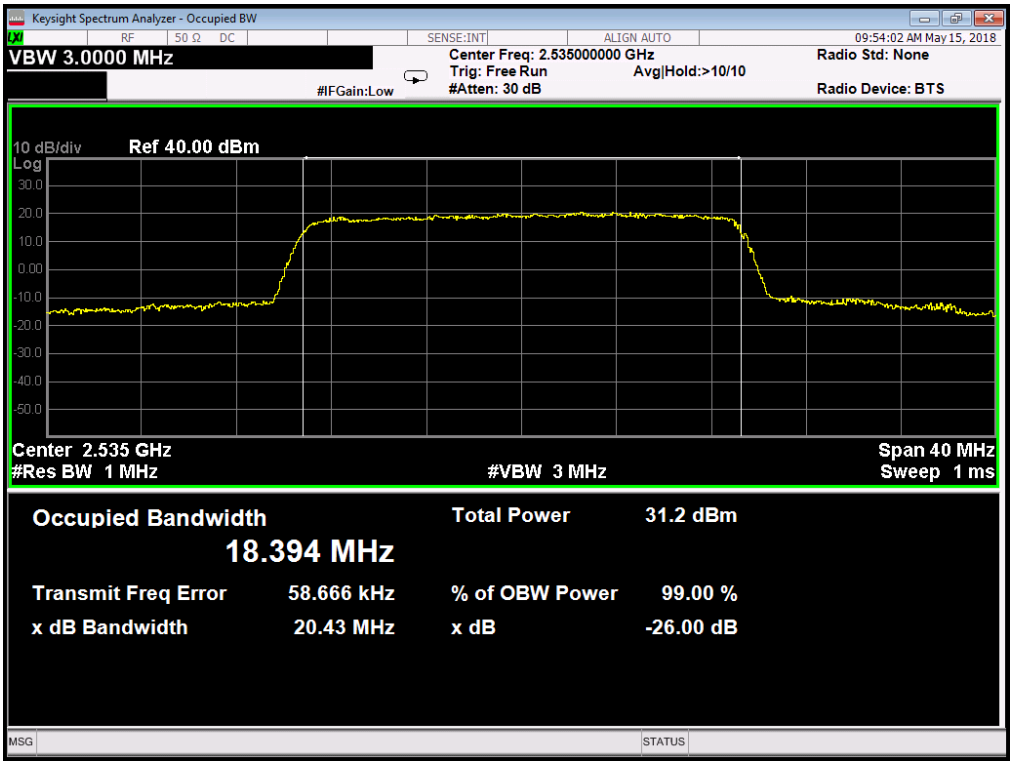
(Plot R3: 99% & 26dB Occupied Bandwidth LTE Band 7/10MHz/16QAM)



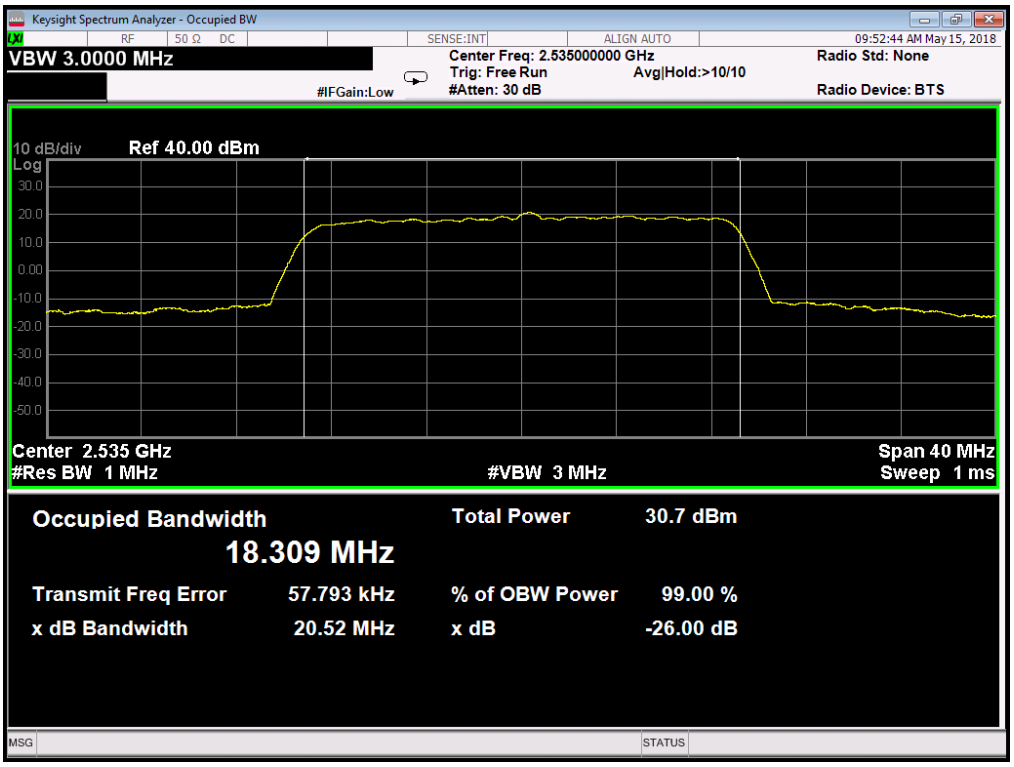
(Plot S1: 99% & 26dB Occupied Bandwidth LTE Band 7/15MHz/QPSK)



(Plot S3: 99% & 26dB Occupied Bandwidth LTE Band 7/15MHz/16QAM)



(Plot T1: 99% & 26dB Occupied Bandwidth LTE Band 7/20MHz/QPSK)



(Plot T3: 99% & 26dB Occupied Bandwidth LTE Band 7/20MHz/16QAM)

2.4 Frequency Stability

2.4.1 Requirement

According to FCC section 27.54, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5ppm) of the center frequency. According to FCC section 2.1055, the test conditions are:

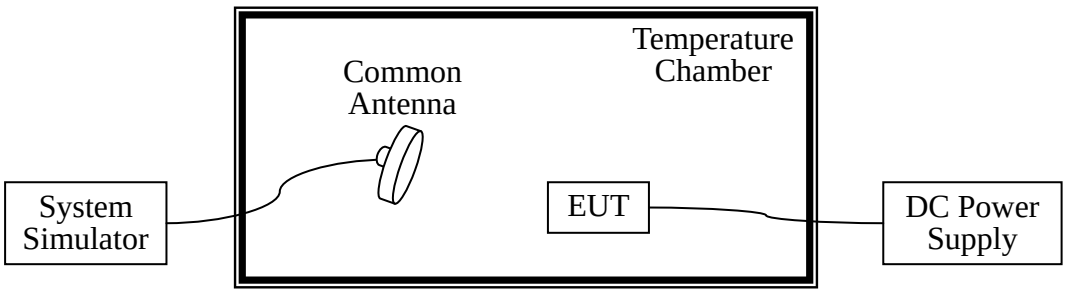
(a) The temperature is varied from -30°C to +50°C at intervals of not more than 10°C.

(b) For hand carried battery powered equipment, the primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacture. The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided.

2.4.2 Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.4.3 Test Setup



2.4.4 Test Procedures

1. The EUT was set up in the thermal chamber and connected with the system simulator.

2. With power OFF, the temperature was decreased to -30°C and the EUT was stabilized

before testing. Power was applied and the maximum change in frequency was recorded within one minute.

3. With power OFF, the temperature was raised in 10°C step up to 50°C. The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.
4. The nominal, highest and lowest extreme voltages are separately 3.8VDC, 4.2VDC and 3.6VDC, which are specified by the applicant; the normal temperature here used is 25°C.
5. The variation in frequency was measured for the worst case.

2.4.5 Test Result of Frequency Stability

1. LTE Band 2, QPSK, BW 10MHz

Test Conditions		Frequency Deviation BW 10MHz Middle Channel 1880MHz		
Power (VDC)	Temperature (°C)	Frequency Error	Frequency Error	Limit
		Hz	ppm	ppm
3.8	-30	53	0.002	2.5
	-20	19	0.002	
	-10	34	0.003	
	0	38	0.003	
	+10	15	0.003	
	+20	58	0.002	
	+30	24	0.002	
	+40	18	0.003	
	+55	49	0.002	
4.2	+25	41	0.003	
3.6	+25	20	0.003	

2. LTE Band 2, 16QAM, BW 10MHz

Test Conditions		Frequency Deviation BW 10MHz Middle Channel 1880MHz		
Power (VDC)	Temperature (°C)	Frequency Error	Frequency Error	Limit
		Hz	ppm	ppm
3.8	-30	21	0.002	2.5
	-20	32	0.002	
	-10	51	0.003	
	0	34	0.002	
	+10	22	0.002	
	+20	23	0.001	
	+30	52	0.002	
	+40	17	0.003	
	+55	32	0.003	
4.2	+25	41	0.003	
3.6	+25	58	0.003	

3. LTE Band 4, QPSK ,BW 10MHz

Test Conditions		Frequency Deviation BW 10MHz Middle Channel 1732.5MHz		
Power (VDC)	Temperature (°C)	Frequency Error	Frequency Error	Limit
		Hz	ppm	ppm
3.8	-30	29	0.002	2.5
	-20	48	0.002	
	-10	19	0.003	
	0	36	0.003	
	+10	18	0.002	
	+20	19	0.002	
	+30	21	0.002	
	+40	53	0.003	
	+55	34	0.002	
4.2	+25	32	0.002	
3.6	+25	23	0.001	

4. LTE Band 4, 16QAM ,BW 10MHz

Test Conditions		Frequency Deviation BW 10MHz Middle Channel 1732.5MHz		
Power (VDC)	Temperature (°C)	Frequency Error	Frequency Error	Limit
		Hz	ppm	ppm
3.8	-30	18	0.001	2.5
	-20	55	0.003	
	-10	34	0.002	
	0	29	0.002	
	+10	33	0.002	
	+20	17	0.001	
	+30	33	0.002	
	+40	23	0.001	
	+55	17	0.001	
4.2	+25	57	0.003	
3.6	+25	33	0.002	

5. LTE Band 5, QPSK ,BW 10MHz

Test Conditions		Frequency Deviation BW 10MHz Middle Channel 836.5MHz		
Power (VDC)	Temperature (°C)	Frequency Error	Frequency Error	Limit
		Hz	ppm	ppm
3.8	-30	27	0.003	2.5
	-20	14	0.004	
	-10	10	0.004	
	0	22	0.003	
	+10	15	0.004	
	+20	9	0.002	
	+30	11	0.003	
	+40	16	0.003	
	+55	12	0.003	
4.2	+25	19	0.002	
3.6	+25	26	0.004	

6. LTE Band 5,16QAM ,BW 10MHz

Test Conditions		Frequency Deviation BW 10MHz Middle Channel 836.5MHz		
Power (VDC)	Temperature (°C)	Frequency Error	Frequency Error	Limit
		Hz	ppm	ppm
3.8	-30	26	0.003	2.5
	-20	18	0.004	
	-10	25	0.004	
	0	12	0.003	
	+10	10	0.003	
	+20	27.	0.003	
	+30	17	0.004	
	+40	15	0.003	
	+55	18	0.003	
4.2	+25	10	0.004	
3.6	+25	24	0.003	

7. LTE Band 7, QPSK ,BW 10MHz

Test Conditions		Frequency Deviation BW 10MHz Middle Channel 2535MHz		
Power (VDC)	Temperature (°C)	Frequency Error	Frequency Error	Limit
		Hz	ppm	ppm
3.8	-30	19	0.003	2.5
	-20	53	0.003	
	-10	41	0.002	
	0	22	0.003	
	+10	23	0.004	
	+20	35	0.003	
	+30	51	0.009	
	+40	43	0.003	
	+55	22	0.003	
4.2	+25	49	0.004	
3.6	+25	54	0.005	

8. LTE Band 7,16QAM ,BW 10MHz

Test Conditions		Frequency Deviation BW 10MHz Middle Channel 2535MHz		
Power (VDC)	Temperature (°C)	Frequency Error	Frequency Error	Limit
		Hz	ppm	ppm
3.8	-30	26	0.002	2.5
	-20	48	0.003	
	-10	25	0.004	
	0	22	0.003	
	+10	23	0.003	
	+20	52	0.004	
	+30	27	0.003	
	+40	23	0.003	
	+55	23	0.003	
4.2	+25	50	0.002	
3.6	+25	24	0.002	

2.5 Conducted Out of Band Emissions

2.5.1 Requirement

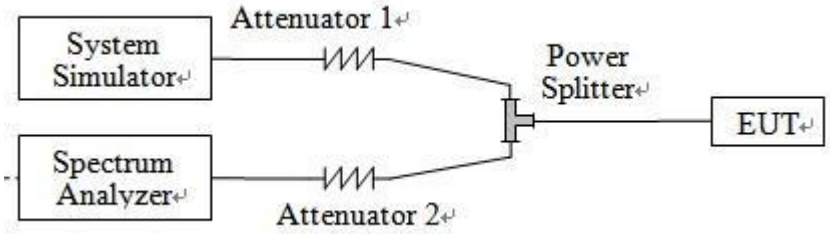
According to FCC section 27.53(h), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43+10*log(P)dB. This calculated to be -13dBm.

It is measured by means of a calibrated spectrum analyzer and scanned from 30MHz up to a frequency including its 10th harmonic.

2.5.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

2.5.3 Test Setup



2.5.4 Test Procedures

1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. The middle channel for the highest RF power within the transmitting frequency was measured.
4. The conducted spurious emission for the whole frequency range was taken.
5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.

6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
7. The limit line is derived from 43 + 10log(P)dB below the transmitter power P(Watts)

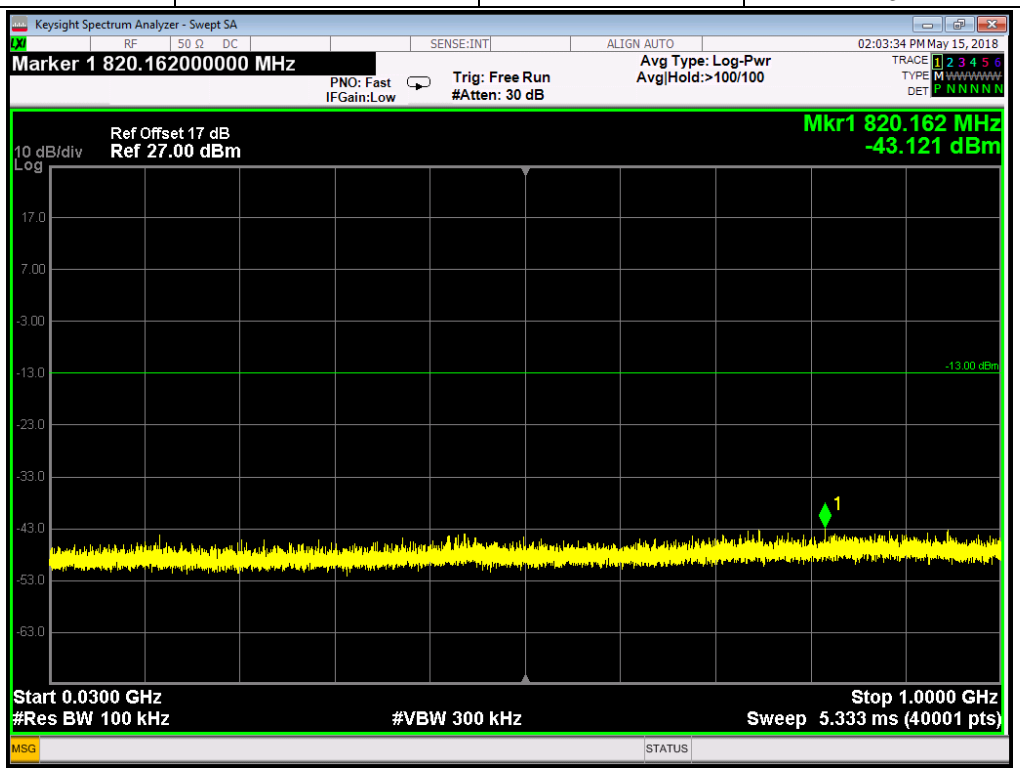
   = P(W)- [43 + 10log(P)] (dB)

   = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)

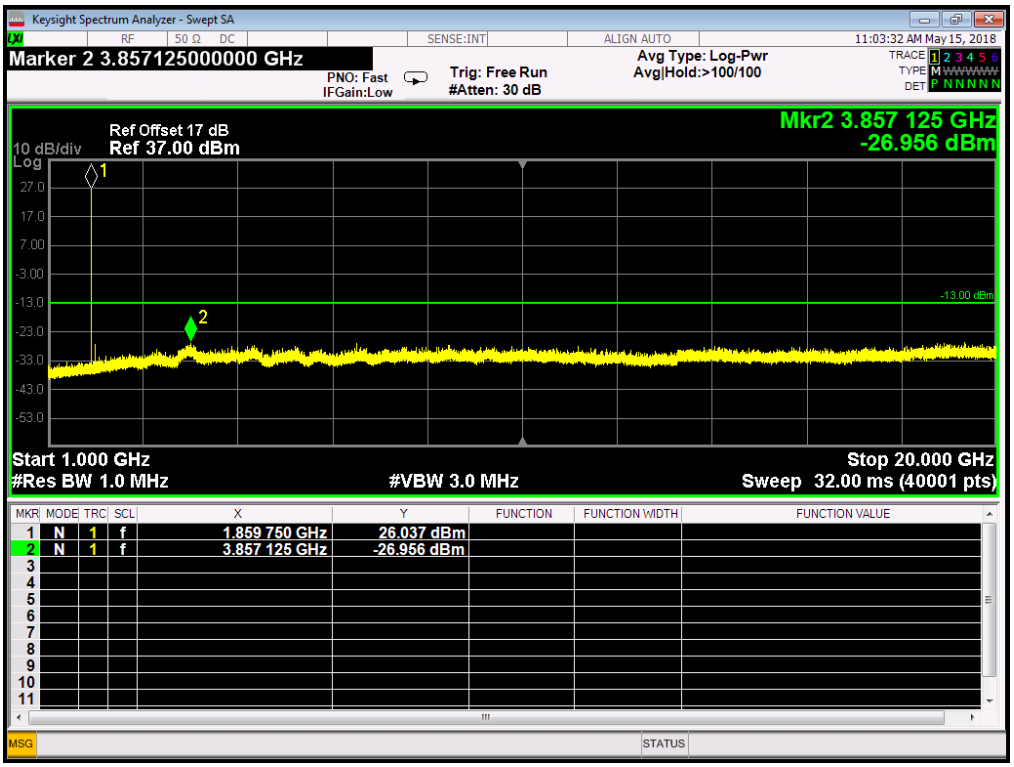
   = -13dBm.

2.5.5 Test Result of Conducted Spurious Emission

Band	LTE Band 2	Channel	Low
Bandwidth	1.4MHz	Modulation	QPSK

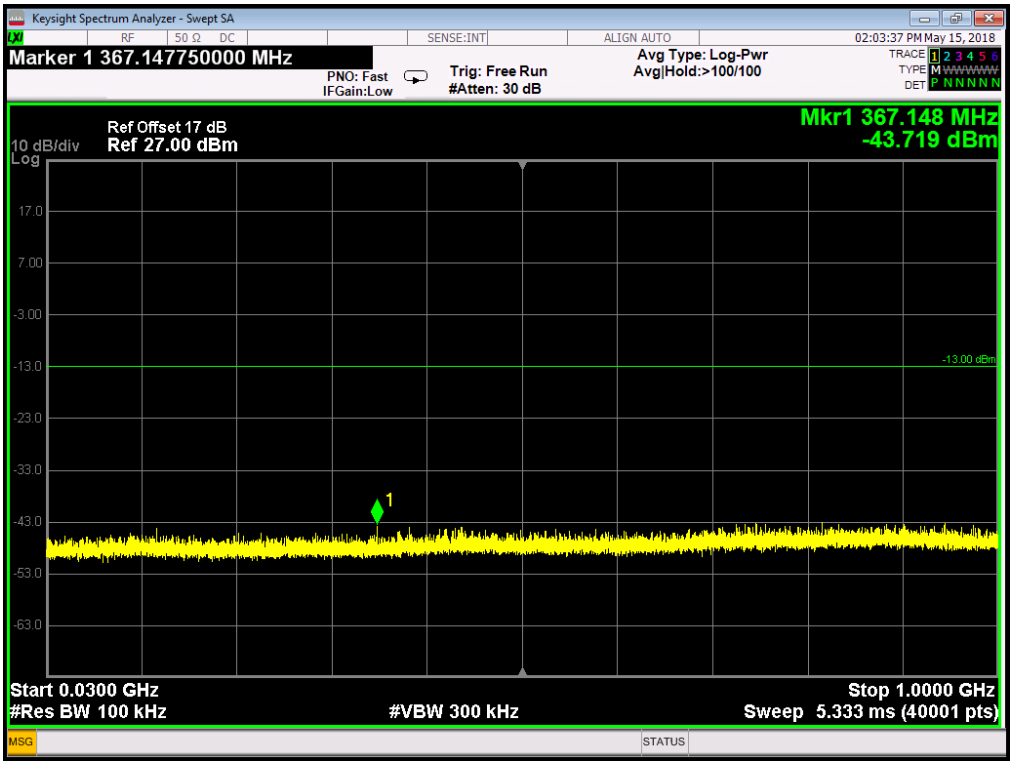


RB Size 1, RB Offset 0 30MHz to 1GHz

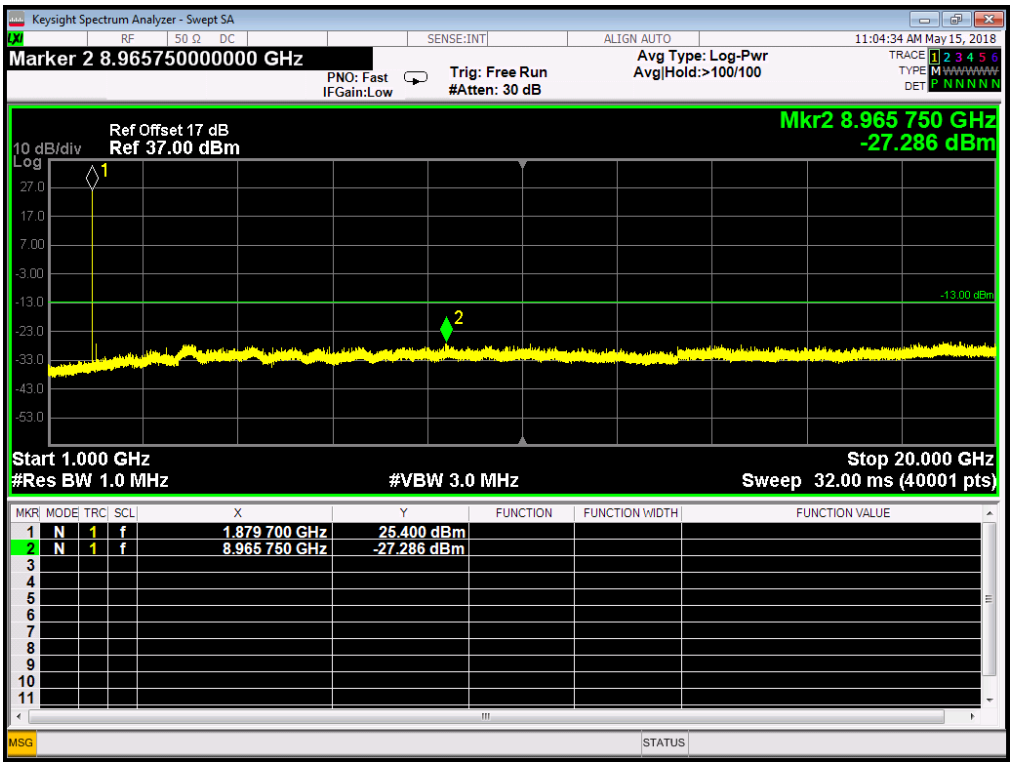


RB Size 1, RB Offset 0 1GHz to 20GHz

Band	LTE Band 2	Channel	Middle
Bandwidth	1.4MHz	Modulation	QPSK

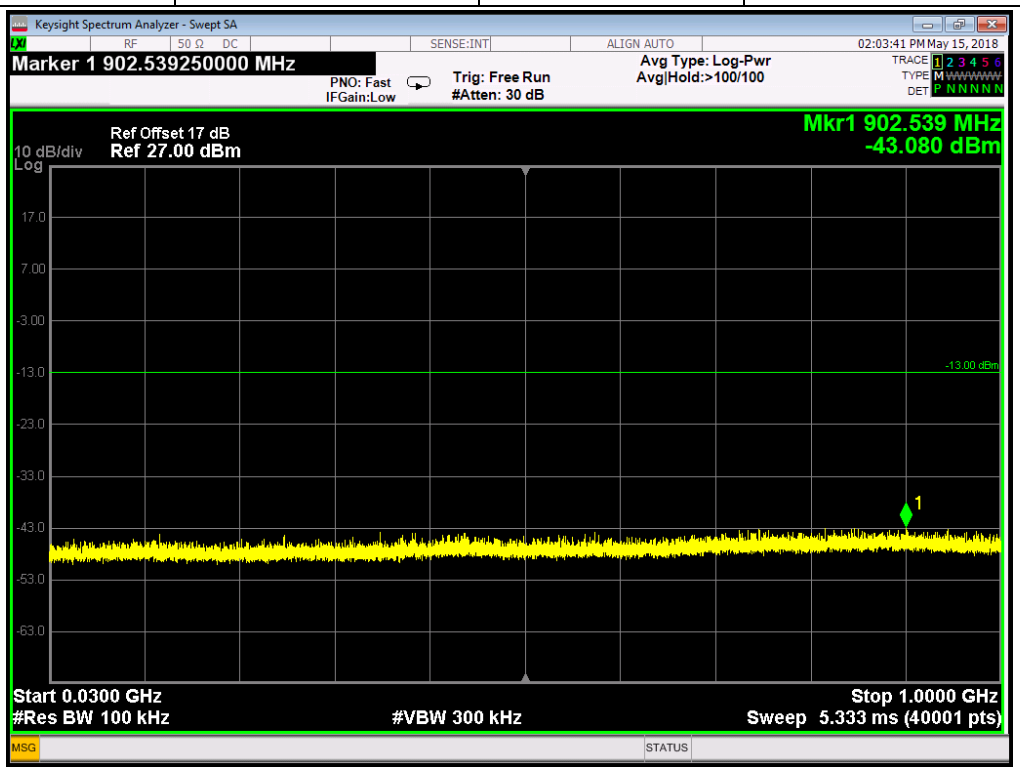


RB Size 1, RB Offset 0 30MHz to 1GHz

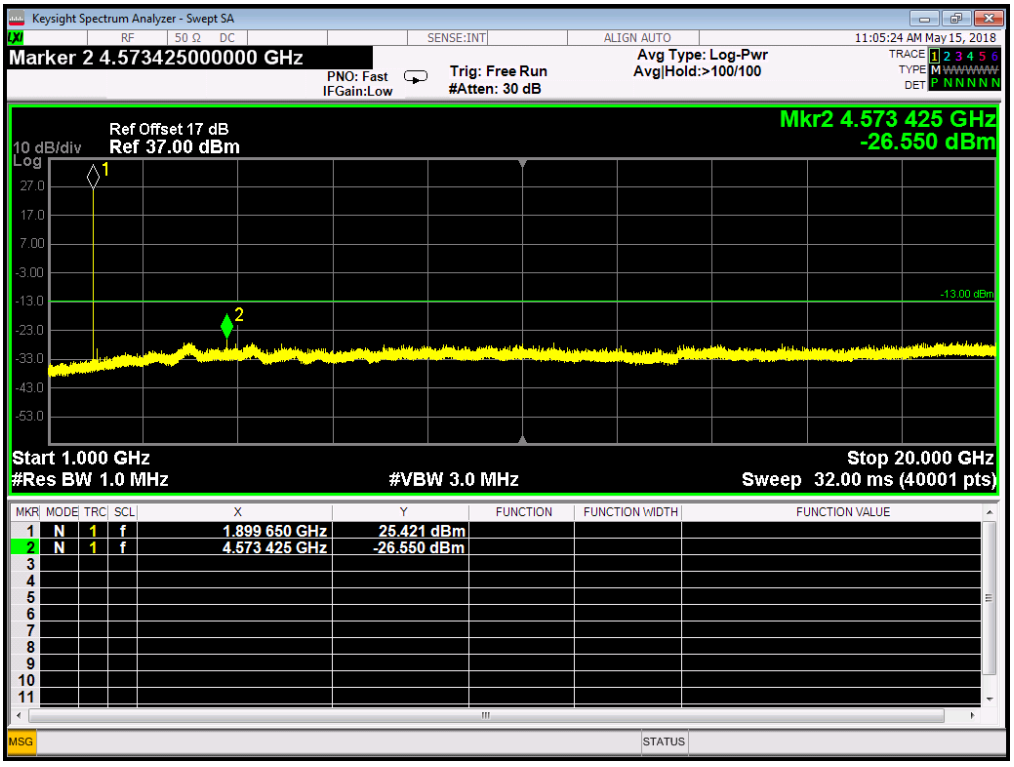


RB Size 1, RB Offset 0 1GHz to 20GHz

Band	LTE Band 2	Channel	High
Bandwidth	1.4MHz	Modulation	QPSK

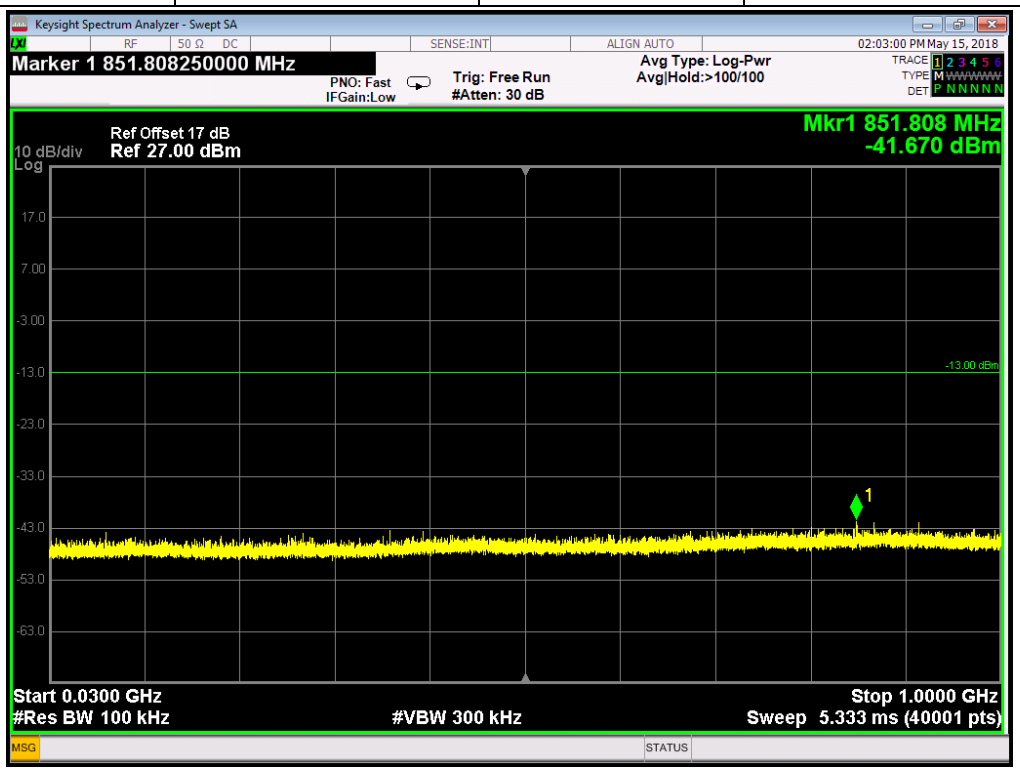


RB Size 1, RB Offset 0 30MHz to 1GHz

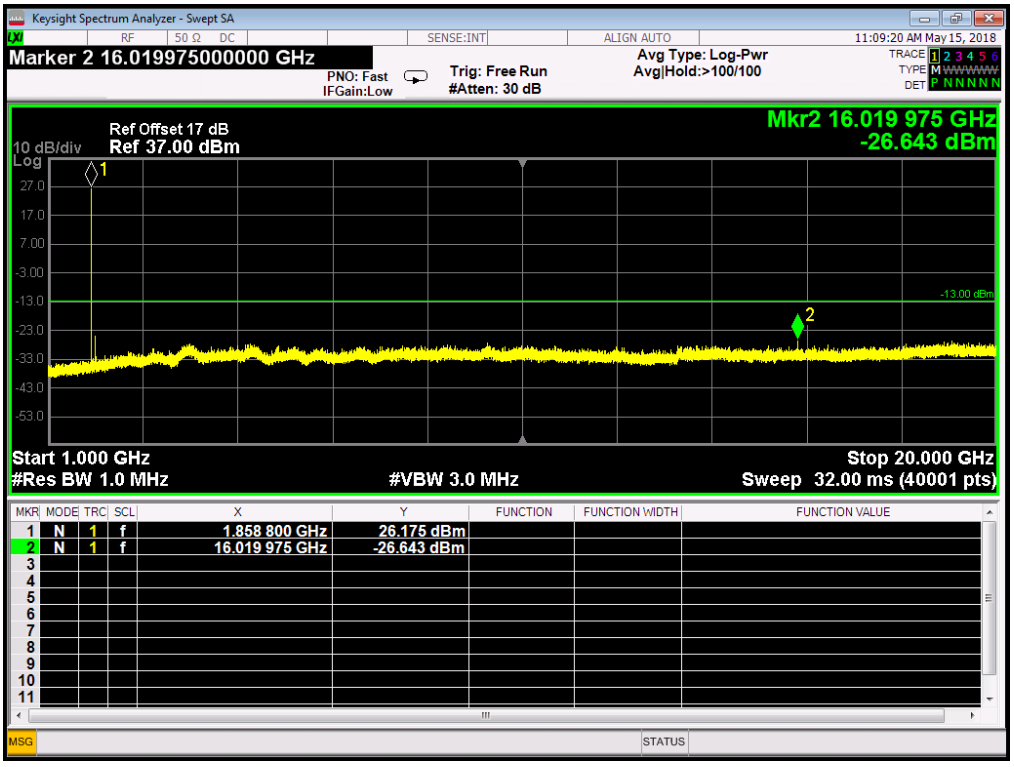


RB Size 1, RB Offset 0 1GHz to 20GHz

Band	LTE Band 2	Channel	Low
Bandwidth	3MHz	Modulation	QPSK

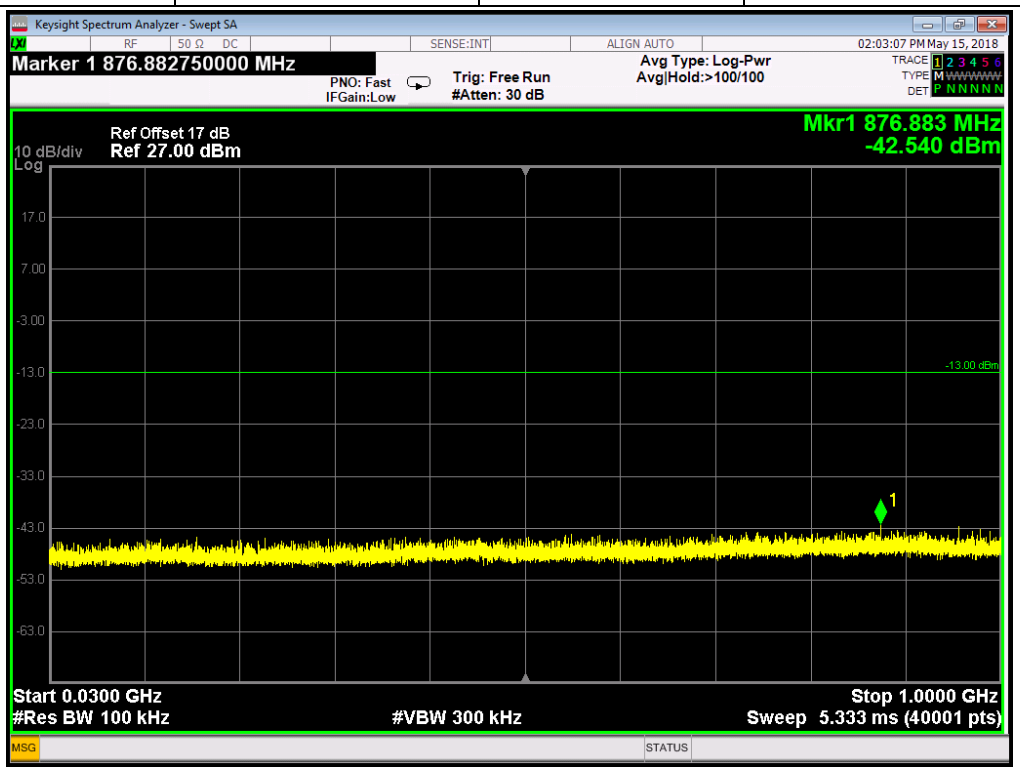


RB Size 1, RB Offset 0 30MHz to 1GHz

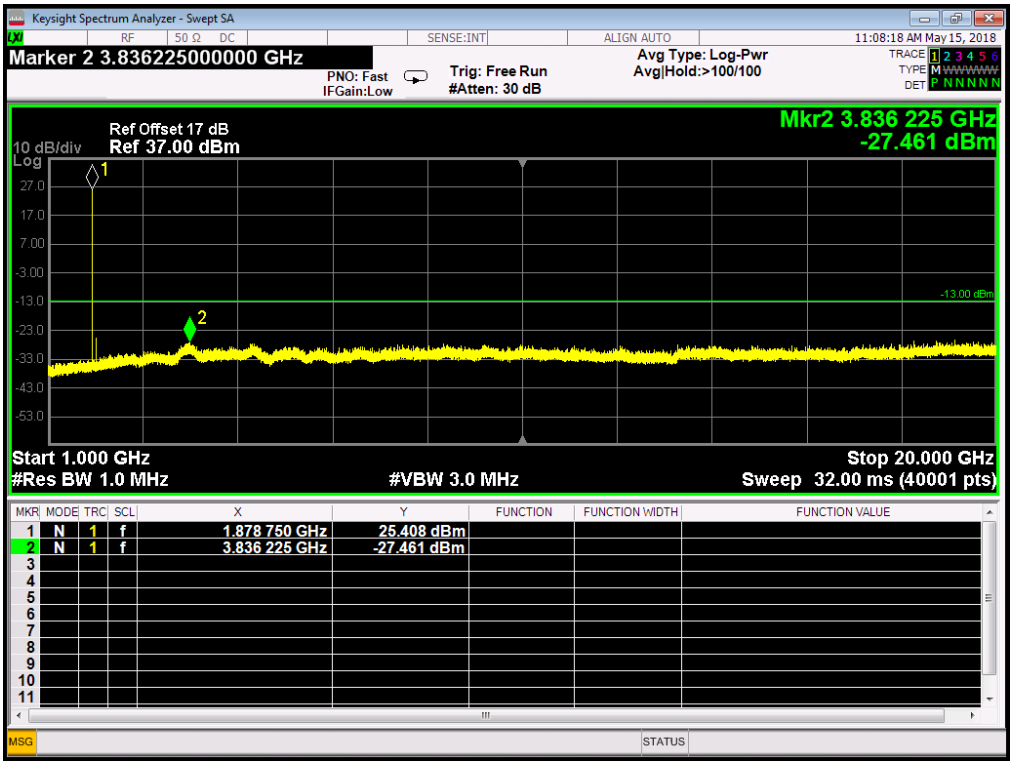


RB Size 1, RB Offset 0 1GHz to 20GHz

Band	LTE Band 2	Channel	Middle
Bandwidth	3MHz	Modulation	QPSK

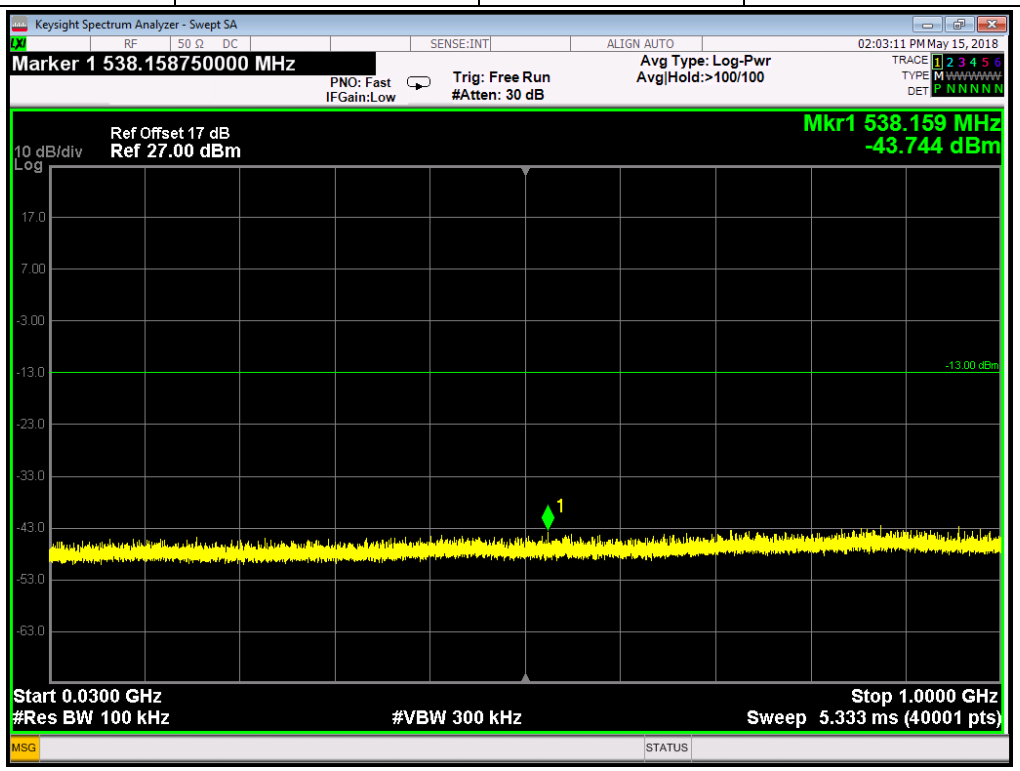


RB Size 1, RB Offset 0 30MHz to 1GHz

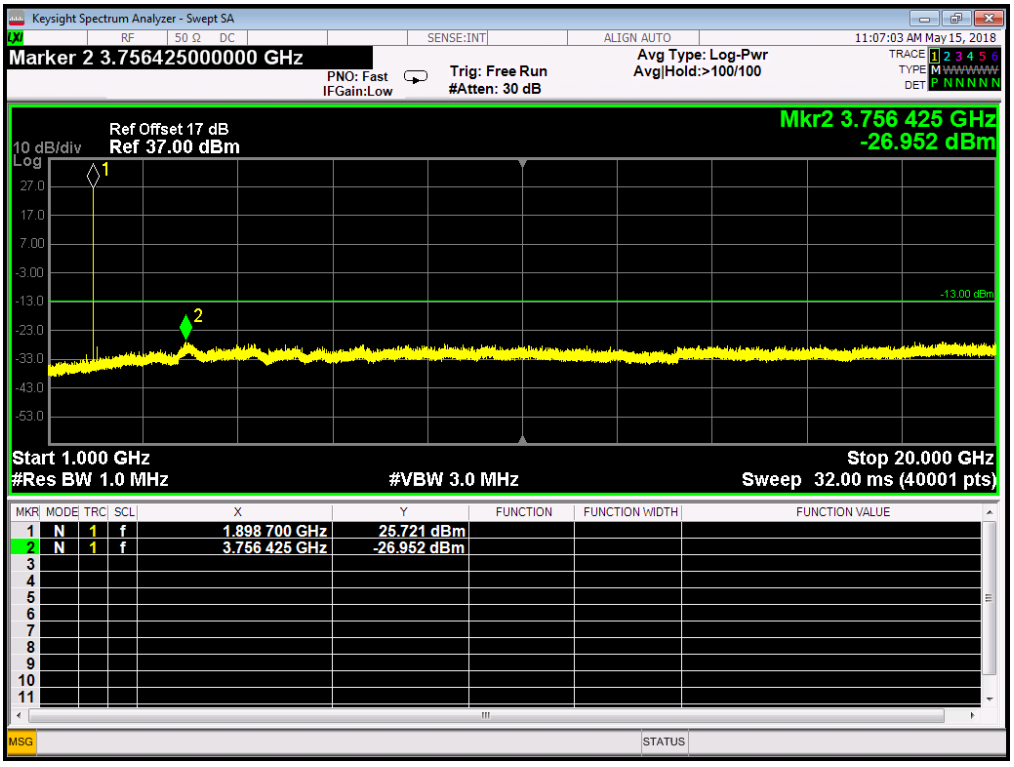


RB Size 1, RB Offset 0 1GHz to 20GHz

Band	LTE Band 2	Channel	High
Bandwidth	3MHz	Modulation	QPSK

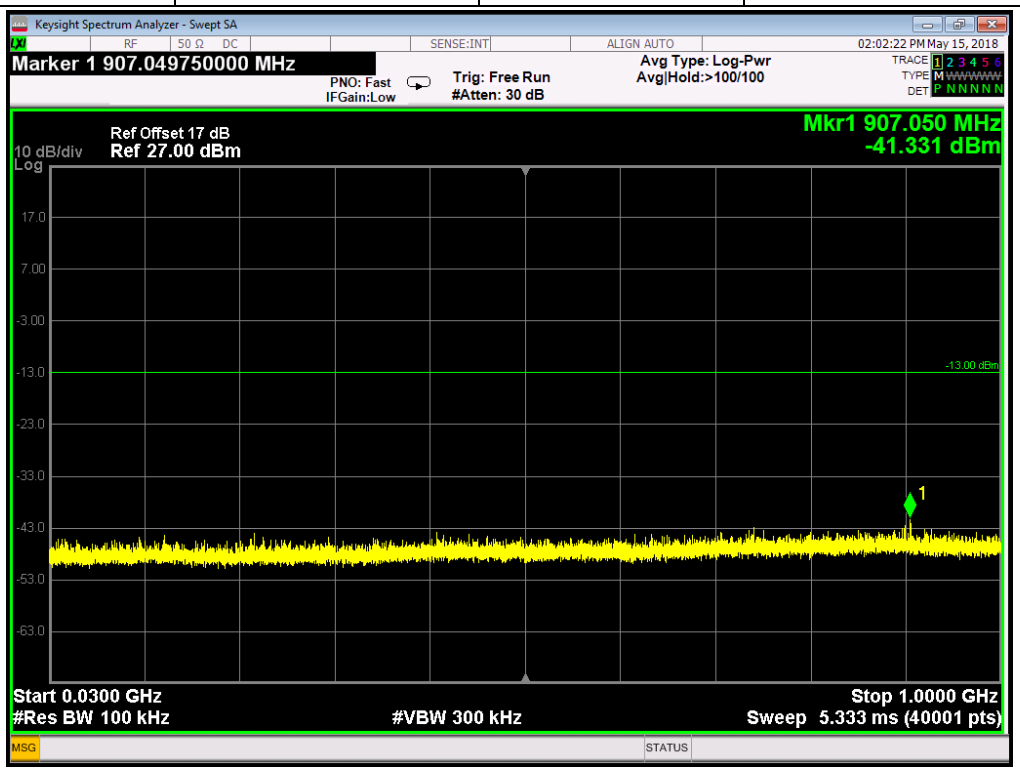


RB Size 1, RB Offset 0 30MHz to 1GHz

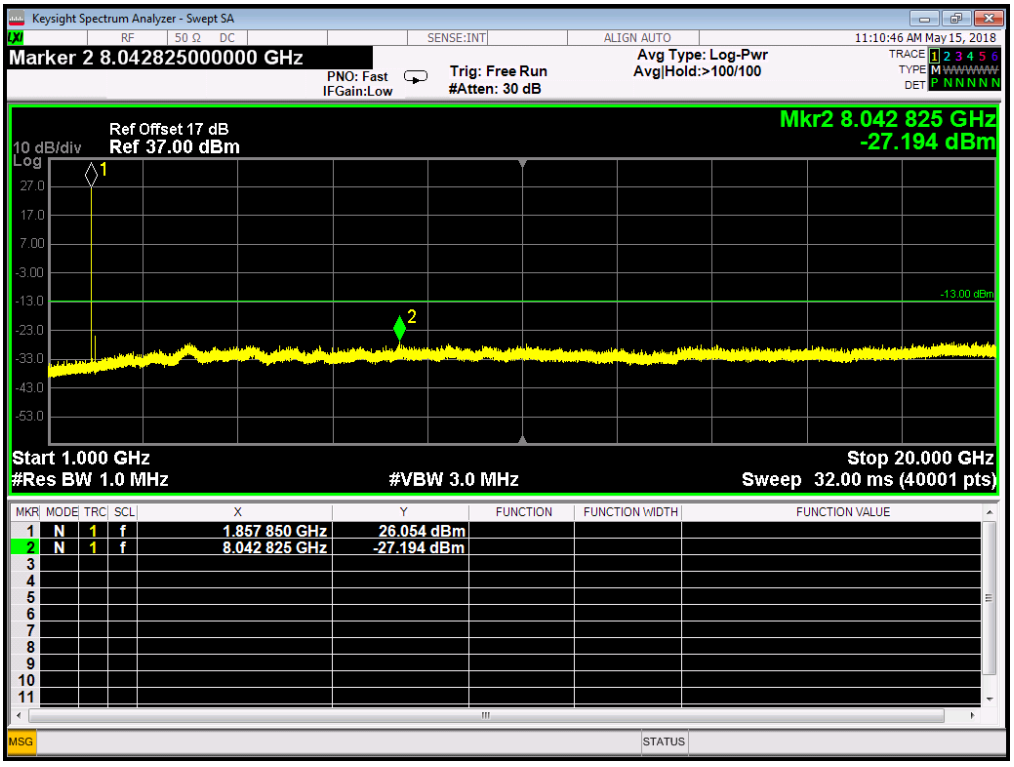


RB Size 1, RB Offset 0 1GHz to 20GHz

Band	LTE Band 2	Channel	Low
Bandwidth	5MHz	Modulation	QPSK

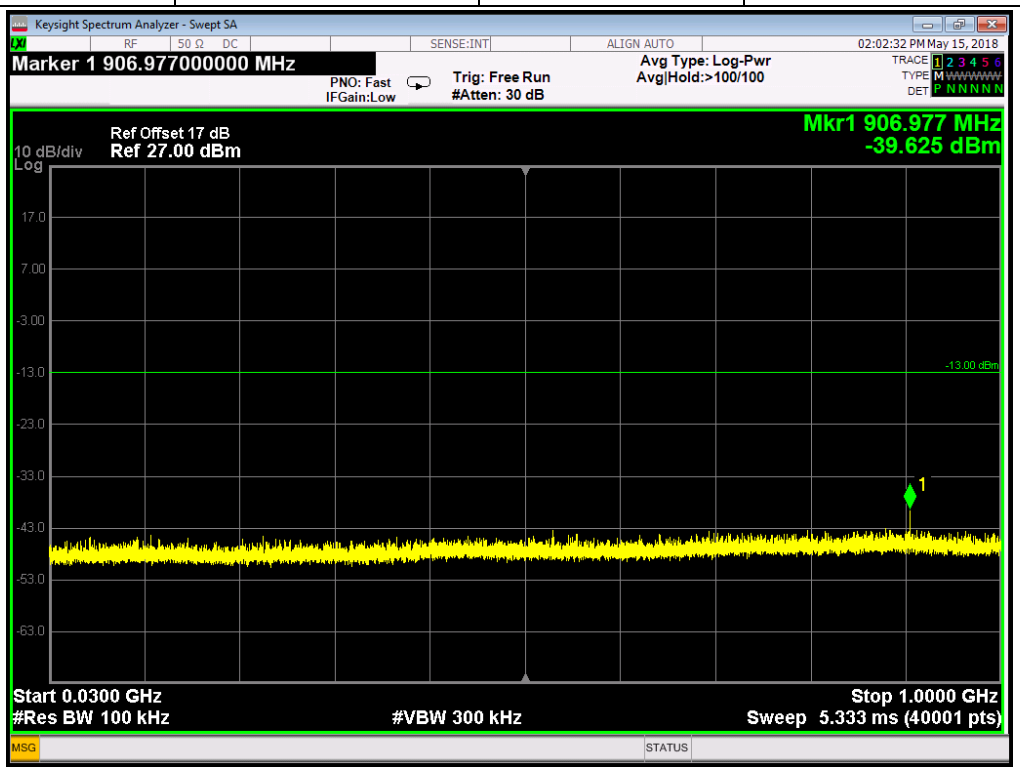


RB Size 1, RB Offset 0 30MHz to 1GHz

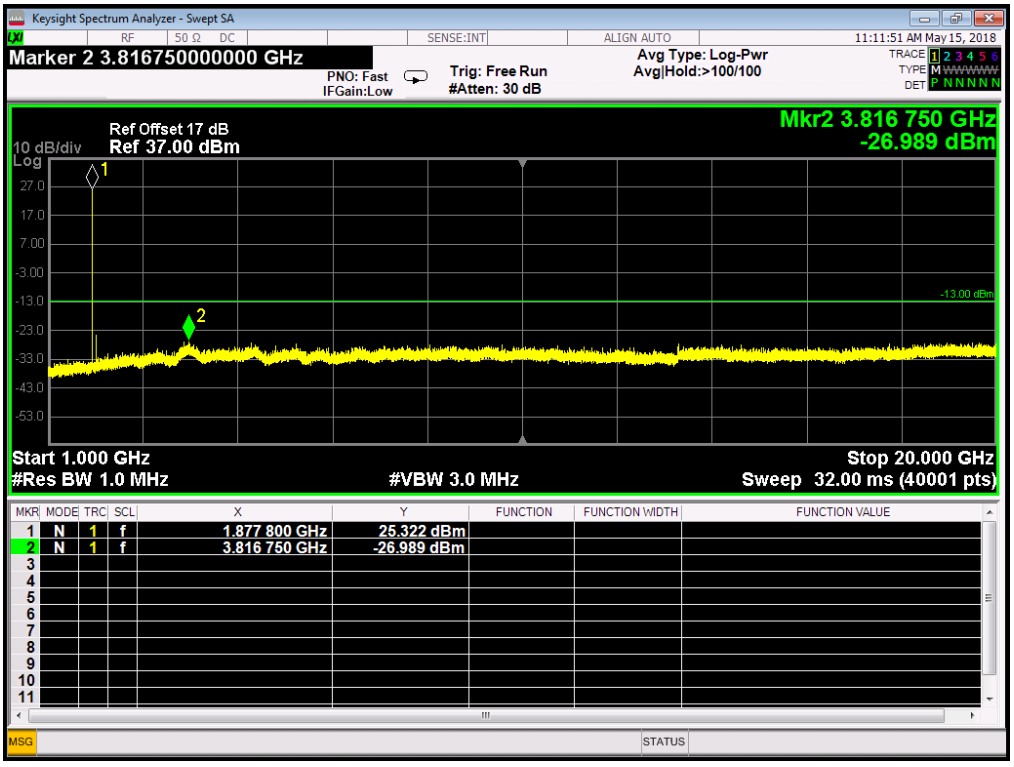


RB Size 1, RB Offset 0 1GHz to 20GHz

Band	LTE Band 2	Channel	Middle
Bandwidth	5MHz	Modulation	QPSK

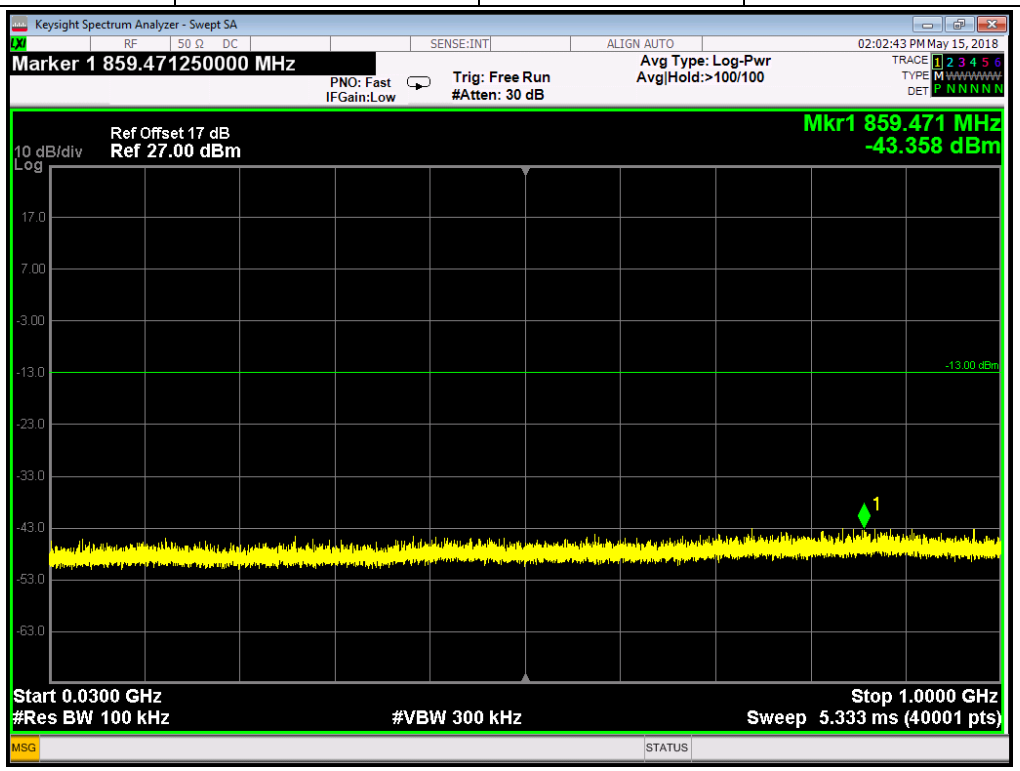


RB Size 1, RB Offset 0 30MHz to 1GHz

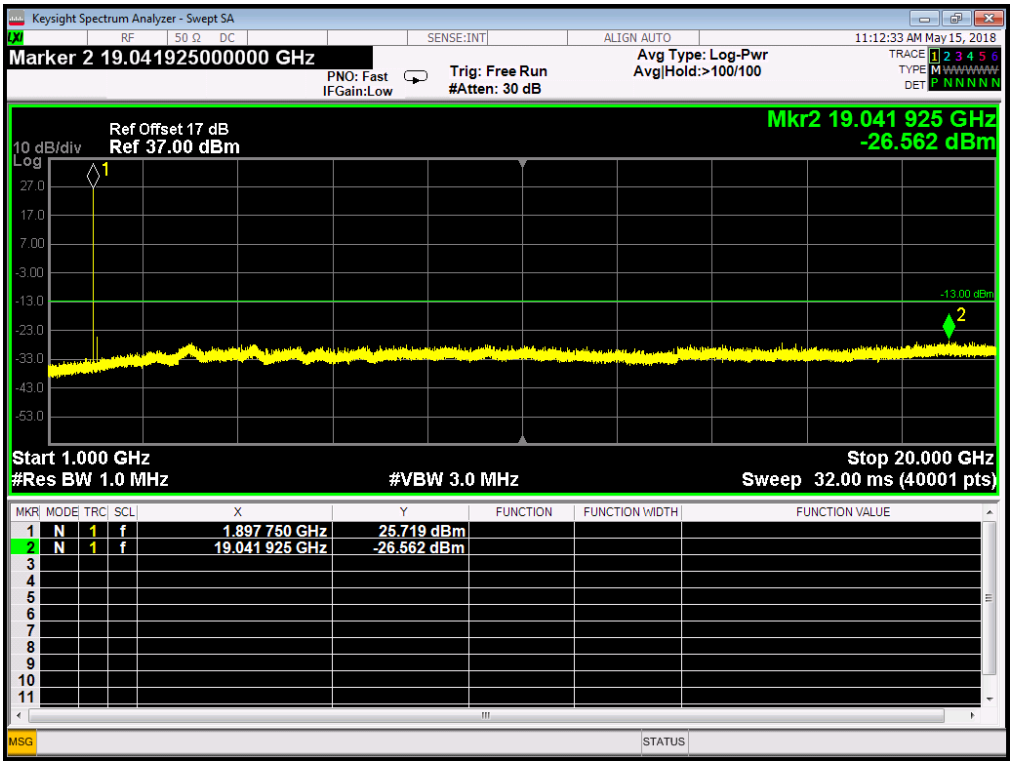


RB Size 1, RB Offset 0 1GHz to 20GHz

Band	LTE Band 2	Channel	High
Bandwidth	5MHz	Modulation	QPSK

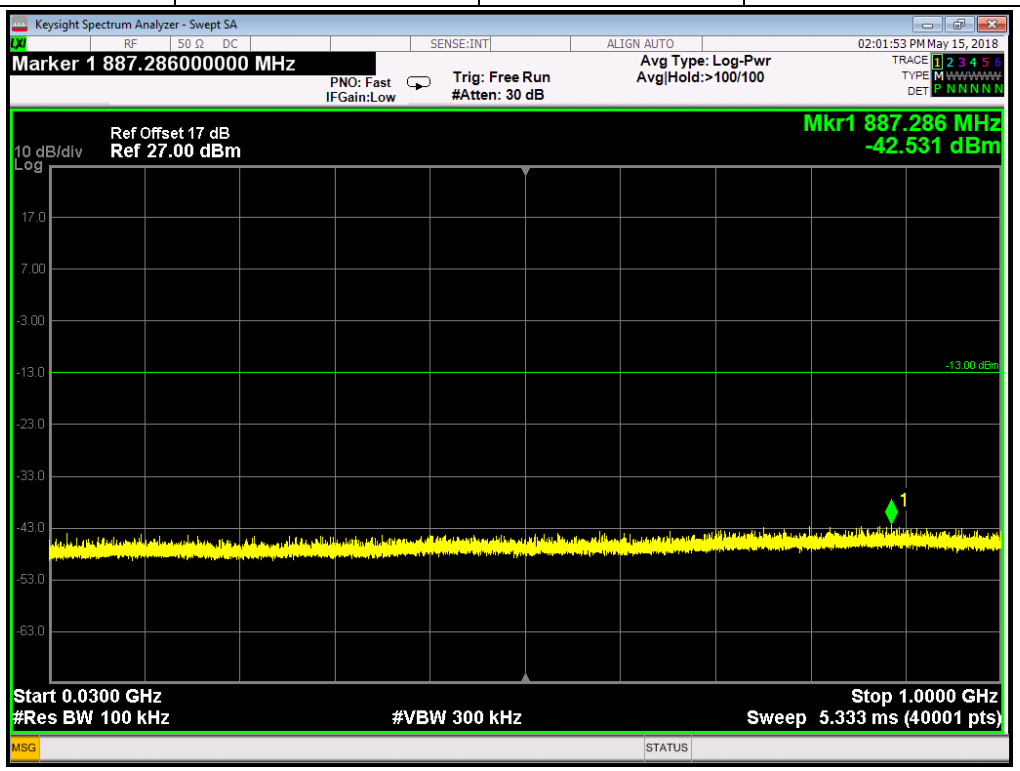


RB Size 1, RB Offset 0 30MHz to 1GHz

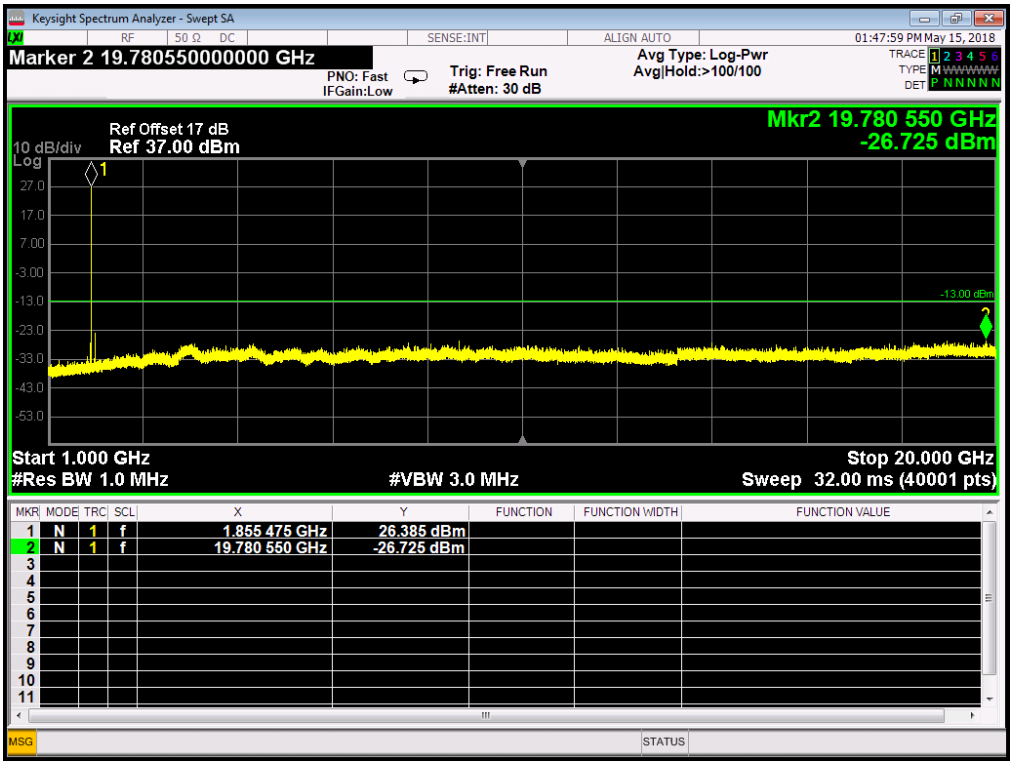


RB Size 1, RB Offset 0 1GHz to 20GHz

Band	LTE Band 2	Channel	Low
Bandwidth	10MHz	Modulation	QPSK

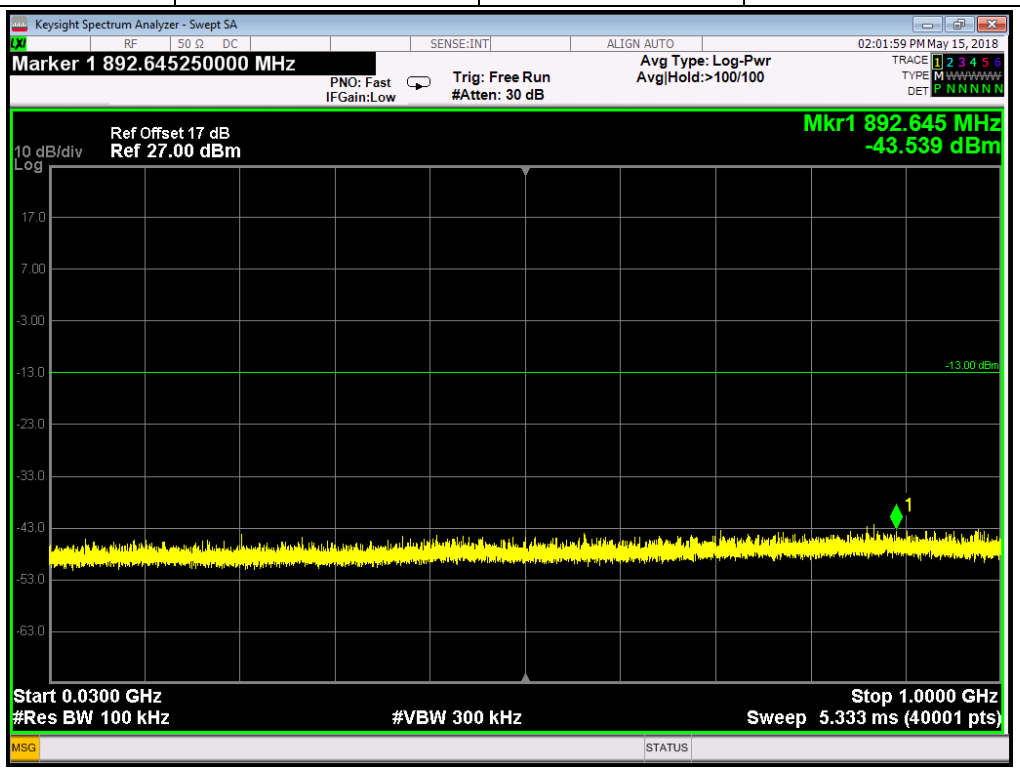


RB Size 1, RB Offset 0 30MHz to 1GHz

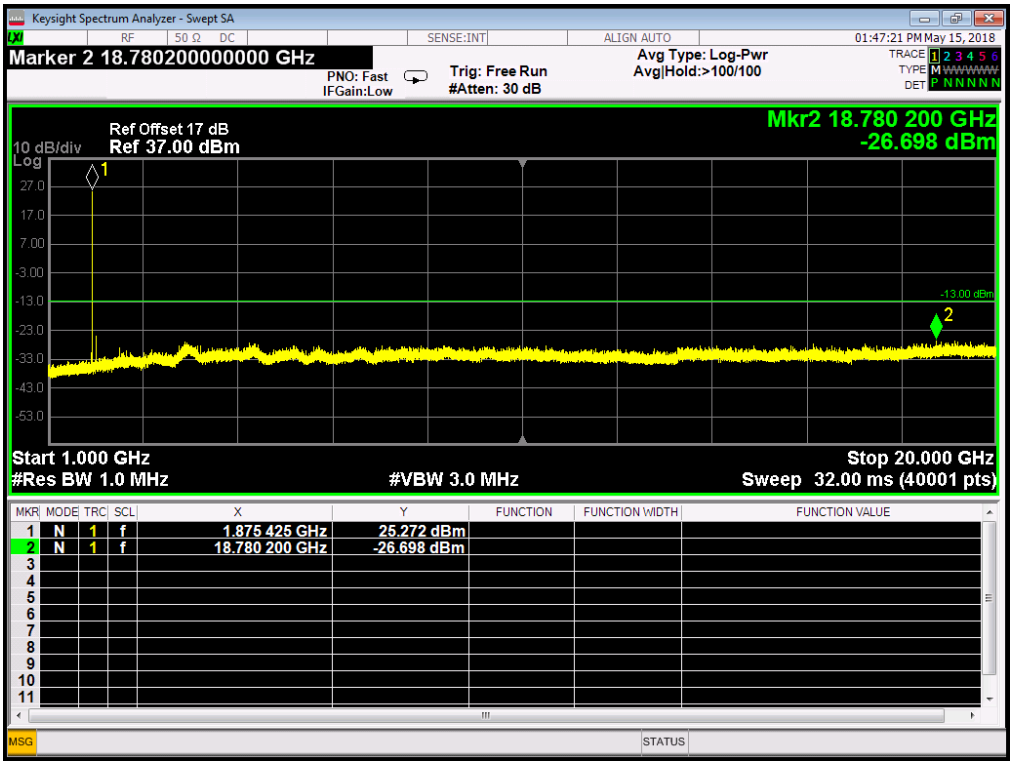


RB Size 1, RB Offset 0 1GHz to 20GHz

Band	LTE Band 2	Channel	Middle
Bandwidth	10MHz	Modulation	QPSK

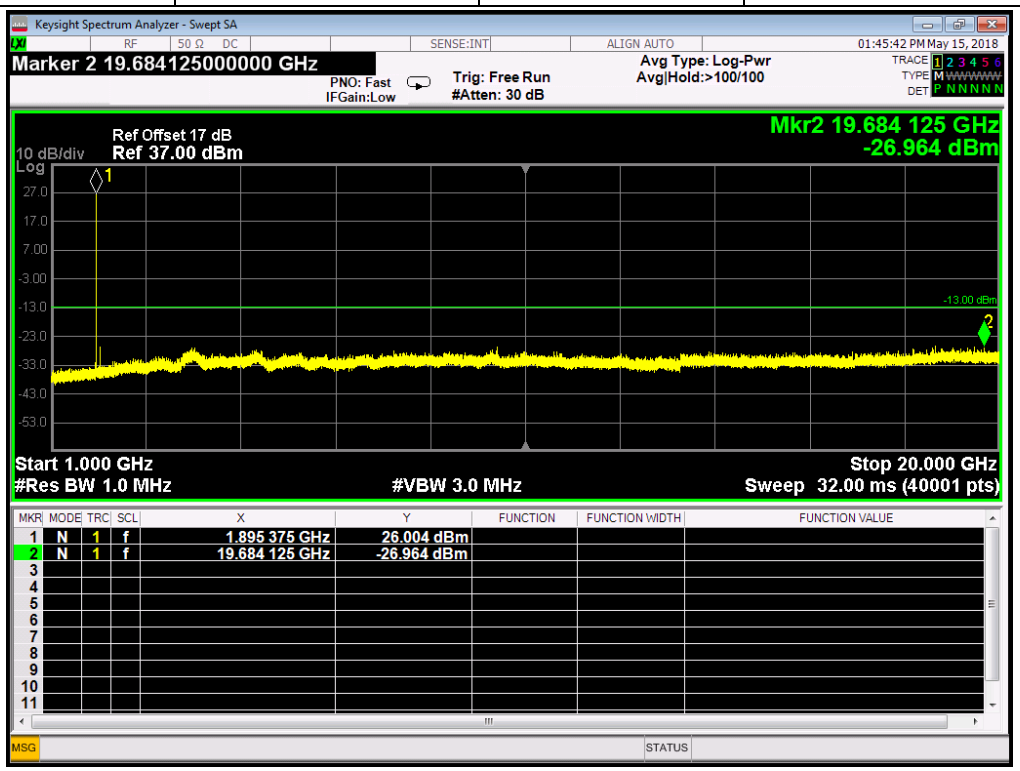


RB Size 1, RB Offset 0 30MHz to 1GHz

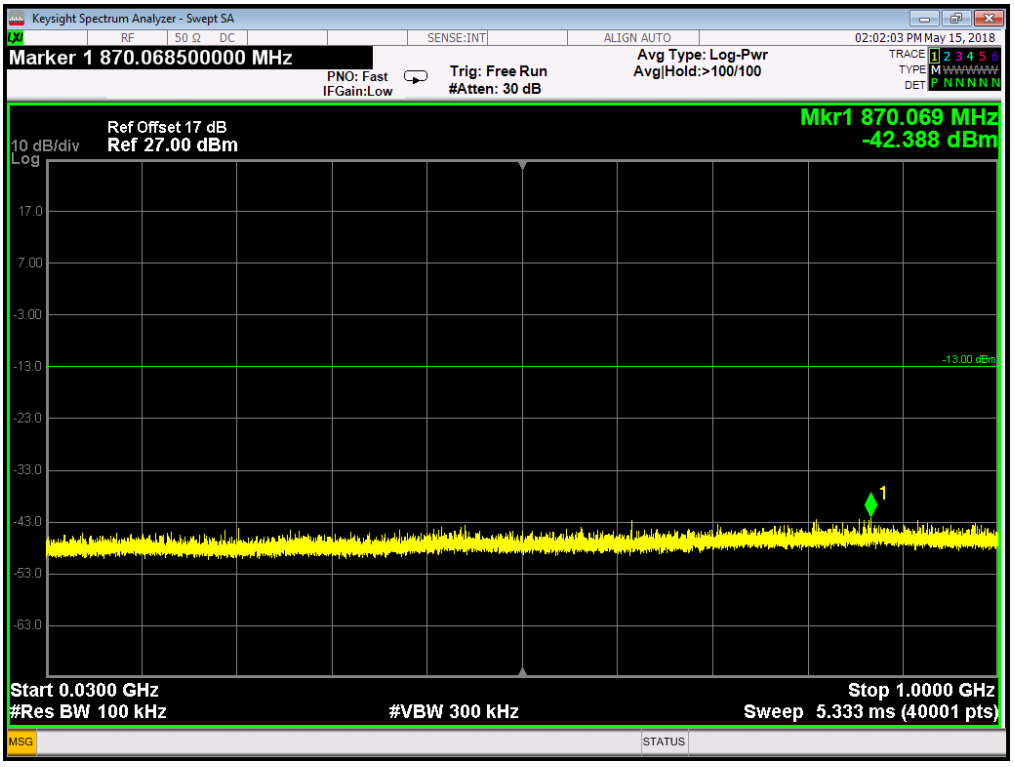


RB Size 1, RB Offset 0 1GHz to 20GHz

Band	LTE Band 2	Channel	High
Bandwidth	10MHz	Modulation	QPSK

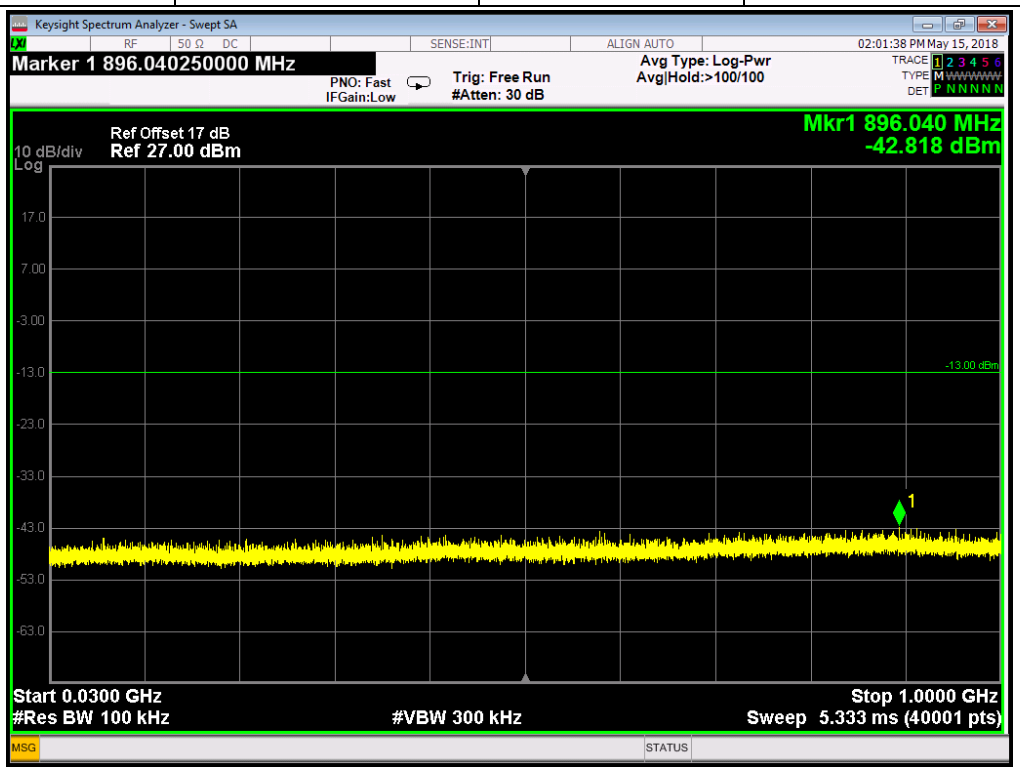


RB Size 1, RB Offset 0 30MHz to 1GHz

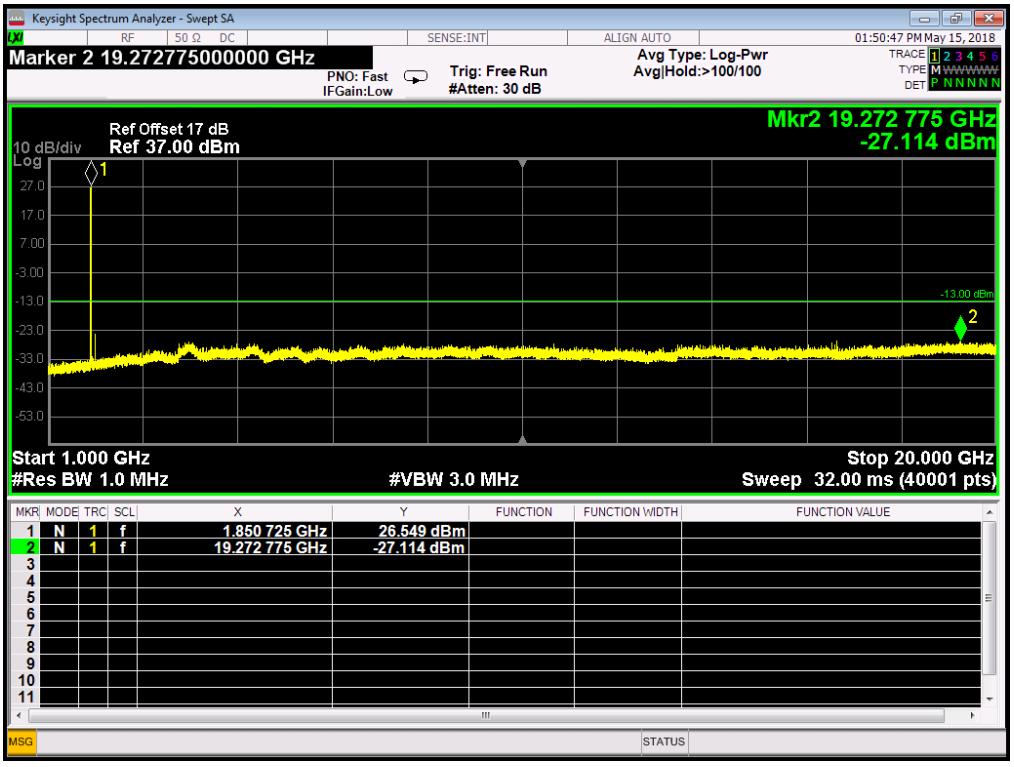


RB Size 1, RB Offset 0 1GHz to 20GHz

Band	LTE Band 2	Channel	Low
Bandwidth	15MHz	Modulation	QPSK

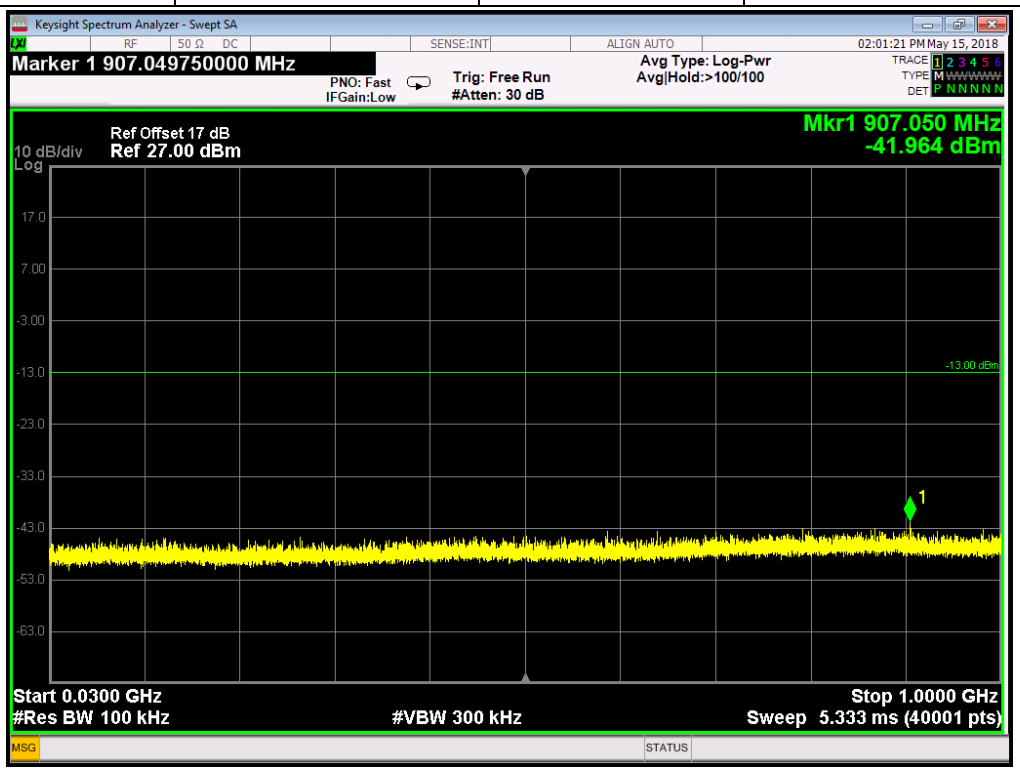


RB Size 1, RB Offset 0 30MHz to 1GHz

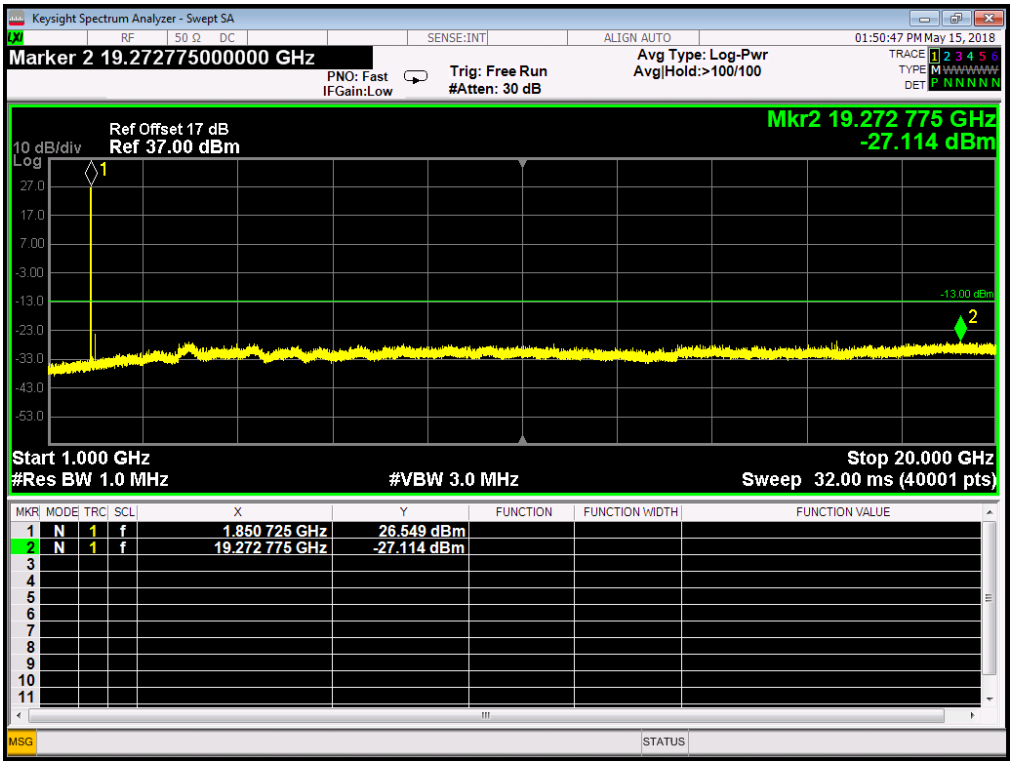


RB Size 1, RB Offset 0 1GHz to 20GHz

Band	LTE Band 2	Channel	Middle
Bandwidth	15MHz	Modulation	QPSK

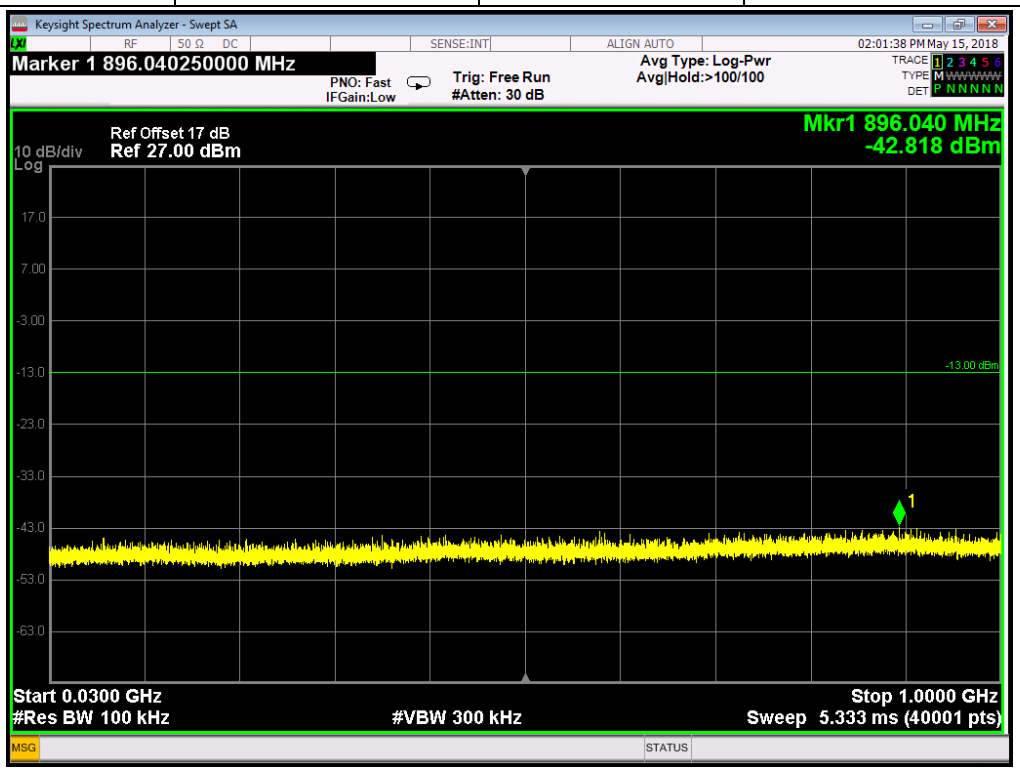


RB Size 1, RB Offset 0 30MHz to 1GHz

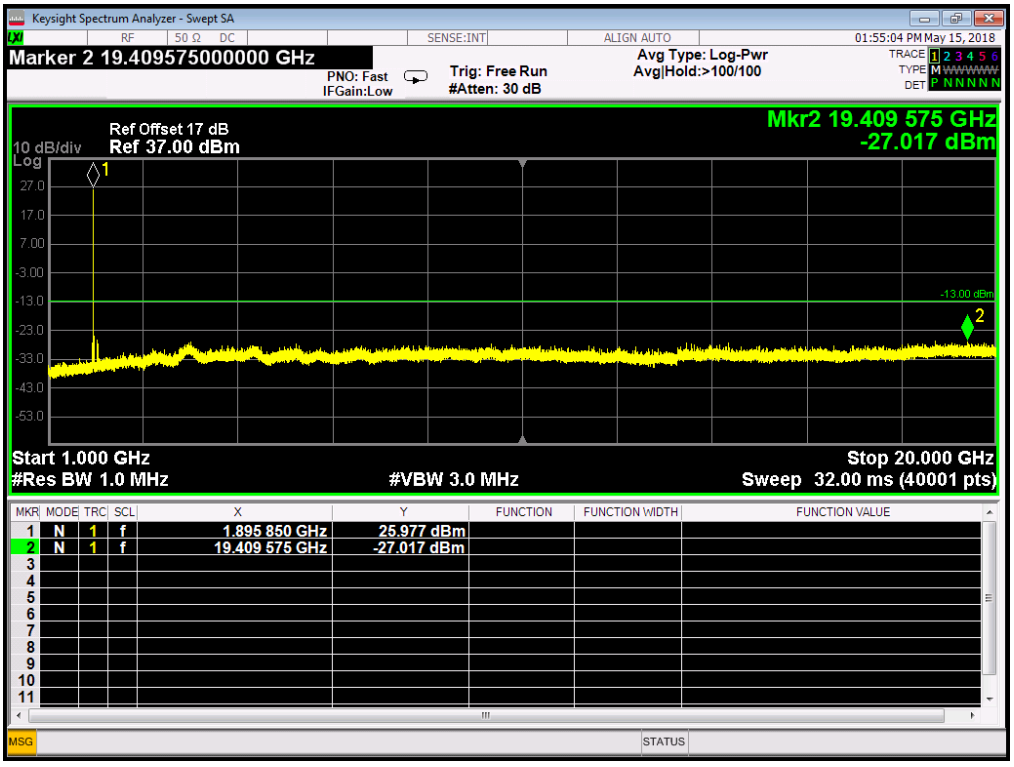


RB Size 1, RB Offset 0 1GHz to 20GHz

Band	LTE Band 2	Channel	High
Bandwidth	15MHz	Modulation	QPSK

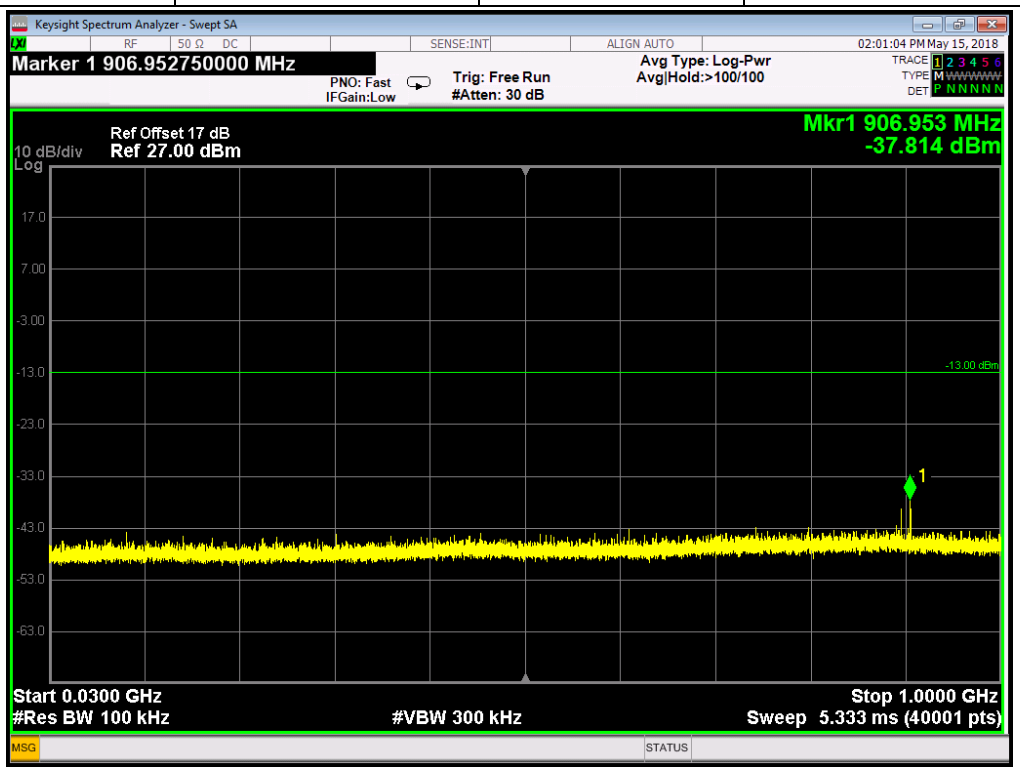


RB Size 1, RB Offset 0 30MHz to 1GHz

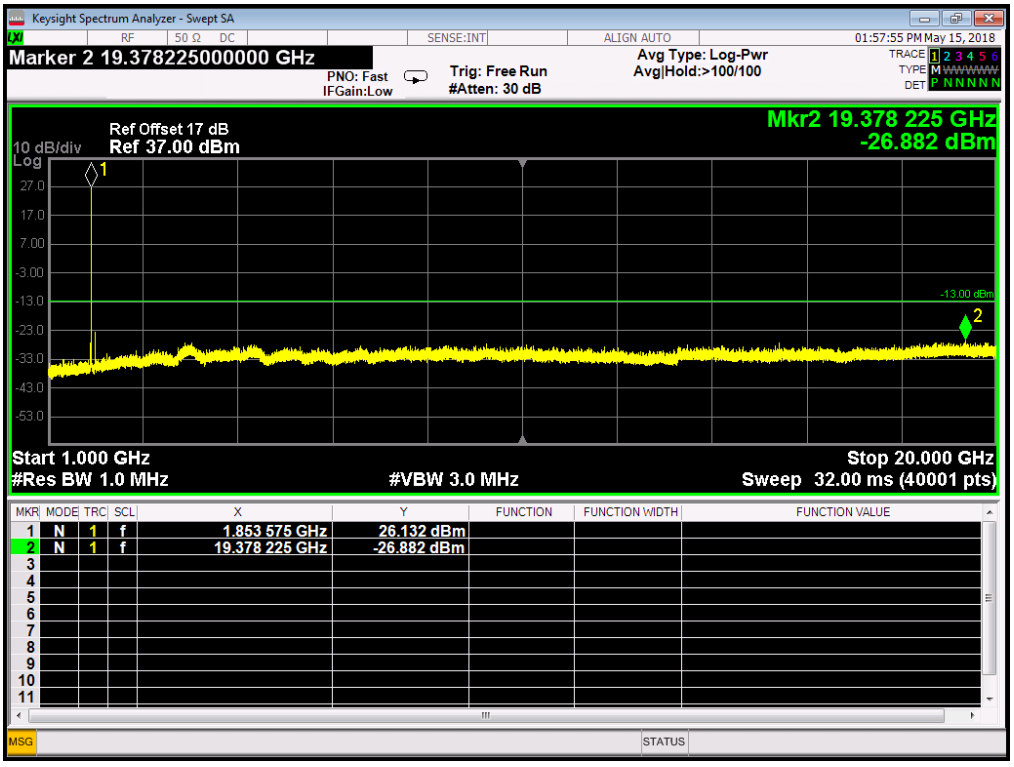


RB Size 1, RB Offset 0 1GHz to 20GHz

Band	LTE Band 2	Channel	Low
Bandwidth	20MHz	Modulation	QPSK

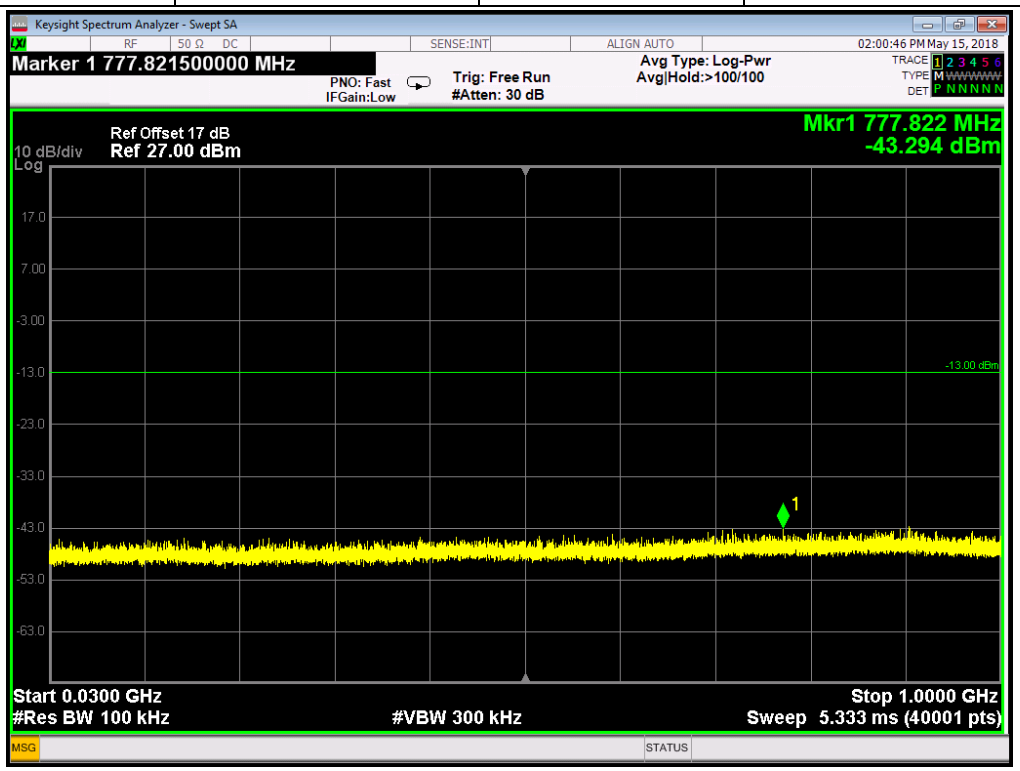


RB Size 1, RB Offset 0 30MHz to 1GHz

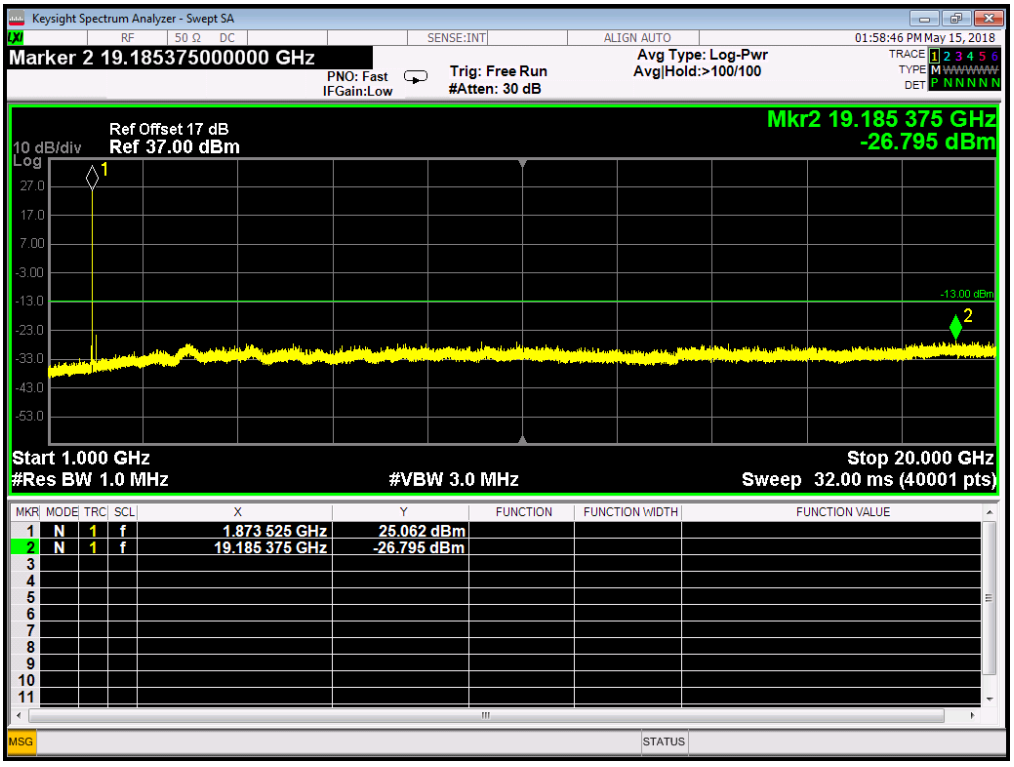


RB Size 1, RB Offset 0 1GHz to 20GHz

Band	LTE Band 2	Channel	Middle
Bandwidth	20MHz	Modulation	QPSK

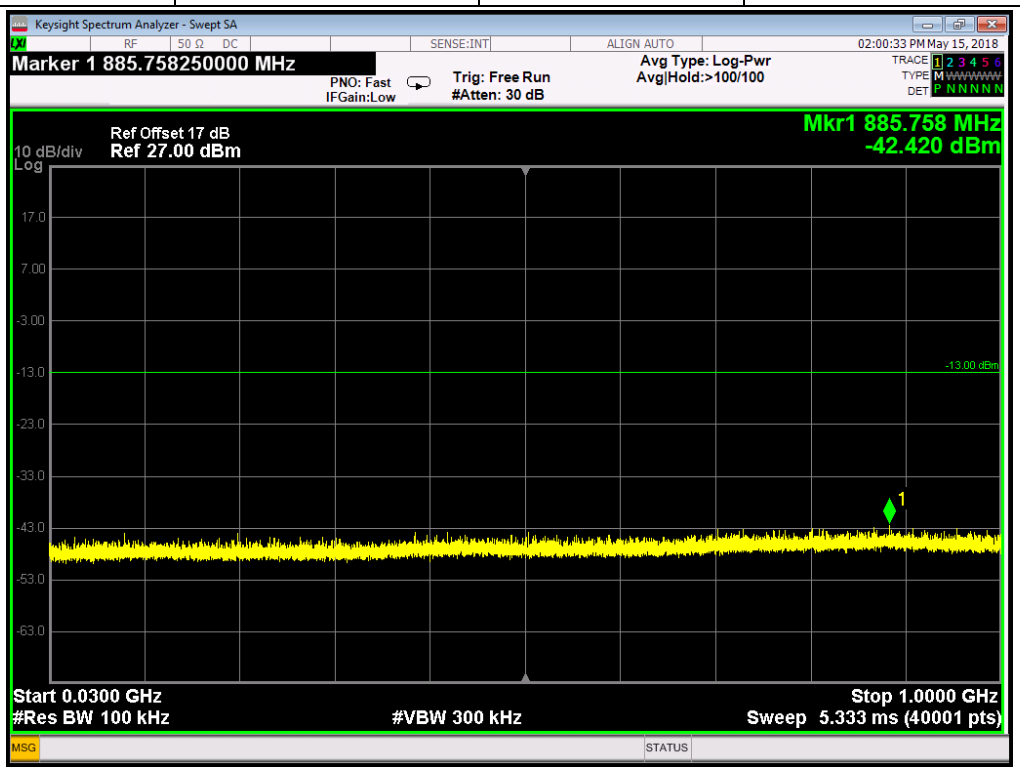


RB Size 1, RB Offset 0 30MHz to 1GHz

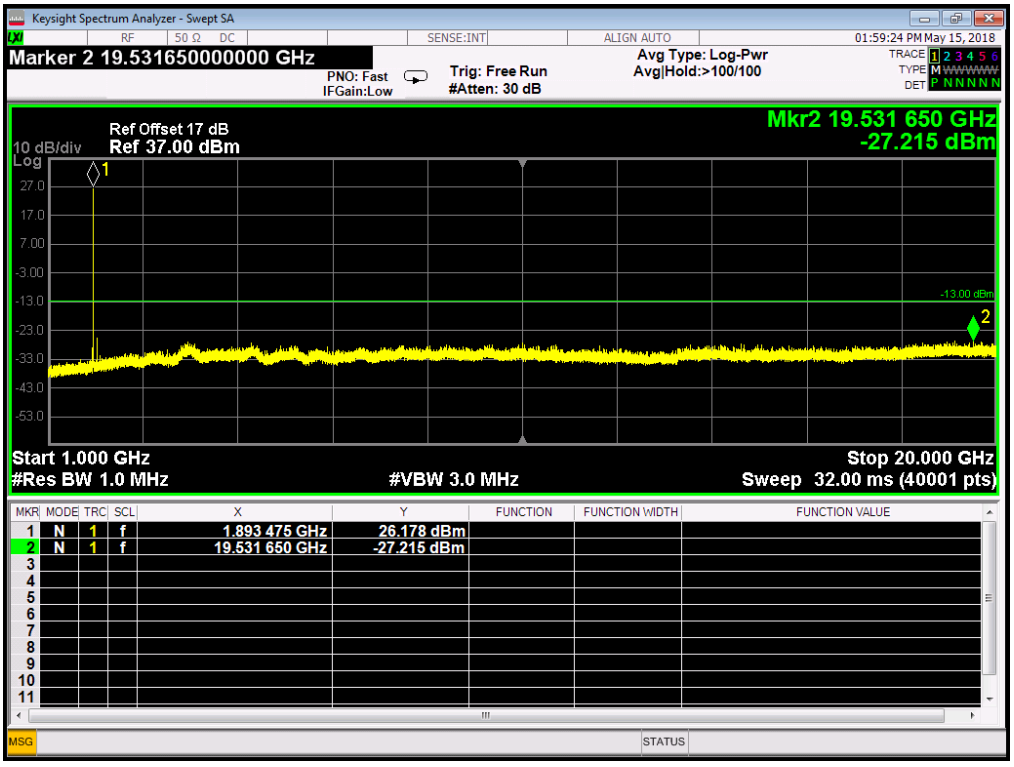


RB Size 1, RB Offset 0 1GHz to 20GHz

Band	LTE Band 2	Channel	High
Bandwidth	20MHz	Modulation	QPSK

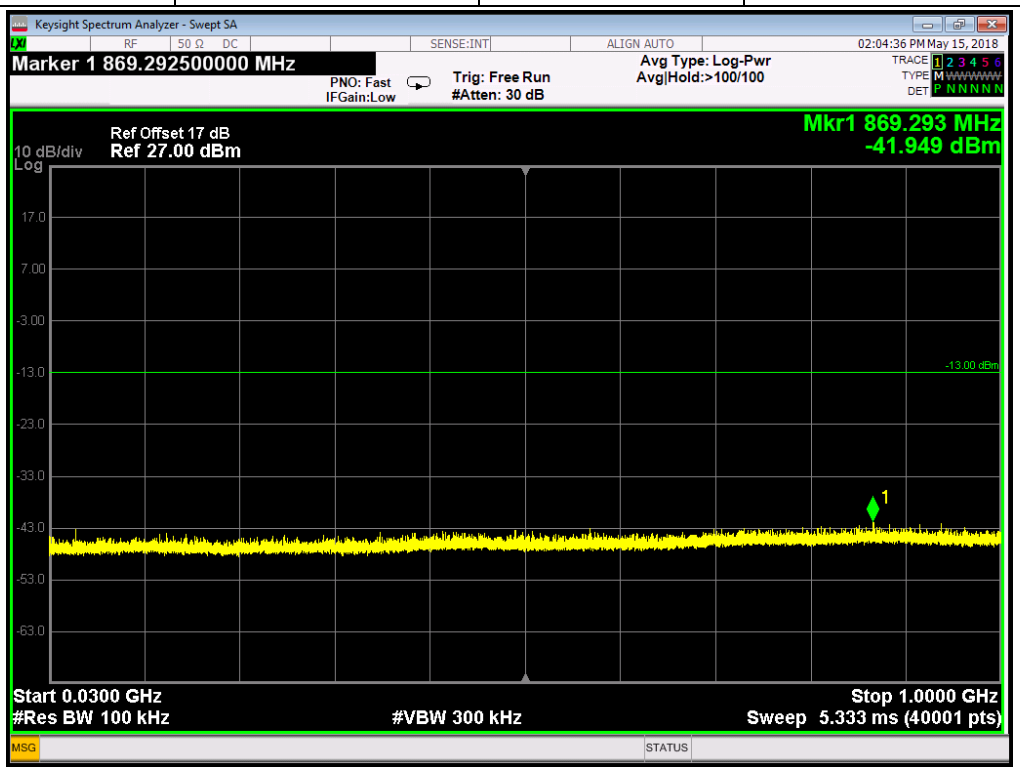


RB Size 1, RB Offset 0 30MHz to 1GHz

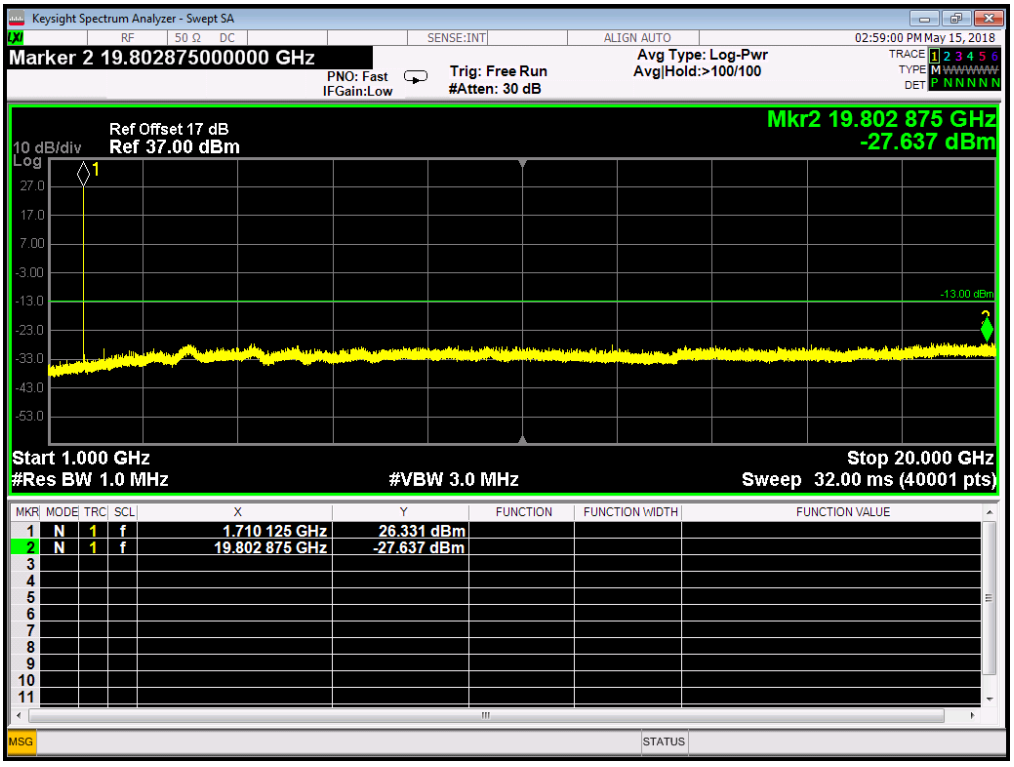


RB Size 1, RB Offset 0 1GHz to 20GHz

Band	LTE Band 4	Channel	Low
Bandwidth	1.4MHz	Modulation	QPSK

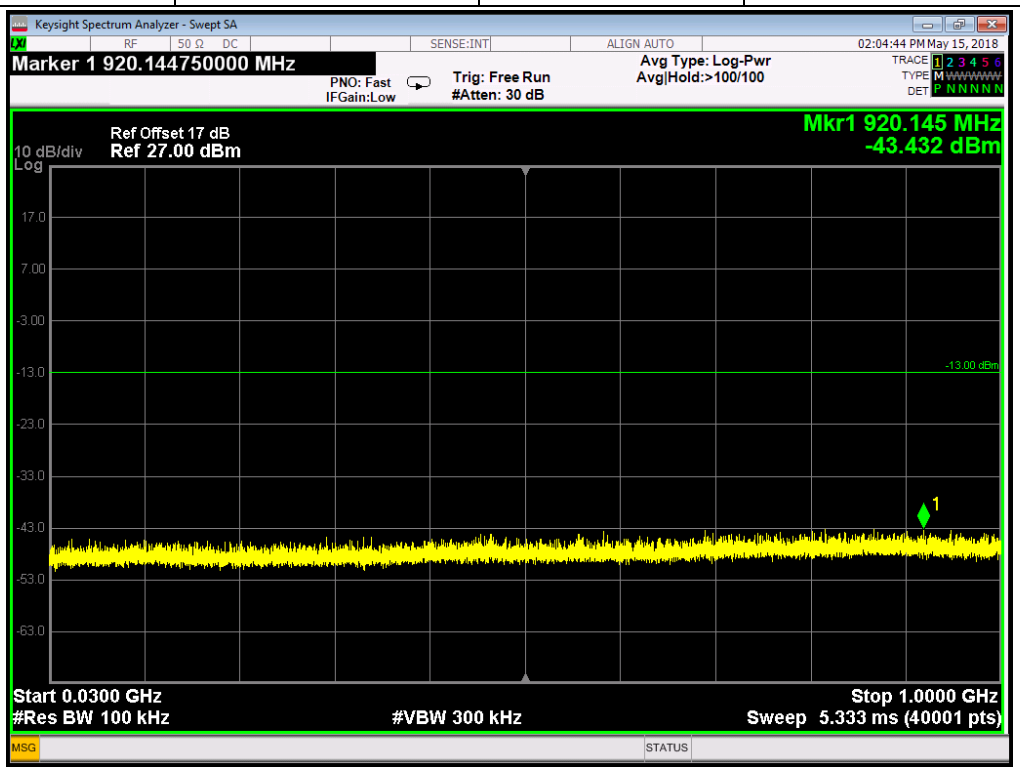


RB Size 1, RB Offset 0 30MHz to 1GHz

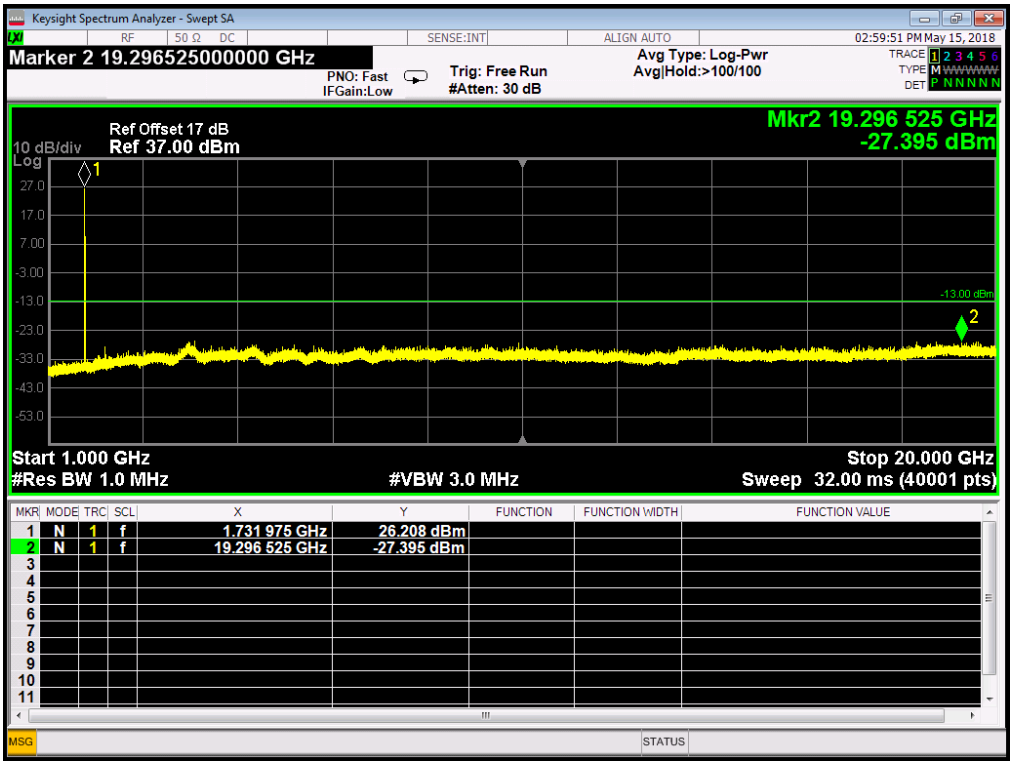


RB Size 1, RB Offset 0 1GHz to 20GHz

Band	LTE Band 4	Channel	Middle
Bandwidth	1.4MHz	Modulation	QPSK

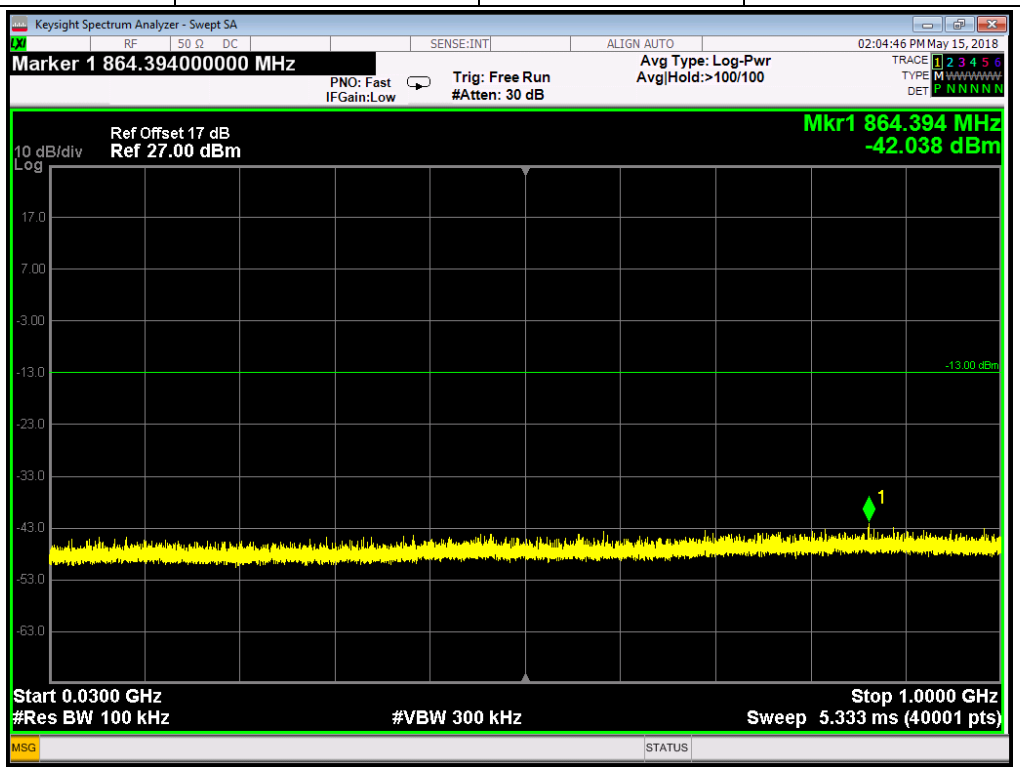


RB Size 1, RB Offset 0 30MHz to 1GHz

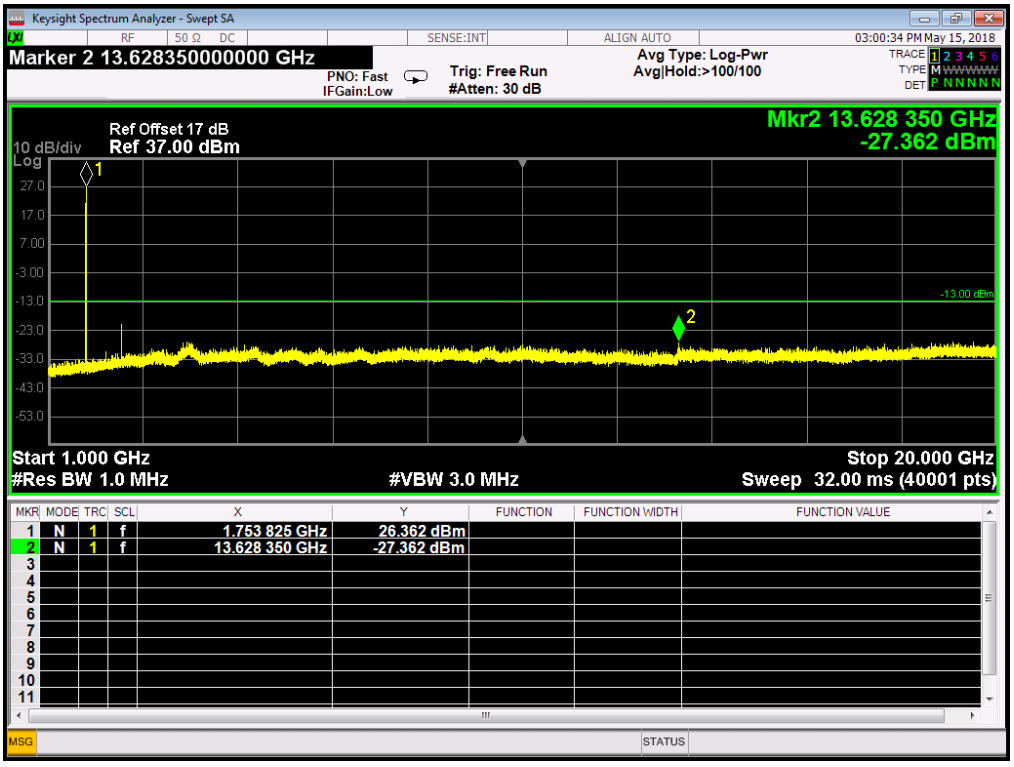


RB Size 1, RB Offset 0 1GHz to 20GHz

Band	LTE Band 4	Channel	High
Bandwidth	1.4MHz	Modulation	QPSK

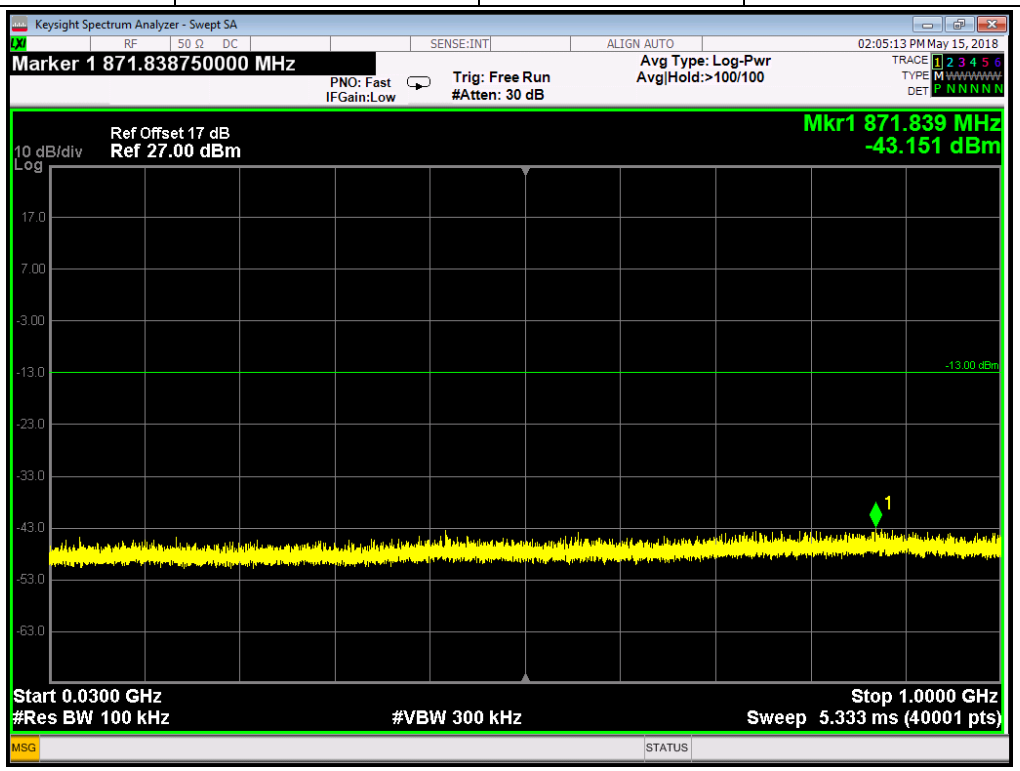


RB Size 1, RB Offset 0 30MHz to 1GHz

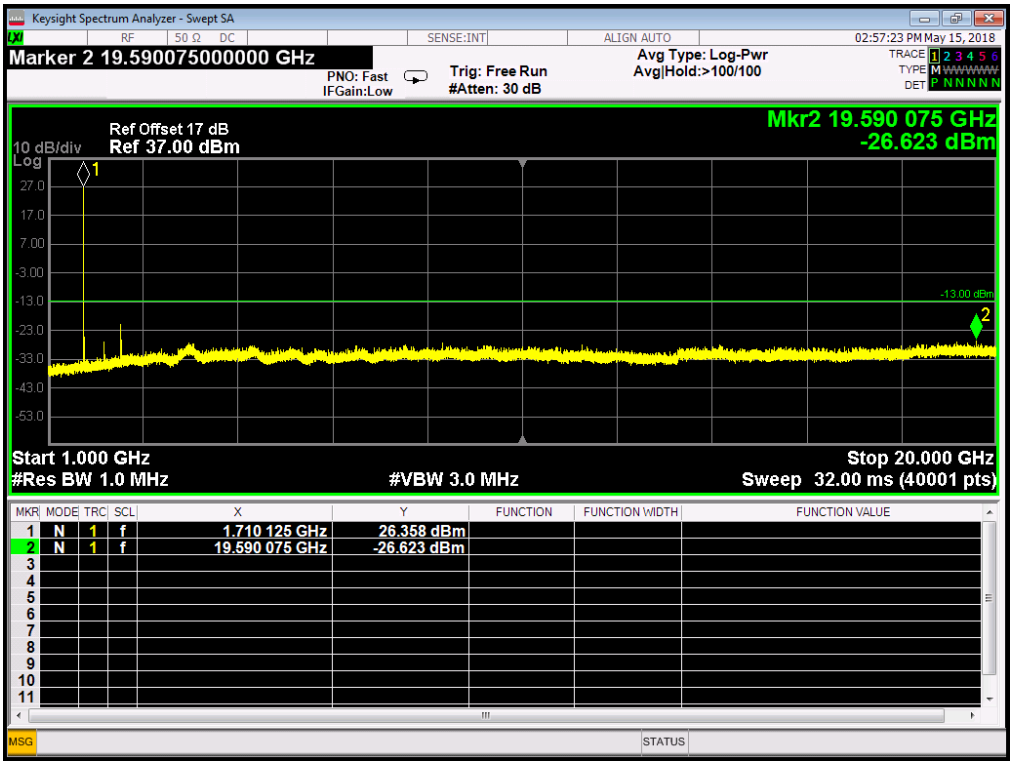


RB Size 1, RB Offset 0 1GHz to 20GHz

Band	LTE Band 4	Channel	Low
Bandwidth	3MHz	Modulation	QPSK

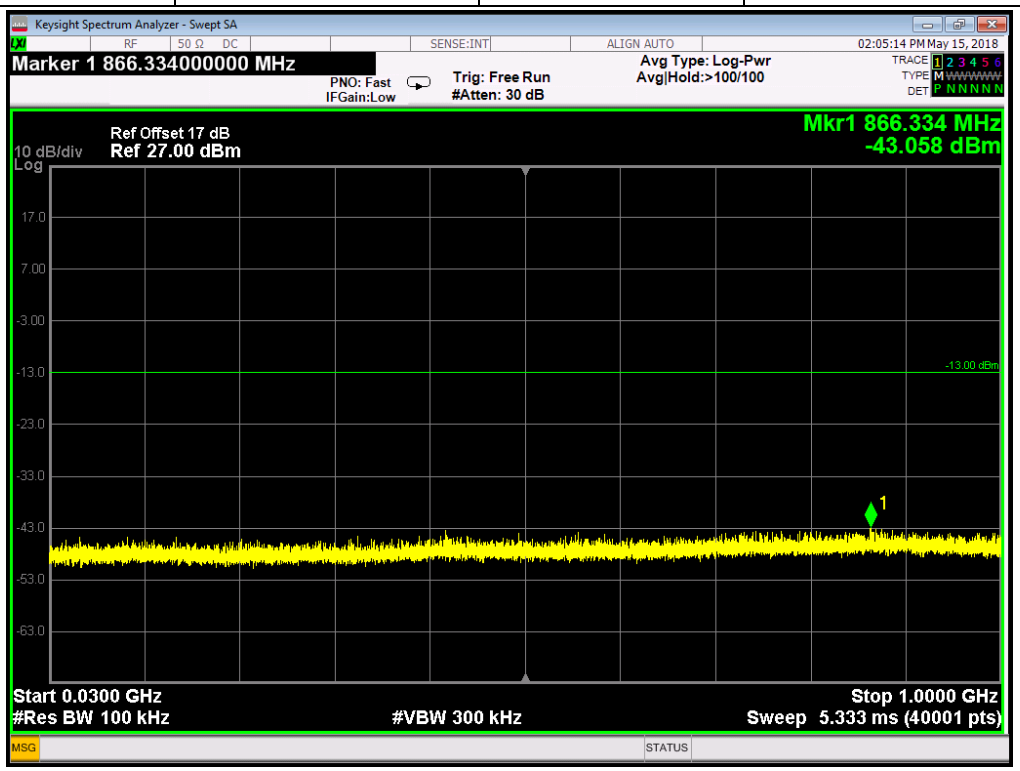


RB Size 1, RB Offset 0 30MHz to 1GHz

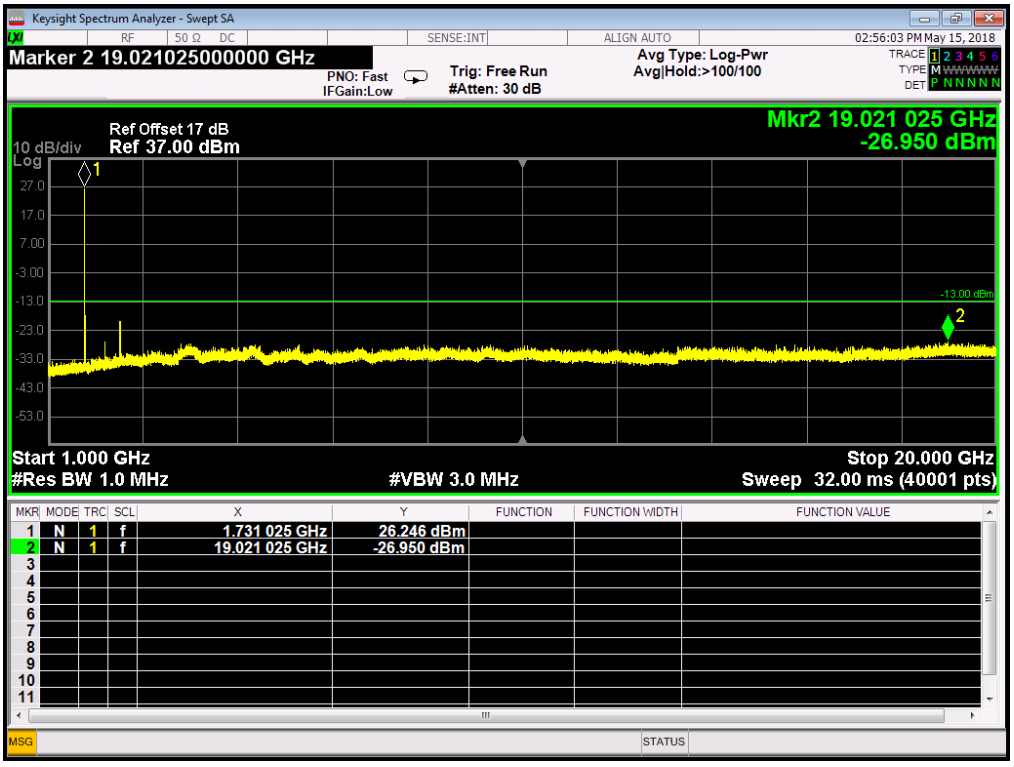


RB Size 1, RB Offset 0 1GHz to 20GHz

Band	LTE Band 4	Channel	Middle
Bandwidth	3MHz	Modulation	QPSK

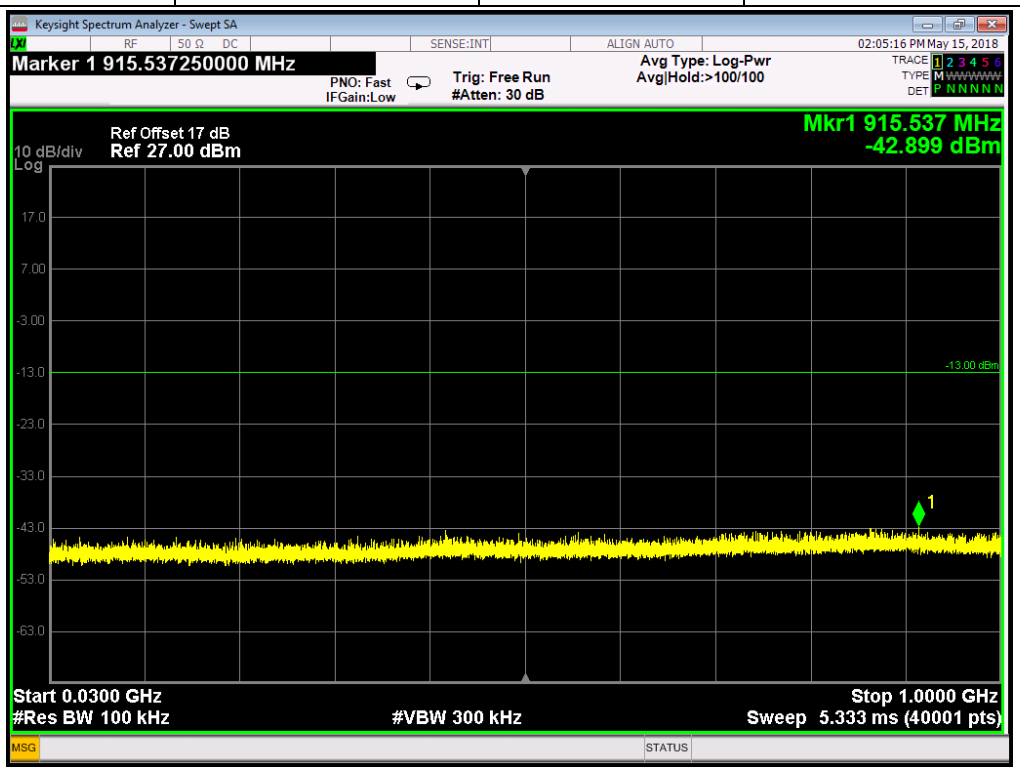


RB Size 1, RB Offset 0 30MHz to 1GHz

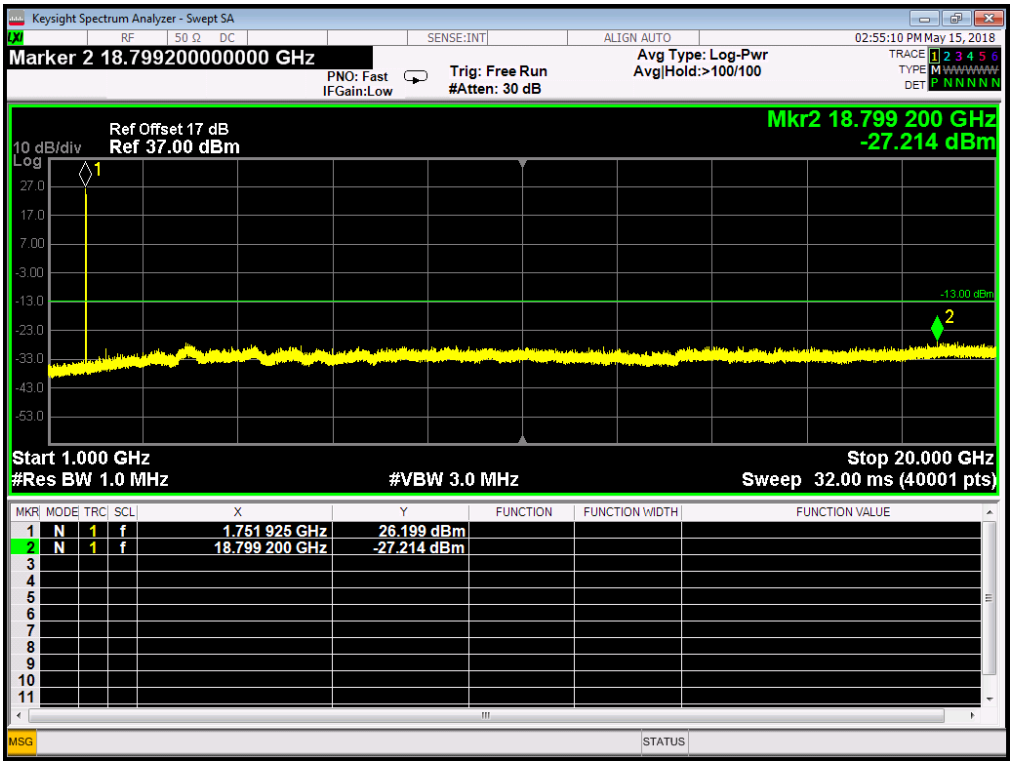


RB Size 1, RB Offset 0 1GHz to 20GHz

Band	LTE Band 4	Channel	High
Bandwidth	3MHz	Modulation	QPSK

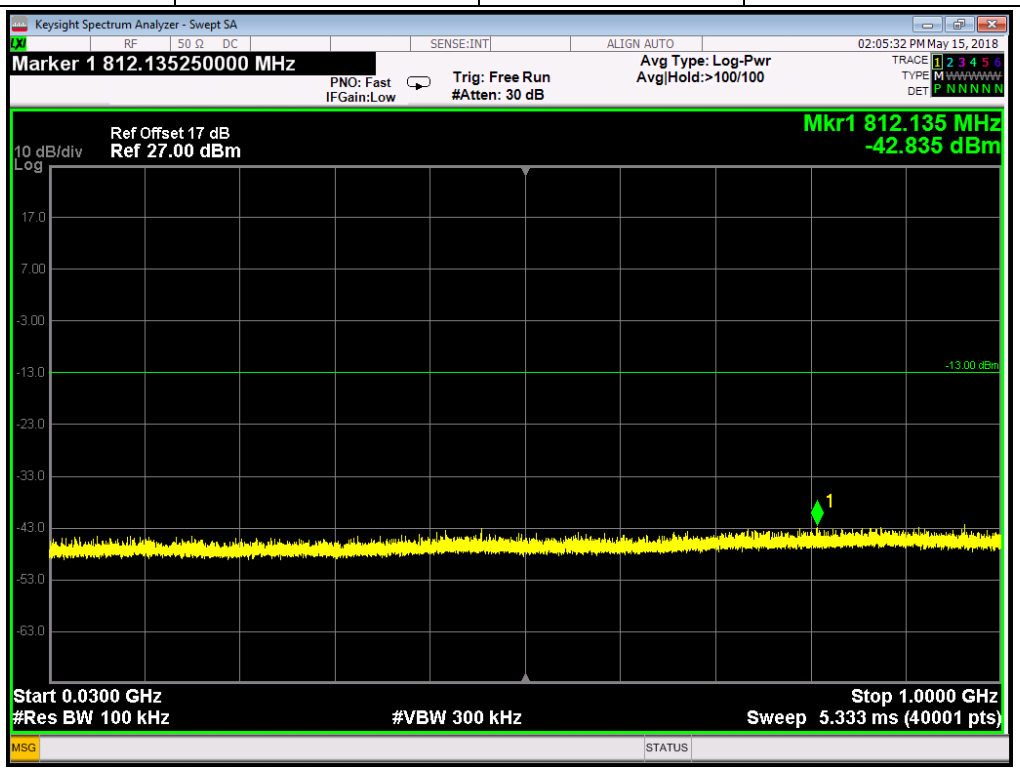


RB Size 1, RB Offset 0 30MHz to 1GHz

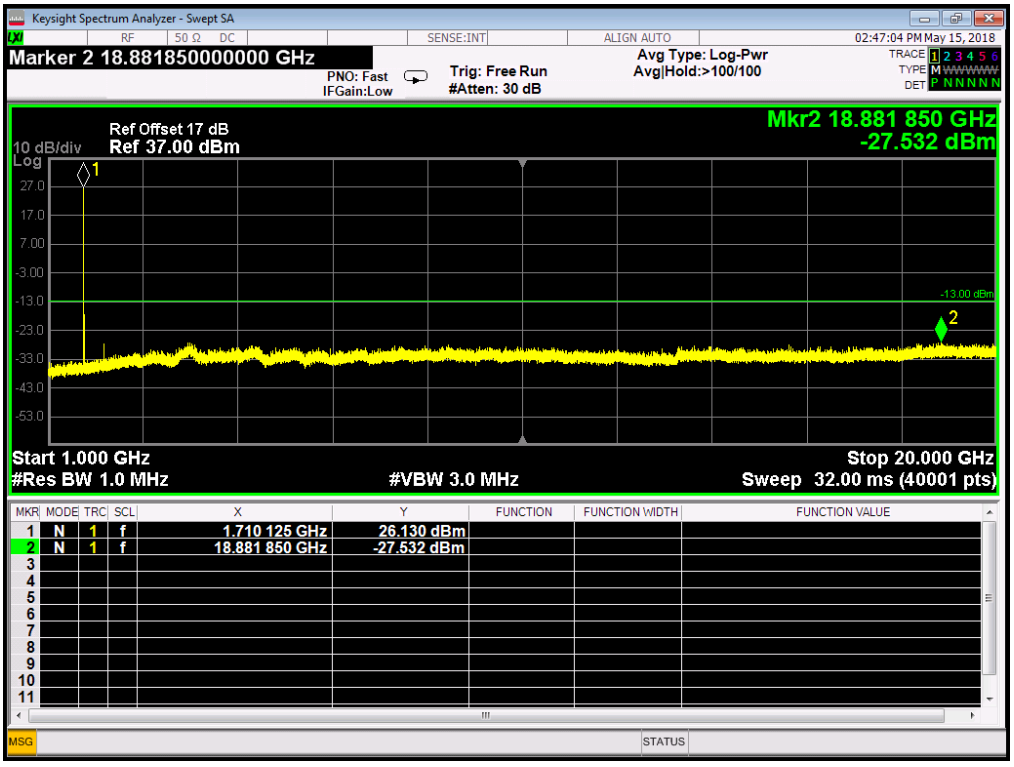


RB Size 1, RB Offset 0 1GHz to 20GHz

Band	LTE Band 4	Channel	Low
Bandwidth	5MHz	Modulation	QPSK

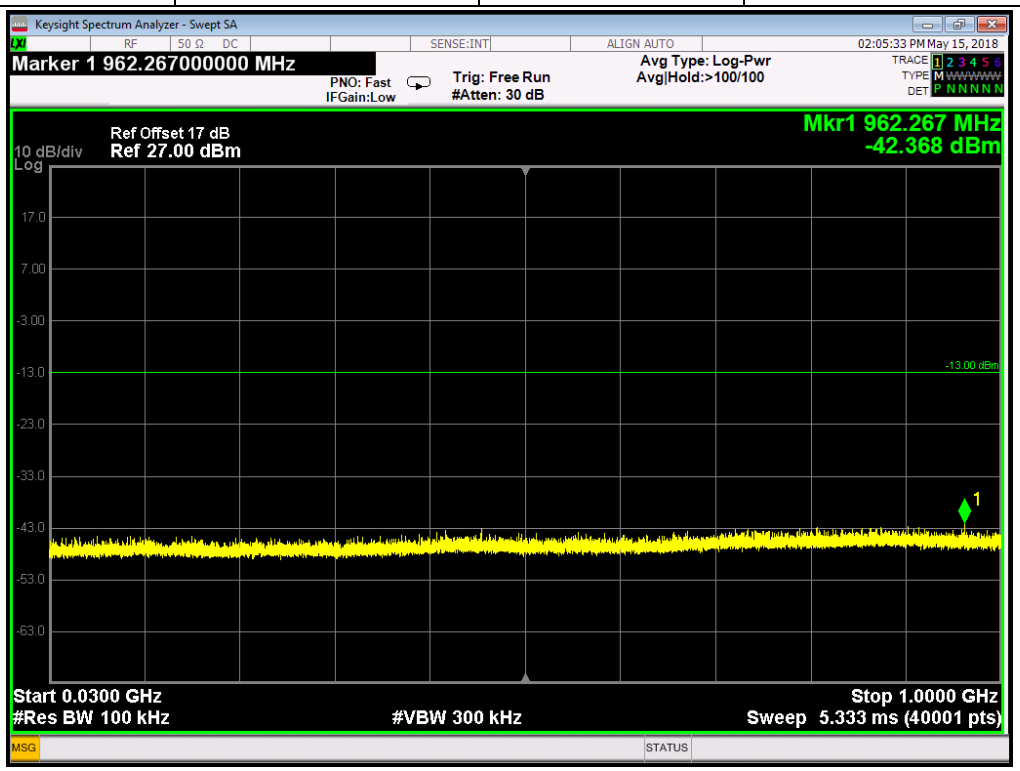


RB Size 1, RB Offset 0 30MHz to 1GHz

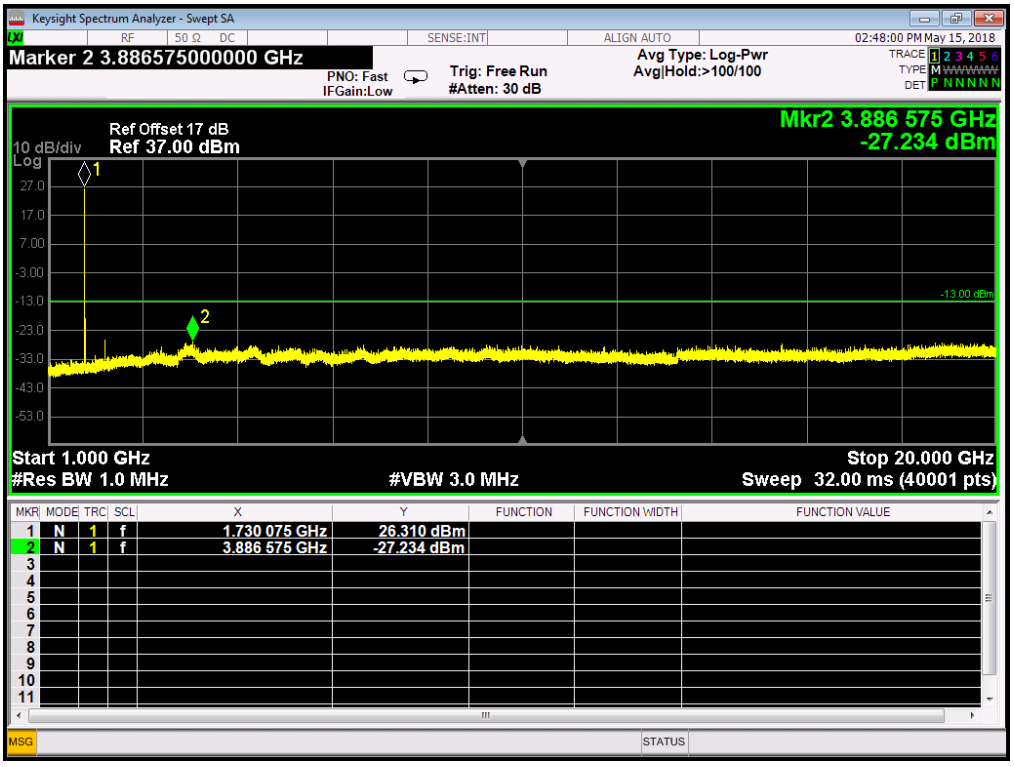


RB Size 1, RB Offset 0 1GHz to 20GHz

Band	LTE Band 4	Channel	Middle
Bandwidth	5MHz	Modulation	QPSK

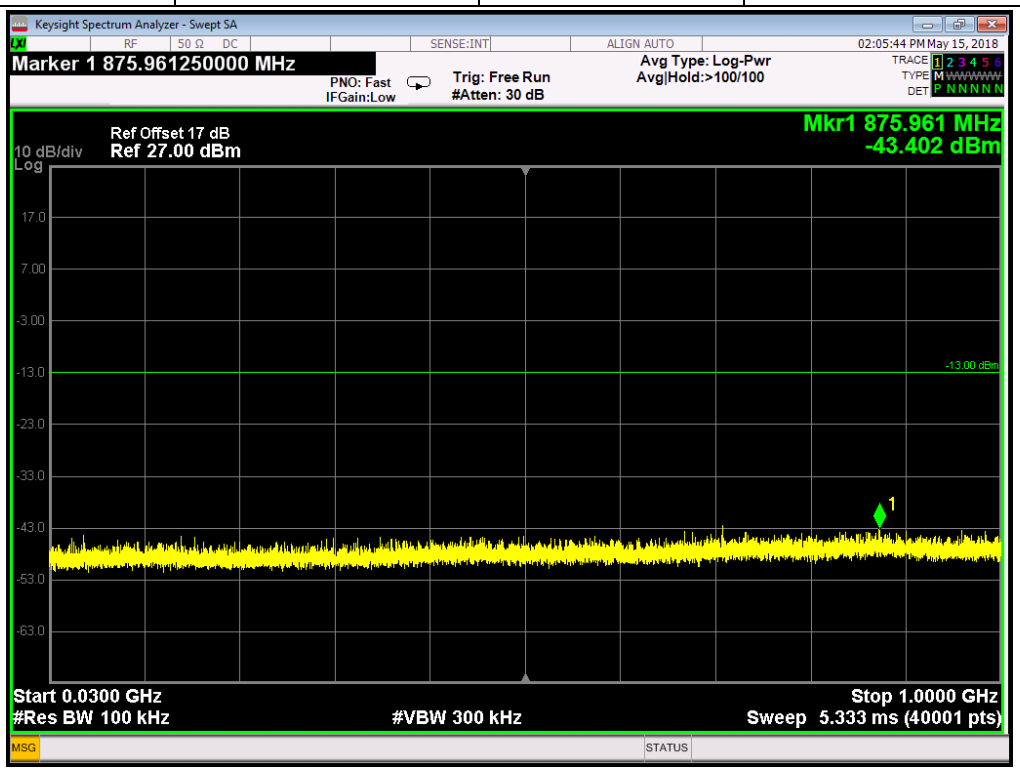


RB Size 1, RB Offset 0 30MHz to 1GHz

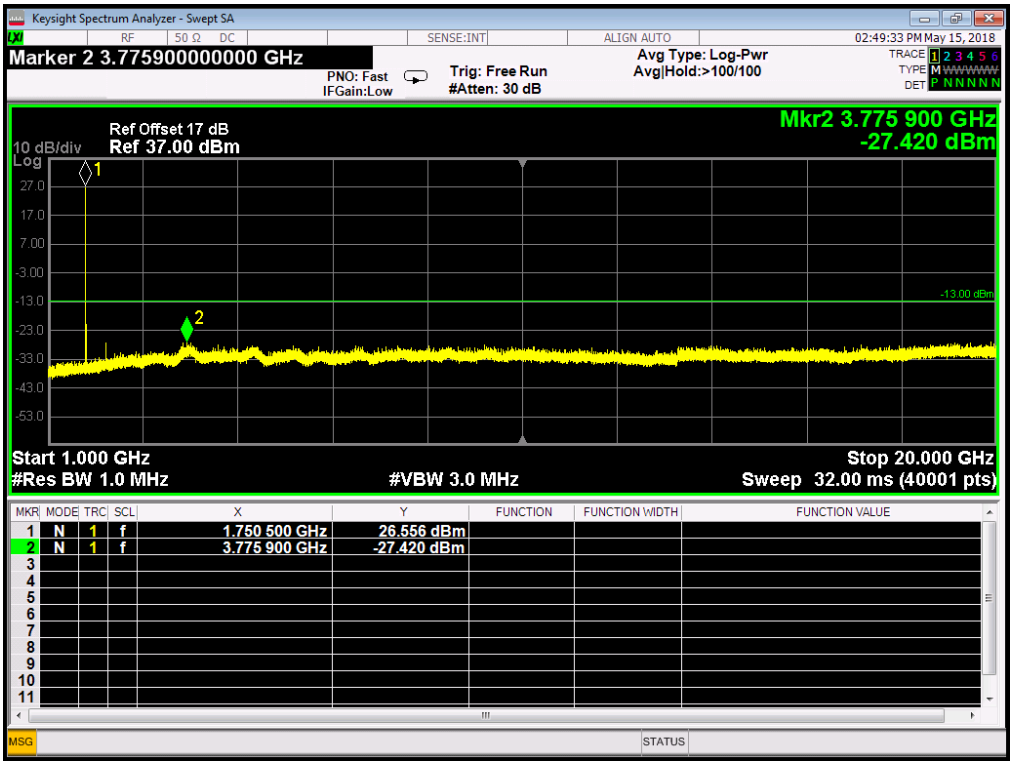


RB Size 1, RB Offset 0 1GHz to 20GHz

Band	LTE Band 4	Channel	High
Bandwidth	5MHz	Modulation	QPSK

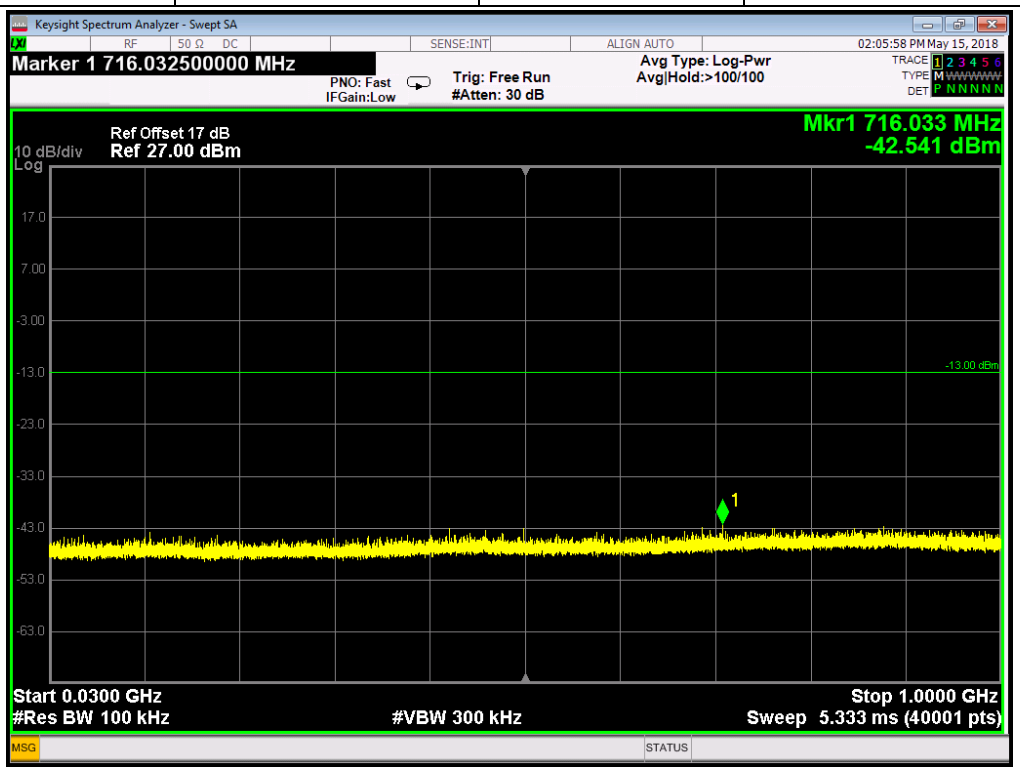


RB Size 1, RB Offset 0 30MHz to 1GHz

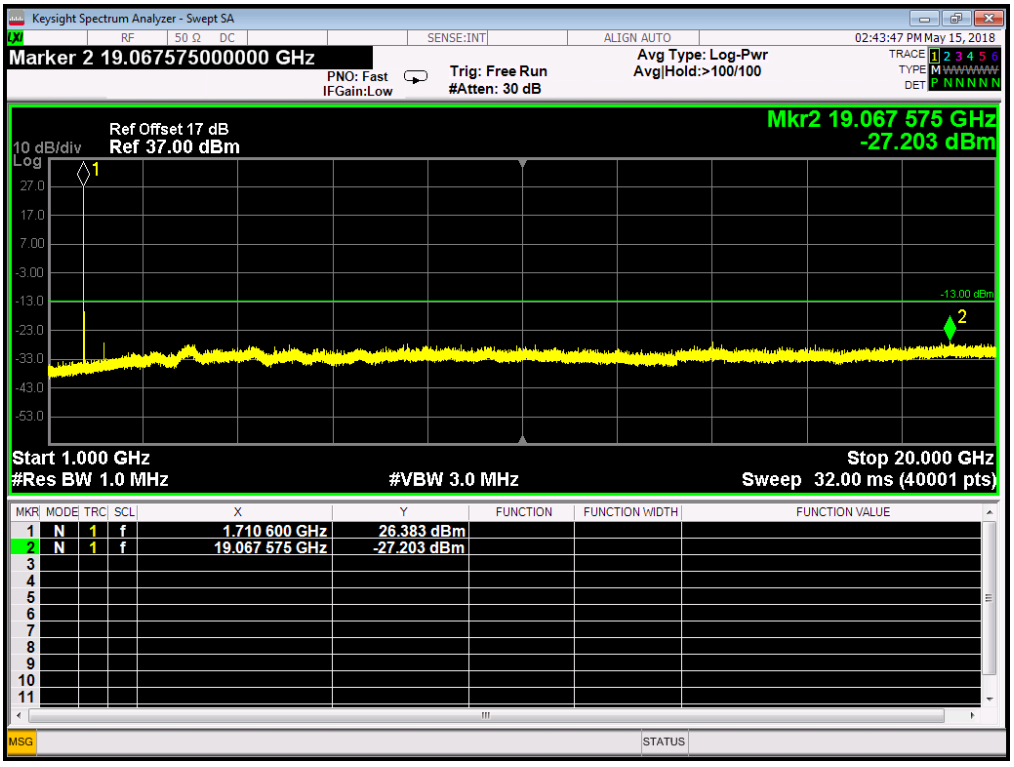


RB Size 1, RB Offset 0 1GHz to 20GHz

Band	LTE Band 4	Channel	Low
Bandwidth	10MHz	Modulation	QPSK

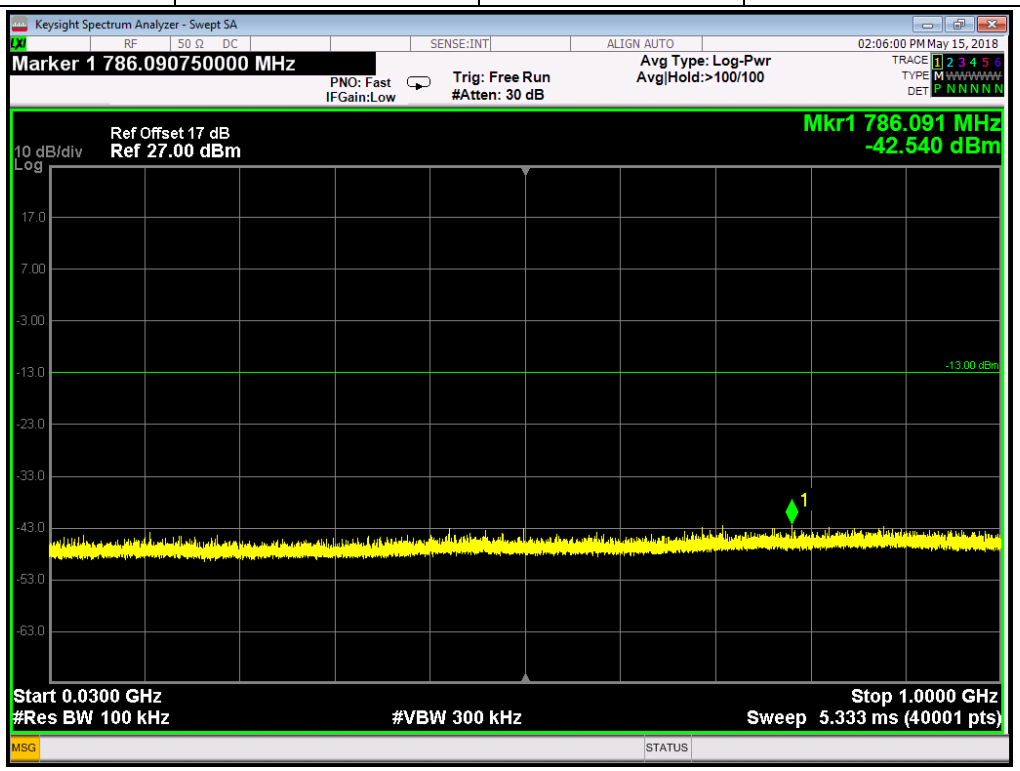


RB Size 1, RB Offset 0 30MHz to 1GHz

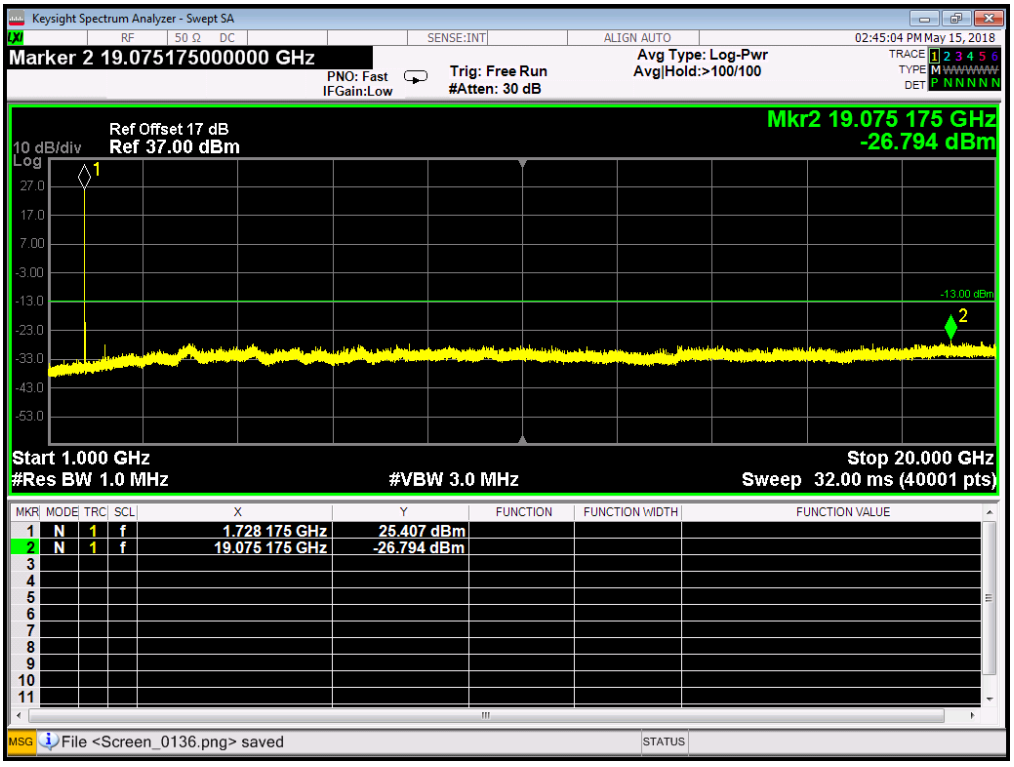


RB Size 1, RB Offset 0 1GHz to 20GHz

Band	LTE Band 4	Channel	Middle
Bandwidth	10MHz	Modulation	QPSK

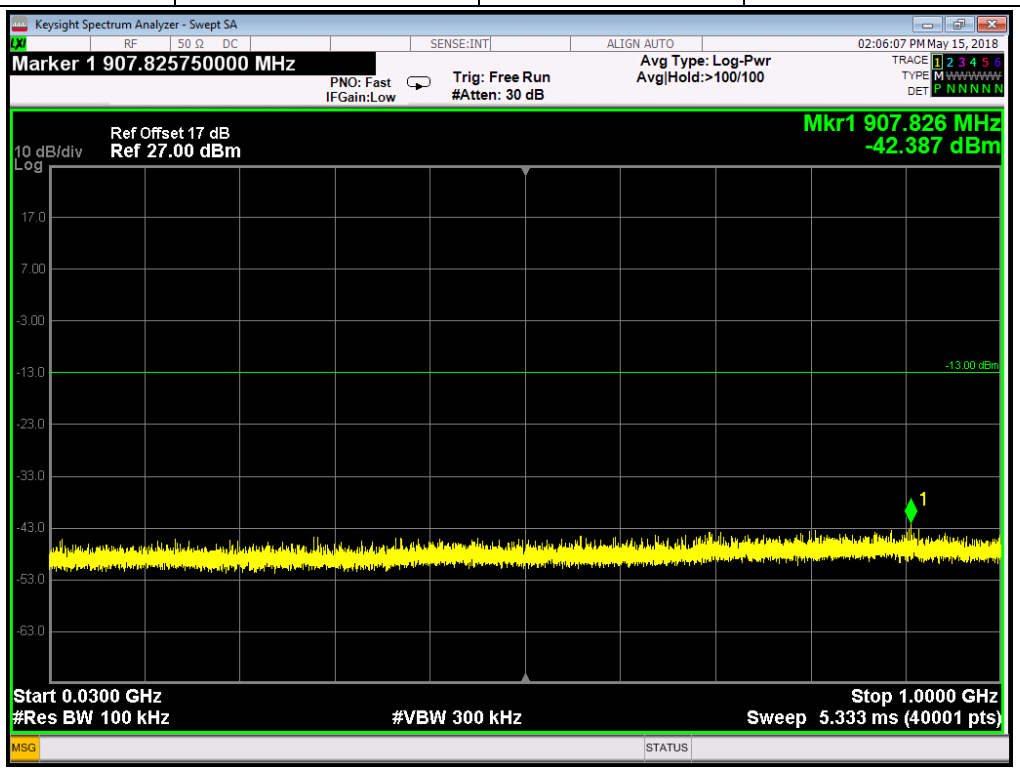


RB Size 1, RB Offset 0 30MHz to 1GHz

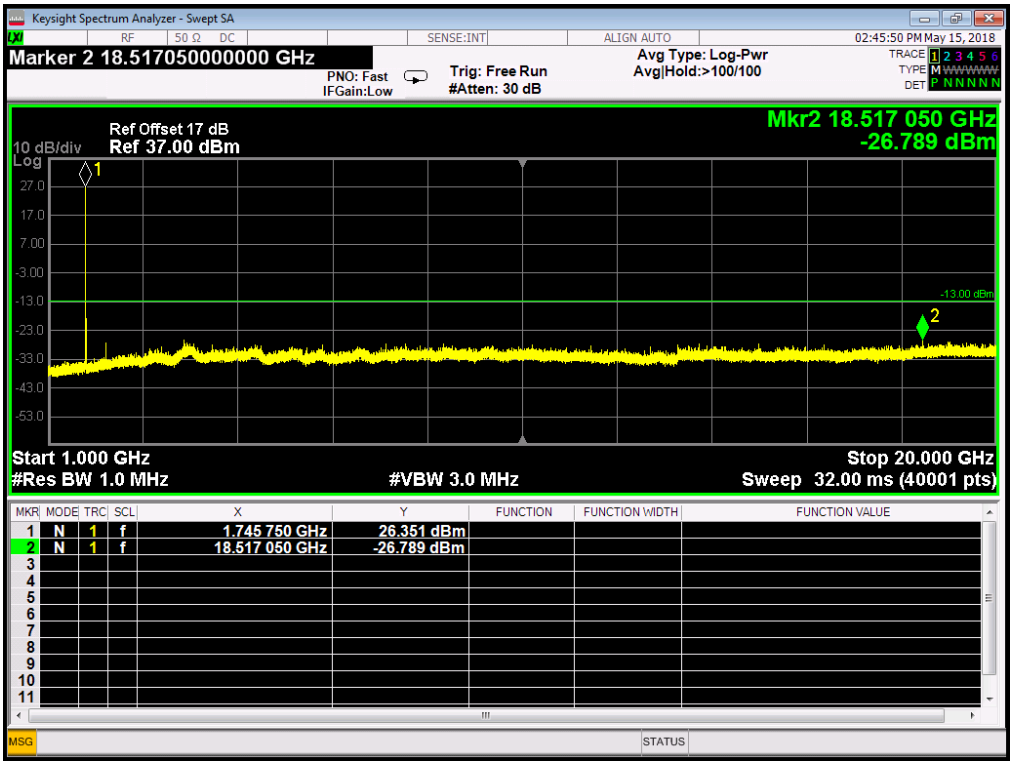


RB Size 1, RB Offset 0 1GHz to 20GHz

Band	LTE Band 4	Channel	High
Bandwidth	10MHz	Modulation	QPSK

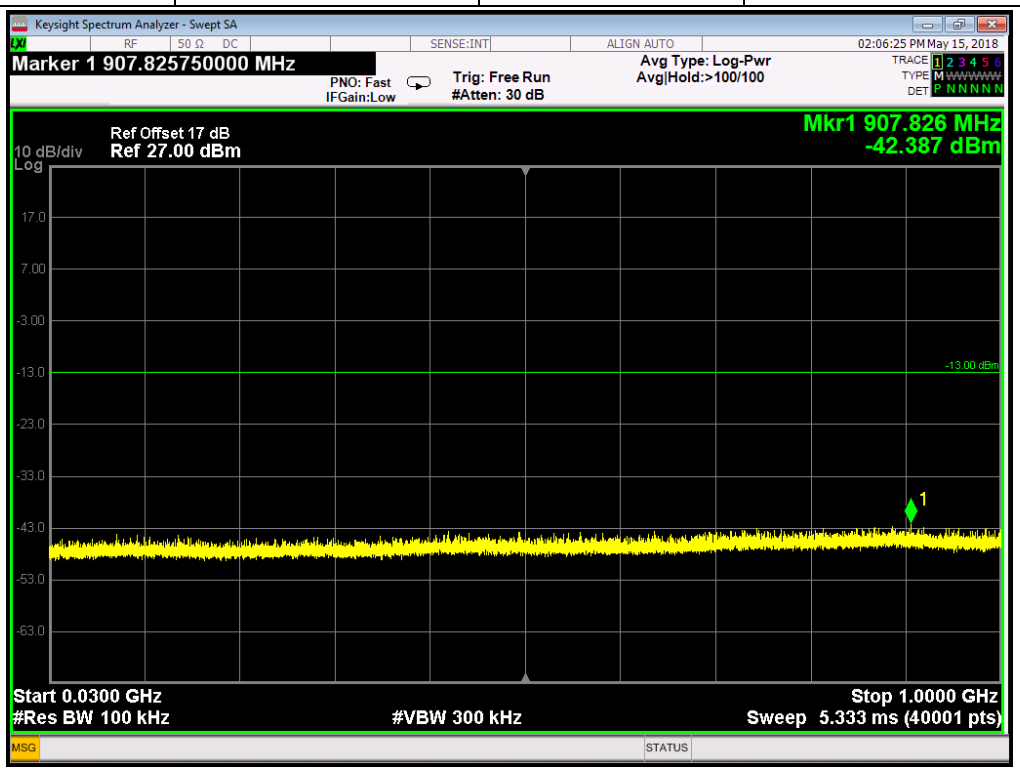


RB Size 1, RB Offset 0 30MHz to 1GHz

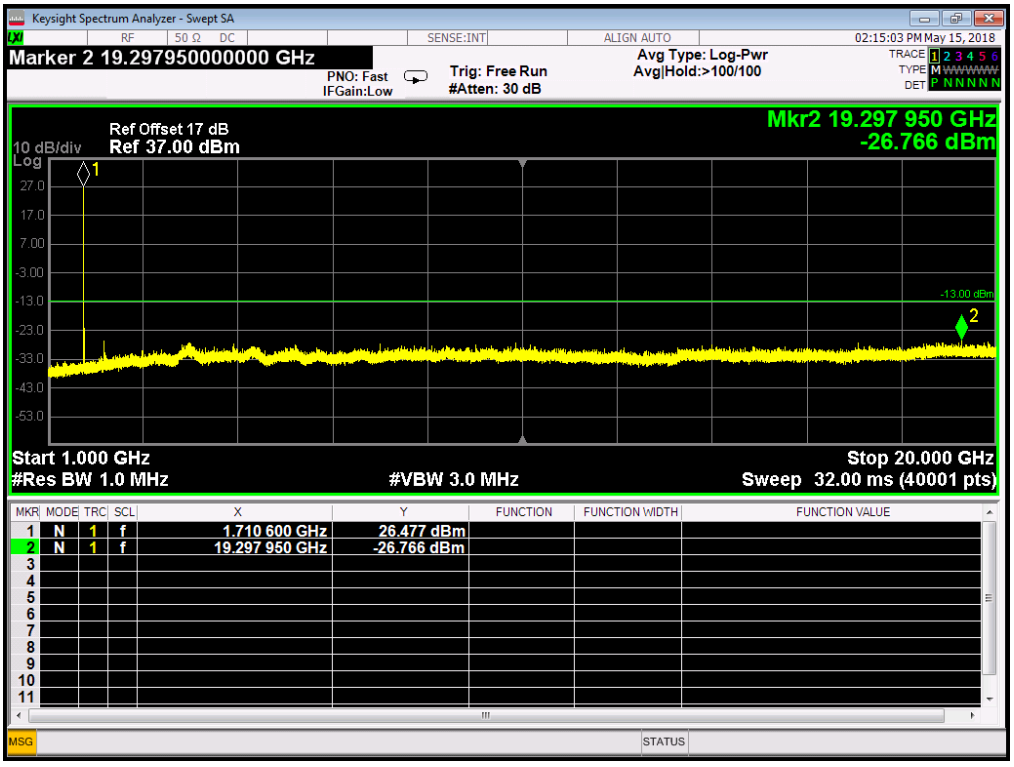


RB Size 1, RB Offset 0 1GHz to 20GHz

Band	LTE Band 4	Channel	Low
Bandwidth	15MHz	Modulation	QPSK

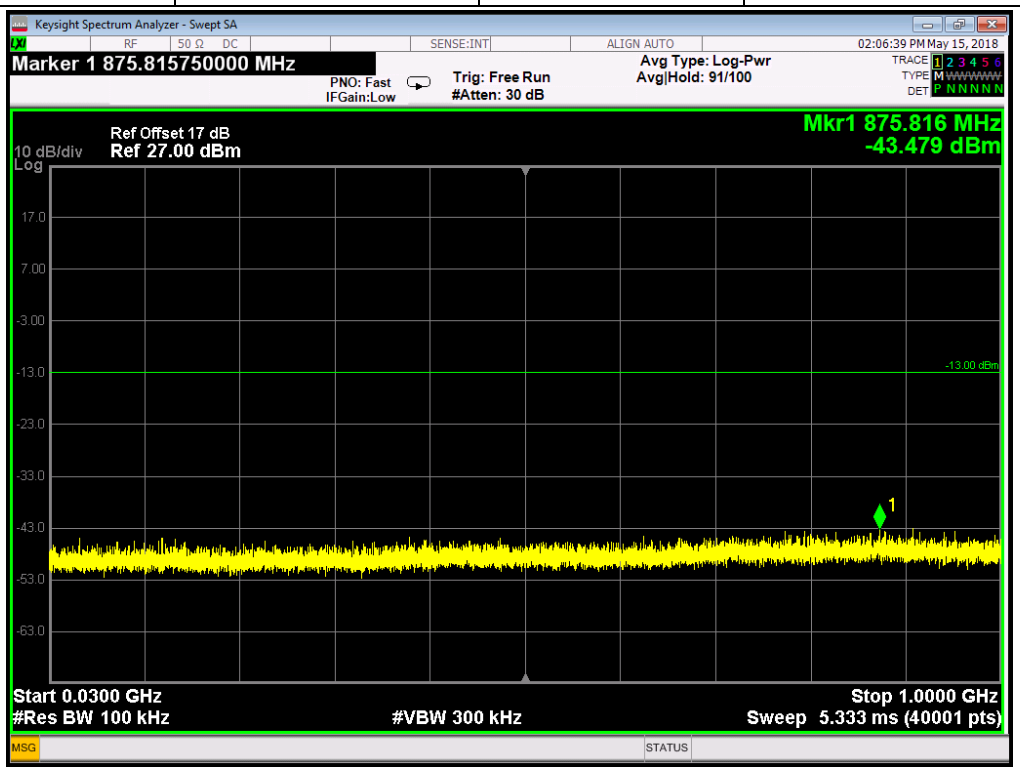


RB Size 1, RB Offset 0 30MHz to 1GHz

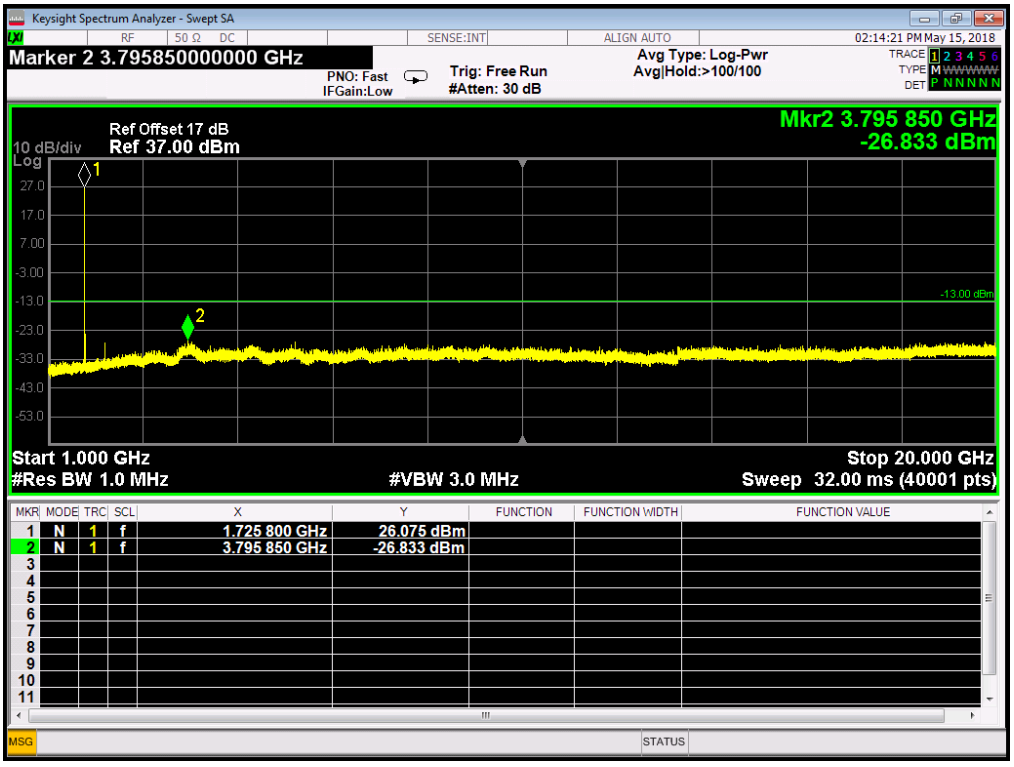


RB Size 1, RB Offset 0 1GHz to 20GHz

Band	LTE Band 4	Channel	Middle
Bandwidth	15MHz	Modulation	QPSK

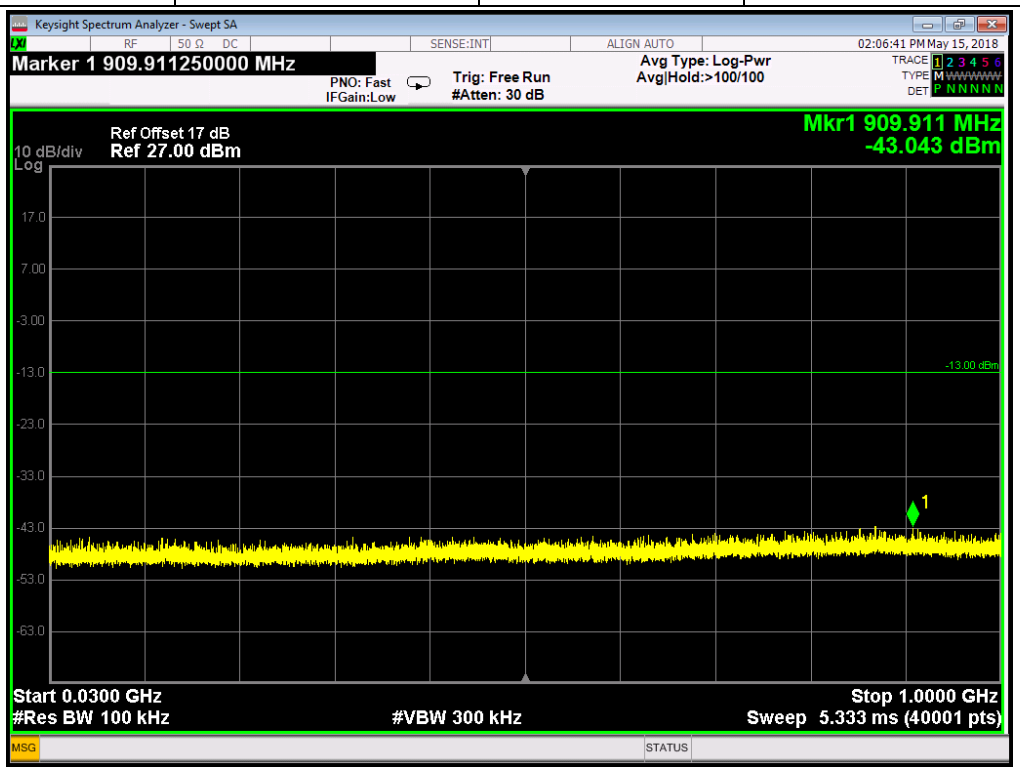


RB Size 1, RB Offset 0 30MHz to 1GHz

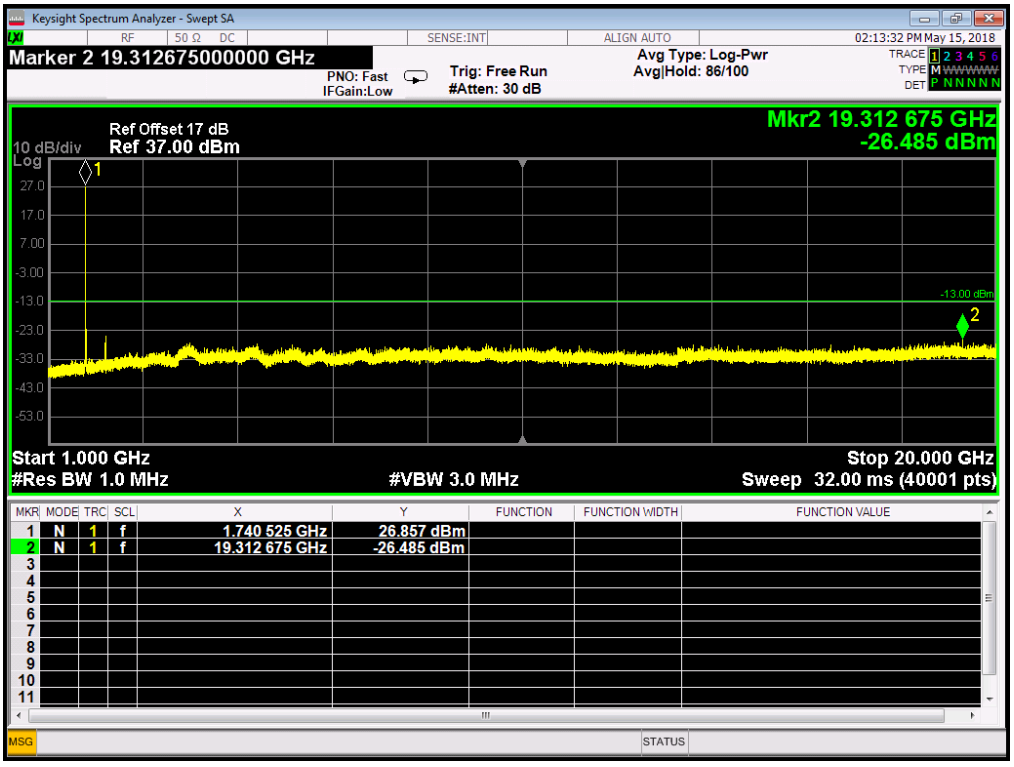


RB Size 1, RB Offset 0 1GHz to 20GHz

Band	LTE Band 4	Channel	High
Bandwidth	15MHz	Modulation	QPSK

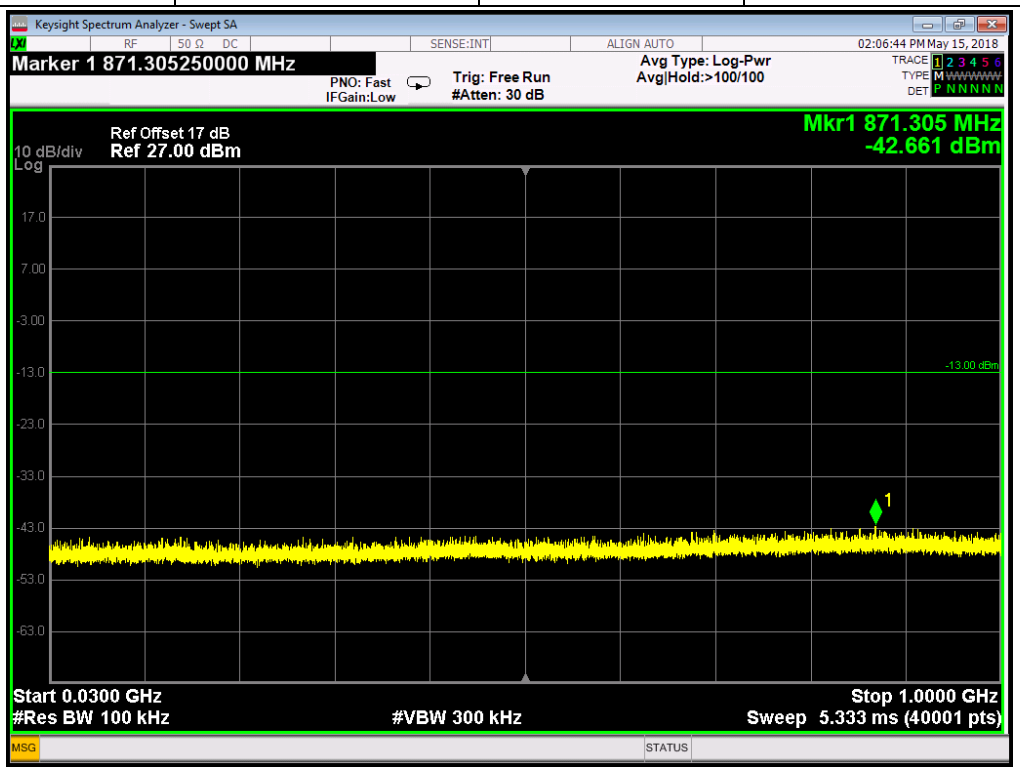


RB Size 1, RB Offset 0 30MHz to 1GHz

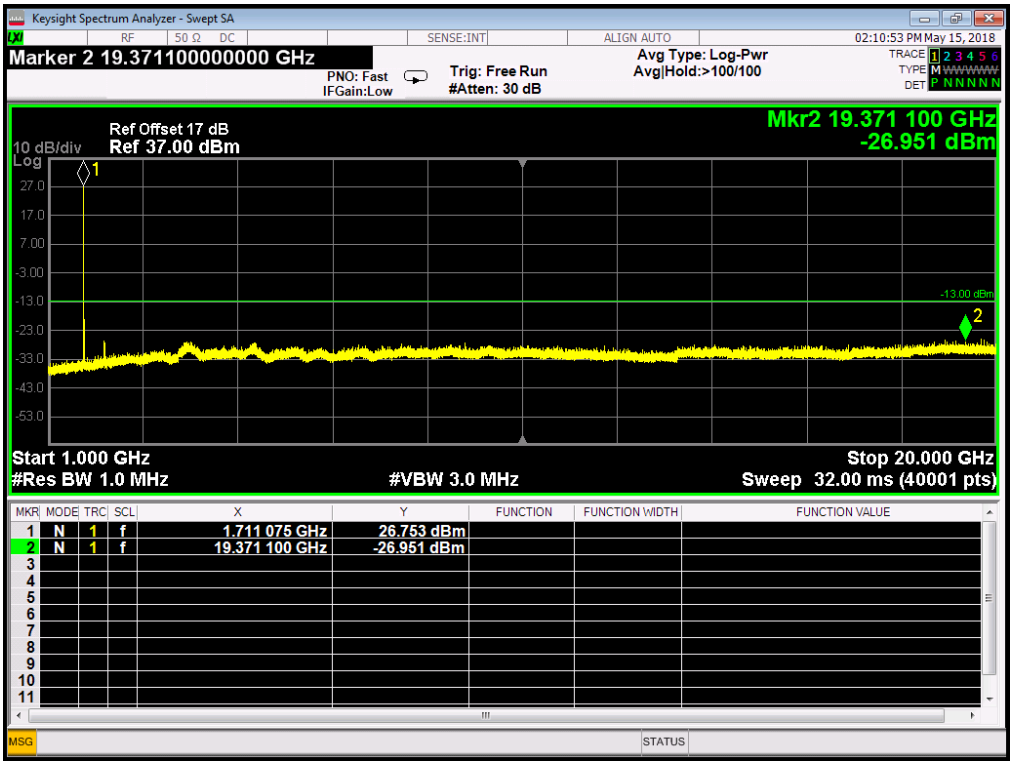


RB Size 1, RB Offset 0 1GHz to 20GHz

Band	LTE Band 4	Channel	Low
Bandwidth	20MHz	Modulation	QPSK

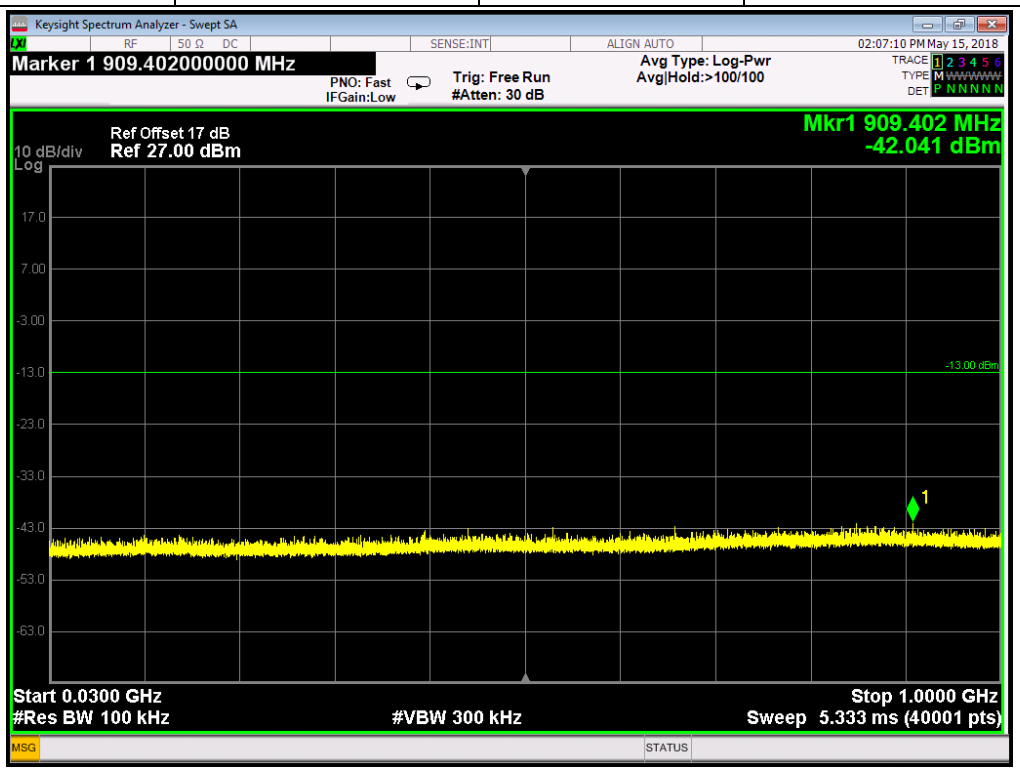


RB Size 1, RB Offset 0 30MHz to 1GHz

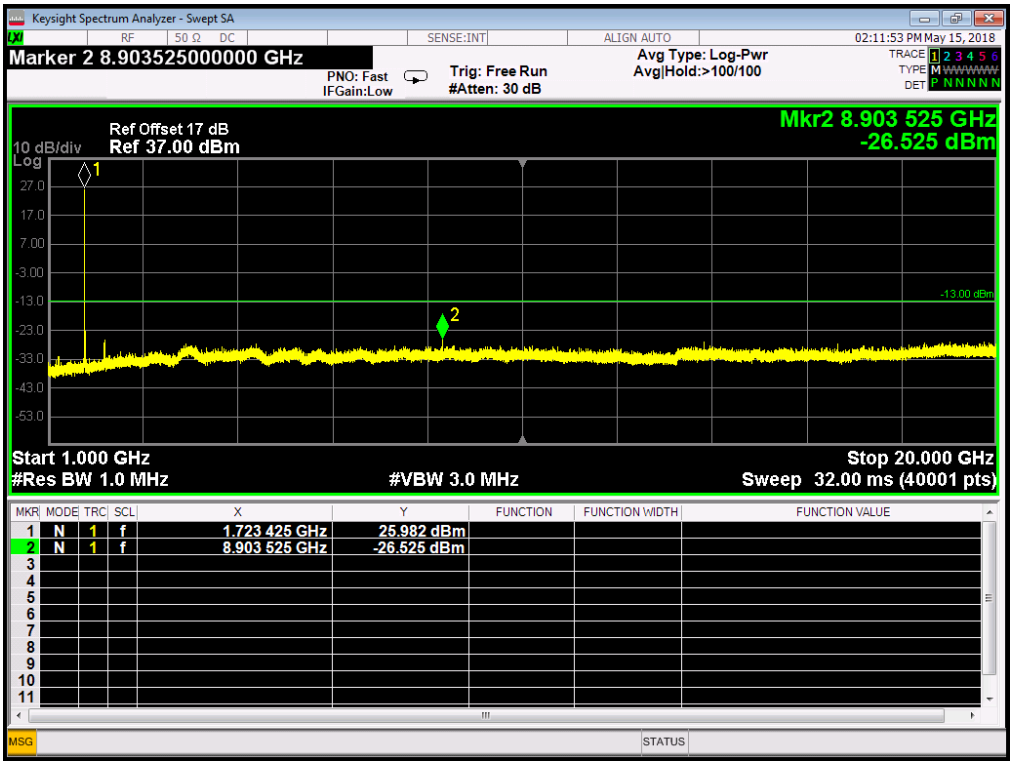


RB Size 1, RB Offset 0 1GHz to 20GHz

Band	LTE Band 4	Channel	Middle
Bandwidth	20MHz	Modulation	QPSK

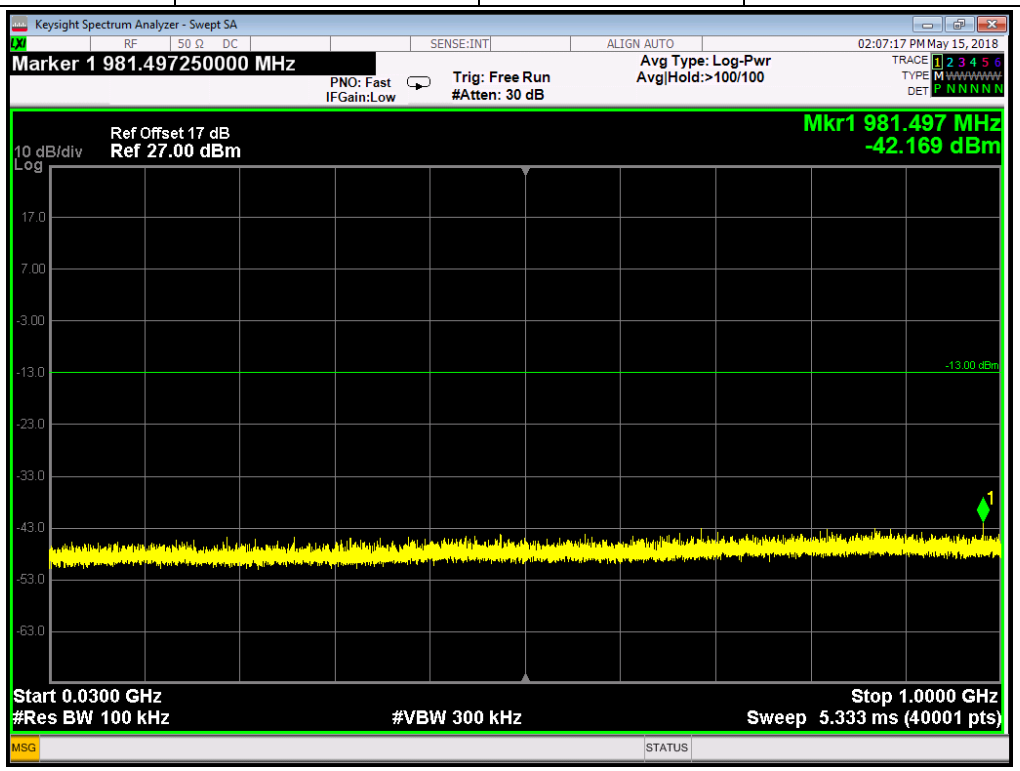


RB Size 1, RB Offset 0 30MHz to 1GHz

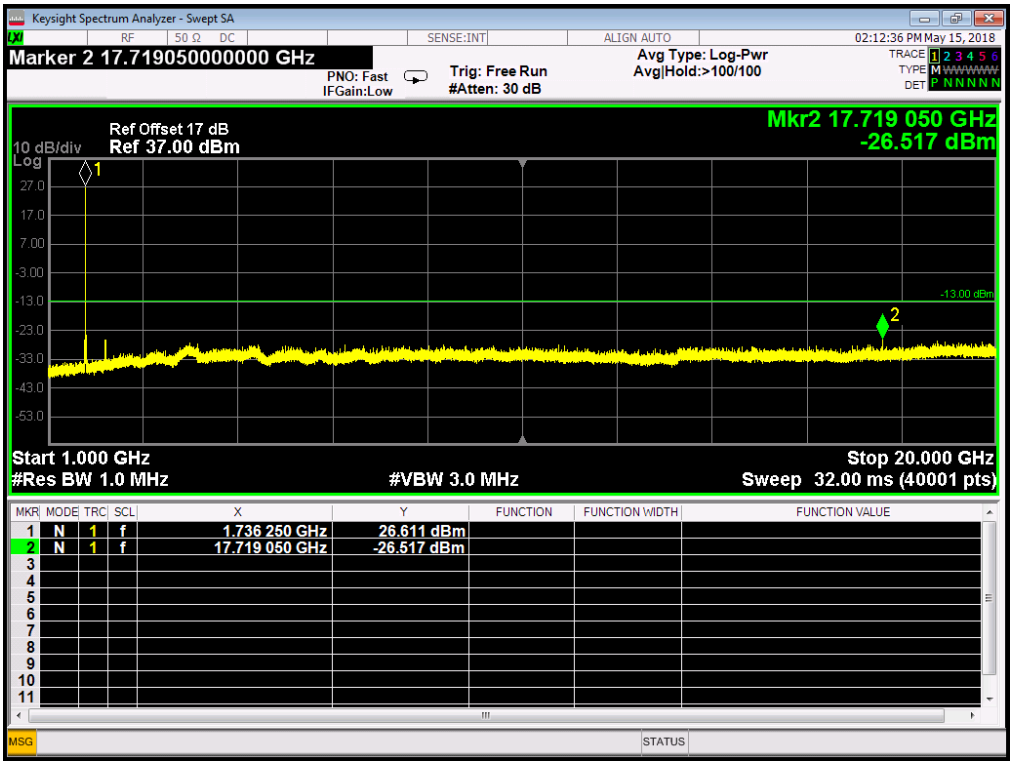


RB Size 1, RB Offset 0 1GHz to 20GHz

Band	LTE Band 5	Channel	Low
Bandwidth	1.4MHz	Modulation	QPSK

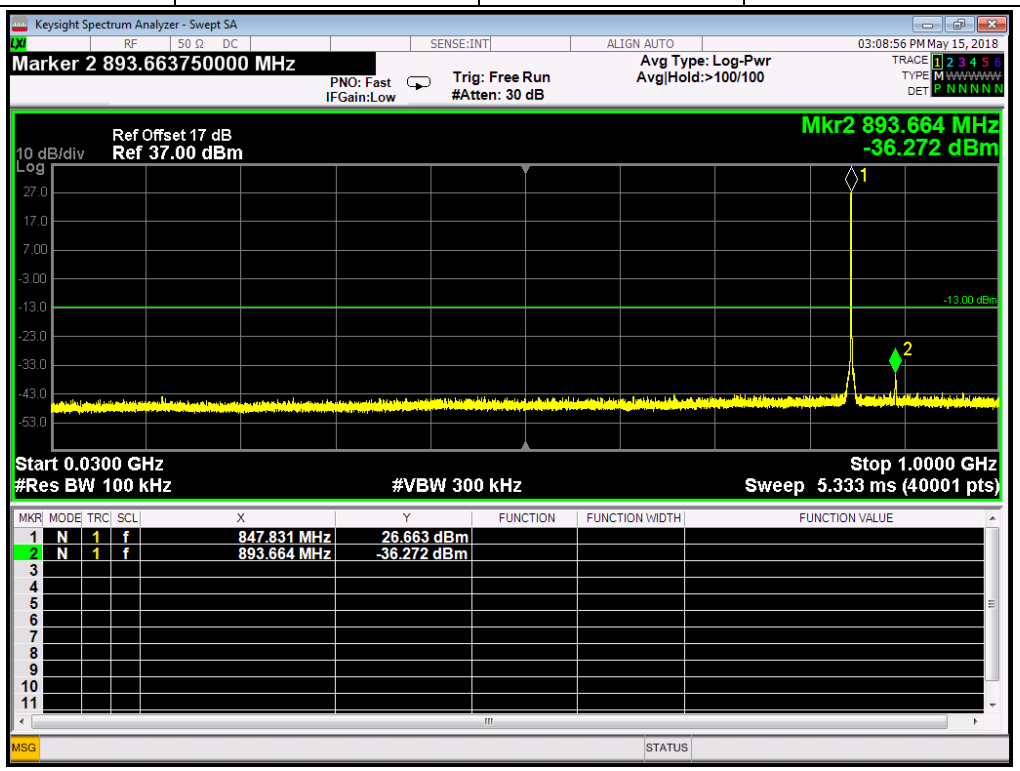


RB Size 1, RB Offset 0 30MHz to 1GHz

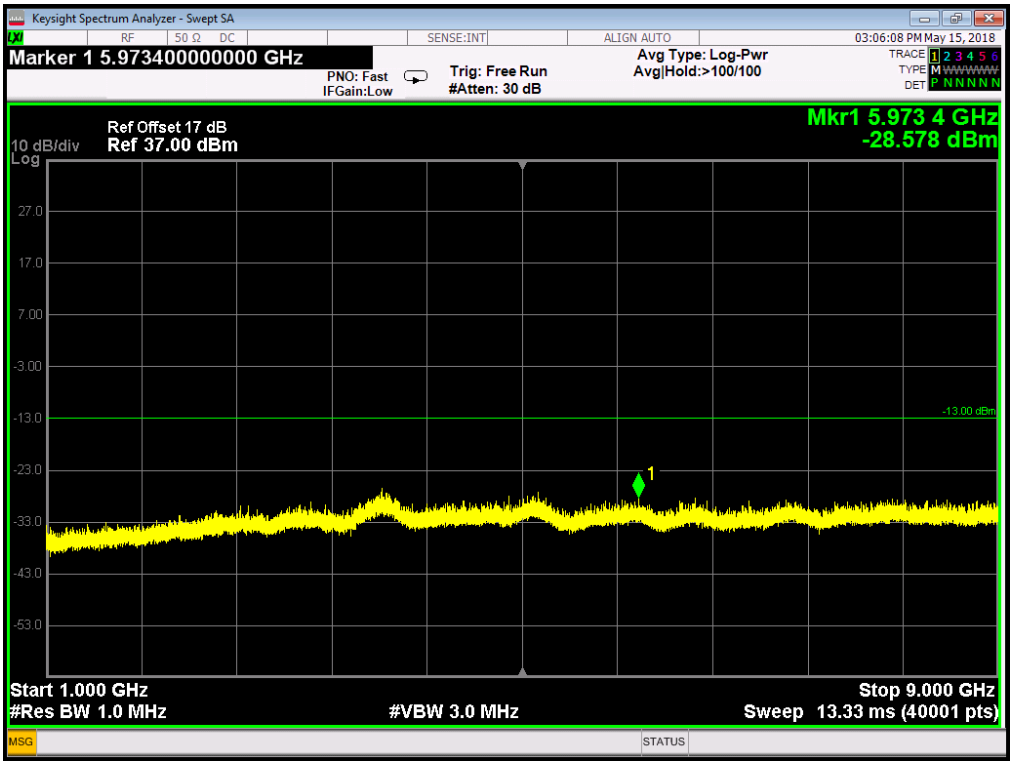


RB Size 1, RB Offset 0 1GHz to 9GHz

Band	LTE Band 5	Channel:	Middle
Bandwidth	1.4MHz	Modulation	QPSK

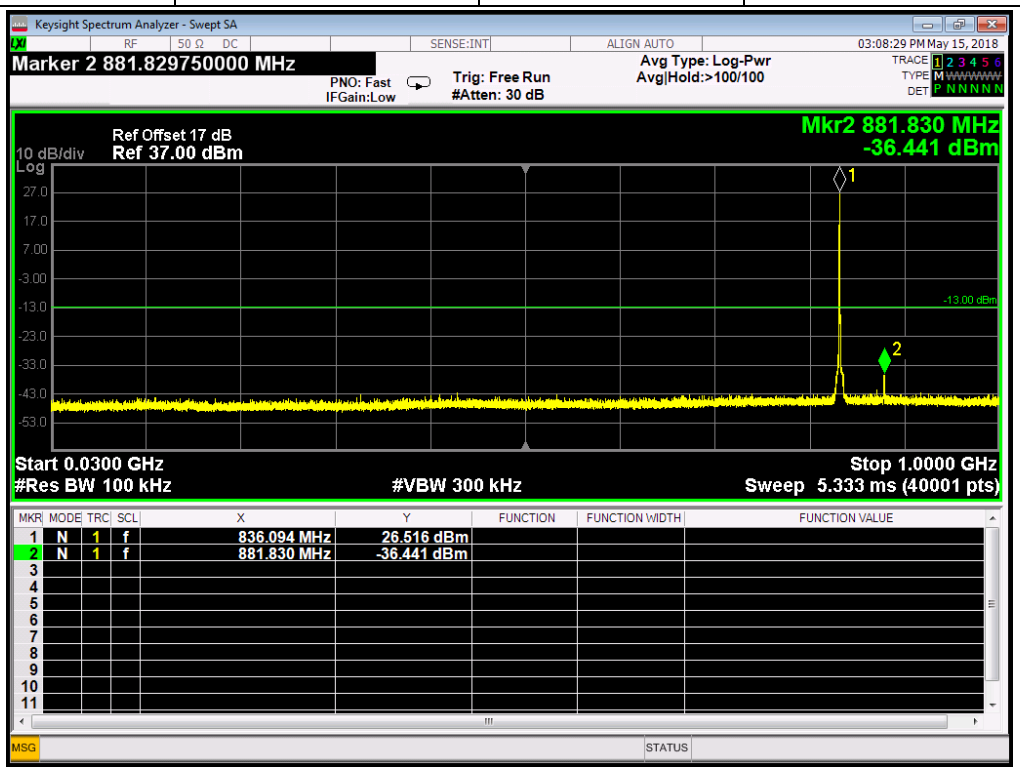


RB Size 1, RB Offset 0 30MHz to 1GHz

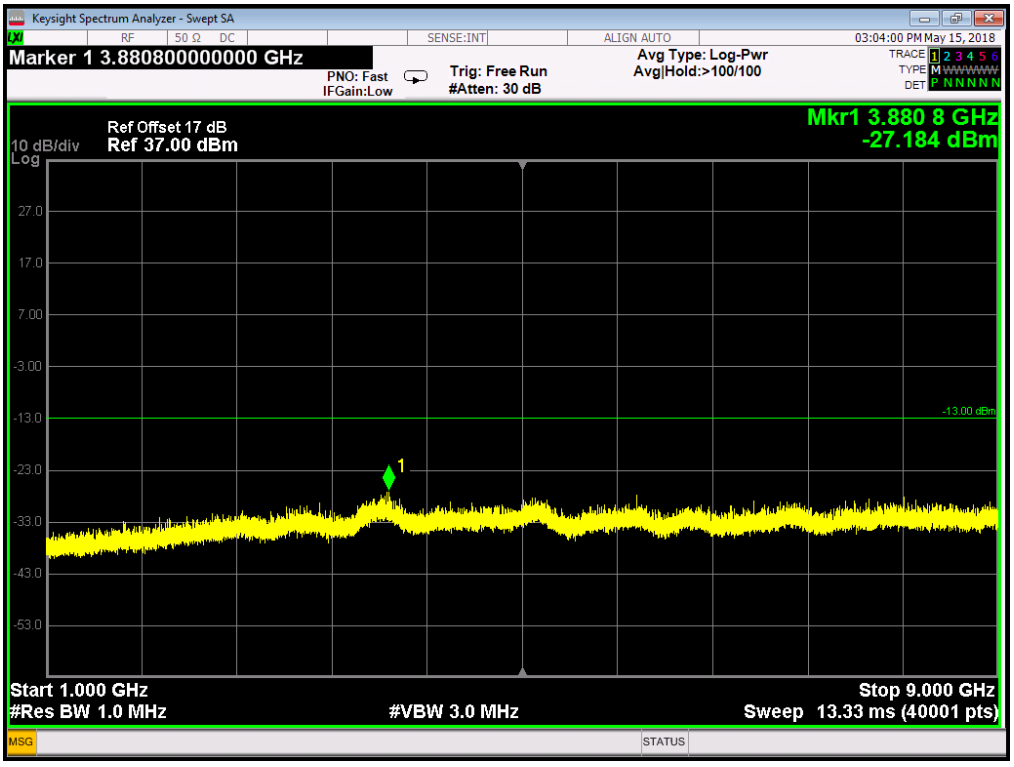


RB Size 1, RB Offset 0 1GHz to 9GHz

Band	LTE Band 5	Channel:	High
Bandwidth	1.4MHz	Modulation	QPSK



RB Size 1, RB Offset 0 30MHz to 1GHz



RB Size 1, RB Offset 0 1GHz to 9GHz