



CERTIFICATION TEST REPORT

Report Number. : 4789793179-E2V2

Applicant : SAMSUNG ELECTRONICS CO., LTD.
129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI,
GYEONGGI-DO, 16677, KOREA

Model : SM-A125U, SM-A125U1/DS, SM-S127DL

FCC ID : A3LSMA125U

EUT Description : GSM/CDMA/WCDMA/LTE Phone + BT/BLE, DTS/UNII a/b/g/n/ac and
NFC

Test Standard(s) : FCC CFR47 PART 22 SUBPART H
FCC CFR47 PART 24 SUBPART E
FCC CFR47 PART 27 SUBPART D,F,H,L,M,N
FCC CFR47 PART 90 SUBPART R,S

Date Of Issue:

March 08, 2021

Prepared by:

UL Korea, Ltd.

26th floor, 152, Teheran-ro, Gangnam-gu Seoul, 06236, Korea

Suwon Test Site: UL Korea, Ltd. Suwon Laboratory

218 Maeyeong-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16675, Korea

TEL: (031) 337-9902

FAX: (031) 213-5433



Testing Laboratory

TL-637

Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	03/02/21	Initial issue	Sungeun Lee
V2	03/08/21	Updated to address TCB's question	Sungeun Lee

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS	4
2. TEST METHODOLOGY	5
3. FACILITIES AND ACCREDITATION	5
4. CALIBRATION AND UNCERTAINTY	6
4.1. <i>MEASURING INSTRUMENT CALIBRATION.....</i>	6
4.2. <i>SAMPLE CALCULATION.....</i>	6
4.3. <i>MEASUREMENT UNCERTAINTY</i>	6
4.4. <i>DECISION RULE</i>	6
5. EQUIPMENT UNDER TEST	7
5.1. <i>DESCRIPTION OF EUT.....</i>	7
5.2. <i>MAXIMUM OUTPUT POWER.....</i>	7
5.3. <i>DESCRIPTION OF AVAILABLE ANTENNAS</i>	17
5.4. <i>WORST-CASE ORIENTATION.....</i>	18
5.5. <i>DESCRIPTION OF TEST SETUP</i>	20
6. TEST AND MEASUREMENT EQUIPMENT	22
7. SUMMARY TABLE.....	23
8. PEAK TO AVERAGE RATIO	24
8.1. <i>CONDUCTED PEAK TO AVERAGE RESULT</i>	25
9. LIMITS AND CONDUCTED RESULTS	46
9.1. <i>OCCUPIED BANDWIDTH.....</i>	46
9.1.1. <i>OCCUPIED BANDWIDTH RESULTS</i>	51
9.2. <i>BAND EDGE EMISSIONS</i>	72
9.2.1. <i>BAND EDGE RESULT.....</i>	76
9.2.2. <i>EMISSION MASK RESULT</i>	114
9.3. <i>OUT OF BAND EMISSIONS.....</i>	151
9.3.1. <i>OUT OF BAND EMISSIONS RESULT.....</i>	154
9.4. <i>FREQUENCY STABILITY.....</i>	174
9.4.1. <i>FREQUENCY STABILITY RESULTS</i>	175
9.5. <i>RADIATED POWER (ERP & EIRP)</i>	185
9.5.1. <i>ERP/EIRP Results.....</i>	187
9.5.2. <i>ERP/EIRP DATA</i>	199
9.6. <i>FIELD STRENGTH OF SPURIOUS RADIATION.....</i>	251
9.6.1. <i>SPURIOUS RADIATION PLOTS</i>	253

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.

EUT DESCRIPTION: GSM/CDMA/WCDMA/LTE Phone + BT/BLE, DTS/UNII a/b/g/n/ac and NFC

MODEL NUMBER: SM-A125U, SM-A125U1/DS, SM-S127DL

SERIAL NUMBER: 4200624edca2a7ff, R38R2005BEE, 35034448014882 (CONDUCTED);
4200d129cc2bb75f, 4200ca62d0bbb769, 4200cca6d0e2b7a1 (RADIATED)

DATE TESTED: JAN 18, 2021 – MAR 08, 2021;

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 22H, 24E, 27 D,F,H,L,M,N, 90R,S	Pass

UL Korea, Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Korea, Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Korea, Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Korea, Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by IAS, any agency of the Federal Government, or any agency of any government.

Approved & Released For
UL Korea, Ltd. By:



Junwhan Lee
Suwon Lab Engineer
UL Korea, Ltd.

Tested By:



Sungeun Lee
Suwon Lab Engineer
UL Korea, Ltd.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with following methods.

1. FCC CFR 47 Part 2.
2. FCC CFR 47 Part 22.
3. FCC CFR 47 Part 24.
4. FCC CFR 47 Part 27.
5. FCC CFR 47 Part 90.
6. ANSI TIA-603-E, 2016
7. ANSI C63.26, 2015
8. KDB 971168 D01 Power Meas License Digital Systems v03r01
9. KDB 412172 D01 Determining ERP and EIRP v01r01

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea. Line conducted emissions are measured only at the 218 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

218 Maeyeong-ro	
<input checked="" type="checkbox"/>	Chamber 1
<input checked="" type="checkbox"/>	Chamber 2
<input type="checkbox"/>	Chamber 3

UL Korea, Ltd. is accredited by IAS, Laboratory Code TL-637. The full scope of accreditation can be viewed at <https://www.iasonline.org/wp-content/uploads/2017/05/TL-637-cert-New.pdf>.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

$EIRP = \text{PSA reading with EUT worst orientation (dBm)} + \text{Path loss (dB)} - \text{cable loss (between the SG and substitution antenna)} + \text{Substitution Antenna Factor (dBi)}$

$ERP = \text{PSA reading with EUT worst orientation (dBm)} + \text{Path loss (dB)} - \text{cable loss (between the SG and substitution antenna)}$

(Path loss = Signal generator output – PSA reading with substitution antenna)

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.01 dB
Radiated Disturbance, 30 MHz to 1 GHz	4.26 dB
Radiated Disturbance, 1 GHz to 18 GHz	5.90 dB
Radiated Disturbance, Above 18 GHz	5.49 dB

Uncertainty figures are valid to a confidence level of 95%.

4.4. DECISION RULE

Decision rule for statement(s) of conformity is based on Procedure 1, Clause 4.4.2 in IEC Guide 115:2007.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a GSM/CDMA/WCDMA/LTE Phone + BT/BLE, DTS/UNII a/b/g/n/ac and NFC. This test report addresses the WWAN operational mode.

This report covers the Samsung models SM-A125U, SM-A125U1/DS and SM-S127DL. These models are identical in hardware except SM-A125U1/DS has dual SIM tray and SM-S127DL is not supported CDMA.

With some pre-scan, model SM-A125U was set for final test.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum average radiated ERP / EIRP output powers as follows:

Note : Conducted output power results were excerpted from RF exposure test report (4789793179-S1 FCC Report SAR).

GSM

FCC Part 22/24						
Band	Frequency Range [MHz]	Modulation	Conducted		Radiated	
			Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
GSM850	824.2~848.8	GPRS	32.94	1969.94	31.82	1520.55
		EGPRS	27.26	532.37	27.09	511.68
GSM1900	1850.2~1909.8	GPRS	29.71	936.35	30.35	1083.93
		EGPRS	26.42	438.77	28.46	701.46

CDMA

FCC Part 22/27/90						
Band	Frequency Range [MHz]	Modulation	Conducted		Radiated	
			Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
BC 10	817.9~823.1	1xRTT	24.96	313.33	15.04	31.92
		EV-DO Rel.0	24.94	311.89	14.83	30.41
		EV-DO Rev.A	24.88	307.61		
BC 0	824.70~848.31	1xRTT	24.21	263.63	21.67	146.89
		EV-DO Rel.0	24.20	263.03	21.97	157.40
		EV-DO Rev.A	23.90	245.47		
BC 1	1851.25~1908.75	1xRTT	24.61	289.07	18.48	70.47
		EV-DO Rel.0	24.95	312.61	18.17	65.61
		EV-DO Rev.A	24.88	307.61		

WCDMA

FCC Part 22/24/27						
Band	Frequency Range [MHz]	Modulation	Conducted		Radiated	
			Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
Band 5	826.4~846.6	Rel. 99	24.24	265.70	21.42	138.68
		HSDPA	23.26	211.61	20.41	109.90
		HSUPA	22.22	166.62		
Band 4	1712.4~1752.6	Rel. 99	23.78	238.99	24.84	304.79
		HSDPA	22.83	191.78	23.77	238.23
		HSUPA	21.75	149.61		
Band 2	1852.4~1907.6	Rel. 99	24.05	254.21	24.59	287.74
		HSDPA	23.03	201.12	23.57	227.51
		HSUPA	21.90	154.96		

LTE Band 7

FCC Part 27							
Band	Frequency Range [MHz]	BandWidth [MHz]	Modulation	Conducted		Radiated	
				Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
Band 7	2500~2570	20	QPSK	18.74	74.81	23.03	200.91
			16QAM	19.25	84.22	21.92	155.60
			64QAM	19.78	95.05		
		15	QPSK	18.81	76.08	22.91	195.43
			16QAM	18.72	74.54	22.07	161.06
			64QAM	19.12	81.66		
		10	QPSK	18.93	78.21	23.72	235.50
			16QAM	18.92	77.91	22.72	187.07
			64QAM	19.22	83.47		
		5	QPSK	18.93	78.10	23.29	213.30
			16QAM	19.30	85.09	22.15	164.06
			64QAM	19.30	85.16		

LTE Band 12

FCC Part 27							
Band	Frequency Range [MHz]	BandWidth [MHz]	Modulation	Conducted		Radiated	
				Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
Band 12	699 ~ 716	10	QPSK	23.67	232.81	18.73	74.64
			16QAM	22.93	196.36	17.88	61.38
			64QAM	22.48	177.05		
		5	QPSK	23.85	242.70	18.74	74.82
			16QAM	23.11	204.75	17.73	59.29
			64QAM	22.46	176.26		
		3	QPSK	24.15	260.05	18.70	74.13
			16QAM	23.22	209.78	17.70	58.88
			64QAM	22.61	182.50		
		1.4	QPSK	24.16	260.57	18.58	72.11
			16QAM	23.51	224.27	17.55	56.89
			64QAM	22.42	174.49		

LTE Band 13

FCC Part 27							
Band	Frequency Range [MHz]	BandWidth [MHz]	Modulation	Conducted		Radiated	
				Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
Band 13	777 ~ 787	10	QPSK	23.75	237.25	18.53	71.29
			16QAM	22.83	191.76	17.48	55.98
			64QAM	22.42	174.52		
		5	QPSK	24.38	274.33	18.95	78.52
			16QAM	23.83	241.28	17.56	57.02
			64QAM	22.62	182.91		

LTE Band 14

FCC Part 90							
Band	Frequency Range [MHz]	BandWidth [MHz]	Modulation	Conducted		Radiated	
				Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
Band 14	788 ~ 798	10	QPSK	23.70	234.21	18.11	64.71
			16QAM	22.72	187.02	17.04	50.58
			64QAM	21.80	151.30		
		5	QPSK	24.10	256.75	18.65	73.28
			16QAM	23.24	211.07	17.25	53.09
			64QAM	22.52	178.73		

LTE Band 25

FCC Part 24							
Band	Frequency Range [MHz]	BandWidth [MHz]	Modulation	Conducted		Radiated	
				Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
Band 25	1850 ~ 1915	20	QPSK	24.45	278.88	24.41	276.06
			16QAM	23.70	234.45	23.20	208.93
			64QAM	22.97	198.15		
		15	QPSK	24.75	298.44	24.47	279.90
			16QAM	23.99	250.79	23.66	232.27
			64QAM	22.95	197.03		
		10	QPSK	24.69	294.38	24.55	285.10
			16QAM	23.69	234.07	23.52	224.91
			64QAM	22.94	197.00		
		5	QPSK	24.90	308.91	24.63	290.40
			16QAM	23.90	245.45	23.67	232.81
			64QAM	22.82	191.51		
		3	QPSK	24.76	299.43	24.57	286.42
			16QAM	23.93	246.98	23.63	230.67
			64QAM	22.97	198.26		
		1.4	QPSK	24.68	293.68	24.86	306.20
			16QAM	23.95	248.30	23.64	231.21
			64QAM	22.92	195.93		

LTE Band 26 (Part 90)

FCC Part 90							
Band	Frequency Range [MHz]	BandWidth [MHz]	Modulation	Conducted		Radiated	
				Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
Band 26	814 ~ 824	15	QPSK	24.44	278.27	19.23	83.75
			16QAM	23.45	221.09	18.08	64.27
			64QAM	22.86	192.99		
		10	QPSK	23.93	246.91	19.31	85.31
			16QAM	23.03	201.03	18.25	66.83
			64QAM	22.13	163.42		
		5	QPSK	24.09	256.32	19.23	83.75
			16QAM	23.24	210.96	18.52	71.12
			64QAM	22.39	173.21		
		3	QPSK	24.39	274.78	19.46	88.31
			16QAM	23.18	207.93	18.19	65.92
			64QAM	22.16	164.52		
		1.4	QPSK	24.43	277.39	19.09	81.10
			16QAM	23.67	232.91	17.86	61.09
			64QAM	23.00	199.51		

LTE Band 26 (Straddle)

Straddle							
Band	Frequency Range [MHz]	BandWidth [MHz]	Modulation	Conducted		Radiated	
				Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
Band 26	824	15	QPSK	24.34	271.64	19.70	93.33
			16QAM	23.58	228.03	18.32	67.92
			64QAM	22.33	171.00		
		10	QPSK	23.77	238.23	19.70	93.33
			16QAM	23.21	209.41	18.68	73.79
			64QAM	22.20	165.96		
		5	QPSK	23.95	248.31	19.52	89.54
			16QAM	22.94	196.79	18.07	64.12
			64QAM	22.15	164.06		
		3	QPSK	23.75	237.14	19.40	87.10
			16QAM	23.56	226.99	18.42	69.50
			64QAM	22.48	177.01		
		1.4	QPSK	23.92	246.60	19.43	87.70
			16QAM	22.65	184.08	18.35	68.39
			64QAM	22.04	159.96		

LTE Band 26 (Part 22)

FCC Part 22							
Band	Frequency Range [MHz]	BandWidth [MHz]	Modulation	Conducted		Radiated	
				Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
Band 26	824 ~ 849	15	QPSK	24.19	262.28	21.30	134.90
			16QAM	23.44	220.63	20.60	114.82
			64QAM	22.58	181.15		
		10	QPSK	23.88	244.15	20.85	121.62
			16QAM	23.27	212.19	20.41	109.90
			64QAM	22.19	165.47		
		5	QPSK	23.93	247.29	21.37	137.09
			16QAM	23.54	225.69	20.20	104.71
			64QAM	22.18	165.14		
		3	QPSK	23.97	249.64	21.23	132.74
			16QAM	23.40	219.01	20.36	108.64
			64QAM	22.35	171.64		
		1.4	QPSK	24.28	267.74	21.11	129.12
			16QAM	23.30	213.77	20.06	101.39
			64QAM	22.13	163.47		

LTE Band 30

FCC Part 27							
Band	Frequency Range [MHz]	BandWidth [MHz]	Modulation	Conducted		Radiated	
				Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
Band 30	2305~2315	10	QPSK	22.00	158.45	22.52	178.65
			16QAM	21.23	132.71	21.40	138.04
			64QAM	20.34	108.24		
		5	QPSK	22.39	173.53	22.54	179.47
			16QAM	21.58	143.88	21.49	140.93
			64QAM	20.69	117.15		

LTE Band 41 (PC2)

FCC Part 27							
Band	Frequency Range [MHz]	BandWidth [MHz]	Modulation	Conducted		Radiated	
				Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
Band 41	2496 ~ 2690	20	QPSK	26.69	467.01	27.16	520.00
			16QAM	25.97	395.74	26.57	453.94
			64QAM	24.98	314.70		
		15	QPSK	26.82	481.10	27.56	570.16
			16QAM	25.98	396.28	27.27	533.33
			64QAM	24.93	310.82		
		10	QPSK	26.60	457.52	27.92	619.44
			16QAM	25.99	397.48	27.20	524.81
			64QAM	24.93	310.82		
		5	QPSK	26.76	474.13	28.48	704.69
			16QAM	25.94	392.41	27.92	619.44
			64QAM	24.98	314.77		

LTE Band 66

FCC Part 27							
Band	Frequency Range [MHz]	BandWidth [MHz]	Modulation	Conducted		Radiated	
				Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
Band 66	1710 ~ 1780	20	QPSK	23.71	235.22	24.89	308.32
			16QAM	22.94	196.77	23.74	236.59
			64QAM	22.47	176.45		
		15	QPSK	23.67	232.92	24.51	282.49
			16QAM	22.96	197.72	23.28	212.81
			64QAM	22.36	172.28		
		10	QPSK	24.00	251.05	24.17	261.22
			16QAM	22.88	193.89	23.13	205.59
			64QAM	22.39	173.57		
		5	QPSK	23.73	236.01	24.02	252.35
			16QAM	23.23	210.59	22.99	199.07
			64QAM	22.45	175.79		
		3	QPSK	23.78	238.66	25.09	322.85
			16QAM	23.13	205.72	23.89	244.91
			64QAM	22.53	179.15		
		1.4	QPSK	24.21	263.76	25.36	343.56
			16QAM	23.18	207.89	23.66	232.27
			64QAM	22.54	179.40		

LTE Band 71

FCC Part 27							
Band	Frequency Range [MHz]	BandWidth [MHz]	Modulation	Conducted		Radiated	
				Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
Band 71	663-698	20	QPSK	24.25	266.04	18.94	78.34
			16QAM	23.16	206.87	17.58	57.28
			64QAM	22.53	179.26		
		15	QPSK	23.87	243.87	18.52	71.12
			16QAM	23.23	210.61	17.43	55.34
			64QAM	22.49	177.45		
		10	QPSK	24.33	270.93	18.65	73.28
			16QAM	23.65	231.83	17.57	57.15
			64QAM	22.52	178.62		
		5	QPSK	24.44	277.69	18.64	73.11
			16QAM	23.24	210.64	17.75	59.57
			64QAM	22.63	183.18		

LTE Band 2

LTE Band 2(Frequency range: 1850-1910 MHz) is covered by LTE Band 25 (Frequency range: 1850-1915 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

LTE Band 4

LTE Band 4 (Frequency range: 1710-1755 MHz) is covered by LTE Band 66 (Frequency range: 1710-1780 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

LTE Band 5

LTE Band 5 (Frequency range: 824-849 MHz) is covered by LTE Band 26 (Frequency range: 814-849 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

LTE Band 38

LTE Band 38 (Frequency range: 2570-2620 MHz) is covered by LTE Band 41 (Frequency range: 2496-2690 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

LTE Band41(PC3)

LTE Band 41(PC3, Frequency range : 2496-2690 MHz) is covered by LTE Band 41(PC2) (Frequency range: 2496-2690 MHz) due to same frequency range, same channel bandwidth and maximum tune-up limit is higher than LTE Band41(PC3).

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a internal antenna for the [List the bands supported] with a maximum peak gain as follow:

Frequency (MHz)	Peak Gain (dBi)
CDMA BC 10 / LTE Band 26 (Part 90) 814 ~ 824 MHz	-5.90
CDMA BC0 / GSM850/ WCDMA Band 5 / LTE Band 5 / LTE Band 26 (Part 22) 824 ~ 849 MHz	-5.70
WCDMA Band 4 / LTE Band 4 / LTE Band 66 1710 ~ 1780 MHz	-5.30
GSM 1900 / WCDMA Band 2 / LTE Band 2 / LTE Band 25 1850 ~ 1915 MHz	-1.80
LTE Band 7 2500 ~ 2570 MHz	-2.12
LTE Band 12 699 ~ 716 MHz	-7.30
LTE Band 13 777 ~ 787 MHz	-5.90
LTE Band 14 788 ~ 798 MHz	-5.50
LTE Band 30 2305 ~ 2315 MHz	-3.26
LTE Band 38 / LTE Band 41 2496 ~ 2690 MHz	-1.95
LTE Band 71 663 ~ 698 MHz	-8.10

5.4. WORST-CASE ORIENTATION

Following modes should be considered as worst-case scenario for all other measurements.

- GSM GPRS/EGPRS
- UMTS REL 99/HSDPA
- CDMA 1xRTT/EV-DO Rel.0

For all LTE, the worst-case scenario for all measurements is based on the average conducted output power measurement investigation results. Output power measurements were measured on QPSK, 16QAM, and 64QAM modulations. It was found that QPSK and 16QAM results were worst case. All testing was performed using QPSK and 16QAM modulations to represent the worst case. However, the out of band emissions and spurious radiation were only performed on bandwidth and RB offset(with RB size 1) with the highest conducted power in QPSK.

Highest power setting for each bands				
LTE Band	Frequency (MHz)	Bandwidth (MHz)	RB size	RB offset
7	2505.0	10	1	25
	2535.0		1	25
	2565.0		1	25
12	701.5	5	1	12
	707.5		1	12
	713.5		1	0
13	779.5	5	1	12
	792.0		1	12
	784.5		1	12
14	790.5	5	1	12
	793.0		1	12
	795.5		1	12
25	1852.5	5	1	12
	1882.5		1	12
	1912.5		1	12
26(Part 90)	821.5	15	1	37
26(Straddle)	824	15	1	37
26(Part 22)	824.7	1.4	1	3
	831.5		1	3
	848.3		1	3
30	2307.5	5	1	12
	2310.0		1	12
	2312.5		1	12
41 (PC2)	2501.0	10	1	25
	2593.0		1	25
	2685.0		1	25
66	1710.7	1.4	1	3
	1745.0		1	3
	1779.3		1	0
71	665.5	5	1	12
	680.5		1	12
	695.5		1	12

The fundamental and radiated spurious emission were investigated in three orthogonal orientations X, Y and Z, it was determined that below orientation was worst-case orientation for each band.

Band	ERP/EIRP			RSE		
	X	Y	Z	X	Y	Z
GSM850	-	-	O	-	O	-
GSM1900	O	-	-	O	-	-
CDMA BC10	-	-	O	-	-	O
CDMA BC0	-	-	O	-	-	O
CDMA BC1	-	O	-	-	O	-
WCDMA B5	-	-	O	-	-	O
WCDMA B4	O	-	-	O	-	-
WCDMA B2	O	-	-	O	-	-
LTE B7	-	-	O	-	-	O
LTE B12	-	O	-	-	O	-
LTE B13	O	-	-	-	O	-
LTE B14	O	-	-	-	O	-
LTE B25	-	O	-	-	O	-
LTE B26	-	-	O	-	O	-
LTE B30	O	-	-	-	-	O
LTE B41	O	-	-	O	-	-
LTE B66	-	O	-	-	O	-
LTE B71	-	-	O	O	-	-

Note : For ERP/EIRP testing, the EUT didn't attached with travel adapter. But radiated spurious testing, the EUT attached with travel adapter for the worst case condition. The EUT is continuously communicated with the call box during the tests.

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	EP-TA200	R37NBH409C3SE3	N/A
Data Cable	SAMSUNG	EP-DR140AWE	N/A	N/A
Earphone	SAMSUNG	EHS64AVFWE	N/A	N/A

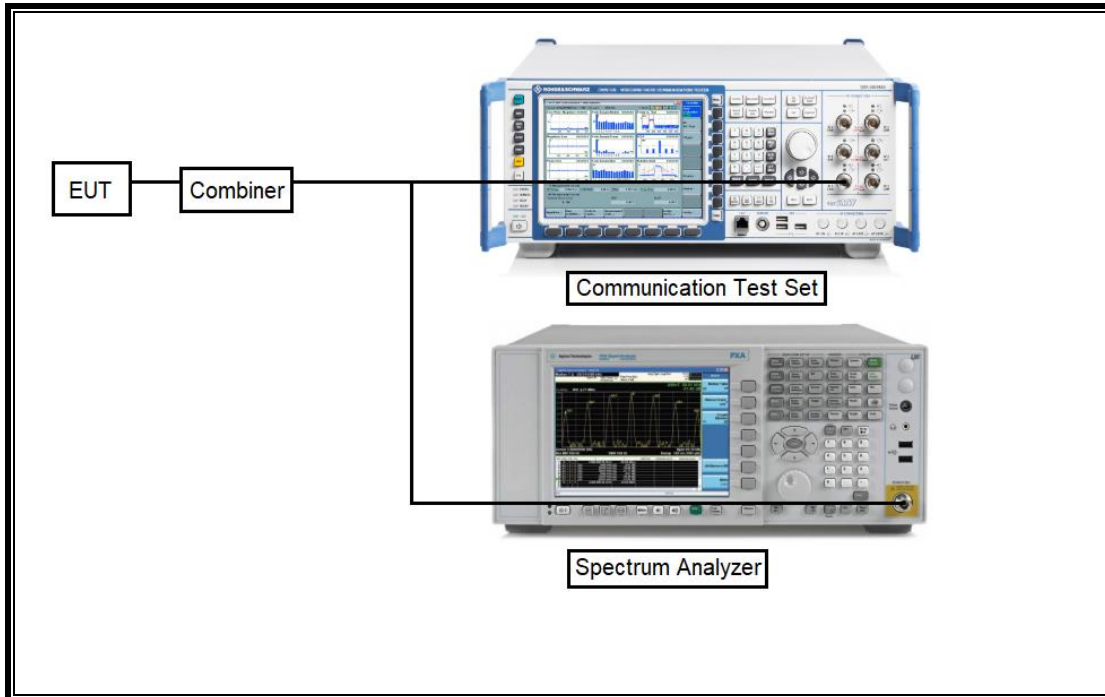
I/O CABLE

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC Power	1	C Type	Shielded	1.0 m	N/A
2	Audio	2	AUX	Unshielded	1.1 m	N/A

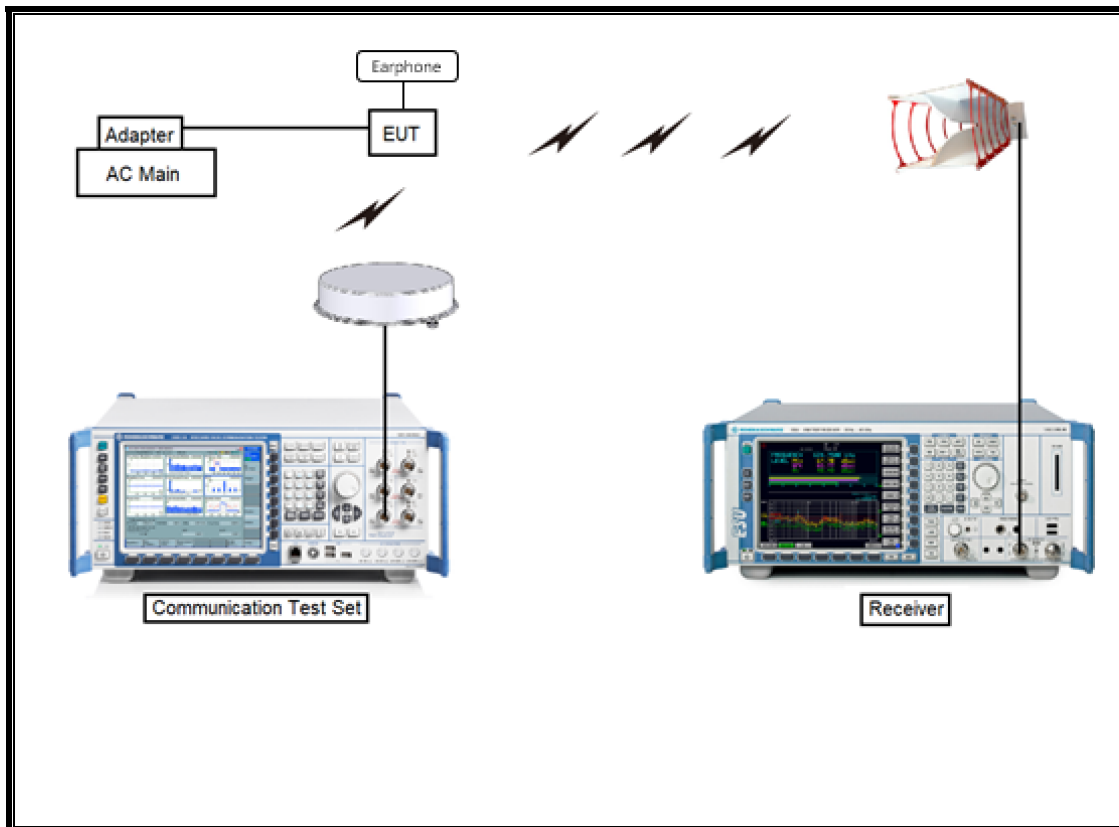
TEST SETUP

The EUT is continuously communicated with the call box during the tests.

SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)



SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment List				
Description	Manufacturer	Model	S/N	Cal Due
Antenna, Tuned Dipole 400 ~ 1000 MHz	ETS	3121DDB4	00164753	01-31-21 ^{note} 02-08-23
Antenna, Loop, 9kHz ~ 30MHz	R&S	HFH2-Z2	100418	10-02-21
Directional Antenna	Cobham	FPA3-0.8.6.0R/1329	110367-0003	N/A
Directional Antenna	Cobham	FPA3-0.8.6.0R/1329	80108-0004	N/A
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	750	08-19-22
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	08-13-22
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	845	08-13-22
Antenna, Horn, 18 GHz	ETS	3115	00167211	07-27-22
Antenna, Horn, 18 GHz	ETS	3115	00161451	08-15-22
Antenna, Horn, 18 GHz	ETS	3117	00168724	07-27-22
Antenna, Horn, 18 GHz	ETS	3117	00168717	08-15-22
Antenna, Horn, 40 GHz	ETS	3116C	00166155	08-04-22
Antenna, Horn, 40 GHz	ETS	3116C	00168645	10-02-21
Preamplifier	ETS	3116C-PA	00168841	08-06-21
Communications Test set	R&S	CMW500	150314	08-04-21
DC Power Supply	Agilent / HP	E3640A	MY54226395	08-05-21
Preamplifier, 1000 MHz	Sonoma	310N	341282	08-03-21
Preamplifier, 1000 MHz	Sonoma	310N	351741	08-03-21
Preamplifier, 1000 MHz	Sonoma	310N	370599	08-06-21
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	08-03-21
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	08-03-21
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029169	08-04-21
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	08-05-21
EMI Test Receive, 40 GHz	R&S	ESU40	100439	08-03-21
EMI Test Receive, 40 GHz	R&S	ESU40	100457	08-03-21
High Pass Filter 1.2 GHz	Micro-Tronics	HPM50108-02	G005	08-05-21
High Pass Filter 1.2 GHz	Micro-Tronics	HPM50108-02	G006	08-05-21
High Pass Filter 2.8 GHz	Micro-Tronics	HPM50111-02	010	08-05-21
High Pass Filter 2.8 GHz	Micro-Tronics	HPM50111-02	011	08-05-21
High Pass Filter 4.0 GHz	Micro-Tronics	HPM50118-02	G001	08-05-21
High Pass Filter 4.0 GHz	Micro-Tronics	HPM50118-02	G006	08-05-21
Attenuator	PASTERNAK	PE7087-10	A001	08-03-21
Attenuator	PASTERNAK	PE7087-10	A008	08-03-21
Attenuator	PASTERNAK	PE7087-10	A009	08-03-21
Attenuator	PASTERNAK	PE7004-10	2	08-04-21
Attenuator	PASTERNAK	PE395-10	A011	08-05-21
Power Splitter	MINI-CIRCUITS	WA1534	UL001	01-27-22
Temperature Chamber	ESPEC	SH-642	93001109	08-04-21
Power Splitter	MINI-CIRCUITS	WA1534	UL001	02-05-21 01-27-22
Power Splitter	MINI-CIRCUITS	WA1534	UL002	02-05-21 01-27-22
UL Software				
Description	Manufacturer	Model	Version	
Antenna port test software	UL	CLT	Ver 2.5	
Radiated software	UL	UL EMC	Ver 9.5	

Note: The radiation test was stated after FEB 08, 2021.

7. SUMMARY TABLE

FCC Part Section	Test Description	Test Limit	Test Condition	Test Result
2.1049	Occupied Band width (99%)	N/A	Conducted	Pass
22.917(a) 24.238(a) 27.53(c),(g),(h) 90.691	Band Edge / Conducted Spurious Emission	-13dBm		Pass
90.543(e)		-35 dBm		Pass
27.53(m)		Conducted Spurious Emission		-25 dBm
27.53(a)(4)	Conducted Spurious Emission	-40 dBm		Pass
27.53(a),(m) 90.691	Emission mask	Section 9.2.2		Pass
2.1046	Conducted output power	N/A		Pass
22.355 24.235 27.54 90.213 90.539(a)	Frequency Stability	2.5PPM		Pass
22.913(a)(5)	Effective Radiated Power	38.5 dBm	Radiated	Pass
90.635(b)		50 dBm		Pass
27.50(b)(10) 27.50(c)(10)		34.77 dBm		Pass
24.232(c) 27.50(h)(2)	Equivalent Isotropic Radiated Power	33dBm		Pass
27.50(d)(4)		30dBm		Pass
22.917(a) 24.238(a) 27.53(c),(g),(h) 90.691	Radiated Spurious Emission	-13dBm		Pass
27.53(f)		-40dBm		Pass
27.53 (m)		-25dBm		Pass

8. PEAK TO AVERAGE RATIO

Test Procedure

Per KDB 971168 D01 Power Meas License Digital Systems v03r01;

The transmitter output was connected to a CMW500 Test Set and configured to operate at maximum power. The PAR were measured on the Spectrum Analyzer.

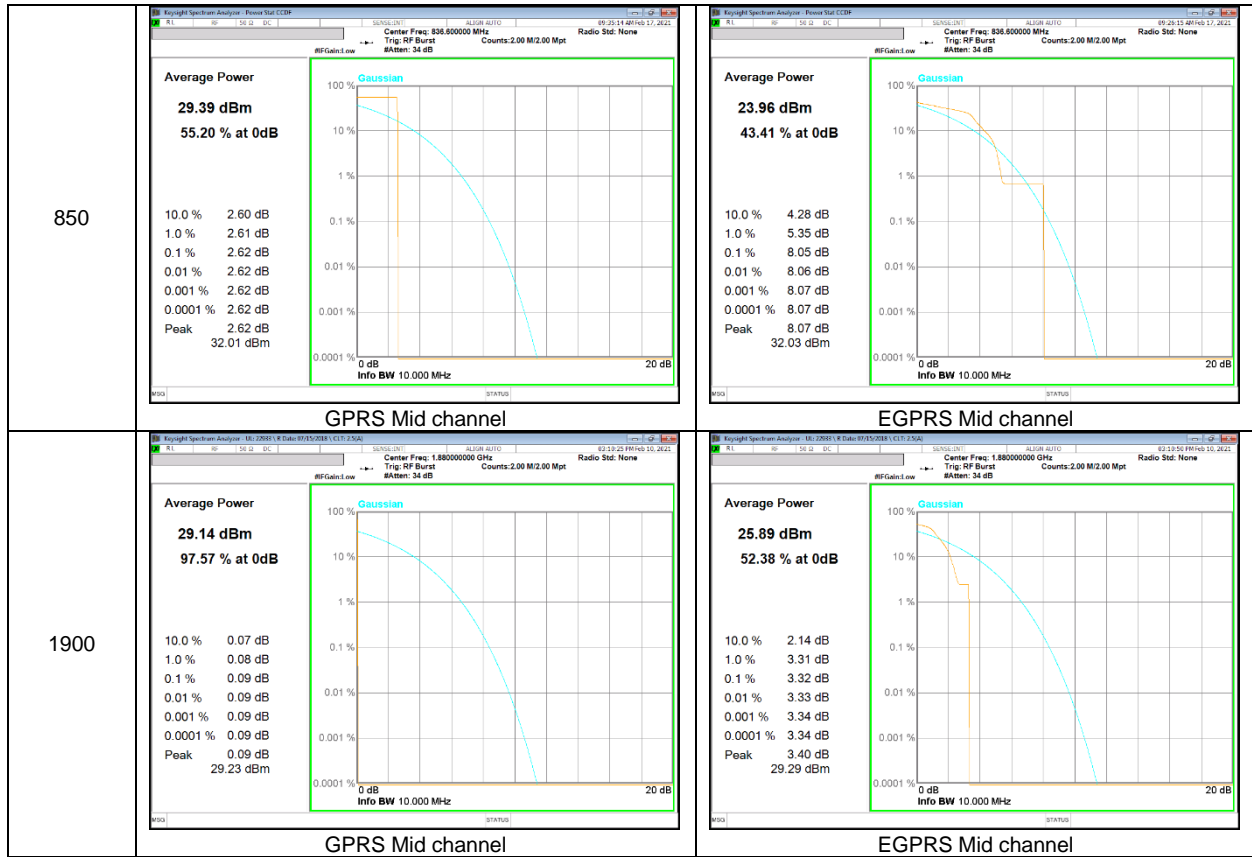
Test Spec

In addition, when the transmitter power is measured in terms of average value, the peak-to-average ratio of the power shall not exceed 13 dB.

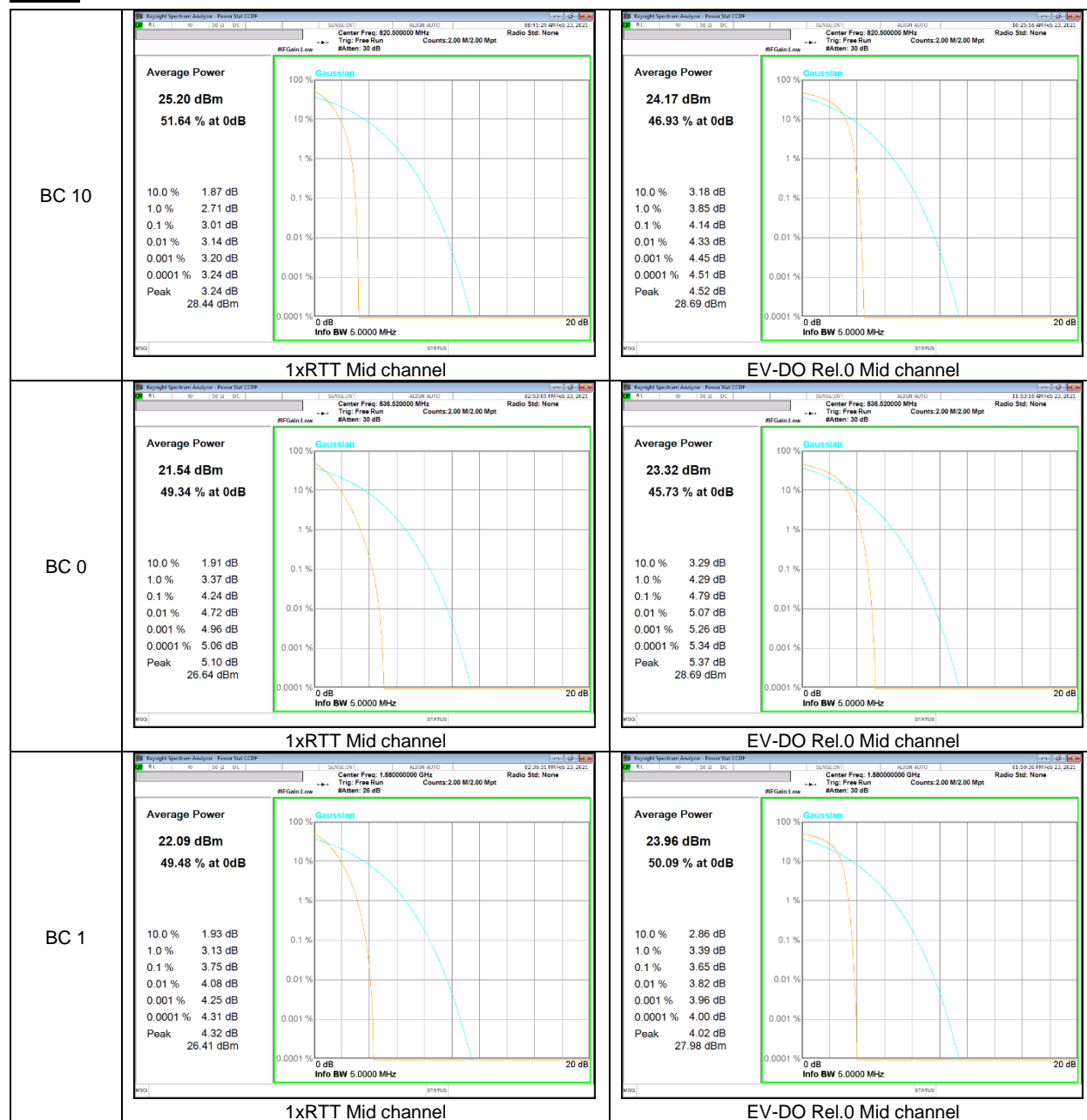
RESULTS

8.1. CONDUCTED PEAK TO AVERAGE RESULT

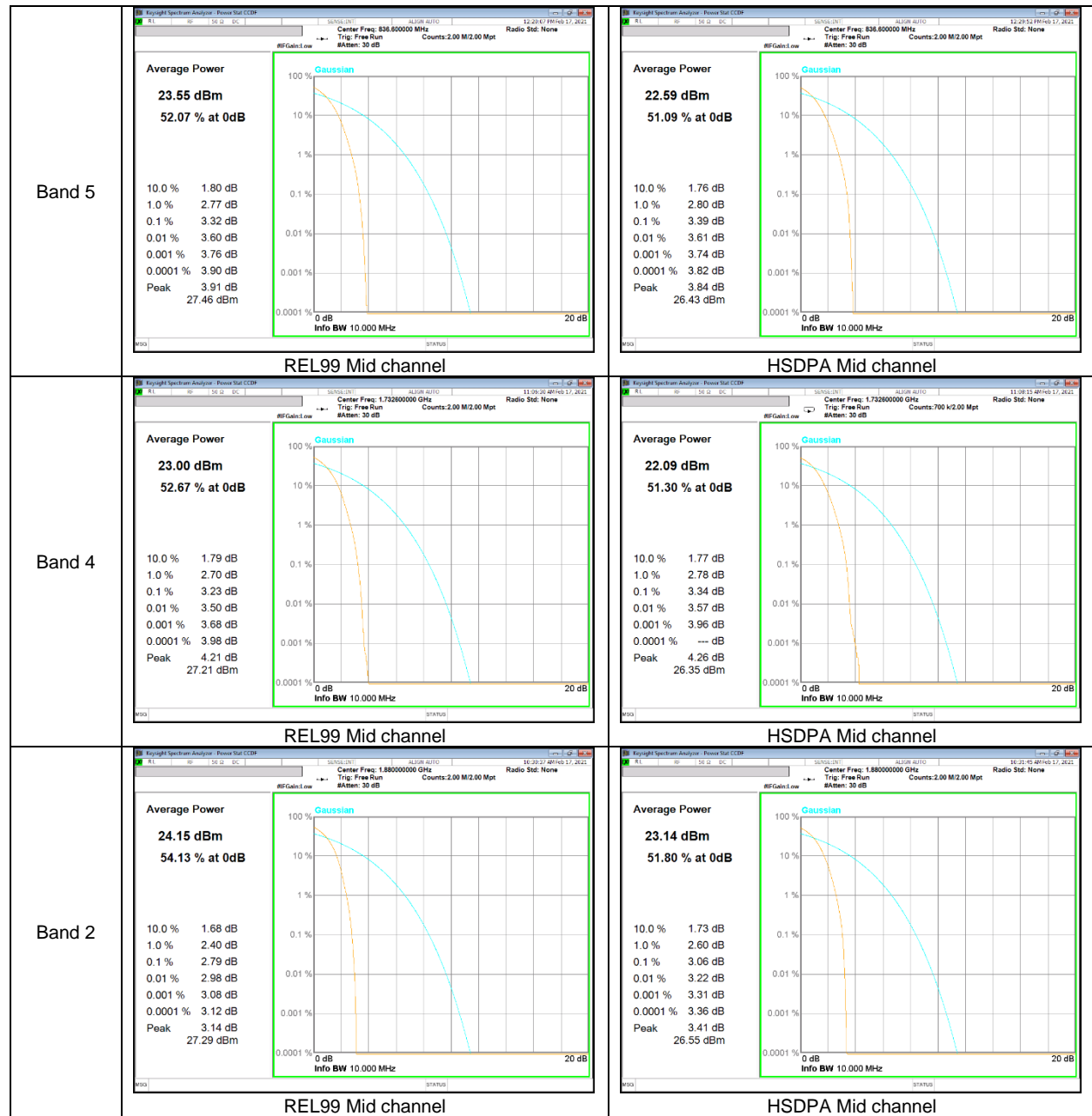
GSM



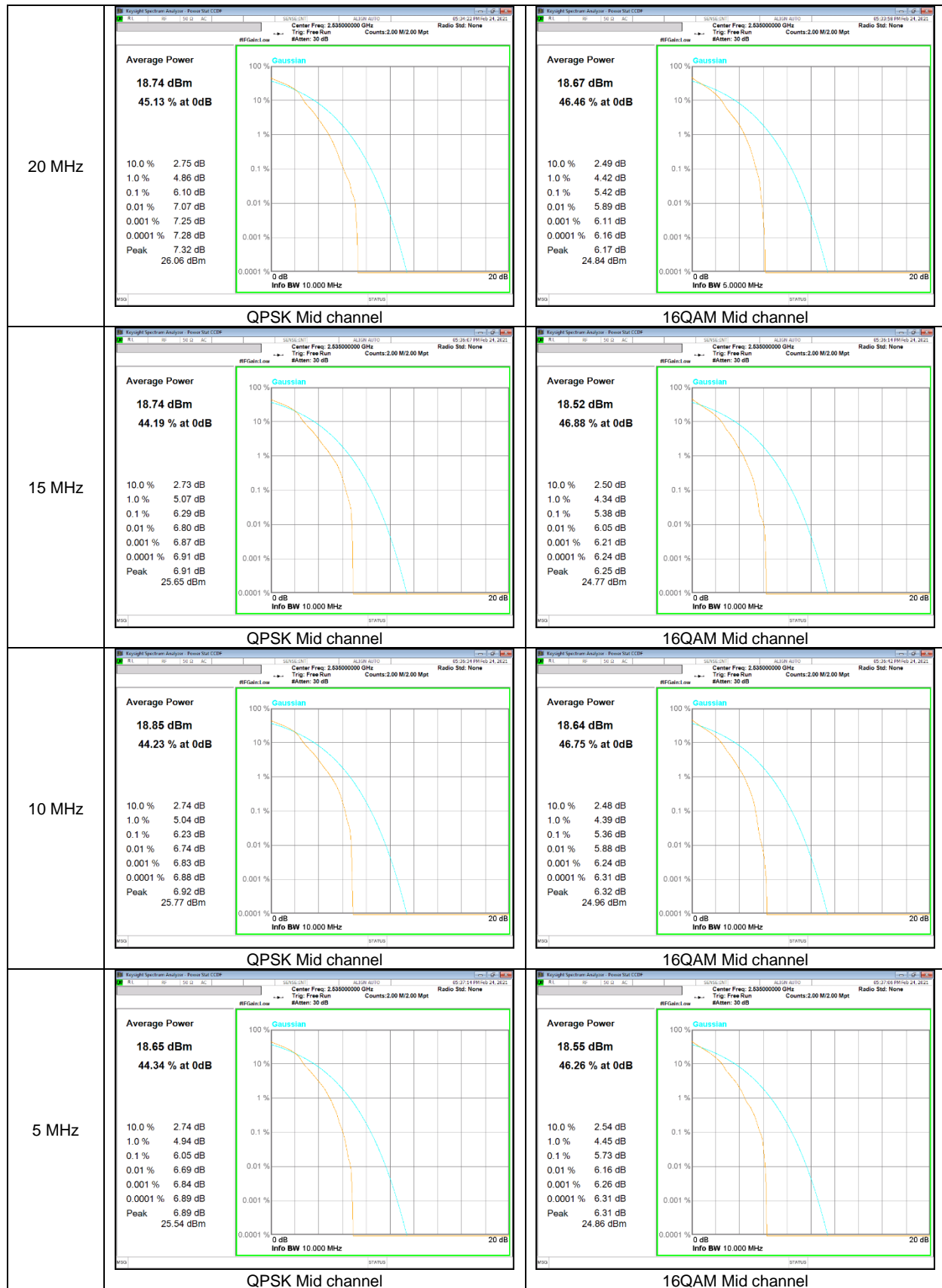
CDMA



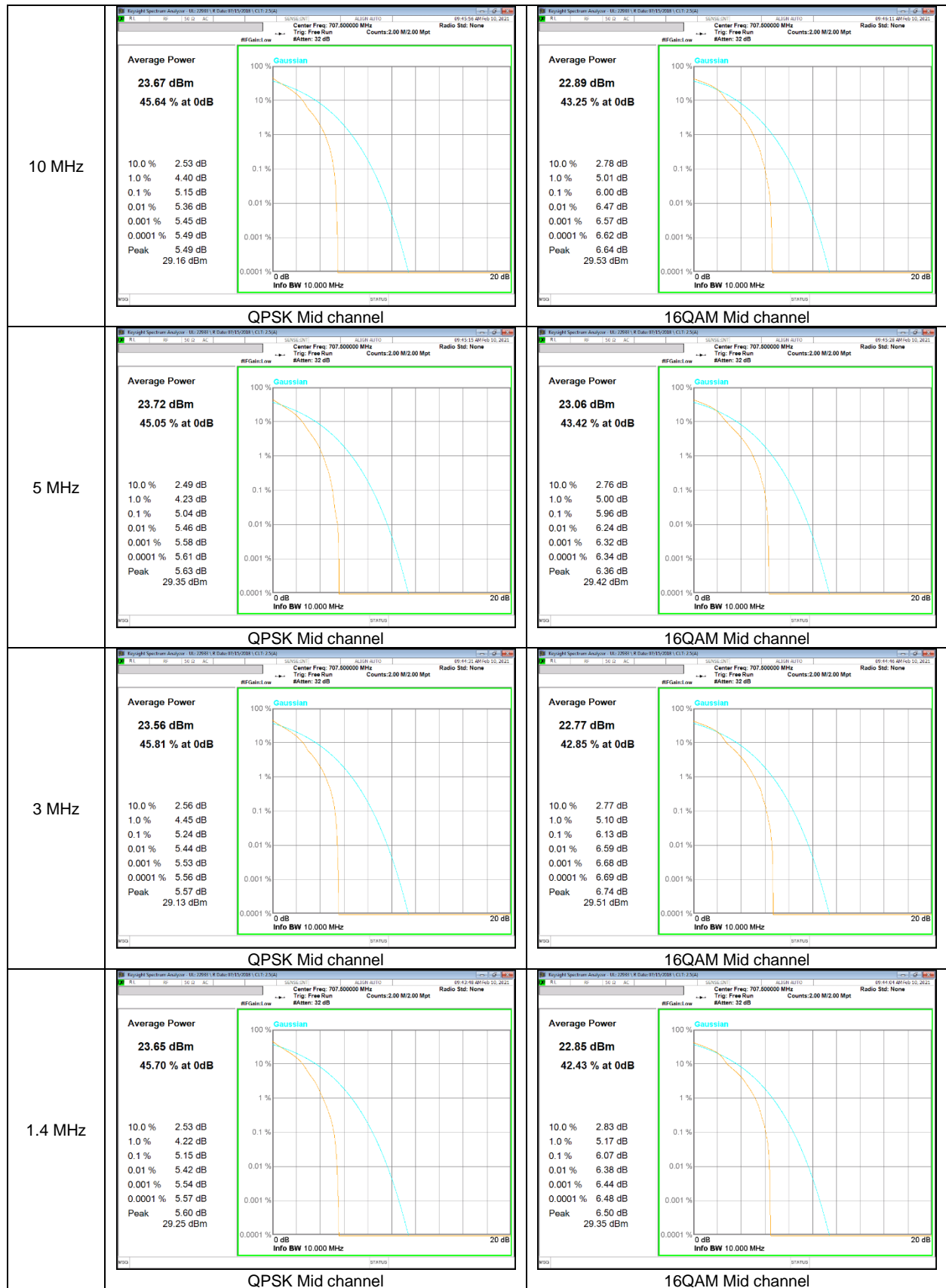
WCDMA



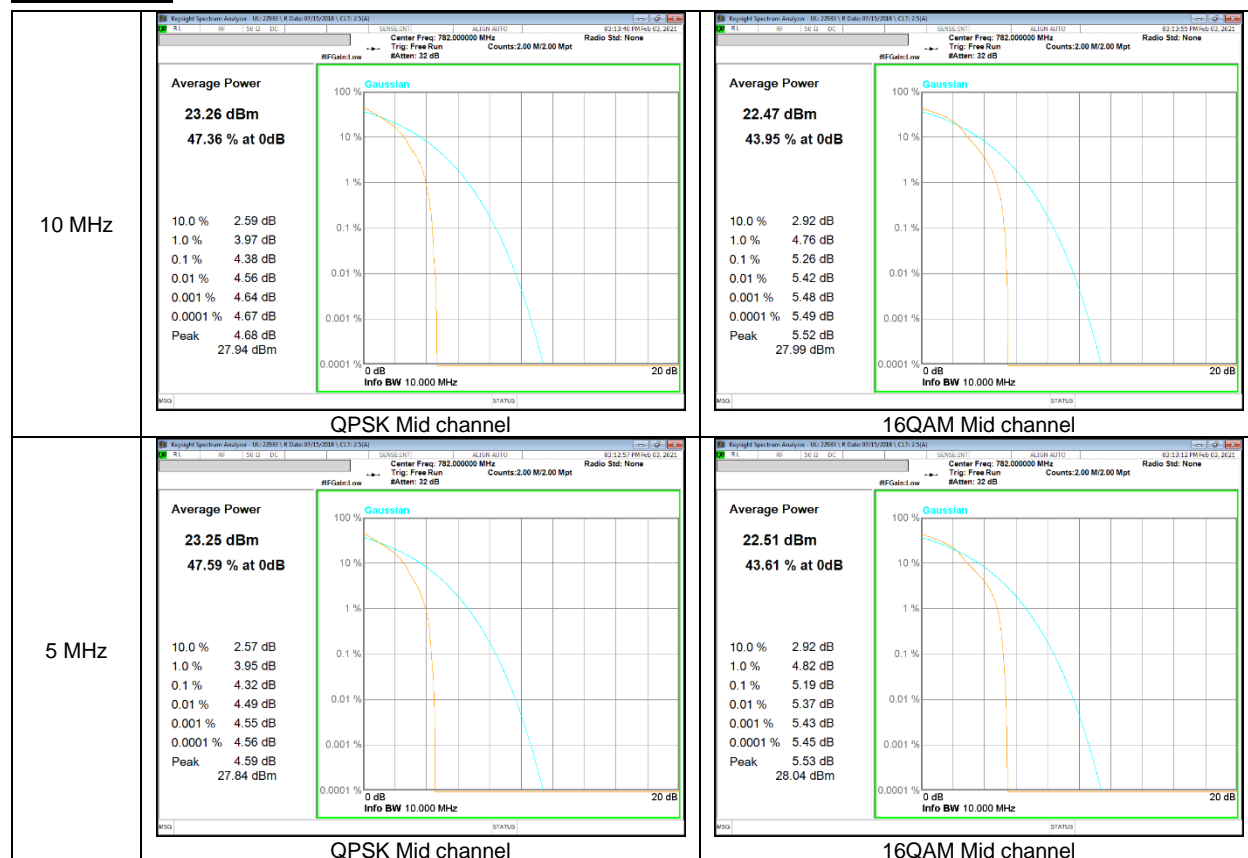
LTE Band 7



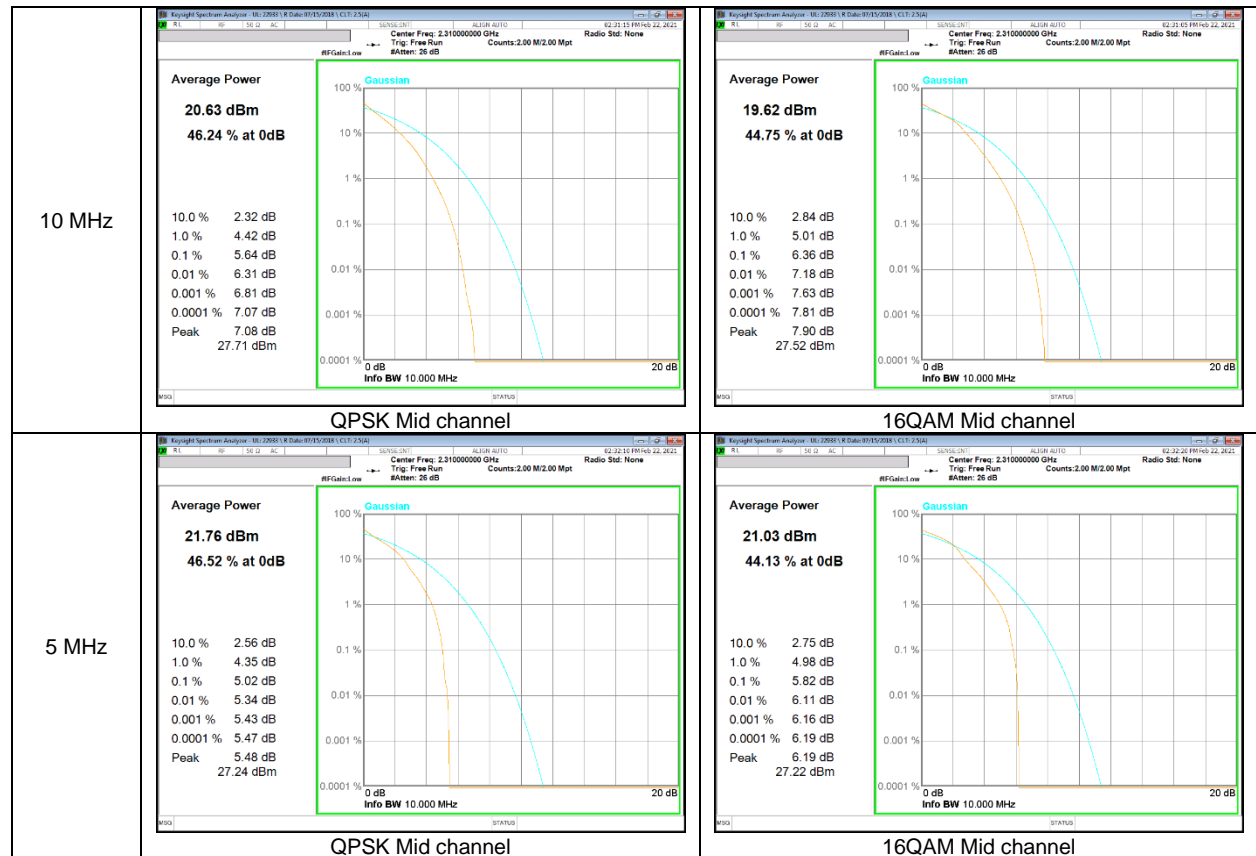
LTE Band 12



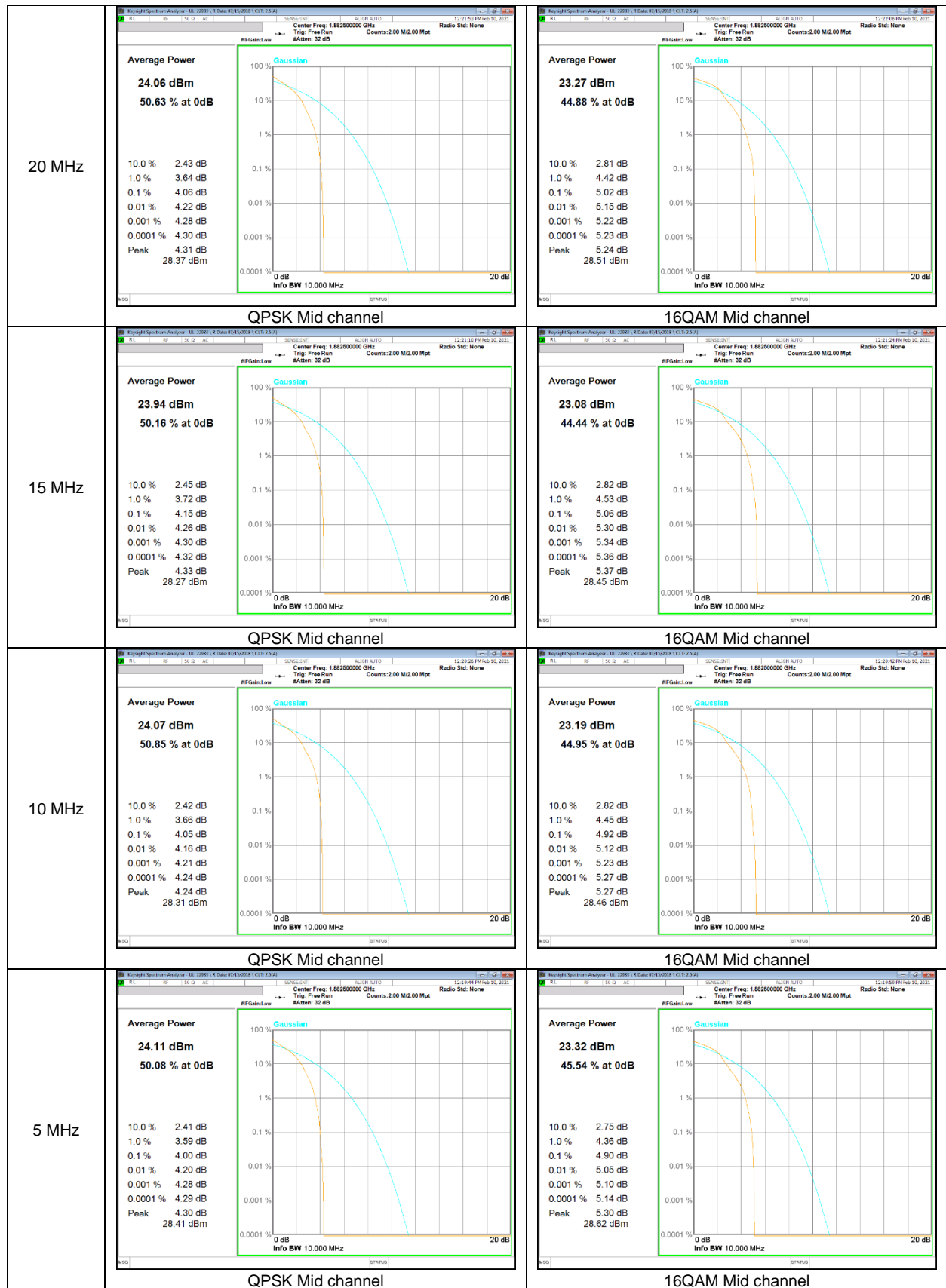
LTE Band 13

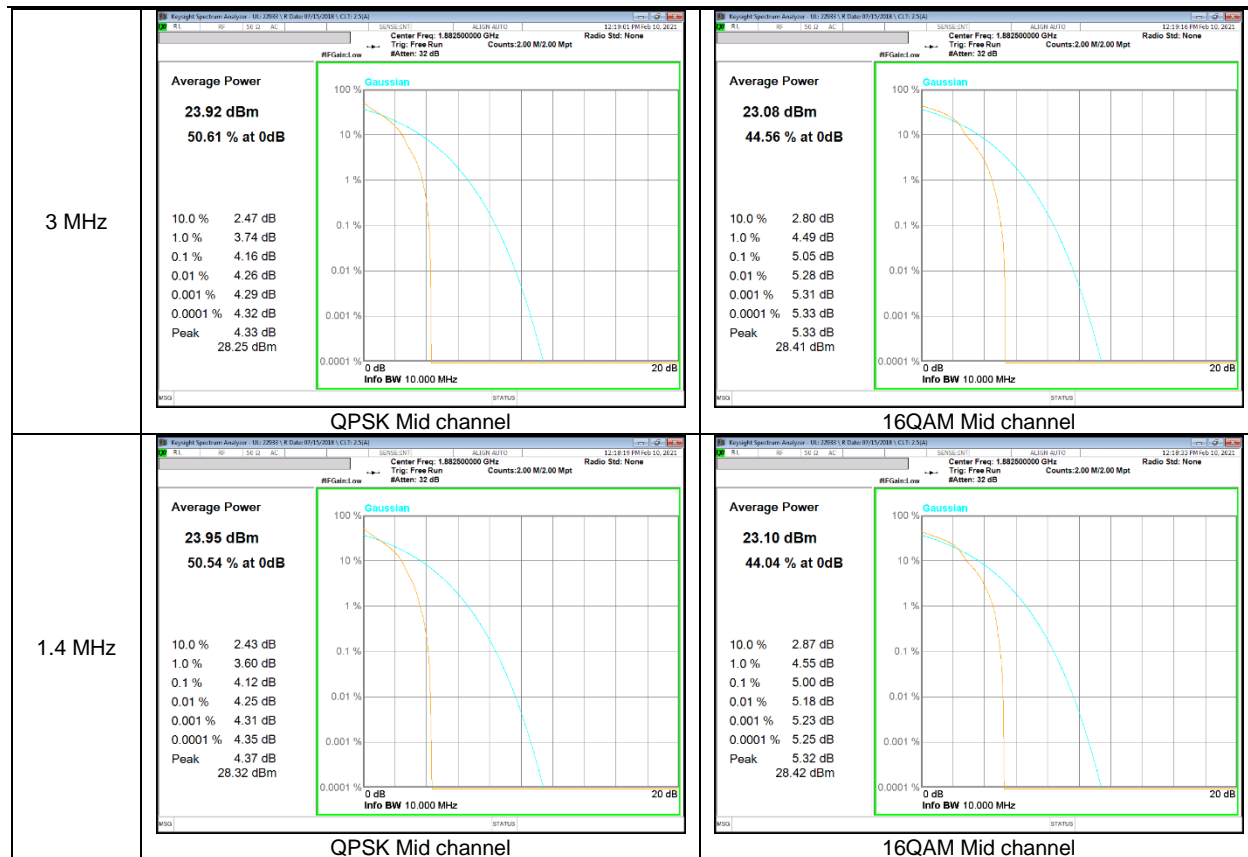


LTE Band 14

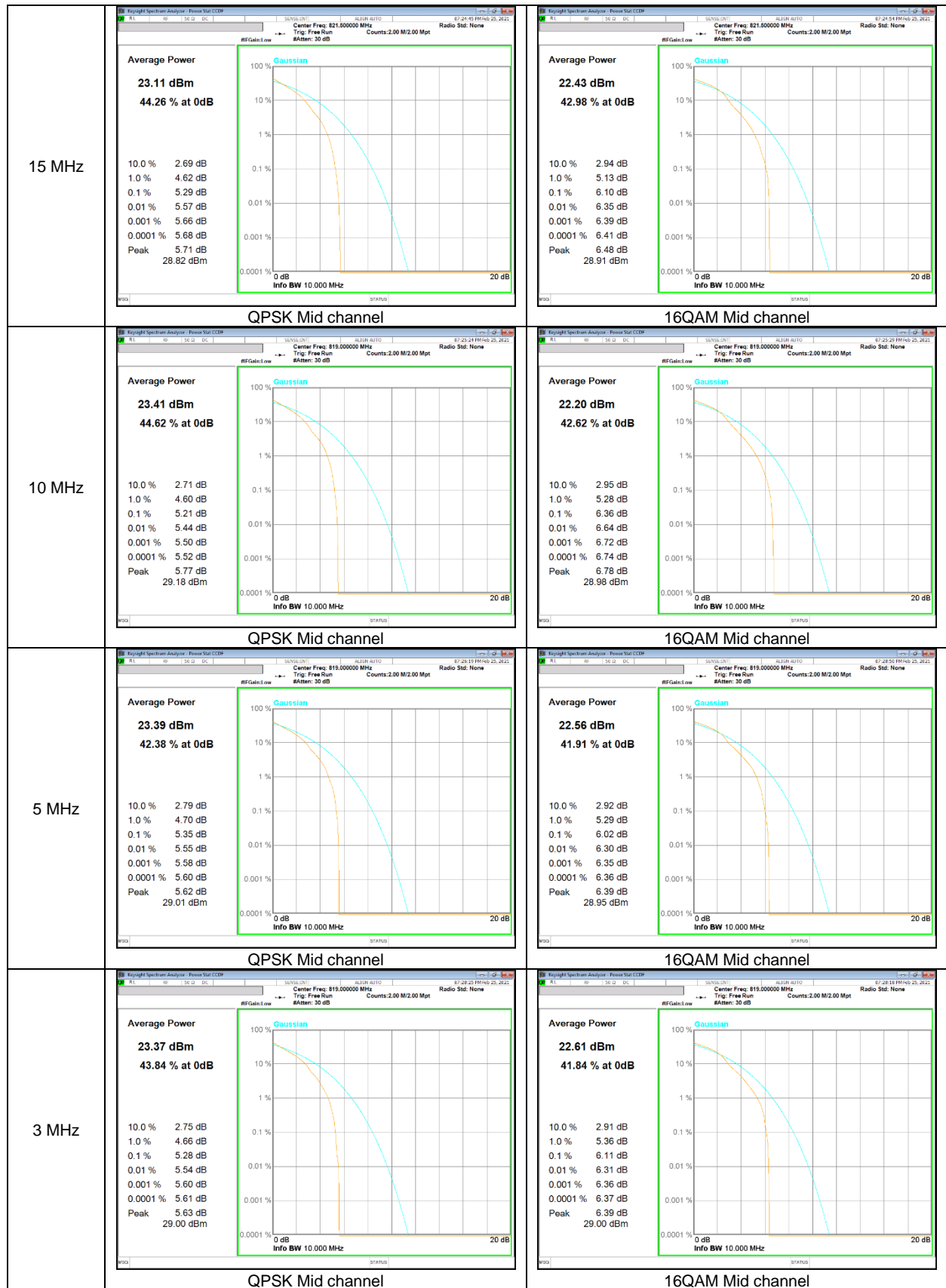


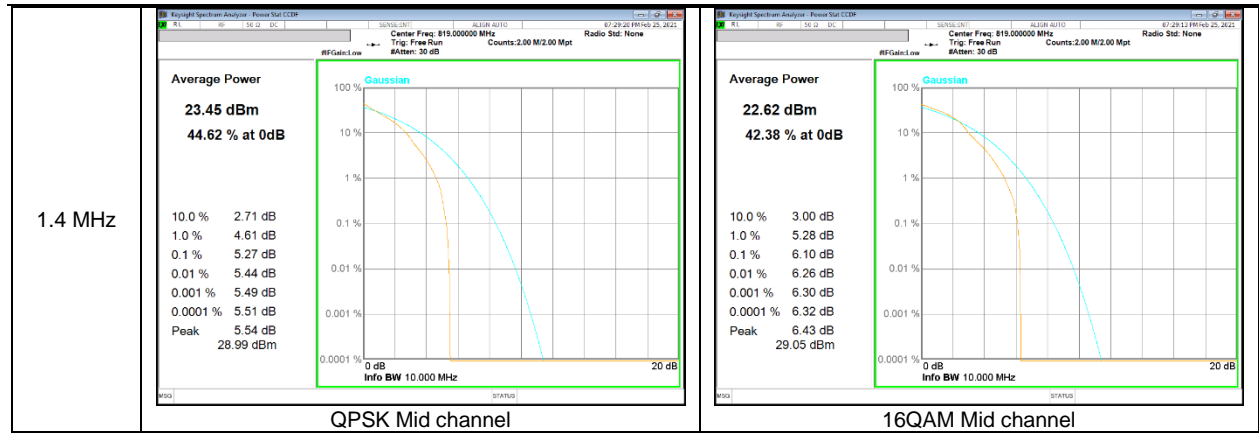
LTE Band 25



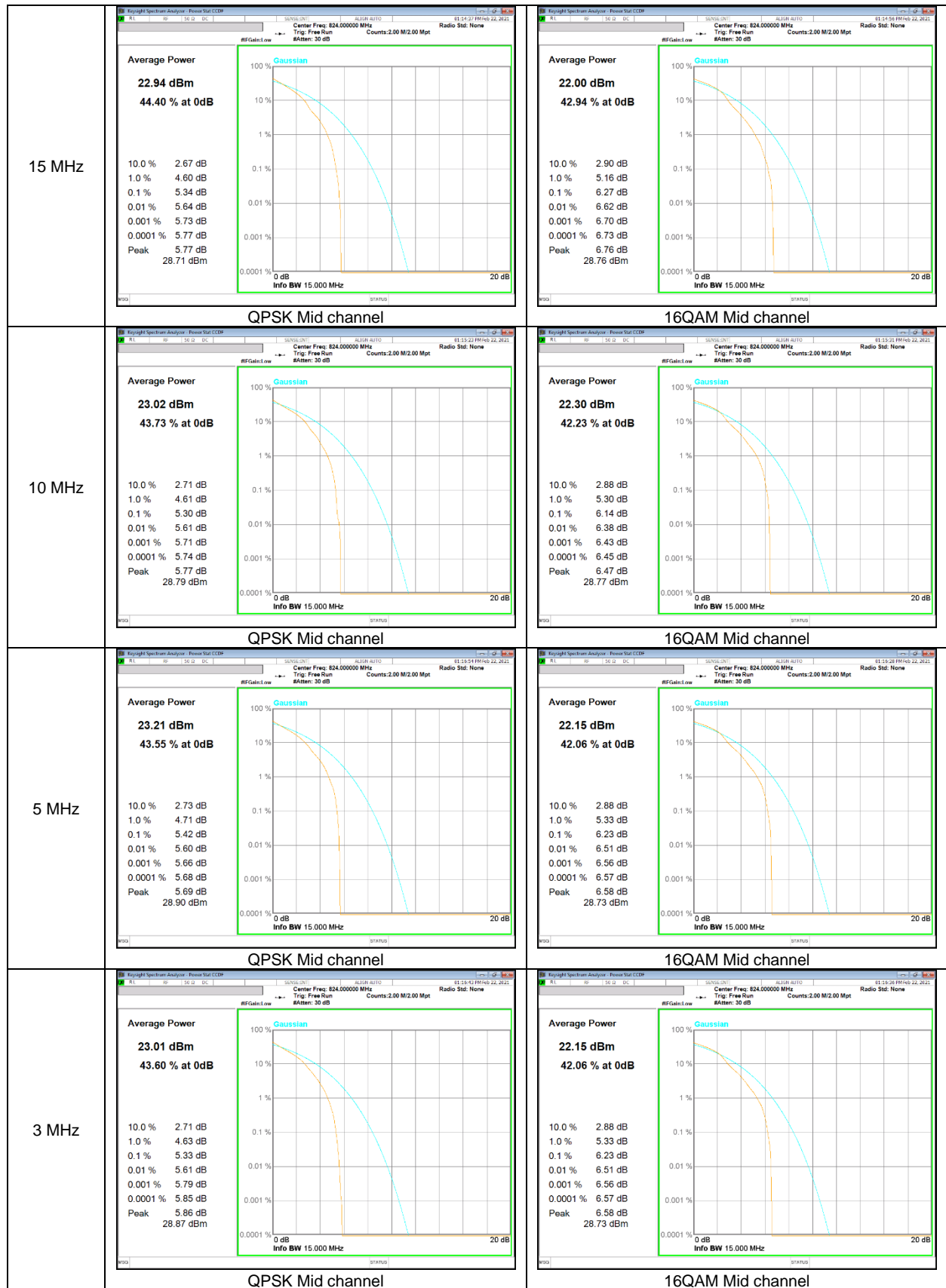


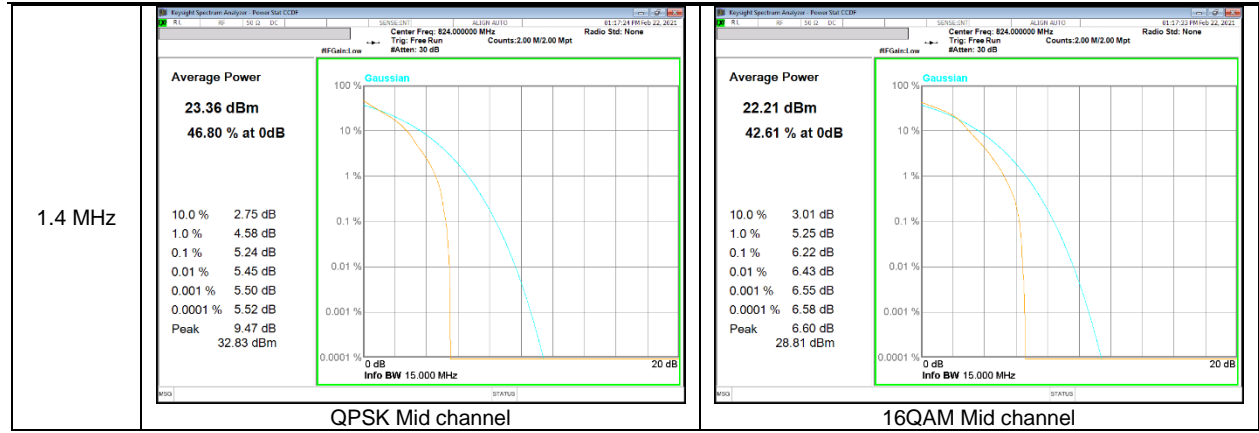
LTE Band 26 (Part 90)





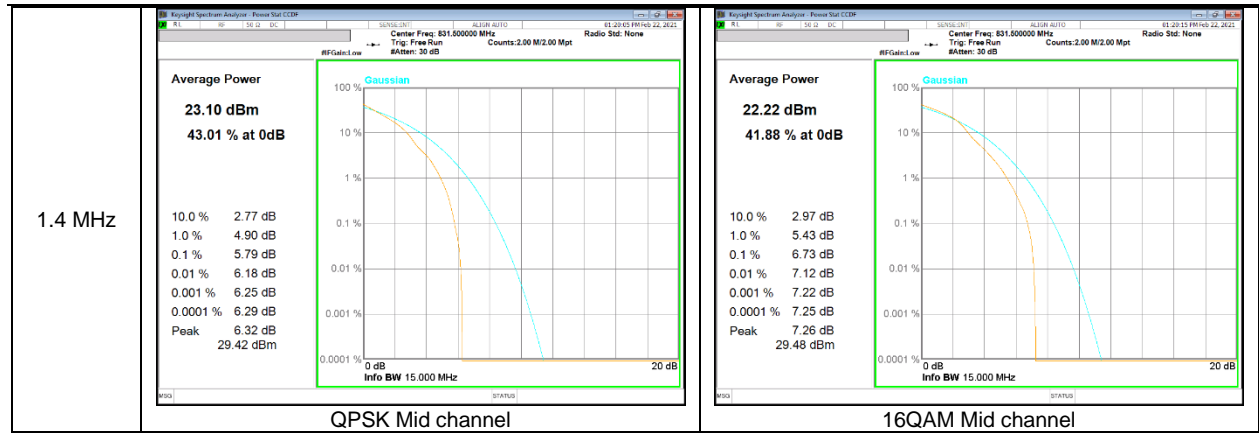
LTE Band 26 (Straddle)



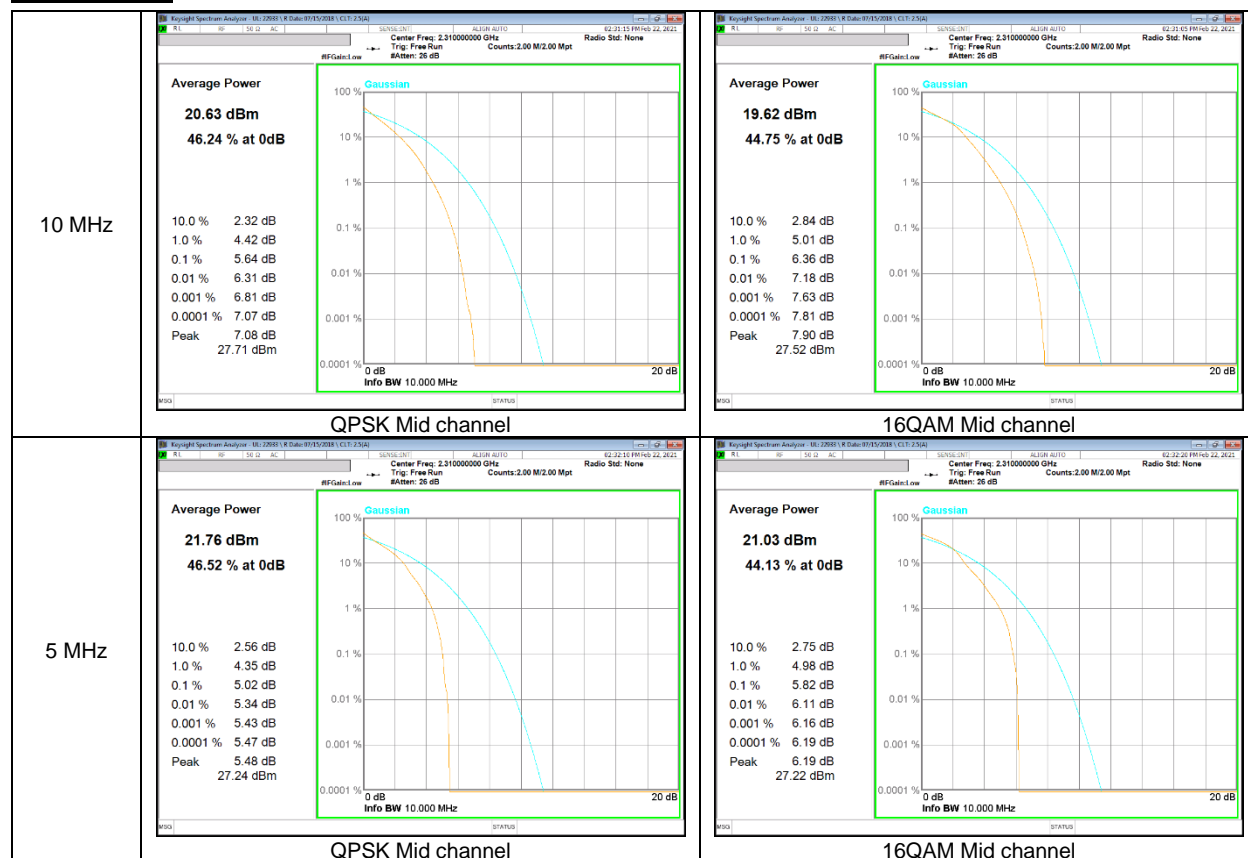


LTE Band 26 (Part 22)

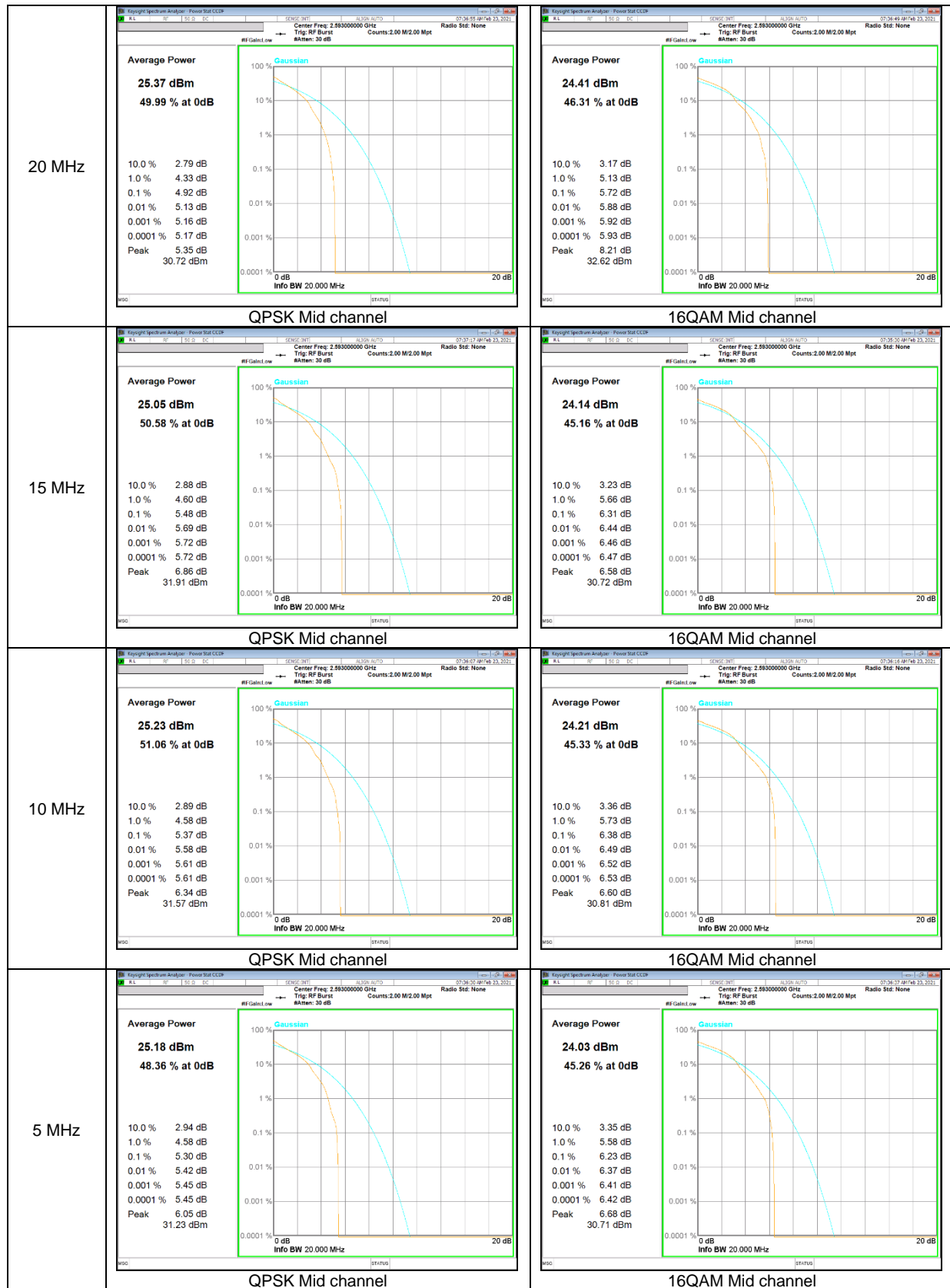




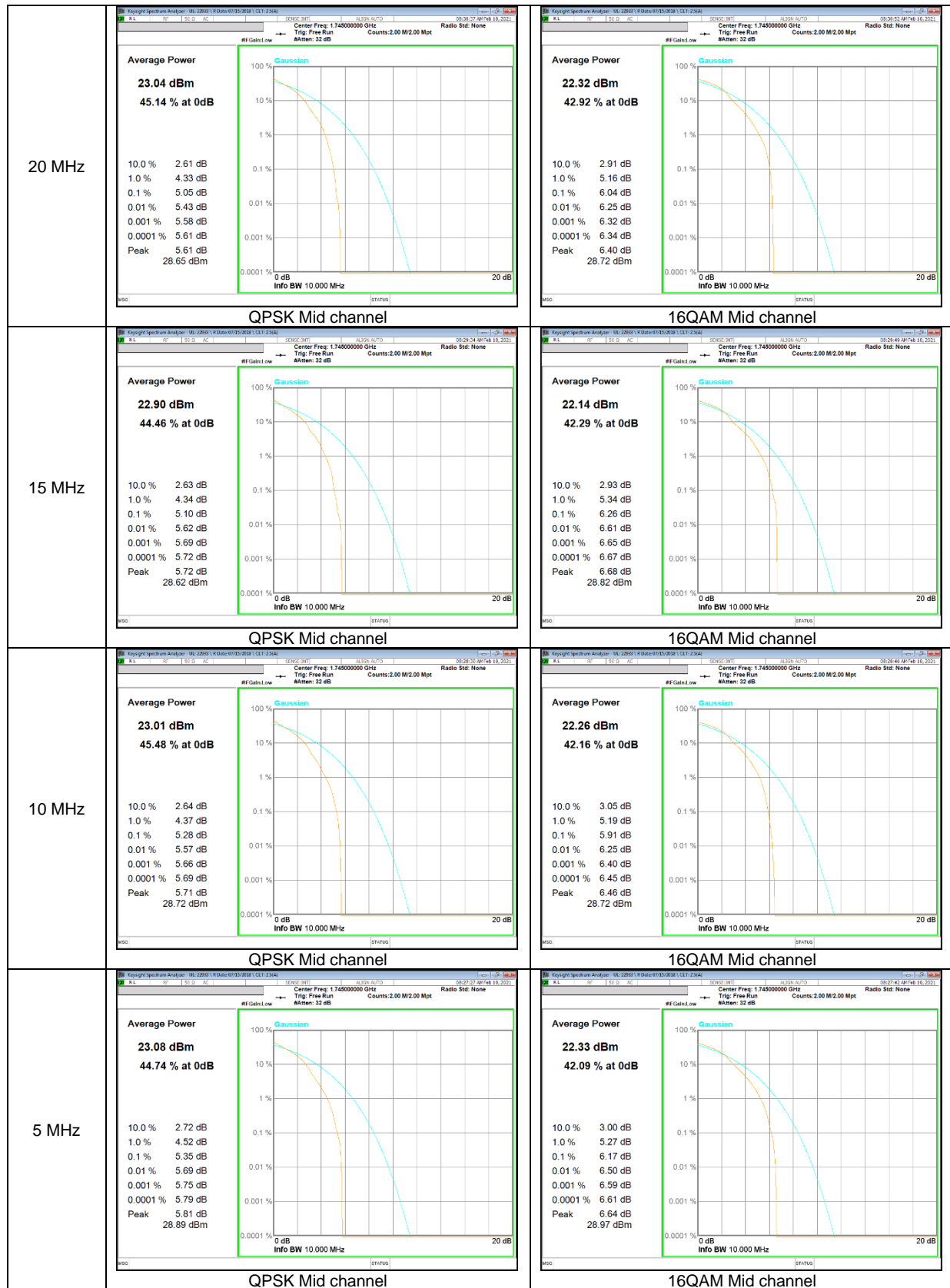
LTE Band 30

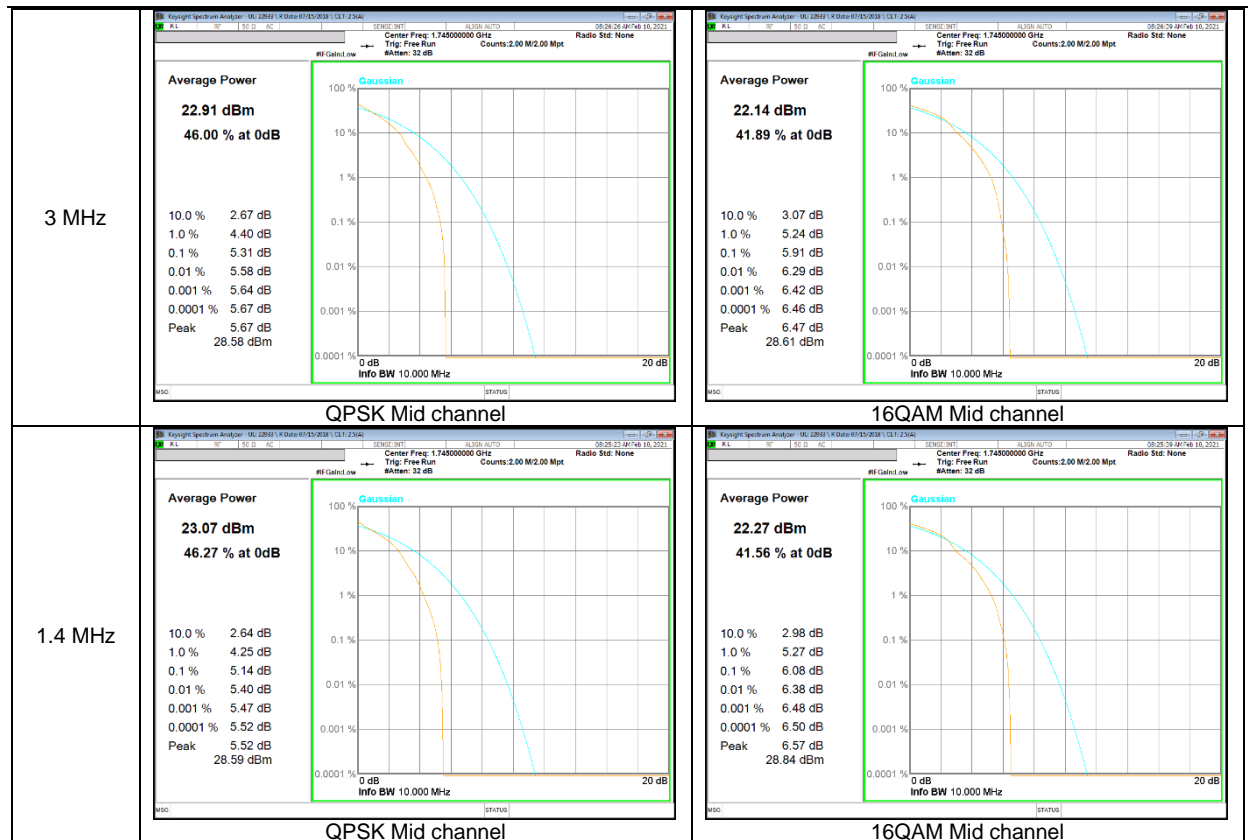


LTE Band 41 (PC2)

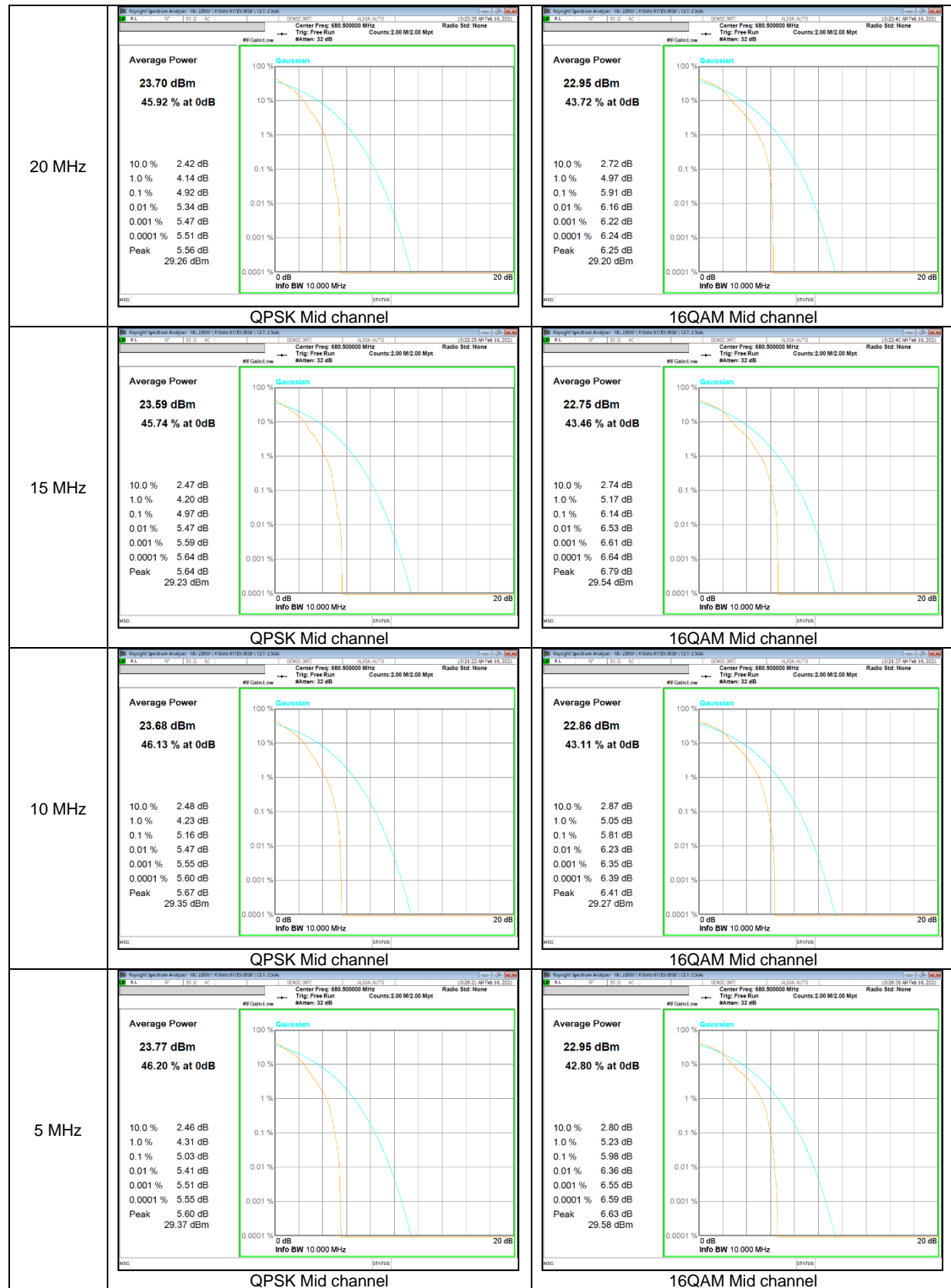


LTE Band 66





LTE Band 71



LTE Band 2

LTE Band 2(Frequency range: 1850-1910 MHz) is covered by LTE Band 25 (Frequency range: 1850-1915 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

LTE Band 4

LTE Band 4 (Frequency range: 1710-1755 MHz) is covered by LTE Band 66 (Frequency range: 1710-1780 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

LTE Band 5

LTE Band 5 (Frequency range: 824-849 MHz) is covered by LTE Band 26 (Frequency range: 814-849 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

LTE Band 38

LTE Band 38 (Frequency range: 2570-2620 MHz) is covered by LTE Band 41 (Frequency range: 2496-2690 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

LTE Band41(PC3)

LTE Band 41(PC3, Frequency range : 2496-2690 MHz) is covered by LTE Band 41(PC2) (Frequency range: 2496-2690 MHz) due to same frequency range, same channel bandwidth and maximum tune-up limit is higher than LTE Band41(PC3).

9. LIMITS AND CONDUCTED RESULTS

9.1. OCCUPIED BANDWIDTH

RULE PART(S)

FCC: §2.1049

LIMITS

For reporting purposes only

TEST PROCEDURE

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The occupied bandwidth was measured with the spectrum analyzer at the low, middle and high channel in each band. The -26dB bandwidth was also measured and recorded.

(KDB 971168 D01 Power Meas License Digital Systems v03r01)

RESULTS

See the following pages.

- GSM

Band	Modulation	f [MHz]	99% BW (kHz)	-26dB BW (kHz)
850	GPRS	836.6	245.82	318.2
	EGPRS		236.68	300.0
1900	GPRS	1880.0	244.59	317.2
	EGPRS		249.55	316.4

- CDMA

Band	Modulation	f [MHz]	99% BW (MHz)	-26dB BW (MHz)
BC 10	1xRTT	820.5	1.270	1.425
	EV-DO Rel.0		1.271	1.432
BC 0	1xRTT	836.52	1.268	1.422
	EV-DO Rel.0		1.266	1.427
BC 1	1xRTT	1880.0	1.271	1.432
	EV-DO Rel.0		1.279	1.472

- WCDMA

Band	Modulation	f [MHz]	99% BW (MHz)	-26dB BW (MHz)
B5	Rel.99	836.6	4.160	4.648
	HSDPA		4.168	4.665
B4	Rel.99	1732.6	4.162	4.644
	HSDPA		4.160	4.643
B2	Rel.99	1880.0	4.183	4.677
	HSDPA		4.175	4.671

- LTE Band 7

Band	BW	Modulation	f [MHz]	99% BW (MHz)	-26dB BW (MHz)
LTE B7	20M	QPSK	2535.0	17.878	19.090
		16QAM		17.860	19.200
	15M	QPSK	2535.0	13.427	14.480
		16QAM		13.414	14.880
	10M	QPSK	2535.0	8.959	9.670
		16QAM		8.959	9.679
5M	QPSK	2535.0	4.479	4.892	
	16QAM		4.473	4.866	

- LTE Band 12

Band	BW	Modulation	f [MHz]	99% BW (MHz)	-26dB BW (MHz)
LTE B12	10M	QPSK	707.5	8.972	10.040
		16QAM		8.968	9.796
	5M	QPSK	707.5	4.514	5.118
		16QAM		4.497	5.113
	3M	QPSK	707.5	2.681	2.885
		16QAM		2.678	2.877
1.4M	QPSK	707.5	1.083	1.283	
	16QAM		1.083	1.260	

- LTE Band 13

Band	BW	Modulation	f [MHz]	99% BW (MHz)	-26dB BW (MHz)
LTE B13	10M	QPSK	782.0	8.951	9.686
		16QAM		8.945	9.617
	5M	QPSK	782.0	4.482	4.887
		16QAM		4.483	4.890

- LTE Band 14

Band	BW	Modulation	f [MHz]	99% BW (MHz)	-26dB BW (MHz)
LTE B14	10M	QPSK	793.0	8.967	9.763
		16QAM		8.960	9.637
	5M	QPSK	793.0	4.489	4.866
		16QAM		4.492	4.889

- LTE Band 25

Band	BW	Modulation	f [MHz]	99% BW (MHz)	-26dB BW (MHz)
LTE B25	20M	QPSK	1882.5	17.941	19.640
		16QAM		17.947	20.380
	15M	QPSK	1882.5	13.475	15.250
		16QAM		13.494	14.990
	10M	QPSK	1882.5	8.982	10.090
		16QAM		8.976	10.030
	5M	QPSK	1882.5	4.503	5.116
		16QAM		4.501	5.193
	3M	QPSK	1882.5	2.681	2.910
		16QAM		2.685	2.889
	1.4M	QPSK	1882.5	1.085	1.284
		16QAM		1.090	1.303

LTE Band 26 (Part 90)

Band	BW	Modulation	f [MHz]	99% BW (MHz)	-26dB BW (MHz)
LTE B26 Part(90)	15M	QPSK	821.5	13.406	14.400
		16QAM		13.379	14.420
	10M	QPSK	819.0	8.949	9.630
		16QAM		8.944	9.597
	5M	QPSK	819.0	4.486	4.893
		16QAM		4.470	4.866
	3M	QPSK	819.0	2.683	2.901
		16QAM		2.682	2.896
	1.4M	QPSK	819.0	1.082	1.270
		16QAM		1.087	1.285

LTE Band 26 (Straddle)

Band	BW	Modulation	f [MHz]	99% BW (MHz)	-26dB BW (MHz)
LTE B26 (Straddle)	15M	QPSK	824.0	13.420	14.390
		16QAM		13.398	14.400
	10M	QPSK	824.0	8.959	9.691
		16QAM		8.954	9.613
	5M	QPSK	824.0	4.493	4.888
		16QAM		4.470	4.820
	3M	QPSK	824.0	2.687	2.876
		16QAM		2.675	2.863
	1.4M	QPSK	824.0	1.082	1.266
		16QAM		1.080	1.256

LTE Band 26 (Part 22)

Band	BW	Modulation	f [MHz]	99% BW (MHz)	-26dB BW (MHz)
LTE B26 (Part 22)	15M	QPSK	831.5	13.452	14.560
		16QAM		13.441	14.460
	10M	QPSK	831.5	8.975	9.733
		16QAM		8.960	9.572
	5M	QPSK	831.5	4.494	4.921
		16QAM		4.480	4.892
	3M	QPSK	831.5	2.681	2.884
		16QAM		2.679	2.890
	1.4M	QPSK	831.5	1.093	1.262
		16QAM		1.087	1.284

- LTE Band 30

Band	BW	Modulation	f [MHz]	99% BW (MHz)	-26dB BW (MHz)
LTE B30	10M	QPSK	2310	8.947	9.727
		16QAM		8.943	9.777
	5M	QPSK	2310	4.484	4.897
		16QAM		4.469	4.848

- LTE Band 41

Band	BW	Modulation	f [MHz]	99% BW (MHz)	-26dB BW (MHz)
LTE B41	20M	QPSK	2593.0	17.942	19.830
		16QAM		17.891	19.150
	15M	QPSK	2593.0	13.436	14.890
		16QAM		13.425	14.740
	10M	QPSK	2593.0	8.951	10.200
		16QAM		8.970	9.827
	5M	QPSK	2593.0	4.471	4.899
		16QAM		4.474	4.921

- LTE Band 66

Band	BW	Modulation	f [MHz]	99% BW (MHz)	-26dB BW (MHz)
LTE B66	20M	QPSK	1745.0	17.853	19.040
		16QAM		17.905	19.140
	15M	QPSK	1745.0	13.438	14.530
		16QAM		13.416	14.480
	10M	QPSK	1745.0	8.961	9.679
		16QAM		8.951	9.558
	5M	QPSK	1745.0	4.496	4.879
		16QAM		4.472	4.861
	3M	QPSK	1745.0	2.680	2.898
		16QAM		2.678	2.897
	1.4M	QPSK	1745.0	1.080	1.263
		16QAM		1.087	1.300

- LTE Band 71

Band	BW	Modulation	f [MHz]	99% BW (MHz)	-26dB BW (MHz)
LTE B71	20M	QPSK	680.5	17.904	19.510
		16QAM		17.900	19.500
	15M	QPSK	680.5	13.435	14.730
		16QAM		13.415	14.890
	10M	QPSK	680.5	8.972	10.070
		16QAM		8.990	10.080
	5M	QPSK	680.5	4.501	5.053
		16QAM		4.484	5.041