



CERTIFICATION TEST REPORT

Report Number. : 4790270388-E1V3

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

Model : SM-S908B/DS

FCC ID : A3LSMS908B

EUT Description : GSM/WCDMA/LTE/5G NR Phone + BT/BLE, DTS/UNII a/b/g/n/ac,ax
NFC, WPT and UWB

Test Standard(s) : FCC CFR47 PART 24 SUBPART E
FCC CFR47 PART 27 SUBPART M,O,Q

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Testing Laboratory
TL-637

Revision History

Rev.	Issue Date	Revisions	Revised By
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V2	2022-03-18	Updated to address TCB's question	Yeonhee Lim
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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.

EUT DESCRIPTION: GSM/WCDMA/LTE/5G NR Phone + BT/BLE, DTS/UNII a/b/g/n/ac,ax
NFC, WPT and UWB

MODEL NUMBER: SM-S908B/DS

SERIAL NUMBER: UJ11714M; (CONDUCTED)
UK03845M, UK03885M; (RADIATED);

DATE TESTED: 2022-01-28 ~ 2022-03-17;

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 24E and 27M,O,Q	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:



Seokhwan Hong
Suwon Lab Engineer
UL Korea, Ltd.

Tested By:



Yeonhee Lim
Suwon Lab Technician
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 24.
3. FCC CFR 47 Part 27.
4. ANSI TIA-603-E, 2016
5. ANSI C63.26, 2015
6. KDB 971168 D01 Power Meas License Digital Systems v03r01

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	
☒	Chamber 1
☒	Chamber 2
☐	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:

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

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

(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	3.02 dB
Radiated Disturbance, 30 MHz to 1 GHz	4.05 dB
Radiated Disturbance, 1 GHz to 18 GHz	5.78 dB
Radiated Disturbance, 18 GHz to 40 GHz	5.58 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 2, Clause 4.4.3 in IEC Guide 115:2007.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a GSM/WCDMA/LTE/5G NR Phone + BT/BLE, DTS/UNII a/b/g/n/ac,ax NFC, WPT and UWB. This test report addresses the WWAN operational mode.

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.
(4790270388-S1 FCC Report SAR)

NR Band n25

FCC Part 24								
Band	Frequency Range [MHz]	BandWidth [MHz]	Modulation	Mode	Conducted		Radiated	
					Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
n25	1860.0~1905.0	20	DFT-s OFDM	$\pi/2$ BPSK	23.7	234.42		
				QPSK	23.7	234.42	23.42	219.79
				16QAM	22.8	190.55	22.36	172.19
				64QAM	21.2	131.83		
				256QAM	19.0	79.43		
			CP-OFDM	QPSK	22.2	165.96		
	1857.5~1907.5	15	DFT-s OFDM	$\pi/2$ BPSK	23.7	234.42		
				QPSK	23.7	234.42	22.82	191.43
				16QAM	22.8	190.55	21.89	154.53
				64QAM	21.3	134.90		
				256QAM	18.9	77.62		
			CP-OFDM	QPSK	22.3	169.82		
	1855.0~1910.0	10	DFT-s OFDM	$\pi/2$ BPSK	23.8	239.88		
				QPSK	23.8	239.88	22.95	197.24
				16QAM	22.7	186.21	22.05	160.32
				64QAM	21.4	138.04		
				256QAM	19.0	79.43		
			CP-OFDM	QPSK	22.3	169.82		
	1852.5~1912.5	5	DFT-s OFDM	$\pi/2$ BPSK	23.8	239.88		
				QPSK	23.7	234.42	23.16	207.01
				16QAM	22.8	190.55	21.94	156.31
				64QAM	21.3	134.90		
				256QAM	19.0	79.43		
			CP-OFDM	QPSK	22.3	169.82		

NR Band n41

FCC Part 27								
Band	Frequency Range [MHz]	BandWidth [MHz]	Modulation	Mode	Conducted		Radiated	
					Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
n41	2546.0~2640.0	100	DFT-s OFDM	$\pi/2$ BPSK	24.6	288.40		
				QPSK	24.6	288.40	22.37	172.58
				16QAM	23.6	229.09	22.15	164.06
				64QAM	22.1	162.18		
				256QAM	20.1	102.33		
			CP-OFDM	QPSK	23.1	204.17		
	2541.0~2645.0	90	DFT-s OFDM	$\pi/2$ BPSK	24.5	281.84		
				QPSK	24.5	281.84	24.48	280.54
				16QAM	23.2	208.93	23.40	218.78
				64QAM	21.8	151.36		
				256QAM	19.5	89.13		
			CP-OFDM	QPSK	22.3	169.82		
	2536.0~2650.0	80	DFT-s OFDM	$\pi/2$ BPSK	24.4	275.42		
				QPSK	24.4	275.42	23.47	222.33
				16QAM	23.0	199.53	23.08	203.24
				64QAM	21.7	147.91		
				256QAM	19.6	91.20		
			CP-OFDM	QPSK	22.2	165.96		
	2526.0~2660.0	60	DFT-s OFDM	$\pi/2$ BPSK	24.6	288.40		
				QPSK	24.6	288.40	23.87	243.78
				16QAM	23.3	213.80	23.64	231.21
				64QAM	21.9	154.88		
				256QAM	19.7	93.33		
			CP-OFDM	QPSK	22.5	177.83		
	2521.0~2665.0	50	DFT-s OFDM	$\pi/2$ BPSK	24.7	295.12		
				QPSK	24.7	295.12	24.60	288.40
				16QAM	23.6	229.09	24.30	269.15
				64QAM	22.2	165.96		
				256QAM	20.1	102.33		
			CP-OFDM	QPSK	22.7	186.21		
	2516.0~2670.0	40	DFT-s OFDM	$\pi/2$ BPSK	24.8	302.00		
				QPSK	24.8	302.00	23.88	244.34
				16QAM	23.7	234.42	22.65	184.08
				64QAM	22.4	173.78		
				256QAM	20.2	104.71		
			CP-OFDM	QPSK	23.1	204.17		
	2511.0~2675.0	30	DFT-s OFDM	$\pi/2$ BPSK	24.7	295.12		
				QPSK	24.7	295.12	24.31	269.77
				16QAM	23.6	229.09	23.88	244.34
				64QAM	22.1	162.18		
				256QAM	20.0	100.00		
			CP-OFDM	QPSK	22.4	173.78		

FCC Part 27								
Band	Frequency Range [MHz]	BandWidth [MHz]	Modulation	Mode	Conducted		Radiated	
					Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
n41	2506.0~2680.0	20	DFT-s OFDM	$\pi/2$ BPSK	24.7	295.12		
				QPSK	24.7	295.12	24.18	261.82
				16QAM	23.6	229.09	23.44	220.80
				64QAM	22.2	165.96		
				256QAM	20.1	102.33		
			CP-OFDM	QPSK	22.8	190.55		
	2503.5~2683.5	15	DFT-s OFDM	$\pi/2$ BPSK	24.8	302.00		
				QPSK	24.9	309.03	24.42	276.69
				16QAM	23.7	234.42	23.55	226.46
				64QAM	22.2	165.96		
				256QAM	19.9	97.72		
			CP-OFDM	QPSK	23.2	208.93		
	2501.0~2685.0	10	DFT-s OFDM	$\pi/2$ BPSK	24.8	302.00		
				QPSK	24.8	302.00	24.02	252.35
				16QAM	23.5	223.87	22.85	192.75
				64QAM	22.2	165.96		
				256QAM	20.0	100.00		
			CP-OFDM	QPSK	23.3	213.80		

NR Band n41 (SRS1)

FCC Part 27						
Band	Frequency Range [MHz]	BandWidth [MHz]	Conducted		Radiated	
			Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
n41	2546.0~2640.0	100	20.9	123.03	20.02	100.46
	2541.0~2645.0	90	20.4	109.65		
	2536.0~2650.0	80	20.3	107.15		
	2526.0~2660.0	60	20.8	120.23		
	2521.0~2665.0	50	20.7	117.49		
	2516.0~2670.0	40	20.5	112.20		
	2511.0~2675.0	30	20.7	117.49		
	2506.0~2680.0	20	20.7	117.49		
	2503.5~2683.5	15	20.7	117.49		
	2501.0~2685.0	10	20.7	117.49		

NR Band n41 (SRS2)

FCC Part 27						
Band	Frequency Range [MHz]	BandWidth [MHz]	Conducted		Radiated	
			Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
n41	2546.0~2640.0	100	19.6	91.20	14.93	31.12
	2541.0~2645.0	90	19.3	85.11		
	2536.0~2650.0	80	19.3	85.11		
	2526.0~2660.0	60	19.5	89.13		
	2521.0~2665.0	50	19.5	89.13		
	2516.0~2670.0	40	19.4	87.10		
	2511.0~2675.0	30	19.4	87.10		
	2506.0~2680.0	20	19.5	89.13		
	2503.5~2683.5	15	19.4	87.10		
	2501.0~2685.0	10	19.4	87.10		

NR Band n41 (SRS3)

FCC Part 27						
Band	Frequency Range [MHz]	BandWidth [MHz]	Conducted		Radiated	
			Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
n41	2546.0~2640.0	100	18.4	69.18	15.81	38.11
	2541.0~2645.0	90	18.0	63.10		
	2536.0~2650.0	80	17.9	61.66		
	2526.0~2660.0	60	18.3	67.61		
	2521.0~2665.0	50	18.3	67.61		
	2516.0~2670.0	40	18.1	64.57		
	2511.0~2675.0	30	18.2	66.07		
	2506.0~2680.0	20	18.2	66.07		
	2503.5~2683.5	15	18.2	66.07		
	2501.0~2685.0	10	18.2	66.07		

NR Band n77(3450 ~ 3550 MHz)

FCC Part 27								
Band	Frequency Range [MHz]	BandWidth [MHz]	Modulation	Mode	Conducted		Radiated	
					Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
n77	3500	100	DFT-s OFDM	$\pi/2$ BPSK	24.2	263.03		
				QPSK	24.1	257.04	24.06	254.68
				16QAM	23.3	213.80	23.14	206.06
				64QAM	20.8	120.23		
				256QAM	18.8	75.86		
			CP-OFDM	QPSK	21.6	144.54		
	3495.0~3505.0	90	DFT-s OFDM	$\pi/2$ BPSK	24.3	269.15		
				QPSK	24.3	269.15	24.20	263.03
				16QAM	23.5	223.87	23.29	213.30
				64QAM	20.6	114.82		
				256QAM	18.8	75.86		
			CP-OFDM	QPSK	21.7	147.91		
	3490.0~3510.0	80	DFT-s OFDM	$\pi/2$ BPSK	24.5	281.84		
				QPSK	24.5	281.84	24.13	258.82
				16QAM	23.3	213.80	23.04	201.37
				64QAM	20.7	117.49		
				256QAM	19.2	83.18		
			CP-OFDM	QPSK	21.8	151.36		
	3485.0~3515.0	70	DFT-s OFDM	$\pi/2$ BPSK	24.5	281.84		
				QPSK	24.4	275.42	24.30	269.15
				16QAM	23.4	218.78	23.22	209.89
				64QAM	21.1	128.82		
				256QAM	19.4	87.10		
			CP-OFDM	QPSK	22.1	162.18		
	3480.0~3520.0	60	DFT-s OFDM	$\pi/2$ BPSK	24.7	295.12		
				QPSK	24.7	295.12	23.05	201.84
				16QAM	23.7	234.42	22.10	162.18
				64QAM	21.6	144.54		
				256QAM	19.6	91.20		
			CP-OFDM	QPSK	22.5	177.83		
	3475.0~3525.0	50	DFT-s OFDM	$\pi/2$ BPSK	24.2	263.03		
				QPSK	24.1	257.04	23.01	199.99
				16QAM	23.7	234.42	22.75	188.36
				64QAM	21.3	134.90		
				256QAM	19.4	87.10		
			CP-OFDM	QPSK	22.2	165.96		

FCC Part 27								
Band	Frequency Range [MHz]	BandWidth [MHz]	Modulation	Mode	Conducted		Radiated	
					Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
n77	3470.0~3530.0	40	DFT-s OFDM	$\pi/2$ BPSK	24.7	295.12		
				QPSK	24.7	295.12	23.21	209.41
				16QAM	23.6	229.09	22.45	175.79
				64QAM	22.3	169.82		
				256QAM	20.3	107.15		
			CP-OFDM	QPSK	23.1	204.17		
	3465.0~3535.0	30	DFT-s OFDM	$\pi/2$ BPSK	24.6	288.40		
				QPSK	24.7	295.12	23.14	206.06
				16QAM	23.9	245.47	22.55	179.89
				64QAM	22.3	169.82		
				256QAM	20.5	112.20		
			CP-OFDM	QPSK	23.2	208.93		
	3460.0~3540.0	20	DFT-s OFDM	$\pi/2$ BPSK	24.6	288.40		
				QPSK	24.6	288.40	23.40	218.78
				16QAM	23.7	234.42	22.86	193.20
				64QAM	22.4	173.78		
				256QAM	20.2	104.71		
			CP-OFDM	QPSK	23.1	204.17		
	3457.5~3542.5	15	DFT-s OFDM	$\pi/2$ BPSK	24.5	281.84		
				QPSK	24.7	295.12	23.54	225.94
				16QAM	24.0	251.19	22.36	172.19
				64QAM	22.3	169.82		
				256QAM	20.4	109.65		
			CP-OFDM	QPSK	23.2	208.93		
	3455.0~3545.0	10	DFT-s OFDM	$\pi/2$ BPSK	24.5	281.84		
				QPSK	24.5	281.84	23.03	200.91
				16QAM	23.4	218.78	22.75	188.36
				64QAM	22.0	158.49		
				256QAM	20.0	100.00		
			CP-OFDM	QPSK	22.9	194.98		

NR Band n77(3450 ~ 3550 MHz, SRS1)

FCC Part 27						
Band	Frequency Range [MHz]	BandWidth [MHz]	Conducted		Radiated	
			Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
n77	3500	100	16.1	40.74	14.17	26.12
	3495.0~3505.0	90	16.0	39.81		
	3490.0~3510.0	80	16.0	39.81		
	3485.0~3515.0	70	16.0	39.81		
	3480.0~3520.0	60	16.0	39.81		
	3475.0~3525.0	50	16.0	39.81		
	3470.0~3530.0	40	15.9	38.90		
	3465.0~3535.0	30	16.0	39.81		
	3460.0~3540.0	20	15.9	38.90		
	3457.5~3542.5	15	15.9	38.90		
	3455.0~3545.0	10	16.0	39.81		

NR Band n77(3450 ~ 3550 MHz, SRS2)

FCC Part 27						
Band	Frequency Range [MHz]	BandWidth [MHz]	Conducted		Radiated	
			Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
n77	3500	100	23.7	234.42	19.21	83.37
	3495.0~3505.0	90	23.6	229.09		
	3490.0~3510.0	80	23.6	229.09		
	3485.0~3515.0	70	23.7	234.42		
	3480.0~3520.0	60	23.6	229.09		
	3475.0~3525.0	50	23.6	229.09		
	3470.0~3530.0	40	23.6	229.09		
	3465.0~3535.0	30	23.6	229.09		
	3460.0~3540.0	20	23.5	223.87		
	3457.5~3542.5	15	23.5	223.87		
	3455.0~3545.0	10	23.5	223.87		

NR Band n77(3450 ~ 3550 MHz, SRS3)

FCC Part 27						
Band	Frequency Range [MHz]	BandWidth [MHz]	Conducted		Radiated	
			Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
n77	3500	100	14.7	29.51	14.46	27.93
	3495.0~3505.0	90	14.7	29.51		
	3490.0~3510.0	80	14.7	29.51		
	3485.0~3515.0	70	14.6	28.84		
	3480.0~3520.0	60	14.6	28.84		
	3475.0~3525.0	50	14.7	29.51		
	3470.0~3530.0	40	14.7	29.51		
	3465.0~3535.0	30	14.6	28.84		
	3460.0~3540.0	20	14.6	28.84		
	3457.5~3542.5	15	14.5	28.18		
	3455.0~3545.0	10	14.6	28.84		

NR Band n77(3700 ~ 3980 MHz)

FCC Part 27								
Band	Frequency Range [MHz]	BandWidth [MHz]	Modulation	Mode	Conducted		Radiated	
					Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
n77	3750.0~3930.0	100	DFT-s OFDM	$\pi/2$ BPSK	24.6	288.40		
				QPSK	24.6	288.40	25.42	348.34
				16QAM	23.7	234.42	24.32	270.40
				64QAM	22.1	162.18		
				256QAM	20.0	100.00		
			CP-OFDM	QPSK	23.0	199.53		
	3745.0~3935.0	90	DFT-s OFDM	$\pi/2$ BPSK	24.5	281.84		
				QPSK	24.5	281.84	24.60	288.40
				16QAM	23.1	204.17	23.51	224.39
				64QAM	21.8	151.36		
				256QAM	20.0	100.00		
			CP-OFDM	QPSK	22.9	194.98		
	3740.0~3940.0	80	DFT-s OFDM	$\pi/2$ BPSK	24.6	288.40		
				QPSK	24.7	295.12	23.14	206.06
				16QAM	22.7	186.21	22.98	198.61
				64QAM	21.7	147.91		
				256QAM	19.7	93.33		
			CP-OFDM	QPSK	22.5	177.83		
	3735.0~3945.0	70	DFT-s OFDM	$\pi/2$ BPSK	24.5	281.84		
				QPSK	24.5	281.84	24.15	260.02
				16QAM	23.0	199.53	23.20	208.93
				64QAM	21.6	144.54		
				256QAM	19.8	95.50		
			CP-OFDM	QPSK	22.4	173.78		
	3730.0~3950.0	60	DFT-s OFDM	$\pi/2$ BPSK	24.6	288.40		
				QPSK	24.5	281.84	24.01	251.77
				16QAM	23.0	199.53	23.12	205.12
				64QAM	21.6	144.54		
				256QAM	19.7	93.33		
			CP-OFDM	QPSK	22.6	181.97		
	3725.0~3955.0	50	DFT-s OFDM	$\pi/2$ BPSK	24.7	295.12		
				QPSK	24.7	295.12	23.90	245.47
				16QAM	23.5	223.87	23.26	211.84
				64QAM	22.2	165.96		
				256QAM	19.9	97.72		
			CP-OFDM	QPSK	23.1	204.17		

FCC Part 27								
Band	Frequency Range [MHz]	BandWidth [MHz]	Modulation	Mode	Conducted		Radiated	
					Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
n77	3720.0~3960.0	40	DFT-s OFDM	$\pi/2$ BPSK	24.8	302.00		
				QPSK	24.8	302.00	24.12	258.23
				16QAM	23.7	234.42	23.22	209.89
				64QAM	22.3	169.82		
				256QAM	20.1	102.33		
			CP-OFDM	QPSK	23.1	204.17		
	3715.0~3965.0	30	DFT-s OFDM	$\pi/2$ BPSK	24.8	302.00		
				QPSK	24.8	302.00	24.28	267.92
				16QAM	23.7	234.42	23.42	219.79
				64QAM	22.3	169.82		
				256QAM	20.4	109.65		
			CP-OFDM	QPSK	23.2	208.93		
	3710.0~3970.0	20	DFT-s OFDM	$\pi/2$ BPSK	24.7	295.12		
				QPSK	24.6	288.40	24.08	255.86
				16QAM	23.8	239.88	22.71	186.64
				64QAM	22.3	169.82		
				256QAM	20.3	107.15		
			CP-OFDM	QPSK	23.1	204.17		
	3707.5~3972.5	15	DFT-s OFDM	$\pi/2$ BPSK	24.8	302.00		
				QPSK	24.8	302.00	24.13	258.82
				16QAM	23.8	239.88	23.34	215.77
				64QAM	22.2	165.96		
				256QAM	20.5	112.20		
			CP-OFDM	QPSK	23.3	213.80		
	3705.0~3975.0	10	DFT-s OFDM	$\pi/2$ BPSK	24.7	295.12		
				QPSK	24.7	295.12	24.21	263.63
				16QAM	23.7	234.42	23.09	203.70
				64QAM	22.3	169.82		
				256QAM	20.5	112.20		
			CP-OFDM	QPSK	23.3	213.80		

NR Band n77(3700 ~ 3980 MHz, SRS1)

FCC Part 27						
Band	Frequency Range [MHz]	BandWidth [MHz]	Conducted		Radiated	
			Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
n77	3750.0~3930.0	100	15.8	38.02		
	3745.0~3935.0	90	16.2	41.69	13.11	20.46
	3740.0~3940.0	80	16.2	41.69		
	3735.0~3945.0	70	16.1	40.74		
	3730.0~3950.0	60	16.2	41.69		
	3725.0~3955.0	50	16.2	41.69		
	3720.0~3960.0	40	16.1	40.74		
	3715.0~3965.0	30	16.2	41.69		
	3710.0~3970.0	20	16.2	41.69		
	3707.5~3972.5	15	16.1	40.74		
	3705.0~3975.0	10	16.2	41.69		

NR Band n77(3700 ~ 3980 MHz, SRS2)

FCC Part 27						
Band	Frequency Range [MHz]	BandWidth [MHz]	Conducted		Radiated	
			Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
n77	3750.0~3930.0	100	24.0	251.19	15.46	35.16
	3745.0~3935.0	90	23.9	245.47		
	3740.0~3940.0	80	23.9	245.47		
	3735.0~3945.0	70	23.9	245.47		
	3730.0~3950.0	60	23.9	245.47		
	3725.0~3955.0	50	23.9	245.47		
	3720.0~3960.0	40	24.0	251.19		
	3715.0~3965.0	30	24.0	251.19		
	3710.0~3970.0	20	24.0	251.19		
	3707.5~3972.5	15	24.0	251.19		
	3705.0~3975.0	10	24.0	251.19		

NR Band n77(3700 ~ 3980 MHz, SRS3)

FCC Part 27						
Band	Frequency Range [MHz]	BandWidth [MHz]	Conducted		Radiated	
			Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
n77	3750.0~3930.0	100	14.4	27.54		
	3745.0~3935.0	90	14.3	26.92		
	3740.0~3940.0	80	14.4	27.54		
	3735.0~3945.0	70	14.4	27.54	14.10	25.70
	3730.0~3950.0	60	14.4	27.54		
	3725.0~3955.0	50	14.3	26.92		
	3720.0~3960.0	40	14.3	26.92		
	3715.0~3965.0	30	14.2	26.30		
	3710.0~3970.0	20	14.3	26.92		
	3707.5~3972.5	15	14.3	26.92		
	3705.0~3975.0	10	14.3	26.92		

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

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

Frequency (MHz)	Gain (dBi)
NR Band n2 / NR Band n25 1850 ~ 1915 MHz	-2.10
NR Band n41 2496 ~ 2690 MHz	-1.90
NR Band n41 (SRS1) 2496 ~ 2690 MHz	-6.5
NR Band n41 (SRS2) 2496 ~ 2690 MHz	-9.9
NR Band n41 (SRS3) 2496 ~ 2690 MHz	-8.4
NR Band n77(Lower) 3450 ~ 3550 MHz	-1.10
NR Band n77(Lower, SRS1) 3450 ~ 3550 MHz	-9.2
NR Band n77(Lower, SRS2) 3450 ~ 3550 MHz	-11.9
NR Band n77(Lower, SRS3) 3450 ~ 3550 MHz	-9.9
NR Band n77(Upper) 3700 ~ 3980 MHz	-1.10
NR Band n77(Upper, SRS1) 3700 ~ 3980 MHz	-9.3
NR Band n77(Upper, SRS2) 3700 ~ 3980 MHz	-10.3
NR Band n77(Upper, SRS3) 3700 ~ 3980 MHz	-9.5

5.4. WORST-CASE ORIENTATION

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

For all 5G NR Bands, the worst-case scenario for all measurements is based on the average conducted output power measurement investigation results. Output power measurements were measured on $\pi/2$ BPSK, QPSK, 16QAM, 64QAM and 256QAM modulations. It was found that QPSK and 16QAM results were worst case.

Both NSA and SA modes were tested and worst case is reported.

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

This device supports SRS (sounding reference signal) 1, 2, 3 mode for NR TDD bands. For each SRS 1, 2 and 3, Conducted power and radiated measurement were performed through FTM mode provide by the customer.

Both 'Main ANT' and 'Sub ANT' were tested and the worst case of either 'Main ANT' or 'Sub ANT' is reported. Sub ANT are SRS1, SRS2, SRS3.

Highest power setting for each bands				
NR Band	Frequency (MHz)	Bandwidth (MHz)	RB size	RB offset
25	1855.0	10	1	26
	1882.5		1	1
	1910.0		1	50
41	2501.0	10	1	22
	2593.0		1	22
	2682.5		1	12
77 (3450-3550 MHz)	3480.0	60	1	81
	3500.0		1	160
	3520.0		1	81
77 (3700-3980 MHz)	3725.0	50	1	131
	3840.0		1	1
	3955.0		1	1

For LTE anchor, the band with highest output power was chosen among the possible combinations with NR Bands.

NR Band	LTE Band
2	5, <u>12</u> , 13
25	<u>12</u> , 13
41	4, <u>12</u> , 66
77 (3450-3550 MHz)	2, 5, <u>12</u> , 13, 25, 66
77 (3700-3980 MHz)	2, 5, <u>12</u> , 13, 25, 66

i. Worst Axis Condition

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.

NR Band	ERP/EIRP			RSE		
	X	Y	Z	X	Y	Z
25	O	-	-	O	-	-
41	O	-	-	-	O	-
41 (SRS1)	O	-	-	O	-	-
41 (SRS2)	-	O	-	-	O	-
41 (SRS3)	-	-	O	-	-	O
77 (3450-3550 MHz)	-	O	-	-	O	-
77 (SRS1) (3450-3550 MHz)	-	O	-	-	O	-
77 (SRS2) (3450-3550 MHz)	-	-	O	-	-	O
77 (SRS3) (3450-3550 MHz)	-	-	O	-	-	O
77 (3700-3980 MHz)	-	O	-	-	-	O
77 (SRS1) (3700-3980 MHz)	O	-	-	O	-	-
77 (SRS2) (3700-3980 MHz)	-	-	O	-	-	O
77 (SRS3) (3700-3980 MHz)	-	-	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.

NR Band 2

NR Band 2 (Frequency range: 1850-1910 MHz) is covered by NR Band n25 (Frequency range: 1850-1915 MHz, FCC Part 24) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

NR Band 41 (SRS1,2,3)

NR Band 41 SRS (Frequency range: 2496-2690 MHz) is covered by NR Band 41 Main due to lower maximum tune-up.

NR Band 77 (SRS1,2,3)

NR Band 77 SRS (Frequency range: 3450-3550 MHz, 3700~3980 MHz) is covered by NR Band 77 Main due to lower maximum tune-up.

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacture	Model	Serial Number	FCC ID
Charger	SAMSUNG	EP-TA800	R37N9BV0382HM3	N/A
Data Cable	SAMSUNG	EP-DN980BBE	N/A	N/A

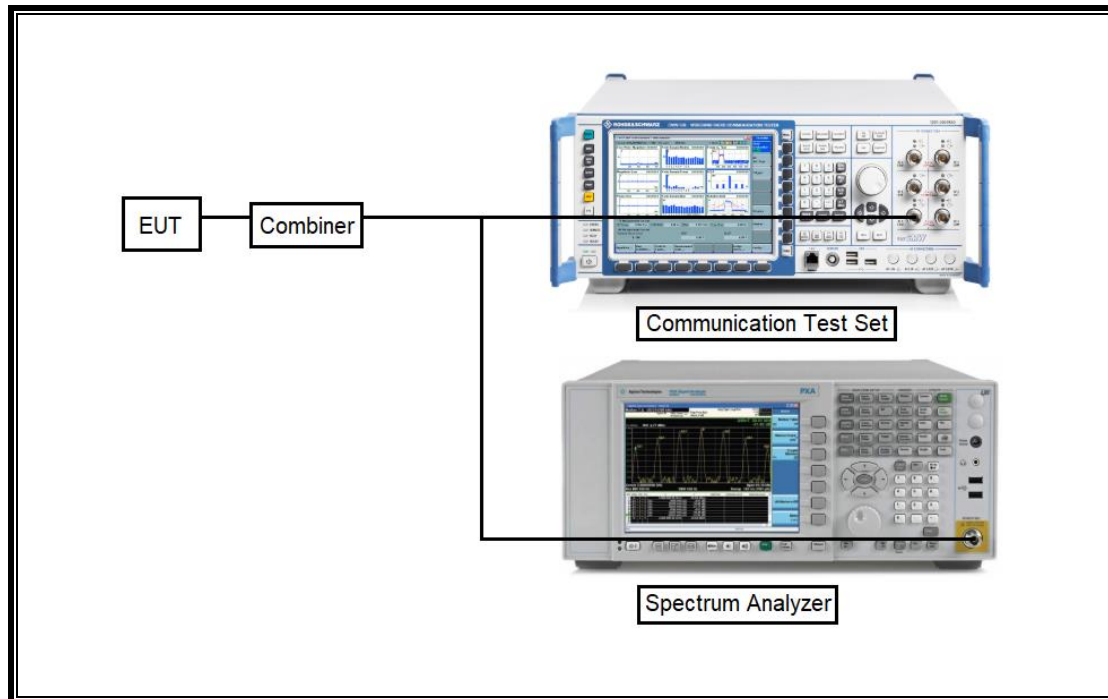
I/O CABLE

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

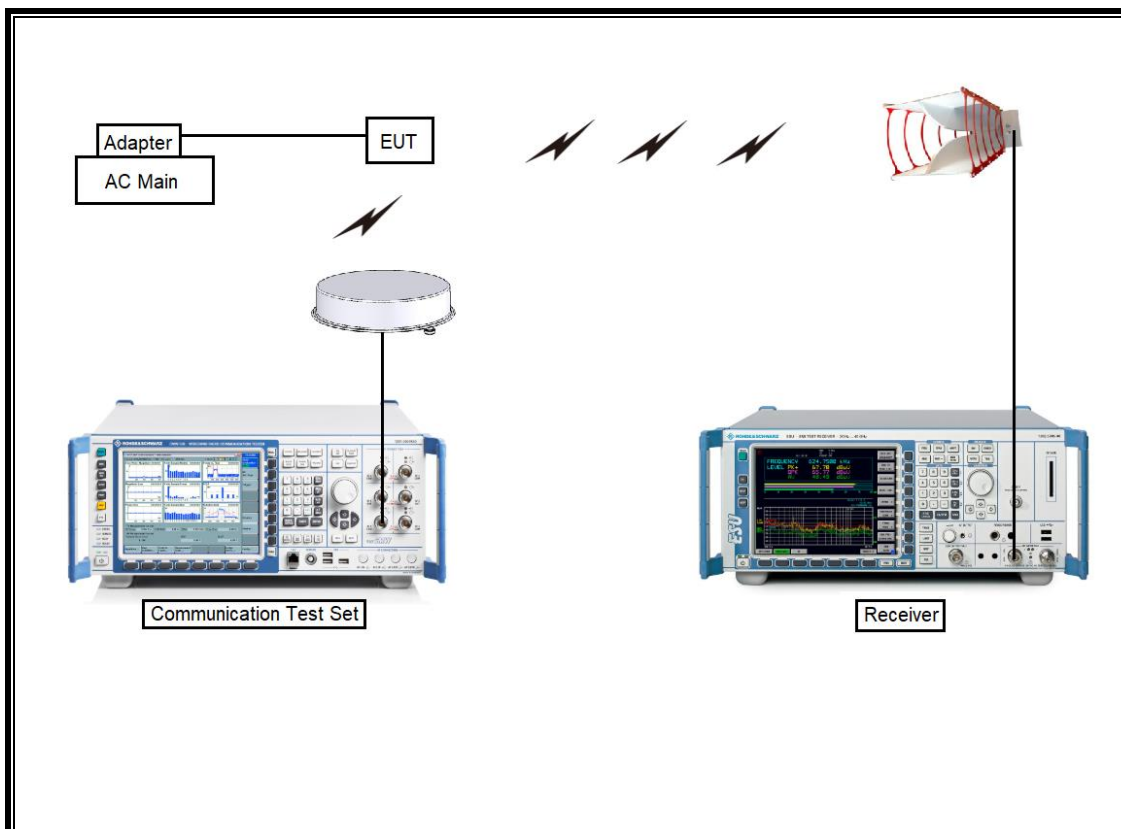
TEST SETUP

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	3121D DB4	00164753	2023-02-08
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, Horn, 40 GHz	ETS	3116C	00166155	2022-08-04
Antenna, Horn, 40 GHz	ETS	3116C	00168645	2023-10-13
Preamplifier	ETS	3116C-PA	00168841	2022-08-04
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	750	2022-08-19
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	845	2022-08-13
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	2022-08-13
Antenna, Horn, 18 GHz	ETS	3115	00167211	2022-07-27
Antenna, Horn, 18 GHz	ETS	3115	00161451	2022-08-15
Antenna, Horn, 18 GHz	ETS	3117	00168724	2022-07-27
Antenna, Horn, 18 GHz	ETS	3117	00168717	2022-08-15
Communications Test Set	R&S	CMW500	169796	2023-01-07
DC Power Supply	Agilent / HP	E3640A	MY54226395	2022-08-02
Preamplifier, 1000 MHz	Sonoma	310N	341282	2022-08-02
Preamplifier, 1000 MHz	Sonoma	310N	370599	2022-08-02
Preamplifier, 1000 MHz	Sonoma	310N	351741	2022-08-02
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	2022-08-02
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029168	2022-08-02
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	2022-08-02
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	2022-08-04
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	2022-08-04
EMI Test Receive, 40 GHz	R&S	ESU40	100439	2022-08-02
EMI Test Receive, 40 GHz	R&S	ESU40	100457	2022-08-02
High Pass Filter 1.2GHz	Micro-Tronics	HPM50108-02	G005	2022-08-03
High Pass Filter 1.2GHz	Micro-Tronics	HPM50108-02	G006	2022-08-02
High Pass Filter 2.8GHz	Micro-Tronics	HPM50111-02	010	2022-08-03
High Pass Filter 2.8GHz	Micro-Tronics	HPM50111-02	011	2022-08-02
High Pass Filter 4GHz	Micro-Tronics	HPM50118-02	G001	2022-08-03
High Pass Filter 4GHz	Micro-Tronics	HPM50118-02	G002	2022-08-02
Attenuator	PASTERNAK	PE7087-10	A009	2022-08-03
Attenuator	PASTERNAK	PE7087-10	A001	2022-08-03
Attenuator	PASTERNAK	PE7087-10	A008	2022-08-03
Attenuator	PASTERNAK	PE7004-10	2	2022-08-02
Attenuator	PASTERNAK	PE7395-10	A011	2022-08-03
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	2023-10-06
Temperature Chamber	ESPEC	SH-642	93001109	2022-08-02
Power Splitter	MINI-CIRCUITS	WA1534	UL003	2023-01-11
Power Splitter	MINI-CIRCUITS	WA1534	UL004	2023-01-11
UXM 5G Wireless Test Platform	KEYSIGHT	E7515B	MY58120110	2023-01-07
UL Software				
Description	Manufacturer	Model	Version	
Antenna port test software	UL	CLT	Ver 3.4	
Radiated software	UL	UL EMC	Ver 9.5	
Antenna port test software (5G NR FR1)	UL	UL iM	Ver 1.06	

7. SUMMARY TABLE

FCC Part Section	Test Description	Test Limit	Test Condition	Test Result
2.1049	Occupied Band width (99%)	N/A	Conducted	Pass
24.238(a) 27.53(l)(2) 27.53(n)(2)	Band Edge / Conducted Spurious Emission	-13dBm		Pass
27.53(m)	Conducted Spurious Emission	-25dBm		Pass
27.53(m)	Emission mask	Section 9.2.2		Pass
2.1046	Conducted output power	N/A		Pass
24.235 27.54	Frequency Stability	2.5PPM		Pass
24.232(c) 27.50(h)(2) 27.50(j)(3) 27.50(k)(3)	Equivalent Isotropic Radiated Power	33dBm	Radiated	Pass
24.238(a)	Radiated Spurious Emission	-13dBm		Pass
27.53 (m) 27.53(l)(2) 27.53(n)(2)		-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 E7515B 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.

NOTE

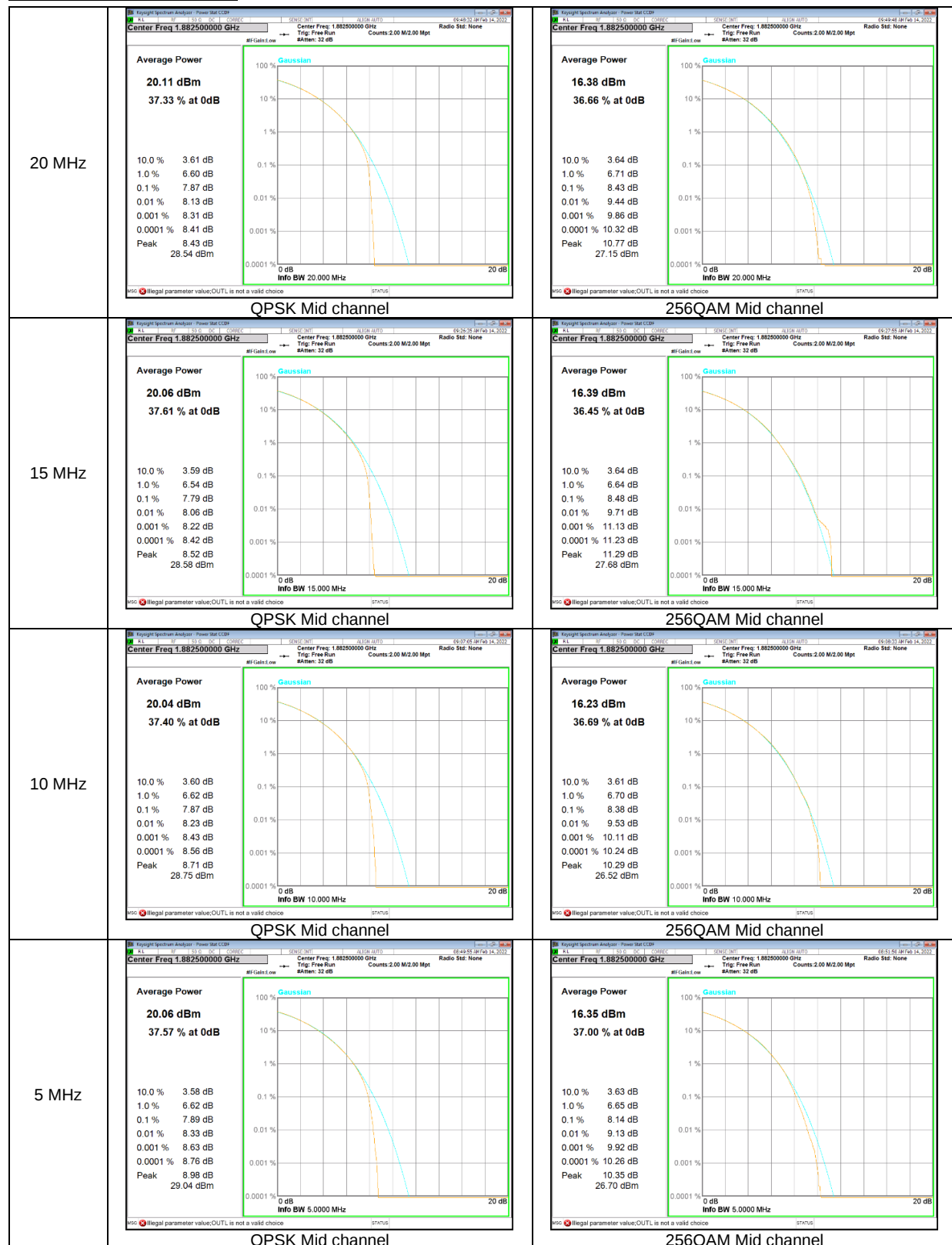
5G NR: All Waveforms (CP-OFDM vs DFT-s OFDM) and modulations ($\pi/2$ BPSK, QPSK, 16QAM, 64QAM, 256QAM) were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

RESULTS

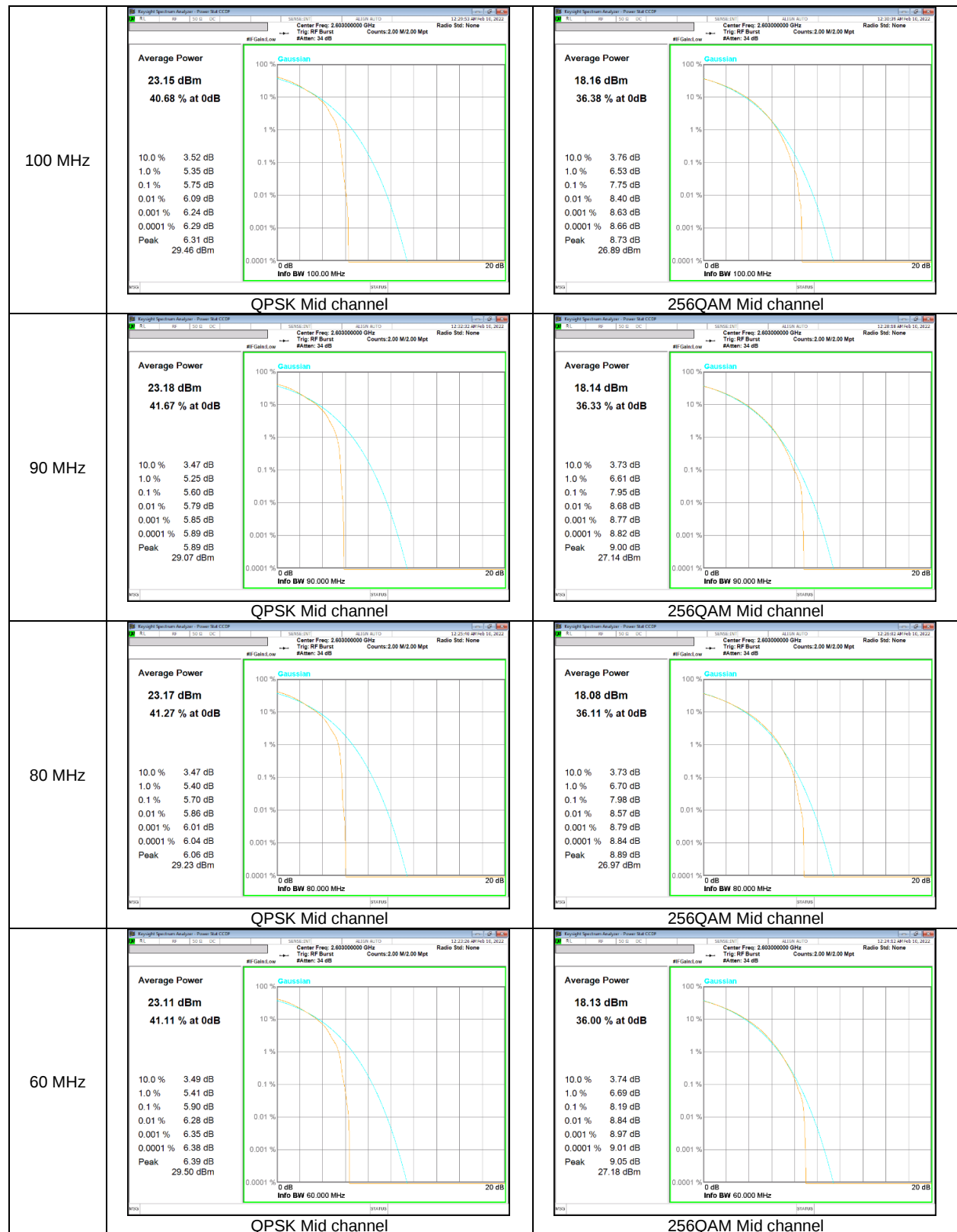
See the following pages.

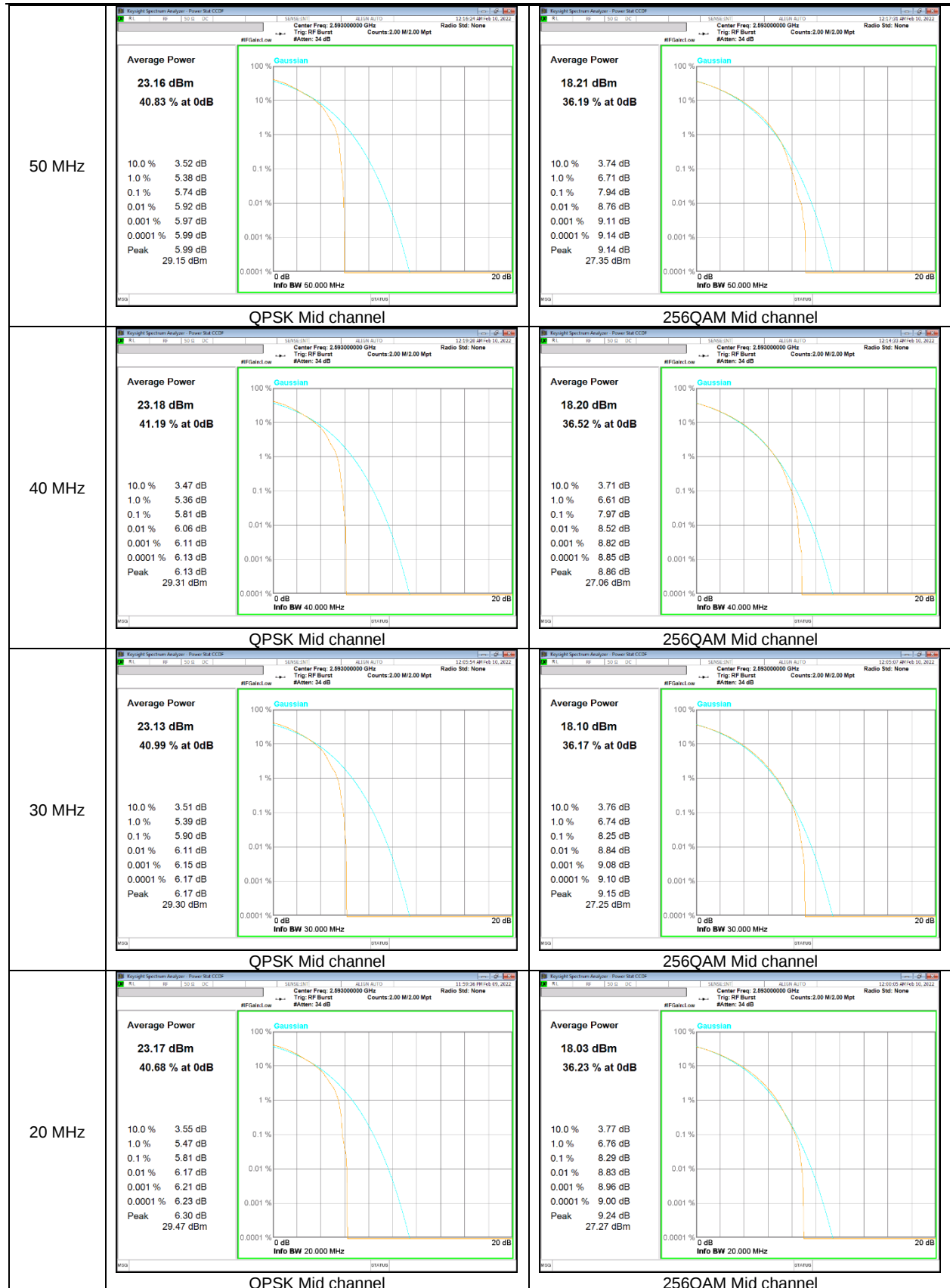
8.1. CONDUCTED PEAK TO AVERAGE RESULT

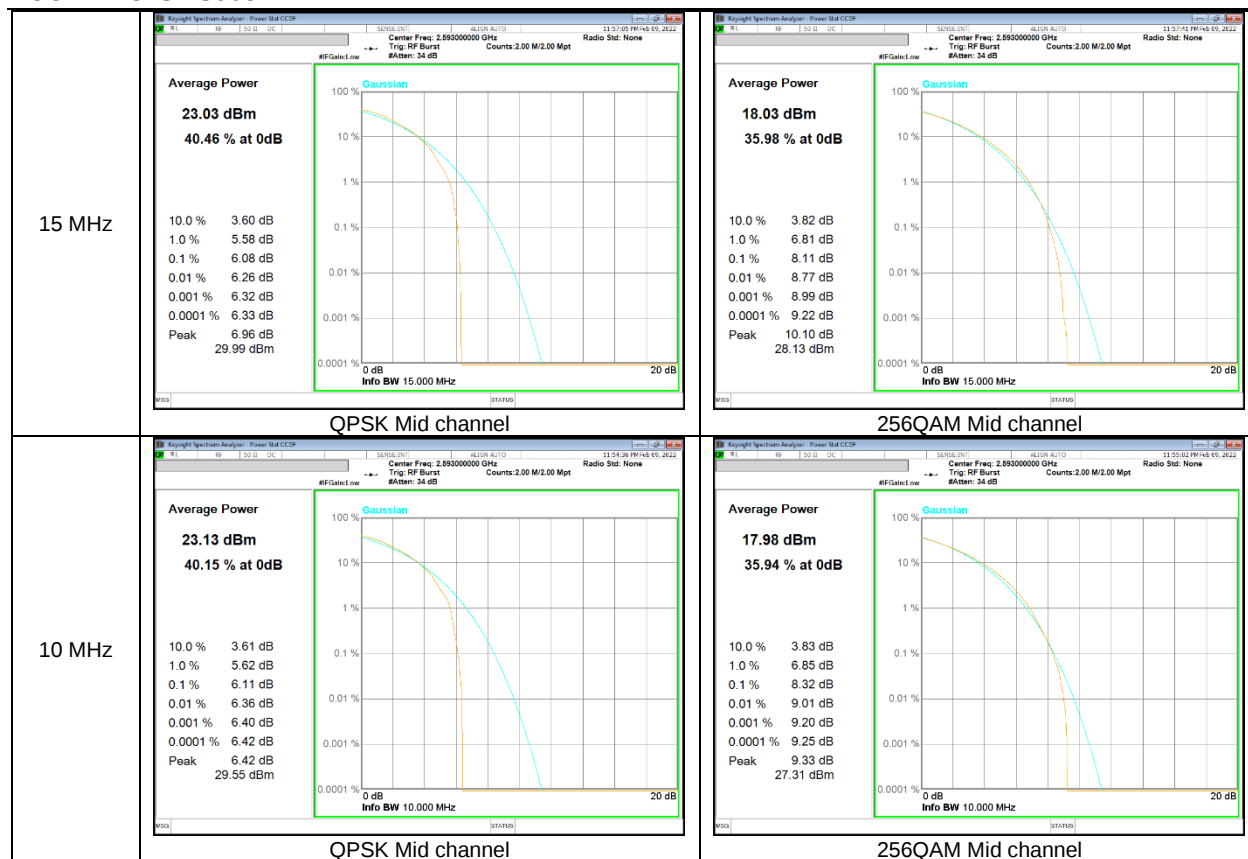
NR Band n25 CP-OFDM

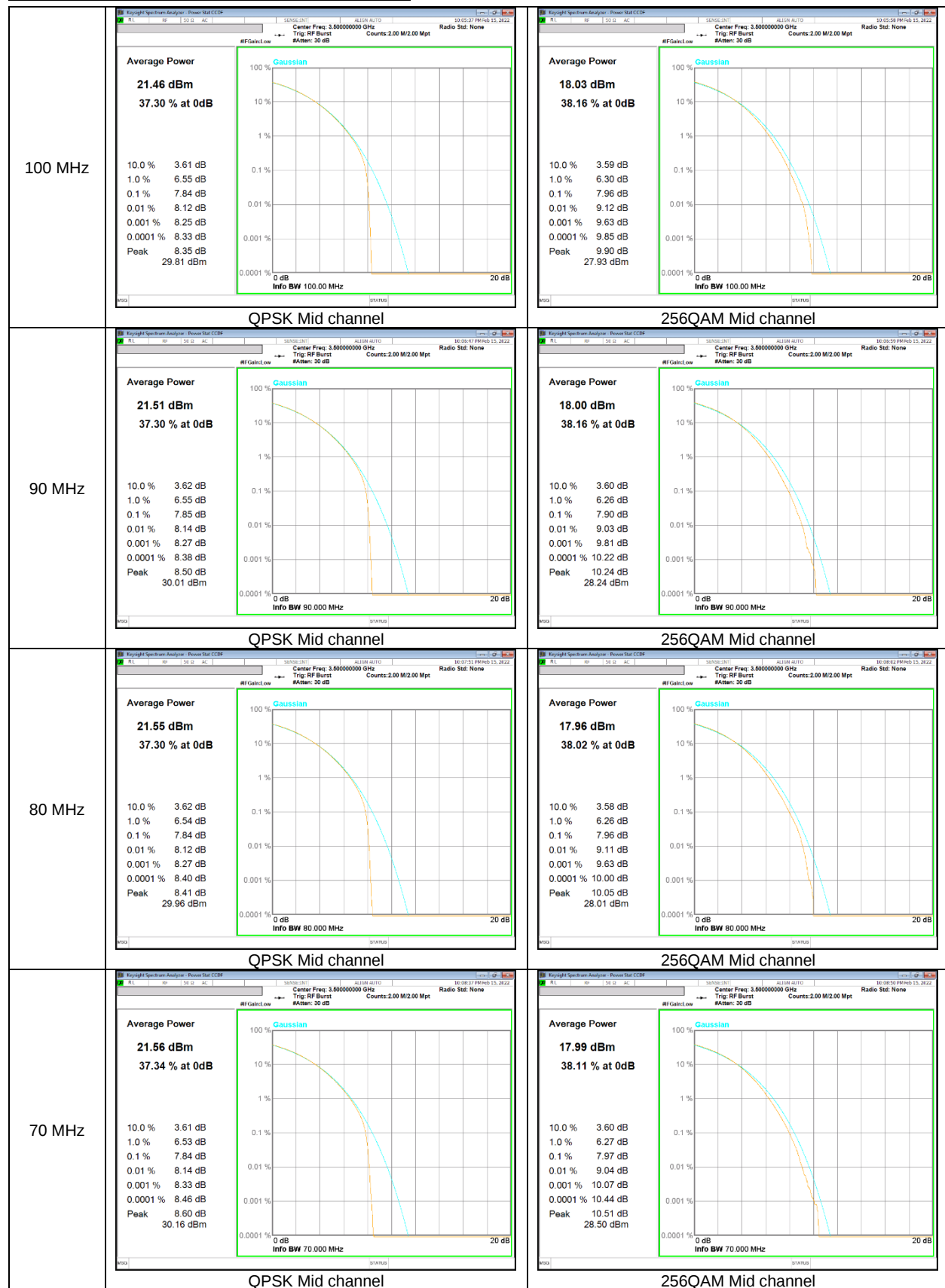


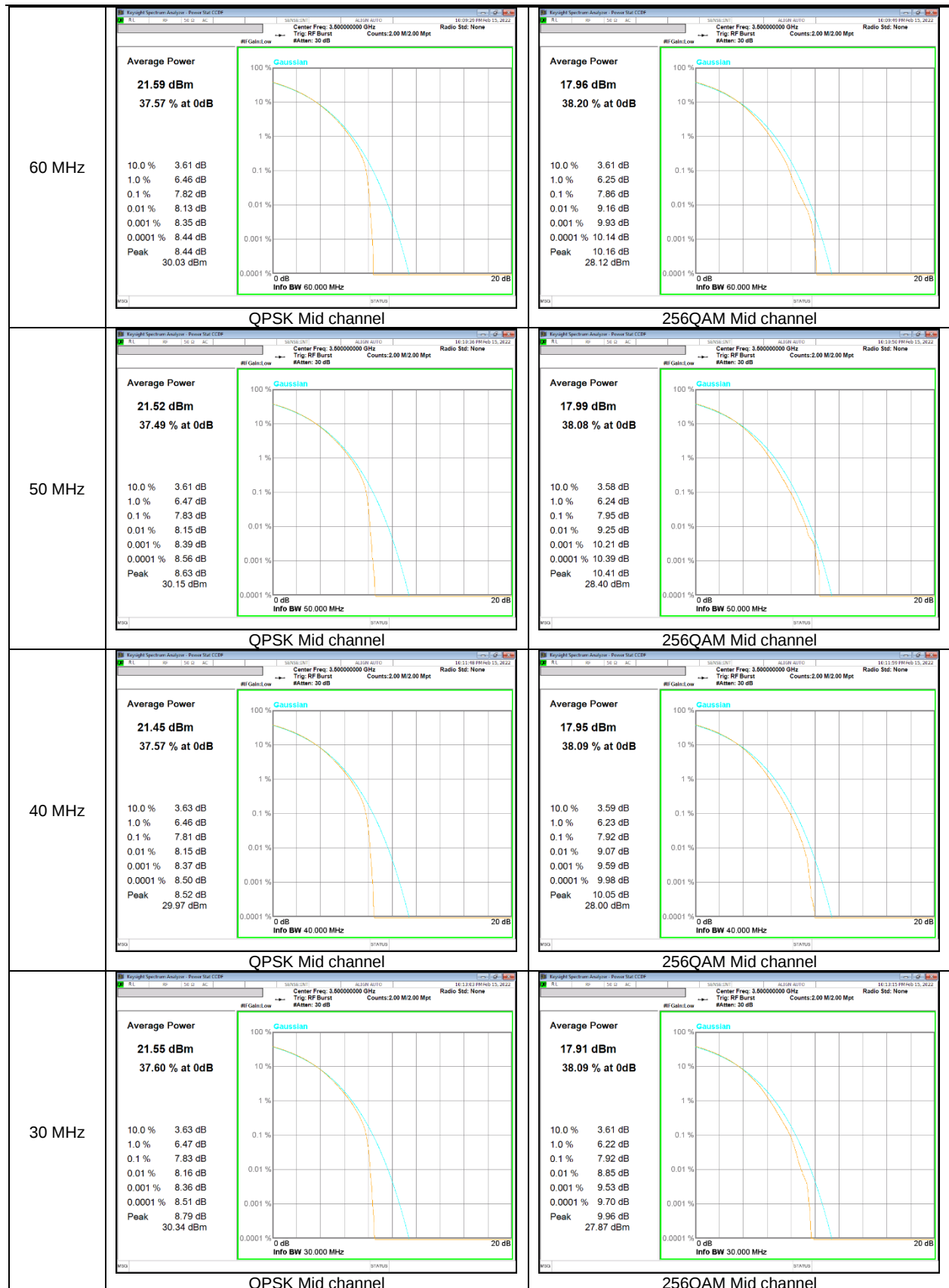
NR Band n41 CP-OFDM

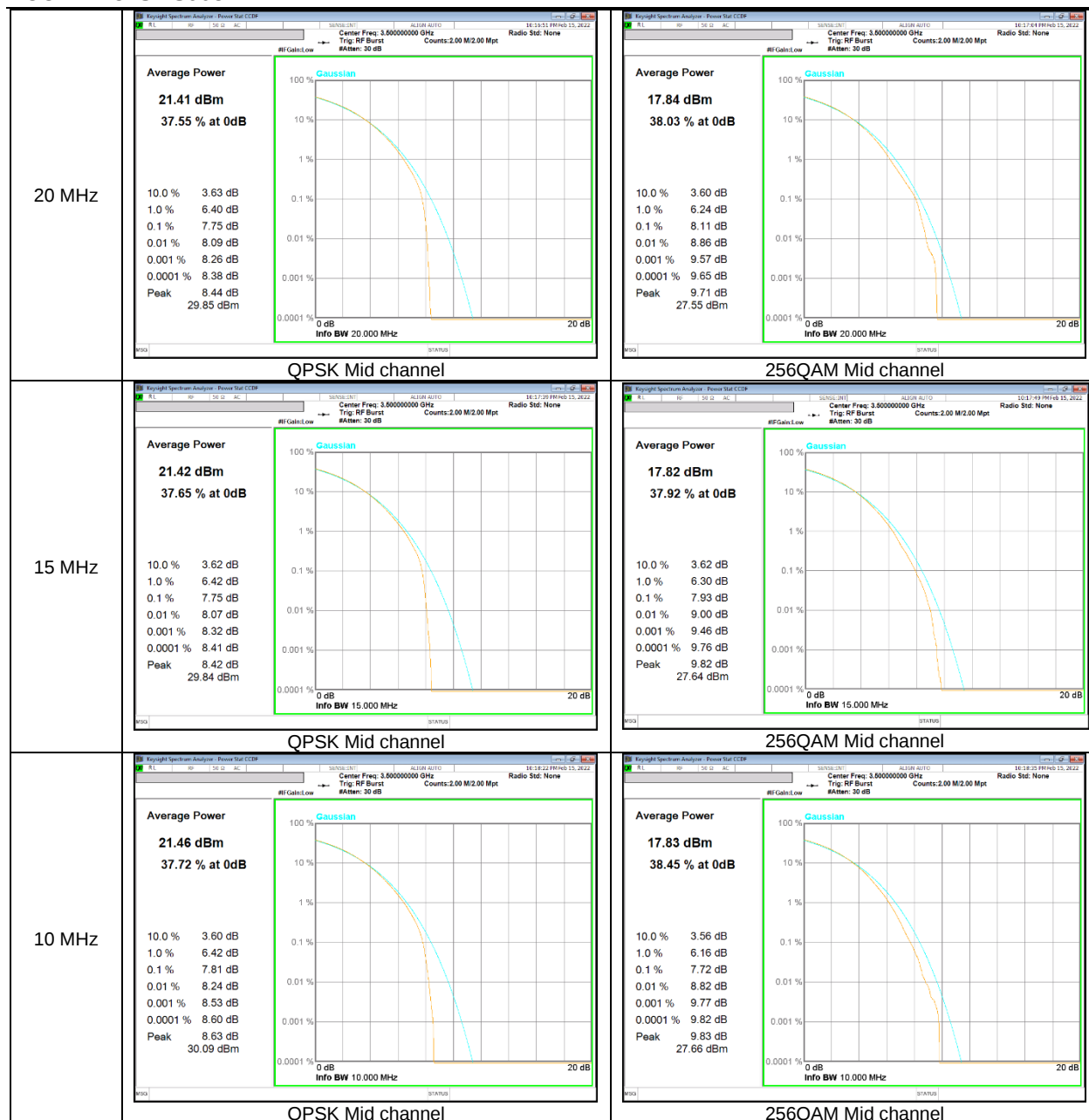


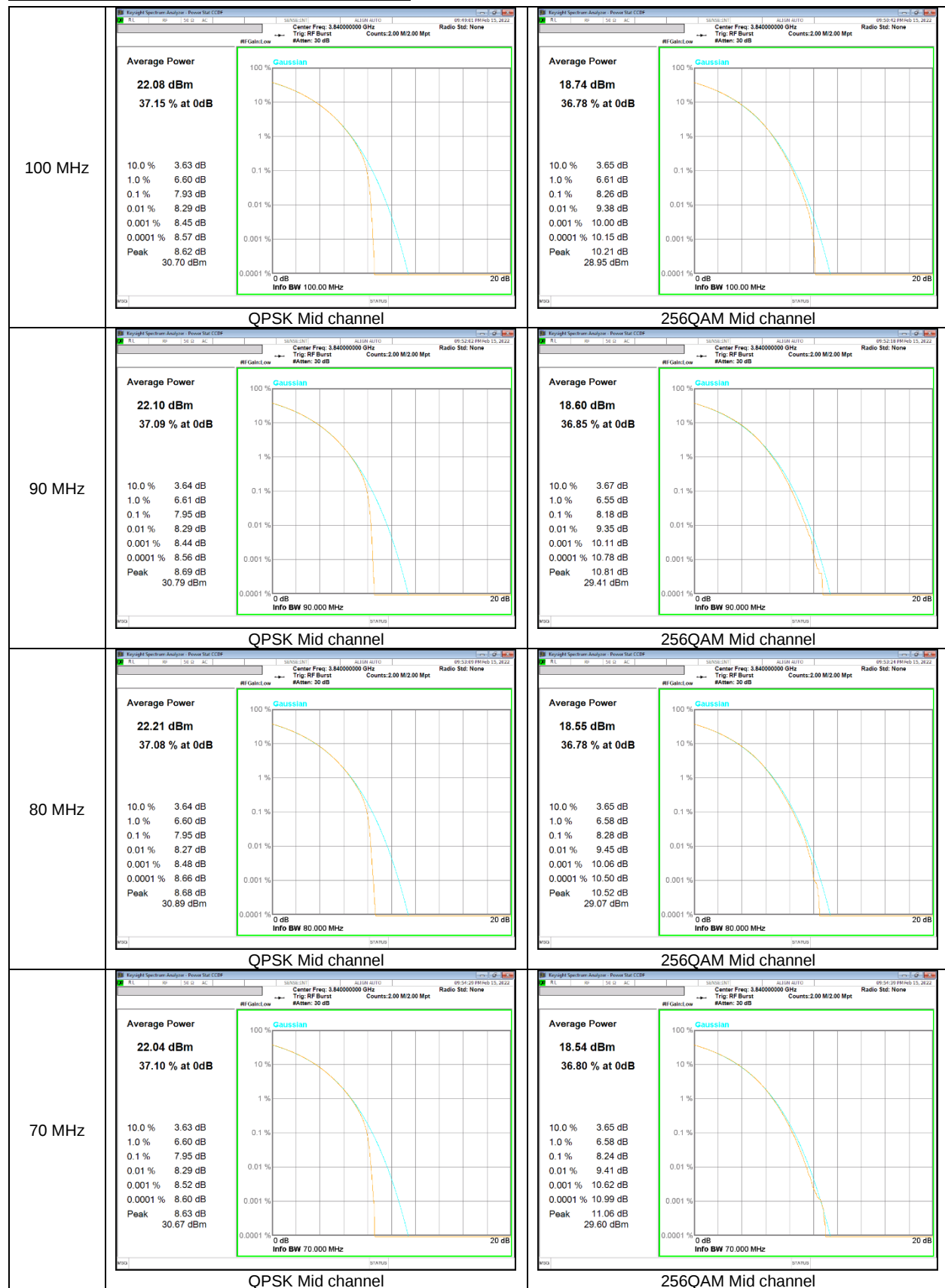


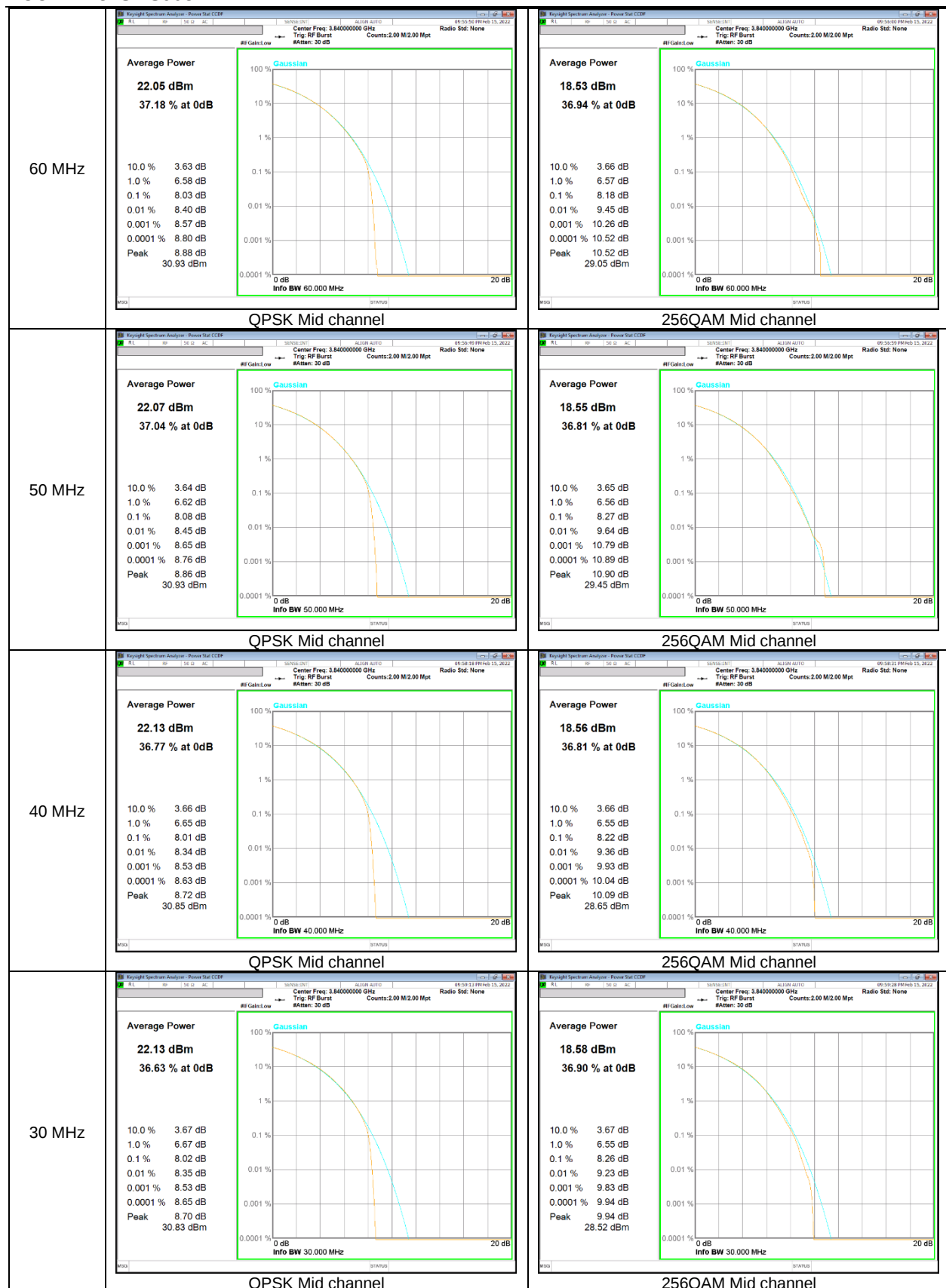


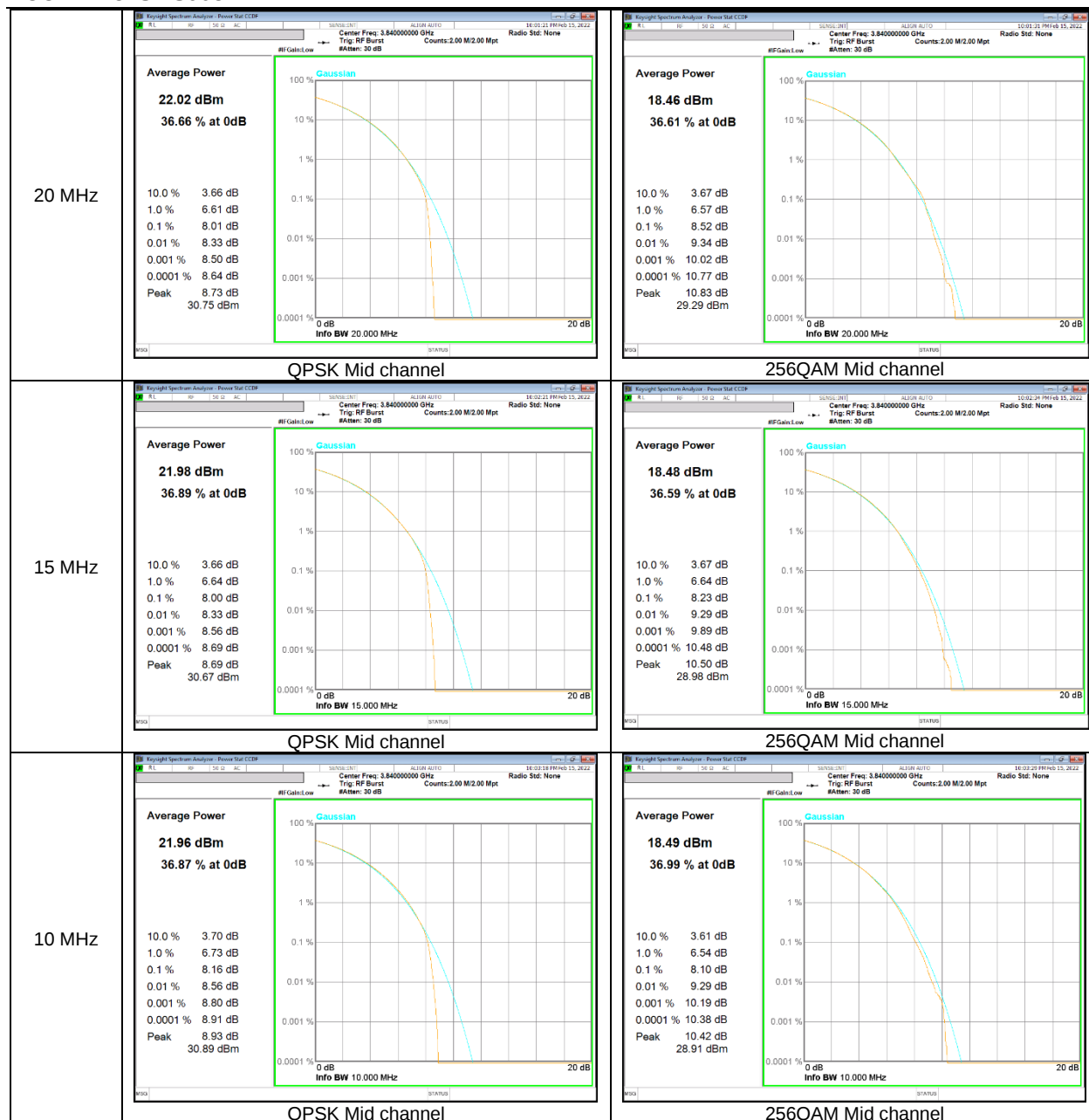
NR Band n77 (3450 – 3550 MHz) CP-OFDM





NR Band n77 (3700 – 3980 MHz) CP-OFDM





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 middle 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.

- NR Band n25 CP-OFDM

Band	BW	Modulation	f [MHz]	99% BW (MHz)	-26dB BW (MHz)
NR n25	20M	QPSK	1882.5	18.965	20.43
		16QAM		18.939	20.36
	15M	QPSK	1882.5	14.138	15.20
		16QAM		14.096	15.20
	10M	QPSK	1882.5	9.301	10.20
		16QAM		9.325	10.35
	5M	QPSK	1882.5	4.494	5.36
		16QAM		4.482	5.22

- NR Band n41 CP-OFDM

Band	BW	Modulation	f [MHz]	99% BW (MHz)	-26dB BW (MHz)
NR n41	100M	QPSK	2593.0	96.185	100.3
		16QAM		96.417	101.6
	90M	QPSK	2593.0	86.639	89.69
		16QAM		86.366	89.68
	80M	QPSK	2593.0	76.692	80.00
		16QAM		76.563	79.23
	60M	QPSK	2593.0	57.182	61.15
		16QAM		57.070	59.79
	50M	QPSK	2593.0	47.037	49.18
		16QAM		46.987	49.18
	40M	QPSK	2593.0	37.522	39.96
		16QAM		37.411	39.06
	30M	QPSK	2593.0	27.752	29.29
		16QAM		27.725	29.49
	20M	QPSK	2593.0	18.270	19.63
		16QAM		18.215	19.37
	15M	QPSK	2593.0	13.521	14.62
		16QAM		13.567	15.01
	10M	QPSK	2593.0	8.605	10.13
		16QAM		8.610	9.93

- NR Band n77 (3450 – 3550 MHz) CP-OFDM

Band	BW	Modulation	f [MHz]	99% BW (MHz)	-26dB BW (MHz)
NR n77	100M	QPSK	3500.0	97.450	103.1
		16QAM		97.323	104.9
	90M	QPSK	3500.0	87.493	92.39
		16QAM		87.082	92.60
	80M	QPSK	3500.0	77.372	83.83
		16QAM		77.598	82.88
	70M	QPSK	3500.0	67.591	73.17
		16QAM		67.436	73.23
	60M	QPSK	3500.0	57.823	62.83
		16QAM		57.898	63.99
	50M	QPSK	3500.0	47.527	51.26
		16QAM		47.479	51.32
	40M	QPSK	3500.0	37.950	40.76
		16QAM		37.980	41.02
	30M	QPSK	3500.0	27.947	29.63
		16QAM		27.867	29.80
	20M	QPSK	3500.0	18.238	19.87
		16QAM		18.300	19.99
	15M	QPSK	3500.0	13.607	15.04
		16QAM		13.600	15.14
	10M	QPSK	3500.0	8.631	9.97
		16QAM		8.638	10.20

- NR Band n77 (3700 – 3980 MHz) CP-OFDM

Band	BW	Modulation	f [MHz]	99% BW (MHz)	-26dB BW (MHz)
NR n77	100M	QPSK	3840.0	97.103	103.3
		16QAM		97.242	102.9
	90M	QPSK	3840.0	87.330	94.58
		16QAM		87.326	94.04
	80M	QPSK	3840.0	77.579	84.03
		16QAM		77.312	82.30
	70M	QPSK	3840.0	67.410	72.69
		16QAM		67.396	73.39
	60M	QPSK	3840.0	57.887	64.53
		16QAM		57.720	63.78
	50M	QPSK	3840.0	47.531	50.93
		16QAM		47.508	50.43
	40M	QPSK	3840.0	37.983	41.14
		16QAM		37.924	41.10
	30M	QPSK	3840.0	27.901	30.00
		16QAM		27.989	29.54
	20M	QPSK	3840.0	18.250	20.04
		16QAM		18.259	19.87
	15M	QPSK	3840.0	13.596	15.23
		16QAM		13.607	15.10
	10M	QPSK	3840.0	8.625	9.92
		16QAM		8.636	9.95

9.1.1. OCCUPIED BANDWIDTH RESULTS

NR Band n25 CP-OFDM



NR Band n41 CP-OFDM





