



# CERTIFICATION TEST REPORT

**Report Number.** : 4790136529-E3V3

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

**Model** : SM-N985F1/DS, SM-N985F1

**FCC ID** : A3LSMN985F1

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

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

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Revision History

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V1	2021-11-12	Initial issue	Yeonhee Lim
V2	2021-11-19	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 Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax, UWB, WPT and NFC

**MODEL NUMBER:** SM-N985F1/DS, SM-N985F1

**SERIAL NUMBER:** R3CR90Y677T, R3CR90Y68DE (CONDUCTED, Original);  
R3CR90Y67BD, R3CR90Y687N (RADIATED, Original);  
R38R900W1EB (RADIATED, Spot-Check)

**DATE TESTED:** 2021-10-22 ~ 2021-11-05(Original);  
2021-11-03 ~ 2021-11-12(Spot-Check);

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 22H, 24E, 27H, 27L, 27F, 27M and 90S	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  
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UL Korea, Ltd.

Tested By:



Yeonhee Lim  
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## 1.1. INTRODUCTION OF TEST DATA REUSE

This report referenced from the FCC ID: A3LSMN986B1 PCE WWAN (FCC CFR 47 Part 22,24,27,90). And the applicant takes full responsibility that the test data as referenced in this report represent compliance for this FCC ID.

## 1.2. DIFFERENCE

The FCC ID: A3LSMN985F1 shares the same enclosure and circuit board as FCC ID: A3LSMN986B1. The WWAN antennas and surrounding circuitry and layout are identical between these two units.

After confirming through preliminary radiated emissions that the performance of the FCC ID: A3LSMN986B1 remains representative of FCC ID: A3LSMN985F1. The test data of FCC ID: A3LSMN986B1 being submitted for this application to cover WWAN features.

## 1.3. SPOT CHECK VERIFICATION DATA

(Worst case of the ERP/EIRP and radiated spurious emissions)

Band	Test Item	Worst Mode	Frequency	Test Limit	Original model	Spot check model	Deviation	Remark
					SM-N986B1/DS Results	SM-N985F1/DS Results		
					FCC ID : A3LSMN986B1	FCC ID : A3LSMN985F1		
GSM 850	ERP	GPRS	836.6 MHz	38.50 dBm	29.54 dBm	29.10 dBm	-0.44 dB	
	RSE	GPRS	1673.2 MHz	-13.00 dBm	-47.40 dBm	-53.80 dBm	-6.40 dB	
GSM 1900	EIRP	GPRS	1880.0 MHz	33.00 dBm	30.81 dBm	30.85 dBm	0.04 dB	
	RSE	GPRS	7639.2 MHz	-13.00 dBm	-48.30 dBm	-47.40 dBm	0.90 dB	
WCDMA Band 2	EIRP	Rel99	1907.6 MHz	33.00 dBm	22.26 dBm	22.78 dBm	0.52 dB	
	RSE	Rel99	7630.4 MHz	-13.00 dBm	-48.10 dBm	-48.10 dBm	0.00 dB	
WCDMA Band 4	EIRP	Rel99	1752.6 MHz	30.00 dBm	23.51 dBm	23.77 dBm	0.26 dB	
	RSE	Rel99	7010.4 MHz	-13.00 dBm	-47.90 dBm	-48.00 dBm	-0.10 dB	
WCDMA Band 5	ERP	Rel99	826.4 MHz	38.50 dBm	21.02 dBm	20.25 dBm	-0.77 dB	
	RSE	Rel99	3386.4 MHz	-13.00 dBm	-53.70 dBm	-51.10 dBm	2.60 dB	
LTE Band 12	ERP	5M QPSK	701.5 MHz	34.80 dBm	19.60 dBm	20.52 dBm	0.92 dB	
	RSE	3M QPSK	2858.0 MHz	-13.00 dBm	-55.00 dBm	-52.50 dBm	2.50 dB	
LTE Band 13	ERP	5M QPSK	779.5 MHz	34.80 dBm	20.73 dBm	20.79 dBm	0.06 dB	
	RSE	5M QPSK	1559.0 MHz	-13.00 dBm	-69.90 dBm	-69.90 dBm	0.00 dB	
LTE Band 25	ERP	20M QPSK	1882.5 MHz	33.00 dBm	22.61 dBm	24.00 dBm	1.39 dB	
	RSE	15M QPSK	7630.0 MHz	-13.00 dBm	-49.40 dBm	-49.20 dBm	0.20 dB	
LTE Band 26 Part 22	ERP	10M QPSK	824.0 MHz	38.50 dBm	20.73 dBm	20.43 dBm	-0.30 dB	
	RSE	15M QPSK	3366.0 MHz	-13.00 dBm	-53.60 dBm	-53.90 dBm	-0.30 dB	
LTE Band 26 Part 90	ERP	3M QPSK	822.5 MHz	50.00 dBm	20.44 dBm	20.21 dBm	-0.23 dB	
	RSE	15M QPSK	3286.0 MHz	-13.00 dBm	-54.20 dBm	-54.20 dBm	0.00 dB	
LTE Band 41	EIRP	20M QPSK	2506.0 MHz	33.00 dBm	24.63 dBm	25.62 dBm	0.99 dB	
	RSE	20M QPSK	10720.0 MHz	-25.00 dBm	-56.50 dBm	-58.80 dBm	-2.30 dB	
LTE Band 66	EIRP	10M QPSK	1715.0 MHz	30.00 dBm	23.96 dBm	24.35 dBm	0.39 dB	
	RSE	3M QPSK	7114.0 MHz	-13.00 dBm	-49.10 dBm	-48.80 dBm	0.30 dB	

Comparison of two models, upper deviation is within 3 dB range and all test results are under FCC Technical Limits.

**1.4. REFERENCE DETAIL**

Reference application that contains the reused reference data in the individual test reports:

Equipment Class	Reference FCC ID (Parent)	Application Type	Reference Test report number	Exhibit Type	Variant Test Report Number	Data Re-used
PCE	A3LSMN986B1	Original Grant	4790136523-E3	Test Report	4790136529-E3	All
DTS	A3LSMN986B1	Original Grant	4790136523-E4 (802.11b/g/n/ax)	Test Report	4790136529-E4 (802.11b/g/n/ax)	All
			4790136523-E5 Bluetooth LE	Test Report	4790136529-E5 Bluetooth LE	All
DSS	A3LSMN986B1	Original Grant	4790136523-E6 (Bluetooth)	Test Report	4790136529-E6 (Bluetooth)	All
DXX	A3LSMN986B1	Original Grant	4790136523-E7 (NFC)	Test Report	4790136529-E7 (NFC)	All
NII	A3LSMN986B1	Original Grant	4790136523-E8 (802.11a/n/ac/ax)	Test Report	4790136529-E8 (802.11a/n/ac/ax)	All
DCD	A3LSMN986B1	Original Grant	4790136523-E9 (WPT)	Test Report	4790136529-E9 (WPT)	All
UWB	A3LSMN986B1	Original Grant	4790136523-E10 (UWB)	Test Report	4790136529-E10 (UWB)	All

## 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

## 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	3.02 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 Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax, UWB, WPT and NFC. This test report addresses the WWAN operational mode.

This report covers the Samsung models SM-N986B1/DS, SM-N986B1.

These models are identical in hardware except SM-N986B1/DS is supported dual SIM tray and SM-N986B1 has single SIM tray.

All series model was same hardware thus, SM-N986B1/DS(Dual SIM tray) 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. (4790136523-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	824~849	GPRS	<b>33.3</b>	<b>2137.96</b>	29.54	899.50
		EGPRS	27.0	501.19	24.97	314.05
GSM1900	1850~1910	GPRS	29.8	954.99	<b>30.81</b>	<b>1205.04</b>
		EGPRS	24.6	288.40	27.29	535.80

#### WCDMA

FCC Part 22/24						
Band	Frequency Range [MHz]	Modulation	Conducted		Radiated	
			Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
Band 5	824~849	Rel. 99	<b>24.5</b>	<b>281.84</b>	21.02	126.47
		HSDPA	22.9	194.98	19.53	89.74
Band 4	1710~1755	Rel. 99	22.2	165.96	<b>23.51</b>	<b>224.39</b>
		HSDPA	21.2	131.83	22.37	172.58
Band 2	1850~1910	Rel. 99	22.9	194.98	22.26	168.27
		HSDPA	22.0	158.49	21.21	132.13

**LTE Band 12**

Band	Frequency Range [MHz]	BandWidth [MHz]	Modulation	Conducted		Radiated	
				Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
Band 12	699 ~ 716	10	QPSK	24.8	302.00	19.42	87.50
			16QAM	24.0	251.19	18.52	71.12
			64QAM	23.0	199.53		
			256QAM	20.0	100.00		
		5	QPSK	24.7	295.12	<b>19.60</b>	<b>91.20</b>
			16QAM	24.0	251.19	18.14	65.16
			64QAM	23.0	199.53		
			256QAM	20.0	100.00		
		3	QPSK	<b>25.0</b>	<b>316.23</b>	19.19	82.99
			16QAM	24.0	251.19	18.44	69.82
			64QAM	23.0	199.53		
			256QAM	20.0	100.00		
		1.4	QPSK	24.5	281.84	19.09	81.10
			16QAM	24.0	251.19	17.97	62.66
			64QAM	22.9	194.98		
			256QAM	19.6	91.20		

**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	24.3	269.15	20.41	109.90
			16QAM	23.3	213.80	19.37	86.50
			64QAM	22.2	165.96		
			256QAM	19.3	85.11		
		5	QPSK	<b>24.4</b>	<b>275.42</b>	<b>20.73</b>	<b>118.30</b>
			16QAM	23.6	229.09	19.62	91.62
			64QAM	22.5	177.83		
			256QAM	19.7	93.33		

**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	21.9	154.88	<b>22.61</b>	<b>182.39</b>
			16QAM	21.1	128.82	21.45	139.64
			64QAM	20.2	104.71		
			256QAM	17.2	52.48		
		15	QPSK	<b>22.2</b>	<b>165.96</b>	22.05	160.32
			16QAM	21.4	138.04	21.39	137.72
			64QAM	20.3	107.15		
			256QAM	17.0	50.12		
		10	QPSK	21.8	151.36	22.29	169.43
			16QAM	21.1	128.82	21.05	127.35
			64QAM	20.0	100.00		
			256QAM	16.9	48.98		
		5	QPSK	21.8	151.36	22.38	172.98
			16QAM	21.0	125.89	21.51	141.58
			64QAM	20.1	102.33		
			256QAM	17.0	50.12		
		3	QPSK	22.0	158.49	22.50	177.83
			16QAM	21.2	131.83	21.26	133.66
			64QAM	20.0	100.00		
			256QAM	17.0	50.12		
		1.4	QPSK	21.5	141.25	22.35	171.79
			16QAM	20.9	123.03	21.15	130.32
			64QAM	19.8	95.50		
			256QAM	16.6	45.71		

**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	814.7 - 823.3	15	QPSK	<b>24.2</b>	<b>263.03</b>	20.29	106.91
			16QAM	23.5	223.87	19.33	85.70
			64QAM	22.3	169.82		
			256QAM	19.1	81.28		
		10	QPSK	24.1	257.04	20.11	102.57
			16QAM	23.1	204.17	19.00	79.43
			64QAM	22.2	165.96		
			256QAM	19.1	81.28		
		5	QPSK	23.1	204.17	20.18	104.23
			16QAM	21.4	138.04	19.25	84.14
			64QAM	20.2	104.71		
			256QAM	19.2	83.18		
		3	QPSK	23.2	208.93	<b>20.44</b>	<b>110.66</b>
			16QAM	21.2	131.83	19.21	83.37
			64QAM	20.1	102.33		
			256QAM	19.0	79.43		
		1.4	QPSK	23.1	204.17	20.10	102.33
			16QAM	21.2	131.83	19.16	82.41
			64QAM	20.2	104.71		
			256QAM	19.2	83.18		

**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	824.7 - 848.3	15	QPSK	24.4	275.42	<b>20.58</b>	<b>114.29</b>
			16QAM	24.0	251.19	19.32	85.51
			64QAM	22.6	181.97		
			256QAM	19.8	95.50		
		10	QPSK	<b>24.5</b>	<b>281.84</b>	20.41	109.90
			16QAM	23.9	245.47	19.56	90.36
			64QAM	22.6	181.97		
			256QAM	19.4	87.10		
		5	QPSK	23.2	208.93	20.16	103.75
			16QAM	21.4	138.04	19.32	85.51
			64QAM	20.1	102.33		
			256QAM	19.2	83.18		
		3	QPSK	23.1	204.17	20.30	107.15
			16QAM	21.4	138.04	19.25	84.14
			64QAM	20.1	102.33		
			256QAM	19.1	81.28		
		1.4	QPSK	23.2	208.93	20.43	110.41
			16QAM	21.3	134.90	19.18	82.79
			64QAM	20.3	107.15		
			256QAM	19.1	81.28		

**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	<b>24.2</b>	<b>263.03</b>	20.47	111.43
			16QAM	23.3	213.80	19.15	82.22
			64QAM	22.1	162.18		
			256QAM	19.3	85.11		
		10	QPSK	24.1	257.04	<b>20.73</b>	<b>118.30</b>
			16QAM	23.4	218.78	19.47	88.51
			64QAM	22.0	158.49		
			256QAM	19.4	87.10		
		5	QPSK	24.1	257.04	20.28	106.66
			16QAM	22.8	190.55	19.16	82.41
			64QAM	22.5	177.83		
			256QAM	19.4	87.10		
		3	QPSK	24.0	251.19	20.40	109.65
			16QAM	23.3	213.80	19.09	81.10
			64QAM	21.9	154.88		
			256QAM	19.1	81.28		
		1.4	QPSK	24.0	251.19	20.36	108.64
			16QAM	23.0	199.53	19.24	83.95
			64QAM	22.1	162.18		
			256QAM	19.7	93.33		

**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	25.0	316.23	<b>24.63</b>	<b>290.40</b>
			16QAM	24.3	269.15	24.46	279.25
			64QAM	23.4	218.78		
			256QAM	20.3	107.15		
		15	QPSK	25.0	316.23	24.48	280.54
			16QAM	24.1	257.04	23.38	217.77
			64QAM	23.3	213.80		
			256QAM	20.3	107.15		
		10	QPSK	25.0	316.23	24.29	268.53
			16QAM	24.5	281.84	23.82	240.99
			64QAM	23.3	213.80		
			256QAM	20.1	102.33		
		5	QPSK	<b>25.2</b>	<b>331.13</b>	24.50	281.84
			16QAM	24.3	269.15	23.98	250.03
			64QAM	23.5	223.87		
			256QAM	20.4	109.65		



**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	22.2	165.96	23.66	232.27
			16QAM	21.5	141.25	22.34	171.40
			64QAM	20.4	109.65		
			256QAM	17.3	53.70		
		15	QPSK	22.4	<b>173.78</b>	23.90	245.47
			16QAM	21.4	138.04	23.05	201.84
			64QAM	20.4	109.65		
			256QAM	17.3	53.70		
		10	QPSK	22.2	165.96	<b>23.96</b>	<b>248.89</b>
			16QAM	21.4	138.04	22.86	193.20
			64QAM	20.3	107.15		
			256QAM	17.1	51.29		
		5	QPSK	22.3	169.82	23.82	240.99
			16QAM	21.5	141.25	22.94	196.79
			64QAM	20.4	109.65		
			256QAM	17.6	57.54		
		3	QPSK	<b>22.4</b>	<b>173.78</b>	23.65	231.74
			16QAM	21.6	144.54	22.46	176.20
			64QAM	20.4	109.65		
			256QAM	17.3	53.70		
		1.4	QPSK	22.0	158.49	23.68	233.35
			16QAM	21.3	134.90	22.52	178.65
			64QAM	20.2	104.71		
			256QAM	17.1	51.29		

### 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)
GSM1900 / WCDMA Band 2 / LTE Band 2/ LTE Band 25 1850 ~ 1915 MHz	-0.16
WCDMA Band 4 / LTE Band 4 / LTE Band 66 1710 ~ 1780 MHz	-0.15
GSM850 / WCDMA Band 5 / LTE Band 5 / LTE Band 26 814 ~ 849 MHz	-3.40
LTE Band 12 / LTE Band 17 699 ~ 716 MHz	-3.02
LTE Band 41 2496 ~ 2690 MHz	-0.12
LTE Band 13 777 ~ 787 MHz	-3.02

### 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

A-MPR is implemented in this EUT when operating on HPUE per the A-MPR specification in 3GPP TS 36.101 (Table 6.2.4-4a). Conducted output power verification data are shown Appendix A. Also only Emission mask test item were performed A-MPR condition (Especially low channel side)

For all LTE 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 QPSK, 16QAM, 64QAM, 256QAM 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 power in QPSK.

Highest power setting for each bands				
LTE Band	Frequency (MHz)	Bandwidth (MHz)	RB size	RB offset
12	700.5	3	1	8
	707.5		1	0
	714.5		1	8
13	779.5	5	1	12
	782.0		1	12
	784.5		1	12
25	1857.5	15	1	37
	1882.5		1	74
	1907.5		1	37
26 (Part 90)	821.5	15	1	37
26 (Straddle)	824.0	15	1	0
26 (Part 22)	831.5	15	1	0
	841.5		1	37
41 (PC2)	2506.0	20	1	0
	2593.0		1	0
	2680.0		1	0
66	1711.5	3	1	8
	1745.0		1	0
	1778.5		1	8

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	-	-
WCDMA B5	-	-	O	-	-	O
WCDMA B4	-	-	O	-	-	O
WCDMA B2	O	-	-	O	-	-
LTE B12	-	-	O	-	-	O
LTE B13	O	-	-	O	-	-
LTE B25	-	-	O	-	-	O
LTE B26	O	-	-	O	-	-
LTE B41(PC2)	O	-	-	O	-	-
LTE B66	-	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.

**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 17**

LTE Band 17 (Frequency range: 704-716 MHz) is covered by LTE Band 12 (Frequency range: 699-716 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

**LTE Band 41(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).

**5.5. DESCRIPTION OF TEST SETUP**

**SUPPORT EQUIPMENT**

Support Equipment List				
Description	Manufacture	Model	Serial Number	FCC ID
Charger	SAMSUNG	EP-TA800	R37R38J4A28SE3	N/A
Data Cable	SAMSUNG	EP- DG980	N/A	N/A

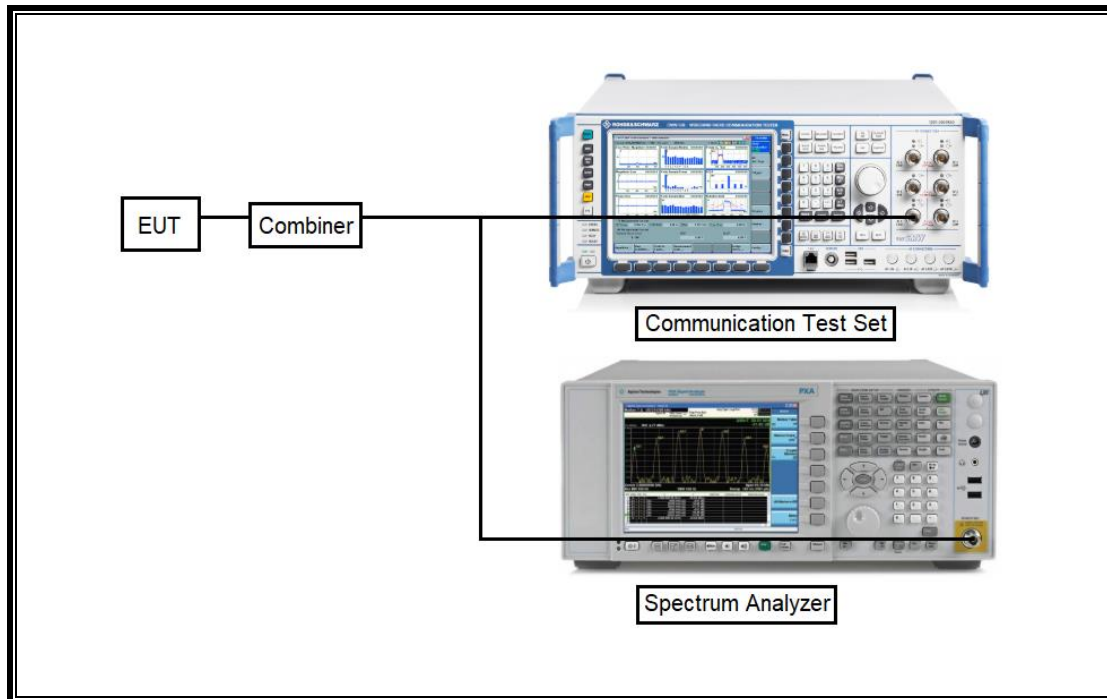
**I/O CABLE**

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

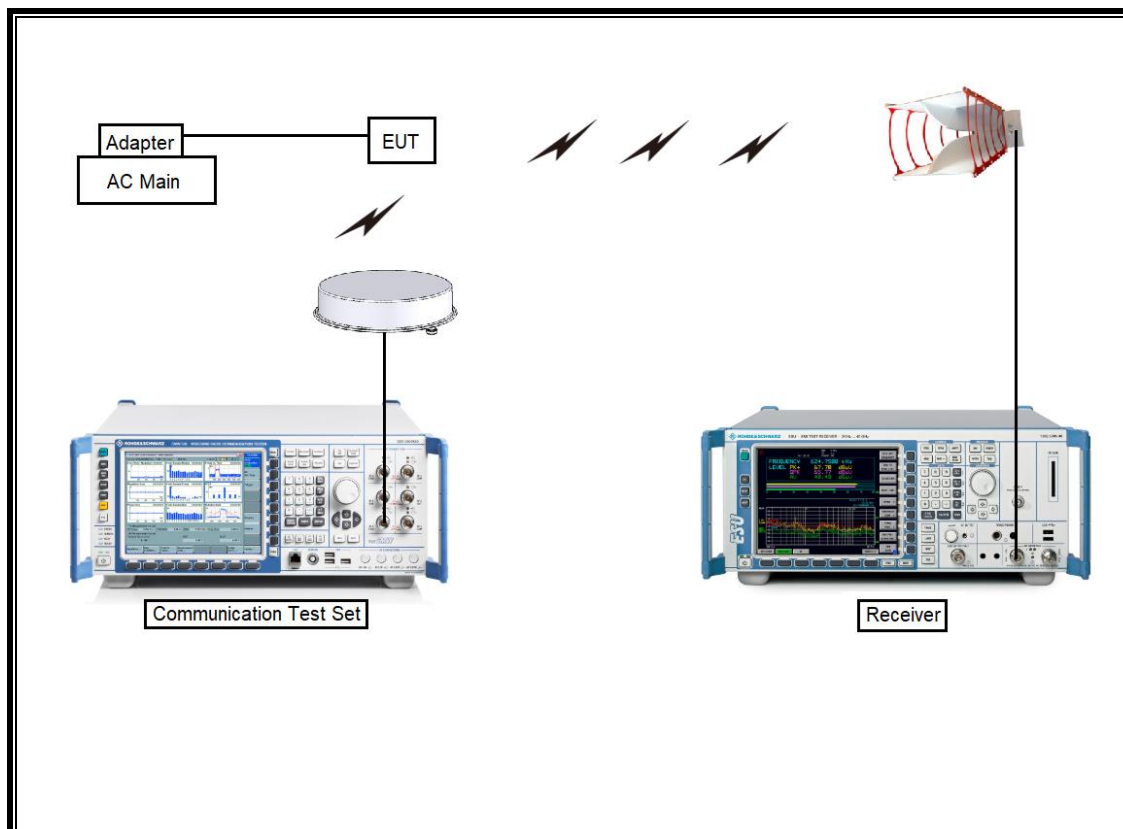
**TEST SETUP**

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	2022-01-27
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	UL001	2022-01-27
Power Splitter	MINI-CIRCUITS	WA1534	UL002	2022-01-27
UXM 5G Wireless Test Platform	KEYSIGHT	E7515B	MY58120110	2022-01-13
UL Software				
Description	Manufacturer	Model	Version	
Antenna port test software	UL	CLT	Ver 3.4	
Radiated software	UL	UL EMC	Ver 9.5	

## 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
27.53(m)	Conducted Spurious Emission	-25dBm		Pass
27.53(m) 90.691	Emission mask	Section 9.2.2		Pass
2.1046	Conducted output power	N/A		Pass
90.635(b)		50 dBm		Pass
22.355 24.235 27.54 90.213	Frequency Stability	2.5PPM		Pass
22.913(a)(5)	Effective Radiated Power	38.5dBm	Radiated	Pass
27.50(c)(10) 27.50(b)(10)		34.77dBm		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 (m)		-25dBm		Pass



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## 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

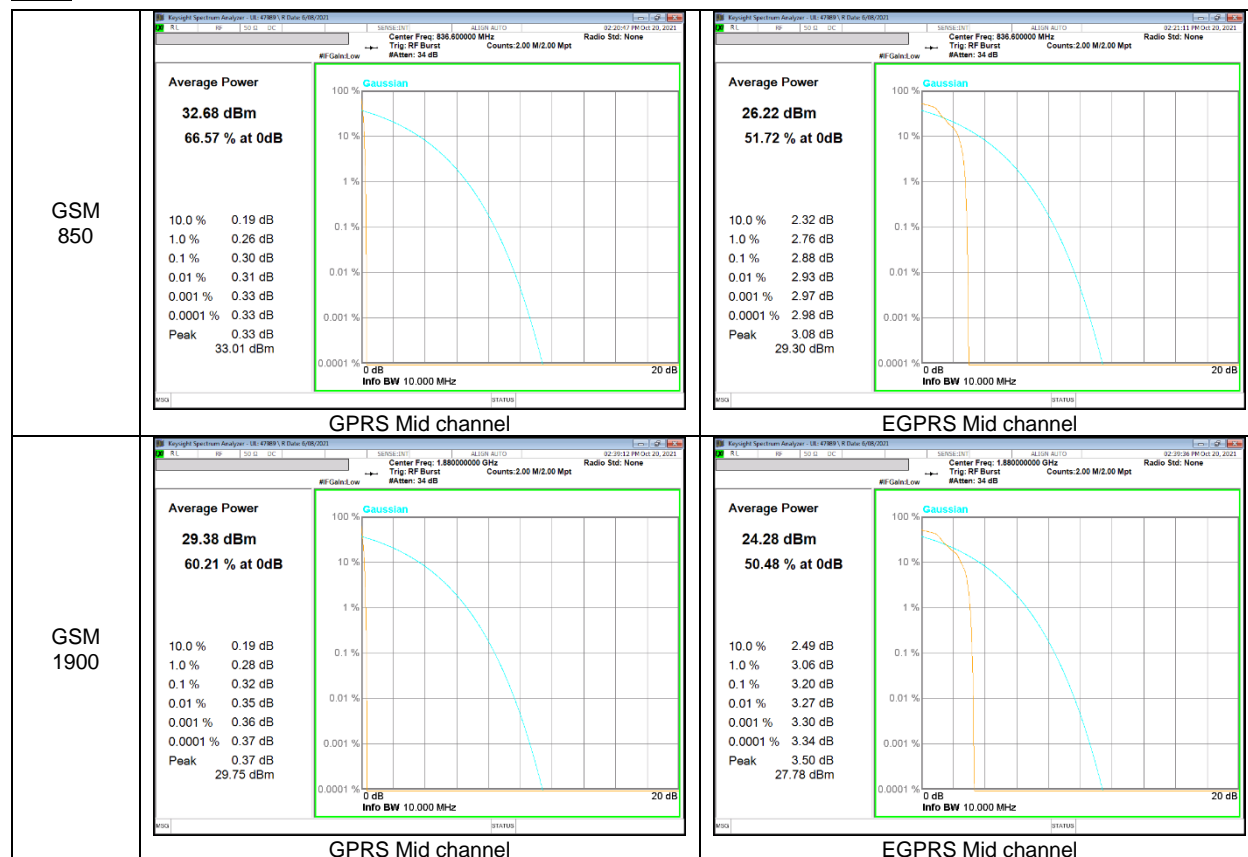
In addition, when the transmitter power is measured in terms of average value, the peak-to-average ratio of the power shall not exceed 13 dB.

### RESULTS

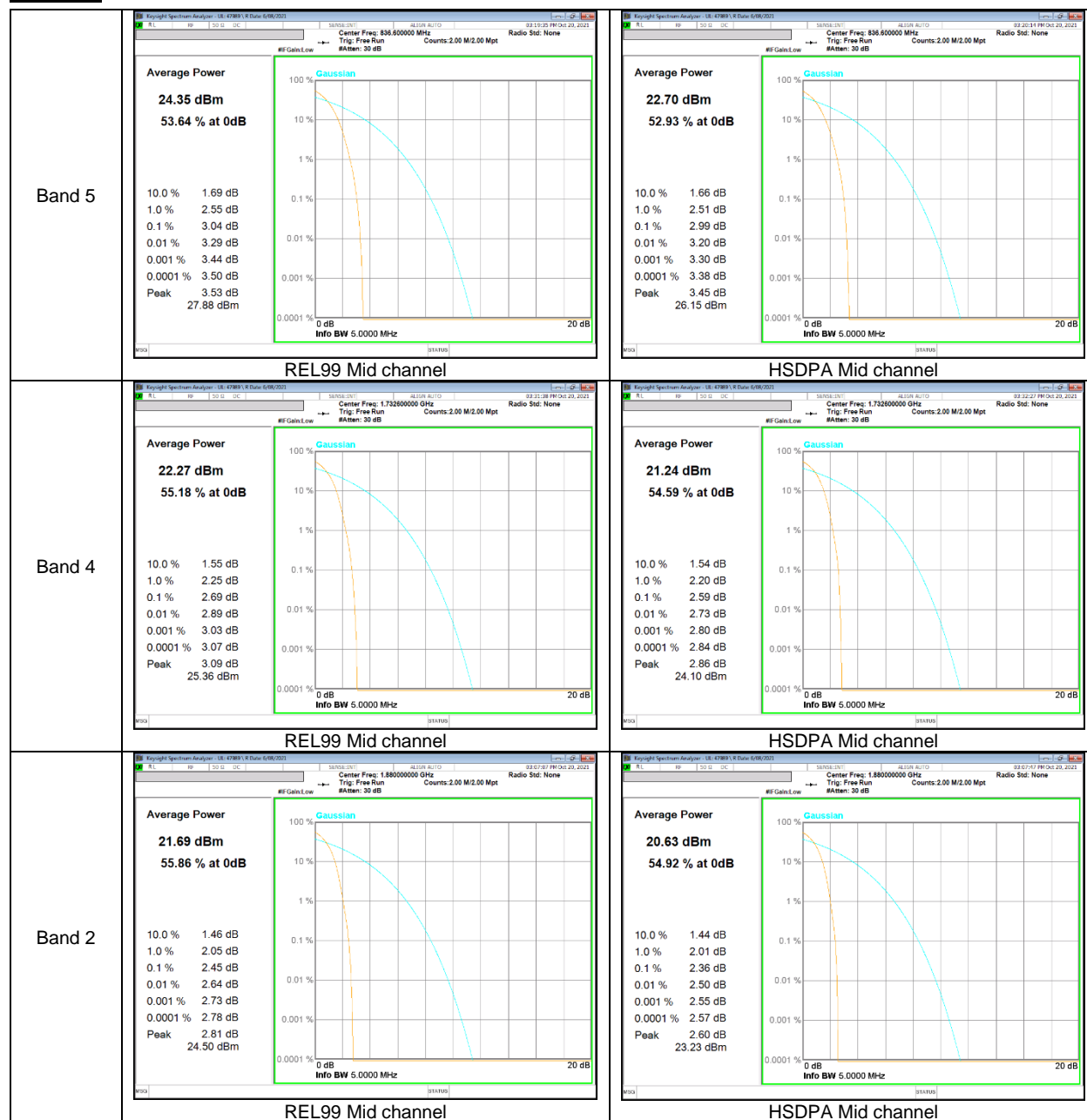
See the following pages.

## 8.1. CONDUCTED PEAK TO AVERAGE RESULT

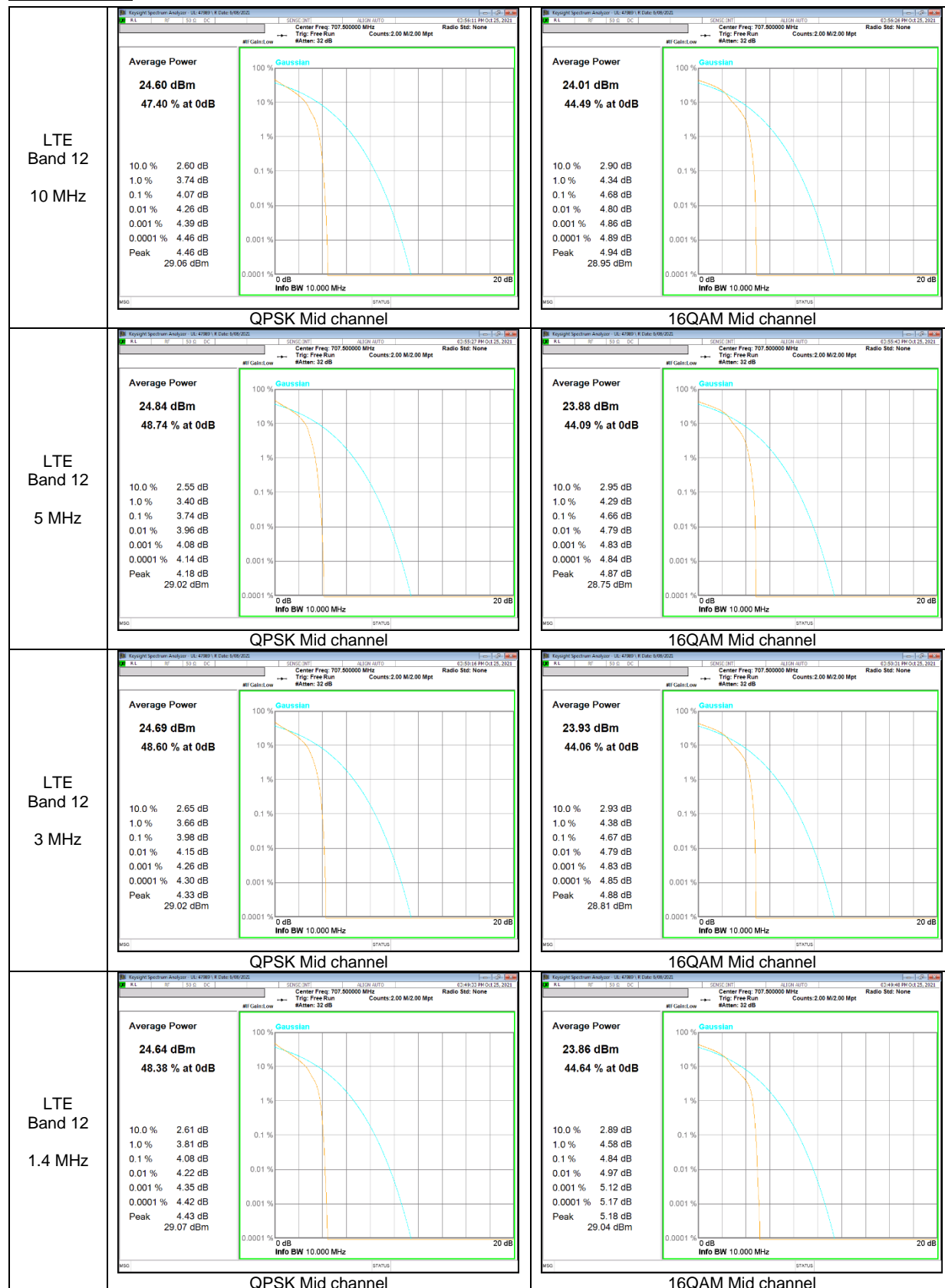
### GSM



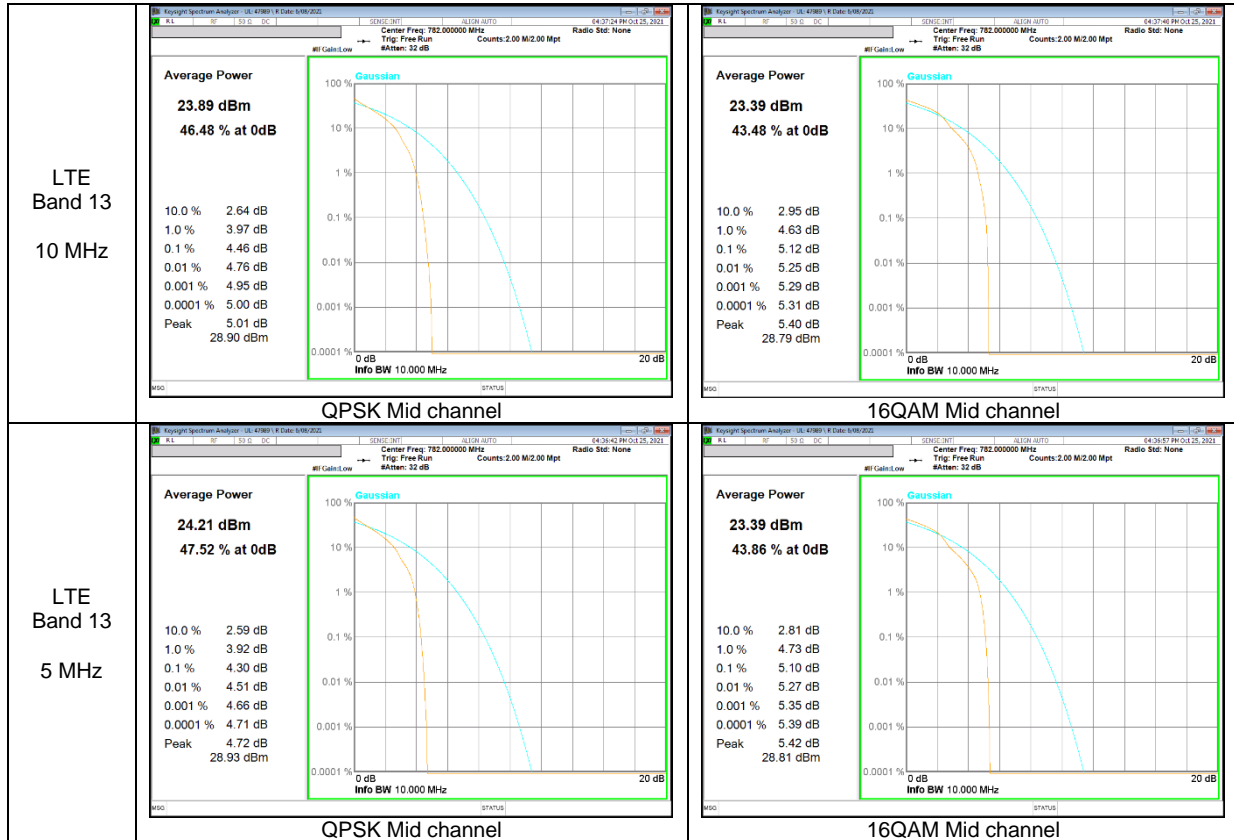
**WCDMA**



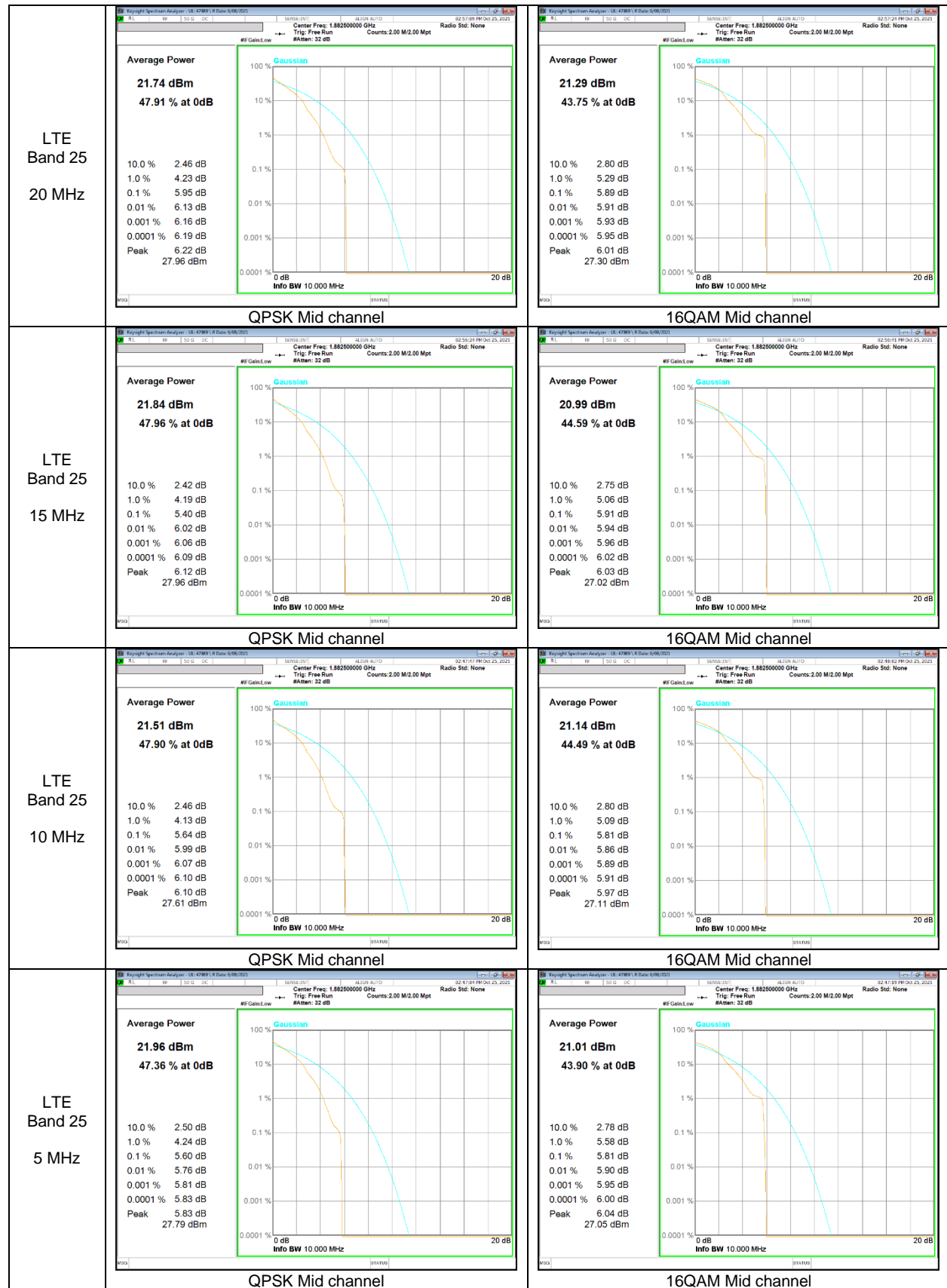
**LTE Band 12**

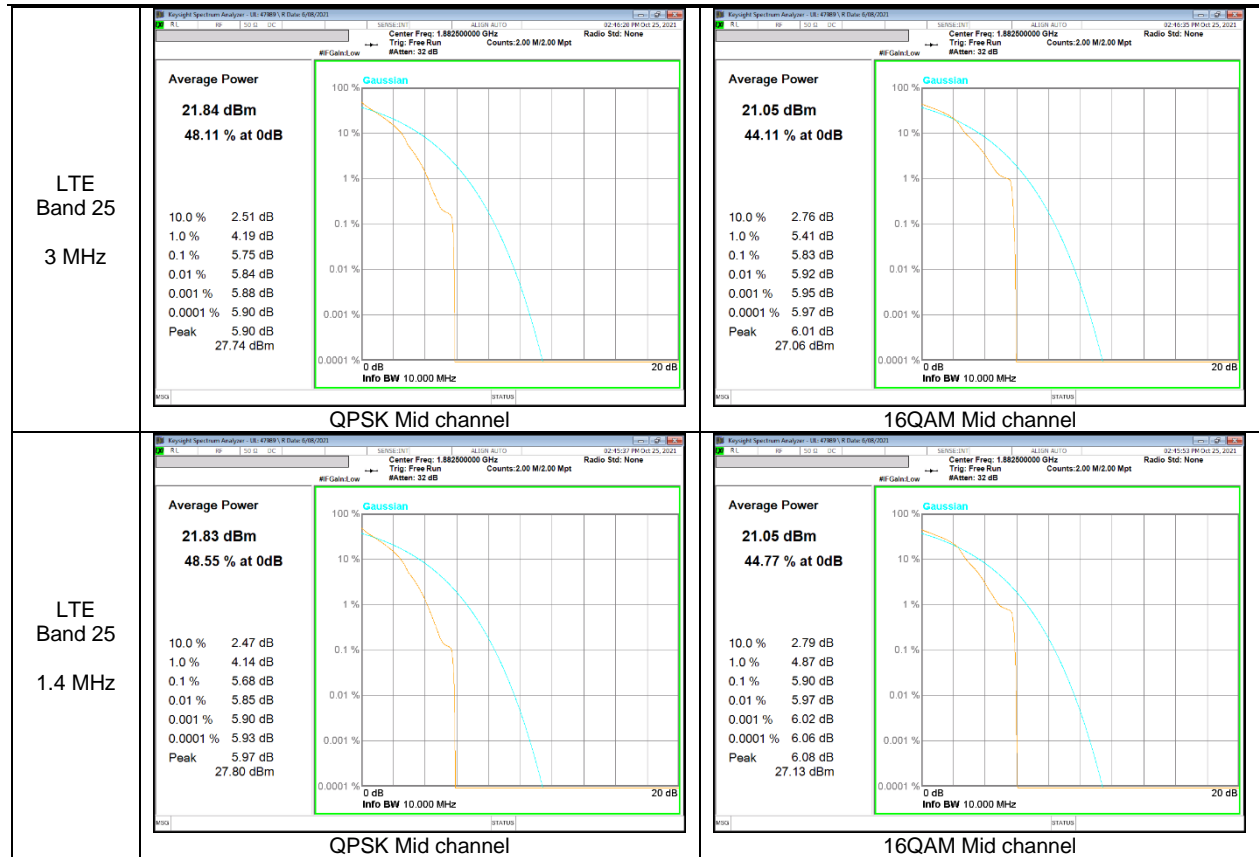


**LTE Band 13**

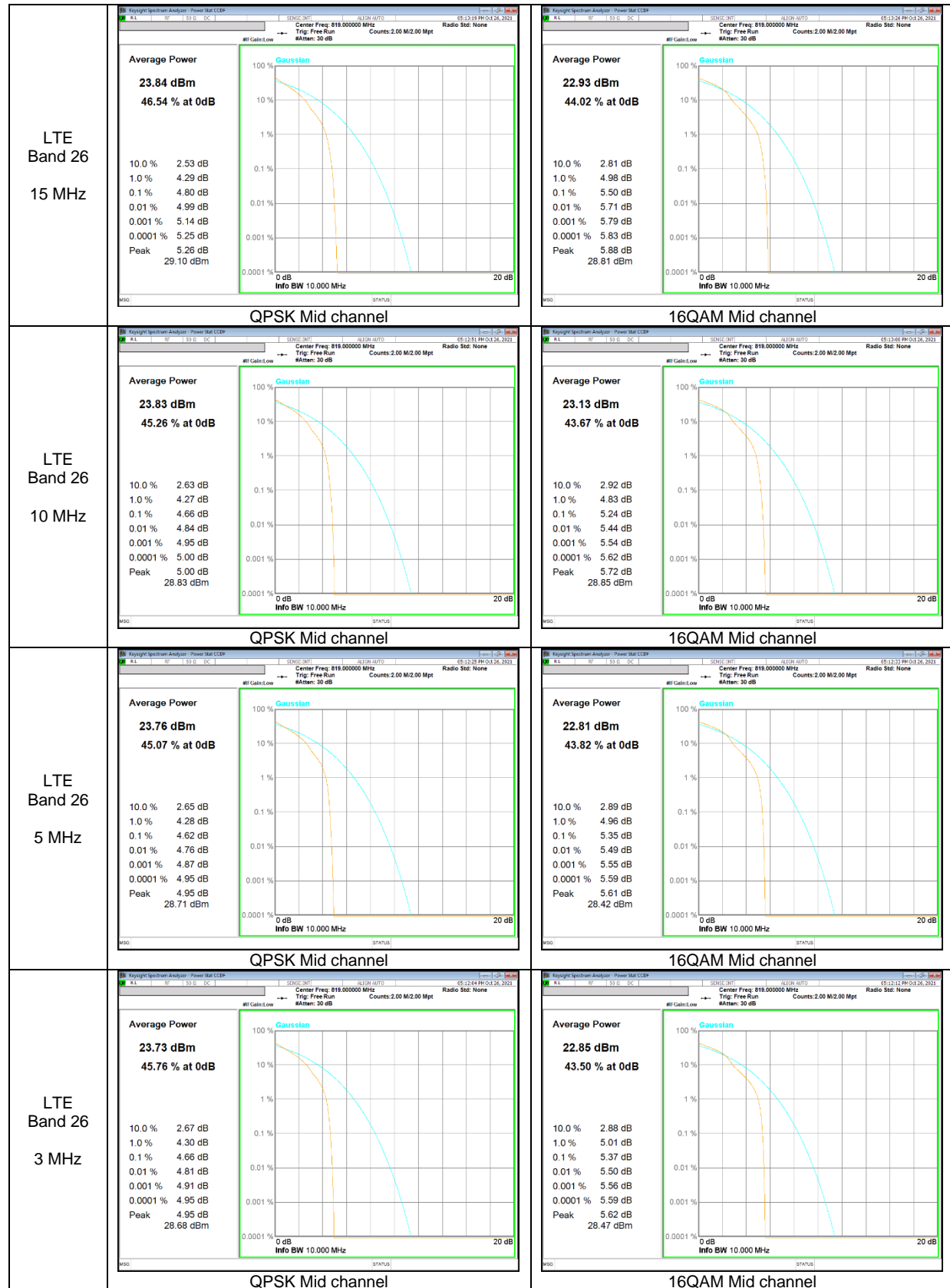


**LTE Band 25**

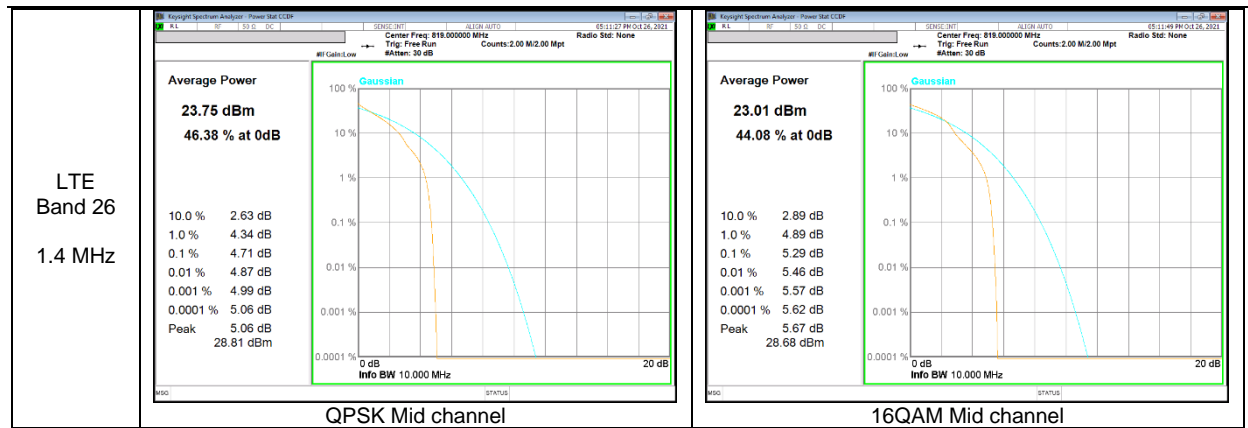




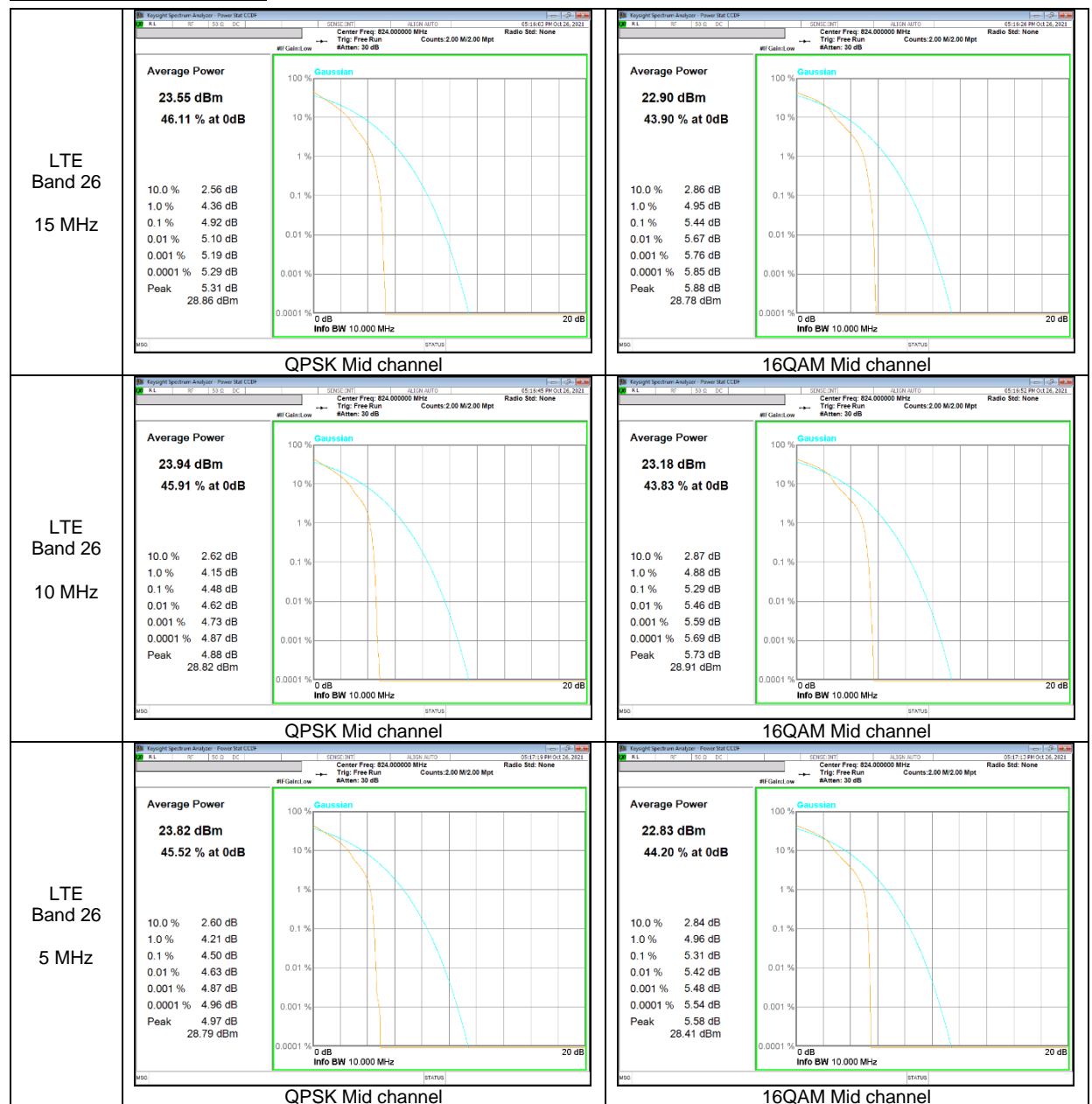
**LTE Band 26 (Part 90)**

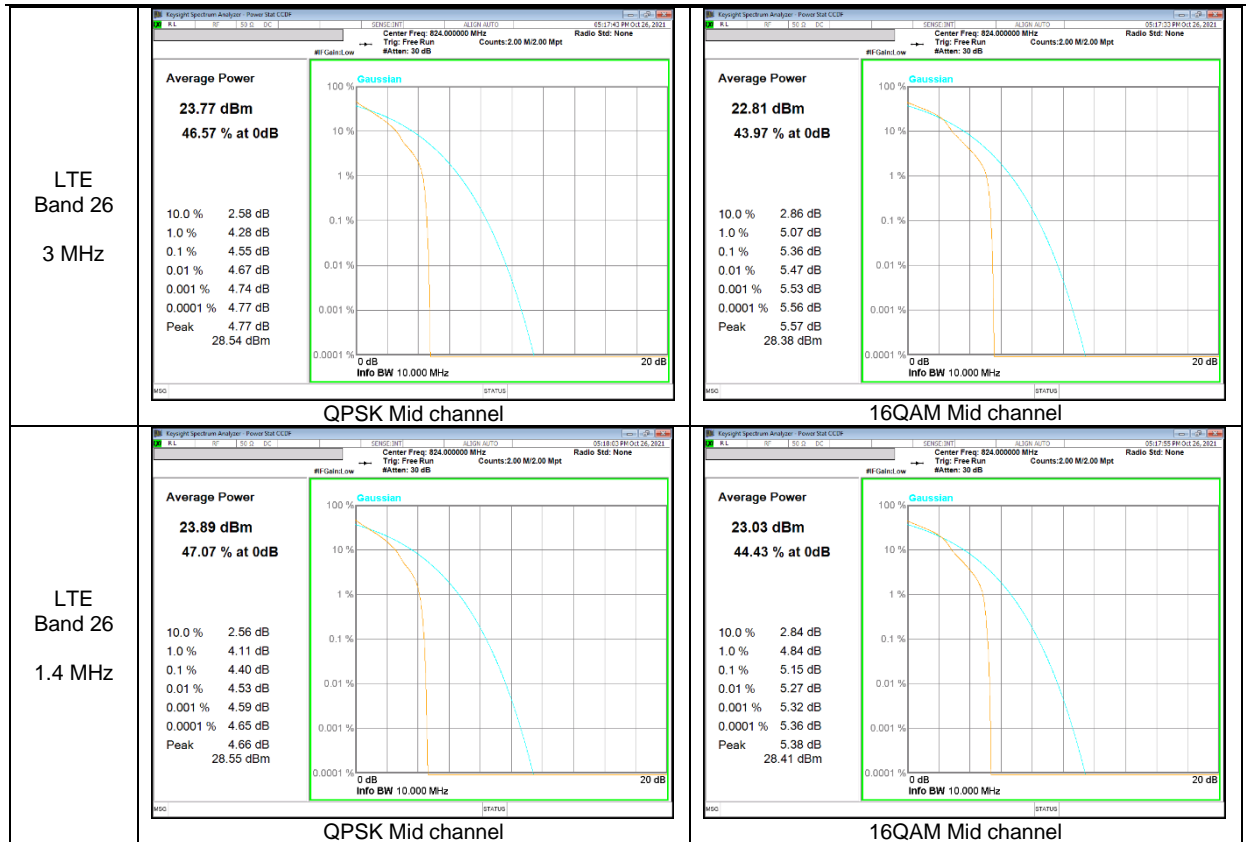




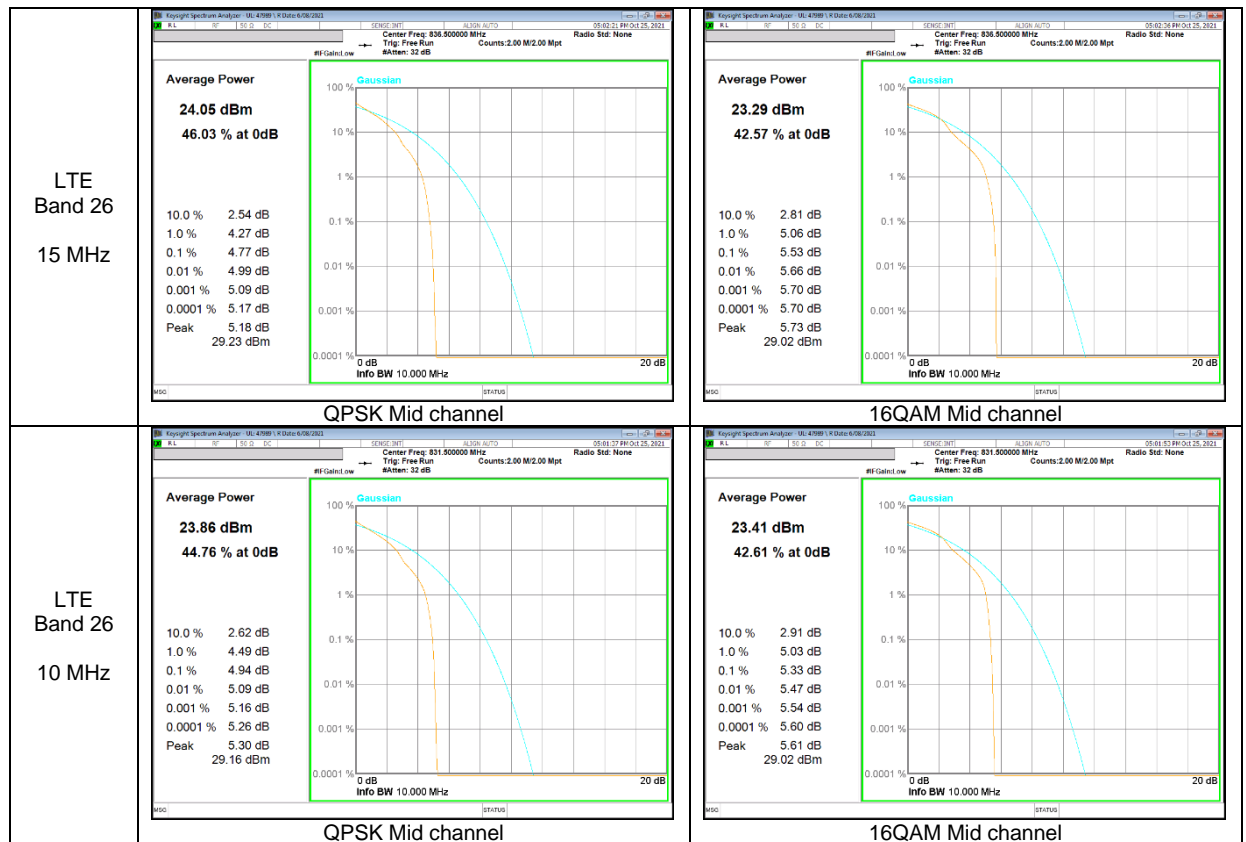


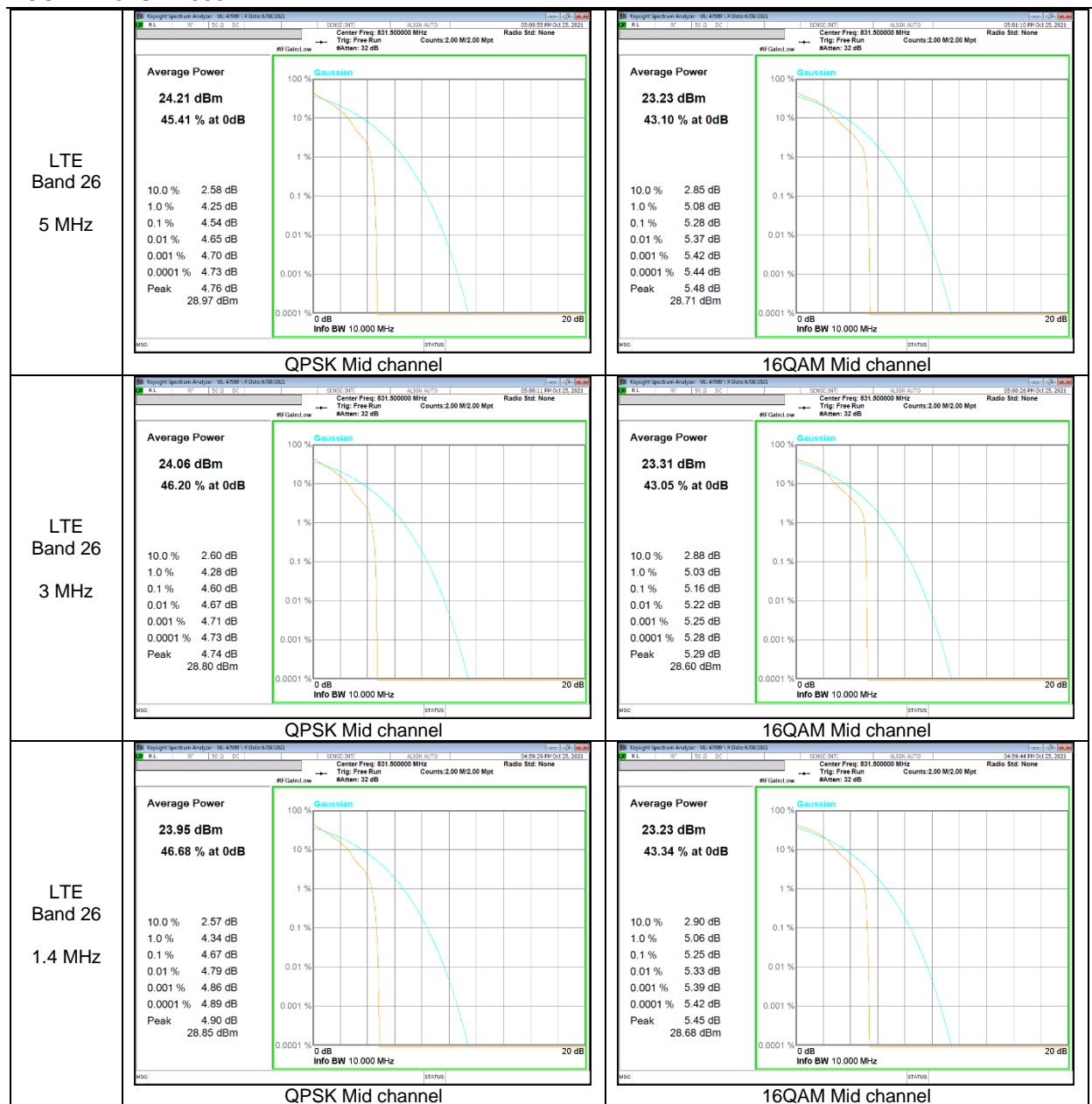
**LTE Band 26 (Straddle)**



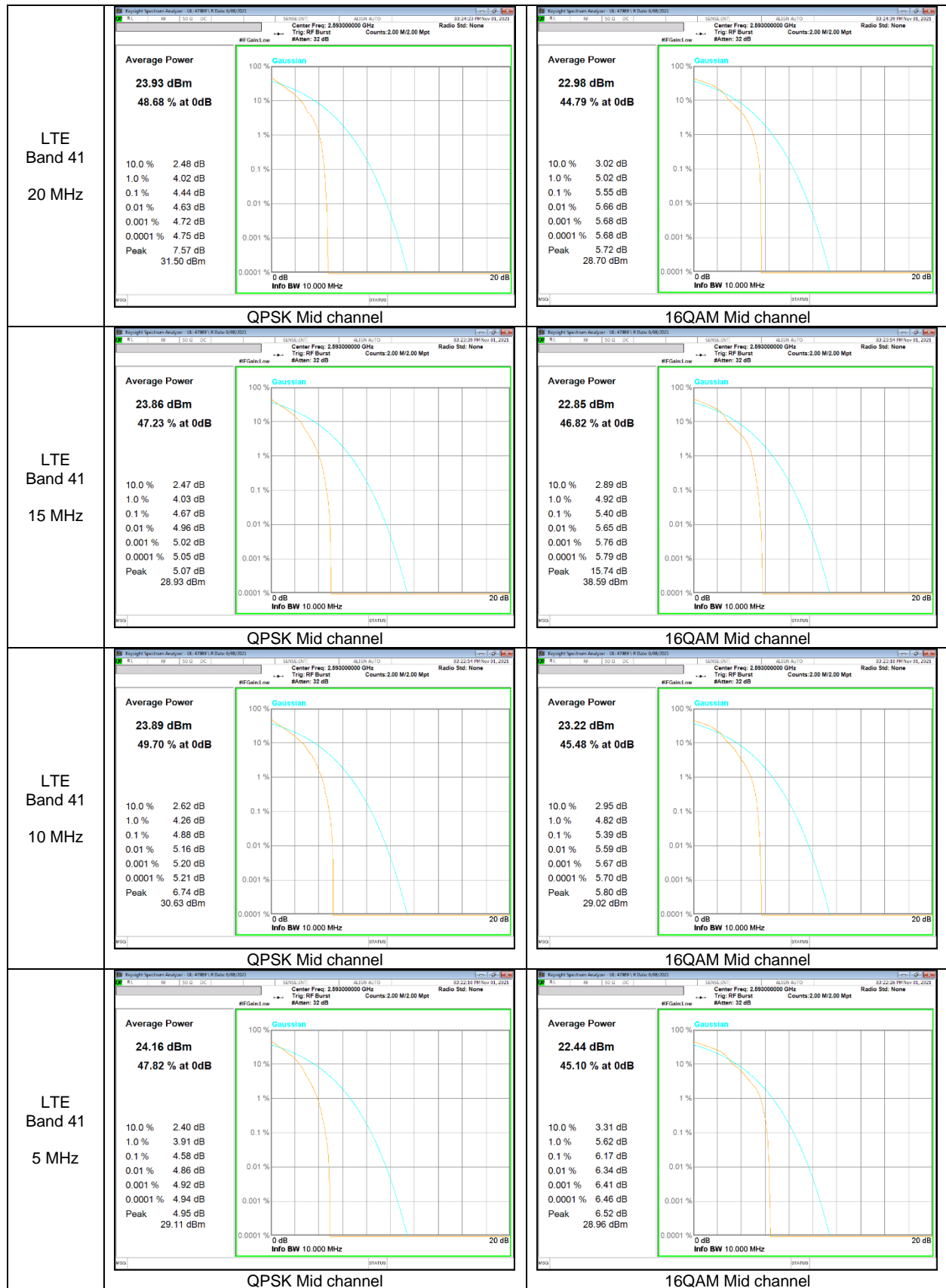


**LTE Band 26 (Part 22)**

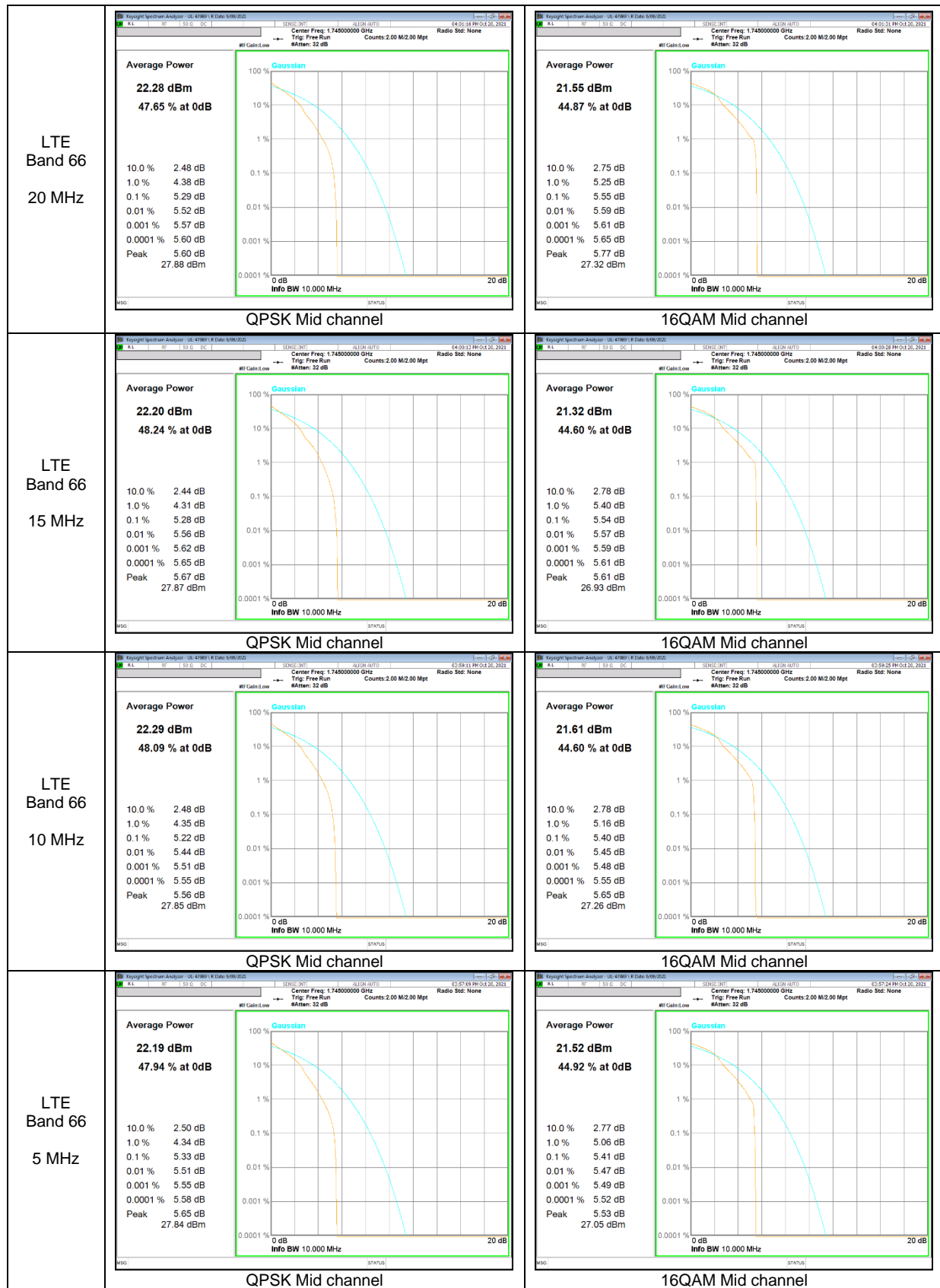


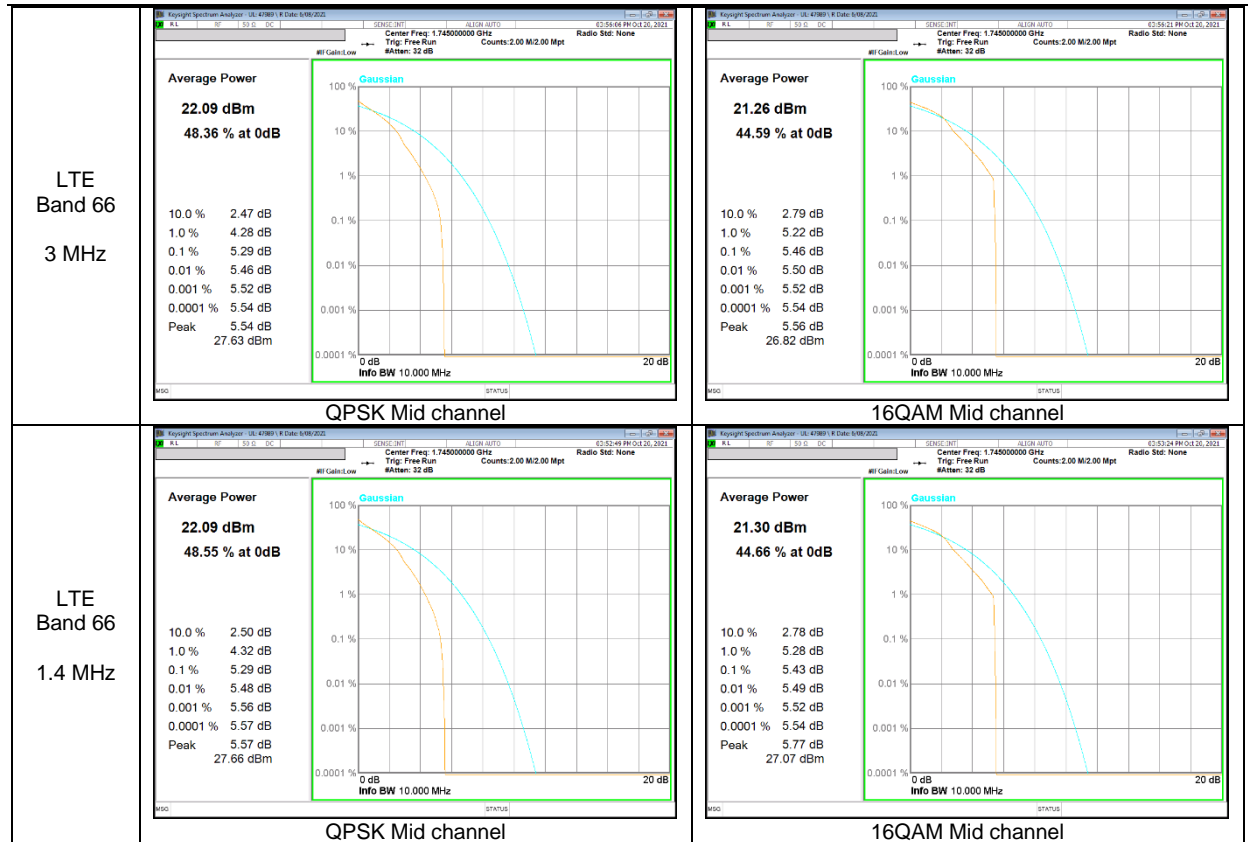


**LTE Band 41 (PC2)**



**LTE Band 66**





## 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.

#### - GSM

Band	Modulation	f [MHz]	99% BW (kHz)	-26dB BW (kHz)
850	GPRS	836.6	241.74	306.7
	EGPRS		248.06	321.7
1900	GPRS	1880.0	243.72	315.7
	EGPRS		250.65	309.8

#### - WCDMA

Band	Modulation	f [MHz]	99% BW (MHz)	-26dB BW (MHz)
B5	Rel.99	836.6	4.155	4.710
	HSDPA		4.176	4.723
B4	Rel.99	1732.6	4.192	4.776
	HSDPA		4.202	4.756
B2	Rel.99	1880.0	4.240	4.802
	HSDPA		4.235	4.886

**- LTE Band 12**

Band	BW	Modulation	f [MHz]	99% BW (MHz)	-26dB BW (MHz)
LTE B12	10M	QPSK	707.5	8.977	10.330
		16QAM		8.986	10.300
	5M	QPSK	707.5	4.503	5.342
		16QAM		4.495	5.233
	3M	QPSK	707.5	2.699	3.050
		16QAM		2.695	3.038
	1.4M	QPSK	707.5	1.092	1.318
		16QAM		1.086	1.295

**- LTE Band 13**

Band	BW	Modulation	f [MHz]	99% BW (MHz)	-26dB BW (MHz)
LTE B13	10M	QPSK	782.0	8.972	10.270
		16QAM		8.979	10.210
	5M	QPSK	782.0	4.500	5.240
		16QAM		4.507	5.227

**- LTE Band 25**

Band	BW	Modulation	f [MHz]	99% BW (MHz)	-26dB BW (MHz)
LTE B25	20M	QPSK	1882.5	17.884	19.910
		16QAM		17.917	19.700
	15M	QPSK	1882.5	13.433	15.140
		16QAM		13.417	14.900
	10M	QPSK	1882.5	8.954	10.160
		16QAM		8.977	10.280
	5M	QPSK	1882.5	4.499	5.221
		16QAM		4.502	5.285
	3M	QPSK	1882.5	2.704	3.104
		16QAM		2.696	3.084
	1.4M	QPSK	1882.5	1.088	1.300
		16QAM		1.087	1.298



**- LTE Band 26 (Part 90)**

Band	BW	Modulation	f [MHz]	99% BW (MHz)	-26dB BW (MHz)
LTE B26 Part(90)	15M	QPSK	821.5	13.414	15.070
		16QAM		13.424	15.040
	10M	QPSK	819.0	8.978	10.290
		16QAM		8.973	10.170
	5M	QPSK	819.0	4.508	5.238
		16QAM		4.522	5.368
	3M	QPSK	819.0	2.697	3.082
		16QAM		2.697	3.092
	1.4M	QPSK	819.0	1.084	1.282
		16QAM		1.086	1.287

**- LTE Band 26 (Straddle)**

Band	BW	Modulation	f [MHz]	99% BW (MHz)	-26dB BW (MHz)
LTE B26 (Straddle)	15M	QPSK	824.0	13.455	14.920
		16QAM		13.410	15.160
	10M	QPSK	824.0	8.992	10.240
		16QAM		8.980	10.170
	5M	QPSK	824.0	4.497	5.245
		16QAM		4.504	5.210
	3M	QPSK	824.0	2.706	3.102
		16QAM		2.693	3.049
	1.4M	QPSK	824.0	1.085	1.303
		16QAM		1.087	1.262

**- LTE Band 26 (Part 22)**

Band	BW	Modulation	f [MHz]	99% BW (MHz)	-26dB BW (MHz)
LTE B26 (Part 22)	15M	QPSK	831.5	13.394	14.990
		16QAM		13.422	14.880
	10M	QPSK	831.5	8.987	10.130
		16QAM		8.971	10.260
	5M	QPSK	831.5	4.502	5.330
		16QAM		4.500	5.195
	3M	QPSK	831.5	2.705	3.063
		16QAM		2.699	3.020
	1.4M	QPSK	831.5	1.085	1.270
		16QAM		1.084	1.300

**- LTE Band 41**

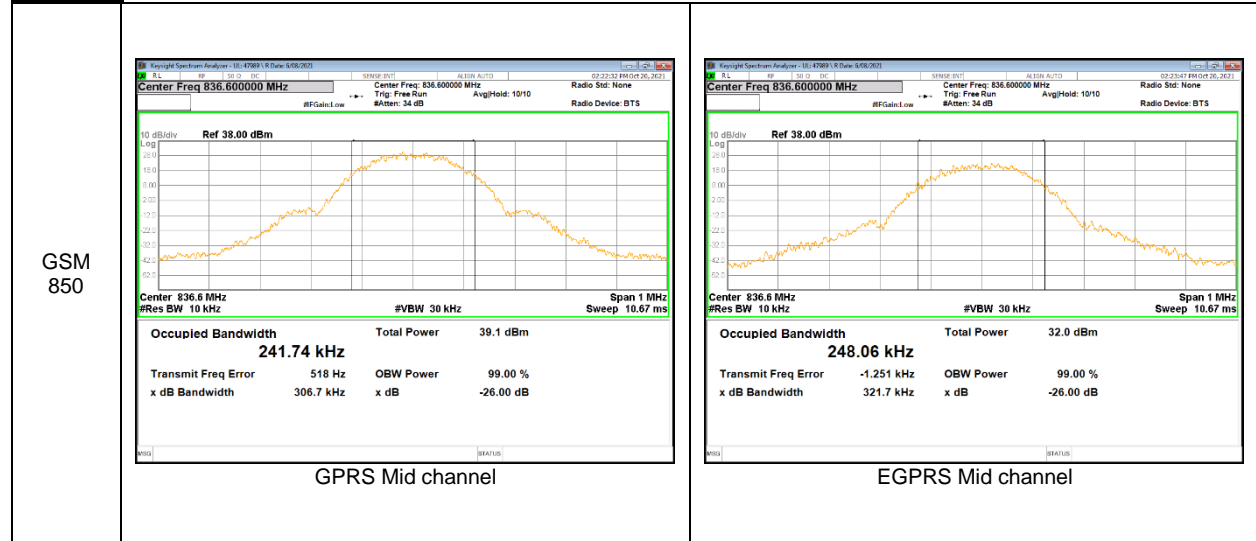
Band	BW	Modulation	f [MHz]	99% BW (MHz)	-26dB BW (MHz)
LTE B41	20M	QPSK	2593.0	17.905	19.880
		16QAM		17.896	19.800
	15M	QPSK	2593.0	13.401	15.210
		16QAM		13.394	15.060
	10M	QPSK	2593.0	8.984	10.110
		16QAM		8.984	10.240
	5M	QPSK	2593.0	4.491	5.329
		16QAM		4.486	5.258

**- LTE Band 66**

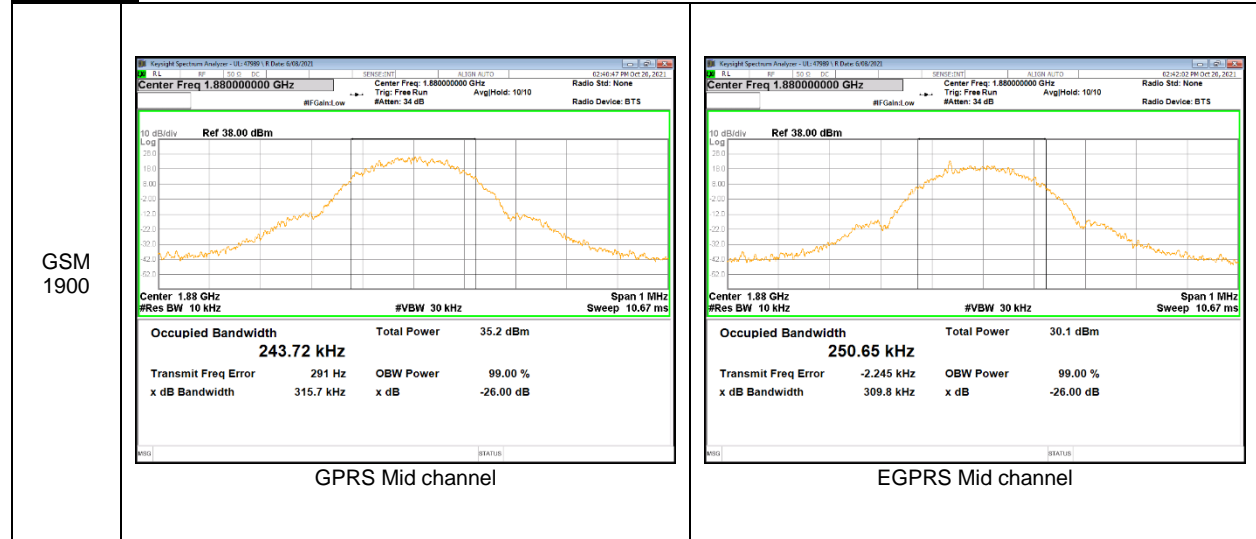
Band	BW	Modulation	f [MHz]	99% BW (MHz)	-26dB BW (MHz)
LTE B66	20M	QPSK	1745.0	17.931	19.770
		16QAM		17.895	19.660
	15M	QPSK	1745.0	13.419	14.990
		16QAM		13.425	15.220
	10M	QPSK	1745.0	8.962	10.150
		16QAM		8.979	10.320
	5M	QPSK	1745.0	4.508	5.302
		16QAM		4.496	5.183
	3M	QPSK	1745.0	2.700	3.078
		16QAM		2.694	3.063
	1.4M	QPSK	1745.0	1.086	1.292
		16QAM		1.088	1.314

**9.1.1. OCCUPIED BANDWIDTH RESULTS**

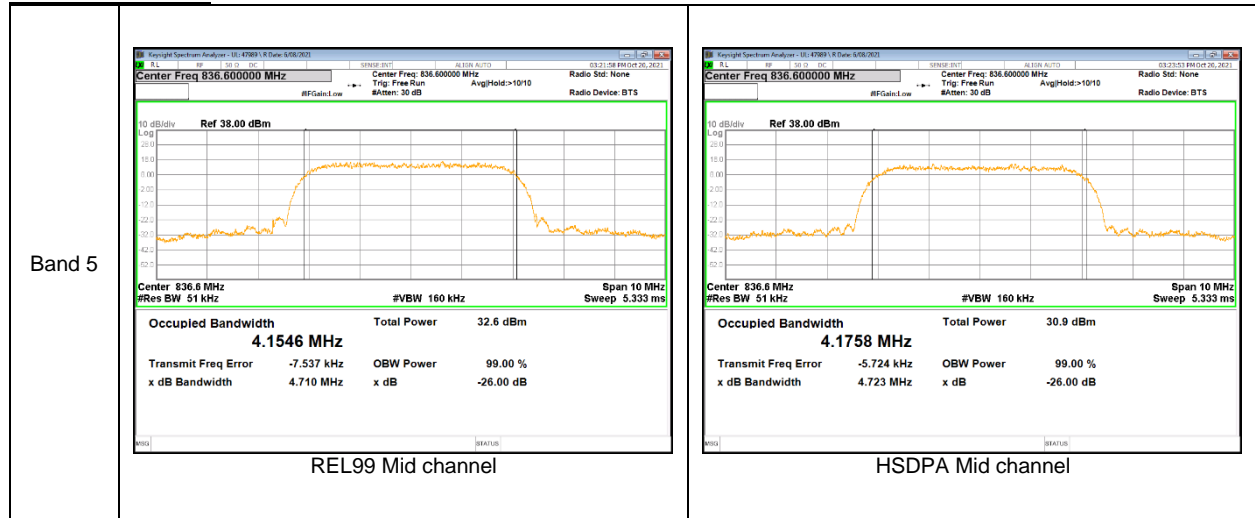
**GSM 850**



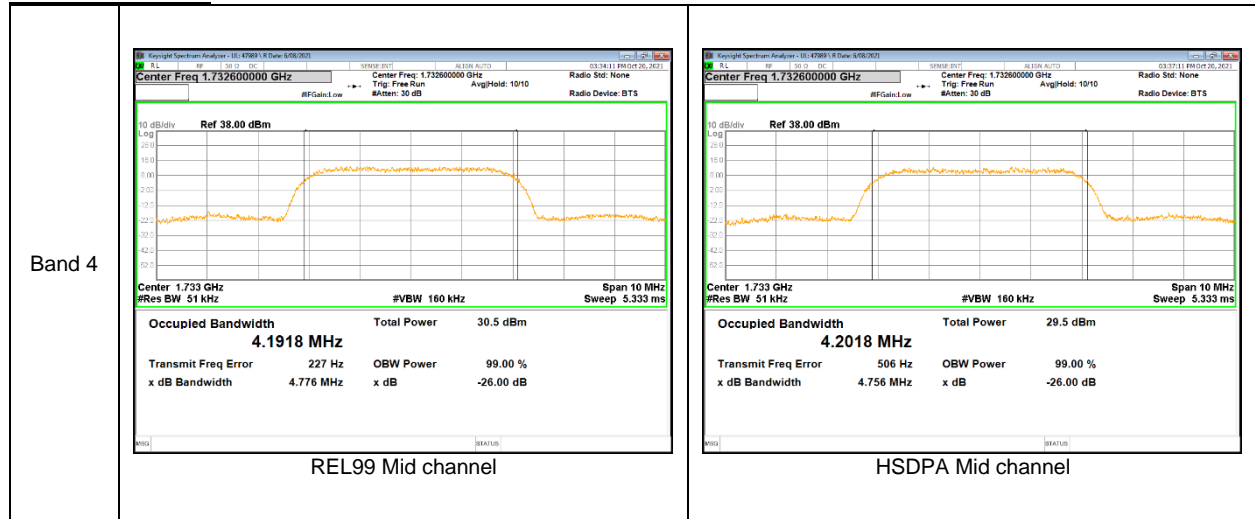
**GSM 1900**



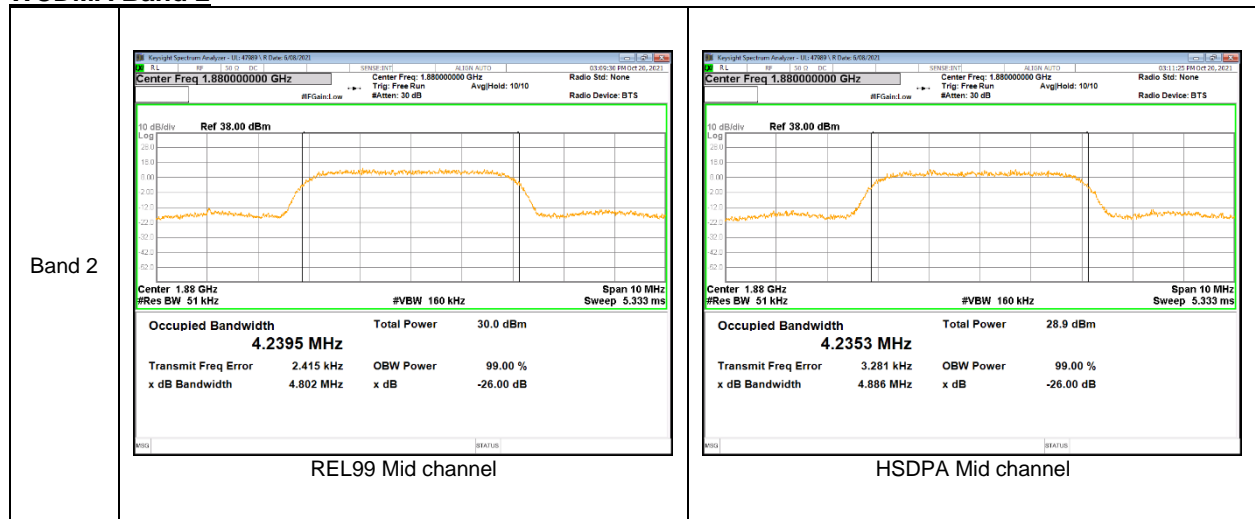
**WCDMA Band 5**



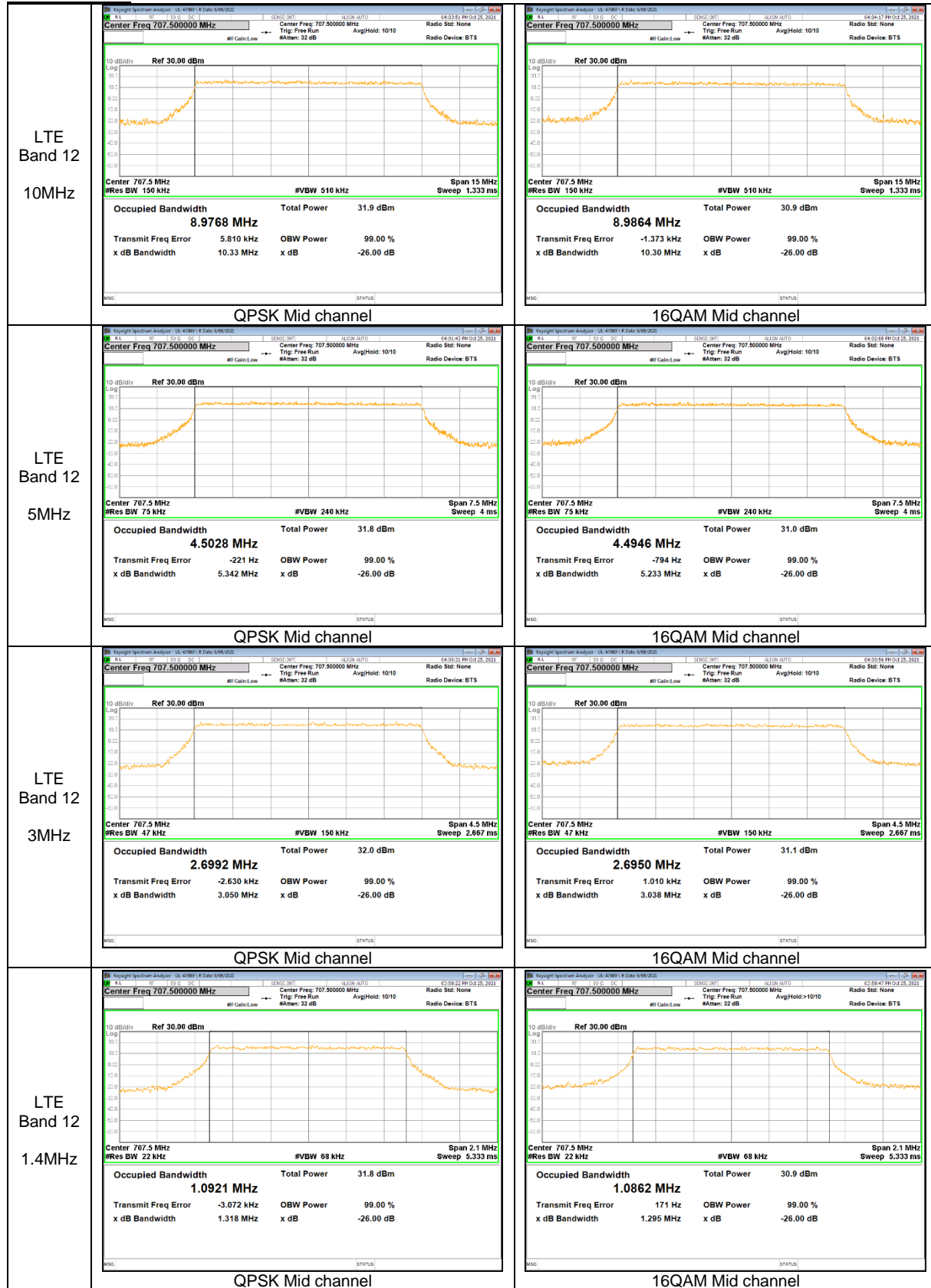
**WCDMA Band 4**



**WCDMA Band 2**



**LTE Band 12**



**LTE Band 13**

