

# CERTIFICATION TEST REPORT

**Report Number.** : 4790776103-E3V1

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

**Model** : SM-X716B

**FCC ID** : A3LSMX716B

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

**Test Standard(s)** : FCC CFR47 PART 24 SUBPART E

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Revision History

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# 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** SAMSUNG ELECTRONICS CO., LTD.

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

**MODEL NUMBER:** SM-X716B

**SERIAL NUMBER:** R32W3004EJL, R32W3004EFK (CONDUCTED);  
R32W3004E3J (RADIATED);

**DATE TESTED:** 2023-03-31 ~ 2023-04-13;


APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 24E	Complies

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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Tested By:



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Suwon Lab Engineer  
UL KOREA LTD.

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## 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. ANSI TIA-603-E, 2016
4. ANSI C63.26, 2015
5. 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(3m semi-anechoic chamber)
<input type="checkbox"/>	Chamber 2(3m semi-anechoic chamber)
<input type="checkbox"/>	Chamber 3(3m semi-anechoic chamber)
<input checked="" type="checkbox"/>	Chamber 4(3m Full-anechoic chamber)
<input type="checkbox"/>	Chamber 5(3m Full-anechoic chamber)

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:

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

### 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	2.80 dB
Radiated Disturbance, 30 MHz to 1 GHz	3.92 dB
Radiated Disturbance, 1 GHz to 18 GHz	5.06 dB
Radiated Disturbance, 18 GHz to 40 GHz	6.02 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 115:2021.

## 5. EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF EUT

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

### 5.2. MAXIMUM OUTPUT POWER

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

#### GSM

FCC Part 24						
Band	Frequency Range [MHz]	Modulation	Conducted		Radiated	
			Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
GSM1900	1850 ~ 1910	GPRS	<b>29.51</b>	<b>893.31</b>	<b>28.46</b>	701.46
		EGPRS	26.27	423.64	26.42	438.53

#### WCDMA

FCC Part 24						
Band	Frequency Range [MHz]	Modulation	Conducted		Radiated	
			Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
Band 2	1850 ~ 1910	Rel. 99	<b>24.37</b>	<b>273.53</b>	<b>25.57</b>	<b>360.58</b>
		HSDPA	23.38	217.77	24.36	272.90

**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	1860 ~ 1905	20	QPSK	23.79	239.33	24.63	290.40
			16QAM	23.27	212.32	24.04	253.51
			64QAM	22.13	163.31		
			256QAM	19.09	81.10		
	1857.5 ~ 1907.5	15	QPSK	23.88	244.34	24.58	287.08
			16QAM	23.15	206.54	24.01	251.77
			64QAM	22.13	163.31		
			256QAM	19.08	80.91		
	1855 ~ 1910	10	QPSK	24.04	253.51	24.89	308.32
			16QAM	23.44	220.80	24.23	264.85
			64QAM	22.34	171.40		
			256QAM	19.26	84.33		
	1852.5 ~ 1912.5	5	QPSK	<b>24.09</b>	<b>256.45</b>	<b>24.92</b>	<b>310.46</b>
			16QAM	23.48	222.84	24.18	261.82
			64QAM	22.32	170.61		
			256QAM	19.27	84.53		
	1851.5 ~ 1913.5	3	QPSK	24.07	255.27	24.86	306.20
			16QAM	23.43	220.29	24.13	258.82
			64QAM	22.42	174.58		
			256QAM	19.31	85.31		
	1850.7 ~ 1914.3	1.4	QPSK	24.07	255.27	24.81	302.69
			16QAM	23.30	213.80	24.21	263.63
			64QAM	22.49	177.42		
			256QAM	19.21	83.37		



### 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)	Peak Gain (dBi)
GSM1900 / WCDMA Band 2 / LTE Band 2, 25 1850 - 1915 MHz	0.35

## 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

For LTE Band 25 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 and 256QAM modulations. 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.

### 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.

- Conducted Spurious Emission

Highest conducted power setting for each bands				
LTE Band	Frequency (MHz)	Bandwidth (MHz)	RB size	RB offset
25	1852.5	5	1	12
	1882.5		1	12
	1912.5		1	12

- Radiated Spurious Emission

Highest EIRP setting for each bands				
LTE Band	Frequency (MHz)	Bandwidth (MHz)	RB size	RB offset
25	1852.5	5	1	12
	1882.5		1	12
	1912.5		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	EIRP			RSE		
	X	Y	Z	X	Y	Z
GSM1900	-	O	-	-	O	-
WCDMA B2	-	O	-	-	O	-
LTE B25	-	O	-	-	O	-

Note : For 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	Manufacture	Model	Serial Number	FCC ID
Charger	SAMSUNG	EP-TA800	R37T7CAG0XRASEA	N/A
Data Cable	SAMSUNG	EP-DW767	GH39-02132A	N/A

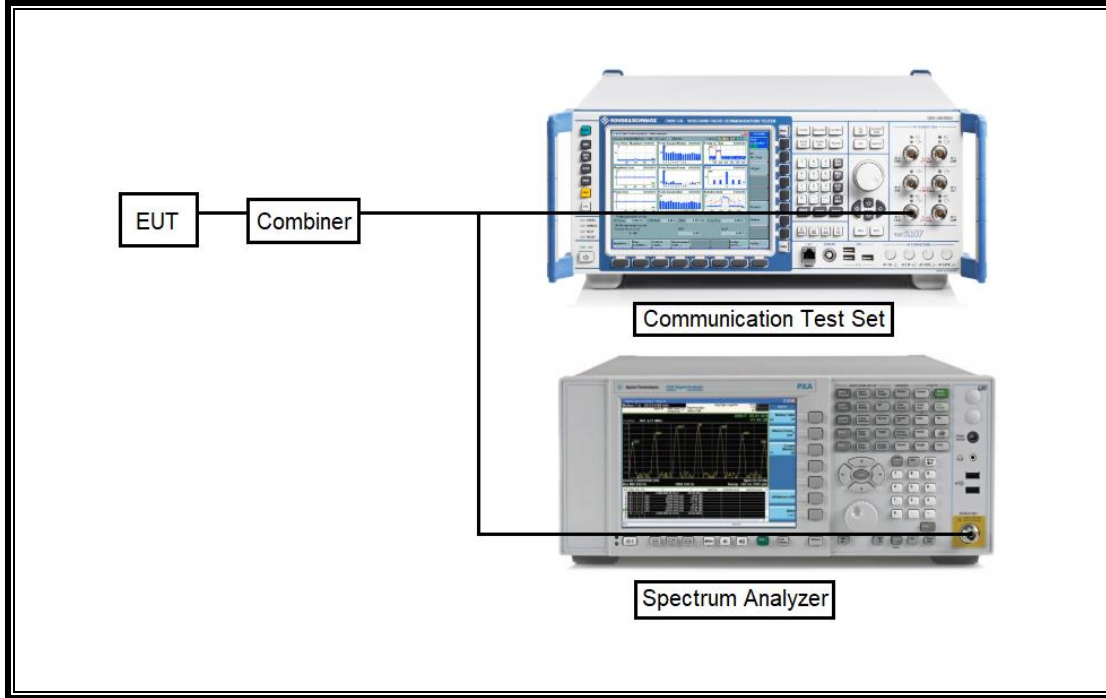
### I/O CABLE

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	1.8 m	N/A

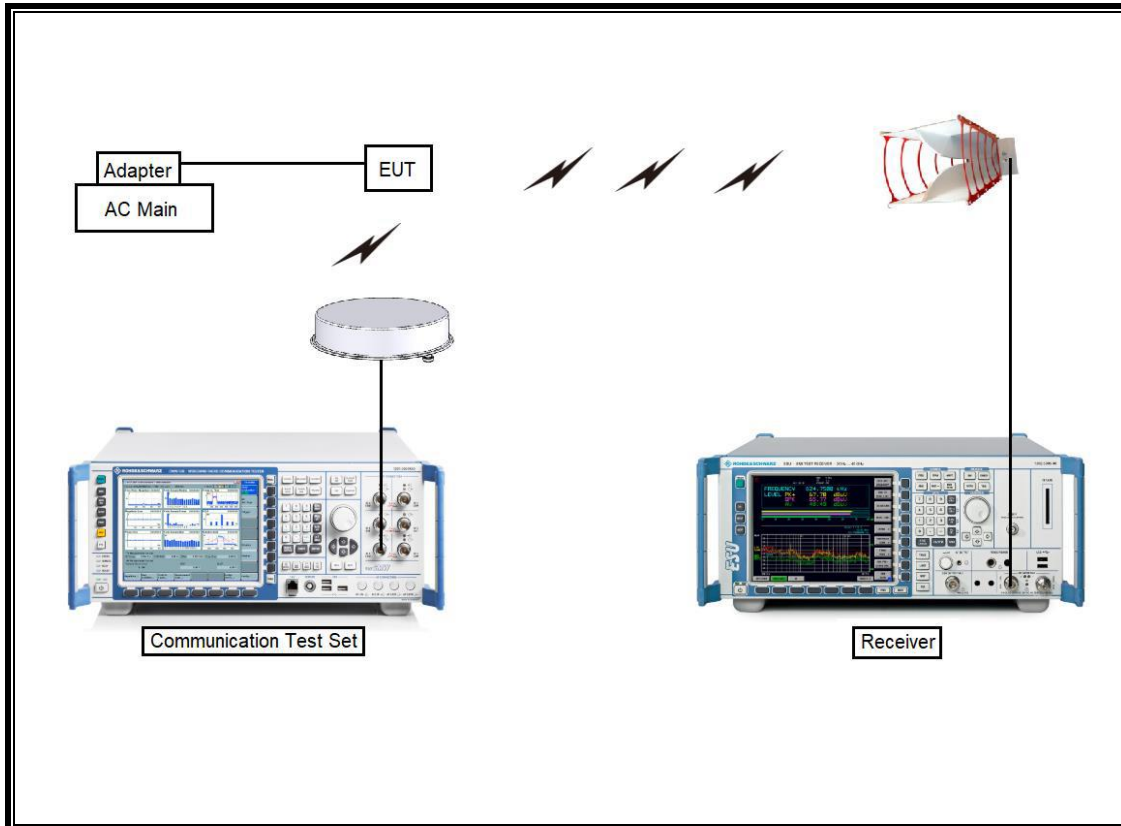
### TEST SETUP

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	2025-01-17
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	00168645	2023-10-13
Preamplifier	ETS	3115-PA	00167475	2023-08-04
Preamplifier	ETS	3116C-PA	00168841	2023-08-04
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	750	2024-08-15
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	845	2024-08-15
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	2024-08-15
Antenna, Horn, 18 GHz	ETS	3115	00161451	2024-08-21
Antenna, Horn, 18 GHz	ETS	3117	00168717	2024-08-21
Communications Test Set	R&S	CMW500	169796	2024-01-05
DC Power Supply	Agilent / HP	E3640A	MY54226395	2023-08-02
Preamplifier, 1000 MHz	Sonoma	310N	341282	2023-08-02
Preamplifier, 1000 MHz	Sonoma	310N	351741	2023-08-02
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029169	2023-08-01
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	2023-08-01
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	2023-08-03
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	2023-08-01
EMI Test Receive, 40 GHz	R&S	ESU40	100439	2023-08-02
EMI Test Receive, 40 GHz	R&S	ESU40	100457	2023-07-29
High Pass Filter 1.2GHz	Micro-Tronics	HPM50108-02	G005	2023-08-01
High Pass Filter 1.2GHz	Micro-Tronics	HPM50108-02	G006	2023-08-01
High Pass Filter 2.8GHz	Micro-Tronics	HPM50111-02	010	2023-08-01
High Pass Filter 2.8GHz	Micro-Tronics	HPM50111-02	011	2023-08-01
High Pass Filter 4GHz	Micro-Tronics	HPM50118-02	G001	2023-08-01
High Pass Filter 4GHz	Micro-Tronics	HPM50118-02	G002	2023-08-01
Attenuator	PASTERNAK	PE7087-10	A009	2023-08-03
Attenuator	PASTERNAK	PE7087-10	A001	2023-08-03
Attenuator	PASTERNAK	PE7087-10	A008	2023-08-03
Attenuator	PASTERNAK	PE7004-10	2	2023-08-01
Attenuator	PASTERNAK	PE7395-10	A011	2023-08-03
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	2023-10-06
Temperature Chamber	ESPEC	SH-642	93001109	2023-08-01
Power Splitter	MINI-CIRCUITS	WA1534	UL003	2024-01-09
Power Splitter	MINI-CIRCUITS	WA1534	UL004	2024-01-09
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
24.238(a)	Band Edge / Conducted Spurious Emission	-13dBm		Pass
2.1046	Conducted output power	N/A		Pass
24.235	Frequency Stability	2.5PPM		Pass
24.232(c)	Equivalent Isotropic Radiated Power	33dBm	Radiated	Pass
24.238(a)	Radiated Spurious Emission	-13dBm		Pass

## 8. CONDUCTED RESULTS

### 8.1. CONDUCTED OUTPUT POWER

#### Test Procedure

Per KDB 971168 D01 Power Meas License Digital Systems v03r01;

The transmitter output was connected to CMW500 Test set and configured to operate at maximum power.

#### RESULTS

See the following pages.

### 8.1.1. CONDUCTED AVERAGE OUTPUT POWER

#### GSM 1900

Mode	Coding Scheme	Time Slots	Ch No.	Freq. (MHz)	Maximum Average Power (dBm)			
					Measured		Tune-up Limit	
					Burst Pw r	Frame Pw r	Burst Pw r	Frame Pw r
GSM (Voice)	CS1	1	512	1850.2	29.54	20.51	30.50	21.5
			661	1880.0	29.68	20.65		
			810	1909.8	30.03	21.00		
GPRS (GMSK)	CS1	1	512	1850.2	29.51	20.48	30.50	21.5
			661	1880.0	29.22	20.19		
			810	1909.8	29.51	20.48		
		2	512	1850.2	27.40	21.38	29.00	22.98
			661	1880.0	27.37	21.35		
			810	1909.8	27.90	21.88		
		3	512	1850.2	26.68	22.42	27.00	22.7
			661	1880.0	24.81	20.55		
			810	1909.8	26.43	22.17		
		4	512	1850.2	24.10	21.09	25.00	22.0
			661	1880.0	24.28	21.27		
			810	1909.8	24.89	21.88		
EGPRS (8PSK)	MCS5	1	512	1850.2	25.88	16.85	27.00	18.0
			661	1880.0	26.08	17.05		
			810	1909.8	26.27	17.24		
		2	512	1850.2	24.27	18.25	25.00	19.0
			661	1880.0	24.22	18.20		
			810	1909.8	24.22	18.20		
		3	512	1850.2	22.26	18.00	23.00	18.7
			661	1880.0	21.35	17.09		
			810	1909.8	22.38	18.12		
		4	512	1850.2	21.41	18.40	22.00	19.0
			661	1880.0	21.34	18.33		
			810	1909.8	21.49	18.48		



**WCDMA B2**

Mode		UL Ch No.	Freq. (MHz)	Maximum Average Power (dBm)		
				Measured Pw r	MPR	Tune-up Limit
Release 99	Rel 99 (RMC, 12.2 kbps)	9262	1852.4	24.37	N/A	24.5
		9400	1880.0	24.13		
		9538	1907.6	24.25		
HSDPA	Subtest 1	9262	1852.4	23.40	0	23.5
		9400	1880.0	23.12		
		9538	1907.6	23.25		
	Subtest 2	9262	1852.4	23.41	0	23.5
		9400	1880.0	23.11		
		9538	1907.6	23.25		
	Subtest 3	9262	1852.4	22.91	0.5	23.0
		9400	1880.0	22.61		
		9538	1907.6	22.76		
	Subtest 4	9262	1852.4	22.91	0.5	23.0
		9400	1880.0	22.62		
		9538	1907.6	22.76		
HSUPA	Subtest 1	9262	1852.4	23.38	0	23.5
		9400	1880.0	23.10		
		9538	1907.6	23.25		
	Subtest 2	9262	1852.4	21.40	2	21.5
		9400	1880.0	21.11		
		9538	1907.6	21.28		
	Subtest 3	9262	1852.4	22.40	1	22.5
		9400	1880.0	22.16		
		9538	1907.6	22.26		
	Subtest 4	9262	1852.4	21.41	2	21.5
		9400	1880.0	21.16		
		9538	1907.6	21.27		
	Subtest 5	9262	1852.4	22.96	0	23.5
		9400	1880.0	22.70		
		9538	1907.6	22.85		
DC-HSDPA	Subtest 1	9262	1852.4	23.39	0	23.5
		9400	1880.0	23.13		
		9538	1907.6	23.27		
	Subtest 2	9262	1852.4	23.36	0	23.5
		9400	1880.0	23.09		
		9538	1907.6	23.26		
	Subtest 3	9262	1852.4	22.90	0.5	23.0
		9400	1880.0	22.60		
		9538	1907.6	22.77		
	Subtest 4	9262	1852.4	22.90	0.5	23.0
		9400	1880.0	22.62		
		9538	1907.6	22.78		

**LTE Band 25**

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)				
				Measured Pwr (dBm)			MPR	Tune-up Limit
				26140	26365	26590		
				1860 MHz	1882.5 MHz	1905 MHz		
20 MHz	QPSK	1	0	23.79	23.68	23.64	0.0	24.5
		1	49	23.70	23.71	23.69	0.0	24.5
		1	99	23.71	23.67	23.64	0.0	24.5
		50	0	22.87	22.75	22.70	1.0	23.5
		50	24	22.85	22.77	22.76	1.0	23.5
		50	50	22.83	22.79	22.75	1.0	23.5
	100	0	22.84	22.79	22.76	1.0	23.5	
	16QAM	1	0	22.99	23.14	23.07	1.0	23.5
		1	49	22.97	23.27	23.04	1.0	23.5
		1	99	22.97	23.01	23.03	1.0	23.5
		50	0	21.89	21.75	21.68	2.0	22.5
		50	24	21.87	21.79	21.80	2.0	22.5
		50	50	21.85	21.75	21.72	2.0	22.5
	100	0	21.83	21.78	21.77	2.0	22.5	
	64QAM	1	0	21.98	21.94	21.88	2.0	22.5
		1	49	21.99	21.98	21.84	2.0	22.5
		1	99	22.13	22.03	22.08	2.0	22.5
		50	0	20.98	20.87	20.78	3.0	21.5
		50	24	21.00	20.91	20.87	3.0	21.5
		50	50	20.90	20.84	20.82	3.0	21.5
	100	0	20.98	20.87	20.86	3.0	21.5	
	256QAM	1	0	18.93	19.09	18.94	5.0	19.5
		1	49	19.01	18.99	18.90	5.0	19.5
		1	99	18.96	19.09	18.92	5.0	19.5
50		0	18.97	18.87	18.79	5.0	19.5	
50		24	18.98	18.87	18.83	5.0	19.5	
50		50	18.94	18.85	18.81	5.0	19.5	
100	0	18.94	18.85	18.83	5.0	19.5		
BW (MHz)	Mode	RB Allocation	RB offset	Measured Pwr (dBm)			MPR	Tune-up Limit
				26115	26365	26615		
				1857.5 MHz	1882.5 MHz	1907.5 MHz		
				1857.5 MHz	1882.5 MHz	1907.5 MHz		
15 MHz	QPSK	1	0	23.88	23.74	23.61	0.0	24.5
		1	37	23.79	23.75	23.63	0.0	24.5
		1	74	23.82	23.68	23.59	0.0	24.5
		36	0	22.86	22.77	22.65	1.0	23.5
		36	20	22.86	22.75	22.72	1.0	23.5
		36	39	22.88	22.77	22.70	1.0	23.5
	75	0	22.88	22.73	22.72	1.0	23.5	
	16QAM	1	0	23.14	23.03	22.88	1.0	23.5
		1	37	23.15	23.09	23.07	1.0	23.5
		1	74	23.14	23.02	23.11	1.0	23.5
		36	0	21.91	21.83	21.65	2.0	22.5
		36	20	21.93	21.79	21.73	2.0	22.5
		36	39	21.91	21.79	21.74	2.0	22.5
	75	0	21.87	21.76	21.74	2.0	22.5	
	64QAM	1	0	22.08	21.99	21.79	2.0	22.5
		1	37	22.07	22.00	21.89	2.0	22.5
		1	74	22.13	21.85	21.91	2.0	22.5
		36	0	20.95	20.82	20.78	3.0	21.5
		36	20	20.94	20.87	20.84	3.0	21.5
		36	39	20.95	20.85	20.81	3.0	21.5
	75	0	20.92	20.86	20.82	3.0	21.5	
	256QAM	1	0	18.95	18.84	18.90	5.0	19.5
		1	37	19.08	18.83	18.97	5.0	19.5
		1	74	19.05	18.94	18.97	5.0	19.5
36		0	18.92	18.85	18.72	5.0	19.5	
36		20	18.93	18.82	18.79	5.0	19.5	
36		39	18.95	18.87	18.78	5.0	19.5	
75	0	18.92	18.88	18.83	5.0	19.5		

BW (MHz)	Mode	RB Allocation	RB offset	Measured Pwr (dBm)			MPR	Tune-up Limit
				26090	26365	26640		
				1855 MHz	1882.5 MHz	1910 MHz		
10 MHz	QPSK	1	0	24.03	23.89	23.84	0.0	24.5
		1	25	24.04	23.92	23.90	0.0	24.5
		1	49	23.94	23.86	23.77	0.0	24.5
		25	0	23.00	22.90	22.79	1.0	23.5
		25	12	23.06	22.88	22.80	1.0	23.5
		25	25	23.01	22.90	22.82	1.0	23.5
	16QAM	50	0	22.99	22.89	22.79	1.0	23.5
		1	0	23.37	23.32	23.11	1.0	23.5
		1	25	23.29	23.32	23.22	1.0	23.5
		1	49	23.44	23.19	23.14	1.0	23.5
		25	0	22.05	21.89	21.77	2.0	22.5
		25	12	22.09	21.91	21.77	2.0	22.5
	64QAM	25	25	22.03	21.91	21.86	2.0	22.5
		50	0	22.04	21.94	21.77	2.0	22.5
		1	0	22.27	22.30	21.95	2.0	22.5
		1	25	22.34	22.23	22.12	2.0	22.5
		1	49	22.21	22.07	22.06	2.0	22.5
		25	0	21.10	20.98	20.85	3.0	21.5
	256QAM	25	12	21.18	20.98	20.87	3.0	21.5
		25	25	21.09	21.00	20.93	3.0	21.5
		50	0	21.08	21.01	20.80	3.0	21.5
		1	0	19.26	19.08	18.99	5.0	19.5
		1	25	19.25	18.99	19.24	5.0	19.5
		1	49	19.21	18.98	18.94	5.0	19.5
5 MHz	QPSK	25	0	19.08	18.99	18.88	5.0	19.5
		25	12	19.17	19.03	18.88	5.0	19.5
		25	25	19.09	19.01	18.97	5.0	19.5
		50	0	19.11	18.99	18.87	5.0	19.5
		1	0	24.00	23.82	23.79	0.0	24.5
		1	12	24.09	23.96	23.88	0.0	24.5
	16QAM	1	24	23.98	23.85	23.83	0.0	24.5
		12	0	23.03	22.85	22.75	1.0	23.5
		12	7	23.05	22.89	22.80	1.0	23.5
		12	13	23.00	22.85	22.88	1.0	23.5
		25	0	23.04	22.87	22.78	1.0	23.5
		1	0	23.34	23.27	23.29	1.0	23.5
	64QAM	1	12	23.48	23.25	23.36	1.0	23.5
		1	24	23.39	23.23	23.26	1.0	23.5
		12	0	21.95	21.93	21.84	2.0	22.5
		12	7	21.96	21.96	21.88	2.0	22.5
		12	13	21.94	21.94	21.96	2.0	22.5
		25	0	22.12	21.92	21.79	2.0	22.5
	256QAM	1	0	22.19	21.96	22.02	2.0	22.5
		1	12	22.32	22.08	22.04	2.0	22.5
		1	24	22.21	22.06	22.01	2.0	22.5
		12	0	21.10	20.98	20.88	3.0	21.5
		12	7	21.20	21.02	20.93	3.0	21.5
		12	13	21.10	20.96	20.95	3.0	21.5
256QAM	25	0	21.10	21.03	20.86	3.0	21.5	
	1	0	19.15	19.11	19.07	5.0	19.5	
	1	12	19.26	19.18	19.20	5.0	19.5	
	1	24	19.27	19.02	19.05	5.0	19.5	
	12	0	19.15	18.98	18.93	5.0	19.5	
	12	7	19.20	19.06	18.88	5.0	19.5	
256QAM	12	13	19.14	18.98	18.91	5.0	19.5	
	25	0	19.12	18.99	18.82	5.0	19.5	

BW (MHz)	Mode	RB Allocation	RB offset	Measured Pwr (dBm)			MPR	Tune-up Limit
				26055	26365	26675		
				1851.5 MHz	1882.5 MHz	1913.5 MHz		
3 MHz	QPSK	1	0	23.99	23.85	23.75	0.0	24.5
		1	8	24.07	23.88	23.92	0.0	24.5
		1	14	23.99	23.80	23.86	0.0	24.5
		8	0	22.97	22.88	22.75	1.0	23.5
		8	4	23.01	22.91	22.88	1.0	23.5
		8	7	23.02	22.91	22.92	1.0	23.5
	16QAM	15	0	23.01	22.85	22.75	1.0	23.5
		1	0	23.35	23.25	23.11	1.0	23.5
		1	8	23.43	23.38	23.18	1.0	23.5
		1	14	23.26	23.24	23.07	1.0	23.5
		8	0	22.03	21.98	21.79	2.0	22.5
		8	4	22.08	22.02	21.94	2.0	22.5
	64QAM	8	7	22.07	22.00	21.98	2.0	22.5
		15	0	22.04	21.90	21.82	2.0	22.5
		1	0	22.05	22.06	21.97	2.0	22.5
		1	8	22.42	22.30	22.10	2.0	22.5
		1	14	22.37	22.09	21.94	2.0	22.5
		8	0	21.11	20.95	20.89	3.0	21.5
	256QAM	8	4	21.22	21.03	20.98	3.0	21.5
		8	7	21.20	21.02	20.99	3.0	21.5
		15	0	21.16	20.97	20.82	3.0	21.5
		1	0	19.30	19.05	18.83	5.0	19.5
		1	8	19.31	19.13	19.04	5.0	19.5
		1	14	19.22	18.87	18.94	5.0	19.5
1.4 MHz	QPSK	8	0	19.15	19.03	18.80	5.0	19.5
		8	4	19.21	19.02	18.94	5.0	19.5
		8	7	19.17	19.03	18.99	5.0	19.5
		15	0	19.17	18.95	18.84	5.0	19.5
		1	0	23.63	23.86	23.79	0.0	24.5
		1	3	23.88	23.96	23.80	0.0	24.5
	16QAM	1	5	23.99	23.92	23.79	0.0	24.5
		3	0	24.07	23.88	23.80	0.0	24.5
		3	1	24.04	23.89	23.79	0.0	24.5
		3	3	24.02	23.88	23.80	0.0	24.5
		6	0	22.99	22.84	22.78	1.0	23.5
		1	0	23.22	23.28	23.06	1.0	23.5
	64QAM	1	3	23.20	23.25	23.30	1.0	23.5
		1	5	23.23	23.15	23.16	1.0	23.5
		3	0	23.16	23.05	22.96	1.0	23.5
		3	1	23.21	23.02	22.96	1.0	23.5
		3	3	23.16	23.05	23.02	1.0	23.5
		6	0	22.08	21.87	21.88	2.0	22.5
	256QAM	1	0	21.90	22.12	22.13	2.0	22.5
		1	3	22.49	22.16	22.31	2.0	22.5
		1	5	22.31	22.03	22.21	2.0	22.5
		3	0	22.16	22.10	22.01	2.0	22.5
		3	1	22.17	22.07	22.01	2.0	22.5
		3	3	22.23	22.07	21.98	2.0	22.5
256QAM	6	0	21.11	21.03	20.88	3.0	21.5	
	1	0	19.17	19.00	18.85	5.0	19.5	
	1	3	19.17	19.05	18.91	5.0	19.5	
	1	5	19.17	18.95	19.01	5.0	19.5	
	3	0	19.18	18.98	18.90	5.0	19.5	
	3	1	19.16	18.92	18.95	5.0	19.5	
256QAM	3	3	19.17	18.97	18.85	5.0	19.5	
	6	0	19.21	18.98	18.84	5.0	19.5	

## 8.2. 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

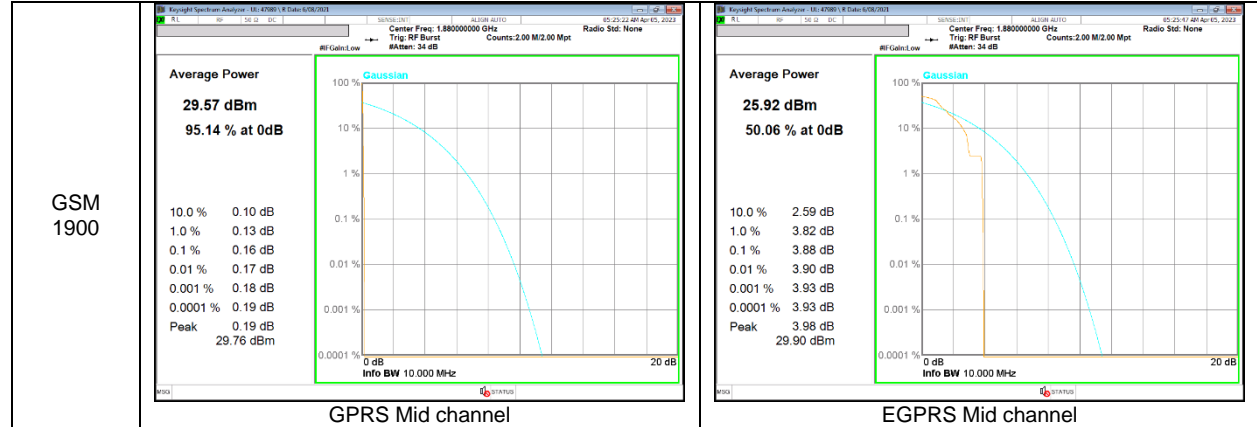
In addition, when the transmitter power is measured in terms of average value, the peak-to-average ratio of the power shall not exceed 13 dB.

### RESULTS

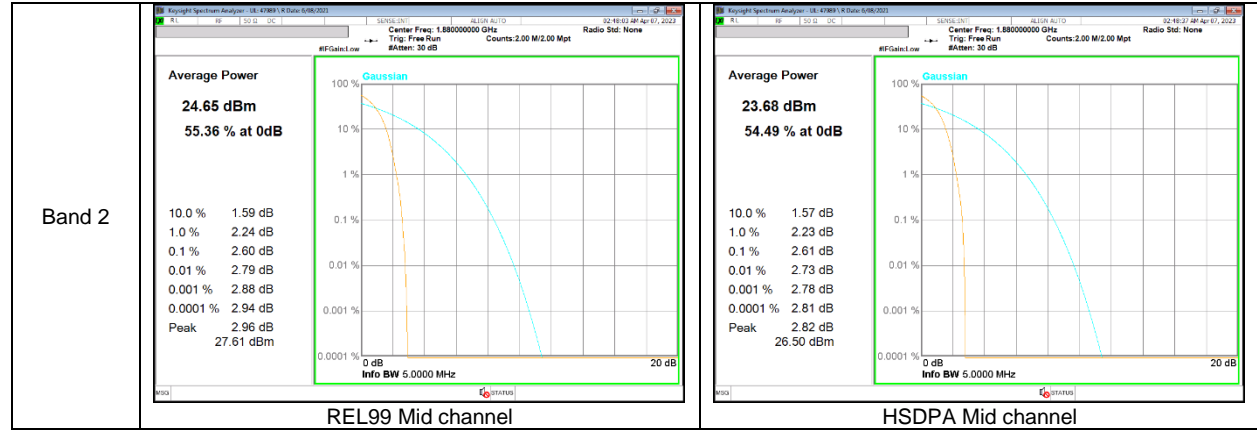
See the following pages.

### 8.2.1. CONDUCTED PEAK TO AVERAGE RESULT

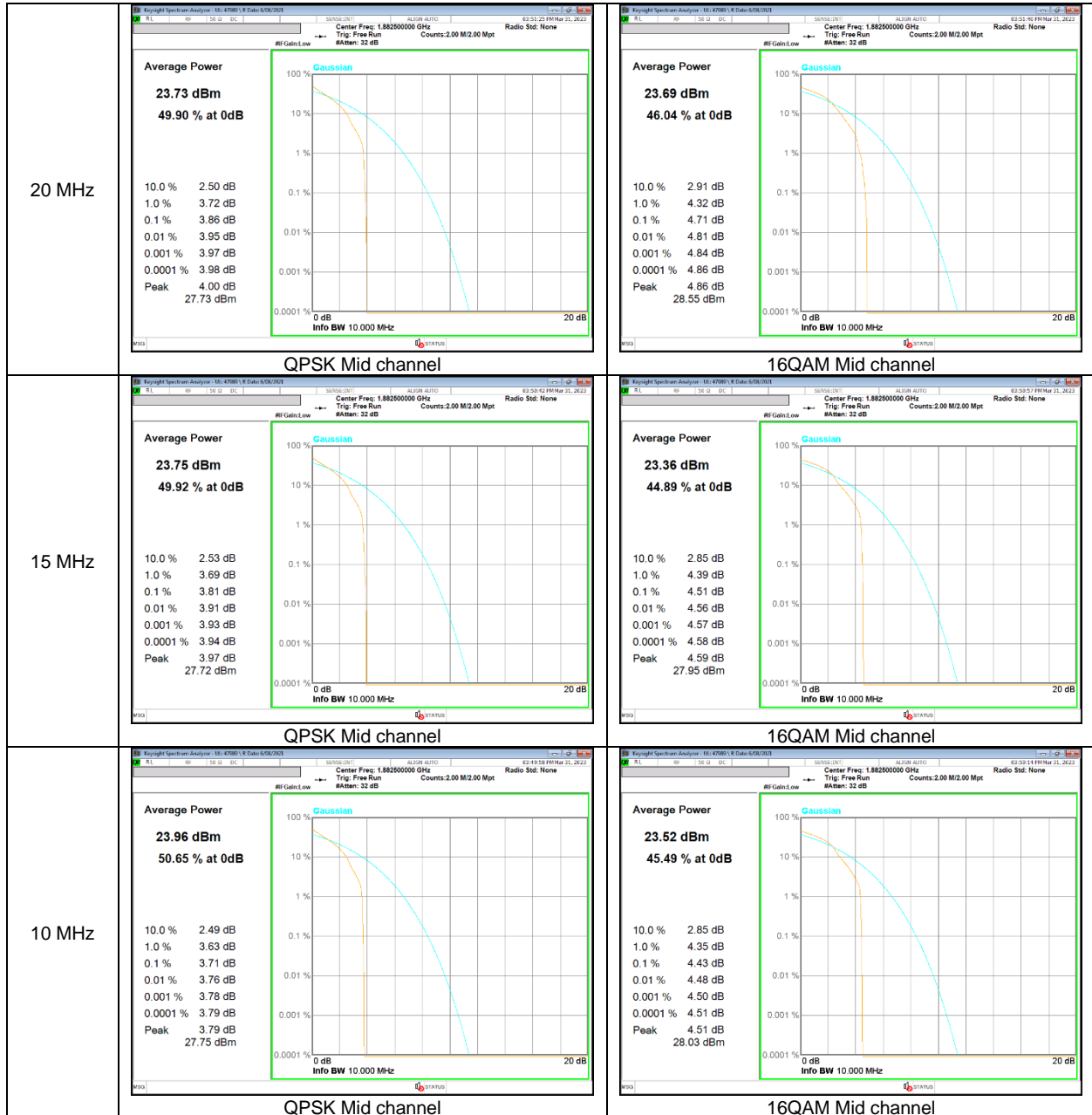
#### GSM

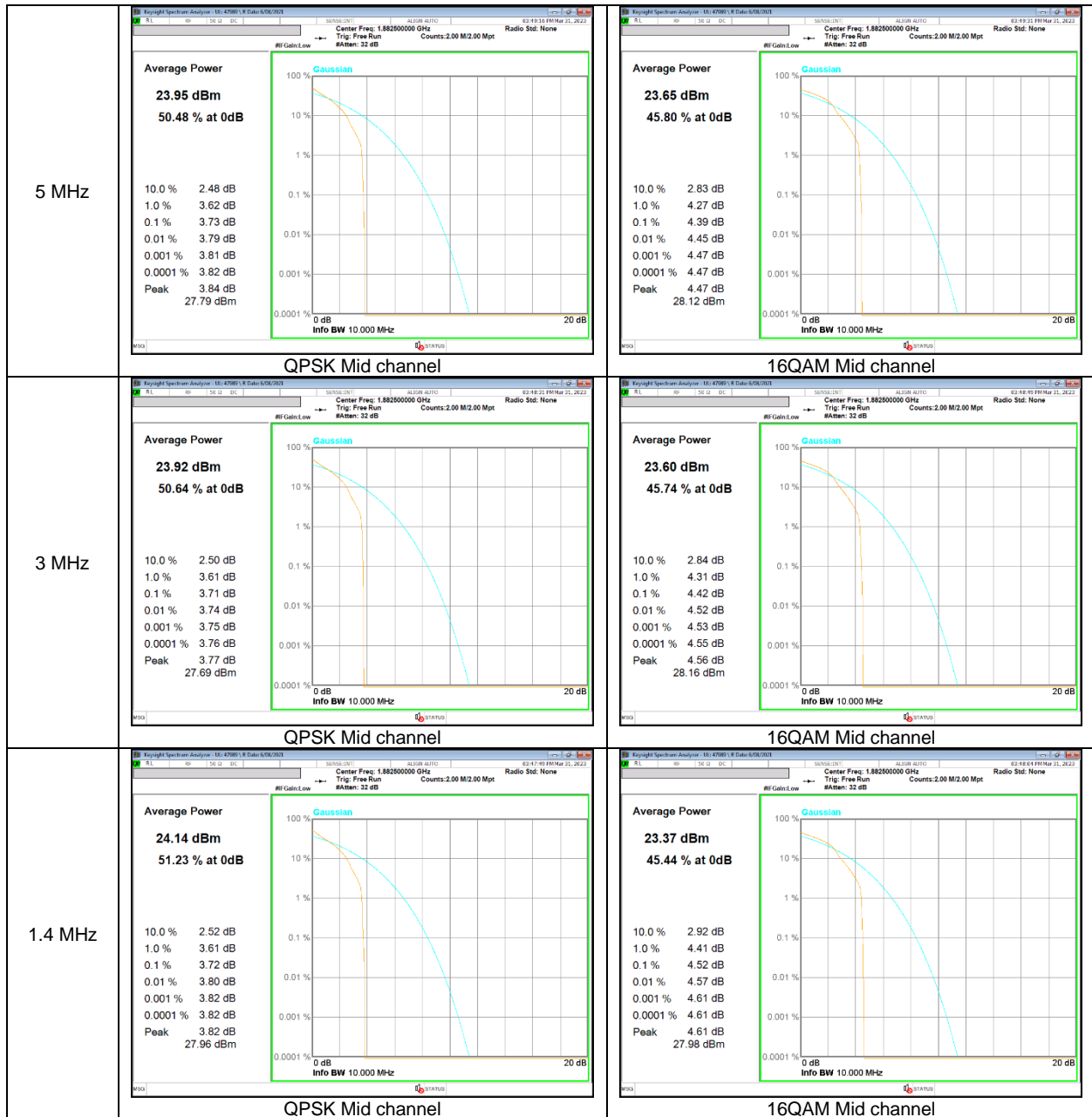


#### WCDMA



**LTE Band 25**







### **8.3. 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)
1900	GPRS	1880.0	244.24	312.7
	EGPRS		239.23	309.7

**- WCDMA**

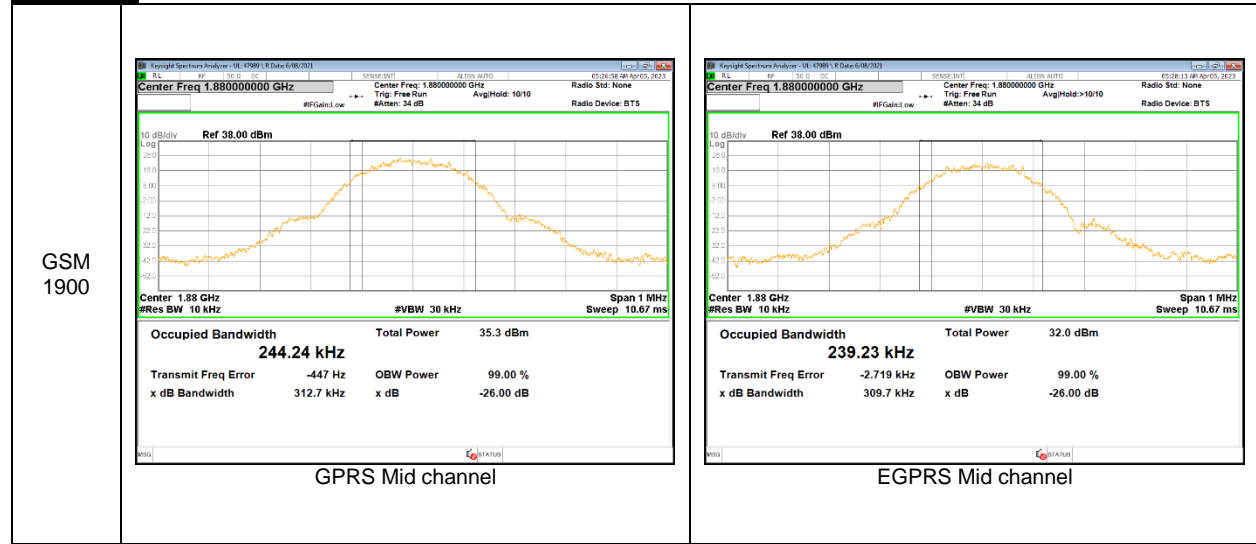
Band	Modulation	f [MHz]	99% BW (MHz)	-26dB BW (MHz)
B2	Rel.99	1880.0	4.169	4.72
	HSDPA		4.162	4.69

**- LTE Band 25**

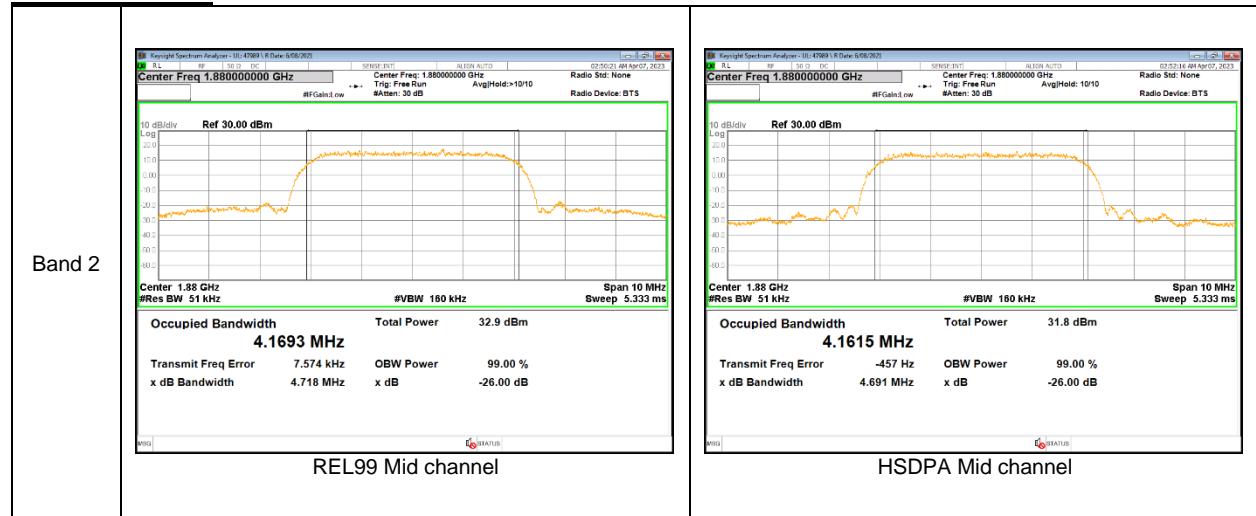
Band	BW	Modulation	f [MHz]	99% BW (MHz)	-26dB BW (MHz)
LTE B25	20M	QPSK	1882.5	17.908	19.57
		16QAM		17.935	19.63
	15M	QPSK		13.426	14.79
		16QAM		13.448	14.66
	10M	QPSK		8.977	9.90
		16QAM		8.967	9.92
	5M	QPSK		4.500	5.13
		16QAM		4.499	5.10
	3M	QPSK		2.697	3.05
		16QAM		2.698	3.05
	1.4M	QPSK		1.092	1.34
		16QAM		1.094	1.38

### 8.3.1. OCCUPIED BANDWIDTH RESULTS

#### GSM 1900

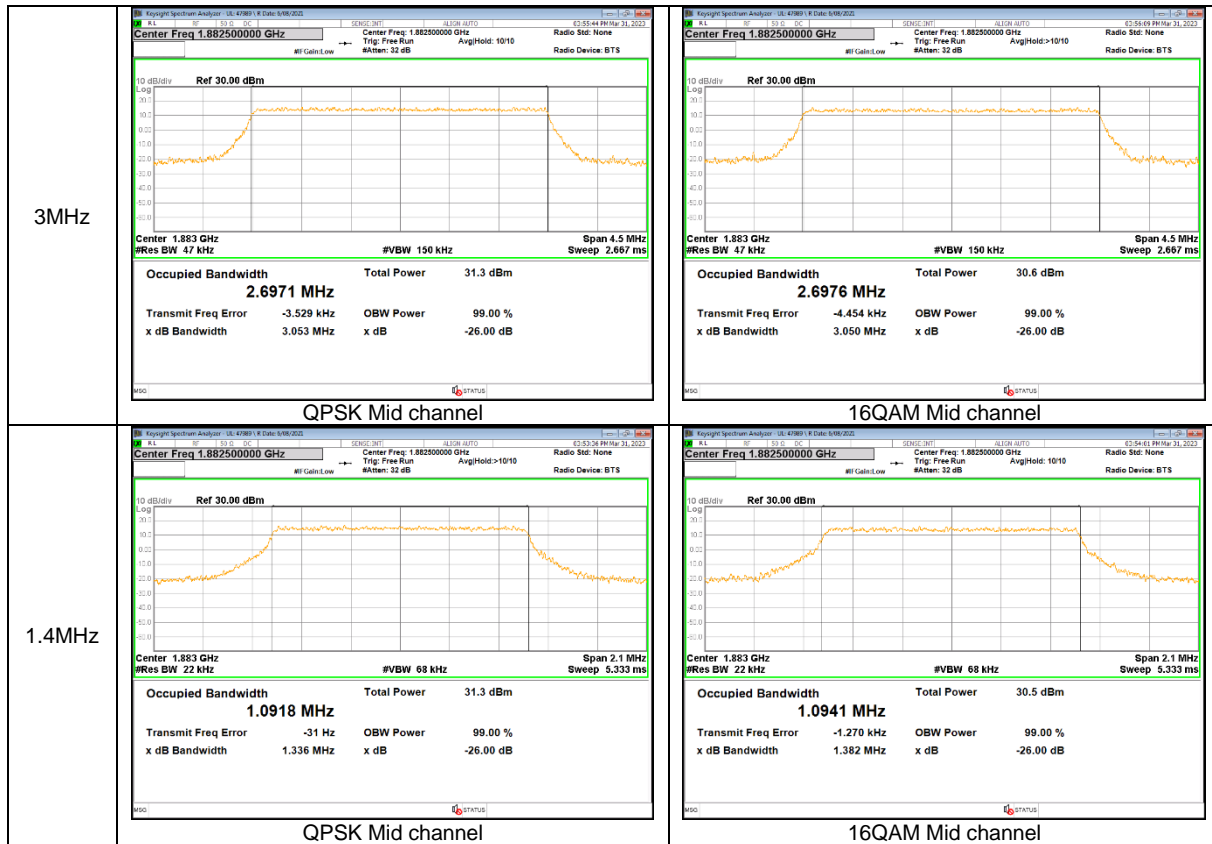


#### WCDMA Band 2



**LTE Band 25**





## 8.4. BAND EDGE EMISSIONS

### RULE PART(S)

FCC: §24.238

### LIMITS

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log (P)$  dB.

### 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 band edge emissions were measured at the required operating frequencies in each band on the Spectrum Analyzer.

### GSM

- a) Set the RBW = 1 - 5% of OBW(GSM1900 – 9.1KHz)
- b) Set VBW  $\geq 3 \times$  RBW;
- c) Set span  $\geq 1.5$  times the OBW;
- d) Sweep time = 1S ;
- e) Detector = RMS;
- f) Ensure that the number of measurement points  $\geq 2 \times$  Span/RBW;
- g) Trace mode = Average(100);
- h) Add duty cycle correction factor (9dB)

### WCDMA/LTE

- a) Set the RBW = 1 - 1.5 % of OBW(Typically limited to a minimum RBW of 1% of the OBW)
- b) Set VBW  $\geq 3 \times$  RBW;
- c) Set span  $\geq 1.5$  times the OBW;
- d) Sweep time = Auto;
- e) Detector = RMS;
- f) Ensure that the number of measurement points  $\geq 2 \times$  Span/RBW;
- g) Trace mode = Average (100);

**NOTE1**

Note that the spurious emissions outside of the channel include narrowband signals. These signals are all below the -13dBm limits. Although the measurement bandwidth is less than the reference bandwidth of 1MHz no addental correction is applied as ANSI C63.26 section 4.2.3 only requires the correction to be applied when the OBW of the emission being measured is wider than the measurement bandwidth (Where the OBW of the signal under measurement is less than the RBW of the measuring instrument, no bandwidth correction or integration will be required.) Plots for low and high channels show the level of the emission measured with the reduced bandwidth and the level of the same emission measured using the integration method over the 1MHz reference bandwidth are very close, indicating the emissions are narrowband.

**NOTE2**

For Band-Edge extended:

CH BW (MHz)	RB Used (kHz)	CF for emissions more than 100kHz	CF for emissions more than 1MHz
1.4	15	+8.2 dB	+18.2 dB
3	30	+5.2 dB	+15.2 dB
5	51	+2.9 dB	+12.9 dB
10	100	N/A	+10.0 dB
15	150	N/A	+8.2 dB
20	200	N/A	+7.0 dB

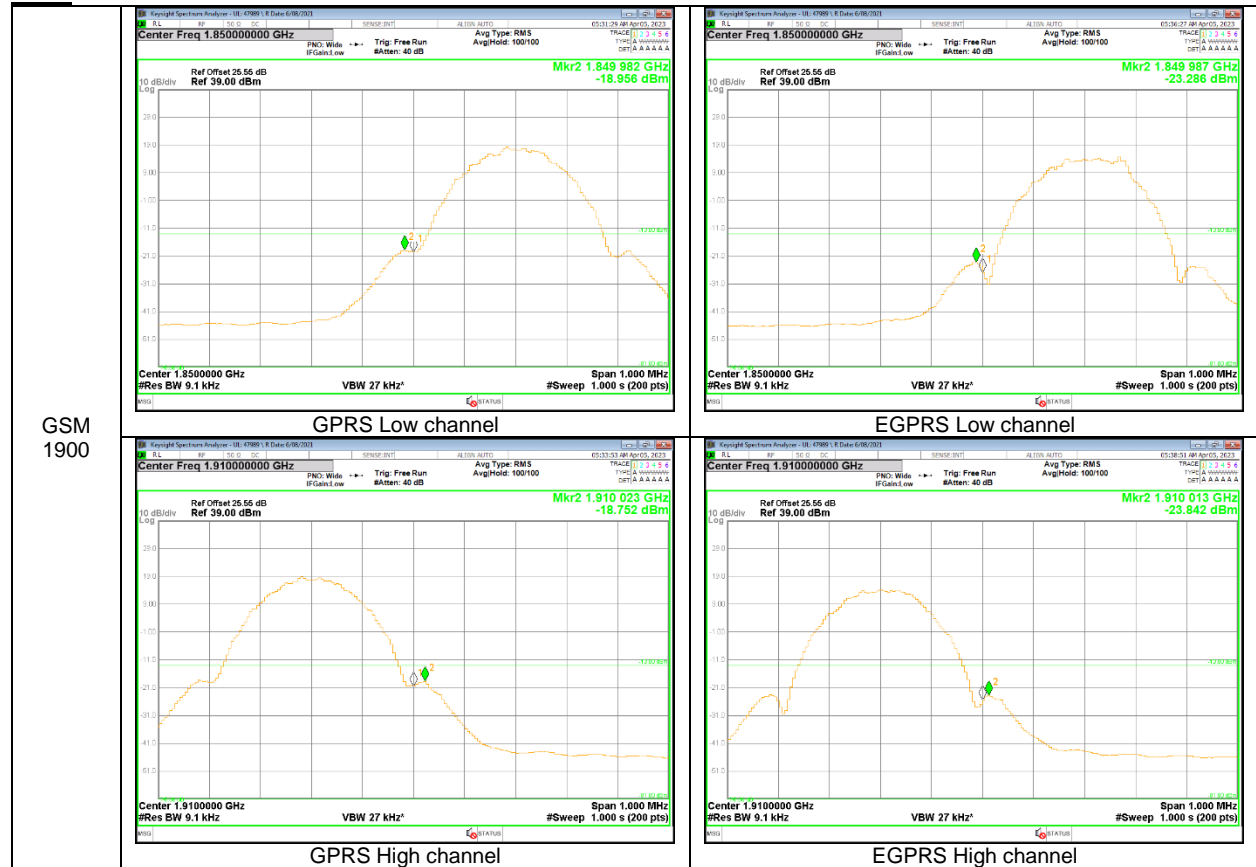
For the band edge value measured in [RB Used], even if [CF for emissions reference bandwidth 100kHz/1MHz] is applied, it is below -13dBm.

**RESULTS**

See the following pages.

### 8.4.1. BAND EDGE RESULT

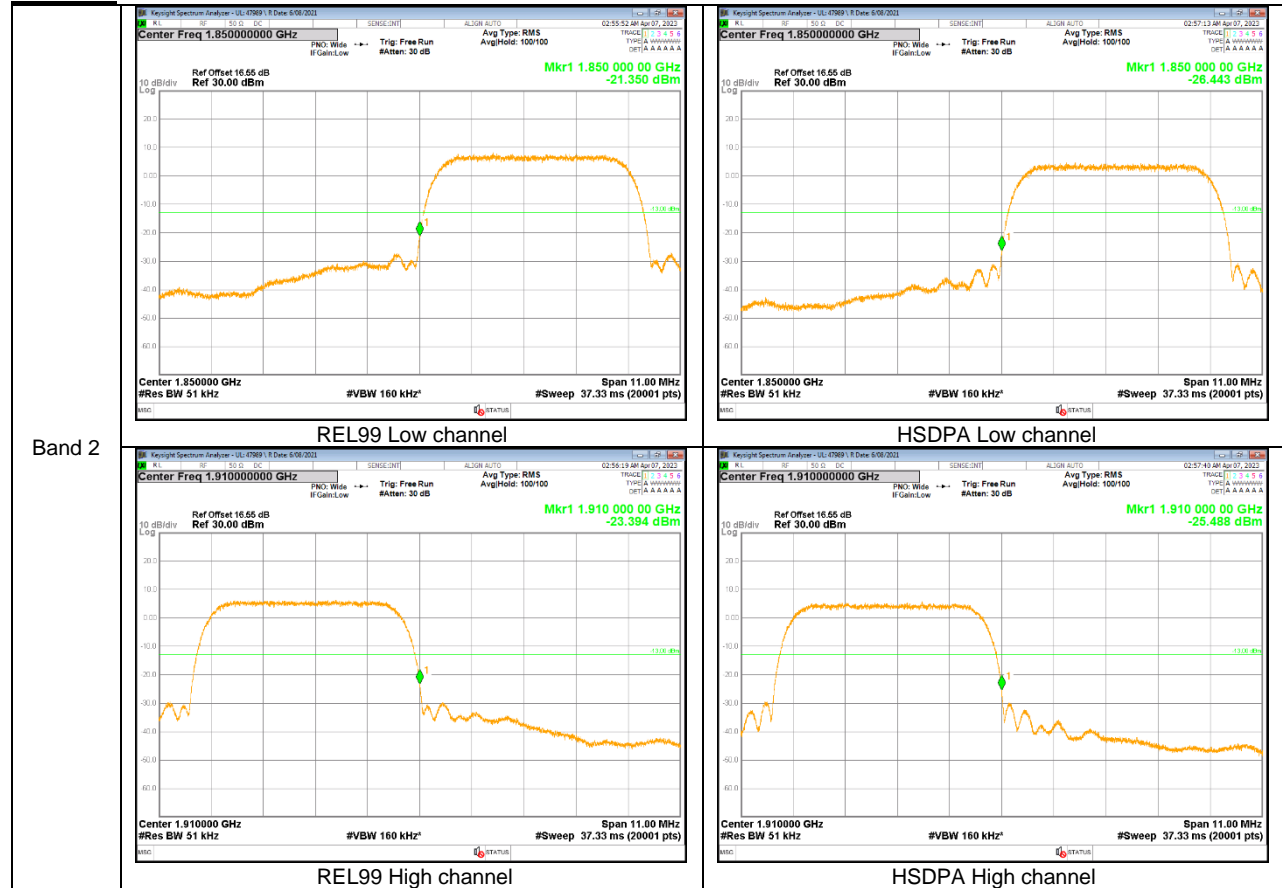
GSM



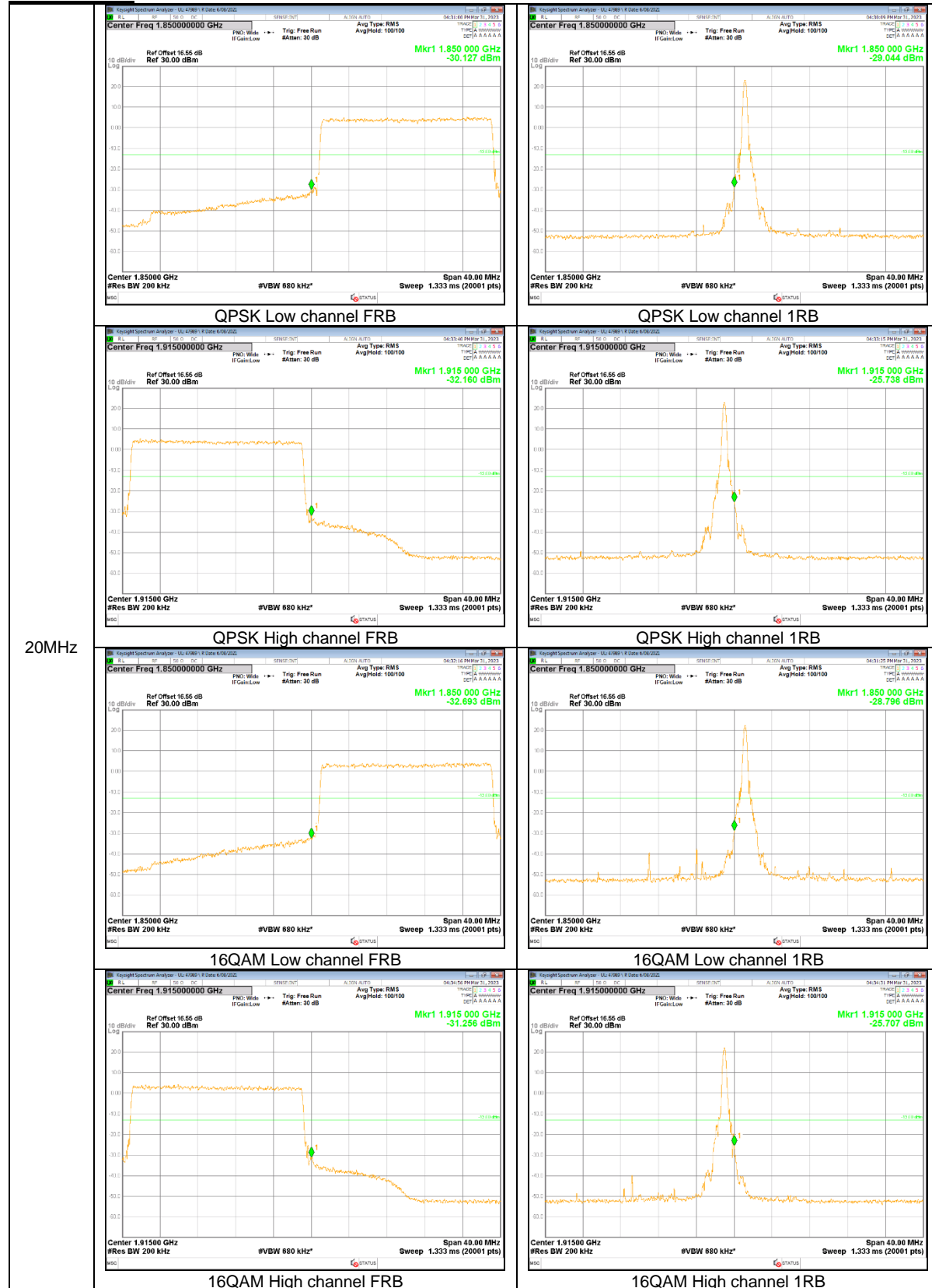
GSM  
1900



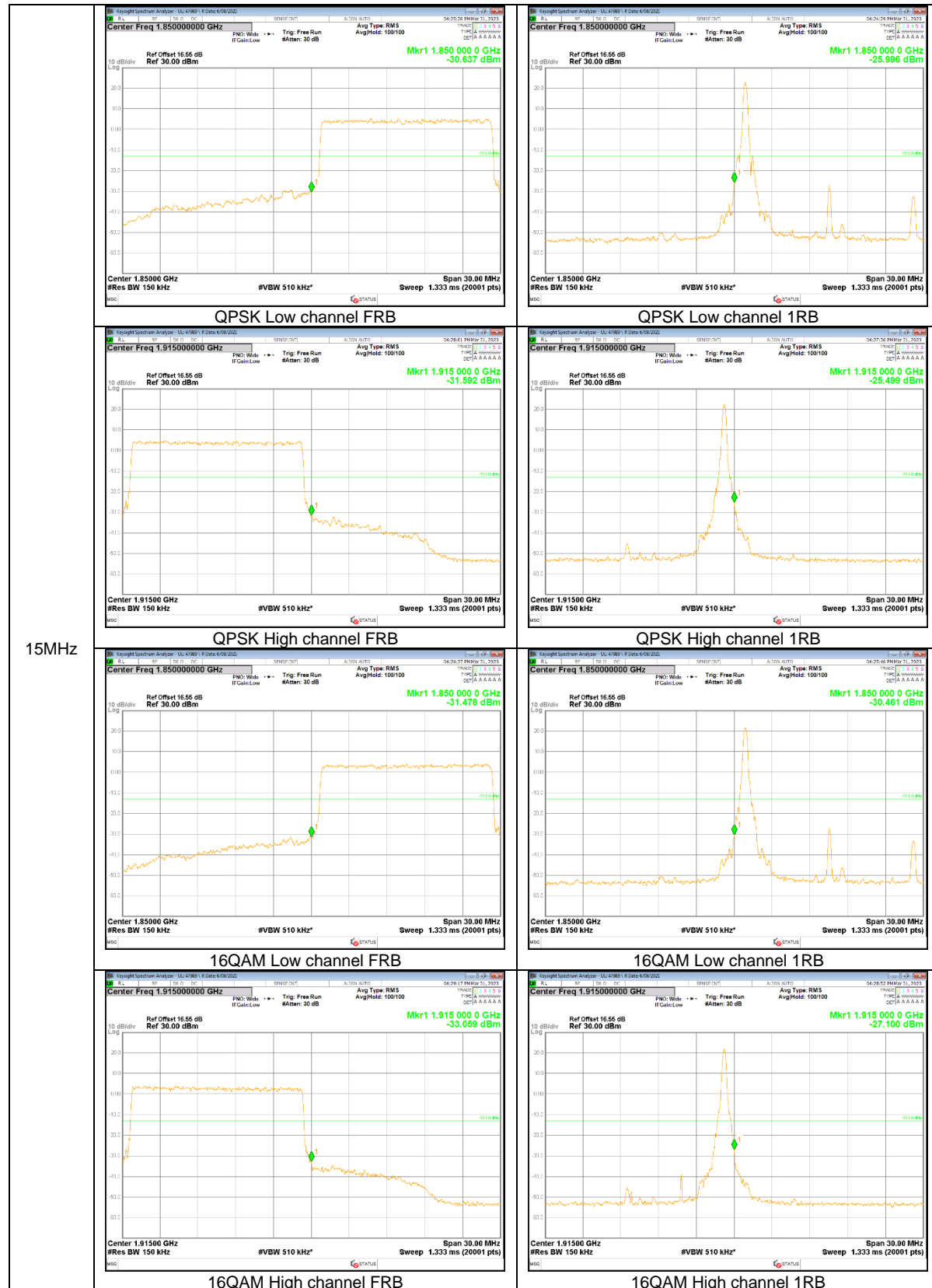
WCDMA

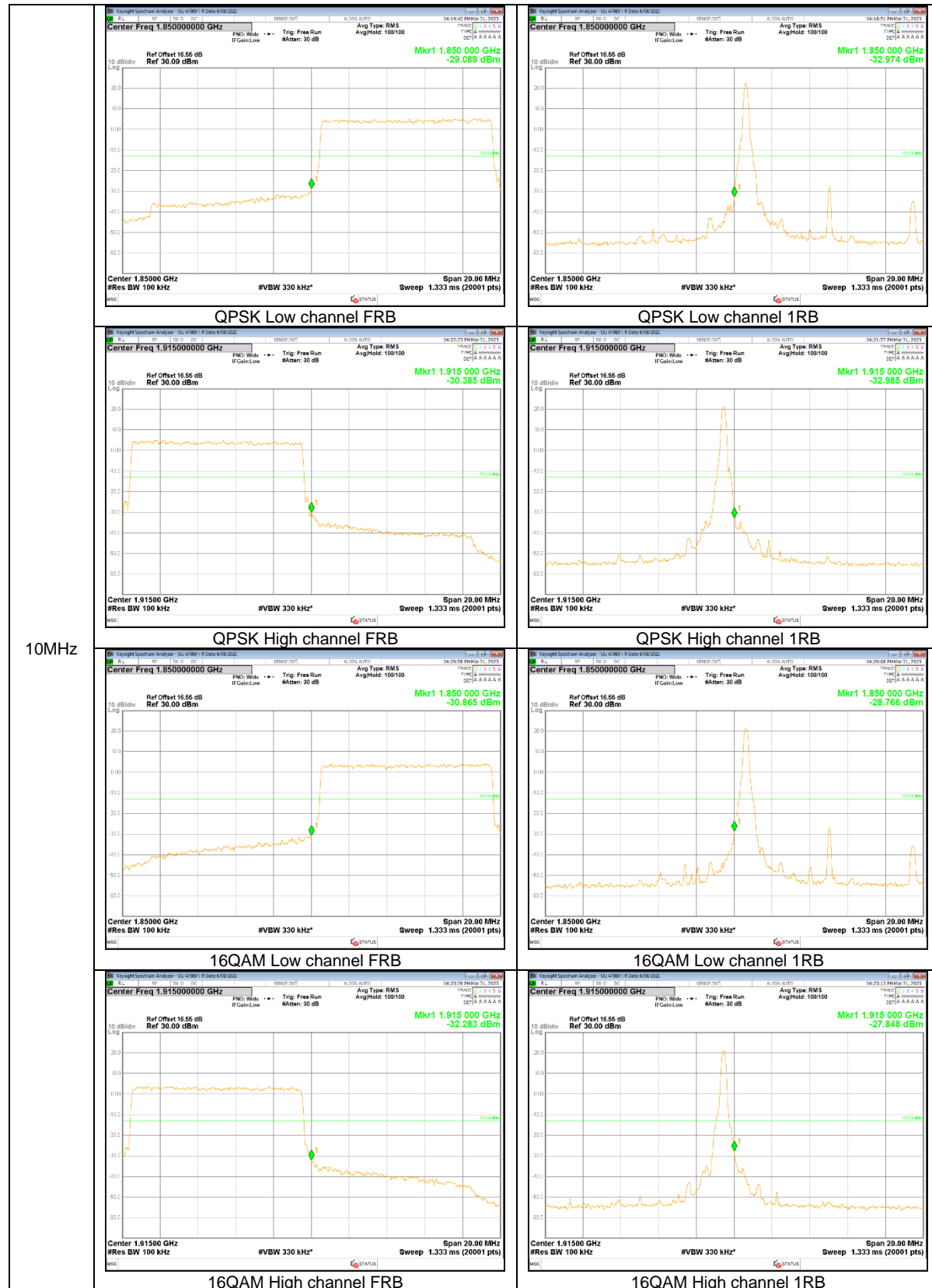


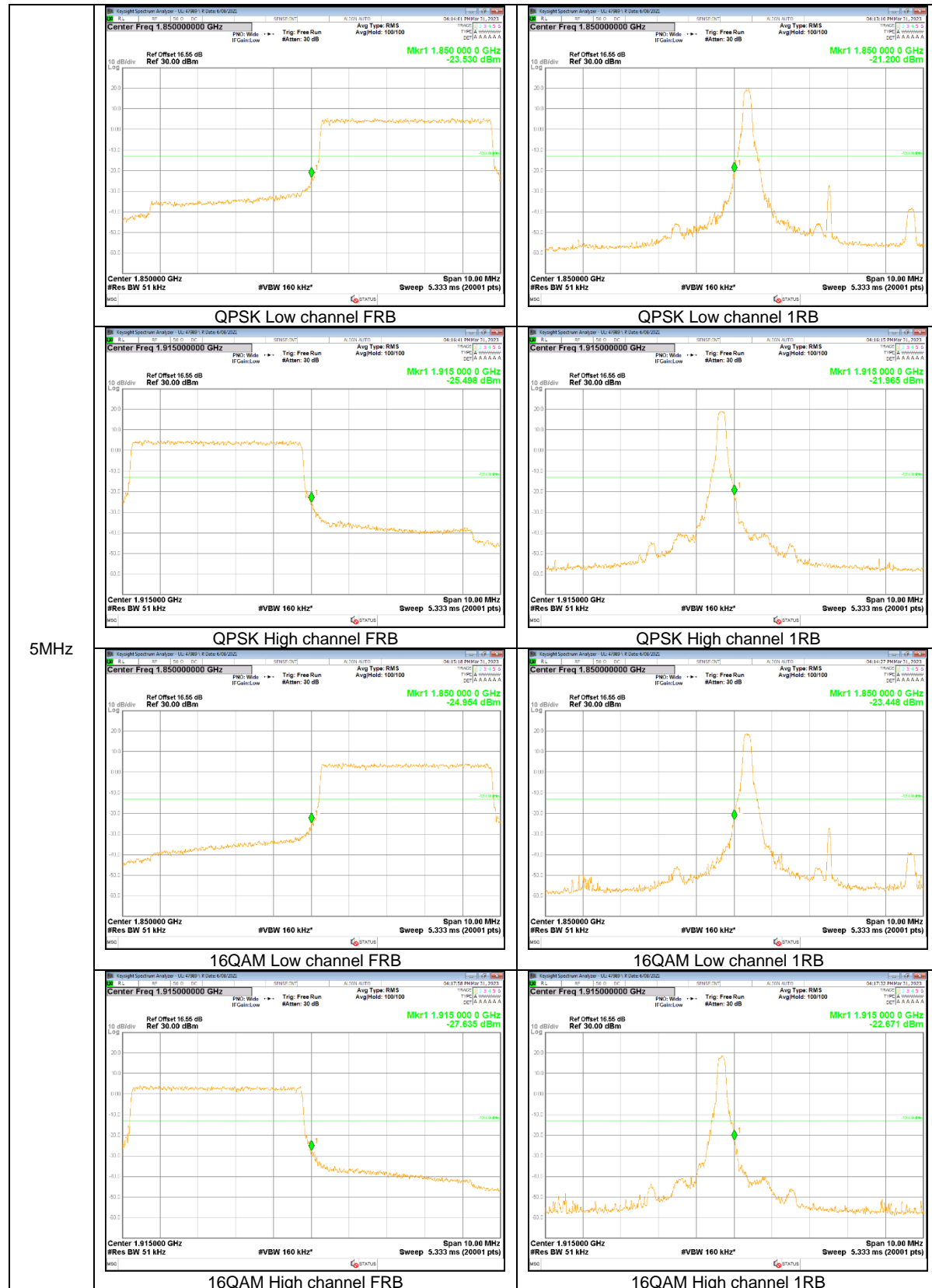
LTE Band 25



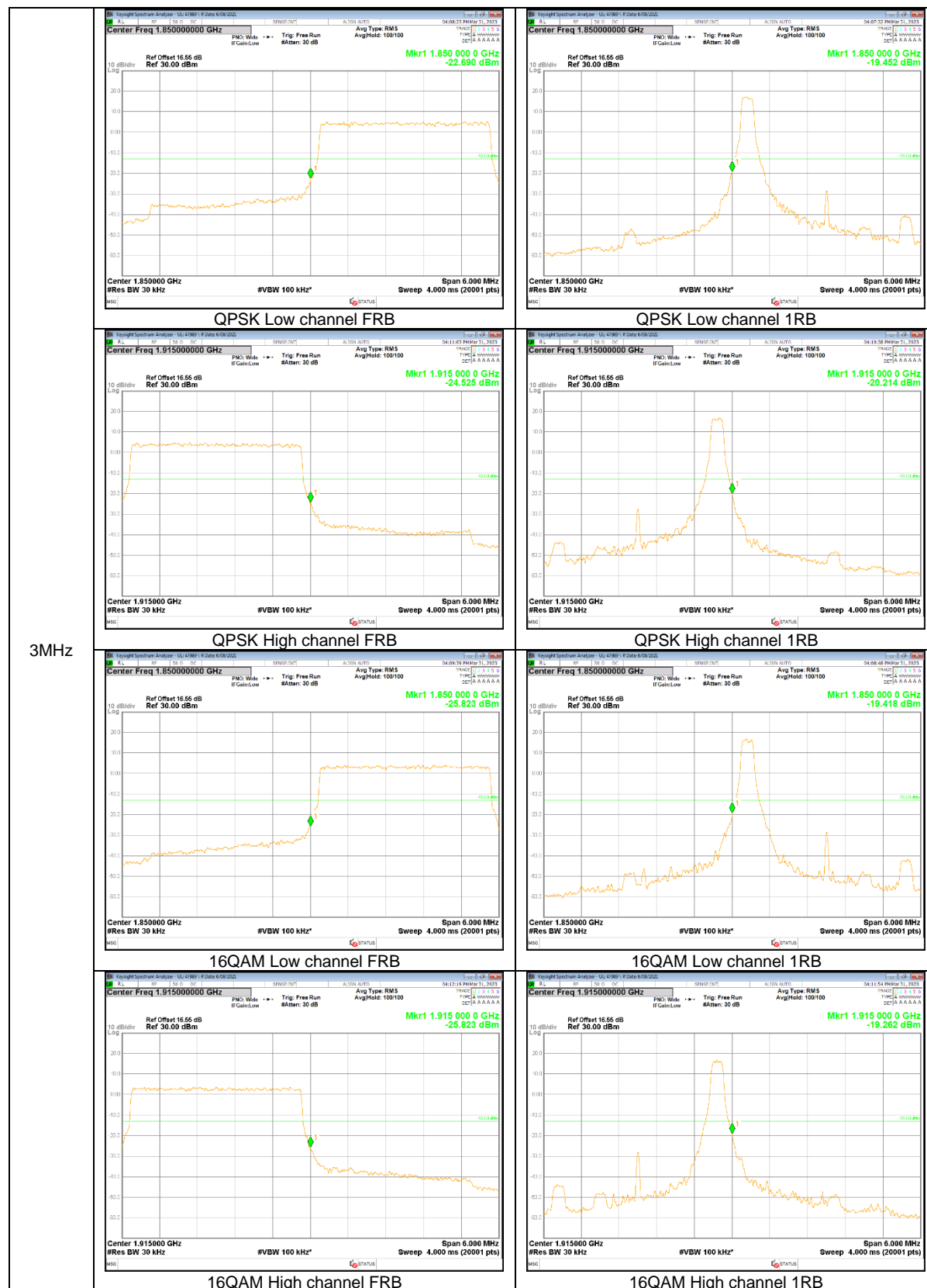
20MHz



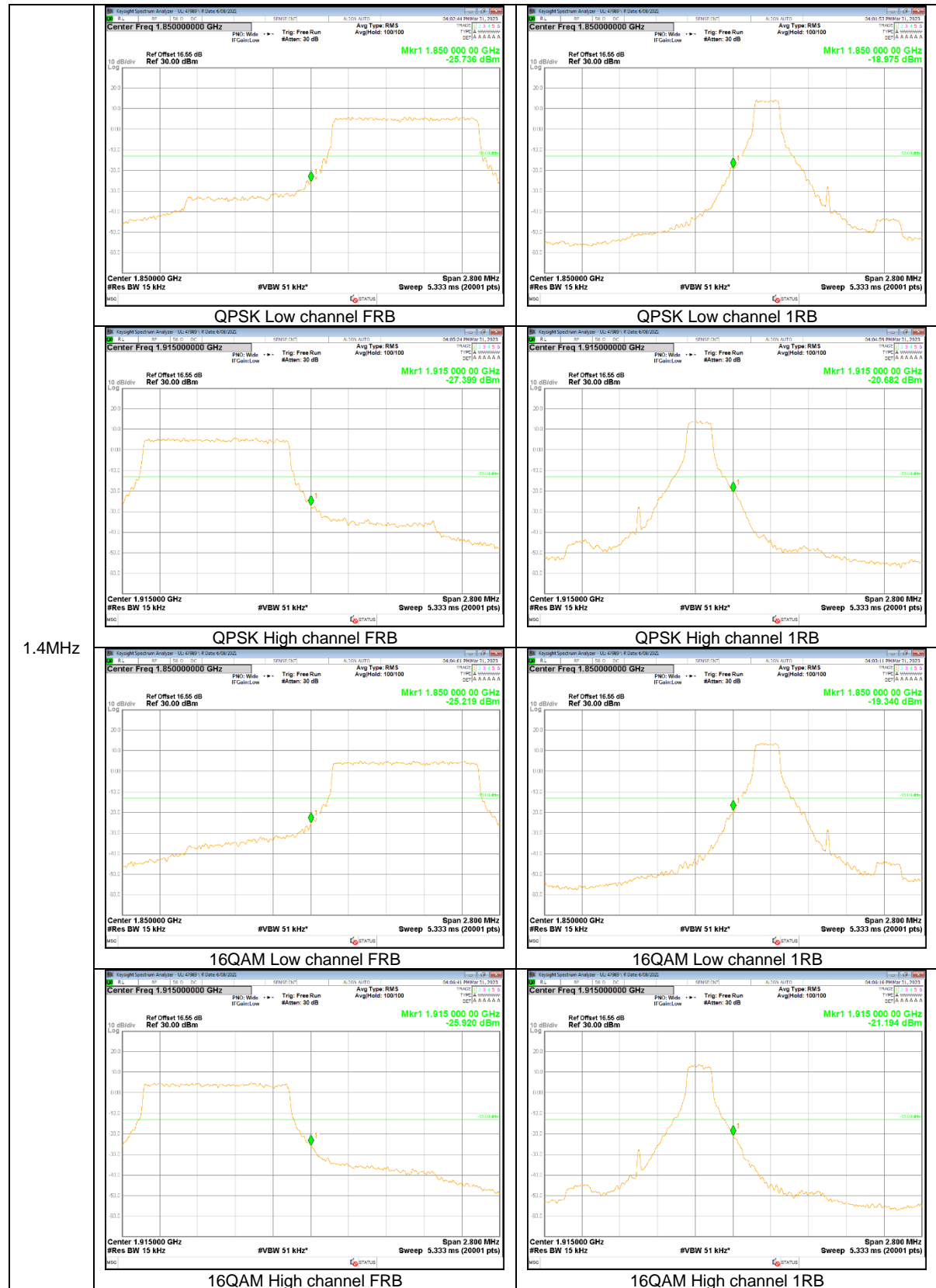




5MHz



3MHz



1.4MHz

## 8.5. CONDUCTED SPURIOUS EMISSIONS

### RULE PART(S)

FCC: §2.1051, §24.238

### LIMITS

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log (P)$  dB.

### TEST PROCEDURE

Per KDB 971168 D01 Power Meas License Digital Systems v03r01

The RF output of the transmitter was connected to a spectrum analyzer through a calibrated coaxial cable. Sufficient scans were taken to show the out-of-band Emissions, if any, up to 10th harmonic.

Multiple sweeps were recorded in maximum hold mode using a peak detector to ensure that the worst-case emissions were caught.

- a) Set the RBW = 1 MHz for emissions above 1 GHz ;  
(Tests were performed 1MHz [Worst case], to sweep 1 time for all frequency range)
- b) Set VBW  $\geq 3 \times$  RBW;
- c) Set span  $\geq 1.5$  times the OBW;
- d) Sweep time = auto couple;
- e) Detector = rms;
- f) Ensure that the number of measurement points = Max (40001);
- g) Trace mode = average(WCDMA, LTE), Max hold(GSM);

### NOTE1

Please refer to section 5.4 for bandwidth and RB setting about LTE bands.

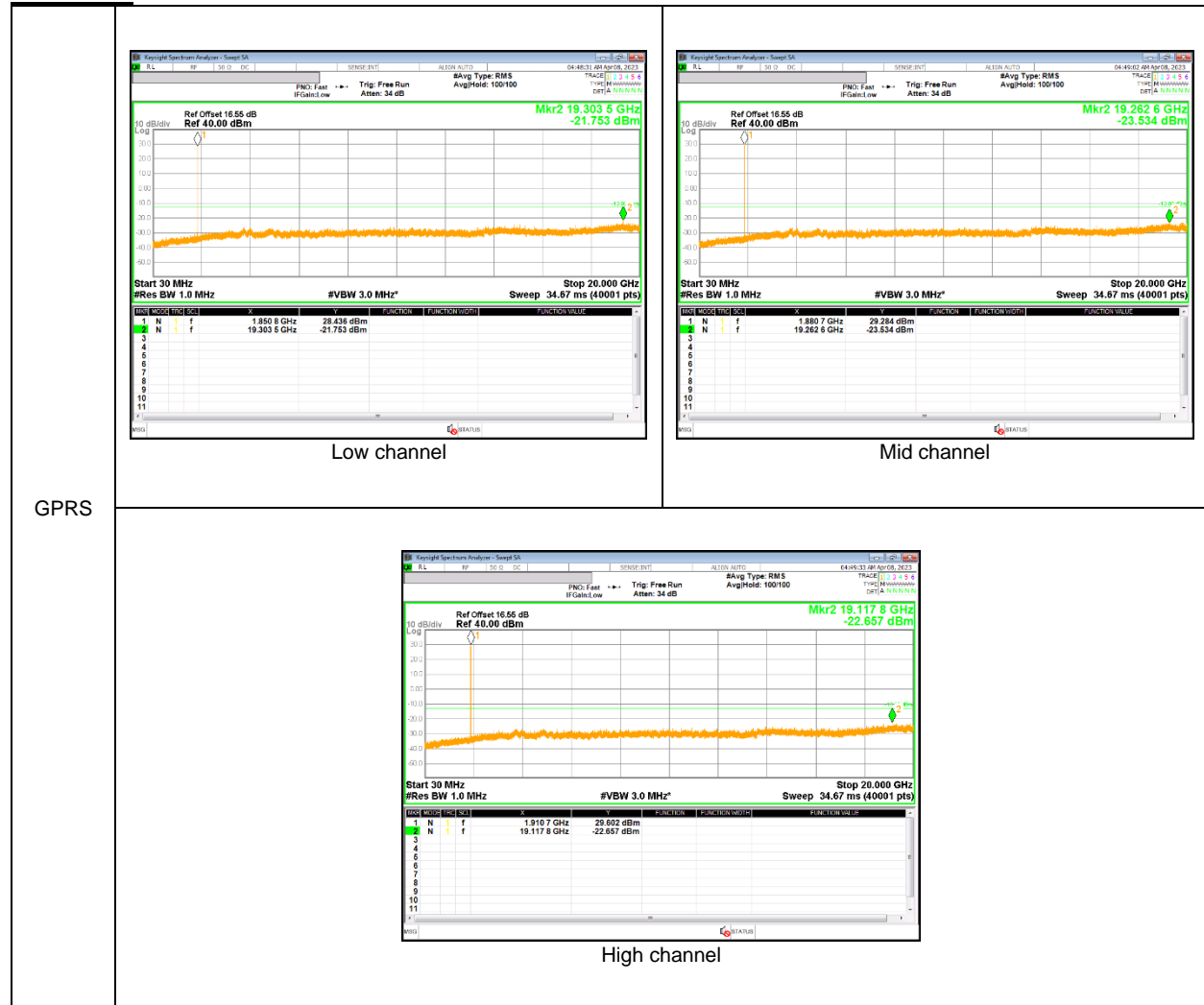
### RESULTS

See the following pages.



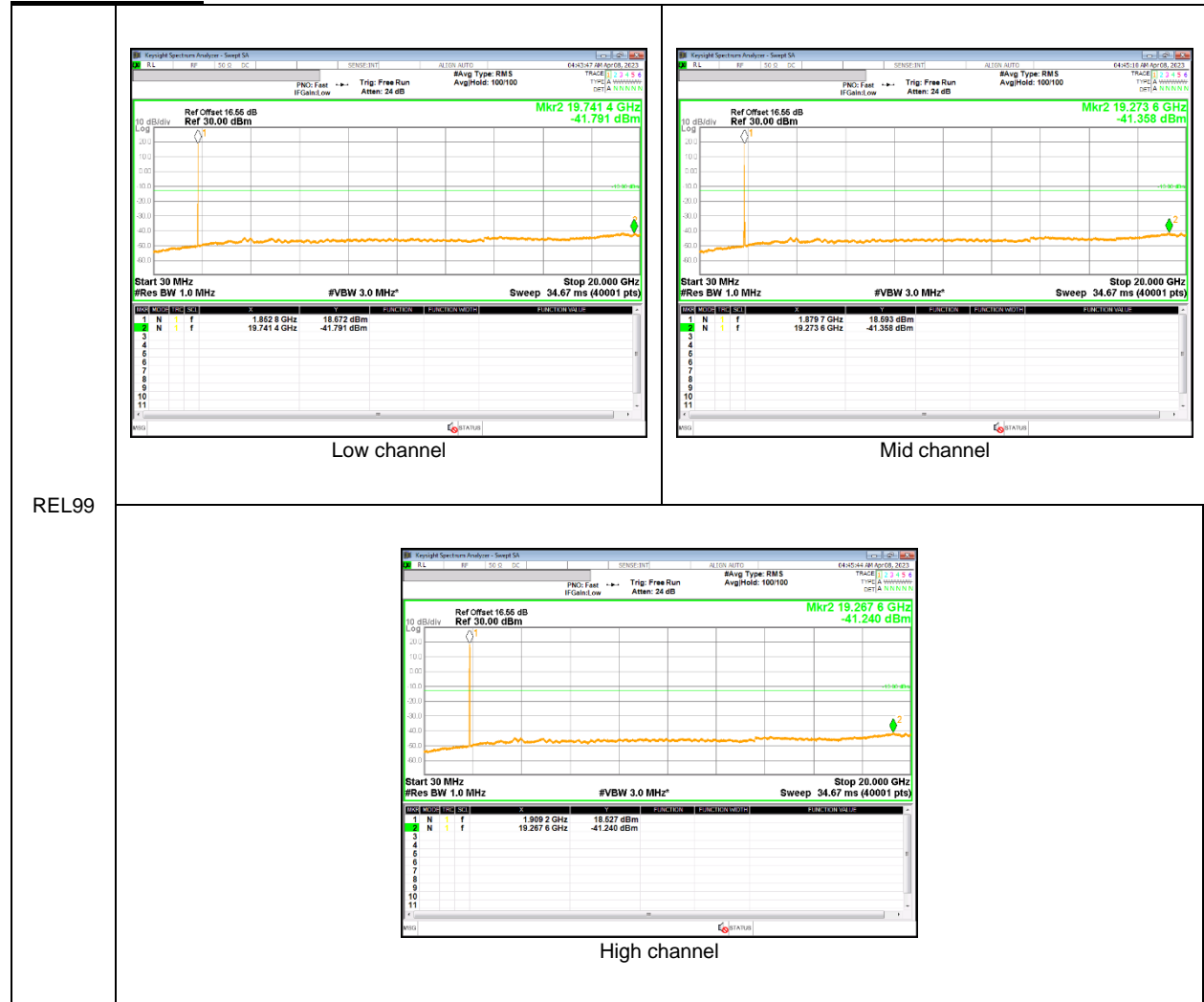
### 8.5.1. OUT OF BAND EMISSIONS RESULT

#### GSM 1900

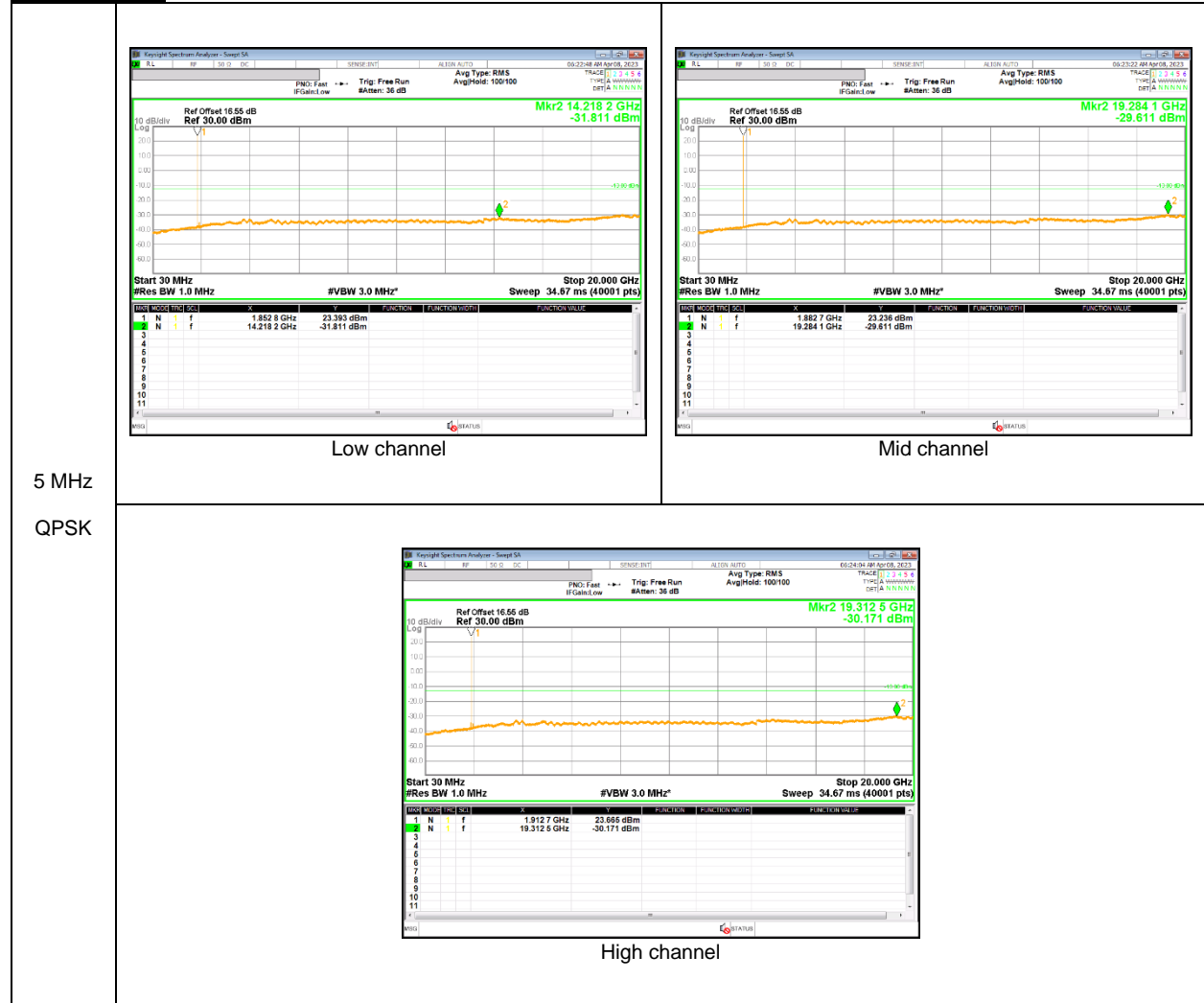


GPRS

WCDMA Band 2



**LTE Band 25**



## **8.6. FREQUENCY STABILITY**

### **RULE PART(S)**

FCC: §2.1055, §24.235

### **LIMITS**

§24.235 - The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

### **TEST PROCEDURE**

Per KDB 971168 D01 Power Meas License Digital Systems v03r01

### **NOTE**

Test were performed each lowest or highest frequency on the modulation condition of more wide bandwidth.(Please refer to section 9.1.1 OBW results)

### **RESULTS**

See the following pages.

### 8.6.1. FREQUENCY STABILITY RESULTS

**GSM 1900, Channel 512/810, Frequency 1850.0/1910.0 MHz  
 (Lowest Frequency:GPRS / Highest Frequency: EGPRS)**

Test Date	2023-04-07
Test Engineer	47989

Limit		1850	1910	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW (MHz)	F high @ End of OBW (MHz)		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	1850.0772	1909.9244		
Extreme (50C)		1850.0773	1909.9245	34.8	0.018
Extreme (40C)		1850.0773	1909.9245	35.3	0.019
Extreme (30C)		1850.0773	1909.9245	34.2	0.018
Extreme (10C)		1850.0773	1909.9245	49.6	0.026
Extreme (0C)		1850.0773	1909.9245	38.7	0.021
Extreme (-10C)		1850.0773	1909.9245	35.3	0.019
Extreme (-20C)		1850.0773	1909.9245	35.9	0.019
Extreme (-30C)		1850.0773	1909.9245	38.8	0.021
20C	15%	1850.0773	1909.9245	42.1	0.022
	-15%	1850.0773	1909.9245	39.8	0.021
	End Point	1850.0773	1909.9245	43.6	0.023

**WCDMA Band 2 (Lowest Frequency: Rel99 / Highest Frequency: HSDPA)**

Test Date	2023-04-06
Test Engineer	47989

Limit		1850	1910	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW	F high @ End of OBW		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	1850.3213	1909.6795		
Extreme (50C)		1850.3213	1909.6795	12.3	0.007
Extreme (40C)		1850.3213	1909.6795	12.8	0.007
Extreme (30C)		1850.3213	1909.6795	12.1	0.006
Extreme (10C)		1850.3213	1909.6795	4.9	0.003
Extreme (0C)		1850.3213	1909.6795	4.4	0.002
Extreme (-10C)		1850.3213	1909.6795	5.2	0.003
Extreme (-20C)		1850.3213	1909.6795	7.9	0.004
Extreme (-30C)		1850.3213	1909.6795	5.3	0.003
20C	15%	1850.3213	1909.6795	11.1	0.006
	-15%	1850.3213	1909.6795	10.9	0.006
	End Point	1850.3213	1909.6795	9.7	0.005

**LTE Band 25 (Lowest Frequency: QPSK / Highest Frequency: 16QAM)**

Test Date	2023-04-10
Test Engineer	47989

Limit		1850	1915	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW	F high @ End of OBW		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	1850.1554	1914.8455		
Extreme (50C)		1850.1554	1914.8455	6.1	0.003
Extreme (40C)		1850.1554	1914.8455	11.2	0.006
Extreme (30C)		1850.1554	1914.8455	8.7	0.005
Extreme (10C)		1850.1554	1914.8455	10.3	0.005
Extreme (0C)		1850.1554	1914.8455	9.3	0.005
Extreme (-10C)		1850.1554	1914.8455	9.4	0.005
Extreme (-20C)		1850.1554	1914.8455	32.7	0.017
Extreme (-30C)		1850.1554	1914.8455	33.0	0.018
20C	15%	1850.1554	1914.8455	8.0	0.004
	-15%	1850.1554	1914.8455	7.9	0.004
	End Point	1850.1554	1914.8455	10.2	0.005

## 9. RADIATED RESULTS

### 9.1. RADIATED POWER (EIRP)

#### RULE PART(S)

FCC: §2.1046, §24.232

#### LIMITS

24.232(c)

Mobile/portable stations are limited to 2 watts e.i.r.p. peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

#### TEST PROCEDURE

ANSI / TIA / EIA 603 E Clause 2.2.17; ESU40 setting reference to 971168 D01 v03r01

For radiated output power measurement with a ESU40:

- a) Set the RBW  $\geq$  OBW;
- b) Set VBW  $\geq 3 \times$  RBW;
- c) Set span  $\geq 2 \times$  OBW;
- d) Sweep time = auto couple or 1 second;
- e) Detector = rms;
- f) Ensure that the number of measurement points  $\geq$  span/RBW;
- g) Trace mode = max hold(GSM, WCDMA), average(LTE);

#### TEST RESULTS

See the following pages.

### 9.1.1. EIRP Results

#### GSM

Band	Mode	f (MHz)	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	Limit (dBm)	Delta (dB)
GSM 1900	GPRS	1850.20	23.42	H	4.48	9.52	28.46	701.46	33.00	-4.54
		1880.00	22.08	H	4.52	9.29	26.85	484.17	33.00	-6.15
		1909.80	23.11	H	4.55	9.00	27.55	568.85	33.00	-5.45
	EGPRS	1850.20	21.38	H	4.48	9.52	26.42	438.53	33.00	-6.58
		1880.00	21.22	V	4.52	9.29	25.99	397.19	33.00	-7.01
		1909.80	20.29	H	4.55	9.00	24.73	297.17	33.00	-8.27

#### WCDMA

Band	Mode	f (MHz)	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	Limit (dBm)	Delta (dB)
Band 2	REL99	1852.40	19.94	V	4.49	9.51	24.96	313.33	33.00	-8.04
		1880.00	20.00	V	4.52	9.29	24.77	299.92	33.00	-8.23
		1907.60	21.09	V	4.55	9.03	25.57	360.58	33.00	-7.43
	HSDPA	1852.40	17.81	V	4.49	9.51	22.83	191.87	33.00	-10.17
		1880.00	18.96	V	4.52	9.29	23.73	236.05	33.00	-9.27
		1907.60	19.88	V	4.55	9.03	24.36	272.90	33.00	-8.64

#### LTE Band 25

BW (MHz)	Modulation	f (MHz)	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	Limit (dBm)	Delta (dB)	RB
1.4	QPSK	1850.70	19.78	V	4.48	9.52	24.81	302.69	33.00	-8.19	1/5
		1882.50	19.51	V	4.52	9.27	24.26	266.69	33.00	-8.74	1/3
		1914.30	20.42	V	4.56	8.94	24.80	302.00	33.00	-8.20	1/3
	16-QAM	1850.70	19.18	V	4.48	9.52	24.21	263.63	33.00	-8.79	1/5
		1882.50	18.91	V	4.52	9.27	23.66	232.27	33.00	-9.34	1/0
		1914.30	19.68	V	4.56	8.94	24.06	254.68	33.00	-8.94	1/3
3	QPSK	1851.50	19.52	V	4.49	9.51	24.54	284.45	33.00	-8.46	1/8
		1882.50	19.55	V	4.52	9.27	24.30	269.15	33.00	-8.70	1/8
		1913.50	20.47	V	4.56	8.95	24.86	306.20	33.00	-8.14	1/8
	16-QAM	1851.50	18.84	V	4.49	9.51	23.86	243.22	33.00	-9.14	1/8
		1882.50	18.95	V	4.52	9.27	23.70	234.42	33.00	-9.30	1/8
		1913.50	19.74	V	4.56	8.95	24.13	258.82	33.00	-8.87	1/8
5	QPSK	1852.50	19.90	V	4.49	9.50	24.92	310.46	33.00	-8.08	1/12
		1882.50	19.59	V	4.52	9.27	24.34	271.64	33.00	-8.66	1/12
		1912.50	20.52	V	4.56	8.96	24.92	310.46	33.00	-8.08	1/12
	16-QAM	1852.50	19.16	V	4.49	9.50	24.18	261.82	33.00	-8.82	1/12
		1882.50	18.80	V	4.52	9.27	23.55	226.46	33.00	-9.45	1/0
		1912.50	19.74	V	4.56	8.96	24.14	259.42	33.00	-8.86	1/12
10	QPSK	1855.00	19.90	V	4.49	9.48	24.89	308.32	33.00	-8.11	1/25
		1882.50	19.57	V	4.52	9.27	24.32	270.40	33.00	-8.68	1/25
		1910.00	20.39	V	4.55	8.99	24.84	304.79	33.00	-8.16	1/25
	16-QAM	1855.00	19.24	V	4.49	9.48	24.23	264.85	33.00	-8.77	1/49
		1882.50	18.99	V	4.52	9.27	23.74	236.59	33.00	-9.26	1/25
		1910.00	19.69	V	4.55	8.99	24.14	259.42	33.00	-8.86	1/25
15	QPSK	1857.50	19.61	V	4.49	9.47	24.58	287.08	33.00	-8.42	1/0
		1882.50	19.40	V	4.52	9.27	24.15	260.02	33.00	-8.85	1/37
		1907.50	19.96	V	4.55	9.03	24.44	277.97	33.00	-8.56	1/37
	16-QAM	1857.50	19.04	V	4.49	9.47	24.01	251.77	33.00	-8.99	1/37
		1882.50	18.72	V	4.52	9.27	23.47	222.33	33.00	-9.53	1/37
		1907.50	19.18	V	4.55	9.03	23.66	232.27	33.00	-9.34	1/74
20	QPSK	1860.00	19.68	V	4.49	9.45	24.63	290.40	33.00	-8.37	1/0
		1882.50	19.23	V	4.52	9.27	23.98	250.03	33.00	-9.02	1/49
		1905.00	19.96	V	4.55	9.06	24.47	279.90	33.00	-8.53	1/49
	16-QAM	1860.00	19.09	V	4.49	9.45	24.04	253.51	33.00	-8.96	1/0
		1882.50	18.60	V	4.52	9.27	23.35	216.27	33.00	-9.65	1/49
		1905.00	19.20	V	4.55	9.06	23.71	234.96	33.00	-9.29	1/0



## 9.2. RADIATED SPURIOUS EMISSION

### RULE PART(S)

FCC: §2.1053, §24.238

### LIMIT

Part Part 24.238(a) The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log (P)$  dB.

### TEST PROCEDURE

ANSI / TIA / EIA 603 E Clause 2.2.12; ESU40 setting reference to 971168 D01 v03r01

For peak power measurement with a ESU40:

- a) Set the RBW = 1 MHz for emissions above 1 GHz ;
- b) Set VBW  $\geq 3 \times$  RBW;
- c) Set span  $\geq 1.5$  times the OBW;
- d) Sweep time = auto couple;
- e) Detector = rms;
- f) Ensure that the number of measurement points  $\geq$  span/RBW;
- g) Trace mode = average(WCDMA, LTE), Maxhold(GSM);

### NOTE

Please refer to section 5.4 for bandwidth and RB setting about LTE bands.

### RESULTS

See the following pages.

### 9.2.1. SPURIOUS RADIATION PLOTS

#### GSM1900

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
Company:		Samsung							
Project #:		4790776103							
Date:		2023-04-12							
Test Engineer:		24542							
Configuration:		EUT / AC Adapter, Y-Position							
Location:		Chamber 1							
Mode:		GPRS 1900 MHz Harmonics							
Test Votage:		AC 120 V, 60 Hz							
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1850.2MHz									
3700.40	-16.6	V	3.0	46.0	1.0	-61.6	-13.0	-48.6	
5550.60	-14.9	V	3.0	45.8	1.0	-59.7	-13.0	-46.7	
7400.80	-5.3	V	3.0	45.5	1.0	-49.9	-13.0	-36.9	
3700.40	-16.3	H	3.0	46.0	1.0	-61.3	-13.0	-48.3	
5550.60	-14.8	H	3.0	45.8	1.0	-59.5	-13.0	-46.5	
7400.80	-7.1	H	3.0	45.5	1.0	-51.7	-13.0	-38.7	
Mid Ch, 1880MHz									
3760.00	-16.1	V	3.0	46.0	1.0	-61.1	-13.0	-48.1	
5640.00	-11.5	V	3.0	45.7	1.0	-56.1	-13.0	-43.1	
7520.00	-6.5	V	3.0	45.5	1.0	-51.0	-13.0	-38.0	
3760.00	-15.8	H	3.0	46.0	1.0	-60.7	-13.0	-47.7	
5640.00	-8.1	H	3.0	45.7	1.0	-52.8	-13.0	-39.8	
7520.00	-6.8	H	3.0	45.5	1.0	-51.4	-13.0	-38.4	
High Ch, 1909.8MHz									
3819.60	-16.2	V	3.0	45.9	1.0	-61.1	-13.0	-48.1	
5729.40	-13.6	V	3.0	45.6	1.0	-58.2	-13.0	-45.2	
7639.20	-6.0	V	3.0	45.6	1.0	-50.5	-13.0	-37.5	
3819.60	-15.9	H	3.0	45.9	1.0	-60.8	-13.0	-47.8	
5729.40	-14.6	H	3.0	45.6	1.0	-59.2	-13.0	-46.2	
7639.20	-7.1	H	3.0	45.6	1.0	-51.7	-13.0	-38.7	

GSM1900  
GPRS

**WCDMA Band 2**

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
<b>Company:</b>		Samsung							
<b>Project #:</b>		4790776103							
<b>Date:</b>		2023-04-13							
<b>Test Engineer:</b>		24542							
<b>Configuration:</b>		EUT / AC Adapter, Y-Position							
<b>Location:</b>		Chamber 1							
<b>Mode:</b>		Rel99 Band 2 Harmonics							
<b>Test Voltage:</b>		AC 120 V, 60 Hz							
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
<b>Low Ch, 1852.4MHz</b>									
3704.80	-9.5	V	3.0	46.0	1.0	-54.5	-13.0	-41.5	
5557.20	-6.9	V	3.0	45.8	1.0	-51.6	-13.0	-38.6	
7409.60	-3.8	V	3.0	45.5	1.0	-48.3	-13.0	-35.3	
3704.80	-9.2	H	3.0	46.0	1.0	-54.2	-13.0	-41.2	
5557.20	-6.8	H	3.0	45.8	1.0	-51.6	-13.0	-38.6	
7409.60	-3.9	H	3.0	45.5	1.0	-48.4	-13.0	-35.4	
<b>Mid Ch, 1880MHz</b>									
3760.00	-9.2	V	3.0	46.0	1.0	-54.2	-13.0	-41.2	
5640.00	-6.6	V	3.0	45.7	1.0	-51.3	-13.0	-38.3	
7520.00	-4.0	V	3.0	45.5	1.0	-48.6	-13.0	-35.6	
3760.00	-8.9	H	3.0	46.0	1.0	-53.9	-13.0	-40.9	
5640.00	-6.6	H	3.0	45.7	1.0	-51.2	-13.0	-38.2	
7520.00	-4.0	H	3.0	45.5	1.0	-48.5	-13.0	-35.5	
<b>High Ch, 1907.6MHz</b>									
3815.20	-9.2	V	3.0	45.9	1.0	-54.1	-13.0	-41.1	
5722.80	-6.6	V	3.0	45.6	1.0	-51.2	-13.0	-38.2	
7630.40	-3.5	V	3.0	45.6	1.0	-48.0	-13.0	-35.0	
3815.20	-8.8	H	3.0	45.9	1.0	-53.7	-13.0	-40.7	
5722.80	-6.6	H	3.0	45.6	1.0	-51.2	-13.0	-38.2	
7630.40	-3.7	H	3.0	45.6	1.0	-48.2	-13.0	-35.2	

Band 2  
REL99

**LTE Band 25**

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
<b>Company:</b>		Samsung							
<b>Project #:</b>		4790776103							
<b>Date:</b>		2023-04-09							
<b>Test Engineer:</b>		26087							
<b>Configuration:</b>		EUT / AC Adapter, Y-Position							
<b>Location:</b>		Chamber 2							
<b>Mode:</b>		LTE_QPSK Band 25 Harmonics, 5MHz Bandwidth							
<b>Test Votage:</b>		AC 120 V, 60 Hz							
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
<b>Low Ch, 1852.5MHz</b>									
3705.00	-11.1	V	3.0	42.1	1.0	-52.2	-13.0	-39.2	
5557.50	-7.9	V	3.0	42.9	1.0	-49.8	-13.0	-36.8	
7410.00	-5.2	V	3.0	42.5	1.0	-46.7	-13.0	-33.7	
3705.00	-11.3	H	3.0	42.1	1.0	-52.3	-13.0	-39.3	
5557.50	-8.1	H	3.0	42.9	1.0	-49.9	-13.0	-36.9	
7410.00	-5.6	H	3.0	42.5	1.0	-47.1	-13.0	-34.1	
<b>Mid Ch, 1882.5MHz</b>									
3765.00	-10.8	V	3.0	42.1	1.0	-51.9	-13.0	-38.9	
5647.50	-7.5	V	3.0	42.9	1.0	-49.4	-13.0	-36.4	
7530.00	-5.6	V	3.0	42.4	1.0	-47.0	-13.0	-34.0	
3765.00	-10.9	H	3.0	42.1	1.0	-52.0	-13.0	-39.0	
5647.50	-7.5	H	3.0	42.9	1.0	-49.4	-13.0	-36.4	
7530.00	-5.8	H	3.0	42.4	1.0	-47.2	-13.0	-34.2	
<b>High Ch, 1912.5MHz</b>									
3825.00	-10.7	V	3.0	42.1	1.0	-51.8	-13.0	-38.8	
5737.50	-7.7	V	3.0	42.9	1.0	-49.6	-13.0	-36.6	
7650.00	-5.6	V	3.0	42.4	1.0	-47.0	-13.0	-34.0	
3825.00	-11.0	H	3.0	42.1	1.0	-52.1	-13.0	-39.1	
5737.50	-7.8	H	3.0	42.9	1.0	-49.7	-13.0	-36.7	
7650.00	-5.7	H	3.0	42.4	1.0	-47.1	-13.0	-34.1	

5 MHz  
QPSK

**END OF REPORT**