

CERTIFICATION TEST REPORT

Report Number. : 4791083081-E3V2

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

Model : SC-53E, SCG27

FCC ID : A3LSMA556JPN

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

Test Standard(s) : FCC 47 CFR PART 24 SUBPART E

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Revision History

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V2	2024-02-01	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, and NFC.

MODEL NUMBER: SC-53E, SCG27

SERIAL NUMBER: R3CWC03BL8N, R3CWC03BL7H (CONDUCTED);
R3CWC03BRHJ, R3CWC03BQSY (RADIATED);

DATE TESTED: 2023-12-20 - 2024-02-01;

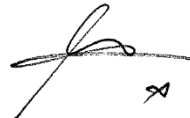
APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 24E	Complies

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
UL KOREA LTD. By:

Tested By:



Seokhwan Hong
Suwon Lab Engineer
UL KOREA LTD.

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Suwon Lab Engineer
UL KOREA LTD.

2. TEST METHODOLOGY

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

1. FCC 47 CFR Part 2.
2. FCC 47 CFR Part 24.
3. ANSI TIA-603-E, 2016
4. ANSI C63.26, 2015
5. KDB 971168 D01 Power Meas License Digital Systems v03r01
6. KDB 971168 D02 Misc Rev Approv License Devices v02r02
7. KDB 412172 D01 Determining ERP and EIRP v01r01

3. FACILITIES AND ACCREDITATION

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

218 Maeyeong-ro	
<input checked="" type="checkbox"/>	Chamber 1(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 Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax, and NFC. This test report addresses the WWAN operational mode.

Representative model	Difference	Derivative model
		SCG27
SC-53E	Hardware	Same as SC-53E
	Software	Different UI

The model SC-53E was used for final testing and is representative of the test results in this report.

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]
GSM 1900	1850.20 ~ 1909.80	GPRS	29.94	986.28	29.61	914.11
		EGPRS	24.93	311.17	26.90	489.78

LTE Band 2

FCC Part 24								
Band	ANT	Frequency Range [MHz]	BandWidth [MHz]	Modulation	Conducted		Radiated	
					Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
Band 2	Antenna A Main 1	1860.00 ~ 1900.00	20	QPSK	23.92	246.60	23.71	234.96
				16QAM	23.13	205.59	22.92	195.88
				64QAM	21.80	151.36		
		1857.50 ~ 1902.50	15	QPSK	23.87	243.78	23.77	238.23
				16QAM	22.87	193.64	22.77	189.23
				64QAM	21.67	146.89		
		1855.00 ~ 1905.00	10	QPSK	23.85	242.66	23.74	236.59
				16QAM	23.07	202.77	22.96	197.70
				64QAM	21.70	147.91		
		1852.50 ~ 1907.50	5	QPSK	23.72	235.50	23.72	235.50
				16QAM	22.74	187.93	21.67	146.89
				64QAM	21.70	147.91		
		1851.50 ~ 1908.50	3	QPSK	23.89	244.91	23.87	243.78
				16QAM	22.98	198.61	22.96	197.70
				64QAM	21.72	148.59		
		1850.70 ~ 1909.30	1.4	QPSK	23.91	246.04	23.86	243.22
				16QAM	22.84	192.31	21.59	144.21
				64QAM	21.83	152.41		
FCC Part 24								
Band	ANT	Frequency Range [MHz]	BandWidth [MHz]	Modulation	Conducted		Radiated	
					Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
Band 2	Antenna E Sub 2	1860.00 ~ 1900.00	20	QPSK	24.10	257.04	21.82	152.05
				16QAM	23.35	216.27	21.15	130.32
				64QAM	22.09	161.81		
		1857.50 ~ 1902.50	15	QPSK	24.02	252.35	21.74	149.28
				16QAM	23.11	204.64	21.06	127.64
				64QAM	22.20	165.96		
		1855.00 ~ 1905.00	10	QPSK	24.09	256.45	21.78	150.66
				16QAM	23.18	207.97	20.84	121.34
				64QAM	22.12	162.93		
		1852.50 ~ 1907.50	5	QPSK	24.02	252.35	21.81	151.71
				16QAM	23.17	207.49	20.85	121.62
				64QAM	22.30	169.82		
		1851.50 ~ 1908.50	3	QPSK	24.15	260.02	21.92	155.60
				16QAM	23.33	215.28	20.76	119.12
				64QAM	22.35	171.79		
		1850.70 ~ 1909.30	1.4	QPSK	24.13	258.82	21.87	153.82
				16QAM	23.19	208.45	20.84	121.34
				64QAM	22.15	164.06		

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)	ANT	Peak Gain (dBi)
GSM1900 / LTE Band 2 1850 - 1910 MHz	Antenna A Main 1	-3.0
	Antenna E Sub 2	-4.2

5.4. WORST-CASE ORIENTATION

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

- GSM GPRS/EGPRS

For LTE Band 2 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 modulations. It was found QPSK and 16QAM results were worst case.

LTE B2 operates in Tx Hopping Mode. So the test case is as below.

Test Item	Test case antenna & port
Conducted output power	All
RF port test	Worst case
EIRP	All
Radiated Spurious Emissions	All

As for the conducted test, 'Main ANT' is the same or higher than 'Sub ANT', so we tested with 'Main ANT'.

Band	Main ANT	Tune-up Limit (dBm)	Sub ANT	Tune up Limit (dBm)
GSM 1900	<u>Antenna A (Main 1)</u>	<u>31.0</u>		
LTE B2	<u>Antenna A (Main 1)</u>	<u>24.5</u>	Antenna E (Sub 2)	24.5

● Conducted Spurious Emission

Highest conducted power setting for each bands					
LTE Band	ANT	Frequency (MHz)	Bandwidth (MHz)	RB size	RB offset
2	Antenna A Main 1	1860.00	20	1	49
		1880.00		1	99
		1900.00		1	0

● Radiated Spurious Emission

Highest EIRP setting for each bands					
LTE Band	ANT	Frequency (MHz)	Bandwidth (MHz)	RB size	RB offset
2	Antenna A Main 1	1851.50	3	1	14
		1880.00		1	0
		1908.50		1	0
2	Antenna E Sub 2	1851.50	3	1	0
		1880.00		1	0
		1908.50		1	14

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	ANT	EIRP			RSE		
		X	Y	Z	X	Y	Z
GSM 1900	Antenna A Main 1	O	-	-	O	-	-
LTE B2	Antenna A Main 1	O	-	-	-	O	-
	Antenna E Sub 2	O	-	-	O	-	-

Note : For the 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	R37W61WENTASEA	N/A
Data Cable	SAMSUNG	EP-DN980	GH39-02117A	N/A

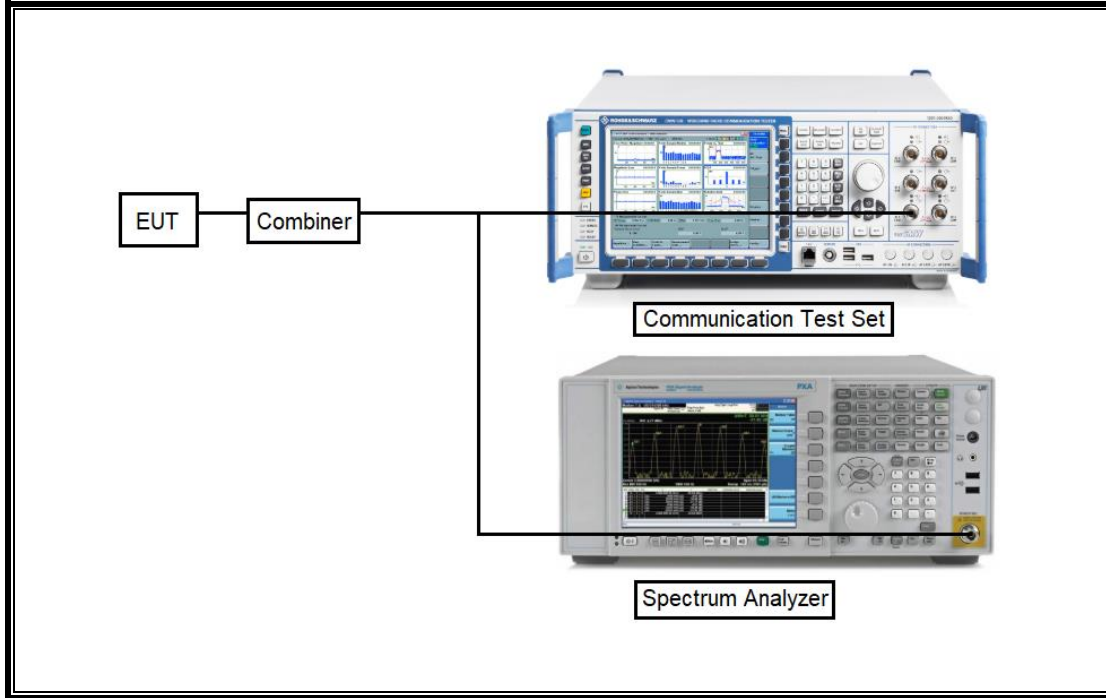
I/O CABLE

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

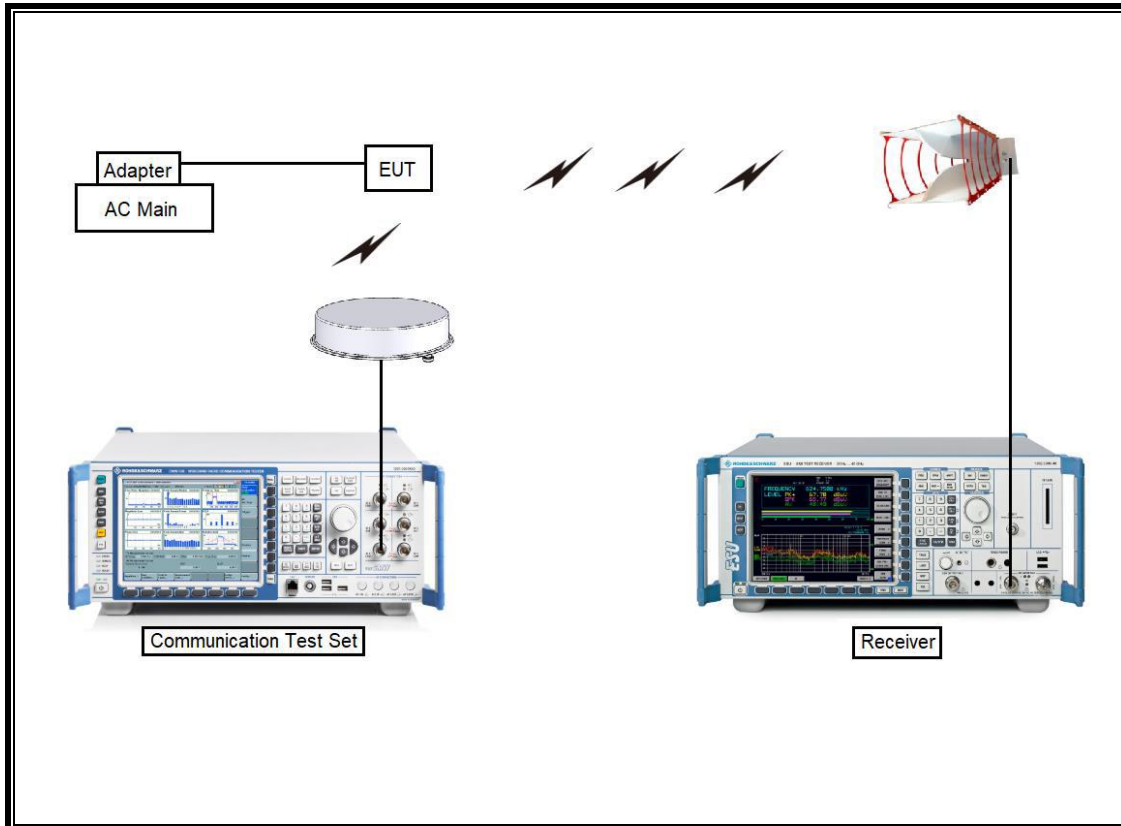
TEST SETUP

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	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	00166155	2024-08-02
Antenna, Horn, 40 GHz	ETS	3116C	00168645	2025-10-05
Preamplifier	ETS	3115-PA	00167475	2024-07-25
Preamplifier	ETS	3116C-PA	00168841	2024-07-25
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	00167211	2024-08-04
Antenna, Horn, 18 GHz	ETS	3115	00161451	2024-08-21
Antenna, Horn, 18 GHz	ETS	3117	00168724	2024-08-04
Antenna, Horn, 18 GHz	ETS	3117	00168717	2024-08-21
Communications Test Set	R&S	CMW500	169797	2024-07-23
DC Power Supply	Agilent / HP	E3640A	MY54226395	2024-07-24
Preamplifier, 1000 MHz	Sonoma	310N	341282	2024-07-24
Preamplifier, 1000 MHz	Sonoma	310N	370599	2024-07-24
Preamplifier, 1000 MHz	Sonoma	310N	351741	2024-07-24
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029169	2024-07-24
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	2024-07-25
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	2024-07-25
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	2024-07-24
Spectrum Analyzer, 44 GHz	KEYSIGHT	N9030B	MY57143717	2024-07-24
EMI Test Receive, 40 GHz	R&S	ESU40	100439	2024-07-23
EMI Test Receive, 40 GHz	R&S	ESU40	100457	2024-07-24
High Pass Filter 1.2GHz	Micro-Tronics	HPM50108-02	G005	2024-07-23
High Pass Filter 1.2GHz	Micro-Tronics	HPM50108-02	G006	2024-07-23
High Pass Filter 2.8GHz	Micro-Tronics	HPM50111-02	010	2024-07-24
High Pass Filter 2.8GHz	Micro-Tronics	HPM50111-02	011	2024-07-24
High Pass Filter 4GHz	Micro-Tronics	HPM50118-02	G001	2024-07-24
High Pass Filter 4GHz	Micro-Tronics	HPM50118-02	G002	2024-07-24
Attenuator	PASTERNAK	PE7087-10	A009	2024-07-24
Attenuator	PASTERNAK	PE7087-10	A001	2024-07-24
Attenuator	PASTERNAK	PE7087-10	A008	2024-07-27
Attenuator	PASTERNAK	PE7004-10	2	2024-07-23
Attenuator	PASTERNAK	PE7395-10	A011	2024-07-25
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	2025-09-06
Temperature Chamber	ESPEC	SH-642	93001109	2024-07-24
Power Splitter	MINI-CIRCUITS	WA1534	UL003	2025-01-02
Power Splitter	MINI-CIRCUITS	WA1534	UL004	2025-01-02
UXM 5G Wireless Test Platform	KEYSIGHT	E7515B	MY57510655	2025-01-03
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 Results
2.1046	Conducted Output Power	N/A	Conducted	Pass
2.1049	Occupied Bandwidth (99%)	N/A		Pass
24.238(a)	Conducted Band Edge / Conducted Spurious Emission	-13 dBm		Pass
24.235	Frequency Stability	2.5 ppm		Pass
24.232(c)	Effective Isotropic Radiated Power	33 dBm	Radiated	Pass
24.238(a)	Radiated Spurious Emission	-13 dBm		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 (Antenna A, Main 1)

Mode	Coding Scheme	Time Slots	Maximum Average Power (dBm)			
			Measured		Tune-up Limit	
			Burst Pwr	Frame Pwr	Burst Pwr	Frame Pwr
GSM (Voice)	CS1	1	29.64	20.45	31.0	22.0
			29.71	20.52		
			29.94	20.75		
GPRS (GMSK)	CS1	1	29.19	20.00	31.0	22.0
			29.41	20.22		
			29.92	20.73		
		2	27.28	21.10	29.0	23.0
			27.40	21.22		
			27.56	21.38		
		3	25.50	21.08	27.5	23.2
			26.11	21.69		
			26.24	21.82		
		4	23.77	20.60	25.5	22.5
			23.98	20.81		
			24.16	20.99		
EGPRS (8PSK)	MCS5	1	24.11	14.92	26.0	17.0
			24.51	15.32		
			24.93	15.74		
		2	22.21	16.03	24.0	18.0
			23.10	16.92		
			23.24	17.06		
		3	21.90	17.48	23.0	18.7
			21.49	17.07		
			21.95	17.53		
		4	19.54	16.37	21.5	18.5
			19.94	16.77		
			20.36	17.19		

LTE Band 2 (Antenna A, Main 1)

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)				
				Measured Pwr (dBm)			MPR	Tune-up Limit
				18700	18900	19100		
				1860.00 MHz	1880.00 MHz	1900.00 MHz		
20 MHz	QPSK	1	0	23.51	23.76	23.92	0.0	24.5
		1	49	23.89	23.58	23.91	0.0	24.5
		1	99	23.75	23.80	22.56	0.0	24.5
		50	0	22.75	22.81	22.98	1.0	23.5
		50	24	22.72	22.80	22.97	1.0	23.5
		50	50	22.68	22.79	22.94	1.0	23.5
	16QAM	100	0	22.70	22.78	22.94	1.0	23.5
		1	0	23.08	22.66	23.09	1.0	23.5
		1	49	23.12	22.77	23.13	1.0	23.5
		1	99	22.90	22.70	22.42	1.0	23.5
		50	0	21.69	21.75	21.88	2.0	22.5
		50	24	21.64	21.75	21.82	2.0	22.5
	64QAM	50	50	21.58	21.73	21.83	2.0	22.5
		100	0	21.64	21.72	21.84	2.0	22.5
		1	0	21.55	21.55	21.80	2.0	22.5
		1	49	21.67	21.53	21.74	2.0	22.5
		1	99	21.66	21.56	21.26	2.0	22.5
		50	0	20.39	20.44	20.68	3.0	21.5
15 MHz	QPSK	50	24	20.35	20.45	20.64	3.0	21.5
		50	50	20.32	20.44	20.68	3.0	21.5
		100	0	20.34	20.40	20.65	3.0	21.5
		1	0	23.71	23.69	23.87	0.0	24.5
		1	37	23.54	23.67	23.83	0.0	24.5
		1	74	23.62	23.77	22.43	0.0	24.5
	16QAM	36	0	22.76	22.86	23.03	1.0	23.5
		36	20	22.72	22.82	22.98	1.0	23.5
		36	39	22.72	22.81	22.98	1.0	23.5
		75	0	22.71	22.83	23.00	1.0	23.5
		1	0	22.73	22.85	22.87	1.0	23.5
		1	37	22.61	22.78	22.80	1.0	23.5
	64QAM	1	74	22.58	22.86	22.19	1.0	23.5
		36	0	21.65	21.76	21.97	2.0	22.5
		36	20	21.60	21.71	21.92	2.0	22.5
		36	39	21.60	21.71	21.91	2.0	22.5
		75	0	21.59	21.75	21.89	2.0	22.5
		1	0	21.67	21.48	21.48	2.0	22.5
10 MHz	QPSK	1	37	21.59	21.32	21.28	2.0	22.5
		1	74	21.61	21.48	21.48	2.0	22.5
		36	0	20.33	20.44	20.70	3.0	21.5
		36	20	20.30	20.42	20.69	3.0	21.5
		36	39	20.28	20.44	20.68	3.0	21.5
		75	0	20.32	20.38	20.60	3.0	21.5
	16QAM	1	0	23.71	23.76	23.85	0.0	24.5
		1	25	23.67	23.77	23.82	0.0	24.5
		1	49	23.71	23.77	23.42	0.0	24.5
		25	0	22.73	22.79	22.97	1.0	23.5
		25	12	22.69	22.77	22.93	1.0	23.5
		25	25	22.65	22.76	22.95	1.0	23.5
	64QAM	50	0	22.68	22.79	22.97	1.0	23.5
		1	0	22.62	22.72	23.07	1.0	23.5
		1	25	22.50	22.64	22.89	1.0	23.5
		1	49	22.48	22.75	23.01	1.0	23.5
		25	0	21.66	21.78	21.94	2.0	22.5
		25	12	21.61	21.74	21.90	2.0	22.5
10 MHz	16QAM	25	25	21.59	21.74	21.92	2.0	22.5
		50	0	21.66	21.71	21.89	2.0	22.5
		1	0	21.51	21.50	21.70	2.0	22.5
		1	25	21.49	21.55	21.61	2.0	22.5
		1	49	21.50	21.61	21.24	2.0	22.5
		25	0	20.34	20.45	20.63	3.0	21.5
	64QAM	25	12	20.32	20.45	20.64	3.0	21.5
		25	25	20.31	20.45	20.67	3.0	21.5
		50	0	20.31	20.43	20.65	3.0	21.5

BW (MHz)	Mode	RB Allocation	RB offset	Measured Pwr (dBm)			MPR	Tune-up Limit
				18625	18900	19175		
				1852.50 MHz	1880.00 MHz	1907.50 MHz		
5 MHz	QPSK	1	0	23.02	23.30	22.09	0.0	24.5
		1	12	23.07	23.11	23.52	0.0	24.5
		1	24	23.20	22.86	23.72	0.0	24.5
		12	0	22.47	22.71	21.38	1.0	23.5
		12	7	22.57	22.69	21.24	1.0	23.5
		12	13	22.65	22.63	21.11	1.0	23.5
	16QAM	25	0	22.57	22.68	21.24	1.0	23.5
		1	0	22.33	22.74	21.67	1.0	23.5
		1	12	22.49	22.55	21.33	1.0	23.5
		1	24	22.67	22.49	21.02	1.0	23.5
		12	0	21.67	21.69	20.91	2.0	22.5
		12	7	21.64	21.68	20.82	2.0	22.5
	64QAM	12	13	21.63	21.69	20.72	2.0	22.5
		25	0	21.64	21.70	20.93	2.0	22.5
		1	0	21.22	21.70	21.64	2.0	22.5
		1	12	21.18	21.55	21.64	2.0	22.5
		1	24	21.27	21.69	21.42	2.0	22.5
		12	0	20.37	20.42	20.65	3.0	21.5
3 MHz	QPSK	12	7	20.34	20.40	20.64	3.0	21.5
		12	13	20.33	20.41	20.66	3.0	21.5
		25	0	20.33	20.36	20.65	3.0	21.5
		1	0	23.79	23.67	23.89	0.0	24.5
		1	8	23.51	23.54	23.60	0.0	24.5
		1	14	23.84	23.67	23.35	0.0	24.5
	16QAM	8	0	22.72	22.69	22.99	1.0	23.5
		8	4	22.70	22.75	23.00	1.0	23.5
		8	7	22.72	22.72	22.99	1.0	23.5
		15	0	22.72	22.72	22.94	1.0	23.5
		1	0	22.72	22.79	22.98	1.0	23.5
		1	8	22.58	22.64	22.86	1.0	23.5
	64QAM	1	14	22.62	22.85	22.89	1.0	23.5
		8	0	21.76	21.81	21.93	2.0	22.5
		8	4	21.71	21.81	21.86	2.0	22.5
		8	7	21.67	21.81	21.86	2.0	22.5
		15	0	21.63	21.69	21.93	2.0	22.5
		1	0	21.61	21.58	21.72	2.0	22.5
1.4 MHz	QPSK	1	8	21.34	21.47	21.61	2.0	22.5
		1	14	21.66	21.68	21.39	2.0	22.5
		8	0	20.45	20.41	20.69	3.0	21.5
		8	4	20.39	20.37	20.70	3.0	21.5
		8	7	20.41	20.36	20.70	3.0	21.5
		15	0	20.27	20.45	20.67	3.0	21.5
	16QAM	1	0	23.60	23.54	23.80	0.0	24.5
		1	3	23.45	23.39	23.64	0.0	24.5
		1	5	23.40	23.31	23.76	0.0	24.5
		3	0	23.28	23.35	23.77	0.0	24.5
		3	1	23.26	23.35	23.81	0.0	24.5
		3	3	23.24	23.31	23.91	0.0	24.5
	64QAM	6	0	22.66	22.75	21.06	1.0	23.5
		1	0	22.50	22.73	21.13	1.0	23.5
		1	3	22.70	22.83	21.08	1.0	23.5
		1	5	22.58	22.84	21.04	1.0	23.5
		3	0	22.72	22.61	21.16	1.0	23.5
		3	1	22.66	22.71	21.16	1.0	23.5
16QAM	3	3	22.69	22.62	21.14	1.0	23.5	
	6	0	21.58	21.67	20.66	2.0	22.5	
	1	0	21.40	21.54	21.79	2.0	22.5	
	1	3	21.47	21.38	21.61	2.0	22.5	
	1	5	21.52	21.48	21.74	2.0	22.5	
	3	0	21.42	21.49	21.80	2.0	22.5	
64QAM	3	1	21.36	21.43	21.81	2.0	22.5	
	3	3	21.48	21.39	21.83	2.0	22.5	
	6	0	20.45	20.50	20.61	3.0	21.5	
	1	0	18607	18900	19193	MPR	Tune-up Limit	
	1850.70 MHz	1880.00 MHz	1909.30 MHz					
	18607	18900	19193					

LTE Band 2 (Antenna E, Sub 2)

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)				
				Measured Pwr (dBm)			MPR	Tune-up Limit
				18700	18900	19100		
				1860.00 MHz	1880.00 MHz	1900.00 MHz		
20 MHz	QPSK	1	0	23.51	23.99	23.25	0.0	24.5
		1	49	23.79	23.69	24.00	0.0	24.5
		1	99	23.84	23.03	24.10	0.0	24.5
		50	0	22.55	23.09	23.19	1.0	23.5
		50	24	22.89	23.12	23.18	1.0	23.5
		50	50	22.86	22.67	23.15	1.0	23.5
	16QAM	100	0	22.86	23.12	23.14	1.0	23.5
		1	0	21.89	23.25	22.65	1.0	23.5
		1	49	22.91	23.35	23.15	1.0	23.5
		1	99	22.85	22.80	23.11	1.0	23.5
		50	0	21.83	22.02	22.17	2.0	22.5
		50	24	21.84	22.06	22.12	2.0	22.5
	64QAM	50	50	21.81	22.08	22.10	2.0	22.5
		100	0	21.83	22.07	22.09	2.0	22.5
		1	0	21.69	21.95	22.09	2.0	22.5
		1	49	21.72	21.89	22.08	2.0	22.5
		50	0	21.83	22.07	22.01	2.0	22.5
		50	24	20.77	20.94	21.04	3.0	21.5
15 MHz	QPSK	50	50	20.76	21.00	21.02	3.0	21.5
		100	0	20.74	20.92	21.01	3.0	21.5
		1	0	22.32	24.02	24.01	0.0	24.5
		1	37	23.58	23.80	23.92	0.0	24.5
		1	74	23.75	22.87	23.99	0.0	24.5
		36	0	22.27	23.22	23.19	1.0	23.5
	16QAM	36	20	22.92	23.24	23.16	1.0	23.5
		36	39	22.91	22.82	23.19	1.0	23.5
		75	0	22.92	23.18	23.19	1.0	23.5
		1	0	21.73	22.98	23.11	1.0	23.5
		1	37	22.70	22.80	22.96	1.0	23.5
		1	74	22.82	22.39	23.07	1.0	23.5
	64QAM	36	0	21.68	22.09	22.15	2.0	22.5
		36	20	21.83	22.08	22.11	2.0	22.5
		36	39	21.83	22.12	22.11	2.0	22.5
		75	0	21.82	22.15	22.10	2.0	22.5
		1	0	21.27	22.06	22.20	2.0	22.5
		1	37	21.80	21.94	22.10	2.0	22.5
10 MHz	QPSK	1	74	22.06	21.97	22.16	2.0	22.5
		36	0	20.92	21.17	21.17	3.0	21.5
		36	20	20.93	21.17	21.10	3.0	21.5
		36	39	20.93	21.20	21.09	3.0	21.5
		75	0	20.91	21.11	21.12	3.0	21.5
		1	0	22.63	24.09	23.99	0.0	24.5
	16QAM	1	25	23.04	23.74	23.93	0.0	24.5
		1	49	23.87	23.14	24.04	0.0	24.5
		25	0	22.08	23.10	23.10	1.0	23.5
		25	12	22.44	23.09	23.06	1.0	23.5
		25	25	22.84	22.88	23.05	1.0	23.5
		50	0	22.56	23.13	23.08	1.0	23.5
		1	0	21.84	23.13	23.16	1.0	23.5
		1	25	22.30	23.18	23.07	1.0	23.5
		1	49	22.68	22.74	23.04	1.0	23.5
		25	0	21.52	22.06	22.05	2.0	22.5
		25	12	21.83	22.04	22.02	2.0	22.5
		25	25	21.82	22.05	22.01	2.0	22.5
64QAM	50	0	21.87	22.05	22.00	2.0	22.5	
	1	0	21.77	21.82	22.12	2.0	22.5	
	1	25	21.83	21.93	21.99	2.0	22.5	
	1	49	21.92	21.99	21.98	2.0	22.5	
	25	0	20.86	21.03	21.11	3.0	21.5	
	25	12	20.87	21.05	21.08	3.0	21.5	
10 MHz	64QAM	25	25	20.88	21.04	21.06	3.0	21.5
		50	0	20.85	21.05	21.02	3.0	21.5

BW (MHz)	Mode	RB Allocation	RB offset	Measured Pwr (dBm)			MPR	Tune-up Limit	
				18625	18900	19175			
				1852.50 MHz	1880.00 MHz	1907.50 MHz			
5 MHz	QPSK	1	0	23.46	23.97	23.95	0.0	24.5	
		1	12	23.41	23.85	23.95	0.0	24.5	
		1	24	23.62	23.97	24.02	0.0	24.5	
		12	0	22.80	23.12	23.03	1.0	23.5	
		12	7	22.83	23.09	23.02	1.0	23.5	
		12	13	22.85	23.09	23.00	1.0	23.5	
	16QAM	25	0	22.85	23.07	23.00	1.0	23.5	
		1	0	22.63	23.17	22.91	1.0	23.5	
		1	12	22.61	22.98	22.82	1.0	23.5	
		1	24	22.71	23.15	22.92	1.0	23.5	
		12	0	21.76	22.03	21.93	2.0	22.5	
		12	7	21.72	22.01	21.88	2.0	22.5	
	64QAM	12	13	21.74	22.00	21.91	2.0	22.5	
		25	0	21.81	22.01	21.96	2.0	22.5	
		1	0	21.61	22.30	21.96	2.0	22.5	
		1	12	21.62	22.19	21.90	2.0	22.5	
		1	24	21.74	22.28	22.00	2.0	22.5	
		12	0	20.79	20.94	20.92	3.0	21.5	
		12	7	20.78	20.93	20.88	3.0	21.5	
		12	13	20.78	20.93	20.91	3.0	21.5	
		25	0	20.81	20.97	20.98	3.0	21.5	
BW (MHz)	Mode	RB Allocation	RB offset	Measured Pwr (dBm)			MPR	Tune-up Limit	
				18615	18900	19185			
				1851.50 MHz	1880.00 MHz	1908.50 MHz			
3 MHz	QPSK	1	0	23.14	24.03	24.08	0.0	24.5	
		1	8	23.07	23.87	23.97	0.0	24.5	
		1	14	23.05	23.78	24.15	0.0	24.5	
		8	0	22.43	23.21	23.14	1.0	23.5	
		8	4	22.44	23.16	23.04	1.0	23.5	
		8	7	22.43	23.18	23.06	1.0	23.5	
	16QAM	15	0	22.46	23.14	23.01	1.0	23.5	
		1	0	22.35	23.28	23.08	1.0	23.5	
		1	8	22.31	22.99	22.93	1.0	23.5	
		1	14	22.34	23.33	22.98	1.0	23.5	
		8	0	21.85	22.23	22.01	2.0	22.5	
		8	4	21.88	22.22	21.95	2.0	22.5	
	64QAM	8	7	21.83	22.19	21.94	2.0	22.5	
		15	0	21.82	22.04	21.95	2.0	22.5	
		1	0	21.92	22.25	22.22	2.0	22.5	
		1	8	21.85	21.97	22.06	2.0	22.5	
		1	14	21.90	22.35	22.29	2.0	22.5	
		8	0	20.89	21.05	21.09	3.0	21.5	
		8	4	20.80	21.01	21.03	3.0	21.5	
		8	7	20.83	21.06	21.01	3.0	21.5	
		15	0	20.82	20.89	21.00	3.0	21.5	
BW (MHz)	Mode	RB Allocation	RB offset	Measured Pwr (dBm)			MPR	Tune-up Limit	
				18607	18900	19193			
				1850.70 MHz	1880.00 MHz	1909.30 MHz			
1.4 MHz	QPSK	1	0	23.10	24.05	24.13	0.0	24.5	
		1	3	23.03	23.88	24.01	0.0	24.5	
		1	5	22.98	23.80	24.11	0.0	24.5	
		3	0	22.94	23.81	24.10	0.0	24.5	
		3	1	22.92	23.79	23.99	0.0	24.5	
		3	3	22.90	23.77	23.96	0.0	24.5	
	16QAM	6	0	22.34	23.14	23.07	1.0	23.5	
		1	0	22.53	22.89	22.91	1.0	23.5	
		1	3	22.50	23.06	23.04	1.0	23.5	
		1	5	22.51	22.96	22.97	1.0	23.5	
		3	0	22.33	23.06	23.19	1.0	23.5	
		3	1	22.33	23.08	23.12	1.0	23.5	
	64QAM	3	3	22.31	23.05	23.05	1.0	23.5	
		6	0	21.75	22.02	21.96	2.0	22.5	
		1	0	21.64	22.15	22.06	2.0	22.5	
		1	3	21.79	21.97	21.97	2.0	22.5	
		1	5	21.81	22.09	21.98	2.0	22.5	
		3	0	21.63	22.01	22.10	2.0	22.5	
		3	1	21.51	22.00	22.05	2.0	22.5	
		3	3	21.60	22.00	21.92	2.0	22.5	
		6	0	20.76	20.95	21.08	3.0	21.5	

8.2. PEAK TO AVERAGE RATIO

Test Procedure

Per KDB 971168 D01 Power Meas License Digital Systems v03r01;

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

Test Spec

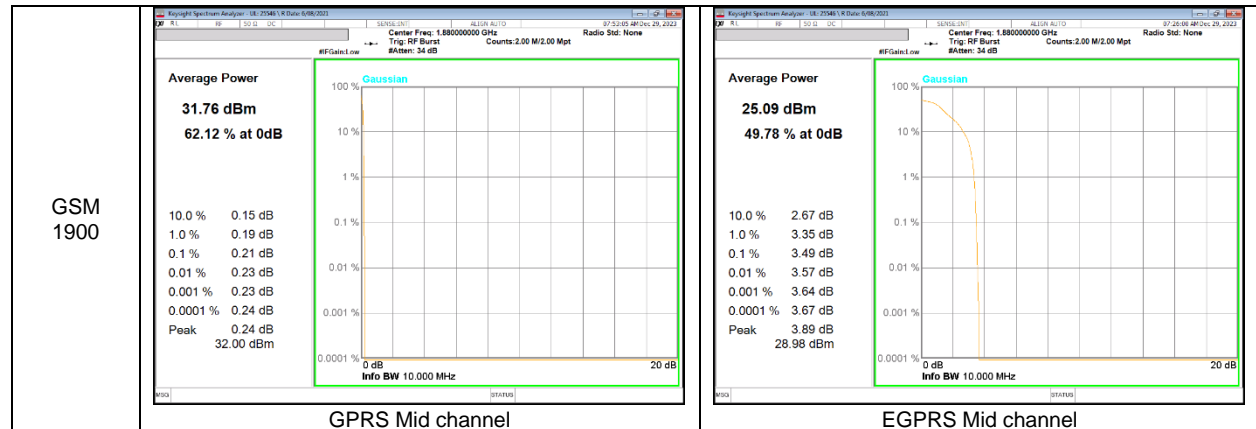
In addition, when the transmitter power is measured in terms of average value, the peak-to-average ratio of the power shall not exceed 13 dB.

RESULTS

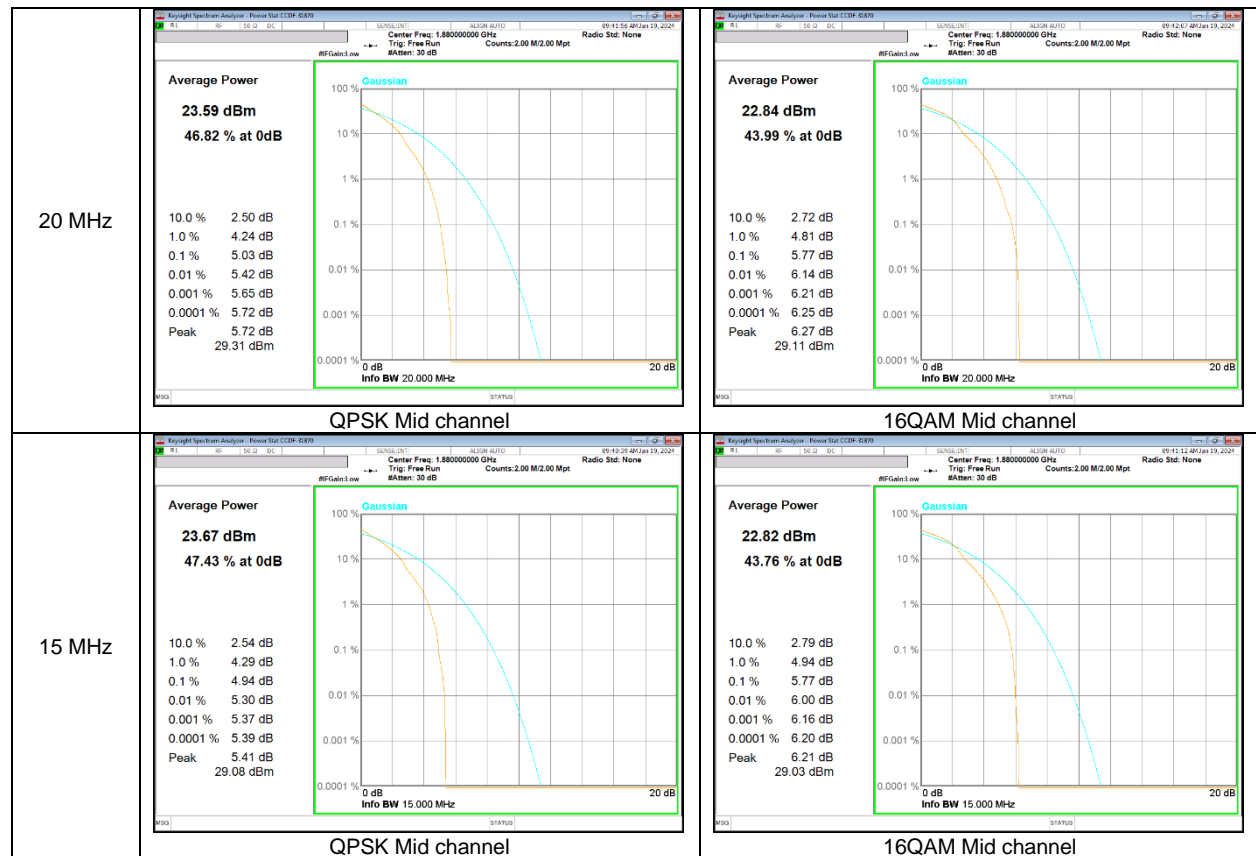
See the following pages.

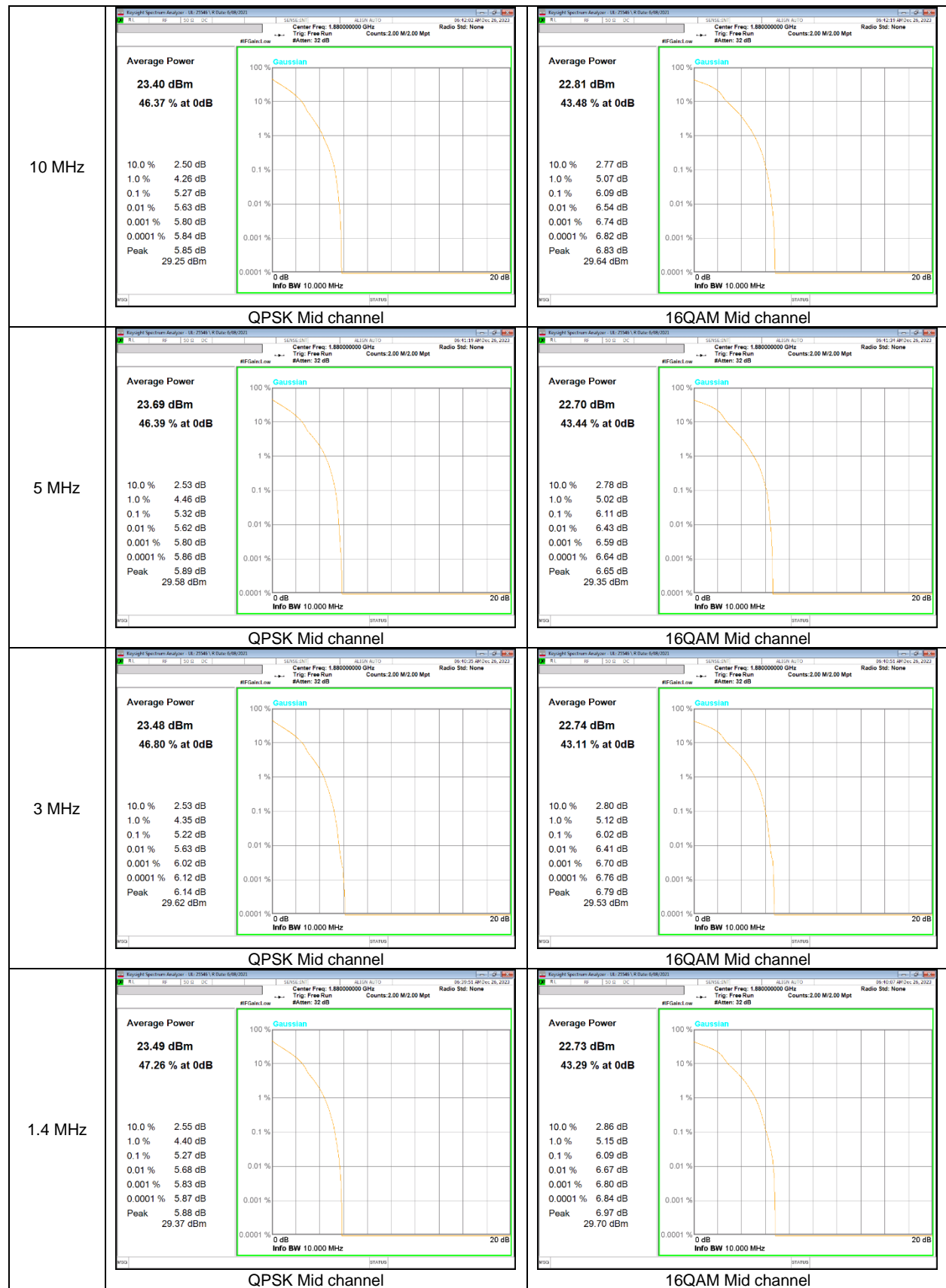
8.2.1. CONDUCTED PEAK TO AVERAGE RESULT

GSM



LTE Band 2





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

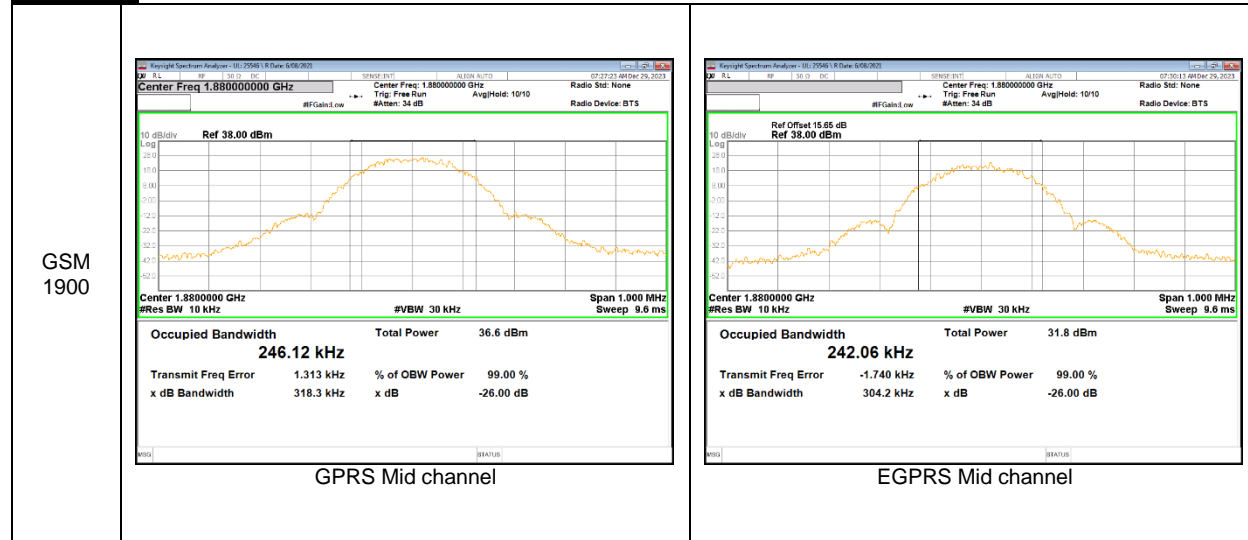
Band	Modulation	f [MHz]	99% BW (kHz)	-26dB BW (kHz)
1900	GPRS	1880.0	246.12	318.3
	EGPRS		242.06	304.2

- LTE Band 2

Band	BW	Modulation	f [MHz]	99% BW (MHz)	-26dB BW (MHz)
LTE B2	20M	QPSK	1880.0	17.936	19.99
		16QAM		17.940	19.81
	15M	QPSK		13.468	14.96
		16QAM		13.430	15.29
	10M	QPSK		8.992	10.24
		16QAM		8.994	10.17
	5M	QPSK		4.504	5.264
		16QAM		4.507	5.381
	3M	QPSK		2.706	3.077
		16QAM		2.709	3.088
	1.4M	QPSK		1.092	1.306
		16QAM		1.090	1.310

8.3.1. OCCUPIED BANDWIDTH RESULTS

GSM 1900



LTE Band 2





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 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 ≥ 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)

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 ≥ 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

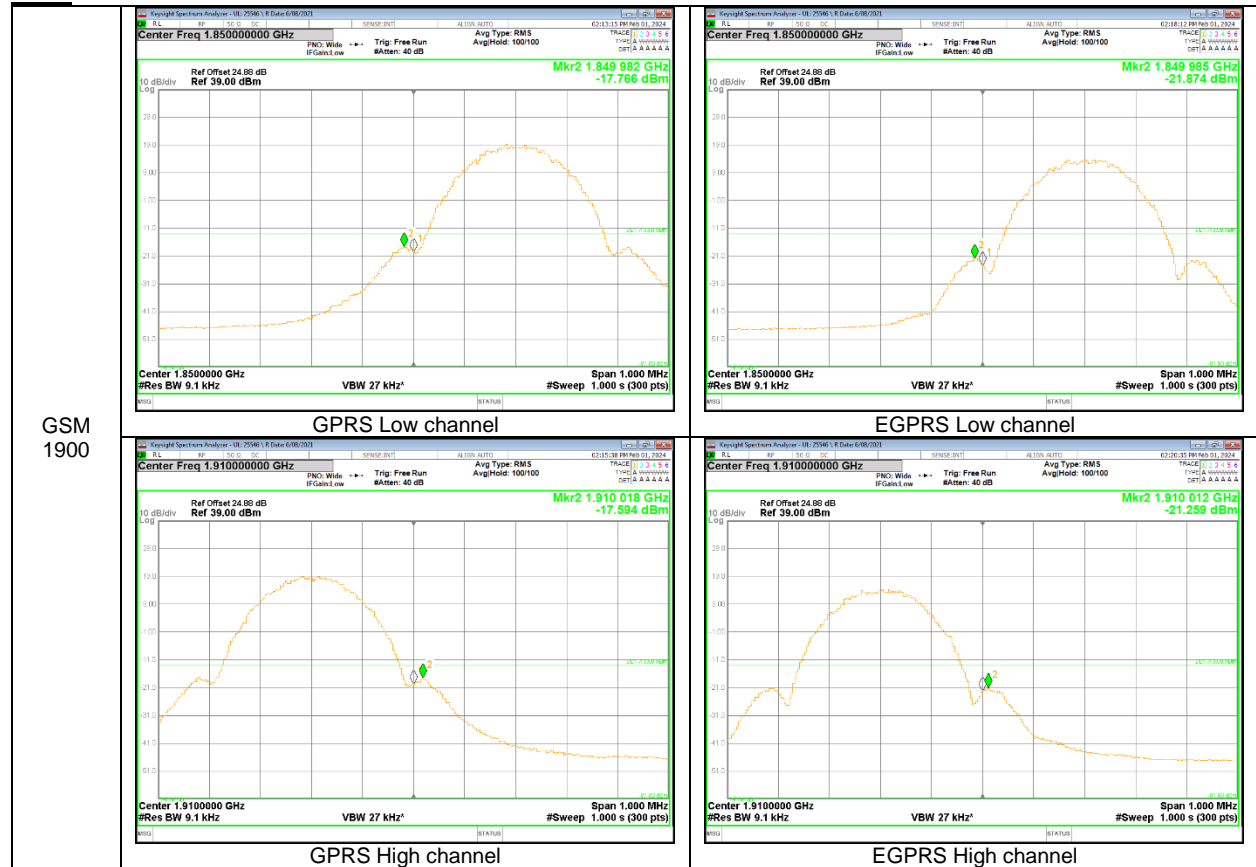
For the band edge value measured in [RB Used], even if [CF for emissions reference bandwidth 100kHz/1MHz] is applied, it is below -13dBm.

RESULTS

See the following pages.

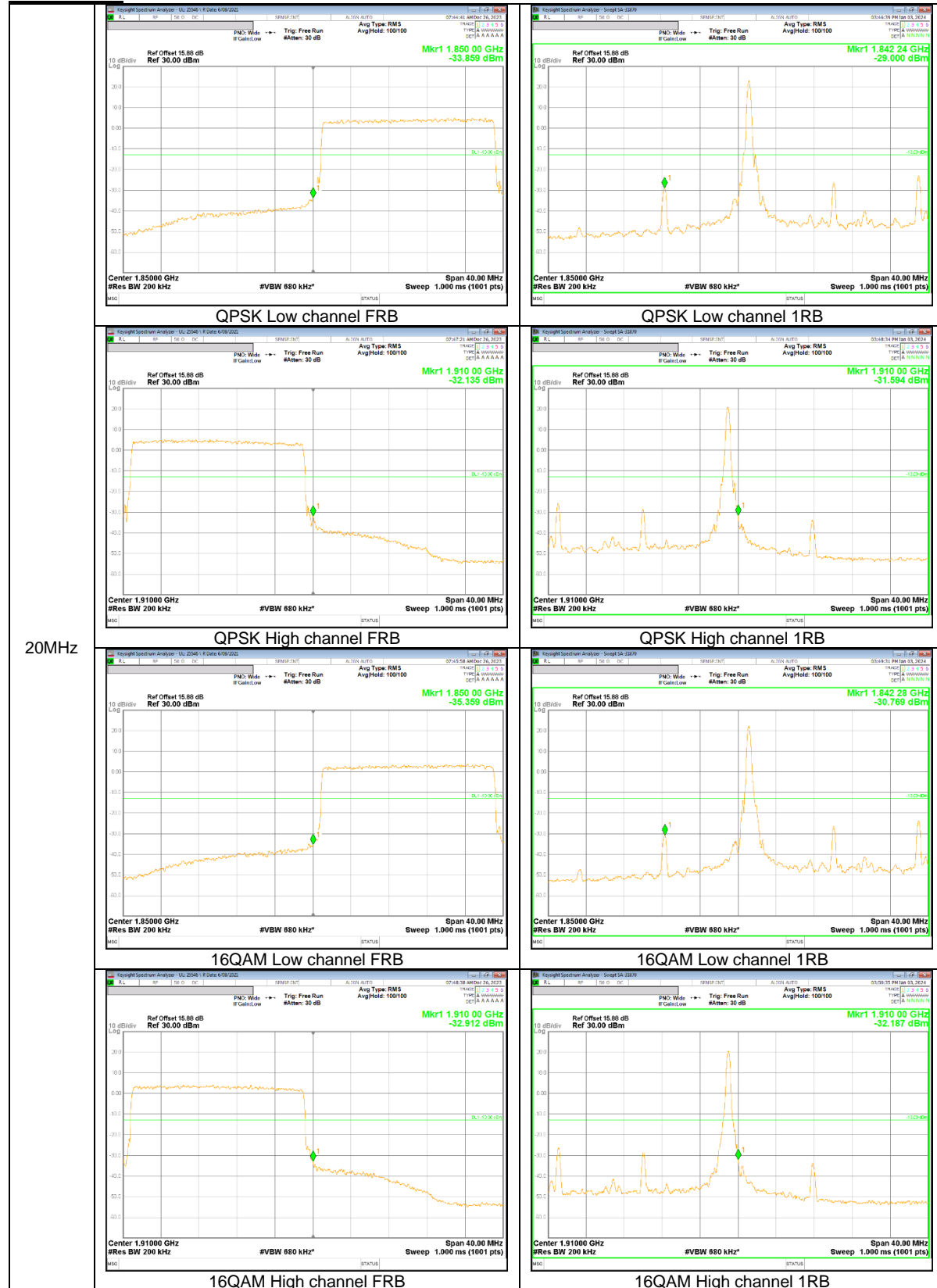
8.4.1. BAND EDGE RESULT

GSM

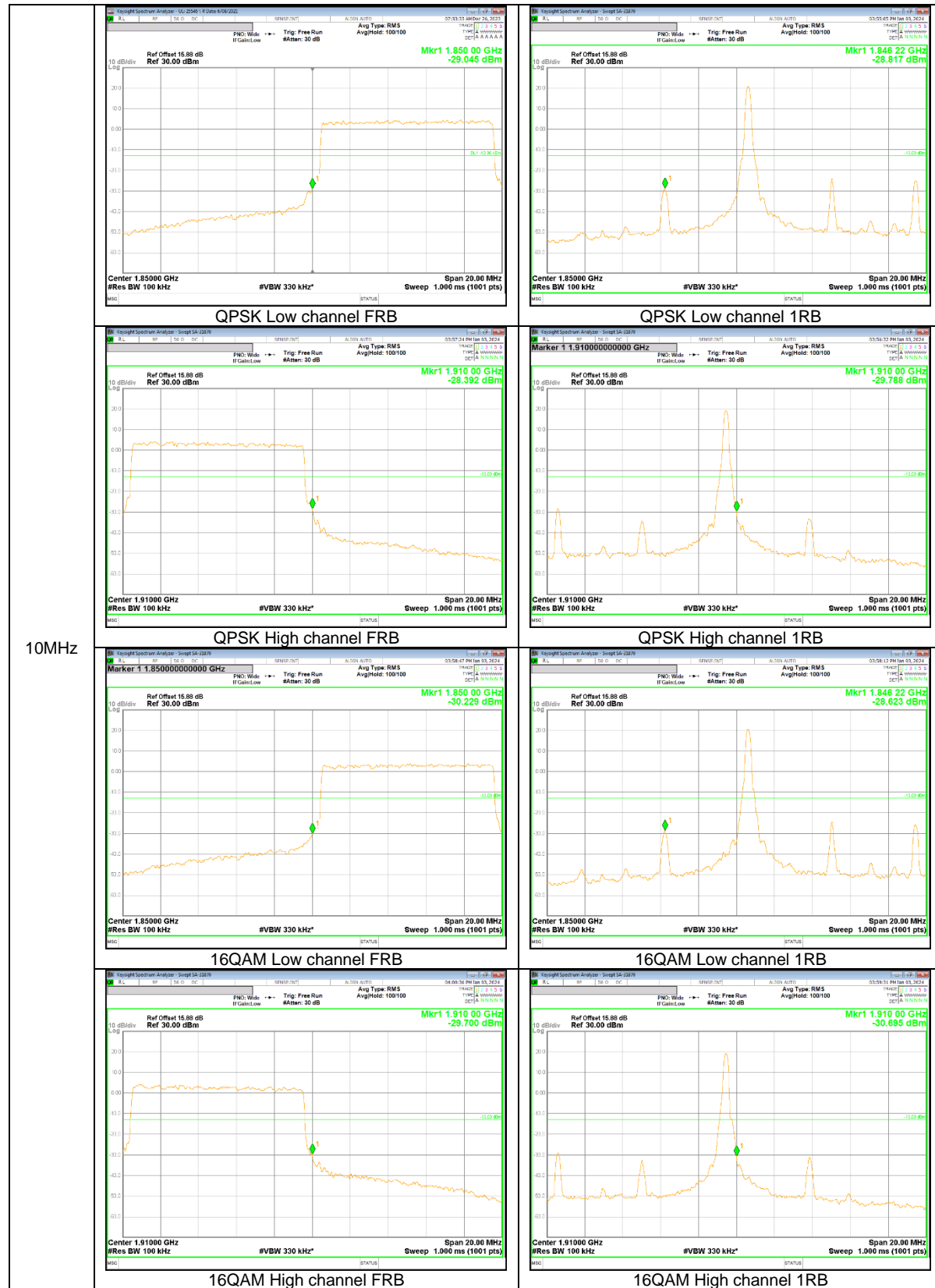


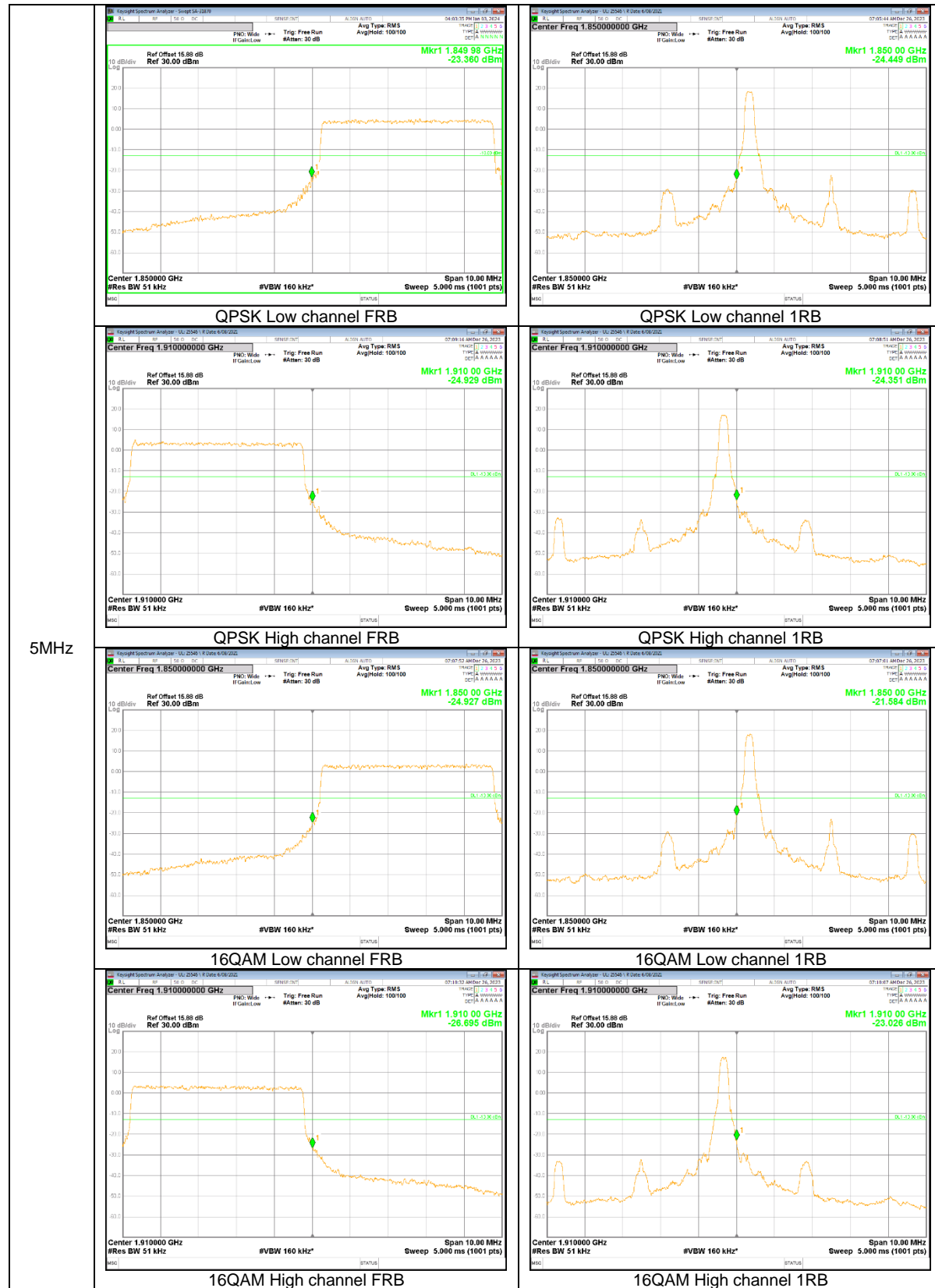
GSM
1900

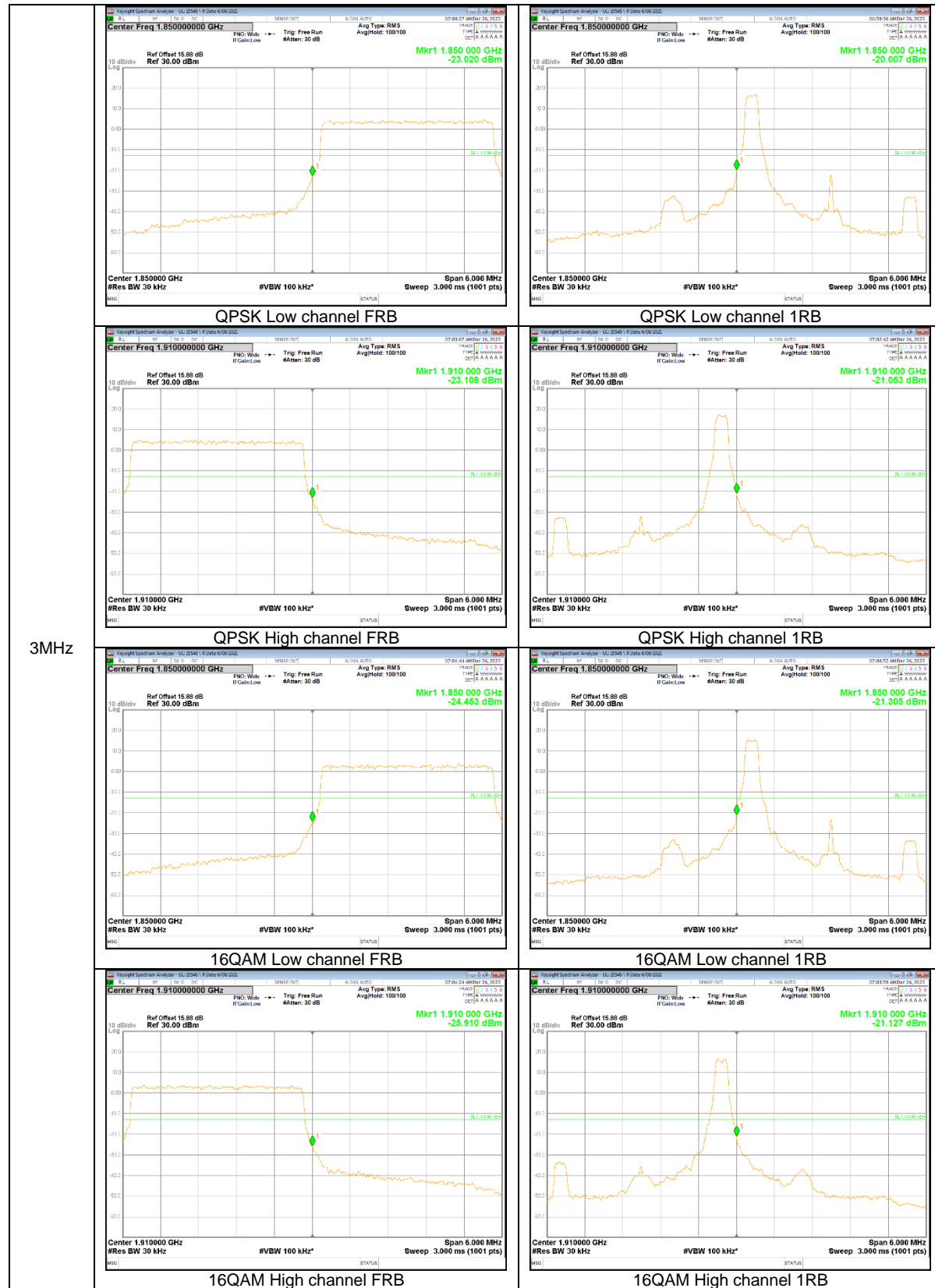
LTE Band 2

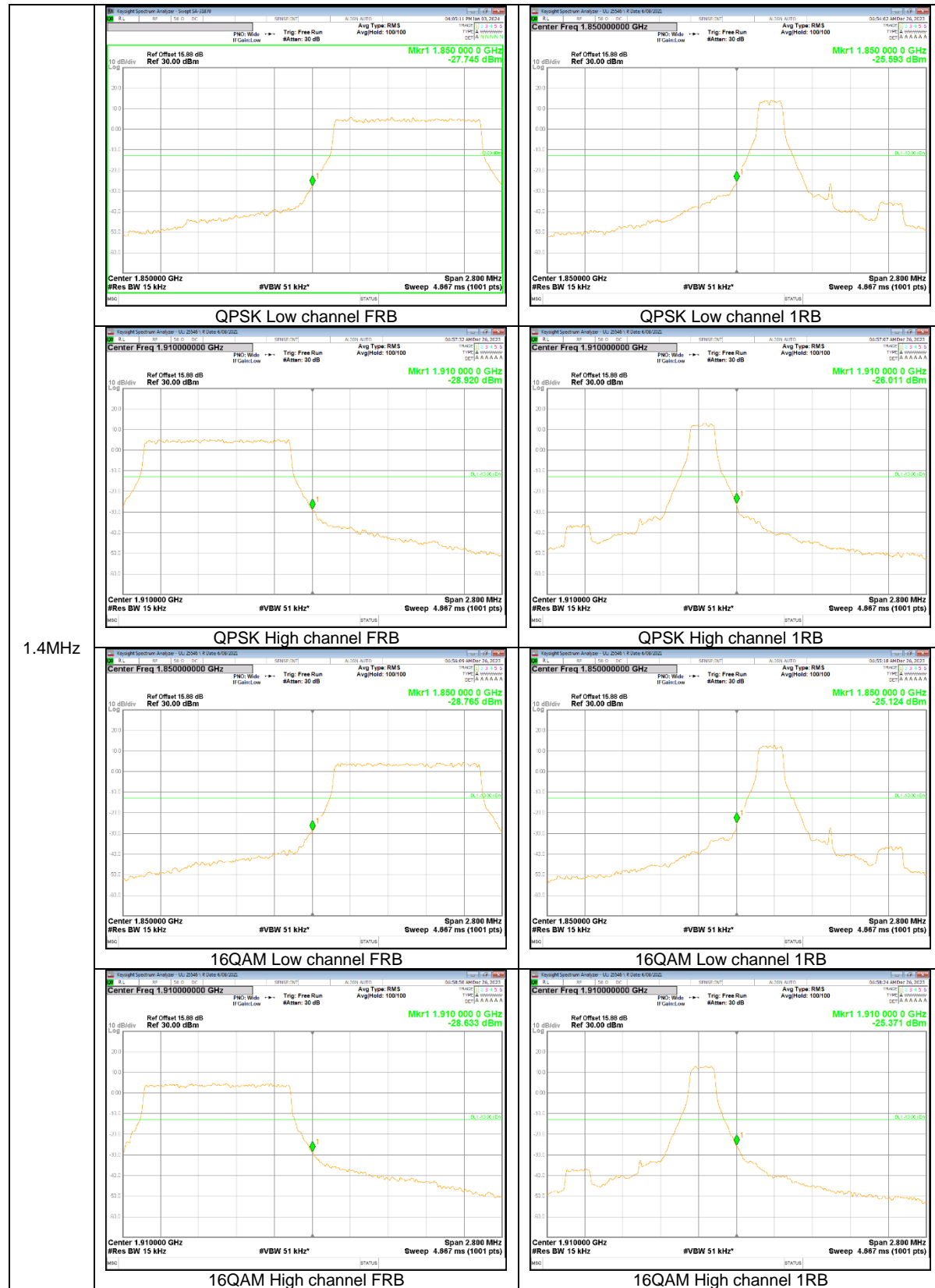












1.4MHz

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 ≥ 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(LTE), Max hold(GSM);

NOTE1

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

RESULTS

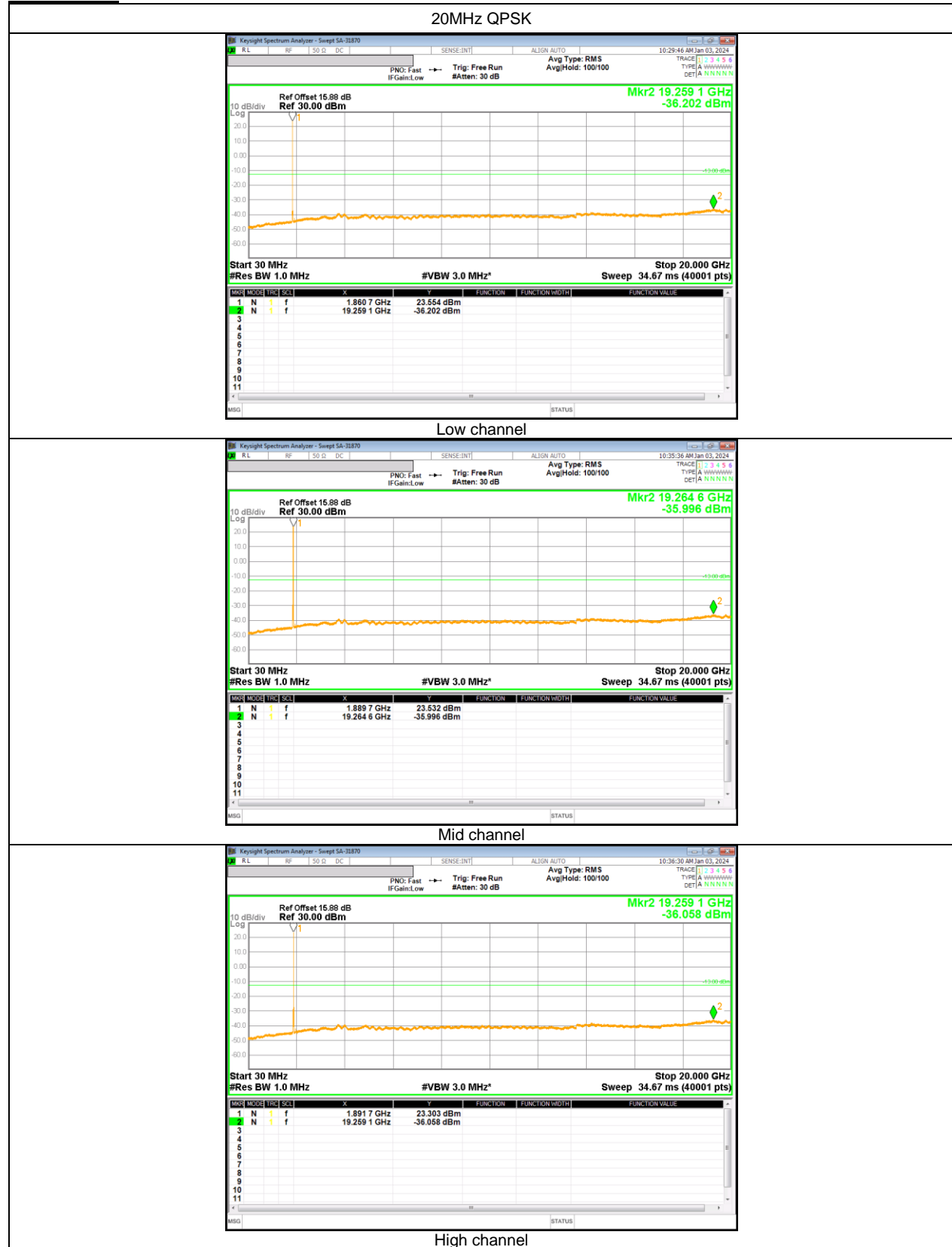
See the following pages.

8.5.1. OUT OF BAND EMISSIONS RESULT

GSM 1900



LTE Band 2



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:EGPRS / Highest Frequency: GPRS)

Test Date	2024-01-02
Test Engineer	25546

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	1850.0752	1909.9230		
Extreme (50C)		1850.0752	1909.9230	27.4	0.015
Extreme (40C)		1850.0752	1909.9230	10.2	0.005
Extreme (30C)		1850.0752	1909.9230	10.5	0.006
Extreme (10C)		1850.0752	1909.9230	7.4	0.004
Extreme (0C)		1850.0752	1909.9230	9.5	0.005
Extreme (-10C)		1850.0752	1909.9230	15.0	0.008
Extreme (-20C)		1850.0752	1909.9230	16.5	0.009
Extreme (-30C)		1850.0752	1909.9230	20.0	0.011
20C	15%	1850.0752	1909.9230	19.7	0.010
	-15%	1850.0752	1909.9230	21.2	0.011
	End Point	1850.0752	1909.9230	19.6	0.010

LTE Band 2 (Lowest Frequency: QPSK / Highest Frequency: 16QAM)

Test Date	2024-01-03
Test Engineer	25546

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	1850.1551	1909.8456		
Extreme (50C)		1850.1551	1909.8456	12.3	0.007
Extreme (40C)		1850.1551	1909.8456	8.3	0.004
Extreme (30C)		1850.1551	1909.8456	10.7	0.006
Extreme (10C)		1850.1551	1909.8456	7.4	0.004
Extreme (0C)		1850.1551	1909.8456	11.4	0.006
Extreme (-10C)		1850.1551	1909.8456	10.5	0.006
Extreme (-20C)		1850.1551	1909.8456	7.5	0.004
Extreme (-30C)		1850.1551	1909.8456	8.7	0.005
20C	15%	1850.1551	1909.8456	7.3	0.004
	-15%	1850.1551	1909.8456	12.7	0.007
	End Point	1850.1551	1909.8456	10.4	0.006

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), average(LTE);

TEST RESULTS

See the following pages.

9.1.1. EIRP Results

GSM (Antenna A, Main 1)

Band	Mode	Frequency (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	21.88	H	4.48	9.52	26.92	492.04	33.00	-6.08
		1880.00	24.82	H	4.52	9.29	29.58	907.82	33.00	-3.42
		1909.80	25.16	H	4.55	9.00	29.61	914.11	33.00	-3.39
	EGPRS	1850.20	17.77	H	4.48	9.52	22.81	190.99	33.00	-10.19
		1880.00	20.67	H	4.52	9.29	25.43	349.14	33.00	-7.57
		1909.80	22.45	H	4.55	9.00	26.90	489.76	33.00	-6.10

LTE Band 2 (Antenna A, Main 1)

BW (MHz)	Modulation	Frequency (MHz)	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	Limit (dBm)	Delta (dB)	RB
20	QPSK	1860.00	17.76	H	4.49	9.45	22.71	186.64	33.00	-10.29	1/49
		1880.00	18.17	H	4.52	9.29	22.94	196.79	33.00	-10.06	1/99
		1900.00	19.12	H	4.54	9.13	23.71	234.96	33.00	-9.29	1/0
	16-QAM	1860.00	16.90	H	4.49	9.45	21.85	153.11	33.00	-11.15	1/49
		1880.00	16.76	H	4.52	9.29	21.52	141.91	33.00	-11.48	1/49
		1900.00	18.33	H	4.54	9.13	22.92	195.88	33.00	-10.08	1/49
15	QPSK	1857.50	17.56	H	4.49	9.47	22.54	179.47	33.00	-10.46	1/0
		1880.00	18.14	H	4.52	9.29	22.90	194.98	33.00	-10.10	1/74
		1902.50	19.22	H	4.54	9.10	23.77	238.23	33.00	-9.23	1/0
	16-QAM	1857.50	16.49	H	4.49	9.47	21.47	140.28	33.00	-11.53	1/0
		1880.00	16.85	H	4.52	9.29	21.61	144.88	33.00	-11.39	1/74
		1902.50	18.22	H	4.54	9.10	22.77	189.23	33.00	-10.23	1/0
10	QPSK	1855.00	17.46	H	4.49	9.48	22.46	176.20	33.00	-10.54	1/0
		1880.00	18.14	H	4.52	9.29	22.90	194.98	33.00	-10.10	1/49
		1905.00	19.22	H	4.55	9.06	23.74	236.59	33.00	-9.26	1/0
	16-QAM	1855.00	16.28	H	4.49	9.48	21.28	134.28	33.00	-11.72	1/0
		1880.00	16.74	H	4.52	9.29	21.50	141.25	33.00	-11.50	1/49
		1905.00	18.44	H	4.55	9.06	22.96	197.70	33.00	-10.04	1/0
5	QPSK	1852.50	16.91	H	4.49	9.50	21.93	155.96	33.00	-11.07	1/24
		1880.00	17.67	H	4.52	9.29	22.43	174.98	33.00	-10.57	1/0
		1907.50	19.24	H	4.55	9.03	23.72	235.50	33.00	-9.28	1/24
	16-QAM	1852.50	16.29	H	4.49	9.50	21.31	135.21	33.00	-11.69	1/24
		1880.00	16.73	H	4.52	9.29	21.49	140.93	33.00	-11.51	1/0
		1907.50	17.19	H	4.55	9.03	21.67	146.89	33.00	-11.33	1/0
3	QPSK	1851.50	17.55	H	4.49	9.51	22.58	181.13	33.00	-10.42	1/14
		1880.00	18.04	H	4.52	9.29	22.80	190.55	33.00	-10.20	1/0
		1908.50	19.40	H	4.55	9.02	23.87	243.78	33.00	-9.13	1/0
	16-QAM	1851.50	16.34	H	4.49	9.51	21.37	137.09	33.00	-11.63	1/0
		1880.00	16.84	H	4.52	9.29	21.60	144.54	33.00	-11.40	1/14
		1908.50	18.49	H	4.55	9.02	22.96	197.70	33.00	-10.04	1/0
1.4	QPSK	1850.70	17.32	H	4.48	9.52	22.36	172.19	33.00	-10.64	1/0
		1880.00	17.91	H	4.52	9.29	22.67	184.93	33.00	-10.33	1/0
		1909.30	19.40	H	4.55	9.00	23.86	243.22	33.00	-9.14	1/0
	16-QAM	1850.70	16.35	H	4.48	9.52	21.39	137.72	33.00	-11.61	1/3
		1880.00	16.83	H	4.52	9.29	21.59	144.21	33.00	-11.41	1/5
		1909.30	16.65	H	4.55	9.00	21.11	129.12	33.00	-11.89	1/0

LTE Band 2 (Antenna E, Sub 2)

BW (MHz)	Modulation	Frequency (MHz)	SG reading (dBm)	Ant. Pol. (HV)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	Limit (dBm)	Delta (dB)	RB
20	QPSK	1860.00	16.87	H	4.49	9.45	21.82	152.05	33.00	-11.18	1/99
		1880.00	15.86	H	4.52	9.29	20.63	115.61	33.00	-12.37	1/0
		1900.00	17.09	H	4.54	9.13	21.68	147.23	33.00	-11.32	1/99
	16-QAM	1860.00	16.20	H	4.49	9.45	21.15	130.32	33.00	-11.85	1/49
		1880.00	15.13	H	4.52	9.29	19.90	97.72	33.00	-13.10	1/49
		1900.00	16.06	H	4.54	9.13	20.65	116.14	33.00	-12.35	1/49
15	QPSK	1857.50	16.76	H	4.49	9.47	21.74	149.28	33.00	-11.26	1/74
		1880.00	15.89	H	4.52	9.29	20.65	116.14	33.00	-12.35	1/0
		1902.50	17.15	H	4.54	9.10	21.70	147.91	33.00	-11.30	1/0
	16-QAM	1857.50	16.08	H	4.49	9.47	21.06	127.64	33.00	-11.94	1/74
		1880.00	14.77	H	4.52	9.29	19.53	89.74	33.00	-13.47	1/0
		1902.50	16.16	H	4.54	9.10	20.71	117.76	33.00	-12.29	1/0
10	QPSK	1855.00	16.78	H	4.49	9.48	21.78	150.66	33.00	-11.22	1/49
		1880.00	15.96	H	4.52	9.29	20.72	118.03	33.00	-12.28	1/0
		1905.00	17.20	H	4.55	9.06	21.72	148.59	33.00	-11.28	1/49
	16-QAM	1855.00	15.84	H	4.49	9.48	20.84	121.34	33.00	-12.16	1/49
		1880.00	14.97	H	4.52	9.29	19.73	93.97	33.00	-13.27	1/25
		1905.00	16.23	H	4.55	9.06	20.75	118.85	33.00	-12.25	1/0
5	QPSK	1852.50	16.49	H	4.49	9.50	21.51	141.58	33.00	-11.49	1/24
		1880.00	15.84	H	4.52	9.29	20.60	114.82	33.00	-12.40	1/0
		1907.50	17.33	H	4.55	9.03	21.81	151.71	33.00	-11.19	1/24
	16-QAM	1852.50	15.83	H	4.49	9.50	20.85	121.62	33.00	-12.15	1/24
		1880.00	14.96	H	4.52	9.29	19.72	93.76	33.00	-13.28	1/0
		1907.50	16.14	H	4.55	9.03	20.62	115.35	33.00	-12.38	1/24
3	QPSK	1851.50	16.01	H	4.49	9.51	21.04	127.06	33.00	-11.96	1/0
		1880.00	15.90	H	4.52	9.29	20.66	116.41	33.00	-12.34	1/0
		1908.50	17.45	H	4.55	9.02	21.92	155.60	33.00	-11.08	1/14
	16-QAM	1851.50	15.47	H	4.49	9.51	20.50	112.20	33.00	-12.50	1/0
		1880.00	15.12	H	4.52	9.29	19.88	97.27	33.00	-13.12	1/14
		1908.50	16.29	H	4.55	9.02	20.76	119.12	33.00	-12.24	1/0
1.4	QPSK	1850.70	15.98	H	4.48	9.52	21.02	126.47	33.00	-11.98	1/0
		1880.00	15.92	H	4.52	9.29	20.68	116.95	33.00	-12.32	1/0
		1909.30	17.41	H	4.55	9.00	21.87	153.82	33.00	-11.13	1/0
	16-QAM	1850.70	15.66	H	4.48	9.52	20.70	117.49	33.00	-12.30	1/0
		1880.00	14.87	H	4.52	9.29	19.63	91.83	33.00	-13.37	1/3
		1909.30	16.38	H	4.55	9.00	20.84	121.34	33.00	-12.16	1/3

9.2. RADIATED SPURIOUS EMISSION

RULE PART(S)

FCC: §2.1053, §24.238

LIMIT

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 ≥ 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(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 #:		4791083081							
Date:		2023-12-22							
Test Engineer:		28183							
Configuration:		EUT, X-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
GPRS									
Antenna A									
Main 1									
Low Ch, 1850.2MHz									
3700.40	11.4	V	3.0	44.1	1.0	-31.8	-13.0	-18.8	
5550.60	0.7	V	3.0	45.0	1.0	-43.2	-13.0	-30.2	
7400.80	0.6	V	3.0	45.0	1.0	-43.4	-13.0	-30.4	
3700.40	8.8	H	3.0	44.1	1.0	-34.3	-13.0	-21.3	
5550.60	-0.9	H	3.0	45.0	1.0	-44.8	-13.0	-31.8	
7400.80	-0.7	H	3.0	45.0	1.0	-44.7	-13.0	-31.7	
Mid Ch, 1880MHz									
3760.00	4.0	V	3.0	44.1	1.0	-39.2	-13.0	-26.2	
5640.00	7.0	V	3.0	45.0	1.0	-37.0	-13.0	-24.0	
7520.00	-0.8	V	3.0	44.9	1.0	-44.8	-13.0	-31.8	
3760.00	5.3	H	3.0	44.1	1.0	-37.8	-13.0	-24.8	
5640.00	1.1	H	3.0	45.0	1.0	-42.9	-13.0	-29.9	
7520.00	-0.8	H	3.0	44.9	1.0	-44.7	-13.0	-31.7	
High Ch, 1909.8MHz									
3819.60	2.3	V	3.0	44.2	1.0	-40.9	-13.0	-27.9	
5729.40	3.0	V	3.0	45.0	1.0	-41.1	-13.0	-28.1	
7639.20	-0.6	V	3.0	44.9	1.0	-44.5	-13.0	-31.5	
3819.60	5.1	H	3.0	44.2	1.0	-38.1	-13.0	-25.1	
5729.40	0.3	H	3.0	45.0	1.0	-43.8	-13.0	-30.8	
7639.20	-0.4	H	3.0	44.9	1.0	-44.3	-13.0	-31.3	

LTE Band 2

		UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement								
		Company: Samsung Project #: 4791083081 Date: 2024-01-16 Test Engineer: 28775 Configuration: EUT / AC Adapter, Y-Position Location: Chamber 1 Mode: LTE_QPSK Band 2 Harmonics, 3MHz Bandwidth 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	
3 MHz										
QPSK										
Antenna A Main 1										
Low Ch, 1851.5MHz										
3703.00	-3.0	V	3.0	44.1	1.0	-46.2	-13.0	-33.2		
5554.50	-5.1	V	3.0	45.0	1.0	-49.1	-13.0	-36.1		
7406.00	-3.5	V	3.0	45.0	1.0	-47.5	-13.0	-34.5		
3703.00	-0.6	H	3.0	44.1	1.0	-43.7	-13.0	-30.7		
5554.50	-4.9	H	3.0	45.0	1.0	-48.8	-13.0	-35.8		
7406.00	-3.4	H	3.0	45.0	1.0	-47.4	-13.0	-34.4		
Mid Ch, 1880MHz										
3760.00	-5.0	V	3.0	44.1	1.0	-48.2	-13.0	-35.2		
5640.00	-5.4	V	3.0	45.0	1.0	-49.4	-13.0	-36.4		
7520.00	-3.5	V	3.0	44.9	1.0	-47.4	-13.0	-34.4		
3760.00	-2.3	H	3.0	44.1	1.0	-45.4	-13.0	-32.4		
5640.00	-5.3	H	3.0	45.0	1.0	-49.2	-13.0	-36.2		
7520.00	-3.4	H	3.0	44.9	1.0	-47.3	-13.0	-34.3		
High Ch, 1908.5MHz										
3817.00	-8.8	V	3.0	44.2	1.0	-52.0	-13.0	-39.0		
5725.50	-6.0	V	3.0	45.0	1.0	-50.0	-13.0	-37.0		
7634.00	-3.3	V	3.0	44.9	1.0	-47.2	-13.0	-34.2		
3817.00	-8.6	H	3.0	44.2	1.0	-51.8	-13.0	-38.8		
5725.50	-5.8	H	3.0	45.0	1.0	-49.8	-13.0	-36.8		
7634.00	-3.1	H	3.0	44.9	1.0	-47.0	-13.0	-34.0		
		UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement								
		Company: Samsung Project #: 4791083081 Date: 2024-01-16 Test Engineer: 28775 Configuration: EUT / AC Adapter, X-Position Location: Chamber 1 Mode: LTE_QPSK Band 2 Harmonics, 3MHz Bandwidth 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	
3 MHz										
QPSK										
Antenna E Sub 2										
Low Ch, 1851.5MHz										
3703.00	-9.0	V	3.0	44.1	1.0	-52.1	-13.0	-39.1		
5554.50	-6.2	V	3.0	45.0	1.0	-50.1	-13.0	-37.1		
7406.00	-3.5	V	3.0	45.0	1.0	-47.5	-13.0	-34.5		
3703.00	-8.7	H	3.0	44.1	1.0	-51.8	-13.0	-38.8		
5554.50	-6.0	H	3.0	45.0	1.0	-50.0	-13.0	-37.0		
7406.00	-3.4	H	3.0	45.0	1.0	-47.4	-13.0	-34.4		
Mid Ch, 1880MHz										
3760.00	-8.7	V	3.0	44.1	1.0	-51.9	-13.0	-38.9		
5640.00	-6.1	V	3.0	45.0	1.0	-50.0	-13.0	-37.0		
7520.00	-3.4	V	3.0	44.9	1.0	-47.3	-13.0	-34.3		
3760.00	-8.5	H	3.0	44.1	1.0	-51.6	-13.0	-38.6		
5640.00	-5.9	H	3.0	45.0	1.0	-49.9	-13.0	-36.9		
7520.00	-3.4	H	3.0	44.9	1.0	-47.3	-13.0	-34.3		
High Ch, 1908.5MHz										
3817.00	-8.7	V	3.0	44.2	1.0	-51.8	-13.0	-38.8		
5725.50	-6.1	V	3.0	45.0	1.0	-50.1	-13.0	-37.1		
7634.00	-3.1	V	3.0	44.9	1.0	-47.0	-13.0	-34.0		
3817.00	-8.4	H	3.0	44.2	1.0	-51.6	-13.0	-38.6		
5725.50	-5.8	H	3.0	45.0	1.0	-49.9	-13.0	-36.9		
7634.00	-3.1	H	3.0	44.9	1.0	-47.0	-13.0	-34.0		

END OF REPORT