

CERTIFICATION TEST REPORT

Report Number. : S-4791953314-E2V2

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

Model : SC-52G, SCG38

FCC ID : A3LSMS947JPN

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

Test Standard(s) : FCC 47 CFR PART 22 SUBPART H

Date Of Issue:
2025-12-31

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Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	2025-12-22	Initial issue	SunGeun Lee
V2	2025-12-31	Updated to address TCB's question	SunGeun Lee

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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/be, NFC, WPT and UWB

MODEL NUMBER: SC-52G, SCG38

SERIAL NUMBER: R3CY90EPDNR, R3CY90EPD5P, R3CY90EPRNP (CONDUCTED);
R3CY90EPMWP (RADIATED);

DATE TESTED: 2025-12-12 – 2025-12-22;

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 22H	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:



Seokhwan Hong
Suwon Lab Engineer
UL KOREA LTD.

Tested By:



Sungeun Lee
Suwon Lab Engineer
UL KOREA LTD.

2. TEST METHODOLOGY

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

1. FCC 47 CFR Part 2.
2. FCC 47 CFR Part 22.
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
8. KDB 648474 D03 Wireless Chrgers Battery Cover v01r04

3. FACILITIES AND ACCREDITATION

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

218 Maeyeong-ro	
☐	Chamber 1(3m semi-anechoic chamber)
☒	Chamber 2(3m semi-anechoic chamber)
☐	Chamber 3(3m semi-anechoic chamber)
☐	Chamber 4(3m Full-anechoic chamber)
☐	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:

ERP = SG reading with EUT worst orientation (dBm) – cable loss(between the SG and substitution antenna) + Substitution Antenna Factor (dBd)

For Radiated Spurious Emission (dBm) = SA reading with EUT worst orientation (dBm) + Antenna Factor (dB/m) + Cable Loss (dB) + Conversion Factor(dB)

SA reading with EUT worst orientation (dBm) = Measured amplitude level (dBuV) +107
Conversion Factor = $107 + 20 \log(D) - 104.8 = 107 + 9.54 - 104.8 = 11.74 \text{ dB}$
where D is the measurement distance (in the far field) in m

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	1.84 dB
Radiated Disturbance, 9 kHz to 30 MHz	2.41 dB
Radiated Disturbance, 30 MHz to 1 GHz	3.69 dB
Radiated Disturbance, 1 GHz to 18 GHz	5.18 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 Clause 4.3.3 in IEC Guide 115:2023.

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/be, NFC, WPT, and UWB. This test report addresses the WWAN Operational mode.

Representative model	Comparison Criteria	Derivative model
		SCG38
SC-52G	Hardware	Same as SC-52G
	Software	UI modified according to Service Provider specifications

The SC-52G model was used as the representative model for final testing. All test results in this report apply to both the representative model and its derivative variants.

5.2. MAXIMUM OUTPUT POWER

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

LTE Band 5

FCC Part 22								
Band	ANT	Frequency Range [MHz]	BandWidth [MHz]	Modulation	Conducted Power		ERP	
					Max. Power [dBm]	Max. Power [W]	Max. Power [dBm]	Max. Power [W]
Band 5	A	829.00 - 844.00	10	QPSK	24.97	0.314	18.93	0.078
				16QAM	24.11	0.258	18.00	0.063
				64QAM	23.95	0.248		
		826.50 - 846.50	5	QPSK	24.62	0.290	18.56	0.072
				16QAM	24.16	0.261	17.45	0.056
				64QAM	24.17	0.261		
		825.50 - 847.50	3	QPSK	24.61	0.289	17.77	0.060
				16QAM	24.26	0.267	17.81	0.060
				64QAM	24.04	0.254		
		824.70 - 848.30	1.4	QPSK	24.58	0.287	18.26	0.067
				16QAM	24.17	0.261	17.36	0.054
				64QAM	22.92	0.196		
Band 5	E	829.00 - 844.00	10	QPSK	23.57	0.228	21.93	0.156
				16QAM	23.18	0.208	20.77	0.119
				64QAM	23.03	0.201		
		826.50 - 846.50	5	QPSK	23.91	0.246	21.88	0.154
				16QAM	23.40	0.219	20.92	0.124
				64QAM	22.64	0.184		
		825.50 - 847.50	3	QPSK	23.59	0.229	21.36	0.137
				16QAM	23.13	0.206	20.51	0.112
				64QAM	22.91	0.195		
		824.70 - 848.30	1.4	QPSK	23.54	0.226	21.63	0.146
				16QAM	22.94	0.197	20.36	0.109
				64QAM	22.32	0.171		

NR Band n5

FCC Part 22									
Band	ANT	Frequency Range [MHz]	BandWidth [MHz]	Modulation	Mode	Conducted Power		ERP	
						Max. Power [dBm]	Max. Power [W]	Max. Power [dBm]	Max. Power [W]
n5	A	834.00 - 839.00	20	DFT-s OFDM	$\pi/2$ BPSK	24.18	0.262		
					QPSK	24.14	0.259	18.54	0.071
					16QAM	23.18	0.208	17.59	0.057
					64QAM	21.63	0.146		
					256QAM	19.45	0.088		
				CP-OFDM	QPSK	22.68	0.185		
					16QAM	22.16	0.164		
					64QAM	20.59	0.115		
					256QAM	17.51	0.056		
		831.50 - 841.50	15	DFT-s OFDM	$\pi/2$ BPSK	24.15	0.260		
					QPSK	24.17	0.261	18.68	0.074
					16QAM	23.20	0.209	17.63	0.058
					64QAM	21.62	0.145		
					256QAM	19.57	0.091		
				CP-OFDM	QPSK	22.69	0.186		
		829.00 - 844.00	10	DFT-s OFDM	$\pi/2$ BPSK	24.15	0.260		
					QPSK	24.18	0.262	18.37	0.069
					16QAM	23.19	0.208	17.49	0.056
					64QAM	21.70	0.148		
					256QAM	19.46	0.088		
				CP-OFDM	QPSK	22.67	0.185		
		826.50 - 846.50	5	DFT-s OFDM	$\pi/2$ BPSK	24.14	0.259		
					QPSK	24.20	0.263	18.27	0.067
					16QAM	23.18	0.208	17.35	0.054
					64QAM	21.46	0.140		
					256QAM	19.44	0.088		
				CP-OFDM	QPSK	22.52	0.179		
n5	E	834.00 - 839.00	20	DFT-s OFDM	$\pi/2$ BPSK	24.05	0.254		
					QPSK	24.12	0.258	22.14	0.164
					16QAM	23.14	0.206	21.19	0.132
					64QAM	21.58	0.144		
					256QAM	19.38	0.087		
				CP-OFDM	QPSK	22.51	0.178		
					16QAM	22.03	0.160		
					64QAM	20.41	0.110		
					256QAM	17.31	0.054		
		831.50 - 841.50	15	DFT-s OFDM	$\pi/2$ BPSK	24.14	0.259		
					QPSK	24.11	0.258	22.22	0.167
					16QAM	23.17	0.207	21.22	0.132
					64QAM	21.45	0.140		
					256QAM	19.39	0.087		
				CP-OFDM	QPSK	22.66	0.185		
		829.00 - 844.00	10	DFT-s OFDM	$\pi/2$ BPSK	24.09	0.256		
					QPSK	24.07	0.255	21.99	0.158
					16QAM	23.19	0.208	21.08	0.128
					64QAM	21.45	0.140		
					256QAM	19.34	0.086		
				CP-OFDM	QPSK	22.64	0.184		
		826.50 - 846.50	5	DFT-s OFDM	$\pi/2$ BPSK	24.10	0.257		
					QPSK	24.20	0.263	21.83	0.152
					16QAM	23.20	0.209	20.93	0.124
					64QAM	21.43	0.139		
					256QAM	19.39	0.087		
				CP-OFDM	QPSK	22.55	0.180		

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)
LTE Band 5 / NR Band n5 824 - 849 MHz	A	-3.9
	E	-2.8

5.4. WORST-CASE ORIENTATION

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

- **LTE Band**
The worst-case scenario for all measurements is based on the average conducted output power measurement investigation results. Output power measurements were measured on QPSK, 16QAM and 64QAM modulations. It was found QPSK and 16QAM results were worst case.
- As for the Antenna Switching supported ASDIV (Antenna Switching Diversity) conditions. ASDIV can be implemented through the application provided by the manufacturer.

Band	Antenna Switching
LTE B5	ASDIV

- The RF port of LTE B5 was tested on all antennas and reported as 'Main ANT' because the test power of 'Main ANT' is same to or higher than 'Sub ANT'.
- So the test case is as below.

Band	Main ANT	Tune up Limit (dBm)	Sub ANT	Tune up Limit (dBm)
LTE B5	<u>A</u>	<u>25.5</u>	E	25.5

Test Item	Test case antenna & port
Conducted output power	All
RF port test	All (Worst case reported)
ERP	All
Radiated Spurious Emissions	All

- NR Band n5

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

This device supports NSA and SA Mode and Worst case reported.

So the test case is as below.

NR Band	NSA	SA
n5	<u>LTE B2/4/66</u>	-

- As for the Antenna Switching supported ASDIV (Antenna Switching Diversity) conditions. ASDIV can be implemented through the application provided by the manufacturer.

Band	Antenna Switching
NR n5	ASDIV

- The RF port of NR n5 was tested on all antennas and reported as Main ANT' because the test power of Main ANT' is same to or higher than "Sub ANT'.

- So the test case is as below.

Band	Main ANT	Tune up Limit (dBm)	Sub ANT	Tune up Limit (dBm)
NR n5	<u>A</u>	<u>24.2</u>	E	24.2

Test Item	Test case antenna & port
Conducted output power	All
RF port test	All (Worst case reported)
ERP	All
Radiated Spurious Emissions	All

● Conducted Spurious Emission

Highest conducted output power setting for each bands						
LTE Band	ANT	Frequency (MHz)	Bandwidth (MHz)	Modulation	RB size	RB offset
5	A	829.00	10	QPSK	1	25
		836.50			1	25
		844.00			1	49
NR Band	ANT	Frequency (MHz)	Bandwidth (MHz)	Modulation	RB size	RB offset
5	A	826.50	5	DFT-s OFDM QPSK	1	1
		836.50			1	1
		846.50			1	1

● Radiated Spurious Emission

Highest ERP setting for each bands						
LTE Band	ANT	Frequency (MHz)	Bandwidth (MHz)	Modulation	RB size	RB offset
5	A	829.00	10	QPSK	1	25
		836.50			1	25
		844.00			1	49
	E	829.00	10	QPSK	1	25
		836.50			1	0
		844.00			1	49
NR Band	ANT	Frequency (MHz)	Bandwidth (MHz)	Modulation	RB size	RB offset
5	A	831.50	15	DFT-s OFDM QPSK	1	1
		836.50			1	1
		841.50			1	1
	E	831.50	15	DFT-s OFDM QPSK	1	1
		836.50			1	1
		841.50			1	1

Note1 : for radiated emission testing, EN-DC and ULCA mode were investigated in simultaneous mode. There was no discernible difference in the spurious emission levels when using different LTE and FR1 anchor bands

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	ERP			RSE		
		X	Y	Z	X	Y	Z
LTE B5	A	-	-	O	-	-	O
	E	-	-	O	-	-	O
NR n5	A	-	-	O	-	O	-
	E	-	-	O	-	-	O

Note1 : 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-T2510	N/A	N/A
Data Cable	SAMSUNG	EP-DN980	N/A	N/A

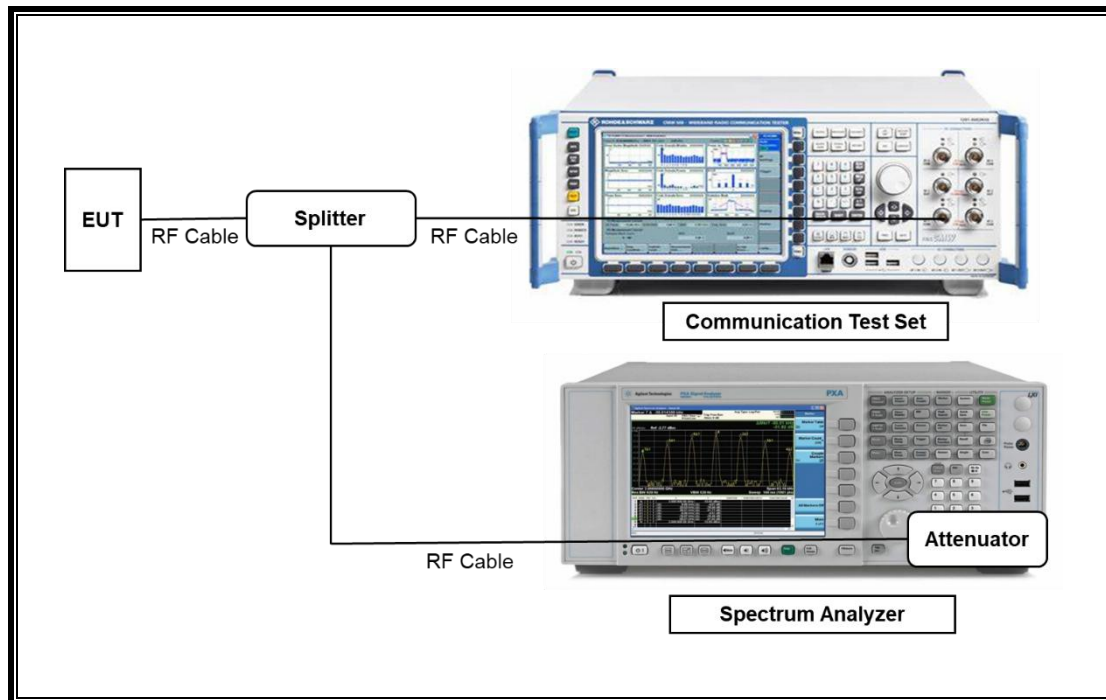
I/O CABLE

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

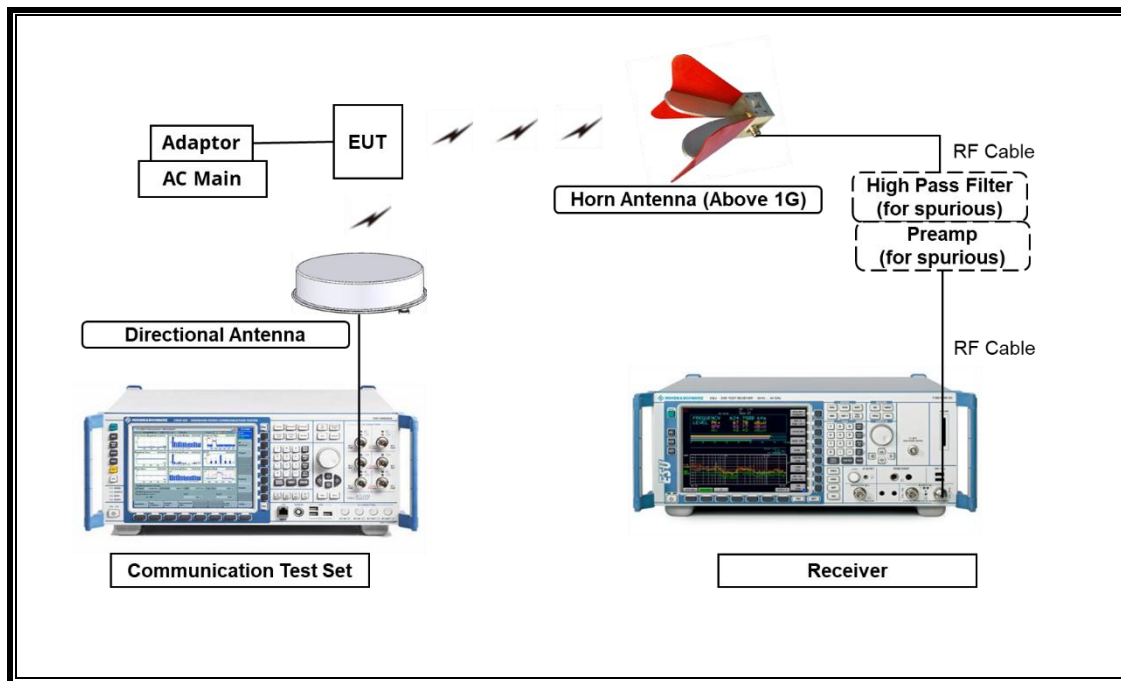
TEST SETUP

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

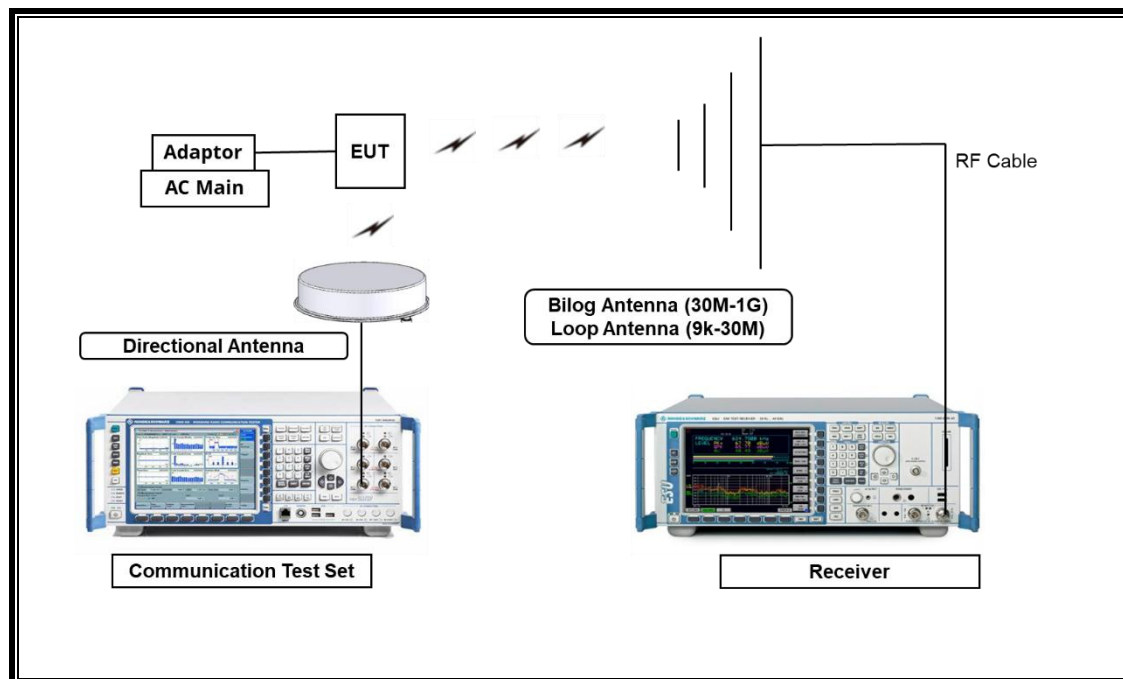
SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)



SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP) Above 1G



SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP) Below 1G



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 DB-4	00164753	2027-01-08
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	2026-07-23
Antenna, Horn, 40 GHz	ETS	3116C	00168645	2027-07-23
Preamplifier	ETS	3116C-PA	00168841	2026-07-28
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB 9163	750	2026-07-30
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB 9163	845	2026-07-30
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB 9163	749	2026-08-12
Antenna, Horn, 18 GHz	ETS	3115	00167211	2026-07-17
Antenna, Horn, 18 GHz	ETS	3115	00161451	2026-07-17
Antenna, Horn, 18 GHz	ETS	3117	00168724	2026-07-17
Antenna, Horn, 18 GHz	ETS	3117	00168717	2026-07-17
Communications Test Set	R&S	CMW500	169797	2026-07-21
DC Power Supply	KIKUSUI	PWR2001ML	AX001947	2026-07-23
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029169	2026-07-21
Preamplifier, 18 GHz	B&Z Technologies, LLC	BZR-01001800-231040-182020	28451	2026-07-21
Preamplifier, 18 GHz	B&Z Technologies, LLC	BZR-01001800-231040-181515	23576	2026-07-22
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	2026-07-21
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	2026-01-02
Spectrum Analyzer, 44 GHz	KEYSIGHT	N9030B	MY57143717	2026-07-21
EMI Test Receive, 40 GHz	R&S	ESU40	100439	2026-07-21
EMI Test Receive, 40 GHz	R&S	ESU40	100457	2026-07-21
High Pass Filter 1.2GHz	Micro-Tronics	HPM50108-02	G005	2026-07-23
High Pass Filter 1.2GHz	Micro-Tronics	HPM50108-02	G006	2026-07-23
Attenuator	PASTERNAK	PE7087-10	A009	2026-07-22
Attenuator	PASTERNAK	PE7087-10	A001	2026-07-22
Attenuator	PASTERNAK	PE7087-10	A008	2026-07-22
Attenuator	PASTERNAK	PE7004-10	2	2026-07-22
Attenuator	PASTERNAK	PE7395-10	A011	2026-07-22
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2E	100900	2027-07-24
Temperature Chamber	ESPEC	SH-642	93001109	2026-07-21
Power Splitter	MINI-CIRCUITS	WA1534	UL003	2026-01-03
Power Splitter	MINI-CIRCUITS	WA1534	UL004	2026-01-03
UXM 5G Wireless Test Platform	KEYSIGHT	E7515B	MY57510655	2026-01-03
Notch Filter	MICRO-TRONICS	BRC50705-02	G024	2026-07-23
Notch Filter	MICRO-TRONICS	BRM50702-02	G036	2026-07-23
Notch Filter	MICRO-TRONICS	BRM50707-02	G002	2026-07-23
Notch Filter	MICRO-TRONICS	BRM50709-02	G001	2026-07-23
Notch Filter	MICRO-TRONICS	BRM50713-02	G001	2026-07-23
Notch Filter	MICRO-TRONICS	BRM50716-2	006	2026-07-23
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	Complies
2.1049	Occupied Bandwidth (99%)	N/A		Complies
22.917(a)	Conducted Band Edge / Conducted Spurious Emission	-13 dBm		Complies
22.355	Frequency Stability	2.5 ppm		Complies
22.913(a)(5)	Effective Radiated Power	38.5 dBm	Radiated	Complies
22.917(a)	Radiated Spurious Emission	-13 dBm		Complies

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 either CMW500 Test Set or E7515B Test set and configured to operate at maximum power.

NOTE1

LTE, 5G NR : Conducted output power has been verified across Low, Mid, and High channels for each resource block configuration. Compliance of MPR (Maximum Power Reduction) and Tune-up limits has also been confirmed. Therefore, representative measurements at 1 RB and Full RB configurations are reported for each channel.

NOTE2

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

RESULTS

See the following pages.

8.1.1. CONDUCTED AVERAGE OUTPUT POWER

LTE Band 5 (ANT A)

BW (MHz)	Mode	RB Allocation	RB offset	20450	20525	20600
				829.00 MHz	836.50 MHz	844.00 MHz
10 MHz	QPSK	1	0	23.99	24.92	24.49
		1	25	24.83	24.97	24.58
		1	49	24.79	24.59	24.65
		50	0	23.60	23.25	23.65
	16QAM	1	0	23.39	23.76	24.11
		1	25	23.87	23.96	23.68
		1	49	23.64	23.95	23.94
		50	0	22.80	22.15	22.64
	64QAM	1	0	22.87	23.58	23.95
		1	25	23.77	23.81	23.70
		1	49	23.61	23.89	23.56
		50	0	21.76	22.15	21.73
BW (MHz)	Mode	RB Allocation	RB offset	20425	20525	20625
				826.50 MHz	836.50 MHz	846.50 MHz
5 MHz	QPSK	1	0	24.01	24.59	24.53
		1	12	23.94	24.60	24.39
		1	24	24.05	24.62	24.30
		25	0	23.70	23.14	23.56
	16QAM	1	0	23.67	24.16	23.81
		1	12	23.48	24.16	23.61
		1	24	23.19	24.16	23.64
		25	0	22.64	22.97	22.54
	64QAM	1	0	23.59	23.46	23.51
		1	12	22.91	24.00	23.54
		1	24	23.37	24.17	23.45
		25	0	22.59	21.99	22.63

BW (MHz)	Mode	RB Allocation	RB offset	20415	20525	20635
				825.50 MHz	836.50 MHz	847.50 MHz
3 MHz	QPSK	1	0	23.98	24.46	24.42
		1	8	24.05	24.61	24.39
		1	14	23.62	24.53	24.55
		15	0	23.35	23.59	23.50
	16QAM	1	0	22.62	23.84	23.49
		1	8	23.29	23.99	23.97
		1	14	22.79	23.76	24.26
		15	0	22.58	22.68	22.60
	64QAM	1	0	22.40	23.96	23.65
		1	8	23.18	23.72	24.04
		1	14	22.85	23.69	23.50
		15	0	22.52	22.52	22.57
BW (MHz)	Mode	RB Allocation	RB offset	20407	20525	20643
				824.70 MHz	836.50 MHz	848.30 MHz
1.4 MHz	QPSK	1	0	23.93	24.46	24.10
		1	3	23.91	24.58	24.40
		1	5	23.78	24.52	24.41
		6	0	23.08	23.58	23.49
	16QAM	1	0	23.26	24.10	23.76
		1	3	23.05	24.17	23.35
		1	5	23.08	24.04	22.97
		6	0	22.34	22.71	22.60
	64QAM	1	0	22.46	22.73	22.86
		1	3	22.30	22.92	22.38
		1	5	22.31	22.80	22.59
		6	0	21.49	21.75	21.48

LTE Band 5 (ANT E)

BW (MHz)	Mode	RB Allocation	RB offset	20450	20525	20600
				829.00 MHz	836.50 MHz	844.00 MHz
10 MHz	QPSK	1	0	23.43	23.35	23.31
		1	25	23.57	23.30	23.36
		1	49	23.26	23.30	23.41
		50	0	22.59	22.44	22.41
	16QAM	1	0	22.27	22.74	22.65
		1	25	22.73	22.67	23.06
		1	49	23.18	22.37	22.70
		50	0	21.58	21.35	21.48
	64QAM	1	0	22.46	22.86	22.40
		1	25	23.03	22.40	22.78
		1	49	22.75	22.34	22.46
		50	0	21.60	21.49	21.49
BW (MHz)	Mode	RB Allocation	RB offset	20425	20525	20625
				826.50 MHz	836.50 MHz	846.50 MHz
5 MHz	QPSK	1	0	23.49	23.57	23.50
		1	12	23.69	23.91	23.50
		1	24	23.54	23.35	23.24
		25	0	22.46	22.45	22.33
	16QAM	1	0	22.74	22.53	22.36
		1	12	23.29	22.93	22.62
		1	24	22.60	23.40	22.68
		25	0	21.53	21.49	21.42
	64QAM	1	0	22.36	22.39	22.64
		1	12	22.52	22.46	22.22
		1	24	22.39	22.63	22.21
		25	0	21.65	21.43	21.73

BW (MHz)	Mode	RB Allocation	RB offset	20415	20525	20635
				825.50 MHz	836.50 MHz	847.50 MHz
3 MHz	QPSK	1	0	23.45	23.33	23.25
		1	8	23.26	23.39	23.36
		1	14	23.59	23.28	23.46
		15	0	22.54	22.42	22.28
	16QAM	1	0	22.80	22.99	22.65
		1	8	22.99	22.81	22.96
		1	14	22.94	22.95	23.13
		15	0	21.43	21.43	21.36
	64QAM	1	0	22.43	22.49	22.64
		1	8	22.49	22.91	22.49
		1	14	22.25	22.63	22.74
		15	0	21.61	21.45	21.45
BW (MHz)	Mode	RB Allocation	RB offset	20407	20525	20643
				824.70 MHz	836.50 MHz	848.30 MHz
1.4 MHz	QPSK	1	0	23.31	23.43	23.54
		1	3	23.36	23.45	23.50
		1	5	23.39	23.37	23.18
		6	0	22.51	22.33	22.37
	16QAM	1	0	22.61	22.84	22.31
		1	3	22.49	22.36	22.94
		1	5	22.70	22.35	22.59
		6	0	21.59	21.49	21.49
	64QAM	1	0	21.45	22.32	21.48
		1	3	21.95	21.99	21.62
		1	5	22.12	21.44	21.67
		6	0	20.57	20.35	20.54

NR Band n5 (ANT A)

BW (MHz)	Modulation	Mode	RB Allocation	RB offset	166800	167300	167800
					834.00 MHz	836.50 MHz	839.00 MHz
20 MHz	DFT-s-OFDM	$\pi/2$ BPSK	1	0	22.85	22.63	22.75
			1	1	24.18	24.16	24.10
			1	52	24.08	23.99	23.91
			1	104	23.77	23.90	23.77
			1	105	23.15	22.91	23.11
			100	0	23.15	23.16	23.11
		QPSK	1	0	22.89	22.61	22.78
			1	1	24.10	24.14	24.11
			1	52	24.07	24.03	23.97
			1	104	23.82	23.87	23.89
			1	105	23.01	22.95	22.98
			100	0	23.17	23.18	23.12
		16QAM	1	0	21.72	21.62	21.68
			1	1	23.18	23.18	23.13
			1	52	23.11	23.09	23.01
			1	104	22.85	22.90	22.85
			1	105	22.03	21.80	22.01
			100	0	21.82	21.79	21.95
		64QAM	1	1	21.60	21.63	21.58
		256QAM	1	1	19.45	19.31	19.25
	CP-OFDM	QPSK	1	0	20.57	20.82	20.62
			1	1	22.11	22.21	22.24
			1	52	22.17	22.17	22.31
			1	104	22.68	22.68	22.32
			1	105	21.17	21.11	20.94
			106	0	21.04	21.17	21.02
		16QAM	1	0	20.81	21.07	20.99
			1	1	21.77	22.03	21.78
			1	52	22.06	22.16	22.05
			1	104	22.14	22.13	21.64
			1	105	21.16	21.17	20.81
			106	0	20.91	21.02	20.97
		64QAM	1	1	20.59	20.57	20.42
		256QAM	1	1	17.51	17.46	17.29
BW (MHz)	Modulation	Mode	RB Allocation	RB offset	166300	167300	168300
					831.50 MHz	836.50 MHz	841.50 MHz
15 MHz	DFT-s-OFDM	$\pi/2$ BPSK	1	0	22.88	22.59	22.71
			1	1	24.13	24.13	24.15
			1	39	24.06	24.04	23.90
			1	76	24.00	23.90	23.92
			1	77	23.14	22.88	23.07
			75	0	23.22	23.20	23.02
		QPSK	1	0	22.82	22.63	22.75
			1	1	24.17	24.15	24.12
			1	39	24.12	24.02	23.88
			1	76	24.05	23.87	23.92
			1	77	21.15	21.08	20.93
			75	0	23.12	23.12	23.01
		16QAM	1	1	23.19	23.20	23.04
			1	39	23.10	23.04	22.94
			1	76	23.06	22.88	22.89
		64QAM	1	1	21.62	21.57	21.50
		256QAM	1	1	19.57	19.38	19.22
	CP-OFDM	QPSK	1	1	22.65	22.66	22.69

BW (MHz)	Modulation	Mode	RB Allocation	RB offset	165800	167300	168800
					829.00 MHz	836.50 MHz	844.00 MHz
10 MHz	DFT-s-OFDM	$\pi/2$ BPSK	1	0	22.88	22.65	22.71
			1	1	24.12	24.06	23.83
			1	26	24.15	24.05	23.87
			1	49	24.10	23.84	23.85
			1	50	23.19	22.91	23.05
			50	0	23.27	23.10	22.99
		QPSK	1	0	22.79	22.59	22.76
			1	1	24.17	24.09	23.84
			1	26	24.18	24.01	23.80
			1	49	24.09	23.87	23.88
			1	50	21.13	21.14	21.01
			50	0	23.18	23.09	22.99
		16QAM	1	1	23.13	23.11	22.97
			1	26	23.19	22.98	22.85
			1	49	23.14	22.91	22.85
		64QAM	1	1	21.70	21.56	21.31
		256QAM	1	1	19.46	19.28	19.00
	CP-OFDM	QPSK	1	1	22.62	22.67	22.54
BW (MHz)	Modulation	Mode	RB Allocation	RB offset	165300	167300	169300
					826.50 MHz	836.50 MHz	846.50 MHz
5 MHz	DFT-s-OFDM	$\pi/2$ BPSK	1	0	22.85	22.63	22.69
			1	1	23.90	23.99	23.99
			1	13	24.14	23.85	23.92
			1	23	23.83	23.84	23.63
			1	24	23.15	22.96	23.01
			25	0	22.10	21.89	22.02
		QPSK	1	0	23.19	23.08	22.95
			1	1	24.20	23.90	24.03
			1	13	24.09	23.86	23.94
			1	23	24.07	23.87	23.99
			1	24	21.07	21.13	20.98
			25	0	23.13	22.97	23.06
		16QAM	1	1	23.18	22.94	23.08
			1	13	23.09	22.88	22.97
			1	23	23.15	22.88	22.99
		64QAM	1	1	21.46	21.27	21.32
		256QAM	1	1	19.44	19.12	19.21
	CP-OFDM	QPSK	1	1	22.30	22.52	22.51

NR Band n5 (ANT E)

BW (MHz)	Modulation	Mode	RB Allocation	RB offset	166800	167300	167800
					834.00 MHz	836.50 MHz	839.00 MHz
20 MHz	DFT-s-OFDM	$\pi/2$ BPSK	1	0	22.86	22.71	22.77
			1	1	23.84	24.05	24.05
			1	52	23.85	23.91	23.88
			1	104	23.85	23.86	23.89
			1	105	22.81	22.86	22.93
			100	0	23.00	22.98	23.02
		QPSK	1	0	22.87	22.78	22.74
			1	1	24.10	24.12	24.03
			1	52	23.88	23.87	23.87
			1	104	23.79	23.84	23.91
			1	105	22.86	22.84	22.95
			100	0	22.97	22.98	23.00
		16QAM	1	0	21.66	21.68	21.52
			1	1	23.14	23.12	23.02
			1	52	22.88	22.96	22.98
			1	104	22.84	22.79	22.91
			1	105	21.73	21.75	21.84
			100	0	21.68	21.61	21.78
		64QAM	1	1	21.51	21.58	21.41
		256QAM	1	1	19.38	19.29	19.21
	CP-OFDM	QPSK	1	0	20.53	20.71	20.68
			1	1	22.20	22.43	22.51
			1	52	22.15	22.19	22.18
			1	104	22.31	22.35	22.41
			1	105	20.87	20.91	20.83
			106	0	20.85	20.86	20.79
		16QAM	1	0	20.81	21.10	21.03
			1	1	21.74	21.44	21.61
			1	52	21.77	21.39	21.55
			1	104	22.03	21.69	21.68
			1	105	21.15	21.07	21.11
			106	0	20.71	20.63	20.68
		64QAM	1	1	20.33	20.39	20.41
		256QAM	1	1	17.23	17.26	17.31
BW (MHz)	Modulation	Mode	RB Allocation	RB offset	166300	167300	168300
					831.50 MHz	836.50 MHz	841.50 MHz
15 MHz	DFT-s-OFDM	$\pi/2$ BPSK	1	0	22.81	22.63	22.75
			1	1	24.14	24.10	23.94
			1	39	23.93	23.89	23.81
			1	76	23.89	23.85	23.88
			1	77	22.76	22.61	22.72
			75	0	23.01	22.98	22.99
		QPSK	1	0	22.79	22.65	22.73
			1	1	24.11	24.09	23.98
			1	39	23.94	23.84	23.78
			1	76	23.89	23.83	23.87
			1	77	22.71	22.68	22.79
			75	0	23.02	22.99	22.98
		16QAM	1	1	23.17	23.10	22.92
			1	39	22.92	22.88	22.87
			1	76	22.96	22.91	22.81
		64QAM	1	1	21.45	21.45	21.31
		256QAM	1	1	19.39	19.30	19.21
	CP-OFDM	QPSK	1	1	22.66	22.56	22.53

BW (MHz)	Modulation	Mode	RB Allocation	RB offset	165800	167300	168800
					829.00 MHz	836.50 MHz	844.00 MHz
10 MHz	DFT-s-OFDM	$\pi/2$ BPSK	1	0	22.77	22.65	22.82
			1	1	24.09	24.02	23.78
			1	26	24.06	23.87	23.78
			1	49	24.00	23.79	23.81
			1	50	22.79	22.81	22.85
			50	0	23.10	22.99	22.89
		QPSK	1	0	22.79	22.72	22.85
			1	1	24.07	24.03	23.80
			1	26	24.06	23.93	23.82
			1	49	23.97	23.75	23.68
			1	50	22.69	22.75	22.91
			50	0	23.10	23.00	22.89
		16QAM	1	1	23.19	23.01	22.84
			1	26	22.99	22.88	22.85
			1	49	22.96	22.86	22.81
		64QAM	1	1	21.45	21.33	21.18
		256QAM	1	1	19.34	19.16	19.00
	CP-OFDM	QPSK	1	1	22.64	22.54	22.32
BW (MHz)	Modulation	Mode	RB Allocation	RB offset	165300	167300	169300
					826.50 MHz	836.50 MHz	846.50 MHz
5 MHz	DFT-s-OFDM	$\pi/2$ BPSK	1	0	22.76	22.68	22.91
			1	1	24.10	24.04	23.88
			1	13	23.95	23.85	23.83
			1	23	23.82	23.88	23.96
			1	24	22.82	22.79	22.95
			25	0	23.19	22.98	22.94
		QPSK	1	0	22.79	22.71	22.89
			1	1	24.20	24.03	23.91
			1	13	24.10	23.89	23.81
			1	23	23.84	23.88	23.87
			1	24	22.75	22.68	22.84
			25	0	23.14	22.97	22.94
		16QAM	1	1	23.20	23.08	22.95
			1	13	23.10	22.94	22.81
			1	23	22.81	22.95	22.95
		64QAM	1	1	21.43	21.38	21.27
		256QAM	1	1	19.39	19.26	19.12
	CP-OFDM	QPSK	1	1	22.55	22.53	22.43

8.2. PEAK TO AVERAGE RATIO

Test Procedure

Per KDB 971168 D01 Power Meas License Digital Systems v03r01;

The transmitter output was connected to either CMW500 Test Set or E7515B Test set and configured to operate at maximum power. The PAR were measured on the Spectrum Analyzer.

Test Spec

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

NOTE

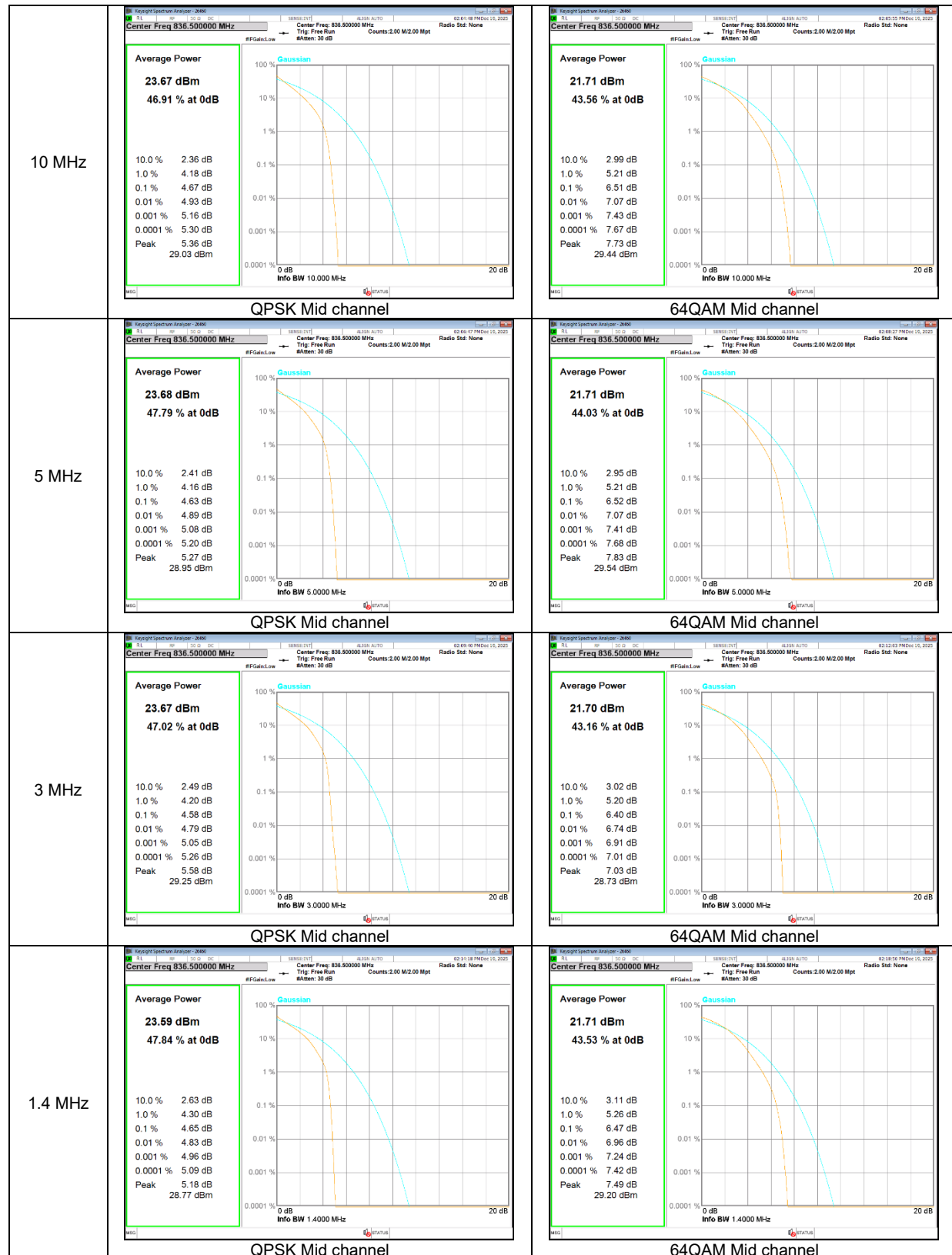
LTE: All modulations were investigated, and the worst modulations (QPSK, 64QAM) are reported.
5G NR: All Waveforms (CP-OFDM vs DFT-s_OFDM) and modulations ($\pi/2$ BPSK, QPSK, 16QAM, 64QAM, 256QAM) were investigated to determine the worst case configuration. All modes of operation were investigated and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

RESULTS

See the following pages.

8.2.1. CONDUCTED PEAK TO AVERAGE RESULT

LTE Band 5 (ANT A)



NR Band n5 CP-OFDM (ANT A)



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.

- LTE Band 5 (ANT A)

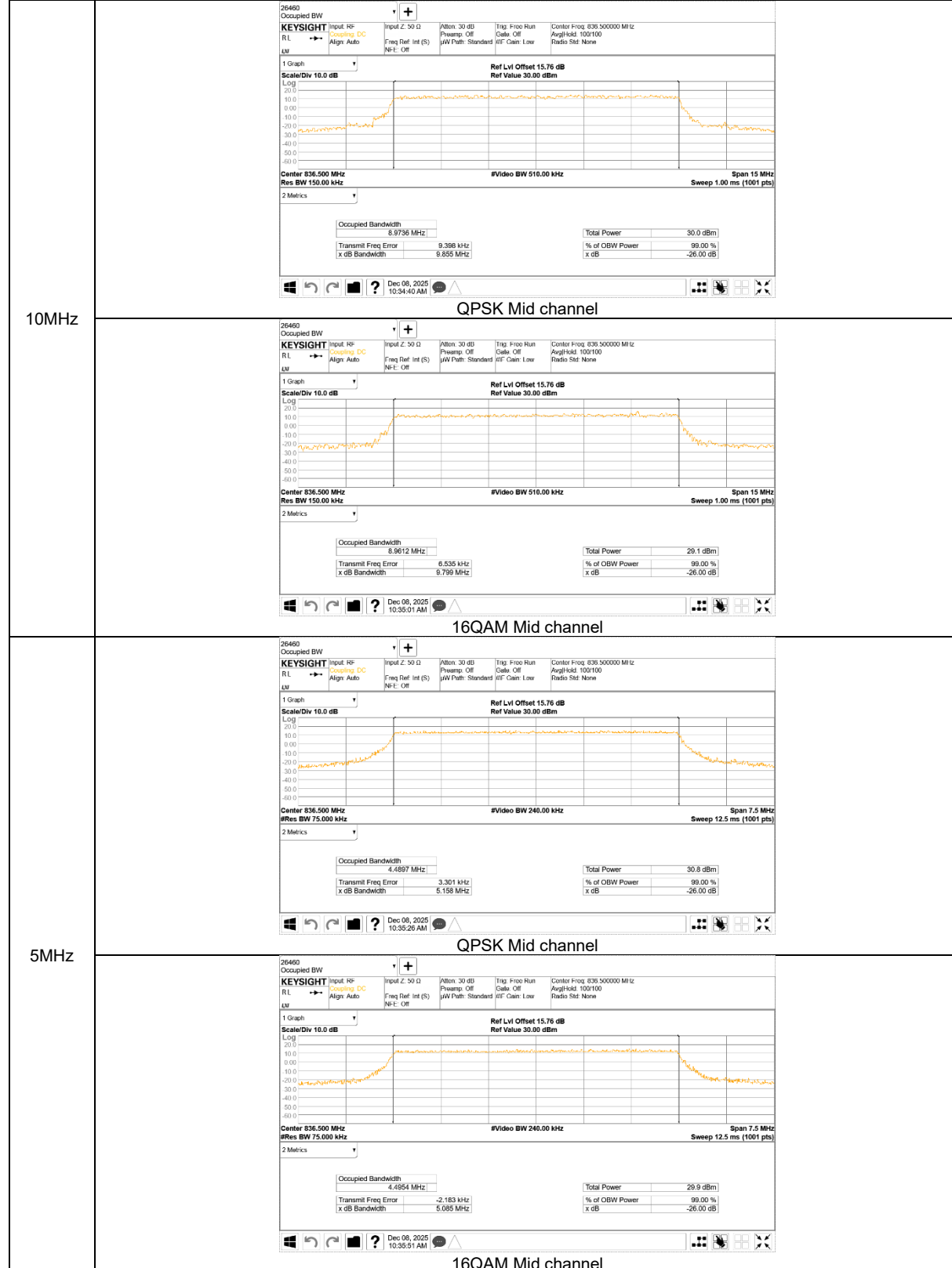
Band	BW	Modulation	f [MHz]	99% BW (MHz)	-26dB BW (MHz)
LTE B5	10M	QPSK	836.50	8.974	9.855
		16QAM		8.961	9.799
	5M	QPSK		4.490	5.158
		16QAM		4.495	5.085
	3M	QPSK		2.698	3.017
		16QAM		2.693	3.002
	1.4M	QPSK		1.089	1.340
		16QAM		1.095	1.477

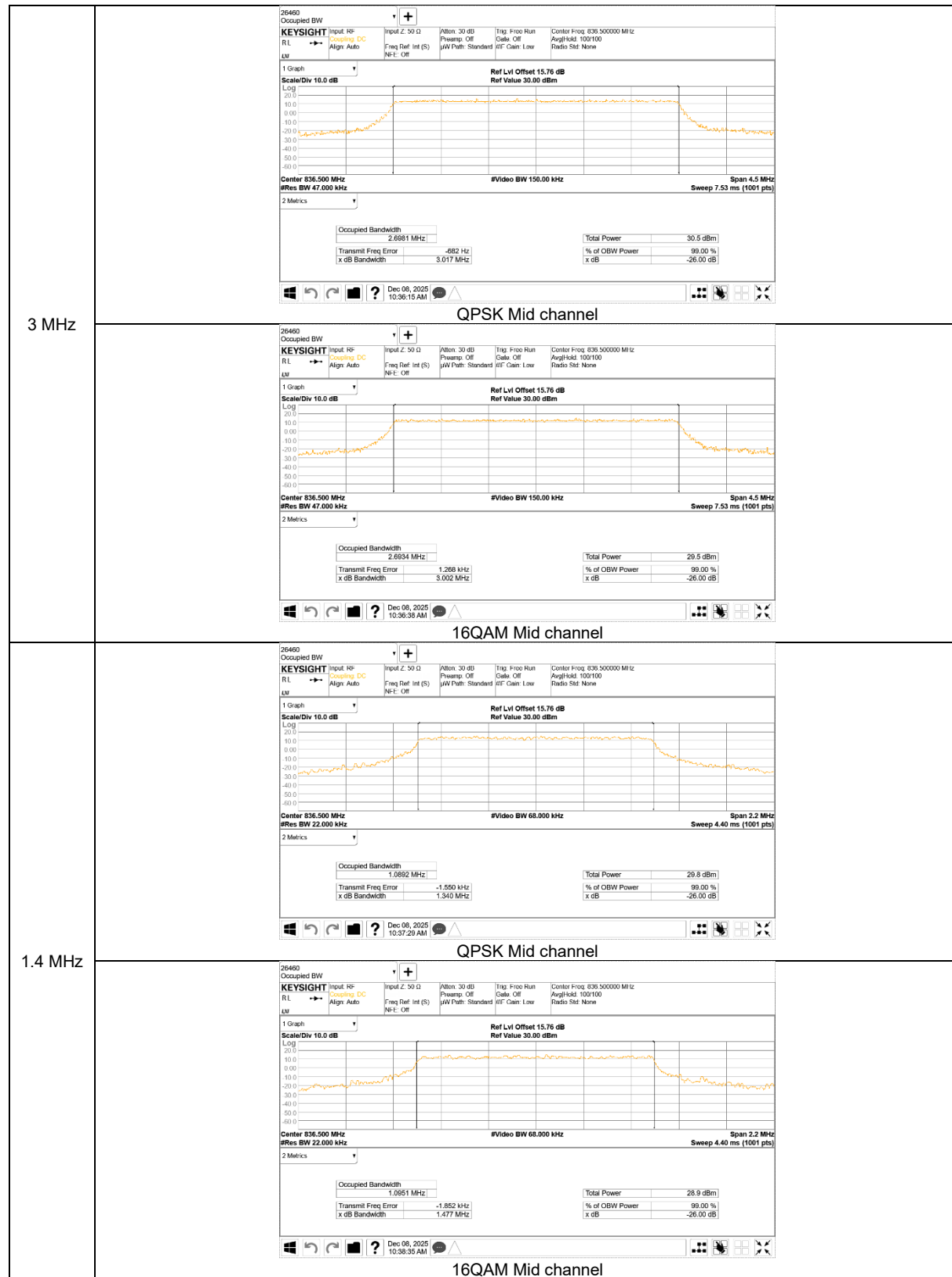
- NR Band n5 CP-OFDM (ANT A)

Band	BW	Modulation	f [MHz]	99% BW (MHz)	-26dB BW (MHz)
NR n5	20M	QPSK	836.50	18.980	20.060
		16QAM		18.973	20.140
	15M	QPSK		14.109	15.180
		16QAM		14.146	15.050
	10M	QPSK		9.356	10.290
		16QAM		9.324	10.210
	5M	QPSK		4.477	5.288
		16QAM		4.492	5.216

8.3.1. OCCUPIED BANDWIDTH RESULT

LTE Band 5





NR Band n5 CP-OFDM



8.4. BAND EDGE EMISSIONS

RULE PART(S)

FCC: §22.359, §22.917

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 either CMW500 Test Set or E7515B 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.

LTE/5G NR

- a) Set the RBW = 1 - 1.5 % of OBW (Typically limited to a minimum RBW of 1% of the OBW) / within 1 MHz from the edge of the authorized frequency block/band.
- b) Set the RBW = 100 kHz / above 1MHz from the edge of the authorized frequency block/band (Part 22 bands)
- c) Set VBW $\geq 3 \times$ RBW;
- d) Set span $\geq 2 \times$ OBW;
- e) Sweep time = Auto;
- f) Detector = RMS;
- g) Ensure that the number of measurement points $\geq 2 \times$ span/RBW;
- h) 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 addtional 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

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

RESULTS

See the following pages.

8.4.1. BAND EDGE RESULT

LTE Band 5 (ANT A)

