



FCC 47 CFR PART 02
FCC 47 CFR PART 22
FCC 47 CFR PART 24
FCC 47 CFR PART 27
ISED RSS- 130 issue 2
ISED RSS- 132 issue 3
ISED RSS- 133 issue 6
ISED RSS- 139 issue 3

CERTIFICATION TEST REPORT

For

Harman TAG2.0 OBD II device

MODEL NUMBER: HSA-20UG-BA

**FCC ID: 2AHPN-HSA-20UG-BA
IC: 6434C-HSA20UGBA**

REPORT NUMBER: 4789869259-5

ISSUE DATE: June 28, 2021

Prepared for

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Prepared by

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Revision History

Rev.	Issue Date	Revisions	Revised By
--	6/28/2021	Initial Issue	

Note:

1. This test report is only published to and used by the applicant, and it is not for evidence purpose in China.
2. The measurement result for the sample received is <Pass> according to < CFR 47 FCC PART 22,24,27>< ISED RSS-130, RSS-132, RSS-133, RSS-139 > when <Accuracy Method> decision rule is applied.



Summary of Test Results			
Standard(s) Section	Description	Requirements	Result
§22.913(a)	Effective (Isotropic) Radiated Power of Transmitter	ERP $\leq$ 7 W	PASS
RSS-132(5.4)	Effective(Isotropic) Radiated Power of Transmitter	ERP $<$ 11.5 W	PASS
§24.232(c) §27.50(h) RSS-133(6.4)	Effective (Isotropic) Radiated Power of Transmitter	EIRP $\leq$ 2 W	PASS
§27.50(d) RSS-139(6.5)	Effective (Isotropic) Radiated Power of Transmitter	EIRP $\leq$ 1 W	PASS
§27.50(b) §27.50(c) RSS-130(4.6)	Effective (Isotropic) Radiated Power of Transmitter	ERP $\leq$ 3 W	PASS
§24.232(d) §27.50(a) §27.50(c) §27.50(d) RSS-130(4.6) RSS-132(5.4) RSS-133(6.4) RSS-139(6.5)	Peak to Average Radio	$\leq$ 13dB	PASS
§2.1049 RSS-GEN(6.7) RSS-130(3.3) RSS-132(3.1) RSS-133(3.1) RSS-139(3.1)	Occupied Bandwidth	OBW: No limit EBW: No limit	PASS
§2.1051, §22.917(a) §24.238(a) §27.53(g) §27.53(h) RSS-130(4.7) RSS-132(5.5) RSS-133(6.5) RSS-139(6.6)	Band Edge Compliance	$\leq 43 + 10\log_{10}(P[W])/1\% \cdot \text{EBW}$, in 1 MHz bands immediately outside and adjacent to the frequency block.	PASS
§2.1051 §22.901 §22.917(a) §24.238(a) §27.53(g) §27.53(h) RSS-130(4.7) RSS-132(5.5) RSS-133(6.5)	Spurious Emission at Antenna Terminal	$\leq 43 + 10\log_{10}(P[W])/100$ kHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges.	PASS



RSS-139(6.6)			
§2.1053, §22.917, §24.238(a), §27.53(h) RSS-130(4.7) RSS-132(5.5) RSS-133(6.5) RSS-139(6.6)	Radiated Spurious Emissions	$\leq 43+10\log_{10}(P[W])$	PASS
§2.1055 §22.355 §24.235 §27.54 RSS-130(4.5) RSS-132(5.3) RSS-133(6.3) RSS-139(6.4)	Frequency Stability	$\leq \pm 2.5\text{ppm}$ (Part 22, 90) Emission must remain in band (Part 24,27)	PASS
		Within Authorized Band	



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1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name: Harman International Industries, Inc.
Address: 30001 , Cabot Drive, Novi, MI 48377, USA

Manufacturer Information

Company Name: Harman International Industries, Inc.
Address: 30001 , Cabot Drive, Novi, MI 48377, USA

EUT Information

EUT Name: Harman TAG2.0 OBD II device
Model: HSA-20UG-BA
Brand: OnStar Link
Sample Received Date: 03/19/2021
Sample Status: Normal
Sample ID: 3752794
Date of Tested: 03/25/2021~ 06/28/2021

APPLICABLE STANDARDS

STANDARD	TEST RESULTS
FCC 47 CFR PART 02	PASS
FCC 47 CFR PART 22 Subpart H	PASS
FCC 47 CFR PART 24 Subpart E	PASS
FCC 47 CFR PART 27 Subpart L	PASS
ISED RSS- 130 issue 2	PASS
ISED RSS- 132 issue 3	PASS
ISED RSS- 133 issue 6	PASS
ISED RSS- 139 issue 3	PASS

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.26-2015 & KDB971168, FCC CFR 47 Part 2, Part 22, Part 24, Part 27, ISSED RSS-132, RSS-133, RSS-139.

3. FACILITIES AND ACCREDITATIO

Accreditation Certificate	A2LA (Certificate No.: 4102.01) UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been assessed and proved to be in compliance with A2LA. FCC (FCC Designation No.: CN1187) UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. Has been recognized to perform compliance testing on equipment subject to the Commission's Declaration of Conformity (DoC) and Certification rules ISED (Company No.: 21320) UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been registered and fully described in a report filed with ISED. The Company Number is 21320. VCCI (Registration No.: G-20019, R-20004, C-20012 and T-20011) UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been assessed and proved to be in compliance with VCCI, the Membership No. is 3793. <u>Facility Name:</u> Chamber D, the VCCI registration No. is G-20019 and R-20004 Shielding Room B , the VCCI registration No. is C-20012 and T-20011
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Note 1: All tests measurement facilities use to collect the measurement data are located at Building 10, Innovation Technology Park, Song Shan Lake Hi tech Development Zone, Dongguan, 523808, China

Note 2: The test anechoic chamber in UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch had been calibrated and compared to the open field sites and the test anechoic chamber is shown to be equivalent to or worst case from the open field site.



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 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Test Item	Uncertainty
Uncertainty for Conduction emission test	3.32dB (150KHz-30MHz)
	3.72dB (9KHz-150KHz)
Uncertainty for Radiation Emission test (include Fundamental emission) (30MHz-1GHz)	4.70 dB (Antenna Polarize: V)
	4.84 dB (Antenna Polarize: H)
Uncertainty for Radiation Emission test (1GHz to 26GHz) (include Fundamental emission)	4.10dB(1-6GHz)
	4.40dB (6GHz-18Gz)
	3.54dB (18GHz-26Gz)
Bandwidth	1.1%
Stop Transmitting Time Test	0.6%
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	



5. EQUIPMENT UNDER TEST

5.1 DESCRIPTION OF EUT

EUT Name	Harman TAG2.0 OBD II device				
Model	HSA-20UG-BA				
Rated Input	DC 12 V				
Supply Voltage	☐ AC mains State				
	☒ DC State	☐ Internal Power Supply			
		☒ External Power Supply or AC/DC adapter	Rate Input:	DC 12V / 24V	
		☐ Battery	Rate Output:		
Software Version	N75NA_TAG20_R4.0.1				
Hardware Version	V1.0				

5.2 TECHNICAL INFORMATION

E-UTRA Band	Characteristics				
	E-UTRA operating bands		Bandwidth		
	Transmit	Receive			
2	1850 MHz to 1910 MHz	1930 MHz to 1990 MHz	☒ 1.4M ☒ 10M	☒ 3M ☒ 15M	☒ 5M ☒ 20M
4	1710 MHz to 1755 MHz	2110 MHz to 2155 MHz	☒ 1.4M ☒ 10M	☒ 3M ☒ 15M	☒ 5M ☒ 20M
5	824 MHz to 849 MHz	869 MHz to 894 MHz	☒ 1.4M ☒ 10M	☒ 3M	☒ 5M
12	699 MHz -716 MHz	729 MHz -746 MHz	☒ 1.4M ☒ 10M	☒ 3M	☒ 5M
13	777 MHz -787 MHz	746 MHz -756 MHz	☒ 5M	☒ 10M	
66	1710 MHz -1780 MHz	2110-2200 MHz	☒ 1.4M ☒ 10M	☒ 3M ☒ 15M	☒ 5M ☒ 20M

5.3 MAXIMUM OUTPUT POWER

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

LTE Band2

Part 24						
EIRP Limit(W)		2.00				
Antenna Gain (dBi)		-1.00				
Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Average (W)
1.4	QPSK	1850.7	1910.3	22.42	21.42	0.139
	16QAM			21.52	20.52	0.113
3	QPSK	1851.5	1908.5	22.58	21.58	0.144
	16QAM			21.5	20.5	0.112
5	QPSK	1852.5	1907.5	22.51	21.51	0.142
	16QAM			21.68	20.68	0.117
10	QPSK	1855.0	1905.0	22.68	21.68	0.147
	16QAM			21.9	20.9	0.123
15	QPSK	1857.5	1902.5	23.34	22.34	0.171
	16QAM			22.42	21.42	0.139
20	QPSK	1860.0	1900.0	23.4	22.4	0.174
	16QAM			22.55	21.55	0.143

LTE Band4

Part 27						
EIRP Limit(W)		1.00				
Antenna Gain (dBi)		-0.3				
Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Average (W)
1.4	QPSK	1710.7	1754.3	23.62	23.32	0.215
	16QAM			22.61	22.31	0.170
3	QPSK	1711.5	1753.5	23.54	23.24	0.211
	16QAM			22.68	22.38	0.173
5	QPSK	1712.5	1752.5	23.63	23.33	0.215
	16QAM			22.87	22.57	0.181
10	QPSK	1715.0	1750.0	23.78	23.48	0.223
	16QAM			22.88	22.58	0.181
15	QPSK	1717.5	1747.5	23.46	23.16	0.207



	16QAM			22.4	22.1	0.162
20	QPSK	1720.0	1745.0	23.78	23.38	0.223
	16QAM			22.52	22.22	0.167

LTE Band5

Part 22H						
ERP Limit(W)		7.00				
Antenna Gain (dBi)		-0.5				
Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	ERP Average (dBm)	ERP Average (W)
1.4	QPSK	824.7	848.3	22.22	19.17	0.083
	16QAM			21.31	18.26	0.067
3	QPSK	825.5	847.5	22.34	19.29	0.085
	16QAM			21.39	18.34	0.068
5	QPSK	826.5	846.5	22.16	19.11	0.081
	16QAM			21.46	18.41	0.069
10	QPSK	829.0	844.0	22.39	19.34	0.086
	16QAM			21.33	18.28	0.067

LTE Band12

Part 27						
ERP Limit(W)		3.00				
Antenna Gain (dBi)		-2.0				
Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	ERP Average (dBm)	ERP Average (W)
1.4	QPSK	699.7	715.3	22.81	19.76	0.095
	16QAM			21.85	18.8	0.076
3	QPSK	700.5	714.5	22.61	19.56	0.090
	16QAM			21.75	18.7	0.074
5	QPSK	701.5	713.5	22.59	19.54	0.090
	16QAM			21.74	18.69	0.074
10	QPSK	704.0	711.0	22.72	19.67	0.093
	16QAM			21.76	18.71	0.074

**LTE Band13**

Part 27						
ERP Limit(W)		3.00				
Antenna Gain (dBi)		0.30				
Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	ERP Average (dBm)	ERP Average (W)
5	QPSK	779.5	784.5	22.84	19.79	0.095
	16QAM			21.98	18.93	0.078
10	QPSK	782	782	22.86	19.81	0.096
	16QAM			21.79	18.74	0.075

LTE Band66

Part 27						
EIRP Limit(W)		1.00				
Antenna Gain (dBi)		0.10				
Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Average (W)
1.4	QPSK	1710.7	1779.3	22.72	22.82	0.191
	16QAM			21.82	21.92	0.156
3	QPSK	1711.5	1778.5	22.55	22.65	0.184
	16QAM			21.64	21.74	0.149
5	QPSK	1712.5	1777.5	22.5	22.6	0.182
	16QAM			21.63	21.73	0.149
10	QPSK	1715.0	1775.0	22.56	22.66	0.185
	16QAM			21.63	21.73	0.149
15	QPSK	1717.5	1772.5	22.62	22.72	0.187
	16QAM			21.69	21.79	0.151
20	QPSK	1720.0	1770.0	22.66	22.76	0.189
	16QAM			21.86	21.96	0.157

5.4 WORST-CASE CONFIGURATION AND MODE

The EUT supports LTE Bands of:
Band 2, Band 4, Band 5, Band 12, Band 13, Band 66.

During all testing, EUT is in link mode with base station emulator at maximum power level. 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. All testing was performed using QPSK and 16QAM modulations to represent the worst case.

The radiated spurious emissions measurements were carried out in semi-anechoic chamber with 3-meter test range, and EUT was investigated in three orthogonal orientations X, Y and Z. It was determined that Y orientation was the worst-case orientation connected with charger and earphone.

Radiated spurious emissions were investigated below 30MHz, 30MHz-1GHz and above 1GHz. There were no emissions found on below 30MHz. the emissions between 30MHz-1GHz were tested the highest transmitting power channel and the worse configuration.

Worst Case

Test Items	Test configuration			
Description	Modulation	Channel	Bandwidth (MHz)	RB Configuration
Occupied Bandwidth	QPSK, 16QAM	L, M, H	1.4,3,5,10,15,20	Full RB
Band Edge Compliance	QPSK, 16QAM	L, M, H	1.4,3,5,10,15,20	1.RB size=1, RB Location= Low & High 2.RB size =Full RB
Spurious Emission at Antenna Terminal	QPSK, 16QAM	L, M, H	1.4,3,5,10,15,20	RB size=1, RB Location= Low
Radiated Spurious Emissions	QPSK	L, M, H	The Minimum and Maximum BW	RB size=1, RB Location= Low



5.5 TEST ENVIRONMENT

Environment Parameter	Selected Values During Tests	
Relative Humidity	52%	
Atmospheric Pressure:	1025Pa	
Temperature	TN	23.5 °C
Voltage:	VL	9 V
	VN	DC 12 V & 24 V
	VH	36 V
	End Voltage	9 V

Note: VL= Lower Extreme Test Voltage

VN= Nominal Voltage

VH= Upper Extreme Test Voltage

TN= Normal Temperature

**5.6 TEST CHANNEL LIST**

Mode	TX	Low	Middle	High
LTE Band 2	TX (1.4 MHz)	18607	18900	19193
		1850.7	1880	1909.3
	TX (3 MHz)	18615	18900	19185
		1851.5	1880	1908.5
	TX (5 MHz)	18625	18900	19175
		1852.5	1880	1907.5
	TX (10 MHz)	18650	18900	19150
		1855	1880	1905
	TX (15 MHz)	18675	18900	19125
		1857.5	1880	1902.5
	TX (20 MHz)	18700	18900	19100
		1860	1880	1900

Mode	TX/RX	Low	Middle	High
LTE Band 4	TX (1.4 MHz)	19957	20175	20393
		1710.7	1732.5	1754.3
	TX (3 MHz)	19965	20175	20385
		1711.5	1732.5	1753.5
	TX (5 MHz)	19975	20175	20375
		1712.5	1732.5	1752.5
	TX (10 MHz)	20000	20175	20350
		1715	1732.5	1750
	TX (15 MHz)	20025	20175	20325
		1717.5	1732.5	1747.5
	TX (20 MHz)	20050	20175	20300
		1720	1732.5	1745

Mode	TX/RX	Low	Middle	High
LTE Band 5	TX (1.4 MHz)	20407	20525	20643
		824.7	836.5	848.3
	TX (3 MHz)	20415	20525	20635
		825.5	836.5	847.5
	TX (5 MHz)	20425	20525	20625
		826.5	836.5	846.5
	TX (10 MHz)	20450	20525	20600
		829.0	836.5	844.0



Mode	TX/RX	Low	Middle	High
LTE Band 12	TX (1.4 MHz)	23017	23095	23173
		699.7	707.5	715.3
	TX (3 MHz)	23025	23095	23165
		700.5	707.5	714.5
	TX (5 MHz)	23035	23095	23155
		701.5	707.5	713.5
	TX (10 MHz)	23060	23095	23130
		704.0	707.5	711.0

Mode	TX/RX	Low	Middle	High
LTE Band 13	TX (5 MHz)	23205	23230	23255
		779.5	782.0	784.5
	TX (10 MHz)	23230	23230	23230
		782.0	782.0	782.0

Mode	TX/RX	Low	Middle	High
LTE Band 66	TX (1.4 MHz)	131979	132322	132665
		1710.7	1745.0	1779.3
	TX (3 MHz)	131987	132322	132657
		1711.5	1745.0	1778.5
	TX (5 MHz)	131997	132322	132647
		1712.5	1745.0	1777.5
	TX (10 MHz)	132022	132322	132622
		1715.0	1745.0	1775.0
	TX (15 MHz)	132047	132322	132597
		1717.5	1745.0	1772.5
	TX (20 MHz)	132072	132322	132572
		1720.0	1745.0	1770.0

5.7 DESCRIPTION OF AVAILABLE ANTENNAS

Band	Antenna Type	Antenna Gain (dBi)
LTE Band 2	PIFA	-1.0
LTE Band 4	PIFA	-0.3
LTE Band 5	PIFA	-0.9
LTE Band 12	PIFA	-2.0
LTE Band 13	PIFA	0.3
LTE Band 66	PIFA	0.1

5.8 DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Item	Equipment	Brand Name	Model Name	Remarks
1	Laptop	ThinkPad	X230i	/
2	Test fixture	/	/	/

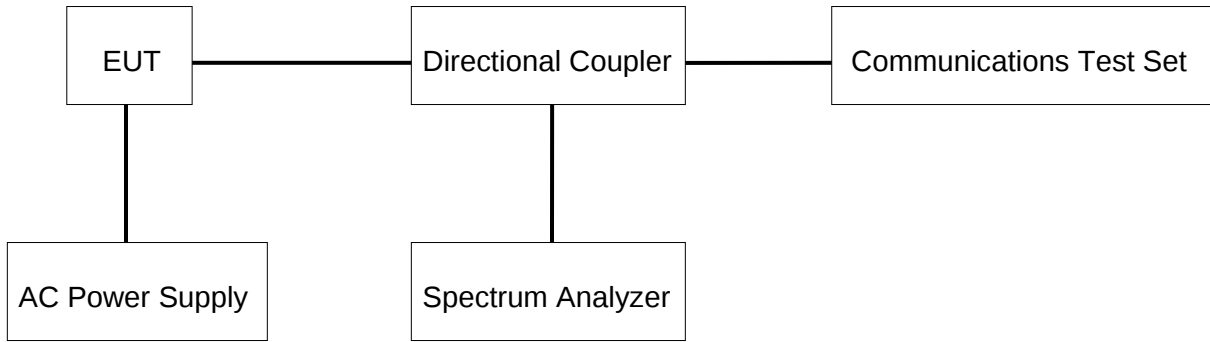
I/O CABLES

Cable No	Port	Connector Type	Cable Type	Cable Length(m)	Remarks
1	USB	USB	Unshielded	1	/

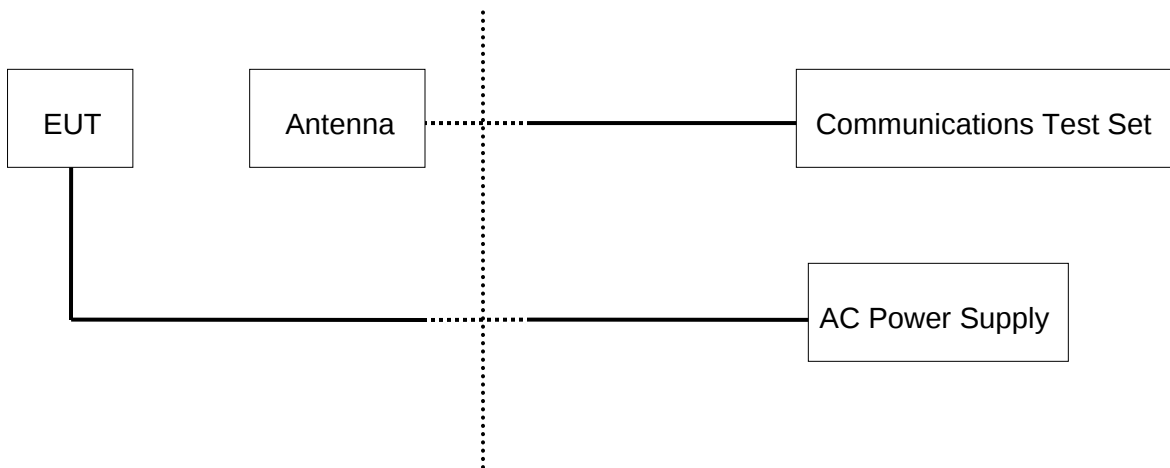
ACCESSORY

Item	Accessory	Brand Name	Model Name	Description
1	AC Adapter	/	HJ-0122000	DC 12V,2A

CONDUCTED TEST SETUP



RADIATED TEST SETUP



**5.9 MEASURING INSTRUMENT AND SOFTWARE USED**

Conducted Emissions					
Instrument					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Wideband Radio Communication Tester	R&S	CMW500	155522	Nov.20,2020	Nov.19,2021
Signal & Spectrum analyzer	R&S	FSW	1312.8000K26-103950-sj	Nov.20,2020	Nov.19,2021
RF conditioning unit	Tonscend	JS0806-1	1518.0003.14-101329-aZ	\	\
Wideband filter unit	Tonscend	JS0806-F	20J8060329	\	\
Software					
Description			Manufacturer	Name	Version
JS1120 RF Test System			Tonscend	JS1120	Ver 2.6.9

Radiated Emissions					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due Date
MXE EMI Receiver	KESIGHT	N9038A	MY56400036	Nov. 12, 2020	Nov. 11, 2021
Hybrid Log Periodic Antenna	TDK	HLP-3003C	130960	Aug. 11, 2018	Aug. 10, 2021
Preamplifier	HP	8447D	2944A09099	Nov. 12, 2020	Nov. 11, 2021
EMI Measurement Receiver	R&S	ESR26	101377	Nov. 12, 2020	Nov. 11, 2021
Horn Antenna	TDK	HRN-0118	130939	Sept. 17, 2018	Sept. 17, 2021
Preamplifier	TDK	PA-02-0118	TRS-305-00067	Nov. 20, 2020	Nov. 19, 2021
Horn Antenna	Schwarzbeck	BBHA9170	#691	Aug. 11, 2018	Aug. 11, 2021
Preamplifier	TDK	PA-02-2	TRS-307-00003	Nov. 12, 2020	Nov. 11, 2021
Preamplifier	TDK	PA-02-3	TRS-308-00002	Nov. 12, 2020	Nov. 11, 2021
Loop antenna	Schwarzbeck	1519B	00008	Jan.17, 2019	Jan.17,2022
Preamplifier	TDK	PA-02-001-3000	TRS-302-00050	Nov. 12, 2020	Nov. 11, 2021
Preamplifier	Mini-Circuits	ZX60-83LN-S+	SUP01201941	Nov. 20, 2020	Nov. 19, 2021
Band Reject Filter	Wainwright	WRCJV8-2350-2400-2483.5-	4	Nov. 12, 2020	Nov. 11, 2021



		2533.5-40SS			
High Pass Filter	Wi	WHKX10- 2700-3000- 18000-40SS	23	Nov. 12, 2020	Nov. 11, 2021
Software					
Description			Manufacturer	Name	Version
Test Software for Radiated Emissions			Farad	EZ-EMC	Ver. UL-3A1

6. TEST RESULTS

6.1 OUTPUT POWER VERIFICATION

ERP/EIRP RULE PART(S)

FCC: §2.1046, §22.913, §24.232, §27.50, §90.635.

ISED: RSS-130, RSS-132, RSS-133, RSS-139.

LIMITS

22.913(a) The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

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.

27.50(c) Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP.

27.50(d) Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watts EIRP.

27.50(h) Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.

90.635(b) The maximum output power of the transmitter for mobile stations is 100 watts (20 dBw).

ERP/EIRP TEST PROCEDURE

ANSI C63.26:2015/ KDB 971168 D01 Section 5.6.

$ERP/ EIRP = P_{Meas} + GT - LC$

where:

ERP or EIRP = effective or equivalent isotropically radiated power, respectively (expressed in the same units as P_{Meas} , typically dBW or dBm);

P_{Meas} = measured transmitter output power or PSD, in dBm or dBW;

GT = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);

LC = signal attenuation in the connecting cable between the transmitter and antenna, in dB

RESULTS

See the following pages.

**LTE Band 2**

Bandwidth	Modulation	RB size	RB offset	Average Power (dBm)		
				Channel	Channel	Channel
				18607	18900	19193
Band 2 1.4MHz	QPSK	1	0	22.28	22.24	22.26
		1	3	22.18	22.26	22.42
		1	5	22.08	22.12	22.35
		3	0	22.12	22.29	22.42
		3	2	22.17	22.15	22.32
		3	3	22.11	22.22	22.31
		6	0	21.25	21.18	21.44
	16QAM	1	0	21.22	21.06	21.41
		1	3	21.27	21.28	21.52
		1	5	21.24	21.18	21.34
		3	0	20.89	21.05	21.09
		3	2	21.04	20.86	21.21
		3	3	20.83	20.93	21.05
		6	0	20.31	20.14	20.36
Bandwidth	Modulation	RB size	RB offset	Average Power (dBm)		
				Channel	Channel	Channel
				18615	18900	19185
Band 2 3MHz	QPSK	1	0	22.38	22.35	22.32
		1	7	22.39	22.27	22.33
		1	14	22.35	22.24	22.58
		8	0	21.47	21.53	21.58
		8	4	21.48	21.46	21.51
		8	7	21.42	21.4	21.55
		15	0	21.5	21.48	21.54
	16QAM	1	0	21.39	21.37	21.5
		1	7	21.41	21.39	21.44
		1	14	21.35	21.33	21.47
		8	0	20.76	20.56	20.6
		8	4	20.61	20.45	20.6
		8	7	20.6	20.49	20.71
		15	0	20.59	20.48	20.53
Bandwidth	Modulation	RB size	RB offset	Average Power (dBm)		
				Channel	Channel	Channel
				18625	18900	19175
Band 2 5MHz	QPSK	1	0	22.51	22.4	22.35
		1	13	22.38	22.45	22.43
		1	24	22.39	22.5	22.45
		12	0	21.44	21.43	21.62
		12	6	21.45	21.44	21.51
		12	13	21.44	21.51	21.58
		25	0	21.48	21.48	21.54



	16QAM	1	0	21.28	21.58	21.64
		1	13	21.68	21.57	21.64
		1	24	21.43	21.43	21.45
		12	0	20.51	20.5	20.56
		12	6	20.45	20.44	20.57
		12	13	20.44	20.5	20.56
		25	0	20.49	20.48	20.74
Bandwidth	Modulation	RB size	RB offset	Average Power (dBm)		
				Channel	Channel	Channel
				18650	18900	19150
Band 2 10MHz	QPSK	1	0	22.3	22.27	22.26
		1	25	22.45	22.62	22.68
		1	49	22.21	22.2	22.35
		25	0	21.61	21.6	21.66
		25	13	21.52	21.53	21.67
		25	25	21.55	21.54	21.69
		50	0	21.59	21.58	21.64
	16QAM	1	0	21.51	21.49	21.55
		1	25	21.85	21.74	21.9
		1	49	21.42	21.4	21.46
		25	0	20.57	20.55	20.72
		25	13	20.61	20.66	20.72
		25	25	20.6	20.45	20.52
		50	0	20.57	20.55	20.62
Bandwidth	Modulation	RB size	RB offset	Average Power (dBm)		
				Channel	Channel	Channel
				18675	18900	19125
Band 2 15MHz	QPSK	1	0	22.65	22.74	23.34
		1	38	23.02	23.11	23.15
		1	74	23.09	23.07	23.14
		36	0	22.06	21.99	22.1
		36	18	21.97	21.89	22.26
		36	39	22.02	21.92	22.18
		75	0	22.02	22.08	22.28
	16QAM	1	0	21.98	21.96	22.14
		1	38	22.03	21.93	22.28
		1	74	21.89	21.97	21.97
		36	0	22.02	21.73	22.42
		36	18	21.93	21.96	22.26
		36	39	22.07	21.98	21.99
		75	0	20.95	21.04	21.25
Bandwidth	Modulation	RB size	RB offset	Average Power (dBm)		
				Channel	Channel	Channel
				18700	18900	19100
Band 2 20MHz	QPSK	1	0	22.99	22.99	23.35
		1	50	23.17	23.18	23.4



		1	99	22.9	23.06	23.19
		50	0	22.14	22.02	22.39
		50	25	22.05	22.01	22.33
		50	50	22	22.2	22.32
		100	0	22.08	22.11	22.32
	16QAM	1	0	22.04	21.93	22.32
		1	50	21.99	22.21	22.55
		1	99	22.06	22.18	22.12
		50	0	20.97	20.99	21.26
		50	25	21	20.95	21.27
		50	50	20.97	21.04	21.23
		100	0	20.91	21.05	21.2

LTE Band 4

Bandwidth	Modulation	RB size	RB offset	Average Power (dBm)		
				Channel	Channel	Channel
				19957	20175	20393
Band 4 1.4MHz	QPSK	1	0	23.16	23.26	23.4
		1	3	23.28	23.62	23.43
		1	5	23.2	23.47	23.44
		3	0	23.21	23.45	23.44
		3	2	23.2	23.39	23.42
		3	3	23.21	23.44	23.41
		6	0	22.24	22.4	22.48
	16QAM	1	0	22.15	22.18	22.29
		1	3	22.13	22.43	22.61
		1	5	22.37	22.01	22.42
		3	0	22.19	22.44	22.53
		3	2	22.24	22.5	22.53
		3	3	22.32	22.51	22.42
		6	0	21.18	21.41	21.63
Bandwidth	Modulation	RB size	RB offset	Average Power (dBm)		
				Channel	Channel	Channel
				19965	20175	20385
Band 4 3MHz	QPSK	1	0	23.25	23.34	23.54
		1	7	23.23	23.28	23.48
		1	14	23.14	23.36	23.5
		8	0	22.31	22.44	22.5
		8	4	22.2	22.46	22.53
		8	7	22.27	22.38	22.61
		15	0	22.22	22.42	22.51
	16QAM	1	0	22.09	22.1	22.6
		1	7	21.9	22.35	22.68
		1	14	22.2	22.42	22.41
		8	0	21.31	21.37	21.51
		8	4	21.19	21.39	21.39
		8	7	21.25	21.32	21.49



		15	0	21.27	21.4	21.29
Bandwidth	Modulation	RB size	RB offset	Average Power (dBm)		
				Channel	Channel	Channel
				19975	20175	20375
Band 4 5MHz	QPSK	1	0	23.13	23.28	23.56
		1	13	23.07	23.19	23.63
		1	24	22.97	23.27	23.49
		12	0	22.24	22.41	22.67
		12	6	22.23	22.41	22.59
		12	13	22.19	22.39	22.67
		25	0	22.27	22.47	22.67
	16QAM	1	0	22.19	22.57	22.6
		1	13	22.31	22.55	22.6
		1	24	22.03	22.43	22.87
		12	0	21.17	21.5	21.69
		12	6	21.33	21.45	21.68
		12	13	21.13	21.39	21.61
		25	0	21.15	21.39	21.32
Bandwidth	Modulation	RB size	RB offset	Average Power (dBm)		
				Channel	Channel	Channel
				20000	20175	20350
Band 4 10MHz	QPSK	1	0	23.26	23.27	23.59
		1	25	23.24	23.53	23.78
		1	49	23.19	23.37	23.6
		25	0	22.28	22.37	22.72
		25	13	22.27	22.38	22.73
		25	25	22.22	22.45	22.69
		50	0	22.19	22.47	22.71
	16QAM	1	0	22.42	22.54	22.66
		1	25	22.18	22.48	22.88
		1	49	22.21	22.38	22.88
		25	0	21.21	21.31	21.7
		25	13	21.27	21.4	21.68
		25	25	21.21	21.33	21.67
		50	0	21.23	21.39	21.66
Bandwidth	Modulation	RB size	RB offset	Average Power (dBm)		
				Channel	Channel	Channel
				20025	20175	20325
Band 4 15MHz	QPSK	1	0	23.17	22.89	23.4
		1	38	23.03	23.11	23.42
		1	74	23.05	23.2	23.46
		36	0	22	21.98	22.35
		36	18	21.82	22.24	22.28
		36	39	22.17	22.34	22.34
		75	0	22.01	22.25	22.56
	16QAM	1	0	21.99	22	22.24
		1	38	21.97	22.08	22.36
		1	74	21.91	22.13	22.35
		36	0	21.96	21.84	22.4



		36	18	21.9	21.98	22.2
		36	39	21.9	22.3	22.34
		75	0	20.99	21.18	21.47
Bandwidth	Modulation	RB size	RB offset	Average Power (dBm)		
				Channel	Channel	Channel
				20050	20175	20300
Band 4 20MHz	QPSK	1	0	23.01	22.97	23.08
		1	50	23.03	23.23	23.78
		1	99	23.21	23.29	22.44
		50	0	22	22.15	22.56
		50	25	22.02	22.16	22.35
		50	50	22.12	22.3	22.34
		100	0	22.03	22.11	22.31
	16QAM	1	0	22	22.06	22.28
		1	50	22.22	22.4	22.48
		1	99	22.17	22.52	22.34
		50	0	21	21.07	21.36
		50	25	21.09	21.13	21.33
		50	50	21.04	21.1	21.41
		100	0	21.05	21.12	21.35

**LTE Band 5**

Bandwidth	Modulation	RB size	RB offset	Average Power (dBm)		
				Channel	Channel	Channel
				20407	20525	20643
Band 5 1.4MHz	QPSK	1	0	22.11	21.89	22.17
		1	3	22.11	22.05	22.22
		1	5	21.89	21.99	21.98
		3	0	21.98	21.88	22.18
		3	2	22.05	21.91	22.18
		3	3	22	21.96	22.14
		6	0	21.1	20.91	21.22
	16QAM	1	0	21.06	20.88	21.13
		1	3	21.16	20.95	21.31
		1	5	21	21.1	21.31
		3	0	21.01	20.93	21.2
		3	2	21.09	20.99	21.3
		3	3	20.95	20.84	21.18
		6	0	20.06	19.92	20.2
Bandwidth	Modulation	RB size	RB offset	Average Power (dBm)		
				Channel	Channel	Channel
				20415	20525	20635
Band 5 3MHz	QPSK	1	0	22.11	22	22.24
		1	7	22.03	21.93	22.3
		1	14	22.01	22.06	22.34
		8	0	21.14	21.01	21.33
		8	4	21.09	21.01	21.25
		8	7	20.92	21.06	21.34
		15	0	20.98	20.99	21.28
	16QAM	1	0	21.22	20.85	21.36
		1	7	20.92	20.9	21.32
		1	14	20.89	21.1	21.39
		8	0	20.11	20.07	20.25
		8	4	20.04	20.11	20.34
		8	7	20.07	20.03	20.31
		15	0	19.98	20	20.3
Bandwidth	Modulation	RB size	RB offset	Average Power (dBm)		
				Channel	Channel	Channel
				20425	20525	20625
Band 5 5MHz	QPSK	1	0	22.12	21.69	22.12
		1	13	21.94	21.98	22.16
		1	24	21.78	22.01	22.1
		12	0	20.95	21	21.2
		12	6	20.97	21.01	21.18
		12	13	21.1	21.05	21.22
		25	0	21	21	21.32
	16QAM	1	0	21.15	20.89	21.33
		1	13	20.87	21.12	21.4
		1	24	20.82	21.02	21.46
		12	0	20.04	19.87	20.2



		12	6	20	19.98	20.26
		12	13	20.18	20.02	20.23
		25	0	19.93	20.15	20.15
Bandwidth	Modulation	RB size	RB offset	Average Power (dBm)		
				Channel	Channel	Channel
				20450	20525	20600
Band 5 10MHz	QPSK	1	0	22.01	21.59	22.17
		1	25	22.15	22.04	22.39
		1	49	21.89	22.05	22.21
		25	0	21.28	20.95	21.09
		25	13	21.04	20.96	21.1
		25	25	21.29	21.05	21.69
		50	0	22.01	21.59	22.17
	16QAM	1	0	21.02	20.66	21.33
		1	25	21.22	21.16	21.17
		1	49	21.01	21.17	21.31
		25	0	20.37	19.93	20.17
		25	13	20.6	19.93	20.06
		25	25	20.04	20.05	20.35
		50	0	20.14	20	20.13

**LTE Band 12**

Bandwidth	Modulation	RB size	RB offset	Average Power (dBm)		
				Channel	Channel	Channel
				23017	23095	23173
Band 12 1.4MHz	QPSK	1	0	22.53	22.43	22.81
		1	3	22.64	22.51	22.47
		1	5	22.43	22.49	22.47
		3	0	22.46	22.53	22.52
		3	2	22.39	22.46	22.45
		3	3	22.43	22.34	22.48
		6	0	21.5	21.42	21.4
	16QAM	1	0	21.85	21.71	21.5
		1	3	21.58	21.83	21.37
		1	5	21.48	21.53	21.32
		3	0	21.39	21.49	21.52
		3	2	21.54	21.43	21.45
		3	3	21.42	21.51	21.59
		6	0	20.42	20.39	20.22
Bandwidth	Modulation	RB size	RB offset	Average Power (dBm)		
				Channel	Channel	Channel
				23025	23095	23165
Band 12 3MHz	QPSK	1	0	22.46	22.33	22.49
		1	7	22.61	22.21	22.4
		1	14	22.61	22.31	22.35
		8	0	21.53	21.36	21.5
		8	4	21.52	21.39	21.52
		8	7	21.55	21.3	21.39
		15	0	21.53	21.29	21.47
	16QAM	1	0	21.46	21.28	21.51
		1	7	21.75	21.25	21.37
		1	14	21.44	21.31	21.07
		8	0	20.38	20.48	20.42
		8	4	20.52	20.33	20.58
		8	7	20.53	20.29	20.39
		15	0	20.54	20.26	20.45
Bandwidth	Modulation	RB size	RB offset	Average Power (dBm)		
				Channel	Channel	Channel
				23035	23095	23155
Band 12 5MHz	QPSK	1	0	22.36	22.3	22.26
		1	13	22.59	22.25	22.41
		1	24	22.55	22.25	22.34
		12	0	21.5	21.39	21.34
		12	6	21.47	21.38	21.33
		12	13	21.52	21.33	21.32
		25	0	21.53	21.29	21.4
	16QAM	1	0	21.42	21.58	21.46
		1	13	21.7	21.45	21.74
		1	24	21.6	21.3	21.67
		12	0	20.45	20.46	20.3



		12	6	20.52	20.36	20.33
		12	13	20.49	20.41	20.22
		25	0	20.65	20.32	20.32
Bandwidth	Modulation	RB size	RB offset	Average Power (dBm)		
				Channel	Channel	Channel
				23060	23095	23130
Band 12 10MHz	QPSK	1	0	22.45	22.23	22.34
		1	25	22.46	22.37	22.72
		1	49	22.35	22.37	22.36
		25	0	21.48	21.41	21.43
		25	13	21.55	21.35	21.39
		25	25	21.56	21.35	21.46
		50	0	21.42	21.32	21.44
	16QAM	1	0	21.14	21.29	21.41
		1	25	21.76	21.15	21.58
		1	49	21.21	21.2	21.57
		25	0	20.53	20.34	20.46
		25	13	20.48	20.39	20.42
		25	25	20.46	20.3	20.57
		50	0	20.48	20.3	20.4

LTE Band 13

Bandwidth	Modulation	RB size	RB offset	Average Power (dBm)		
				Channel	Channel	Channel
				23205	23230	23255
Band 13 5MHz	QPSK	1	0	22.76	22.77	22.62
		1	13	22.84	22.69	22.64
		1	24	22.63	22.67	22.77
		12	0	21.69	21.75	21.63
		12	6	21.74	21.73	21.61
		12	13	21.75	21.72	21.69
		25	0	21.68	21.61	21.64
	16QAM	1	0	21.64	21.45	21.98
		1	13	21.53	21.55	21.95
		1	24	21.37	21.59	21.56
		12	0	20.68	20.65	20.59
		12	6	20.63	20.67	20.59
		12	13	20.71	20.49	20.8
		25	0	20.66	20.64	20.61
Bandwidth	Modulation	RB size	RB offset	Average Power (dBm)		
				Channel	Channel	Channel
				23230	23230	23230
Band 13 10MHz	QPSK	1	0	22.83	22.8	22.75
		1	25	22.86	22.78	22.8
		1	49	22.76	22.59	22.54
		25	0	21.72	21.65	21.57
		25	13	21.78	21.66	21.62
		25	25	21.68	21.57	21.64
		50	0	21.65	21.54	21.51



	16QAM	1	0	21.74	21.54	21.73
		1	25	21.71	21.74	21.79
		1	49	21.59	21.63	21.57
		25	0	20.76	20.59	20.6
		25	13	20.67	20.65	20.58
		25	25	20.61	20.54	20.51
		50	0	20.6	20.49	20.58

LTE Band 66

Bandwidth	Modulation	RB size	RB offset	Average Power (dBm)		
				Channel	Channel	Channel
				131979	132322	132665
Band 66 1.4MHz	QPSK	1	0	22.19	22.52	22.49
		1	3	22.29	22.72	22.55
		1	5	22.22	22.69	22.42
		3	0	22.25	22.69	22.53
		3	2	22.2	22.67	22.48
		3	3	22.16	22.7	22.4
	16QAM	6	0	21.19	21.5	21.43
		1	0	21.12	21.75	21.65
		1	3	21.39	21.76	21.75
		1	5	21.26	21.82	21.46
		3	0	21.32	21.71	21.52
		3	2	21.24	21.75	21.37
		3	3	21.14	21.46	21.53
		6	0	20.19	20.58	20.47
Bandwidth	Modulation	RB size	RB offset	Average Power (dBm)		
				Channel	Channel	Channel
				131987	132322	132657
Band 66 3MHz	QPSK	1	0	22.09	22.55	22.43
		1	7	22.11	22.43	22.35
		1	14	22.12	22.48	22.37
		8	0	21.14	21.45	21.22
		8	4	21.11	21.45	21.25
		8	7	21.09	21.53	21.23
		15	0	21.17	21.4	21.25
	16QAM	1	0	21.2	21.64	21.52
		1	7	21.25	21.47	21.39
		1	14	21.1	21.38	21.34
		8	0	20.19	20.41	20.27
		8	4	20.18	20.62	20.25
		8	7	20.11	20.47	20.22
		15	0	19.92	20.54	20.26
Bandwidth	Modulation	RB size	RB offset	Average Power (dBm)		
				Channel	Channel	Channel
				131997	132322	132647
Band 66 5MHz	QPSK	1	0	21.91	22.5	22.28
		1	13	22.01	22.42	22.27
		1	24	21.92	22.36	22.24



		12	0	21	21.41	21.24
		12	6	20.97	21.41	21.25
		12	13	21.03	21.37	21.22
		25	0	20.99	21.37	21.3
	16QAM	1	0	21.24	21.5	21.48
		1	13	21.2	21.37	21.63
		1	24	20.92	21.45	21.34
		12	0	19.98	20.42	20.2
		12	6	19.98	20.33	20.27
		12	13	20.04	20.4	20.32
		25	0	19.9	20.41	20.3
Bandwidth	Modulation	RB size	RB offset	Average Power (dBm)		
				Channel	Channel	Channel
				132022	132322	132622
Band 66 10MHz	QPSK	1	0	22.11	22.56	22.35
		1	25	22.12	22.54	22.37
		1	49	22.13	22.41	22.25
		25	0	21.05	21.44	21.35
		25	13	21.05	21.45	21.31
		25	25	21.17	21.48	21.29
		50	0	21.05	21.45	21.27
	16QAM	1	0	21.1	21.63	21.54
		1	25	21.16	21.46	21.35
		1	49	21.1	21.51	21.23
		25	0	20.07	20.5	20.55
		25	13	20.07	20.57	20.34
		25	25	20.17	20.44	20.34
		50	0	20.02	20.45	20.27
Bandwidth	Modulation	RB size	RB offset	Average Power (dBm)		
				Channel	Channel	Channel
				132047	132322	132597
Band 66 15MHz	QPSK	1	0	22.16	22.58	22.5
		1	38	22.1	22.62	22.36
		1	74	22.37	22.37	22.4
		36	0	20.91	21.45	21.46
		36	18	21.02	21.68	21.55
		36	39	21.24	21.54	21.34
		75	0	21.2	21.58	21.35
	16QAM	1	0	21.33	21.34	21.49
		1	38	21.17	21.5	21.26
		1	74	21.14	21.57	21.42
		36	0	20.98	21.69	21.37
		36	18	21.36	21.68	21.38
		36	39	21.24	21.41	21.15
		75	0	20.25	20.57	20.46
Bandwidth	Modulation	RB size	RB offset	Average Power (dBm)		
				Channel	Channel	Channel
				132072	132322	132572
Band 66	QPSK	1	0	22.2	22.53	22.33



20MHz		1	50	22.32	22.66	22.57
		1	99	22.44	22.37	22.41
		50	0	21.1	21.65	21.44
		50	25	21.14	21.64	21.44
		50	50	21.28	21.56	21.4
		100	0	21.26	21.6	21.46
	16QAM	1	0	21.27	21.21	21.44
		1	50	21.4	21.86	21.35
		1	99	21.46	21.61	21.71
		50	0	20.16	20.6	20.39
		50	25	20.14	20.61	20.39
		50	50	20.31	20.59	20.46
		100	0	20.26	20.63	20.4

6.2 PEAK TO AVERAGE RADIO

LIMITS

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.

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 was measured on the Spectrum Analyzer.

RESULTS

See the following pages.

LTE Band	Bandwidth (MHz)	F (MHz)	RB Configuration	Modulation	Measured (dB)	Limit (dB)	Verdict
2	1.4	1850.7	1RB 0#	QPSK	8.46	13	PASS
				16QAM	8.44	13	PASS
	3	1851.5		QPSK	8.48	13	PASS
				16QAM	8.46	13	PASS
	5	1852.5		QPSK	8.46	13	PASS
				16QAM	8.48	13	PASS
	10	1855.0		QPSK	8.46	13	PASS
				16QAM	8.46	13	PASS
	15	1857.5		QPSK	3.08	13	PASS
				16QAM	4.06	13	PASS
	20	1860.0		QPSK	3.10	13	PASS
				16QAM	3.98	13	PASS

LTE Band	Bandwidth (MHz)	F (MHz)	RB Configuration	Modulation	Measured (dB)	Limit (dB)	Verdict
4	1.4	1710.7	1RB 0#	QPSK	3.92	13	PASS
				16QAM	4.78	13	PASS
	3	1711.5		QPSK	3.90	13	PASS
				16QAM	4.78	13	PASS
	5	1712.5		QPSK	3.94	13	PASS
				16QAM	4.80	13	PASS
	10	1715.0		QPSK	3.98	13	PASS
				16QAM	4.82	13	PASS
	15	1717.5		QPSK	3.94	13	PASS
				16QAM	4.98	13	PASS
20	1720.0	QPSK	4.04	13	PASS		
		16QAM	4.96	13	PASS		



LTE Band	Bandwidth (MHz)	F (MHz)	RB Configuration	Modulation	Measured (dB)	Limit (dB)	Verdict
5	1.4	824.7	1RB 0#	QPSK	3.64	13	PASS
				16QAM	4.68	13	PASS
	3	825.5		QPSK	3.66	13	PASS
				16QAM	4.64	13	PASS
	5	826.5		QPSK	3.60	13	PASS
				16QAM	4.62	13	PASS
	10	829.0		QPSK	3.60	13	PASS
				16QAM	4.54	13	PASS

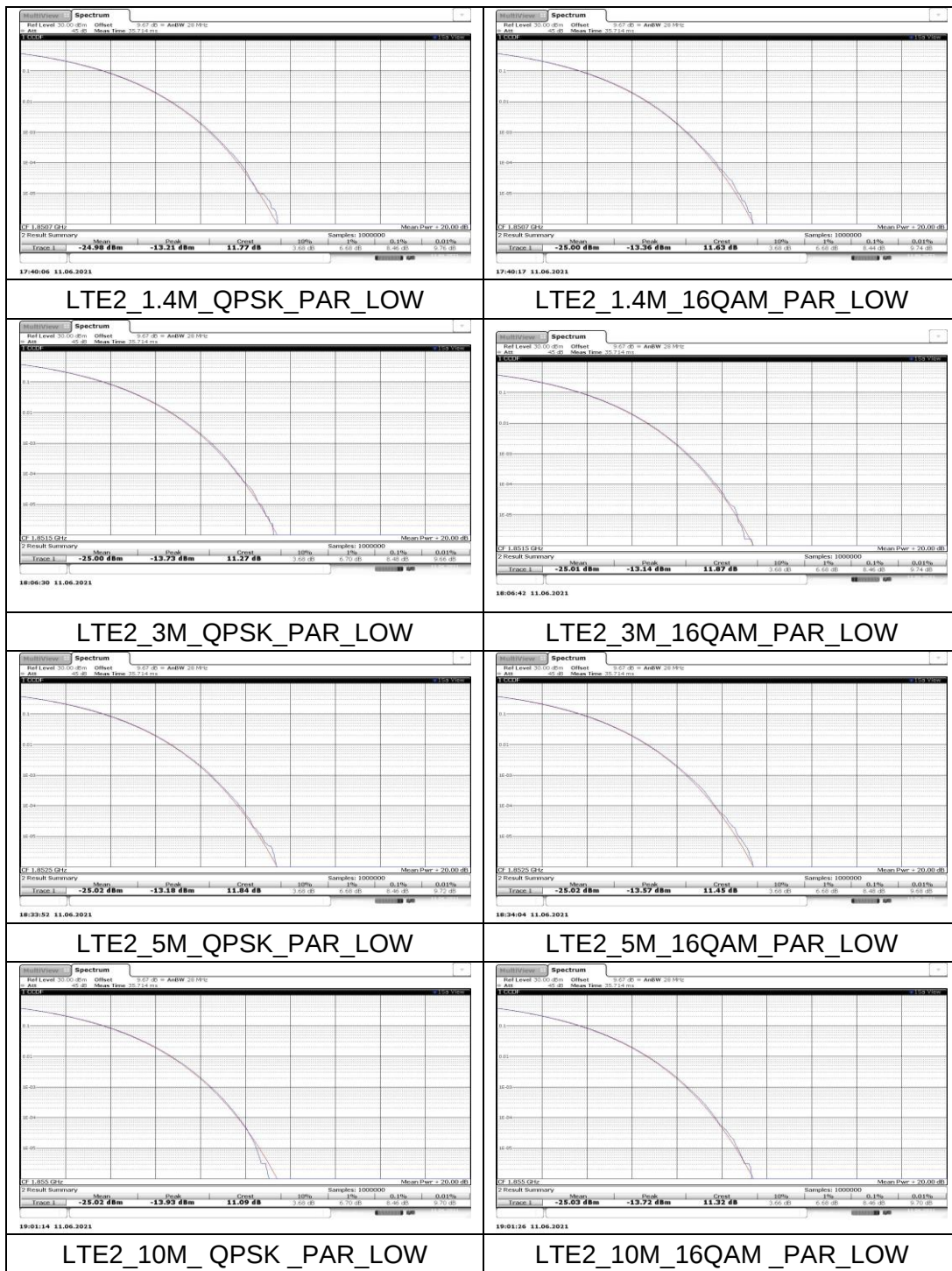
LTE Band	Bandwidth (MHz)	F (MHz)	RB Configuration	Modulation	Measured (dB)	Limit (dB)	Verdict
12	1.4	699.7	1RB 0#	QPSK	3.78	13	PASS
				16QAM	4.86	13	PASS
	3	700.5		QPSK	3.84	13	PASS
				16QAM	4.76	13	PASS
	5	701.5		QPSK	3.74	13	PASS
				16QAM	4.72	13	PASS
	10	704.0		QPSK	3.68	13	PASS
				16QAM	4.64	13	PASS

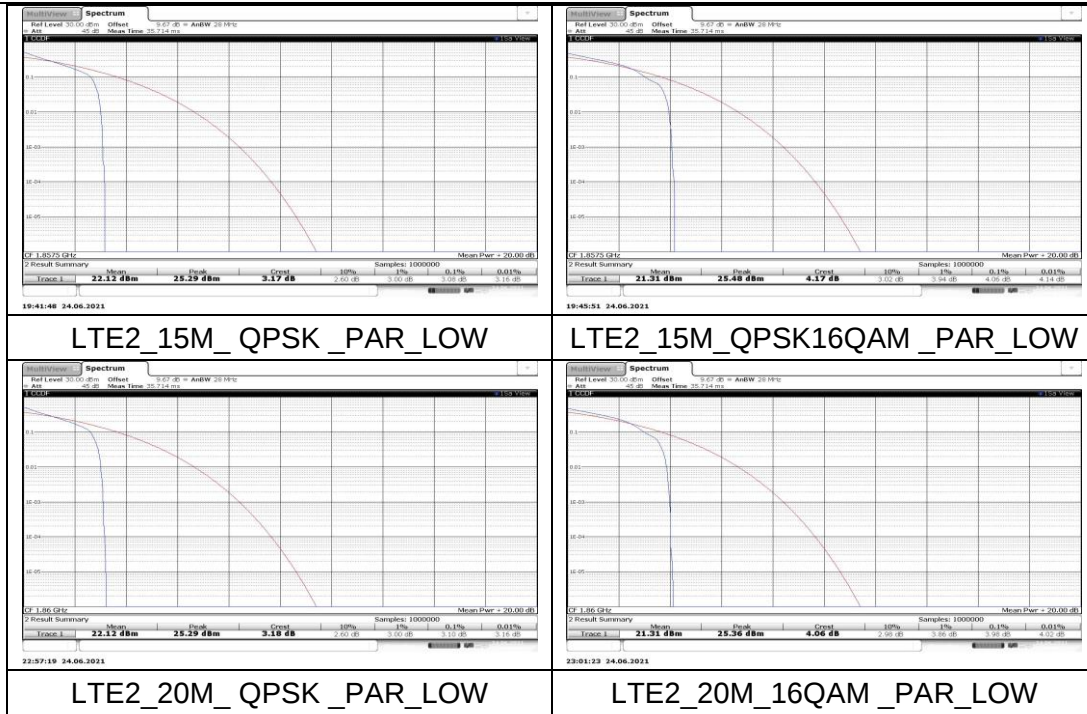
LTE Band	Bandwidth (MHz)	F (MHz)	RB Configuration	Modulation	Measured (dB)	Limit (dB)	Verdict
13	5	826.5	1RB 0#	QPSK	3.86	13	PASS
				16QAM	4.84	13	PASS
	10	829.0		QPSK	3.94	13	PASS
				16QAM	4.94	13	PASS

LTE Band	Bandwidth (MHz)	F (MHz)	RB Configuration	Modulation	Measured (dB)	Limit (dB)	Verdict
66	1.4	1710.7	1RB 0#	QPSK	4.32	13	PASS
				16QAM	5.24	13	PASS
	3	1711.5		QPSK	4.42	13	PASS
				16QAM	5.38	13	PASS
	5	1712.5		QPSK	4.36	13	PASS
				16QAM	5.44	13	PASS
	10	1715.0		QPSK	4.36	13	PASS
				16QAM	5.26	13	PASS
	15	1717.5		QPSK	4.32	13	PASS
				16QAM	5.36	13	PASS
	20	1720.0		QPSK	4.38	13	PASS
				16QAM	5.30	13	PASS



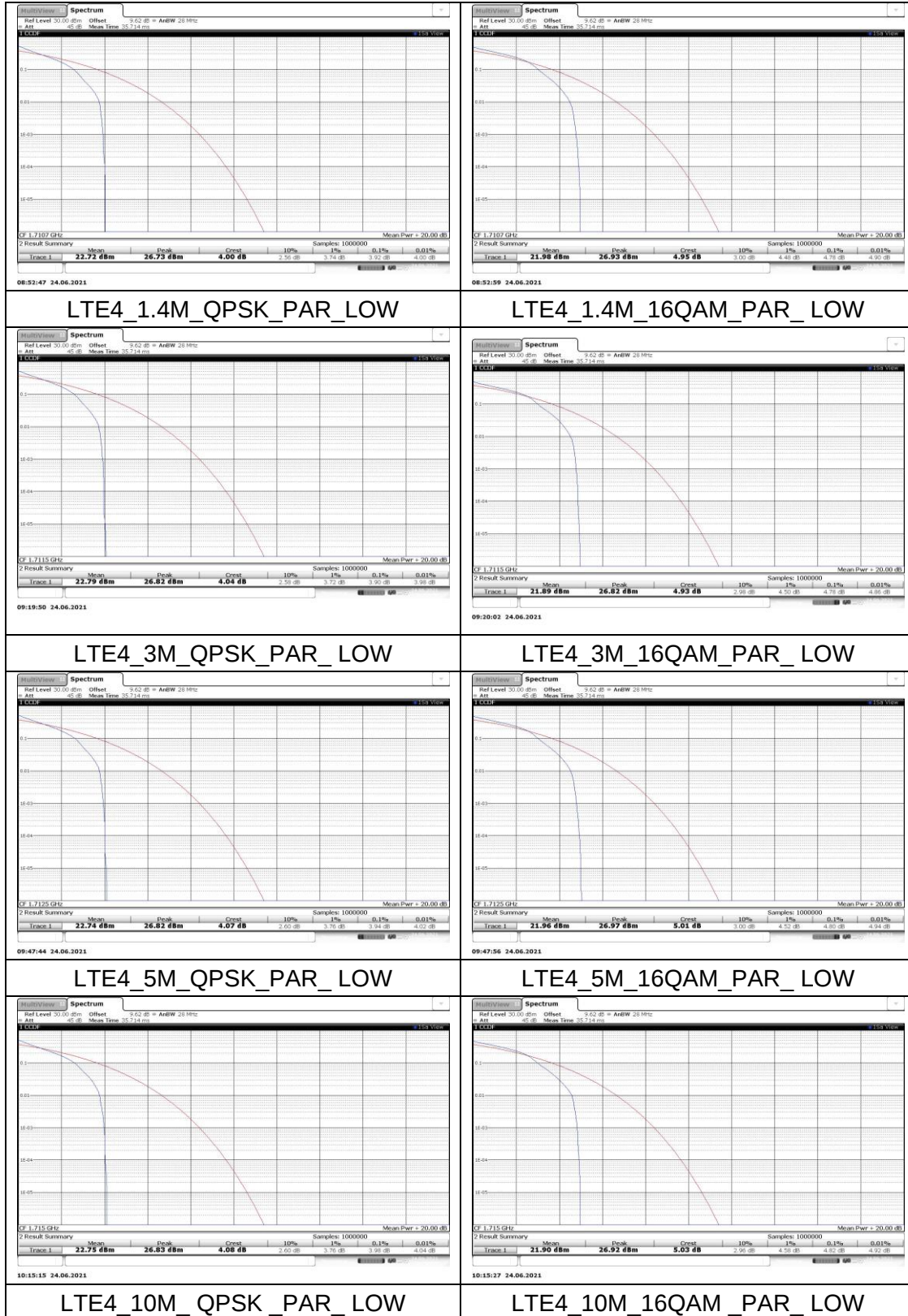
LTE Band 2

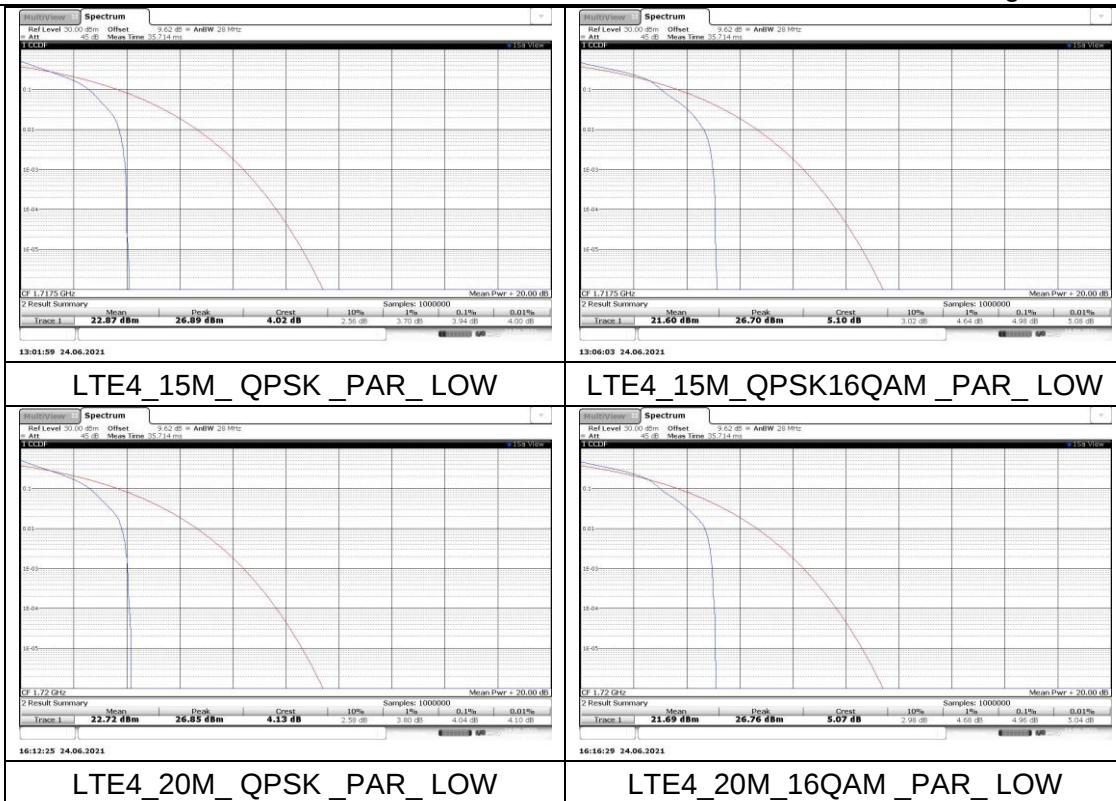






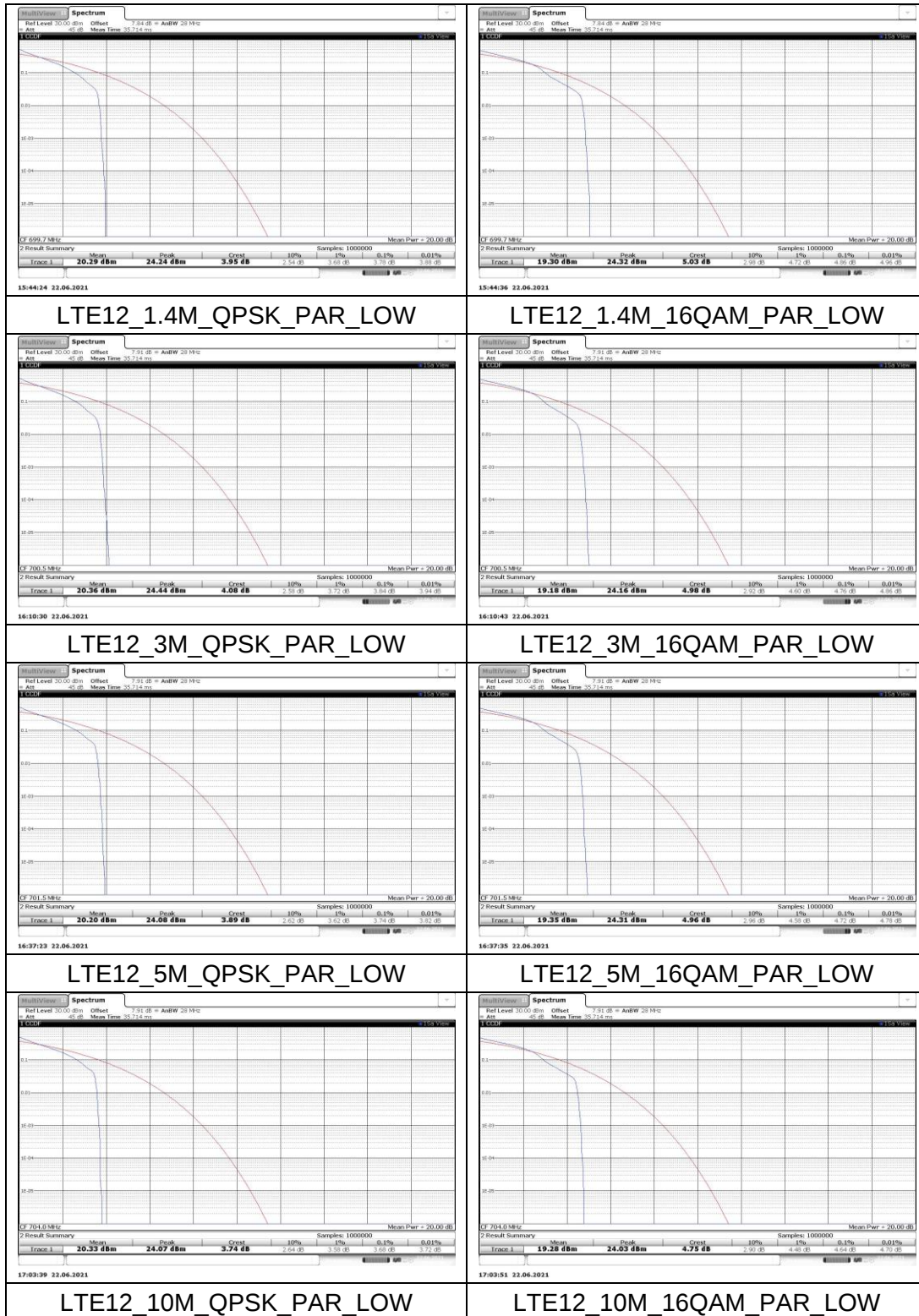
LTE Band 4

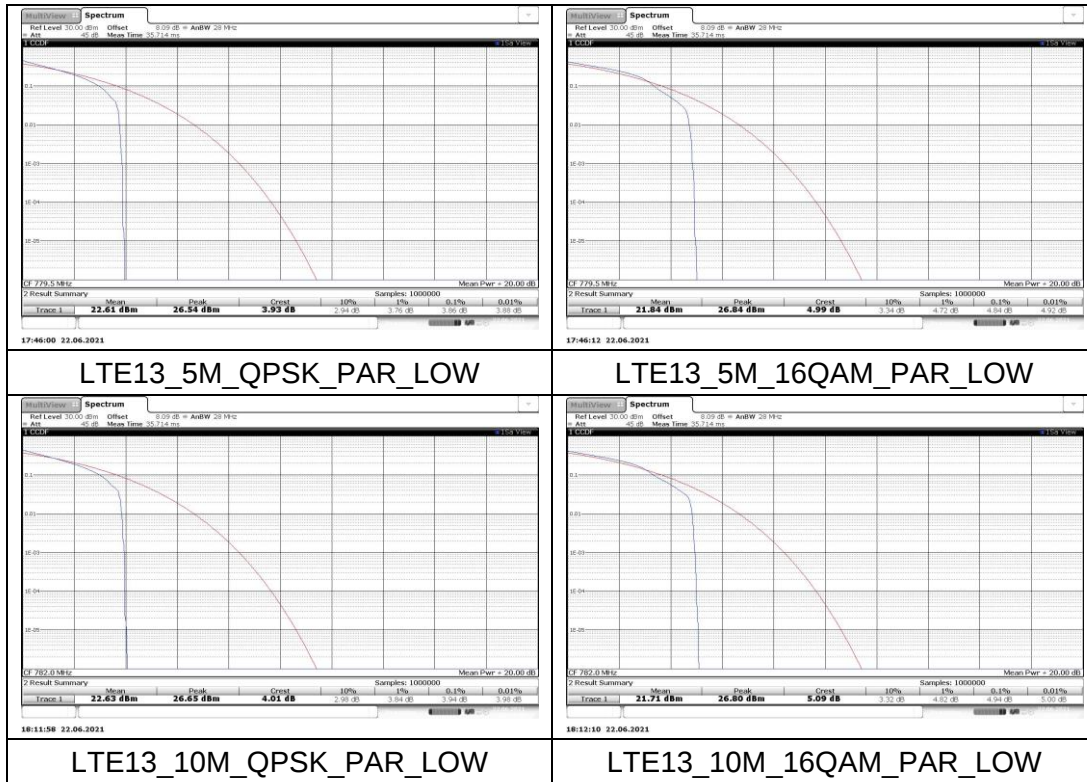






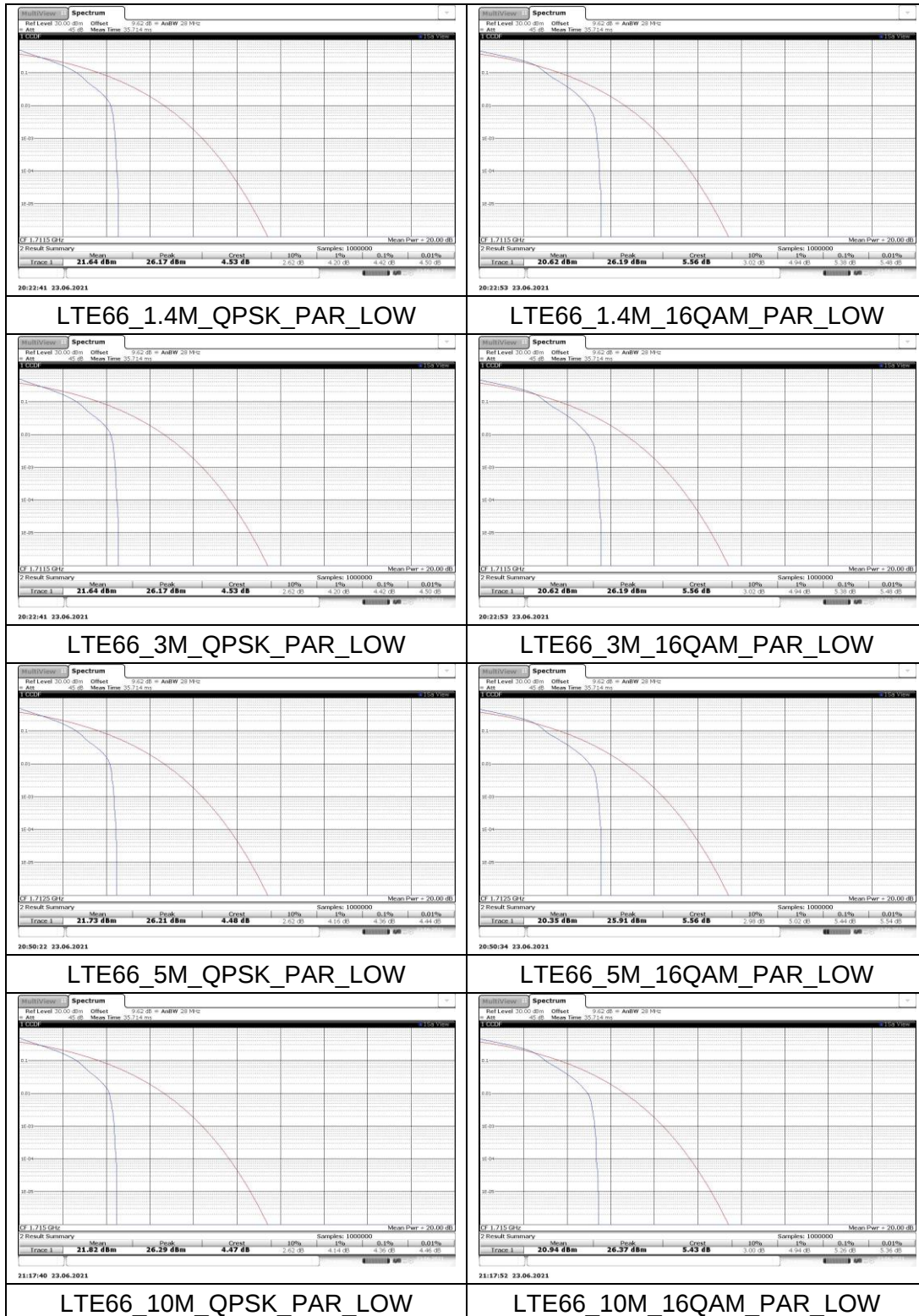
LTE Band 12

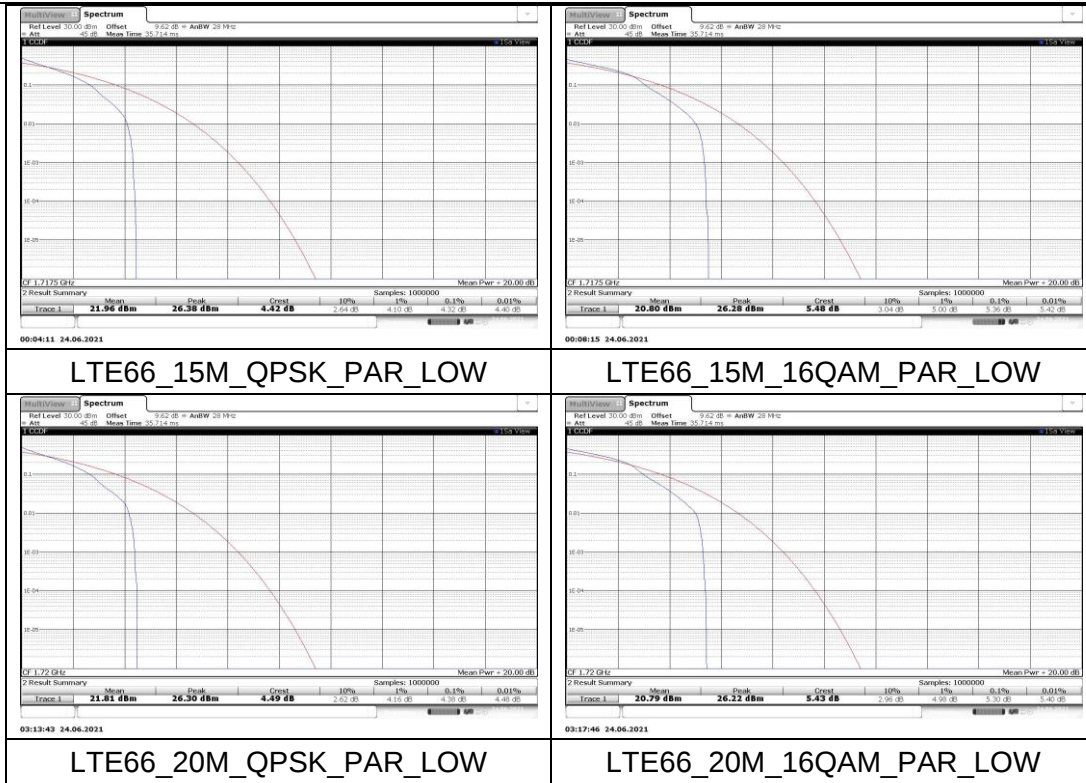


**LTE Band 13**



LTE Band 66





6.3 OCCUPIED BANDWIDTH

LIMITS

For reporting purposes only.

TEST PROCEDURE

KDB 971168 D01 Power Meas License Digital Systems v03r01.

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 the low, middle and high channel in each band. The -26dB bandwidth was also measured and recorded.

RESULTS

See the following pages.

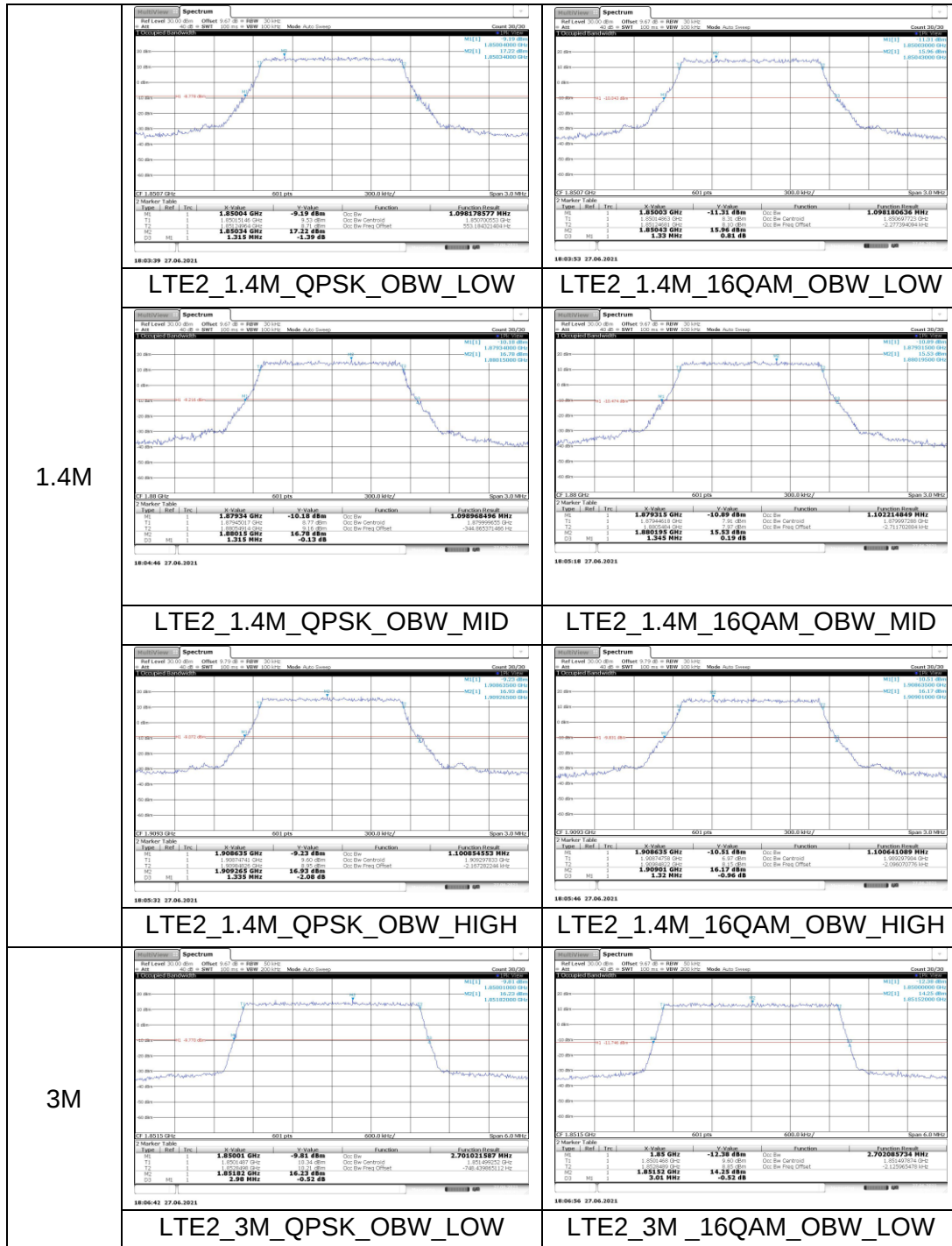
LTE Band	Bandwidth (MHz)	Channel	Modulation	The Maximum Measured OBW	
				99% OBW	-26dB BW
2	1.4	HIGH	QPSK	1.101	1.335
		MID	16QAM	1.102	1.345
	3	LOW	QPSK	2.701	2.980
		MID	16QAM	2.704	3.010
	5	HIGH	QPSK	4.517	5.010
		HIGH	16QAM	4.517	5.030
	10	LOW	QPSK	8.973	10.067
		LOW	16QAM	8.982	9.967
	15	LOW	QPSK	13.467	14.850
		LOW	16QAM	13.453	14.900
	20	LOW	QPSK	18.018	19.867
		LOW	16QAM	18.004	19.800
LTE Band	Bandwidth (MHz)	Channel	Modulation	The Maximum Measured OBW	
				99% OBW	-26dB BW
4	1.4	HIGH	QPSK	1.100	1.305
		HIGH	16QAM	1.102	1.335
	3	LOW	QPSK	2.699	3.010
		HIGH	16QAM	2.707	3.000
	5	HIGH	QPSK	4.513	5.080
		HIGH	16QAM	4.512	5.060
	10	HGIG	QPSK	8.986	10.000
		LOW	16QAM	8.988	10.000
	15	HIGH	QPSK	13.461	14.850
		LOW	16QAM	13.478	14.850
	20	LOW	QPSK	18.031	19.800
		HIGH	16QAM	17.989	19.733
LTE Band	Bandwidth (MHz)	Channel	Modulation	The Maximum Measured OBW	
				99% OBW	-26dB BW

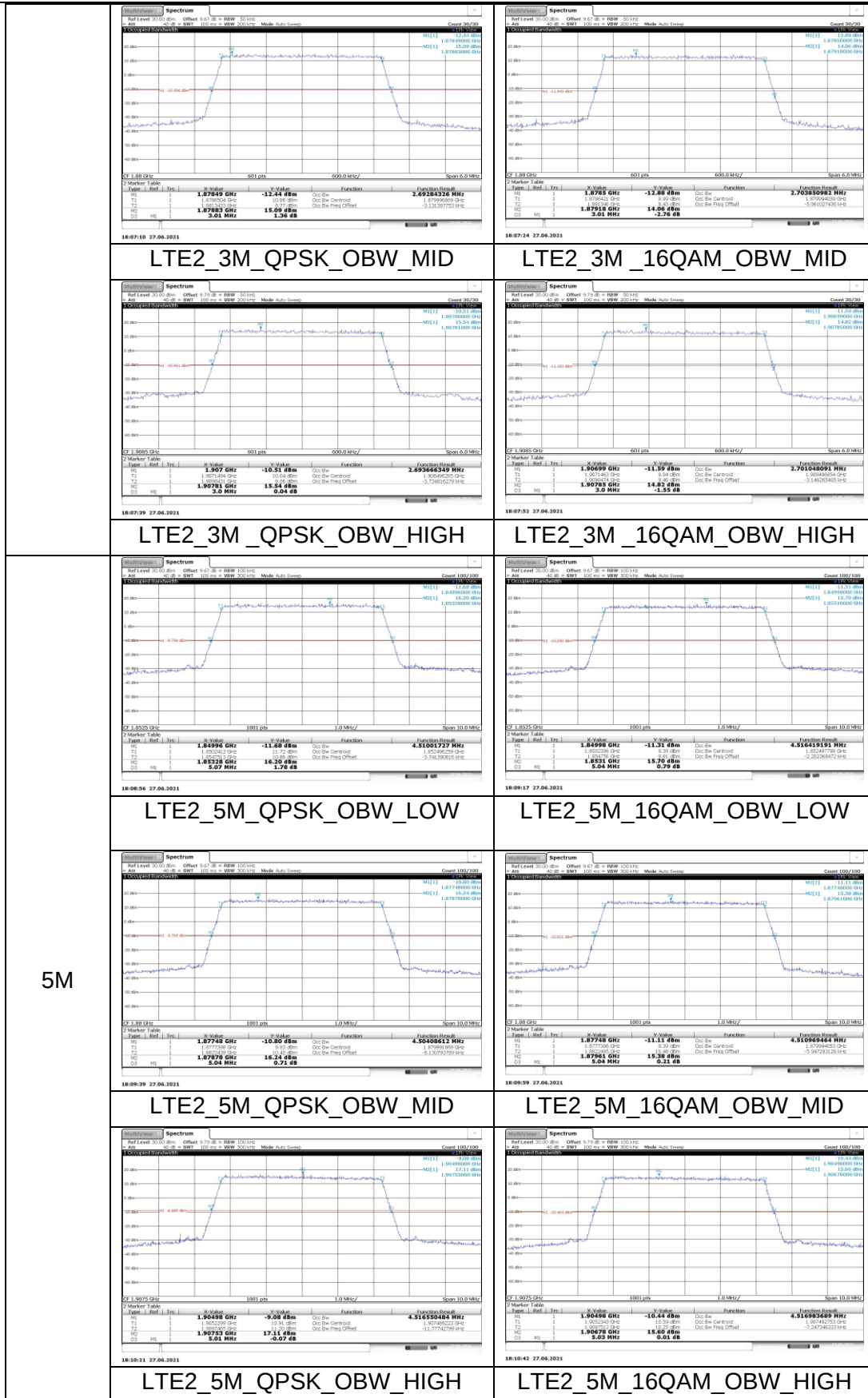


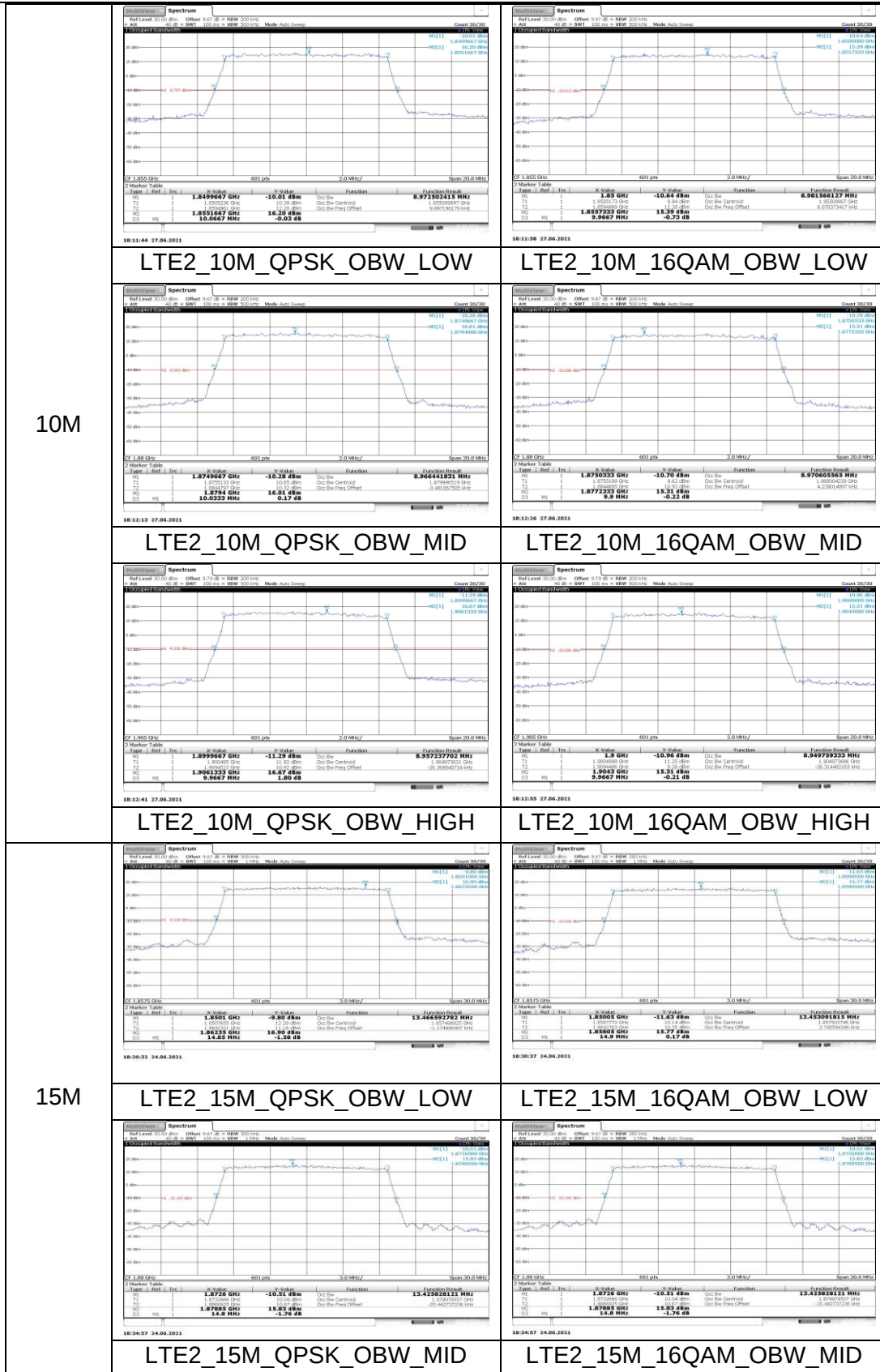
5	1.4	MID	QPSK	1.103	1.310
		LOW	16QAM	1.104	1.315
	3	HIGH	QPSK	2.699	2.990
		LOW	16QAM	2.702	3.010
	5	LOW	QPSK	4.520	5.050
		MID	16QAM	4.511	5.050
	10	LOW	QPSK	9.020	9.967
		HIGH	16QAM	9.018	10.033
LTE Band	Bandwidth (MHz)	Channel	Modulation	The Maximum Measured OBW	
				99% OBW	-26dB BW
12	1.4	HIGH	QPSK	1.100	1.315
		MID	16QAM	1.102	1.315
	3	MID	QPSK	2.699	2.990
		HIGH	16QAM	2.702	2.990
	5	MID	QPSK	4.525	5.070
		MID	16QAM	4.519	5.040
	10	MID	QPSK	9.013	10.067
		MID	16QAM	9.020	10.000
LTE Band	Bandwidth (MHz)	Channel	Modulation	The Maximum Measured OBW	
				99% OBW	-26dB BW
13	5	HIGH	QPSK	4.526	5.030
		HIGH	16QAM	4.522	5.090
	10	MID	QPSK	8.955	9.933
		LOW	16QAM	8.946	9.933
LTE Band	Bandwidth (MHz)	Channel	Modulation	The Maximum Measured OBW	
				99% OBW	-26dB BW
66	1.4	MID	QPSK	1.101	1.305
		HIGH	16QAM	1.102	1.305
	3	LOW	QPSK	2.700	3.010
		MID	16QAM	2.703	3.000
	5	MID	QPSK	4.516	5.030
		HIGH	16QAM	4.517	5.070
	10	LOW	QPSK	8.975	10.000
		LOW	16QAM	8.982	10.000
	15	MID	QPSK	13.475	14.850
		LOW	16QAM	13.483	14.750
	20	MID	QPSK	17.999	19.800
		MID	16QAM	17.985	19.733

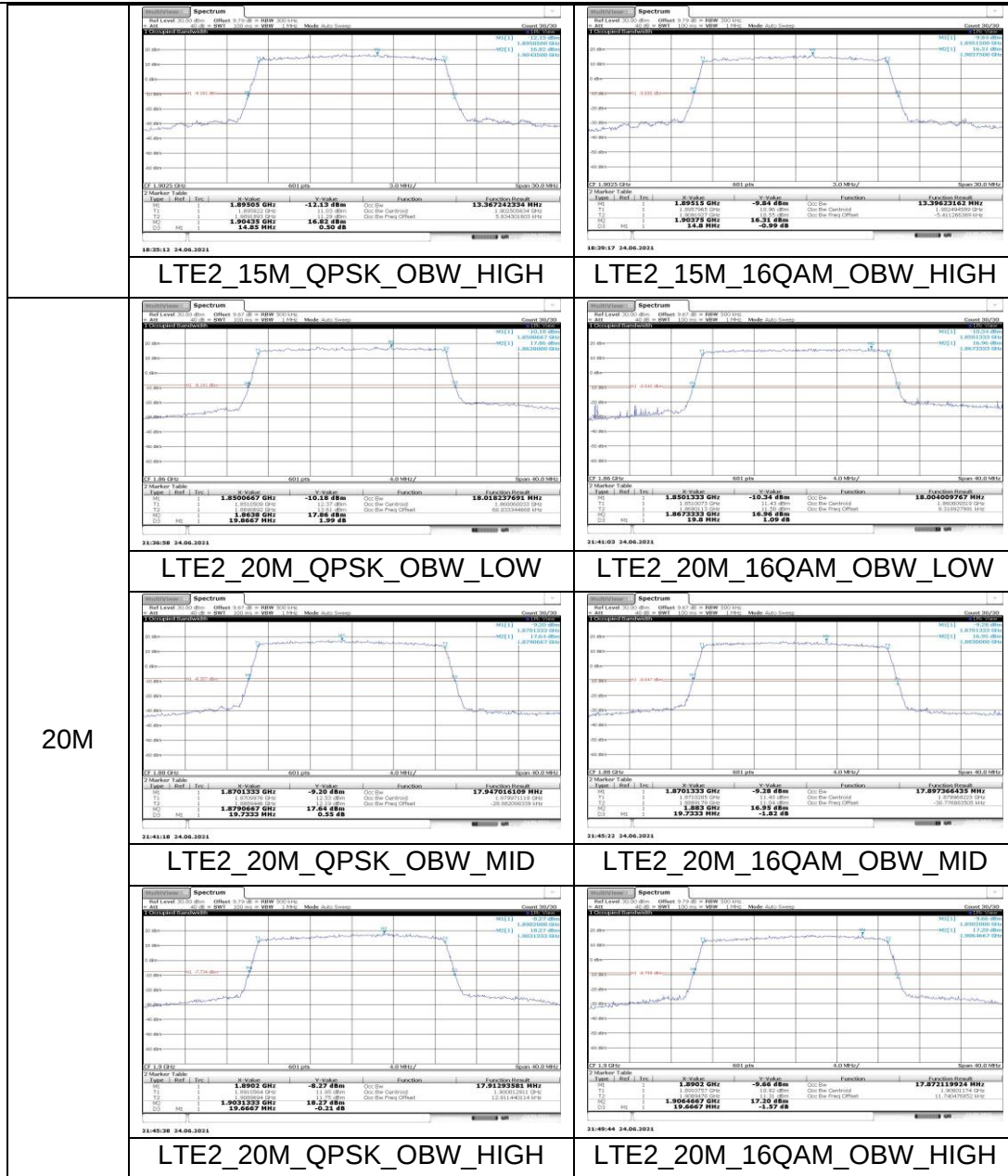


LTE Band 2











LTE Band 4

