



Prüfbericht-Nr.: Test report no.:	CN21DEDK(P27-WWAN) 001	Auftrags-Nr.: Order no.:	238495775	Seite 1 von 36 Page 1 of 36
Kunden-Referenz-Nr.: Client reference no.:	N/A	Auftragsdatum: Order date:	2020-12-29	
Auftraggeber: Client:	Kinship Partners, Inc. 1355 Market St., Suite 210, San Francisco, California, United States, 94103			
Prüfgegenstand: Test item:	Whistle Switch			
Bezeichnung / Typ-Nr.: Identification / Type no.:	Switch			
Auftrags-Inhalt: Order content:	FCC Part 27 Test report			
Prüfgrundlage: Test specification:	FCC 47CFR Part 27 Subpart C, H, L			
Wareneingangsdatum: Date of sample receipt:	2020-12-30			
Prüfmuster-Nr.: Test sample no:	A002978819-044 A002978819-009			
Prüfzeitraum: Testing period:	2021-01-09 - 2021-04-14			
Ort der Prüfung: Place of testing:	EMC/RF Taipei Testing Site			
Prüflaboratorium: Testing laboratory:	Taipei Testing Laboratories			
Prüfergebnis*: Test result*:	Pass			
überprüft von: reviewed by:			genehmigt von: authorized by:	
Datum: Date:	2021-04-14	Ausstellungsdatum: Issue date:	2021-04-14	
Stellung / Position:	David Huang Project Manager	Stellung / Position:	Brenda Chen Senior Project Manager	
Sonstiges / Other:				
Zustand des Prüfgegenstandes bei Anlieferung: Condition of the test item at delivery:		Prüfmuster vollständig und unbeschädigt Test item complete and undamaged		
* Legende:	1 = sehr gut P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	3 = befriedigend F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	4 = ausreichend N/A = nicht anwendbar
* Legend:	1 = very good P(ass) = passed a.m. test specification(s)	2 = good F(ail) = failed a.m. test specification(s)	3 = satisfactory F(ail) = failed a.m. test specification(s)	4 = sufficient N/A = not applicable
5 = mangelhaft N/T = nicht getestet				
5 = poor N/T = not tested				
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.				

TEST SUMMARY

Report Section	FCC Clause	Test Item	Result
5.1.1	2.1046	Conducted Output Power	Pass
	27.50(c)(10)	Effective Radiated Power	Pass
	27.50(d)(4)	Effective Isotropically Radiated Power	Pass
5.1.2	2.1055 27.54	Frequency Stability	Pass
5.1.3	27.50(d)(5)	Peak to Average Ratio	Pass
5.1.4	2.1049	Occupied Bandwidth and 26 dB Bandwidth	Pass
5.1.5	2.1051	Conducted Band Edge & Emission Mask	Pass
	27.53(h)		Pass
	27.53(g)		Pass
5.1.6	2.1051	Conducted Spurious Emissions	Pass
	27.53(h)		Pass
	27.53(g)		Pass
5.1.7	2.1053	Radiated Spurious Emissions	Pass
	27.53(h)		Pass
	27.53(g)		Pass

Note:

1. The mark "-" means that the standard applied to all the bands.
2. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

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APPENDIX A - TEST RESULT OF CONDUCTED

APPENDIX B - TEST RESULT OF RADIATED SPURIOUS EMISSIONS

APPENDIX SP - PHOTOGRAPHS TEST SETUP

APPENDIX EP - PHOTOGRAPHS OF EUT

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HISTORY OF THIS TEST REPORT

Report No.	Description	Date Issued
CN21DEDK(P27-WWAN) 001	Original Release	2021-04-14

1. General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix A - Test Result of Conducted

Appendix B - Test Result of Radiated Spurious Emissions

Appendix SP - Photographs Test Setup

Appendix EP - Photographs of EUT

Applied Standard and Test Levels

Radio
FCC 47 CFR Part 2
FCC 47 CFR Part 27
KDB 971168 D01 Power Meas License Digital Systems v03r01
ANSI/TIA/EIA-603-E 2016
ANSI C63.26-2015

1.2 Decision Rule of Conformity

The decision rule of conformity of this test report is following the requirements of the requested standard in the quotation, and agreed among testing laboratory and manufacturer (applicant) to exclude the consideration of Measurement Uncertainty, unless it is required by the specific standard.

2. Test Sites

2.1 Test Laboratory

Taipei Testing Laboratories

11F. No.758, Sec. 4, Bade Rd., Songshan Dist.
Taipei City 105
Taiwan (R.O.C.)

2.2 Test Facility

Taipei Testing Laboratories

No.458-18, Sec. 2, Fenliao Rd., Linkou Dist.,
New Taipei City 244
Taiwan (R.O.C.)
FCC Registration No.: 226631
ISED Registration No.: 25563

2.3 Traceability

All measurement equipment calibrations are traceable to NML(Taiwan)/NIST(USA) or where calibration is performed outside Taiwan, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically in a suitably accredited Calibration Lab. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.

2.5 Measurement Uncertainty

All measurement uncertainty values are shown with a coverage factor of $k=2$ to indicate a 95% level of confidence.

Emission Measurement Uncertainty

Parameter	Uncertainty
Radiated Emission (9 kHz ~ 30 MHz)	± 1.15 dB
Radiated Emission (30 MHz ~ 200 MHz)	± 1.32 dB
Radiated Emission (200 MHz ~ 1 GHz)	± 1.31 dB
Radiated Emission (1 GHz ~ 18 GHz)	± 1.53 dB
Radiated Emission (18 GHz ~ 40 GHz)	± 2.50 dB

3. General Product Information

3.1 Product Function and Intended Use

The EUT is a Whistle Switch. It contains a WWAN compatible module enabling the user to communicate data through a wireless interface.

For details refer to the User Guide, Data Sheet and Circuit Diagram.

3.2 System Details and Ratings

Basic Information of EUT

Item	EUT information
Kind of Equipment/Test Item	Whistle Switch
Type Identification	Switch
FCC ID	2AYHI-W05A

Technical Specification of EUT

Item	EUT information	
Operating Frequency	LTE-M1 Band 4 (1.4 MHz)	1710.7 ~ 1754.3 MHz
	LTE-M1 Band 4 (3 MHz)	1711.5 ~ 1753.5 MHz
	LTE-M1 Band 4 (5 MHz)	1712.5 ~ 1752.5 MHz
	LTE-M1 Band 4 (10 MHz)	1715.0 ~ 1750.0 MHz
	LTE-M1 Band 4 (15 MHz)	1717.5 ~ 1747.5 MHz
	LTE-M1 Band 4 (20 MHz)	1720.0 ~ 1745.0 MHz
	LTE-M1 Band 12 (1.4 MHz)	699.7 ~ 715.3 MHz
	LTE-M1 Band 12 (3 MHz)	700.5 ~ 714.5 MHz
	LTE-M1 Band 12 (5 MHz)	701.5 ~ 713.5 MHz
	LTE-M1 Band 12 (10 MHz)	704.0 ~ 711.0 MHz
Modulation	LTE-M1	QPSK, 16QAM
Operation Voltage	3.8Vdc	
Antenna Type	PIFA Antenna	
Antenna Gain (dBi)	LTE-M1 Band 4	-0.06
	LTE-M1 Band 12	-3.45
Accessory Device	Refer to 4.3	

Maximum ERP/EIRP and Emission Designator

Item	Band	Value
Maximum ERP/EIRP (mW)	LTE-M1 Band 4	131.22
	LTE-M1 Band 12	45.71
Emission Designator	LTE-M1 Band 4 (1.4 MHz)	1M12G7D
	LTE-M1 Band 4 (3 MHz)	1M11G7D
	LTE-M1 Band 4 (5 MHz)	1M11G7D
	LTE-M1 Band 4 (10 MHz)	1M12D7W
	LTE-M1 Band 4 (15 MHz)	1M14D7W
	LTE-M1 Band 4 (20 MHz)	1M12G7D
	LTE-M1 Band 12 (1.4 MHz)	1M11G7D
	LTE-M1 Band 12 (3 MHz)	1M11G7D
	LTE-M1 Band 12 (5 MHz)	1M13D7W
	LTE-M1 Band 12 (10 MHz)	1M12G7D

3.3 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram.

3.4 Submitted Documents

- Circuit Diagram
- Instruction Manual
- Rating Label
- Technical Description

4. Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

The equipment under test (EUT) was configured to measure its maximum power level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Setup for testing: Test samples make a communication with CMW500 and MT8821C which makes it possible to control them through a test software installed on a notebook computer.

This software was running on the laptop computer connected to the EUT. It was used to enable the operation modes listed as below.

Test Software	nRF Connect for Mobile_v4.24.3_apkpure.com
---------------	--

The samples were used as follows:

A002978819-044 for radiated

A002978819-009 for conducted

Full test was applied on all test modes, but only worst case was shown.

Effective Radiated Power (ERP) / Effective Isotropically Radiated Power (EIRP)

☒ Pre-Scan full test was applied on all test modes, but only worst case was shown.

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Band	Channel Bandwidth	Available Channel	Tested Channel	Modulation	Mode	Postion
-	LTE-M1 Band 4	20 MHz	20050 to 20300	20050, 20175, 20300	QPSK, 16QAM	1 RB	H-plane
	LTE-M1 Band 12	10 MHz	23060 to 23130	23060, 23095, 23130	QPSK, 16QAM	1 RB	

Frequency Stability

☒ Pre-Scan full test was applied on all test modes, but only worst case was shown.

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Band	Channel Bandwidth	Available Channel	Tested Channel	Modulation	Mode
-	LTE-M1 Band 4	1.4 MHz	19957 to 20393	19957, 20393	QPSK	1 RB
		3 MHz	19965 to 20385	19965, 20385	QPSK	1 RB
		5 MHz	19975 to 20375	19975, 20375	QPSK	1 RB
		10 MHz	20000 to 20350	20000, 20350	QPSK	1 RB
		15 MHz	20025 to 20325	20025, 20325	QPSK	1 RB
		20 MHz	20050 to 20300	20050, 20300	QPSK	1 RB
-	LTE-M1 Band 12	1.4 MHz	23017 to 23173	23017, 23173	QPSK	1 RB
		3 MHz	23025 to 23165	23025, 23165	QPSK	1 RB
		5 MHz	23035 to 23155	23035, 23155	QPSK	1 RB
		10 MHz	23060 to 23130	23060, 23130	QPSK	1 RB

Peak to Average Ratio

- ☒ Pre-Scan full test was applied on all test modes, but only worst case was shown.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Band	Channel Bandwidth	Available Channel	Tested Channel	Modulation	Mode
-	LTE-M1 Band 4	1.4 MHz	19957 to 20393	19957, 20175, 20393	QPSK, 16QAM	1 RB
		3 MHz	19965 to 20385	19965, 20175, 20385	QPSK, 16QAM	1 RB
		5 MHz	19975 to 20375	19975, 20175, 20375	QPSK, 16QAM	1 RB
		10 MHz	20000 to 20350	20000, 20175, 20350	QPSK, 16QAM	1 RB
		15 MHz	20025 to 20325	20025, 20175, 20325	QPSK, 16QAM	1 RB
		20 MHz	20050 to 20300	20050, 20175, 20300	QPSK, 16QAM	1 RB
-	LTE-M1 Band 12	1.4 MHz	23017 to 23173	23017, 23095, 23173	QPSK, 16QAM	1 RB
		3 MHz	23025 to 23165	23025, 23095, 23165	QPSK, 16QAM	1 RB
		5 MHz	23035 to 23155	23035, 23095, 23155	QPSK, 16QAM	1 RB
		10 MHz	23060 to 23130	23060, 23095, 23130	QPSK, 16QAM	1 RB

Occupied Bandwidth and 26 dB Bandwidth

- ☒ Pre-Scan full test was applied on all test modes, but only worst case was shown.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Band	Channel Bandwidth	Available Channel	Tested Channel	Modulation	Mode
-	LTE-M1 Band 4	1.4 MHz	19957 to 20393	19957, 20175, 20393	QPSK, 16QAM	Full RB
		3 MHz	19965 to 20385	19965, 20175, 20385	QPSK, 16QAM	Full RB
		5 MHz	19975 to 20375	19975, 20175, 20375	QPSK, 16QAM	Full RB
		10 MHz	20000 to 20350	20000, 20175, 20350	QPSK, 16QAM	Full RB
		15 MHz	20025 to 20325	20025, 20175, 20325	QPSK, 16QAM	Full RB
		20 MHz	20050 to 20300	20050, 20175, 20300	QPSK, 16QAM	Full RB
-	LTE-M1 Band 12	1.4 MHz	23017 to 23173	23017, 23095, 23173	QPSK, 16QAM	Full RB
		3 MHz	23025 to 23165	23025, 23095, 23165	QPSK, 16QAM	Full RB
		5 MHz	23035 to 23155	23035, 23095, 23155	QPSK, 16QAM	Full RB
		10 MHz	23060 to 23130	23060, 23095, 23130	QPSK, 16QAM	Full RB

Band Edge & Emission Mask

- ☒ Pre-Scan full test was applied on all test modes, but only worst case was shown.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Band	Channel Bandwidth	Available Channel	Tested Channel	Modulation	Mode
-	LTE-M1 Band 4	1.4 MHz	19957 to 20393	19957, 20393	QPSK, 16QAM	1 RB / Full RB
		3 MHz	19965 to 20385	19965, 20385	QPSK, 16QAM	1 RB / Full RB
		5 MHz	19975 to 20375	19975, 20375	QPSK, 16QAM	1 RB / Full RB
		10 MHz	20000 to 20350	20000, 20350	QPSK, 16QAM	1 RB / Full RB
		15 MHz	20025 to 20325	20025, 20325	QPSK, 16QAM	1 RB / Full RB
		20 MHz	20050 to 20300	20050, 20300	QPSK, 16QAM	1 RB / Full RB
-	LTE-M1 Band 12	1.4 MHz	23017 to 23173	23017, 23173	QPSK, 16QAM	1 RB / Full RB
		3 MHz	23025 to 23165	23025, 23165	QPSK, 16QAM	1 RB / Full RB
		5 MHz	23035 to 23155	23035, 23155	QPSK, 16QAM	1 RB / Full RB
		10 MHz	23060 to 23130	23060, 23130	QPSK, 16QAM	1 RB / Full RB

Conducted Spurious Emissions

- ☒ Pre-Scan full test was applied on all test modes, but only worst case was shown.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Band	Channel Bandwidth	Available Channel	Tested Channel	Modulation	Mode
-	LTE-M1 Band 4	20 MHz	20050 to 20300	20050, 20175, 20300	QPSK	1 RB
	LTE-M1 Band 12	10 MHz	23060 to 23130	23060, 23095, 23130	QPSK	1 RB

Radiated Spurious Emissions

- ☒ Pre-Scan full test was applied on all test modes, but only worst case was shown.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Band	Channel Bandwidth	Available Channel	Tested Channel	Modulation	Mode	Position
-	LTE-M1 Band 4	20 MHz	20050 to 20300	20050, 20175, 20300	QPSK	1 RB	H-plane
	LTE-M1 Band 12	10 MHz	23060 to 23130	23060, 23095, 23130	QPSK	1 RB	H-plane

Test Condition

Test Item	Ambient Temperature	Relative Humidity	Tested by
ERP / EIRP	20.9-21 °C	59.8-65.5 %	Eagle Tsai
Frequency Stability	20.9-21 °C	59.8-65.5 %	Chun-Yi Wu
Peak to Average Ratio	20.9-21 °C	59.8-65.5 %	Chun-Yi Wu
Occupied Bandwidth and 26 dB Bandwidth	20.9-21 °C	59.8-65.5 %	Chun-Yi Wu
Band Edge & Emission Mask	20.9-21 °C	59.8-65.5 %	Chun-Yi Wu
Conducted Spurious Emissions	20.9-21 °C	59.8-65.5 %	Chun-Yi Wu
Radiated Spurious Emissions	18.6-20.6 °C	50-55 %	Eagle Tsai

4.3 Special Accessories and Auxiliary Equipment

The product has been tested together with the following additional accessories:

Accessory of EUT

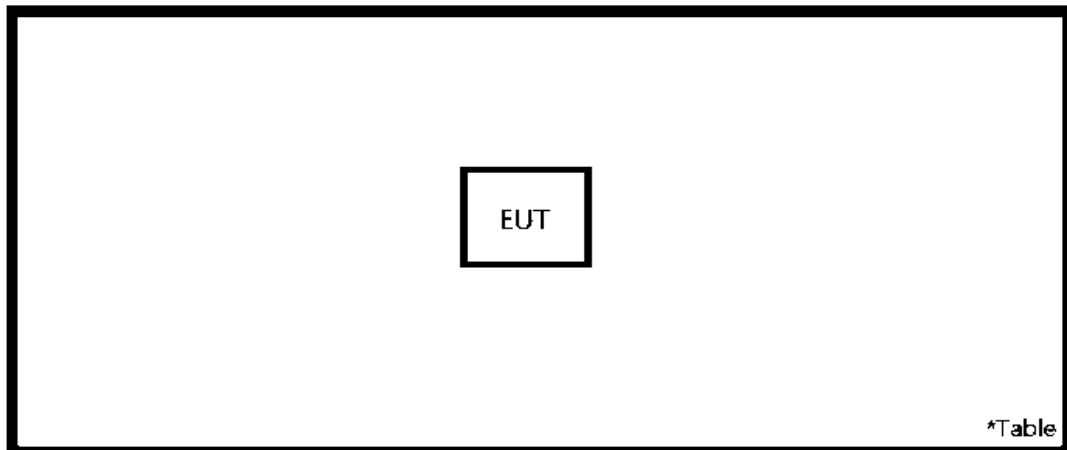
No.	Description	Brand	Model	S/N	Remark
A	Micro Usb Cable	A.P.G	A.P.G001	-	100cm shielded cable w/o core
					Radiated Test
-	Battery	A.P.G	TBB204900189	-	-

Support Unit

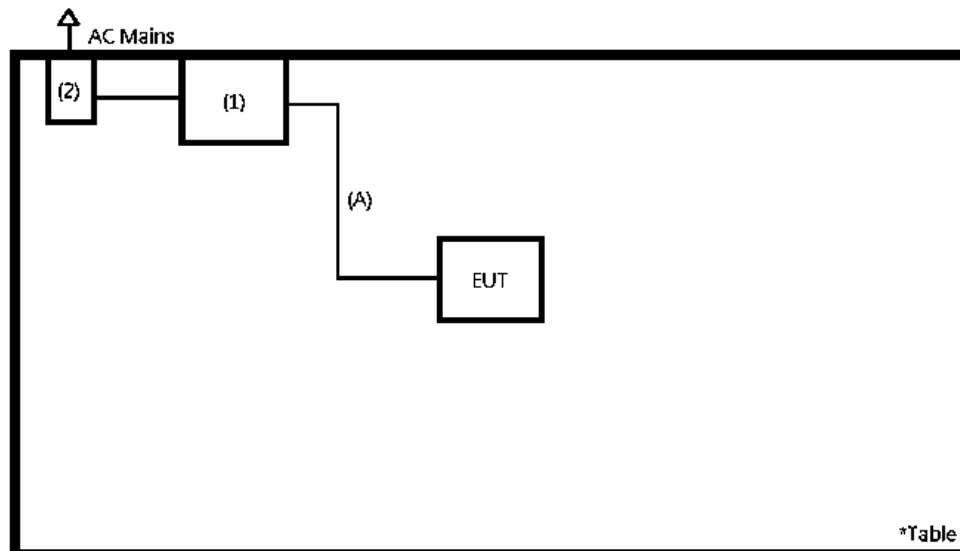
No.	Description	Brand	Model	S/N	Remark
Radiated Test					
-	Fixture	A.P.G	2045WS	-	-
1	Notebook	Lenovo	TP00094F	PF-1V4YV0	-
2	Adapter	Lenovo	ADLX65YLC3A	N/A	180cm shielded cable w/o core
-	Radio Communication Aalyzer	Anritsu	MT8821C	6262044753	-
-	Wireless Communication Tester	R&S	CMW500	166923	-
Conducted Test					
-	Notebook	HP	TPN-C139	CND93662VF	-

4.4 Test Setup Diagram

<EIRP>



<Radiated Emission>



5. Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Conducted Output Power and ERP/EIRP

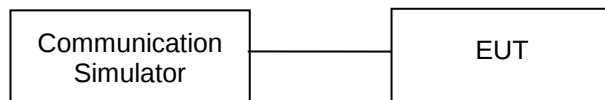
Limit

According to §27.50(d)(4): The EIRP must not exceed 1 Watts.
According to §27.50(c)(10): The ERP must not exceed 3 Watts.

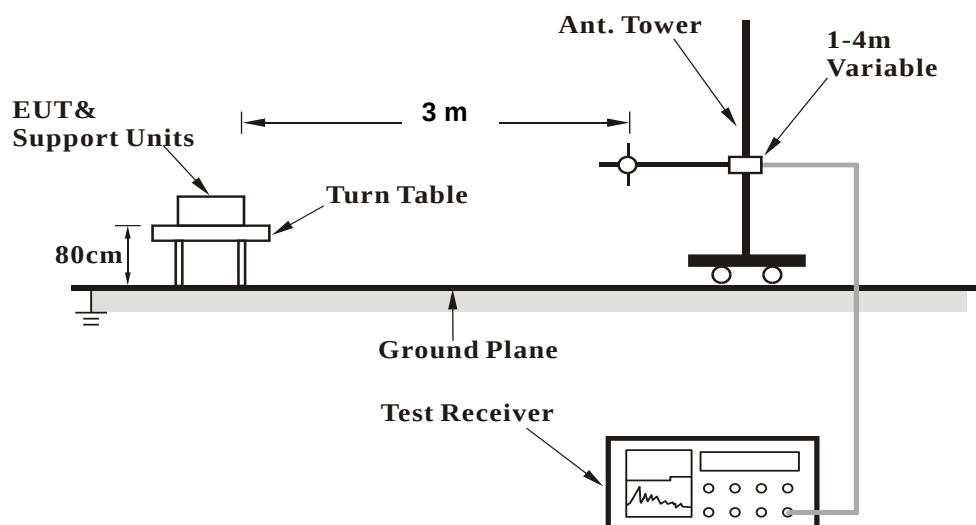
Kind of Test Site Shielded room

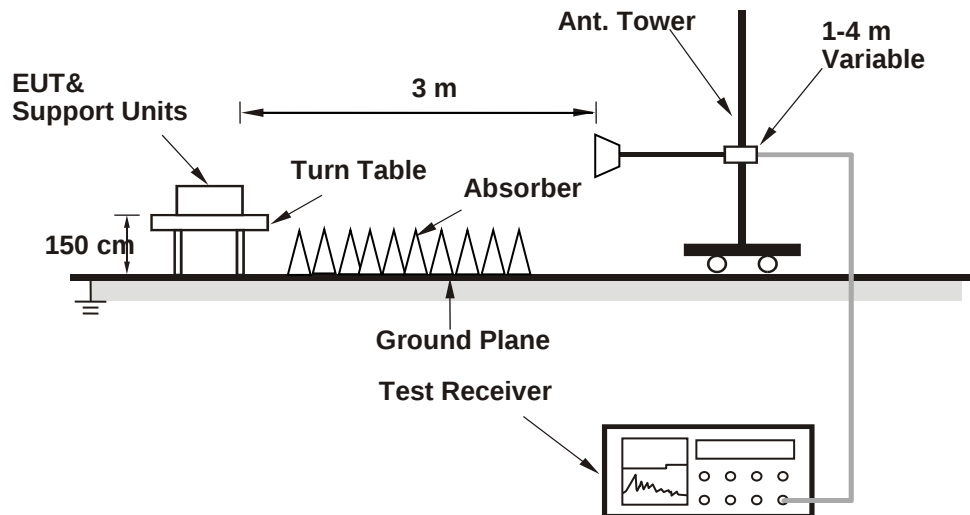
Test Setup

<Conducted Output Power>



<Radiated Emission below or equal to 1 GHz>



<Radiated Emission above 1 GHz>

Test Instruments

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date
Signal Analyzer	R&S	FSV40	101508	2020/3/16	2021/3/15
Receiver	R&S	ESR7	102108	2020/4/22	2021/4/21
Bilog Antenna	SCHWARZBECK	VULB-9168	00950	2021/1/25	2022/1/24
Horn Antenna	ETS-Lindgren	3117	00218930	2020/12/1	2021/11/30
LF-AMP	Agilent	8447D	2727A05146	2021/2/1	2022/1/31
HF-AMP + AC source	EMCI	EMC184045SE	980657	2021/2/1	2022/1/31
Microwave Cable	HUBER+SUHNER	SUCOFLEX 104EA	800056/4EA	2020/3/25	2021/3/24
Microwave Cable	HUBER+SUHNER	SUCOFLEX 104	804680/4	2020/3/25	2021/3/24
Microwave Cable	HUBER+SUHNER	SUCOFLEX 104	MY37202/4	2020/3/25	2021/3/24
Microwave Cable	HUBER+SUHNER	SUCOFLEX 102EA	800898/2EA	2020/4/22	2021/4/21
Microwave Cable	HUBER+SUHNER	SUCOFLEX 102EA	800901/2EA	2020/4/22	2021/4/21
Microwave Cable	HUBER+SUHNER	SUCOFLEX 102EA	801027/2EA	2020/4/22	2021/4/21
Wireless Communication Tester	R&S	CMW500	166923	2020/2/11	2021/2/10
Radio Communication Analyzer	Anritsu	MT8821C	6262044753	2021/1/29	2022/1/28

Test Procedures**Conducted Power Measurement:**

The EUT was set up for the maximum power with WWAN link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

EIRP / ERP Measurement:

- a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 5 MHz for WCDMA and 10 MHz for LTE mode.
- b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m (below or equal 1 GHz) and/or 1.5 m (above 1 GHz) height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1 m to 4 m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- c. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a tx cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to "Read Value" of step b. Record the power level of S.G.
- d. $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}$. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, $E.R.P \text{ power} = E.I.R.P \text{ power} - 2.15 \text{ dB}$.
- e. The ERP / EIRP testing was performed in the X(E1), Y(H) and Z(E2) axis orientation. The worst-case Axis orientation is recorded in this test report.

Test Result
<Conducted Output Power>

LTE-M1 Band 4										
Bandwidth	1.4 MHz					3 MHz				
Modulation	RB Size / Offset	NB Index	Channel / Frequency (MHz)			RB Size / Offset	NB Index	Channel / Frequency (MHz)		
			19957/1710.7	20175/1732.5	20393/1754.3			19965/1711.5	20175/1732.5	20385/1753.5
QPSK	1/0	0	22.14	22.76	22.19	1/0	0	22.18	22.80	22.23
	1/5	0	22.05	22.67	22.10	1/5	1	22.09	22.71	22.14
	3/0	0	21.94	22.56	21.99	3/0	0	21.98	22.60	22.03
	3/3	0	21.74	22.36	21.79	3/3	1	21.78	22.40	21.83
	6/0	0	21.85	22.47	21.90	6/0	0	21.97	22.59	22.02
	-	-	-	-	-	6/0	1	21.89	22.51	21.94
16QAM	1/0	0	21.60	21.88	21.85	1/0	0	22.00	21.65	21.93
	1/4	0	21.98	22.26	22.23	1/4	1	22.50	22.03	22.31
	3/0	0	22.11	22.39	22.36	3/0	0	22.50	22.16	22.44
	3/2	0	22.15	22.43	22.40	3/2	1	22.50	22.20	22.48
	5/0	0	21.72	22.00	21.97	5/0	0	22.50	21.77	22.05
	-	-	-	-	-	5/0	1	22.00	21.66	21.94
Bandwidth	5 MHz					10 MHz				
Modulation	RB Size / Offset	NB Index	Channel / Frequency (MHz)			RB Size / Offset	NB Index	Channel / Frequency (MHz)		
			19975/1712.5	20175/1732.5	20375/1752.5			20000/1715.0	20175/1732.5	20350/1750.0
QPSK	1/0	0	22.18	22.80	22.23	1/0	0	22.24	22.86	22.29
	1/0	3	21.98	22.60	22.03	1/0	3	22.04	22.66	22.09
	1/5	0	22.09	22.71	22.14	1/5	4	22.15	22.77	22.20
	1/5	3	22.04	22.66	22.09	1/5	7	22.10	22.72	22.15
	3/0	0	21.98	22.60	22.03	3/0	0	22.04	22.66	22.09
	3/3	3	21.78	22.40	21.83	3/3	7	21.84	22.46	21.89
	6/0	0	21.97	22.59	22.02	6/0	0	22.03	22.65	22.08
	6/0	3	21.89	22.51	21.94	6/0	7	21.95	22.57	22.00
16QAM	1/0	0	21.65	21.93	21.90	1/0	0	21.71	21.99	21.96
	1/0	3	22.15	22.43	22.40	1/0	3	22.21	22.49	22.46
	1/4	0	22.03	22.31	22.28	1/4	4	22.09	22.37	22.34
	1/4	3	21.97	22.25	22.22	1/4	7	22.03	22.31	22.28
	3/0	0	22.16	22.44	22.41	3/0	0	22.22	22.50	22.47
	3/2	3	22.20	22.48	22.45	3/2	7	22.26	22.54	22.51
	5/0	0	21.77	22.05	22.02	5/0	0	21.83	22.11	22.08
	5/0	3	21.66	21.94	21.91	5/0	7	21.72	22.00	21.97

Bandwidth	15 MHz					20 MHz				
Modulation	RB Size / Offset	NB Index	Channel / Frequency (MHz)			RB Size / Offset	NB Index	Channel / Frequency (MHz)		
			20025/1717.5	20175/1732.5	20325/1747.5			20050/1720.0	20175/1732.5	20300/1745
QPSK	1/0	0	22.29	22.91	22.34	1/0	0	22.59	23.21	22.64
	1/0	3	22.09	22.71	22.14	1/0	3	22.39	23.01	22.44
	1/5	8	22.20	22.82	22.25	1/5	12	22.50	23.12	22.55
	1/5	11	22.15	22.77	22.20	1/5	15	22.45	23.07	22.50
	3/0	0	22.09	22.71	22.14	3/0	0	22.39	23.01	22.44
	3/3	11	21.89	22.51	21.94	3/3	15	22.19	22.81	22.24
	6/0	0	22.08	22.70	22.13	6/0	0	22.38	22.97	22.43
	6/0	11	22.00	22.62	22.05	6/0	15	22.30	22.92	22.35
16QAM	1/0	0	21.76	22.04	22.01	1/0	0	22.06	22.34	22.31
	1/0	3	22.26	22.54	22.51	1/0	3	22.56	22.84	22.81
	1/4	8	22.14	22.42	22.39	1/4	12	22.44	22.72	22.69
	1/4	11	22.08	22.36	22.33	1/4	15	22.38	22.66	22.63
	3/0	0	22.27	22.55	22.52	3/0	0	22.57	22.85	22.82
	3/2	11	22.31	22.59	22.56	3/2	15	22.61	22.89	22.86
	5/0	0	21.88	22.16	22.13	5/0	0	22.18	22.46	22.43
	5/0	11	21.77	22.05	22.02	5/0	15	22.07	22.35	22.32

LTE-M1 Band 12										
Bandwidth	1.4 MHz					3 MHz				
Modulation	RB Size / Offset	NB Index	Channel / Frequency (MHz)			RB Size / Offset	NB Index	Channel / Frequency (MHz)		
			23017/699.7	23095/707.5	23173/715.3			23025/700.5	23095/707.5	23165/714.5
QPSK	1/0	0	22.73	23.08	22.77	1/0	0	22.77	23.12	22.81
	1/5	0	22.67	23.02	22.71	1/5	1	22.71	23.06	22.75
	3/0	0	22.65	23.00	22.69	3/0	0	22.69	23.04	22.73
	3/3	0	22.61	22.96	22.65	3/3	1	22.65	23.00	22.69
	6/0	0	22.36	22.71	22.40	6/0	0	22.40	22.75	22.44
	-	-	-	-	-	6/0	1	22.13	22.48	22.17
16QAM	1/0	0	22.41	22.61	22.31	1/0	0	22.44	22.64	22.34
	1/4	0	22.18	22.38	22.08	1/4	1	22.21	22.41	22.11
	3/0	0	22.16	22.36	22.06	3/0	0	22.19	22.39	22.09
	3/2	0	22.23	22.43	22.13	3/2	1	22.26	22.46	22.16
	5/0	0	22.24	22.44	22.14	5/0	0	22.27	22.47	22.17
	-	-	-	-	-	5/0	1	22.40	22.49	22.30
Bandwidth	5 MHz					10 MHz				
Modulation	RB Size	NB Index	Channel / Frequency (MHz)			RB Size	NB Index	Channel / Frequency (MHz)		
			23035/701.5	23095/707.5	23155/713.5			23060/704.0	23095/707.5	23130/711.0
QPSK	1/0	0	22.80	23.15	22.84	1/0	0	22.87	23.22	22.91
	1/0	3	22.63	22.98	22.67	1/0	3	22.70	23.05	22.74
	1/5	0	22.74	23.09	22.78	1/5	4	22.81	23.16	22.85
	1/5	3	22.69	23.04	22.73	1/5	7	22.76	23.11	22.80
	3/0	0	22.72	23.07	22.76	3/0	0	22.79	23.14	22.83
	3/3	3	22.68	23.03	22.72	3/3	7	22.75	23.10	22.79
	6/0	0	22.43	22.78	22.47	6/0	0	22.50	22.85	22.54
	6/0	3	22.16	22.51	22.20	6/0	7	22.23	22.58	22.27
16QAM	1/0	0	22.47	22.67	22.37	1/0	0	22.54	22.74	22.44
	1/0	3	22.24	22.44	22.14	1/0	3	22.31	22.51	22.21
	1/4	0	22.16	22.36	22.06	1/4	4	22.23	22.43	22.13
	1/4	3	22.25	22.45	22.15	1/4	7	22.32	22.52	22.22
	3/0	0	22.22	22.42	22.12	3/0	0	22.29	22.49	22.19
	3/2	3	22.29	22.49	22.19	3/2	7	22.36	22.56	22.26
	5/0	0	22.30	22.50	22.20	5/0	0	22.37	22.57	22.27
	5/0	3	22.43	22.63	22.33	5/0	7	22.50	22.70	22.40

<ERP / EIRP>

LTE-M1 Band 4_Channel Bandwidth_20M							
QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
H	20050	1720.0	-28.98	44.44	15.46	35.16	H
	20175	1732.5	-29.49	45.13	15.64	36.64	
	20300	1745.0	-27.66	44.63	16.97	49.77	
	20050	1720.0	-24.86	45.43	20.57	114.02	V
	20175	1732.5	-24.66	45.75	21.09	128.53	
	20300	1745.0	-25.12	46.30	21.18	131.22	
16QAM							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
H	20050	1720.0	-29.23	44.44	15.21	33.19	H
	20175	1732.5	-29.66	45.13	15.47	35.24	
	20300	1745.0	-28.39	44.63	16.24	42.07	
	20050	1720.0	-25.66	45.43	19.77	94.84	V
	20175	1732.5	-25.01	45.75	20.74	118.58	
	20300	1745.0	-25.33	46.30	20.97	125.03	

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB)

LTE-M1 Band 12_Channel Bandwidth_10M							
QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (mW)	Polarization (H/V)
H	23060	704	-27.00	34.51	5.36	3.44	H
	23095	707.5	-27.43	34.75	5.17	3.29	
	23130	711	-27.25	34.67	5.27	3.37	
	23060	704	-18.32	36.79	16.32	42.85	V
	23095	707.5	-18.12	36.87	16.60	45.71	
	23130	711	-18.54	36.98	16.29	42.56	
16QAM							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (mW)	Polarization (H/V)
H	23060	704	-27.89	34.51	4.47	2.80	H
	23095	707.5	-27.98	34.75	4.62	2.90	
	23130	711	-28.04	34.67	4.48	2.81	
	23060	704	-19.34	36.79	15.30	33.88	V
	23095	707.5	-19.35	36.87	15.37	34.43	
	23130	711	-19.39	36.98	15.44	34.99	

Note: ERP (dBm) = Reading (dBm) + Correction Factor (dB) – 2.15

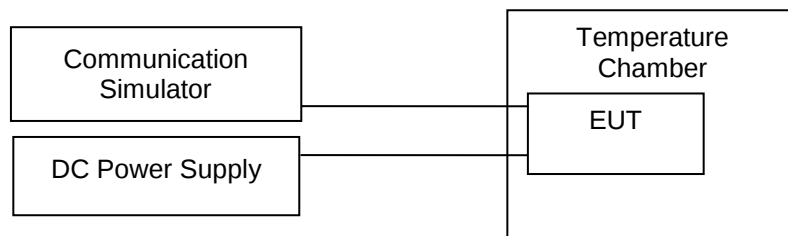
5.1.2 Frequency Stability

Limit

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

Kind of Test Site Shielded room

Test Setup



Test Instruments

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date	Test Date	
						From	Until
Wireless Communication Tester	R&S	CMW500	166923	2020/2/11	2021/2/10	2021/1/12	2021/1/19
Radio Communication Analyzer	Anritsu	MT8821C	6262044753	2021/1/29	2022/1/28	2021/1/12	2021/1/19
Thermal Chamber	Giant Force	GHT-150-40-CP-SD	MAA1902-010	2020/3/10	2021/3/9	2021/1/12	2021/1/19

Test Procedure

- Device is placed at the temperature chamber. The temperature chamber could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.
- EUT is connected the external power supply to control the DC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.
- The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the ± 0.5 °C during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

Test Results

LTE-M1 Band 4 1.4 MHz				
Frequency Error versus Voltage				
Power Supply (Vdc)	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.35	1710.70	-0.013199	1754.30	-0.002099
3.8	1710.70	0.006430	1754.30	-0.007410
3.35	1710.70	0.004410	1754.30	-0.001022
Frequency Error versus Temperature				
Temperature (°C)	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
50	1710.70	-0.008692	1754.30	0.000482
40	1710.70	-0.014806	1754.30	0.008046
30	1710.70	-0.002912	1754.30	-0.002170
20	1710.70	0.006430	1754.30	-0.007410
10	1710.70	-0.013329	1754.30	0.010557
0	1710.70	0.012220	1754.30	-0.002131
-10	1710.70	0.006587	1754.30	-0.000679

LTE-M1 Band 4 3 MHz				
Frequency Error versus Voltage				
Power Supply (Vdc)	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.35	1711.50	0.001711	1753.50	0.012187
3.8	1711.50	0.007011	1753.50	0.005703
3.35	1711.50	0.009589	1753.50	-0.006391
Frequency Error versus Temperature				
Temperature (°C)	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
50	1711.50	0.011498	1753.50	-0.000646
40	1711.50	-0.012965	1753.50	-0.010104
30	1711.50	0.009264	1753.50	0.008555
20	1711.50	0.007011	1753.50	0.005703
10	1711.50	0.005721	1753.50	-0.005773
0	1711.50	-0.012812	1753.50	0.008046
-10	1711.50	-0.011469	1753.50	-0.000623

LTE-M1 Band 4_5 MHz				
Frequency Error versus Voltage				
Power Supply (Vdc)	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.35	1712.50	0.014061	1752.50	0.001998
3.8	1712.50	0.005843	1752.50	-0.015398
3.35	1712.50	0.002279	1752.50	-0.003453
Frequency Error versus Temperature				
Temperature (°C)	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
50	1712.50	-0.010589	1752.50	-0.004974
40	1712.50	0.009250	1752.50	-0.001770
30	1712.50	0.006325	1752.50	-0.013474
20	1712.50	0.005843	1752.50	-0.015398
10	1712.50	0.001845	1752.50	-0.000838
0	1712.50	-0.003637	1752.50	-0.013474
-10	1712.50	0.010120	1752.50	-0.013316

LTE-M1 Band 4_10 MHz				
Frequency Error versus Voltage				
Power Supply (Vdc)	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.35	1715.00	0.004046	1750.00	0.004282
3.8	1715.00	-0.016360	1750.00	-0.013117
3.35	1715.00	0.003028	1750.00	-0.014240
Frequency Error versus Temperature				
Temperature (°C)	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
50	1715.00	0.011683	1750.00	-0.014631
40	1715.00	0.004035	1750.00	-0.009669
30	1715.00	0.006406	1750.00	0.013853
20	1715.00	-0.016360	1750.00	-0.013117
10	1715.00	0.000298	1750.00	0.014027
0	1715.00	-0.003498	1750.00	-0.008620
-10	1715.00	0.009057	1750.00	0.003244

LTE-M1 Band 4_15 MHz				
Frequency Error versus Voltage				
Power Supply (Vdc)	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.35	1717.50	0.013319	1747.50	0.011196
3.8	1717.50	-0.014607	1747.50	-0.015398
3.35	1717.50	0.006517	1747.50	-0.006660
Frequency Error versus Temperature				
Temperature (°C)	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
50	1717.50	0.008091	1747.50	0.003486
40	1717.50	-0.011083	1747.50	0.009832
30	1717.50	-0.010632	1747.50	-0.013663
20	1717.50	-0.014607	1747.50	-0.015398
10	1717.50	-0.012527	1747.50	-0.007623
0	1717.50	0.012527	1747.50	-0.012173
-10	1717.50	-0.011249	1747.50	-0.011381

LTE-M1 Band 4_20 MHz				
Frequency Error versus Voltage				
Power Supply (Vdc)	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.35	1720.00	0.004588	1745.00	-0.000257
3.8	1720.00	-0.002921	1745.00	-0.014257
3.35	1720.00	-0.013325	1745.00	0.007149
Frequency Error versus Temperature				
Temperature (°C)	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
50	1720.00	-0.006427	1745.00	-0.014257
40	1720.00	-0.005259	1745.00	-0.011406
30	1720.00	-0.006427	1745.00	-0.014257
20	1720.00	-0.002921	1745.00	-0.014257
10	1720.00	0.004674	1745.00	0.003422
0	1720.00	-0.005843	1745.00	-0.007414
-10	1720.00	0.007596	1745.00	0.005703

LTE-M1 Band 12_1.4 MHz				
Frequency Error versus Voltage				
Power Supply (Vdc)	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.35	699.70	-0.002252	715.30	-0.010042
3.8	699.70	0.011691	715.30	0.010261
3.35	699.70	-0.001570	715.30	-0.009043
Frequency Error versus Temperature				
Temperature (°C)	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
50	699.70	-0.008419	715.30	-0.004452
40	699.70	-0.011016	715.30	0.013629
30	699.70	-0.000616	715.30	0.011740
20	699.70	0.011691	715.30	0.010261
10	699.70	0.005967	715.30	-0.011505
0	699.70	-0.003031	715.30	-0.009861
-10	699.70	-0.013438	715.30	0.010433

LTE-M1 Band 12_3 MHz				
Frequency Error versus Voltage				
Power Supply (Vdc)	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.35	700.50	0.004091	714.50	0.010719
3.8	700.50	0.009933	714.50	0.009125
3.35	700.50	0.011301	714.50	-0.008284
Frequency Error versus Temperature				
Temperature (°C)	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
50	700.50	0.012766	714.50	0.010701
40	700.50	-0.010396	714.50	0.014027
30	700.50	-0.003401	714.50	0.013522
20	700.50	0.009933	714.50	0.009125
10	700.50	0.010389	714.50	-0.010340
0	700.50	0.010074	714.50	0.004093
-10	700.50	-0.002813	714.50	0.007855

LTE-M1 Band 12_5 MHz				
Frequency Error versus Voltage				
Power Supply (Vdc)	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.35	701.50	0.000362	713.50	-0.005076
3.8	701.50	0.010517	713.50	0.001711
3.35	701.50	-0.012350	713.50	-0.008662
Frequency Error versus Temperature				
Temperature (°C)	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
50	701.50	-0.004257	713.50	-0.004257
40	701.50	0.014899	713.50	0.014899
30	701.50	-0.003274	713.50	-0.003274
20	701.50	0.010517	713.50	0.010517
10	701.50	0.006496	713.50	0.006496
0	701.50	0.004075	713.50	0.004075
-10	701.50	-0.011735	713.50	-0.011735

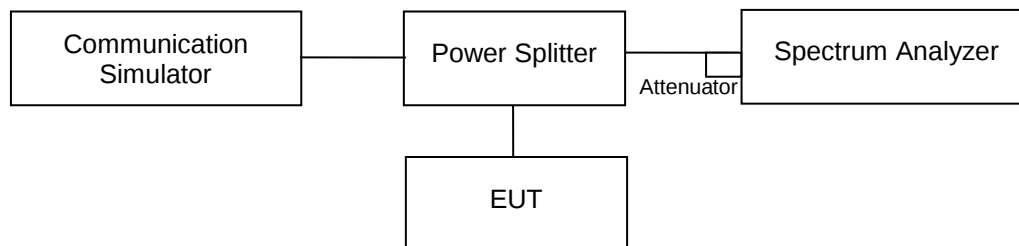
LTE-M1 Band 12_10 MHz				
Frequency Error versus Voltage				
Power Supply (Vdc)	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.35	704.00	-0.001580	711.00	0.008274
3.8	704.00	0.012270	711.00	0.005133
3.35	704.00	-0.011949	711.00	0.001699
Frequency Error versus Temperature				
Temperature (°C)	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
50	704.00	0.010517	711.00	0.003422
40	704.00	0.009349	711.00	0.005703
30	704.00	0.005259	711.00	0.001711
20	704.00	0.012270	711.00	0.005133
10	704.00	-0.003506	711.00	-0.002851
0	704.00	-0.003506	711.00	0.002851
-10	704.00	0.002921	711.00	0.005703

5.1.3 Peak to Average Ratio

Limit 13 dB

Kind of Test Site Shielded room

Test Setup



Test Instruments

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date	Test Date	
						From	Until
Spectrum Analyzer	R&S	FSV40	101513	2020/5/28	2021/5/27	2021/1/12	2021/4/14
Wireless Communication Tester	R&S	CMW500	166923	2020/2/11	2021/2/10	2021/1/12	2021/4/14
Radio Communication Analyzer	Anritsu	MT8821C	6262044753	2021/1/29	2022/1/28	2021/1/12	2021/4/14

Test Procedure

1. Set resolution/measurement bandwidth $\geq$ signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;
3. Record the maximum PAPR level associated with a probability of 0.1 %.

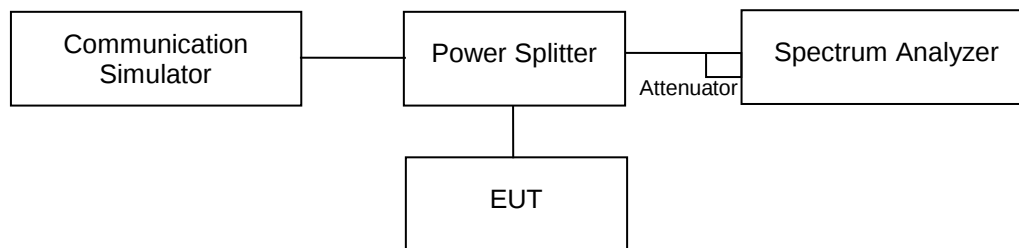
Test Results

Please refer to Appendix A.

5.1.4 Occupied Bandwidth and 26 dB Bandwidth Measurement

Kind of Test Site Shielded room

Test Setup



Test Instruments

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date	Test Date	
						From	Until
Spectrum Analyzer	R&S	FSV40	101513	2020/5/28	2021/5/27	2021/1/12	2021/4/14
Wireless Communication Tester	R&S	CMW500	166923	2020/2/11	2021/2/10	2021/1/12	2021/4/14
Radio Communication Analyzer	Anritsu	MT8821C	6262044753	2021/1/29	2022/1/28	2021/1/12	2021/4/14

Test Procedure

The EUT makes a call to the communication simulator. All measurements were done at low, middle and high operational frequency range. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency.

- Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.
- Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

Test Results

Please refer to Appendix A.

5.1.5 Conducted Band Edge & Emission Mask

Limit

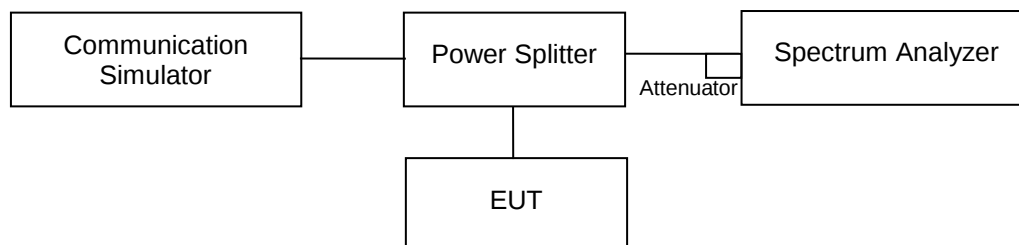
§27.53(h): For operations in the 1710–1755 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least $43 + 10 \log (P)$ dB.

§27.53(g): For operations in the 600 MHz and 698-787 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log (P)$ dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater.

However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

Kind of Test Site Shielded room

Test Setup



Test Instruments

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date	Test Date	
						From	Until
Spectrum Analyzer	R&S	FSV40	101513	2020/5/28	2021/5/27	2021/1/12	2021/4/14
Wireless Communication Tester	R&S	CMW500	166923	2020/2/11	2021/2/10	2021/1/12	2021/4/14
Radio Communication Analyzer	Anritsu	MT8821C	6262044753	2021/1/29	2022/1/28	2021/1/12	2021/4/14

Test Procedure

- All measurements were done at low and high operational frequency range.
- The center frequency of spectrum is the band edge frequency.
- Record the maximum trace plot into the test report.

Test Results

Please refer to Appendix A.

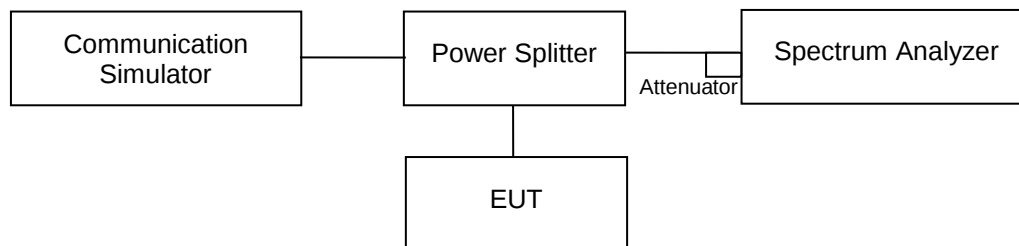
5.1.6 Conducted Spurious Emissions

Limit

§27.53(h), §27.53(g): The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least $43 + 10 \log (P)$ dB.

Kind of Test Site Shielded room

Test Setup



Test Instruments

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date	Test Date	
						From	Until
Spectrum Analyzer	R&S	FSV40	101513	2020/5/28	2021/5/27	2021/1/12	2021/4/14
Wireless Communication Tester	R&S	CMW500	166923	2020/2/11	2021/2/10	2021/1/12	2021/4/14
Radio Communication Analyzer	Anritsu	MT8821C	6262044753	2021/1/29	2022/1/28	2021/1/12	2021/4/14

Test Procedure

- The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range.
- Measuring frequency range is from 9 kHz to the 10th harmonic of fundamental frequency. 10 dB attenuation pad is connected with spectrum.

Test Results

Please refer to Appendix A.

5.1.7 Radiated Spurious Emissions

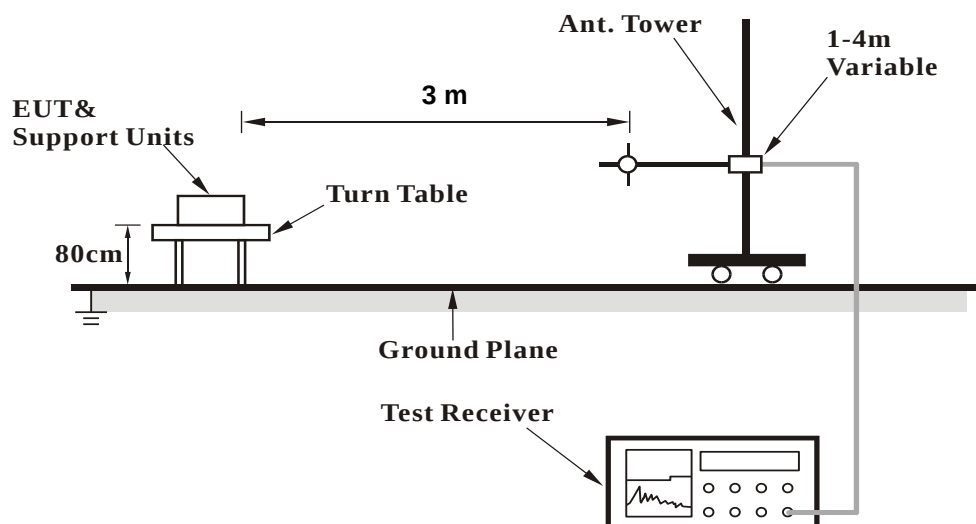
Limit

§27.53(h), §27.53(g): The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least $43 + 10 \log (P)$ dB.

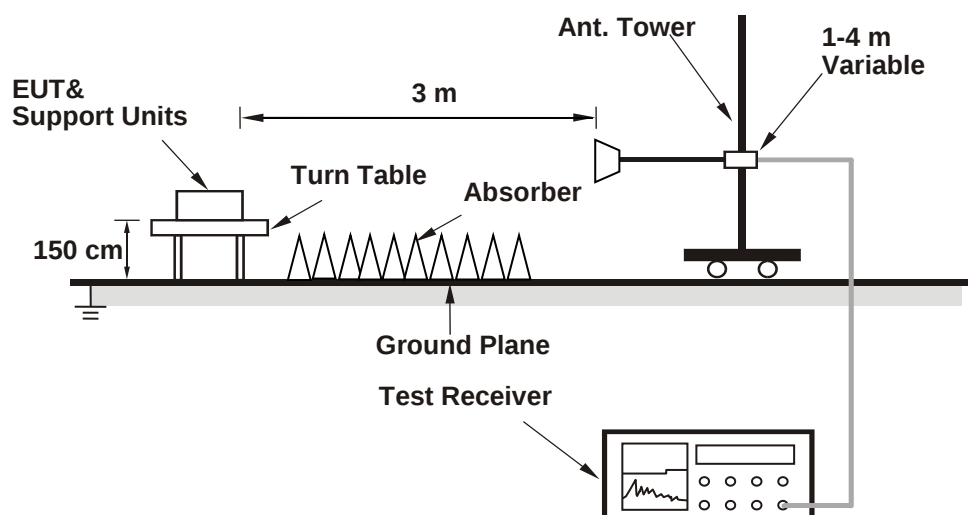
Kind of Test Site 3m Semi-Anechoic Chamber

Test Setup

<Radiated Emissions below or equal to 1 GHz>



<Radiated Emissions above 1 GHz>



For the actual test configuration, please refer to the attached file (Test Setup Photo).

Test Instruments

Refer to 5.1.1 Test Instruments

Test Procedures

- a. Substitution method is used for E.I.R.P. measurement. In the semi-anechoic chamber, EUT placed on the 0.8m (below or equal to 1 GHz) and/or 1.5m (above 1 GHz) height of turn table, rotated the table around horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- b. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the turn table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a value of spectrum reading equal to "Read Value" of step a. Record the power level of S.G.
- c. $E.I.R.P. = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}.$
- d. $E.R.P. \text{ can be calculated from E.I.R.P. by subtracting the gain of dipole, } E.R.P. = E.I.R.P - 2.15 \text{ dB}.$

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.
2. Testing was carried out within frequency range 30 MHz to the tenth harmonic.
3. All modes of operation were investigated and the worst-case emissions are reported.
4. The Radiated Emissions testing was performed in the X(E1), Y(H) and Z(E2) axis orientation. The worst-case Axis orientation is recorded in this test report.

Test Results

Please refer to Appendix B.

Appendix A: Test Results of Conducted Test

Peak to Average Ratio

LTE Band 4 _ Channel Bandwidth: 1.4 MHz

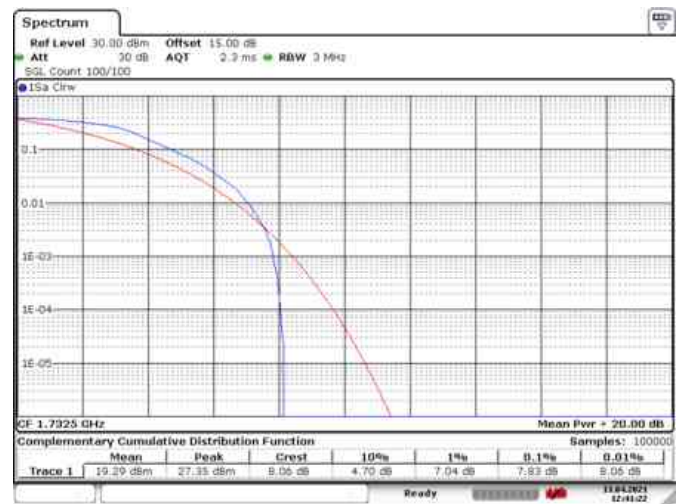
Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM
19957	1710.7	4.35	6.14
20175	1732.5	7.83	6.52
20393	1754.3	4.00	7.04

QPSK

Channel_19957

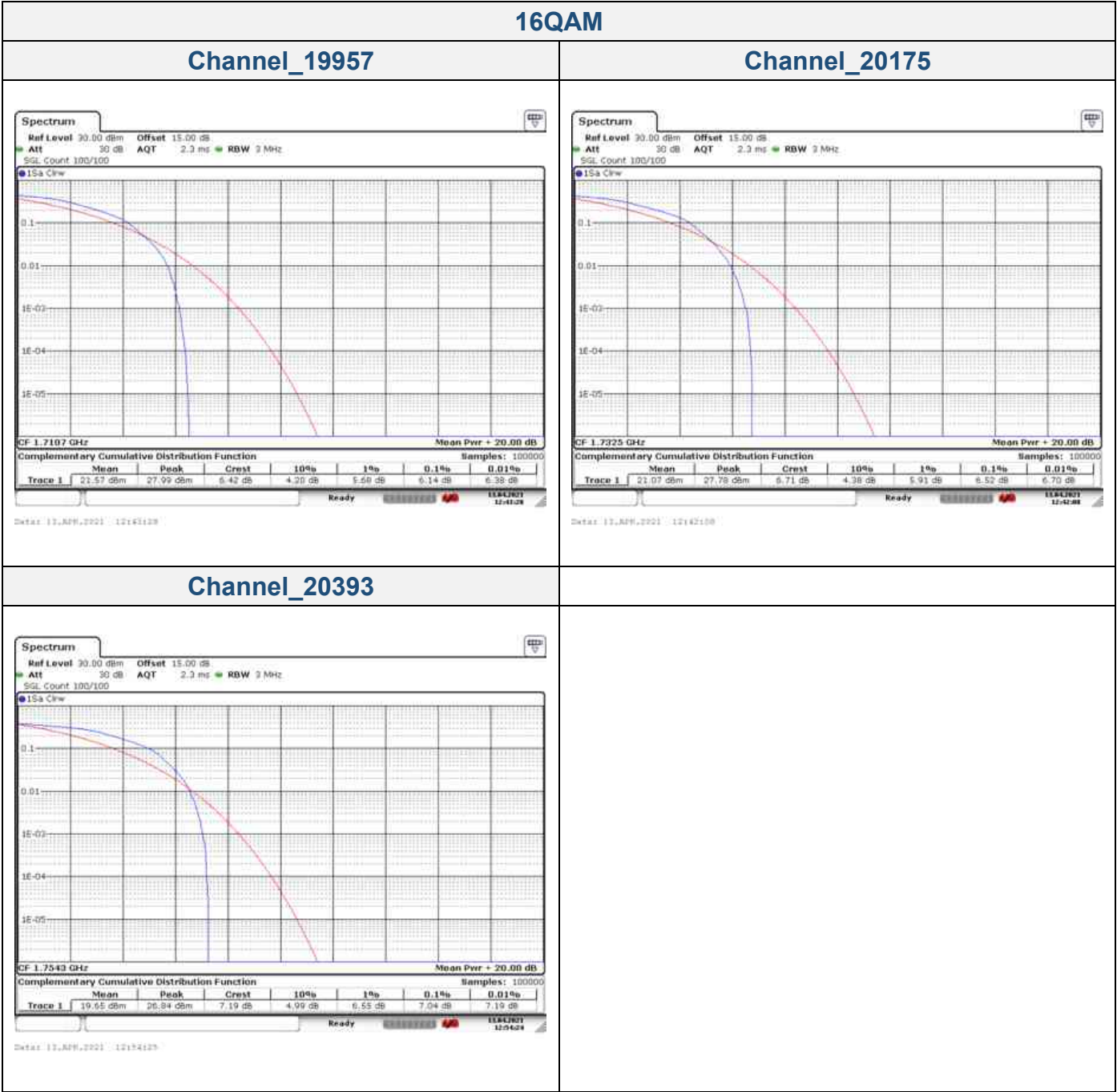


Channel_20175



Channel_20393



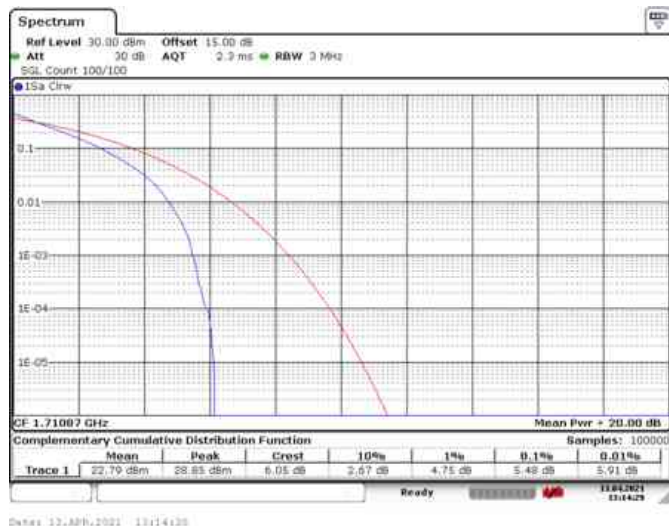


LTE Band 4 _ Channel Bandwidth: 3 MHz

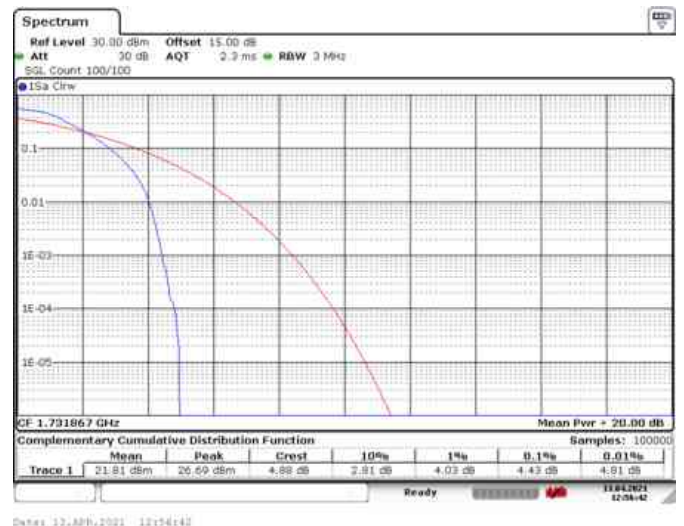
Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM
19965	1711.5	5.48	8.64
20175	1732.5	4.43	4.90
20385	1753.5	6.99	6.96

QPSK

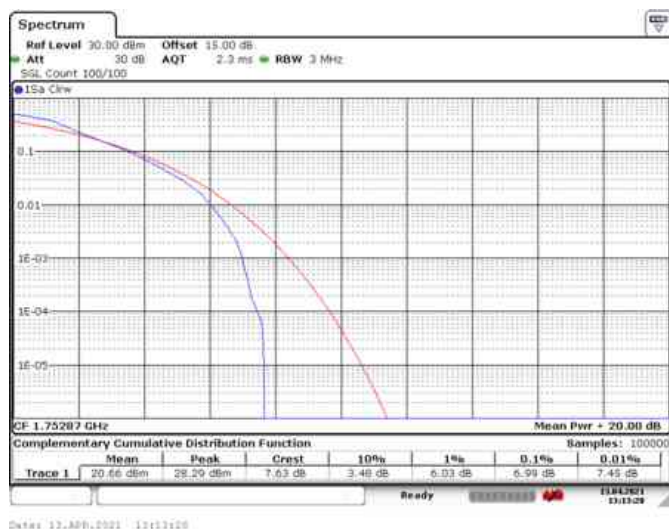
Channel_19965



Channel_20175



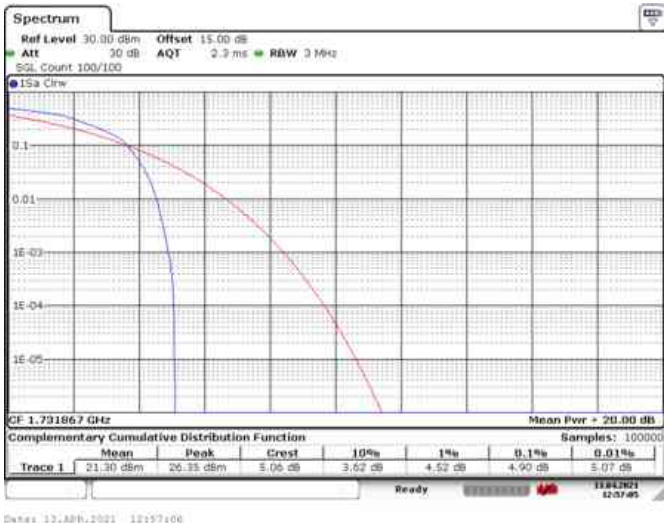
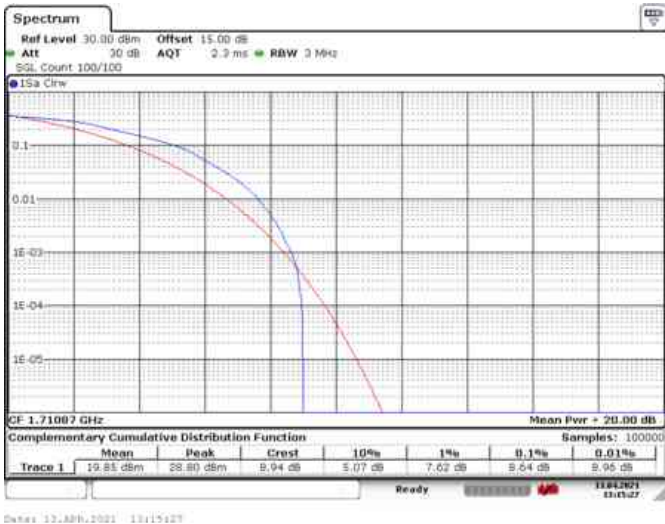
Channel_20385



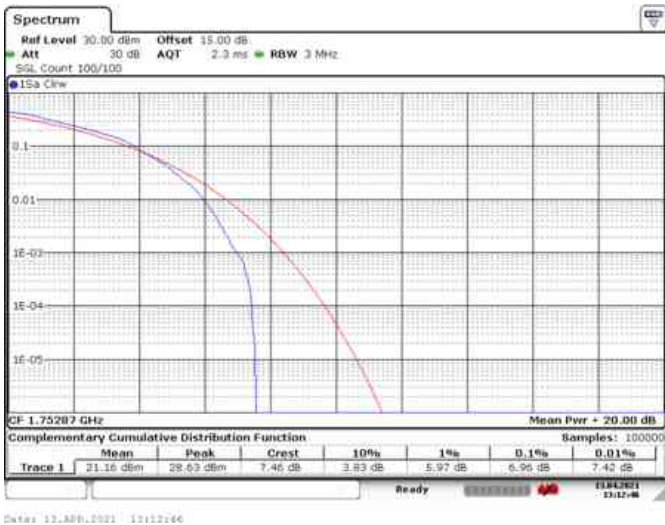
16QAM

Channel_19965

Channel_20175



Channel_20385

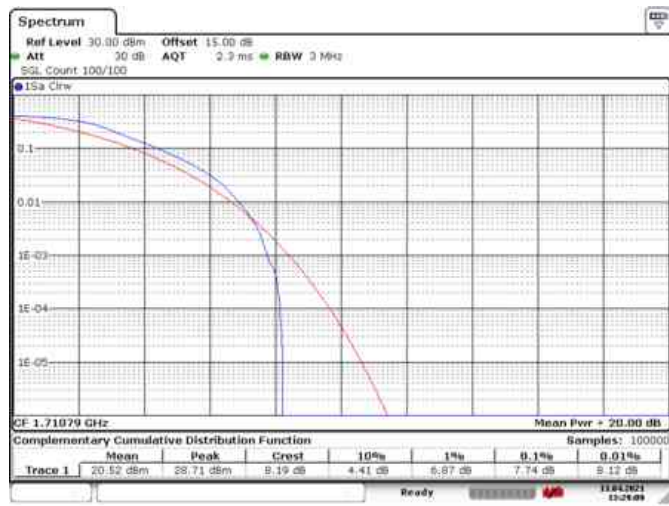


LTE Band 4 _ Channel Bandwidth: 5 MHz

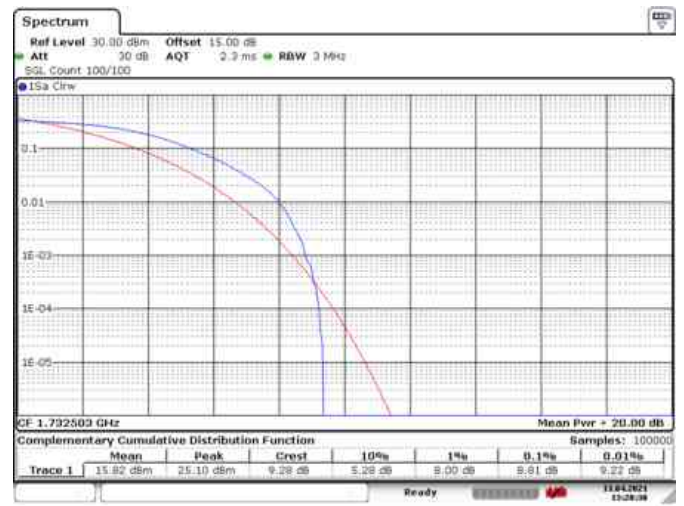
Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM
19975	1712.5	7.74	7.88
20175	1732.5	8.81	8.20
20375	1752.5	4.72	7.07

QPSK

Channel_19975

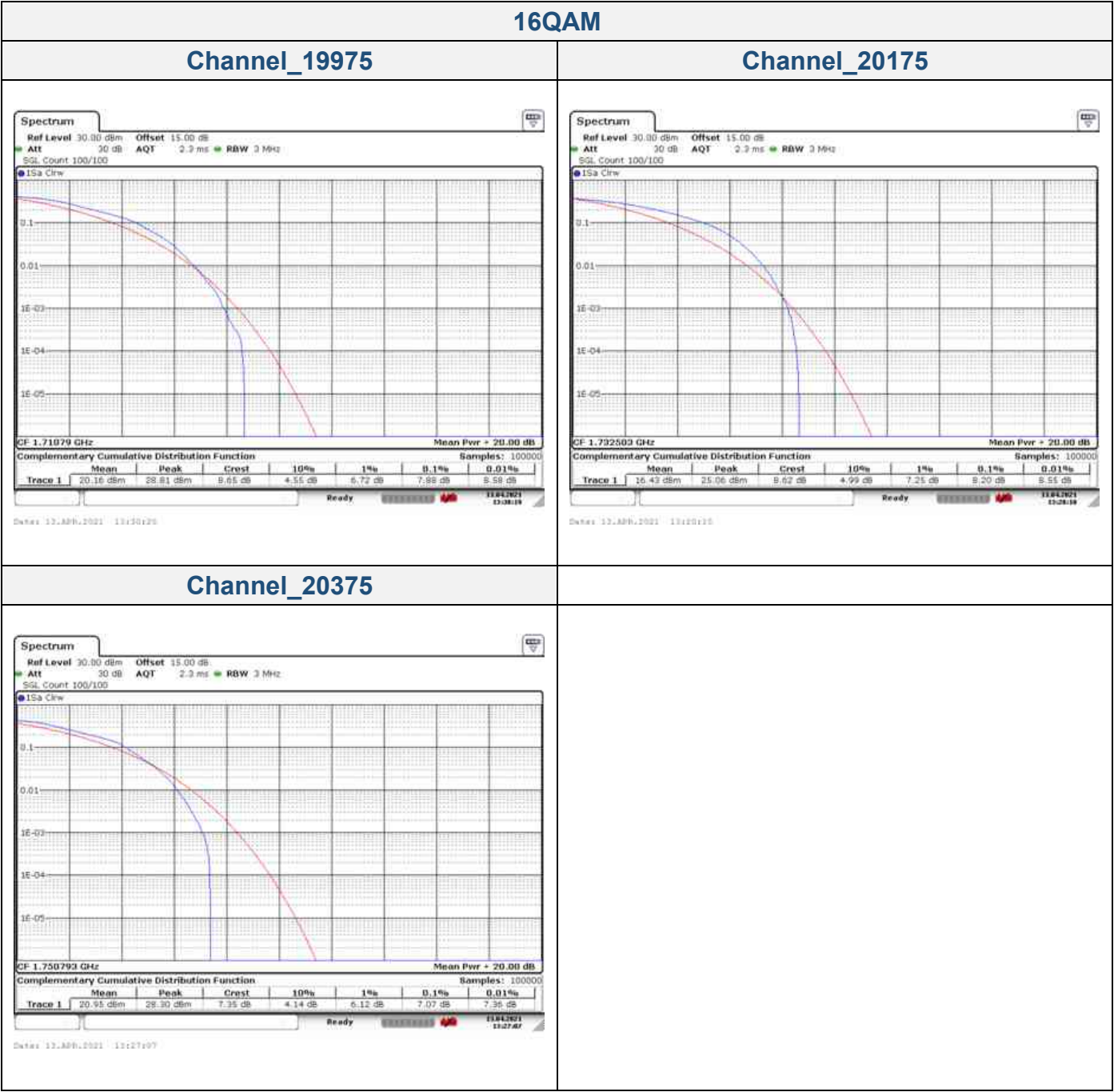


Channel_20175



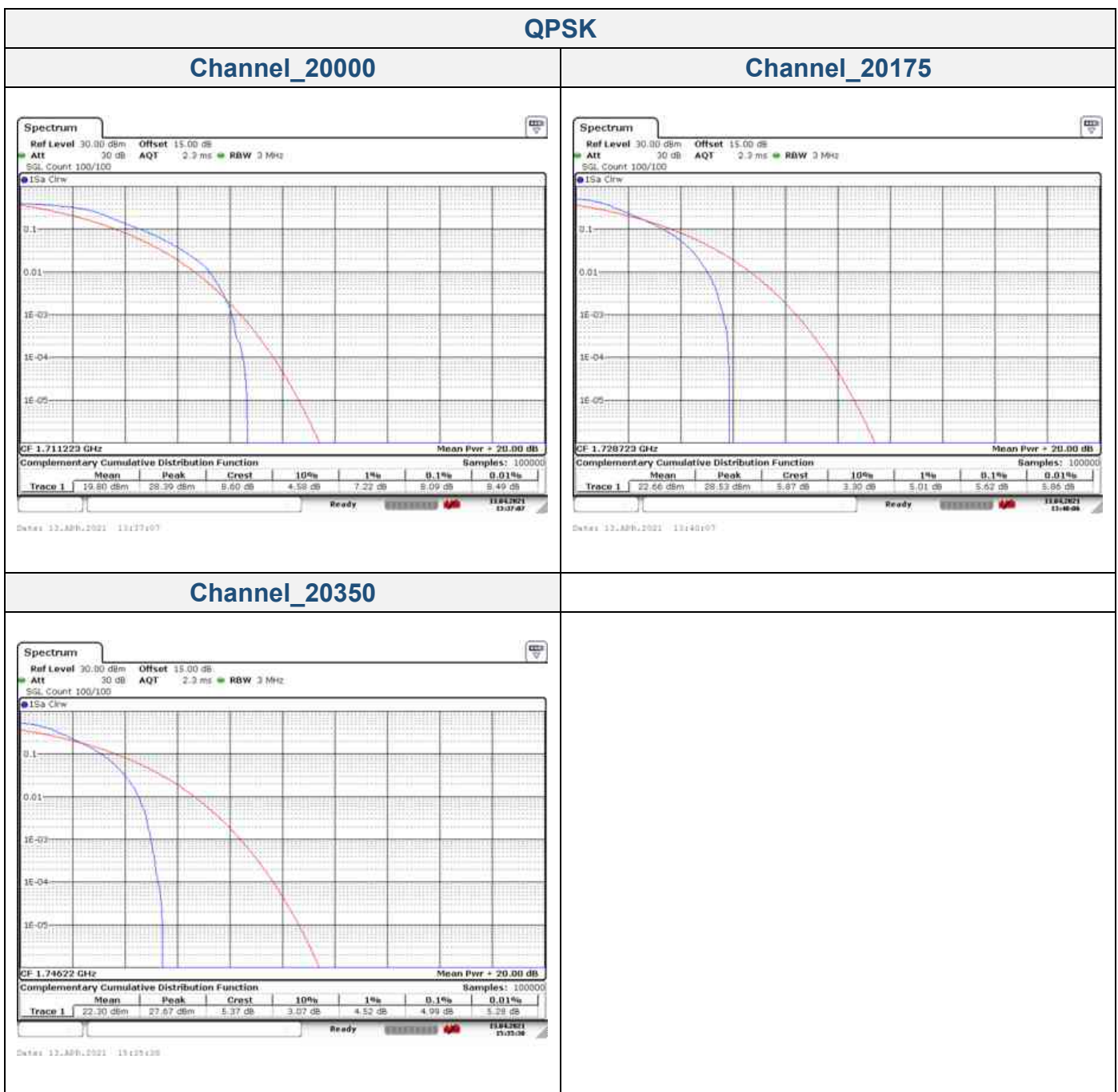
Channel_20375

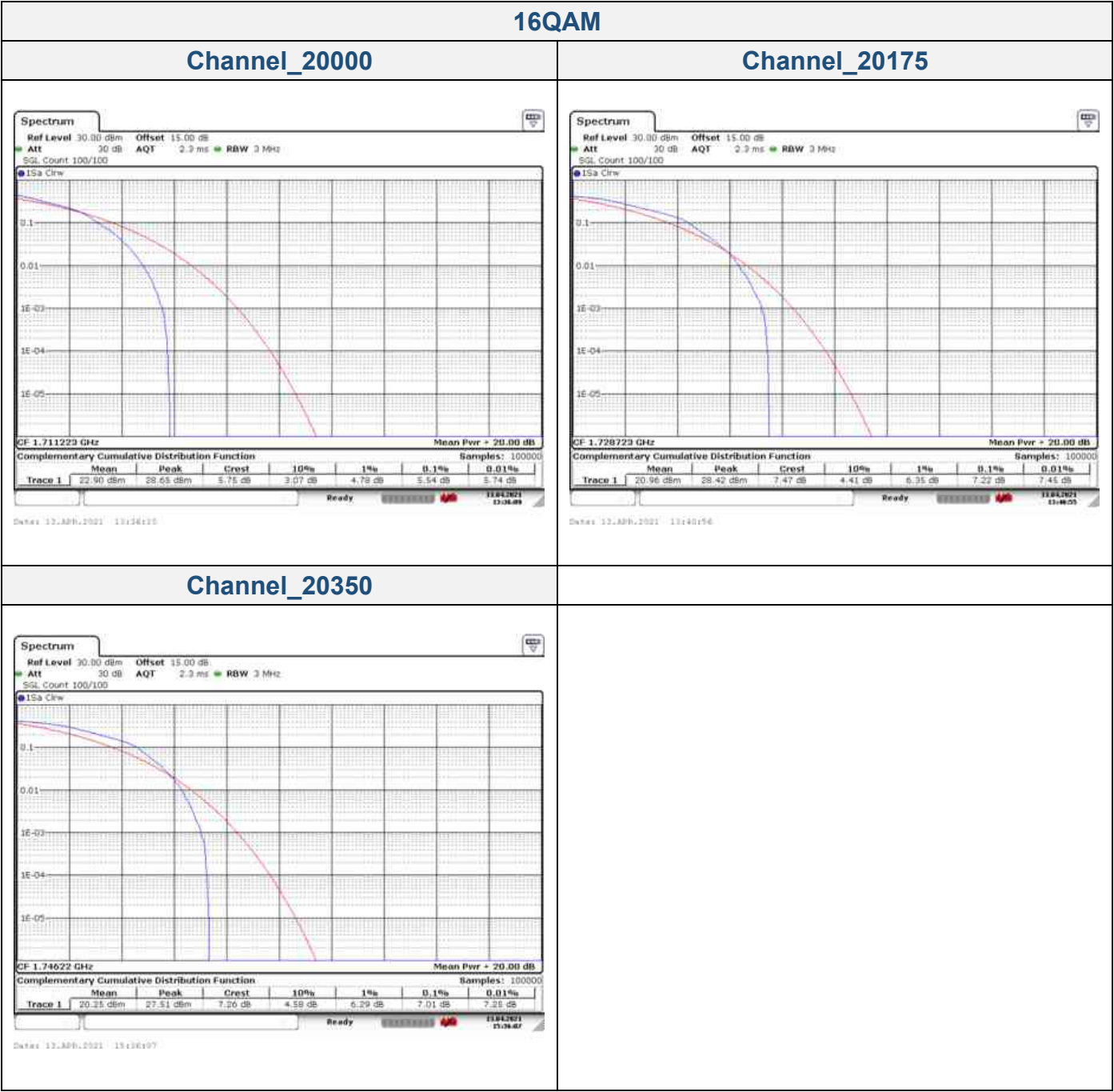




LTE Band 4 _ Channel Bandwidth: 10 MHz

Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM
20000	1715.0	8.09	5.54
20175	1732.5	5.62	7.22
20350	1750.0	4.99	7.01



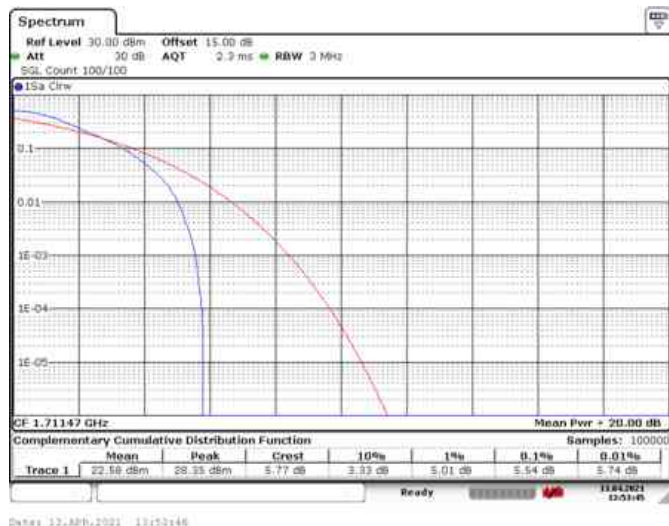


LTE Band 4 _ Channel Bandwidth: 15 MHz

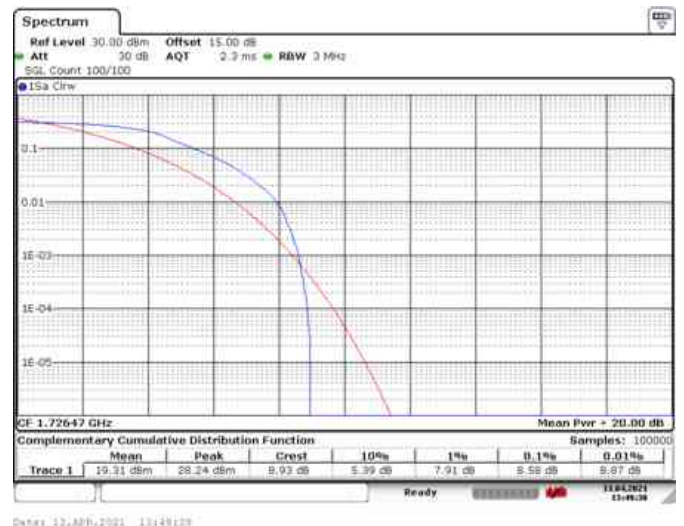
Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM
20025	1717.5	5.54	7.57
20175	1732.5	8.58	5.33
20325	1747.5	4.55	8.03

QPSK

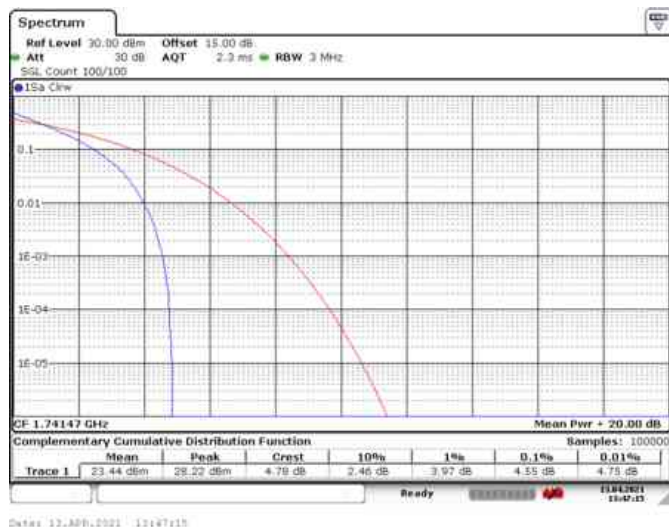
Channel_20025

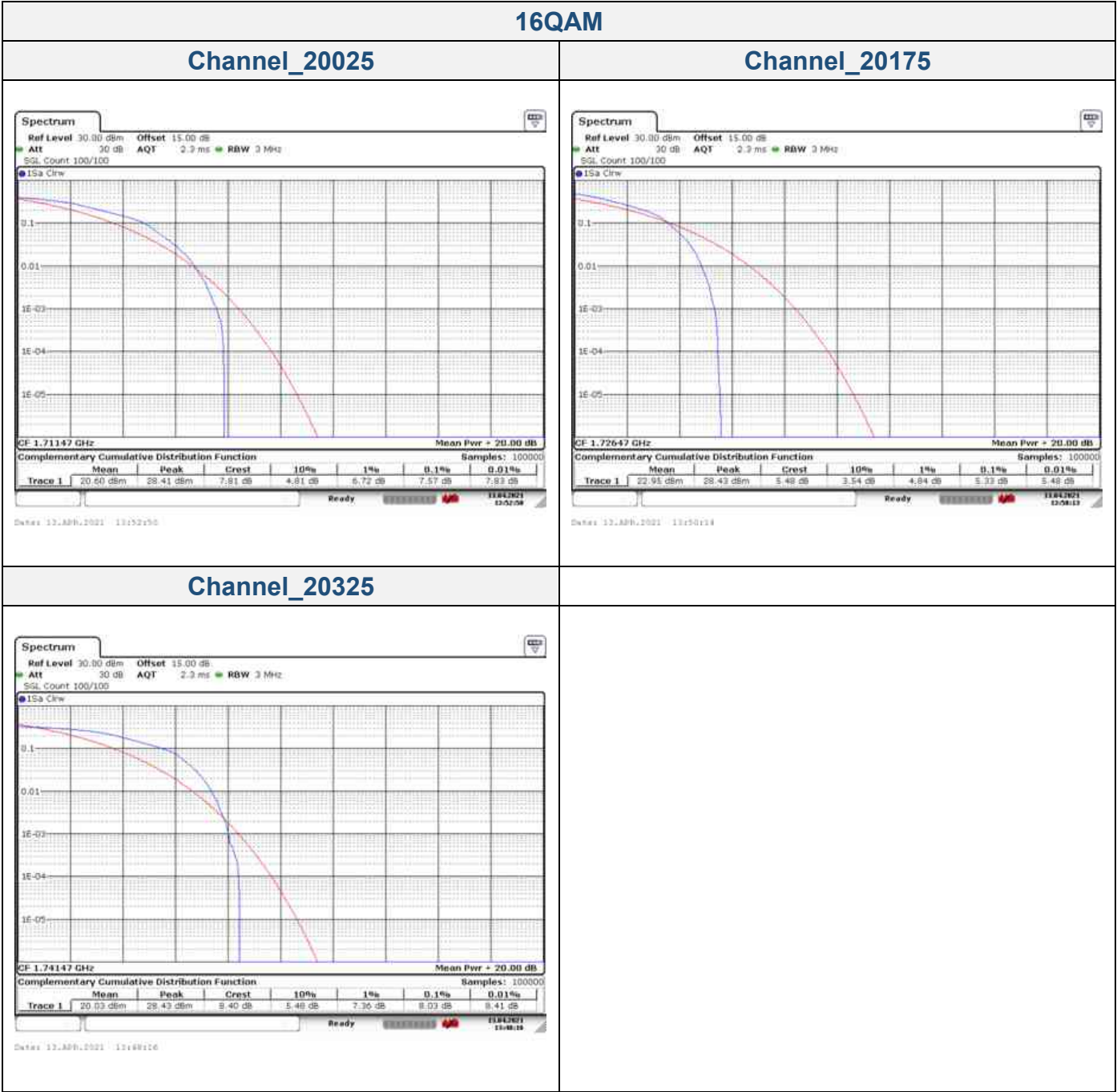


Channel_20175



Channel_20325



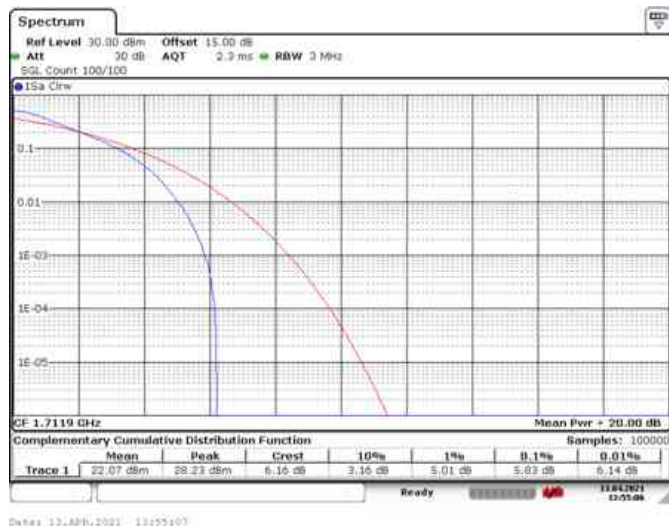


LTE Band 4 _ Channel Bandwidth: 20 MHz

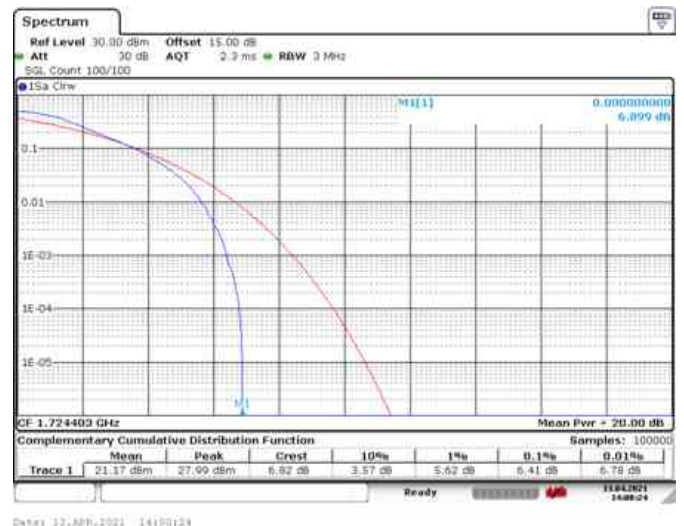
Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM
20050	1720.0	5.83	8.06
20175	1732.5	6.41	5.22
20300	1745.0	5.33	5.22

QPSK

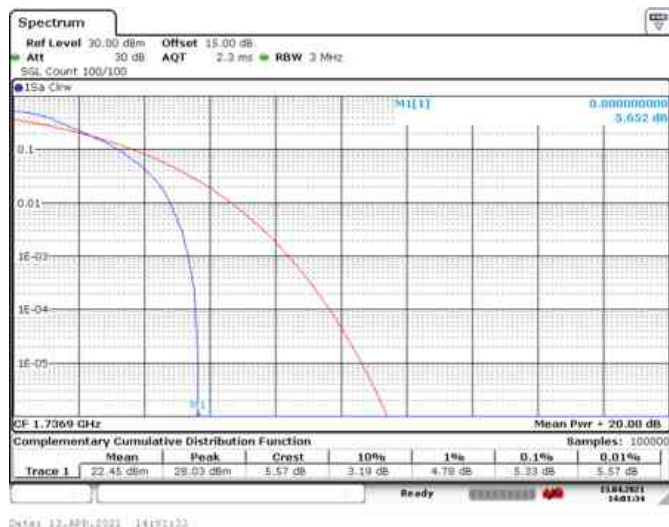
Channel_20050

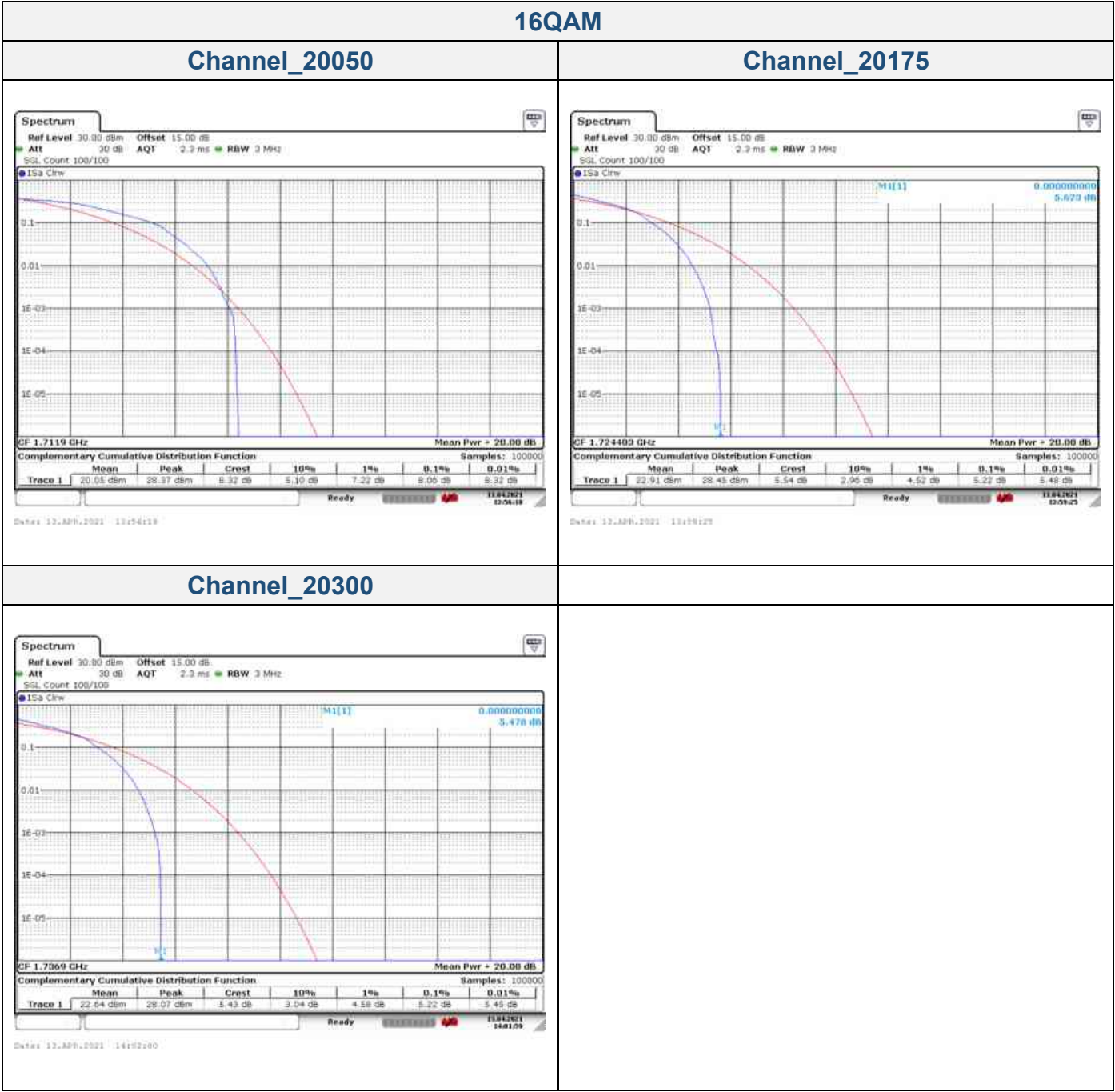


Channel_20175



Channel_20300



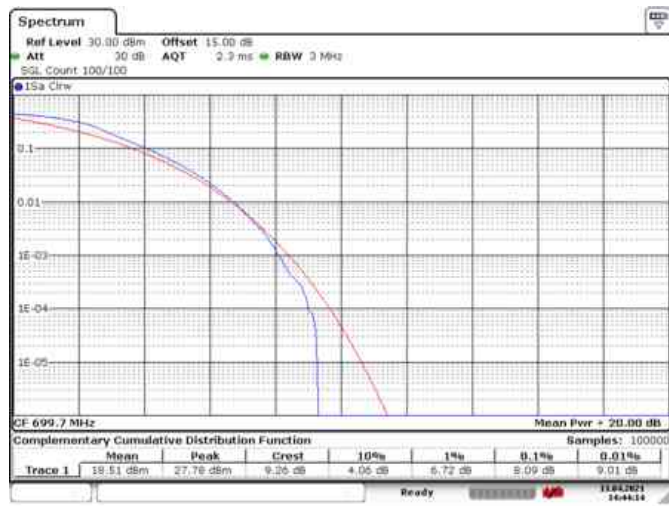


LTE Band 12 _ Channel Bandwidth: 1.4 MHz

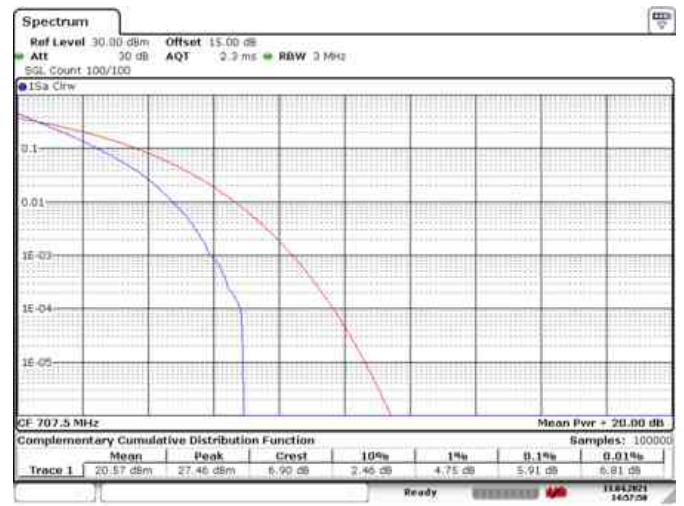
Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM
23017	699.7	8.09	6.93
23095	707.5	5.91	7.59
23173	715.3	7.36	8.29

QPSK

Channel_23017

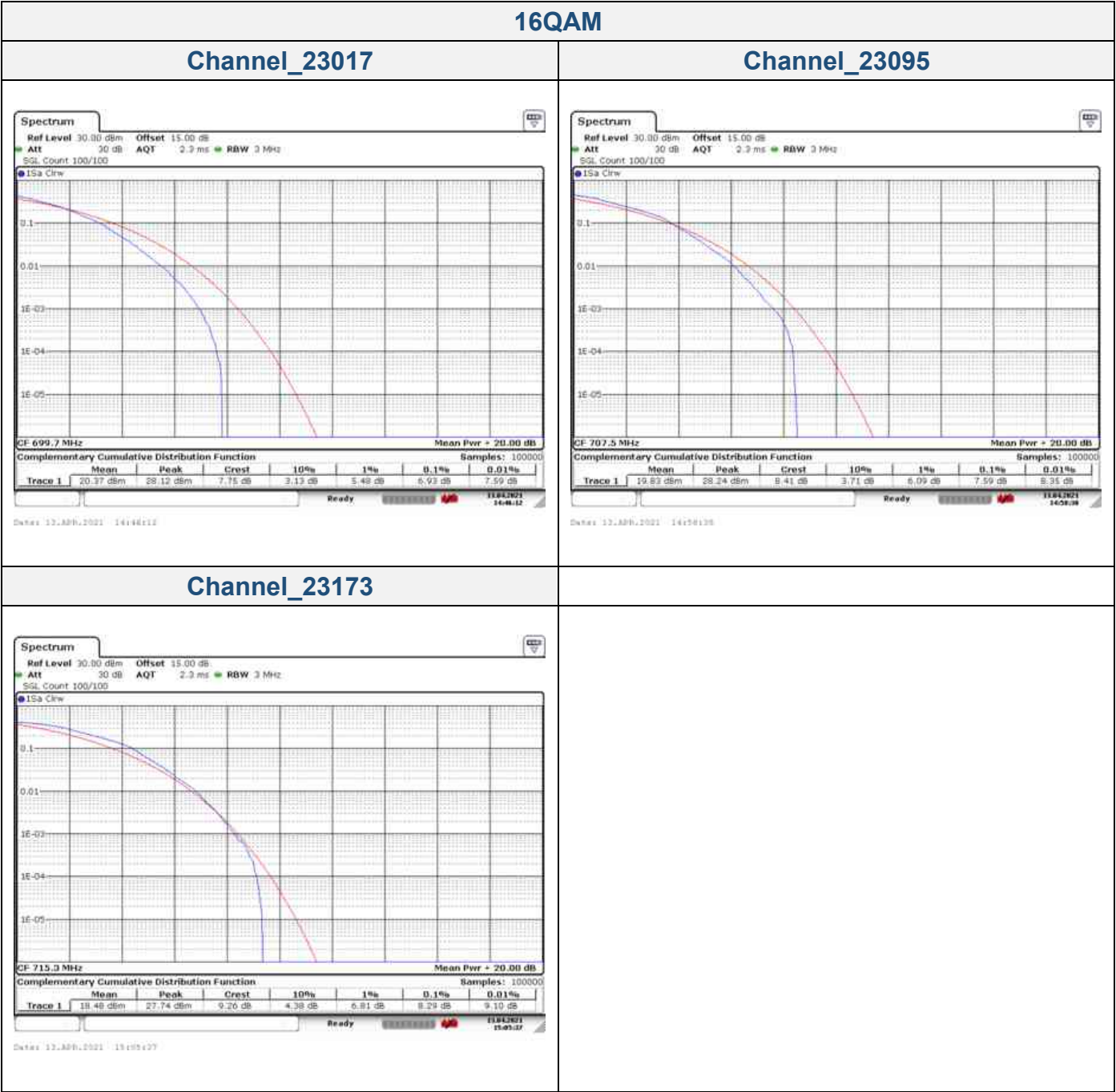


Channel_23095



Channel_23173



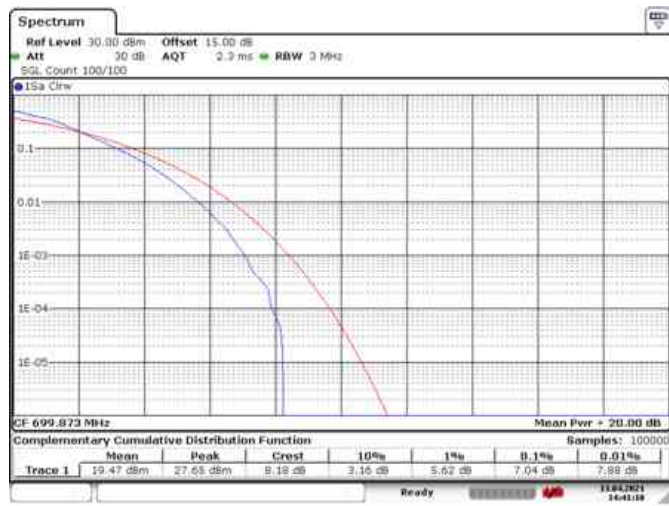


LTE Band 12 _ Channel Bandwidth: 3 MHz

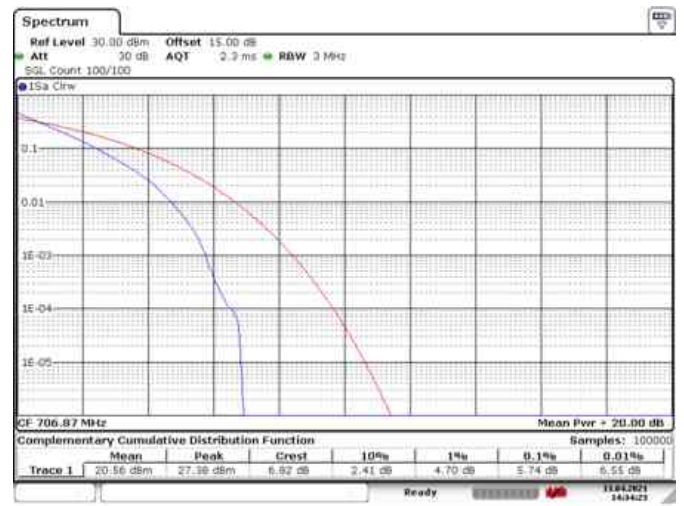
Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM
23025	700.5	7.04	6.84
23095	707.5	5.74	7.22
23165	714.5	5.77	6.81

QPSK

Channel_23025

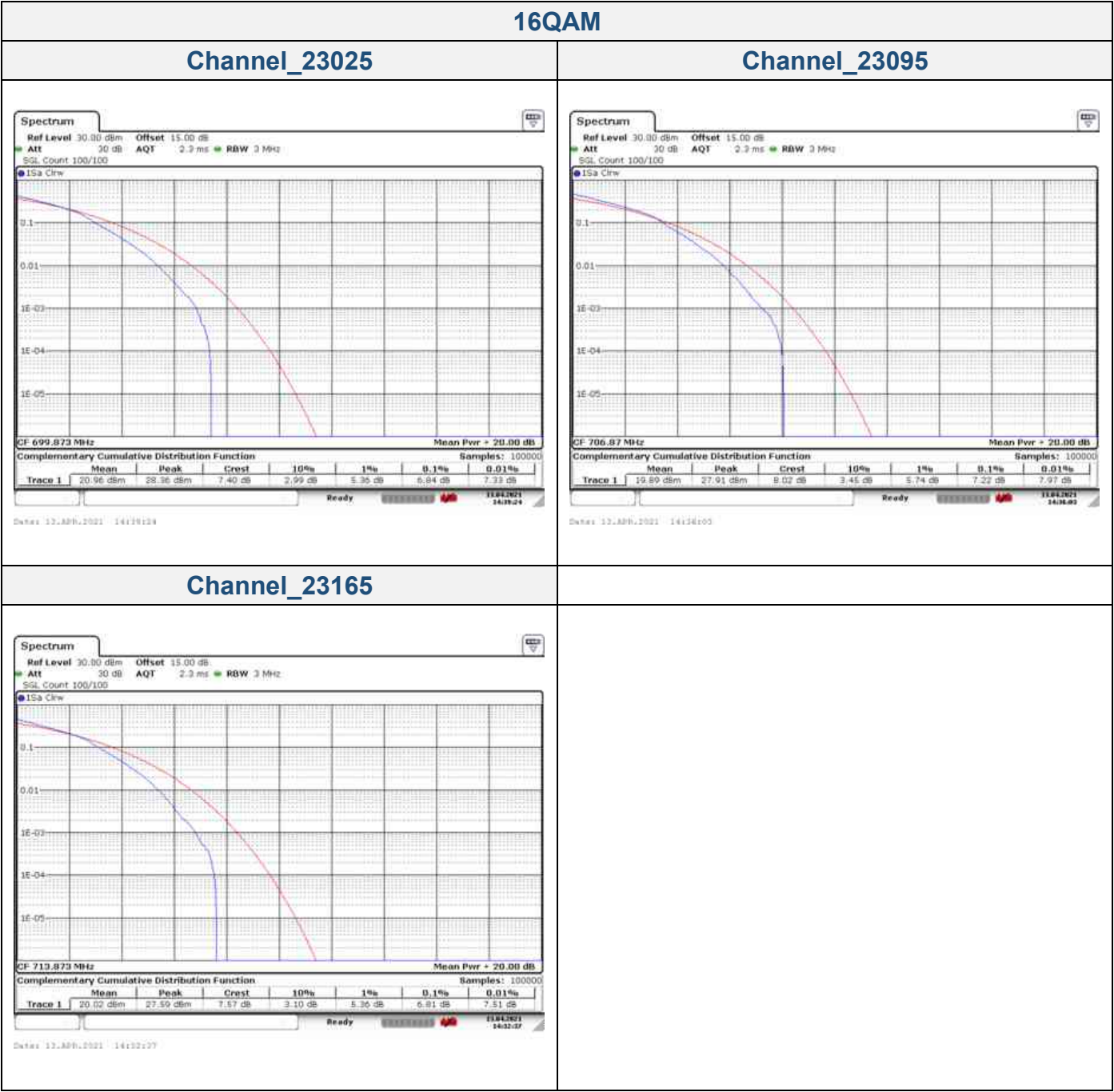


Channel_23095



Channel_23165



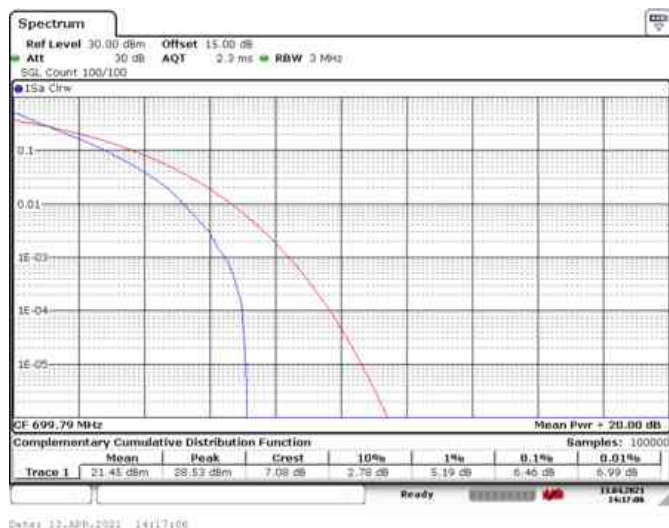


LTE Band 12 _ Channel Bandwidth: 5 MHz

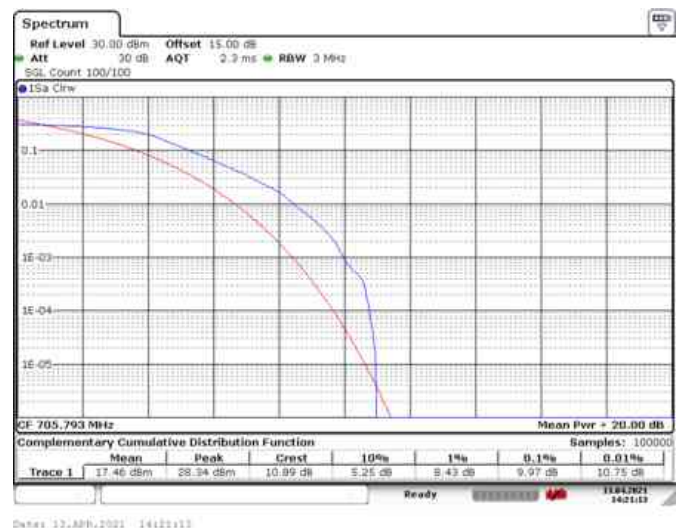
Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM
23035	701.5	6.46	7.13
23095	707.5	9.97	8.99
23155	713.5	6.26	7.97

QPSK

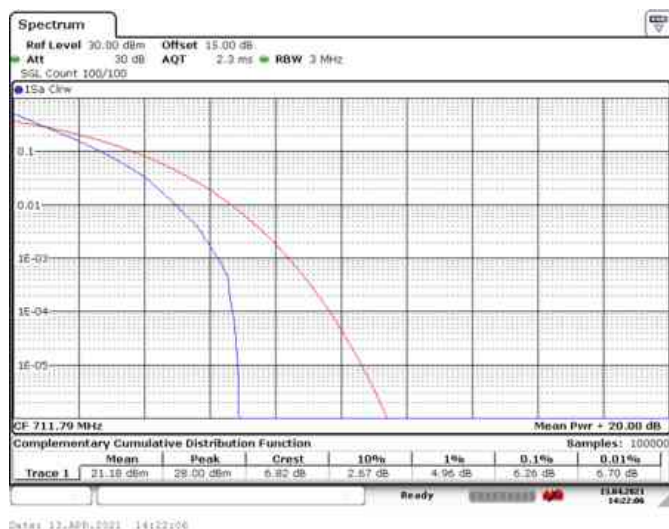
Channel_23035

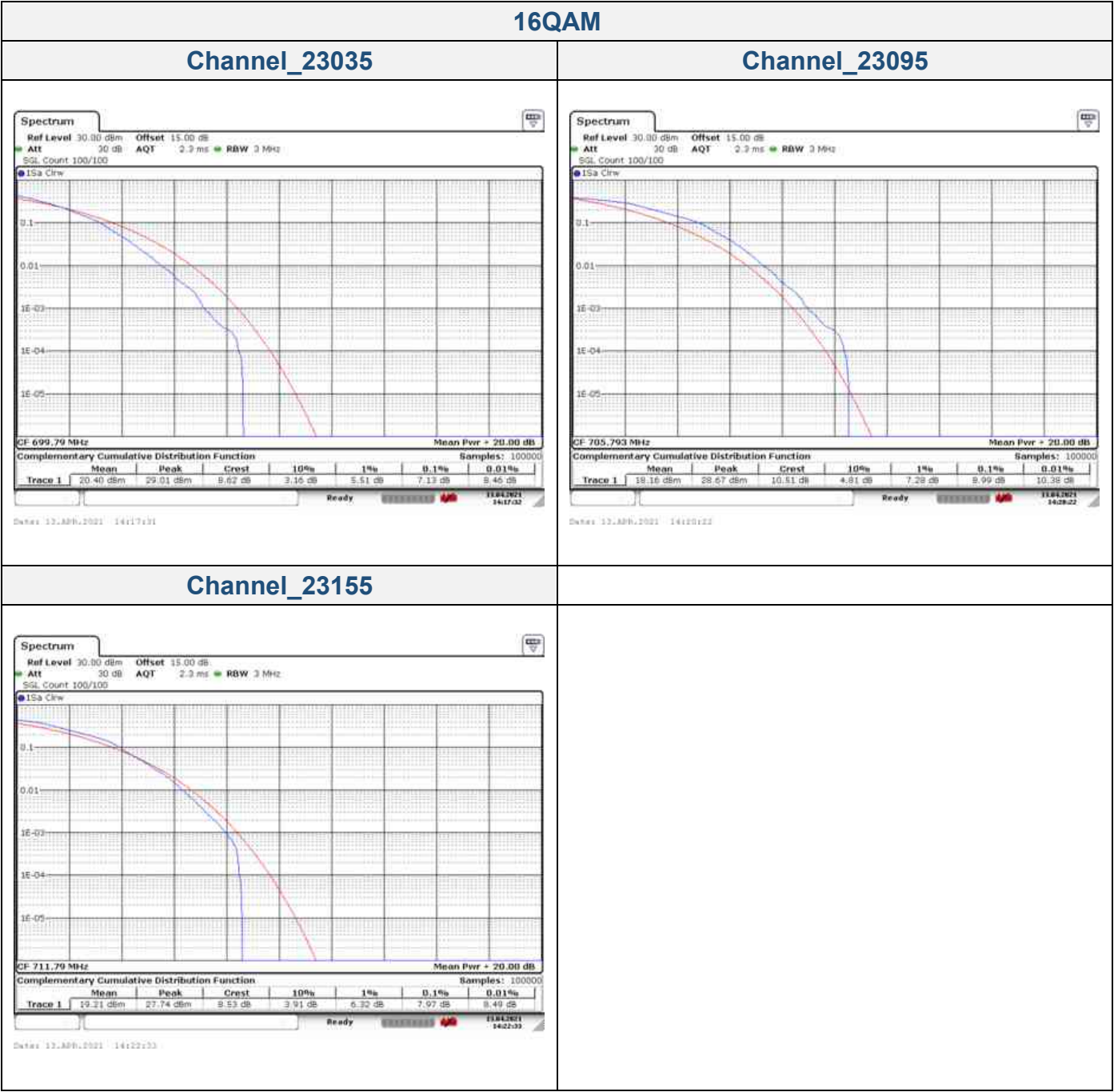


Channel_23095



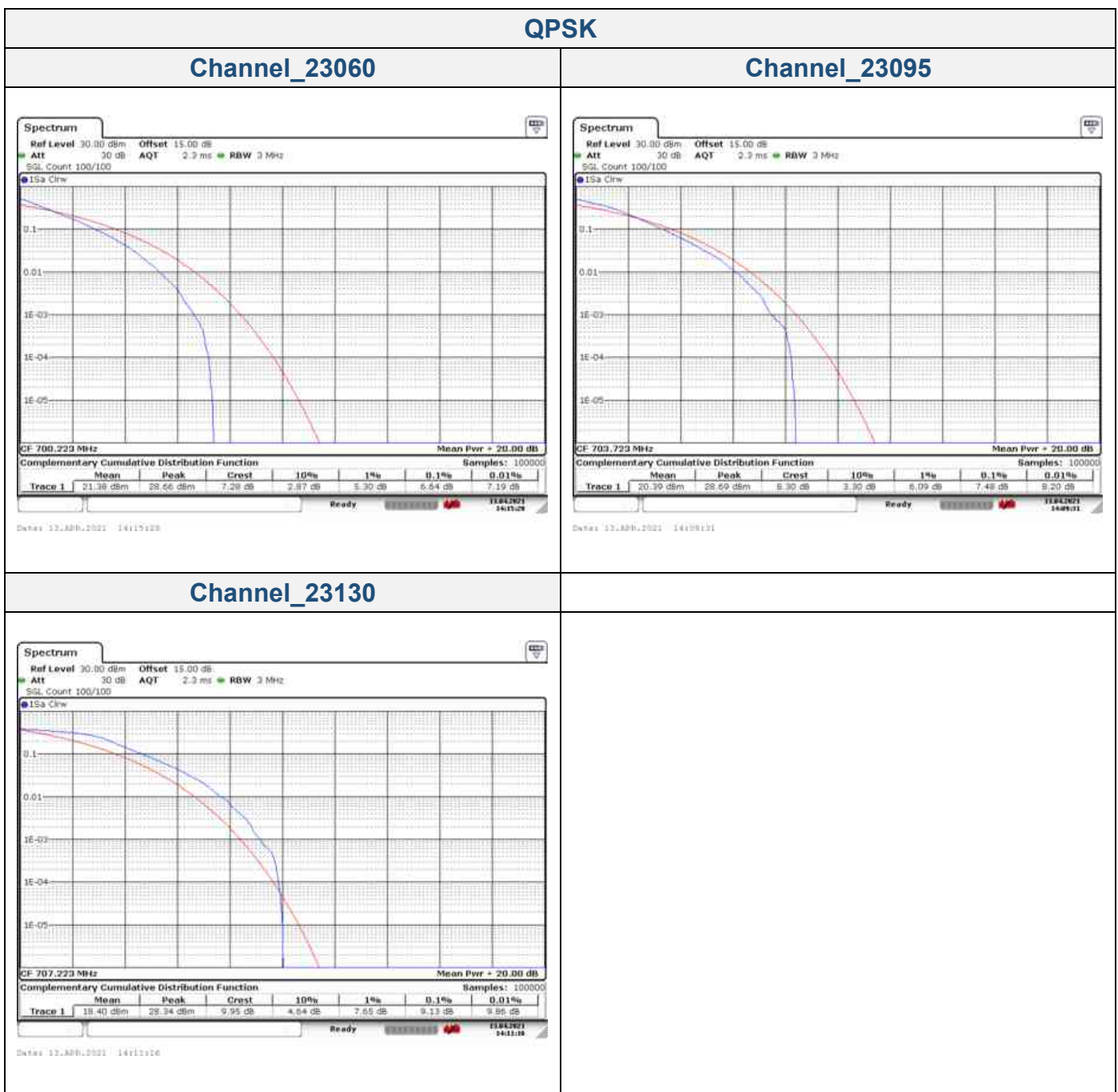
Channel_23155

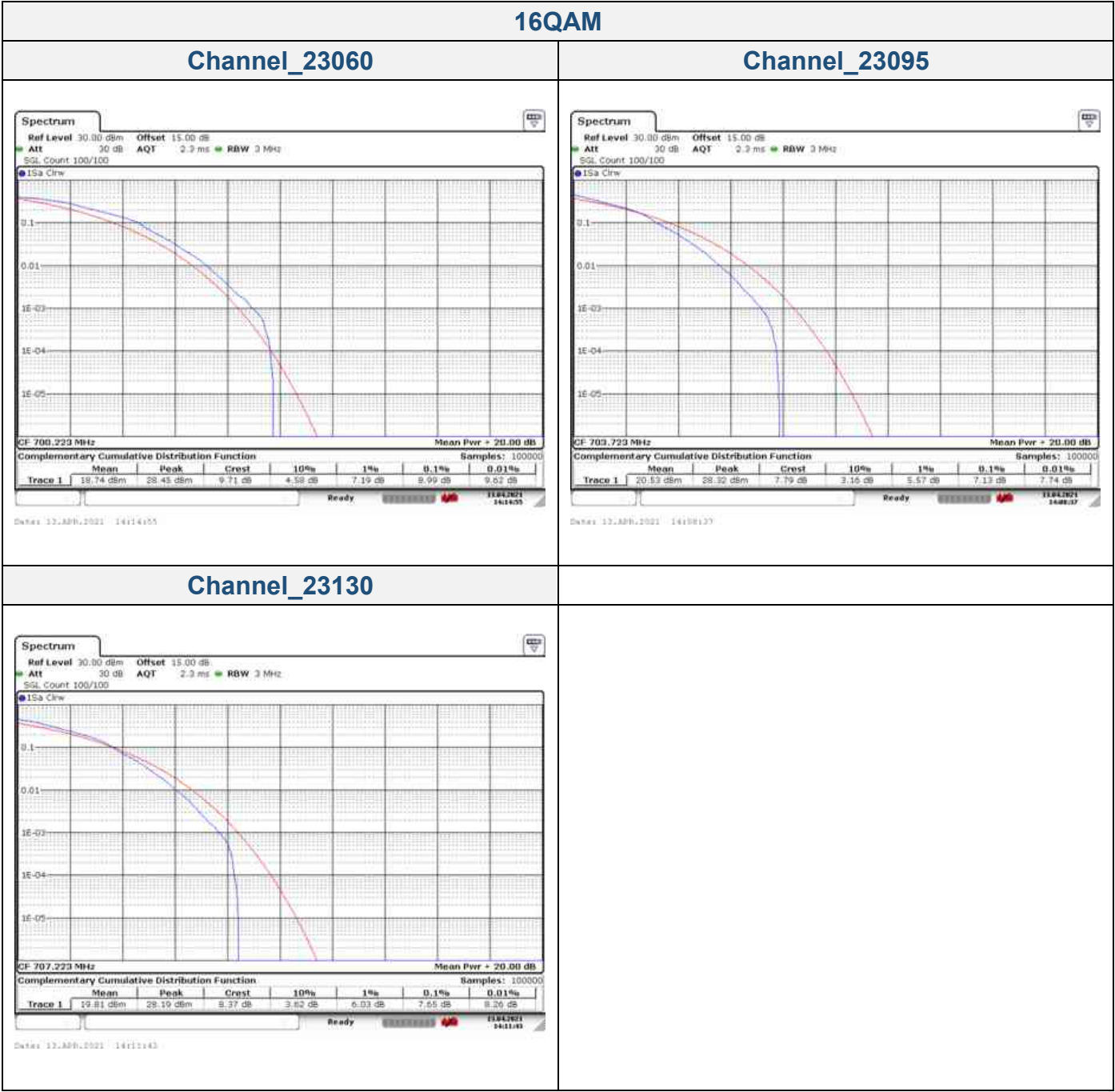




LTE Band 12 _ Channel Bandwidth: 10 MHz

Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM
23060	704.0	6.64	8.99
23095	707.5	7.48	7.13
23130	711.0	9.13	7.65





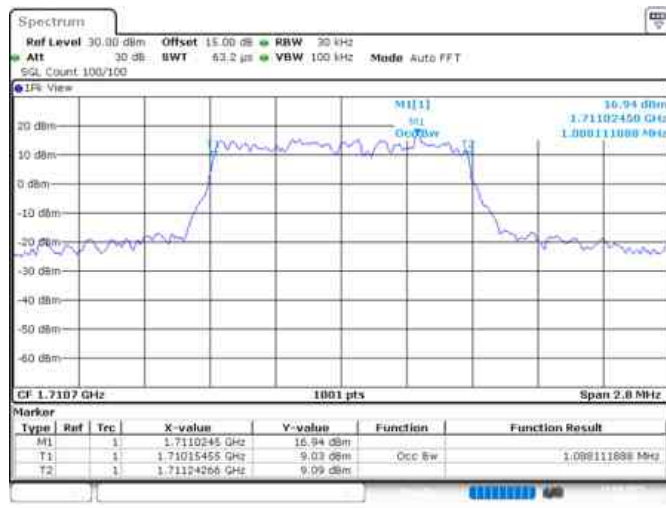
99 % Occupied Bandwidth

LTE Band 4 _ Channel Bandwidth: 1.4 MHz

Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)	
		QPSK	16QAM
19957	1710.7	1.088	1.102
20175	1732.5	1.094	1.105
20393	1754.3	1.122	1.091

QPSK

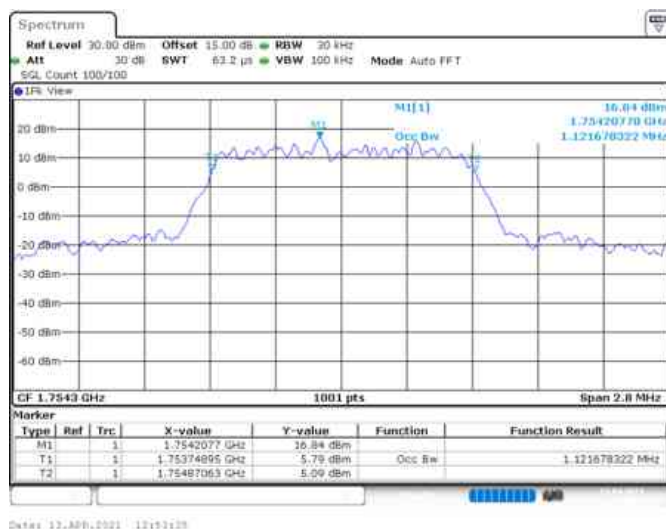
Channel_19957



Channel_20175



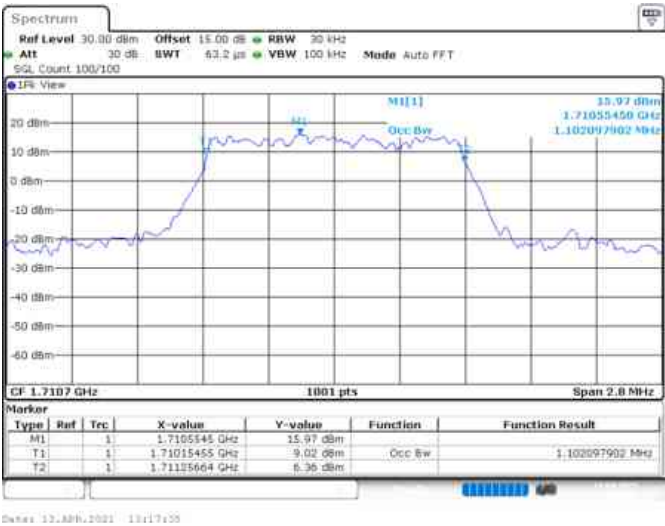
Channel_20393



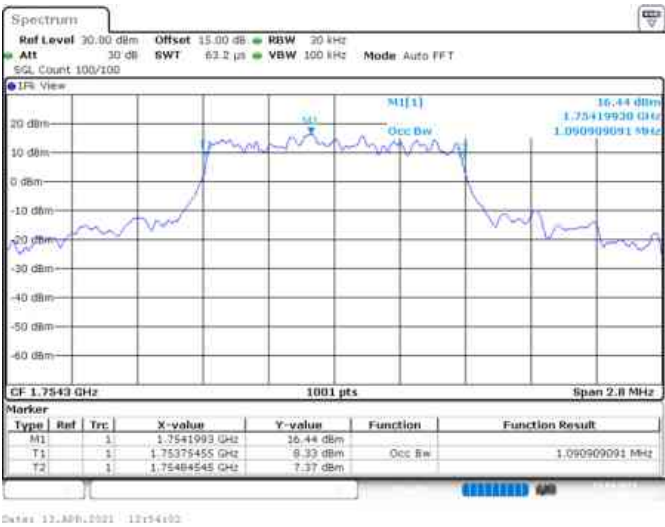
16QAM

Channel_19957

Channel_20175



Channel_20393



LTE Band 4 _ Channel Bandwidth: 3 MHz

Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)	
		QPSK	16QAM
19965	1711.5	1.109	1.109
20175	1732.5	1.085	1.103
20385	1753.5	1.091	1.097

QPSK

Channel_19965



Channel_20175



Channel_20385

