

<b>Prüfbericht-Nr.:</b> <i>Test report no.:</i>	CN21SAM6(P27-WWAN) 001	<b>Auftrags-Nr.:</b> <i>Order no.:</i>	238511397	Seite 1 von 39 Page 1 of 39
<b>Kunden-Referenz-Nr.:</b> <i>Client reference no.:</i>	N/A	<b>Auftragsdatum:</b> <i>Order date:</i>	2021-04-16	
<b>Auftraggeber:</b> <i>Client:</i>	Skinny Lab Inc. DBA Spin 450 Mission St. Ste. 400 San Francisco			
<b>Prüfgegenstand:</b> <i>Test item:</i>	E-scooter			
<b>Bezeichnung / Typ-Nr.:</b> <i>Identification / Type no.:</i>	S-100T			
<b>Auftrags-Inhalt:</b> <i>Order content:</i>	FCC Part 27 Test report			
<b>Prüfgrundlage:</b> <i>Test specification:</i>	FCC 47CFR Part 27 Subpart C, H, F, L			
<b>Wareneingangsdatum:</b> <i>Date of sample receipt:</i>	2021-02-23			
<b>Prüfmuster-Nr.:</b> <i>Test sample no.:</i>	A003005263-014			
<b>Prüfzeitraum:</b> <i>Testing period:</i>	2021-04-19 - 2021-04-27			
<b>Ort der Prüfung:</b> <i>Place of testing:</i>	EMC/RF Taipei Testing Site			
<b>Prüflaboratorium:</b> <i>Testing laboratory:</i>	Taipei Testing Laboratories			
<b>Prüfergebnis*:</b> <i>Test result*:</i>	Pass			
<b>überprüft von:</b> <i>reviewed by:</i>		<b>genehmigt von:</b> <i>authorized by:</i>		
<b>Datum:</b> <i>Date:</i>	2021-05-10	<b>Ausstellungsdatum:</b> <i>Issue date:</i>	2021-05-10	
<b>Stellung / Position:</b>	David Huang Project Manager	<b>Stellung / Position:</b>	Ryan Chen Senior Project Manager	
<b>Sonstiges / Other:</b>				
<b>Zustand des Prüfgegenstandes bei Anlieferung:</b> <i>Condition of the test item at delivery:</i>		Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>		
<p>* Legende: 1 = sehr gut    2 = gut    3 = befriedigend    4 = ausreichend    5 = mangelhaft  P(ass) = entspricht o.g. Prüfgrundlage(n)    F(ail) = entspricht nicht o.g. Prüfgrundlage(n)    N/A = nicht anwendbar    N/T = nicht getestet</p> <p>* Legend: 1 = very good    2 = good    3 = satisfactory    4 = sufficient    5 = poor  P(ass) = passed a.m. test specification(s)    F(ail) = failed a.m. test specification(s)    N/A = not applicable    N/T = not tested</p>				
<p><b>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.</b>  <i>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.</i></p>				

## TEST SUMMARY

Report Section	FCC Clause	Test Item	Result
5.1.1	2.1046	Conducted Output Power	Pass
	27.50(b)(9)	Effective Radiated Power	Pass
	27.50(c)(10)		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 (c) (2) & f		Pass
	27.53(h)		Pass
	27.53(g)		Pass
5.1.6	2.1051	Conducted Spurious Emissions	Pass
	27.53 (c) (2) & f		Pass
	27.53(h)		Pass
	27.53(g)		Pass
5.1.7	2.1053	Radiated Spurious Emissions	Pass
	27.53 (c) (2) & f		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
CN21SAM6(P27-WWAN) 001	Original Release	2021-05-10

## 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)	$\pm 1.15$ dB
Radiated Emission (30 MHz ~ 200 MHz)	$\pm 1.32$ dB
Radiated Emission (200 MHz ~ 1 GHz)	$\pm 1.31$ dB
Radiated Emission (1 GHz ~ 18 GHz)	$\pm 1.53$ dB
Radiated Emission (18 GHz ~ 40 GHz)	$\pm 2.50$ dB



### 3. General Product Information

#### 3.1 Product Function and Intended Use

The EUT is a E-scooter. 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	E-scooter
Type Identification	S-100T
FCC ID	2AMWASPINS150-001

##### 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
	LTE-M1 Band 13 (5 MHz)	779.5 ~ 784.5MHz
	LTE-M1 Band 13 (10 MHz)	782
Modulation	LTE-M1	QPSK, 16QAM
Operation Voltage	110-240Vac from Charger, 48.1Vdc from Battery	
Antenna Type	Metal PIFA Antenna	
Antenna Gain (dBi)	LTE-M1 Band 4	3.27
	LTE-M1 Band 12	-1.83
	LTE-M1 Band 13	-2.03
Accessory Device	Refer to 4.3	

**Maximum ERP/EIRP and Emission Designator**

Item	Band	Value
Maximum ERP/EIRP (mW)	LTE-M1 Band 4	126.77
	LTE-M1 Band 12	154.88
	LTE-M1 Band 13	155.24
Emission Designator	LTE-M1 Band 4 (1.4 MHz)	1M10G7D
	LTE-M1 Band 4 (3 MHz)	1M09G7D
	LTE-M1 Band 4 (5 MHz)	1M10G7D
	LTE-M1 Band 4 (10 MHz)	1M10D7W
	LTE-M1 Band 4 (15 MHz)	1M14D7W
	LTE-M1 Band 4 (20 MHz)	1M12G7D
	LTE-M1 Band 12 (1.4 MHz)	1M10G7D
	LTE-M1 Band 12 (3 MHz)	1M09G7D
	LTE-M1 Band 12 (5 MHz)	1M10D7W
	LTE-M1 Band 12 (10 MHz)	1M10G7D
	LTE-M1 Band 13 (5 MHz)	1M10G7D
	LTE-M1 Band 13 (10 MHz)	1M10G7D

### **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 MT8821C when the power is on.

Test Software	None.
---------------	-------

The samples were used as follows:

A003005263-014 for conducted and radiated

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	Position
-	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	H-plane
-	LTE-M1 Band 13	10 MHz	23230	23230	QPSK, 16QAM	1 RB	H-plane

#### 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
-	LTE-M1 Band 13	5 MHz	23205 to 23255	23205, 23255	QPSK	1 RB
		10 MHz	23230	23230	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
-	LTE-M1 Band 13	5 MHz	23205 to 23255	23205, 23230, 23255	QPSK, 16QAM	1 RB
		10 MHz	23230	23230	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
-	LTE-M1 Band 13	5 MHz	23205 to 23255	23205, 23230, 23255	QPSK, 16QAM	Full RB
		10 MHz	23230	23230	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, 20175, 20393	QPSK, 16QAM	1 RB / Full RB
		3 MHz	19965 to 20385	19965, 20175, 20385	QPSK, 16QAM	1 RB / Full RB
		5 MHz	19975 to 20375	19975, 20175, 20375	QPSK, 16QAM	1 RB / Full RB
		10 MHz	20000 to 20350	20000, 20175, 20350	QPSK, 16QAM	1 RB / Full RB
		15 MHz	20025 to 20325	20025, 20175, 20325	QPSK, 16QAM	1 RB / Full RB
		20 MHz	20050 to 20300	20050, 20175, 20300	QPSK, 16QAM	1 RB / Full RB
-	LTE-M1 Band 12	1.4 MHz	23017 to 23173	23017, 23095, 23173	QPSK, 16QAM	1 RB / Full RB
		3 MHz	23025 to 23165	23025, 23095, 23165	QPSK, 16QAM	1 RB / Full RB
		5 MHz	23035 to 23155	23035, 23095, 23155	QPSK, 16QAM	1 RB / Full RB
		10 MHz	23060 to 23130	23060, 23095, 23130	QPSK, 16QAM	1 RB / Full RB
-	LTE-M1 Band 13	5 MHz	23205 to 23255	23205, 23230, 23255	QPSK, 16QAM	1 RB / Full RB
		10 MHz	23230	23230	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, 16QAM	1 RB
-	LTE-M1 Band 12	10 MHz	23060 to 23130	23060, 23095, 23130	QPSK, 16QAM	1 RB
-	LTE-M1 Band 13	5 MHz	23205 to 23255	23205, 23230, 23255	QPSK, 16QAM	1 RB
		10 MHz	23230	23230	QPSK, 16QAM	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
-	LTE-M1 Band 13	10MHz	23230	23230	QPSK	1 RB	H-plane

**Test Condition**

Test Item	Ambient Temperature	Relative Humidity	Tested by
ERP / EIRP	20.1-24.1 °C	60-65 %	Eagle Tsai
Frequency Stability	20.9-25.8 °C	55.6-65.5 %	Chun-Yi Wu
Peak to Average Ratio	20.9-25.8 °C	55.6-65.5 %	Chun-Yi Wu
Occupied Bandwidth and 26 dB Bandwidth	20.9-25.8 °C	55.6-65.5 %	Chun-Yi Wu
Band Edge	20.9-25.8 °C	55.6-65.5 %	Chun-Yi Wu
Conducted Spurious Emissions	20.1-24.1 °C	60-65 %	Eagle Tsai
Radiated Spurious Emissions	20.1-24.1 °C	60-65 %	Eagle Tsai

### 4.3 Special Accessories and Auxiliary Equipment

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

#### Accessory of EUT

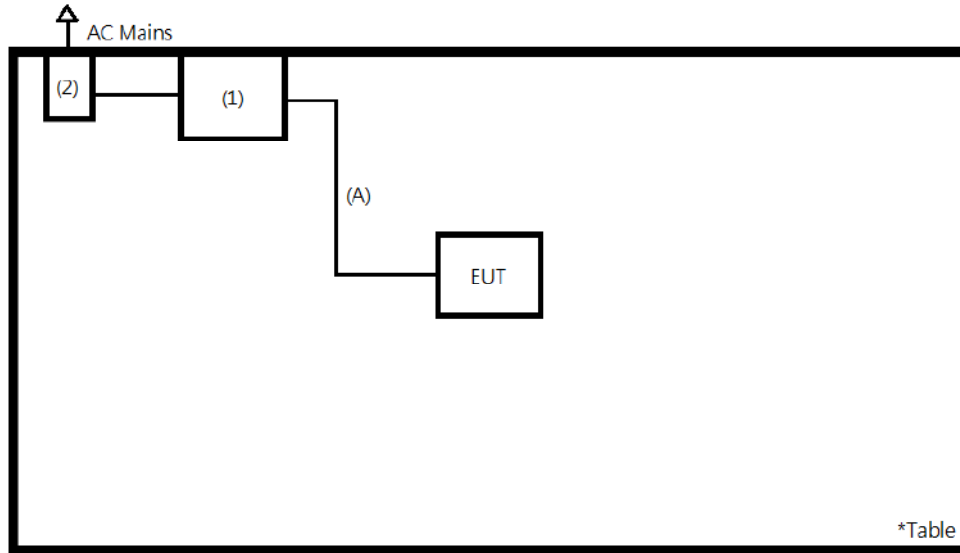
No.	Product	Brand	Model	Description
A	AC Adapter	MDA	SPBC4802A	I/P: 100-240 Vac, O/P: 54.6 Vdc, 180 cm shielded cable with core Radiated, Mains Conducted and E.I.R.P Tests
B	LI-ION BATTERY PACK	SPIN	B1	48.1Vdc, 11100 mAh Radiated and E.I.R.P. Tests

#### Support Unit

No.	Description	Brand	Model	S/N	Remark
Conducted Test					
-	Notebook	HP	TPN-C139	CND93662WT	-

### 4.4 Test Setup Diagram

<E.I.R.P. and Radiated Emission >





## 5. Test Results

### 5.1 Transmitter Requirement & Test Suites

#### 5.1.1 Conducted Output Power and ERP/EIRP

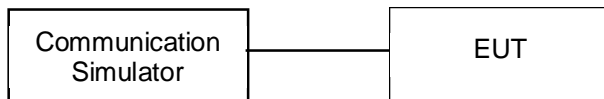
##### Limit

According to §27.50(b)(9): The ERP must not exceed 30 Watts.  
 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.

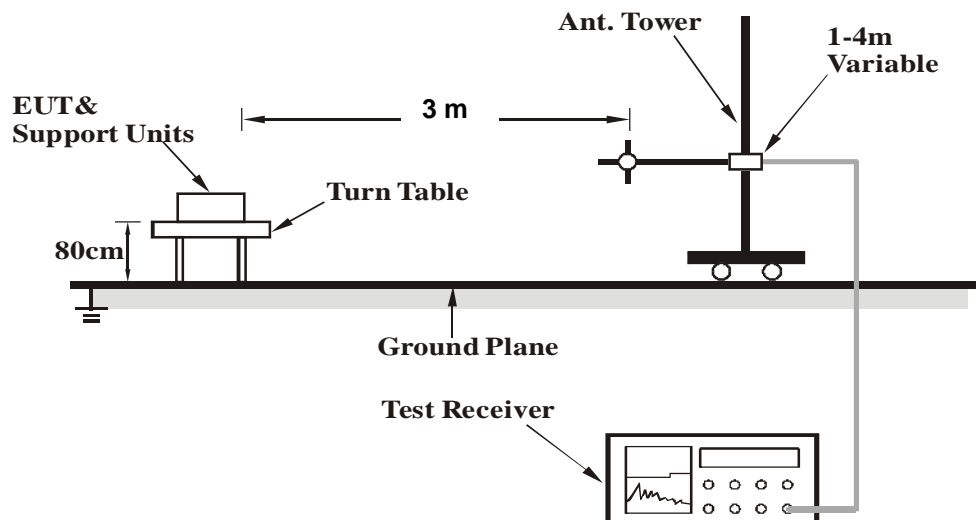
**Kind of Test Site**                      Shielded room

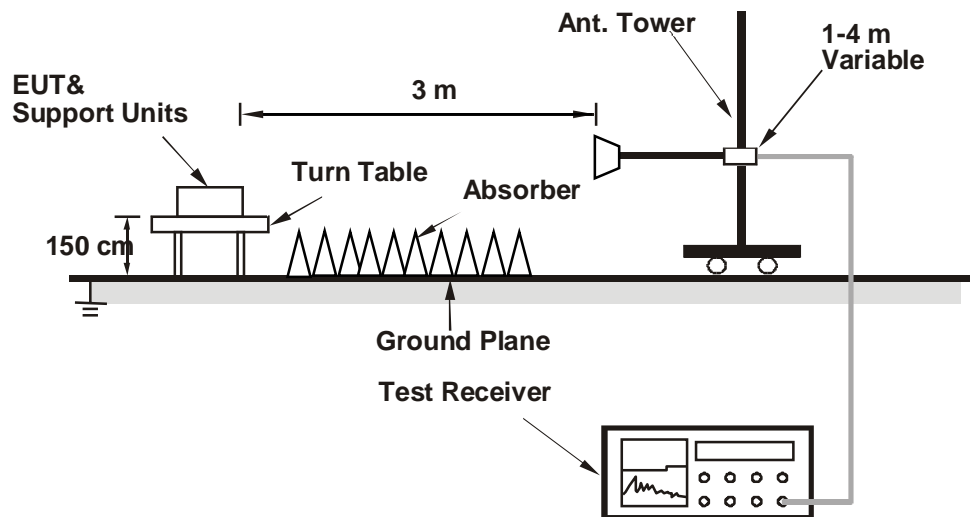
##### Test Setup

<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	2021/3/16	2022/3/15
Receiver	R&S	ESR7	102109	2021/3/16	2022/3/15
Bilog Antenna	SCHWARZBECK	VULB-9168	00951	2021/2/18	2022/2/17
Horn Antenna	ETS-Lindgren	3117	00218930	2020/12/1	2021/11/30
LF-AMP	Agilent	8447D	2944A10772	2021/2/18	2022/2/17
HF-AMP + AC source	EMCI	EMC051845SE	980633	2021/2/9	2022/2/8
HF-AMP + AC source	EMCI	EMC184045SE	980657	2021/2/1	2022/1/31
Horn Antenna	SCHWARZBECK	BBHA 9170	00887	2021/4/8	2022/4/7
Microwave Cable	HUBER+SUHNER	SUCOFLEX 104EA	800056/4EA	2021/3/17	2022/3/16
Microwave Cable	HUBER+SUHNER	SUCOFLEX 104	804680/4	2021/3/17	2022/3/16
Microwave Cable	HUBER+SUHNER	SUCOFLEX 104	MY37202/4	2021/3/17	2022/3/16
Microwave Cable	HUBER+SUHNER	SUCOFLEX 102EA	800898/2EA	2021/4/16	2022/4/15
Microwave Cable	HUBER+SUHNER	SUCOFLEX 102EA	800898/2EA	2020/4/17	2021/4/16
Microwave Cable	HUBER+SUHNER	SUCOFLEX 102EA	800901/2EA	2021/4/16	2022/4/15
Microwave Cable	HUBER+SUHNER	SUCOFLEX 102EA	800901/2EA	2020/4/17	2021/4/16
Microwave Cable	HUBER+SUHNER	SUCOFLEX 102EA	801027/2EA	2021/4/16	2022/4/15
Microwave Cable	HUBER+SUHNER	SUCOFLEX 102EA	801027/2EA	2020/4/17	2021/4/16
Loop Antenna	Chance Most	EMCILPA600 +calibration	287	2020/6/17	2021/6/16

**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	RB Offset	NB Index	Channel / Frequency (MHz)			RB Size	RB 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	20.51	20.83	20.63	1	0	0	20.48	20.56	20.92
	1	5	0	20.24	20.66	20.61	1	5	1	20.24	20.53	20.52
	3	0	0	19.50	19.65	19.90	3	0	0	19.31	19.63	19.91
	3	3	0	19.38	19.51	19.78	3	3	1	19.36	19.51	19.64
	6	0	0	18.63	18.76	19.18	6	0	0	18.50	18.75	18.89
	-	-	-	-	-	-	6	0	1	18.51	18.68	18.90
16QAM	1	0	0	19.27	19.77	19.66	1	0	0	18.44	19.38	19.31
	1	4	0	19.13	19.62	19.57	1	4	1	19.08	19.52	19.52
	3	0	0	18.77	18.63	18.79	3	0	0	18.42	18.69	18.84
	3	2	0	18.75	18.62	18.44	3	2	1	18.75	18.85	18.93
	5	0	0	18.51	18.61	18.81	5	0	0	18.61	19.07	18.95
	-	-	-	-	-	-	5	0	1	18.40	18.83	19.01
Bandwidth	5 MHz						10 MHz					
Modulation	RB Size	RB Offset	NB Index	Channel / Frequency (MHz)			RB Size	RB Offset	NB Index	Channel / Frequency (MHz)		
				19975/1712.5	20175/1732.5	20375/1752.5				20000/1715	20175/1732.5	20350/1750
QPSK	1	0	0	20.28	20.60	20.71	1	0	0	20.74	20.81	21.02
	1	0	3	20.35	20.67	20.61	1	0	3	20.78	20.90	21.08
	1	5	0	20.14	20.33	20.47	1	5	4	20.61	20.70	20.86
	1	5	3	20.12	20.38	20.55	1	5	7	20.72	20.77	20.93
	3	0	0	20.21	20.71	20.54	3	0	0	20.79	20.82	20.99
	3	3	3	20.04	20.56	20.51	3	3	7	20.66	20.68	20.87
	6	0	0	19.15	19.55	19.50	6	0	0	19.57	19.67	19.84
	6	0	3	19.23	19.48	19.61	6	0	7	19.65	19.75	19.96
16QAM	1	0	0	19.96	20.11	20.32	1	0	0	20.50	20.52	20.75
	1	0	3	20.01	20.13	20.32	1	0	3	20.57	20.55	20.76
	1	4	0	19.81	19.96	20.17	1	4	4	20.27	20.36	20.54
	1	4	3	19.89	19.98	20.33	1	4	7	20.34	20.51	20.55
	3	0	0	20.01	20.16	20.36	3	0	0	20.35	20.50	20.79
	3	2	3	19.95	20.03	20.53	3	2	7	20.48	20.63	20.95
	5	0	0	18.80	19.56	19.52	5	0	0	20.60	20.60	20.67
	5	0	3	18.88	19.34	19.63	5	0	7	20.70	20.77	20.82

LTE-M1 Band 4												
Bandwidth	15 MHz						20 MHz					
Modulation	RB Size	RB Offset	NB Index	Channel / Frequency (MHz)			RB Size	RB Offset	NB Index	Channel / Frequency (MHz)		
				20025/ 1717.5	20175/ 1732.5	20325/ 1747.5				20050/ 1720	20175/ 1732.5	20300/ 1745
QPSK	1	0	0	20.74	20.87	20.97	1	0	0	20.78	20.77	21.09
	1	0	3	20.86	20.84	21.01	1	0	3	20.73	20.89	20.97
	1	5	8	20.64	20.76	20.88	1	5	12	20.74	20.80	20.91
	1	5	11	20.79	20.88	20.95	1	5	15	20.89	20.83	21.00
	3	0	0	20.71	20.73	20.82	3	0	0	20.80	20.69	20.87
	3	3	11	20.66	20.74	20.94	3	3	15	20.90	20.75	21.00
	6	0	0	20.52	20.63	20.82	6	0	0	20.63	20.69	20.84
	6	0	11	20.79	20.87	20.90	6	0	15	20.85	20.91	21.05
16QAM	1	0	0	20.52	20.57	20.66	1	0	0	20.52	20.55	20.58
	1	0	3	20.45	20.64	20.70	1	0	3	20.56	20.73	20.57
	1	4	8	20.43	20.44	20.58	1	4	12	20.52	20.49	20.65
	1	4	11	20.51	20.61	20.61	1	4	15	20.57	20.51	20.65
	3	0	0	20.43	20.53	20.63	3	0	0	20.43	20.52	20.59
	3	2	11	20.75	20.65	20.83	3	2	15	20.61	20.68	21.05
	5	0	0	20.26	20.65	20.56	5	0	0	20.62	20.53	20.56
	5	0	11	20.77	20.85	20.76	5	0	15	20.84	20.89	20.81

LTE-M1 Band 12												
Bandwidth	1.4 MHz						3 MHz					
Modulation	RB Size	RB Offset	NB Index	Channel / Frequency (MHz)			RB Size	RB 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	21.03	20.94	21.51	1	0	0	21.34	21.20	21.45
	1	5	0	20.87	20.67	21.44	1	5	1	21.20	21.22	21.44
	3	0	0	20.18	20.02	20.58	3	0	0	20.14	19.92	20.51
	3	3	0	20.04	19.76	20.51	3	3	1	19.88	19.71	20.44
	6	0	0	19.22	19.10	19.52	6	0	0	19.21	18.96	19.42
	-	-	-	-	-	-	6	0	1	19.14	18.94	19.53
16QAM	1	0	0	20.00	19.75	20.45	1	0	0	19.87	19.64	20.11
	1	4	0	19.81	19.58	20.43	1	4	1	19.67	19.50	20.21
	3	0	0	19.07	18.86	19.36	3	0	0	18.87	18.83	19.14
	3	2	0	19.04	18.80	19.43	3	2	1	18.81	18.82	19.19
	5	0	0	19.13	18.94	19.50	5	0	0	19.15	18.95	19.35
	-	-	-	-	-	-	5	0	1	19.13	18.93	19.51
Bandwidth	5 MHz						10 MHz					
Modulation	RB Size	RB Offset	NB Index	Channel / Frequency (MHz)			RB Size	RB Offset	NB Index	Channel / Frequency (MHz)		
				23035/ 701.5	23095/ 707.5	23155/ 713.5				23060/ 704	23095/ 707.5	23130/ 711
QPSK	1	0	0	21.23	21.20	21.31	1	0	0	21.31	21.30	21.47
	1	0	3	21.23	21.17	21.33	1	0	3	21.19	21.24	21.32
	1	5	0	21.17	21.03	21.34	1	5	4	21.02	21.03	21.37
	1	5	3	21.06	21.14	21.41	1	5	7	20.88	21.33	21.55
	3	0	0	21.14	21.16	21.21	3	0	0	21.08	21.15	20.86
	3	3	3	21.09	20.93	21.50	3	3	7	20.89	21.15	21.32
	6	0	0	20.19	19.99	20.74	6	0	0	20.11	20.58	19.93
	6	0	3	20.09	20.04	20.61	6	0	7	20.91	21.16	21.62
16QAM	1	0	0	20.92	20.76	20.67	1	0	0	20.91	20.50	20.65
	1	0	3	20.74	20.79	21.16	1	0	3	20.81	20.65	20.84
	1	4	0	20.76	20.50	20.92	1	4	4	20.66	20.57	20.75
	1	4	3	20.68	20.70	21.17	1	4	7	20.71	20.85	21.08
	3	0	0	20.48	20.63	20.81	3	0	0	20.74	20.70	20.53
	3	2	3	20.57	20.59	21.08	3	2	7	20.50	21.00	21.06
	5	0	0	20.18	19.94	20.14	5	0	0	20.81	20.08	20.73
	5	0	3	20.08	19.99	20.59	5	0	7	20.81	21.06	21.52

LTE-M1 Band 13										
Bandwidth	5 MHz						10 MHz			
Modulation	RB Size	RB Offset	NB Index	Channel / Frequency (MHz)			RB Size	RB Offset	NB Index	Channel / Frequency (MHz)
				23205/ 779.5	23230/ 782	23255/ 784.5				23230/ 782
QPSK	1	0	0	21.95	21.89	21.99	1	0	0	21.86
	1	0	3	21.86	21.77	21.97	1	0	3	22.01
	1	5	0	21.63	21.86	21.77	1	5	4	21.81
	1	5	3	21.81	21.64	21.93	1	5	7	21.83
	3	0	0	21.55	21.80	21.72	3	0	0	21.56
	3	3	3	21.56	21.50	21.68	3	3	7	21.58
	6	0	0	20.62	20.65	20.68	6	0	0	21.30
	6	0	3	20.65	20.55	20.66	6	0	7	21.75
16QAM	1	0	0	21.36	21.58	21.50	1	0	0	21.43
	1	0	3	21.44	21.36	21.37	1	0	3	21.33
	1	4	0	21.33	21.36	21.17	1	4	4	21.16
	1	4	3	21.23	21.25	20.95	1	4	7	21.25
	3	0	0	21.22	21.17	21.27	3	0	0	21.26
	3	2	3	21.27	21.18	21.08	3	2	7	21.11
	5	0	0	20.38	20.43	20.25	5	0	0	21.30
	5	0	3	20.62	20.52	20.55	5	0	7	21.72

**<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	-25.38	44.44	19.06	80.54	H
	20175	1732.5	-24.10	45.13	21.03	126.77	
	20300	1745.0	-25.17	44.63	19.46	88.31	
	V	20050	1720.0	-26.68	45.43	18.75	74.99
		20175	1732.5	-26.38	45.75	19.37	86.50
		20300	1745.0	-26.86	46.30	19.44	87.90
16QAM							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
H	20050	1720.0	-25.67	44.44	18.77	75.34	H
	20175	1732.5	-24.56	45.13	20.57	114.02	
	20300	1745.0	-25.89	44.63	18.74	74.82	
	V	20050	1720.0	-27.68	45.43	17.75	59.57
		20175	1732.5	-27.38	45.75	18.37	68.71
		20300	1745.0	-27.86	46.30	18.44	69.82

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	-10.86	34.51	21.50	141.25	H
	23095	707.5	-10.70	34.75	21.90	154.88	
	23130	711	-10.78	34.67	21.74	149.28	
	V	23060	704	-15.95	36.79	18.69	73.96
		23095	707.5	-16.21	36.87	18.51	70.96
		23130	711	-16.46	36.98	18.37	68.71
16QAM							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (mW)	Polarization (H/V)
H	23060	704	-11.54	34.51	20.82	120.78	H
	23095	707.5	-11.88	34.75	20.72	118.03	
	23130	711	-11.86	34.67	20.66	116.41	
	V	23060	704	-16.95	36.79	17.69	58.75
		23095	707.5	-17.21	36.87	17.51	56.36
		23130	711	-17.46	36.98	17.37	54.58

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



LTE-M1 Band 13_Channel Bandwidth_10M							
QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (mW)	Polarization (H/V)
H	23230	782	-12.82	36.88	21.91	155.24	H
	23230	782	-15.88	37.34	19.31	85.31	V
16QAM							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (mW)	Polarization (H/V)
H	23230	782	-15.65	36.88	19.08	80.91	H
	23230	782	-16.57	37.34	18.62	72.78	V

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

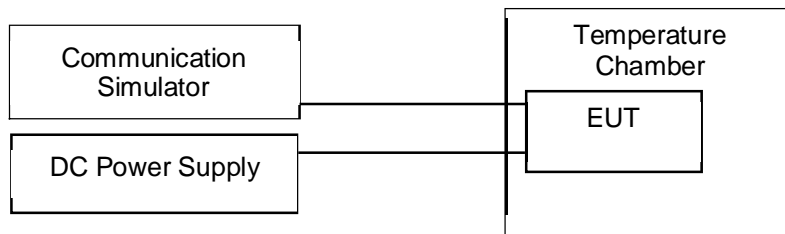
## 5.1.2 Frequency Stability

### 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
Radio Communication Analyzer	Anritsu	MT8821C	6262044753	2021/1/29	2022/1/28	2021/4/19	2021/4/19
Thermal Chamber	Giant Force	GHT-150-40-CP-SD	MAA1902-010	2021/3/4	2022/3/3	2021/4/19	2021/4/19

### 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  $\pm 0.5$  °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)
4.37	1710.700	-0.013199	1754.300	-0.002099
3.8	1710.700	0.006430	1754.300	-0.007410
3.23	1710.700	0.004410	1754.300	-0.001022
Frequency Error versus Temperature				
Temperature (°C)	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
50	1710.700	-0.008692	1754.300	0.000482
40	1710.700	-0.014806	1754.300	0.008046
30	1710.700	-0.002912	1754.300	-0.002170
20	1710.700	0.006430	1754.300	-0.007410
10	1710.700	-0.013329	1754.300	0.010557
0	1710.700	0.012220	1754.300	-0.002131
-10	1710.700	0.006587	1754.300	-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)
4.37	1711.500	0.001711	1753.500	0.012187
3.8	1711.500	0.007011	1753.500	0.005703
3.23	1711.500	0.009589	1753.500	-0.006391
Frequency Error versus Temperature				
Temperature (°C)	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
50	1711.500	0.011498	1753.500	-0.000646
40	1711.500	-0.012965	1753.500	-0.010104
30	1711.500	0.009264	1753.500	0.008555
20	1711.500	0.007011	1753.500	0.005703
10	1711.500	0.005721	1753.500	-0.005773
0	1711.500	-0.012812	1753.500	0.008046
-10	1711.500	-0.011469	1753.500	-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)
4.37	1712.500	0.014061	1752.500	0.001998
3.8	1712.500	0.005843	1752.500	-0.015398
3.23	1712.500	0.002279	1752.500	-0.003453
Frequency Error versus Temperature				
Temperature (°C)	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
50	1712.500	-0.010589	1752.500	-0.004974
40	1712.500	0.009250	1752.500	-0.001770
30	1712.500	0.006325	1752.500	-0.013474
20	1712.500	0.005843	1752.500	-0.015398
10	1712.500	0.001845	1752.500	-0.000838
0	1712.500	-0.003637	1752.500	-0.013474
-10	1712.500	0.010120	1752.500	-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)
4.37	1715.000	0.004046	1750.000	0.004282
3.8	1715.000	-0.016360	1750.000	-0.013117
3.23	1715.000	0.003028	1750.000	-0.014240
Frequency Error versus Temperature				
Temperature (°C)	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
50	1715.000	0.011683	1750.000	-0.014631
40	1715.000	0.004035	1750.000	-0.009669
30	1715.000	0.006406	1750.000	0.013853
20	1715.000	-0.016360	1750.000	-0.013117
10	1715.000	0.000298	1750.000	0.014027
0	1715.000	-0.003498	1750.000	-0.008620
-10	1715.000	0.009057	1750.000	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)
4.37	1717.500	0.013319	1747.500	0.011196
3.8	1717.500	-0.014607	1747.500	-0.015398
3.23	1717.500	0.006517	1747.500	-0.006660
Frequency Error versus Temperature				
Temperature (°C)	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
50	1717.500	0.008091	1747.500	0.003486
40	1717.500	-0.011083	1747.500	0.009832
30	1717.500	-0.010632	1747.500	-0.013663
20	1717.500	-0.014607	1747.500	-0.015398
10	1717.500	-0.012527	1747.500	-0.007623
0	1717.500	0.012527	1747.500	-0.012173
-10	1717.500	-0.011249	1747.500	-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)
4.37	1720.000	0.004588	1745.000	-0.000257
3.8	1720.000	-0.002921	1745.000	-0.014257
3.23	1720.000	-0.013325	1745.000	0.007149
Frequency Error versus Temperature				
Temperature (°C)	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
50	1720.000	-0.006427	1745.000	-0.014257
40	1720.000	-0.005259	1745.000	-0.011406
30	1720.000	-0.006427	1745.000	-0.014257
20	1720.000	-0.002921	1745.000	-0.014257
10	1720.000	0.004674	1745.000	0.003422
0	1720.000	-0.005843	1745.000	-0.007414
-10	1720.000	0.007596	1745.000	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)
4.37	699.700	-0.002252	715.300	-0.010042
3.8	699.700	0.011691	715.300	0.010261
3.23	699.700	-0.001570	715.300	-0.009043
Frequency Error versus Temperature				
Temperature (°C)	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
50	699.700	-0.008419	715.300	-0.004452
40	699.700	-0.011016	715.300	0.013629
30	699.700	-0.000616	715.300	0.011740
20	699.700	0.011691	715.300	0.010261
10	699.700	0.005967	715.300	-0.011505
0	699.700	-0.003031	715.300	-0.009861
-10	699.700	-0.013438	715.300	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)
4.37	700.500	0.004091	714.500	0.010719
3.8	700.500	0.009933	714.500	0.009125
3.23	700.500	0.011301	714.500	-0.008284
Frequency Error versus Temperature				
Temperature (°C)	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
50	700.500	0.012766	714.500	0.010701
40	700.500	-0.010396	714.500	0.014027
30	700.500	-0.003401	714.5000	0.013522
20	700.500	0.009933	714.50	0.009125
10	700.500	0.010389	714.500	-0.010340
0	700.500	0.010074	714.500	0.004093
-10	700.500	-0.002813	714.500	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)
4.37	701.500	0.000362	713.500	-0.005076
3.8	701.500	0.010517	713.500	0.001711
3.23	701.500	-0.012350	713.500	-0.008662
Frequency Error versus Temperature				
Temperature (°C)	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
50	701.500	-0.004257	713.500	0.002117
40	701.500	0.014899	713.500	-0.006976
30	701.500	-0.003274	713.500	-0.000785
20	701.500	0.010517	713.500	0.001711
10	701.500	0.006496	713.500	0.007677
0	701.500	0.004075	713.500	0.003508
-10	701.500	-0.011735	713.500	0.007420

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)
4.37	704.000	-0.001580	711.000	0.008274
3.8	704.000	0.012270	711.000	0.005133
3.23	704.000	-0.011949	711.000	0.001699
Frequency Error versus Temperature				
Temperature (°C)	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
50	704.000	0.010517	711.000	0.003422
40	704.000	0.009349	711.000	0.005703
30	704.000	0.005259	711.000	0.001711
20	704.000	0.012270	711.000	0.005133
10	704.000	-0.003506	711.000	-0.002851
0	704.000	-0.003506	711.000	0.002851
-10	704.000	0.002921	711.000	0.005703

LTE-M1 Band 13_5 MHz				
Frequency Error versus Voltage				
Power Supply (Vdc)	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.37	779.500	-0.005083	784.500000	0.008250
3.8	779.500	0.005341	784.500000	-0.008489
3.23	779.500	-0.006960	784.500000	0.006524
Frequency Error versus Temperature				
Temperature (°C)	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
50	779.500	-0.007356	784.500	-0.006328
40	779.500	0.007666	784.500	0.007347
30	779.500	0.008488	784.500	-0.006234
20	779.500	-0.007685	784.500	0.006267
10	779.500	0.005848	784.500	-0.009127
0	779.500	0.006794	784.500	0.004653
-10	779.500	-0.007892	784.500	-0.008325

LTE-M1 Band 13_10 MHz		
Frequency Error versus Voltage		
Power Supply (Vdc)	Low Channel	
	Frequency (MHz)	Frequency Error (ppm)
4.37	782.000	-0.006958
3.8	782.000	0.005643
3.23	782.000	-0.008982
Frequency Error versus Temperature		
Temperature (°C)	Low Channel	
	Frequency (MHz)	Frequency Error (ppm)
50	782.000	0.007397
40	782.000	-0.004832
30	782.000	0.005229
20	782.000	0.005109
10	782.000	-0.007482
0	782.000	0.005197
-10	782.000	-0.007153

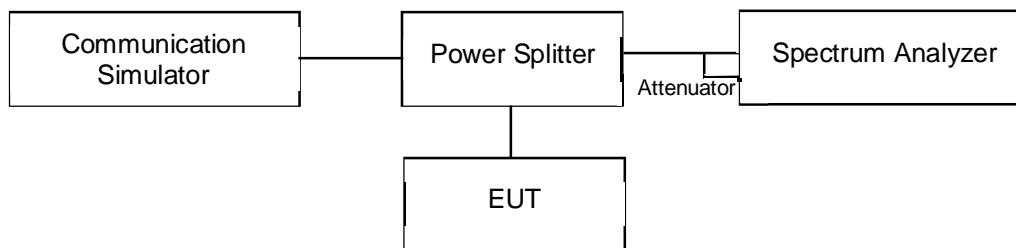


### 5.1.3 Peak to Average Ratio

**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	101512	2021/1/28	2022/1/27	2021/4/23	2021/4/25
Radio Communication Analyzer	Anritsu	MT8821C	6262044753	2021/1/29	2022/1/28	2021/4/23	2021/4/25

#### 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 %.

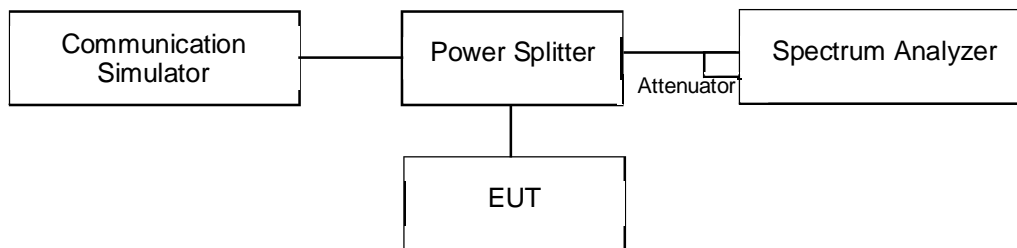
#### Test Results

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	101512	2021/1/28	2022/1/27	2021/4/20	2021/4/25
Radio Communication Analyzer	Anritsu	MT8821C	6262044753	2021/1/29	2022/1/28	2021/4/20	2021/4/25

**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(c) : For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the 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, On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least  $43 + 10 \log (P)$  dB.

27.53(f) For operations in the 775-788 MHz, emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz. The limit of emissions is equal to -40 dBm.

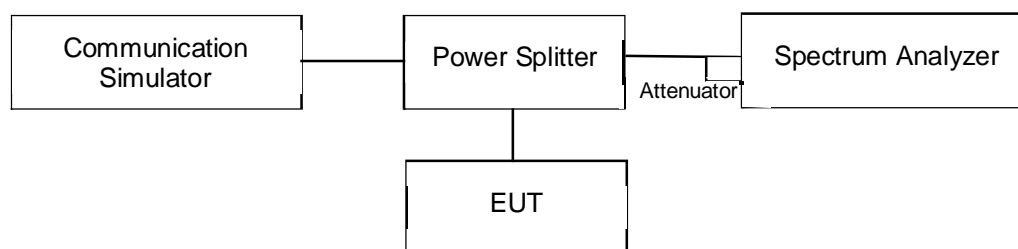
§27.53(h): For operations in the 1710–1755 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least  $43 + 10 \log (P)$  dB.

§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	101512	2021/1/28	2022/1/27	2021/4/21	2021/4/23
Radio Communication Analyzer	Anritsu	MT8821C	6262044753	2021/1/29	2022/1/28	2021/4/21	2021/4/23

#### 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.

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*Test Report No.*

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*Page 36 of 39*

**Test Results**

Please refer to Appendix A.

## 5.1.6 Conducted Spurious Emissions

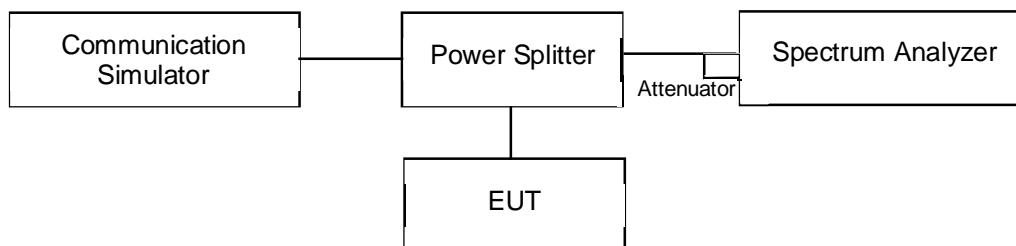
### Limit

§27.53(c), §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.

§27.53(f) For operations in the 775-788 MHz, emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz. The limit of emissions is equal to -40 dBm.

**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	101512	2020/2/24	2021/2/23	2021/4/21	2021/4/23
Spectrum Analyzer	R&S	FSV40	101512	2021/1/28	2022/1/27		
Wireless Communication Tester	R&S	CMW500	166923	2020/2/11	2021/2/10	2021/4/21	2021/4/23
Radio Communication Analyzer	Anritsu	MT8821C	6262044753	2021/1/29	2022/1/28		

### 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 10<sup>th</sup> 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

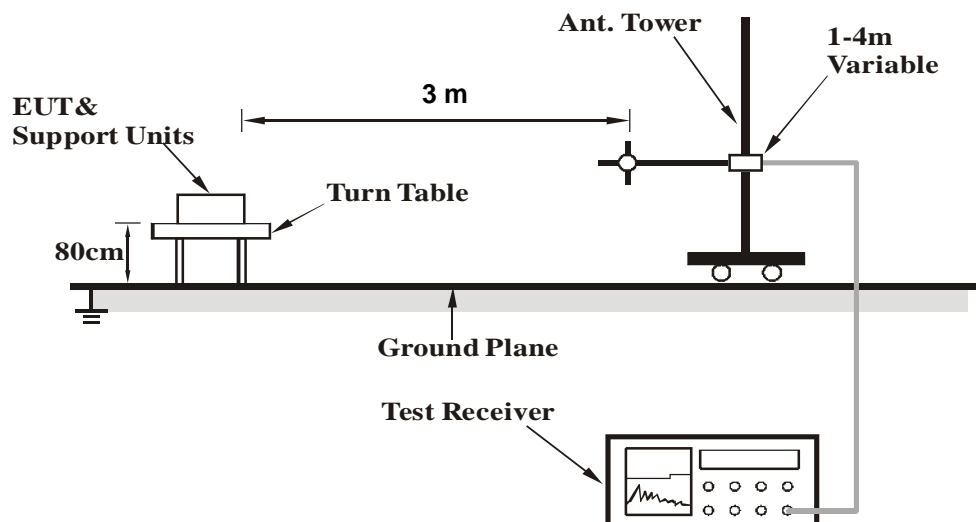
§27.53(c), §27.53(h), §27.53(g): The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least  $43 + 10 \log (P)$  dB.

§27.53(f) For operations in the 775-788 MHz, emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz. The limit of emissions is equal to -40 dBm.

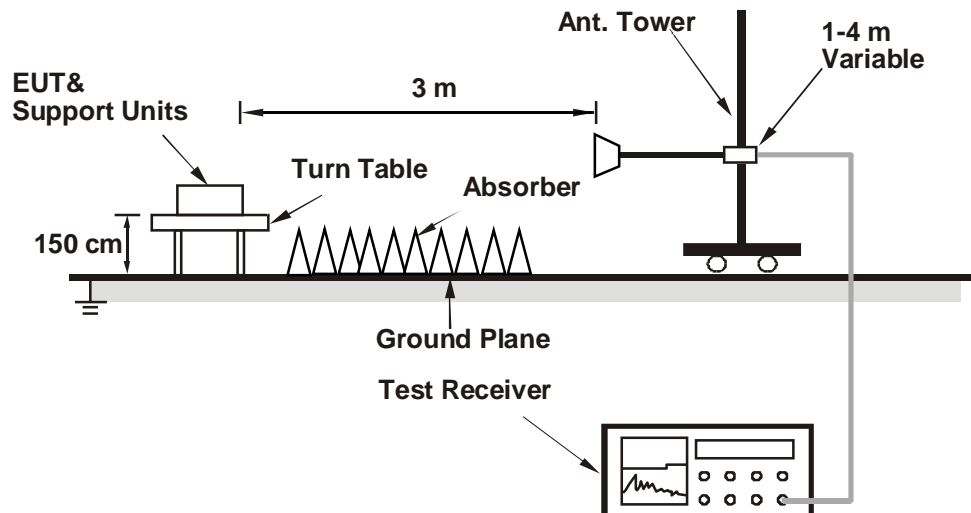
**Kind of Test Site**                      3m Semi-Anechoic Chamber

### 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

- 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.
- 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.
- $E.I.R.P. = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn.}$
- $E.R.P. \text{ can be calculated from E.I.R.P. by subtracting the gain of dipole, } E.R.P. = E.I.R.P - 2.15 \text{ dB.}$

Note:

- The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.
- Testing was carried out within frequency range 30 MHz to the tenth harmonic.
- All modes of operation were investigated and the worst-case emissions are reported.
- 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

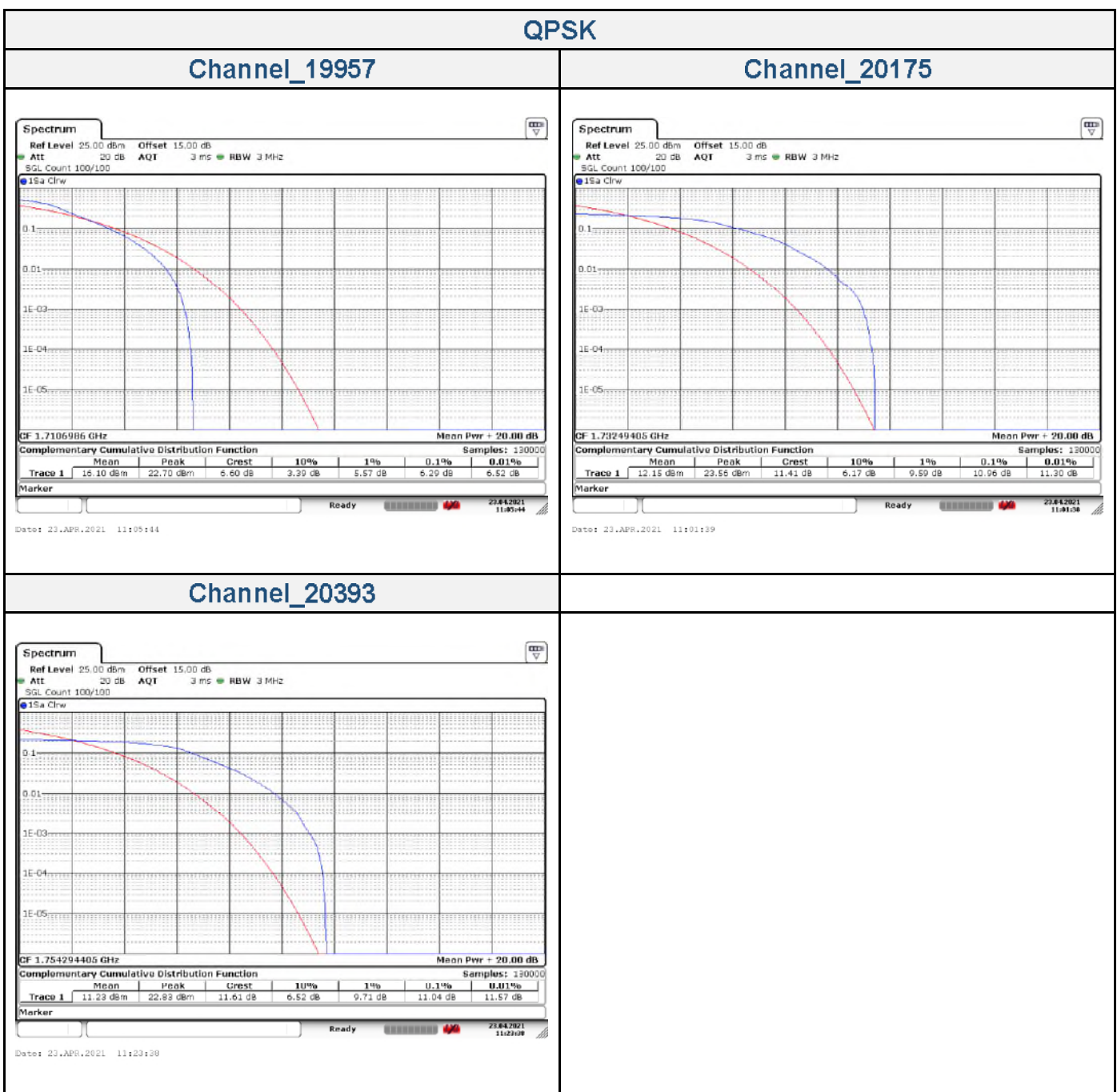
Please refer to Appendix B.

# 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	6.29	9.07
20175	1732.5	10.96	7.88
20393	1754.3	11.04	6.70

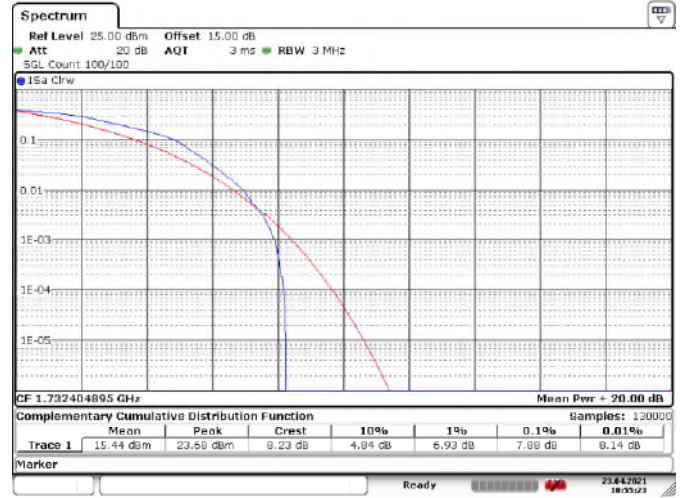
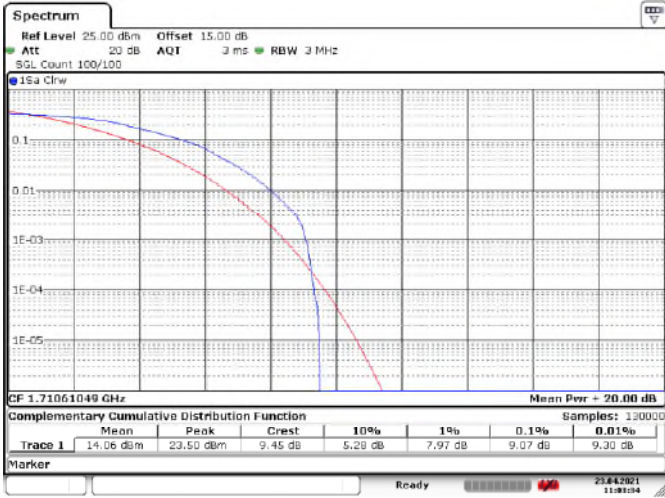




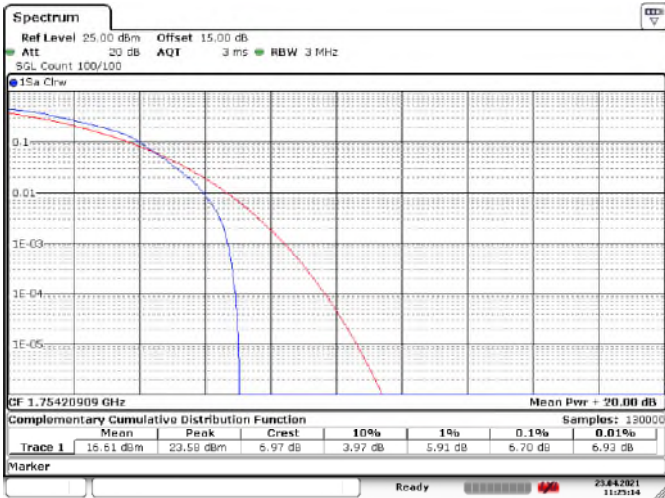
16QAM

Channel\_19957

Channel\_20175

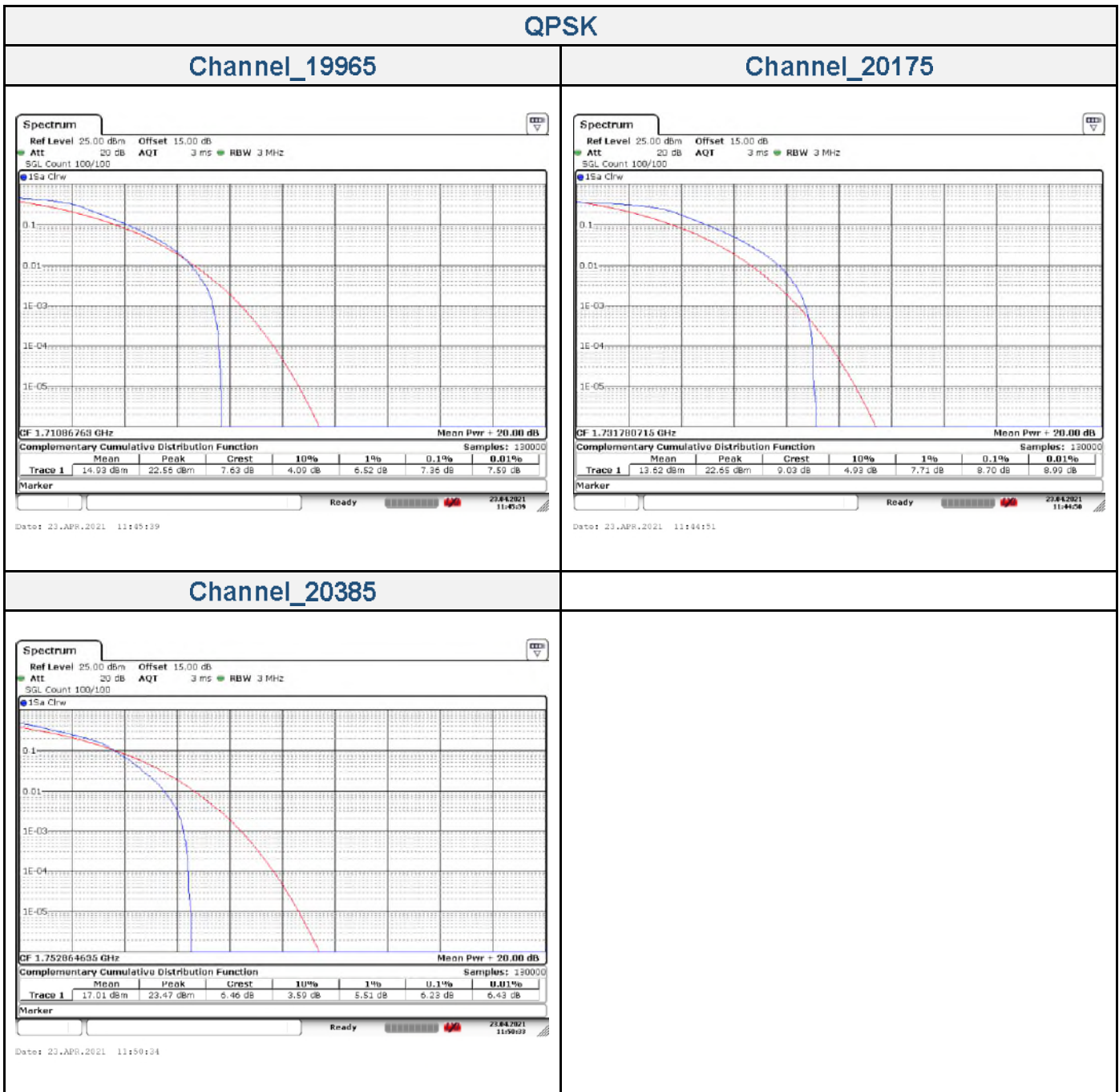


Channel\_20393



LTE Band 4 \_ Channel Bandwidth: 3 MHz

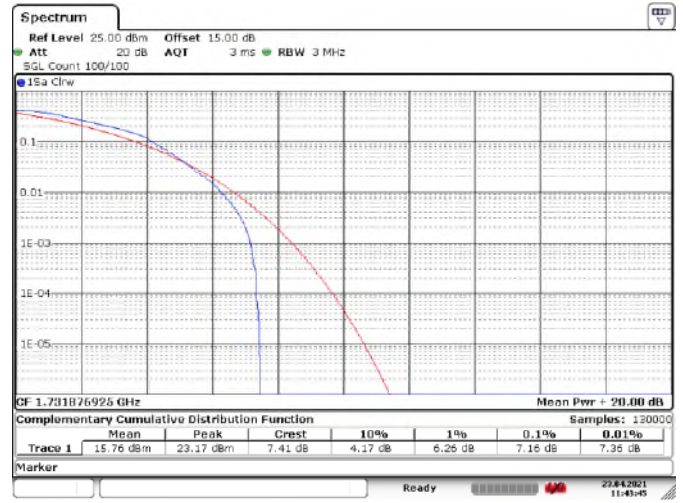
Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM
19965	1711.5	7.36	8.00
20175	1732.5	8.70	7.16
20385	1753.5	6.23	5.97



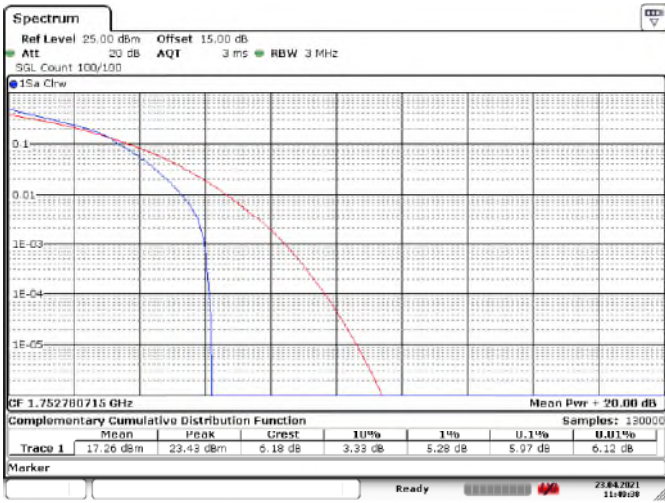
16QAM

Channel\_19965

Channel\_20175

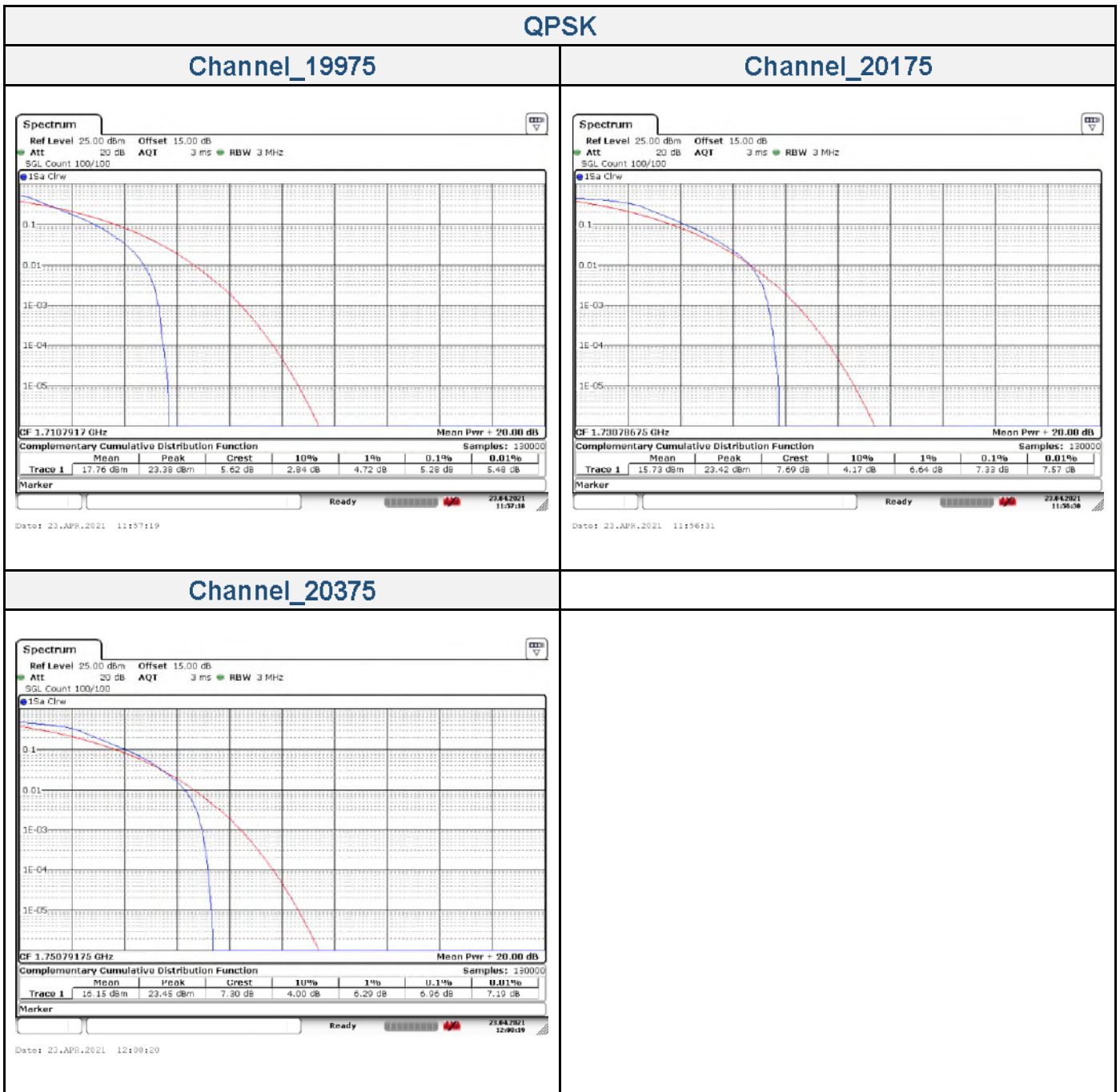


Channel\_20385



LTE Band 4 \_ Channel Bandwidth: 5 MHz

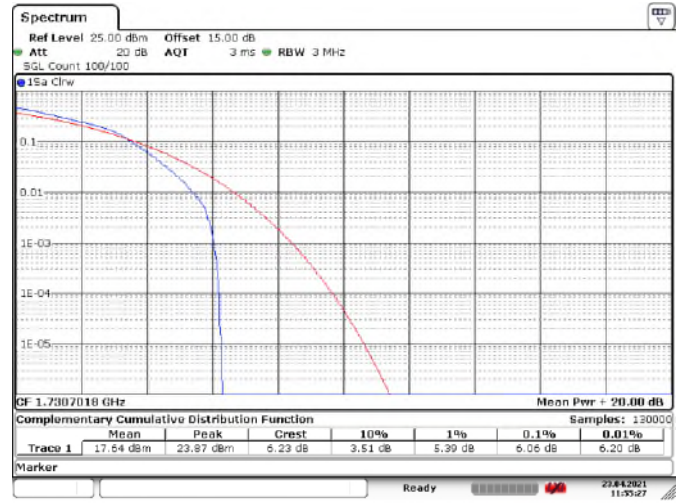
Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM
19975	1712.5	5.28	5.74
20175	1732.5	7.33	6.06
20375	1752.5	6.96	7.94



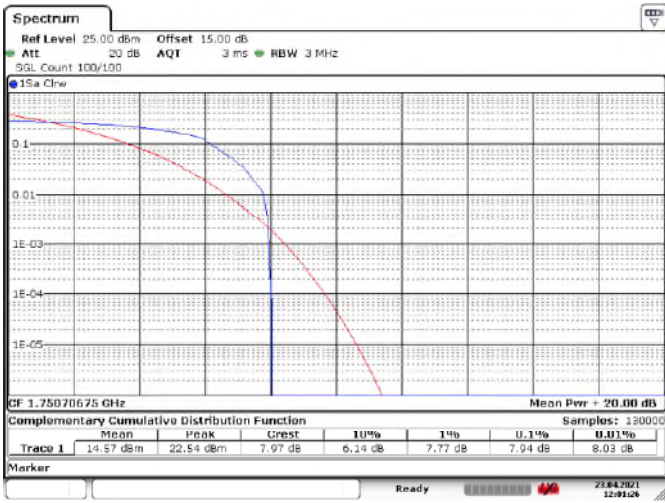
16QAM

Channel\_19975

Channel\_20175

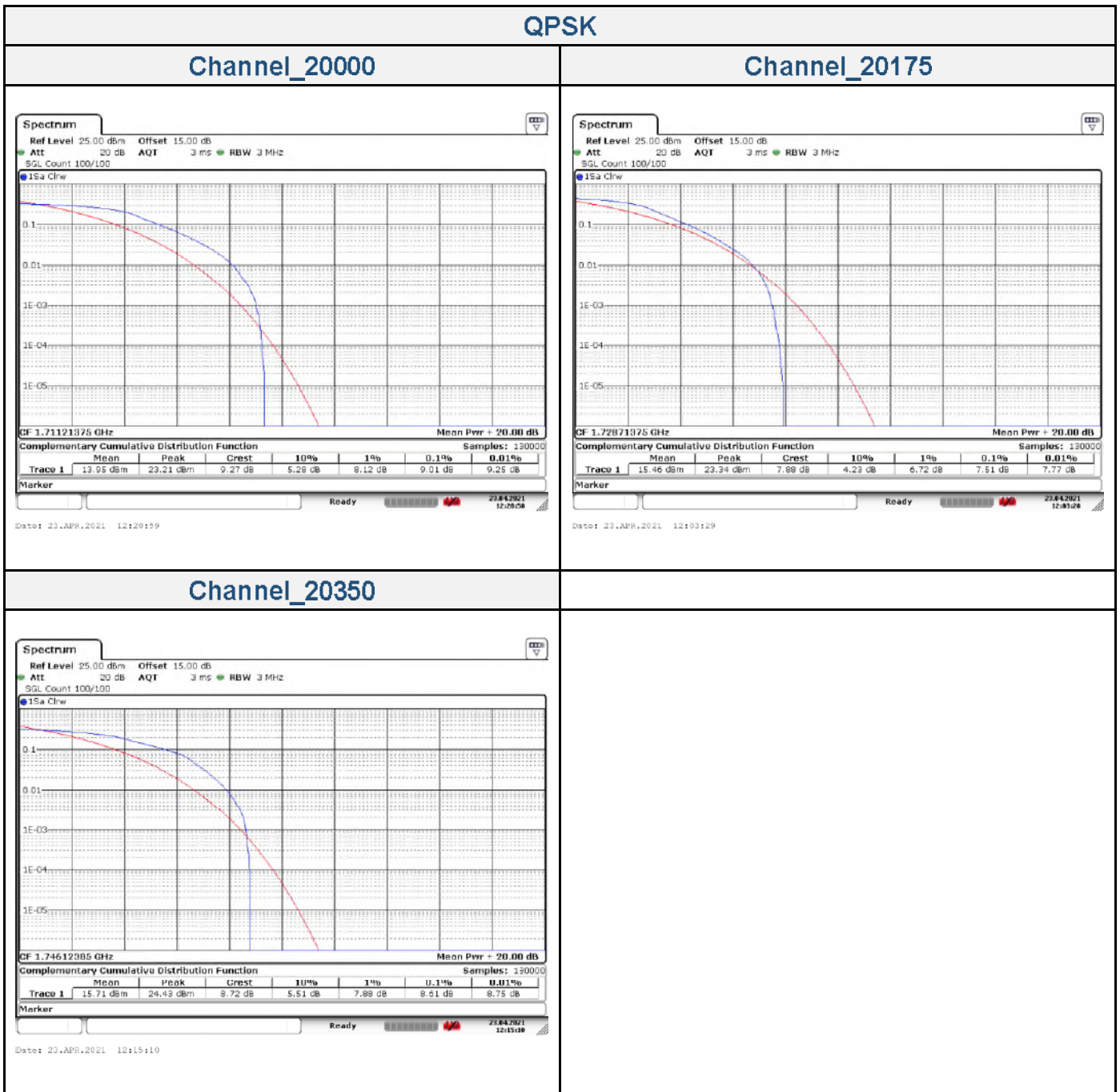


Channel\_20375



LTE Band 4 \_ Channel Bandwidth: 10 MHz

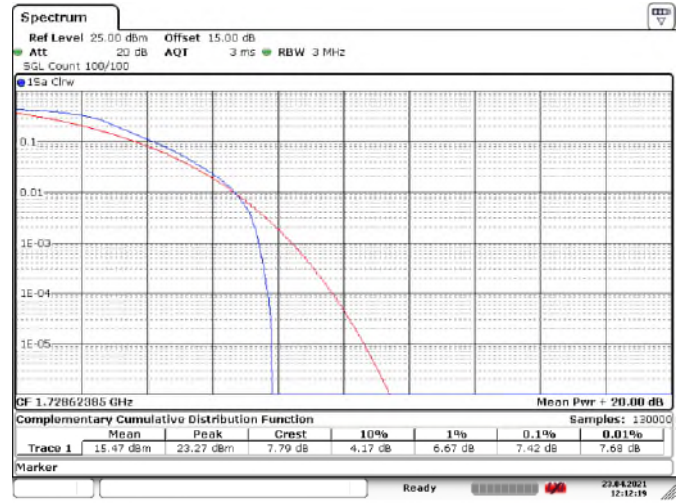
Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM
20000	1715.0	9.01	9.88
20175	1732.5	7.51	7.42
20350	1750.0	8.61	9.80



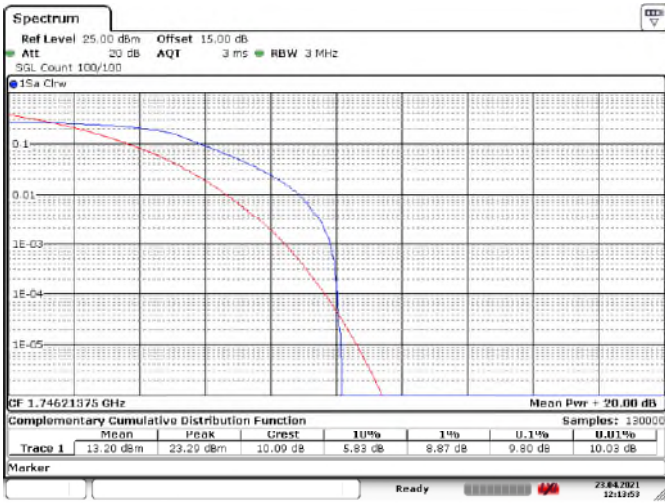
16QAM

Channel\_20000

Channel\_20175

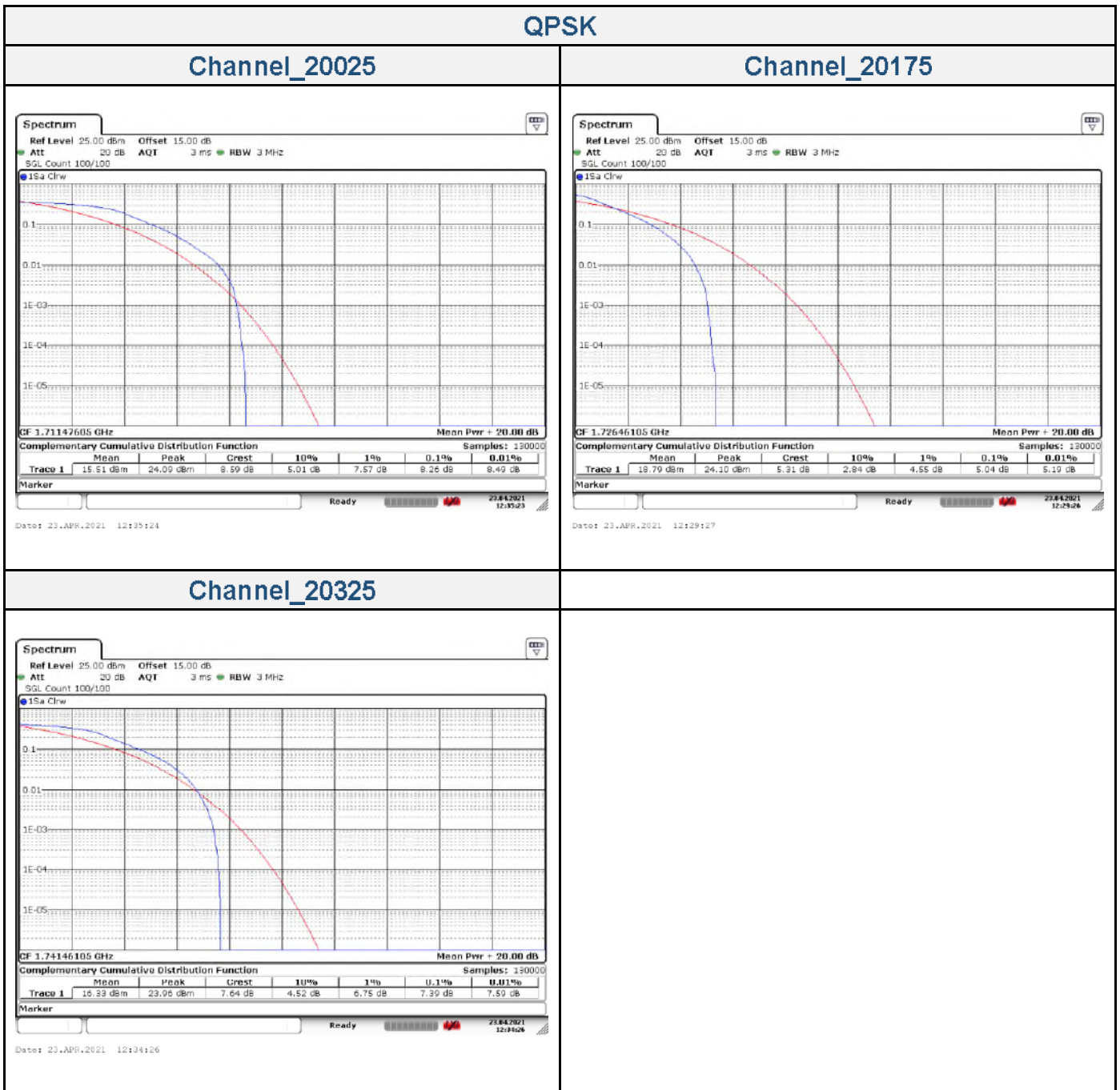


Channel\_20350



LTE Band 4 \_ Channel Bandwidth: 15 MHz

Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM
20025	1717.5	8.26	6.38
20175	1732.5	5.04	7.28
20325	1747.5	7.39	10.23

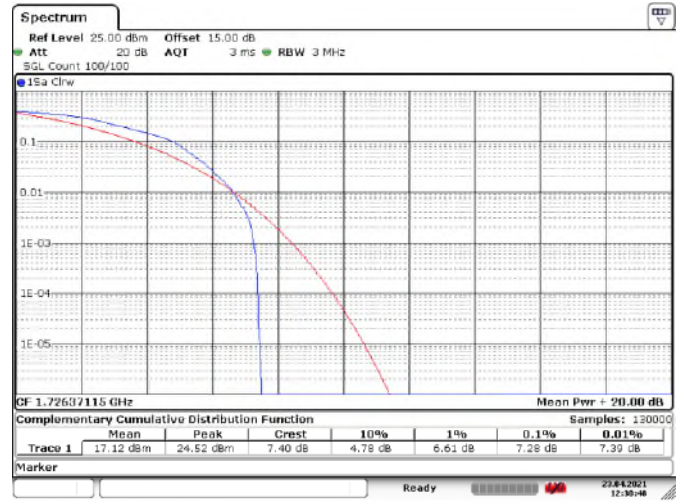
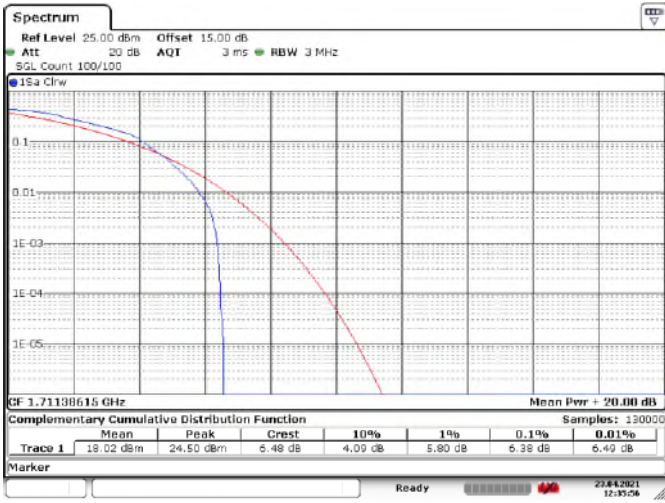




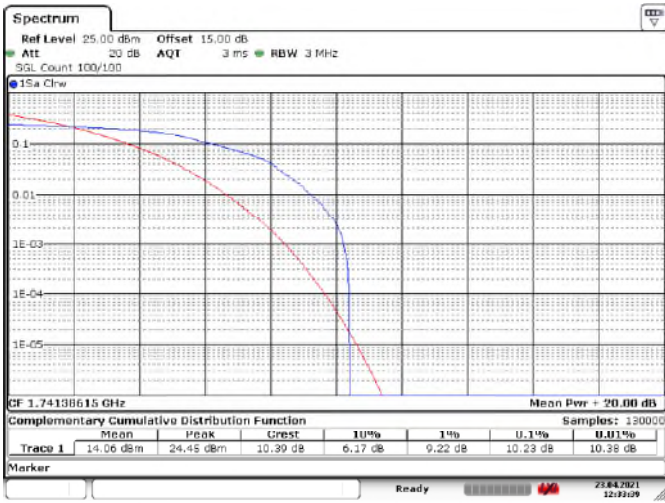
16QAM

Channel\_20025

Channel\_20175

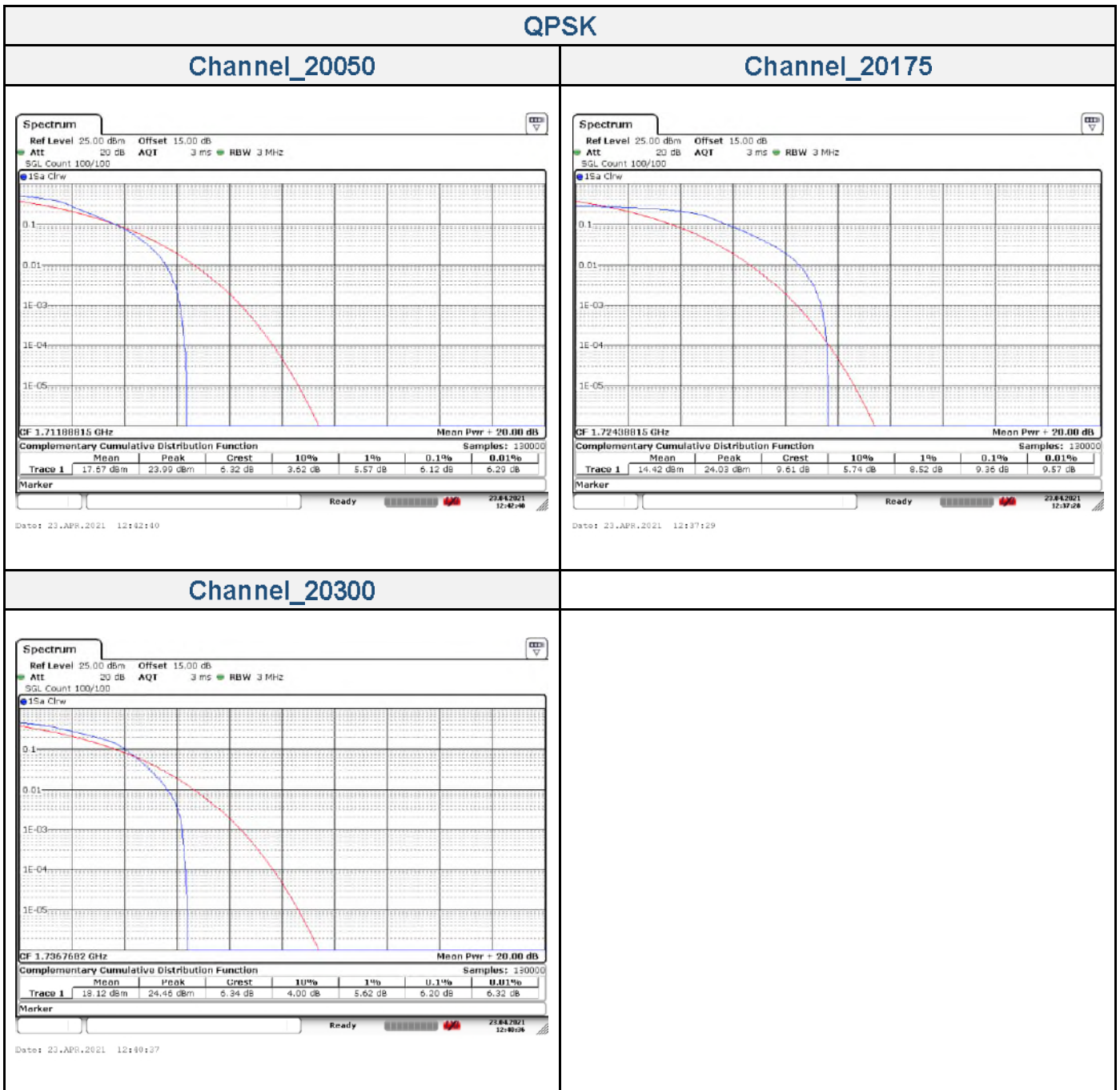


Channel\_20325



LTE Band 4 \_ Channel Bandwidth: 20 MHz

Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM
20050	1720.0	6.12	7.97
20175	1732.5	9.36	5.77
20300	1745.0	6.20	6.81



16QAM

Channel\_20050



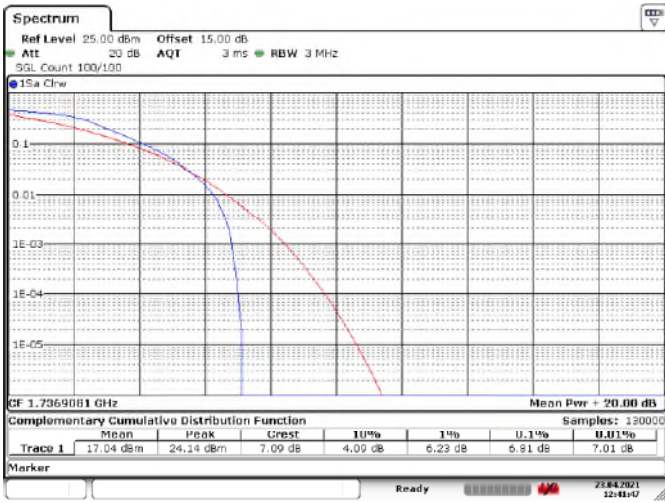
Date: 23.APR.2021 12:43:54

Channel\_20175



Date: 23.APR.2021 12:38:50

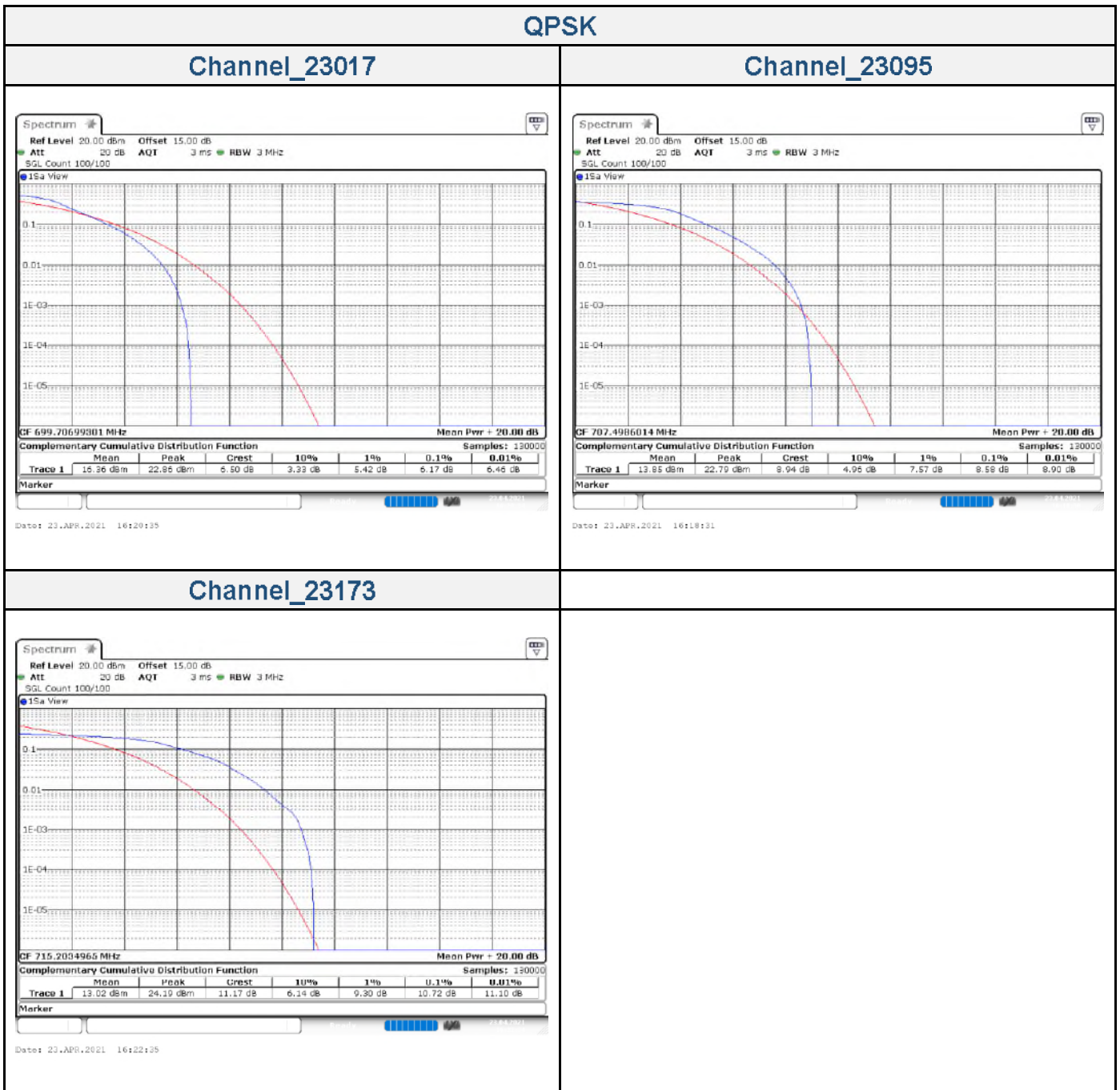
Channel\_20300



Date: 23.APR.2021 12:41:17

LTE Band 12 \_ Channel Bandwidth: 1.4 MHz

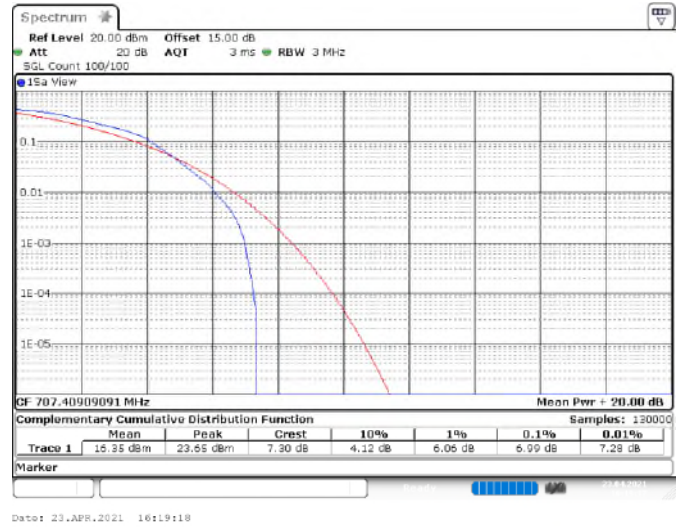
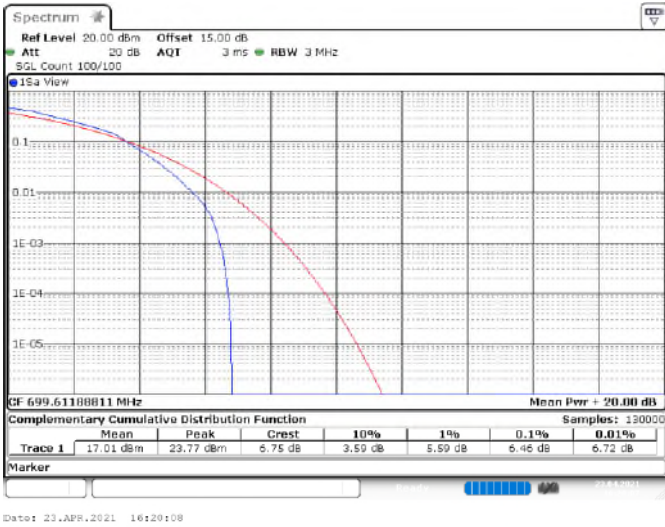
Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM
23017	699.7	6.17	6.46
23095	707.5	8.58	6.99
23173	715.3	8.96	10.72



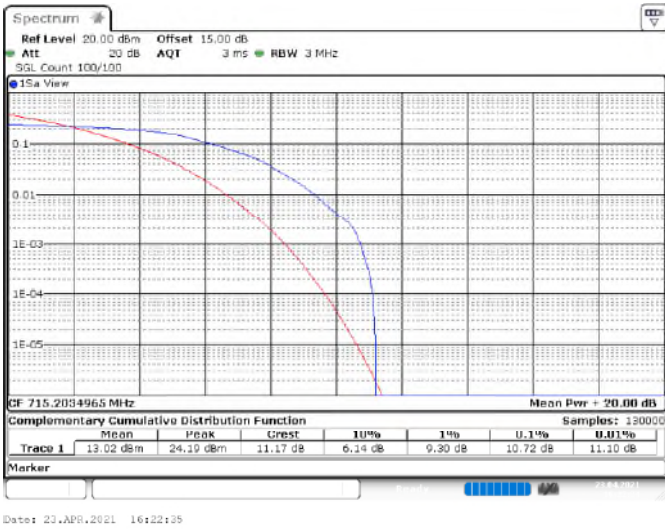
16QAM

Channel\_23017

Channel\_23095

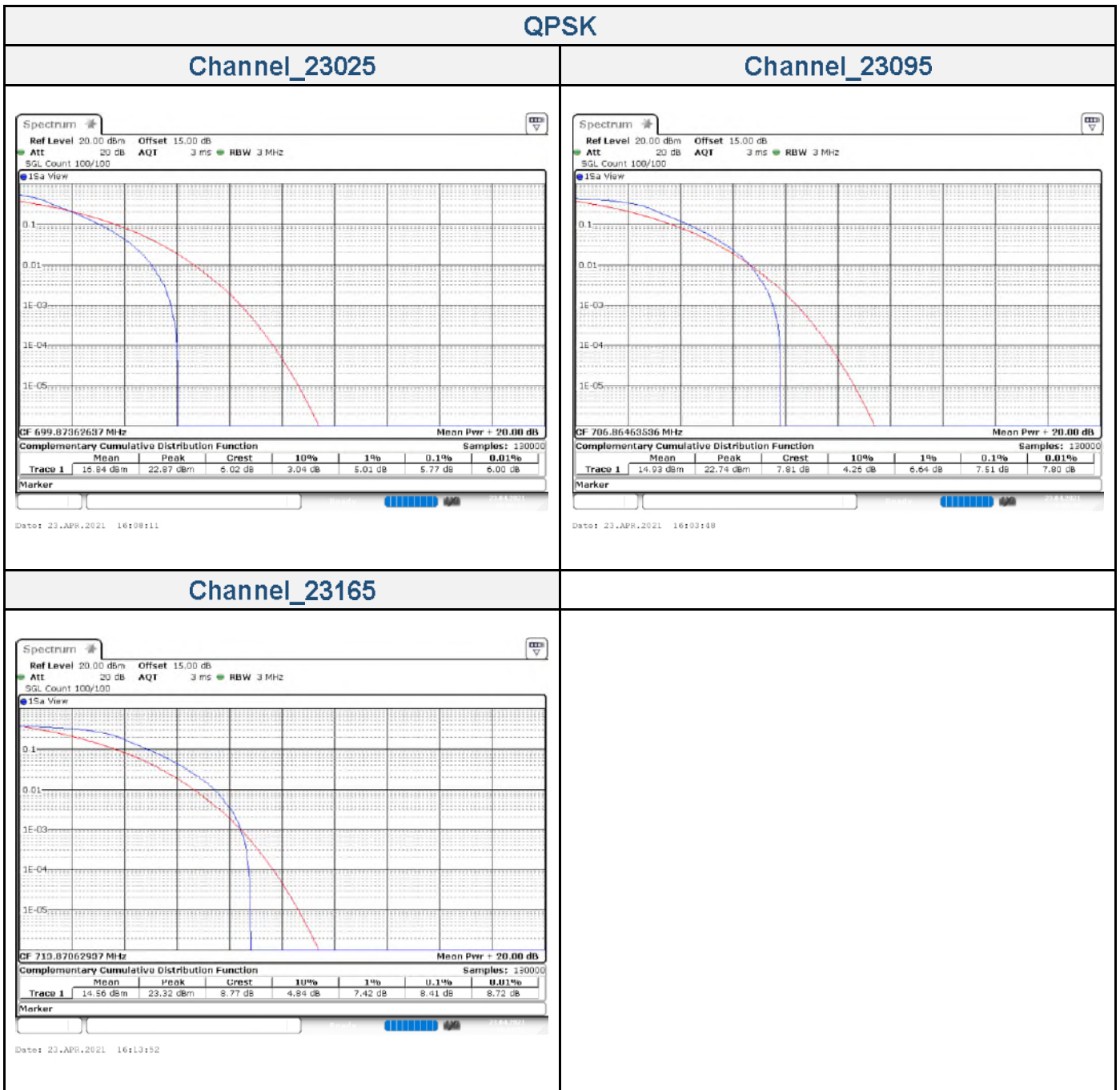


Channel\_23173



LTE Band 12 \_ Channel Bandwidth: 3 MHz

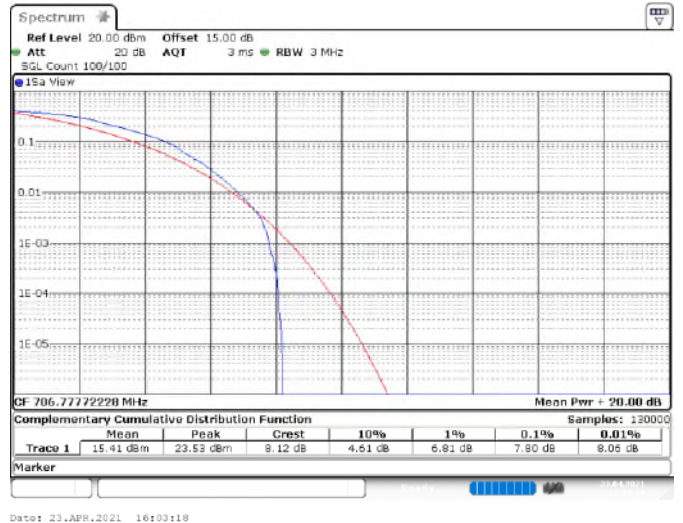
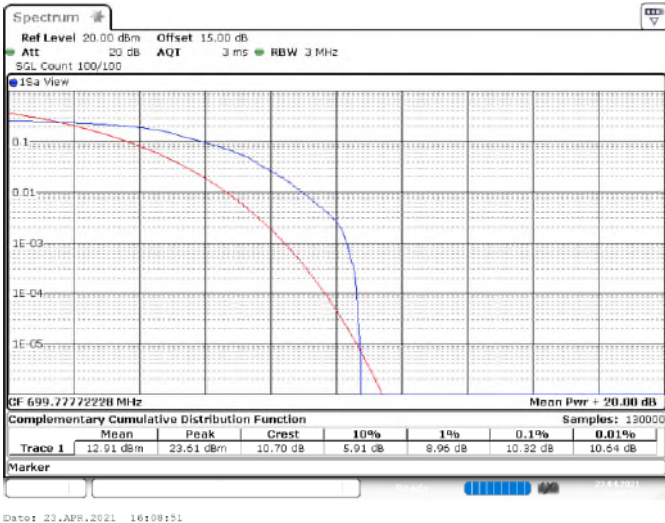
Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM
23025	700.5	5.77	10.32
23095	707.5	7.51	7.80
23165	714.5	7.42	8.09



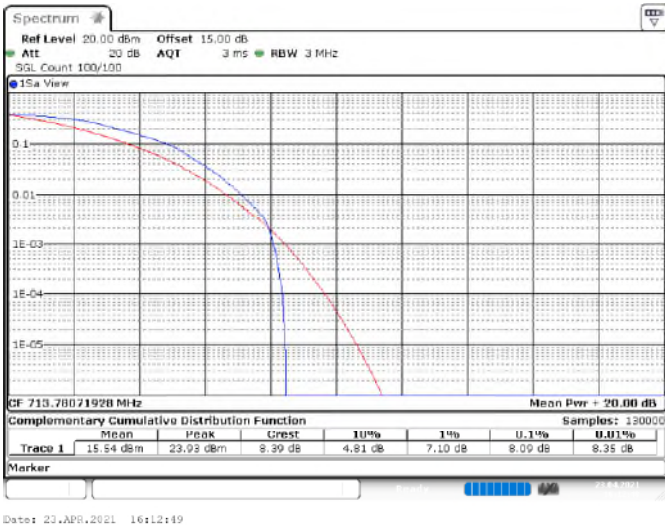
16QAM

Channel\_23025

Channel\_23095

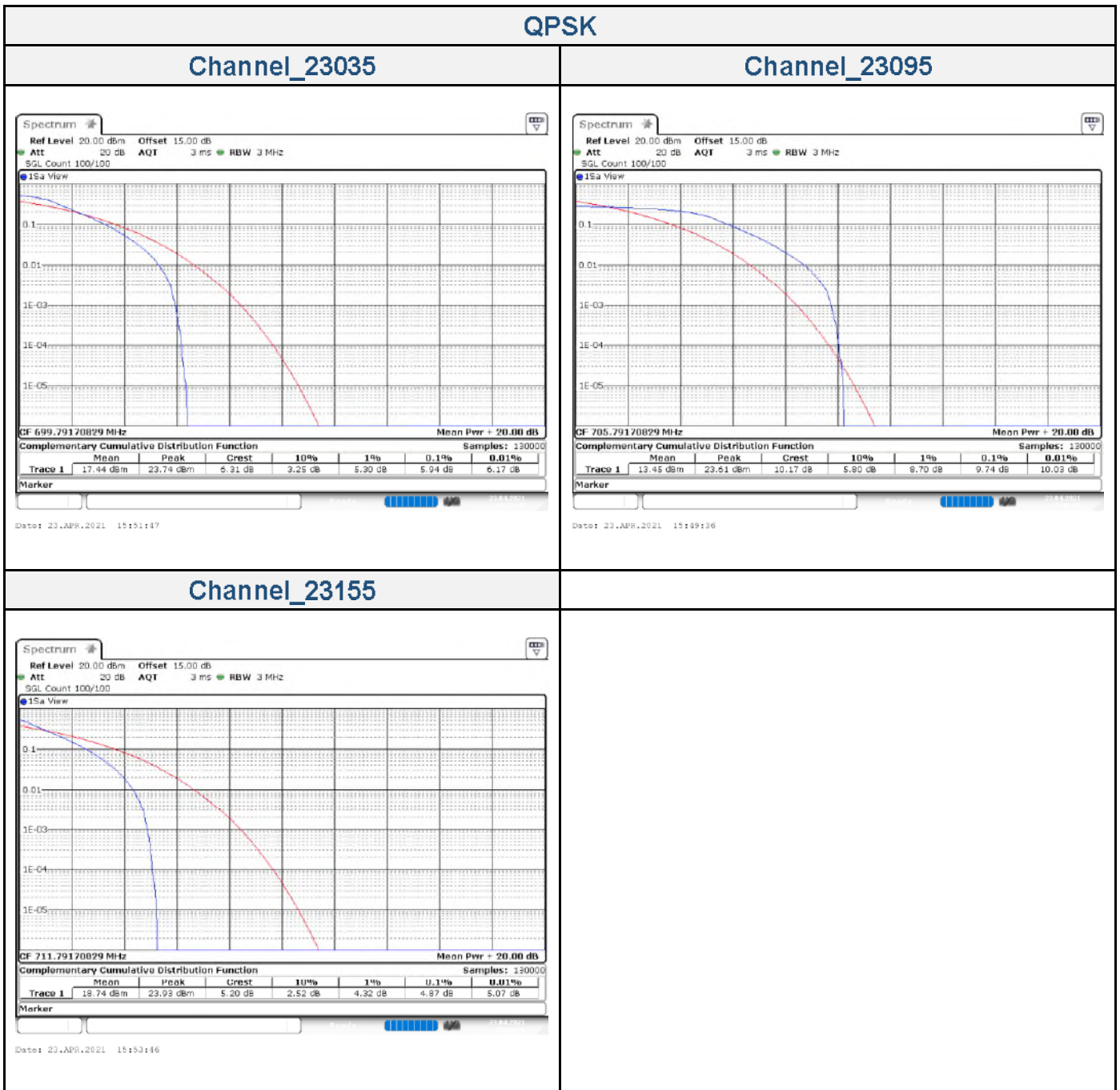


Channel\_23165



LTE Band 12 \_ Channel Bandwidth: 5 MHz

Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM
23035	701.5	5.94	7.10
23095	707.5	9.74	6.75
23155	713.5	4.87	10.38

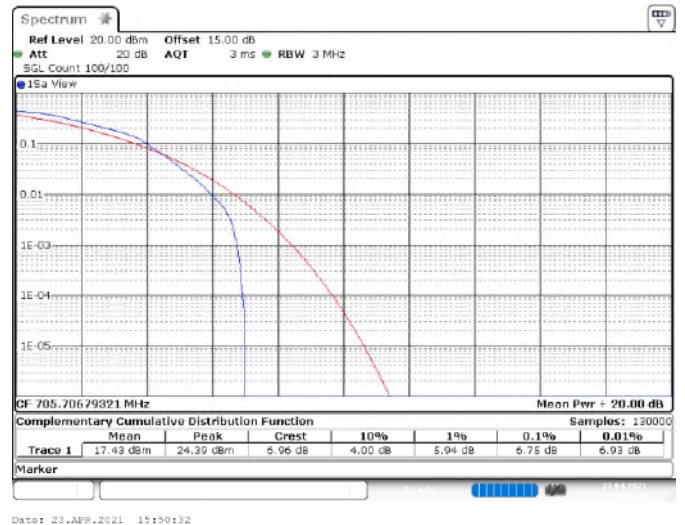
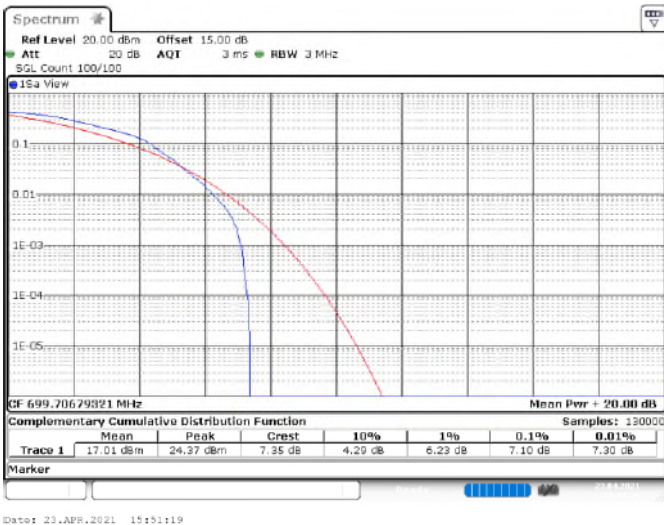




16QAM

Channel\_23035

Channel\_23095

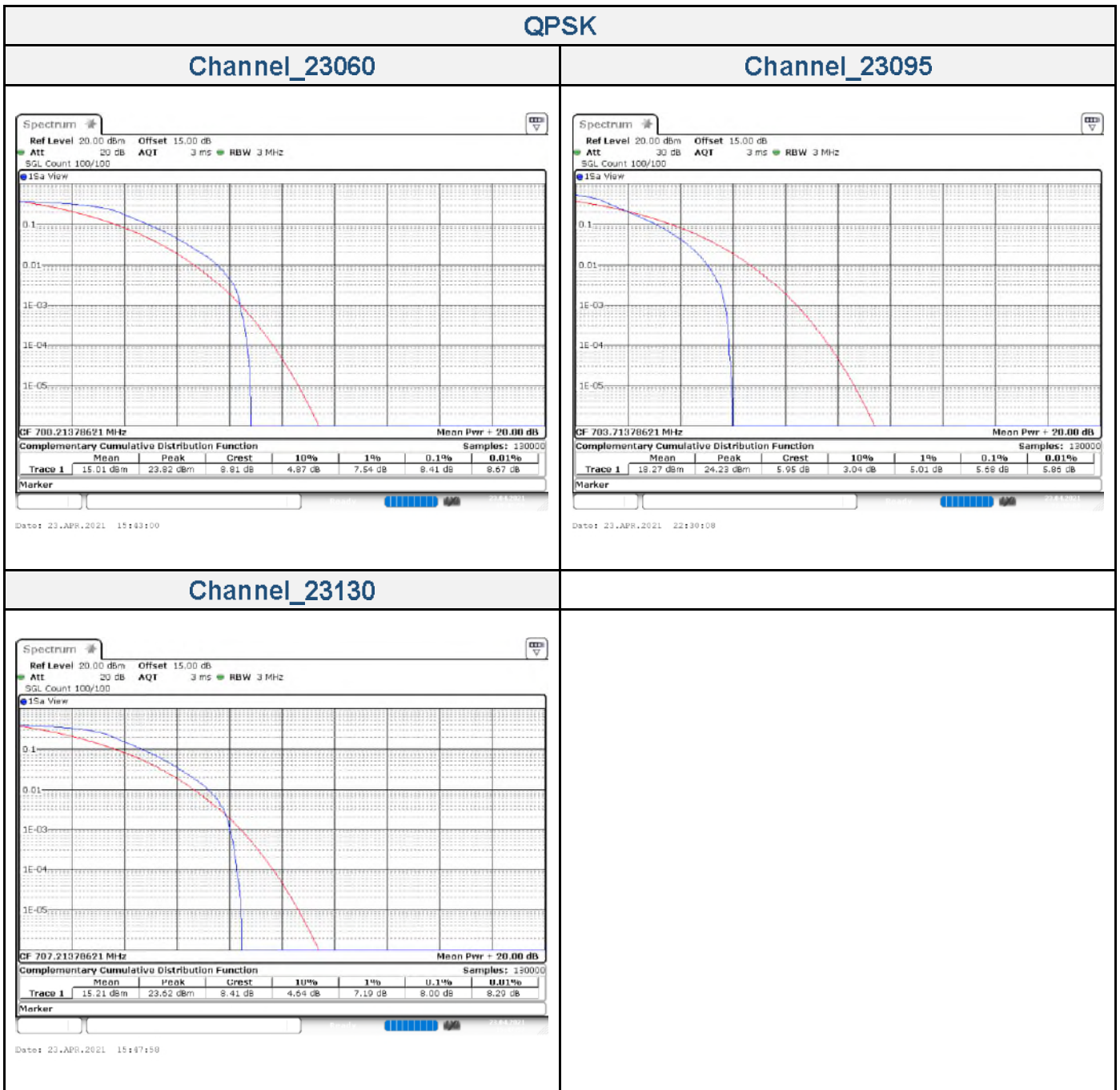


Channel\_23155



LTE Band 12 \_ Channel Bandwidth: 10 MHz

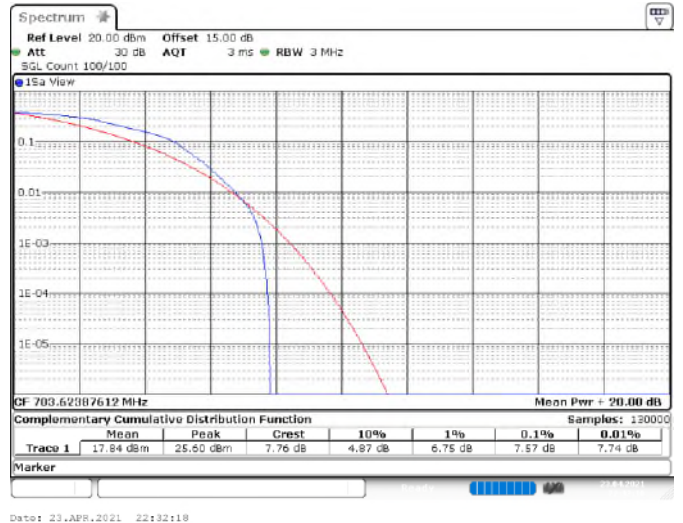
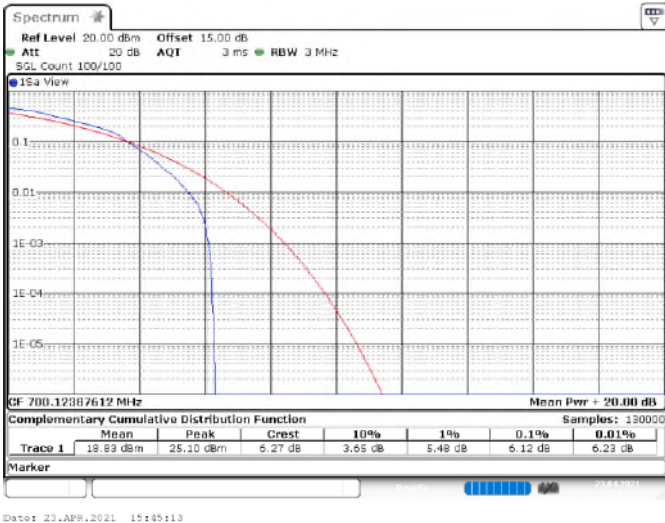
Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM
23060	704.0	8.41	6.12
23095	707.5	5.68	7.57
23130	711.0	8.00	9.80



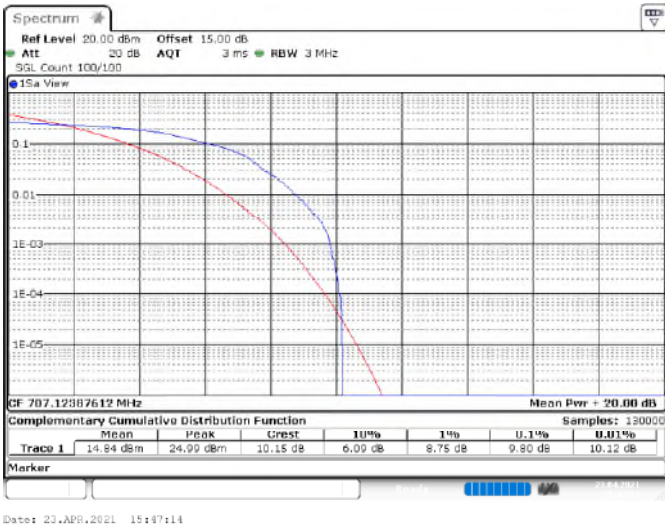
16QAM

Channel\_23060

Channel\_23095

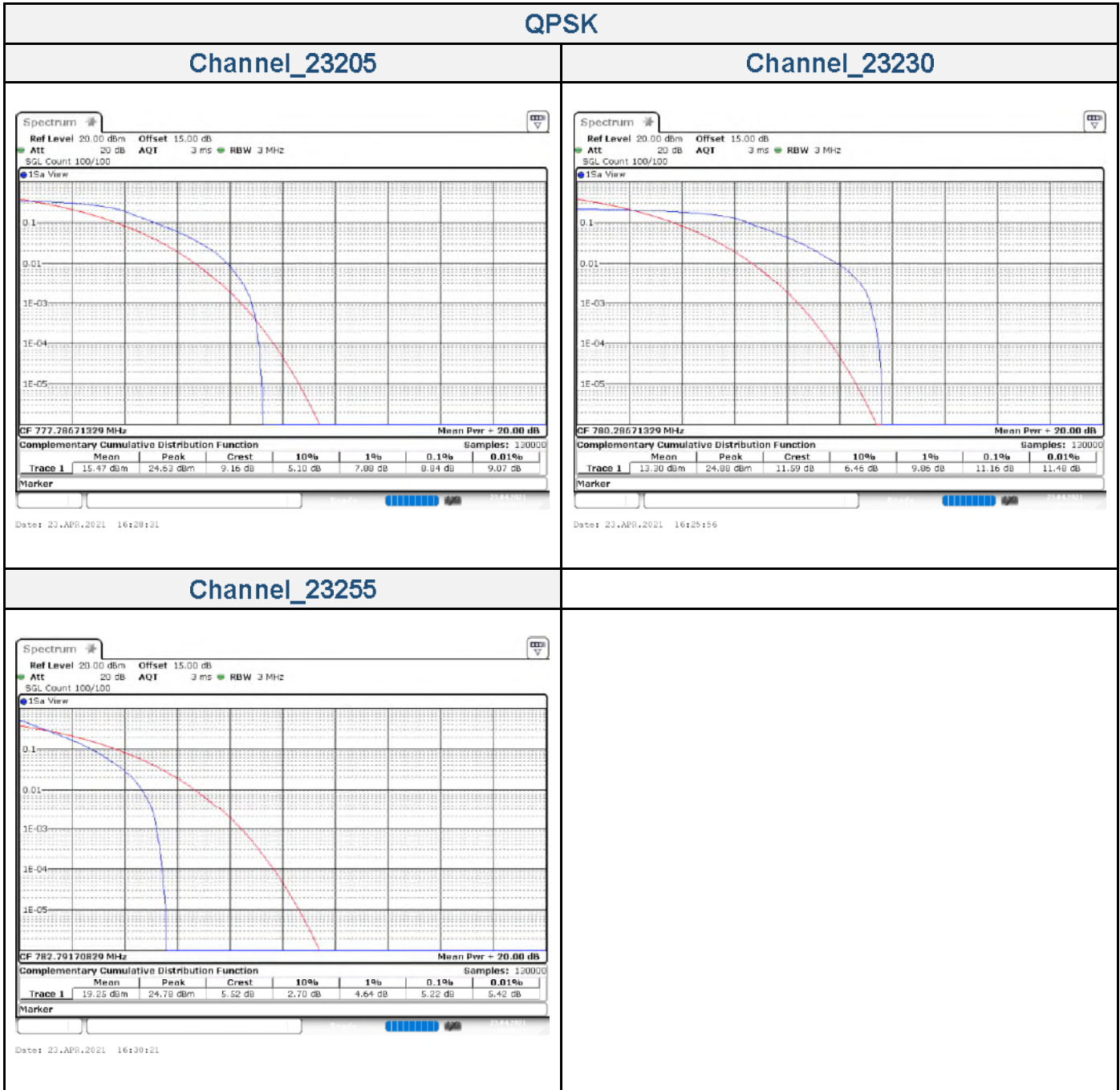


Channel\_23130



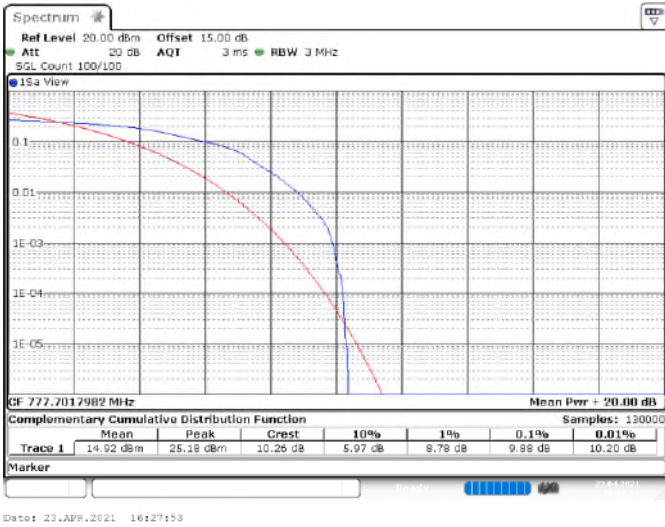
LTE Band 13 \_ Channel Bandwidth: 5 MHz

Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM
23205	779.5	8.84	9.88
23230	782	11.16	8.49
23255	784.5	5.22	9.74

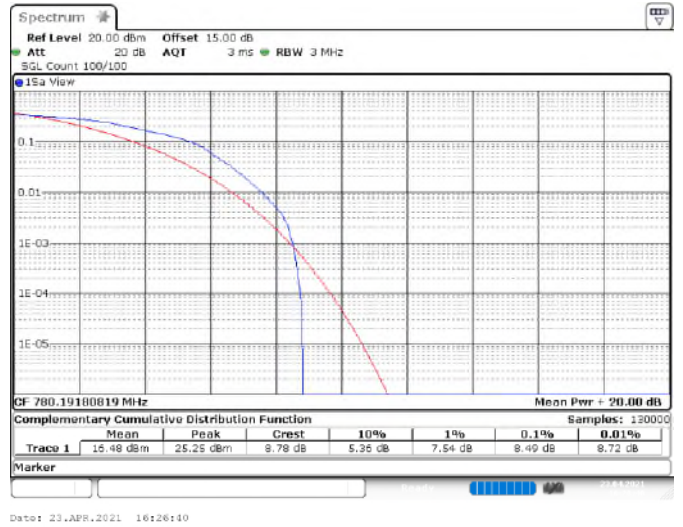


16QAM

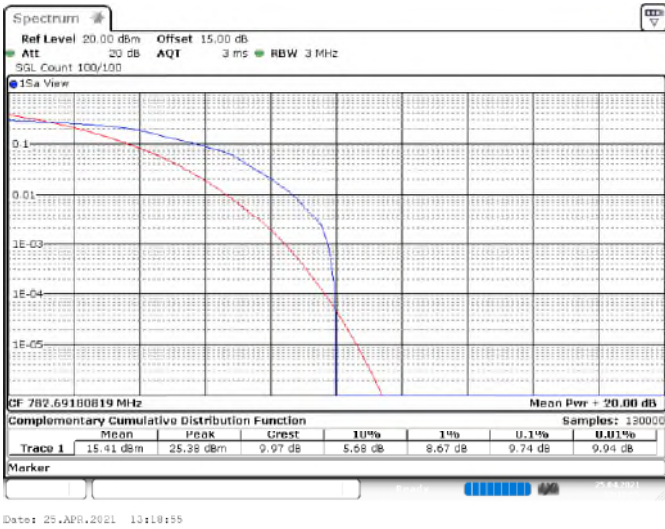
Channel\_23205



Channel\_23230

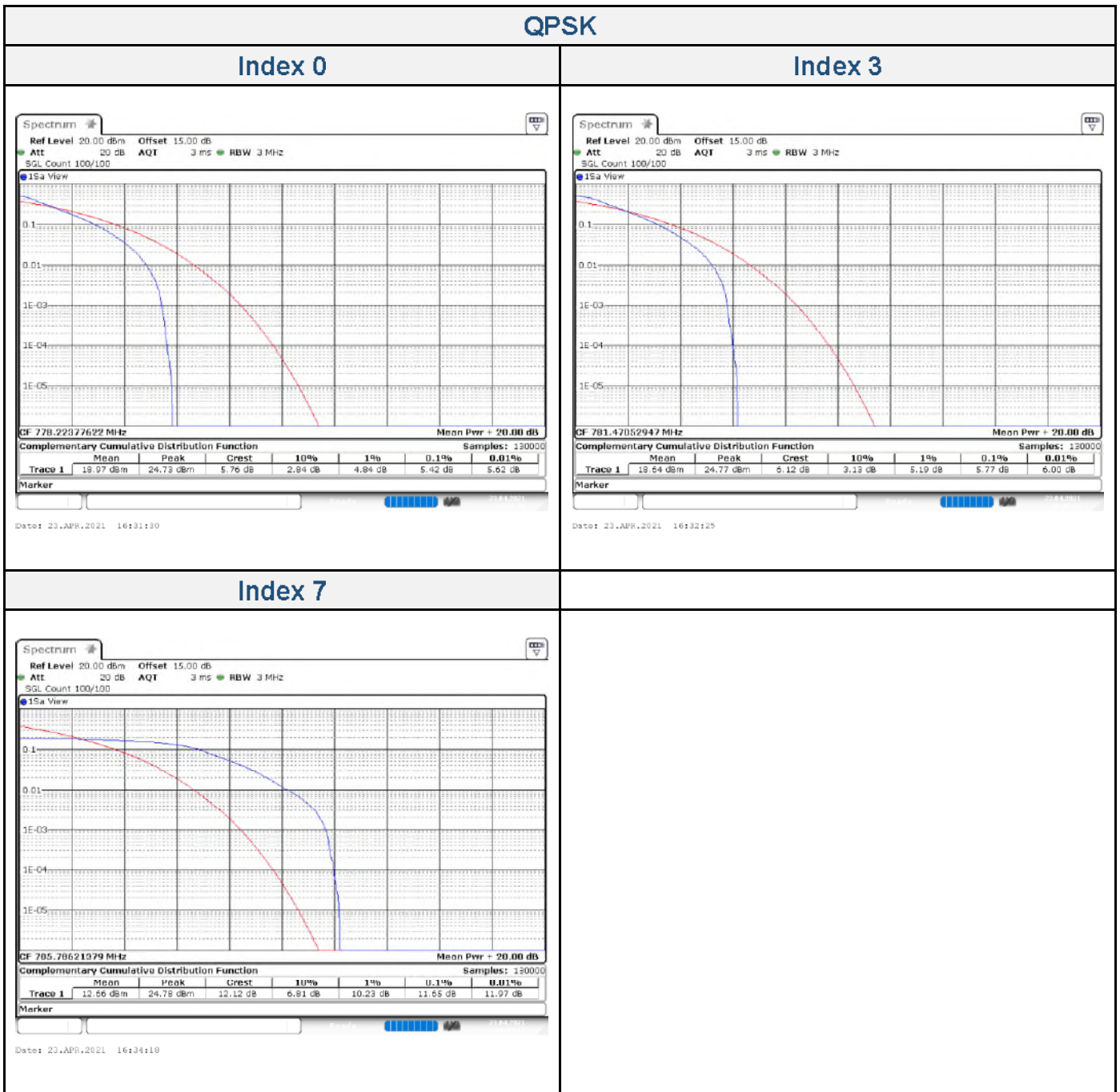


Channel\_23255



LTE Band 13 \_ Channel Bandwidth: 10 MHz

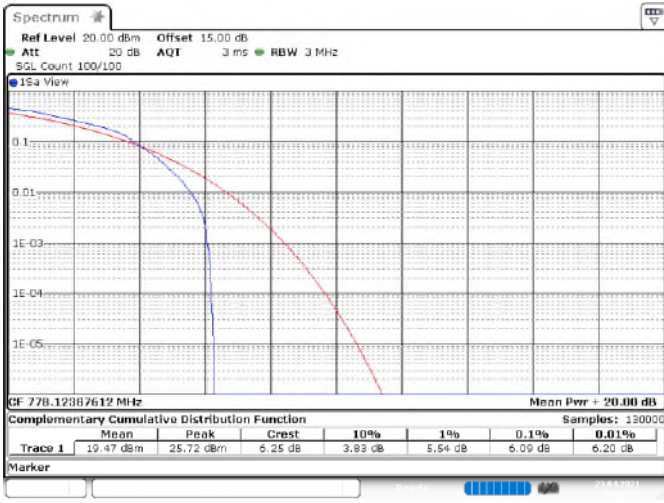
Channel	Frequency (MHz)	Index	Peak to Average Ratio (dB)	
			QPSK	16QAM
23230	782	0	5.42	6.09
		3	5.77	7.77
		7	11.65	5.22



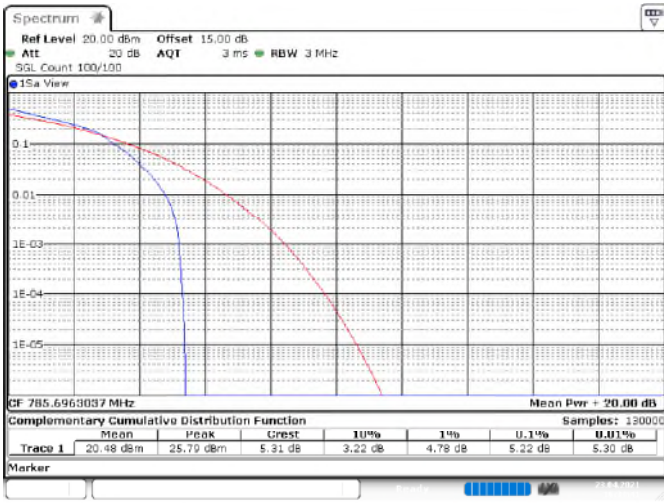
16QAM

Index 0

Index 3



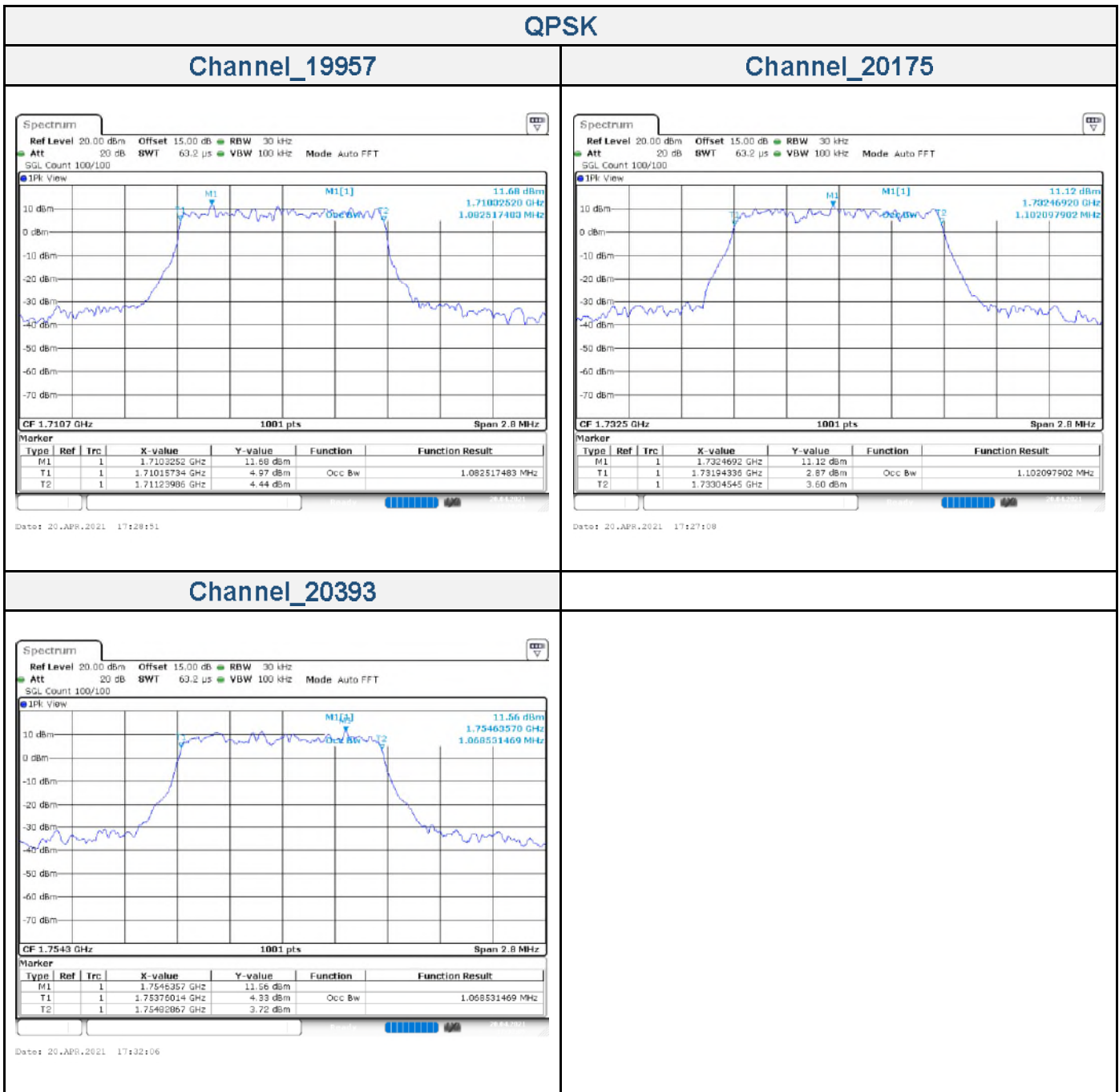
Index 0



### 99 % Occupied Bandwidth

LTE Band 4 \_ Channel Bandwidth: 1.4 MHz

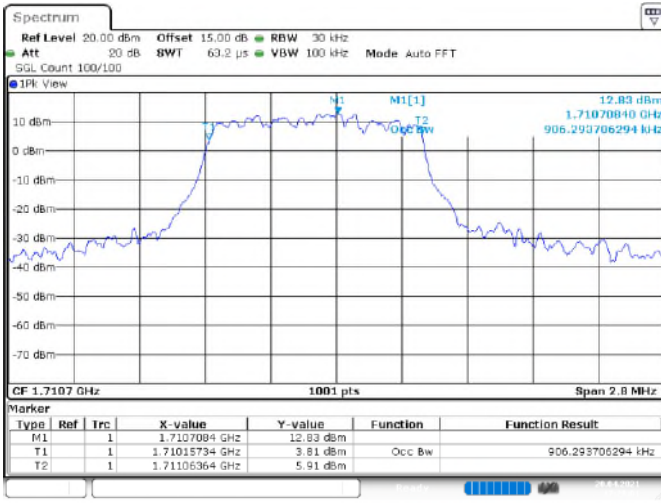
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)	
		QPSK	16QAM
19957	1710.7	1.08	0.91
20175	1732.5	1.10	0.92
20393	1754.3	1.07	0.88





16QAM

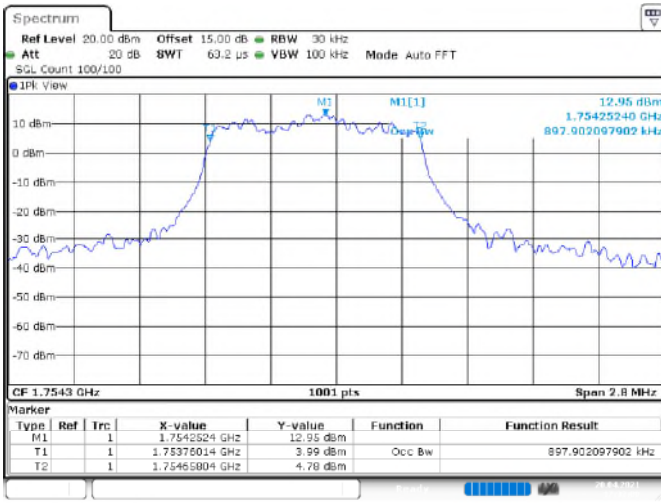
Channel\_19957



Channel\_20175



Channel\_20393



LTE Band 4 \_ Channel Bandwidth: 3 MHz

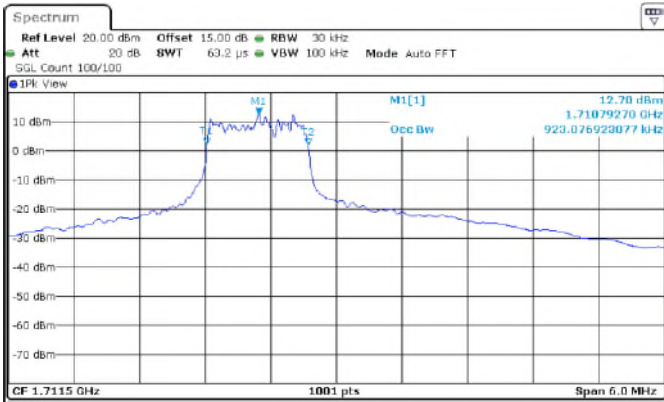
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)	
		QPSK	16QAM
19965	1711.5	1.08	0.92
20175	1732.5	1.09	0.91
20385	1753.5	1.08	0.91



16QAM

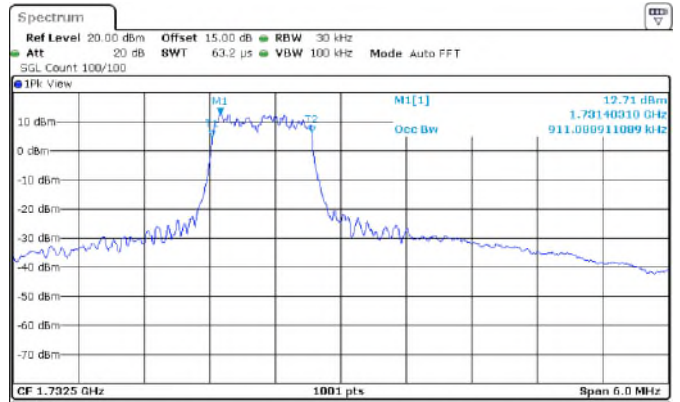
Channel\_19965

Channel\_20175



Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1	1		1.7107927 GHz	12.78 dBm		
T1	1		1.71031918 GHz	2.38 dBm	Occ Bw	923.076923077 kHz
T2	1		1.71124226 GHz	1.55 dBm		

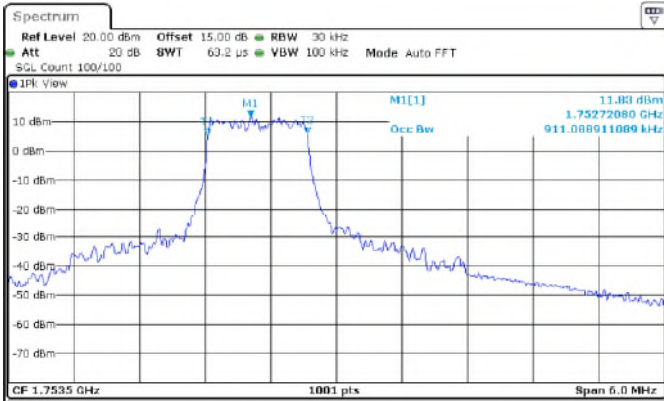
Date: 20.APR.2021 17:16:08



Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1	1		1.7314031 GHz	12.71 dBm		
T1	1		1.73132517 GHz	-4.59 dBm	Occ Bw	911.088911089 kHz
T2	1		1.73223626 GHz	6.28 dBm		

Date: 20.APR.2021 17:14:34

Channel\_20385

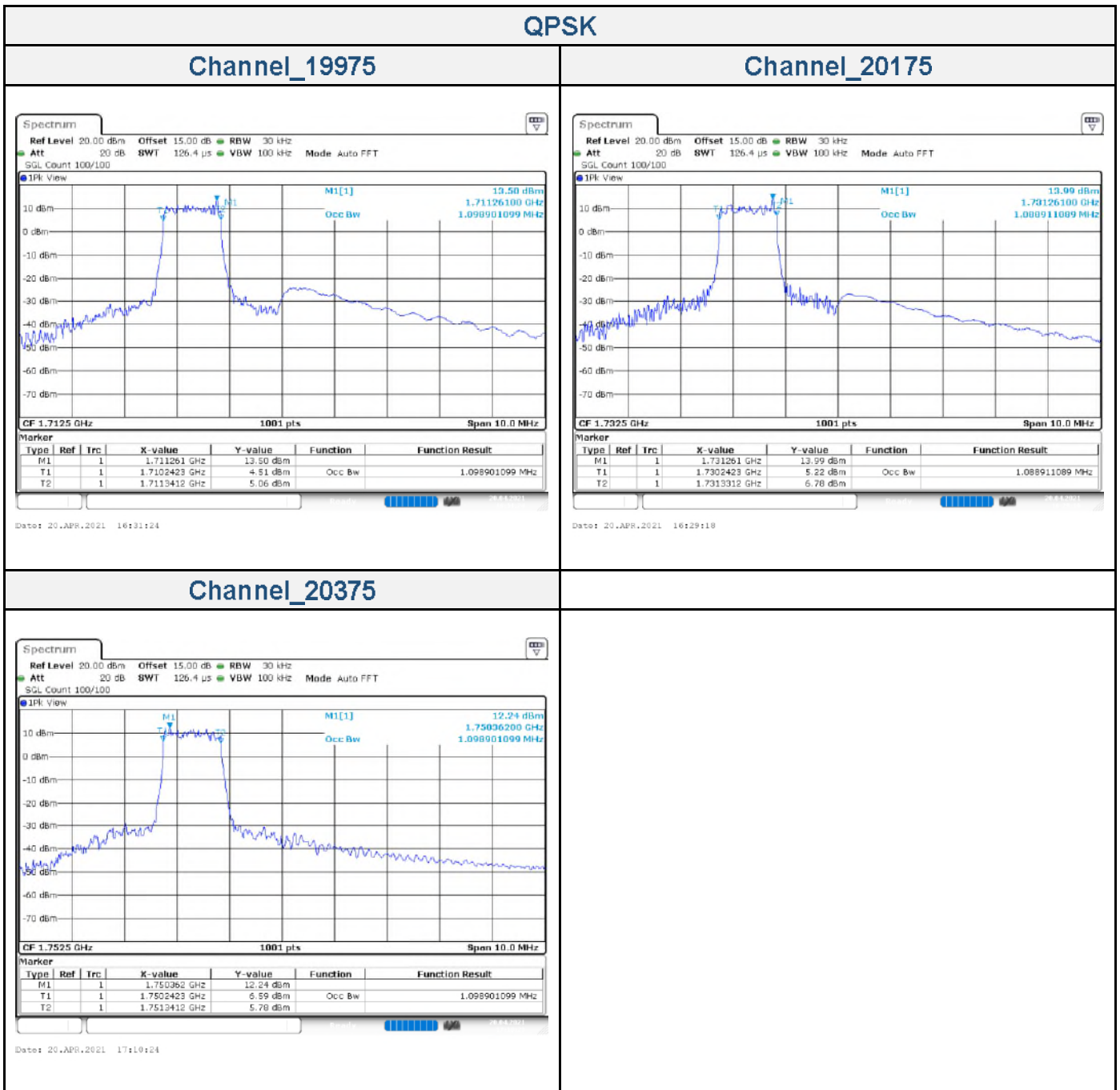


Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1	1		1.7527208 GHz	11.83 dBm		
T1	1		1.75232517 GHz	5.39 dBm	Occ Bw	911.088911089 kHz
T2	1		1.75323626 GHz	6.08 dBm		

Date: 20.APR.2021 17:20:20

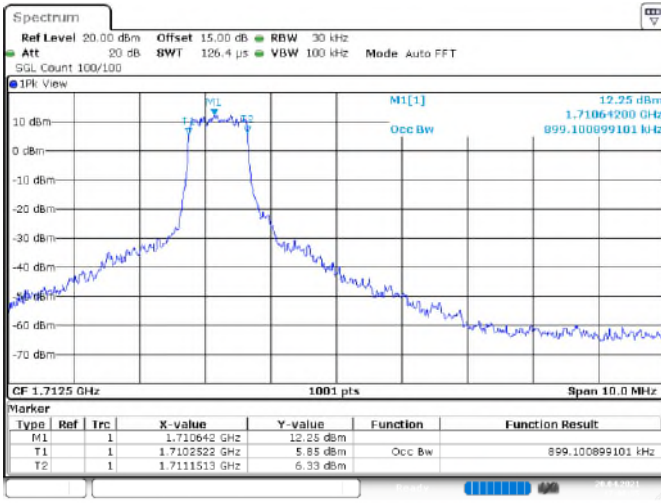
LTE Band 4 \_ Channel Bandwidth: 5 MHz

Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)	
		QPSK	16QAM
19975	1712.5	1.10	0.90
20175	1732.5	1.09	0.92
20375	1752.5	1.10	0.91



16QAM

Channel\_19975



Channel\_20175



Channel\_20375



LTE Band 4 \_ Channel Bandwidth: 10 MHz

Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)	
		QPSK	16QAM
20000	1715.0	1.10	0.92
20175	1732.5	1.10	0.92
20350	1750.0	1.10	0.92

