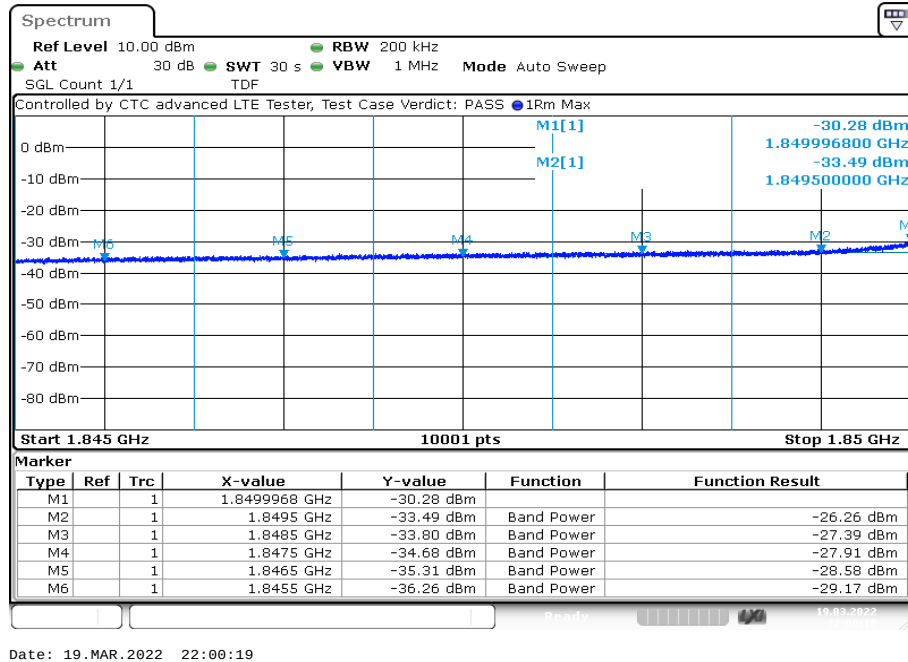
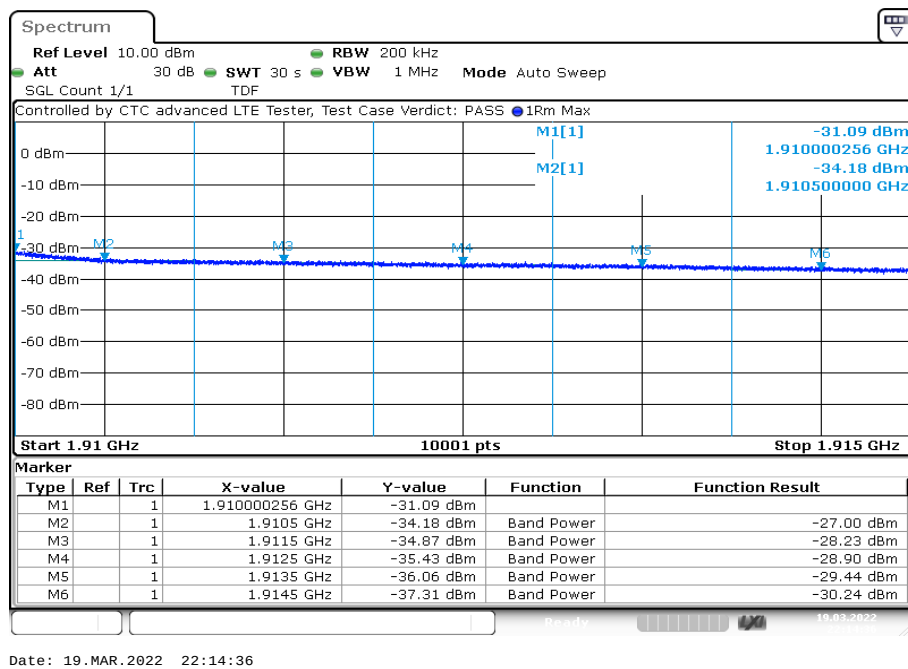
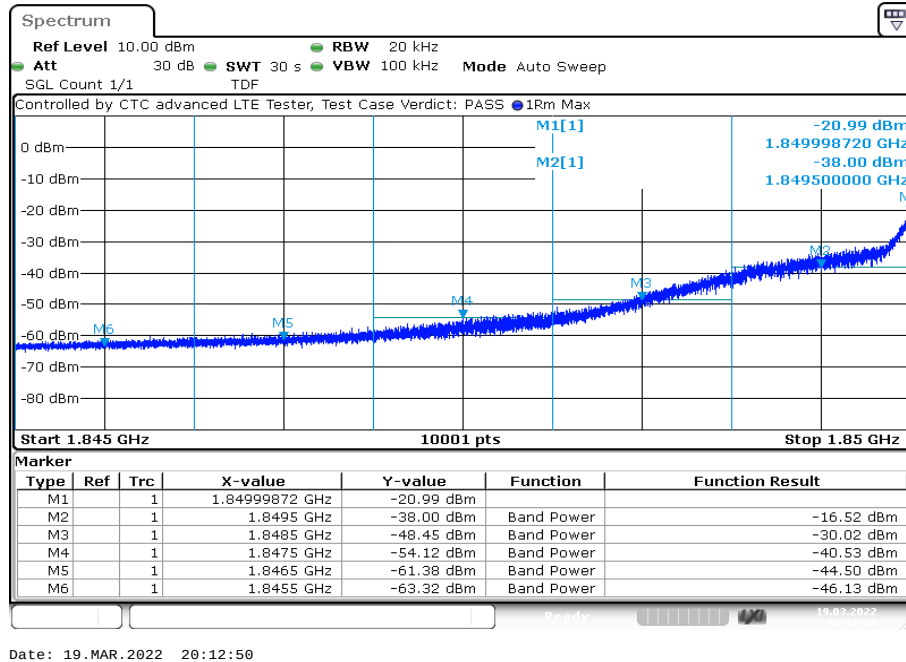
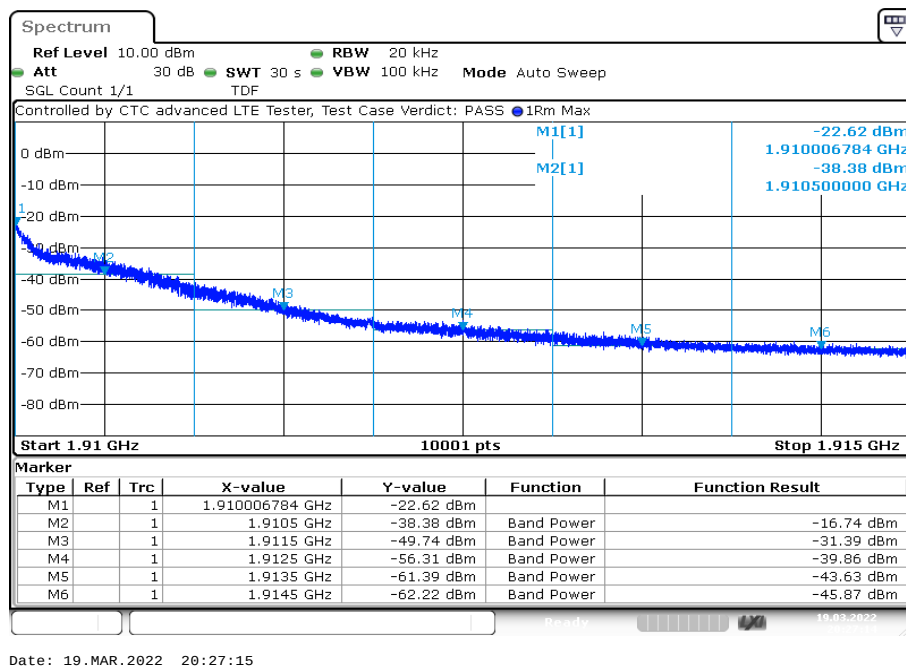


Plot 11: 20 MHz – QPSK - Lowest channel

Plot 12: 20 MHz – QPSK - Highest channel


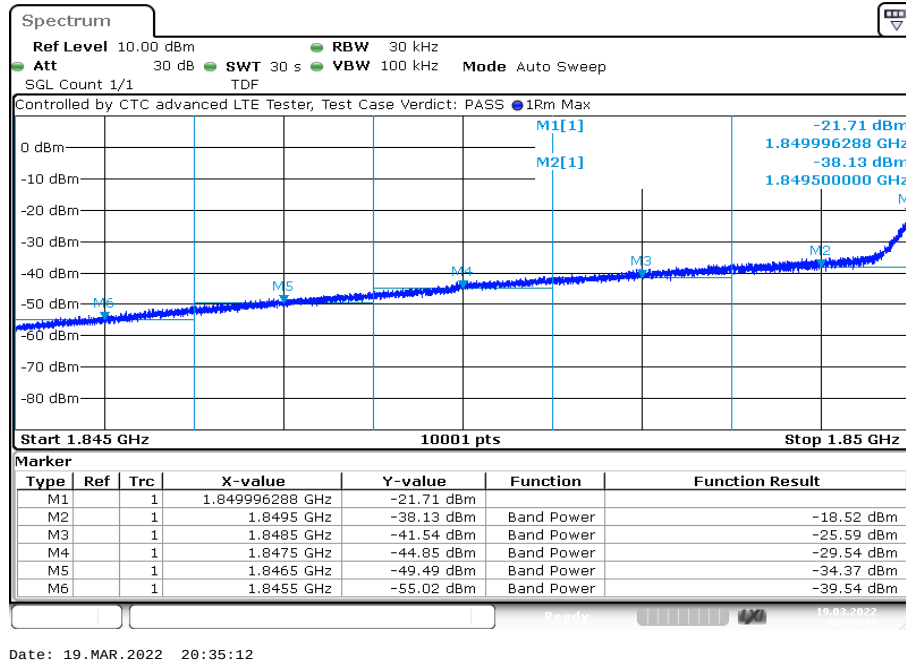
Plot 13: 1.4 MHz – 16-QAM - Lowest channel



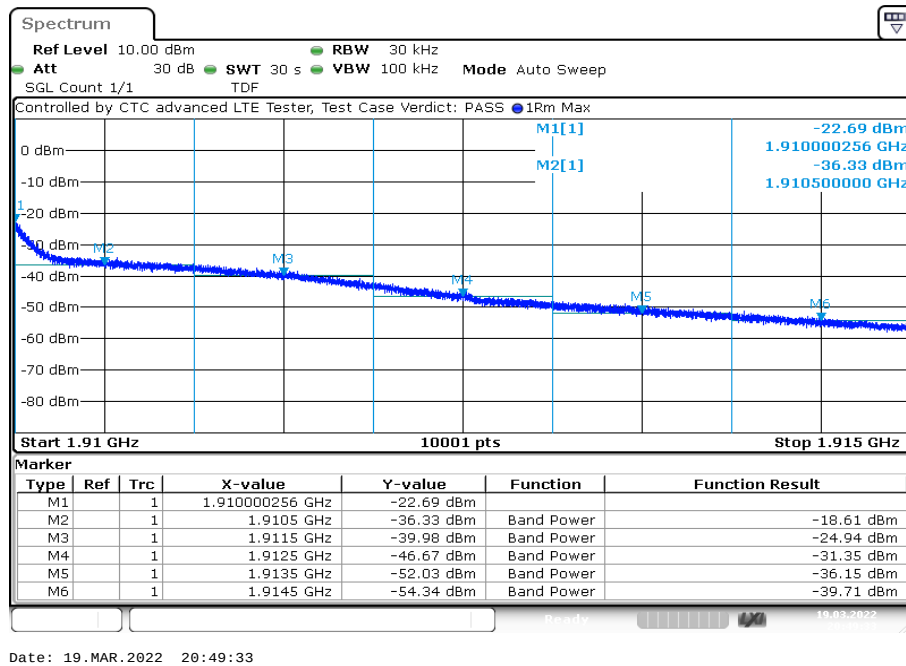
Plot 14: 1.4 MHz – 16-QAM - Highest channel



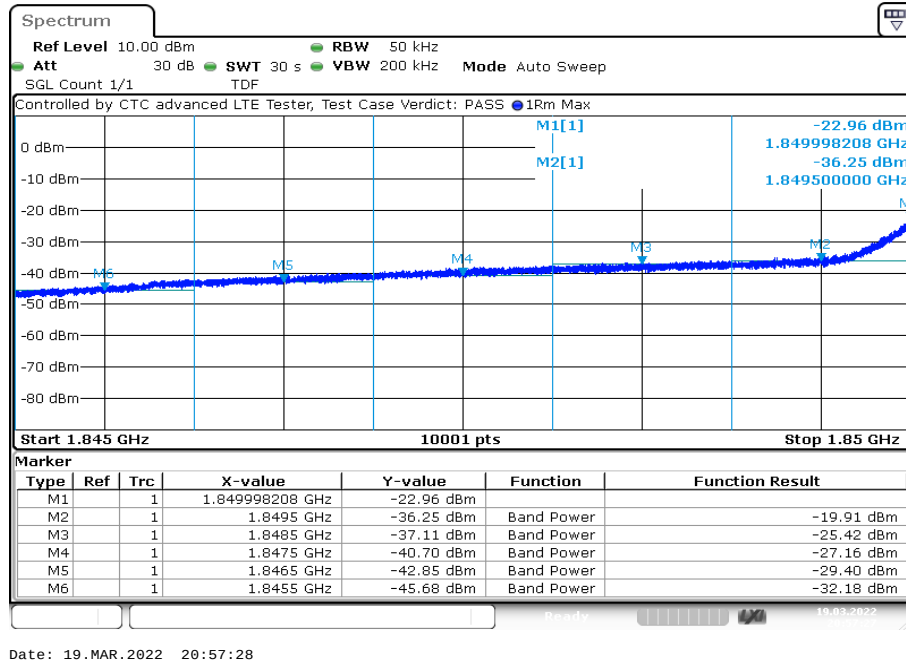
Plot 15: 3 MHz – 16-QAM - Lowest channel



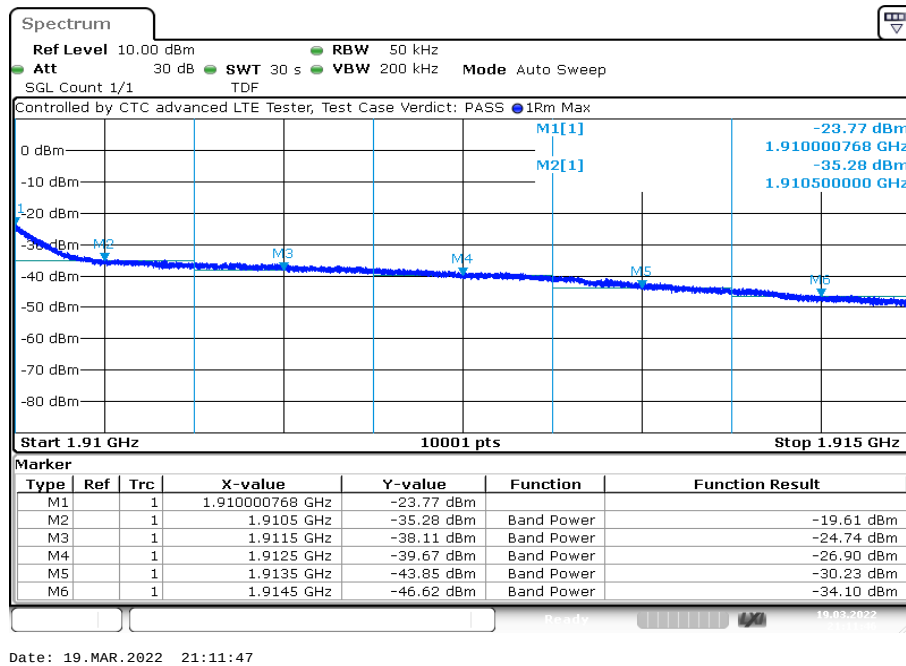
Plot 16: 3 MHz – 16-QAM - Highest channel



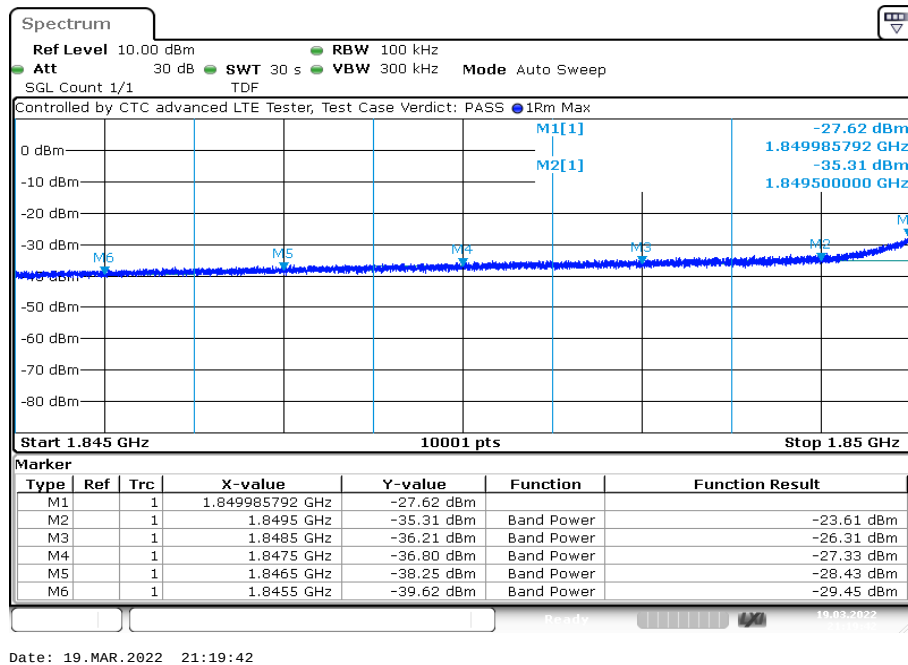
Plot 17: 5 MHz – 16-QAM - Lowest channel



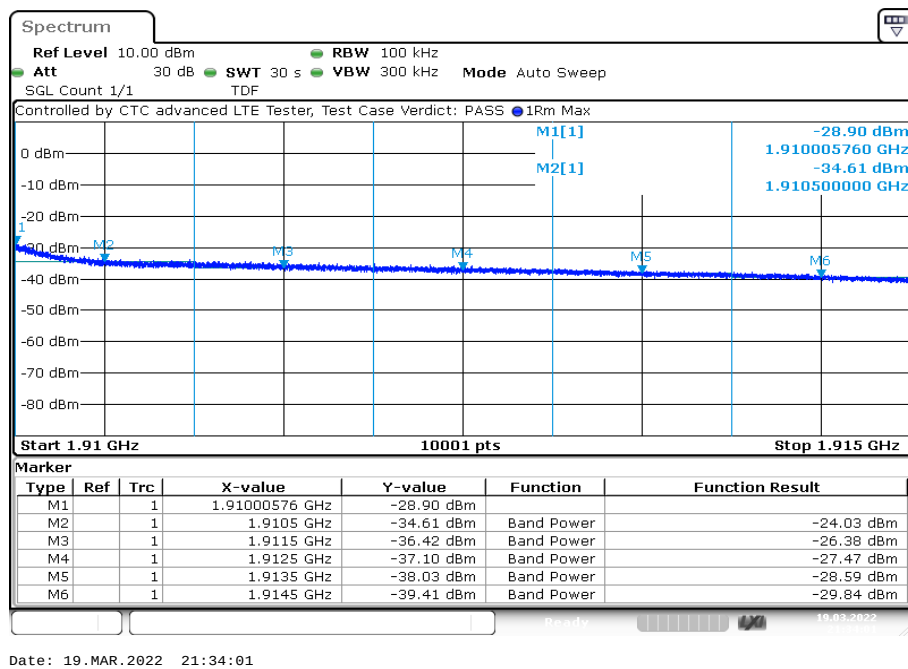
Plot 18: 5 MHz – 16-QAM - Highest channel

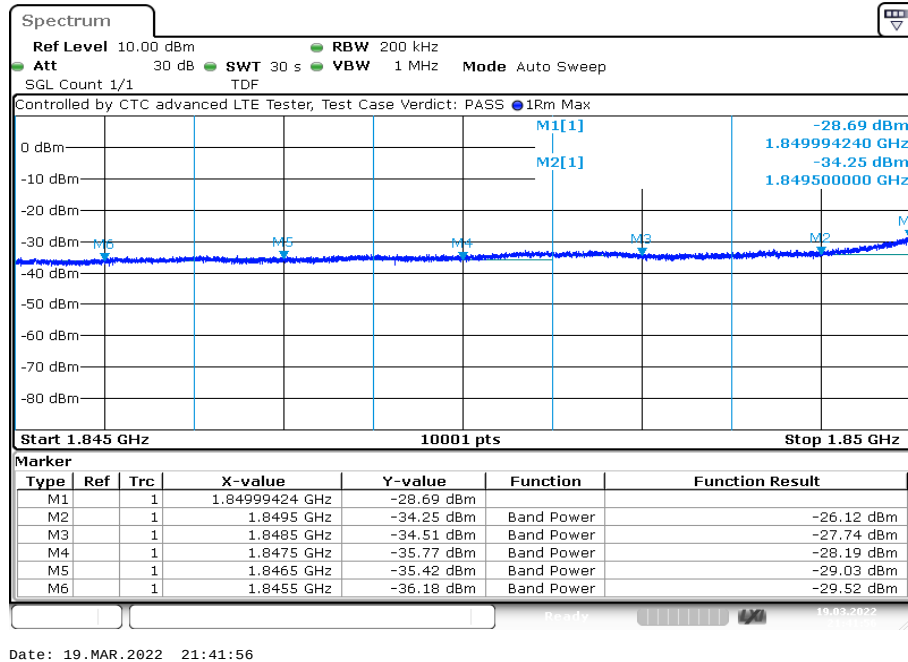
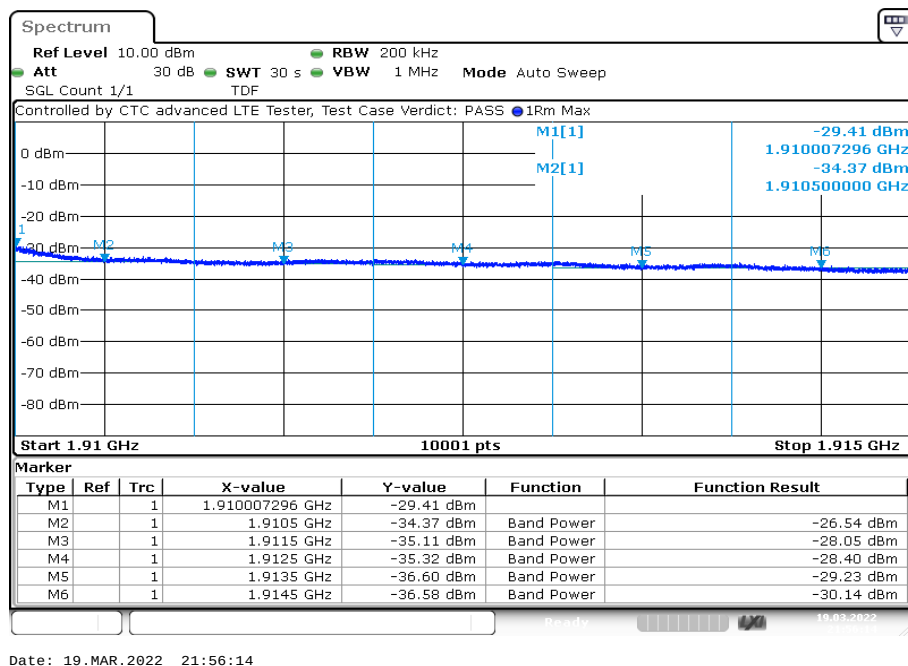


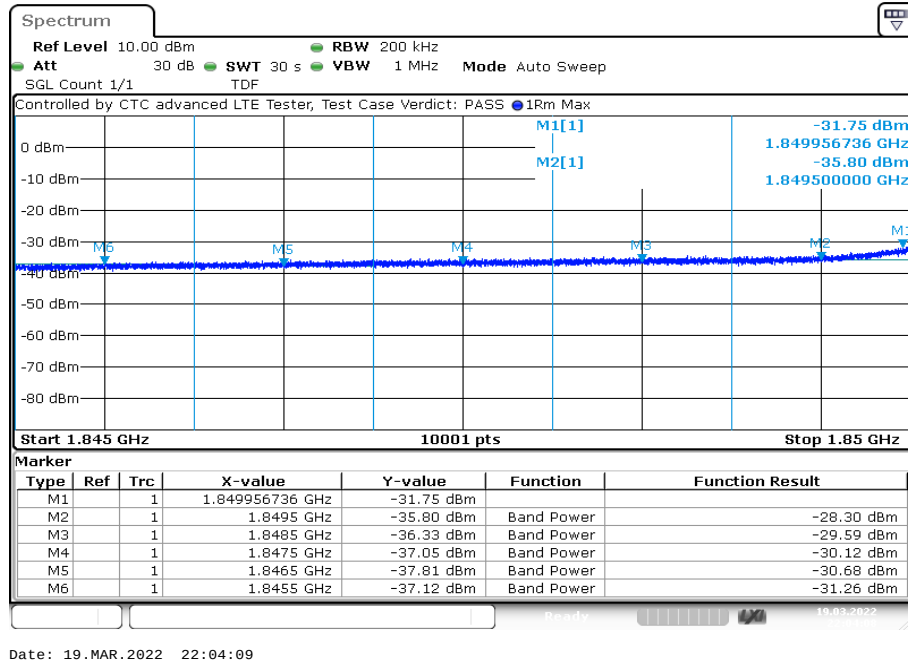
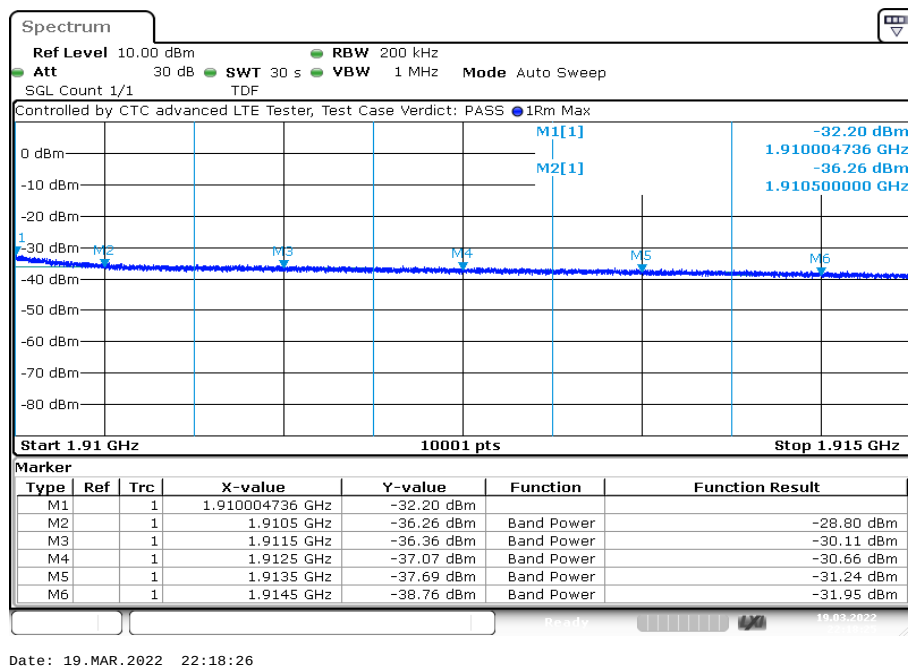
Plot 19: 10 MHz – 16-QAM - Lowest channel

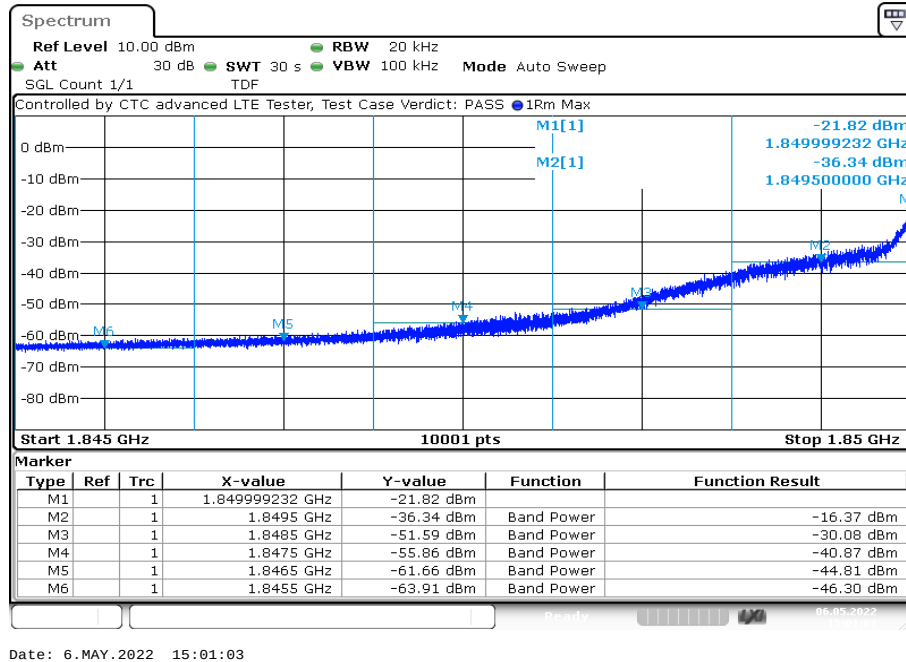
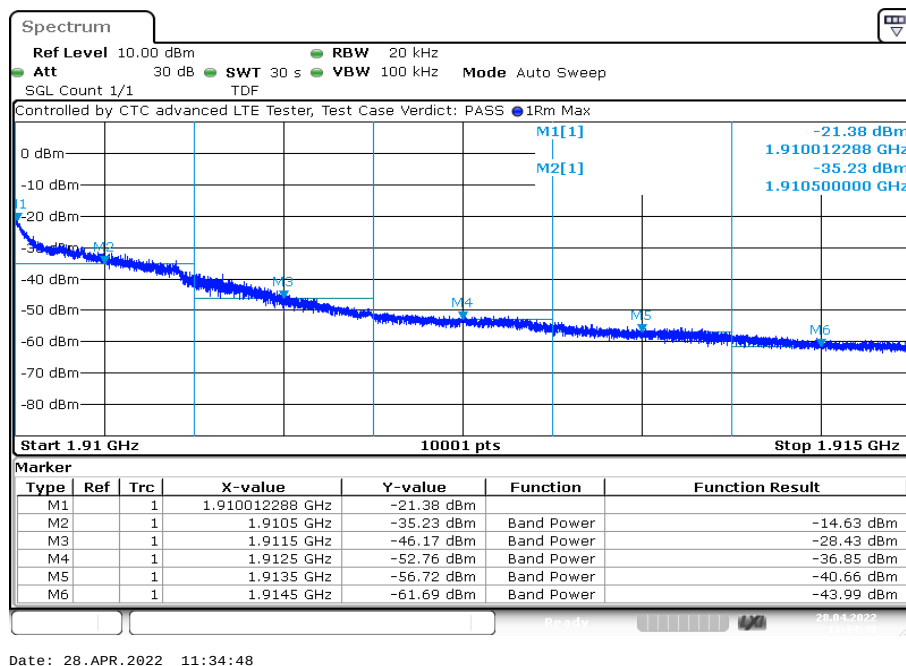


Plot 20: 10 MHz – 16-QAM - Highest channel

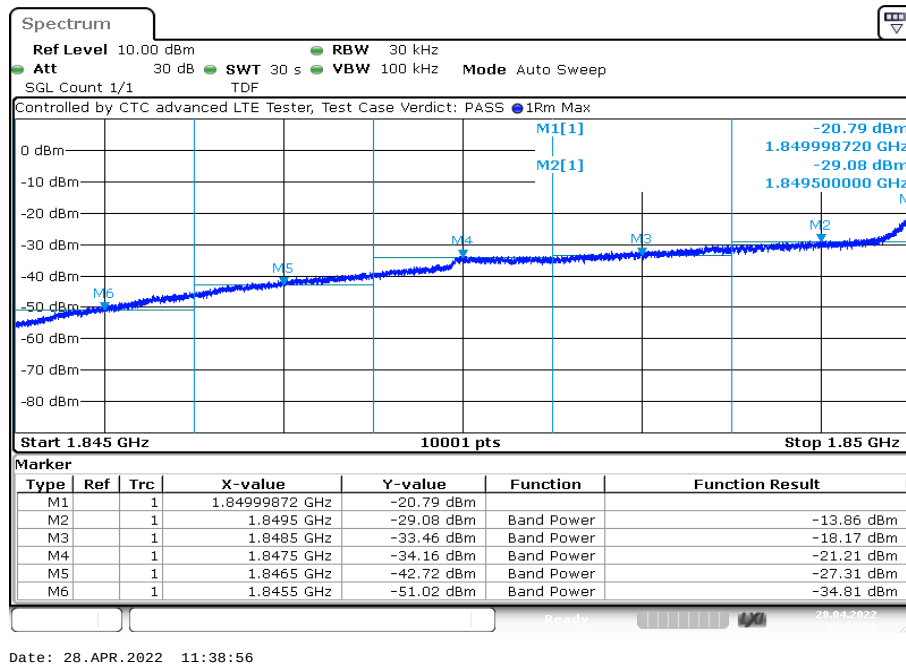


Plot 21: 15 MHz – 16-QAM - Lowest channel

Plot 22: 15 MHz – 16-QAM - Highest channel


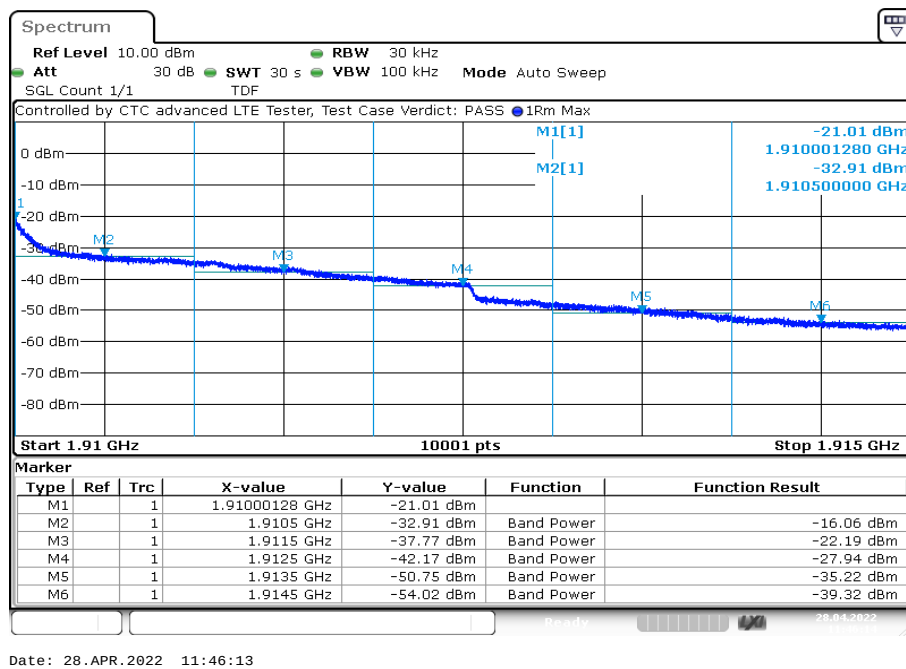
Plot 23: 20 MHz – 16-QAM - Lowest channel**Plot 24:** 20 MHz – 16-QAM - Highest channel

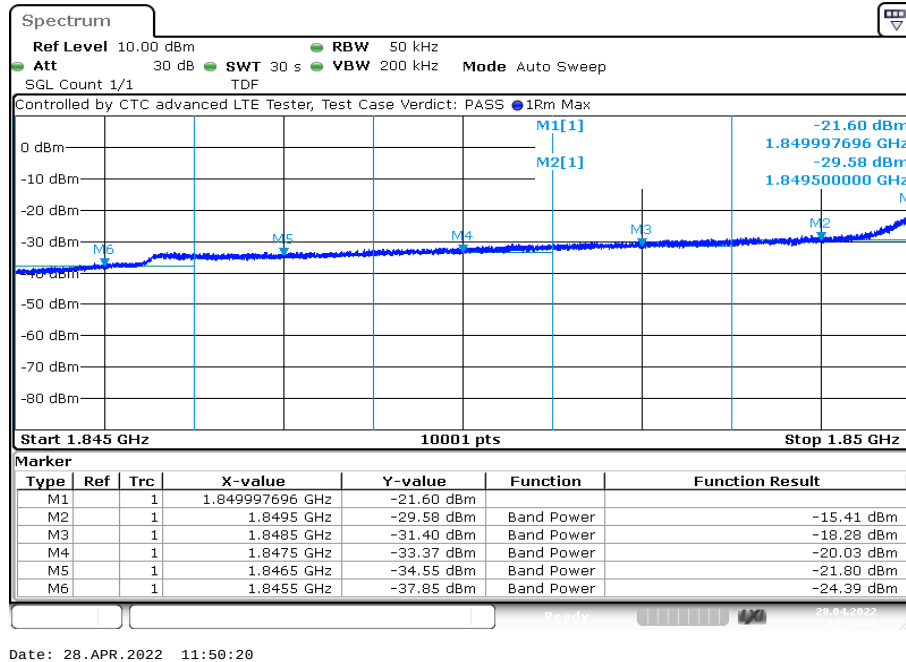
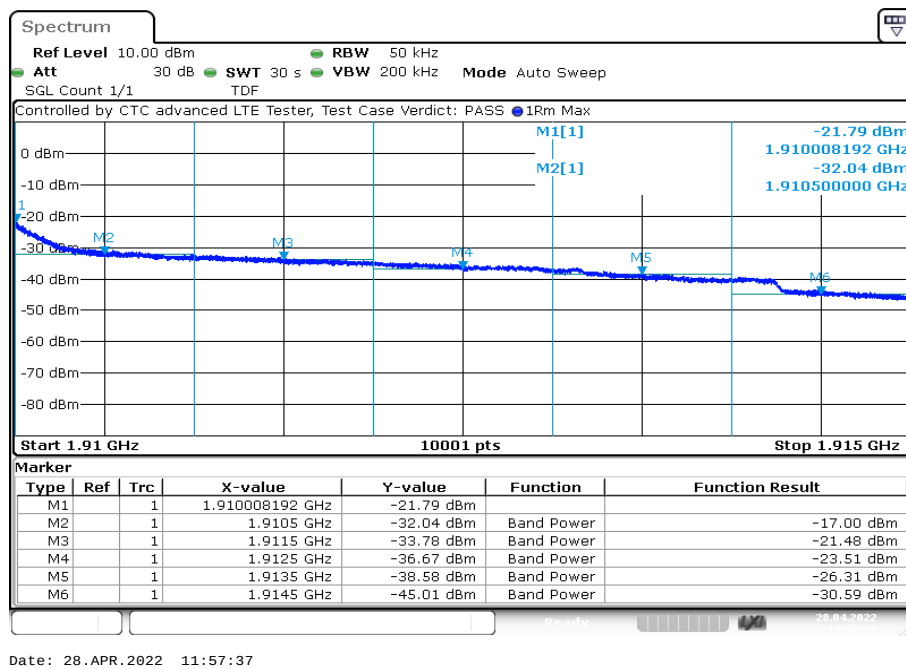
Plot 25: 1.4 MHz – 64-QAM - Lowest channel

Plot 26: 1.4 MHz – 64-QAM - Highest channel


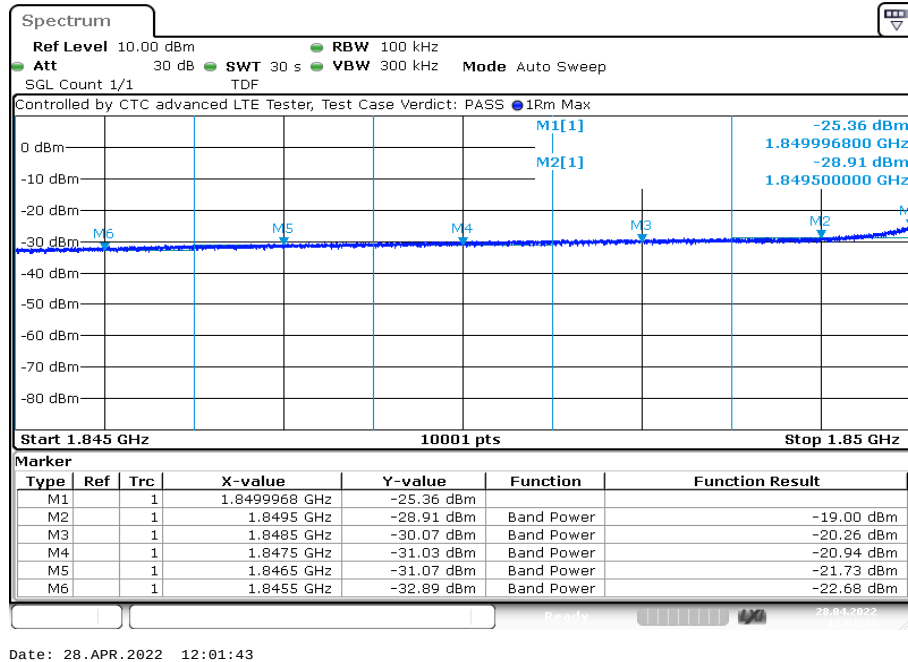
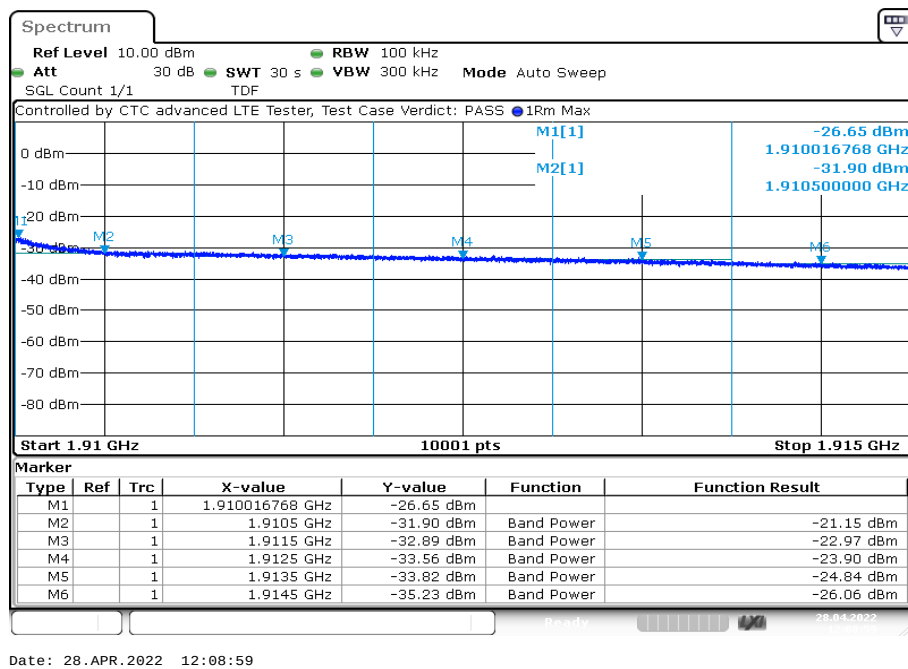
Plot 27: 3 MHz – 64-QAM - Lowest channel

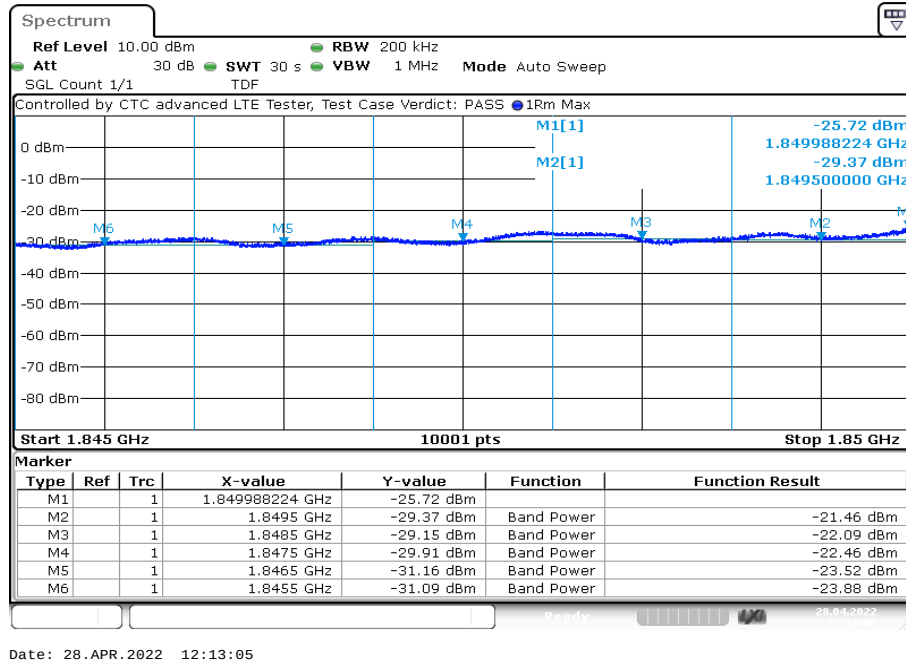
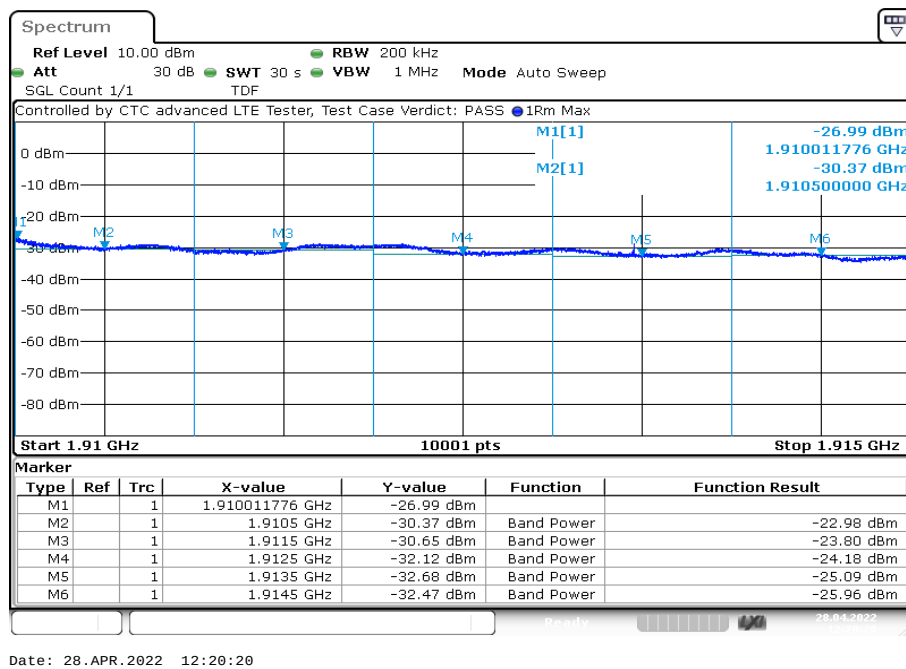


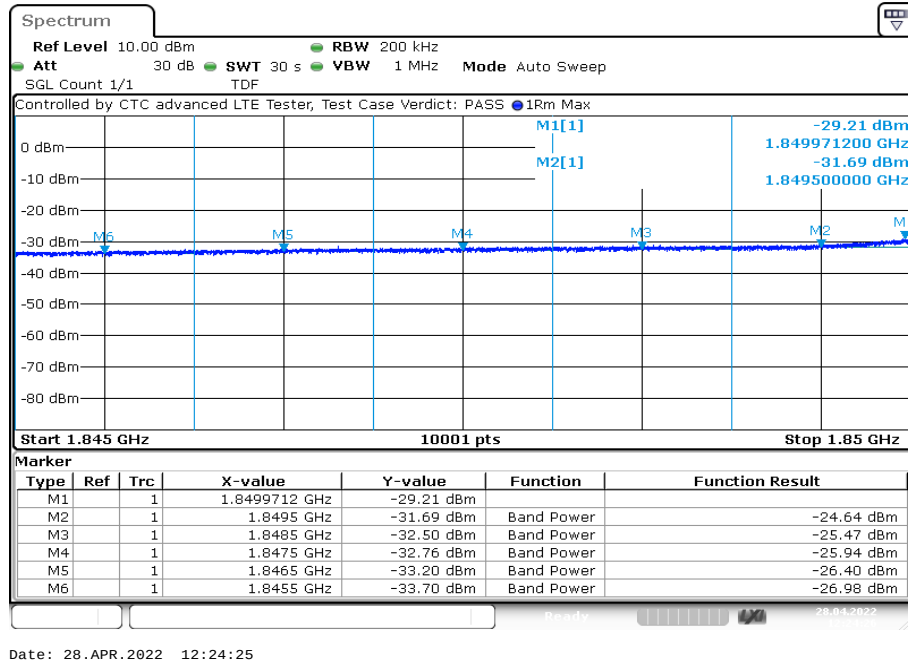
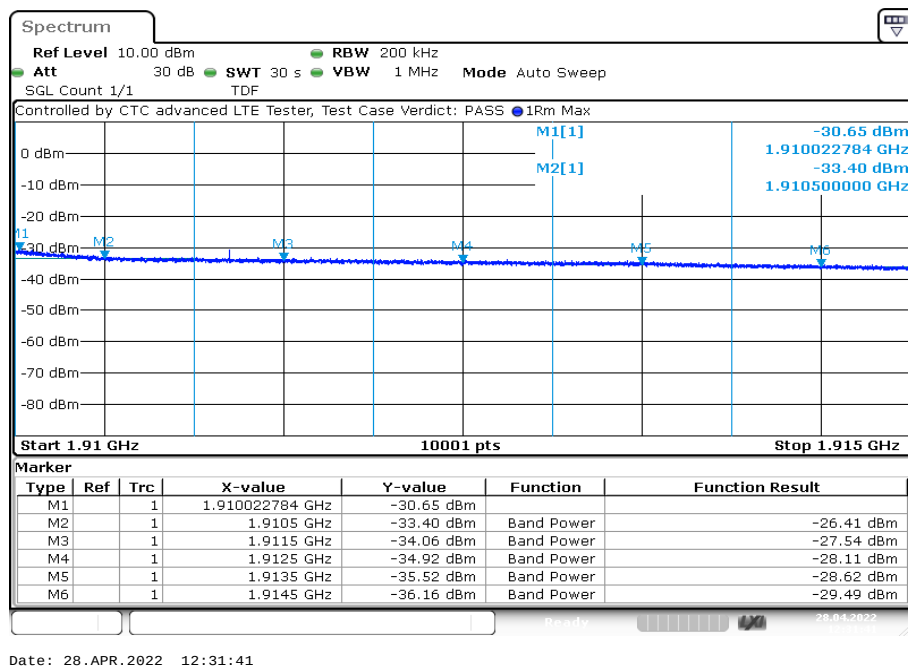
Plot 28: 3 MHz – 64-QAM - Highest channel



Plot 29: 5 MHz – 64-QAM - Lowest channel

Plot 30: 5 MHz – 64-QAM - Highest channel


Plot 31: 10 MHz – 64-QAM - Lowest channel

Plot 32: 10 MHz – 64-QAM - Highest channel


Plot 33: 15 MHz – 64-QAM - Lowest channel**Plot 34:** 15 MHz – 64-QAM - Highest channel

Plot 35: 20 MHz – 64-QAM - Lowest channel**Plot 36:** 20 MHz – 64-QAM - Highest channel

12.2.6 Occupied bandwidth

Description:

Measurement of the occupied bandwidth of the transmitted signal.

Measurement:

Similar to conducted emissions, occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of the LTE band II frequency band. The table below lists the measured 99% power and -26dBc occupied bandwidths. Spectrum analyzer plots are included on the following pages.

Measurement parameters	
Detector:	Peak
Sweep time:	180s
Video bandwidth:	100 kHz
Resolution bandwidth:	30 kHz
Span:	2 x nominal bandwidth
Trace-Mode:	Max Hold
Used equipment:	See chapter 8.4 setup A
Measurement uncertainty:	See chapter 9
Measurement procedure	FCC: § 2.1049

Limits:

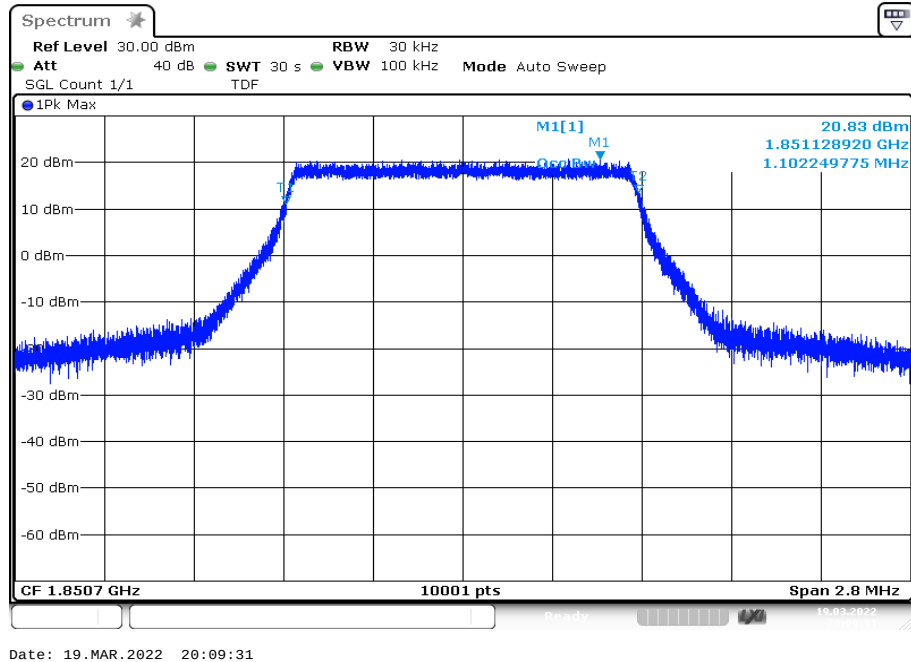
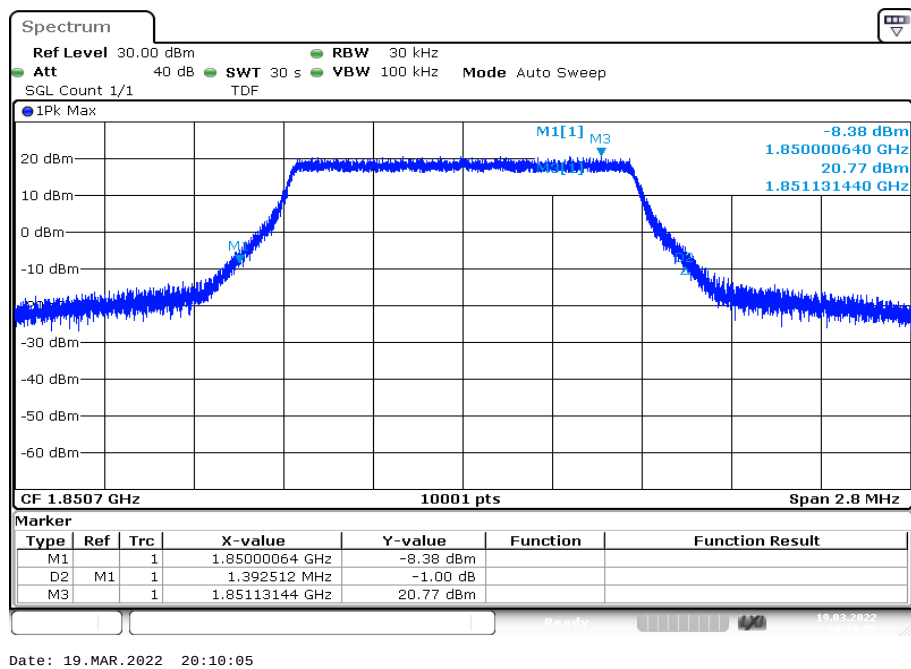
FCC
§ 2.1049
Reporting only

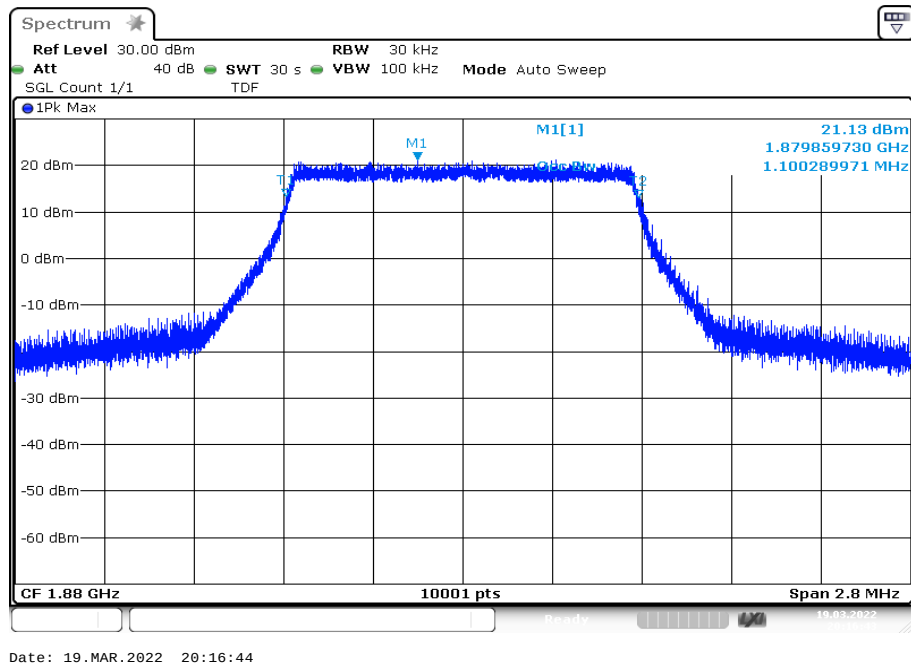
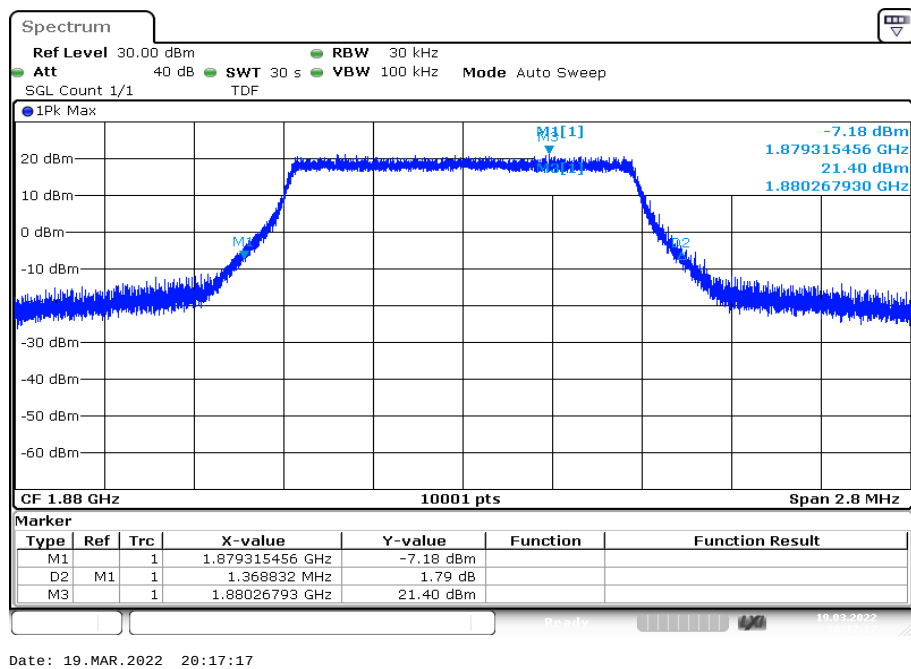
Results:

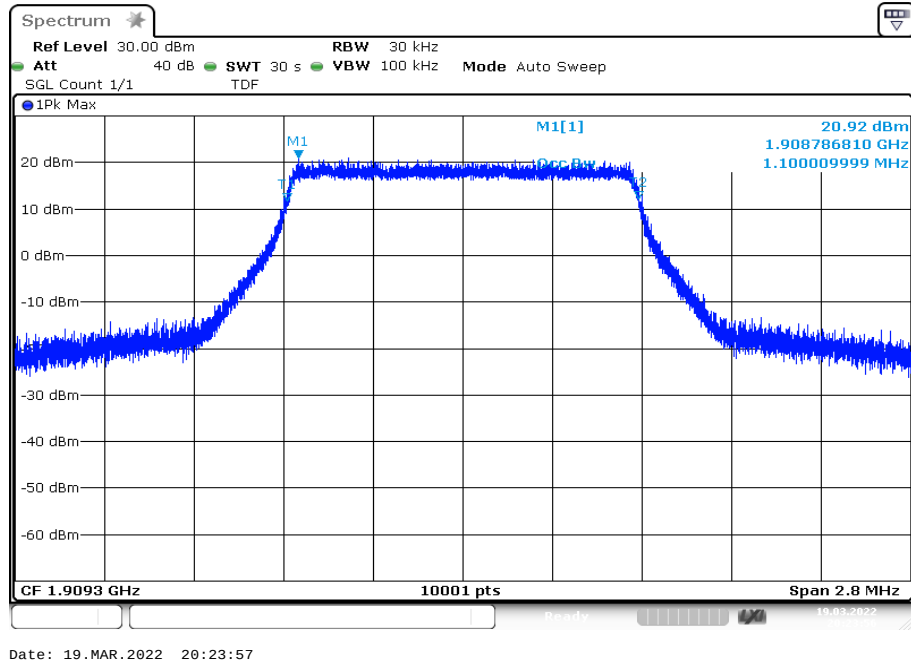
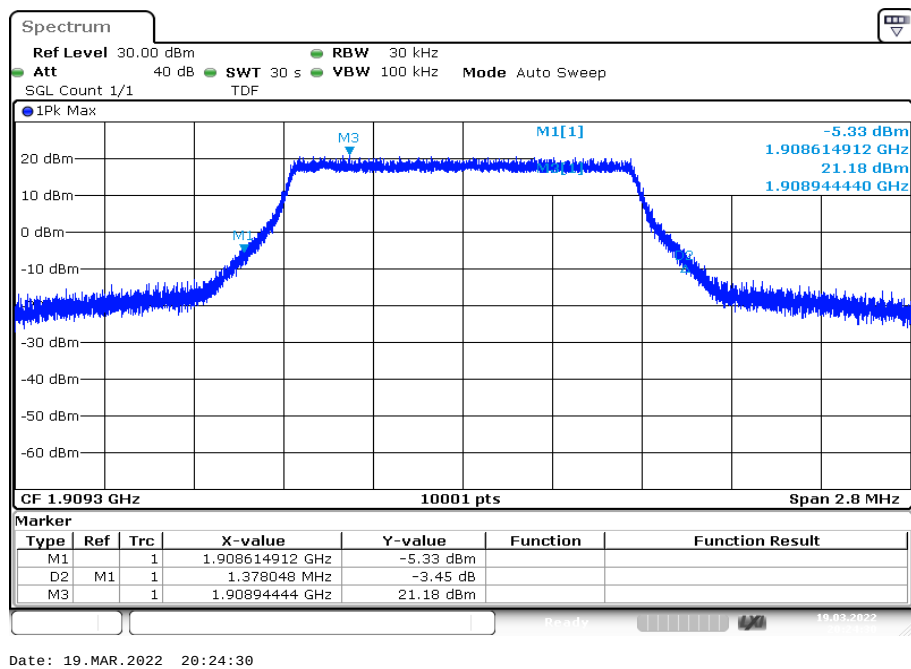
Occupied Bandwidth – QPSK			
Bandwidth	Channel	99% OBW (kHz)	-26 dBc BW (kHz)
1.4	low	1.1022	1.3925
	mid	1.1003	1.3688
	high	1.1000	1.3780
3.0	low	2.7447	3.1785
	mid	2.7495	3.1869
	high	2.7459	3.1617
5.0	low	4.5165	5.1905
	mid	4.5225	5.2005
	high	4.5145	5.1296
10.0	low	9.0811	10.3409
	mid	9.0871	10.3389
	high	9.0871	10.3109
15.0	low	13.5106	15.1544
	mid	13.5076	15.1485
	high	13.4927	15.0435
20.0	low	18.0862	20.2060
	mid	18.0662	20.0540
	high	18.0422	20.0501

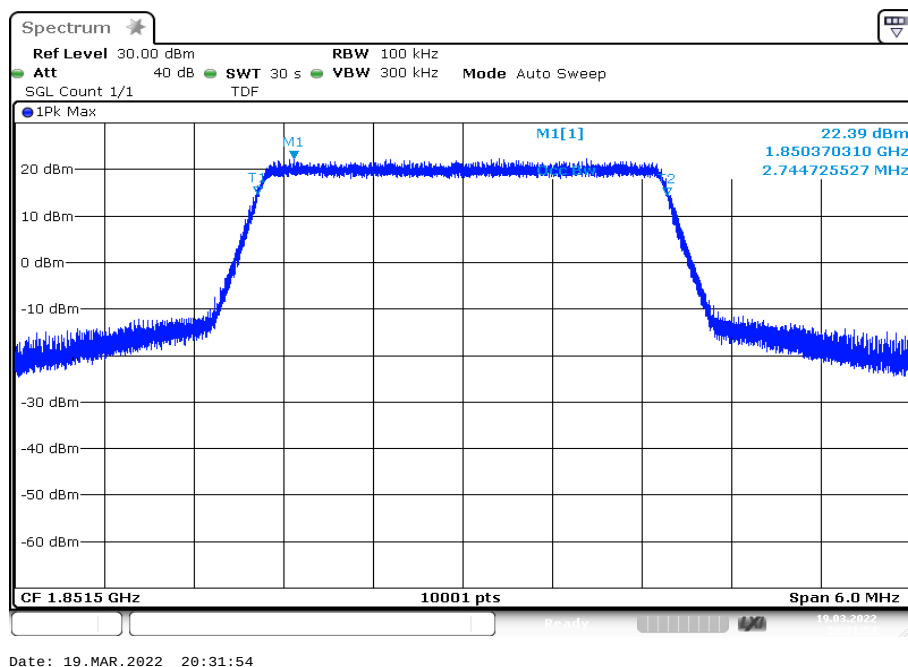
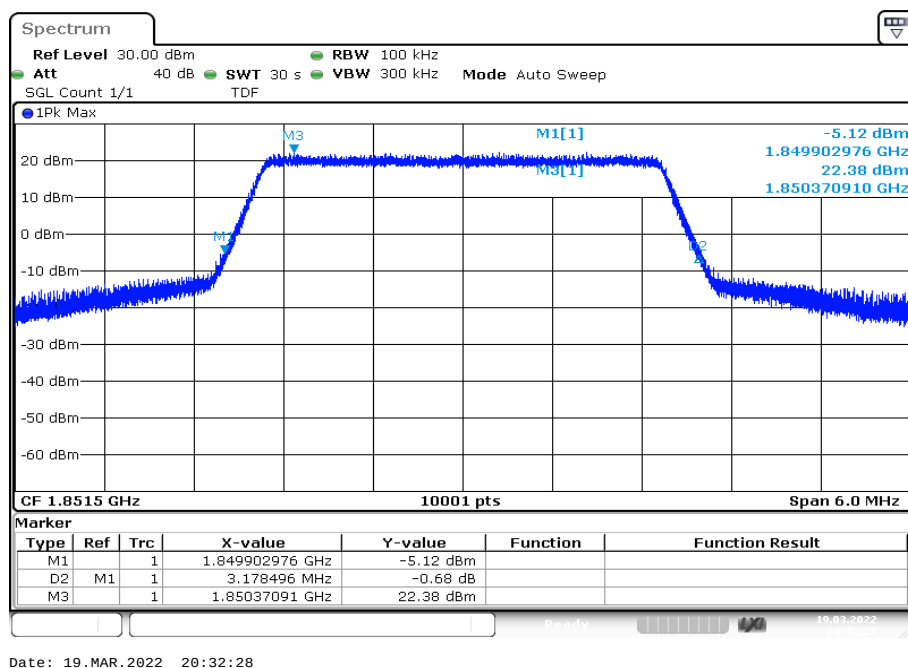
Occupied Bandwidth – 16-QAM			
Bandwidth	Channel	99% OBW (kHz)	-26 dBc BW (kHz)
1.4	low	1103.4	1397.6
	mid	1106.7	1426.6
	high	1104.2	1423.6
3.0	low	2748.3	3188.1
	mid	2746.5	3170.7
	high	2747.7	3161.6
5.0	low	4526.5	5181.6
	mid	4530.5	5164.4
	high	4524.5	5193.5
10.0	low	9089.1	10324.9
	mid	9097.7	10300.9
	high	9097.1	10329.0
15.0	low	13510.6	14305.5
	mid	13513.7	15160.6
	high	13498.7	15058.6
20.0	low	18090.2	20126.0
	mid	18074.2	22053.8
	high	18054.2	20098.1

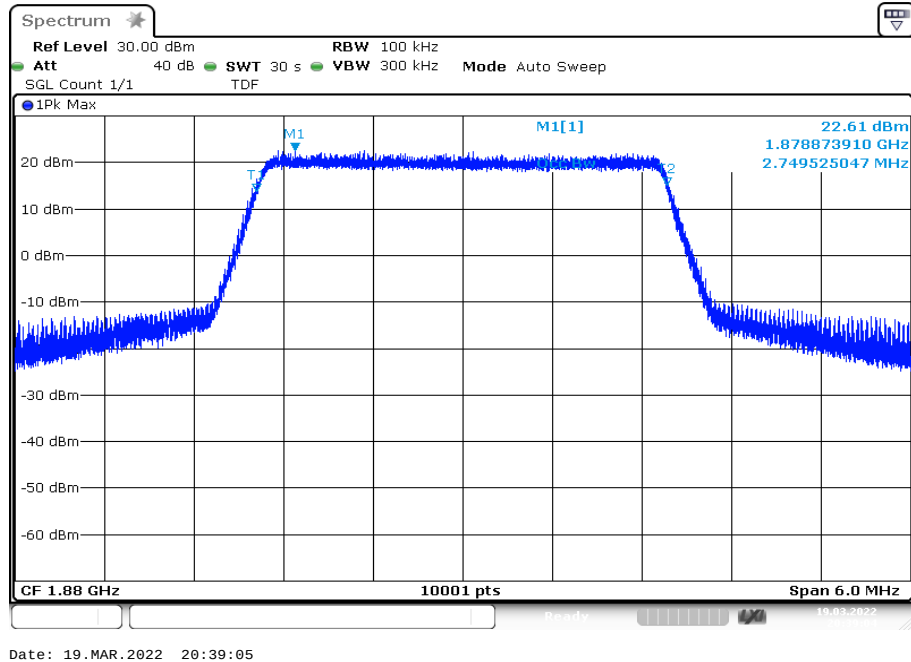
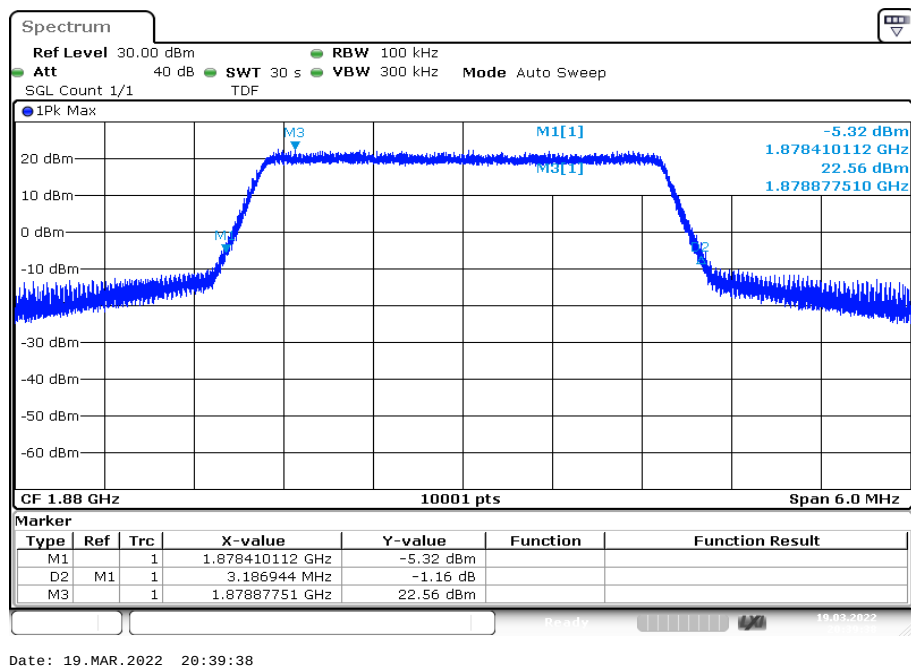
Occupied Bandwidth – 64-QAM			
Bandwidth	Channel	99% OBW (kHz)	-26 dBc BW (kHz)
1.4	low	1100.8	1393.4
	mid	1103.4	1385.2
	high	1099.7	1371.6
3.0	low	2746.5	3188.1
	mid	2747.1	3166.5
	high	2744.1	3168.9
5.0	low	4526.5	5200.5
	mid	4521.5	5216.5
	high	4522.5	5217.4
10.0	low	9099.1	10289.0
	mid	9081.1	10399.0
	high	9095.1	10335.0
15.0	low	13525.6	15082.5
	mid	13501.7	15019.5
	high	13495.7	15067.5
20.0	low	18082.2	20142.0
	mid	18054.2	20120.2
	high	18014.2	20026.0

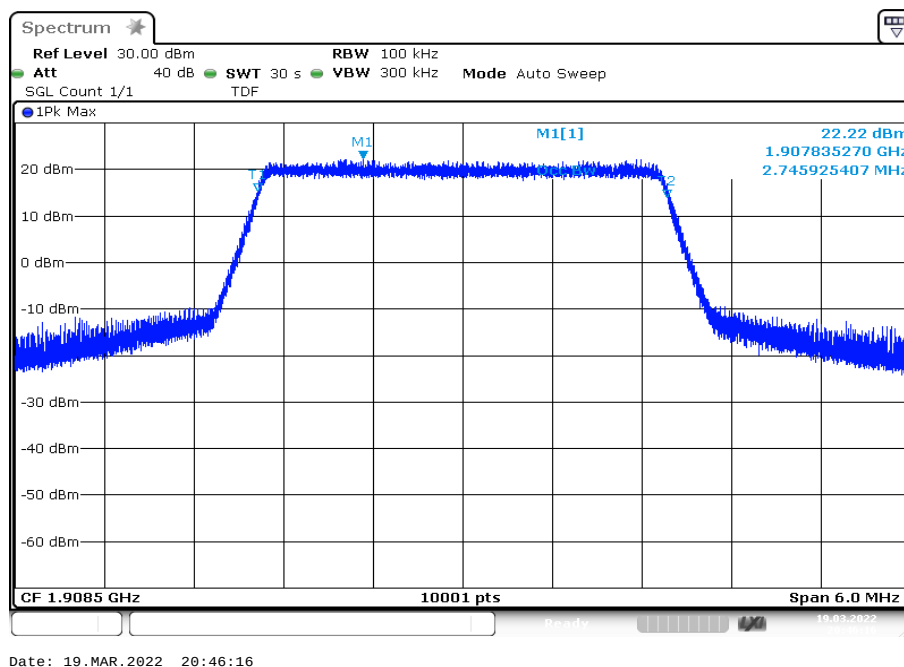
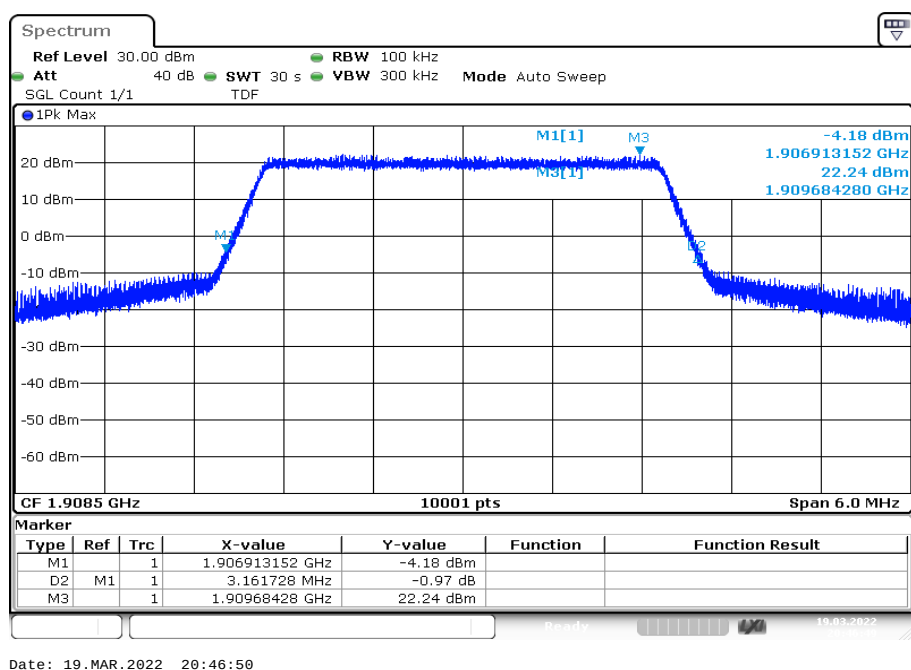
Plots:**Plot 1:** 1.4 MHz – QPSK - lowest channel (99% - OBW)**Plot 2:** 1.4 MHz – QPSK - lowest channel (-26 dBc BW)

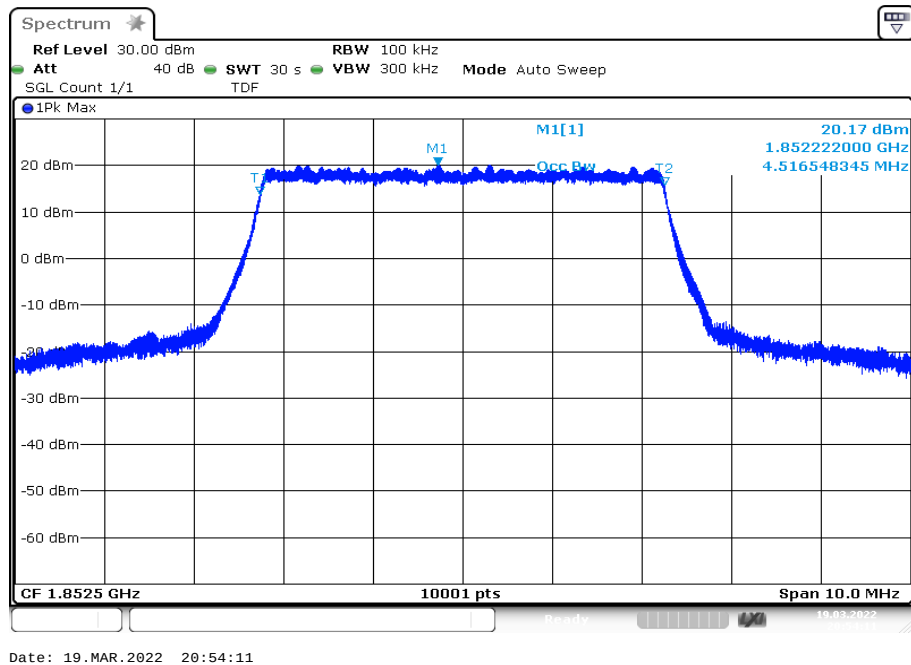
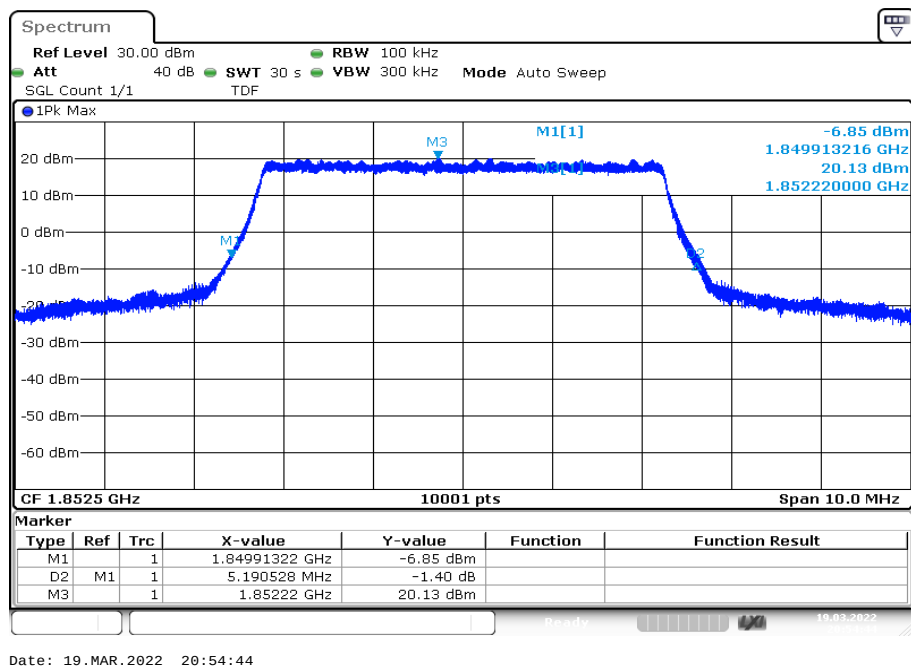
Plot 3: 1.4 MHz – QPSK – middle channel (99% - OBW)**Plot 4:** 1.4 MHz – QPSK – middle channel (-26 dBc BW)

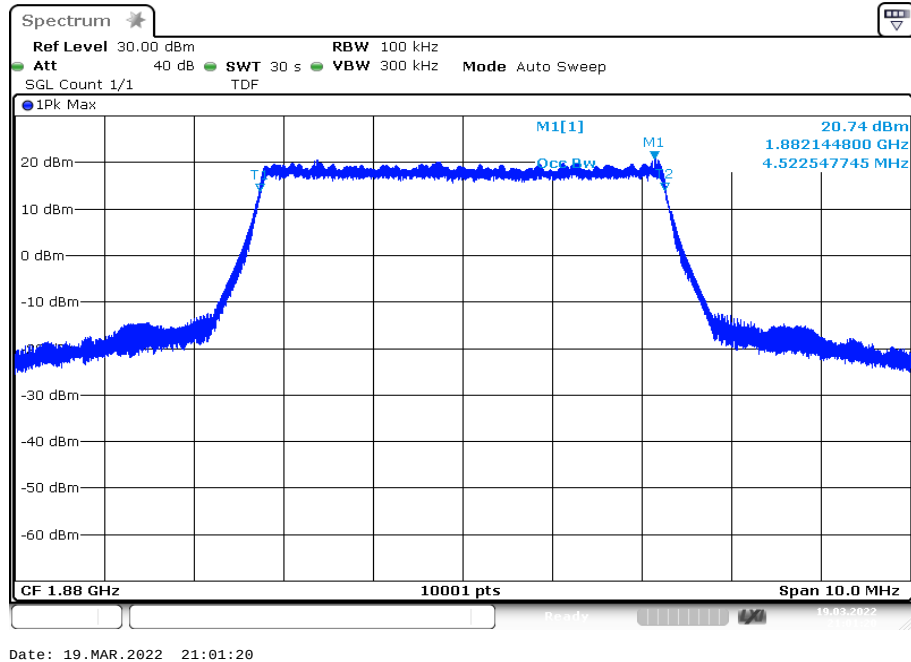
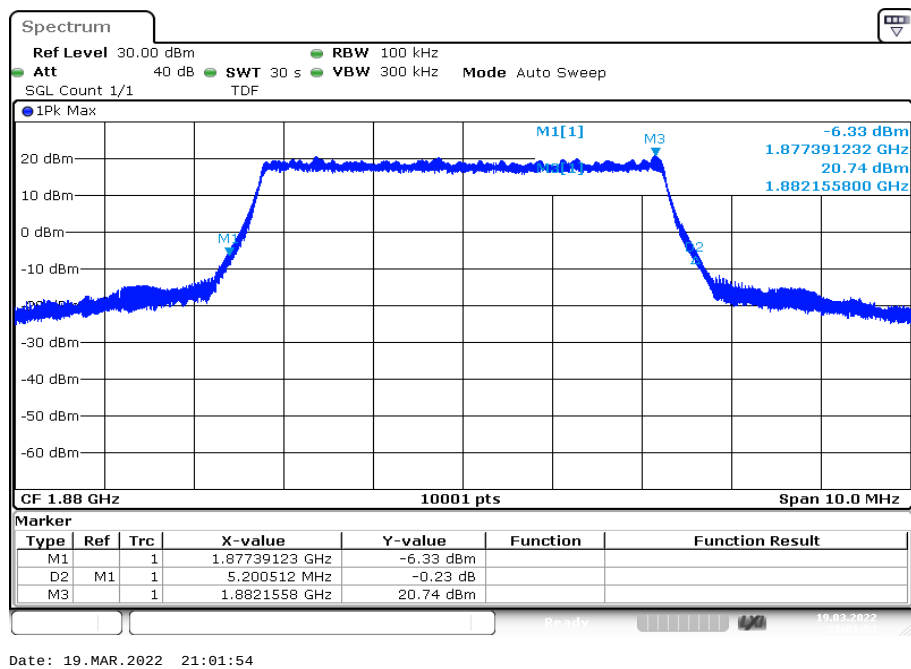
Plot 5: 1.4 MHz – QPSK - highest channel (99% - OBW)**Plot 6:** 1.4 MHz – QPSK - highest channel (-26 dBc BW)

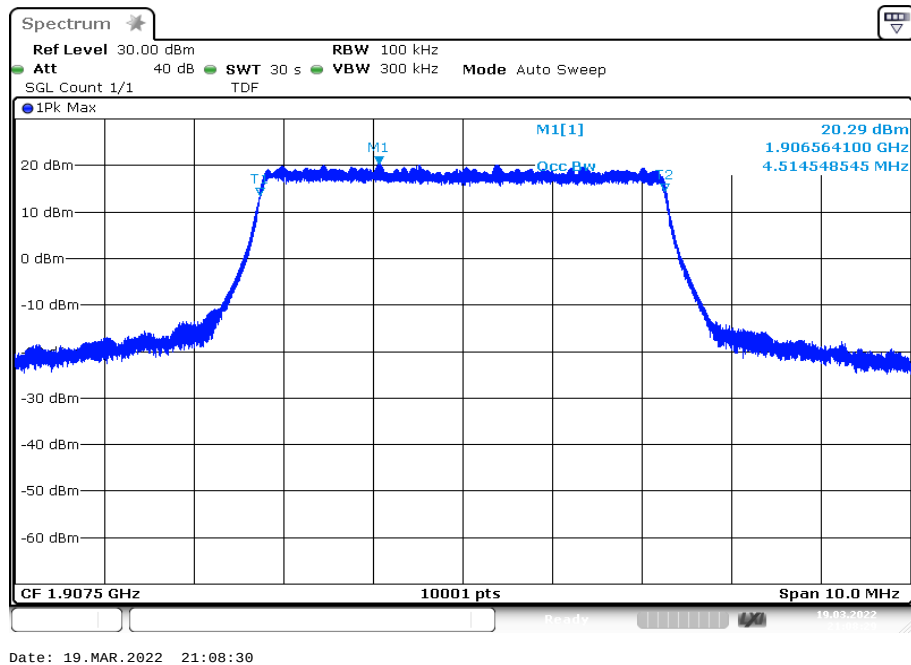
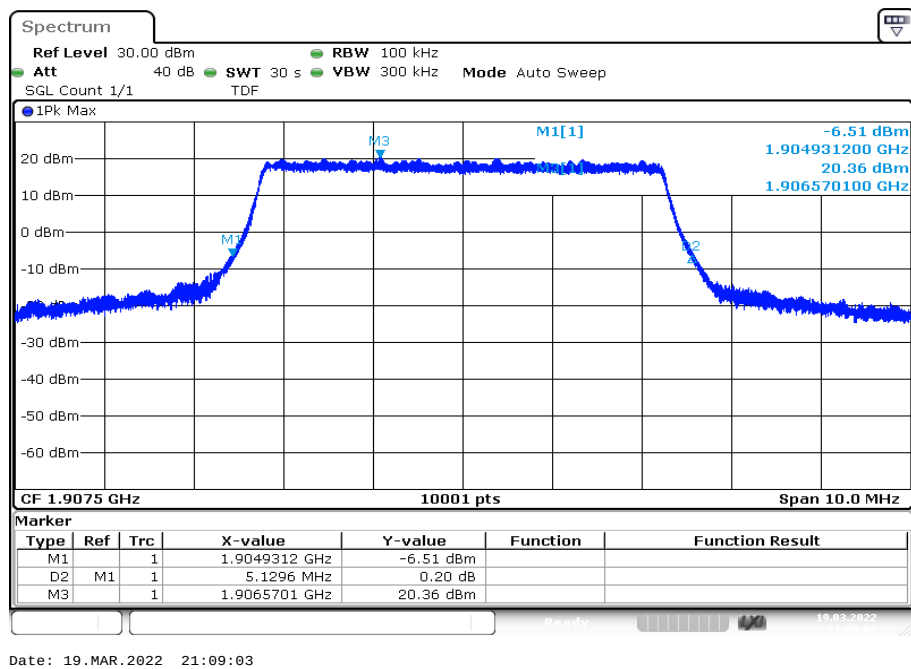
Plot 7: 3 MHz – QPSK - lowest channel (99% - OBW)**Plot 8:** 3 MHz – QPSK - lowest channel (-26 dBc BW)

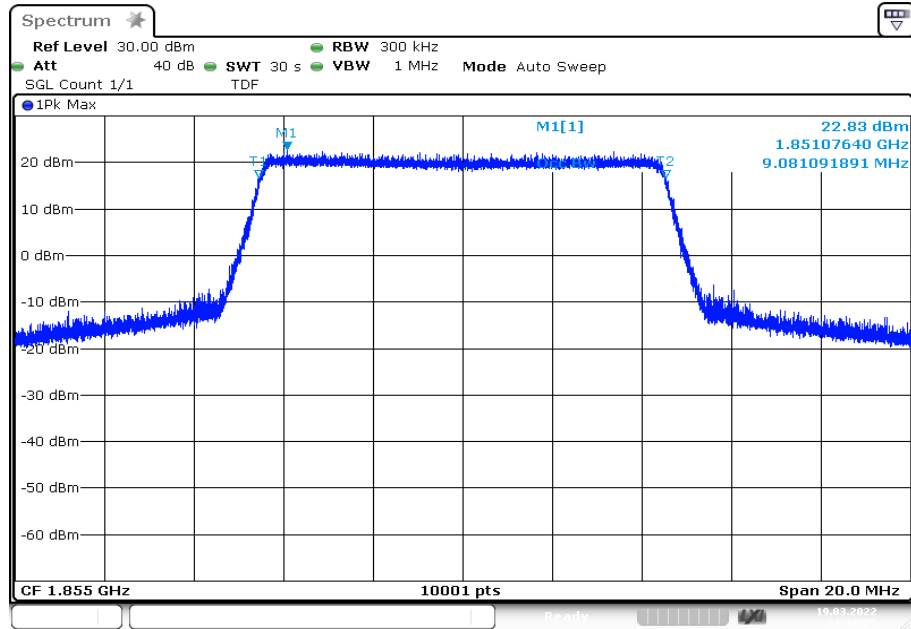
Plot 9: 3 MHz – QPSK - middle channel (99% - OBW)**Plot 10:** 3 MHz – QPSK - middle channel (-26 dBc BW)

Plot 11: 3 MHz – QPSK - highest channel (99% - OBW)**Plot 12:** 3 MHz – QPSK - highest channel (-26 dBc BW)

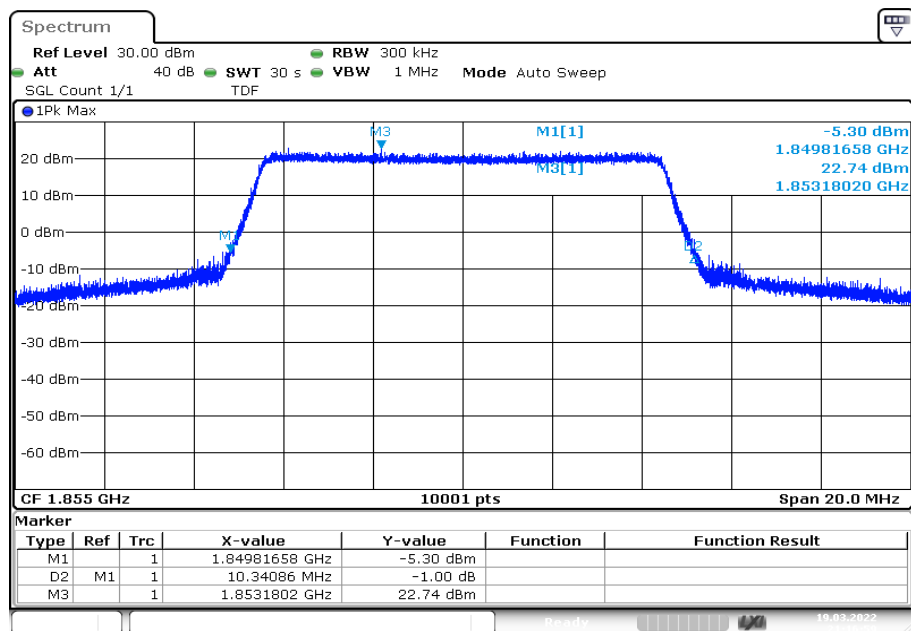
Plot 13: 5 MHz – QPSK - lowest channel (99% - OBW)**Plot 14:** 5 MHz – QPSK - lowest channel (-26 dBc BW)

Plot 15: 5 MHz – QPSK - middle channel (99% - OBW)**Plot 16:** 5 MHz – QPSK - middle channel (-26 dBc BW)

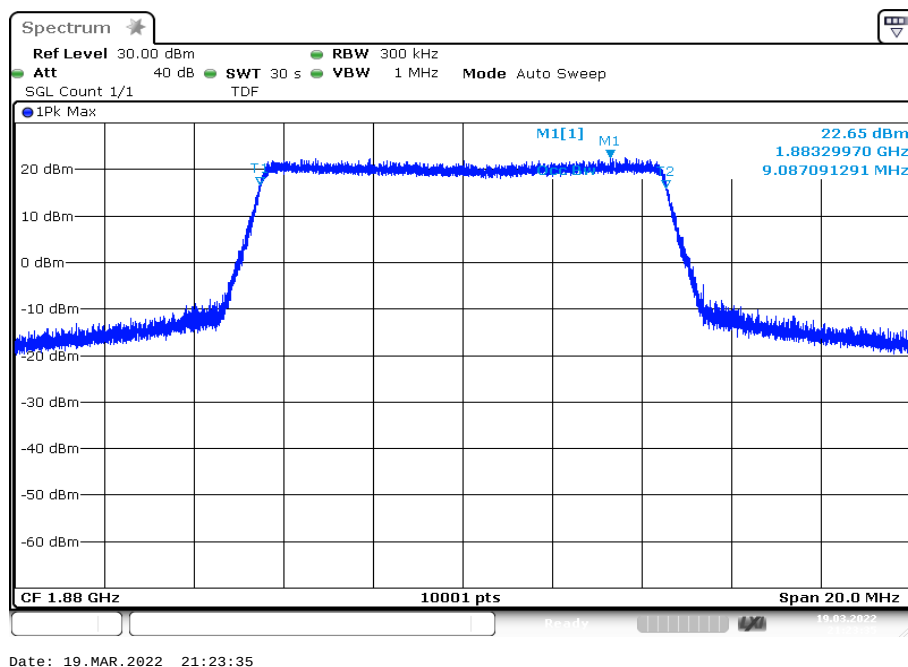
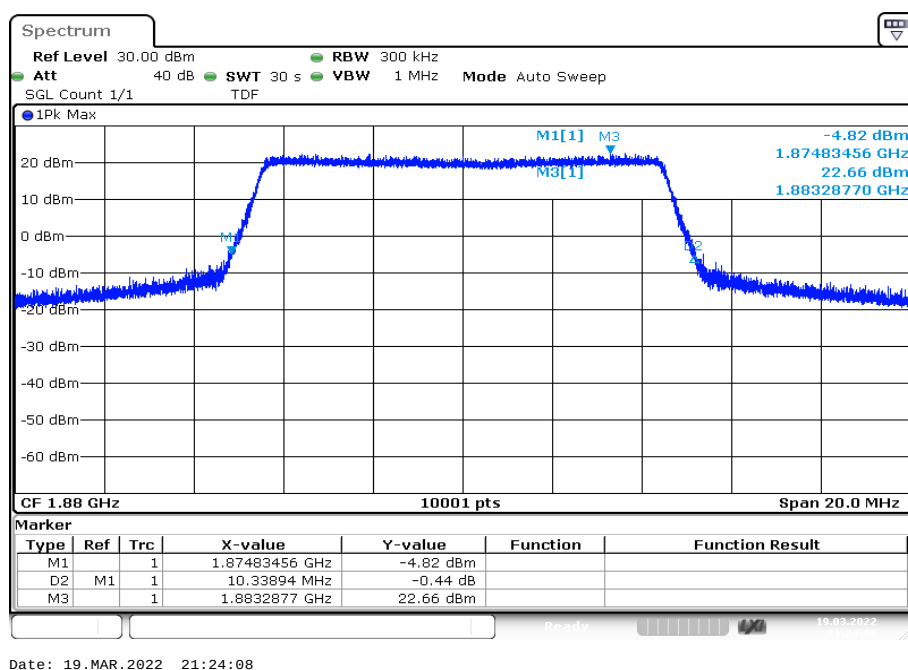
Plot 17: 5 MHz – QPSK - highest channel (99% - OBW)**Plot 18:** 5 MHz – QPSK - highest channel (-26 dBc BW)

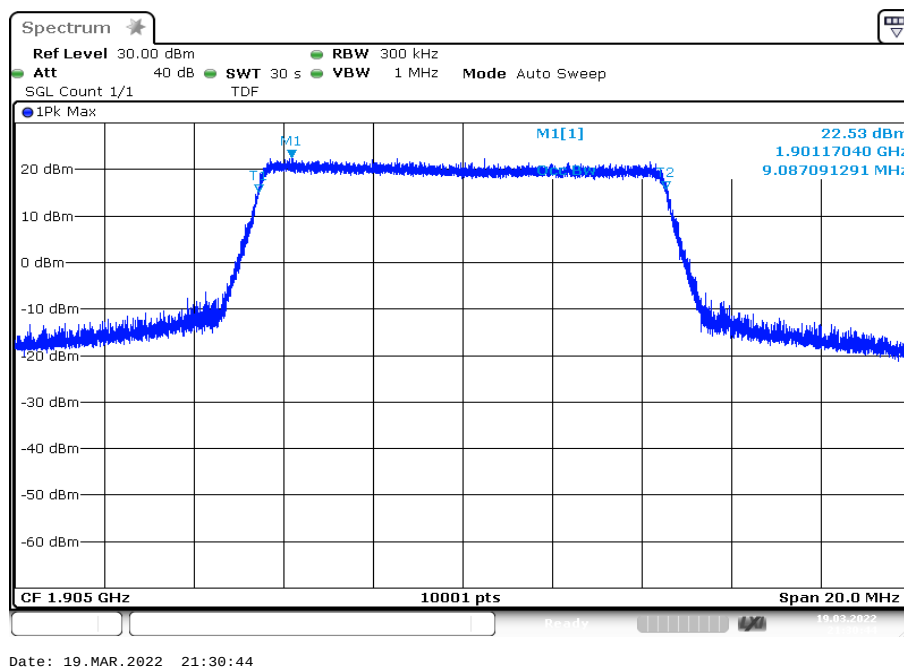
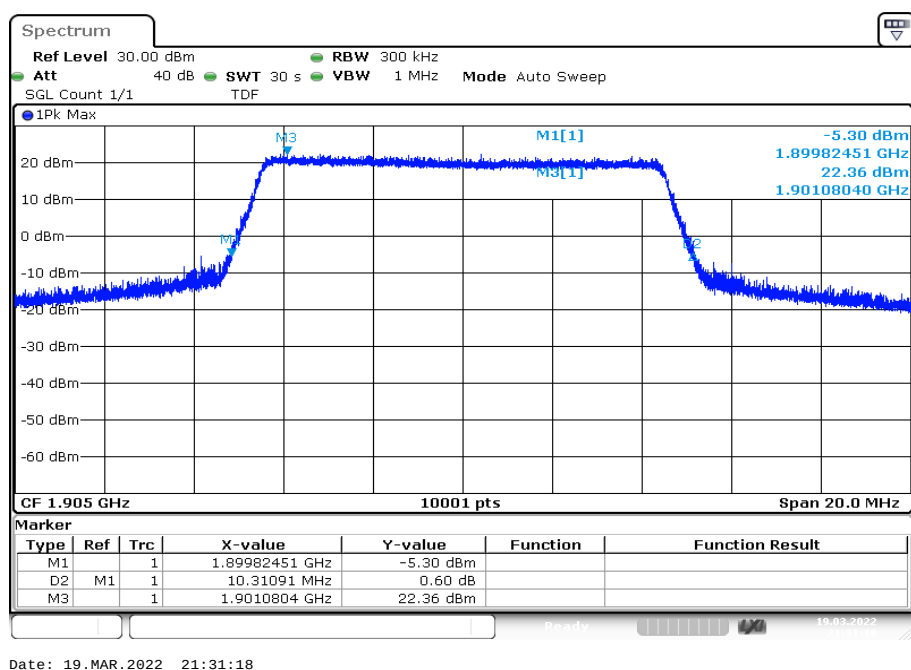
Plot 19: 10 MHz – QPSK - lowest channel (99% - OBW)

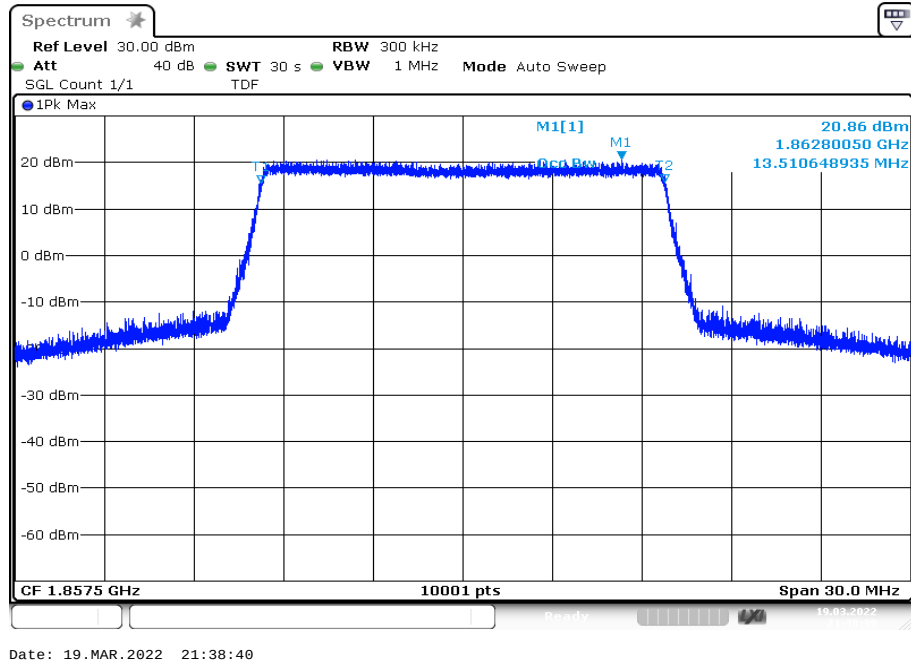
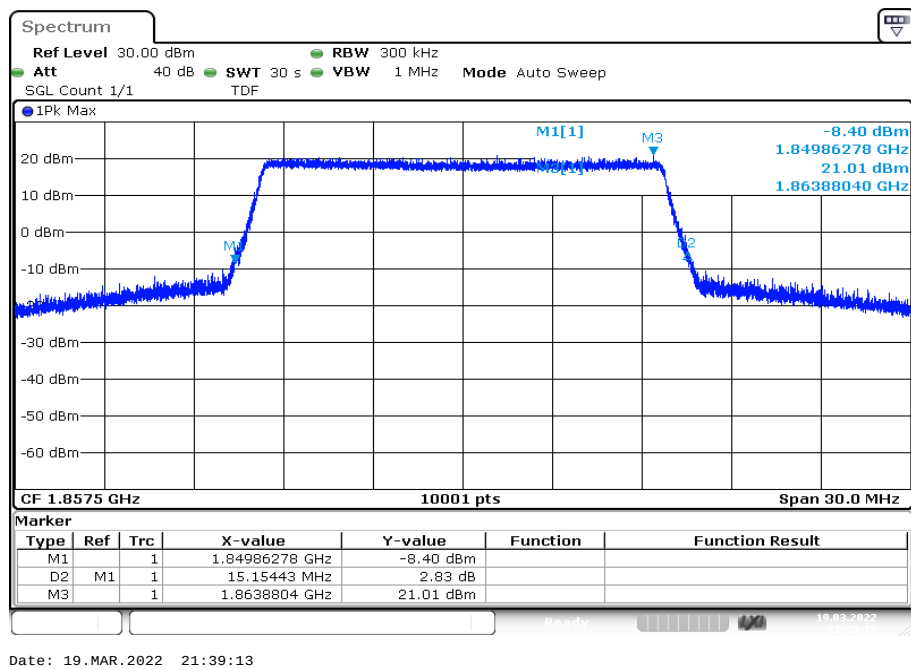
Date: 19.MAR.2022 21:16:25

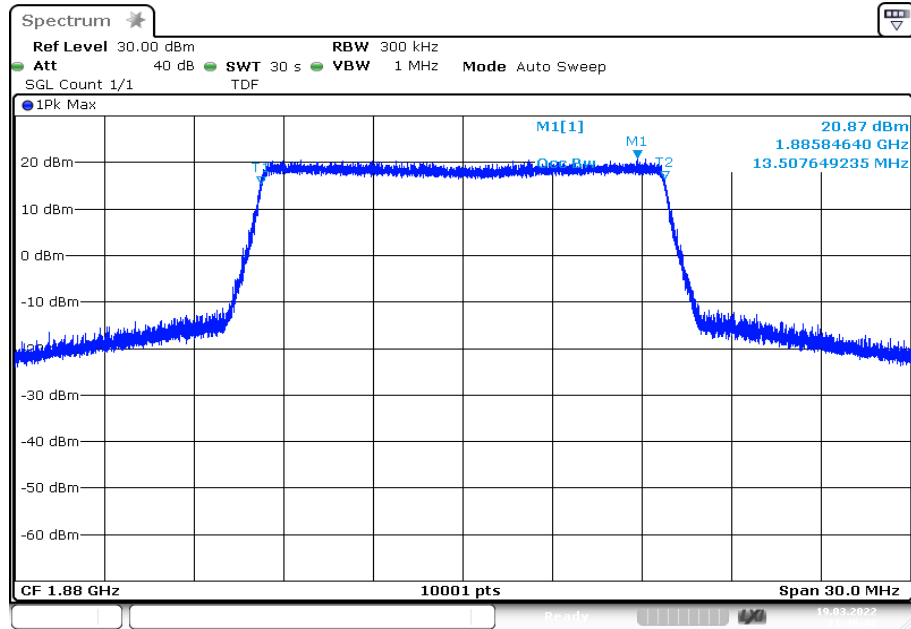
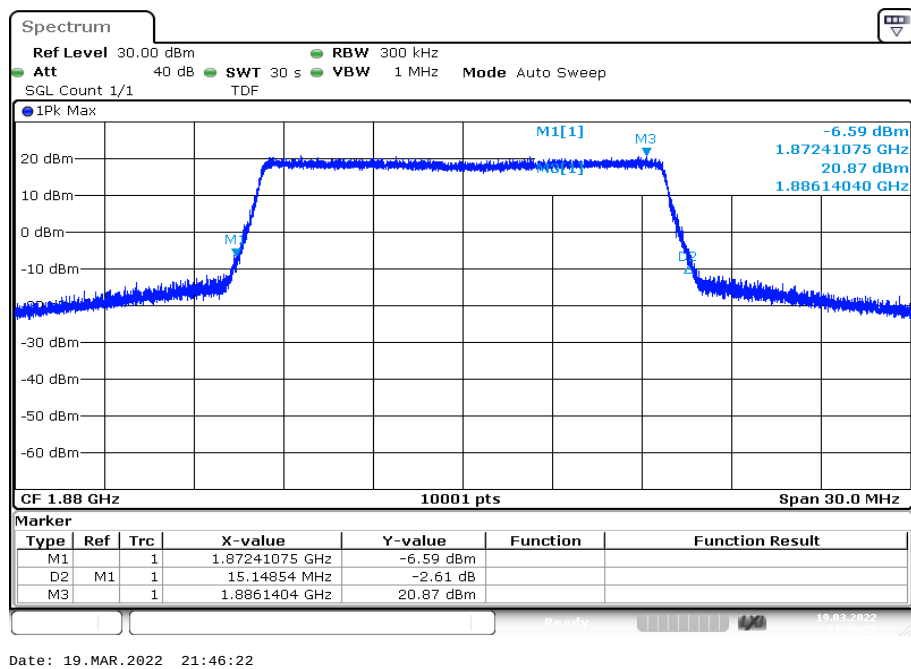
Plot 20: 10 MHz – QPSK - lowest channel (-26 dBc BW)

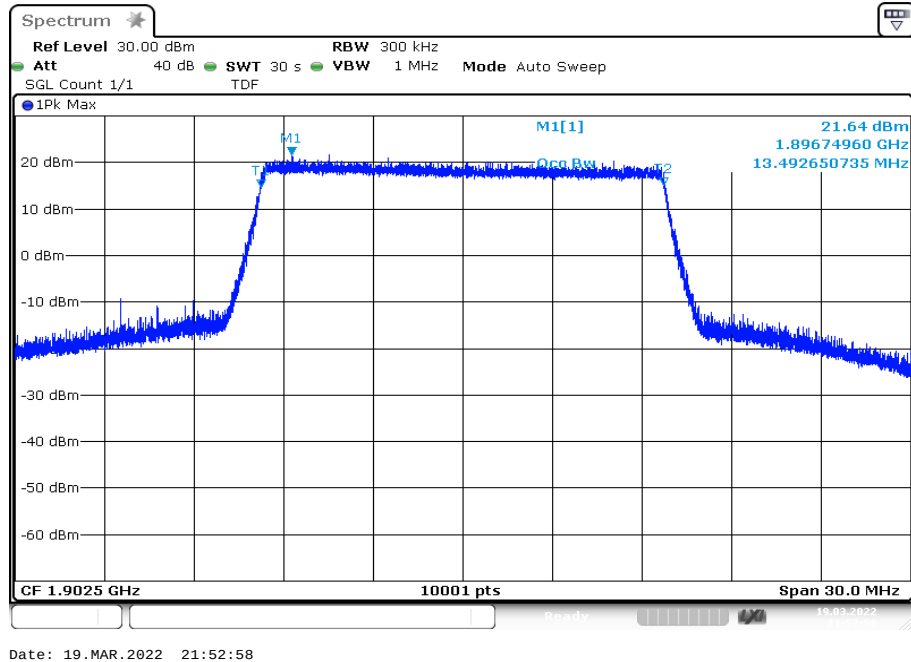
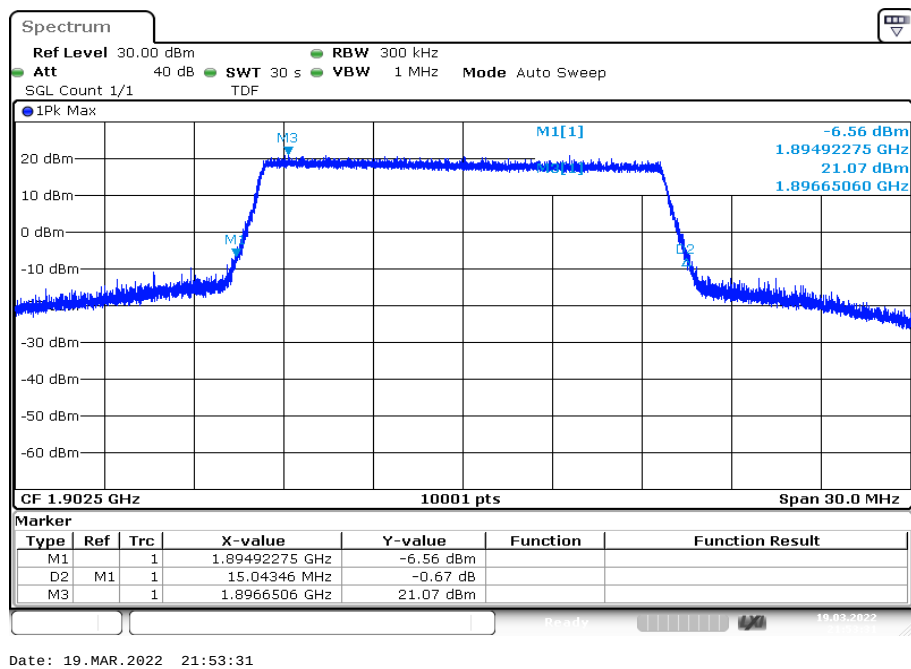
Date: 19.MAR.2022 21:16:59

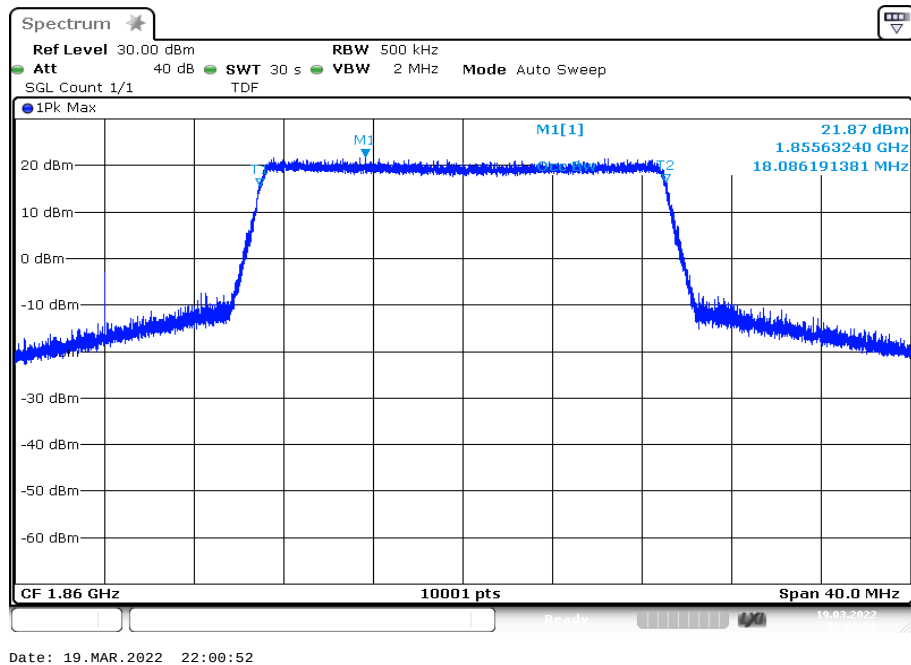
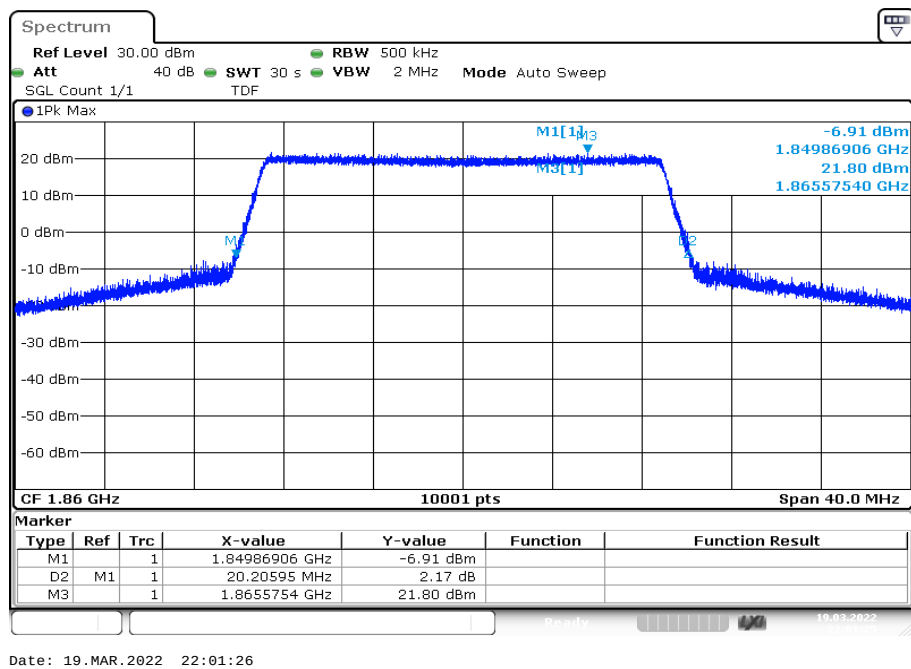
Plot 21: 10 MHz – QPSK - middle channel (99% - OBW)**Plot 22:** 10 MHz – QPSK - middle channel (-26 dBc BW)

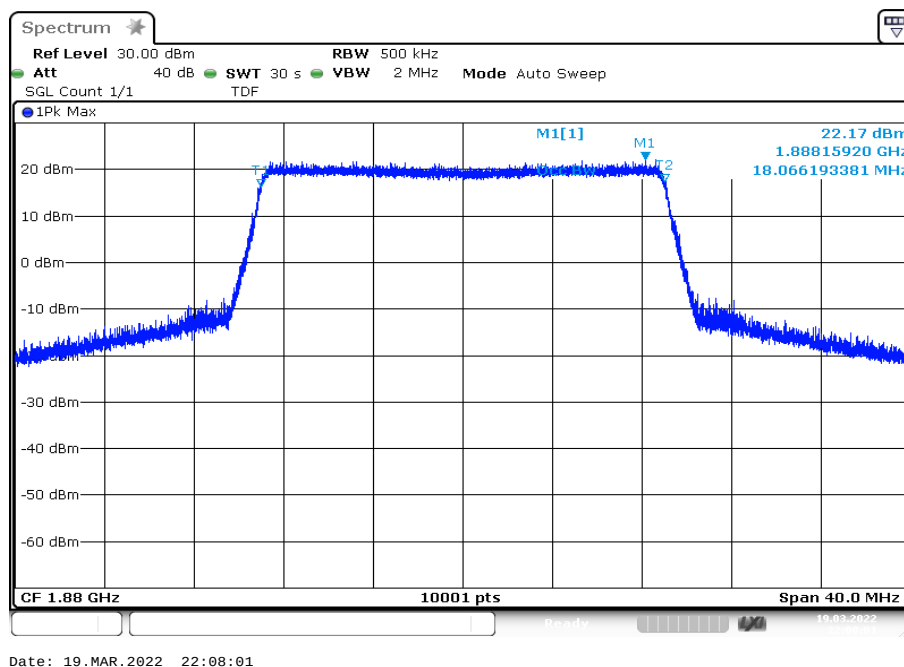
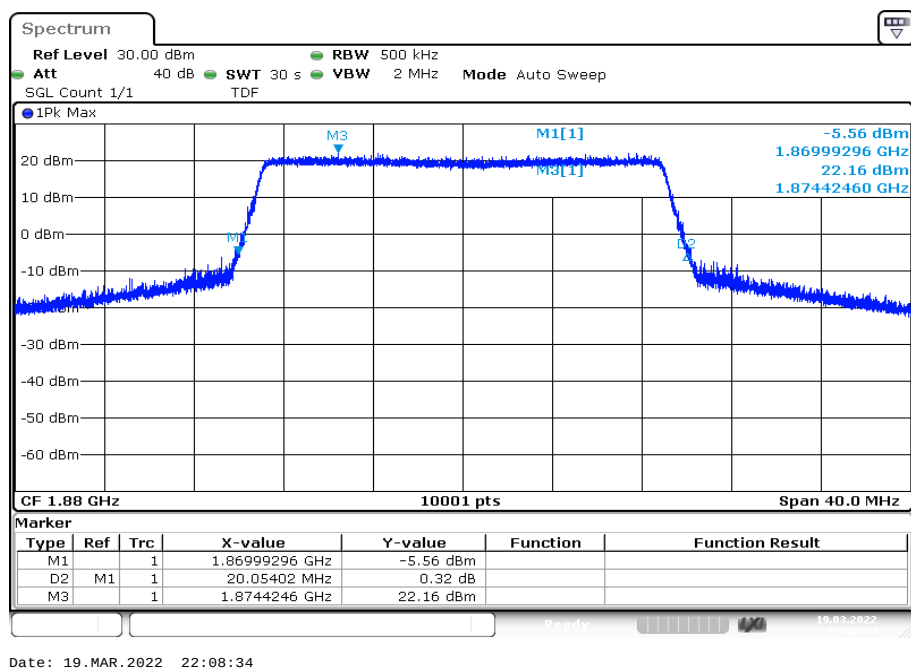
Plot 23: 10 MHz – QPSK - highest channel (99% - OBW)**Plot 24:** 10 MHz – QPSK - highest channel (-26 dBc BW)

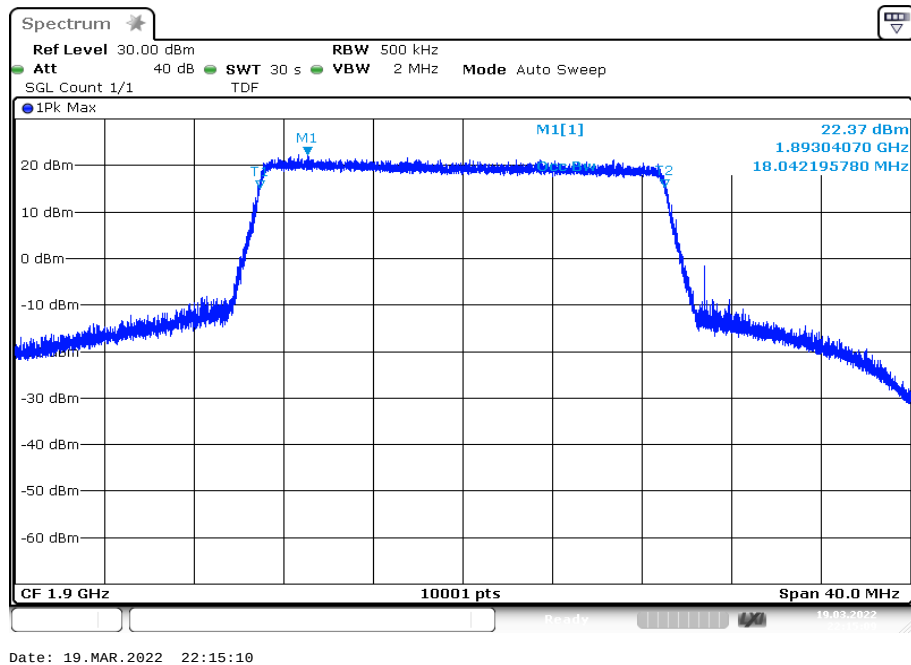
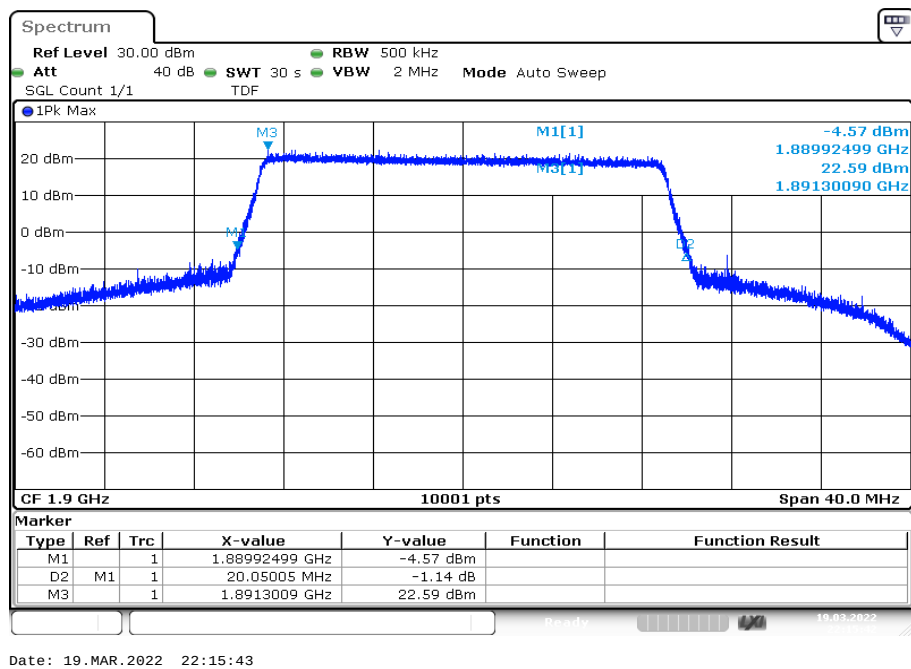
Plot 25: 15 MHz – QPSK - lowest channel (99% - OBW)**Plot 26:** 15 MHz – QPSK - lowest channel (-26 dBc BW)

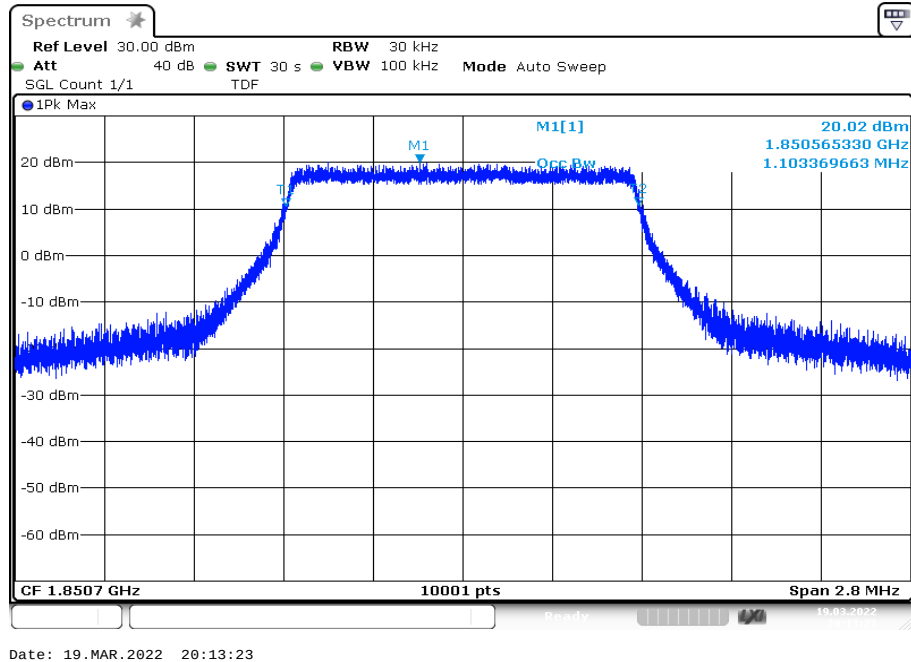
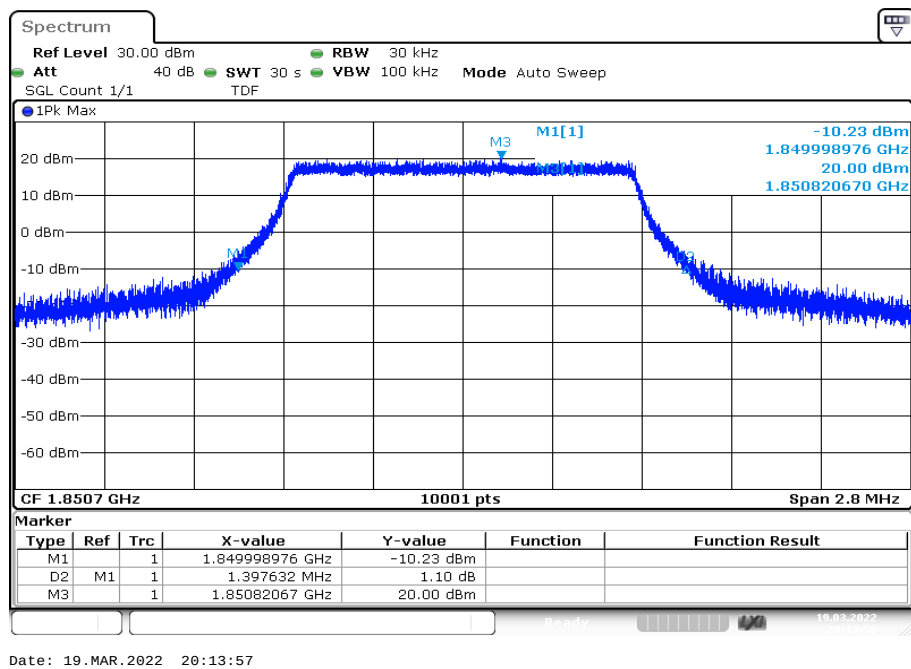
Plot 27: 15 MHz – QPSK - middle channel (99% - OBW)**Plot 28:** 15 MHz – QPSK - middle channel (-26 dBc BW)

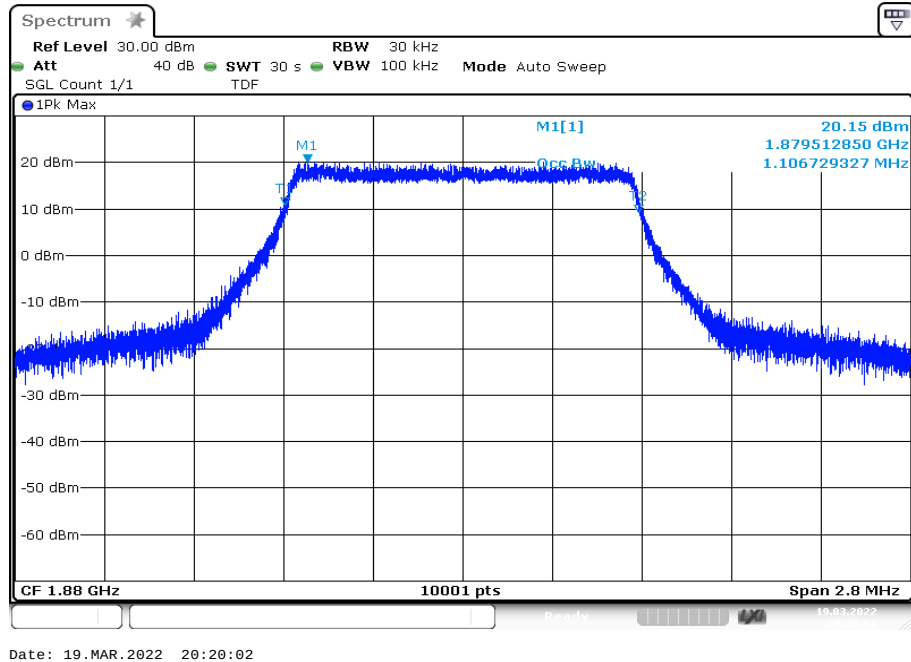
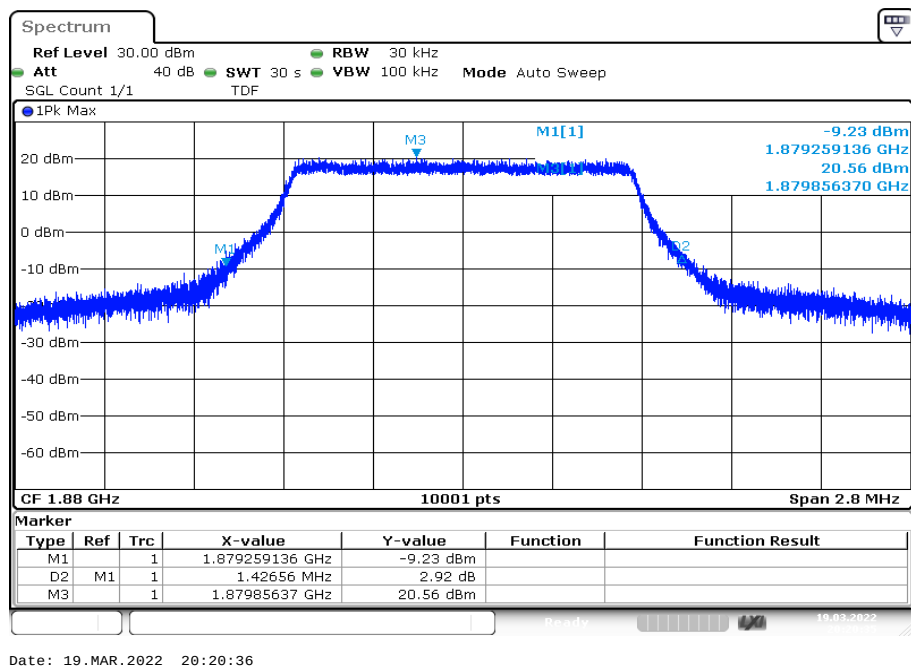
Plot 29: 15 MHz – QPSK - highest channel (99% - OBW)**Plot 30:** 15 MHz – QPSK - highest channel (-26 dBc BW)

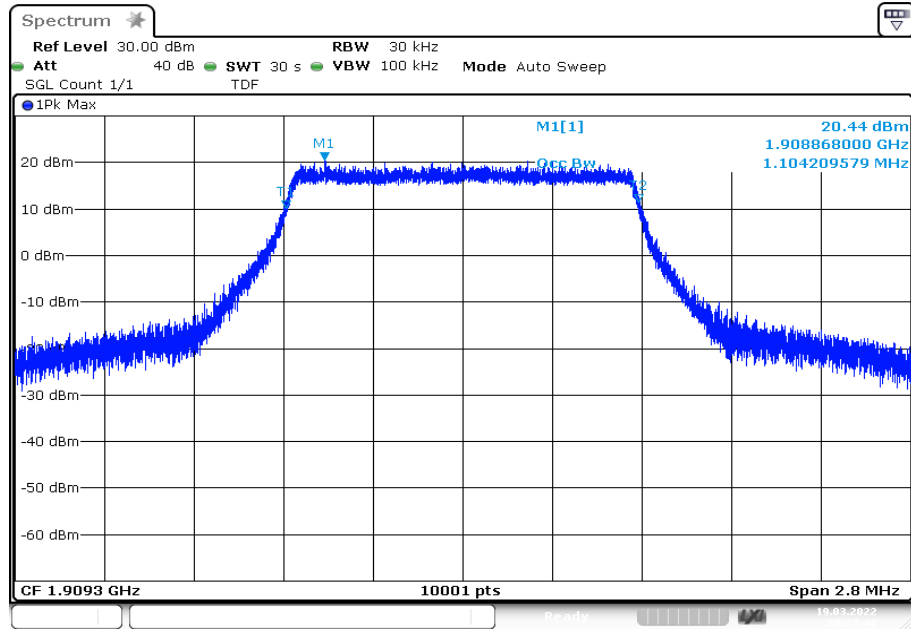
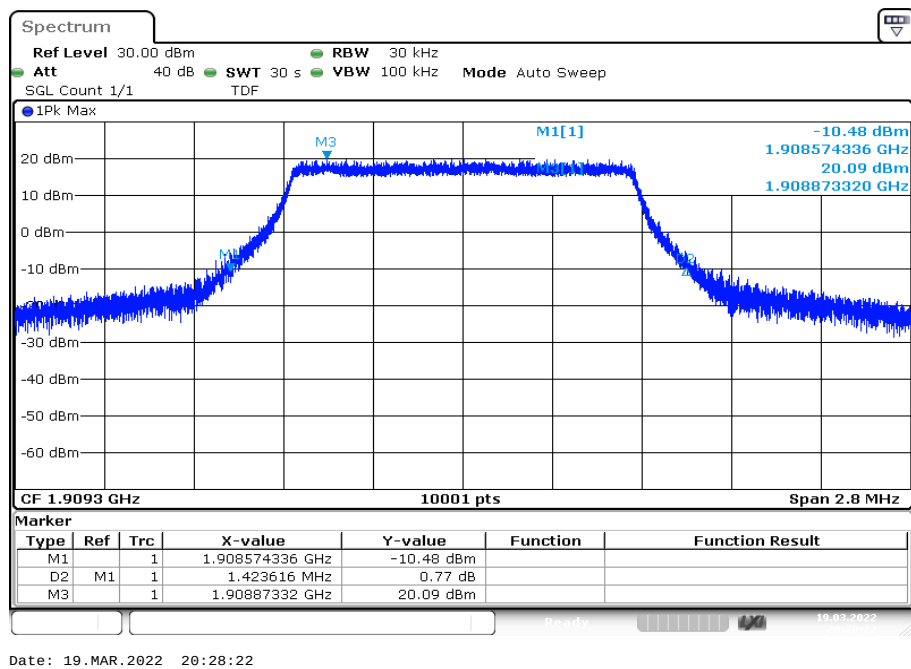
Plot 31: 20 MHz – QPSK - lowest channel (99% - OBW)**Plot 32:** 20 MHz – QPSK - lowest channel (-26 dBc BW)

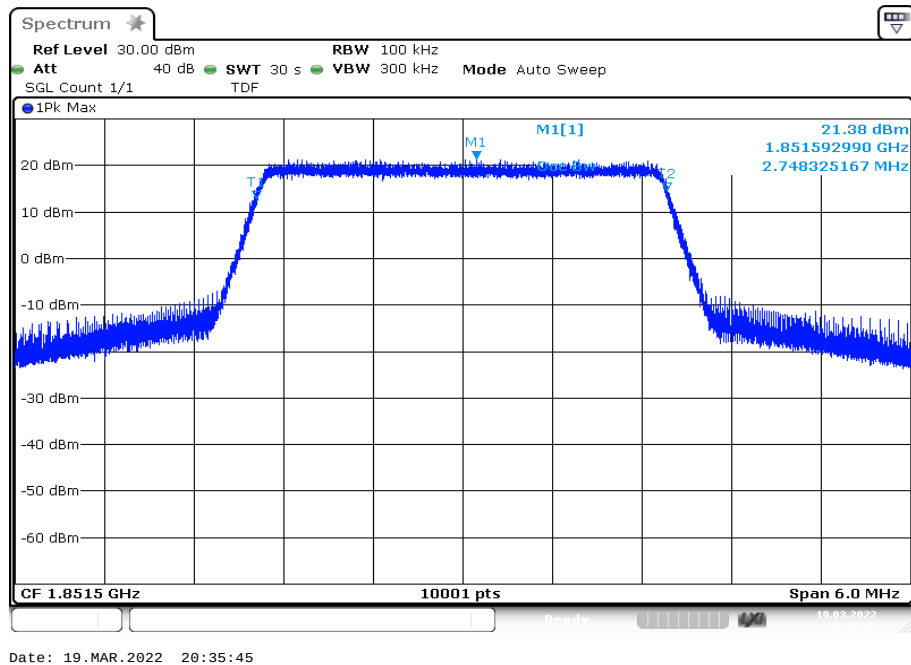
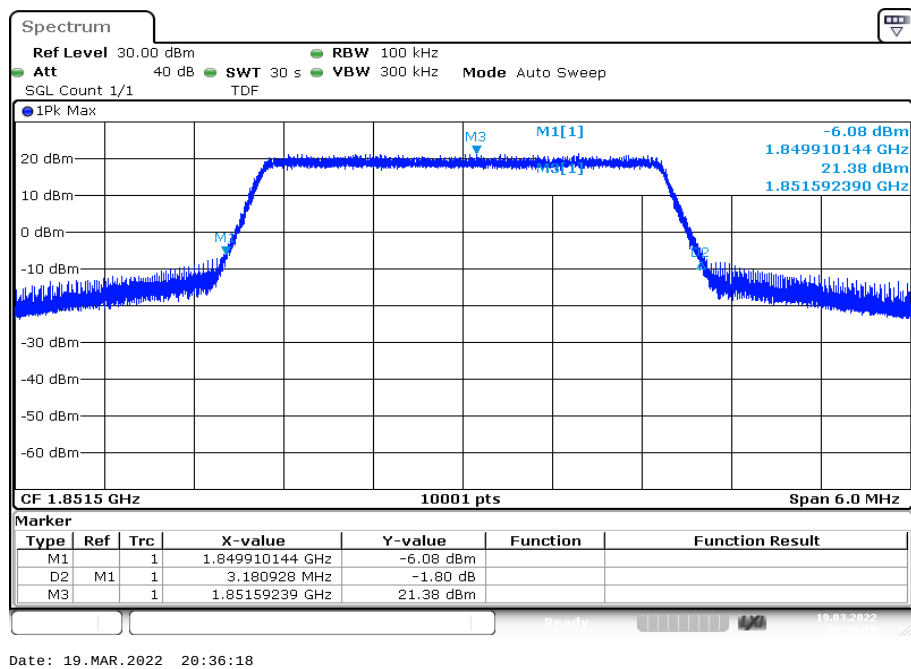
Plot 33: 20 MHz – QPSK - middle channel (99% - OBW)**Plot 34:** 20 MHz – QPSK - middle channel (-26 dBc BW)

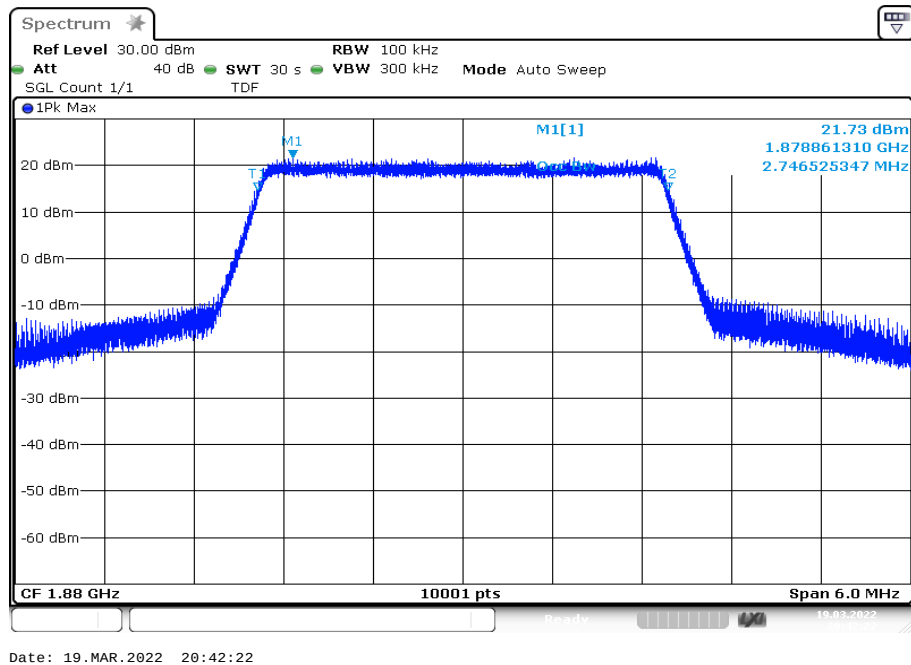
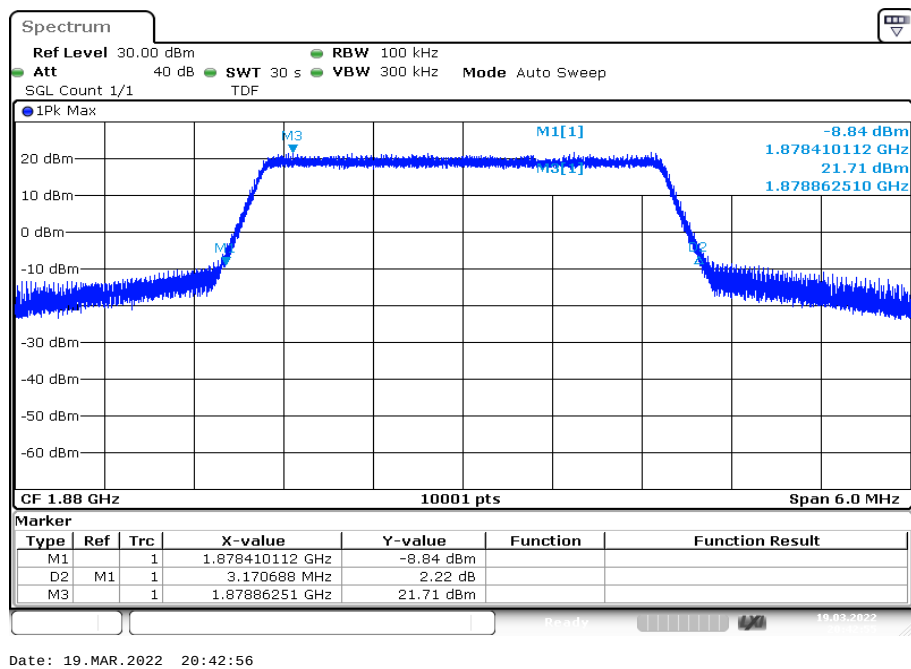
Plot 35: 20 MHz – QPSK - highest channel (99% - OBW)**Plot 36:** 20 MHz – QPSK - highest channel (-26 dBc BW)

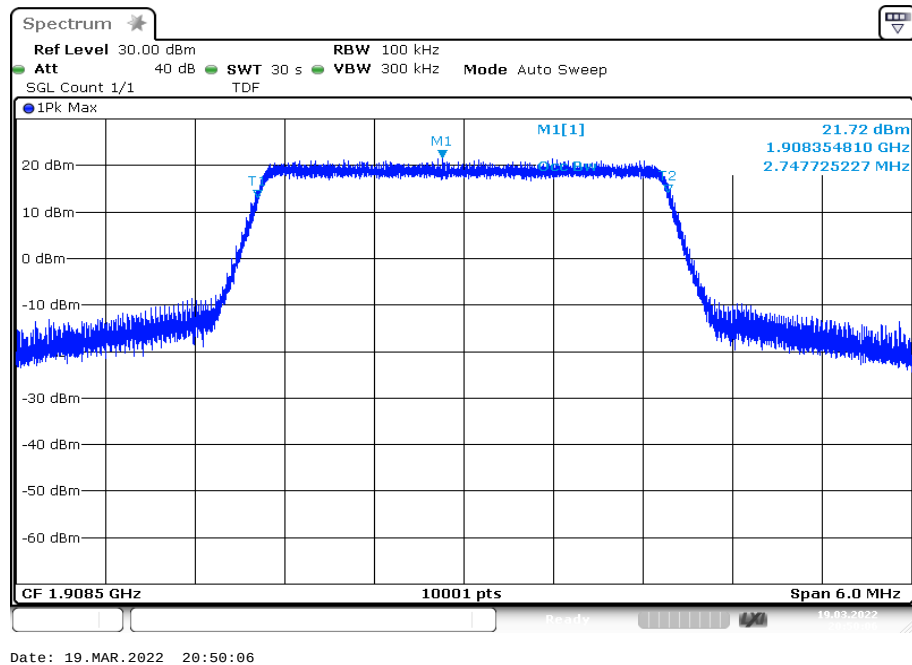
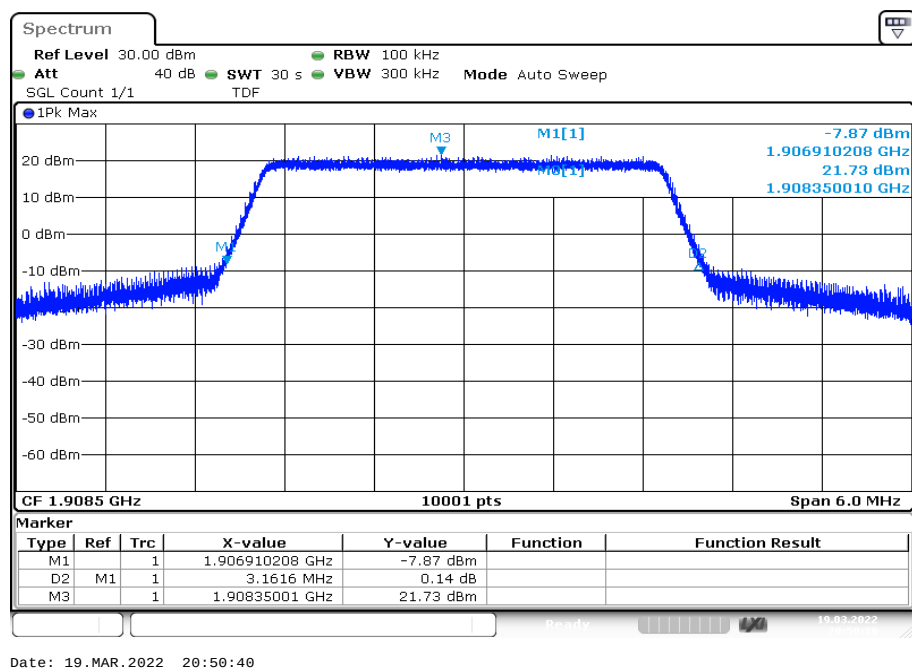
Plot 37: 1.4 MHz – 16-QAM - lowest channel (99% - OBW)**Plot 38:** 1.4 MHz – 16-QAM - lowest channel (-26 dBc BW)

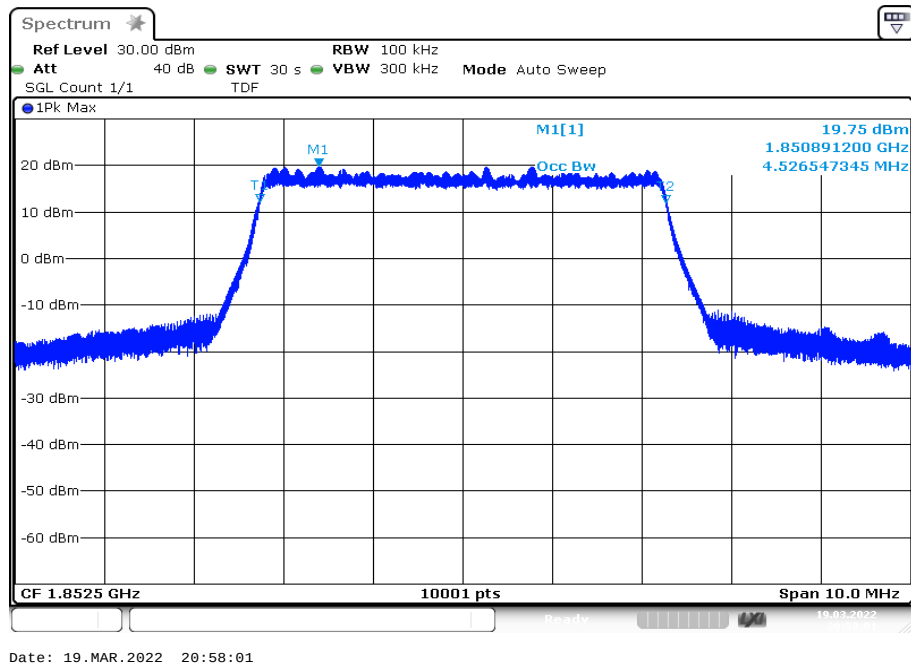
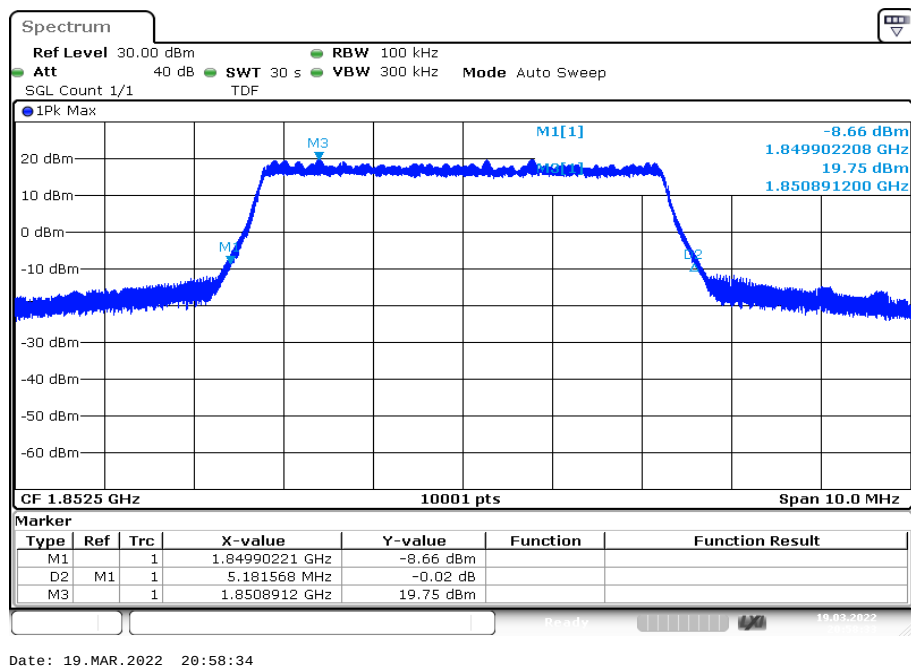
Plot 39: 1.4 MHz – 16-QAM - middle channel (99% - OBW)**Plot 40:** 1.4 MHz – 16-QAM - middle channel (-26 dBc BW)

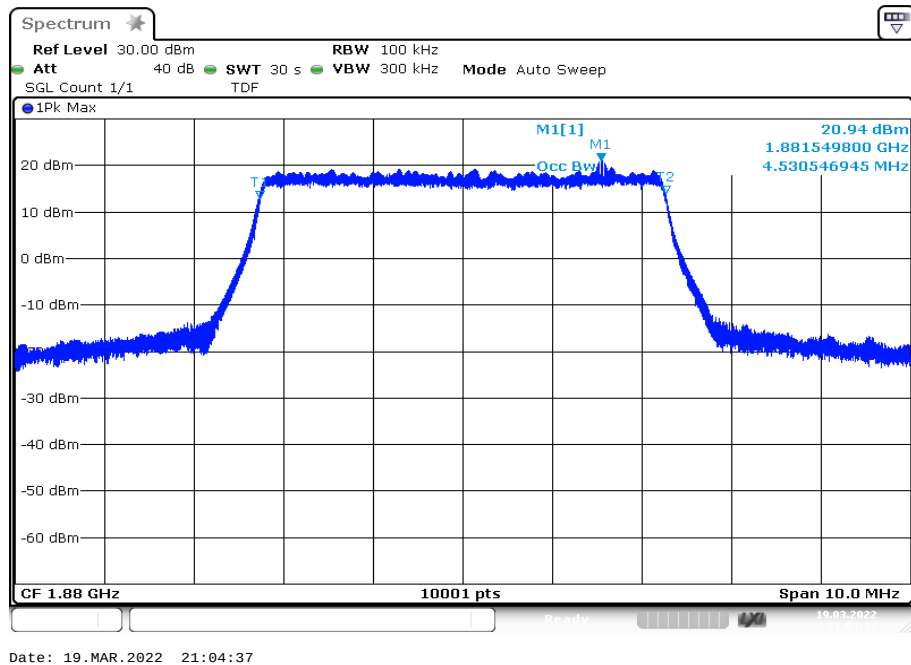
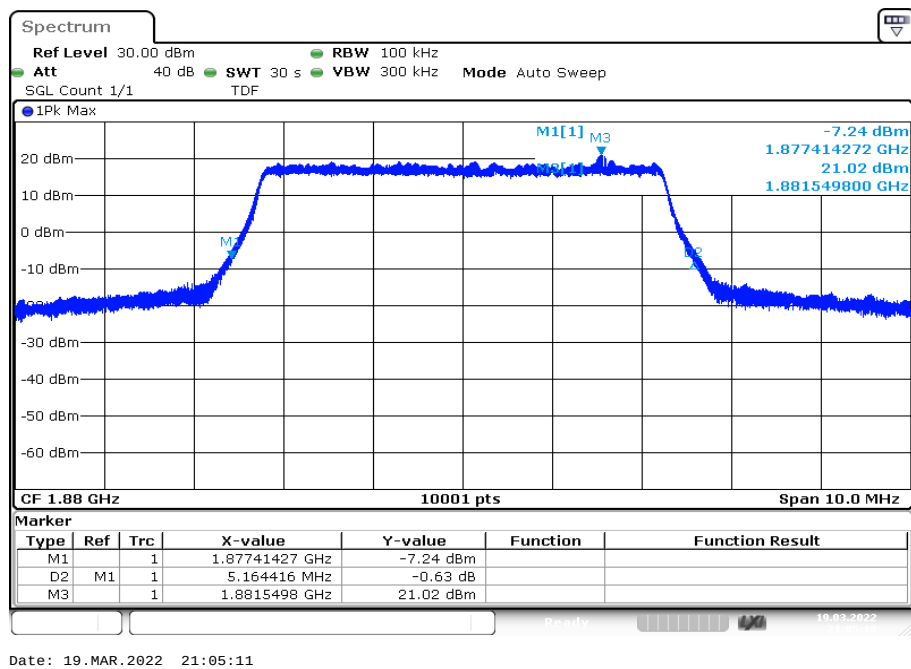
Plot 41: 14 MHz – 16-QAM - highest channel (99% - OBW)**Plot 42:** 14 MHz – 16-QAM - highest channel (-26 dBc BW)

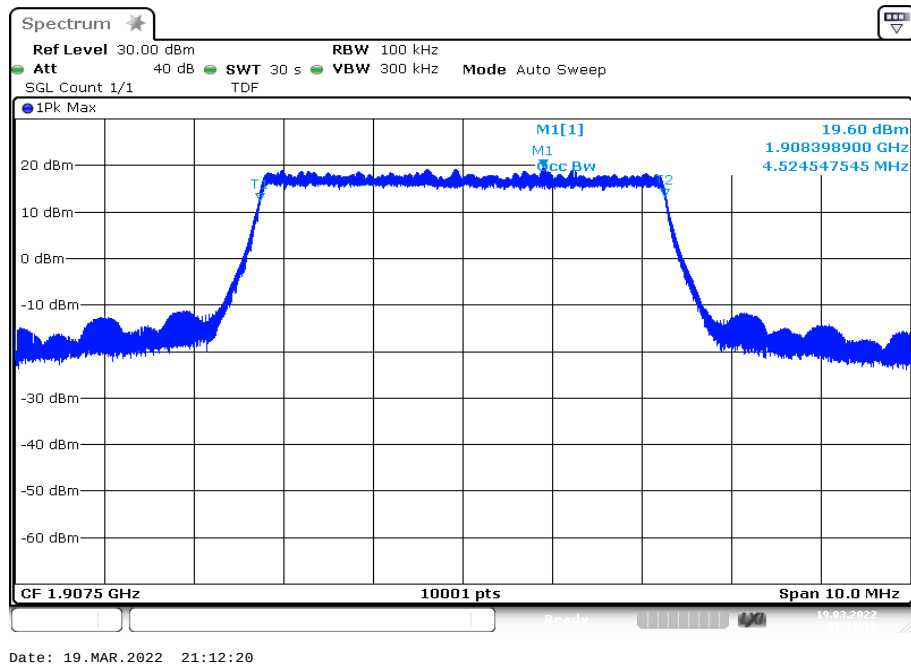
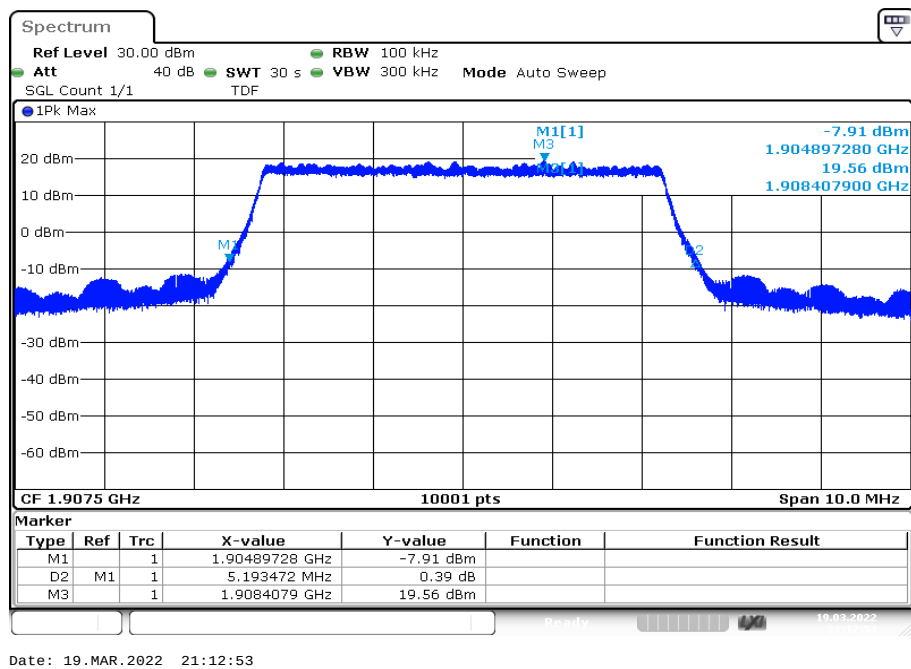
Plot 43: 3 MHz – 16-QAM - lowest channel (99% - OBW)**Plot 44:** 3 MHz – 16-QAM - lowest channel (-26 dBc BW)

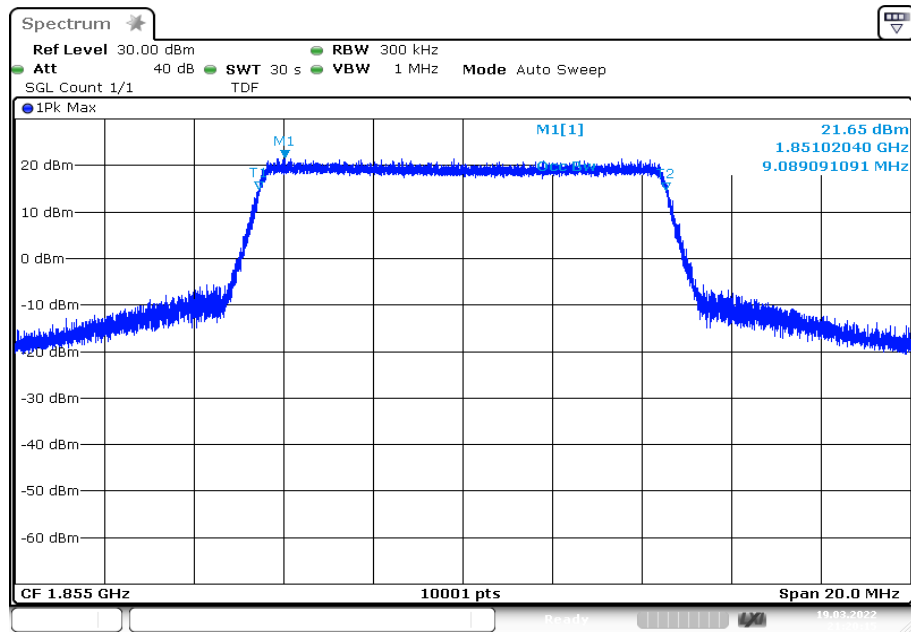
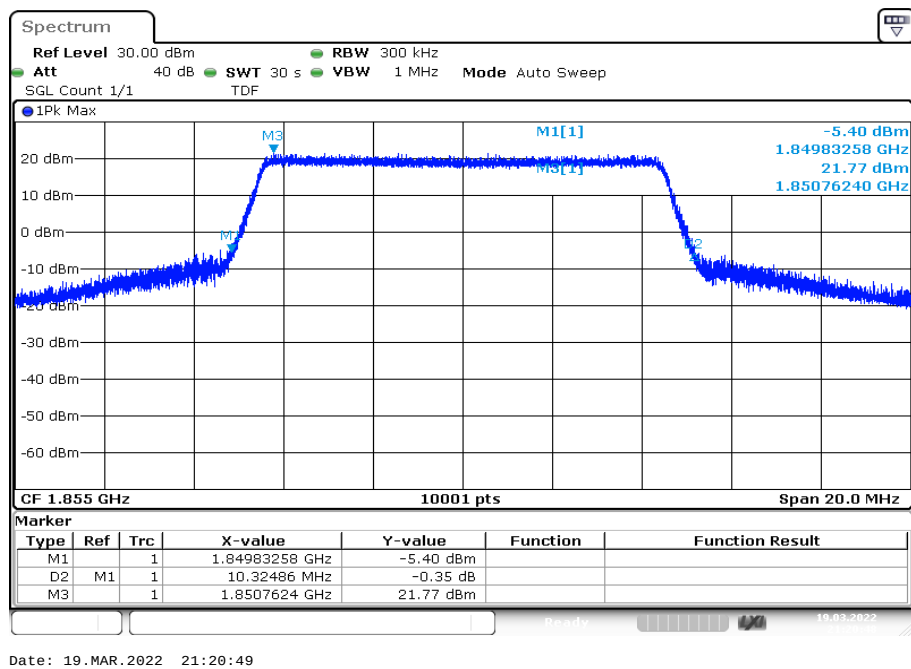
Plot 45: 3 MHz – 16-QAM - middle channel (99% - OBW)**Plot 46:** 3 MHz – 16-QAM - middle channel (-26 dBc BW)

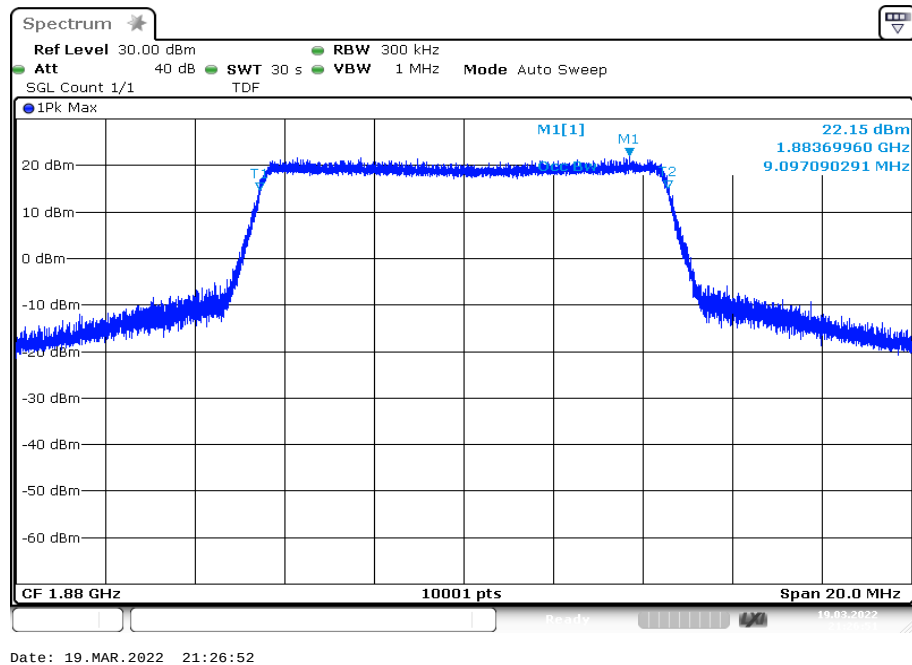
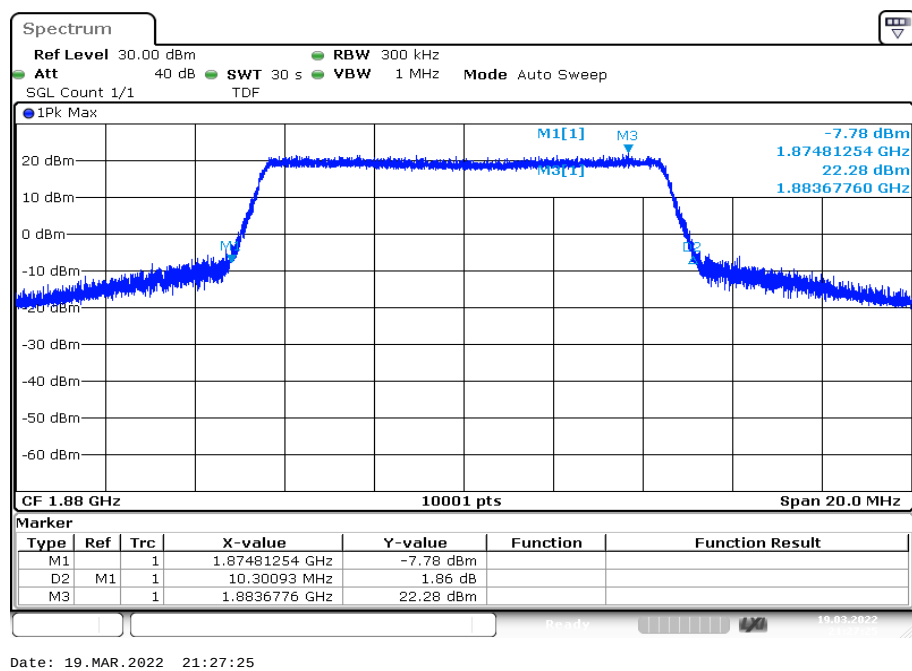
Plot 47: 3 MHz – 16-QAM - highest channel (99% - OBW)**Plot 48:** 3 MHz – 16-QAM - highest channel (-26 dBc BW)

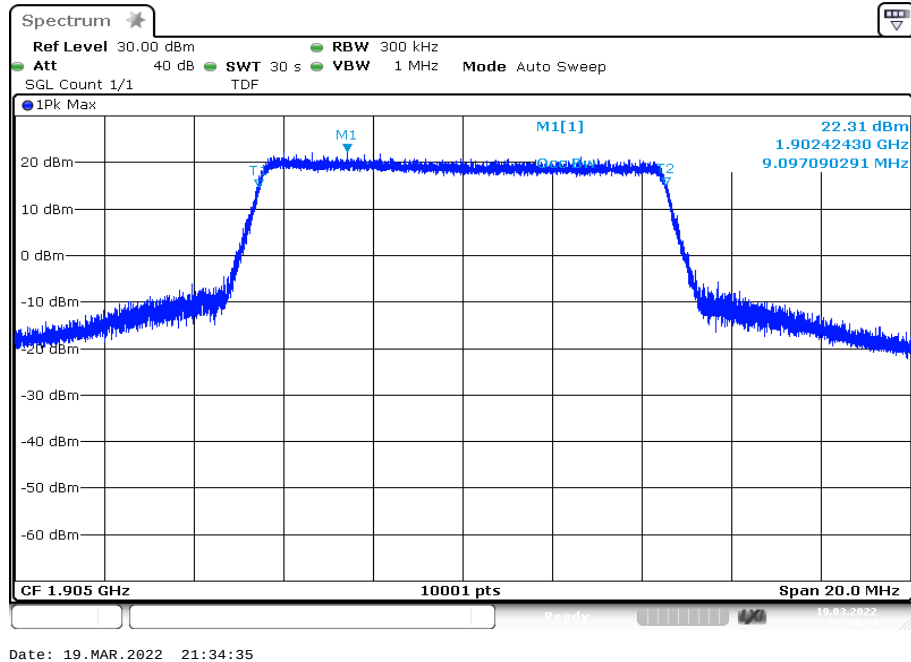
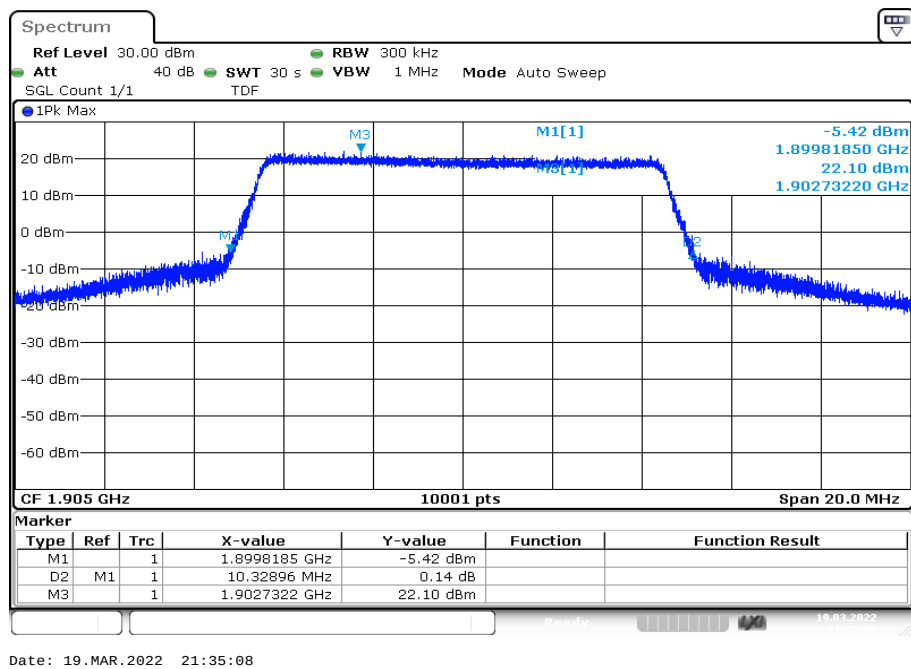
Plot 49: 5 MHz – 16-QAM - lowest channel (99% - OBW)**Plot 50:** 5 MHz – 16-QAM - lowest channel (-26 dBc BW)

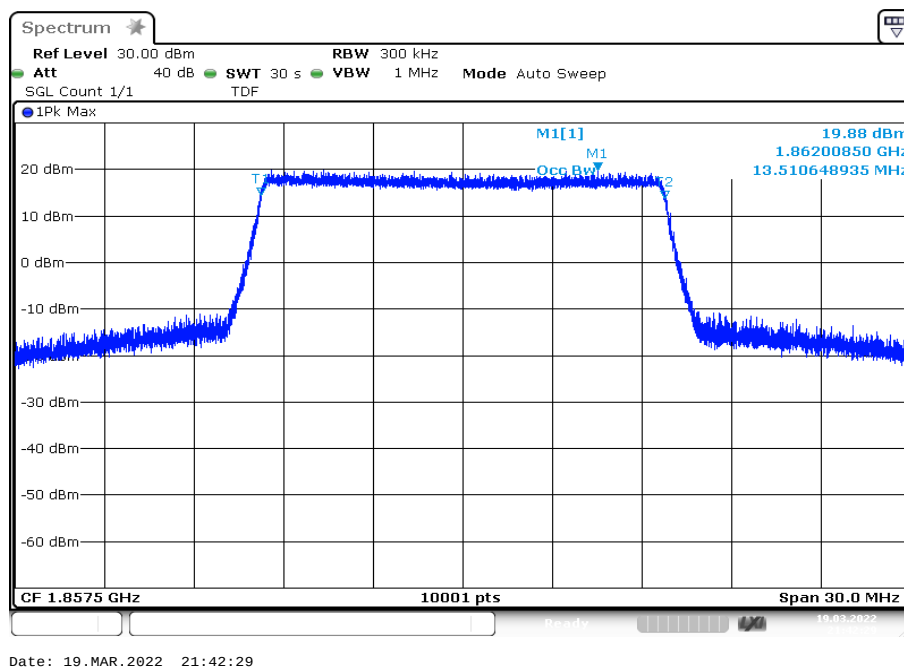
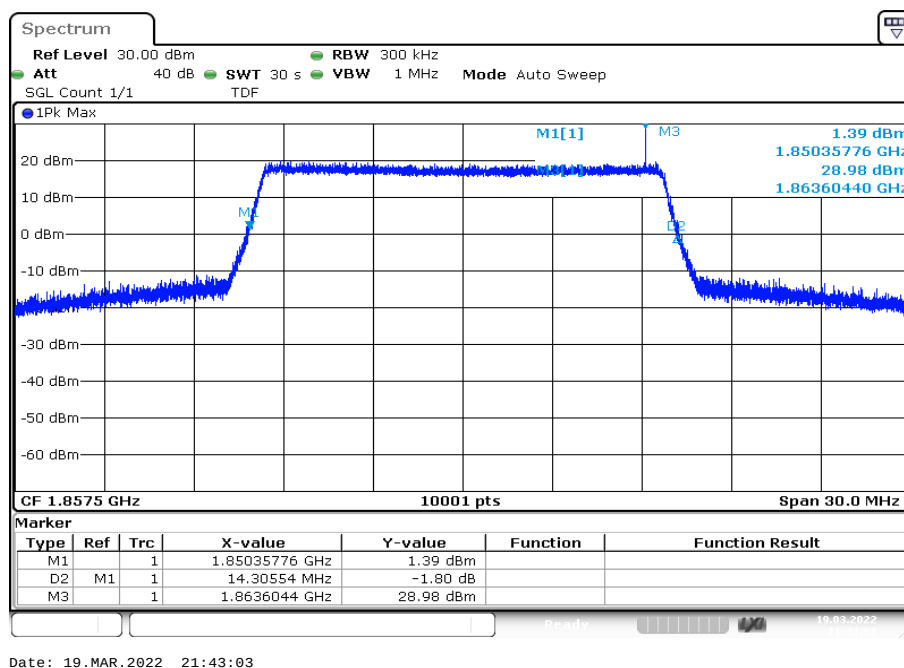
Plot 51: 5 MHz – 16-QAM - middle channel (99% - OBW)**Plot 52:** 5 MHz – 16-QAM - middle channel (-26 dBc BW)

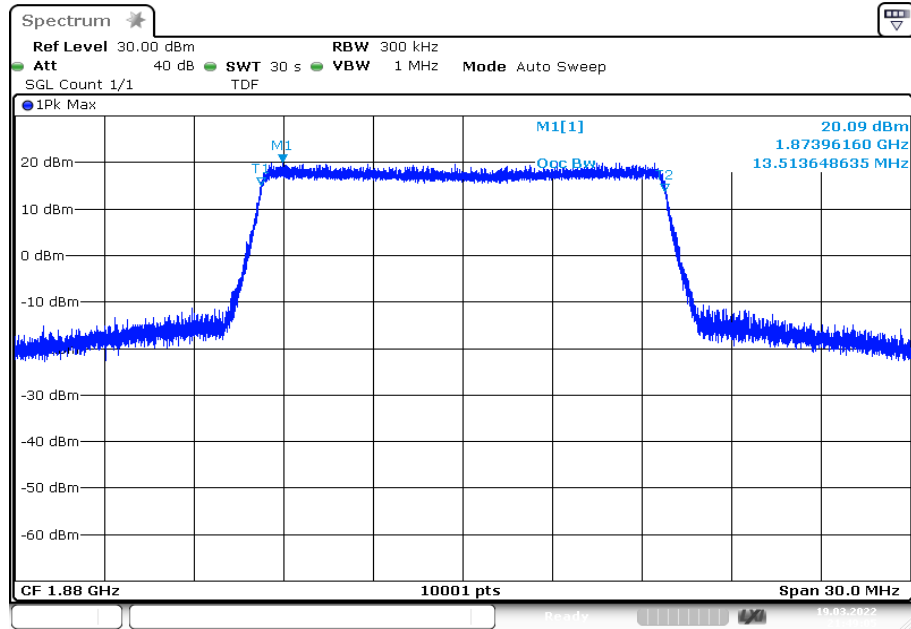
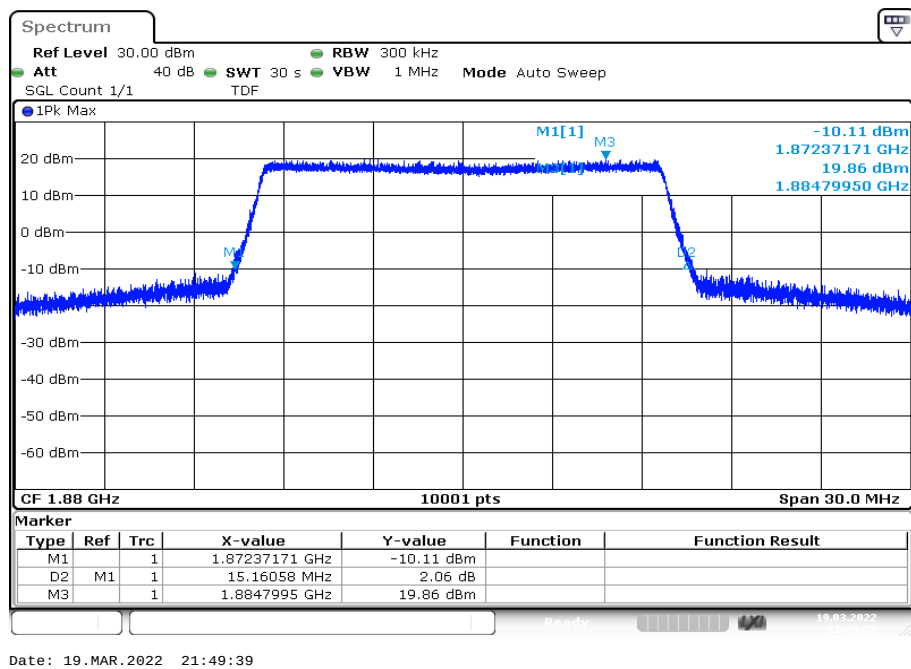
Plot 53: 5 MHz – 16-QAM - highest channel (99% - OBW)**Plot 54:** 5 MHz – 16-QAM - highest channel (-26 dBc BW)

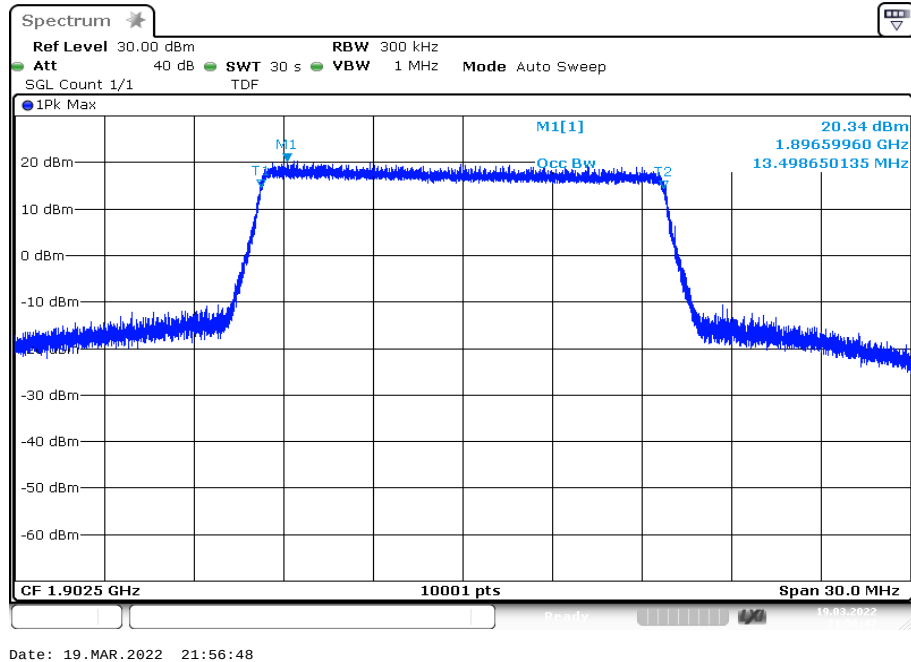
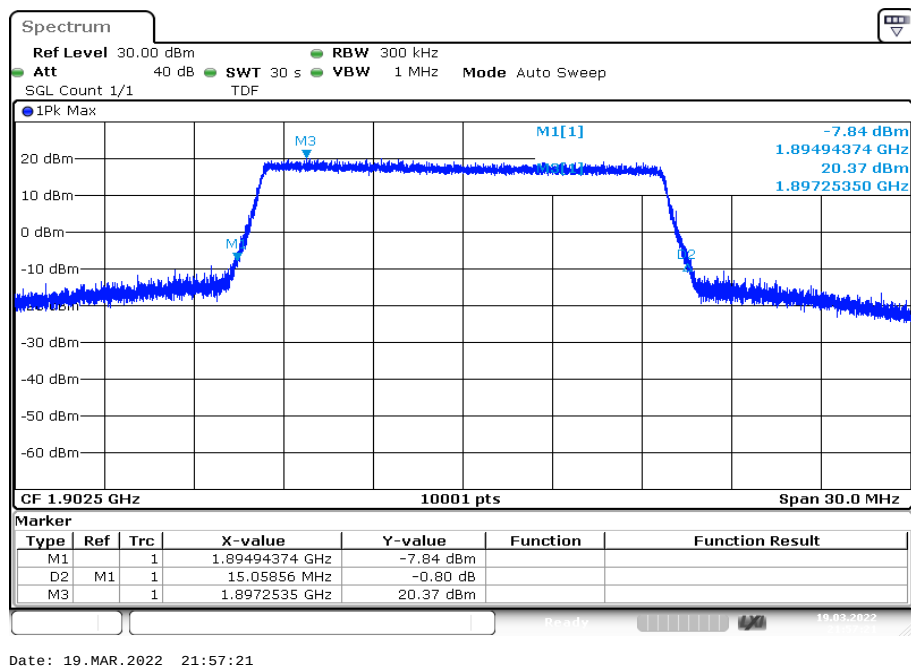
Plot 55: 10 MHz – 16-QAM - lowest channel (99% - OBW)**Plot 56:** 10 MHz – 16-QAM - lowest channel (-26 dBc BW)

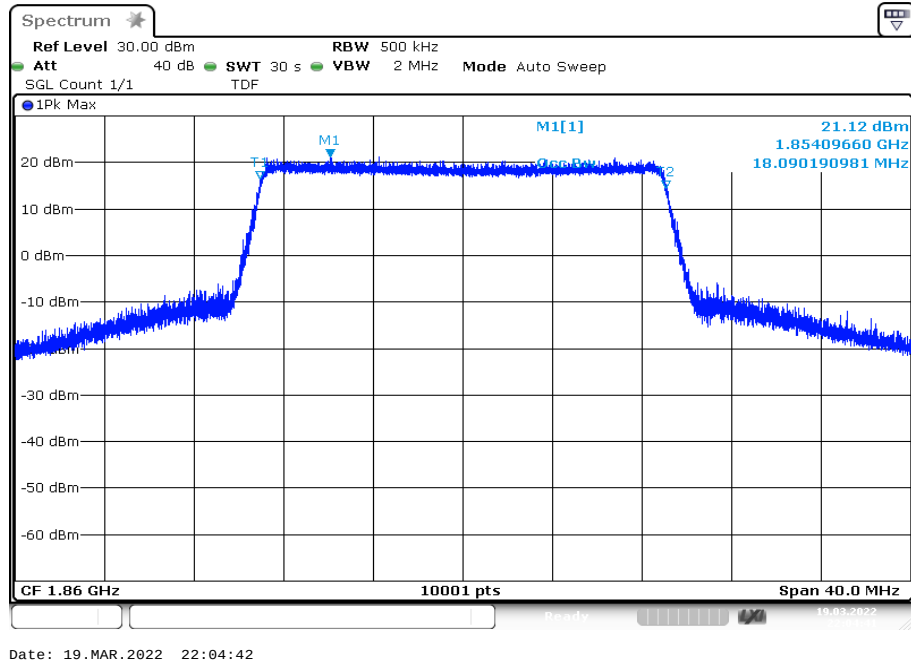
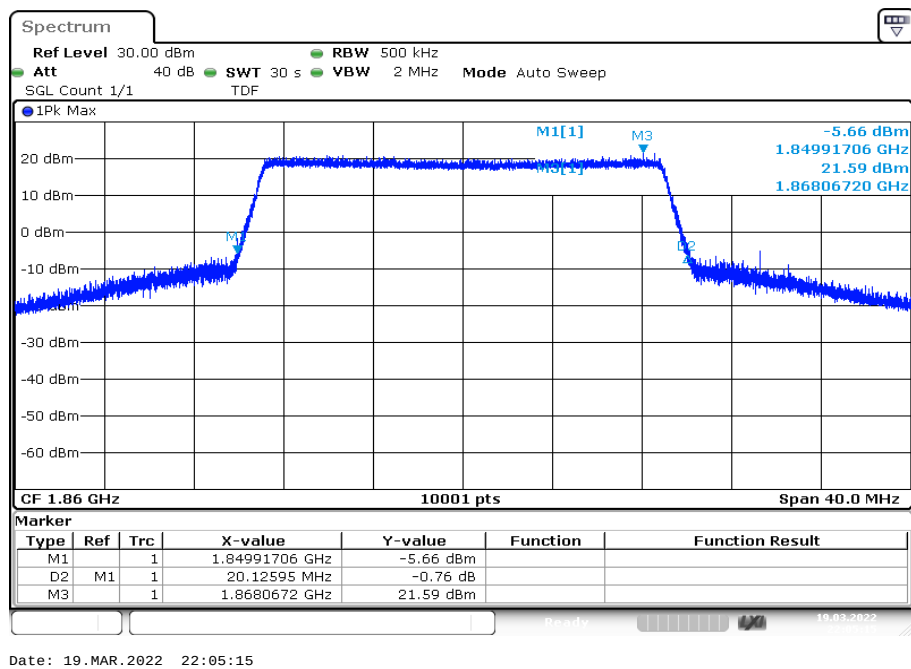
Plot 57: 10 MHz – 16-QAM - middle channel (99% - OBW)**Plot 58:** 10 MHz – 16-QAM - middle channel (-26 dBc BW)

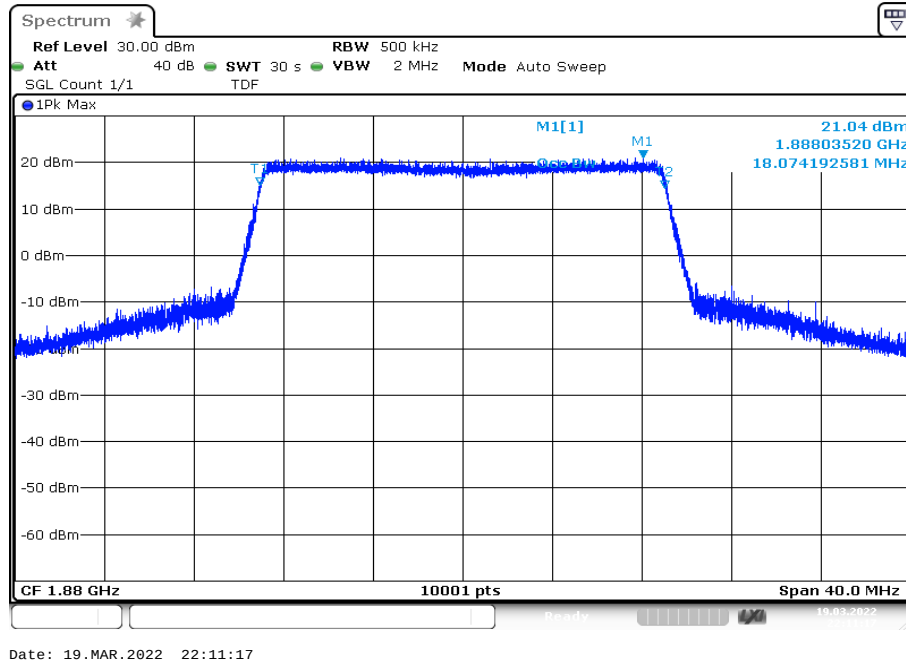
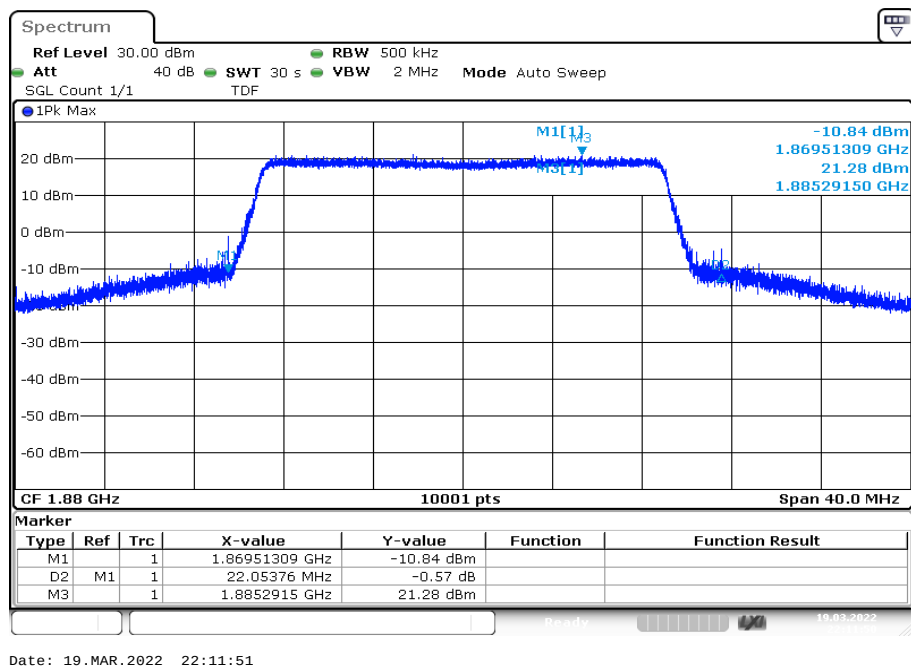
Plot 59: 10 MHz – 16-QAM - highest channel (99% - OBW)**Plot 60:** 10 MHz – 16-QAM - highest channel (-26 dBc BW)

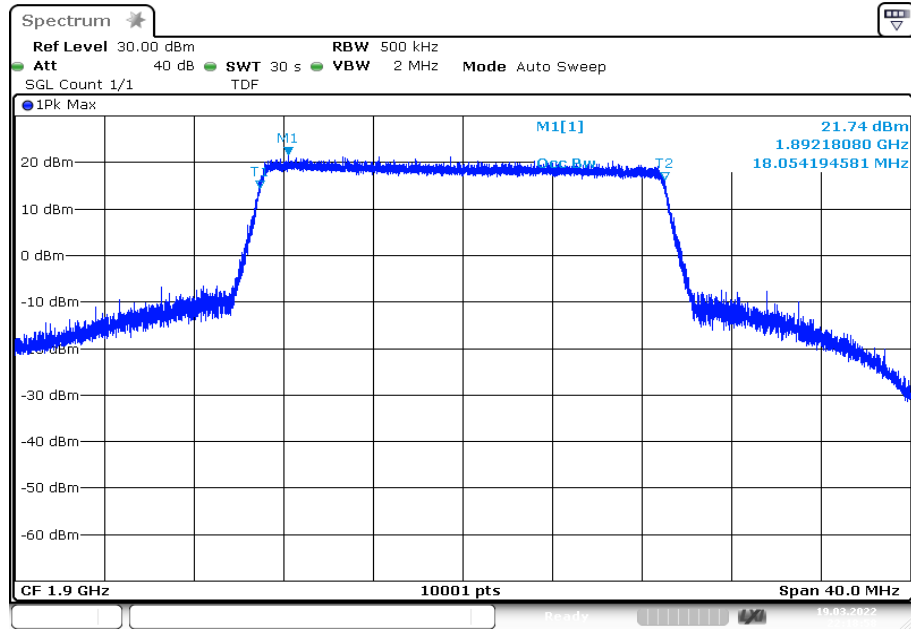
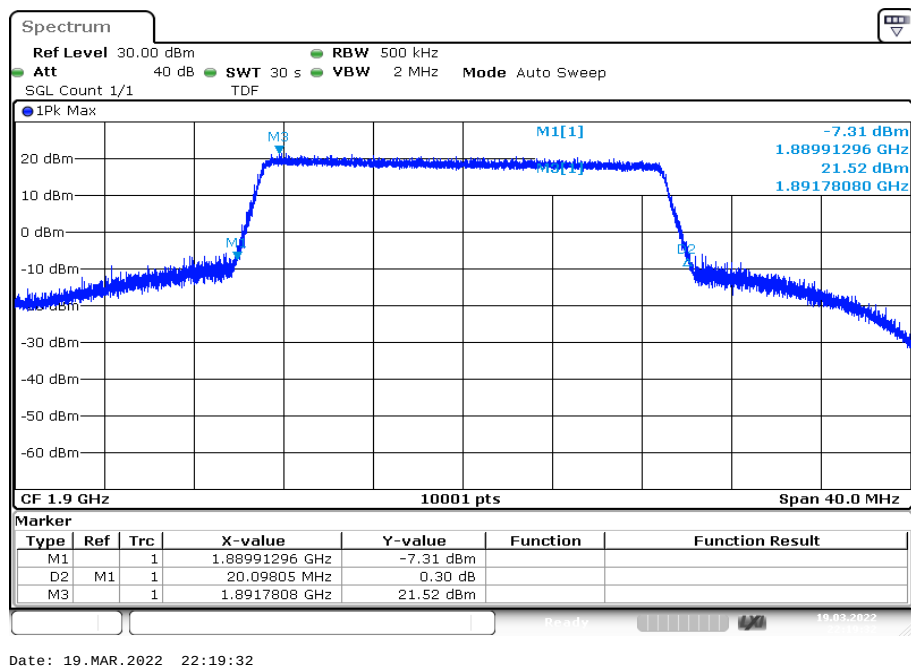
Plot 61: 15 MHz – 16-QAM - lowest channel (99% - OBW)**Plot 62:** 15 MHz – 16-QAM - lowest channel (-26 dBc BW)

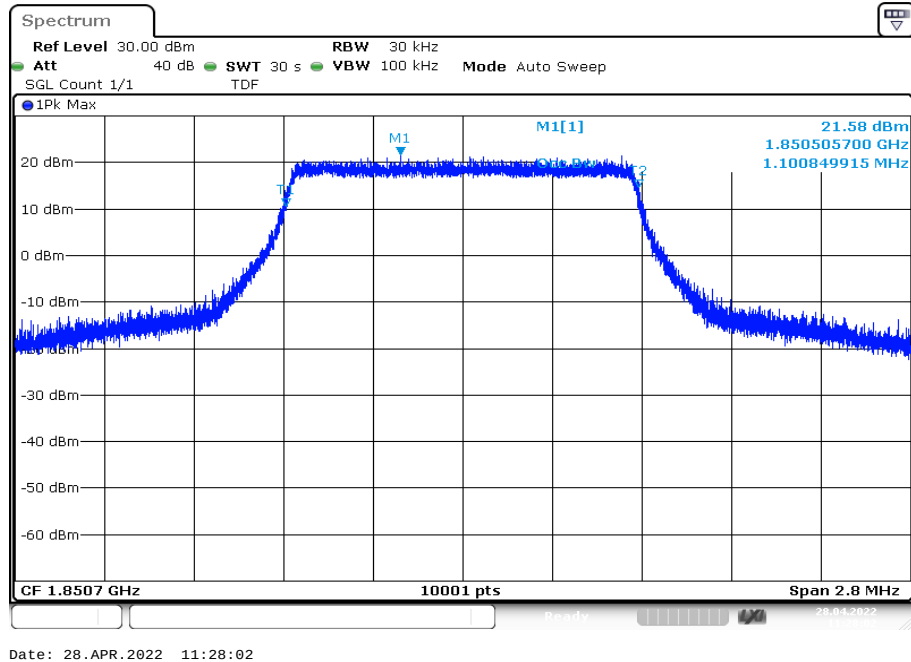
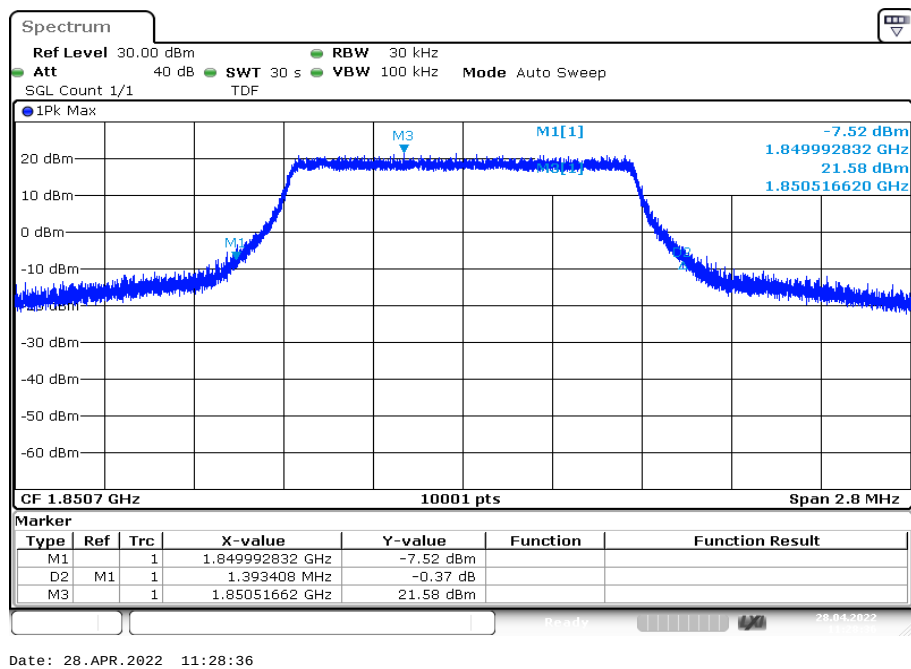
Plot 63: 15 MHz – 16-QAM - middle channel (99% - OBW)**Plot 64:** 15 MHz – 16-QAM - middle channel (-26 dBc BW)

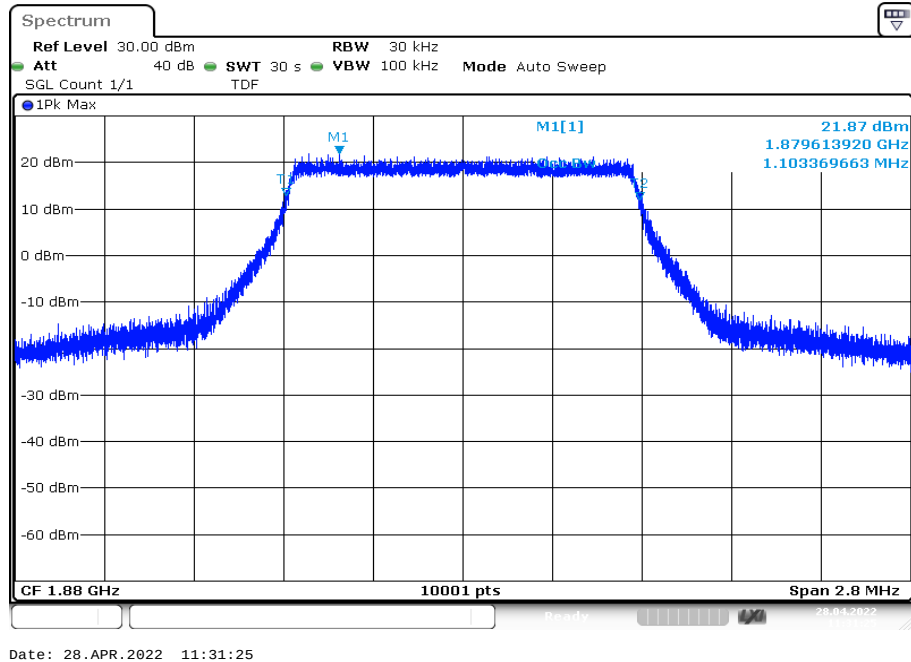
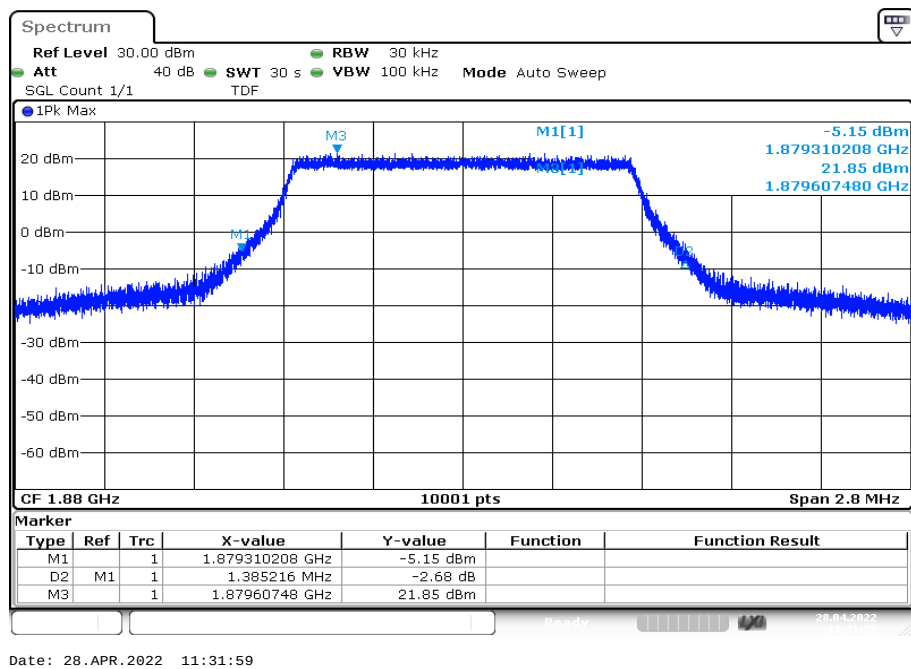
Plot 65: 15 MHz – 16-QAM - highest channel (99% - OBW)**Plot 66:** 15 MHz – 16-QAM - highest channel (-26 dBc BW)

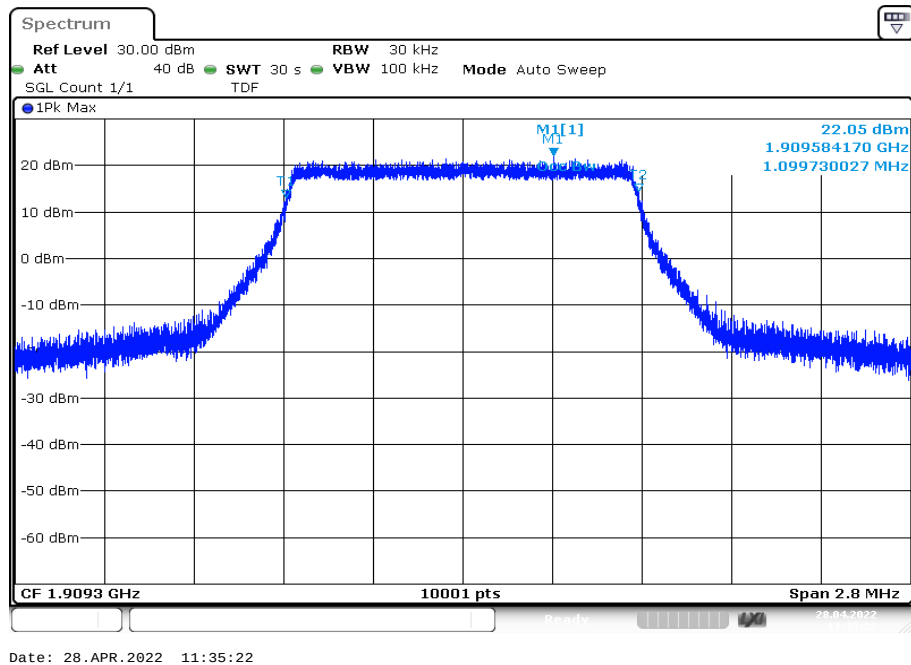
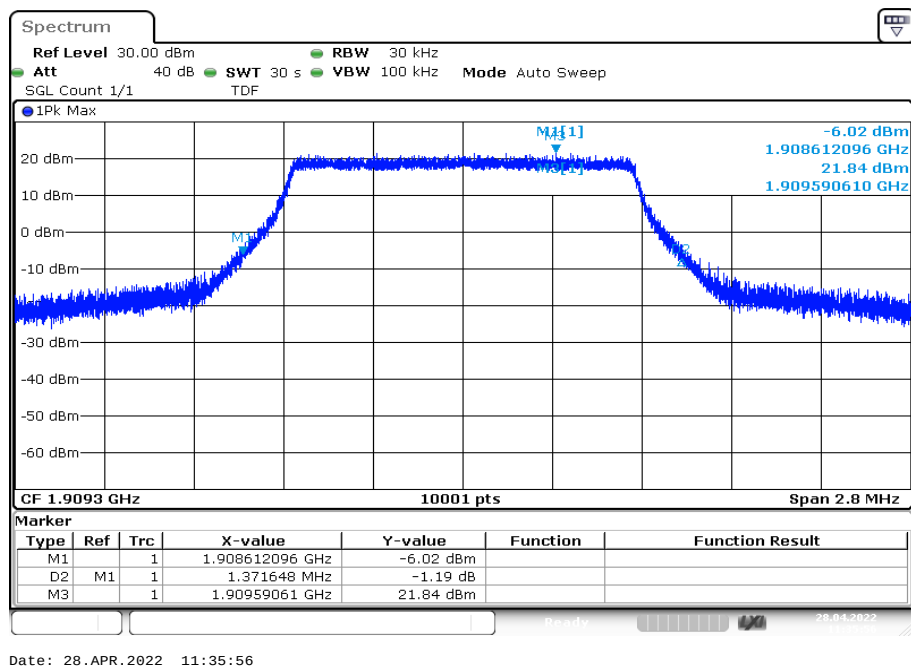
Plot 67: 20 MHz – 16-QAM - lowest channel (99% - OBW)**Plot 68:** 20 MHz – 16-QAM - lowest channel (-26 dBc BW)

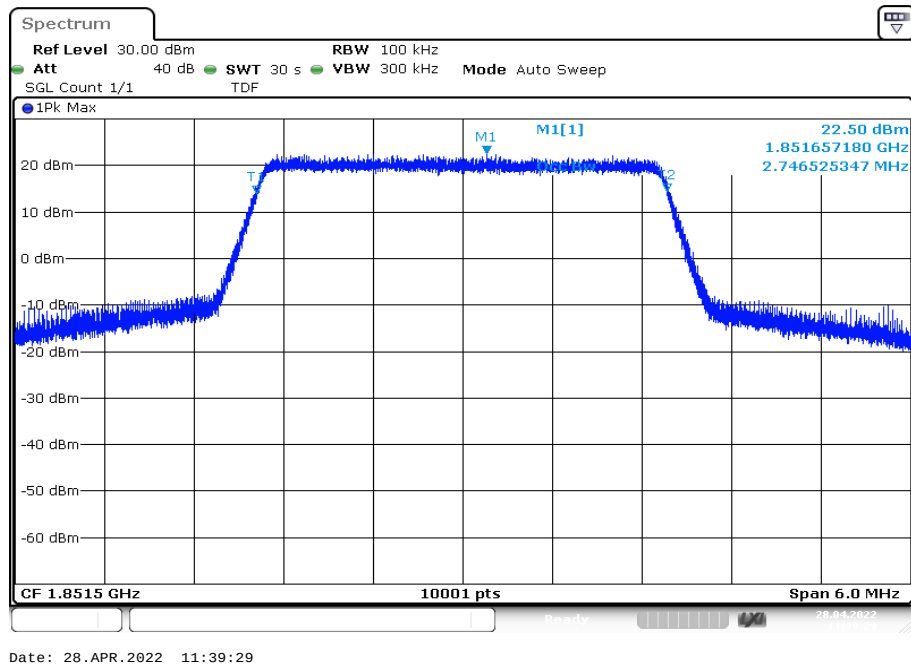
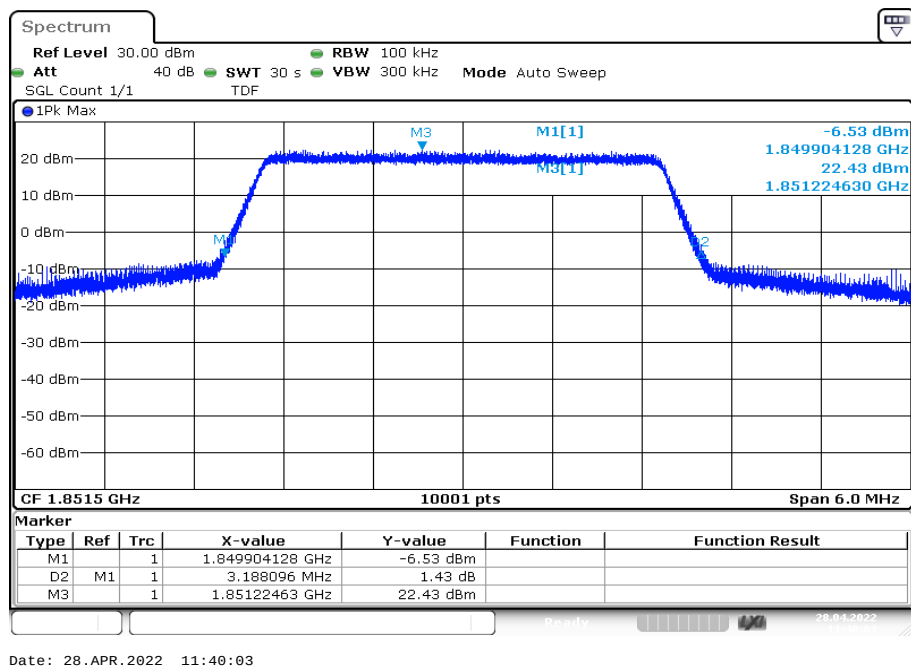
Plot 69: 20 MHz – 16-QAM - middle channel (99% - OBW)**Plot 70:** 20 MHz – 16-QAM - middle channel (-26 dBc BW)

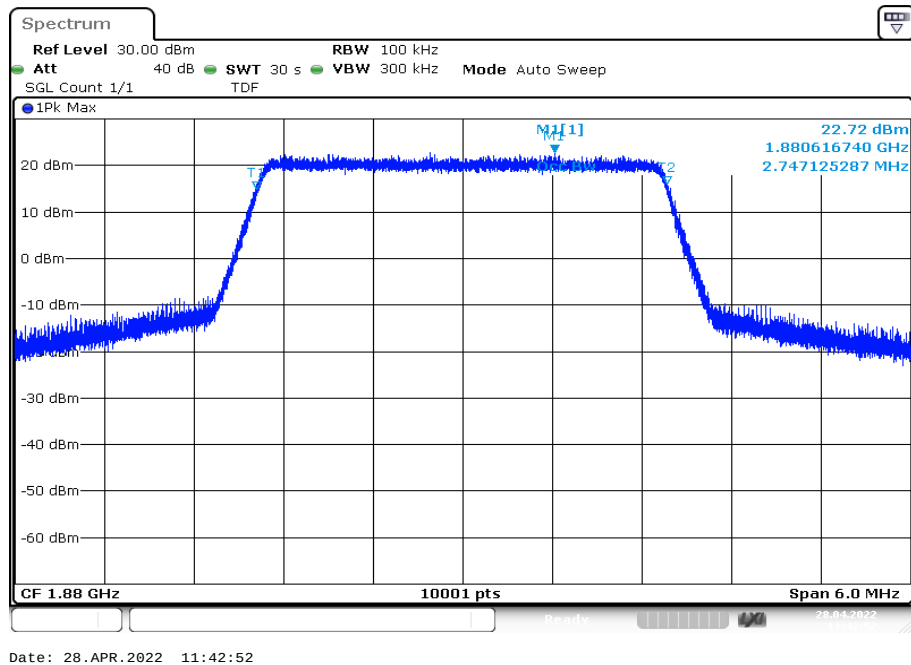
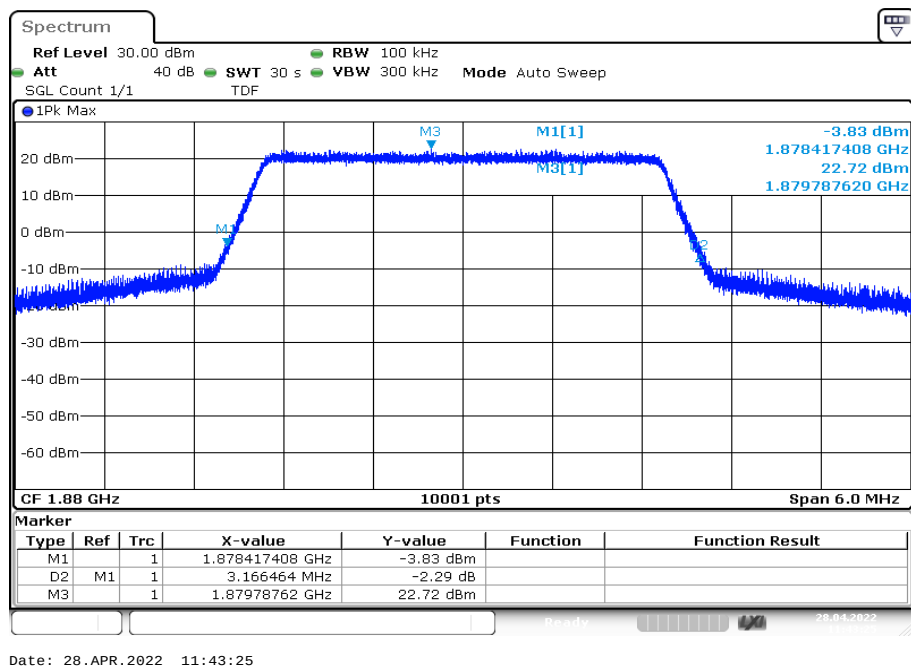
Plot 71: 20 MHz – 16-QAM - highest channel (99% - OBW)**Plot 72:** 20 MHz – 16-QAM - highest channel (-26 dBc BW)

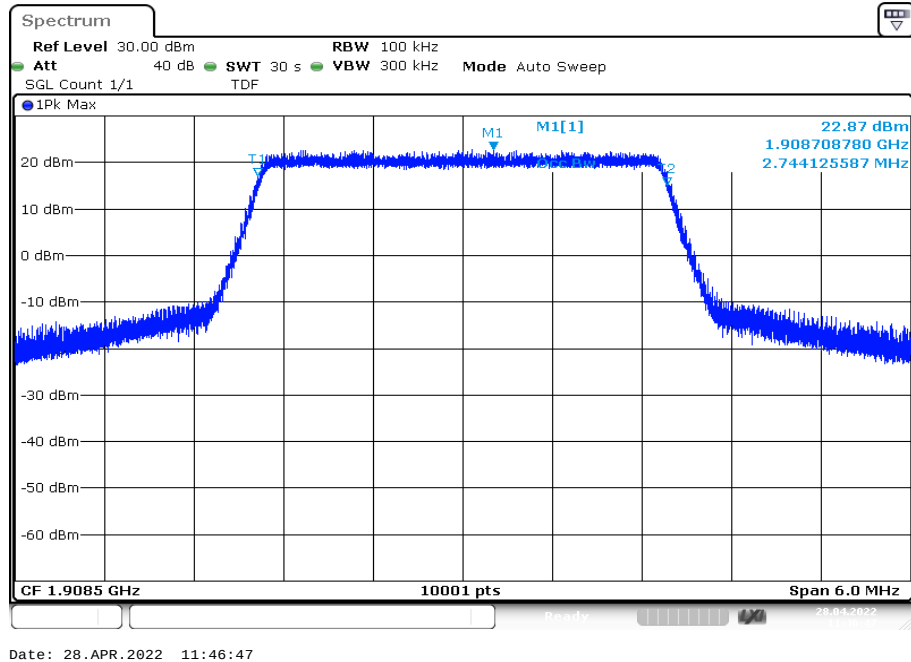
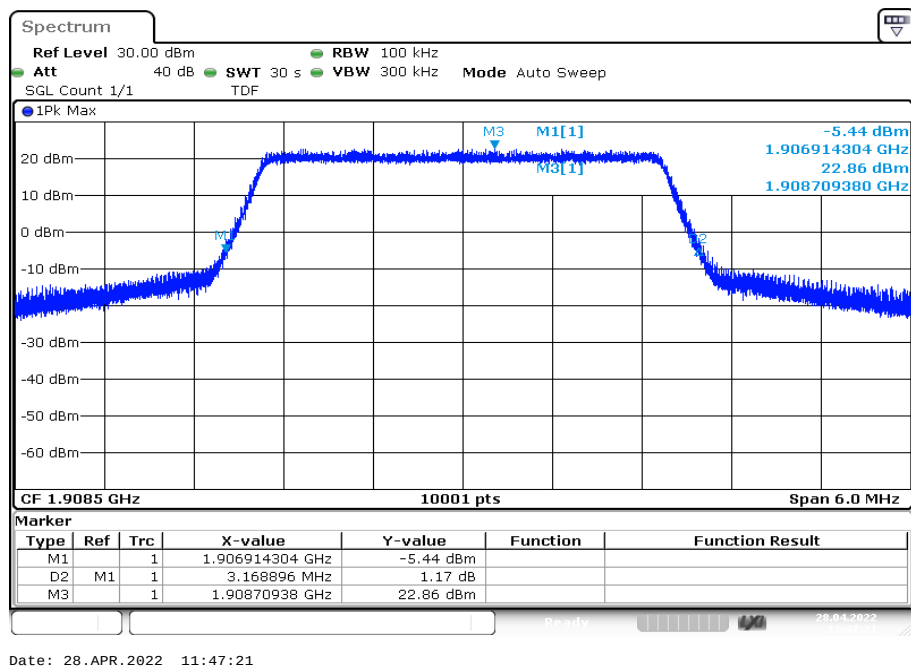
Plot 73: 1.4 MHz – 64-QAM - lowest channel (99% - OBW)**Plot 74:** 1.4 MHz – 64-QAM - lowest channel (-26 dBc BW)

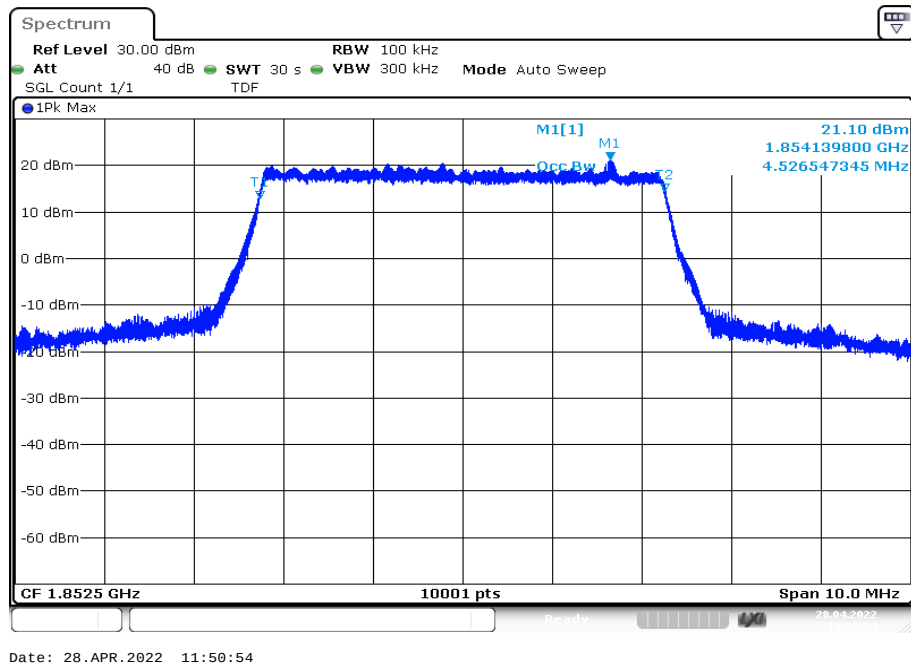
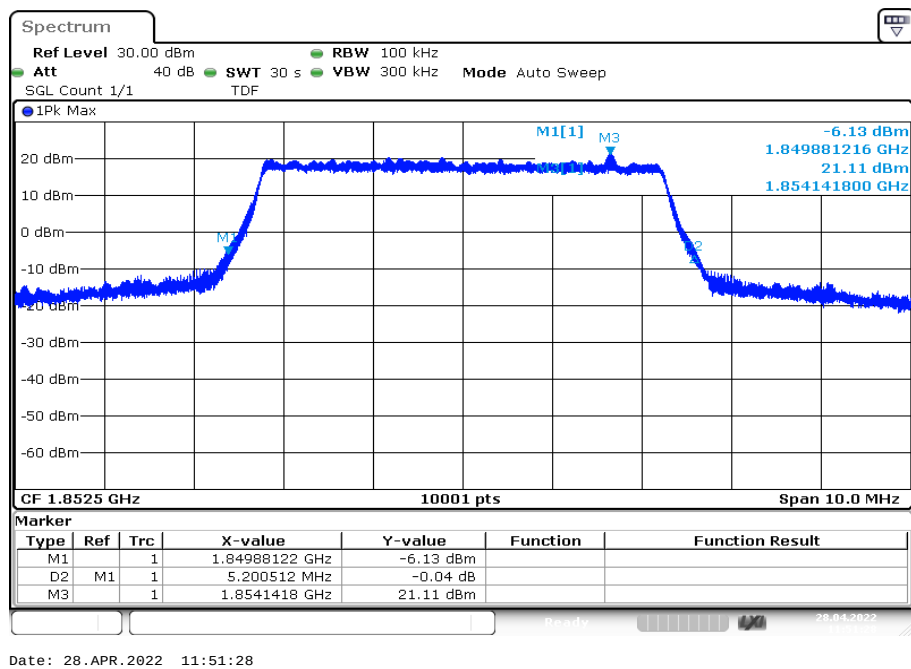
Plot 75: 1.4 MHz – 64-QAM - middle channel (99% - OBW)**Plot 76:** 1.4 MHz – 64-QAM - middle channel (-26 dBc BW)

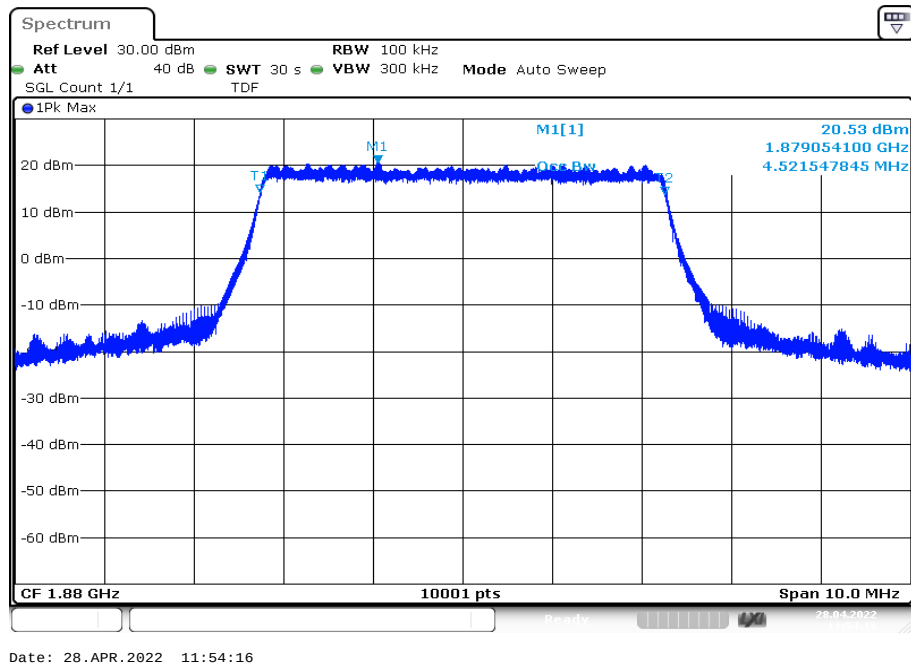
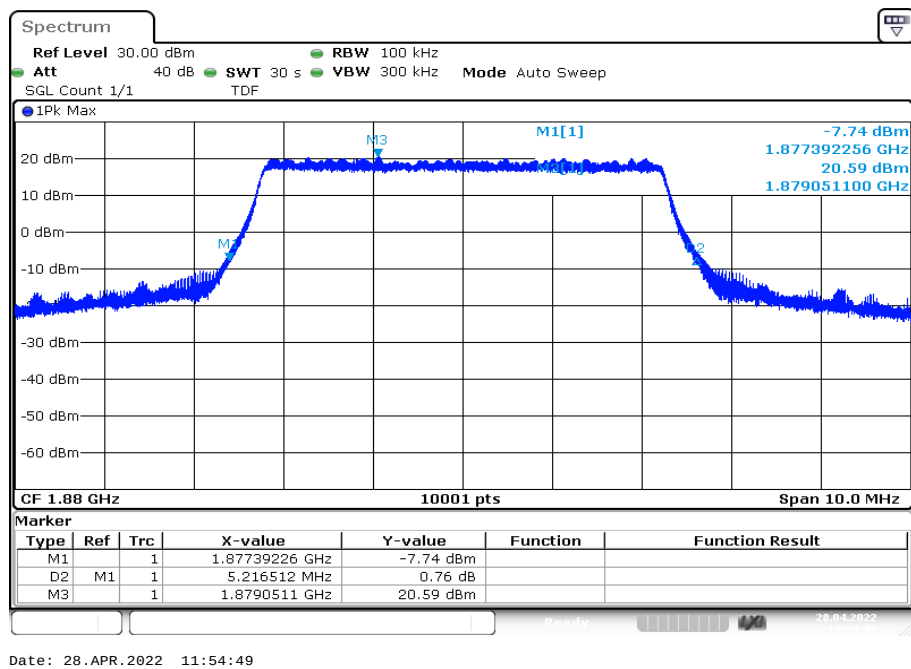
Plot 77: 1.4 MHz – 64-QAM - highest channel (99% - OBW)**Plot 78:** 1.4 MHz – 64-QAM - highest channel (-26 dBc BW)

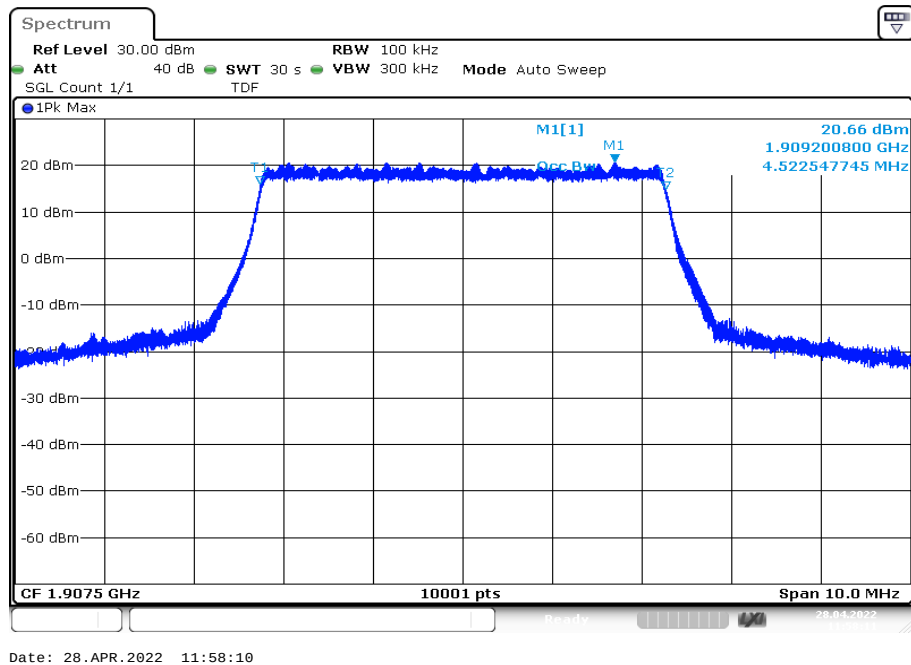
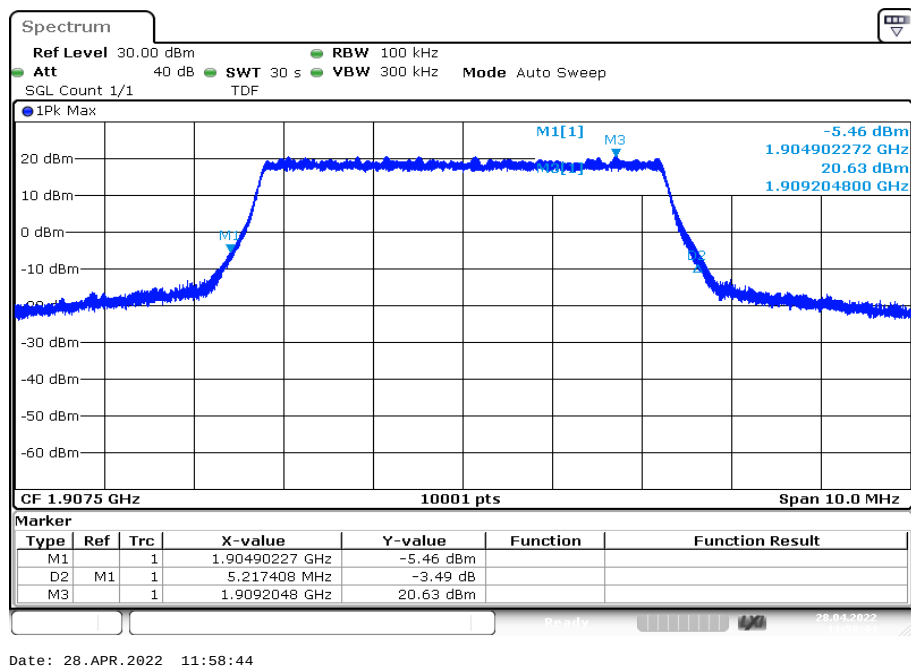
Plot 79: 3 MHz – 64-QAM - lowest channel (99% - OBW)**Plot 80:** 3 MHz – 64-QAM - lowest channel (-26 dBc BW)

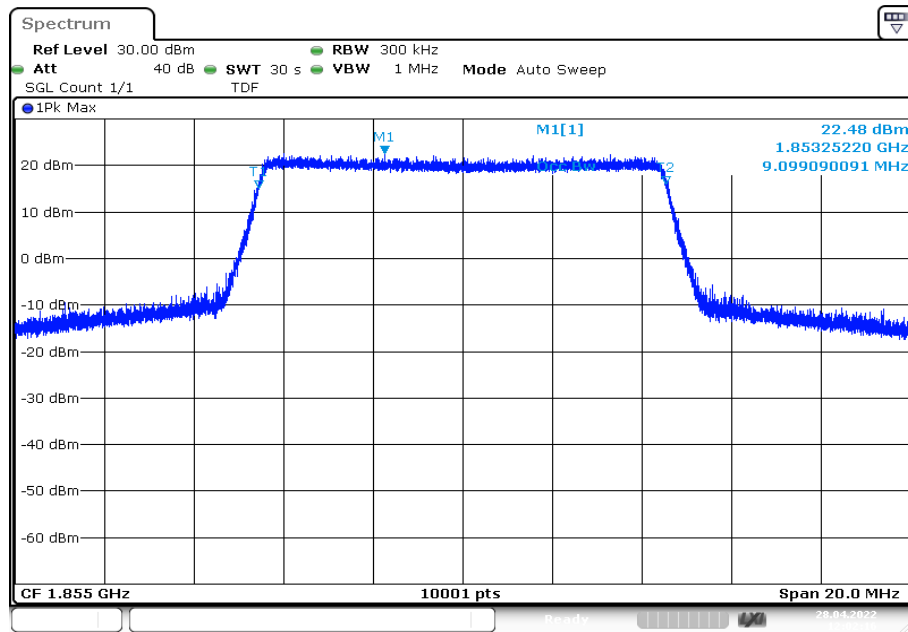
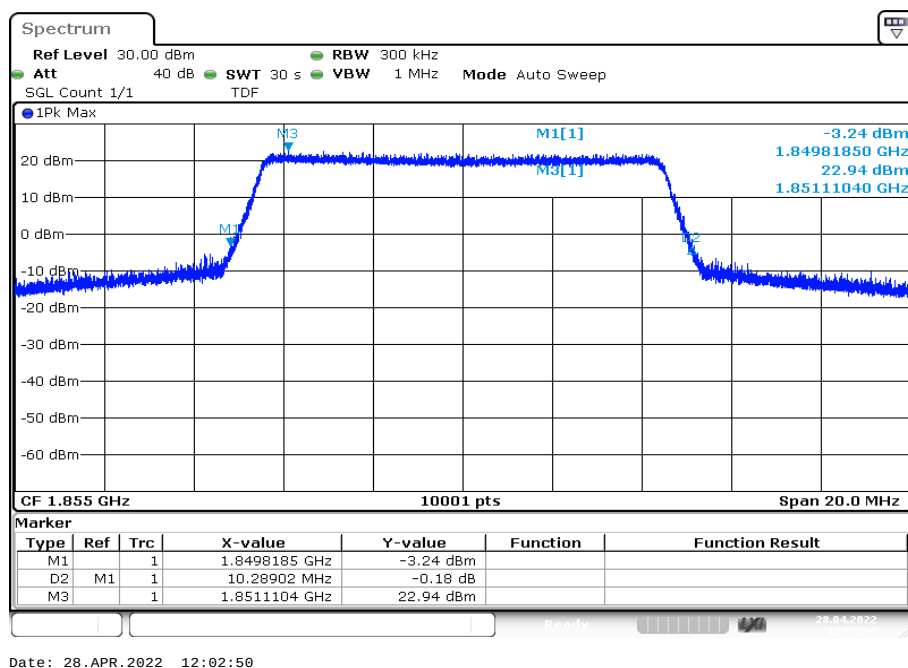
Plot 81: 3 MHz – 64-QAM - middle channel (99% - OBW)**Plot 82:** 3 MHz – 64-QAM - middle channel (-26 dBc BW)

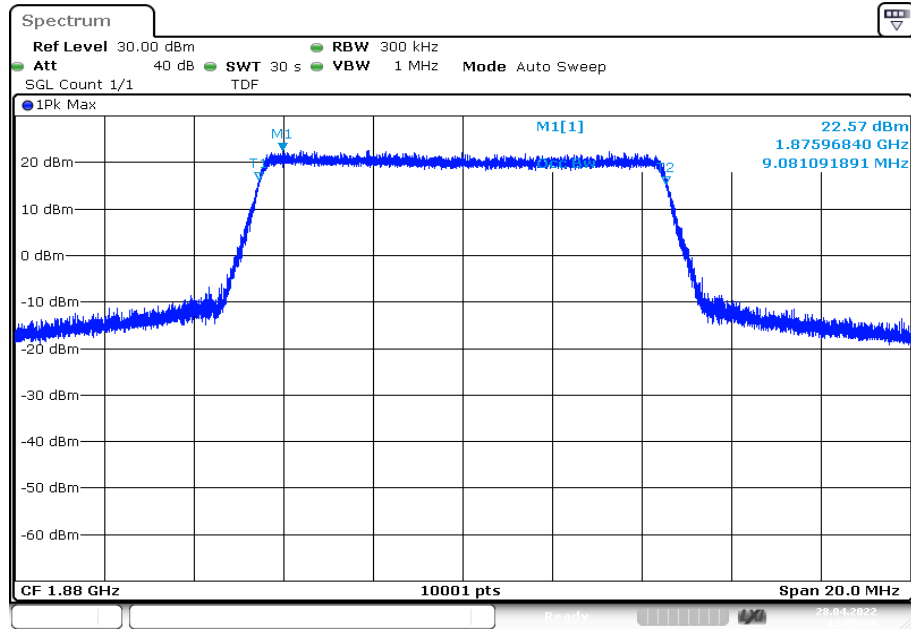
Plot 83: 3 MHz – 64-QAM - highest channel (99% - OBW)**Plot 84:** 3 MHz – 64-QAM - highest channel (-26 dBc BW)

Plot 85: 5 MHz – 64-QAM - lowest channel (99% - OBW)**Plot 86:** 5 MHz – 64-QAM - lowest channel (-26 dBc BW)

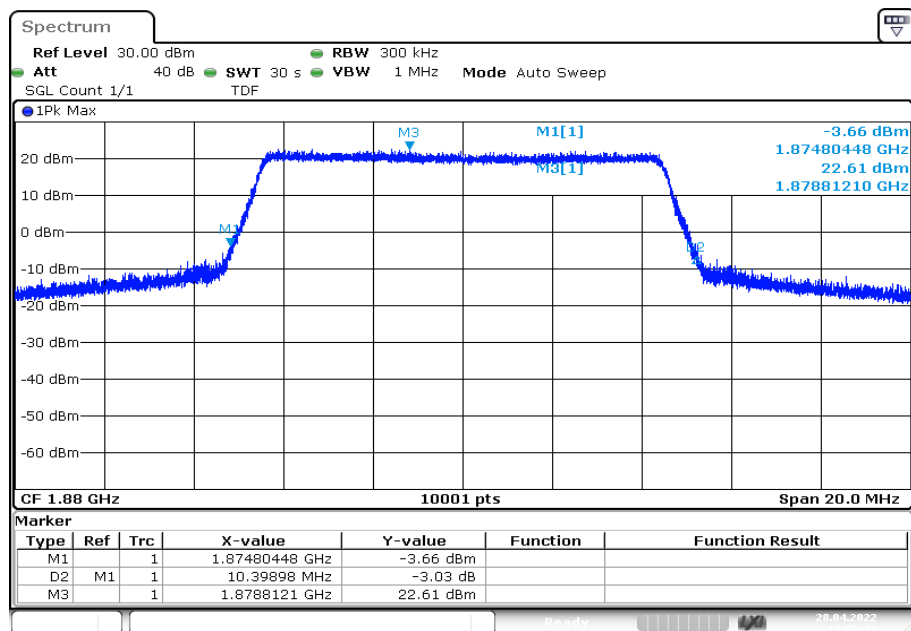
Plot 87: 5 MHz – 64-QAM - middle channel (99% - OBW)**Plot 88:** 5 MHz – 64-QAM - middle channel (-26 dBc BW)

Plot 89: 5 MHz – 64-QAM - highest channel (99% - OBW)**Plot 90:** 5 MHz – 64-QAM - highest channel (-26 dBc BW)

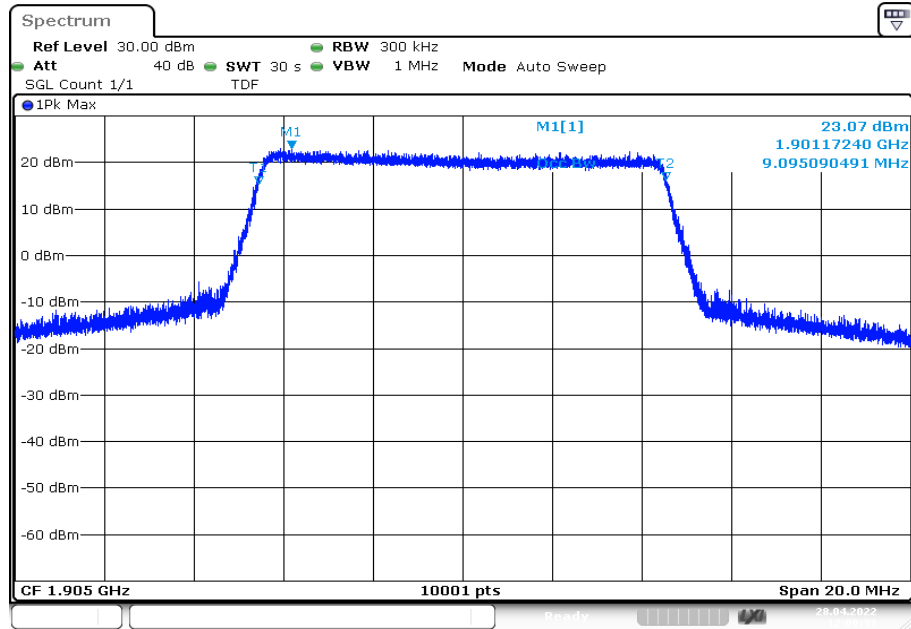
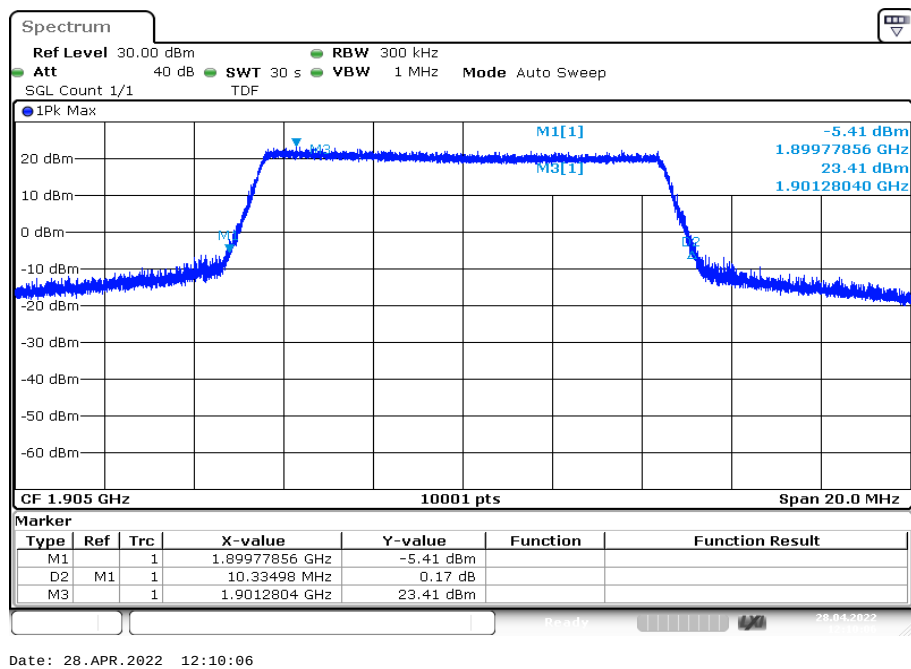
Plot 91: 10 MHz – 64-QAM - lowest channel (99% - OBW)**Plot 92:** 10 MHz – 64-QAM - lowest channel (-26 dBc BW)

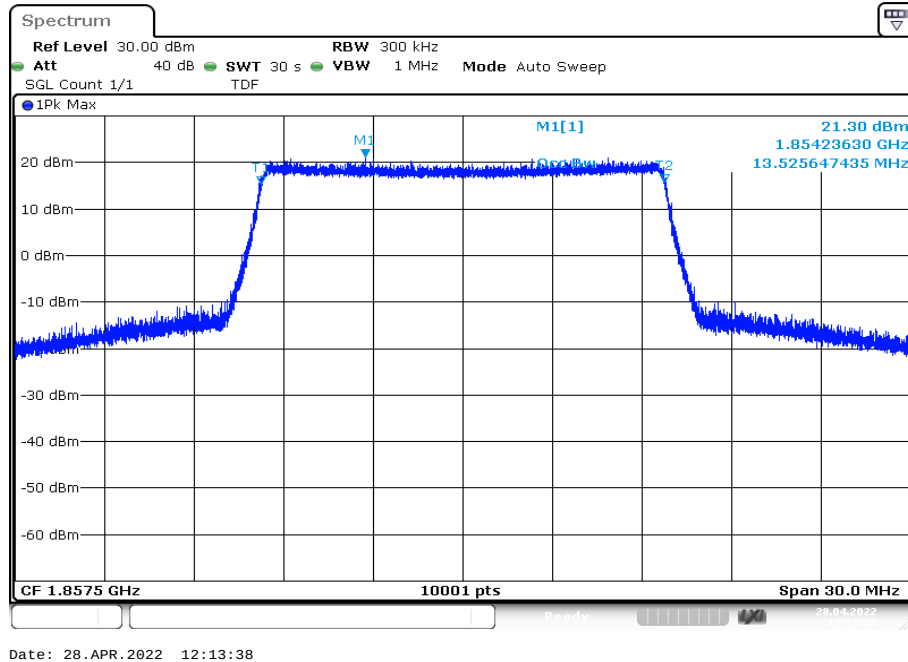
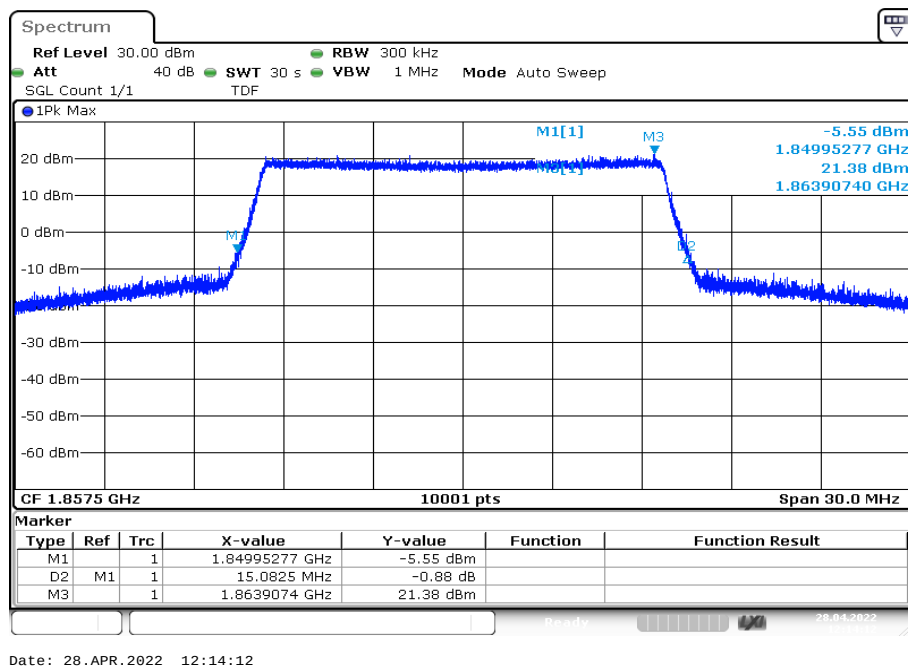
Plot 93: 10 MHz – 64-QAM - middle channel (99% - OBW)

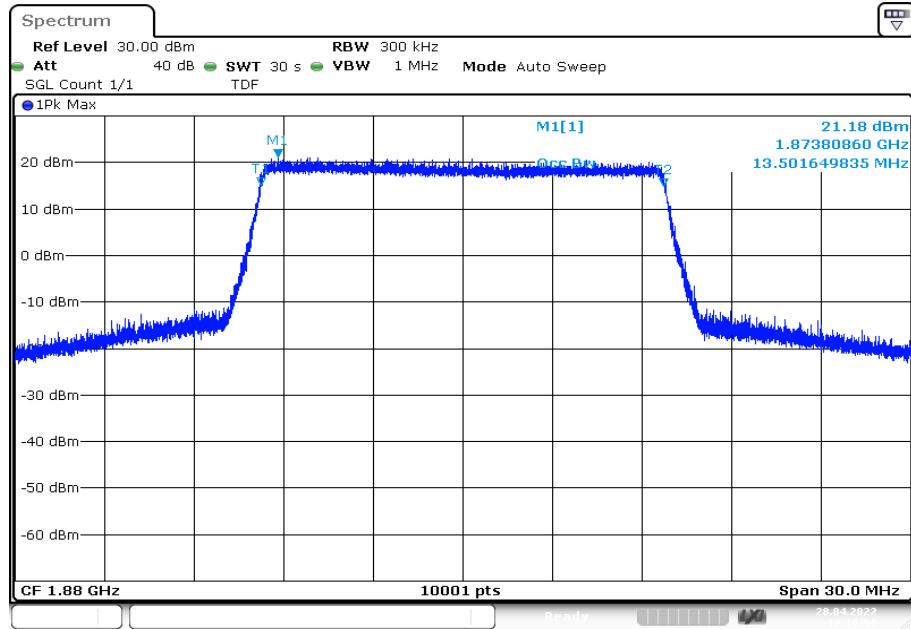
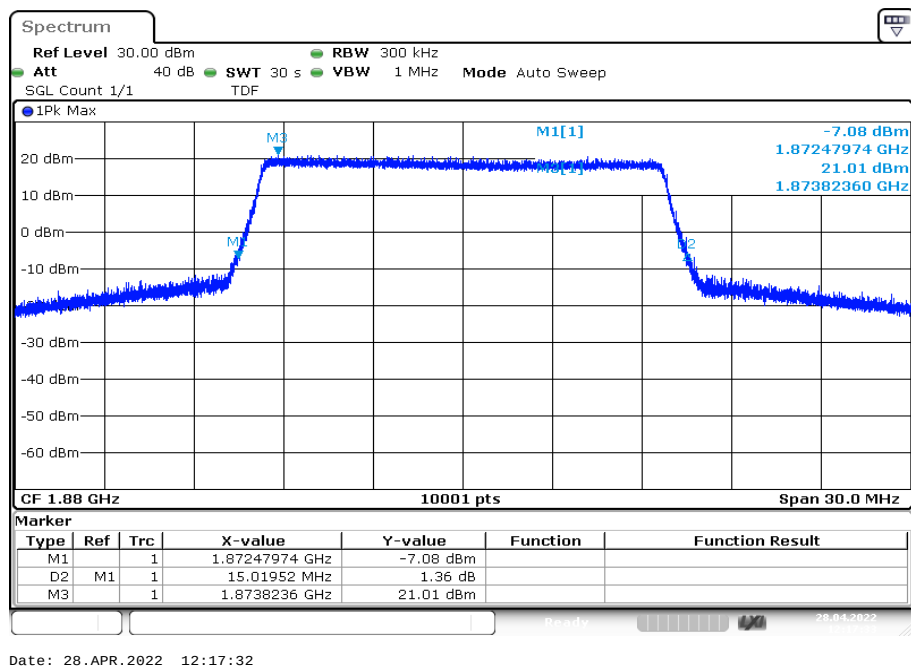
Date: 28.APR.2022 12:05:38

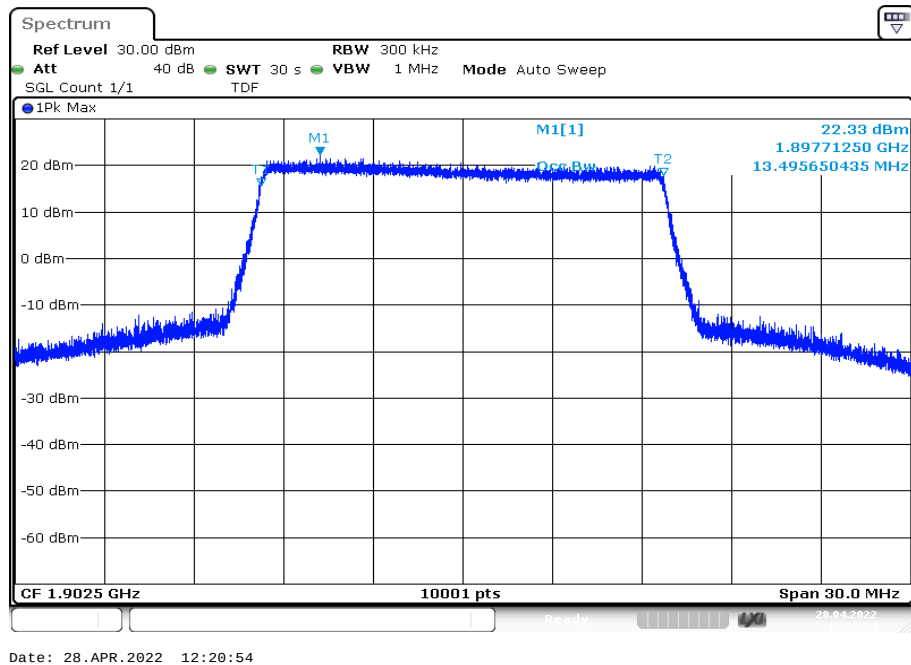
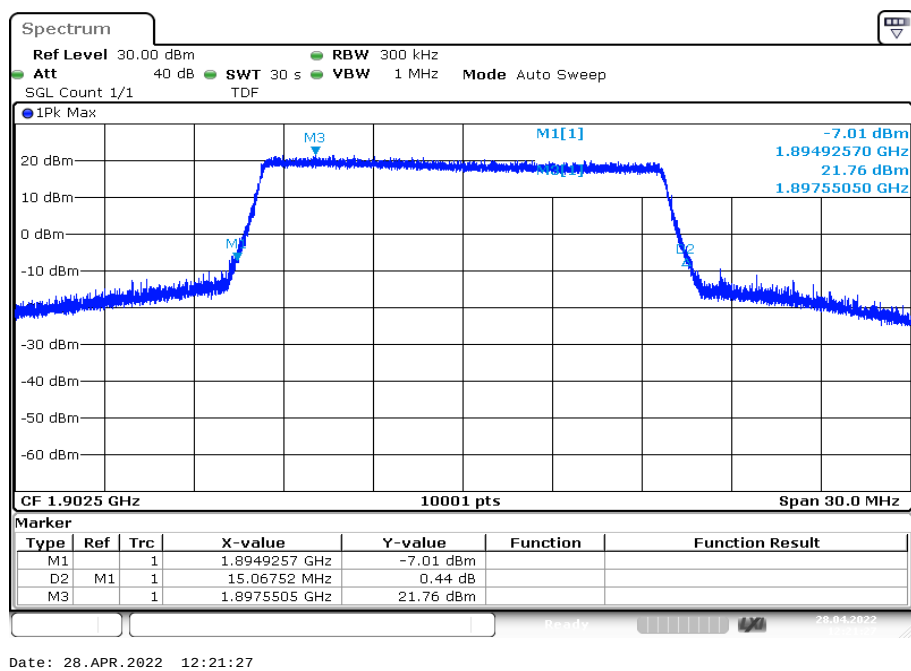
Plot 94: 10 MHz – 64-QAM - middle channel (-26 dBc BW)

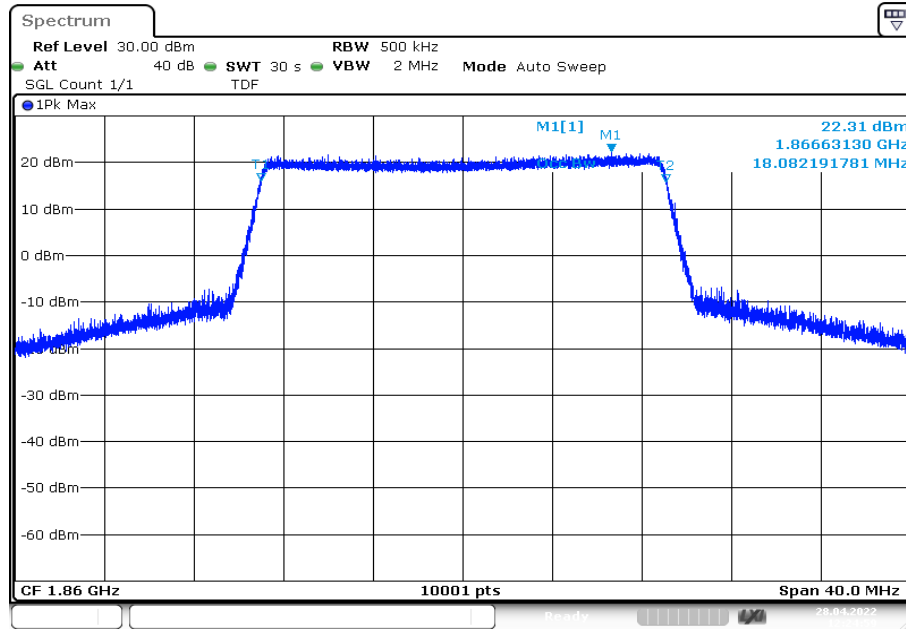
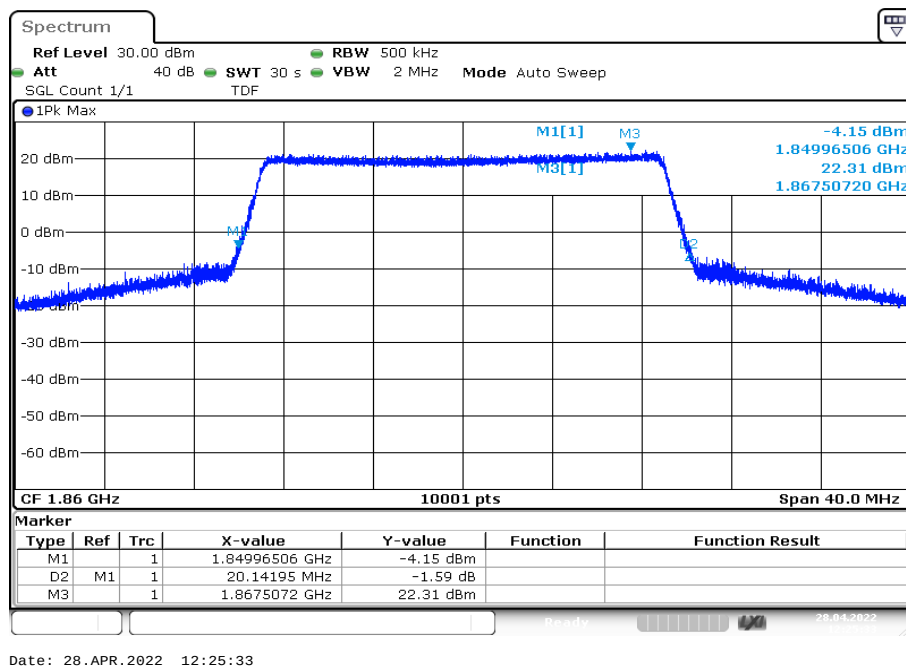
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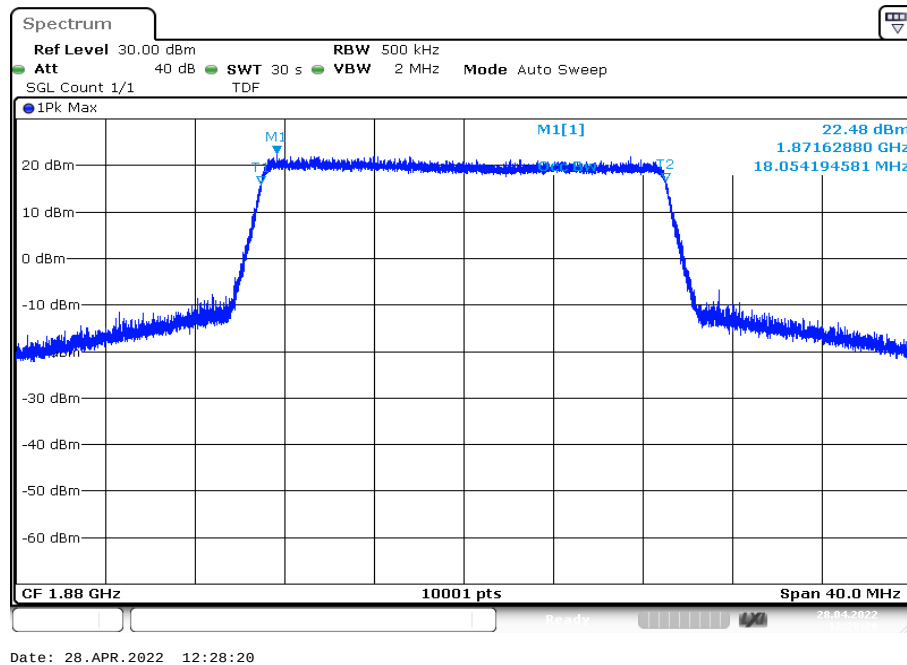
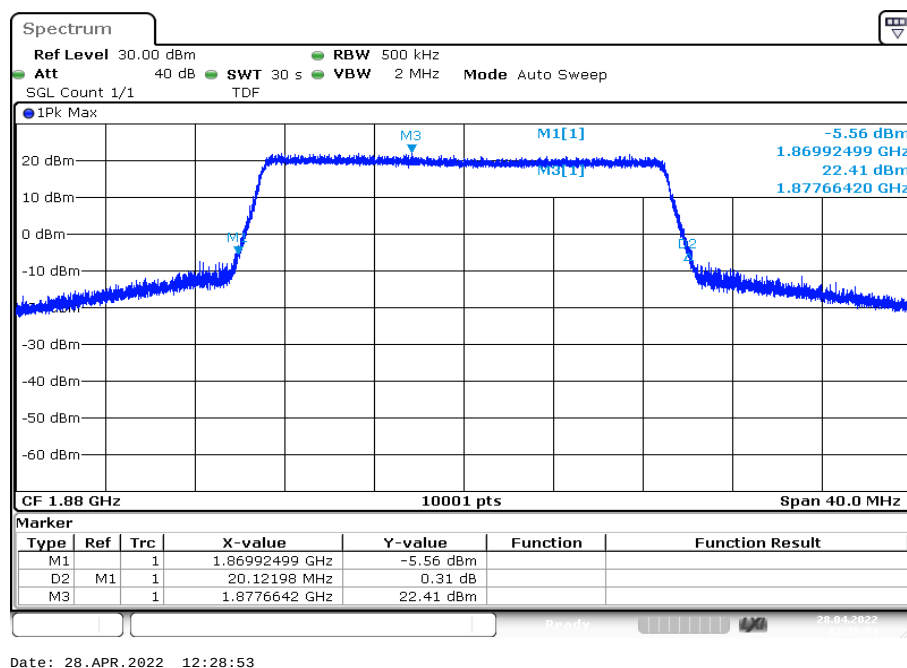
Plot 95: 10 MHz – 64-QAM - highest channel (99% - OBW)**Plot 96:** 10 MHz – 64-QAM - highest channel (-26 dBc BW)

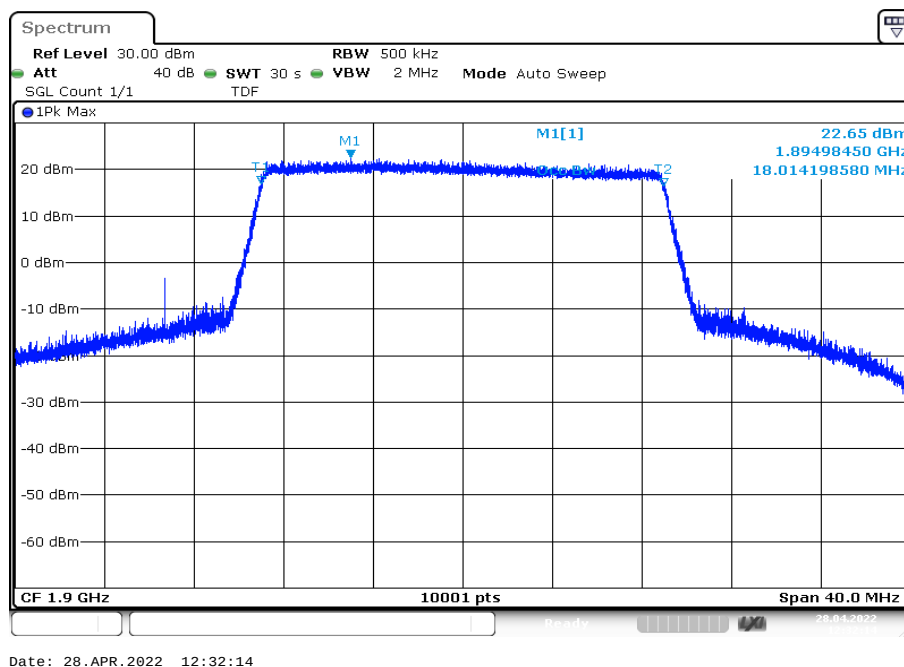
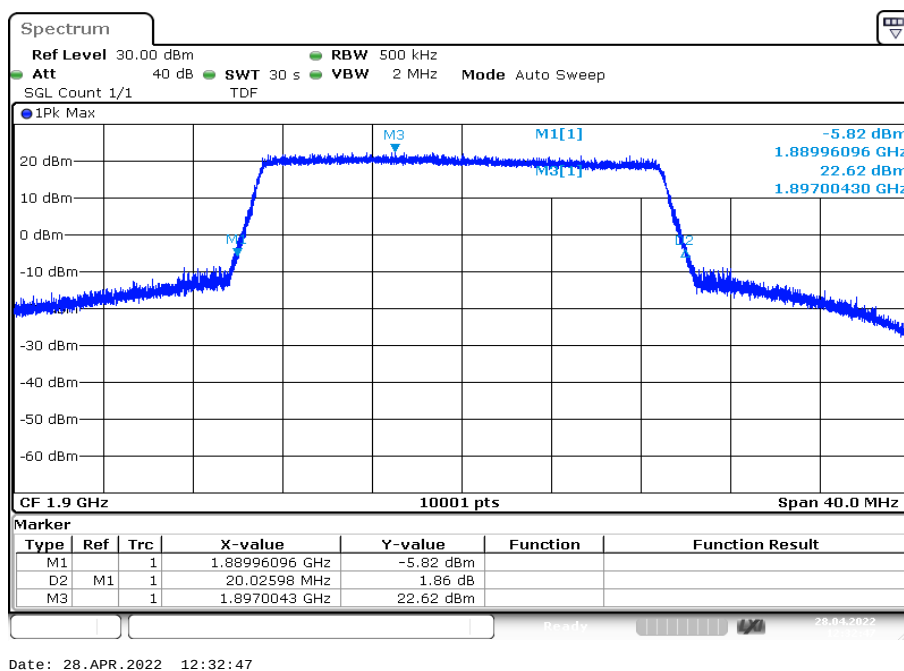
Plot 97: 15 MHz – 16-QAM - lowest channel (99% - OBW)**Plot 98:** 15 MHz – 16-QAM - lowest channel (-26 dBc BW)

Plot 99: 15 MHz – 64-QAM - middle channel (99% - OBW)**Plot 100:** 15 MHz – 64-QAM - middle channel (-26 dBc BW)

Plot 101: 15 MHz – 64-QAM - highest channel (99% - OBW)**Plot 102:** 15 MHz – 64-QAM - highest channel (-26 dBc BW)

Plot 103: 20 MHz – 64-QAM - lowest channel (99% - OBW)**Plot 104:** 20 MHz – 64-QAM - lowest channel (-26 dBc BW)

Plot 105: 20 MHz – 64-QAM - middle channel (99% - OBW)**Plot 106:** 20 MHz – 64-QAM - middle channel (-26 dBc BW)

Plot 107: 20 MHz – 64-QAM - highest channel (99% - OBW)**Plot 108:** 20 MHz – 64-QAM - highest channel (-26 dBc BW)

13 Glossary

EUT	Equipment under test
DUT	Device under test
UUT	Unit under test
GUE	GNSS User Equipment
ETSI	European Telecommunications Standards Institute
EN	European Standard
FCC	Federal Communications Commission
FCC ID	Company Identifier at FCC
IC	Industry Canada
PMN	Product marketing name
HMN	Host marketing name
HVIN	Hardware version identification number
FVIN	Firmware version identification number
EMC	Electromagnetic Compatibility
HW	Hardware
SW	Software
Inv No	Inventory number
S/N or SN	Serial number
C	Compliant
NC	Not compliant
NA	Not applicable
NP	Not performed
PP	Positive peak
QP	Quasi peak
AVG	Average
OC	Operating channel
OCW	Operating channel bandwidth
OBW	Occupied bandwidth
OOB	Out of band
DFS	Dynamic frequency selection
CAC	Channel availability check
OP	Occupancy period
NOP	Non occupancy period
DC	Duty cycle
PER	Packet error rate
CW	Clean wave
MC	Modulated carrier
WLAN	Wireless local area network
RLAN	Radio local area network
DSSS	Dynamic sequence spread spectrum
OFDM	Orthogonal frequency division multiplexing
FHSS	Frequency hopping spread spectrum
GNSS	Global Navigation Satellite System
C/N₀	Carrier to noise-density ratio, expressed in dB-Hz

14 Document history

Version	Applied changes	Date of release
-/-	Initial release	2022-05-27

15 Accreditation Certificate – D-PL-12076-01-05

first page	last page
 Deutsche Akkreditierungsstelle GmbH Entrusted according to Section 8 subsection 1 AkkStelleG in connection with Section 1 subsection 1 AkkStelleGBV Signatory to the Multilateral Agreements of EA, ILAC and IAF for Mutual Recognition Accreditation  The Deutsche Akkreditierungsstelle GmbH attests that the testing laboratory CTC advanced GmbH Untertürkheimer Straße 6-10, 66117 Saarbrücken is competent under the terms of DIN EN ISO/IEC 17025:2018 to carry out tests in the following fields: Telecommunication (FCC Requirements) The accreditation certificate shall only apply in connection with the notice of accreditation of 09.06.2020 with the accreditation number D-PL-12076-01. It comprises the cover sheet, the reverse side of the cover sheet and the following annex with a total of 05 pages. Registration number of the certificate: D-PL-12076-01-05 Frankfurt am Main, 09.06.2020 by order: Dipl.-Ing. (FH) Galf Egnier Head of Division The certificate together with its annex reflects the status at the time of the date of issue. The current status of the scope of accreditation can be found in the database of accredited bodies of Deutsche Akkreditierungsstelle GmbH. https://www.dakks.de/en/content/accredited-bodies-dakks See notes on final.	Deutsche Akkreditierungsstelle GmbH Office Berlin Spittelmarkt 10 10117 Berlin Office Frankfurt am Main Europa-Allee 52 60327 Frankfurt am Main Office Braunschweig Bundesallee 100 38116 Braunschweig The publication of extracts of the accreditation certificate is subject to the prior written approval by Deutsche Akkreditierungsstelle GmbH (DAkKS). Exempted is the unchanged form of separate disseminations of the cover sheet by the conformity assessment body mentioned overleaf. No impression shall be made that the accreditation also extends to fields beyond the scope of accreditation attested by DAkKS. The accreditation was granted pursuant to the Act on the Accreditation Body (AkkStelleG) of 31 July 2009 (Federal Law Gazette I p. 2625) and the Regulation (EC) No 765/2008 of the European Parliament and of the Council of 9 July 2008 setting out the requirements for accreditation and market surveillance relating to the marketing of products (Official Journal of the European Union L 218 of 9 July 2008, p. 30). DAkKS is a signatory to the Multilateral Agreements for Mutual Recognition of the European co-operation for Accreditation (EA), International Accreditation Forum (IAF) and International Laboratory Accreditation Cooperation (ILAC). The signatories to these agreements recognise each other's accreditations. The up-to-date state of membership can be retrieved from the following websites: EA: www.european-accreditation.org ILAC: www.ilac.org IAF: www.iaf.nu

Note: The current certificate annex is published on the websites (link see below)

<https://www.dakks.de/files/data/as/pdf/D-PL-12076-01-05epdf>

or

https://ctcadvancedcom/app/uploads/2020/06/D-PL-12076-01-05_TCB_USApdf

END OF TEST REPORT