



TEST REPORT

Test report no.: 1-3977/22-02-14

BNetzA-CAB-02/21-102

Testing laboratory

CTC advanced GmbH

Untertuerkheimer Strasse 6 – 10

66117 Saarbruecken / Germany

Phone: + 49 681 5 98 - 0

Fax: + 49 681 5 98 - 9075

Internet: <https://www.ctcadvanced.com>

e-mail: mail@ctcadvanced.com

Accredited Testing Laboratory:

The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2018-03) by the Deutsche Akkreditierungsstelle GmbH (DAkkS)

The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate starting with the registration number: D-PL-12076-01.

Applicant

SAGEMCOM BROADBAND SAS

250, route de l' Empereur

92848 Rueil-Malmaison Cedex / FRANCE

Phone: -/-

Contact: Ludovic Bomba

e-mail: ludovic.bomba-ext@sagemcom.com

Manufacturer

SAGEMCOM BROADBAND SAS

250, route de l' Empereur

92848 Rueil-Malmaison Cedex / FRANCE

Test standard/s

FCC - Title 47 CFR Part 27 FCC - Title 47 of the Code of Federal Regulations; Chapter I; Part 27 - Miscellaneous wireless communications services

For further applied test standards please refer to section 3 of this test report.

Test Item

Kind of test item:	Gateway
Model name:	F5688W
FCC ID:	VW3FAST5688W
Frequency:	Band 41
Technology tested:	LTE CA
Antenna:	4 integrated antennas
Power supply:	120 V AC by power supply unit
Temperature range:	0°C to +50°C

This test report is electronically signed and valid without handwritten signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

Test report authorized:

Michael Dorongovski
Lab Manager
Radio Communications

Test performed:

Andreas Luckenbill
Head of Department
Radio Communications

1 Table of contents

1	Table of contents	2
2	General information	3
2.1	Notes and disclaimer	3
2.2	Application details	3
2.3	Test laboratories sub-contracted	3
3	Test standard/s, references and accreditations	4
4	Reporting statements of conformity – decision rule	5
5	Test environment	6
6	Test item.....	6
6.1	General description	6
6.2	Additional information	6
7	Description of the test setup.....	7
7.1	Conducted measurements normal and extreme conditions.....	8
8	Measurement uncertainty	9
9	Additional information and comments	10
10	Summary of measurement results	11
10.1	Part 27: LTE band 41	11
11	RF measurements	12
11.1	Description of test setup	12
11.2	Results LTE band 41	12
11.2.1	RF output power	12
11.2.2	Occupied bandwidth.....	18
12	Glossary	27
13	Document history	28
14	Accreditation Certificate – D-PL-12076-01-05	28

2 General information

2.1 Notes and disclaimer

The test results of this test report relate exclusively to the test item specified in this test report. CTC advanced GmbH does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item.

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2.2 Application details

Date of receipt of order:	2022-03-11
Date of receipt of test item:	2022-02-16
Start of test:*	2022-05-30
End of test:*	2022-06-01
Person(s) present during the test:	-/-

*Date of each measurement, if not shown in the plot, can be requested. Dates are stored in the measurement software.

2.3 Test laboratories sub-contracted

None

3 Test standard/s, references and accreditations

Test standard	Date	Description
FCC - Title 47 CFR Part 27		FCC - Title 47 of the Code of Federal Regulations; Chapter I; Part 27 - Miscellaneous wireless communications services

Guidance	Version	Description
ANSI C63.4-2014	-/-	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
ANSI C63.26-2015	-/-	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
KDB 662911 D01	v02r01	Emissions Testing of Transmitters with Multiple Outputs in the Same Band
Power Meas License Systems: KDB 971168 D01	v03r01	Measurement Guidance for Certification of Licensed Digital Transmitters

Accreditation	Description
D-PL-12076-01-05	Telecommunication FCC requirements https://www.dakks.de/as/ast/d/D-PL-12076-01-05e.pdf



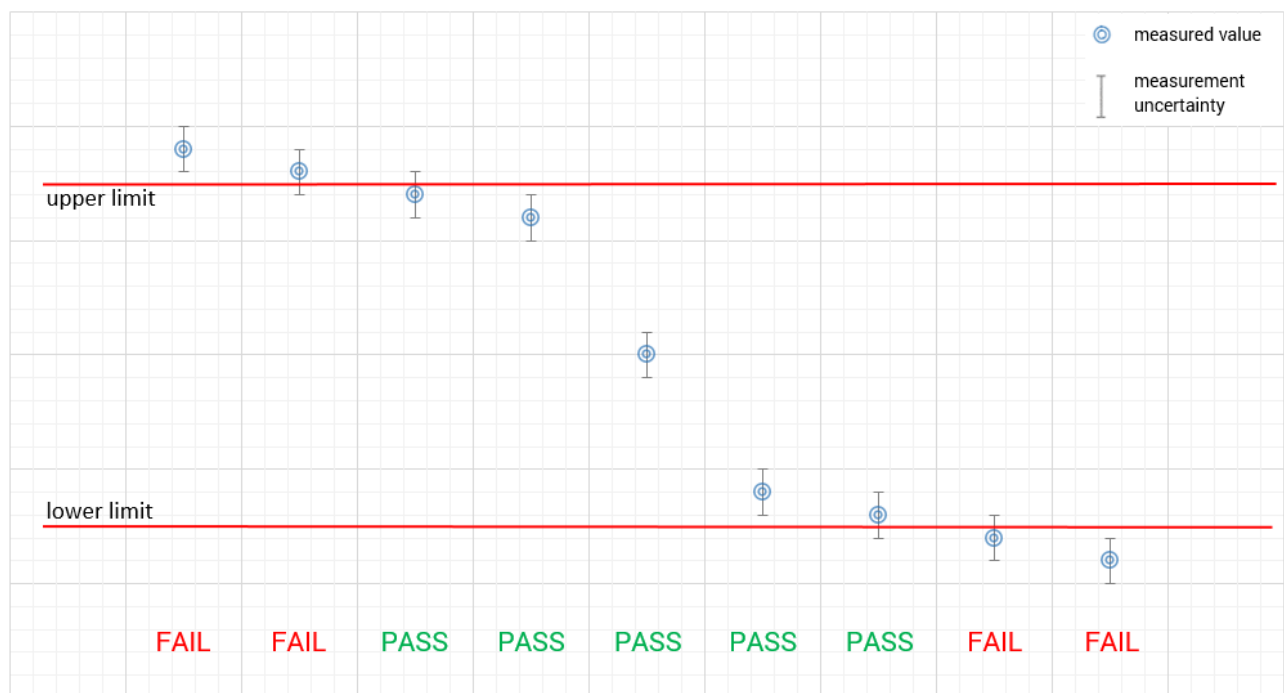
FCC designation number: DE0002

4 Reporting statements of conformity – decision rule

Only the measured values related to their corresponding limits will be used to decide whether the equipment under test meets the requirements of the test standards listed in chapter 3.

The measurement uncertainty is mentioned in this test report, see chapter 9, but is not taken into account - neither to the limits nor to the measurement results. Measurement results with a smaller margin to the corresponding limits than the measurement uncertainty have a potential risk of more than 5% that the decision might be wrong."

measured value, measurement uncertainty, verdict



5 Test environment

Temperature	:	T_{nom} +22 °C during room temperature tests T_{max} +50 °C during high temperature tests T_{min} -30 °C during low temperature tests
Relative humidity content	:	55 %
Barometric pressure	:	1021 hpa
Power supply	:	V_{nom} 120 V AC by power supply unit. V_{max} 138 V AC by external power supply. V_{min} 102 V AC by external power supply.

6 Test item

6.1 General description

Kind of test item	:	Gateway
Model name	:	F5688W
S/N serial number	:	Conducted units: DM2205259000045 (IMEI: 359509840012014)
Hardware status	:	V1.0
Software status	:	SGJi10000C/SG520TMDAR01A02M4G_01.001.01.001_V03
Firmware status	:	SGJi10000C/SG520TMDAR01A02M4G_01.001.01.001_V03
Frequency band	:	Band 41
Type of radio transmission	:	Modulated carrier
Use of frequency spectrum	:	
Type of modulation	:	QPSK, 16-QAM, 64-QAM
Antenna	:	4 integrated antennas
Power supply	:	120 V AC by power supply unit
Temperature range	:	0°C to +50°C

6.2 Additional information

The content of the following annexes is defined in the QA. It may be that not all of the listed annexes are necessary for this report, thus some values in between may be missing.

Test setup and EUT photos are included in test report:

- 1-3977/22-02-01_AnnexA
- 1-3977/22-02-01_AnnexB
- 1-3977/22-02-01_AnnexC

7 Description of the test setup

Typically, the calibrations of the test apparatus are commissioned to and performed by an accredited calibration laboratory. The calibration intervals are determined in accordance with the DIN EN ISO/IEC 17025. In addition to the external calibrations, the laboratory executes comparison measurements with other calibrated test systems or effective verifications. Weekly chamber inspections and range calibrations are performed. Where possible, RF generating and signaling equipment as well as measuring receivers and analyzers are connected to an external high-precision 10 MHz reference (GPS-based or rubidium frequency standard).

In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Lab/Item).

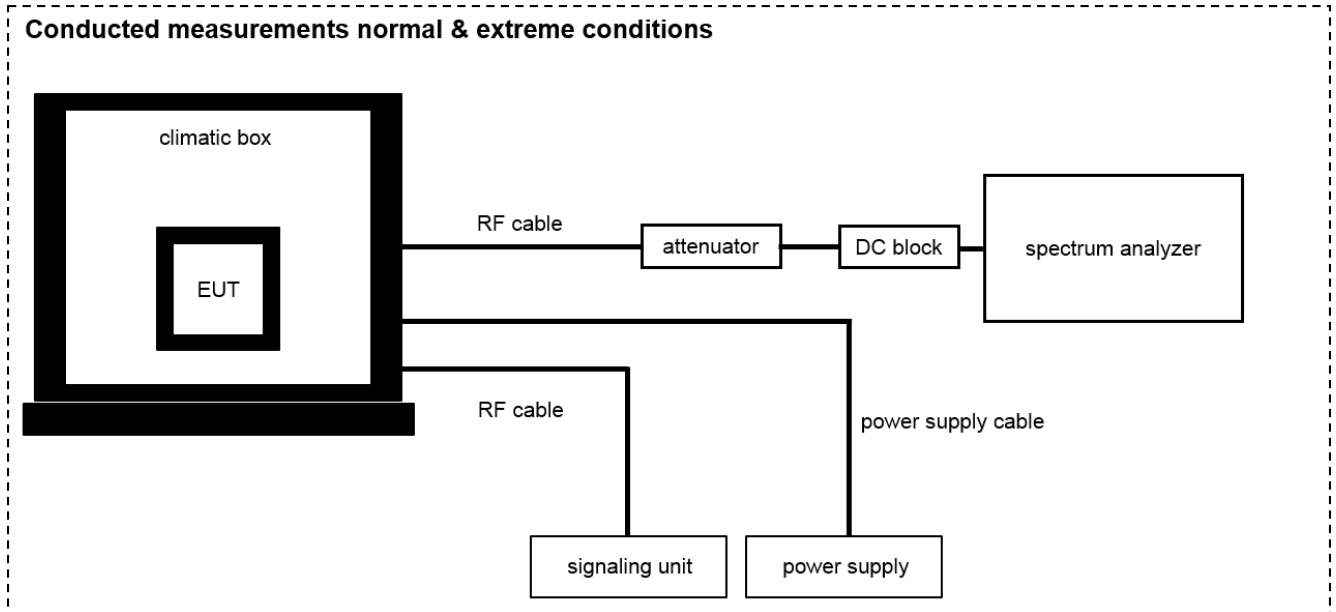
Each block diagram listed can contain several test setup configurations. All devices belonging to a test setup are identified with the same letter syntax. For example: Column Setup and all devices with an A.

Agenda: Kind of Calibration

k	calibration / calibrated	EK	limited calibration
ne	not required (k, ev, izw, zw not required)	zw	cyclical maintenance (external cyclical maintenance)
ev	periodic self verification	izw	internal cyclical maintenance
Ve	long-term stability recognized	g	blocked for accredited testing
vlk!	Attention: extended calibration interval		
NK!	Attention: not calibrated	*)	next calibration ordered / currently in progress

7.1 Conducted measurements normal and extreme conditions

Conducted measurements normal & extreme conditions



OP = AV + CA
(OP-output power; AV-analyzer value; CA-loss signal path)

Example calculation:

OP [dBm] = 6.0 [dBm] + 11.7 [dB] = 17.7 [dBm] (58.88 mW)

Equipment table:

No.	Setup	Equipment	Type	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	A	Signal analyzer	FSV40	Rohde&Schwarz	101042	300004517	k	25.01.2022	31.01.2023
2	A	Teststand	Teststand Custom Sequence Editor	National Instruments GmbH		300004590	ne	-/-	-/-
3	A	RF-Cable	ST18/SMAm/SMAM /72	Huber & Suhner	Batch no. 699714	400001184	ev	-/-	-/-
4	A	DC-Blocker 0.1-40 GHz	8141A	Inmet		400001185	ev	-/-	-/-
5	A	RF-Cable	ST18/SMAM/SMAM /36	Huber & Suhner	Batch no. 601494	400001309	ev	-/-	-/-
6	A	Temperature Test Chamber	T-40/50	CTS GmbH	064023	300003540	ev	08.05.2020	07.05.2022
7	A	Wideband Radio Communication Tester	CMW500	Rohde & Schwarz	170616	300006251	k	16.09.2021	30.09.2023

8 Measurement uncertainty

Measurement uncertainty		
Test case	Uncertainty	
Antenna gain	± 3 dB	
99 % bandwidth	± RBW	
-26 dB bandwidth	± RBW	
Frequency stability	10 ⁻⁶	
Maximum output power conducted	± 1.56 dB	
Block edge compliance	± 1.56 dB	
Spurious emissions conducted	> 3.6 GHz	± 1.56 dB
	> 7 GHz	± 1.56 dB
	> 18 GHz	± 2.31 dB
	≥ 40 GHz	± 2.97 dB
Spurious emissions radiated below 30 MHz	± 3 dB	
Spurious emissions radiated 30 MHz to 1 GHz	± 3 dB	
Spurious emissions radiated 1 GHz to 12.75 GHz	± 3.7 dB	
Spurious emissions radiated above 12.75 GHz	± 4.5 dB	

9 Additional information and comments

Reference documents: Customer Questionnaire_F5688W_Sagemcom_v3.docx
F5866WTMO_ANTENNA MAPPING_v2.xlsx

Special test descriptions: Although the device has 4 integrated antennas, only antenna 1 (5GNR_P) is used for TX mode for LTE.

Configuration descriptions: ANT1 = LTE_M (not used)
ANT2 = 5GNR_P (used for these tests)

EUT selection:

- Only one device available
- Devices selected by the customer
- Devices selected by the laboratory (Randomly)

10 Summary of measurement results

<input checked="" type="checkbox"/>	No deviations from the technical specifications were ascertained
<input type="checkbox"/>	There were deviations from the technical specifications ascertained
<input type="checkbox"/>	This test report is only a partial test report. The content and verdict of the performed test cases are listed below.

TC identifier	Description	verdict	date	Remark
RF-Testing	FCC: CFR Part 2 & Part 27	See table!	2022-06-01	-/-

10.1 Part 27: LTE band 41

Test Case	temperature conditions	power source voltages	C	NC	NA	NP	Remark
RF Output Power	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
Frequency Stability	Extreme	Extreme	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	measured for PCC only
Spurious Emissions Radiated	Nominal	Nominal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	measured for PCC only
Spurious Emissions Conducted	Nominal	Nominal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	measured for PCC only
Block Edge Compliance	Nominal	Nominal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	measured for PCC only
Occupied Bandwidth	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-

Notes:

C	Compliant	NC	Not compliant	NA	Not applicable	NP	Not performed
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11 RF measurements

11.1 Description of test setup

For the spurious measurements we use the substitution method according TIA/EIA 603.

11.2 Results LTE band 41

The EUT was set to transmit the maximum power.

11.2.1 RF output power

Description:

This paragraph contains average power, peak output power and EIRP measurements for the mobile station. In all cases, the peak output power is within the required mask (this mask is specified in the JTC standards, TIA PN3389 Vol. 1 Chap 7, and is no FCC requirement).

Measurement:

The mobile was set up for the maximum output power with pseudo random data modulation.

Measurement parameters	
Detector:	Sample
AQT:	See plot
Resolution bandwidth:	40 MHz
Used equipment:	See chapter 7.1
Measurement uncertainty:	See chapter 8
Measurement procedure:	FCC: § 2.1046

Limits:

FCC
§27.50(h)(2)
<i>Mobile and other user stations.</i> Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.
Power: 33 dBm EIRP

Results:**Output Power FOR LTE BAND 41 (5MHz + 20 MHz)**

PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)		
		Size	Offset	Size	Offset	QPSK	16 QAM	64 QAM
2499.3	2511.0	1	24	1	0	23.9	22.9	22.1
		25	0	100	0	22.0	21.0	21.0
2583.8	2595.5	1	24	1	0	24.3	23.1	22.3
		25	0	100	0	22.4	21.4	21.4
2668.3	2680.0	1	24	1	0	23.4	22.4	21.4
		25	0	100	0	21.4	20.4	20.4

Output Power FOR LTE BAND 41 (20MHz + 5 MHz)

PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)		
		Size	Offset	Size	Offset	QPSK	16 QAM	64 QAM
2506.0	2517.7	1	99	1	0	23.8	22.7	21.7
		100	0	25	0	21.9	20.9	20.9
2590.5	2602.2	1	99	1	0	24.2	23.1	22.3
		100	0	25	0	22.3	21.3	21.3
2675.0	2686.7	1	99	1	0	23.3	22.3	21.3
		100	0	25	0	21.3	20.4	20.4

Output Power FOR LTE BAND 41 (10MHz + 20 MHz)

PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)		
		Size	Offset	Size	Offset	QPSK	16 QAM	64 QAM
2501.5	2515.9	1	49	1	0	24.3	23.2	22.2
		50	0	100	0	22.3	21.3	21.2
2583.6	2598.0	1	49	1	0	24.2	23.2	22.2
		50	0	100	0	22.3	21.3	21.3
2665.6	2680.0	1	49	1	0	24.2	23.0	22.3
		50	0	100	0	22.2	21.4	21.4

Output Power FOR LTE BAND 41 (20MHz + 10 MHz)

PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)		
		Size	Offset	Size	Offset	QPSK	16 QAM	64 QAM
2506.0	2520.4	1	99	1	0	23.7	22.8	22.0
		100	0	50	0	22.0	21.1	21.2
2588.1	2602.5	1	99	1	0	23.7	22.8	22.1
		100	0	50	0	22.2	21.1	21.1
2670.1	2684.5	1	99	1	0	23.9	22.9	22.0
		100	0	50	0	22.2	21.2	21.2

Output Power FOR LTE BAND 41 (15MHz + 15 MHz)

PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)		
		Size	Offset	Size	Offset	QPSK	16 QAM	64 QAM
2503.5	2518.5	1	74	1	0	24.2	22.8	22.3
		75	0	75	0	22.3	21.3	21.3
2585.5	2600.5	1	74	1	0	24.3	22.8	22.4
		75	0	75	0	22.3	21.3	21.3
2667.5	2682.5	1	74	1	0	24.3	22.9	22.6
		75	0	75	0	22.4	21.4	21.4

Output Power FOR LTE BAND 41 (15MHz + 20 MHz)

PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)		
		Size	Offset	Size	Offset	QPSK	16 QAM	64 QAM
2503.8	2520.9	1	74	1	0	24.0	23.2	22.3
		75	0	100	0	22.3	21.3	21.3
2583.3	2600.4	1	74	1	0	24.2	23.3	22.3
		75	0	100	0	22.4	21.4	21.4
2662.9	2680.0	1	74	1	0	24.1	23.3	22.2
		75	0	100	0	22.4	21.3	21.3

Output Power FOR LTE BAND 41 (20MHz + 15 MHz)

PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)		
		Size	Offset	Size	Offset	QPSK	16 QAM	64 QAM
2506.0	2523.1	1	99	1	0	24.0	23.2	22.3
		100	0	75	0	22.3	21.2	21.2
2585.6	2602.7	1	99	1	0	24.2	23.3	22.3
		100	0	75	0	22.3	21.3	21.3
2665.1	2682.2	1	99	1	0	24.1	23.2	22.2
		100	0	75	0	22.3	21.3	21.3

Output Power FOR LTE BAND 41 (20MHz + 20 MHz)

PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)		
		Size	Offset	Size	Offset	QPSK	16 QAM	64 QAM
2506.0	2525.8	1	99	1	0	24.2	23.1	22.3
		100	0	100	0	22.2	21.3	21.2
2583.1	2602.9	1	99	1	0	24.2	23.2	22.4
		100	0	100	0	22.4	21.4	21.4
2660.2	2680.0	1	99	1	0	24.3	23.2	22.3
		100	0	100	0	22.4	21.4	21.4

Results: EIRP

Output Power FOR LTE BAND 41 (5MHz + 20 MHz)

PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Average output power EIRP (dBm)		
		Size	Offset	Size	Offset	QPSK	16 QAM	64 QAM
2499.3	2511.0	1	24	1	0	28.6	25.8	24.2
		25	0	100	0	26.7	23.9	23.1
2583.8	2595.5	1	24	1	0	29.0	26.0	24.4
		25	0	100	0	27.1	24.3	23.5
2668.3	2680.0	1	24	1	0	28.1	25.3	23.5
		25	0	100	0	26.1	23.3	22.5

Output Power FOR LTE BAND 41 (20MHz + 5 MHz)

PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Average output power EIRP (dBm)		
		Size	Offset	Size	Offset	QPSK	16 QAM	64 QAM
2506.0	2517.7	1	99	1	0	28.5	25.6	23.8
		100	0	25	0	26.6	23.8	23.0
2590.5	2602.2	1	99	1	0	28.9	26.0	24.4
		100	0	25	0	27.0	24.2	23.4
2675.0	2686.7	1	99	1	0	28.0	25.2	23.4
		100	0	25	0	26.0	23.3	22.5

Output Power FOR LTE BAND 41 (10MHz + 20 MHz)

PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Average output power EIRP (dBm)		
		Size	Offset	Size	Offset	QPSK	16 QAM	64 QAM
2501.5	2515.9	1	49	1	0	29.0	26.1	24.3
		50	0	100	0	27.0	24.2	23.3
2583.6	2598.0	1	49	1	0	28.9	26.1	24.3
		50	0	100	0	27.0	24.2	23.4
2665.6	2680.0	1	49	1	0	28.9	25.9	24.4
		50	0	100	0	26.9	24.3	23.5

Output Power FOR LTE BAND 41 (20MHz + 10 MHz)

PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Average output power EIRP (dBm)		
		Size	Offset	Size	Offset	QPSK	16 QAM	64 QAM
2506.0	2520.4	1	99	1	0	28.4	25.7	24.1
		100	0	50	0	26.7	24.0	23.3
2588.1	2602.5	1	99	1	0	28.4	25.7	24.2
		100	0	50	0	26.9	24.0	23.2
2670.1	2684.5	1	99	1	0	28.6	25.8	24.1
		100	0	50	0	26.9	24.1	23.3

Output Power FOR LTE BAND 41 (15MHz + 15 MHz)

PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Average output power EIRP (dBm)		
		Size	Offset	Size	Offset	QPSK	16 QAM	64 QAM
2503.5	2518.5	1	74	1	0	28.9	25.7	24.4
		75	0	75	0	27.0	24.2	23.4
2585.5	2600.5	1	74	1	0	29.0	25.7	24.5
		75	0	75	0	27.0	24.2	23.4
2667.5	2682.5	1	74	1	0	29.0	25.8	24.7
		75	0	75	0	27.1	24.3	23.5

Output Power FOR LTE BAND 41 (15MHz + 20 MHz)

PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Average output power EIRP (dBm)		
		Size	Offset	Size	Offset	QPSK	16 QAM	64 QAM
2503.8	2520.9	1	74	1	0	28.7	26.1	24.4
		75	0	100	0	27.0	24.2	23.4
2583.3	2600.4	1	74	1	0	28.9	26.2	24.4
		75	0	100	0	27.1	24.3	23.5
2662.9	2680.0	1	74	1	0	28.8	26.2	24.3
		75	0	100	0	27.1	24.2	23.4

Output Power FOR LTE BAND 41 (20MHz + 15 MHz)

PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Average output power EIRP (dBm)		
		Size	Offset	Size	Offset	QPSK	16 QAM	64 QAM
2506.0	2523.1	1	99	1	0	28.7	26.1	24.4
		100	0	75	0	27.0	24.1	23.3
2585.6	2602.7	1	99	1	0	28.9	26.2	24.4
		100	0	75	0	27.0	24.2	23.4
2665.1	2682.2	1	99	1	0	28.8	26.1	24.3
		100	0	75	0	27.0	24.2	23.4

Output Power FOR LTE BAND 41 (20MHz + 20 MHz)

PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Average output power EIRP (dBm)		
		Size	Offset	Size	Offset	QPSK	16 QAM	64 QAM
2506.0	2525.8	1	99	1	0	28.9	26.0	24.4
		100	0	100	0	26.9	24.2	23.3
2583.1	2602.9	1	99	1	0	28.9	26.1	24.5
		100	0	100	0	27.1	24.3	23.5
2660.2	2680.0	1	99	1	0	29.0	26.1	24.4
		100	0	100	0	27.1	24.3	23.5

11.2.2 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. 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:	See plots
Video bandwidth:	See plots
Resolution bandwidth:	See plots
Span:	2 x nominal bandwidth
Trace mode:	Max Hold
Used equipment:	See chapter 7.1
Measurement uncertainty:	See chapter 8
Measurement procedure	FCC: § 2.1049

Limits:

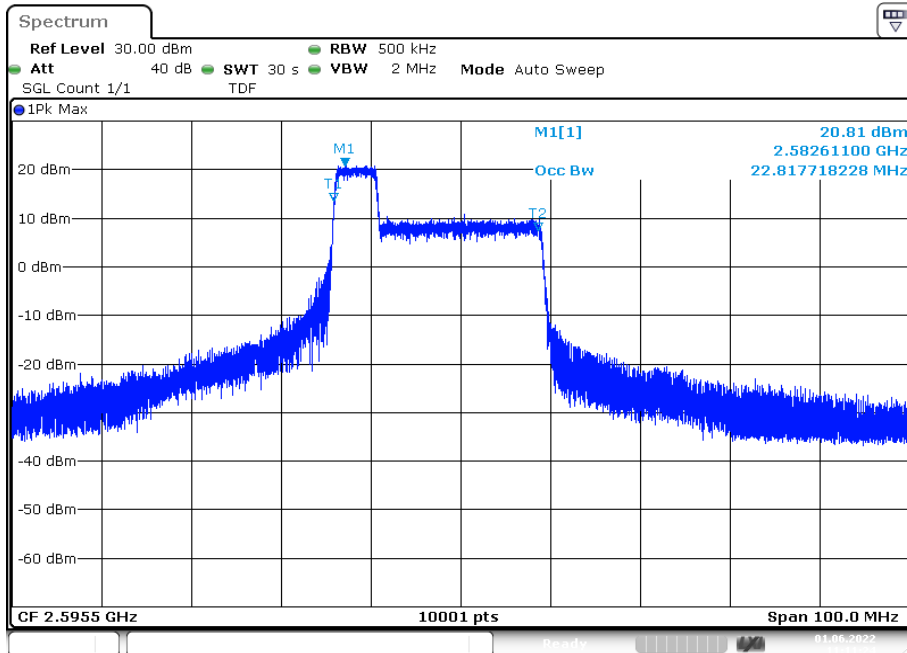
FCC
§ 2.1049
Reporting only

Results:

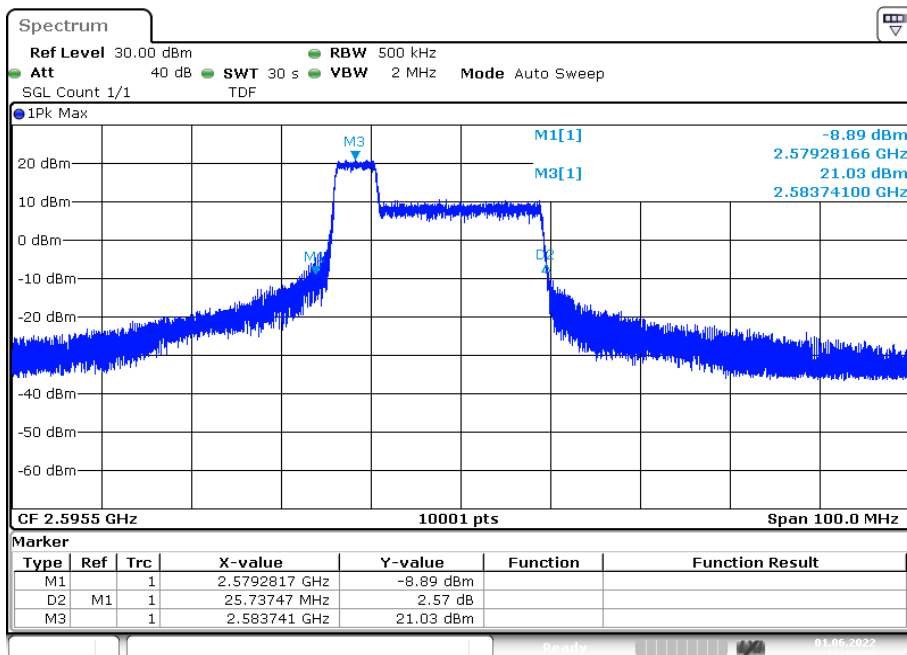
Occupied Bandwidth – QPSK			
Bandwidth	Channel	99% OBW (kHz)	-26 dBc BW (kHz)
5 + 20	mid	22817.7	25737.5
20 + 5	mid	22877.7	27267.3
10 + 20	mid	27557.2	30226.9
20 + 10	mid	27657.2	31166.7
15 + 15	mid	28147.2	30498.0
15 + 20	mid	32416.8	35866.4
20 + 15	mid	32466.8	36466.4
20 + 20	mid	37286.3	40495.9

Plots:

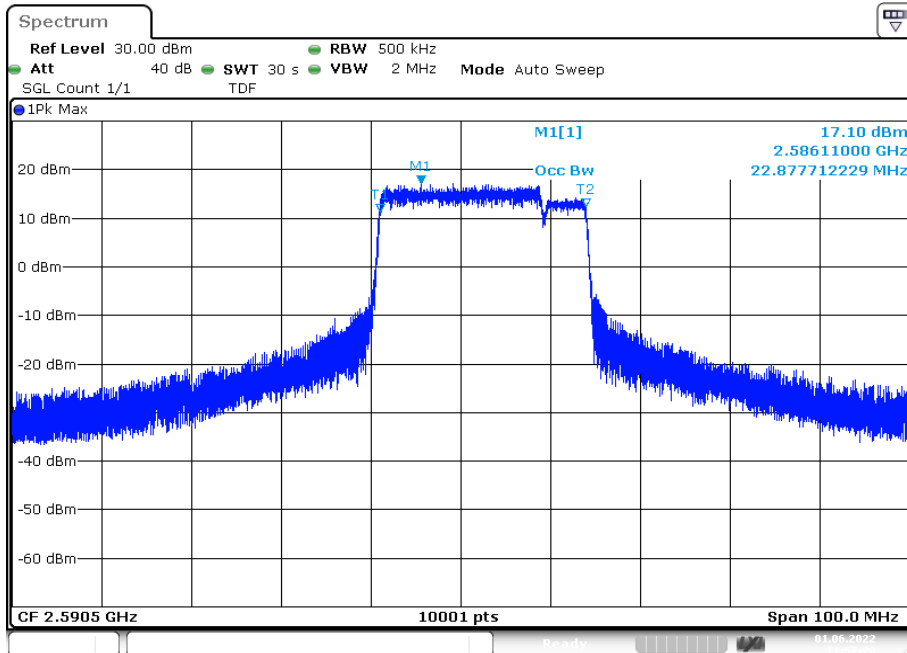
Plot 1: 5 MHz + 20 MHz– QPSK - middle channel (99% - OBW)



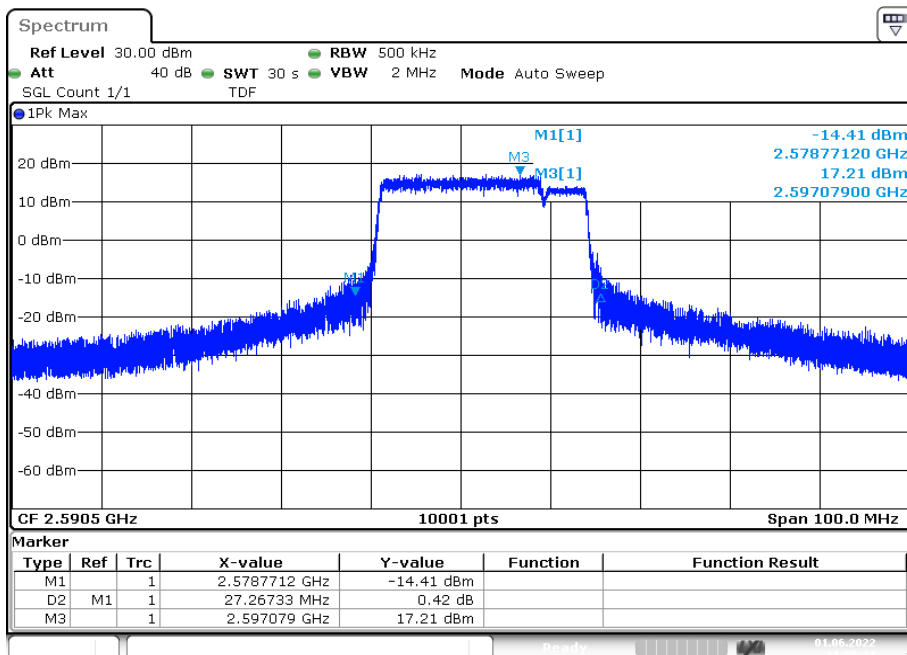
Plot 2: 5 MHz + 20 MHz– QPSK - middle channel (-26 dBc BW)



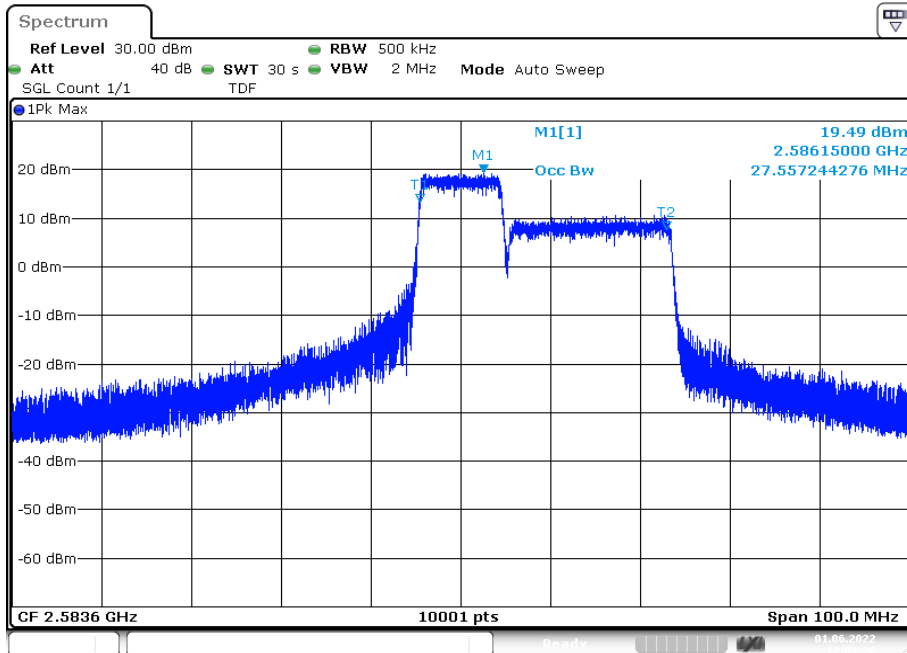
Plot 3: 20 MHz + 5 MHz– QPSK - middle channel (99% - OBW)



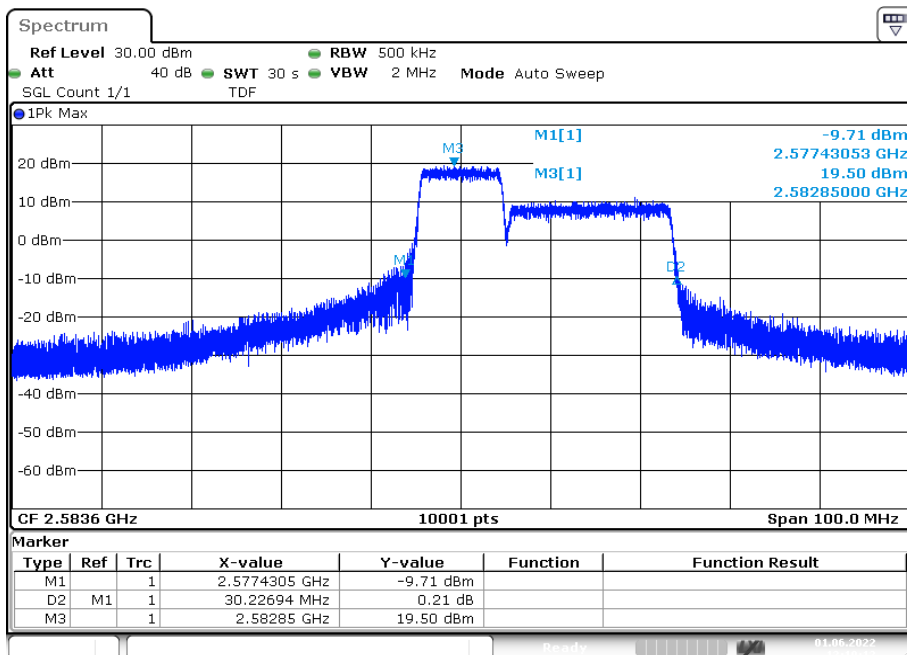
Plot 4: 20 MHz + 5 MHz– QPSK - middle channel (-26 dBc BW)



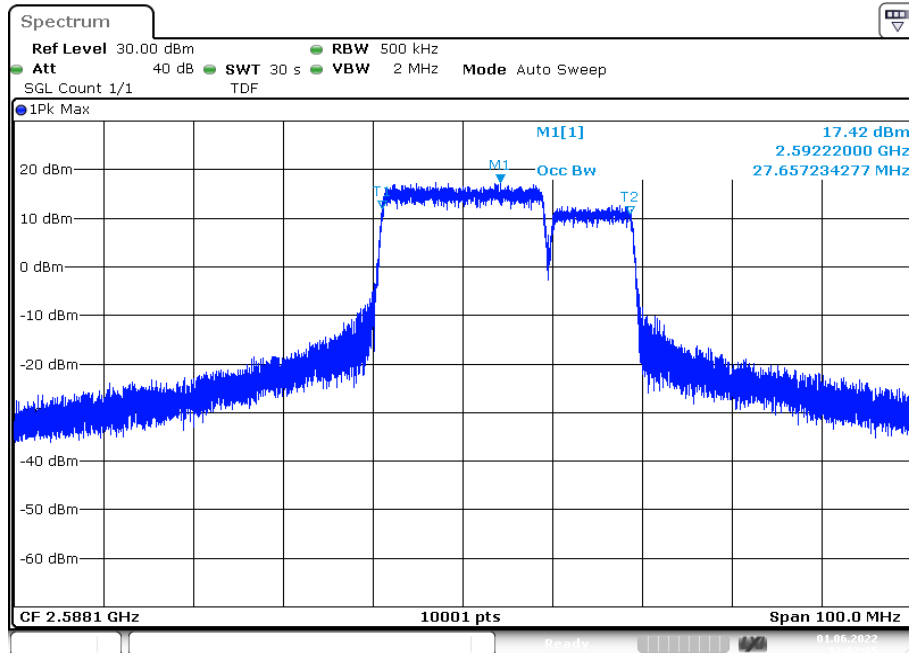
Plot 5: 10 MHz + 20 MHz– QPSK - middle channel (99% - OBW)



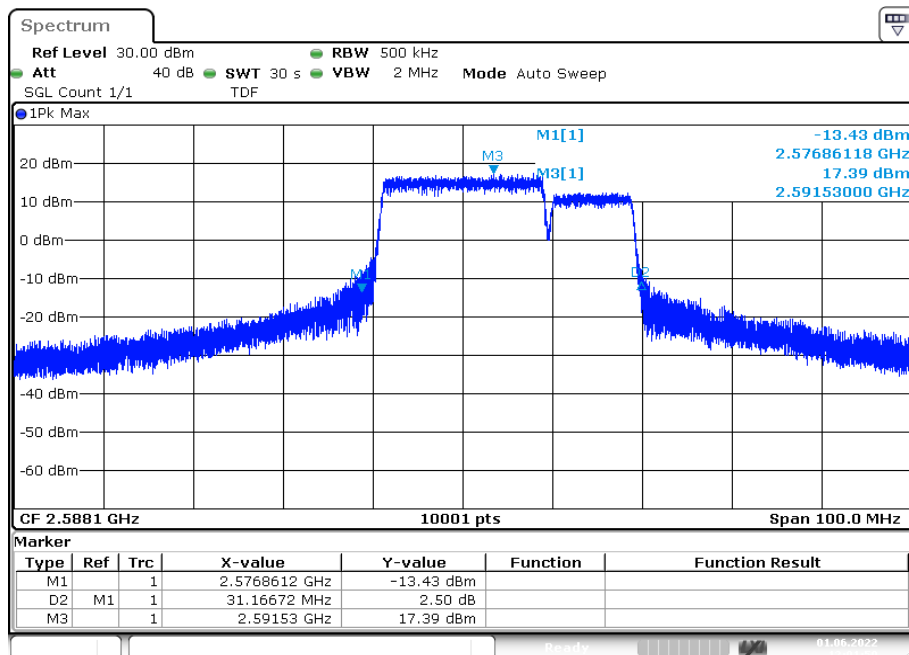
Plot 6: 10 MHz + 20 MHz– QPSK - middle channel (-26 dBc BW)



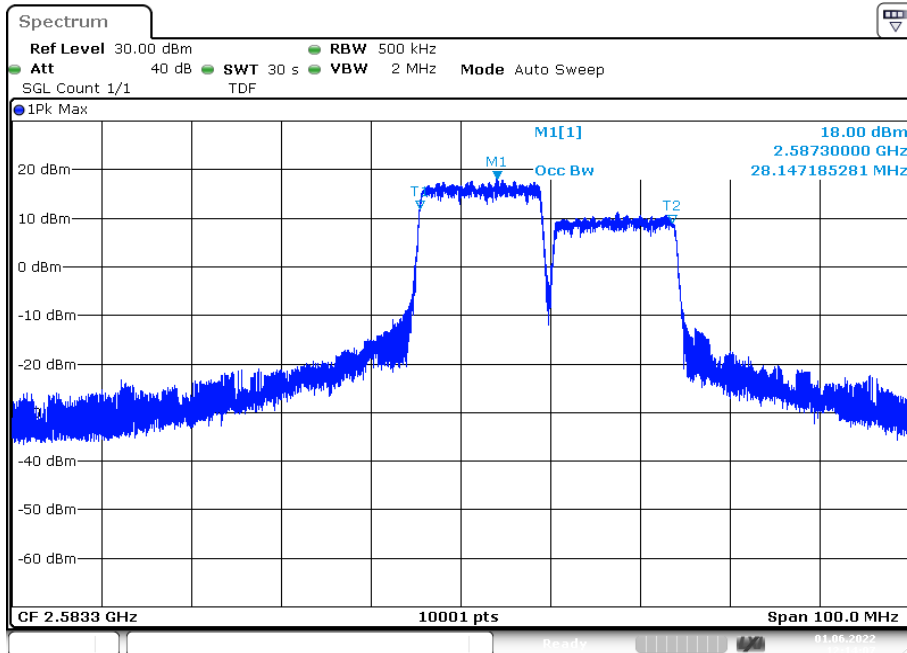
Plot 7: 20 MHz + 10 MHz– QPSK - middle channel (99% - OBW)



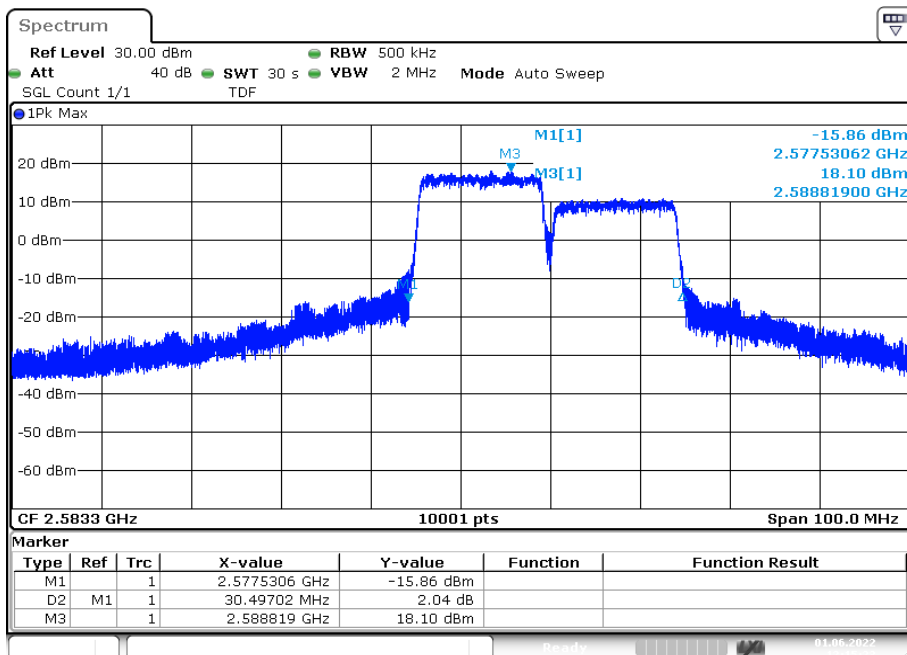
Plot 8: 20 MHz + 10 MHz– QPSK - middle channel (-26 dBc BW)



Plot 9: 15 MHz + 15 MHz– QPSK - middle channel (99% - OBW)

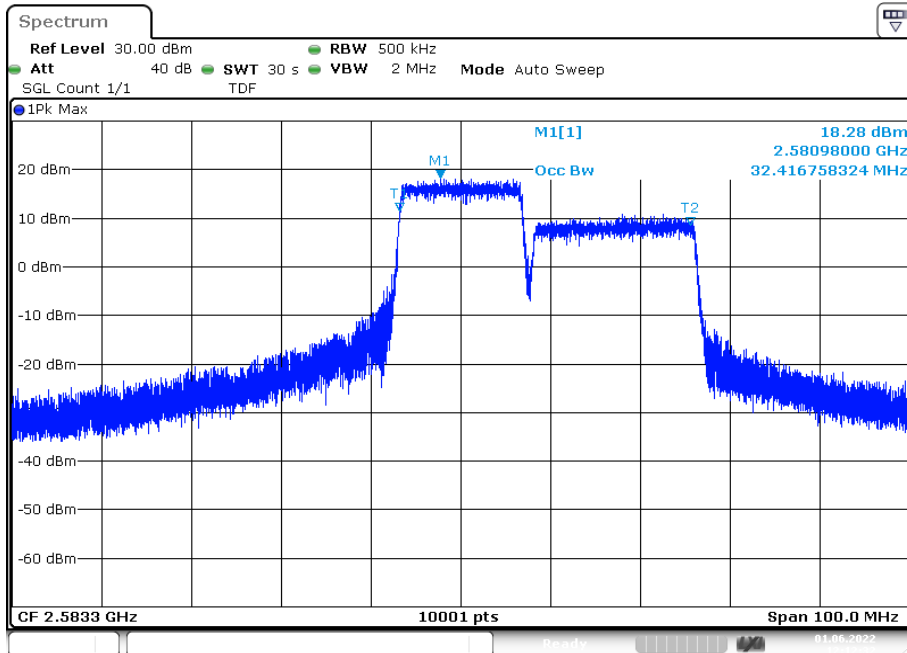


Plot 10: 15 MHz + 15 MHz– QPSK - middle channel (-26 dBc BW)

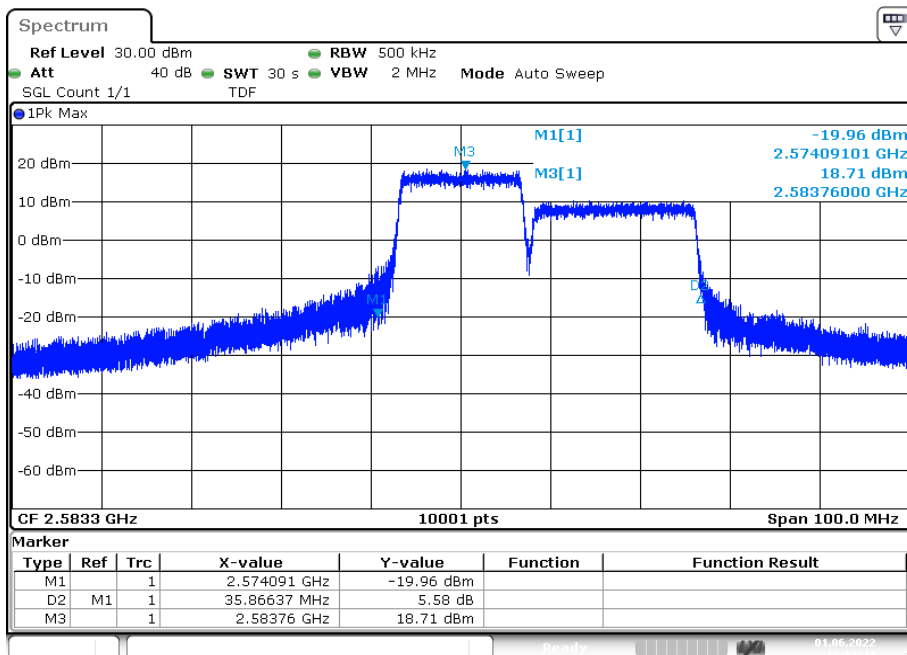


Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.5775306 GHz	-15.86 dBm		
D2	M1	1	30.49702 MHz	2.04 dB		
M3		1	2.588819 GHz	18.10 dBm		

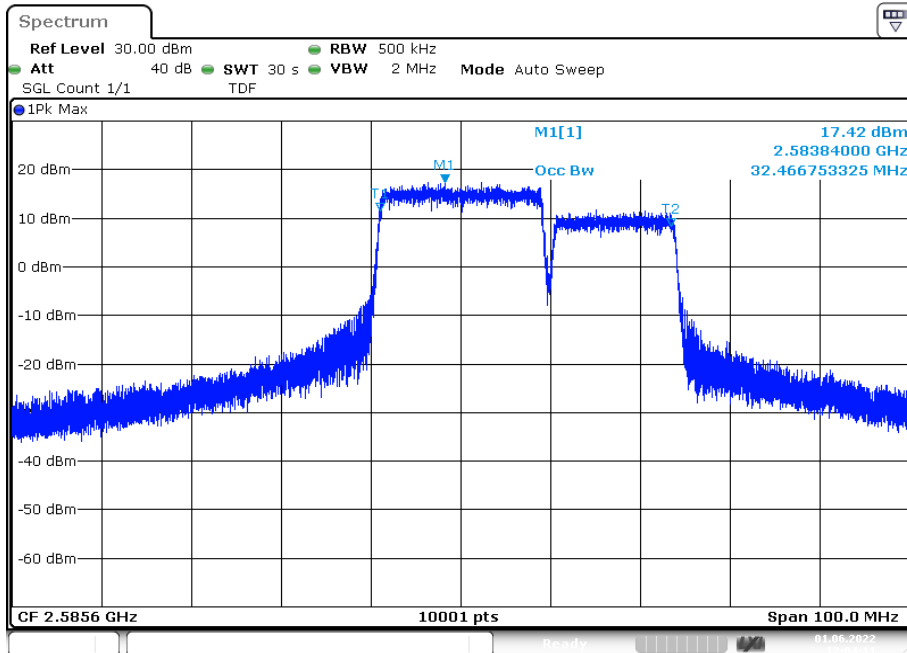
Plot 11: 15 MHz + 20 MHz– QPSK - middle channel (99% - OBW)



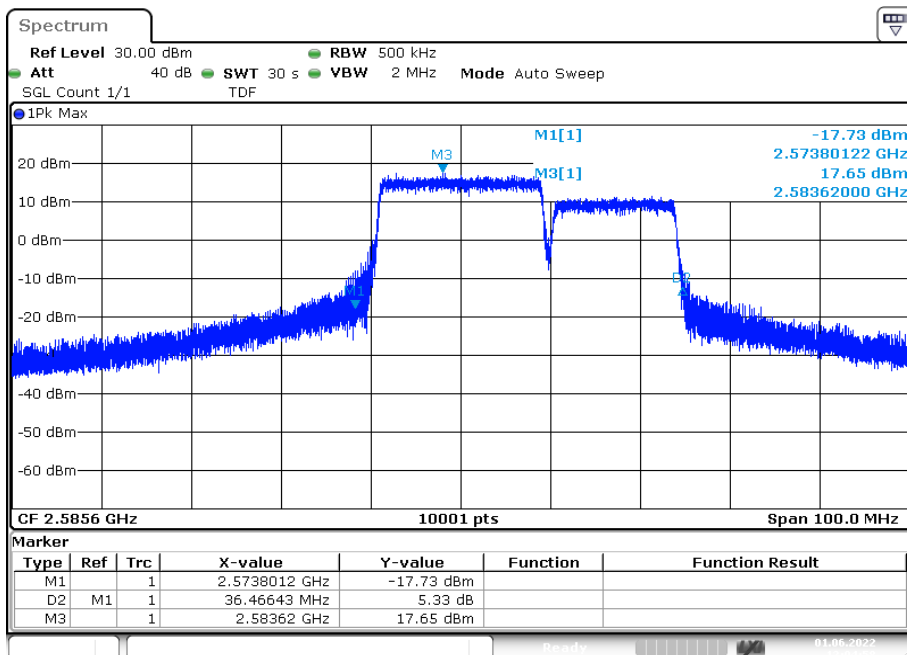
Plot 12: 15 MHz + 20 MHz– QPSK - middle channel (-26 dBc BW)



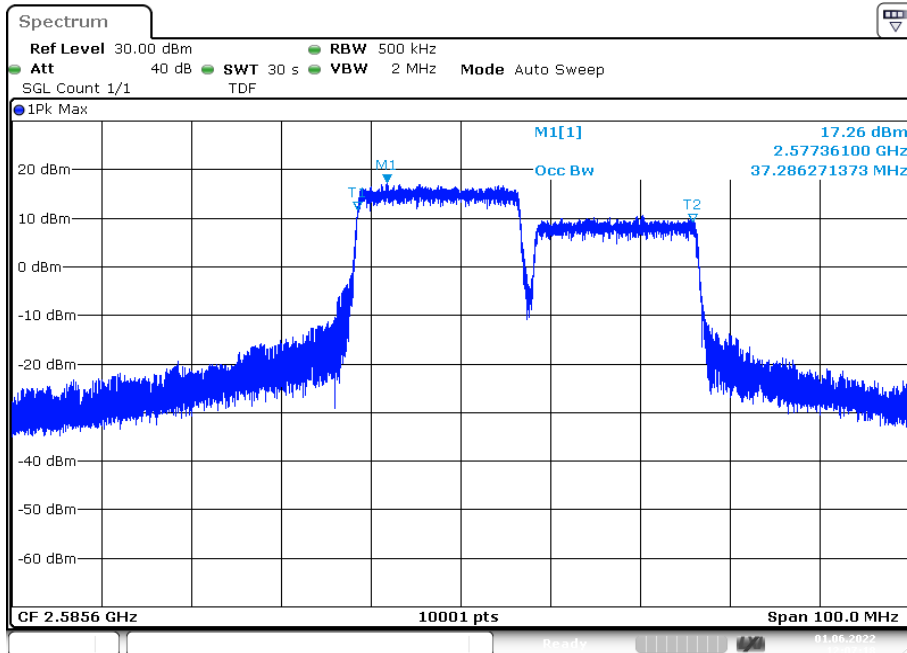
Plot 13: 20 MHz + 15 MHz– QPSK - middle channel (99% - OBW)



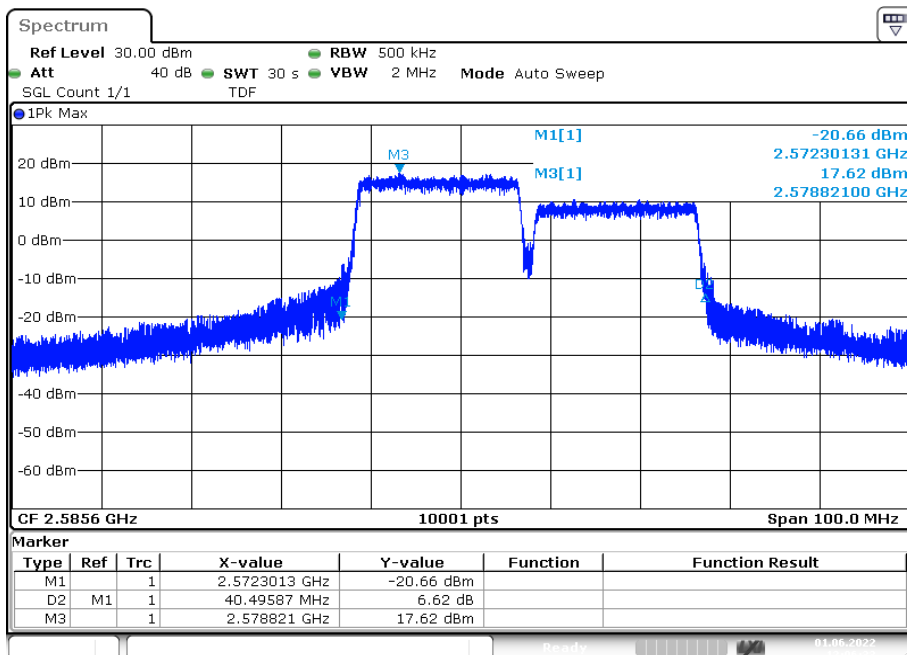
Plot 14: 20 MHz + 15 MHz– QPSK - middle channel (-26 dBc BW)



Plot 15: 20 MHz + 20 MHz– QPSK - middle channel (99% - OBW)



Plot 16: 20 MHz + 20 MHz– QPSK - middle channel (-26 dBc BW)



12 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

13 Document history

Version	Applied changes	Date of release
-/-	Initial release	2022-06-01

14 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  Ralf Eigner
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 back.

Deutsche Akkreditierungsstelle GmbH

Office Berlin
Spittelmarkt 10
10117 Berlin

Office Frankfurt am Main
Europa-Allee 52
60527 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-12076-01-05e.pdf>

or

https://ctcadvanced.com/app/uploads/2020/06/D-PL-12076-01-05_TCB_USA.pdf

END OF TEST REPORT