Bundesnetzagentur

BNetzA-CAB-02/21-102

TEST REPORT

Test report no.: 1-6411/18-02-04

DAkkS Deutsche Akkreditierungsstelle D-PL-12076-01-03

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: http://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 (2005) by the Deutsche Akkreditierungsstelle GmbH (DAkkS)
The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate with the registration number: D-PL-12076-01-04 and D-PL-12076-01-05.

Applicant

RSI Video Technologies SA
25 rue Jacobi-Netter
67200 Strasbourg / FRANCE
Phone: +33 3 90 20 66 96
Contact: Geoffroy Eude
e-mail: geoffroy.eude@rsivideotech.com
Phone: +33 3 90 20 66 39

Manufacturer

RSI Video Technologies SA
25 rue Jacobi-Netter
67200 Strasbourg / FRANCE

Test standard/s

FCC - Title 47 CFR Part 24	FCC - Title 47 of the Code of Federal Regulations; Chapter I; Part 24 - Personal communications services
RSS - 133 Issue 6	Spectrum Management and Telecommunications Policy - Radio Standards Specifications, 2 GHz Personal Communication Services

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

Test Item

Kind of test item:	**Alarm panel**
Model name:	**XT640**
FCC ID:	**X46XT08**
IC:	**8816A-XT08**
Frequency:	LTE Band II: 1850 MHz to 1910 MHz
Technology tested:	LTE
Antenna:	internal antenna
Power supply:	4.2 V to 14.4 V DC by battery
Temperature range:	-10°C to +55°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:

cn=Mihail Dorongovskij, o=CTC advanced GmbH, ou=DOR-281116, email=Mihail.Dorongovskij@ctcadvanced.com, c=DE
2019.09.09 17:23:13 +02'00'

Mihail Dorongovskij
Lab Manager
Radio Communications & EMC

Test performed:

cn=Andreas Luckenbill, o=CTC advanced GmbH, ou=LUC-180217, email=andreas.luckenbill@ctcadvanced.com, c=DE
2019.09.09 17:22:39 +02'00'

Andreas Luckenbill
Lab Manager
Radio Communications & EMC

1 Table of contents

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.
The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of CTC advanced GmbH.
The testing service provided by CTC advanced GmbH has been rendered under the current "General Terms and Conditions for CTC advanced GmbH".
CTC advanced GmbH will not be liable for any loss or damage resulting from false, inaccurate, inappropriate or incomplete product information provided by the customer.
Under no circumstances does the CTC advanced GmbH test report include any endorsement or warranty regarding the functionality, quality or performance of any other product or service provided.
Under no circumstances does the CTC advanced GmbH test report include or imply any product or service warranties from CTC advanced GmbH, including, without limitation, any implied warranties of merchantability, fitness for purpose, or non-infringement, all of which are expressly disclaimed by CTC advanced GmbH.
All rights and remedies regarding vendor's products and services for which CTC advanced GmbH has prepared this test report shall be provided by the party offering such products or services and not by CTC advanced GmbH.
In no case this test report can be considered as a Letter of Approval.

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.

2.2 Application details

Date of receipt of order:	2018-05-28
Date of receipt of test item:	2018-05-29
Start of test:	2018-05-29
End of test:	2019-07-12
Person(s) present during the test:	-/-

2.3 Test laboratories sub-contracted

None

3 Test standard/s and references

Test standard	Date	Description
FCC - Title 47 CFR Part 24	-/-	FCC - Title 47 of the Code of Federal Regulations; Chapter I; Part 24 - Personal communications services
RSS - 133 Issue 6	January 2018	Spectrum Management and Telecommunications Policy - Radio Standards Specifications, 2 GHz Personal Communication 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
Power Meas License Systems: KDB 971168 D01	v03r01	Measurement Guidance for Certification of Licensed Digital Transmitters

4 Test environment

Temperature	:	T_{nom} T_{max} T_{min}	+20 °C during room temperature tests No tests under extreme temperature conditions performed No tests under extreme temperature conditions performed
Relative humidity content	:		55 %
Barometric pressure	:		1021 hpa
Power supply	:	V_{nom} V_{max} V_{min}	12.0 V DC by battery No tests under extreme voltage conditions performed No tests under extreme voltage conditions performed

5 Test item

5.1 General description

Kind of test item	:	Alarm panel
Type identification	:	XT640
HMN	:	-/-
PMN	:	XT640
HVIN	:	XT640
FVIN	:	-/-
S/N serial number	:	F5C01219EF0A0006
Hardware status	:	5CA1299D-0A2 (Motherboard) 5CA0775A-0b (Input/Output board)
Software status	:	V.04.04.8T.028D
Firmware status	:	-/-
Frequency band	:	LTE Band II: 1850 MHz to 1910 MHz lowest frequency: 1850.7 MHz; highest frequency: 1909.3 MHz
Type of radio transmission Use of frequency spectrum	: :	OFDM
Type of modulation	:	QPSK, 16 – QAM
Antenna	:	internal antenna
Power supply	:	4.2 V to 14.4 V DC by battery
Temperature range	:	-10°C to +55°C

5.2 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: 1-6411/18-02-01_AnnexA
1-6411/18-02-01_AnnexB
1-6411/18-02-01_AnnexD

6 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).

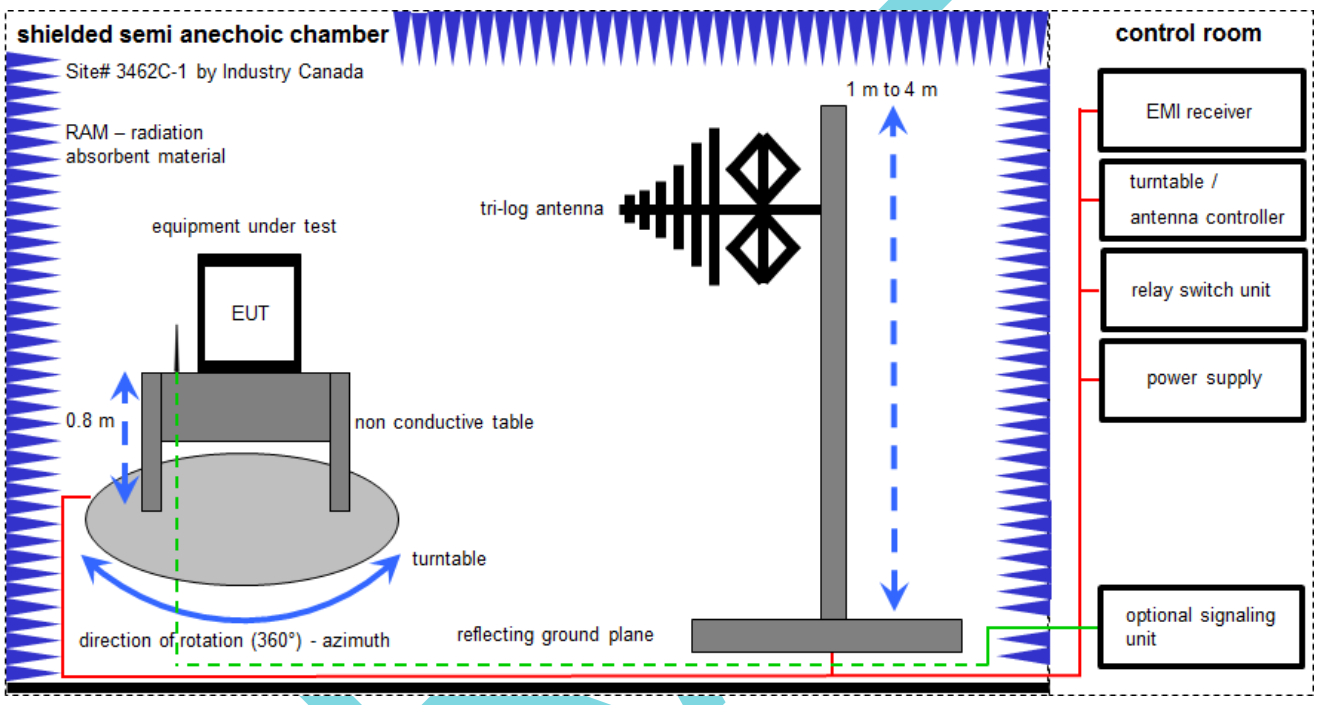
In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Lab/Item).

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
vlkl!	Attention: extended calibration interval		
NK!	Attention: not calibrated	*)	next calibration ordered / currently in progress

6.1 Shielded semi anechoic chamber

The radiated measurements are performed in vertical and horizontal plane in the frequency range from 30 MHz to 1 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber. The receiving antennas are conform to specifications ANSI C63. These antennas can be moved over the height range between 1.0 m and 4.0 m in order to search for maximum field strength emitted from EUT. The measurement distances between EUT and receiving antennas are indicated in the test setups for the various frequency ranges. For each measurement, the EUT is rotated in all three axes until the maximum field strength is received. The wanted and unwanted emissions are received by spectrum analyzers where the detector modes and resolution bandwidths over various frequency ranges are set according to requirement ANSI C63.



Measurement distance: tri-log antenna 10 meter
EMC32 software version: 10.30.0

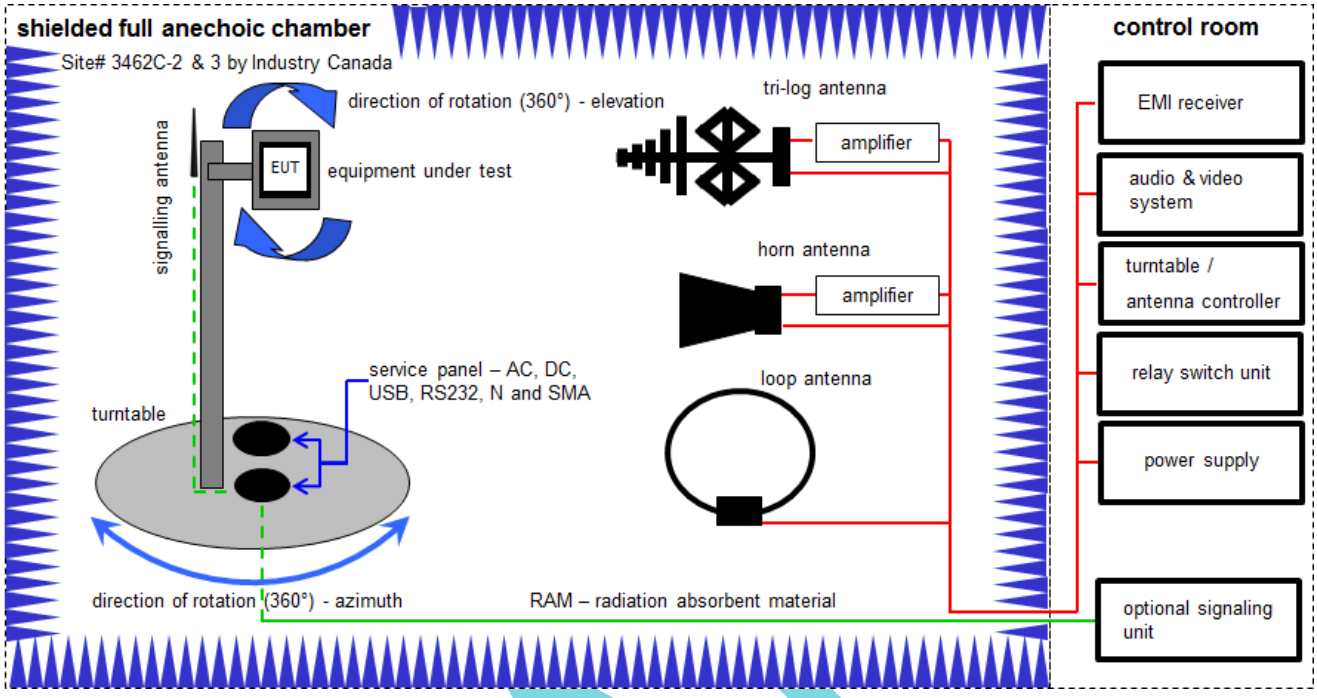
FS = UR + CL + AF
(FS-field strength; UR-voltage at the receiver; CL-loss of the cable; AF-antenna factor)

Example calculation:
FS [dBµV/m] = 12.35 [dBµV/m] + 1.90 [dB] + 16.80 [dB/m] = 31.05 [dBµV/m] (35.69 µV/m)

Equipment table:

No.	Lab / Item	Equipment	Type	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	A	Wideband Radio Communication Tester	CMW500	R&S	102375	300004187	k	11.01.2018	10.01.2020
2	A	Switch-Unit	3488A	HP	2719A14505	300000368	ev	-/-	-/-
3	A	Meßkabine 1	HF-Absorberhalle	MWB AG 300023	-/-	300000551	ne	-/-	-/-
4	A	EMI Test Receiver	ESCI 3	R&S	100083	300003312	k	15.12.2017 12.12.2018	14.12.2018 11.12.2019
5	A	Antenna Tower	Model 2175	ETS-Lindgren	64762	300003745	izw	-/-	-/-
6	A	Positioning Controller	Model 2090	ETS-Lindgren	64672	300003746	izw	-/-	-/-
7	A	Turntable Interface-Box	Model 105637	ETS-Lindgren	44583	300003747	izw	-/-	-/-
8	A	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck Mess - Elektronik	371	300003854	vlKl!	24.11.2017	23.11.2020

6.2 Shielded fully anechoic chamber



Measurement distance: tri-log antenna and horn antenna 3 meter; loop antenna 3 meter

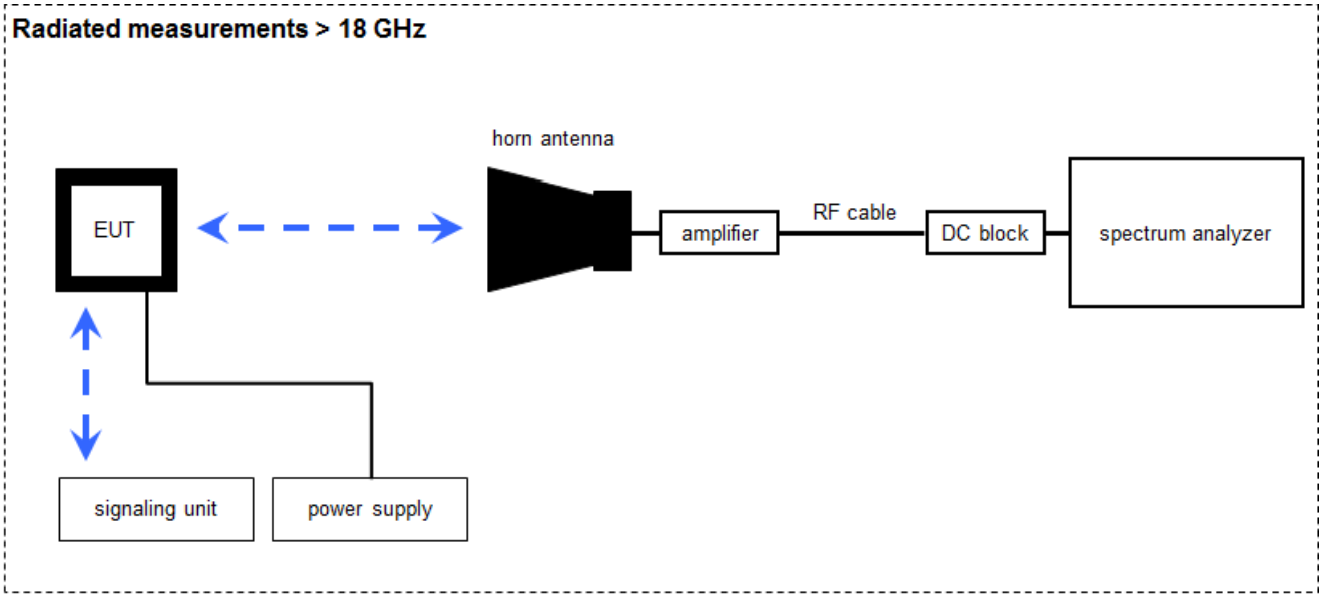
OP = AV + D - G + CA
(OP-radiated output power; AV-analyzer value; D-free field attenuation of measurement distance; G-antenna gain+amplifier gain; CA-loss signal path)

Example calculation:
OP [dBm] = -65.0 [dBm] + 50 [dB] - 20 [dBi] + 5 [dB] = -30 [dBm] (1 µW)

Equipment table:

No.	Lab / Item	Equipment	Type	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	C	Active Loop Antenna 9 kHz to 30 MHz	6502	EMCO	2210	300001015	vlKl!	07.07.2017	06.07.2019
2	A, B, C	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996	ev	-/-	-/-
3	A, B	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	vlKl!	07.07.2017	06.07.2019
4	A, B, C	Switch / Control Unit	3488A	HP	*	300000199	ne	-/-	-/-
5	A	Highpass Filter	WHKX2.9/18G-12SS	Wainwright	1	300003492	ev	-/-	-/-
6	A, B, C	EMI Test Receiver 9kHz-26,5GHz	ESR26	R&S	101376	300005063	k	14.12.2017 19.12.2018	13.12.2018 18.12.2019
7	A	Highpass Filter	WHK1.1/15G-10SS	Wainwright	3	300003255	ev	-/-	-/-
8	A	Highpass Filter	WHKX7.0/18G-8SS	Wainwright	19	300003790	ne	-/-	-/-
9	A	Broadband Amplifier 0.5-18 GHz	CBLU5184540	CERNEX	22049	300004481	ev	-/-	-/-
10	A, B, C	4U RF Switch Platform	L4491A	Agilent Technologies	MY50000037	300004509	ne	-/-	-/-
11	A, B, C	NEXIO EMV-Software	BAT EMC V3.16.0.49	EMCO	-/-	300004682	ne	-/-	-/-
12	A, B, C	PC	ExOne	F+W	-/-	300004703	ne	-/-	-/-
13	A, B ,C	Wideband Radio Communication Tester	CMW500	R&S	102375	300004187	k	11.01.2018	10.01.2020

6.3 Radiated measurements > 18 GHz



Measurement distance: horn antenna 50 cm

OP = AV + D - G + CA
(OP-radiated output power; AV-analyzer value; D-free field attenuation of measurement distance; G-antenna gain+amplifier gain; CA-loss signal path)

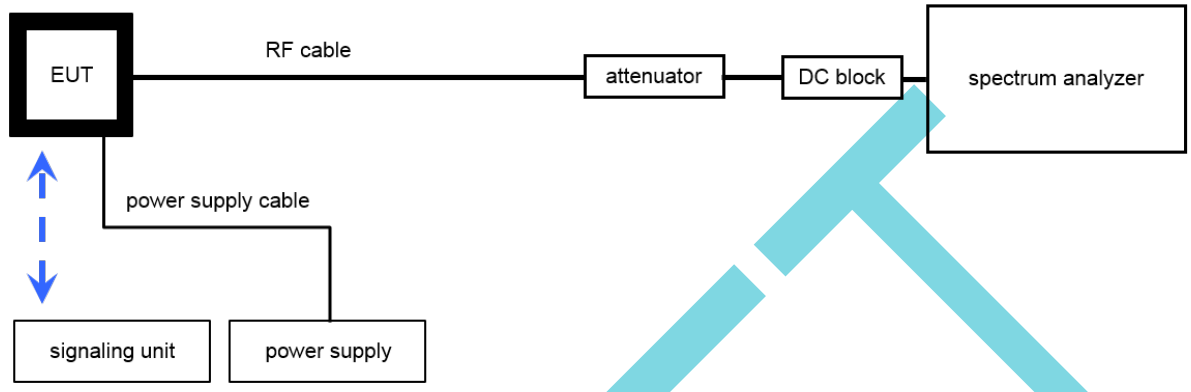
Example calculation:
OP [dBm] = -65.0 [dBm] + 50.0 [dB] - 20.0 [dBi] + 5.0 [dB] = -30 [dBm] (1 µW)

Equipment table:

No.	Lab / Item	Equipment	Type	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	A	Microwave System Amplifier, 0.5-26.5 GHz	83017A	HP	00419	300002268	ev	-/-	-/-
2	A	Std. Gain Horn Antenna 18.0-26.5 GHz	638	Narda	01096	300000486	vlKl!	13.12.2017	12.12.2019
3	A	Signal Analyzer 40 GHz	FSV40	R&S	101042	300004517	k	17.12.2018	16.12.2019
4	A	RF-Cable	ST18/SMAm/SMAm/48	Huber & Suhner	Batch no. 600918	400001182	ev	-/-	-/-
5	A	RF-Cable	ST18/SMAm/SMAm/48	Huber & Suhner	Batch no. 127377	400001183	ev	-/-	-/-
6	A	DC-Blocker 0.1-40 GHz	8141A	Inmet	-/-	400001185	ev	-/-	-/-
7	A	Wideband Radio Communication Tester	CMW500	R&S	102375	300004187	k	11.01.2018	10.01.2020

6.4 Conducted measurements

Conducted measurements normal 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.	Lab / Item	Equipment	Type	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	A	Hygro-Thermometer	-/-, 5-45°C, 20-100%rF	Thies Clima	-/-	400000108	ev	11.05.2018	10.05.2020
2	A	Wideband Radio Communication Tester	CMW500	R&S	102375	300004187	k	11.01.2018	10.01.2020
3	A	Signal Analyzer 40 GHz	FSV40	R&S	101042	300004517	k	17.12.2018	16.12.2019
4	A	PC Tester R005	Intel Core i3 3220/3,3 GHz, Prozessor	-/-	2V2403033A4523	300004589	ne	-/-	-/-
5	A	Teststand	Teststand Custom Sequence Editor	National Instruments GmbH	-/-	300004590	ne	-/-	-/-
6	A	Resistive Power Dividers, DC-40 GHz, 1W	1575	MRC COMPONENTS	-/-	300004671	ne	-/-	-/-
7	A	USB-GPIB-Adapter	GPIB-USB-HS	National Instruments	1829974	400001136	ne	-/-	-/-
8	A	RF-Cable	ST18/SMAm/SMAm/72	Huber & Suhner	Batch no. 699714	400001184	ev	-/-	-/-
9	A	DC-Blocker 0.1-40 GHz	8141A	Inmet	-/-	400001185	ev	-/-	-/-
10	A	Synchron Power Meter	SPM-4	CTC	1	300005580	ev	-/-	-/-
11	A	RF-Cable	ST18/SMAm/SMAm/36	Huber & Suhner	Batch no. 601494	400001309	ev	-/-	-/-

7 Measurement uncertainty

Measurement uncertainty	
Test case	**Uncertainty**
RF output power conducted	± 1 dB
RF output power radiated	± 3 dB
Frequency stability	± 20 Hz
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
Spurious emissions conducted	± 3 dB
Block edge compliance	± 3 dB
Occupied bandwidth	± RBW

8 Summary of measurement results

☐	No deviations from the technical specifications were ascertained
☐	There were deviations from the technical specifications ascertained
☒	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	CFR Part 24 RSS 133	See table	2019-09-09	partial test only

8.1 LTE band II

Test Case	temperature conditions	power source voltages	C	NC	NA	NP	Remark
RF Output Power	Nominal	Nominal	☒	☐	☐	☐	-/-
Frequency Stability	Nominal	Extreme	☐	☐	☐	☒	partial test only
Frequency Stability	Extreme	Nominal	☐	☐	☐	☒	partial test only
Spurious Emissions Radiated	Nominal	Nominal	☒	☐	☐	☐	-/-
Spurious Emissions Conducted	Nominal	Nominal	☐	☐	☐	☒	partial test only
Block Edge Compliance	Nominal	Nominal	☐	☐	☐	☒	partial test only
Occupied Bandwidth	Nominal	Nominal	☐	☐	☐	☒	partial test only

Notes:

C	Compliant	**NC**	Not compliant	**NA**	Not applicable	**NP**	Not performed

9 RF measurements

9.1 Results LTE band II

The EUT was set to transmit at the maximum power.

9.1.1 RF output power

Description:

This paragraph contains EIRP average power measurements for the mobile station.

Measurement:

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

To determine the Peak-To-Average Power Ratio (PAPR) the measurement was performed with the Power Complementary Cumulative Distribution Function (CCDF).

Measurement parameters	
Detector:	Sample
AQT:	Auto
Resolution bandwidth:	40 MHz
Used equipment:	See chapter 6.2 – B & 6.4 – A
Measurement uncertainty:	See chapter 8

Limits:

FCC	IC
CFR Part 24.232 CFR Part 2.1046	RSS 133, Issue 6, Section 6.4
+33.00 dBm In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.	

Results:

Output Power (conducted)						
Bandwidth (MHz)	**Frequency (MHz)**	**Resource block allocation**	**Average Output Power (dBm) QPSK**	**Peak to Average Ratio (dB)**	**Average Output Power (dBm) 16-QAM**	**Peak to Average Ratio (dB)**
1.4	1850.7	1 RB low	21.5	5.4	20.9	6.2
		1 RB mid	21.5	5.4	20.9	6.2
		1 RB high	21.6	5.3	20.9	6.2
		50% RB low	21.6	5.1	20.7	6.1
		50% RB mid	21.6	5.2	20.8	6.1
		50% RB high	21.6	5.2	20.7	6.2
		100% RB	20.6	5.4	19.6	6.3
	1880.0	1 RB low	21.8	5.2	21.0	5.9
		1 RB mid	21.8	5.2	21.0	5.9
		1 RB high	21.8	5.0	21.0	5.8
		50% RB low	21.8	5.1	20.9	6.1
		50% RB mid	21.8	5.1	20.8	6.0
		50% RB high	21.8	5.1	20.9	6.0
		100% RB	20.7	5.2	19.8	6.1
	1909.3	1 RB low	22.0	5.2	21.1	6.3
		1 RB mid	22.0	5.3	21.2	6.3
		1 RB high	22.0	5.3	21.2	6.3
		50% RB low	22.0	5.4	21.0	6.3
		50% RB mid	22.0	5.4	21.1	6.4
		50% RB high	21.9	5.4	21.0	6.3
		100% RB	20.9	5.6	20.1	6.4
3	1851.5	1 RB low	21.6	5.1	-30.4	8.8
		1 RB mid	21.6	5.3	20.9	6.3
		1 RB high	21.5	5.3	20.7	6.1
		50% RB low	20.6	5.4	19.7	6.2
		50% RB mid	20.6	5.4	19.7	6.3
		50% RB high	20.7	5.4	19.7	6.3
		100% RB	20.6	5.4	19.7	6.4
	1880.0	1 RB low	21.8	5.0	21.1	5.7
		1 RB mid	21.7	5.2	21.2	5.9
		1 RB high	21.7	4.9	21.0	5.6
		50% RB low	20.8	5.2	20.0	6.1
		50% RB mid	20.8	5.2	19.9	6.1

		50% RB high	20.8	5.2	19.9	6.0
		100% RB	20.8	5.2	19.8	6.1
	1908.5	1 RB low	21.9	5.0	21.1	5.7
		1 RB mid	22.0	5.2	21.1	6.2
		1 RB high	21.9	5.2	21.1	6.1
		50% RB low	20.9	5.2	20.0	6.1
		50% RB mid	20.9	5.4	19.9	6.2
		50% RB high	20.9	5.5	20.0	6.3
		100% RB	20.9	5.4	20.0	6.3
5	1852.5	1 RB low	21.6	5.1	20.9	6.0
		1 RB mid	21.6	5.3	20.9	6.1
		1 RB high	21.5	5.4	20.7	6.4
		50% RB low	20.6	5.3	19.7	6.2
		50% RB mid	20.6	5.4	19.7	6.2
		50% RB high	20.5	5.4	19.7	6.3
		100% RB	20.5	5.4	19.6	6.3
	1880.0	1 RB low	21.9	5.2	21.1	6.0
		1 RB mid	21.8	5.1	20.9	6.0
		1 RB high	21.6	5.1	20.8	6.0
		50% RB low	20.8	5.2	19.9	6.0
		50% RB mid	20.8	5.2	19.9	6.0
		50% RB high	20.7	5.1	19.8	5.9
		100% RB	20.8	5.1	19.8	6.0
	1907.5	1 RB low	21.7	5.0	20.9	5.8
		1 RB mid	21.7	5.1	21.2	5.9
		1 RB high	21.8	5.4	21.1	6.3
		50% RB low	20.8	5.1	19.9	6.0
		50% RB mid	20.8	5.2	20.0	6.1
		50% RB high	20.8	5.4	20.0	6.3
		100% RB	20.9	5.2	19.9	6.0
10	1855	1 RB low	21.6	5.1	21.0	5.8
		1 RB mid	21.5	5.5	20.8	6.5
		1 RB high	21.3	5.7	20.7	6.6
		50% RB low	20.6	5.4	19.6	6.3
		50% RB mid	20.5	5.6	19.5	6.5
		50% RB high	20.4	5.7	19.5	6.6
		100% RB	20.5	5.5	19.6	6.4
	1880	1 RB low	22.0	5.1	21.3	5.7
		1 RB mid	21.7	5.0	21.0	5.7

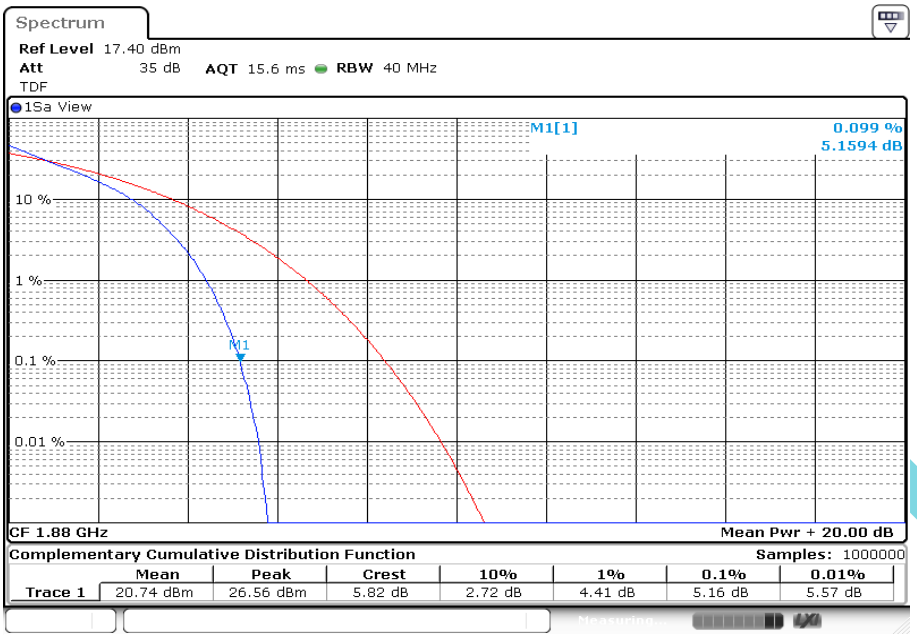
		1 RB high	21.5	5.0	20.8	5.6
		50% RB low	20.9	5.2	20.0	6.1
		50% RB mid	20.8	5.1	19.8	6.0
		50% RB high	20.6	5.1	19.6	6.0
		100% RB	20.7	5.2	19.8	6.0
	1905	1 RB low	21.6	5.5	20.9	6.3
		1 RB mid	21.7	5.0	21.2	5.7
		1 RB high	21.6	5.3	20.9	6.2
		50% RB low	20.7	5.4	19.8	6.3
		50% RB mid	20.7	5.2	19.8	6.1
		50% RB high	20.8	5.1	19.9	6.0
		100% RB	20.7	5.3	19.8	6.1
15	1857.5	1 RB low	21.7	4.9	20.9	5.8
		1 RB mid	21.6	5.7	20.9	6.6
		1 RB high	21.3	5.9	20.6	6.9
		50% RB low	20.6	5.4	19.7	6.2
		50% RB mid	20.5	5.7	19.6	6.5
		50% RB high	20.5	5.8	19.6	6.6
		100% RB	20.5	5.9	19.6	6.6
	1880.0	1 RB low	22.0	5.0	21.1	6.1
		1 RB mid	21.8	4.8	21.0	5.9
		1 RB high	21.4	4.8	20.6	5.9
		50% RB low	21.0	5.1	20.1	6.0
		50% RB mid	20.8	5.1	19.8	6.0
		50% RB high	20.6	5.0	19.6	5.9
		100% RB	20.7	5.3	19.8	6.0
	1902.5	1 RB low	21.7	5.6	20.9	6.6
		1 RB mid	21.7	5.2	21.0	6.1
		1 RB high	21.4	5.2	20.7	6.2
		50% RB low	20.6	5.7	19.7	6.6
		50% RB mid	20.7	5.4	19.7	6.3
		50% RB high	20.6	5.2	19.6	6.1
		100% RB	20.6	5.6	19.7	6.3
20	1860	1 RB low	21.2	5.0	20.6	5.9
		1 RB mid	21.4	5.7	20.8	7.0
		1 RB high	20.9	5.7	20.3	6.8
		50% RB low	20.5	5.5	19.5	6.3
		50% RB mid	20.4	5.9	19.5	6.7
		50% RB high	20.4	5.9	19.4	6.7

		100% RB	20.4	5.8	19.4	6.6
	1880	1 RB low	21.5	5.2	20.9	6.0
		1 RB mid	21.7	4.9	21.0	5.8
		1 RB high	20.8	5.2	20.2	5.9
		50% RB low	20.9	5.2	19.9	6.1
		50% RB mid	20.6	5.2	19.6	6.0
		50% RB high	20.4	5.2	19.5	5.9
		100% RB	20.6	5.3	19.6	6.1
	1900	1 RB low	21.3	5.2	20.5	6.1
		1 RB mid	21.5	5.6	20.8	6.7
		1 RB high	21.0	5.2	20.3	6.1
		50% RB low	20.6	5.7	19.7	6.6
		50% RB mid	20.5	5.7	19.6	6.6
		50% RB high	20.5	5.3	19.5	6.2
		100% RB	20.4	5.5	19.5	6.4

Output Power (radiated)			
Bandwidth (MHz)	**Frequency (MHz)**	**Average Output Power (dBm) QPSK**	**Average Output Power (dBm) 16-QAM**
1.4	1850.7	23.1	22.4
	1880.0	24.8	24.0
	1909.3	22.8	22.0
3	1851.2	23.1	22.4
	1880.0	24.8	24.2
	1908.5	22.8	21.9
5	1852.5	23.1	22.4
	1880.0	24.9	24.1
	1907.5	22.6	22.0
10	1855.0	23.1	22.5
	1880.0	25.0	24.3
	1905.0	22.5	22.0
15	1857.5	23.2	22.4
	1880.0	25.0	24.1
	1902.5	22.5	21.8
20	1860.0	22.9	22.3
	1880.0	24.7	24.0
	1900.0	22.3	21.6

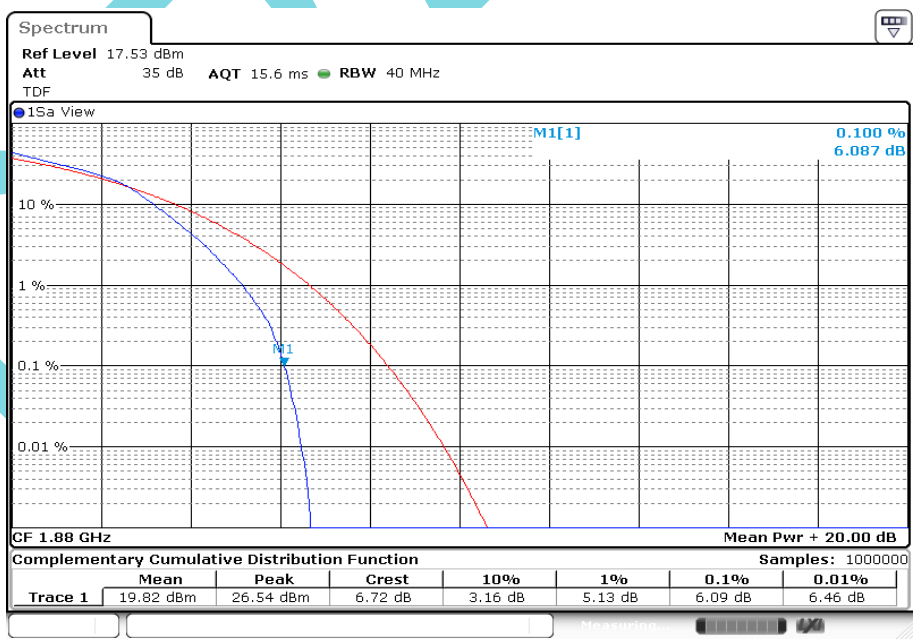
Plots:

Plot 1: CCDF power measurement, 1.4 MHz, QPSK, mid channel, 100% #RB



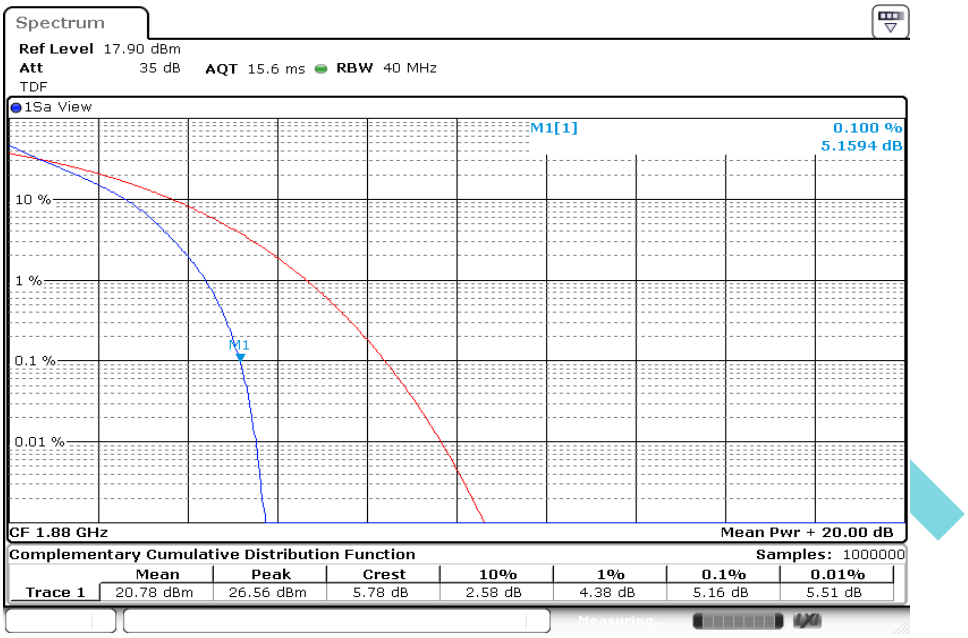
Date: 12.JUL.2019 12:57:48

Plot 2: CCDF power measurement, 1.4 MHz, 16-QAM, mid channel, 100% #RB



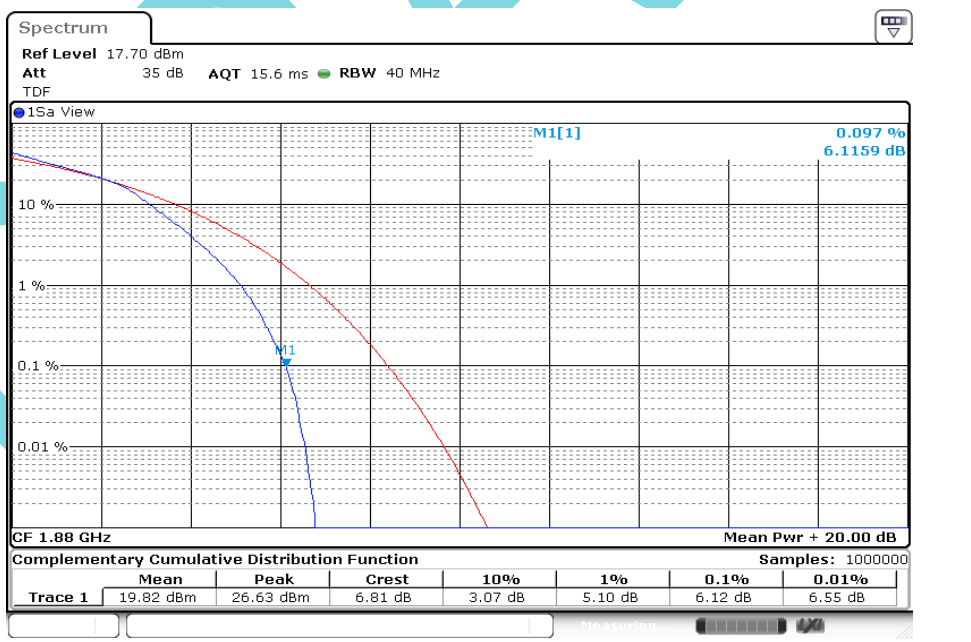
Date: 12.JUL.2019 12:57:55

Plot 3: CCDF power measurement, 3 MHz, QPSK, mid channel, 100% #RB



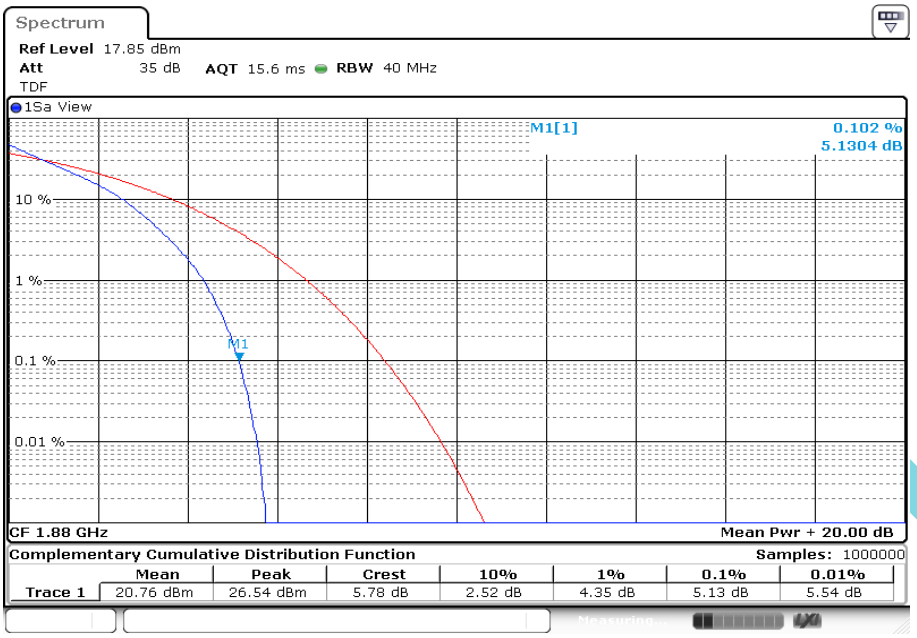
Date: 12.JUL.2019 13:12:33

Plot 4: CCDF power measurement, 3 MHz, 16-QAM, mid channel, 100% #RB



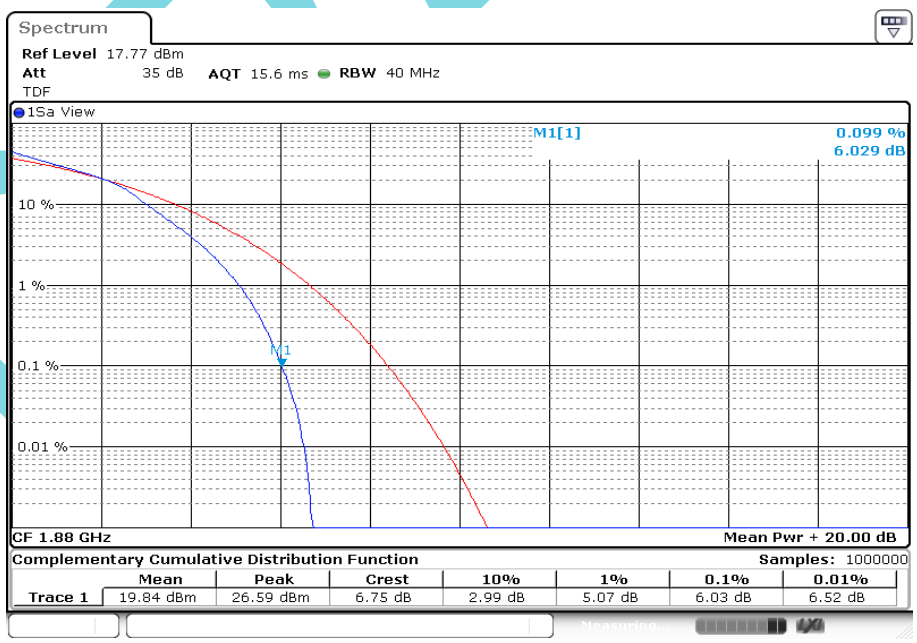
Date: 12.JUL.2019 13:12:42

Plot 5: CCDF power measurement, 5 MHz, QPSK, mid channel, 100% #RB



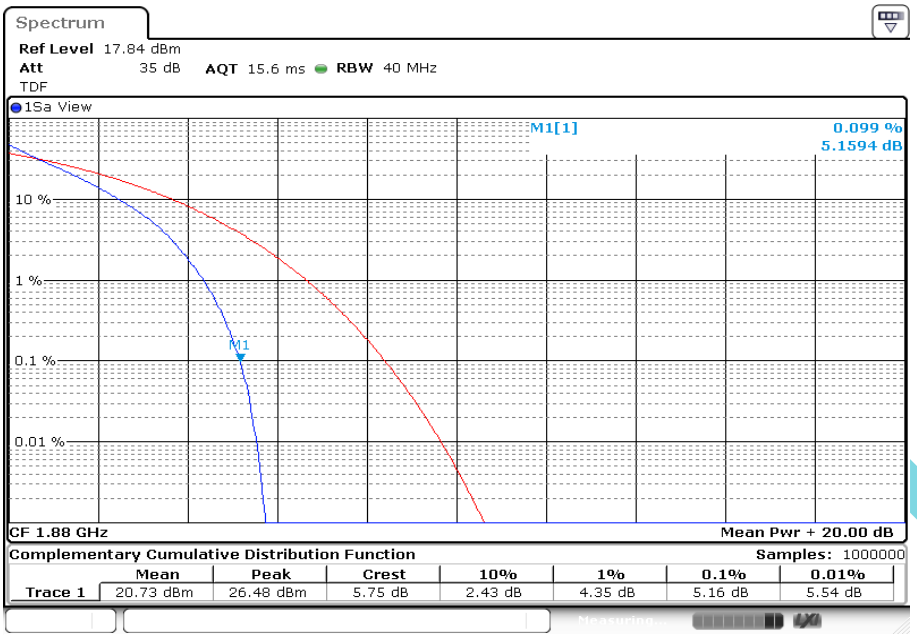
Date: 12.JUL.2019 13:20:29

Plot 6: CCDF power measurement, 5 MHz, 16-QAM, mid channel, 100% #RB

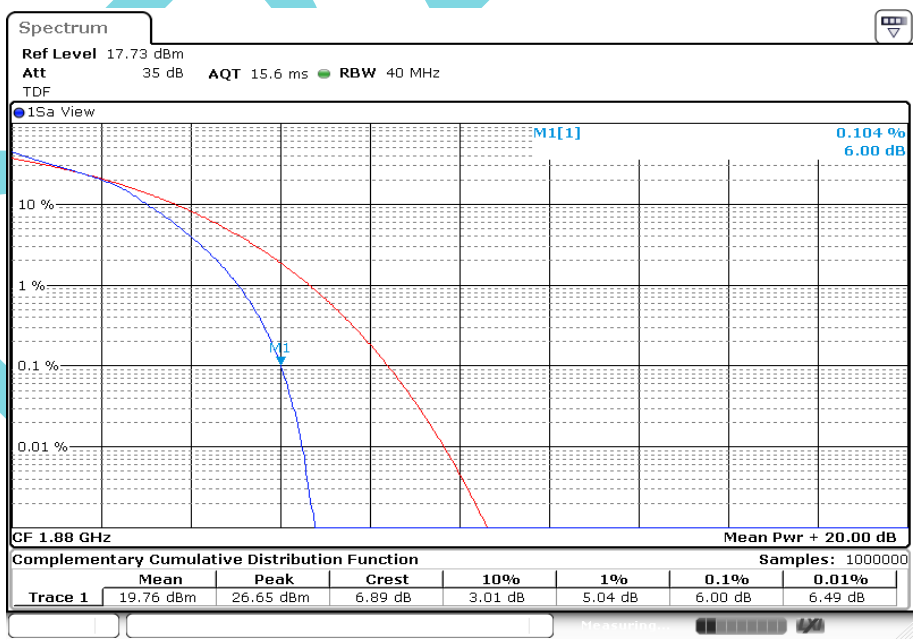


Date: 12.JUL.2019 13:20:36

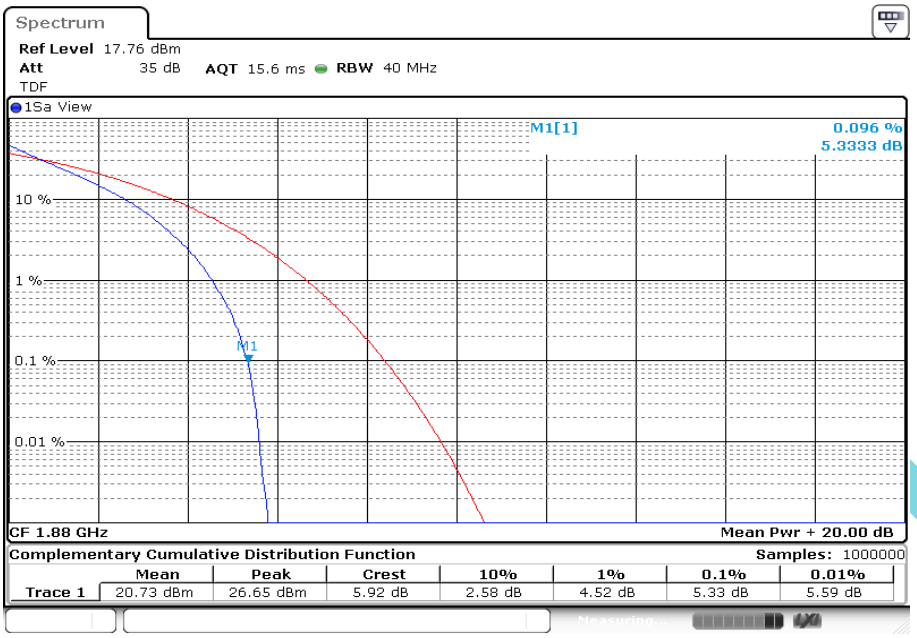
Plot 7: CCDF power measurement, 10 MHz, QPSK, mid channel, 100% #RB



Plot 8: CCDF power measurement, 10 MHz, 16-QAM, mid channel, 100% #RB

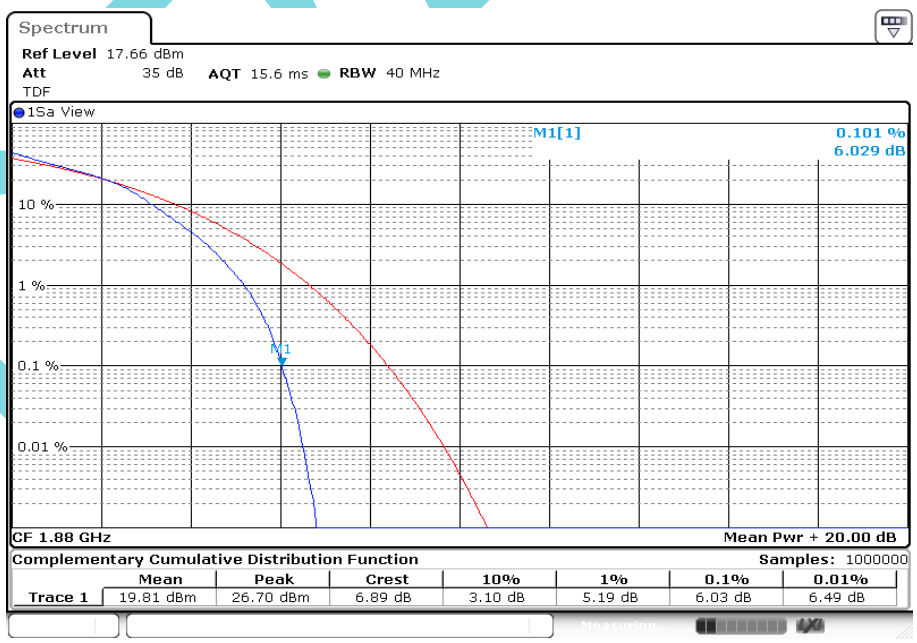


Plot 9: CCDF power measurement, 15 MHz, QPSK, mid channel, 100% #RB



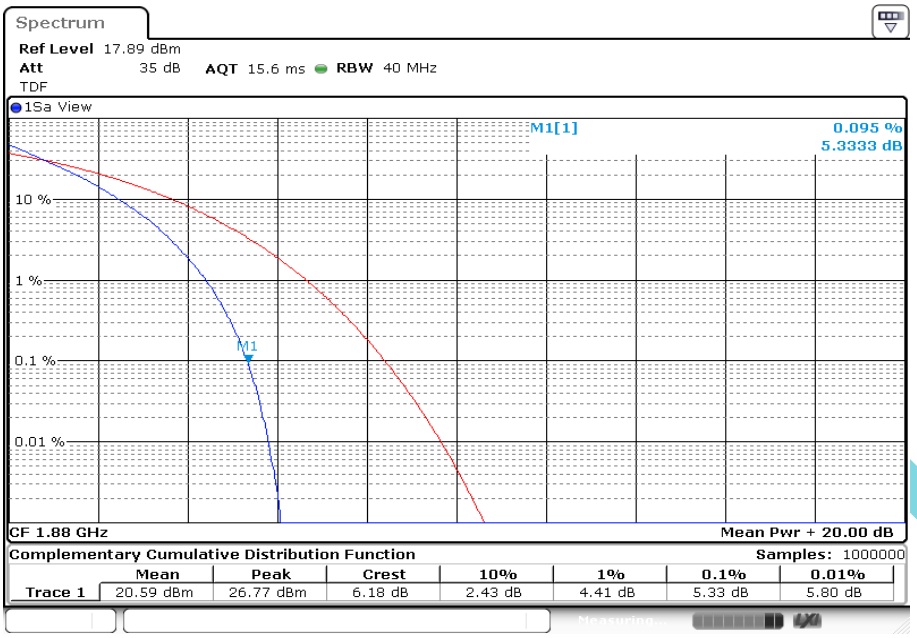
Date: 12.JUL.2019 13:31:05

Plot 10: CCDF power measurement, 15 MHz, 16-QAM, mid channel, 100% #RB



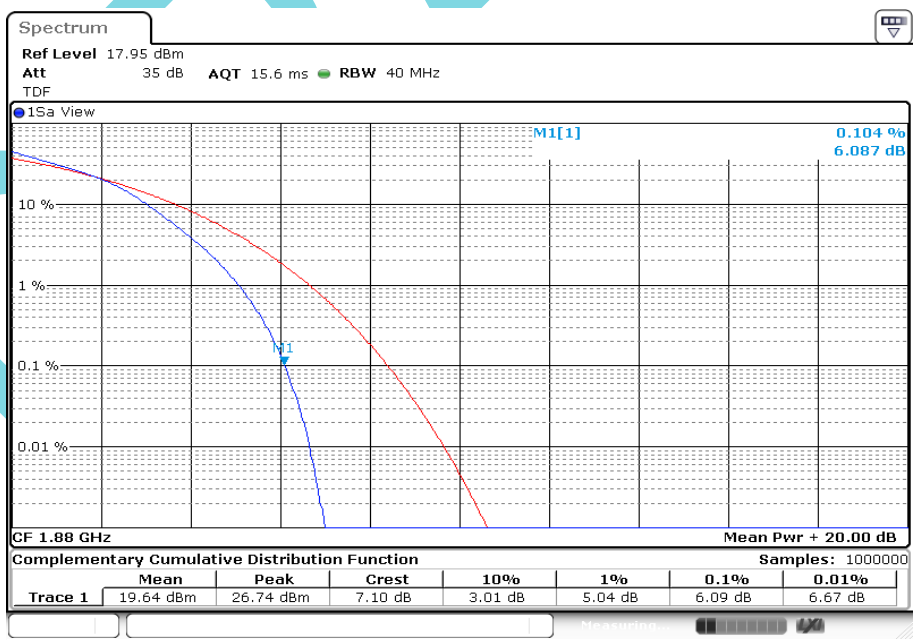
Date: 12.JUL.2019 13:31:12

Plot 11: CCDF power measurement, 20 MHz, QPSK, mid channel, 100% #RB



Date: 12.JUL.2019 13:36:07

Plot 12: CCDF power measurement, 20 MHz, 16-QAM, mid channel, 100% #RB



Date: 12.JUL.2019 13:36:14

9.1.2 Spurious emissions radiated

Description:

Investigation of the spectrum from 9 kHz to 20 GHz.

Measurement:

Measurement parameters	
Detector:	Peak
Sweep time:	2 sec.
Video bandwidth:	3 MHz
Resolution bandwidth:	1 MHz
Span:	100 MHz Steps
Trace mode:	Max Hold
Test setup:	See chapter 6.1 A; 6.2 C & 6.3 A
Measurement uncertainty:	See chapter 8

Limits:

FCC	IC
CFR Part 24.238 CFR Part 2.1053	RSS 133
Spurious Emissions Radiated	
Attenuation ≥ 43 + 10log(P) (P, Power in Watts)	
-13 dBm	

Results:

Radiated emissions measurements were made only at the center carrier frequency of the LTE band 2 (1880 MHz). It was decided that measurements at this carrier frequency would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of the LTE band 2 into any of the other blocks. The equipment must still, however, meet emissions requirements with the carrier at all frequencies over which it is capable of operating and it is the manufacturer's responsibility to verify this.

The final open field radiated levels are presented on the next pages.
All measurements were done in horizontal and vertical polarization; the plots show the worst case.
The plots show only the middle channel. If spurious were detected, the lowest and highest channel were checked too. The found values are stated in the table below.

As can be seen from this data, the emissions from the test item were within the specification limit.

QPSK

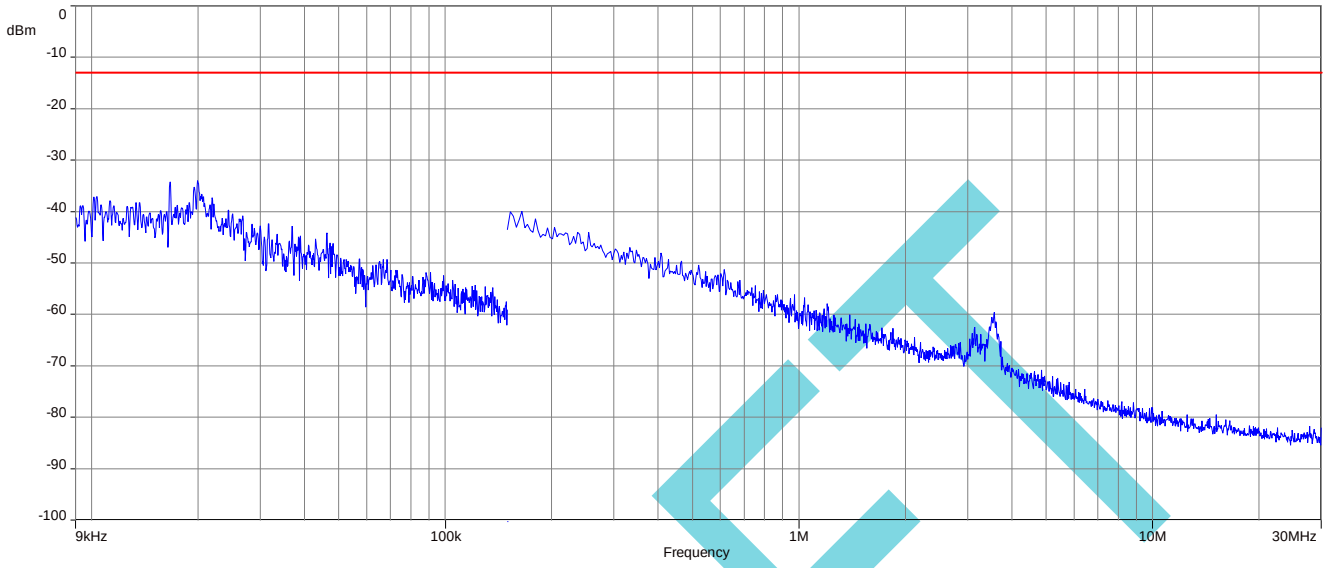
Spurious emission level (dBm)					
Low channel		**Middle channel**		**High channel**	
Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]
All detected emissions are more than 20 dB below the limit.		All detected emissions are more than 20 dB below the limit.		All detected emissions are more than 20 dB below the limit.	
-/-	-/-	-/-	-/-	-/-	-/-
-/-	-/-	-/-	-/-	-/-	-/-
-/-	-/-	-/-	-/-	-/-	-/-
-/-	-/-	-/-	-/-	-/-	-/-
-/-	-/-	-/-	-/-	-/-	-/-
-/-	-/-	-/-	-/-	-/-	-/-
-/-	-/-	-/-	-/-	-/-	-/-

16-QAM

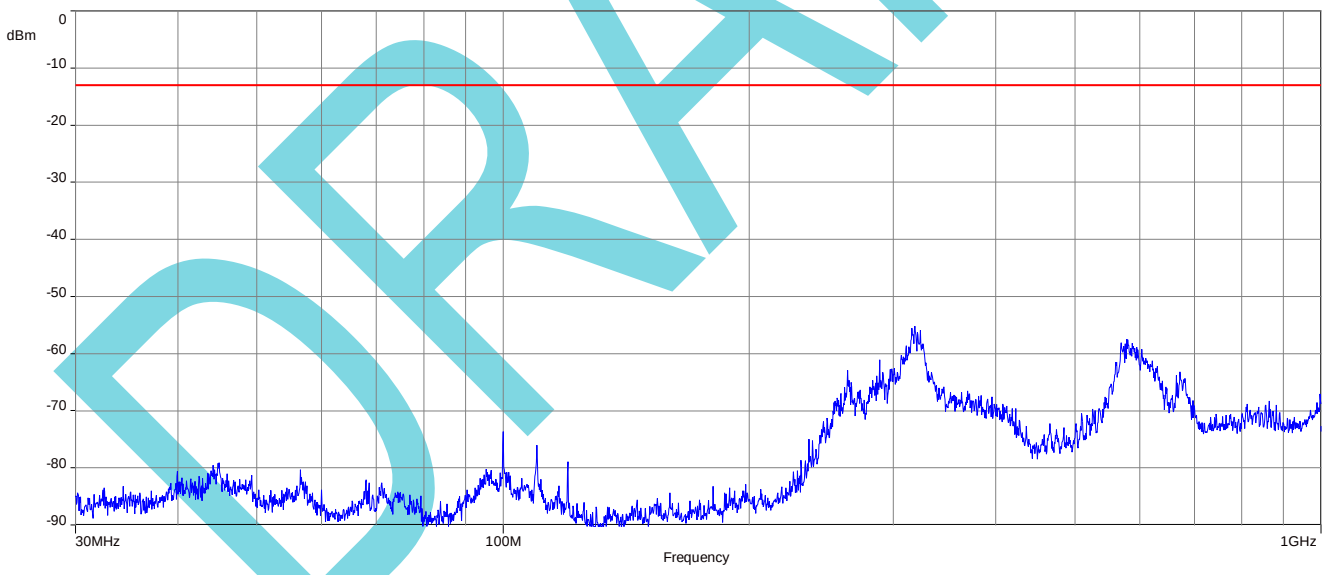
Spurious emission level (dBm)					
Low channel		**Middle channel**		**High channel**	
Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]
All detected emissions are more than 20 dB below the limit.		All detected emissions are more than 20 dB below the limit.		All detected emissions are more than 20 dB below the limit.	
-/-	-/-	-/-	-/-	-/-	-/-
-/-	-/-	-/-	-/-	-/-	-/-
-/-	-/-	-/-	-/-	-/-	-/-
-/-	-/-	-/-	-/-	-/-	-/-
-/-	-/-	-/-	-/-	-/-	-/-
-/-	-/-	-/-	-/-	-/-	-/-
-/-	-/-	-/-	-/-	-/-	-/-

QPSK

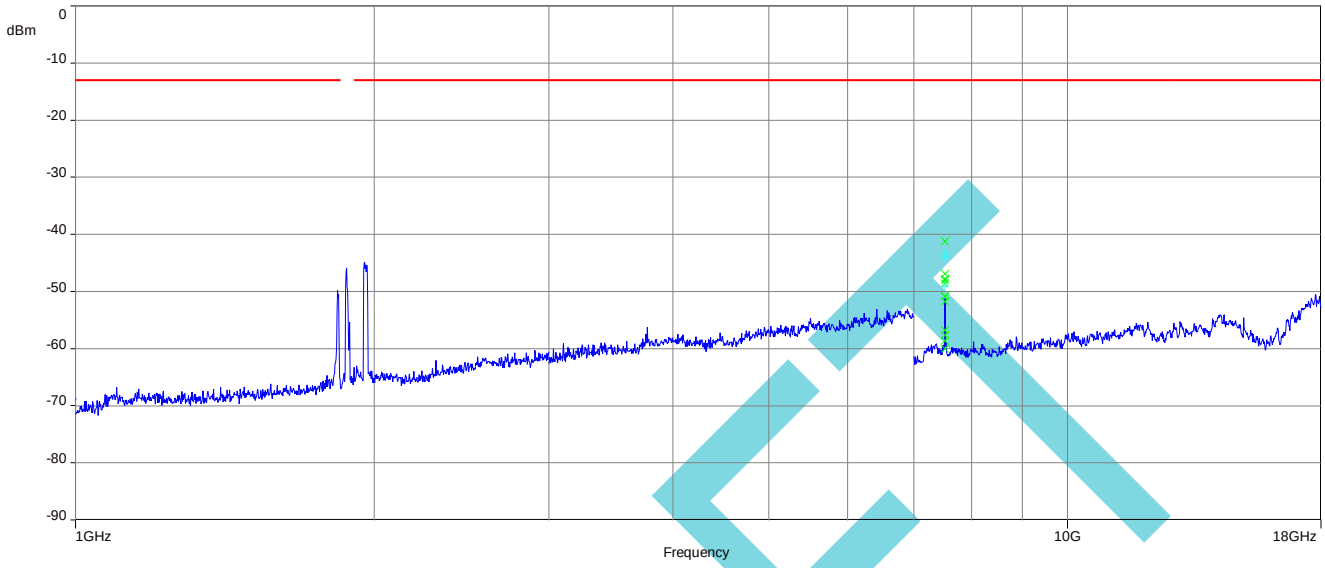
Plot 1: Middle channel, 9 kHz to 30 MHz



Plot 2: Middle channel, 30 MHz to 1 GHz

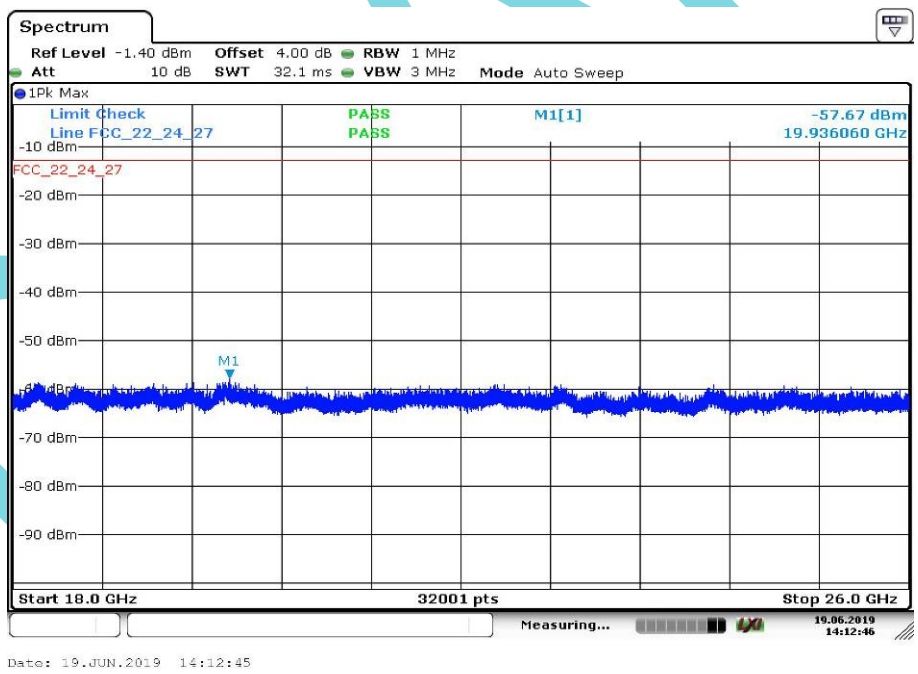


Plot 3: Middle channel, 1 GHz – 18 GHz



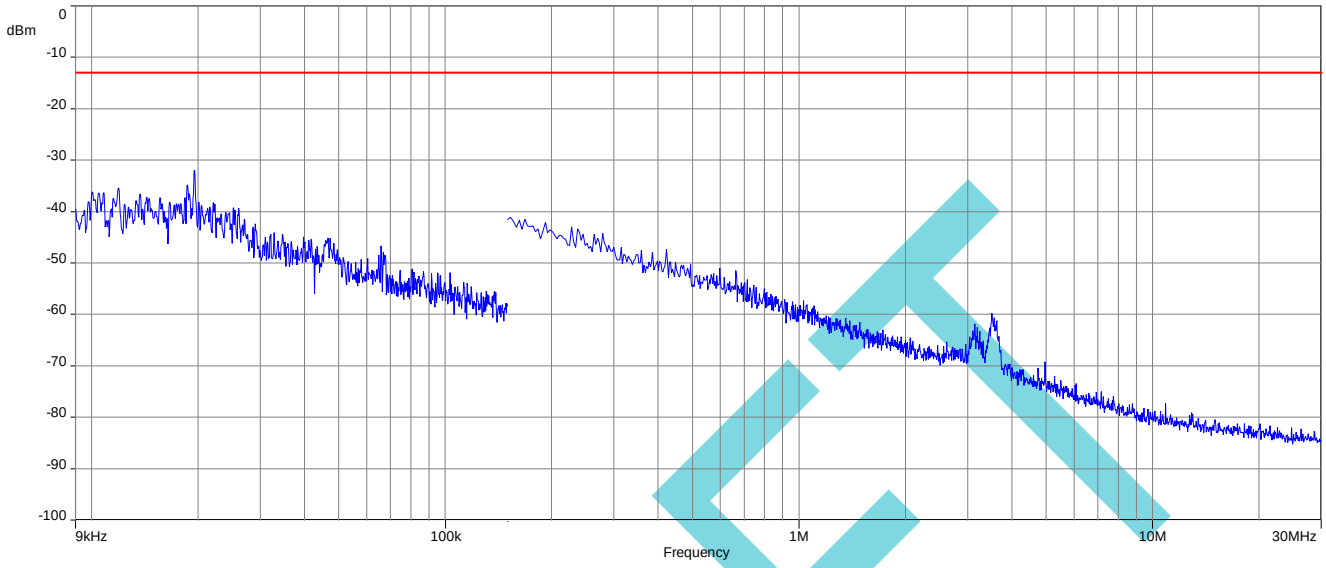
Carrier notched with 1.9 GHz rejection filter

Plot 4: Middle channel, 18 GHz – 26 GHz

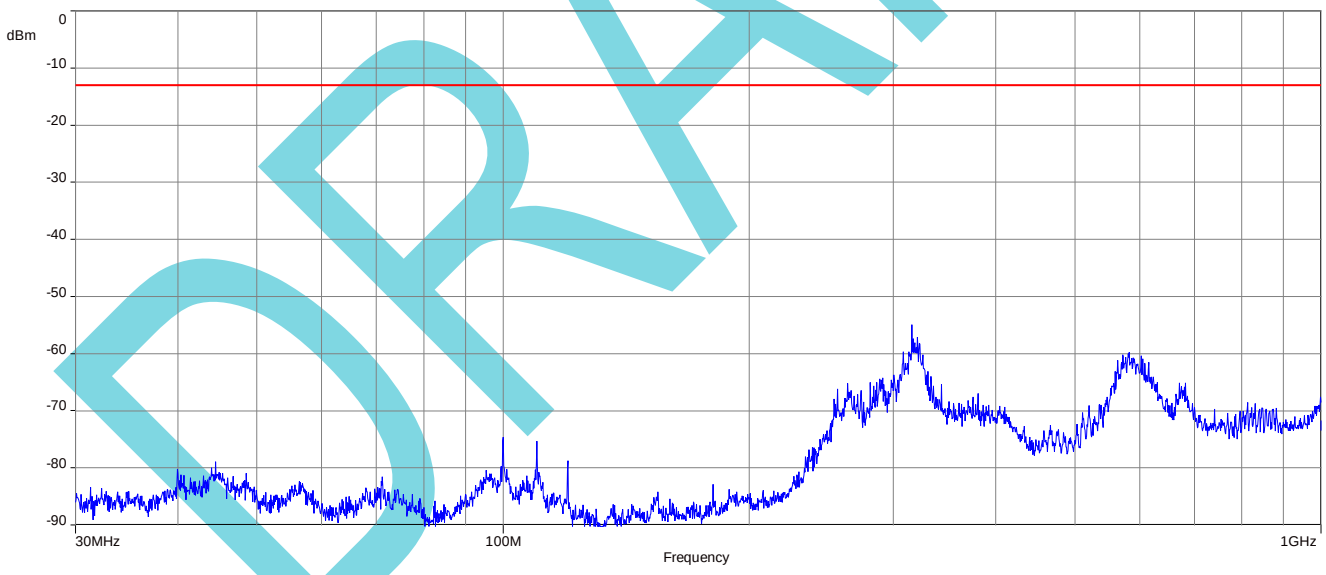


16-QAM:

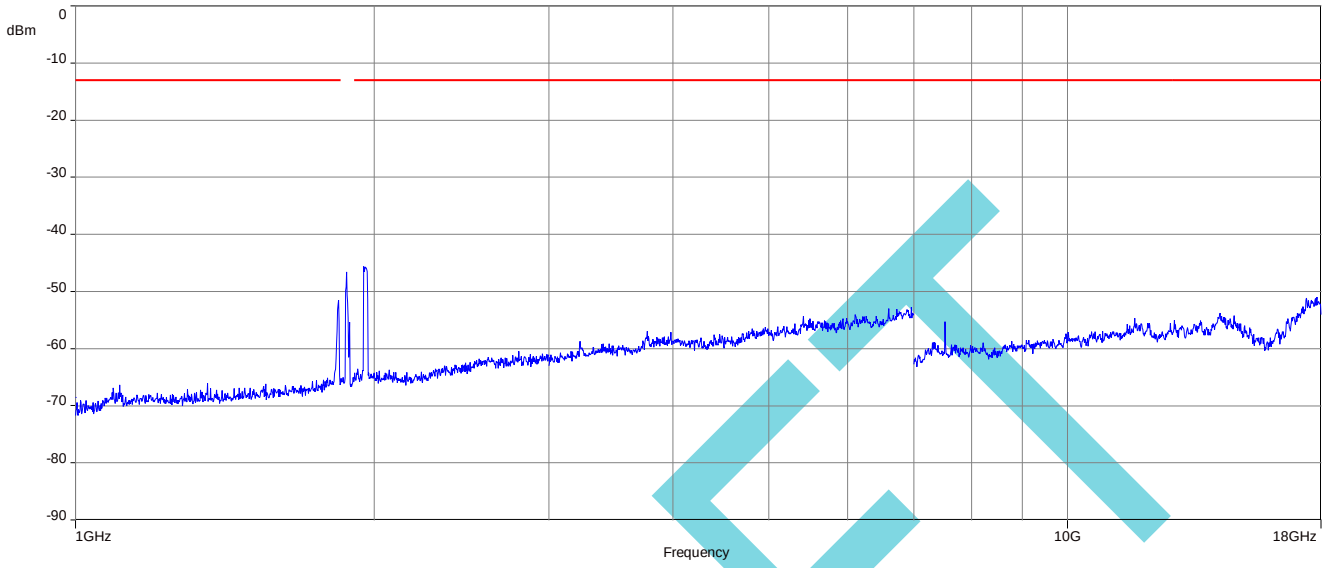
Plot 1: Middle channel, 9 kHz to 30 MHz



Plot 2: Middle channel, 30 MHz to 1 GHz

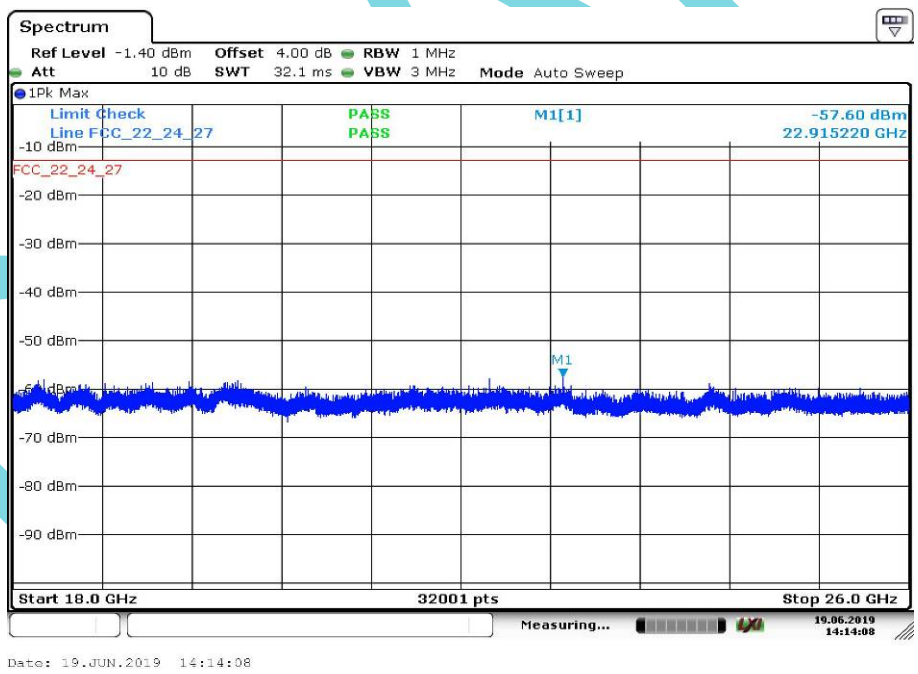


Plot 3: Middle channel, 1 GHz – 18 GHz



Carrier notched with 1.9 GHz rejection filter

Plot 4: Middle channel, 18 GHz – 26 GHz



10 Observations

No observations except those reported with the single test cases have been made.

Annex A 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/N_0	Carrier to noise-density ratio, expressed in dB-Hz

Annex B Document history

Version	Applied changes	Date of release
-/-	Initial release	2019-09-09

Annex C Accreditation Certificate – D-PL-12076-01-04

first page	last page
	

Note: The current certificate annex is published on the website (link see below) of the Accreditation Body DAkkS or may be received by CTC advanced GmbH on request

https://www.dakks.de/as/ast/d/D-PL-12076-01-04.pdf

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

first page	last page
	

DAkkS Deutsche Akkreditierungsstelle

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 17025:2005 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 11.01.2019 with the accreditation number D-PL-12076-01 and is valid until 21.04.2021. It comprises the cover sheet, the reverse side of the cover sheet and the following annex with a total of 5 pages.

Registration number of the certificate: **D-PL-12076-01-05**

Frankfurt am Main, 11.01.2019

Dipl.-Biol. Uwe Zimmermann
Head of Division

See notes overleaf.

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 website (link see below) of the Accreditation Body DAkkS or may be received by CTC advanced GmbH on request

https://www.dakks.de/as/ast/d/D-PL-12076-01-05.pdf

########## END OF TEST REPORT ##########