
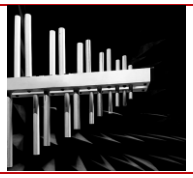
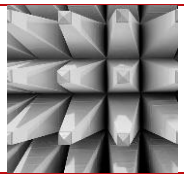

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consulting - testing - certification ➤➤➤

TEST REPORT

Test report no.: 1-8297/14-02-07-B

ilac-MRA DAkkS Deutsche Akkreditierungsstelle D-PL-12076-01-00

Testing laboratory

CETECOM ICT Services GmbH
Untertuerkheimer Strasse 6 – 10
66117 Saarbruecken / Germany
Phone: + 49 681 5 98 - 0
Fax: + 49 681 5 98 - 9075
Internet: http://www.cetecom.com
e-mail: ict@cetecom.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-12076-01-00

Applicant

peiker acustic GmbH & Co. KG
Max-Planck Str. 28-32
61381 Friedrichsdorf / GERMANY
Phone: -/-
Fax: +49 6172 767-220
Contact: Martin Fleckenstein
e-mail: martin.fleckenstein@peiker.de
Phone: +49 6172 767-1379

Manufacturer

peiker acustic GmbH & Co. KG
Max-Planck Str. 28-32
61381 Friedrichsdorf / GERMANY

Test standard/s

47 CFR Part 24	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:	**Advanced Telecommunication module (ATM) Roof Version**
Model name:	**ATM-01 R1-US-4GW**
FCC ID:	**QWY-ATM-R-522**
IC:	**6588A-ATMR522**
Frequency:	LTE FDD 2:1850 MHz to 1910 MHz
Technology tested:	LTE
Antenna:	External antenna
Power supply:	14.0 V DC by external power supply
Temperature range:	-30°C to +60°C

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

Test report authorised:

p.o.
cn=Stefan Boes, o=CETECOM ICT Services GmbH, ou=BOE-111011, email=Stefan.Boes@cetecom.com, c=DE
2015.06.16 15:52:34 +02'00'

Andreas Luckenbill
Radio Communications & EMC

Test performed:

cn=Marco Bertolino, o=CETECOM ICT Services GmbH, ou=BTL-100826, email=marco.bertolino@cetecom.com, c=DE
2015.06.16 16:12:45 +02'00'

Marco Bertolino
Radio Communications & EMC

1 Table of contents

2 General information

2.1 Notes and disclaimer

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2.2 Application details

Date of receipt of order:	2014-12-19
Date of receipt of test item:	2015-02-17
Start of test:	2015-02-27
End of test:	2015-03-07
Person(s) present during the test:	-/-

3 Test standard/s

Test standard	Date	Test standard description
47 CFR Part 24	-/-	Title 47 of the Code of Federal Regulations; Chapter I; Part 24 - Personal communications services
RSS - 133 Issue 6	01.01.2013	Spectrum Management and Telecommunications Policy - Radio Standards Specifications, 2 GHz Personal Communication Services

4 Test environment

Temperature:	T_{nom}	+22 °C	during room temperature tests
	T_{max}	+60 °C	during high temperature tests
	T_{min}	-30 °C	during low temperature tests
Relative humidity content:		42 %	
Barometric pressure:		not relevant for this kind of testing	
Power supply:	V_{nom}	14.0 V	DC by external power supply
	V_{max}	18.0 V	
	V_{min}	4.5 V	

5 Test item

Kind of test item	:	Advanced Telecommunication module (ATM) Roof Version
HVIN	:	ATM-01 R1-US-4GW
PMN	:	ATM roof version
S/N serial number	:	Radiated / conducted unit: 0000506765
HW hardware status	:	112.010.016
SW software status	:	001.017.047
Frequency band	:	LTE FDD 2:1850 MHz to 1910 MHz
Type of modulation	:	QPSK, 16-QAM
Antenna	:	External antenna
Power supply	:	14.0 V DC by external power supply
Temperature range	:	-30°C to +60°C

5.1 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: 1-8297/14-02-01_AnnexA
1-8297/14-02-01_AnnexB
1-8297/14-02-01_AnnexC

6 Test laboratories sub-contracted

None

7 Summary of measurement results

	No deviations from the technical specifications were ascertained
	There were deviations from the technical specifications ascertained
X	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!	2015-06-16	Tests according to manufacturer test plan.

7.1 LTE band II

Test Case	temperature conditions	power source voltages	Pass	Fail	NA	NP	Remark
RF Output Power	Nominal	Nominal	☒	☐	☐	☐	-/-
Frequency Stability	Nominal	Nominal	☐	☐	☐	☒	-/-
Spurious Emissions Radiated	Nominal	Nominal	☒	☐	☐	☐	-/-
Spurious Emissions Conducted	Nominal	Nominal	☐	☐	☐	☒	-/-
Block Edge Compliance	Nominal	Nominal	☒	☐	☐	☐	-/-
Occupied Bandwidth	Nominal	Nominal	☐	☐	☐	☒	-/-

Note: NA = Not applicable; NP = Not performed

8 RF measurements

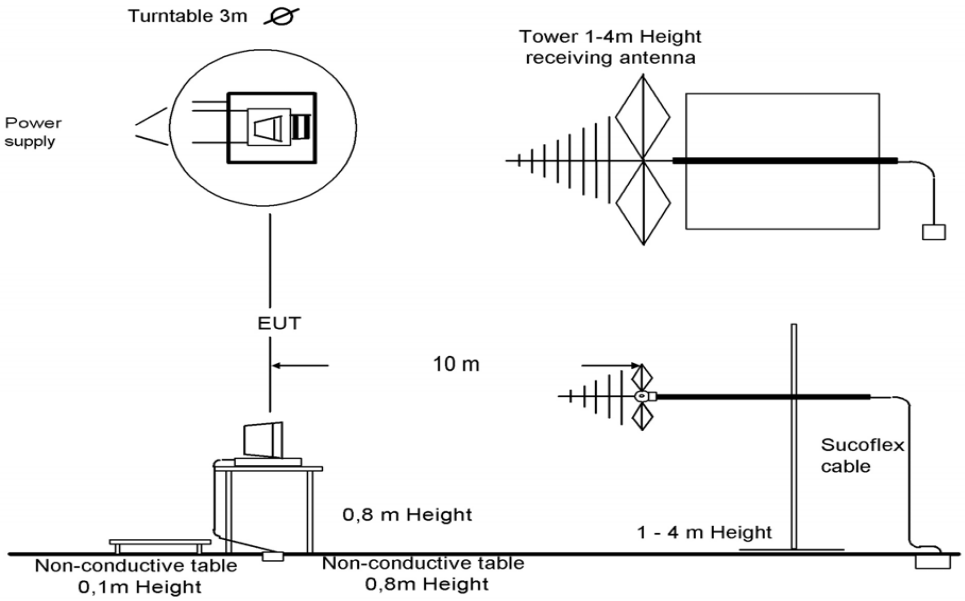
8.1 Description of test setup

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

8.1.1 Radiated measurements

The radiated emissions from the EUT are performed in a semi anechoic chamber. The EUT is placed on a conductive turntable and powered with nominal voltage. The signalling is performed either from outside the chamber with a signalling unit (AP or other) by air link using a signalling antenna or directly by special test software from the customer.

Semi anechoic chamber



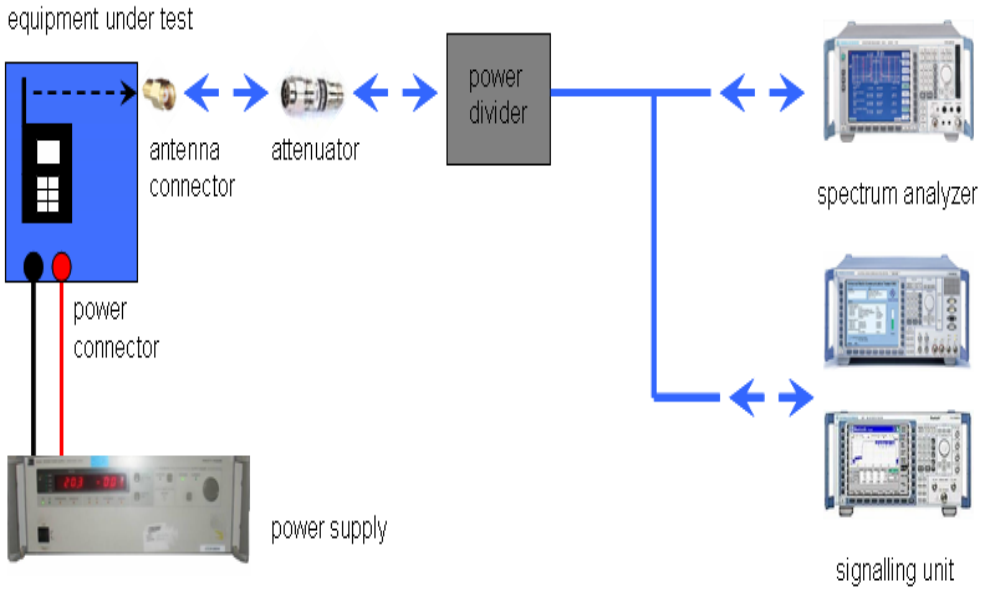
Picture 1: Diagram radiated measurements

9 kHz - 30 MHz:	active loop antenna
30 MHz – 1 GHz:	tri-log antenna
> 1 GHz:	horn antenna

Frequency being measured f	Measuring receiver bandwidth 6 dB	Spectrum analyser bandwidth 3dB
f < 150 kHz	200 Hz or	300 Hz
150 kHz ≤ f < 25 MHz	9 kHz or	10 kHz
25 MHz ≤ f < 1000 MHz	120 kHz or	100 kHz
1000 MHz ≤ f		1 MHz
NOTE: Specific requirements in CEPT/ERC/Recommendation 70-03 [2] shall be applied where applicable.		

8.1.2 Conducted measurements

The EUT's RF signal is coupled out by the antenna connector which is supplied by the manufacturer. The signal is first 10dB attenuated before it is power divided (~6dB loss per branch). One of the signal paths is connected to the signalling unit (AP or other), the other one is connected to the spectrum analyzer. The specific losses for both signal paths are first checked within a calibration. The measurement readings on the signalling unit/spectrum analyzer are corrected by the specific test set-up loss. The attenuator, power divider, signalling unit and the spectrum analyzer are impedance matched on 50 Ohm. If special software is used, there is no power divider necessary.



Picture 2: Diagram conducted measurements

The term measuring receiver refers to either a selective voltmeter or a spectrum analyser.

Frequency being measured f	Measuring receiver bandwidth 6 dB	Spectrum analyser bandwidth 3dB
f < 150 kHz	200 Hz or	300 Hz
150 kHz ≤ f < 25 MHz	9 kHz or	10 kHz
25 MHz ≤ f < 1000 MHz	120 kHz or	100 kHz
1000 MHz ≤ f		1 MHz
NOTE: Specific requirements in CEPT/ERC/Recommendation 70-03 [2] shall be applied where applicable.		

8.2 Results LTE band II

The EUT was set to transmit the maximum power.

8.2.1 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.

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

Measurement parameters	
Detector:	Measured with CMW500
Sweep time:	
Video bandwidth:	
Resolution bandwidth:	
Span:	
Trace-Mode:	

Limits:

FCC	IC
CFR Part 24.232 CFR Part 2.1046	RSS 133, Issue 5, Section 6.4
Nominal Peak Output Power	
+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.	

Used setup acc. chapter 8.1.2.
Used equipment see table chapter 9

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	23.7	4.75	22.8	5.49
		1 RB high	23.7	4.86	22.8	5.58
		50% RB mid	23.6	4.68	22.5	6.20
		100% RB	22.5	5.87	21.4	6.87
	1880.0	1 RB low	23.4	5.68	22.3	4.38
		1 RB high	23.4	5.71	22.3	4.39
		50% RB mid	23.4	6.01	22.5	5.01
		100% RB	22.5	6.49	21.5	6.42
	1909.3	1 RB low	23.2	3.61	21.9	4.93
		1 RB high	23.1	3.54	21.8	4.82
		50% RB mid	23.2	3.92	22.3	4.77
		100% RB	22.2	5.46	21.4	5.83
3	1851.5	1 RB low	23.6	5.56	22.7	4.80
		1 RB high	23.8	5.64	22.8	4.90
		50% RB mid	22.6	6.73	21.3	5.81
		100% RB	22.8	6.52	21.6	6.17
	1880.0	1 RB low	23.0	4.58	21.7	5.84
		1 RB high	23.3	4.53	21.9	5.84
		50% RB mid	22.4	5.84	21.6	6.26
		100% RB	22.3	5.94	21.3	7.08
	1908.5	1 RB low	23.3	5.18	21.9	3.75
		1 RB high	23.1	5.12	21.6	3.60
		50% RB mid	22.2	5.53	21.3	4.73
		100% RB	22.2	5.94	21.3	5.25
5	1852.5	1 RB low	23.5	4.87	22.5	5.03
		1 RB high	23.9	4.89	22.8	5.05
		50% RB mid	22.6	5.79	21.6	6.51
		100% RB	22.5	6.01	21.6	7.07
	1880.0	1 RB low	23.2	5.69	22.0	4.55
		1 RB high	23.6	5.75	22.3	4.51
		50% RB mid	22.3	6.51	21.3	5.78
		100% RB	22.2	7.35	21.2	6.12
	1907.5	1 RB low	23.3	3.76	22.1	5.05
		1 RB high	23.2	3.46	22.0	4.80
		50% RB mid	22.3	4.75	21.3	5.76
		100% RB	22.2	5.39	21.2	6.40

10	1855	1 RB low	23.5	5.62	22.6	4.84
		1 RB high	23.7	5.75	22.8	5.05
		50% RB mid	22.7	6.95	21.6	5.88
		100% RB	22.5	7.15	21.4	6.14
	1880	1 RB low	22.8	4.48	21.5	5.75
		1 RB high	23.5	4.50	22.0	5.87
		50% RB mid	22.2	5.86	21.3	7.01
		100% RB	22.1	6.35	21.1	7.14
	1905	1 RB low	22.8	5.47	21.5	4.06
		1 RB high	23.1	5.13	21.7	3.65
		50% RB mid	22.0	6.31	21.0	5.13
		100% RB	21.9	6.94	20.8	5.82
15	1857.5	1 RB low	23.5	4.91	22.6	5.62
		1 RB high	23.4	5.01	22.3	5.87
		50% RB mid	22.4	6.2	21.5	7.24
		100% RB	22.3	6.52	21.3	7.08
	1880.0	1 RB low	22.7	6.00	21.8	4.65
		1 RB high	23.3	6.16	22.4	4.78
		50% RB mid	22.0	7.08	21.0	5.93
		100% RB	21.9	7.29	20.9	6.25
	1902.5	1 RB low	22.7	4.21	21.5	5.60
		1 RB high	23.0	3.72	21.7	5.15
		50% RB mid	21.8	5.37	20.8	6.38
		100% RB	21.7	6.19	20.8	6.80
20	1860	1 RB low	23.4	6.06	22.6	4.90
		1 RB high	22.9	6.08	22.0	4.87
		50% RB mid	22.3	7.47	21.3	6.30
		100% RB	22.2	7.27	21.2	6.21
	1880	1 RB low	22.6	4.86	21.8	5.70
		1 RB high	23.3	4.82	22.1	5.84
		50% RB mid	22.0	6.06	21.0	7.02
		100% RB	22.0	6.37	21.0	7.14
	1900	1 RB low	23.3	4.96	22.0	4.62
		1 RB high	23.1	4.21	22.3	3.88
		50% RB mid	21.5	6.65	20.6	5.62
		100% RB	21.8	6.88	20.8	5.92
Measurement uncertainty			± 0.5 dB			

The radiated output power is measured in the mode with the highest conducted output power.

Output Power (radiated)			
Bandwidth (MHz)	**Frequency (MHz)**	**Average Output Power (dBm) QPSK**	**Average Output Power (dBm) 16-QAM**
1.4	1850.7	21.3	20.4
	1880.0	20.2	19.3
	1909.3	20.3	19.4
3	1851.5	21.4	20.4
	1880.0	20.1	18.7
	1908.5	20.4	19.0
5	1852.5	21.5	20.4
	1880.0	20.4	19.1
	1907.5	20.4	19.2
10	1855.0	21.3	20.4
	1880.0	20.3	18.8
	1905.0	20.2	18.8
15	1857.5	21.1	20.2
	1880.0	20.1	19.2
	1902.5	20.1	18.8
20	1860.0	21.0	20.2
	1880.0	20.1	18.9
	1900.0	20.4	19.4
Measurement uncertainty		± 3.0 dB	

Verdict: **complies**

8.2.2 Spurious emissions radiated

Description:

The following steps outline the procedure used to measure the radiated emissions from the mobile station. The site is constructed in accordance with ANSI C63.4:2014 requirements and is recognized by the FCC to be in compliance for a 3 and a 10 meter site. The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier that can be as high as 1910 MHz. Measured up to 26 GHz. The resolution bandwidth is set as outlined in Part 24.238. The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of the LTE band II.

The final open field emission (here 10m semi-anechoic chamber listed by FCC) test procedure is as follows:

a) The test item was placed on a 0.8 meter high non-conductive stand at a 3 meter test distance from the receive antenna.
b) The antenna output was terminated in a 50 ohm load (if possible).
c) A double ridged wave guide antenna was placed on an adjustable height antenna mast 3 meters from the test item for emission measurements.
d) Detected emissions were maximized at each frequency by rotating the test item and adjusting the receive antenna height and polarization. The maximum meter reading was recorded. The radiated emission measurements of the harmonics of the transmit frequency through the 10th harmonic were measured with peak detector and 1 MHz bandwidth. If the harmonic could not be detected above the noise floor, the ambient level was recorded. The equivalent power into a dipole antenna was calculated from the field intensity levels measured at 3 meters.
e) Now each detected emissions were substituted by the substitution method, in accordance with the TIA/EIA 603.

Measurement:

Measurement parameters	
Detector:	Peak
Sweep time:	2 sec.
Video bandwidth:	Below 1 GHz: 100 kHz Above 1 GHz: 1 MHz
Resolution bandwidth:	Below 1 GHz: 100 kHz Above 1 GHz: 1 MHz
Span:	100 MHz Steps
Trace-Mode:	Max Hold

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	

Used setup acc. chapter 8.1.1.
Used equipment see table chapter 9

Results:

Radiated emissions measurements were made only at the center carrier frequency of the LTE band II (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 II 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)								
Harmonic	Lowest channel Freq. (MHz)	Level [dBm]	Harmonic	Middle channel Freq. (MHz)	Level [dBm]	Harmonic	Highest channel Freq. (MHz)	Level [dBm]
2	3710.0	-	2	3760.0	-	2	3810.0	-
3	5565.0	-	3	5640.0	-	3	5715.0	-
4	7420.0	-	4	7520.0	-	4	7620.0	-
5	9275.0	-	5	9400.0	-	5	9525.0	-
6	11130.0	-	6	11280.0	-	6	11430.0	-
7	12985.0	-	7	13160.0	-	7	13335.0	-
8	14840.0	-	8	15040.0	-	8	15240.0	-
9	16695.0	-	9	16920.0	-	9	17145.0	-
10	18550.0	-	10	18800.0	-	10	19050.0	-
Measurement uncertainty				± 3dB				

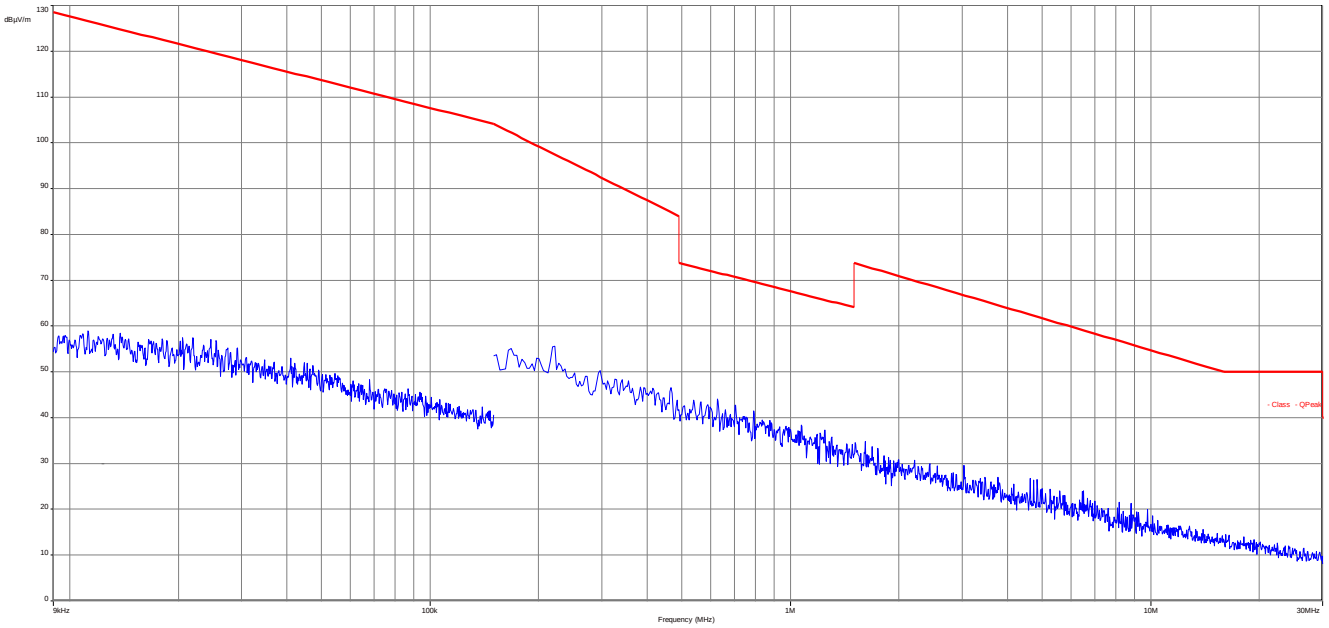
16-QAM:

Spurious Emission Level (dBm)								
Harmonic	Lowest channel Freq. (MHz)	Level [dBm]	Harmonic	Middle channel Freq. (MHz)	Level [dBm]	Harmonic	Highest channel Freq. (MHz)	Level [dBm]
2	3710.0	-	2	3760.0	-	2	3810.0	-
3	5565.0	-	3	5640.0	-	3	5715.0	-
4	7420.0	-	4	7520.0	-	4	7620.0	-
5	9275.0	-	5	9400.0	-	5	9525.0	-
6	11130.0	-	6	11280.0	-	6	11430.0	-
7	12985.0	-	7	13160.0	-	7	13335.0	-
8	14840.0	-	8	15040.0	-	8	15240.0	-
9	16695.0	-	9	16920.0	-	9	17145.0	-
10	18550.0	-	10	18800.0	-	10	19050.0	-
Measurement uncertainty			± 3dB					

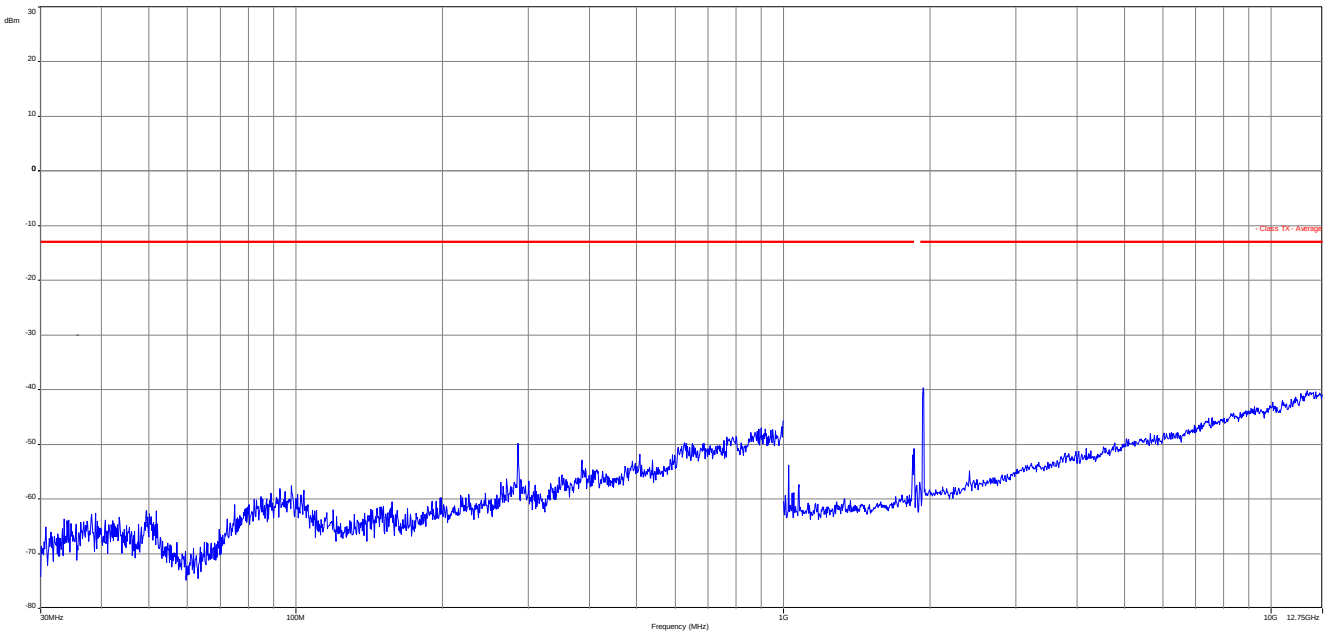
Verdict: **complies**

QPSK with 10 MHz channel bandwidth

Plot 1: Channel 1880 MHz (Traffic mode up to 30 MHz)

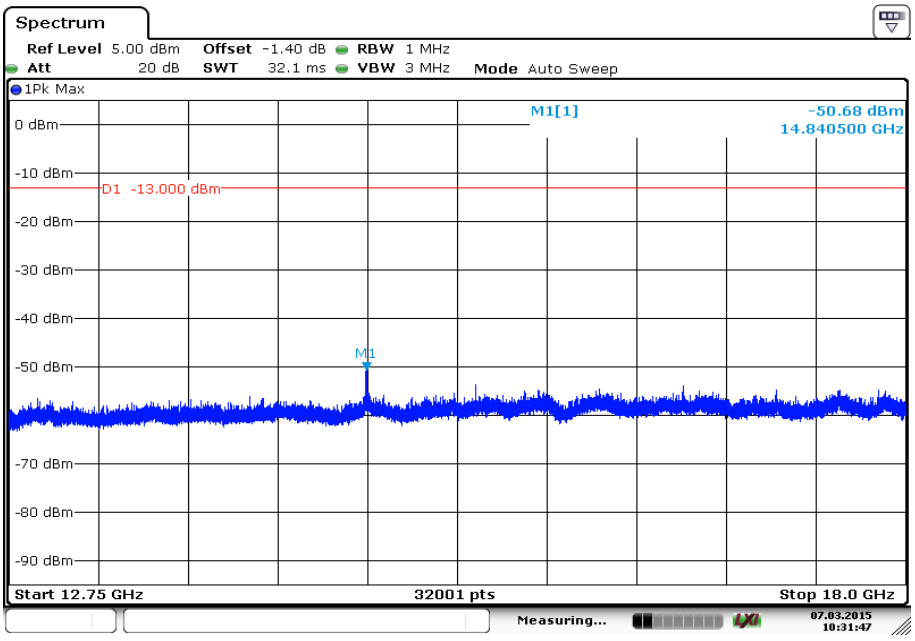


Plot 2: Channel 1855 MHz (30 MHz – 12.75 GHz)



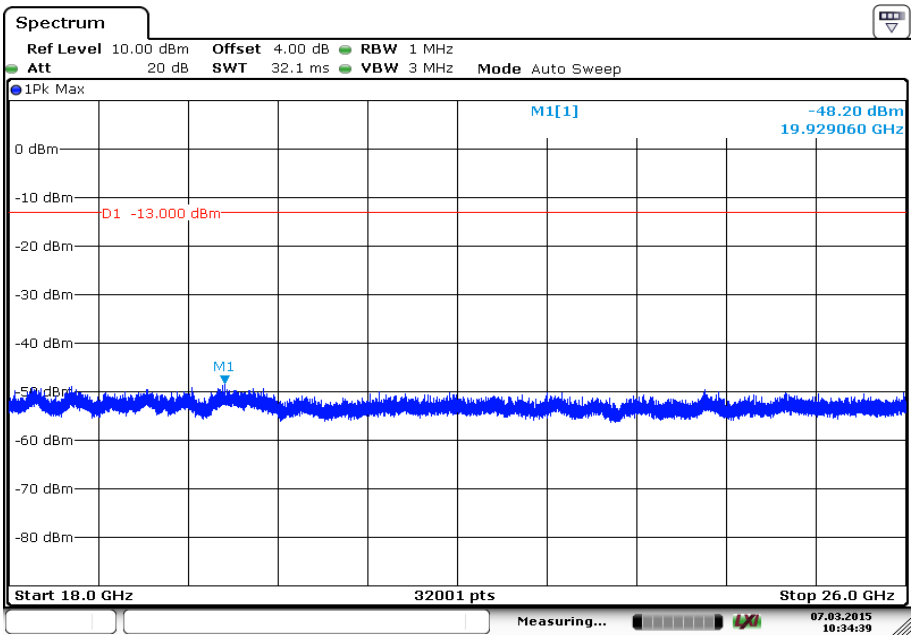
Carrier notched with 1.9 GHz rejection filter

Plot 3: Channel 1855 MHz (12.75 GHz – 18 GHz)



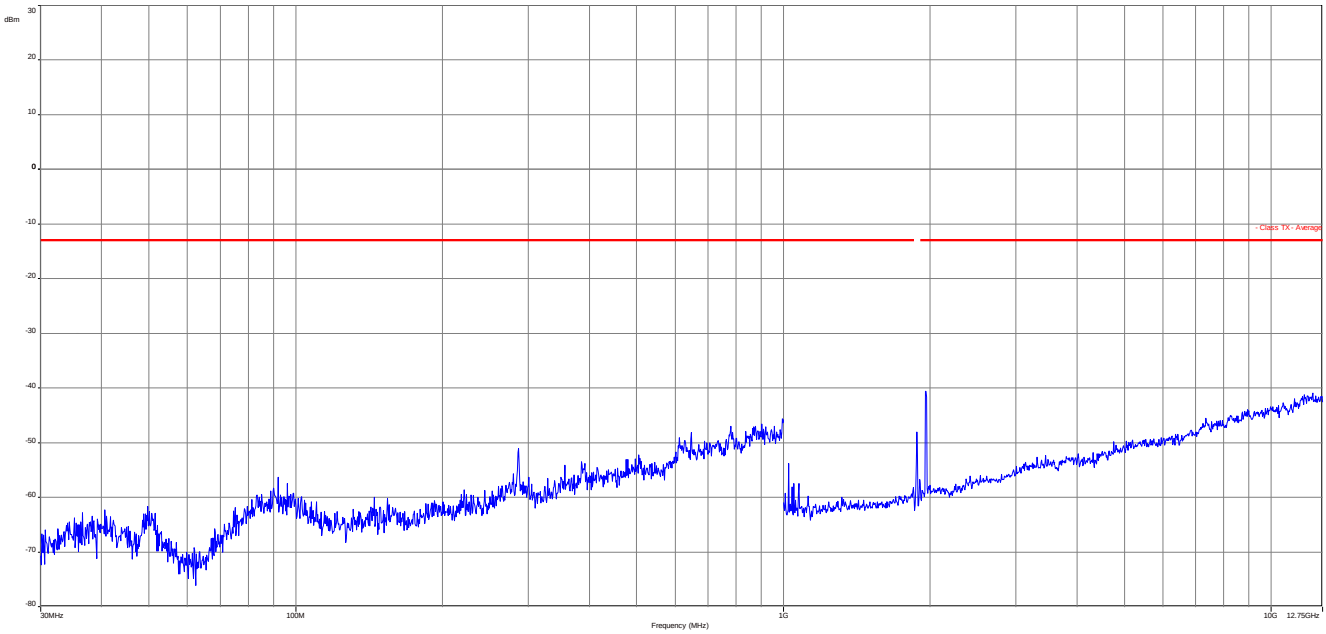
Date: 7.MAR.2015 10:31:47

Plot 4: Channel 1855 MHz (18 GHz – 26 GHz)



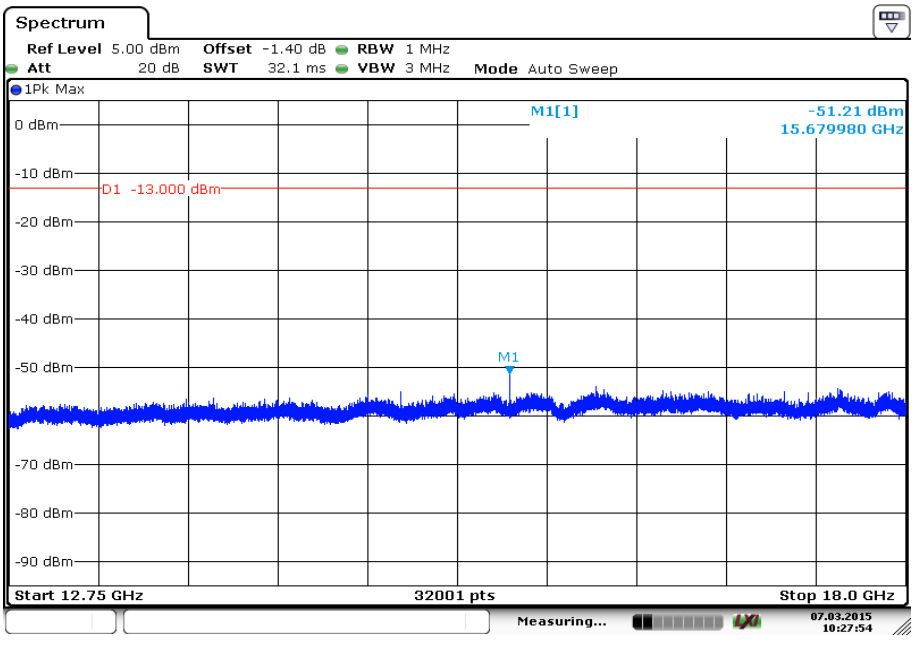
Date: 7.MAR.2015 10:34:39

Plot 5: Channel 1880 MHz (30 MHz – 12.75 GHz)



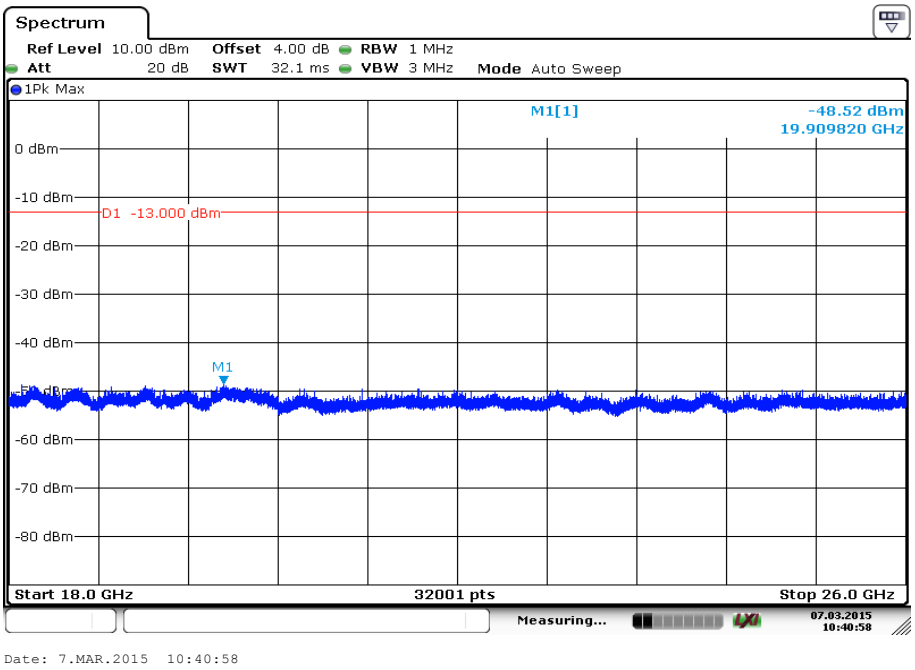
Carrier notched with 1.9 GHz rejection filter

Plot 6: Channel 1880 MHz (12.75 GHz – 18 GHz)

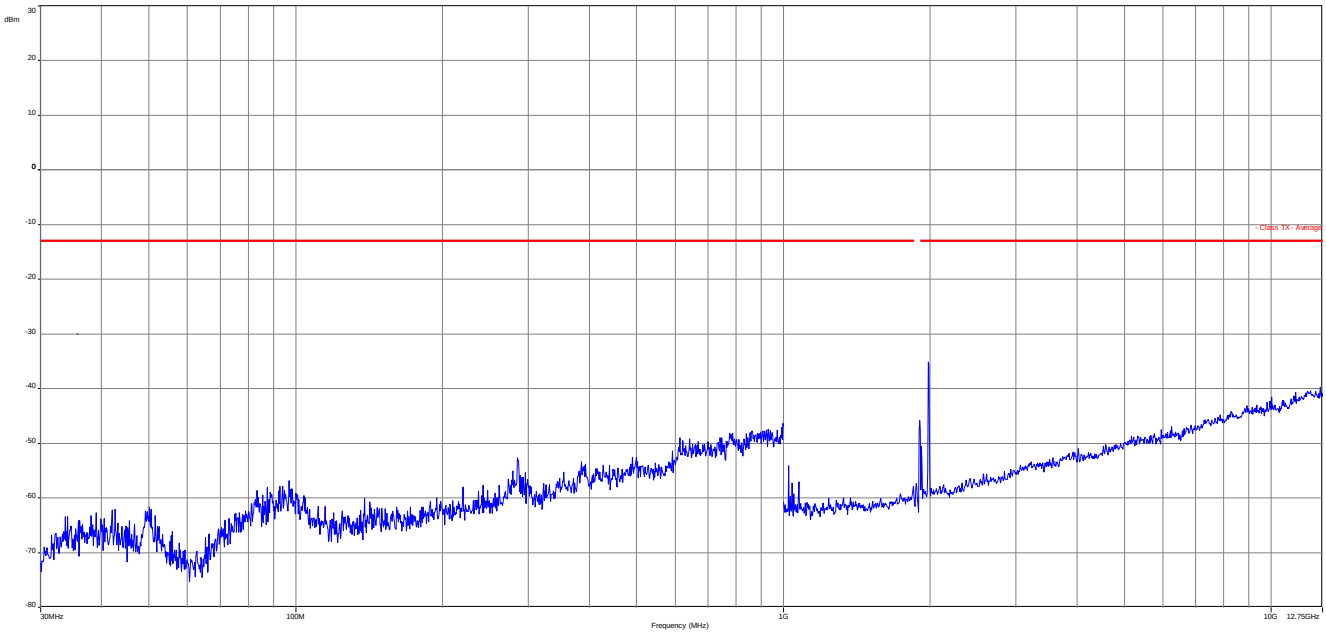


Date: 7.MAR.2015 10:27:54

Plot 7: Channel 1880 MHz (18 GHz – 26 GHz)

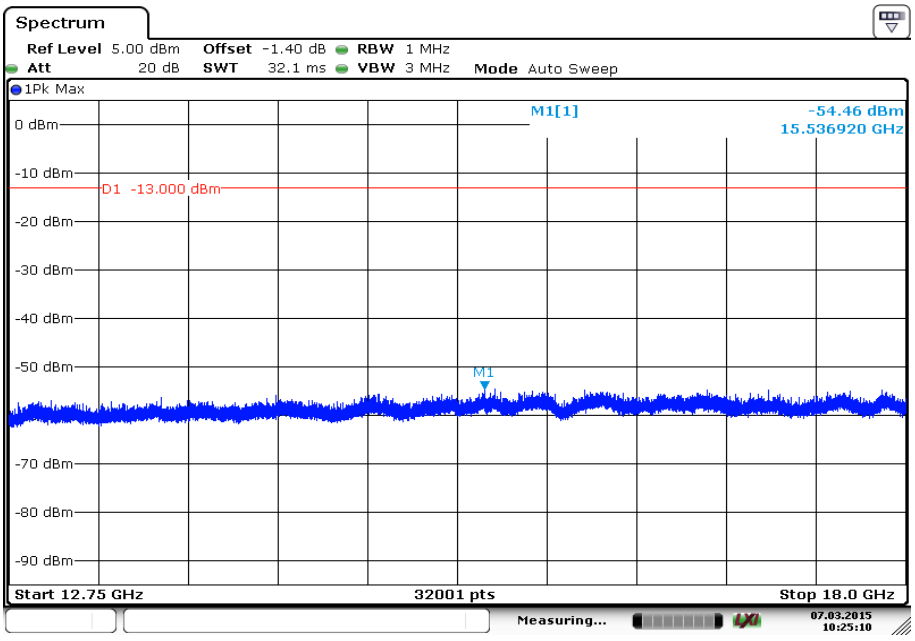


Plot 8: Channel 1905 MHz (30 MHz – 12.75 GHz)



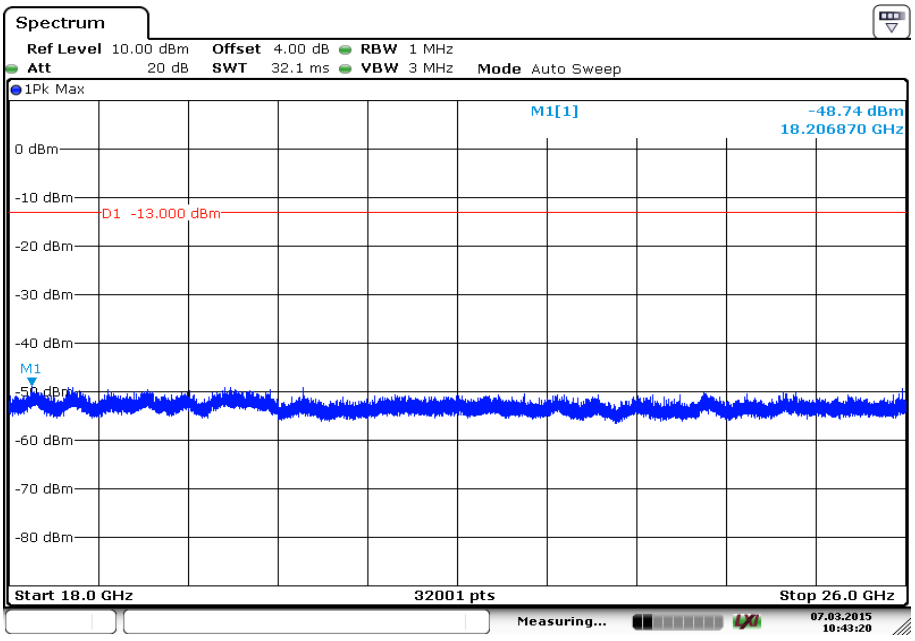
Carrier notched with 1.9 GHz rejection filter

Plot 9: Channel 1905 MHz (12.75 GHz – 18 GHz)



Date: 7.MAR.2015 10:25:10

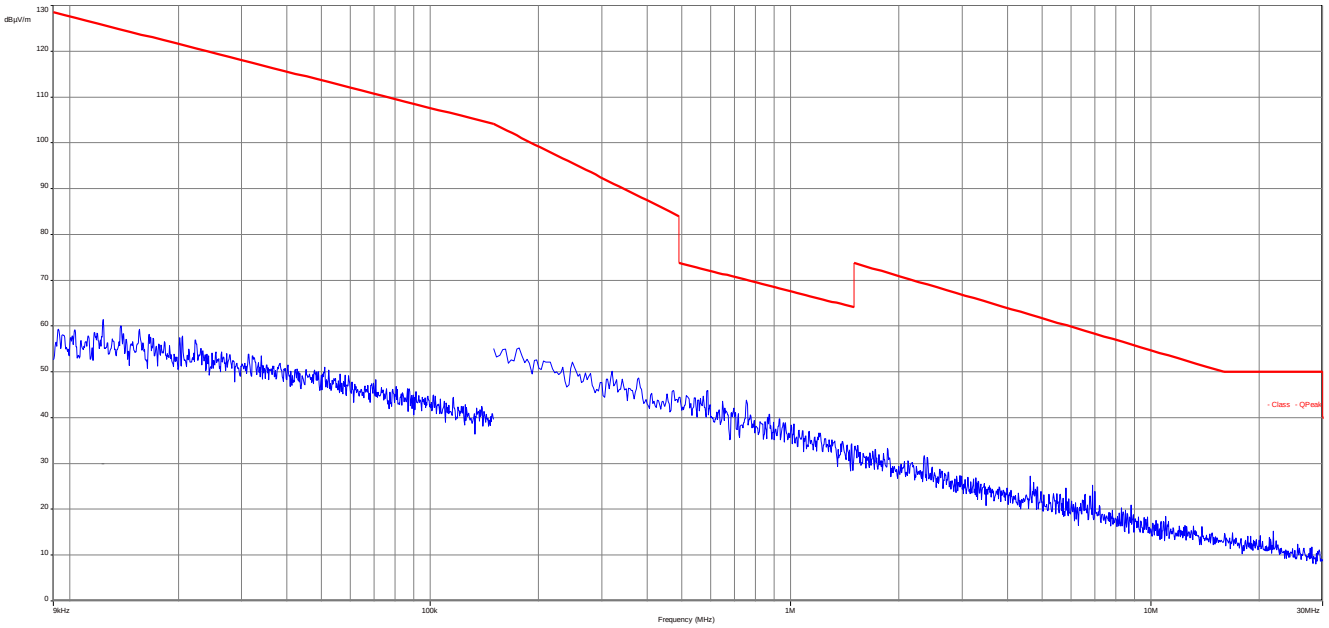
Plot 10: Channel 1905 MHz (18 GHz – 26 GHz)



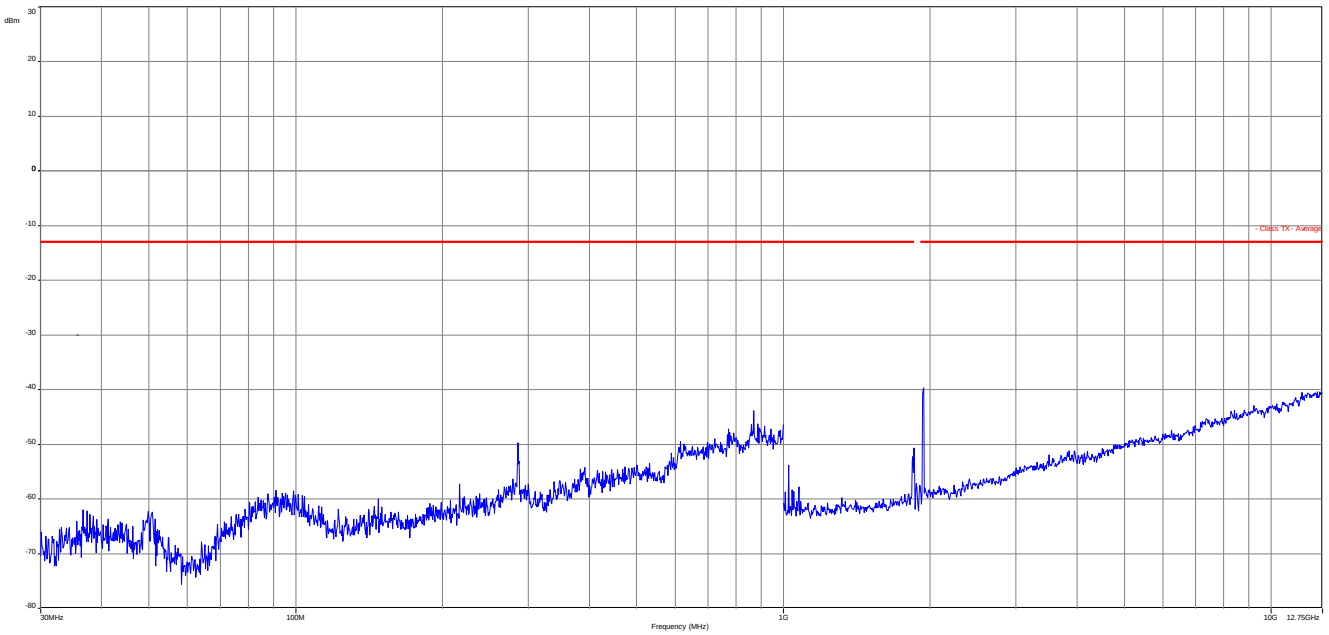
Date: 7.MAR.2015 10:43:20

16-QAM with 10 MHz channel bandwidth

Plot 1: Channel 1880 MHz (Traffic mode up to 30 MHz)

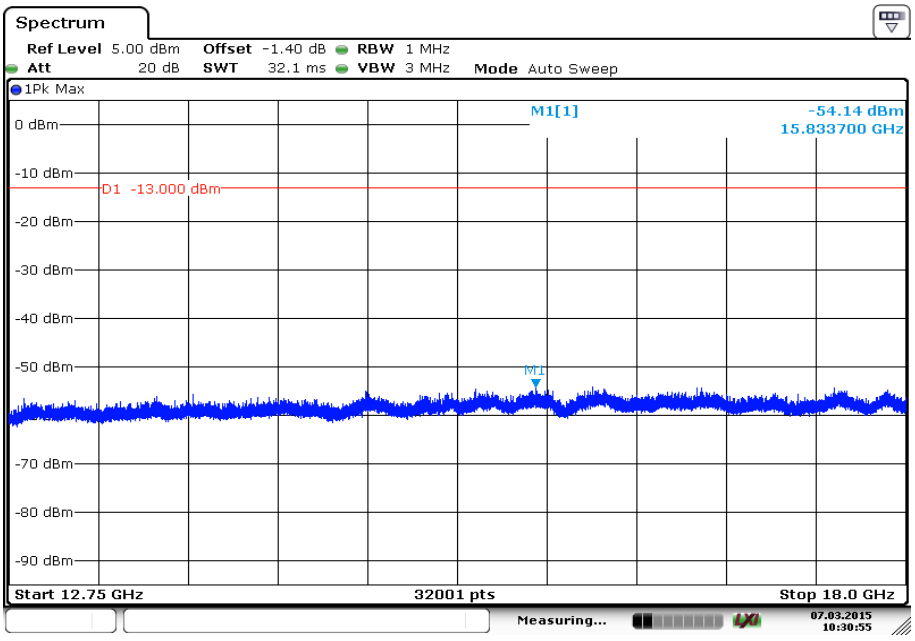


Plot 2: Channel 1855 MHz (30 MHz – 12.75 GHz)



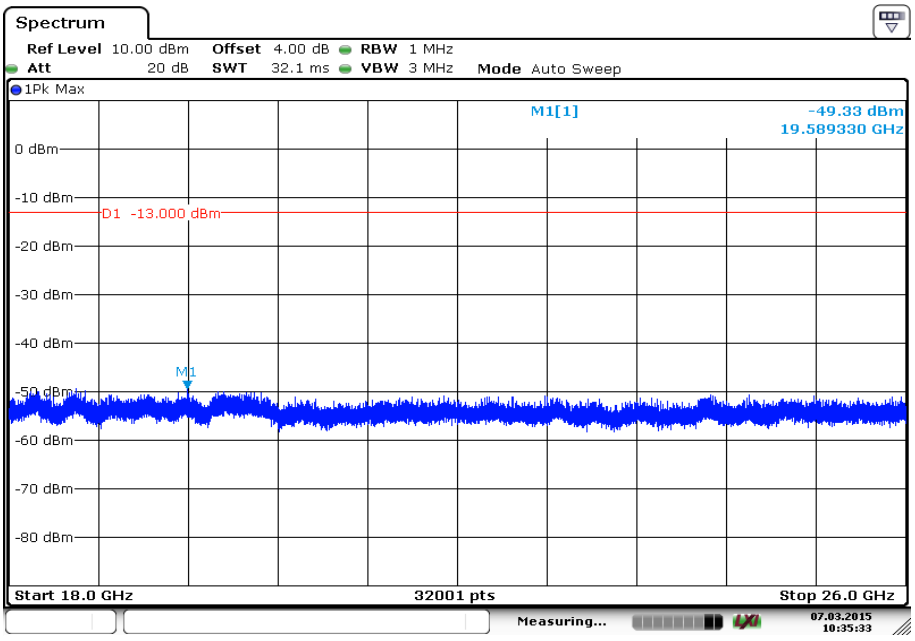
Carrier notched with 1.9 GHz rejection filter

Plot 3: Channel 1855 MHz (12.75 GHz – 18 GHz)



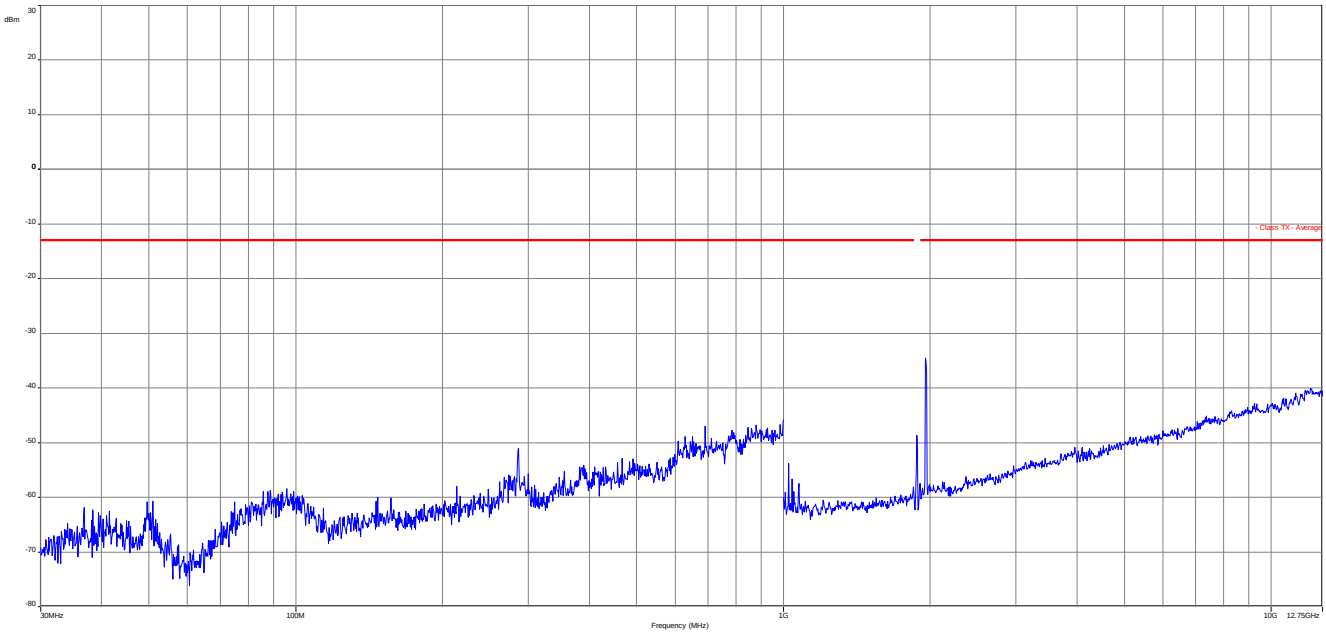
Date: 7.MAR.2015 10:30:54

Plot 4: Channel 1855 MHz (18 GHz – 26 GHz)



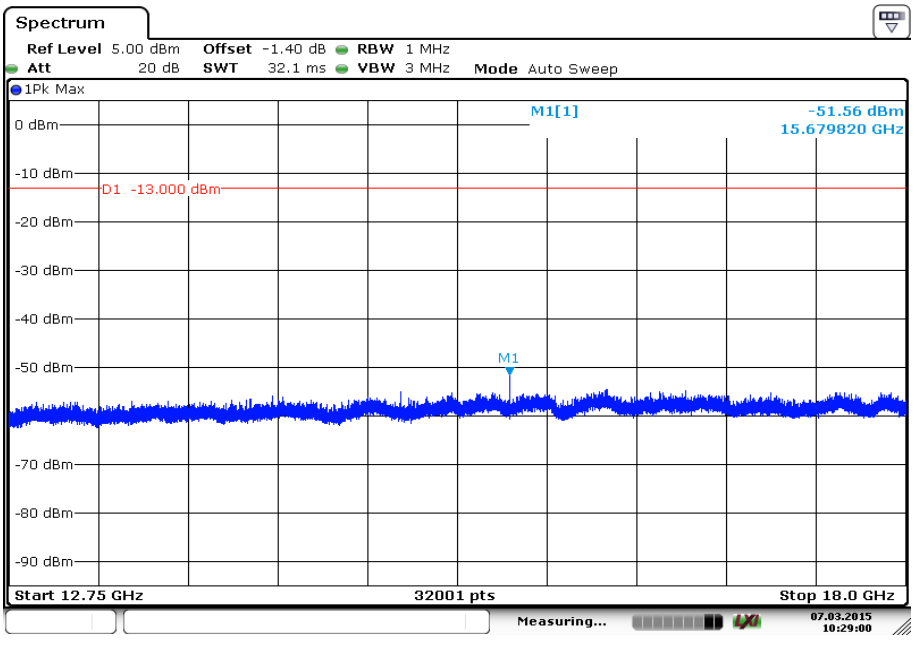
Date: 7.MAR.2015 10:35:33

Plot 5: Channel 1880 MHz (30 MHz – 12.75 GHz)



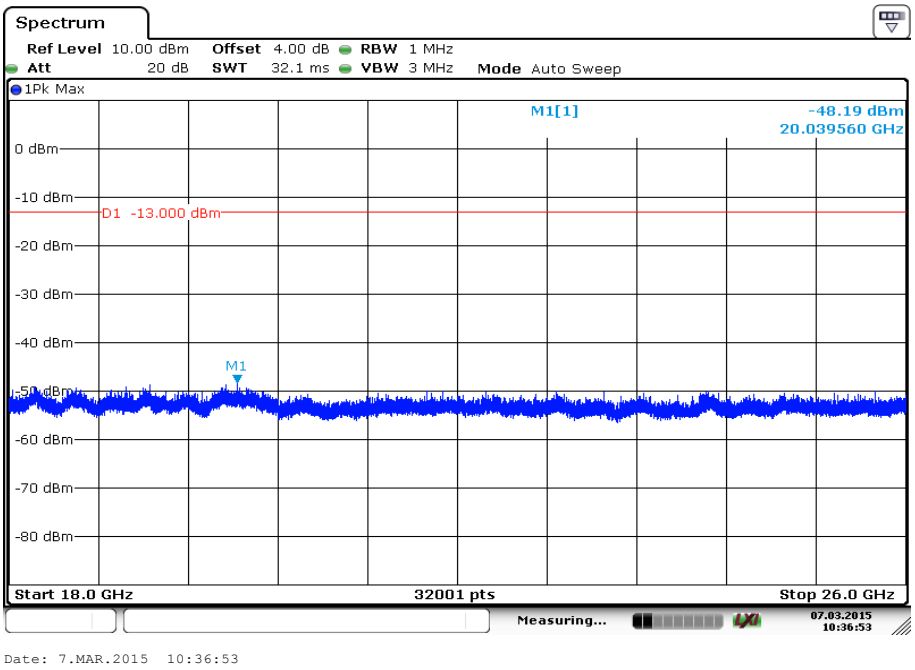
Carrier notched with 1.9 GHz rejection filter

Plot 6: Channel 1880 MHz (12.75 GHz – 18 GHz)

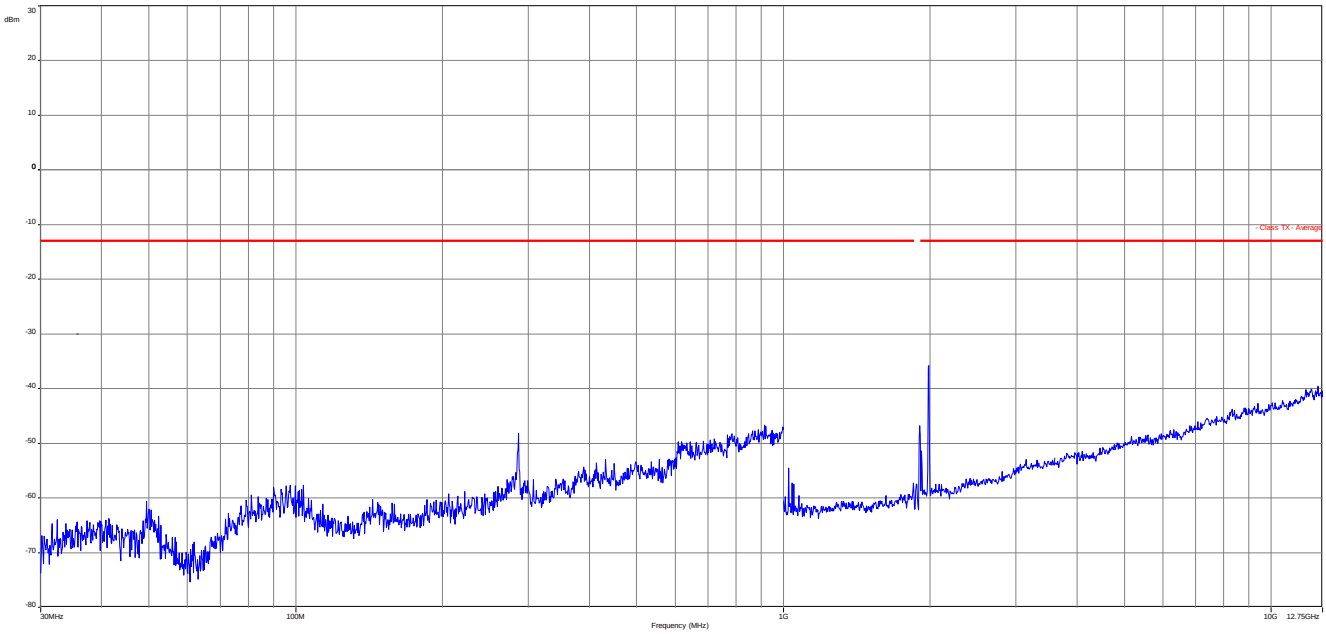


Date: 7.MAR.2015 10:29:01

Plot 7: Channel 1880 MHz (18 GHz – 26 GHz)

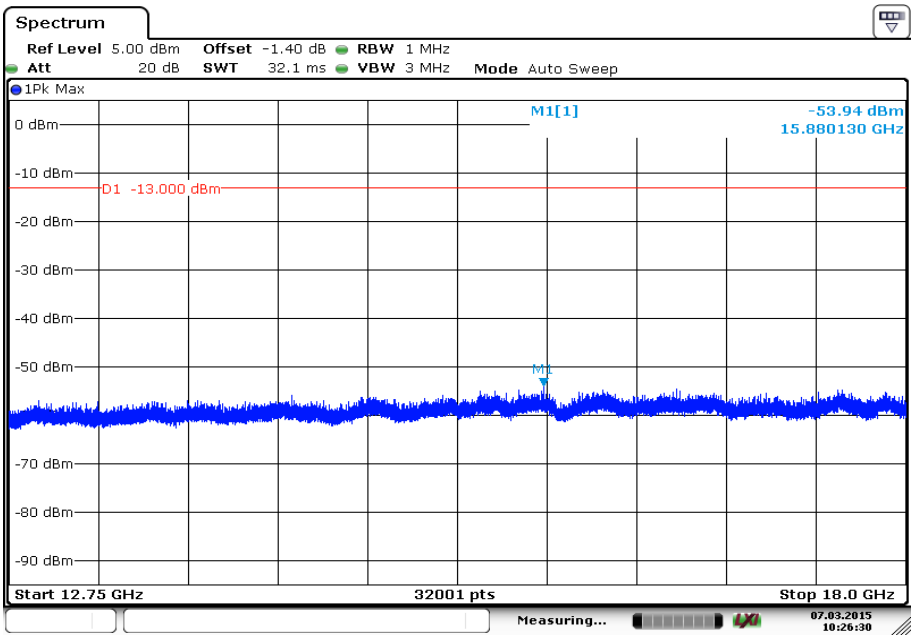


Plot 8: Channel 1905 MHz (30 MHz – 12.75 GHz)



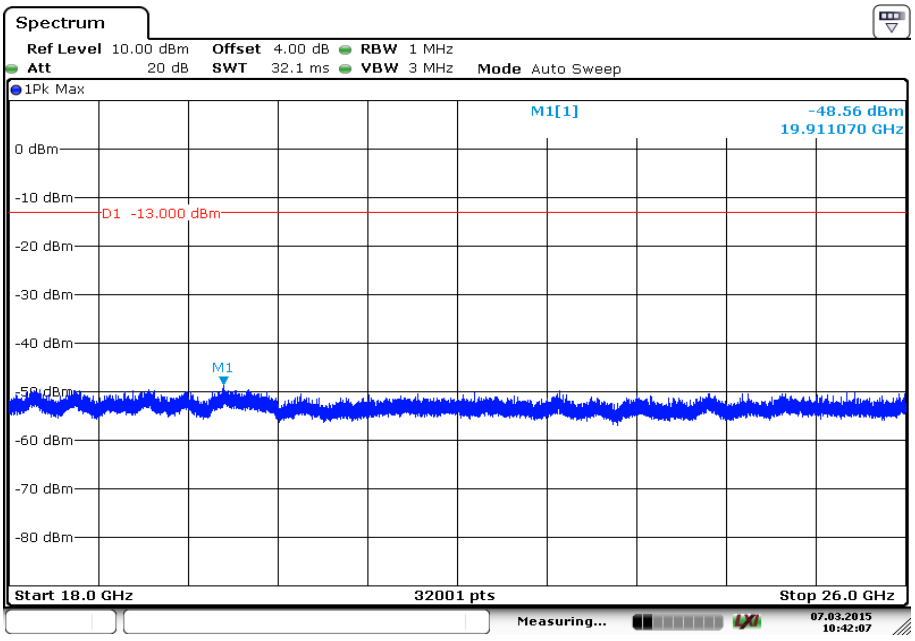
Carrier notched with 1.9 GHz rejection filter

Plot 9: Channel 1905 MHz (12.75 GHz – 18 GHz)



Date: 7.MAR.2015 10:26:31

Plot 10: Channel 1905 MHz (18 GHz – 26 GHz)



Date: 7.MAR.2015 10:42:07

8.2.3 Block edge compliance

Description:

The spectrum at the band edges must comply with the spurious emissions limits.

Measurement:

Measurement parameters	
Detector:	RMS
Sweep time:	60 sec.
Video bandwidth:	30 kHz
Resolution bandwidth:	30 kHz
Span:	1 MHz
Trace-Mode:	Max Hold

Limits:

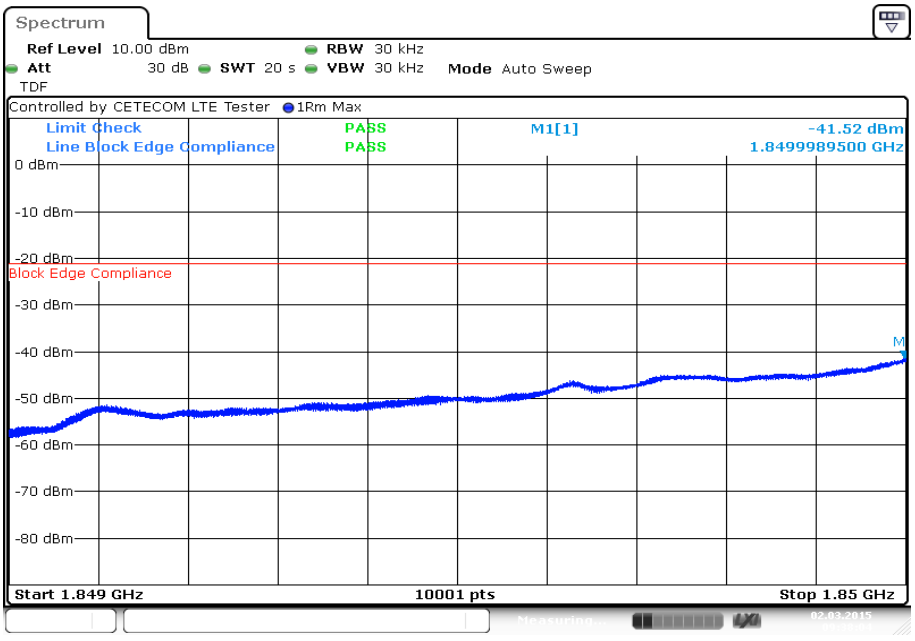
FCC	IC
CFR Part 24.238 CFR Part 2.1051	RSS 133
Block Edge Compliance	
Part 24.238 specifies that "the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB." However, in publication number 890810, The FCC Office of Engineering and Technology specified the following correction to the limits when a resolution bandwidth smaller than 1% of the emission bandwidth is used: "An alternative is to add an additional correction factor of 10 Log (RBW1/ RBW2) to the 43 +10 Log (P) limit. RBW1 is the narrower measurement resolution bandwidth and RBW2 is either the 1% emissions bandwidth or 1 MHz." When using a 30 kHz bandwidth, this yields a -8.239 adjustment to the limit [10 log(30kHz/50kHz) = -8.239]. When this adjustment is applied to the limit, the limit becomes -21.24.	
-21.24 dBm	

The limit line in the plots shows the over all LTE bands and channel bandwidths worst case -21.24 dBm.

Used setup acc. chapter 8.1.2.
Used equipment see table chapter 9

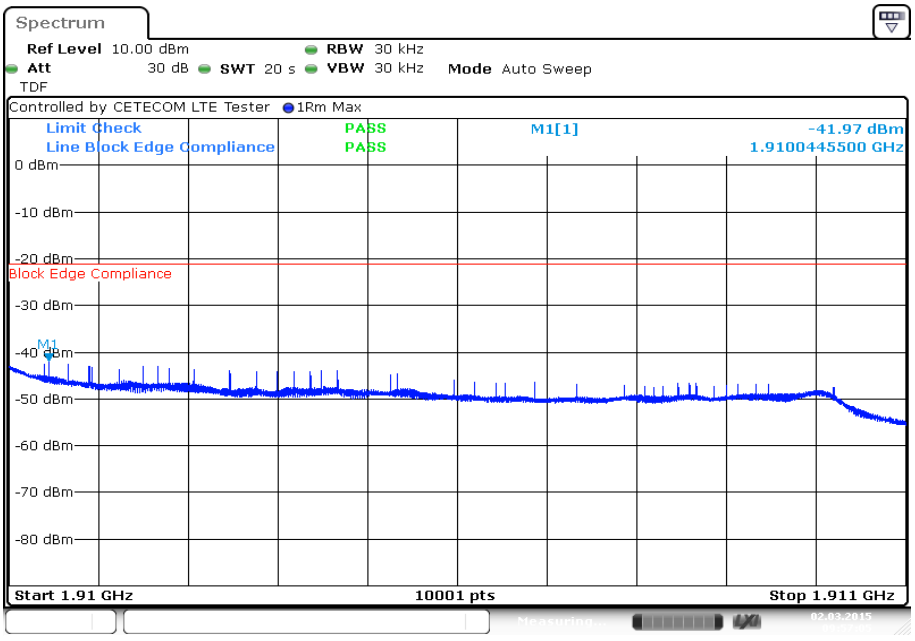
Results: **1.4 MHz channel bandwidth**

Plot 1: Lowest channel – QPSK



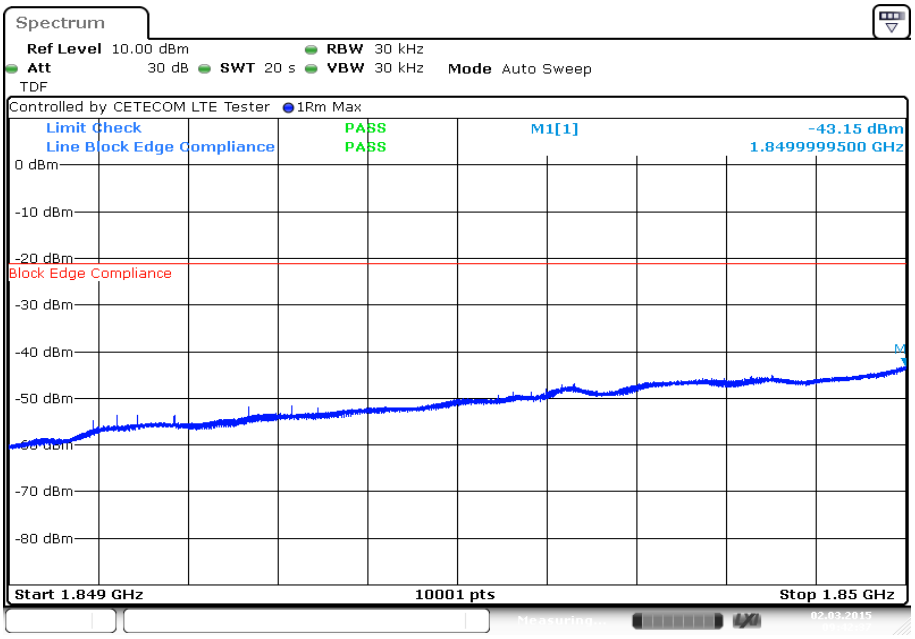
Date: 2.MAR.2015 09:38:04

Plot 2: Highest channel – QPSK



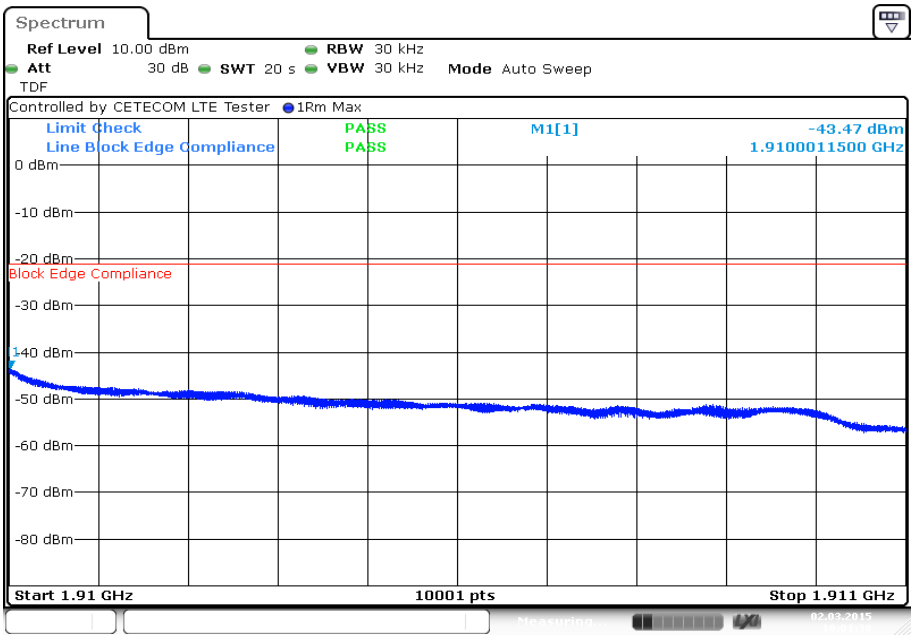
Date: 2.MAR.2015 09:57:05

Plot 3: Lowest channel – 16-QAM



Date: 2.MAR.2015 09:42:37

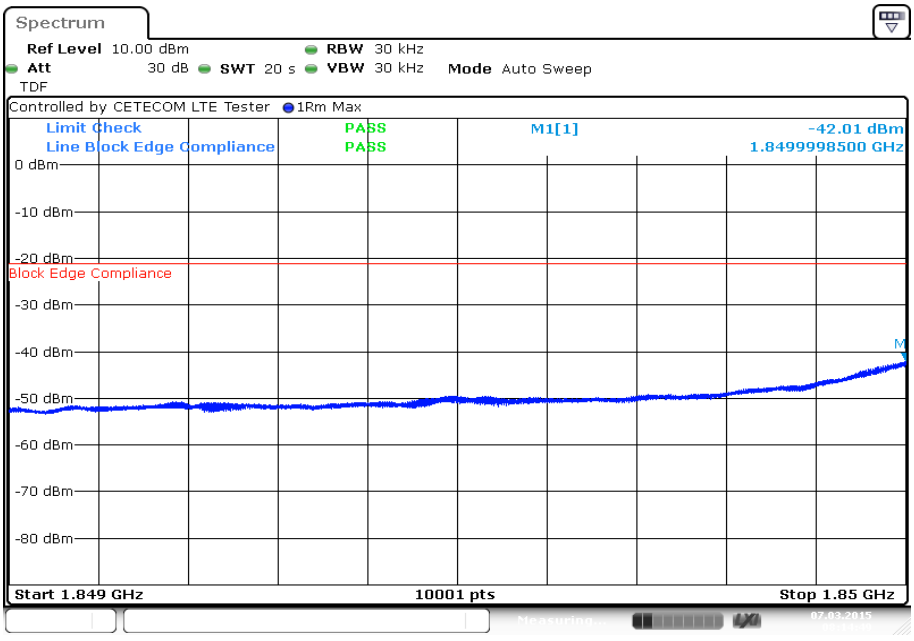
Plot 4: Highest channel – 16-QAM



Date: 2.MAR.2015 10:01:37

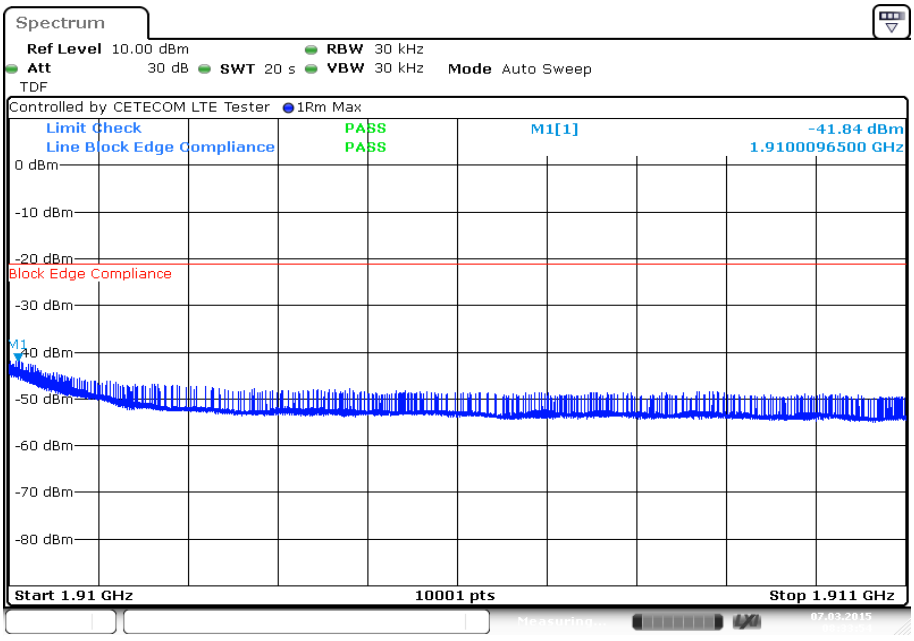
Results: **3 MHz channel bandwidth**

Plot 1: Lowest channel – QPSK



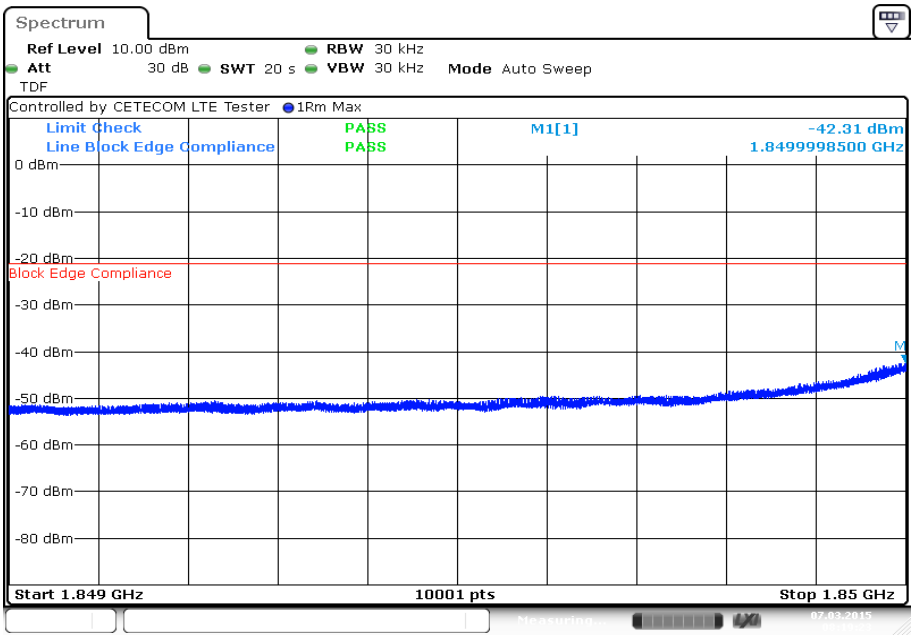
Date: 7.MAR.2015 08:14:49

Plot 2: Highest channel – QPSK



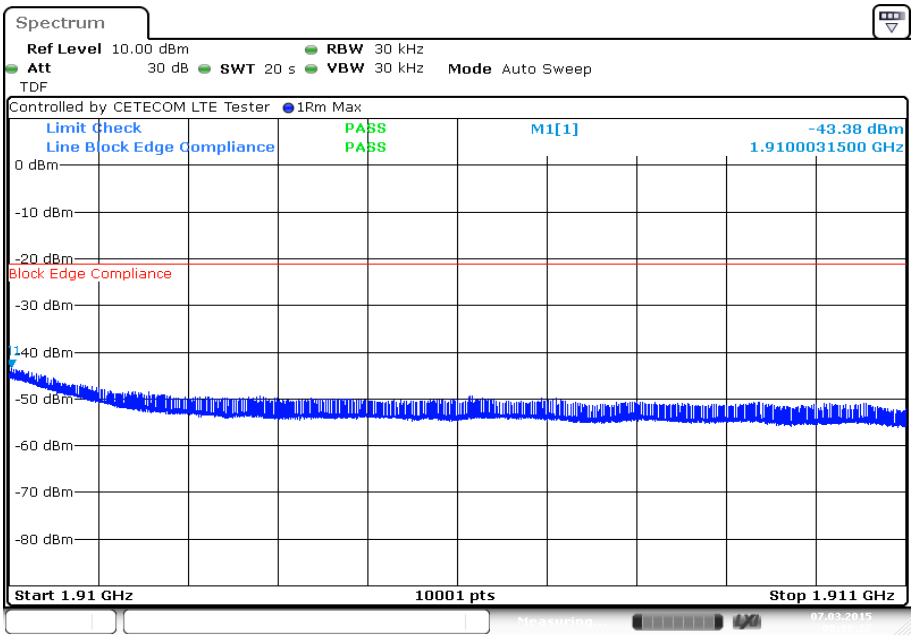
Date: 7.MAR.2015 08:33:54

Plot 3: Lowest channel – 16-QAM



Date: 7.MAR.2015 08:19:24

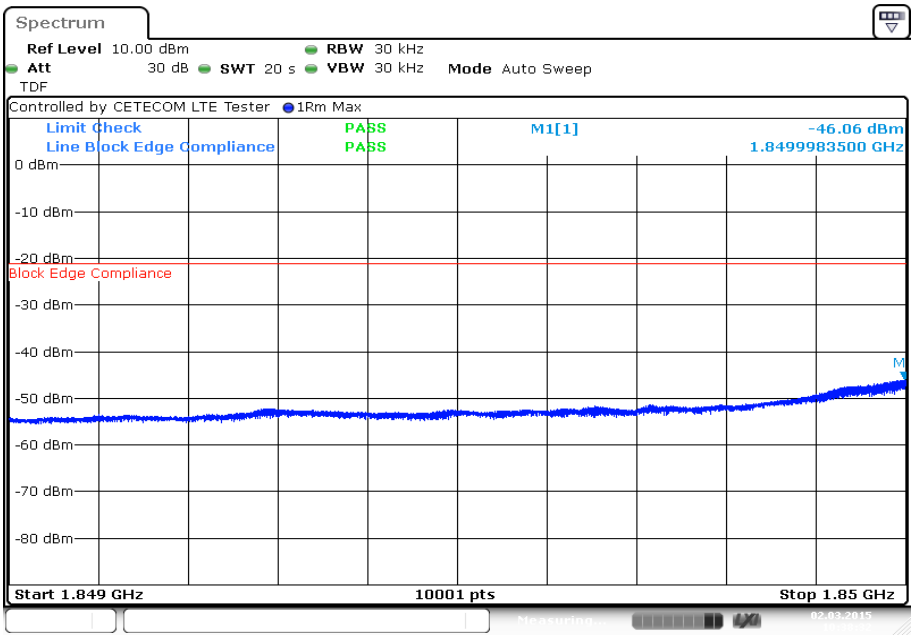
Plot 4: Highest channel – 16-QAM



Date: 7.MAR.2015 08:38:27

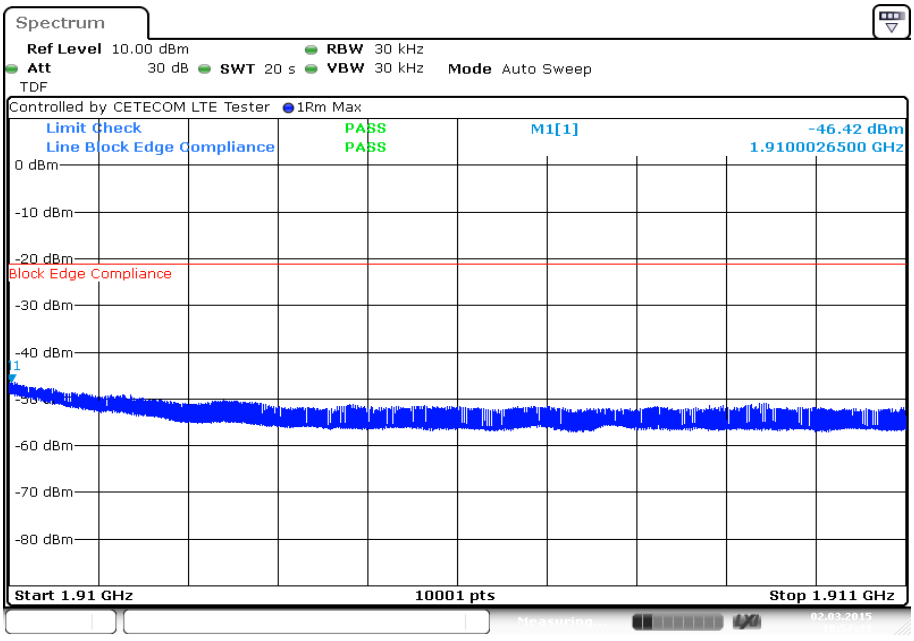
Results: **5 MHz channel bandwidth**

Plot 1: Lowest channel – QPSK



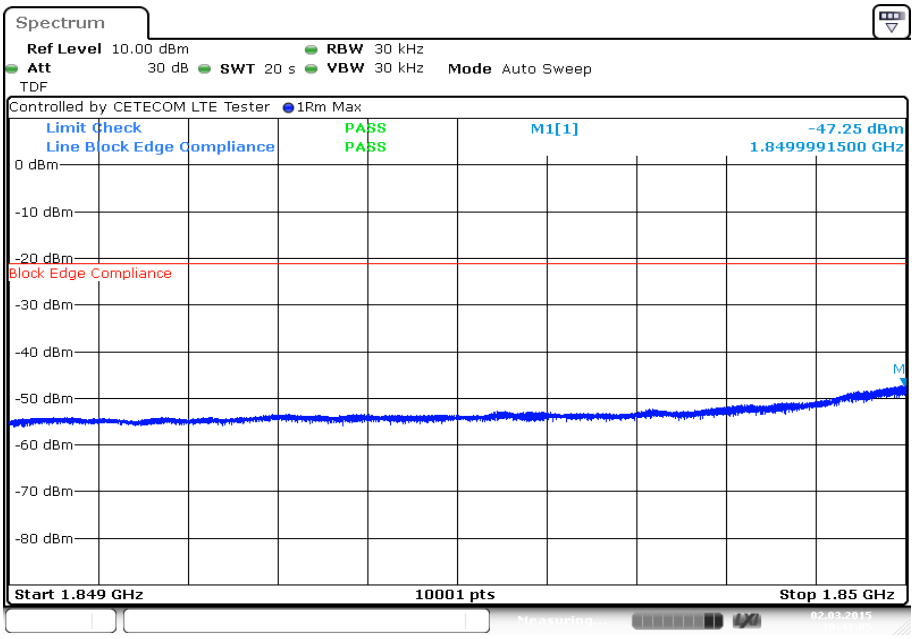
Date: 2.MAR.2015 10:38:32

Plot 2: Highest channel – QPSK



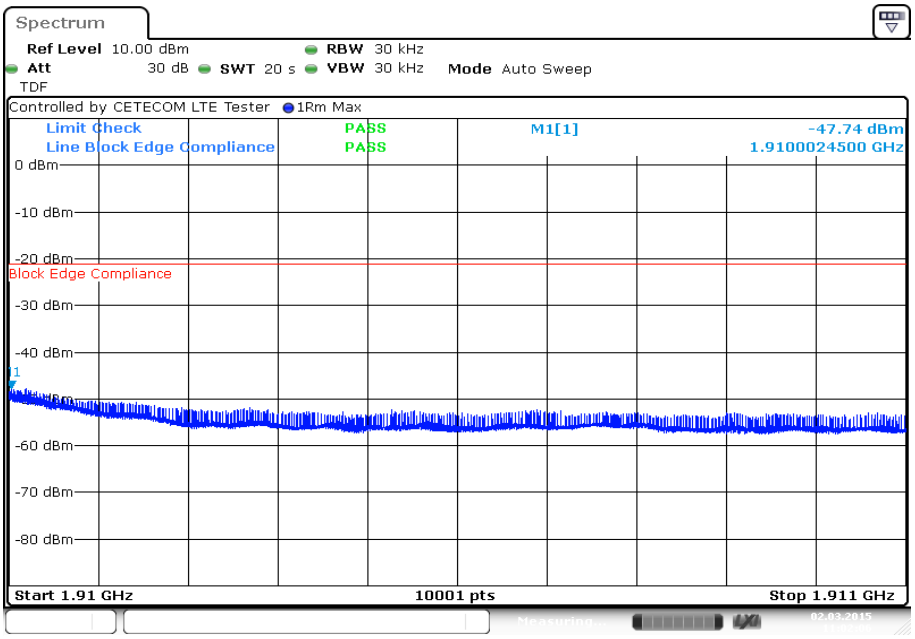
Date: 2.MAR.2015 10:57:32

Plot 3: Lowest channel – 16-QAM



Date: 2.MAR.2015 10:43:05

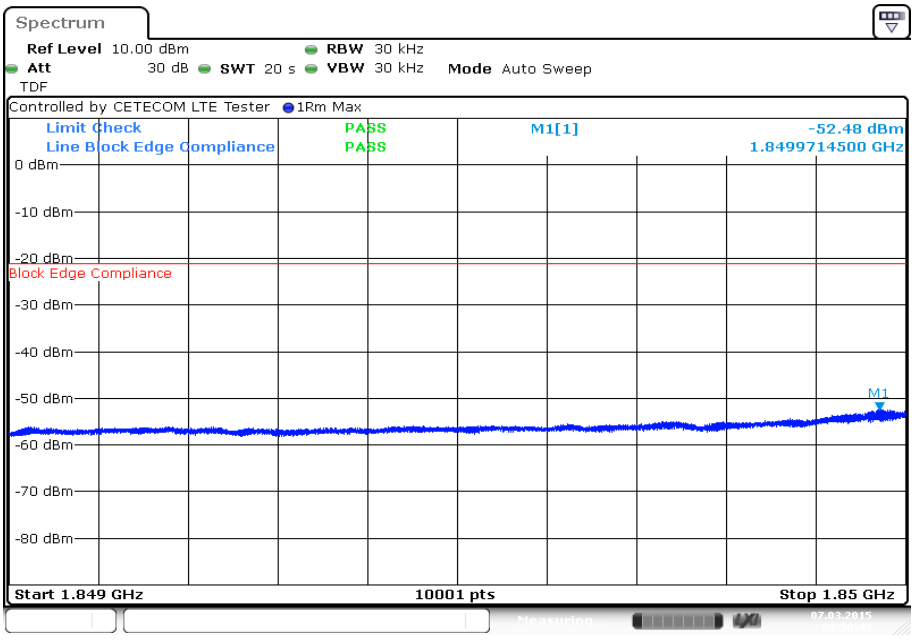
Plot 4: Highest channel – 16-QAM



Date: 2.MAR.2015 11:02:05

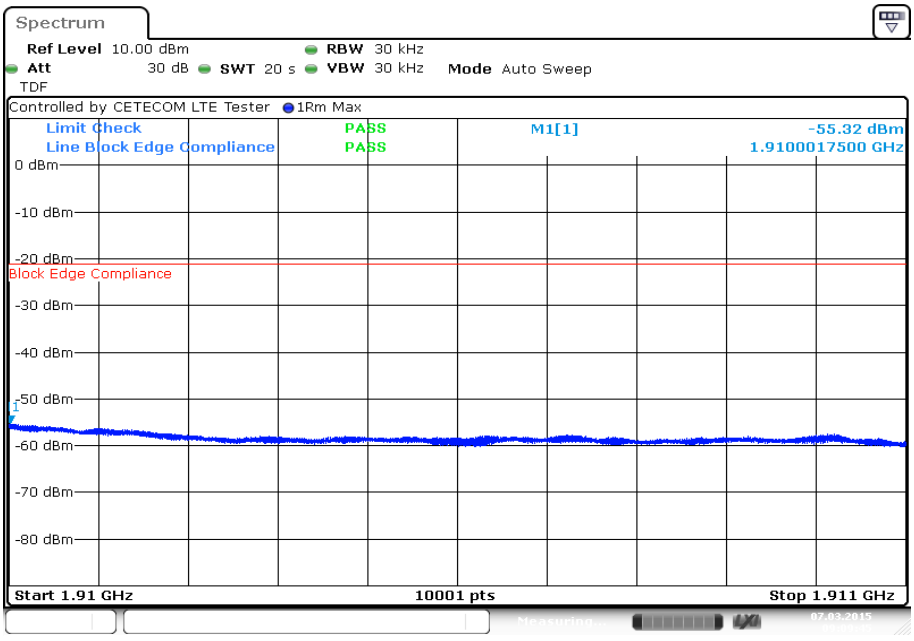
Results: **10 MHz channel bandwidth**

Plot 1: Lowest channel – QPSK



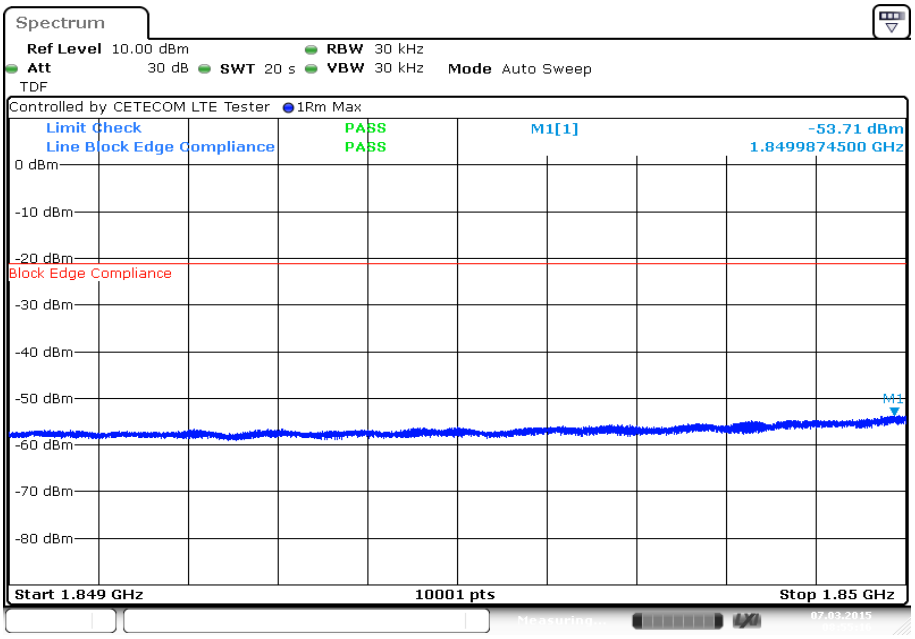
Date: 7.MAR.2015 08:50:44

Plot 2: Highest channel – QPSK



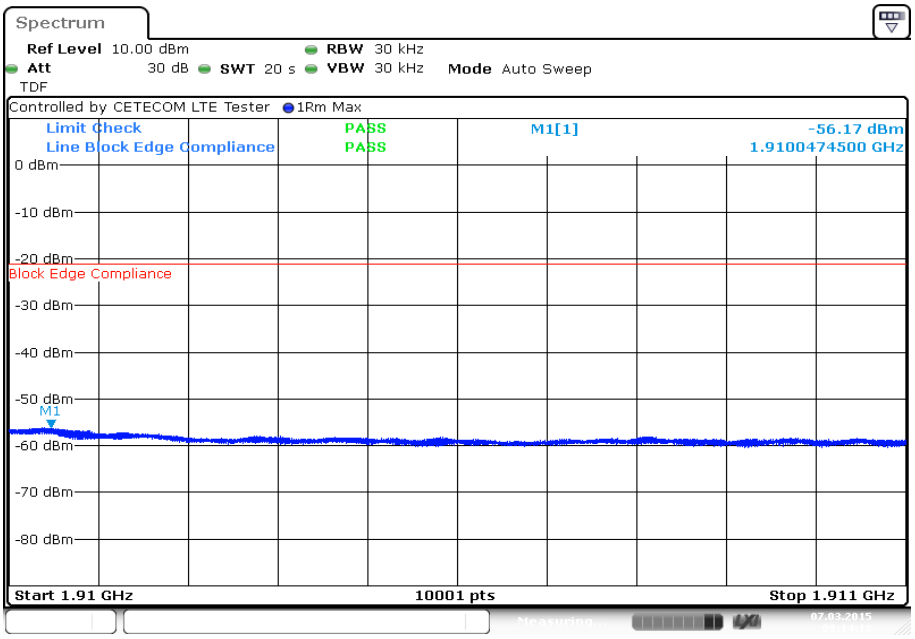
Date: 7.MAR.2015 09:09:45

Plot 3: Lowest channel – 16-QAM



Date: 7.MAR.2015 08:55:17

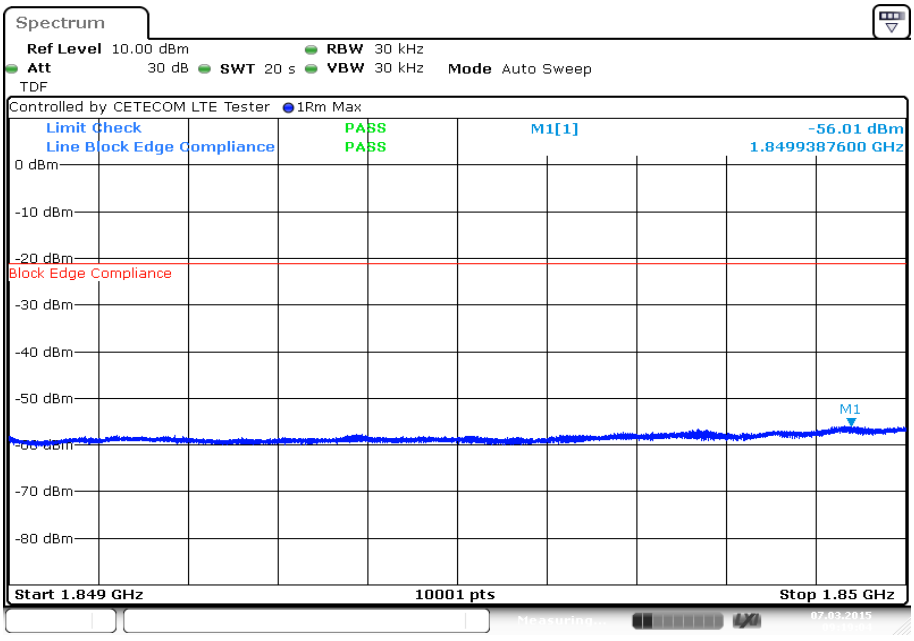
Plot 4: Highest channel – 16-QAM



Date: 7.MAR.2015 09:14:18

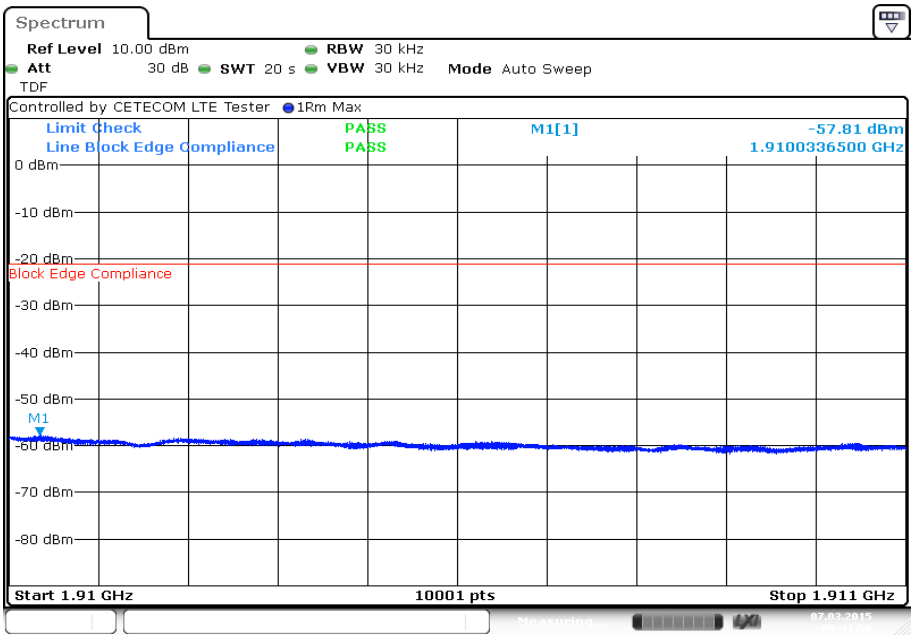
Results: **15 MHz channel bandwidth**

Plot 1: Lowest channel – QPSK



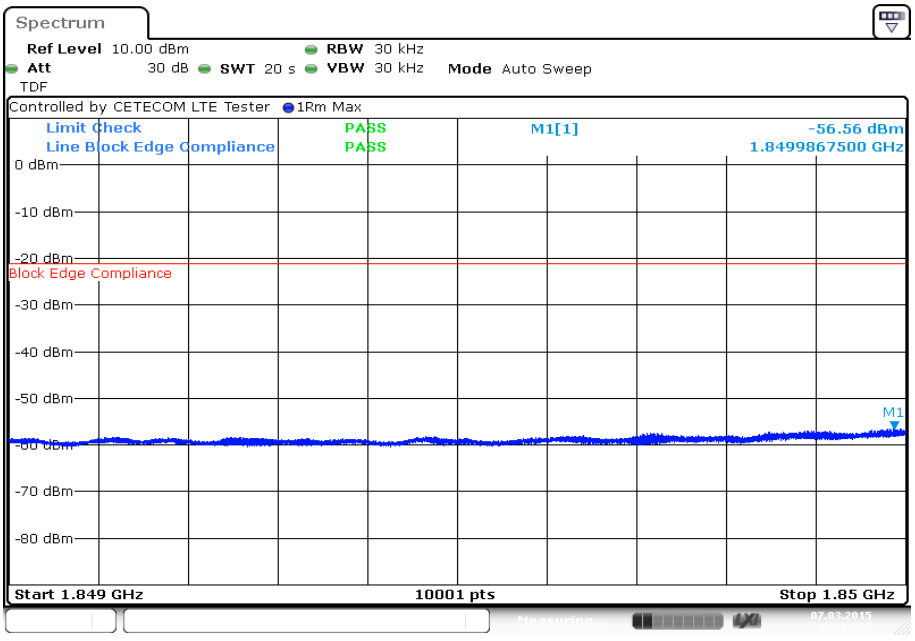
Date: 7.MAR.2015 09:19:05

Plot 2: Highest channel – QPSK



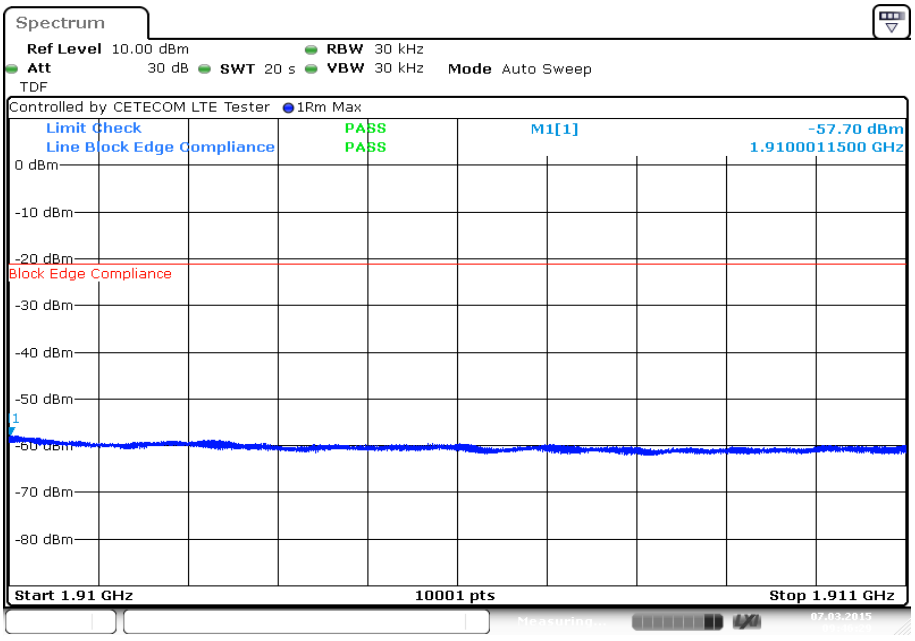
Date: 7.MAR.2015 09:41:57

Plot 3: Lowest channel – 16-QAM



Date: 7.MAR.2015 09:23:38

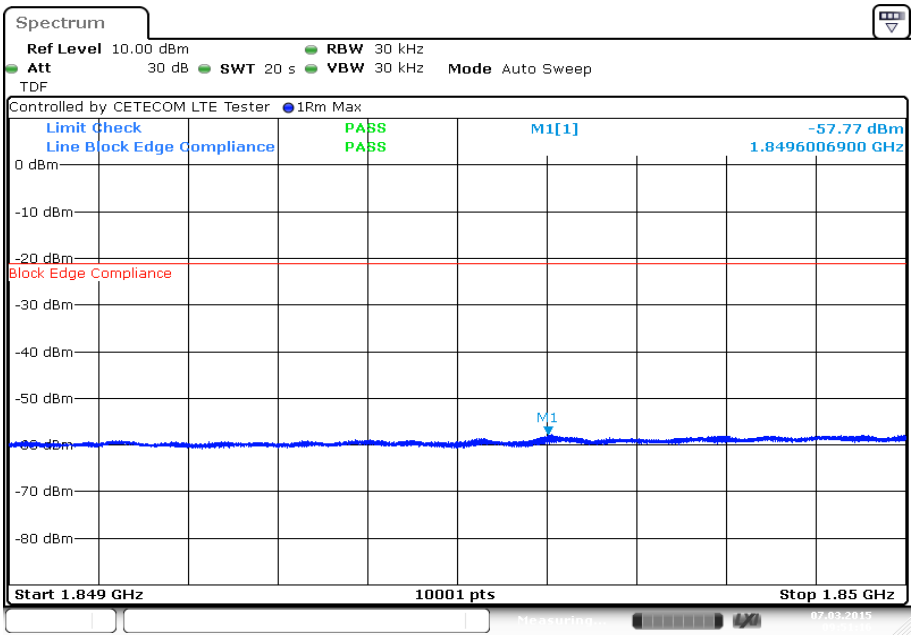
Plot 4: Highest channel – 16-QAM



Date: 7.MAR.2015 09:46:30

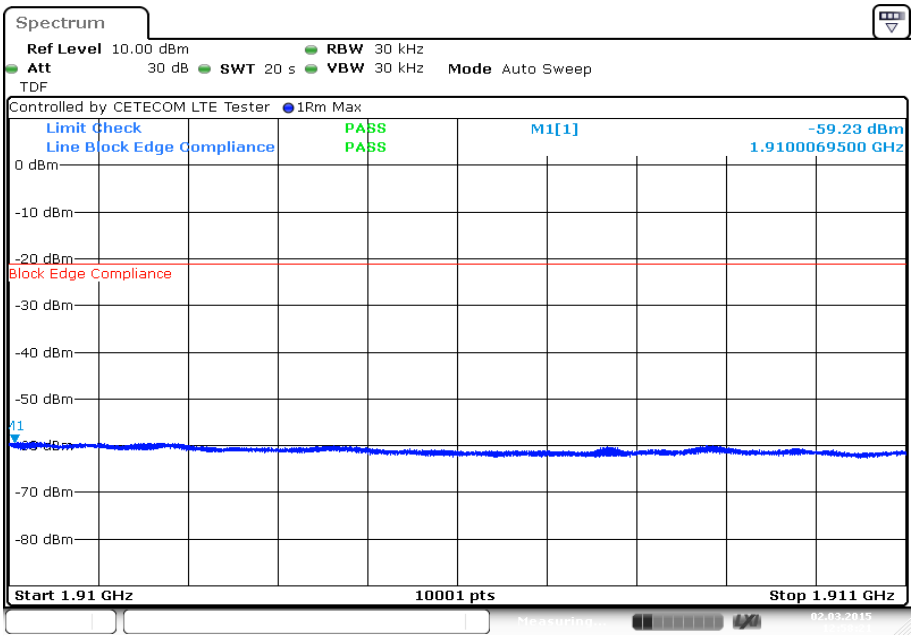
Results: **20 MHz channel bandwidth**

Plot 1: Lowest channel – QPSK



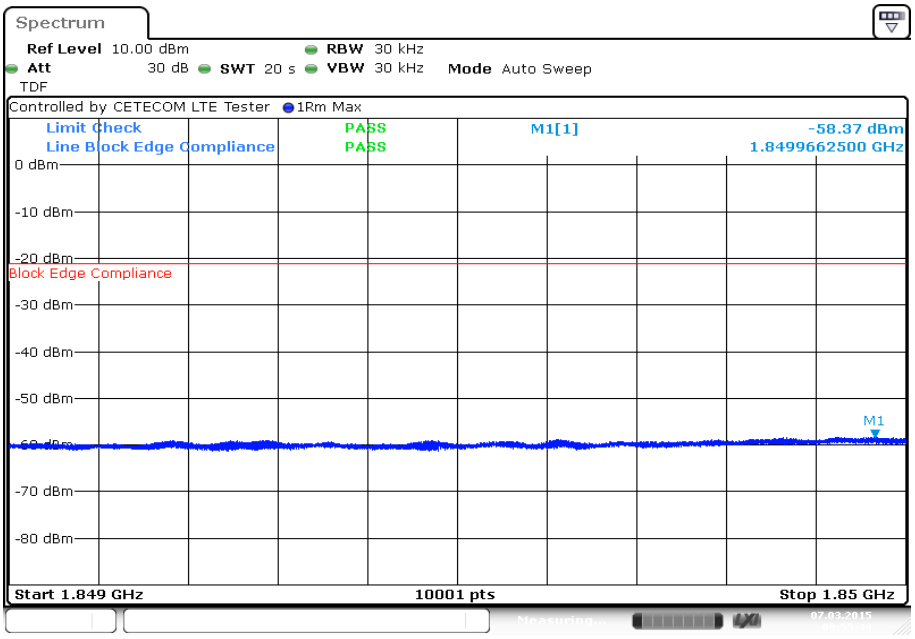
Date: 7.MAR.2015 09:51:16

Plot 2: Highest channel – QPSK



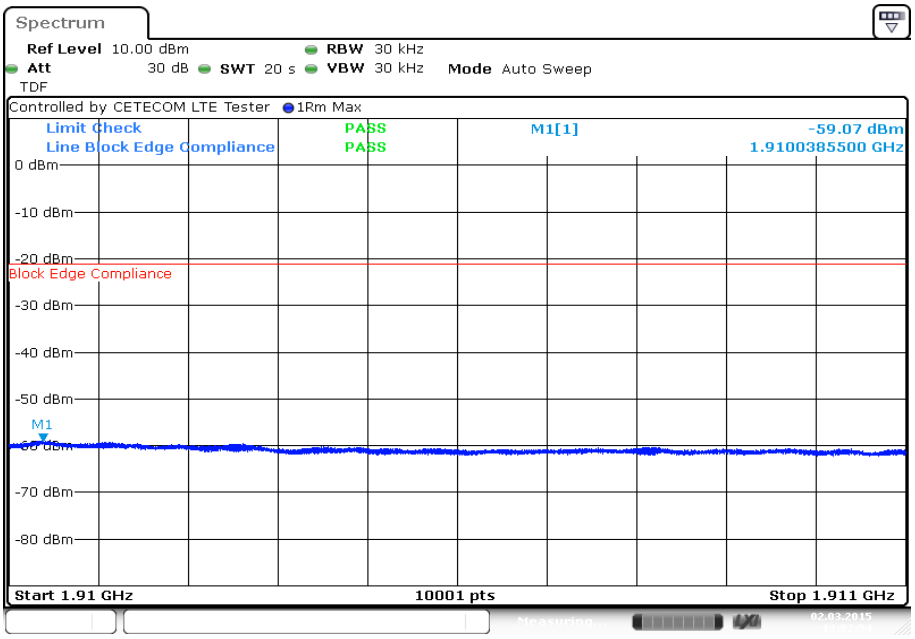
Date: 2.MAR.2015 12:58:21

Plot 3: Lowest channel – 16-QAM



Date: 7.MAR.2015 09:55:49

Plot 4: Highest channel – 16-QAM



Date: 2.MAR.2015 13:02:54

Verdict: complies

9 Test equipment and ancillaries used for tests

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 signalling 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).

No.	Lab / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	n. a.	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP	2818A03450	300001040	Ve	20.01.2015	20.01.2018
2	n. a.	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	vlKl!	08.05.2013	08.05.2015
3	n. a.	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996	ev		
4	n. a.	Switch / Control Unit	3488A	HP	*	300000199	ne		
5	90	Active Loop Antenna 10 kHz to 30 MHz	6502	Kontron Psychotech	8905-2342	300000256	k	13.06.2013	13.06.2015
6	90	Amplifier	js42-00502650-28-5a	Parzich GMBH	928979	300003143	ne		
7	90	Band Reject filter	WRCG1855/1910-1835/1925-40/8SS	Wainwright	7	300003350	ev		
8	90	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	371	300003854	vlKl!	29.10.2014	29.10.2017
9	90	MXE EMI Receiver 20 Hz to 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405	k	13.03.2014	13.03.2015
10	11b	Microwave System Amplifier, 0.5-26.5 GHz	83017A	HP	00419	300002268	ev		
11	A026	Std. Gain Horn Antenna 12.4 to 18.0 GHz	639	Narda	8402	300000787	k	22.07.2013	22.07.2015
12	A029	Std. Gain Horn Antenna 18.0 to 26.5 GHz	638	Narda	8205	300002442	k	19.07.2013	19.07.2015
13	A029	Signal Analyzer 40 GHz	FSV40	R&S	101042	300004517	k	22.01.2015	22.01.2016
14	n. a.	Wideband Radio Communication Tester	CMW500	R&S	102375	300004187	k	28.01.2015	28.01.2017
15	n. a.	Universal Communication Tester	CMU200	R&S	106240	300003321	vlKl!	12.06.2013	12.06.2015

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

10 Observations

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

Annex A Document history

Version	Applied changes	Date of release
	Initial release	2015-03-25
A	New editorial requirements (Canada)	2015-04-28
B	Editorial corrections	2015-06-16

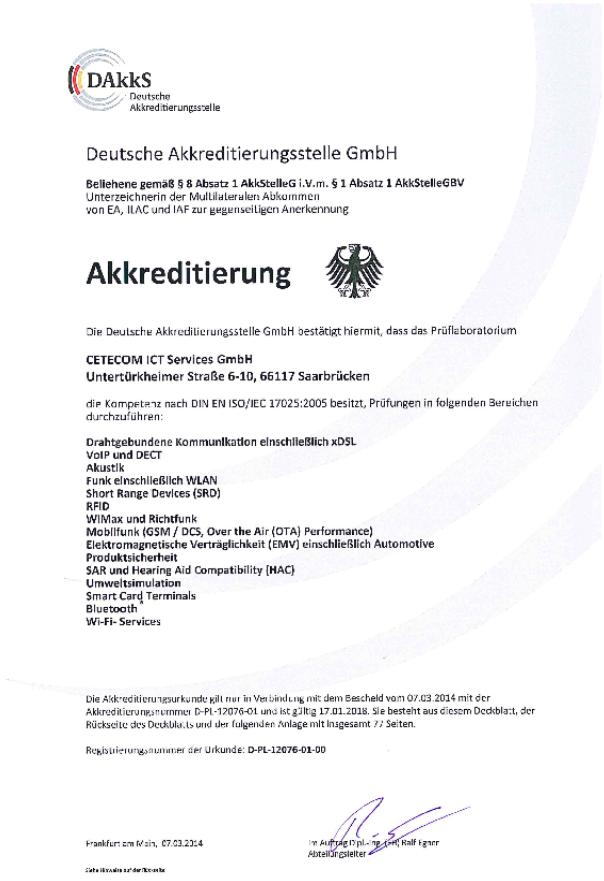
Annex B Further information

Glossary

AVG - Average
DUT - Device under test
EMC - Electromagnetic Compatibility
EN - European Standard
EUT - Equipment under test
ETSI - European Telecommunications Standard Institute
FCC - Federal Communication Commission
FCC ID - Company Identifier at FCC
HW - Hardware
IC - Industry Canada
Inv. No. - Inventory number
N/A - Not applicable
PP - Positive peak
QP - Quasi peak
S/N - Serial number
SW - Software

Annex C Accreditation Certificate

Front side of certificate



DAkkS
Deutsche
Akkreditierungsstelle

Deutsche Akkreditierungsstelle GmbH

Beliehene gemäß § 8 Absatz 1 AkkStelleG i.V.m. § 1 Absatz 1 AkkStelleGBV
Unterzeichnerin der Multilateralen Abkommen
von EA, ILAC und IAF zur gegenseitigen Anerkennung

Akkreditierung

Die Deutsche Akkreditierungsstelle GmbH bestätigt hiermit, dass das Prüflaboratorium

CETECOM ICT Services GmbH
Untertürkheimer Straße 6-10, 66117 Saarbrücken

die Kompetenz nach DIN EN ISO/IEC 17025:2005 besitzt, Prüfungen in folgenden Bereichen durchzuführen:

Drahtgebundene Kommunikation einschließlich xDSL
VoIP und DECT
Akustik
Funk einschließlich WLAN
Short Range Devices (SRD)
RFID
WiMax und Richtfunk
Mobilfunk (GSM / DCS, Over the Air (OTA) Performance)
Elektromagnetische Verträglichkeit (EMV) einschließlich Automotive
Produktsicherheit
SAR und Hearing Aid Compatibility (HAC)
Umweltsimulation
Smart Card Terminals
Bluetooth
Wi-Fi- Services

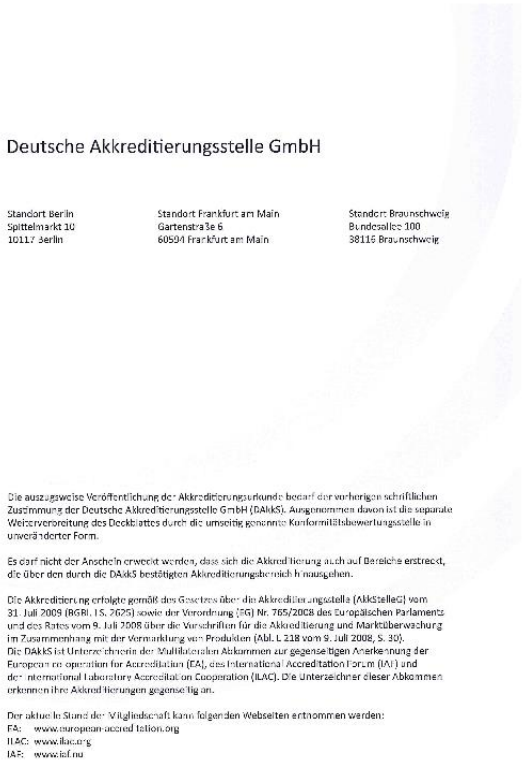
Die Akkreditierungsurkunde gilt nur in Verbindung mit dem Bescheid vom 07.03.2014 mit der Akkreditierungsnummer D-PL-12076-01 und ist gültig 17.01.2018. Sie besteht aus diesem Deckblatt, der Rückseite des Deckblatts und der folgenden Anlage mit insgesamt 77 Seiten.

Registrierungsnummer der Urkunde: **D-PL-12076-01-00**

Frankfurt am Main, 07.03.2014

Im Auftrag Dipl.-Ing. (FH) Ralf Egner
Abteilungsleiter

Back side of certificate



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Die auszugsweise Veröffentlichung der Akkreditierungsurkunde bedarf der vorherigen schriftlichen Zustimmung der Deutsche Akkreditierungsstelle GmbH (DAkkS). Ausgenommen davon ist die separate Weiterverbreitung des Deckblattes durch die umseitig genannte Konformitätsbewertungsstelle in unveränderter Form.

Es darf nicht der Anschein erweckt werden, dass sich die Akkreditierung auch auf Bereiche erstreckt, die über den durch die DAkkS bestätigten Akkreditierungsbereich hinausgehen.

Die Akkreditierung erfolgte gemäß des Gesetzes über die Akkreditierungsstelle (AkkStelleG) vom 31. Juli 2009 (BGBl. I S. 2625) sowie der Verordnung (EG) Nr. 765/2008 des Europäischen Parlaments und des Rates vom 9. Juli 2008 über die Vorschriften für die Akkreditierung und Marktüberwachung im Zusammenhang mit der Vermarktung von Produkten (Abl. L 218 vom 9. Juli 2008, S. 30).
Die DAkkS ist Unterzeichnerin der Multilateralen Abkommen zur gegenseitigen Anerkennung der European co-operation for Accreditation (EA), des International Accreditation Forum (IAF) und der International Laboratory Accreditation Cooperation (ILAC). Die Unterzeichner dieser Abkommen erkennen ihre Akkreditierungen gegenseitig an.

Der aktuelle Stand der Mitgliedschaft kann folgenden Webseiten entnommen werden:
EA: www.european-accreditation.org
ILAC: www.ilac.org
IAF: www.iaf.nu

Note:

The current certificate including annex is published on our website (see link below) or may be received from CETECOM ICT Services on request.

http://www.cetecom.com/eu/de/cetecom-group/europa/deutschland-saarbruecken/akkreditierungen.html