

## 8.2.5 Block edge compliance

### Description:

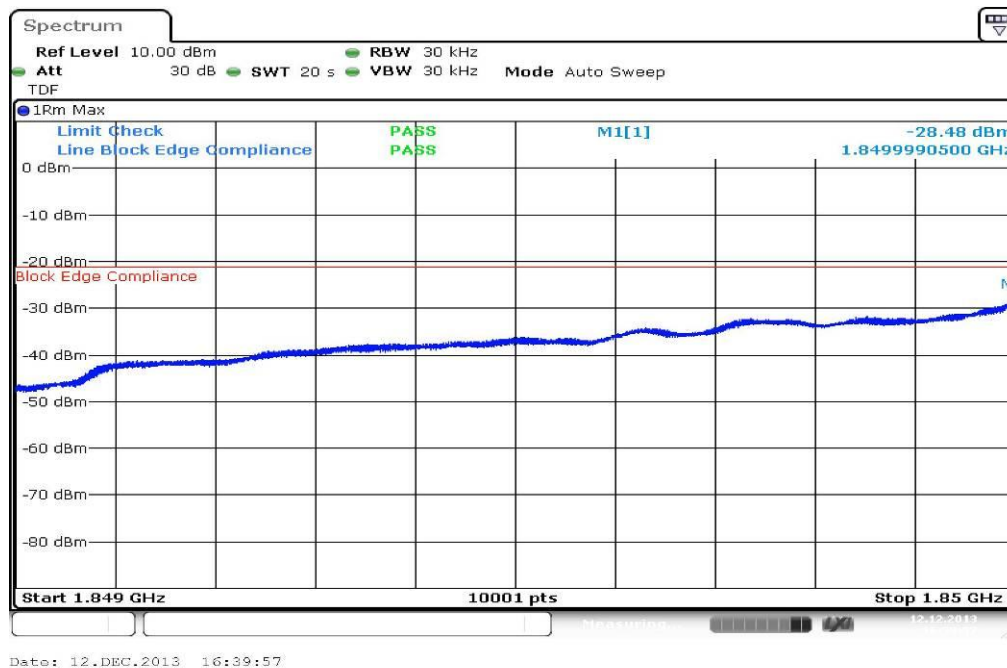
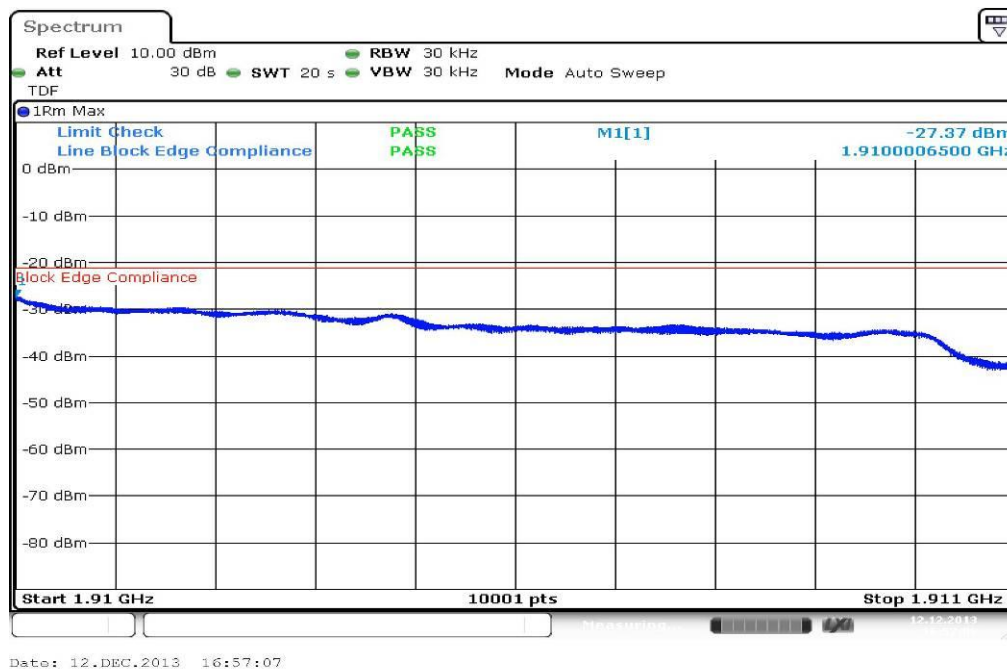
The spectrum at the band edges must comply with the spurious emissions limits.

### Measurement:

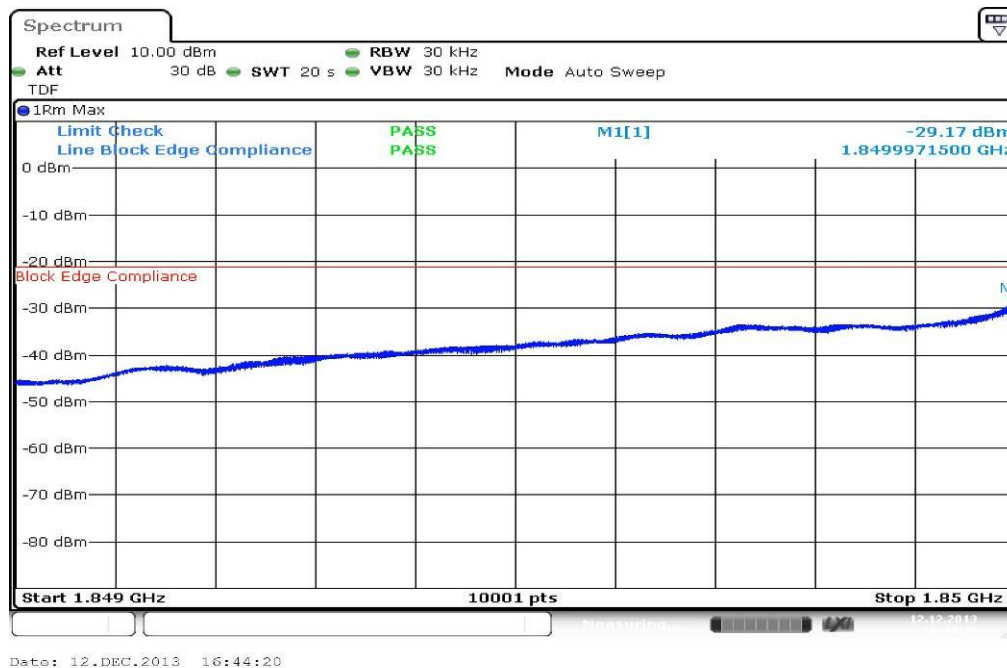
Measurement parameters	
Detector:	RMS
Sweep time:	60 sec.
Video bandwidth:	30 kHz
Resolution bandwidth:	30 kHz
Span:	1 MHz
Trace-Mode:	Max Hold

### Limits:

FCC	-/-
CFR Part 24.238 CFR Part 2.1051	-/-
Block Edge Compliance	
<p>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 <math>43 + 10 \log(P)</math> dB."</p> <p>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:</p> <p>"An alternative is to add an additional correction factor of <math>10 \log(RBW1/RBW2)</math> to the <math>43 + 10 \log(P)</math> limit. RBW1 is the narrower measurement resolution bandwidth and RBW2 is either the 1% emissions bandwidth or 1 MHz."</p> <p>When using a 30 kHz bandwidth, this yields a -2.2185 adjustment to the limit [<math>10 \log(30 \text{ kHz} / 200 \text{ kHz}) = -8.239</math>]. When this adjustment is applied to the limit, the limit becomes -21.24.</p>	
-21.24 dBm	

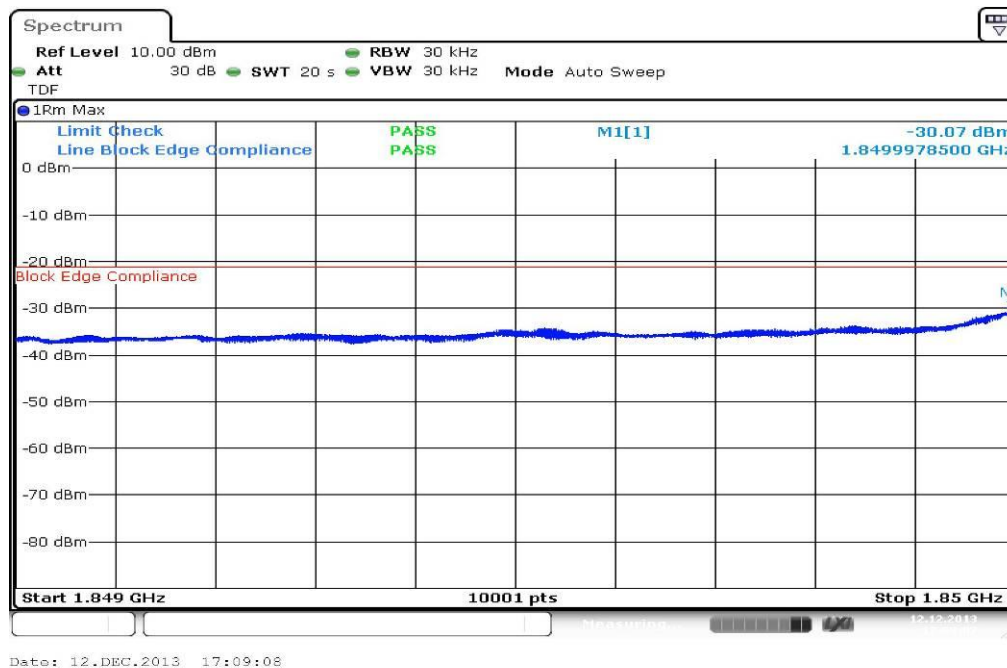
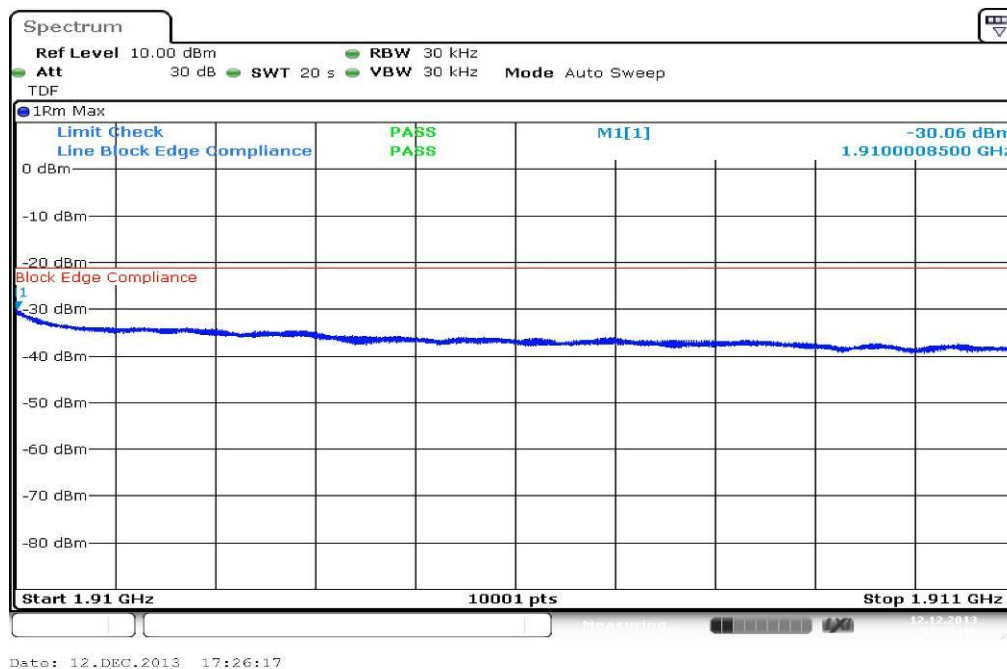
**Results: 1.4 MHz channel bandwidth****Plot 1: Lowest channel – QPSK****Plot 2: Highest channel – QPSK**

Plot 3: Lowest channel – 16-QAM

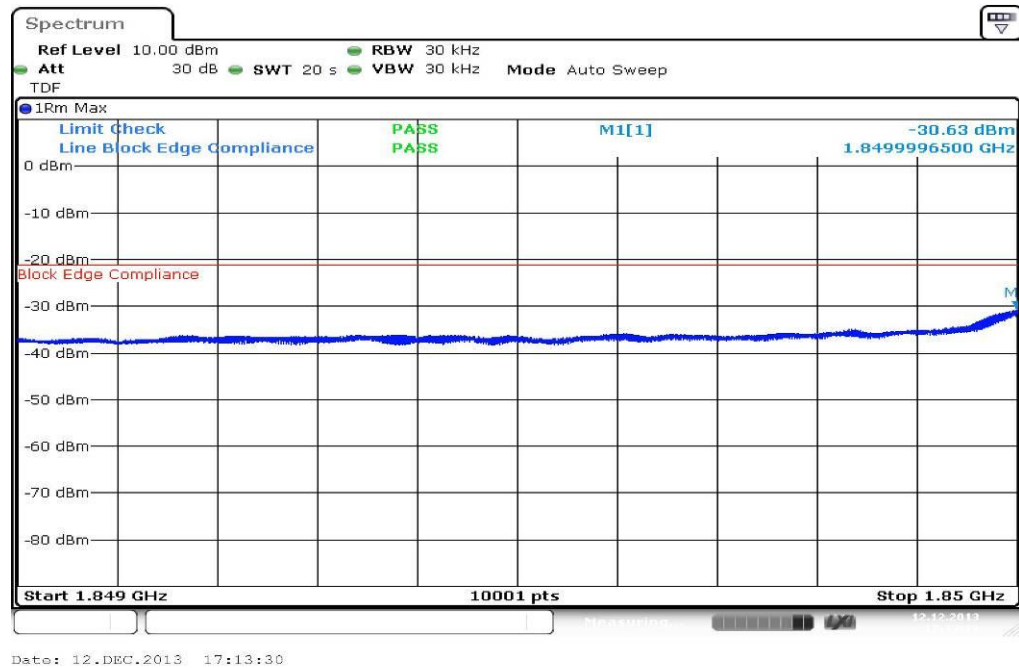


Plot 4: Highest channel – 16-QAM

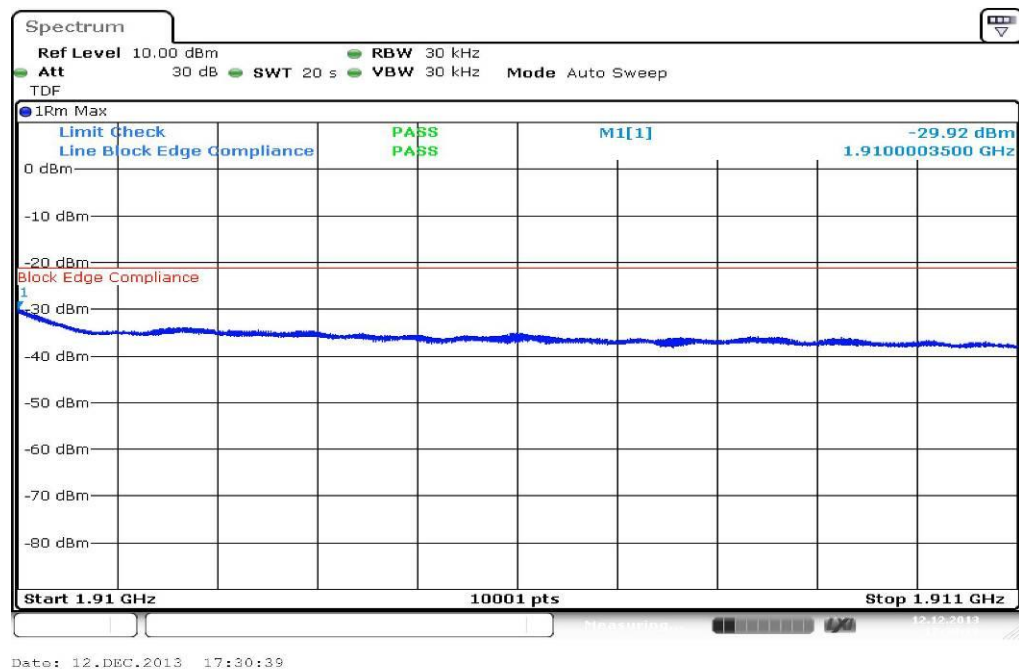


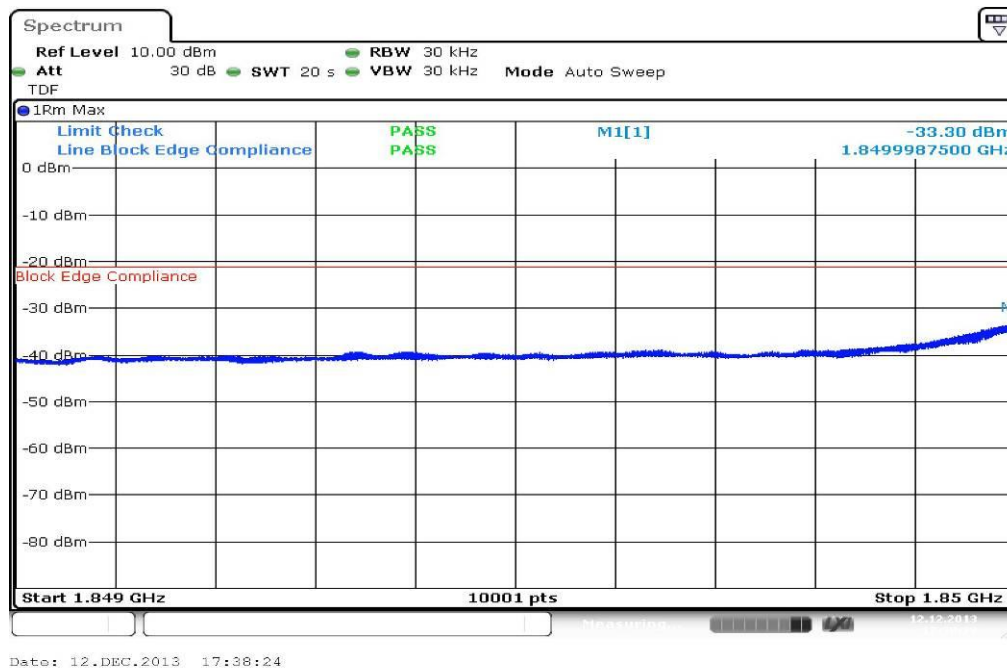
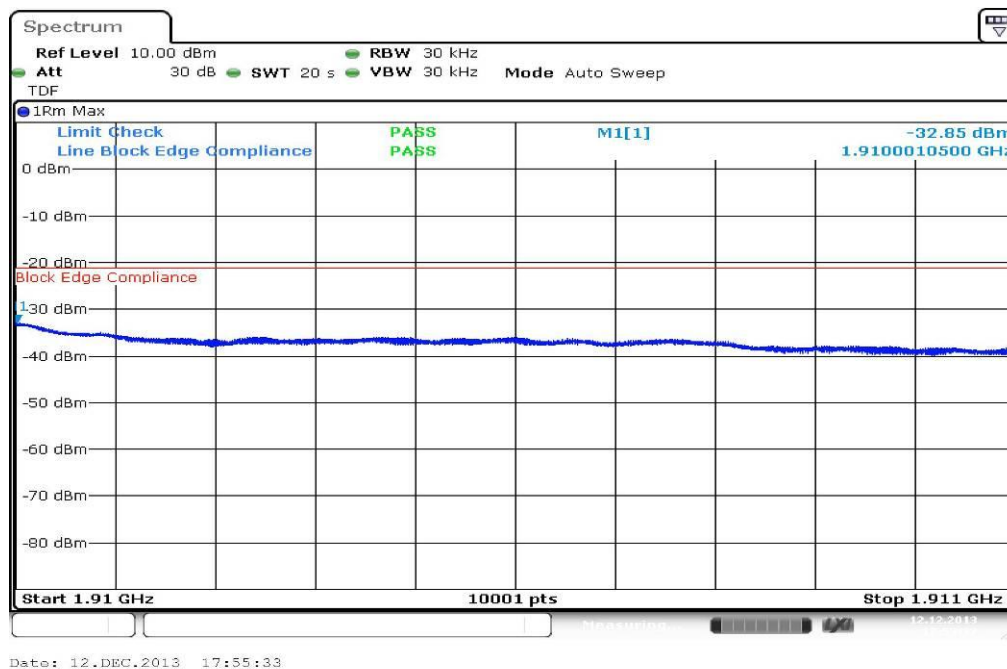
**Results: 3 MHz channel bandwidth****Plot 1: Lowest channel – QPSK****Plot 2: Highest channel – QPSK**

### Plot 3: Lowest channel – 16-QAM

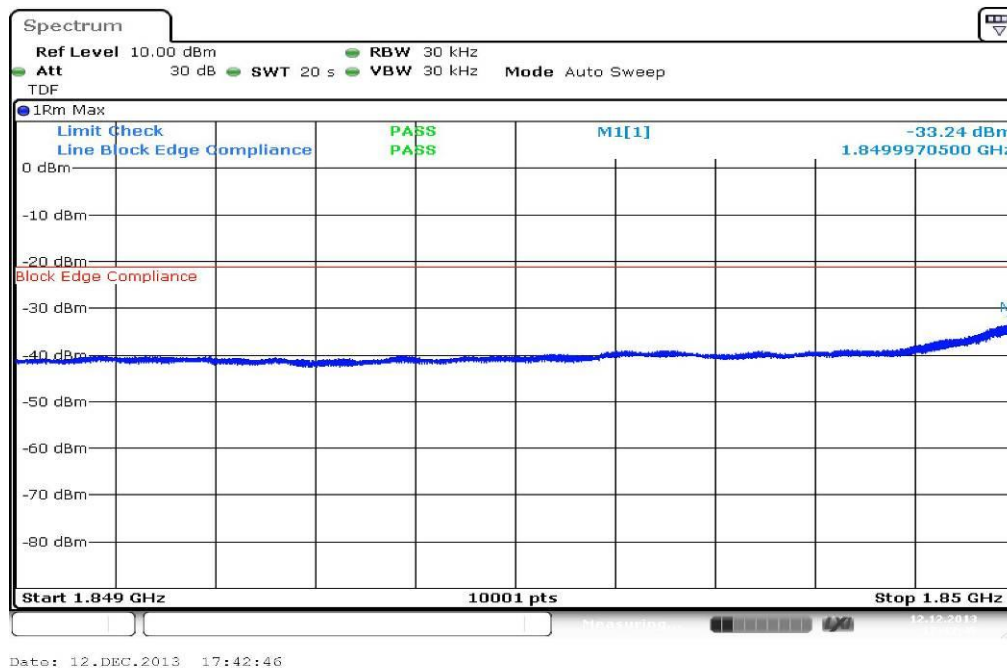


#### Plot 4: Highest channel – 16-QAM

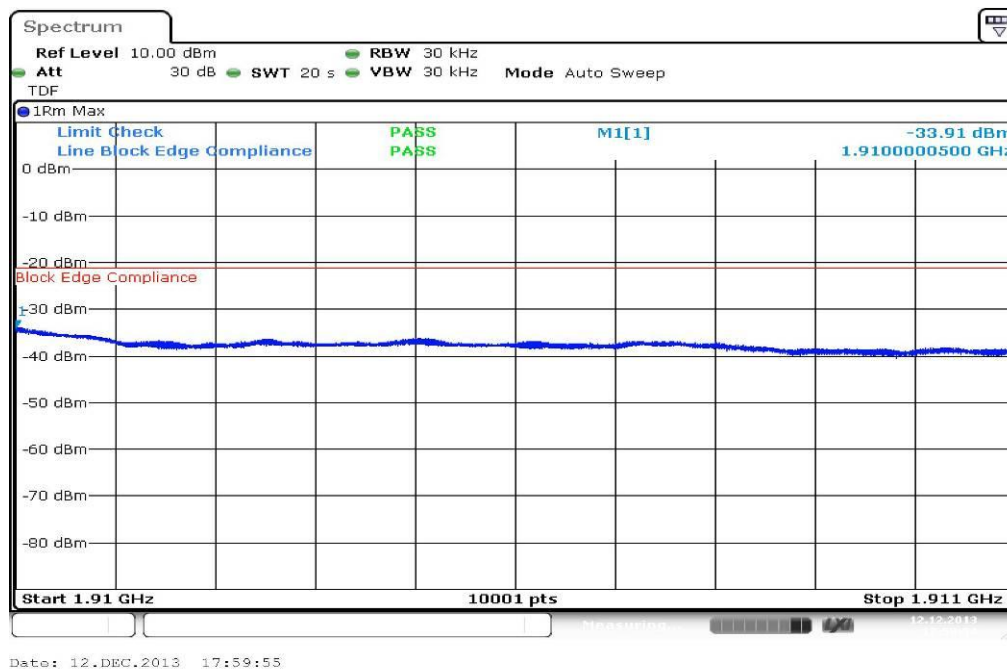


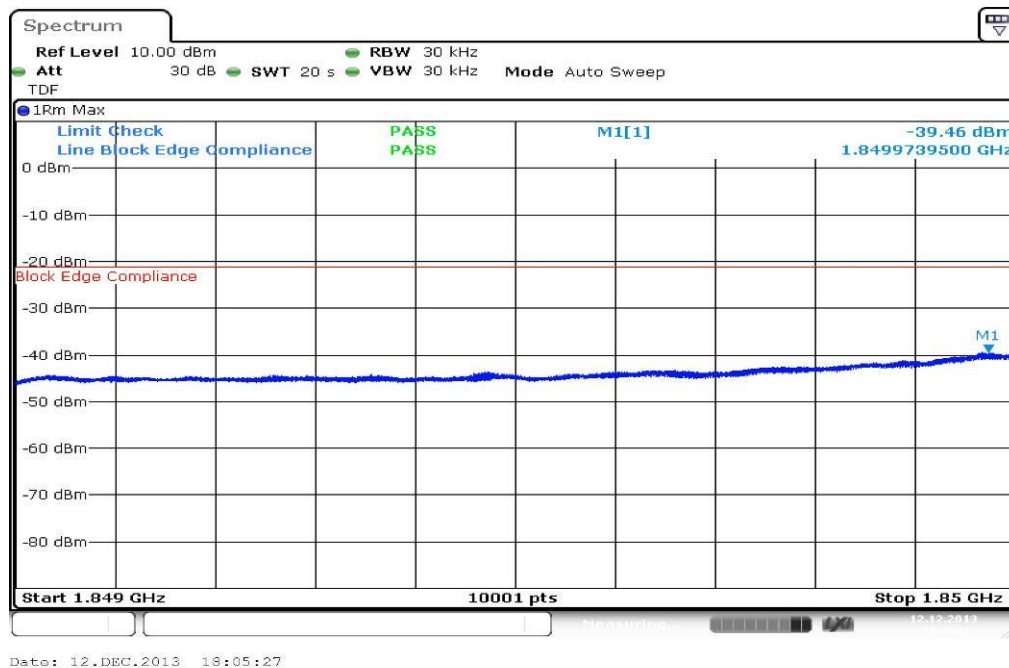
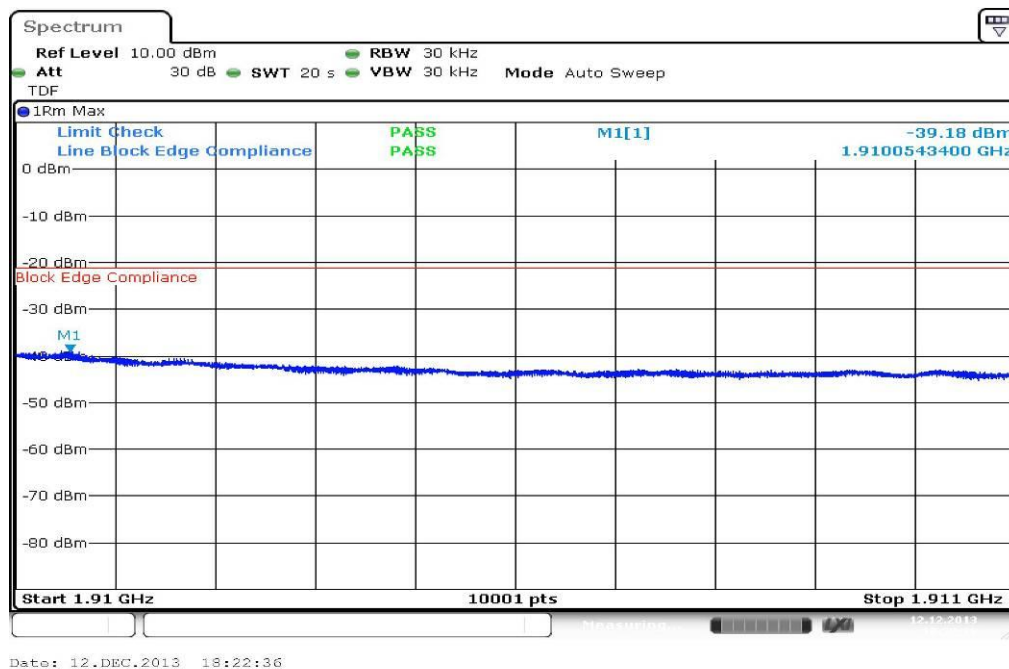
**Results: 5 MHz channel bandwidth****Plot 1: Lowest channel – QPSK****Plot 2: Highest channel – QPSK**

Plot 3: Lowest channel – 16-QAM



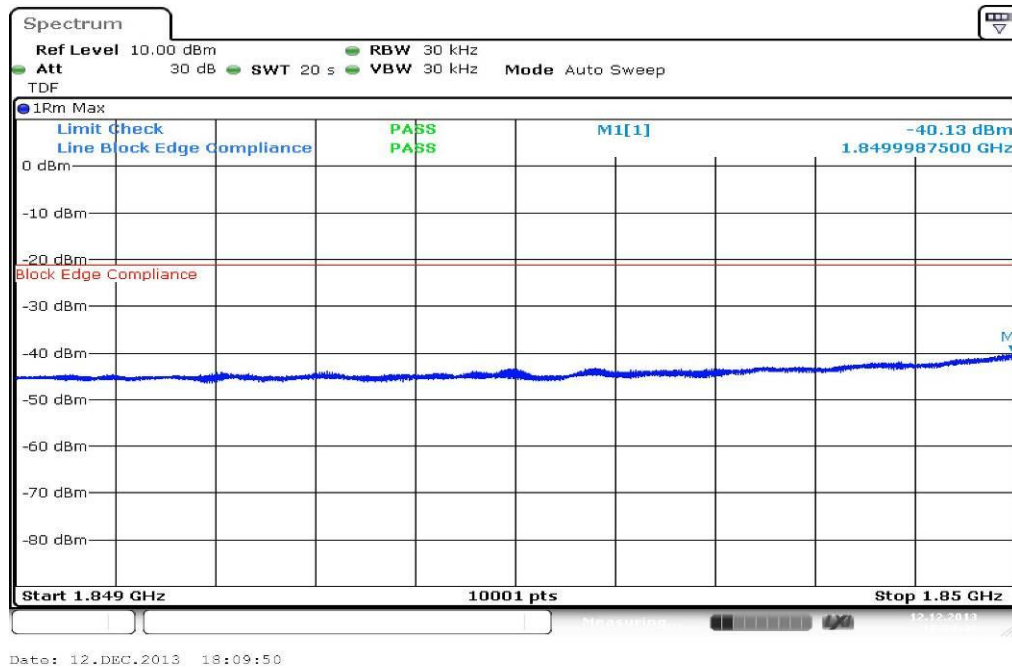
Plot 4: Highest channel – 16-QAM



**Results: 10 MHz channel bandwidth****Plot 1: Lowest channel – QPSK****Plot 2: Highest channel – QPSK**

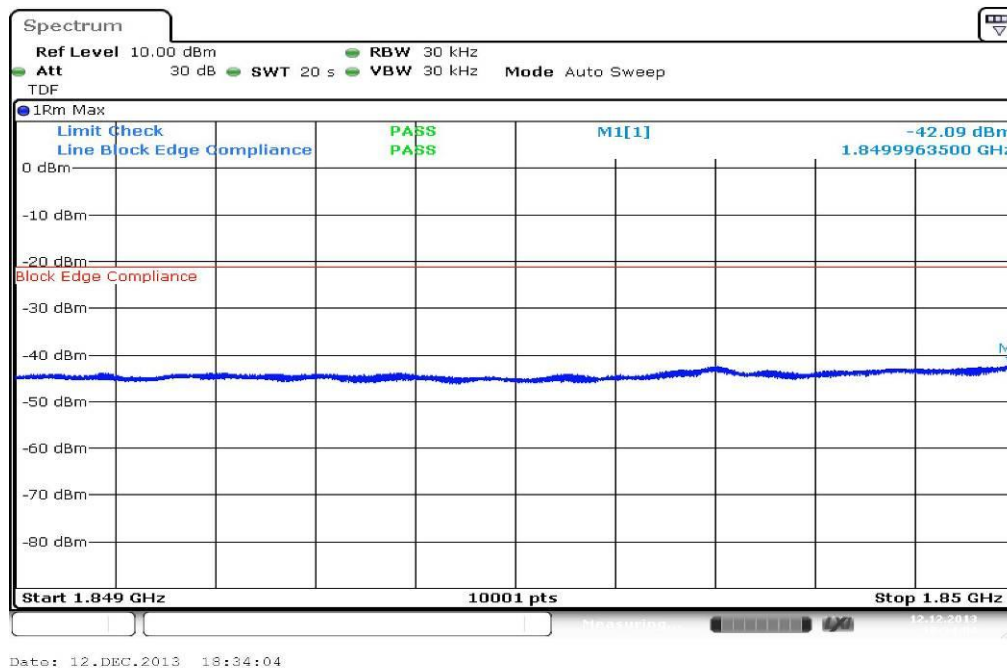
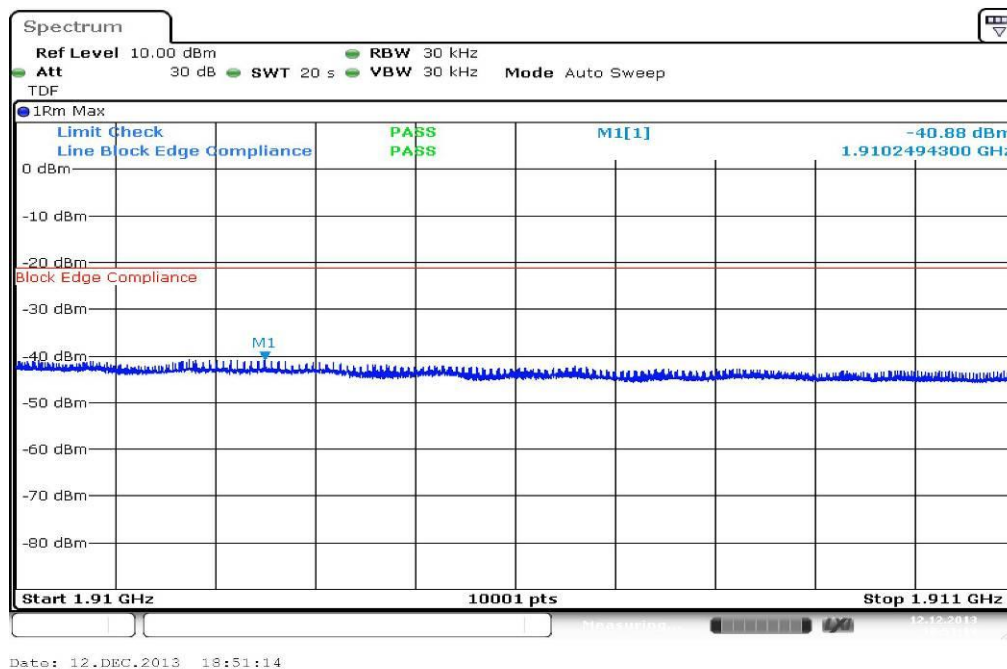


Plot 3: Lowest channel – 16-QAM

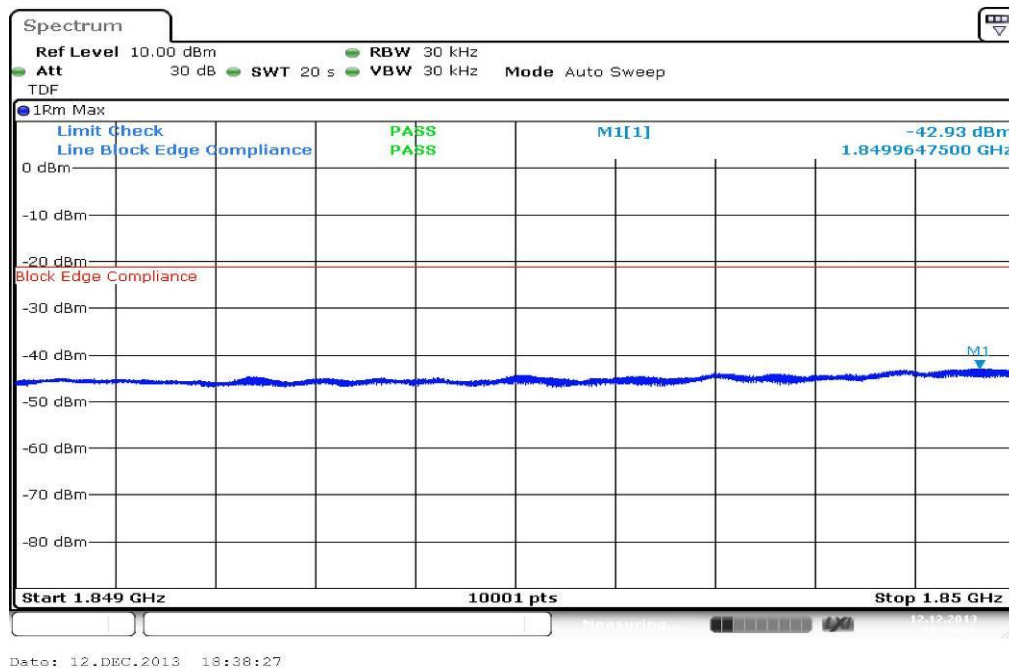


Plot 4: Highest channel – 16-QAM

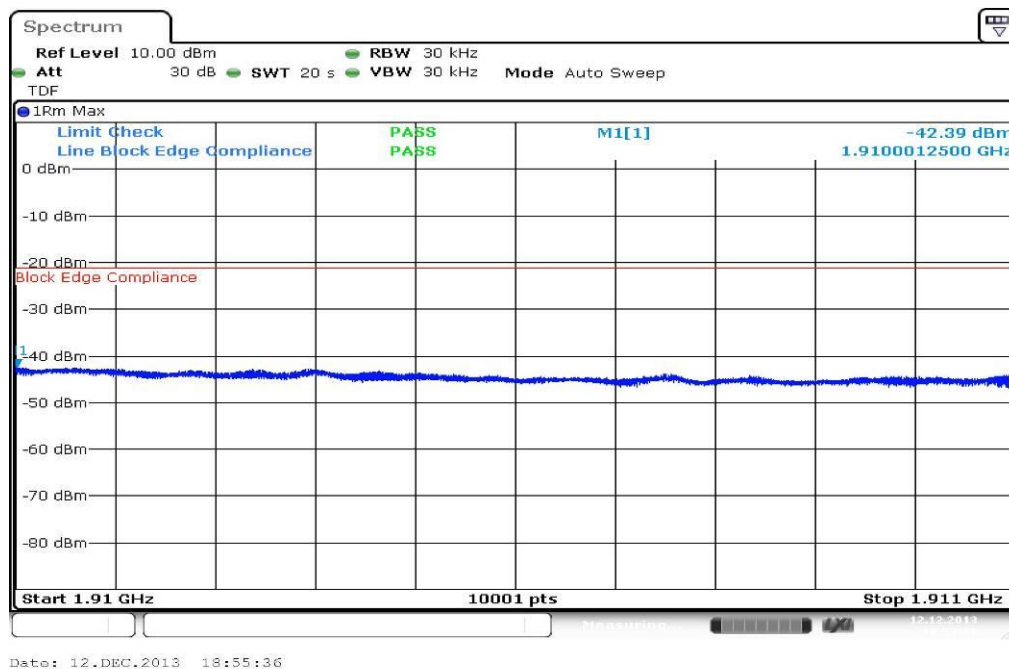


**Results: 15 MHz channel bandwidth****Plot 1: Lowest channel – QPSK****Plot 2: Highest channel – QPSK**

Plot 3: Lowest channel – 16-QAM

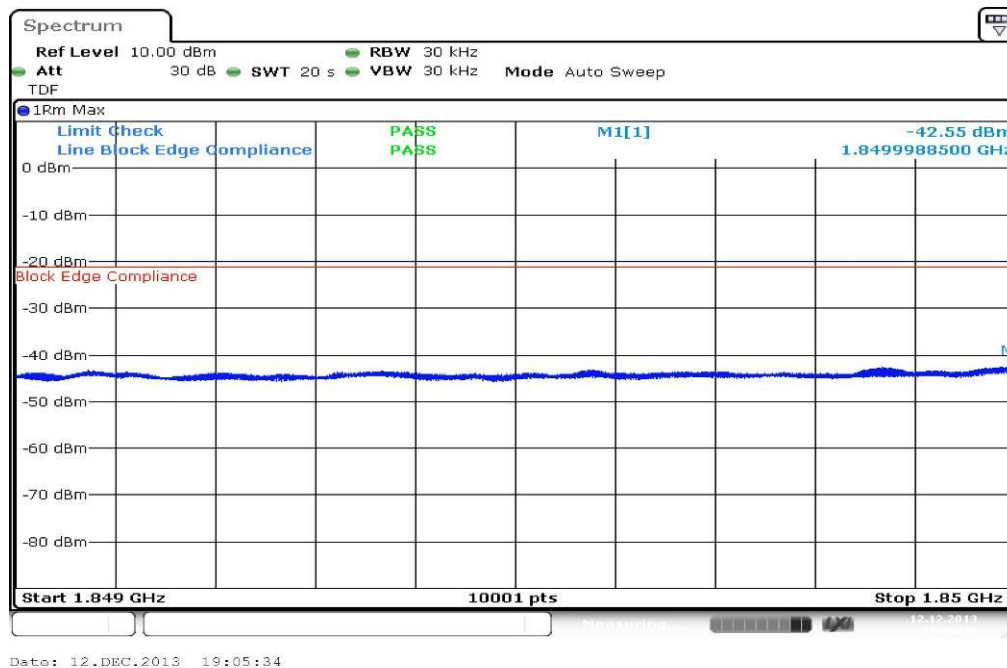


Plot 4: Highest channel – 16-QAM

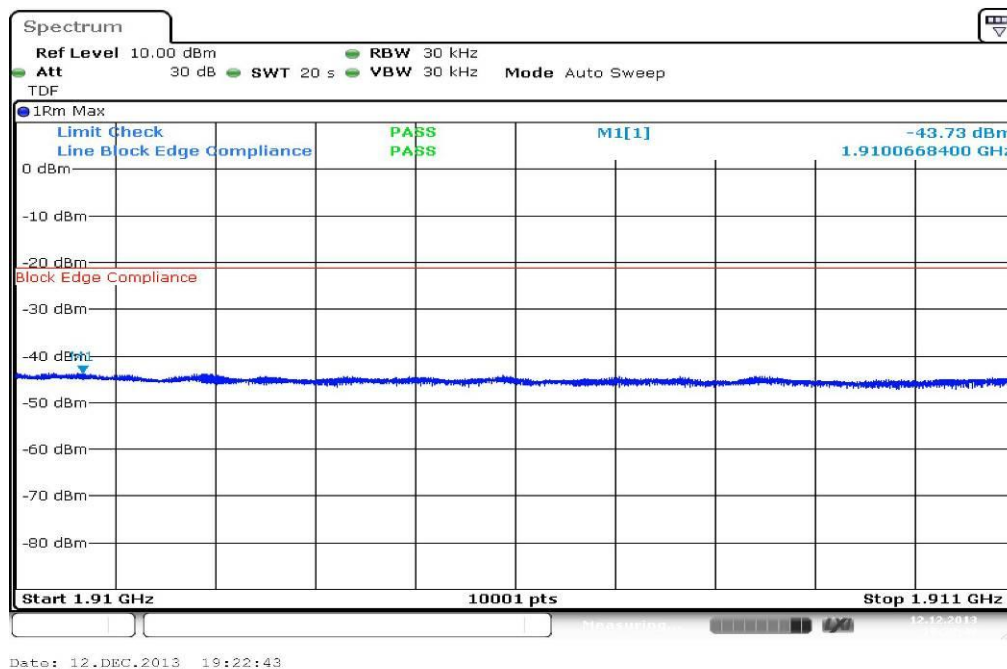




Plot 3: Lowest channel – 16-QAM



Plot 4: Highest channel – 16-QAM

**Result: Passed**

## 8.2.6 Occupied bandwidth

### Description:

Measurement of the occupied bandwidth of the transmitted signal.

### Measurement:

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

Measurement parameters	
Detector:	Peak
Sweep time:	Auto
Video bandwidth:	100 kHz to 2 MHz
Resolution bandwidth:	30 kHz to 500 kHz
Span:	2 x nominal bandwidth
Trace-Mode:	Max Hold

### Limits:

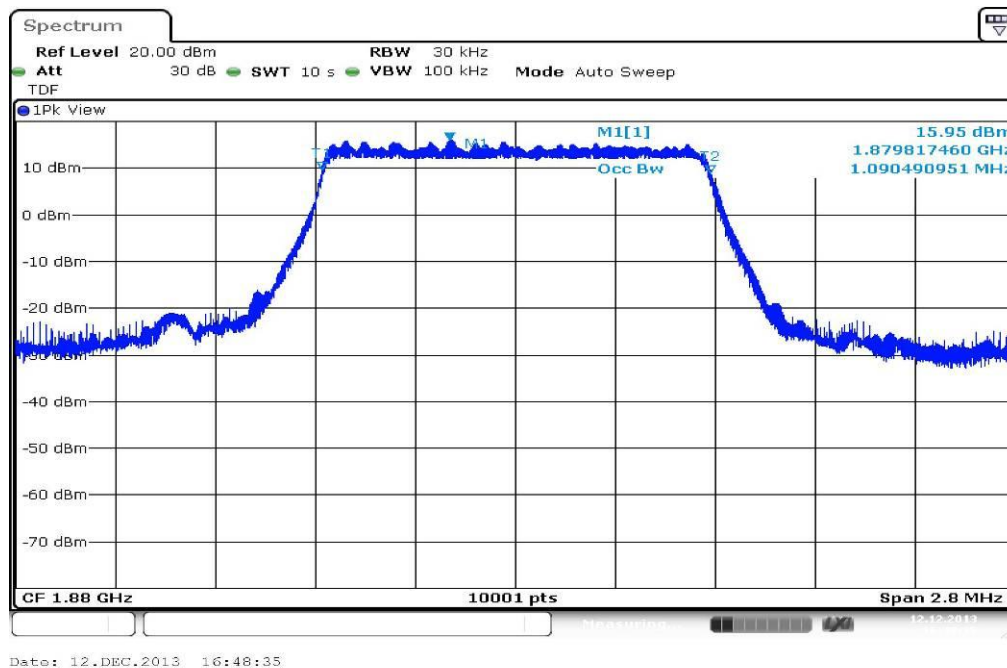
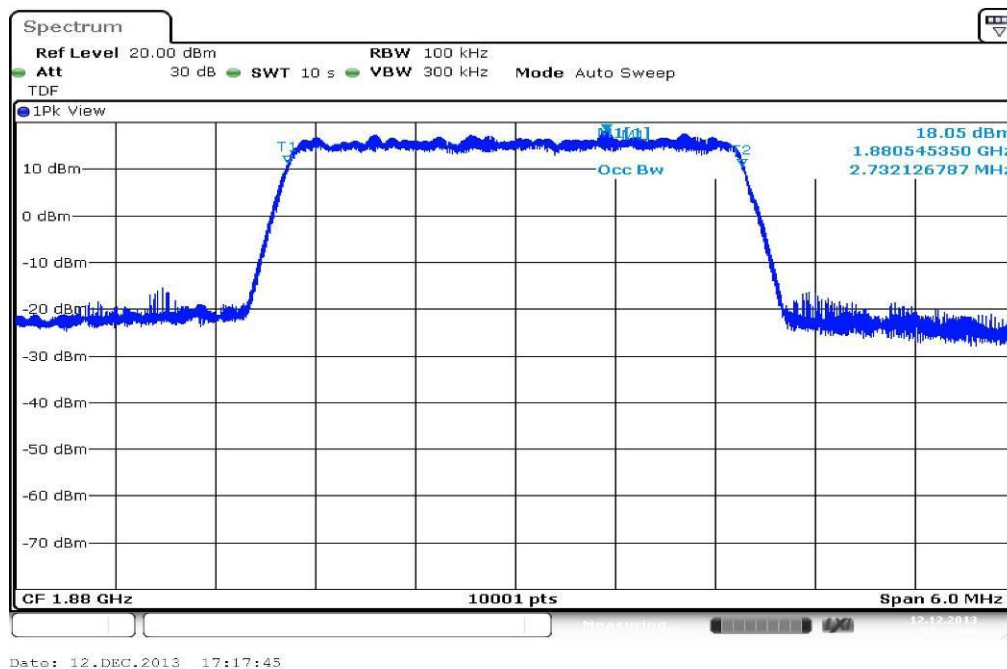
FCC	-/-
CFR Part 24.238 CFR Part 2.1049	-/-
Occupied Bandwidth	
Spectrum must fall completely in the specified band	

**Results:**

Occupied Bandwidth – QPSK		
Bandwidth (MHz)	99% OBW (kHz)	26 dB bandwidth (kHz)
1.4	1090	1290
3.0	2732	3046
5.0	4502	4992
10.0	9061	10143
15.0	13424	14705
20.0	17910	19618
Measurement uncertainty	± 30 kHz to ± 500 kHz depending on channel bandwidth	

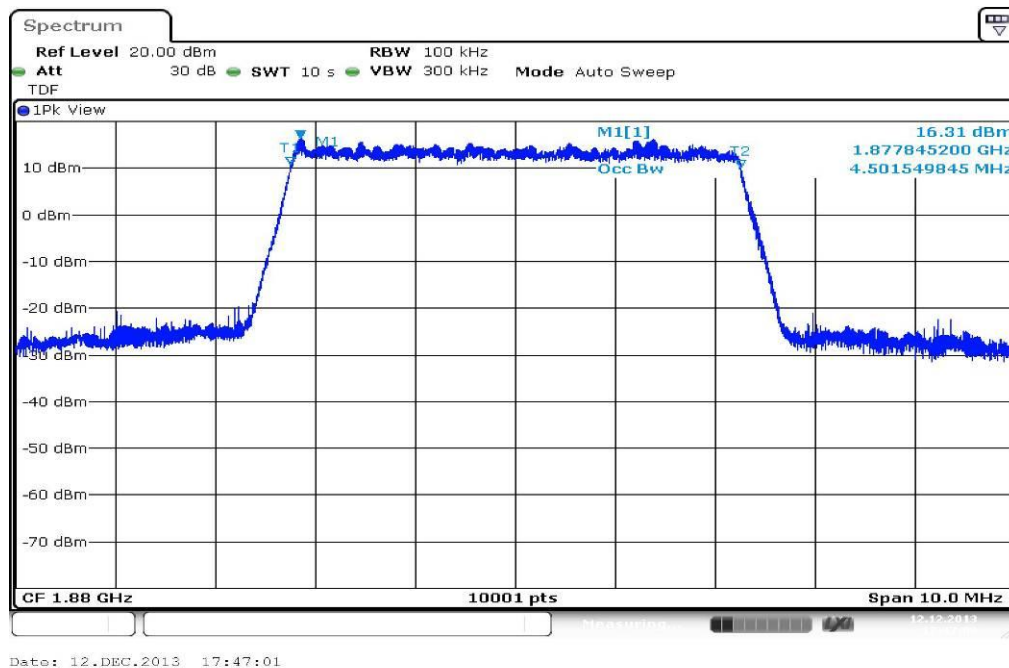
Occupied Bandwidth – 16-QAM		
Bandwidth (MHz)	99% OBW (kHz)	26 dB bandwidth (kHz)
1.4	1096	1299
3.0	2726	3046
5.0	4517	5007
10.0	9061	10049
15.0	13418	14684
20.0	17922	19586
Measurement uncertainty	± 30 kHz to ± 500 kHz depending on channel bandwidth	

**Result:** Passed

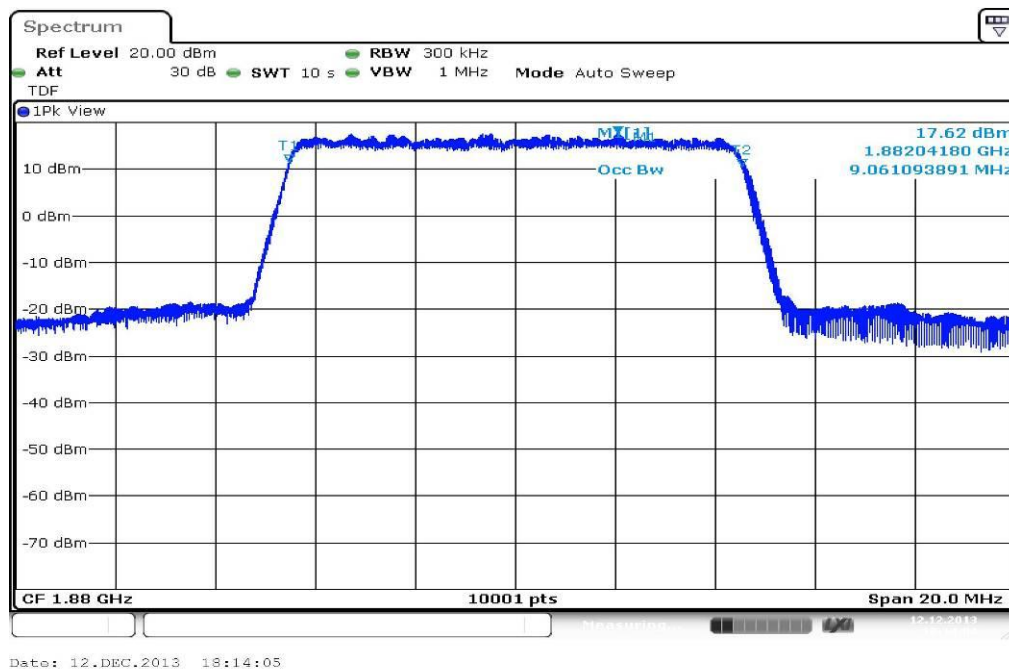
**Plots: QPSK****Plot 1: 1.4 MHz (99% - OBW)****Plot 2: 3 MHz (99% - OBW)**



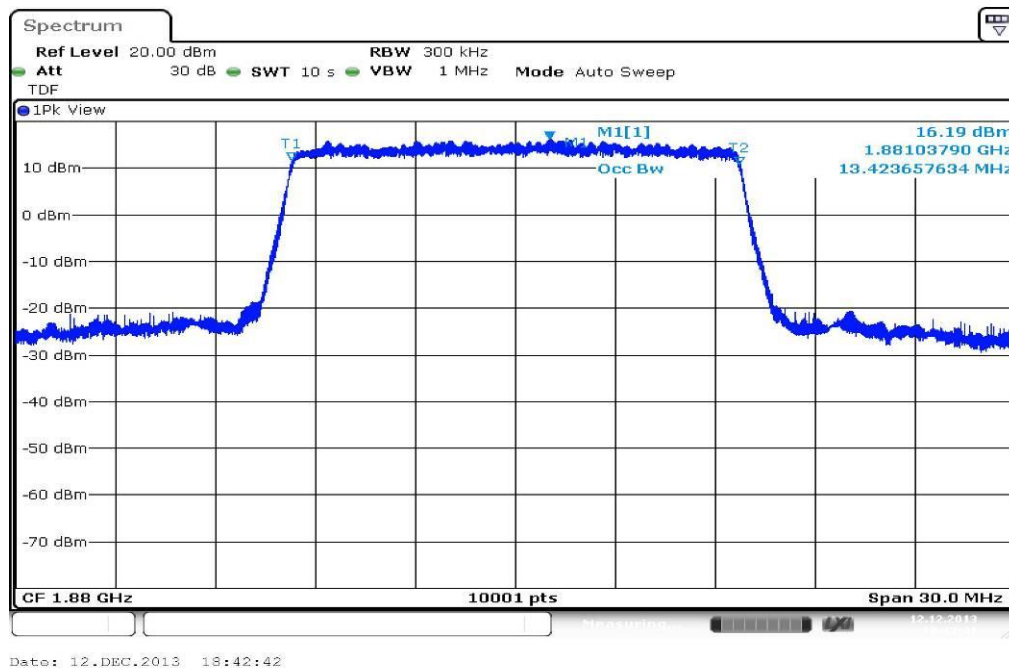
Plot 3: 5 MHz (99% - OBW)



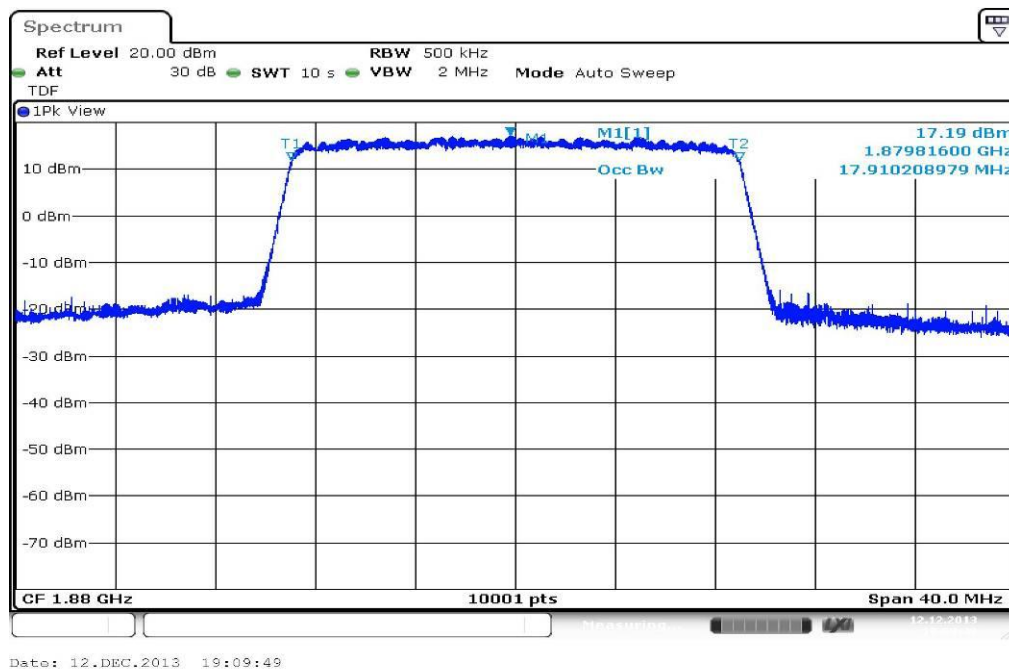
Plot 4: 10 MHz (99% - OBW)

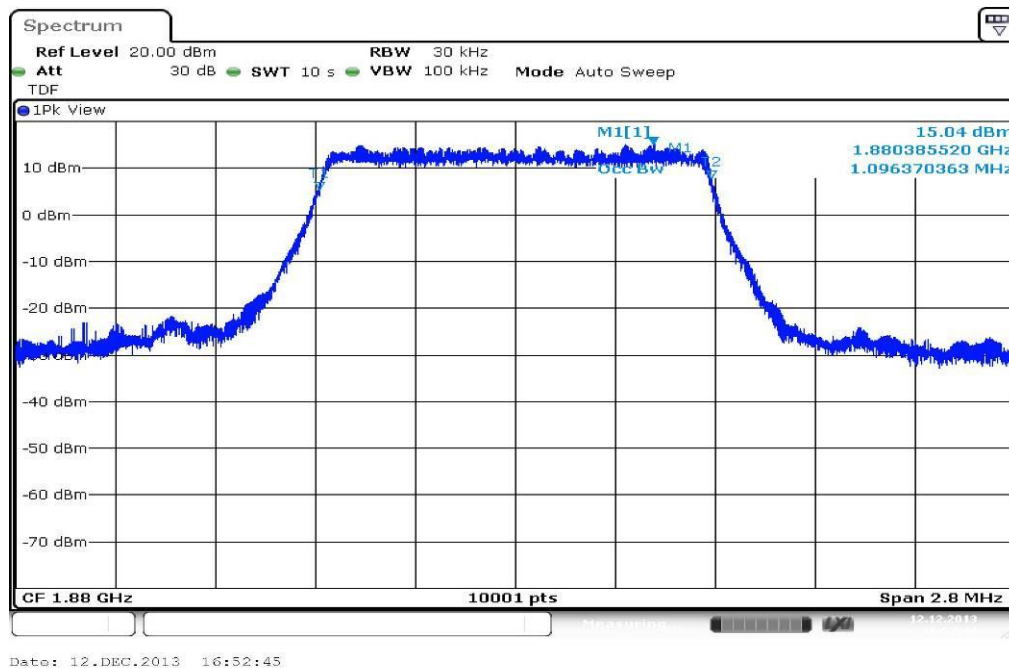
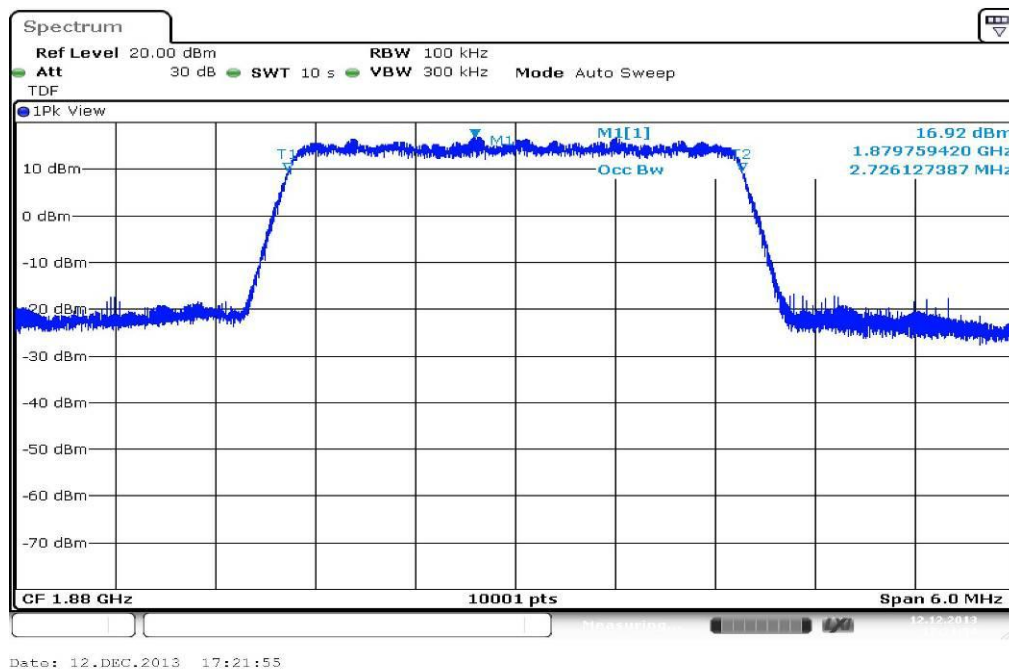


Plot 5: 15 MHz (99% - OBW)

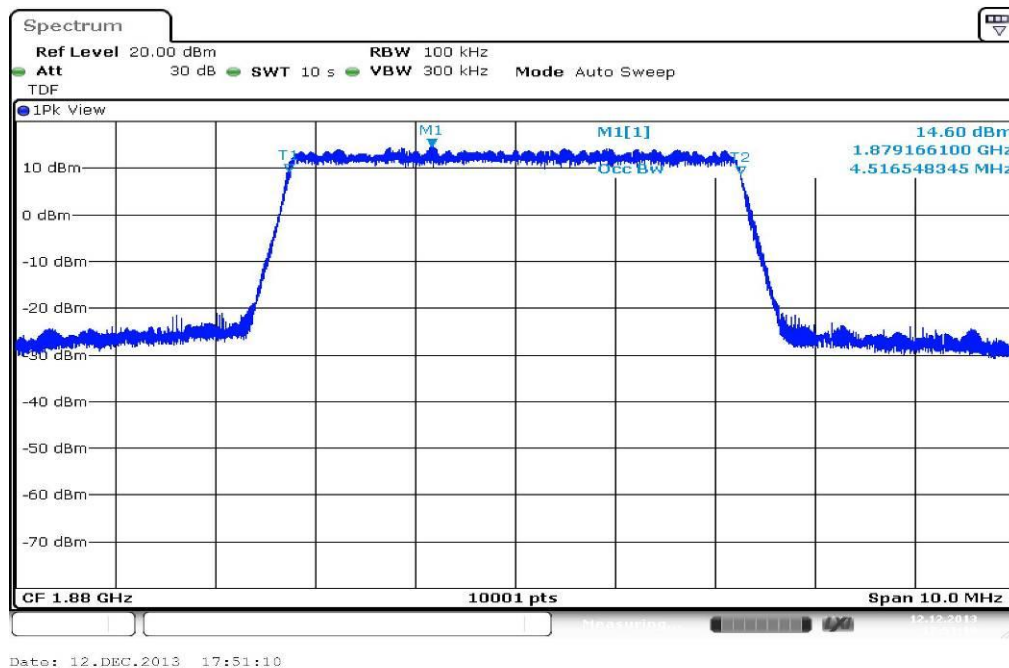


Plot 6: 20 MHz (99% - OBW)

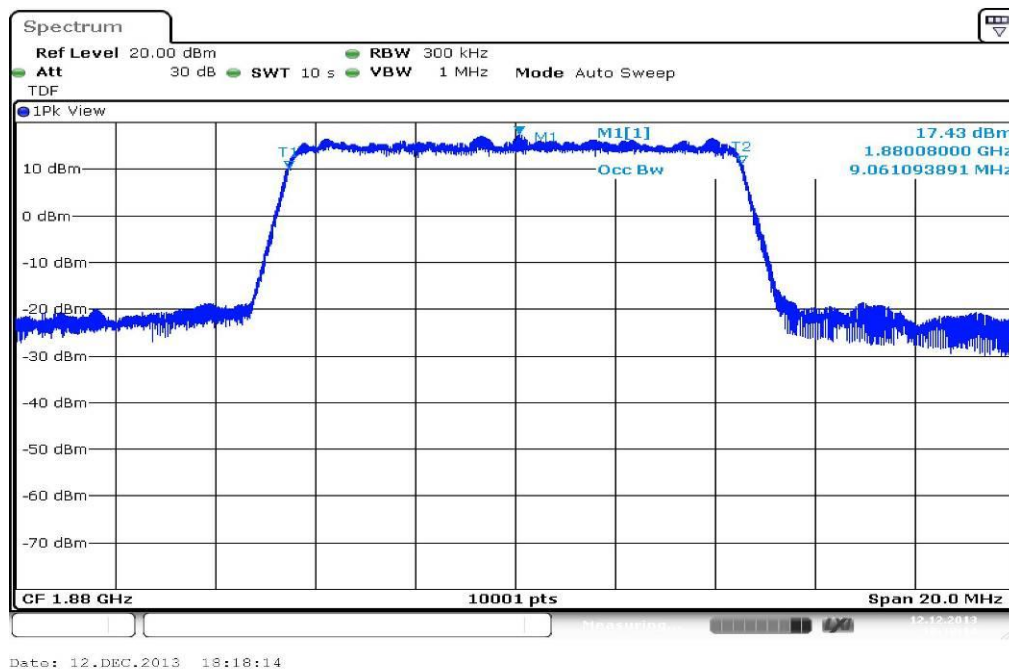


**Plots: 16-QAM****Plot 1: 1.4 MHz (99% - OBW)****Plot 2: 3 MHz (99% - OBW)**

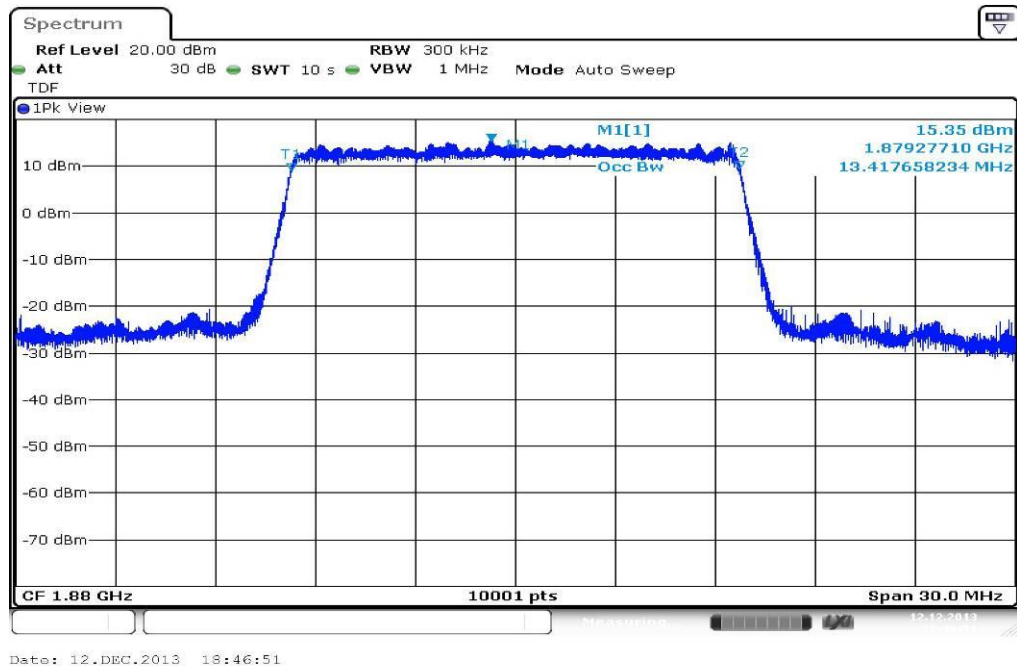
Plot 3: 5 MHz (99% - OBW)



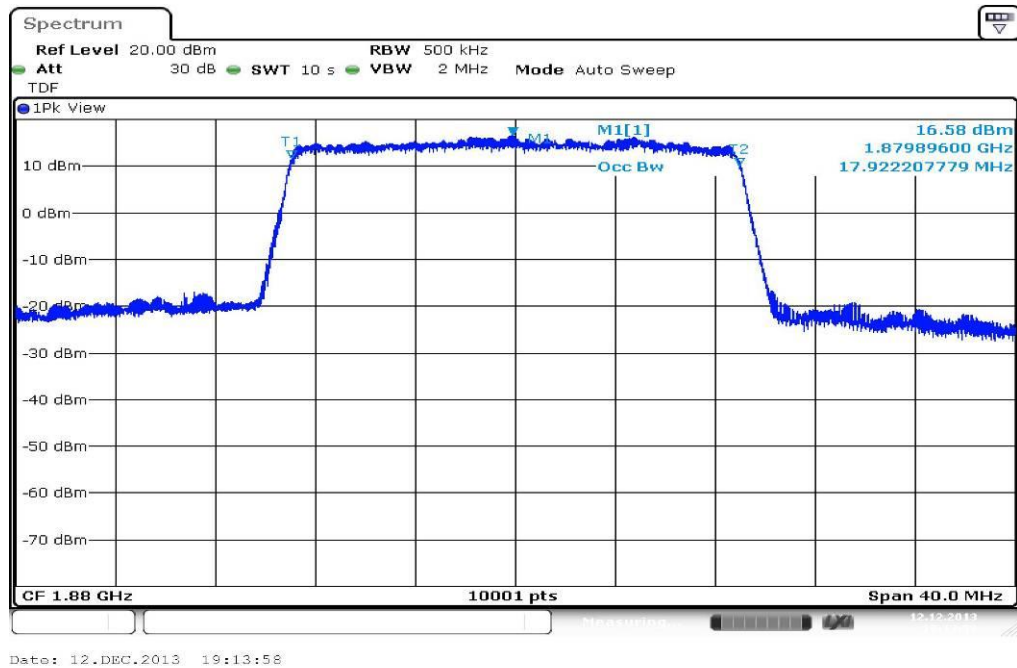
Plot 4: 10 MHz (99% - OBW)



Plot 5: 15 MHz (99% - OBW)



Plot 6: 20 MHz (99% - OBW)



## 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 (Labor/Item).

No.	Lab / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	n. a.	Wideband Radio Communication Tester	CMW500	R&S	102375	300004187_0	k	16.07.2013	16.07.2015
2	n. a.	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	vIKI!	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 Meßtechnik	*	300000199	ne		
5	n. a.	Switch / Control Unit	3488A	HP Meßtechnik	2719A15013	300001156	ne		
6	n. a.	Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997	ne		
7	90	Active Loop Antenna 10 kHz to 30 MHz	6502	Kontron Psychotech	8905-2342	300000256	k	13.06.2013	13.06.2015
8	n. a.	Amplifier	js42-00502650-28-5a	Parzich GMBH	928979	300003143	ne		
9	n. a.	Band Reject filter	WRCG185 5/1910-1835/1925-40/8SS	Wainwright	7	300003350	ev		
10	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	371	300003854	vIKI!	14.10.2011	14.10.2014
11	n. a.	MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405	k	21.02.2013	21.02.2014
12	n. a.	Signal Analyzer 40 GHz	FSV40	R&S	101042	300004517	k	22.10.2012	22.01.2014
13	n. a.	Temperature Test Chamber	VT 4002	Heraeus Voetsch	521/83761	300002326	Ve	26.09.2013	26.09.2015
14	n. a.	Power Supply 0-20V, 0-5A	6632B	Agilent Technologies	GB42110541	400000562	vIKI!	10.01.2013	10.01.2016

### Agenda: Kind of Calibration

k calibration / calibrated  
 ne not required (k, ev, izw, zw not required)  
 ev periodic self verification  
 Ve long-term stability recognized  
 vIKI! Attention: extended calibration interval  
 NK! Attention: not calibrated

EK limited calibration  
 zw cyclical maintenance (external cyclical maintenance)  
 izw internal cyclical maintenance  
 g blocked for accredited testing  
 \*) next calibration ordered / currently in progress

## 10 Observations

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

**Annex A Document history**

Version	Applied changes	Date of release
	Initial release	2014-01-10
A	Canada removed / EUT name changed	2014-01-22

**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



Back side of certificate



### 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>