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consulting - testing - certification >>>

## TEST REPORT

Test report no.: 1-6965/13-12-06



Deutsche  
Akreditierungsstelle  
D-PL-12076-01-01

### Testing laboratory

#### CETECOM ICT Services GmbH

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#### 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-12076-01-01

Area of Testing:  
Radio Communications & EMC (RCE)

### Applicant

#### Sony Mobile Communications AB

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Phone: +46 7 03 22 75 03

### Manufacturer

#### Sony Mobile Communications AB

Nya Vattentornet  
22188 Lund / SWEDEN

### Test standard/s

47 CFR Part 27

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: Tablet PC GPRS/EGPRS 850/900/1800/1900; UMTS HSPA FDDI/II/V; LTE FDD1/3/17/18; LTE TDD41; CDMA 2K C00/C06; WLAN b/g/n/a/ac; BT 4.0; RFID; A-GPS  
FCC ID: PY7TM-0044  
Frequency: LTE FDD 17: 704 MHz to 716 MHz  
Technology tested: LTE FDD  
Antenna: Integrated antenna  
Power supply: 3.7V DC by Li - polymer battery  
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:

Stefan Bös  
Senior Testing Manager

### Test performed:

Marco Bertolino  
Testing Manager

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## 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. CETECOM ICT Services 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:	2013-12-19
Date of receipt of test item:	2014-02-17
Start of test:	2014-02-17
End of test:	2014-02-26
Person(s) present during the test:	-/-

## 3 Test standard/s

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

## 4 Test environment

Temperature:	$T_{\text{nom}}$	+22 °C during room temperature tests
	$T_{\text{max}}$	+60 °C during high temperature tests
	$T_{\text{min}}$	-30 °C during low temperature tests
Relative humidity content:		42 %
Barometric pressure:		not relevant for this kind of testing
Power supply:	$V_{\text{nom}}$	3.7 V DC by Li - polymer battery
	$V_{\text{max}}$	4.4 V
	$V_{\text{min}}$	3.3 V

## 5 Test item

Kind of test item	:	Tablet PC GPRS/EGPRS 850/900/1800/1900; UMTS HSPA FDDI/II/V; LTE FDD1/3/17/18; LTE TDD41; CDMA 2K C00/C06; WLAN b/g/n/a/ac; BT 4.0; RFID; A-GPS
S/N serial number	:	Rad. CB5126DAH7 Cond. CB5126DA2Z
HW hardware status	:	AP1
SW software status	:	17.1.C.0.97
Frequency band [MHz]	:	LTE FDD 17: 704 MHz to 716 MHz
Type of modulation	:	QPSK, 16-QAM
Antenna	:	Integrated antenna
Power supply	:	3.7 V DC by Li - polymer battery
Temperature range	:	-30°C to +60 °C

### 5.1 Additional information

Test setup- and EUT-photos are included in test report: 1-6965/13-12-01\_AnnexA  
 1-6965/13-12-01\_AnnexB  
 1-6965/13-12-01\_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

TC identifier	Description	verdict	date	Remark
RF-Testing	CFR Part 27	passed	2014-02-27	-/-

### 7.1 LTE – Band 17

Test Case	temperature conditions	power source voltages	Pass	Fail	NA	NP	Remark
RF Output Power	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
Frequency Stability	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
Spurious Emissions Radiated	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
Spurious Emissions Conducted	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
Block Edge Compliance	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
Occupied Bandwidth	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-

**Note:** NA = Not applicable; NP = Not performed

## 8 RF measurements

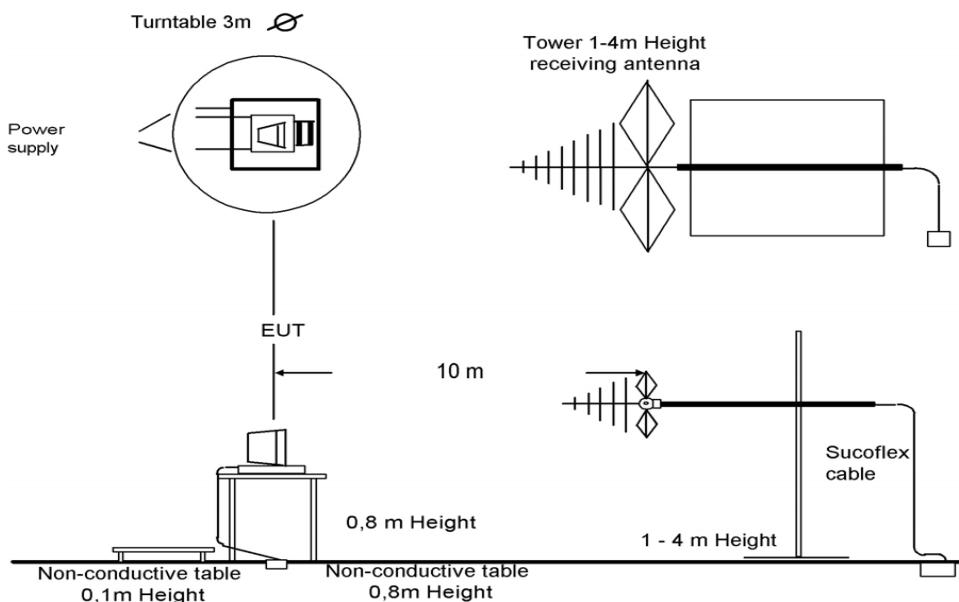
### 8.1 Description of test setup

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

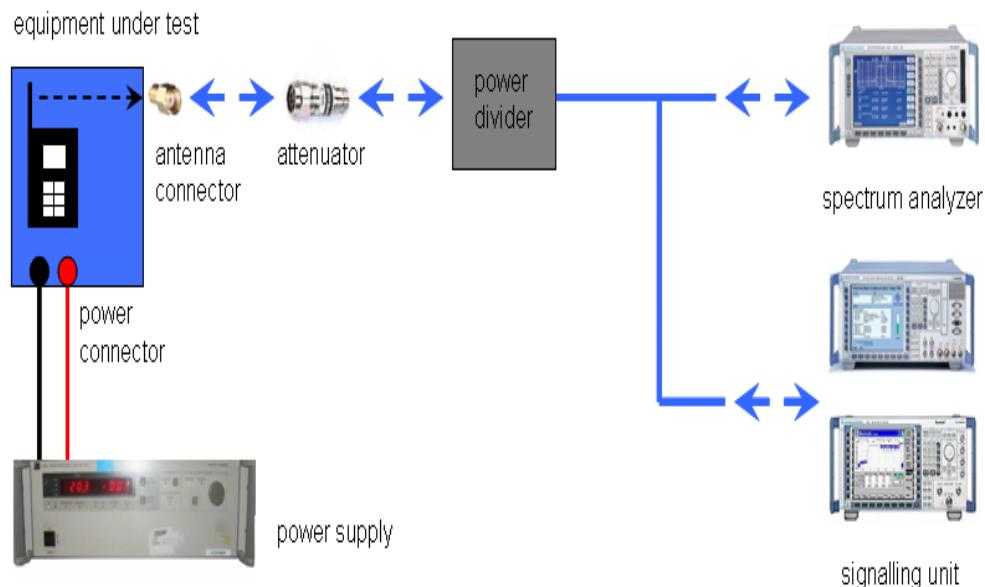
9 kHz - 30 MHz: active loop antenna

30 MHz – 1 GHz: tri-log antenna

> 1 GHz: horn antenna

### 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 $\leq f < 25$ MHz	9 kHz or	10 kHz
$25$ MHz $\leq f < 1000$ MHz	120 kHz or	100 kHz
$1000$ MHz $\leq f$		1 MHz

NOTE: Specific requirements in CEPT/ERC/Recommendation 70-03 [2] shall be applied where applicable.

## 8.2 LTE technologies supported by EUT

### Channel bandwidth

	Band 4	Band 7	Band 13	Band 17
[MHz]				
1.4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
10	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
15	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## 8.3 Results LTE – Band 17

The EUT was set to transmit the maximum power.

### 8.3.1 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:	Peak and RMS (Power in Burst)
Sweep time:	Auto
Video bandwidth:	Depends on Channel Bandwidth
Resolution bandwidth:	Depends on Channel Bandwidth
Span:	Zero Span
Trace-Mode:	Max Hold

#### Limits:

FCC	-/-
34.77 dBm	37 dBm
Nominal Peak Output Power	
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)
5	706.5	1 RB low	23.4	4.5	22.4	5.3
		1 RB high	23.5	4.6	22.5	5.3
		50% RB mid	22.4	4.9	21.4	5.8
		100% RB	22.3	5.7	21.4	6.3
	710.0	1 RB low	23.3	4.9	22.8	4.6
		1 RB high	23.4	4.9	22.8	4.7
		50% RB mid	22.5	5.8	21.5	5.0
		100% RB	22.4	6.5	21.4	5.6
	713.5	1 RB low	23.4	4.6	22.3	5.5
		1 RB high	23.4	4.6	22.2	5.5
		50% RB mid	22.5	5.0	21.4	5.9
		100% RB	22.4	5.6	21.5	6.6
10	709.0	1 RB low	23.4	5.2	22.5	4.6
		1 RB high	23.4	5.2	22.6	4.6
		50% RB mid	22.4	5.8	21.5	5.0
		100% RB	22.4	6.3	21.4	5.4
	710.0	1 RB low	23.4	4.6	22.2	5.5
		1 RB high	23.5	4.6	22.2	5.6
		50% RB mid	22.5	5.0	21.5	5.7
		100% RB	22.5	6.1	21.4	6.7
	711.0	1 RB low	23.4	5.6	22.2	4.6
		1 RB high	23.5	5.7	22.3	4.7
		50% RB mid	22.4	5.9	21.4	5.1
		100% RB	22.4	6.5	21.4	5.3
Measurement uncertainty				± 0.5 dB		

The output power is measured with full resource blocks.

Output Power (radiated)			
Bandwidth (MHz)	Frequency (MHz)	Average Output Power (dBm) QPSK	Average Output Power (dBm) 16-QAM
5	706.5	16.8	15.8
	710.0	16.9	16.3
	713.5	17.2	16.1
10	709.0	16.7	15.9
	710.0	17.0	15.7
	711.0	17.3	16.1
Measurement uncertainty		± 3.0 dB	

**Result:** Passed

### 8.3.2 Frequency stability

#### Description:

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the mobile station in a “call mode”. This is accomplished with the use of a R&S CMW500 DIGITAL RADIOCOMMUNICATION TESTER.

1. Measure the carrier frequency at room temperature.
2. Subject the mobile station to overnight soak at -30 C.
3. With the mobile station, powered with  $V_{\text{nom}}$ , connected to the CMW500 and in a simulated call on channel 1412 (centre channel), measure the carrier frequency. These measurements should be made within two minutes of powering up the mobile station, to prevent significant self warming.
4. Repeat the above measurements at 10°C increments from -30°C to +60°C. Allow at least 1.5 hours at each temperature, unpowered, before making measurements.
5. Remeasure carrier frequency at room temperature with  $V_{\text{nom}}$ . Vary supply voltage from  $V_{\text{min}}$  to  $V_{\text{max}}$ , in 0.1 Volt steps remeasuring carrier frequency at each voltage. Pause at  $V_{\text{nom}}$  for 1.5 hours unpowered, to allow any self heating to stabilize, before continuing.
6. At all temperature levels hold the temperature to +/- 0.5°C during the measurement procedure.

This measurement was performed with the highest channel bandwidth supported from the EUT on the middle channel

#### Measurement:

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

#### Limits:

FCC	-/-
Frequency Stability	
< 2.5 ppm	

**Results:****FREQ ERROR versus VOLTAGE**

Voltage (V)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
3.3	-3	-0.00000042	-0.0042
3.4	11	0.00000155	0.0155
3.5	-9	-0.00000127	-0.0127
3.6	10	0.00000141	0.0141
3.7	11	0.00000155	0.0155
3.8	8	0.00000113	0.0113
3.9	-7	-0.00000099	-0.0099
4.0	-13	-0.00000183	-0.0183
4.1	4	0.00000056	0.0056
4.2	8	0.00000113	0.0113
4.3	4	0.00000056	0.0056
4.4	1	0.00000014	0.0014

**FREQ ERROR versus TEMPERATURE**

Temperature (°C)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
-30	-7	-0.00000099	-0.0099
-20	-1	-0.00000014	-0.0014
-10	9	0.00000127	0.0127
± 0	7	0.00000099	0.0099
10	-6	-0.00000085	-0.0085
20	-8	-0.00000113	-0.0113
30	-7	-0.00000099	-0.0099
40	15	0.00000211	0.0211
50	13	0.00000183	0.0183
60	-8	-0.00000113	-0.0113

**Result:** **Passed**

### 8.3.3 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 C63.4:2009 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 746 MHz. Measurement is made up to 12.75 GHz. The resolution bandwidth is set as outlined in Part 27.53. The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of the LTE band 17.

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

- The test item was placed on a 0.8 meter high non-conductive stand at a 3 meter test distance from the receive antenna.
- The antenna output was terminated in a 50 ohm load (if possible).
- A double ridged wave guide antenna was placed on an adjustable height antenna mast 3 meters from the test item for emission measurements.
- 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.
- 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 s
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	-/-
Spurious Emissions Radiated	
Attenuation $\geq 43 + 10\log(P)$ (P, Power in Watts)	
-13 dBm	

**Results:**

Radiated emissions measurements were made only at the upper, center, and lower carrier frequencies of the LTE band 17 (706.5 MHz, 710.0 MHz and 713.5 MHz). It was decided that measurements at these three carrier frequencies 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 17 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 with 10 MHz bandwidth and full resource blocks. If spurious were detected, the lowest and highest channel and all supported channel bandwidths were checked, too.

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

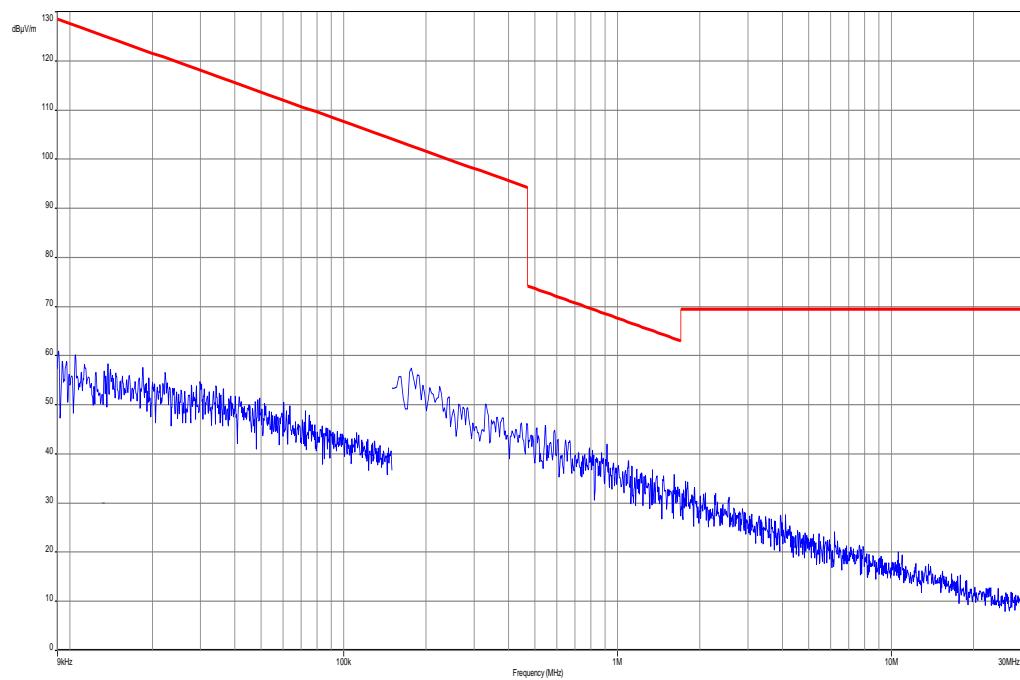
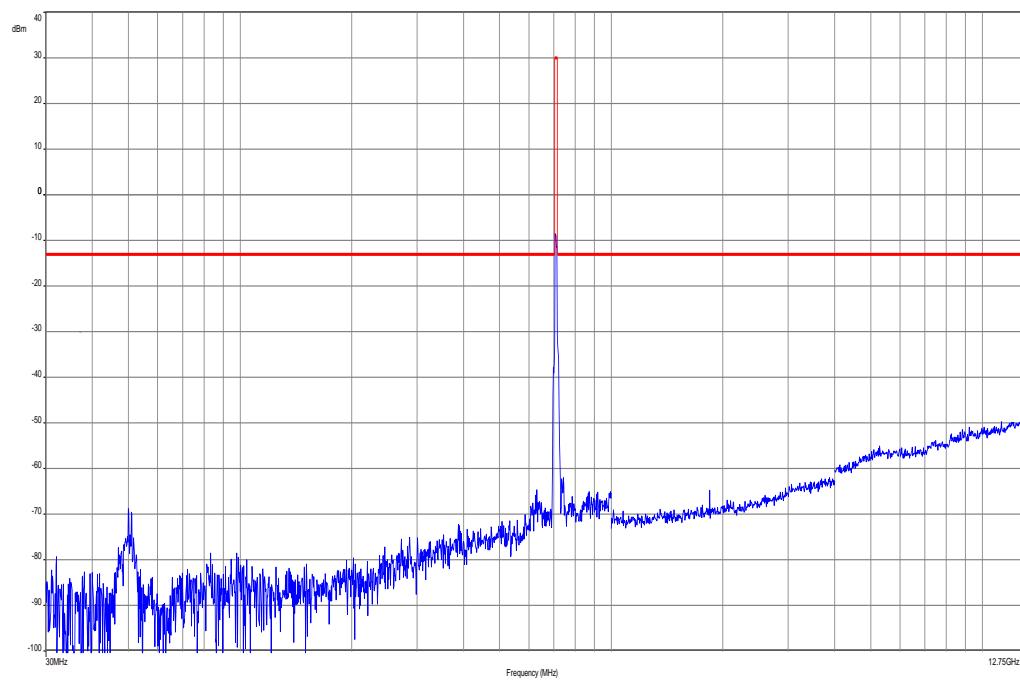
**QPSK**

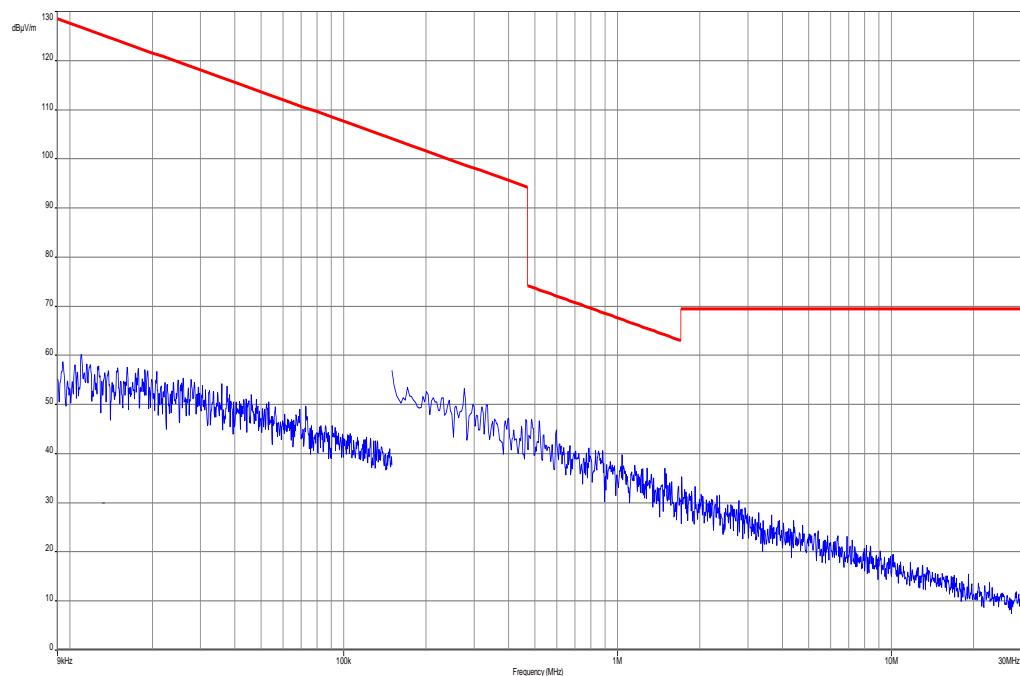
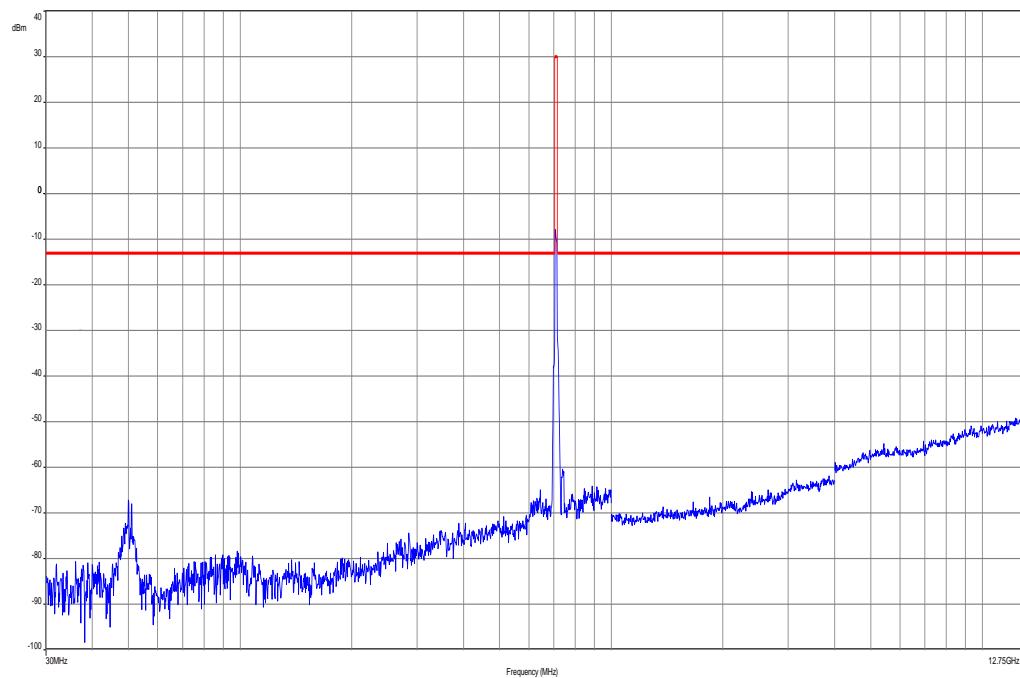
Spurious Emission Level (dBm)					
Lowest channel		Lowest channel		Lowest channel	
Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]
No emissions detected.					
	-		-		-
	-		-		-
	-		-		-
	-		-		-
	-		-		-
	-		-		-
	-		-		-
Measurement uncertainty		$\pm 3\text{dB}$			

**16-QAM**

Spurious Emission Level (dBm)					
Lowest channel		Lowest channel		Lowest channel	
Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]
No emissions detected.					
	-		-		-
	-		-		-
	-		-		-
	-		-		-
	-		-		-
	-		-		-
	-		-		-
Measurement uncertainty		$\pm 3\text{dB}$			

**Result: Passed**

**QPSK with 10 MHz channel bandwidth****Plot 1:** Middle channel, up to 30 MHz**Plot 2:** Middle channel, 30 MHz to 12.75 GHz

**16-QAM with 10 MHz channel bandwidth****Plot 5:** Middle channel, up to 30 MHz**Plot 6:** Middle channel, 30 MHz to 12.75 GHz

### 8.3.4 Spurious emissions conducted

#### Description:

The following steps outline the procedure used to measure the conducted emissions from the mobile station.

1. Determine frequency range for measurements: From CFR 2.1057 the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency. For the mobile station equipment tested, this equates to a frequency range of 13 MHz to 7460 MHz, data taken from 10 MHz to 25 GHz.
2. Determine mobile station transmits frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.

#### Measurement:

Measurement parameters	
Detector:	Peak
Sweep time:	Auto
Video bandwidth:	Pre-measurement with 1 MHz On spurious detection re-measurement below 1 GHz with 100 kHz Above 1 GHz with 1 MHz
Resolution bandwidth:	Pre-measurement with 1 MHz On spurious detection re-measurement below 1 GHz with 100 kHz Above 1 GHz with 1 MHz
Span:	10 MHz – 12 GHz
Trace-Mode:	Max Hold

#### Limits:

FCC	IC
Spurious Emissions Conducted	
Attenuation $\geq 43 + 10\log(P)$ (P, Power in Watts)	
-13 dBm	

**Results: for 5 MHz channel bandwidth**
**QPSK**

Spurious Emission Level (dBm)					
Lowest channel		Middle channel		Highest channel	
Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]
No emissions detected.					
	-		-		-
	-		-		-
	-		-		-
	-		-		-
	-		-		-
	-		-		-
	-		-		-
Measurement uncertainty		$\pm 3\text{dB}$			

**16-QAM**

Spurious Emission Level (dBm)					
Lowest channel		Middle channel		Highest channel	
Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]
No emissions detected.					
	-		-		-
	-		-		-
	-		-		-
	-		-		-
	-		-		-
	-		-		-
	-		-		-
Measurement uncertainty		$\pm 3\text{dB}$			

**Result: Passed**

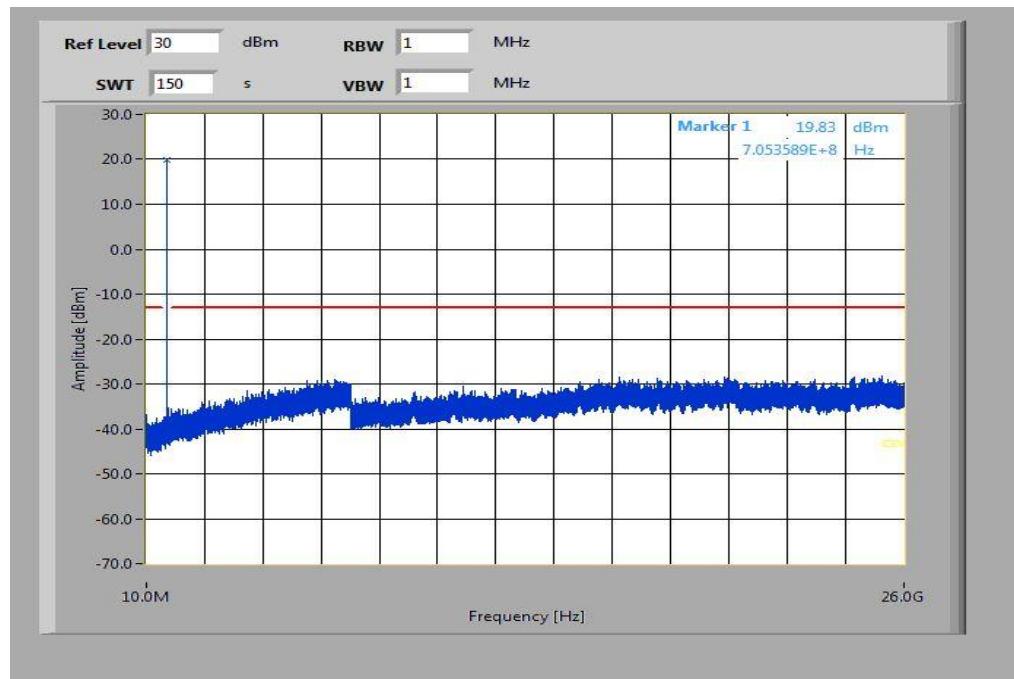
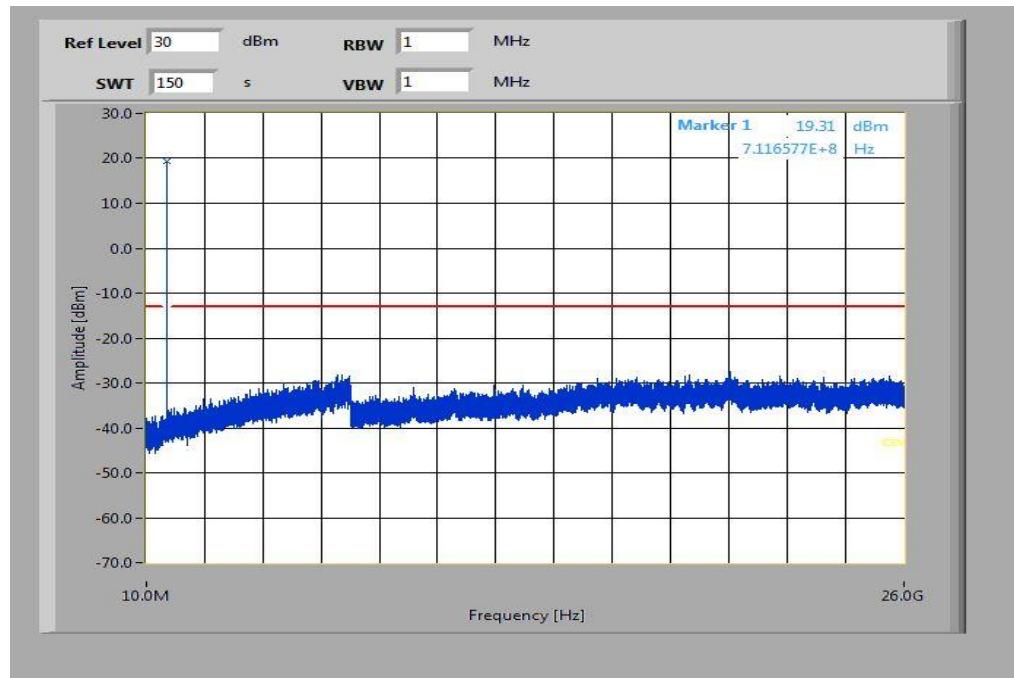
**Results: for 10 MHz channel bandwidth**
**QPSK**

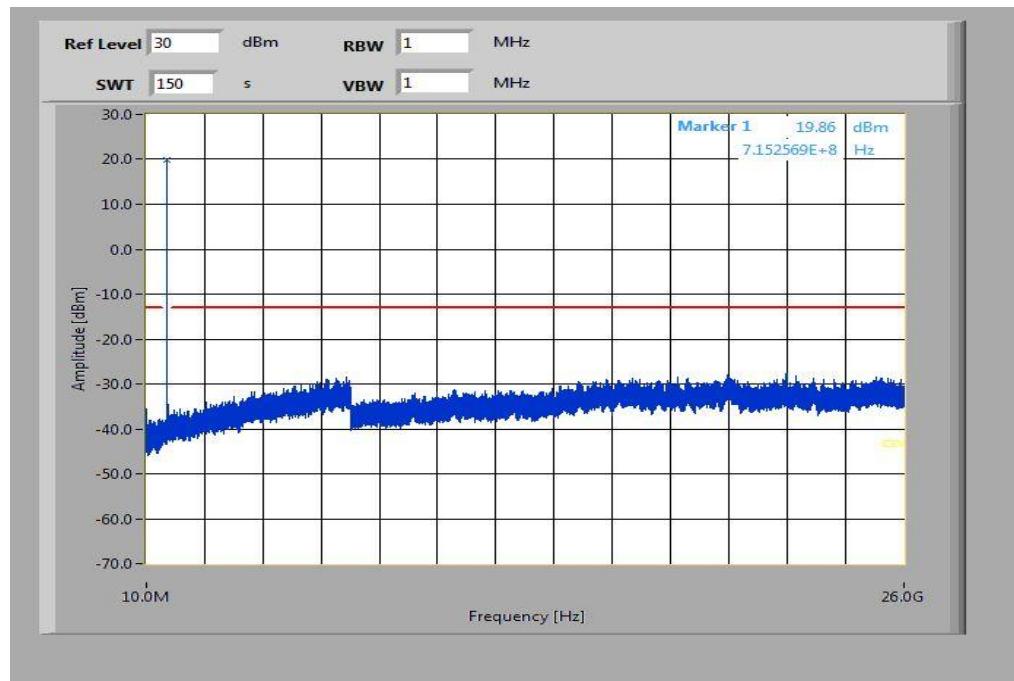
Spurious Emission Level (dBm)					
Lowest channel		Middle channel		Highest channel	
Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]
No emissions detected.					
	-		-		-
	-		-		-
	-		-		-
	-		-		-
	-		-		-
	-		-		-
	-		-		-
Measurement uncertainty		$\pm 3\text{dB}$			

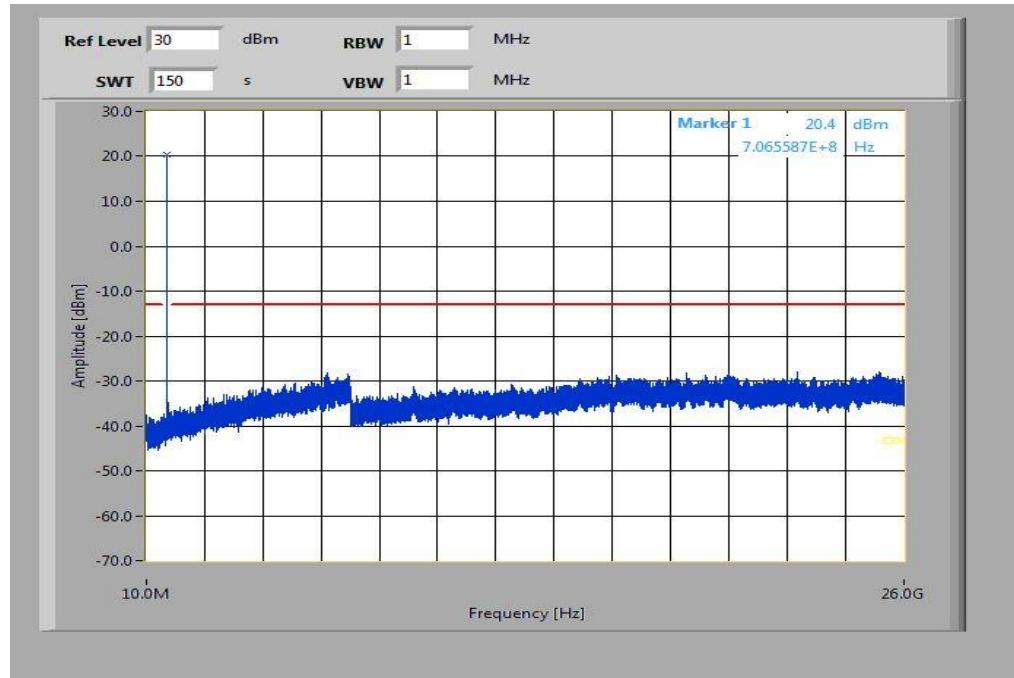
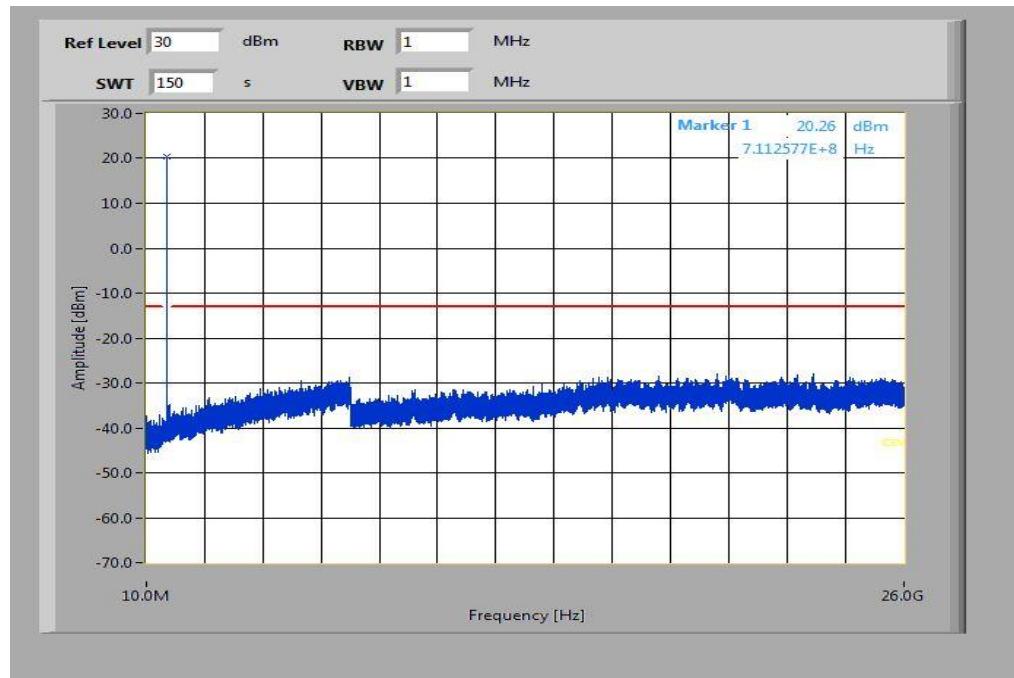
**16-QAM**

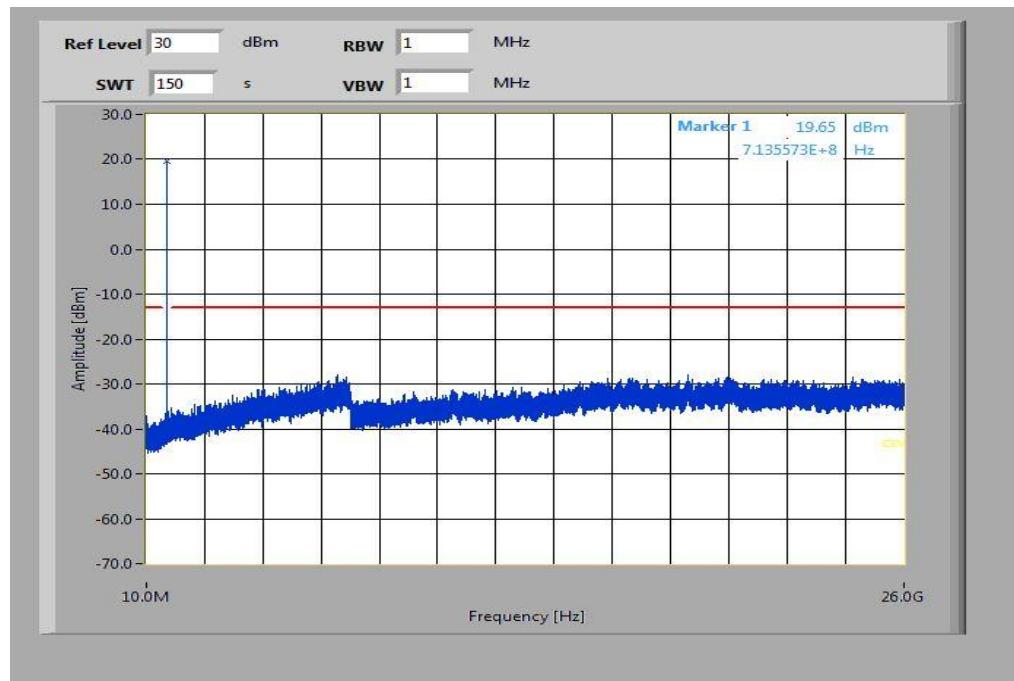
Spurious Emission Level (dBm)					
Lowest channel		Middle channel		Highest channel	
Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]
No emissions detected.					
	-		-		-
	-		-		-
	-		-		-
	-		-		-
	-		-		-
	-		-		-
	-		-		-
Measurement uncertainty		$\pm 3\text{dB}$			

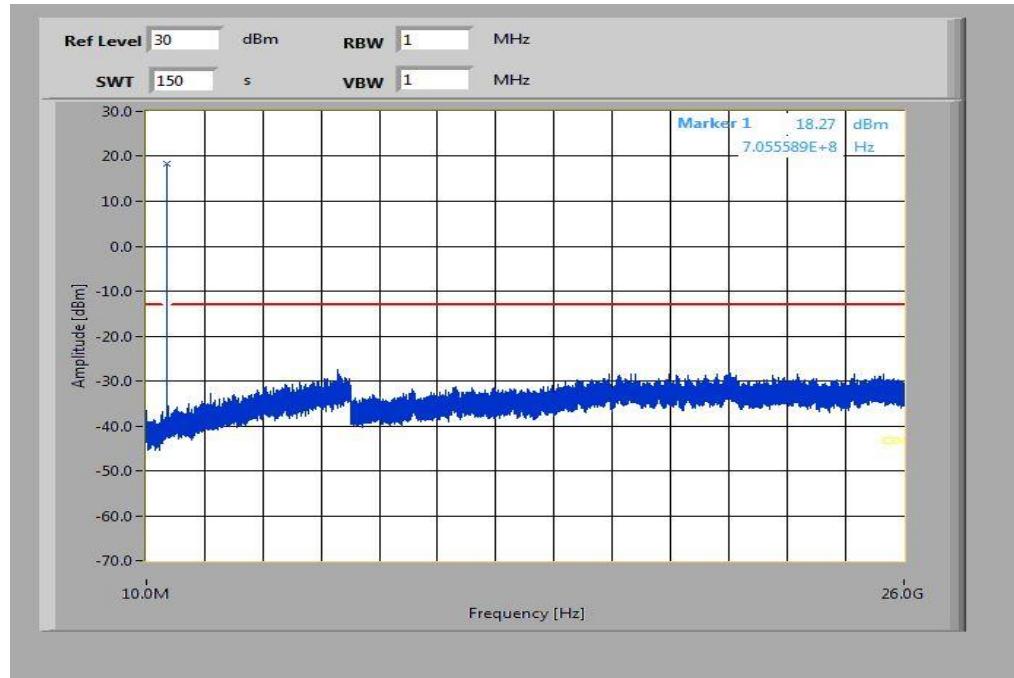
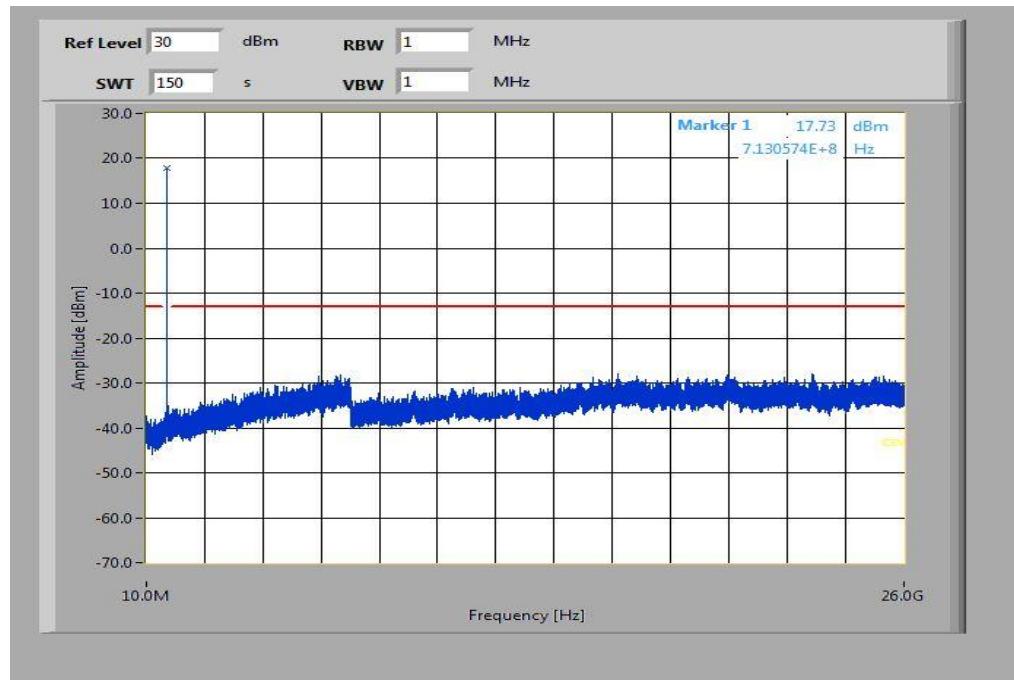
**Result: Passed**

**Plots for 5 MHz channel bandwidth, QPSK****Plot 1:** Lowest channel, 10 MHz to 25 GHz**Plot 2:** Middle channel, 10 MHz to 25 GHz

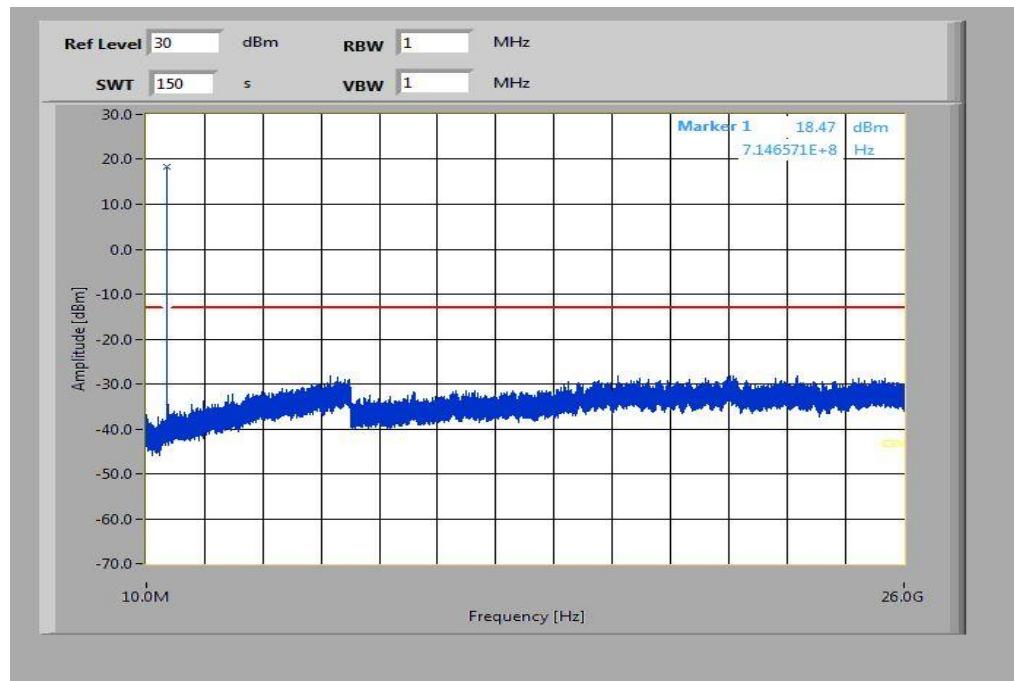
**Plot 3:** Highest channel, 10 MHz to 25 GHz

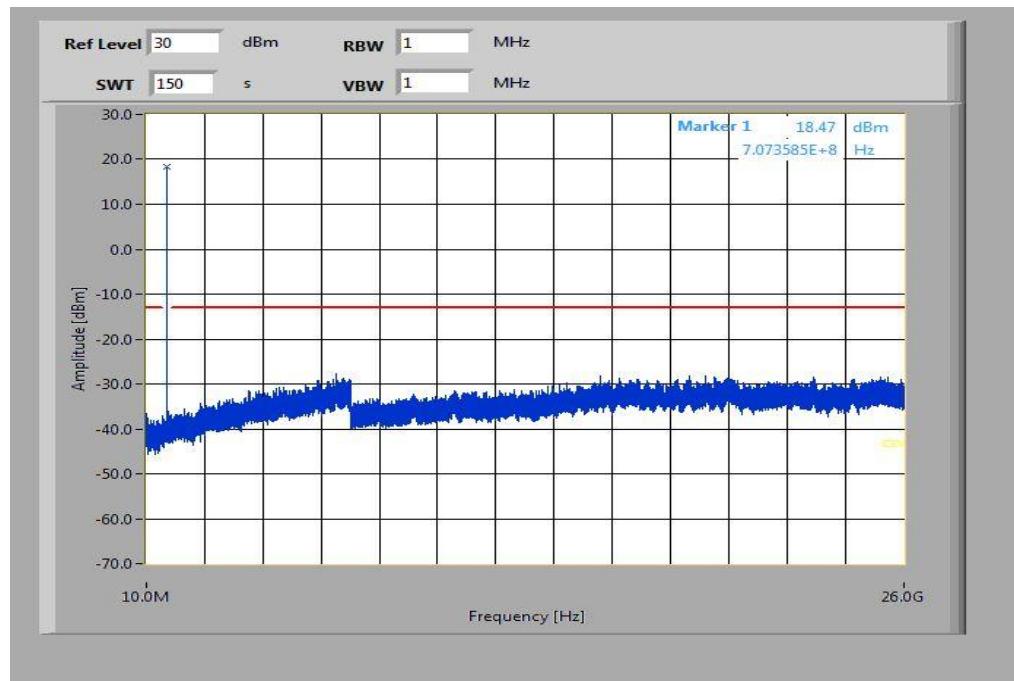
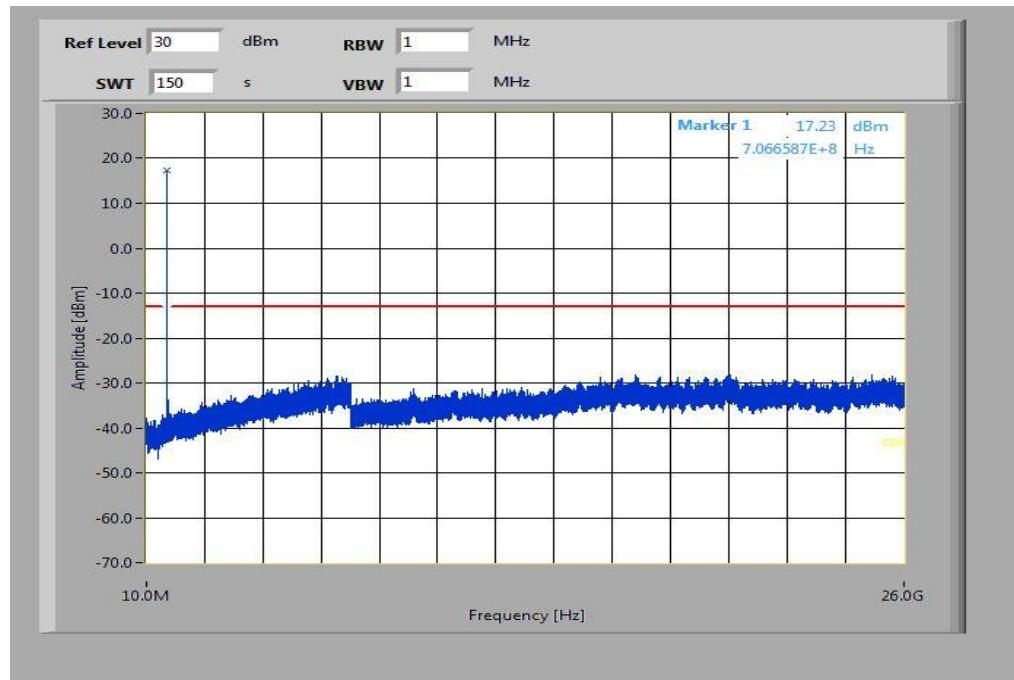
**Plots for 5 MHz channel bandwidth, 16-QAM****Plot 4:** Lowest channel, 10 MHz to 25 GHz**Plot 5:** Middle channel, 10 MHz to 25 GHz

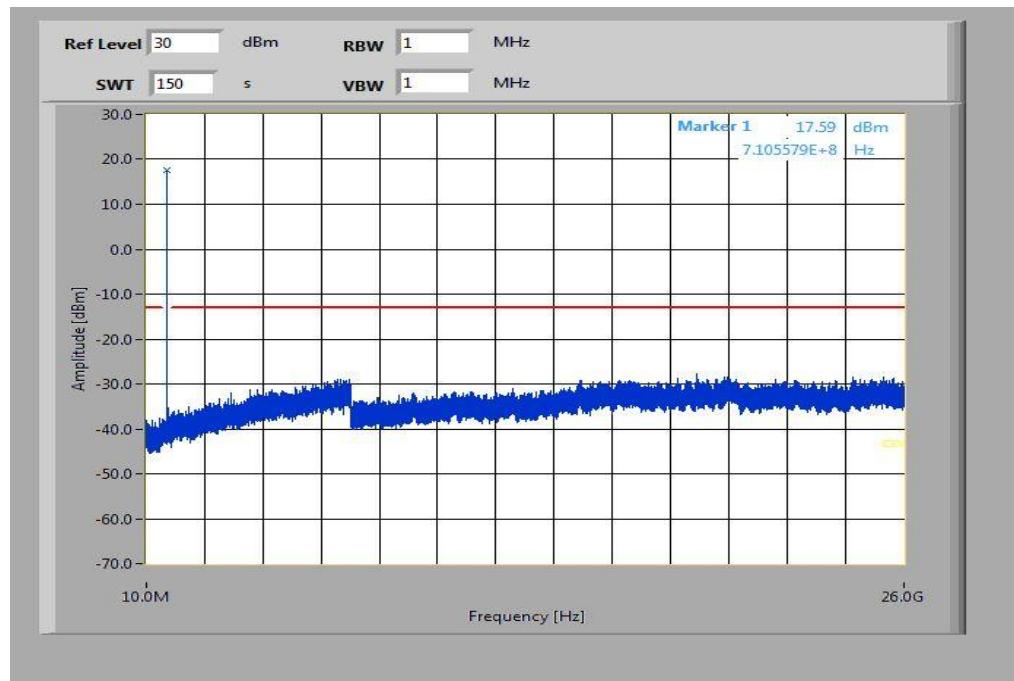
**Plot 6:** Highest channel, 10 MHz to 25 GHz

**Plots for 10 MHz channel bandwidth, QPSK****Plot 1:** Lowest channel, 10 MHz to 25 GHz**Plot 2:** Middle channel, 10 MHz to 25 GHz

**Plot 3:** Highest channel, 10 MHz to 25 GHz



**Plots for 10 MHz channel bandwidth, 16-QAM****Plot 4:** Lowest channel, 10 MHz to 25 GHz**Plot 5:** Middle channel, 10 MHz to 25 GHz

**Plot 6:** Highest channel, 10 MHz to 25 GHz

### 8.3.5 Block edge compliance

#### Description:

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

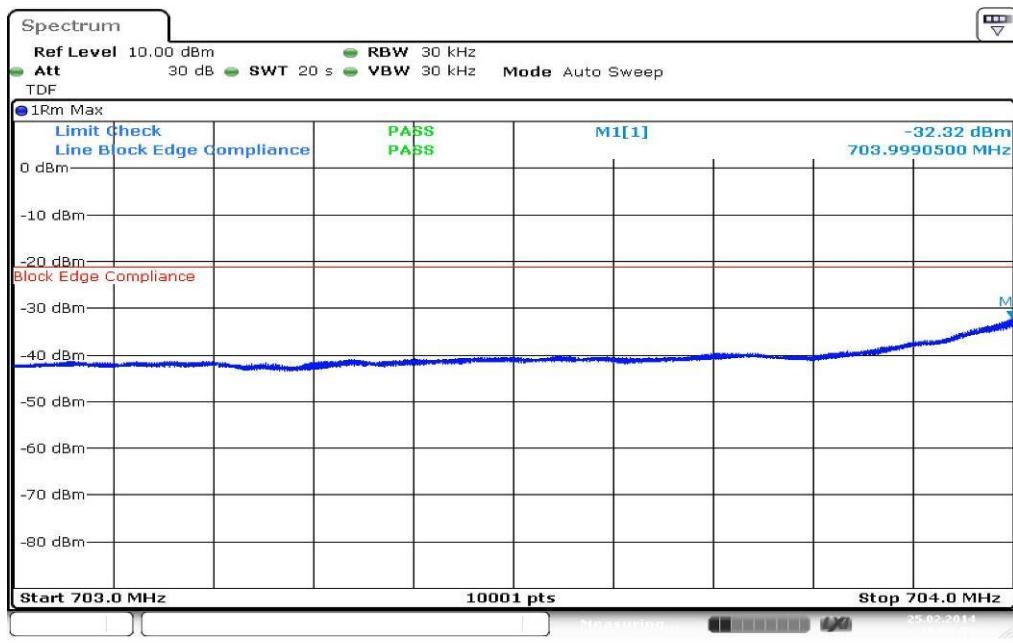
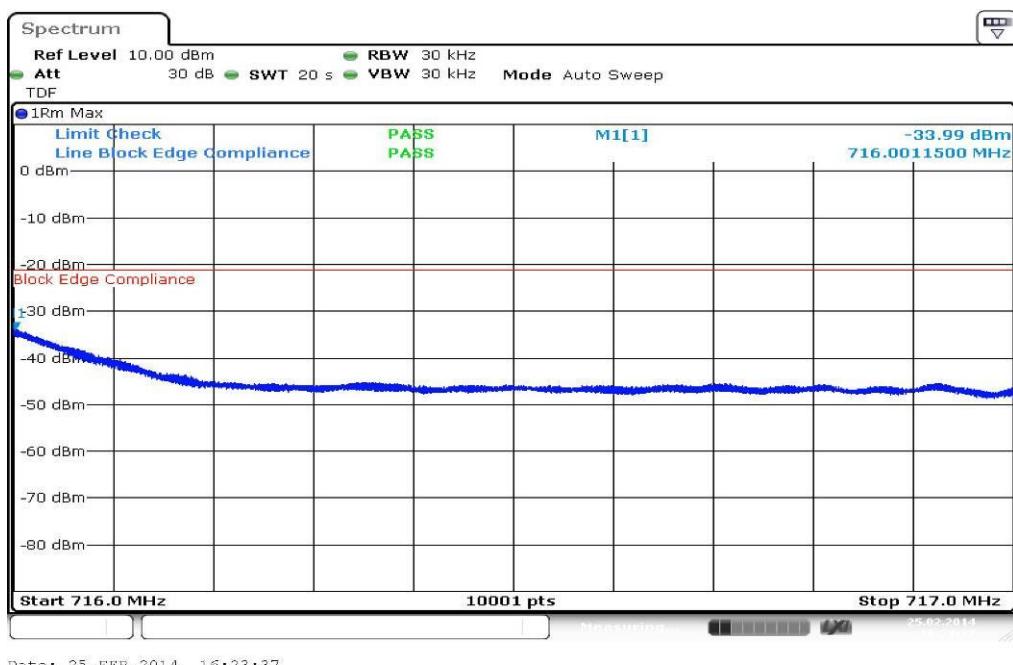
#### Measurement:

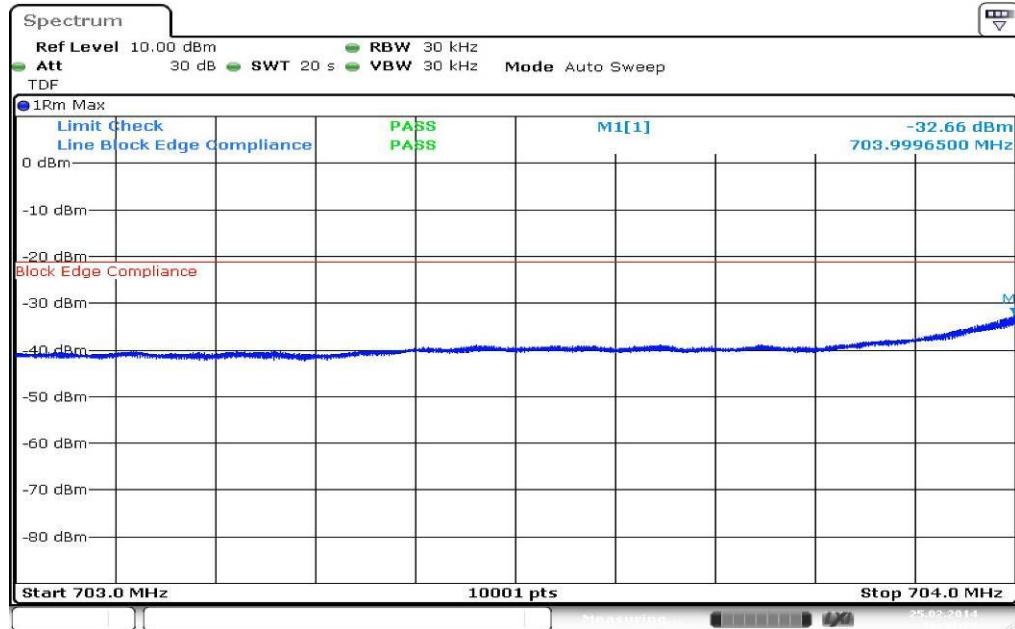
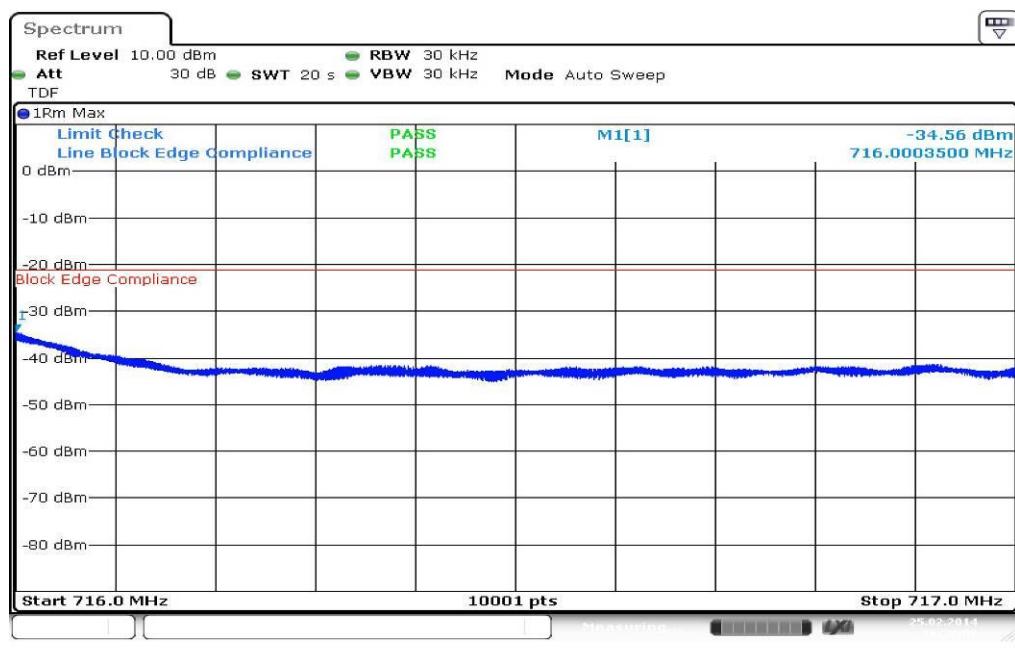
Measurement parameters	
Detector:	RMS
Sweep time:	20 sec.
Video bandwidth:	30 kHz
Resolution bandwidth:	30 kHz
Span:	1 MHz
Trace-Mode:	Max Hold

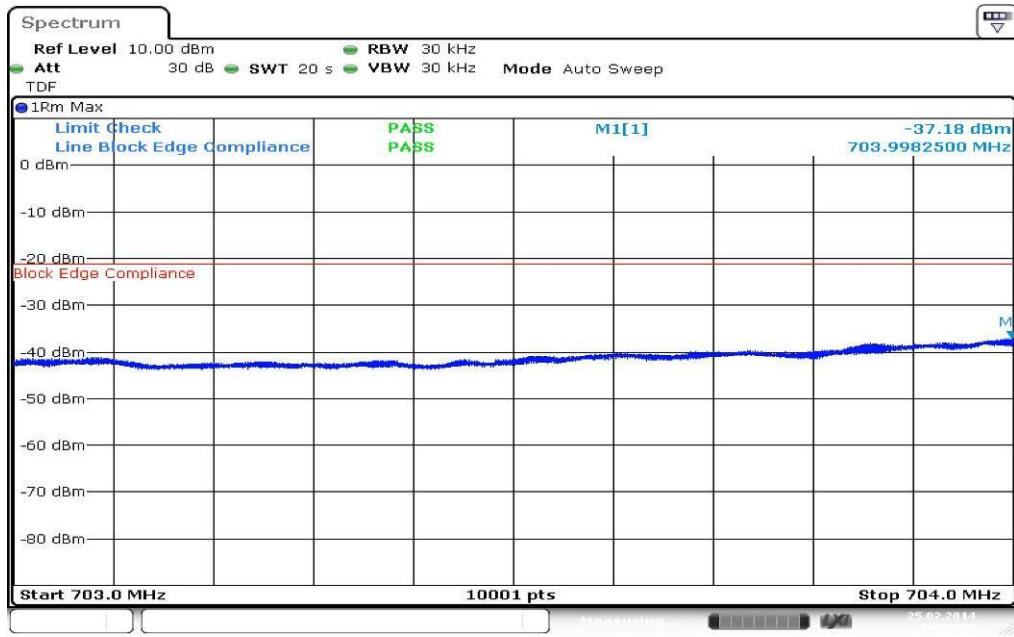
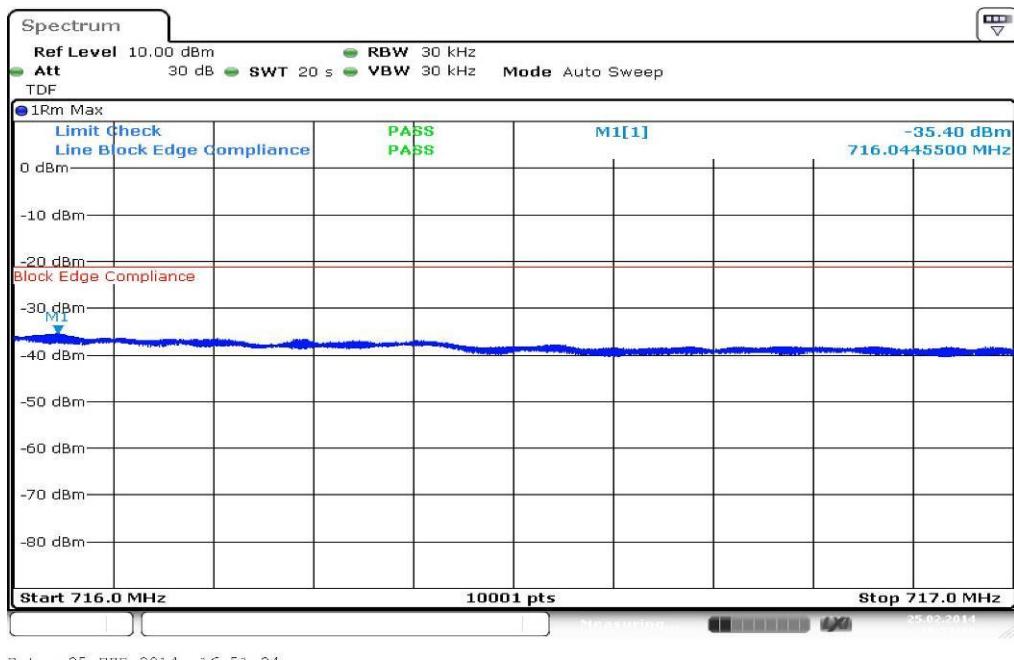
#### Limits:

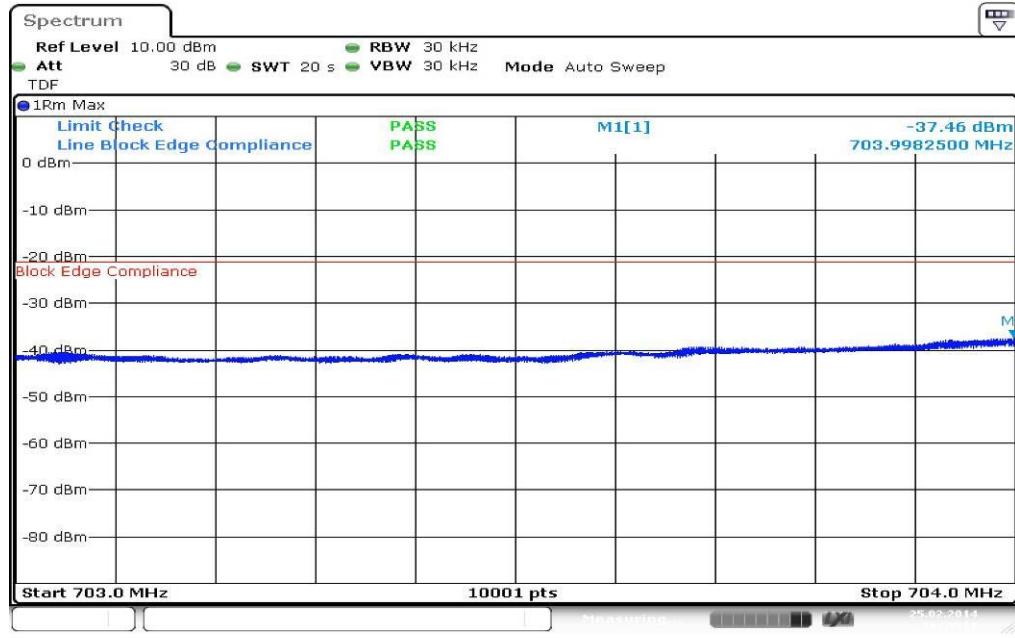
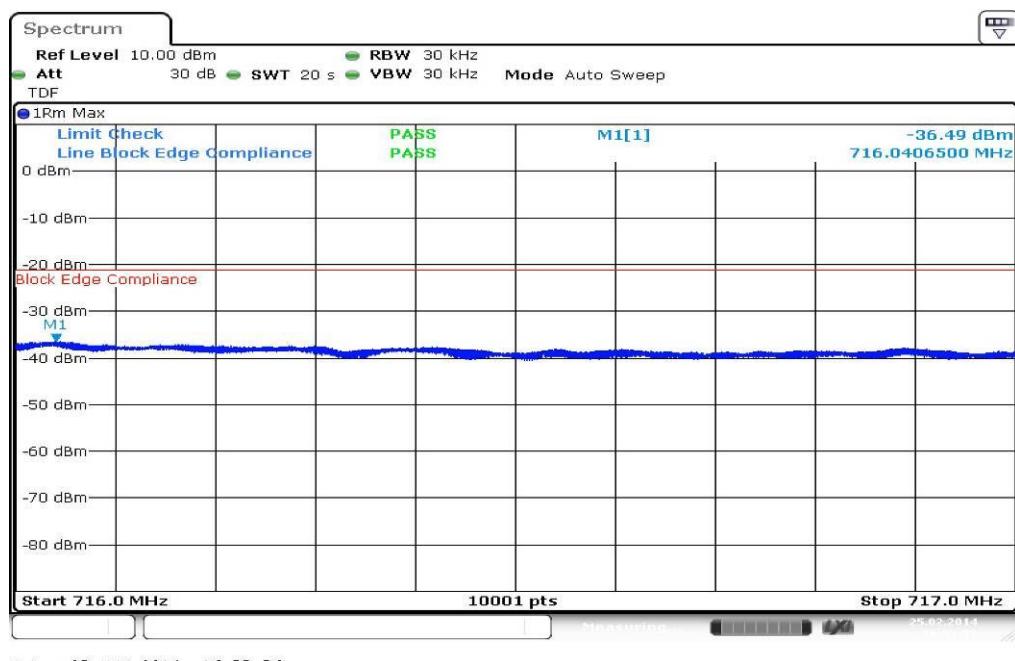
FCC	-/-
Block Edge Compliance	
<p>Part 27.53 specifies that "the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least <math>43 + 10 \log(P)</math> dB."</p> <p>However, in publication number 890810, The FCC 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 -5.2288 adjustment to the limit [<math>10 \log(30\text{kHz}/100\text{kHz}) = -5.2288</math>]. When this adjustment is applied to the limit, the limit becomes -18.2288.</p>	
-18.23 dBm	

The limit line in the plots is the overall LTE bands and channel bandwidths worst case -21.24 dBm.

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

**Plot 3: Lowest channel, 16 – QAM modulation****Plot 4: Highest channel, 16 – QAM modulation**

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

**Plot 3: Lowest channel, 16 – QAM modulation****Plot 4: Highest channel, 16 – QAM modulation****Result: Passed**

### 8.3.6 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 mid frequencies of the LTE band 17. The table below lists the measured 99% power bandwidths. Spectrum analyzer plots are included on the following pages.

Part 27.53 requires a measurement bandwidth of at least 1% of the occupied bandwidth.

Measurement parameters	
Detector:	Peak
Sweep time:	Auto
Video bandwidth:	Depends on Channel Bandwidth
Resolution bandwidth:	Depends on Channel Bandwidth
Span:	Depends on Channel Bandwidth
Trace-Mode:	Max Hold

#### Limits:

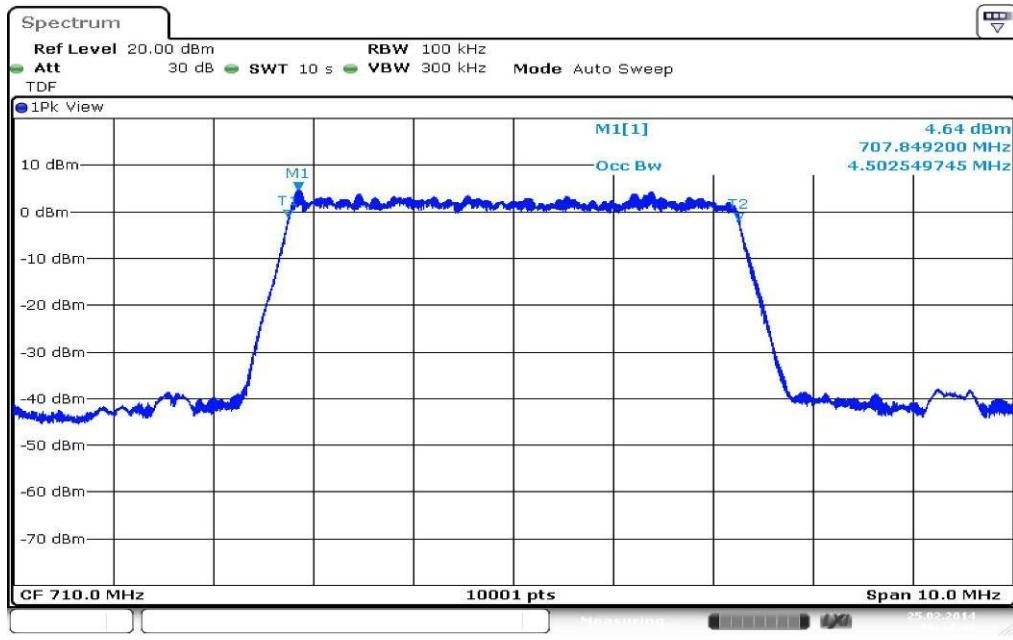
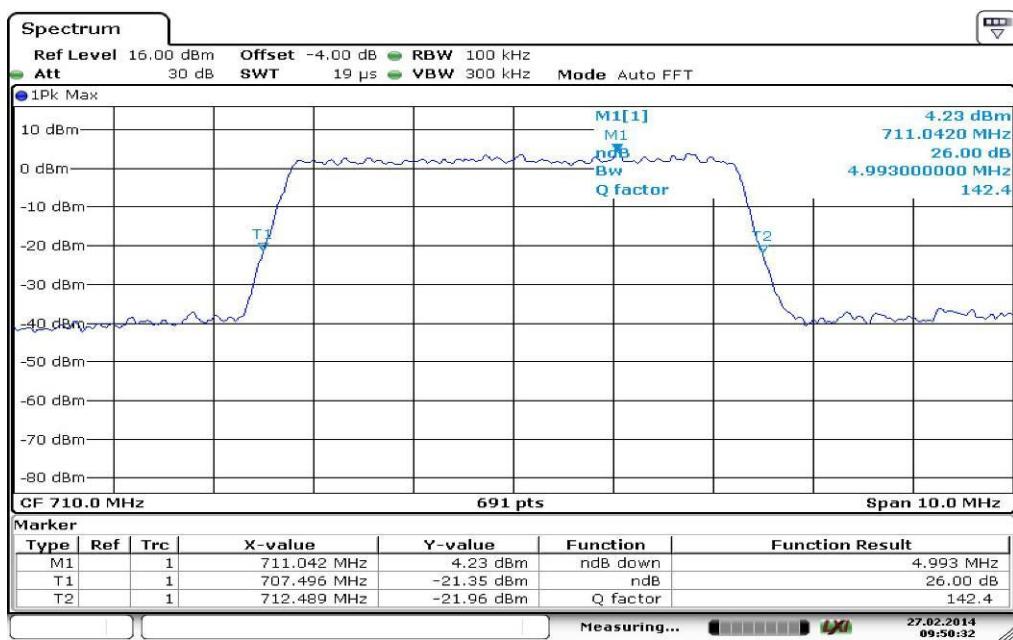
FCC	-/-
Occupied Bandwidth	
Spectrum must fall completely in the specified band	

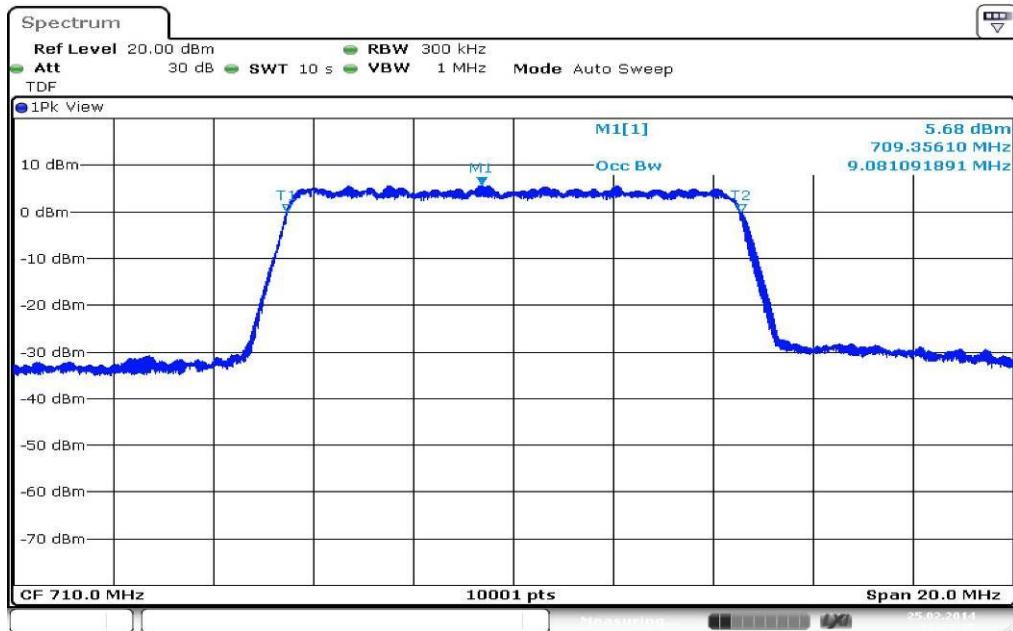
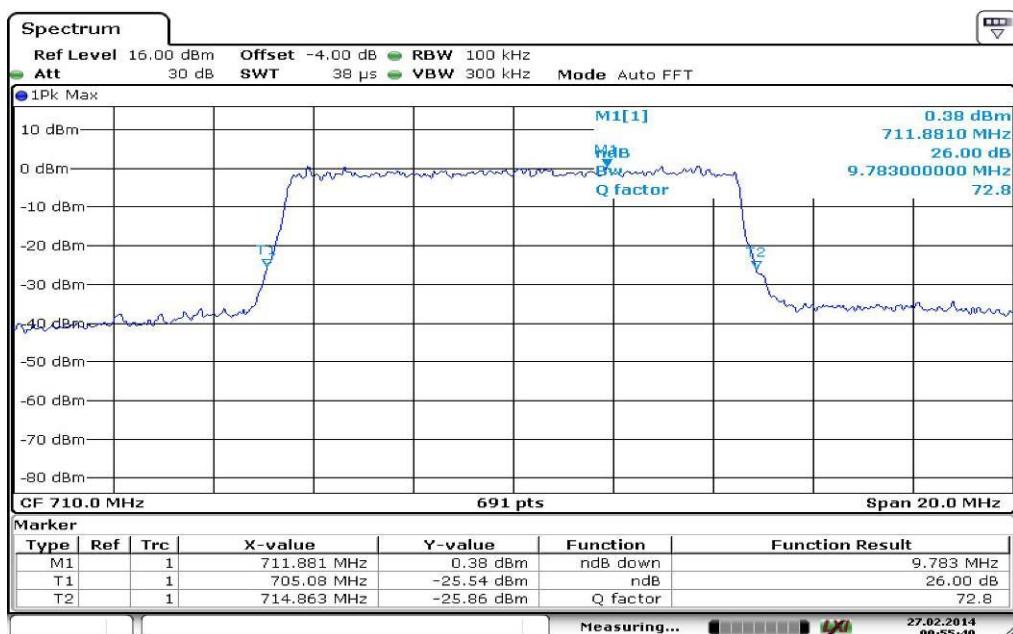
**Results:**

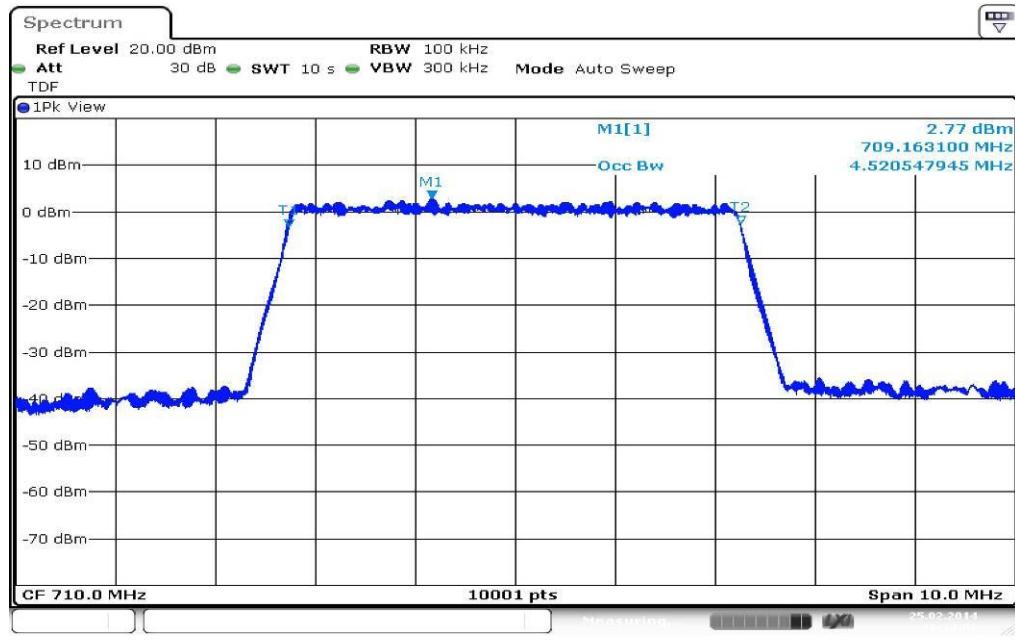
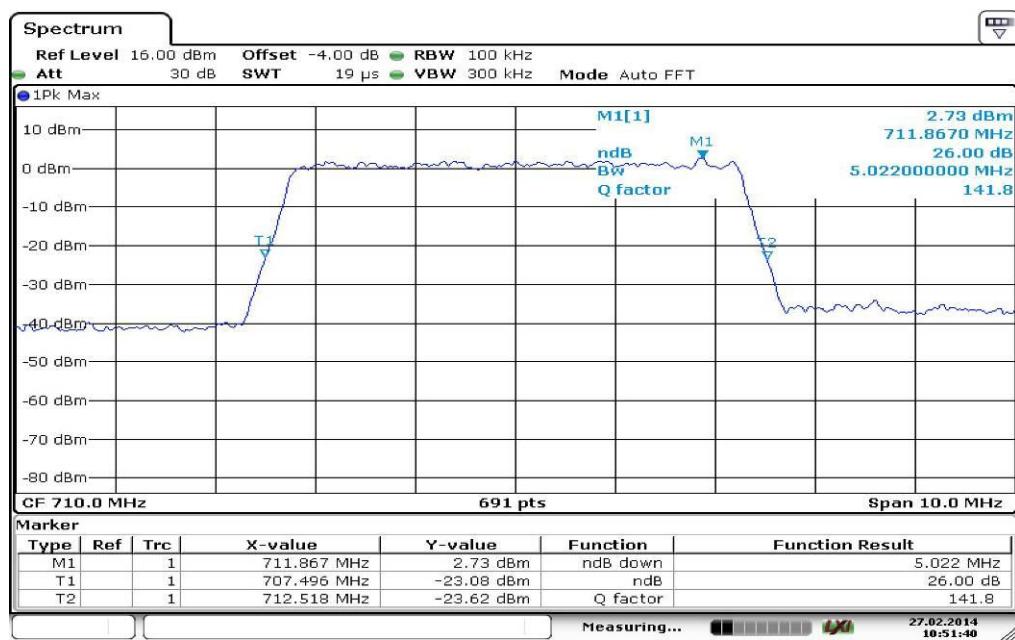
Occupied Bandwidth - QPSK		
Bandwidth [MHz]	99% OBW (kHz)	-26 dBc
5	4503	4993
10	9081	9783
Measurement uncertainty	$\pm 100$ kHz	

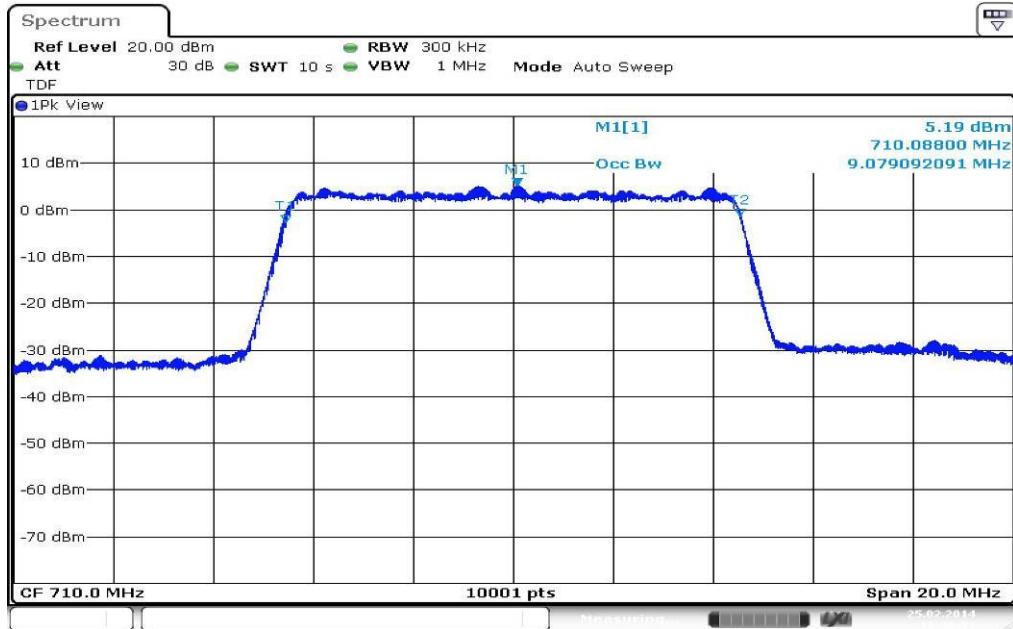
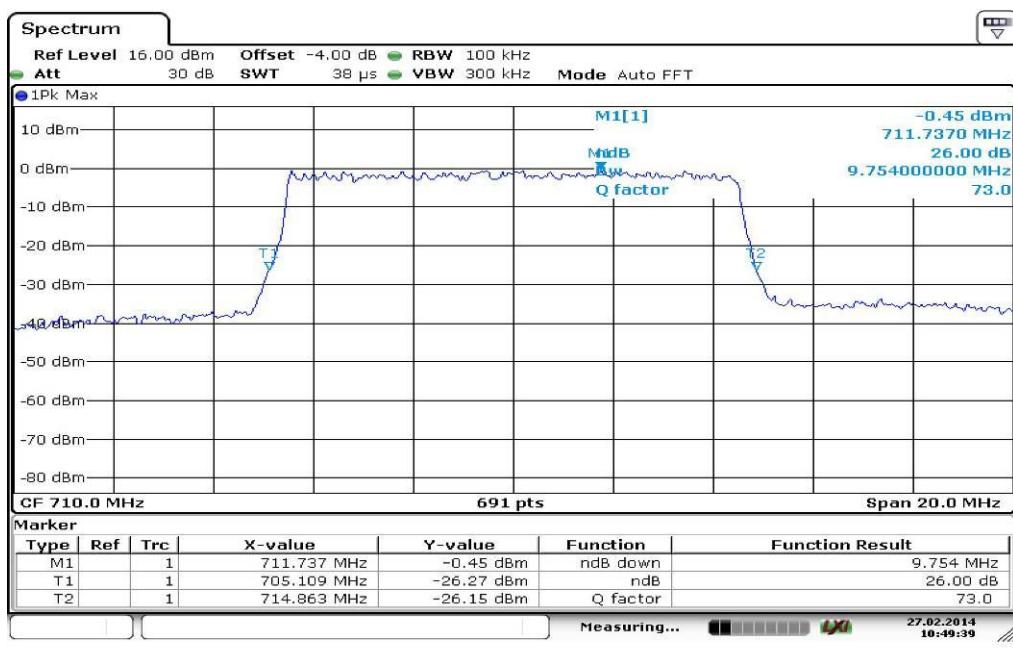
Occupied Bandwidth – 16-QAM		
Bandwidth [MHz]	99% OBW (kHz)	-26 dBc
5	4521	5022
10	9079	9754
Measurement uncertainty	$\pm 100$ kHz	

**Result:** **Passed**

**Plots: QPSK****Plot 1: 5 MHz, 99% OBW****Plot 2: 5 MHz, -26 dBc**

**Plot 3: 10 MHz, 99% OBW****Plot 4: 10 MHz, -26 dBc**

**Plots: 16-QAM****Plot 1: 5 MHz, 99% OBW****Plot 2: 5 MHz, -26 dBc**

**Plot 3: 10 MHz, 99% OBW****Plot 4: 10 MHz, -26 dBc**

## 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.	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	vlK!!	08.05.2013	08.05.2015
2	n. a.	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996	ev		
3	n. a.	Switch / Control Unit	3488A	HP Meßtechnik	*	300000199	ne		
4	n. a.	Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997	ne		
5	n. a.	Amplifier	js42-00502650-28-5a	Parzich GMBH	928979	300003143	ne		
6	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	371	300003854	vlK!!	14.10.2011	14.10.2014
7	n. a.	MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405	k	21.02.2013	21.02.2015
8	11b	Microwave System Amplifier, 0.5-26.5 GHz	83017A	HP Meßtechnik	00419	300002268	ev		
9	A026	Std. Gain Horn Antenna 12.4 to 18.0 GHz	639	Narda	8402	300000787	k	22.07.2013	22.07.2015
10	A029	Std. Gain Horn Antenna 18.0 to 26.5 GHz	638	Narda	8205	300002442	k	19.07.2013	19.07.2015
11	n. a.	Signal Analyzer 40 GHz	FSV40	R&S	101042	300004517	k	21.01.2014	21.01.2015
12	n. a.	Temperature Test Chamber	VT 4002	Heraeus Voetsch	521/84193	300003889	Ve	26.09.2013	26.09.2015
13	n. a.	Power Supply 0-20V, 0-5A	6632B	Agilent Technologies	GB42110541	400000562	vlK!!	10.01.2013	10.01.2016

### 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	*) next calibration ordered / currently in progress	
NK!	Attention: not calibrated		

## 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	2014-02-27

**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



Deutsche Akkreditierungsstelle GmbH

Bescheinigt 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  
SAF und Vehicle Aid Compatibility (HAC)  
Umweltimulation  
Smart Card Terminals  
Bluetooth  
Wi-Fi- Services

Die Akkreditierungsurkunde gilt nur in Verbindung mit dem Bescheid vom 18.01.2013 mit der  
Akkreditierungsnr. 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 80 Seiten.

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

Frankfurt am Main, 18.01.2013  
Seite 1 von 80 auf der Rückseite

Im Auftrag  
Dr. Wolfgang (FH) A. Eigner  
Abteilungsleiter

Back side of certificate

Deutsche Akkreditierungsstelle GmbH

Standort Berlin  
Spittelmarkt 10  
10117 Berlin

Standort Frankfurt am Main  
Gartenstraße 6  
60594 Frankfurt am Main

Standort Braunschweig  
Rundesallee 100  
38116 Braunschweig

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 umsichtig 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](http://www.european-accreditation.org)  
ILAC: [www.ilac.org](http://www.ilac.org)  
IAF: [www.iaf.org](http://www.iaf.org)

### 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>