

**CETECOM**™

**CETECOM ICT Services**  
consulting - testing - certification >>>

## TEST REPORT

Test report no.: 1-1110/16-31-07



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

### Testing laboratory

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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

### Applicant

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### Manufacturer

**NCXX Inc.**  
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47 CFR Part 22

Title 47 of the Code of Federal Regulations; Chapter I; Part 22 - Public mobile services

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

### Test standard/s

47 CFR Part 22

Title 47 of the Code of Federal Regulations; Chapter I; Part 22 - Public mobile services

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

### Test Item

**Kind of test item:** 3 way speed sensor  
**Model name:** GX410NC  
**FCC ID:** SLKGX410NC  
**Frequency:** UMTS band V; 824 MHz – 849 MHz  
**Technology tested:** UMTS  
**Antenna:** Integrated antenna  
**Power supply:** 12 / 24 V DC by external power supply  
**Temperature range:** -30°C to +55°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 authorized:

Marco Bertolino  
Lab Manager  
Radio Communications & EMC

### Test performed:

Andreas Luckenbill  
Lab Manager  
Radio Communications & EMC

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

### 2.2 Application details

Date of receipt of order:	2016-08-18
Date of receipt of test item:	2016-08-22
Start of test:	2016-08-23
End of test:	2016-08-24
Person(s) present during the test:	-/-

## 3 Test standard/s and references

Test standard	Date	Description
47 CFR Part 22	-/-	Title 47 of the Code of Federal Regulations; Chapter I; Part 22 - Public mobile services

Guidance	Version	Description
ANSI C63.4-2014	-/-	American national standard for methods of measurement of radio-noise emissions from low-voltage electrical and electronic equipment in the range of 9 kHz to 40 GHz

## 4 Test environment

Temperature :	$T_{\text{nom}}$	+22 °C during room temperature tests
	$T_{\text{max}}$	+55 °C during high temperature tests
	$T_{\text{min}}$	-30 °C during low temperature tests
Relative humidity content :		55 %
Barometric pressure :		not relevant for this kind of testing
Power supply :	$V_{\text{nom}}$	12 / 24 V DC by external power supply
	$V_{\text{max}}$	30.0 V
	$V_{\text{min}}$	10.8 V

## 5 Test item

### 5.1 General description

Kind of test item :	3 way speed sensor
Type identification :	GX410NC
S/N serial number :	Rad. IMEI: 351593070011480 Cond. IMEI: 351593070011019
HW hardware status :	1.1
SW software status :	1.1
Frequency band :	UMTS band V; 824 MHz – 849 MHz lowest channel: 4132 – 826.4 MHz highest channel: 4233 – 846.6 MHz
Type of modulation :	QPSK, DQPSK
Antenna :	Integrated antenna
Power supply :	12 / 24 V DC by external power supply
Temperature range :	-30°C to +55°C

### 5.2 Additional information

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

Test setup- and EUT-photos are included in test report: 1-1110/16-31-01\_AnnexA  
 1-1110/16-31-01\_AnnexB  
 1-1110/16-31-01\_AnnexD

## 6 Test laboratories sub-contracted

None

## 7 Description of the test setup

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

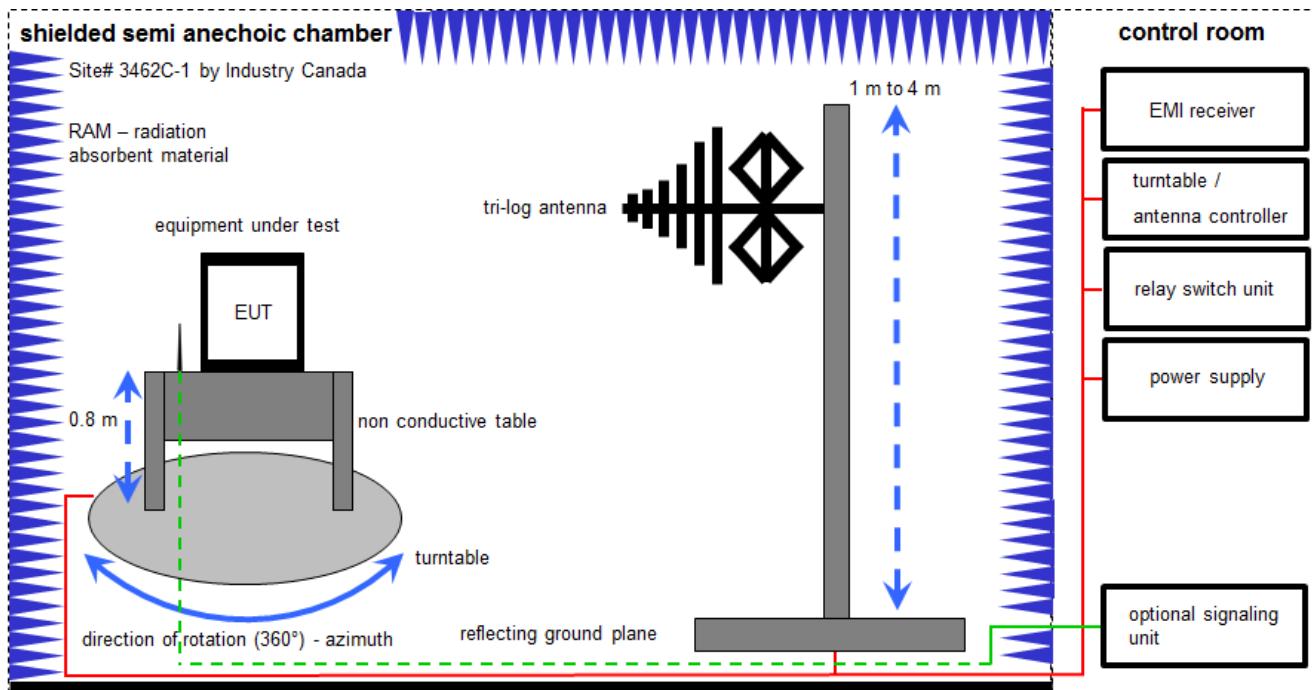
In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Lab/Item).

### 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

## 7.1 Shielded semi anechoic chamber

The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 1 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber. The receiving antennas are confirmed with specifications ANSI C63. These antennas can be moved over the height range between 1.0 m and 4.0 m in order to search for maximum field strength emitted from EUT. The measurement distances between EUT and receiving antennas are indicated in the test setups for the various frequency ranges. For each measurement, the EUT is rotated in all three axes until the maximum field strength is received. The wanted and unwanted emissions are received by spectrum analyzers where the detector modes and resolution bandwidths over various frequency ranges are set according to requirement ANSI C63.



Measurement distance: tri-log antenna 10 meter

$$OP = AV + D - G + CA$$

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

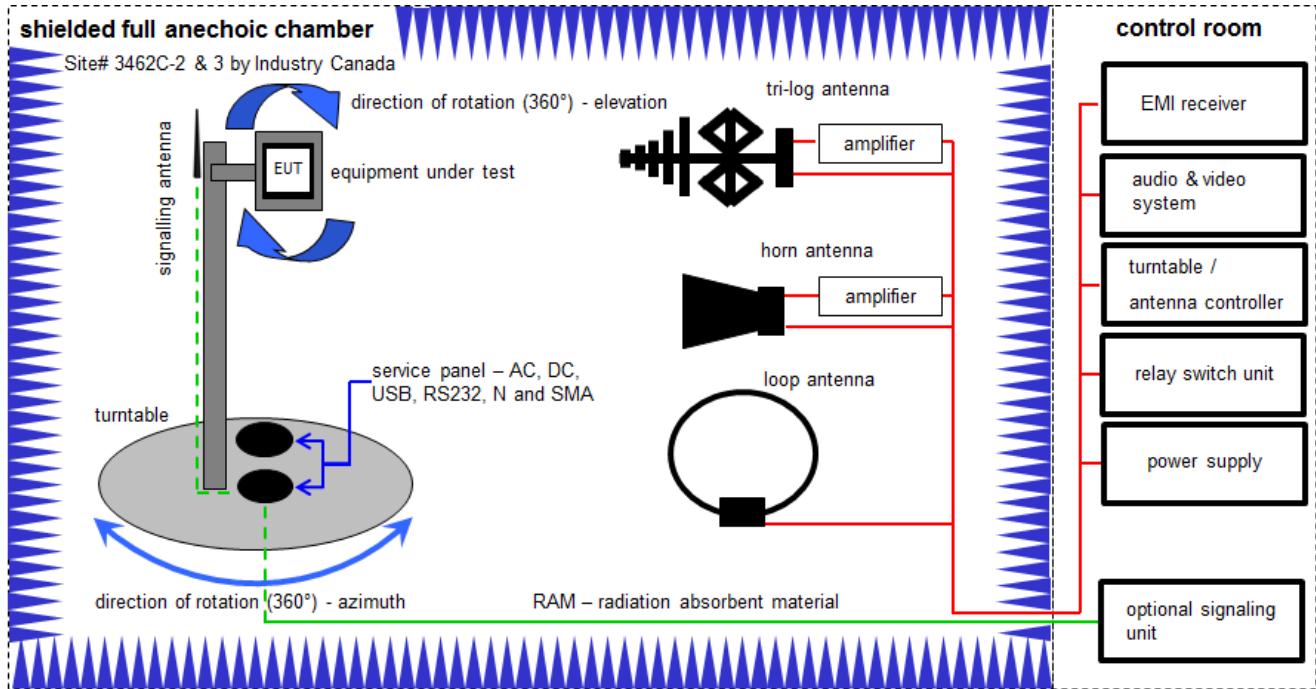
Example calculation:

$$OP [dBm] = -65.0 [dBm] + 50 [dB] - 20 [dBi] + 5 [dB] = -30 [dBm] (1 \mu W)$$

### Equipment table:

No.	Lab / Item	Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	A	Wideband Radio Communication Tester	CMW500	R&S	102375	300004187	k	14.12.2015	14.12.2017
2	A	Switch-Unit	3488A	HP	2719A14505	300000368	ev	-/-	-/-
3	A	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP	2920A04466	300000580	ne	-/-	-/-
4	A	EMI Test Receiver	ESCI 3	R&S	100083	300003312	k	08.03.2016	08.03.2017
5	A	Antenna Tower	Model 2175	ETS-Lindgren	64762	300003745	izw	-/-	-/-
6	A	Positioning Controller	Model 2090	ETS-Lindgren	64672	300003746	izw	-/-	-/-
7	A	Turntable Interface-Box	Model 105637	ETS-Lindgren	44583	300003747	izw	-/-	-/-
8	A	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	295	300003787	k	25.04.2016	25.04.2018

## 7.2 Shielded fully anechoic chamber



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

OP = AV + D - G + CA

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

Example calculation:

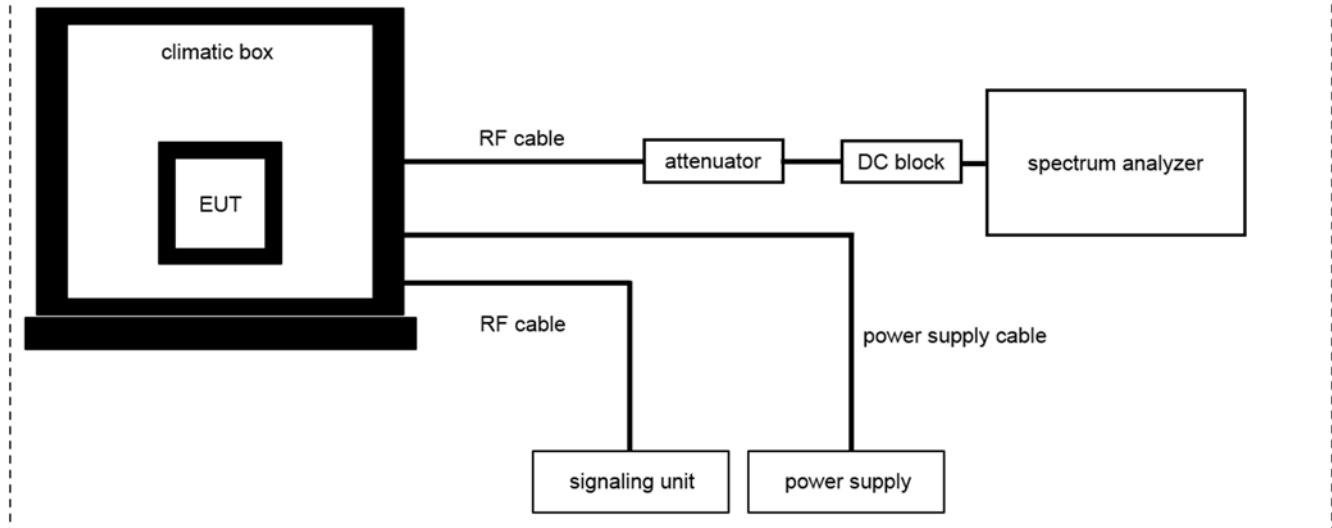
$$OP \text{ [dBm]} = -65.0 \text{ [dBm]} + 50 \text{ [dB]} - 20 \text{ [dBi]} + 5 \text{ [dB]} = -30 \text{ [dBm]} (1 \mu\text{W})$$

### Equipment table:

No.	Lab / Item	Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	A	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP	2818A03450	300001040	Ve	20.01.2015	20.01.2018
2	A	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	viKI!	20.05.2015	20.05.2017
3	A	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996	ev	-/-	-/-
4	A	Switch / Control Unit	3488A	HP	*	300000199	ne	-/-	-/-
5	A	Amplifier	js42-00502650-28-5a	Parzich GMBH	928979	300003143	ne	-/-	-/-
6	A	Highpass Filter	WHKX7.0/18G-8SS	Wainwright	18	300003789	ne	-/-	-/-
7	A	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	371	300003854	viKI!	29.10.2014	29.10.2017
8	A	4U RF Switch Platform	L4491A	Agilent Technologies	MY50000037	300004509	ne	-/-	-/-
9	A	EMI Test Receiver 9kHz-26,5GHz	ESR26	R&S	101376	300005063	k	04.09.2015	04.09.2016
10	A	Wideband Radio Communication Tester	CMW500	R&S	102375	300004187	k	14.12.2015	14.12.2017

### 7.3 Conducted measurements normal and extreme conditions

#### Conducted measurements normal & extreme conditions



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

#### Example calculation:

$$\text{OP [dBm]} = 6.0 \text{ [dBm]} + 11.7 \text{ [dB]} = 17.7 \text{ [dBm]} (58.88 \text{ mW})$$

#### Equipment table:

No.	Lab / Item	Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	A, B	DC Power Supply 0 – 32V	1108-32	Heiden Elektronik	001802	300001383	Ve	29.01.2014	29.01.2017
2	B	Temperature Test Chamber	VT 4002	Heraeus Voetsch	521/83761	300002326	ev	03.09.2015	03.09.2017
3	A,B	Hygro-Thermometer	-/-, 5-45C, 20-100rF	Heraeus Voetsch	-/-	400000108	ev	07.09.2015	07.09.2017
4	A	Signal Analyzer 40 GHz	FSV40	R&S	101042	300004517	k	21.01.2016	21.01.2017
5	A	PC-WLAN Tester	Intel Core i3 3220/3,3 GHz, Prozessor	R&S	2V2403033A45 23	300004589	ne	-/-	-/-
6	A	Teststand	Teststand Custom Sequence Editor	National Instruments GmbH	2V2403033A45 23	300004590	ne	-/-	-/-
7	A,B	RF-Cable	ST18/SMAm/SMAm/72	Huber & Suhner	Batch no. 699714	400001184	ev	-/-	-/-
8	A,B	DC-Blocker 0.1-40 GHz	8141A	Inmet	Batch no. 699714	400001185	ev	-/-	-/-
9	A,B	Coax Attenuator 10 dB 2W 0-40 GHz	MCL BW-K10-2W44+	Mini Circuits	Batch no. 699714	400001186	ev	-/-	-/-
10	B	Universal Communication Tester	CMU200	R&S	103992	300003231	vlKI!	29.01.2015	29.01.2017
11	A	Wideband Radio Communication Tester	CMW500	R&S	102375	300004187	k	14.12.2015	14.12.2017

## 8 Sequence of testing

### 8.1 Sequence of testing radiated spurious 9 kHz to 30 MHz

#### Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer.
- If the EUT is a tabletop system, a 2-axis positioner with 1.5 m height is used.
- If the EUT is a floor standing device, it is placed directly on the turn table.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C 63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measurement distance is 3 m (see ANSI C 63.4) – see test details.
- EUT is set into operation.

#### Premeasurement

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna height is 1.5 m.
- At each turntable position the analyzer sweeps with positive-peak detector to find the maximum of all emissions.

#### Final measurement

- Identified emissions during the premeasurement are maximized by the software by rotating the turntable from 0° to 360°. In case of the 2-axis positioner is used the elevation axis is also rotated from 0° to 360°.
- The final measurement is done in the position (turntable and elevation) causing the highest emissions with quasi-peak (as described in ANSI C 63.4).
- Final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. A plot with the graph of the premeasurement and the limit is stored.

## 8.2 Sequence of testing radiated spurious 30 MHz to 1 GHz

### Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer.
- If the EUT is a tabletop system, a table with 0.8 m height is used, which is placed on the ground plane.
- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C 63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measurement distance is 10 m or 3 m (see ANSI C 63.4) – see test details.
- EUT is set into operation.

### Premeasurement

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna is polarized vertical and horizontal.
- The antenna height changes from 1 m to 3 m.
- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.

### Final measurement

- The final measurement is performed for at least six highest peaks according to the requirements of the ANSI C63.4.
- Based on antenna and turntable positions at which the peak values are measured the software maximize the peaks by changing turntable position  $\pm 45^\circ$  and antenna height between 1 and 4 m.
- The final measurement is done with quasi-peak detector (as described in ANSI C 63.4).
- Final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit are recorded. A plot with the graph of the premeasurement with marked maximum final results and the limit is stored.

## 8.3 Sequence of testing radiated spurious 1 GHz to 18 GHz

### Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer.
- If the EUT is a tabletop system, a 2-axis positioner with 1.5 m height is used.
- If the EUT is a floor standing device, it is placed directly on the turn table.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C 63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measurement distance is 3 m (see ANSI C 63.4) – see test details.
- EUT is set into operation.

### Premeasurement

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna is polarized vertical and horizontal.
- The antenna height is 1.5 m.
- At each turntable position and antenna polarization the analyzer sweeps with positive peak detector to find the maximum of all emissions.

### Final measurement

- The final measurement is performed for at least six highest peaks according to the requirements of the ANSI C63.4.
- Based on antenna and turntable positions at which the peak values are measured the software maximizes the peaks by rotating the turntable from 0° to 360°. This measurement is repeated for different EUT-table positions (0° to 150° in 30°-steps) and for both antenna polarizations.
- The final measurement is done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and RMS detector (as described in ANSI C 63.4).
- Final levels, frequency, measuring time, bandwidth, turntable position, EUT-table position, antenna polarization, correction factor, margin to the limit and limit are recorded. A plot with the graph of the premeasurement with marked maximum final results and the limit is stored.

## 9 Measurement uncertainty

Measurement uncertainty	
Test case	Uncertainty
RF output power conducted	± 1 dB
RF output power radiated	± 3 dB
Frequency stability	± 20 Hz
Spurious emissions radiated below 30 MHz	± 3 dB
Spurious emissions radiated 30 MHz to 1 GHz	± 3 dB
Spurious emissions radiated 1 GHz to 12.75 GHz	± 3.7 dB
Spurious emissions conducted	± 3 dB
Block edge compliance	± 3 dB
Occupied bandwidth	± RBW

## 10 Summary of measurement results

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

TC identifier	Description	verdict	date	Remark
RF-Testing	CFR Part 22	See table!	2016-09-06	-/-

### 10.1 UMTS band V

Test Case	temperature conditions	power source voltages	C	NC	NA	NP	Remark
RF Output Power	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
Frequency Stability	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:** C = Compliant; NC = Not compliant; NA = Not applicable; NP = Not performed

## 11 Results UMTS band V

All UMTS-band measurements are done in WCDMA mode only.

The connection was established with the following setup: WCDMA CS-RMC, Max Power (All Bit up)

### 11.1 RF output power

#### Description:

This paragraph contains average power, peak output power and ERP 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:	10 MHz
Resolution bandwidth:	10 MHz
Span:	Zero Span
Trace-Mode:	Max Hold

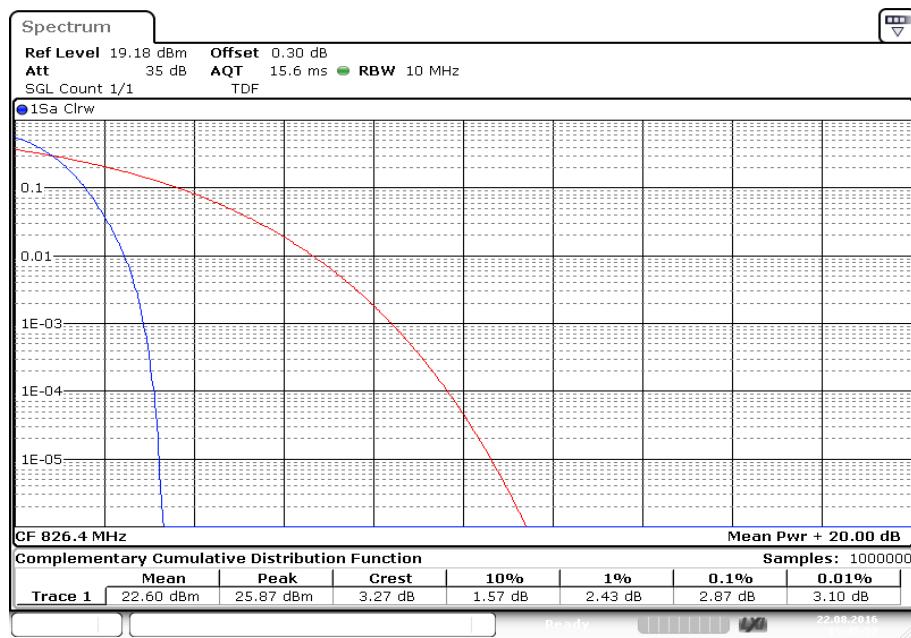
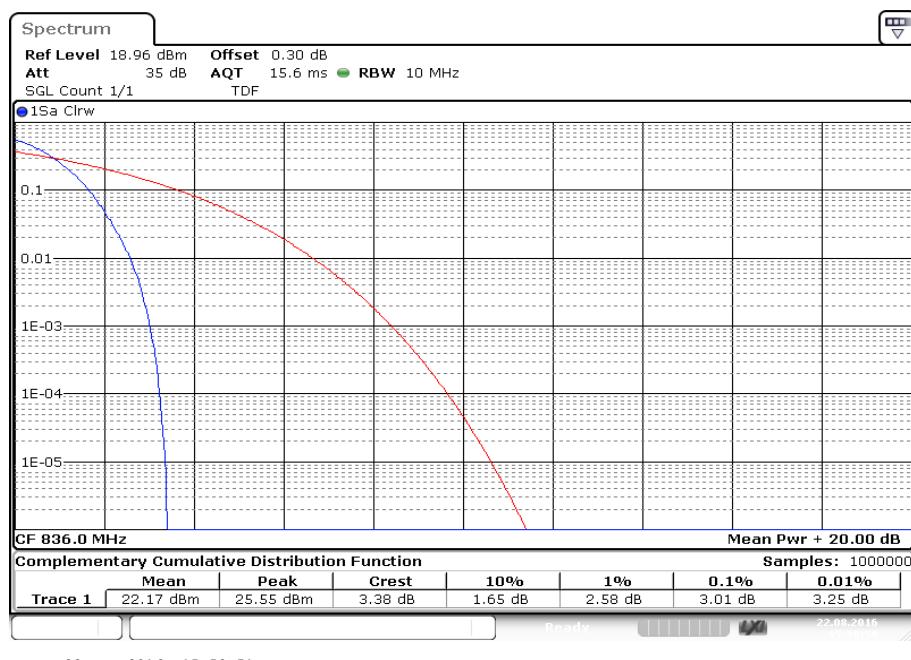
#### Limits:

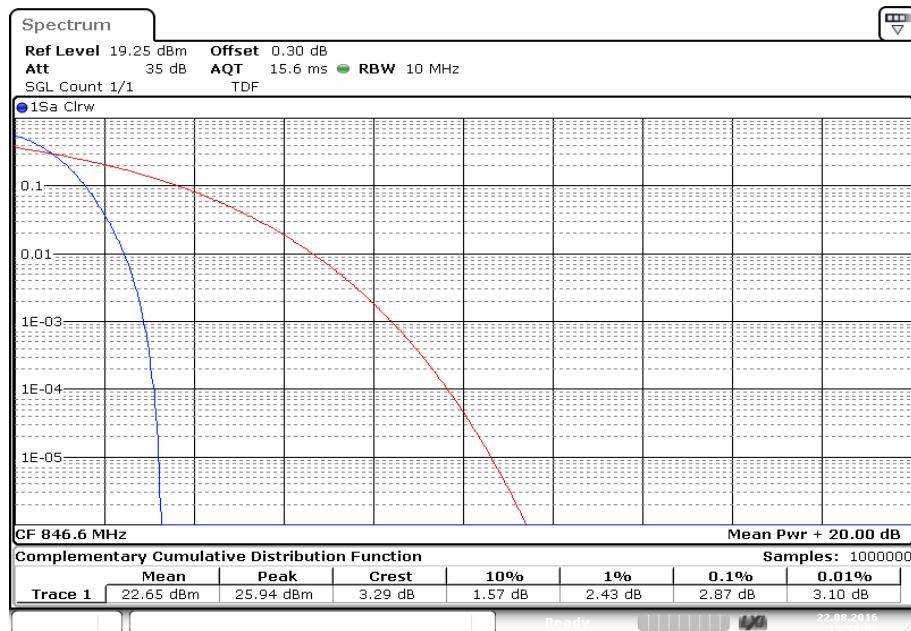
FCC	
CFR Part 22.913	
CFR Part 2.1046	
Nominal Peak Output Power	
+38.45 dBm	
In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.	

**Results:**

Output Power (conducted) WCDMA mode		
Frequency (MHz)	Average Output Power (dBm)	Peak to Average Ratio (dB)
826.4	22.6	2.87
836.0	22.2	3.01
846.6	22.7	2.87

Output Power (radiated) WCDMA mode	
Frequency (MHz)	Average Output Power (dBm) - ERP
826.4	20.6
836.0	21.2
846.6	20.0

**Plots:**
**Plot 1:** CCDF measurement, lowest channel, conducted

**Plot 2:** CCDF measurement, lowest channel, conducted


**Plot 3:** CCDF measurement, lowest channel, conducted

## 11.2 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 CMU200 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  $V_{nom}$ , connected to the CMU200 and in a simulated call on channel 4180 (center 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  $V_{nom}$ . Vary supply voltage to the voltage steps and remeasuring carrier frequency at each voltage.
6. At all temperature levels hold the temperature to +/- 0.5°C during the measurement procedure.

### Measurement:

Measurement parameters	
Detector:	
Sweep time:	
Video bandwidth:	
Resolution bandwidth:	
Span:	
Trace-Mode:	Measured with CMU200

### Limits:

FCC
CFR Part 22.355
CFR Part 2.1055
Frequency Stability
± 0.1 ppm

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

Voltage (V)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
10.8	-25	-0.00000299	-0.0299
12.0	14	0.00000167	0.0167
24.0	1	0.00000012	0.0012
30.0	17	0.00000203	0.0203

**AFC FREQ ERROR versus TEMPERATURE**

Temperature (°C)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
-30	3	0.00000036	0.0036
-20	2	0.00000024	0.0024
-10	-15	-0.00000179	-0.0179
± 0	-16	-0.00000191	-0.0191
10	12	0.00000144	0.0144
20	-6	-0.00000072	-0.0072
30	10	0.00000120	0.0120
40	-19	-0.00000227	-0.0227
50	-3	-0.00000036	-0.0036
55 (customer's request)	-15	-0.00000179	-0.0179

### 11.3 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 C63.4:2014 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 846.6 MHz. Measurements made up to 12.75 GHz. The resolution bandwidth is set as outlined in Part 22.917. The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of the UMTS band V.

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 100 kHz 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.
Resolution bandwidth:	100 kHz
Video bandwidth:	300 kHz
Span:	100 MHz Steps
Trace-Mode:	Max Hold

#### Limits:

FCC
CFR Part 22.917
CFR Part 2.1053
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 UMTS band V (826.4 MHz, 836.0 MHz and 846.6 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 UMTS band V 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.

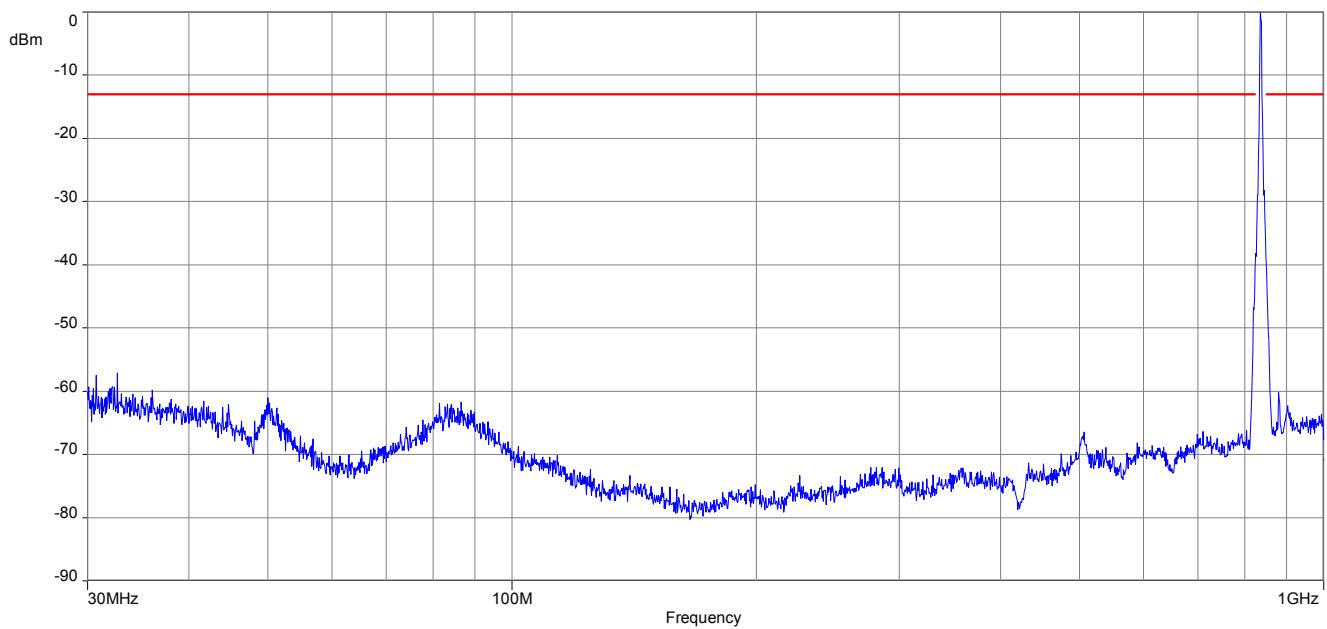
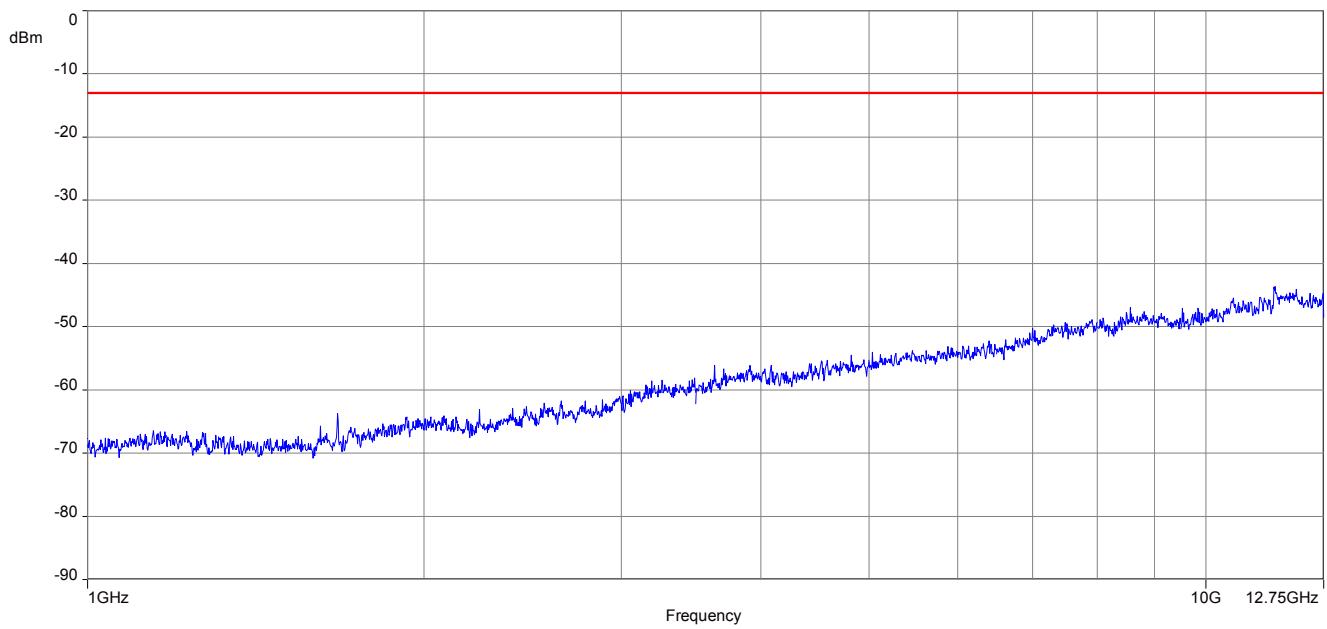
The final open field radiated levels are presented on the next pages.

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.

Spurious Emission Level (dBm)								
Harmonic	Ch. 4132 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 4180 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 4233 Freq. (MHz)	Level [dBm]
2	1652.8	-	2	1672.0	-	2	1693.2	-
3	2479.2	-	3	2508.0	-	3	2539.8	-
4	3305.6	-	4	3344.0	-	4	3386.4	-
5	4132.0	-	5	4180.0	-	5	4233.0	-
6	4958.4	-	6	5016.0	-	6	5079.6	-
7	5784.8	-	7	5852.0	-	7	5926.2	-
8	6611.2	-	8	6688.0	-	8	6772.8	-
9	7437.6	-	9	7524.0	-	9	7619.4	-
10	8264.0	-	10	8360.0	-	10	8466.0	-

**Plots:****Plot 1: Channel 4180 (30 MHz – 1 GHz)****Plot 2: Channel 4180 (1 GHz – 12.75 GHz)**

## 11.4 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 9 GHz, data taken from 10 MHz to 26 GHz.
2. Determine mobile station transmits frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.

UMTS band V Transmitter Channel Frequency

4132 826.4 MHz

4180 836.0 MHz

4233 846.6 MHz

### Measurement:

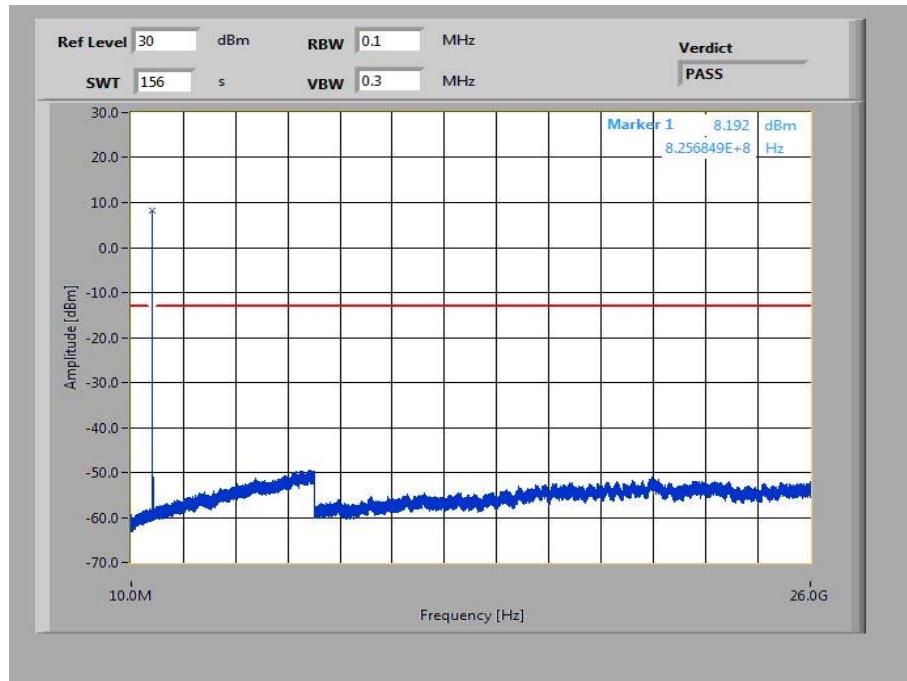
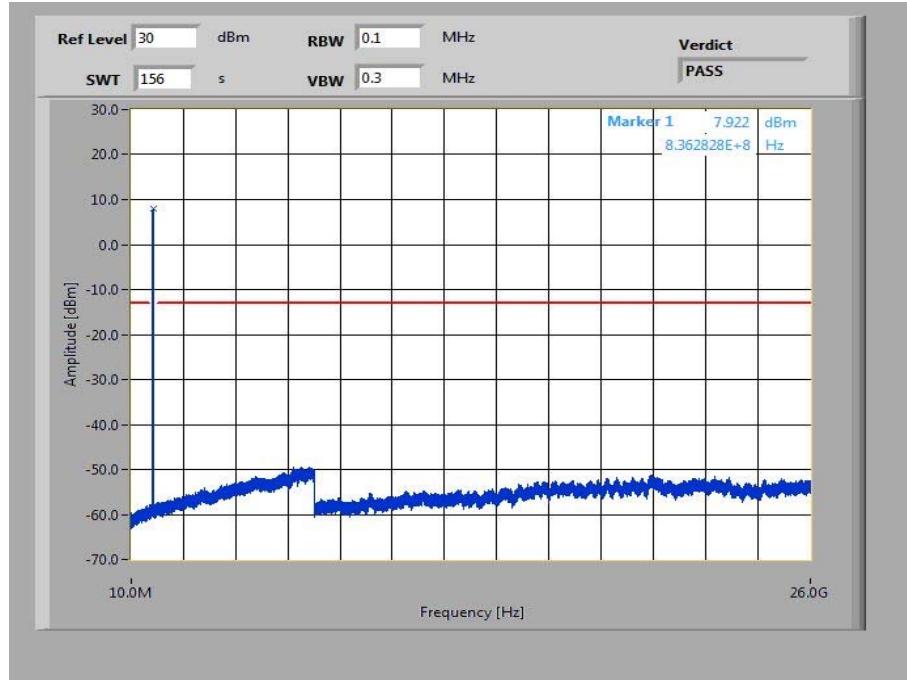
Measurement parameters	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	100 kHz
Video bandwidth:	300 kHz
Span:	30 MHz – 26 GHz
Trace-Mode:	Max Hold

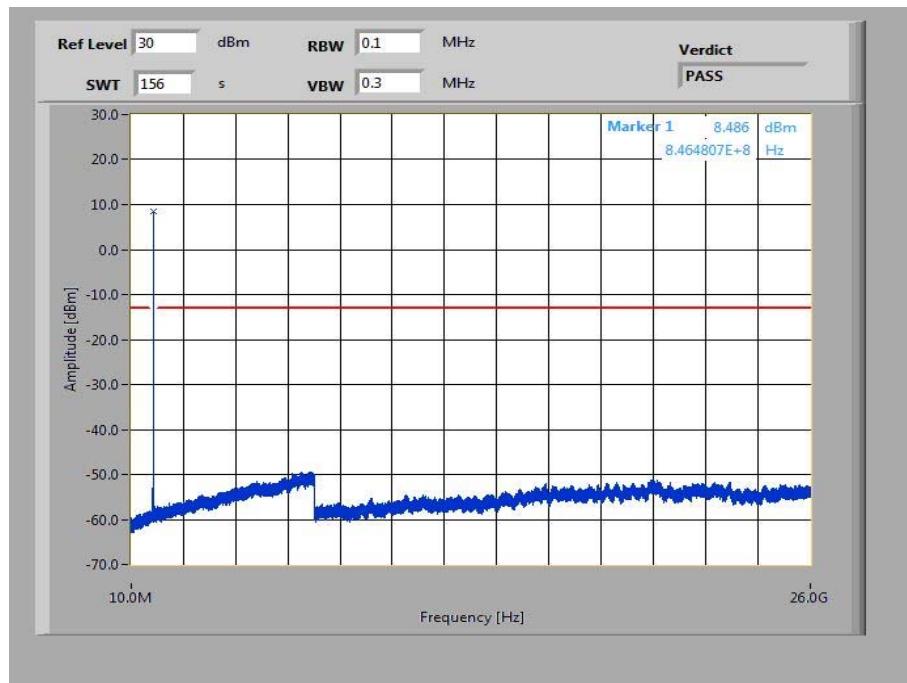
### Limits:

FCC
CFR Part 22.917
CFR Part 2.1051
Spurious Emissions Conducted
Attenuation $\geq 43 + 10\log(P)$ (P, Power in Watts)
-13 dBm

**Results:**

Spurious Emission Level (dBm)								
Harmonic	Ch. 4132 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 4180 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 4233 Freq. (MHz)	Level [dBm]
2	1652.8	-	2	1672.0	-	2	1693.2	-
3	2479.2	-	3	2508.0	-	3	2539.8	-
4	3305.6	-	4	3344.0	-	4	3386.4	-
5	4132.0	-	5	4180.0	-	5	4233.0	-
6	4958.4	-	6	5016.0	-	6	5079.6	-
7	5784.8	-	7	5852.0	-	7	5926.2	-
8	6611.2	-	8	6688.0	-	8	6772.8	-
9	7437.6	-	9	7524.0	-	9	7619.4	-
10	8264.0	-	10	8360.0	-	10	8466.0	-

**Plots:****Plot 1:** Channel 4132 (10 MHz - 25 GHz)**Plot 2:** Channel 4180 (10 MHz - 25 GHz)

**Plot 3:** Channel 4233 (10 MHz - 25 GHz)

## 11.5 Block edge compliance

### Description:

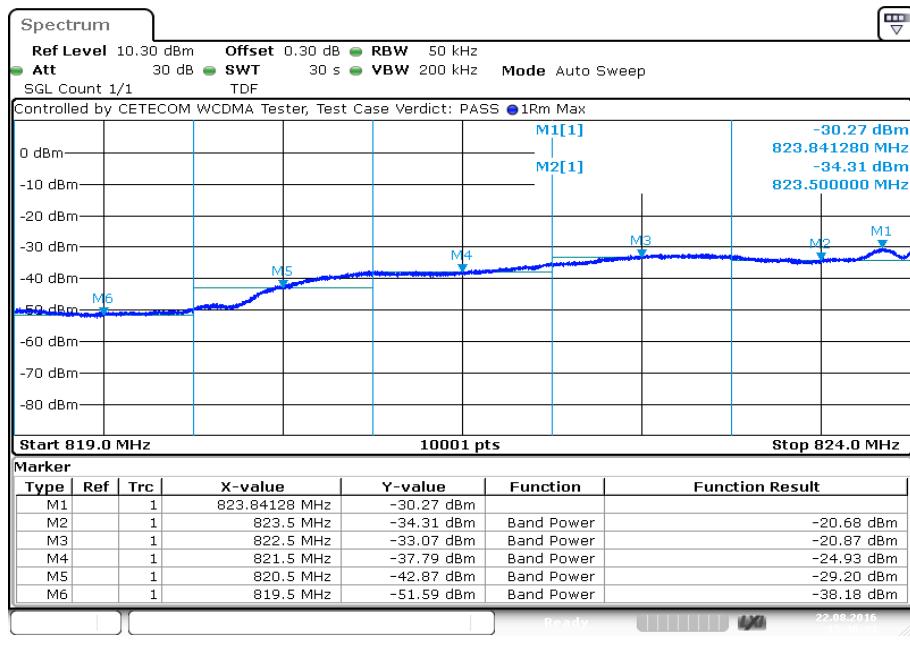
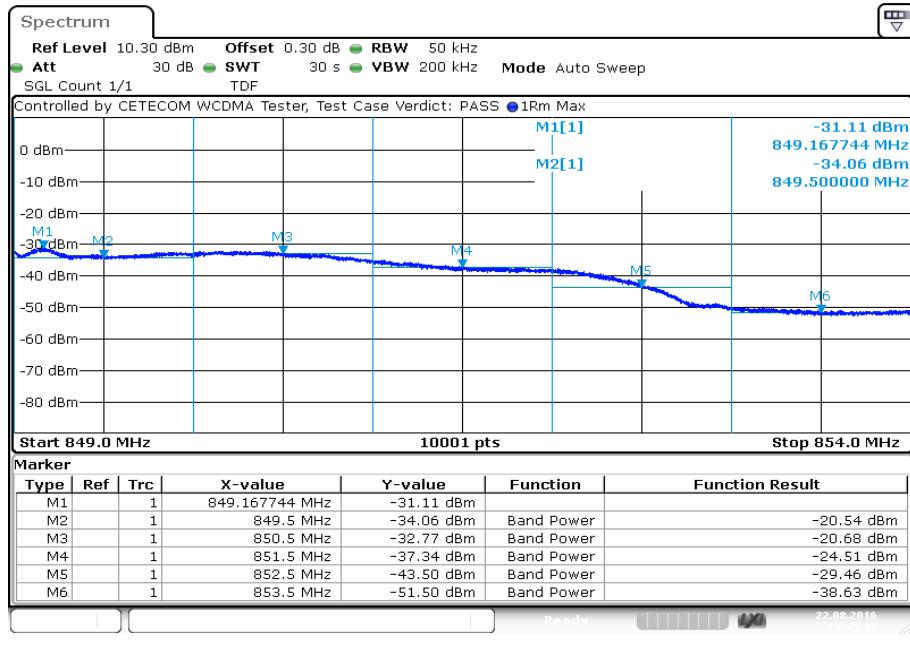
The spectrum at the band edges must comply with the spurious emissions limits.

### Measurement:

Measurement parameters	
Detector:	RMS
Sweep time:	30 sec.
Resolution bandwidth:	50 kHz
Video bandwidth:	200 kHz
Span:	5 MHz
Trace-Mode:	Max Hold

### Limits:

FCC
CFR Part 22.917
CFR Part 2.1051
Block Edge Compliance
-13 dBm

**Plots:****Plot 1: Channel 4132****Plot 2: Channel 4233**

## 11.6 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 UMTS band V. The table below lists the measured 99% power and -26dBc occupied bandwidths. Spectrum analyzer plots are included on the following pages.

Part 22.917 requires a measurement bandwidth of at least 1% of the occupied bandwidth. For ca. 4700 kHz, this equates to a resolution bandwidth of at least 50 kHz. For this testing, a resolution bandwidth 100 kHz was used.

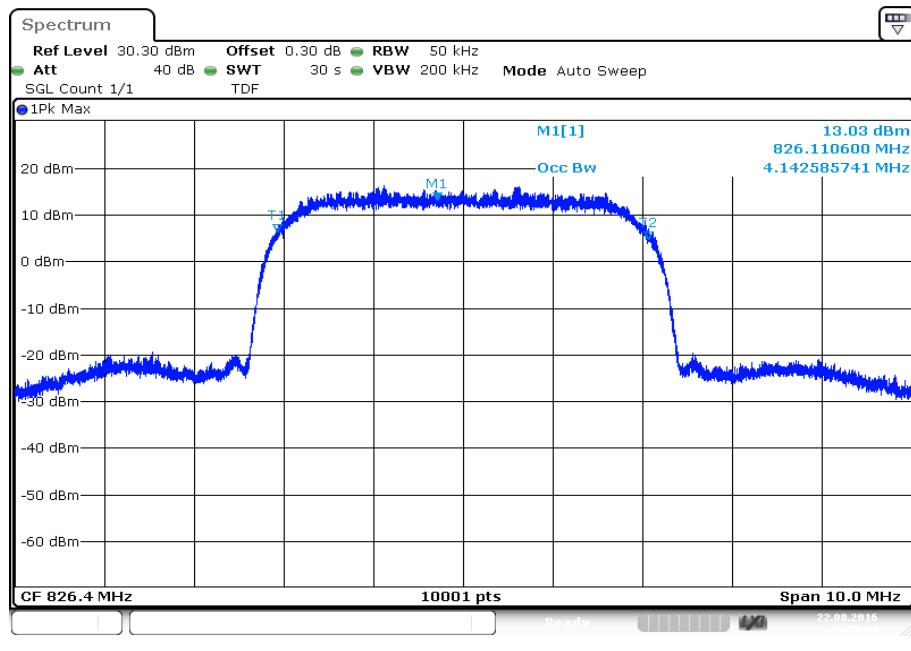
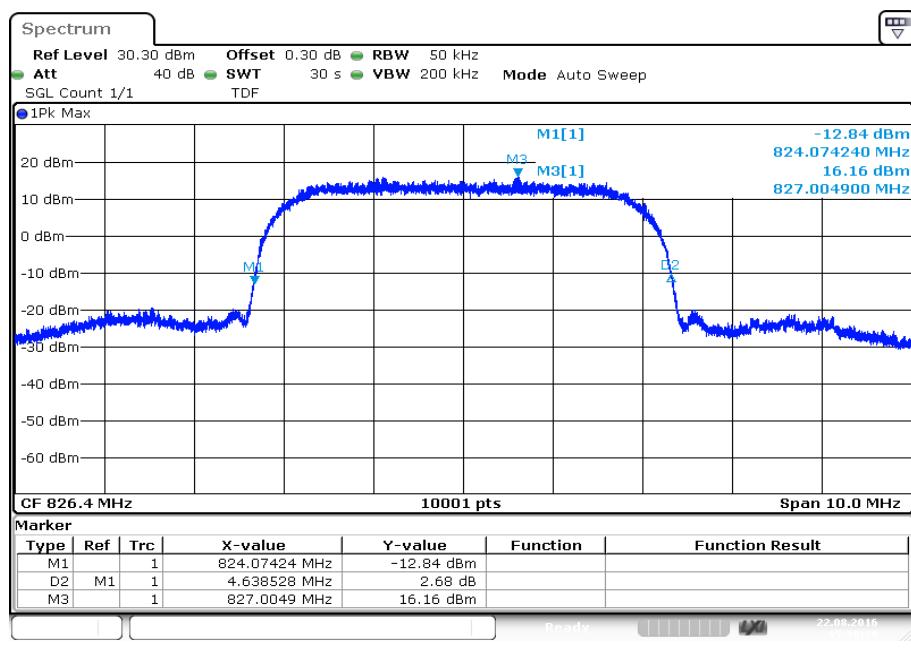
Measurement parameters	
Detector:	Peak
Sweep time:	Auto
Video bandwidth:	300 kHz
Resolution bandwidth:	100 kHz
Span:	6 MHz
Trace-Mode:	Max Hold

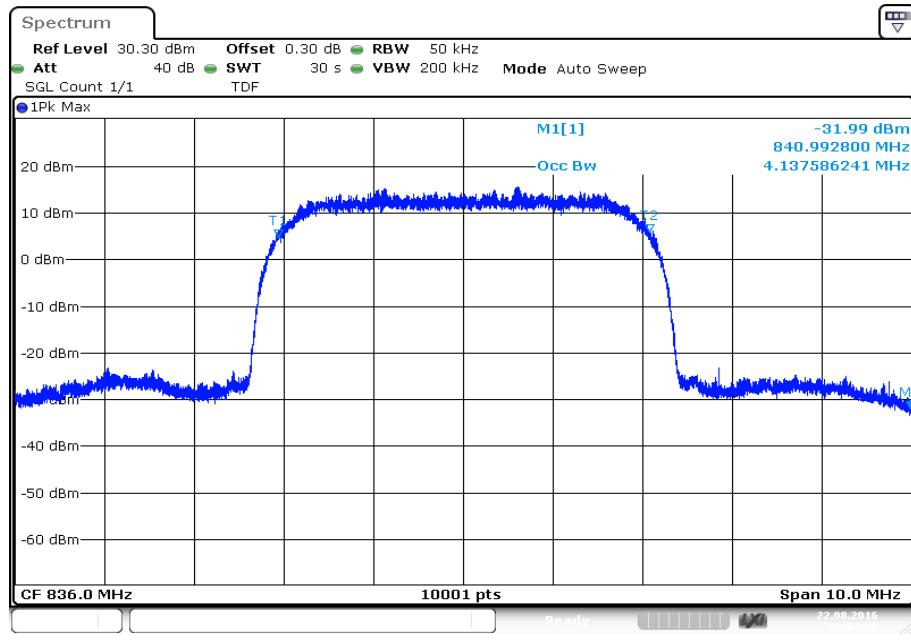
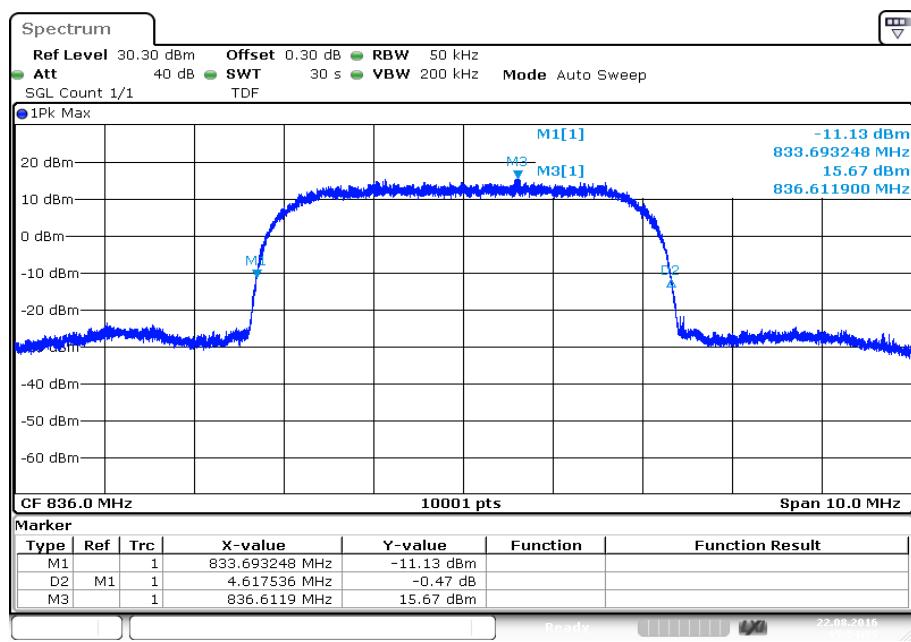
### Limits:

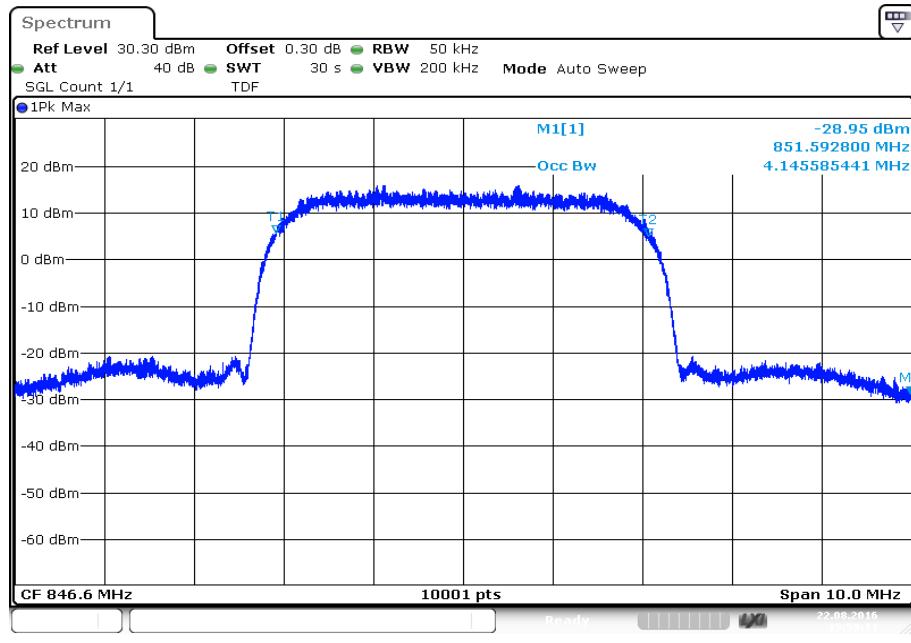
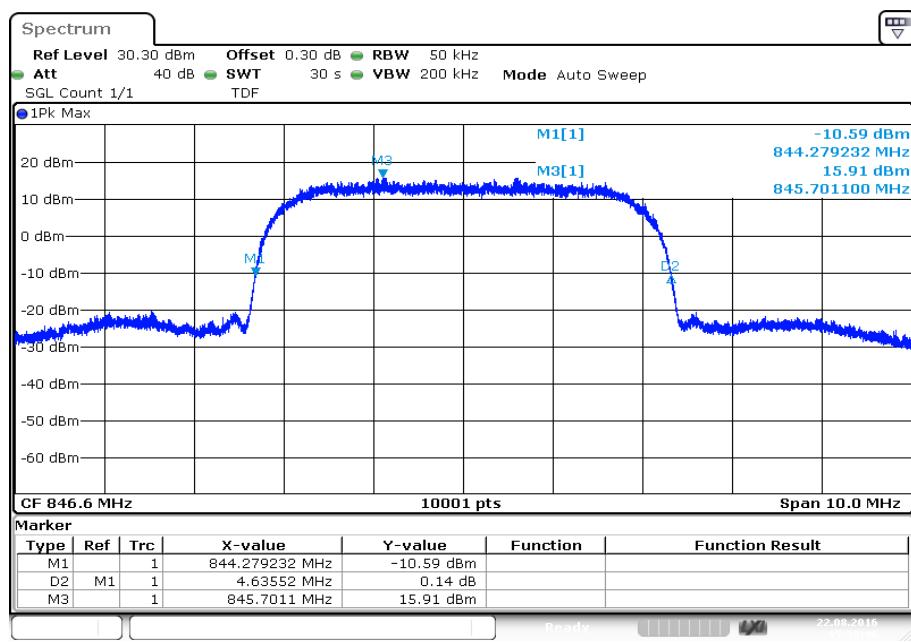
FCC
CFR Part 22.917
CFR Part 2.1049
Occupied Bandwidth
Spectrum must fall completely in the specified band

### Results:

Occupied Bandwidth		
Frequency (MHz)	99% OBW (kHz)	-26 dBc BW (kHz)
826.4	4143	4639
836.0	4138	4618
846.6	4146	4636

**Plots:****Plot 1: Channel 4132 (99% - OBW)****Plot 2: Channel 4132 (-26 dBc BW)**

**Plot 3: Channel 4180 (99% - OBW)**

**Plot 4: Channel 4180 (-26 dBc BW)**


**Plot 5: Channel 4233 (99% - OBW)****Plot 6: Channel 4233 (-26 dBc BW)**

**Annex A Document history**

Version	Applied changes	Date of release
	Initial release	2016-08-25

**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
PMN	-	Product marketing name
HMN	-	Host marketing name
HVIN	-	Hardware version identification number
FVIN	-	Firmware version identification number

**Annex C      Accreditation Certificate**

Front side of certificate

Back side of certificate



Deutsche Akkreditierungsstelle GmbH

Berelehene 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  
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Elektromagnetische Verträglichkeit (EMV)  
Produktsicherheit  
SAR / EMF  
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Kanadische Anforderungen  
US-Anforderungen  
Akustik  
Near Field Communication (NFC)

Die Akkreditierungsurkunde gilt nur in Verbindung mit dem Bescheid vom 04.05.2016 mit der  
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Registrierungsnummer der Urkunde: D-PL-12076-01-01

Frankfurt, 04.05.2016

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

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10117 Berlin

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60327 Frankfurt am Main

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38116 Braunschweig

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**Note:**

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