

## TEST REPORT

Test report no.: 1-4784/17-01-08



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-12076-01-03

### Applicant

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### Manufacturer

#### M-TEC Trackunit A/S

Gasvaerksvej 24, 4sal

9000 Aalborg / DENMARK

### Test standard/s

47 CFR Part 22	Title 47 of the Code of Federal Regulations; Chapter I; Part 22 - Public mobile services
47 CFR Part 24	Title 47 of the Code of Federal Regulations; Chapter I; Part 24 - Personal communications services
RSS - 132 Issue 3	Spectrum Management and Telecommunications Radio Standards Specification - Cellular Telephone Systems Operating in the Bands 824-849 MHz and 869-894 MHz

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

### Test Item

Kind of test item:	Tracking unit
Model name:	TU500-1 SPOT
FCC ID:	ZMF-ME500
IC:	9746A-ME500
Frequency:	GSM850, PCS1900
Technology tested:	GPRS
Antenna:	Integrated antenna
Temperature range:	-30°C to +60°C



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

### Test report authorized:



Andreas Luckenbill  
Lab Manager  
Radio Communications & EMC

### Test performed:



Marco Bertolino  
Testing 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. CTC advanced GmbH does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item.

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### 2.2 Application details

Date of receipt of order:	2017-08-23
Date of receipt of test item:	2017-09-18
Start of test:	2017-12-04
End of test:	2017-12-08
Person(s) present during the test:	-/-

### 2.3 Test laboratories sub-contracted

None

### 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
47 CFR Part 24	-/-	Title 47 of the Code of Federal Regulations; Chapter I; Part 24 - Personal communications services
RSS - 132 Issue 3	January 2013	Spectrum Management and Telecommunications Radio Standards Specification - Cellular Telephone Systems Operating in the Bands 824-849 MHz and 869-894 MHz
RSS - 133 Issue 6	January 2013	Spectrum Management and Telecommunications Policy - Radio Standards Specifications, 2 GHz Personal Communication Services

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

## 4 Test environment

Temperature	:	$T_{nom}$ $T_{max}$ $T_{min}$	+22 °C during room temperature tests No tests under high temperature conditions performed No tests under low temperature conditions performed
Relative humidity content	:		55 %
Barometric pressure	:		1021 hpa
Power supply	:	$V_{nom}$ $V_{max}$ $V_{min}$	3.5 V DC by Li-MnO <sub>2</sub> battery pack No tests under high voltage conditions performed No tests under low voltage conditions performed

## 5 Test item

### 5.1 General description

Kind of test item	:	Tracking unit
Type identification	:	TU500-1 SPOT
HMN	:	N/A
PMN	:	Trackunit
HVIN	:	TU500-1 Spot
FVIN	:	N/A
S/N serial number	:	radiated: 841353 conducted: 1500158
HW hardware status	:	N/A
SW software status	:	N/A
Frequency band	:	GSM850, PCS1900
Type of modulation	:	GMSK
Antenna	:	Integrated antenna
Power supply	:	3.5 V DC by Li-MnO <sub>2</sub> battery pack
Temperature range	:	-30°C to +60°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:

Internal Pictures 500-1 Spot v2.pdf  
External Pictures 500-1 Spot.pdf  
1-4784/17-01-08\_AnnexC

## 6 Description of the test setup

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

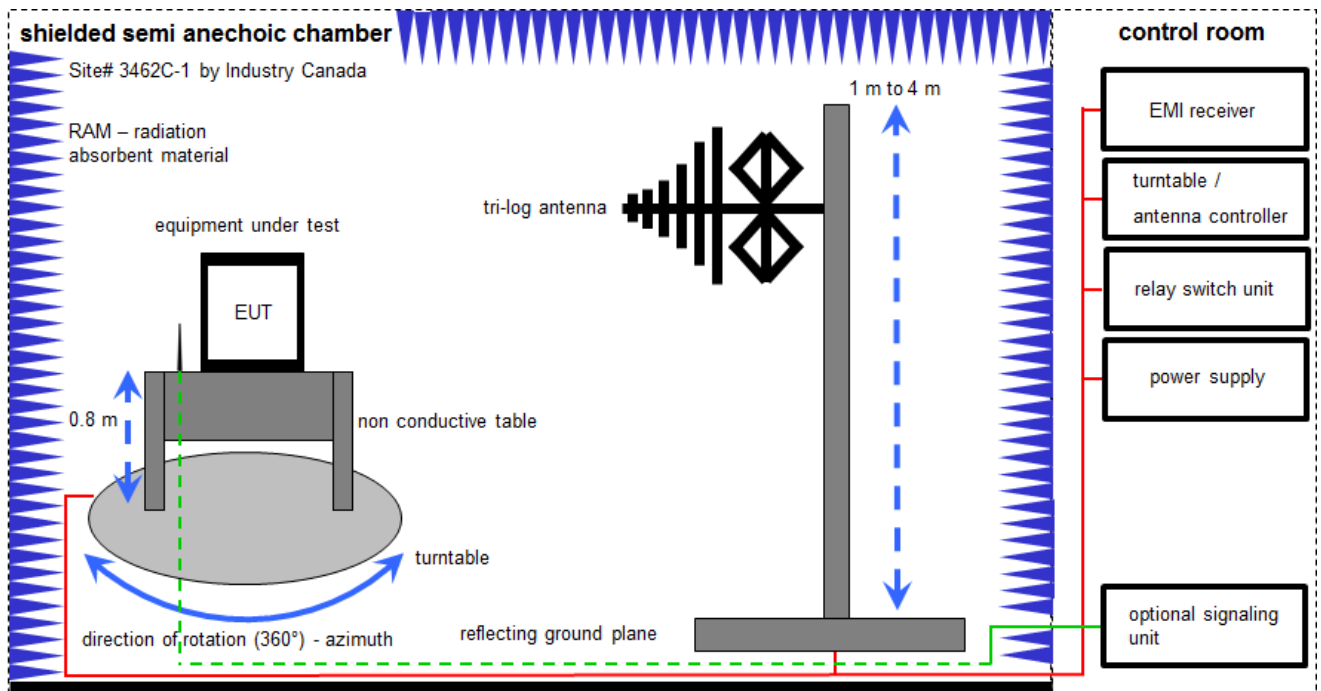
In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Lab/Item).

**Agenda:** Kind of Calibration

k	calibration / calibrated	EK	limited calibration
ne	not required (k, ev, izw, zw not required)	zw	cyclical maintenance (external cyclical maintenance)
ev	periodic self verification	izw	internal cyclical maintenance
Ve	long-term stability recognized	g	blocked for accredited testing
vkl!	Attention: extended calibration interval		
NK!	Attention: not calibrated	*)	next calibration ordered / currently in progress

## 6.1 Shielded semi anechoic chamber

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



Measurement distance: tri-log antenna 10 meter

$$FS = UR + CL + AF$$

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

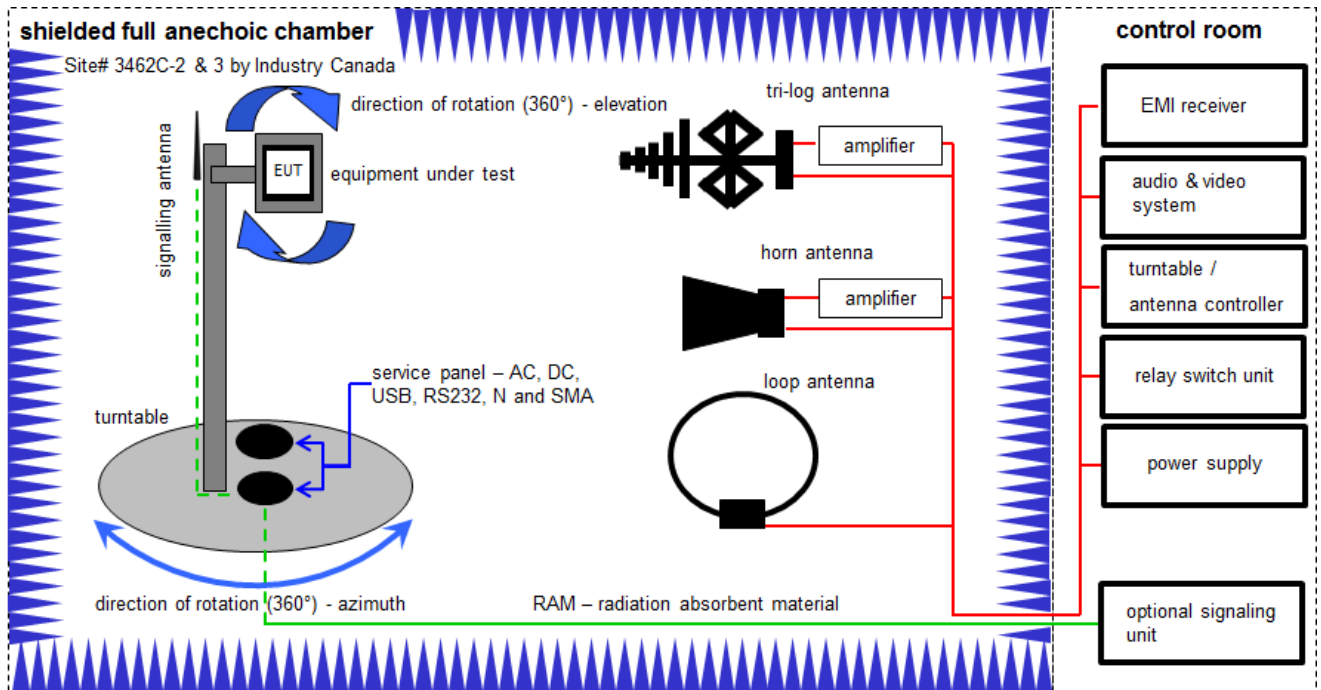
Example calculation:

$$FS [dB\mu V/m] = 12.35 [dB\mu V/m] + 1.90 [dB] + 16.80 [dB/m] = 31.05 [dB\mu V/m] \quad (35.69 \mu V/m)$$

### Equipment table:

No.	Lab / Item	Equipment	Type	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	A	Switch-Unit	3488A	HP	2719A14505	300000368	ev	-/-	-/-
2	A	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP	2920A04466	300000580	ne	-/-	-/-
3	A	Meßkabine 1	HF-Absorberhalle	MWB AG 300023	-/-	300000551	ne	-/-	-/-
4	A	EMI Test Receiver	ESCI 3	R&S	100083	300003312	k	01.02.2017	31.01.2018
5	A	Analyzer-Reference-System (Harmonics and Flicker)	ARS 16/1	SPS	A3509 07/0 0205	300003314	Ve	-/-	-/-
6	A	Antenna Tower	Model 2175	ETS-Lindgren	64762	300003745	izw	-/-	-/-
7	A	Positioning Controller	Model 2090	ETS-Lindgren	64672	300003746	izw	-/-	-/-
8	A	Turntable Interface-Box	Model 105637	ETS-Lindgren	44583	300003747	izw	-/-	-/-
9	A	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	295	300003787	k	25.04.2016	25.04.2018
10	A	Universal Communication Tester	CMU200	R&S	106826	300003346	k	02.02.2017	01.02.2018

## 6.2 Shielded fully anechoic chamber



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

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

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

### Example calculation:

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

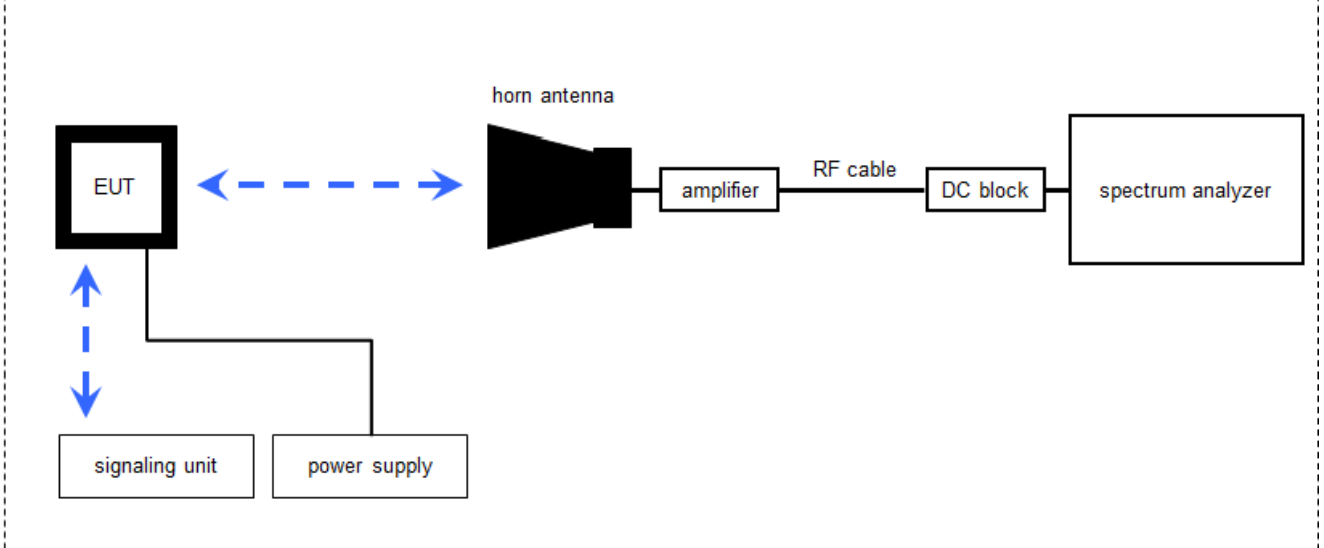
### Equipment table:

No.	Lab / Item	Equipment	Type	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	B	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	vIKI!	07.07.2017	06.07.2019
2	B	Active Loop Antenna 9 kHz to 30 MHz	6502	EMCO	2210	300001015	k	07.07.2017	06.07.2019
3	B	Highpass Filter	WHK1.1/15G-10SS	Wainwright	37	400000148	ne	-/-	-/-
4	B	Band Reject Filter	WRCG1850/1910-1835/1925-40/8SS	Wainwright	23	400000149	ne	-/-	-/-
5	A, B	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	318	300003696	k	23.05.2017	22.05.2020
6	B	Broadband Amplifier 0.5-18 GHz	CBLU5184540	CERNEX	22051	300004483	ev	-/-	-/-
7	A,B	4U RF Switch Platform	L4491A	Agilent Technologies	MY50000032	300004510	ne	-/-	-/-
8	A,B	Computer	Intel Core i3 3220/3,3 GHz, Prozessor	-/-	2V2403033A 5421	300004591	ne	-/-	-/-
9	B	Highpass Filter	WHKX2.6/18G-10SS	Wainwright	12	300004651	ne	-/-	-/-
10	A,B	NEXIO EMV-Software	BAT EMC V3.16.0.49	EMCO	-/-	300004682	ne	-/-	-/-
11	A,B	Anechoic chamber	-/-	TDK	-/-	300003726	ne	-/-	-/-
12	A,B	EMI Test Receiver 9kHz-26,5GHz	ESR26	R&S	101376	300005063	vIKI!	13.09.2016	13.03.2018
13	A,B	Universal Communication Tester	CMU200	R&S	106826	300003346	k	02.02.2017	01.02.2018



### 6.3 Radiated measurements > 18 GHz

#### Radiated measurements > 18 GHz



Measurement distance: horn antenna 50 cm

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

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

#### Example calculation:

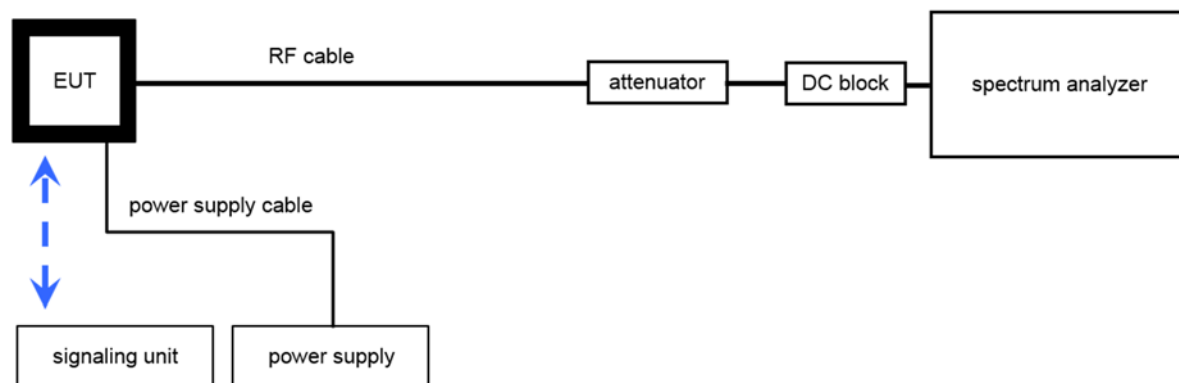
$$OP \text{ [dBm]} = -59.0 \text{ [dBm]} + 44.0 \text{ [dB]} - 20.0 \text{ [dBi]} + 5.0 \text{ [dB]} = -30 \text{ [dBm]} (1 \mu\text{W})$$

#### Equipment table:

No.	Lab / Item	Equipment	Type	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	A	Amplifier 2-40 GHz	JS32-02004000-57-5P	MITEQ	1777200	300004541	ev	-/-	-/-
2	A	PC-WLAN Tester	Intel Core i3 3220/3,3 GHz, Prozessor	-/-	2V2403033A4523	300004589	ne	-/-	-/-
3	A	Signal Analyzer 40 GHz	FSV40	R&S	101042	300004517	k	25.01.2017	24.01.2018
4	A	Power Supply 0-20V, 0-5A	6632B	Agilent Technologies	GB42110541	400000562	vIKI!	26.01.2016	26.01.2019
5	A	Horn Antenna 18,0-40,0 GHz	LHAF180	Microw.Devel	39180-103-022	300001748	k	22.05.2015	22.05.2018
6	A	RF-Cable	ST18/SMAm/SMAm/48	Huber & Suhner	Batch no. 600918	400001182	ev	-/-	-/-
7	A	RF-Cable	ST18/SMAm/SMAm/48	Huber & Suhner	Batch no. 127377	400001183	ev	-/-	-/-
8	A	Universal Communication Tester	CMU200	R&S	106826	300003346	k	02.02.2017	01.02.2018

## 6.4 Conducted measurements

### Conducted measurements normal conditions



$$OP = AV + CA$$

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

#### Example calculation:

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

#### Equipment table:

No.	Lab / Item	Equipment	Type	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	A	Teststand	Teststand Custom Sequence Editor	National Instruments GmbH	-/-	300004590	ne	-/-	-/-
2	A	RF-Cable	ST18/SMAm/SMAm/72	Huber & Suhner	Batch no. 699714	400001184	ev	-/-	-/-
3	A	DC-Blocker 0.1-40 GHz	8141A	Inmet	-/-	400001185	ev	-/-	-/-
4	A	Coax Attenuator 10 dB 2W 0-40 GHz	MCL BW-K10-2W44+	Mini Circuits	-/-	400001186	ev	-/-	-/-
5	A	Synchron Power Meter	SPM-4	CTC	1	400001294	ev	-/-	-/-
6	A	RF-Cable	ST18/SMAm/SMAm/36	Huber & Suhner	Batch no. 601494	400001309	ev	-/-	-/-
7	A	DC-Blocker	WA7046	Weinschel Associates	-/-	400001310	ev	-/-	-/-
8	A	Signal Analyzer 40 GHz	FSV40	R&S	101042	300004517	k	25.01.2017	24.01.2018
9	A	Universal Communication Tester	CMU200	R&S	106826	300003346	k	02.02.2017	01.02.2018

**7 Measurement uncertainty**

Measurement uncertainty	
Test case	Uncertainty
RF output power conducted	± 1 dB
RF output power radiated	± 3 dB
Frequency stability	± 20 Hz
Spurious emissions radiated below 30 MHz	± 3 dB
Spurious emissions radiated 30 MHz to 1 GHz	± 3 dB
Spurious emissions radiated 1 GHz to 12.75 GHz	± 3.7 dB
Spurious emissions radiated above 12.75 GHz	± 4.5 dB
Spurious emissions conducted	± 3 dB
Block edge compliance	± 3 dB
Occupied bandwidth	± RBW

## 8 Summary of measurement results

<input type="checkbox"/>	No deviations from the technical specifications were ascertained
<input type="checkbox"/>	There were deviations from the technical specifications ascertained
<input checked="" 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	Date	Remark
RF-Testing	CFR Part 22, 24 RSS 132, 133	2017-12-11	-/-

### 8.1 GSM 850

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 type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" 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 type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-/-
Block Edge Compliance	Nominal	Nominal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-/-
Occupied Bandwidth	Nominal	Nominal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-/-

**Note:** C = Compliant; NC = Not compliant; NA = Not applicable; NP = Not performed

### 8.2 PCS 1900

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 type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" 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 type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-/-
Block Edge Compliance	Nominal	Nominal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-/-
Occupied Bandwidth	Nominal	Nominal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-/-

**Note:** C = Compliant; NC = Not compliant; NA = Not applicable; NP = Not performed

## 9 Results GSM 850

All GSM-band measurements are done in GSM packet data mode only. All tests were performed with one timeslot in uplink activated and one timeslot in downlink activated. For each mode the highest output power was determined and used.

### 9.1 RF output power

#### Description:

This paragraph contains average power, peak output power, PAPR and ERP measurements for the mobile station.

The plots in this test report represents only an example of the measurements. All plots of this chapter are available on request.

The red line in the measurements indicates the ideal Gaussian distribution for the measured amplitude range.

#### Measurement:

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

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

Measurement parameters	
Detector:	Sample
AQT:	See plot
Resolution bandwidth:	1 MHz
Used equipment:	See chapter 6.2 – A See chapter 6.5 – A
Measurement uncertainty:	see chapter 7

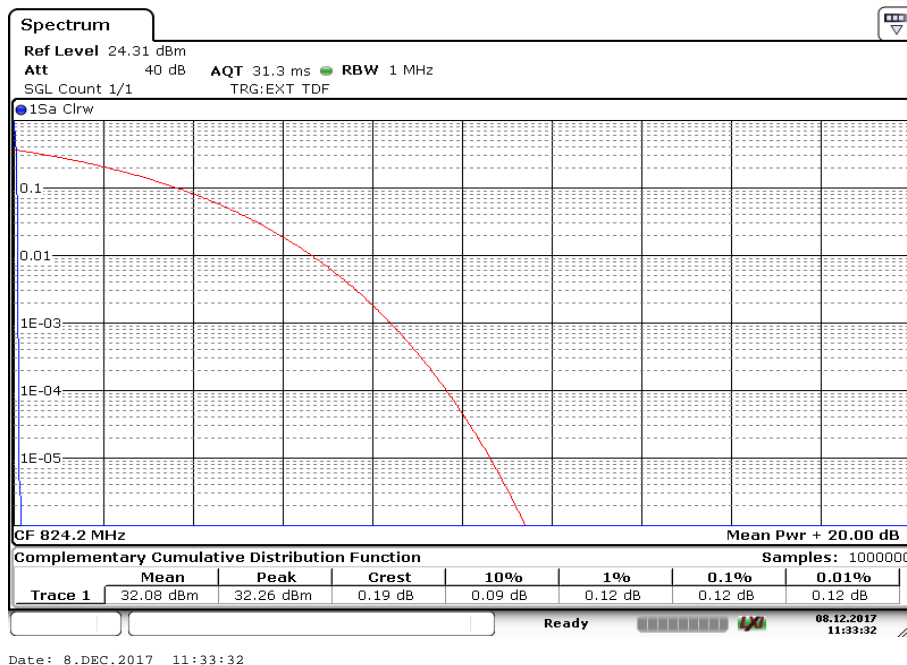
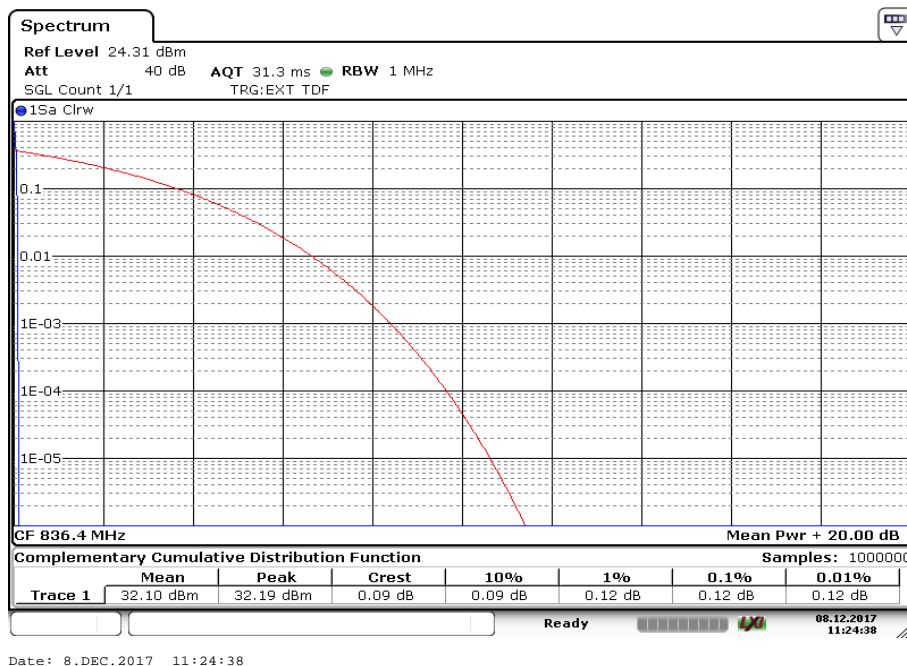
#### Limits:

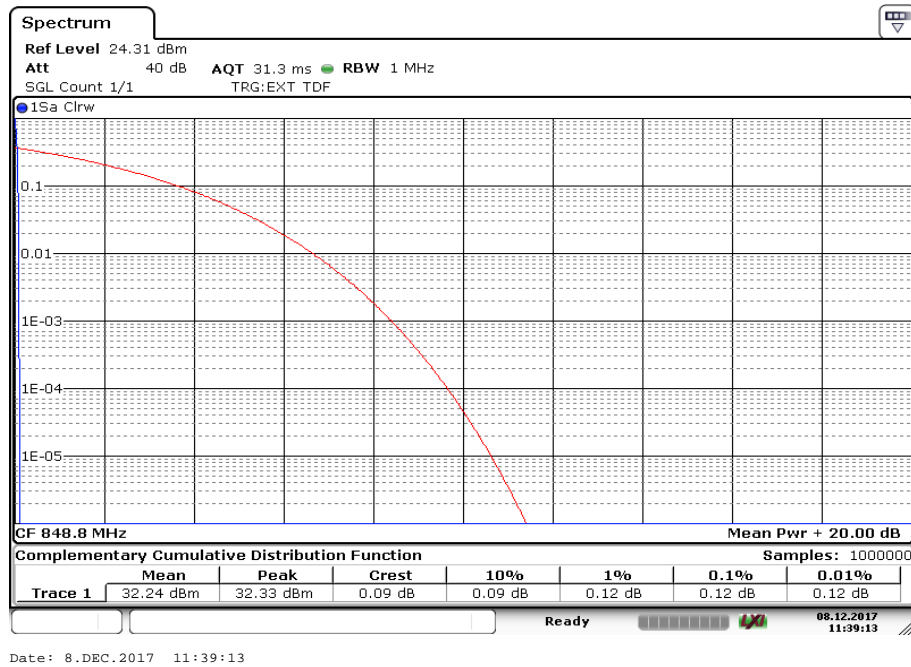
FCC	IC
+38.45 dBm In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.	

**Results:**

Output Power (conducted) GMSK mode			
Frequency (MHz)	Peak Output Power (dBm)	Average Output Power (dBm)	Peak to Average Ratio (dB) CCDF
824.2	32.3	32.1	0.1
836.4	32.2	32.1	0.1
848.8	32.3	32.2	0.1

Output Power (radiated) GMSK mode	
Frequency (MHz)	Average Output Power (dBm) - ERP
824.2	31.4
836.4	31.3
848.8	31.3

**Plots:** GMSK**Plot 1:** CCDF, channel 128**Plot 2:** CCDF, channel 189

**Plot 3: CCDF, channel 251**



## 9.2 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 848.8 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 GSM-850 band.

### Measurement:

Measurement parameters	
Detector:	Peak
Sweep time:	2 s
Resolution bandwidth:	100 kHz
Video bandwidth:	300 kHz
Span:	100 MHz Steps
Trace mode:	Max Hold
Used equipment:	See chapter 6.1 – A See chapter 6.2 – B
Measurement uncertainty:	see chapter 7

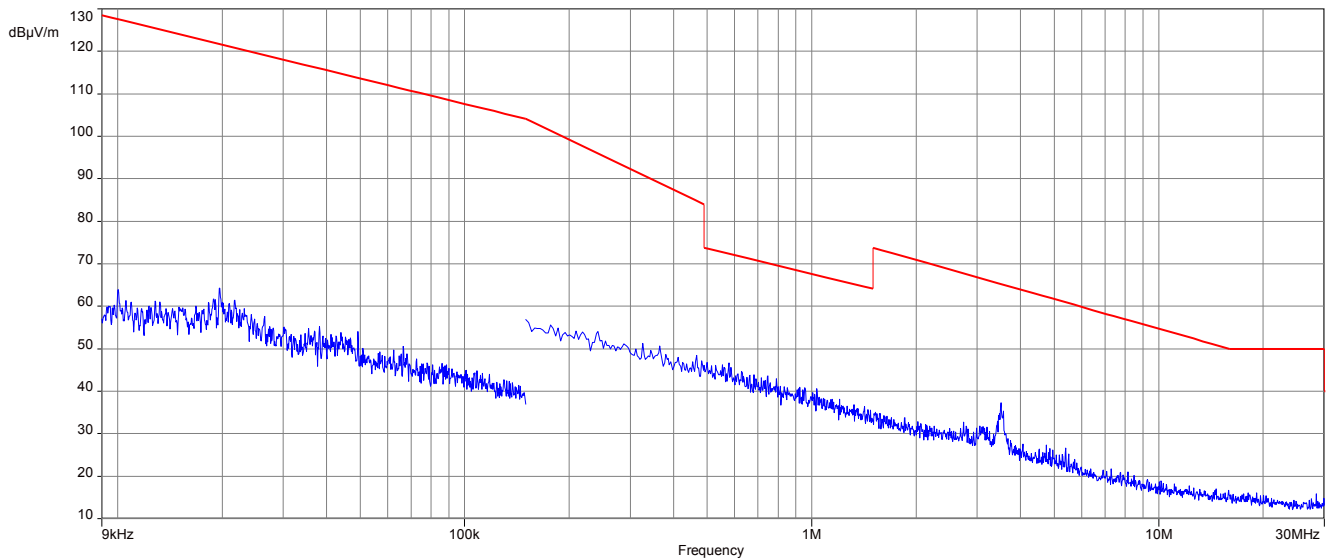
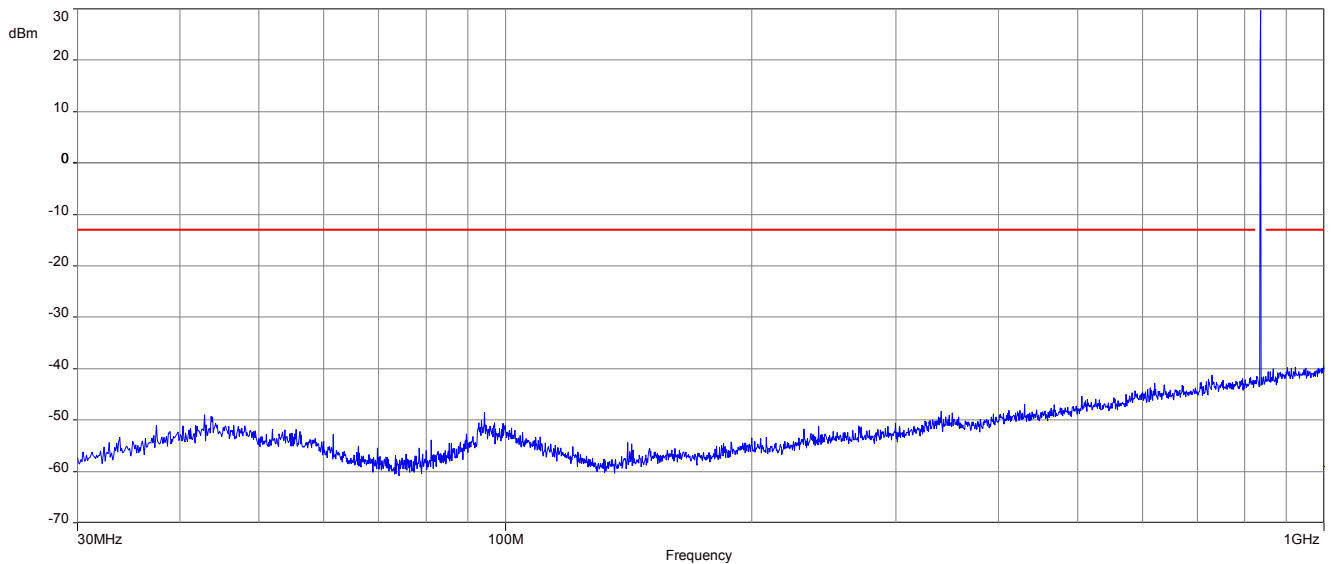
### Limits:

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

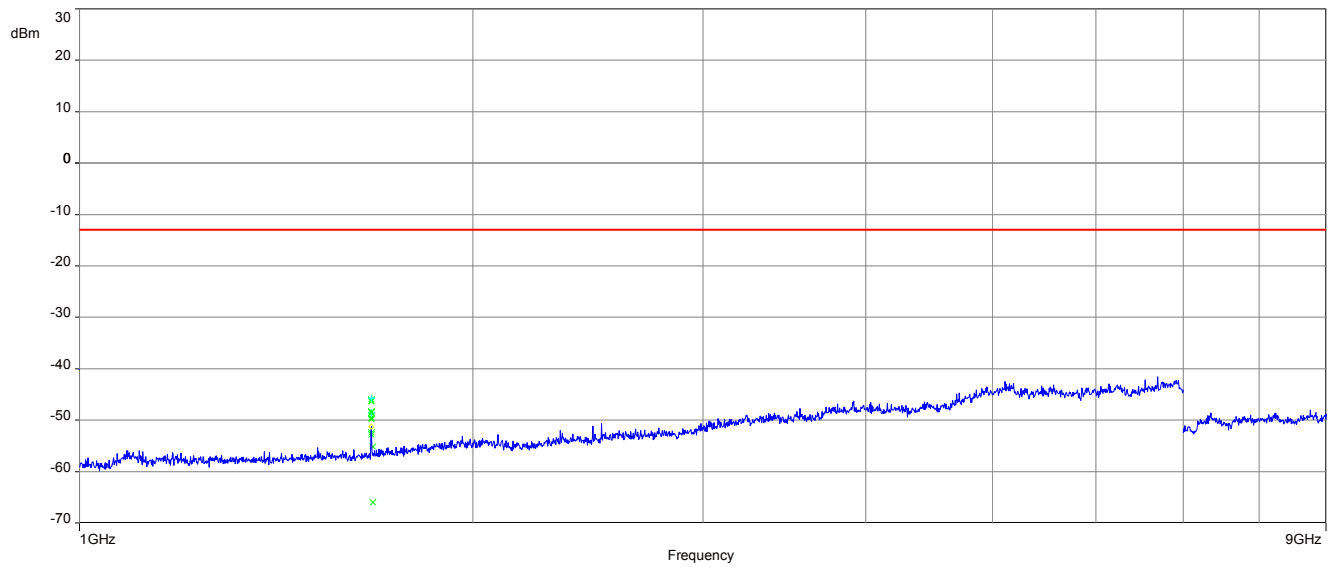
### Results GPRS:

Radiated emissions measurements were made only at the center carrier frequency of the GSM-850 band (836.4 MHz). The measurements shows the cabinet radiation in transmit mode. The antenna port can be terminated with 50  $\Omega$ .

Spurious emission level (dBm)								
Harmonic	Ch. 128 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 189 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 251 Freq. (MHz)	Level [dBm]
2	1648.4	-	2	1672.8	-	2	1697.6	-
3	2472.6	-	3	2509.2	-	3	2546.4	-
4	3296.8	-	4	3345.6	-	4	3395.2	-
5	4121.0	-	5	4182.0	-	5	4244.0	-
6	4945.2	-	6	5018.4	-	6	5092.8	-
7	5769.4	-	7	5854.8	-	7	5941.6	-
8	6593.6	-	8	6691.2	-	8	6790.4	-
9	7417.8	-	9	7527.6	-	9	7639.2	-
10	8242.0	-	10	8364.0	-	10	8488.0	-

**Plots:** GMSK**Plot 1:** Channel 189 (Traffic mode up to 30 MHz)**Plot 2:** Channel 189 (30 MHz – 1 GHz)

**Plot 3:** Channel 189 (1 GHz – 9 GHz)



## 10 Results PCS 1900

All GSM-band measurements are done in GSM mode only (packet data). All tests were performed with one timeslot in uplink activated and one timeslot in downlink activated. For each mode the highest output power was determined and used.

### 10.1 RF output power

#### Description:

This paragraph contains average power, peak output power, PAPR and ERP measurements for the mobile station.

The plots in this test report represents only an example of the measurements. All plots of this chapter are available on request.

The red line in the measurements indicates the ideal Gaussian distribution for the measured amplitude range.

#### Measurement:

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

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

Measurement parameters	
Detector:	Sample
AQT:	See plot
Resolution bandwidth:	1 MHz
Used equipment:	See chapter 6.2 – A See chapter 6.5 – A
Measurement uncertainty:	see chapter 7

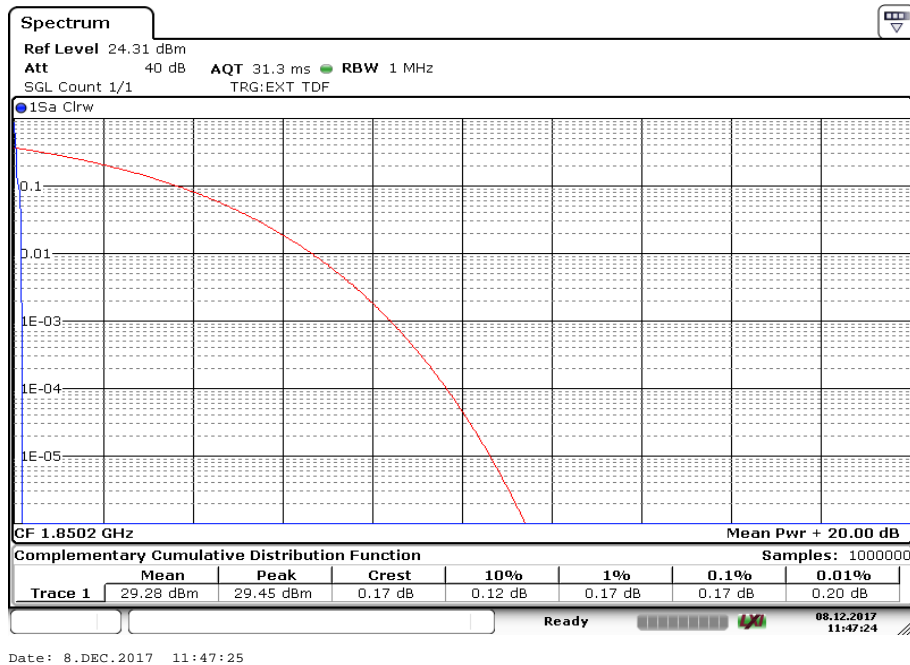
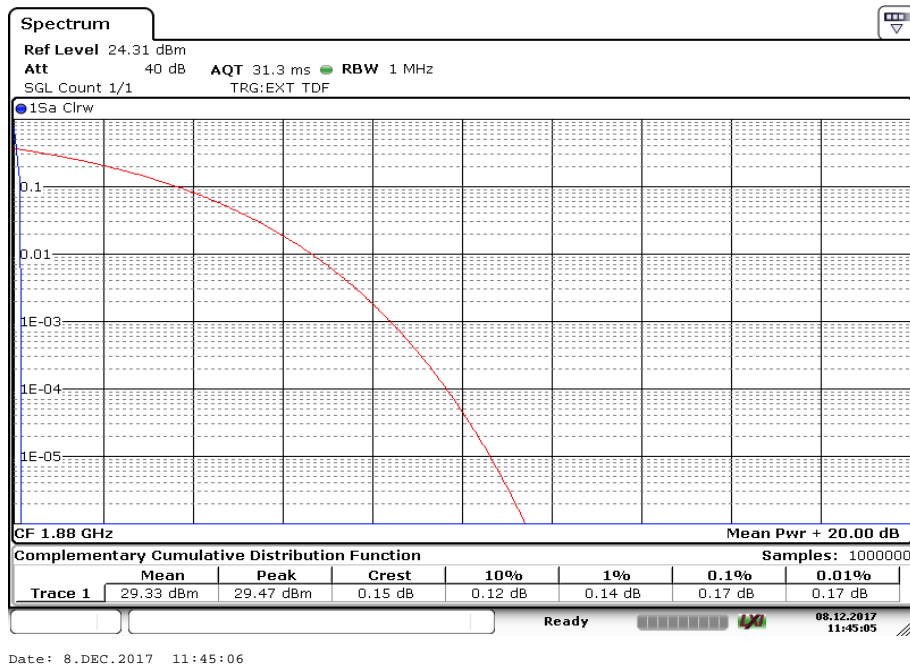
#### Limits:

FCC	IC
+33.00 dBm In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.	

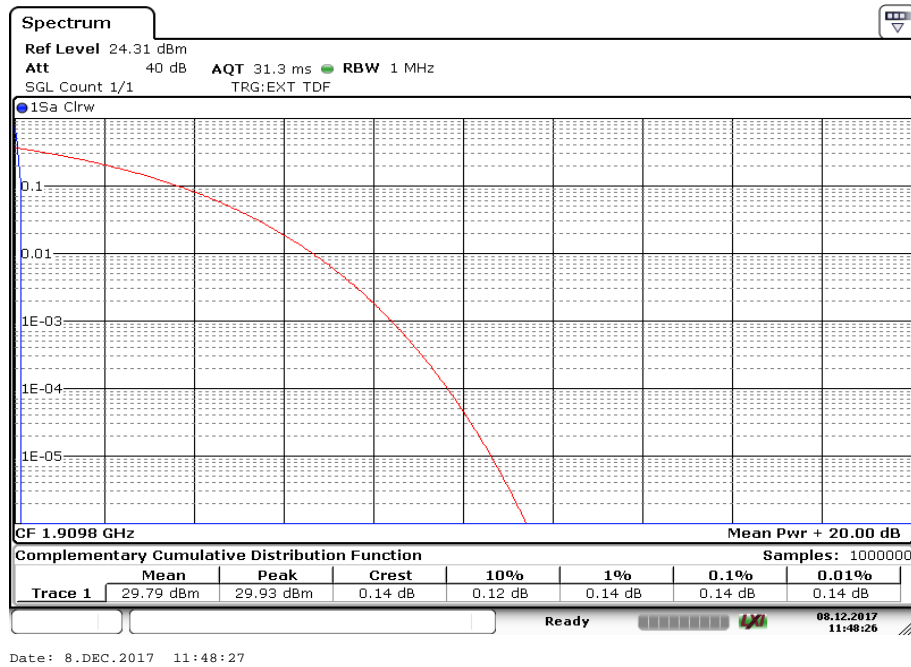
**Results:**

Output Power (conducted) GMSK mode			
Frequency (MHz)	Peak Output Power (dBm)	Average Output Power (dBm)	Peak to Average Ratio (dB) CCDF
1850.2	29.5	29.3	0.2
1880.0	29.5	29.3	0.2
1909.8	29.9	29.8	0.1

Output Power (radiated) GMSK mode	
Frequency (MHz)	Average Output Power (dBm) - EIRP
1850.2	33.0
1880.0	33.0
1909.8	31.2

**Plots:** GMSK**Plot 1:** CCDF, channel 512**Plot 2:** CCDF, channel 661

**Plot 3: CCDF, channel 810**





## 10.2 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. Measurement made up to 25 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 PCS1900 band.

### Measurement:

Measurement parameters	
Detector:	Peak
Sweep time:	2 sec.
Resolution bandwidth:	1 MHz
Video bandwidth:	3 MHz
Span:	100 MHz Steps
Trace mode:	Max Hold
Used equipment:	See chapter 6.1 – A See chapter 6.2 – C See chapter 6.3 – A
Measurement uncertainty:	see chapter 7

### Limits:

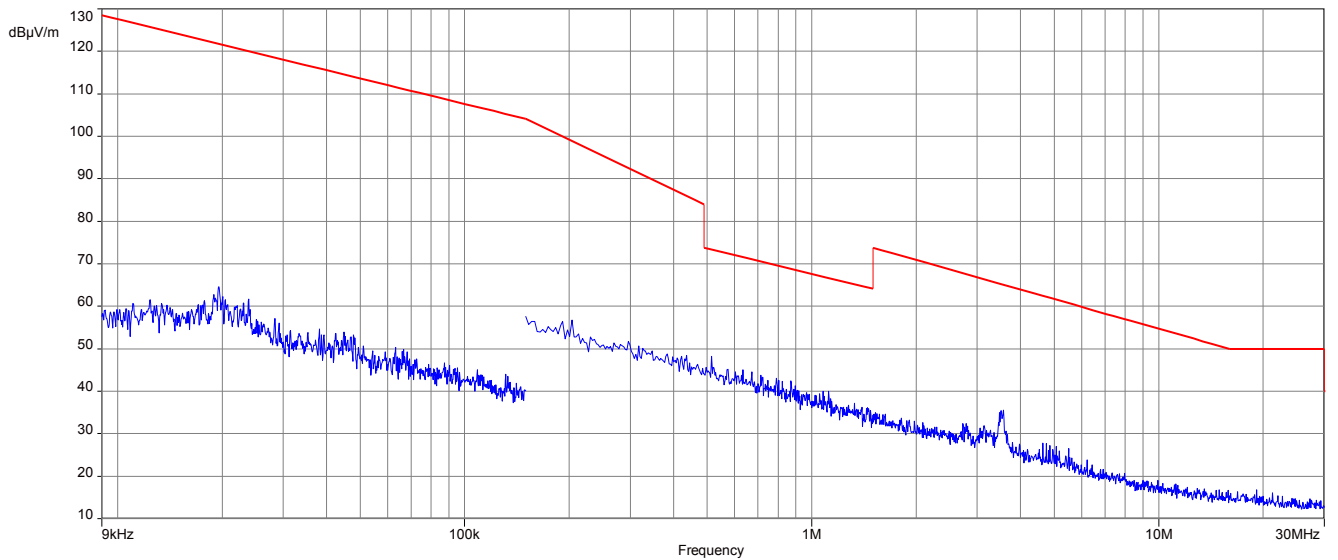
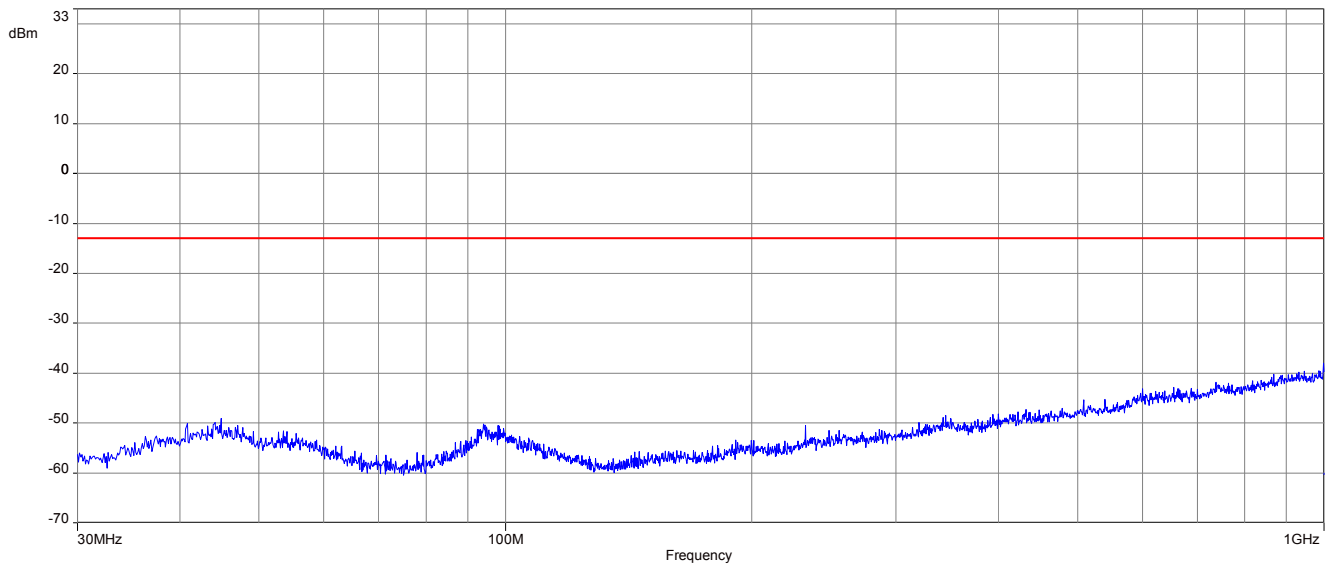
FCC	IC
Attenuation $\geq 43 + 10\log(P)$ (P, Power in Watts)	
-13 dBm	

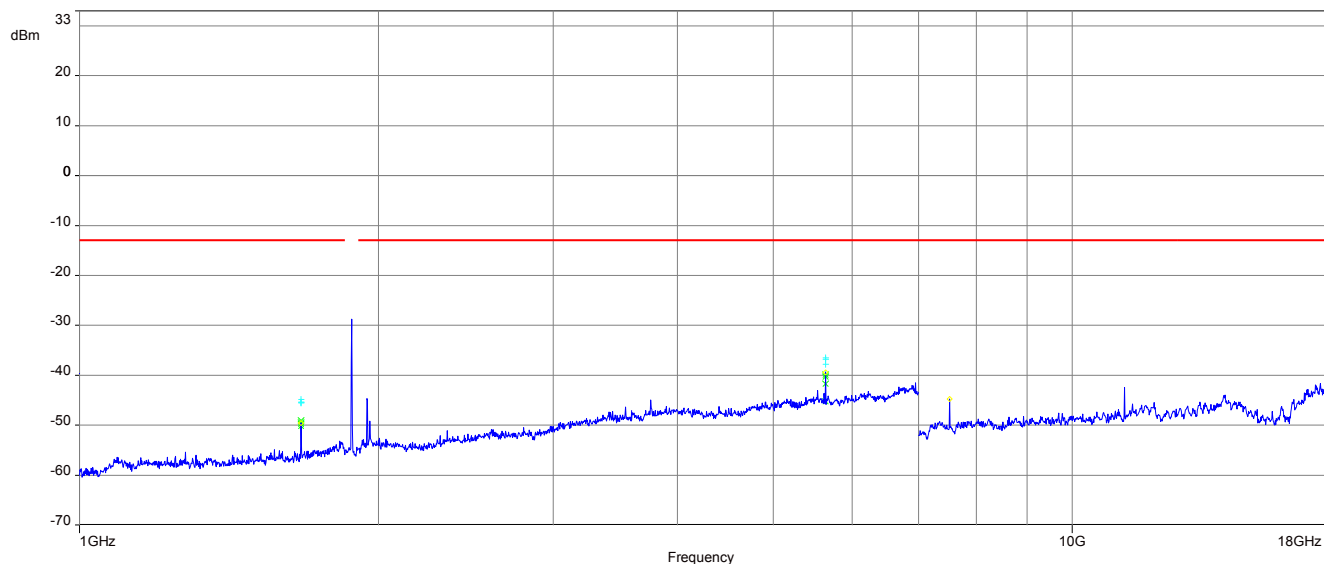
### Results GPRS:

Radiated emissions measurements were made only at the center carrier frequencies of the PCS1900 band (1880.0 MHz) to show the compliance with cabinet radiation limits.

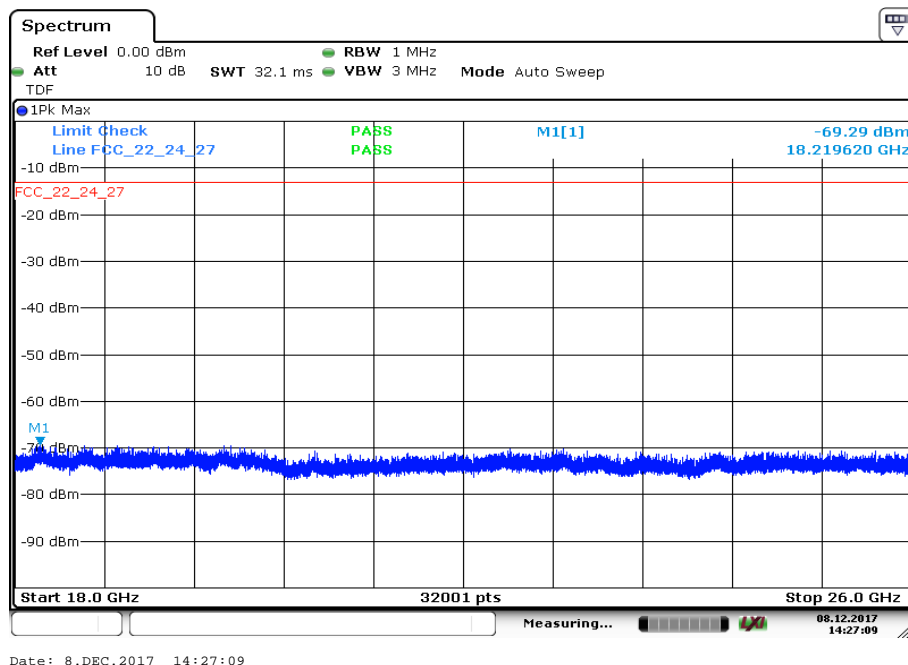
**Results:**

Spurious emission level (dBm)								
Harmonic	Ch. 512 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 661 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 810 Freq. (MHz)	Level [dBm]
2	3700.4	-	2	3760.0	-	2	3819.6	-
3	5550.6	-	3	5640.0	-	3	5729.4	-
4	7400.8	-	4	7520.0	-	4	7639.2	-
5	9251.0	-	5	9400.0	-	5	9549.0	-
6	11101.2	-	6	11280.0	-	6	11458.8	-
7	12951.4	-	7	13160.0	-	7	13368.6	-
8	14801.6	-	8	15040.0	-	8	15278.4	-
9	16651.8	-	9	16920.0	-	9	17188.2	-
10	18502.0	-	10	18800.0	-	10	19098.0	-

**Plots:** GMSK**Plot 1:** Channel 661 (Traffic mode up to 30 MHz)**Plot 2:** Channel 661 (30 MHz – 1 GHz)

**Plot 3:** Channel 661 (1 GHz - 18 GHz)

*Carrier notched with 1.9 GHz rejection filter*

**Plot 4:** Channel 661 (18 GHz - 26 GHz)

**Annex A Glossary**

<b>EUT</b>	Equipment under test
<b>DUT</b>	Device under test
<b>UUT</b>	Unit under test
<b>GUE</b>	GNSS User Equipment
<b>ETSI</b>	European Telecommunications Standards Institute
<b>EN</b>	European Standard
<b>FCC</b>	Federal Communications Commission
<b>FCC ID</b>	Company Identifier at FCC
<b>IC</b>	Industry Canada
<b>PMN</b>	Product marketing name
<b>HMN</b>	Host marketing name
<b>HVIN</b>	Hardware version identification number
<b>FVIN</b>	Firmware version identification number
<b>EMC</b>	Electromagnetic Compatibility
<b>HW</b>	Hardware
<b>SW</b>	Software
<b>Inv. No.</b>	Inventory number
<b>S/N or SN</b>	Serial number
<b>C</b>	Compliant
<b>NC</b>	Not compliant
<b>NA</b>	Not applicable
<b>NP</b>	Not performed
<b>PP</b>	Positive peak
<b>QP</b>	Quasi peak
<b>AVG</b>	Average
<b>OC</b>	Operating channel
<b>OCW</b>	Operating channel bandwidth
<b>OBW</b>	Occupied bandwidth
<b>OOB</b>	Out of band
<b>DFS</b>	Dynamic frequency selection
<b>CAC</b>	Channel availability check
<b>OP</b>	Occupancy period
<b>NOP</b>	Non occupancy period
<b>DC</b>	Duty cycle
<b>PER</b>	Packet error rate
<b>CW</b>	Clean wave
<b>MC</b>	Modulated carrier
<b>WLAN</b>	Wireless local area network
<b>RLAN</b>	Radio local area network
<b>DSSS</b>	Dynamic sequence spread spectrum
<b>OFDM</b>	Orthogonal frequency division multiplexing
<b>FHSS</b>	Frequency hopping spread spectrum
<b>GNSS</b>	Global Navigation Satellite System
<b>C/N<sub>0</sub></b>	Carrier to noise-density ratio, expressed in dB-Hz

## Annex B Document history

Version	Applied changes	Date of release
-/-	Initial release	2017-11-10

## Annex C Accreditation Certificate

first page	last page
 <p>Deutsche Akkreditierungsstelle GmbH</p> <p>Entrusted according to Section 8 subsection 1 AkkStelleG in connection with Section 1 subsection 1 AkkStelleGBV Signatory to the Multilateral Agreements of EA, ILAC and IAF for Mutual Recognition</p> <p><b>Accreditation</b></p>  <p>The Deutsche Akkreditierungsstelle GmbH attests that the testing laboratory</p> <p><b>CTC advanced GmbH</b> Untertürkheimer Straße 6-10, 66117 Saarbrücken</p> <p>is competent under the terms of DIN EN ISO/IEC 17025:2005 to carry out tests in the following fields:</p> <p>Telecommunication</p> <p>The accreditation certificate shall only apply in connection with the notice of accreditation of 02.06.2017 with the accreditation number D-PL-12076-01 and is valid until 21.04.2021. It comprises the cover sheet, the reverse side of the cover sheet and the following annex with a total of 43 pages.</p> <p>Registration number of the certificate: D-PL-12076-01-03</p> <p>Frankfurt, 02.06.2017</p>  <p>Dipl.-Ing. (FH) Ralf Böker Head of Division</p> <p>See notes on sheet 1</p>	<p>Deutsche Akkreditierungsstelle GmbH</p> <p>Office Berlin Spittelmarkt 10 10117 Berlin</p> <p>Office Frankfurt am Main Europa-Allee 52 60327 Frankfurt am Main</p> <p>Office Braunschweig Bundesallee 100 38116 Braunschweig</p> <p>The publication of extracts of the accreditation certificate is subject to the prior written approval by Deutsche Akkreditierungsstelle GmbH (DAkKS). Exempted is the unchanged form of separate disseminations of the cover sheet by the conformity assessment body mentioned overleaf.</p> <p>No impression shall be made that the accreditation also extends to fields beyond the scope of accreditation attested by DAkKS.</p> <p>The accreditation was granted pursuant to the Act on the Accreditation Body (AkkStelleG) of 31 July 2009 (Federal Law Gazette I p. 2625) and the Regulation (EC) No 765/2008 of the European Parliament and of the Council of 9 July 2008 setting out the requirements for accreditation and market surveillance relating to the marketing of products (Official Journal of the European Union L 218 of 9 July 2008, p. 30). DAkKS is a signatory to the Multilateral Agreements for Mutual Recognition of the European co-operation for Accreditation (EA), International Accreditation Forum (IAF) and International Laboratory Accreditation Cooperation (ILAC). The signatories to these agreements recognise each other's accreditations.</p> <p>The up-to-date state of membership can be retrieved from the following websites: EA: <a href="http://www.european-accreditation.org">www.european-accreditation.org</a> ILAC: <a href="http://www.ilac.org">www.ilac.org</a> IAF: <a href="http://www.iaf.nu">www.iaf.nu</a></p>

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

<http://www.dakks.de/as/ast/d/D-PL-12076-01-03.pdf>