

TEST REPORT
No.:16-1-0116301T04a-C1

According to:
FCC Regulations
Part 1.1310 , Part 2.1091

IC-Regulations
RSS-102, Issue 5

for
WAGO Kontakttechnik GmbH & Co. KG

SPS Controller 750-8207/025-001

FCC-ID: 2AKUEPFC200
IC: 22322-07508207
PMN: PFC200 CS 2ETH RS 3G Telecontrol/T
HVIN: 750-8207/025-001

Laboratory Accreditation and Listings						
 Deutsche Akkreditierungsstelle D-PL-12047-01-01	 MRA US-EU 0003	 Industry Canada Reg. No.: 3462D-1 Reg. No.: 3462D-2 Reg. No.: 3462D-3	 Voluntary Controls for Electromagnetic Emissions Reg. No.: R-2666 C-2914, T-1967, G-301			
 AUTHORIZED RF LABORATORY	 Lab Code: 20011130-00					
accredited according to DIN EN ISO/IEC 17025						
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1. Summary of test results

The test results apply exclusively to the test samples as presented in this Report. The CETECOM GmbH does not assume responsibility for any conclusions and generalizations taken in conjunction with other specimens or samples of the type of the item presented to tests.

Following tests have been performed to show compliance with applicable FCC Part 2.1091 and FCC Part 1.1310 of the FCC CFR 47 Rules.

The presented Equipment Under Test (in this report, hereinafter referred as EUT) integrates an already FCC certified cellular module (https://apps.fcc.gov/oetcf/tcb/reports/Tcb731GrantForm.cfm?mode=COPY&RequestTimeout=500&tcb_code=&application_id=9meMwfWI9XWT4kGcHMnCw%3D%3D&fcc_id=XMR201312UC20). Other implemented wireless technologies were not considered within this test report.

1.1 Summary of tests results

RF-Exposure Evaluation (separation distance user to RF-radiating element greater 20cm)								
Test cases	Port	References & Limits				EUT set-up	EUT op. mode	Result
		FCC Standard	Test Limit	RSS Standard	Test Limit			
Radio frequency radiation exposure Requirements	Cabinet + Inter-Connecting Cables (conducted)	§2.1091 §2.1093	RF-Field Strength Limits: FCC: "general population/uncontrolled" environment	RSS-102, Issue 5	Chapter 4 Table4	1	1	Pass

The current version of the Test Report CETECOM_TR16-1-0116301T04a-C1 replaces the Test Report CETECOM_TR16-1-0116301T04a dated 2017-06-26. The replaced test report is herewith invalid.

Dipl.-Ing. Rachid Acharkaoui
Responsible for test section

Dipl.-Ing. Ninovic Perez
Responsible for test report

1.2 Summary of product description

FCC ID:	2AKUEPFC200		
Product name	SPS Controller 750-8207		
Exposure category	<input checked="" type="checkbox"/> General population/uncontrolled environment <input type="checkbox"/> Occupational exposure/controlled environment		
Output power	<input checked="" type="checkbox"/> Conducted <input type="checkbox"/> ERP <input type="checkbox"/> EIRP <input checked="" type="checkbox"/> Peak <input type="checkbox"/> Source-based time-averaging		
Antenna gain	details refer Chapter 1.5		
Technology	<input type="checkbox"/> MIMO <input checked="" type="checkbox"/> non-MIMO		<input type="checkbox"/> 2T2R <input type="checkbox"/> 3T3R <input type="checkbox"/> 4T4R <input checked="" type="checkbox"/> 1T1R <input type="checkbox"/> 1T2R <input type="checkbox"/> 2T1R
Evaluation type	<input checked="" type="checkbox"/> Standalone <input type="checkbox"/> Simultaneous transmission		
Evaluation distance	<input checked="" type="checkbox"/> 20 cm <input type="checkbox"/> XXX cm		declares by manufacturer
EUT type	<input checked="" type="checkbox"/> Production Unit <input type="checkbox"/> Engineering Unit		
Device type	<input type="checkbox"/> Mobile device <input checked="" type="checkbox"/> Fixed device		
Refer rules	<input checked="" type="checkbox"/> CFR 47 FCC Part 2.1091 <input checked="" type="checkbox"/> CFR 47 FCC Part 1.1310 <input checked="" type="checkbox"/> KDB 447497 D01v06 October 23, 2015 <input checked="" type="checkbox"/> KDB 865664 D01v01r04 August 7, 2015 <input checked="" type="checkbox"/> KDB 865664 D02v01r02 October 23, 2015		

1.3 Refer Rules

ANSI C95.1-1999	IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.
KDB 447498 D01 v06 October 23, 2015	Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.
KDB 865664 D01v01r04 August 7, 2015	SAR measurement requirements for 100 MHz to 6 GHz
KDB 865664 D02v01r02 October 23, 2015	RF Exposure Compliance Reporting and Documentation Considerations.
CFR 47 FCC Part 2.1091	Radiofrequency radiation exposure evaluation: mobile devices.
CFR 47 FCC Part 1.1310	Radiofrequency radiation exposure limits.

1.4 EUT Technologies

Wireless Technologies	Frequency bands	Operation mode			Duty cycle
<input type="checkbox"/> GSM	<input type="checkbox"/> 850 <input type="checkbox"/> 1900	Voice (GMSK)		1 slot	<input type="checkbox"/> 12.5%
	<input type="checkbox"/> Support DTM (Dual Transfer Mode)				
<input type="checkbox"/> GPRS	<input type="checkbox"/> 850 <input type="checkbox"/> 1900	GPRS (GMSK) Multi – Slot Class	<input type="checkbox"/> 8	1 slot (1 Up, 4 Down)	<input type="checkbox"/> 12.5%
			<input type="checkbox"/> 10	2 slots (2 Up, 4 Down)	<input type="checkbox"/> 12.5% <input type="checkbox"/> 25%
			<input type="checkbox"/> 12	4 slots (4 Up, 4 Down)	<input type="checkbox"/> 12.5% <input type="checkbox"/> 25% <input type="checkbox"/> 37.5% <input type="checkbox"/> 50%

<input type="checkbox"/> EDGE	<input type="checkbox"/> 850 <input type="checkbox"/> 1900	EDGE (8-PSK) Multi – Slot Class	<input type="checkbox"/> 8	1 slot (1 Up, 4 Down)	<input type="checkbox"/> 12.5%
			<input type="checkbox"/> 10	2 slots (2 Up, 4 Down)	<input type="checkbox"/> 12.5% <input type="checkbox"/> 25%
			<input type="checkbox"/> 12	4 slots (4 Up, 4 Down)	<input type="checkbox"/> 12.5% <input type="checkbox"/> 25% <input type="checkbox"/> 37.5% <input type="checkbox"/> 50%
<input checked="" type="checkbox"/> WCDMA (UMTS)	<input checked="" type="checkbox"/> Band II <input type="checkbox"/> Band IV <input checked="" type="checkbox"/> Band V	<input checked="" type="checkbox"/> UMTS Rel.99 (Voice & Data) <input type="checkbox"/> HSDPA(Rel.5) <input type="checkbox"/> HSUPA(Rel.6) <input type="checkbox"/> DC-HSDPA(Rel.8) <input type="checkbox"/> HSPA ⁺ (Rel.7)			<input checked="" type="checkbox"/> 100%
<input type="checkbox"/> CDMA (CDMA2000)	<input type="checkbox"/> BC0 <input type="checkbox"/> BC1 <input type="checkbox"/> BC10	<input type="checkbox"/> 1xRTT (Voice & Data) <input type="checkbox"/> 1xEVDO Rel.0 <input type="checkbox"/> 1xEVDO Rel.A <input type="checkbox"/> 1xAdvanced <input type="checkbox"/> Support SV-DO (1xRTT-1xEVDO)			<input type="checkbox"/> 100%
<input type="checkbox"/> LTE-FDD	<input type="checkbox"/> Band 2 <input type="checkbox"/> Band 4 <input type="checkbox"/> Band 5 <input type="checkbox"/> Band 7 <input type="checkbox"/> Band 12 <input type="checkbox"/> Band 13 <input type="checkbox"/> Band 17 <input type="checkbox"/> Band 25 <input type="checkbox"/> Band 26 <input type="checkbox"/> Band 27 <input type="checkbox"/> Band 30	<input type="checkbox"/> QPSK <input type="checkbox"/> 16QAM <input type="checkbox"/> Rel.11 Carrier Aggregation	<input type="checkbox"/> 2 Uplinks 2 Downlinks <input type="checkbox"/> 2 Uplinks 3 Downlinks <input type="checkbox"/> 3 Uplinks 2 Downlinks <input type="checkbox"/> 3 Uplinks 3 Downlinks		100%
		<input type="checkbox"/> Supports SV-LTE (1xRTT-LTE)			
<input type="checkbox"/> LTE-TDD	<input type="checkbox"/> Band 38 <input type="checkbox"/> Band 39 <input type="checkbox"/> Band 40 <input type="checkbox"/> Band 41 <input type="checkbox"/> Band 42	<input type="checkbox"/> QPSK <input type="checkbox"/> 16QAM <input type="checkbox"/> Rel.11 Carrier Aggregation	<input type="checkbox"/> 2 Uplinks 2 Downlinks <input type="checkbox"/> 2 Uplinks 3 Downlinks <input type="checkbox"/> 3 Uplinks 2 Downlinks <input type="checkbox"/> 3 Uplinks 3 Downlinks		63.3% This device supports uplink-downlink configuration 0-6. The configuration with highest duty cycle was used (configuration 0 at 63.3%)
		<input type="checkbox"/> Supports SV-LTE (1xRTT-LTE)			
<input type="checkbox"/> Wi-Fi	<input type="checkbox"/> 2.4GHz	<input type="checkbox"/> IEEE 802.11b	<input type="checkbox"/> 2412 – 2462 MHz <input type="checkbox"/> 2412 – 2472 MHz		<input type="checkbox"/> 100%
		<input type="checkbox"/> IEEE 802.11g	<input type="checkbox"/> 2412 – 2462 MHz <input type="checkbox"/> 2412 – 2472 MHz		<input type="checkbox"/> 100%
		<input type="checkbox"/> IEEE 802.11n HT20	<input type="checkbox"/> 2412 – 2462 MHz <input type="checkbox"/> 2412 – 2472 MHz		<input type="checkbox"/> 100%
		<input type="checkbox"/> IEEE 802.11n HT40	<input type="checkbox"/> 2422 – 2452 MHz		<input type="checkbox"/> 100%
	<input type="checkbox"/> 5GHz	<input type="checkbox"/> IEEE 802.11a	<input type="checkbox"/> 5180 – 5240 MHz <input type="checkbox"/> 5260 – 5320 MHz <input type="checkbox"/> 5500 – 5700 MHz <input type="checkbox"/> 5745 – 5825 MHz		<input type="checkbox"/> 100%
		<input type="checkbox"/> IEEE 802.11n HT20	<input type="checkbox"/> 5180 – 5240 MHz <input type="checkbox"/> 5260 – 5320 MHz <input type="checkbox"/> 5500 – 5700 MHz <input type="checkbox"/> 5745 – 5825 MHz		<input type="checkbox"/> 100%
		<input type="checkbox"/> IEEE 802.11n HT40	<input type="checkbox"/> 5190 – 5230 MHz <input type="checkbox"/> 5270 – 5310 MHz <input type="checkbox"/> 5510 – 5670 MHz		<input type="checkbox"/> 100%

			<input type="checkbox"/> 5755 – 5795 MHz	
		<input type="checkbox"/> IEEE 802.11ac VHT20	<input type="checkbox"/> 5180 – 5240 MHz <input type="checkbox"/> 5260 – 5320 MHz <input type="checkbox"/> 5500 – 5700 MHz <input type="checkbox"/> 5745 – 5825 MHz	<input type="checkbox"/> 100%
		<input type="checkbox"/> IEEE 802.11ac VHT40	<input type="checkbox"/> 5190 – 5230 MHz <input type="checkbox"/> 5270 – 5310 MHz <input type="checkbox"/> 5510 – 5670 MHz <input type="checkbox"/> 5755 – 5795 MHz	<input type="checkbox"/> 100%
		<input type="checkbox"/> IEEE 802.11ac VHT80	<input type="checkbox"/> 5210 – 5210 MHz <input type="checkbox"/> 5290 – 5290 MHz <input type="checkbox"/> 5530 – 5530 MHz <input type="checkbox"/> 5775 – 5775 MHz	<input type="checkbox"/> 100%
		<input type="checkbox"/> Supports Band gap channels		
<input type="checkbox"/> Others	<input type="checkbox"/> 2.4GHz	<input type="checkbox"/> 1 MHz Bandwidth	<input type="checkbox"/> 2402 – 2472 MHz	<input type="checkbox"/> 100%
<input type="checkbox"/> Bluetooth	<input type="checkbox"/> 2.4GHz	<input type="checkbox"/> Version 2.1+EDR <input type="checkbox"/> Version 3.0+HS <input type="checkbox"/> Version 4.0 <input type="checkbox"/> Version 4.1+EDR <input type="checkbox"/> Version 4.2+EDR	<input type="checkbox"/> 77.5% <input type="checkbox"/> 77.5% <input type="checkbox"/> 100% <input type="checkbox"/> 77.5% <input type="checkbox"/> 77.5%	

1.5 Antenna Information

Wireless Technologies	Frequency bands	Antenna type	Maximum antenna gain	
<input type="checkbox"/> GSM	<input type="checkbox"/> 850	<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 0	
		<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 1	
<input type="checkbox"/> GSM	<input type="checkbox"/> 1900	<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 0	
		<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 1	
<input type="checkbox"/> WCDMA (UMTS)	<input type="checkbox"/> Band II	<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 0	
		<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 1	
	<input type="checkbox"/> Band IV	<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 0	
		<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 1	
<input type="checkbox"/> CDMA (CDMA2000)	<input type="checkbox"/> Band V	<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 0	
		<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 1	
	<input type="checkbox"/> CDMA800	<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 0	
		<input type="checkbox"/> PIFA	<input type="checkbox"/> Antenna 1	

		<input type="checkbox"/> PCB <input type="checkbox"/>		
	<input type="checkbox"/> CDMA1900	<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 0	
		<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 1	
	<input type="checkbox"/> Band 2	<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 0	
		<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 1	
	<input type="checkbox"/> Band 4	<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 0	
		<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 1	
	<input type="checkbox"/> Band 5	<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 0	
		<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 1	
	<input type="checkbox"/> Band 7	<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 0	
		<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 1	
<input type="checkbox"/> LTE-FDD	<input type="checkbox"/> Band 12	<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 0	
		<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 1	
	<input type="checkbox"/> Band 13	<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 0	
		<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 1	
	<input type="checkbox"/> Band 17	<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 0	
		<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 1	
	<input type="checkbox"/> Band 25	<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 0	
		<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 1	
	<input type="checkbox"/> Band 26	<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 0	
		<input type="checkbox"/> PIFA <input type="checkbox"/> PCB	<input type="checkbox"/> Antenna 1	

		<input type="checkbox"/>		
	<input type="checkbox"/> Band 27	<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 0	
		<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 1	
	<input type="checkbox"/> Band 38	<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 0	
		<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 1	
	<input type="checkbox"/> Band 39	<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 0	
		<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 1	
	<input type="checkbox"/> Band 40	<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 0	
		<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 1	
	<input type="checkbox"/> Band 41	<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 0	
		<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 1	
	<input type="checkbox"/> Band 42	<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 0	
		<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 1	
	<input type="checkbox"/> 2.4GHz	<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 0	
		<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 1	
		<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 2	
	<input type="checkbox"/> 5GHz	<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 0	
		<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 1	
		<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/>	<input type="checkbox"/> Antenna 2	

□ Others	□ 2.4GHz	□ PIFA □ PCB □ PRESTTA	□ Antenna 0	
		□ PIFA □ PCB □ Intel FA5 Port 1	□ Antenna 1	
		□ PIFA □ PCB □ Intel FA5 Port 5	□ Antenna 2	
□ Bluetooth	□ 2.4GHz	□ PIFA □ PCB □	□ Antenna 0	

1.6 Description of EUT

Short description*)	EUT	Type	S/N serial number	HW hardware status	SW software status
EUT A	PFC200 CS 2ETH RS 3G Telecontrol/T	750-8207/025-001	MAC-ID: 00:30:DE:41_2 A:23	06	02
EUT B	PFC200 CS 2ETH RS 3G/T	750-8207/025-000	--	--	--
EUT C	PFC200 CS 2ETH RS 3G	750-8207	--	--	--

*) EUT short description is used to simplify the identification of the EUT in this test report.

Remark: Tests only performed with EUT A

1.7 Auxiliary Equipment (AE)

AE short description *)	Auxiliary Equipment	Type	S/N serial number	HW hardware status	SW software status
AE 1	Magnetic base antenna	758-965	--	--	--

*) AE short description is used to simplify the identification of the auxiliary equipment in this test report.

1.8 EUT Set-ups

EUT set-up no.*)	Combination of EUT and AE	Description
set. 1	EUT A + AE 1	RF-Radiated test set-up
set. 2	EUT A	RF-Conducted test set-up

*) EUT set-up no. is used to simplify the identification of the EUT set-up in this test report.

1.9 Configuration of cables used for testing

Cable number	Item	Connections	Cable length
Cable 1	--	--	--

2 Administrative Data

2.1 Identification of the testing laboratory

Company name:	CETECOM GmbH
Address:	Im Teelbruch 116 45219 Essen - Kettwig Germany
Responsible for testing laboratory:	Dipl.-Ing. Rachid Acharkaoui
Deputy:	Dipl.-Ing. Niels Jeß

2.2 Test location

2.2.1 Test laboratory "CTC"

Company name:	see chapter 2.1 Identification of the testing laboratory
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2.3 Organizational items

Responsible for test report and project leader:	Dipl.-Ing. N. Perez
Receipt of EUT:	2016-11-21
Date(s) of test:	2016-11-22, 2017-02-20
Date of report:	2017-08-10

Version of template: 13.02

Remark 1: based on applicants tune-up info

2.4 Applicant's details

Applicant's name:	WAGO Kontakttechnik GmbH & Co. KG
Address:	Hansastraße 27 32423 Minden
	Germany
Contact person:	Amela Plicanic

2.5 Manufacturer's details

Manufacturer's name:	please see Applicant's details
Address:	please see Applicant's details

3 Measurements

3.1. Test location

test location	<input checked="" type="checkbox"/> CETECOM Essen	<input type="checkbox"/>	<input type="checkbox"/>
For Evaluation instruments are not needed. Results are determined by calculation based on applicants delivered Tune-Up procedure.			

3.2 Evaluation Rules for FCC Standard

Systems operating under the provisions of FCC 47 CFR section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as mobile device whereby a distance of 0.2m normally can be maintained between the user and the device, and below RF Permissible Exposure limit shall comply with.

In accordance with KDB447498D01 for Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modelled or measured field strengths or power density, is ≤ 1.0 . The MPE ratio of each antenna is determined at the minimum test separation distance required by the operating configurations and exposure conditions of the host device, according to the ratio of field strengths or power density to MPE limit, at the test frequency. Either the maximum peak or spatially averaged results from measurements or numerical simulations may be used to determine the MPE ratios. Spatial averaging does not apply when MPE is estimated using simple calculations based on far-field plane-wave equivalent conditions. The antenna installation and operating requirements for the host device must meet the minimum test separation distances required by all antennas, in both standalone and simultaneous transmission operations, to satisfy compliance.

3.3 Limits for FCC Standard

Table 1: LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

(A) Limits for Occupational/Controlled Exposure				
Frequency range [MHz]	Electric field strength [V/m]	Magnetic field strength [A/m]	Power density [mW/cm ²]	Averaging time [minutes]
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f ²)*	6
30-300	61.4	0.163	1.0	6
300-1500	--	--		6
1500-100,000	--	--		6
(B) Limits for General Population/Uncontrolled Exposure				
Frequency range [MHz]	Electric field strength [V/m]	Magnetic field strength [A/m]	Power density [mW/cm ²]	Averaging time [minutes]
0.3-3.0	614	1.63	*(100)	30
3.0-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500	-	-	f/1500	30
1500-100,000	-	-	1.0	30

f=frequency in MHz

*Plane-wave equivalent power density

NOTE1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure. These limits apply to amateur station licensees and members of their immediate household as discussed in the text.

NOTE2: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure. As discussed in the text, these limits apply to neighbours living near amateur radio stations.

3.4 Requirements and limits for RSS Standard

RSS-102, Issue 5	<p>2.5 Exemption Limits for Routine Evaluation</p> <p>All transmitters are exempt from routine SAR and RF exposure evaluations provided that they comply with the requirements of sections 2.5.1 or 2.5.2. If the equipment under test (EUT) meets the requirements of sections 2.5.1 or 2.5.2, applicants are only required to submit a properly signed declaration of compliance (see Annex C). The information contained in the RF exposure technical brief may be limited to the value(s) of the maximum output power, the information that demonstrates how the maximum output power of the transmitter was derived and the rationale for the separation distances applied (see Table 1), which must be based on the most conservative exposure condition for the applicable module or host platform test procedure requirements.</p>
	<p>2.5.2 Exemption Limits for Routine Evaluation — RF Exposure Evaluation</p> <p>RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:</p> <ul style="list-style-type: none"> • below 20 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance); • at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $4.49/f^{0.5}$ W (adjusted for tune-up tolerance), where f is in MHz; • at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance); • at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz; • at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance). <p>In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the e.i.r.p. was derived.</p>
	<p>2.6 User Manual Requirements</p> <p>The applicant is responsible for providing proper instructions to the user of the radio device, and any usage restrictions, including limits of exposure durations. The user manual shall provide installation and operation instructions, as well as any special usage conditions (e.g. proper accessory required, including the proper orientation of the device in the accessory, maximum antenna gain in the case of detachable antenna), in order to ensure compliance with SAR and/or RF field strength limits. For instance, compliance distance shall be clearly stated in the user manual.</p> <p>The user manual of devices intended for controlled use shall also include information relating to the operating characteristics of the device; the operating instructions to ensure compliance with SAR and/or RF field strength limits; information on the installation and operation of accessories to ensure compliance with SAR and/or RF field strength limits; and contact information where the user can obtain Canadian information on RF exposure and compliance. Other related information may also be included.</p>

3.5 MPE Calculation method

Predication of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = \frac{EIRP}{4\pi R^2} = \frac{P * G}{4\pi R^2}$$

$$G_{NUMERIC} = \frac{S * 4\pi R^2}{P}$$

Where: S=power density

P=power input to antenna

G=power gain of the antenna in the direction of interest relative to an isotropic radiator

R=distance to the centre of radiation of the antenna

3.6 Conducted Output Power

FDD Band 2								
Test case	Power value [dBm]							
	UARFCN no. 9262		UARFCN no. 9400		UARFCN no. 9538			
	PK	AV	PK	AV	PK	AV		
Release 99 12.2kbps RMC	26.41	23.06	26.42	23.08	26.12	23.15		

FDD Band 5								
Test case	Power value [dBm]							
	UARFCN no. 4132		UARFCN no. 4183		UARFCN no. 4233			
	PK	AV	PK	AV	PK	AV		
Release 99 12.2kbps RMC	26.93	23.99	26.22	22.98	27.12	23.57		

Regarding tune-up information maximum average output power is 24dBm +1dB tolerance. Applying customer's declared tolerance of 1dB to the results of conducted power verification are below 25dBm.

3.7 Evaluation Method

3.7.1 Standalone

Valid for Cellular 3G Mode:

A RMS detector was used. No duty-cycle correction factor is applicable

Please find in the following tables the calculations based on applicants tune-up information for the power values.

Results for FCC Standard

Wireless Technologies	Output power*		Antenna Gain (dBi)	Duty Cycle	MPE (mW/cm ²)	MPE Limits (mW/cm ²)	Verdict
	dBm	mW					
WCDMA FDD Band 2	25.0	525	2.2	100%	0.1044	1.0000	Pass
WCDMA FDD Band 5	25.0	525	2.2	100%	0.1712	0.5576	Pass

Remark:

1. Output power (Average) including tune-up tolerance;
2. Output power was adjust to duty cycle at 100% if measured duty cycle less than 98%;
3. MPE evaluate distance is 20cm from user manual provide by manufacturer;
4. Depending on output power and antenna gain only the worst case is reported;

Results for RSS Standard

Distance	0,2	m	Operating Mode	Frequency on channel (MHz)	Declared maximum conducted output power (dBm)	Max. positive tolerance according manufacturer's tune-up info (dB)	Antenna Gain (dBi)	Path Loss module to ext. antenna connector according manufacturer (dB)	Maximum delivered antenna power: (dBm)	Duty-Cycle	Maximum delivered power: (EIRP) (W)	Power incl. Duty-Cycle: (EIRP) (W)	MPE Limit accord. Table 4 (EIRP-Limit) (W/m^2)	MPE-Value (EIRP referred) (W/m^2)	Margin (W/m^2)	Fraction for Co-location calculations (W/m^2)	Maximum Fraction Value within Frequency band
WCDMA FDD Band 5 (RMS-Value)	826,4	24,0	1,0	2,20	0	27,20	100%	0,5248	0,5248	2,5807	1,0441	1,5367	0,404564	0,404564	0,404564		
	837,0	24,0	1,0	2,20	0	27,20	100%	0,5248	0,5248	2,6033	1,0441	1,5592	0,401055				
	846,6	24,0	1,0	2,20	0	27,20	100%	0,5248	0,5248	2,6237	1,0441	1,5796	0,397942				

Maximum calculated MPE value:		
Lowest MPE-Limit within frequency-band:	2,5807	[W/m^2]
Highest MPE value within frequency-band:	1,0441	[W/m^2]
Lowest margin to limit within frequency-band:	1,5367	[W/m^2]

Distance	0,2	m	Operating Mode	Frequency on channel (MHz)	Declared maximum conducted output power (dBm)	Max. positive tolerance according manufacturer's tune-up info (dB)	Antenna Gain (dBi)	Path Loss module to ext. antenna connector according manufacturer (dB)	Max. positive path loss uncertainty: (dB)	Maximum delivered antenna power: (dBm)	Duty-Cycle	Maximum delivered power to Antenna: (W)	Maximum delivered power to Antenna incl. Duty-Cycle: (W)	MPE Limit accord. Table 4 (W/m^2)	MPE-Value (W/m^2)	Margin (W/m^2)	Fraction for Co-location calculations (W/m^2)	Maximum Fraction Value within Frequency band
W-CDMA FDD Band 2 (RMS-Value)	1852,4	24,0	1,0	2,20	0,00	0,00	27,20	100%	0,5248	0,5248	4,4803	1,0441	3,4362	0,23303690	0,2330369	0,2330369		
	1880,0	24,0	1,0	2,20	0,00	0,00	27,20			0,5248	0,5248	4,5258	1,0441	3,4817	0,23069340			
	1907,6	24,0	1,0	2,20	0,00	0,00	27,20			0,5248	0,5248	4,5711	1,0441	3,5270	0,22840711			

Maximum calculated MPE value:		
Lowest MPE-Limit within frequency-band:	4,4803	[W/m^2]
Highest MPE value within frequency-band:	1,0441	[W/m^2]
Lowest margin to limit within frequency-band:	3,4362	[W/m^2]

Remark:

1. Output power (Average) including tune-up tolerance;
2. Output power was adjust to duty cycle at 100% if measured duty cycle less than 98%;
3. MPE evaluate distance is 20cm from user manual provide by manufacturer;
4. Depending on output power and antenna gain only the worst case is reported;

3.7.3 Simultaneous Transmission MPE

According to KDB447498 for Transmitters used in mobile exposure conditions for simultaneous transmission operations; \sum of MPE ratios ≤ 1.0

PFC200 CS 2ETH RS 3G use only one transmitter antenna, no need consider simultaneous transmission.

3.8 Conclusion

The measurement results comply with the FCC Limit per 47 CFR 2.1091 for the uncontrolled RF Exposure of mobile device.

The measurement results comply with the RSS-102, Issue 5.

4 Measurement uncertainties

The reported uncertainties are calculated based on the standard uncertainty multiplied with the appropriate coverage factor k , such that a confidence level of approximately 95% is achieved.

For uncertainty determination, each component used in the concrete measurement set-up was taken in account and its contribution to the overall uncertainty according its statistical distribution calculated.

Following table shows expectable uncertainties for each measurement type performed.

RF-Measurement	Reference	Frequency range	Calculated uncertainty based on a confidence level of 95%						Remarks	
Conducted emissions (U _{CISPR})	CISPR 16-2-1	9 kHz - 150 kHz 150 kHz - 30 MHz	4.0 dB 3.6 dB						-	
Radiated emissions Enclosure	CISPR 16-2-3	30 MHz - 1 GHz 1 GHz - 18 GHz	4.2 dB 5.1 dB						E-Field	
Disturbance power	CISPR 16-2-2	30 MHz - 300 MHz	-						-	
Power Output radiated	-	30 MHz - 4 GHz	3.17 dB						Substitution method	
Power Output conducted	-	Set-up No.	Cel-C1	Cel-C2	BT1	W1	W2			
		9 kHz - 12.75 GHz	N/A	0.60	--	--	--		-	
		12.75 - 26.5GHz	N/A	0.82	--	--	--			
Conducted emissions on RF-port	-	9 kHz - 2.8 GHz	0.70	N/A	--	--	--		N/A - not applicable	
		2.8 GHz - 12.75GHz	1.48	N/A	--	--	--			
		12.75 GHz - 18GHz	1.81	N/A	--	--	--			
		18 GHz - 26.5GHz	1.83	N/A	--	--	--			
Occupied bandwidth	-	9 kHz - 4 GHz	0.1272 ppm (Delta Marker)						Frequency error	
			1.0 dB						Power	
Emission bandwidth	-	9 kHz - 4 GHz	0.1272 ppm (Delta Marker)						Frequency error	
			See above: 0.70 dB						Power	
Frequency stability	-	9 kHz - 20 GHz	0.0636 ppm						-	
Radiated emissions Enclosure	-	150 kHz - 30 MHz 30 MHz - 1 GHz 1 GHz - 20 GHz	5.0 dB 4.2 dB 3.17 dB						Magnetic field E-field Substitution	

Table: measurement uncertainties, valid for conducted/radiated measurements

5 Abbreviations used in this report

The abbreviations	
ANSI	American National Standards Institute
AV, AVG, CAV	Average detector
EIRP	Equivalent isotropically radiated power, determined within a separate measurement
EUT	Equipment Under Test
FCC	Federal Communications Commission, USA
n.a.	not applicable
Op-Mode	Operating mode of the equipment
PK	Peak
RBW	resolution bandwidth
RF	Radio frequency
RSS	Radio Standards Specification, Documents from Industry Canada
Rx	Receiver
TCH	Traffic channel
Tx	Transmitter
QP	Quasi peak detector
VBW	Video bandwidth
ERP	Effective radiated power

6 Accreditation details of CETECOM's laboratories and test sites

Ref.-No.	Accreditation Certificate	Valid for laboratory area or test site	Accreditation Body
-	D-PL-12047-01-01	All laboratories and test sites of CETECOM GmbH, Essen	DAkkS, Deutsche Akkreditierungsstelle GmbH
337 487 558 348 348	MRA US-EU 0003	Radiated Measurements 30 MHz to 1 GHz, 3 m / 10 m (OATS) Radiated Measurements 30 MHz to 1 GHz, 3 m (SAR) Radiated Measurements above 1 GHz, 3 m (FAR) Mains Ports Conducted Interference Measurements Telecommunication Ports Conducted Interference Measurem.	FCC, Federal Communications Commission Laboratory Division, USA
337 487 550 558	3462D-1 3462D-2 3462D-2 3462D-3	Radiated Measurements 30 MHz to 1 GHz, 3 m / 10 m (OATS) Radiated Measurements 30 MHz to 1 GHz, 3 m (SAR) Radiated Measurements 1 GHz to 6 GHz, 3 m (SAR) Radiated Measurements above 1 GHz, 3 m (FAR)	IC, Industry Canada Certification and Engineering Bureau
487 550 348 348	R-2666 G-301 C-2914 T-1967	Radiated Measurements 30 MHz to 1 GHz, 3 m (SAR) Radiated Measurements 1 GHz to 6 GHz, 3 m (SAR) Mains Ports Conducted Interference Measurements Telecommunication Ports Conducted Interference Measurem.	VCCI, Voluntary Control Council for Interference by Information Technology Equipment, Japan

OATS = Open Area Test Site, SAR = Semi Anechoic Room, FAR = Fully Anechoic Room

7 Test report version

Version	Applied changes	Date of release
--	Initial release	2017-06-26
C1	Additional references added, HVIN, PMN corrected	2017-08-10