P A R T I A L T E S T R E P O R T
No.: 16-1-0181301T13a

According to:

FCC Regulations
Part 15.207
Part 15.247
Part 15.407

for

Datalogic S.r.l.

SKORPIO X4
Type: 00ANM4HS0GF0A4

FCC ID: U4GSX4WB

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

CETECOM GmbH
Laboratory Radio Communications & Electromagnetic Compatibility
Im Teelbruch 116 • 45219 Essen • Germany
Registered in Essen, Germany, Reg. No.: HRB Essen 8984
Tel.: + 49 (0) 20 54 / 95 19-954 • Fax: + 49 (0) 20 54 / 95 19-964
E-mail: info@cetecom.com • Internet: www.cetecom.com

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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.

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. Also we refer on special conditions which the applicant should fulfill according §2.927 to §2.948, special focus regarding modification of the equipment and availability of sample equipment for market surveillance tests.

The presented Equipment Under Test(in this report, hereinafter referred as EUT) : **SKORPIO X4** integrates total 1 of pre-certified module **WL18MODGI (FCC ID: Z64-WL18DBMOD)** & supports following technologies :
EUT supported Technologies which are not tested within this test report

EUT supported Technology	Test Report Reference
Bluetooth FHSS (BR-EDR) Modes: 2402 – 2480 MHz	CETECOM_TR16-1-0181301T11a
Bluetooth Low Energy Modes: 2402 – 2480 MHz	CETECOM_TR16-1-0181301T12a
WLAN 802.11b/g/n(HT20) Modes: 2412 – 2462 MHz	CETECOM_TR16-1-0181301T09a
WLAN802.11a/n(HT20)/n(HT40)Modes: 5150–5850 MHz	CETECOM_TR16-1-0181301T10a

EUT supported Technologies which are tested within this test report

- **SKORPIO X4 Battery Charging Function using Battery chargers**

Following test cases have been performed to show compliance with valid Part 15.207 of the FCC CFR Title 47 Rules, Edition 4th November 2016.

1.1. Tests measurement overview according to US CFR Title 47, Subpart 15C

Test cases	Port	References and Limits		EUT set-up	EUT op. mode	Result
		FCC Standard	Test limit			
TX-Mode						
AC-Power Lines Conducted Emissions	AC-Power lines or Battery Chargers	§15.207(a)	AC Power line conducted limits	1 + 2	1 + 2 + 3 + 4	**PASS**

Specific Absorption Rate (SAR) Measurements (separation distance user to RF-radiating element within 20cm)						
Test cases	Port	References & Limits		EUT set-up	EUT op. mode	Result
		FCC Standard	Test Limit			
Specific Absorption Rate (SAR) requirements	Cabinet + Inter-connecting cables (radiated)	§2.1091 §2.1093 + IEEE 1528-2013 + KDB 865664D01v0r04	**Specific Absorption Rate (SAR)** for Devices Used by the General Public **(Uncontrolled Environment)** **:** 1.6 W/Kg as averaged over any 1 g tissue	--	--	Refer test report CTC advanced GmbH Test report no.: 1-2904/16-01-04

Dipl.-Ing. Rachid Acharkaoui
Responsible for test section

Digital unterschrieben von Ajit Phadtare
DN: cn=Ajit Phadtare, o=CETECOM GmbH, ou=RC-EMC, email=ajit.phadtare@cetecom.com, c=DE
Datum: 2017.06.28 14:15:00 +02'00'

M.Sc. Ajit Phadtare
Responsible for test report

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

2.3. Organizational items

Responsible for test report and Project leader:	M.Sc. Ajit Phadtare
Receipt of EUT:	2017-03-20
Date(s) of test:	2017-04-08 to 2017-06-21
Date of report:	2017-06-27
Version of template: 13.02	

2.4. Applicant's details

Applicant's name:	Datalogic S.r.l.
Address:	Via S. Vitalino, 13 40012, Lippo di Calderara di Reno (BO) ITALY
Contact :	Mr. Eucarpio Guarisco

2.5. Manufacturer's details

Manufacturer's name:	same as Applicant
Address:	same as Applicant

3. Equipment under test (EUT)

3.1. Certification Data of Main EUT declared by Applicant

EUT Model	**SKORPIO X4**		
EUT Model Type	**00ANM4HS0GF0A4**		
EUT Type	**Portable Mobile Computer**		
EUT Applications	**Shopping Applications & General Purpose Mobile Computer**		
FCC ID	**U4GSX4WB**		
Additional Information: Integrated Module			
Integrated Module	**WL18MODGI**		
Module Certification FCC ID	**Z64-WL18DBMOD**		
Number of Integrated Modules	**1**		
Additional Information : Supported Technologies			
Technology	**Modes**	**Frequency Range**	**Remarks**
WLAN 2.4 GHz	**WLAN 802.11b/g/n(HT20)**	**2412 MHz – 2462 MHz**	Refer Chapter 3.2
Bluetooth FHSS	**Bluetooth BR-EDR**	**2402 MHz – 2480 MHz**	Refer Chapter 3.3
Bluetooth LE	**Bluetooth Low Energy**	**2402 MHz – 2480 MHz**	Refer Chapter 3.4
WLAN 5 GHz	**WLAN 802.11a/n(HT20)/n(HT40)**	**5150 MHz –5850 MHz**	Refer Chapter 3.5

3.2. WLAN 802.11b/g/n(HT20) Technical Data Of Main EUT as Declared by Applicant

EUT Model	**SKORPIO X4**		
EUT Model Type	**00ANM4HS0GF0A4**		
EUT Type	**Portable Mobile Computer**		
EUT Applications	**Shopping applications & general purpose mobile computer**		
Hardware Version	**BETA**		
Software Version	**Android 4.4.4**		
Firmware Version	**2.00.29**		
Frequency | Channel | B.W. (USA bands only)**	WLAN 2.4 GHz 802.11b (SISO)	☒ Ch 1 | 2 | 3| 4 | 5 | 6 ☒ Ch. 7| 8 | 9 | 10 | 11	☒ Bandwidth 20 MHz
	WLAN 2.4 GHz 802.11g (SISO)	☒ Ch 1 | 2 | 3| 4 | 5 | 6 ☒ Ch. 7| 8 | 9 | 10 | 11	☒ Bandwidth 20 MHz
	WLAN 2.4 GHz 802.11n (SISO / MIMO)	☒ Ch 1 | 2 | 3| 4 | 5 | 6 ☒ Ch. 7| 8 | 9 | 10 | 11	☒ Bandwidth 20 MHz
Channels Power Settings	+20 dBm (According to Applicant's Declaration Max. Rated Power Values)		
802.11b – Mode OFDM Modulation | Data Rates	☒ DBPSK | 1 Mbps ☒ DQPSK | 2 Mbps ☒ CCK-PBCC | 5.5 Mbps / 11 Mbps ☒ ERP-PBCC | 22 Mbps		
802.11g – Mode OFDM Modulation | Data Rates	☒ BPSK | 6 Mbps / 9 Mbps ☒ QPSK | 12 Mbps / 18 Mbps ☒ 16-QAM | 24 Mbps / 36 Mbps ☒ 64-QAM | 48 Mbps / 54 Mbps		
802.11n – Mode OFDM Modulation | Data Rates	☒ HT20(MCS0 to MCS7) 7.2 / 14.4 / 21.7 / 28.9 / 43.3 / 57.8 / 65 / 72.2 Mbps ☒ HT20(MCS8 to MCS15) 14.44 / 28.88 / 43.33 / 57.77 / 86.66 / 115.55 / 130 / 144.44 Mbps		
Antenna Details	Integrated (ANT1 & ANT2)		
Antenna Type	Laird PCBA Antenna		
ANT1 Gain (Peak)	2.95 dBi (2400 MHz – 2500 MHz) (According to Applicant's Declaration)		
ANT2 Gain (Peak)	0.60 dBi (2400 MHz – 2500 MHz) (According to Applicant's Declaration)		
Total Number of Modules	1 (WL18MODGI Module FCC ID: Z64-WL18DBMOD)		
Total Number of Antennas	2	Integrated (ANT1 & ANT2)	
ANT1 SISO Modes	WLAN 2.4 GHz 802.11b /g/n Mode	ANT1 Gain: 2.95 dBi	
ANT1 MIMO Mode	WLAN 2.4 GHz 802.11n(HT20) Mode	ANT1 Gain: 2.95 dBi	
ANT2 MIMO Mode	WLAN 2.4 GHz 802.11n(HT20) Mode	ANT2 Gain: 0.6 dBi	
Test Mode Settings	Datalogic WiFi Test Application		
Power Supply	☒ Internal Battery:BT-0016| Li-ion|3.7- 4.2VDC 5200mAh(2Cylindrical Cells)		
Special EMI Components	--		
EUT Sample Type	☒ Production	☐ Pre-Production	☐ Engineering
Firmware	☐ for normal use	☒ Special version for test execution : Datalogic WiFi Test	
FCC label attached	☐ Yes	☒ No	
For further details refer Applicants Declaration & following technical documents			

Description of Reference Document (supplied by applicant)	Version	Total Pages
SKORPIO X4_Test-Tools_Quick_Start_Instructions	Rev: 3 Date:04/11/2017	43
SKORPIO X4_Operational Description	Rev: 01 Date: 19.06.2017	15
SKORPIO X4_SW Image Update	Rev:2 Date:09/12/2016	4
SKORPIO X4 Hardware Modifications (BETA Changes)	March 2017	8
Datalogic SKORPIO X4 Antennas Report 5	22-June-2016	15

3.3. Bluetooth FHSS Technical Data of Main EUT as Declared by Applicant

EUT Model	**SKORPIO X4**		
EUT Model Type	**00ANM4HS0GF0A4**		
EUT Type	**Portable Mobile Computer**		
EUT Applications	**Shopping applications & general purpose mobile computer**		
Hardware Version	**BETA**		
Software Version	**Android 4.4.4**		
Firmware Version	**2.00.29**		
Frequency Band	2.4 GHz ISM Band (2400 MHz - 2483.5 MHz)		
Frequency Channels (Range)	Channel 0: 2402 MHz to Channel 78: 2480 MHz		
Number of Channels	79 Frequency Hopping Channels (FHSS)		
Channels Power Settings	+7 dBm (According to Applicant's Declaration Max. Rated Power Values)		
Nominal Channel Bandwidth	1 MHz		
Type of FHSS Modes Modulation | Data Rate | Packet	Basic Rate (BR) Mode : ☒ BT 1.0 / BT 1.1: GFSK | 1 Mbps | DH1/DH3/DH5	Enhanced Data Rate (EDR) Mode: ☒ BT 2.0 / BT 2.1: π/4 DQPSK | 2 Mbps | DH1/2DH3/2DH5 ☒ BT 3.0: 8DPSK | 3 Mbps | 3DH1/3DH3/3DH5	
Antenna Details	Integrated (ANT1 & ANT2)		
Antenna Connections	Primary Antenna : ANT1 (BT FHSS)	Secondary Antenna: ANT2 not used	
Antenna Type	Laird PCBA Antenna		
ANT1 Gain (Peak)	2.95 dBi (2400 MHz – 2500 MHz) (According to Applicant's Declaration)		
ANT2 Gain (Peak)	0.60 dBi (2400 MHz – 2500 MHz) (According to Applicant's Declaration)		
Total Number of Modules	1 (WL18MODGI Module FCC ID: Z64-WL18DBMOD)		
Total Number of Antennas	2	Primary Antenna: ANT1 (BT-FHSS)	Secondary Antenna: ANT2 not used
Test Mode Settings	Datalogic RFTest Application		
Power Supply	☒ Internal Battery:BT-0016| Li-ion|3.7- 4.2VDC 5200mAh(2Cylindrical Cells)		
Special EMI Components	--		
EUT Sample Type	☒ Production	☐ Pre-Production	☐ Engineering
Firmware	☐ for normal use	☒ Special version for test execution : Datalogic RFTest	
FCC label attached	☐ Yes	☒ No	

For further details refer Applicants Declaration & following technical documents

Description of Reference Document (supplied by applicant)	Version	Total Pages
SKORPIO X4_Test-Tools_Quick_Start_Instructions	Rev: 3 Date: 04/11/2017	43
SKORPIO X4_Operational Description	Rev: 01 Date: 19/06/2017	15
SKORPIO X4_SW Image Update	Rev:2 Date: 09/12/2016	4
SKORPIO X4 Hardware Modifications (BETA Changes)	March 2017	8
Datalogic SKORPIO X4 Antennas Report 5	22-June-2016	15

3.4. Bluetooth LE Technical Data of Main EUT as Declared by Applicant

EUT Model	**SKORPIO X4**		
EUT Model Type	**00ANM4HS0GF0A4**		
EUT Type	**Portable Mobile Computer**		
EUT Applications	**Shopping applications & general purpose mobile computer**		
Hardware Version	**BETA**		
Software Version	**Android 4.4.4**		
Firmware Version	**2.00.29**		
Frequency Band	2.4 GHz ISM Band (2400 MHz - 2483.5 MHz)		
Frequency Channels (Range)	Channel 37: 2402 MHz to Channel 39: 2480 MHz		
Number of Channels	40 (37 Hopping + 3 Advertising)		
Channels Power Settings	+7 dBm (According to Applicant's Declaration Max. Rated Power Values)		
Nominal Channel Bandwidth	1 MHz		
Type of DSSS Mode Modulation | Data Rate	Low Energy (LE) Mode : ☒BT 4.0: GFSK | 1 Mbps		
Antenna Details	Integrated (ANT1 & ANT2)		
Antenna Connections	Primary Antenna : ANT1 (BT LE)	Secondary Antenna: ANT2 not used	
Antenna Type	Laird PCBA Antenna		
ANT1 Gain (Peak)	2.95 dBi (2400 MHz – 2500 MHz) (According to Applicant's Declaration)		
ANT2 Gain (Peak)	0.60 dBi (2400 MHz – 2500 MHz) (According to Applicant's Declaration)		
Total Number of Modules	1 (WL18MODGI Module IC: 451I-WL18DBMOD)		
Total Number of Antennas	2	Primary Antenna : ANT1 (BT LE)	Secondary Antenna: ANT2 not used
Test Mode Settings	Datalogic RFTest Application		
Power Supply	☒ Internal Battery:BT-0016| Li-ion|3.7- 4.2VDC 5200mAh(2Cylindrical Cells)		
Special EMI Components	--		
EUT Sample Type	☒ Production	☐ Pre-Production	☐ Engineering
Firmware	☐ for normal use	☒ Special version for test execution : Datalogic RFTest	
FCC label attached	☐ Yes	☒ No	

For further details refer Applicants Declaration & following technical documents		
Description of Reference Document (supplied by applicant)	Version	Total Pages
SKORPIO X4_Test-Tools_Quick_Start_Instructions	Rev: 3 Date:04/11/2017	43
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SKORPIO X4_SW Image Update	Rev:2 Date:09/12/2016	4
SKORPIO X4 Hardware Modifications (BETA Changes)	March 2017	8
Datalogic SKORPIO X4 Antennas Report 5	22-June-2016	15

3.5. WLAN 5 GHz 802.11a/n Technical Data Of Main EUT as Declared by Applicant

EUT Model	**SKORPIO X4**		
EUT Model Type	**00ANM4HS0GF0A4**		
EUT Type	**Portable Mobile Computer**		
EUT Applications	**Shopping applications & general purpose mobile computer**		
Hardware Version	**BETA**		
Software Version	**Android 4.4.4**		
Firmware Version	**2.00.29**		
Frequency | Channel | B.W. (USA bands only)**	U-NII 1: 5150-5250 MHz	☒ Ch 36 | 40 | 44| 48	☒ Bandwidth 20 MHz
		☒ Ch. 38 | 46	☒ Bandwidth 40 MHz
	U-NII2A: 5250-5350 MHz	☒ Ch 52 | 56 | 60| 64	☒ Bandwidth 20 MHz
		☒ Ch. 54 | 62	☒ Bandwidth 40 MHz
	U-NII 2C: 5470-5725 MHz	☒ Ch 100 | 104 | 108	☒ Bandwidth 20 MHz
		☒ Ch 112 | 1116 | 120	
		☒ Ch 124 | 128 | 132	
		☒ Ch 136 | 140	
		☒ Ch. 102 | 110 | 118	☒ Bandwidth 40 MHz
		☒ Ch 126 | 134	
	U-NII 3: 5725 -5850 MHz	☒ Ch 149 | 153 | 157	☒ Bandwidth 20 MHz
		☒ Ch 161 | 165	
		☒ Ch 151 | 159	☒ Bandwidth 40 MHz
Channels Power Settings	+20 dBm (According to Applicant's Declaration Max. Rated Power Values)		
802.11a – Mode OFDM Modulation | Data Rates	☒ BPSK | 6 Mbps / 9 Mbps ☒ QPSK | 12 Mbps / 18 Mbps ☒ 16-QAM | 24 Mbps / 36 Mbps ☒ 64-QAM | 48 Mbps / 54 Mbps		
802.11n – Mode OFDM Modulation | Data Rates	☒ HT20 (MCS0 – MCS7) | 7.2/14.4/21.7/28.9/43.3/57.8/65/72.2 Mbps ☒ HT40 (MCS0 – MCS7) | 15/30/45/60/90/120/135/150 Mbps		
Antenna Details	Integrated (ANT1 & ANT2)		
Antenna Connections	Primary Antenna: ANT1(WLAN 5 GHz)	Secondary Antenna: ANT2 not used	
Antenna Type	Laird PCBA Antenna		
ANT1 Gain (Peak)	5.27 dBi (4900 MHz – 5900 MHz) (According to Applicant's Declaration)		
ANT2 Gain (Peak)	2.78 dBi (4900 MHz – 5900 MHz) (According to Applicant's Declaration)		
Total Number of Modules	1 (WL18MODGI Module FCC ID: Z64-WL18DBMOD)		
Total Number of Antennas	2 | Primary ANT1 : WLAN 5 GHz	Secondary ANT2: not used	
Test Mode Settings	Datalogic WiFi Test Application		
Power Supply	☒ Internal Battery: BT-0016| Li-ion|3.7- 4.2VDC 5200mAh(2Cylindrical Cells)		
Special EMI Components	--		
EUT Sample Type	☒ Production	☐ Pre-Production	☐ Engineering
Firmware	☐ for normal use	☒ Special version for test execution : Datalogic WiFi Test	
FCC label attached	☐ Yes	☒ No	

For further details refer Applicants Declaration & following technical documents

Description of Reference Document (supplied by applicant)	Version	Total Pages
SKORPIO X4_Test-Tools_Quick_Start_Instructions	Rev: 3 Date:04/11/2017	43
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SKORPIO X4 Hardware Modifications (BETA Changes)	March 2017	8
Datalogic SKORPIO X4 Antennas Report 5	22-June-2016	15

** Until further notice, devices subject to RSS-247, Issue 2,February 2017 section 6.2.3
Operating in Frequency bands 5470-5600 MHz and 5650-5725 MHz shall not transmit in the band 5600-5650 MHz. This restriction is for the protection of Environment Canada's weather radars operating in this band.

3.6. EUT: Type, S/N etc. and short descriptions used in this test report

Short Descrip-tion*)	EUT	Type	Serial Number	Hardware Status	Software Status
EUT A	SKORPIO X4	00ANM4HS0GF0A4	Z16P01723	HW Version: BETA P/N: 942600012	SW Version: Android 4.4.4 Firmware Version: 2.00.29
EUT B	SKORPIO X4	00ANM4HS0GF0A4	Z16P01742	HW Version: BETA P/N: 942600012	SW Version: Android 4.4.4 Firmware Version: 2.00.29

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

3.7. Auxiliary Equipment (AE): Type, S/N etc. and short descriptions

AE short descrip-tion *)	Auxiliary Equipment	Type	S/N serial number	HW hardware status	SW software status
AE 1	AC/DC charger µUSB	BI24-050200-I AC 100-240V 0.8A to DC 5 V 2 A	--	1278	--
AE 2	Test-PC Ctc062011	DELL- LATITUDE 2120	66T5RQ1	Intel Atom	Window 7 Professional
AE 3	Docking Station (with Spare Battery)	DOCK SKORPIOX3 SINGLE SLOT 94A150062 5 V DC	G16I06229	94A150062 AUG 2016	--
AE 4	Docking Station AC/DC adapter	Model BI24-050300-I AC 100-240V 0.8A to DC 5 V 3 A	--	3016	--
AE 5	RS232 Null Modem cable	94A051020	--	--	--
AE 6	µUSB Cable	USB2.0 A/M to Micro B/M Handy link	--	USB2.0 Length : 2 m	--
AE 7	USB Cable	Type B	--	Length : 2 m	--

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

3.8. EUT set-ups

EUT set-up no.*)	Combination of EUT and AE	Description
set. 1	EUT A + AE 1	AC-Power Lines Conducted Emissions : Mode 1 & Mode 2 (Please refer chapter 3.9)
set. 2	EUT B + AE 2 + AE 3 + AE 4 + AE 5 + AE 7	AC-Power Lines Conducted Emissions : Mode 3 & Mode 4 (Please refer chapter 3.9)

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

3.9. EUT operating modes

EUT operating mode no.*)	Description of operating modes	Additional information
op. 1	Battery Charging AC/DC adapter + WLAN 2.4 GHz 802.11b/g/n(HT20) SISO / MIMIO Modes TX-Fixed Channel (Modulated) + Bluetooth FHSS Modes TX-Fixed Channel (Modulated)	Mode 1 was activated using special test software which include following : Charging EUT battery using AC/DC adapter (AE 1) + WLAN 2.4 GHz 802.11b/g/n(HT20) SISO/ MIMO **Fixed Channel (Modulated) Continuous transmissions mode** was activated Mode| Channel | Modulation | Data Rate | Bandwidth Combinations. **Channel Power Settings : +20 dBm** with help of Datalogic WiFi Test Application. + Bluetooth BR & EDR FHSS Mode **Fixed Channel (Modulated) Continuous transmissions mode** was activated Channel | Modulation | Data Rate Combinations. **Channel Power Settings : +7 dBm** with help of Datalogic RFTest Application.
op. 2	Battery Charging AC/DC adapter + WLAN 5 GHz 802.11a/n Modes TX-Fixed Channel (Modulated) + Bluetooth Low Energy Modes TX-Fixed Channel (Modulated)	Mode 2 was activated using special test software which include following : Charging EUT battery using AC/DC adapter (AE 1) + WLAN 5 GHz 802.11a/n Mode **Fixed Channel (Modulated) Continuous transmissions mode** was activated Mode| Channel | Modulation | Data Rate | Bandwidth Combinations. **Channel Power Settings : +20 dBm** with help of Datalogic WiFi Test Application. + Bluetooth Low Energy Mode **Fixed Channel (Modulated) Continuous transmissions mode** was activated Channel | Modulation | Data Rate | Pattern Length : 37 | PRBS9 Combinations. **Channel Power Settings : +7 dBm** with help of Datalogic RFTest Application.

*) EUT operating mode no. is used to simplify the test report.

EUT operating mode no.*)	Description of operating modes	Additional information
op. 3	Battery Charging Docking Station + Data Transfer + WLAN 2.4 GHz 802.11b/g/n(HT20) SISO / MIMIO Modes TX-Fixed Channel (Modulated) + Bluetooth FHSS Modes TX-Fixed Channel (Modulated)	Mode 3 was activated using special test software which include following : Charging EUT battery using Docking station (AE 3) powered by AC DC Wall adapter (AE 4) + USB (type-B) connection to host PC (AE 2) and data transfer RS232 connection to host PC (AE 2) and data transfer + WLAN 2.4 GHz 802.11b/g/n(HT20) SISO/ MIMO **Fixed Channel (Modulated) Continuous transmissions mode** was activated Mode| Channel | Modulation | Data Rate | Bandwidth Combinations. **Channel Power Settings : +20 dBm** with help of Datalogic WiFi Test Application. **+** Bluetooth BR & EDR FHSS Mode **Fixed Channel (Modulated) Continuous transmissions mode** was activated Channel | Modulation | Data Rate Combinations. **Channel Power Settings : +7 dBm** with help of Datalogic RFTest Application. + Spare Battery charging
op. 4	Battery Charging Docking Station + Data Transfer + WLAN 5 GHz 802.11a/n Modes TX-Fixed Channel (Modulated) + Bluetooth Low Energy Modes TX-Fixed Channel (Modulated)	Mode 4 was activated using special test software which include following : Charging EUT battery using Docking station (AE 3) powered by AC DC Wall adapter (AE 4) + USB (type-B) connection to host PC (AE 2) and data transfer RS232 connection to host PC (AE 2) and data transfer + WLAN 5 GHz 802.11a/n Mode **Fixed Channel (Modulated) Continuous transmissions mode** was activated Mode| Channel | Modulation | Data Rate | Bandwidth Combinations. **Channel Power Settings : +20 dBm** with help of Datalogic WiFi Test Application. **+** Bluetooth Low Energy Mode **Fixed Channel (Modulated) Continuous transmissions mode** was activated Channel | Modulation | Data Rate | Pattern Length : 37 | PRBS9 Combinations. **Channel Power Settings : +7 dBm** with help of Datalogic RFTest Application. + Spare Battery charging

*) EUT operating mode no. is used to simplify the test report.

3.10. Configuration of cables used for testing

Cable number	Description	Connections	Cable length
Cable 1	--	--	--
Cable 2	--	--	--

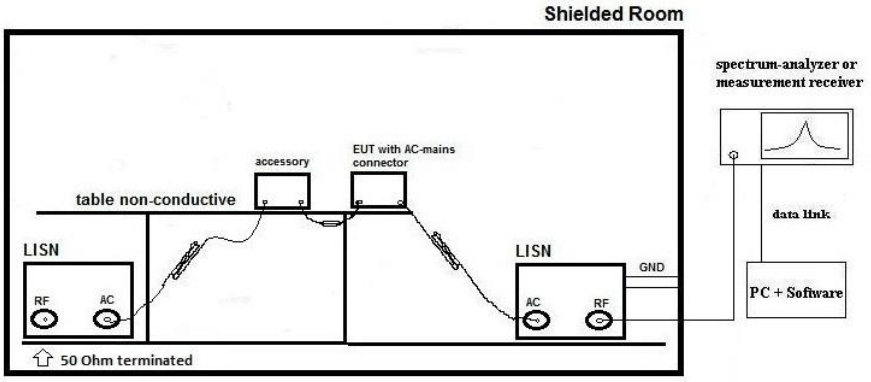
4. Description of test system set-up's

4.1. Test system set-up for AC power-line conducted emission measurements

Specification: ANSI C63.4-2014 chapter 7, ANSI C63.10-2013chapter 6.2

General Description: The radio frequency voltage conducted back into the AC power line in the frequency range 150 kHz to 30 MHz has to be investigated. Compliance should be tested by measuring the radio frequency voltage between each power line and ground at the power terminals in the stated frequency range.
A 50 Ohm / 50 µH line impedance stabilization network (LISN) is used coupling the interface to the measurement equipment. The EUT power input leads are connected through the LISN to the AC-power source. The LISN enclosure is electrically connected to the ground plane. The measuring instrument is connected to the coaxial output of the LISN.
Tabletop devices were set-up on a 80 cm height above reference ground plane, floor standing equipment 10 cm raised above ground plane. Measurements have been performed on each phase line and neutral line of the devices AC-power lines. The EUT was power supplied with 110 V/60 Hz. The EUT was tested in the defined operating mode and installed (connected) to accessory equipment according the general description of use given by the applicant.

Schematic:



Only schematic view, we refer to figure 6, 7 and 8 of ANSI C63.4-2009 for more details.

Testing method: **Exploratory, preliminary measurements** as a first step, determines the worst-case phase line (neutral or phase) as well as the most critical operating mode of the equipment. A complete frequency-sweep with PK-Detector is performed on each current-carrying conductor.

Final testing for power phases and critical frequencies (Margin to AV- or QP limit lower than 3 dB) as a second step includes measurements with receivers detector set to Quasi-Peak and Average.

Formula:

$V_C = V_R + C_L$ (1)

$M = L_T - V_C$ (2)

V_C = measured Voltage –corrected value
V_R = Receiver reading
C_L = Cable loss
M = Margin
L_T = Limit

Values are in dB, positive margin means value is below limit.

5. Measurements

5.1. General Limit - Conducted emissions on AC-Power lines (AC/DC adapter)

5.1.1. Test location and equipment

test location	☒ CETECOM Essen (Chapter 2.2.1)		☐ Please see Chapter 2.2.2		☐ Please see Chapter 2.2.3	
test site	☐ 333 EMI field	☒ 348 EMI cond.				
receiver	☐ 001 ESS	☒ 377 ESCS 30	☐ 489 ESU 40	☐ 620 ESU 26		
LISN	☒ 005 ESH2-Z5	☐ 007 ESH3-Z6	☐ 300 ESH3-Z5 & 50Ω used for AE		☐ no LISN for AE	
signaling	☐ 392 MT8820A	☐ 436 CMU	☐ 547 CMU	☐ 594 CMW		
line voltage	☒ 5 VDC (for EUT A / EUT B supplied from AE 1)		☒ 060 120 V 60 Hz via PAS 5000 (for AE 1)			

5.1.2. Requirements

FCC		☒ Part 15 Subpart C, §15.207	
ANSI		C63.4-2014, § 5.2, 6, 7	
Limit	Frequency [MHz]	☒ Conducted limit Class B	
		QUASI-Peak [dBµV]	AVERAGE [dBµV]
	0.15 – 0.5	66 to 56*	56 to 46*
	0.5 – 5	56	46
	5 – 30	60	50
Remark: * decreases with the logarithm of the frequency			

5.1.3. Test condition and test set-up

Signal link to test system (if used):		☐ air link	☐ cable connection	☒ none
EUT-grounding		☐ none	☒ with power supply	☐ additional connection
Equipment set up		☒ table top (40 cm distance to reference ground plane (wall)		☐ floor standing EUT stands isolated on reference ground plane (floor)
Climatic conditions		Temperature: (22±3°C)		Rel. humidity: (40±20)%
EMI-Receiver or Analyzer settings	Scan data	☐ 9 – 150 kHz, RBW = 200 Hz, Step = 61 Hz ☒ 150 kHz – 30 MHz RBW = 9 kHz, Step = 4 kHz ☐ other:		
	Scan-Mode Pre-measurement Final measurement	6 dB EMI-Receiver Mode Peak detector, Repetitive-Scan, max-hold, sweep-time 50 µs per frequency point Average & Quasi-peak detector at critical frequencies		
General measurement procedures		Please see chapter “Test system set-up for AC power line conducted emissions measurements”		

5.1.4. AC-Power Lines Conducted Emissions (AC/DC adapter) Results

Set-up no.:1			EUT OP-mode no.: 1	
Diagram-No.	Used Detector	Power line	Mode Details	Result
1.01	☒ Peak (pre-scan) ☐ CAV (final) ☒ QP (final)	L1/ N	Battery Charging AC/DC adapter + WLAN 2.4 GHz b SISO Mode | B.W. 20 MHz | 11 Mbit | Ch 11 (2462 MHz) +20 dBm + Bluetooth FHSS BR Mode | GFSK | 1 Mbps | Ch 0 (2402 MHz) | +7 dBm	**Pass**
Remark 1: For further details please refer → Annex 1: Test results CETECOM_TR16-1-0181301T13a-A1				

Set-up no.:1			EUT OP-mode no.: 2	
Diagram-No.	Used Detector	Power line	Mode Details	Result
1.02	☒ Peak (pre-scan) ☐ CAV (final) ☒ QP (final)	L1/ N	Battery Charging AC/DC adapter + WLAN 5 GHz a SISO Mode | B.W. 20 MHz | 24 Mbit | Ch 36 (5180 MHz) +20 dBm + Bluetooth Low Energy GFSK | 1 Mbps | Pattern Length:37 | PRBS9 Ch 0 (2402 MHz) +7 dBm	**Pass**
Remark 1: For further details please refer → Annex 1: Test results CETECOM_TR16-1-0181301T13a-A1				

5.2. General Limit - Conducted emissions on AC-Power lines (Docking Station)

5.2.1. Test location and equipment

test location	☒ CETECOM Essen (Chapter 2.2.1)		☐ Please see Chapter 2.2.2		☐ Please see Chapter 2.2.3	
test site	☐ 333 EMI field	☒ 348 EMI cond.				
receiver	☐ 001 ESS	☒ 377 ESCS 30	☐ 489 ESU 40	☐ 620 ESU 26		
LISN	☒ 005 ESH2-Z5	☐ 007 ESH3-Z6	☐ 300 ESH3-Z5 & 50Ω used for AE		☐ no LISN for AE	
signaling	☐ 392 MT8820A	☐ 436 CMU	☐ 547 CMU	☐ 594 CMW		
line voltage	☒ 5 VDC (for EUT A / EUT B supplied from AE 4 via AE 3)		☒ 060 120 V 60 Hz via PAS 5000 (for AE 4)			

5.2.2. Requirements

FCC		☒ Part 15 Subpart C, §15.207	
ANSI		C63.4-2014, § 5.2, 6, 7	
Limit	Frequency [MHz]	☒ Conducted limit Class B	
		QUASI-Peak [dBµV]	AVERAGE [dBµV]
	0.15 – 0.5	66 to 56*	56 to 46*
	0.5 – 5	56	46
	5 – 30	60	50
Remark: * decreases with the logarithm of the frequency			

5.2.3. Test condition and test set-up

Signal link to test system (if used):		☐ air link	☐ cable connection	☒ none
EUT-grounding		☐ none	☒ with power supply	☐ additional connection
Equipment set up		☒ table top (40 cm distance to reference ground plane (wall)		☐ floor standing EUT stands isolated on reference ground plane (floor)
Climatic conditions		Temperature: (22±3°C)		Rel. humidity: (40±20)%
EMI-Receiver or Analyzer settings	Scan data	☐ 9 – 150 kHz, RBW = 200 Hz, Step = 61 Hz ☒ 150 kHz – 30 MHz RBW = 9 kHz, Step = 4 kHz ☐ other:		
	Scan-Mode Pre-measurement Final measurement	6 dB EMI-Receiver Mode Peak detector, Repetitive-Scan, max-hold, sweep-time 50 µs per frequency point Average & Quasi-peak detector at critical frequencies		
General measurement procedures		Please see chapter "Test system set-up for AC power line conducted emissions measurements"		

5.2.4. AC-Power Lines Conducted Emissions (Docking Station) Results

Set-up no.:2			EUT OP-mode no.: 3	
Diagram-No.	Used Detector	Power line	Mode Details	Result
1.03	☒ Peak (pre-scan) ☐ CAV (final) ☒ QP (final)	L1/ N	Battery Charging Docking Station + Data Transfer + WLAN 2.4 GHz b SISO Mode | B.W. 20 MHz | 11 Mbit | Ch 11 (2462 MHz) +20 dBm + Bluetooth FHSS BR Mode | GFSK | 1 Mbps | Ch 0 (2402 MHz) | +7 dBm + Spare Battery charging	**Pass**
Remark 1: For further details please refer → Annex 1: Test results CETECOM_TR16-1-0181301T13a-A1				

Set-up no.:2			EUT OP-mode no.: 4	
Diagram-No.	Used Detector	Power line	Mode Details	Result
1.04	☒ Peak (pre-scan) ☐ CAV (final) ☒ QP (final)	L1/ N	Battery Charging Docking Station + Data Transfer + WLAN 5 GHz a SISO Mode | B.W. 20 MHz | 24 Mbit | Ch 36 (5180 MHz) +20 dBm + Bluetooth Low Energy GFSK | 1 Mbps | Pattern Length:37 | PRBS9 Ch 0 (2402 MHz) +7 dBm + Spare Battery charging	**Pass**
Remark 1: For further details please refer → Annex 1: Test results CETECOM_TR16-1-0181301T13a-A1				

5.3. 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 it's contribution to the overall uncertainty according it's 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	0.7	0.25	N/A	--	-
		12.75 - 26.5GHz	N/A	0.82	--	N/A	N/A	--	
Conducted emissions on RF-port	-	9 kHz - 2.8 GHz	0.70	N/A	0.70	N/A	0.69	--	N/A - not applicable
		2.8 GHz - 12.75GHz	1.48	N/A	1.51	N/A	1.43	--	
		12.75 GHz - 18GHz	1.81	N/A	1.83	N/A	1.77	--	
		18 GHz - 26.5GHz	1.83	N/A	1.85	N/A	1.79	--	
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

6. 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
EGPRS	Enhanced General Packet Radio Service
EUT	Equipment Under Test
FCC	Federal Communications Commission. USA
IC	Industry Canada
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

7. 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			

8. Instruments and Ancillary

TC"
The "Ref.-No" in the left column of the following tables allows the clear identification of the laboratory equipment.

8.1.1. Test software and firmware of equipment

Ref.-No.	Equipment	Type	Serial-No.	Version of Firmware or Software during the test
001	EMI Test Receiver	ESS	825132/017	Firm.= 1.21 , OTP=2.0, GRA=2.0
012	Signal Generator (EMS-cond.)	SMY 01	839069/027	Firm.= V 2.02
013	Power Meter (EMS cond.)	NRVD	839111/003	Firm.= V 1.51
017	Digital Radiocommunication Tester	CMD 60 M	844365/014	Firmware = V 3.52 .22.01.99, DECT = D2.87 13.01.99
053	Audio Analyzer	UPA3	860612/022	Firm. V 4.3
119	RT Harmonics Analyzer dig. Flickermeter	B10	G60547	Firm.= V 3.1DHG
140	Signal Generator	SMHU	831314/006	Firm.= 3.21
261	Thermal Power Sensor	NRV-Z55	825083/0008	EPROM-Datum 02.12.04, SE EE 1 B
262	Power Meter	NRV-S	825770/0010	Firm.= 2.6
263	Signal Generator	SMP 04	826190/0007	Firm.=3.21
295	Racal Digital Radio Test Set	6103	1572	UNIT Firmware= 4.04, SW-Main=4.04, SW-BBP=1.04, SW-DSP=1.02, Hardboot=1.02, Softboot=2.02
298	Univ. Radio Communication Tester	CMU 200	832221/091	R&S Test Firmware =3.53 /3.54 (current Testsoftw. f. all band used
323	Digital Radiocommunication Tester	CMD 55	825878/0034	Firm.= 3.52 .22.01.99
335	CTC-EMS-Conducted	System EMS Conducted	-	EMC 32 V 8.52
340	Digital Radiocommunication Tester	CMD 55	849709/037	Firm.= 3.52 .22.01.99
355	Power Meter	URV 5	891310/027	Firm.= 1.31
365	10V Insertion Unit 50 Ohm	URV5-Z2	100880	Eprom Data = 31.03.08
366	Ultra Compact Simulator	UCS 500 M4	V0531100594	Firm. UCS 500=001925/3.06a02, rc=ISMIEC 4.10
371	Bluetooth Tester	CBT32	100153	CBT V5,30+ SW-Option K55, K57
377	EMI Test Receiver	ESCS 30	100160	Firm.= 2.30, OTP= 02.01, GRA= 02.36
378	Broadband RF Field Monitor	RadiSense III	03D00013SNO-08	Firm.= V.03D13
389	Digital Multimeter	Keithley 2000	0583926	Firm. = A13 (Mainboard) A02 (Display)
392	Radio Communication Tester	MT8820A	6K00000788	Firm.= 4.50 #005, IPL=4.01#001,OS=4.02#001, GSM=4.41#013, W-CDMA= 4.54#004, scenario= 4.52#002
436	Univ. Radio Communication Tester	CMU 200	103083	R&S Test Firmware Base=5.14, Mess-Software= GSM:5.14 WCDMA:5.14 (current Testsoftw. F. all band
441	CTC-SAR-EMI Cable Loss	System EMI field (SAR)	-	EMC 32 Version 8.52
442	CTC-SAR-EMS	System EMS field (SAR)	-	EMC 32 Version 8.40
443	CTC-FAR-EMI-RSE	System CTC-FAR-EMI-RSE	-	Spuri 7.2.5 or EMC 32 Ver. 9.15.00
444	CTC-FAR-EMS field	System-EMS-Field (FAR)	-	EMC 32 Version 9.15.00
460	Univ. Radio Communication Tester	CMU 200	108901	R&S Test Firmware Base=5.14, GSM=5.14 WCDMA=5.14 (current Testsoftw.,f. all band to be used,
489	EMI Test Receiver	ESU40	1000-30	Firmware=4.43 SP3, Bios=V5.1-16-3, Spec. =01.00
491	ESD Simulator dito	ESD dito	dito307022	V 2.30
524	Voltage Drop Simulator	VDS 200	0196-16	Software Nr: 000037 Version V4.20a01
526	Burst Generator	EFT 200 A	0496-06	Software Nr. 000034 Version V2.32
527	Micro Pulse Generator	MPG 200 B	0496-05	Software-Nr. 000030 Version V2.43
528	Load Dump Simulator	LD 200B	0496-06	Software-Nr. 000031 Version V2.35a01
546	Univ. Radio Communication Tester	CMU 200	106436	R&S Test Firmware Base=5.14, GSM=5.14 WCDMA=5.14 (current Testsoftw.,f. all band to be used
547	Univ. Radio Communication Tester	CMU 200	835390/014	R&S Test Firmware Base=V5.1403 (current Testsoftw., f. all band used, GSM = 5.14 WCDMA: = 5.14
584	Spectrum Analyzer	FSU 8	100248	2.82_SP3
597	Univ. Radio Communication Tester	CMU 200	100347	R&S Test Firmware Base=5.01, GSM=5.02 WCDMA= not installed, Mainboard= µP1=V.850
598	Spectrum Analyzer	FSEM 30	831259/013	Firmware Bios 3.40 , Analyzer 3.40 Sp 2
607	Signal Generator	SMR 20	832033/011	V1.25
620	EMI Test Receiver	ESU 26	100362	4.43_SP3
642	Wideband Radio Communication Tester	CMW 500	126089	Setup V03.26, Test programm component V03.02.20
670	Univ. Radio Communication Tester	CMU 200	106833	µP1 =V8.50, Firmware = V.20
689	Vector Signal Generator	SMU200	100970	02.20.360.142
692	Bluetooth Tester	CBT 32	100236	CBT V 5.40, FW: V.2.41 (FPGA Digital, V. 3.09 FPGA RF)

8.1.2. Single instruments and test systems

Ref.-No.	Equipment	Type	Serial-No.	Manufacturer	Interval of calibration	Remark	Cal due
001	EMI Test Receiver	ESS	825132/017	Rohde & Schwarz	12 M	-	16.05.2018
005	AC - LISN (50 Ohm/50µH, test site 1)	ESH2-Z5	861741/005	Rohde & Schwarz	12 M	-	15.05.2018
007	Single-Line V-Network (50 Ohm/5µH)	ESH3-Z6	892563/002	Rohde & Schwarz	12 M	-	17.05.2018
009	Power Meter (EMS-radiated)	NRV	863056/017	Rohde & Schwarz	24 M	-	15.05.2019
016	Line Impedance Simulating Network	Op. 24-D	B6366	Spitzenberger+Spies	36 M	-	30.05.2019
020	Horn Antenna 18 GHz (Subst 1)	3115	9107-3699	EMCO	36/12 M	-	31.07.2017
021	Loop Antenna (H-Field)	6502	9206-2770	EMCO	36 M	-	30.04.2018
030	Loop Antenna (H-field)	HFH-Z2	879604/026	Rohde & Schwarz	36 M	-	30.04.2018
033	RF-current probe (100kHz-30MHz)	ESH2-Z1	879581/18	Rohde & Schwarz	24 M	-	15.05.2019
057	relay-switch-unit (EMS system)	RSU	494440/002	Rohde & Schwarz	pre-m	1a	
060	power amplifier (DC-2kHz)	PAS 5000	B6363	Spitzenberger+Spies	-	3	
066	notch filter (WCDMA; FDD1)	WRCT 1900/2200-5/40-10EEK	5	Wainwright GmbH	12 M	1g	30.06.2017
086	DC - power supply, 0 -10 A	LNG 50-10	-	Heinzinger Electronic	pre-m	2	
087	DC - power supply, 0 -5 A	EA-3013 S	-	Elektro Automatik	pre-m	2	
091	USB-LWL-Converter	OLS-1	007/2006	Ing. Büro Scheiba	-	4	
099	passive voltage probe	ESH2-Z3	299.7810.52	Rohde & Schwarz	36 M	-	30.04.2018
100	passive voltage probe	Probe TK 9416	without	Schwarzbeck	36 M	-	30.04.2018
110	USB-LWL-Converter	OLS-1	-	Ing. Büro Scheiba	-	4	
119	RT Harmonics Analyzer dig. Flickermeter	B10	G60547	BOCONSULT	36 M	-	30.05.2019
133	horn antenna 18 GHz (Meas 1)	3115	9012-3629	EMCO	36 M	1c	10.03.2020
134	horn antenna 18 GHz (Subst 2)	3115	9005-3414	EMCO	36 M	-	10.03.2020
136	adjustable dipole antenna (Dipole 1)	3121C-DB4	9105-0697	EMCO	36 M	-	30.04.2018
140	Signal Generator	SMHU	831314/006	Rohde & Schwarz	24 M	-	30.05.2018
248	attenuator	SMA 6dB 2W	-	Radiall	pre-m	2	
249	attenuator	SMA 10dB 10W	-	Radiall	pre-m	2	
252	attenuator	N 6dB 12W	-	Radiall	pre-m	2	
256	attenuator	SMA 3dB 2W	-	Radiall	pre-m	2	
257	hybrid	4031C	04491	Narda	pre-m	2	
260	hybrid coupler	4032C	11342	Narda	pre-m	2	
261	Thermal Power Sensor	NRV-Z55	825083/0008	Rohde & Schwarz	24 M	-	30.05.2018
262	Power Meter	NRV-S	825770/0010	Rohde & Schwarz	24 M	-	30.05.2018
263	Signal Generator	SMP 04	826190/0007	Rohde & Schwarz	36 M	-	30.05.2019
265	peak power sensor	NRV-Z33, Model 04	840414/009	Rohde & Schwarz	24 M	-	30.05.2018
266	Peak Power Sensor	NRV-Z31, Model 04	843383/016	Rohde & Schwarz	24 M	-	30.05.2018
267	notch filter GSM 850	WRCA 800/960-6EEK	9	Wainwright GmbH	pre-m	2	
270	termination	1418 N	BB6935	Weinschel	pre-m	2	
271	termination	1418 N	BE6384	Weinschel	pre-m	2	
272	attenuator (20 dB) 50 W	Model 47	BF6239	Weinschel	pre-m	2	
273	attenuator (10 dB) 100 W	Model 48	BF9229	Weinschel	pre-m	2	
274	attenuator (10 dB) 50 W	Model 47 (10 dB) 50 W	BG0321	Weinschel	pre-m	2	
275	DC-Block	Model 7003 (N)	C5129	Weinschel	pre-m	2	
276	DC-Block	Model 7006 (SMA)	C7061	Weinschel	pre-m	2	
279	power divider	1515 (SMA)	LH855	Weinschel	pre-m	2	
287	pre-amplifier 25MHz - 4GHz	AMF-2D-100M4G-35-10P	379418	Miteq	12 M	1c	30.06.2017
291	high pass filter GSM 850/900	WHJ 2200-4EE	14	Wainwright GmbH	12 M	1c	30.06.2017
298	Univ. Radio Communication Tester	CMU 200	832221/091	Rohde & Schwarz	pre-m	3	
300	AC LISN (50 Ohm/50µH, 1-phase)	ESH3-Z5	892 239/020	Rohde & Schwarz	12 M	-	17.05.2018
301	attenuator (20 dB) 50W, 18GHz	47-20-33	AW0272	Lucas Weinschel	pre-m	2	
302	horn antenna 40 GHz (Meas 1)	BBHA9170	155	Schwarzbeck	36 M	-	14.03.2020
303	horn antenna 40 GHz (Subst 1)	BBHA9170	156	Schwarzbeck	36 M	-	20.03.2020
331	Climatic Test Chamber -40/+180 Grad	HC 4055	43146	Heraeus Vötsch	24 M	-	30.10.2018
341	Digital Multimeter	Fluke 112	81650455	Fluke	24 M	-	30.05.2018
342	Digital Multimeter	Voltcraft M-4660A	IB 255466	Voltcraft	24 M	-	17.05.2019
347	laboratory site	radio lab.	-	-	-	5	
348	laboratory site	EMI conducted	-	-	-	5	
354	DC - Power Supply 40A	NGPE 40/40	448	Rohde & Schwarz	pre-m	2	
355	Power Meter	URV 5	891310/027	Rohde & Schwarz	24 M	-	30.05.2018
357	power sensor	NRV-Z1	861761/002	Rohde & Schwarz	24 M	-	24.05.2019
371	Bluetooth Tester	CBT32	100153	R&S	36 M	-	30.05.2019
373	Single-Line V-Network (50 Ohm/5µH)	ESH3-Z6	100535	Rohde & Schwarz	12 M	-	17.05.2018
377	EMI Test Receiver	ESCS 30	100160	Rohde & Schwarz	12 M	-	15.05.2018
389	Digital Multimeter	Keithley 2000	0583926	Keithley	24 M	-	30.04.2017
392	Radio Communication Tester	MT8820A	6K00000788	Anritsu	12 M	-	18.05.2018
405	Thermo-/Hygrometer	OPUS 10 THI	126.0604.0003.3.3.3.22	LUFFT Mess u. Regeltechnik	24 M	-	30.03.2019
431	Model 7405	Near-Field Probe Set	9305-2457	EMCO	-	4	
436	Univ. Radio Communication Tester	CMU 200	103083	Rohde & Schwarz	12 M	-	24.05.2018
439	UltraLog-Antenna	HL 562	100248	Rohde & Schwarz	36 M	-	10.03.2020

Ref.-No.	Equipment	Type	Serial-No.	Manufacturer	Interval of calibration	Remark	Cal due
441	CTC-SAR-EMI Cable Loss	System EMI field (SAR) Cable	-	CETECOM	12 M	5	05.06.2017
443	CTC-FAR-EMI-RSE	System CTC-FAR-EMI-RSE	-	ETS-Lindgren / CETECOM	12 M	5	30.06.2017
448	notch filter WCDMA_FDD II	WRCT 1850.0/2170.0-5/40-	5	Wainwright Instruments GmbH	12 M	1c	30.06.2017
449	notch filter WCDMA FDD V	WRCT 824.0/894.0-5/40-8SSK	1	Wainwright	12 M	1c	30.06.2017
454	Oscilloscope	HM 205-3	9210 P 29661	Hameg	-	4	
456	DC-Power supply 0-5 A	EA 3013 S	207810	Elektro Automatik	pre-m	2	
459	DC -Power supply 0-5 A , 0-32 V	EA-PS 2032-50	910722	Elektro Automatik	pre-m	2	
460	Univ. Radio Communication Tester	CMU 200	108901	Rohde & Schwarz	12 M	-	16.06.2018
463	Universal source	HP3245A	2831A03472	Agilent	-	4	
466	Digital Multimeter	Fluke 112	89210157	Fluke USA	24 M	-	30.05.2018
467	Digital Multimeter	Fluke 112	89680306	Fluke USA	36 M	-	30.04.2018
468	Digital Multimeter	Fluke 112	90090455	Fluke USA	36 M	-	30.04.2018
477	ReRadiating GPS-System	AS-47	-	Automotive Cons. Fink	-	3	
480	power meter (Fula)	NRVS	838392/031	Rohde & Schwarz	24 M	-	16.05.2019
482	filter matrix	Filter matrix SAR 1	-	CETECOM (Brl)	-	1d	
484	pre-amplifier 2,5 - 18 GHz	AMF-5D-02501800-25-10P	1244554	Miteq	12 M	-	30.07.2017
487	System CTC NSA-Verification SAR-EMI	System EMI field (SAR) NSA	-	ETS Lindgren / CETECOM	24 M	-	31.07.2017
489	EMI Test Receiver	ESU40	1000-30	Rohde & Schwarz	12 M	-	18.05.2019
502	band reject filter	WRCG 1709/1786-1699/1796-	SN 9	Wainwright	pre-m	2	
503	band reject filter	WRCG 824/849-814/859-	SN 5	Wainwright	pre-m	2	
512	notch filter GSM 850	WRCA 800/960-02/40-6EEK	SN 24	Wainwrght	12 M	1c	30.06.2017
517	relais switch matrix	HF Relais Box Keithley	SE 04	Keithley	pre-m	2	
523	Digital Multimeter	L4411A	MY46000154	Agilent	24 M	-	18.05.2019
529	6 dB Broadband resistive power divider	Model 1515	LH 855	Weinschel	pre-m	2	
530	10 dB Broadband resistive power divider	R 416110000	LOT 9828	-	pre-m	2	
546	Univ. Radio Communication Tester	CMU 200	106436	R&S	12 M	-	30.03.2018
547	Univ. Radio Communication Tester	CMU 200	835390/014	Rohde & Schwarz	12 M	-	30.04.2017
549	Log.Per-Antenna	HL025	1000060	Rohde & Schwarz	36/12 M	-	31.07.2018
550	System CTC S-VSWR Verification SAR-EMI	System EMI Field SAR S-VSWR	-	ETS Lindgren/CETECOM	24 M	-	31.07.2017
552	high pass filter 2,8-18GHz	WHKX 2.8/18G-10SS	4	Wainwright	12 M	1c	30.06.2017
557	System CTC-OTA-2	R&S TS8991	-	Rohde & Schwarz	12 M	5	30.09.2016
558	System CTC FAR S-VSWR	System CTC FAR S-VSWR	-	CTC	24 M	-	31.07.2017
574	Biconilog Hybrid Antenna	BTA-L	980026L	Frankonia	36/12 M	-	31.03.2019
584	Spectrum Analyzer	FSU 8	100248	Rohde & Schwarz	pre-m	-	
594	Wideband Radio Communication Tester	CMW 500	101757	Rohde & Schwarz	12 M	-	30.04.2017
597	Univ. Radio Communication Tester	CMU 200	100347	Rohde & Schwarz	pre-m	-	
598	Spectrum Analyzer	FSEM 30	831259/013	Rohde & Schwarz	24 M	-	30.04.2017
600	power meter	NRVD (Reserve)	834501/018	Rohde & Schwarz	24 M	-	17.05.2019
601	medium-sensitivity diode sensor	NRV-Z5 (Reserve)	8435323/003	Rohde & Schwarz	24 M	-	15.05.2019
602	peak power sensor	NRV-Z32 (Reserve)	835080	Rohde & Schwarz	24 M	-	
608	UltraLog-Antenna	HL 562	830547/009	Rohde & Schwarz	36 M	-	31.03.2014
611	DC power supply	E3632A	KR 75305854	Agilent	pre-m	2	
612	DC power supply	E3632A	MY 40001321	Agilent	pre-m	2	
613	Attenuator	R416120000 20dB 10W	Lot. 9828	Radiall	pre-m	2	
616	Digitalmultimeter	Fluke 177	88900339	Fluke	24 M	-	30.05.2018
617	Power Splitter/Combiner	ZFSC-2-2-S+	S F987001108	Mini Circuits	-	2	
618	Power Splitter/Combiner	50PD-634	600994	JFW Industries USA	-	2	
619	Power Splitter/Combiner	50PD-634	600995	JFW Industries, USA	-	3	
620	EMI Test Receiver	ESU 26	100362	Rohde-Schwarz	12 M	-	16.05.2018
621	Step Attenuator 0-139 dB	RSP	100017	Rohde & Schwarz	pre-m	2	
625	Generic Test Load USB	Generic Test Load USB	-	CETECOM	-	2	
627	data logger	OPUS 1	201.0999.9302.6.4.1.43	G. Lufft GmbH	24 M	-	30.03.2019
634	Spectrum Analyzer	FSM (HF-Unit)	826188/010	Rohde & Schwarz	pre-m	2	
637	High Speed HDMI with Ethernet 1m	HDMI cable with Ethernet 1m	-	KogiLink	-	2	
638	HDMI Kabel with Ethernet 1,5 m flach	HDMI cable with Ethernet	-	Reichelt	-	2	
640	HDMI cable 2m rund	HDMI cable 2m rund	-	Reichelt	-	2	
641	HDMI cable with Ethernet	Certified HDMI cable with	-	PureLink	-	2	
642	Wideband Radio Communication Tester	CMW 500	126089	Rohde&Schwarz	12 M	-	24.05.2018
644	Amplifierer	ZX60-2534M+	SN865701299	Mini-Circuits	-	-	
670	Univ. Radio Communication Tester	CMU 200	106833	Rohde & Schwarz	24 M	-	30.05.2018
671	DC-power supply 0-5 A	EA-3013S	-	Elektro Automatik	pre-m	2	

Ref.-No.	Equipment	Type	Serial-No.	Manufacturer	Interval of calibration	Remark	Cal due
678	Power Meter	NRP	101638	Rohde&Schwarz	pre-m	-	
683	Spectrum Analyzer	FSU 26	200571	Rohde & Schwarz	12 M	-	17.05.2018
686	Field Analyzer	EHP-200A	160WX30702	Narda Safety Test Solutions	24 M	-	29.03.2019
687	Signal Generator	SMF 100A	102073	Rohde&Schwarz	12 M	-	17.05.2018
688	Pre Amp	JS-18004000-40-8P	1750117	Miteq	pre-m	-	
690	Spectrum Analyzer	FSU	100302/026	Rohde&Schwarz	12 M	-	16.05.2018
691	OSP120 Base Unit	OSP120	101183	Rohde & Schwarz	12 M	-	22.05.2018
692	Bluetooth Tester	CBT 32	100236	Rohde & Schwarz	36 M	-	29.05.2020
693	TS8997	CTC-Radio Lab 1_TS8997	-	Rohde&Schwarz	12 M	5	06.06.2017
697	Power Splitter	ZN4PD-642W-S+	165001445	Mini-Circuits	-	2	
701	CMW500 wide. Radio Comm.	CMW500	158150	Rohde & Schwarz	12 M	-	01.05.2017
703	INNCO Antennen Mast	MA 4010-KT080-XPET-ZSS3	MA4170-KT100-XPET-	INNCO	pre-m	-	
704	INNCON Controller	CO 3000-4port	CO3000/933/3841051 6/L	INNCO Systems GmBh	pre-m	-	
711	Harmonic Mixer 90 GHz - 140GHz	RPG FS-Z140	101004	RPG	12 M	-	22.02.2018
712	Harmonic Mixer 75 GHz - 110GHz	FS-Z110	101468	Rohde & Schwarz	12 M	-	22.02.2018
713	Harmonic Mixer, 50 GHz - 75GHz	FS-Z75	101022	Rohde & Schwarz	12 M	-	22.05.2018
714	Signal Analyzer 67GHz	FSW67	104023	Rohde & Schwarz	24 M	-	03.03.2019
715	Harmonic Mixer, 140 GHz - 220GHz	FS-Z220	101009	RPG Radiometer Physics	12 M	-	03.08.2018
716	Harmonic Mixer 220 GHz to 325 GHZ	FS-Z325	101005	RPG Radiometer Physics	12 M	-	13.02.2018
747	Spectrum Analyzer	FSU 26	200152	Rohde & Schwarz	12 M	-	18.05.2018
748	Pickett-Potter Horn Antenna	FH-PP 4060	010001	Radiometer Physiscs	-	-	
749	Pickett-potter Horn Antenna	FH-PP 60-90	010003	Radiometer Physics	-	-	
750	Pickett-Potter Horn Antenna	FH-PP 140-220	010011	Radiometer Physics	-	-	

8.1.3. Legend

Note / remarks		Calibrated during system calibration:
	1a	System CTC-SAR-EMS (Ref.-No. 442)
	1b	System-CTC-EMS-Conducted (Ref.-No. 335)
	1c	System CTC-FAR-EMI-RSE (Ref.-No . 443)
	1d	System CTC-SAR-EMI (Ref.-No . 441)
	1e	System CTC-OATS (EMI radiated) (Ref.-No. 337)
	1 f	System CTC-CTIA-OTA (Ref.-No . 420)
	1 g	System CTC-FAR-EMS (Ref.-No . 444)
	2	Calibration or equipment check immediately before measurement
	3	Regulatory maintained equipment for functional check or support purpose
	4	Ancillary equipment without calibration e.g. mechanical equipment or monitoring equipment
	5	Test System

Interval of calibration	12 M	12 month
	24 M	24 month
	36 M	36 month
	24/12 M	Calibration every 24 months. between this every 12 months internal validation
	36/12 M	Calibration every 36 months. between this every 12 months internal validation
	Pre-m	Check before starting the measurement
	-	Without calibration

9. Versions of test reports (change history)

Version	Applied changes	Date of release
--	Inital release	2017-06-27
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