

PARTIAL TEST REPORT No.: 2-20842790-15-10c

According to: FCC Regulations Part15.247, Part 15.207

> IC-Regulations RSS-Gen, Issue 4 RSS-247, Issue 1

> > for

Datalogic ADC S.r.l.

JOYA TOUCH Type : P00AN04HL0GT0W7-GRR

IC: 3862E-JNGWB PMN: JOYA TOUCH HVIN: JNG P GUN

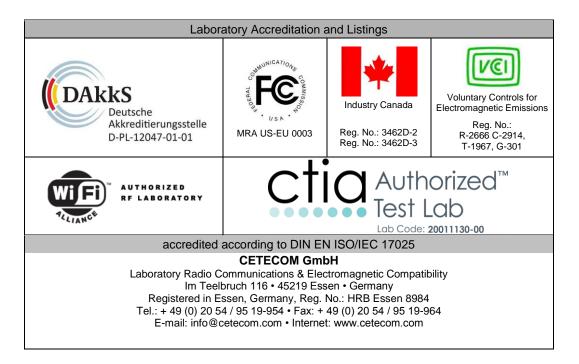




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1. Summary of test results

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 <u>Equipment Under Test</u> (in this report, hereinafter referred as EUT) integrates a Bluetooth[©] transmitter. Other implemented wireless technologies are not considered within this test report. **The build-in Bluetooth module is already approved with FCC ID: SQGBT900 and IC:3147A-BT900.**

Following test cases have been performed to show compliance with applicable FCC Part 2 and Part 15 rules of the FCC CFR Title 47 Rules, Edition 4th November 2015 and IC RSS-247 Issue 1/RSS-Gen Issue 4 standards

		References and Limits				EUT	
Test cases	Port	FCC Standard	RSS Section	Test limit	EUT set-up	op. mode	Result
20 dB bandwidth	Antenna terminal	§15.247	RSS-247, Issue 1: 5.1 (1)	At least 25 kHz or 2/3			Remark 1.)
Channel carrier frequency separation	(conducted)	(a)(1)	RSS-247, Issue 1: 5.1 (2)	of 20 dB bandwith			Remark 1.)
99% occupied bandwidth	Antenna terminal (conducted)	2.1049(h)	RSS-Gen, Issue 4: Chapter 6.6	99% Power bandwidth			Remark 1.)
Channel use, average channel use, input band- width and synchronization between signals		\$15.247 (a)(1)	RSS-210, Issue 8: 5.1	See specification			Remark 1.)
Channel average Occupancy time and number of channels	Antenna terminal (conducted)	\$15.247 (a)(1) (iii)	RSS-247, Issue 1: 5.1 (3)	0.4 seconds			Remark 1.)
Transmitter Peak output power	Antenna terminal (conducted)	§15.247 (b)(1)	RSS-247, Issue 1: 5.1 (2)	< 125 mW	2	1	Pass
Transmitter frequency stability	Antenna terminal (conducted)		RSS-Gen, Chapter 4.7	Operation within designated operational band			Not tested
Transmitter Peak output power radiated	Enclosure (radiated)	\$15.247 (b)(4)	RSS-247, Issue 1: 5.1 (2)	< 125 mW (EIRP) for antenna with directional gain less 6 dBi			Remark 1.)
Out-Of-Band RF- emissions Band-Edge emissions	Antenna terminal (conducted)	§15.247 (d)	RSS-247, Issue 1, Chapter 5.5	20 dBc and Emissions in restricted bands must meet the general field strength radiated limits			Remark 1.)

1.1. Tests overview of US (FCC) and Canada IC (RSS) Standards



General field strength emissions + restricted bands	Enclosure + Interconnecting cables (radiated)	\$15.247 (d) \$15.205 \$15.209	RSS-247, Issue 1, Chapter 5.5 RSS-Gen: Issue 4: §8.9 Table 4+5+6	Emissions in restricted bands must meet the general field-strength radiated limits	1	1	Pass
AC-Power Lines Conducted Emissions	AC-Power lines	§15.207	RSS-Gen, Issue 4: Chapter 8.8 Table 3	FCC §15.107 class B limits §15.207 limits IC: Table 3, Chapter 8.8			Remark 2.)

Remark: 1.) Please refer integrated BT900-SA Module's reports

FCC ID: SQGBT900 Reports FR442807AD & FR442807AE Version Rev.01, issued May 28, 2014

IC: 3147A-BT900 Reports CR442807-02AD & CR442807-02AE Version Rev.01, issued Oct. 23, 2015

2.) Please refer separate test report TR2-20842790-15-10d and corresponding annexes

Attestation:

I declare that all measurements were performed by me or under my supervision and that all measurements have been performed and are correct to my best knowledge and belief to Industry Canada standards. All requirements as shown in above table are met in accordance with enumerated standards.

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Dipl.-Ing. Rachid Acharkaoui Responsible for test section

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Dipl.-Ing. Christian Lorenz Responsible for test report



2. Administrative Data

adoratory	
CETECOM GmbH	
Im Teelbruch 116	
45219 Essen - Kettwig	
Germany	
DiplIng. Rachid Acharkaoui	
DiplIng. Niels Jeß	
	CETECOM GmbH Im Teelbruch 116 45219 Essen - Kettwig Germany DiplIng. Rachid Acharkaoui

2.1. Identification of the testing laboratory

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

DiplIng. Christian Lorenz
DiplIng. V. Krueger
2016-02-29
2016-03-03 to 2016-10-10
2016-10-12

2.4. Applicant's details

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

2.5. Manufacturer's details

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



3. Equipment under test (EUT)

3.1. Technical data of main EUT declared by applicant

Main function	Shopping application	ation & general purp	oose mobile computer			
Туре	Portable equipment					
Frequency range and channels (US/Canada -bands)	2402 MHz to 2480 MHz					
Type of modulation (packet types)		E BT 1.0 / BT 1.1: DH1/DH3/DH5 – GFSK				
		2.1: DH1/2DH3/2D	-			
	E BT 3.0:					
	E BT 4.0:		5 – GFSK			
Number of channels	🗷 0 to 78 (BR &					
(USA/Canada -bands)	🗷 0 to 40 (LE M	lode)				
Antenna Type	Integrated					
	□ External, no F					
	□ External, sepa	rate RF-connector				
Antenna Gain	Maximum 0.50 d	Bi gain according a	pplicants information in 2.4 GHz band			
MAX Field strength (radiated):	99.80 dBµV/m@3m distance on nominal 2480 MHz					
FCC-ID	U4GJNGWB					
IC-ID	3862E-JNGWB					
Installed options	🗷 W-LAN 2.4 C	Hz (not tested with	in this test report)			
	🗷 W-LAN 5 GH	Iz (not tested within	this test report)			
	NFC (not test	ed within this test re	port)			
	🗷 battery chargi	ng option (WPC) (n	ot tested within this test report)			
Power supply	Internal battery Li-Io 3.41V DC to 4.35 V DC (nominal 3.75 V DC)					
Special EMI components						
EUT sample type	□ Production	Pre-Production	□ Engineering			
Firmware		\Box for normal use	Special version for test execution			
FCC label attached	¥ yes □ no					

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

Short descrip- tion*)	EUT	Туре	S/N serial number	HW hardware status	SW software status
EUT A	JOYA TOUCH	Type : P00AN04HL0GT0W7 -GRR	Z16P00014	Beta HW Version P/N:911350013	SW Version:WEC7 Firmware Version: 2.16

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

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

AE short descrip- tion *)	Auxiliary Equipment	Туре	S/N serial number	HW hardware status	SW software status
AE 1	Laptop	DELL Inspiron			Windows 7

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



3.4. EUT set-ups

EUT set-up no.*)	Combination of EUT and AE	Remarks
set. 1	EUT A	Radiated measurements Set-up (AE 1 & Cable 1 were used only to activate Bluetooth mode was placed outside measurement chambers)
set. 2	EUT A + Cable 2	Conducted measurements Set-up (AE 1 & Cable 1 were used only to activate Bluetooth mode was placed outside measurement chambers)

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

3.5. EUT operating modes

EUT operating mode no.*)	Description of operating modes	Additional information
op. 1	TX-HFSS Mode Bluetooth BR/EDR	A continuous Bluetooth TX modes BR(Basic Rate) Mode GFSK- Modulation / EDR (Enhanced Data Rate (Vers. 2.1)) Mode can be established on with help of Datalogic test firmware version 2.16 & below mentioned softwares - USB to BT900 bridge using Windows-XP 32bit Virtual Machine - Bluetooth driver installation using BT900 firmware - Serial connection using Uw Teminal command window - Configuration of test mode, channels, modulation, Power in Blue Test3
op. 2	RX-HFSS Mode Bluetooth BR/EDR	 A continuous Bluetooth-RX Mode BR(Basic Rate) Mode GFSK- Modulation / EDR (Enhanced Data Rate (Vers. 2.1)) can be established on with help of Datalogic test firmware version 2.16 & below mentioned softwares USB to BT900 bridge using Windows-XP 32bit Virtual Machine Bluetooth driver installation using BT900 firmware Serial connection using Uw Teminal command window Configuration of test mode, channels, modulation, Power in Blue Test3.
op. 3	TX-DSSS Mode Bluetooth LE	 A continuous Bluetooth- LE (Low Energy) TX Mode can be established on with help of Datalogic test firmware version 2.16 & below mentioned softwares USB to BT900 bridge using Windows-XP 32bit Virtual Machine Bluetooth driver installation using BT900 firmware Serial connection using Uw Teminal command window Configuration of test mode, channels, modulation, Power in Blue Test3
op. 4	RX-DSSS Mode Bluetooth LE	 A continuous Bluetooth- LE (Low Energy) -RX Mode can be established on with help of Datalogic test firmware version 2.16 & below mentioned softwares USB to BT900 bridge using Windows-XP 32bit Virtual Machine Bluetooth driver installation using BT900 firmware Serial connection using Uw Teminal command window Configuration of test mode, channels, modulation, Power in Blue Test3.

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



3.6. Configuration of cables used for testing

Cable number	Item	Туре	S/N serial number	HW hardware status	Cable length
Cable 1	CABLETECH TECHNOLOGY	High-speed revision2.0		AWM 2725 FT2 E237114	1.2 m
Cable 2	RF –SMA Cable				0.133 m



4. Description of test system set-up's

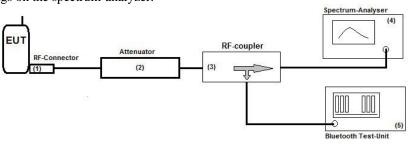
4.1. Test system set-up for conducted measurements on antenna port

Bluetooth conducted RF-Setup 1 (BT1 Set-up)

The EUT's RF-signal is coupled out by a suitable antenna coupling connector (1). The signal is first attenuated (2) then on the RF-coupler the coupled RF-path is connected to a Bluetooth test unit communication tester (5). The direct RF-path is connected to the spectrum – analyzer (4) for specific RF-measurements. The specific attenuation losses for both signal paths/branches are determined prior to the measurement within a set-up calibration. These are then taken into account by correcting the measurement readings on the spectrum-analyzer.

Schematic:

General description:



Testing method:	ANSI C63.10:2013, KDB 558074 D01 DTS Meas.Guidance v03r05		
Used Equipment	Passive Elements	Test Equipment	Remark:
	☑ 10 dB Attenuator	☑ CBT32 Communication Test- Unit for Bluetooth	See List of equipment under each test case and chapter 8 for calibration info
	Low loss RF- cables	☑ DC-Power Supply	
	☑ RF-Coupler	Spectrum-Analyser	
Measurement uncertainty	See chapter 5.6		



4.2. Test system set-up for radiated magnetic field measurements below 30 MHz

Specification: ANSI C63.10-2013 chapter 6.4 (§6.4.4.2)

General Description: Evaluating the radiated field emissions are done first by an exploratory emission measurement and a final measurement for most critical frequencies determined.

> The loop antenna was placed at 1 m height above ground plane and 3 m measurement distance from set-up for investigations. Because of reduced measurement distance, correction data were applied, as stated in chapter "General Limit - Radiated field strength emissions below 30 MHz". The tests are performed in the semi anechoic room recognized by the regulatory commission.

Schemat

Testing

atic:	< arr 3 m distance €	Receiver
	Anechoic Room	m magnetic antenna PC with measurement software Positioning Controller
	Power supply (if needed)	unit (if needed)
g method:	Exploratory, preliminary measurement The EUT and it's associated accessories are placed on a non-conductive position manipulator (tipping device) of 0.8 m height which is placed on the turntable. By rotating the turntable (step 90°, range 0°to 360°) and the EUT itself either	Final measurement on critical frequencies Based on the exploratory measurements, the most critical frequencies are re-measured by main- taining the EUT's worst-case operation mode, cable position, etc.
	on 3-orthogonal axis (portable equipment) or 2- orthogonal axis (defined operational position of EUT), the emission spectrum was recorded. The	First a frequency zoom around the critical frequency is done to locate the frequency more precisely. After this step, for all identified critical

ıl ely. After this step, for all identifie frequencies, the maximum peak was determined.

Following parameters were varied: the turntable angle continuously in the range 0 to 360 degree, the EUT itself either over 3-orthogonal axis (not defined usage position) or 2-orthogonal axis (defined usage position).

On the determined worst-case position, a final measurement with necessary bandwidth and detector according standard has been carried out.

Formula:	$E_C = E_R + AF + C_L + D_F - G_A$	AF =Antenna factor
		$C_L = Cable loss$
	$M = L_T - E_C$	D _F = Distance correction factor
		E_C = Electrical field – corrected value
		$E_R = Receiver reading$
		G_A = Gain of pre-amplifier (if used)
		$L_{T} = Limit$
		M = Margin
	All units are dB-units, positive margin m	eans value is below limit.

loop antenna was moved at least to 2-perpendicular axes (antenna vector in direction of EUT and parallel to EUT) in order to

maximize the emissions. The results are

documented in a diagram. Critical frequencies

(low margin to limit) are saved within a data

reduction table for further investigations. If

various operating modes are supported, further investigations are made to find the worst-case.

Also the interconnection cables and equipment

position were varied in order to maximize the

emissions.

Distance correction:

Reference for applied correction (extrapolating) factors due to reduced measurement distance: ANSI C63.10:2013, §6.4.4.2 - Equations (2) + (3) + (4)



4.3. Test system set-up for radiated electric field measurement 30 MHz to 1 GHz

Specification:

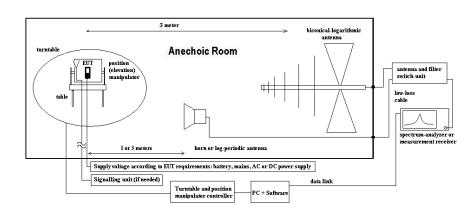
ANSI C63.4-2014 chapter 8.2.3, ANSI C63.10-2013 chapter 6.5

General Description:

Evaluating the field emissions have to be done first by an exploratory emissions measurement and a final measurement for most critical frequencies. The tests are performed in a NSA-compliant semi anechoic room (SAR) recognized by the regulatory commissions.

Schematic:

Testing method:



Exploratory, preliminary measurements

The EUT and its associated accessories are placed on a non-conductive position manipulator (tipping device) of 0.8 m height which is placed on the turntable. By rotating the turntable (range 0° to 360°, step 90°) and the EUT itself either on 3-orthogonal axis (portable equipment) or 2-orthogonal axis (defined operational position of EUT) the emission spectrum and it's characteristics was recorded with an EMI-receiver, broadband antenna and software.

Measurement antenna: horizontal and vertical, heights: 1,0 m and 1,82 m as worst-case determined by an exploratory emission measurements. The results are documented in a diagram. Critical frequencies (low margin to limit) are saved within a table for further investigations. If various operating modes are supported, further investigations are made to find the worst-case of them. Also the interconnection cables and equipment position were varied in order to maximize the emissions. Final measurement on critical frequencies

Based on the exploratory measurements, the most critical frequencies are re-measured by maintaining the EUT's worst-case operation mode, cable position, etc. either on 10m OATS or 3m semi-anechoic room.

First a frequency zoom around the critical frequency is done to locate the frequency more precisely. After this step, for all identified critical frequencies, the maximum peak was determined.

Following parameters were varied: the turntable angle continuously in the range 0 to 360 degree, the EUT itself either over 3-orthogonal axis (not defined usage position) or 2-orthogonal axis (defined usage position). The measurement antenna height between 1 m and 4 m.

On the determined worst-case position, a final measurement with necessary bandwidth and detector according standard has been carried out.

$E_C = E_R + AF + C_L + D_F - G_A (1)$	AF = Antenna factor
	$C_L = Cable loss$
$\mathbf{M} = \mathbf{L}_{\mathrm{T}} - \mathbf{E}_{\mathrm{C}} \tag{2}$	D_F = Distance correction factor (if used)
	E_C = Electrical field – corrected value
	$E_R = Receiver reading$
	$G_A = Gain of pre-amplifier (if used)$
	$L_{T} = Limit$
	M = Margin

All units are dB-units, positive margin means value is below limit.

Formula:



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4.4. Test system set-up for radiated electric field measurement above 1 GHz

Specification:

ANSI C63.4-2014 chapter 8.3, ANSI C63.10-2013 chapter 6.6.3.3 & 6.6.4

General Description: Evaluating the emissions have to be done first by an exploratory emissions measurement and a final measurement for most critical frequencies. The tests are performed in a CISPR 16-1-4:2010 compliant fully anechoic room (FAR) recognized by the regulatory commission. The measurement distance was set to 3 meter for frequencies up to 18 GHz and 2 meter above 18 GHz. A logarithmic periodic antenna is used for the frequency range 30 MHz to 1 GHz. Horn antennas are used for frequency range 1 GHz to 40 GHz. The EUT is aligned within 3 dB beam width of the measurement antenna with three orthogonal axis measurements on the EUT.

Schematic:

3 m	eter	~	
turntable position (elevation) table 1 or 3 meters Supply voltage according to E	Anechoic Room		antisuma and filter owritch-unit low-loss cable spectrum-analyzer or measurement receiver
Exploratory, preliminary mease The EUT and its associated placed on a non-conductive positi (tipping device) of 1.55 m height on the turntable. By rotating the to 0° to 360°, step 15°) and the EUT 3-orthogonal axis (portable equ orthogonal axis (defined operation EUT) the emission spectric characteristics was recorded of receiver, broadband antenna and so The measurements are performed and vertical polarization of th antennas. The results are doo diagram. Critical frequencies (limit) are saved within a tal investigations. If various opera supported, further investigations at the worst-case of them. Also the cables and equipment position order to maximize the emissions.	accessories are bassion manipulator criti which is placed tain urntable (range cabl f itself either on uipment) or 2- firs preconstruction of freq um and it's preconstruction with an EMI- goftware. Foll and in horizontal angle e measurement the cumented in a heig low margin to ble for further On ting modes are mea are made to find dete interconnection On were varied in measurement the	al measurement on critic ed on the exploratory mea cal frequencies are re-r ing the EUT's worst-ca le position, etc. t a frequency zoom a uency is done to locate cisely. After this step, for uencies, the maximum pe owing parameters were v le continuously in the rar EUT itself over 3-ortho the for EUT with large dir the determined worst-ca surement with necessa actor according standard h the determined worst-ca surement with necessa	asurements, the most measured by main- se operation mode, around the critical the frequency more all identified critical tak was determined. varied: the turntable nge 0 to 360 degree, ogonal axis and the mensions. use position, a final ry bandwidth and as been carried out. use position, a final ry bandwidth and
$E_{\rm C} = E_{\rm R} + AF + C_{\rm L} + D_{\rm F} - 0$ $M = L_{\rm T} - E_{\rm C} \qquad (2)$	E _R M = L _T	= Electrical field – c = Receiver reading = Margin = Limit ' = Antenna factor	corrected value

 $G_A = Gain \text{ of pre-amplifier (if used)}$ All units are dB-units, positive margin means value is below limit.

 $C_L = Cable loss$

 D_F = Distance correction factor (if used)



5. Measurements

5.1. RF-Parameter – RF Power conducted

5.1.1. Test location and equipment (for reference numbers please see chapter 'List of test equipment')

test location	☑ CETECOM Essen (Chapter. 2.2.1) □ 4		443 System CTC-FAR-EMI-		□ Please see Chapter. 2.2.3	
test site	□ 441 EMISAR	487 SAR NSA	□ 337 OATS	🗷 347 Radio.lab.		
receiver	□ 377 ESCS30	□ 001 ESS	🗷 489 ESU			
spectr. analys.	□ 489 ESU	□ 120 FSEM	□ 264 FSEK			
power supply	□ 456 EA 3013A □ 457 EA 3013A □ 459 EA 2032-50		□ 459 EA 2032-50	0 🗷 4.35 V DC (fully charged internal battery)		ry)
otherwise	☑ 613 20dB Attenuator		□ Directional Coupler 1539R-10			
Power meter	☑ 600 NRVD Power meter			🗷 266 NRV-Z31 Pea	k Power Sensor	

5.1.2. Requirements:

FCC	§15.247 (b) (1) for FHSS	
IC	RSS-247, Issue 1. Chapter 5.1, Point 2	
ANSI	C63.10-2013 (chapter 6.101)	

5.1.3. Reference: EUT antenna characteristics:

☑ Directional Gain < 6 dBi (measured: difference between measured conducted and radiated eirp. power) □ Directional Gain > 6 dBi (measured / applicant's declaration) -> conducted power reduction necessary

5.1.4. EUT settings:

For FHHS-systems hopping mode was switched-off so fixed three different channels could be measured. The EUT was instructed to send with maximum power (if adjustable) according applicants instructions. Different modulation characteristics have been checked, e.g. data rates which EUT can operate.

5.1.5. Measurement method:

The measurement was performed in non-hopping transmission mode with the carrier set to lowest/middle and highest channel. The power was also checked for different data rates, modulation scheme or packet types if applicable.

Set of RBW

RBW > 20 dB bandwith of the emission (for FHSS)

5.1.0. Settings on Speetrum-Analyzer.		
Center Frequency Nominal channel frequency		
Span	8 MHz	
Resolution Bandwidth (RBW)	3 MHz > 20 dB-Bandwidth of the signal	
Video Bandwidth (VBW)	3 times the resolution bandwidth = $10MHz$	
Sweep time	coupled	
Detector	Peak, Max hold mode	
Sweep Mode	Repetitive mode	

5.1.6. Settings on Spectrum-Analyzer:



5.1.7. Conducted measurement: Max. Peak Power

• Maximum declared antenna gain [isotropical]: 0.50 dBi

MAX PEAK POWER (conducted) [dBm]					
Set-up no.: 2 Op-Mode: 1	Low channel = 0 (2402 MHz)	High channel = 78 (2480 MHz)			
BR Mode-1Mbps -GFSK	4.59	7.17	8.25		
EDR Mode-3Mbps-8 DPSK	-2.45 1.21 2.48				
Maximum Conducted value	8.25 dBm (6.68 mW)				
Maximum antenna gain:	0.50 dBi				
Maximum e.i.r.p. value	8.75 dBm (7.50 mW)				
Limit	21dBm (125 mW)				

MAX PEAK POWER (conducted) [dBm]								
Set-up no.:2Op-Mode:3	Low channel =37 (2402 MHz)							
LE Mode-1Mbps -GFSK	5.92	5.39	5.98					
Maximum Conducted value	5.98 dBm (3.96 mW)							
Maximum antenna gain:	0.50 dBi							
Maximum e.i.r.p. value	6.48 dBm (4.44 mW)							
Limit	21dBm (125 mW)							

Remarks:

1.) For further details please refer diagrams in separate annex A1

Maximum Conducted value among all Modes: 8.25 dBm (6.68 mW)

TEST RESULT: Pass



5.2. General Limit - Radiated field strength emissions below 30 MHz

5.2.1. Test location and equipment

5.2.1. Test location and equipment									
test location	CETECOM Esser	n (Chapter. 2.2.1)	Please see Chapte	er. 2.2.2	Please see Chapt	er. 2.2.3			
test site	🗷 441 EMISAR	□ 487 SAR NSA	□ 347 Radio.lab.						
receiver	□ 377 ESCS30	🗷 001 ESS							
spectr. analys.	□ 584 FSU	□ 120 FSEM	□ 264 FSEK						
antenna	🗆 574 BTA-L	□ 133 EMCO3115	□ 302 BBHA9170	289 CBL 6141	🗷 030 HFH-Z2	□ 477 GPS			
signaling	□ 392 MT8820A	□ 371 CBT32	□ 547 CMU	□ 594 CMW					
otherwise	□ 400 FTC40x15E	□ 401 FTC40x15E	□110 USB LWL	□ 482 Filter Matrix	□ 378 RadiSense				
DC power	🗆 456 EA 3013A	🗆 457 EA 3013A	□ 459 EA 2032-50	268 EA- 3050	□ 494 AG6632A	□ 498 NGPE 40			
line voltage	🗆 230 V 50 Hz via p	oublic mains	🗷 4.35 V DC (fully	charged internal batte	ry)				

5.2.2. Requirements

1212 Requirements									
FCC	Part 15, Subpart 0	art 15, Subpart C, §15.205 & §15.209							
IC	RSS-Gen: Issue 4	SS-Gen: Issue 4: §8.9 Table 5							
ANSI	C63.10-2013	.10-2013							
Frequency [MHz]	Field strength limit [µV/m] [dBµV/m]		Distance [m]	Remarks					
0.009 - 0.490	2400/f (kHz) 67.6 – 20Log(f) (kHz)		300	Correction factor used due to measurement distance of 3 m					
0.490 - 1.705	24000/f (kHz) 87.6 – 20Log(f) (kHz)		30	Correction factor used due to measurement distance of 3 m					
1.705 - 30	30	29.5	30	Correction factor used due to measurement distance of 3 m					

5.2.3. Test condition and test set-up

eraler rest cond	and test set-	ap					
Signal link to test sy	ystem (if used):	🗆 air link	□ cable connection	🗵 none			
EUT-grounding		🗷 none	□ with power supply	□ additional connection			
Equipment set up		🗷 table top		□ floor standing			
Climatic conditions		Temperature:	(22±3°C)	Rel. humidity: (40±20)%			
	Scan data		\blacksquare 9 - 150 kHzRBW/VBW = 200 HzScan step = 80 Hz \blacksquare 150 kHz - 30 MHzRBW/VBW = 9 kHzScan step = 4 kHz \Box other:				
EMI-Receiver or	Scan-Mode	🗷 6 dB EMI-I	🗷 6 dB EMI-Receiver Mode 🗆 3dB Spectrum analyser Mode				
Analyzer Settings	Detector	Peak (pre-measurement) and Quasi-PK/Average (final if applicable)					
	Mode:	Repetitive-Sca	ın, max-hold				
	Sweep-Time			ous signal otherwise adapted to EUT's individual			
		transmission duty-cycle					
General measurement	General measurement procedures		Please see chapter "Test system set-up radiated magnetic field measurements below 30 MHz"				

5.2.4. Measurement Results

The results are presented below in summary form only. For more information please consult the diagrams included in annex 1.

Table of measurement results:

Diagram No.	Channel		Frequency range	Set- OP- up mode		Remark	Used detector			Result
	Range	No.		no. no.				AV	QP	
2.04	High	78	9 kHz-30 MHz	1	1	BR Mode (GFSK-1Mbps)	×			Pass
2.05	High	78	9 kHz-30 MHz	1	1	EDR Mode (8DPSK-3Mbps)	×			Pass
2.06	High	39	9 kHz-30 MHz	1	3	LE Mode (GFSK-1Mbps)	X			Pass

Remark: 1.) For further details please refer diagrams in separate annex A1

2.) Tests performed only on Worst-Case Channels of Conducted measurements



5.2.5. Correction factors due to reduced meas. distance (f< 30 MHz)

The used correction factors when the measurement distance is reduced compared to regulatory measurement distance, are calculated according Extrapolation formulas valid for EUT's with maximum dimension of 0.625xLambda. Formula 2+3+4 as presented in ANSI C63.10, Chapter 6.4.4 are used for the calculations of proper extrapolation factors.

Frequency -Range	f [kHz/MHz]	Lambda [m]	Far-Field Point [m]	Distance Limit accord. 15.209 [m]	1st Condition (dmeas< D _{near-field})	2'te Condition (Limit distance bigger d _{near-field})	Distance Correction accord. Formula
	9,00E+03	33333, 33	5305,17		fullfilled	not fullfilled	-80,00
	1,00E+04	30000,00	4774,65		fullfilled	not fullfilled	-80,00
	2,00E+04	15000,00	2387,33		fullfilled	not fullfilled	-80,00
	3,00E+04	10000,00	1591,55		fullfilled	not fullfilled	-80,00
	4,00E+04	7500,00	1193,66		fullfilled	not fullfilled	-80,00
	5,00E+04	6000,00	954, 93		fullfilled	not fullfilled	-80,00
	6,00E+04	5000,00	795, 78		fullfilled	not fullfilled	-80,00
	7,00E+04	4285,71	682,09	300	fullfilled	not fullfilled	-80,00
	8,00E+04	3750,00	596,83	000	fullfilled	not fullfilled	-80,00
	9,00E+04	3333,33	530, 52		fullfilled	not fullfilled	-80,00
kHz	1,00E+05	3000,00	477,47		fullfilled	not fullfilled	-80,00
	1,25E+05	2400,00	381,97		fullfilled	not fullfilled	-80,00
	2,00E+05	1500,00	238,73		fullfilled	fulfilled	-78,02
	3,00E+05	1000,00	159, 16		fullfilled	fulfilled	-74, 49
	4,00E+05	750,00	119, 37		fullfilled	fullfilled	-72,00
	4,90E+05	612,24	97,44		fullfilled	fulfilled	-70,23
	5,00E+05	600,00	95,49		fullfilled	not fullfilled	-40,00
	6,00E+05	500,00	79,58		fullfilled	not fullfilled	-40,00
	7,00E+05	428,57	68,21		fullfilled	not fullfilled	-40,00
	8,00E+05	375,00	59,68		fullfilled	not fullfilled	-40,00
	9,00E+05	333, 33	53,05		fullfilled	not fullfilled	-40,00
	1,00	300,00	47,75		fullfilled	not fullfilled	-40,00
	1,59	188,50	30,00		fullfilled	not fullfilled	-40,00
	2,00	150,00	23,87		fullfilled	fullfilled	-38, 02
	3,00	100,00	15,92		fullfilled	fulfilled	-34, 49
	4,00	75,00	11,94		fullfilled	fullfilled	-32,00
	5,00	60,00	9,55		fullfilled	fullfilled	-30,06
	6,00	50,00	7,96		fullfilled	fulfilled	-28,47
	7,00	42,86	6,82		fullfilled	fullfilled	-27, 13
	8,00	37,50	5,97		fullfilled	fullfilled	-25,97
	9,00	33, 33	5,31		fullfilled	fullfilled	-24,95
	10,00	30,00	4,77	30	fullfilled	fullfilled	-24,04
	10,60	28, 30	4,50		fullfilled	fulfilled	-23, 53
MHz	11,00	27,27	4,34		fullfilled	fullfilled	-23,21
	12,00	25,00	3,98		fullfilled	fullfilled	-22, 45
1	13,56	22, 12	3,52		fullfilled	fullfilled	-21, 39
	15,00	20,00	3, 18		fullfilled	fullfilled	-20,51
	15,92	18,85	3,00		fullfilled	fulfilled	-20,00
	17,00	17,65	2,81		not fullfilled	fulfilled	-20,00
	18,00	16,67	2,65		not fullfilled	fulfilled	-20,00
	20,00	15,00	2,39		not fullfilled	fulfilled	-20,00
	21,00	14,29	2,27		not fullfilled	fulfilled	-20,00
	23,00	13,04	2,08		not fullfilled	fulfilled	-20,00
1	25,00	12,00	1,91		not fullfilled	fullfilled	-20,00
	27,00	11, 11	1,77		not fullfilled	fulfilled	-20,00
	29,00	10,34	1,65		not fullfilled	fulfilled	-20,00
	30,00	10,00	1,59		not fullfilled	fullfilled	-20,00



5.3. General Limit - Radiated field strength emissions, 30 MHz - 1 GHz

5.3.1. Test location and equipment

5.5.1. Test location and equipment									
test location	CETECOM Essen (Chapter. 2.2.1)		Please see Chapte	er. 2.2.2	□ Please see Chapter. 2.2.3				
test site	🗷 441 EMI SAR	🗷 487 SAR NSA							
receiver	□ 377 ESCS30	🗷 001 ESS	□ 489 ESU 40	□ 620 ESU 26					
spectr. analys.	□ 584 FSU	□ 120 FSEM	□ 264 FSEK						
antenna	🗷 574 BTA-L	□ 133 EMCO3115	□ 302 BBHA9170	289 CBL 6141	□ 030 HFH-Z2	□ 477 GPS			
signaling	□ 392 MT8820A	□ 371 CBT32	□ 547 CMU	□ 594 CMW					
otherwise	□ 400 FTC40x15E	□ 401 FTC40x15E	□ 110 USB LWL	🗷 482 Filter Matrix					
DC power	🗆 456 EA 3013A	🗆 457 EA 3013A	□ 459 EA 2032-50	268 EA- 3050	□ 494 AG6632A	□ 498 NGPE			
line voltage	🗆 230 V 50 Hz via	public mains	🗷 4.35 V DC (fully	charged internal batte	ry)				

5.3.2. Requirements/Limits

	FCC	 Part 15 Subpart B, §15.109, class B Part 15 Subpart C, §15.209 @ frequencies defined in §15.205 				
	IC	 RSS-Gen., Issue 4, Chapter 8.9, Table 4+6 (licence-exempt radio apparatus) RSS-Gen., Issue 4, Chapter 7.1.2, Table 2 (receiver) ICES-003, Issue 6, Table 5 (Class B) RSS-247, Issue 1, Chapter 5 				
	ANSI	□ C63.4-2014 ☑ C63.10-2013				
	Engine av [MII]	Radiated emission	ns limits, 3 meters			
	Frequency [MHz]	QUASI Peak [µV/m]	QUASI-Peak [dBµV/m]			
Limit	30 - 88	100	40.0			
Linnt	88 - 216	150	43.5			
	216 - 960	200 46.0				
	above 960	500	54.0			

5.3.3. Restricted bands of operation (FCC §15.205/ RSS-Gen, Issue 4 Chapter 8.9, Table 4)

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.20725-4.20775	37.5-38.25	1645.5-1646.5	9.3-9.5
6.215-6.218	73-74.6	1660-1710	10.6-12.7
6.26775-6.26825	74.8-75.2	1718.8-1722.2	13.25-13.4
6.31175-6.31225	108-121.94	2200-2300	14.47-14.5
8.291-8.294	123-138	2310-2390	15.35-16.2
8.362-8.366	149.9-150.05	2483.5-2500	17.7-21.4
8.37625-8.38675	156.52475-156.52525	2690-2900	22.01-23.12
8.41425-8.41475	156.7-156.9	3260-3267	23.6-24.0
12.29-12.293	162.0125-167.17	3332-3339	31.2-31.8
12.51975-12.52025	167.72-173.2	3345.8-3358	36.43-36.5
12.57675-12.57725	240-285	3600-4400	
13.36-13.41	322-335.4		
Remark: only spurious emis	sions are allowed within these freque	ency bands not exceeding the limits	per §15.209

Signal link to test sy	/stem (if used):	🗆 air link	□ cable connection	🗵 none			
EUT-grounding		🗷 none	□ with power supply	□ additional connection			
Equipment set up		☑ table top 0.8	8m height	□ floor standing			
Climatic conditions		Temperature: ((22±3°C)	Rel. humidity: (40±20)%			
EMI-Receiver	Scan frequency range:	¥ 30−1000 M	1Hz 🗆 other:				
(Analyzer) Settings	Scan-Mode	🗷 6 dB EMI-R	6 dB EMI-Receiver Mode 3 dB spectrum analyser mode				
	Detector	Peak / Quasi-peak					
	RBW/VBW	100 kHz/300 k	Hz				
	Mode:	Repetitive-Sca	ın, max-hold				
	Scan step	80 kHz					
	Sweep-Time	Coupled - cali	brated display if continue	ous tx-signal otherwise adapted to EUT's individual			
		duty-cycle					
General measureme	ent procedures	Please see chapter "Test system set-up for electric field measurement in the range 30 MHz					
		to 1 GHz"					

5.3.4. Test condition and measurement test set-up

5.3.5. MEASUREMENT RESULTS

The results are presented below in summary form only. For more information please consult the diagrams included in annex 1.

Table of measurement results:

Dia- gram	Carrier C	Channel	Frequency range	Set- up	OP- mode	Remark	Use	d detec	ctor	Result
no.	Range	No.	0	no.	no.		PK	AV	QP	
3.04	High	78	30 MHz – 1 GHz	1	1	BR Mode (GFSK-1Mbps)	X		X	Pass
3.05	High	78	30 MHz – 1 GHz	1	1	EDR Mode (8DPSK-3Mbps)	X		×	Pass
3.06	High	39	30 MHz – 1 GHz	1	3	LE Mode (GFSK-1Mbps)	X		×	Pass

Remark: 1.) For further details please refer diagrams in separate annex A1

2.) Tests performed only on Worst-Case Channels of Conducted measurements



GP 477 S

5.4. General Limit - Radiated emissions, above 1 GHz

5.4.1. Test lo	ocation and equ	ipment FAR						
test site	□441 EMISAR	□ 348 EMI cond.	🗷 443 EMI FAR	□ 347 Radio.lab.		337	OATS	
spectr. analys.	□584 FSU	□ 120 FSEM	□ 264 FSEK	🗷 489 ESU 40				
antenna meas	□574 BTA-L	□ 289 CBL 6141	□ 608 HL 562	⊠ 549 HL025	×	302	BBHA9170	
antenna meas	□123 HUF-Z2	□ 132 HUF-Z3	□ 030 HFH-Z2	□ 376 BBHA9120E	1			
antenna subst	□071 HUF-Z2	□ 020 EMCO3115	🗆 063 LP 3146	□ 303 BBHA9170				
multimeter	□341 Fluke 112							
signaling	□392 MT8820A	□ 371 CBT32	□ 547 CMU	□ 594 CMW				
DCpower	□086 LNG50-10	087 EA3013	□ 354 NGPE 40	□ 349 car battery		350	Car battery	
line voltage	🗆 230 V 50 Hz via	public mains	A 4.35 V DC (fully	charged internal batte	ery)			

5.4.2. Requirements/Limits (CLASS B equipment)

FCC	□ Part 15 Subpart B, §15.109 class B ☑ Part 15 Subpart C, §15.209 for frequencies defined in §15.205 □ Part 15 Subpart C, §15.407(b)(1)(2)(3) 9							
IC	 RSS-Gen., Issue 4, Chapter 8.9, Table 4+6 (transmitter licence excempt) RSS-Gen., Issue 4, Chapter 8.9, Table 2 (receiver) ICES-003, Issue 6, Chapter 6.2.2, Table 7 (class B) 							
ANSI	□ C63.4-2014 ☑ C63.10-2013							
		Limits	8					
Frequency	AV	AV	Peak	Peak				
[MHz]	[µV/m]	[dBµV/m]	[µV/m]	[dBµV/m] or [dBm/MHz]				
above 1 GHz for frequencies as defined in §15.205 or RSS-Gen., Issue 4, §8.10 - Table 6	500	54.0	5000	74.0 dBµV/m				

5.4.3. Test condition and measurement test set-up

Signal link	Signal link to test system (if used):		□ cable connection	x none		
0						
EUT-groun	ding	🗷 none	with power supply	□ additional connection		
Equipment	set up	☑ table top 1.5	5m height	□ floor standing		
Climatic co	nditions	Temperature: ((22±3°C)	Rel. humidity: (40±20)%		
Spectrum-	Scan frequency range:	⊠ 1 – 18 GHz	⊠ 18 – 25 GHz □ 18	$-40 \text{ GHz} \square$ other:		
Analyzer	Scan-Mode	🗷 6 dB EMI-Receiver Mode 🗆 3 dB Spectrum analyser Mode				
settings	Detector	Peak and Average				
	RBW/VBW	1 MHz / 3 MHz				
	Mode:	Repetitive-Scan, max-hold				
	Scan step	400 kHz				
	Sweep-Time	nal otherwise adapted to EUT's individual duty-cycle				
General mea	surement procedures	Please see chapter "Test system set-up for radiated electric field measurements above 1 GHz"				



5.4.4. Measurement Results

The results are presented below in summary form only. For more information please consult the diagrams included in annex 1.

Dia- gram	Carrier (Channel	Frequency range	Set- up	OP- mode	Remark	Use	d detec	ctor	Result
no.	Range	No.	runge	no.	no.		РК	AV	QP	
4.04	High	78	1-18 GHz	1	1	BR Mode (GFSK-1Mbps)	X	×		Pass
4.04a	High	78	18-25 GHz	1	1	BR Mode (GFSK-1Mbps)	×	×		Pass
4.05	High	78	1-18 GHz	1	1	EDR Mode (8DPSK-3Mbps)	×	×		Pass
4.05a	High	78	18-25 GHz	1	1	EDR Mode (8DPSK-3Mbps)	×	×		Pass
4.06	High	39	1-18 GHz	1	3	LE Mode (GFSK-1Mbps)	×	×		Pass
4.06a	High	39	18-25 GHz	1	3	LE Mode (GFSK-1Mbps)	×	×		Pass

Remark: 1.) For further details please refer diagrams in separate annex A1

2.) Tests performed only on Worst-Case Channels of Conducted measurements

3.) Carrier on diagram wanted TX-channel, not relevant for results

5.5. RF-Parameter - Radiated Band Edge compliance measurements

5.5.1. Test location and equipment FAR

te	st site	□441 EMISAR	□ 348 EMI cond.	🗷 443 EMI FAR	□ 347 Radio.lab.	□ 337 OATS				
sp	bectr. analys.	□584 FSU	□ 120 FSEM	□ 264 FSEK	🗷 489 ESU 40					
an	ntenna meas	□574 BTA-L	□ 289 CBL 6141	🗆 608 HL 562	🗷 549 HL025	□ 302 BBHA9170	□ 477 GPS			
an	ntenna meas	□123 HUF-Z2	□ 132 HUF-Z3	□ 030 HFH-Z2						
an	ntenna subst	□071 HUF-Z2	□ 020 EMCO3115	🗆 063 LP 3146	□ 303 BBHA9170					
m	ultimeter	□341 Fluke 112								
si	gnaling	□392 MT8820A	□ 371 CBT32	□ 547 CMU	□ 594 CMW					
D	C power	□086 LNG50-10	🗷 087 EA3013	□ 354 NGPE 40	□ 349 car battery	□ 350 Car battery				
lir	ne voltage	🗷 4.35 V DC (fully	charged internal batte	ery)	□ 060 120 V 60 Hz via PAS 5000					

5.5.2. Requirements/Limits

FCC	□ Part 15 Subpart B, §15.109 class B ☑ Part 15 subpart C, §15.209 @ frequencies defined in §15.205				
IC \square RSS-210, Issue 8, Annex 8 \blacksquare RSS-Gen: Issue 4: §8.9 Table 4+5+6					
ANSI	□ C63.4-2009 □ C63.4-2014 □ C63.10-2009 ⊠ C63.10-2013, Chapter 6.10.6				

5.5.3. Test condition and measurement test set-up

	cist rest condition and measurement test set up									
Signal ink t	o test system (if used):	🗆 air link	□ cable connection	🗷 none						
EUT-groun	EUT-grounding		□ with power supply	□ additional connection						
Equipment	set up	☑ table top 1.5	5m height	□ floor standing						
Climatic co	nditions	Temperature: ((22±3°C)	Rel. humidity: (40±20)%						
Spectrum-	Scan frequency range:	□ 1 – 18 GHz	□ 18 – 25 GHz □ 18 -	– 40 GHz 🗷 other: see diagrams						
Analyzer	Scan-Mode	□ 6 dB EMI-Receiver Mode 🗵 3 dB Spectrum analyser Mode								
settings	Detector	Peak and Aver	age							
	RBW/VBW	Left band-edge: 100kHz/300kHz								
		Right band-edge: 1 MHz / 3 MHz								
	Mode:	Repetitive-Scan, max-hold								
	Scan step	40kHz or 400	kHz							
	Sweep-Time	Coupled – calibrated display if CW signal otherwise adapted to EUT's individual duty-cycle								
General mea	surement procedures	Please see chapter "Test system set-up for radiated electric field measurements above 1 GHz"								
		for general measurements procedures in anechoic chamber.								

5.5.4. Measurement Method

For <u>uncritical results</u> where a measurement resolution bandwidth of 1MHz can clearly show the compliance without influencing the results, a field strength measurement was performed to show compliance.

For <u>critical results</u> a Marker-Delta marker method was used for showing compliance to restricted bands. The method is according ANSI C63.10:2013, Chapter 6.10.6 "Marker-Delta method", The method consists of three independent steps:

- **1. Step:** Prior to the measurement the fundamental radiated In-Band field strength was performed. The determined value is used as reference value.
- **2. Step**: Second step consist of finding the relative attenuation between the fundamental emission and the maximum local out-of-band emission (within 2 MHz range around the band edge either on the band-edge directly or some modulation product if the level is greater than that on the band-edge) when measured with lower resolution bandwidth.
- **3. Step:** The delta value recorded in step 2 will be subtracted from value recorded in step 1, thus giving the required field strength at the band-edge. This value must fulfil the requirements for radiated spurious emissions in restricted bands in FCC §15.205 or RSS-Gen, Issue 4, Chapter 8.10, Table 6 with the general limits of FCC §15.209 or RSS-Gen, Issue 4 Chapter 8.9, Table 4.

5.5.5. EUT settings

The EUT was instructed to send with maximum power (if adjustable) according to applicants instructions.



5.5.6. Results: for non-restricted bands near-by

5.5.6.1. Non-restricted bands near-by - limits according FCC §15.407 and RSS-247, Issue 1, Chapter 5.5

Diagram No.	Channel Restricte		icted IOBUV/MI		Peak-Value at Band-Edge	Difference	Limit	Margin	Verdict	Remark:	
Diagram No.	no.	band ?	Peak-Value			[dB] [dBc]		[dB]	verdict		
9.07	0	no	94,6	90,3	50,1	44,5	20	24,5	PASS	TX_BR_GFSK(1Mbps)-mode_CH0 Power Value= Maximum Power	
9.09	0	no	89,63	79,7	50,3	39,33	20	19,33	PASS	TX_EDR_8DPSK(3Mbps)-mode_CH0 Power Value= Maximum Power	
9.11	0	no	92,26	83,57	50,2	42,06	20	22,06	PASS	TX_LE_GFSK(1Mbps)-mode_CH0 Power Value= Maximum Power	

Remark: 1.) For further details please refer diagrams in separate annex A1

5.5.6.2. Restricted bands near-by (§15.205 with limits accord. FCC §15.209) and (RSS-Gen, Issue4, Chapter 8.10)

Diagram No.	Channel				, , , , , , , , , , , , , , , , , , ,		Ŭ						•	Verdict	Remark:	
	no.	band ?	Peak-Value	Average-Value	Peak -Value	Average -Value	Peak -Value	Average -Value	Peak	Average						
9.08	78	yes	98,33	98,26	57,29	45,86	74	54	16,71	8,14	PASS	TX_BR(GFSK 1Mbps)_CH78 Power Value= Maximum Power				
9.10	78	yes	96,20	93,17	57,49	46,01	74	54	16,51	7,99	PASS	TX_EDR(8DPSK 3Mbps)-mode_CH78 Power Value= Maximum Power				
9.12	39	yes	99,80	96,62	63,77	53,23	74	54	10,23	0,77	PASS	TX_LE(GFSK 1Mbps)-mode_CH39 Power Value= Maximum Power				

Remark: 1.) For further details please refer diagrams in separate annex A1

5.5.7. Verdict: Pass



5.6. Measurement uncertainties

The reported uncertainties are calculated based on the standard uncertainty multiplied with the appropriate coverage factor \mathbf{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	Ca			tainty b level of	based or 95%	ı a	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 d	В					Substitution method	
Power Output conducted		Set-up No.	Cel- C1	Cel- C2	BT1	W1	W2			
Power Output conducted	-	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	-	9 kHz - 2.8 GHz	0.70	N/A	0.70	N/A	0.69		N/A - not	
on RF-port		2.8 GHz - 12.75GHz	1.48	N/A	1.51	N/A	1.43		applicable	
		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		Delta N	Marker))		Frequency error Power	
Emission bandwidth	-	9 kHz - 4 GHz	0.1272	0.1272 ppm (Delta Marker) See above: 0.70 dB				Frequency error Power		
Frequency stability	-	9 kHz - 20 GHz	0.063	6 ppm					-	
Radiated emissions Enclosure	-	150 kHz - 30 MHz 30 MHz - 1 GHz 1 GHz - 20 GHz	5.0 dE 4.2 dE 3.17 d	3					Magnetic field E-field Substitution	

Table: measurement uncertainties, valid for conducted/radiated measurements



The abbreviation	S
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
РК	Peak
RBW	resolution bandwidth
RF	Radio frequency
RSS	Radio Standards Specification, Dokuments from Industry Canada
Rx	Receiver
TCH	Traffic channel
Tx	Transmitter
QP	Quasi peak detector
VBW	Video bandwidth
ERP	Effective radiated power

6. Abbreviations used in this report

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 OATS	R-2666Radiated Measurements 30 MHz to 1 GHz, 3 m (SAR)G-301Radiated Measurements 1 GHz to 6 GHz, 3 m (SAR)C-2914Mains Ports Conducted Interference Measurements		VCCI, Voluntary Control Council for Interference by Information Technology Equipment, Japan	



8. Instruments and Ancillary

8.1. Used equipment "CTC"

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

RefNo.	Equipment	Туре	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
528 546	Load Dump Simulator Univ. Radio Communication Tester	LD 200B CMU 200	0496-06 106436	Software-Nr. 000031 Version V2.35a01 R&S Test Firmware Base=5.14, GSM=5.14
547	Univ. Radio Communication Tester	CMU 200	835390/014	WCDMA=5.14 (current Testsoftw.,f. all band to be used 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
				R&S Test Firmware Base=5.01, GSM=5.02 WCDMA=
597 598	Univ. Radio Communication Tester Spectrum Analyzer	CMU 200 FSEM 30 (Reserve)	100347 831259/013	not installed, Mainboard= μP1=V.850 Firmware Bios 3.40, Analyzer 3.40 Sp 2
620	EMI Test Receiver	ESU 26	100362	4.43 SP3
642	Wideband Radio Communication Tester	CMW 500	126089	4.45_SF5 Setup V03.26, Test programm component V03.02.20
670	Univ. Radio Communication Tester	CMU 200	120089	μ P1 =V8.50, Firmware = V.20
689	Vector Signal Generator	SMU200	100833	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

RefNo.	Equipment	Туре	Serial-No.	Manufacturer	Interval of calibration	Remark	Cal due
001	EMI Test Receiver	ESS	825132/017	Rohde & Schwarz	12 M	-	30.05.2017
005	AC - LISN (50 Ohm/50µH, test site 1)	ESH2-Z5	861741/005	Rohde & Schwarz	12 M	-	30.05.2017
007	Single-Line V-Network (50 Ohm/5µH)	ESH3-Z6	892563/002	Rohde & Schwarz	12 M	-	30.05.2017
009	Power Meter (EMS-radiated)	NRV	863056/017	Rohde & Schwarz	24 M	-	30.04.2017
	Line Impedance Simulating Network	Op. 24-D	B6366	Spitzenberger+Spies	36 M	-	30.05.2019
	Horn Antenna 18 GHz (Subst 1)	3115	9107-3699	EMCO	36/12 M	-	31.03.2017
021	Loop Antenna (H-Field)	6502	9206-2770	EMCO	36 M	-	30.04.2018
	Loop Antenna (H-field)	HFH-Z2	879604/026	Rohde & Schwarz	36 M	-	30.04.2018
	RF-current probe (100kHz-30MHz)	ESH2-Z1	879581/18	Rohde & Schwarz	24 M	-	30.04.2017
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	30.06.2016
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
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	•	2	
-			-		pre-m		
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	
					•	2	
276	DC-Block	Model 7006 (SMA)	C7061	Weinschel	pre-m		
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
	high pass filter GSM 850/900	WHJ 2200-4EE	14	Wainwright GmbH	12 M	1c	30.06.2017
	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	-	30.05.2017
301	attenuator (20 dB) 50W, 18GHz	47-20-33	AW0272	Lucas Weinschel	pre-m	2	I
302	horn antenna 40 GHz (Meas 1)	BBHA9170	155	Schwarzbeck	36 M	-	31.03.2017
	horn antenna 40 GHz (Subst 1)	BBHA9170	156	Schwarzbeck	36 M	-	31.03.2017
331	Climatic Test Chamber -40/+80 Grad	HC 4055	43146	Heraeus Vötsch	Pre-m	2	
341	Digital Multimeter	Fluke 112	81650455	Fluke	24 M	-	30.05.2018
-	Digital Multimeter	Voltcraft M-4660A	IB 255466	Voltcraft	24 M	-	30.04.2017
347	laboratory site	radio lab.	-	-	-	5	
348	laboratory site	EMI conducted	-	-	-	5	
-	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	-	30.04.2017
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	-	30.05.2017
377	EMI Test Receiver	ESCS 30	100160	Rohde & Schwarz	12 M	-	30.05.2017
389	Digital Multimeter	Keithley 2000	0583926	Keithley	24 M	-	30.04.2017
392	Radio Communication Tester	MT8820A	6K00000788	Anritsu	12 M	-	30.05.2017
431	Model 7405	Near-Field Probe Set	9305-2457	EMCO	-	4	[]
436	Univ. Radio Communication Tester	CMU 200	103083	Rohde & Schwarz	12 M	-	30.04.2017
439	UltraLog-Antenna	HL 562	100248	Rohde & Schwarz	36 M	-	31.03.2017
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



163 Universal source HP3215A 281A03472 Aglent - 4 4 165 Digital Multimeter Fluke 112 \$9001955 Fluke USA 36 M - 30.05.27 167 Digital Multimeter Fluke 112 \$9001955 Fluke USA 36 M - 30.04.27 168 Digital Multimeter Fluke 112 \$9001955 Fluke USA 36 M - 30.04.27 169 Power ander Ghala NKVS Rassover and the state of the	RefNo.	Equipment	Туре	Serial-No.	Manufacturer	Interval of calibration	Remark	Cal due
199 DC - Power supply -0.5. do -2.1 Elstic Automatik power 2 300.12 640 Liveral source HP3345A 2831.03127 Aglem - 4 647 Digital Multimeter Fluke 112 39501037 Puke USA 36.04 - 300.12 647 Digital Multimeter Fluke 112 39500306 Fluke USA 36.04 - 300.12 647 Redutating CPS System A4.4 - 2000405 Fluke USA 36.04 - 300.12 648 Presentifies 25 - 18 GHz 100 Nor Rold & Schunger 124 - 300.02 649 presentifies 25 - 18 GHz 100 100.00 Rold & Schunger 124 - 300.22 702 Inder schuler System CTC NSA-Verification SAR-EMI System SMI feld SAR - S00.24 - 300.24 - 300.24 - 300.24 - 300.24 - 300.24 - 300.24 - 300.24 - 300.24	454	Oscilloscope	HM 205-3	9210 P 29661	Hameg	-	4	
160 Univ. Radio Communication Toter CMU 200 100901 Rouke & Schwarz 12.1 - Adjust 166 Digital Multimeter Flake 112 98710177 Flake USA 3.60 - 3.00.12 168 Digital Multimeter Flake 112 9960106 Flake USA 3.60 - 3.00.12 168 Digital Multimeter Flake 112 9960106 Flake USA 3.00.12 - 3.00.12 168 Digital Multimeter Flake 112 9960106 Flake USA 3.00.12 - 3.00.12 169 Intermarks Particital State Advert Sto DO21000-25: 1.244554 Milling CTS Schwart 1.2 - 1.00.23 160 Intermarks Ra Film Store DO21000-25: 1.244554 Milling CTS Milling CTS Schwart 1.2 - 1.00.23 170 Diadi Schwart ISA Milling CTS Schwart 1.00.13 Nond Schwart 1.0 1.00.23 180 Diadi Schwart ISA Milling CTS Schwart 1.0 1.00.23 Nond S	456	DC-Power supply 0-5 A	EA 3013 S	207810	Elektro Automatik	pre-m	2	
Inst. Universal source HP325A 28714372 Agkent - 4 - 1 500.55 46 Digula Multimeter Fluke 112 9800306 Fluke USA 30.45X 30.45X<	459	DC -Power supply 0-5 A, 0-32 V	EA-PS 2032-50	910722	Elektro Automatik	pre-m	2	
166 Epidal Multimeter Flake 112 992(16)7 Flake USA 20 M	460	Univ. Radio Communication Tester	CMU 200	108901	Rohde & Schwarz	12 M	-	30.04.2017
197 Digital Multimeter Plake 112 990000455 Plake USA 35 M - 300.42 288 Digital Multimeter Name Allorentity Cons. Fink - 3	463	Universal source	HP3245A	2831A03472	Agilent	-	4	
168 Diginal Multimeter Fluke 112 90009435 Fluke USA 0.440 <th0< td=""><td>466</td><td>Digital Multimeter</td><td>Fluke 112</td><td>89210157</td><td>Fluke USA</td><td>24 M</td><td>-</td><td>30.05.2018</td></th0<>	466	Digital Multimeter	Fluke 112	89210157	Fluke USA	24 M	-	30.05.2018
177 Rekatiating GPS System A5-17 - Automative Cons. Fink - 3 - 304 22 488 Provements (Tubu) NRVS Si3372/03 Robbe & Schwarz 14 M - 304 24 482 Inter marits AN I - CTTCCOM (0hr) - 14 - 300 24 483 Inter marits AN I - CTTCCOM (0hr) 24 M - 300 24 483 Inter marits AN I - CTTCTSA-Verification SAR-EMI System EMI field (SAR) - CTT The Solution of the Schwarz 12 M - 200 52 512 Indan rights Filter WKCG 1709/1786 SN 9 Wainwright Pre-m 2 512 Inda Rights Filter WKCA 800/040/240° SN 24 Wainwright 12 M - 300.24 513 India Bondmiterio power diviter Model 1515 L11 8S Weinhele Pre-m 2 514 India Bondmiterio power diviter Model 1510 L11 8S Application 21 M - 300.24 <td>467</td> <td>Digital Multimeter</td> <td>Fluke 112</td> <td>89680306</td> <td>Fluke USA</td> <td>36 M</td> <td>-</td> <td>30.04.2018</td>	467	Digital Multimeter	Fluke 112	89680306	Fluke USA	36 M	-	30.04.2018
180 prover metri (Pui) NRVS 878/92/01 Robe & Schwarz 24 M - 100-22 26 filter marix SAR 1 - CETECOM (#b) - 10 487 Filter marix SAR 1 - CETECOM (#b) - 10 487 System CTC NSA-Verification SAR-EM NAM System EM field (\$AR) - CETECOM 12 M - 300.52 489 EMI Test Receiver ISMO 1000-50 Robe & Schwarz 12 M - 300.52 512 hord spicet filter 1000/1796- SN 9 Wainweight re-m 2 512 hords filter GSM 850 WECG 82/49/814/859- SN 5 Wainweight re-m 2 512 hords filter marix Iff Reds Rob Kettley SN 24 Wainweight re-m 2 526 of BB coadbard resistive power divider Red 1515 L14 85 Weinschell re-m 2 300.52 530 Id dB Roadbard resistive power divider Red 1515 L14 85 4 30	468	Digital Multimeter	Fluke 112	90090455	Fluke USA	36 M	-	30.04.2018
192 Ider matrix Filter matrix SAR I. - CETECOM (Brb) I.d. 484 pre-amplifier 2.5 - 18 GHz MIRC DO 2030 100-72 1244554 Mincq 12 M. - 30.06.27 487 System CTC NSA-Verification SAR-PMM System FMI field (SAR) . CETECOM 24 M. - 31.07.27 502 Inand reject fiber WEQI (779/1786- SN 9 Wainwright Pre-m 2 512 noch fiber GM S00 GFEK SN 9 Wainwright Pre-m 2 512 noch fiber GM S00 GFEK SN 14 Wainwright Pre-m 2 512 noch fiber GM S00 GFEK SN 14 Wainwright Pre-m 2 513 relas solich natrix HF Reias Rox Keinley SN 14 Kainbley Pre-m 2 50.01 Additionator SM 14 Rokin Additionator Sixies power divider 14.11.0 NV 44000154 Agita 30.01.22 10.01 Bita Grant Additionator Sixies power divider 14.01.00 10.01.23 10.01.23 10.0	477	ReRadiating GPS-System	AS-47	-	Automotive Cons. Fink	-	3	
484 pre-amplifier 2.5 - 18 GHz AHF-SD 0250090-25: 100-0 1244554 Macq 12 M 3 30.06.20 487 System CTC NSA-Verification SAR-EMI System EMI field (SAR) ETS Lindgren / CETECOMI 24 M - 31.07.20 489 EMI Test Receiver ISL40 1000-30 Rohé & Schwarz 12 M - 30.06.20 481 EMI Test Receiver ISL40 1000-30 Rohé & Schwarz 12 M - 30.06.20 482 Indar reject filter WRCG 82.3459.814.859. SN 5 Wainweight re-m 2 512 note: filter GSM 850 GFK SN 24 Wainweight re-m 2 512 filter Bonaband resistive power divider Med 1515 LH 85 Weinschell gres-m 2 513 Iold Broadband resistive power divider Rel 151 LH 85 Weinschell 12 M 3 30.05.22 52 Iolg Broadband resistive power divider Rel 151 LH 85 Weinschell 12 M 3 30.05.22 53 <td>480</td> <td>power meter (Fula)</td> <td>NRVS</td> <td>838392/031</td> <td>Rohde & Schwarz</td> <td>24 M</td> <td>-</td> <td>30.04.2017</td>	480	power meter (Fula)	NRVS	838392/031	Rohde & Schwarz	24 M	-	30.04.2017
161 Hos-anguner L2 is Ord? 110 2 300.8.2 147 System CTC NSA Verification SAR EMI SAK System EMI field (SAR) - ETS Lindgren / CFTECOM 24 M - 31.07.20 305 band reject filter WRC (1707)786. N9 Wainwright pre-m 2 305 band reject filter WRC (20090-02-00. SN 5 Wainwright pre-m 2 305 band reject filter WRC (20090-02-00. SN 24 Wainwright 12 M 16 30.06.20 305 outs filter GSM 850 GEE K SN 24 Wainwright 12 M 16 30.06.20 305 JOBE Mandband resistive power divider HFI Relais Sock Estildy SN 24 Wainwright 12 M 30.02	482	filter matrix	Filter matrix SAR 1	-	CETECOM (Brl)	-	1d	
18/1 System CLE NSA-Vertification SARC-SM NSA	484	pre-amplifier 2,5 - 18 GHz		1244554	Miteq	12 M	-	30.06.2017
502 band reject filter (WECC 1799/1786- 1600 SN 9 Wainwright pre-m 2 503 hand reject filter WRCC 824849-814.859- 04EEK SN 5 Wainwright 12 M 12 512 tookh filter GSM 850 WRCC 824849-814.859- 04EEK SN 5 Wainwright 12 M 12 M 523 Digital Multimeter HF Rekais Rot Keithely SE 04 Keithely perem 2 524 Oth Roadband resistive power divider Kold 1515 LH 855 Weinschel perem 2 547 Oth Roadband resistive power divider Kold 1515 LH 855 Weinschel 12 M 30.04.20 549 Log Per-Antenna Feator CMU 200 835390014 Robde & Schwarz 12 M 30.07.20 550 System CTC 5-VSWR Verification SAE System SUT 2.8-186(Hz) VSWR 28 H 86(1085 12 M 30.107.20 551 Bidg puse filter 2.8-186(Hz) Weit 2.8-186(1085 4 Wainwright 12 M 5 30.09.21 553 System CTC	487	System CTC NSA-Verification SAR-EMI		-		24 M	-	31.07.2017
502 band reject filter [1690] 736,- NS 9 Watnwrigh pre-m 2 503 band reject filter WRCG 824-893-814-859. SN 5 Wainwrigh pre-m 2 512 noch filter GSM 850 GEEK SN 24 Wainwrigh pre-m 2 512 relais switch matrix HF Relais BOX Keithley SE 04 Keithley pre-m 2 520 Jogtal Multimeter L411/A MY4000154 Agleten 2.4 M > 30.04.27 530 10.03. Broadband essitive power divider Alod 11515 L11.855 Weinschell pre-m 2 2 540 Univ. Rudio Communication Tester CMU 200 1053390014 Rohde & Schwarz 30.04.27 30.04.27 550 System CTC -OTA-2 R&S TS891 - ETG TECCOM 24 4 31.07.27 551 System CTC -FAR S- VSWR 31.03.22 553 System CTC -FAR S- VSWR System CTC	489	EMI Test Receiver	ESU40	1000-30	Rohde & Schwarz	12 M	-	30.05.2017
50 band reject filter 10091 / 0m 2m 2m 2mm	502	band reject filter		SN 9	Wainwright	pre-m	2	
512 noch filer GSM 850 WRCA 800/960/0240- GEK SN 24 Wainwrgh 12 M 1e 30.06.20 517 relais switch matrix HF Relais Box Keitbley SE 0.4 Keitbley pre-m 2 523 Digtal Multimeter L4411.A MY44000154 Agalent 72.4 M z 30.04.2 530 10.0B Roadband residue power divider R 416110000 LOT 9828 - pre-m 2 30.04.2 547 Urin: Radio Communication Tester CMU 200 106456 R&S 12.4 M - 30.04.2 540 Lin: Neadio Communication Tester CMU 200 1064576 R&S 12.4 M - 30.07.2 551 Spite Provention SWR SWR SWR SWR - Lindgreen/ETECOM 24.M - 30.07.2 551 Spite DTC FA 8- SWR SWR VSWR - Rohde & Schwarz 12.M 16.300.62 551 Spite CTC FA 8- SWR VSWR - CTC 2.4 M - 10.07.2					U	-		
171 celais switch matrix HF Relais Box Keitbley SE 0.4 Keitbley prem 2 223 Digital Multimeter L411A MY 48000154 Agilen 2.4 7.3 30.04.27 320 Digital Multimeter L411A MY 4800154 Weinschel prem 2 331 10.08 prem Z and 2 and 2 347 Univ. Radio Communication Tester CMU 200 106436 Re.8 12.M - 30.04.27 347 Univ. Radio Communication Tester CMU 200 106436 Re.8 30.12.2 - 30.10.21 - 30.04.21 - 30.04.27 350 Synth CTC S-NWR Verification SAR Synth CTC FAR S- - Lindgreen/CTETCOM 24 M - 30.09.27 351 System CTC FAR S - VSWR VSWR - CTC 24 M - 10.04.27 365 System CTC FAR S - VSWR VSWR - CTC 24 M - 10.04.27 374 Bioptime Radio			WRCA 800/960-02/40-		e			30.06.2017
123 Digital Multimeter L411A MV4000154 Agilem 21 300.1 250 6.B. Broadband resistive power divider R.41610000 L07.9828 - pre-m 2 540 Univ. Radio Communication Tester CMU 200 106436 R&S 12 M - 30.04.23 540 Log Per-Antenna HL020 835300104 Rohde & Schwarz 12 M - 30.04.23 541 Log Per-Antenna HL020 RAST SS900104 Rohde & Schwarz 12 M 1 31.07.22 552 System CTC FAR S-VSWR Verification SAR System CTC FAR S-VSWR VSWR - Rohde & Schwarz 12 M 1 30.05.21 553 System CTC FAR S-VSWR VSWR - CTC 2 4 M 31.03.22 544 Bioonling Hybrid Antenna BTA-L 980026L Frankonia 36(12 M 2 31.03.22 545 Spectrum Analyzer FSLM 30 (Reserve) 812250013 Rohde & Schwarz 12 M - 30.04.22 546 Univ, Ra					-			
529 6.dB Broadband resistive power divider Model 1515 L1I 855 Weinschel pre-m 2 530 10.dB Broadband resistive power divider R.410110000 L07 9828 i pre-m 2 30 547 Univ. Radio Communication Tester CMU 200 106436 R&S 12 M - 30.04.2 547 Univ. Radio Communication Tester CMU 200 835390/014 Rolade & Schwarz 26/12 M - 30.04.2 540 System CTC - S-VSWR Verification SAR- ELMI System CTC FAR S-VSWR Verification SAR- System CTC CATA-2 R&S TS8971 - Rolade & Schwarz 12 M 16 30.09.27 573 System CTC CATA-2 R&S TS8971 - Rolade & Schwarz 12 M 16 30.09.27 574 Biconitog Hybrid Antenna BTA- 9800261 Frankonia 3612 M 10.31.27 574 Biconitog Hybrid Antenna BTA- 9800261 Frankonia 3612 M 30.09.27 574 Biconitog Hybrid Antenna BTA- 9800261 Frankonia 361	_		,				-	30.04.2017
130 10 dB. Broadbad resistive power divider R 416110000 LOT 9828 - pre-m 2 154 Uuix, Radio Communication Tester CMU 200 1853500014 Rohde & Schwarz 12 M - 3005 27 159 Log Per-Aneman 11025 1000060 Rohde & Schwarz 12 M - 3005 27 159 Log Per-Aneman System CTC FAVENR Verification SAR System CTC FAVENR Verification SAR System CTC FAR S-18GHz WHKX 28/18G-108S 4 Wainweight 12 M 16 3006.27 157 System CTC FAR S-VSWR VSWR - Rohde & Schwarz 12 M 5 3009.27 158 System CTC FAR S-VSWR VSWR - CTC 2 M 3 3107.21 154 Spectrum Analyzer FSU 8 100248 Rohde & Schwarz 12 M 3 3009.27 158 Spectrum Analyzer FSU 80 00 (Reserve) 831250013 Rohde & Schwarz 2 M 3 304.27 159 Univ. Radio Communication Tester CMV 20 1003477<	-				e e		2	2010 112017
546 Univ. Radio Communication Tester CMU 200 106436 Reks 12 M - 3 00 5.2 547 Univ. Radio Communication Tester CMU 200 853590014 Rohde & Schwarz 12 M - 3 00 5.2 549 Log Per-Anterna HL025 1000060 Rohde & Schwarz 3 612 M - 3 10.7 2C 550 EMI System EMI Field SAR S- - LindgreeCTEFCOM 2 M - 3 10.7 2C 551 System ETC -OTA-2 R&S TS8991 - Rohde & Schwarz 12 M - 3 10.9 2C 553 System CTC -OTA-2 R&S TS8991 - CTC 2 M - 3 10.9 2C 554 System CTC FAR S- - CTC 2 M - 3 10.9 2C 554 Wadeband Radio Communication Tester CMU 300 100347 Rohde & Schwarz 12 M - 3 0.0 42C 579 Waik And Radio Communication Tester CMU 200 100347 Rohde & Schwarz 24 M - 3 0.0 42C 579 <td></td> <td>*</td> <td></td> <td></td> <td>weinseher</td> <td>•</td> <td></td> <td></td>		*			weinseher	•		
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594 Wideband Radio Communication Tester CMW 500 101757 Rohde & Schwarz 12 M - 30.04.20 597 Univ. Radio Communication Tester CMU 200 100347 Rohde & Schwarz pre-m - 598 Spectrum Analyzer FSEM 30 (Reserve) 831259/013 Rohde & Schwarz 24 M - 30.04.20 600 power meter NRVD (Reserve) 834501/018 Rohde & Schwarz 24 M - 30.04.20 610 medium-sensitivity diode sensor NRV-Z32 (Reserve) 83532003 Rohde & Schwarz 24 M - 30.04.20 611 DC power supply E3632A KR 75305854 Agilent pre-m 2 613 Attenuator R416120000 20dB 10W Lot, 9828 Radial1 pre-m 2 2 616 Digitalmultimeter Fluke 177 8900339 Fluke 24 M - 30.05.20 617 Power Splitter/Combiner SOPD-634 600995 JFW Industries USA - 2 2 <t< td=""><td>574</td><td>Biconilog Hybrid Antenna</td><td></td><td></td><td>Frankonia</td><td>36/12 M</td><td>-</td><td>31.03.2019</td></t<>	574	Biconilog Hybrid Antenna			Frankonia	36/12 M	-	31.03.2019
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619 Power Splitter/Combiner 50PD-634 600995 JFW Industries, USA - 3 620 EMI Test Receiver ESU 26 100362 Rohde-Schwarz 12 M - 30.05.20 621 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 1 201.0999.9302.6.4.1.4 G. Lufft GmbH 24 M - 30.04.20 634 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 - Reichelt - 2 - 640 HDMI cable 2m rund - PureLink - 2	617	Power Splitter/Combiner	ZFSC-2-2-S+	S F987001108	Mini Circuits	-	2	
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	621	Step Attenuator 0-139 dB	RSP	100017	Rohde & Schwarz	pre-m	2	
627data loggerOPUS 13G. Luff GmbH 24 M- $30.04.20$ 634 Spectrum AnalyzerFSM (HF-Unit) $826188/010$ Rohde & Schwarzpre-m2 637 High Speed HDMI with Ethernet 1mHDMI cable with Ethernet 1m-KogiLink-2 638 HDMI Kabel with Ethernet 1,5 m flachHDMI cable with Ethernet HDMI cable 2m rund-Reichelt-2 640 HDMI cable 2m rundHDMI cable 2m rund-Reichelt-2 644 AmplifiererZX60-2534M+SN865701299Mini-Circuits 670 Univ. Radio Communication TesterCMU 200106833Rohde & Schwarz24 M-30.05.20 671 DC-power supply 0-5 AEA-3013S-Elektro Automatikpre-m2 678 Power MeterNRP101638Rohde & Schwarz12 M-30.05.20 686 Field AnalyzerFSU 26200571Rohde & Schwarz12 M-30.05.20 686 Field AnalyzerEHP-200A160WX30702Narda Safety Test Solutions24 M-30.05.20 688 Pre AmpJS-18004000-40-8P1750117Miteqpre-m-30.05.20 692 Bluetooth TesterCBT 32100236Rohde & Schwarz12 M-30.05.20 692 Bluetooth TesterCBT 32100236Rohde & Schwarz36 M-31.03.20	625	Generic Test Load USB	Generic Test Load USB	-	CETECOM	-	2	
637High Speed HDMI with Ethernet 1mHDMI cable with Ethernet 1m-KogiLink-2638HDMI Kabel with Ethernet 1,5 m flachHDMI cable with Ethernet-Reichelt-2640HDMI cable 2m rundHDMI cable 2m rund-Reichelt-2641HDMI cable with EthernetCertified HDMI cable with-PureLink-2644AmplifiererZX60-2534M+SN865701299Mini-Circuits670Univ. Radio Communication TesterCMU 200106833Rohde & Schwarz24 M-30.05.20671DC-power supply 0-5 AEA-3013S-Elektro Automatikpre-m2678Power MeterNRP101638Rohde & Schwarz12 M-30.05.20683Spectrum AnalyzerFSU 26200571Rohde & Schwarz12 M-30.05.20686Field AnalyzerEHP-200A160WX30702Narda Safety Test Solutions24 M-30.05.20688Pre AmpJS-18004000-40-8P1750117Miteqpre-m690Spectrum AnalyzerFSU100302/026Rohde & Schwarz12 M-30.05.20692Bluetooth TesterCBT 32100236Rohde & Schwarz12 M-30.05.20	627	data logger	OPUS 1		G. Lufft GmbH	24 M	-	30.04.2017
637 High Speed HDMI with Ethernet In Im - Kögl.link - 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 - 2 644 Amplifierer ZX60-2534M+ SN865701299 Mini-Circuits - - 670 Univ. Radio Communication Tester CMU 200 106833 Rohde & Schwarz 24 M - 30.05.20 671 DC-power supply 0-5 A EA-3013S - Elektro Automatik pre-m 2 678 Power Meter NRP 101638 Rohde & Schwarz 12 M - 30.05.20 686 Field Analyzer FSU 26 200571 Rohde & Schwarz 12 M - 30.05.20 687 Signal Generator SMF 100A 102073 Rohde & Schwarz 12 M - 30.05.20 688 Pre Amp JS-18004000	634	Spectrum Analyzer		826188/010	Rohde & Schwarz	pre-m	2	
640 HDMI cable 2m rund HDMI cable 2m rund - Reichelt - 2 641 HDMI cable with Ethernet Certified HDMI cable with - PureLink - 2 644 Amplifierer ZX60-2534M+ SN865701299 Mini-Circuits - - 670 Univ. Radio Communication Tester CMU 200 106833 Rohde & Schwarz 24 M - 30.05.20 671 DC-power supply 0-5 A EA-3013S - Elektro Automatik pre-m 2 678 Power Meter NRP 101638 Rohde & Schwarz 12 M - 30.05.20 683 Spectrum Analyzer FSU 26 200571 Rohde & Schwarz 12 M - 30.04.20 686 Field Analyzer EHP-200A 160WX30702 Narda Safety Test Solutions 24 M - 30.05.20 688 Pre Amp JS-18004000-40-8P 1750117 Miteq pre-m - 690 Spectrum Analyzer FSU 100302/026 Rohde & Schwar	637	High Speed HDMI with Ethernet 1m		-	KogiLink	-	2	
641 HDMI cable with Ethernet Certified HDMI cable with - PureLink - 2 644 Amplifierer ZX60-2534M+ SN865701299 Mini-Circuits - - 670 Univ. Radio Communication Tester CMU 200 106833 Rohde & Schwarz 24 M - 30.05.20 671 DC-power supply 0-5 A EA-3013S - Elektro Automatik pre-m 2 678 Power Meter NRP 101638 Rohde & Schwarz 12 M - 30.05.20 683 Spectrum Analyzer FSU 26 200571 Rohde & Schwarz 12 M - 30.05.20 686 Field Analyzer EHP-200A 160WX30702 Narda Safety Test Solutions 24 M - 30.05.20 687 Signal Generator SMF 100A 102073 Rohde & Schwarz 12 M - 30.05.20 688 Pre Amp JS-18004000-40-8P 1750117 Miteq pre-m - 690 Spectrum Analyzer FSU 100302/026 Rohde & Schwarz 12 M - 30.05.20 692	638	HDMI Kabel with Ethernet 1,5 m flach	HDMI cable with Ethernet	-	Reichelt	-	2	
644 Amplifierer ZX60-2534M+ SN865701299 Mini-Circuits - - 670 Univ. Radio Communication Tester CMU 200 106833 Rohde & Schwarz 24 M - 30.05.20 671 DC-power supply 0-5 A EA-3013S - Elektro Automatik pre-m 2 678 Power Meter NRP 101638 Rohde & Schwarz pre-m - 683 Spectrum Analyzer FSU 26 200571 Rohde & Schwarz 12 M - 30.05.20 686 Field Analyzer EHP-200A 160WX30702 Narda Safety Test Solutions 24 M - 30.05.20 687 Signal Generator SMF 100A 102073 Rohde & Schwarz 12 M - 30.05.20 688 Pre Amp JS-18004000-40-8P 1750117 Miteq pre-m - 690 Spectrum Analyzer FSU 100302/026 Rohde & Schwarz 12 M - 30.05.20 692 Bluetooth Tester CBT 32 100236 Rohde & Schwarz 36 M - 31.03.20	640	HDMI cable 2m rund	HDMI cable 2m rund	-	Reichelt	-	2	
644 Amplifierer ZX60-2534M+ SN865701299 Mini-Circuits - - 670 Univ. Radio Communication Tester CMU 200 106833 Rohde & Schwarz 24 M - 30.05.20 671 DC-power supply 0-5 A EA-3013S - Elektro Automatik pre-m 2 678 Power Meter NRP 101638 Rohde & Schwarz pre-m - 683 Spectrum Analyzer FSU 26 200571 Rohde & Schwarz 12 M - 30.05.20 686 Field Analyzer EHP-200A 160WX30702 Narda Safety Test Solutions 24 M - 30.05.20 687 Signal Generator SMF 100A 102073 Rohde & Schwarz 12 M - 30.05.20 688 Pre Amp JS-18004000-40-8P 1750117 Miteq pre-m - 690 Spectrum Analyzer FSU 100302/026 Rohde & Schwarz 12 M - 30.05.20 692 Bluetooth Tester CBT 32 100236 Rohde & Schwarz 36 M - 31.03.20	641	HDMI cable with Ethernet	Certified HDMI cable with	-	PureLink	-	2	
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678 Power Meter NRP 101638 Rohde&Schwarz pre-m - 683 Spectrum Analyzer FSU 26 200571 Rohde & Schwarz 12 M - 30.05.20 686 Field Analyzer EHP-200A 160WX30702 Narda Safety Test Solutions 24 M - 30.04.20 687 Signal Generator SMF 100A 102073 Rohde&Schwarz 12 M - 30.05.20 688 Pre Amp JS-18004000-40-8P 1750117 Miteq pre-m - 690 Spectrum Analyzer FSU 100302/026 Rohde&Schwarz 12 M - 30.05.20 692 Bluetooth Tester CBT 32 100236 Rohde & Schwarz 36 M - 31.03.20				-			2	
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690 Spectrum Analyzer FSU 100302/026 Rohde&Schwarz 12 M - 30.05.20 692 Bluetooth Tester CBT 32 100236 Rohde & Schwarz 36 M - 31.03.20	-					1	-	
692 Bluetooth Tester CBT 32 100236 Rohde & Schwarz 36 M - 31.03.20	_	*			•	-	-	30.05.2017
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8.1.3. Legend

Note / remarks		Calibrated during system calibration:
	1a	System CTC-SAR-EMS (RefNo. 442)
	1b System-CTC-EMS-Conducted (RefNo. 335)	
	1c	System CTC-FAR-EMI-RSE (RefNo . 443)
	1d	System CTC-SAR-EMI (RefNo . 441)
	1e	System CTC-OATS (EMI radiated) (RefNo. 337)
	1 f	System CTC-CTIA-OTA (RefNo . 420)
	1 g	System CTC-FAR-EMS (RefNo . 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
	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		Calibration every 36 months, between this every 12 months internal validation
Pre-m Check before starting the measurement		Check before starting the measurement
	-	Without calibration

9. Versions of test reports (change history)

Version	Applied changes	Date of release
	Inital release	2016-10-12