

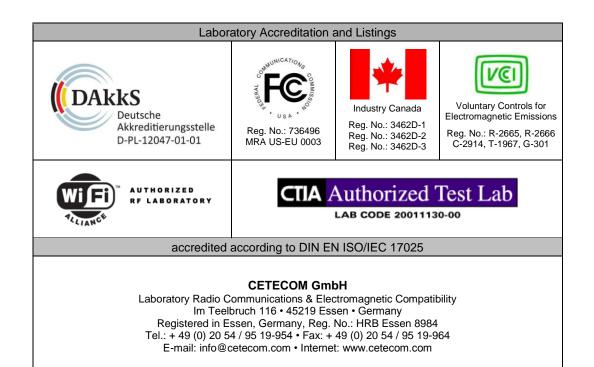
# ANNEX A1: DIAGRAMS OF TESTING No.:6-0082-11-1-2c

According to:
FCC Regulations
Part 15.107 & 15.111, Part 15.109 Class B
IC-Regulations
RSS-132 Issue 2 & RSS-133 Issue 5
RSS-Gen, Issue 3

for

## u-blox AG

RF-Data Module LISA-U200 FCC-ID: XPYLISAU200 IC-ID: 8595A-LISAU200





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# 1. Diagrams

# 1.1. Diagrams of conducted AC-emission

## Diagram No. a\_1.1

Test Description: Conducted Voltage Measurement Class B

Testspecification: FCC 15.107 Class B

Technical Data: Please see next page for detailed information

Diagram: Shows the peak values as a sum of measured ports (N+L1) in maxhold mode

Operator name: HLa

Report.- Nr. 6-0082-11-1-2c

 EUT:
 LISA U-200

 Manufacturer:
 U-blox

 Operating mode:
 GSM 850 Idle

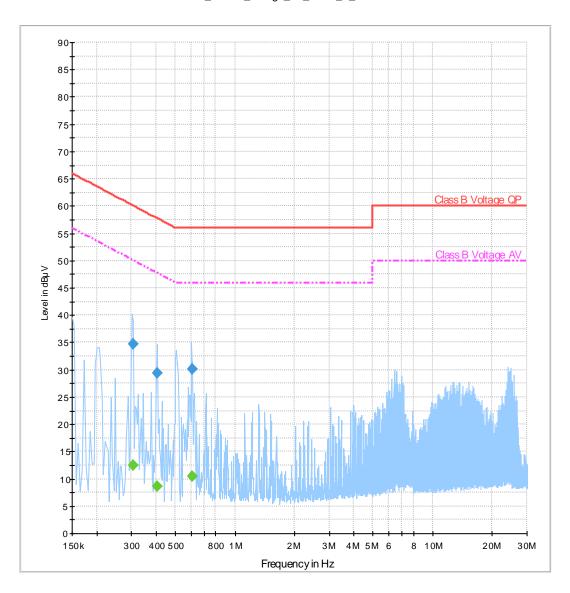
 Measured on line:
 Mains AC L1 and N

 Power during test:
 110 V AC 60 Hz

 Comment 1:
 channel (182)

Accessories: two USB cables 1,80 m one connected to the laptop + AC/DC adapter + GA.107 Ant.

### 01\_Class B\_Voltage\_PK\_QPAV\_N\_L1





Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.304844	34.7	15000.0	9.000	GND	L1	0.0	25.4	60.1
0.406406	29.4	15000.0	9.000	GND	L1	0.0	28.3	57.7
0.605625	30.2	15000.0	9.000	GND	L1	0.0	25.8	56.0

Final Result 2 Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)			Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	
0.304844	12.6	15000.0	9.000	GND	L1	0.0	37.5	50.1	
0.406406	8.6	15000.0	9.000	GND	L1	0.0	39.1	47.7	
0.605625	10.4	15000.0	9.000	GND	L1	0.0	35.6	46.0	



# Diagram No. a\_1.8

Test Description: Conducted Voltage Measurement Class B

Testspecification: FCC 15.107 Class B

Technical Data: Please see next page for detailed information

Diagram: Shows the peak values as a sum of measured ports (N+L1) in maxhold mode

Operator name: HLa

Report.- Nr. 6-0082-11-1-2c

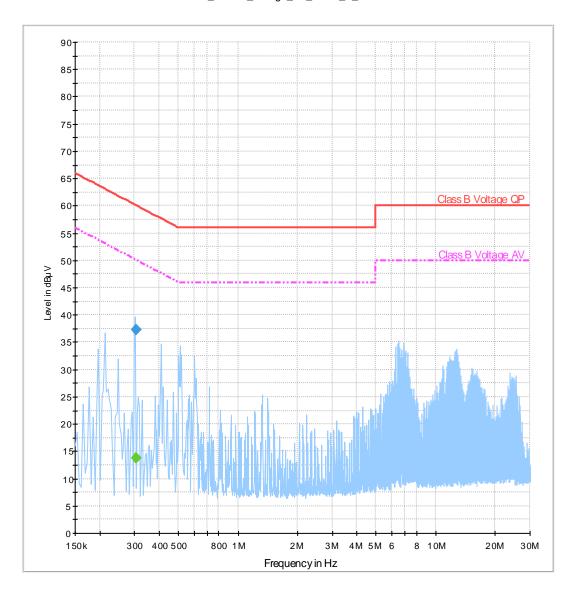
EUT: LISA U-200 Manufacturer: U-blox

Operating mode: EGPRS GSM 1900 RX
Measured on line: Mains AC L1 and N
Power during test: 110 V AC 60 Hz

Accessories: two USB cables 1,80 m one connected to the laptop + AC/DC adapter + GA.107 antenna

Comment 1: DL ch 651

### 01\_Class B\_Voltage\_PK\_QPAV\_N\_L1





Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.304844	37.3	15000.0	9.000	GND	L1	0.0	22.8	60.1

Frequency (MHz)	CAverage (dΒμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.304844	13.8	15000.0	9.000	GND	L1	0.0	36.4	50.1



## Diagram No. b\_1.8

Test Description: Conducted Voltage Measurement Class B

Testspecification: FCC 15.107 Class B

Technical Data: Please see next page for detailed information

Diagram: Shows the peak values as a sum of measured ports (N+L1) in maxhold mode

Operator name: HLa

Report.- Nr. 6-0082-11-1-2c

 EUT:
 LISA U-200

 Manufacturer:
 U-blox

 Operating mode:
 FDD II RX

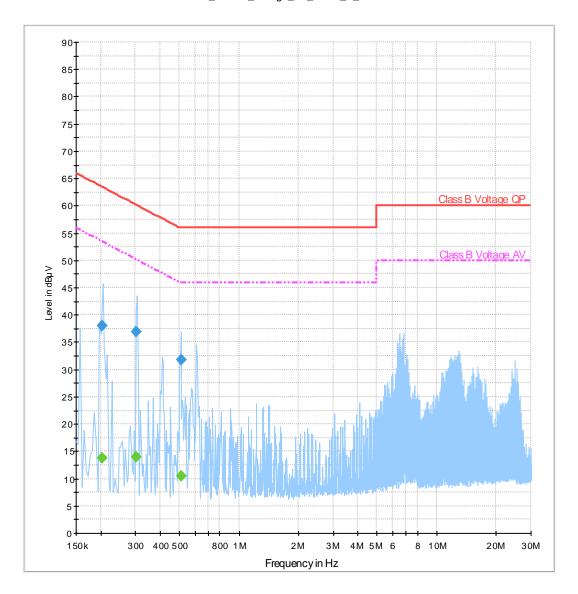
 Measured on line:
 Mains AC L1 and N

 Power during test:
 110 V AC 60 Hz

Accessories : two USB cables 1,80 m one connected to the laptop + AC/DC adapter + GA.107 ant.

Comment 1: DL ch 9800

### 01\_Class B\_Voltage\_PK\_QPAV\_N\_L1





Final Result 1 Frequency (MHz)	QuasiPeak (dΒμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.202188	38.0	15000.0	9.000	GND	L1	0.0	25.5	63.5
0.303750	36.9	15000.0 15000.0	9.000	GND	N N	0.0	23.3	60.1 56.0

Frequency (MHz)	CAverage (dΒμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.202188	13.8	15000.0	9.000	GND	L1	0.0	39.7	53.5
0.303750	13.9	15000.0	9.000	GND	N	0.0	36.2	50.1
0.511875	10.5	15000.0	9.000	GND	N	0.0	35.5	46.0



# Diagram No. b\_1.7

Test Description: Conducted Voltage Measurement Class B

Testspecification: FCC 15.107 Class B

Technical Data: Please see next page for detailed information

Diagram: Shows the peak values as a sum of measured ports (N+L1) in maxhold mode

Operator name: HLa

Report.- Nr. 6-0082-11-1-2c

 EUT:
 LISA U-200

 Manufacturer:
 U-blox

 Operating mode:
 FDD V RX

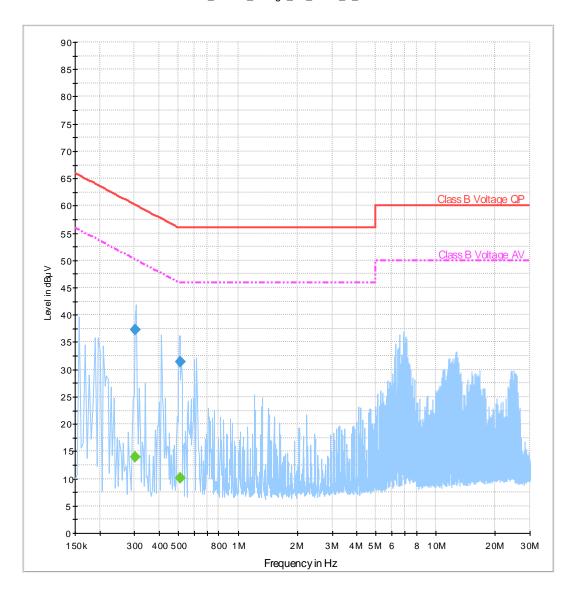
 Measured on line:
 Mains AC L1 and N

 Power during test:
 110 V AC 60 Hz

Accessories : two USB cables 1,80 m one connected to the laptop + AC/DC adapter + GA.107 ant.

Comment 1: DL ch 4407

### 01\_Class B\_Voltage\_PK\_QPAV\_N\_L1





Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.303750	37.3	15000.0	9.000	GND	L1	0.0	22.9	60.1
0.512969	31.4	15000.0	9.000	GND	N	0.0	24.6	56.0

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.303750	14.0	15000.0	9.000	GND	L1	0.0	36.2	50.1
0.512969	10.2	15000.0	9.000	GND	N	0.0	35.8	46.0



## 1.2. Diagrams of radiated field strength emissions (<1 GHz)

### Diagram No. a\_2.01

Test description: Test site and distance: Measured sides of EUT: Rec. antenna (pre-scan): Rec. antenna (final): Turntable step: Used filter:

Test specification.:

Operator: Operating conditions: Power during tests: Comment 1:

**EUT Information** EUT Name:

Manufacturer: IMEI: FW:

Electric Fieldstrength Measurement. measurement distance 3 m Semi Anechoic Room (SAR) with 3 m measurement distance

front. right. rear. left. top. under

height 1.00 m and 1.82 m. horizontal and vertical polarisation height between 1 m to 4 m. polarisation according to pre-scan results 90° during pre-scan. continuously turning during final measurement lowpass 1200 MHz FCC 15.109 Class B: RSS-Gen: Issue 3

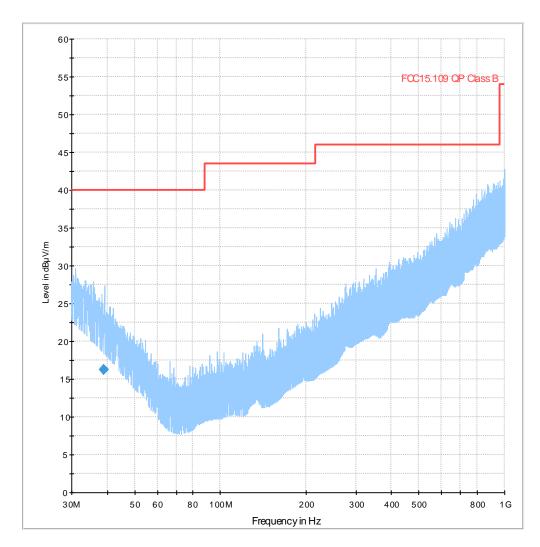
HLa IDLE 850

110V/60Hz Channel GSM850 middle (182)

M/N LISA-U200 Ublox 358901040001734

21.0.3

FCC15.109\_hor+vert



Freq. (MHz)	Quasi Pk (dBµV/m)	Meas .	Bandwid. (kHz)	Hght. (cm)	Pol.	Azim. (deg)	Corr	Mar- gin	Limit (dBµV/
		Time					(dB)	(dB)	m)
38.80000	16.3	1000.	120.000	199.0	Н	263.0	17.9	23.7	40.0



## Diagram No. a\_2.02

Electric Fieldstrength Measurement. measurement distance 3 m Semi Anechoic Room (SAR) with 3 m measurement distance Test description: Test site and distance Measured sides of EUT:

Rec. antenna (pre-scan): Rec. antenna (final):

front, right, rear, left, top, under height 1.00 m and 1.82 m, horizontal and vertical polarisation height between 1 m to 4 m, polarisation according to pre-scan results 90° during pre-scan, continuously turning during final measurement

Used filter: Test specification.: lowbass 1200 MHz FCC 15.109 Class B: RSS-Gen: Issue 3

HLa IDLE 1900 110V/60Hz Operator: Operating conditions: Power during tests:

Channel GSM 1900 middle (651) Comment 1:

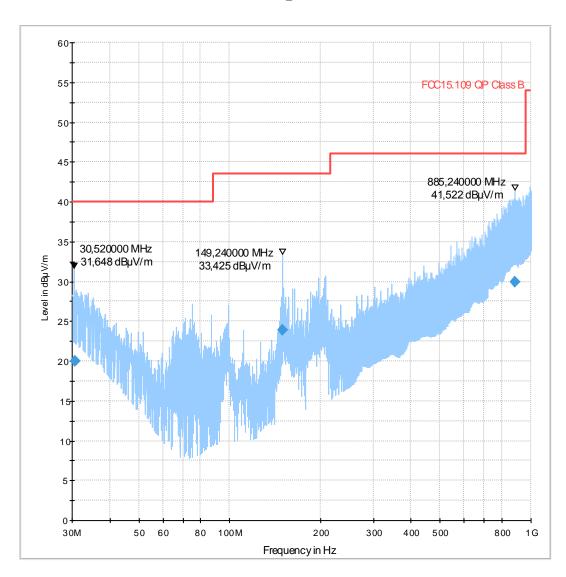
**EUT Information** 

Turntable step:

M/N LISA-U200 **EUT Name:** Manufacturer: u-blox AG 358901040001734 IMEI: FW: 21.03

Two USB cable (1.8m) connected and one to the laptop +GA.107ant. + AC/DC Accessories:

### FCC15.109\_hor+vert





Frequen	Quasi	Mea	Bandwid	Heig	Polarizati	Azimu	Corr	Marg	Limit	Comme
cy	Peak	s.	th	ht	on	th		in	(dBµV/	nt
(MHz)	$(dB\mu V/$	Time	(kHz)	(cm)		(deg)	(dB)	(dB)	m)	
	m)	(ms)								
30.8100	20.0	1000	120.000	142.0	V	72.0	21.5	20.0	40.0	
150.190	23.9	1000	120.000	100.0	V	270.0	8.7	19.6	43.5	
885.240	30.0	1000	120.000	140.0	Н	351.0	26.3	16.0	46.0	



## Diagram No. b\_2.02

Test description: Electric Fieldstrength Measurement, measurement distance 3 m Test site and distance Semi Anechoic Room (SAR) with 3 m measurement distance front. right. rear. left. top. under height 1.00 m and 1.82 m, horizontal and vertical polarisation Measured sides of EUT:

Rec. antenna (pre-scan): Rec. antenna (final): Turntable step: height between 1 m to 4 m. polarisation according to pre-scan results 90° during pre-scan. continuously turning during final measurement

Used filter:

lowpass 1200 MHz FCC 15.109 Class B: RSS-Gen: Issue 3 Test specification .:

Operator: Operating conditions:

FDD II Idle 110V/60Hz Channel FDD II middle (9400) Power during tests: Comment 1:

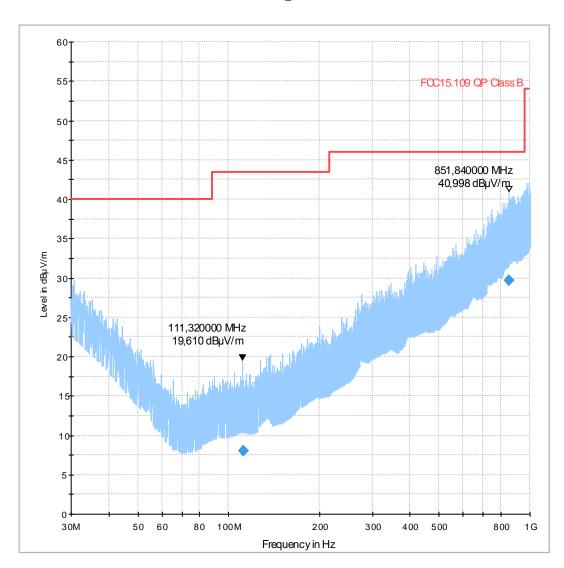
**EUT Information** 

M/N LISA-U200 u-blox AG 358901040001734 21.03 **EUT Name:** Manufacturer: IMEI:

FW:

Two USB cable (1.8m) connected and one to the laptop +GA.107 ant. + AC/DC Accessories:

### FCC15.109\_hor+vert





Frequen	QuasiPe	Mea	Bandwid	Heig	Polarizati	Azim	Cor	Marg	Limit	Comme
cy	ak	s.	th	ht	on	uth	r.	in	(dBµV/	nt
(MHz)	(dBµV/	Tim	(kHz)	(cm)		(deg)	(dB	(dB)	m)	
	m)	e					)			
		(ms)								
111.680	8.0	1000	120.000	100.0	Н	285.0	8.4	35.5	43.5	
852.760	29.6	1000	120.000	331.0	Н	103.0	25.6	16.4	46.0	



## Diagram No. b\_2.01

Electric Fieldstrength Measurement. measurement distance 3 m Semi Anechoic Room (SAR) with 3 m measurement distance Test description: Test site and distance:

Measured sides of EUT: front. right. rear. left. top. under

Rec. antenna (pre-scan): height 1.00 m and 1.82 m. horizontal and vertical polarisation height between 1 m to 4 m. polarisation according to pre-scan results 90° during pre-scan. continuously turning during final measurement Rec. antenna (final): Turntable step: lowpass 1200 MHz FCC 15.109 Class B: RSS-Gen: Issue 3 Used filter:

Test specification.:

HLa FDD V Idle 110V/60Hz Channel FDD V middle Operator: Operating conditions:

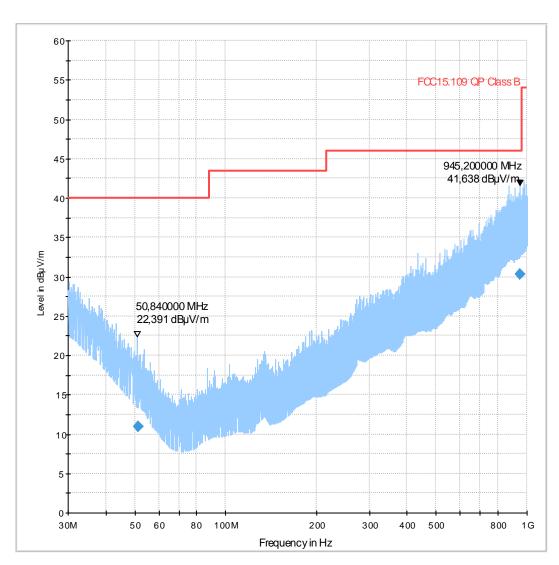
Power during tests: Comment 1:

**EUT Information** 

EUT Name: M/N LISA-U200 u-blox AG 358901040001734 21.03 Manufacturer: FW:

Accessories: Two USB cable (1.8m) connected and one to the laptop +GA.107 ant. + AC/DC

### FCC15.109\_hor+vert





Frequen cy (MHz)	QuasiPe ak (dBµV/ m)	Mea s. Time (ms)	Bandwid th (kHz)	Heig ht (cm)	Polarizati on	Azimu th (deg)	Corr (dB)	Marg in (dB)	Limit (dBµV/ m)	Comme
51.2200	10.9	1000	120.000	187.0	V	69.0	12.7	29.1	40.0	
945.990	30.3	1000	120.000	152.0	V	8.0	26.8	15.7	46.0	



# 1.3. Diagrams of radiated electrical field strength emissions (>1 GHz)

### a\_5.01

### **Common Information**

Test Description: Radiated field strength emission in 3m distance

Test Site: CETECOM GmbH Essen

Test Standard: FCC 15.109 Unintentional Radiator

Antenna polarisation: horizontal/vertical

Operation mode: IDLE Mode GSM850

Operator Name: Tas/dpa

Comment: Downlink channel middle: 182 External Antenna of EUT used

### **EUT Information**

Manufacturer: u-blox Model: LISA-U200

Type: GSM/WCDMA Module

------

EUT: EUT additional information: HW version: SW version: 21.03

SW version: 21.0
Additional SW: Config: -

Serial number: 358901040001353

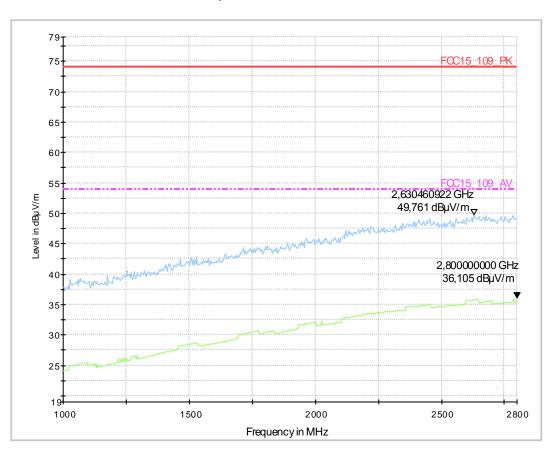
Aux. Devices: Magnet Antenna GA107, USB Port 1 connected 1,8m standard USB cable, USB

Port 2 connected 1,8m standard USB cable to Notebook, AC/DC 12V Charger

AC Charger connected to 110 V / 60 Hz

# Power Supply: Comments:

### 01\_Sweep1\_FSEK\_SM1\_KP1\_PA1\_10ms





# a\_5.02

### **Common Information**

Test Description: Radiated field strength emission in 3m distance

Test Site: CETECOM GmbH Essen

Test Standard: FCC 15.109 Unintentional Radiator

Antenna polarisation: horizontal/vertical

Operation mode: IDLE Mode GSM850

Operator Name: dpa

Comment: Downlink channel middle: 182

### **EUT Information**

Manufacturer: u-blox Model: LISA-U200

Type: GSM/WCDMA Module

EUT: -

Serial number: 358901040001353

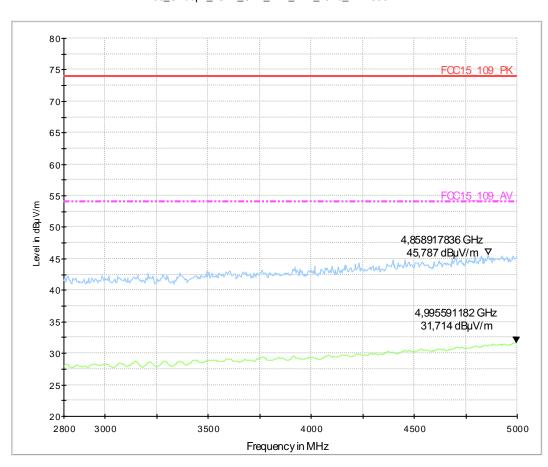
Aux. Devices: Magnet Antenna GA107, USB Port 1 connected 1,8m standard USB cable, USB Port

2 connected 1,8m standard USB cable to Notebook, AC/DC 12V Charger

Power Supply: AC Charger connected to 110 V / 60 Hz

Comments:

### 03\_Sweep2\_FSEK\_SM1\_KP1\_PA1\_10ms\_IDLE850





# Diagram No.: a\_5.09

### **Common Information**

Test Description: Radiated field strength emission in 3m distance

Test Site: CETECOM GmbH Essen

Test Standard: FCC 15.109 Unintentional Radiator

Antenna polarisation: horizontal/vertical

Operation mode: IDLE Mode PCS1900 (DL: ARFCN 651)

Operator Name: Oou

comment Internal/External Antenna of EUT used

#### **EUT Information**

Manufacturer: u-blox Model: LISA-U200

Type: GSM/WCDMA Module

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EUT: EUT additional information: HW version: SW version: 21.03
Additional SW: Config: -

Serial number: 358901040001353

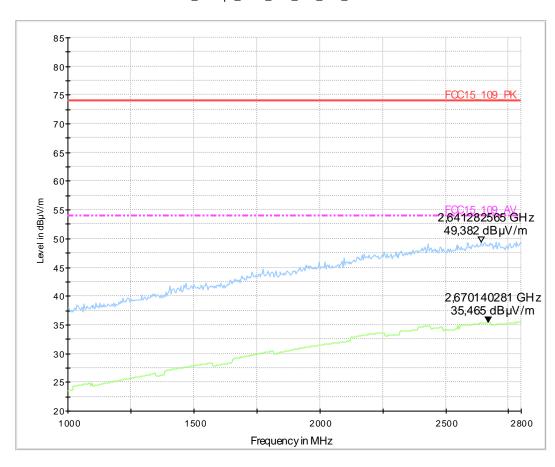
Aux. Devices: Magnet Antenna GA107, USB Port 1 connected 1,8m standard USB cable, USB Port

2 connected 1,8m standard USB cable to Notebook, AC/DC 12V Charger

Power Supply: AC Charger connected to 110 V / 60 Hz

Comments:

### 01\_Sweep1\_FSEK\_SM1\_KP1\_PA1\_10ms





# Diagram No.: a\_5.10\_RX

### **Common Information**

Test Description: Radiated field strength emission in 3m distance

Test Site: CETECOM GmbH Essen

Test Standard: FCC 15.109 Unintentional Radiator

Antenna polarisation: horizontal/vertical

Operation mode: IDLE Mode PCS1900 (DL: ARFCN 651)

Operator Name: Oou

comment External Antenna of EUT used

#### **EUT Information**

Manufacturer: u-blox Model: LISA-U200

Type: GSM/WCDMA Module

·····

EUT: EUT additional information: HW version: SW version: 21.03
Additional SW: Config: -

Serial number: 358901040001353

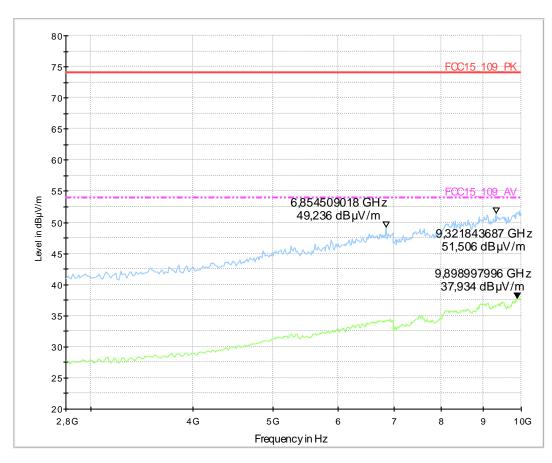
Aux. Devices: Magnet Antenna GA107, USB Port 1 connected 1,8m standard USB cable, USB Port

2 connected 1,8m standard USB cable to Notebook, AC/DC 12V Charger

Power Supply: AC Charger connected to 110 V / 60 Hz

Comments:

### 02\_Sweep2\_FSEK\_SM1\_KP1\_PA1\_10ms\_IDLE1900





CETECOM GmbH

## Diagram No.: b\_5.17

Common Information

Radiated field strength emission in 3m distance CETECOM GmbH Essen FCC 15.109 Unintentional Radiator

Test Description: Test Site:

Test Standard:

Antenna polarisation: horizontal/vertical

Idle-Mode FDD II (DL: UARFCN 9800) Tas Operation mode: Operator Name:

Comment:

6-0082-11-1-2b Downlink channel at 1960 MHz visible

**EUT Information** 

Manufacturer: u-blox Model: Type: LISA-U200 GSM/WCDMA Module

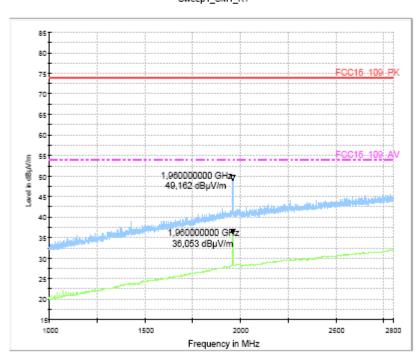
EUT: EUT additional information: HW version: SW version: Additional SW: Config: Serial number: Aux. Devices: 21.03

358901040001353

Magnet Antenna GA107, USB Port 1 connected 1,8m standard USB cable, USB Port 2 connected 1,8m standard USB cable to Notebook, AC/DC 12V Charger AC Charger connected to 110 V / 60 Hz

Power Supply: Comments:

#### Sweep1\_SM1\_K1



10.11.2011 07:32:12



# Diagram No.: b\_5.18

### **Common Information**

Test Description: Radiated field strength emission in 3m distance

Test Site: Fully Anechoic Room (FAR)
Test Standard: FCC 15.109 Unintentional Radiator

Antenna polarisation: horizontal/vertical

Operation mode: Idle-Mode FDD II (DL: UARFCN 9800)

Operator Name: Tas

Project no.: 6-0082-11-1-2b

### **EUT Information**

Manufacturer: u-blox Model: LISA-U200

Type: GSM/WCDMA Module

EUT: -

Serial number: 358901040001353

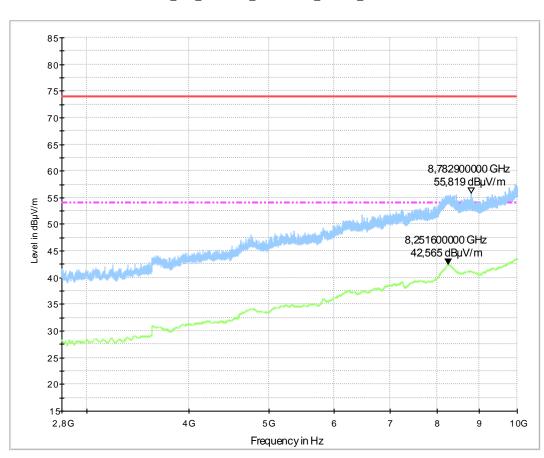
Aux. Devices: Magnet Antenna GA107, USB Port 1 connected 1,8m standard USB cable, USB Port

2 connected 1,8m standard USB cable to Notebook, AC/DC 12V Charger

Power Supply: AC Charger connected to 110 V / 60 Hz

Comments:

### 030441\_FCC\_Part15.109\_Unintentional\_Radiator\_1G-18G





CETECOM GmbH

# Diagram No.: b\_5.19

### **Common Information**

Test Description: Radiated field strength emission in 3m distance

Test Site: CETECOM GmbH Essen

Test Standard: FCC 15.109 Unintentional Radiator

Antenna polarisation: horizontal/vertical

Operation mode: Idle-Mode FDD V

Operator Name: Tas

Comment: 6-0082-11-1-2b

### **EUT Information**

Manufacturer: u-blox Model: LISA-U200

Type: GSM/WCDMA Module

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EUT: EUT additional information: HW version: SW version: 21.03
Additional SW: Config: -

Serial number: 358901040001353

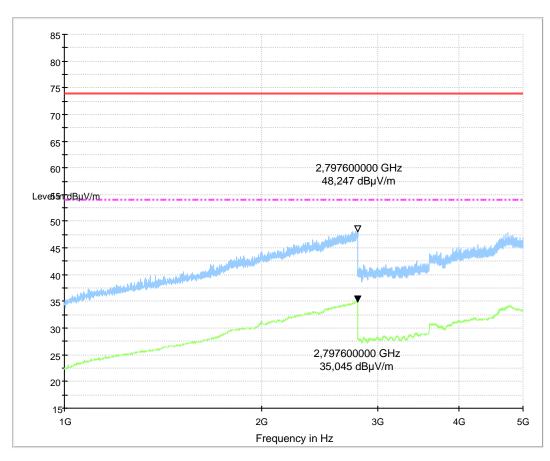
Aux. Devices: Magnet Antenna GA107, USB Port 1 connected 1,8m standard USB cable, USB Port

2 connected 1,8m standard USB cable to Notebook, AC/DC 12V Charger

Power Supply: AC Charger connected to 110 V / 60 Hz

Comments:

### 030441\_FCC\_Part15.109\_Unintentional\_Radiator\_1G-18G







# 1.4. Conducted emissions on antenna port in receive mode Diagram No.: a\_4.33

### **Common Information**

Test Description: RX Spurious Emission conducted

Test Site: Radio laboratory
Test Standard: FCC 2.1051, RSS 132

Operating condition: 23°C 47%

Operation mode: Idle, G850 (ARFCN 182)

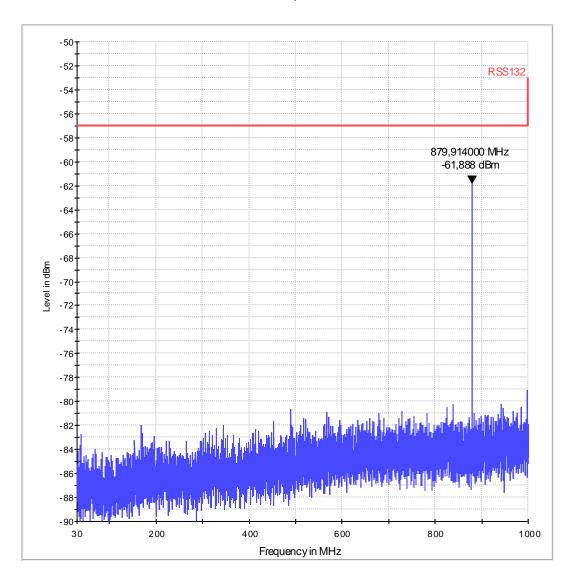
Operator Name: Tas

Comment: 6-0082-11-1-2a
DL at 880 MHz visible

#### **EUT Information**

EUT Name: Lisa u-200
Manufacturer: u-blox AG
Serial Number: 358901040001353

Hardware Rev: 21.03 Voltage: 3,8 VDC





# Diagram No.: a\_4.34

### **Common Information**

Test Description: RX Spurious Emission conducted

Test Site: Radio laboratory
Test Standard: FCC 2.1051 , RSS 132

Operating condition 23°C 47%

Op. mode Idle, G850 (ARFCN 182)

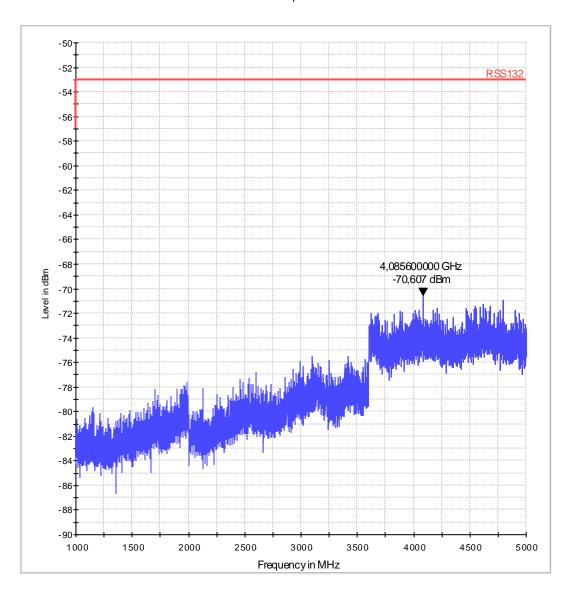
Operator Tas

Project no. 6-0082-11-1-2a

### **EUT Information**

EUT Name: Lisa u-200
Manufacturer: u-blox AG
Serial Number: 358901040001353

Hardware Rev: 21.03 Voltage: 3,8 VDC





# a\_4.31

### **Common Information**

Test Description: Receiver Conducted Emissions (IDLE)

Test Site: Radio laboratory

Test Standard: FCC Part 24.238, RSS-133

Test condition: 24.5°C 39%

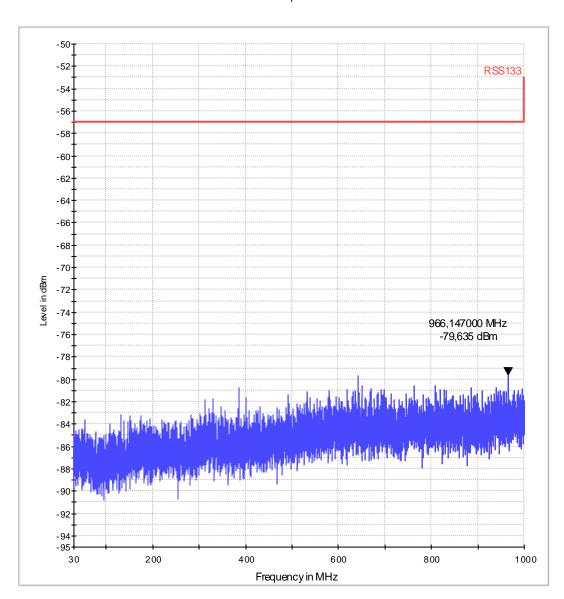
Operation mode: EGPRS-RX, PCS19000 (Downlink ch. 651)

Operator Name: dpa

### **EUT Information**

EUT Name: Lisa u-200
Manufacturer: u-blox AG
Serial Number: 358901040001353

Hardware Rev: 21.03 Voltage: 3,8 VDC





# a\_4.32

### **Common Information**

Test Description: Receiver Conducted Emissions (IDLE)

Test Site: Radio laboratory

Test Standard: FCC Part 24.238, RSS-133

Test condition: 24.5°C 39%

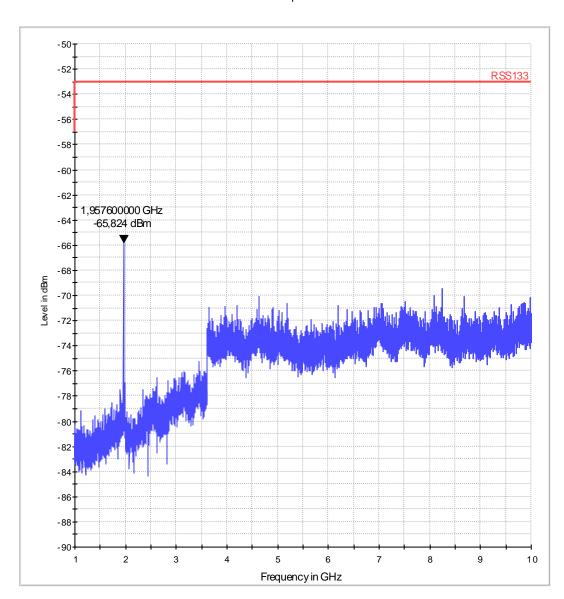
Operation mode: EGPRS-RX, PCS19000 (Downlink ch. 651 visible)

Operator Name: dpa

### **EUT Information**

EUT Name: Lisa u-200
Manufacturer: u-blox AG
Serial Number: 358901040001353

Hardware Rev: 21.03 Voltage: 3,8 VDC





### **Common Information**

Test Description: Receiver Conducted Emissions (IDLE)

Test Site: Radio laboratory

Test Standard: FCC Part 24.238, RSS-133

Test Conditions: 23°C 41%

Operation mode: FDDII-RX (Downlink 9800 (1960MHz))

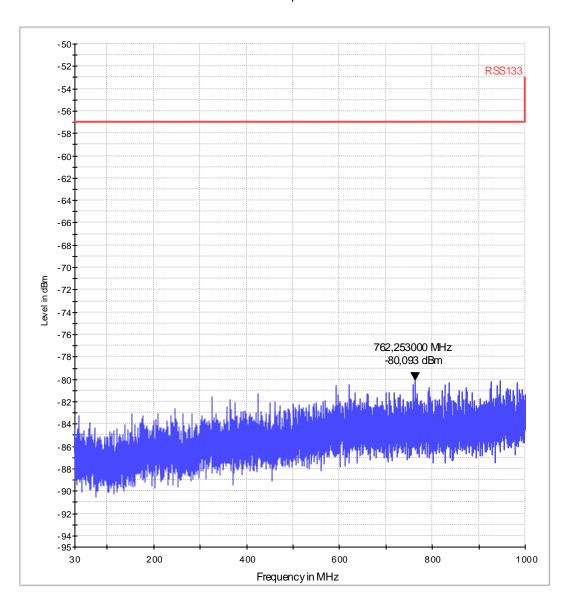
Operator Name: dpa

Comment:

### **EUT Information**

EUT Name: Lisa u-200
Manufacturer: u-blox AG
Serial Number: 358901040001353

Hardware Rev: 21.03 Voltage: 3,8 VDC





### **Common Information**

Test Description: Receiver Conducted Emissions (IDLE)

Test Site: Radio laboratory

Test Standard: FCC Part 24.238, RSS-133

Test Conditions: 23°C 41%

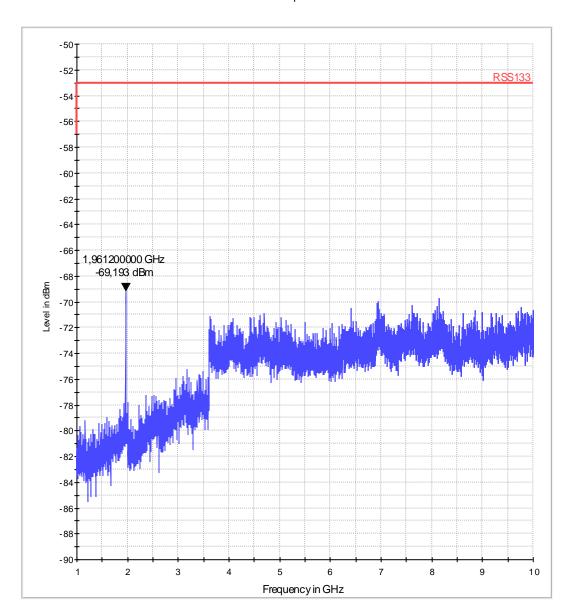
Operation mode: FDDII-RX (Downlink ch. 9800 ( visible1960MHz))

Operator Name: dpa

### **EUT Information**

EUT Name: Lisa u-200
Manufacturer: u-blox AG
Serial Number: 358901040001353

Hardware Rev: 21.03 Voltage: 3,8 VDC





### **Common Information**

Test Description: Receiver Conducted Emissions (IDLE)

Test Site: Radio laboratory FCC Part 22, RSS-132 Test Standard:

23°C 41% Test condition:

Operation mode: FDDV-RX (Downlink ch. 4407 (visible 880,1 MHz))

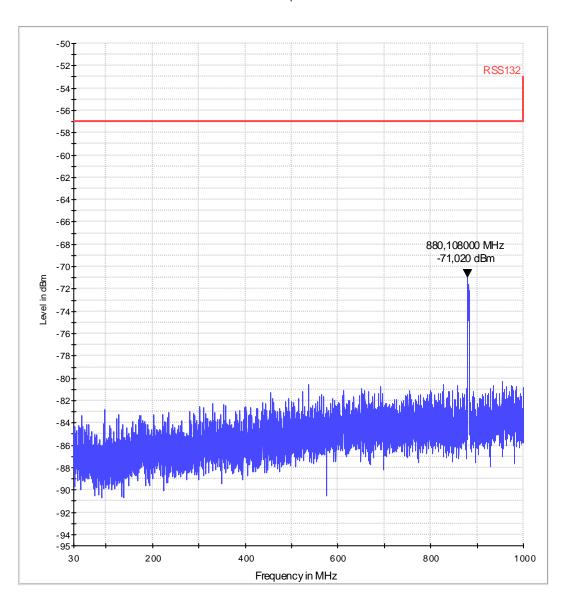
Operator: dpa

### **EUT Information**

EUT Name: Lisa u-200 Manufacturer: u-blox AG Serial Number: 358901040001353

Hardware Rev: 21.03

Voltage: 3,8 VDC





### **Common Information**

Test Description: Receiver Conducted Emissions (IDLE)

Test Site: Radio laboratory Test Standard: FCC Part 22, RSS-132

Test condition: 23°C 41%

Operation mode: FDDV-RX (Downlink ch. 4407 (881,4MHz))

Operator: dpa

### **EUT Information**

Lisa u-200 EUT Name: Manufacturer: u-blox AG Serial Number: 358901040001353

Hardware Rev: 21.03

Voltage: 3,8 VDC

