

Annex 1: Measurement diagrams to
TEST REPORT
 No.: 16-1-0088301T01a

According to:
FCC Regulations
 Part 15B: §15.107, §15.109
 Part 15C: §15.207

IC-Regulations
 ICES-003, Issue 6
 RSS-Gen Issue 4

for

u-Blox AG

GSM/ W-CDMA Module SARA-U201

FCC-ID: XPY1CGM5NNN
IC: 8595A-1CGM5NNN
PMN: SARA-U201
HVIN: SARA-U201

Laboratory Accreditation and Listings			
 DAkkS Deutsche Akkreditierungsstelle D-PL-12047-01-01	 FEDERAL COMMUNICATIONS COMMISSION USA • NOISE MRA US-EU 0003	 Industry Canada Reg. No.: 3462D-1 Reg. No.: 3462D-2 Reg. No.: 3462D-3	 Voluntary Controls for Electromagnetic Emissions Reg. No.: R-2666 C-2914, T-1967, G-301
 WiFi ALLIANCE AUTHORIZED RF LABORATORY	 ctia Authorized TM Test Lab Lab Code: 20011130-00		
accredited according to DIN EN ISO/IEC 17025			
CETECOM GmbH Laboratory Radio Communications & Electromagnetic Compatibility Im Teelbruch 116 • 45219 Essen • Germany Registered in Essen, Germany, Reg. No.: HRB Essen 8984 Tel.: + 49 (0) 20 54 / 95 19-954 • Fax: + 49 (0) 20 54 / 95 19-964 E-mail: info@cetecom.com • Internet: www.cetecom.com			

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1. Measurement diagrams

1.1. MEASUREMENT DIAGRAMS

1.1. Conducted emissions on AC-mains (120V/60Hz)

1.1.1. Part 15B: RX-Mode

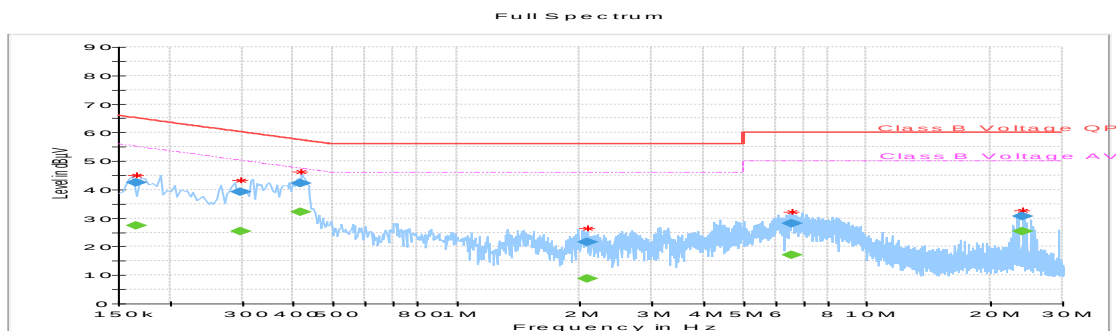
1.02_RX_CH192

Common Information

Test Description:	Conducted Voltage Measurement Class B
Test Site & Location:	Conducted Emission, CETECOM GmbH Essen
Test Software:	R&S EMC32 v9.15
Test Specification:	FCC 15.107, FCC 15.207
Operating Mode:	GSM 850 Idle +Data USB Transfer
Measured on line:	N/L1
Diagram details:	Shows the peak values as a sum of measured ports in maxhold mode
Environmental Conditions:	Humidity: 48%rH; Temperature: 21°C
Operator:	Kmo

EUT Information

Manufacturer:	u-blox AG
Model:	SARA-U201
Type:	GSM/WCDMA module
EUT:	-
HW version:	261A01
SW version:	23.56
SVN:	-
Config:	-
Serial number:	357520070032293
Connected Interfaces:	Antenna GSATT1505001611 and Headset
Power Supply:	3.8V DC
Comments:	-



Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)
0.166563	---	27.37	55.13
0.166563	42.45	---	65.13
0.296563	39.20	---	60.34
0.296563	---	25.32	50.34
0.417031	42.17	---	57.51
0.417031	---	32.23	47.51
2.078281	---	8.69	46.00
2.078281	21.56	---	56.00
6.555938	---	17.18	50.00
6.555938	28.09	---	60.00
23.854531	---	25.45	50.00
23.854531	30.75	---	60.00

1.04_RX_Ch4185

Common Information

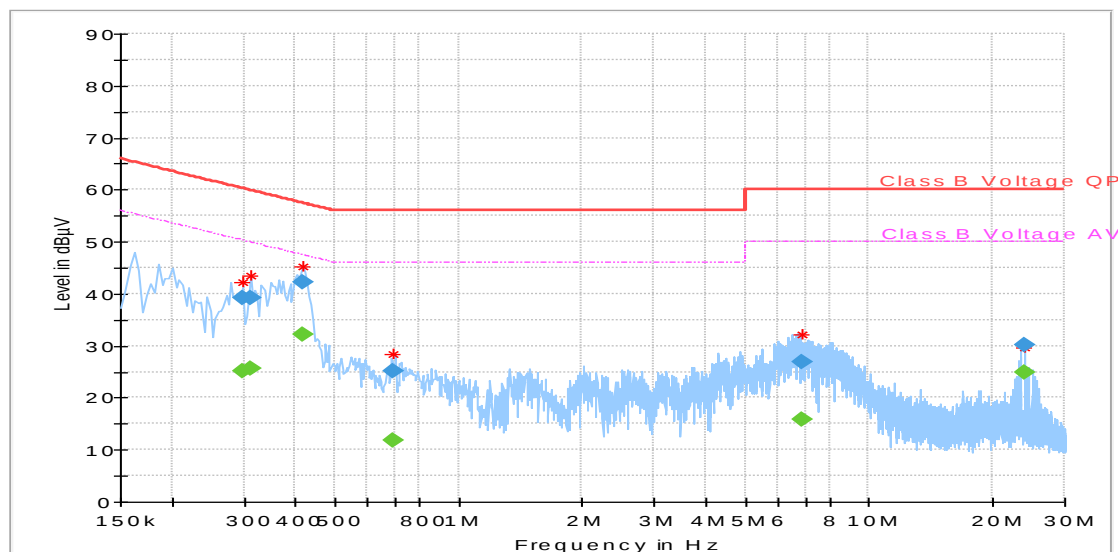
Test Description:	Conducted Voltage Measurement Class B
Test Site & Location:	Conducted Emission, CETECOM GmbH Essen
Test Software:	R&S EMC32 v9.15
Test Specification:	FCC 15.107, FCC 15.207
Operating Mode:	FDD5 Idle +Data USB Transfer
Measured on line:	N/L1
Diagram details:	Shows the peak values as a sum of measured ports in maxhold mode
Environmental Conditions:	Humidity: 48%rH; Temperature: 21°C
Operator:	Kmo

EUT Information

Manufacturer:	u-blox AG
Model:	SARA-U201
Type:	GSM/WCDMA module

EUT:	-
HW version:	261A01
SW version:	23.56
SVN:	-
Config:	-
Serial number:	357520070032293
Connected Interfaces:	Antenna GSATT1505001611 and Headset
Power Supply:	3.8V DC
Comments:	-

Full Spectrum



Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)
0.296406	---	25.26	50.34
0.296406	39.16	---	60.34
0.312656	---	25.71	49.90
0.312656	39.23	---	59.90
0.417031	---	32.17	47.51
0.417031	42.11	---	57.51
0.693281	---	11.81	46.00
0.693281	25.12	---	56.00
6.851094	---	15.77	50.00
6.851094	27.00	---	60.00
23.855625	---	24.94	50.00
23.855625	30.11	---	60.00

1.1.2. Part 15C: TX-Mode

1.01_TX_CH192

Common Information

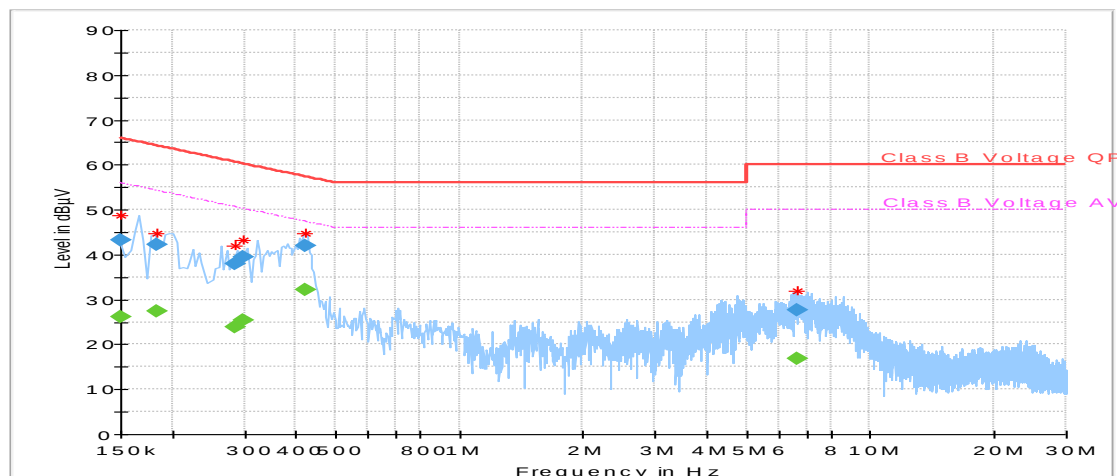
Test Description:	Conducted Voltage Measurement Class B
Test Site & Location:	Conducted Emission, CETECOM GmbH Essen
Test Software:	R&S EMC32 v9.15
Test Specification:	FCC 15.107, FCC 15.207
Operating Mode:	GSM 850 TCH +Data USB Transfer
Measured on line:	N/L1
Diagram details:	Shows the peak values as a sum of measured ports in maxhold mode
Environmental Conditions:	Humidity: 48%rH; Temperature: 21°C
Operator:	Lor/KMo

EUT Information

Manufacturer:	u-blox AG
Model:	SARA-U201
Type:	GSM/WCDMA module

EUT:	-
HW version:	261A01
SW version:	23.56
SVN:	-
Config:	-
Serial number:	357520070032293
Connected Interfaces:	Antenna GSATT1505001611 and Headset
Power Supply:	3.8V DC
Comments:	-

Full Spectrum



Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)
0.150000	---	26.27	56.00
0.150000	43.17	---	66.00
0.183281	---	27.40	54.34
0.183281	42.24	---	64.34
0.285781	---	23.95	50.65
0.285781	38.08	---	60.65
0.299375	---	25.49	50.26
0.299375	39.49	---	60.26
0.420938	---	32.19	47.43
0.420938	42.00	---	57.43
6.659219	---	16.84	50.00
6.659219	27.63	---	60.00

1.03_TX_Ch4185

Common Information

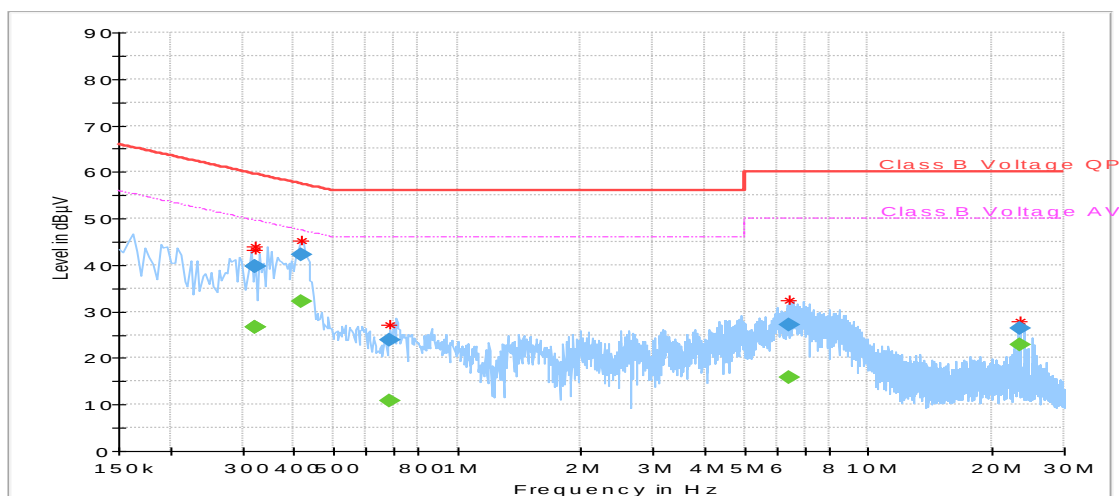
Test Description:	Conducted Voltage Measurement Class B
Test Site & Location:	Conducted Emission, CETECOM GmbH Essen
Test Software:	R&S EMC32 v9.15
Test Specification:	FCC 15.107, FCC 15.207
Operating Mode:	FDD5 +Data USB Transfer
Measured on line:	N/L1
Diagram details:	Shows the peak values as a sum of measured ports in maxhold mode
Environmental Conditions:	Humidity: 48%rH; Temperature: 21°C
Operator:	Kmo

EUT Information

Manufacturer:	u-blox AG
Model:	SARA-U201
Type:	GSM/WCDMA module

EUT:	-
HW version:	261A01
SW version:	23.56
SVN:	-
Config:	-
Serial number:	357520070032293
Connected Interfaces:	Antenna GSATT1505001611 and Headset
Power Supply:	3.8V DC
Comments:	-

Full Spectrum



Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)
0.321563	39.65	---	59.67
0.321563	---	26.60	49.67
0.322813	---	26.64	49.63
0.322813	39.65	---	59.63
0.418125	42.13	---	57.49
0.418125	---	32.19	47.49
0.683281	23.80	---	56.00
0.683281	---	10.69	46.00
6.408125	27.13	---	60.00
6.408125	---	15.92	50.00
23.496250	---	22.90	50.00
23.496250	26.46	---	60.00

1.2. Radiated emissions in the frequency range 30 to 1000MHz

1.2.1. Part 15B: RX-Mode

Diagram No. 3.02_Data Transfer_15B

Test description: Electric Field Strength Measurement
 Test site and distance: Ref.-Nr. 441 Semi Anechoic Room (SAR) with 3m measurement distance
 Version of Testsoftware: EMC32 V9.25.0
 Distance correction: not used
 Technical Data: Please see page 2 for detailed data of measurement setup
 Used filter: not used
 Test specification: FCC15.109, class B; RSS-Gen.: Issue 4

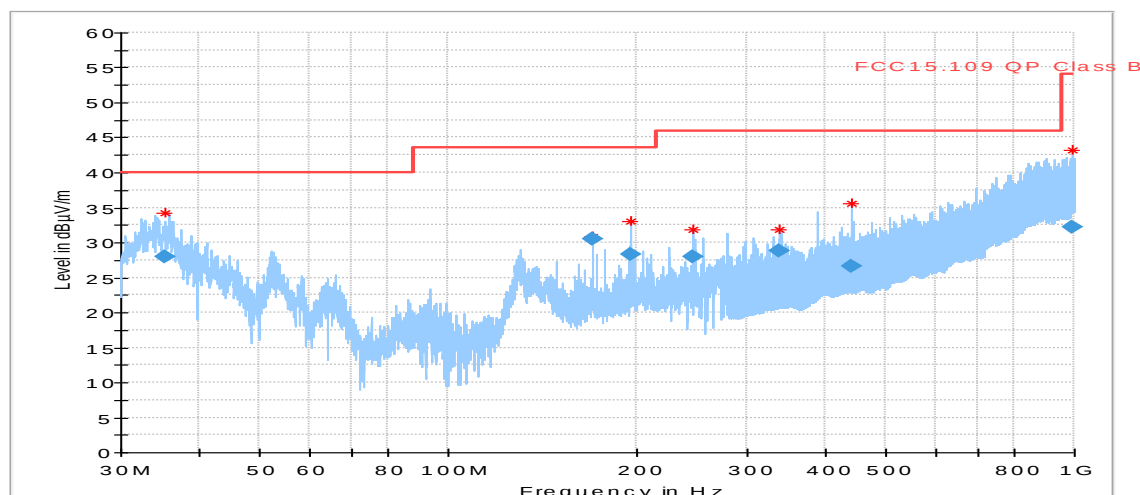
Operator: AHO
 Operating conditions: Data transfer USB port + Registered 1900 Mode
 Measured sides of EUT: front, right, rear, left, top, under
 Power during tests: 120V/ 60Hz
 Comment 1: 3.8V DC Module voltage/ 120V/60Hz Board voltage
 Comment 2: Additional operation mode: IDLE on channel 661 (GSM1900)

EUT Information

Manufacturer: u-blox AG
 Model: SARA-U201
 Type: GSM/WCDMA module

EUT: -
 HW version: 261A01
 SW version: 23.56
 SVN: -
 Config: -
 Serial number: 357520070032293
 Connected Interfaces: Antenna GSATT1505001611 and Headset
 Power Supply: 3.8V DC
 Comments: -

Full Spectrum



Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
35.410000	27.93	40.00	12.07	1000.0	120.000	320.0	H	69.0	90.0	19.1
169.680000	30.53	43.50	12.97	1000.0	120.000	105.0	V	83.0	0.0	10.3
195.010000	28.24	43.50	15.26	1000.0	120.000	129.0	H	64.0	90.0	11.6
245.900000	27.98	46.00	18.02	1000.0	120.000	178.0	V	318.0	90.0	13.1
339.070000	28.88	46.00	17.12	1000.0	120.000	109.0	V	359.0	0.0	16.4
440.880000	26.54	46.00	19.46	1000.0	120.000	202.0	H	63.0	90.0	19.4
990.180000	32.18	54.00	21.82	1000.0	120.000	351.0	V	184.0	0.0	28.0

1.3. Radiated emissions in the frequency range above 1000MHz

1.3.1. Part 15B: RX-Mode

Diagram No: 4.01_Data Transfer_15B

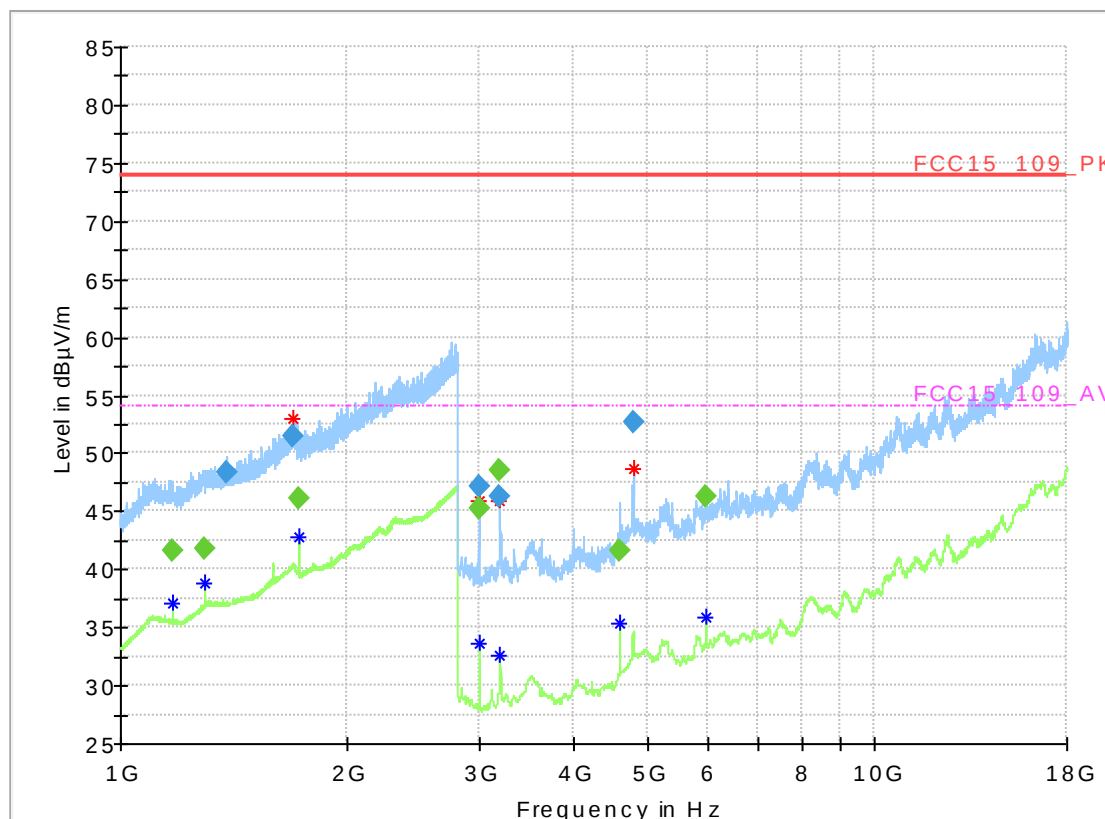
Common Information

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:	Data Transfer USB + IDLE Ch. 192
Operator Name:	Lor
Comment:	Additional Operating mode: Idle on channel 192 (GSM850)

EUT Information

Manufacturer:	u-blox AG
Model:	SARA-U201
Type:	GSM/WCDMA module
EUT:	-
HW version:	261A01
SW version:	23.56
SVN:	-
Config:	-
Serial number:	357520070032293
Connected Interfaces:	Antenna GSATT1505001611 and Headset
Power Supply:	3.8V DC + 120V AC/ 60Hz
Comments:	-

Full Spectrum



Final_Result

Frequency (MHz)	MaxPeak (dBμV/m)	RMS (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Measurement Time	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)
1169.968000	---	41.56	54.00	12.45	100.0	1000.000	155.0	V	47.0	90.0
1293.631000	---	41.85	54.00	12.15	100.0	1000.000	155.0	V	108.0	0.0
1385.957000	48.37	---	74.00	25.63	100.0	1000.000	155.0	H	171.0	90.0
1697.655000	51.46	---	74.00	22.54	100.0	1000.000	155.0	V	240.0	0.0
1724.831000	---	46.08	54.00	7.92	100.0	1000.000	155.0	V	153.0	0.0
2989.313000	---	45.15	54.00	8.85	100.0	1000.000	155.0	V	8.0	90.0
2991.122333	47.11	---	74.00	26.90	100.0	1000.000	155.0	V	175.0	90.0
3186.517333	---	48.57	54.00	5.43	100.0	1000.000	155.0	V	142.0	90.0
3190.747333	46.19	---	74.00	27.81	100.0	1000.000	155.0	V	148.0	0.0
4598.042334	---	41.54	54.00	12.46	100.0	1000.000	155.0	V	109.0	0.0
4786.070667	52.67	---	74.00	21.33	100.0	1000.000	155.0	V	97.0	90.0
5980.535666	---	46.31	54.00	7.69	100.0	1000.000	155.0	V	46.0	0.0

(continuation of the "Final_Result" table from column 16 ...)

Frequency (MHz)	Correction	Comment
1169.968000	27.8	14:13:07 - 17.06.2016
1293.631000	29.1	14:10:34 - 17.06.2016
1385.957000	29.2	14:09:08 - 17.06.2016
1697.655000	32.5	14:07:38 - 17.06.2016
1724.831000	31.6	14:11:44 - 17.06.2016
2989.313000	-1.3	15:07:01 - 17.06.2016
2991.122333	-1.3	15:01:36 - 17.06.2016
3186.517333	-0.2	15:08:42 - 17.06.2016
3190.747333	-0.1	14:58:13 - 17.06.2016
4598.042334	3.3	15:05:11 - 17.06.2016
4786.070667	4.9	14:59:55 - 17.06.2016
5980.535666	7.3	15:03:27 - 17.06.2016