

Transmit Simultaneously Report

1. Product Information

Name of EUT	2G mobile phone
Model Number	S1 Arsenal, S1 Arsenal plus, S1 Arsenal pro, S1 Madrid, S1 Madrid pro
Model Declaration	PCB board, structure and internal of these model(s) are the same, only model name and shell colors is different for these models.
Test Model	S1 Arsenal
Modulation Type	GMSK for GSM/GPRS
Antenna Gain	0.36dBi (max.) for GSM 850; 0.47dBi (max.) for GSM 900; 0.83dBi (max.) for DCS 1800; 0.72dBi (max.) for PCS 1900; 0dBi (max.) for BT
Hardware version	V1.0
Software version	V1.0
GSM/EDGE/GPRS Operation Frequency Band	GSM850/PCS1900/GPRS850/GPRS1900
UMTS Operation Frequency Band	Not Supported
LTE Operation Frequency Band	Not Supported
GSM/EDGE/GPRS	Supported GSM/GPRS
GSM Release Version	R99
GSM/EDGE/GPRS Power Class	GSM850:Power Class 4/ PCS1900:Power Class 1
GPRS/EDGE Multislot Class	GPRS: Multi-slot Class 12
GPRS operation mode	Class B
WCDMA Release Version	Not Supported
HSDPA Release Version	Not Supported
HSUPA Release Version	Not Supported
DC-HSUPA Release Version	Not Supported
LTE Release Version	Not Supported
LTE/UMTS Power Class	Not Supported
WLAN FCC Modulation Type	Not Supported
WLAN FCC Operation frequency	Not Supported
Antenna Type	Integral Antenna
BT Modulation Type	GFSK, $\pi/4$ -DQPSK, 8-DPSK (BT V2.1+EDR)
Extreme temp. Tolerance	-30°C to +55°C
GPS function	Not Supported
FM function	Support and only RX
NFC Function	Not Supported
Extreme vol. Limits	3.40VDC to 4.20VDC (nominal: 3.70VDC)

2. Summary of Test Results

Applied Standard: FCC Part 15 Subpart C		
FCC Rules	Description of Test	Result
§15.209	Radiated Emissions	Compliant

3. Description of Test Modes

The EUT works in the X-axis, Y-axis, Z-axis. The following operating modes were applied for the related test items. All test modes were tested, only the result of the worst case was recorded in the report.

Transmit Simultaneously For Radiated Emission	
Test Mode	
Mode 1	BT+GPRS 850
Mode 2	BT+GPRS1900

4. Summary of Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1	EMI Test Software	AUDIX	E3	/	2018-06-16	2019-06-15
2	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2018-06-16	2019-06-15
3	Positioning Controller	MF	MF-7082	/	2018-06-16	2019-06-15
4	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2018-07-26	2019-07-25
5	Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1925	2018-07-02	2019-07-01
6	Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	791	2018-09-20	2019-09-19
7	Broadband Preamplifier	SCHWARZBECK	BBV 9719	9719-025	2018-09-20	2019-09-19
8	EMI Test Receiver	R&S	ESR 7	101181	2018-06-16	2019-06-15
9	RS SPECTRUM ANALYZER	R&S	FSP40	100503	2018-11-15	2019-11-14
10	AMPLIFIER	QuieTek	QTK	CHM/0809065	2018-11-15	2019-11-14
11	RF Cable-R03m	Jye Bao	RG142	CB021	2018-06-16	2019-06-15
12	RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	2018-06-16	2019-06-15

Note: All equipment is calibrated through GUANGZHOU LISAI CALIBRATION AND TEST CO.,LTD.

4.1. Statement of the Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16 – 4 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements” and is documented in the LCS quality system acc. To DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

4.2. Measurement Uncertainty

Test Item		Frequency Range	Uncertainty	Note
Radiation Uncertainty	:	9KHz~30MHz	3.10dB	(1)
		30MHz~200MHz	2.96dB	(1)
		200MHz~1000MHz	3.10dB	(1)
		1GHz~26.5GHz	3.80dB	(1)
		26.5GHz~40GHz	3.90dB	(1)

(1). This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

5. Radiated Emissions Measurement

5.1. Standard Applicable

1) Sequence of testing 30 MHz to 1 GHz

Setup:

- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.
- If the EUT is a tabletop system, a table with 0.8 m height is used, which is placed on the ground plane.
- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- Auxiliary equipment and cables were positioned to simulate normal operation conditions
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- The measurement distance is 3 meter.
- The EUT was set into operation.

Premeasurement:

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna is polarized vertical and horizontal.
- The antenna height changes from 1 to 3 meter.
- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.

Final measurement:

- The final measurement will be performed with minimum the six highest peaks.
- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position ($\pm 45^\circ$) and antenna movement between 1 and 4 meter.
- The final measurement will be done with QP detector with an EMI receiver.
- The final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

2) Sequence of testing 1 GHz to 18 GHz

Setup:

- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.
- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.
- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- Auxiliary equipment and cables were positioned to simulate normal operation conditions
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- The measurement distance is 3 meter.
- The EUT was set into operation.

Premeasurement:

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna is polarized vertical and horizontal.
- The antenna height scan range is 1 meter to 2.5 meter.
- At each turntable position and antenna polarization the analyzer sweeps with peak detection to find the maximum of all emissions.

Final measurement:

- The final measurement will be performed with minimum the six highest peaks.
- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position ($\pm 45^\circ$) and antenna movement between 1 and 4 meter. This procedure is repeated for both antenna polarizations.
- The final measurement will be done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and Average detector.
- The final levels, frequency, measuring time, bandwidth, turntable position, EUT-table position, antenna polarization, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

3) Sequence of testing above 18 GHz

Setup:

- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.
- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.
- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- Auxiliary equipment and cables were positioned to simulate normal operation conditions
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- The measurement distance is 1 meter.
- The EUT was set into operation.

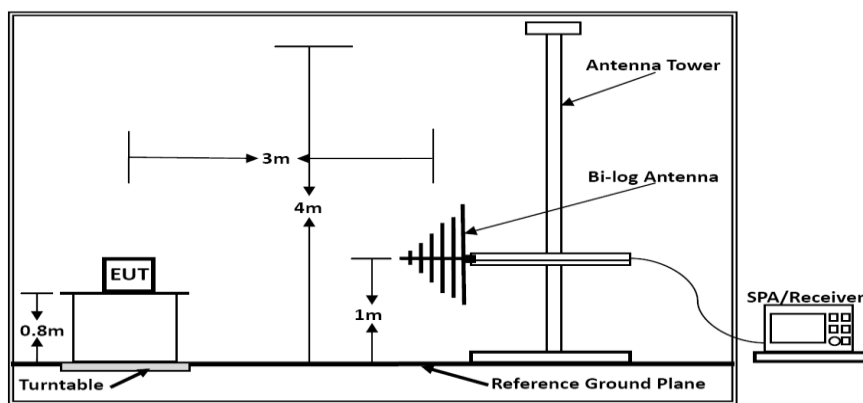
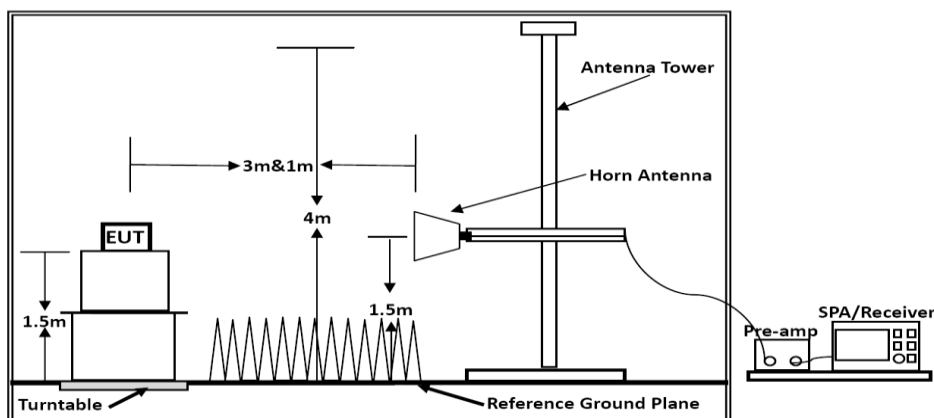
Premeasurement:

--- The antenna is moved spherical over the EUT in different polarizations of the antenna.

Final measurement:

--- The final measurement will be performed at the position and antenna orientation for all detected emissions that were found during the premeasurements with Peak and Average detector.

--- The final levels, frequency, measuring time, bandwidth, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

5.2. Test Setup Layout**Below 1GHz****Above 1GHz**

Above 10 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade from 3m to 1.5m.

Distance extrapolation factor = $20 \log (\text{specific distance [3m]} / \text{test distance [1.5m]})$ (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor [6 dB].

5.3. Results of Radiated Emissions

Temperature / Humidity	23.5°C / 52.6%	Test Engineer	Mina Xu
Test Voltage	Nominal Voltage	/	/

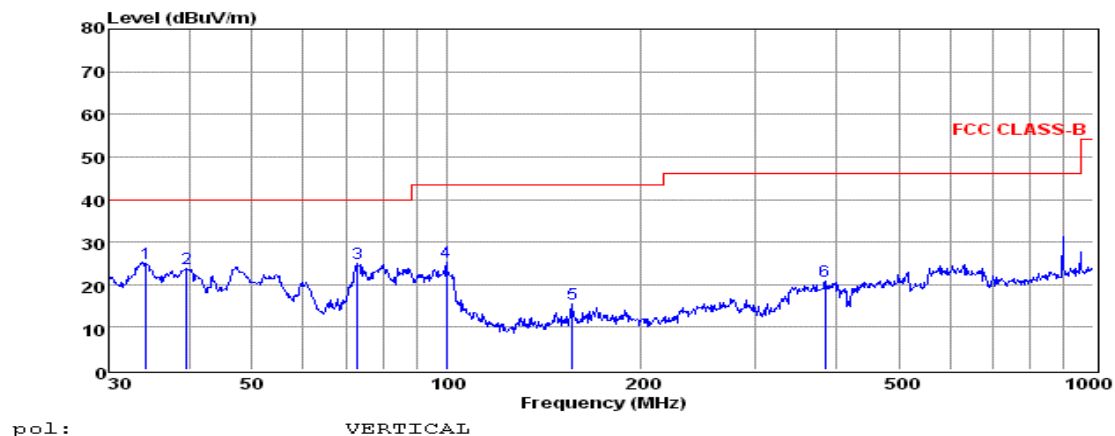
PASS.

Only record the worst test result in this report.

The test data please refer to following page.

Below 1GHz (Worst case: BT+GPRS850)

Vertical



pol:

VERTICAL

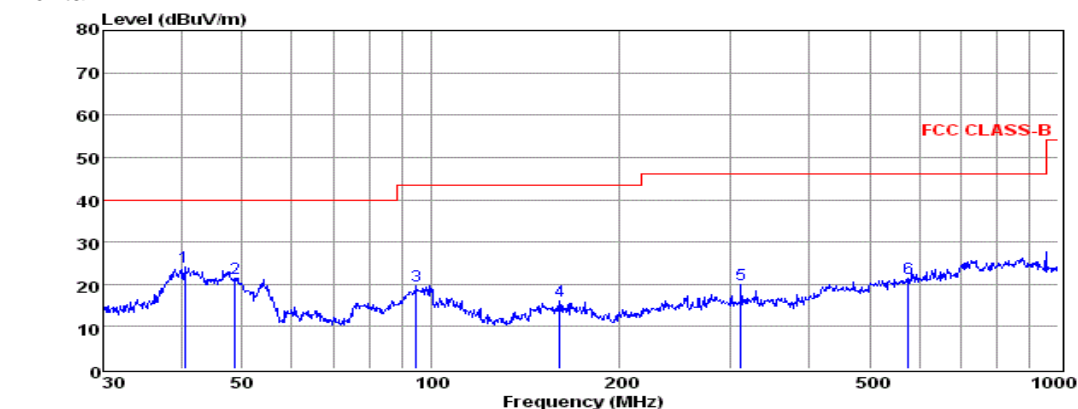
	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	34.28	12.21	0.37	12.30	24.88	40.00	-15.12	QP
2	39.58	9.83	0.38	13.47	23.68	40.00	-16.32	QP
3	72.85	16.25	0.55	8.17	24.97	40.00	-15.03	QP
4	99.88	11.38	0.60	13.15	25.13	43.50	-18.37	QP
5	156.46	6.01	0.83	8.52	15.36	43.50	-28.14	QP
6	385.28	4.77	1.32	14.71	20.80	46.00	-25.20	QP

Note: 1. All readings are Quasi-peak values.

2. Measured= Reading + Antenna Factor + Cable Loss

3. The emission that are 20db below the official limit are not reported

Horizontal



pol:

HORIZONTAL

	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	40.42	10.11	0.50	13.58	24.19	40.00	-15.81	QP
2	48.67	7.79	0.35	13.33	21.47	40.00	-18.53	QP
3	94.76	6.40	0.58	12.79	19.77	43.50	-23.73	QP
4	160.35	6.57	0.75	8.68	16.00	43.50	-27.50	QP
5	312.18	5.67	1.09	13.22	19.98	46.00	-26.02	QP
6	576.64	1.85	1.49	18.01	21.35	46.00	-24.65	QP

Note: 1. All readings are Quasi-peak values.

2. Measured= Reading + Antenna Factor + Cable Loss

3. The emission that are 20db below the official limit are not reported

***Note: Only record the worst test result in this report.

Above 1GHz**BT+GPRS850**

Freq. MHz	Reading dBuv	Ant. Fac dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuv/m	Limit dBuv/m	Margin dB	Remark	Pol.
4804.00	56.74	33.06	35.04	3.94	58.70	74.00	-15.30	Peak	Horizontal
4804.00	37.84	33.06	35.04	3.94	39.80	54.00	-14.20	Average	Horizontal
4882.00	54.09	33.16	35.15	3.96	56.06	74.00	-17.94	Peak	Horizontal
4882.00	35.98	33.16	35.15	3.96	37.95	54.00	-16.05	Average	Horizontal
4960.00	54.35	33.26	35.14	3.98	56.45	74.00	-17.55	Peak	Horizontal
4960.00	42.20	33.26	35.14	3.98	44.30	54.00	-9.70	Average	Horizontal
1648.40	53.06	30.42	31.01	2.12	54.59	74.00	-19.41	Peak	Horizontal
1648.40	36.82	30.42	31.01	2.12	38.35	54.00	-15.65	Average	Horizontal
1673.20	51.46	30.45	31.08	2.15	52.98	74.00	-21.02	Peak	Horizontal
1673.20	40.96	30.45	31.08	2.15	42.48	54.00	-11.52	Average	Horizontal
1697.60	49.93	30.58	31.12	2.17	51.56	74.00	-22.44	Peak	Horizontal
1697.60	38.37	30.58	31.12	2.17	40.00	54.00	-14.00	Average	Horizontal
4804.00	48.31	33.06	35.04	3.94	50.27	74.00	-23.73	Peak	Vertical
4804.00	39.02	33.06	35.04	3.94	40.98	54.00	-13.02	Average	Vertical
4882.00	51.81	33.16	35.15	3.96	53.78	74.00	-20.22	Peak	Vertical
4882.00	37.92	33.16	35.15	3.96	39.89	54.00	-14.11	Average	Vertical
4960.00	49.76	33.26	35.14	3.98	51.86	74.00	-22.14	Peak	Vertical
4960.00	35.00	33.26	35.14	3.98	37.10	54.00	-16.90	Average	Vertical
1648.40	55.89	30.42	31.01	2.12	57.42	74.00	-16.58	Peak	Vertical
1648.40	38.80	30.42	31.01	2.12	40.33	54.00	-13.67	Average	Vertical
1673.20	57.41	30.45	31.08	2.15	58.93	74.00	-15.07	Peak	Vertical
1673.20	41.61	30.45	31.08	2.15	43.13	54.00	-10.87	Average	Vertical
1697.60	56.28	30.58	31.12	2.17	57.91	74.00	-16.09	Peak	Vertical
1697.60	38.06	30.58	31.12	2.17	39.69	54.00	-14.31	Average	Vertical

BT+GPRS1900

Freq. MHz	Reading dBuv	Ant. Fac dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuv/m	Limit dBuv/m	Margin dB	Remark	Pol.
4804.00	55.43	33.06	35.04	3.94	57.39	74.00	-16.61	Peak	Horizontal
4804.00	38.80	33.06	35.04	3.94	40.76	54.00	-13.24	Average	Horizontal
4882.00	54.84	33.16	35.15	3.96	56.81	74.00	-17.19	Peak	Horizontal
4882.00	35.94	33.16	35.15	3.96	37.91	54.00	-16.09	Average	Horizontal
4960.00	55.25	33.26	35.14	3.98	57.35	74.00	-16.65	Peak	Horizontal
4960.00	40.86	33.26	35.14	3.98	42.96	54.00	-11.04	Average	Horizontal
3700.40	47.53	32.14	34.12	3.53	49.08	74.00	-24.92	Peak	Horizontal
3700.40	36.91	32.14	34.12	3.53	38.46	54.00	-15.54	Average	Horizontal
3760.00	49.55	32.17	34.15	3.55	51.12	74.00	-22.88	Peak	Horizontal
3760.00	40.96	32.17	34.15	3.55	42.53	54.00	-11.47	Average	Horizontal
3819.60	47.56	32.21	34.19	3.58	49.16	74.00	-24.84	Peak	Horizontal
3819.60	38.52	32.21	34.19	3.58	40.12	54.00	-13.88	Average	Horizontal
4804.00	47.26	33.06	35.04	3.94	49.22	74.00	-24.78	Peak	Vertical
4804.00	41.00	33.06	35.04	3.94	42.96	54.00	-11.04	Average	Vertical
4882.00	52.59	33.16	35.15	3.96	54.56	74.00	-19.44	Peak	Vertical
4882.00	37.97	33.16	35.15	3.96	39.94	54.00	-14.06	Average	Vertical
4960.00	49.82	33.26	35.14	3.98	51.92	74.00	-22.08	Peak	Vertical
4960.00	36.25	33.26	35.14	3.98	38.35	54.00	-15.65	Average	Vertical
3700.40	54.22	32.14	34.12	3.53	55.77	74.00	-18.23	Peak	Vertical
3700.40	37.86	32.14	34.12	3.53	39.41	54.00	-14.59	Average	Vertical
3760.00	55.07	32.17	34.15	3.55	56.64	74.00	-17.36	Peak	Vertical
3760.00	37.85	32.17	34.15	3.55	39.42	54.00	-14.58	Average	Vertical
3819.60	54.11	32.21	34.19	3.58	55.71	74.00	-18.29	Peak	Vertical
3819.60	37.18	32.21	34.19	3.58	38.78	54.00	-15.22	Average	Vertical

- 1). Only record the worst test result in this report
 2). 18~25GHz at least have 20dB margin. No recording in the test report.

Revision History

Revision	Issue Date	Revisions	Revised By
000	December 18, 2018	Initial Issue	Gavin Liang

-----THE END OF REPORT-----