

FCC Test Report

APPLICANT : Brightstar Corporation

EQUIPMENT: Mobile phone

BRAND NAME : Avvio

MODEL NAME : AVVIO 399S FCC ID : WVBA399S

STANDARD : FCC 47 CFR FCC Part 15 Subpart B

CLASSIFICATION : Certification

The product was received on Feb. 17, 2012 and completely tested on Mar. 14, 2012. We, SPORTON INTERNATIONAL (KUNSHAN) INC., would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.4-2003 and shown the compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL (KUNSHAN) INC., the test report shall not be reproduced except in full.

Reviewed by:

Jones Tsai / Manager





SPORTON INTERNATIONAL (KUNSHAN) INC. No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P.R.C.



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Report No. : FC221703



REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FC221703	Rev. 01	Initial issue of report	Mar. 23, 2012

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SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
					Under limit
3.1	15.107	AC Conducted Emission	< 15.107 limits	PASS	10.05 dB at
					0.19 MHz
					Under limit
					3.20 dB at
					371.40 MHz for
3.2	15.109	Radiated Emission	< 15.109 limits	DAGO	peak
3.2	15.109	Radiated Effission	< 15.109 III1IIIS	PASS	Under limit
					1.52 dB at
					30.00 MHz for
					Quasi-Peak

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1. General Description

1.1. Applicant

Brightstar Corporation

9725 NW 117th Ave., Miami, Florida, United States

1.2. Manufacturer

Lenovo Mobile Internet and Digital Home

East 5/F, Lenovo Research & Development Centre, Gaoxinnanyi Road, Hi-Tech Industrial Park, Shenzhen, Guangdong, China

1.3. Feature of Equipment Under Test

Product Feature & Specification				
Equipment	Mobile phone			
Brand Name	Avvio			
Model Name	AVVIO 399S			
FCC ID	WVBA399S			
	GSM850 : 824 MHz ~ 849 MHz			
Tx Frequency Range	GSM1900 : 1850 MHz ~ 1910 MHz			
	Bluetooth : 2400 MHz ~ 2483.5 MHz			
	GSM850 : 869 MHz ~ 894 MHz			
Rx Frequency Range	GSM1900 : 1930 MHz ~ 1990 MHz			
	Bluetooth : 2400 MHz ~ 2483.5 MHz			
Antonno Tyro	WWAN : Fixed Internal Antenna			
Antenna Type	Bluetooth : Dipole Antenna			
HW Version	PCB version 1.2			
SW Version	T22A_LX_S12_BRAZIL_EP_V0_0_21(20120220).			
	GSM/ GPRS: GMSK			
Type of Modulation	Bluetooth (1Mbps) : GFSK			
	Bluetooth EDR (2Mbps) : π/4-DQPSK			
	Bluetooth EDR (3Mbps) : 8-DPSK			
EUT Stage	Production Unit			

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

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1.4. Test Site

Test Site	SPORTON INTERNATIONAL (SHENZHEN) INC.
	No. 101, Complex Building C, Guanglong Village, Xili Town,
Test Site Location	Nanshan District, Shenzhen, Guangdong, P.R.C.
rest Site Location	TEL: +86-755-8637-9589
	FAX: +86-755-8637-9595
Took Cita No	Sporton Site No. :
Test Site No.	CO01-SZ

Test Site	SPORTON INTERNATIONAL (KUNSHAN) INC.				
	No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P.R.C.				
Test Site Location	TEL: +86-0512-5790-0158				
	FAX: +86-0512-5790-0958				
Toot Site No	Sporton Site No. FCC/IC Registration				
Test Site No.	03CH01-KS	149928/4086E-1			

1.5. Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC 47 CFR FCC Part 15 Subpart B
- ANSI C63.4-2003

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.

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1.6. Ancillary Equipment List

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m
2.	System Simulator	Agilent	E5515C	N/A	N/A	Unshielded, 1.8 m
3.	Singal Generator	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m
4.	PC	DELL	MT380	FCC DoC	N/A	Unshielded, 1.8 m
5.	Monitor	DELL	E1910Hc	FCC DoC	Shielded, 1.2 m	Unshielded, 1.8 m
6.	Monitor	DELL	1707FPt	FCC DoC	Shielded, 1.2 m	Unshielded, 1.8 m
7.	Printer	HP	Laser Jet 1018	FCC DoC	Shielded, 1.8 m	Unshielded, 1.8 m
8.	(USB) Keyboard	DELL	SK-8115	FCC DoC	Shielded, 1.8 m	N/A
9.	(USB) Mouse	DELL	N231	FCC DoC	Shielded, 1.8 m	N/A
10.	iPod Apple		A1199	FCC DoC	Shielded, 1.2 m	N/A
11.	iPod	Apple	MC525 ZP/A	FCC DoC	Shielded, 1.0 m	N/A
12.	Bluetooth Earphone Nokia		BH-102	PYAHS-107W	N/A	N/A
13.	Bluetooth Earphone	Nokia	BH-108	N/A	N/A	N/A
14.	Earphone	Eimuse	E-500MV	FCC DoC	Shielded, 2.2 m	N/A
						AC I/P:
15.	Notebook	DELL	VOSTRO 1440	QDS-BRCM1051	N/A	Unshielded, 1.8 m
15.	INOTEDOOK	DELL	VOSTRO 1440	QD3-BRCW1051	N/A	DC O/P:
						Shielded, 1.8 m

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2. Test Configuration of Equipment Under Test

2.1. Test Mode

The EUT has been associated with peripherals pursuant to ANSI C63.4-2003 and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

Frequency range investigated: conduction (150 KHz to 30 MHz), radiation (30MHz to the 5th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

The following tables are showing the test modes as the worst cases and recorded in this report.

		Te	est Condition	on
Item	EUT Configuration	EMI AC	EMI RE<1G	EMI RE≥1G
1.	Operating Mode (EUT with earphone)	Note 1	\boxtimes	Note 1
2.	Charging Mode (EUT with adapter)		\boxtimes	Note 1
3.	Data application transferred mode (EUT with	5 7	\boxtimes	\boxtimes
	Notebook/PC)			

Abbreviations:

EMI AC: AC conducted emissions

EMI RE ≥ 1G: EUT radiated emissions ≥ 1GHz

EMI RE < 1G: EUT radiated emissions < 1GHz

Note 1: Testing for this mode is not required or not the worst case.

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Test Items	EUT Configure Mode	Function Type
		Mode 1: GSM 850 Idle + Bluetooth Idle + Adapter + Camera
AC Conducted	2/3	Mode 2: GSM 1900 Idle + Bluetooth Idle + Adapter + MP3
Emission	Emission — —	Mode 3: GSM 1900 Idle + Bluetooth Idle + USB Cable (Data Link with Notebook)
		Mode 1: GSM 850 Idle + Bluetooth Idle + Adapter + Camera
D-4:-464		Mode 2: GSM 1900 Idle + Bluetooth Idle + Adapter + MP3
Radiated Emissions < 1GHz	1/2/3	Mode 3: GSM 850 Idle + Bluetooth Idle + Earphone + FM Rx
		Mode 4: GSM 1900 Idle + Bluetooth Idle + USB Cable (Data Link with PC)
Radiated Emissions ≥ 1GHz	.5	Mode 1: GSM 1900 Idle + Bluetooth Idle + USB Cable (Data Link with PC)

Remark:

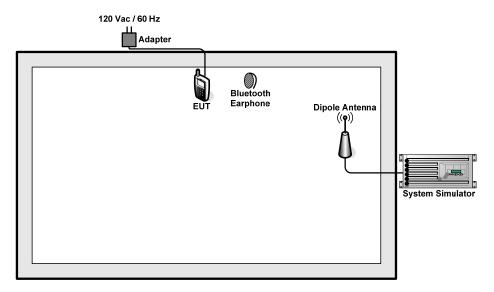
- 1. The worst case of AC is mode 3; only the test data of this mode was reported.
- 2. The worst case of RE < 1G is mode 4; only the test data of this mode was reported.
- **3.** Link with Notebook/PC means data application transferred mode between EUT and Notebook.

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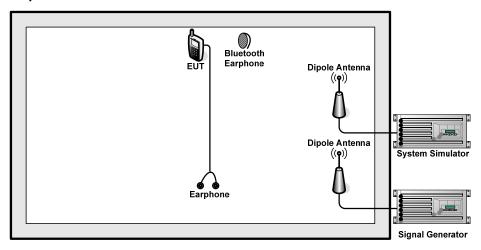


2.2. Connection Diagram of Test System

<EUT with Adapter Mode>



<EUT with Earphone Mode>



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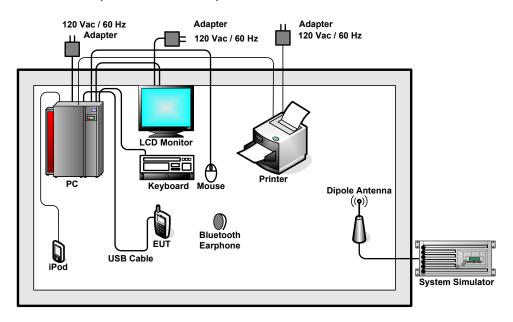
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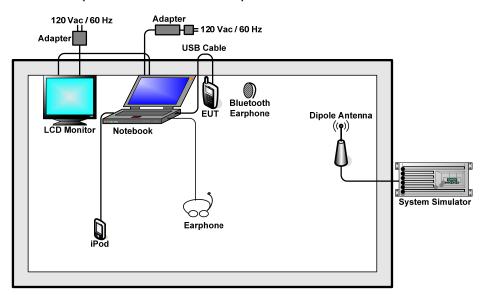


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< EUT with USB Cable (Data Link with PC) Mode >



<EUT with USB Cable (Data Link with Notebook) Mode>



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2.3. Test Software

The EUT was in GSM idle mode during the testing. The EUT was synchronized to the BCCH, and is in continuous receiving mode by setting system simulator's paging reorganization.

At the same time, the EUT was attached to the Bluetooth earphone, and the following programs installed in the EUT were programmed during the test.

- 1. Execute the program, "Winthrax", installed in notebook or PC for active sync files transfer with EUT via USB cable / iPod.
- 2. Execute "Music Player" to play MP3 file.
- 3. Turn on camera to capture images.
- 4. Turn on FM function to make the EUT receive signals from signal generator continuously.
- 5. Keep the EUT transmitting and receiving signals continuously from system simulator.

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3. Test Result

3.1. Test of AC Conducted Emission Measurement

3.1.1 Limits of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 KHz to 30 MHz shall not exceed the limits in the following table.

Frequency of emission	Conducted	limit (dBuV)
(MHz)	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

^{*}Decreases with the logarithm of the frequency.

3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

3.1.3 Test Procedure

- 1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
- 2. The EUT link with PC/notebook, connect PC/notebook to the power mains through a line impedance stabilization network (LISN).
- 3. All the support units are connecting to the other LISN.
- 4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
- The FCC states that a 50 ohm, 50 microhenry LISN should be used. 5.
- Both sides of AC line were checked for maximum conducted interference. 6.
- 7. The frequency range from 150 KHz to 30 MHz was searched.
- 8. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.

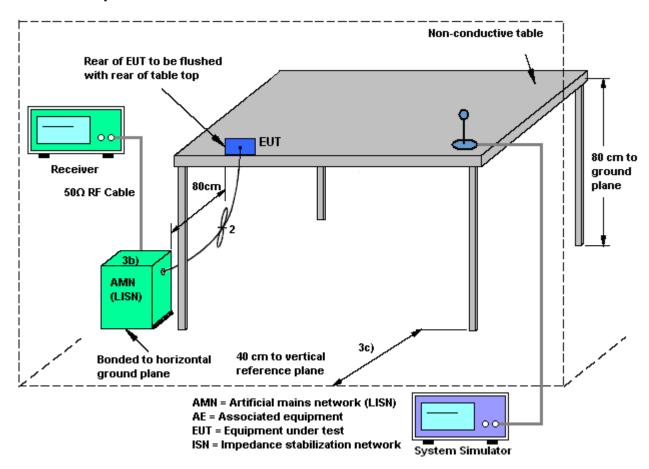
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3.1.4 Test Setup



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3.1.5 Test Result of AC Conducted Emission

Test Mode :	Mode 3				Temp	erature	:	22~23°C		
Test Engineer :	Jacky J	lia			Relati	Relative Humidity :			44~46%	
Test Voltage :	120Va	c / 60H	Z		Phase	:		Line		
Function Type :	GSM 1	900 ld	le + Blu	etooth	Idle + l	JSB Ca	ble (Da	ıta Link wi	th Notebook)	
Remark :	All emi	ssions	not rep	orted h	ere are	more t	han 10	dB below	the prescribed I	imit.
400	evel (dBuV)						Di	ate: 2012-03-06	
90.0										
80.0										
70.0									FCC 15B_QP	
60.0	fing.									
50.0	1194	-						40	FGC 15B_AVG	
40.0	# ##	₩ <mark>₩₩₩</mark>	A New York	preparate many	druktud vara	Managh April Styristing	Manual.	and hearth by	11 Mayor Mayor	
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20.0										
10.0										
0	_		.5						20 20	
.1	5 .2		.5	1	2 Frequence	cy (MHz)	5	10	20 30	
Site	: 000									
Conditi Project				_L_200	0601 I	INE				
Mode	: (FI		00							
	_		Over	Limit	Read		Cable			
	Freq	Level	Limit	Line	Level	Factor	Loss	Remark		
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		-	
1			-17.98			0.03	10.05	Average		
2			-16.98				10.05			
3			-24.44					Average		
4			-22.34				10.05			
5	0.19		-16.65	53.93				Average		
6	0.19		-10.05				10.05			
7 8	0.22		-22.04 -11.54	52.92		0.02	10.06	Average		
9						0.02				
10						0.02		_		
11						0.25				
12						0.25				
	20.27		20.20	22.20	31.20	1.20	22.10	*-		

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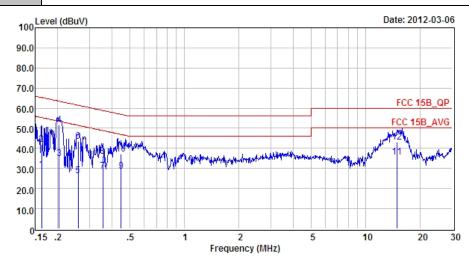
Test Mode : Mode 3 Temperature : 22~23°C

Test Engineer : Jacky Jia Relative Humidity : 44~46%

Test Voltage : 120Vac / 60Hz Phase : Neutral

Function Type: GSM 1900 Idle + Bluetooth Idle + USB Cable (Data Link with Notebook)

Remark: All emissions not reported here are more than 10 dB below the prescribed limit.



Site : CO01-SZ

Condition: FCC 15B_QP LISN_N_2000601 NEUTRAL

Project : (FD) 221703 Mode : Mode3

Over Limit Read LISN Cable Freq Level Limit Line Level Factor Loss Remark dB dBuV dBuV dB MHz dBuV dB 0.16 29.37 -25.93 55.30 19.30 0.02 10.05 Average 0.16 41.87 -23.43 65.30 31.80 0.02 10.05 QP 0.20 34.87 -18.58 53.45 24.79 0.02 10.06 Average 0.20 51.67 -11.78 63.45 41.59 0.02 10.06 QP 0.26 26.28 -25.19 51.47 16.20 0.26 43.48 -17.99 61.47 33.40 0.02 10.06 Average 0.02 10.06 QP 5 0.35 28.69 -20.18 48.87 18.60 0.02 10.07 Average 0.35 35.89 -22.98 58.87 25.80 0.02 10.07 QP 0.45 28.70 -18.23 46.93 18.60 0.02 10.08 Average 0.45 37.20 -19.73 56.93 27.10 0.02 10.08 QP 14.91 35.57 -14.43 50.00 24.80 0.34 10.43 Average 10 11 14.91 42.97 -17.03 60.00 32.20 0.34 10.43 QP

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3.2. Test of Radiated Emission Measurement

3.2.1. Limit of Radiated Emission

The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency	Field Strength	Measurement Distance
(MHz)	(microvolts/meter)	(meters)
0.009 - 0.490	2400/F(KHz)	300
0.490 – 1.705	24000/F(KHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

3.2.2. Measuring Instruments

See list of measuring instruments of this test report.

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3.2.3. Test Procedures

- 1. The EUT was placed on a turntable with 0.8 meter above ground.
- 2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
- 3. The table was rotated 360 degrees to determine the position of the highest radiation.
- 4. The antenna is a Bi-Log antenna and its height is adjusted between one meter and four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
- 5. For each suspected emission, the EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
- 6. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.
- 7. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the quasi-peak method and reported
- 8. Emission level $(dBuV/m) = 20 \log Emission level (uV/m)$
- 9. Corrected Reading: Antenna Factor + Cable Loss + Read Level Preamp Factor = Level

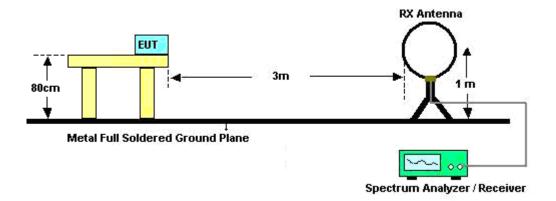
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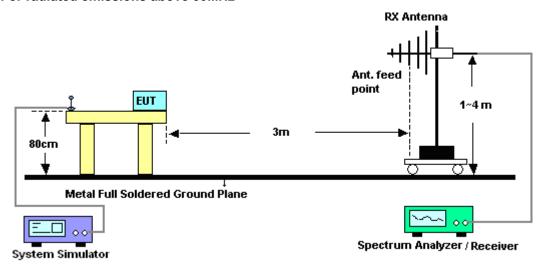


3.2.4. Test Setup of Radiated Emission

For radiated emissions below 30MHz



For radiated emissions above 30MHz



3.2.5. Test Results of Radiated Emissions (9 kHz ~ 30 MHz)

The low frequency, which started from 9 KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

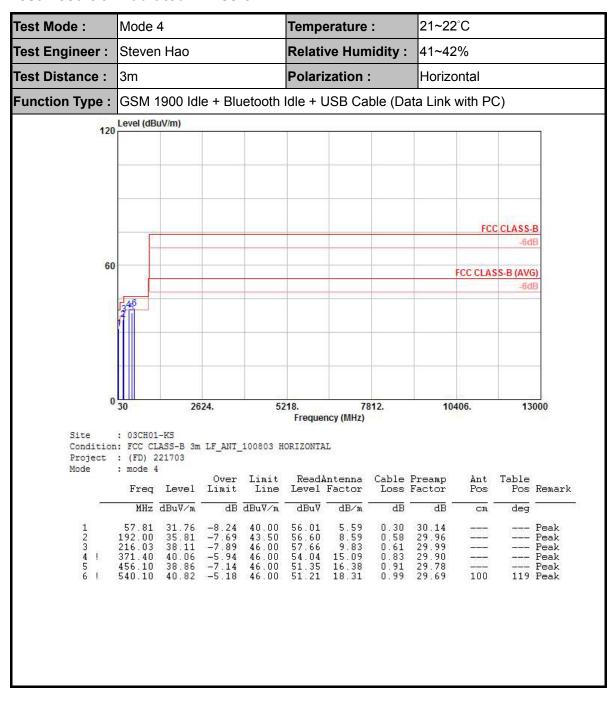
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3.2.6. Test Result of Radiated Emission

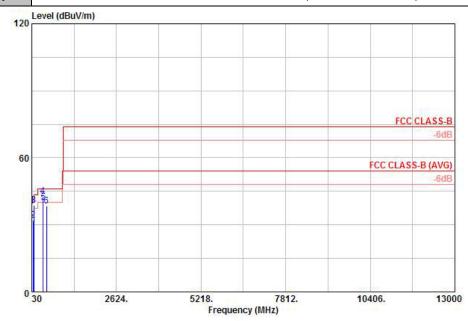


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21~22°C Test Mode: Mode 4 Temperature : Steven Hao 41~42% Test Engineer: Relative Humidity: Test Distance : 3m Polarization: Vertical

GSM 1900 Idle + Bluetooth Idle + USB Cable (Data Link with PC) Function Type:



: 03CH01-KS Site

Condition: FCC CLASS-B 3m LF_ANT_100803 VERTICAL Project : (FD) 221703

Mode : mode 4

		Freq Leve		Freq Leve		Freq Level				Antenna Factor		Factor	Pos	Pos	Remark
	85	MHz	$\overline{\mathtt{dBuV/m}}$	dB	$\overline{\mathtt{dBuV/m}}$	dBuV	dB/m	dB	dB	CM.	deg				
1	Ü	30.00	38.48	-1.52	40.00	50.30	18.00	0.26	30.08	100	0	QP			
2		66.72	32.16	-7.84	40.00	56.68	5.25	0.33	30.10	100	122	QP			
3	1	89.94	38.94	-4.56	43.50	59.64	8.90	0.39	29.99			Peak			
4	1	371.40	42.80	-3.20	46.00	56.78	15.09	0.83	29.90	0.00000	0.79790	Peak			
5	18	384.00	40.12	-5.88	46.00	53.56	15.59	0.83	29.86			Peak			
6		486.20	38.57	-7.43	46.00	50.37	16.99	0.95	29.74		0.000	Peak			

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4. List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristic s	Calibration Date	Test Date	Due Date	Remark
AC LISN	ETS-LINDGR EN	3816/2SH	00103912	0.1MHz~108M Hz	Feb. 27, 2012	Mar. 06, 2012	Feb. 26, 2013	Conduction (CO01-SZ)
AC LISN	ETS-LINDGR EN	3816/2SH	00103892	0.1MHz~108M Hz	Feb. 27, 2012	Mar. 06, 2012	Feb. 26, 2013	Conduction (CO01-SZ)
ESCIO TEST Receiver	R&S	1142.8007. 03	100724	9K-3GHz	Mar. 08, 2011	Mar. 06, 2012	Mar. 07, 2012	Conduction (CO01-SZ)
AVR	Throma	61602	616020000891	N/A	Oct. 12, 2011	Mar. 06, 2012	Oct. 11, 2012	Conduction (CO01-SZ)
AC LISN	SCHWARZBE CK	NNLK 8121	8121370	10KHz-30MHz	Jun. 13, 2011	Mar. 06, 2012	Jun. 12, 2012	Conduction (CO01-SZ)
System Simulator	Agilent	E5515C	MY50264168	GSM/WCDMA /CDMA2000	Mar. 14, 2011	Mar. 06, 2012	Mar. 13, 2012	Conduction (CO01-SZ)
EMI Test Receiver	R&S	ESCI	100534	9kHz~3GHz	Nov. 09, 2011	Mar. 14, 2012	Nov. 08, 2012	Radiation (03CH01-KS)
Spectrum Analyzer	R&S	FSP40	100319	9kHz~40GHz	Dec. 30, 2011	Mar. 14, 2012	Dec. 29, 2012	Radiation (03CH01-KS)
Bilog Antenna	SCHAFFNER	CBL6112D	23182	25MHz~2GHz	Dec. 08, 2011	Mar. 14, 2012	Dec. 07, 2012	Radiation (03CH01-KS)
Loop Antenna	R&S	HFH2-Z2	860004/00	9 kHz~30 MHz	Jul. 28, 2011	Mar. 14, 2012	Jul. 27, 2012	Radiation (03CH01-KS)
Double Ridge Horn Antenna	EMCO	3117	00075959	1GHz~18GHz	Jan. 06, 2012	Mar. 14, 2012	Jan. 05, 2013	Radiation (03CH01-KS)
Amplifier	Wireless	FPA-6592G	060007	30MHz~2GHz	Dec. 30, 2011	Mar. 14, 2012	Dec. 29, 2012	Radiation (03CH01-KS)
Amplifier	Agilent	8449B	3008A02370	1GHz~26.5GH z	Dec. 30, 2011	Mar. 14, 2012	Dec. 29, 2012	Radiation (03CH01-KS)
Active Horn Antenna	com-power	AHA-118	701023	1GHz~18GHz	Nov. 07, 2011	Mar. 14, 2012	Nov. 06, 2012	Radiation (03CH01-KS)
Signal Generator	R&S	SMR40	100455	10GHz~40GH z	Dec. 30, 2011	Mar. 14, 2012	Dec. 29, 2012	Radiation (03CH01-KS)
SHE-EHF Horn	Schwarzbeck	BBHA9170	BBHA170249	15GHz~40GH z	Oct. 11, 2011	Mar. 14, 2012	Oct. 10, 2012	Radiation (03CH01-KS)
System Simulator	R&S	CMU200	837587/066	2G Full-Band	Dec. 30, 2011	Mar. 14, 2012	Dec. 29, 2012	Radiation (03CH01-KS)

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5. Uncertainty of Evaluation

Uncertainty of Conducted Emission Measurement (150 KHz ~ 30 MHz)

	Uncerta				
Contribution	dB	Probability Distribution	u(X _i)		
Receiver Reading	0.10	Normal (k=2)	0.05		
Cable Loss	0.10	Normal (k=2)	0.05		
AMN Insertion Loss	2.50	Rectangular	0.63		
Receiver Specification	1.50	Rectangular	0.43		
Site Imperfection	1.39	Rectangular	0.80		
Mismatch	+0.34 / -0.35	U-Shape	0.24		
Combined Standard Uncertainty Uc(y)	1.13				
Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	2.26				

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

	Uncerta			
Contribution	dB	Probability Distribution	u(X _i)	
Receiver Reading	0.41	Normal (k=2)	0.21	
Antenna Factor Calibration	0.83	Normal (k=2)	0.42	
Cable Loss Calibration	0.25	Normal (k=2)	0.13	
Pre-Amplifier Gain Calibration	0.27	Normal (k=2)	0.14	
RCV/SPA Specification	2.50	Rectangular	0.72	
Antenna Factor Interpolation for Frequency	1.00	Rectangular	0.29	
Site Imperfection	1.43	Rectangular	0.83	
Mismatch	+0.39 / -0.41	U-Shape	0.28	
Combined Standard Uncertainty Uc(y)	1.27			
Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	2.54			

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Uncertainty of Radiated Emission Measurement (1 GHz ~ 40 GHz)

	Uncertai					
Contribution	dB	Probability Distribution	u(X _i)	C _i	C _i * u(X _i)	
Receiver Reading	±0.10	Normal (k=2)	0.10	1	0.10	
Antenna Factor Calibration	±1.70	Normal (k=2)	0.85	1	0.85	
Cable Loss Calibration	±0.50	Normal (k=2)	0.25	1	0.25	
Receiver Correction	±2.00	Rectangular	1.15	1	1.15	
Antenna Factor Directional	±1.50	Rectangular	0.87	1	0.87	
Site Imperfection	±2.80	Triangular	1.14	1	1.14	
Mismatch Receiver VSWR Γ 1 = 0.197 Antenna VSWR Γ 2 = 0.194 Uncertainty = 20Log(1- Γ 1* Γ 2)	+0.34 / -0.35	U-Shape	0.244	1	0.244	
Combined Standard Uncertainty Uc(y)	2.36					
Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	4.72					

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Appendix A. Photographs of EUT

Please refer to Sporton report number EP221703 as below.

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