FCC RADIO TEST REPORT
FCC ID: 2AJTUS550

Product：	High precision industrial grade GNSS receiver pad
Trade Name：	SOUTH, SANDING, KOLIDA, RUIDE, TIANYU, TEXCEL
Model Name：	S550
Serial Model：	S510, S520, S540, S560, D40, D50, D60, K40, K50, K60
Report No.：	STUEMO016072605210RF4

Prepared for

South Geo-science Technology Co., Ltd.

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Prepared by

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TEST RESULT CERTIFICATION

Applicant's name	:	South Geo-science Technology Co., Ltd.
Address	:	Room 301 South Building, No.24-26 Keyun Road, Tian He District, Guangzhou, China
Manufacture's Name	:	Guangzhou South Satellite Navigation Co., Ltd.
Address	:	Layer 2-3, N0.52-54 Jian Zhong Road, Tian He District, Guangzhou, China
Product description		
Product name	:	High precision industrial grade GNSS receiver pad
Model and/or type reference	:	S550, S510, S520, S540, S560, D40, D50, D60, K40, K50, K60
Standards	:	FCC Part 15B: 2016
Test procedure		ANSI C63.4: 2014

This device described above has been tested by BZT, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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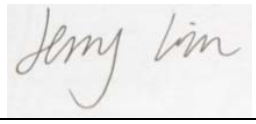
Date of Test	:	
Date (s) of performance of tests	:	7 Aug. 2016 ~17 Aug. 2016
Date of Issue	:	17 Aug. 2016
Test Result	:	**Pass**

Testing Engineer : 

(Jerry Lin)

Technical Manager : 

(Jimmy Yao)

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(Terry Yang)

Table of Contents **Page**

1 . TEST SUMMARY 4
1.1 TEST FACILITY 5
1.2 MEASUREMENT UNCERTAINTY 5
2 . GENERAL INFORMATION 6
2.1 GENERAL DESCRIPTION OF EUT 6
2.2 DESCRIPTION OF TEST MODES 7
2.3 DESCRIPTION OF TEST SETUP 8
2.4 DESCRIPTION TEST PERIPHERAL AND EUT PERIPHERAL 9
2.5 MEASUREMENT INSTRUMENTS LIST 10
3 . EMC EMISSION TEST 11
3.1 CONDUCTED EMISSION MEASUREMENT 11
3.1.1 POWER LINE CONDUCTED EMISSION 11
3.1.2 TEST PROCEDURE 12
3.1.3 TEST SETUP 12
3.1.4 EUT OPERATING CONDITIONS 12
3.1.5 TEST RESULTS 13
3.2 RADIATED EMISSION MEASUREMENT 15
3.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT 15
3.2.2 TEST PROCEDURE 15
3.2.3 TEST SETUP 16
3.2.4 EUT OPERATING CONDITIONS 16
3.2.5 TEST RESULTS(Blow 30MHZ) 17
3.2.6 TEST RESULTS(30MHZ-1GHZ) 18
3.2.7 TEST RESULTS(Above 1GHz) 20

1. TEST SUMMARY

Test procedures according to the technical standards:

EMC Emission				
Standard	Test Item	Limit	Judgment	Remark
FCC Part 15B: 2016 ANSI C63.4:2014	Conducted Emission	Class B	PASS	
	Radiated Emission	Class B	PASS	

1.1 TEST FACILITY

BZT Testing Technology Co., Ltd.

Add.:1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street, Bao'an District, Shenzhen P.R. China.

FCC Registered No.: 701733

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y** ± **U**，where expended uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k=2**，providing a level of confidence of approximately **95** %。

A. Conducted Measurement :

Test Site	Method	Measurement Frequency Range	U，(dB)	NOTE
BZTC01	ANSI	150 KHz ~ 30MHz	3.2	

B. Radiated Measurement :

Test Site	Method	Measurement Frequency Range	U，(dB)	NOTE
BZTA01	ANSI	30MHz ~ 1000MHz	4.7	
		1GHz ~6GHz	5.0	

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	High precision industrial grade GNSS receiver pad
Brand Name	SOUTH, SANDING, KOLIDA,RUIDE, TIANYU, TEXCEL
Model Name.	S550
Serial No	S510, S520, S540, S560, D40, D50, D60, K40, K50, K60
Model Difference	All the model are the same circuit and RF module, except model names and color.
Product Description	The EUT is a High precision industrial grade GNSS receiver pad. Connecting I/O port: USB Port Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User's Manual.
Adapter	Model: DSA-60PFC-121 Input: AC 100-240V; 50/60Hz; 1.5A Output: DC 12V,5A
Battery	Model: BTNF-L3713W Capacity: 7200mAh Related Voltage: 3.7V

2.2 DESCRIPTION OF TEST MODES

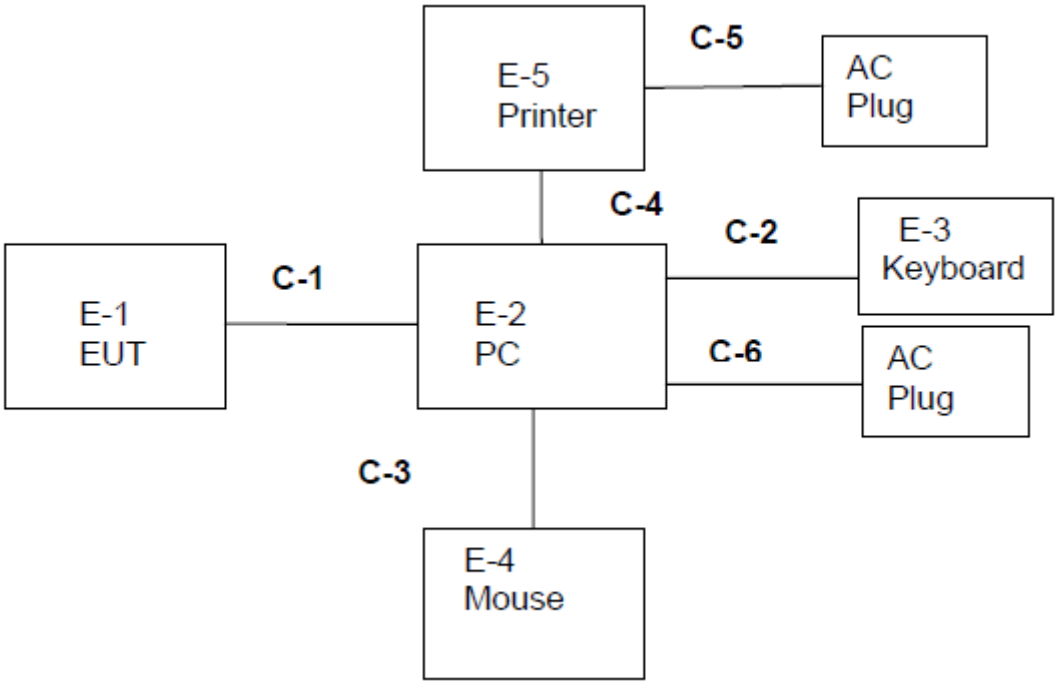
To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	PC Mode

For Conducted Test	
Final Test Mode	Description
Mode 1	PC Mode

For Radiated Test	
Final Test Mode	Description
Mode 1	PC Mode

2.3 DESCRIPTION OF TEST SETUP



2.4 DESCRIPTION TEST PERIPHERAL AND EUT PERIPHERAL

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
E-1	High precision industrial grade GNSS receiver pad	SOUTH	S550	N/A	EUT
E-2	PC	4CV428DQXR	500-320cx	4CV428DQYN	
E-3	Keyboard	HP	PR1101U	DKUSB1B06Q42209FBK800	
E-4	Mouse	MOTOSPEED	F66	697738-001	
E-5	Printer	HP	HP1020	CNBB102765	

Item	Shielded Type	Ferrite Core	Length	Note
C-1	USB Cable	NO	90cm	
C-2	USB Cable	NO	100cm	
C-3	USB Cable	NO	100cm	
C-4	USB Cable	NO	100cm	
C-5	AC (Printer Cable)	NO	100cm	
C-6	AC (PC Cable)	NO	120cm	

Note:

(1) The support equipment was authorized by Declaration of Confirmation.
(2) For detachable type I/O cable should be specified the length in cm in『Length』column.

2.5 MEASUREMENT INSTRUMENTS LIST

Radiation Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Spectrum Analyzer	Agilent	E4407B	MY45108040	2016.07.06	2017.07.05	1 year
2	Test Receiver	R&S	ESPI	101318	2016.06.07	2017.06.06	1 year
3	Bilog Antenna	TESEQ	CBL6111D	31216	2016.07.06	2017.07.05	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2016.06.07	2017.06.06	1 year
5	Spectrum Analyzer	ADVANTEST	R3132	150900201	2016.06.07	2017.06.06	1 year
6	Horn Antenna	EM	EM-AH-10180	2011071402	2016.07.06	2017.07.05	1 year
7	Horn Ant	Schwarzbeck	BBHA 9170	9170-181	2016.07.06	2017.07.05	1 year
8	Amplifier	EM	EM-30180	060538	2015.12.22	2016.12.21	1 year
9	Loop Antenna	ARA	PLA-1030/B	1029	2016.06.08	2017.06.07	1 year

Conduction Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Test Receiver	R&S	ESCI	101160	2016.06.06	2017.06.05	1 year
2	LISN	R&S	ENV216	101313	2015.08.24	2016.08.23	1 year
3	LISN	EMCO	3816/2	00042990	2015.08.24	2016.08.23	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2016.06.07	2017.06.06	1 year
5	Passive Voltage Probe	R&S	ESH2-Z3	100196	2016.06.07	2017.06.06	1 year
6	Absorbing clamp	R&S	MOS-21	100423	2016.06.08	2017.06.07	1 year

3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION (Frequency Range 150KHz-30MHz)

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *
0.50 -5.0	73.00	60.00	56.00	46.00
5.0 -30.0	73.00	60.00	60.00	50.00

Note:

(1) The tighter limit applies at the band edges.

(2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

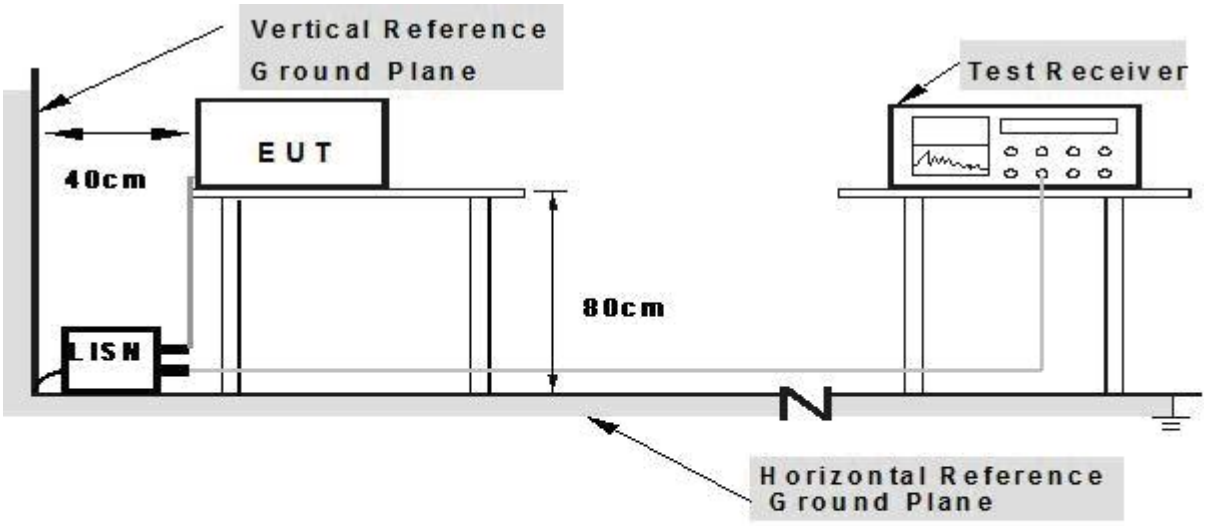
The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

3.1.2 TEST PROCEDURE

a. The EUT was placed 0.4 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
d. LISN at least 80 cm from nearest part of EUT chassis.
e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.1.3 TEST SETUP



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

3.1.4 EUT OPERATING CONDITIONS

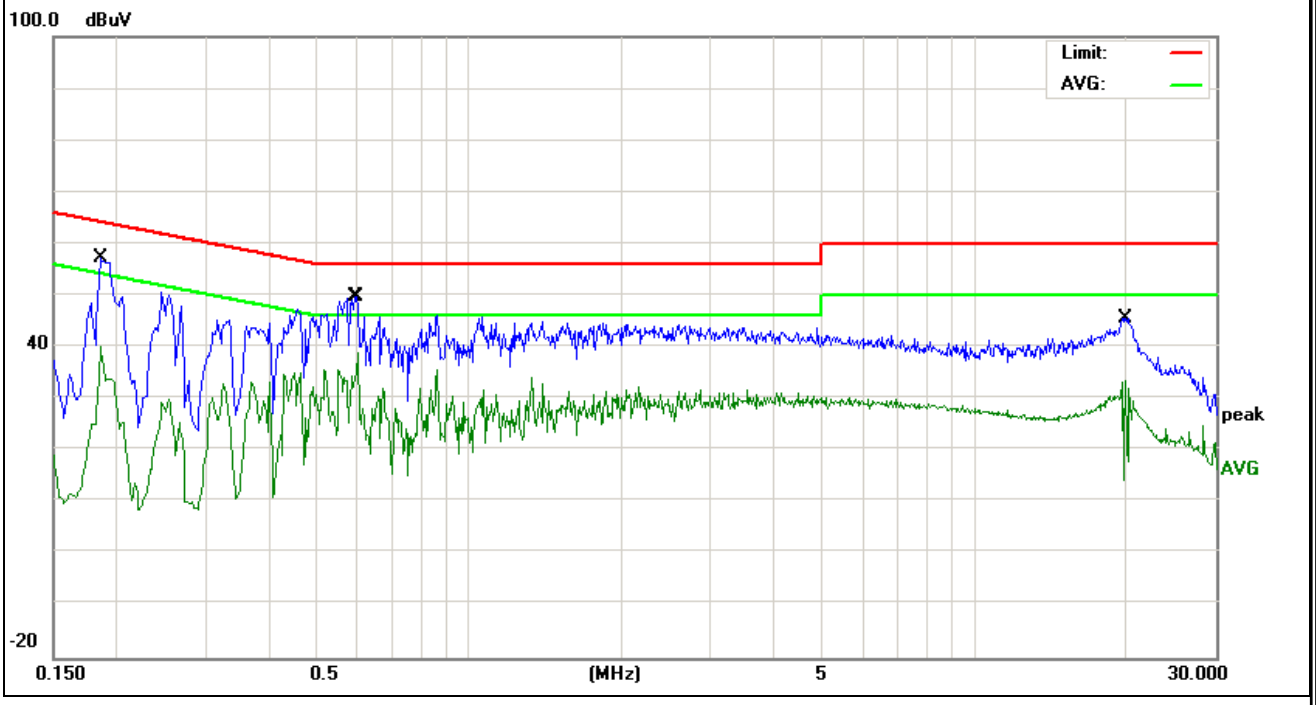
The EUT tested system was configured as the statements of **2.3** Unless otherwise a special operating condition is specified in the follows during the testing.

3.1.5 TEST RESULTS

EUT：	High precision industrial grade GNSS receiver pad	Model Name. ：	S550
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Phase：	L
Test Voltage ：	AC120V/60Hz	Test Mode：	Mode 1

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.1860	47.22	10.10	57.32	64.21	-6.89	QP
0.1860	29.97	10.10	40.07	54.21	-14.14	AVG
0.5940	39.48	10.22	49.70	56.00	-6.30	QP
0.6020	28.83	10.22	39.05	46.00	-6.95	AVG
19.9420	34.95	10.65	45.60	60.00	-14.40	QP
19.9420	23.04	10.65	33.69	50.00	-16.31	AVG

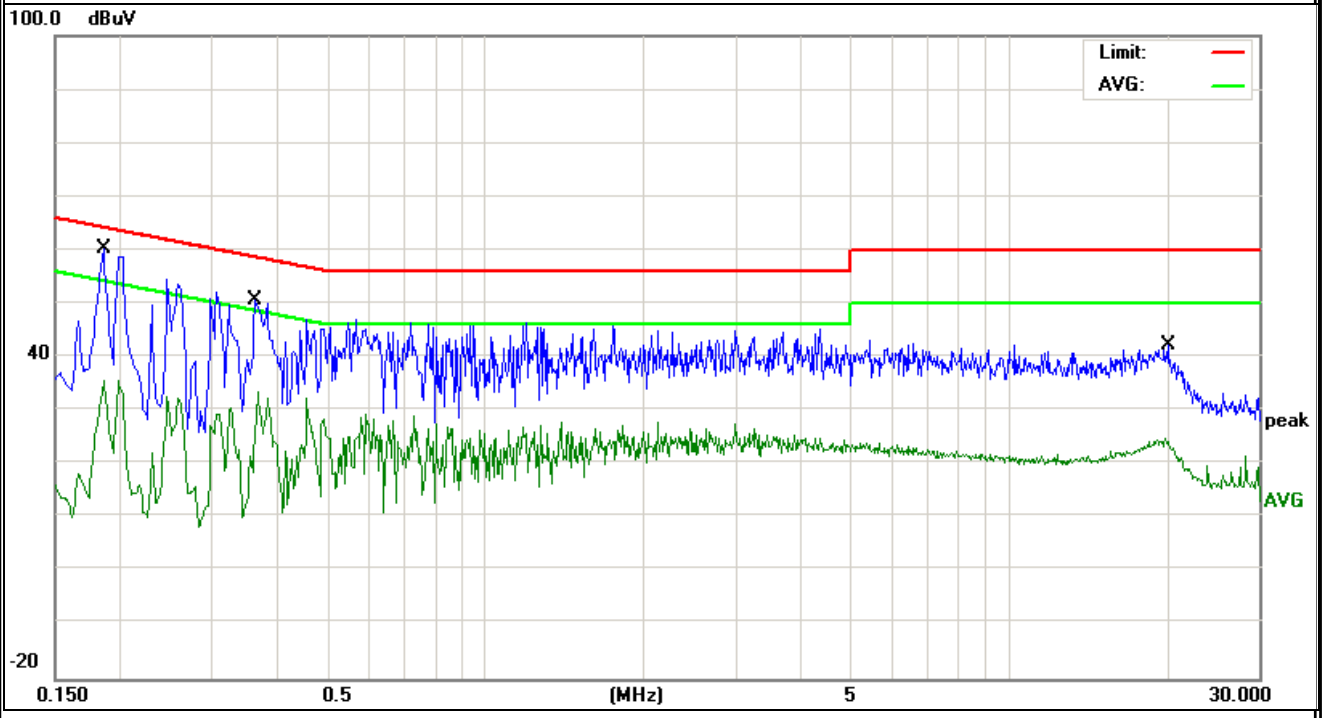
Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.



EUT：	High precision industrial grade GNSS receiver pad	Model Name. ：	S550
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Phase：	N
Test Voltage ：	AC120V/60Hz	Test Mode：	Mode 1

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.1860	50.24	10.10	60.34	64.21	-3.87	QP
0.1860	25.69	10.10	35.79	54.21	-18.42	AVG
0.3620	40.49	10.20	50.69	58.68	-7.99	QP
0.3660	23.39	10.20	33.59	48.59	-15.00	AVG
19.9259	14.10	10.65	24.75	50.00	-25.25	AVG
20.0940	31.54	10.65	42.19	60.00	-17.81	QP

Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.



3.2 RADIATED EMISSION MEASUREMENT

3.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

FREQUENCY (MHz)	Class A (at 10m)	Class B (at 3m)
	dBuV/m	dBuV/m
30 ~ 88	39.0	40.0
88 ~ 216	43.5	43.5
216 ~ 960	46.5	46.0
Above 960	49.5	54.0

Notes:

(1) The limit for radiated test was performed according to as following: FCC PART 15B /ICES-003.

(2) The tighter limit applies at the band edges.

(3) Emission level (dBuV/m)=20log Emission level (uV/m).

3.2.2 TEST PROCEDURE

a. The measuring distance of at 10 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.

b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.

c. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

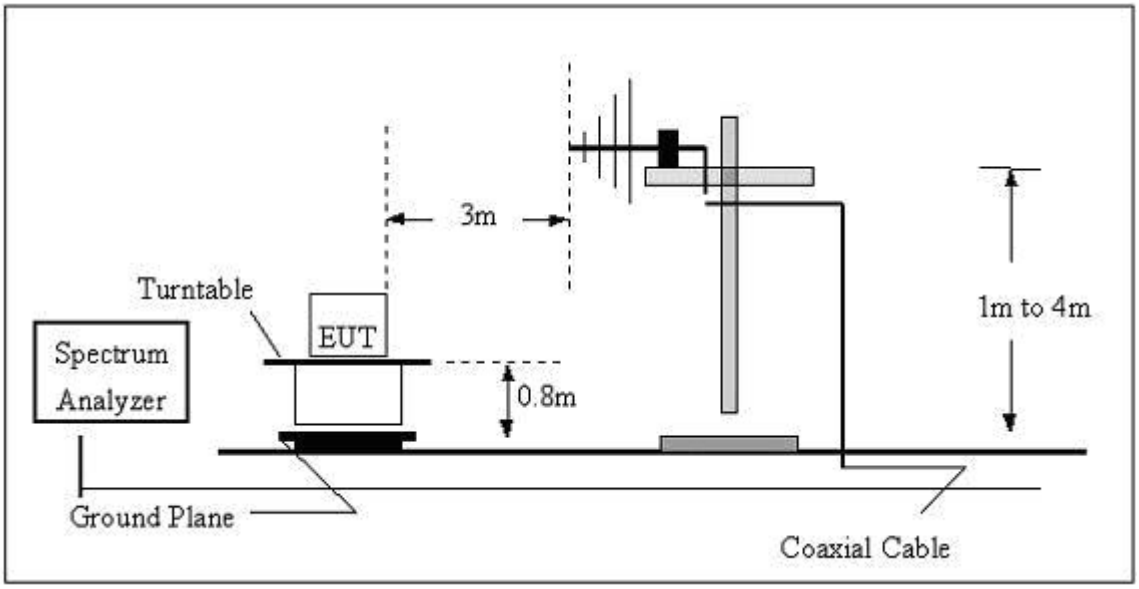
d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured, above 1G Average detector mode will be instead.

e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP(AV) Limits and then no additional QP Mode measurement performed.

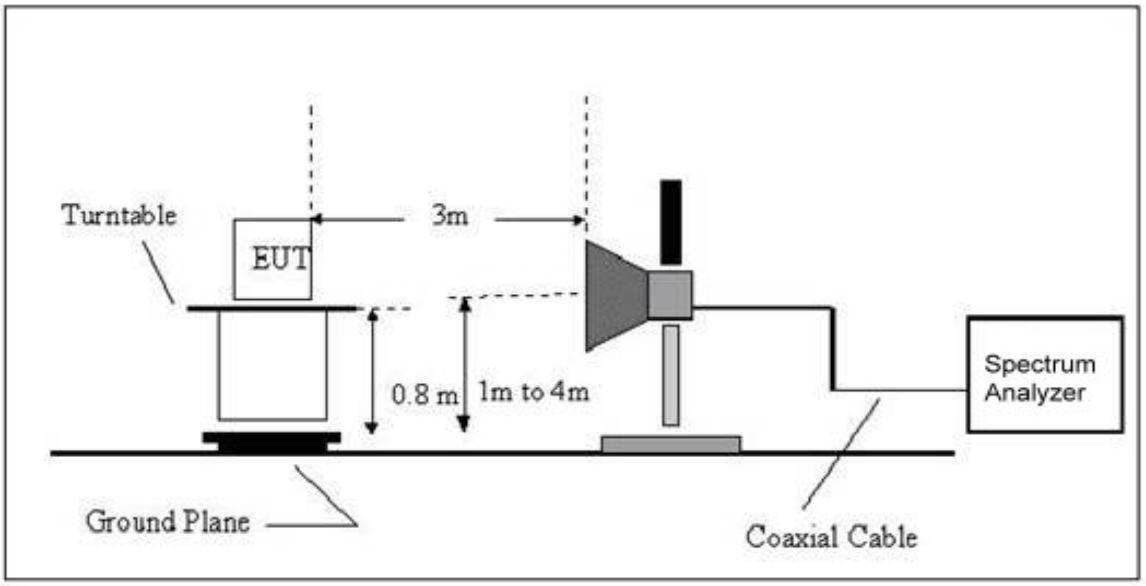
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.2.3 TEST SETUP

(A) Radiated Emission Test Set-Up Frequency Below 1 GHz



(B) Radiated Emission Test Set-Up Frequency Above 1GHz



3.2.4 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of **2.3** Unless otherwise a special operating condition is specified in the follows during the testing.

3.2.5 TEST RESULTS(Blow 30MHZ)

EUT：	High precision industrial grade GNSS receiver pad	Model Name ：	S550
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	AC120V
Test Mode ：	Mode 1	Polarization :	--

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	PASS
--	--	--	--	PASS

NOTE:

1.The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
2.Distance extrapolation factor =40 log (specific distance/test distance)(dB);
3.Limit line = specific limits(dBuv) + distance extrapolation factor.

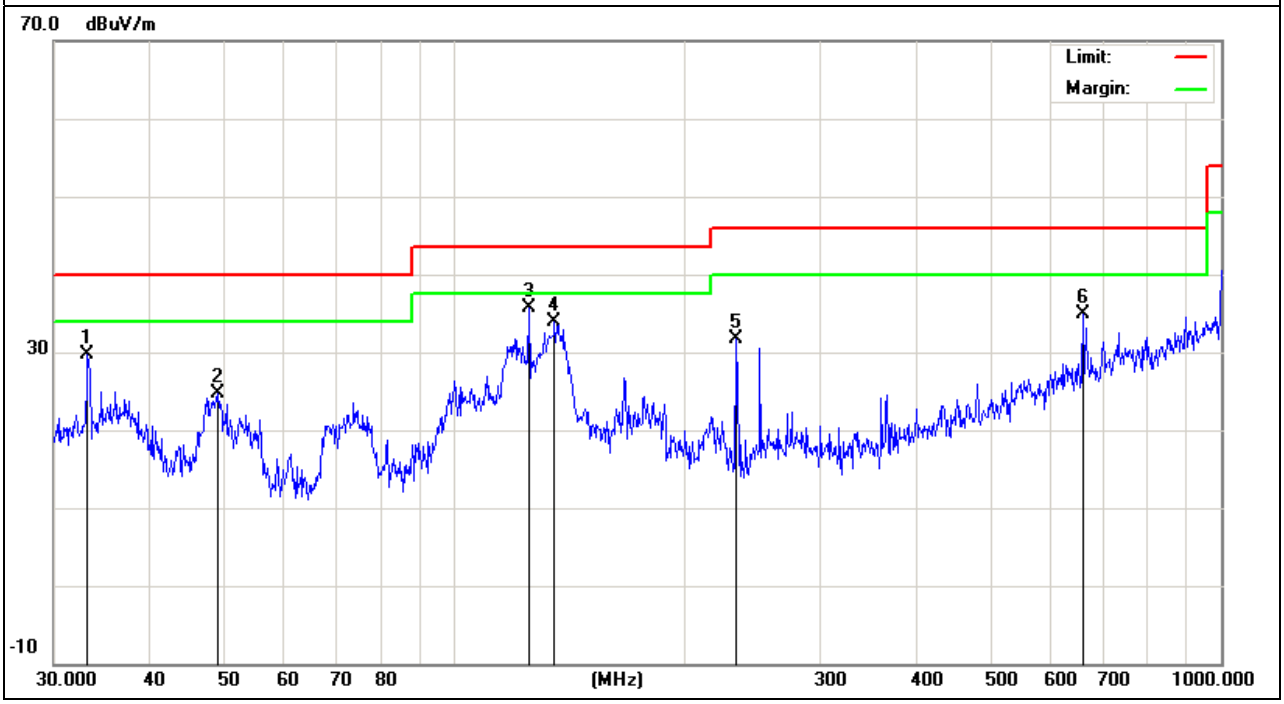
3.2.6 TEST RESULTS(30MHZ-1GHZ)

EUT：	High precision industrial grade GNSS receiver pad	Model Name ：	S550
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	AC120V
Test Mode ：	Mode 1	Polarization：	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
33.2111	12.94	16.79	29.73	40.00	-10.27	QP
49.1865	16.07	8.62	24.69	40.00	-15.31	QP
125.0066	23.52	12.21	35.73	43.50	-7.77	QP
135.0319	21.72	12.25	33.97	43.50	-9.53	QP
233.3487	20.62	10.99	31.61	46.00	-14.39	QP
661.1504	11.16	23.67	34.83	46.00	-11.17	QP

Remark:

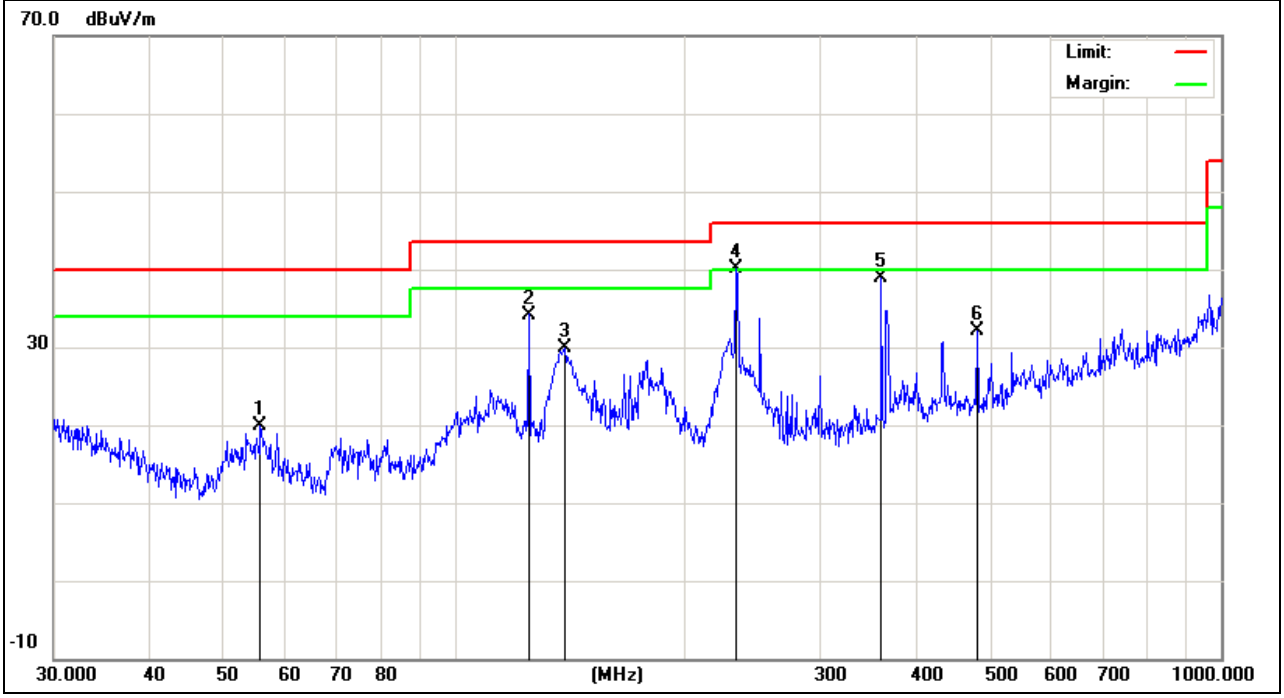
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.



EUT：	High precision industrial grade GNSS receiver pad	Model Name ：	S550
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	AC120V
Test Mode ：	Mode 1	Polarization：	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
55.8046	13.82	6.04	19.86	40.00	-20.14	QP
125.0066	21.99	12.21	34.20	43.50	-9.30	QP
139.3611	17.70	12.18	29.88	43.50	-13.62	QP
232.5318	29.21	10.94	40.15	46.00	-5.85	QP
360.4476	22.51	16.46	38.97	46.00	-7.03	QP
480.5276	12.15	20.04	32.19	46.00	-13.81	QP

Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

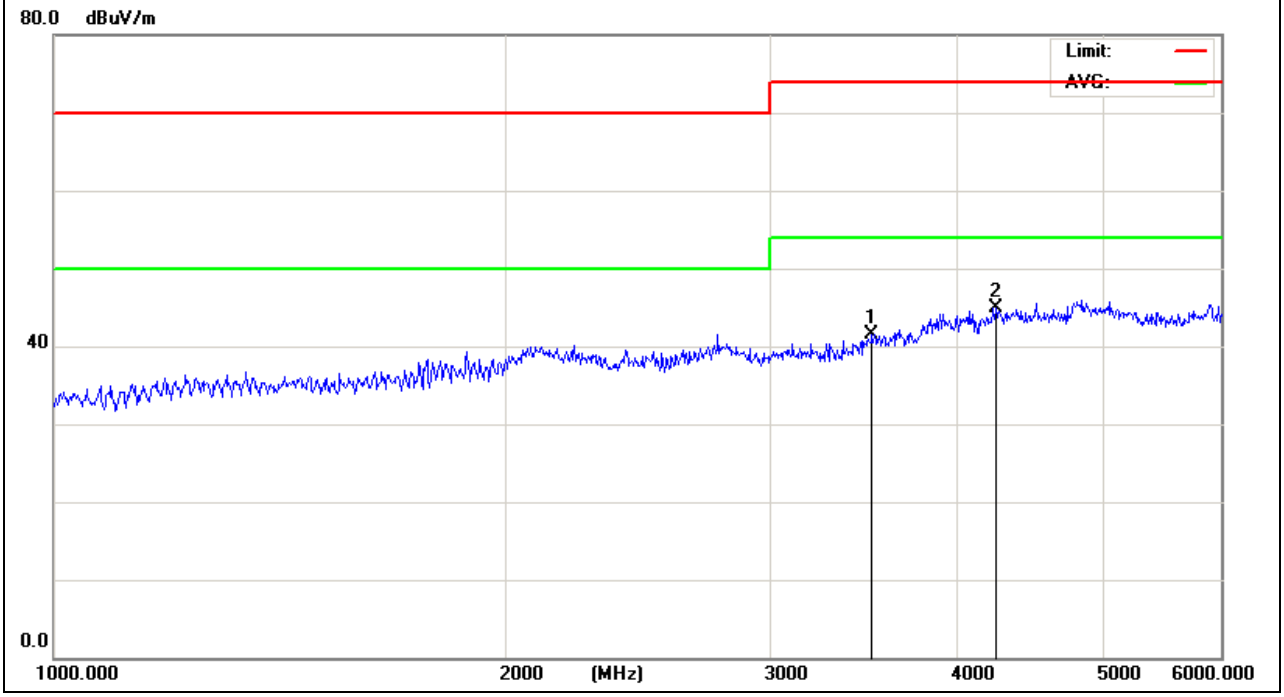


3.2.7 TEST RESULTS(Above 1GHz)

EUT：	High precision industrial grade GNSS receiver pad	Model Name ：	S550
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	AC120V
Test Mode ：	Model 1	Polarization：	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
3511.43	50.9	-9.36	41.54	74	-32.46	peak
4245.883	50.64	-5.71	44.93	74	-29.07	peak

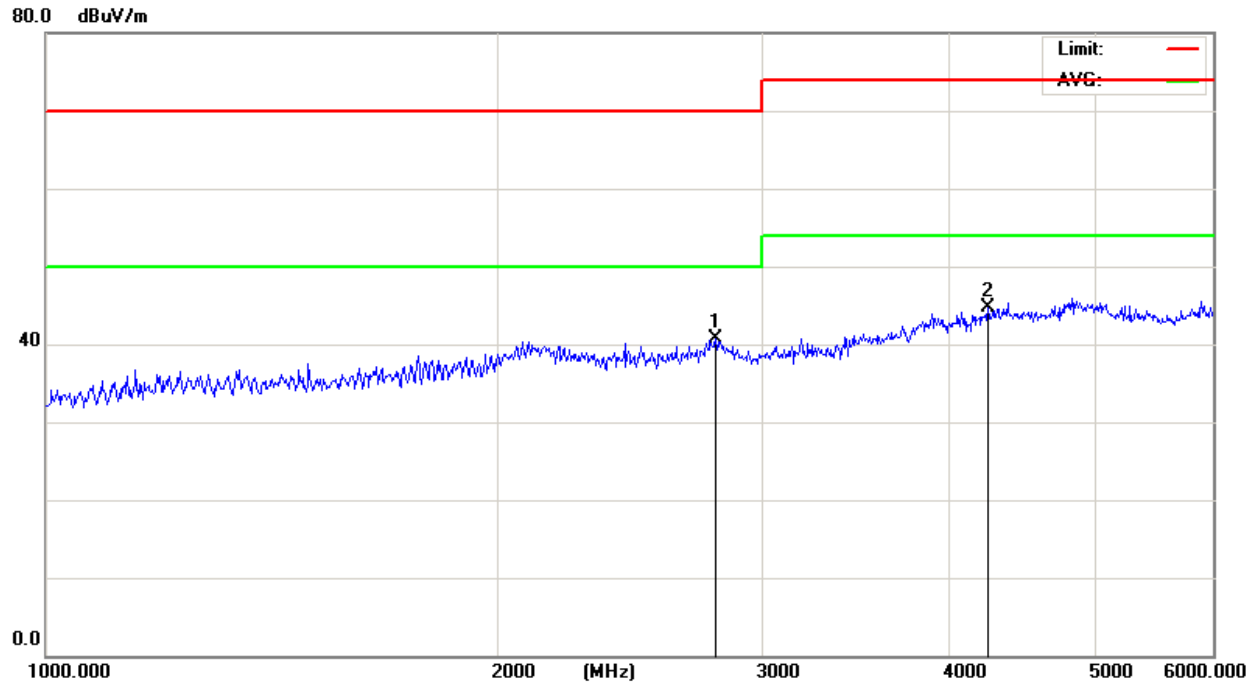
Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.



EUT：	High precision industrial grade GNSS receiver pad	Model Name ：	S550
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	AC120V
Test Mode ：	Model 1	Polarization：	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2796.783	52.33	-11.67	40.66	70	-29.34	peak
4245.883	50.34	-5.71	44.63	74	-29.37	peak

Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.



RADIATED SPURIOUS EMISSION

AC CONDUCTED EMISSION