EMC
TEST REPORT

Report No.: EME-040889
Model No.: 4001/49
Issued Date: Oct. 7, 2004

Applicant: **ShanTou Botong Electronic Technology Co., Ltd**
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Test By: **Intertek Testing Services Taiwan Ltd.**
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Summary of Tests

Flying Saucer -Model: 4001/49
FCC ID: SIS4001-49M

Test	Reference	Results
Field strength of fundamental frequency	15.235(a)	Complies
Radiated emission	15.235(b), 15.209	Complies

1. General information

1.1 Identification of the EUT

Applicant:	ShanTou Botong Electronic Technology Co., Ltd
Product:	Flying Saucer
Model No.:	4001/49
FCC ID.:	SIS4001-49M
Frequency Range:	49.86MHz
Channel Number:	1 channel
Frequency of Each Channel:	49.86MHz
Type of Modulation:	FM
Power Supply:	9Vdc
Power Cord:	N/A
Sample Received:	Sep. 8, 2004
Test Date(s):	Sep. 8, 2004 ~ Oct. 5, 2004

1.2 Additional information about the EUT

The EUT is a Flying Saucer, and was defined as information technology equipment.

For more detail features, please refer to User's manual as file name “Installation guide.pdf”

1.3 Antenna description

The EUT uses a permanently connected antenna.

Antenna Gain:	0dBi max
Antenna Type:	Monopole antenna
Connector Type:	N/A

2. Test specifications

2.1 Test standard

The EUT was performed according to the procedures in FCC Part 15 Subpart C Paragraph 15.235.

The test of radiated measurements according to FCC Part15 Section 15.33(a) had been conducted and the field strength of this frequency band were all meet limit requirement, thus we evaluate the EUT pass the specified test.

2.2 Operation mode

Transmitter:
In Radiated Emission test, it worked in the status of continuously transmitting.

After verifying three setups of transmitter, we found the worst case was occurred at setup 3. The final test was excute under this condition and recorded in this report.

Receiver:
In Radiated Emission test, it worked in normal operating mode.

2.3 Test equipment

Equipment	Brand	Frequency range	Model No.	Intertek ID No.	Next Cal. Date
EMI Test Receiver	Rohde & Schwarz	9kHz~2.75GHz	ESCS 30	EC303	04/13/2005
EMI Test Receiver	Rohde & Schwarz	20Hz~26.5GHz	ESMI	EC317	07/14/2005
Spectrum Analyzer	Rohde & Schwarz	9kHz~30GHz	FSP 30	EC353	07/13/2005
Bilog Antenna	SCHWARZBECK	25MHz~1.7GHz	VULB 9160	EC368	05/20/2005
Turn Table	HDGmbH	N/A	DS 420S	EP317-3	N/A
Antenna Tower	HDGmbH	N/A	MA 240	EP317-2	N/A
Controller	HDGmbH	N/A	HD 100	EP317-1	N/A

Note: The above equipments are within the valid calibration period.

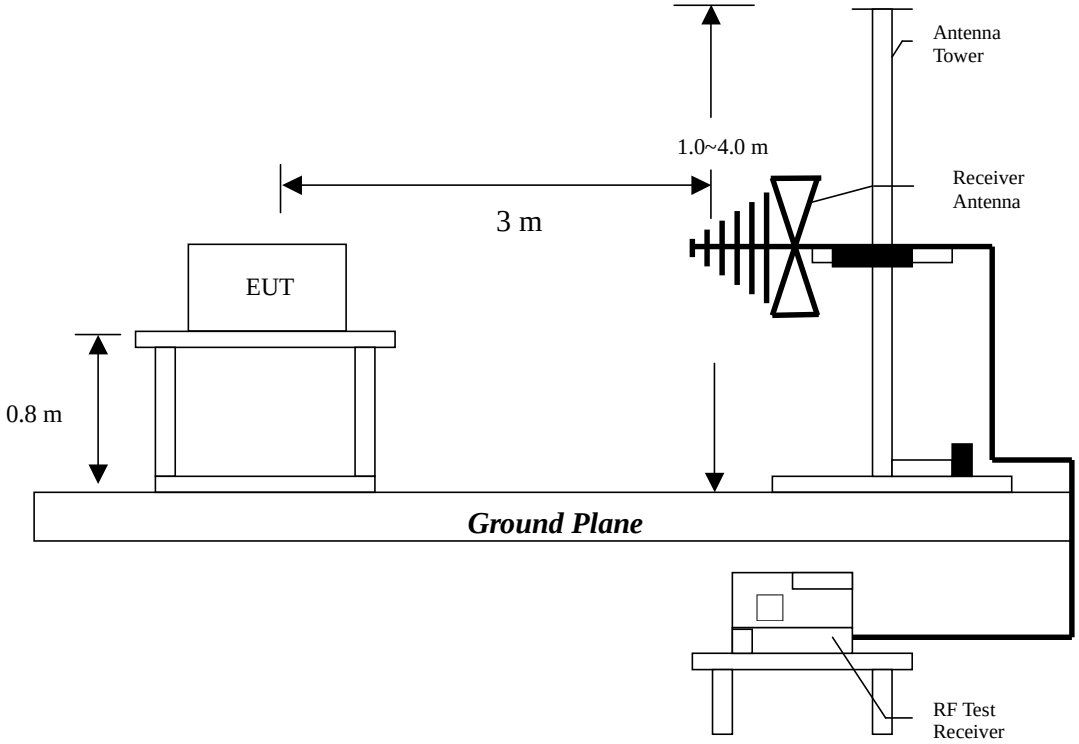
3. Radiated emission test FCC 15.235 (a)/(b)

3.1 Operating environment

Temperature:	22	℃	(10-40℃)
Relative Humidity:	54	%	(10-90%)
Atmospheric Pressure	1023	hPa	(860-1060hPa)

3.2 Test setup & procedure

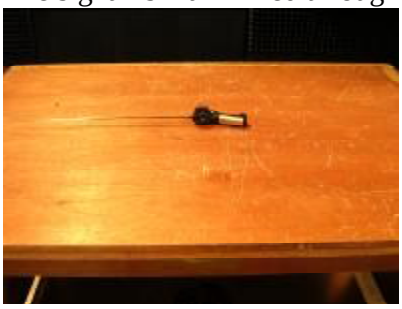
The Diagram below shows the test setup, which is utilized to make these measurements.



Radiated emissions were invested cover the frequency range from 30MHz to 1000MHz using a receiver RBW of 120kHz record QP reading, and the frequency over 1GHz using a spectrum analyzer RBW of 1MHz and 10Hz VBW record Average reading. (15.209 paragraph), the Peak reading (1MHz RBW/VBW) recorded also on the report.
The EUT for testing is arranged on a wooden turntable. If some peripherals apply to the EUT, the peripherals will be connected to EUT and the whole system. During the test, all cables were arranged to produce worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meters and down to 1 meter.

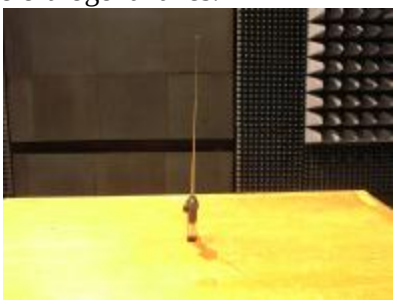
The measurement for radiated emission will be done at the distance of three meters unless the signal level is too low to measure at that distance. In the case of the reading under noise floor, a pre-amplifier is used and/or the test is conducted at a closer distance. And then all readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance.

The signal is maximized through rotation and placement in the three orthogonal axes.



Setup 1

Setup 2



Setup 3

After verifying three axes, we found the maximum electromagnetic field was occurred at setup 3 configuration. The final tset data was executed under this configuration.

The EUT configuration please refer to the "Spurious set-up photo.pdf".

3.3 Emission limit

3.3.1 Fundamental and harmonics emission limits

Frequency (MHz)	Field Strength of Fundamental	
	(uV/m@3m)	(dBuV/m@3m)
49.82-49.90	10000	80

The emission limit above is based on measurement instrumentation employing an average detector. The provisions in Section 15.35 for limiting peak emissions apply.

3.3.2 General radiated emission limits

Frequency MHz	15.209 Limits (dB μ V/m@3m)
30-88	40
88-216	43.5
216-960	46
Above 960	54

Remark:
1. In the above table, the tighter limit applies at the band edges.
2. Distance refers to the distance in meters between the measuring antenna and the closed point of any part of the device or system

Uncertainty was calculated in accordance with NAMAS NIS 81.
Expanded uncertainty (k=2) of radiated emission measurement is ±4.98 dB.

3.4 Radiated emission test data

3.4.1 Fundamental Radiated Emission Data

EUT : 4001/49
Test Unit : Tx
Worst Case : Setup 3
Antenna Length : Full extend

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polarize. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
49.860	PK	V	13.05	63.01	76.06	100.00	-23.94	110.00	245.00
49.860	AV	V	13.05	57.71	70.76	80.00	-9.24	110.00	245.00
49.860	PK	H	13.05	45.79	58.84	100.00	-41.16	390.00	0.00
49.860	AV	H	13.05	40.13	53.18	80.00	-26.82	390.00	0.00

Remark:
1.Corrected Level = Reading Level + Correction Factor
2.Correction Factor = Antenna Factor + Cable Loss

3.4.2 Harmonic Radiated Emission Data

EUT : 4001/49
Test Unit : Tx
Worst Case : Setup 3
Antenna Length : Full extend

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polarize. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
99.720	QP	V	10.44	30.90	41.34	43.50	-2.16	100.00	49.00
149.580	QP	V	14.27	19.50	33.77	43.50	-9.73	100.00	18.00
199.450	QP	V	12.03	18.40	30.43	43.50	-13.07	100.00	284.00
249.300	QP	V	12.85	11.60	24.45	46.00	-21.55	192.00	320.00
349.020	QP	V	15.56	9.30	24.86	46.00	-21.14	243.00	18.00
398.890	QP	V	16.40	6.20	22.60	46.00	-23.40	100.00	128.00
99.720	QP	H	10.44	21.00	31.44	43.50	-12.06	292	302
149.580	QP	H	14.27	4.80	19.07	43.50	-24.43	100	0
199.440	QP	H	12.03	5.40	17.43	43.50	-26.07	100	360
249.300	QP	H	12.85	1.20	14.05	46.00	-31.95	100	262
298.770	QP	H	14.07	6.77	20.84	46.00	-25.16	125	247
348.250	QP	H	15.56	8.45	24.01	46.00	-21.99	138	184

Remark:
1.Corrected Level = Reading Level + Correction Factor
2.Correction Factor = Antenna Factor + Cable Loss

EUT : 4001/49
Test Unit : Rx
Test Case : Normal operating mode

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polarize. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
489.900	QP	V	18.61	2.40	21.01	46.00	-24.99	100.00	360.00
561.300	QP	V	19.99	4.30	24.29	46.00	-21.71	124.00	258.00
577.100	QP	V	19.99	5.90	25.89	46.00	-20.11	108.00	14.00
630.670	QP	V	21.32	4.70	26.02	46.00	-19.98	132.00	12.00
666.150	QP	V	21.72	4.80	26.52	46.00	-19.48	125.00	123.00
703.450	QP	V	22.22	3.50	25.72	46.00	-20.28	140.00	256.00
508.050	QP	H	18.58	5.90	24.48	46.00	-21.52	129.00	212.00
540.070	QP	H	19.60	5.90	25.50	46.00	-20.50	121.00	62.00
533.810	QP	H	19.15	4.90	24.05	46.00	-21.95	118.00	18.00
567.760	QP	H	19.99	6.30	26.29	46.00	-19.71	102.00	312.00
578.800	QP	H	19.99	6.70	26.69	46.00	-19.31	112.00	20.00
732.800	QP	H	22.60	4.10	26.70	46.00	-19.30	102.00	12.00

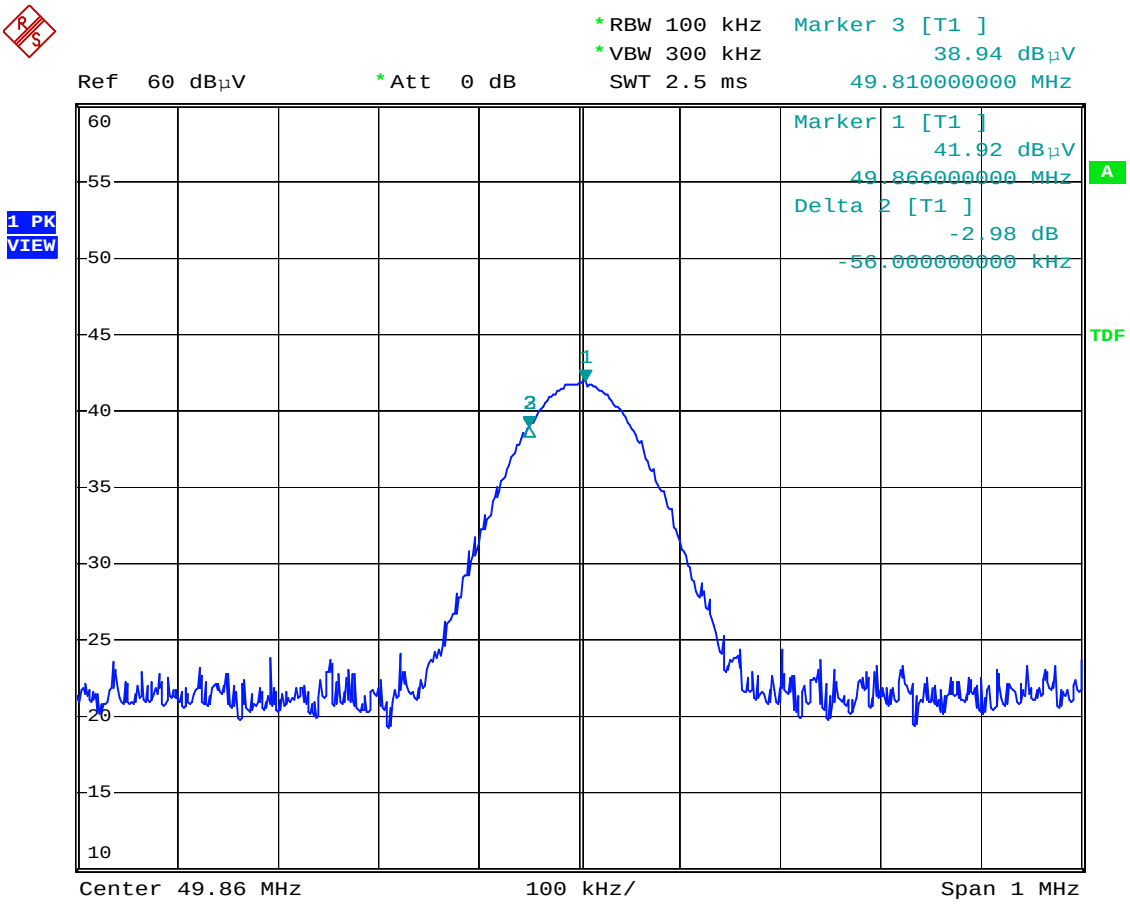
Remark:
1.Corrected Level = Reading Level + Correction Factor
2.Correction Factor = Antenna Factor + Cable Loss

4. The field strength of any emissions appearing between the band edges §FCC 15.235(b)

The field strength of any emissions appearing between the band edges and up to 10 kHz above and below the band edges shall be attenuated at least 26 dB below the level of the unmodulated carrier or to the general limits in Section 15.209, whichever permits the higher emission levels.

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polarize. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
49.860	PK	V	13.05	25.89	38.94	40.00	-1.06	110.00	245.00
49.860	PK	H	13.05	25.96	39.01	40.00	-0.99	390.00	0.00

Please see the plot below.



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Comment: Vertical polarization (EC338/353/373)
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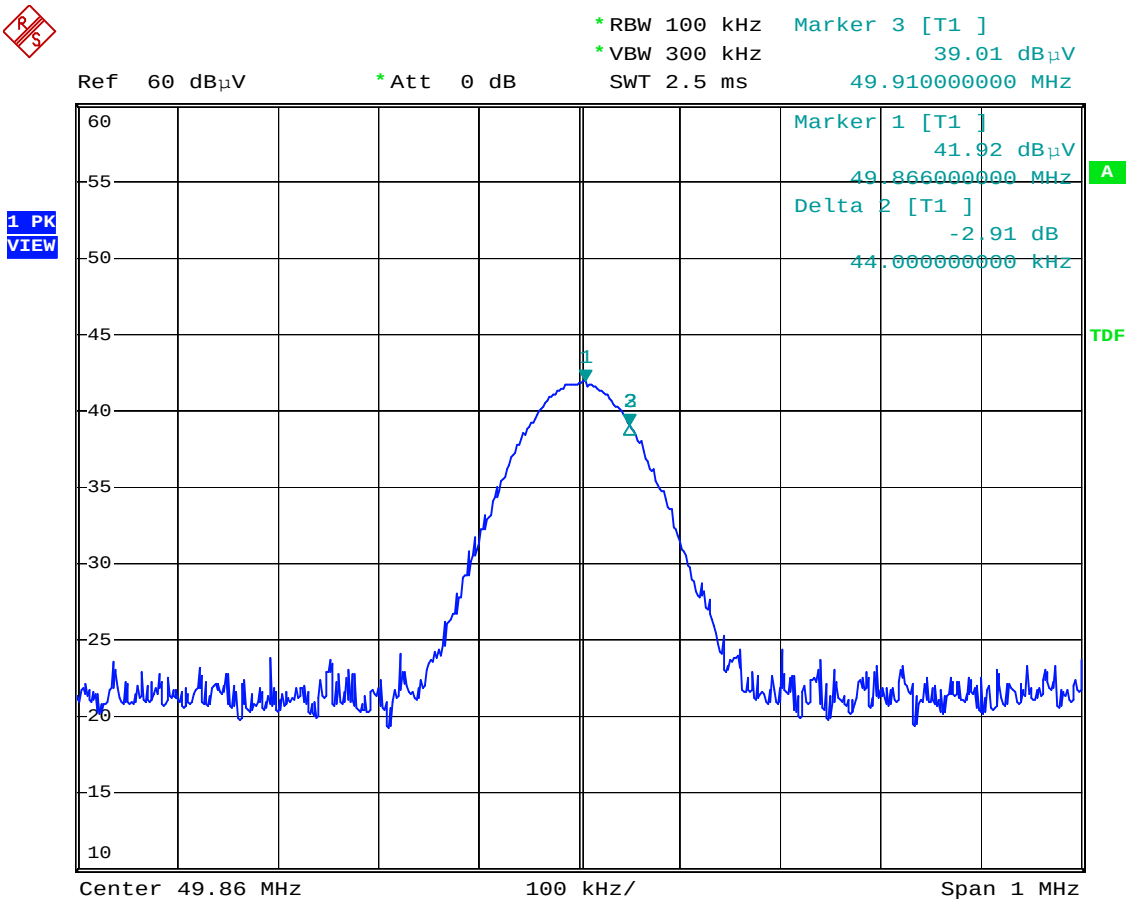

Comment: Unmodulated signal
Comment: Vertical polarization (EC338/353/373)
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