

FCC Part 15B

Measurement and Test Report

For

ZillionSource Technologies (Shanghai) Co., Ltd.

Suit 5130,118 Rijng Road, Shanghai Free Trade Zone, Shanghai, China

FCC ID: 2ACRJZS-100

FCC Rules:	<u>FCC Part 22H, FCC Part 24E</u>
Product Description:	<u>Environmental variable collector for logistics</u>
Tested Model:	<u>ZS-100</u>
Report No.:	<u>STR14078057I-2</u>
Tested Date:	<u>2014-07-10 to 2014-07-23</u>
Issued Date:	<u>2014-07-23</u>
Tested By:	<u>Seven Song / Engineer</u> <i>Seven Song</i>
Reviewed By:	<u>Lahm Peng / EMC Manager</u> <i>Lahm peng</i>
Approved & Authorized By:	<u>Jandy so / PSQ Manager</u> <i>Jandyso</i>
Prepared By:	

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Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by Shenzhen SEM. Test Technology Co., Ltd.

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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: ZillionSource Technologies (Shanghai) Co., Ltd.
 Address of applicant: Suit 5130,118 Rijing Road, Shanghai Free Trade Zone, Shanghai, China
 Manufacturer: ZillionSource Technologies (Shanghai) Co., Ltd.
 Address of manufacturer: Suit 5130,118 Rijing Road, Shanghai Free Trade Zone, Shanghai, China

General Description of EUT	
Product Name:	Environmental variable collector for logistics
Brand Name:	Tubao
Model No.:	ZS-100
Adding Mode:	ZS-101, ZS-103, ZS-104, ZS-105, ZS-106, ZS-107, ZS-108, ZS-109
Software Version:	/
Hardware Version:	ZillionSoure V4
IMEI:	013777007427519
<p><i>Note: The test data is gathered from a production sample, provided by the manufacturer. The appearance of others models listed in the report is different from main-test model ZS-100, but the circuit and the electronic construction do not change, declared by the manufacturer.</i></p>	

Technical Characteristics of EUT	
Rated Voltage:	DC 3.7V Battery, Charging: DC 5V
Rated Current:	1A
Rated Power:	/
Power Adapter Model:	FJ-SW0501000
Lowest Internal Frequency:	32.768KHz
Highest Internal Frequency:	36MHz
Classification of ITE:	Class B

1.2 Test Standards

The following report is prepared on behalf of the ZillionSource Technologies (Shanghai) Co., Ltd. in accordance with Part 2, Subpart J, and Part 15, Subparts A and B of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 15, Subpart B, and section 15.205, 15.107, and 15.109 rules.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which result in lowering the emission, should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

1.4 Test Facility

- **FCC – Registration No.: 934118**

Shenzhen SEM.Test Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files and the Registration is 934118.

- **Industry Canada (IC) Registration No.: 11464A**

The 3m Semi-anechoic chamber of Shenzhen SEM.Test Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A.

- **CNAS Registration No.: L4062**

Shenzhen SEM.Test Technology Co., Ltd. is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L4062. All measurement facilities used to collect the measurement data are located at 1/F, Building A, Hongwei Industrial Park, Liuxian 2nd Road, Bao'an District, Shenzhen, P.R.C (518101)

1.5 EUT Setup and Operation Mode

The equipment under test (EUT) was configured to measure its highest possible emission level. The test modes were adapted according to the operation manual for use, more detailed description as follows:

Test Mode List:

Test Mode	Description	Remark
TM1	Charging	Connect to Adapter
TM2	Data Communication	Connected to PC
TM3	GPS Receiving	/

EUT Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
/	/	/	/

Auxiliary Equipment List and Details

Description	Manufacturer	Model	Serial Number
Adapter	Fujia	FJ-SW0501000	/

Special Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
USB Cable	1.0	Shielded	

2. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test Item	Result
§ 15.107 (a)	Conducted Emissions	Compliant
§ 15.109 (a)	Radiated Emissions	Compliant

N/A: not applicable

3. Conducted Emissions

3.1 Measurement Uncertainty

Base on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement is ± 2.88 dB.

3.2 Test Equipment List and Details

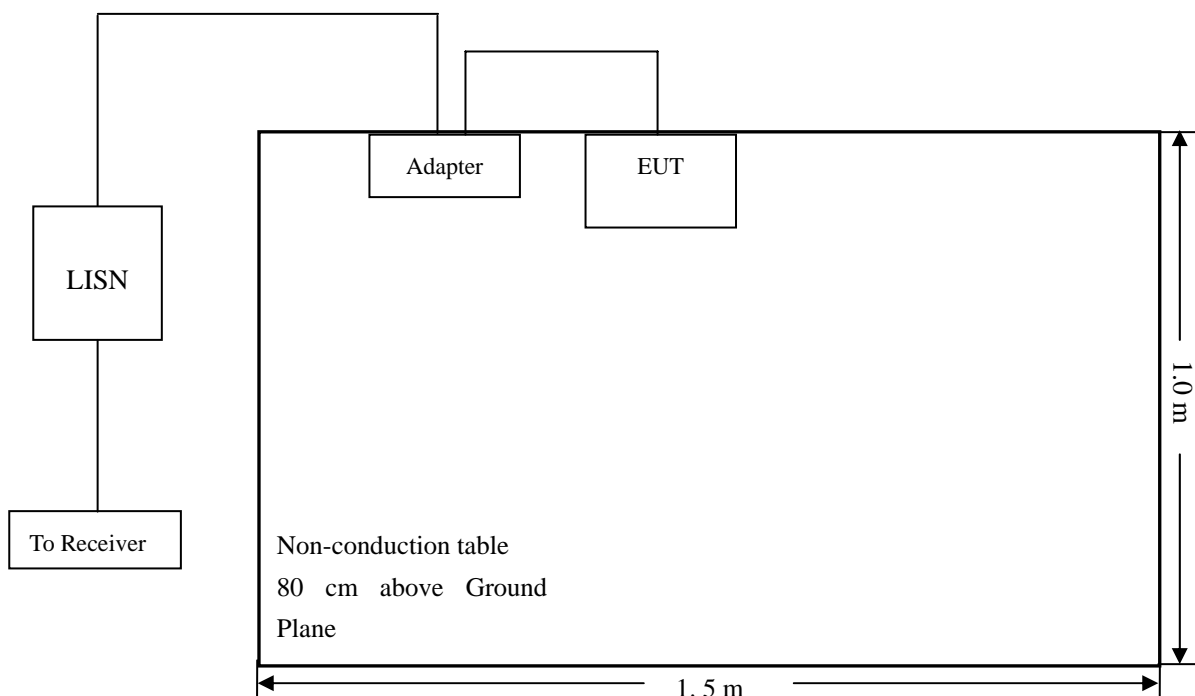
Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2014-05-28	2015-05-27
L.I.S.N	Schwarz beck	NSLK8126	8126-224	2014-05-28	2015-05-27
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2014-05-28	2015-05-27

3.3 Test Procedure

Test is conducting under the description of ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

Note: Base on the calibrated result, for the impedance characteristic and insertion loss, the effect shall be ignored from the placed multiple outlet power strip between the device and LISN.

3.4 Basic Test Setup Block Diagram



3.5 Environmental Conditions

Temperature:	23 °C
Relative Humidity:	52%
ATM Pressure:	1011 mbar

3.6 Summary of Test Results/Plots

According to the data in section 3.7, the EUT complied with the FCC Part 15.107(a) Conducted margin for a Class B device, with the *worst* margin reading of:

-2.15 dB at 2.8980 MHz in the **Line, Peak** detector, 0.15-30MHz

3.7 Conducted Emissions Test Data

Plot of Conducted Emissions Test Data

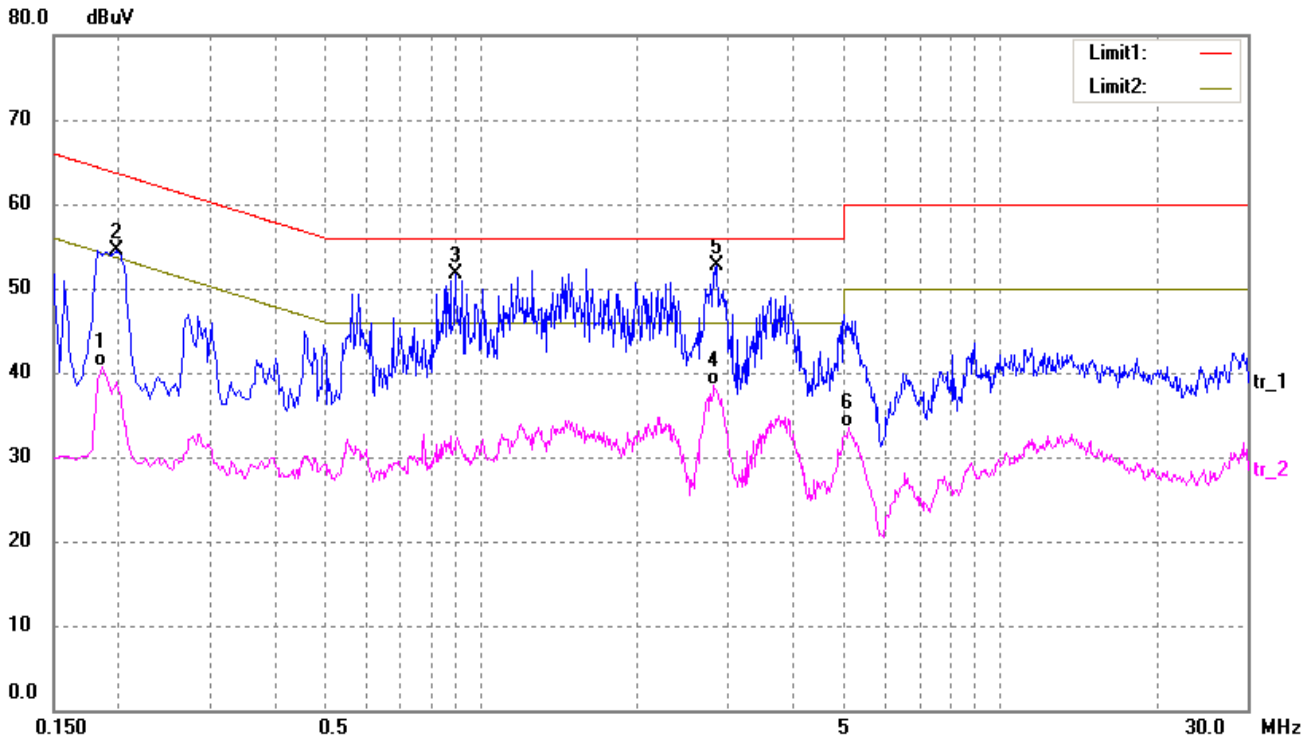
EUT: Environmental variable collector for logistics

Tested Model: ZS-100

Operating Condiation: AC 120V/60Hz; Adapter DC 5V/1A

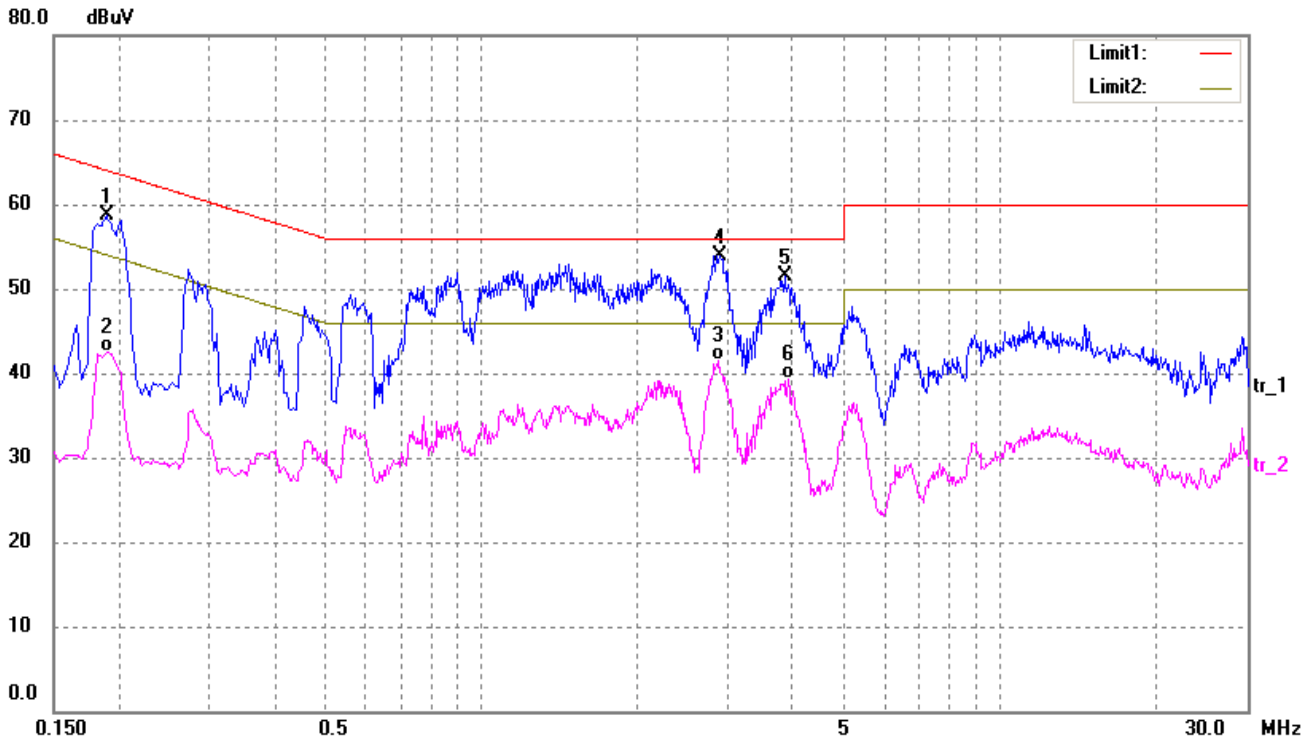
Comment: TM1

Test Specification: Neutral



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1860	31.28	9.50	40.78	54.21	-13.43	AVG
2	0.1980	44.99	9.50	54.49	63.69	-9.20	peak
3	0.8900	41.76	9.89	51.65	56.00	-4.35	peak
4	2.8140	28.55	10.00	38.55	46.00	-7.45	AVG
5	2.8420	42.73	10.00	52.73	56.00	-3.27	peak
6	5.1180	23.47	10.00	33.47	50.00	-16.53	AVG

Test Specification: Line



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1900	49.12	9.50	58.62	64.04	-5.42	peak
2	0.1900	33.05	9.50	42.55	54.04	-11.49	AVG
3	2.8820	31.57	10.00	41.57	46.00	-4.43	AVG
4	2.8980	43.85	10.00	53.85	56.00	-2.15	peak
5	3.8420	41.52	10.00	51.52	56.00	-4.48	peak
6	3.9060	29.24	10.00	39.24	46.00	-6.76	AVG

Plot of Conducted Emissions Test Data

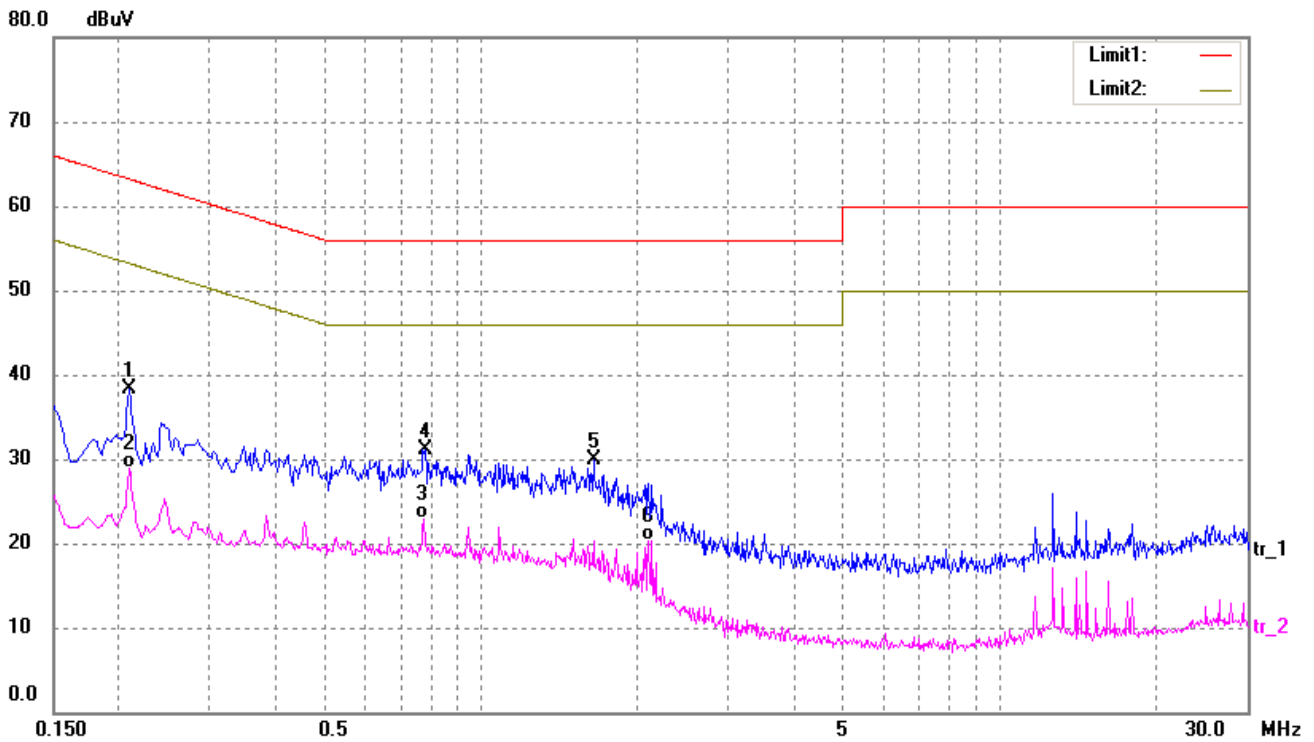
EUT: Environmental variable collector for logistics

Tested Model: ZS-100

Operating Condition: AC 120V/60Hz; USB DC 5V

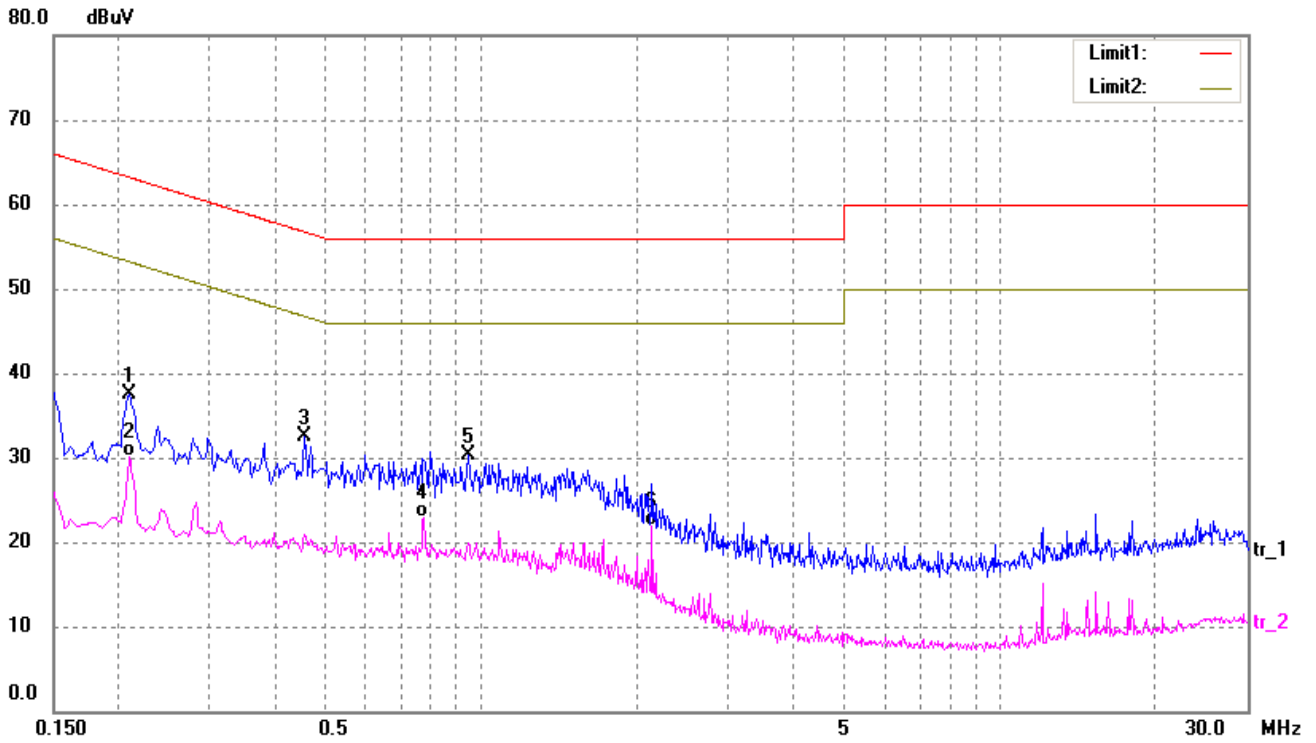
Comment: TM2

Test Specification: Neutral



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.2100	28.71	9.50	38.21	63.21	-25.00	peak
2	0.2100	19.46	9.50	28.96	53.21	-24.25	AVG
3	0.7780	13.07	9.78	22.85	46.00	-23.15	AVG
4	0.7820	21.38	9.78	31.16	56.00	-24.84	peak
5	1.6460	19.94	10.00	29.94	56.00	-26.06	peak
6	2.1020	10.38	10.00	20.38	46.00	-25.62	AVG

Test Specification: Line



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.2100	28.06	9.50	37.56	63.21	-25.65	peak
2	0.2100	20.63	9.50	30.13	53.21	-23.08	AVG
3	0.4580	23.00	9.50	32.50	56.73	-24.23	peak
4	0.7780	13.06	9.78	22.84	46.00	-23.16	AVG
5	0.9460	20.28	9.95	30.23	56.00	-25.77	peak
6	2.1380	11.81	10.00	21.81	46.00	-24.19	AVG

4. Radiated Emissions

4.1 Measurement Uncertainty

Base on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any radiation emissions measurement is ± 5.10 dB.

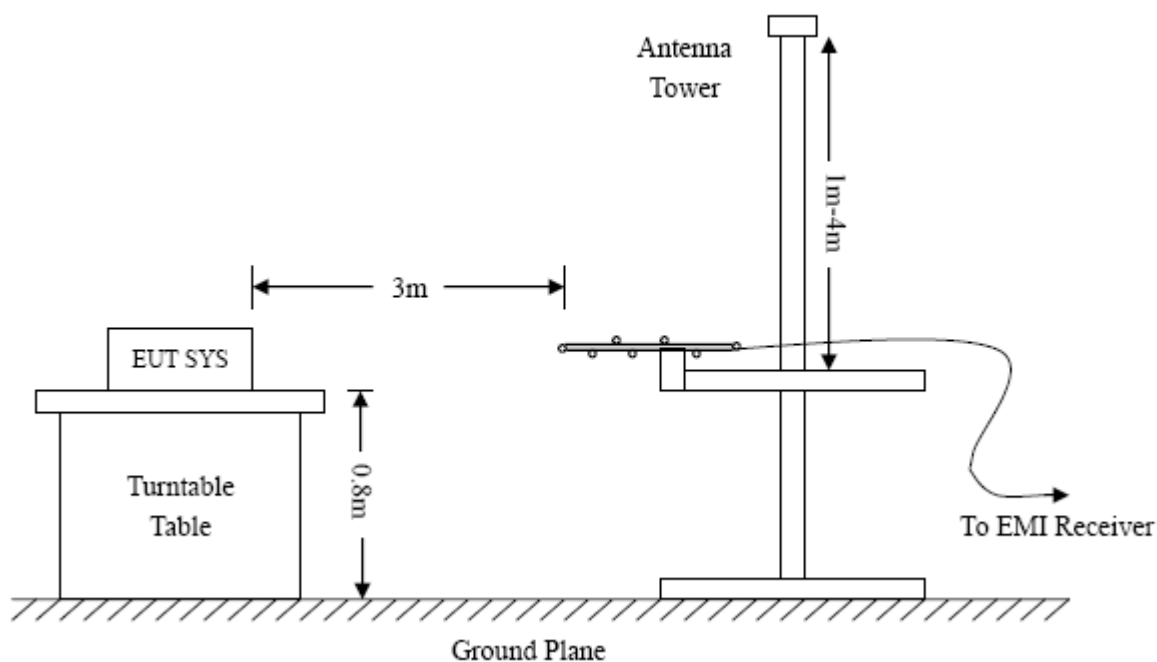
4.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	R&S	FSP	836079/035	2014-05-28	2015-05-27
EMI Test Receiver	R&S	ESVB	825471/005	2014-05-28	2015-05-27
Pre-amplifier	Agilent	8447F	3113A06717	2014-05-28	2015-05-27
Pre-amplifier	Compliance Direction	PAP-0118	24002	2014-05-28	2015-05-27
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2014-05-24	2015-05-23
Horn Antenna	ETS	3117	00086197	2014-05-24	2015-05-23
Loop Antenna	SCHWARZECK	HFRA 5165	9365	2014-05-28	2015-05-27

4.3 Test Procedure

The setup of EUT is according with per ANSI C63.4-2003 measurement procedure. The specification used was with the FCC Part 15.109 Limit.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle. The spacing between the peripherals was 10 cm.



4.4 Test Receiver Setup

Frequency :9kHz-30MHz	Frequency :30MHz-1GHz	Frequency :Above 1GHz
RBW=10KHz,	RBW=120KHz,	RBW=1MHz,
VBW =30KHz	VBW=300KHz	VBW=3MHz(Peak), 10Hz(AV)
Sweep time= Auto	Sweep time= Auto	Sweep time= Auto
Trace = max hold	Trace = max hold	Trace = max hold
Detector function = peak	Detector function = peak, QP	Detector function = peak, AV

4.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and the Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} - \text{Corr. Factor}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dB μ V means the emission is 6dB μ V below the maximum limit for a Class B device. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{FCC Part 15.109(a) Limit}$$

4.6 Environmental Conditions

Temperature:	23 °C
Relative Humidity:	55 %
ATM Pressure:	1011 mbar

4.7 Summary of Test Results/Plots

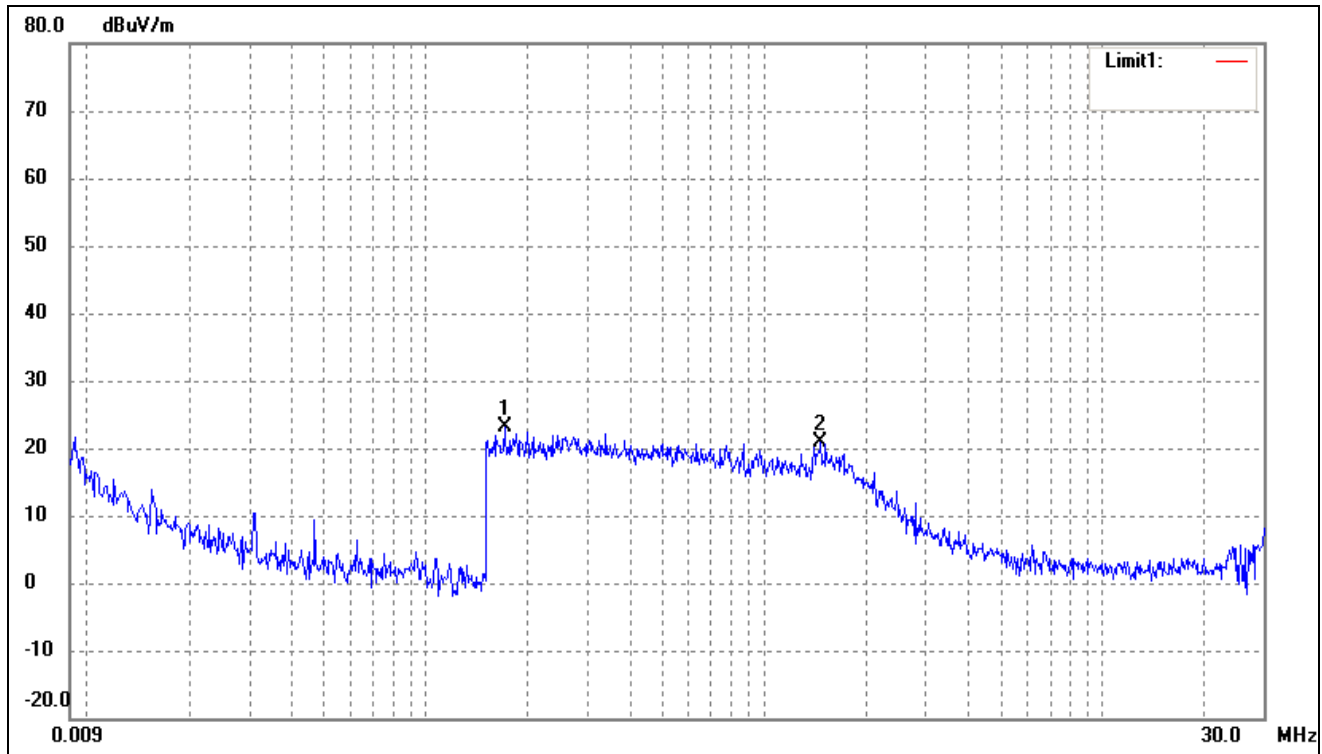
According to the data, the EUT complied with the FCC Part 15.109(a) rule, and had the worst margin of:

-1.54 dB at 207.8501 MHz in the Horizontal polarization, Charging & Playing mode, 9 kHz to 6 GHz, 3Meters

Plot of Radiated Emissions Test Data (9kHz~30MHz)

EUT: Environmental variable collector for logistics
 Tested Model: ZS-100
 Operating Condition: AC 120V/60Hz; Adapter DC 5V/1A
 Comment: TM1&TM3

Test Specification:

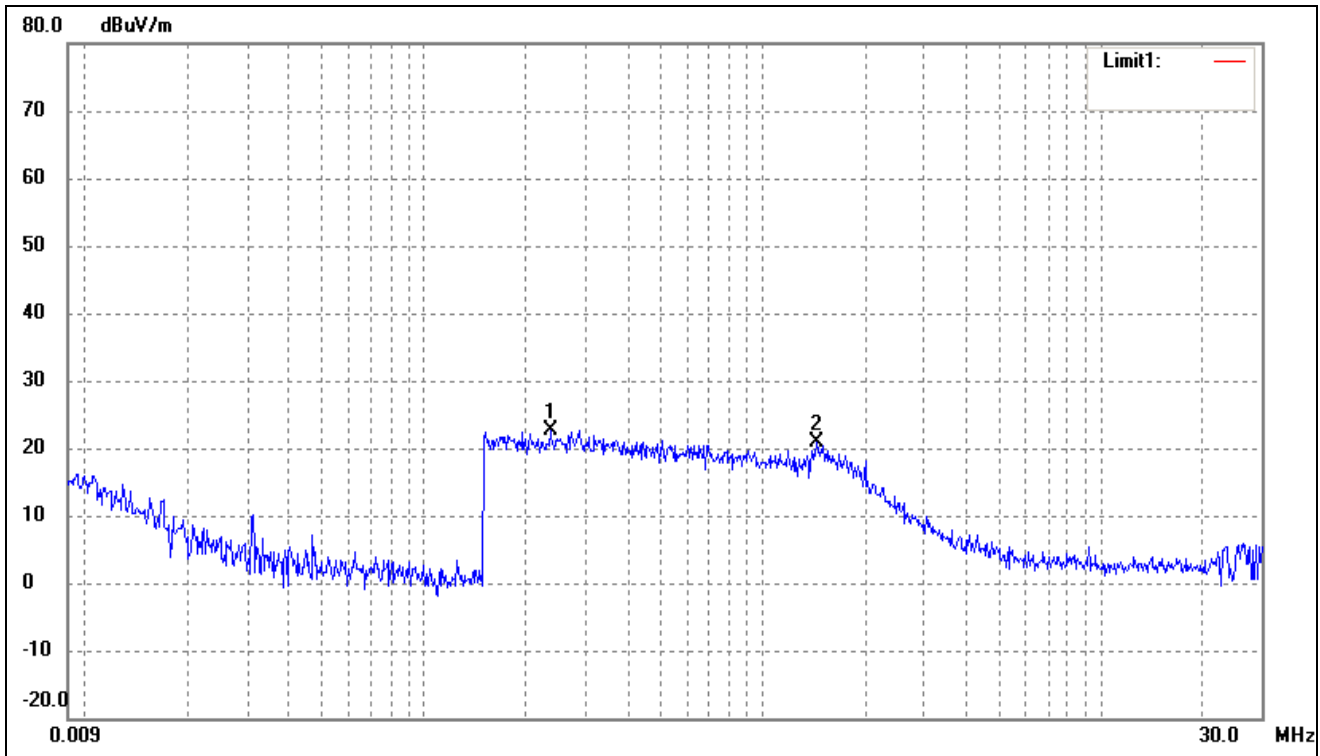


No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	0.1711	3.52	19.63	23.15	102.94	-79.79	154	100	peak
2	1.4638	7.61	13.19	20.80	64.29	-43.49	108	100	peak

Plot of Radiated Emissions Test Data (9kHz~30MHz)

EUT: Environmental variable collector for logistics
 Tested Model: ZS-100
 Operating Condition: AC 120V/60Hz; USB 5V
 Comment: TM2

Test Specification:



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	0.2353	3.15	19.56	22.71	100.17	-77.46	254	100	peak
2	1.4483	7.58	13.19	20.77	64.39	-43.62	116	100	peak

Plot of Radiated Emissions Test Data

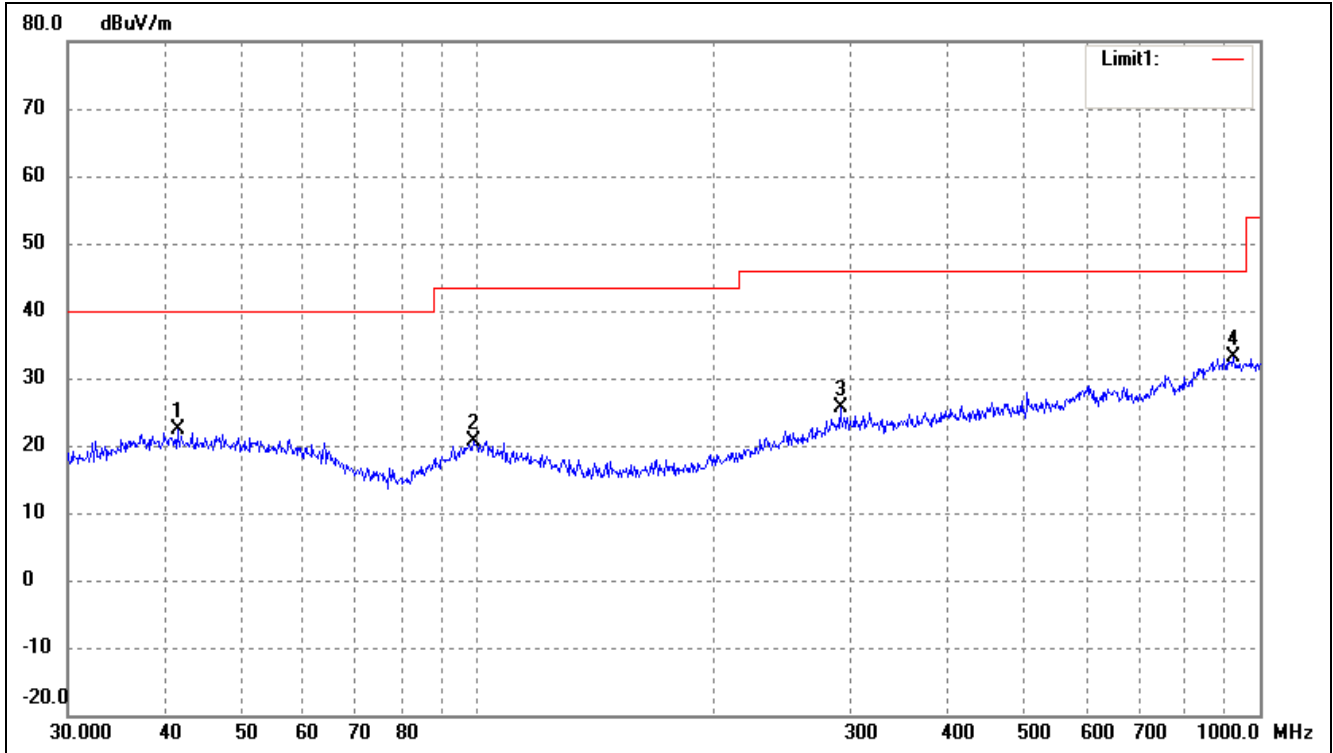
EUT: Environmental variable collector for logistics

Tested Model: ZS-100

Operating Condition: AC 120V/60Hz; Adapter DC 5V/2A

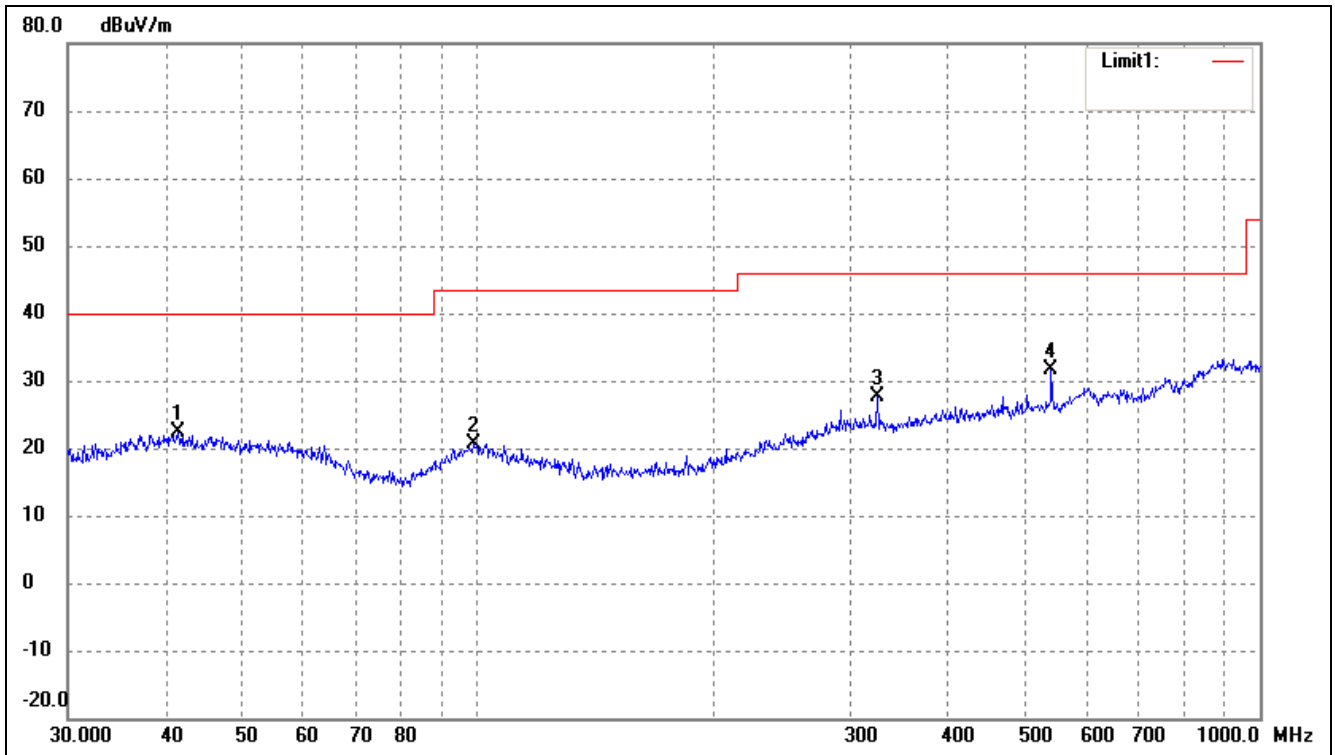
Comment: TM1&TM3

Test Specification: Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Detector
1	41.4215	15.18	7.11	22.29	40.00	-17.71	188	100	peak
2	98.8326	14.79	5.84	20.63	43.50	-22.87	45	100	peak
3	291.0360	16.84	8.83	25.67	46.00	-20.33	39	200	peak
4*	925.7563	16.67	16.40	33.07	46.00	-12.93	109	200	peak

Test Specification: Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Detector
1	41.5670	13.56	8.78	22.34	40.00	-17.66	128	100	peak
2	98.8326	14.79	5.84	20.63	43.50	-22.87	265	100	peak
3	324.4561	18.58	9.16	27.74	46.00	-18.26	198	200	peak
4*	541.3725	20.28	11.31	31.59	46.00	-14.41	324	200	peak

Plot of Radiated Emissions Test Data

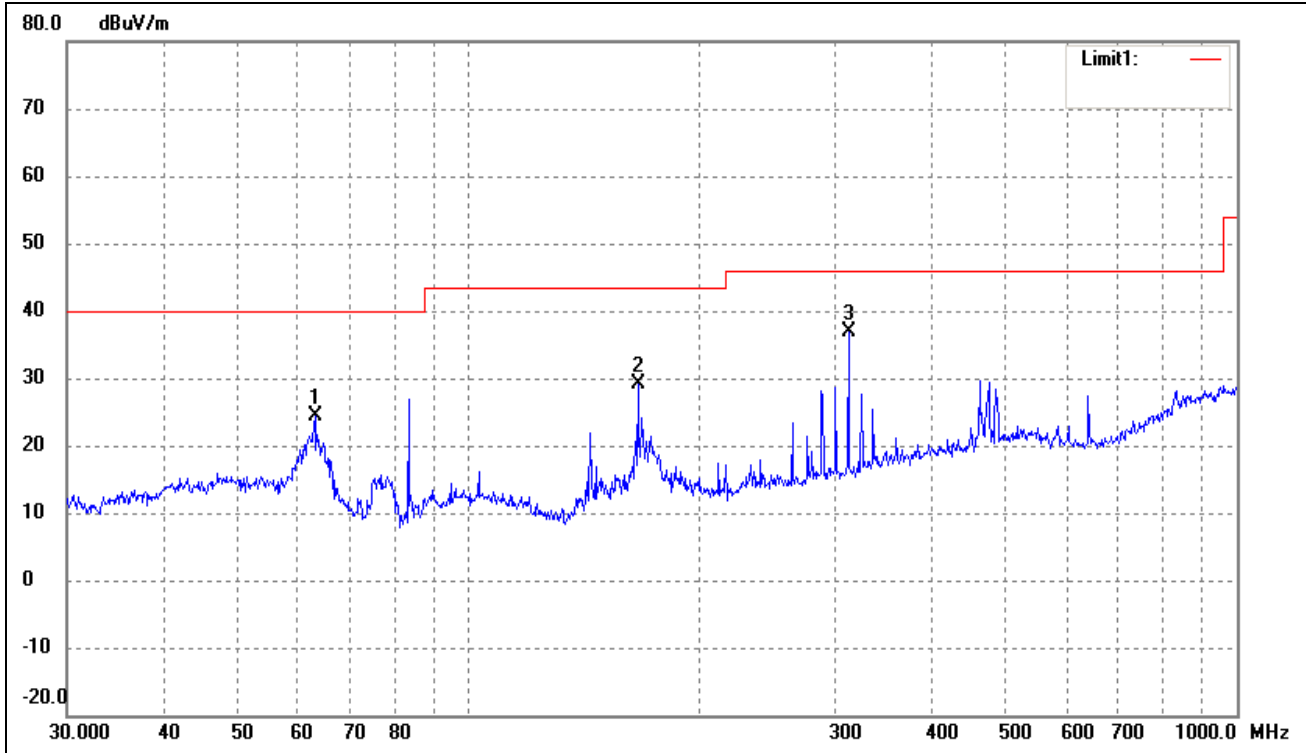
EUT: *Environmental variable collector for logistics*

Tested Model: *ZS-100*

Operating Condition: *AC 120V/60Hz; USB 5V*

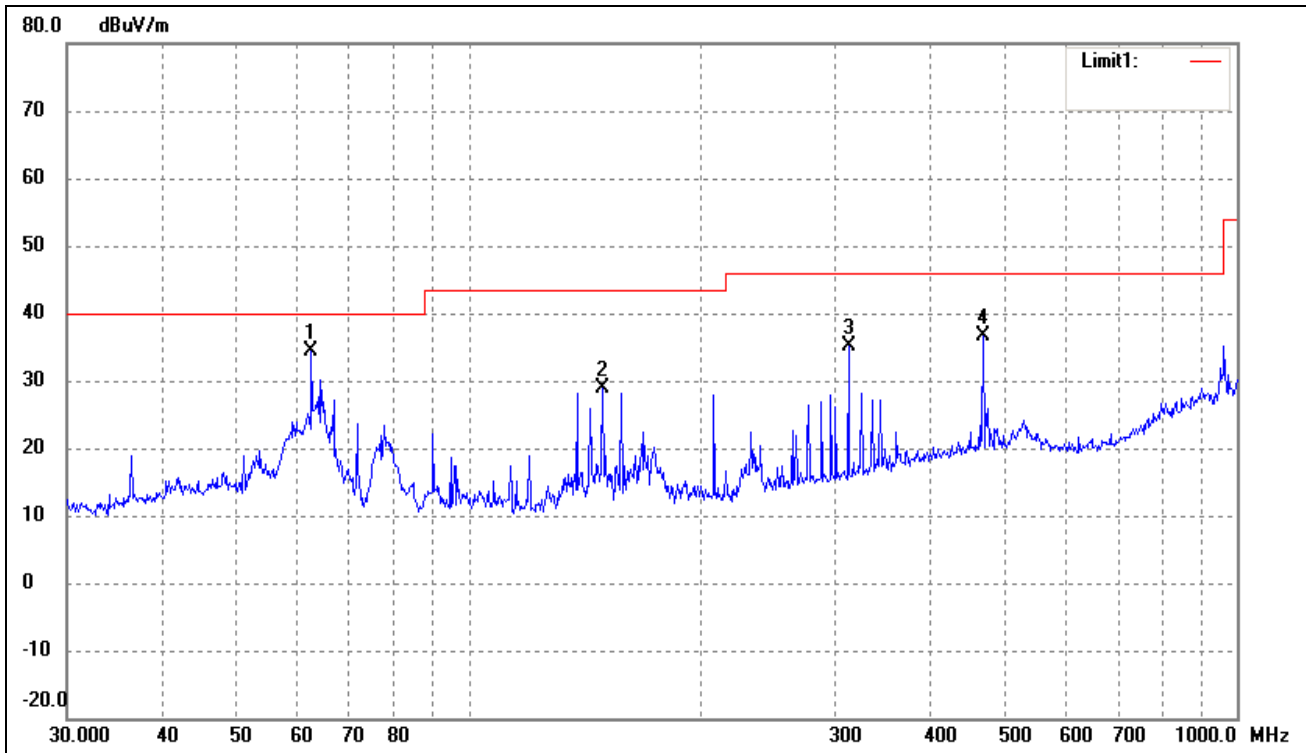
Comment: *TM2*

Test Specification: *Horizontal*



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Detector
1	63.0916	33.93	-9.53	24.40	40.00	-15.60	51	100	peak
2	166.0680	41.28	-12.03	29.25	43.50	-14.25	308	100	peak
3*	312.1794	42.56	-5.78	36.78	46.00	-9.22	120	100	peak

Test Specification: Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Detector
1*	62.4314	43.77	-9.42	34.35	40.00	-5.65	158	150	peak
2	149.4857	41.80	-12.96	28.84	43.50	-14.66	226	100	peak
3	312.1794	41.00	-5.78	35.22	46.00	-10.78	129	150	peak
4	467.2349	38.54	-1.87	36.67	46.00	-9.33	109	100	peak

Remark:

Testing is carried out with frequency rang 9kHz to the 1GHz, The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.

***** END OF REPORT *****