

# FCC Part 15B

## Measurement and Test Report

### For

**Michley Electronics Inc.**

**2433 De La Cruz Blvd. Santa Clara, CA 95050**

**FCC ID: 2AFWB-5400**

**Test Rule(s):** FCC Part 15 Subpart B

**Product Description:** 4G Smart Phone

**Tested Model:** Alba 5400

**Report No.:** STR15088291I-6

**Tested Date:** 2015-08-27 to 2015-09-06

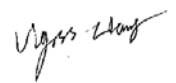
**Issued Date:** 2015-09-07

**Tested By:** Vigoss Liang / Engineer

**Reviewed By:** Lahm Peng / EMC Manager

**Approved & Authorized By:** Jandy So / PSQ Manager

**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: Michley Electronics Inc.  
Address of applicant: 2433 De La Cruz Blvd. Santa Clara, CA 95050

Manufacturer: Shenzhen Fortuneship Technology Co., Ltd.  
Address of manufacturer: Room 701-716, 7th Floor, Kanghesheng Building, No.1  
ChuangSheng Road, Nanshan District, Shenzhen,  
Guangdong, P. R. China

| General Description of EUT  |  |
|---|--|
| Product Name:   | 4G Smart Phone                             |
| Trade Name:   | /  |
| Model No.:  | Alba 5400                                  |
| Adapter Model:  | JT-H050100                                 |
|   | INPUT:100-240V,50/60Hz,0.5A; OUTPUT:5V,1A  |
| Hardware version:   | A880-MB-V1.0                               |
| Software version:   | A880_10H_HS005_QHD_ALBA_V001_20150908_1120 |
| IMEI:   | 353222070171361/353222070171379            |
| <i>The EUT Main board support GSM850/900/DCS1800/PCS1900, WCDMA Band 1/2/4/5, LTE Band 2/4/7/17 function. It is intended for speech, Multimedia Message Service (MMS) transmission and Alba 5400. It is equipped with GPRS/EDGE class 12 for GSM850/900/DCS1800/PCS1900, GPS, FM, Bluetooth and Wi-Fi functions. For more information see the following datasheet</i> |  |
| <i>Note: The test data is gathered from a production sample provided by the manufacturer.</i>   |  |

| Technical Characteristics of EUT |           |
|----------------------------------|-----------|
| Rated Voltage:                   | DC 3.8V   |
| Battery Capacitor:               | 2200mAh   |
| Rated Power:                     | /         |
| Lowest Internal Frequency:       | 32.768kHz |
| Highest Internal Frequency:      | 1.3GHz    |
| Classification of ITE:           | Class B   |

## 1.2 Test Standards

The following report is prepared on behalf of the Michley Electronics Inc. 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 C63.4-2009, 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 & Playing | With Earphone      |
| TM2       | Downloading        | Connected to PC    |
| TM3       | Camera on          | Powered by battery |
| TM4       | /                  | /                  |

EUT Cable List and Details

| Cable Description | Length (M) | Shielded/Unshielded | With Core/Without Core |
|-------------------|------------|---------------------|------------------------|
| USB Cable         | 1.0        | Unshielded          | Without Ferrite        |
| Earphone          | 1.2        | Unshielded          | Without Ferrite        |

Auxiliary Equipment List and Details

| Description | Manufacturer | Model | Serial Number |
|-------------|--------------|-------|---------------|
| Notebook    | Lenovo       | E10   | LR-63C8R      |

Special Cable List and Details

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

## 1.6 Test Equipment List and Details

| Description       | Manufacturer    | Model     | Serial Number | Cal Date   | Due Date   |
|-------------------|-----------------|-----------|---------------|------------|------------|
| Spectrum Analyzer | Agilent         | E4407B    | MY41440400    | 2015-06-17 | 2016-06-16 |
| Spectrum Analyzer | Rohde & Schwarz | FSP       | 836079/035    | 2015-06-17 | 2016-06-16 |
| EMI Test Receiver | Rohde & Schwarz | ESVB      | 825471/005    | 2015-06-17 | 2016-06-16 |
| Amplifier         | Agilent         | 8447F     | 3113A06717    | 2015-06-17 | 2016-06-16 |
| Amplifier         | C&D             | PAP-1G18  | 2002          | 2015-06-17 | 2016-06-16 |
| Broadband Antenna | Schwarz beck    | VULB9163  | 9163-333      | 2015-06-17 | 2016-06-16 |
| Horn Antenna      | ETS             | 3117      | 00086197      | 2015-06-17 | 2016-06-16 |
| Loop Antenna      | Schwarz beck    | FMZB 1516 | 9773          | 2015-06-17 | 2016-06-16 |
| EMI Test Receiver | Rohde & Schwarz | ESPI      | 101611        | 2015-06-17 | 2016-06-16 |
| L.I.S.N           | Schwarz beck    | NSLK8126  | 8126-224      | 2015-06-17 | 2016-06-16 |
| Pulse Limiter     | Rohde & Schwarz | ESH3-Z2   | 100911        | 2015-06-17 | 2016-06-16 |

## 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

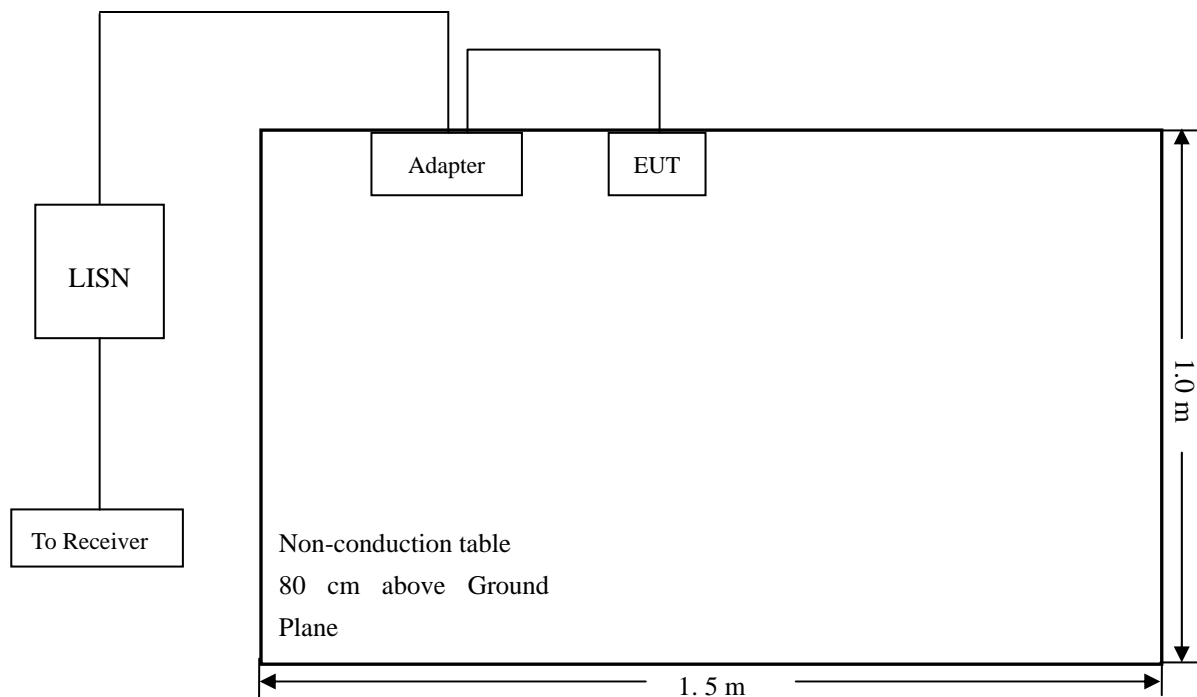
#### 3.1 Measurement Uncertainty

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

#### 3.2 Test Procedure

Test is conducting under the description of ANSI C63.4-2014, 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.

#### 3.3 Basic Test Setup Block Diagram



### 3.4 Environmental Conditions

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

### 3.5 Summary of Test Results/Plots

According to the data in section 3.6, the EUT complied with the FCC Part 15.107(a) Conducted margin for a Class B device, with the *worst* margin reading of:

**-5.26 dB at 0.8500 MHz** in the **Neutral, Peak** detector, TM1, 0.15-30MHz

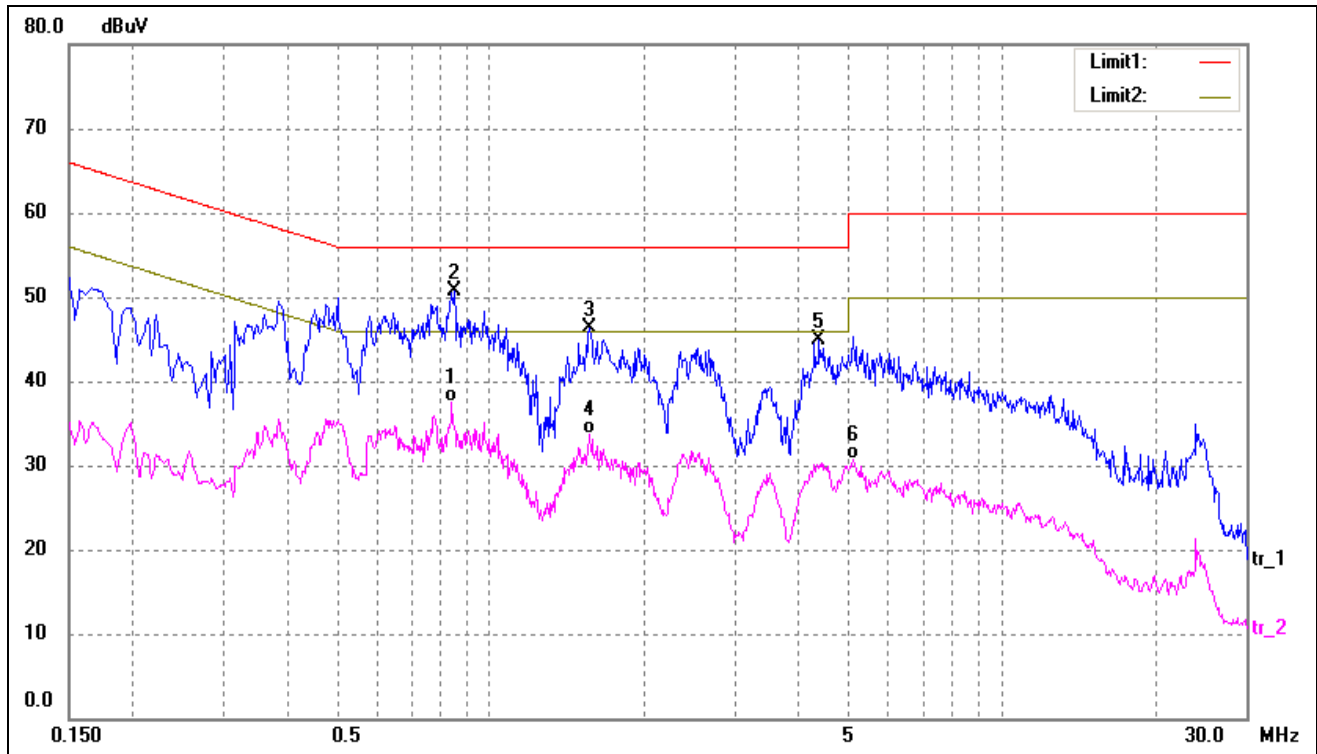
### 3.6 Conducted Emissions Test Data



### Plot of Conducted Emissions Test Data

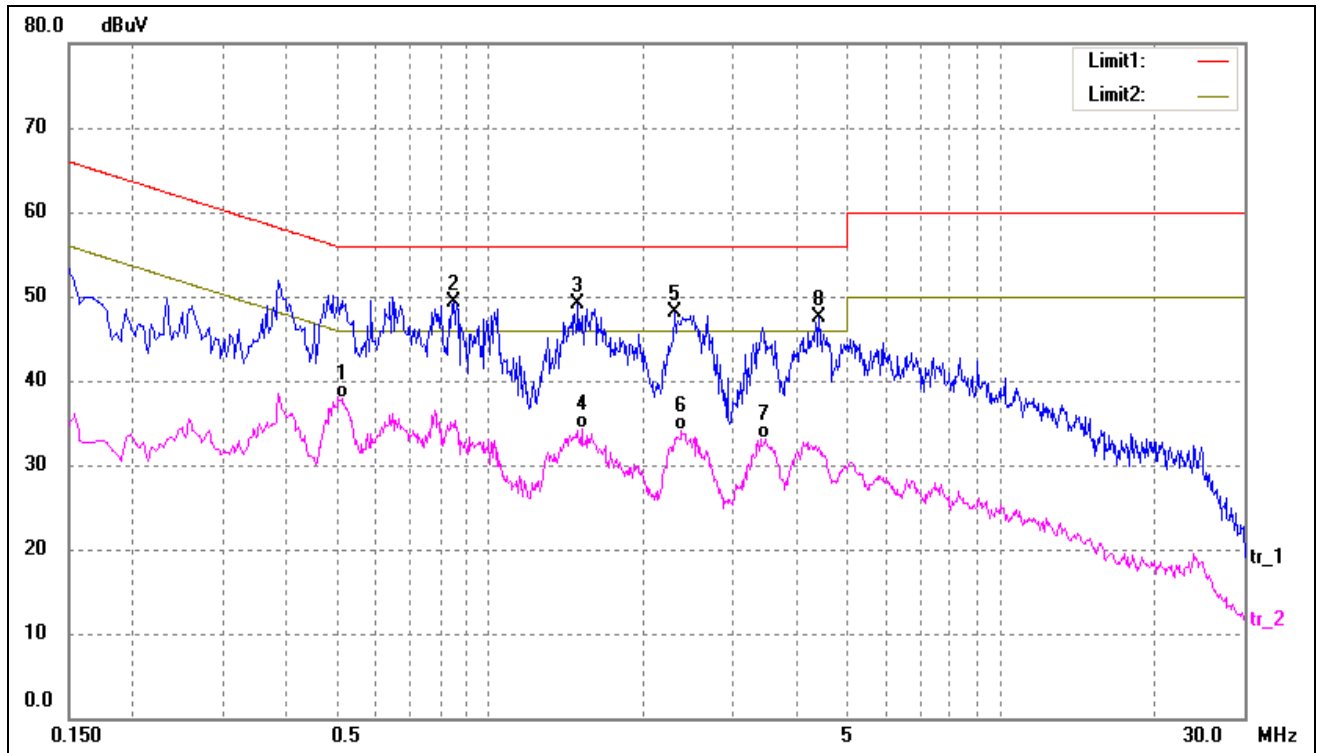
EUT: 4G Smart Phone  
 Tested Model: Alba 5400  
 Operating Condition: TM1  
 Comment: AC 120V/60Hz; Adapter DC 5V

Test Specification: Neutral



| No. | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>(dB/m) | Result<br>(dBuV) | Limit<br>(dBuV) | Margin<br>(dB) | Detector |
|-----|--------------------|-------------------|-------------------|------------------|-----------------|----------------|----------|
| 1   | 0.8420             | 24.70             | 12.84             | 37.54            | 46.00           | -8.46          | AVG      |
| 2*  | 0.8500             | 37.89             | 12.85             | 50.74            | 56.00           | -5.26          | peak     |
| 3   | 1.5620             | 33.25             | 13.00             | 46.25            | 56.00           | -9.75          | peak     |
| 4   | 1.5620             | 20.74             | 13.00             | 33.74            | 46.00           | -12.26         | AVG      |
| 5   | 4.4020             | 31.99             | 13.00             | 44.99            | 56.00           | -11.01         | peak     |
| 6   | 5.1220             | 17.78             | 12.95             | 30.73            | 50.00           | -19.27         | AVG      |

Test Specification: Line



| No. | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>(dB/m) | Result<br>(dBuV) | Limit<br>(dBuV) | Margin<br>(dB) | Detector |
|-----|--------------------|-------------------|-------------------|------------------|-----------------|----------------|----------|
| 1   | 0.5140             | 25.34             | 12.51             | 37.85            | 46.00           | -8.15          | AVG      |
| 2*  | 0.8500             | 36.39             | 12.85             | 49.24            | 56.00           | -6.76          | peak     |
| 3   | 1.4940             | 36.16             | 13.00             | 49.16            | 56.00           | -6.84          | peak     |
| 4   | 1.5140             | 21.38             | 13.00             | 34.38            | 46.00           | -11.62         | AVG      |
| 5   | 2.3020             | 35.16             | 13.00             | 48.16            | 56.00           | -7.84          | peak     |
| 6   | 2.3780             | 21.10             | 13.00             | 34.10            | 46.00           | -11.90         | AVG      |
| 7   | 3.4580             | 20.10             | 13.00             | 33.10            | 46.00           | -12.90         | AVG      |
| 8   | 4.4180             | 34.58             | 13.00             | 47.58            | 56.00           | -8.42          | peak     |

### Plot of Conducted Emissions Test Data

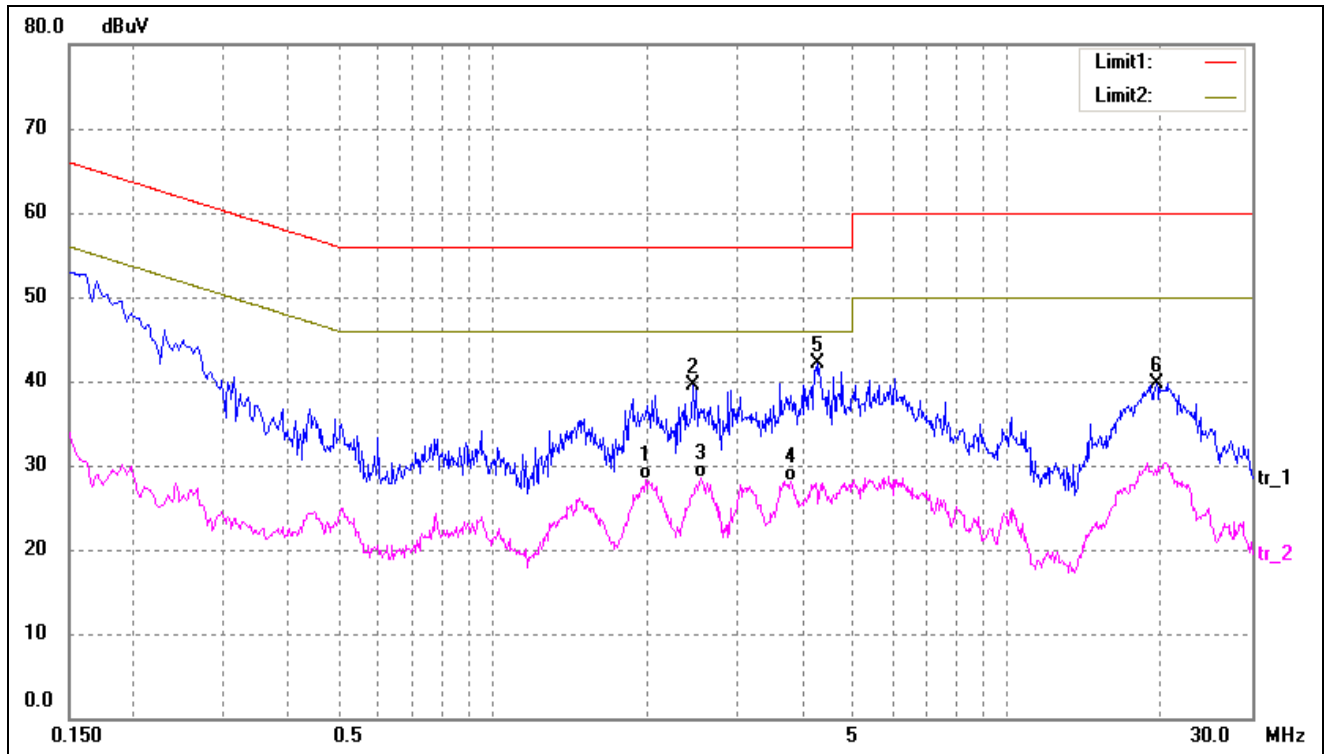
EUT: 4G Smart Phone

Tested Model: Alba 5400

Operating Condition: TM2

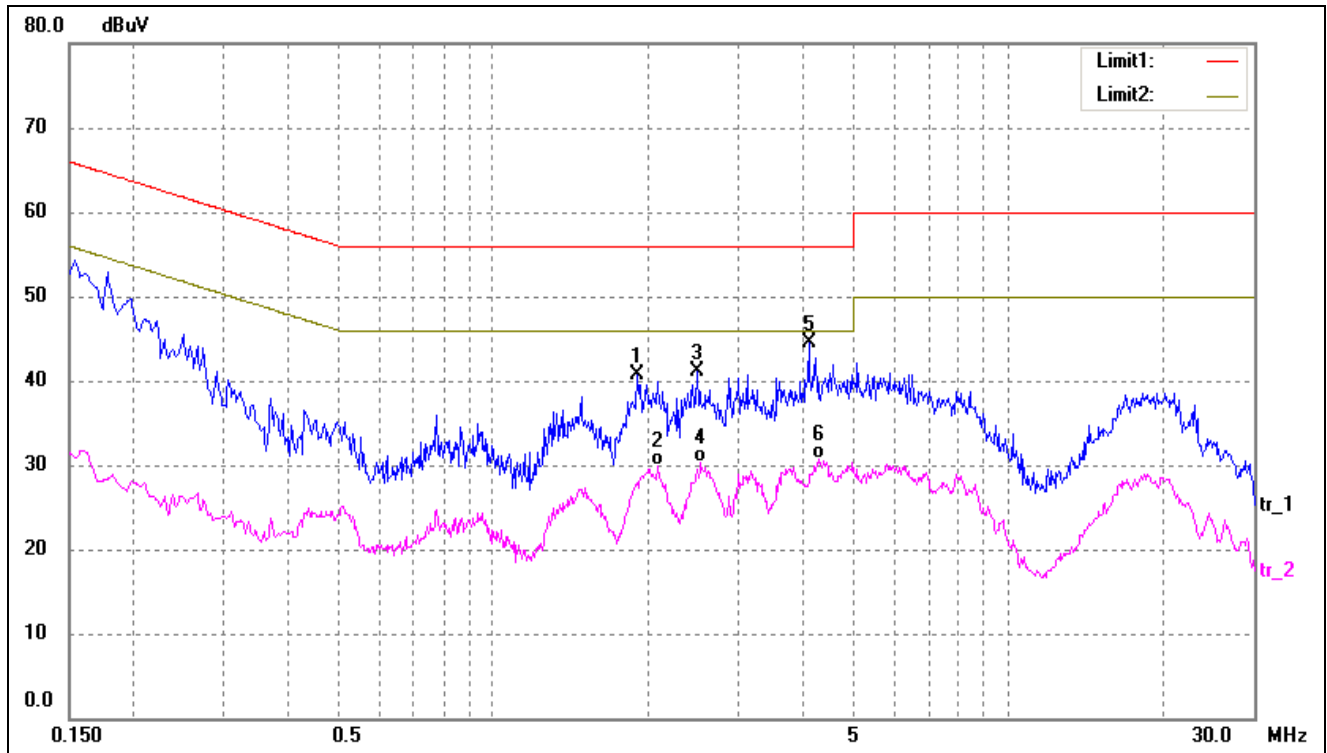
Comment: AC 120V/60Hz; USB 5V

Test Specification: Neutral



| No. | Frequency | Reading | Correct | Result | Limit  | Margin | Detector |
|-----|-----------|---------|---------|--------|--------|--------|----------|
|     | (MHz)     | (dBuV)  | (dB/m)  | (dBuV) | (dBuV) | (dB)   |          |
| 1   | 1.9832    | 18.23   | 10.00   | 28.23  | 46.00  | -17.77 | AVG      |
| 2   | 2.4525    | 29.54   | 10.00   | 39.54  | 56.00  | -16.46 | peak     |
| 3   | 2.5575    | 18.51   | 10.00   | 28.51  | 46.00  | -17.49 | AVG      |
| 4   | 3.8068    | 18.12   | 10.00   | 28.12  | 46.00  | -17.88 | AVG      |
| 5*  | 4.2985    | 32.01   | 10.00   | 42.01  | 56.00  | -13.99 | peak     |
| 6   | 19.6264   | 27.80   | 11.93   | 39.73  | 60.00  | -20.27 | peak     |

Test Specification: Line



| No. | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>(dB/m) | Result<br>(dBuV) | Limit<br>(dBuV) | Margin<br>(dB) | Detector |
|-----|--------------------|-------------------|-------------------|------------------|-----------------|----------------|----------|
| 1   | 1.9007             | 30.71             | 10.00             | 40.71            | 56.00           | -15.29         | peak     |
| 2   | 2.0955             | 19.90             | 10.00             | 29.90            | 46.00           | -16.10         | AVG      |
| 3   | 2.4855             | 31.05             | 10.00             | 41.05            | 56.00           | -14.95         | peak     |
| 4   | 2.5312             | 20.34             | 10.00             | 30.34            | 46.00           | -15.66         | AVG      |
| 5*  | 4.0975             | 34.52             | 10.00             | 44.52            | 56.00           | -11.48         | peak     |
| 6   | 4.2765             | 20.66             | 10.00             | 30.66            | 46.00           | -15.34         | AVG      |

## 4. Radiated Emissions

### 4.1 Measurement Uncertainty

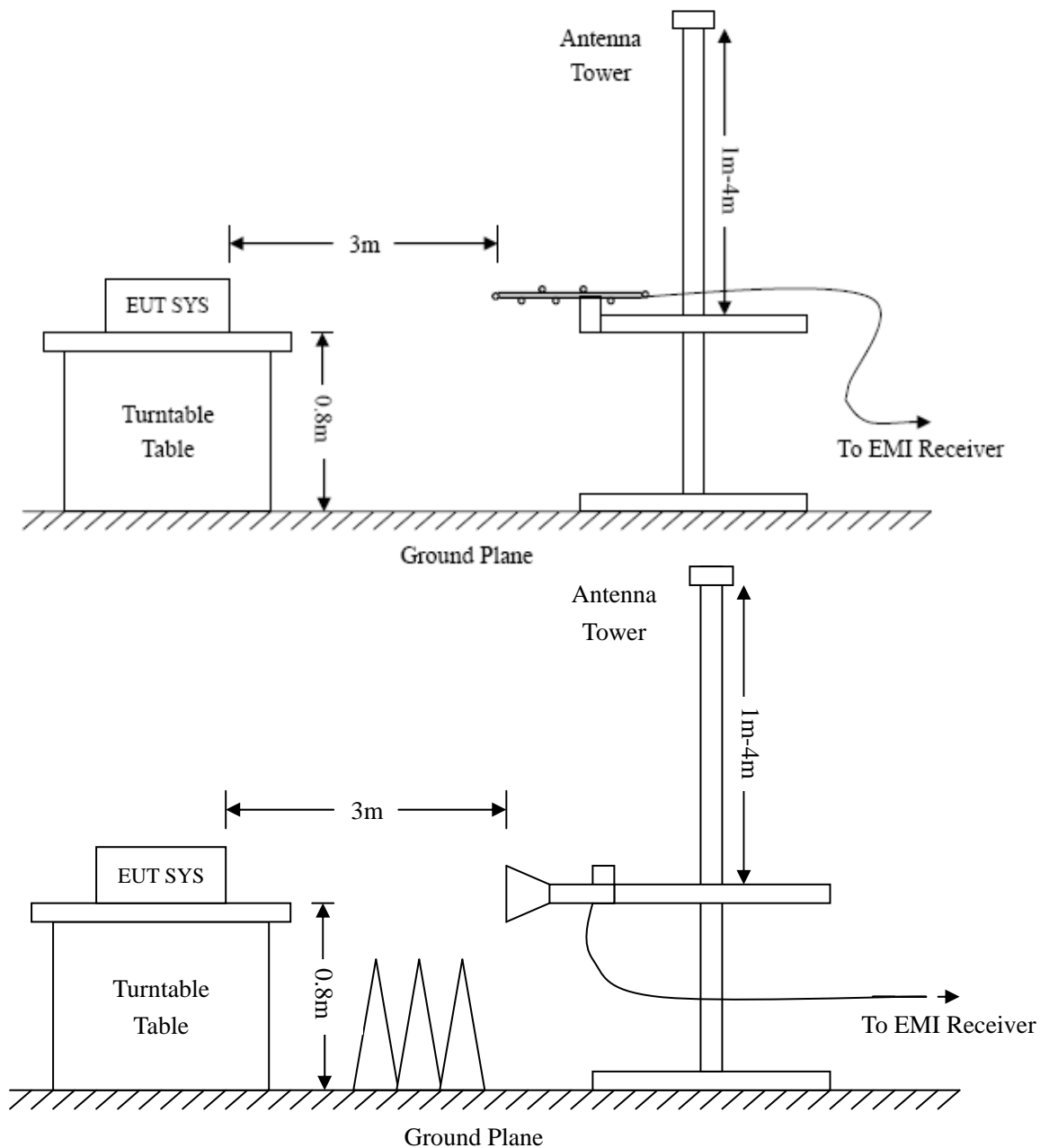
Base on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any radiation emissions measurement is  $\pm 5.10$  dB.

### 4.2 Test Procedure

The setup of EUT is according with per ANSI C63.4-2014 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.



### 4.3 Test Receiver Setup

Frequency :9kHz-30MHz

RBW=10KHz,

VBW =30KHz

Sweep time= Auto

Trace = max hold

Detector function = peak

Frequency :30MHz-1GHz

RBW=120KHz,

VBW=300KHz

Sweep time= Auto

Trace = max hold

Detector function = peak, QP

Frequency :Above 1GHz

RBW=1MHz,

VBW=3MHz(Peak), 10Hz(AV)

Sweep time= Auto

Trace = max hold

Detector function = peak, AV

### 4.4 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 $\mu$ V means the emission is 6dB $\mu$ V below the maximum limit for a Class B device. The equation for margin calculation is as follows:

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

### 4.5 Environmental Conditions

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

### 4.6 Summary of Test Results/Plots

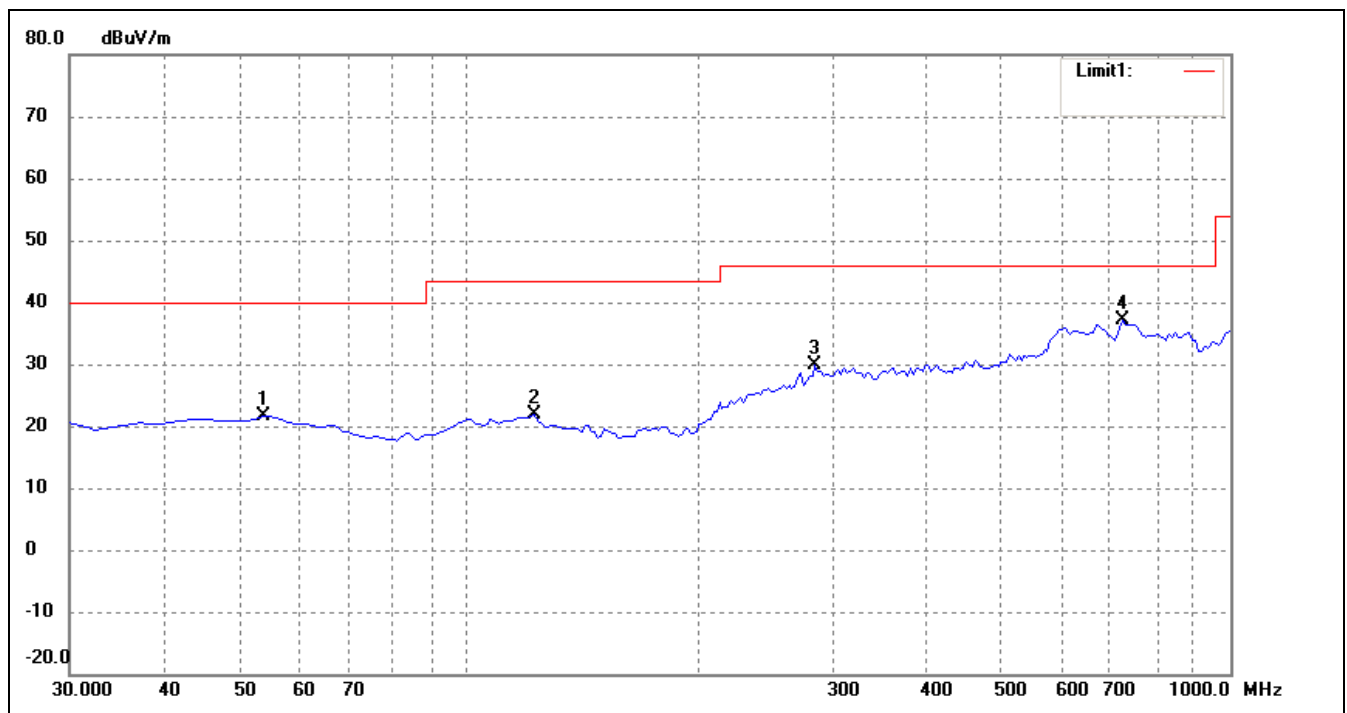
According to the data, the EUT complied with the FCC Part 15.109(a) rule, and had the worst margin of:

**-1.69 dB at 165.8000 MHz in the Vertical polarization, TM2 Mode 9 kHz to 6.5 GHz, 3Meters**

### Plot of Radiated Emissions Test Data

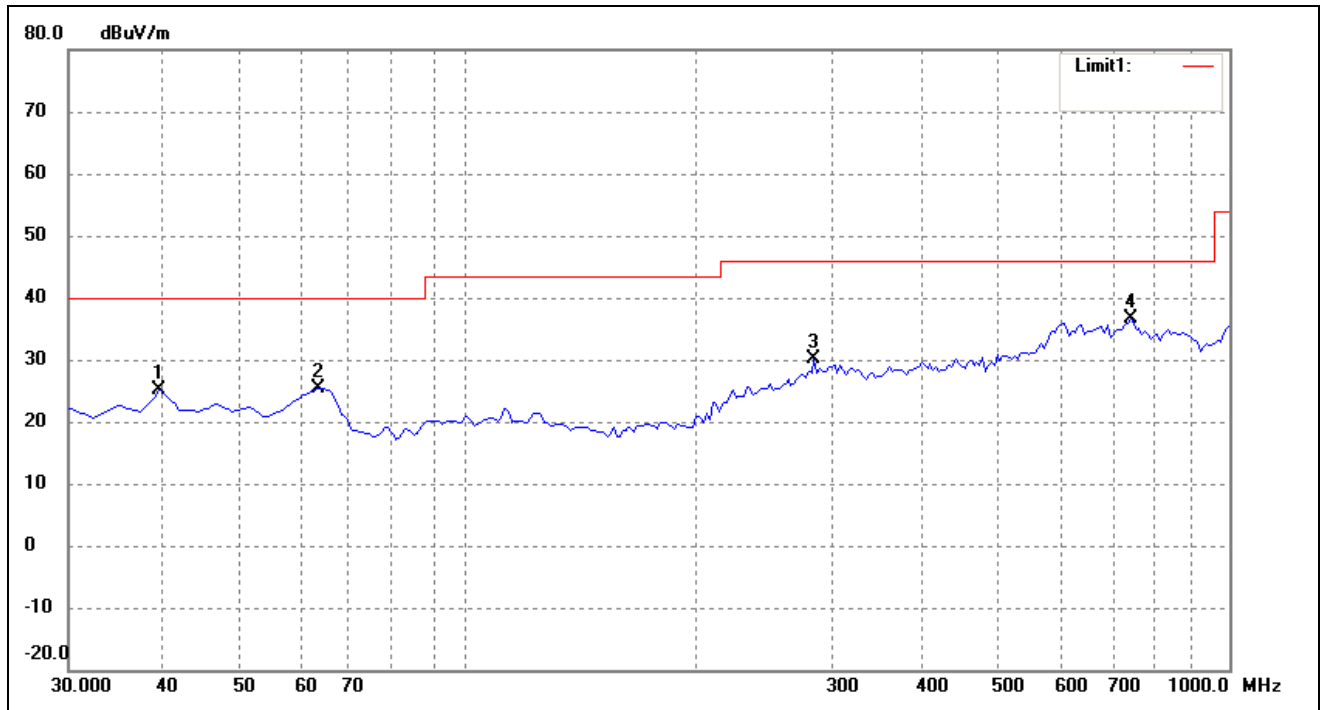
EUT: 4G Smart Phone  
 Tested Model: Alba 5400  
 Operating Condition: TM1  
 Comment: AC 120V/60Hz; Adapter DC 5V

Test Specification: Horizontal



| No. | Frequency<br>(MHz) | Reading<br>(dBuV/m) | Correct<br>dB/m | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Degree<br>( ° ) | Height<br>(cm) | Remark |
|-----|--------------------|---------------------|-----------------|--------------------|-------------------|----------------|-----------------|----------------|--------|
| 1   | 54.2500            | 16.37               | 5.31            | 21.68              | 40.00             | -18.32         | 42              | 100            | QP     |
| 2   | 122.1500           | 17.08               | 4.84            | 21.92              | 43.50             | -21.58         | 132             | 100            | QP     |
| 3   | 287.0500           | 18.30               | 11.68           | 29.98              | 46.00             | -16.02         | 168             | 100            | QP     |
| 4   | 725.9750           | 18.30               | 18.72           | 37.02              | 46.00             | -8.98          | 0               | 100            | QP     |

Test Specification: Vertical



| No. | Frequency<br>(MHz) | Reading<br>(dBuV/m) | Correct<br>dB/m | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Degree<br>( ° ) | Height<br>(cm) | Remark |
|-----|--------------------|---------------------|-----------------|--------------------|-------------------|----------------|-----------------|----------------|--------|
| 1   | 39.7000            | 19.82               | 5.20            | 25.02              | 40.00             | -14.98         | 59              | 100            | QP     |
| 2   | 63.9500            | 20.95               | 4.51            | 25.46              | 40.00             | -14.54         | 147             | 100            | QP     |
| 3   | 287.0500           | 18.45               | 11.68           | 30.13              | 46.00             | -15.87         | 236             | 100            | QP     |
| 4   | 742.9500           | 17.10               | 19.42           | 36.52              | 46.00             | -9.48          | 158             | 100            | QP     |



### Plot of Radiated Emissions Test Data

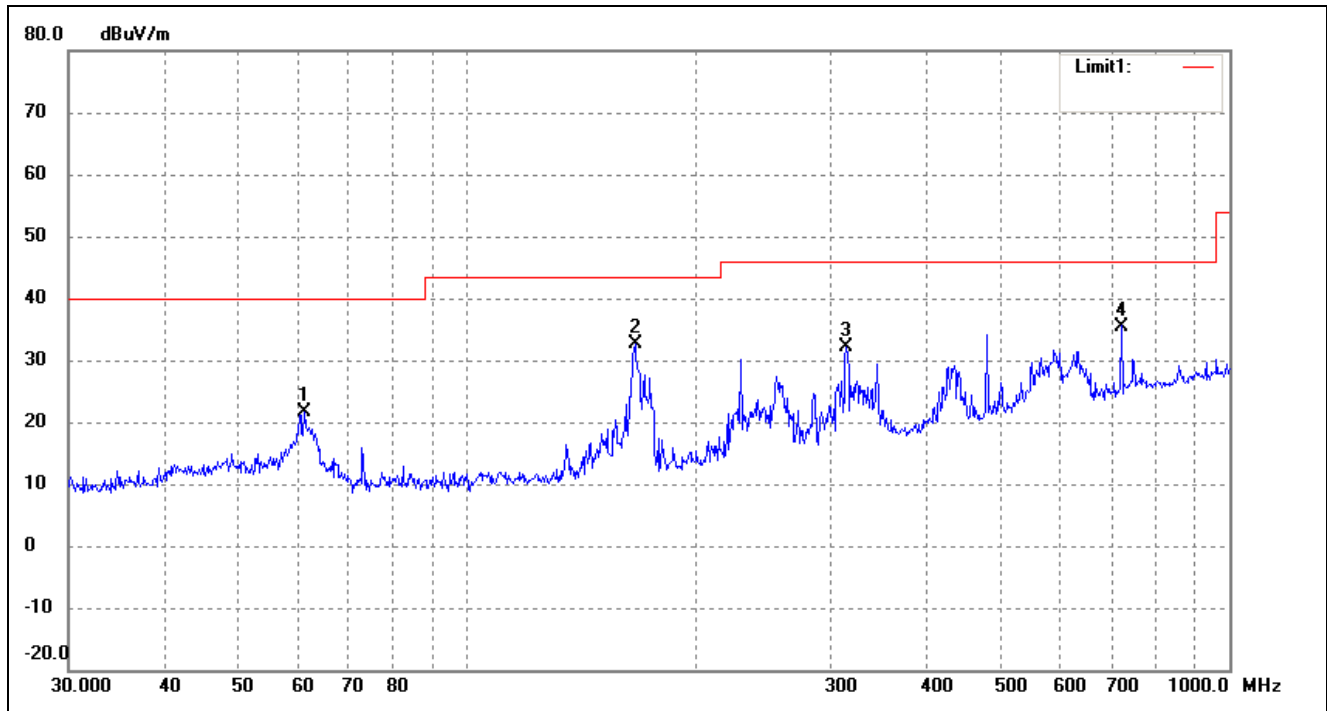
EUT: 4G Smart Phone

Tested Model: Alba 5400

Operating Condition: TM2

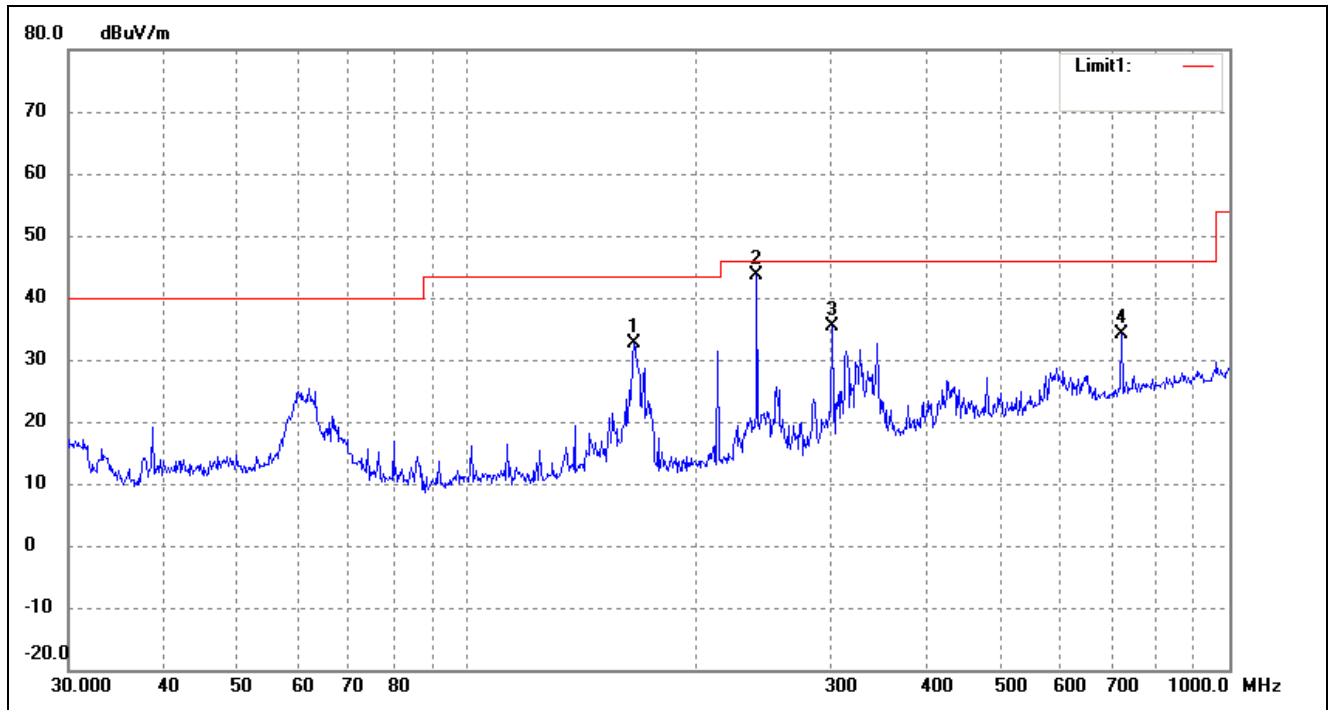
Comment: USB: DC5V

Test Specification: Horizontal



| No. | Frequency<br>(MHz) | Reading<br>(dBuV/m) | Correct<br>Factor(dB) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Degree<br>( ° ) | Height<br>(cm) | Remark |
|-----|--------------------|---------------------|-----------------------|--------------------|-------------------|----------------|-----------------|----------------|--------|
| 1   | 61.1316            | 32.35               | -10.68                | 21.67              | 40.00             | -18.33         | 51              | 100            | QP     |
| 2   | 166.0680           | 42.84               | -10.26                | 32.58              | 43.50             | -10.92         | 124             | 100            | QP     |
| 3   | 314.3765           | 36.61               | -4.60                 | 32.01              | 46.00             | -13.99         | 203             | 100            | QP     |
| 4   | 721.7259           | 32.26               | 3.24                  | 35.50              | 46.00             | -10.50         | 86              | 100            | QP     |

Test Specification: Vertical



| No. | Frequency<br>(MHz) | Reading<br>(dBuV/m) | Correct<br>dB/m | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Degree<br>( ° ) | Height<br>(cm) | Remark |
|-----|--------------------|---------------------|-----------------|--------------------|-------------------|----------------|-----------------|----------------|--------|
| 1   | 165.4867           | 42.92               | -10.29          | 32.63              | 43.50             | -10.87         | 22              | 100            | QP     |
| 2   | 239.9874           | 50.01               | -6.46           | 43.55              | 46.00             | -2.45          | 146             | 100            | QP     |
| 3   | 301.4224           | 40.34               | -4.95           | 35.39              | 46.00             | -10.61         | 197             | 100            | QP     |
| 4   | 721.7259           | 30.88               | 3.24            | 34.12              | 46.00             | -11.88         | 375             | 100            | QP     |

### Plot of Radiated Emissions Test Data

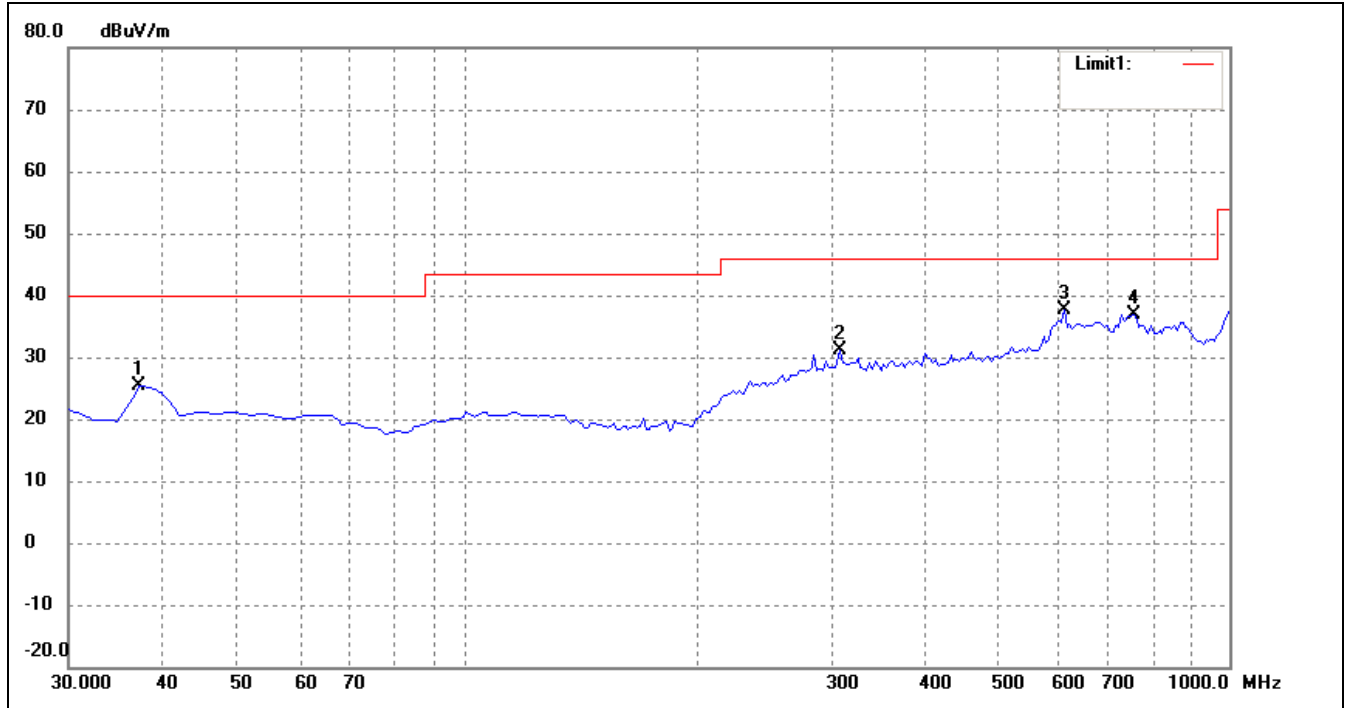
EUT: 4G Smart Phone

Tested Model: Alba 5400

Operating Condition: TM3

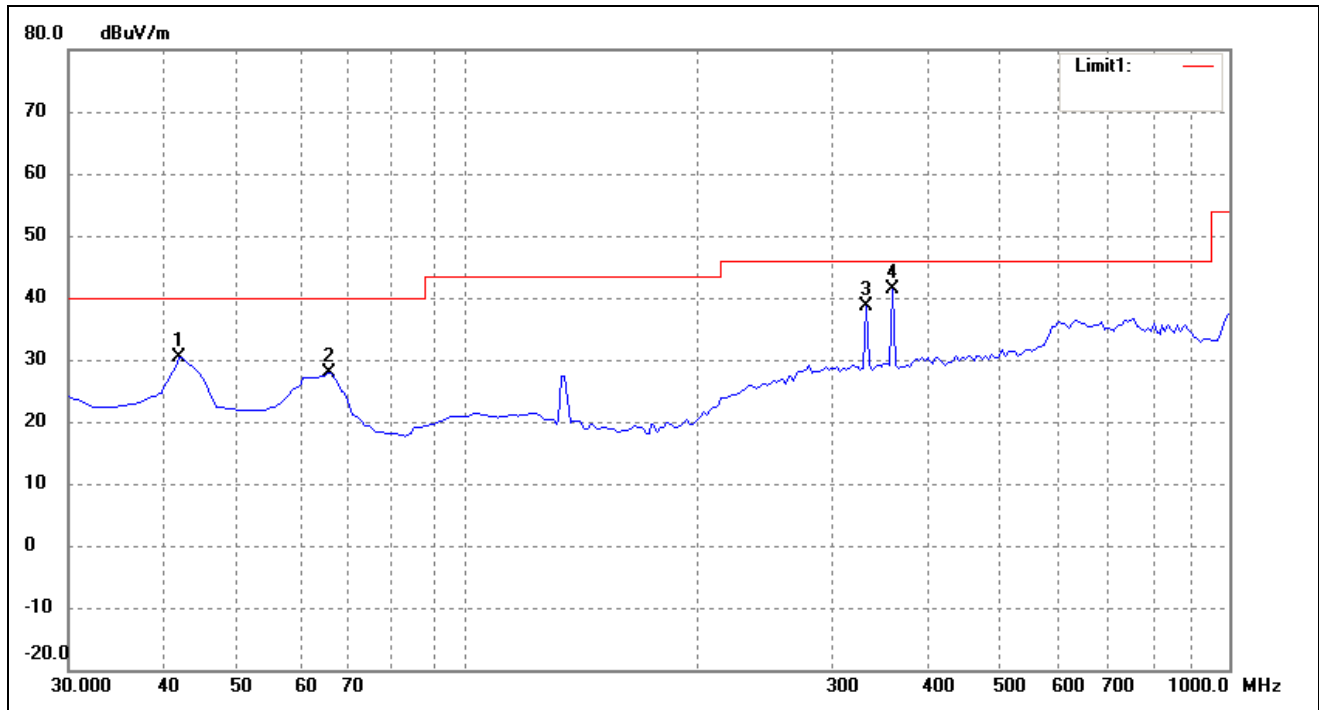
Comment: DC 3.8V

Test Specification: Horizontal



| No. | Frequency<br>(MHz) | Reading<br>(dBuV/m) | Correct<br>dB/m | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Degree<br>(°) | Height<br>(cm) | Remark |
|-----|--------------------|---------------------|-----------------|--------------------|-------------------|----------------|---------------|----------------|--------|
| 1   | 37.2750            | 20.64               | 4.79            | 25.43              | 40.00             | -14.57         | 158           | 100            | QP     |
| 2   | 311.3000           | 18.99               | 12.24           | 31.23              | 46.00             | -14.77         | 0             | 100            | QP     |
| 3   | 612.0000           | 19.06               | 18.48           | 37.54              | 46.00             | -8.46          | 147           | 100            | QP     |
| 4   | 752.6500           | 17.95               | 18.98           | 36.93              | 46.00             | -9.07          | 352           | 100            | QP     |

Test Specification: Vertical



| No. | Frequency<br>(MHz) | Reading<br>(dBuV/m) | Correct<br>dB/m | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Degree<br>( ° ) | Height<br>(cm) | Remark |
|-----|--------------------|---------------------|-----------------|--------------------|-------------------|----------------|-----------------|----------------|--------|
| 1   | 42.1250            | 25.13               | 5.25            | 30.38              | 40.00             | -9.62          | 76              | 100            | QP     |
| 2   | 66.3750            | 23.94               | 3.99            | 27.93              | 40.00             | -12.07         | 288             | 100            | QP     |
| 3   | 335.5500           | 26.72               | 11.85           | 38.57              | 46.00             | -7.43          | 10              | 100            | QP     |
| 4   | 364.6500           | 29.05               | 12.23           | 41.28              | 46.00             | -4.72          | 11              | 100            | QP     |

Note: Testing is carried out with frequency rang 9kHz to the 6.5GHz, which above 1GHz is close to the noise base even antenna close up to 1meter distance according the measurement of ANSI C63.4.

The measurements greater than 20dB below the limit from 9kHz to 30MHz and test data are not provided.

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