

# FCC Test Report

**Client Name** : Meferi Technologies Co.,Ltd.

**Client Address** : 4501, 45th Floor, Building A, No. 530, Middle  
Tianfu Avenue, High-tech Zone, Chengdu,  
China

**Product Name** : HANDHELD TERMINAL

**Report Date** : Mar. 07, 2023

**Shenzhen Anbotek Compliance Laboratory Limited**



# Contents

|                                                   |    |
|---------------------------------------------------|----|
| 1. General Information .....                      | 6  |
| 1.1. Client Information .....                     | 6  |
| 1.2. Description of Device (EUT) .....            | 6  |
| 1.3. Auxiliary Equipment Used During Test .....   | 8  |
| 1.4. Operation State .....                        | 8  |
| 1.5. Environmental Conditions .....               | 8  |
| 1.6. Test Equipment List .....                    | 9  |
| 1.7. Measurement Uncertainty .....                | 10 |
| 1.8. Description of Test Facility .....           | 10 |
| 2. Summary of Test .....                          | 11 |
| 2.1. Summary of test result .....                 | 11 |
| 3. Conducted Output Power Test .....              | 12 |
| 3.1. Test Standard and Limit .....                | 12 |
| 3.2. Test Setup .....                             | 12 |
| 3.3. Test Procedure .....                         | 12 |
| 3.4. Test Data .....                              | 12 |
| 4. Peak-Average Ratio .....                       | 13 |
| 4.1. Test Standard and Limit .....                | 13 |
| 4.2. Test Setup .....                             | 13 |
| 4.3. Test Procedure .....                         | 13 |
| 4.4. Test Data .....                              | 13 |
| 5. Modulation Characteristic .....                | 14 |
| 6. 99% Occupied Bandwidth & 26 dB Bandwidth ..... | 15 |
| 6.1. Test Standard and Limit .....                | 15 |
| 6.2. Test Setup .....                             | 15 |
| 6.3. Test Procedure .....                         | 15 |
| 6.4. Test Data .....                              | 15 |
| 7. Band Edge .....                                | 16 |
| 7.1. Test Standard and Limit .....                | 16 |
| 7.2. Test Setup .....                             | 16 |
| 7.3. Test Procedure .....                         | 16 |
| 7.4. Test Data .....                              | 16 |
| 8. Conducted Spurious Emission .....              | 17 |
| 8.1. Test Standard and Limit .....                | 17 |
| 8.2. Test Setup .....                             | 17 |
| 8.3. Test Procedure .....                         | 17 |



|                                                          |    |
|----------------------------------------------------------|----|
| 8.4. Test Data .....                                     | 17 |
| 9. Radiated Spurious Emission .....                      | 18 |
| 9.1. Test Standard and Limit .....                       | 18 |
| 9.2. Test Setup .....                                    | 18 |
| 9.3. Test Procedure .....                                | 18 |
| 9.4. Test Data .....                                     | 20 |
| 10. ERP and EIRP .....                                   | 23 |
| 10.1. Test Standard and Limit .....                      | 23 |
| 10.2. Test Setup .....                                   | 23 |
| 10.3. Test Procedure .....                               | 23 |
| 10.4. Test Data .....                                    | 25 |
| 11. Frequency stability VS Voltage measurement .....     | 26 |
| 11.1. Test Standard and Limit .....                      | 26 |
| 11.2. Test Setup .....                                   | 26 |
| 11.3. Test Procedure .....                               | 26 |
| 11.4. Test Data .....                                    | 26 |
| 12. Frequency stability VS Temperature measurement ..... | 27 |
| 12.1. Test Standard and Limit .....                      | 27 |
| 12.2. Test Setup .....                                   | 27 |
| 12.3. Test Procedure .....                               | 27 |
| 12.4. Test Data .....                                    | 27 |
| APPENDIX I -- TEST SETUP PHOTOGRAPH .....                | 28 |
| APPENDIX II -- EXTERNAL PHOTOGRAPH .....                 | 28 |
| APPENDIX III -- INTERNAL PHOTOGRAPH .....                | 28 |



## TEST REPORT

Applicant : Meferi Technologies Co.,Ltd.  
Manufacturer : Meferi Technologies Co.,Ltd.  
Product Name : HANDHELD TERMINAL  
Model No. : ME40K, ME40M, ME40, ME40K\_M, ME40M\_EEA, ME40K\_ROW, ME40L, ME41K, ME40S, ME40P  
Trade Mark : MEFERI  
Rating(s) : Input: 5V= 2A, 9V= 2A, (via adapter input: 100-240V~, 50/60Hz, 0.6A, Output: 3.6V-6.0Vdc, 3.0A; or 6.0-9.0Vdc, 2.0A; or 9.0-12.0Vdc, 1.5A)  
Capacity: 3.85V, 5180mAh (BATME40K)

Test Standard(s) : FCC PART 2, FCC Part 22(H), FCC Part 24(E), FCC Part 27(C)

Test Method(s) : ANSI C63.26-2015

KDB 971168 D01 Power Meas License Digital Systems v03r01

The device described above is tested by Shenzhen Anbotek Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotek Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the FCC Part 22, FCC Part 24, FCC Part 27 requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotek Compliance Laboratory Limited.

Date of Receipt

Nov. 30, 2022

Date of Test :

Nov. 30, 2022~Feb. 01, 2023

Prepared by :

Tu Tu Hong

(TuTu Hong)

Approved & Authorized Signer :

Kingkong Jin

(Kingkong Jin)



## Revision History

| Report Version | Description     | Issued Date   |
|----------------|-----------------|---------------|
| R00            | Original Issue. | Mar. 07, 2023 |
|                |                 |               |
|                |                 |               |



## 1. General Information

### 1.1. Client Information

|              |   |                                                                                             |
|--------------|---|---------------------------------------------------------------------------------------------|
| Applicant    | : | Meferi Technologies Co.,Ltd.                                                                |
| Address      | : | 4501, 45th Floor, Building A, No. 530, Middle Tianfu Avenue, High-tech Zone, Chengdu, China |
| Manufacturer | : | Meferi Technologies Co.,Ltd.                                                                |
| Address      | : | 4501, 45th Floor, Building A, No. 530, Middle Tianfu Avenue, High-tech Zone, Chengdu, China |
| Factory      | : | Dongguan Unicair Communication Tec. Co., Ltd.                                               |
| Address      | : | No. 49,Yinhu Road,Shishuikou Village,Qiaotou Town,Dongguan City,Guangdong Province,China    |

### 1.2. Description of Device (EUT)

|                         |   |                                                                                                                                                                                 |
|-------------------------|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product Name            | : | HANDHELD TERMINAL                                                                                                                                                               |
| Model No.               | : | ME40K, ME40M, ME40, ME40K_M, ME40M_EEA, ME40K_ROW, ME40L, ME41K, ME40S, ME40P<br>(Note: All samples are the same except the model number, so we prepare "ME40K" for test only.) |
| Trade Mark              | : | MEFERI                                                                                                                                                                          |
| Test Power Supply       | : | DC 3.85V Battery inside                                                                                                                                                         |
| Test Sample No.         | : | 1-2-1(Normal Sample), 1-2-2(Engineering Sample)                                                                                                                                 |
| Adapter                 | : | Model: TPA-10S120150UU01<br>Input: 100-240V~50/60Hz 0.6A<br>Output: 3.6-6V== 3A/ 6-9V== 2A/ 9-12V== 1.5A                                                                        |
| <b>RF Specification</b> |   |                                                                                                                                                                                 |
| Support Band            | : | <input checked="" type="checkbox"/> FDD Band II <input checked="" type="checkbox"/> FDD Band V <input checked="" type="checkbox"/> FDD Band IV                                  |
| Transmit Frequency      | : | FDD Band II: 1852.40MHz~1907.60MHz<br>FDD Band V: 826.40MHz~846.60MHz<br>FDD Band IV: 1712.40MHz~1752.60MHz                                                                     |
| Receive Frequency       | : | FDD Band II: 1932.40MHz~1987.60MHz<br>FDD Band V: 871.40MHz~891.60MHz<br>FDD Band IV: 2112.40MHz~2152.60MHz                                                                     |
| Modulation Type         | : | QPSK                                                                                                                                                                            |
| Power Class             | : | Class 3                                                                                                                                                                         |



|                                                                                                                                     |   |                                                                                                                                                |
|-------------------------------------------------------------------------------------------------------------------------------------|---|------------------------------------------------------------------------------------------------------------------------------------------------|
| Antenna Type                                                                                                                        | : | FPC Antenna                                                                                                                                    |
| Antenna Gain(Peak):                                                                                                                 |   | FDD Band II: -0.84 dBi (Provided by customer)<br>FDD Band V: -2.27 dBi (Provided by customer)<br>FDD Band IV: -2.98 dBi (Provided by customer) |
| <b>Remark:</b> 1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual. |   |                                                                                                                                                |



### 1.3. Auxiliary Equipment Used During Test

| Description | Rating(s) |
|-------------|-----------|
| --          | --        |

### 1.4. Operation State

#### Test frequency list:

| FDD Band II |                 | FDD Band V |                 | FDD Band IV |                 |
|-------------|-----------------|------------|-----------------|-------------|-----------------|
| Channel     | Frequency (MHz) | Channel    | Frequency (MHz) | Channel     | Frequency (MHz) |
| 9262        | 1852.40         | 4132       | 826.40          | 1312        | 1712.40         |
| 9400        | 1880.00         | 4183       | 836.60          | 1413        | 1732.60         |
| 9538        | 1907.60         | 4233       | 846.60          | 1513        | 1752.60         |

#### Test mode:

Antenna port conducted and radiated test items were performed according to KDB 971168 D01 Power Meas. License Digital Systems v03 and ANSI C63.26-2015 with maximum output power.

Radiated measurements were performed with rotating EUT in different three orthogonal test planes to find the maximum emission.

Radiated emissions were investigated as following frequency range:

30 MHz to 10th harmonic for FDD Band II, Band V, Band IV

All modes and data rates and positions were investigated.

Test modes are chosen to be reported as the worst case configuration below:

| Test modes    |                     |                     |
|---------------|---------------------|---------------------|
| Band          | Radiated            | Conducted           |
| FDD Band II   | ■ RMC 12.2Kbps Link | ■ RMC 12.2Kbps Link |
| FDD Band V    | ■ RMC 12.2Kbps Link | ■ RMC 12.2Kbps Link |
| WCDMA Band IV | ■ RMC 12.2Kbps Link | ■ RMC 12.2Kbps Link |

### 1.5. Environmental Conditions

|                    |           |
|--------------------|-----------|
| Temperature range: | 21-25℃    |
| Humidity range:    | 40-75%    |
| Pressure range:    | 86-106kPa |



**1.6. Test Equipment List**

| Item | Equipment                             | Manufacturer    | Model No.             | Serial No.    | Last Cal.     | Cal. Interval |
|------|---------------------------------------|-----------------|-----------------------|---------------|---------------|---------------|
| 1.   | EMI Preamplifier                      | SKET Electronic | LNPA-0118G-45         | SKET-PA-002   | Oct. 13, 2022 | 1 Year        |
| 2.   | EMI Test Receiver                     | Rohde & Schwarz | ESR26                 | 101481        | Oct. 23, 2022 | 1 Year        |
| 3.   | Double Ridged Horn Antenna            | SCHWARZBECK     | BBHA 9120D            | 02555         | Oct. 16, 2022 | 3 Year        |
| 4.   | Bilog Broadband Antenna               | Schwarzbeck     | VULB9163              | VULB 9163-289 | Oct. 23, 2022 | 2 Year        |
| 5.   | Pre-amplifier                         | SONOMA          | 310N                  | 186860        | Oct. 23, 2022 | 1 Year        |
| 6.   | EMI Test Software EZ-EMC              | SHURPLE         | N/A                   | N/A           | N/A           | N/A           |
| 7.   | MXA Spectrum Analysis                 | Agilent         | N9020A                | MY51170037    | Oct. 13, 2022 | 1 Year        |
| 8.   | MXG RF Vector Signal Generator        | Agilent         | N5182A                | MY48180656    | Oct. 13, 2022 | 1 Year        |
| 9.   | DC Power Supply                       | LW              | TPR-6420D             | 374470        | Oct. 22, 2022 | 1 Year        |
| 10.  | Constant Temperature Humidity Chamber | ZHONGJIAN       | ZJ-KHWS80B            | N/A           | Oct. 19, 2022 | 1 Year        |
| 11.  | Wideband Radio Communication Tester   | Rohde & Schwarz | CMW 500               | 167336        | Oct. 13, 2022 | 1 Year        |
| 12.  | High-Pass Filter                      | CDKMV           | ZHPF-BM1100-4000-0730 | B2015094550   | Oct. 22, 2022 | 1 Year        |
| 13.  | High-Pass Filter                      | CDKMV           | ZHPF-M3.5-18G-3834    | 1307006523    | Oct. 22, 2022 | 1 Year        |



### 1.7. Measurement Uncertainty

Maximum measurement uncertainty

| Parameter                                       | Uncertainty |
|-------------------------------------------------|-------------|
| RF output power, conducted                      | ±1,5 dB     |
| Power Spectral Density, conducted               | ±3 dB       |
| Unwanted Emissions, conducted                   | ±3 dB       |
| All emissions, radiated                         | ±6 dB       |
| Temperature                                     | ±1 °C       |
| Humidity                                        | ±5 %        |
| DC and low frequency voltages                   | ±3 %        |
| Time                                            | ±5 %        |
| Confidence interval: 95%. Confidence factor:k=2 |             |

### 1.8. Description of Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

#### FCC-Registration No.: 184111

Shenzhen Anbotek Compliance Laboratory Limited, 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. Registration No. 184111.

#### ISED-Registration No.: 8058A

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (ISED) Innovation, Science and Economic Development Canada. The acceptance letter from the ISED is maintained in our files. Registration 8058A.

#### Test Location

Shenzhen Anbotek Compliance Laboratory Limited.

1/F, Building D, Sogood Science and Technology Park, Sanwei community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.518102



## 2. Summary of Test

### 2.1. Summary of test result

| FCC Rules                                                        | Description of Test                      | Result     |
|------------------------------------------------------------------|------------------------------------------|------------|
| Part 2.1046<br>Part 22.913(a)<br>Part 24.232(c)<br>Part 27.50(d) | Conducted Output Power                   | Compliance |
| Part 24.232<br>Part 27.50(d)                                     | Peak-Average Ratio                       | Compliance |
| § 2.1047                                                         | Modulation Characteristics               | N/A        |
| Part 2.1049                                                      | 99% Occupied Bandwidth & 26 dB Bandwidth | Compliance |
| Part 2.1051<br>Part 22.917<br>Part 24.238<br>Part 27.53(h)       | Conducted Spurious Emission              | Compliance |
| Part 2.1051<br>Part 22.917<br>Part 24.238<br>Part 27.53(h)       | Band Edge                                | Compliance |
| Part 2.1055(a)(1)(b)<br>Part 22.355<br>Part 24.235<br>Part 27.54 | Frequency stability VS. temperature      | Compliance |
| Part 2.1055(d)(1)(2)<br>Part 22.355<br>Part 24.235<br>Part 27.54 | Frequency stability VS. voltage          | Compliance |
| Part 2.1046<br>Part 22.913(a)<br>Part 24.232(c)<br>Part 27.50    | ERP and EIRP                             | Compliance |
| Part 2.1053<br>Part 22.917<br>Part 24.238<br>Part 27.53(h)       | Radiated Spurious Emission               | Compliance |

Note: Testing was performed by configuring EUT to maximum output power status, the declared output power class for different

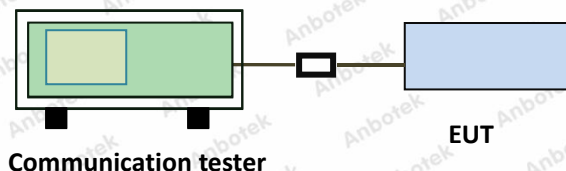


### 3. Conducted Output Power Test

#### 3.1. Test Standard and Limit

|                      |                                                                  |
|----------------------|------------------------------------------------------------------|
| Applicable Standard: | Part 2.1046<br>Part 22.913(a)<br>Part 24.232(c)<br>Part 27.50(d) |
| Limit:               | N/A                                                              |

#### 3.2. Test Setup



#### 3.3. Test Procedure

1. The EUT output port was connected to communication tester.
2. Set EUT at maximum power through communication tester.
3. Select lowest, middle, and highest channels for each band and different modulation.
4. Measure the maximum burst average power.

#### 3.4. Test Data

Pass

Please refer to Appendix A of the Appendix Test Data.

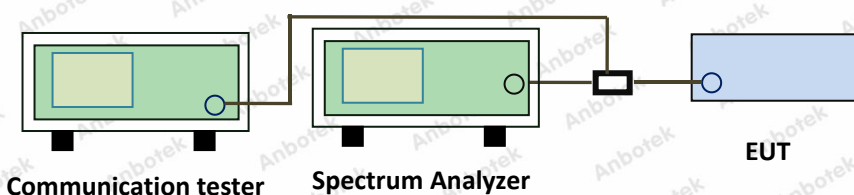


## 4. Peak-Average Ratio

### 4.1. Test Standard and Limit

|                      |                              |
|----------------------|------------------------------|
| Applicable Standard: | Part 24.232<br>Part 27.50(d) |
| Limit:               | 13dB                         |

### 4.2. Test Setup



### 4.3. Test Procedure

According with KDB 971168 D01 Section 5.7:

1. The EUT was connected to the spectrum analyzer and communication tester via a power splitter.
2. Set EUT in maximum power output.
3. Center Frequency = Carrier frequency, RBW > Emission bandwidth of signal.
4. The signal analyzer was set to collect one million samples to generate the CCDF curve.
5. The measurement interval was set depending on the type of signal analyzed.
  - i. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms.
  - ii. For burst transmissions, the spectrum analyzer is set to use an internal "RF Burst" trigger that is synced with an incoming pulse and the measurement interval is set to less than the duration of the "on time" of one burst to ensure that energy is only captured during a time in which the transmitter is operating at maximum power
6. Record the maximum PAPR level associated with a probability of 0.1%.

### 4.4. Test Data

Pass

Please refer to Appendix B of the Appendix Test Data.



## 5. Modulation Characteristic

According to FCC § 2.1047(d), Part 22H, Part 24E, Part 27C there is no specific requirement for digital modulation, therefore modulation characteristic is not presented.

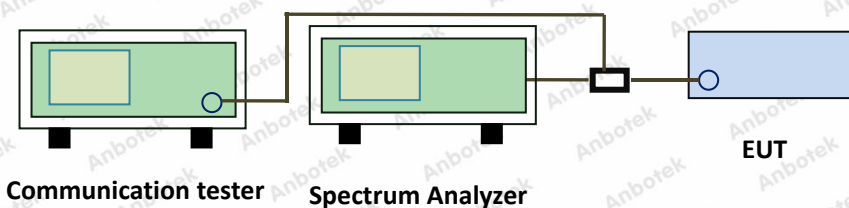


## 6. 99% Occupied Bandwidth & 26 dB Bandwidth

### 6.1. Test Standard and Limit

|                      |             |
|----------------------|-------------|
| Applicable Standard: | Part 2.1049 |
| Limit:               | N/A         |

### 6.2. Test Setup



### 6.3. Test Procedure

1. The EUT was connected to the spectrum analyzer and communication tester via a power splitter.
2. Set EUT in maximum power output.
3. Spectrum analyzer setting as follow:  
Center Frequency= Carrier frequency, RBW=1% to 5% of anticipated OBW, VBW= 3 \* RBW, Detector=Peak, Trace maximum hold.
4. Record the value of 99% Occupied bandwidth and -26dB bandwidth.

### 6.4. Test Data

Pass

Please refer to Appendix C of the Appendix Test Data.

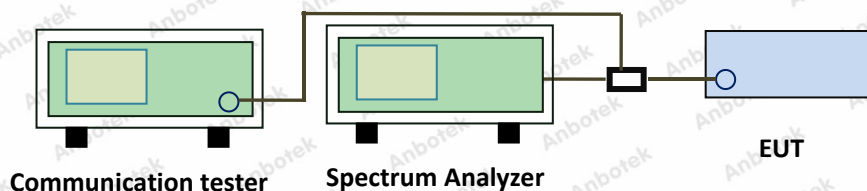


## 7. Band Edge

### 7.1. Test Standard and Limit

|                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Applicable Standard: | Part 2.1051<br>Part 22.917<br>Part 24.238<br>Part 27.53(h)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Limit:               | <p>Part 24.238 and Part 22.917 and Part 27.53(h) specify that the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least <math>43 + 10 \log(P)</math> dB.</p> <p>The specification that emissions shall be attenuated below the transmitter power (P) by at least <math>43 + 10 \log(P)</math> dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.</p> |

### 7.2. Test Setup



### 7.3. Test Procedure

1. The EUT was connected to the spectrum analyzer and communication tester via a power splitter.
2. Set EUT in maximum power output.
3. The band edges of low and high channels were measured.
4. Spectrum analyzer setting as follow:  
RBW=3KHz, VBW = 10KHz, Sweep time= Auto
5. Record the test plot.

### 7.4. Test Data

Pass

Please refer to Appendix D of the Appendix Test Data.

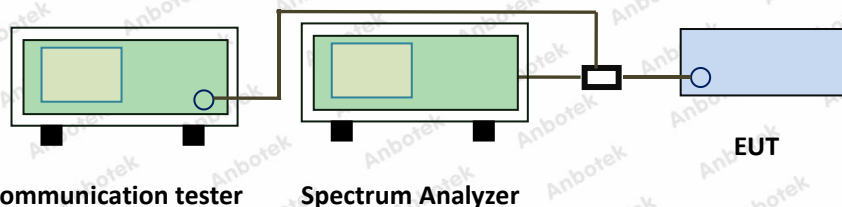


## 8. Conducted Spurious Emission

### 8.1. Test Standard and Limit

|                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Applicable Standard: | Part 2.1051<br>Part 22.917<br>Part 24.238<br>Part 27.53(h)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Limit:               | <p>Part 24.238 and Part 22.917 and Part 27.53(h) specify that the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least <math>43 + 10 \log(P)</math> dB.</p> <p>The specification that emissions shall be attenuated below the transmitter power (P) by at least <math>43 + 10 \log(P)</math> dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.</p> |

### 8.2. Test Setup



### 8.3. Test Procedure

1. The EUT was connected to the spectrum analyzer and communication tester via a power splitter.
2. Set EUT in maximum power output.
3. Spectrum analyzer setting as follow:  
Below 1GHz, RBW=100KHz, VBW = 300KHz, Detector=Peak, Sweep time= Auto  
Above 1GHz, RBW=1MHz, VBW=3MHz, Detector=Peak, Sweep time= Auto  
Scan frequency range up to 10<sup>th</sup> harmonic.
4. Record the test plot.

### 8.4. Test Data

Pass

Please refer to Appendix E of the Appendix Test Data.

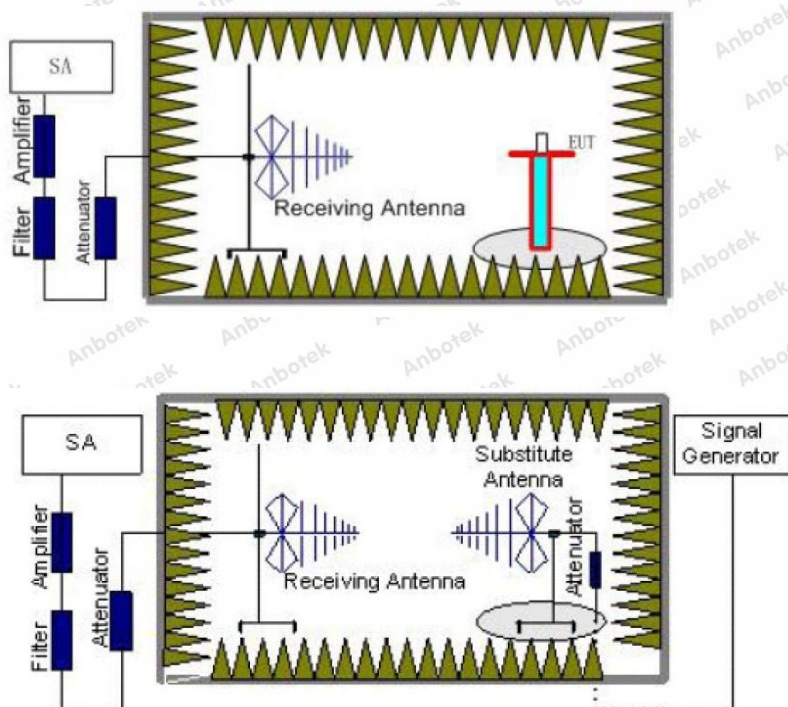


## 9. Radiated Spurious Emission

### 9.1. Test Standard and Limit

|                      |                                                            |
|----------------------|------------------------------------------------------------|
| Applicable Standard: | Part 2.1053<br>Part 22.917<br>Part 24.238<br>Part 27.53(h) |
| Limit:               | -13dBm                                                     |

### 9.2. Test Setup



### 9.3. Test Procedure

- Place the EUT in the center of the turntable.
  - For radiated emissions measurements performed at frequencies less than or equal to 1 GHz, the EUT shall be placed on a RF-transparent table at a nominal height of 80 cm above the reference ground plane
  - For radiated measurements performed at frequencies above 1 GHz, the EUT shall be placed on an RF transparent table at a nominal height of 1.5 m above the ground plane.
- Unless the EUT uses an integral antenna, the EUT shall be terminated with a non-radiating transmitter load. In cases where the EUT uses an adjustable antenna, the antenna shall be adjusted through typical positions and lengths to maximize emissions levels.
- The EUT shall be tested while operating on the frequency per manufacturer specification. Set the transmitter to operate in continuous transmit mode.
- Receiver or Spectrum set as follow:

**Shenzhen Anbotek Compliance Laboratory Limited**

Address: 1/F., Building D, Sogood Science and Technology Park, Sanwei Community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.  
Tel: (86) 0755-26066440 Fax: (86) 0755-26014772 Email: service@anbotek.com

Code: AB-RF-05-b

Hotline  
400-003-0500  
www.anbotek.com.cn



Below 1GHz, RBW=100kHz, VBW=300kHz, Detector=Peak, Sweep time=Auto

Above 1GHz, RBW=1MHz, VBW=3MHz, Detector=Peak, Sweep time=Auto

5. Each emission under consideration shall be evaluated:

- a) Raise and lower the measurement antenna from 1 m to 4 m, as necessary to enable detection of the maximum emission amplitude relative to measurement antenna height.
- b) Rotate the EUT through 360° to determine the maximum emission level relative to the axial position.
- c) Return the turntable to the azimuth where the highest emission amplitude level was observed.
- d) Vary the measurement antenna height again through 1 m to 4 m again to find the height associated with the maximum emission amplitude.
- e) Record the measured emission amplitude level and frequency

6. Repeat step 5 for each emission frequency with the measurement antenna oriented in both the horizontal and vertical polarizations to determine the orientation that gives the maximum emissions amplitude.

7. Set-up the substitution measurement with the reference point of the substitution antenna located as near as possible to where the center of the EUT radiating element was located during the initial EUT measurement.

8. Maintain the previous measurement instrument settings and test set-up, with the exception that the EUT is removed and replaced by the substitution antenna.

9. Connect a signal generator to the substitution antenna; locate the signal generator so as to minimize any potential influences on the measurement results. Set the signal generator to the frequency where emissions are detected, and set an output power level such that the radiated signal can be detected by the measurement instrument, with sufficient dynamic range relative to the noise floor.

10. For each emission that was detected and measured in the initial test

- a) Vary the measurement antenna height between 1 m to 4 m to maximize the received (measured) signal amplitude.
- b) Adjust the signal generator output power level until the amplitude detected by the measurement instrument equals the amplitude level of the emission previously measured directly in step 5 and step 6.
- c) Record the output power level of the signal generator when equivalence is achieved in step b).

11. Repeat step 8 through step 10 with the measurement antenna oriented in the opposite polarization.

12. Calculate the emission power in dBm referenced to a half-wave dipole using the following equation:

$$P_e = P_s(\text{dBm}) - \text{cable loss (dB)} + \text{antenna gain (dBd)}$$

where

$P_e$  = equivalent emission power in dBm

$P_s$  = source (signal generator) power in dBm

*NOTE—dBd refers to the measured antenna gain in decibels relative to a half-wave dipole.*

13. Correct the antenna gain of the substitution antenna if necessary to reference the emission power to a half-wave dipole. When using measurement antennas with the gain specified in dBi, the equivalent dipole-referenced gain can be determined from:

$$\text{gain (dBd)} = \text{gain (dBi)} - 2.15 \text{ dB.}$$



If necessary, the antenna gain can be calculated from calibrated antenna factor information

14. Provide the complete measurement results as a part of the test report.

#### 9.4. Test Data

Pass

Note: Worst case at WCDMA Band II/ WCDMA Band V/ WCDMA Band IV

| WCDMA Band II |                 |                   |               |             |             |             |        |
|---------------|-----------------|-------------------|---------------|-------------|-------------|-------------|--------|
| Channel       | Frequency (MHz) | Spurious Emission |               |             |             | Limit (dBm) | Result |
|               |                 | Polarization      | Reading (dBm) | Factor (dB) | Level (dBm) |             |        |
| 9262          | 3704.80         | Vertical          | -48.85        | 13.26       | -35.59      | <-13.00     | PASS   |
|               | 5557.20         | V                 | -55.89        | 16.62       | -39.27      |             |        |
|               | 7409.60         | V                 | -58.20        | 17.84       | -40.36      |             |        |
|               | 3704.80         | Horizontal        | -50.37        | 13.26       | -37.11      | <-13.00     | PASS   |
|               | 5557.20         | H                 | -57.32        | 16.62       | -40.70      |             |        |
|               | 7409.60         | H                 | -59.41        | 17.84       | -41.57      |             |        |
| 9400          | 3760.00         | Vertical          | -47.72        | 13.27       | -34.45      | <-13.00     | PASS   |
|               | 5640.00         | V                 | -54.69        | 16.49       | -38.20      |             |        |
|               | 7520.00         | V                 | -57.31        | 17.96       | -39.35      |             |        |
|               | 3760.00         | Horizontal        | -48.99        | 13.27       | -35.72      | <-13.00     | PASS   |
|               | 5640.00         | H                 | -56.06        | 16.49       | -39.57      |             |        |
|               | 7520.00         | H                 | -58.46        | 17.96       | -40.50      |             |        |
| 9538          | 3815.20         | Vertical          | -46.09        | 13.59       | -32.50      | <-13.00     | PASS   |
|               | 5722.80         | V                 | -53.12        | 16.69       | -36.43      |             |        |
|               | 7630.40         | V                 | -55.62        | 17.95       | -37.67      |             |        |
|               | 3815.20         | Horizontal        | -48.63        | 13.59       | -35.04      | <-13.00     | PASS   |
|               | 5722.80         | H                 | -55.62        | 16.69       | -38.93      |             |        |
|               | 7630.40         | H                 | -57.91        | 17.95       | -39.96      |             |        |

Remark:

1. The emission behaviour belongs to narrowband spurious emission.
2. The emission levels of not record in the report are very lower than the limit and not show in test report.



| WCDMA Band V |                 |                   |               |             |             |             |        |
|--------------|-----------------|-------------------|---------------|-------------|-------------|-------------|--------|
| Channel      | Frequency (MHz) | Spurious Emission |               |             |             | Limit (dBm) | Result |
|              |                 | Polarization      | Reading (dBm) | Factor (dB) | Level (dBm) |             |        |
| 4132         | 1652.80         | Vertical          | -38.60        | 5.62        | -32.98      | <-13.00     | PASS   |
|              | 2479.20         | V                 | -46.88        | 9.32        | -37.56      |             |        |
|              | 3305.60         | V                 | -52.83        | 12.69       | -40.14      |             |        |
|              | 1652.80         | Horizontal        | -40.15        | 5.62        | -34.53      | <-13.00     | PASS   |
|              | 2479.20         | H                 | -48.34        | 9.32        | -39.02      |             |        |
|              | 3305.60         | H                 | -54.20        | 12.69       | -41.51      |             |        |
| 4183         | 1673.20         | Vertical          | -39.38        | 7.69        | -31.69      | <-13.00     | PASS   |
|              | 2509.80         | V                 | -45.81        | 9.46        | -36.35      |             |        |
|              | 3346.40         | V                 | -51.26        | 12.26       | -39.00      |             |        |
|              | 1673.20         | Horizontal        | -41.15        | 7.69        | -33.46      | <-13.00     | PASS   |
|              | 2509.80         | H                 | -47.47        | 9.46        | -38.01      |             |        |
|              | 3346.40         | H                 | -52.82        | 12.26       | -40.56      |             |        |
| 4233         | 1693.20         | Vertical          | -38.43        | 8.26        | -30.17      | <-13.00     | PASS   |
|              | 2539.80         | V                 | -44.57        | 9.65        | -34.92      |             |        |
|              | 3386.40         | V                 | -50.07        | 12.41       | -37.66      |             |        |
|              | 1693.20         | Horizontal        | -40.46        | 8.26        | -32.20      | <-13.00     | PASS   |
|              | 2539.80         | H                 | -46.47        | 9.65        | -36.82      |             |        |
|              | 3386.40         | H                 | -51.86        | 12.41       | -39.45      |             |        |

## Remark:

1. The emission behaviour belongs to narrowband spurious emission.
2. The emission levels of not record in the report are very lower than the limit and not show in test report.



| WCDMA Band IV |                 |                   |               |             |             |             |        |
|---------------|-----------------|-------------------|---------------|-------------|-------------|-------------|--------|
| Channel       | Frequency (MHz) | Spurious Emission |               |             |             | Limit (dBm) | Result |
|               |                 | Polarization      | Reading (dBm) | Factor (dB) | Level (dBm) |             |        |
| 1312          | 1652.80         | Vertical          | -41.19        | 8.69        | -32.50      | <-13.00     | PASS   |
|               | 2479.20         | V                 | -46.31        | 9.23        | -37.08      |             |        |
|               | 3305.60         | V                 | -52.25        | 12.59       | -39.66      |             |        |
|               | 1652.80         | Horizontal        | -43.06        | 8.69        | -34.37      | <-13.00     | PASS   |
|               | 2479.20         | H                 | -48.07        | 9.23        | -38.84      |             |        |
|               | 3305.60         | H                 | -53.90        | 12.59       | -41.31      |             |        |
| 1413          | 1673.20         | Vertical          | -39.73        | 8.78        | -30.95      | <-13.00     | PASS   |
|               | 2509.80         | V                 | -45.27        | 9.65        | -35.62      |             |        |
|               | 3346.40         | V                 | -50.90        | 12.61       | -38.29      |             |        |
|               | 1673.20         | Horizontal        | -41.86        | 8.78        | -33.08      | <-13.00     | PASS   |
|               | 2509.80         | H                 | -47.28        | 9.65        | -37.63      |             |        |
|               | 3346.40         | H                 | -52.78        | 12.61       | -40.17      |             |        |
| 1513          | 1693.20         | Vertical          | -37.81        | 8.69        | -29.12      | <-13.00     | PASS   |
|               | 2539.80         | V                 | -43.42        | 9.52        | -33.90      |             |        |
|               | 3386.40         | V                 | -49.36        | 12.69       | -36.67      |             |        |
|               | 1693.20         | Horizontal        | -40.25        | 8.69        | -31.56      | <-13.00     | PASS   |
|               | 2539.80         | H                 | -45.72        | 9.52        | -36.20      |             |        |
|               | 3386.40         | H                 | -51.52        | 12.69       | -38.83      |             |        |

## Remark:

1. The emission behaviour belongs to narrowband spurious emission.
2. The emission levels of not record in the report are very lower than the limit and not show in test report.

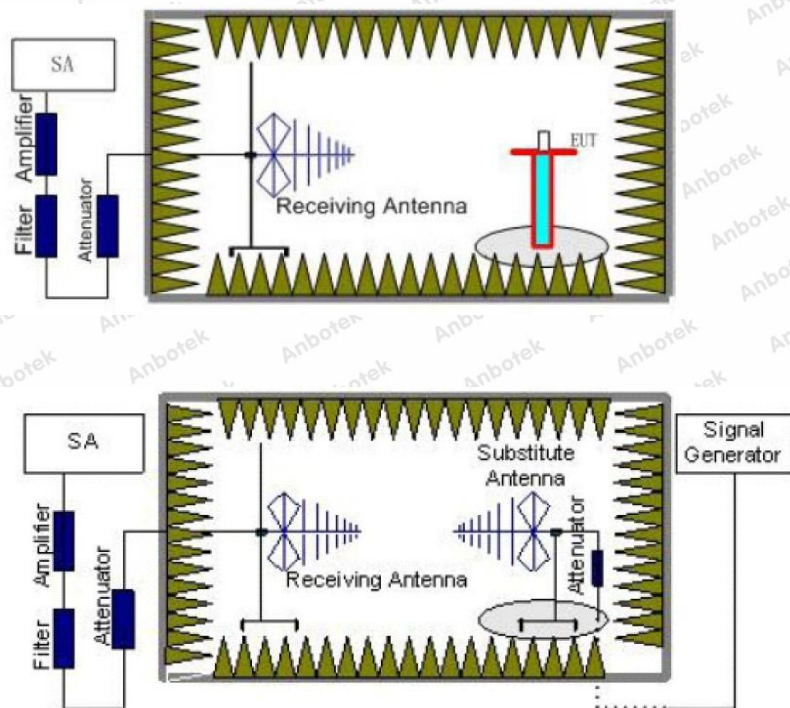


## 10. ERP and EIRP

### 10.1. Test Standard and Limit

|                      |                                                                                                     |
|----------------------|-----------------------------------------------------------------------------------------------------|
| Applicable Standard: | Part 2.1046<br>Part 22.913(a)<br>Part 24.232(c)<br>Part 27.50                                       |
| Limit:               | WCDMA Band II: 2W (33dBm) EIRP<br>WCDMA Band V: 7W (38.45dBm) ERP<br>WCDMA Band IV: 1W (30dBm) EIRP |

### 10.2. Test Setup



### 10.3. Test Procedure

- Place the EUT in the center of the turntable.
  - For radiated emissions measurements performed at frequencies less than or equal to 1 GHz, the EUT shall be placed on a RF-transparent table at a nominal height of 80 cm above the reference ground plane
  - For radiated measurements performed at frequencies above 1 GHz, the EUT shall be placed on an RF transparent table at a nominal height of 1.5 m above the ground plane.
- Unless the EUT uses an integral antenna, the EUT shall be terminated with a non-radiating transmitter load. In cases where the EUT uses an adjustable antenna, the antenna shall be adjusted through typical positions and lengths to maximize emissions levels.



3. The EUT shall be tested while operating on the frequency per manufacturer specification. Set the transmitter to operate in continuous transmit mode.
4. Receiver or Spectrum set as follow:  
Below 1GHz, RBW=100kHz, VBW=300kHz, Detector=Peak, Sweep time=Auto  
Above 1GHz, RBW=1MHz, VBW=3MHz, Detector=Peck, Sweep time=Auto
5. Each emission under consideration shall be evaluated:
  - a) Raise and lower the measurement antenna from 1 m to 4 m, as necessary to enable detection of the maximum emission amplitude relative to measurement antenna height.
  - b) Rotate the EUT through 360° to determine the maximum emission level relative to the axial position.
  - c) Return the turntable to the azimuth where the highest emission amplitude level was observed.
  - d) Vary the measurement antenna height again through 1 m to 4 m again to find the height associated with the maximum emission amplitude.
  - e) Record the measured emission amplitude level and frequency
6. Repeat step 5 for each emission frequency with the measurement antenna oriented in both the horizontal and vertical polarizations to determine the orientation that gives the maximum emissions amplitude.
7. Set-up the substitution measurement with the reference point of the substitution antenna located as near as possible to where the center of the EUT radiating element was located during the initial EUT measurement.
8. Maintain the previous measurement instrument settings and test set-up, with the exception that the EUT is removed and replaced by the substitution antenna.
9. Connect a signal generator to the substitution antenna; locate the signal generator so as to minimize any potential influences on the measurement results. Set the signal generator to the frequency where emissions are detected, and set an output power level such that the radiated signal can be detected by the measurement instrument, with sufficient dynamic range relative to the noise floor.
10. For each emission that was detected and measured in the initial test
  - a) Vary the measurement antenna height between 1 m to 4 m to maximize the received (measured) signal amplitude.
  - b) Adjust the signal generator output power level until the amplitude detected by the measurement instrument equals the amplitude level of the emission previously measured directly in step 5 and step 6.
  - c) Record the output power level of the signal generator when equivalence is achieved in step b).
11. Repeat step 8 through step 10 with the measurement antenna oriented in the opposite polarization.
12. Calculate the emission power in dBm referenced to a half-wave dipole using the following equation:  
$$Pe = Ps(\text{dBm}) - \text{cable loss (dB)} + \text{antenna gain (dBd)}$$

where

Pe = equivalent emission power in dBm

Ps = source (signal generator) power in dBm



*NOTE—dBd refers to the measured antenna gain in decibels relative to a half-wave dipole.*

13. Correct the antenna gain of the substitution antenna if necessary to reference the emission power to a half-wave dipole. When using measurement antennas with the gain specified in dBi, the equivalent dipole-referenced gain can be determined from:

$$\text{gain (dBd)} = \text{gain (dBi)} - 2.15 \text{ dB.}$$

If necessary, the antenna gain can be calculated from calibrated antenna factor information

14. Provide the complete measurement results as a part of the test report.

#### 10.4. Test Data

Pass

| ERP&EIRP                |         |          |            |             |        |
|-------------------------|---------|----------|------------|-------------|--------|
| Mode                    | Channel | (dBm)    |            | Limit (dBm) | Result |
|                         |         | Vertical | Horizontal |             |        |
| WCDMA Band II<br>(EIRP) | 9262    | 22.36    | 20.80      | <33.00      | PASS   |
|                         | 9400    | 22.98    | 19.46      |             |        |
|                         | 9538    | 22.03    | 20.52      |             |        |
| WCDMA Band V<br>(ERP)   | 4132    | 21.00    | 19.82      | <38.45      | PASS   |
|                         | 4183    | 21.52    | 18.58      |             |        |
|                         | 4233    | 20.40    | 19.50      |             |        |
| WCDMA Band IV<br>(EIRP) | 1312    | 20.68    | 20.51      | <30.00      | PASS   |
|                         | 1413    | 21.32    | 18.71      |             |        |
|                         | 1513    | 20.35    | 19.98      |             |        |

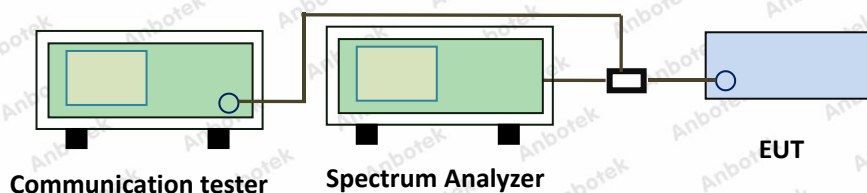


## 11. Frequency stability VS Voltage measurement

### 11.1. Test Standard and Limit

|                      |                                                                  |
|----------------------|------------------------------------------------------------------|
| Applicable Standard: | Part 2.1055(d)(1)(2)<br>Part 22.355<br>Part 24.235<br>Part 27.54 |
| Limit:               | 2.5ppm                                                           |

### 11.2. Test Setup



### 11.3. Test Procedure

1. The equipment under test was connected to an external DC power supply and input rated voltage.
2. The EUT output port was connected to communication tester.
3. The EUT was placed inside the temperature chamber at 25°C.
4. The power supply voltage to the EUT was varied  $\pm 15\%$  of the nominal value measured at the input to the EUT.
5. Record the maximum frequency change.

### 11.4. Test Data

Pass

Please refer to Appendix F of the Appendix Test Data.

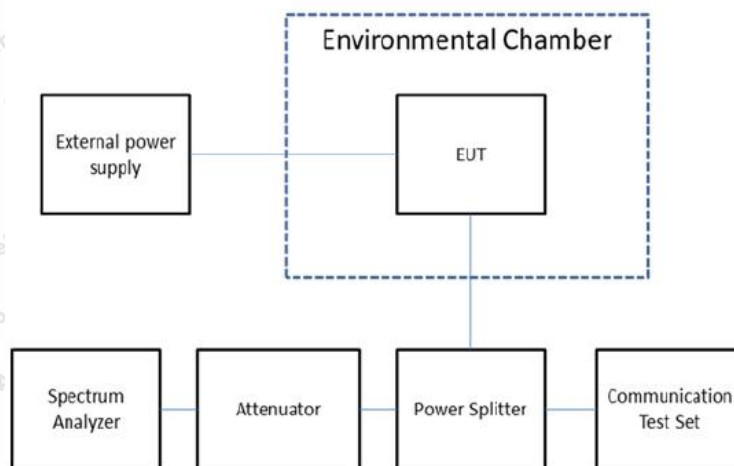


## 12. Frequency stability VS Temperature measurement

### 12.1. Test Standard and Limit

|                      |                                                                  |
|----------------------|------------------------------------------------------------------|
| Applicable Standard: | Part 2.1055(a)(1)(b)<br>Part 22.355<br>Part 24.235<br>Part 27.54 |
| Limit:               | 2.5ppm                                                           |

### 12.2. Test Setup



### 12.3. Test Procedure

1. The equipment under test was connected to an external DC power supply and input rated voltage.
2. The EUT output port was connected to communication tester.
3. The EUT was placed inside the temperature chamber.
4. Turn EUT off and set the chamber temperature to  $-30^{\circ}\text{C}$ . After the temperature stabilized for approximately 30 minutes recorded the frequency.
5. Repeat step 4 measure with  $10^{\circ}\text{C}$  increased per stage until the highest temperature of  $+50^{\circ}\text{C}$  reached.

### 12.4. Test Data

Pass

Please refer to Appendix G of the Appendix Test Data.



## **APPENDIX I -- TEST SETUP PHOTOGRAPH**

Please refer to separated files Appendix I -- Test Setup Photograph\_Licensed

## **APPENDIX II -- EXTERNAL PHOTOGRAPH**

Please refer to separated files Appendix II -- External Photograph

## **APPENDIX III -- INTERNAL PHOTOGRAPH**

Please refer to separated files Appendix III -- Internal Photograph

----- End of Report -----

