

# TEST REPORT

**Applicant:** Cellslink Intelligence Technology Co, Ltd  
**Address:** 3rd Floor, Building 1, No. 3560, Waiqingsong Road,  
Baihe Town, Qingpu District, Shanghai  
**Equipment Type:** TC10A-NA  
**Model Name:** TC10A-NA  
**Brand Name:** Cellslink  
**FCC ID:** 2BSX3-TC10A-NA  
**Test Standard:** 47 CFR Part 2  
(Others refer to chapter 3.1)  
**Sample Arrival Date:** Oct.23, 2025  
**Test Date:** Oct.23, 2025 - Oct.31, 2025  
**Date of Issue:** Nov.21, 2025

**ISSUED BY:**

Shanghai Tejet Communications Technology Co., Ltd. Testing Center

**Prepared by:** Yan Jun

**Reviewed by:** Zhu Feng

**Approved by:** Chen Zidong  
(Technical Director)

Yan Jun

Zhu Feng

Chen Zidong

### Revision History

| Version        | Issue Date          | Revisions Content    |
|----------------|---------------------|----------------------|
| <u>Rev. 01</u> | <u>Nov.21, 2025</u> | <u>Initial Issue</u> |

## TABLE OF CONTENTS

|                                                              |    |
|--------------------------------------------------------------|----|
| 1 GENERAL INFORMATION .....                                  | 4  |
| 1.1 Test Laboratory .....                                    | 4  |
| 1.2 Test Location .....                                      | 4  |
| 2 PRODUCT INFORMATION .....                                  | 5  |
| 2.1 Applicant Information .....                              | 5  |
| 2.2 Manufacturer Information .....                           | 5  |
| 2.3 Factory Information .....                                | 5  |
| 2.4 General Description for Equipment under Test (EUT) ..... | 5  |
| 2.5 Technical Information .....                              | 6  |
| 3 SUMMARY OF TEST RESULTS .....                              | 7  |
| 3.1 Test Standards .....                                     | 7  |
| 3.2 Test Verdict .....                                       | 7  |
| 3.3 Measurement Uncertainty .....                            | 8  |
| 3.4 Decision Rule .....                                      | 8  |
| 4 GENERAL TEST CONFIGURATIONS .....                          | 9  |
| 4.1 Test Environments .....                                  | 9  |
| 4.2 Test Equipment List .....                                | 9  |
| 4.3 Test Configurations .....                                | 10 |
| 4.4 Test Setup .....                                         | 14 |
| 5 TEST ITEMS .....                                           | 16 |
| 5.1 Transmitter Radiated Power (EIRP/ERP) .....              | 16 |
| 5.2 Peak to Average Ratio .....                              | 19 |
| 5.3 Occupied Bandwidth .....                                 | 21 |
| 5.4 Frequency Stability .....                                | 23 |
| 5.5 Spurious Emission at Antenna Terminals .....             | 25 |

---

|                                                |    |
|------------------------------------------------|----|
| 5.6 Band Edge .....                            | 29 |
| 5.7 Field Strength of Spurious Radiation ..... | 33 |
| ANNEX B TEST SETUP PHOTOS .....                | 37 |
| ANNEX C EUT EXTERNAL PHOTOS .....              | 37 |
| ANNEX D EUT INTERNAL PHOTOS .....              | 37 |

# 1 GENERAL INFORMATION

## 1.1 Test Laboratory

|         |                                                                                          |
|---------|------------------------------------------------------------------------------------------|
| Name    | Shanghai Tejet Communications Technology Co., Ltd. Testing Center                        |
| Address | 1-2/F., Building 1, No.222, Xuanlan Road, Xuanqiao, Pudong New District, Shanghai, China |

## 1.2 Test Location

|                           |                                                                                                                                |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| Name                      | Shanghai Tejet Communications Technology Co., Ltd. Testing Center                                                              |
| Location                  | 1-2/F., Building 1, No.222, Xuanlan Road, Xuanqiao, Pudong New District, Shanghai, China                                       |
| Accreditation Certificate | The laboratory is a testing organization accredited by FCC as a accredited testing laboratory.The designation number is CN1352 |

## 2 PRODUCT INFORMATION

### 2.1 Applicant Information

|           |                                                                                          |
|-----------|------------------------------------------------------------------------------------------|
| Applicant | Cellslink Intelligence Technology Co, Ltd                                                |
| Address   | 3rd Floor, Building 1, No. 3560, Waiqingsong Road, Baihe Town, Qingpu District, Shanghai |

### 2.2 Manufacturer Information

|              |                                                                                          |
|--------------|------------------------------------------------------------------------------------------|
| Manufacturer | Cellslink Intelligence Technology Co, Ltd                                                |
| Address      | 3rd Floor, Building 1, No. 3560, Waiqingsong Road, Baihe Town, Qingpu District, Shanghai |

### 2.3 Factory Information

|         |                                                                                                        |
|---------|--------------------------------------------------------------------------------------------------------|
| Factory | CTTech Co., Ltd                                                                                        |
| Address | Xinli plant, No.1 South Side of Xinhua Avenue,<br>Tongqiao Town, Zhongkai High Tech Zone, Huizhou City |

### 2.4 General Description for Equipment under Test (EUT)

|                                           |                  |
|-------------------------------------------|------------------|
| EUT Name                                  | TC10A-NA         |
| Model Name Under Test                     | TC10A-NA         |
| Series Model Name                         | N/A              |
| Description of Model name differentiation | N/A              |
| Sample No                                 | SC-SH25A0027-S01 |
| Hardware Version                          | V1.0             |
| Software Version                          | R01A01           |
| Dimensions (Approx.)                      | N/A              |
| Weight (Approx.)                          | N/A              |

## 2.5 Technical Information

|                                           |                                                                                     |
|-------------------------------------------|-------------------------------------------------------------------------------------|
| Network and Wireless connectivity for EUT | 4G Network<br>LTE FDD Band 2/4/5/12/13/17/66/71<br>GPS, Glonass, BDS, Galileo, QZSS |
| About the Product                         | The equipment is TC10A-NA, intended for used with information technology equipment. |

The requirement for the following technical information of the EUT was tested in this report:

|                                    |             |                                                                                                                                                                                                                                           |                                  |
|------------------------------------|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
| Operating Bands                    |             | 4G Network<br>LTE FDD Band 2/4/5/12/13/17/66/71                                                                                                                                                                                           |                                  |
| Modulation Type                    |             | LTE                                                                                                                                                                                                                                       | UL: QPSK/16QAM<br>DL: QPSK/16QAM |
| Antenna Type                       |             | PIFA Antenna                                                                                                                                                                                                                              |                                  |
| Antenna Gain                       |             | FDD LTE Band 2: 1.34 dBi<br>FDD LTE Band 4: 1.29 dBi<br>FDD LTE Band 5: -1.65 dBi<br>FDD LTE Band 12: -1.39 dBi<br>FDD LTE Band 13: -3.67 dBi<br>FDD LTE Band 17: -1.54 dBi<br>FDD LTE Band 66: 1.29 dBi<br>FDD LTE Band 71: -1.52 dBi    |                                  |
| The Max RF Output Power (EIRP/ERP) |             | FDD LTE Band 2: 23.87 dBm<br>FDD LTE Band 4: 23.86 dBm<br>FDD LTE Band 5: 18.97 dBm<br>FDD LTE Band 12: 18.85 dBm<br>FDD LTE Band 13: 17.71 dBm<br>FDD LTE Band 17: 19.26 dBm<br>FDD LTE Band 66: 23.96 dBm<br>FDD LTE Band 71: 18.85 dBm |                                  |
| Band                               | Power Class | Tx Frequency Range                                                                                                                                                                                                                        | Rx Frequency Range               |
| LTE B2                             | 3           | 1850 MHz ~ 1910 MHz                                                                                                                                                                                                                       | 1930 MHz ~ 1990 MHz              |
| LTE B4                             | 3           | 1710 MHz ~ 1755 MHz                                                                                                                                                                                                                       | 2110 MHz ~ 2155 MHz              |
| LTE B5                             | 3           | 824 MHz ~ 849 MHz                                                                                                                                                                                                                         | 869 MHz ~ 894 MHz                |
| LTE B12                            | 3           | 699 MHz ~ 716 MHz                                                                                                                                                                                                                         | 729 MHz ~ 746 MHz                |
| LTE B13                            | 3           | 777 MHz ~ 787 MHz                                                                                                                                                                                                                         | 746 MHz ~ 756 MHz                |
| LTE B17                            | 3           | 704 MHz ~ 716 MHz                                                                                                                                                                                                                         | 734 MHz ~ 746 MHz                |
| LTE B66                            | 3           | 1710 MHz ~ 1780 MHz                                                                                                                                                                                                                       | 2110 MHz ~ 2180 MHz              |
| LTE B71                            | 3           | 663 MHz ~ 698 MHz                                                                                                                                                                                                                         | 617 MHz ~ 652 MHz                |

Note1: The EUT information provided by the applicant, except for The Max RF Conducted Power. For more detailed band specifications and features description, please refer to the manufacturer's specifications or user's manual.

Note2: All ENDC bands support Power Class 3 only.

Note3: These frequency ranges are only applicable in the United States.

### 3 SUMMARY OF TEST RESULTS

#### 3.1 Test Standards

| No. | Identity                    | Document Title                                                                                       |
|-----|-----------------------------|------------------------------------------------------------------------------------------------------|
| 1   | 47 CFR Part 2               | Frequency Allocations and Radio Treaty Matters;<br>General Rules and Regulations                     |
| 2   | 47 CFR Part 22<br>Subpart H | Cellular Radiotelephone Service                                                                      |
| 3   | 47 CFR Part 24<br>Subpart E | Broadband PCS                                                                                        |
| 4   | 47 CFR Part 27              | Miscellaneous Wireless Communications Services                                                       |
| 5   | ANSI C63.26-2015            | American National Standard for Compliance Testing of Transmitters<br>Used in Licensed Radio Services |
| 7   | KDB 971168<br>D01 v03       | Measurement Guidance for Certification of Licensed Digital<br>Transmitters                           |

#### 3.2 Test Verdict

| No. | Test Description                          | FCC Part No.                                 | Test Verdict |
|-----|-------------------------------------------|----------------------------------------------|--------------|
| 1   | Conducted RF Output Power                 | 2.1046                                       | Pass         |
| 2   | Effective (Isotropic) Radiated Power      | 2.1046<br>22.913<br>24.232<br>27.50          | Pass         |
| 3   | Peak to Average Ratio                     | 2.1046<br>22.913(d)<br>24.232(d)<br>27.50(d) | Pass         |
| 4   | Occupied Bandwidth                        | 2.1049<br>22.917<br>24.238<br>27.53          | Pass         |
| 5   | Frequency Stability                       | 2.1055<br>22.355<br>24.235<br>27.54          | Pass         |
| 6   | Spurious Emission at<br>Antenna Terminals | 2.1051<br>22.917<br>24.238<br>27.53          | Pass         |
| 7   | Band Edge                                 | 2.1051                                       | Pass         |

| No. | Test Description                     | FCC Part No.                        | Test Verdict |
|-----|--------------------------------------|-------------------------------------|--------------|
|     |                                      | 22.917<br>24.238<br>27.53           |              |
| 8   | Field Strength of Spurious Radiation | 2.1053<br>22.917<br>24.238<br>27.53 | Pass         |

### 3.3 Measurement Uncertainty

| Test Case                                 | Uncertainty                                            |
|-------------------------------------------|--------------------------------------------------------|
| Conducted RF Output Power                 | 0.68dB                                                 |
| Effective (Isotropic) Radiated Power      | 2.50dB                                                 |
| Peak to Average Ratio                     | 0.015%                                                 |
| Occupied Bandwidth                        | 1.4/3MHz: 30kHz<br>5/10MHz: 100KHZ<br>15/20MHz: 300kHz |
| Frequency Stability                       | 12Hz                                                   |
| Spurious Emission at Antenna Terminal0073 | 2.56dB                                                 |
| Band Edge                                 | 1.48dB                                                 |
| Field Strength of Spurious Radiation      | 4.55dB                                                 |

### 3.4 Decision Rule

☐ No Need

☒ Use General conformity decision rule (Consider uncertainty or not ☒ No ☐ Yes)

☐ Use Special Conformity Decision Rule (Consider uncertainty or not ☐ No ☐ Yes)

## 4 GENERAL TEST CONFIGURATIONS

### 4.1 Test Environments

During the measurement, the environmental conditions were within the listed ranges:

|                             |                         |                |
|-----------------------------|-------------------------|----------------|
| Relative Humidity           |                         | 25% to 75%     |
| Test Voltage of the EUT     | NV (Normal Voltage)     | 3.8V           |
|                             | LV (Low Voltage)        | 3.3V           |
|                             | HV (High Voltage)       | 4.3V           |
| Test Temperature of the EUT | NT (Normal Temperature) | 15 °C to 35 °C |
|                             | LT (Low Temperature)    | -30 °C         |
|                             | HT (High Temperature)   | +50 °C         |

### 4.2 Test Equipment List

| Description                                 | Manufacturer | Model       | Equipment No. | Software /Firmware Version | Cal. Date | Cal. Due  |
|---------------------------------------------|--------------|-------------|---------------|----------------------------|-----------|-----------|
| <b>BL410 2G/3G/4G/5G RF Test System</b>     |              |             |               |                            |           |           |
| Wideband Radio Communication Tester         | R&S          | CMW 500     | BH-EMC-L064   | V3.7.60                    | 2025/2/12 | 2026/2/12 |
| PSA Spectrum Analyzer                       | Agilent      | E4440A      | TJEMC013      | A.11.07                    | 2025/4/6  | 2026/4/6  |
| Signal Generator                            | Keysight     | N5173B      | BH-EMC-L074   | B.01.90                    | 2025/2/12 | 2026/2/12 |
| DC Power Supply                             | ITECH        | IT6863A     | BH-EMC-L113   | N/A                        | 2025/2/12 | 2026/2/12 |
| Filter unit                                 | BALUN        | SU319F      | BH-EMC-L077   | N/A                        | N/A       | N/A       |
| Filter unit                                 | BALUN        | SU319F      | BH-EMC-L078   | N/A                        | N/A       | N/A       |
| Filter unit                                 | BALUN        | SU319F      | BH-EMC-L122   | N/A                        | N/A       | N/A       |
| Switch unit                                 | BALUN        | SU319       | BH-EMC-L076   | N/A                        | N/A       | N/A       |
| Wireless Communication Comprehensive Tester | Starpoint    | SP9500-C TS | BH-EMC-L093   | NA                         | 2025/2/12 | 2026/2/12 |
| Test Software                               | BALUN        | BL410R      | NA            | V3.0.1.539                 | N/A       | N/A       |
| <b>Radiated Test System</b>                 |              |             |               |                            |           |           |
| Test Antenna-Bi-Log                         | SCHWARZ BECK | VULB 9163   | BH-EMC-L008   | NA                         | 2024/3/11 | 2027/3/10 |

|                                     |             |            |             |          |           |           |
|-------------------------------------|-------------|------------|-------------|----------|-----------|-----------|
| Test Antenna-Horn                   | Schwarzbeck | BBHA 9120D | BH-EMC-L044 | NA       | 2024/3/11 | 2027/3/10 |
| Anechoic Chamber                    | YIHENG      | 9m*6m*6m   | BH-EMC-L001 | NA       | 2024/4/14 | 2027/4/13 |
| EMI Receiver                        | KEYSIGHT    | N9038A     | BH-EMC-L127 | NA       | 2025/2/12 | 2026/2/11 |
| Wideband Radio Communication Tester | R&S         | CMW 500    | BH-EMC-L094 | V3.7.172 | 2025/2/12 | 2026/2/11 |
| Radio Communication Analyzer        | Anritsu     | MT8000A    | TJOTA080    | N/A      | 2025/4/23 | 2026/4/23 |
| Test Software                       | BALUN       | BL410-E    | NA          | V21.919  | N/A       | N/A       |

### 4.3 Test Configurations

| LTE Band                             | Bandwidth (MHz) |    |    |    |    |    | Modulation Type |        |        | RB# |      |      | Test Channel |     |     |
|--------------------------------------|-----------------|----|----|----|----|----|-----------------|--------|--------|-----|------|------|--------------|-----|-----|
|                                      | 1.4             | 3  | 5  | 10 | 15 | 20 | QPSK            | 16-QAM | 64-QAM | 1   | Half | Full | LCH          | MCH | HCH |
| Effective (Isotropic) Radiated Power |                 |    |    |    |    |    |                 |        |        |     |      |      |              |     |     |
| 2                                    | v               | v  | v  | v  | v  | v  | v               | v      | --     | v   | v    | v    | v            | v   | v   |
| 4                                    | v               | v  | v  | v  | v  | v  | v               | v      | --     | v   | v    | v    | v            | v   | v   |
| 5                                    | v               | v  | v  | v  | n  | n  | v               | v      | --     | v   | v    | v    | v            | v   | v   |
| 12                                   | v               | v  | v  | v  | n  | n  | v               | v      | --     | v   | v    | v    | v            | v   | v   |
| 13                                   | n               | n  | v  | v  | n  | n  | v               | v      | --     | v   | v    | v    | v            | v   | v   |
| 17                                   | n               | n  | v  | v  | n  | n  | v               | v      | --     | v   | v    | v    | v            | v   | v   |
| 66                                   | v               | v  | v  | v  | v  | v  | v               | v      | --     | v   | v    | v    | v            | v   | v   |
| 71                                   | n               | n  | v  | v  | v  | v  | v               | v      | --     | v   | v    | v    | v            | v   | v   |
| Peak to Average Ratio                |                 |    |    |    |    |    |                 |        |        |     |      |      |              |     |     |
| 2                                    | --              | -- | -- | -- | -- | v  | v               | v      | --     | v   | --   | v    | v            | v   | v   |
| 4                                    | --              | -- | -- | -- | -- | v  | v               | v      | --     | v   | --   | v    | v            | v   | v   |
| 5                                    | --              | -- | -- | v  | n  | n  | v               | v      | --     | v   | --   | v    | v            | v   | v   |
| 12                                   | --              | -- | -- | v  | n  | n  | v               | v      | --     | v   | --   | v    | v            | v   | v   |
| 13                                   | n               | n  | -- | v  | n  | n  | v               | v      | --     | v   | --   | v    | --           | v   | --  |
| 17                                   | n               | n  | -- | v  | n  | n  | v               | v      | --     | v   | --   | v    | v            | v   | v   |
| 66                                   | --              | -- | -- | -- | -- | v  | v               | v      | --     | v   | --   | v    | v            | v   | v   |
| 71                                   | n               | n  | n  | n  | n  | v  | v               | v      | --     | v   | --   | v    | v            | v   | v   |
| Occupied Bandwidth                   |                 |    |    |    |    |    |                 |        |        |     |      |      |              |     |     |
| 2                                    | v               | v  | v  | v  | v  | v  | v               | v      | --     | --  | --   | v    | v            | v   | v   |
| 4                                    | v               | v  | v  | v  | v  | v  | v               | v      | --     | --  | --   | v    | v            | v   | v   |
| 5                                    | v               | v  | v  | v  | n  | n  | v               | v      | --     | --  | --   | v    | v            | v   | v   |
| 12                                   | v               | v  | v  | v  | n  | n  | v               | v      | --     | --  | --   | v    | v            | v   | v   |
| 13                                   | n               | n  | v  | v  | n  | n  | v               | v      | --     | --  | --   | v    | v            | v   | v   |
| 17                                   | n               | n  | v  | v  | n  | n  | v               | v      | --     | --  | --   | v    | v            | v   | v   |
| 66                                   | v               | v  | v  | v  | v  | v  | v               | v      | --     | --  | --   | v    | v            | v   | v   |

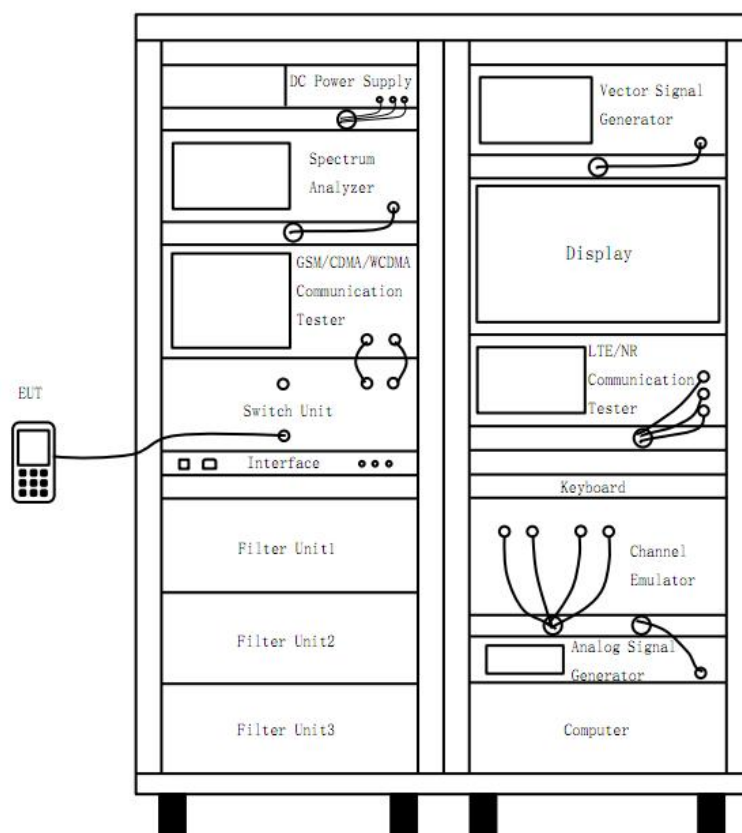
|                                                                           |            |    |    |    |    |    |   |   |    |    |    |    |    |    |    |
|---------------------------------------------------------------------------|------------|----|----|----|----|----|---|---|----|----|----|----|----|----|----|
| 71                                                                        | n          | n  | v  | v  | v  | v  | v | v | -- | -- | -- | v  | v  | v  | v  |
| Frequency Stability                                                       |            |    |    |    |    |    |   |   |    |    |    |    |    |    |    |
| 2                                                                         | --         | -- | -- | v  | -- | -- | v | v | -- | -- | -- | v  | -- | v  | -- |
| 4                                                                         | --         | -- | -- | v  | -- | -- | v | v | -- | -- | -- | v  | -- | v  | -- |
| 5                                                                         | --         | -- | -- | v  | n  | n  | v | v | -- | -- | -- | v  | -- | v  | -- |
| 12                                                                        | --         | -- | -- | v  | n  | n  | v | v | -- | -- | -- | v  | -- | v  | -- |
| 13                                                                        | n          | n  | -- | v  | n  | n  | v | v | -- | -- | -- | v  | -- | v  | -- |
| 17                                                                        | n          | n  | v  | -- | n  | n  | v | v | -- | -- | -- | v  | -- | v  | -- |
| 66                                                                        | --         | -- | -- | v  | -- | -- | v | v | -- | -- | -- | v  | -- | v  | -- |
| 71                                                                        | n          | n  | -- | v  | -- | -- | v | v | -- | -- | -- | v  | -- | v  | -- |
| Spurious Emission at Antenna Terminals                                    |            |    |    |    |    |    |   |   |    |    |    |    |    |    |    |
| 2                                                                         | v          | v  | v  | v  | v  | v  | v | v | -- | v  | -- | -- | v  | v  | v  |
| 4                                                                         | v          | v  | v  | v  | v  | v  | v | v | -- | v  | -- | -- | v  | v  | v  |
| 5                                                                         | v          | v  | v  | v  | n  | n  | v | v | -- | v  | -- | -- | v  | v  | v  |
| 12                                                                        | v          | v  | v  | v  | n  | n  | v | v | -- | v  | -- | -- | v  | v  | v  |
| 13                                                                        | n          | n  | v  | v  | n  | n  | v | v | -- | v  | -- | -- | v  | v  | v  |
| 17                                                                        | n          | n  | v  | v  | n  | n  | v | v | -- | v  | -- | -- | v  | v  | v  |
| 66                                                                        | v          | v  | v  | v  | v  | v  | v | v | -- | v  | -- | -- | v  | v  | v  |
| 71                                                                        | n          | n  | v  | v  | v  | v  | v | v | -- | v  | -- | -- | v  | v  | v  |
| Band Edge                                                                 |            |    |    |    |    |    |   |   |    |    |    |    |    |    |    |
| 2                                                                         | v          | v  | v  | v  | v  | v  | v | v | -- | v  | -- | v  | v  | -- | v  |
| 4                                                                         | v          | v  | v  | v  | v  | v  | v | v | -- | v  | -- | v  | v  | -- | v  |
| 5                                                                         | v          | v  | v  | v  | n  | n  | v | v | -- | v  | -- | v  | v  | -- | v  |
| 12                                                                        | v          | v  | v  | v  | n  | n  | v | v | -- | v  | -- | v  | v  | -- | v  |
| 13                                                                        | n          | n  | v  | v  | n  | n  | v | v | -- | v  | -- | v  | v  | -- | v  |
| 17                                                                        | n          | n  | v  | v  | n  | n  | v | v | -- | v  | -- | v  | v  | -- | v  |
| 66                                                                        | v          | v  | v  | v  | v  | v  | v | v | -- | v  | -- | v  | v  | -- | v  |
| 71                                                                        | n          | n  | v  | v  | v  | v  | v | v | -- | v  | -- | -- | -- | v  | -- |
| Field Strength of Spurious Radiation                                      |            |    |    |    |    |    |   |   |    |    |    |    |    |    |    |
| 2                                                                         | Worst case |    |    |    |    |    |   |   |    |    |    |    |    |    |    |
| 4                                                                         | Worst case |    |    |    |    |    |   |   |    |    |    |    |    |    |    |
| 5                                                                         | Worst case |    |    |    |    |    |   |   |    |    |    |    |    |    |    |
| 12                                                                        | Worst case |    |    |    |    |    |   |   |    |    |    |    |    |    |    |
| 13                                                                        | Worst case |    |    |    |    |    |   |   |    |    |    |    |    |    |    |
| 17                                                                        | Worst case |    |    |    |    |    |   |   |    |    |    |    |    |    |    |
| 66                                                                        | Worst case |    |    |    |    |    |   |   |    |    |    |    |    |    |    |
| 71                                                                        | Worst case |    |    |    |    |    |   |   |    |    |    |    |    |    |    |
| Note 1: The mark “v” means that this configuration is chosen for testing. |            |    |    |    |    |    |   |   |    |    |    |    |    |    |    |
| Note 2: The mark “n” means that this bandwidth is not supported.          |            |    |    |    |    |    |   |   |    |    |    |    |    |    |    |

| Test Mode   | UL Channel   | Channel Bandwidth (MHz) | UL Channel No. | UL Frequency (MHz) |
|-------------|--------------|-------------------------|----------------|--------------------|
| LTE Band 2  | Low Range    | 1.4                     | 18607          | 1850.7             |
|             |              | 3                       | 18615          | 1851.5             |
|             |              | 5                       | 18625          | 1852.5             |
|             |              | 10                      | 18650          | 1855               |
|             |              | 15                      | 18675          | 1857.5             |
|             |              | 20                      | 18700          | 1860               |
|             | Middle Range | 1.4/3/5/10/15/20        | 18900          | 1880               |
|             | High Range   | 1.4                     | 19193          | 1909.3             |
|             |              | 3                       | 19185          | 1908.5             |
|             |              | 5                       | 19175          | 1907.5             |
|             |              | 10                      | 19150          | 1905               |
|             |              | 15                      | 19125          | 1902.5             |
|             |              | 20                      | 19100          | 1900               |
| LTE Band 4  | Low Range    | 1.4                     | 19957          | 1710.7             |
|             |              | 3                       | 19965          | 1711.5             |
|             |              | 5                       | 19975          | 1712.5             |
|             |              | 10                      | 20000          | 1715               |
|             |              | 15                      | 20025          | 1717.5             |
|             |              | 20                      | 20050          | 1720               |
|             | Middle Range | 1.4/3/5/10/15/20        | 20175          | 1732.5             |
|             | High Range   | 1.4                     | 20393          | 1754.3             |
|             |              | 3                       | 20385          | 1753.5             |
|             |              | 5                       | 20375          | 1752.5             |
|             |              | 10                      | 20350          | 1750               |
|             |              | 15                      | 20325          | 1747.5             |
|             |              | 20                      | 20300          | 1745               |
| LTE Band 5  | Low Range    | 1.4                     | 20407          | 824.7              |
|             |              | 3                       | 20415          | 825.5              |
|             |              | 5                       | 20425          | 826.5              |
|             |              | 10                      | 20450          | 829                |
|             | Middle Range | 1.4/3/5/10              | 20525          | 836.5              |
|             | High Range   | 1.4                     | 20643          | 848.3              |
|             |              | 3                       | 20635          | 847.5              |
|             |              | 5                       | 20625          | 846.5              |
|             |              | 10                      | 20600          | 844                |
| LTE Band 12 | Low Range    | 1.4                     | 23017          | 699.7              |
|             |              | 3                       | 23025          | 700.5              |
|             |              | 5                       | 23035          | 701.5              |
|             |              | 10                      | 23060          | 704                |
|             | Middle Range | 1.4/3/5/10              | 23095          | 707.5              |
|             | High Range   | 1.4                     | 23173          | 715.3              |

| Test Mode   | UL Channel   | Channel Bandwidth (MHz) | UL Channel No. | UL Frequency (MHz) |
|-------------|--------------|-------------------------|----------------|--------------------|
|             |              | 3                       | 23165          | 714.5              |
|             |              | 5                       | 23155          | 713.5              |
|             |              | 10                      | 23130          | 711                |
| LTE Band 13 | Low Range    | 5                       | 23205          | 779.5              |
|             |              | 10                      | 23230          | 782                |
|             | Middle Range | 5/10                    | 23230          | 782                |
|             | High Range   | 5                       | 23255          | 784.5              |
|             |              | 10                      | 23230          | 782                |
|             |              |                         |                |                    |
| LTE Band 17 | Low Range    | 5                       | 23755          | 706.5              |
|             |              | 10                      | 23780          | 709                |
|             | Middle Range | 5/10                    | 23790          | 710                |
|             | High Range   | 5                       | 23825          | 713.5              |
|             |              | 10                      | 23800          | 711                |
|             |              |                         |                |                    |
| LTE-Band 66 | Low Range    | 1.4                     | 131979         | 1710.7             |
|             |              | 3                       | 131987         | 1711.5             |
|             |              | 5                       | 131997         | 1712.5             |
|             |              | 10                      | 132022         | 1715               |
|             |              | 15                      | 132047         | 1717.5             |
|             |              | 20                      | 132072         | 1720               |
|             | Middle Range | 1.4/3/5/10/15/20        | 132322         | 1745               |
|             | High Range   | 1.4                     | 132665         | 1779.3             |
|             |              | 3                       | 132657         | 1778.5             |
|             |              | 5                       | 132647         | 1777.5             |
|             |              | 10                      | 132622         | 1775               |
|             |              | 15                      | 132597         | 1772.5             |
|             |              | 20                      | 132572         | 1770               |
| LTE-Band 71 | Low Range    | 5                       | 133147         | 665.5              |
|             |              | 10                      | 133172         | 668                |
|             |              | 15                      | 133197         | 670.5              |
|             |              | 20                      | 133222         | 673                |
|             | Middle Range | 5/10/15/20              | 133297         | 680.5              |
|             | High Range   | 5                       | 133447         | 695.5              |
|             |              | 10                      | 133422         | 693                |
|             |              | 15                      | 133397         | 690.5              |
|             |              | 20                      | 133372         | 688                |
|             |              |                         |                |                    |

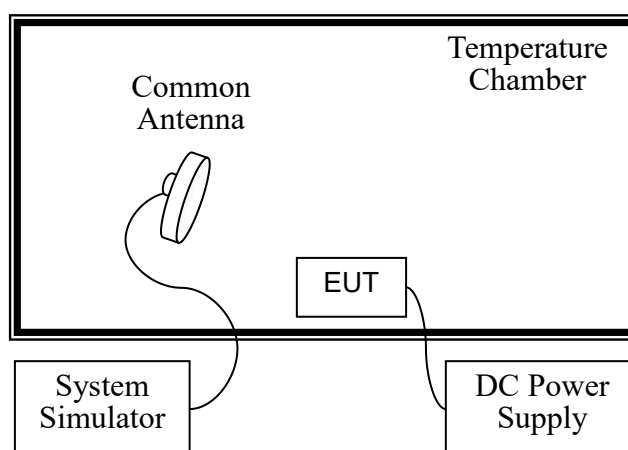
## 4.4 Test Setup

### 4.4.1 For Antenna Port Test



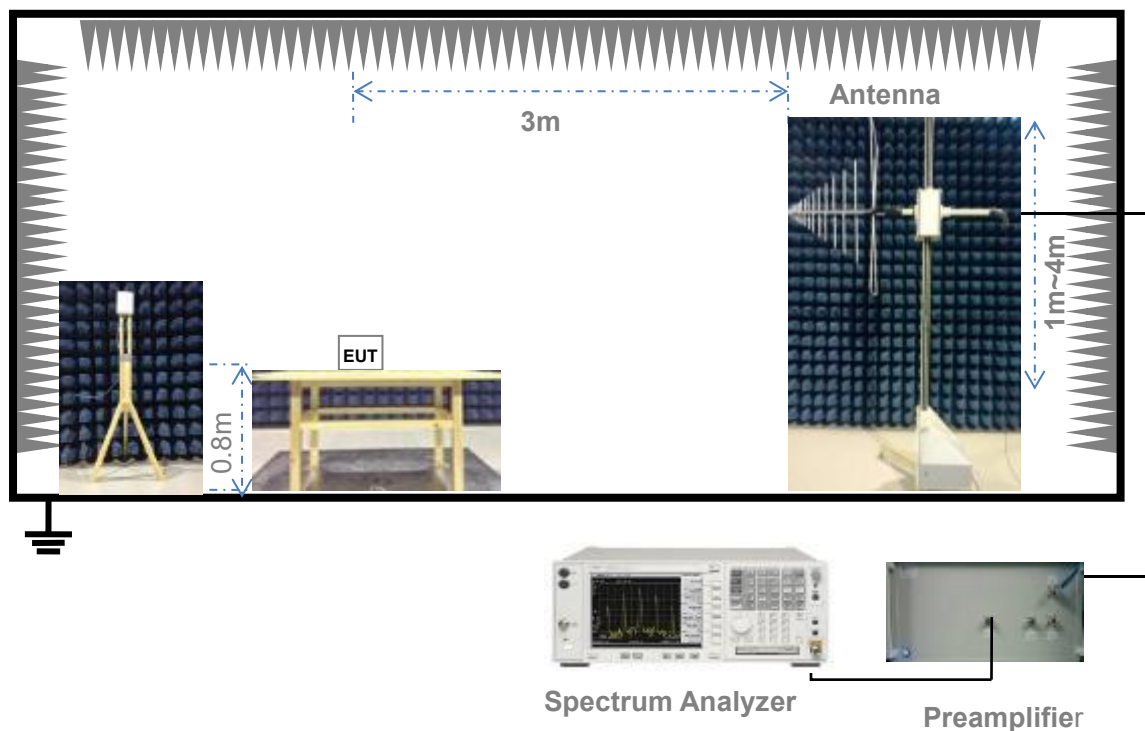
(Diagram 1)

### 4.4.2 For Frequency Stability Test



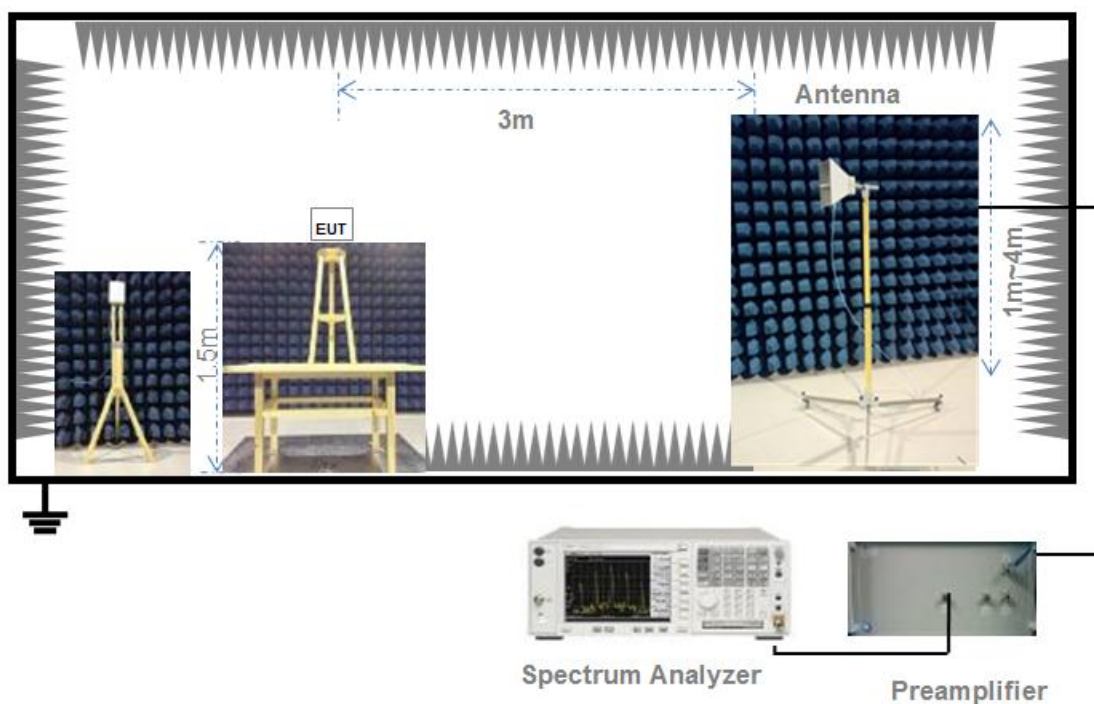
(Diagram 2)

#### 4.4.3 For Radiated Test (30 MHz ~ 1 GHz)



(Diagram 3)

#### 4.4.4 For Radiated Test (Above 1 GHz)



(Diagram 4)

## 5 TEST ITEMS

### 5.1 Transmitter Radiated Power (EIRP/ERP)

#### 5.1.1 Limit

FCC § 2.1046 & 22.913(a) & 24.232(c) & 27.50(a) & 27.50(b) & 27.50(c) & 27.50(d) & 27.50(h) & 27.50(j) & 27.50(k)

According to FCC section 22.913(a) (5), the Effective Radiated Power (ERP) of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

According to FCC section 24.232(c), mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

According to FCC section 27.50(a) (3), for mobile and portable stations transmitting in the 2305-2315MHz band or the 2350-2360MHz band, the average EIRP must not exceed 50 milliwatts within any 1 megahertz of authorized bandwidth, except that for mobile and portable stations compliant with 3GPP LTE standards.

FCC section 27.50(b) (10), portable stations (hand-held devices) transmitting in the 746-757MHz, 776-788MHz, and 805-806MHz bands are limited to 3 watts ERP.

FCC section 27.50(c) (10), portable stations (hand-held devices) in the 600MHz uplink band and the 698-746MHz band, and fixed and mobile stations in the 600MHz uplink band are limited to 3 watts ERP.

FCC section 27.50(d) (4), fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP. Fixed stations operating in the 1710-1755 MHz band are limited to a maximum antenna height of 10 meters above ground. Mobile and portable stations operating in these bands must employ a means for limiting power to the minimum necessary for successful communications.

(7) Fixed, mobile, and portable (hand-held) stations operating in the 2000-2020 MHz band are limited to 2 watts EIRP.

And FCC section 27.50(h) (2), for mobile and other user stations, mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.

FCC section 27.50(j) (3), for mobile, and portable (hand-held) stations operating in the 3700-3980 MHz band are limited to 1 watt EIRP.

FCC section 27.50(k) (3), Mobile devices are limited to 1Watt (30 dBm) EIRP in the 3450-3550 MHz band.

#### 5.1.2 Test Setup

The section 4.4.1 (Diagram 1) test setup description is used for conducted test, and the section 4.4.3 and 4.4.4 (Diagram 3, 4) test setup description is used for radiated test. The photo of test setup please refer to ANNEX B.

### 5.1.3 Test Procedure

#### **Description of the Conducted Output Power Measurement**

The EUT is coupled to the SS with attenuator through power splitter; the RF load attached to EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. A system simulator is used to establish communication with the EUT, and its parameters are set to force the EUT transmitting at maximum output power. The measured power in the radio frequency on the transmitter output terminals shall be reported.

The relevant equation for determining the conducted measured value is:

$$\text{Conducted Output Power Value (dBm)} = \text{Measured Value (dBm)} + \text{Path Loss (dB)}$$

where:

Conducted Output Power Value = final conducted measured value in the conducted power test, in dBm;

Measured Value = measured conducted power received by spectrum analyzer or power meter, in dBm;

Path Loss = signal attenuation in the connecting cable between the transmitter and spectrum analyzer or power meter, including external cable loss, in dB;

During the test, the data of Path Loss (dB) is added in the spectrum analyzer or power meter, so Measured Value (dBm) is the final values which contains the data of Path Loss (dB).

For example:

In the conducted output power test, when measured value for GSM850 is 24.7 dBm, and path loss is 8.5 dB, then final conducted output power value is:

$$\text{Conducted Output Power Value (dBm)} = 24.7 \text{ dBm} + 8.5 \text{ dB} = 33.2 \text{ dBm}$$

#### **Description of the Transmitter Radiated Power Measurement**

In many cases, the RF output power limits for licensed digital transmission devices is specified in terms of effective radiated power (ERP) or equivalent isotropic radiated power (EIRP). Typically, ERP is specified when the operating frequency is less than or equal to 1 GHz and EIRP is specified when the operating frequency is greater than 1 GHz. Both are determined by adding the transmit antenna gain to the conducted RF output power with the primary difference between the two being that when determining the ERP, the transmit antenna gain is referenced to a dipole antenna (i.e., dBd) whereas when determining the EIRP, the transmit antenna gain is referenced to an isotropic antenna (dBi).

Final measurement calculation as below:

The relevant equation for determining the ERP or EIRP from the conducted RF output power measured

using the guidance provided above is:

$$\text{ERP/EIRP} = P_{\text{Meas}} + \text{GT} - \text{LC}$$

where:

ERP/EIRP = effective or equivalent radiated power, respectively (expressed in the same units as  $P_{\text{Meas}}$ , typically dBW or dBm);

$P_{\text{Meas}}$  = measured transmitter output power or PSD, in dBm or dBW;

GT = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);

dBd (ERP)=dBi (EIRP) -2.15 dB

LC = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

For devices utilizing multiple antennas, KDB 662911 provides guidance for determining the effective array transmit antenna gain term to be used in the above equation.

For example:

In the EIRP test, when  $P_{\text{Meas}}$  value for GSM1900 is 30.2 dBm, LC is 0.6 dB, and GT is -3.4 dB, then final EIRP value is:

$$\text{EIRP for GSM1900} = 30.2 \text{ dBm} - 3.4 \text{ dBi} - 0.6 \text{ dB} = 26.2 \text{ dBm}$$

The relevant equation for determining the ERP/EIRP from the radiated RF output power is:

$$\text{ERP/EIRP (dBm)} = \text{SA Read Value (dBm)} + \text{Correction Factor (dB)}$$

where:

ERP/EIRP = effective or equivalent radiated power, in dBm;

SA Read Value = measured transmitter power received by EMI receiver or spectrum analyzer, in dBm;

Correction Factor = total correction factor including cable loss, in dB;

During the test, the data of Correction Factor (dB) is added in the EMI receiver or spectrum analyzer, so SA Read Value (dBm) is the final values which contains the data of Correction Factor (dB).

For example:

In the ERP test, when SA read value for GSM850 is 21dBm, and correction factor is 8dB, then final ERP value for GSM850 is:

$$\text{ERP (dBm)} = 21\text{dBm} + 8\text{dB} = 29\text{dBm}$$

#### 5.1.4 Test Result

Please refer to the document “BL-SH25A1181-501 Data Part 1.pdf”.

## 5.2 Peak to Average Ratio

### 5.2.1 Limit

FCC § 2.1046 & 22.913(d) & 24.232(d) & 27.50(d) & 27.50(j) & 27.50(k)

In addition, when the transmitter power is measured in terms of average value, the peak-to-average power ratio (PAPR) of the transmitter shall not exceed 13 dB for more than 0.1% of the time using a signal corresponding to the highest PAPR during periods of continuous transmission.

According to 22.913(d), Measurement of the ERP of Cellular base transmitters and repeaters must be made using an average power measurement technique. The peak-to-average ratio (PAR) of the transmission must not exceed 13 dB.

According to FCC section 24.232(d), power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with 24.232 (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of § 24.51. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

FCC section 24.232(e), peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms equivalent voltage. The measurement results shall be properly adjusted for any instrument limitations, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, sensitivity, etc., so as to obtain a true peak measurement for the emission in question over the full bandwidth of the channel.

According to FCC section 27.50(d) (5) & 27.50(j) & 27.50(k), in measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13dB.

### 5.2.2 Test Setup

The section 4.4.1 (Diagram 1) test setup description is used for this test. The photo of test setup please refer to ANNEX B.

### 5.2.3 Test Procedure

Here the lowest, middle and highest channels are selected to perform testing to verify the peak-to-average ratio.

According to KDB 971168 D01, there is CCDF procedure for PAPR:

- a) Refer to instrument's analyzer instruction manual for details on how to use the power statistics/CCDF function;
- b) Set resolution/measurement bandwidth  $\geq$  signal's occupied bandwidth;
- c) Set the number of counts to a value that stabilizes the measured CCDF curve;

d) Set the measurement interval as follows:

1) for continuous transmissions, set to 1 ms,

2) for burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize and set the measurement interval to a time that is less than or equal to the burst duration.

e) Record the maximum PAPR level associated with a probability of 0.1%.

Alternate procedure for PAPR:

Use one of the procedures presented in 4.1 to measure the total peak power and record as  $P_{Pk}$ . Use one of the applicable procedures presented 4.2 to measure the total average power and record as  $P_{Avg}$ . Both the peak and average power levels must be expressed in the same logarithmic units (e.g., dBm). Determine the PAPR from:

$$PAPR (dB) = P_{Pk} (dBm) - P_{Avg} (dBm).$$

#### 5.2.4 Test Result

Please refer to the document “BL-SH25A1181-501 Data Part 2.pdf”.

## 5.3 Occupied Bandwidth

### 5.3.1 Limit

#### FCC § 2.1049

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission.

Many of the individual rule parts specify a relative OBW in lieu of the 99% OBW. In such cases, the OBW is defined as the width of the signal between two points, one below the carrier center frequency and on above the carrier center frequency, outside of which all emissions are attenuated by at least X dB below the transmitter power, where the value of X is typically specified as 26.

### 5.3.2 Test Setup

The section 4.4.1 (Diagram 1) test setup description is used for this test. The photo of test setup please refer to ANNEX B.

### 5.3.3 Test Procedure

The following procedure shall be used for measuring power bandwidth.

- a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (i.e., two to five times the anticipated OBW).
- b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.
- c) Set the reference level of the instrument as required to keep the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope must be at least 10log (OBW / RBW) below the reference level.
- d) NOTE—Steps a) through c) may require iteration to adjust within the specified tolerances.
- e) For -26 dB OBW, the dynamic range of the spectrum analyzer at the selected RBW shall be at least 10dB below the target “-X dB down” requirement, e.g. -26 dB OBW, the spectrum analyzer noise floor at the selected RBW shall be 36dB below the reference value.
- f) Set the detection mode to peak, and the trace mode to max hold.
- g) For 99% OBW, use the 99 % power bandwidth function of the spectrum analyzer (if available) and report the measured bandwidth.

If the instrument does not have a 99 % power bandwidth function, the trace data points are to be recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached; that frequency is

recorded as the lower frequency. The process is repeated until 99.5 % of the total is reached; that frequency is recorded as the upper frequency. The 99 % power bandwidth is the difference between these two frequencies.

h) For -26 dB OBW, determine the reference value: Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).

Determine the “-X dB down amplitude” as equal to (reference value -X). Alternatively, this calculation can be performed by the analyzer by using the marker-delta function.

Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below “-X dB down amplitude” determined in step g). If a marker is below this “-X dB down amplitude” value it shall be placed as close as possible to this value. The OBW is the positive frequency difference between the two markers.

i) The OBW shall be reported by providing plot(s) of the measuring instrument display. The frequency and amplitude axes and scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

j) Change variable modulations, coding, or channel bandwidth settings, then repeat above test procedures.

#### 5.3.4 Test Result

Please refer to the document “BL-SH25A1181-501 Data Part 3.pdf”.

## 5.4 Frequency Stability

### 5.4.1 Limit

FCC § 2.1055 & 22.355 & 24.235 & 27.54

FCC § 2.1055

The frequency stability shall be measured with variation of ambient temperature as follows:

- (1) The temperature is varied from -30°C to +50°C.
- (2) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10°C through the range.

The frequency stability shall be measured with variation of primary supply voltage as follows:

- (1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than carried battery equipment.
- (2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating and point which shall be specified by the manufacture.
- (3) The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided.

FCC § 22.355

Except as otherwise provided in this part, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table C-1 of this section.

**Table C-1—Frequency Tolerance for Transmitters in the Public Mobile Services**

| Frequency range (MHz) | Base, fixed (ppm) | Mobile > 3 watts (ppm) | Mobile ≤ 3 watts (ppm) |
|-----------------------|-------------------|------------------------|------------------------|
| 25 to 50              | 20.0              | 20.0                   | 50.0                   |
| 50 to 450             | 5.0               | 5.0                    | 50.0                   |
| 450 to 512            | 2.5               | 5.0                    | 5.0                    |
| 821 to 896            | 1.5               | 2.5                    | 2.5                    |
| 928 to 929            | 5.0               | n/a                    | n/a                    |
| 929 to 960            | 1.5               | n/a                    | n/a                    |
| 2110 to 2220          | 10.0              | n/a                    | n/a                    |

FCC § 24.235

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

FCC § 27.54

The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

#### 5.4.2 Test Setup

The section 4.4.2 (Diagram 2) test setup description is used for this test. The photo of test setup please refer to ANNEX B.

#### 5.4.3 Test Procedure

1. The EUT is placed in a temperature chamber.
2. The temperature is set to 25°C and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured.
3. The temperature is increased by not more than 10 degrees, allowed to stabilize and soak, and then repeat the frequency error measurement.
4. Repeat procedure 3 until +50°C and -30°C is reached.
5. Change supply voltage, and repeat measurement until extreme voltage is reached.

#### 5.4.4 Test Result

Please refer to the document “BL-SH25A1181-501 Data Part 4.pdf”.

## 5.5 Spurious Emission at Antenna Terminals

### 5.5.1 Limit

FCC § 2.1051 & 22.917(a) & 24.238(a) & 27.53(a) & 27.53(c) & 27.53(f) & 27.53(g) & 27.53(h) & 27.53(l) & 27.53(m) & 27.53(n)

In the 1 MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

FCC § 22.917(a) & 24.238(a)

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  $43 + 10 \log(P)$  dB. This is calculated to be -13 dBm.

FCC § 27.53(a) (4)

For mobile and portable stations operating in the 2305-2315MHz and 2350-2360MHz bands:

(1) By a factor of not less than:  $43 + 10 \log(P)$  dB on all frequencies between 2305 and 2320MHz and on all frequencies between 2345 and 2360MHz that are outside the licensed band(s) of operation, not less than  $55 + 10 \log(P)$  dB on all frequencies between 2320 and 2324MHz and on all frequencies between 2341 and 2345MHz, not less than  $61 + 10 \log(P)$  dB on all frequencies between 2324 and 2328MHz and on all frequencies between 2337 and 2341MHz, and not less than  $67 + 10 \log(P)$  dB on all frequencies between 2328 and 2337MHz.

(2) By a factor of not less than  $43 + 10 \log(P)$  dB on all frequencies between 2300 and 2305MHz,  $55 + 10 \log(P)$  dB on all frequencies between 2296 and 2300MHz,  $61 + 10 \log(P)$  dB on all frequencies between 2292 and 2296MHz,  $67 + 10 \log(P)$  dB on all frequencies between 2288 and 2292MHz, and  $70 + 10 \log(P)$  dB below 2288MHz.

(3) By a factor of not less than  $43 + 10 \log(P)$  dB on all frequencies between 2360 and 2365MHz, and not less than  $70 + 10 \log(P)$  dB above 2365MHz.

FCC § 27.53(c)

For operations in the 746–758 MHz band and the 776–788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(1) On any frequency outside the 746–758 MHz band, the power of any emission shall be attenuated outside the

band below the transmitter power (P) by at least  $43 + 10 \log(P)$  dB;

(2) On any frequency outside the 776–788 MHz band, the power of any emission shall be attenuated outside the

band below the transmitter power (P) by at least  $43 + 10 \log (P)$  dB;

(3) On all frequencies between 763–775 MHz and 793–805 MHz, by a factor not less than  $76 + 10 \log (P)$  dB in a 6.25 kHz band segment, for base and fixed stations;

(4) On all frequencies between 763–775 MHz and 793–805 MHz, by a factor not less than  $65 + 10 \log (P)$  dB in a 6.25 kHz band segment, for mobile and portable stations;

(5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater.

However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth

of at least 30 kHz may be employed;

(6) Compliance with the provisions of paragraphs (c)(3) and (c)(4) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.

#### FCC § 27.53(f)

For operations in the 746–758 MHz, 775–788 MHz, and 805–806 MHz bands, emissions in the band 1559–1610 MHz shall be limited to - 70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

#### FCC § 27.53(g)

For operations in the 600MHz band and the 698-746MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least  $43+10*\log(P)$  dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

#### FCC § 27.53(h) (1)

Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \log_{10} (P)$  dB.

#### FCC § 27.53(l) (2)

For mobile operations in the 3700-3980 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed -13 dBm/MHz.

#### FCC § 27.53(m) (4)

For mobile digital stations (BRS and EBS stations), the attenuation factor shall be not less than:

- $40 + 10 \log P$  dB ( $-10$  dBm,  $100$  nW) on all frequencies between the channel edge and  $5$  MHz from the channel edge.
- $43 + 10 \log P$  dB ( $-13$  dBm,  $50$  nW) on all frequencies between  $5$  MHz and  $X$  MHz from the channel edge,
- $55 + 10 \log P$  dB ( $-25$  dBm,  $3$  nW) on all frequencies more than  $X$  MHz from the channel edge, where  $X$  is the greater of  $6$  MHz or the actual emission bandwidth ( $26$  dB).

In addition, the attenuation factor shall not be less than  $43 + 10 \log (P)$  dB on all frequencies between  $2490.5$  MHz and  $2496$  MHz and  $55 + 10 \log (P)$  dB at or below  $2490.5$  MHz. Mobile Satellite Service licensees operating on frequencies below  $2495$  MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

#### FCC § 27.53(n) (2)

For mobile operations in the  $3450$ - $3550$  MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed  $-13$  dBm/MHz.

### 5.5.2 Test Setup

The section 4.4.1 (Diagram 1) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

### 5.5.3 Test Procedure

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power ( $P$ ) by at least  $43 + 10 \log(P)$  dB. Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of  $1$  MHz or greater. However, in the  $1$  MHz bands immediately outside and adjacent to the frequency blocks a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least  $26$  dB below the transmitter power.

1. The EUT is coupled to the system simulator and spectrum analyzer; the RF load attached to EUT antenna terminal is  $50\Omega$ ; the path loss as the factor is calibrated to correct the reading.
2. CMW500 is used to establish communication with the EUT, and its parameters are set to force the EUT transmitting at maximum output power.

3. The RF output of the transmitter is connected to the input of the spectrum analyzer through sufficient attenuation.
4. Spurious emissions are tested with 0.001MHz RBW for frequency less than 150kHz, 0.01MHz RBW for frequency less than 30MHz, 0.1MHz RBW for frequency less than 1GHz, and 1MHz RBW for frequency above 1GHz. And sweep point number are at least 401, referring to following formula.

Sweep point number = Span/RBW

VBW=3\*RBW

Detector Mode=mean or average power

5. Record the frequencies and levels of spurious emissions.

#### 5.5.4 Test Result

Please refer to the document “BL-SH25A1181-501 Data Part 5.pdf”.

## 5.6 Band Edge

### 5.6.1 Limit

FCC § 2.1051 & 22.917(a) & 24.238(a) & 27.53(a) & 27.53(c) & 27.53(g) & 27.53(h) & 27.53(l) & 27.53(m) & 27.53(n)

In the 1 MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

FCC § 22.917(a) & 24.238(a)

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  $43 + 10 \log(P)$  dB. This is calculated to be -13 dBm.

FCC § 27.53(a) (4)

For mobile and portable stations operating in the 2305-2315MHz and 2350-2360MHz bands:

(1) By a factor of not less than:  $43 + 10 \log(P)$  dB on all frequencies between 2305 and 2320MHz and on all frequencies between 2345 and 2360MHz that are outside the licensed band(s) of operation, not less than  $55 + 10 \log(P)$  dB on all frequencies between 2320 and 2324MHz and on all frequencies between 2341 and 2345MHz, not less than  $61 + 10 \log(P)$  dB on all frequencies between 2324 and 2328MHz and on all frequencies between 2337 and 2341MHz, and not less than  $67 + 10 \log(P)$  dB on all frequencies between 2328 and 2337MHz.

(2) By a factor of not less than  $43 + 10 \log(P)$  dB on all frequencies between 2300 and 2305MHz,  $55 + 10 \log(P)$  dB on all frequencies between 2296 and 2300MHz,  $61 + 10 \log(P)$  dB on all frequencies between 2292 and 2296MHz,  $67 + 10 \log(P)$  dB on all frequencies between 2288 and 2292MHz, and  $70 + 10 \log(P)$  dB below 2288MHz.

(3) By a factor of not less than  $43 + 10 \log(P)$  dB on all frequencies between 2360 and 2365MHz, and not less than  $70 + 10 \log(P)$  dB above 2365MHz.

FCC § 27.53(c)

For operations in the 746–758 MHz band and the 776–788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(1) On any frequency outside the 746–758 MHz band, the power of any emission shall be attenuated outside the

band below the transmitter power (P) by at least  $43 + 10 \log(P)$  dB;

(2) On any frequency outside the 776–788 MHz band, the power of any emission shall be attenuated outside the

band below the transmitter power (P) by at least  $43 + 10 \log (P)$  dB;

(3) On all frequencies between 763–775 MHz and 793–805 MHz, by a factor not less than  $76 + 10 \log (P)$  dB in a 6.25 kHz band segment, for base and fixed stations;

(4) On all frequencies between 763–775 MHz and 793–805 MHz, by a factor not less than  $65 + 10 \log (P)$  dB in a 6.25 kHz band segment, for mobile and portable stations;

(5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater.

However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth

of at least 30 kHz may be employed;

(6) Compliance with the provisions of paragraphs (c)(3) and (c)(4) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.

#### FCC § 27.53(g)

For operations in the 600MHz band and the 698-746MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least  $43+10*\log(P)$  dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

#### FCC § 27.53(h) (1)

Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \log_{10} (P)$  dB.

#### FCC § 27.53(l) (2)

For mobile operations in the 3700-3980 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed  $-13$  dBm/MHz.

#### FCC § 27.53(m) (4)

For mobile digital stations (BRS and EBS stations), the attenuation factor shall be not less than:

- $40+10\log P$  dB ( $-10$  dBm, 100 nW) on all frequencies between the channel edge and 5 MHz from the channel edge.
- $43+10\log P$  dB ( $-13$  dBm, 50 nW) on all frequencies between 5 MHz and X MHz from the channel edge,

- $55+10\log P$  dB ( $-25$  dBm,  $3$  nW) on all frequencies more than  $X$  MHz from the channel edge, where  $X$  is the greater of  $6$  MHz or the actual emission bandwidth ( $26$  dB).

In addition, the attenuation factor shall not be less than  $43 + 10 \log (P)$  dB on all frequencies between  $2490.5$  MHz and  $2496$  MHz and  $55 + 10 \log (P)$  dB at or below  $2490.5$  MHz. Mobile Satellite Service licensees operating on frequencies below  $2495$  MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

FCC § 27.53(n) (2)

For mobile operations in the  $3450$ - $3550$  MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed  $-13$  dBm/MHz.

## 5.6.2 Test Setup

The section 4.4.1 (Diagram 1) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

## 5.6.3 Test Procedure

The EUT, which is powered by the Battery, is coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is  $50$  Ohm; the path loss as the factor is calibrated to correct the reading.

1. The EUT is coupled to the system simulator and spectrum analyzer; the RF load attached to EUT antenna terminal is  $50$  Ohm; the path loss as the factor is calibrated to correct the reading.

2. CMW500 is used to establish communication with the EUT, and its parameters are set to force the EUT transmitting at maximum output power.

3. The RF output of the transmitter is connected to the input of the spectrum analyzer through sufficient attenuation.

4. The center of the spectrum analyzer was set to block edge frequency.

5. Band edge are tested with  $1\% \text{cBW}$  (RBW), and sweep point number referred to following formula.

$$\text{Sweep point number} = 2 \times \text{Span} / \text{RBW}$$

$$\text{VBW} = 3 \text{RBW}$$

6. Record the frequencies and levels of spurious emissions.

For mobile and portable stations, on all frequencies between  $763$ – $775$  MHz and  $793$ – $805$  MHz, by a factor not less than  $65 + 10 \log (P)$  dB in a  $6.25$  kHz band segment. Since it was not possible to set the resolution bandwidth to  $6.25$  kHz with the available equipment, a bandwidth of  $10$  kHz was used instead to show compliance. By using a  $10$  kHz bandwidth on the spectrum analyzer.

$$10 \cdot \log(10 \text{ kHz} / 6.25 \text{ kHz}) = 2.04 \text{ dB}$$

$$\text{Limit Line} = -35 \text{ dBm} + 2.04 \text{ dB} = -32.96 \text{ dBm}$$

#### 5.6.4 Test Result

Please refer to the document "BL-SH25A1181-501 Data Part 6.pdf".

## 5.7 Field Strength of Spurious Radiation

### 5.7.1 Limit

FCC § 2.1053 & 22.917(a) & 24.238(a) & 27.53(a) & 27.53(c) & 27.53(f) & 27.53(g) & 27.53(h) & 27.53(l) & 27.53(m) & 27.53(n)

FCC § 22.917(a) & 24.238(a)

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  $43 + 10 \log(P)$  dB. This is calculated to be -13 dBm.

FCC § 27.53(a) (4)

For mobile and portable stations operating in the 2305-2315MHz and 2350-2360MHz bands:

(1) By a factor of not less than:  $43 + 10 \log(P)$  dB on all frequencies between 2305 and 2320MHz and on all frequencies between 2345 and 2360MHz that are outside the licensed band(s) of operation, not less than  $55 + 10 \log(P)$  dB on all frequencies between 2320 and 2324MHz and on all frequencies between 2341 and 2345MHz, not less than  $61 + 10 \log(P)$  dB on all frequencies between 2324 and 2328MHz and on all frequencies between 2337 and 2341MHz, and not less than  $67 + 10 \log(P)$  dB on all frequencies between 2328 and 2337MHz.

(2) By a factor of not less than  $43 + 10 \log(P)$  dB on all frequencies between 2300 and 2305MHz,  $55 + 10 \log(P)$  dB on all frequencies between 2296 and 2300MHz,  $61 + 10 \log(P)$  dB on all frequencies between 2292 and 2296MHz,  $67 + 10 \log(P)$  dB on all frequencies between 2288 and 2292MHz, and  $70 + 10 \log(P)$  dB below 2288MHz.

(3) By a factor of not less than  $43 + 10 \log(P)$  dB on all frequencies between 2360 and 2365MHz, and not less than  $70 + 10 \log(P)$  dB above 2365MHz.

FCC § 27.53(c)

For operations in the 746–758 MHz band and the 776–788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(1) On any frequency outside the 746–758 MHz band, the power of any emission shall be attenuated outside the

band below the transmitter power (P) by at least  $43 + 10 \log(P)$  dB;

(2) On any frequency outside the 776–788 MHz band, the power of any emission shall be attenuated outside the

band below the transmitter power (P) by at least  $43 + 10 \log(P)$  dB;

(3) On all frequencies between 763–775 MHz and 793–805 MHz, by a factor not less than  $76 + 10 \log(P)$  dB in a 6.25 kHz band segment, for base and fixed stations;

(4) On all frequencies between 763–775 MHz and 793–805 MHz, by a factor not less than  $65 + 10 \log(P)$  dB in a 6.25 kHz band segment, for mobile and portable stations;

(5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of

measurement instrumentation employing a resolution bandwidth of 100 kHz or greater.

However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth

of at least 30 kHz may be employed;

(6) Compliance with the provisions of paragraphs (c)(3) and (c)(4) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.

FCC § 27.53(f)

For operations in the 746–758 MHz, 775–788 MHz, and 805–806 MHz bands, emissions in the band 1559–1610 MHz shall be limited to - 70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

FCC § 27.53(g)

For operations in the 600MHz band and the 698-746MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least  $43+10\log(P)$  dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

FCC § 27.53(h) (1)

Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \log_{10}(P)$  dB.

FCC § 27.53(i) (2)

For mobile operations in the 3700-3980 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed -13 dBm/MHz.

FCC § 27.53(m) (4)

For mobile digital stations (BRS and EBS stations), the attenuation factor shall be not less than:

- $40+10\log P$  dB (-10 dBm, 100 nW) on all frequencies between the channel edge and 5 MHz from the channel edge.
- $43+10\log P$  dB (-13 dBm, 50 nW) on all frequencies between 5 MHz and X MHz from the channel edge,
- $55+10\log P$  dB (-25 dBm, 3 nW) on all frequencies more than X MHz from the channel edge, where X is the greater of 6 MHz or the actual emission bandwidth (26 dB).

In addition, the attenuation factor shall not be less than  $43 + 10 \log (P)$  dB on all frequencies between 2490.5 MHz and 2496 MHz and  $55 + 10 \log (P)$  dB at or below 2490.5 MHz. Mobile Satellite Service

licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

#### FCC § 27.53(n) (2)

For mobile operations in the 3450-3550 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed -13 dBm/MHz.

### 5.7.2 Test Setup

The section 4.4.3 and 4.4.4 (Diagram 3, 4) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

### 5.7.3 Test Procedure

1. On a test site, the EUT shall be placed at 80cm height on a turn table, and in the position close to normal use as declared by the applicant.
2. The test antenna shall be oriented initially for vertical polarization located 3 m from EUT to correspond to the fundamental frequency of the transmitter.
3. The output of the test antenna shall be connected to the measuring receiver and the peak detector is used for the measurement.
4. During the measurement of the EUT, the resolution bandwidth was to 1 MHz and the average bandwidth was set to 1 MHz.
5. The transmitter shall be switched on; the measuring receiver shall be tuned to the frequency of the transmitter under test.
6. The test antenna shall be raised and lowered through the specified range of height until the maximum signal level is detected by the measuring receiver.
7. The transmitter shall be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
8. The test antenna shall be raised and lowered again through the specified range of height until the maximum signal level is detected by the measuring receiver.
9. The maximum signal level detected by the measuring receiver shall be noted.
10. The EUT was replaced by half-wave dipole (824 ~ 849 MHz) or horn antenna (1 850 ~ 1 910 MHz) connected to a signal generator.
11. In necessary, the input attenuator setting on the measuring receiver shall be adjusted in order to

increase

the sensitivity of the measuring receiver.

12. The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.

13. The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, which is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver.

14. The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.

15. The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.

Final measurement calculation as below:

The relevant equation for determining the ERP/EIRP from the radiated RF output power is:

$$\text{ERP/EIRP (dBm)} = \text{SA Read Value (dBm)} + \text{Correction Factor (dB)}$$

where:

ERP/EIRP = effective or equivalent radiated power, in dBm;

SA Read Value = measured transmitter power received by EMI receiver or spectrum analyzer, in dBm;

Correction Factor = total correction factor including cable loss, in dB;

During the test, the data of Correction Factor (dB) is added in the EMI receiver or spectrum analyzer, so SA Read Value (dBm) is the final values which contains the data of Correction Factor (dB).

For example:

In the ERP test, when SA read value for GSM850 is 21dBm, and correction factor is 8dB, then final ERP value for GSM850 is:

$$\text{ERP (dBm)} = 21\text{dBm} + 8\text{dB} = 29\text{dBm}$$

#### 5.7.4 Test Result

Please refer to the document “BL-SH25A1181-501 Data Part 7.pdf”.

## **ANNEX B TEST SETUP PHOTOS**

Please refer to the document “BL-SH25A1181-AR.PDF”.

## **ANNEX C EUT EXTERNAL PHOTOS**

Please refer to the document “BL-SH25A1181-AW.PDF”.

## **ANNEX D EUT INTERNAL PHOTOS**

Please refer to the document “BL-SH25A1181-AI.PDF”.

## Statement

1. The Testing Center guarantees the scientificity, accuracy and impartiality of the test, and is responsible for all the information in the report, except the information provided by the customer. The customer is responsible for the impact of the information provided on the validity of the results.
2. For the report with Accreditation Symbol, the items marked with "☆" are not within the accredited scope.
3. This report is invalid if it is altered, without the signature of the testing and approval personnel, or without the test report stamp.
4. The test data and results are only valid for the tested samples provided by the customer.
5. This report shall not be partially reproduced without the written permission of the Testing Center.
6. Any objection shall be raised to the Testing Center within 30 days after receiving the report.

--END OF REPORT--