



## JAPAN RADIO TEST REPORT

|                 |  |
|-----------------|--|
| Product Name:   | <b>Digital Broadcasting Device (D34.1)</b>   |
| Trademark:      | <b>SONY</b>  |
| Model Number:   | <b>D34.1</b>   |
| Prepared For:   | <b>Sony Mobile Communications Inc</b>  |
| Address:        | 4-12-3 Higashi-Shinagawa, Shinagawa-Ku, Tokyo, 140-0002, Japan   |
| Prepared By:    | <b>Shenzhen BCTC Testing Co., Ltd.</b>   |
| Address:        | BCTC Building & 1-2F, East of B Building, Pengzhou Industrial, Fuyuan 1st Road, Qiaotou Community, Fuyong Street, Bao'an District, Shenzhen, China |
| Test Date:      | Jun. 19 - Jun. 26, 2018  |
| Date of Report: | Jun. 26, 2018  |
| Report No.:     | <b>BCTC-LH180601582J</b>   |



## TEST RESULT CERTIFICATION

**Applicant's name**..... **Sony Mobile Communications Inc**

**Address**..... 4-12-3 Higashi-Shinagawa, Shinagawa-Ku, Tokyo, 140-0002,  
Japan

**Manufacturer's Name**..... **Shenzhen Minew Technologies Co., Ltd**

**Address**..... 3th Floor, I Building, Gangzhilong Science Park, Qinglong  
Road, Longhua District, Shenzhen City, China

**Test specification:**

**Standard**..... ARIB STD T-66 Ver.3.7(2014)  
MIC public notice 88:2004, annex 43

**Test item description**

**Product name**..... Digital Broadcasting Device (D34.1)

**Model and/or type reference** : D34.1

**Rating(s)** ..... DC 3V

This device described above has been tested by BCTC, and the test results show that the equipment under test (EUT) is in compliance with the ARIB STD T-66 requirements. And it is applicable only to the tested sample identified in the report.

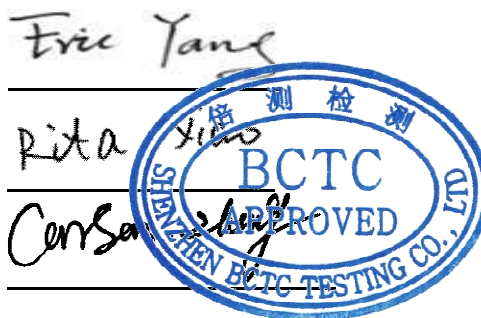
This report shall not be reproduced except in full, without the written approval of BCTC, this document may be altered or revised by BCTC, personal only, and shall be noted in the revision of the document.

**Test Result** ..... : **Pass**

**Prepared by(Engineer):** Eric Yang

**Reviewer(Supervisor):** Rita Xiao

**Approved(Manager):** Carson Zhang





| <b>Table of Contents</b>                                    | <b>Page</b> |
|---|-------------|
| <b>1 . SUMMARY OF TEST RESULTS</b>                          | <b>6</b>    |
| 1.1 TEST FACILITY   | 7           |
| 1.2 MEASUREMENT UNCERTAINTY                                 | 7           |
| <b>2 . GENERAL INFORMATION</b>                              | <b>8</b>    |
| 2.1 GENERAL DESCRIPTION OF EUT                              | 8           |
| 2.2 DESCRIPTION OF TEST MODES                               | 10          |
| 2.3 TEST CONDITIONS   | 10          |
| 2.4 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING            | 11          |
| 2.5 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED | 11          |
| 2.6 DESCRIPTION OF SUPPORT UNITS (CONDUCTED MODE)           | 12          |
| 2.7 EQUIPMENTS LIST FOR ALL TEST ITEMS                      | 13          |
| <b>3 . RF SHIELDING METHOD</b>                              | <b>14</b>   |
| <b>4 . TEST RESULT FOR BLUETOOTH</b>                        | <b>15</b>   |
| 4.1 FREQUENCY ERROR   | 15          |
| 4.2 LIMIT   | 15          |
| 4.3 MEASURING INSTRUMENTS AND SETTING                       | 15          |
| 4.4 TEST PROCEDURES   | 15          |
| 4.5 TEST SETUP LAYOUT                                       | 15          |
| <b>5 . ANTENNA POWER</b>                                    | <b>22</b>   |
| 5.1 LIMIT   | 22          |
| 5.2 TEST SETUP LAYOUT                                       | 22          |
| 5.3 TEST DEVIATION  | 22          |
| 5.4 TEST RESULT   | 23          |
| <b>6 . OCCUPIED BANDWITH</b>                                | <b>24</b>   |
| 6.1 LIMIT   | 24          |
| 6.2 TEST PROCEDURES   | 24          |
| 6.1 TEST SETUP LAYOUT                                       | 24          |
| 6.2 TEST RESULT   | 25          |
| <b>7 . UNWANTED EMISSION INTENSITY MEASUREMENT</b>          | <b>34</b>   |
| 7.1 LIMIT   | 34          |



| <b>Table of Contents</b>   | <b>Page</b> |
|--|-------------|
| 7.2 . MEASURING INSTRUMENTS AND SETTING                                | 34          |
| 7.3 . TEST PROCEDURES  | 34          |
| 7.4 . TEST SETUP LAYOUT  | 35          |
| 7.5 . TEST DEVIATION   | 35          |
| 7.6 . TEST RESULT  | 36          |
| 8 . IMITATION OF COLLATERAL EMISSION OF RECEIVER MEASUREMENT           | 45          |
| 8.1 LIMIT  | 45          |
| 8.2 MEASURING INSTRUMENTS AND SETTING                                  | 45          |
| 8.3 TEST PROCEDURES  | 45          |
| 8.4 TEST RESULT  | 46          |
| 9 . TRANSMISSION ANTENNA GAIN (EIRP ANTENNA POWER) MEASUREMENT         | 49          |
| 9.1 LIMIT  | 49          |
| 9.2 MEASURING INSTRUMENTS AND SETTING                                  | 49          |
| 9.3 TEST SETUP LAYOUT  | 50          |
| 9.4 TEST DEVIATION   | 50          |
| 9.5 EUT OPERATION DURING TEST  | 50          |
| 9.6 RESULTS OF TRANSMISSION ANTENNA GAIN                               | 50          |
| 10 . TRANSMISSION RADIATION ANGLE WIDTH (3DB BEAMWIDTH) MEASUREMENT    | 51          |
| 10.1 LIMIT   | 51          |
| 10.2 MEASURING INSTRUMENTS AND SETTING                                 | 51          |
| 10.3 TEST PROCEDURES   | 51          |
| 10.4 TEST SETUP LAYOUT   | 52          |
| 10.5 TEST DEVIATION  | 52          |
| 10.6 EUT OPERATION DURING TEST   | 52          |
| 10.7 TEST RESULT OF TRANSMISSION RADIATION ANGLE WIDTH (3DB BEAMWIDTH) | 52          |
| 11 . RADIO INTERFERENCE PREVENTION CAPABILITY MEASUREMENT              | 53          |
| 11.1 LIMIT   | 53          |
| 11.2 MEASURING ID CODE SOFTWARE  | 53          |



---

| <b>Table of Contents</b>   | <b>Page</b> |
|--|-------------|
| <b>11.3 TEST PROCEDURES</b>  | <b>53</b>   |
| <b>11.4 TEST SETUP LAYOUT</b>                                      | <b>53</b>   |
| <b>11.5 TEST DEVIATION</b>   | <b>53</b>   |
| <b>11.6 EUT OPERATION DURING TEST</b>                              | <b>53</b>   |
| <b>11.7 TEST RESULT OF RADIO INTERFERENCE PREVENTION CAPABILIT</b> | <b>53</b>   |
| <b>12 . CARRIER SENSE CAPABILITY</b>                               | <b>54</b>   |
| <b>13 . EUT TEST PHOTO</b>   | <b>55</b>   |
| <b>14 . EUT PHOTOS</b>   | <b>56</b>   |
| <b>APPENDIX-PHOTOGRAPHS OF EUT CONSTRUCTIONAL DETAILS</b>          |             |



## 1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

| Part | Rule Section | Description of Test  | Result   |
|------|--------------|--|----------|
| 4.1  | 3            | Frequency Error  | Complies |
| 4.2  | 4            | Occupied Bandwidth (99%) and Spread-spectrum Bandwidth (90%) | Complies |
| 4.3  | 5            | Unwanted Emission Intensity                                  | Complies |
| 4.4  | 6            | Antenna Power Error  | Complies |
| 4.5  | 7            | Limitation of Collateral Emission of Receiver                | Complies |
| 4.6  | 8            | Transmission Antenna Gain (EIRP Antenna Power)               | Complies |
| 4.7  | 9            | Transmission Radiation Angle Width (3dB Beamwidth)           | N/A      |
| 4.8  | 10           | Radio Interference Prevention Capability                     | Complies |
| 4.9  | Note1        | Carrier Sense Capability                                     | N/A      |
| 4.10 | Note 2       | Construction Protection Confirmation                         | Complies |

**NOTE:**

(1) "N/A" denotes test is not applicable in this Test Report

(2) MIC Notice No.88 Appendix No.43

(3) MIC Ordinance Regulating Radio Equipment Section 4.17 of Article 49.20



## 1.1 TEST FACILITY

Shenzhen BCTC Testing Co., Ltd.

Add. : BCTC Building & 1-2F, East of B Building, Pengzhou Industrial, Fuyuan 1st Road, Qiaotou Community, Fuyong Street, Bao'an District, Shenzhen, China

FCC Test Firm Registration Number: 712850

IC Registered No.: 23583

## 1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement  $y \pm U$ , where expended uncertainty  $U$  is based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately **95 %**.

| No. | Item                          | Uncertainty         |
|-----|-------------------------------|---------------------|
| 1   | RF power, conducted           | $\pm 0.16\text{dB}$ |
| 2   | Spurious emissions, conducted | $\pm 0.21\text{dB}$ |
| 3   | frequency error ppm           | $\pm 0.5\text{ppm}$ |



## 2. GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF EUT

|                     |  |                    |
|---------------------|--|--------------------|
| Equipment           | Digital Broadcasting Device (D34.1)  |                    |
| Model Name          | D34.1  |                    |
| Trademark           | SONY   |                    |
| Serial Model        | N/A  |                    |
| Model Difference    | N/A  |                    |
| Product Description | Operation Frequency:   | 2402~2480 MHz      |
|                     | Bit Rate of Transmitter:   | GFSK               |
|                     | BT Version:  | V4.0               |
|                     | Number Of Channel:   | 40 CH              |
|                     | Antenna Designation:   | Please see Note 3. |
|                     | Antenna Gain(Peak):  | -1.86dBi           |
|                     | Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical Specification. Please refer to the User's Manual. |                    |
| Channel List        | Please refer to the Note 2.  |                    |
| Battery             | DC 3 V   |                    |
| Hardware Version    | V1.2   |                    |
| Software Version    | SV01   |                    |





Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

2.

| Channel List |                 |         |                 |         |                 |
|--------------|-----------------|---------|-----------------|---------|-----------------|
| Channel      | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 01           | 2402            | 11      | 2422            | 21      | 2442            |
| 02           | 2404            | 12      | 2424            | 22      | 2444            |
| 03           | 2406            | 13      | 2426            | 23      | 2446            |
| ~            | ~               | ~       | ~               | ~       | ~               |
| 09           | 2418            | 19      | 2438            | 20      | 2440            |
| 10           | 2420            | 20      | 2440            | 40      | 2480            |

3. Table for Filed Antenna

| Ant. | Brand | Model Name | Antenna Type | Gain (dBi) | NOTE |
|------|-------|------------|--------------|------------|------|
| 1    | N/A   | ANT-2G4-03 | PCB Antenna  | -1.86dBi   |      |



## 2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generated from EUT, the test system was pre-scanning tested based on the consideration of following EUT operation mode or test configuration mode which possibly have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

| Pretest Mode | Description |      |
|--------------|-------------|------|
| Mode1        | CH01        | GFSK |
| Mode2        | CH20        |      |
| Mode3        | CH40        |      |
| Mode4        | RX          |      |

| Pretest Mode | Conducted Emission |      |
|--------------|--------------------|------|
| Mode1        | CH01               | GFSK |
| Mode2        | CH20               |      |
| Mode3        | CH40               |      |
| Mode4        | RX                 |      |

## 2.3 TEST CONDITIONS

The Digital Broadcasting Device (D34.1) was tested while in a continuous transmitter/receiver mode. The EUT was tuned to a low, middle, and high channel for all tests. For all test case pre/scans were completed in all Modes to determine worst case levels.

### Power Supply Voltage Fluctuation Test

| Voltage Fluctuation Test | Normal Voltage | High Voltage +10% of Normal Voltage | Low Voltage -10% of Normal Voltage |
|--------------------------|----------------|-------------------------------------|------------------------------------|
| Input DC Power           | 3 V            | 3.3V                                | 2.7V                               |
| Voltage Variation (%)    | 0%             | +10%                                | -10%                               |

#### NOTE:

Voltage Variation (%)

= (Output high or Low Voltage - Output Normal Voltage) / Output Normal Voltage \* 100

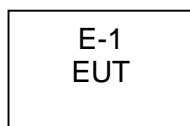


## 2.4 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of FHSS

| Test software Version | Test program: 1.0 |          |          |
|-----------------------|-------------------|----------|----------|
| Frequency             | 2402 MHz          | 2440 MHz | 2480 MHz |
| Parameters            | DEF               | DEF      | DEF      |

## 2.5 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED





## 2.6 DESCRIPTION OF SUPPORT UNITS (CONDUCTED MODE)

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| Item | Equipment                           | Mfr/Brand | Model/Type No. | Series No. | Note |
|------|-------------------------------------|-----------|----------------|------------|------|
| E-1  | Digital Broadcasting Device (D34.1) | SONY      | D34.1          | N/A        | EUT  |
|      |                                     |           |                |            |      |

| Item | Shielded Type | Ferrite Core | Length | Note |
|------|---------------|--------------|--------|------|
|      |               |              |        |      |
|      |               |              |        |      |

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.
- (3) “YES” is means “shielded” “with core”; “NO” is means “unshielded” “without core”.

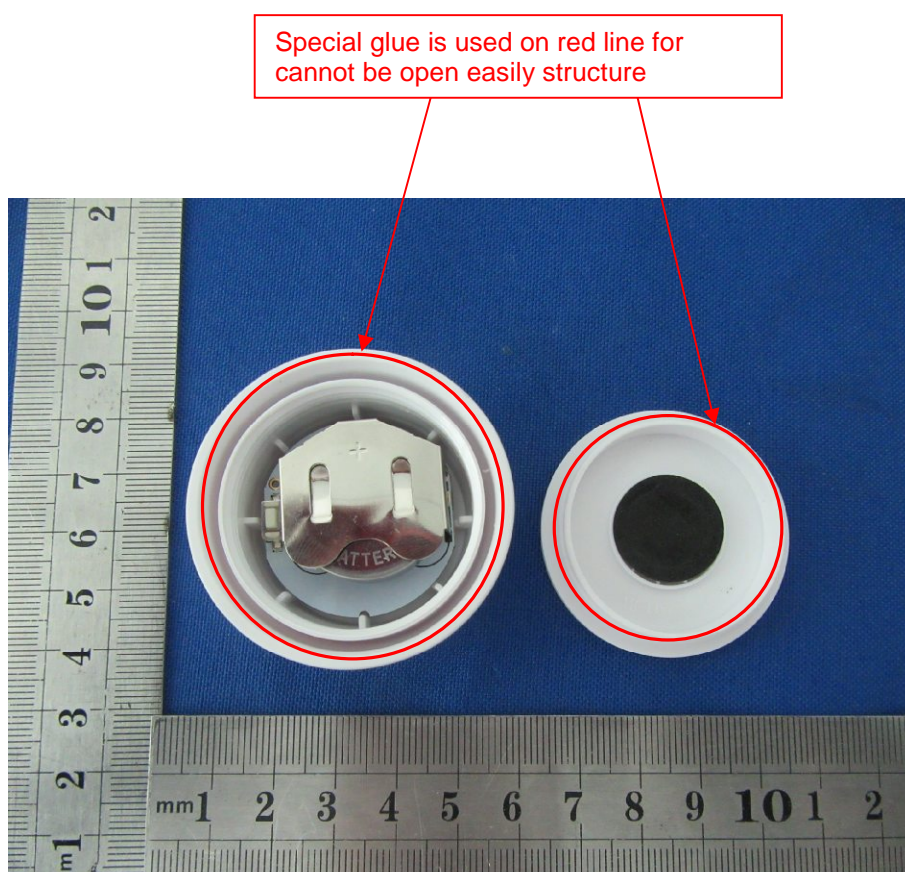
**2.7 EQUIPMENTS LIST FOR ALL TEST ITEMS**

| Item | Kind of Equipment  | Manufacturer | Type No.    | Serial No. | Last calibration | Calibrated until |
|------|--------------------|--------------|-------------|------------|------------------|------------------|
| 1    | SPECTRUM ANALYZER  | AGILENT      | E4407B      | 160400005  | 2017.07.05       | 2018.07.06       |
| 2    | TEST RECEIVER      | R&S          | ESPI        | 101318     | 2017.07.05       | 2018.07.06       |
| 3    | BILOG ANTENNA      | TESEQ        | CBL6111D    | 31216      | 2017.07.05       | 2018.07.06       |
| 4    | 50Ω COAXIAL SWITCH | ANRITSU      | MP59B       | 6200264416 | 2017.07.05       | 2018.07.06       |
| 5    | SPECTRUM ANALYZER  | ADVANTEST    | R3132       | 150900201  | 2017.07.05       | 2018.07.06       |
| 6    | HORN ANTENNA       | EM           | EM-AH-10180 | 2011071402 | 2017.07.05       | 2018.07.06       |
| 7    | HORN ANT           | SCHWARZBECK  | BBHA 9170   | 9170-181   | 2017.07.05       | 2018.07.06       |
| 8    | AMPLIFIER          | EM           | EM-30180    | 060538     | 2017.07.10       | 2018.07.11       |
| 9    | LOOP ANTENNA       | ARA          | PLA-1030/B  | 1029       | 2017.07.10       | 2018.07.11       |
| 10   | POWER METER        | R&S          | NRVS        | 100696     | 2017.07.10       | 2018.07.11       |
| 11   | TEST RECEIVER      | R&S          | ESCI        | 101160     | 2017.07.05       | 2018.07.06       |
| 12   | LISN               | R&S          | ENV216      | 101313     | 2017.07.05       | 2018.07.06       |
| 13   | LISN               | EMCO         | 3816/2      | 00042990   | 2017.07.05       | 2018.07.06       |
| 14   | 50Ω COAXIAL SWITCH | ANRITSU      | MP59B       | 6200264417 | 2017.07.05       | 2018.07.06       |
| 15   | POWER SENSORS      | R&S          | NRP8SN      | 100524     | 2017.07.10       | 2018.07.11       |

### 3. RF SHIELDING METHOD

Enclosure:

The product structure is stuck by glue and thread sewn together, it's shell will have to engineering plastic processing, If the shell will be open, so the product should be damage. See below the structure:



## 4. TEST RESULT FOR BLUETOOTH

### 4.1 FREQUENCY ERROR

### 4.2 LIMIT

| Item            | Limits |
|-----------------|--------|
| Frequency Error | ±50ppm |

### 4.3 MEASURING INSTRUMENTS AND SETTING

The following table is the setting of Spectrum Analyzer.

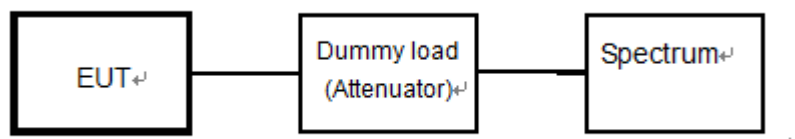
| Spectrum Parameter | Setting  |
|--------------------|----------|
| Attenuation        | Auto     |
| RB / VB            | 10KHz    |
| Detector           | Peak     |
| Trace              | Max Hold |
| Sweep Time         | Auto     |

### 4.4 TEST PROCEDURES

- (1) In the case of unmodulated signal (continuous or continuous burst), measure the frequency directly by a frequency meter.
- (2) In the case of burst waves, the measurement shall be done for enough time in order to obtain the enough measuring accuracy, and the average of the measured values becomes the final value.
- (3) In the case of a test mode with a specific frequency spectrum, measure the frequency of the specific spectrum by a spectrum analyzer.
- (4) In the cases above, if the frequency equivalent to the test frequency is not directly measured in principle, it shall be obtained by necessary calculation.

In the case of modulated signal, if there is no specific spectrum measurable by a spectrum analyzer but a specific dip is observed, it is allowed to measure the frequency with the signal generator (synthesized). That is, observe a signal of the signal generator concurrently (or alternately) with the tested signal using the spectrum analyzer while setting the frequency of the signal generator to the position of the dip on the screen of the spectrum analyzer, and determine the frequency of the signal generator at the time as a measured value.

### 4.5 TEST SETUP LAYOUT

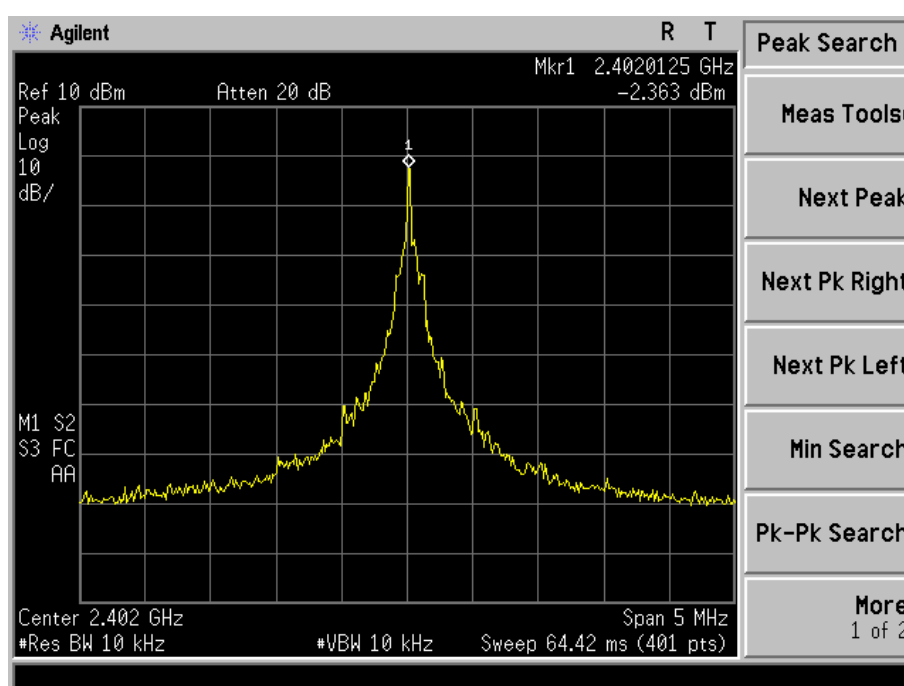


### EUT OPERATION DURING TEST

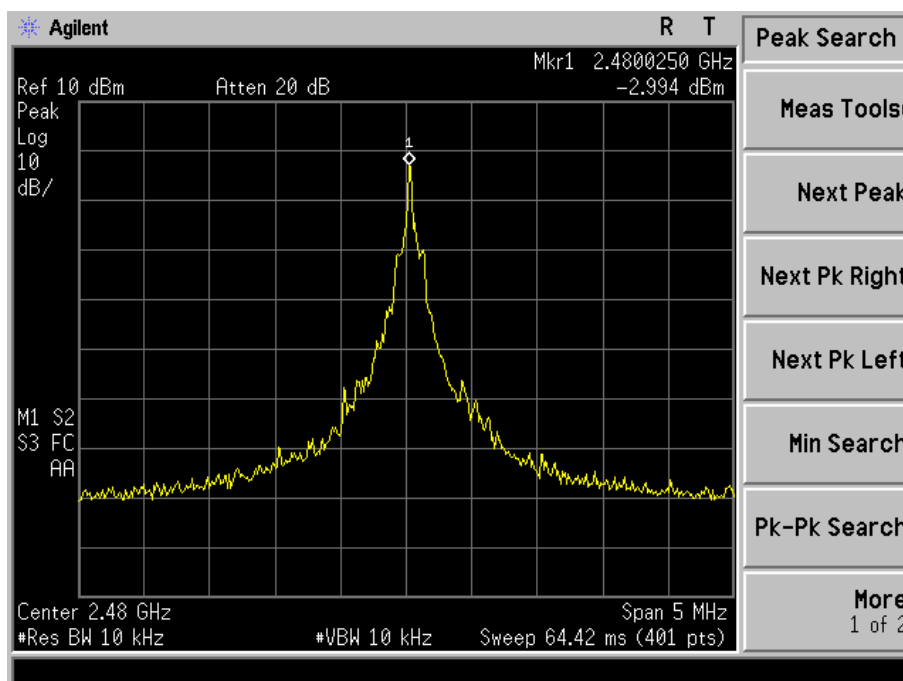
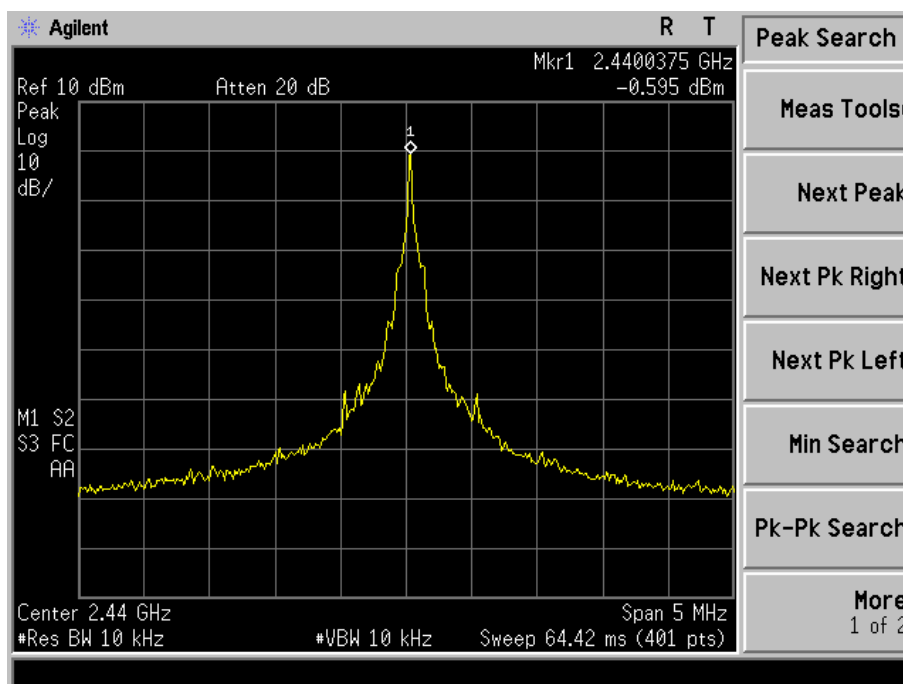
The EUT was placed on the test table and programmed in un-modulation function.

#### 4.5.1 TEST RESULT

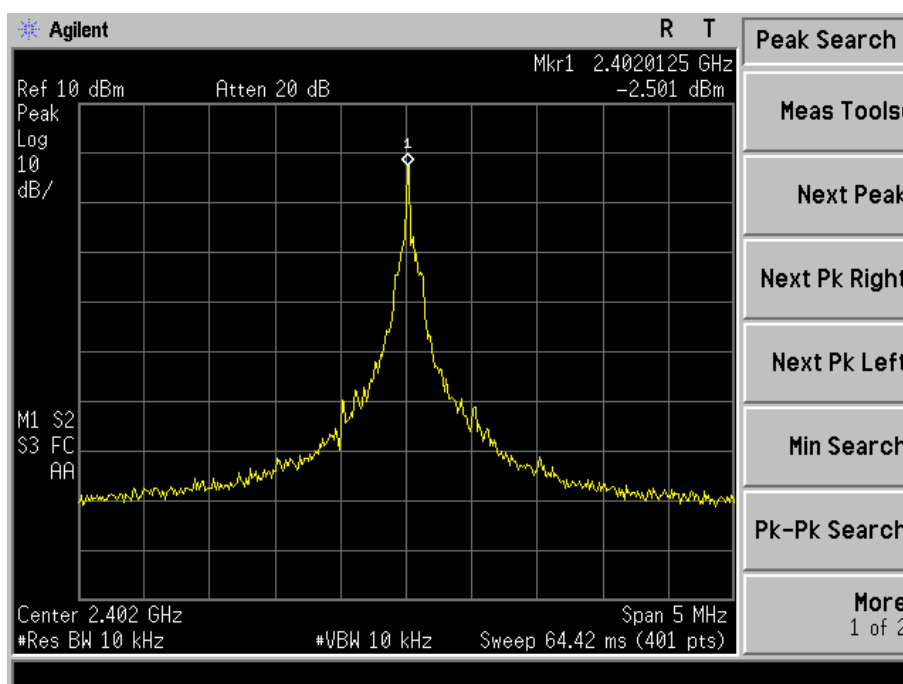
| Voltage           | Frequency | Reading   | Tolerance | Limit |
|-------------------|-----------|-----------|-----------|-------|
| Normal<br>Voltage | MHz       | MHz       | ppm       | (ppm) |
|                   | 2402      | 2402.0125 | 5.20      | ±50   |
|                   | 2440      | 2440.0375 | 15.37     | ±50   |
|                   | 2480      | 2480.0250 | 10.08     | ±50   |

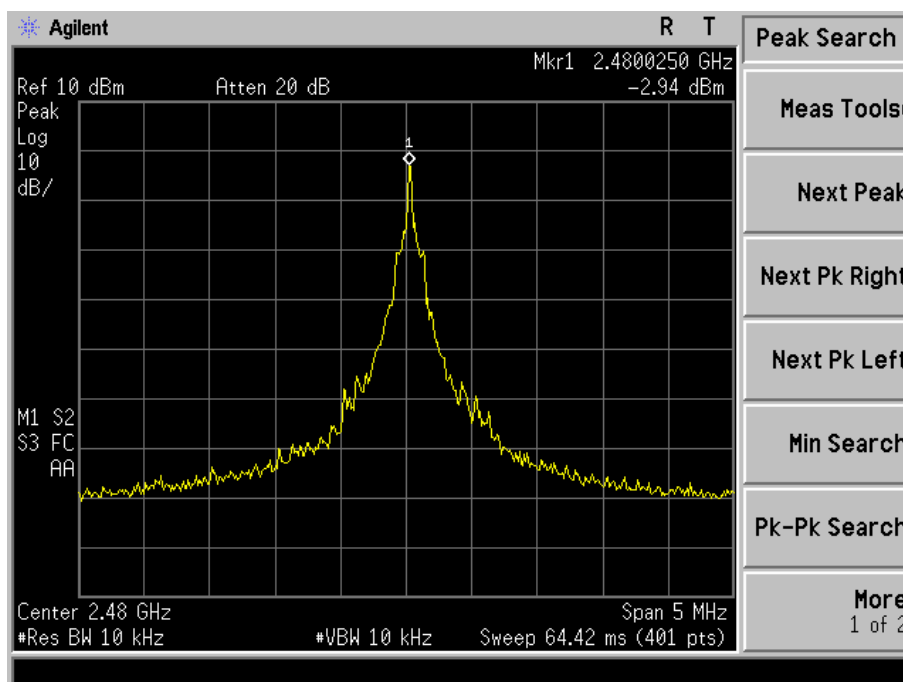
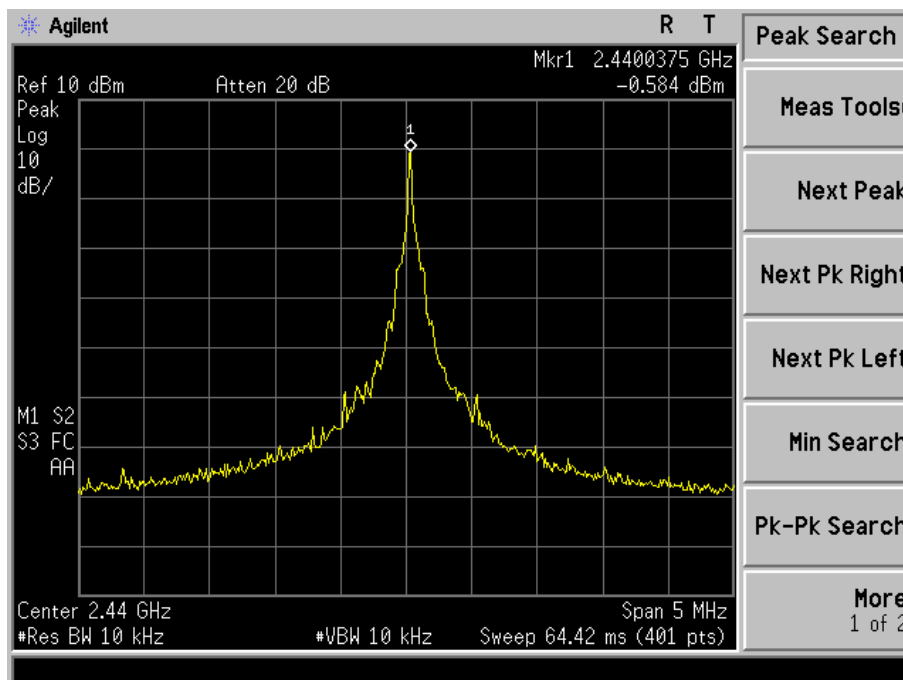




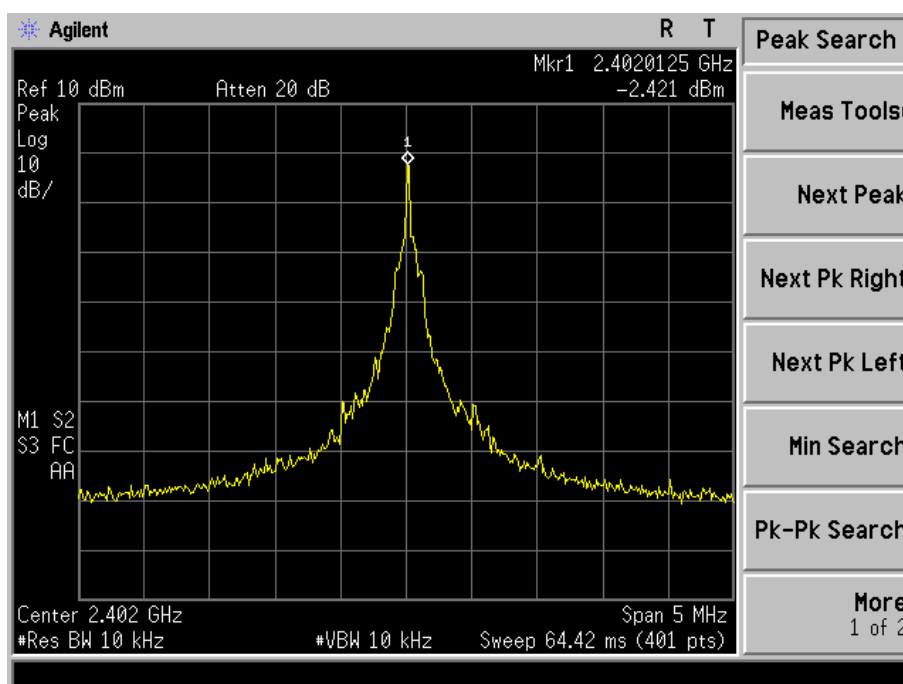


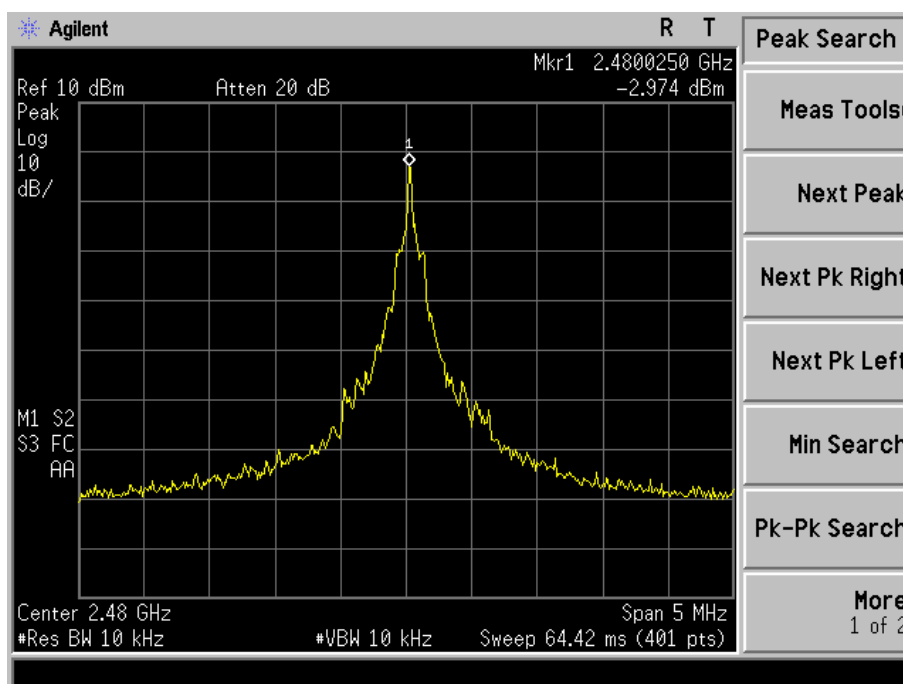
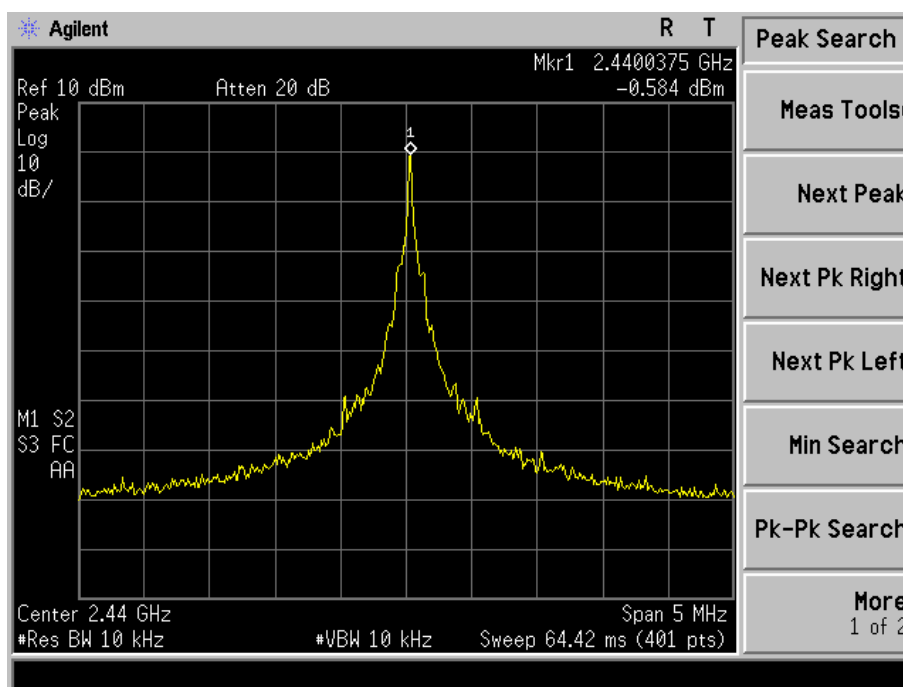
| Voltage                | Frequency | Reading   | Tolerance | Limit |
|------------------------|-----------|-----------|-----------|-------|
| Normal<br>Voltage +10% | MHz       | MHz       | ppm       | (ppm) |
|                        | 2402      | 2402.0125 | 5.20      | ±50   |
|                        | 2440      | 2440.0375 | 15.37     | ±50   |
|                        | 2480      | 2480.0250 | 10.08     | ±50   |





| Voltage                | Frequency | Reading   | Tolerance | Limit |
|------------------------|-----------|-----------|-----------|-------|
| Normal<br>Voltage -10% | MHz       | MHz       | ppm       | (ppm) |
|                        | 2402      | 2402.0125 | 5.20      | ±50   |
|                        | 2440      | 2440.0375 | 15.37     | ±50   |
|                        | 2480      | 2480.0250 | 10.08     | ±50   |



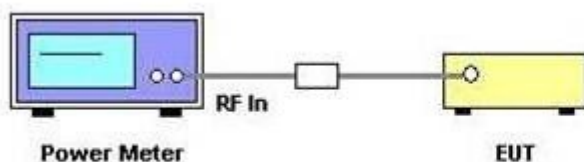


## 5. ANTENNA POWER

### 5.1 LIMIT

| Item                  | Limits   |
|-----------------------|--|
| Antenna Power Density | $\leq 3\text{mW/MHz}$ (FH form 2427 - 2470.75 MHz)<br>$\leq 10\text{mW/MHz}$ (OFDM,DS from 2400~2483.5MHz)<br>$\leq 10\text{mW}$ (Other from 2400~2483.5MHz) |
| Antenna Power Error   | +20%, -80% (Base on manufacturer declare antenna power density)  |

### 5.2 TEST SETUP LAYOUT



### 5.3 TEST DEVIATION

There is no deviation with the original standard.



## 5.4 TEST RESULT

| Voltage   |        | Test Frequency | Conducted RF output power density (mW) | Rated power density (mW) | Limit (mW) | Antenna Power Error (%) |
|---|--------|----------------|--|--------------------------|------------|-------------------------|
| Normal Voltage  | DC3V   | CH 01          | 1.035                                  | 1                        | 10         | 3.50                    |
|   |        | CH 20          | 1.014                                  |                          |            | 1.40                    |
|   |        | CH 40          | 0.738                                  |                          |            | -26.20                  |
| High Voltage  | DC3.3V | CH 01          | 1.047                                  |                          |            | 4.70                    |
|   |        | CH 20          | 1.035                                  |                          |            | 3.50                    |
|   |        | CH 40          | 0.773                                  |                          |            | -22.70                  |
| Low Voltage   | DC2.7V | CH 01          | 1.019                                  |                          |            | 1.90                    |
|   |        | CH 20          | 0.966                                  |                          |            | -3.40                   |
|   |        | CH 40          | 0.740                                  |                          |            | -26.00                  |
| Limit : +20%, -80% (Base on manufacturer declare antenna power density) |        |                |  |                          |            |                         |

| Voltage        | Test Frequency | Conducted RF output power density (dBm) | Antenna Gain (dBi) | EIRP Power (dBm) |
|----------------|----------------|---|--------------------|------------------|
| Normal Voltage | 2402MHz        | 0.15                                    | -1.86              | -1.71            |
|                | 2440MHz        | 0.06                                    | -1.86              | -1.80            |
|                | 2480 MHz       | -1.32                                   | -1.86              | -3.18            |
| High Voltage   | 2402MHz        | 0.20                                    | -1.86              | -1.66            |
|                | 2440MHz        | 0.15                                    | -1.86              | -1.71            |
|                | 2480 MHz       | -1.12                                   | -1.86              | -2.98            |
| Low Voltage    | 2402MHz        | 0.08                                    | -1.86              | -1.78            |
|                | 2440MHz        | -0.15                                   | -1.86              | -2.01            |
|                | 2480 MHz       | -1.31                                   | -1.86              | -3.17            |

## 6. OCCUPIED BANDWIDTH

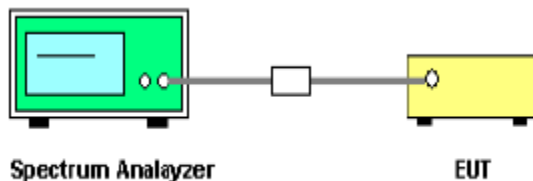
### 6.1 LIMIT

| Item                 | Limits  |
|----------------------|---|
| Occupied Band Width: | FH 83.5MHz; OFDM,DS<br>$\leq 26\text{MHz}$ ; Others $\leq 26\text{MHz}$ |
| Spreading Bandwidth: | $\geq 500\text{ kHz}$ (FH, DS)  |

### 6.2 TEST PROCEDURES

1. Setting of SA is following as: RB: 300kHz / VB:300kHz / SPAN: 3MHz / AT: 20dB Ref: 10dBm / Sweep time: Auto / Sweep Mode: Continuous sweep / Detect mode: Positive peak / Trace mode: Max hold
2. EUT have transmitted the maximum modulation signal and fixed channelize ( For DSSS or OFDM Device) or continuous maximum power of hopping mode(For FHSS Device). SA set to 99% of occupied bandwidth to measure occupied bandwidth. The limit is less than 26MHz (For DSSS or OFDM Device) or 83.5MHz (For FHSS Device).
3. SA set to 90% of occupied bandwidth to measure Spread Spectrum Bandwidth and must greater than 500kHz.
4. Spread Spectrum Factor = Spread Spectrum Bandwidth / modulation rate of EUT.
5. Spread Spectrum Factor limit is greater than 5

### 6.1 TEST SETUP LAYOUT



### TEST DEVIATION

There is no deviation with the original standard.

### EUT OPERATION DURING TEST

The EUT was programmed to be in continuously transmitting mode.



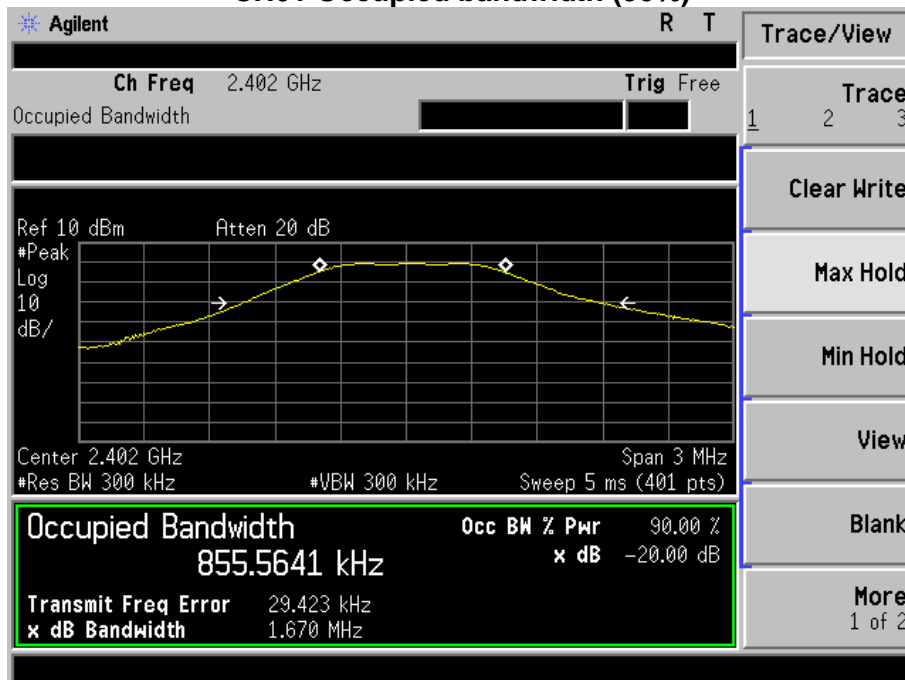
## 6.2 TEST RESULT

|      | Voltage        | 99%Occupied bandwidth MHz | Occupied Bandwidth Limit MHz | 90%Spread bandwidth MHz | Spread Bandwidth Limit |
|------|----------------|---------------------------|------------------------------|-------------------------|------------------------|
| GFSK | Normal Voltage | 1.3157                    | $\leq 26\text{MH}$           | 0.8556                  | $\geq 500\text{ kHz}$  |

CH01 Occupied bandwidth (99%)



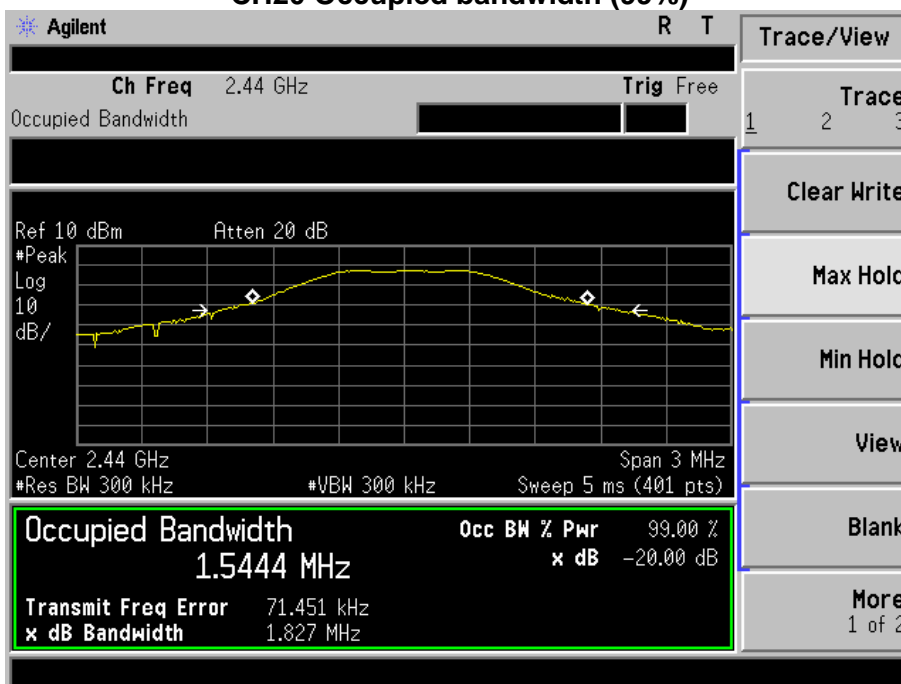
CH01 Occupied bandwidth (90%)



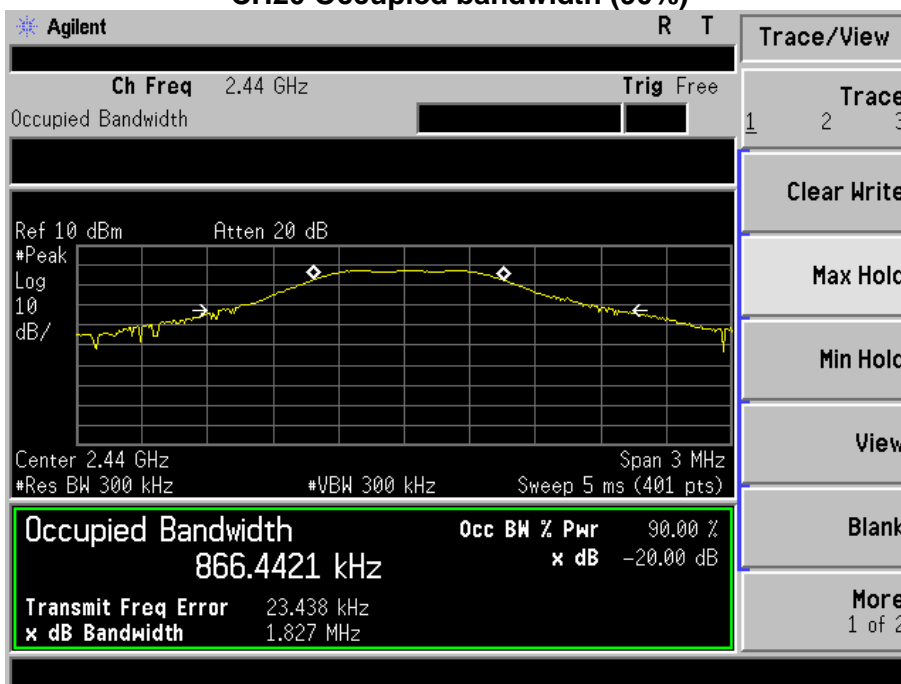


|      | Voltage        | 99%Occupied bandwidth MHz | Occupied Bandwidth Limit MHz | 90%Spread bandwidth MHz | Spread Bandwidth Limit |
|------|----------------|---------------------------|------------------------------|-------------------------|------------------------|
| GFSK | Normal Voltage | 1.5444                    | $\leq 26\text{MH}$           | 0.8664                  | $\geq 500\text{ kHz}$  |

CH20 Occupied bandwidth (99%)



CH20 Occupied bandwidth (90%)



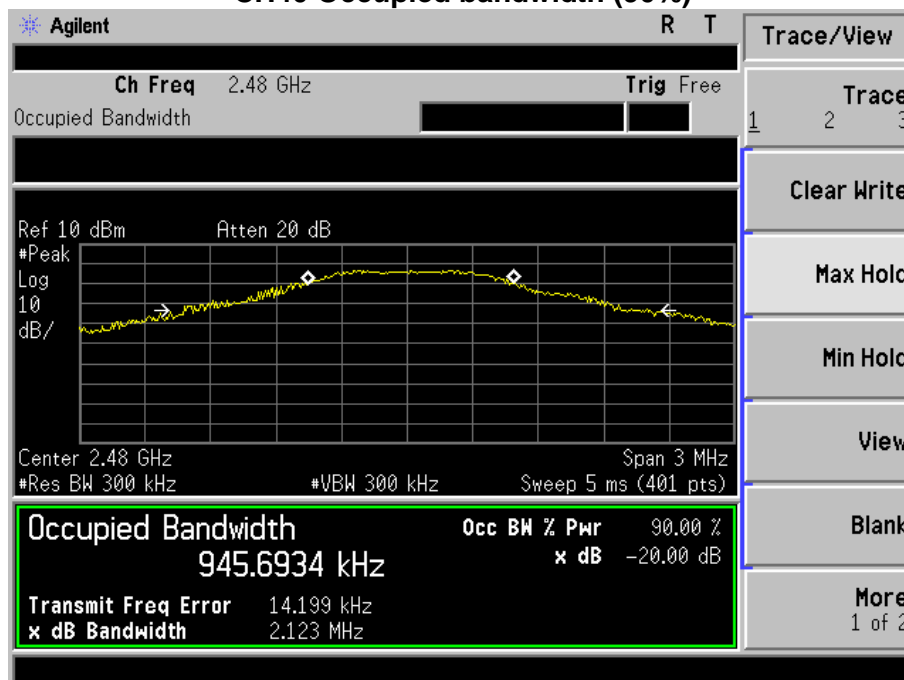


|      | Voltage        | 99%Occupied bandwidth MHz | Occupied Bandwidth Limit MHz | 90%Spread bandwidth MHz | Spread Bandwidth Limit |
|------|----------------|---------------------------|------------------------------|-------------------------|------------------------|
| GFSK | Normal Voltage | 1.7709                    | $\leq 26\text{MH}$           | 0.9457                  | $\geq 500\text{ kHz}$  |

CH40 Occupied bandwidth (99%)



CH40 Occupied bandwidth (90%)



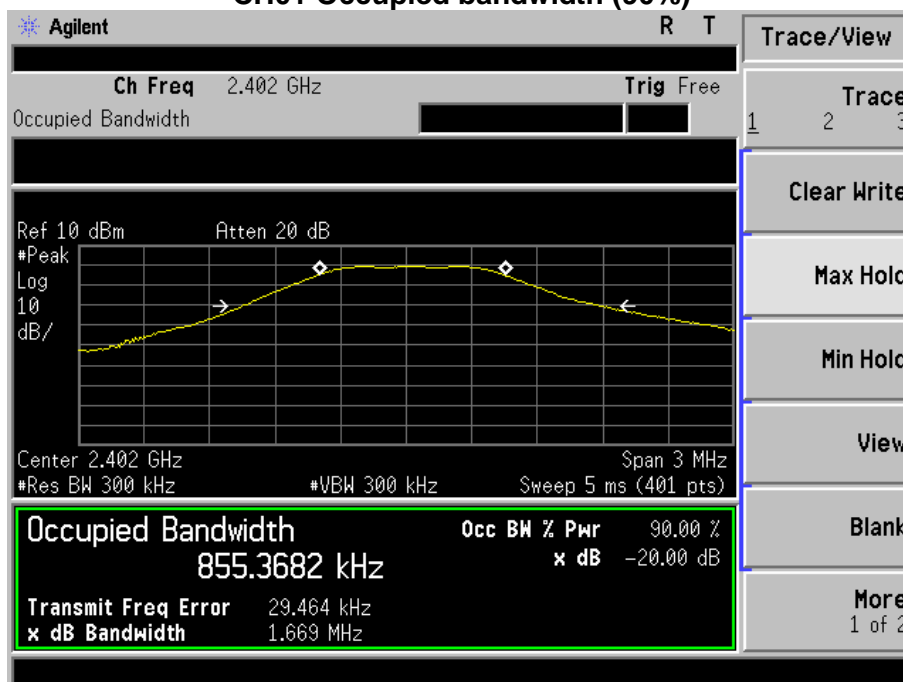


|      | Voltage             | 99%Occupied bandwidth MHz | Occupied Bandwidth Limit MHz | 90%Spread bandwidth MHz | Spread Bandwidth Limit |
|------|---------------------|---------------------------|------------------------------|-------------------------|------------------------|
| GFSK | Normal Voltage +10% | 1.3495                    | $\leq 26\text{MH}$           | 0.8554                  | $\geq 500\text{ kHz}$  |

CH01 Occupied bandwidth (99%)



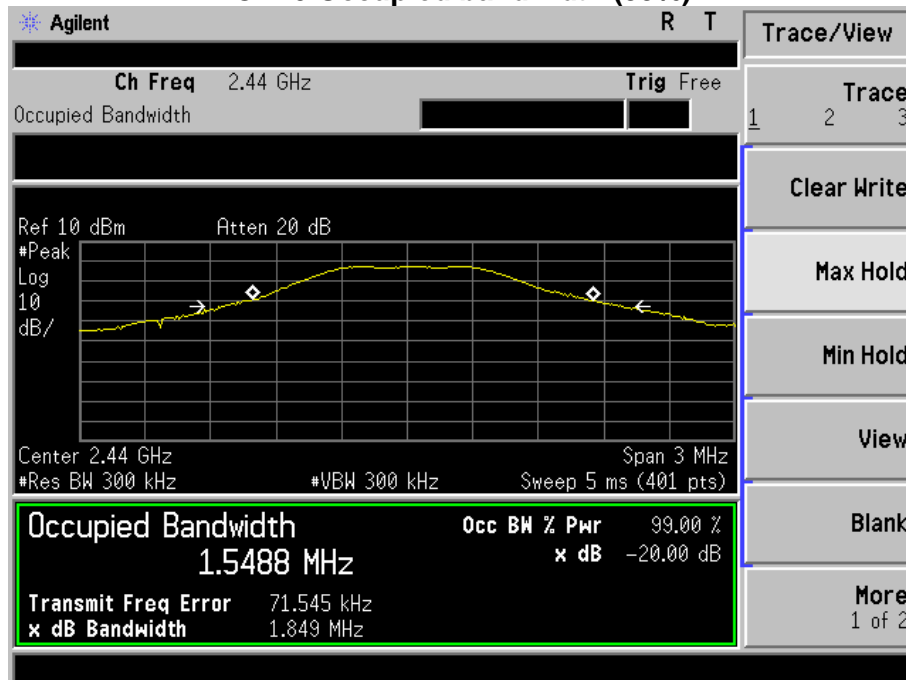
CH01 Occupied bandwidth (90%)



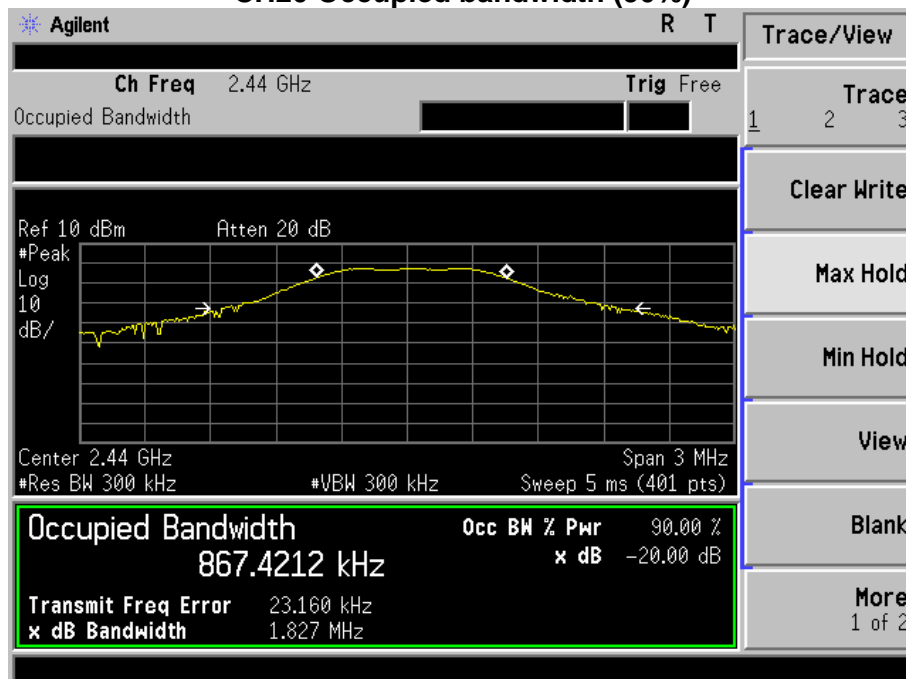


|      | Voltage             | 99%Occupied bandwidth MHz | Occupied Bandwidth Limit MHz | 90%Spread bandwidth MHz | Spread Bandwidth Limit |
|------|---------------------|---------------------------|------------------------------|-------------------------|------------------------|
| GFSK | Normal Voltage +10% | 1.5488                    | $\leq 26\text{MH}$           | 0.8674                  | $\geq 500\text{ kHz}$  |

## CH20 Occupied bandwidth (99%)



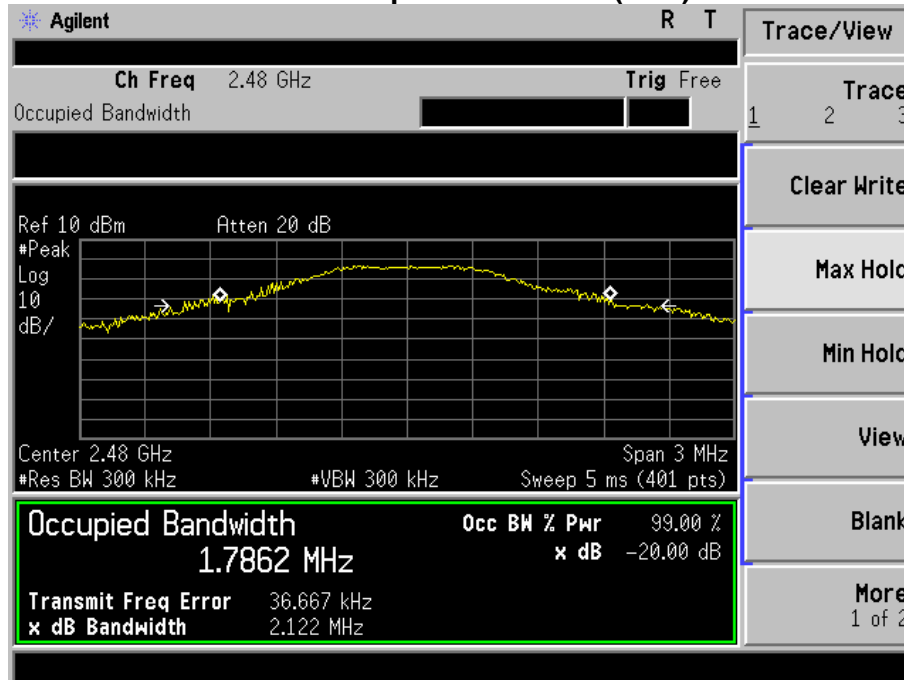
## CH20 Occupied bandwidth (90%)



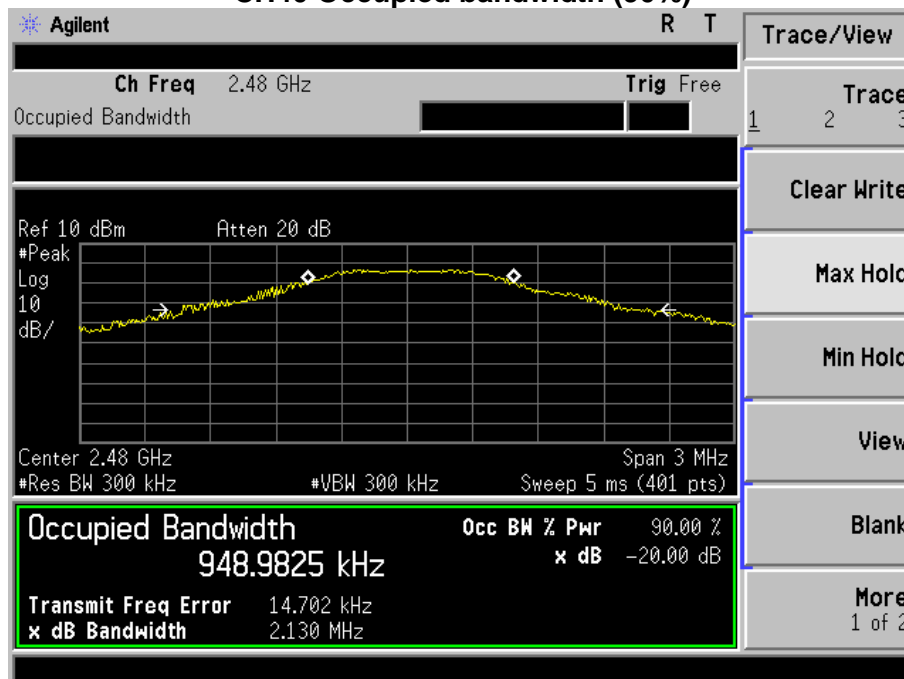


|      | Voltage             | 99%Occupied bandwidth MHz | Occupied Bandwidth Limit MHz | 90%Spread bandwidth MHz | Spread Bandwidth Limit |
|------|---------------------|---------------------------|------------------------------|-------------------------|------------------------|
| GFSK | Normal Voltage +10% | 1.7862                    | $\leq 26\text{MH}$           | 0.9490                  | $\geq 500\text{ kHz}$  |

### CH40 Occupied bandwidth (99%)



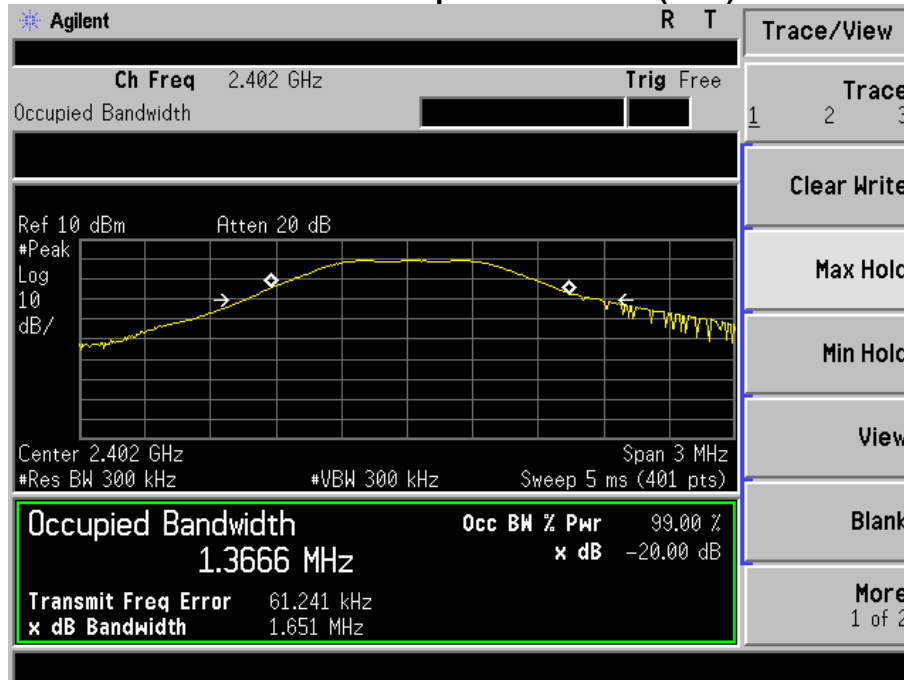
### CH40 Occupied bandwidth (90%)



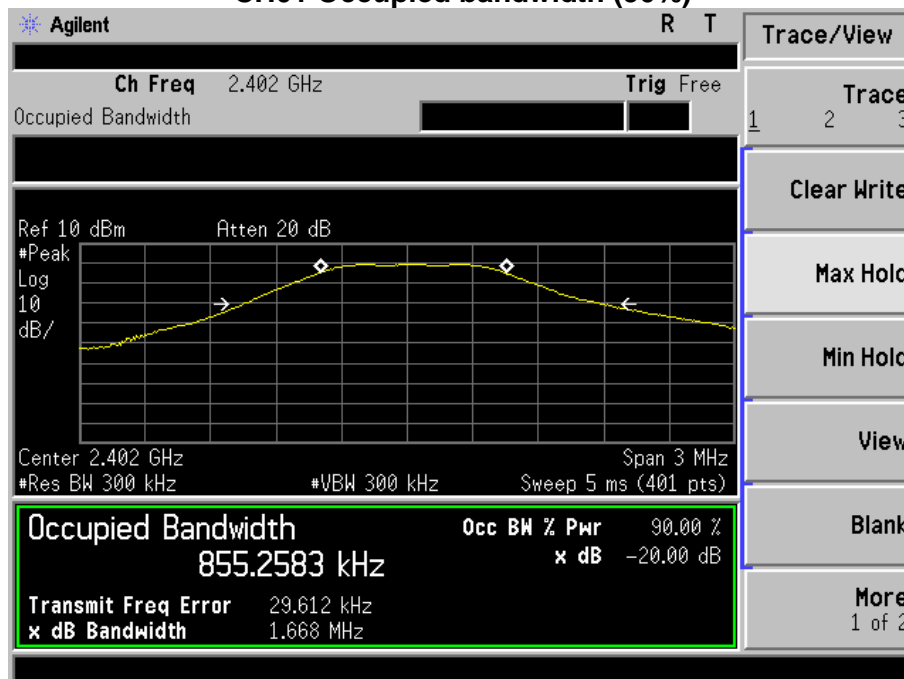


|      | Voltage             | 99%Occupied bandwidth MHz | Occupied Bandwidth Limit MHz | 90%Spread bandwidth MHz | Spread Bandwidth Limit |
|------|---------------------|---------------------------|------------------------------|-------------------------|------------------------|
| GFSK | Normal Voltage -10% | 1.3666                    | $\leq 26\text{MH}$           | 0.8553                  | $\geq 500\text{ kHz}$  |

## GFSK CH01 Occupied bandwidth (99%)



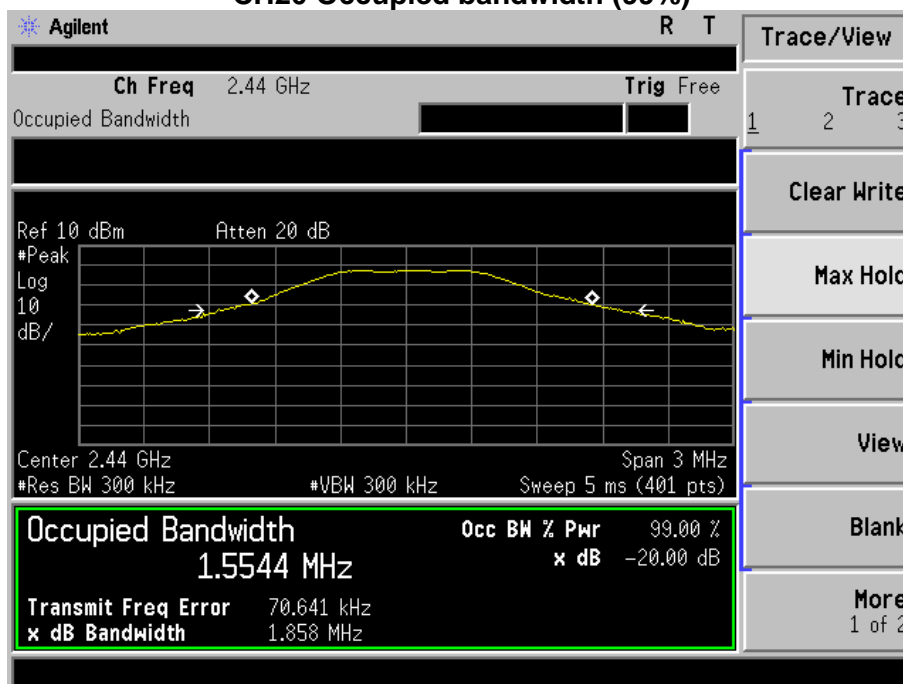
## CH01 Occupied bandwidth (90%)



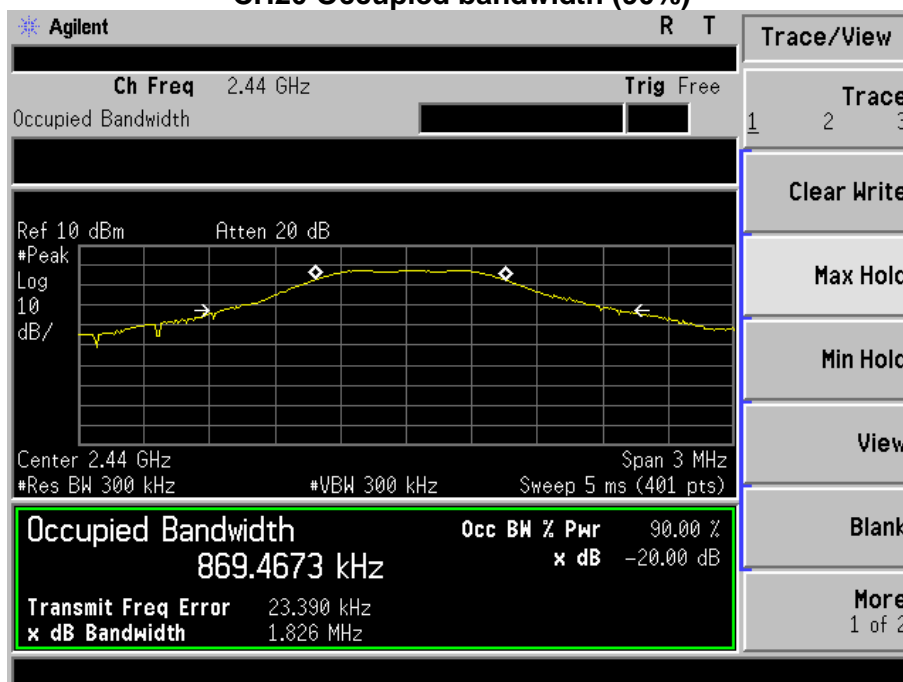


|      | Voltage             | 99%Occupied bandwidth MHz | Occupied Bandwidth Limit MHz | 90%Spread bandwidth MHz | Spread Bandwidth Limit |
|------|---------------------|---------------------------|------------------------------|-------------------------|------------------------|
| GFSK | Normal Voltage -10% | 1.5544                    | $\leq 26\text{MH}$           | 0.8695                  | $\geq 500\text{ kHz}$  |

### CH20 Occupied bandwidth (99%)



### CH20 Occupied bandwidth (90%)

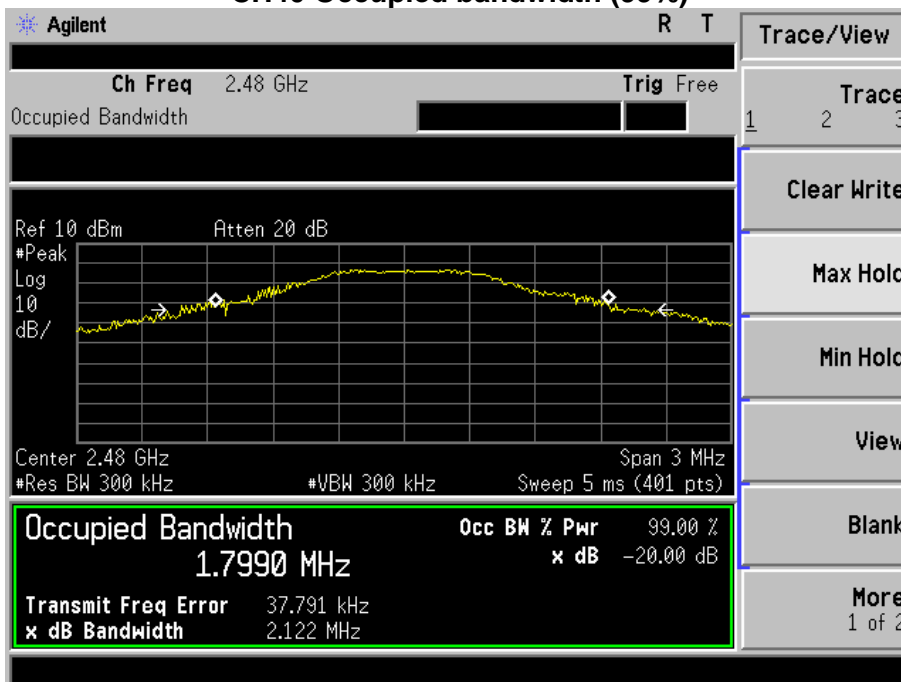




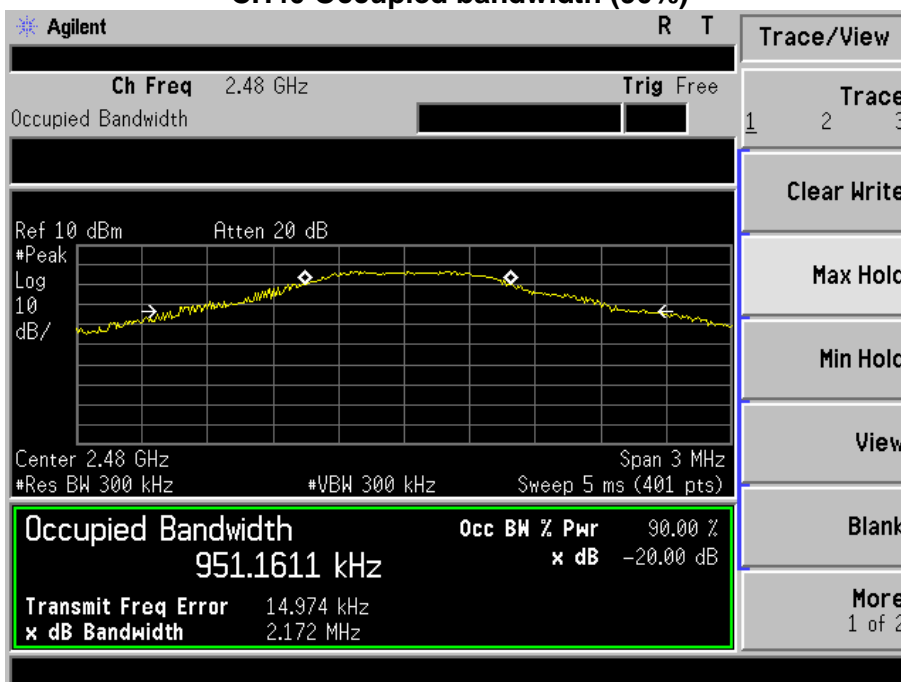


|      | Voltage                | 99%Occupied bandwidth MHz | Occupied Bandwidth Limit MHz | 90%Spread bandwidth MHz | Spread Bandwidth Limit |
|------|------------------------|---------------------------|------------------------------|-------------------------|------------------------|
| GFSK | Normal Voltage<br>-10% | 1.7990                    | $\leq 26\text{MH}$           | 0.9512                  | $\geq 500\text{ kHz}$  |

#### CH40 Occupied bandwidth (99%)



#### CH40 Occupied bandwidth (90%)





## 7. UNWANTED EMISSION INTENSITY MEASUREMENT

### 7.1 LIMIT

| Item                 | Limits   |
|----------------------|--|
| TX Spurious Emission | $\leq 0.25 \mu\text{W}$ ( $30\text{MHz} \leq f \leq 1000\text{MHz}$ )  |
|                      | $\leq 2.5 \mu\text{W}$ ( $1000\text{MHz} < f \leq 2387\text{MHz}$ )    |
|                      | $\leq 25 \mu\text{W}$ ( $2387\text{MHz} < f \leq 2400\text{MHz}$ )     |
|                      | $\leq 25 \mu\text{W}$ ( $2483.5\text{MHz} \leq f < 2496.5\text{MHz}$ ) |
|                      | $\leq 2.5 \mu\text{W}$ ( $2496.5\text{MHz} \leq f < 12500\text{MHz}$ ) |

### 7.2. MEASURING INSTRUMENTS AND SETTING

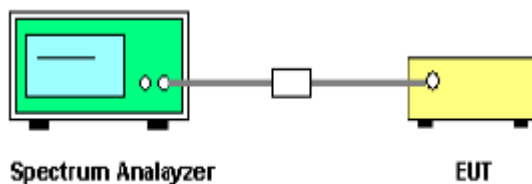
Please refer to section 5 in this report. The following table is the setting of Spectrum Analyzer.

| Spectrum Parameter | Setting  |
|--------------------|----------|
| Attenuation        | Auto     |
| RB / VB            | 1 MHz    |
| Detector           | Peak     |
| Trace              | Max Hold |
| Sweep Time         | Auto     |

### 7.3. TEST PROCEDURES

1. EUT have transmitted the maximum modulation signal and fixed channelize.
2. Setting of SA is following as: Below 1GHz RB:100KHz / VB:100KHz  
Above 1GHz RB:1MHz / VB:1MHz / AT: 10dB Ref: 0dBm / Sweep time: Auto  
Sweep Mode: Continuous sweep / Detect mode: Positive peak  
Trace mode: Max hold
3. Setting of SA is following as 30MHz and stop frequency 1000MHz Then to mark peak reading value + cable loss shall be less than 0.25 $\mu\text{W}$ .
4. Setting of SA is following as 1000MHz and stop frequency 2387MHz Then to mark peak reading value + cable loss shall be less than 2.5 $\mu\text{W}$ .
5. SA adjusted to start frequency 2387MHz and stop frequency 2400MHz. Then to mark peak reading value + cable loss shall be less than 25 $\mu\text{W}$ .
6. SA adjusted to start frequency 2483.5MHz and stop frequency 2496.5MHz Then to mark peak reading value + cable loss shall be less than 25 $\mu\text{W}$
7. SA adjusted to start frequency 2496.5MHz and stop frequency 12500MHz Then to mark peak reading value + cable loss shall be less than 2.5 $\mu\text{W}$
8. Measure side band spurious as follows: For 2.4GHz band: 2374MHz~2400MHz and 2483.5MHz~2509.5MHz RBW = VBW = 30kHz, Result\_Value = Measured\_Value + 15.2 [dBm]
9. If the Result\_Value is over the requirement, take total sum of 1MHz band centered at the spur frequency like ACLP measurement as Result\_Value.

#### 7.4. TEST SETUP LAYOUT



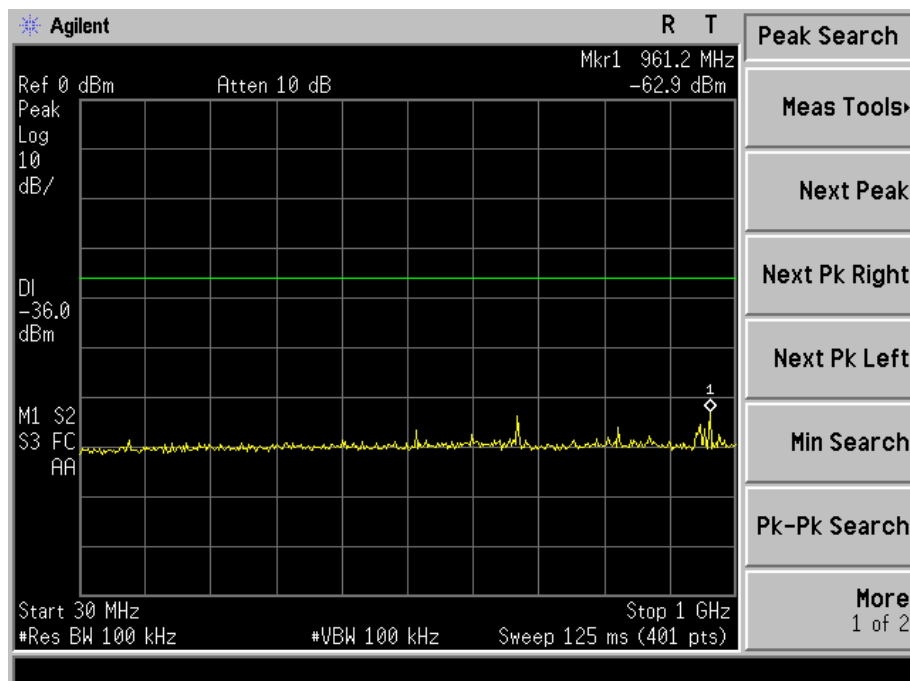
#### 7.5. TEST DEVIATION

There is no deviation with the original standard.

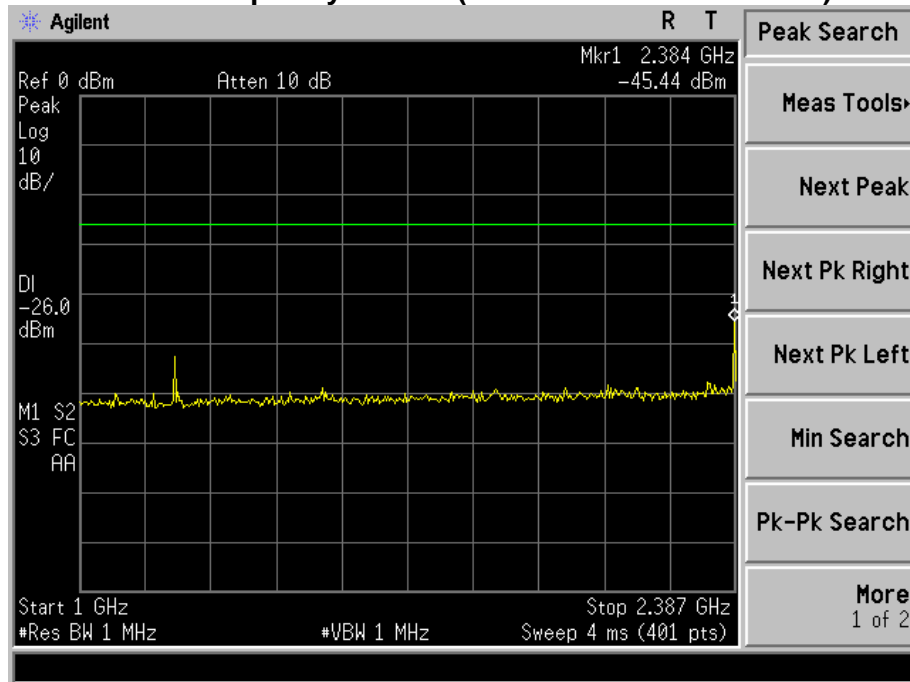
## 7.6. TEST RESULT

|                 |                                     |              |       |
|-----------------|-------------------------------------|--------------|-------|
| EUT:            | Digital Broadcasting Device (D34.1) |              |       |
| Temperature:    | 25°C                                |              |       |
| Humidity:       | 55 % RH                             | Test Voltage | DC 3V |
| Operation Mode: | GFSK TX ; Normal Voltage (DC 3V)    |              |       |

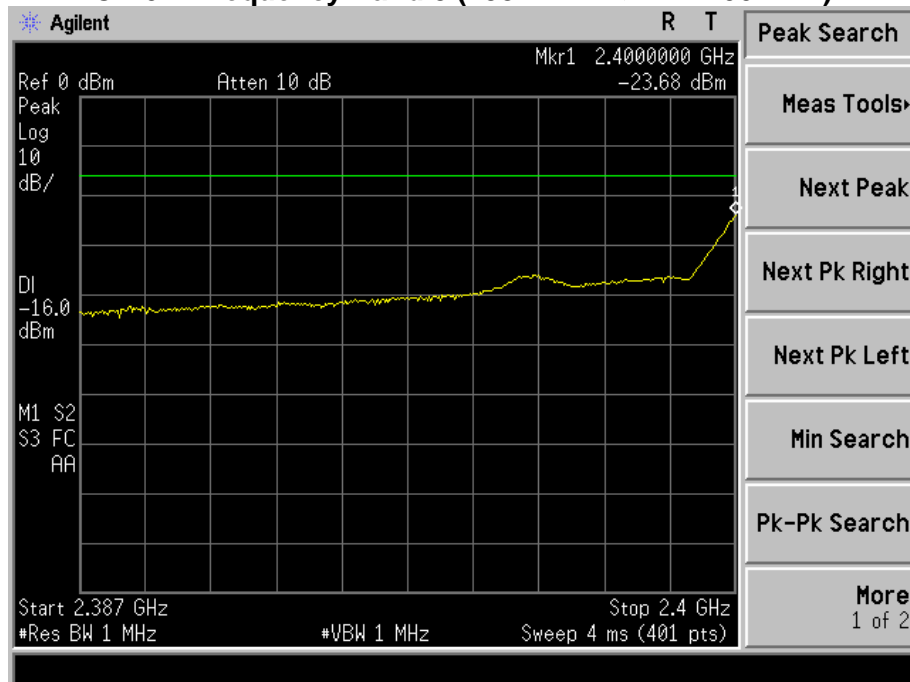
### CH 01- Frequency Band 1 (30 MHz $\leq$ f $\leq$ 1000 MHz)



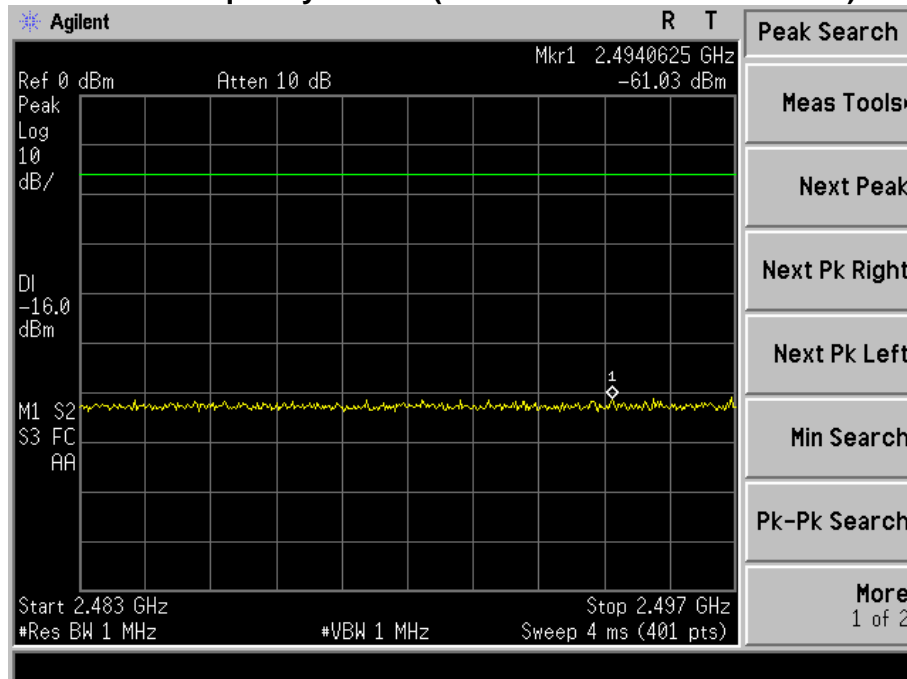
### CH 01- Frequency Band 2 ( $1000 \text{ MHz} < f \leq 2387 \text{ MHz}$ )



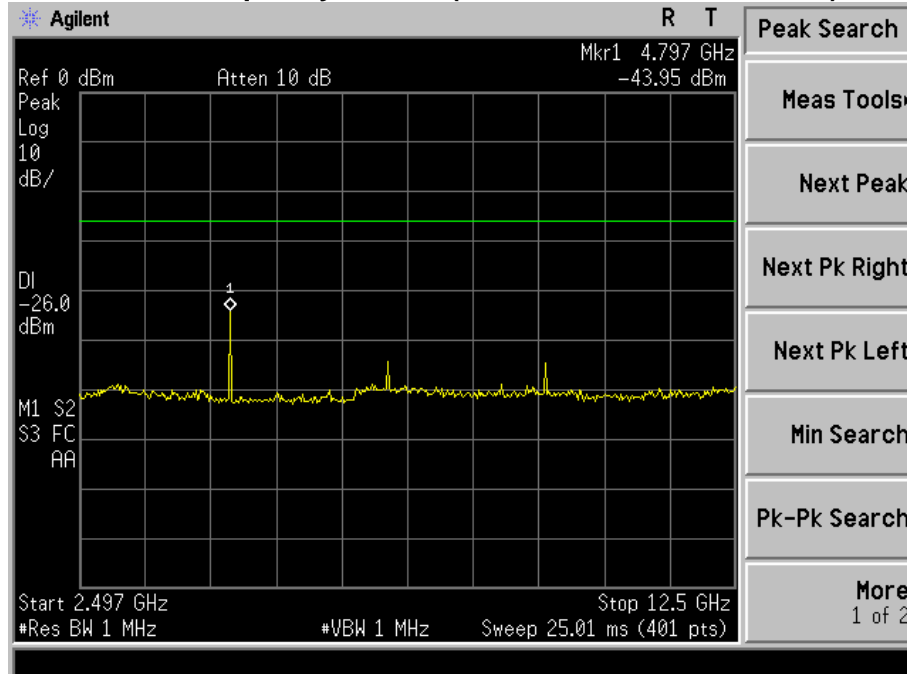
### CH 01- Frequency Band 3 ( $2387 \text{ MHz} < f \leq 2400 \text{ MHz}$ )



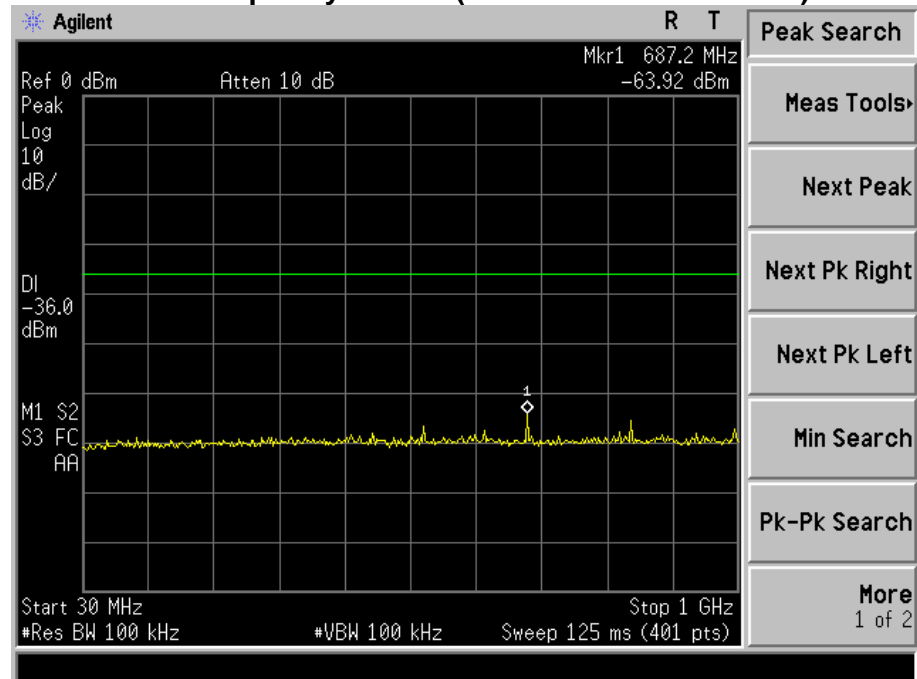
### CH 01- Frequency Band 4 ( $2483.5 \text{ MHz} \leq f < 2496.5 \text{ MHz}$ )



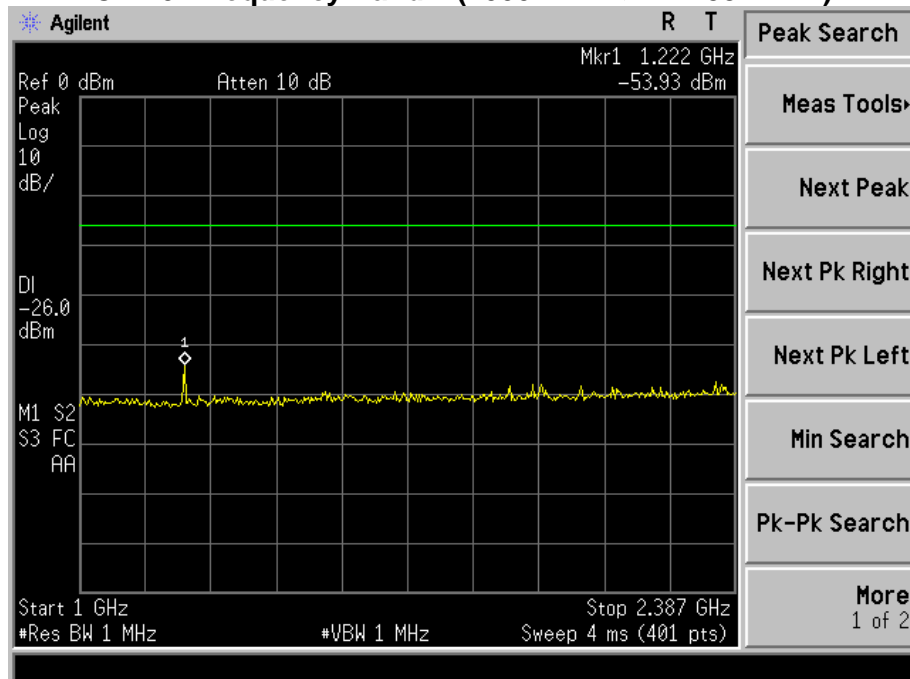
### CH 01- Frequency Band 5 ( $2496.5 \text{ MHz} \leq f < 12.5 \text{ GHz}$ )

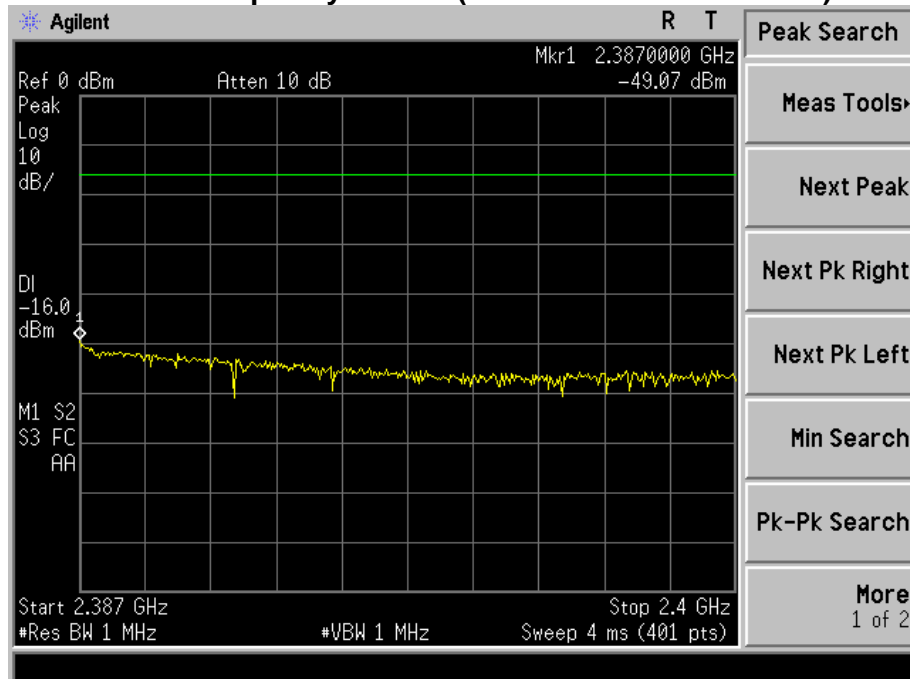
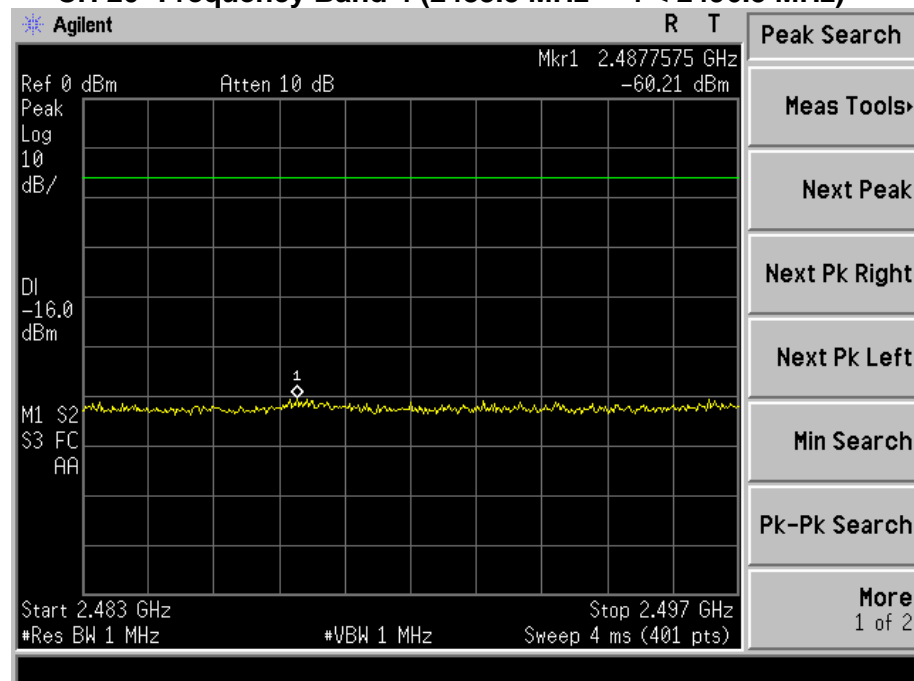


### CH 20- Frequency Band 1 ( $30 \text{ MHz} \leq f \leq 1000 \text{ MHz}$ )

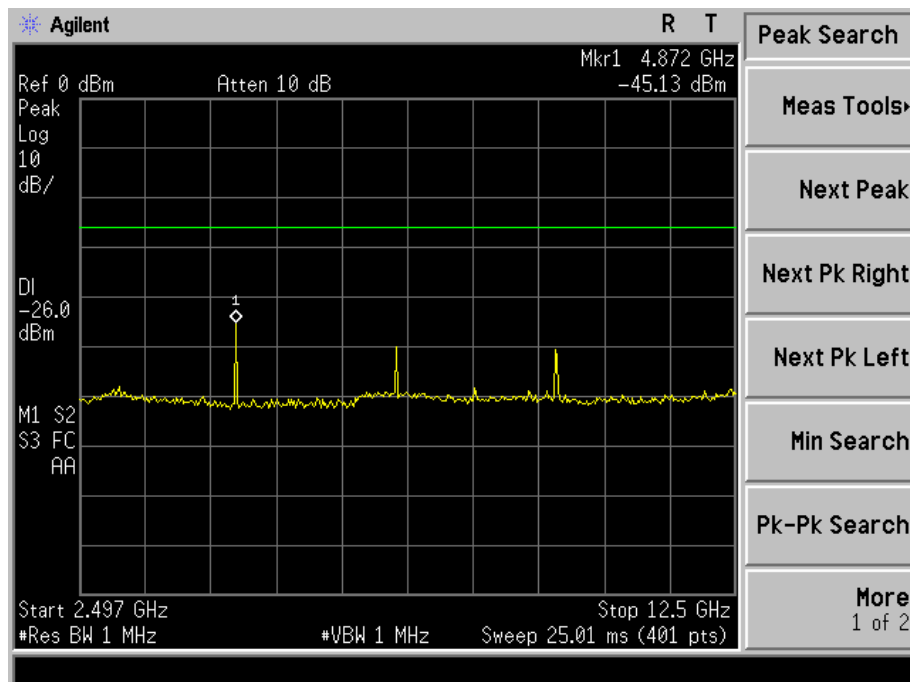


### CH 20- Frequency Band 2 ( $1000 \text{ MHz} < f \leq 2387 \text{ MHz}$ )

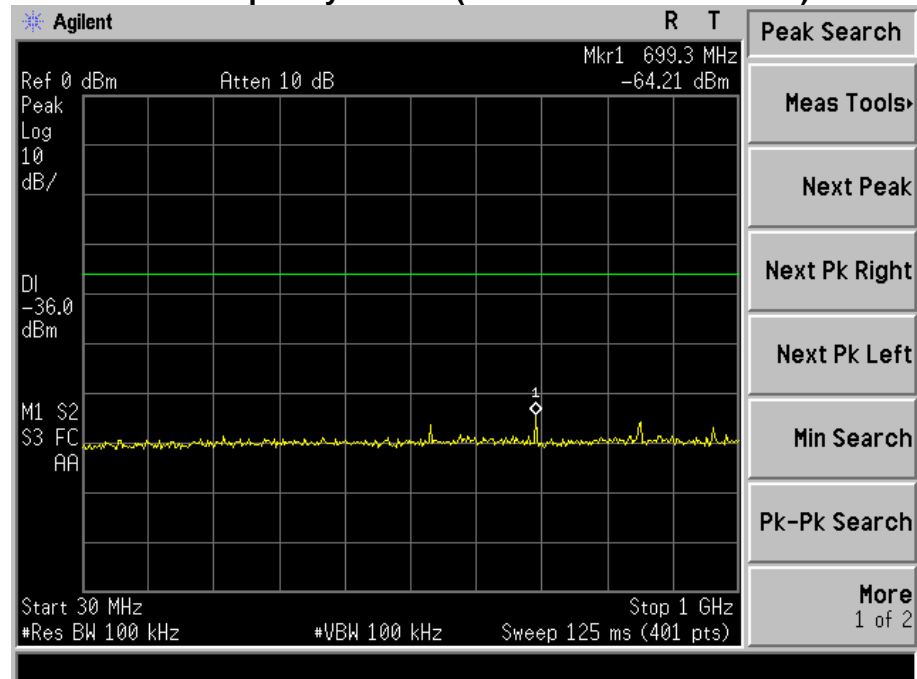


**CH 20- Frequency Band 3 ( $2387 \text{ MHz} < f \leq 2400 \text{ MHz}$ )****CH 20- Frequency Band 4 ( $2483.5 \text{ MHz} \leq f < 2496.5 \text{ MHz}$ )**

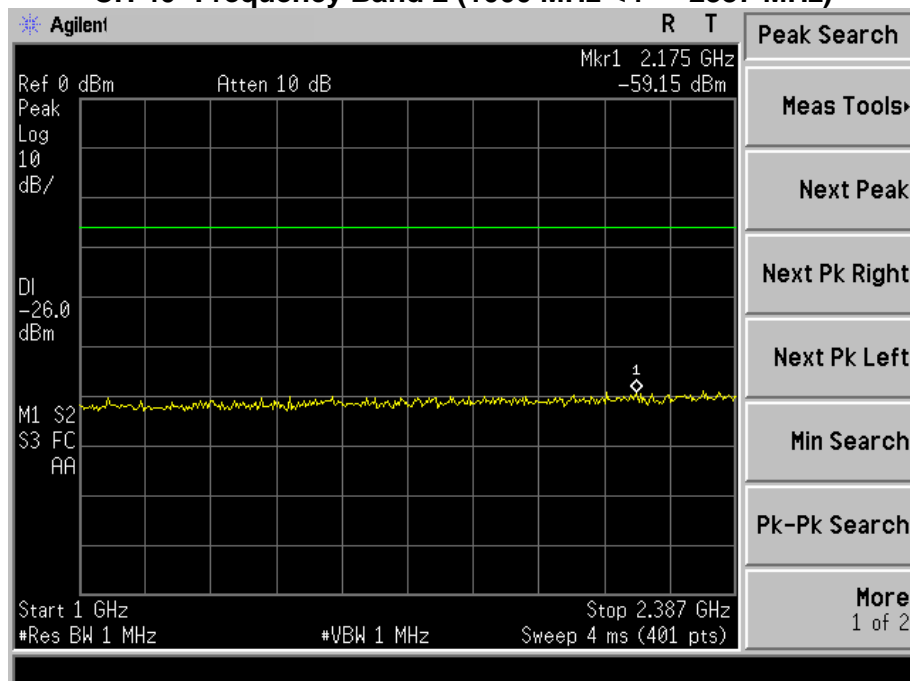


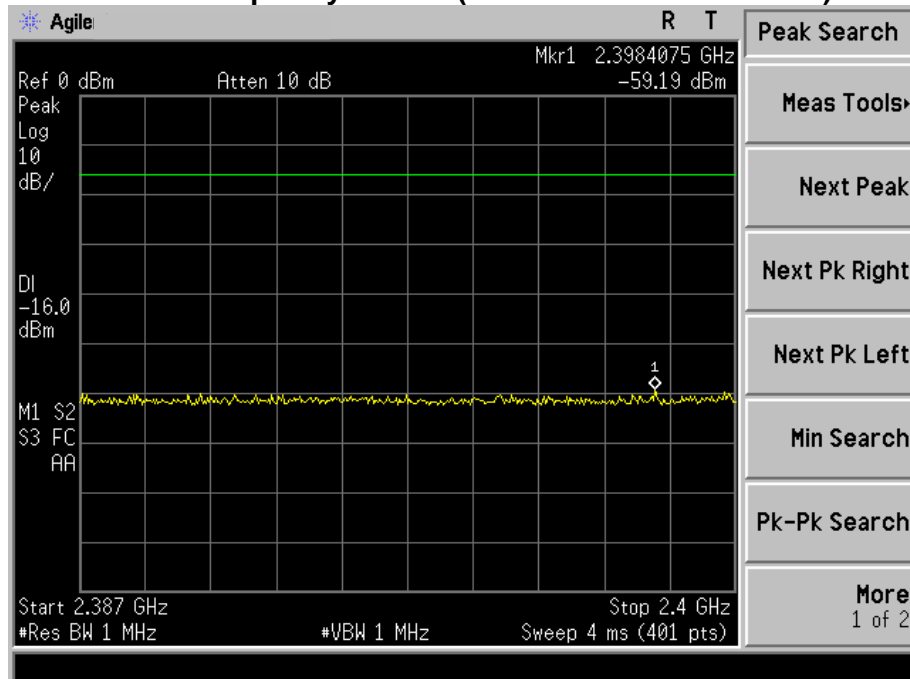
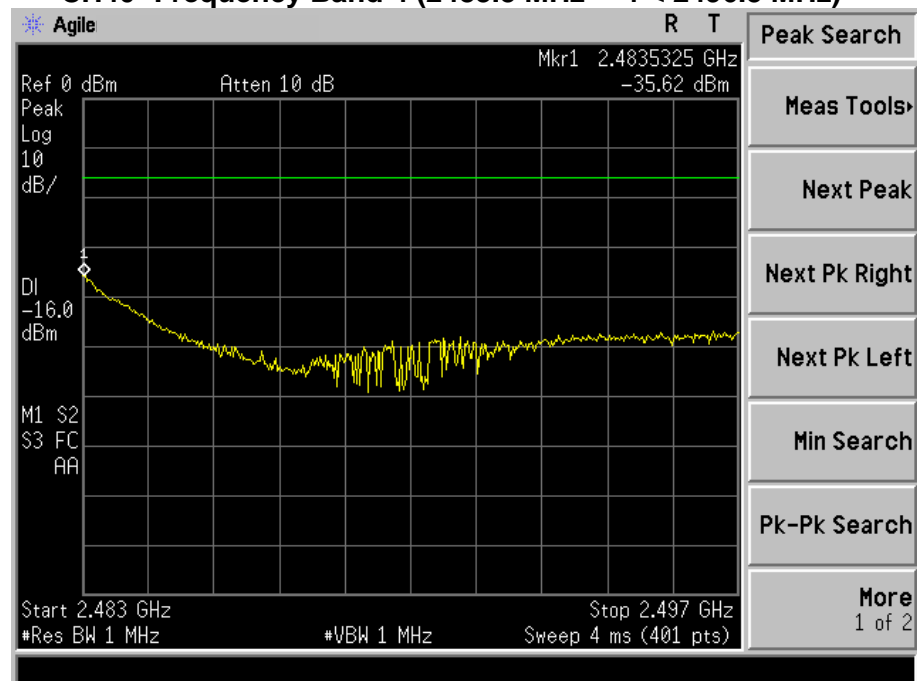
**CH 20- Frequency Band 5 ( $2496.5 \text{ MHz} \leq f < 12.5 \text{ GHz}$ )**

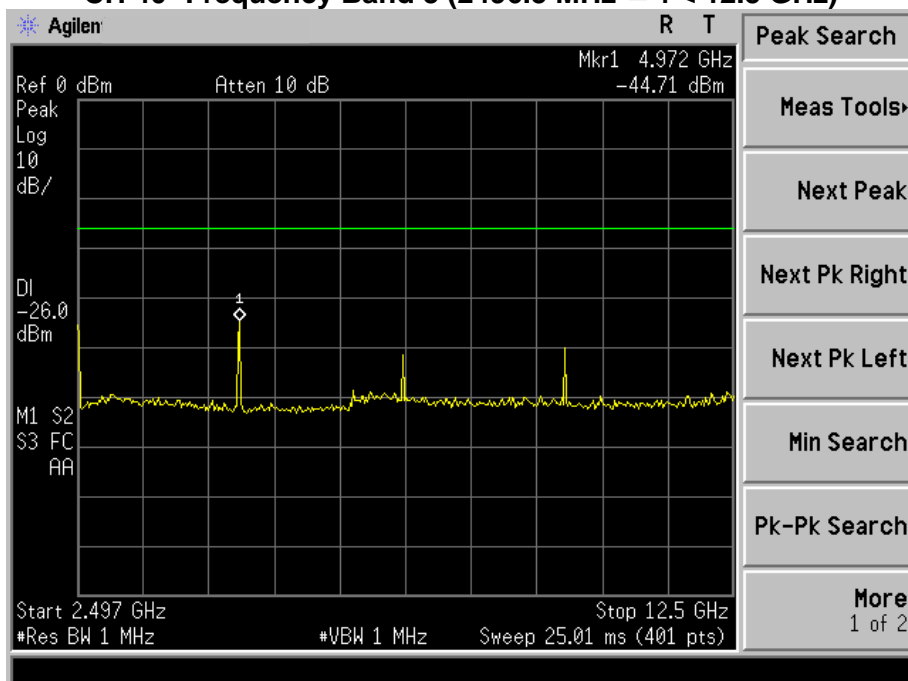
### CH 40- Frequency Band 1 ( $30 \text{ MHz} \leq f \leq 1000 \text{ MHz}$ )



### CH 40- Frequency Band 2 ( $1000 \text{ MHz} < f \leq 2387 \text{ MHz}$ )



**CH 40- Frequency Band 3 ( $2387 \text{ MHz} < f \leq 2400 \text{ MHz}$ )****CH40- Frequency Band 4 ( $2483.5 \text{ MHz} \leq f < 2496.5 \text{ MHz}$ )**

**CH 40- Frequency Band 5 ( $2496.5 \text{ MHz} \leq f < 12.5 \text{ GHz}$ )**



## 8. IMITATION OF COLLATERAL EMISSION OF RECEIVER MEASUREMENT

### 8.1 LIMIT

| Item                  | Limits                                      |
|-----------------------|---|
| RX Spurious Emission: | $\leq 4\text{nW}$ ( $f < 1\text{GHz}$ )     |
|                       | $\leq 20\text{nW}$ ( $1\text{GHz} \leq f$ ) |

### 8.2 MEASURING INSTRUMENTS AND SETTING

Please refer to section 5 in this report. The following table is the setting of Spectrum Analyzer.

| Spectrum Parameter | Setting  |
|--------------------|--|
| Attenuation        | Auto   |
| RB                 | 100 kHz (below 1GHz emissions)<br>1 MHz (above 1GHz emissions) |
| VB                 | 100 kHz (below 1GHz emissions)<br>1 MHz (above 1GHz emissions) |
| Detector           | Peak   |
| Trace              | Max Hold   |
| Sweep Time         | Auto   |

### 8.3 TEST PROCEDURES

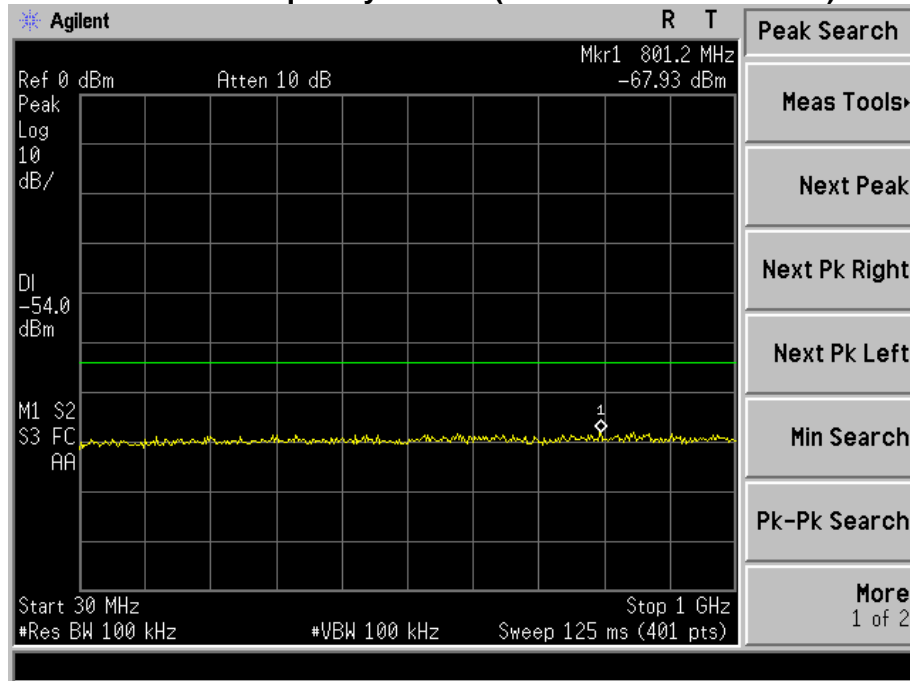
1. EUT have the continuous reception mode and fixed only one channelize.
2. Setting of SA is following as RB / VB: 100 kHz (below 1GHz emissions) / 1 MHz (above 1GHz emissions) / AT: 10dB / Ref: 0dBm / Sweep time: Auto / Sweep Mode: Continuous sweep / Detect mode: Positive peak / Trace mode: Max hold
3. SA set RB: 100kHz and VB: 100kHz. Then adjust to start frequency 30MHz and stop frequency 1000MHz. Search to mark peak reading value + cable loss shall be less than 4nW
4. SA set RB: 1MHz and VB: 1MHz. Then adjust to start frequency 1000MHz and stop frequency 12500MHz. Search to mark peak reading value + cable loss shall be less than 20nW
5. If power level of lower emissions are more than 1/10 of limit (.0.4nW for  $f < 1\text{GHz}$ , 2nW for  $f \geq 1\text{GHz}$ ), all those are to be indicated in the 2nd and 3rd lines. If others are 1/10 or less more of the limit, no necessary to be indicated.



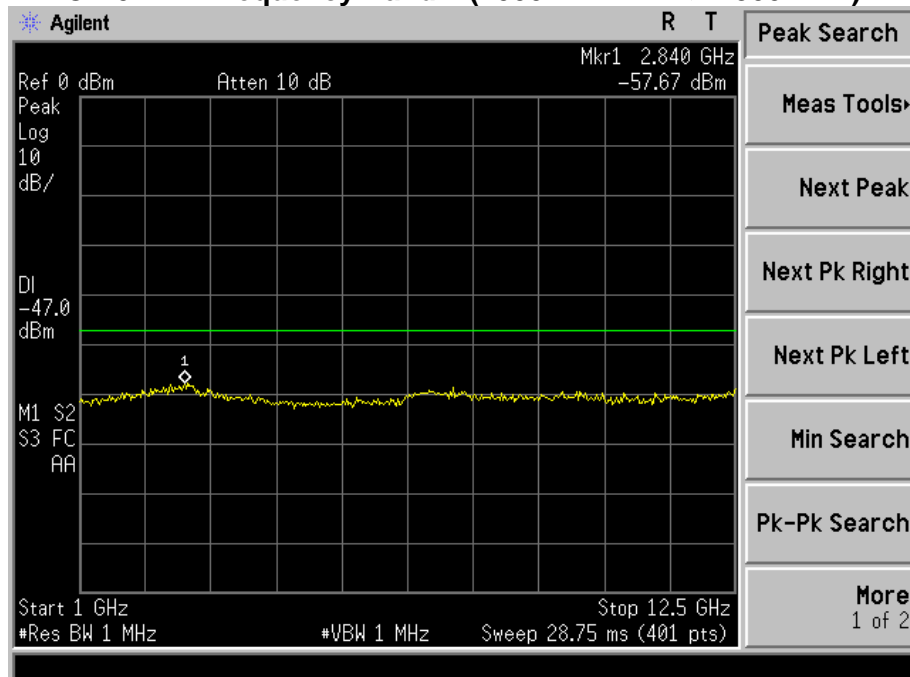
## 8.4 TEST RESULT

|                 |                                     |              |       |
|-----------------|-------------------------------------|--------------|-------|
| EUT:            | Digital Broadcasting Device (D34.1) |              |       |
| Temperature:    | 25°C                                |              |       |
| Humidity:       | 55 % RH                             | Test Voltage | DC 3V |
| Operation Mode: | GFSK                                |              |       |

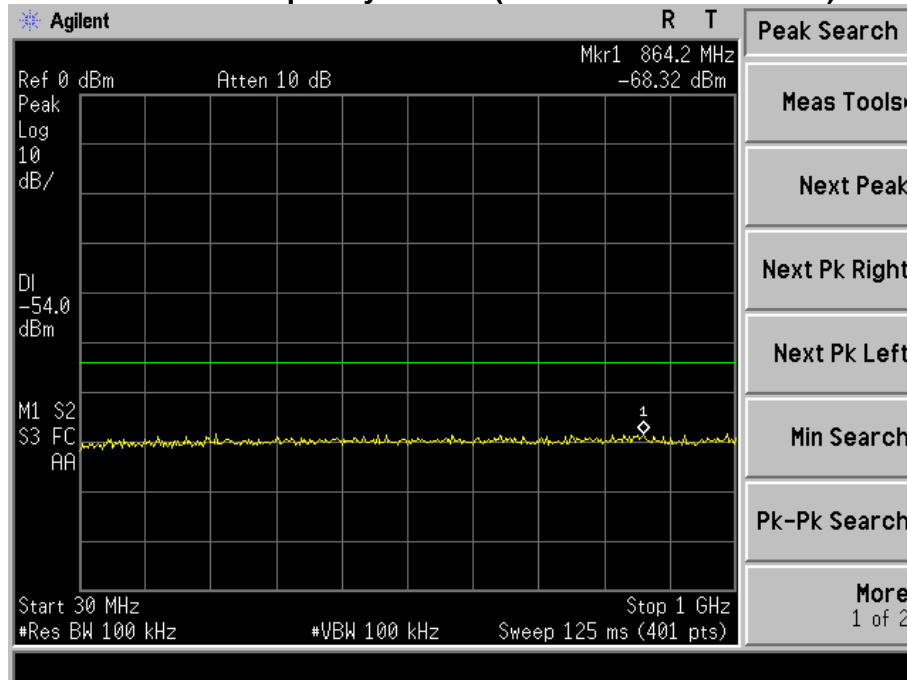
### CH 01 RX-Frequency Band 1 ( $30 \text{ MHz} \leq f < 1000 \text{ MHz}$ )



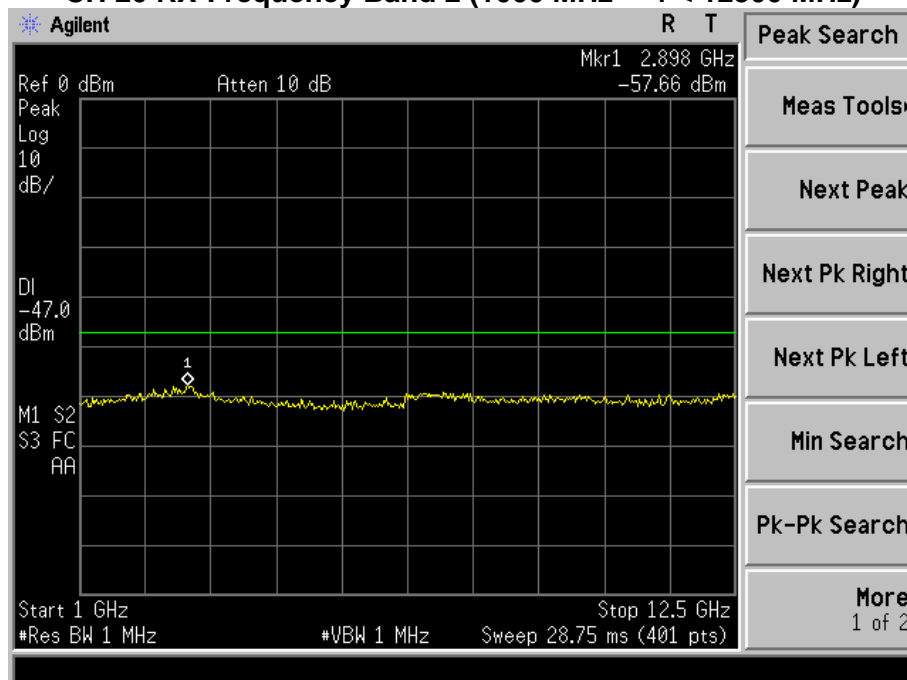
### CH 01 RX-Frequency Band 2 ( $1000 \text{ MHz} \leq f < 12500 \text{ MHz}$ )

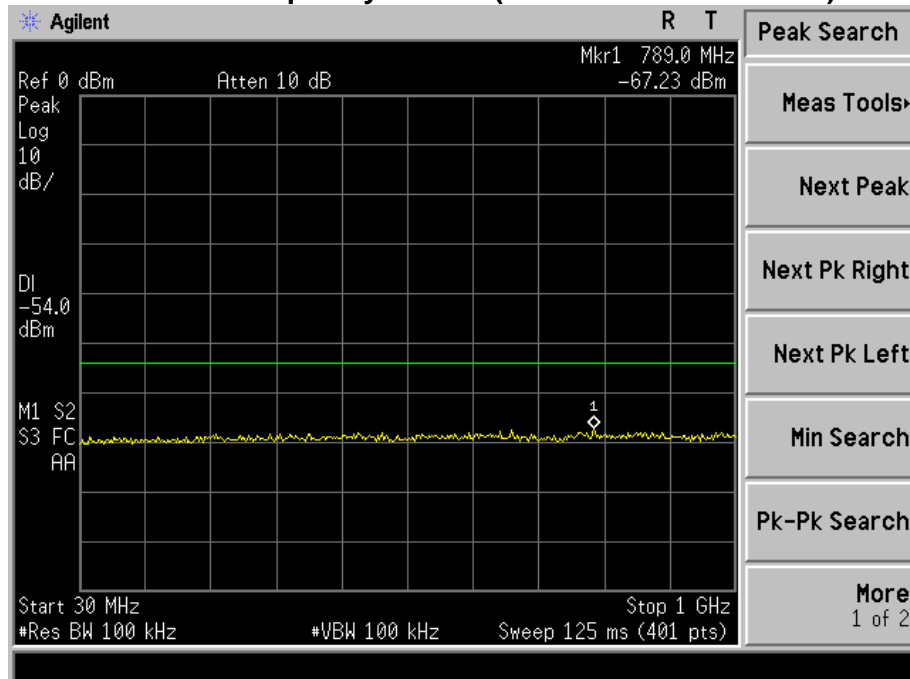
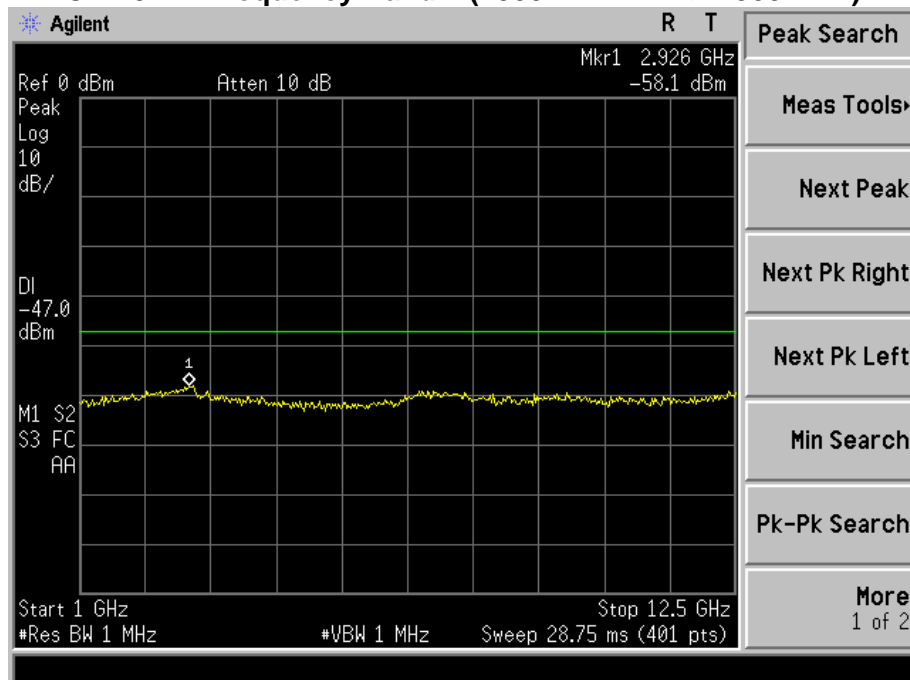


### CH 20 RX-Frequency Band 1 ( $30 \text{ MHz} \leq f < 1000 \text{ MHz}$ )



### CH 20 RX-Frequency Band 2 ( $1000 \text{ MHz} \leq f < 12500 \text{ MHz}$ )



**CH 40 RX-Frequency Band 1 ( $30 \text{ MHz} \leq f < 1000 \text{ MHz}$ )****CH 40 RX-Frequency Band 2 ( $1000 \text{ MHz} \leq f < 12500 \text{ MHz}$ )**



## 9. TRANSMISSION ANTENNA GAIN (EIRP ANTENNA POWER) MEASUREMENT

### 9.1 LIMIT

| Item  | Limits  |
|---|---|
| EIRP Power Density  | $\leq 16.91\text{dBm/MHz}$ (FH form 2427 - 2470.75 MHz)<br>$\leq 22.14\text{dBm/MHz}$ (OFDM,DS from 2400~2483.5MHz)<br>$\leq 22.14\text{dBm}$ (Other from 2400~2483.5MHz) |
| Note: This test item is not applied for radio equipment with equivalent isotropic radiation power lower than 12.14dBm/MHz, but Antenna Power(Conducted) limit is 10 mW/MHz (10 dBm/MHz), So the test item will not be applied to the transmission antenna which has a gain of 2.14dBi or less |   |

### 9.2 MEASURING INSTRUMENTS AND SETTING

Please refer to section 5 in this report. The following table is the setting of spectrum analyzer.

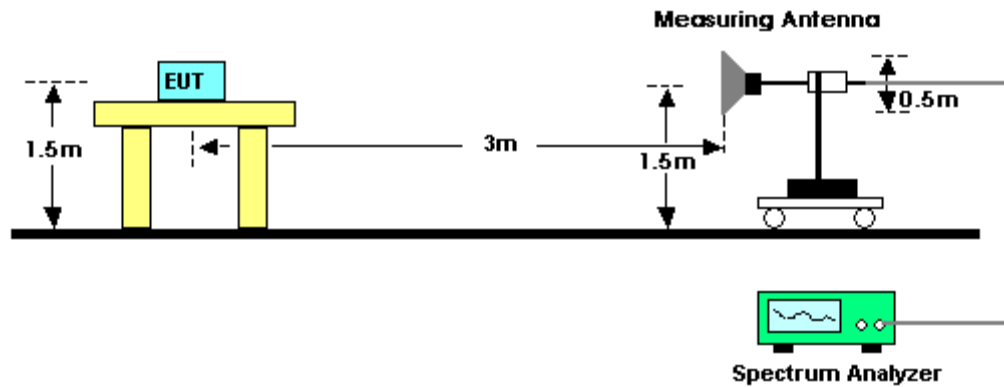
| Spectrum Parameter | Setting  |
|--------------------|----------|
| Attenuation        | Auto     |
| RB/VB              | 1 MHz    |
| Detector           | Peak     |
| Trace              | Max Hold |
| Sweep Time         | Auto     |

#### 9.2.1 TEST PROCEDURES

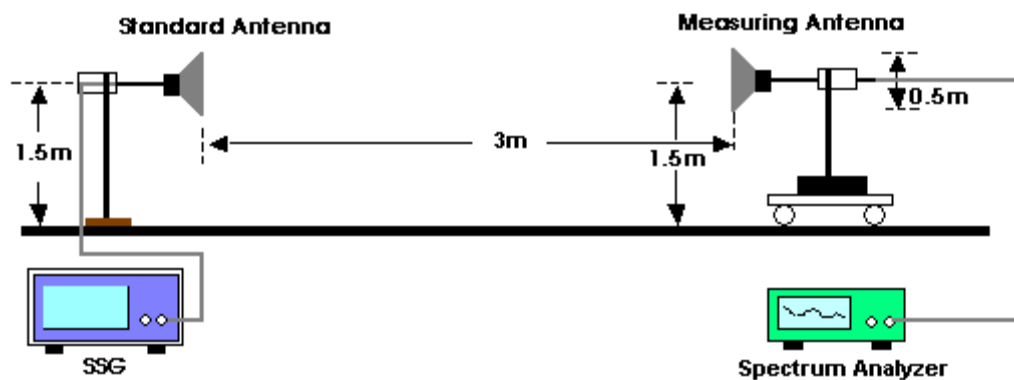
1. Set EUT ad measuring antenna at the same height and roughly facing each other.
2. Move the measuring antenna height up and down within  $\pm 50\text{cm}$  of EUT height and swing it to find the maximum output of the measuring antenna. The output level at the spectrum analyzer is read sa "E".
3. Remove the EUT from the turn table and put the replacing antenna facing to measuring antenna at same height. Set the standard signal generator (SSG) at same frequency and transmit on then receive the signal
4. Swing the replacing antenna give a maximum receiving level.
5. Move the measuring antenna height up and down within  $\pm 50\text{cm}$  of replacing antenna height and swing it to find the maximum receiving level.
6. Set SSG output power at Pt to give the equivalent output level of "E" or caluate Pt with SSG output which gives the nearest of "E" and difference ( $\pm 1\text{dB}$ ). Record the Pt.
7. Calculate EIRP by the formula below  $\text{EIRP} = \text{Gt} - \text{L} + \text{Pt}$ .  
Gt: gain of replacing antenna (dBi)  
L: feeder loss between SSG and replacing antenna  
Pt: Output power of the SSG
8. If the antenna for the EUT has circular polarization, sum of V-field and H-field will be result if measuring antenna is linear polarization.

### 9.3 TEST SETUP LAYOUT

For EUT radiation measurement



For standard antenna measurement



### 9.4 TEST DEVIATION

There is no deviation with the original standard.

### 9.5 EUT OPERATION DURING TEST

The EUT was programmed to be in continuously transmitting mode.

### 9.6 RESULTS OF TRANSMISSION ANTENNA GAIN

**Note:** This test item will not be applied to the transmission antenna which has a gain of -1.86dBi or less

## 10. TRANSMISSION RADIATION ANGLE WIDTH (3DB BEAMWIDTH) MEASUREMENT

### 10.1 LIMIT

| Item  | Limits  |
|---|---|
| 3dB antenna beam width  | $360/A$ (If $A < 1$ ; then $A=1$ )<br>$A = \{ \text{EIRP Power [mW]} / 16.36 \text{ for DS, OFDM} \}$ or<br>$A = \{ \text{EIRP Power [mW]} / 4.9 \text{ for FH} \}$ |
| Note: This test item is not applied for radio equipment with equivalent isotropic radiation power lower than 12.14dBm/MHz, but Antenna Power(Conducted) limit is 10 mW/MHz (10 dBm/MHz), So the test item will not be applied to the transmission antenna which has a gain of 2.14dBi or less |   |

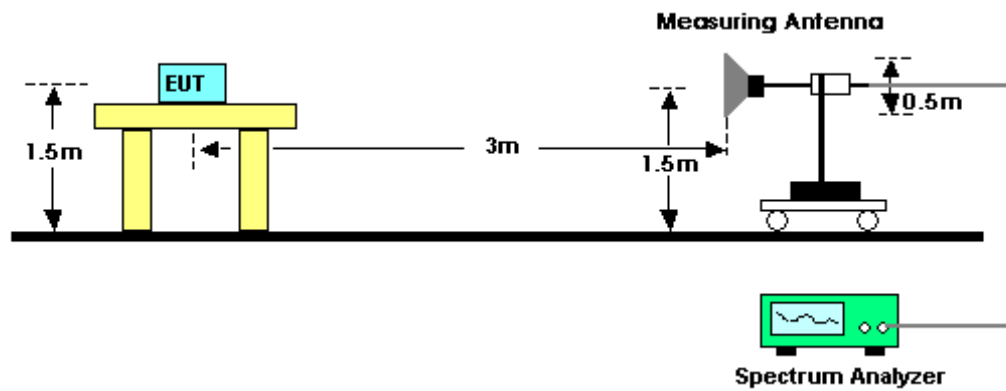
### 10.2 MEASURING INSTRUMENTS AND SETTING

| Spectrum Parameter | Setting  |
|--------------------|----------|
| Attenuation        | Auto     |
| Span Frequency     | 0 MHz    |
| RB                 | 1 MHz    |
| VB                 | 1 kHz    |
| Detector           | Peak     |
| Trace              | Max Hold |
| Sweep Time         | Auto     |

### 10.3 TEST PROCEDURES

- Set EUT and measuring antenna at the same height and roughly facing each other.
- Set spectrum analyzer with condition in section 4.7.2 and tune reference level to observe receiving signal position.
- Rotate directions of the EUT horizontally and vertically to find the maximum receiving power.
- Move the measuring antenna height up and down within  $\pm 50\text{cm}$  of EUT height and swing it to find the maximum output of measuring antenna. The output level at the spectrum analyzer is read as "E"
- Calculate permitted radiation angle in horizontal and vertical using EIRP measured in another test method.
- Calculate 3dB antenna beam width by the formula below  $360/A$  (If  $A < 1$ ; then  $A=1$ ).  
 $A = \{ \text{EIRP Power [mW]} / 16.36 \text{ for DS, OFDM} \}$  or  
 $A = \{ \text{EIRP Power [mW]} / 4.9 \text{ for FH} \}$

#### 10.4 TEST SETUP LAYOUT



#### 10.5 TEST DEVIATION

There is no deviation with the original standard.

#### 10.6 EUT OPERATION DURING TEST

The EUT was programmed to be in continuously transmitting mode.

#### 10.7 TEST RESULT OF TRANSMISSION RADIATION ANGLE WIDTH (3DB BEAMWIDTH)

The test item will not be applied to the transmission antenna which has a gain of -1.86 dBi or less

## 11. RADIO INTERFERENCE PREVENTION CAPABILITY MEASUREMENT

### 11.1 LIMIT

| Item                | Limits         |
|---------------------|----------------|
| Identification code | $\geq 48$ bits |

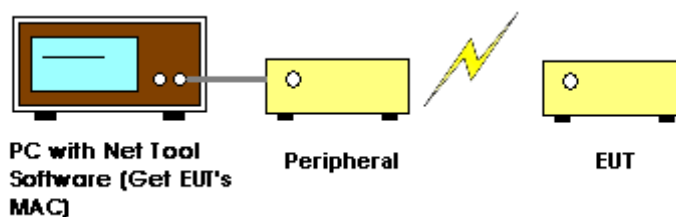
### 11.2 MEASURING ID CODE SOFTWARE

| Item        | Limits   |
|-------------|----------|
| MAC IP List | MAC Scan |

### 11.3 TEST PROCEDURES

- In the case that the EUT has the function of automatically transmitting the identification code: a. Transmit the predetermined identification codes from EUT. b. Check the transmitted identification codes with the demodulator.
- In the case of receiving the identification code: a. Transmit the predetermined identification codes from the counterpart. b. Check if communication is normal. c. Transmit the signals other than predetermined ID codes from the counterpart. d. Check if the EUT stops the transmission, or if it displays that identification codes are different from the predetermined ones.

### 11.4 TEST SETUP LAYOUT



### 11.5 TEST DEVIATION

There is no deviation with the original standard.

### 11.6 EUT OPERATION DURING TEST

The EUT was programmed to be in normal transmitting mode.

### 11.7 TEST RESULT OF RADIO INTERFERENCE PREVENTION CAPABILITY

|                 |                                     |              |       |
|-----------------|-------------------------------------|--------------|-------|
| EUT:            | Digital Broadcasting Device (D34.1) |              |       |
| Temperature:    | 25°C                                |              |       |
| Humidity:       | 55 % RH                             | Test Voltage | DC 3V |
| Operation Mode: | GFSK                                |              |       |

Bluetooth Device Address: 0C-5B-63-D9-E4-EC-34

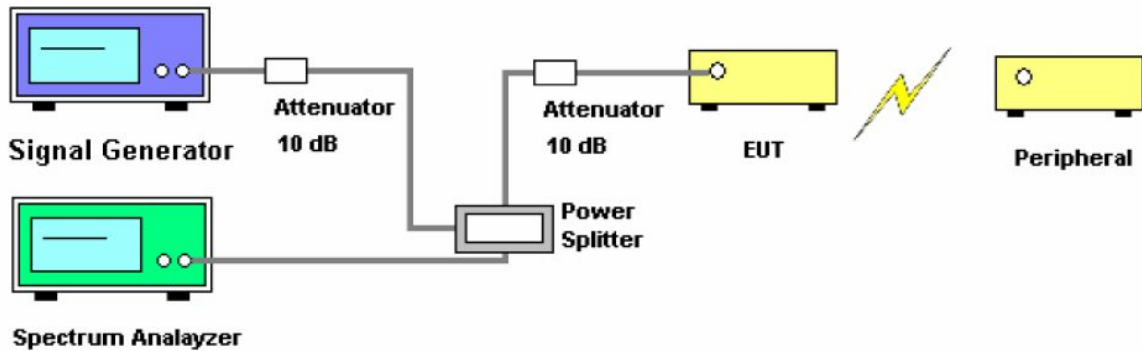
## 12. CARRIER SENSE CAPABILITY

### Limit

EUT stop RF transmission signal after carrier inject to EUT

### Test Procedure

Measurement System Diagram



1. SG adjusted the frequency as same as the EUT transmitted signal and emitted the absence of modulation from SG and power level is  $(on\ 22.79 + G - 20 \cdot \log(f) \text{ dBm})$  (G is the antenna gain, f is the test frequency).
2. turn off the RF signal of the SG.
3. EUT have transmitted the maximum modulation signal and fixed channelize.
4. Setting of SA :RBW/VBW=1MHz/1MHz, Span=50MHz, Sweep time=auto, Sweep mode=continuous, Detect mode=positive peak
5. SG RF signal on.
6. EUT shall be stop the transmitted any signal and SG RF signal off, the EUT will be continuous transmitted signal.

|        | Normal Voltage | High Voltage | Low Voltage |
|--------|----------------|--------------|-------------|
| Result | N/A            | N/A          | N/A         |

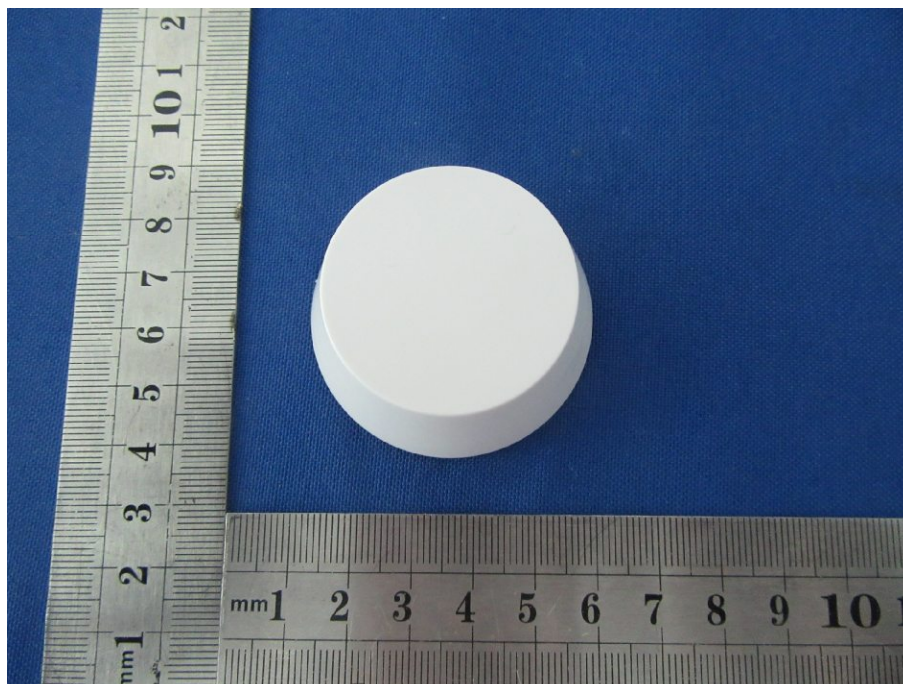
### 13. EUT TEST PHOTO

#### Measurement Photos





#### 14. EUT PHOTOS



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