

# Japan Test Report

**Test report  
On Behalf of  
KORYU Co., Ltd.**

**For  
WATERPROOF SPEAKER**

**Model No.: KSL-044, KSL-044-1, KSL-044-2, KSL-044-3,  
KSL-044-4, KSL-044-5, KSL-044-6, KSL-044-7, KSL-044-8,  
KSL-044-9**

**Prepared For :** **KORYU Co., Ltd.**  
**4-1-20 HOSODACHO NAGATAKU KOBE 6530835 JAPAN**

**Prepared By :** **Shenzhen HUAKE Testing Technology Co., Ltd.**  
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Fuhai Street, Bao'an District, Shenzhen, Guangdong, China**

**Date of Test:** **Feb. 18, 2025 ~ Mar. 07, 2025**

**Date of Report:** **Nov. 04, 2025**

**Report Number:** **HK2510155661-E**

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## Test Result Certification

**Applicant's name** ..... : KORYU Co., Ltd.  
**Address**..... : 4-1-20 HOSODACHO NAGATAKU KOBE 6530835 JAPAN  
**Manufacturer's Name**..... : Guangdong Shenglai Technology Co., Ltd  
**Address**..... : Zhongtai Industrial Zone, Hengshan Village, Gurao Town,  
Chaoyang District, Shantou City, Guangdong Province, China  
**Product description**  
**Trade Mark:** N/A  
**Product name** ..... : WATERPROOF SPEAKER  
**Model and/or type reference** : KSL-044, KSL-044-1, KSL-044-2, KSL-044-3, KSL-044-4,  
KSL-044-5, KSL-044-6, KSL-044-7, KSL-044-8, KSL-044-9  
**Standards**..... : Article 2 Paragraph 1 of Item 19

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**Date of Test** .....

Date (s) of performance of tests.... **Feb. 18, 2025 ~ Mar. 07, 2025**

Date of Issue ..... **Nov. 04, 2025**

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

Testing Engineer :

*Len Liao*

(Len Liao)

Technical Manager :

*Sliver Wan*

(Sliver Wan)

Authorized Signatory :

*Jason Zhou*

(Jason Zhou)

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**\*\* Modified History \*\***

| Revision     | Description                                                                       | Issued Date   | Remark     |
|--------------|-----------------------------------------------------------------------------------|---------------|------------|
| Revision 1.0 | Initial Test Report Release                                                       | Mar. 07, 2025 | Jason Zhou |
| Revision 2.0 | Change applicant and add series model photos. Original report No.: HK2502180616-E | Nov. 04, 2025 | Jason Zhou |
|              |                                                                                   |               |            |

## 1 Test Summary

### 1.1 Test Procedures and Results

Test procedures according to the technical standards:

| Rule Section           | Description of Test                   | Result   |
|------------------------|---------------------------------------|----------|
| Transmitter Parameters |                                       |          |
| 3.2 (2)                | Antenna Power<br>(EIRP Antenna Power) | Complies |
| 3.2 (3)                | Tolerances for Antenna Power          | Complies |
| 3.2 (4)                | Frequency Tolerance                   | Complies |
| 3.2 (7)                | Occupied Frequency Bandwidth          | Complies |
| 3.2 (9)                | Process Gain                          | Complies |
| 3.2 (10)               | Number of Carriers                    | N/A      |
| 3.2 (11)               | Dwell Time                            | Complies |
| 3.2 (6)                | Spurious Emissions                    | Complies |
| /                      | Interference prevention function      | Complies |
| /                      | Carrier Sensing function              | N/A      |
| Receiver Parameters    |                                       |          |
| 3.3 (1)                | Secondary Radiated Emissions          | Complies |

**NOTE:**

- 1) "N/A" denotes test is not applicable in this Test Report.
- 2) MIC Public Notice 88:2023, annex 1 and annex 43.
- 3) MIC Ordinance Regulating Radio Equipment Section 4.17 of Article 49.20.
- 4) Referenced in the standard ARIB STD-T66.

## 1.2 Information of the Test Laboratory

Shenzhen HUAKE Testing Technology Co., Ltd.

Add.: 1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

## 1.3 Measurement Uncertainty

The reported uncertainty of measurement  $y \pm U$ , where expanded 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   | Conducted Emission Test       | $\pm 2.71\text{dB}$ |
| 2   | Radiated Emission Test        | $\pm 4.26\text{dB}$ |
| 3   | RF power, conducted           | $\pm 0.37\text{dB}$ |
| 4   | Spurious emissions, conducted | $\pm 2.20\text{dB}$ |
| 5   | All emissions, radiated (<1G) | $\pm 3.90\text{dB}$ |
| 6   | All emissions, radiated (>1G) | $\pm 4.28\text{dB}$ |

## 2 General Information

### 2.1 General Description of EUT

|                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                          |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Equipment                                                                                                                                                                                                                                                                                                                   | WATERPROOF SPEAKER                                                                                                                                       |
| Model Name                                                                                                                                                                                                                                                                                                                  | KSL-044                                                                                                                                                  |
| Series Model                                                                                                                                                                                                                                                                                                                | KSL-044-1, KSL-044-2, KSL-044-3, KSL-044-4, KSL-044-5, KSL-044-6, KSL-044-7, KSL-044-8, KSL-044-9                                                        |
| Model Difference                                                                                                                                                                                                                                                                                                            | All model's the function, software and electric circuit are the same, only with a product color and model named different.<br>Test sample mode: KSL-044. |
| Antenna Type                                                                                                                                                                                                                                                                                                                | PCB Antenna                                                                                                                                              |
| Antenna Gain                                                                                                                                                                                                                                                                                                                | -0.68dBi                                                                                                                                                 |
| BT Operation frequency                                                                                                                                                                                                                                                                                                      | 2402-2480MHz                                                                                                                                             |
| Number of Channels                                                                                                                                                                                                                                                                                                          | 79CH                                                                                                                                                     |
| Modulation Type                                                                                                                                                                                                                                                                                                             | GFSK, Pi / 4DQPSK                                                                                                                                        |
| Data Rate                                                                                                                                                                                                                                                                                                                   | 1Mbps, 2Mbps                                                                                                                                             |
| Power Source                                                                                                                                                                                                                                                                                                                | DC 5V From Type-C or DC 3.7V From Battery                                                                                                                |
| Power Rating                                                                                                                                                                                                                                                                                                                | DC 5V From Type-C or DC 3.7V From Battery                                                                                                                |
| Firmware Version                                                                                                                                                                                                                                                                                                            | V1.0                                                                                                                                                     |
| Hardware Version                                                                                                                                                                                                                                                                                                            | V1.0                                                                                                                                                     |
| <b>Note:</b><br>1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.<br>2. Antenna gain Refer to the antenna specifications.<br>3. The cable loss data is obtained from the supplier.<br>4. The test results in the report only apply to the tested sample. |                                                                                                                                                          |

### 2.1.1 Carrier Frequency of Channels

| Channel List |                 |         |                 |         |                 |
|--------------|-----------------|---------|-----------------|---------|-----------------|
| Channel      | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 00           | 2402            | 27      | 2429            | 54      | 2456            |
| 01           | 2403            | 28      | 2430            | 55      | 2457            |
| 02           | 2404            | 29      | 2431            | 56      | 2458            |
| 03           | 2405            | 30      | 2432            | 57      | 2459            |
| 04           | 2406            | 31      | 2433            | 58      | 2460            |
| 05           | 2407            | 32      | 2434            | 59      | 2461            |
| 06           | 2408            | 33      | 2435            | 60      | 2462            |
| 07           | 2409            | 34      | 2436            | 61      | 2463            |
| 08           | 2410            | 35      | 2437            | 62      | 2464            |
| 09           | 2411            | 36      | 2438            | 63      | 2465            |
| 10           | 2412            | 37      | 2439            | 64      | 2466            |
| 11           | 2413            | 38      | 2440            | 65      | 2467            |
| 12           | 2414            | 39      | 2441            | 66      | 2468            |
| 13           | 2415            | 40      | 2442            | 67      | 2469            |
| 14           | 2416            | 41      | 2443            | 68      | 2470            |
| 15           | 2417            | 42      | 2444            | 69      | 2471            |
| 16           | 2418            | 43      | 2445            | 70      | 2472            |
| 17           | 2419            | 44      | 2446            | 71      | 2473            |
| 18           | 2420            | 45      | 2447            | 72      | 2474            |
| 19           | 2421            | 46      | 2448            | 73      | 2475            |
| 20           | 2422            | 47      | 2449            | 74      | 2476            |
| 21           | 2423            | 48      | 2450            | 75      | 2477            |
| 22           | 2424            | 49      | 2451            | 76      | 2478            |
| 23           | 2425            | 50      | 2452            | 77      | 2479            |
| 24           | 2426            | 51      | 2453            | 78      | 2480            |
| 25           | 2427            | 52      | 2454            |         |                 |
| 26           | 2428            | 53      | 2455            |         |                 |

### 2.2 Operation of EUT During Testing

| Tested mode, channel, and data rate information |             |                 |
|-------------------------------------------------|-------------|-----------------|
| Mode                                            | Channel     | Frequency (MHz) |
| Carrier Tx Mode                                 | CH0         | 2402            |
|                                                 | CH39        | 2441            |
|                                                 | CH78        | 2480            |
| hopping on Tx Mode                              | CH0 to CH78 | 2402 to 2480    |
| Tx Mode                                         | CH0         | 2402            |
|                                                 | CH39        | 2441            |
|                                                 | CH78        | 2480            |
| Rx Mode                                         | CH0         | 2402            |
|                                                 | CH78        | 2480            |

## 2.3 Description of Test Setup



## 2.4 Test Conditions

The BT module 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 mode                                                                                                                                                               | Input Voltage | Radio Unit Voltage |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------------------|
| DC Input                                                                                                                                                                   | DC 4.5V       | 3.31V              |
|                                                                                                                                                                            | DC 5.0V       | 3.30V              |
|                                                                                                                                                                            | DC 5.5V       | 3.30V              |
| Battery                                                                                                                                                                    | DC 3.33V      | 3.31V              |
|                                                                                                                                                                            | DC 3.70V      | 3.30V              |
|                                                                                                                                                                            | DC 4.07V      | 3.30V              |
| Note: 1 The radio unit Voltage with the module regulator IC regulator.<br>2 The radio unit less than 1%, so the test only rated voltage (Normal voltage) with the battery. |               |                    |

During the input supply voltage to the EUT from the external power source is varied by +/- 10%, if output voltage had been confirmed that the fluctuation of power supply to the RF circuit of EUT (excluding power source) is equal to or less than +/-1%. Exempt extremely high and low supply voltage condition test, EUT only operated in normal voltage to test all regulations.

## 2.5 Measurement Instruments List

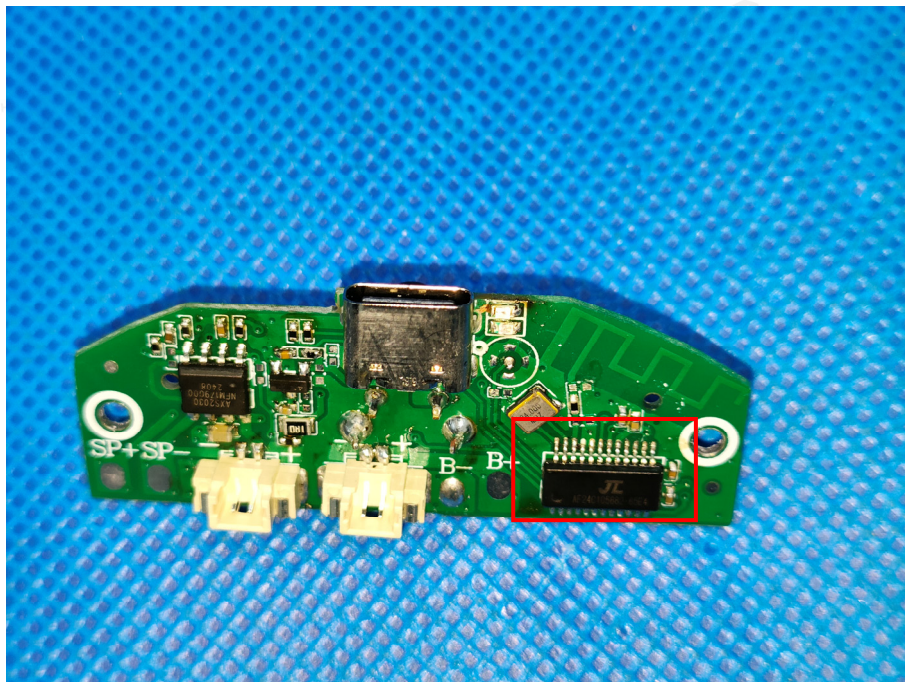
| Item | Equipment                       | Manufacturer | Calibration Institution                   | Model No.               | Serial No. | Equipment Number | Last Cal.  | Cal. Interval |
|------|---------------------------------|--------------|-------------------------------------------|-------------------------|------------|------------------|------------|---------------|
| 1    | Spectrum analyzer               | Agilent      | Guangzhou LiSai Metrology & Test Co.,Ltd. | N9020A                  | 101431     | HKE-025          | 2025/02/19 | 1 Year        |
| 2    | Spectrum analyzer               | R&S          | Guangzhou LiSai Metrology & Test Co.,Ltd. | FSV3044                 | 25984      | HKE-126          | 2025/02/19 | 1 Year        |
| 3    | RF Automatic control unit       | Tonscend     | Guangzhou LiSai Metrology & Test Co.,Ltd. | JS0806-2                | 71557      | HKE-060          | 2025/02/19 | 1 Year        |
| 4    | High pass filter unit           | Tonscend     | Guangzhou LiSai Metrology & Test Co.,Ltd. | JS0806-F                | 17155      | HKE-055          | 2025/02/19 | 1 Year        |
| 5    | Wireless Communication Test Set | R&S          | Guangzhou LiSai Metrology & Test Co.,Ltd. | CMU200                  | 105255     | HKE-026          | 2025/02/19 | 1 Year        |
| 6    | Wireless Communication Test Set | R&S          | Guangzhou LiSai Metrology & Test Co.,Ltd. | CMW500                  | 103974     | HKE-027          | 2025/02/19 | 1 Year        |
| 7    | RF Test Software                | Tonscend     | /                                         | JS1120-3 Version 3.3.23 | /          | HKE-083          | /          | /             |

Note: The calibration agency listed on the table corresponds to item ii c) of Article 24-2 paragraph 4.

### 3 RF Shielding Method

We apply the product for Japan RF certification. Number of terminals is 24, Terminal pitch is 1 mm. It is not easily removed. Please refer to following for photo for details.

Red circle part of the RF module soldered on the PCB.

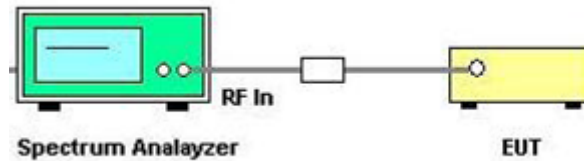


## 4 Antenna Power

### 4.1 Limit

|           |         |
|-----------|---------|
| Limit     | 3mW/MHz |
| Tolerance | +20%    |

### 4.2 Test Setup



### 4.3 Test Procedure

- (1) Configure EUT and assistant system according clause 2.2 and 4.3
  - (2) Set EUT work in test mode as described in clause 2.2
  - (3) Connected the EUT's antenna port to the Spectrum Analyzer by suitable attenuator, set the Spectrum Analyzer as below:
    - Centre Frequency: The centre frequency of the channel under test.
    - Resolution BW: 1MHz (above 6dB bandwidth of signal)
    - Video BW: 1MHz.
    - Span: Wide enough to cover the complete power envelope of the signal of the EUT.
    - Detector: Peak.
    - Trace Mode: Max Hold.
  - (4) When the trace is complete, find the peak value of the power envelope and record.
- Note: The cable loss and attenuator loss have been put into spectrum analyzer as amplitude offset.

#### 4.4 Test Result

|              |                    |              |                |
|--------------|--------------------|--------------|----------------|
| EUT :        | WATERPROOF SPEAKER | Test Date:   | Mar. 04, 2025  |
| Temperature: | 25°C               | Tested by:   | Len Liao       |
| Humidity:    | 55 % RH            | Test Voltage | Normal Voltage |

| Operation Mode:                                                   | Conducted RF output power (dbm) | Conducted RF output power (mW) | Spread Bandwidth | Conducted RF output power density (mW/MHz) | Limit   | Rated power density (mW/MHz) | Antenna Power Error (%) |
|-------------------------------------------------------------------|---------------------------------|--------------------------------|------------------|--------------------------------------------|---------|------------------------------|-------------------------|
| GFSK mode                                                         | -1.83                           | 0.66                           | 71.469           | 0.009                                      | 3mW/MHz | 0.02                         | -54.10                  |
| Pi / 4DQPSK mode                                                  | -3.54                           | 0.44                           | 71.350           | 0.006                                      | 3mW/MHz | 0.02                         | -68.98                  |
| Limit : +20% (Base on manufacturer declare antenna power density) |                                 |                                |                  |                                            |         |                              |                         |

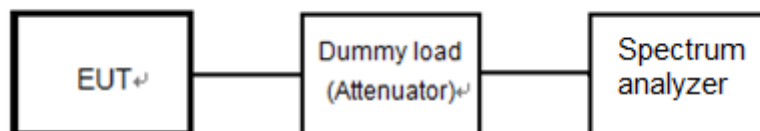
| Operation Mode:  | Conducted RF output power density (mW/MHz) | Conducted RF output power density (dBm/MHz) | Antenna Gain (dBi) | EIRP(dBm/MHz) | Limit(dBm/MHz) |
|------------------|--------------------------------------------|---------------------------------------------|--------------------|---------------|----------------|
| GFSK mode        | 0.009                                      | -20.458                                     | -0.68              | -21.138       | 6.91           |
| Pi / 4DQPSK mode | 0.006                                      | -22.218                                     | -0.68              | -22.898       | 6.91           |

## 5 Frequency Tolerance

### 5.1 Limit

+/- 50x 10<sup>-6</sup> or less (50ppm)

### 5.2 Test Setup



### 5.3 Test Procedure

1. The EUT was placed on a table which is 0.8m above ground plane.
2. The EUT was directly connected to the spectrum analyzer.

### 5.4 EUT Operation During Test

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

### 5.5 Test Result

|                 |                    |              |                |
|-----------------|--------------------|--------------|----------------|
| EUT :           | WATERPROOF SPEAKER | Test Date:   | Mar. 04, 2025  |
| Temperature:    | 25°C               | Tested by:   | Len Liao       |
| Humidity:       | 55 % RH            | Test Voltage | Normal Voltage |
| Operation Mode: | Carrier Tx mode    |              |                |

| Test Frequency (MHz) | Measured (MHz) | Tolerance (MHz) | Result (ppm) | Limit (ppm) |
|----------------------|----------------|-----------------|--------------|-------------|
| 2402                 | 2402.016       | 0.016           | 6.661        | +/-50       |
| 2441                 | 2441.016       | 0.016           | 6.555        | +/-50       |
| 2480                 | 2480.016       | 0.016           | 6.452        | +/-50       |

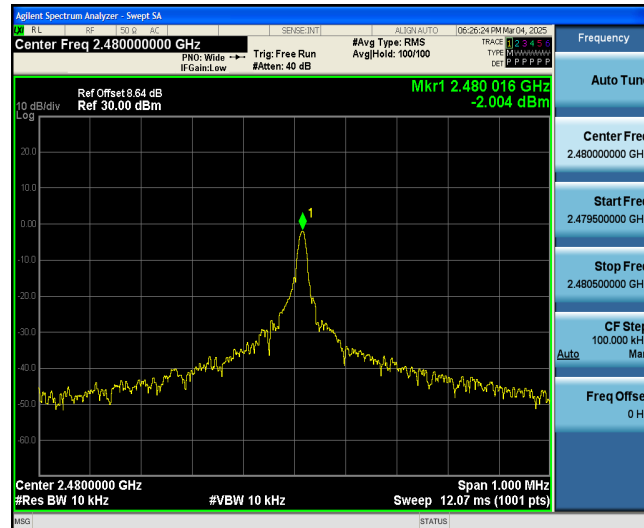
CH00: 2402MHz



CH39: 2441MHz



CH78: 2480MHz



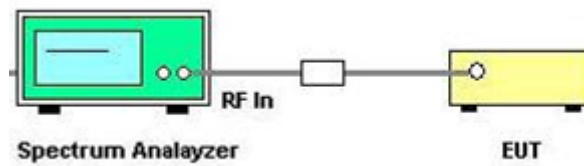
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## 6 Occupied Frequency Bandwidth

### 6.1 Limit

Permissible value for occupied bandwidth using the FH system, a hybrid system combining DS and FH systems, or a hybrid system combining FH and OFDM systems shall be 83.5 MHz or less, while necessary bandwidth (minimum occupied bandwidth sufficient to ensure information transmission of required quality at a required transmission rate for the system used under specified conditions for a given emission type) using a system other than any of the above shall be 26 MHz.

### 6.2 Test Setup



### 6.3 Test Procedure

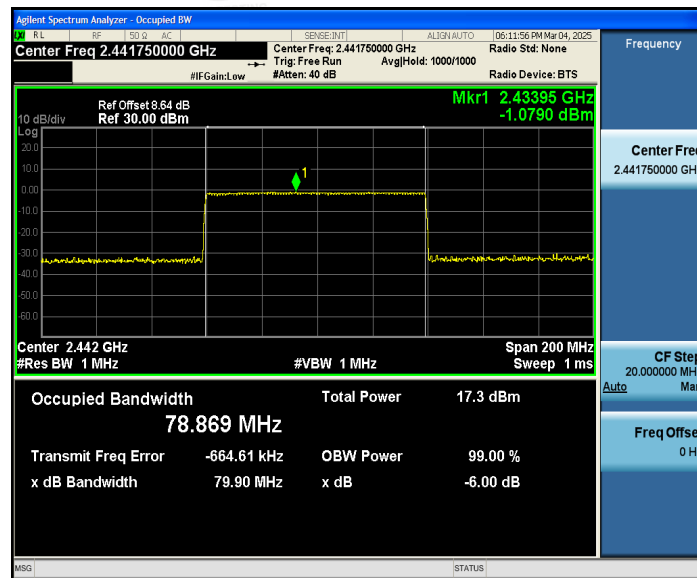
- (1) Configure EUT and assistant system according clause 2.2 and 6.3
- (2) Set EUT work in carrier Tx mode as described in clause 2.2
- (3) Connected the EUT's antenna port to the Spectrum Analyzer by suitable attenuator, set the Spectrum Analyzer as below:  
Centre Frequency: The centre frequency of the channel under test.  
Resolution BW: 1MHz  
Video BW: 1MHz  
Span: Wide enough to cover the complete power envelope of the signal of the EUT.  
Detector: Peak.  
Trace Mode: Max Hold.
- (4) When the trace is complete, measure the occupied bandwidth (99% bandwidth) with spectrum analyzer's bandwidth measure function.

## 6.4 Test Result

|              |                    |              |                |
|--------------|--------------------|--------------|----------------|
| EUT :        | WATERPROOF SPEAKER | Test Date:   | Mar. 04, 2025  |
| Temperature: | 25°C               | Tested by:   | Len Liao       |
| Humidity:    | 55 % RH            | Test Voltage | Normal Voltage |

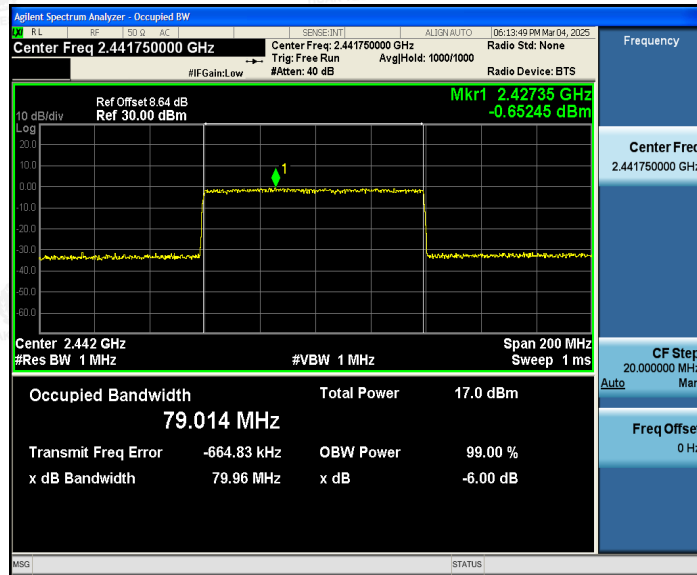
| Operation Mode<br>(MHz)        | Test Frequency<br>(MHz) | Occupied<br>Bandwidth [MHz] | Limit<br>[MHz] | Verdict |
|--------------------------------|-------------------------|-----------------------------|----------------|---------|
| Hopping<br>GFSK TX Mode        | /                       | 78.869                      | <=83.5         | PASS    |
| Hopping<br>Pi / 4DQPSK TX Mode | /                       | 79.014                      | <=83.5         | PASS    |

### GFSK TX Mode



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Pi / 4DQPSK TX Mode

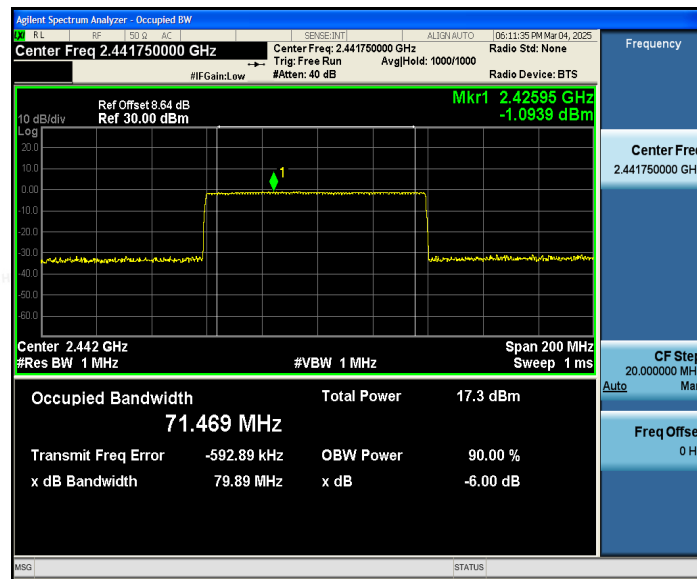


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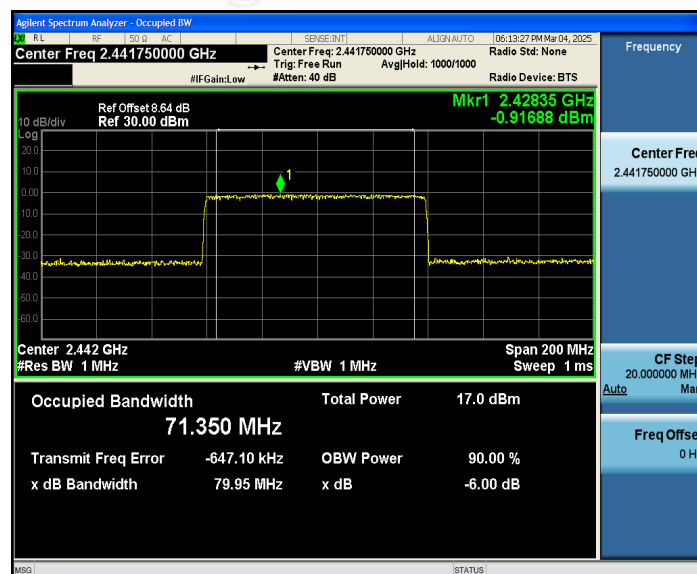
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| Operation Mode<br>(MHz)        | Test<br>Channel | Spread<br>Bandwidth [MHz] |
|--------------------------------|-----------------|---------------------------|
| Hopping GFSK TX<br>Mode        | /               | 71.469                    |
| Hopping Pi / 4DQPSK<br>TX Mode | /               | 71.350                    |

### GFSK TX Mode



### Pi / 4DQPSK TX Mode



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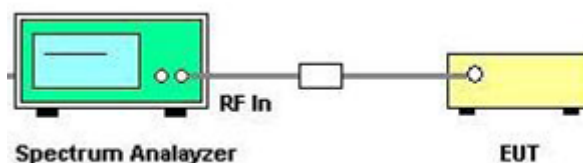
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## 7 Dwell time

### 7.1 Limit

Frequency dwell time (time during which radio waves continue to be emitted at a specified frequency) of a transmitting equipment using the FH system shall be 0.4 seconds or less.

### 7.2 Test Setup



### 7.3 Test Procedure

- (1) Configure EUT and assistant system according clause 2.2 and 8.3
- (2) Set EUT work in carrier Tx mode as described in clause 2.2
- (3) Connected the EUT's antenna port to the Spectrum Analyzer by suitable attenuator, set the Spectrum Analyzer as below:  
 Centre Frequency: The centre frequency of the middle hopping channel.  
 Resolution BW: 1MHz.  
 Video BW: 1MHz.  
 Span: Zero span.  
 Detector: Peak.  
 Trace Mode: Max Hold.  
 Sweep: Video Trigger
- (4) When the trace is complete, measure the sending time of 1 burst and the duty cycle of 1 burst cycle.
- (5) Calculate dwell time follow below formula:  

$$\text{Dwell time} = (0.4(\text{s}) \times \text{spreading rate} \times \text{sending time of 1 burst(s)}) / (\text{burst cycle(s)} \times \text{No. of hopping channel})$$
  

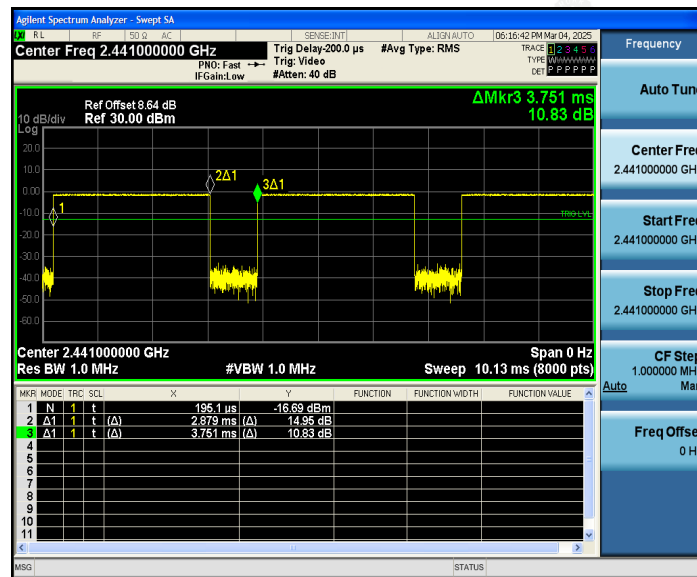
$$\text{Spreading rate} = \text{Spread bandwidth (actual measurement value)} / \text{Transmission rate}.$$

## 7.4 Test Result

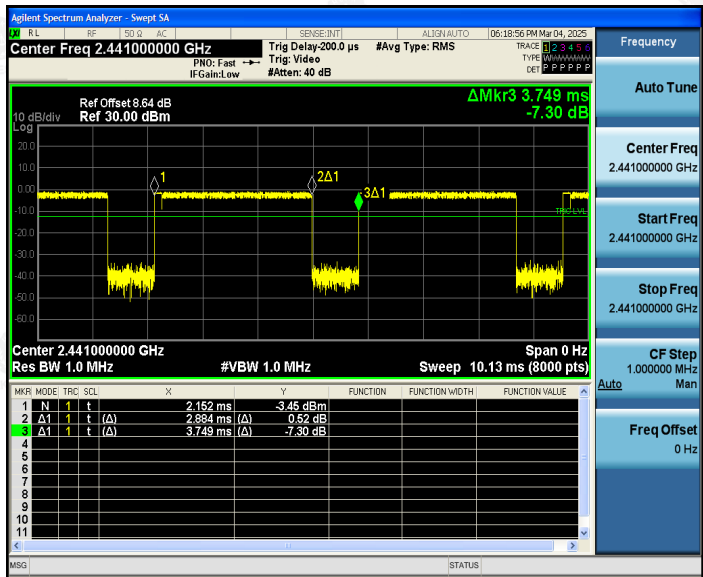
|                 |                    |              |                |
|-----------------|--------------------|--------------|----------------|
| EUT :           | WATERPROOF SPEAKER | Test Date:   | Mar. 04, 2025  |
| Temperature:    | 25°C               | Tested by:   | Len Liao       |
| Humidity:       | 55 % RH            | Test Voltage | Normal Voltage |
| Operation Mode: | Hopping mode       |              |                |

| Test Condition | Test Mode | Ant  | transmission time of 1 burst (ms) | burst cycle (ms) | spreading rate | Dwell Time[s] | Limit[s] | Verdict |
|----------------|-----------|------|-----------------------------------|------------------|----------------|---------------|----------|---------|
| TNVN           | DH5       | Ant1 | 2.879                             | 3.751            | 71.469         | 0.2777        | <0.4     | PASS    |
| TNVN           | 2DH5      | Ant1 | 2.884                             | 3.749            | 35.675         | 0.1390        | <0.4     | PASS    |

### DH5



2DH5



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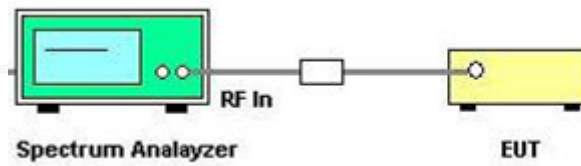
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## 8 Process Gain

### 8.1 Limit

Process gain (value obtained by dividing the spread bandwidth by a frequency equal to the transmission rate of the modulation signal; this also applies hereafter) in the spread spectrum system shall be 5 or more.

### 8.2 Test Setup



### 8.3 Test Procedure

- (1) Configure EUT and assistant system according clause 2.2 and 9.3
- (2) Set EUT work in carrier Tx mode as described in clause 2.2

### 8.4 Test Result

|              |                    |              |                |
|--------------|--------------------|--------------|----------------|
| EUT :        | WATERPROOF SPEAKER | Test Date:   | Mar. 04, 2025  |
| Temperature: | 25°C               | Tested by:   | Len Liao       |
| Humidity:    | 55 % RH            | Test Voltage | Normal Voltage |
| Test result: | CONFORM            |              |                |

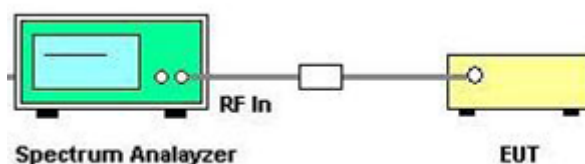
## 9 Transmitter Spurious Emissions (conducted)

### 9.1 Limit

Permissible mean power of spurious emission of each frequency supplied to a feeder, that is, mean power of spurious emission in the 1 MHz bandwidth at frequency  $f$  other than frequency band used shall be as follows:

- a.  $2,387\text{MHz} \leq f \leq 2,400\text{MHz}$  and  $2,483.5\text{MHz} < f \leq 2,496.5\text{MHz}$  25  $\mu\text{W}$  or less
- b.  $2,387\text{MHz} > f$  and  $2,496.5\text{MHz} < f$  2.5  $\mu\text{W}$  or less

### 9.2 Test Setup



### 9.3 Test Procedure

- (1) Configure EUT and assistant system according to clause 2.2 and 11.3
- (2) Set EUT to work in hopping on Tx mode as described in clause 2.2
- (3) Connect the EUT's antenna port to the Spectrum Analyzer by suitable attenuator, set the Spectrum Analyzer as below:
  - Resolution BW: 1MHz.
  - Video BW: 1MHz.
  - Detector: Peak.
  - Trace Mode: Max Hold
- (4) When the trace is complete, measure the Transmitter Spurious Emissions (conducted) with the spectrum analyzer's bandwidth measure function.

### 9.4 Test Result

TX mode:

|              |                    |              |                |
|--------------|--------------------|--------------|----------------|
| EUT :        | WATERPROOF SPEAKER | Test Date:   | Mar. 04, 2025  |
| Temperature: | 25°C               | Tested by:   | Len Liao       |
| Humidity:    | 55 % RH            | Test Voltage | Normal Voltage |

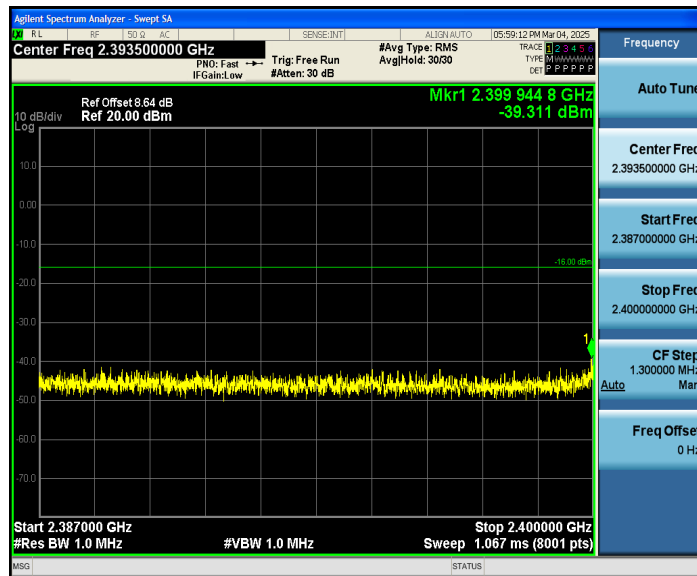
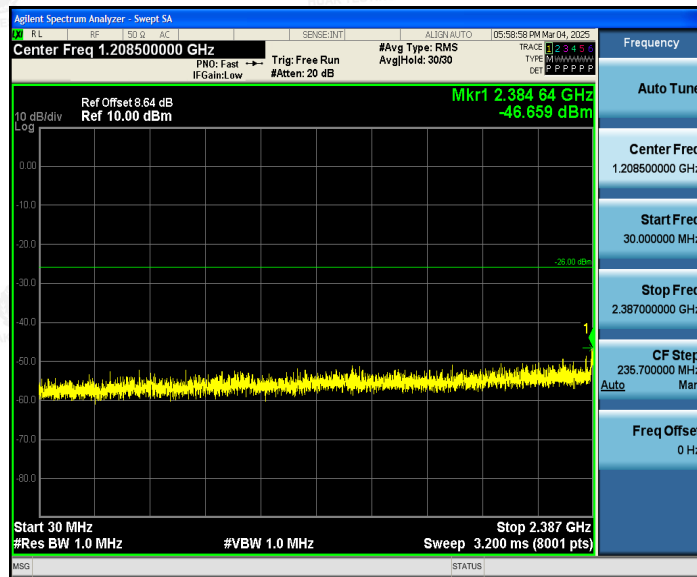
| Operation Mode (MHz) | Test Frequency (MHz) | StartFre[MHz] | StopFre[MHz] | Test Fre [MHz] | Max.Level[dBm] | Max.Level[μW] | Limit[μW] | Verdict |
|----------------------|----------------------|---------------|--------------|----------------|----------------|---------------|-----------|---------|
| GFSK TX Mode         | 2402                 | 30            | 2387         | 2384.64        | -46.66         | 0.0216        | <2.5      | PASS    |
|                      | 2402                 | 2387          | 2400         | 2399.94        | -39.31         | 0.1172        | <25       | PASS    |
|                      | 2402                 | 2483.5        | 2496.5       | 2487.10        | -40.96         | 0.0802        | <25       | PASS    |
|                      | 2402                 | 2496.5        | 13000        | 4804.23        | -42.67         | 0.0541        | <2.5      | PASS    |
|                      | 2441                 | 30            | 2387         | 95.11          | -48.68         | 0.0136        | <2.5      | PASS    |
|                      | 2441                 | 2387          | 2400         | 2387.08        | -41.50         | 0.0708        | <25       | PASS    |
|                      | 2441                 | 2483.5        | 2496.5       | 2486.71        | -41.56         | 0.0698        | <25       | PASS    |
|                      | 2441                 | 2496.5        | 13000        | 4882.49        | -41.19         | 0.0760        | <2.5      | PASS    |
|                      | 2480                 | 30            | 2387         | 2374.33        | -49.34         | 0.0116        | <2.5      | PASS    |
|                      | 2480                 | 2387          | 2400         | 2391.07        | -41.61         | 0.0690        | <25       | PASS    |
|                      | 2480                 | 2483.5        | 2496.5       | 2494.90        | -40.35         | 0.0923        | <25       | PASS    |
|                      | 2480                 | 2496.5        | 13000        | 4959.69        | -40.78         | 0.0836        | <2.5      | PASS    |
| Pi / 4DQPSK TX Mode  | 2402                 | 30            | 2387         | 2378.46        | -44.12         | 0.0387        | <2.5      | PASS    |
|                      | 2402                 | 2387          | 2400         | 2399.98        | -36.12         | 0.2443        | <25       | PASS    |
|                      | 2402                 | 2483.5        | 2496.5       | 2495.17        | -42.10         | 0.0617        | <25       | PASS    |
|                      | 2402                 | 2496.5        | 13000        | 4803.71        | -43.93         | 0.0405        | <2.5      | PASS    |
|                      | 2441                 | 30            | 2387         | 1974.82        | -50.56         | 0.0088        | <2.5      | PASS    |
|                      | 2441                 | 2387          | 2400         | 2394.12        | -42.26         | 0.0594        | <25       | PASS    |
|                      | 2441                 | 2483.5        | 2496.5       | 2486.50        | -41.84         | 0.0655        | <25       | PASS    |
|                      | 2441                 | 2496.5        | 13000        | 4882.49        | -42.10         | 0.0617        | <2.5      | PASS    |

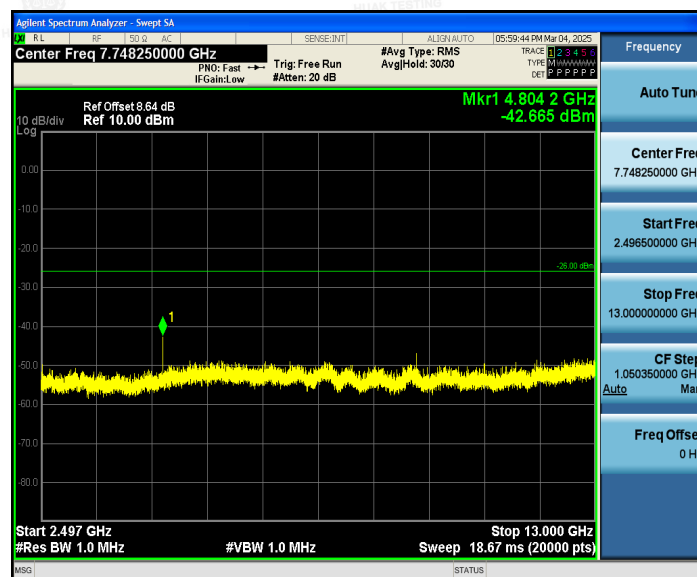
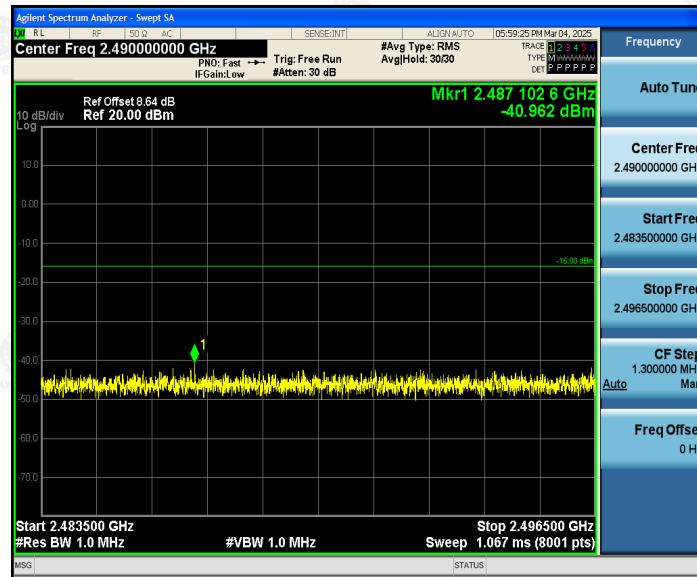
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|  |      |        |        |         |        |        |      |      |
|--|------|--------|--------|---------|--------|--------|------|------|
|  | 2480 | 30     | 2387   | 239.77  | -49.52 | 0.0112 | <2.5 | PASS |
|  | 2480 | 2387   | 2400   | 2388.61 | -42.10 | 0.0617 | <25  | PASS |
|  | 2480 | 2483.5 | 2496.5 | 2488.57 | -40.90 | 0.0813 | <25  | PASS |
|  | 2480 | 2496.5 | 13000  | 4960.74 | -40.75 | 0.0841 | <2.5 | PASS |

Note: All mode has been test, Low and High channel is worst case.

## GFSK TX Mode 2402MHz

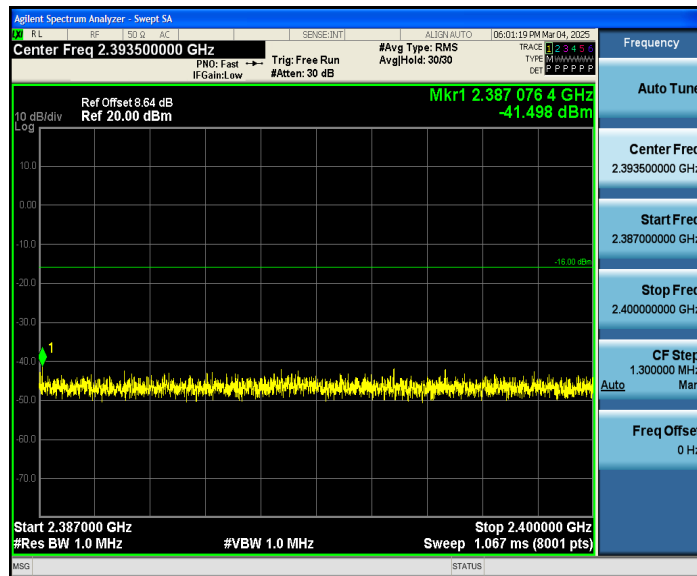
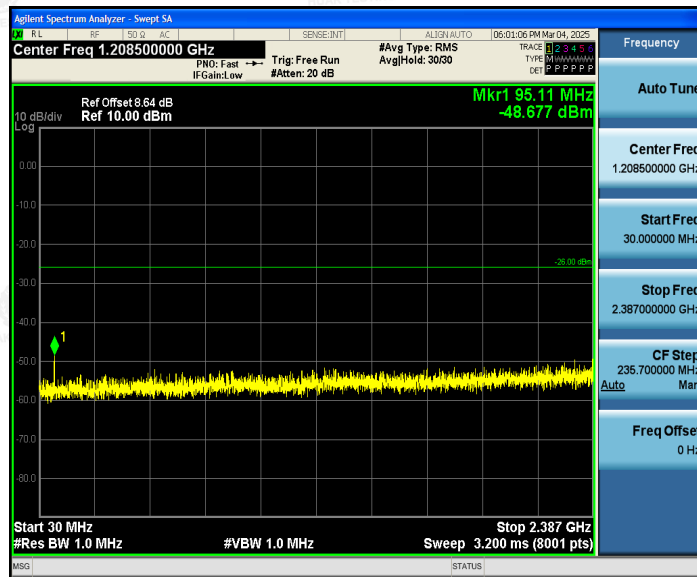




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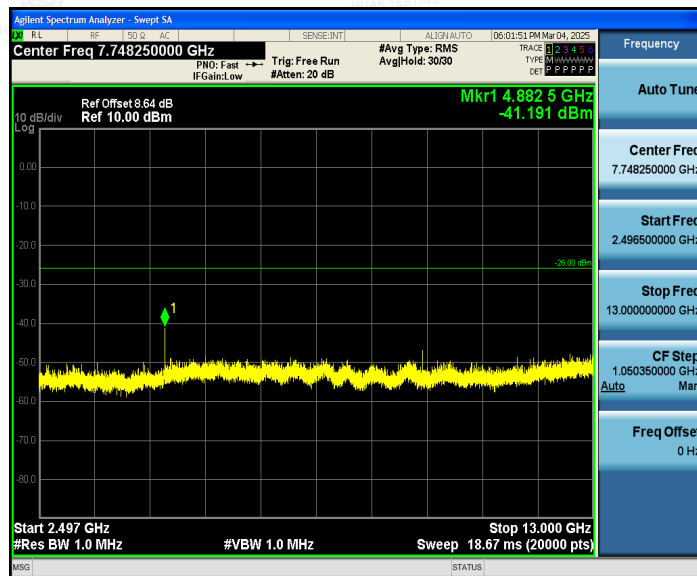
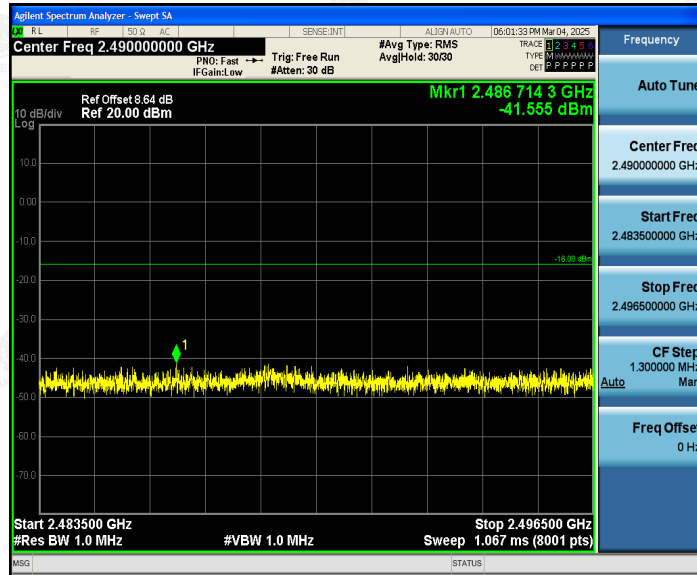
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## GFSK TX Mode 2441MHz

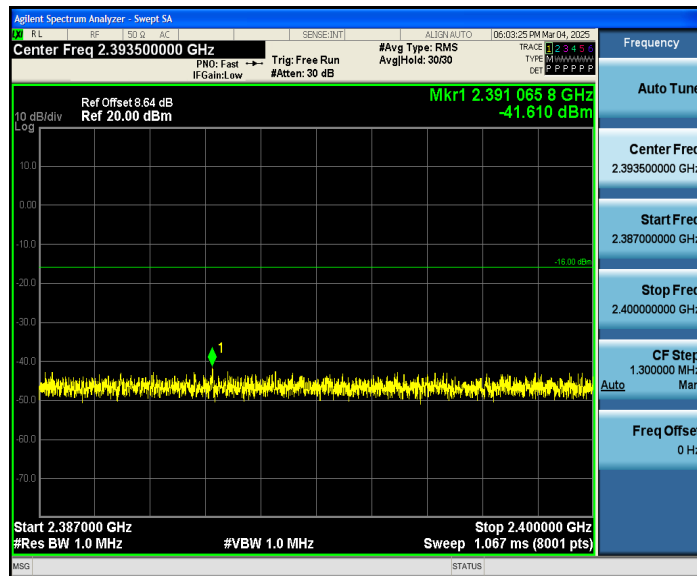
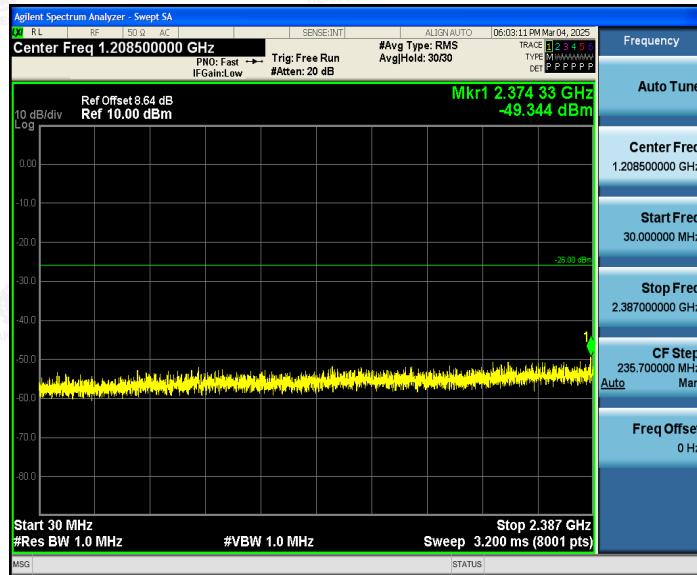


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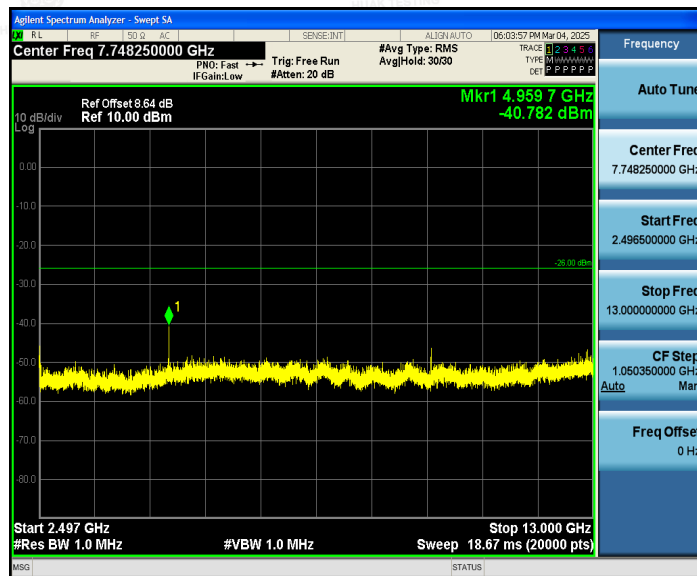
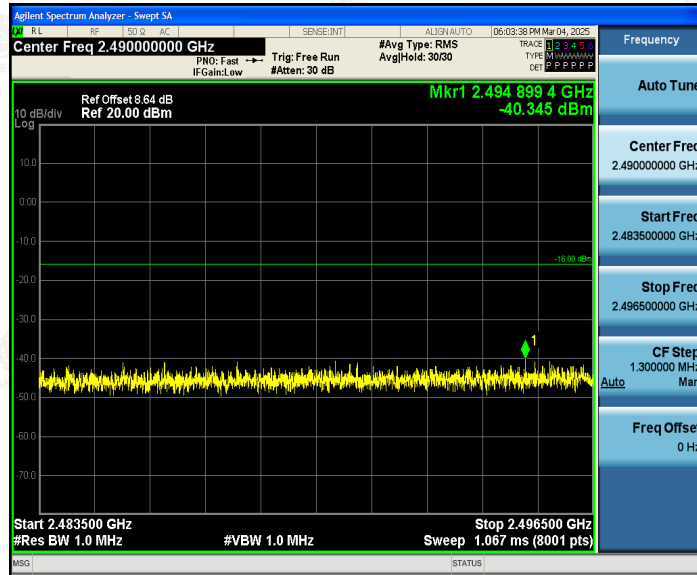


## GFSK TX Mode 2480MHz



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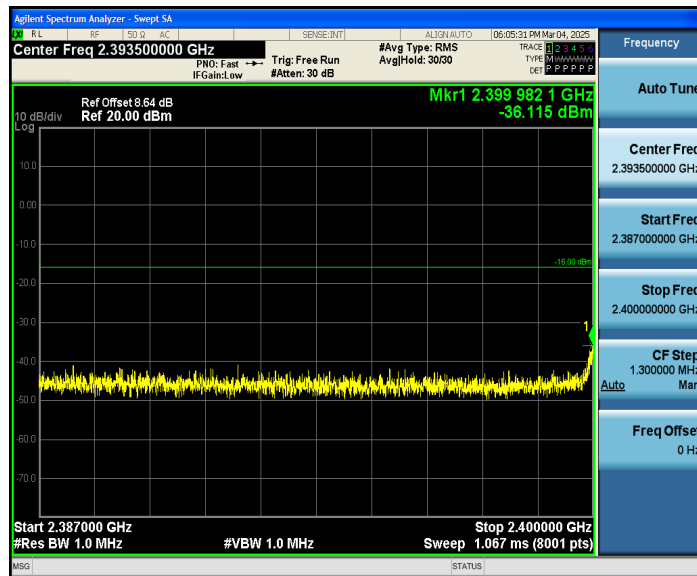
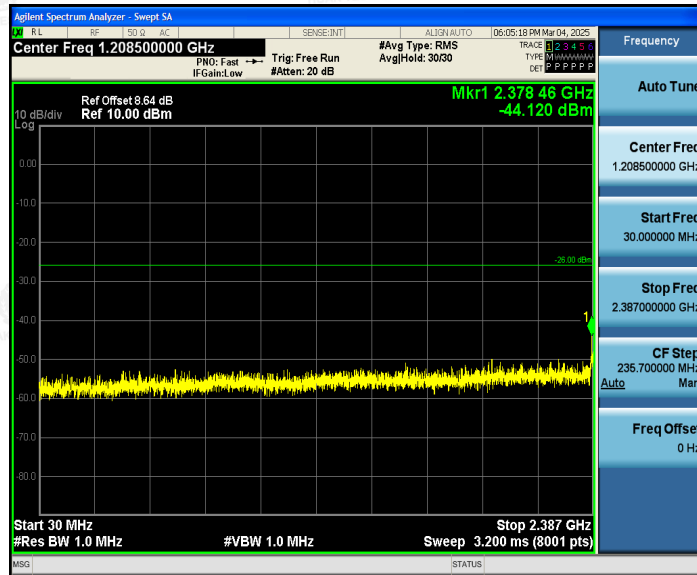
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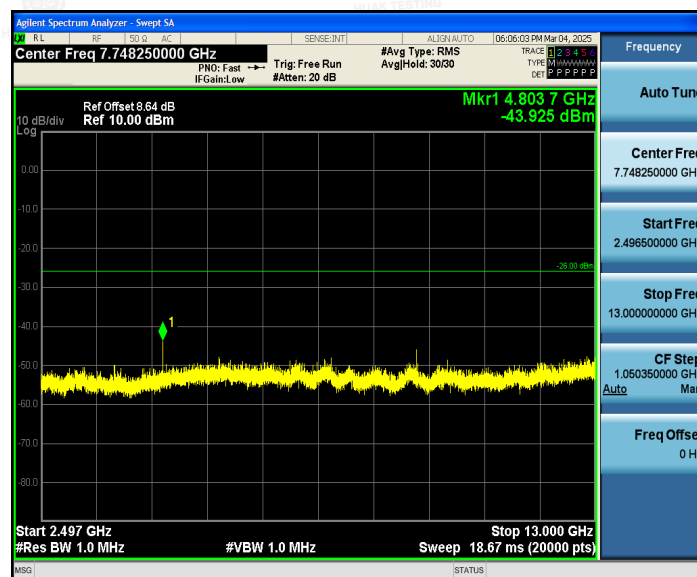
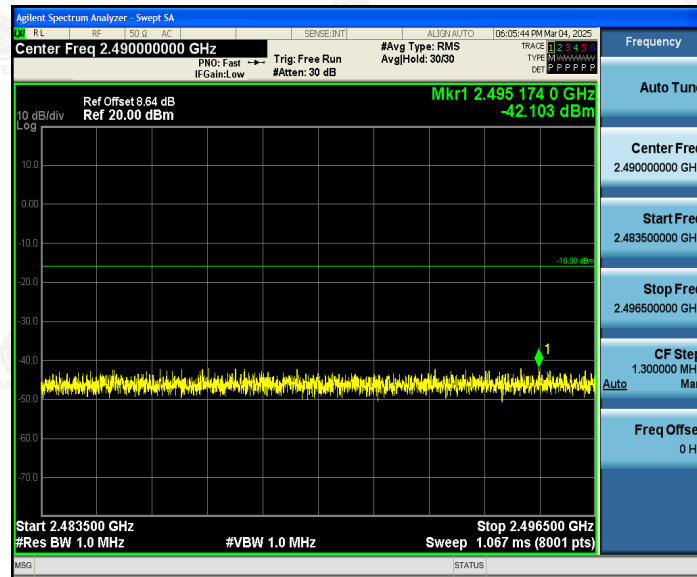


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# Pi / 4DQPSK TX Mode 2402MHz

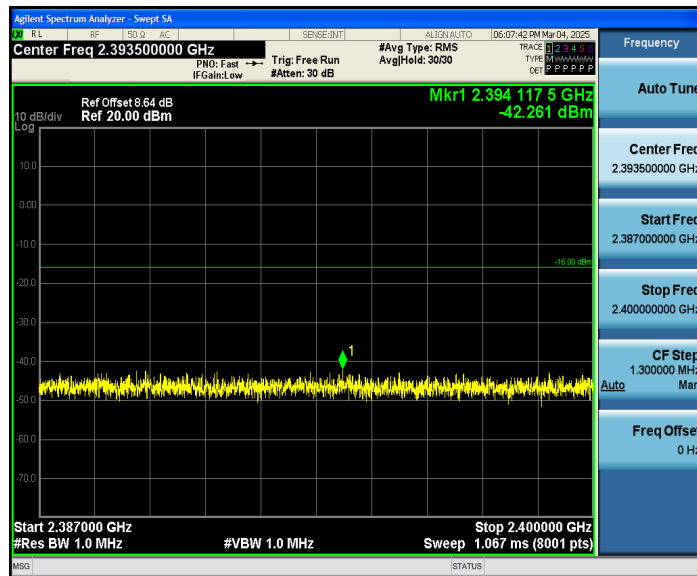
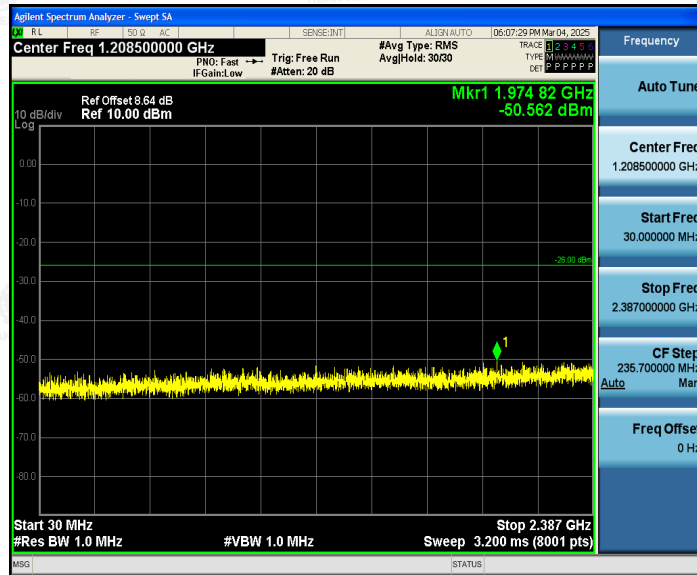


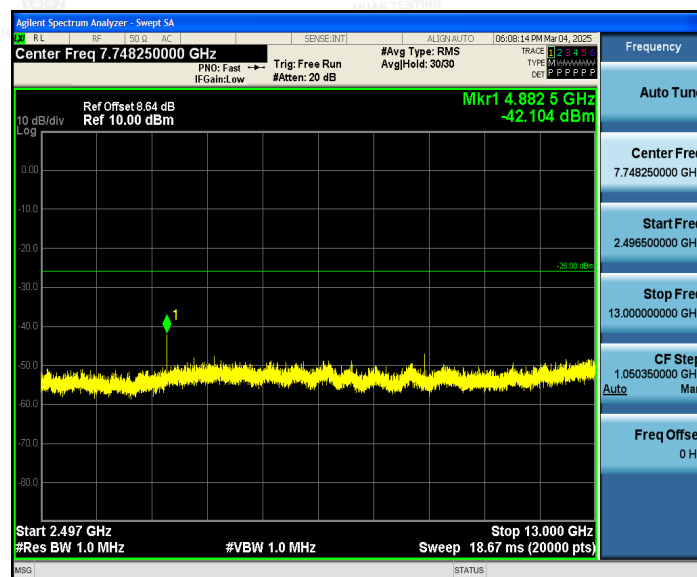
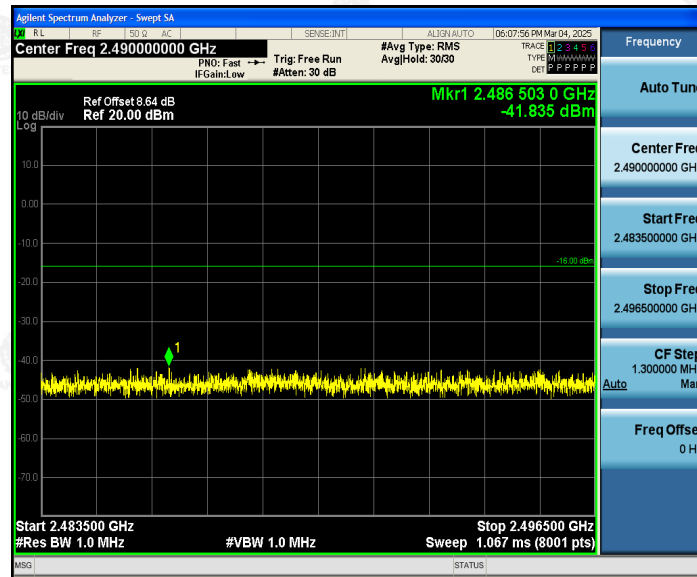


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## Pi / 4DQPSK TX Mode 2441MHz

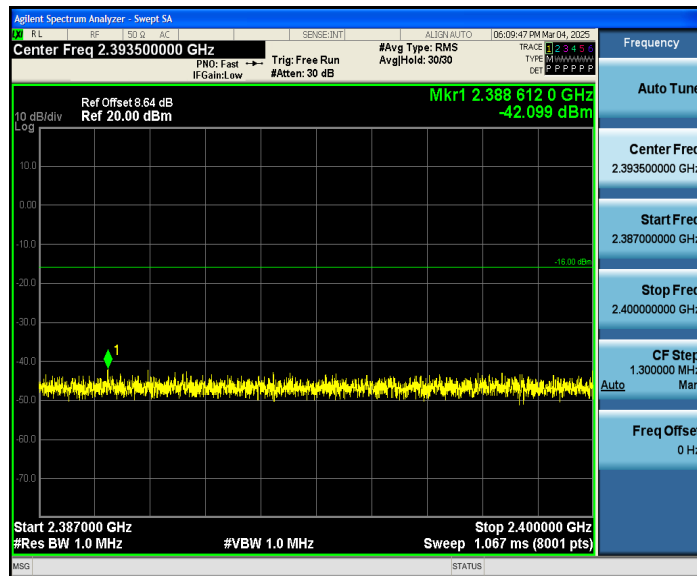
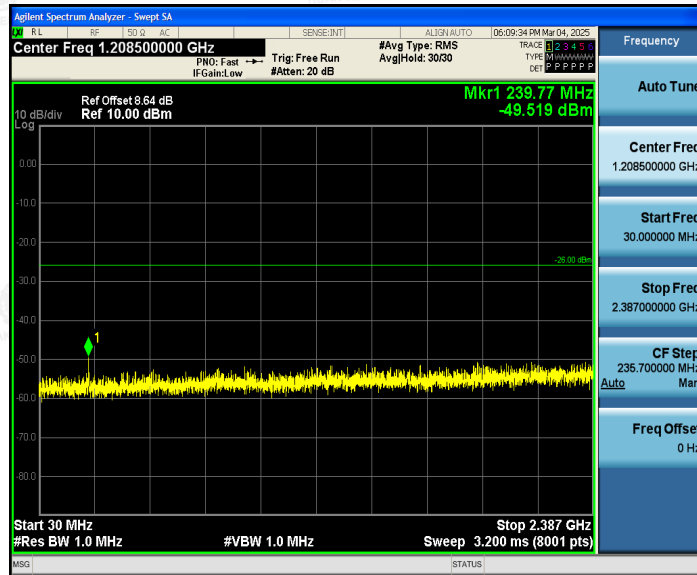




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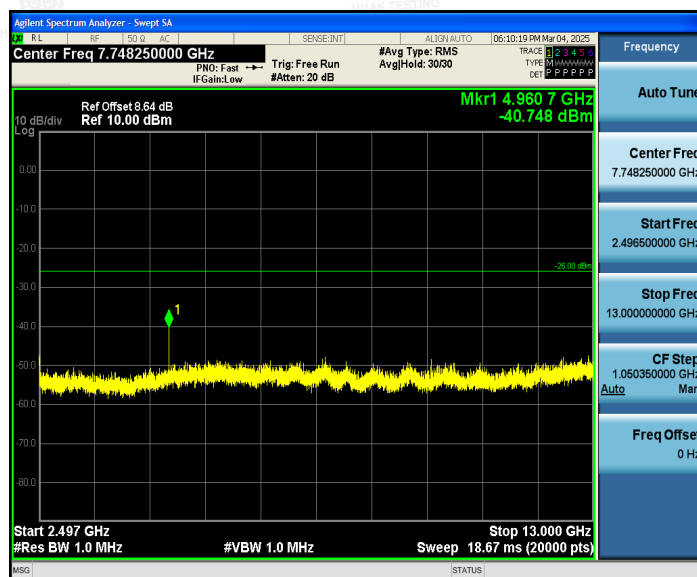
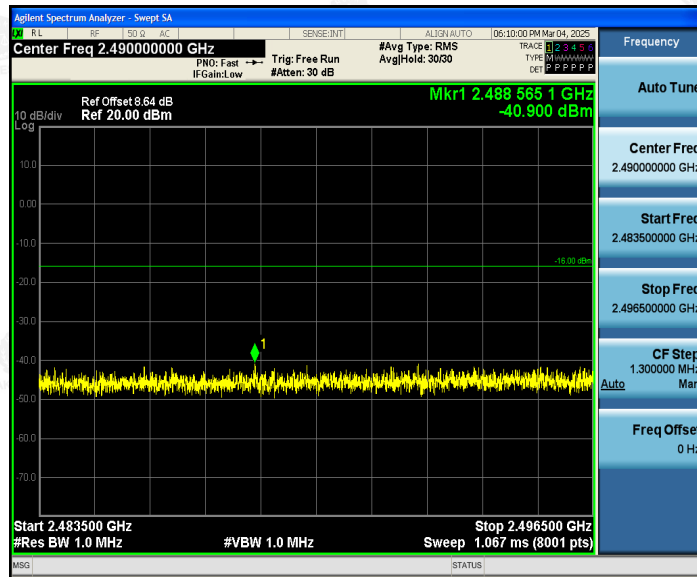
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## Pi / 4DQPSK TX Mode 2480MHz



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Hopping on TX mode:

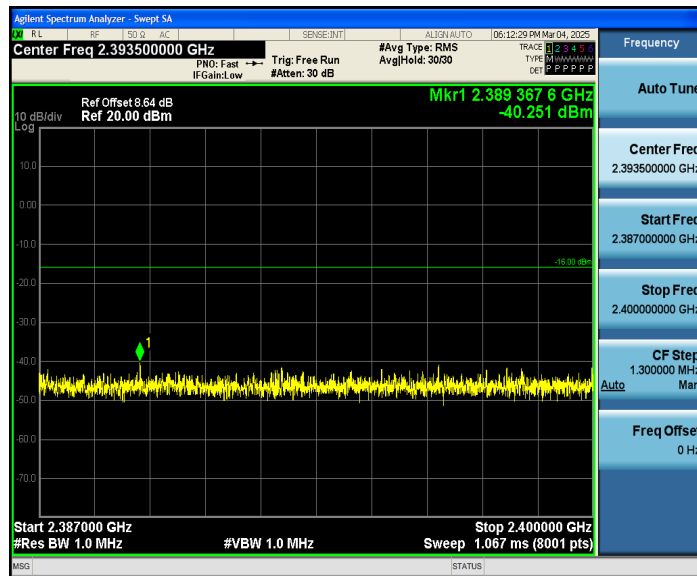
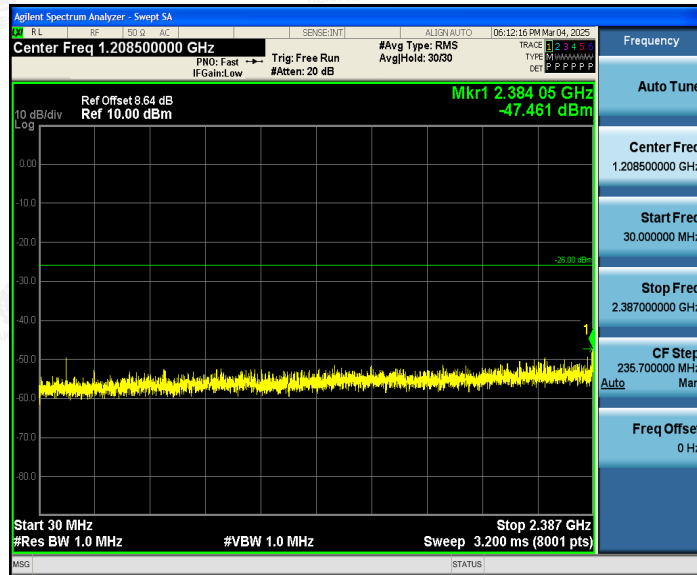
|              |                    |              |                |
|--------------|--------------------|--------------|----------------|
| EUT :        | WATERPROOF SPEAKER | Test Date:   | Mar. 04, 2025  |
| Temperature: | 25°C               | Tested by:   | Len Liao       |
| Humidity:    | 55 % RH            | Test Voltage | Normal Voltage |

| Operation Mode<br>(MHz) | StartFre[MHz] | StopFre[MHz] | Test Fre<br>[MHz] | Max.Level[dBm] | Max.Level[μW] | Limit[μW] | Verdict |
|-------------------------|---------------|--------------|-------------------|----------------|---------------|-----------|---------|
| GFSK                    | 30            | 2387         | 2384.05           | -47.46         | 0.0179        | <2.5      | PASS    |
|                         | 2387          | 2400         | 2389.37           | -40.25         | 0.0944        | <25       | PASS    |
|                         | 2483.5        | 2496.5       | 2489.84           | -41.05         | 0.0785        | <25       | PASS    |
|                         | 2496.5        | 13000        | 4894.04           | -41.72         | 0.0673        | <2.5      | PASS    |
| Pi / 4DQPSK             | 30            | 2387         | 2379.63           | -48.25         | 0.0150        | <2.5      | PASS    |
|                         | 2387          | 2400         | 2392.53           | -41.03         | 0.0789        | <25       | PASS    |
|                         | 2483.5        | 2496.5       | 2486.19           | -41.12         | 0.0773        | <25       | PASS    |
|                         | 2496.5        | 13000        | 4859.91           | -41.83         | 0.0656        | <2.5      | PASS    |

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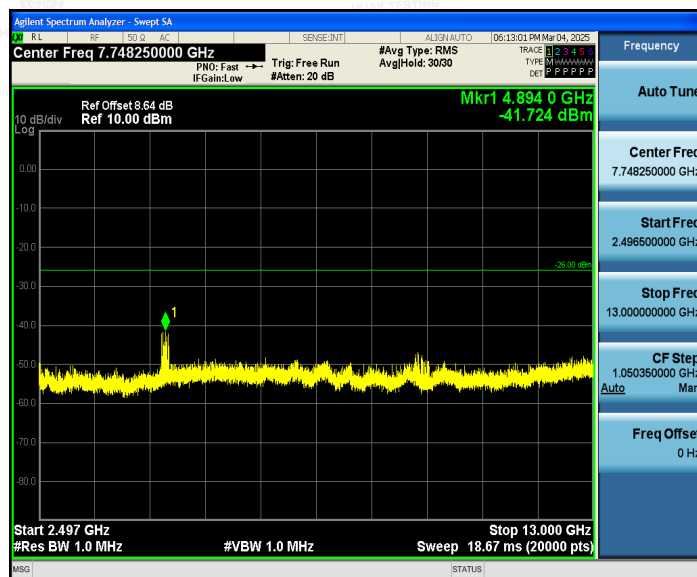
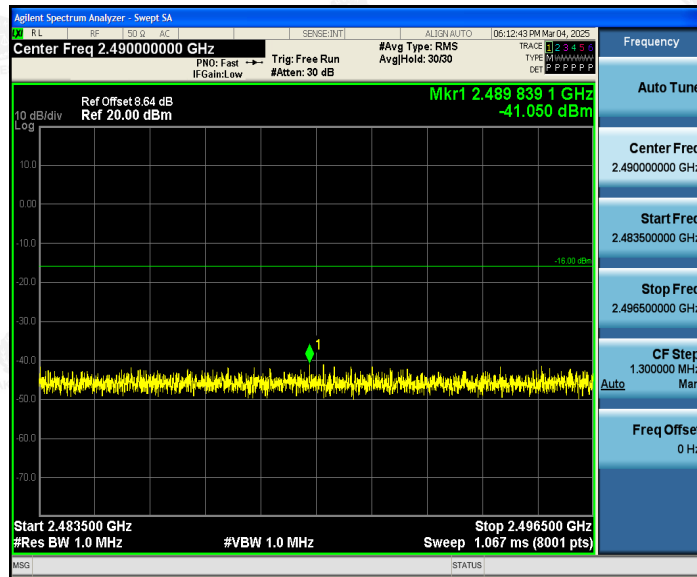
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GFSK:



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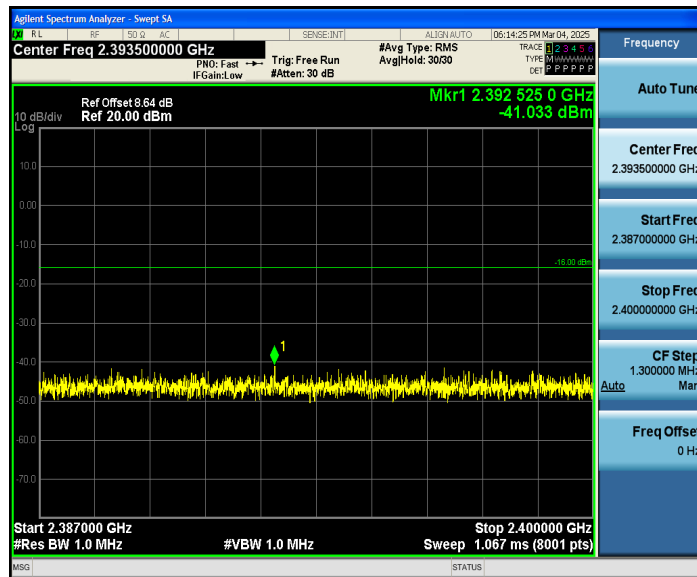
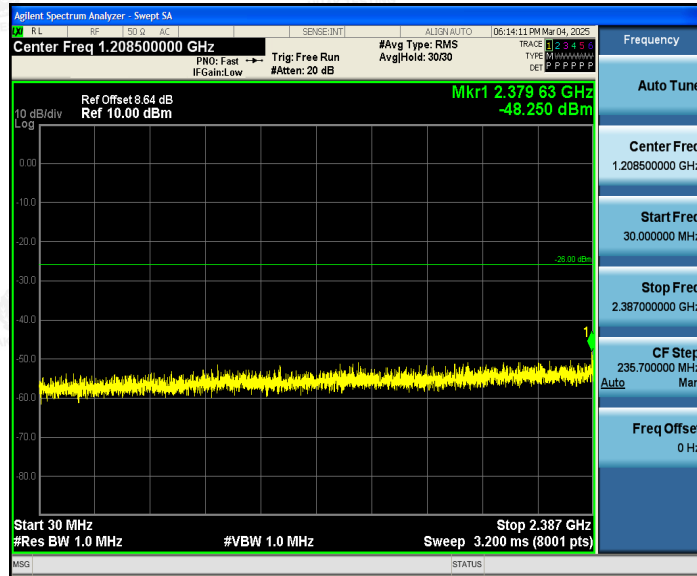
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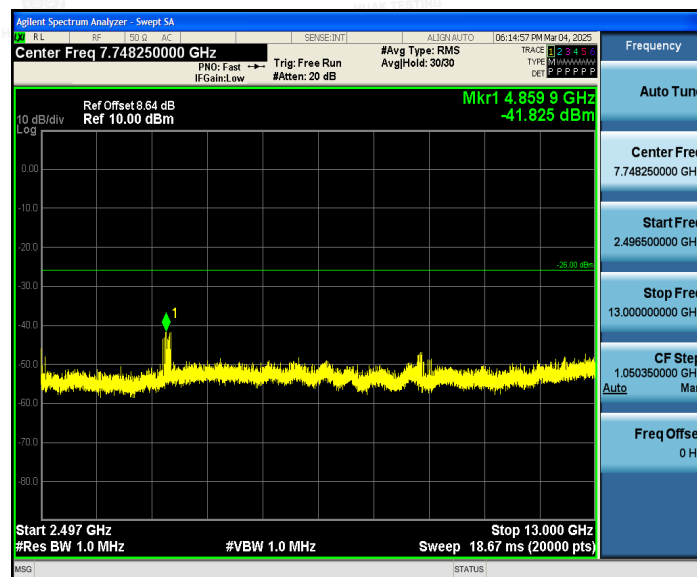
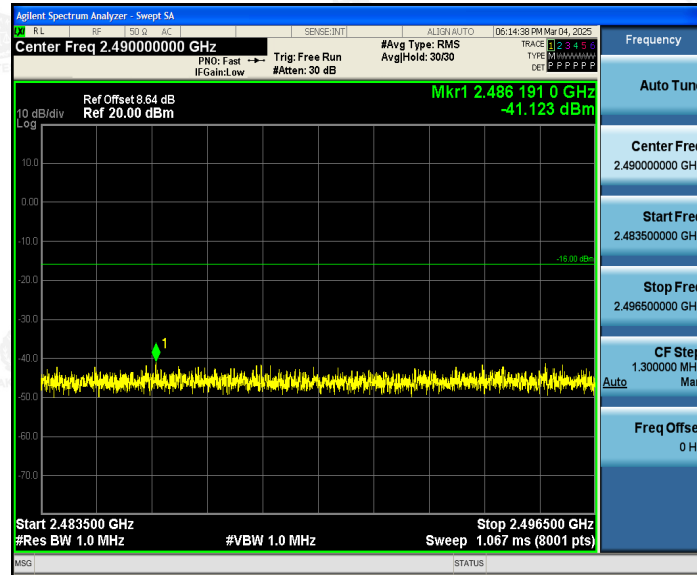


The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 15 days only. The document is issued by Shenzhen HUAKE Testing Technology Co., Ltd., this document cannot be reproduced except in full with our prior written permission.

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Pi / 4DQPSK:





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## 10 Interference Prevention Function

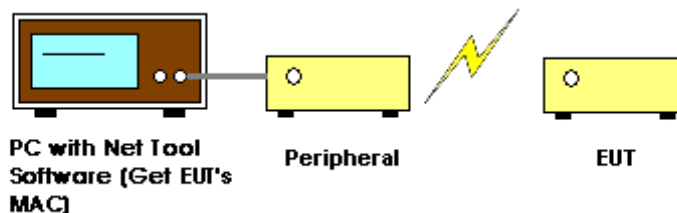
### 10.1 Limit

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

### 10.2 Measuring ID Code Software

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

### 10.3 Test Setup



### 10.4 Test Procedure

- (1) 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.
- (2) 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.

### 10.5 Test Result

|              |                                  |              |                |
|--------------|----------------------------------|--------------|----------------|
| EUT :        | WATERPROOF SPEAKER               | Test Date:   | Mar. 04, 2025  |
| Temperature: | 25 <sup>0</sup> C                | Tested by:   | Len Liao       |
| Humidity:    | 55 % RH                          | Test Voltage | Normal Voltage |
| Test result: | CONFORM (MAC: 5D:28:37:25:D7:4A) |              |                |

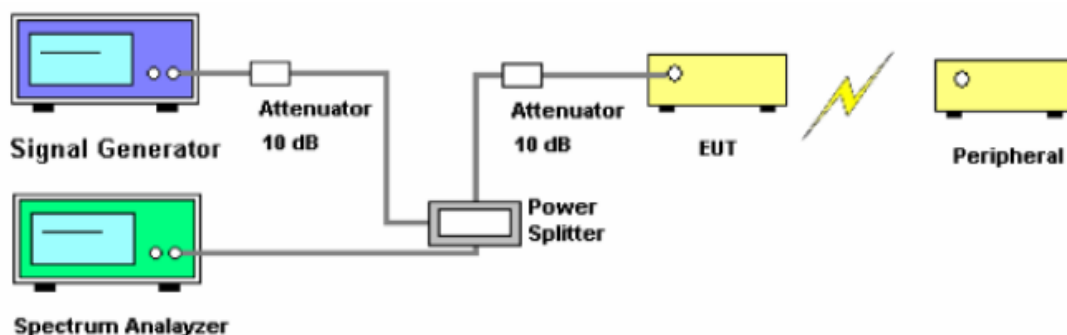
## 11 Carrier Sensing Function

### 11.1 Limit

The device shall not transmit radio wave when receiving 100Mw/m

### 11.2 Test Setup

#### ❖ Measurement System Diagram



#### ❖ Conditions of Application Equipment (EUT)

- The EUT state shall be “normal mode link with wireless router”.

### 11.3 Test Procedure

- (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

### 11.4 Test Result

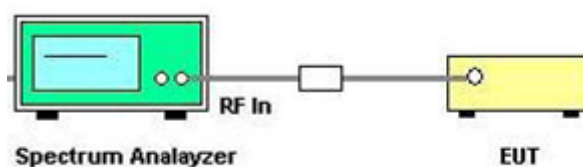
|              |                                            |              |   |
|--------------|--------------------------------------------|--------------|---|
| EUT :        | WATERPROOF SPEAKER                         | Test Date:   | / |
| Temperature: | 25 <sup>0</sup> C                          | Tested by:   | / |
| Humidity:    | 55 % RH                                    | Test Voltage | / |
| Test result: | Not applicable other than OFDM modulation. |              |   |

## 12 Secondary Radiated Emissions

### 12.1 Limit

The limit on secondary emissions radiated from the receiving equipment within which the function of other radio equipment will not be impaired shall be, in terms of the power of a dummy antenna circuit that has the same electrical constant as the receiving antenna, 4 nW or less at a frequency below 1 GHz and 20 nW or less at a frequency of 1 GHz or higher as measured using the circuit.

### 12.2 Test Setup



### 12.3 Test Procedure

- (1) Configure EUT and assistant system according to clause 2.2 and 14.2
- (2) Set EUT to work in hopping on mode as described in clause 2.2
- (3) Connect the EUT's antenna port to the Spectrum Analyzer by suitable attenuator, set the Spectrum Analyzer as below:
  - For below 1G:
    - Resolution BW: 100KHz.
    - Video BW: 100KHz.
    - Detector: Peak.
    - Trace Mode: Max Hold
  - For above 1G:
    - Resolution BW: 1MHz.
    - Video BW: 1MHz.
    - Detector: Peak.
    - Trace Mode: Max Hold
- (4) When the trace is complete, measure the Secondary Radiated Emissions with the spectrum analyzer's bandwidth measure function.

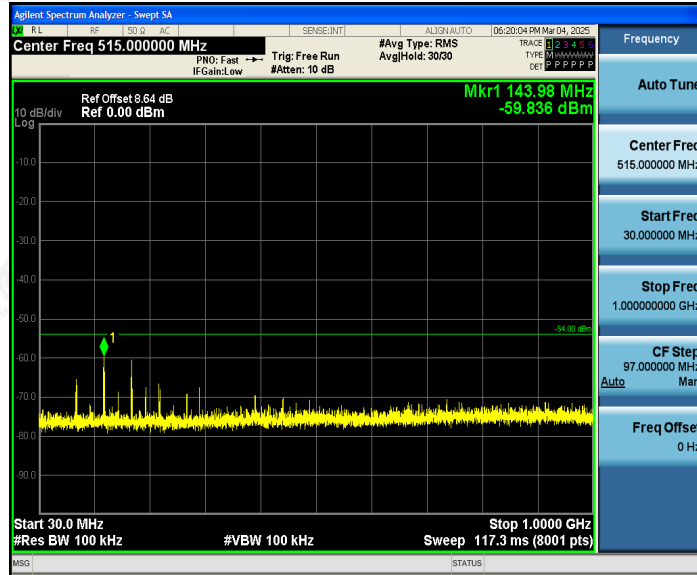
### 12.4 Test Result

|                                                                        |                    |              |                |
|------------------------------------------------------------------------|--------------------|--------------|----------------|
| EUT :                                                                  | WATERPROOF SPEAKER | Test Date:   | Mar. 04, 2025  |
| Temperature:                                                           | 25°C               | Tested by:   | Len Liao       |
| Humidity:                                                              | 55 % RH            | Test Voltage | Normal Voltage |
| Note: The worst test channel of all channels was showed as the follow. |                    |              |                |

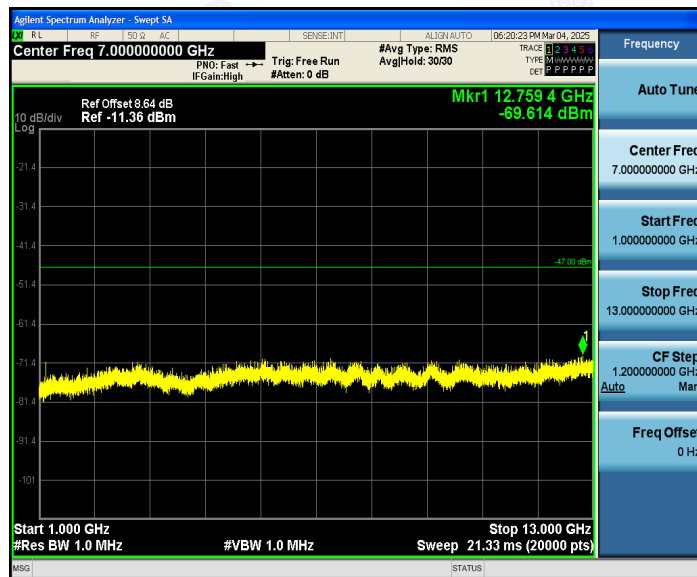
| Operation Mode (MHz) | Test Channel | StartFre[MHz] | StopFre[MHz] | Test Fre [MHz] | Max.Level [dBm] | Max.Level[nW] | Limit[nW] | Verdict |
|----------------------|--------------|---------------|--------------|----------------|-----------------|---------------|-----------|---------|
| GFSK RX Mode         | 2402         | 30            | 1000         | 143.98         | -59.84          | 1.04          | <4        | PASS    |
|                      | 2402         | 1000          | 13000        | 12759.39       | -69.61          | 0.11          | <20       | PASS    |
|                      | 2441         | 30            | 1000         | 94.63          | -63.44          | 0.45          | <4        | PASS    |
|                      | 2441         | 1000          | 13000        | 9505.43        | -69.56          | 0.11          | <20       | PASS    |
|                      | 2480         | 30            | 1000         | 95.96          | -61.81          | 0.66          | <4        | PASS    |
|                      | 2480         | 1000          | 13000        | 12813.39       | -68.72          | 0.13          | <20       | PASS    |
| Pi / 4DQPSK RX Mode  | 2402         | 30            | 1000         | 95.96          | -59.05          | 1.24          | <4        | PASS    |
|                      | 2402         | 1000          | 13000        | 12755.79       | -69.05          | 0.12          | <20       | PASS    |
|                      | 2441         | 30            | 1000         | 95.48          | -60.06          | 0.99          | <4        | PASS    |
|                      | 2441         | 1000          | 13000        | 12985.60       | -68.69          | 0.14          | <20       | PASS    |
|                      | 2480         | 30            | 1000         | 95.96          | -60.68          | 0.86          | <4        | PASS    |
|                      | 2480         | 1000          | 13000        | 5745.64        | -66.76          | 0.21          | <20       | PASS    |

# GFSK RX Mode:

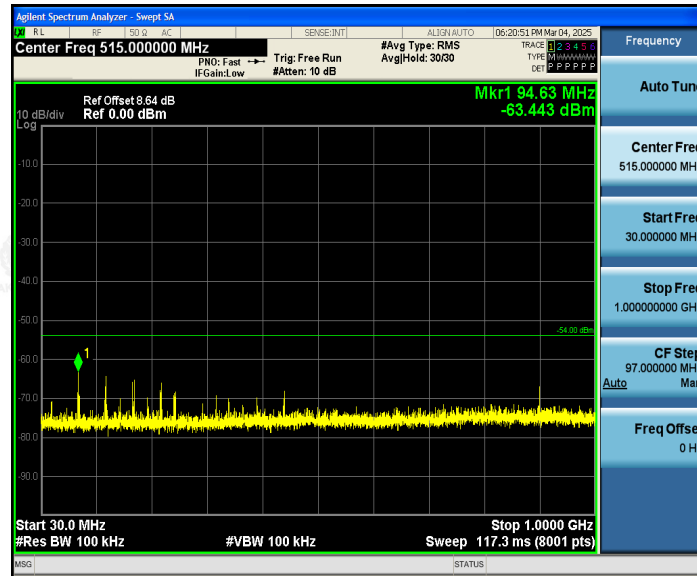
## CH 00:2402MHz-RX-Frequency Band 1 ( $30\text{ MHz} \leq f < 1000\text{ MHz}$ )



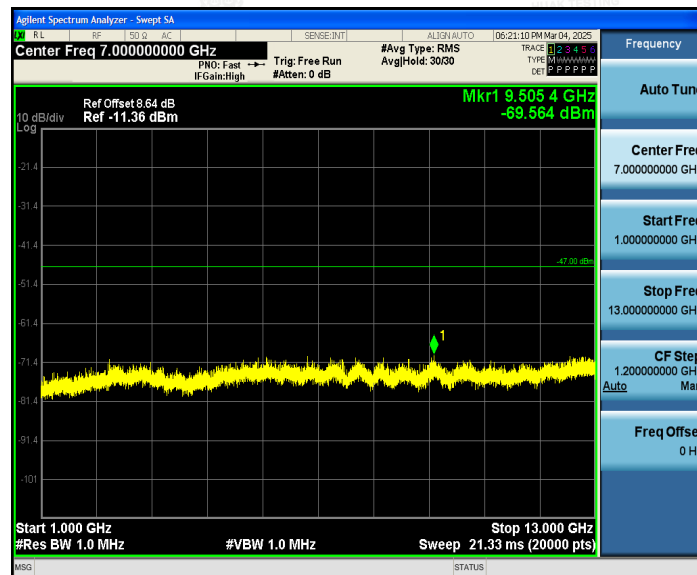
## CH 00:2402MHz-RX-Frequency Band 2 ( $1000\text{ MHz} \leq f < 13000\text{ MHz}$ )



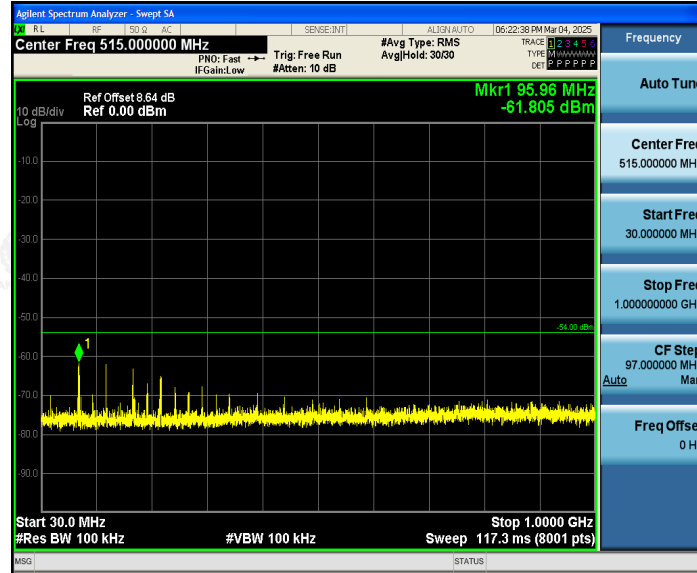
### CH 39:2441MHz-RX-Frequency Band 1 (30 MHz $\leq$ f < 1000 MHz)



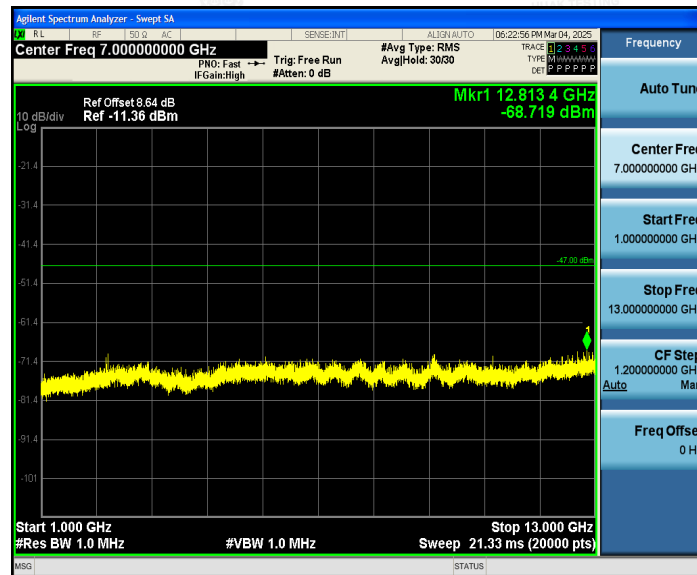
### CH 39:2441MHz-RX-Frequency Band 2 (1000 MHz $\leq$ f < 13000 MHz)



## CH 78:2480MHz-RX-Frequency Band 1 (30 MHz $\leq$ f < 1000 MHz)

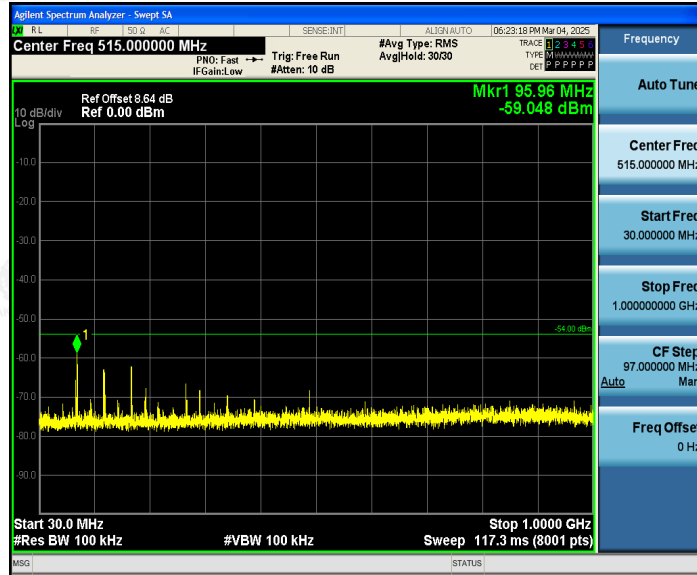


## CH 78:2480MHz-RX-Frequency Band 2 (1000 MHz $\leq$ f < 13000 MHz)

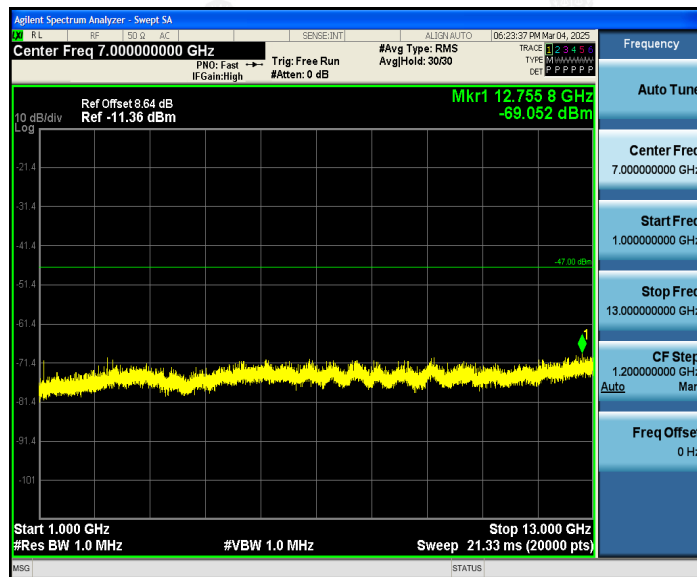


Pi / 4DQPSK RX Mode:

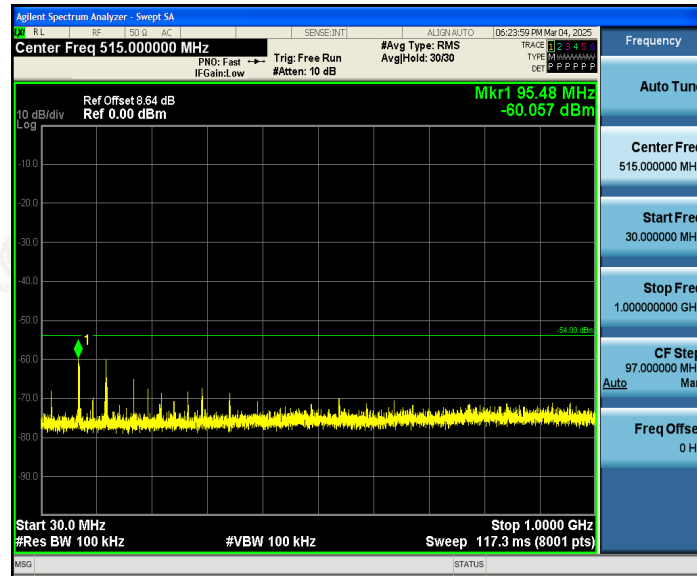
CH 00:2402MHz-RX-Frequency Band 1 ( $30\text{ MHz} \leq f < 1000\text{ MHz}$ )



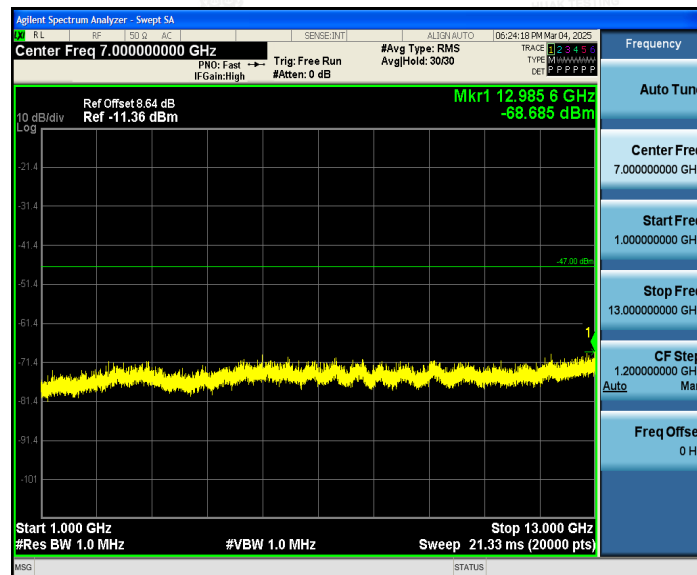
CH 00:2402MHz-RX-Frequency Band 2 ( $1000\text{ MHz} \leq f < 13000\text{ MHz}$ )



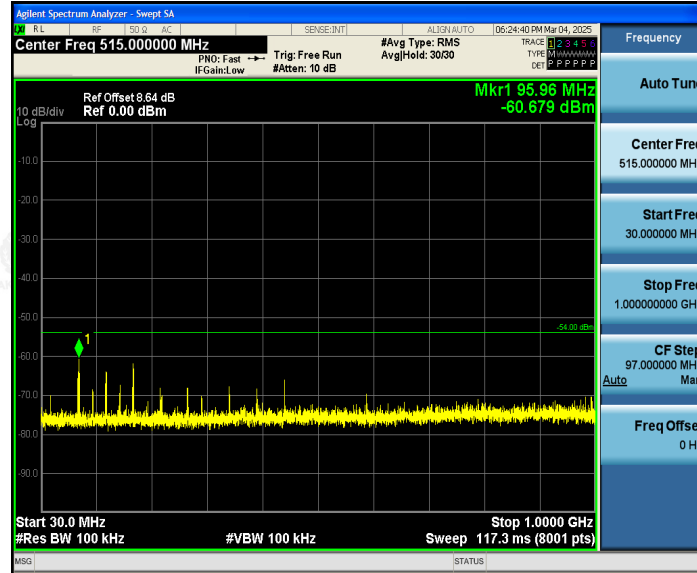
### CH 39:2441MHz-RX-Frequency Band 1 (30 MHz $\leq$ f < 1000 MHz)



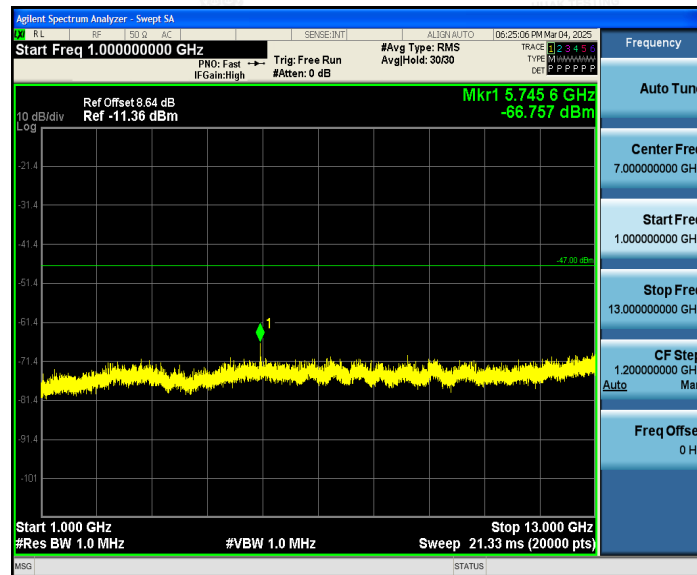
### CH 39:2441MHz-RX-Frequency Band 2 (1000 MHz $\leq$ f < 13000 MHz)



## CH 78:2480MHz-RX-Frequency Band 1 (30 MHz $\leq$ f < 1000 MHz)

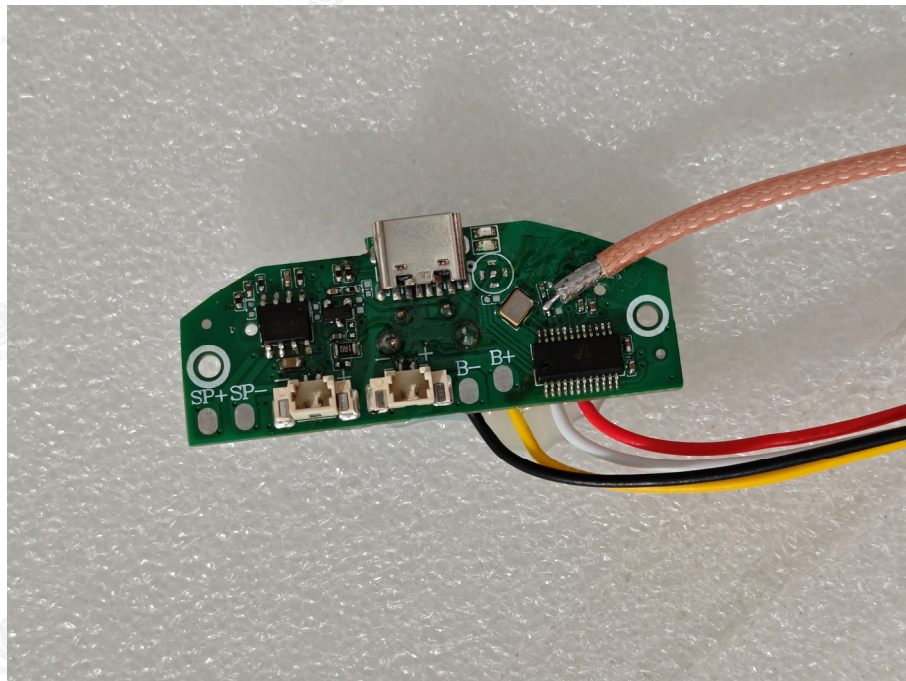
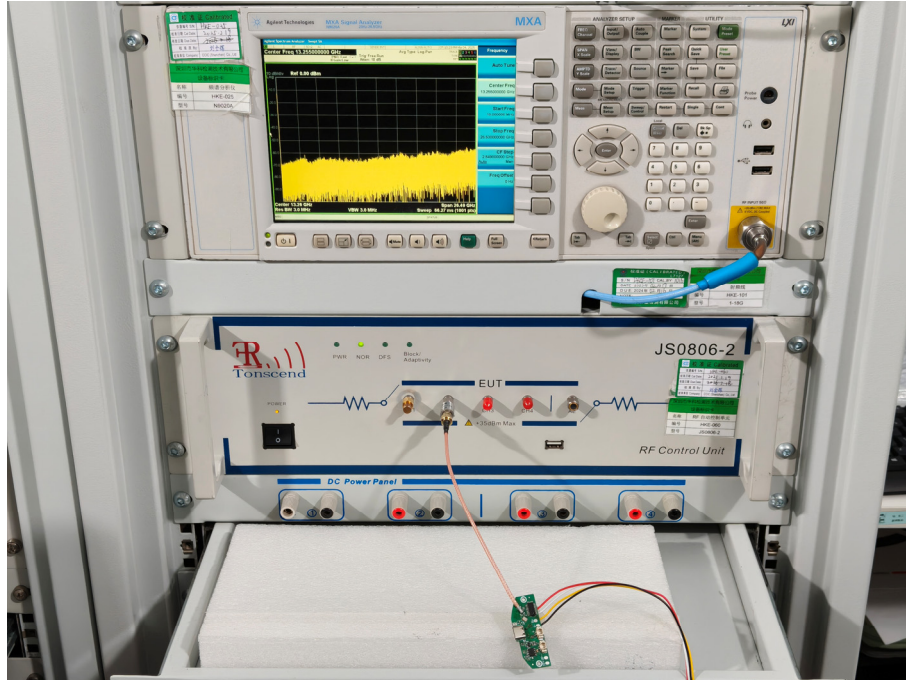


## CH 78:2480MHz-RX-Frequency Band 2 (1000 MHz $\leq$ f < 13000 MHz)



## 13 Test Setup Photos of the EUT

### Measurement Photos



## 14 Photos of the EUT

Reference to the report: ANNEX A of external photos and ANNEX B of internal photos

-----End of report-----