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# ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT





**EUT Description:** MM8108-MF15457 Applicant: Morse Micro Pty Ltd

Level 8, 10-14 Waterloo St, Surry Hills NSW 2010, Australia

Manufacturer: Morse Micro Pty Ltd

Level 8, 10-14 Waterloo St, Surry Hills NSW 2010, Australia

**Brand Name:** Morse Micro

Model No.: MM8108-MF15457

**Report Number:** TERF2502000807ER

FCC ID 2A74O-737B5B

Date of EUT Received: November 15, 2024

Date of Test: March 6, 2025~April 29, 2025

Issue Date: April 30, 2025

Jazz Huan

## We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. Central RF Lab The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10:2013 and the energy emitted by the sample EUT comply with FCC rule part §15.247.

The results of this report relate only to the sample identified in this report.

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| Revision History |          |                    |                |            |        |  |  |  |
|------------------|----------|--------------------|----------------|------------|--------|--|--|--|
| Report Number    | Revision | Description        | Issue Date     | Revised By | Remark |  |  |  |
| TERF2502000807ER | 00       | Original           | April 15, 2025 | Susan Lin  |        |  |  |  |
| TERF2502000807ER | 01       | Update section 8.5 | April 30, 2025 | Susan Lin  | *      |  |  |  |
|                  |          |                    |                |            |        |  |  |  |
|                  |          |                    |                |            |        |  |  |  |
|                  |          |                    |                |            |        |  |  |  |
|                  |          |                    |                |            |        |  |  |  |
|                  |          |                    |                |            |        |  |  |  |

### Note:

1 . The remark "\*" indicates modification of the report upon requests from certification

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## **GENERAL INFORMATION**

### 1.1 **Product Description**

| EUT Description:              | MM8108-MF15457      |
|-------------------------------|---------------------|
| Brand Name:                   | Morse Micro         |
| Model No.:                    | MM8108-MF15457      |
| Hardware Version:             | v3.2                |
| Firmware Version:             | FW 1.15.4           |
| EUT Series No.:               | 0-01JR8J            |
| Power Supply:                 | 3.3Vdc              |
| Test Software (Name/Version): | RF Tester Etna v3.2 |

### 1.2 **RF Specification**

| Radio Technology: | 802.11ah  |
|-------------------|---|
| Frequency Range:  | 902~928MHz  |
| Modulation type:  | OFDM  |
| Transmit Power:   | Average Power<br>802.11ah 1M: 25.10 dBm<br>802.11ah 2M: 24.51 dBm |
|                   | Peak Power<br>802.11ah 4M: 29.47 dBm<br>802.11ah 8M: 29.38 dBm    |

### 1.3 **Antenna Designation**

| Antenna | Freq.   | Peak Antenna |  |
|---------|---------|--------------|--|
| Type    | (MHz)   | Gain (dBi)   |  |
| Dipole  | 902~928 | 1            |  |

Note: Antenna information is provided by the applicant.

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## **Test Methodology of Applied Standards**

FCC Part 15, Subpart C §15.247

FCC KDB 558074 D01 15.247 Meas Guidance v05r02

### 1.5 **Test Facility**

| Laboratory       | Test Site Address                     | Test Site Name | FCC Designa-<br>tion number | IC CAB |
|------------------|---------------------------------------|----------------|-----------------------------|--------|
|                  |                                       | SAC 1          |                             |        |
|                  |                                       | SAC 2          |                             |        |
|                  |                                       | SAC 3          |                             |        |
|                  | No.134, Wu Kung Road, New Taipei      | Conduction 1   |                             |        |
|                  |                                       | Conducted 1    | <b>T</b> 144000 <b>T</b>    |        |
|                  | Industrial Park, Wuku District, New   | Conducted 2    | TW0027                      |        |
|                  | Taipei City, Taiwan.                  | Conducted 3    |                             |        |
|                  |                                       | Conducted 4    |                             |        |
|                  |                                       | Conducted 5    |                             |        |
| SGS Taiwan Ltd.  |                                       | Conducted 6    |                             |        |
| Central RF Lab.  |                                       | Conduction C   |                             | TW3702 |
| (TAF code 3702)  |                                       | SAC C          |                             |        |
| (1741 code 5702) |                                       | SAC D          |                             |        |
|                  |                                       | SAC G          |                             |        |
|                  | No 0 K ii 4 4 B t Oviale as Bistaire  | Conducted A    |                             |        |
|                  | No.2, Keji 1st Rd., Guishan District, | Conducted B    | TW0028                      |        |
|                  | Taoyuan City, Taiwan 333              | Conducted C    |                             |        |
|                  |                                       | Conducted D    |                             |        |
|                  |                                       | Conducted E    |                             |        |
|                  |                                       | Conducted F    |                             |        |
|                  |                                       | Conducted G    |                             |        |

Note: Test site name is remarked on the equipment list in each section of this report as an indication where measurements occurred in specific test site and address.

### 1.6 **Special Accessories**

There are no special accessories used while test was conducted.

### 1.7 **Equipment Modifications**

There was no modification incorporated into the EUT.

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## SYSTEM TEST CONFIGURATION

### 2.1 **EUT Configuration**

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

#### 2.2 **EUT Exercise**

An engineering test mode (software/firmware) that applicant provided was utilized to manipulate the EUT into transmit, selection of the test channel, and modulation scheme.

#### 2.3 **Test Procedure**

#### 2.3.1 **Conducted Emissions**

The EUT is placed on a table which is 0.8 m above ground plane. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz. The CISPR Quasi-Peak and Average detector mode is employed. The two LISNs provide 50uH/50 ohm of coupling impedance for the measuring instrument. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

### 2.3.2 Conducted Test (RF)

The active antenna port of the unlicensed wireless device is connected to the spectrum analyzer with attenuator to protect the instrumentation. If a second antenna port is available, it is tested at one operating frequency, with other port(s) appropriately terminated, to verify it has similar output characteristics as the fully tested port.

#### 2.3.3 Radiated Emissions

The EUT is placed on a turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.

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## **Measurement Results Explanation Example**

### 2.4.1 Radiated Emission Test Sites For Measurements From 9 kHz To 30 MHz

Radiated emission below 30MHz is measured in a 9m\*6m\*6m semi-anechoic chamber. the measurements correspond to those obtained at an open-field test site.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

### 2.4.2 For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuation factor between EUT conducted port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly EUT RF output level.

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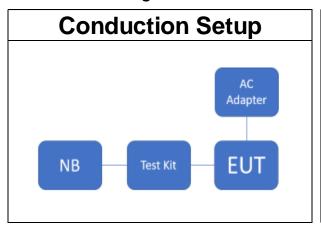
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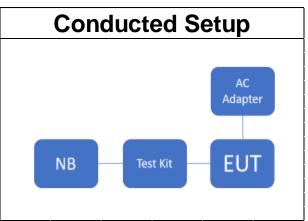


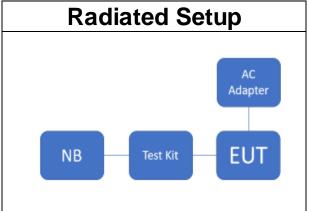
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### 2.5 **Test Configuration**







### 2.6 Control Unit(s)

| AC Power-Line Conducted Emission Test Site: Conduction 1 |   |  |  |  |  |  |  |  |
|--|---|--|--|--|--|--|--|--|
| EQUIPMENT TYPE   | EQUIPMENT TYPE MFR MODEL NUMBER SERIAL NUMBER LAST CAL. CAL DUE. (mm/dd/yyyy) |  |  |  |  |  |  |  |
| Notebook   |   |  |  |  |  |  |  |  |

| Conducted Emission Test Site: Conducted 2 |   |  |  |  |  |  |  |  |
|---|---|--|--|--|--|--|--|--|
| EQUIPMENT TYPE                            | EQUIPMENT TYPE MFR MODEL NUMBER SERIAL NUMBER LAST CAL. (mm/dd/yyyy) (mm/dd/yyyy) |  |  |  |  |  |  |  |
| Notebook                                  |   |  |  |  |  |  |  |  |

| Radiated Emission Test Site: SAC 1  |  |  |  |  |  |  |  |
|---|--|--|--|--|--|--|--|
| EQUIPMENT TYPE MFR MODEL NUMBER SERIAL NUMBER LAST CAL. (mm/dd/yyyy) (mm/dd/yyyy) |  |  |  |  |  |  |  |
| Notebook HP HSN-Q35C-4 5CD238GDV7 N/A N/A   |  |  |  |  |  |  |  |

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## SUMMARY OF TEST RESULTS

| FCC Rules                        | Description Of Test                          | Result    |
|----------------------------------|--|-----------|
| §15.207(a)                       | AC Power Line Conducted<br>Emission          | Compliant |
| §15.247(b) (3)                   | Peak Output Power                            | Compliant |
| §15.247(a)(2)                    | Emission Bandwidth                           | Compliant |
| §15.205<br>§15.209<br>§15.247(d) | Conducted Band Edge<br>and Spurious Emission | Compliant |
| §15.205<br>§15.209<br>§15.247(d) | Radiated Spurious Emission                   | Compliant |
| §15.205                          | Restricted Bands                             | Compliant |
| §15.247(e)                       | Peak Power Density                           | Compliant |
| §15.203                          | Antenna Requirement                          | Compliant |

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## 4 DESCRIPTION OF TEST MODES

## 4.1 Operating Frequencies

|         | OF | DM 1M      | OF | DM 2M      | OF | DM 4M      | OF | DM 8M      |
|---------|----|------------|----|------------|----|------------|----|------------|
|         | CH | Freq.(MHz) | СН | Freq.(MHz) | СН | Freq.(MHz) | СН | Freq.(MHz) |
|         | 1  | 902.5      | 2  | 903        | 8  | 906        | 12 | 908        |
|         | 3  | 903.5      | 6  | 905        | 16 | 910        | 28 | 916        |
|         | 5  | 904.5      | 10 | 907        | 24 | 914        | 44 | 924        |
|         | 7  | 905.5      | 14 | 909        | 32 | 918        |    |            |
|         | 9  | 906.5      | 18 | 911        | 40 | 922        |    |            |
|         | 11 | 907.5      | 22 | 913        | 48 | 926        |    |            |
|         | 13 | 908.5      | 26 | 915        |    |            |    |            |
|         | 15 | 909.5      | 30 | 917        |    |            |    |            |
|         | 17 | 910.5      | 34 | 919        |    |            |    |            |
|         | 19 | 911.5      | 38 | 921        |    |            |    |            |
|         | 21 | 912.5      | 42 | 923        |    |            |    |            |
| Channel | 23 | 913.5      | 46 | 925        |    |            |    |            |
| List    | 25 | 914.5      | 50 | 927        |    |            |    |            |
|         | 27 | 915.5      |    |            |    |            |    |            |
|         | 29 | 916.5      |    |            |    |            |    |            |
|         | 31 | 917.5      |    |            |    |            |    |            |
|         | 33 | 918.5      |    |            |    |            |    |            |
|         | 35 | 919.5      |    |            |    |            |    |            |
|         | 37 | 920.5      |    |            |    |            |    |            |
|         | 39 | 921.5      |    |            |    |            |    |            |
|         | 41 | 922.5      |    |            |    |            |    |            |
|         | 43 | 923.5      |    |            |    |            |    |            |
|         | 45 | 924.5      |    |            |    |            |    |            |
|         | 47 | 925.5      |    |            |    |            |    |            |
|         | 49 | 926.5      |    |            |    |            |    |            |
|         | 51 | 927.5      |    |            |    |            |    |            |

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### 4.2 The Worst Test Modes and Channel Details

- 1. The EUT has been tested under operating condition.
- Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.
- 3. Investigation has been done on all the possible configurations for searching the worst case. The given UE is pre-scanned among below modes.

| CONDUCTED TEST |                      |                   |            |                        |  |  |
|----------------|----------------------|-------------------|------------|------------------------|--|--|
| MODE           | AVAILABLE<br>CHANNEL | TESTED<br>CHANNEL | MODULATION | DATA<br>RATE<br>(Mbps) |  |  |
| 802.11ah 1M    | 1 to 51              | 1,3,25,49,51      | OFDM       | MCS0                   |  |  |
| 802.11ah 2M    | 2 to 50              | 2,6,26,46,50      | OFDM       | MCS0                   |  |  |
| 802.11ah 4M    | 8 to 48              | 8,24,48           | OFDM       | MCS0                   |  |  |
| 802.11ah 8M    | 12 to 44             | 12,28,44          | OFDM       | MCS0                   |  |  |

| TRANSMIT RADIATED EMISSION TEST (BELOW 1 GHz) |                      |                   |            |                     |  |  |  |
|---|----------------------|-------------------|------------|---------------------|--|--|--|
| MODE  | AVAILABLE<br>CHANNEL | TESTED<br>CHANNEL | MODULATION | DATA RATE<br>(Mbps) |  |  |  |
| 802.11ah 1M                                   | 1 to 51              | 1,25,51           | OFDM       | MCS0                |  |  |  |
| 802.11ah 2M                                   | 2 to 50              | 2,26,50           | OFDM       | MCS0                |  |  |  |
| 802.11ah 4M                                   | 8 to 48              | 8,24,48           | OFDM       | MCS0                |  |  |  |
| 802.11ah 8M                                   | 12 to 44             | 12,28,44          | OFDM       | MCS0                |  |  |  |

| TRANSMIT RADIATED EMISSION TEST (ABOVE 1 GHz) |                      |                   |            |                     |  |  |  |
|---|----------------------|-------------------|------------|---------------------|--|--|--|
| MODE  | AVAILABLE<br>CHANNEL | TESTED<br>CHANNEL | MODULATION | DATA RATE<br>(Mbps) |  |  |  |
| 802.11ah 1M                                   | 1 to 51              | 3,25,49           | OFDM       | MCS0                |  |  |  |
| 802.11ah 2M                                   | 2 to 50              | 6,26,46           | OFDM       | MCS0                |  |  |  |
| 802.11ah 4M                                   | 8 to 48              | 8,24,48           | OFDM       | MCS0                |  |  |  |
| 802.11ah 8M                                   | 12 to 44             | 12,28,44          | OFDM       | MCS0                |  |  |  |

### Note:

The field strength of radiated emission was measured as the EUT positioned in different orthogonal planes (E1/E2/H) based on actual usage of the EUT to pre-scan the emissions for determining the worst case scenario.

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## **MEASUREMENT UNCERTAINTY**

| Test Items                       | Und | certainty |    |
|----------------------------------|-----|-----------|----|
| AC Power Line Conducted Emission | +/- | 1.54      | dB |
| Output Power measurement         | +/- | 0.97      | dB |
| Emission Bandwidth               | +/- | 1.38      | Hz |
| Conducted emission measurement   | +/- | 0.77      | dB |
| Peak Power Density               | +/- | 0.61      | dB |
| Temperature                      | +/- | 0.6       | °C |
| Humidity                         | +/- | 3         | %  |
| DC / AC Power Source             | +/- | 1         | %  |

| Radiated Spurious Emission Measurement Uncertainty |     |      |    |                 |
|--|-----|------|----|-----------------|
|  | +/- | 1.89 | dB | 9kHz~30MHz      |
| Polarization: Vertical                             | +/- | 4.1  | dB | 30MHz - 1000MHz |
| Polarization. Vertical                             | +/- | 3.37 | dB | 1GHz - 18GHz    |
|  | +/- | 3.83 | dB | 18GHz - 40GHz   |
|  | +/- | 1.89 | dB | 9kHz~30MHz      |
| Polarization: Horizontal                           | +/- | 4.1  | dB | 30MHz - 1000MHz |
| Polarization. Horizontal                           | +/- | 3.37 | dB | 1GHz - 18GHz    |
|  | +/- | 3.83 | dB | 18GHz - 40GHz   |
|  | +/- | 2    | dB | 33GHz-50GHz     |
| De l'ete l'Occeste de Envis                        | +/- | 1.59 | dB | 50GHz-60GHz     |
| Radiated Spurious Emission                         | +/- | 1.71 | dB | 60GHz-90GHz     |
| 31011  | +/- | 1.64 | dB | 90GHz-140GHz    |
|  | +/- | 3.84 | dB | 140GHz-220GHz   |

### Note:

- 1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.
- 2. The conformity assessment statement in this report is based solely on the test results, measurement uncertainty is excluded.

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## **MEASUREMENT EQUIPMENT USED**

### 6.1 **Emission from AC power line**

|                   | AC Power-Line Conducted Emission Test Site: Conduction 1 |                          |                           |                          |            |  |  |  |
|-------------------|--|--------------------------|---------------------------|--------------------------|------------|--|--|--|
| EQUIPMENT TYPE    | MFR  | MODEL NUMBER             | LAST CAL.<br>(mm/dd/yyyy) | CAL DUE.<br>(mm/dd/yyyy) |            |  |  |  |
| Coaxial Cables    | EMC Instruments Corp.                                    | EMCCFD300-BM-<br>BM-3000 | 161207                    | 06/22/2024               | 06/21/2025 |  |  |  |
| EMI Test Receiver | R&S  | ESCI 7                   | 100759                    | 08/28/2024               | 08/27/2025 |  |  |  |
| LISN              | SCHWARZBECK  | NSLK 8127                | 1040                      | 09/07/2024               | 09/06/2025 |  |  |  |
| Pulse Limiter     | SCHWARZBECK  | VTSD 9561F-N             | 793                       | 06/22/2024               | 06/21/2025 |  |  |  |
| Test Software     | Audix  | e3                       | Ver. 9.210616             | N.C.R                    | N.C.R      |  |  |  |

#### 6.2 **Conducted Measurement**

|                          | Conducted Emission Test Site: Conducted 2 |           |            |                           |                          |  |  |  |
|--------------------------|---|-----------|------------|---------------------------|--------------------------|--|--|--|
| EQUIPMENT TYPE           | PE MFR MODEL NUMBER SERIAL NUMBE          |           |            | LAST CAL.<br>(mm/dd/yyyy) | CAL DUE.<br>(mm/dd/yyyy) |  |  |  |
| Attenuator               | Mini-Circuits                             | BW-S20W5  | 3          | 12/11/2024                | 12/10/2025               |  |  |  |
| DC Block                 | Mini-Circuits                             | BLK-18-S+ | 31129      | 12/11/2024                | 12/10/2025               |  |  |  |
| EXA Spectrum<br>Analyzer | KEYSIGHT                                  | N9010B    | MY59071541 | 07/08/2024                | 07/07/2025               |  |  |  |
| Power Meter              | Anritsu                                   | ML2496A   | 2138003    | 10/09/2024                | 10/08/2025               |  |  |  |
| Power Sensor             | Anritsu                                   | MA2411B   | 1911393    | 10/09/2024                | 10/08/2025               |  |  |  |
| Power Sensor             | Anritsu                                   | MA2411B   | 1911394    | 10/09/2024                | 10/08/2025               |  |  |  |

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### 6.3 Radiated Measurement

| Radiated Emission Test Site: SAC 1 |               |   |  |                           |                          |  |
|------------------------------------|---------------|---|--|---------------------------|--------------------------|--|
| EQUIPMENT TYPE                     | MFR           | MODEL NUMBER                                | SERIAL NUMBER                          | LAST CAL.<br>(mm/dd/yyyy) | CAL DUE.<br>(mm/dd/yyyy) |  |
| 1.3G High Pass<br>Filter           | Woken         | WHKX10-1066                                 | 19                                     | 12/11/2024                | 12/10/2025               |  |
| Attenuator                         | Mini-Circuits | BW-S10W2+                                   | 1                                      | 12/11/2024                | 12/10/2025               |  |
| Attenuator                         | Mini-Circuits | BW-S20W5                                    | 2                                      | 12/11/2024                | 12/10/2025               |  |
| Band Reject Filter<br>902-928      | Titan         | T04N90292850S02                             | 24090402-1                             | 10/15/2024                | 10/14/2025               |  |
| Bi-log Antenna                     | SCHWARZBECK   | VULB9168                                    | 1208                                   | 07/17/2024                | 07/16/2025               |  |
| Bi-log Antenna                     | SCHWARZBECK   | VULB9168                                    | 443                                    | 01/23/2025                | 01/22/2026               |  |
| Coaxial Cable                      | EMCI          | EMC104-SM-SM-<br>8000+EMC106-SM-<br>SM-7600 | RX Cable 9K-<br>18G(160125+15081<br>7) | 08/30/2024                | 08/29/2025               |  |
| EMI Test Receiver                  | R&S           | ESR 7                                       | 102525                                 | 02/08/2025                | 02/07/2026               |  |
| EXA Spectrum<br>Analyzer           | KEYSIGHT      | N9010B                                      | MY60242081                             | 10/23/2024                | 10/22/2025               |  |
| Horn Antenna                       | SCHWARZBECK   | BBHA9120D                                   | D803                                   | 01/09/2025                | 01/08/2026               |  |
| Loop Antenna                       | COM-POWER     | AL-130R                                     | 10160104                               | 12/19/2024                | 12/18/2025               |  |
| Pre-Amplifier                      | EMCI          | EMC118A45SEE                                | 980933                                 | 08/30/2024                | 08/29/2025               |  |
| Pre-Amplifier                      | HP            | 8447D                                       | 2944A09469                             | 08/30/2024                | 08/29/2025               |  |
| Site Cal                           | SGS           | SAC 1                                       | N/A                                    | 08/30/2024                | 08/29/2025               |  |
| Test Software                      | Audix         | e3  | Ver. 9.210616                          | N.C.R                     | N.C.R                    |  |

NOTE: N.C.R means No Calibration Required.

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## CONDUCTED EMISSION TEST

### 7.1 Standard Applicable:

Frequency range within 150kHz to 30MHz shall not exceed the Limit table as below.

| Frequency range | Limits<br>(dBμV) |          |  |  |
|-----------------|------------------|----------|--|--|
| MHz             | Quasi-peak       | Average  |  |  |
| 0.15 to 0.50    | 66 to 56         | 56 to 46 |  |  |
| 0.50 to 5       | 56               | 46       |  |  |
| 5 to 30         | 60               | 50       |  |  |

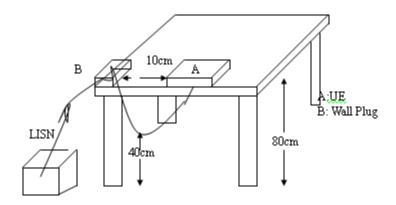
### Note

- 1. The lower limit shall apply at the transition frequencies
- 2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

### 7.2 **EUT Setup:**

- 1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.10:2013.
- 2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
- 3. The LISN was connected with 120Vac/60Hz power source.

#### 7.3 Test Setup



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## **Measurement Procedure:**

- 1. The EUT was placed on a table which is 0.8m above ground plane.
- 2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 3. Repeat above procedures until all phases of power being supplied by given UE are completed

#### 7.5 **Measurement Result:**

Note: Refer to next page for measurement data and plots.

Note2: The \* reveals the worst-case results that closest to the limit.

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## AC POWER LINE CONDUCTED EMISSION TEST DATA

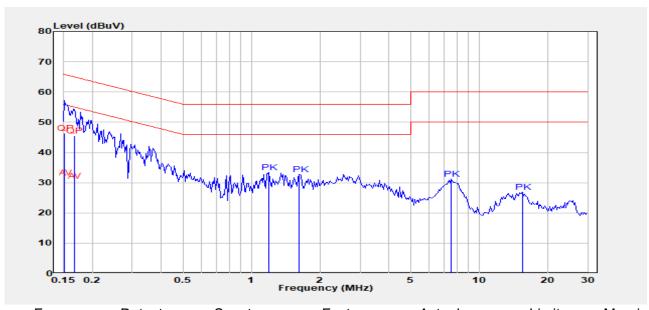
Report Number :TERF2502000807ER Test Site :Conduction 1

Operation Mode :Halow Test Date :2025-03-27

Power :120V/60Hz Temp./Humi. :23.1°C/59%

Probe :L Engineer :WJ Lin

Note: :



| Freq.  | Detector<br>Mode | Spectrum<br>Reading Level | Factor | Actual<br>FS | Limit | Margin |
|--------|------------------|---------------------------|--------|--------------|-------|--------|
| MHz    | PK/QP/AV         | dΒμ̈V                     | dB     | dΒμV         | dΒμV  | dB     |
|        |                  |                           |        |              |       |        |
| 0.152  | Average          | 21.51                     | 10.13  | 31.64        | 55.91 | -24.27 |
| 0.152  | QP               | 36.25                     | 10.13  | 46.38        | 65.91 | -19.53 |
| 0.167  | Average          | 20.47                     | 10.13  | 30.60        | 55.12 | -24.52 |
| 0.167  | QP               | 35.48                     | 10.13  | 45.61        | 65.12 | -19.51 |
| 1.197  | Peak             | 23.24                     | 10.20  | 33.44        | 56.00 | -22.56 |
| 1.628  | Peak             | 22.47                     | 10.19  | 32.67        | 56.00 | -23.33 |
| 7.566  | Peak             | 20.77                     | 10.36  | 31.14        | 60.00 | -28.86 |
| 15.552 | Peak             | 16.34                     | 10.48  | 26.81        | 60.00 | -33.19 |

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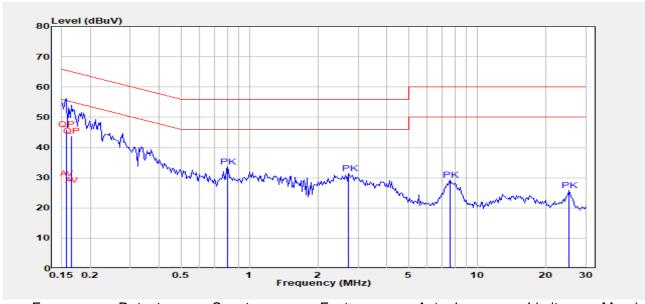
Report Number :TERF2502000807ER **Test Site** :Conduction 1

**Operation Mode** :Halow **Test Date** :2025-03-27

:120V/60Hz Temp./Humi. :23.1°C/59% Power

Probe :N Engineer :WJ Lin

Note:



| Freq.  | Detector<br>Mode | Spectrum<br>Reading Level | Factor | Actual<br>FS | Limit | Margin |
|--------|------------------|---------------------------|--------|--------------|-------|--------|
| MHz    | PK/QP/AV         | dΒμV                      | dB     | dBµV         | dΒμV  | dB     |
|        |                  |                           |        |              |       |        |
| 0.156  | Average          | 19.61                     | 10.12  | 29.73        | 55.65 | -25.92 |
| 0.156  | QP               | 35.95                     | 10.12  | 46.07        | 65.65 | -19.58 |
| 0.165  | Average          | 17.35                     | 10.12  | 27.47        | 55.21 | -27.74 |
| 0.165  | QP               | 33.74                     | 10.12  | 43.86        | 65.21 | -21.35 |
| 0.800  | Peak             | 23.45                     | 10.18  | 33.63        | 56.00 | -22.37 |
| 2.736  | Peak             | 21.27                     | 10.24  | 31.52        | 56.00 | -24.48 |
| 7.646  | Peak             | 18.87                     | 10.38  | 29.26        | 60.00 | -30.74 |
| 25.321 | Peak             | 15.23                     | 10.63  | 25.86        | 60.00 | -34.14 |

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## PEAK OUTPUT POWER MEASUREMENT

### 8.1 Standard Applicable:

#### 8.1.1 **FCC**

For systems using digital modulation in the 902-928 MHz bands, the limit for peak output power is 1Watt.

If the transmitting antenna of directional gain greater than 6dBi are used the peak output power form the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the Antenna exceeds 6dBi. (FCC only)

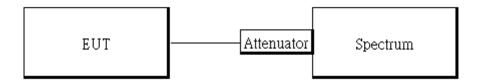
In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of Antenna exceeds 6dBi.

### Note:

When the antenna gain is greater than 6 dBi, the power limit attenuated accordingly.

#### 8.2 **Test Setup**

## 8.2.1 Duty Cycle



## 8.2.2 Output Power



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#### 8.3 **Measurement Procedure:**

### 8.3.1 **Duty Cycle**

- Place the EUT on the table and set it in transmitting mode.
- 2. Set span = Zero
- 3. RBW = 8MHz, VBW = <math>8MHz,
- 4. Detector = Peak

#### 8.4 **Output Power**

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
- 3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter.
- 4. Record the max. Reading as observed from Power Meter.
- 5. Repeat above procedures until all test default channel measured was complete.

### 8.5 **Duty Factor:**

|         | Duty Cycle (%)<br>= Ton / (Ton+Toff) | Duty Factor<br>(dB)<br>=10*log ( 1/Duty<br>Cycle ) | 1/T (kHz) | VBW<br>setting<br>(kHz) |
|---------|--------------------------------------|--|-----------|-------------------------|
| OFDM_1M | 98.10                                | 80.0   | 0.13      | 0.01                    |
| OFDM_2M | 98.33                                | 0.07   | 0.13      | 0.01                    |
| OFDM_4M | 98.51                                | 0.07   | 0.13      | 0.01                    |
| OFDM_8M | 96.58                                | 0.15   | 0.25      | 1.00                    |

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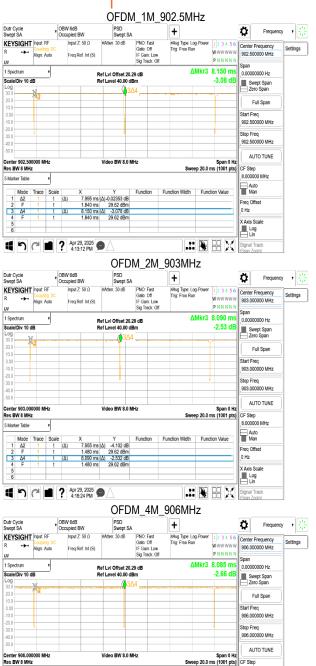
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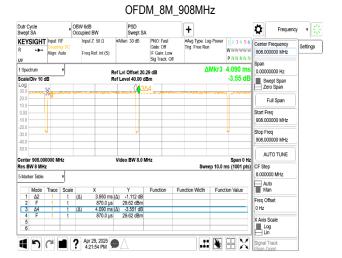
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Auto Man

req Offse

X Axis Scale

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X Y
7.965 ms (Δ) -2.073 dB
1.860 ms 29.62 dBm
8.085 ms (Δ) -2.664 dB
1.860 ms 29.62 dBm

| Mode | Trace | Scale | | Δ2 | 1 | t | (Δ) |

(A)

4:19:12 PM

No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan/新北市五股區新北產業園區五工路 134 號

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## **Output Power:**

### 8.6.1 Peak & Avg

## **OFDM 1M mode**

| СН | Frequency<br>(MHz) | Power<br>Setting | Avg. Output Power (dBm) | Required Limit<br>(dBm) |
|----|--------------------|------------------|-------------------------|-------------------------|
| 1  | 902.5              | -19              | 7.22                    | 30                      |
| 3  | 903.5              | 0                | 25.06                   | 30                      |
| 25 | 914.5              | 0                | 25.08                   | 30                      |
| 49 | 926.5              | 0                | 25.10                   | 30                      |
| 51 | 927.5              | -21              | 5.27                    | 30                      |

\*Note:

### **OFDM 2M mode**

| СН | Frequency<br>(MHz) | Power<br>Setting | Avg. Output Power (dBm) | Required Limit<br>(dBm) |
|----|--------------------|------------------|-------------------------|-------------------------|
| 2  | 903                | -17.5            | 7.95                    | 30                      |
| 6  | 905                | -0.5             | 24.48                   | 30                      |
| 26 | 915                | -0.5             | 24.51                   | 30                      |
| 46 | 925                | -0.5             | 24.51                   | 30                      |
| 50 | 927                | -19              | 6.49                    | 30                      |

<sup>\*</sup>Note:

1. Measured by power meter, cable loss 20.29 dB + Duty cycle factor has been offseted to the power meter for Avg. power and cable loss has been offseted for Peak power measurement.

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<sup>1.</sup> Measured by power meter, cable loss 20.29 dB + Duty cycle factor has been offseted to the power meter for Avg. power and cable loss has been offseted for Peak power measurement.



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### **OFDM 4M mode**

| СН | Frequency<br>(MHz) | Power<br>Setting | Peak Output Power<br>(dBm) | Required Limit<br>(dBm) |
|----|--------------------|------------------|----------------------------|-------------------------|
| 8  | 906                | 0                | 29.44                      | 30                      |
| 24 | 914                | 0                | 29.47                      | 30                      |
| 48 | 926                | -1               | 29.42                      | 30                      |
| СН | Frequency<br>(MHz) | Power<br>Setting | Avg. Output Power<br>(dBm) | Required Limit<br>(dBm) |
| 8  | 906                | 0                | 22.41                      | 30                      |
| 24 | 914                | 0                | 22.45                      | 30                      |
| 48 | 926                | -1               | 21.71                      | 30                      |

<sup>\*</sup>Note:

### **OFDM 8M mode**

| СН | Frequency<br>(MHz) | Power<br>Setting | Peak Output Power<br>(dBm) | Required Limit<br>(dBm) |
|----|--------------------|------------------|----------------------------|-------------------------|
| 12 | 908                | -0.5             | 29.38                      | 30                      |
| 28 | 916                | -1.5             | 29.34                      | 30                      |
| 44 | 924                | -2.5             | 29.07                      | 30                      |
| СН | Frequency<br>(MHz) | Power<br>Setting | Avg. Output Power<br>(dBm) | Required Limit<br>(dBm) |
| 12 | 908                | -0.5             | 21.63                      | 30                      |
| 28 | 916                | -1.5             | 20.57                      | 30                      |
| 44 | 924                | -2.5             | 19.91                      | 30                      |

<sup>\*</sup>Note:

1. Measured by power meter, cable loss 20.29 dB + Duty cycle factor has been offseted to the power meter for Avg. power and cable loss has been offseted for Peak power measurement.

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<sup>1.</sup>Measured by power meter, cable loss 20.29 dB + Duty cycle factor has been offseted to the power meter for Avg. power and cable loss has been offseted for Peak power measurement.



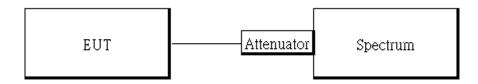
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## **EMISSION BANDWIDTH MEASUREMENT**

### 9.1 Standard Applicable

The minimum 6 dB bandwidth shall be at least 500 kHz.

### 9.2 **Test Setup**



#### 9.3 **Measurement Procedure:**

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

#### 9.3.1 6dB BW measurements

- 1. The testing follows the Measurement Procedure of the KDB 558074 D01.
- 2. Set the spectrum analyzer as

RBW= 100 kHz,

VBW = 3 X RBW.

Span= 2 to 5 times of the OBW,

Sweep=auto, Detector = Peak, and Max hold.

- 3. Mark the upper and lower frequencies of -6dB.
- 4. Repeat above procedures until all test default channel is completed.

#### 9.3.2 99% BW measurements

- 1. The testing follows the Measurement Procedure of the RSS-Gen section 6.7.
- 2. Set the spectrum analyzer as

RBW= 1 % to 5% of 99%,

VBW ≥ 3 X RBW,

Span= large enough to capture all products of the modulation process Sweep=auto, Detector = Peak, and Max hold.

- Mark the upper and lower frequencies of 99%.
- 4. Repeat above procedures until all test default channel is completed.

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## 9.4 Measurement Result:

# 9.4.1 6dB BW measurements

## **OFDM 1M mode**

| Frequency<br>(MHz) | 6dB<br>BW<br>(MHz) | Required<br>BW<br>(MHz) | Result |
|--------------------|--------------------|-------------------------|--------|
| 902.5              | 0.8668             | ≥ 0.5                   | PASS   |
| 903.5              | 0.8625             | ≥ 0.5                   | PASS   |
| 914.5              | 0.8574             | ≥ 0.5                   | PASS   |
| 926.5              | 0.8634             | ≥ 0.5                   | PASS   |
| 927.5              | 0.8489             | ≥ 0.5                   | PASS   |

## **OFDM 2M mode**

| Frequency<br>(MHz) | 6dB<br>BW<br>(MHz) | Required<br>BW<br>(MHz) | Result |
|--------------------|--------------------|-------------------------|--------|
| 903                | 1.786              | ≥ 0.5                   | PASS   |
| 905                | 1.801              | ≥ 0.5                   | PASS   |
| 915                | 1.798              | ≥ 0.5                   | PASS   |
| 925                | 1.805              | ≥ 0.5                   | PASS   |
| 925                | 1.795              | ≥ 0.5                   | PASS   |

## **OFDM 4M mode**

| Frequency<br>(MHz) | 6dB<br>BW<br>(MHz) | Required<br>BW<br>(MHz) | Result |
|--------------------|--------------------|-------------------------|--------|
| 906                | 3.659              | ≥ 0.5                   | PASS   |
| 914                | 3.662              | ≥ 0.5                   | PASS   |
| 926                | 3.656              | ≥ 0.5                   | PASS   |

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### **OFDM 8M mode**

| Frequency<br>(MHz) | 6dB<br>BW<br>(MHz) | Required<br>BW<br>(MHz) | Result |
|--------------------|--------------------|-------------------------|--------|
| 908                | 7.634              | ≥ 0.5                   | PASS   |
| 916                | 7.639              | ≥ 0.5                   | PASS   |
| 924                | 7.625              | ≥ 0.5                   | PASS   |

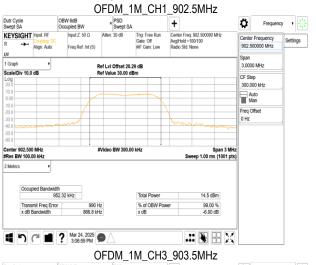
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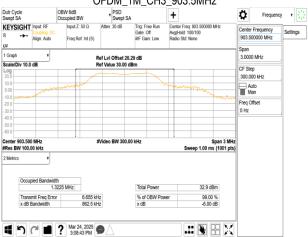
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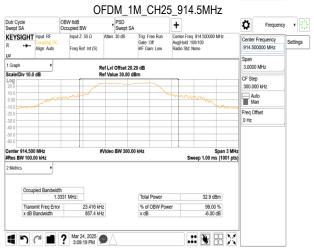
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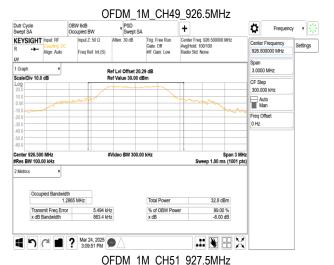


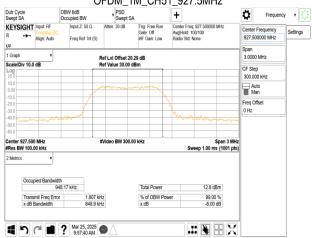
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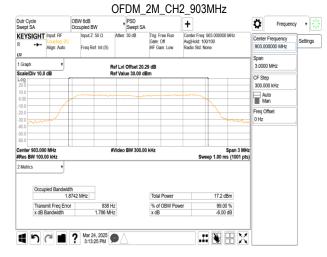












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Occupied Bandwidth
1.9155 MHz

Transmit Freq Error

Report No.: TERF2502000807ER

Ö

927.000000 MHz

CF Step 300.000 kHz

Auto Man

Freq Offset 0 Hz

♡

Center Frequency 906.000000 MHz

6 0000 MH

Auto Man

Freq Offset 0 Hz

Frequency •

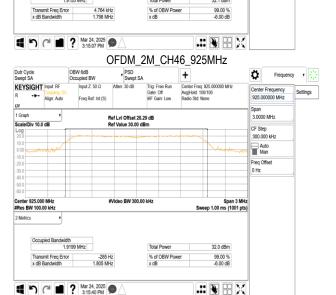
Settings

Frequency •

Settings

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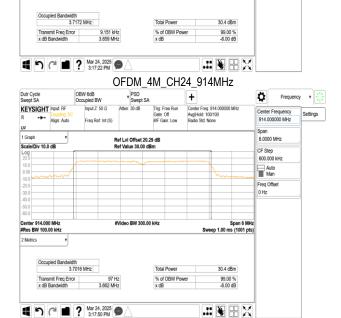
#### OFDM 2M CH6 905MHz OFDM\_2M\_CH50\_927MHz Trig: Free Run Gate: Off Aug/Hol #IF Gain: Low Dutr Cycle Swent SA PSD Swept SA Atten: 30 dB Frequency • Dutr Cycle Swept SA Ö PSD Swept SA KEYSIGHT Input: RF Input Z: 50 Ω KEYSIGHT Input: RF Freq Ref: Int (S) 1 Graph 1 Graph Scale/Div 10.0 dB Scale/Div 10 0 dB CF Step 300.000 kHz Auto Man Freq Offse 0 Hz eep 1.00 ms (1001 pts) Occupied Bandwidth 1.9199 MHz Occupied Bandwidth 1.8771 MHz Total Power 32.0 dBm Total Power 15.2 dBm % of OBW Power x dB Transmit Freq Error x dB Bandwidth Transmit Freq Error x dB Bandwidth % of OBW Power x dB 99.00 % -6.00 dB 99.00 % -6.00 dB Mar 24, 2025 Mar 2 1 9 Mar 25, 2025 9:59:34 AM OFDM 2M CH26 915MHz OFDM 4M CH8 906MHz PSD Swept SA Atten: 30 dB PSD Swept SA Atten: 30 dB Dutr Cycle Swept SA Frequency v Trig: Free Run KEYSIGHT Input: RF Input Z: 50 Q KEYSIGHT Input RF Input Z: 50 Q Center Frequency 915.000000 MHz Gate: Off #IF Gain: Low Freq Ref. Int (S) Freq Ref: Int (S) 1 Graph 3,0000 MH; 1 Graph Ref Lvi Offset 20.29 dE Scale/Div 10 0 dB Scale/Div 10 0 dB Auto Man Freq Offse 0 Hz



Total Power

Sweep 1.00 ms (1001 pts)

32.1 dBm



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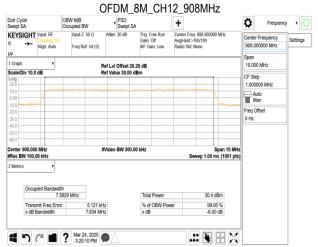
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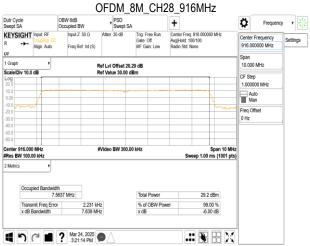
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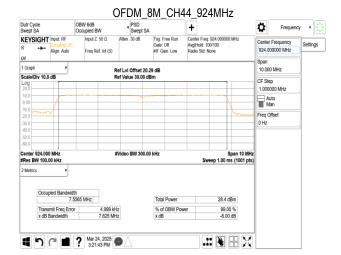


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### OFDM 4M CH48 926MHz Dutr Cycle Swent SA PSD Swept SA Atten: 30 dB Frequency • ₽ Trig: Free Run Gate: Off #IF Gain: Low KEYSIGHT Input: RF Input Z: 50 Ω 1 Graph Scale/Div 10.0 dB CF Step 600.000 kHz Auto Man Freq Offse 0 Hz Occupied Band 3.7152 MHz Total Power 30.5 dBm Transmit Freq Error x dB Bandwidth % of OBW Power x dB 99.00 % -6.00 dB ■ ? Mar 24, 2025 ■ ? 3:18:22 PM







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### 9.4.2 99% Bandwidth

### **OFDM 1M mode**

| Frequency (MHz) | 99%Bandwidth (MHz) |
|-----------------|--------------------|
| 902.5           | 0.88229            |
| 903.5           | 0.96448            |
| 914.5           | 0.9721             |
| 926.5           | 0.9698             |
| 927.5           | 0.88217            |

### OFDM 2M mode

| Frequency (MHz) | 99%Bandwidth (MHz) |
|-----------------|--------------------|
| 903             | 1.8512             |
| 905             | 1.9291             |
| 915             | 1.9264             |
| 925             | 1.9320             |
| 927             | 1.8577             |

## **OFDM 4M mode**

| Frequency (MHz) | 99%Bandwidth (MHz) |
|-----------------|--------------------|
| 906             | 3.7282             |
| 914             | 3.7005             |
| 926             | 3.6877             |

## **OFDM 8M mode**

| Frequency (MHz) | 99%Bandwidth (MHz) |
|-----------------|--------------------|
| 908             | 7.5625             |
| 916             | 7.5450             |
| 924             | 7.5435             |

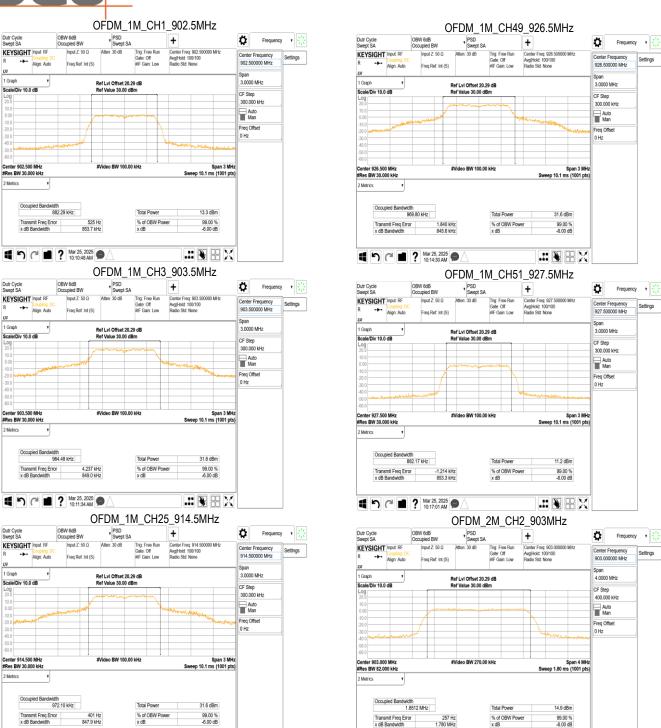
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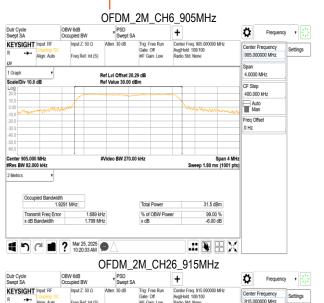
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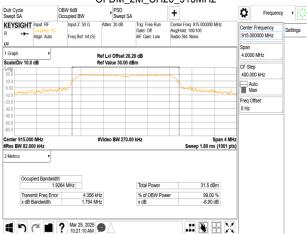
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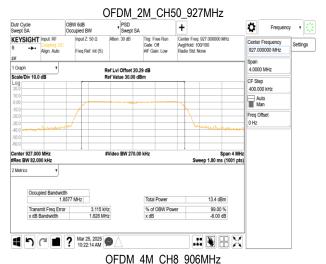


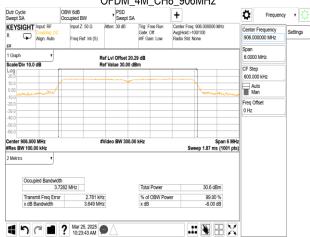
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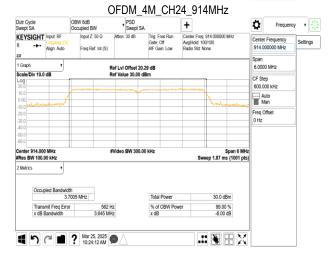












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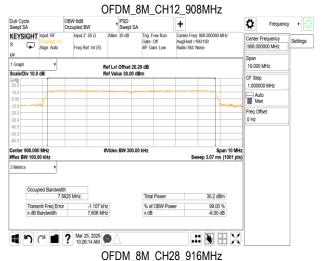
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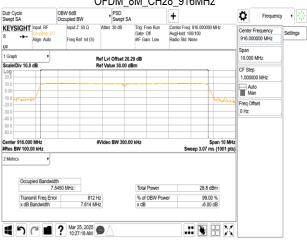
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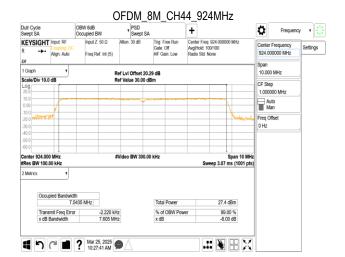


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### OFDM 4M CH48 926MHz Dutr Cycle Swept SA ٥ Frequency • PSD Swept SA KEYSIGHT Input: RF Input Z: 50 Ω 1 Graph Scale/Div 10.0 dB Auto Man Freq Offse 0 Hz Sweep 1.87 ms (1001 pts) Occupied Band width 3.6877 MHz Total Power 29.3 dBm Transmit Freq Error x dB Bandwidth % of OBW Power x dB 99.00 % -6.00 dB







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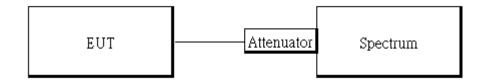
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## 10 CONDUCTED BAND EDGES AND SPURIOUS EMISSION MEASUREMENT

### 10.1 Standard Applicable

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

### 10.2 **Test Setup**



#### 10.3 Measurement Procedure

#### 10.3.1 **Reference Level of Emission Limit:**

- 1. Set analyzer center frequency to DTS channel center frequency.
- 2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
- 3. Set the span to 1.5 times the DTS channel bandwidth.
- 4. Set the RBW = 100kHz & VBW = 300 kHz.
- 5. Detector = peak.
- 6. Sweep time = auto couple.
- 7. Trace mode = max hold.
- 8. Allow trace to fully stabilize.
- 9. Use the peak marker function to determine the maximum amplitude level.

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# 10.3.2 Conducted Band Edge:

- 1. To connect Antenna Port of EUT to Spectrum.
- 2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
- 3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 4. Set start to edge frequency, and stop frequency of spectrum analyzer so as to encompass the spectrum to be examined.
- 5. Set the spectrum analyzer as RBW=100 kHz, VBW=300 kHz, Detector = Peak, Sweep = auto
- Set DL as the limit =
   OFDM 1M & 2M reading on marker of reference level measurement 30dBm
   OFDM 4M & 8M reading on marker of reference level measurement 20dBm
- 7. Mark the highest readings of the emissions outside of 902-928 MHz.
- 8. Repeat above procedures until all default test channel (low, middle, and high) was complete.

## 10.3.3 Conducted Spurious Emission:

- 1. To connect Antenna Port of EUT to Spectrum.
- 2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
- 3. Set RBW = 100 kHz & VBW=300 kHz, Detector = Peak, Sweep = Auto
- 4. Allow trace to fully stabilize.
- 5. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.
- 6. Repeat above procedures until all default test channel measured were complete.

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### 10.4 Measurement Result

### OFDM 1M mode Reference Level of Limit

| Frequency<br>(MHz) | RF Power<br>Density (dBm) | Reference Level of Limit<br>= PSD - 30dB<br>(dBm) |
|--------------------|---------------------------|---|
| 914.5              | 24.72                     | -5.28   |

\*Note:

1.cable loss as 20.29dB that offsets in the spectrum 2.Refer to next page for plots.

### OFDM 2M mode Reference Level of Limit

| Frequency<br>(MHz) | RF Power<br>Density (dBm) | Reference Level of Limit<br>= PSD - 30dB<br>(dBm) |
|--------------------|---------------------------|---|
| 915                | 20.65                     | -9.35   |

\*Note:

1.cable loss as 20.29dB that offsets in the spectrum 2.Refer to next page for plots.

### **OFDM 4M mode Reference Level of Limit**

| Frequency<br>(MHz) | RF Power<br>Density (dBm) | Reference Level of Limit<br>= PSD - 20dB<br>(dBm) |
|--------------------|---------------------------|---|
| 914                | 16.34                     | -3.66   |

\*Note:

1.cable loss as 20.29dB that offsets in the spectrum 2.Refer to next page for plots.

## OFDM 8M mode\_Reference Level of Limit

| Frequency<br>(MHz) | RF Power<br>Density (dBm) | Reference Level of Limit<br>= PSD - 20dB<br>(dBm) |
|--------------------|---------------------------|---|
| 916                | 12.28                     | -7.72   |

\*Note:

1.cable loss as 20.29dB that offsets in the spectrum 2.Refer to next page for plots.

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Settings

Swept Span Zero Span

Full Span

Stop Freq 921.729250 MHz

CF Step 1.145850 MHz

Auto Man

Freq Offse

Swept Span Zero Span

4.500000 MHz

Swept Span

Auto Man

Freq Offse 0 Hz X Axis Scale

Signal Trad

Full Span Start Freq 867.500000 MHz

Frequency v

Auto Man

Freq Offse

0 Hz X Axis Scale

Full Span

0 Hz

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X Axis Scale

Span 5.493 MHz
Sweep 1.00 ms (1501 pts)

Signal Trac

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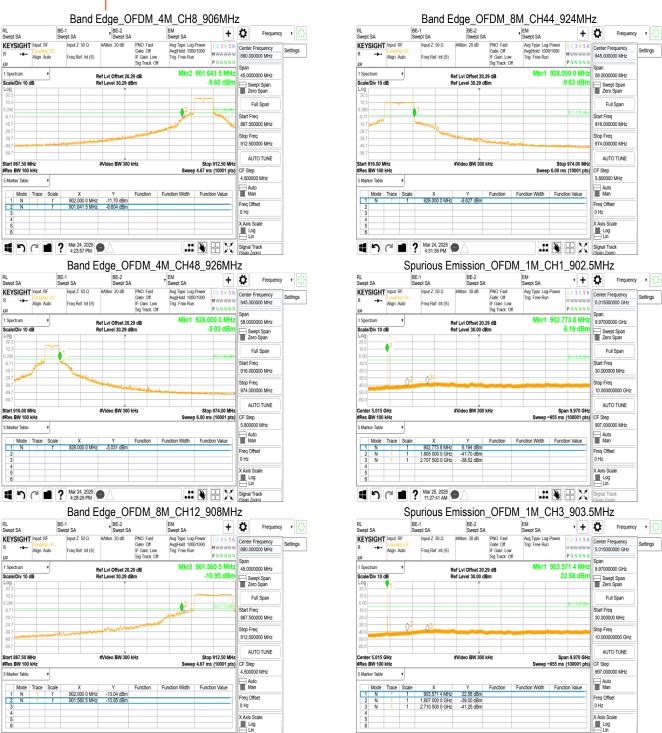
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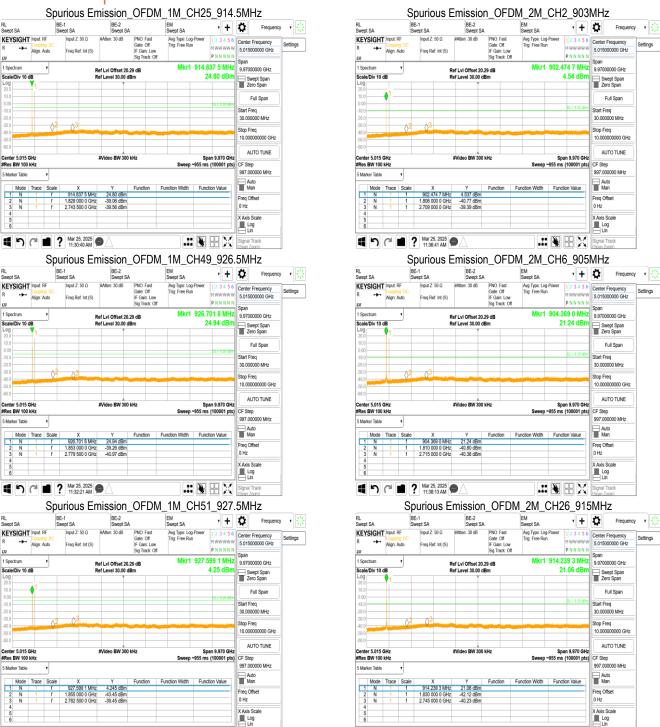
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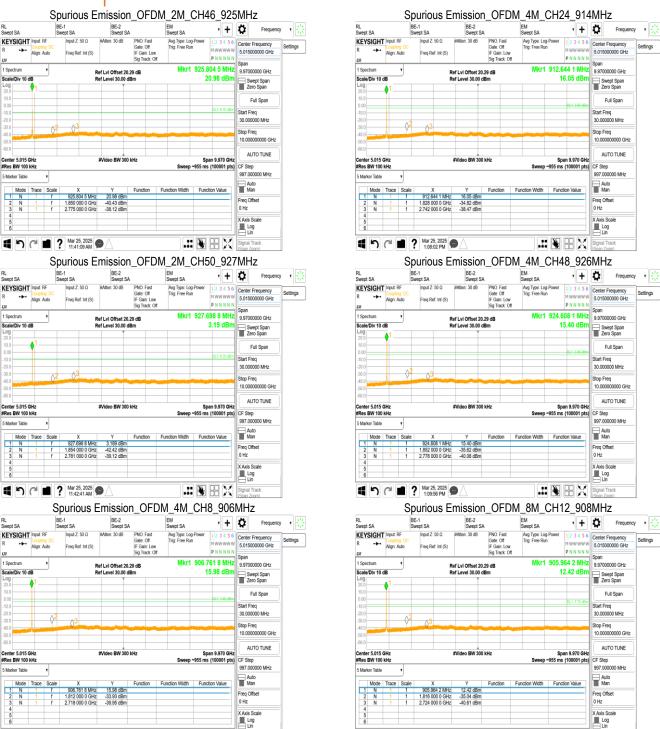
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