# FCC TEST REPORT

# FCC ID: 2BF9L-W80-30

| | | |
|---|---|---|
| Product | : | iMat ®Weigh -30 Smart office Vending machine |
| Model Name | : | W80-30, KT-MiniCtrl-G, KT-MiniCtrl-F, W90-30, S50-80, S50-80Plus, W60-30, G50-33B, G30-84, S20-60, S50-60, A10-864 |
| Brand | : | N/A |
| Report No. | : | PTC24022617701E-FC05 |

**Prepared for**

ShenZhen KunTon Intelligent Storage Technology Co.,Ltd

No.14 building,Hua Lian Industrial Zone XinShi Community, DaLang Street,LongHua District,ShenZhen City,GuangDong Province

**Prepared by**

Precise Testing & Certification Co., Ltd

Building 1, No. 6, Tongxin Road, Dongcheng Street, Dongguan, Guangdong, China

# 1 Test Result Certification

| | | |
|---|---|---|
| Applicant's name | : | ShenZhen KunTon Intelligent Storage Technology Co.,Ltd |
| Address | : | No.14 building,Hua Lian Industrial Zone XinShi Community, DaLang Street,LongHua District,ShenZhen City,GuangDong Province |
| Manufacture's name | : | ShenZhen KunTon Intelligent Storage Technology Co.,Ltd |
| Address | : | No.14 building,Hua Lian Industrial Zone XinShi Community, DaLang Street,LongHua District,ShenZhen City,GuangDong Province |
| Product name | : | iMat ®Weigh -30 Smart office Vending machine |
| Model name | : | W80-30, KT-MiniCtrl-G,KT-MiniCtrl-F,W90-30,S50-80,S50-80Plus,W60-30 ,G50-33B,G30-84,S20-60,S50-60,A10-864 |
| Standards | : | 47 CFR FCC Part 22 Subpart H,47 CFR FCC Part 24 Subpart E,47 CFR FCC Part 27, ANSI C63.26-2015, ANSI TIA-603-E-2016, KDB 971168 D01 Power Meas License Digital Systems v03r01 |
| Test Date | : | Apr. 01, 2024 to Jul. 24, 2024 |
| Date of Issue | : | Jul. 24, 2024 |
| Test Result | : | Pass |

This device described above has been tested by PTC, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.
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Test Engineer:

Jack zhou / Engineer

Technical Manager:

Simon Pu / Manager

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# 1. General Description Of Eut

| | |
|---|---|
| **Equipment Type:** | iMat ®Weigh -30 Smart office Vending machine |
| **Model Name:** | W80-30 |
| **Additional model:** | KT-MiniCtrl-G,KT-MiniCtrl-F,W90-30,S50-80,S50-80Plus,W60-30,G50-33B,G30-84,S20-60,S50-60,A10-864 |
| **Hardware version:** | N/A |
| **Software version:** | N/A |
| **Frequency Bands:** | WCDMA:<br>☒WCDMA BandⅡ ☒WCDMA BandⅣ ☒WCDMA BandⅤ |
| **Antenna Type:** | FPC Antenna |
| **Antenna gain:** | WCDMA BandⅡ: 2.81dBi<br>WCDMA BandⅣ : 2.81dBi<br>WCDMA BandⅤ: 2.14dBi |
| **Type of Modulation:** | ☒RMC(QPSK) ☒ HSUPA(QPSK)<br>☒ HSDPA(QPSK,16QAM) |
| **Adapter Information:** | Input:85~264VAC<br>Out:12VDC |
| **Max power:** | See Table 2.1 |
| **Extreme Vol. Limits:** | DC 10.8V to 13.2V (Normal: DC 12V) |
| **Test sample No.** | PTC24022617701E-1/2, PTC24022617701E-2/2. |

**Table 2.1 The Basic Technical Specification for Working BAND(S).**

| operation band(s) | Power Class | Mod. | ERP/EIRP(dBm) |
|---|---|---|---|
| WCDMA Band Ⅱ | Class 3 | QPSK | 26.49 |
| WCDMA Band Ⅳ | Class 3 | QPSK | 26.29 |
| WCDMA Band Ⅴ | Class 3 | QPSK | 24.04 |

# 2. Facilities And Accreditations

## 2.1. Test Facility

Precise Testing & Certification Co., Ltd

Address: Building 1, No. 6, Tongxin Road, Dongcheng Street, Dongguan, Guangdong, China

FCC Registration Number: 790290

A2LA Certificate No.: 4408.01

IC Registration Number: 12191A

## 2.2. Description Of Test Channels And Test Modes

### Test channels:

| WCDMA BAND Ⅱ | | | |
|---|---|---|---|
| Test Channel | BW(MHz) | UL Channel | Frequency(MHz) |
| Low Range | 5 | 9262 | 1852.4 |
| Mid Range | 5 | 9400 | 1880 |
| High Range | 5 | 9538 | 1907.6 |

| WCDMA BANDⅣ | | | |
|---|---|---|---|
| Test Channel | BW(MHz) | UL Channel | Frequency(MHz) |
| Low Range | 5 | 1312 | 1712.4 |
| Mid Range | 5 | 1413 | 1732.6 |
| High Range | 5 | 1513 | 1752.6 |

| WCDMA BAND Ⅴ | | | |
|---|---|---|---|
| Test Channel | BW(MHz) | UL Channel | Frequency(MHz) |
| Low Range | 5 | 4132 | 826.4 |
| Mid Range | 5 | 4182 | 836.4 |
| High Range | 5 | 4233 | 846.6 |

Note 1: The worst condition was recorded in the test report if no other modes test data.

## 2.3. Equipment Modifications

Not available for this EUT intended for grant.

# 3. Summary Of Test Requirements And Results

## WCDMA Band Ⅱ:

| Test Item | FCC Rule No. | Requirements | Judgement |
|---|---|---|---|
| Effective (Isotropic) Radiated Power | §2.1046, §24.232(c) | EIRP ≤ 2W(33dBm) | Pass |
| Bandwidth | §2.1049 | OBW: No limit.<br>EBW: No limit. | Pass |
| Band Edges | §2.1051, §24.238 | ⩽-13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block. | Pass |
| Spurious Emission at Antenna Terminals | §2.1051, §24.238 | FCC: ⩽-13 dBm/100 kHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges. | Pass |
| Field Strength of Spurious Radiation | §2.1053, §24.238(a) | -13dBm/1MHz | Pass |
| Frequency Stability | §2.1055, §24.235 | the fundamental emission stays within the authorized frequency block. ⩽±2.5ppm. | Pass |
| Peak to average ratio | §2.1046 §24.232 | ⩽13dB | Pass |

## WCDMA Band Ⅳ:

| Test Item | FCC Rule No. | Requirements | Judgement |
|---|---|---|---|
| Effective (Isotropic) Radiated Power | §2.1046, §2.913(a) | EIRP ≤ 1W(30dBm) | Pass |
| Occupied Bandwidth | §2.1049 | OBW: No limit. | Pass |
| Emission Bandwidth | §2.1049 | EBW: No limit. | Pass |
| Band Edges Compliance | §2.1051 §27.53(h) | ⩽-13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block. | Pass |
| Spurious Emission at Antenna Terminals | §2.1051, §27.53(h) | FCC: ⩽-13 dBm/100 kHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges. | Pass |
| Field Strength of Spurious Radiation | §2.1053, §22.917 | FCC: ⩽-13 dBm/100 kHz. | Pass |
| Frequency Stability | §2.1055, §27.54 | the fundamental emissions stay within the authorized bands of operation. (2.5ppm) | Pass |
| Peak to average ratio | §2.1046 §27.50(d) | ⩽13dB | Pass |

**WCDMA Band V:**

| Test Item | FCC Rule No. | Requirements | Judgement |
|---|---|---|---|
| Effective (Isotropic) Radiated Power | §2.1046, §2.913(a) | EIRP ≤ 7W(38.5dBm) | Pass |
| Occupied Bandwidth | §2.1049 | OBW: No limit. | Pass |
| Emission Bandwidth | 22.917(b) | EBW: No limit. | Pass |
| Band Edges Compliance | §2.1051 §22.917(a) | ⩽-13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block. | Pass |
| Spurious Emission at Antenna Terminals | §2.1051, §22.917 | FCC: ⩽-13 dBm/100 kHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges. | Pass |
| Field Strength of Spurious Radiation | §2.1053, §22.917 | FCC: ⩽-13 dBm/100 kHz. | Pass |
| Frequency Stability | §2.1055, §22.355 | the fundamental emissions stay within the authorized bands of operation. (2.5ppm) | Pass |

# 4. Measurement Instruments

RF Conducted Test

| Name of Equipment | Manufacturer | Model | Serial No. | Characteristics | Last Calibration | Calibration Interval |
|---|---|---|---|---|---|---|
| MXG Signal Analyzer | Agilent | N9020A | SER MY5111038 | 10Hz-30GHz | Aug.17, 2023 | 1 Year |
| Coaxial Cable | CDS | 79254 | 46107086 | 10Hz-30GHz | Aug.17, 2023 | 1 Year |
| Power Meter | Anritsu | ML2495A | 0949003 | 300MHz-40GHz | Aug.17, 2023 | 1 Year |
| Power Sensor | Anritsu | MA2411B | 0917017 | 300MHz-40GHz | Aug.17, 2023 | 1 Year |
| Signal Analyzer 40GHZ | Rohde&Schwarz | FSV40 | 101456 | 10Hz-40GHz | Aug.17, 2023 | 1 Year |
| Wireless Communication Tester | Rohde&Schwar | CMW500 | 134930 | / | Aug.17, 2023 | 1 year |

Remark: The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

| Name of Equipment | Manufacturer | Model | Serial No. | Characteristics | Last Calibration | Calibration Interval |
|---|---|---|---|---|---|---|
| EMI Test Receiver | Rohde&Schwarz | ESCI7 | 101671 | 9KHz-7GHz | Aug. 17,2023 | 1 Year |
| Loop Antenna | Schwarzbeck | FMZB 1519B | 192 | 9 KHz -30MHz | Aug. 17,2023 | 1 Year |
| Bilog Antenna | SCHWARZBECK | VULB9160 | 9160-3355 | 25MHz-2GHz | Aug. 17,2023 | 1 Year |
| Preamplifier (low frequency) | SCHWARZBECK | BBV 9475 | 9745-0013 | 1MHz-1GHz | Mar. 23,2024 | 1 Year |
| Cable | Schwarzbeck | PLF-100 | 549489 | 9KHz-3GHz | Aug. 17,2023 | 1 Year |
| Spectrum Analyzer | Rohde&Schwarz | FSV40 | 6625-01-588-5515 | 9KHz-40GHz | Aug.17, 2023 | 1 Year |
| Horn Antenna | SCHWARZBECK | 9120D | 9120D-1246 | 1GHz-18GHz | Aug. 17, 2023 | 1 Year |
| Power Amplifier | ZHINAN | ZN3380C | 15002 | 1GHz-26.5GHz | Aug. 17, 2023 | 1 Year |
| Horn Antenna | SCHWARZBECK | BBHA 9170 | 9170-1066 | 15GHz-40GHz | Jul. 19, 2023 | 1 Year |

| | | | | | | |
|---|---|---|---|---|---|---|
| Amplifier | SCHWARZBECK | BBV 9721 | 9721-205 | 18GHz-40GHz | Jul. 19, 2023 | 1 Year |
| Cable | H+S | CBL-26 | N/A | 1GHz-26.5GHz | Aug. 17,2023 | 1 Year |
| RF Cable | R&S | R204 | R21X | 1GHz-40GHz | Aug. 17,2023 | 1 Year |
| MXG Vector Signal Generator | Agilent | N5182A | MY49060455 | - | Aug. 17,2023 | 1 Year |
| ESG Series Analog signal generator | Agilent | E4421B | GB40051240 | - | Aug. 17,2023 | 1 Year |

# 5. Effective (Isotropic) Radiated Power and Conducted Output Power

## 5.1. Conducted Output Power

Measurement Procedure: FCC KDB 971168 D01 V03r01
The transmitter output was connected to a calibrated coaxial cable, attenuator and power meter, the other end of which was connected to a Base Station Simulator. The Base Station Simulator was set to force the EUT to its maximum power setting. The power output at the transmitter antenna port was determined by adding the value of the cable insertion loss to the power reading. The tests were performed at three frequencies (low channel, middle channel and high channel) and on the highest power levels, which can be setup on the transmitters.

## 5.2. Effective (Isotropic) Radiated Power

Measurement Procedure: FCC KDB 971168 D01 V03r01 ; C63.26 (2015).
Calculate power in dBm by the following formula:
ERP (dBm) = Conducted Power (dBm) + antenna gain (dBd)
EIRP(dBm) = Conducted Power (dBm) + antenna gain (dBi)
EIRP=ERP+2.15dB

## Test result:

**WCDMA Band 2; WCDMA Band 4; WCDMA Band 5 RMC:**

| Band | Channel | Power(dBm) | ERP/EIRP(dBm) | Limit(dBm) | Verdict |
|---|---|---|---|---|---|
| Band2 | 9262 | **23.68** | **26.49** | 33 | PASS |
| Band2 | 9400 | 23.30 | 26.11 | 33 | PASS |
| Band2 | 9538 | 22.57 | 25.38 | 33 | PASS |
| Band4 | 1312 | **23.48** | **26.29** | 30 | PASS |
| Band4 | 1413 | 23.39 | 26.20 | 30 | PASS |
| Band4 | 1513 | 23.42 | 26.23 | 30 | PASS |
| Band5 | 4132 | **24.05** | **24.04** | 38.5 | PASS |
| Band5 | 4182 | 24.02 | 24.01 | 38.5 | PASS |
| Band5 | 4233 | 23.84 | 23.83 | 38.5 | PASS |

**WCDMA Band 2; WCDMA Band 4; WCDMA Band 5 HSDPA :**

| Band | Channel | SubTest | Power(dBm) | ERP/EIRP(dBm) | Limit(dBm) | Verdict |
|---|---|---|---|---|---|---|
| Band2 | 9262 | 1 | 22.53 | 25.34 | 33 | PASS |
| Band2 | 9262 | 2 | 22.30 | 25.11 | 33 | PASS |
| Band2 | 9262 | 3 | **22.37** | **25.18** | 33 | PASS |
| Band2 | 9262 | 4 | 22.36 | 25.17 | 33 | PASS |
| Band2 | 9400 | 1 | 22.01 | 24.82 | 33 | PASS |
| Band2 | 9400 | 2 | 21.76 | 24.57 | 33 | PASS |
| Band2 | 9400 | 3 | 21.83 | 24.64 | 33 | PASS |
| Band2 | 9400 | 4 | 21.84 | 24.65 | 33 | PASS |
| Band2 | 9538 | 1 | 21.23 | 24.04 | 33 | PASS |
| Band2 | 9538 | 2 | 21.01 | 23.82 | 33 | PASS |
| Band2 | 9538 | 3 | 21.08 | 23.89 | 33 | PASS |
| Band2 | 9538 | 4 | 21.09 | 23.90 | 33 | PASS |
| Band4 | 1312 | 1 | 21.51 | 24.32 | 30 | PASS |
| Band4 | 1312 | 2 | 21.27 | 24.08 | 30 | PASS |
| Band4 | 1312 | 3 | 21.40 | 24.21 | 30 | PASS |
| Band4 | 1312 | 4 | 21.44 | 24.25 | 30 | PASS |
| Band4 | 1413 | 1 | **21.88** | **24.69** | 30 | PASS |
| Band4 | 1413 | 2 | 21.59 | 24.40 | 30 | PASS |
| Band4 | 1413 | 3 | 21.70 | 24.51 | 30 | PASS |
| Band4 | 1413 | 4 | 21.74 | 24.55 | 30 | PASS |
| Band4 | 1513 | 1 | 21.65 | 24.46 | 30 | PASS |
| Band4 | 1513 | 2 | 21.41 | 24.22 | 30 | PASS |
| Band4 | 1513 | 3 | 21.51 | 24.32 | 30 | PASS |
| Band4 | 1513 | 4 | 21.52 | 24.33 | 30 | PASS |
| Band5 | 4132 | 1 | 23.22 | 23.21 | 38.5 | PASS |
| Band5 | 4132 | 2 | 22.65 | 22.64 | 38.5 | PASS |
| Band5 | 4132 | 3 | 22.64 | 22.63 | 38.5 | PASS |
| Band5 | 4132 | 4 | 22.64 | 22.63 | 38.5 | PASS |
| Band5 | 4182 | 1 | **23.18** | **23.17** | 38.5 | PASS |
| Band5 | 4182 | 2 | 22.70 | 22.69 | 38.5 | PASS |
| Band5 | 4182 | 3 | 22.59 | 22.58 | 38.5 | PASS |
| Band5 | 4182 | 4 | 22.67 | 22.66 | 38.5 | PASS |
| Band5 | 4233 | 1 | 22.97 | 22.96 | 38.5 | PASS |
| Band5 | 4233 | 2 | 22.48 | 22.47 | 38.5 | PASS |
| Band5 | 4233 | 3 | 22.45 | 22.44 | 38.5 | PASS |
| Band5 | 4233 | 4 | 22.45 | 22.44 | 38.5 | PASS |

**WCDMA Band 2 and Band 5 HSUPA :**

| Band | Channel | SubTest | Power(dBm) | ERP/EIRP(dBm) | Limit(dBm) | Verdict |
|---|---|---|---|---|---|---|
| Band2 | 9262 | 1 | 22.58 | 25.39 | 33 | PASS |
| Band2 | 9262 | 2 | 21.74 | 24.55 | 33 | PASS |
| Band2 | 9262 | 3 | 20.93 | 23.74 | 33 | PASS |
| Band2 | 9262 | 4 | 22.16 | 24.97 | 33 | PASS |
| Band2 | 9262 | 5 | **22.57** | **25.38** | 33 | PASS |
| Band2 | 9400 | 1 | 21.57 | 24.38 | 33 | PASS |
| Band2 | 9400 | 2 | 21.22 | 24.03 | 33 | PASS |
| Band2 | 9400 | 3 | 20.34 | 23.15 | 33 | PASS |
| Band2 | 9400 | 4 | 21.67 | 24.48 | 33 | PASS |
| Band2 | 9400 | 5 | 22.28 | 25.09 | 33 | PASS |
| Band2 | 9538 | 1 | 20.78 | 23.59 | 33 | PASS |
| Band2 | 9538 | 2 | 19.71 | 22.52 | 33 | PASS |
| Band2 | 9538 | 3 | 20.38 | 25.39 | 33 | PASS |
| Band2 | 9538 | 4 | 20.68 | 24.55 | 33 | PASS |
| Band2 | 9538 | 5 | 21.64 | 23.74 | 33 | PASS |
| Band4 | 1312 | 1 | 21.05 | 23.86 | 30 | PASS |
| Band4 | 1312 | 2 | 20.77 | 23.58 | 30 | PASS |
| Band4 | 1312 | 3 | 20.32 | 23.13 | 30 | PASS |
| Band4 | 1312 | 4 | 21.16 | 23.97 | 30 | PASS |
| Band4 | 1312 | 5 | 21.90 | 24.71 | 30 | PASS |
| Band4 | 1413 | 1 | 21.30 | 24.11 | 30 | PASS |
| Band4 | 1413 | 2 | 20.97 | 23.78 | 30 | PASS |
| Band4 | 1413 | 3 | 20.92 | 23.73 | 30 | PASS |
| Band4 | 1413 | 4 | 21.09 | 23.90 | 30 | PASS |
| Band4 | 1413 | 5 | **22.07** | **24.88** | 30 | PASS |
| Band4 | 1513 | 1 | 21.26 | 24.07 | 30 | PASS |
| Band4 | 1513 | 2 | 21.01 | 23.82 | 30 | PASS |
| Band4 | 1513 | 3 | 20.99 | 23.80 | 30 | PASS |

| | | | | | | |
|---|---|---|---|---|---|---|
| Band4 | 1513 | 4 | 20.88 | 23.69 | 30 | PASS |
| Band4 | 1513 | 5 | 22.00 | 24.81 | 30 | PASS |
| Band5 | 4132 | 1 | 23.12 | 23.11 | 38.5 | PASS |
| Band5 | 4132 | 2 | 21.76 | 21.75 | 38.5 | PASS |
| Band5 | 4132 | 3 | 22.01 | 22.00 | 38.5 | PASS |
| Band5 | 4132 | 4 | 22.06 | 22.05 | 38.5 | PASS |
| Band5 | 4132 | 5 | 23.01 | 23.00 | 38.5 | PASS |
| Band5 | 4182 | 1 | 23.07 | **23.06** | 38.5 | PASS |
| Band5 | 4182 | 2 | 22.05 | 22.04 | 38.5 | PASS |
| Band5 | 4182 | 3 | 21.41 | 21.40 | 38.5 | PASS |
| Band5 | 4182 | 4 | 22.54 | 22.53 | 38.5 | PASS |
| Band5 | 4182 | 5 | 23.04 | 23.03 | 38.5 | PASS |
| Band5 | 4233 | 1 | 22.12 | 22.11 | 38.5 | PASS |
| Band5 | 4233 | 2 | 21.46 | 21.45 | 38.5 | PASS |
| Band5 | 4233 | 3 | 21.14 | 23.11 | 38.5 | PASS |
| Band5 | 4233 | 4 | 21.85 | 21.75 | 38.5 | PASS |
| Band5 | 4233 | 5 | 22.92 | 22.00 | 38.5 | PASS |

Note:
For getting the EIRP (Efficient Isotropic Radiated Power), the following formula The following formula is used for calculation:
1.ERP [dBm] = Conducted Power [dBm] + Gain [dBd]
2.EIRP [dBm] = Conducted Power [dBm] + Gain [dBi]

# 6. Spurious Emission (Conducted and Radiated)

## 6.1. Measurement Result (Pre-measurement)

**WCDMA BANDⅡ:**

| Test Channel | BW(MHz) | UL Channel | Frequency(MHz) | Judgment |
|---|---|---|---|---|
| Low Range | 0.2 | 9262 | 1852.4 | Pass |
| Middle Range | 0.2 | 9400 | 1880 | Pass |
| High Range | 0.2 | 9538 | 1907.6 | Pass |

**WCDMA BAND Ⅳ:**

| Test Channel | BW(MHz) | UL Channel | Frequency(MHz) | Judgment |
|---|---|---|---|---|
| Low Range | 0.2 | 1312 | 1712.4 | Pass |
| Middle Range | 0.2 | 1413 | 1732.6 | Pass |
| High Range | 0.2 | 1513 | 1752.6 | Pass |

**WCDMA BAND Ⅴ:**

| Test Channel | BW(MHz) | UL Channel | Frequency(MHz) | Judgment |
|---|---|---|---|---|
| Low Range | 5 | 4132 | 826.4 | Pass |
| Middle Range | 5 | 4182 | 836.4 | Pass |
| High Range | 5 | 4233 | 846.6 | Pass |

Test Plot(s)
**Conducted method**

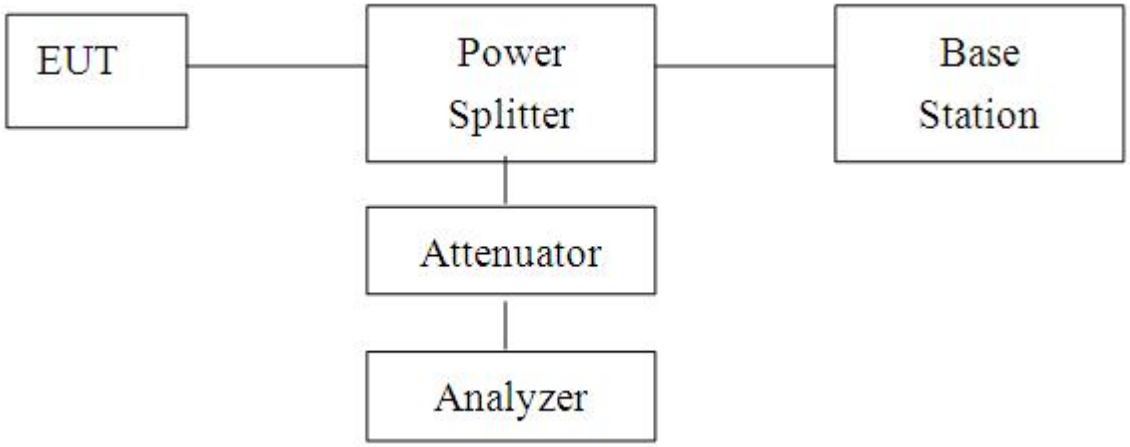
## Test limit:

The spurious (unwanted) emission limits specified in the individual FCC rule parts applicable to licensed digital transmitters (typically referred to under the heading 'emission limits') normally apply to any and all emissions that are present outside of the authorized frequency band/block and apply to emissions in both the out-of-band and spurious domains. In some rule parts, the unwanted emission limits are specified by an emission mask that defines the applicable limit as a function of the frequency range relative to the authorized frequency block.
Typically, unwanted emissions are required by the licensed rule parts to be attenuated below the transmitter power by a factor of at least X + 10log(P) dB, where P represents the transmitter power expressed in watts and X is a specified scalar value (e.g., 43). This specification can be interpreted in one of two equivalent ways. First, the required attenuation can be construed to be relative to the mean carrier power, with the resultant of the equation X + 10log(P) being expressed in dBc (dB relative to the maximum carrier power). Alternatively, the specification can be interpreted as an absolute limit when the specified attenuation is actually subtracted from the maximum permissible transmitter power [i.e., 10log(P) – {X + 10log(P)}], resulting in an absolute level of -X dBW [or (-X + 30) dBm]. See section 4.

## Test procedure:

The RF output of the transceiver was connected to a spectrum analyzer and simulator through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100 kHz below 1 GHz and 1 MHz above 1 GHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonics.

## Conducted Emission Test-Up:



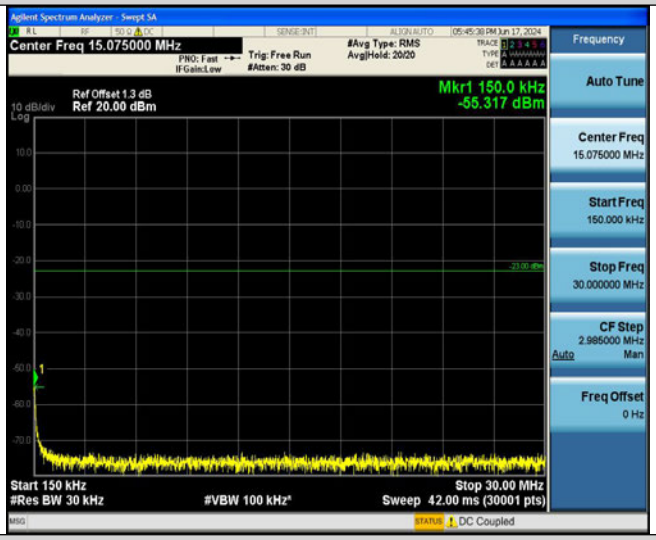
**Test Result:**

| Band | Channel | Frequency Range (Mhz) | Frequency (dBm) | Result (dBm) | Limit (dBm) | Verdict |
|---|---|---|---|---|---|---|
| Band2 | 9262 | 0.009~0.15MHz | 0.01 | -66.36 | -43 | PASS |
| Band2 | 9262 | 0.15~30MHz | 0.15 | -55.32 | -23 | PASS |
| Band2 | 9262 | 30~1000MHz | 781.49 | -56.71 | -13 | PASS |
| Band2 | 9262 | 1000~3000MHz | 2684.4 | -51.7 | -13 | PASS |
| Band2 | 9262 | 3000~20000MHz | 17049.93 | -40.54 | -13 | PASS |
| Band2 | 9400 | 0.009~0.15MHz | 0.01 | -66.67 | -43 | PASS |
| Band2 | 9400 | 0.15~30MHz | 0.15 | -52.17 | -23 | PASS |
| Band2 | 9400 | 30~1000MHz | 896.53 | -57.3 | -13 | PASS |
| Band2 | 9400 | 1000~3000MHz | 2677.6 | -51.7 | -13 | PASS |
| Band2 | 9400 | 3000~20000MHz | 17036.9 | -40.34 | -13 | PASS |
| Band2 | 9538 | 0.009~0.15MHz | 0.01 | -65.43 | -43 | PASS |
| Band2 | 9538 | 0.15~30MHz | 0.15 | -52.85 | -23 | PASS |
| Band2 | 9538 | 30~1000MHz | 790.87 | -56.72 | -13 | PASS |
| Band2 | 9538 | 1000~3000MHz | 2678.13 | -51.81 | -13 | PASS |
| Band2 | 9538 | 3000~20000MHz | 17026.13 | -40.45 | -13 | PASS |
| Band4 | 1312 | 0.009~0.15MHz | 0.01 | -66.97 | -43 | PASS |
| Band4 | 1312 | 0.15~30MHz | 0.15 | -52.91 | -23 | PASS |
| Band4 | 1312 | 30~1000MHz | 915.13 | -57.22 | -13 | PASS |
| Band4 | 1312 | 1000~3000MHz | 2677.6 | -51.76 | -13 | PASS |
| Band4 | 1312 | 3000~20000MHz | 17012.53 | -40.45 | -13 | PASS |
| Band4 | 1413 | 0.009~0.15MHz | 0.01 | -66.35 | -43 | PASS |
| Band4 | 1413 | 0.15~30MHz | 0.15 | -53.01 | -23 | PASS |
| Band4 | 1413 | 30~1000MHz | 773.44 | -56.69 | -13 | PASS |
| Band4 | 1413 | 1000~3000MHz | 2683.4 | -51.77 | -13 | PASS |
| Band4 | 1413 | 3000~20000MHz | 16993.83 | -40.44 | -13 | PASS |
| Band4 | 1513 | 0.009~0.15MHz | 0.01 | -66.35 | -43 | PASS |
| Band4 | 1513 | 0.15~30MHz | 0.15 | -53.87 | -23 | PASS |
| Band4 | 1513 | 30~1000MHz | 791.42 | -56.98 | -13 | PASS |
| Band4 | 1513 | 1000~3000MHz | 2671.87 | -51.73 | -13 | PASS |
| Band4 | 1513 | 3000~20000MHz | 17010.83 | -40.49 | -13 | PASS |
| Band5 | 4132 | 0.009~0.15MHz | 0.01 | -67.15 | -33 | PASS |
| Band5 | 4132 | 0.15~30MHz | 0.15 | -53.54 | -13 | PASS |
| Band5 | 4132 | 30~1000MHz | 980.31 | -64.45 | -13 | PASS |
| Band5 | 4132 | 1000~10000MHz | 3175 | -48.26 | -13 | PASS |
| Band5 | 4182 | 0.009~0.15MHz | 0.01 | -64.96 | -33 | PASS |
| Band5 | 4182 | 0.15~30MHz | 0.16 | -54.39 | -13 | PASS |
| Band5 | 4182 | 30~1000MHz | 184.55 | -64.52 | -13 | PASS |
| Band5 | 4182 | 1000~10000MHz | 3179.5 | -48.17 | -13 | PASS |
| Band5 | 4233 | 0.009~0.15MHz | 0.01 | -64.15 | -33 | PASS |
| Band5 | 4233 | 0.15~30MHz | 0.15 | -52.7 | -13 | PASS |
| Band5 | 4233 | 30~1000MHz | 964.11 | -64.77 | -13 | PASS |
| Band5 | 4233 | 1000~10000MHz | 3187 | -48.33 | -13 | PASS |

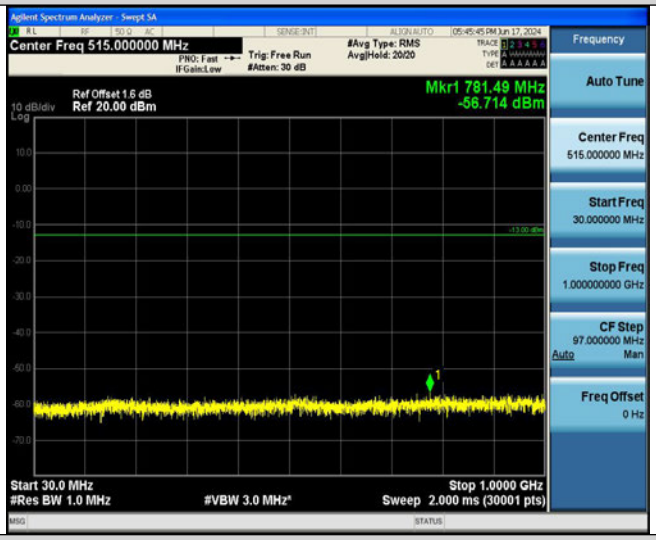
**Test Graphs:**

Band2-9262-0.009~0.15MHz

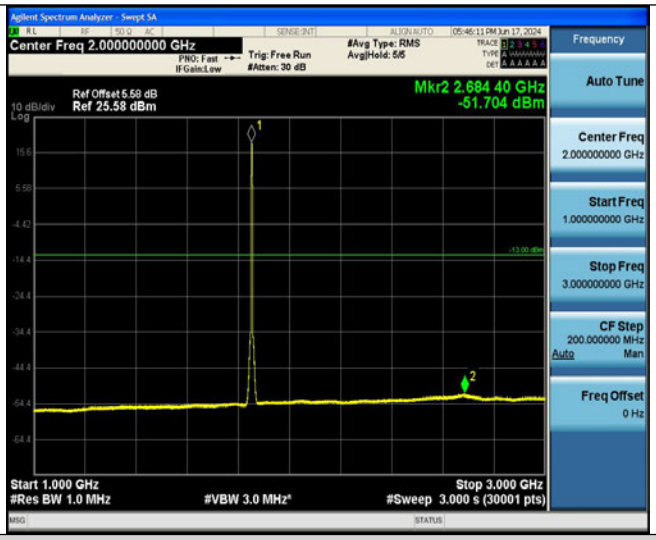
Band2-9262-0.15~30MHz




Band2-9262-30~1000MHz



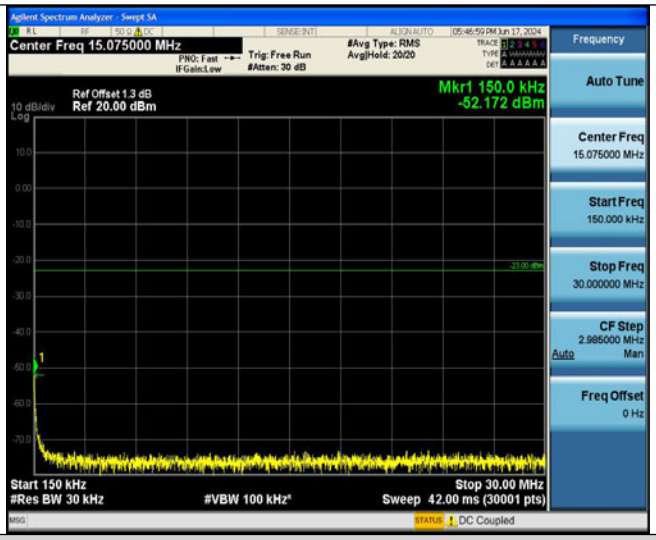

Band2-9262-1000~3000MHz



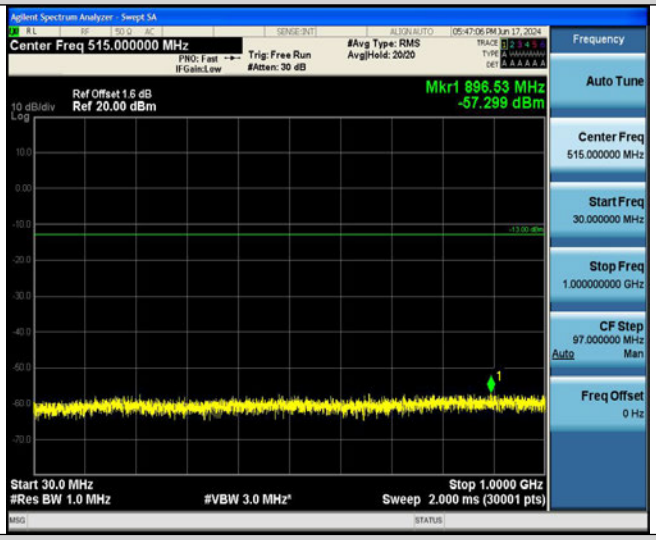

Band2-9262-3000~20000MHz

Band2-9400-0.009~0.15MHz

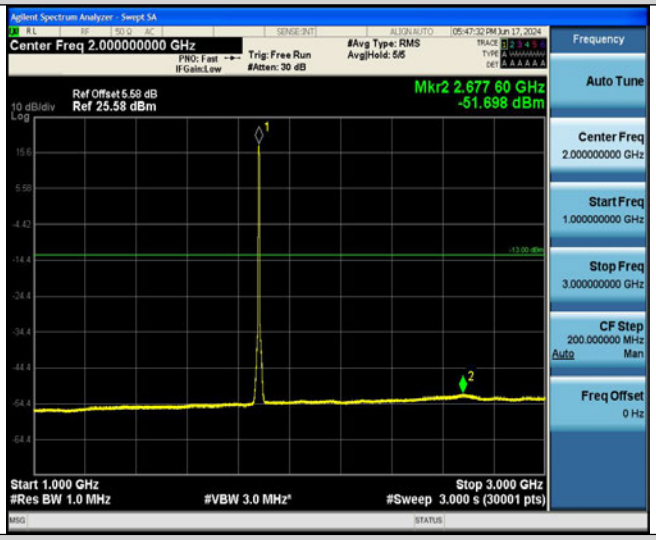
Band2-9400-0.15~30MHz




Band2-9400-30~1000MHz



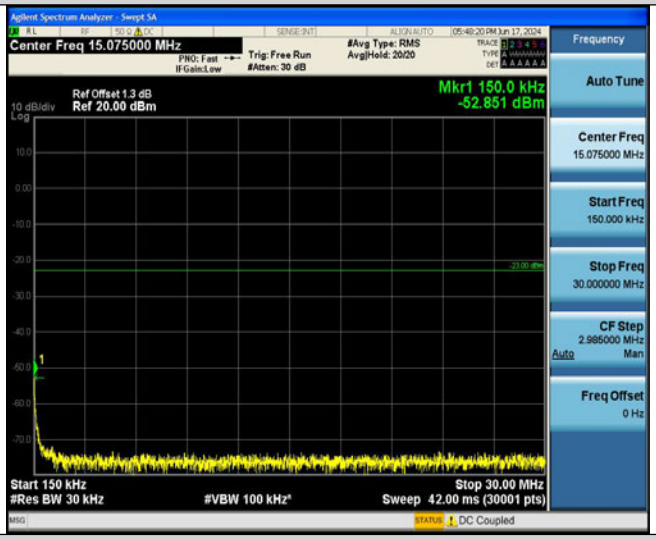

Band2-9400-1000~3000MHz



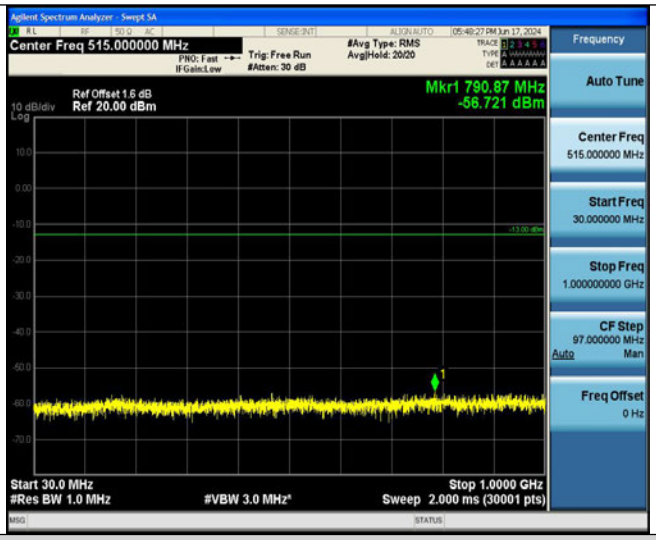

Band2-9400-3000~20000MHz

Band2-9538-0.009~0.15MHz

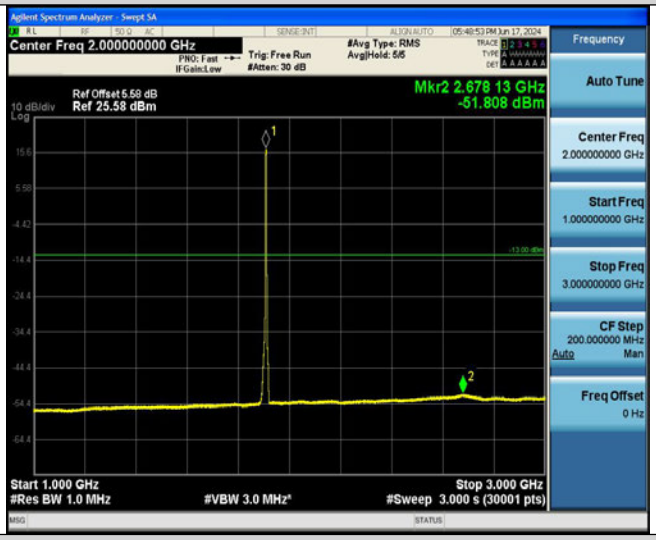
Band2-9538-0.15~30MHz




Band2-9538-30~1000MHz



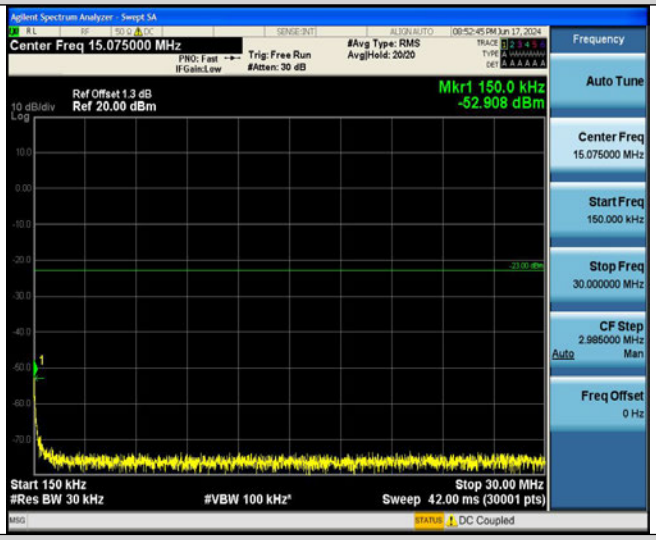

Band2-9538-1000~3000MHz



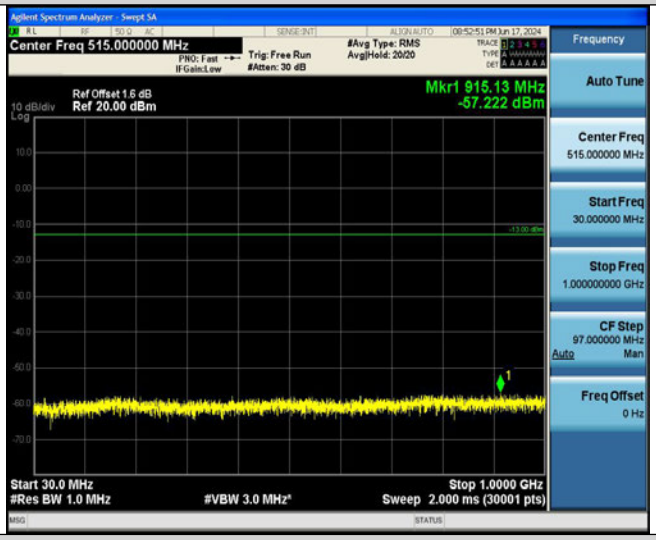

Band2-9538-3000~20000MHz

Band4-1312-0.009~0.15MHz

Band4-1312-0.15~30MHz




Band4-1312-30~1000MHz



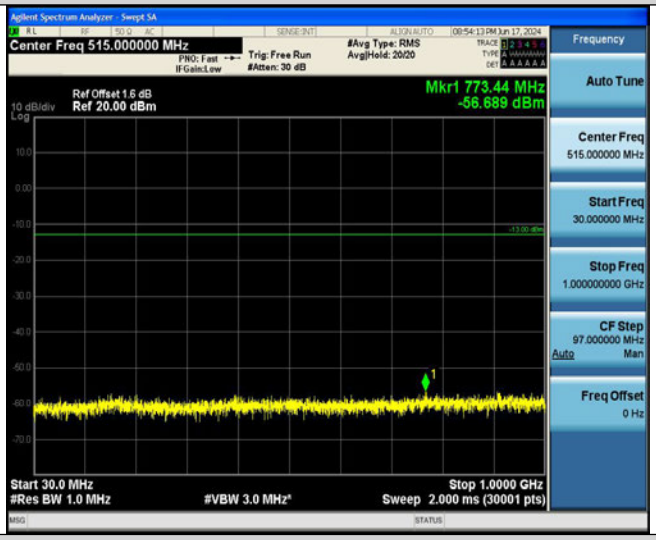

Band4-1312-1000~3000MHz

Band4-1312-3000~20000MHz

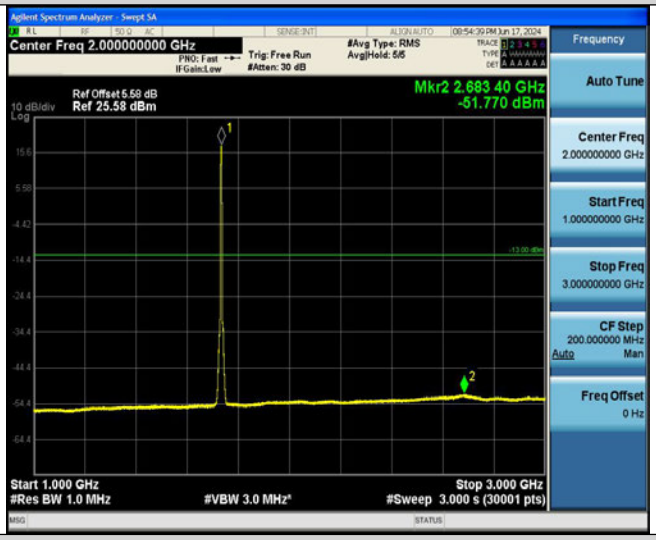
Band4-1413-0.009~0.15MHz

Band4-1413-0.15~30MHz

Band4-1413-30~1000MHz



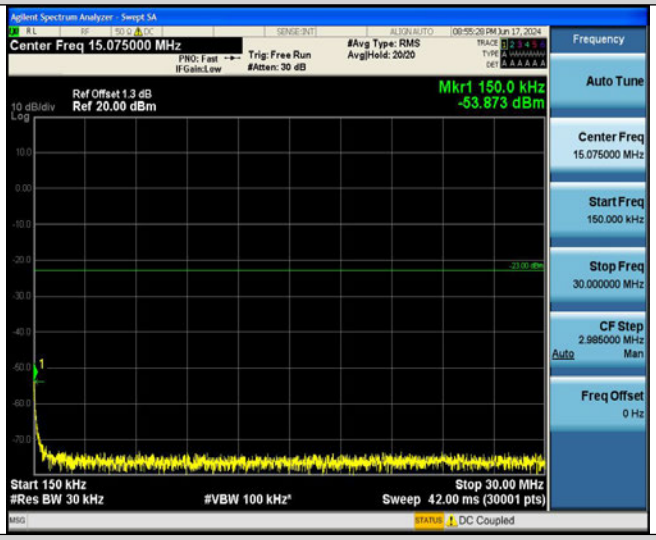

Band4-1413-1000~3000MHz



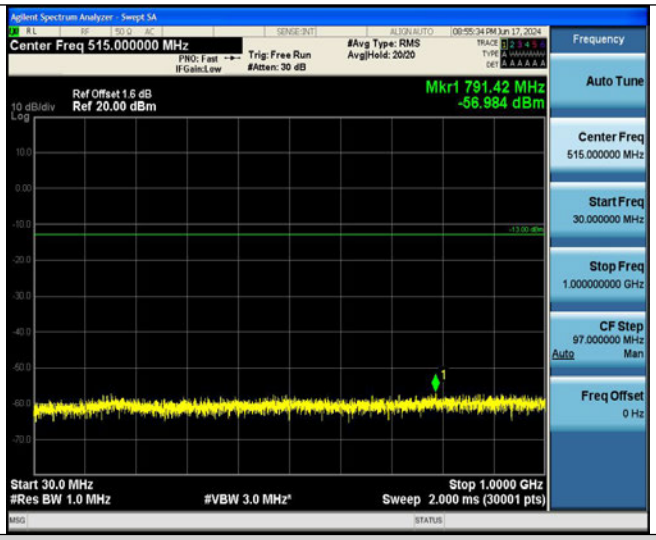

Band4-1413-3000~20000MHz

Band4-1513-0.009~0.15MHz

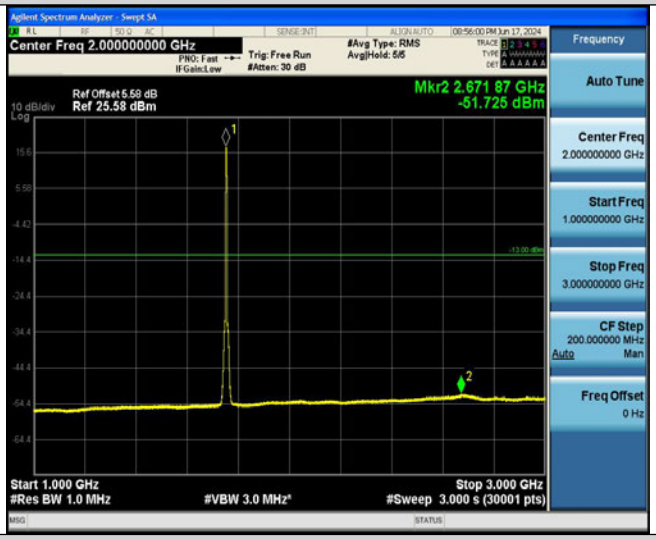
Band4-1513-0.15~30MHz




Band4-1513-30~1000MHz



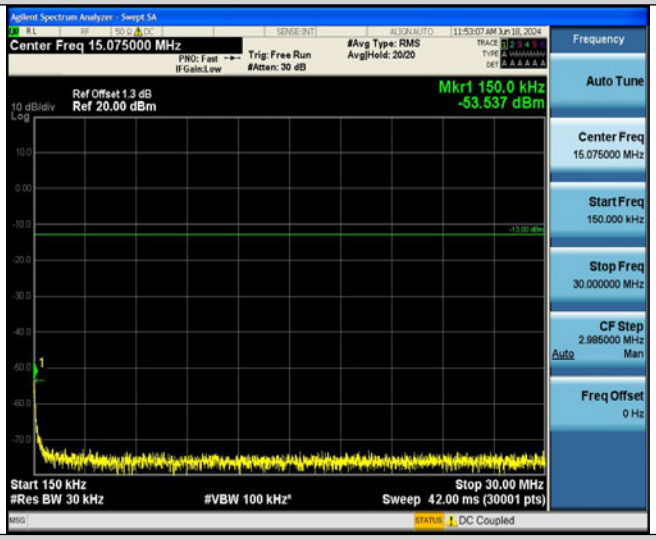

Band4-1513-1000~3000MHz



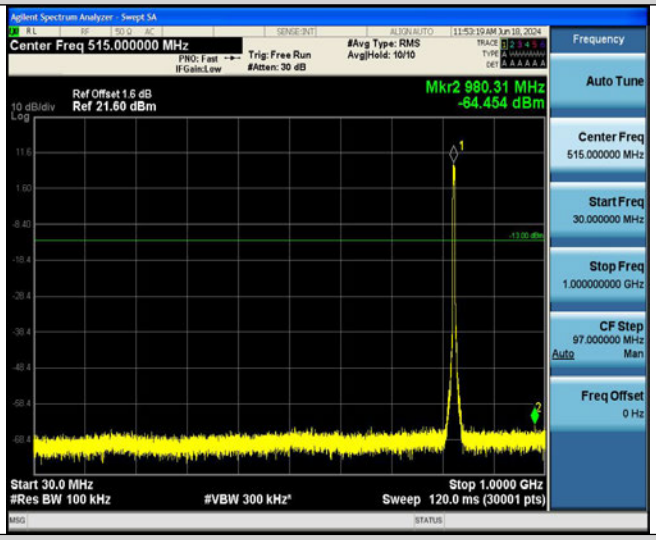

Band4-1513-3000~20000MHz

Band5-4132-0.009~0.15MHz

Band5-4132-0.15~30MHz



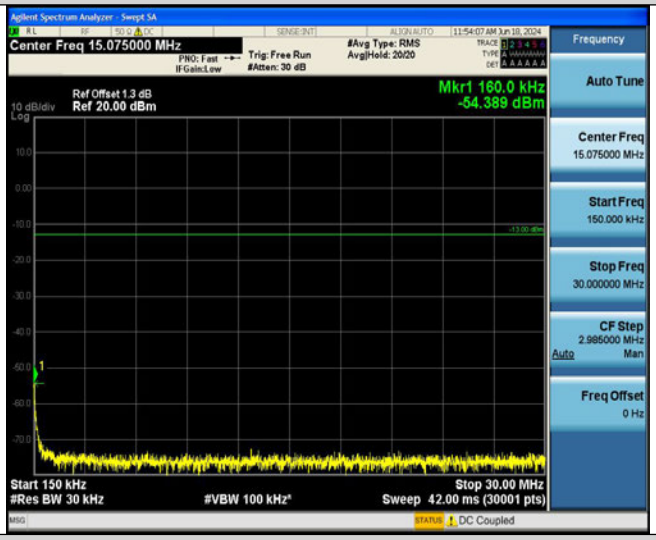

Band5-4132-30~1000MHz



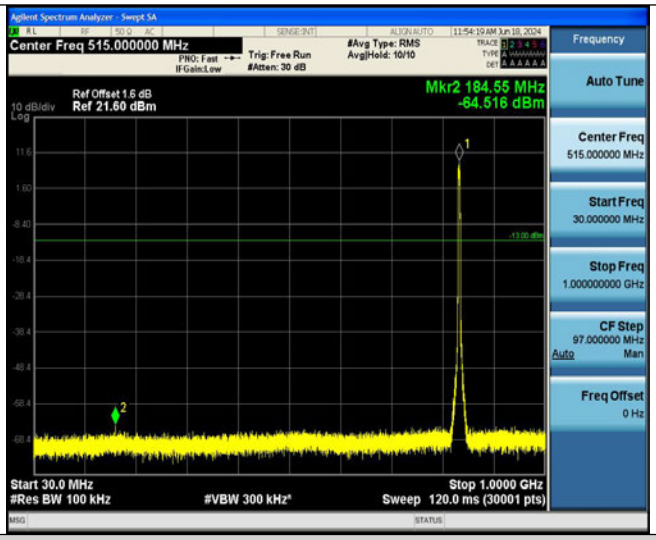

Band5-4132-1000~10000MHz

Band5-4182-0.009~0.15MHz

Band5-4182-0.15~30MHz



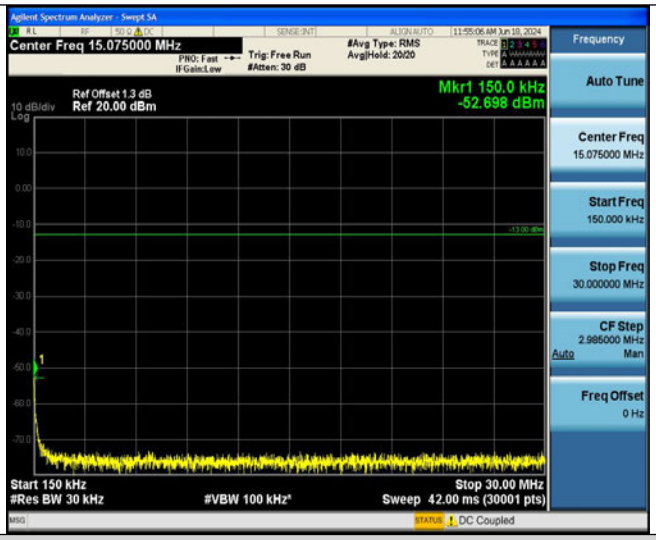

Band5-4182-30~1000MHz



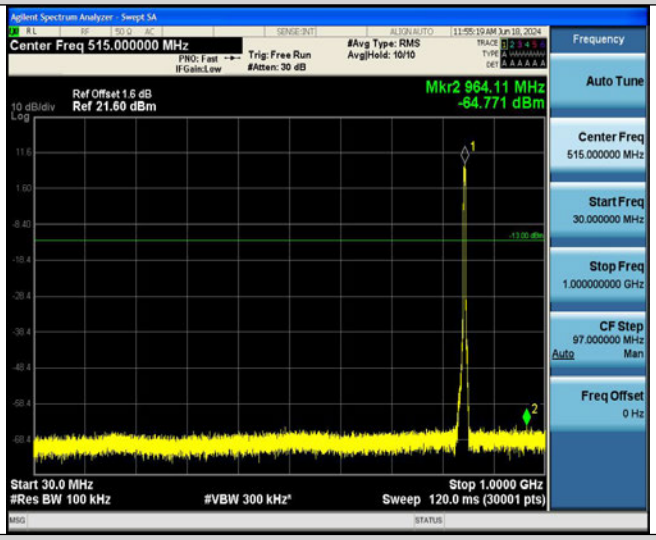

Band5-4182-1000~10000MHz

Band5-4233-0.009~0.15MHz

Band5-4233-0.15~30MHz




Band5-4233-30~1000MHz




Band5-4233-1000~10000MHz

## Radiated method

### Test limit:

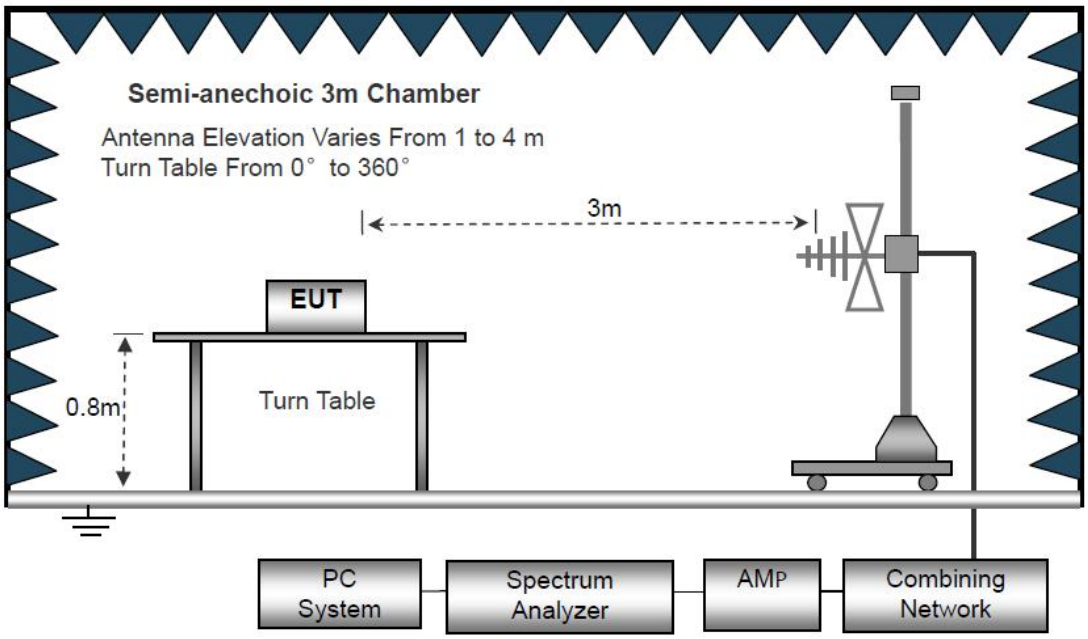
The spurious (unwanted) emission limits specified in the individual FCC rule parts applicable to licensed digital transmitters (typically referred to under the heading 'emission limits') normally apply to any and all emissions that are present outside of the authorized frequency band/block and apply to emissions in both the out-of-band and spurious domains. In some rule parts, the unwanted emission limits are specified by an emission mask that defines the applicable limit as a function of the frequency range relative to the authorized frequency block.
Typically, unwanted emissions are required by the licensed rule parts to be attenuated below the transmitter power by a factor of at least X + 10log(P) dB, where P represents the transmitter power expressed in watts and X is a specified scalar value (e.g., 43). This specification can be interpreted in one of two equivalent ways. First, the required attenuation can be construed to be relative to the mean carrier power, with the resultant of the equation X + 10log(P) being expressed in dBc (dB relative to the maximum carrier power). Alternatively, the specification can be interpreted as an absolute limit when the specified attenuation is actually subtracted from the maximum permissible transmitter power [i.e., 10log(P) – {X + 10log(P)}], resulting in an absolute level of -X dBW [or (-X + 30) dBm]. See section 4.

### Test procedure:

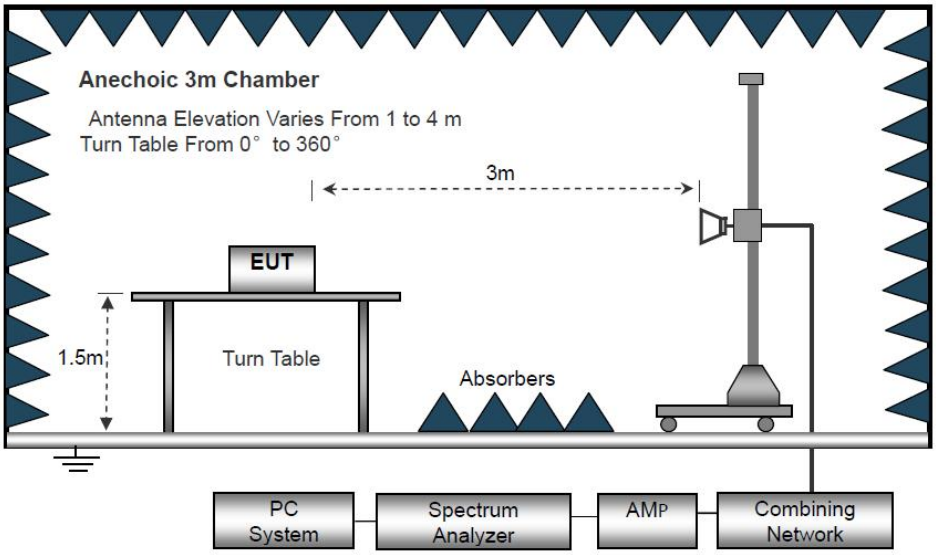
The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site. The resolution bandwidth of the spectrum analyzer was set at 100 kHz below 1 GHz and 1 MHz above 1 GHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonics.

### Test setup:

（A）Radiated Emission Test-Up Frequency 30MHz~1GHz




（B）Radiated Emission Test-Up Frequency Above 1GHz




**Note:**
1, Below 30MHz no Spurious found.
2, UE is poistioned at 3 axis at the pre-scan stage, and only the measurement of the worst case is reported in this part.

**List of final test modes:**

**WCDMA band II:**

| Mode | UL Channel | Frequency | Judgement |
|---|---|---|---|
| 1 | 9262 | 1852.4 | Pass |
| 2 | 9400 | 1880.0 | Pass |
| 3 | 9538 | 1907.6 | Pass |

**WCDMA BANDⅣ:**

| Mode | UL Channel | Frequency | Judgement |
|---|---|---|---|
| 1 | 1312 | 1712.4 | Pass |
| 2 | 1413 | 1732.6 | Pass |
| 3 | 1513 | 1752.6 | Pass |

**WCDMA band V:**

| Mode | UL Channel | Frequency | Judgement |
|---|---|---|---|
| 1 | 4132 | 826.4 | Pass |
| 2 | 4183 | 836.6 | Pass |
| 3 | 4233 | 846.6 | Pass |

**Note:** All modes have been tested and only the worst modes are recorded in the report.

Test record:

**WCDMA band II:**

**Middle Channel**

| Frequency(MHz) | Reading level(dBm) | Factor(dB) | Level (dBm) | Limit (dBm) | Margin (dBm) | Polarity |
|---|---|---|---|---|---|---|
| 3760.00 | -49.97 | -1.04 | -51.01 | -13.00 | 38.01 | Horizontal |
| 5640.00 | -50.75 | 6.05 | -44.70 | -13.00 | 31.70 | Horizontal |
| 3760.00 | -49.71 | -1.04 | -50.75 | -13.00 | 37.75 | Vertical |
| 5640.00 | -50.40 | 6.05 | -44.35 | -13.00 | 31.35 | Vertical |

**Note:**1. Level= Reading level+ Factor. Margin=Limit-Level.
2. The emission levels of below 1 GHz are lower than the limit 10dB, so not show in test report.

**WCDMA band Ⅳ:**

**Middle Channel**

| Frequency(MHz) | Reading level(dBm) | Factor(dB) | Level (dBm) | Limit (dBm) | Margin (dBm) | Polarity |
|---|---|---|---|---|---|---|
| 3465.00 | -48.47 | -2.43 | -50.90 | -13.00 | 37.90 | Horizontal |
| 5197.50 | -41.2 | 4.14 | -37.06 | -13.00 | 24.06 | Horizontal |
| 3465.00 | -48.57 | -2.18 | -50.75 | -13.00 | 37.75 | Vertical |
| 5197.50 | -42 | 3.76 | -38.24 | -13.00 | 25.24 | Vertical |

**Note:**1. Level= Reading level+ Factor. Margin=Limit-Level.
2. The emission levels of below 1 GHz are lower than the limit 10dB, so not show in test report.

**WCDMA band V:**

**Highest Channel**

| Frequency(MHz) | Reading level(dBm) | Factor(dB) | Level (dBm) | Limit (dBm) | Margin (dBm) | Polarity |
|---|---|---|---|---|---|---|
| 1693.20 | -48.53 | -11.08 | -59.61 | -13.00 | 46.61 | Horizontal |
| 2546.40 | -40.29 | -6.35 | -46.64 | -13.00 | 33.64 | Horizontal |
| 3386.40 | -47.21 | -5.17 | -52.38 | -13.00 | 39.38 | Horizontal |
| 1693.20 | -49.43 | -11.08 | -60.51 | -13.00 | 47.51 | Vertical |
| 2546.40 | -30.62 | -6.35 | -36.97 | -13.00 | 23.97 | Vertical |
| 3386.40 | -46.98 | -5.17 | -52.15 | -13.00 | 39.15 | Vertical |

**Note:**1. Level= Reading level+ Factor. Margin=Limit-Level.
2. The emission levels of below 1 GHz are lower than the limit 10dB, so not show in test report.

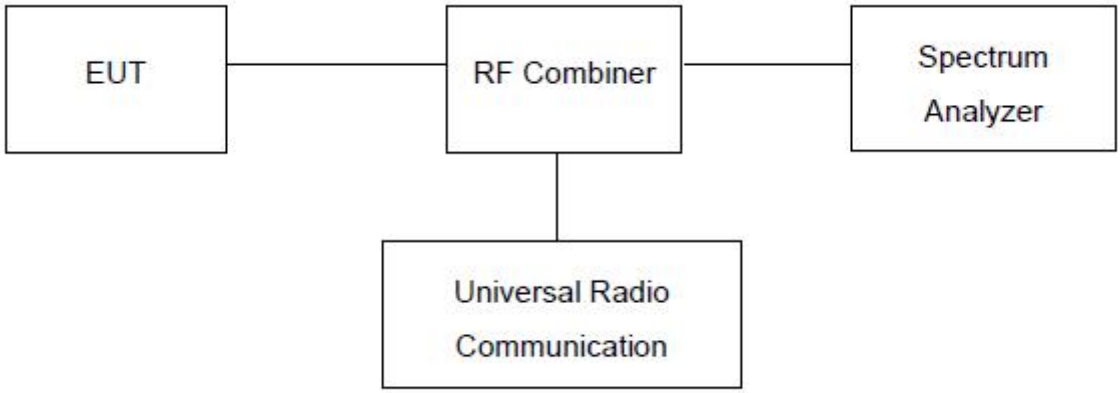
# 7. Occupied Bandwidth and Emission Bandwidth

Test limit:
The occupied bandwidth (OBW), that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission, shall be measured when modulated by an input signal such that its amplitude and symbol rate represent the maximum rated conditions under which the equipment will be operated. The signal shall be applied through any filter networks, pseudo-random generators or other devices required in normal service. Additionally, the occupied bandwidth shall be shown for operation with any devices used for modifying the spectrum when such devices are optional at the discretion of the user. [¡ì2.1049(h)]
Many of the individual rule parts specify a relative OBW in lieu of the 99% OBW. In such cases, the OBW is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated by at least X dB below the transmitter power, where the value of X is typically specified as 26.
The relative OBW must be measured and reported when it is specified in the applicable rule part; otherwise, the 99% OBW shall be measured and reported. The test report shall specify which OBW is reported.
A spectrum/signal analyzer or other instrument providing a spectral display is recommended for these measurements and the video bandwidth shall be set to a value at least three times greater than the IF/resolution bandwidth to avoid any amplitude smoothing. Video filtering shall not be used during occupied bandwidth tests.
The OBW shall be measured for all operating conditions that will affect the bandwidth results (e.g. variable modulations, coding, or channel bandwidth settings). See section 4.

Test procedure:
Occupied bandwidth – relative measurement procedure
The reference value is the highest level of the spectral envelope of the modulated signal.
a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be between two and five times the anticipated OBW.
b) The nominal resolution bandwidth (RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.
c) Set the reference level of the instrument as required to prevent the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope must be at least 10log (OBW / RBW) below the reference level.
d) NOTE—Steps a) through c) may require iteration to adjust within the specified tolerances.
e) The dynamic range of the spectrum analyzer at the selected RBW shall be at least 10 dB below the target “-X dB down” requirement (i.e., if the requirement calls for measuring the –26 dB OBW, the spectrum analyzer noise floor at the selected RBW shall be at least 36 dB below the reference value).
f) Set the detection mode to peak, and the trace mode to max hold.
g) Determine the reference value: Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).
h) Determine the “-X dB down amplitude” as equal to (Reference Value – X). Alternatively,

this calculation can be performed by the analyzer by using the marker-delta function.
i) Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below the "–X dB down amplitude" determined in step g). If a marker is below this "-X dB down amplitude" value it shall be placed as close as possible to this value. The OBW is the positive frequency difference between the two markers.
j) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display. The frequency and amplitude axes and scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s).
Occupied bandwidth – power bandwidth (99%) measurement procedure
The following procedure shall be used for measuring (99 %) power bandwidth
a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (i.e., two to five times the OBW).
b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.
c) Set the reference level of the instrument as required to keep the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope must be at least 10log (OBW / RBW) below the reference level.
d) NOTE—Steps a) through c) may require iteration to adjust within the specified tolerances.
e) Set the detection mode to peak, and the trace mode to max hold..
f) Use the 99 % power bandwidth function of the spectrum analyzer (if available) and report the measured bandwidth.
g) If the instrument does not have a 99 % power bandwidth function, the trace data points are to be recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5 % of the total is reached; that frequency is recorded as the upper frequency. The 99 % power bandwidth is the difference between these two frequencies.
h) The OBW shall be reported by providing plot(s) of the measuring instrument display. The frequency and amplitude axes and scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

Test setup:



## Measurement Result:

| Band | Channel | Occupied Bandwidth (kHz) | 26dB Bandwidth (kHz) | Limit(kHz) | Verdict |
|---|---|---|---|---|---|
| Band2 | 9262 | 4.1417 | 4.720 | --- | PASS |
| Band2 | 9400 | 4.1364 | 4.716 | --- | PASS |
| Band2 | 9538 | 4.1380 | 4.729 | --- | PASS |
| Band4 | 1312 | 4.1410 | 4.715 | --- | PASS |
| Band4 | 1413 | 4.1383 | 4.713 | --- | PASS |
| Band4 | 1513 | 4.1380 | 4.728 | --- | PASS |
| Band5 | 4132 | 4.1435 | 4.693 | --- | PASS |
| Band5 | 4182 | 4.1395 | 4.701 | --- | PASS |
| Band5 | 4233 | 4.1387 | 4.711 | --- | PASS |

## Test Graphs:

Band2-9262

Band2-9400

Band2-9538

Band4-1312

Band4-1413

Band4-1513

Band5-4132

Band5-4182

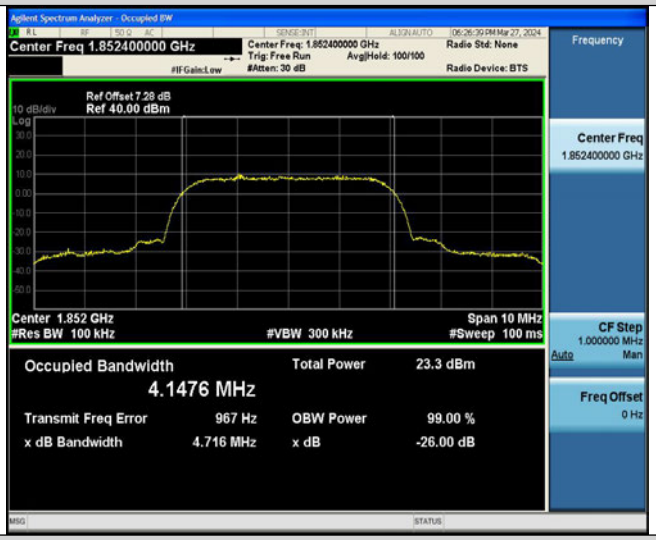
Band5-4233

Agilent Spectrum Analyzer - Occupied BW
Center Freq 846.600000 MHz
Center Freq: 846.600000 MHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Frequency
Ref Offset 5.21 dB
10 dB/div
Ref 40.00 dBm
Log
Center Freq
846.600000 MHz
Center 846.6 MHz
#Res BW 100 kHz
#VBW 300 kHz
Span 10 MHz
#Sweep 100 ms
CF Step
1.000000 MHz
Auto
Man
Occupied Bandwidth
4.1338 MHz
Total Power
27.3 dBm
Transmit Freq Error
-5.307 kHz
OBW Power
99.00 %
x dB Bandwidth
4.721 MHz
x dB
-26.00 dB
Freq Offset
0 Hz
MSG
STATUS

Band2-9262-1

Band2-9262-2

Band2-9262-3




Band2-9262-4

Band2-9400-1

Band2-9400-2

Band2-9400-3

Band2-9400-4

Band2-9538-1

Band2-9538-2