# FCC - TEST REPORT

| | | | | |
|---|---|---|---|---|
| Report Number | : | **68.950.19.2998.01** | Date of Issue: | February 27, 2020 |
| Model | : | ATH-ANC300TW | | |
| Product Type | : | WIRELESS HEADPHONES | | |
| Applicant | : | Audio-Technica Corporation | | |
| Address | : | 2-46-1 Nishi-naruse, Machida Tokyo 194-8666 Japan | | |
| Factory | : | Charter Media (Dongguan) Co., Ltd. | | |
| Address | : | Dabandi Industrial Zone, Daning District, Humen Town, | | |
| | : | 523930 Dongguan City, Guangdong Province, | | |
| | : | PEOPLE'S REPUBLC OF CHINA | | |
| Test Result | : | **n Positive o Negative** | | |
| Total pages including Appendices | : | **31** | | |

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# 1 Table of Contents





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## 2 Details about the Test Laboratory

**Details about the Test Laboratory**
Test Site 1

| | |
|---|---|
| Company name: | TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch<br>Building 12 & 13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District<br>Shenzhen 518052<br>P.R. China |
| Telephone: | 86 755 8828 6998 |
| Fax: | 86 755 8288 5299 |
| FCC Registration No.: | 514049 |

# 3 Description of the Equipment Under Test

| | |
|---|---|
| Product: | WIRELESS HEADPHONES |
| Model no.: | ATH-ANC300TW |
| FCC ID: | JFZANC300TW-L |
| Options and accessories: | USB Cable, Charging Case |
| Rating: | Headphones: 3.8VDC, 75mAh (Supplied by Built Li-ion battery)<br>Charging case: 5VDC (Charged by USB port)<br>3.7VDC, 700mAh(Supplied by Polymer Li-ion Rechargeable battery) |
| RF Transmission Frequency: | 2402MHz-2480MHz |
| No. of Operated Channel: | 40 |
| Modulation: | GFSK |
| Antenna Type: | FPC Inverted-F antenna |
| Antenna Gain: | 2.0dBi |
| Description of the EUT: | The Equipment Under Test (EUT) is WIRELESS HEADPHONES operated at 2.4GHz |


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# 4 Summary of Test Standards

| Test Standards | |
|---|---|
| FCC Part 15 Subpart C<br>10-1-2017 Edition | PART 15 - RADIO FREQUENCY DEVICES<br>Subpart C - Intentional Radiators |

All the test methods were according to KDB558074 D01 v05r02 DTS Measurement Guidance and ANSI C63.10 (2013).


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# 5 Summary of Test Results

| Technical Requirements | | | | | | |
|---|---|---|---|---|---|---|
| **FCC Part 15 Subpart C** | | | | | | |
| Test Condition | | Pages | Test Site | Test Result | | |
| | | | | Pass | Fail | N/A |
| §15.207 | Conducted emission AC power port | -- | -- | ☐ | ☐ | ☒ |
| §15.247 (b) (1) | Conducted peak output power | 10 | Site 1 | ☒ | ☐ | ☐ |
| §15.247(a)(1) | 20dB bandwidth | --- | --- | ☐ | ☐ | ☒ |
| §15.247(a)(1) | Carrier frequency separation | --- | --- | ☐ | ☐ | ☒ |
| §15.247(a)(1)(iii) | Number of hopping frequencies | --- | --- | ☐ | ☐ | ☒ |
| §15.247(a)(1)(iii) | Dwell Time | --- | --- | ☐ | ☐ | ☒ |
| §15.247(a)(2) | 6dB bandwidth and 99% Occupied Bandwidth | 13 | Site 1 | ☒ | ☐ | ☐ |
| §15.247(e) | Power spectral density | 16 | Site 1 | ☒ | ☐ | ☐ |
| §15.247(d) | Spurious RF conducted emissions | 20 | Site 1 | ☒ | ☐ | ☐ |
| §15.247(d) | Band edge | 24 | Site 1 | ☒ | ☐ | ☐ |
| §15.247(d) & §15.209 & §15.205 | Spurious radiated emissions for transmitter | 26 | Site 1 | ☒ | ☐ | ☐ |
| §15.203 | Antenna requirement | See note 1 | | ☒ | ☐ | ☐ |

Note 1: N/A=Not Applicable.
Note 2: The EUT uses a FPC Inverted-F antenna, which gain is 2.0dBi. In accordance to §15.203, it is considered sufficiently to comply with the provisions of this section.


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## 6 General Remarks

**Remarks**

This submittal(s) (test report) is intended for FCC ID: JFZANC300TW-L complies with Section 15.205, 15.209, 15.247 of the FCC Part 15, Subpart C.

ATH-ANC300TW is a Bluetooth Headset with Bluetooth 5.0, but it supports 1Mbps only for for Bluetooth Low Energy, but does not support 2Mbps.The TX and RX range is 2402MHz-2480MHz.

Note: The report is for BLE only

**SUMMARY:**

All tests according to the regulations cited on page 5 were

n - Performed

o - **Not** Performed

The Equipment under Test

n - **Fulfills** the general approval requirements.

o - **Does not** fulfill the general approval requirements.

| | |
|---|---|
| Sample Received Date: | November 21, 2019 |
| Testing Start Date: | November 21, 2019 |
| Testing End Date: | January 3, 2020 |

- TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch -

| Reviewed by: | Prepared by: | Tested by: |
|---|---|---|
| John Zhi | Mark Chen | Tree Zhan |
| EMC Project Manager | EMC Project Engineer | EMC Test Engineer |


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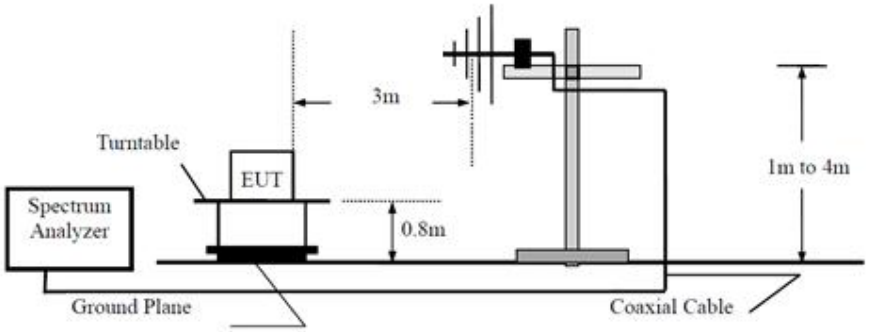
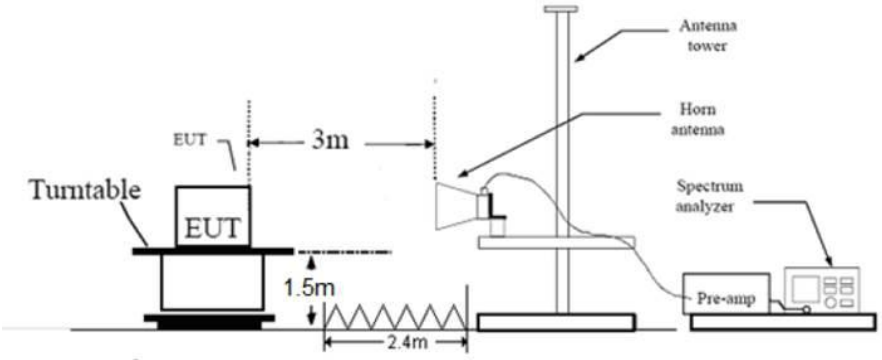
# 7 Test Setups

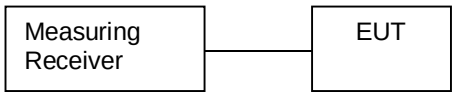
Below 1GHz




Above 1GHz




Conducted RF test setups



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# 8 Systems test configuration

Auxiliary Equipment Used during Test:

| DESCRIPTION | MANUFACTURER | MODEL NO.(SHIELD) | S/N(LENGTH) |
|---|---|---|---|
| Notebook | Lenovo | X220 | --- |
| Adapter | --- | --- | |

Test software: Bluetooth 3 Test Tool, which used to control the EUT in continues transmitting mode.

The system was configured to channel 0, 19, and 39 for the test.


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# 9 Technical Requirement

## 9.1 Conducted peak output power

**Test Method**

1. Use the following spectrum analyzer settings:
   RBW > the 6dB bandwidth of the emission being measured, VBW≥3RBW, Span≥3RBW
   Sweep = auto, Detector function = peak, Trace = max hold.
2. Add a correction factor to the display.
3. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power.

**Limits**

According to §15.247 (b) (1), conducted peak output power limit as below:

| Frequency Range<br>MHz | Limit<br>W | Limit<br>dBm |
|---|---|---|
| 2400-2483.5 | ≤1 | ≤30 |

Test result as below table

| Frequency<br>MHz | Conducted Peak Output Power<br>dBm | Result |
|---|---|---|
| Low channel 2402MHz | -0.18 | Pass |
| Middle channel 2440MHz | -0.26 | Pass |
| High channel 2480MHz | -0.48 | Pass |


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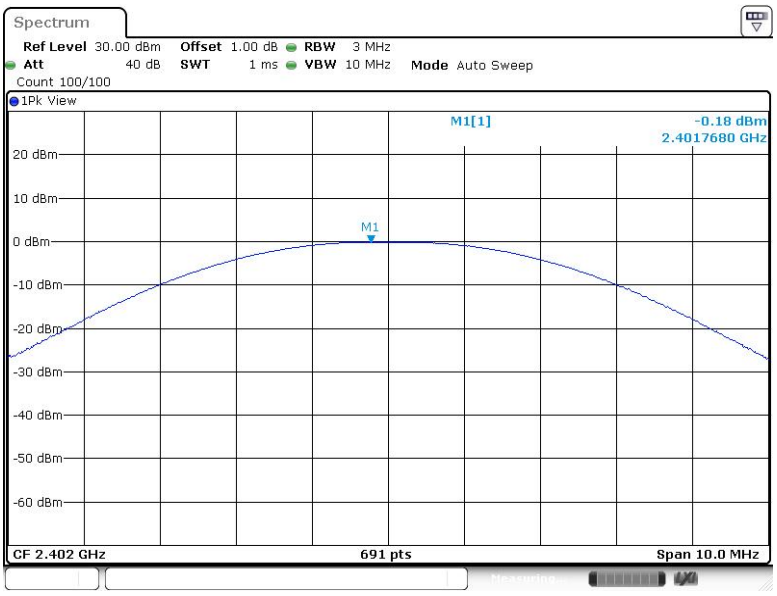
Low channel 2402MHz

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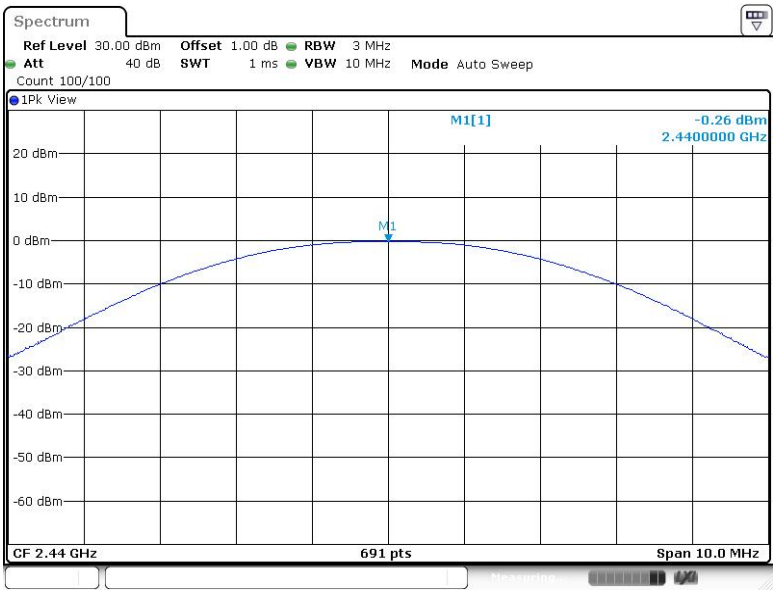
Middle channel 2440MHz

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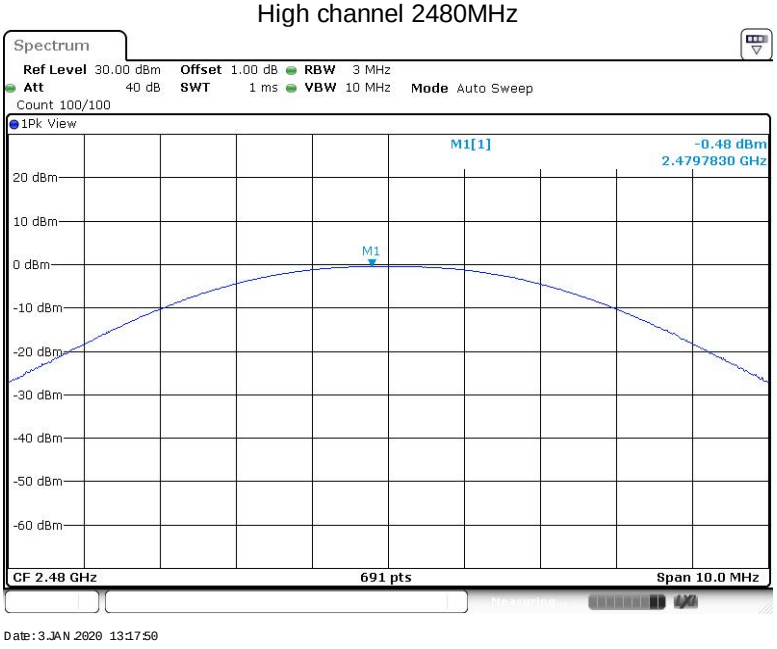
High channel 2480MHz



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## 9.2 Power spectral density

**Test Method**

This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance:

1. Set analyzer center frequency to DTS channel center frequency. RBW=3kHz, VBW≥3RBW, Span=1.5 times DTS bandwidth, Detector=Peak, Sweep=auto, Trace= max hold.
2. Allow trace to fully stabilize, use the peak marker function to determine the maximum amplitude level within the RBW.
3. Repeat above procedures until other frequencies measured were completed.

**Limit**

| Limit [dBm] |
|---|
| ≤8dBm/3KHz |

Test result

| Frequency<br>**MHz** | Power spectral density<br>**dBm/3KHz** | Result |
|---|---|---|
| Top channel 2402MHz | -15.61 | Pass |
| Middle channel 2440MHz | -15.55 | Pass |
| Bottom channel 2480MHz | -15.84 | Pass |


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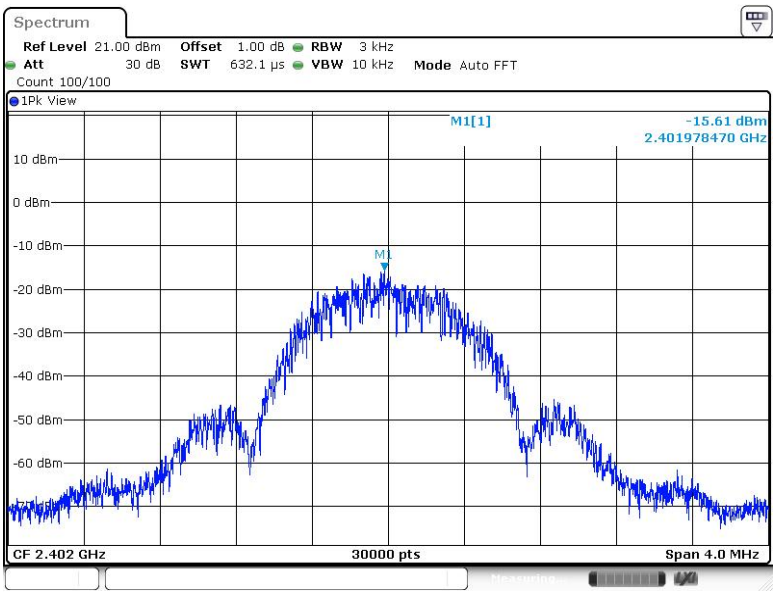
Low channel 2402MHz

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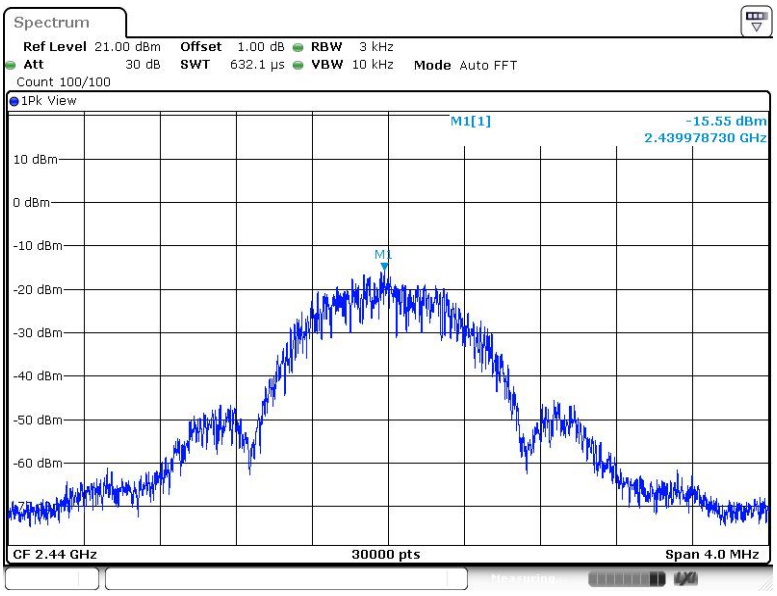
Middle channel 2440MHz

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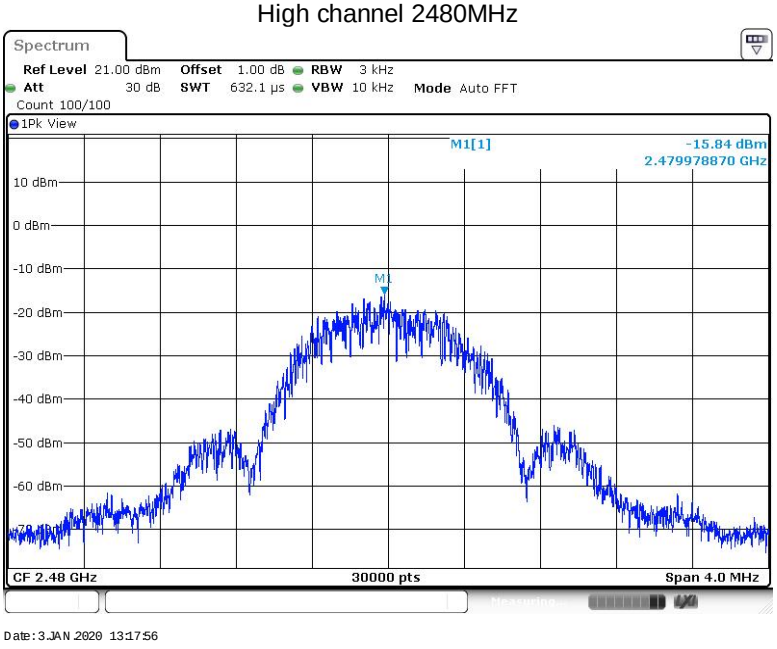
High channel 2480MHz



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## 9.3 6 dB Bandwidth and 99% Occupied Bandwidth

**Test Method**

1. Use the following spectrum analyzer settings:
RBW=100K, VBW≥3RBW, Sweep = auto, Detector function = peak, Trace = max hold
2. Use the automatic bandwidth measurement capability of an instrument, may be employed using the X dB bandwidth mode with X set to 6 dB, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be ≥ 6 dB.
3. Allow the trace to stabilize, record the X dB Bandwidth value.

**Limit**

| Limit [kHz] |
|---|
| ≥500 |

Test result

| Frequency MHz | 6dB bandwidth kHz | 99 bandwidth kHz | Result |
|---|---|---|---|
| Bottom channel 2402MHz | 728 | 1039 | Pass |
| Middle channel 2440MHz | 732 | 1039 | Pass |
| Top channel 2480MHz | 728 | 1039 | Pass |


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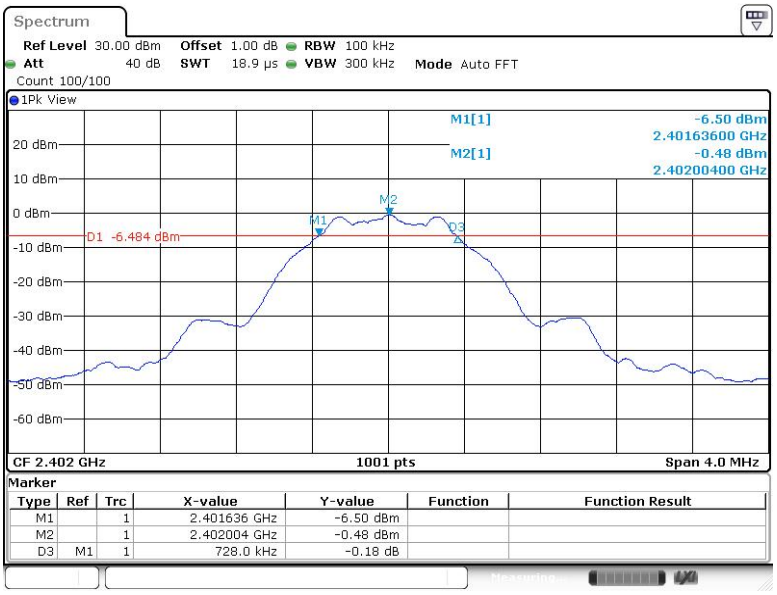
## 6 dB Bandwidth

Low channel 2402MHz

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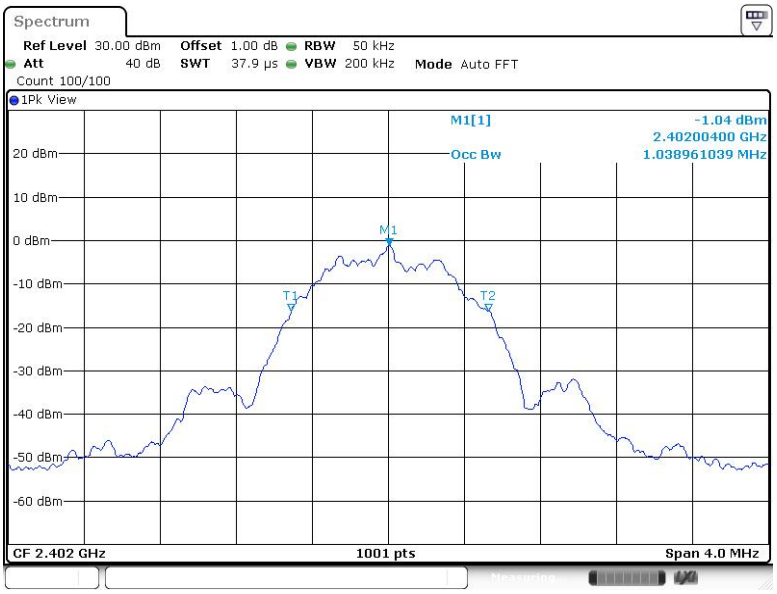


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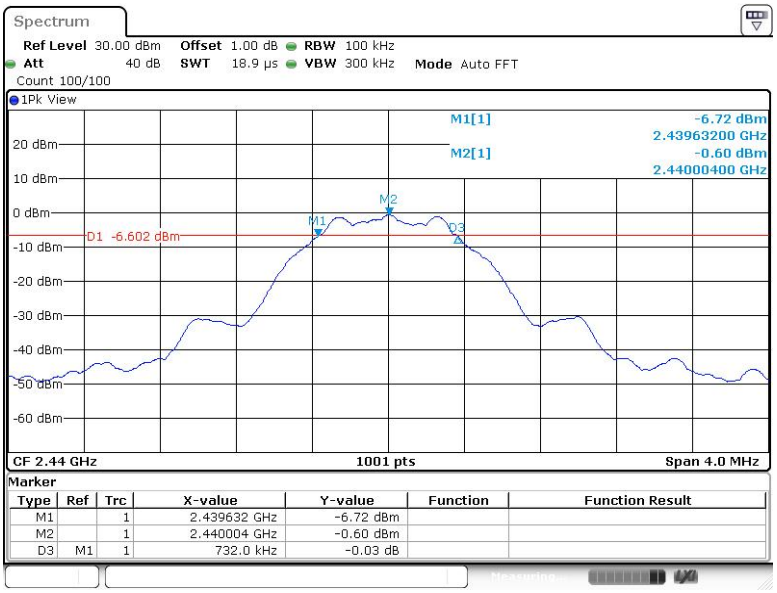
Middle channel 2440MHz

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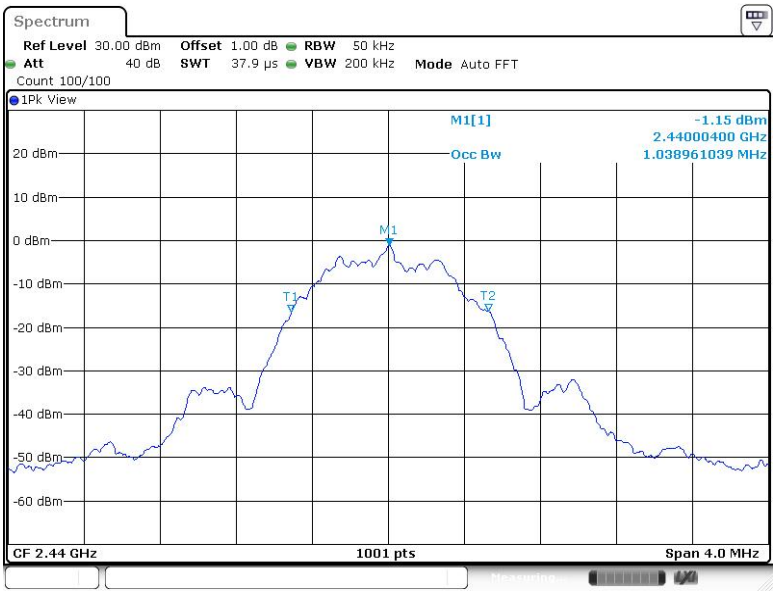


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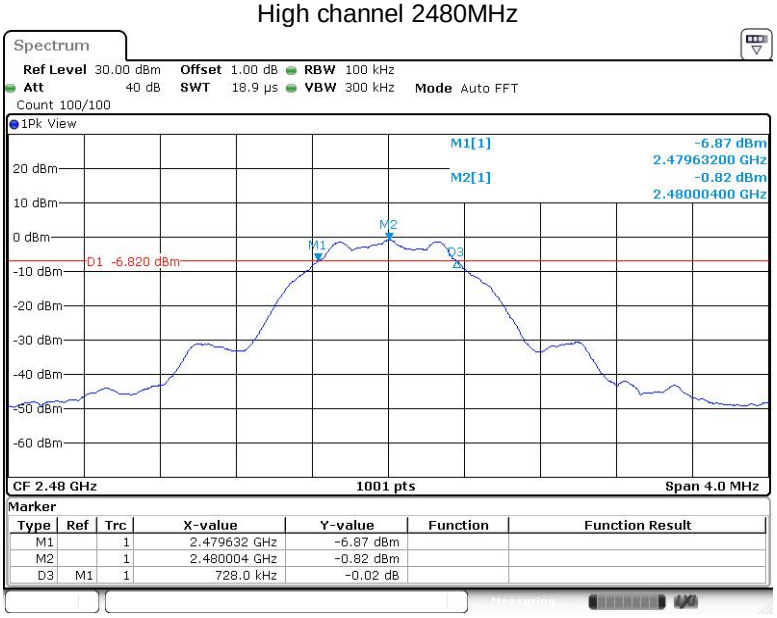
High channel 2480MHz

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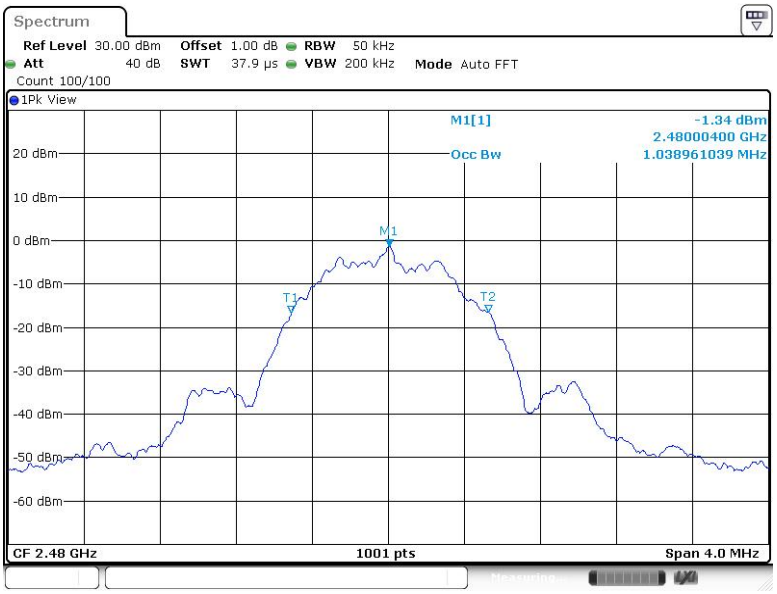


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## 9.4 Spurious RF conducted emissions

**Test Method**

1. Establish a reference level by using the following procedure:
   a. Set RBW=100 kHz. VBW≥3RBW. Detector =peak, Sweep time = auto couple, Trace mode = max hold.
   b. Allow trace to fully stabilize, use the peak marker function to determine the maximum PSD level.
2. Use the maximum PSD level to establish the reference level.
   a. Set the center frequency and span to encompass frequency range to be measured.
   b. Use the peak marker function to determine the maximum amplitude level. Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements, report the three highest emissions relative to the limit.
3. Repeat above procedures until other frequencies measured were completed.

**Limit**

| Frequency Range MHz | Limit (dBc) |
|---|---|
| 30-25000 | -20 |


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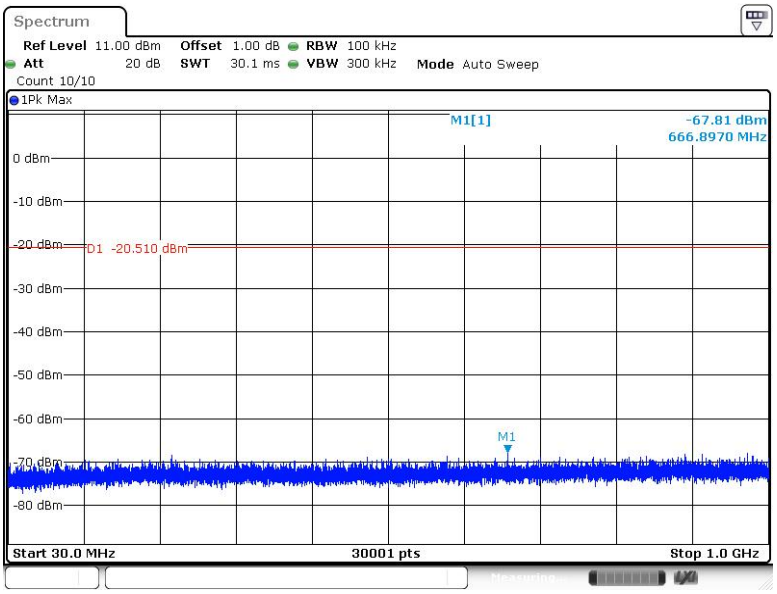
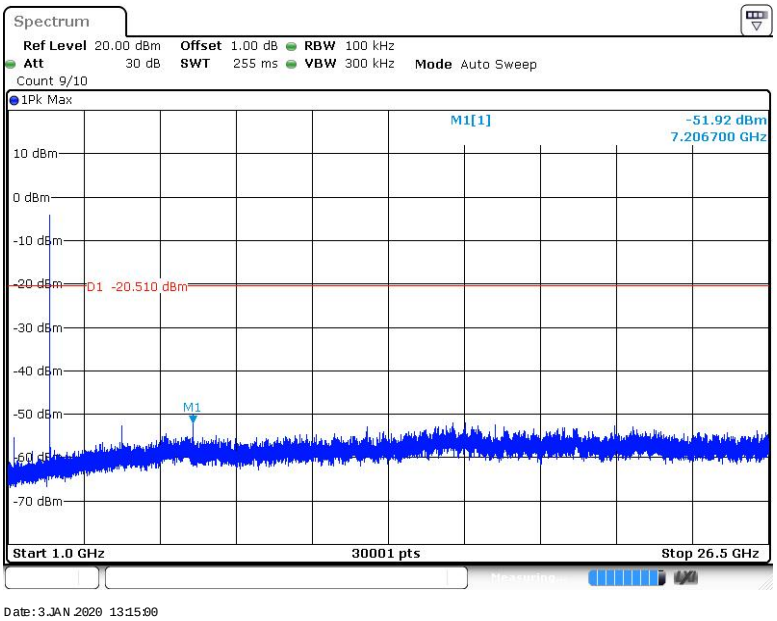
## Spurious RF conducted emissions

2402MHz



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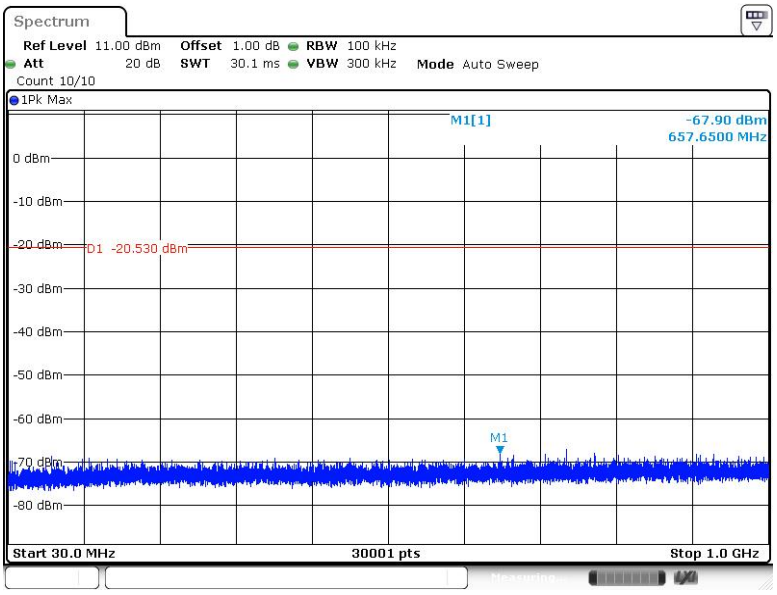
2440MHz

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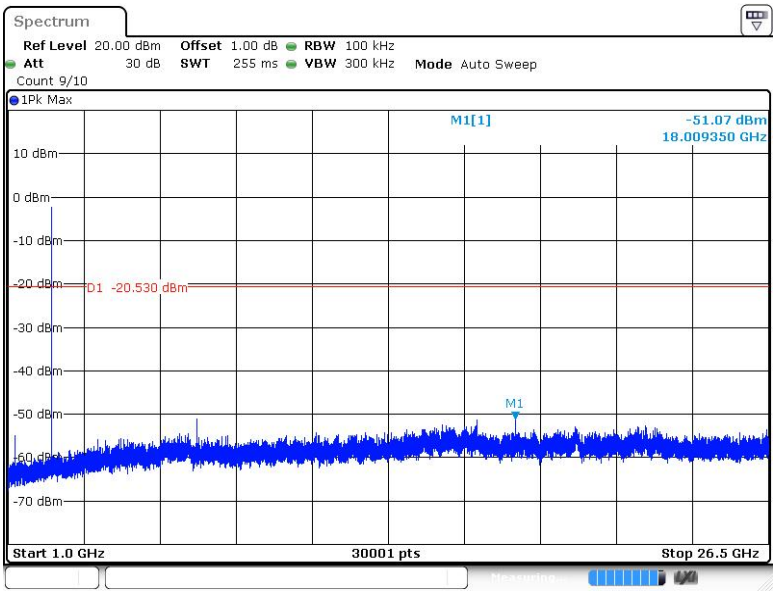


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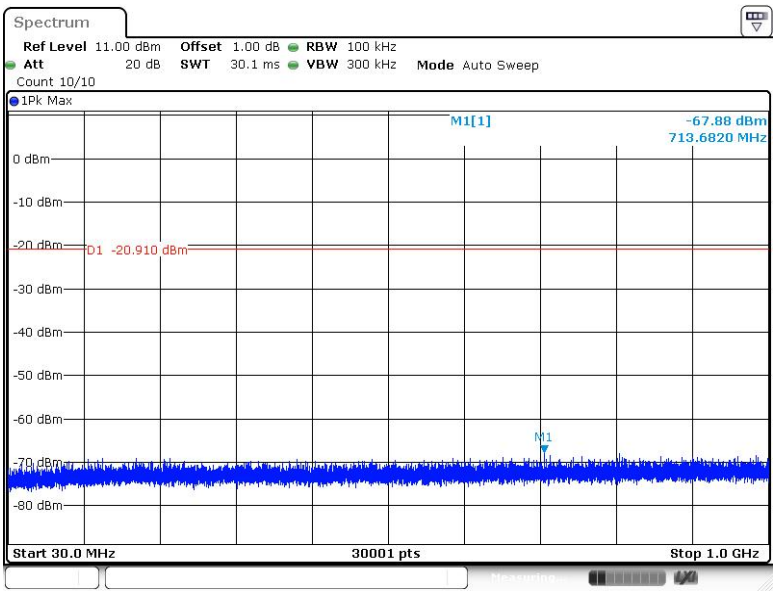
2480MHz

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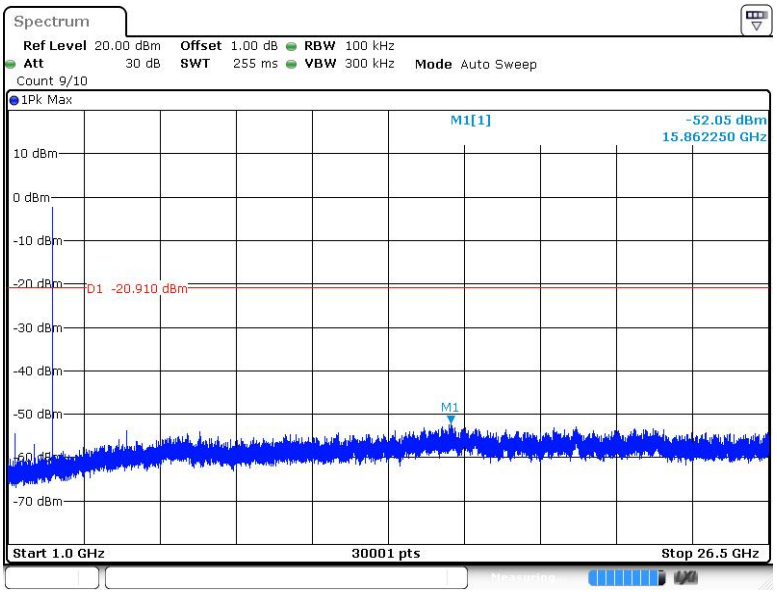


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## 9.5 Band edge

**Test Method**

1 Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 100 kHz, VBW≥RBW, Sweep = auto, Detector function = peak, Trace = max hold.
2 Allow the trace to stabilize, use the peak and delta measurement to record the result.
3 The level displayed must comply with the limit specified in this Section.

**Limit**

| Frequency Range MHz | Limit (dBc) |
|---|---|
| 30-25000 | -20 |


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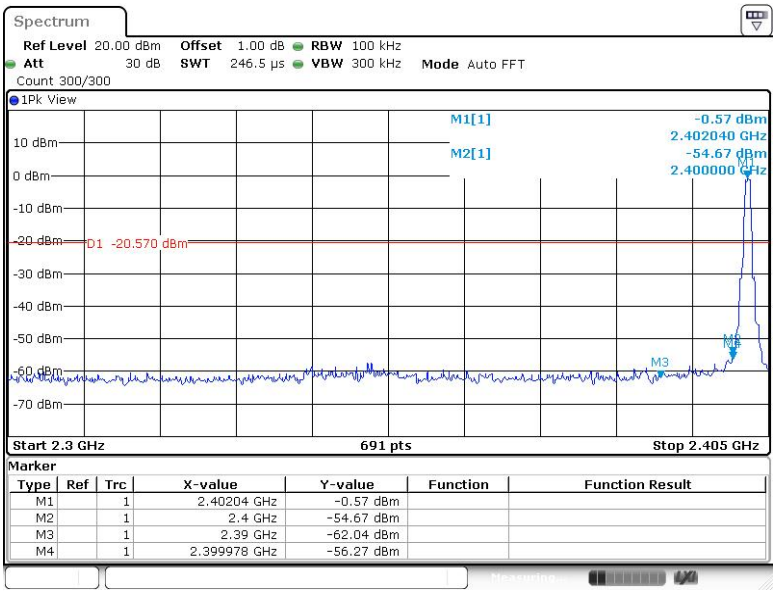
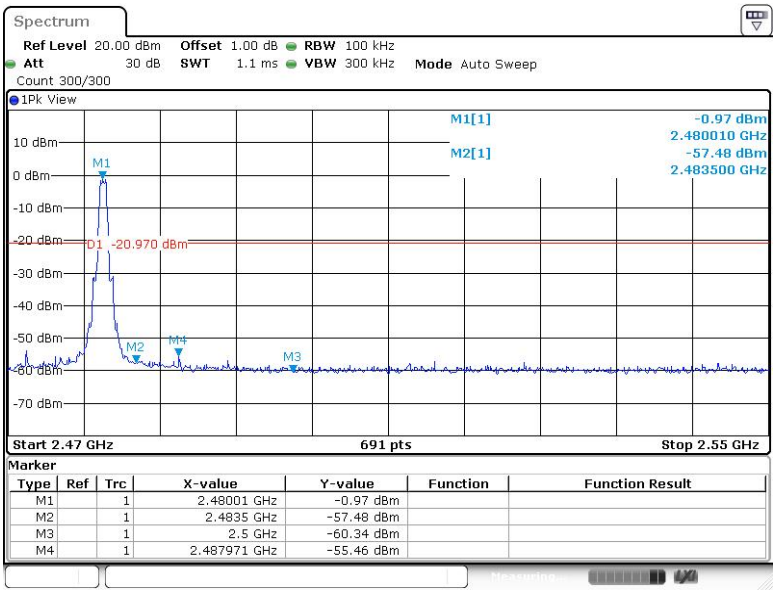
## Band edge testing

2402MHz




2480MHz



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## 9.6 Spurious radiated emissions for transmitter

**Test Method**

1: The EUT was place on a turn table which is 1.5m above ground plane for above 1GHz and 0.8m above ground for below 1GHz at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.

2: The EUT was set 3 meters away from the interference – receiving antenna, which was mounted on the top of a variable – height antenna tower.

3: The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

4: For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

5: Use the following spectrum analyzer settings According to C63.10:

For Below 1GHz

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious RBW = 100 KHz to 120KHz, VBW≥RBW for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.

For Peak unwanted emissions Above 1GHz:

Span = wide enough to capture the peak level of the in-band emission and all spurious RBW = 1MHz, VBW≥RBW for peak measurement ,Sweep = auto, Detector function = peak, Trace = max hold.

Procedures for average unwanted emissions measurements above 1000 MHz

a) RBW = 1 MHz.

b) VBW \ [3 × RBW].

c) Detector = RMS (power averaging), if [span / (# of points in sweep)] \ RBW / 2. Satisfying this condition can require increasing the number of points in the sweep or reducing the span. If the condition is not satisfied, then the detector mode shall be set to peak.

d) Averaging type = power (i.e., rms) (As an alternative, the detector and averaging type may be set for linear voltage averaging. Some instruments require linear display mode to use linear voltage averaging. Log or dB averaging shall not be used.)

e) Sweep time = auto.

f) Perform a trace average of at least 100 traces if the transmission is continuous. If the transmission is not continuous, then the number of traces shall be increased by a factor of 1 / D,where D is the duty cycle. For example, with 50% duty cycle, at least 200 traces shall be averaged. (If a specific emission is demonstrated to be continuous—i.e., 100% duty cycle—then rather than turning ON and OFF with the transmit cycle, at least 100 traces shall be averaged.)

g) If tests are performed with the EUT transmitting at a duty cycle less than 98%, then a correction factor shall be added to the measurement results prior to comparing with the emission limit, to compute the emission level that would have been measured had the test been performed at 100% duty cycle. The correction factor is computed as follows:

1) If power averaging (rms) mode was used in the preceding step e), then the correction factor is [10 log (1 / D)], where D is the duty cycle. For example, if the transmit duty cycle was 50%, then 3 dB shall be added to the measured emission levels.


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2) If linear voltage averaging mode was used in the preceding step e), then the correction factor is [20 log (1 / D)], where D is the duty cycle. For example, if the transmit duty cycle was 50%, then 6 dB shall be added to the measured emission levels.
3) If a specific emission is demonstrated to be continuous (100% duty cycle) rather than turning ON and OFF with the transmit cycle, then no duty cycle correction is required for that emission.

**Limit**

The radio emission outside the operating frequency band 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. Radiated emissions which fall in the restricted bands, as defined in section15.205, must comply with the radiated emission limits specified in section 15.209.

| Frequency MHz | Field Strength uV/m | Field Strength dBµV/m | Detector |
|---|---|---|---|
| 30-88 | 100 | 40 | QP |
| 88-216 | 150 | 43.5 | QP |
| 216-960 | 200 | 46 | QP |
| 960-1000 | 500 | 54 | QP |
| Above 1000 | 500 | 54 | AV |
| Above 1000 | 5000 | 74 | PK |


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## Spurious radiated emissions for transmitter

According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.

**Transmitting spurious emission test result as below:**

Low channel 2402MHz Test Result

| Frequency Band | Frequency | Emission Level | Polarization | Limit | Detector | Margin | Correct factor | Result |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | | dBµV/m | | dBuV/m | (dB/m) | |
| 30-1000MHz | 856.93 | 32.82 | H | 46 | QP | 13.18 | -16.8 | Pass |
| | 911.68 | 32.24 | V | 46 | QP | 13.76 | -15.8 | Pass |
| 1000-25000MHz | 7206* | 39.82 | H | 74 | PK | 34.18 | 4.8 | Pass |
| | -- | -- | H | 54 | AV | -- | -- | Pass |
| | 4804* | 48.24 | V | 74 | PK | 25.76 | 1.3 | Pass |
| | -- | -- | V | 54 | AV | -- | -- | Pass |

Middle channel 2440MHz Test Result

| Frequency Band | Frequency | Emission Level | Polarization | Limit | Detector | Margin | Correct factor | Result |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | | dBµV/m | | dBuV/m | (dB/m) | |
| 30-1000MHz | -- | -- | H | 43.5 | QP | -- | -- | Pass |
| | -- | -- | H | 46 | QP | -- | -- | Pass |
| 1000-25000MHz | 4882* | 40.02 | H | 74 | PK | 33.98 | 1.8 | Pass |
| | -- | -- | H | 54 | AV | -- | -- | Pass |
| | 4882* | 45.24 | V | 74 | PK | 28.76 | 1.8 | Pass |
| | -- | -- | V | 54 | AV | -- | -- | Pass |


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High channel 2480MHz Test Result

| Frequency Band | Frequency | Emission Level | Polarization | Limit | Detector | Margin | Correct factor | Result |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | | dBµV/m | | dBuV/m | (dB/m) | |
| 30-1000MHz | -- | -- | H | 43.5 | QP | -- | -- | Pass |
| | -- | -- | H | 46 | QP | -- | -- | Pass |
| 1000-25000MHz | 7440* | 41.38 | H | 74 | PK | 32.62 | 3.4 | Pass |
| | -- | -- | H | 54 | AV | -- | -- | Pass |
| | 4960* | 41.94 | V | 74 | PK | 32.06 | 1.7 | Pass |
| | -- | -- | V | 54 | AV | -- | -- | Pass |

Remark:

(1) "*" means the emission(s) appear within the restrict bands shall follow the requirement of section 15.205.

(2) Data of measurement within this frequency range shown "--" in the table above means the reading of emissions are the noise floor or attenuated more than 10dB below the permissible limits or the field strength is too small to be measured.

(3) Level=Reading Level + Correction Factor
Above 1GHz: Corrector factor = Antenna Factor + Cable Loss- Amplifier Gain
Below 1GHz: Corrector factor = Antenna Factor + Cable Loss
(The Reading Level is recorded by software which is not shown in the sheet)


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# 10 Test Equipment List

## List of Test Instruments

Radiated Spurious Emission Test

| Description | Manufacturer | Model no. | Equipment ID | Serial no. | cal. due date |
|---|---|---|---|---|---|
| Signal Analyzer | Rohde & Schwarz | FSV40 | 68-4-74-14-003 | 101031 | 2020-6-28 |
| Trilog Super Broadband Test Antenna | Schwarzbeck | VULB 9163 | 68-4-80-14-003 | 708 | 2020-7-5 |
| Horn Antenna | Rohde & Schwarz | HF907 | 68-4-80-14-004 | 102295 | 2020-7-5 |
| Wideband Horn Antenna | Q-PAR | QWH-SL-18-40-K-SG | 68-4-80-14-008 | 12827 | 2020-7-5 |
| Loop Antenna | Rohde & Schwarz | HFH2-Z2 | 68-4-80-14-006 | 100398 | 2020-7-7 |
| Pre-amplifier | Rohde & Schwarz | SCU 18 | 68-4-29-14-001 | 102230 | 2020-6-28 |
| Pre-amplifier | Rohde & Schwarz | SCU 40A | 68-4-29-14-002 | 100432 | 2020-7-16 |
| Fully Anechoic Chamber | TDK | 8X4X4 | 68-4-90-14-002 | -- | 2020-7-7 |
| Test software | Rohde & Schwarz | EMC32 | 68-4-90-14-002-A10 | Version 9.15.00 | N/A |

RF Conducted

| Description | Manufacturer | Model no. | Equipment ID | Serial no. | cal. due date |
|---|---|---|---|---|---|
| Signal Analyzer | Rohde & Schwarz | FSV40 | 68-4-74-14-004 | 101030 | 2020-6-28 |


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## 11 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

| System Measurement Uncertainty | |
|---|---|
| Test Items | Extended Uncertainty |
| Uncertainty for Radiated Spurious Emission 25MHz-3000MHz | Horizontal: 4.81dB;<br>Vertical: 4.89dB; |
| Uncertainty for Radiated Spurious Emission 3000MHz-18000MHz | Horizontal: 4.69dB;<br>Vertical: 4.68dB; |
| Uncertainty for Radiated Spurious Emission 18000MHz-40000MHz | Horizontal: 4.89dB;<br>Vertical: 4.87dB; |
| Uncertainty for Conducted RF test with TS 8997 | RF Power Conducted: 1.16dB<br>Frequency test involved:<br>0.6×10-7 or 1% |


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