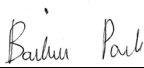



| | |
|----------------------|---------------|
| Report Reference ID: | 372719-3TRFWL |
|----------------------|---------------|

| | |
|---------------------|--|
| Test specification: | Title 47 – Telecommunication Chapter I – Federal Communications Commission Subchapter B – Common carrier services Part 27 – Miscellaneous wireless communications services |
|---------------------|--|

| | |
|------------|--|
| Applicant: | TEKO Telecom Srl. Via Meucci, 24/a I-40024 Castel S. Pietro Terme (BO) (Italy) |
| Apparatus: | Medium Power Remote Unit |
| Model: | TRU67E8AEWM/AC-WT |
| FCC ID: | XM2- MP67E8AE |

| | |
|---------------------|---|
| Testing laboratory: | Nemko Italy Spa Via del Carroccio, 4 20853 Biassono (MB) – Italy Telephone: +39 039 2201201 Facsimile: +39 039 2201221 |
|---------------------|---|

| | Name and title | Date |
|--------------|---|------------|
| Tested by: |  <u>P. Barbieri</u> , Wireless/EMC Specialist | 06/24/2019 |
| Reviewed by: |  <u>R. Giampaglia</u> , Wireless/EMC Specialist | 06/24/2019 |

Nemko Spa, 20853 Biassono (MB) - Italy. All rights reserved.

This publication may be reproduced in whole for non-commercial purposes as long as Nemko Spa is acknowledged as copyright owner and source of the material. Nemko Spa takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context. Nemko Spa accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report. This test report may not be partially reproduced, except with the prior written permission of Nemko Spa. The test report merely corresponds to the test sample. The phase of sampling / collection of equipment under test is carried out by the customer.

This Test Report, when bearing the Nemko name and logo is only valid when issued by a Nemko laboratory, or by a laboratory having special agreement with Nemko.

Table of contents

| | |
|---|-----------|
| Section 1: Report summary | 4 |
| 1.1 Test specification..... | 4 |
| 1.2 Statement of compliance | 4 |
| 1.3 Exclusions | 4 |
| 1.4 Registration number | 4 |
| 1.5 Test report revision history | 4 |
| 1.6 Limits of responsibility..... | 4 |
| Section 2: Summary of test results | 5 |
| 2.1 FCC Part 27, test results | 5 |
| Section 3: Equipment under test (EUT) and application details..... | 6 |
| 3.1 Applicant details | 6 |
| 3.2 Modular equipment..... | 6 |
| 3.3 Product details..... | 6 |
| 3.4 Application purpose | 6 |
| 3.5 Composite/related equipment..... | 7 |
| 3.6 Sample information..... | 7 |
| 3.7 EUT technical specifications | 7 |
| 3.8 Accessories and support equipment..... | 8 |
| 3.9 Operation of the EUT during testing..... | 9 |
| 3.10 EUT setup diagram..... | 9 |
| Section 4: Engineering considerations | 10 |
| 4.1 Modifications incorporated in the EUT | 10 |
| 4.2 Deviations from laboratory tests procedures..... | 10 |
| 4.3 Technical judgment | 10 |
| Section 5: Test conditions | 11 |
| 5.1 Deviations from laboratory tests procedures..... | 11 |
| 5.2 Test conditions, power source and ambient temperatures | 11 |
| 5.3 Measurement uncertainty | 12 |
| 5.4 Test equipment..... | 13 |
| Appendix A: Test results..... | 14 |
| Clause 935210 D05v01r01 (3.2) AGC threshold | 14 |
| Clause 935210 D05v01r01 (3.3) Out of band rejection | 15 |
| Clause 935210 D05v01r01 (3.4) Occupied bandwidth | 16 |
| Clause 27.50(b) Peak output power at RF antenna connector | 18 |
| Clause 27.53(c) Spurious emissions at RF antenna connector | 21 |

| | |
|---|-----------|
| Clause 27.53(c) Radiated Spurious emissions..... | 28 |
| Clause 27.53(f) Radiated spurious emissions within 1559–1610 MHz band | 34 |
| Appendix B: Block diagrams of test set-ups | 37 |
| Appendix C: EUT Photos..... | 38 |

Section 1: Report summary

1.1 Test specification

| | |
|-----------------------|---|
| Specifications | Part 27 – Miscellaneous wireless communications services |
|-----------------------|---|

1.2 Statement of compliance

| | |
|-------------------|--|
| Compliance | <p>In the configuration tested the EUT was found compliant</p> <p>Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>This report contains an assessment of apparatus against specifications based upon tests carried out on samples submitted at Nemko Spa. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 27. Radiated tests were conducted in accordance with ANSI C63.26-2015.</p> |
|-------------------|--|

1.3 Exclusions

| | |
|-------------------|------|
| Exclusions | None |
|-------------------|------|

1.4 Registration number

| | |
|--------------------------------|--------|
| Test site FCC ID number | 682159 |
|--------------------------------|--------|

1.5 Test report revision history

| Revision # | Details of changes made to test report |
|------------|--|
| TRF | Original report issued |
| R1TRF | ---- |

1.6 Limits of responsibility

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025. Nemko Spa authorizes the applicant to reproduce this report provided it is reproduced in its entirety and for use by the company's employees only.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties.

Nemko Spa accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

Section 2: Summary of test results

2.1 FCC Part 27, test results

| Part | Methods | Test description | Verdict |
|--|-----------------------------|---|---------|
| | § 935210 D05v01r03 (3.2) | AGC threshold | Pass |
| | § 935210 D05v01r03 (3.3) | Out of band rejection | Pass |
| | § 935210 D05v01r03 (3.4) | Occupied bandwidth | Pass |
| §27.50(b) | § 935210 D05v01r03 (3.5) | Peak output power at RF antenna connector | Pass |
| §27.53(c) | § 935210 D05v01r03 (3.6) | Spurious emissions at RF antenna connector | Pass |
| §27.53(c) | § 935210 D05v01r03 (3.8) | Radiated spurious emissions | Pass |
| §27.53(f) | § 935210 D05v01r03 (3.8) | Radiated spurious emissions within 1559–1610 MHz band | Pass |
| §27.54 | § 935210 D05v01r03 (3.7) | Frequency stability | N/A a) |
| Notes: a) NOT APPLICABLE: Modulation/frequency conversion circuitry not in use. No frequency change in EUT (input and output have same frequency) | | | |

Section 3: Equipment under test (EUT) and application details

3.1 Applicant details

| | | |
|---|------------------------------------|------------------------|
| Applicant complete business name | Name: | Teko Telecom Srl |
| | Federal Registration Number (FRN): | 0018963462 |
| | Grantee code | XM2 |
| Mailing address | Address: | Via Meucci, 24/a |
| | City: | Castel S. Pietro Terme |
| | Province/State: | Bologna |
| | Post code: | 40024 |
| | Country: | Italy |

3.2 Modular equipment

| | |
|---|--|
| a) Single modular approval | Single modular approval Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> |
| b) Limited single modular approval | Limited single modular approval Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> |

3.3 Product details

| | | |
|---|--------------------|-------------------|
| FCC ID | Grantee code: | XM2 |
| | Product code: | -MP67E8AE |
| Equipment class | B2I | |
| Description of product as it is marketed | Booster | |
| | Model name/number: | TRU67E8AEWM/AC-WT |
| | Serial number: | 1012791001 |

3.4 Application purpose

| | |
|----------------------------|---|
| Type of application | <input checked="" type="checkbox"/> Original certification |
| | <input type="checkbox"/> Change in identification of presently authorized equipment |
| | Original FCC ID: Grant date: |
| | <input type="checkbox"/> Class II permissive change or modification of presently authorized equipment |

Section 3: Equipment under test

3.5 Composite/related equipment

| | |
|-------------------------------|---|
| a) Composite equipment | The EUT is a composite device subject to an additional equipment authorization Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> |
| b) Related equipment | The EUT is part of a system that operates with, or is marketed with, another device that requires an equipment authorization Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> |
| c) Related FCC ID | If either of the above is "yes": <input type="checkbox"/> has been granted under the FCC ID(s) listed below: <input type="checkbox"/> is in the process of being filled under the FCC ID(s) listed below: <input type="checkbox"/> is pending with the FCC ID(s) listed below: <input type="checkbox"/> has a mix of pending and granted statuses under the FCC ID(s) listed below: i FCC ID: XM2-MP67E8AE ii FCC ID: |

3.6 Sample information

| | |
|--------------------------------|------------|
| Receipt date: | 05/27/2019 |
| Nemko sample ID number: | ----- |

3.7 EUT technical specifications

| | |
|-----------------------------|--|
| Operating band: | Down Link 746–758 MHz, Up Link 776-788 MHz |
| Operating frequency: | Wideband |
| Modulation type: | LTE-FDD (QAM and QPSK) |
| Occupied bandwidth: | LTE: 1,4 MHz – 3 MHz – 5 MHz – 10MHz |
| Channel spacing: | standard |
| Emission designator: | LTE: D7W |
| RF Output | Down Link: 33dBm (2W) Up Link: N.A. (The EUT does not transmit over the air in the up-link direction) |
| Gain | Down Link: 38dB Up Link: N.A. (The EUT does not transmit over the air in the up-link direction) |
| Antenna type: | External Antenna is not provided, equipment that has an external 50 Ω RF connector |
| Power source: | 100-240 Vac |

Section 3: Equipment under test

3.8 Accessories and support equipment

The following information identifies accessories used to exercise the EUT during testing:

Item # 1

| | |
|------------------------|-----------------------|
| Type of equipment: | Master Unit - Subrack |
| Brand name: | Teko Telecom srl |
| Model name or number: | SUB-TRX-PSU |
| Serial number: | 101083001 |
| Nemko sample number: | ----- |
| Connection port: | ----- |
| Cable length and type: | ----- |

Item # 2

| | |
|------------------------|---------------------------------|
| Type of equipment: | Master Unit – Management Module |
| Brand name: | Teko Telecom srl |
| Model name or number: | TSPV-R |
| Serial number: | 110942253 |
| Nemko sample number: | ----- |
| Connection port: | LAN port |
| Cable length and type: | ----- |

Item # 3

| | |
|------------------------|---|
| Type of equipment: | Master Unit – Optical Module |
| Brand name: | Teko Telecom srl |
| Model name or number: | TTRU4W-S-M |
| Serial number: | 110679007 |
| Nemko sample number: | ----- |
| Connection port: | DL/UL RF connector (to connect to the base station) Optical port (to connect to remote unit) |
| Cable length and type: | ----- |

Item # 4

| | |
|------------------------|----------------------------|
| Type of equipment: | Master Unit – Power Supply |
| Brand name: | Teko Telecom srl |
| Model name or number: | TPSU/AC |
| Serial number: | 081063004 |
| Nemko sample number: | ----- |
| Connection port: | ----- |
| Cable length and type: | ----- |

3.9 Operation of the EUT during testing

Details:

In down-link direction, normal working at max gain with max RF power output.

3.10 EUT setup diagram

In this system, Remote Unit is the EUT. Master Unit includes only management module and optical module (to convert RF signal in optical signal in down link direction and viceversa optical signal in RF signal in up link direction). As described in "Operational description", master unit is connected directly to base station, so the system doesn't use another equipment (under another FCC ID) to exercise the EUT. Signal generator is linked directly to the RF connector of optical module in the Master Unit.

Test setup for output power, occupied bandwidth, spurious emissions:

Procedure

Connect the signal modulated generator to the input of the EUT, so that the EUT works at the max gain. Raise the input level to the EUT until reach the maximum output power. Connect the spectrum analyzer to the RF output connector of the EUT.

Section 4: Engineering considerations

4.1 Modifications incorporated in the EUT

Modifications

Modifications performed to the EUT during this assessment
None ☒ Yes ☐, performed by Client ☐ or Nemko ☐
Details:

4.2 Deviations from laboratory tests procedures

Deviations

Deviations from laboratory test procedures
None ☒ Yes ☐ - details are listed below:

4.3 Technical judgment

Judgment

None

Section 5: Test conditions

5.1 Deviations from laboratory tests procedures

No deviations were made from laboratory test procedures.

5.2 Test conditions, power source and ambient temperatures

| | |
|---|---|
| Normal temperature, humidity and air pressure test conditions | <p>Temperature: 15–30 °C Relative humidity: 20–75 % Air pressure: 86–106 kPa</p> <p>When it is impracticable to carry out tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests shall be recorded and stated.</p> |
| Power supply range: | <p>The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages $\pm 5\%$, for which the equipment was designed.</p> |

Section 5: Test conditions, continued

5.3 Measurement uncertainty

| EUT | Type | Test | Range and Setup features | Measurement Uncertainty | Notes |
|-------------|-----------|---|--------------------------|-------------------------|-------|
| Transmitter | Conducted | Frequency error | 0.001 MHz ÷ 40 GHz | 0.08 ppm | (1) |
| | | Carrier power RF Output Power | 10 kHz ÷ 30 MHz | 1.0 dB | (1) |
| | | | 30 MHz ÷ 18 GHz | 1.5 dB | (1) |
| | | | 18 MHz ÷ 40 GHz | 3.0 dB | (1) |
| | | Adjacent channel power | 1 MHz ÷ 18 GHz | 1.6 dB | (1) |
| | | Conducted spurious emissions | 10 kHz ÷ 26 GHz | 3.0 dB | (1) |
| | | | 26 GHz ÷ 40 GHz | 4.5 dB | (1) |
| | | Intermodulation attenuation | 1 MHz ÷ 18 GHz | 2.2 dB | (1) |
| | | Attack time – frequency behaviour | 1 MHz ÷ 18 GHz | 2.0 ms | (1) |
| | | Attack time – power behaviour | 1 MHz ÷ 18 GHz | 2.5 ms | (1) |
| | | Release time – frequency behaviour | 1 MHz ÷ 18 GHz | 2.0 ms | (1) |
| | | Release time – power behaviour | 1 MHz ÷ 18 GHz | 2.5 ms | (1) |
| | | Transient behaviour of the transmitter– Transient frequency behaviour | 1 MHz ÷ 18 GHz | 0.2 kHz | (1) |
| | | Transient behaviour of the transmitter – Power level slope | 1 MHz ÷ 18 GHz | 9% | (1) |
| | | Frequency deviation - Maximum permissible frequency deviation | 0.001 MHz ÷ 18 GHz | 1.3% | (1) |
| | | Frequency deviation - Response of the transmitter to modulation frequencies above 3 kHz | 0.001 MHz ÷ 18 GHz | 0.5 dB | (1) |
| | | Dwell time | - | 3% | (1) |
| | | Hopping Frequency Separation | 0.01 MHz ÷ 18 GHz | 1% | (1) |
| | | Occupied Channel Bandwidth | 0.01 MHz ÷ 18 GHz | 2% | (1) |
| | | Modulation Bandwidth | 0.01 MHz ÷ 18 GHz | 2% | (1) |
| Receiver | Radiated | Radiated spurious emissions | 10 kHz ÷ 26.5 GHz | 6.0 dB | (1) |
| | | | 26.5 GHz ÷ 40 GHz | 8.0 dB | (1) |
| | | Effective radiated power transmitter | 10 kHz ÷ 26.5 GHz | 6.0 dB | (1) |
| | | | 26,5 GHz ÷ 40 GHz | 8.0 dB | (1) |
| | Conducted | Conducted spurious emissions | 10 kHz ÷ 26 GHz | 3.0 dB | (1) |
| | | | 26 GHz ÷ 40 GHz | 4.5 dB | (1) |

(1) The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$ which has been derived from the assumed normal probability distribution with infinite degrees of freedom and for a coverage probability of 95 %

5.4 Test equipment

| Equipment | Manufacturer | Model No. | Asset/Serial No. | Next cal. |
|---|--------------|---------------------------|------------------|-----------|
| Vector Signal Generator | Agilent | N5172B EXG | MY53051238 | 05/2021 |
| Vector Signal Generator | Agilent | E4438C ESG | MY45094485 | 08/2019 |
| Spectrum Analyzer | Agilent | N9030A PXA | MY53120882 | 12/2019 |
| Trilog Broad Band Antenna 25-8000 MHz | Schwarzbeck | VULB 9162 | VULB 9162-25 | 07/2021 |
| Antenna 1-18 GHz | Schwarzbeck | STLP 9148 | STPL 9148-123 | 07/2021 |
| Double ridge horn antenna (4 ÷ 40 GHz) | RFSpin | DRH40 | 061106A40 | 02/2020 |
| Broadband preamplifier (18 ÷ 40 GHz) | Miteq | JS44-18004000-35-8P-R | 1.627 | 09/2019 |
| Broadband preamplifier 1-18 GHz | Schwarzbeck | BBV 9718 | 9718-137 | 08/2019 |
| EMI receiver 20 Hz ÷ 8 GHz | R&S | ESU8 | 100202 | 01/2020 |
| EMI receiver 2 Hz ÷ 44 GHz | R&S | ESW44 | 101620 | 05/2019 |
| Hydraulic revolving platform | Nemko | RTPL 01 | 4.233 | NCR |
| Turning-table | R&S | HCT | 835 803/03 | NCR |
| Antenna mast | R&S | HCM | 836 529/05 | NCR |
| Controller | R&S | HCC | 836 620/7 | NCR |
| Semi-anechoic chamber | Nemko | 10m semi-anechoic chamber | 530 | 09/2021 |
| Shielded room | Siemens | 10m control room | 1947 | NCR |
| Semi-anechoic chamber | Nemko | 10m semi-anechoic chamber | 70 | NCR |
| Shielded Room | Siemens | 3m semi-anechoic chamber | 3 | NCR |
| Motor controller | Emco | 1051-25 | 9012-1559 | NCR |
| Motor controller | Emco | 1061-1.521 | 9012-1508 | NCR |
| Antenna Tower | Emco | 2071-2 | 9601-1940 | NCR |
| Controller pole/table | Emco | 2090 | 9511-1099 | NCR |
| Note: N/A = Not Applicable, NCR = No Cal Required, COU = CAL On Use (*) Equipment supplied by manufacturer's | | | | |

Appendix A: Test results

Clause 935210 D05v01r01 (3.2) AGC threshold

Measure of EUT AGC Threshold

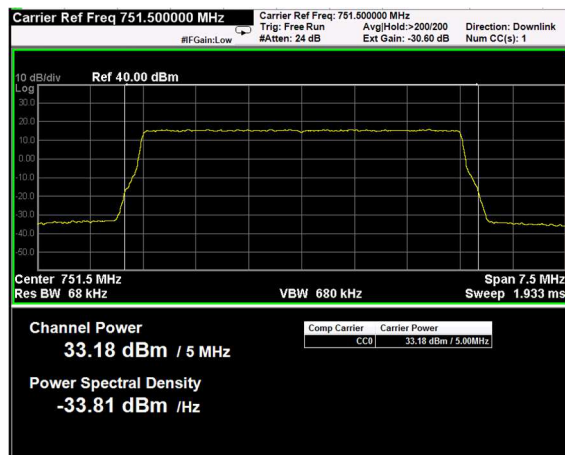
Test date: 05/27/2019 to 06/24/2019

Test results: Pass

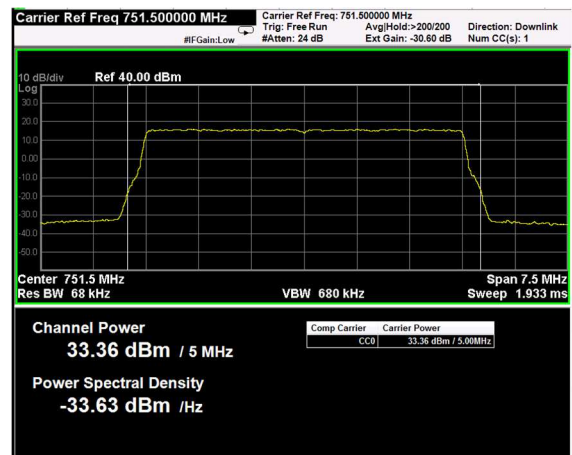
Special notes

- Broadband amplifiers: AWGN test signal used (5 MHz LTE channel)

Test data



AWGN signal, nominal input signal



AWGN signal, nominal input signal + 1dB

Clause 935210 D05v01r01 (3.3) Out of band rejection

Out of Band Rejection – Test for rejection of out of band signals.

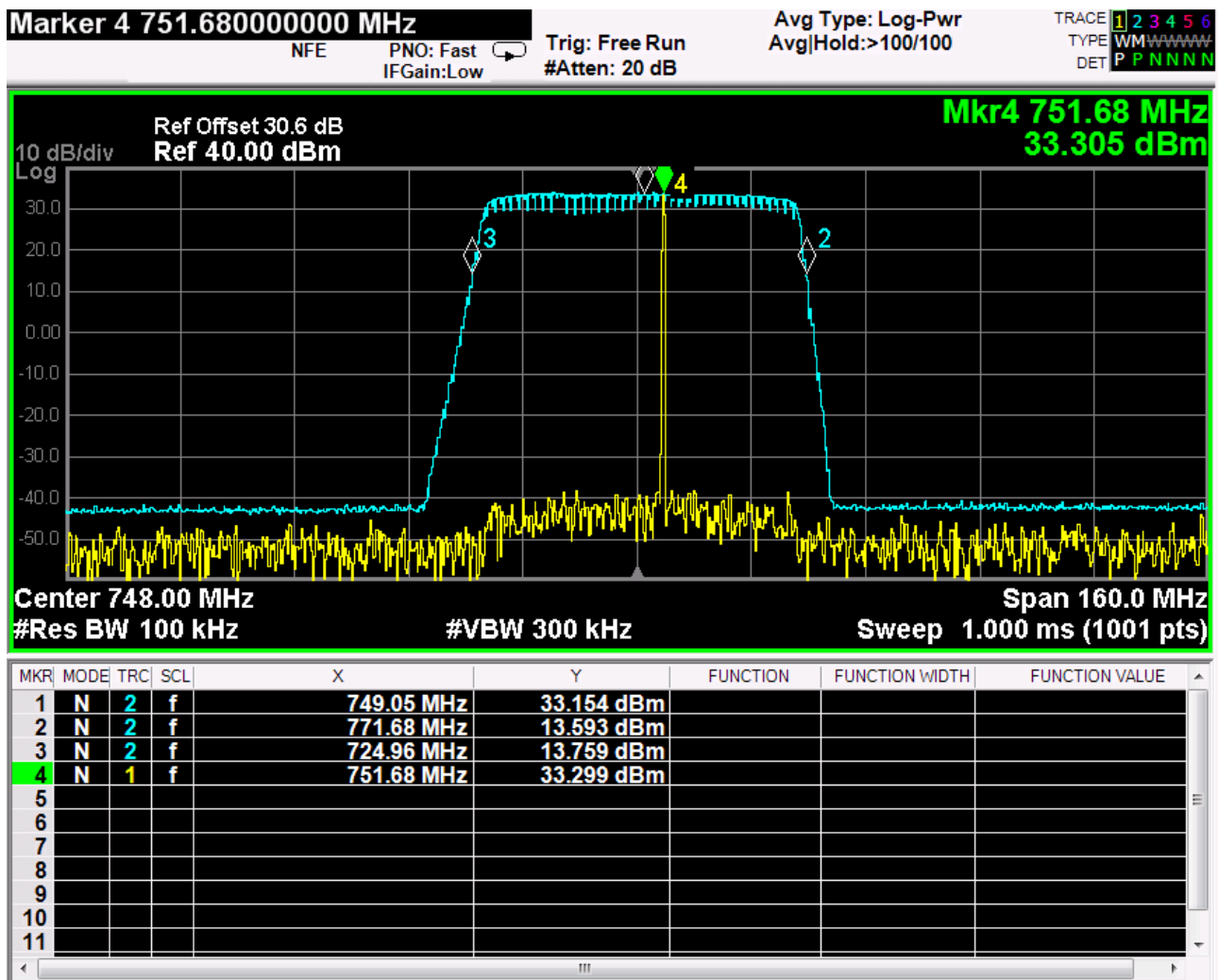
Test date: 05/27/2019 to 06/24/2019

Test results: Pass

Special notes

–

Test data



Clause 935210 D05v01r01 (3.4) Occupied bandwidth

A 26 dB bandwidth measurement shall be performed on the input signal and the output signal; alternatively, the 99% OBW can be measured and used.

Test date: 05/27/2019 to 06/24/2019

Test results: Pass

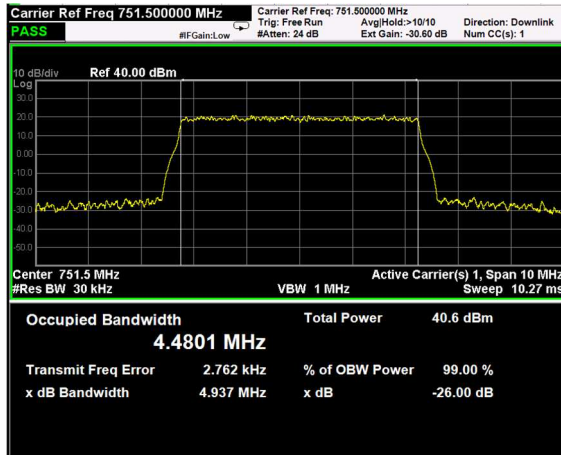
Special notes

- Broadband amplifiers: AWGN test signal used (5 MHz LTE channel)

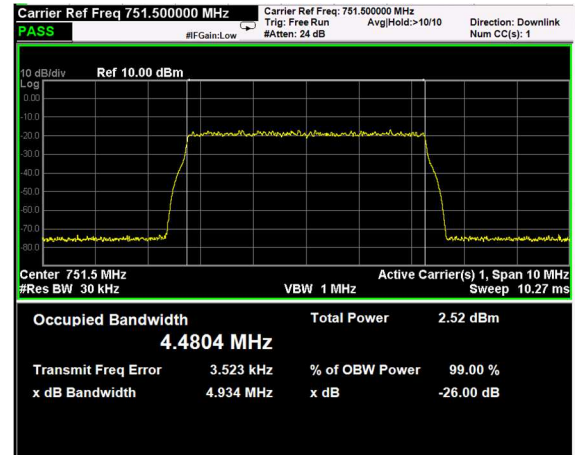
Clause 935210 D05v01r01 (3.4) Occupied bandwidth, continued

Test data

AWGN signal, nominal input signal

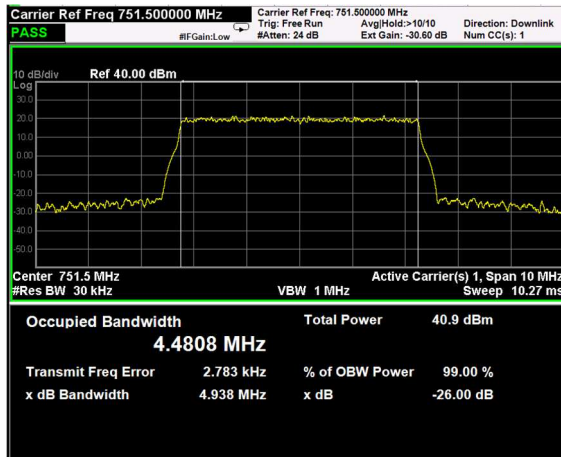


Output

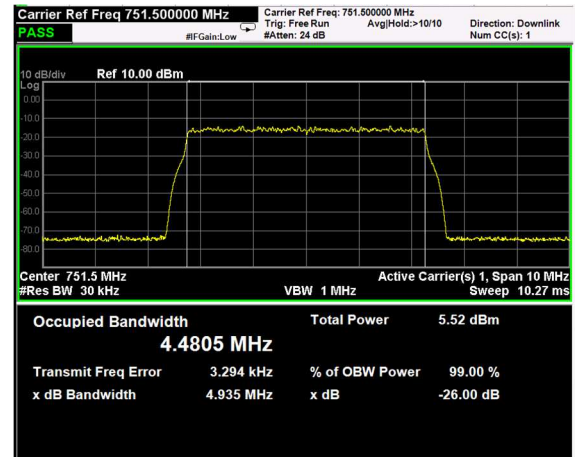


Input

AWGN signal, nominal input signal + 3dB



Output



Input

Clause 27.50(b) Peak output power at RF antenna connector**§ 27.50(b) Operation within the bands: 746–758 MHz, 775–788 MHz and 805–806 MHz.**

- 4) Fixed and base stations transmitting a signal in the 746–757 MHz and 776–787 MHz bands with an emission bandwidth greater than 1 MHz must not exceed an ERP of 1000 watts/MHz and an antenna height of 305 m HAAT, except that antenna heights greater than 305 m HAAT are permitted if power levels are reduced below 1000 watts/MHz ERP accordance with Table 3 of this section.
- 12) For transmissions in the 746–757, 776–787 MHz bands, licensees may employ equipment operating in compliance with either the measurement techniques described in paragraph (b)(11) of this section or a Commission-approved average power technique. In both instances, equipment employed must be authorized in accordance with the provisions of §27.51

Test date: 05/27/2019 to 06/24/2019

Test results: Pass

Special notes

- Broadband amplifiers: AWGN test signal used (5 MHz LTE channel)

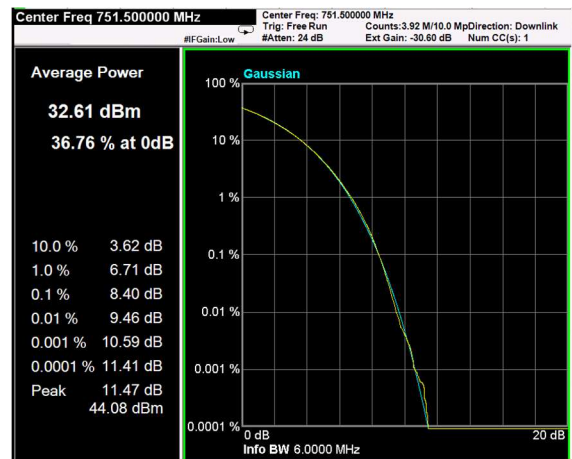
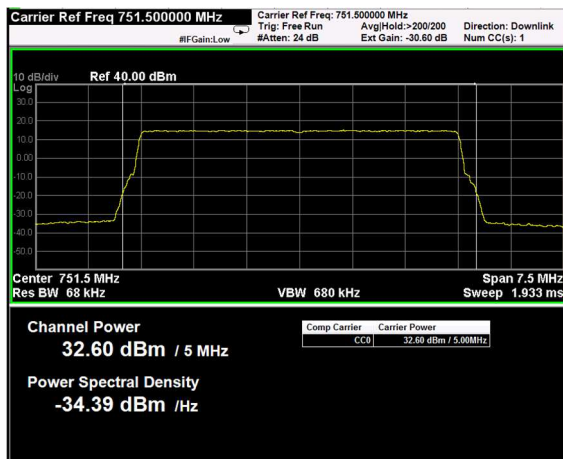
Clause 27.50(b) Peak output power at RF antenna connector

Test data

AWGN signal, nominal input signal -0.5dBm

Test data

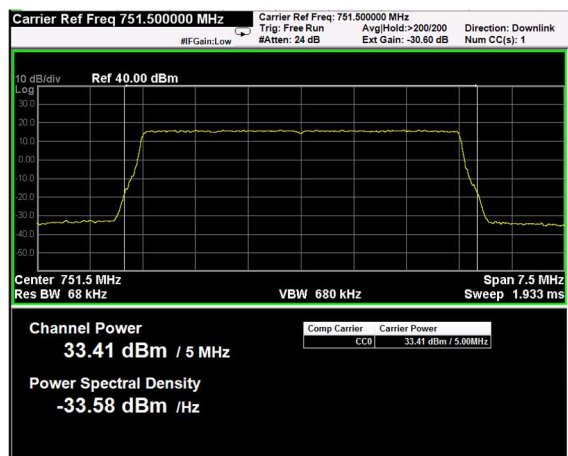
| Direction | Modulation | Frequency (MHz) | RF output Power (dBm) | RF output channel Power (W) | RF output Power (W/MHz) | PAR (dB) |
|-----------|------------------|-----------------|-----------------------|-----------------------------|-------------------------|----------|
| Down-link | AWGN (LTE, 5MHz) | 751.5 | 32.60 | 1.82 | 0.364 | 11.47 |



PAR measure is performed by the “CCDF” function installed on Spectrum analyzer that provides average power (the same measured with “Channel power” function), peak power and PAR.

AWGN signal, nominal input signal + 3dB

| Test data | | | | | |
|-----------|------------------|-----------------|-----------------------|-----------------------------|-------------------------|
| Direction | Modulation | Frequency (MHz) | RF output Power (dBm) | RF output channel Power (W) | RF output Power (W/MHz) |
| Down-link | AWGN (LTE, 5MHz) | 751.5 | 33.41 | 2.20 | 0.44 |



Clause 27.53(c) Spurious emissions at RF antenna connector

(c) For operations in the 746–758 MHz band and the 776–788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

- (1) On any frequency outside the 746–758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log (P)$ dB;
- (3) On all frequencies between 763–775 MHz and 793–805 MHz, by a factor not less than $76 + 10 \log (P)$ dB in a 6.25 kHz band segment, for base and fixed stations;
- (5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;
- (6) Compliance with the provisions of paragraphs (c)(3) and (c)(4) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.

Test date: 05/27/2019 to 06/24/2019

Test results: Pass

Special notes

- Broadband amplifiers: AWGN test signal used (5 MHz LTE channel)

Clause 27.53 (c) Spurious emissions at RF antenna connector, continued

Test data

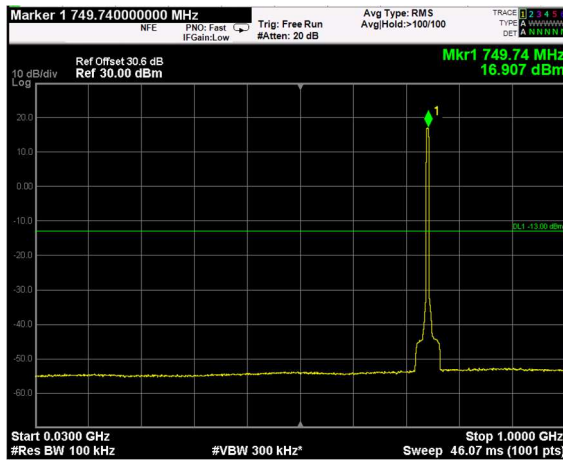
See Plots below

Spurious emissions measurement results:

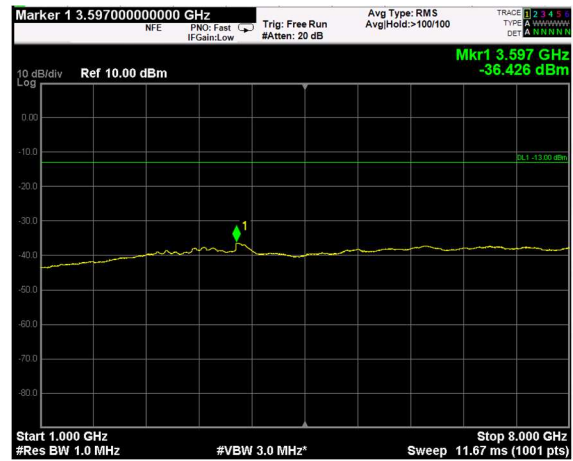
| Frequency (MHz) | Spurious emission (dBm) | Limit (dBm) | Margin (dB) |
|--------------------|----------------------------|----------------|----------------|
| Low channel | | | |
| First channel | Negligible | -13 | |
| | | | |
| | | | |
| Mid channel | | | |
| 751.5 MHz | Negligible | -13 | |
| | | | |
| | | | |
| High channel | | | |
| Last channel | Negligible | -13 | |
| | | | |
| | | | |

Test data, continued: spurious emissions at antenna terminal

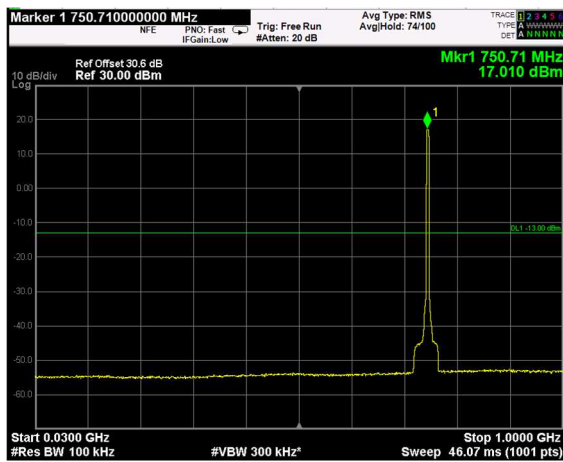
AWGN signal



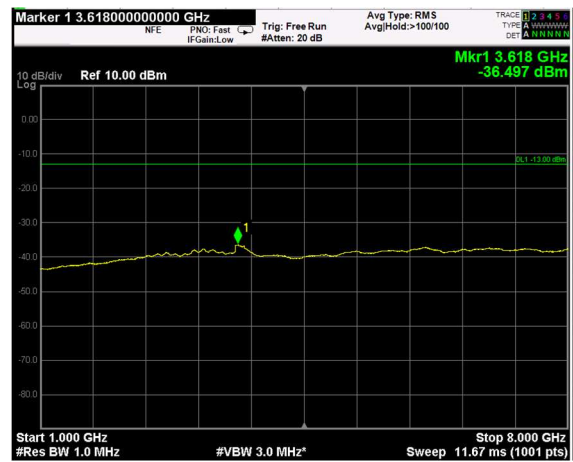
30MHz-1GHz, First Channel



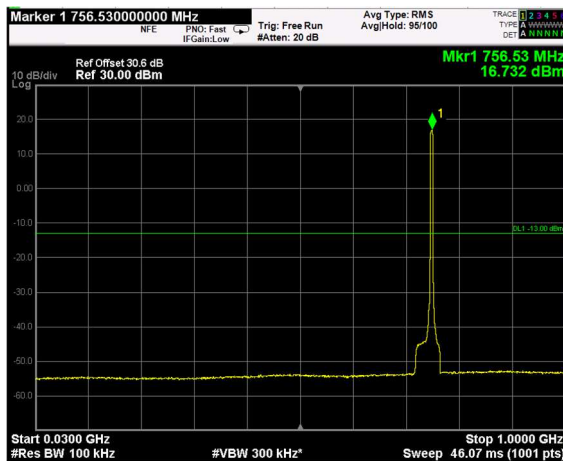
1GHz-8GHz, First Channel



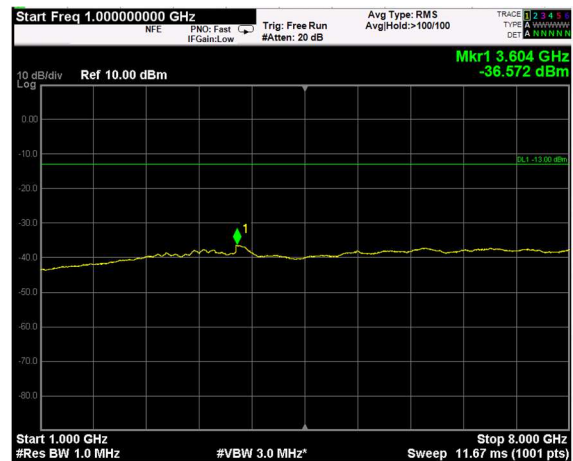
30MHz-1GHz, Middle Channel



1GHz-8GHz, Middle Channel



30MHz-1GHz, Last Channel



1GHz-8GHz, Last Channel

Test data, continued: Spurious emissions at antenna terminal, band 763-775MHz and 793-805MHz

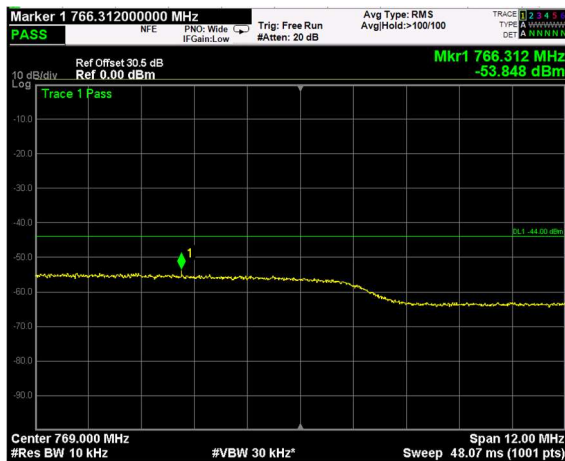
Special notes

On all frequencies between 763–775 MHz and 793–805 MHz, by a factor not less than $76 + 10 \log(P)$ dB in a 6.25 kHz band segment, for base and fixed stations

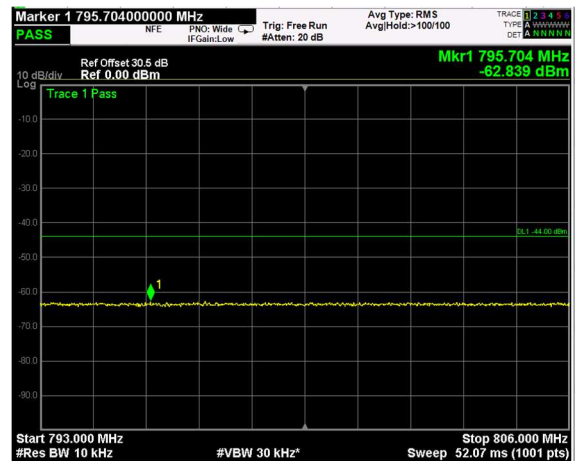
$$76 + 10 \log P(W) = 76 + 10 \log 2W = 79$$

$$P(W) = 2W = 33 \text{ dBm}$$

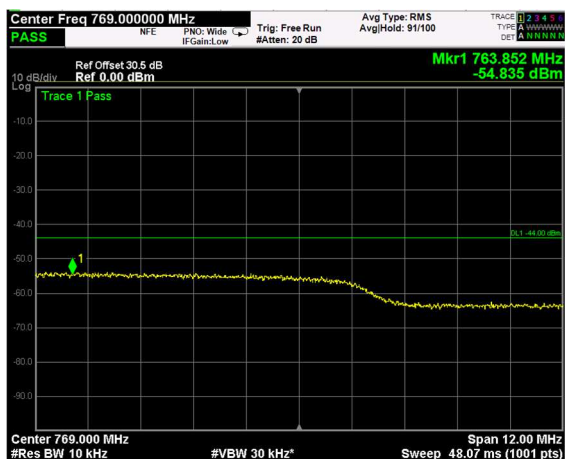
$$\rightarrow \text{limit: } 33 - 79 = -46 \text{ dBm/6,25kHz} = -44 \text{ dBm/10kHz}$$



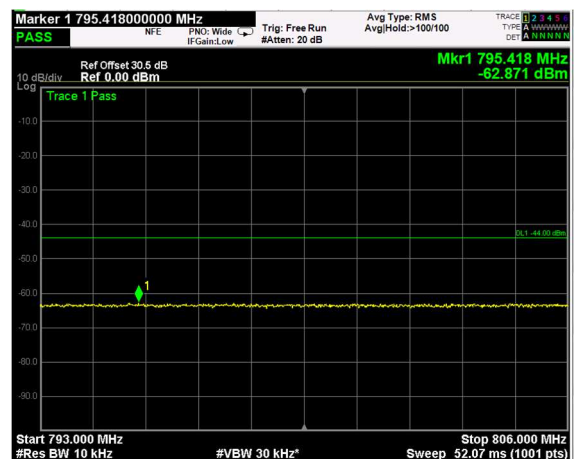
763MHz-775MHz, First Channel



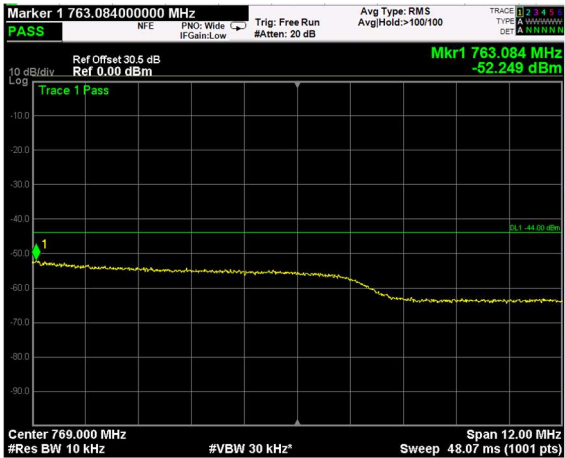
793MHz-806MHz, First Channel



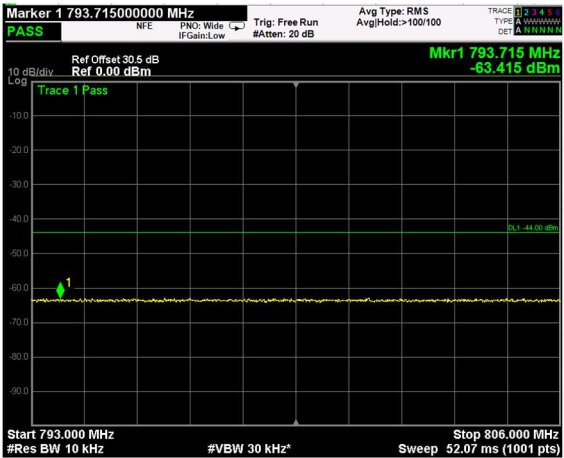
763MHz-775MHz, Middle Channel



793MHz-806MHz, Middle Channel



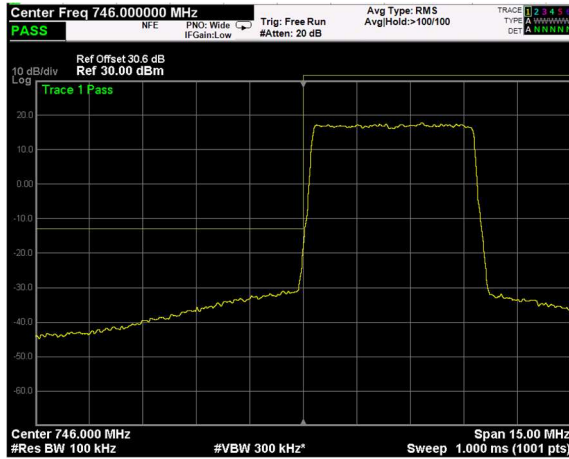
763MHz-775MHz, Last Channel



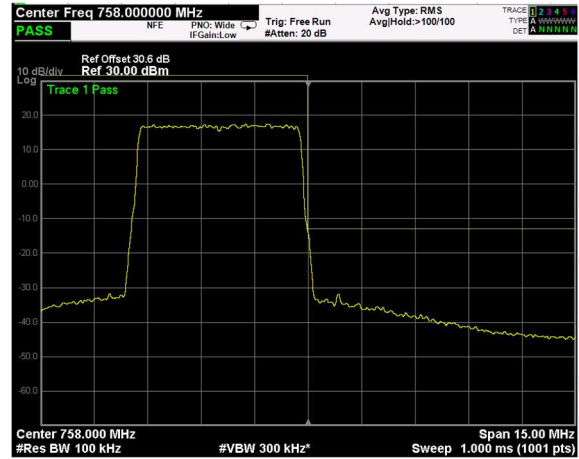
793MHz-806MHz, Last Channel

Test data, continued: band edges Inter modulation

AWGN signal, 1 Carrier, Nominal input signal

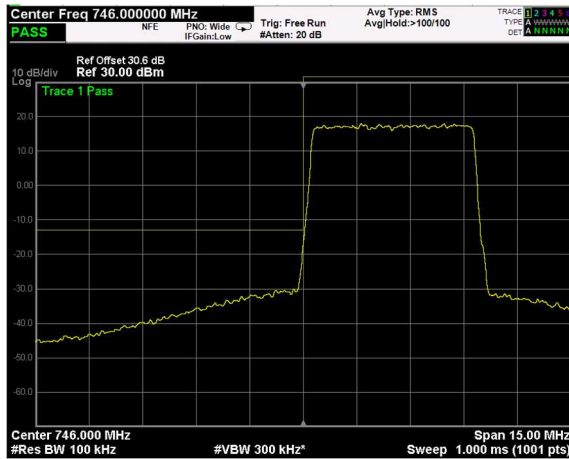


Low Band Edge

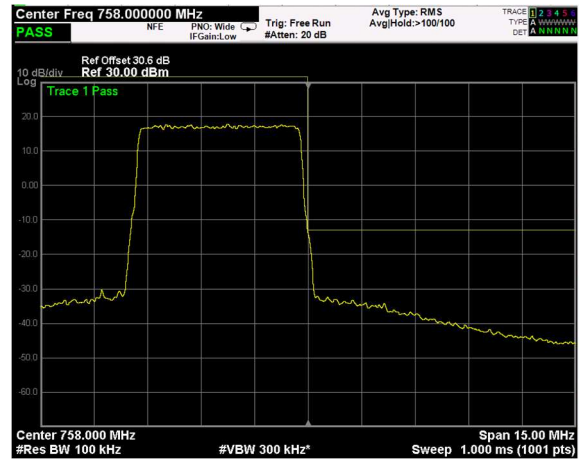


High Band Edge

AWGN signal, 1 Carrier, Nominal input signal + 3dBm

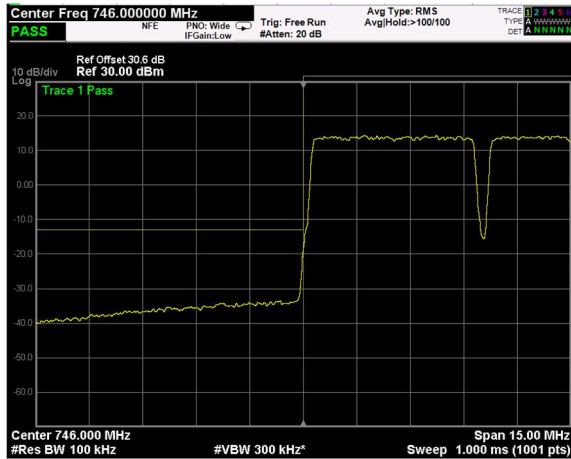


Low Band Edge

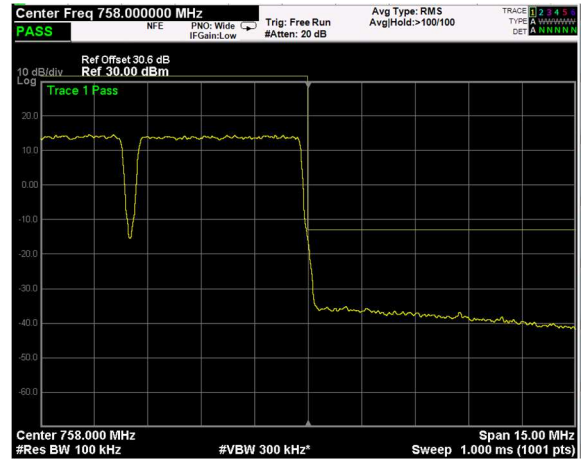


High Band Edge

AWGN signal, 2 carrier, Nominal input signal

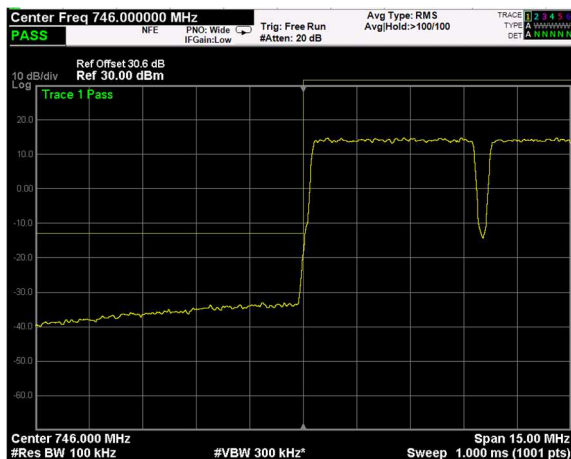


Low Band Edge

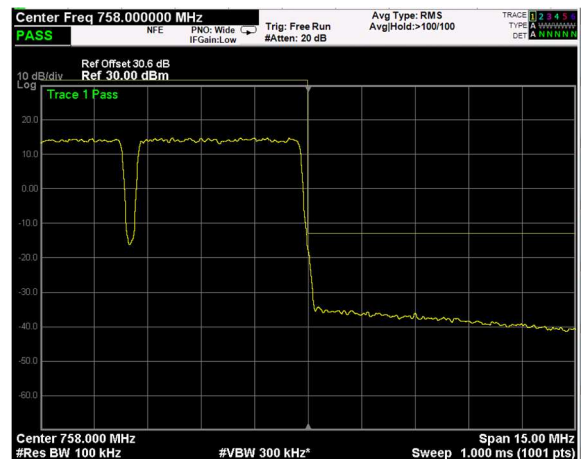


High Band Edge

AWGN signal, 2 carrier, Nominal input signal + 3dBm



Low Band Edge



High Band Edge

Clause 27.53(c) Radiated Spurious emissions

- (c) For operations in the 746–758 MHz band and the 776–788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:
- (1) On any frequency outside the 746–758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log (P)$ dB;
 - (3) On all frequencies between 763–775 MHz and 793–805 MHz, by a factor not less than $76 + 10 \log (P)$ dB in a 6.25 kHz band segment, for base and fixed stations;
 - (5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;
 - (6) Compliance with the provisions of paragraphs (c)(3) and (c)(4) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.

Test date: 05/27/2019 to 06/24/2019

Test results: Pass

Special notes

Clause 27.53(c) Radiated spurious emissions, continued

Test data

The D.U.T. was positioned according to the radiated emissions set-up

The D.U.T. antenna connector was terminated by a 50 Ω shielded dummy load.

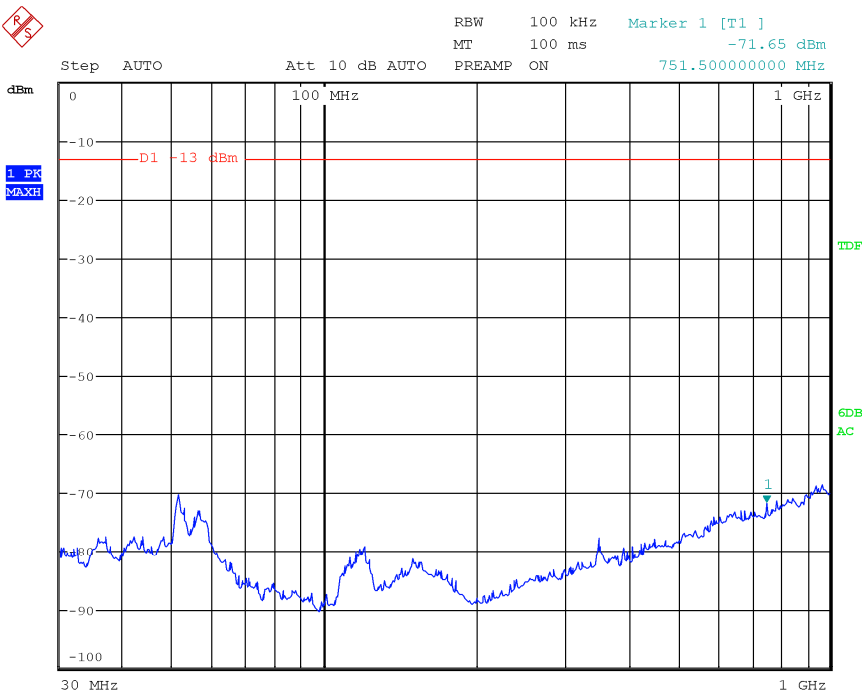
The spectrum was searched from 30 MHz to 1 GHz (RBW 100 kHz) & 1 GHz (RBW 1 MHz) to the tenth harmonic of the carrier.

There were no emissions detected above the noise floor which was at least 20 dB below the specification limit.

Spurious emissions measurement results:

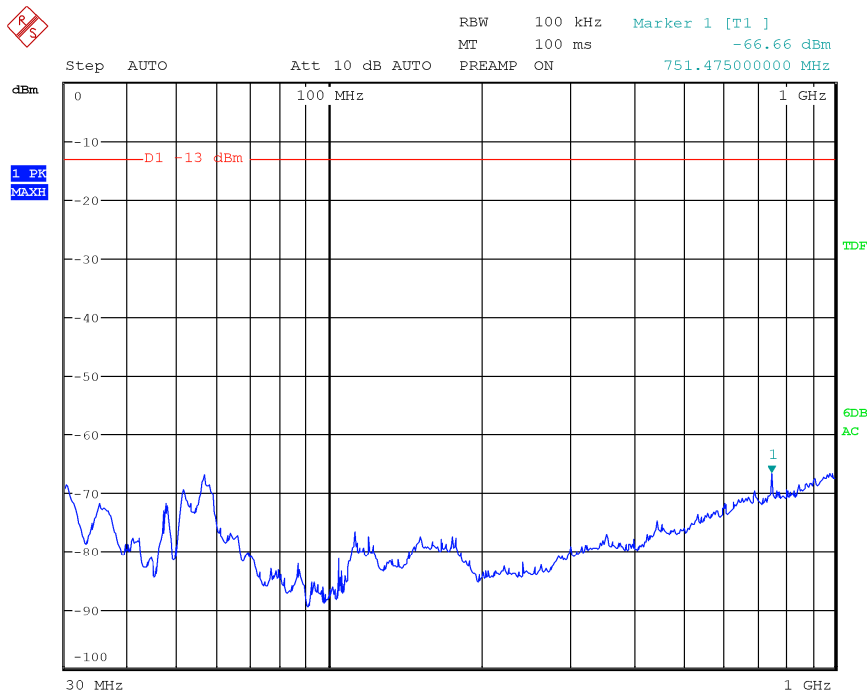
| Frequency (MHz) | Polarization. V/H | Field strength (dBm) | Limit (dBm) | Margin (dB) |
|-----------------|-------------------|----------------------|-------------|-------------|
| Low channel | | | | |
| First Channel | V/H | Negligible | -13 | |
| Mid channel | | | | |
| 751.5 | V/H | Negligible | -13 | |
| High channel | | | | |
| Last Channel | V/H | Negligible | -13 | |

Note: Field strength includes correction factor of antenna, cable loss, amplifier, and attenuators where applicable.



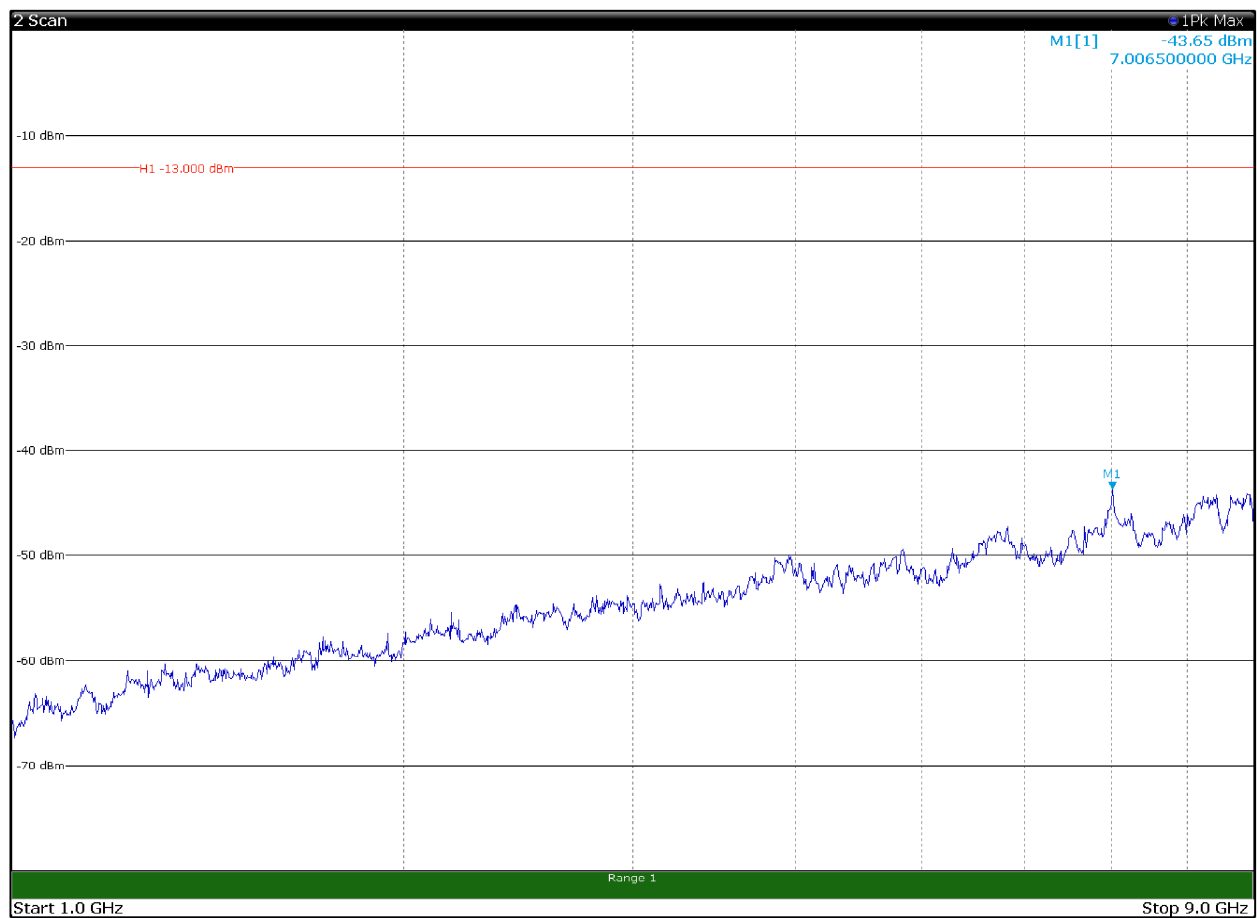
Date: 19.JUN.2019 10:32:46

30MHz-1GHz – H Pol



Date: 19.JUN.2019 10:32:06

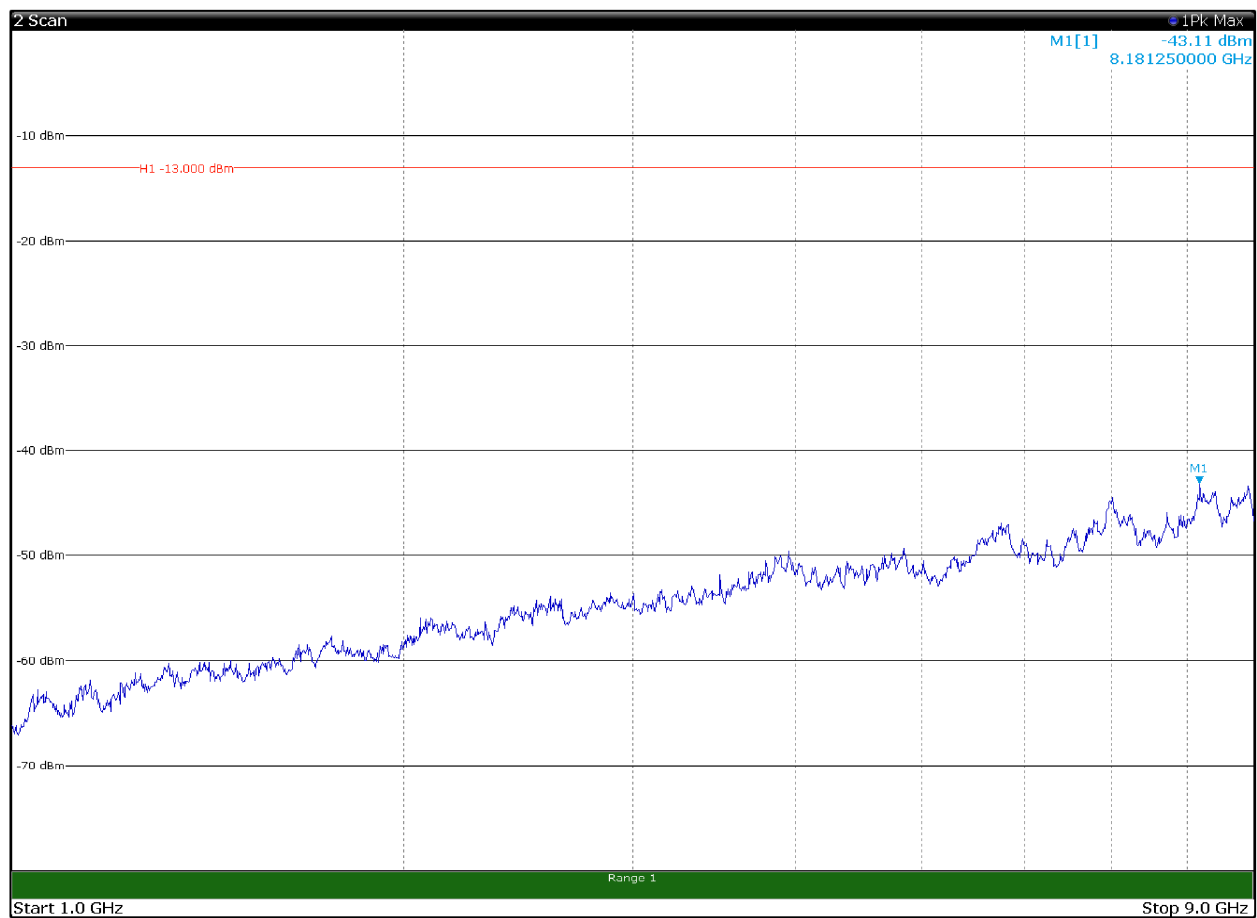
30MHz-1GHz – V Pol



08:34:07 18.06.2019

Page 1/1

1GHz-9GHz – H Pol



08:34:33 18.06.2019

Page 1/1

1GHz-9GHz – V Pol

Clause 27.53(f) Radiated spurious emissions within 1559–1610 MHz band

- (f) For operations in the 746–763 MHz, 775–793 MHz, and 805–806 MHz bands, emissions in the band 1559–1610 MHz shall be limited to –70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and –80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

Test date: 05/27/2019 to 06/24/2019

Test results: Pass

Special notes

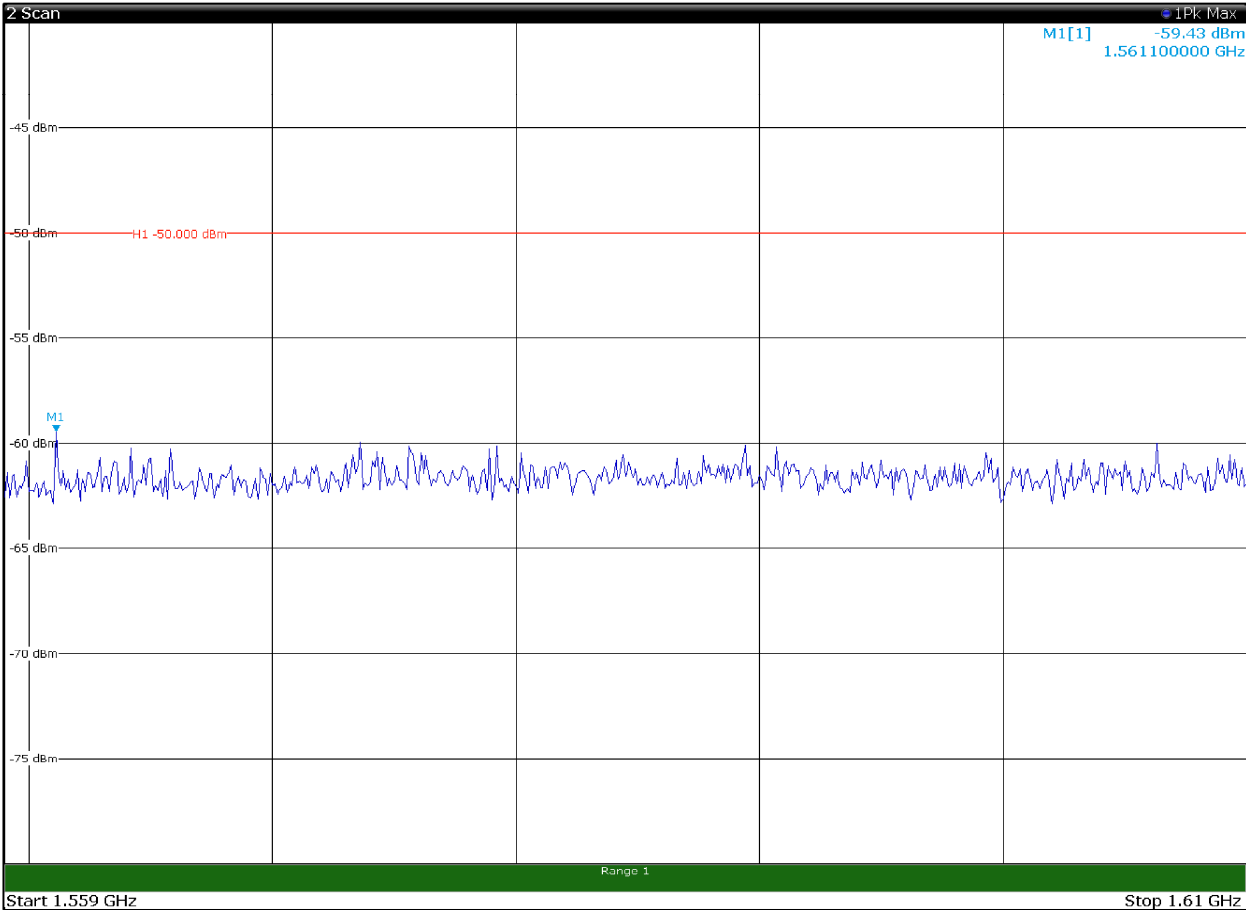
Method of measurement according to TIA-603-C (EIRP in GNSS band: 1.556 to 1.610 GHz) .

Δ Band = 51 MHz, Correction Factor calculated at central band 1604.5 MHz. in Fraunhofer Region.

Limit used for discrete emissions: -80 dBw = -50 dBm

Clause 27.53(f) Radiated spurious emissions within 1559–1610 MHz band, continued

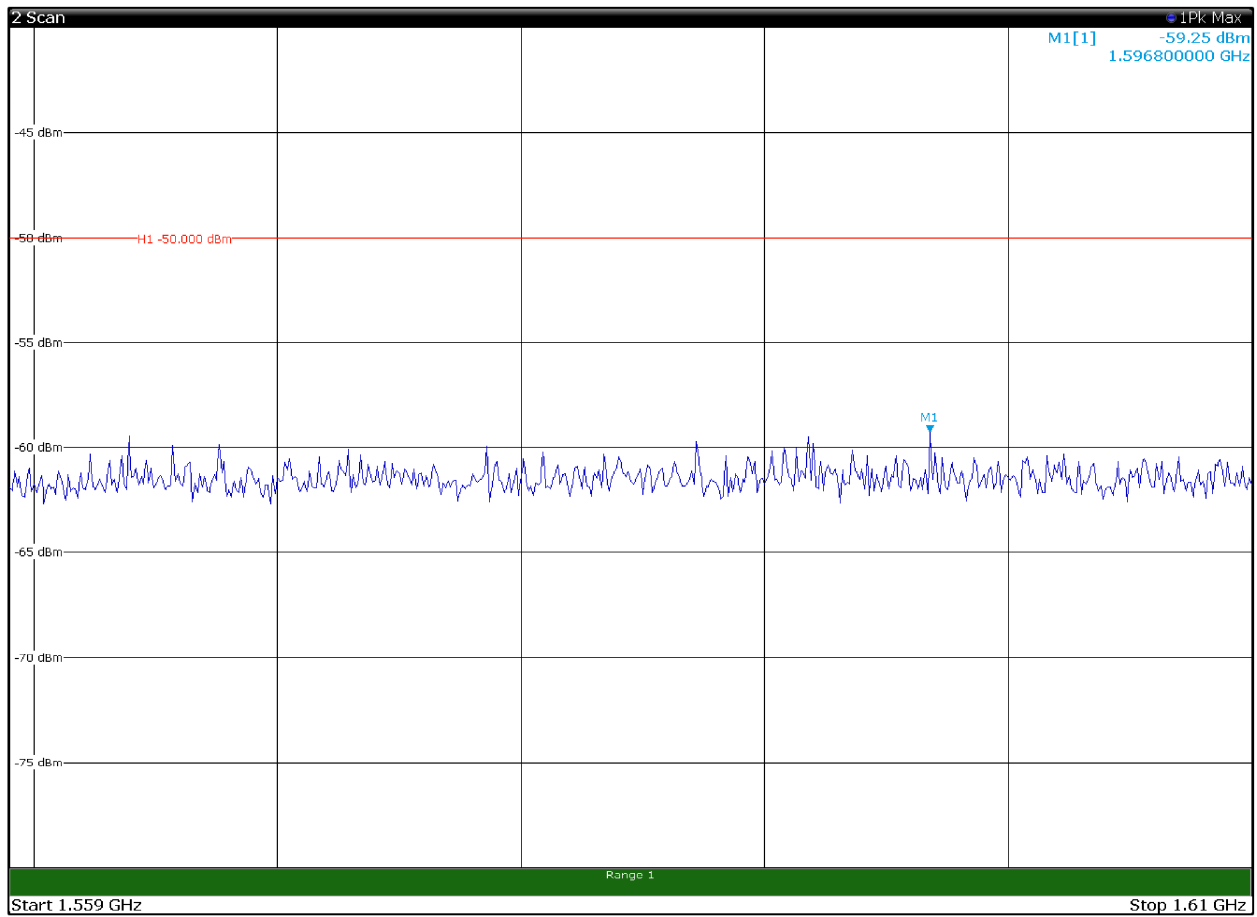
Test data



09:07:53 18.06.2019

Page 1/1

1559MHz-1610MHz – H Pol



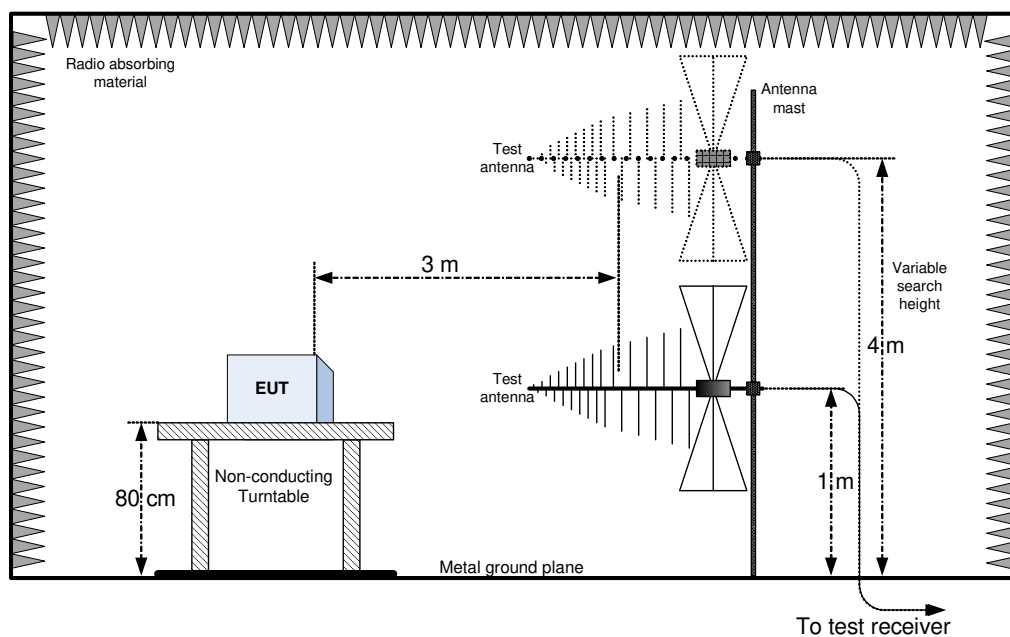
09:06:59 18.06.2019

Page 1/1

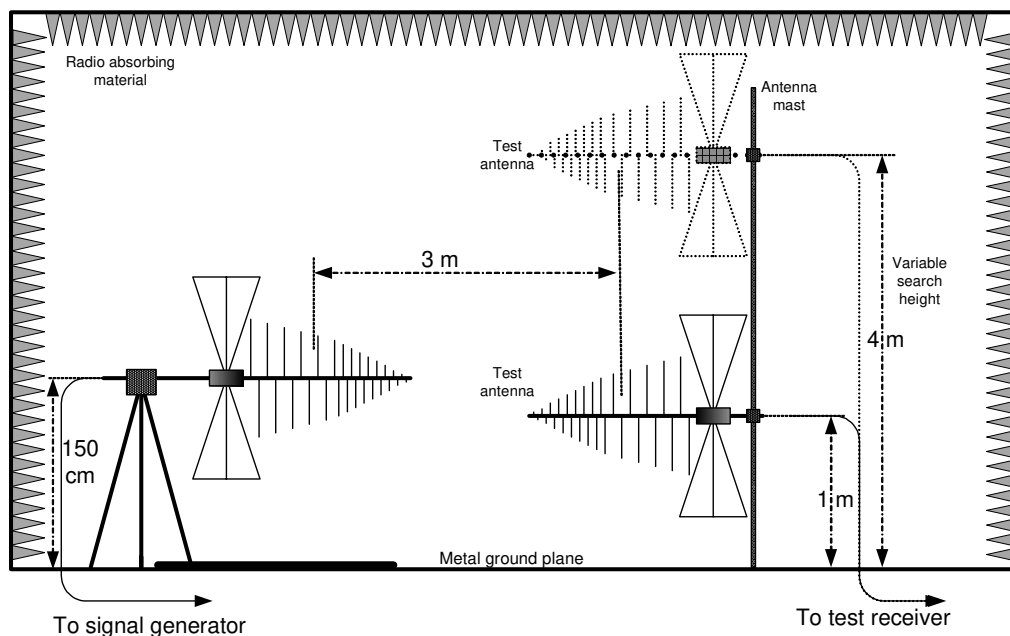
1559MHz-1610MHz – V Pol

Appendix B: Block diagrams of test set-ups

Radiated emissions set-up



Substitution method set-up



Appendix C: EUT Photos

Photo Set up

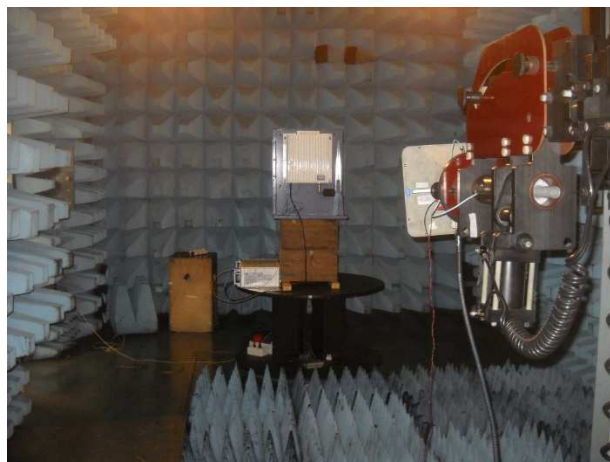
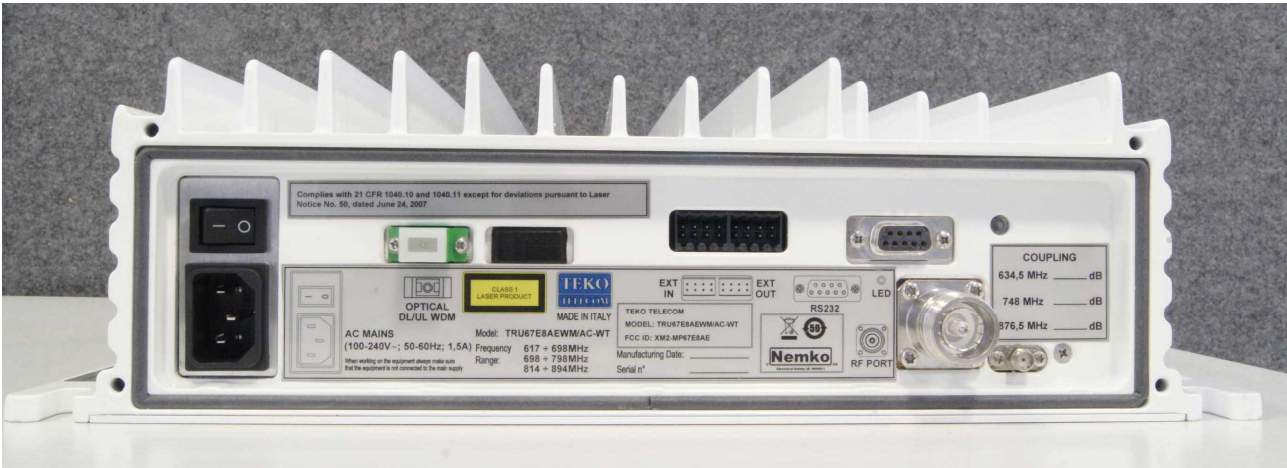


Photo EUT





END OF REPORT