# FCC PART 15.247

# TEST REPORT

For

## Chengdu Ebyte Electronic Technology Co., Ltd

Building B2, Mould Industrial Park, 199# Xi-Qu Ave, West High-tech Zone, Chengdu, 611731, Sichuan, China

**Tested Model: E01-ML01SP4**
**FCC ID: 2A8C3-E01ML01SP4**

| **Report Type:** | **Product Name:** |
|---|---|
| Amended Report | wireless module |

| | |
|---|---|
| **Report Number:** | RSC240925001-0M1 |
| **Date of Report Issue:** | 2024-12-03 |
| **Reviewed By:** | Sula Huang |
| **Test Laboratory:** | Bay Area Compliance Laboratories Corp. (Chengdu)<br>No.5040, Huilongwan Plaza, No. 1, Shawan Road,<br>Jinniu District, Chengdu, Sichuan, China<br>Tel: +86-28-65525123<br>Fax: +86-28-65525125<br>www.baclcorp.com |

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# DOCUMENT REVISION HISTORY

| Revision Number | Report Number | Description of Revision | Date of Revision |
|---|---|---|---|
| 0 | RSC240925001-0 | Original Report | 2024-10-14 |
| 1 | RSC240925001-0M1 | Amended Report<br>（Revised FCC § 2.1091 to § 2.1093） | 2024-12-03 |

# GENERAL INFORMATION

## Product Description for Equipment under Test (EUT)

| | |
|---|---|
| Applicant | Chengdu Ebyte Electronic Technology Co., Ltd |
| Address | Building B2, Mould Industrial Park, 199# Xi-Qu Ave, West High-tech Zone, Chengdu, 611731, Sichuan, China |
| Email | 157768495@qq.com |
| Product | wireless module |
| Tested Model | E01-ML01SP4 |
| FCC ID | 2A8C3-E01ML01SP4 |
| Frequency* | 2402 MHz – 2480 MHz |
| Modulation Type* | GFSK (250kbps, 1Mbps, 2Mbps) |
| Antenna Gain* | 4.0dBi(Peak),-2.0dBi(Average) |
| RF peak output power | 1.06 dBm |
| Voltage* | DC 2V – 3.6V (Typical: 3.3V) |
| Measure approximately | 18mm (L)×14.5mm (W)×3mm (H) |
| Sample serial number | 240925001/01 (RF Radiated Test & RF Conducted Test) (assigned by the BACL, Chengdu) |
| Sample/EUT Status | The test sample was in good condition and received: 2024-09-25 |

Note 1: Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.
Note 2: Report no.: RSC240925001-0M1 replaced report no.: RSC240925001-0.

## Objective

This report is prepared on behalf of **Chengdu Ebyte Electronic Technology Co., Ltd** in accordance with Part 2, Subpart J, Part 15, Subparts A and C of the Federal Communications Commission's rules.

The tests were performed in order to determine the compliance of the EUT with FCC Part 15-Subpart C, section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

## Measurement Uncertainty

| Item | | | Measurement Uncertainty | $U_{cispr}$ |
|---|---|---|---|---|
| AC power line conducted emission | | | 2.79 dB | 3.4 dB |
| Radiated Emission | 9kHz-30MHz | | 4.48dB | - |
| | 30MHz-200MHz | H | 4.34dB | 6.3dB |
| | 30MHz-200MHz | V | 4.59dB | 6.3dB |
| | 200MHz-1GHz | H | 4.69dB | 6.3dB |
| | 200MHz-1GHz | V | 5.79dB | 6.3dB |
| | 1GHz-6GHz | | 4.58dB | 5.2dB |
| | 6GHz-18GHz | | 4.58dB | 5.5dB |
| | 18GHz-40GHz | | 5.50dB | - |

| Item | Measurement Uncertainty |
|---|---|
| RF output power, conducted | ±0.61dB |
| Occupied Bandwidth | ±1.69% |
| Power Spectrum Density, conducted | ±2.52dB |
| Humidity | ±5% |
| Temperature | ±1℃ |
| Voltage(DC) | ±0.4% |
| Voltage(AC,<10kHz) | ±1% |
| Time | 1% |

Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the corresponding inclusion factor K when the inclusion probability is about 95%.

## Test Methodology

All measurements contained in this report were conducted with:

1. ANSI C63.10-2020 American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.
2. KDB558074 D01 15.247 Meas Guidance v05r02.

## Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Chengdu) to collect test data is located No.5040, Huilongwan Plaza, No. 1, Shawan Road, Jinniu District, Chengdu, Sichuan, China.

Bay Area Compliance Laboratories Corp. (Chengdu) lab is accredited to ISO/IEC 17025 by NVLAP (Lab code: 600346-0) and the FCC designation No.: CN5056. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

# SYSTEM TEST CONFIGURATION

## Description of Test Configuration*

The system was configured in testing mode, which was provided by manufacturer.

For GFSK (250kbps, 1Mbps, 2Mbps) mode, 79 channels are provided for testing:

| Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---|---|---|---|
| 2 | **2402** | 42 | 2442 |
| 3 | 2403 | 43 | 2443 |
| 4 | 2404 | 44 | 2444 |
| 5 | 2405 | 45 | 2445 |
| 6 | 2406 | 46 | 2446 |
| 7 | 2407 | 47 | 2447 |
| 8 | 2408 | 48 | 2448 |
| 9 | 2409 | 49 | 2449 |
| 10 | 2410 | 50 | 2450 |
| 11 | 2411 | 51 | 2451 |
| 12 | 2412 | 52 | 2452 |
| 13 | 2413 | 53 | 2453 |
| 14 | 2414 | 54 | 2454 |
| 15 | 2415 | 55 | 2455 |
| 16 | 2416 | 56 | 2456 |
| 17 | 2417 | 57 | 2457 |
| 18 | 2418 | 58 | 2458 |
| 19 | 2419 | 59 | 2459 |
| 20 | 2420 | 60 | 2460 |
| 21 | 2421 | 61 | 2461 |
| 22 | 2422 | 62 | 2462 |
| 23 | 2423 | 63 | 2463 |
| 24 | 2424 | 64 | 2464 |
| 25 | 2425 | 65 | 2465 |
| 26 | 2426 | 66 | 2466 |
| 27 | 2427 | 67 | 2467 |
| 28 | 2428 | 68 | 2468 |
| 29 | 2429 | 69 | 2469 |
| 30 | 2430 | 70 | 2470 |
| 31 | 2431 | 71 | 2471 |
| 32 | 2432 | 72 | 2472 |
| 33 | 2433 | 73 | 2473 |
| 34 | 2434 | 74 | 2474 |
| 35 | 2435 | 75 | 2475 |
| 36 | 2436 | 76 | 2476 |
| 37 | 2437 | 77 | 2477 |
| 38 | 2438 | 78 | 2478 |
| 39 | 2439 | 79 | 2479 |
| 40 | **2440** | 80 | **2480** |
| 41 | 2441 | - | - |

The EUT was tested with channel 2, 40 and 80.

## Equipment Modifications

No modification was made to the EUT tested.

## EUT Exercise Software*

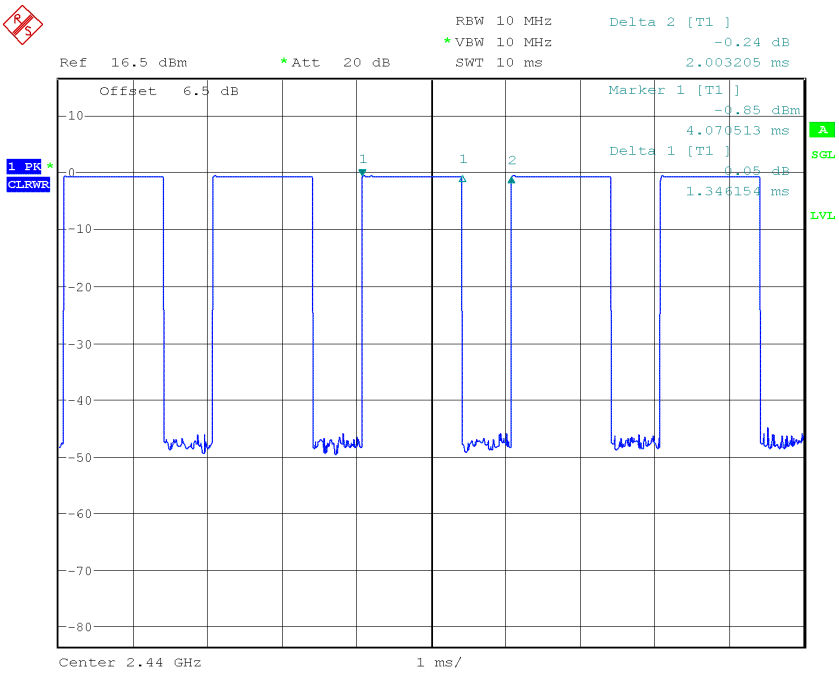
The setting by the software as following table:

| Test Mode | Test Software | XCOM V2.6 | | |
|---|---|---|---|---|
| 250kbps | **Test Frequency (MHz)** | 2402 | 2440 | 2480 |
| | **Data Rate** | 250kbps | 250kbps | 250kbps |
| | **Power Level** | 0 | 0 | 0 |
| 1Mbps | **Test Frequency (MHz)** | 2402 | 2440 | 2480 |
| | **Data Rate** | 1Mbps | 1Mbps | 1Mbps |
| | **Power Level** | 0 | 0 | 0 |
| 2Mbps | **Test Frequency (MHz)** | 2402 | 2440 | 2480 |
| | **Data Rate** | 2Mbps | 2Mbps | 2Mbps |
| | **Power Level** | 0 | 0 | 0 |

Duty Cycle information is below:

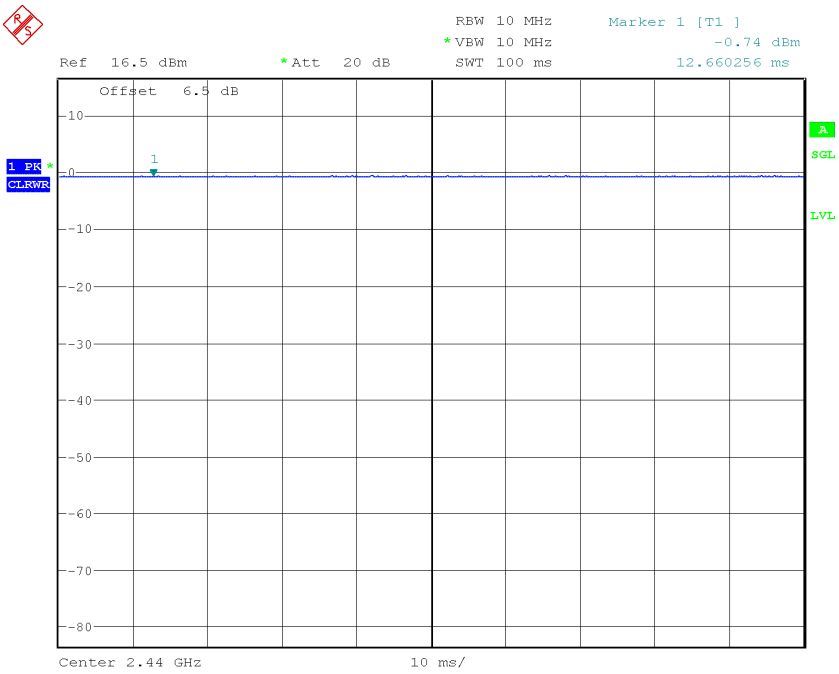
| Mode | $T_{on}$ | $T_p$ | Duty Cycle |
|---|---|---|---|
| | (ms) | (ms) | (%) |
| 250kbps | 1.34 | 2.00 | 67% |
| 1Mbps | 100 | 100 | 100 |
| 2Mbps | 100 | 100 | 100 |

## Duty Cycle, 250kbps



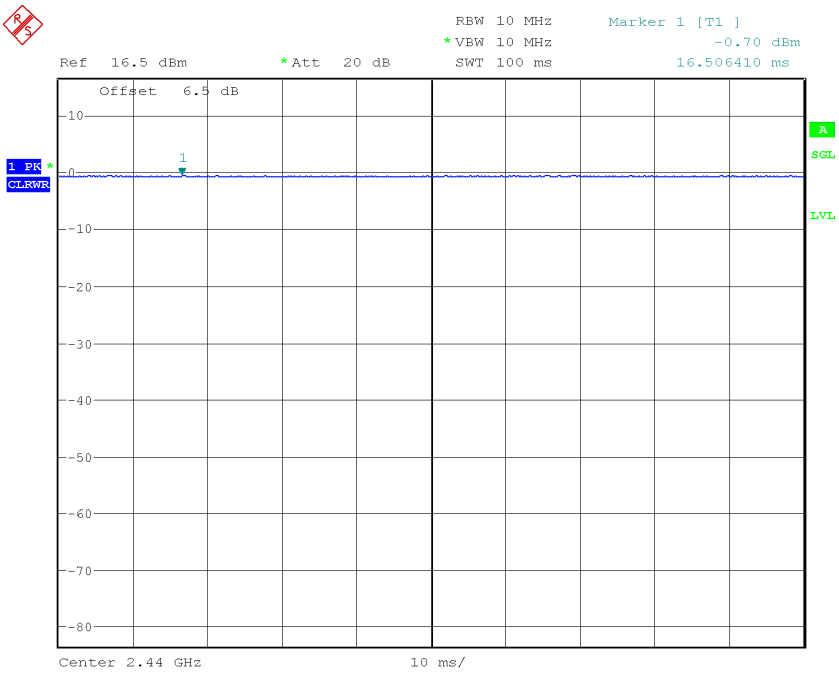

Comment: Project:RSC240925001-0 Tester:Murphy Guo
Date: 29.SEP.2024 18:04:11

## Duty Cycle, 1Mbps




Comment: Project:RSC240925001-0 Tester:Murphy Guo
Date: 29.SEP.2024 13:07:01

## Duty Cycle, 2Mbps




Comment: Project:RSC240925001-0 Tester:Murphy Guo
Date: 29.SEP.2024 13:08:25

## Support Test Devices Description

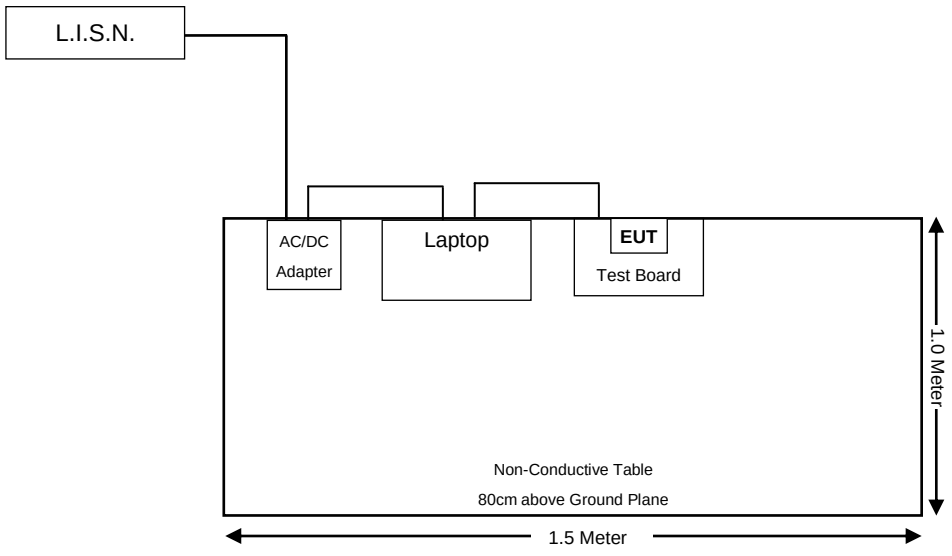
| Manufacturer | Device Name | Model | Serial Number |
|---|---|---|---|
| Local | | | |
| Lenovo | Laptop | L540 | No |
| Lenovo | AC/DC Adapter | ADLX45NDC2A | SA10E75790 |
| Ebyte | Test Board | V1.0 | 10578 |

## Support Test Cable Description

| Cable Description | Length (m) | From / Port | To |
|---|---|---|---|
| Unshielded AC Power Cable | 1.5 | L.I.S.N. | AC/DC Adapter |
| Unshielded DC Power Cable | 1.5 | Adapter | Laptop |
| Unshielded USB Power Cable | 1.3 | Laptop | Test Board |

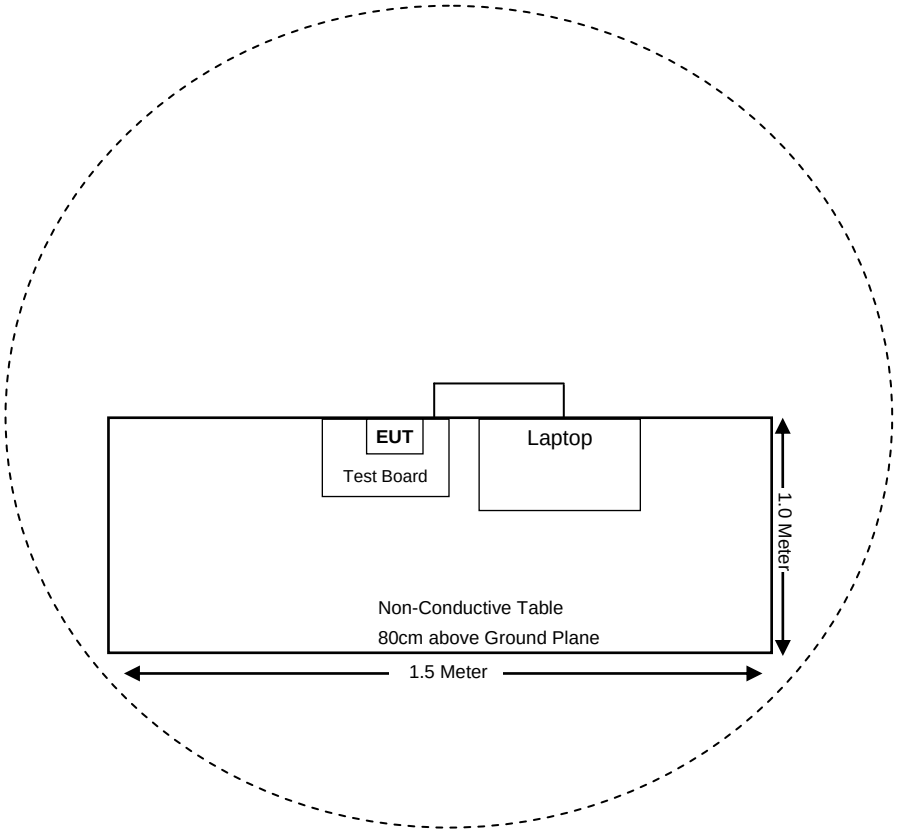
## Block Diagram of Test Setup

Conducted Emissions:

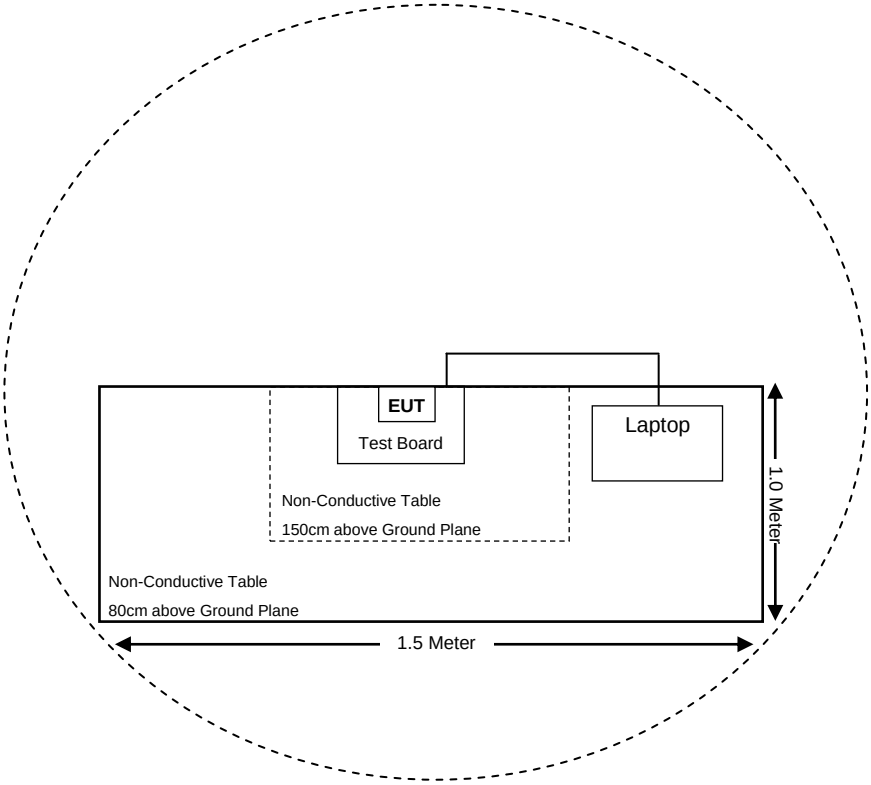


Radiated Emissions

Below 1GHz:



Above 1GHz:


EUT
Test Board
Laptop
Non-Conductive Table
150cm above Ground Plane
Non-Conductive Table
80cm above Ground Plane
1.0 Meter
1.5 Meter

# SUMMARY OF TEST RESULTS

| FCC Rules | Description of Test | Result |
|---|---|---|
| ***FCC §15.247 & §1.1310 & §2.1093*** | ***RF Exposure*** | ***Compliant*** |
| §15.203 | Antenna Requirement | Compliant |
| §15.207 (a) | AC Line Conducted Emissions | Compliant |
| §15.205, §15.209, §15.247(d) | Raidated Spurious Emissions | Compliant |
| §15.247(d) | Conducted Spurious Emissions at Antenna Terminal | Compliant |
| §15.247 (a)(2) | 6 dB Emission Bandwidth | Compliant |
| §15.247(b)(3) | Maximum conducted output power | Compliant |
| §15.247(d) | 100 kHz Bandwidth of Frequency Band Edge | Compliant |
| §15.247(e) | Power Spectral Density | Compliant |

Note: Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

# TEST EQUIPMENTS LIST

| Manufacturer | Description | Model Number | Serial Number | Calibration Date | Calibration Due Date |
|---|---|---|---|---|---|
| Conducted Emissions | | | | | |
| Rohde & Schwarz | EMI Test Receiver | ESCI 3 | 100028 | 2024-04-10 | 2025-04-09 |
| Rohde & Schwarz | L.I.S.N. | ENV216 | 3560.6550.16 | 2024-04-10 | 2025-04-09 |
| HP | RF Limiter | 11947A | 3107A01270 | 2024-08-03 | 2025-08-02 |
| UTIFLEX | Conducted Cable | L-E-003 | 000003 | 2024-08-03 | 2025-08-02 |
| Rohde & Schwarz | EMC32 | EMC32 | V 8.52.0 | NCR | NCR |
| Radiated Emissions (9kHz-30MHz) | | | | | |
| EMCT | Semi-Anechoic Chamber | 966 | 001 | 2023-04-15 | 2028-04-14 |
| Rohde & Schwarz | EMI Test Receiver | ESR3 | 102456 | 2024-04-11 | 2025-04-10 |
| BACL CORP | Active Loop Antenna | 1313-1A | 4031411 | 2024-05-20 | 2025-05-19 |
| Xin Hang Xun Wei Bo | RF Cable (Below 1GHz) | XH500A-N/J-N/J-2Mbps-A | T-E271 | 2023-11-30 | 2024-11-29 |
| Xin Hang Xun Wei Bo | RF Cable (Below 1GHz) | XH500A-N/J-N/J-7M-A | T-E268 | 2023-11-30 | 2024-11-29 |
| Rohde & Schwarz | EMC32 | EMC32 | V9.10.00 | NCR | NCR |
| Radiated Emissions (30MHz-1GHz) | | | | | |
| EMCT | Semi-Anechoic Chamber | 966 | 001 | 2023-04-15 | 2028-04-14 |
| SONOMA INSTRUMENT | Pre-Amplifier | 310 N | 186684 | 2024-08-07 | 2025-08-06 |
| SUNOL SCIENCES | Broadband Antenna | JB3 | A121808 | 2024-01-24 | 2025-01-23 |
| INMET | Attenuator | 18N-6dB | 64671 | 2024-01-24 | 2025-01-23 |
| Rohde & Schwarz | EMI Test Receiver | ESR3 | 102456 | 2024-04-11 | 2025-04-10 |
| HUBER+SUHENER | RF Cable (Below 1GHz) | L-E-015 | MY4345/EA | 2023-11-30 | 2024-11-29 |
| Xin Hang Xun Wei Bo | RF Cable (Below 1GHz) | XH500A-N/J-N/J-2Mbps-A | T-E271 | 2023-11-30 | 2024-11-29 |
| Xin Hang Xun Wei Bo | RF Cable (Below 1GHz) | XH500A-N/J-N/J-7M-A | T-E268 | 2023-11-30 | 2024-11-29 |
| Rohde & Schwarz | EMC32 | EMC32 | V9.10.00 | NCR | NCR |

| Manufacturer | Description | Model Number | Serial Number | Calibration Date | Calibration Due Date |
|---|---|---|---|---|---|
| Radiated Emissions (1GHz-18GHz) | | | | | |
| EMCT | Semi-Anechoic Chamber | 966 | 001 | 2023-04-15 | 2028-04-14 |
| Rohde & Schwarz | Signal Analyzer | FSV40 | 101943 | 2024-04-10 | 2025-04-09 |
| Rohde & Schwarz | EMI Test Receiver | ESIB40 | 100215 | 2024-04-10 | 2025-04-09 |
| ETS | Horn Antenna | 3115 | 003-6076 | 2024-08-16 | 2025-08-15 |
| A.H. Systems, inc. | Pre-Amplifier | PAM-0118P | 509 | 2024-08-07 | 2025-08-06 |
| MICRO-TRONICS | 2.4GHz Notch Filter | BRM50702 | G396 | 2024-05-18 | 2025-05-17 |
| Xin Hang Xun Wei Bo | RF Cable (Above 1GHz) | XH500A-SMA/J-N/J-2Mbps-A | L-E-016 | 2024-01-05 | 2025-01-04 |
| Xin Hang Xun Wei Bo | RF Cable (Above 1GHz) | XH500A-SMA/J-N/J-5M-A | L-E-017 | 2024-01-05 | 2025-01-04 |
| Rohde & Schwarz | EMC32 | EMC32 | V9.10.00 | NCR | NCR |
| Radiated Emissions (18GHz-25GHz) | | | | | |
| EMCT | Semi-Anechoic Chamber | 966 | 001 | 2023-04-15 | 2028-04-14 |
| Rohde & Schwarz | EMI Test Receiver | ESIB40 | 100215 | 2024-04-10 | 2025-04-09 |
| A.H. Systems, inc. | Horn Antenna | SAS-574 | 510 | 2024-01-19 | 2025-01-18 |
| EM Electronics Corporation | Pre-Amplifier | EM18G40 | 060725 | 2024-04-10 | 2025-04-09 |
| Xin Hang Xun Wei Bo | RF Cable (Above 18GHz) | T-E302 | XH360A-2.92/J-2.92/J-1.5M-A | 2024-06-03 | 2025-06-02 |
| Rohde & Schwarz | EMC32 | EMC32 | V9.10.00 | NCR | NCR |
| RF Conducted Test | | | | | |
| Rohde & Schwarz | Spectrum Analyzer | FSU26 | 100113 | 2024-04-10 | 2025-04-09 |
| MIDWEST | 6dB Attenuator | 219 | AA4305 | 2024-03-01 | 2025-03-01 |
| Astrolab | RF Coaxial Cable | MINIREND-5 | 1206 | 2023-10-18 | 2024-10-17 |

Statement of Traceability: Bay Area Compliance Laboratories Corp. (Chengdu) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

# *FCC §15.247 & §1.1310 & §2.1093 - RF EXPOSURE*

## *Applicable Standard*

***According to§15.247(i) and §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.***

***According to KDB447498 D01 General RF Exposure Guidance v06:***
***The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:***
***[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] . [√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where***
***• f(GHz) is the RF channel transmit frequency in GHz***
***• Power and distance are rounded to the nearest mW and mm before calculation***
***• The result is rounded to one decimal place for comparison***
***• 3.0 and 7.5 are referred to as the numeric thresholds in the step 2 below***

***The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm according to 5) in section 4.1 is applied to determine SAR test exclusion.***

***Measurement Result***
***The max conducted power including tune-up tolerance is 1.50 dBm (1.41mW).***
***[(max. power of channel, mW)/(min. test separation distance, mm)][√f(GHz)]***
***= 1.41/5(√2.48) = 0.4< 3.0***

***So the stand-alone SAR evaluation is not necessary.***

# FCC §15.203 - ANTENNA REQUIREMENT

## Applicable Standard

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.
b. Antenna must use a unique type of connector to attach to the EUT.
c. The unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

## Antenna Information*

The EUT has one external antenna with IPEX connector and the maximum antenna gain is 4dBi, which fulfill the requirement of this section. Please refer to the EUT photos.

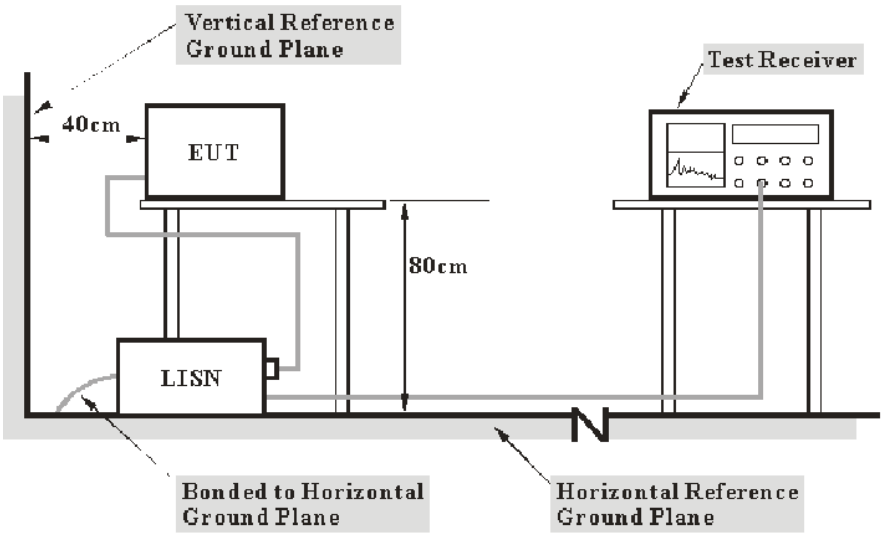
**Result:** Compliance

# FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

## Applicable Standard

FCC§15.207

## EUT Setup




Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2020 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

## EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

| Frequency Range | IF B/W |
|---|---|
| 150 kHz – 30 MHz | 9 kHz |

## Test Procedure

During the conducted emission test, the adapter of laptop was connected to the first L.I.S.N.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

## Corrected Amplitude & Margin Calculation

The basic equation is as follows:

$V_C = V_R + A_C + VDF$
$C_f = A_C + VDF$

Herein,
$V_C$ (cord. Reading): corrected voltage amplitude
$V_R$: reading voltage amplitude
$A_c$: attenuation caused by cable loss
VDF: voltage division factor of AMN
$C_f$: Correction Factor

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin = Limit – Corrected Amplitude

## Test Data

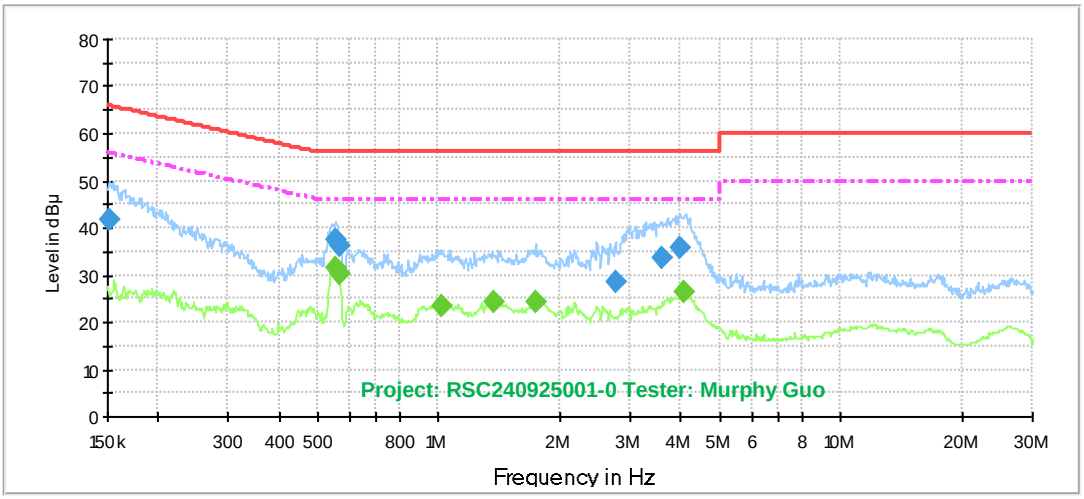
### Test Environment Conditions

| | |
|---|---|
| Temperature: | 21 °C |
| Relative Humidity: | 66 % |
| ATM Pressure: | 96.2 kPa |

The testing was performed by Murphy Guo on 2024-10-10.

Test Mode: Transmitting_2Mbps_low channel_worst case

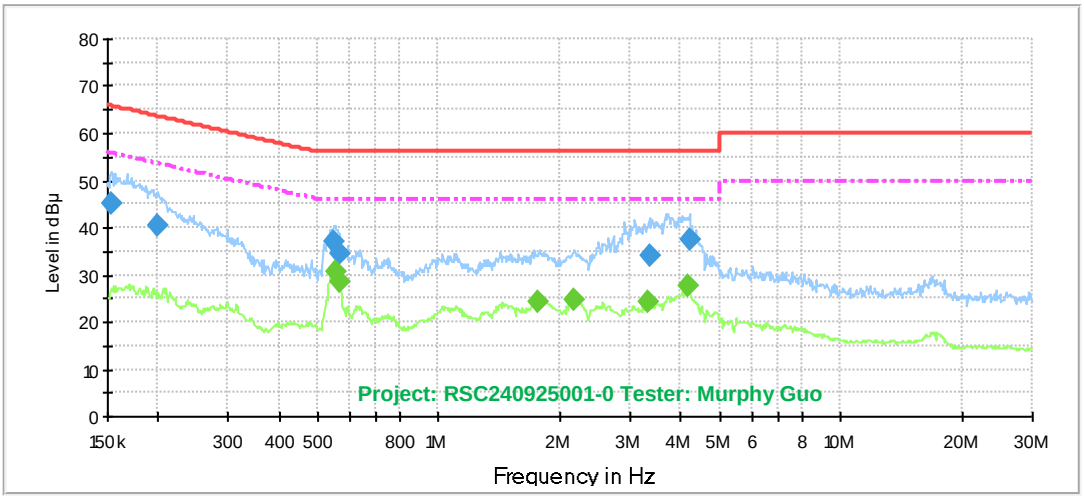
**AC120V/60Hz, Line:**




| Frequency (MHz) | Corrected Amplitude QuasiPeak (dBµ V) | Reading QuasiPeak (dBµ V) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) | Margin (dB) | Limit (dBµ V) |
|---|---|---|---|---|---|---|---|---|
| 0.151504 | 41.7 | 21.9 | 5000.0 | 9.000 | L1 | 19.8 | 24.2 | 65.9 |
| 0.554115 | 37.6 | 18.0 | 5000.0 | 9.000 | L1 | 19.6 | 18.4 | 56.0 |
| 0.565280 | 36.1 | 16.5 | 5000.0 | 9.000 | L1 | 19.6 | 19.9 | 56.0 |
| 2.747297 | 28.4 | 8.8 | 5000.0 | 9.000 | L1 | 19.6 | 27.6 | 56.0 |
| 3.578548 | 33.5 | 13.8 | 5000.0 | 9.000 | L1 | 19.7 | 22.5 | 56.0 |
| 3.973691 | 35.9 | 16.2 | 5000.0 | 9.000 | L1 | 19.7 | 20.1 | 56.0 |

| Frequency (MHz) | Corrected Amplitude Average (dBµ V) | Reading Average (dBµ V) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) | Margin (dB) | Limit (dBµ V) |
|---|---|---|---|---|---|---|---|---|
| 0.554115 | 31.7 | 12.1 | 5000.0 | 9.000 | L1 | 19.6 | 14.3 | 46.0 |
| 0.565280 | 30.2 | 10.6 | 5000.0 | 9.000 | L1 | 19.6 | 15.8 | 46.0 |
| 1.013195 | 23.5 | 3.8 | 5000.0 | 9.000 | L1 | 19.7 | 22.5 | 46.0 |
| 1.373482 | 24.5 | 4.9 | 5000.0 | 9.000 | L1 | 19.6 | 21.6 | 46.0 |
| 1.744994 | 24.4 | 4.9 | 5000.0 | 9.000 | L1 | 19.5 | 21.6 | 46.0 |
| 4.094402 | 26.3 | 6.6 | 5000.0 | 9.000 | L1 | 19.7 | 19.7 | 46.0 |

## AC120V/60Hz, Neutral:




| Frequency (MHz) | Corrected Amplitude QuasiPeak (dBµ V) | Reading QuasiPeak (dBµ V) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) | Margin (dB) | Limit (dBµ V) |
|---|---|---|---|---|---|---|---|---|
| 0.153788 | 45.3 | 25.8 | 5000.0 | 9.000 | N | 19.5 | 20.5 | 65.8 |
| 0.200319 | 40.3 | 20.9 | 5000.0 | 9.000 | N | 19.4 | 23.3 | 63.6 |
| 0.548615 | 36.8 | 17.3 | 5000.0 | 9.000 | N | 19.5 | 19.2 | 56.0 |
| 0.565280 | 34.4 | 14.9 | 5000.0 | 9.000 | N | 19.5 | 21.6 | 56.0 |
| 3.337198 | 34.2 | 14.6 | 5000.0 | 9.000 | N | 19.6 | 21.8 | 56.0 |
| 4.197791 | 37.6 | 17.9 | 5000.0 | 9.000 | N | 19.7 | 18.4 | 56.0 |

| Frequency (MHz) | Corrected Amplitude Average (dBµ V) | Reading Average (dBµ V) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) | Margin (dB) | Limit (dBµ V) |
|---|---|---|---|---|---|---|---|---|
| 0.551358 | 30.8 | 11.3 | 5000.0 | 9.000 | N | 19.5 | 15.2 | 46.0 |
| 0.565280 | 28.6 | 9.1 | 5000.0 | 9.000 | N | 19.5 | 17.4 | 46.0 |
| 1.771300 | 24.2 | 4.7 | 5000.0 | 9.000 | N | 19.5 | 21.8 | 46.0 |
| 2.173205 | 24.8 | 5.3 | 5000.0 | 9.000 | N | 19.5 | 21.2 | 46.0 |
| 3.320595 | 24.2 | 4.6 | 5000.0 | 9.000 | N | 19.6 | 21.8 | 46.0 |
| 4.176906 | 27.5 | 7.8 | 5000.0 | 9.000 | N | 19.7 | 18.5 | 46.0 |

**Note:**
1) Correction Factor =LISN VDF (Voltage Division Factor) + Cable Loss + Transient Limiter Attenuation
The corrected factor has been input into the transducer of the test software.
2) Corrected Amplitude = Reading + Correction Factor
3) Margin = Limit – Corrected Amplitude

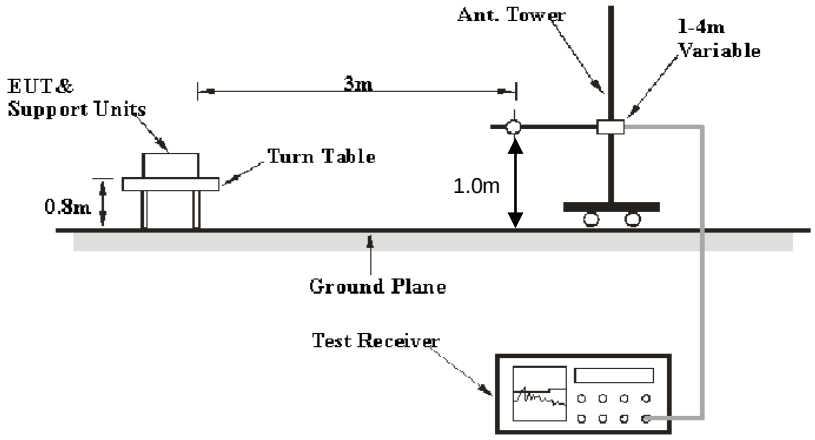
# FCC §15.209, §15.205 & §15.247(d) - RADIATED SPURIOUS EMISSIONS & BAND EDGE

## Applicable Standard

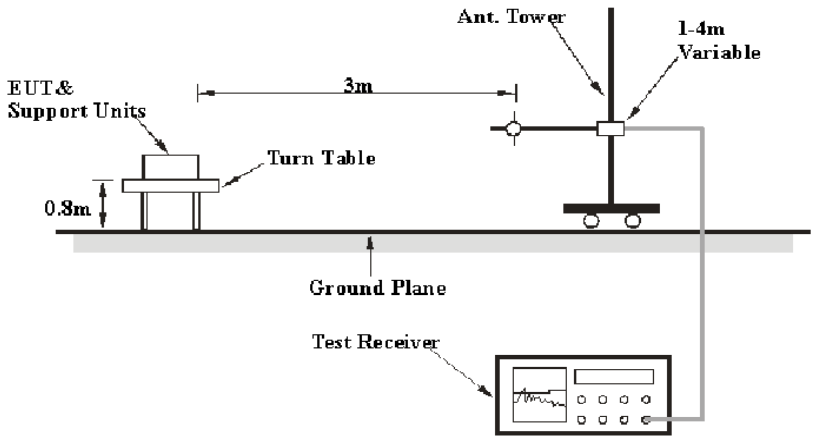
FCC §15.247 (d); §15.209; §15.205;

## EUT Setup

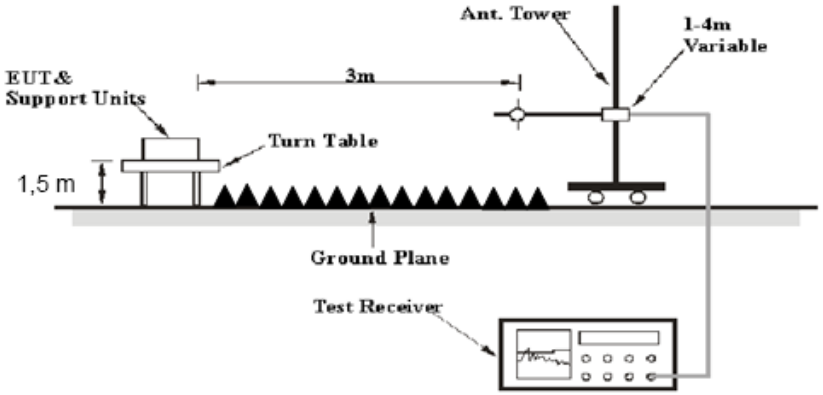
### 9kHz - 30MHz:




### 30MHz - 1GHz:



**Above 1GHz:**




The radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.10-2020. The specification used was the FCC 15.209, and FCC 15.247 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

## EMI Test Receiver & Signal Analyzer Setup

The system was investigated from 9 kHz to 25 GHz.

During the radiated emission test, the EMI test receiver or Signal Analyzer was set with the following configurations:

| Frequency Range | RBW | Video B/W | Measurement |
|---|---|---|---|
| 9 kHz – 150 kHz | 200 Hz | 1 kHz | PK |
| 150 kHz – 30 MHz | 9 kHz | 30 kHz | PK |
| 30 MHz – 1000 MHz | 120 kHz | 300 kHz | QP |
| Above 1 GHz | 1 MHz | 3 MHz | PK |
| | 1 MHz | 3 MHz | CISPR AV |

The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

If the maximized peak measured value complies with under the QP/Average limit more than 6dB, then it is unnecessary to perform an QP/Average measurement.

If the peak detected amplitude can be shown to comply with the average limit, then it is not necessary to perform a separate average measurement.

## Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1 GHz, peak and Average detection modes for frequencies above 1 GHz.

## Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Loss and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

Corrected Amplitude (MaxPeak or QuasiPeak)= Meter Reading + Antenna Loss + Cable Loss- Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

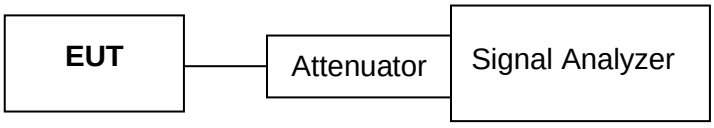
Margin = Limit –Corrected Amplitude

## Conducted Spurious Emission At Antenna Port:

Connect the antenna port through an attenuator to the spectrum analyzer input; in the results, account for all losses between the unlicensed wireless device output and the spectrum analyzer. The instrument shall span 30 MHz to 10 times the operating frequency in GHz, with a resolution bandwidth of 100 kHz, video bandwidth of 300 kHz, and a coupled sweep time with a peak detector.

a) Set the center frequency and span to encompass frequency range to be measured.
b) Set the RBW = 100 kHz.
c) Set the VBW ≥ [3 × RBW].
d) Detector = peak.
e) Sweep time = No faster than coupled (auto) time.
f) Trace mode = max-hold.
g) Allow trace to fully stabilize.
h) Use the peak marker function to determine the maximum unwanted emissions amplitude level.

## Test Setup Block



# Test Data

## Test Environment Conditions

| Test Measurement: | Radiated | Conducted |
|---|---|---|
| Test Date: | 2024-10-10 | 2024-09-29 |
| Temperature: | 22 °C | 25 °C |
| Relative Humidity: | 65 % | 63 % |
| ATM Pressure: | 96.1 kPa | 96.2 kPa |

The testing was performed by Murphy Guo.

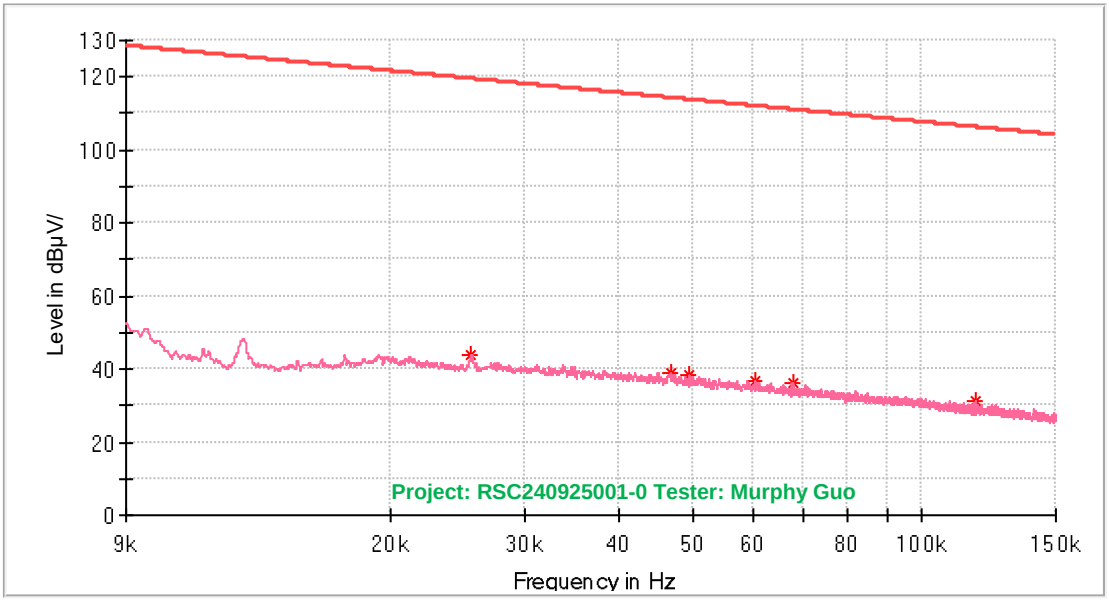
Test Mode: Transmitting

Note: Pre-scan and configuration EUT with X, Y and Z-axis, the Y-axis is the worst case.

## Radiated Spurious Emissions:

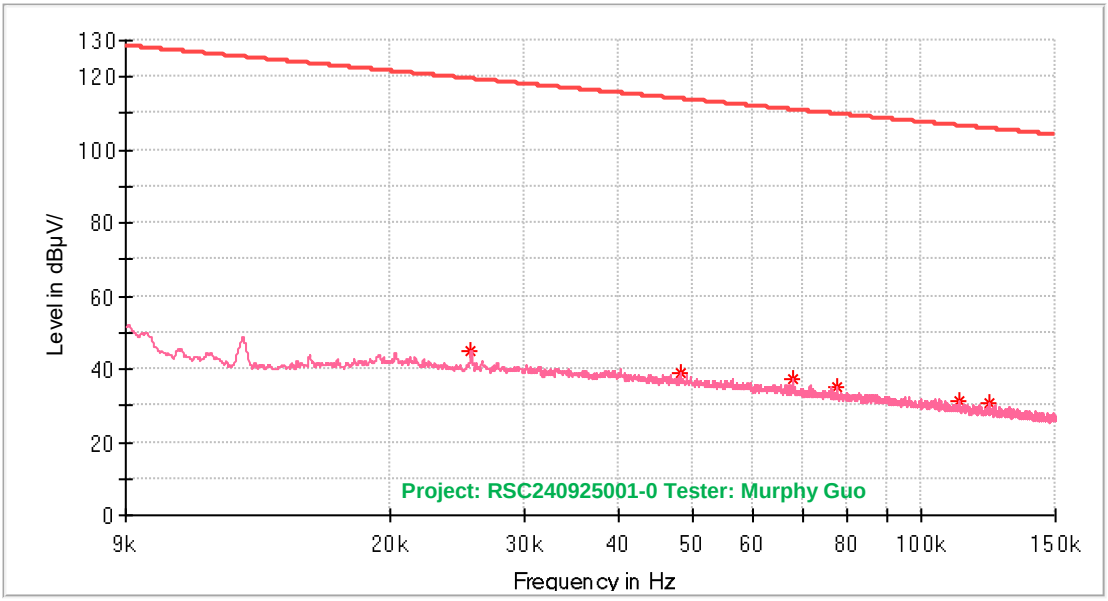
### 1) 9 kHz to 150 kHz_2Mbps_low channel_worst case

**Parallel**



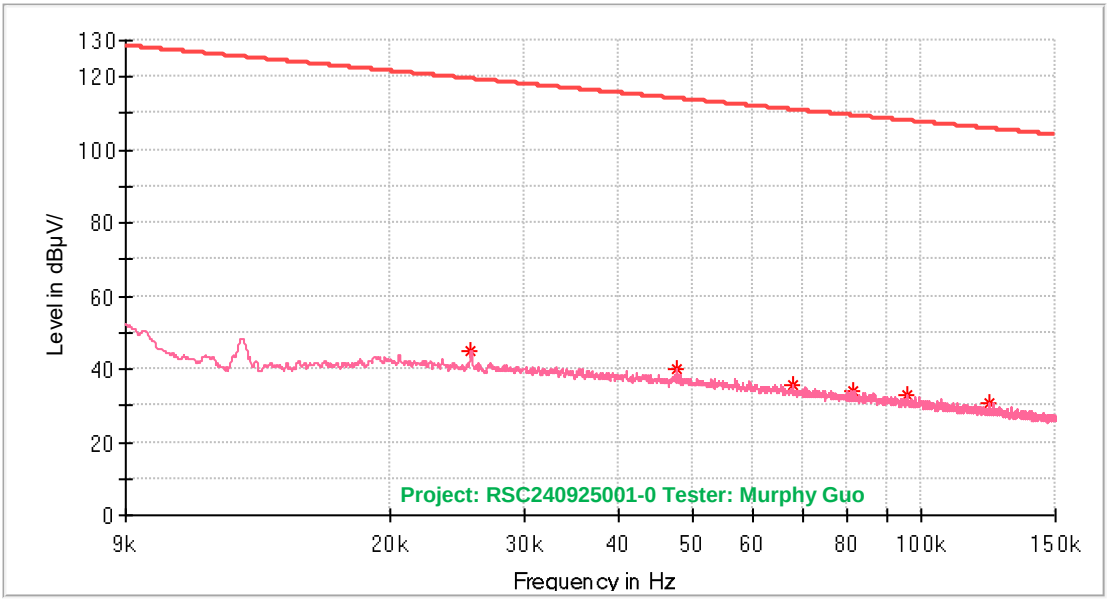

| Frequency (MHz) | MaxPeak (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Height (cm) | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|
| 0.025585 | 44.05 | 119.43 | 75.38 | 100.0 | 166.0 | 22.6 |
| 0.046735 | 38.98 | 114.20 | 75.22 | 100.0 | 38.0 | 19.8 |
| 0.049573 | 38.44 | 113.69 | 75.25 | 100.0 | 238.0 | 19.4 |
| 0.060536 | 36.66 | 111.95 | 75.29 | 100.0 | 261.0 | 17.9 |
| 0.067586 | 36.03 | 111.00 | 74.97 | 100.0 | 344.0 | 17.1 |
| 0.117623 | 31.43 | 106.19 | 74.76 | 100.0 | 355.0 | 12.7 |

**Perpendicular**




| Frequency (MHz) | MaxPeak (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Height (cm) | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|
| 0.025603 | 44.83 | 119.42 | 74.59 | 100.0 | 295.0 | 22.6 |
| 0.048180 | 39.22 | 113.94 | 74.72 | 100.0 | 230.0 | 19.6 |
| 0.067726 | 37.17 | 110.98 | 73.81 | 100.0 | 272.0 | 17.0 |
| 0.077367 | 35.21 | 109.82 | 74.61 | 100.0 | 311.0 | 16.0 |
| 0.112230 | 31.35 | 106.59 | 75.24 | 100.0 | 260.0 | 13.1 |
| 0.122523 | 30.69 | 105.83 | 75.14 | 100.0 | 42.0 | 12.3 |

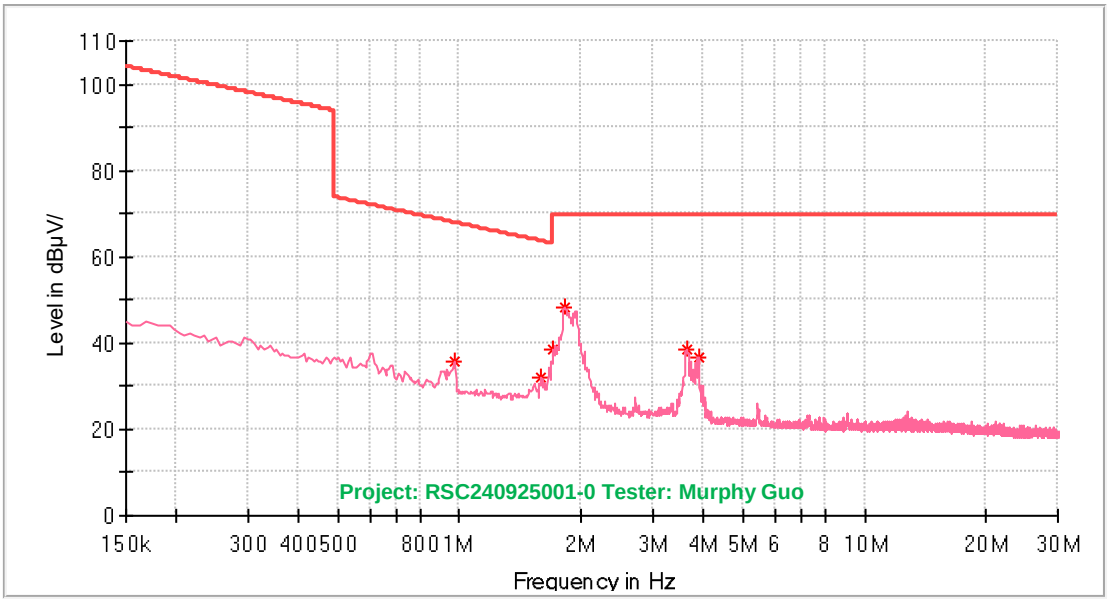
**Ground Parallel**




| Frequency (MHz) | MaxPeak (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Height (cm) | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|
| 0.025603 | 45.19 | 119.42 | 74.23 | 100.0 | 0.0 | 22.6 |
| 0.047775 | 40.11 | 114.01 | 73.90 | 100.0 | 280.0 | 19.6 |
| 0.067709 | 35.89 | 110.98 | 75.09 | 100.0 | 0.0 | 17.0 |
| 0.081544 | 34.16 | 109.37 | 75.21 | 100.0 | 138.0 | 15.6 |
| 0.095644 | 32.97 | 107.98 | 75.01 | 100.0 | 50.0 | 14.4 |
| 0.122540 | 30.60 | 105.83 | 75.23 | 100.0 | 134.0 | 12.3 |

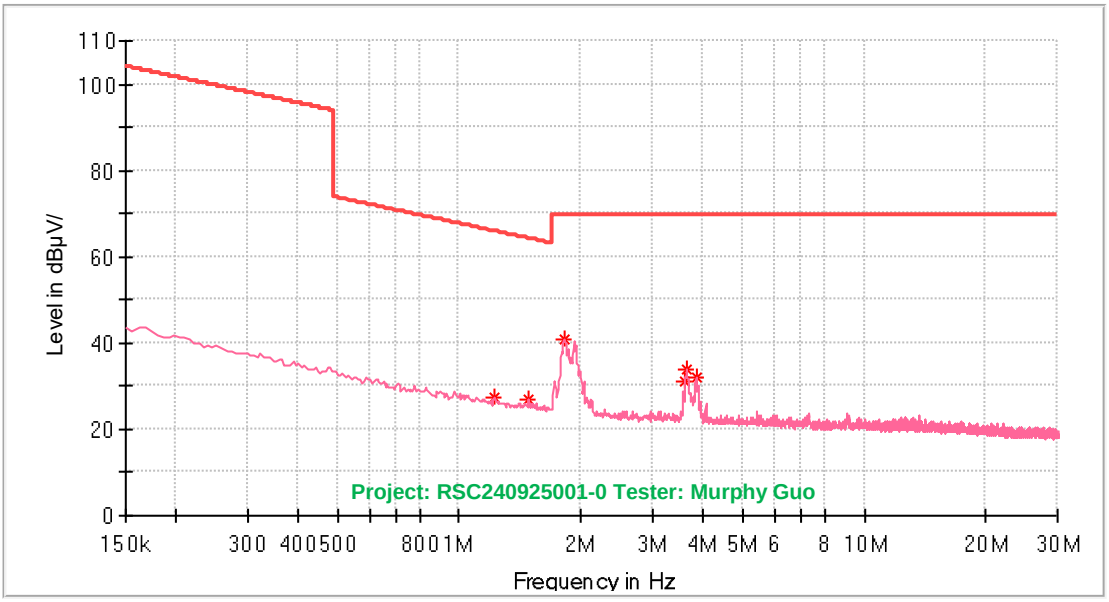
## 2) 150 kHz to 30 MHz_2Mbps_low channel_worst case

### Parallel



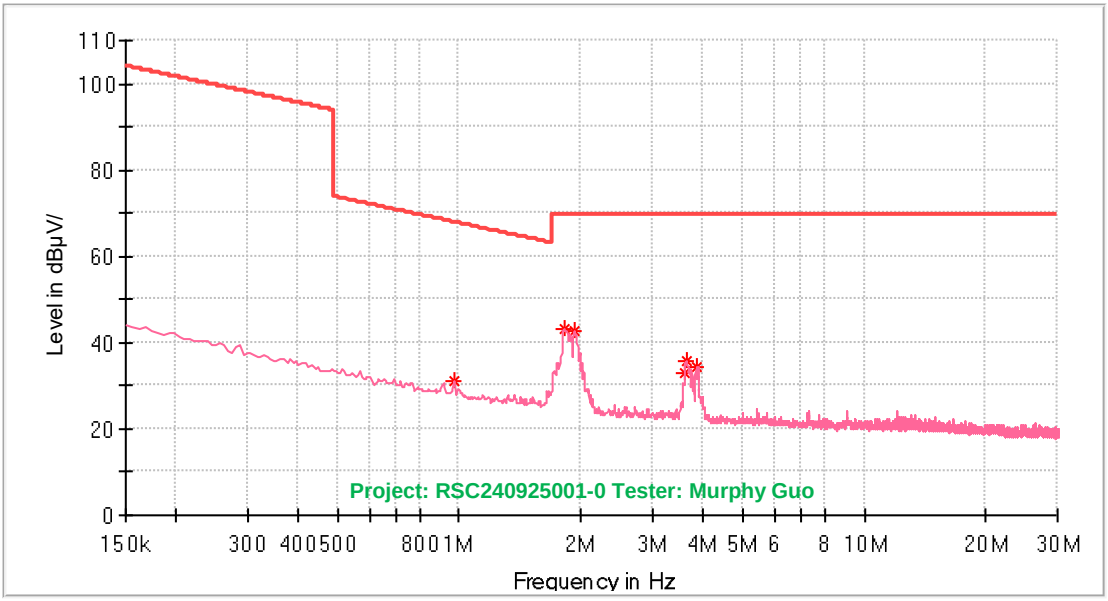

| Frequency (MHz) | MaxPeak (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Height (cm) | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|
| 0.967890 | 35.69 | 67.90 | 32.21 | 100.0 | 189.0 | -3.9 |
| 1.594740 | 32.16 | 63.58 | 31.42 | 100.0 | 17.0 | -6.3 |
| 1.702200 | 38.50 | 63.01 | 24.51 | 100.0 | 9.0 | -6.6 |
| 1.809660 | 48.29 | 69.50 | 21.21 | 100.0 | 29.0 | -6.9 |
| 3.636480 | 38.52 | 69.50 | 30.98 | 100.0 | 37.0 | -8.4 |
| 3.887220 | 36.75 | 69.50 | 32.75 | 100.0 | 17.0 | -8.5 |

**Perpendicular**



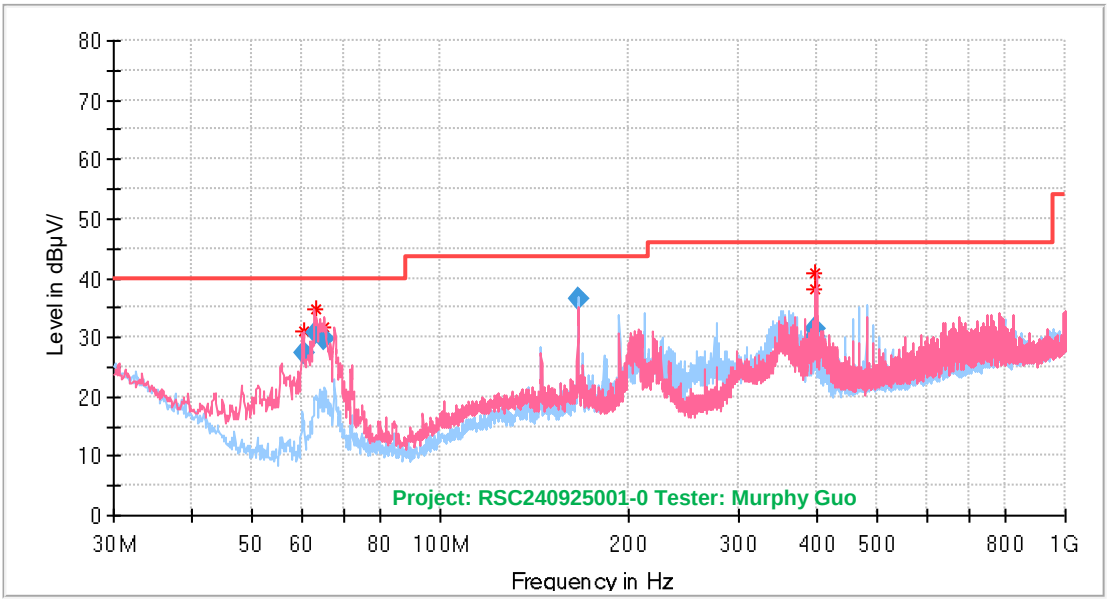

| Frequency (MHz) | MaxPeak (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Height (cm) | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|
| 1.224600 | 27.26 | 65.87 | 38.61 | 100.0 | 14.0 | -5.1 |
| 1.481310 | 26.75 | 64.22 | 37.47 | 100.0 | 170.0 | -5.9 |
| 1.815630 | 41.01 | 69.50 | 28.49 | 100.0 | 0.0 | -6.9 |
| 3.600660 | 30.89 | 69.50 | 38.61 | 100.0 | 359.0 | -8.4 |
| 3.636480 | 33.94 | 69.50 | 35.56 | 100.0 | 0.0 | -8.4 |
| 3.845430 | 32.02 | 69.50 | 37.48 | 100.0 | 359.0 | -8.5 |

**Ground Parallel**




| Frequency (MHz) | MaxPeak (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Height (cm) | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|
| 0.973860 | 31.30 | 67.85 | 36.55 | 100.0 | 218.0 | -4.0 |
| 1.821600 | 43.22 | 69.50 | 26.28 | 100.0 | 167.0 | -6.9 |
| 1.917120 | 42.88 | 69.50 | 26.62 | 100.0 | 0.0 | -7.2 |
| 3.600660 | 32.75 | 69.50 | 36.75 | 100.0 | 159.0 | -8.4 |
| 3.630510 | 35.61 | 69.50 | 33.89 | 100.0 | 0.0 | -8.4 |
| 3.875280 | 34.20 | 69.50 | 35.30 | 100.0 | 354.0 | -8.5 |

### 3) 30 MHz to 1 GHz_2Mbps_low channel_worst case



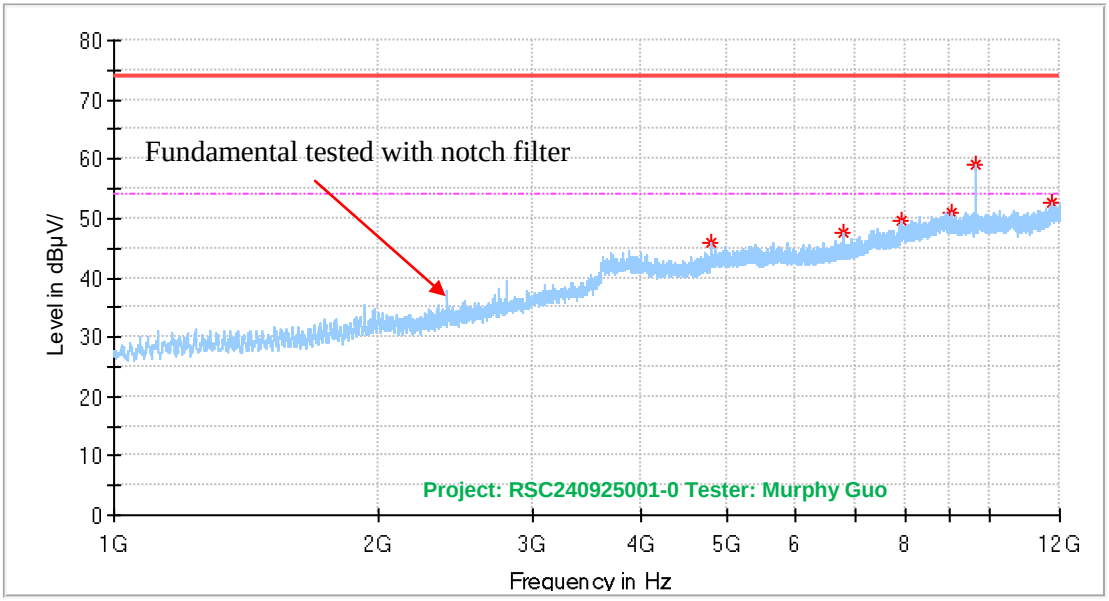

| Frequency (MHz) | QuasiPeak (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 60.385250 | 27.45 | 40.00 | 12.55 | 1000.0 | 120.000 | 105.0 | V | 84.0 | -16.7 |
| 63.085500 | 30.69 | 40.00 | 9.31 | 1000.0 | 120.000 | 108.0 | V | 45.0 | -16.4 |
| 65.217250 | 29.55 | 40.00 | 10.45 | 1000.0 | 120.000 | 112.0 | V | 307.0 | -16.0 |
| 166.572000 | 36.59 | 43.50 | 6.91 | 1000.0 | 120.000 | 169.0 | H | 41.0 | -11.5 |
| 398.363250 | 30.14 | 46.00 | 15.86 | 1000.0 | 120.000 | 160.0 | V | 43.0 | -6.9 |
| 398.487000 | 31.43 | 46.00 | 14.57 | 1000.0 | 120.000 | 139.0 | V | 58.0 | -6.9 |

### 4) 1GHz-12GHz

Note: 1. The fourth harmonic is non-restricted band and compliance with a relative limit: –20 dB relative to highest fundamental level.
2. If the peak detected amplitude can be shown to comply with the average limit, then it is not necessary to perform a separate average measurement.

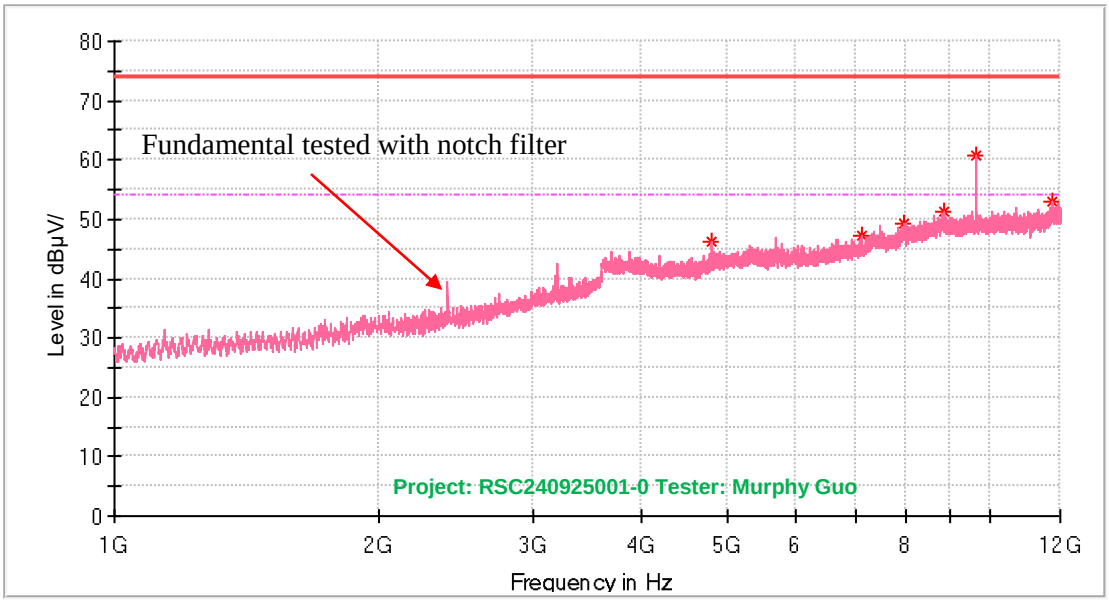
### 250kbps mode

**Low Channel_Horizontal**



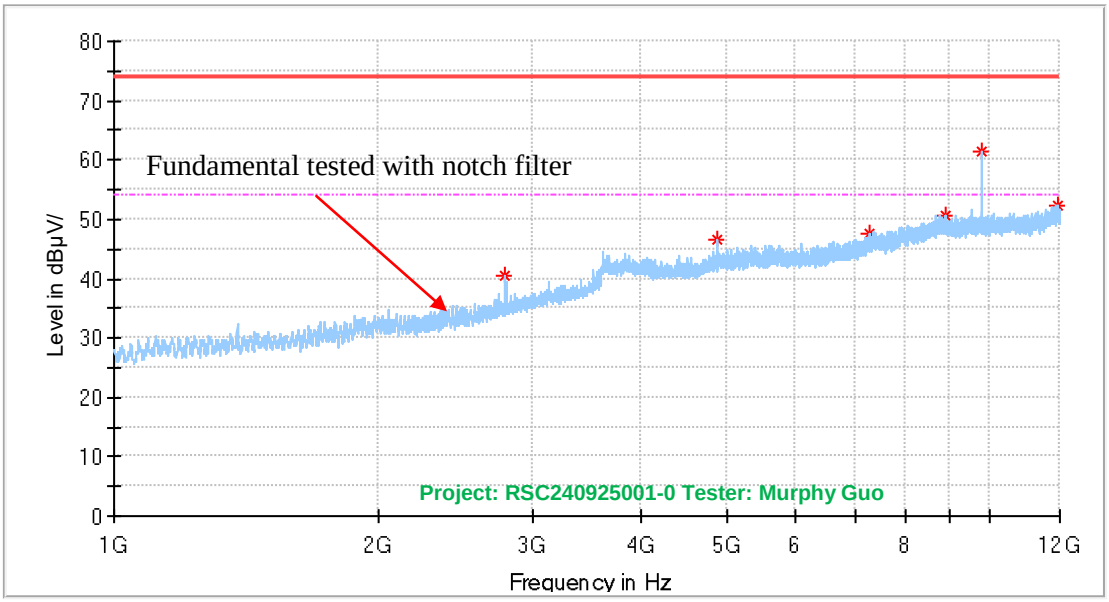

| Frequency (MHz) | MaxPeak (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Pol | Corr. (dB) |
|---|---|---|---|---|---|
| 4803.800000 | 45.77 | 74.00 | 28.23 | H | -5.1 |
| 6799.200000 | 47.59 | 74.00 | 26.41 | H | -2.8 |
| 7923.400000 | 49.60 | 74.00 | 24.40 | H | 0.1 |
| 9052.000000 | 50.99 | 74.00 | 23.01 | H | 0.8 |
| 9607.500000 | 59.16 | 73.54 | 14.38 | H | 1.4 |
| 11753.600000 | 52.65 | 74.00 | 21.35 | H | 3.9 |

**Low Channel_Vertical**




| Frequency (MHz) | MaxPeak (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Pol | Corr. (dB) |
|---|---|---|---|---|---|
| 4803.800000 | 46.41 | 74.00 | 27.59 | V | -5.1 |
| 7107.200000 | 47.38 | 74.00 | 26.62 | V | -2.6 |
| 7953.100000 | 49.30 | 74.00 | 24.70 | V | 0.2 |
| 8839.700000 | 51.21 | 74.00 | 22.79 | V | 1.5 |
| 9607.500000 | 60.91 | 69.00 | 8.09 | V | 1.4 |
| 11739.300000 | 52.87 | 74.00 | 21.13 | V | 3.7 |

**Middle Channel_Horizontal**

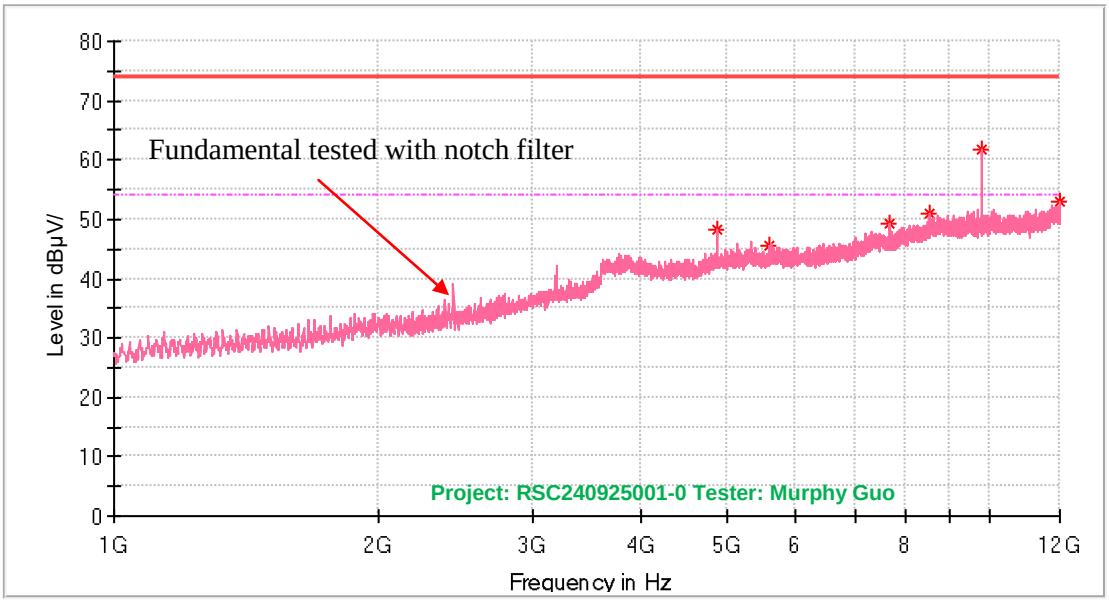



| Frequency (MHz) | MaxPeak (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Pol | Corr. (dB) |
|---|---|---|---|---|---|
| 2790.800000 | 40.66 | 74.00 | 33.34 | H | -11.4 |
| 4879.700000 | 46.64 | 74.00 | 27.36 | H | -5.1 |
| 7290.900000 | 47.55 | 74.00 | 26.45 | H | -1.7 |
| 8870.500000 | 50.73 | 74.00 | 23.27 | H | 1.5 |
| 9760.400000 | 61.58 | 69.82 | 8.24 | H | 1.6 |
| 11949.400000 | 52.46 | 74.00 | 21.54 | H | 4.6 |

**Fundamental Strength**

| Frequency (MHz) | MaxPeak (dBµ V/m) | Average (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Pol | Corr. (dB) |
|---|---|---|---|---|---|---|
| 2440.000000 | 90.18 | 89.82 | - | - | H | -0.3 |

**Middle Channel_Vertical**

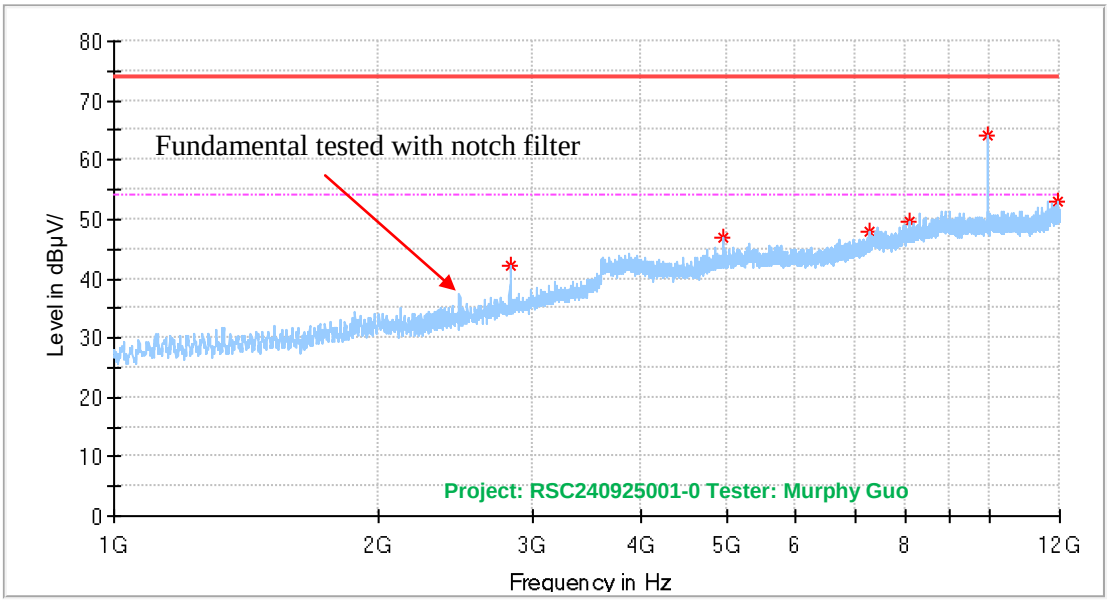



| Frequency (MHz) | MaxPeak (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Pol | Corr. (dB) |
|---|---|---|---|---|---|
| 4879.700000 | 48.15 | 74.00 | 25.85 | V | -5.1 |
| 5581.500000 | 45.70 | 74.00 | 28.30 | V | -4.2 |
| 7683.600000 | 49.39 | 74.00 | 24.61 | V | -1.3 |
| 8530.600000 | 50.97 | 74.00 | 23.03 | V | 0.9 |
| 9759.300000 | 61.76 | 69.97 | 8.21 | V | 1.6 |
| 11971.400000 | 52.87 | 74.00 | 21.13 | V | 4.4 |

**Fundamental Strength**

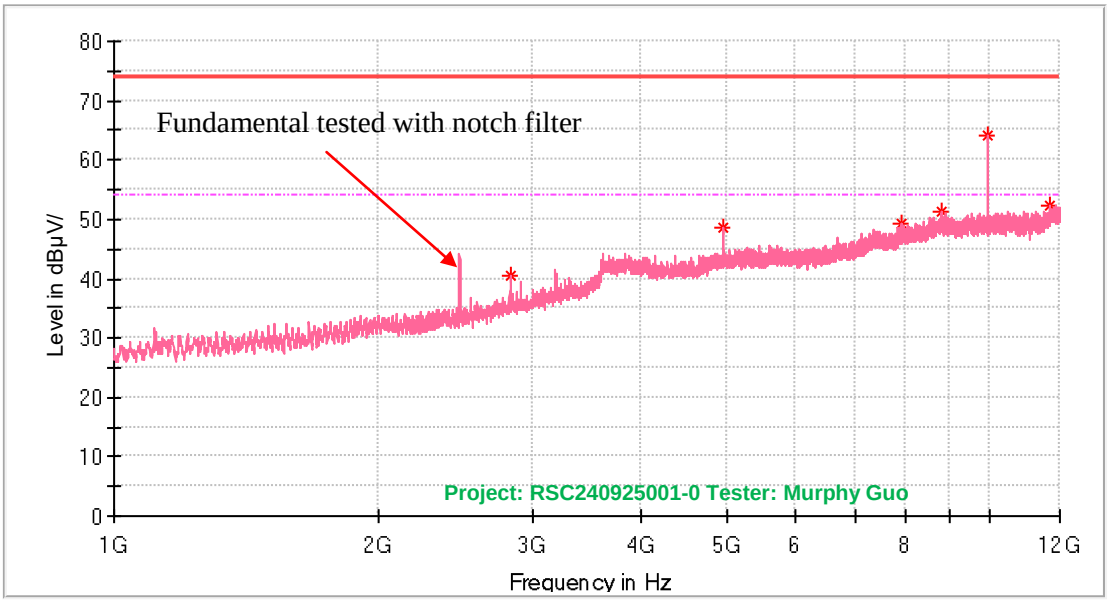
| Frequency (MHz) | MaxPeak (dBµ V/m) | Average (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Pol | Corr. (dB) |
|---|---|---|---|---|---|---|
| 2440.000000 | 90.96 | 89.97 | - | - | V | -0.3 |

**High Channel_Horizontal**




| Frequency (MHz) | MaxPeak (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Pol | Corr. (dB) |
|---|---|---|---|---|---|
| 2835.900000 | 42.13 | 74.00 | 31.87 | H | -11.1 |
| 4960.000000 | 47.07 | 74.00 | 26.93 | H | -4.7 |
| 7278.800000 | 47.79 | 74.00 | 26.21 | H | -1.8 |
| 8088.400000 | 49.54 | 74.00 | 24.46 | H | 0.1 |
| 9919.900000 | 66.32 | 71.22 | 4.90 | H | 1.3 |
| 11949.400000 | 52.98 | 74.00 | 21.02 | H | 4.6 |

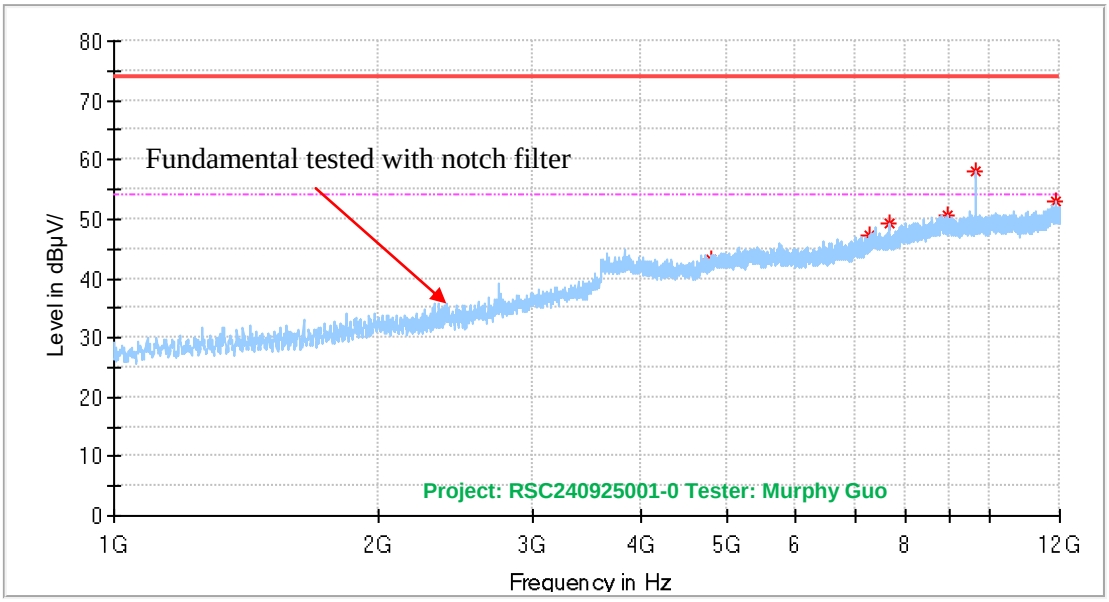
**High Channel_Vertical**




| Frequency (MHz) | MaxPeak (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Pol | Corr. (dB) |
|---|---|---|---|---|---|
| 2835.900000 | 40.61 | 74.00 | 33.39 | V | -11.1 |
| 4960.000000 | 48.52 | 74.00 | 25.48 | V | -4.7 |
| 7906.900000 | 49.36 | 74.00 | 24.64 | V | 0.0 |
| 8777.000000 | 51.37 | 74.00 | 22.63 | V | 1.6 |
| 9919.900000 | 64.19 | 69.70 | 5.51 | V | 1.3 |
| 11660.100000 | 52.40 | 74.00 | 21.60 | V | 3.0 |

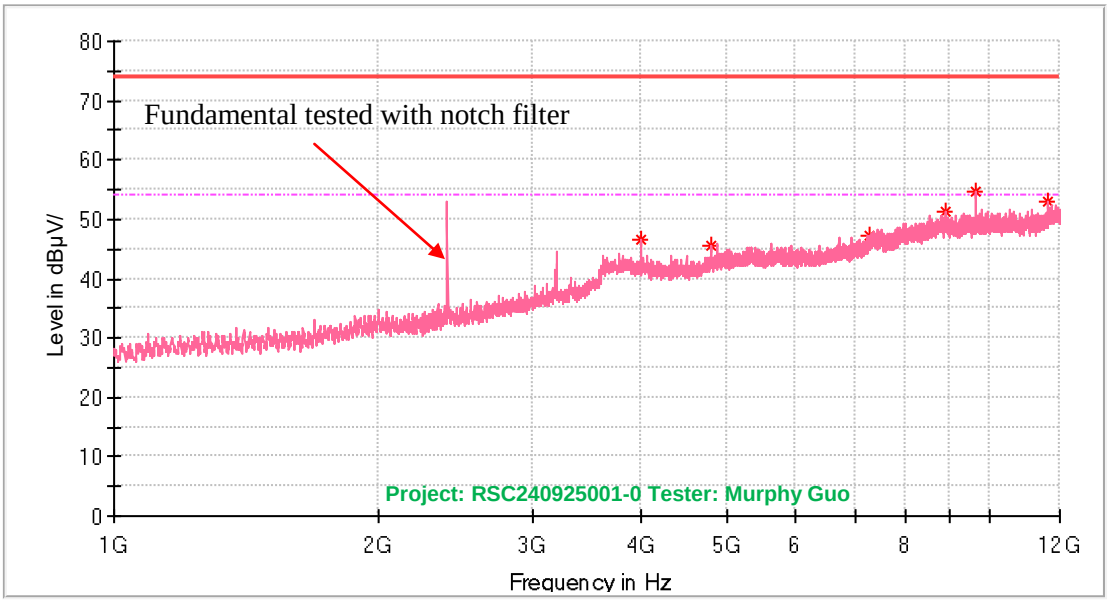
## 1Mbps mode

**Low Channel_Horizontal**



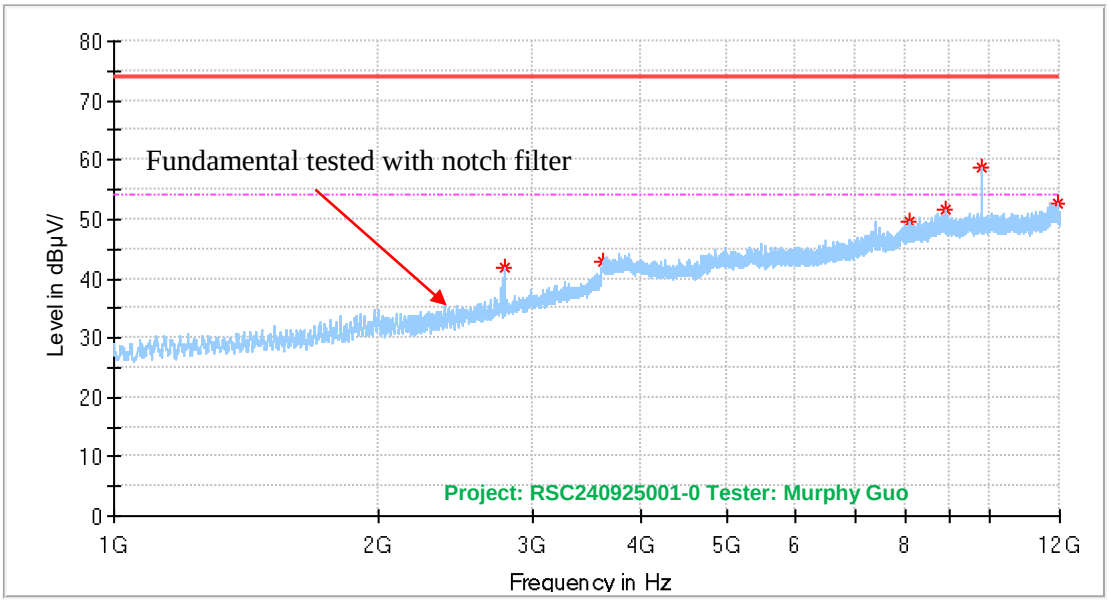

| Frequency (MHz) | MaxPeak (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Pol | Corr. (dB) |
|---|---|---|---|---|---|
| 4804.900000 | 43.35 | 74.00 | 30.65 | H | -5.1 |
| 7277.700000 | 47.13 | 74.00 | 26.87 | H | -1.8 |
| 7650.600000 | 49.44 | 74.00 | 24.56 | H | -1.3 |
| 8927.700000 | 50.71 | 74.00 | 23.29 | H | 1.2 |
| 9607.500000 | 57.91 | 73.55 | 15.64 | H | 1.4 |
| 11848.200000 | 52.97 | 74.00 | 21.03 | H | 4.3 |

**Low Channel_Vertical**




| Frequency (MHz) | MaxPeak (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Pol | Corr. (dB) |
|---|---|---|---|---|---|
| 3984.300000 | 46.45 | 74.00 | 27.55 | V | -6.2 |
| 4804.900000 | 45.60 | 74.00 | 28.40 | V | -5.1 |
| 7294.200000 | 47.29 | 74.00 | 26.71 | V | -1.7 |
| 8896.900000 | 51.47 | 74.00 | 22.53 | V | 1.6 |
| 9607.500000 | 54.60 | 69.16 | 14.56 | V | 1.4 |
| 11621.600000 | 52.96 | 74.00 | 21.04 | V | 2.7 |

**Middle Channel_Horizontal**

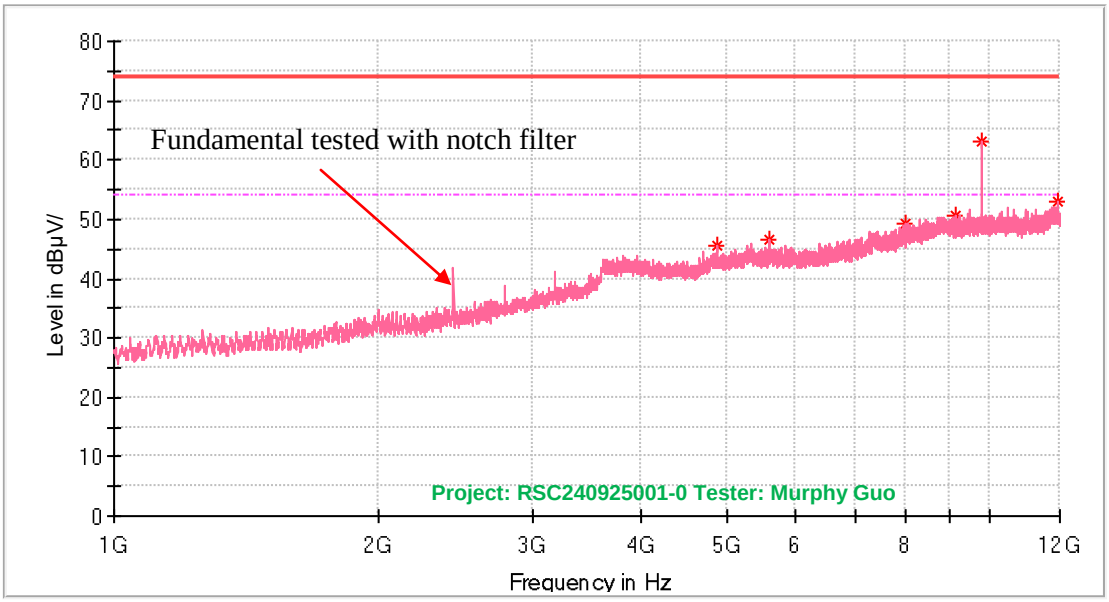



| Frequency (MHz) | MaxPeak (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Pol | Corr. (dB) |
|---|---|---|---|---|---|
| 2790.800000 | 41.92 | 74.00 | 32.08 | H | -11.4 |
| 3608.100000 | 42.98 | 74.00 | 31.02 | H | -6.2 |
| 8102.700000 | 49.66 | 74.00 | 24.34 | H | 0.1 |
| 8912.300000 | 51.57 | 74.00 | 22.43 | H | 1.4 |
| 9759.300000 | 58.81 | 69.66 | 10.85 | H | 1.6 |
| 11936.200000 | 52.81 | 74.00 | 21.19 | H | 4.4 |

**Fundamental Strength**

| Frequency (MHz) | MaxPeak (dBµ V/m) | Average (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Pol | Corr. (dB) |
|---|---|---|---|---|---|---|
| 2440.000000 | 90.21 | 89.66 | - | - | H | -0.3 |

**Middle Channel_Vertical**

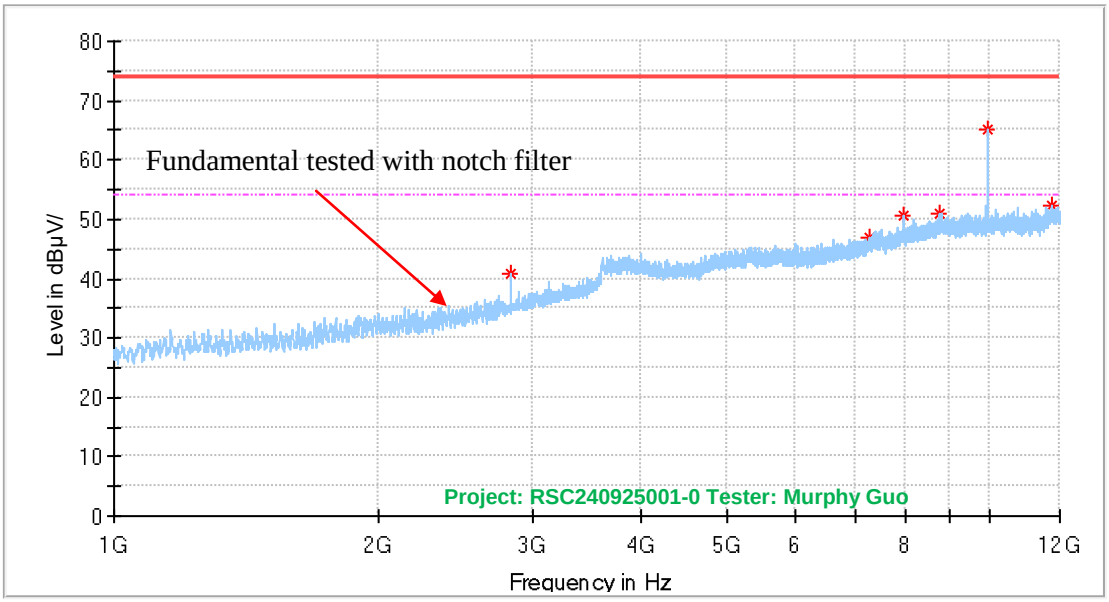



| Frequency (MHz) | MaxPeak (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Pol | Corr. (dB) |
|---|---|---|---|---|---|
| 4879.700000 | 45.59 | 74.00 | 28.41 | V | -5.1 |
| 5581.500000 | 46.74 | 74.00 | 27.26 | V | -4.2 |
| 7987.200000 | 49.21 | 74.00 | 24.79 | V | 0.1 |
| 9118.000000 | 50.79 | 74.00 | 23.21 | V | 1.0 |
| 9760.400000 | 63.17 | 69.93 | 6.76 | V | 1.6 |
| 11907.600000 | 52.95 | 74.00 | 21.05 | V | 4.2 |

**Fundamental Strength**

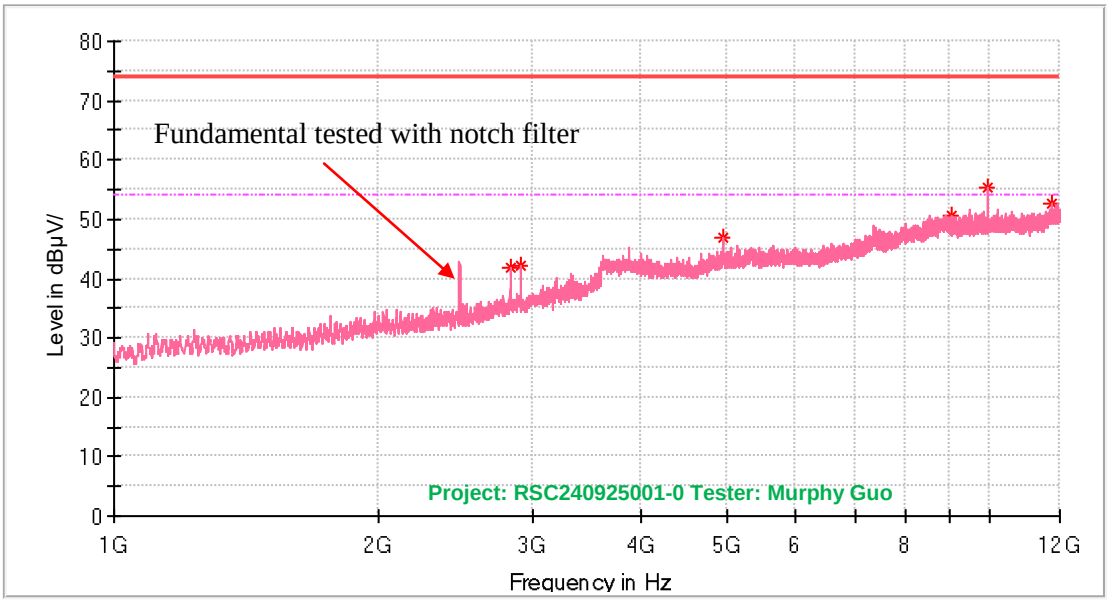
| Frequency (MHz) | MaxPeak (dBµ V/m) | Average (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Pol | Corr. (dB) |
|---|---|---|---|---|---|---|
| 2440.000000 | 90.46 | 89.93 | - | - | V | -0.3 |

**High Channel_Horizontal**




| Frequency (MHz) | MaxPeak (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Pol | Corr. (dB) |
|---|---|---|---|---|---|
| 2835.900000 | 40.86 | 74.00 | 33.14 | H | -11.1 |
| 7276.600000 | 47.02 | 74.00 | 26.98 | H | -1.8 |
| 7945.400000 | 50.56 | 74.00 | 23.44 | H | 0.2 |
| 8727.500000 | 51.06 | 74.00 | 22.94 | H | 1.5 |
| 9919.900000 | 65.06 | 71.12 | 6.06 | H | 1.3 |
| 11754.700000 | 52.21 | 74.00 | 21.79 | H | 3.9 |

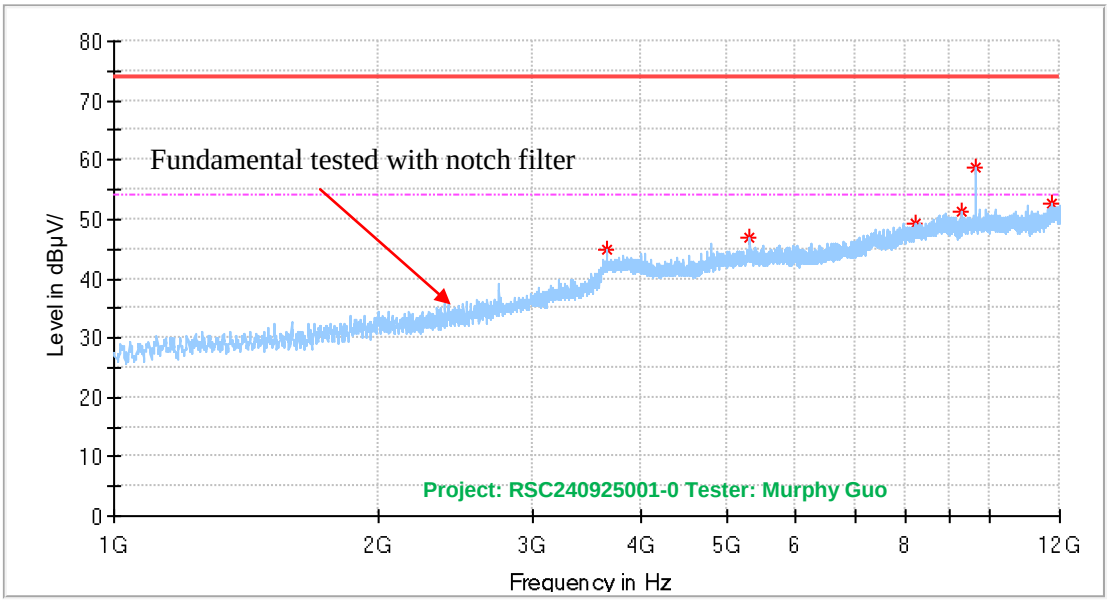
**High Channel_Vertical**




| Frequency (MHz) | MaxPeak (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Pol | Corr. (dB) |
|---|---|---|---|---|---|
| 2835.900000 | 41.81 | 74.00 | 32.19 | V | -11.1 |
| 2915.100000 | 42.20 | 74.00 | 31.80 | V | -10.6 |
| 4960.000000 | 46.97 | 74.00 | 27.03 | V | -4.7 |
| 9006.900000 | 50.80 | 74.00 | 23.20 | V | 0.9 |
| 9919.900000 | 55.31 | 69.76 | 14.45 | V | 1.3 |
| 11725.000000 | 52.79 | 74.00 | 21.21 | V | 3.4 |

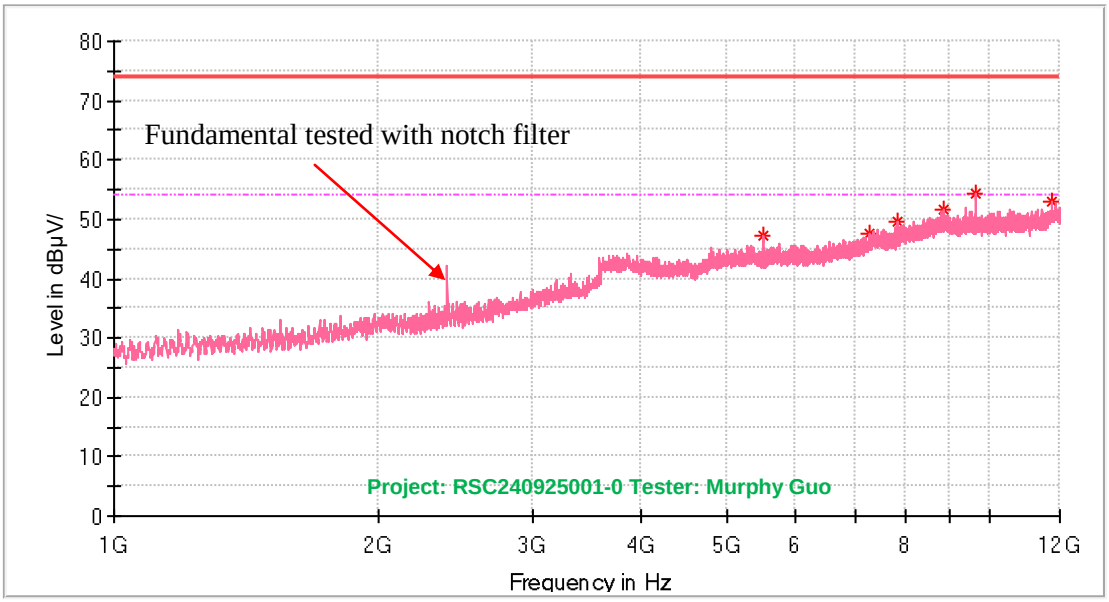
## 2Mbps mode

**Low Channel_Horizontal**



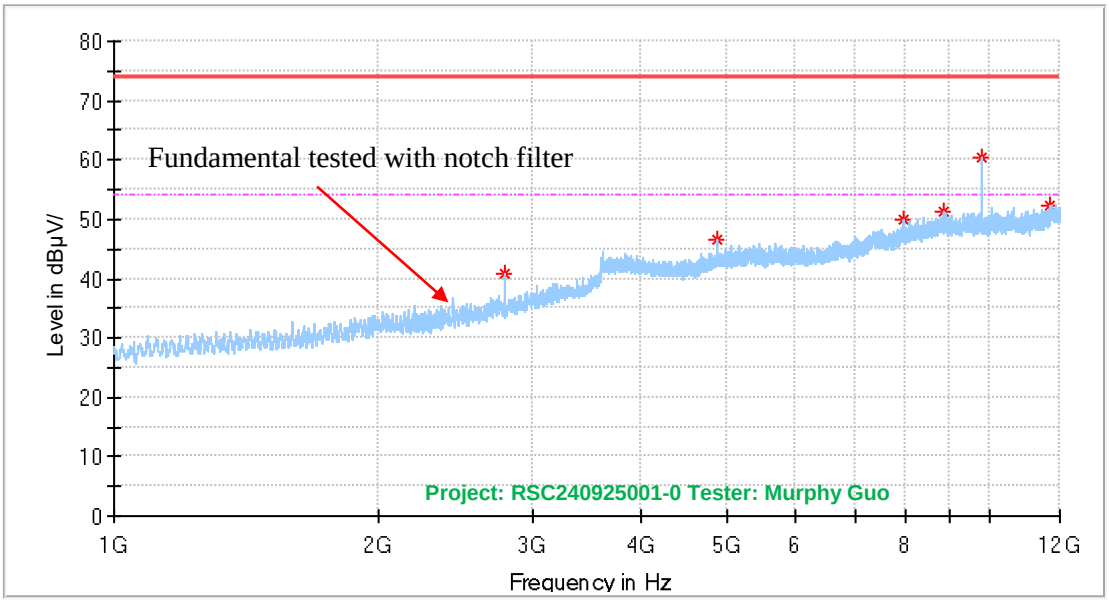

| Frequency (MHz) | MaxPeak (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Pol | Corr. (dB) |
|---|---|---|---|---|---|
| 3649.900000 | 45.04 | 74.00 | 28.96 | H | -6.1 |
| 5319.700000 | 46.77 | 74.00 | 27.23 | H | -4.1 |
| 8197.300000 | 49.38 | 74.00 | 24.62 | H | 0.3 |
| 9276.400000 | 51.36 | 74.00 | 22.64 | H | 1.3 |
| 9608.600000 | 58.62 | 72.86 | 14.24 | H | 1.4 |
| 11749.200000 | 52.58 | 74.00 | 21.42 | H | 3.9 |

**Low Channel_Vertical**




| Frequency (MHz) | MaxPeak (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Pol | Corr. (dB) |
|---|---|---|---|---|---|
| 5494.600000 | 47.20 | 74.00 | 26.80 | V | -4.4 |
| 7276.600000 | 47.50 | 74.00 | 26.50 | V | -1.8 |
| 7850.800000 | 49.73 | 74.00 | 24.27 | V | -0.6 |
| 8861.700000 | 51.52 | 74.00 | 22.48 | V | 1.5 |
| 9608.600000 | 54.36 | 68.19 | 13.83 | V | 1.4 |
| 11756.900000 | 52.94 | 74.00 | 21.06 | V | 3.9 |

**Middle Channel_Horizontal**

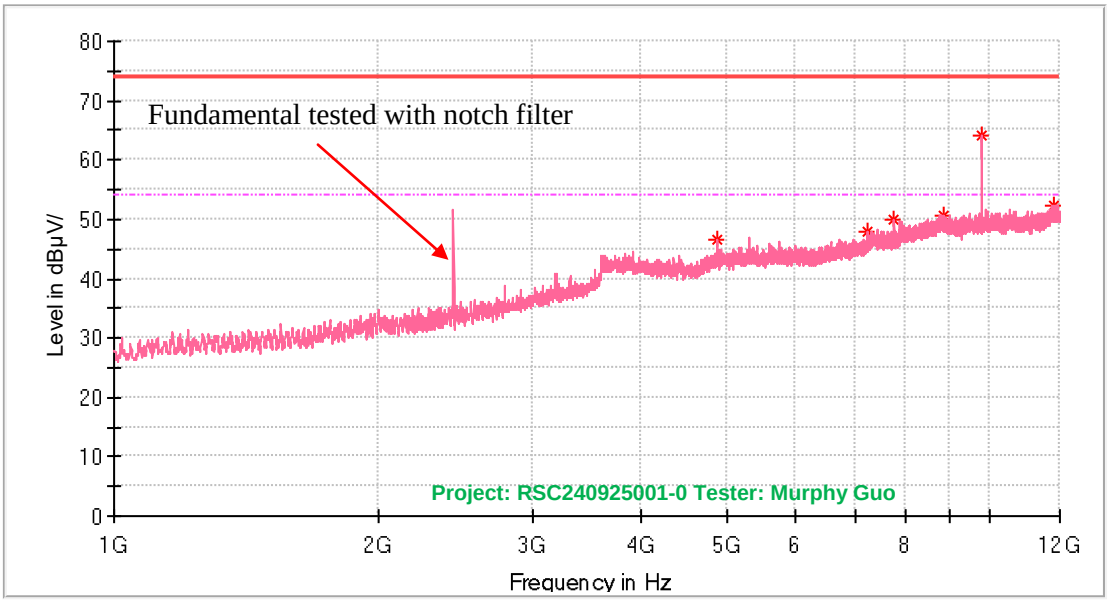



| Frequency (MHz) | MaxPeak (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Pol | Corr. (dB) |
|---|---|---|---|---|---|
| 2790.800000 | 40.91 | 74.00 | 33.09 | H | -11.4 |
| 4879.700000 | 46.64 | 74.00 | 27.36 | H | -5.1 |
| 7946.500000 | 50.00 | 74.00 | 24.00 | H | 0.2 |
| 8846.300000 | 51.27 | 74.00 | 22.73 | H | 1.5 |
| 9760.400000 | 60.55 | 69.38 | 8.83 | H | 1.6 |
| 11681.000000 | 52.34 | 74.00 | 21.66 | H | 3.0 |

**Fundamental Strength**

| Frequency (MHz) | MaxPeak (dBµ V/m) | Average (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Pol | Corr. (dB) |
|---|---|---|---|---|---|---|
| 2440.000000 | 90.33 | 89.38 | - | - | H | -0.3 |

**Middle Channel_Vertical**

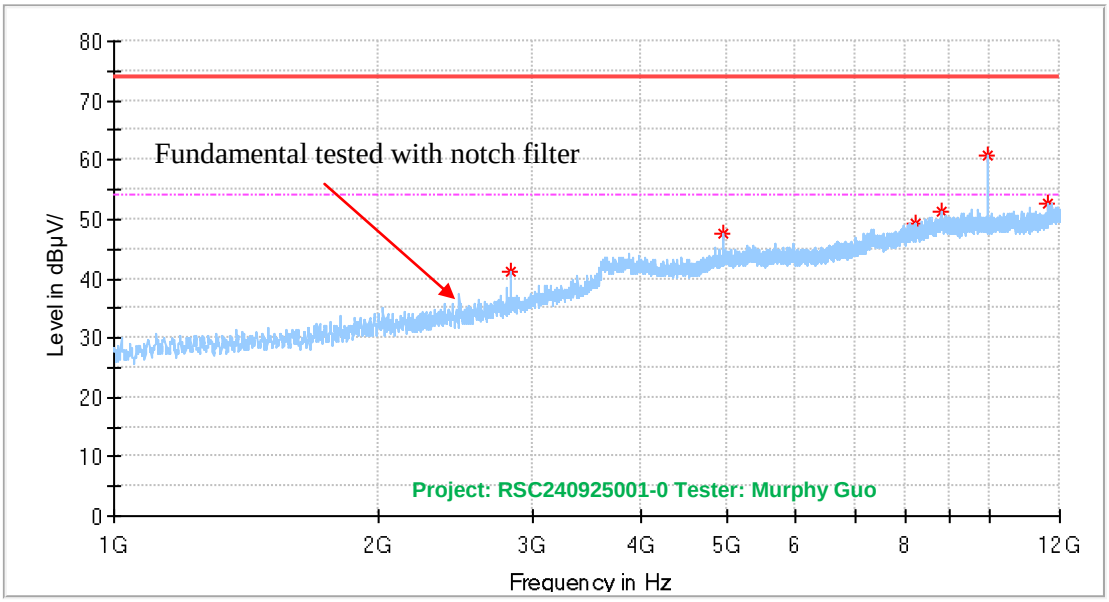



| Frequency (MHz) | MaxPeak (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Pol | Corr. (dB) |
|---|---|---|---|---|---|
| 4879.700000 | 46.59 | 74.00 | 27.41 | V | -5.1 |
| 7252.400000 | 48.07 | 74.00 | 25.93 | V | -2.0 |
| 7771.600000 | 49.85 | 74.00 | 24.15 | V | -1.2 |
| 8825.400000 | 50.70 | 74.00 | 23.30 | V | 1.6 |
| 9760.400000 | 64.15 | 69.61 | 5.46 | V | 1.6 |
| 11819.600000 | 52.46 | 74.00 | 21.54 | V | 3.9 |

**Fundamental Strength**

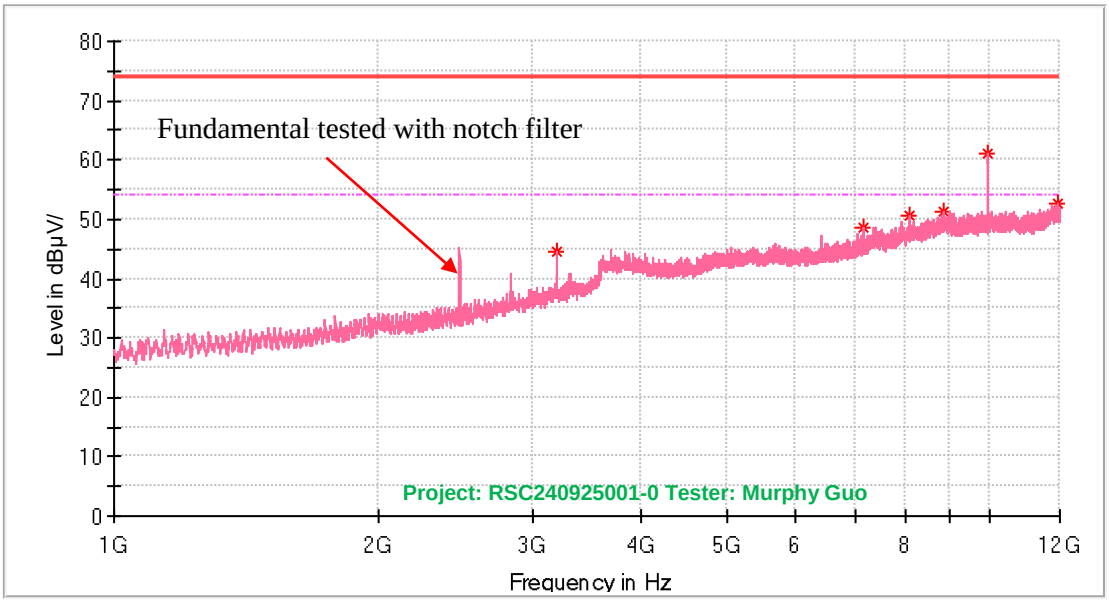
| Frequency (MHz) | MaxPeak (dBµ V/m) | Average (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Pol | Corr. (dB) |
|---|---|---|---|---|---|---|
| 2440.000000 | 90.45 | 89.61 | - | - | V | -0.3 |

**High Channel_Horizontal**




| Frequency (MHz) | MaxPeak (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Pol | Corr. (dB) |
|---|---|---|---|---|---|
| 2835.900000 | 41.33 | 74.00 | 32.67 | H | -11.1 |
| 4958.900000 | 47.73 | 74.00 | 26.27 | H | -4.7 |
| 8208.300000 | 49.27 | 74.00 | 24.73 | H | 0.3 |
| 8795.700000 | 51.38 | 74.00 | 22.62 | H | 1.7 |
| 9921.000000 | 60.69 | 70.41 | 9.72 | H | 1.3 |
| 11656.800000 | 52.81 | 74.00 | 21.19 | H | 3.0 |

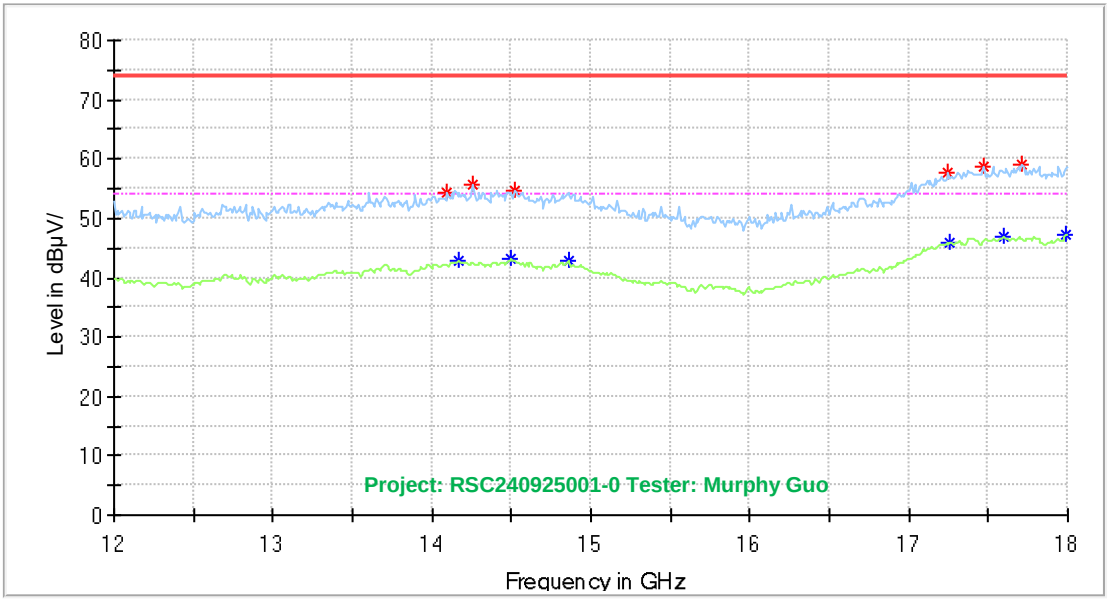
**High Channel_Vertical**




| Frequency (MHz) | MaxPeak (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Pol | Corr. (dB) |
|---|---|---|---|---|---|
| 3198.900000 | 44.43 | 74.00 | 29.57 | V | -9.0 |
| 7178.700000 | 48.52 | 74.00 | 25.48 | V | -2.3 |
| 8081.800000 | 50.77 | 74.00 | 23.23 | V | 0.1 |
| 8837.500000 | 51.17 | 74.00 | 22.83 | V | 1.6 |
| 9922.100000 | 61.00 | 68.94 | 7.94 | V | 1.3 |
| 11960.400000 | 52.69 | 74.00 | 21.31 | V | 4.5 |

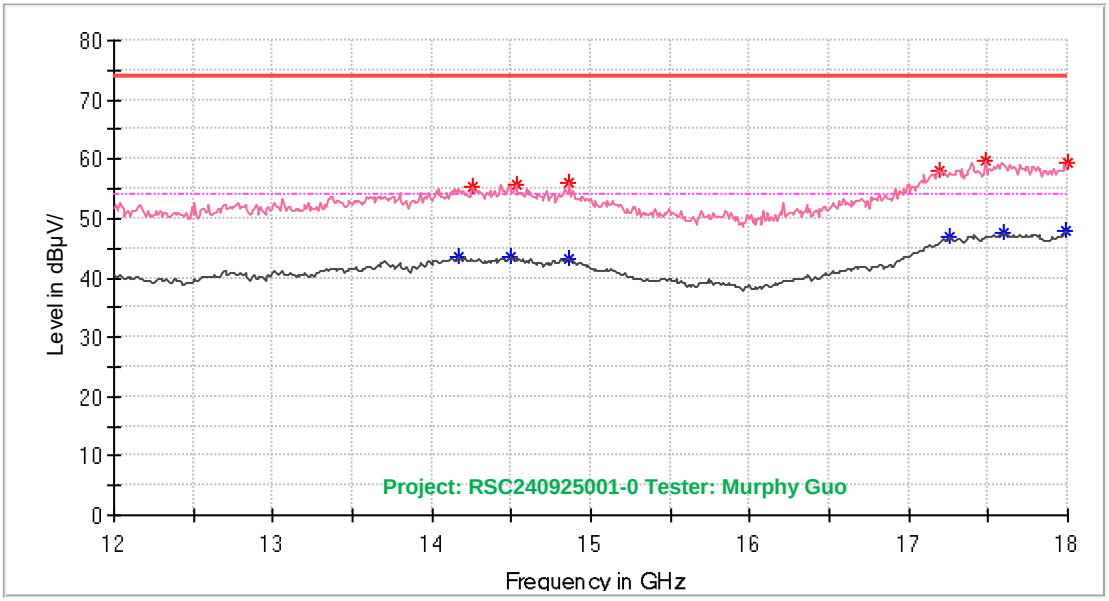
## 5) 12GHz-18GHz_2Mbps_Low Channel_worst case

**Horizontal**




| Frequency (MHz) | MaxPeak (dBµ V/m) | Average (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Pol | Corr. (dB) |
|---|---|---|---|---|---|---|
| 14096.153846 | 54.29 | --- | 74.00 | 19.71 | H | 7.3 |
| 14173.076923 | --- | 42.89 | 54.00 | 11.11 | H | 7.2 |
| 14259.615385 | 55.72 | --- | 74.00 | 18.28 | H | 7.0 |
| 14500.000000 | --- | 43.13 | 54.00 | 10.87 | H | 7.6 |
| 14519.230769 | 54.75 | --- | 74.00 | 19.25 | H | 7.5 |
| 14855.769231 | --- | 42.91 | 54.00 | 11.09 | H | 7.1 |
| 17250.000000 | 57.73 | --- | 74.00 | 16.27 | H | 10.3 |
| 17259.615385 | --- | 45.97 | 54.00 | 8.03 | H | 10.3 |
| 17471.153846 | 58.75 | --- | 74.00 | 15.25 | H | 10.1 |
| 17596.153846 | --- | 46.86 | 54.00 | 7.14 | H | 10.8 |
| 17711.538462 | 58.96 | --- | 74.00 | 15.04 | H | 10.5 |
| 17990.384615 | --- | 47.27 | 54.00 | 6.73 | H | 11.0 |

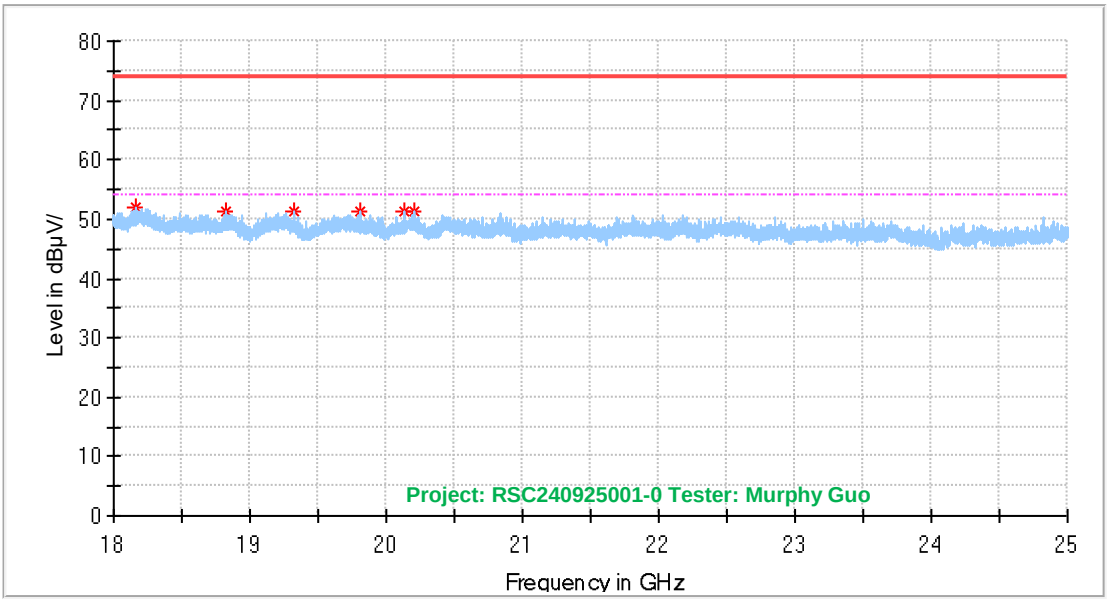
**Vertical**




| Frequency (MHz) | MaxPeak (dBµ V/m) | Average (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Pol | Corr. (dB) |
|---|---|---|---|---|---|---|
| 14173.076923 | --- | 43.50 | 54.00 | 10.50 | V | 7.2 |
| 14259.615385 | 55.23 | --- | 74.00 | 18.77 | V | 7.0 |
| 14500.000000 | --- | 43.56 | 54.00 | 10.44 | V | 7.6 |
| 14528.846154 | 55.68 | --- | 74.00 | 18.32 | V | 7.5 |
| 14855.769231 | --- | 43.14 | 54.00 | 10.86 | V | 7.1 |
| 14865.384615 | 56.08 | --- | 74.00 | 17.92 | V | 7.0 |
| 17192.307692 | 58.05 | --- | 74.00 | 15.95 | V | 9.9 |
| 17259.615385 | --- | 46.79 | 54.00 | 7.21 | V | 10.3 |
| 17480.769231 | 59.67 | --- | 74.00 | 14.33 | V | 10.1 |
| 17596.153846 | --- | 47.45 | 54.00 | 6.55 | V | 10.8 |
| 17990.384615 | --- | 47.82 | 54.00 | 6.18 | V | 11.0 |
| 18000.000000 | 59.44 | --- | 74.00 | 14.56 | V | 11.2 |

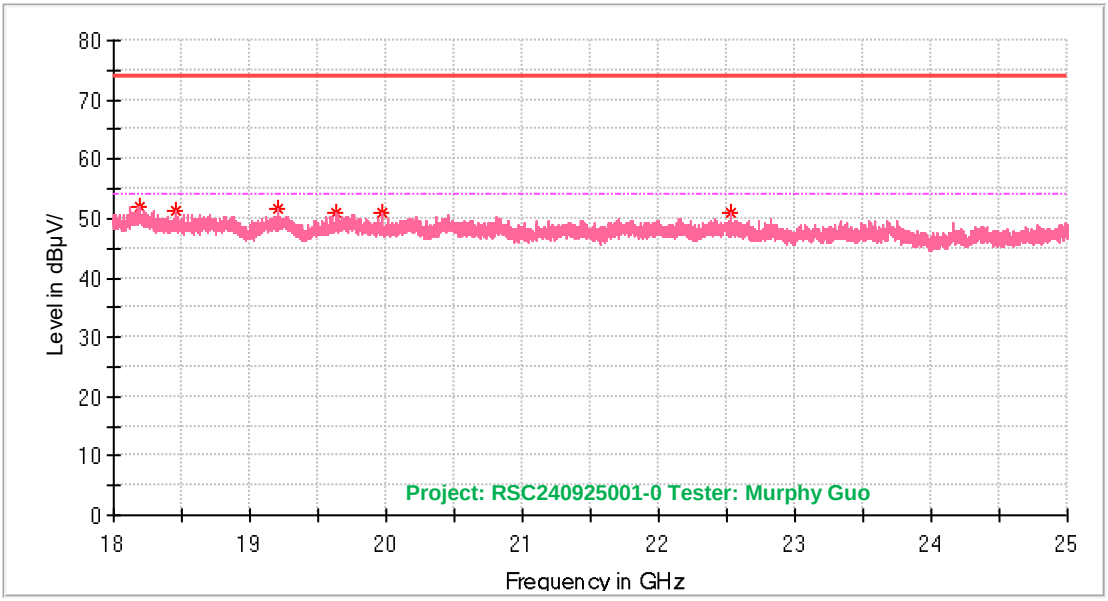
## 6) 18GHz-25GHz_2Mbps_Low Channel_worst case

**Horizontal**




| Frequency (MHz) | MaxPeak (dBµ V/m) | CAverage (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Pol | Corr. (dB) |
|---|---|---|---|---|---|---|
| 18168.700000 | 52.09 | --- | 74.00 | 21.91 | H | 6.7 |
| 18168.700000 | --- | 42.67 | 54.00 | 11.33 | H | 6.7 |
| 18820.400000 | 51.32 | --- | 74.00 | 22.68 | H | 6.2 |
| 18820.400000 | --- | 41.81 | 54.00 | 12.19 | H | 6.2 |
| 19325.800000 | 51.20 | --- | 74.00 | 22.80 | H | 6.6 |
| 19325.800000 | --- | 42.01 | 54.00 | 11.99 | H | 6.6 |
| 19811.600000 | 51.46 | --- | 74.00 | 22.54 | H | 7.1 |
| 19811.600000 | --- | 41.72 | 54.00 | 12.28 | H | 7.1 |
| 20127.300000 | 51.18 | --- | 74.00 | 22.82 | H | 6.8 |
| 20127.300000 | --- | 42.07 | 54.00 | 11.93 | H | 6.8 |
| 20210.600000 | 51.15 | --- | 74.00 | 22.85 | H | 7.1 |
| 20210.600000 | --- | 41.71 | 54.00 | 12.29 | H | 7.1 |

**Vertical**



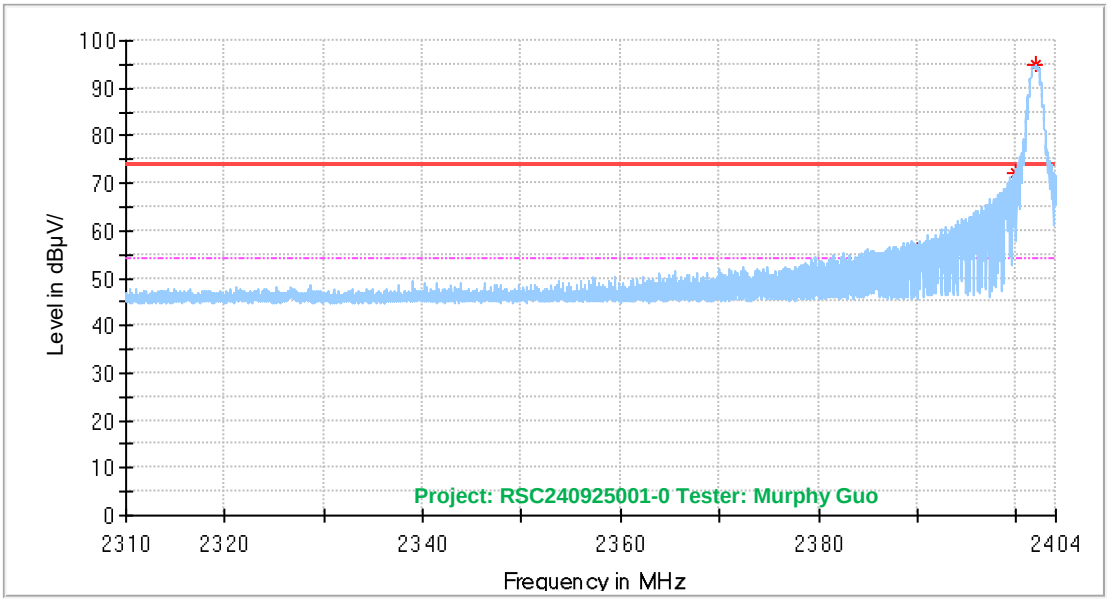

| Frequency (MHz) | MaxPeak (dBµ V/m) | CAverage (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Pol | Corr. (dB) |
|---|---|---|---|---|---|---|
| 18187.600000 | 52.13 | --- | 74.00 | 21.87 | V | 6.7 |
| 18187.600000 | --- | 42.55 | 54.00 | 11.45 | V | 6.7 |
| 18457.100000 | 51.20 | --- | 74.00 | 22.80 | V | 6.5 |
| 18457.100000 | --- | 41.74 | 54.00 | 12.26 | V | 6.5 |
| 19211.700000 | 51.76 | --- | 74.00 | 22.24 | V | 6.2 |
| 19211.700000 | --- | 41.80 | 54.00 | 12.20 | V | 6.2 |
| 19638.700000 | 50.83 | --- | 74.00 | 23.17 | V | 7.0 |
| 19638.700000 | --- | 41.84 | 54.00 | 12.16 | V | 7.0 |
| 19975.400000 | 50.94 | --- | 74.00 | 23.06 | V | 6.7 |
| 19975.400000 | --- | 41.65 | 54.00 | 12.35 | V | 6.7 |
| 22531.100000 | 50.99 | --- | 74.00 | 23.01 | V | 6.6 |
| 22531.100000 | --- | 41.64 | 54.00 | 12.36 | V | 6.6 |

Note:
Corrected Amplitude (MaxPeak or QuasiPeak) = Corrected Factor + Reading
Corrected Factor=Antenna factor (RX) + Cable Loss – Amplifier Factor or Antenna factor (RX) + Cable Loss
Margin = Limit- Corr. Amplitude

**Band Edge:**

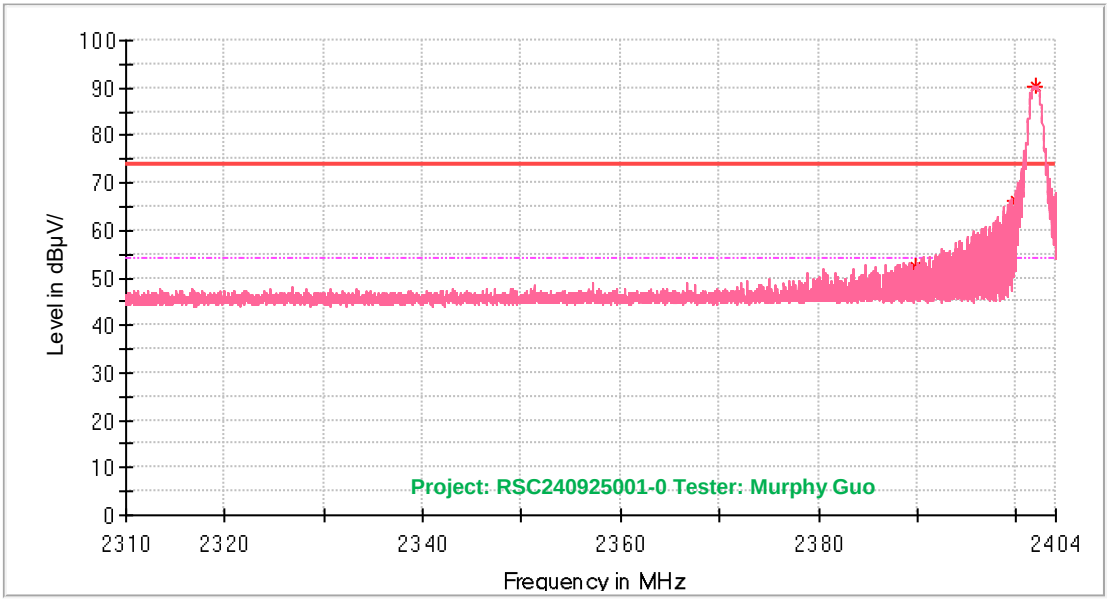
**250kbps mode**

**Peak, Left_ Horizontal**



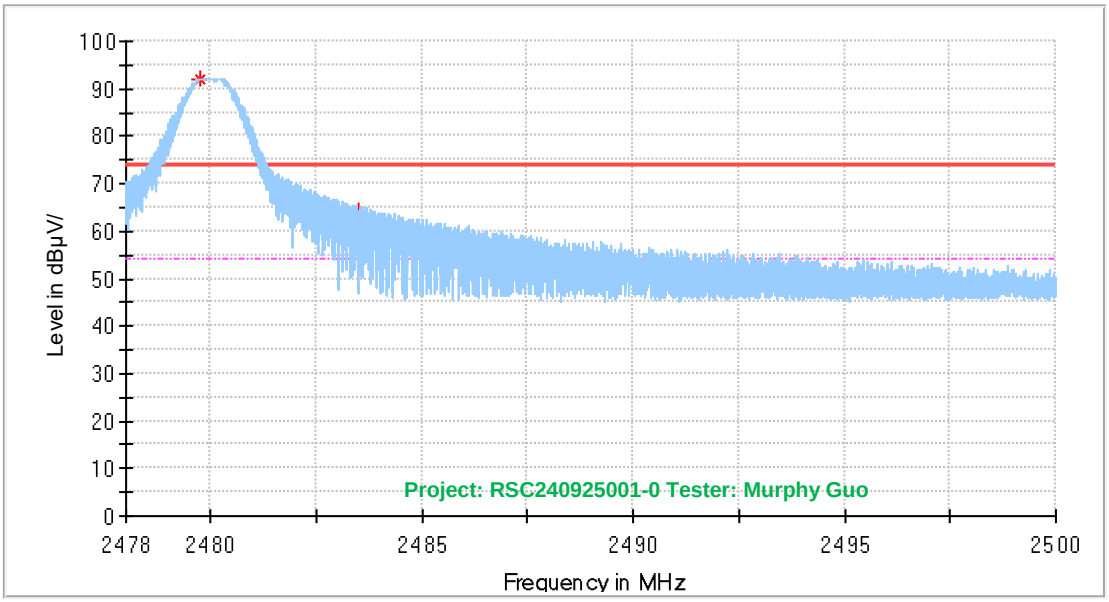

| Frequency (MHz) | MaxPeak (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|
| 2389.975200 | 55.70 | 74.00 | 18.30 | 174.0 | H | 4.0 | -0.3 |
| 2399.976800 | 72.32 | 74.75 | 2.43 | 174.0 | H | 160.0 | -0.2 |
| 2402.007200 | 94.75 | --- | --- | 173.0 | H | 166.0 | -0.2 |

**Peak, Left_Vertical**



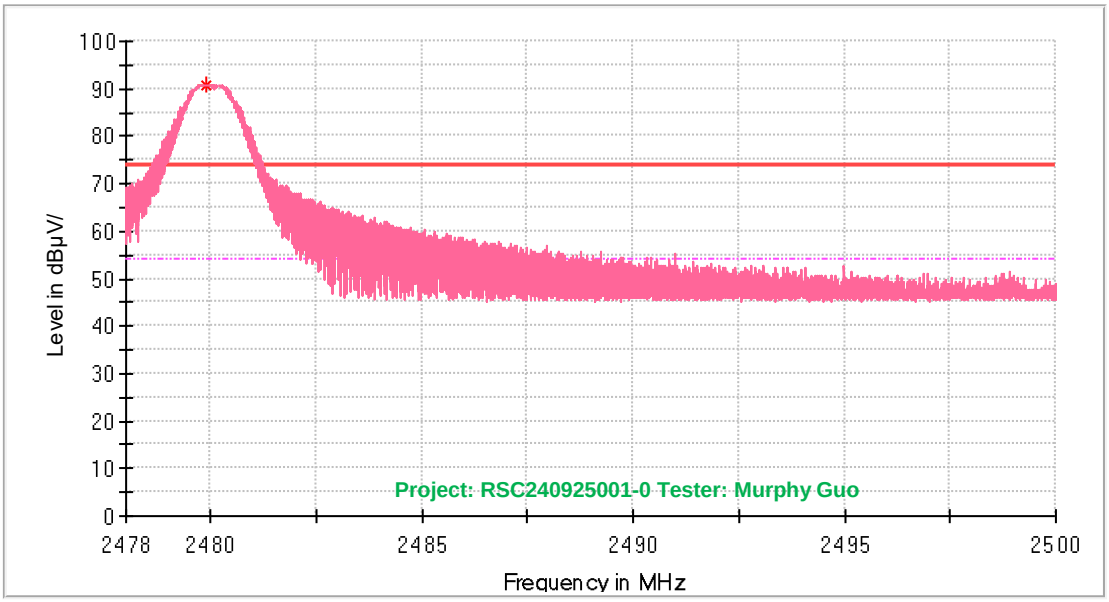

| Frequency (MHz) | MaxPeak (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|
| 2389.843600 | 52.45 | 74.00 | 21.55 | 240.0 | V | 218.0 | -0.3 |
| 2400.014400 | 66.04 | 70.18 | 4.14 | 241.0 | V | 228.0 | -0.2 |
| 2402.026000 | 90.18 | --- | --- | 240.0 | V | 242.0 | -0.2 |

**Peak, Right_Horizontal**



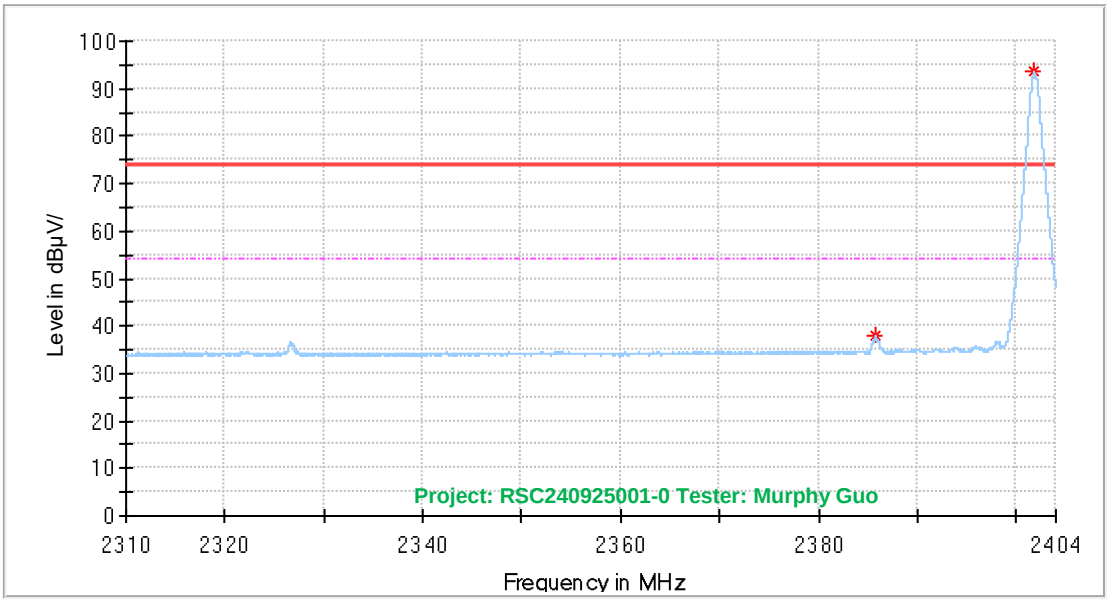

| Frequency (MHz) | MaxPeak (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|
| 2479.775400 | 92.18 | --- | --- | 199.0 | H | 175.0 | -0.3 |
| 2483.519800 | 64.06 | 74.00 | 9.94 | 200.0 | H | 167.0 | -0.3 |

**Peak, Right_Vertical**



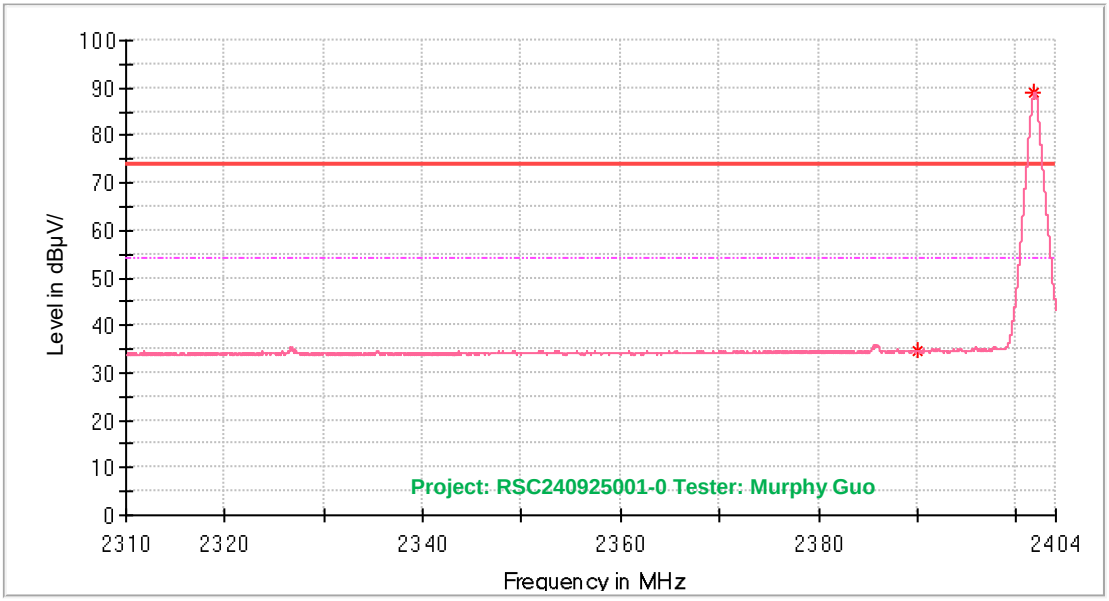

| Frequency (MHz) | MaxPeak (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|
| 2479.878800 | 90.79 | --- | --- | 166.0 | V | 244.0 | -0.3 |
| 2483.506600 | 61.17 | 74.00 | 12.83 | 167.0 | V | 228.0 | -0.3 |

**Average, Left_ Horizontal**



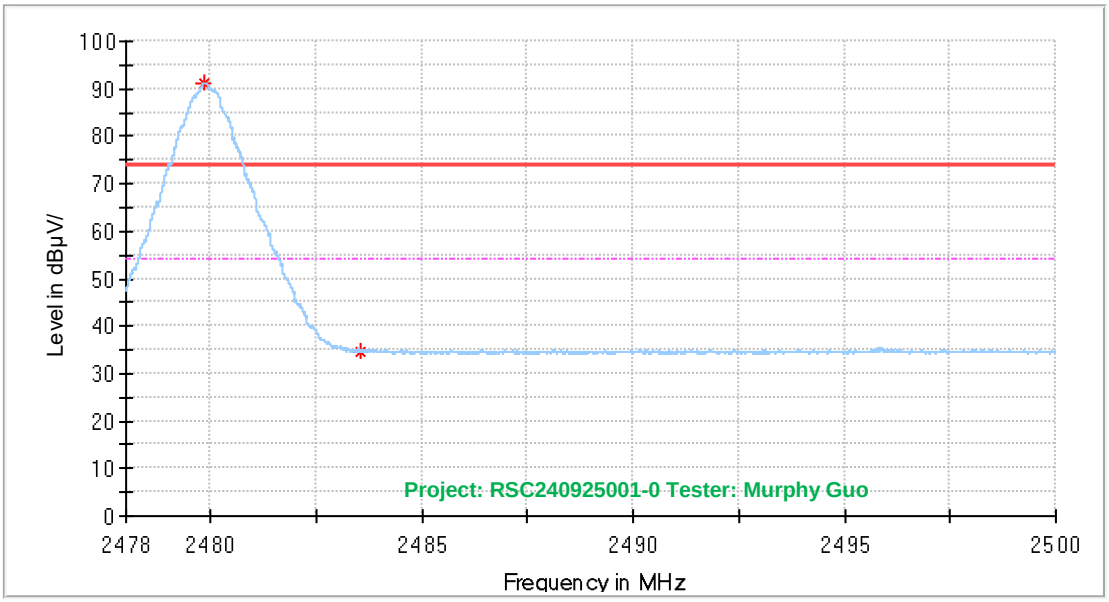

| Frequency (MHz) | Average (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|
| 2385.820400 | 37.88 | 54.00 | 16.12 | 173.0 | H | 162.0 | -0.3 |
| 2401.866200 | 93.54 | --- | --- | 173.0 | H | 166.0 | -0.2 |

**Average, Left_Vertical**



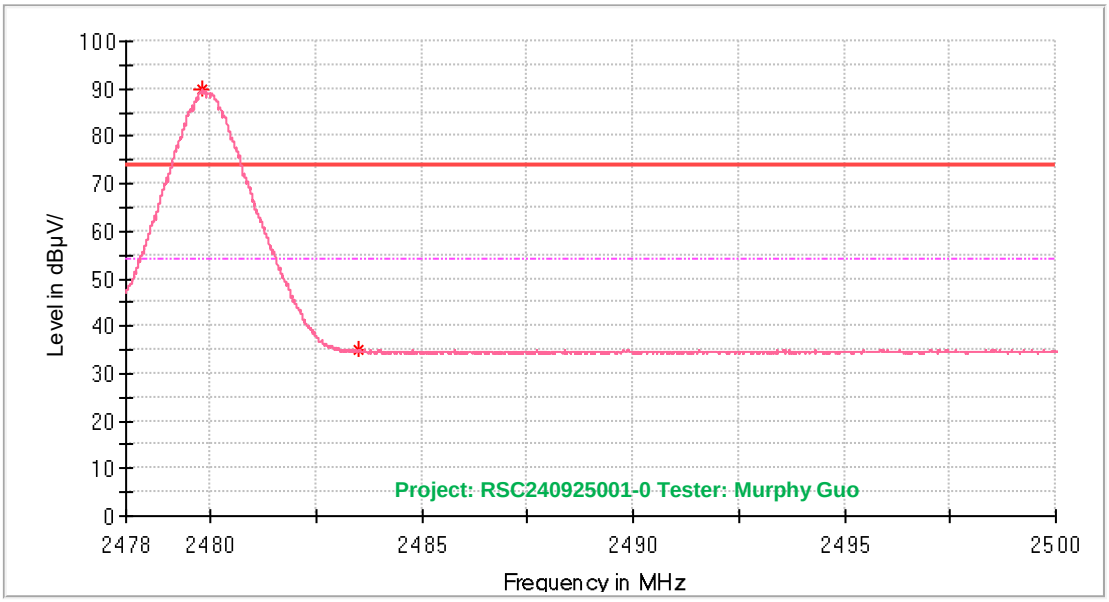

| Frequency (MHz) | Average (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|
| 2389.994000 | 34.59 | 54.00 | 19.41 | 240.0 | V | 146.0 | -0.3 |
| 2401.838000 | 89.00 | --- | --- | 240.0 | V | 242.0 | -0.2 |

**Average, Right_Horizontal**




| Frequency (MHz) | Average (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|
| 2479.856800 | 91.22 | --- | --- | 199.0 | H | 175.0 | -0.3 |
| 2483.550600 | 34.69 | 54.00 | 19.31 | 199.0 | H | 172.0 | -0.3 |

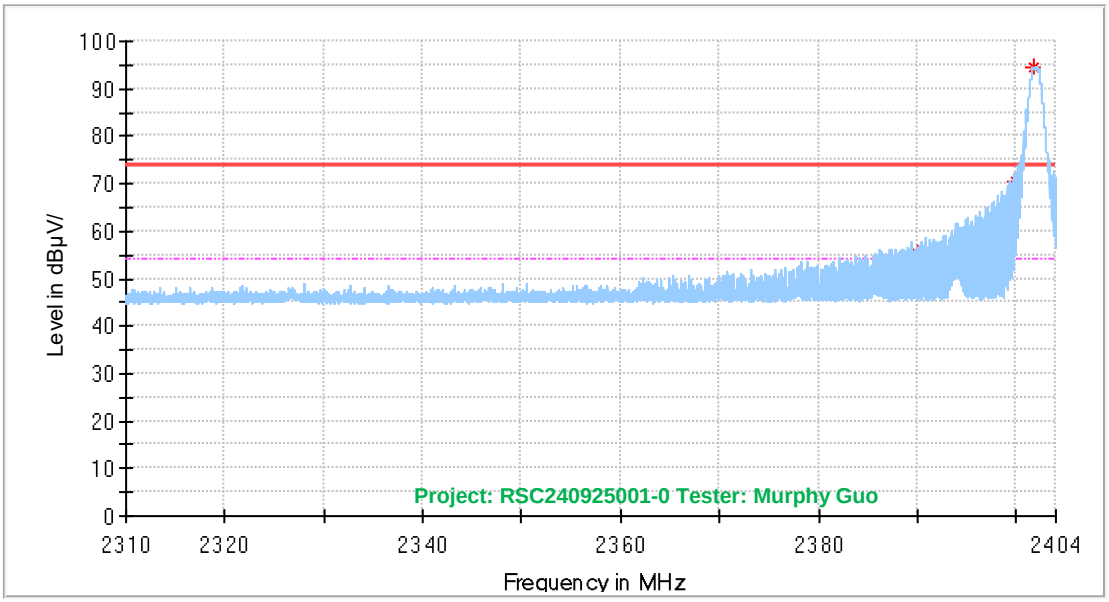
**Average, Right_Vertical**




| Frequency (MHz) | Average (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|
| 2479.790800 | 89.70 | --- | --- | 166.0 | V | 241.0 | -0.3 |
| 2483.522000 | 35.05 | 54.00 | 18.95 | 166.0 | V | 209.0 | -0.3 |

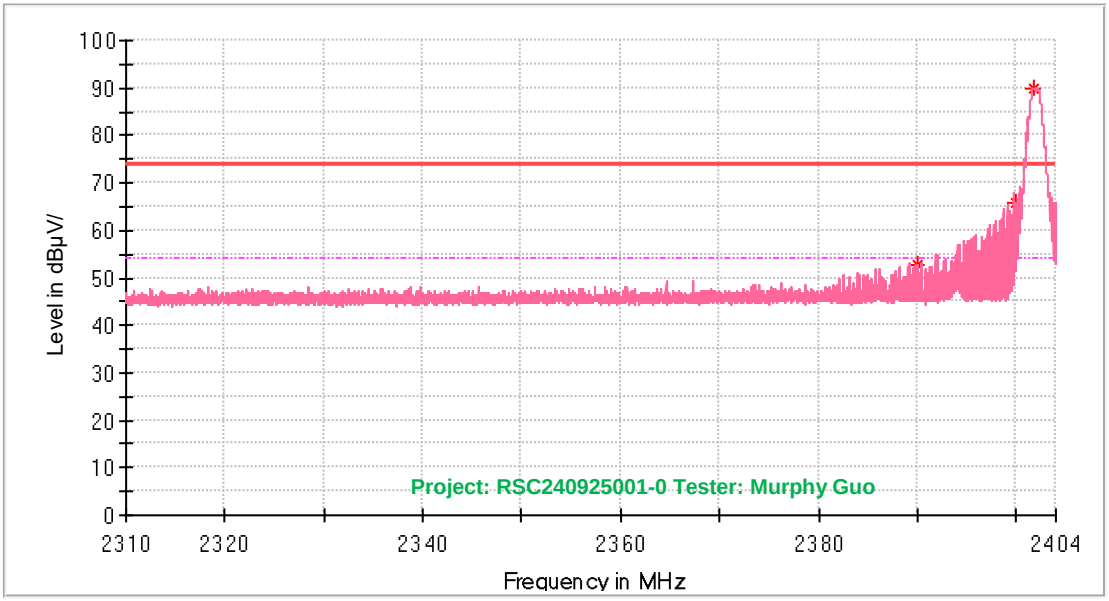
## 1Mbps mode

**Peak, Left_ Horizontal**



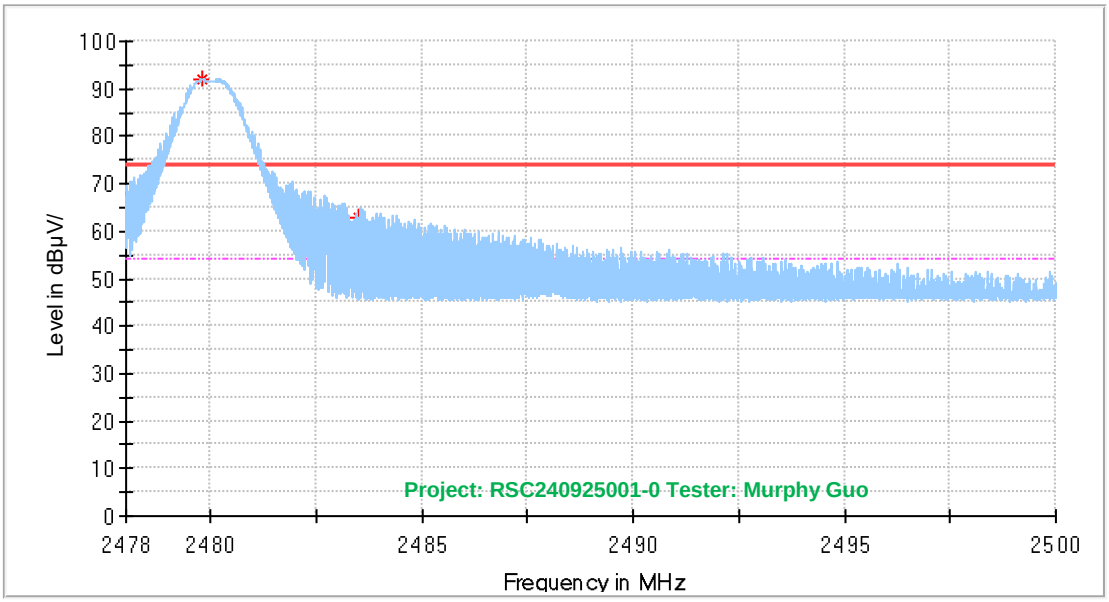

| Frequency (MHz) | MaxPeak (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|
| 2389.975200 | 55.30 | 74.00 | 18.70 | 173.0 | H | 252.0 | -0.3 |
| 2399.986200 | 70.32 | 74.56 | 4.24 | 174.0 | H | 174.0 | -0.2 |
| 2401.734600 | 94.56 | --- | --- | 173.0 | H | 167.0 | -0.2 |

**Peak, Left_Vertical**



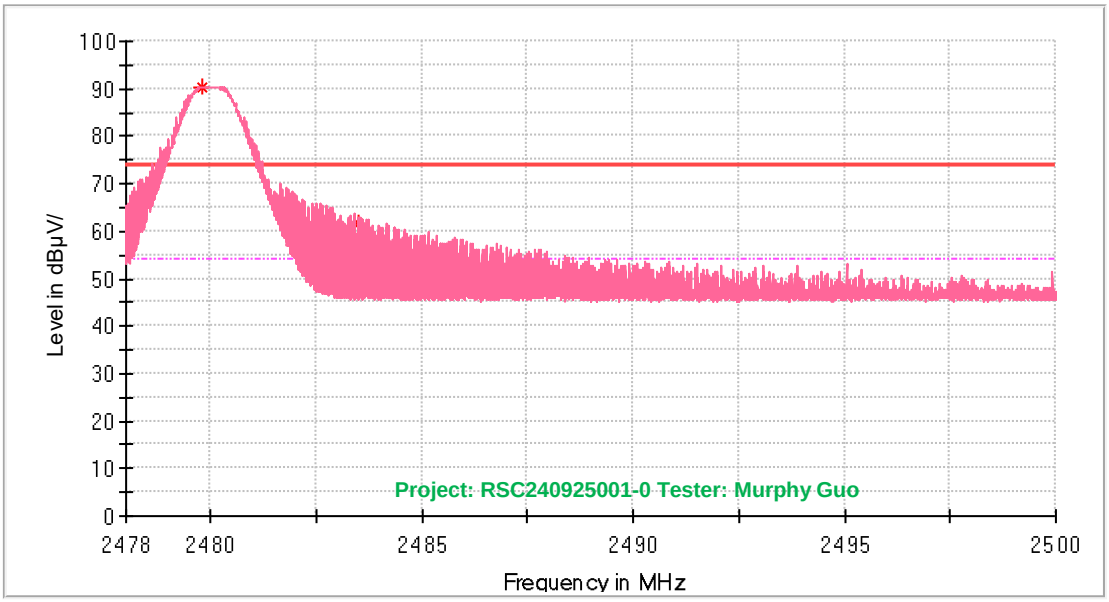

| Frequency (MHz) | MaxPeak (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|
| 2389.994000 | 52.55 | 74.00 | 21.45 | 240.0 | V | 221.0 | -0.3 |
| 2399.986200 | 65.85 | 69.92 | 4.07 | 240.0 | V | 281.0 | -0.2 |
| 2401.706400 | 89.92 | --- | --- | 241.0 | V | 242.0 | -0.2 |

**Peak, Right_Horizontal**



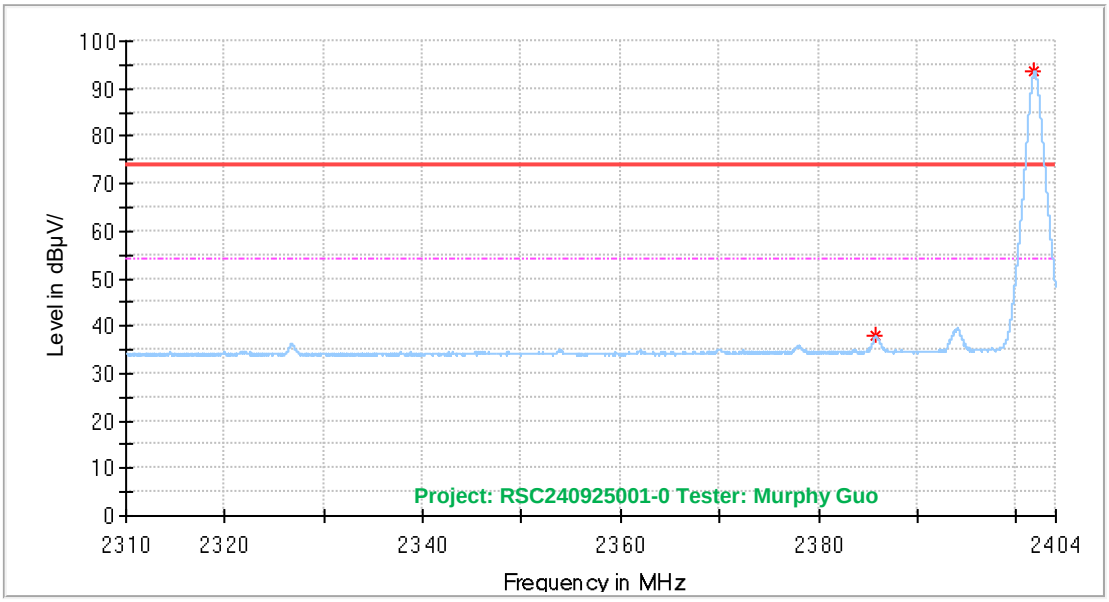

| Frequency (MHz) | MaxPeak (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|
| 2479.790800 | 91.90 | --- | --- | 199.0 | H | 176.0 | -0.3 |
| 2483.504400 | 62.91 | 74.00 | 11.09 | 199.0 | H | 352.0 | -0.3 |

**Peak, Right_Vertical**



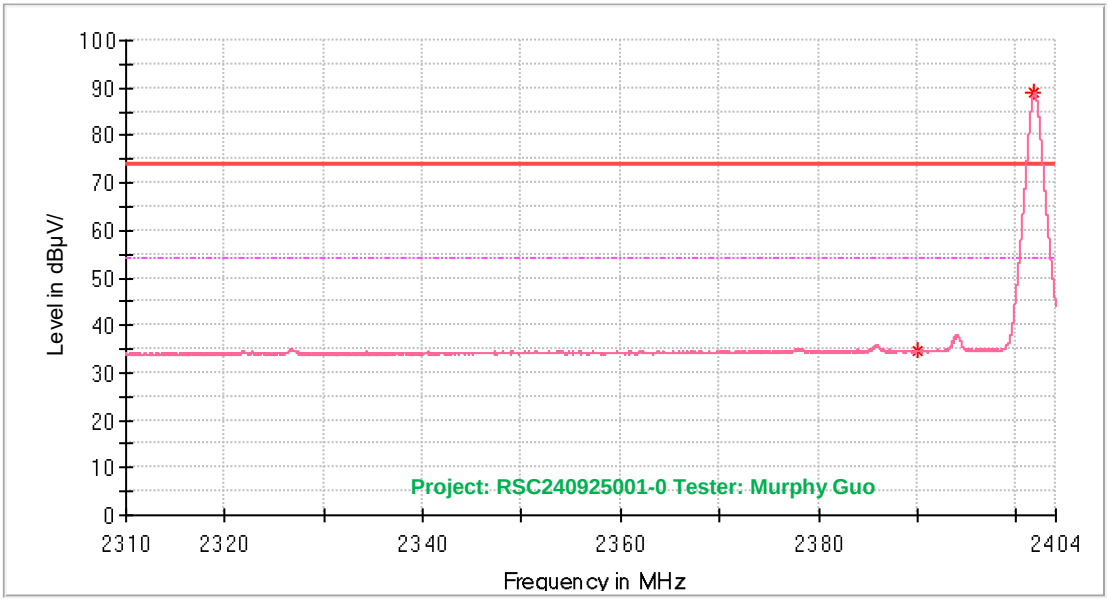

| Frequency (MHz) | MaxPeak (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|
| 2479.797400 | 90.48 | --- | --- | 166.0 | V | 243.0 | -0.3 |
| 2483.511000 | 61.58 | 74.00 | 12.42 | 167.0 | V | 227.0 | -0.3 |

**Average, Left_ Horizontal**



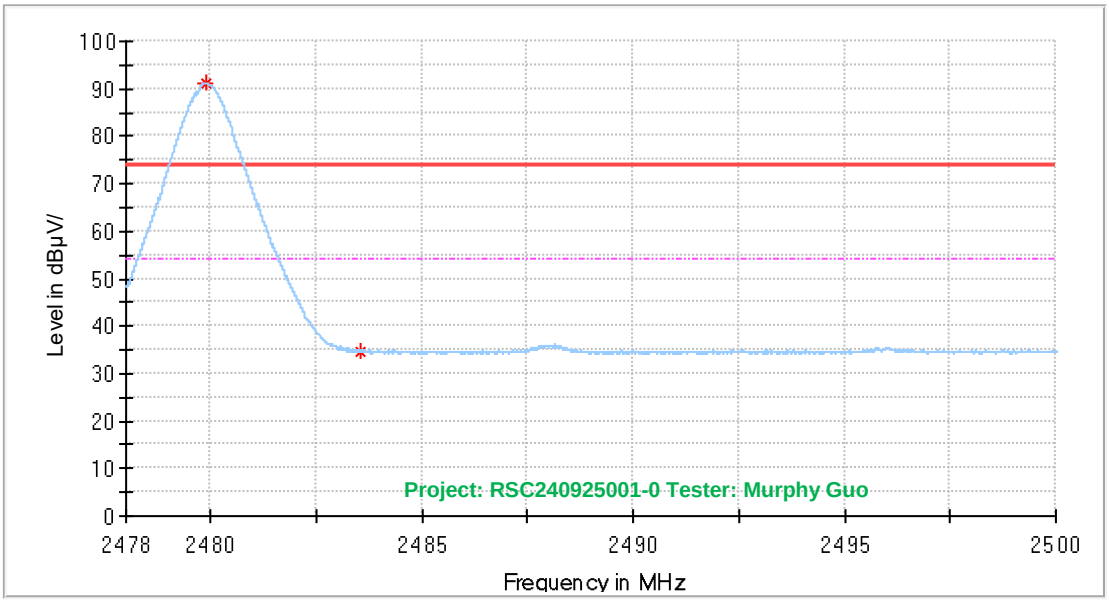

| Frequency (MHz) | Average (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|
| 2385.839200 | 37.89 | 54.00 | 16.11 | 173.0 | H | 170.0 | -0.3 |
| 2401.866200 | 93.55 | --- | --- | 173.0 | H | 170.0 | -0.2 |

**Average, Left_Vertical**



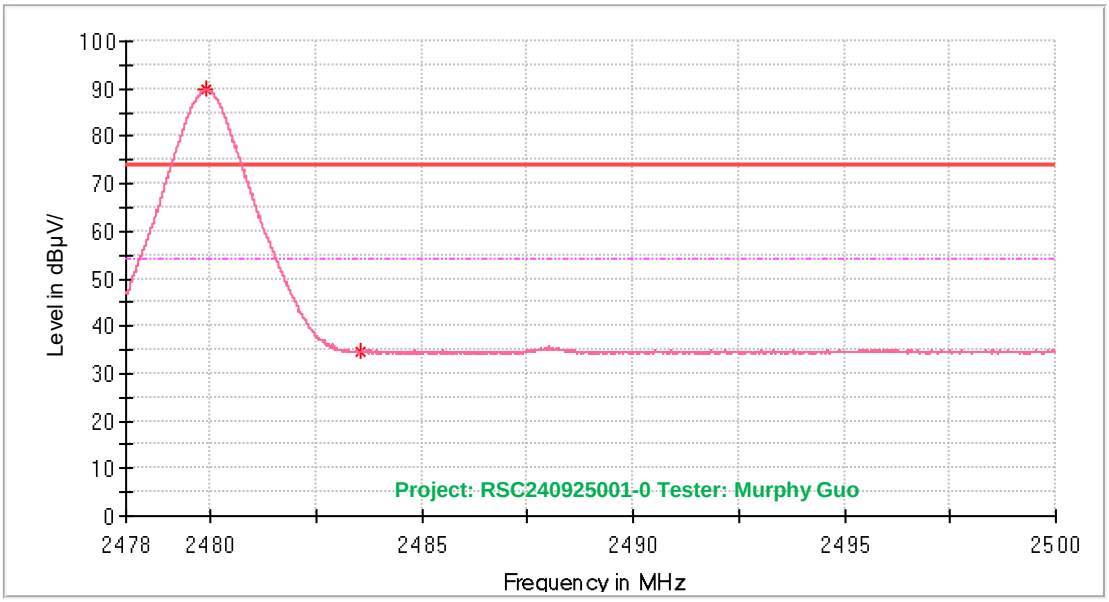

| Frequency (MHz) | Average (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|
| 2390.012800 | 34.48 | 54.00 | 19.52 | 241.0 | V | 83.0 | -0.3 |
| 2401.856800 | 89.16 | --- | --- | 241.0 | V | 242.0 | -0.2 |

**Average, Right_Horizontal**




| Frequency (MHz) | Average (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|
| 2479.900800 | 91.12 | --- | --- | 199.0 | H | 177.0 | -0.3 |
| 2483.570400 | 34.53 | 54.00 | 19.47 | 199.0 | H | 173.0 | -0.3 |

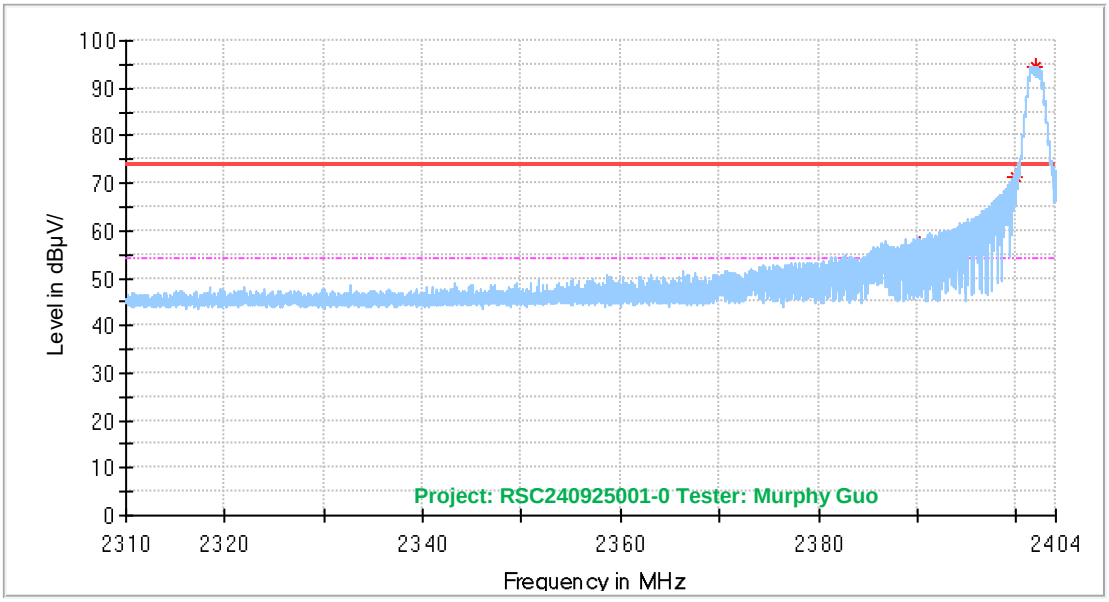
**Average, Right_Vertical**




| Frequency (MHz) | Average (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|
| 2479.894200 | 89.76 | --- | --- | 166.0 | V | 245.0 | -0.3 |
| 2483.539600 | 34.48 | 54.00 | 19.52 | 166.0 | V | 241.0 | -0.3 |

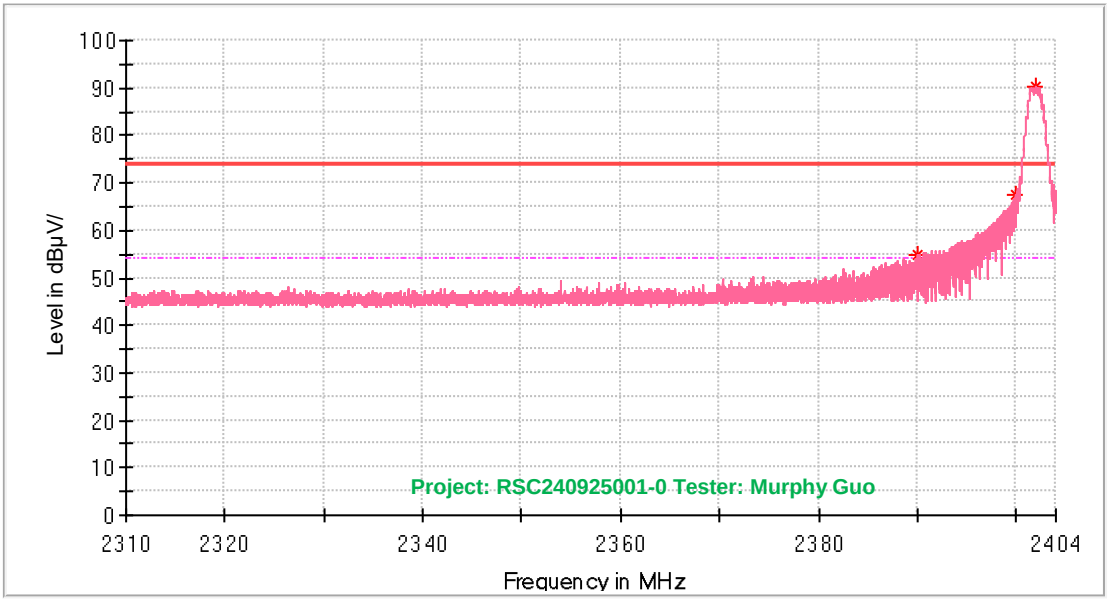
## 2Mbps mode

**Peak, Left_ Horizontal**



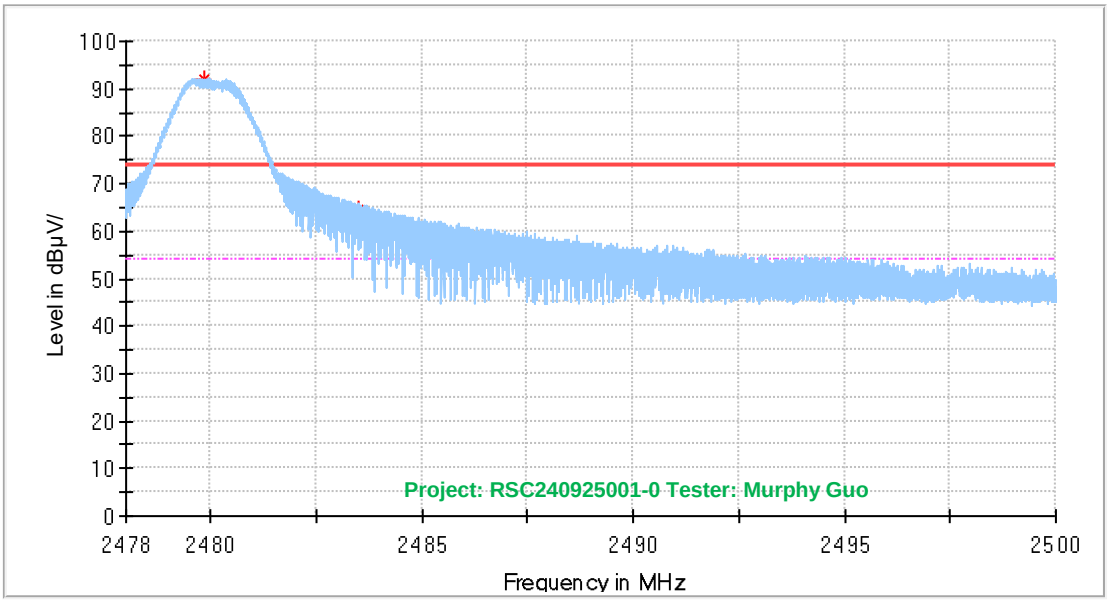

| Frequency (MHz) | MaxPeak (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|
| 2390.172600 | 56.79 | 74.00 | 17.21 | 173.0 | H | 358.0 | -0.3 |
| 2399.948600 | 71.25 | 74.63 | 3.38 | 173.0 | H | 168.0 | -0.2 |
| 2401.997800 | 94.63 | --- | --- | 173.0 | H | 164.0 | -0.2 |

**Peak, Left_Vertical**



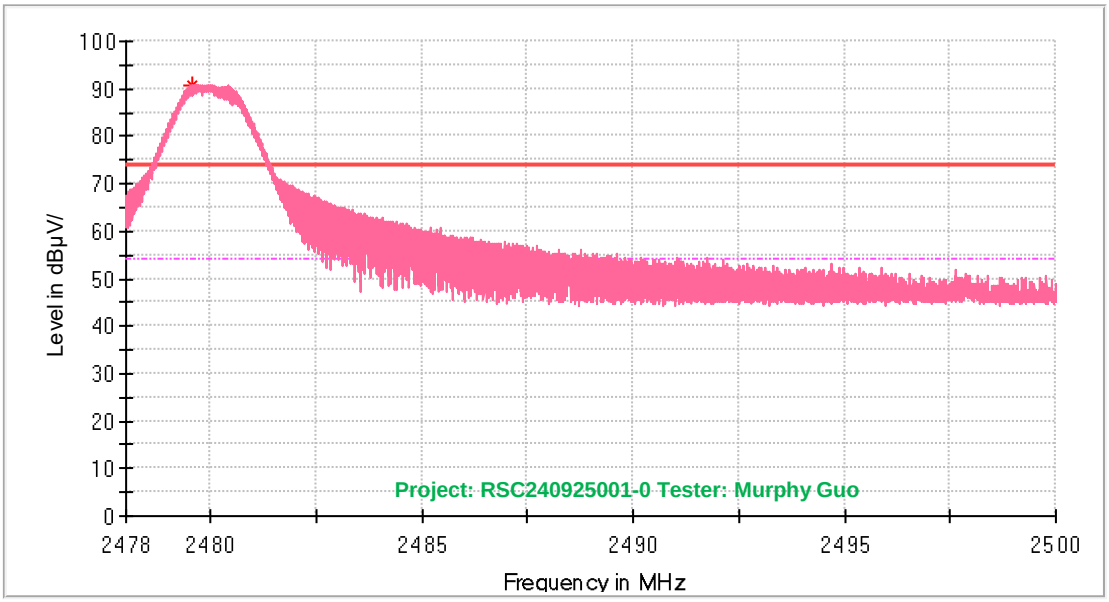

| Frequency (MHz) | MaxPeak (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|
| 2389.994000 | 54.84 | 74.00 | 19.16 | 241.0 | V | 234.0 | -0.3 |
| 2399.967400 | 67.67 | 70.10 | 2.43 | 241.0 | V | 238.0 | -0.2 |
| 2402.054200 | 90.10 | --- | --- | 241.0 | V | 238.0 | -0.2 |

**Peak, Right_Horizontal**



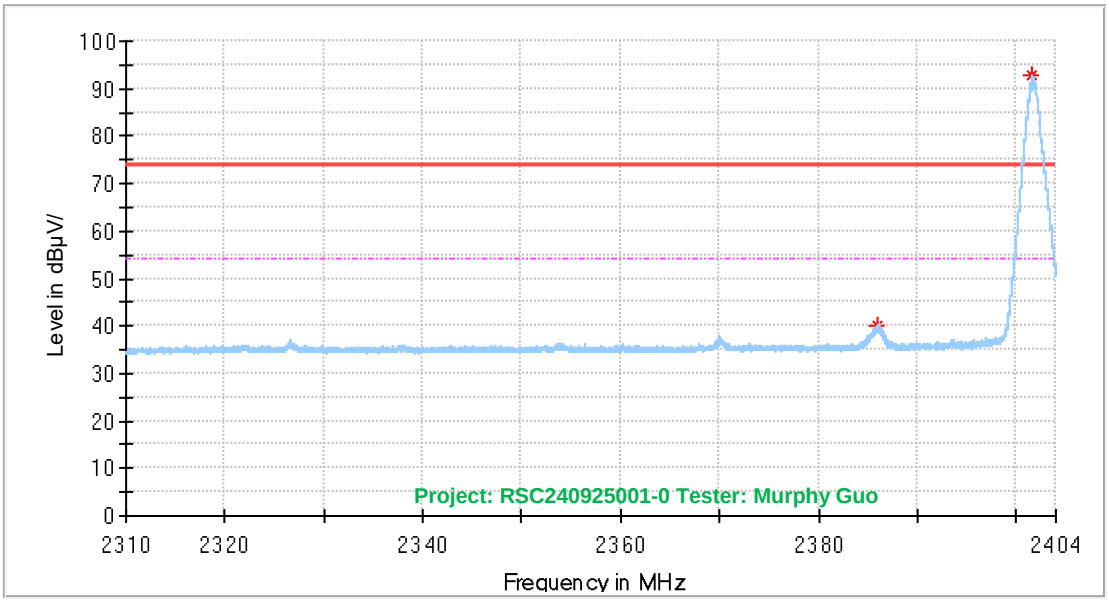

| Frequency (MHz) | MaxPeak (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|
| 2479.867800 | 91.96 | --- | --- | 199.0 | H | 175.0 | -0.3 |
| 2483.511000 | 64.36 | 74.00 | 9.64 | 199.0 | H | 160.0 | -0.3 |

**Peak, Right_Vertical**



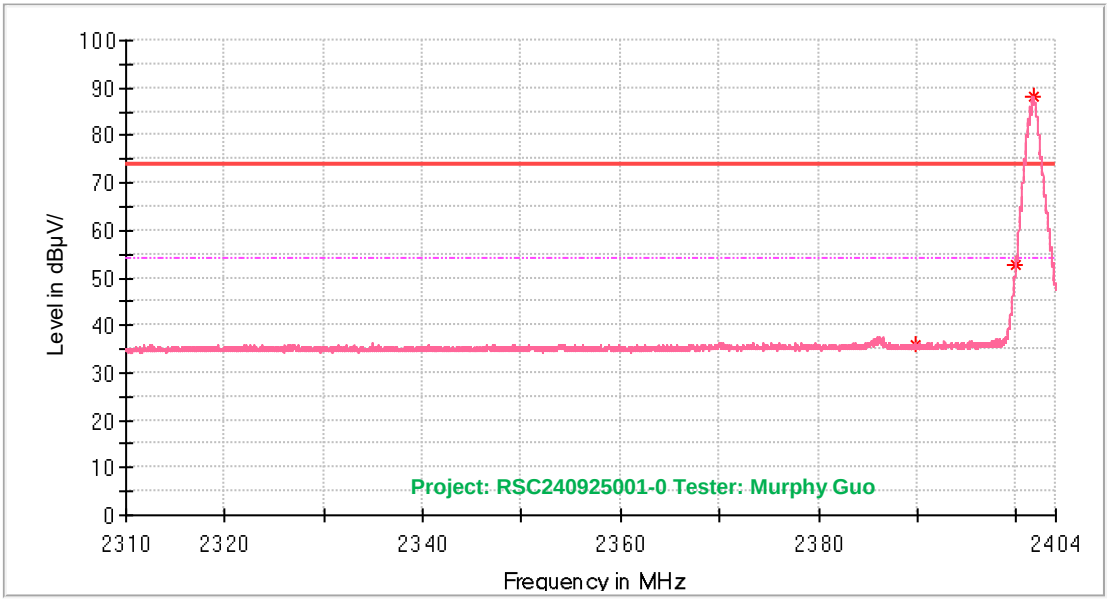

| Frequency (MHz) | MaxPeak (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|
| 2479.586200 | 90.73 | --- | --- | 166.0 | V | 245.0 | -0.3 |
| 2483.502200 | 60.35 | 74.00 | 13.65 | 166.0 | V | 222.0 | -0.3 |

**Average, Left_ Horizontal**



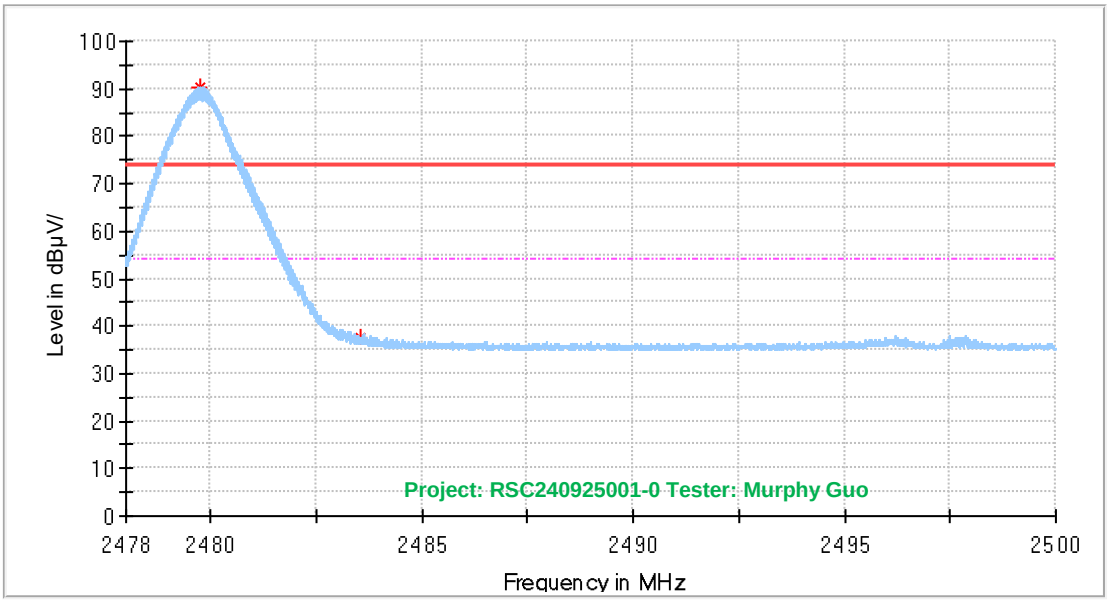

| Frequency (MHz) | Average (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|
| 2386.036600 | 39.93 | 54.00 | 14.07 | 173.0 | H | 355.0 | -0.3 |
| 2401.650000 | 92.86 | --- | --- | 173.0 | H | 168.0 | -0.2 |

**Average, Left_Vertical**



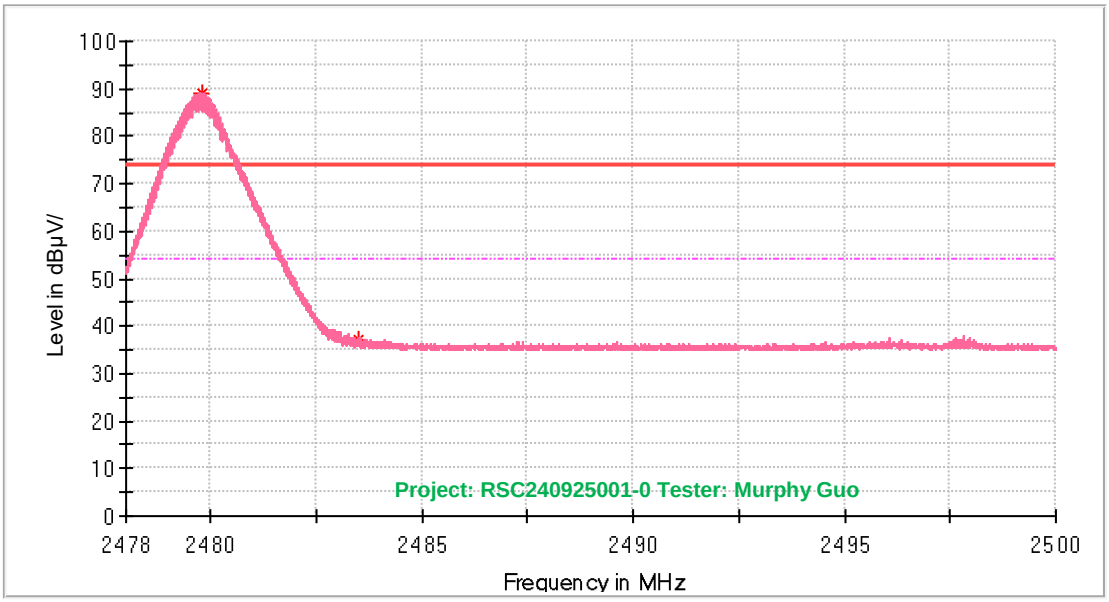

| Frequency (MHz) | Average (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|
| 2389.815400 | 35.99 | 54.00 | 18.01 | 241.0 | V | 263.0 | -0.3 |
| 2401.687600 | 88.19 | --- | --- | 241.0 | V | 243.0 | -0.2 |

**Average, Right_Horizontal**




| Frequency (MHz) | Average (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|
| 2479.755600 | 90.41 | --- | --- | 199.0 | H | 177.0 | -0.3 |
| 2483.537400 | 37.45 | 54.00 | 16.55 | 199.0 | H | 181.0 | -0.3 |

**Average, Right_Vertical**

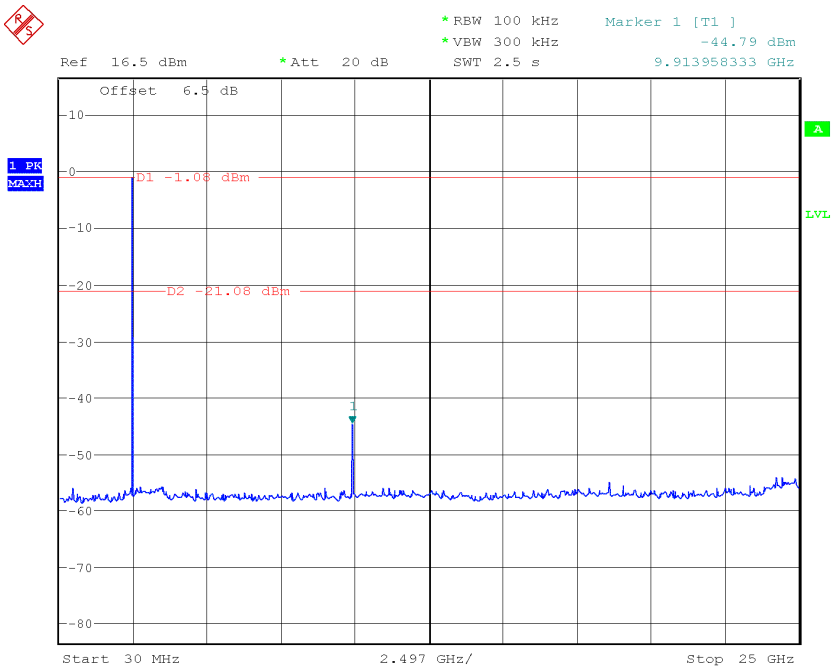



| Frequency (MHz) | Average (dBµ V/m) | Limit (dBµ V/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|
| 2479.782000 | 88.94 | --- | --- | 166.0 | V | 242.0 | -0.3 |
| 2483.519800 | 37.24 | 54 | 16.76 | 166.0 | V | 298.0 | -0.3 |

## Conducted Spurious Emission At Antenna Port:

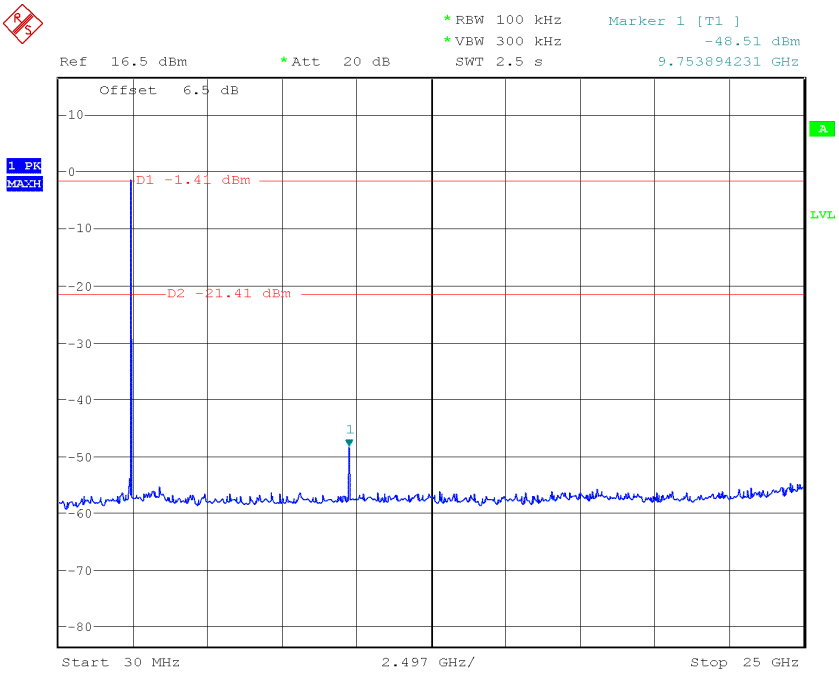
## 250kbps mode

### Low Channel



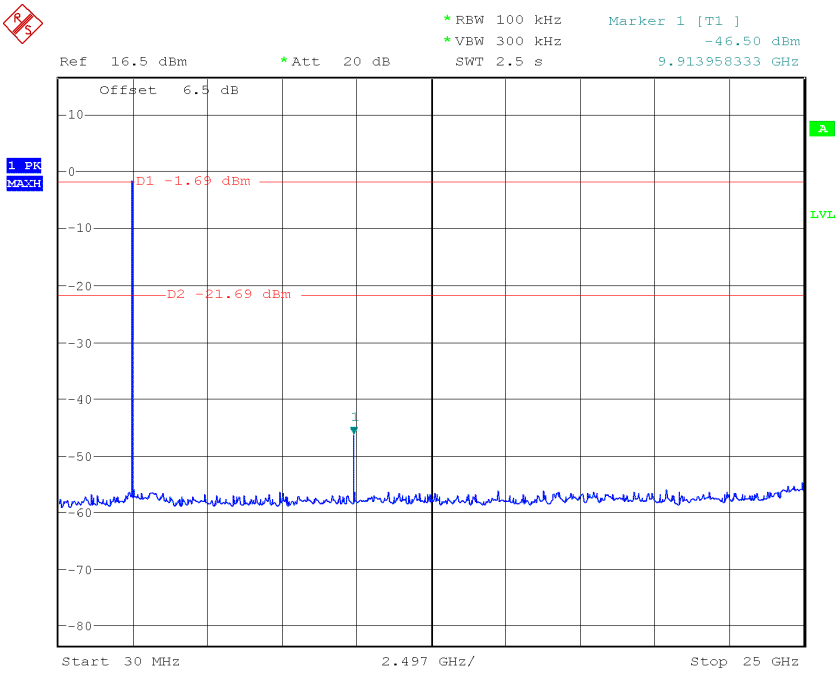

Comment: Project:RSC240925001-0 Tester:Murphy Guo
Date: 29.SEP.2024 21:30:10

### Middle Channel




Comment: Project:RSC240925001-0 Tester:Murphy Guo
Date: 29.SEP.2024 21:24:48

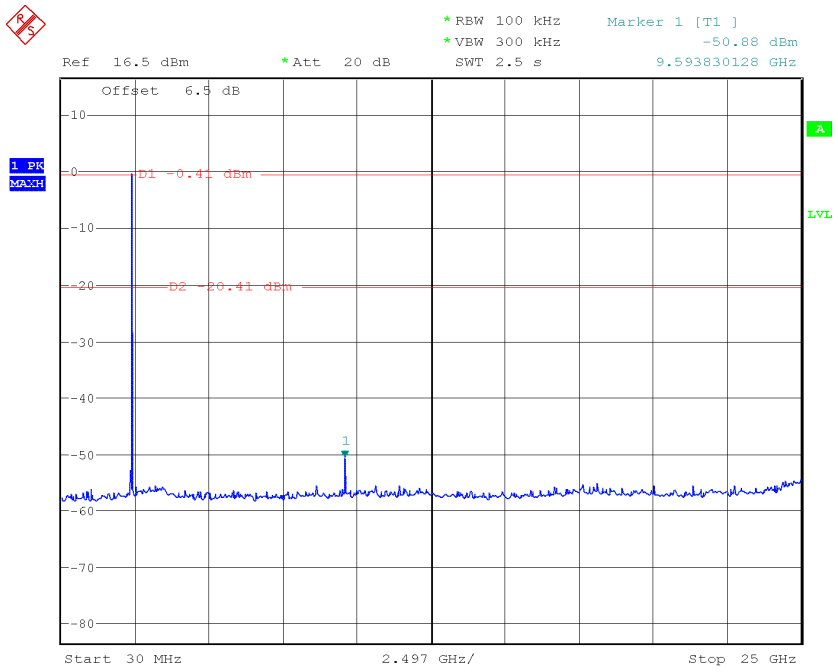
### High Channel




Comment: Project:RSC240925001-0 Tester:Murphy Guo
Date: 29.SEP.2024 21:21:40

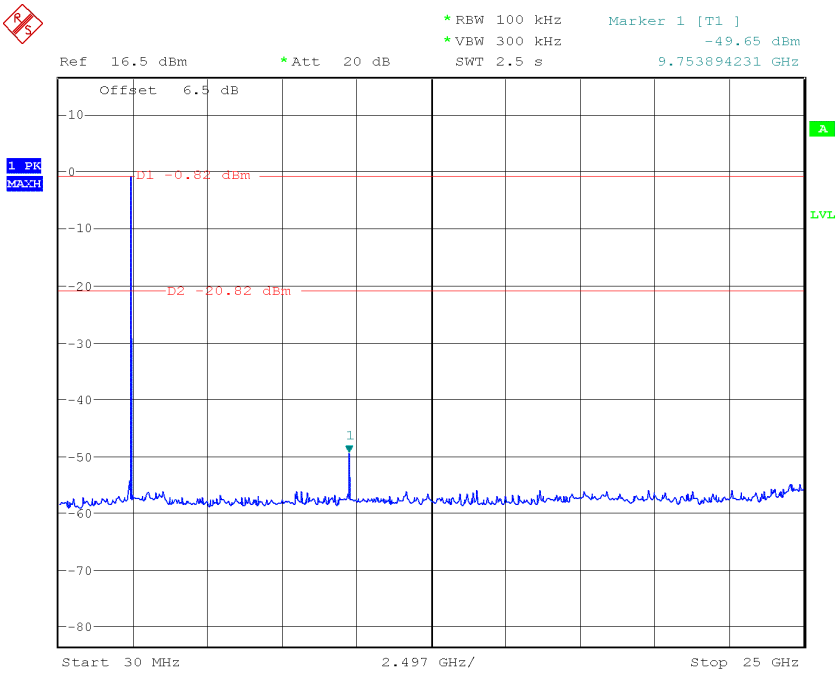
## 1Mbps mode

### Low Channel



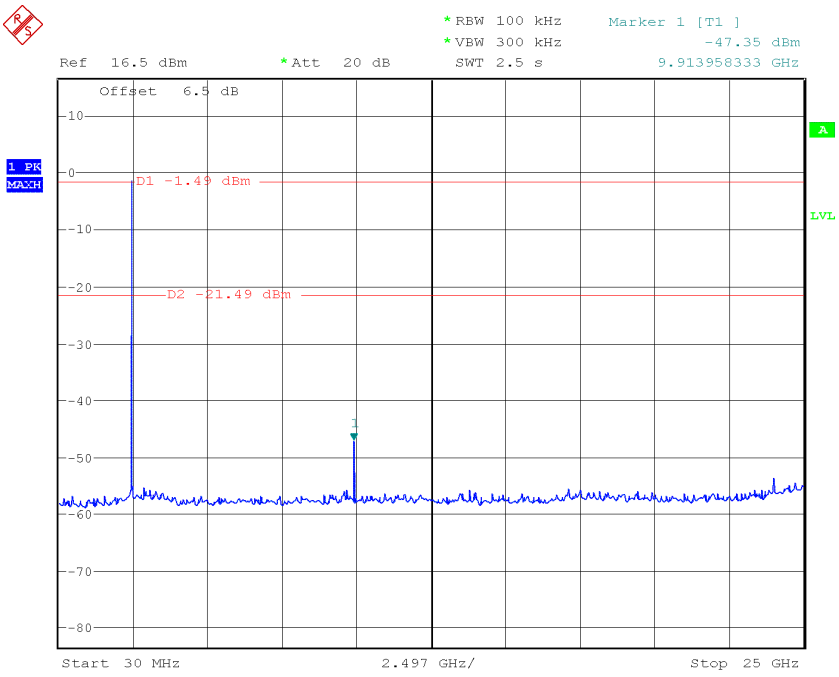

Comment: Project:RSC240925001-0 Tester:Murphy Guo
Date: 29.SEP.2024 21:19:30

## Middle Channel




Comment: Project:RSC240925001-0 Tester:Murphy Guo
Date: 29.SEP.2024 21:11:30

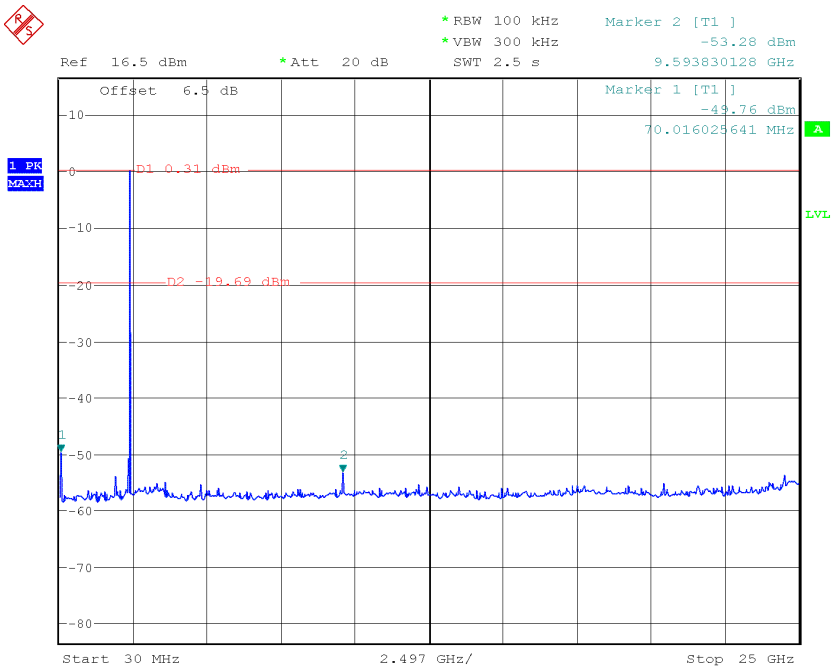
## High Channel




Comment: Project:RSC240925001-0 Tester:Murphy Guo
Date: 29.SEP.2024 21:09:29

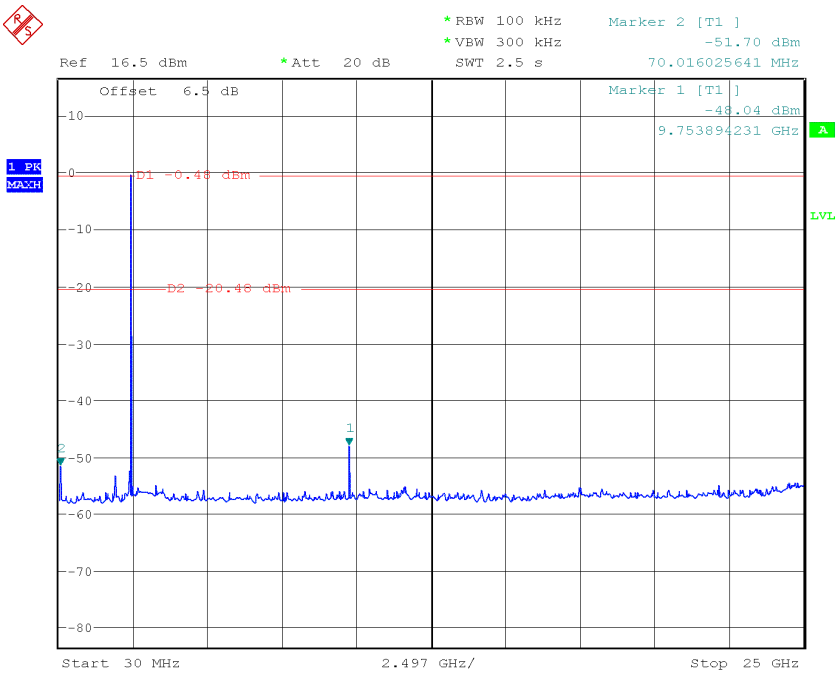
## 2Mbps mode

### Low Channel



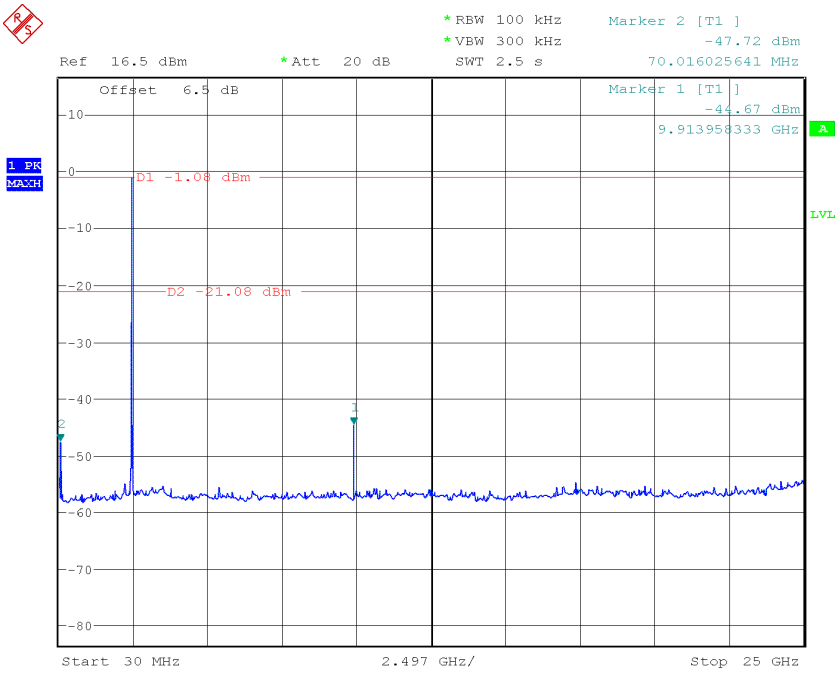

Comment: Project:RSC240925001-0 Tester:Murphy Guo
Date: 29.SEP.2024 14:52:59

### Middle Channel




Comment: Project:RSC240925001-0 Tester:Murphy Guo
Date: 29.SEP.2024 15:03:50

## High Channel




Comment: Project:RSC240925001-0 Tester:Murphy Guo
Date: 29.SEP.2024 14:17:21

# FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH

## Applicable Standard

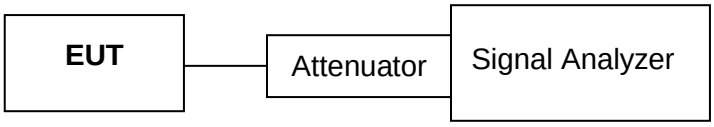
Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, 5725–5850 MHz bands.
The minimum 6 dB bandwidth shall be at least SRD.

## Test Procedure

ANSI C63.10-2020 Clause 11.8.1 Option 1

a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 3×RBW
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

## Test Setup Block




Note: Offset (6.5dB) = 6dB Attenuator(6dB) + RF cable loss(0.5dB)

# Test Data

## Environmental Conditions

| | |
|---|---|
| **Temperature:** | 25 °C |
| **Relative Humidity:** | 63 % |
| **ATM Pressure:** | 96.2 kPa |

The testing was performed by Murphy Guo on 2024-09-29.

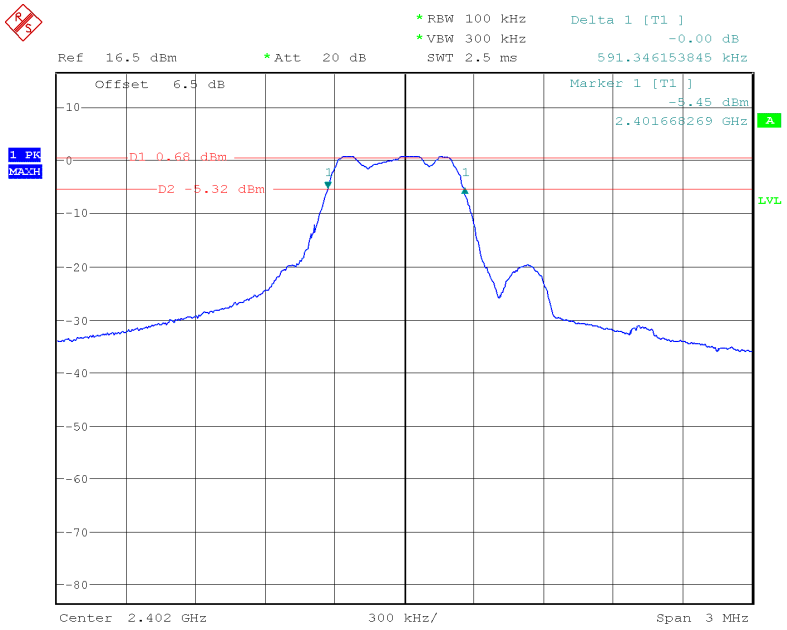
Test Mode: Transmitting

Test Result: Compliance. Please refer to the following table and plots.

| Mode | Channel | Frequency (MHz) | 6dB Bandwidth (kHz) | Limit (kHz) |
|---|---|---|---|---|
| 250kbps | Low | 2402 | 591.346 | ≥500 |
| | Middle | 2440 | 572.115 | ≥500 |
| | High | 2480 | 572.115 | ≥500 |
| 1Mbps | Low | 2402 | 557.692 | ≥500 |
| | Middle | 2440 | 552.885 | ≥500 |
| | High | 2480 | 552.885 | ≥500 |
| 2Mbps | Low | 2402 | 681.090 | ≥500 |
| | Middle | 2440 | 649.038 | ≥500 |
| | High | 2480 | 753.205 | ≥500 |

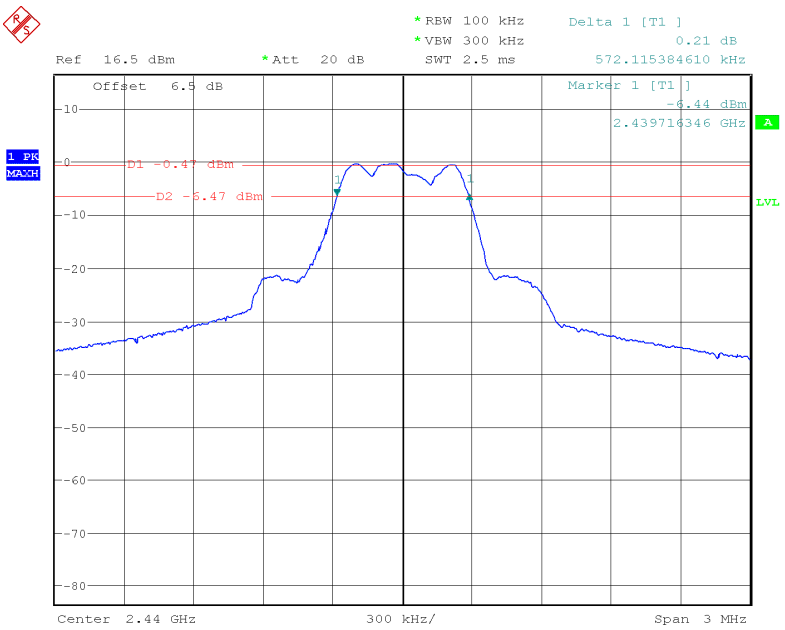
## 250kbps mode

### Low Channel



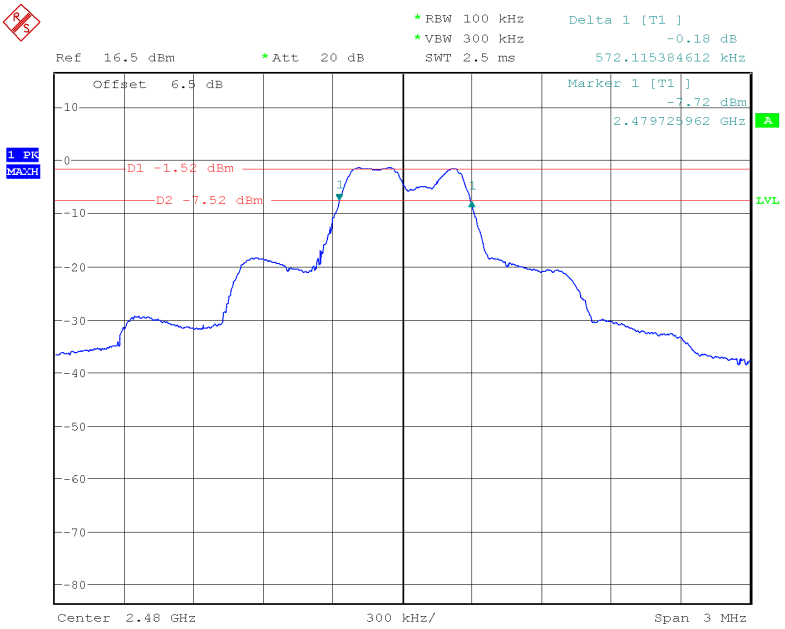

Comment: Project:RSC240925001-0 Tester:Murphy Guo
Date: 29.SEP.2024 13:37:31

## Middle Channel




Comment: Project:RSC240925001-0 Tester:Murphy Guo
Date: 29.SEP.2024 14:01:44

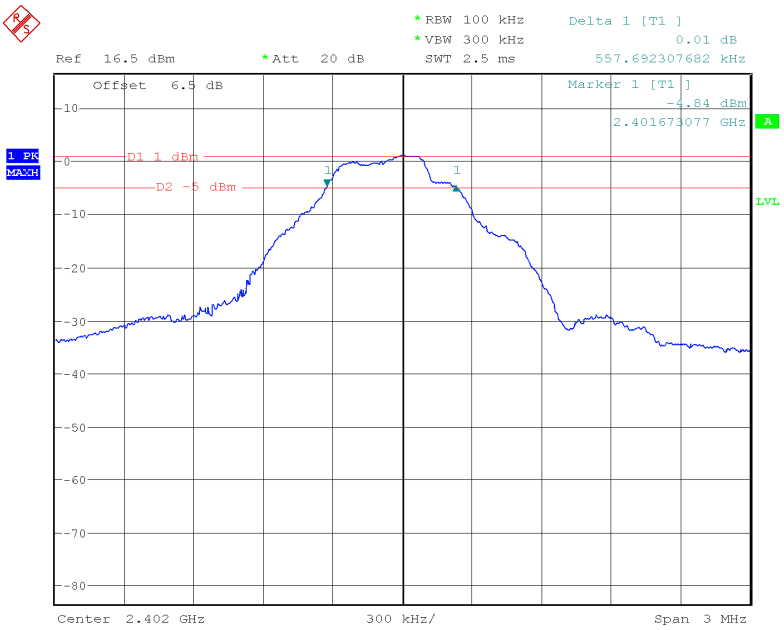
## High Channel




Comment: Project:RSC240925001-0 Tester:Murphy Guo
Date: 29.SEP.2024 14:12:36

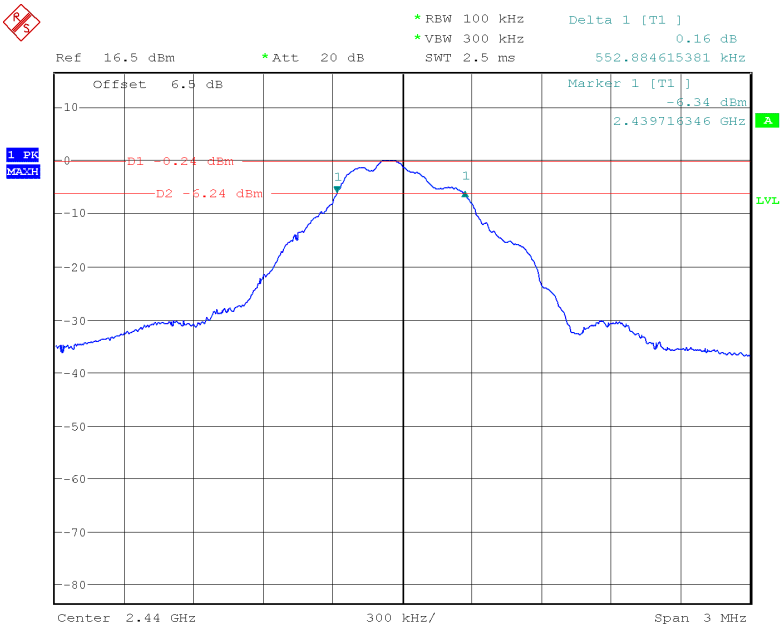
## 1Mbps mode

### Low Channel



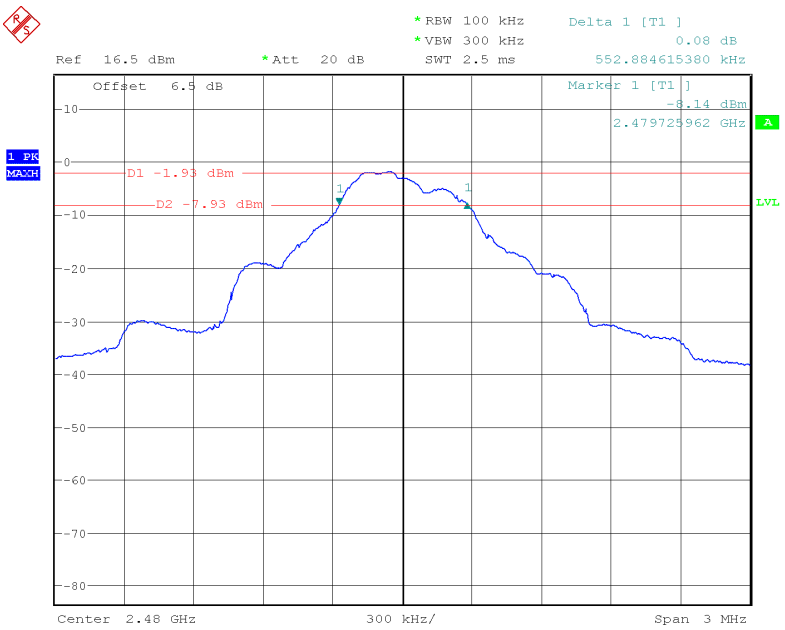

Comment: Project:RSC240925001-0 Tester:Murphy Guo
Date: 29.SEP.2024 13:46:18

### Middle Channel




Comment: Project:RSC240925001-0 Tester:Murphy Guo
Date: 29.SEP.2024 13:57:13

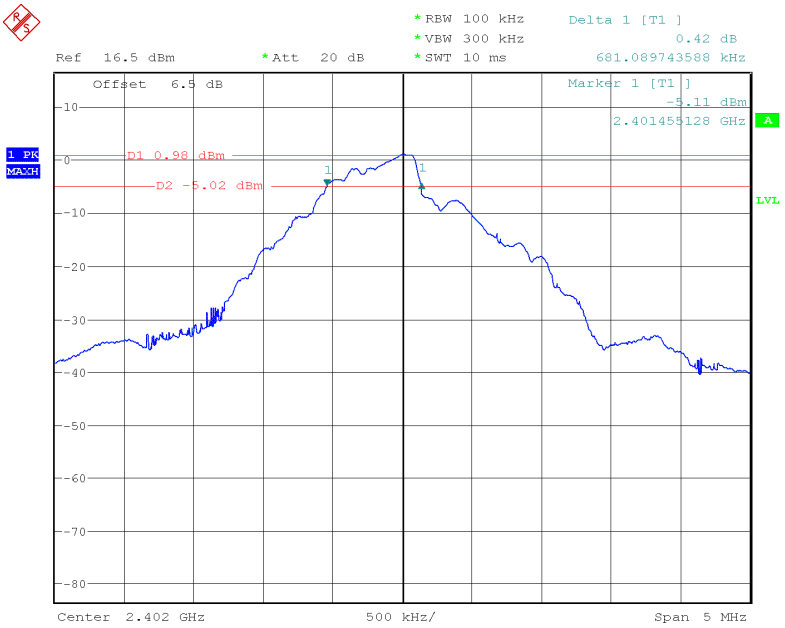
### High Channel




Comment: Project:RSC240925001-0 Tester:Murphy Guo
Date: 29.SEP.2024 19:34:40

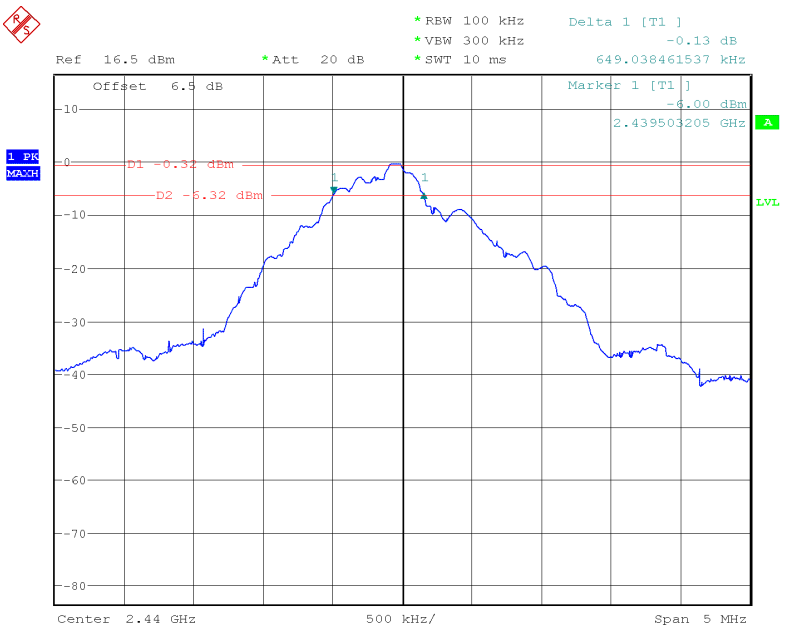
## 2Mbps mode

### Low Channel



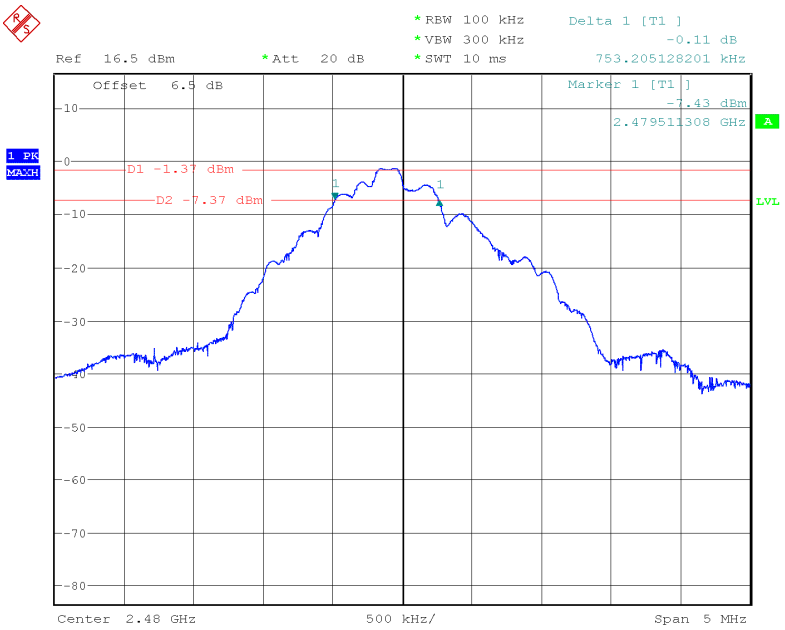

Comment: Project:RSC240925001-0 Tester:Murphy Guo
Date: 29.SEP.2024 16:52:00

## Middle Channel




Comment: Project:RSC240925001-0 Tester:Murphy Guo
Date: 29.SEP.2024 16:57:24

## High Channel




Comment: Project:RSC240925001-0 Tester:Murphy Guo
Date: 29.SEP.2024 17:18:55

# FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER

## Applicable Standard

According to FCC §15.247(b) (3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

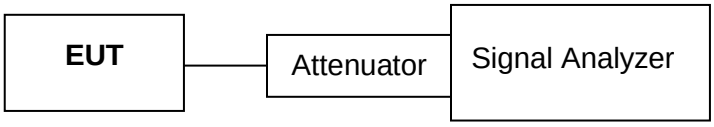
## Test Procedure

ANSI C63.10-2020 Clause 11.9.1.1 RBW ≥ DTS bandwidth

The following procedure shall be used when an instrument with a resolution bandwidth that is greater than the DTS bandwidth is available to perform the measurement:

a) Set the RBW ≥ DTS bandwidth.
b) Set VBW ≥ [3 × RBW].
c) Set span ≥ [3 × RBW].
d) Sweep time = No faster than coupled (auto) time.
e) Detector = peak.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use peak marker function to determine the peak amplitude level.

## Test Setup Block



# Test Data

## Environmental Conditions

| | |
|---|---|
| **Temperature:** | 25 °C |
| **Relative Humidity:** | 63 % |
| **ATM Pressure:** | 96.2 kPa |

The testing was performed by Murphy Guo on 2024-09-29.

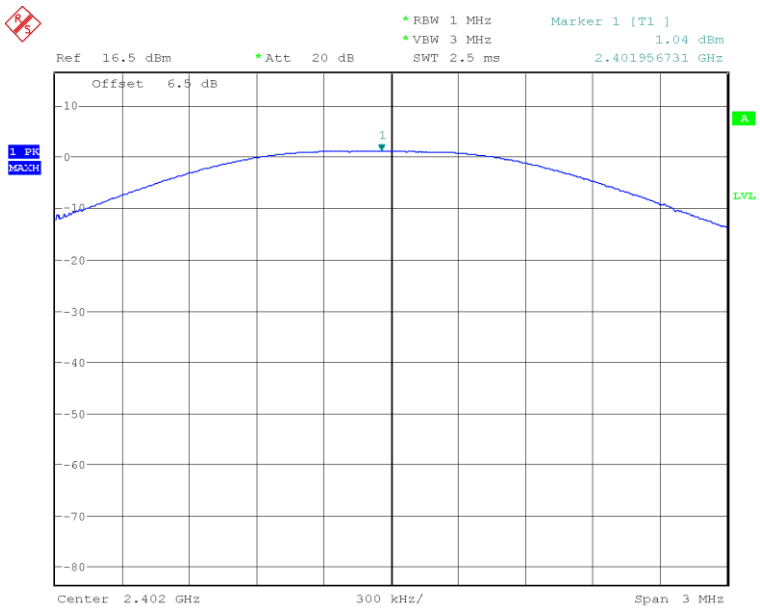
Test Mode: Transmitting

Test Result: Compliance. Please refer to the following table and plots.

| Mode | Channel | Frequency (MHz) | Conducted Output Power (dBm) | Limit (dBm) |
|---|---|---|---|---|
| 250kbps | Low | 2402 | 1.04 | ≤30 |
| | Middle | 2440 | -0.20 | ≤30 |
| | High | 2480 | -1.24 | ≤30 |
| 1Mbps | Low | 2402 | 1.04 | ≤30 |
| | Middle | 2440 | -0.35 | ≤30 |
| | High | 2480 | -1.34 | ≤30 |
| 2Mbps | Low | 2402 | 1.06 | ≤30 |
| | Middle | 2440 | -0.22 | ≤30 |
| | High | 2480 | -1.33 | ≤30 |

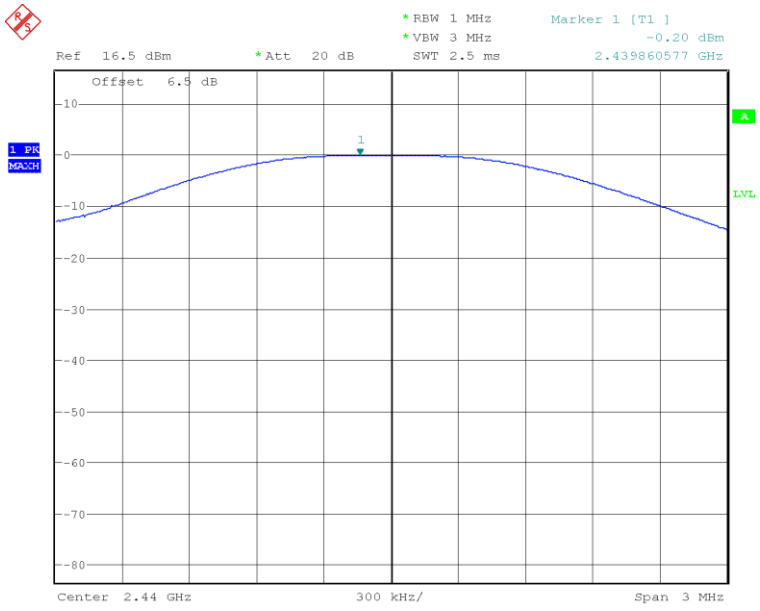
## 250kbps mode

### Low Channel



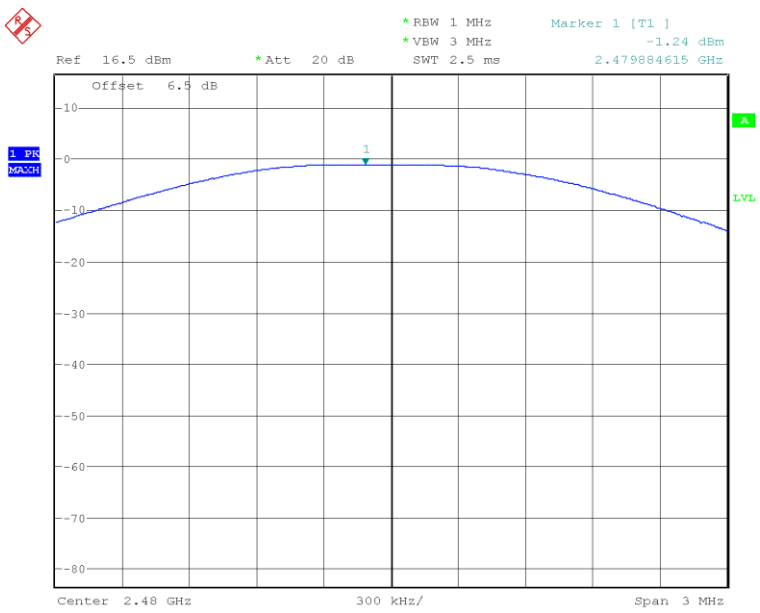

Comment: Project:RSC240925001-0 Tester:Murphy Guo
Date: 29.SEP.2024 20:40:30

### Middle Channel




Comment: Project:RSC240925001-0 Tester:Murphy Guo
Date: 29.SEP.2024 20:53:28

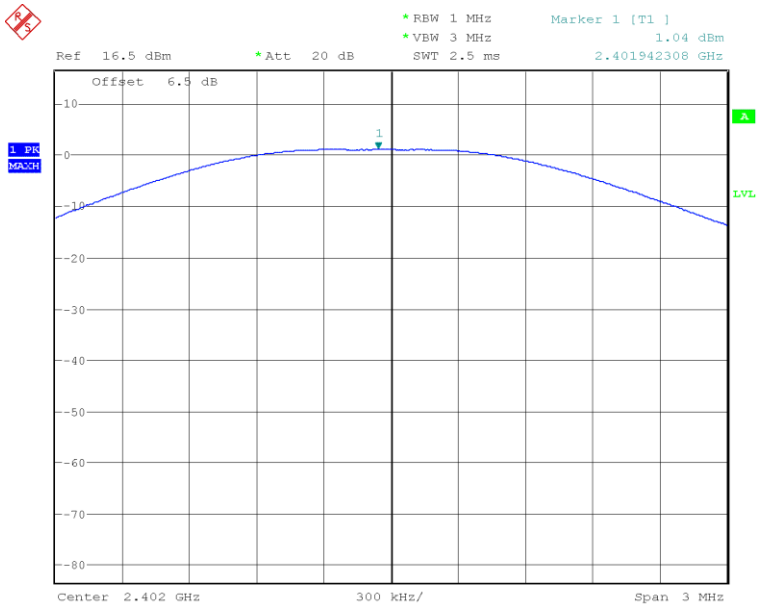
**High Channel**




Comment: Project:RSC240925001-0 Tester:Murphy Guo
Date: 29.SEP.2024 20:56:36

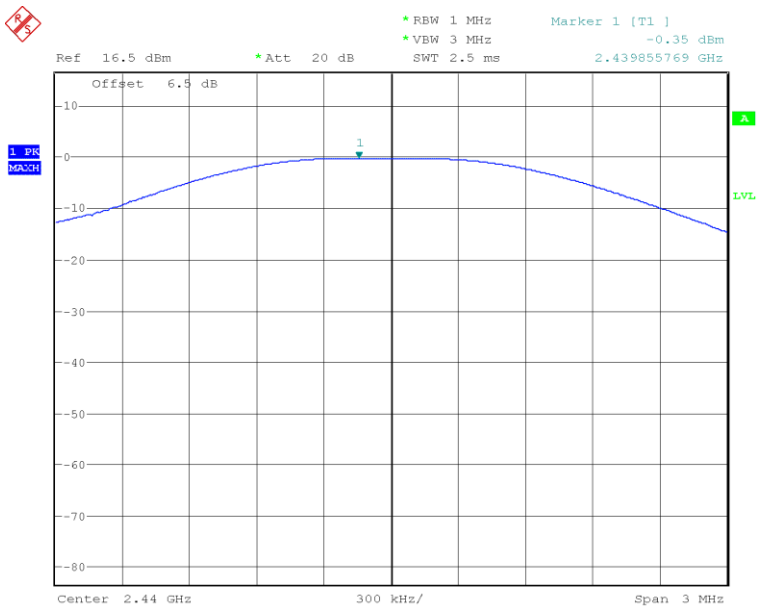
**1Mbps mode**

**Low Channel**



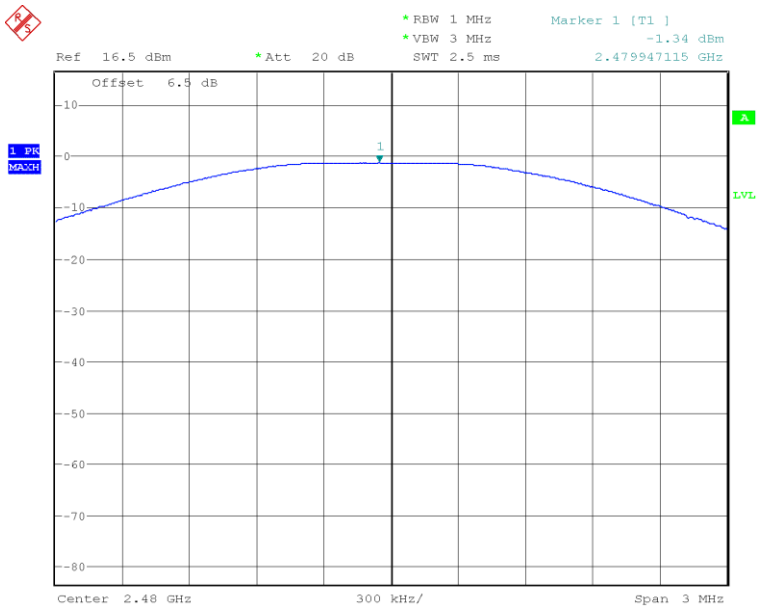

Comment: Project:RSC240925001-0 Tester:Murphy Guo
Date: 29.SEP.2024 20:43:02

## Middle Channel




Comment: Project:RSC240925001-0 Tester:Murphy Guo
Date: 29.SEP.2024 20:52:05

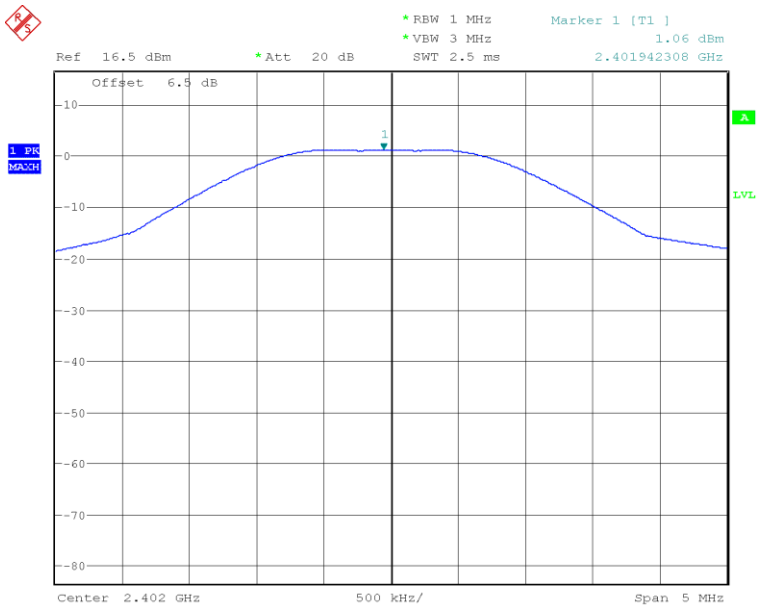
## High Channel




Comment: Project:RSC240925001-0 Tester:Murphy Guo
Date: 29.SEP.2024 21:02:19

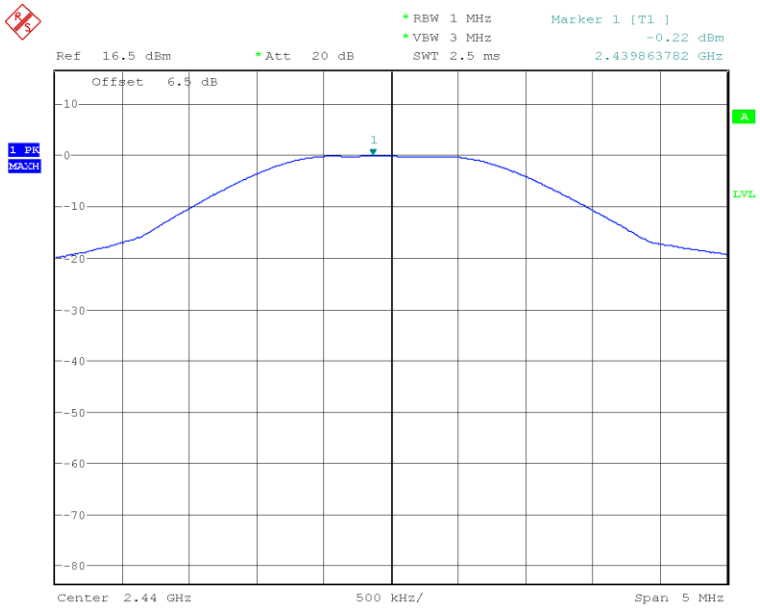
## 2Mbps mode

### Low Channel



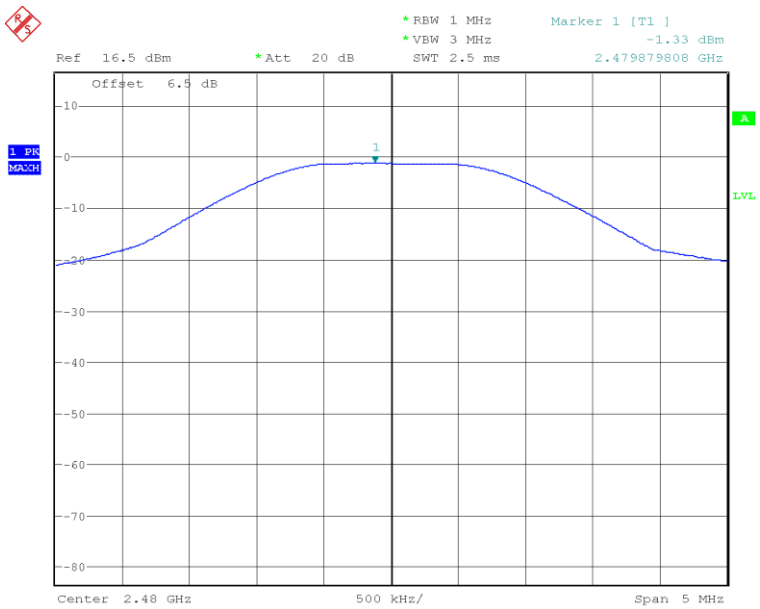

Comment: Project:RSC240925001-0 Tester:Murphy Guo
Date: 29.SEP.2024 20:44:31

### Middle Channel




Comment: Project:RSC240925001-0 Tester:Murphy Guo
Date: 29.SEP.2024 20:46:17

## High Channel




Comment: Project:RSC240925001-0 Tester:Murphy Guo
Date: 29.SEP.2024 21:03:56

# FCC §15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE

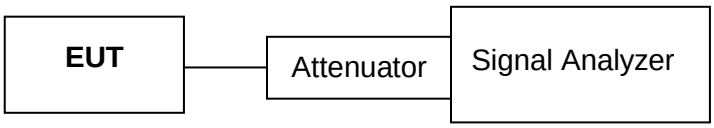
## Applicable Standard

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

## Test Procedure

1. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including100 kHz bandwidth from band edge.
2. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
3. Repeat above procedures until all measured frequencies were complete.

## Test Setup Block




## Test Data

### Environmental Conditions

| | |
|---|---|
| **Temperature:** | 25 °C |
| **Relative Humidity:** | 63 % |
| **ATM Pressure:** | 96.2 kPa |

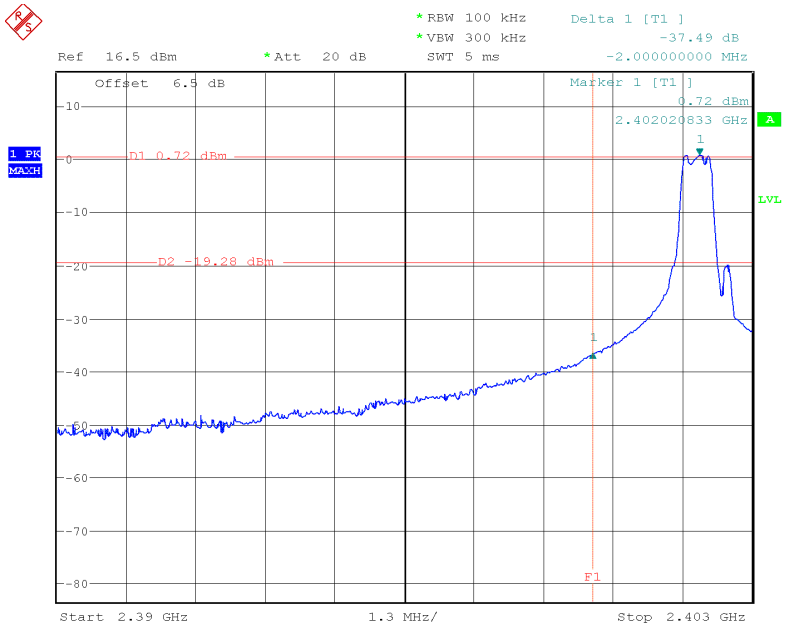
The testing was performed by Murphy Guo on 2024-09-29.

Test mode: Transmitting

Test Result: Compliance. Please refer to following plots.

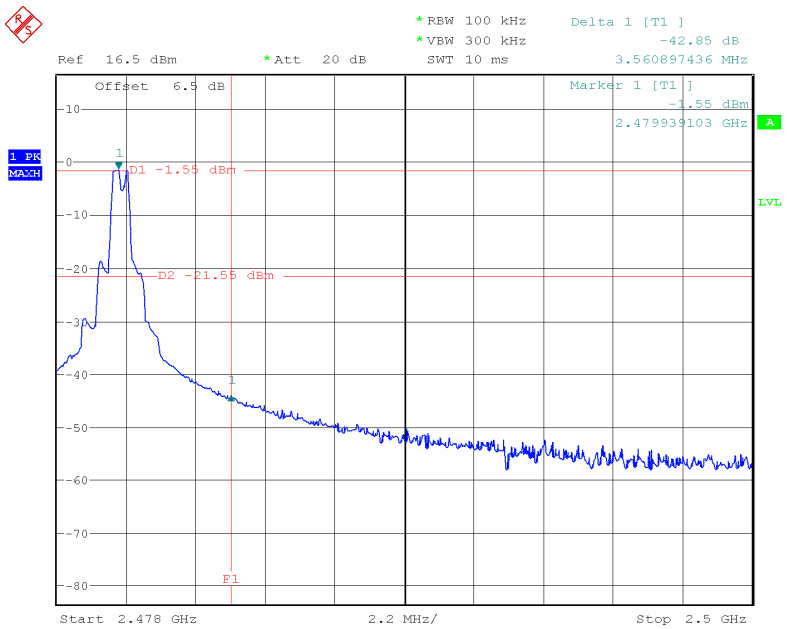
## 250kbps mode

### Band Edge, Left Side




Comment: Project:RSC240925001-0 Tester:Murphy Guo
Date: 29.SEP.2024 21:51:16

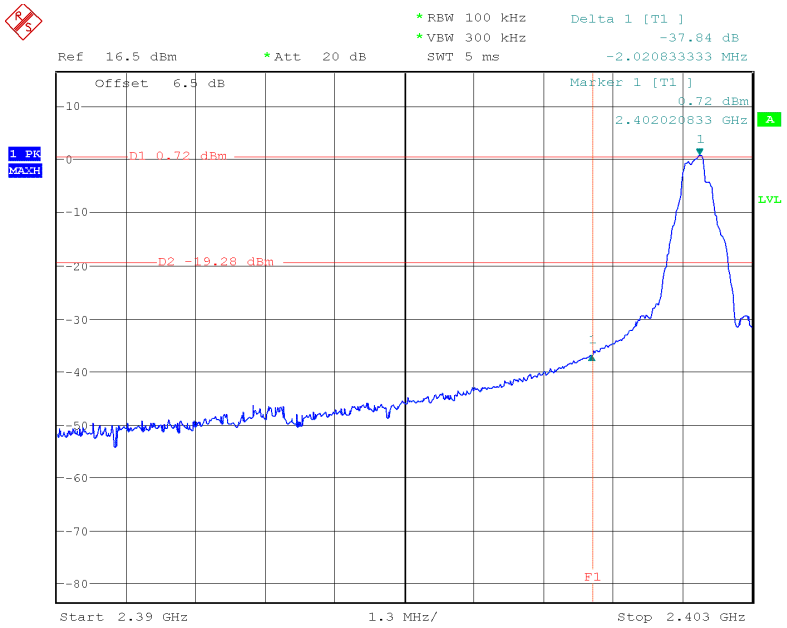
### Band Edge, Right Side




Comment: Project:RSC240925001-0 Tester:Murphy Guo
Date: 29.SEP.2024 21:42:06

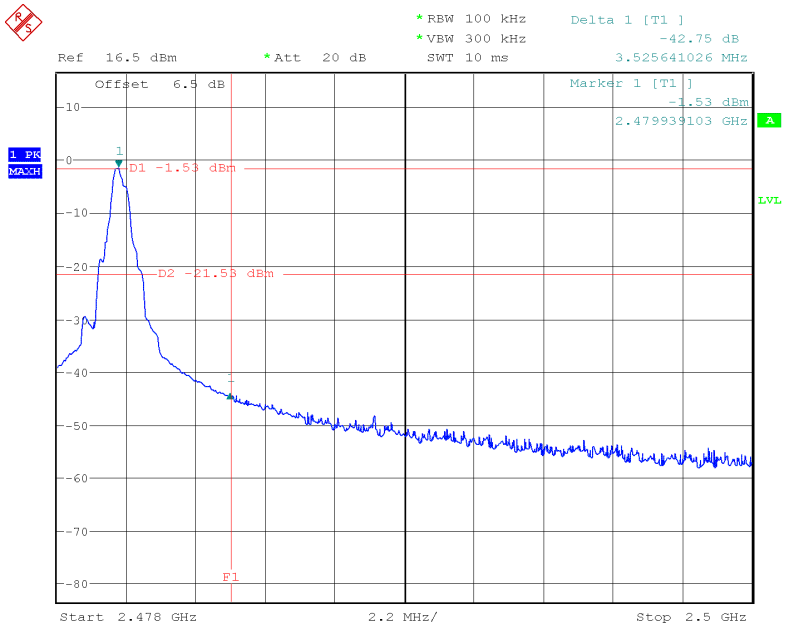
## 1Mbps mode

### Band Edge, Left Side




Comment: Project:RSC240925001-0 Tester:Murphy Guo
Date: 29.SEP.2024 21:46:30

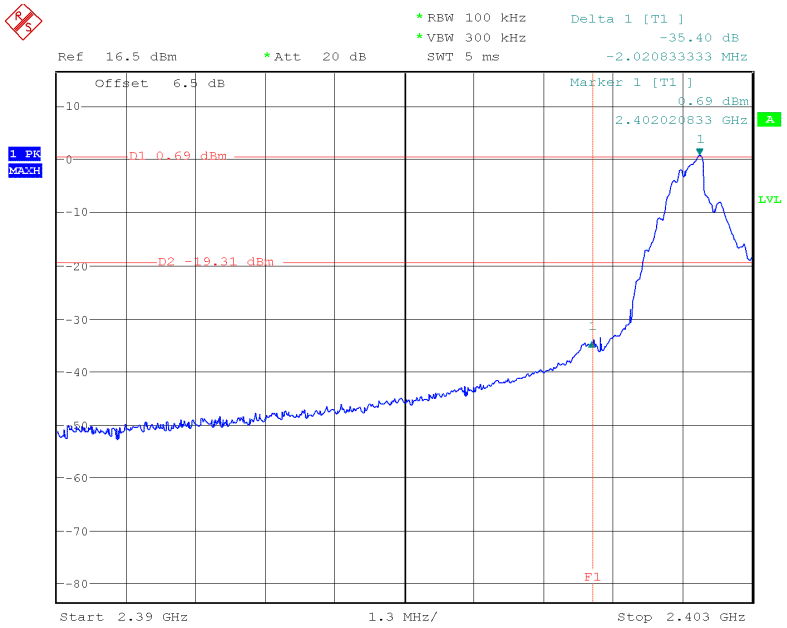
### Band Edge, Right Side




Comment: Project:RSC240925001-0 Tester:Murphy Guo
Date: 29.SEP.2024 21:37:28

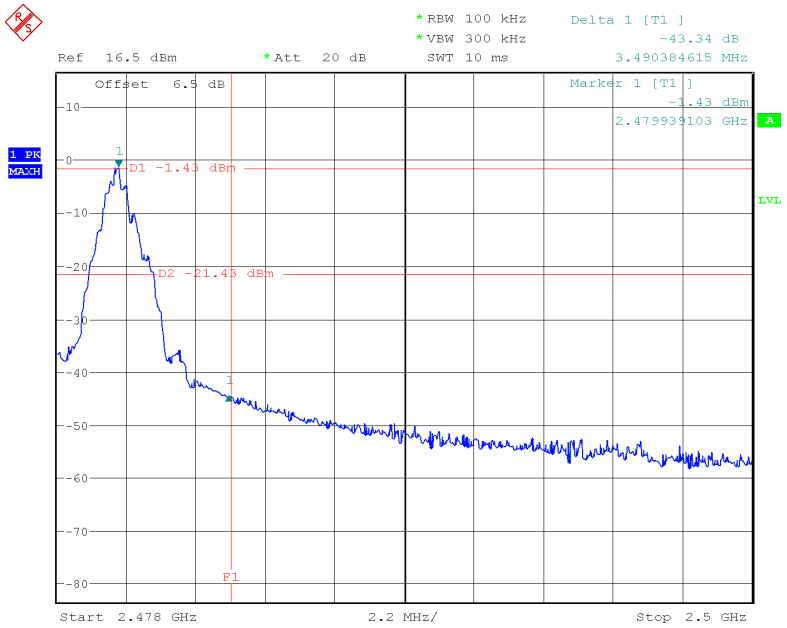
## 2Mbps mode

### Band Edge, Left Side




Comment: Project:RSC240925001-0 Tester:Murphy Guo
Date: 29.SEP.2024 17:40:52

### Band Edge, Right Side




Comment: Project:RSC240925001-0 Tester:Murphy Guo
Date: 29.SEP.2024 17:45:14

# FCC §15.247(e) - POWER SPECTRAL DENSITY

## Applicable Standard

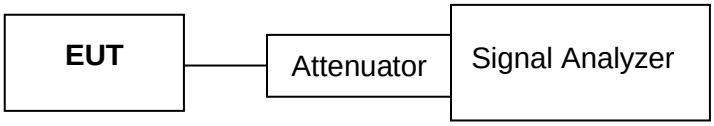
For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

## Test Procedure

ANSI C63.10-2020 Clause 11.10.2(PKPSD)

a) Set analyzer center frequency to DTS channel center frequency.
b) Set the span to 1.5 times the DTS bandwidth.
c) Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
d) Set the VBW ≥ 3×RBW.
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level within the RBW.
j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

## Test Setup Block



# Test Data

## Environmental Conditions

| | |
|---|---|
| **Temperature:** | 25 °C |
| **Relative Humidity:** | 63 % |
| **ATM Pressure:** | 96.2 kPa |

The testing was performed by Murphy Guo on 2024-09-29.

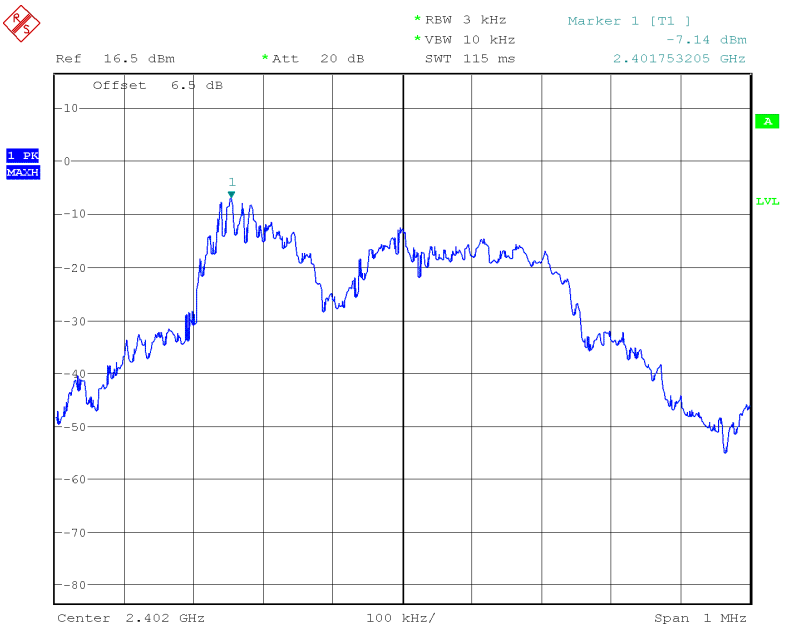
Test Mode: Transmitting

Test Result: Compliance. Please refer to the following table and plots.

| Mode | Channel | Frequency (MHz) | PKPSD (dBm/3KHz) | Limit (dBm/3kHz) |
|---|---|---|---|---|
| 250kbps | Low | 2402 | -7.14 | ≤8 |
| | Middle | 2440 | -8.25 | ≤8 |
| | High | 2480 | -9.95 | ≤8 |
| 1Mbps | Low | 2402 | -11.72 | ≤8 |
| | Middle | 2440 | -13.14 | ≤8 |
| | High | 2480 | -14.96 | ≤8 |
| 2Mbps | Low | 2402 | -15.01 | ≤8 |
| | Middle | 2440 | -15.90 | ≤8 |
| | High | 2480 | -18.06 | ≤8 |

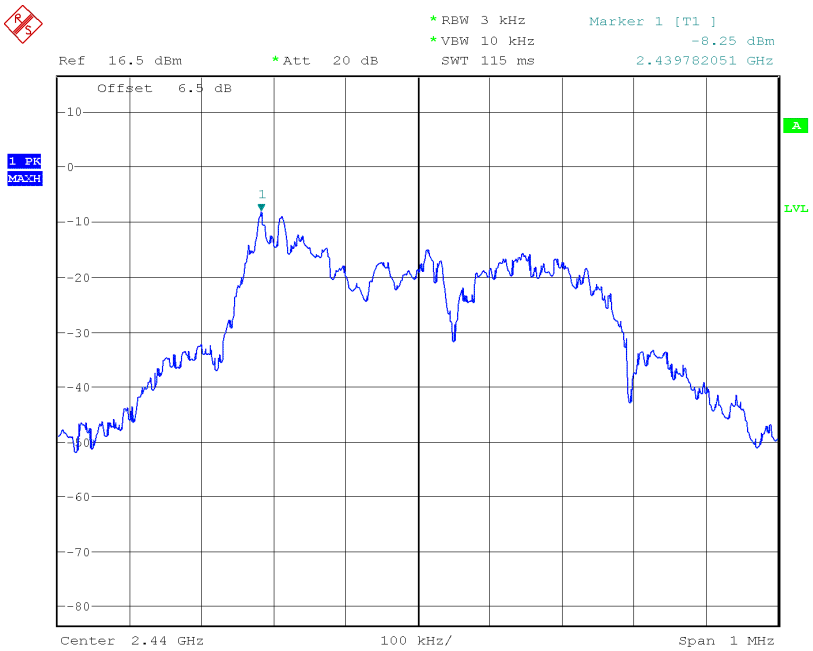
## 250kbps mode

### Power Spectral Density, Low Channel



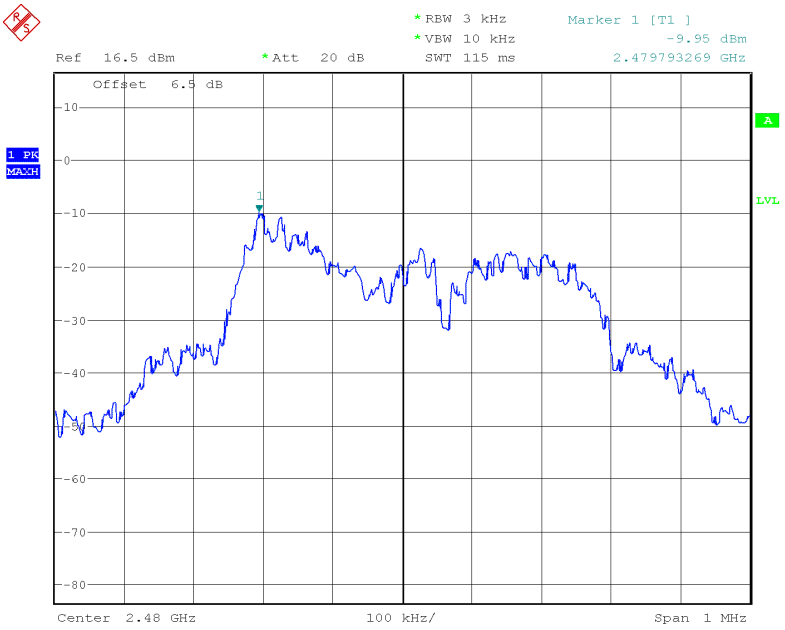

Comment: Project:RSC240925001-0 Tester:Murphy Guo
Date: 29.SEP.2024 20:40:47

### Power Spectral Density, Middle Channel




Comment: Project:RSC240925001-0 Tester:Murphy Guo
Date: 29.SEP.2024 20:43:13

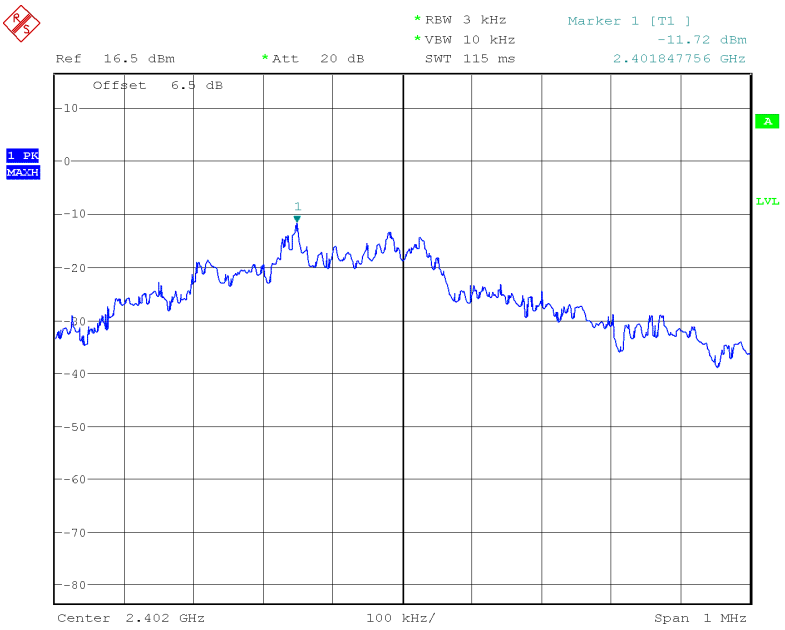
**Power Spectral Density, High Channel**




Comment: Project:RSC240925001-0 Tester:Murphy Guo
Date: 29.SEP.2024 20:44:21

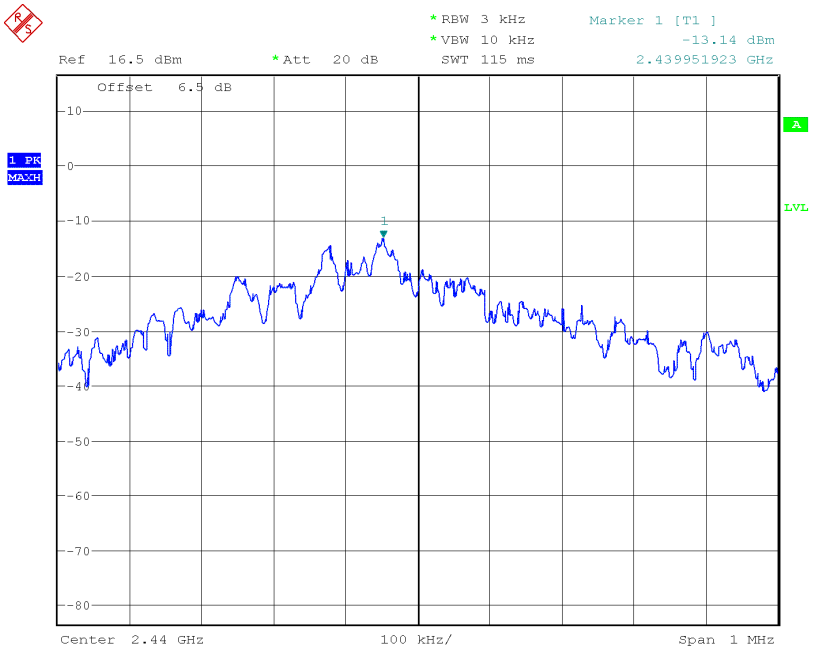
## 1Mbps mode

**Power Spectral Density, Low Channel**



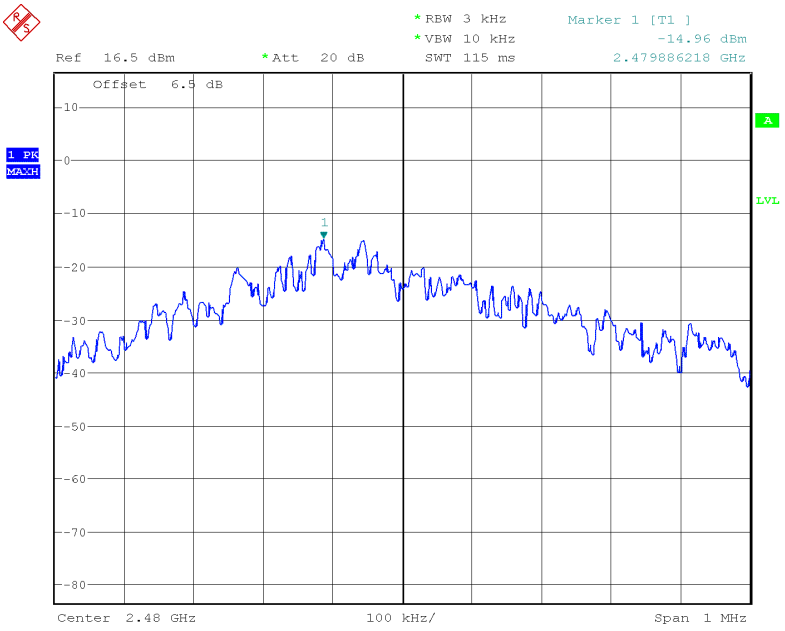

Comment: Project:RSC240925001-0 Tester:Murphy Guo
Date: 29.SEP.2024 20:51:39

## Power Spectral Density, Middle Channel




Comment: Project:RSC240925001-0 Tester:Murphy Guo
Date: 29.SEP.2024 20:47:56

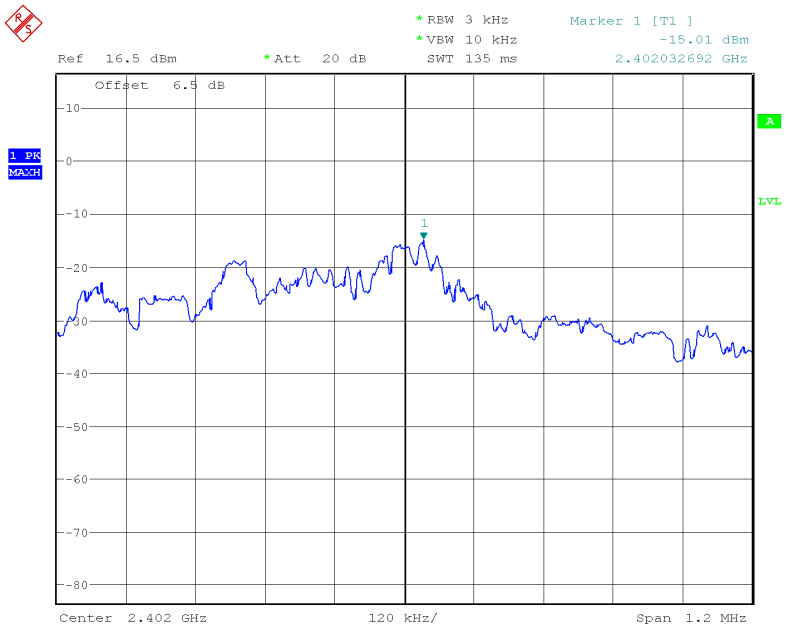
## Power Spectral Density, High Channel




Comment: Project:RSC240925001-0 Tester:Murphy Guo
Date: 29.SEP.2024 20:46:12

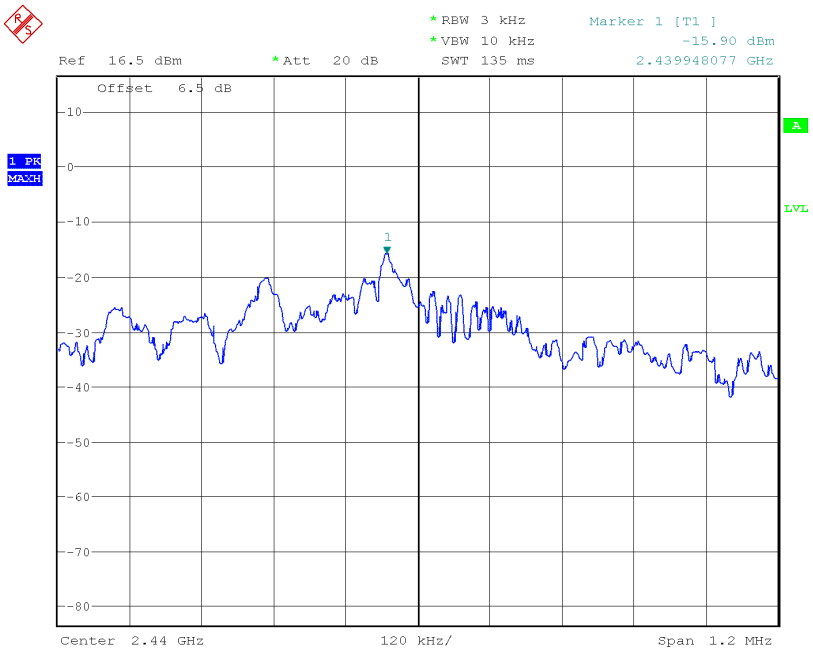
## 2Mbps mode

### Power Spectral Density, Low Channel



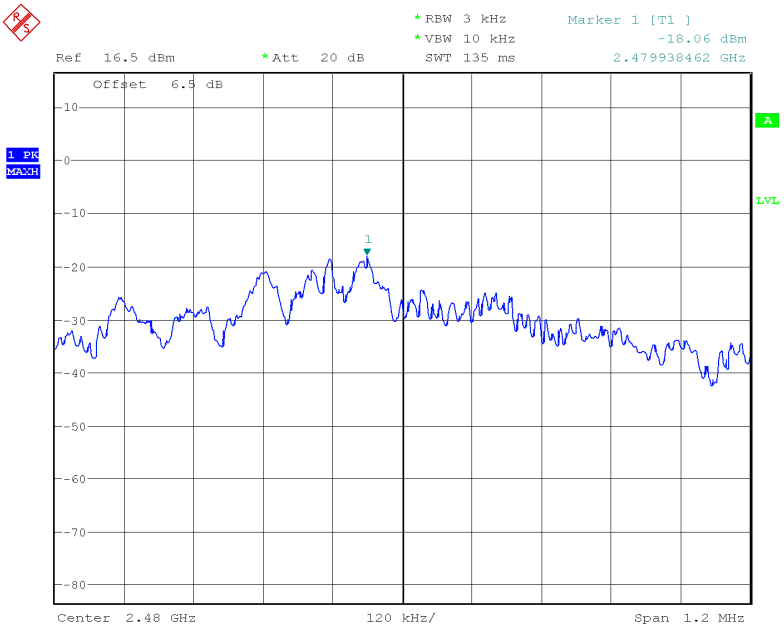

Comment: Project:RSC240925001-0 Tester:Murphy Guo
Date: 29.SEP.2024 14:20:18

### Power Spectral Density, Middle Channel




Comment: Project:RSC240925001-0 Tester:Murphy Guo
Date: 29.SEP.2024 14:18:13

## Power Spectral Density, High Channel




Comment: Project:RSC240925001-0 Tester:Murphy Guo
Date: 29.SEP.2024 14:14:58

## END OF REPORT