# CFR 47 FCC PART 22 H
# CFR 47 FCC PART 24 E
# CFR 47 FCC PART 27
# RSS-132, RSS-133, RSS-139

## TEST REPORT

*For*

**Shopify POS Go**

**MODEL NUMBER: S2001**

**FCC ID: 2AB7X-S2001**

**IC: 24244-S2001**

**REPORT NUMBER: 47900096770-14**

**ISSUE DATE: February 21, 2022**

*Prepared for*

**BBPOS International Limited(FCC)**
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**Shopify Inc(ISED)**
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*Prepared by*

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Revision History

| Rev. | Issue Date | Revisions | Revised By |
|---|---|---|---|
| V0 | 01/26/2022 | Initial Issue | |
| V1 | 02/21/2022 | Updated TCB comments | Denny Huang |

Note:
1.This test report is only published to and used by the applicant, and it is not for evidence purpose in China.
2. The measurement result for the sample received is <Pass> according to < CFR 47 FCC PART 22 H >< CFR 47 FCC PART 24 E>< CFR 47 FCC PART 27 >< RSS-132, RSS-133, RSS-139>when <Accuracy Method> decision rule is applied.

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# 1. ATTESTATION OF TEST RESULTS

**Applicant Information(FCC)**

Company Name: BBPOS International Limited
Address: Suite 1903-04, Tower 2, Nina Tower, 8 Yeung Uk Road, Tsuen Wan, NT, Hong Kong

**Manufacturer Information(FCC)**

Company Name: BBPOS International Limited
Address: Suite 1903-04, Tower 2, Nina Tower, 8 Yeung Uk Road, Tsuen Wan, NT, Hong Kong

**Applicant Information(ISED)**

Company Name: Shopify Inc
Address: 150 Elgin Street Ottawa ON K2P1L4 Canada

**Manufacturer Information(ISED)**

Company Name: BBPOS International Limited
Address: Suite 1903-04, Tower 2, Nina Tower, 8 Yeung Uk Road, Tsuen Wan, NT, Hong Kong
Brand: Shopify
Sample Status: Normal
Sample ID: 4378334
Date of Tested: Aug 23, 2021 ~ Jan 21, 2022

| APPLICABLE STANDARDS | |
|---|---|
| **STANDARD** | **TEST RESULTS** |
| CFR 47 FCC PART 22 H | PASS |
| CFR 47 FCC PART 24 E | PASS |
| CFR 47 FCC PART 27 | PASS |
| CFR 47 FCC PART 90S | PASS |
| RSS-132, RSS-133, RSS-139 | PASS |

Prepared By:

Denny Huang
Project Engineer

Checked By:

Shawn Wen
Laboratory Leader

Approved By:

Stephen Guo
Laboratory Manager

## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.26-2015, 971168 D01 Power Meas License Digital Systems v03r01, 971168 D02 Misc Rev Approv License Devices v02r01, 412172 D01 v01r01 Determining ERP and EIRP, CFR 47 FCC Part 2, Part 22 H, Part 24 E, Part 27, Part 90, RSS-132, RSS-133, RSS-139

## 3. FACILITIES AND ACCREDITATION

| | |
|---|---|
| Accreditation Certificate | **A2LA (Certificate No.: 4102.01)**<br>UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been assessed and proved to be in compliance with A2LA.<br>**FCC (FCC Designation No.: CN1187)**<br>UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. Has been recognized to perform compliance testing on equipment subject to the Commission's Delcaration of Conformity (DoC) and Certification rules<br>**ISED (Company No.: 21320)**<br>UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been registered and fully described in a report filed with ISED. The Company Number is 21320 and the test lab Conformity Assessment Body Identifier (CABID) is CN0046.<br>**VCCI (Registration No.: G-20019, R-20004, C-20012 and T-20011)**<br>UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been assessed and proved to be in compliance with VCCI, the Membership No. is 3793.<br>Facility Name:<br>Chamber D, the VCCI registration No. is G-20019 and R-20004<br>Shielding Room B , the VCCI registration No. is C-20012 and T-20011 |

Note 1: All tests measurement facilities use to collect the measurement data are located at Building 10, Innovation Technology Park, Song Shan Lake Hi tech Development Zone, Dongguan, 523808, China

Note 2: The test anechoic chamber in UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch had been calibrated and compared to the open field sites and the test anechoic chamber is shown to be equivalent to or worst case from the open field site.

Note 3: For below 30 MHz, lab had performed measurements at test anechoic chamber and comparing to measurements obtained on an open field site. And these measurements below 30 MHz had been correlated to measurements performed on an OFS.

# 4. CALIBRATION AND UNCERTAINTY

## 4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations and is traceable to recognize national standards.

## 4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

| Test Item | Uncertainty |
|---|---|
| Conduction emission | 3.62 dB |
| Radiated Emission (Included Fundamental Emission) (9 kHz ~ 30 MHz) | 2.2 dB |
| Radiated Emission (Included Fundamental Emission) (30 MHz ~ 1 GHz) | 4.00 dB |
| Radiated Emission (Included Fundamental Emission) (1 GHz to 40 GHz) | 5.78 dB (1 GHz-18 GHz) |
| | 5.23dB (18 GHz-26 GHz) |
| | 5.64 dB (26 GHz-40 GHz) |
| Bandwidth | 1.1 % |
| Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of k=2. | |

# 5. EQUIPMENT UNDER TEST

## 5.1. DESCRIPTION OF EUT

| | |
|---|---|
| EUT Name | POS Equipment |
| EUT Description | The Equipment Under Test (EUT) is a POS device which supports BT/WLAN and Cellular function. |
| Model | S2001 |
| Series Model | N/A |
| Model Difference | N/A |
| Ratings | DC 5 V, 1.5 A & DC 9 V, 1.5 A |
| Battery | 3960 mAh, 3.85 V |

| Item | Accessory | Brand Name | Model Name | Description |
|---|---|---|---|---|
| 1 | Type-C Cable | N/A | N/A | Length: 1.0 m<br>No Ferrite Core<br>shield |

## 5.2. TEST CHANNEL CONFIGURATION

| Band | Mode | Low | Middle | High |
|---|---|---|---|---|
| GSM850 | GRPS/EGPRS | 128 | 190 | 251 |
| | | 824.2 MHz | 836.6 MHz | 848.8 MHz |
| GSM1900 | GRPS/EGPRS | 512 | 661 | 810 |
| | | 1850.2 MHz | 1880.0 MHz | 1909.8 MHz |
| WCDMA Band 4 | HSDPA/HSUPA | 1312 | 1413 | 1513 |
| | | 1712.4 MHz | 1732.6 MHz | 1752.6 MHz |
| WCDMA Band 2 | HSDPA/HSUPA | 9262 | 9400 | 9538 |
| | | 1852.4 MHz | 1880.0 MHz | 1907.6 MHz |
| WCDMA Band 5 | HSDPA/HSUPA | 4132 | 4183 | 4233 |
| | | 826.4 MHz | 836.6 MHz | 846.6 MHz |

## 5.3. MAXIMUM AVERAGE OUTPUT POWER

**GSM 850**

| Part 22H | | | | | | |
|---|---|---|---|---|---|---|
| ERP Limit(W) | 7.00 | | | | | |
| Antenna Gain (dBi) | -0.64 | | | | | |
| Mode | Ch | Freq(MHz) | Conducted Average power (dBm) | ERP (W) | 99% OBW (MHz) | Emission Designator |
| GRPS(GMSK) | 190 | 836.6 | 32.76 | 0.99 | 0.247 | 247KGXW |
| EGPRS(8PSK) | 128 | 824.2 | 26.04 | 0.21 | 0.234 | 234KG7W |

| RSS-132 | | | | | | |
|---|---|---|---|---|---|---|
| EIRP Limit(W) | 11.5 | | | | | |
| Antenna Gain (dBi) | -0.64 | | | | | |
| Mode | Ch | Freq(MHz) | Conducted Average power (dBm) | EIRP (W) | 99% OBW (MHz) | Emission Designator |
| GRPS(GMSK) | 190 | 836.6 | 32.76 | 1.63 | 0.247 | 247KGXW |
| EGPRS(8PSK) | 128 | 824.2 | 26.04 | 0.35 | 0.234 | 234KG7W |

**GSM 1900**

| Part 24/RSS-133 | | | | | | |
|---|---|---|---|---|---|---|
| EIRP Limit(W) | 2 | | | | | |
| Antenna Gain (dBi) | -0.03 | | | | | |
| Mode | Ch | Freq(MHz) | Conducted Average power (dBm) | EIRP (W) | 99% OBW (kHz) | Emission Designator |
| GRPS(GMSK) | 661 | 1880.0 | 29.25 | 0.84 | 0.245 | 245KGXW |
| EGPRS(8PSK) | 512 | 1850.2 | 25.05 | 0.32 | 0.234 | 234KG7W |

**WCDMA Band2**

| Part 24/RSS-133 | | | | | | |
|---|---|---|---|---|---|---|
| EIRP Limit(W) | 2 | | | | | |
| Antenna Gain (dBi) | -0.03 | | | | | |
| Mode | Ch | Freq(MHz) | Conducted Average power (dBm) | EIRP (W) | 99% OBW (MHz) | Emission Designator |
| Rel99 | 9400 | 1880.0 | 21.75 | 0.15 | 4.140 | 4M14F9W |
| HSDPA | 9262 | 1852.4 | 20.76 | 0.12 | 4.184 | 4M18F9W |
| HSUPA | 9400 | 1880.0 | 20.72 | 0.12 | 4.170 | 4M17F9W |

**WCDMA Band4**

| Part 27/RSS-139 | | | | | | |
|---|---|---|---|---|---|---|
| EIRP Limit(W) | 1 | | | | | |
| Antenna Gain (dBi) | -0.18 | | | | | |
| Mode | Ch | Freq(MHz) | Conducted Average power (dBm) | EIRP (W) | 99% OBW (MHz) | Emission Designator |
| Rel99 | 1413 | 1732.6 | 22.99 | 0.19 | 4.127 | 4M13F9W |

| | | | | | | |
|---|---|---|---|---|---|---|
| HSDPA | 1413 | 1732.6 | 21.97 | 0.15 | 4.128 | 4M13F9W |
| HSUPA | 1513 | 1752.6 | 22.04 | 0.15 | 4.154 | 4M15F9W |

**WCDMA Band5**

| Part 22 | | | | | | |
|---|---|---|---|---|---|---|
| ERP Limit(W) | 7.0 | | | | | |
| Antenna Gain (dBi) | -0.64 | | | | | |
| Mode | Ch | Freq(MHz) | Conducted Average power (dBm) | ERP (W) | 99% OBW (MHz) | Emission Designator |
| Rel99 | 4233 | 846.6 | 24.01 | 0.13 | 4.136 | 4M14F9W |
| HSDPA | 4233 | 846.6 | 22.99 | 0.10 | 4.134 | 4M13F9W |
| HSUPA | 4233 | 846.6 | 23.09 | 0.11 | 4.165 | 4M17F9W |

| RSS-132 | | | | | | |
|---|---|---|---|---|---|---|
| EIRP Limit(W) | 11.5 | | | | | |
| Antenna Gain (dBi) | -0.64 | | | | | |
| Mode | Ch | Freq(MHz) | Conducted Average power (dBm) | EIRP (W) | 99% OBW (MHz) | Emission Designator |
| Rel99 | 4233 | 846.6 | 24.01 | 0.22 | 4.136 | 4M14F9W |
| HSDPA | 4233 | 846.6 | 22.99 | 0.17 | 4.134 | 4M13F9W |
| HSUPA | 4233 | 846.6 | 23.09 | 0.18 | 4.165 | 4M17F9W |

## 5.4. WORST-CASE CONFIGURATION AND MODE

The radiated spurious emissions measurements were carried out in semi-anechoic chamber with 3-meter test range, and EUT was investigated in three orthogonal orientations X, Y and Z. It was determined that X orientation was the worst-case orientation.

Radiated spurious emissions were investigated below 30 MHz, 30 MHz - 1 GHz and above 1 GHz. There were no emissions found on below 1GHz and above 18 GHz, the emissions between 1 GHz – 18 GHz were tested the highest transmitting power channel and the worse configuration.

For GSM850/1900, GPRS worst results are shown in test report.
For WCDMA, HSDPA worst results are shown in test report.

## 5.5. DESCRIPTION OF AVAILABLE ANTENNAS

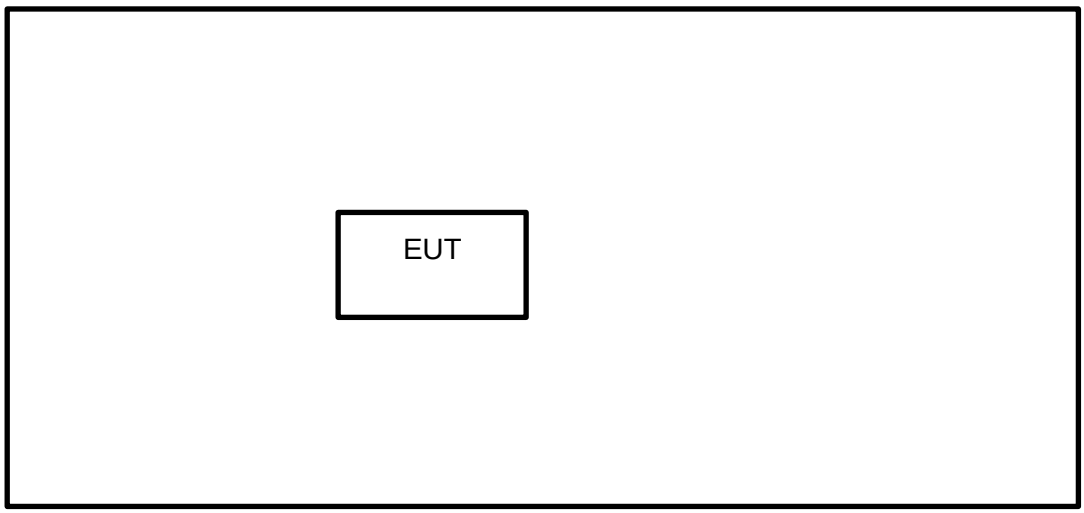
| Antenna | Band | Antenna Type | MAX Antenna Gain (dBi) |
|---|---|---|---|
| 1 | GSM850 | PIFA | -0.64 |
| 1 | GSM1900 | PIFA | -0.03 |
| 1 | WCDMA Band 2 | PIFA | -0.03 |
| 1 | WCDMA Band 4 | PIFA | -0.18 |
| 1 | WCDMA Band 5 | PIFA | -0.64 |

| Band | Transmit and Receive Mode | Description |
|---|---|---|
| GSM850 | ☒1TX, 1RX | Antenna 1 can be used as transmitting/receiving antenna. |
| GSM1900 | ☒1TX, 1RX | Antenna 1 can be used as transmitting/receiving antenna. |
| WCDMA Band 2 | ☒1TX, 1RX | Antenna 1 can be used as transmitting/receiving antenna. |
| WCDMA Band 4 | ☒1TX, 1RX | Antenna 1 can be used as transmitting/receiving antenna. |
| WCDMA Band 5 | ☒1TX, 1RX | Antenna 1 can be used as transmitting/receiving antenna. |

Note: The value of the antenna gain was declared by customer.

## 5.6. DESCRIPTION OF TEST SETUP

SETUP DIAGRAM FOR TESTS



# 6. MEASURING INSTRUMENT AND SOFTWARE USED

| Antenna Terminal Test | | | | | | |
|---|---|---|---|---|---|---|
| Instrument | | | | | | |
| Used | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Next Cal. |
| ☑ | Spectrum Analyzer | R&S | FSW40 | S421035420 | Oct.30, 2021 | Oct.29, 2022 |
| ☑ | Wideband Radio Communication Tester | R&S | CMW500 | 155523 | Oct.30, 2021 | Oct.29, 2022 |
| ☑ | DC Power Supply | Array | 3662A | A1512015 | Oct.30, 2021 | Oct.29, 2022 |
| Software | | | | | | |
| Used | Description | | Manufacturer | Name | | Version |
| ☑ | Tonsend Cellular Test System | | Tonsend | JS1120 RF Auto Test System | | 2.6.9.0826 |
| **Radiated Test** | | | | | | |
| Instrument | | | | | | |
| Used | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Next Cal. |
| ☑ | MXE EMI Receiver | KESIGHT | N9038A | MY56400036 | Oct.30, 2021 | Oct.29, 2022 |
| ☑ | Hybrid Log Periodic Antenna | TDK | HLP-3003C | 130960 | Aug.02, 2021 | Aug.01, 2024 |
| ☑ | Preamplifier | HP | 8447D | 2944A09099 | Oct.30, 2021 | Oct.29, 2022 |
| ☑ | EMI Measurement Receiver | R&S | ESR26 | 101377 | Oct.30, 2021 | Oct.29, 2022 |
| ☑ | Horn Antenna | TDK | HRN-0118 | 130939 | July 20, 2021 | July 19, 2024 |
| ☑ | High Gain Horn Antenna | Schwarzbeck | BBHA-9170 | 691 | July 20, 2021 | July 19, 2024 |
| ☑ | Preamplifier | TDK | PA-02-0118 | TRS-305-00066 | Oct.31, 2021 | Oct.30, 2022 |
| ☑ | Preamplifier | TDK | PA-02-2 | TRS-307-00003 | Oct.31, 2021 | Oct.30, 2022 |
| ☑ | Loop antenna | Schwarzbeck | 1519B | 00008 | Jan.17,2022 | Jan.17,2025 |
| ☑ | High Pass Filter | Wi | WHKX10-2700-3000-18000-40SS | 23 | Oct.31, 2021 | Oct.30, 2022 |
| Software | | | | | | |
| Used | Description | | Manufacturer | Name | | Version |
| ☑ | Test Software for Radiated disturbance | | Farad | EZ-EMC | | Ver. UL-3A1 |

# 7. ANTENNA TERMINAL TEST RESULTS

## 7.1. EFFECTIVE (ISOTROPIC) RADIATED POWER OF TRANSMITTER

**RULE PART(S)**

FCC: §2.1046, §22.913, §24.232, §27.50
RSS-132, RSS-133, RSS-139

**LIMITS**

22.913(a) The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.
24.232(c) Mobile/portable stations are limited to 2 watts e.i.r.p. peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.
27.50(c) Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP.
27.50(d) Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watts EIRP.
27.50(h) Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.
In addition, when the transmitter power is measured in terms of average value, the peak-to-average ratio of the power shall not exceed 13 dB.

RSS-132
The transmitter output power shall be measured in terms of average power. The equivalent isotropically radiated power (e.i.r.p.) for mobile equipment shall not exceed 11.5 watts.

In addition, the peak-to-average power ratio (PAPR) of the transmitter shall not exceed 13 dB for more than 0.1% of the time using a signal corresponding to the highest PAPR during periods of continuous transmission.

RSS-133
The equivalent isotropically radiated power (e.i.r.p.) for transmitters shall not exceed the limits 2W.
In addition, the transmitter's peak-to-average power ratio (PAPR) shall not exceed 13 dB for more than 0.1% of the time using a signal corresponding to the highest PAPR during periods of continuous transmission.

RSS-139
The equivalent isotropically radiated power (e.i.r.p.) for mobile and portable transmitters shall not exceed one watt.
In addition, the peak to average power ratio (PAPR) of the equipment shall not exceed 13 dB for more than 0.1% of the time, using a signal that corresponds to the highest PAPR during periods of continuous transmission.

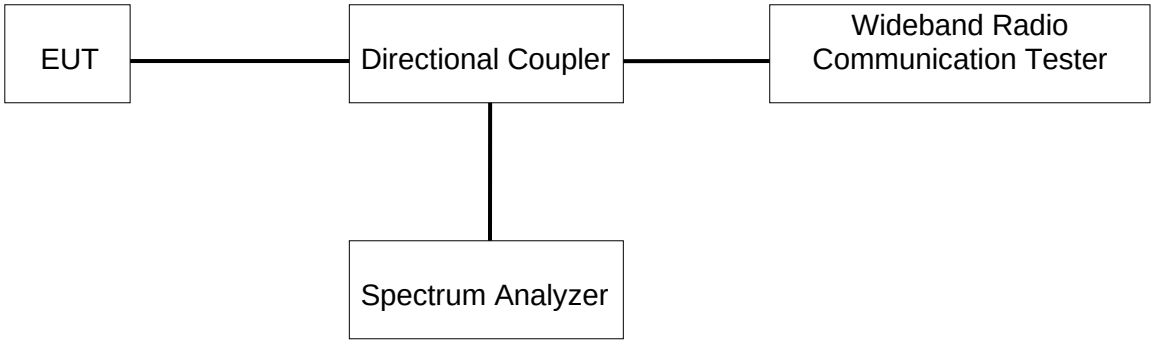
**TEST PROCEDURE**

Refer to ANSI C63.26:2015 and KDB 971168 D01 Section 5.6
ERP/ EIRP = PMeas + GT − LC
where:

ERP or EIRP = effective or equivalent isotropically radiated power, respectively (expressed in the same units as PMeas, typically dBW or dBm);
PMeas = measured transmitter output power or PSD, in dBm or dBW;
GT = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);
LC = signal attenuation in the connecting cable between the transmitter and antenna, in dB

The transmitter has a maximum radiated ERP / EIRP output powers as follows:

**TEST SETUP**




**TEST ENVIRONMENT**

| | | | |
|---|---|---|---|
| Temperature | 22.1°C | Relative Humidity | 54.6% |
| Atmosphere Pressure | 101kPa | Test Voltage | |

**RESULTS**

**GSM 850**

| Band | | Conducted Average Power (dBm) | | |
|---|---|---|---|---|
| | | Channel | Channel | Channel |
| | | 128 | 190 | 251 |
| GPRS850 | TestSlot 1 | 32.45 | **32.76** | 32.73 |
| | TestSlot 2 | 31.17 | 31.42 | 31.49 |
| | TestSlot 3 | 30.03 | 30.3 | 30.45 |
| | TestSlot 4 | 27.78 | 27.98 | 28.22 |
| EGPRS850 | TestSlot 1 | 26.02 | 25.81 | **26.04** |
| | TestSlot 2 | 25.8 | 25.71 | 25.97 |
| | TestSlot 3 | 24.61 | 24.49 | 24.79 |
| | TestSlot 4 | 23.36 | 23.23 | 23.51 |

**GSM 1900**

| Band | | Conducted Average Power (dBm) | | |
|---|---|---|---|---|
| | | Channel | Channel | Channel |
| | | 512 | 661 | 810 |
| GPRS1900 | TestSlot 1 | 29.19 | **29.25** | 29.19 |

| | | | | |
|---|---|---|---|---|
| | TestSlot 2 | 27.96 | 28.04 | 26.29 |
| | TestSlot 3 | 26.09 | 26.23 | 28.05 |
| | TestSlot 4 | 24.78 | 25.08 | 25.16 |
| EGPRS1900 | TestSlot 1 | **25.05** | 24.93 | 25.03 |
| | TestSlot 2 | 23.74 | 23.83 | 23.93 |
| | TestSlot 3 | 22.51 | 22.69 | 22.83 |
| | TestSlot 4 | 21.3 | 21.47 | 21.55 |

**WCDMA Band2**

| UMTS 1900MHz (Band II) | | Average Power (dBm) | | |
|---|---|---|---|---|
| | | 9262CH | 9400CH | 9538CH |
| WCDMA | 12.2kbps RMC | 21.62 | **21.75** | 21.65 |
| | 64kbps RMC | 21.7 | 21.74 | 21.64 |
| | 144kbps RMC | 20.81 | 20.79 | 20.71 |
| | 384kbps RMC | 21.54 | 21.52 | 21.43 |
| HSDPA | Subtest 1 | 20.68 | **20.76** | 20.62 |
| | Subtest 2 | 20.31 | 20.3 | 20.19 |
| | Subtest 3 | 20.19 | 20.25 | 20.13 |
| | Subtest 4 | 20.22 | 20.27 | 20.13 |
| HSUPA | Subtest 1 | 20.43 | **20.72** | 20.5 |
| | Subtest 2 | 19.19 | 19.21 | 19.02 |
| | Subtest 3 | 19.64 | 19.72 | 19.62 |
| | Subtest 4 | 18.56 | 18.66 | 18.56 |
| | Subtest 5 | 20.72 | 20.74 | 20.61 |

**WCDMA Band4**

| UMTS 1700MHz (Band IV) | | Average Power (dBm) | | |
|---|---|---|---|---|
| | | 1312CH | 1413CH | 1513CH |
| WCDMA | 12.2kbps RMC | 22.62 | **22.99** | 22.98 |
| | 64kbps RMC | 22.61 | 22.95 | 22.97 |
| | 144kbps RMC | 22.57 | 22.91 | 22.91 |
| | 384kbps RMC | 22.54 | 22.90 | 22.88 |
| HSDPA | Subtest 1 | 21.59 | **21.97** | 21.97 |
| | Subtest 2 | 21.12 | 21.47 | 21.48 |
| | Subtest 3 | 21.11 | 21.47 | 21.46 |
| | Subtest 4 | 21.09 | 21.47 | 21.46 |
| HSUPA | Subtest 1 | 21.42 | 21.79 | 21.79 |
| | Subtest 2 | 20.18 | 20.51 | 20.49 |
| | Subtest 3 | 20.70 | 20.95 | 20.91 |
| | Subtest 4 | 19.59 | 19.91 | 20.00 |
| | Subtest 5 | 21.68 | 22.00 | **22.04** |

**WCDMA Band5**

| UMTS 850MHz (Band V) | | Average Power (dBm) | | |
|---|---|---|---|---|
| | | 4132CH | 4182CH | 4233CH |
| WCDMA | 12.2kbps RMC | 23.58 | 23.89 | **24.01** |
| | 64kbps RMC | 23.57 | 23.87 | 24.00 |
| | 144kbps RMC | 23.51 | 23.82 | 23.98 |
| | 384kbps RMC | 23.49 | 23.78 | 23.97 |
| HSDPA | Subtest 1 | 22.54 | 22.84 | **22.99** |
| | Subtest 2 | 22.05 | 22.35 | 22.52 |
| | Subtest 3 | 22.05 | 22.36 | 22.52 |
| | Subtest 4 | 22.05 | 22.35 | 22.53 |
| HSUPA | Subtest 1 | 22.32 | 22.63 | 22.73 |
| | Subtest 2 | 20.96 | 21.43 | 21.54 |
| | Subtest 3 | 21.62 | 21.85 | 22.05 |
| | Subtest 4 | 20.38 | 20.83 | 20.92 |
| | Subtest 5 | 22.47 | 22.78 | **23.09** |

## 7.2. PEAK TO AVERAGE RADIO

**LIMITS**

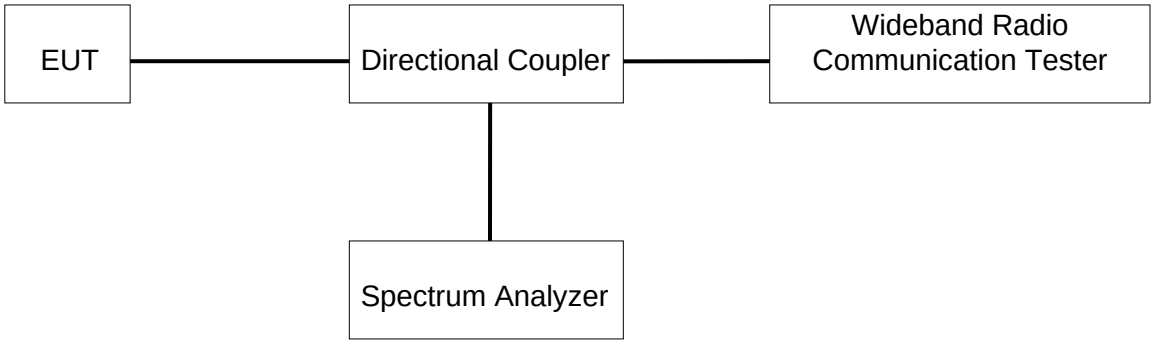
In addition, when the transmitter power is measured in terms of average value, the peak-to-average ratio of the power shall not exceed 13 dB.

**TEST PROCEDURE**

Refer to KDB 971168 D01 Power Meas License Digital Systems v03r01;

The transmitter output was connected to a CMW500 Test Set and configured to operate at maximum power. The PAR was measured on the Spectrum Analyzer.

**TEST SETUP**



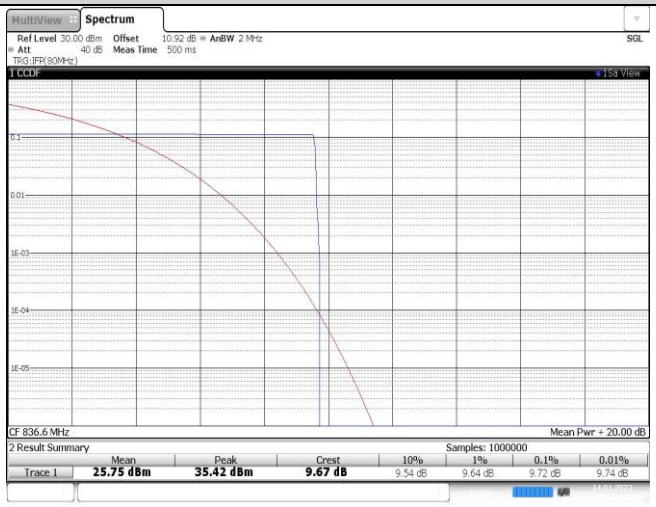

**TEST ENVIRONMENT**

| | | | |
|---|---|---|---|
| Temperature | 22.2°C | Relative Humidity | 55.3% |
| Atmosphere Pressure | 101kPa | Test Voltage | / |

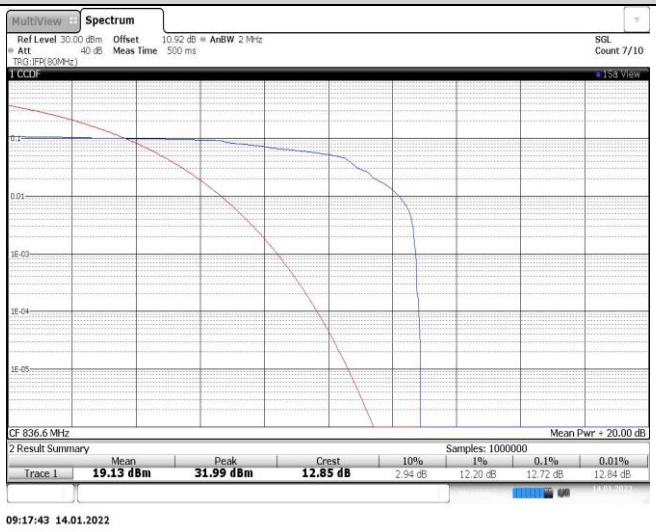
**RESULTS**

| Band | Channel | Result(dB) | Limit(dB) | Verdict |
|---|---|---|---|---|
| GPRS850 | 190 | 8.44 | 13 | PASS |
| EGPRS850 | 190 | 12.72 | 13 | PASS |
| GPRS1900 | 661 | 9.8 | 13 | PASS |
| EGPRS1900 | 661 | 12.72 | 13 | PASS |

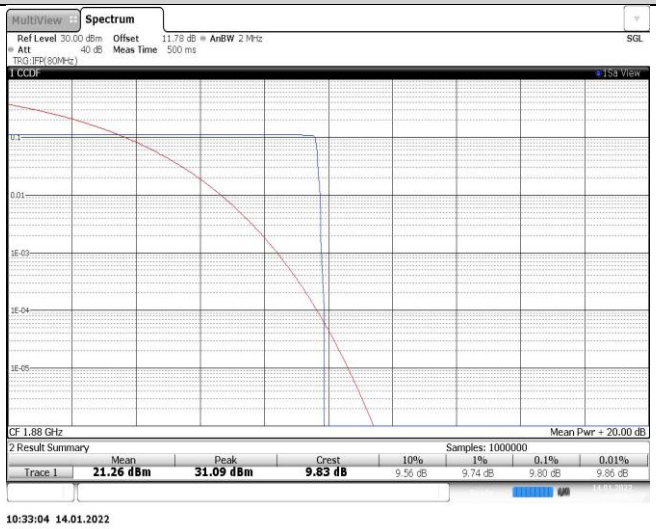
GPRS850-190



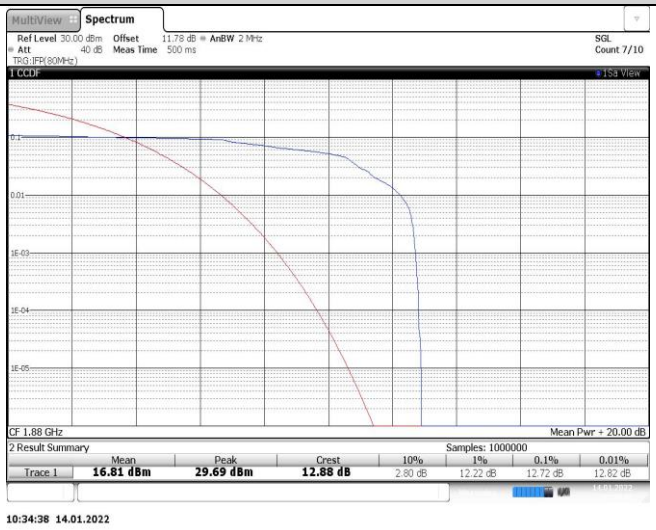

EGPRS850-190




GPRS1900-661



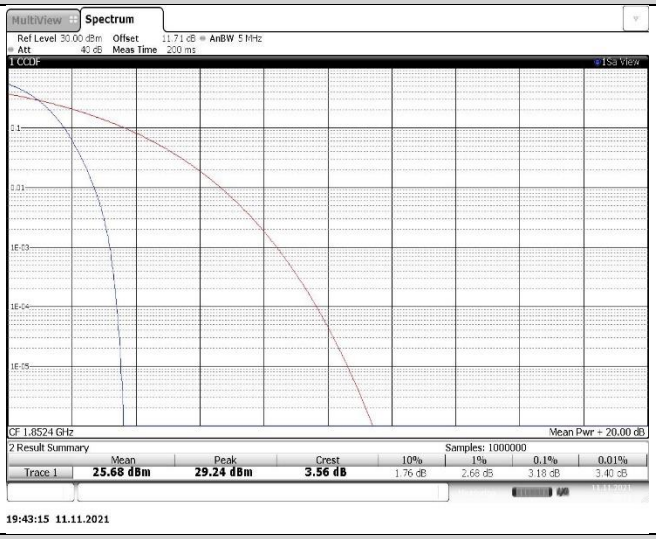
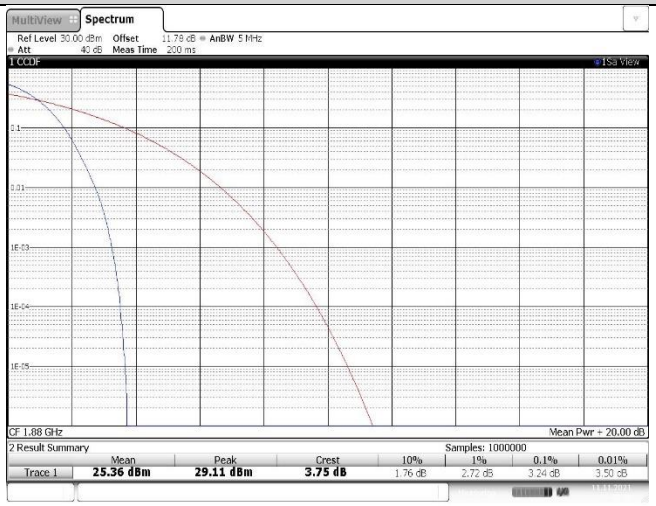
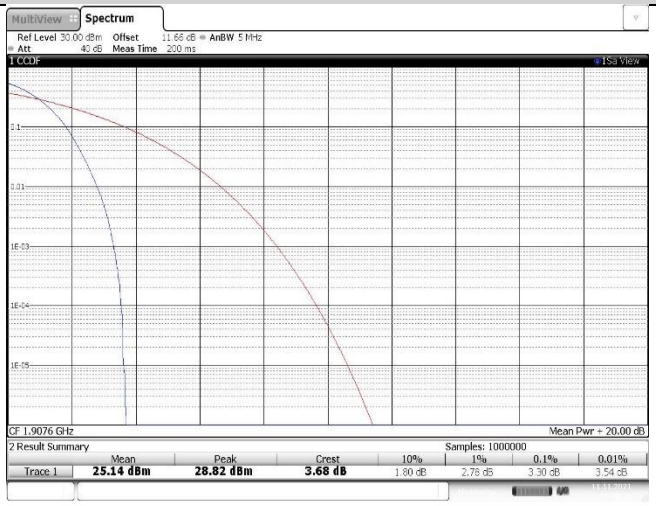
EGPRS1900-661



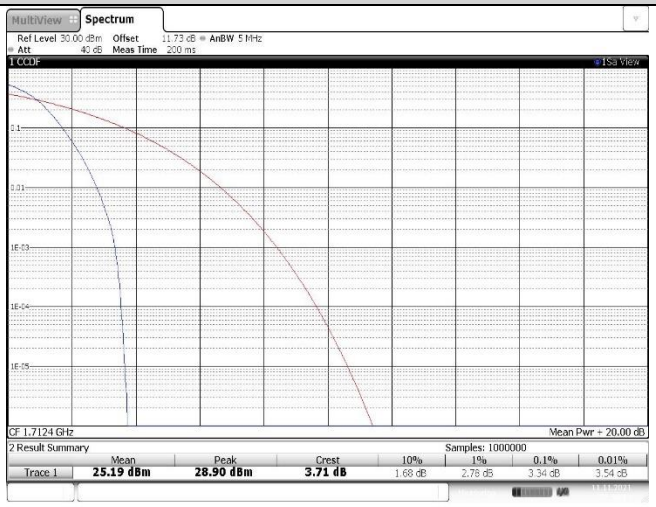

WCDMA

| Band | Channel | SubTest | Peak-to-Average Ratio(dB) | Limit(dB) | Verdict |
|---|---|---|---|---|---|
| Band2 | 9400 | Rel | 3.56 | 13 | PASS |
| | | HSDPA | 3.75 | 13 | PASS |
| | | HSUPA | 3.68 | 13 | PASS |
| Band4 | 1413 | Rel | 3.71 | 13 | PASS |
| | | HSDPA | 3.53 | 13 | PASS |
| | | HSUPA | 3.55 | 13 | PASS |
| Band5 | 4183 | Rel | 3.57 | 13 | PASS |
| | | HSDPA | 3.54 | 13 | PASS |
| | | HSUPA | 3.52 | 13 | PASS |

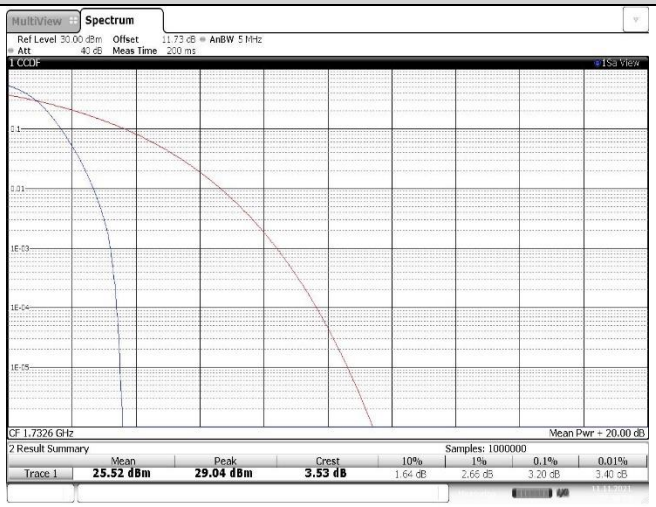
HSDPA

| Band2-9400-Rel |
| --- |
|  |
| Band2-9400-HSDPA |
|  |
| Band2-9400-HSUPA |
|  |

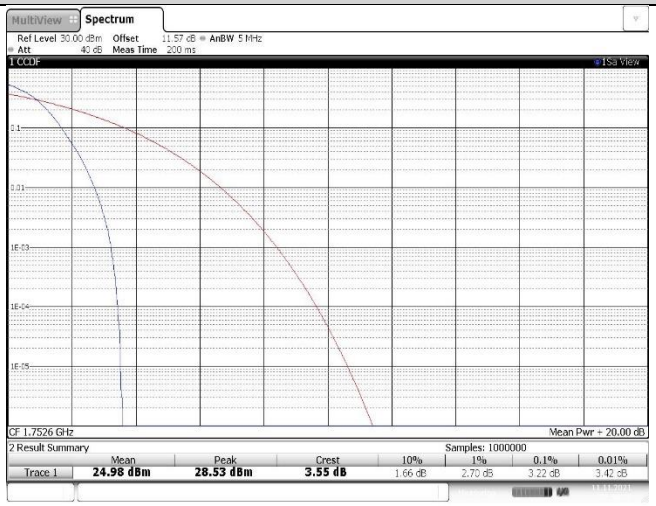
## Band4-1413-Rel99



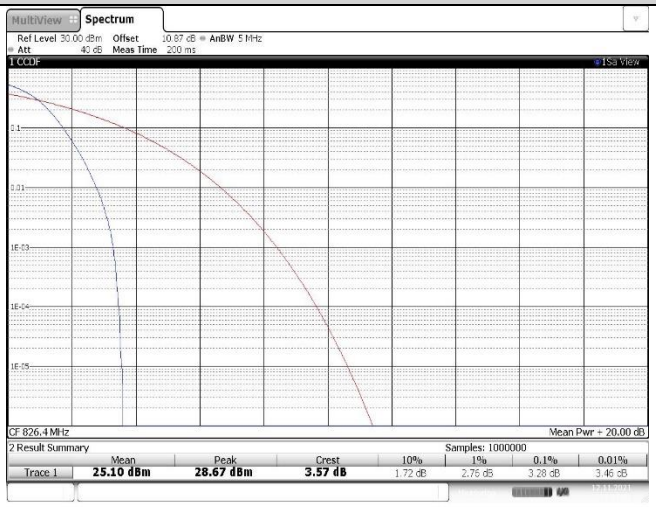

## Band4-1413-HSDPA



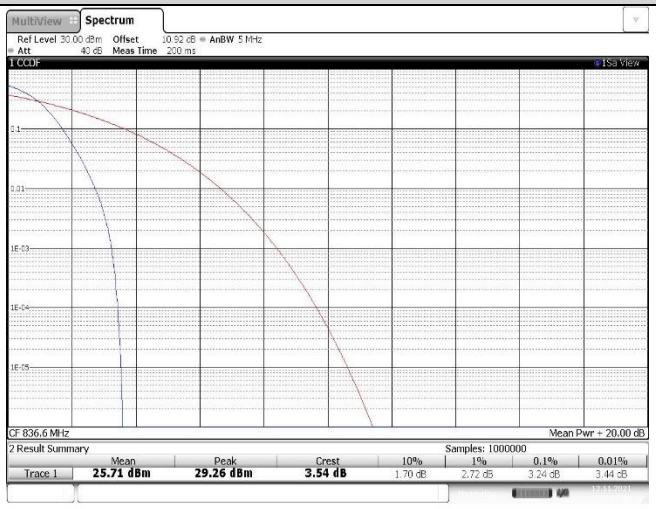

## Band4-1413-HSUPA



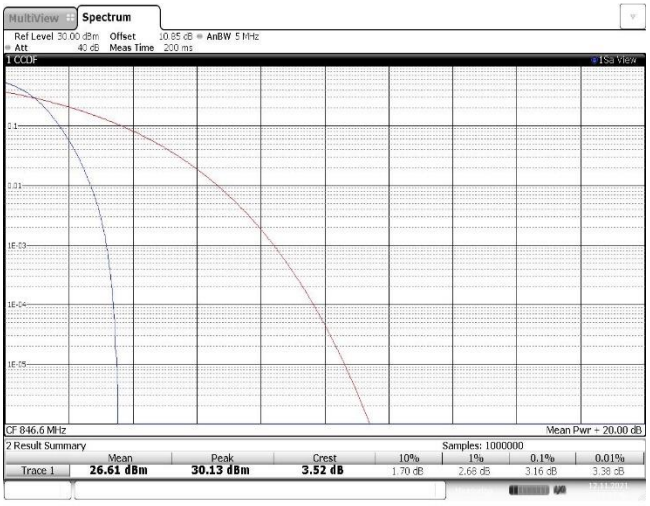
## Band5-4183-Rel99




## Band5-4183-HSDPA




## Band5-4183-HSUPA



## 7.3. OCCUPIED BANDWIDTH

**RULE PART(S)**

FCC: §2.1049, RSS-132, RSS-133, RSS-139

**LIMITS**

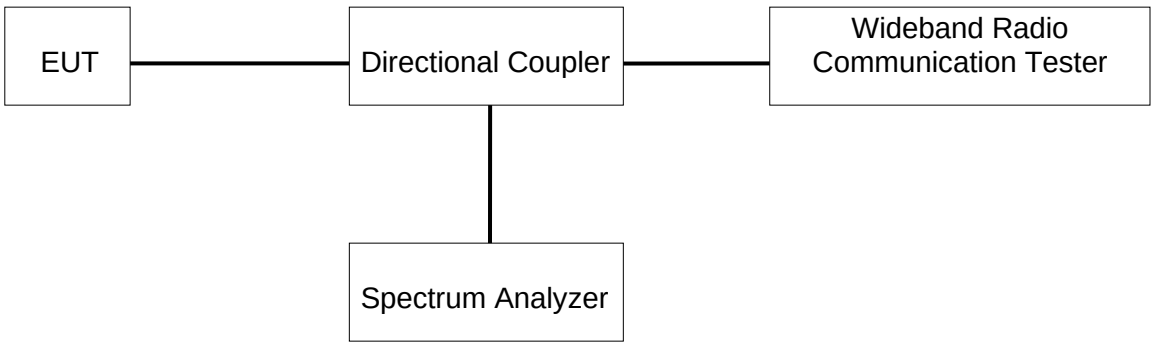
For reporting purposes only.

**TEST PROCEDURE**

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The occupied bandwidth was measured with the spectrum analyzer at the low, middle and high channel in each band. The -26dB bandwidth was also measured and recorded.

(Refer to KDB 971168 D01 Power Meas License Digital Systems v03r01)

**TEST SETUP**



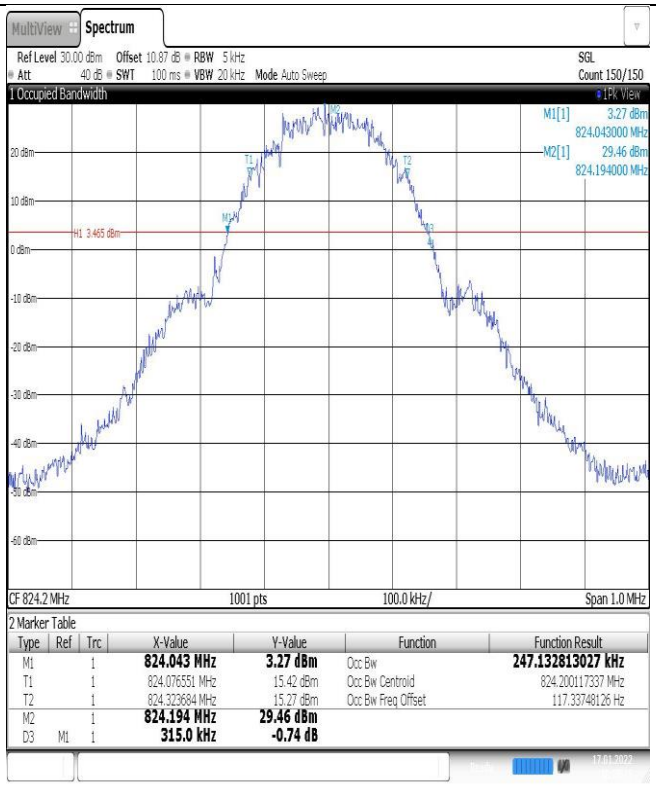

**TEST ENVIRONMENT**

| | | | |
|---|---|---|---|
| Temperature | 22.9°C | Relative Humidity | 56.3% |
| Atmosphere Pressure | 101kPa | Test Voltage | / |

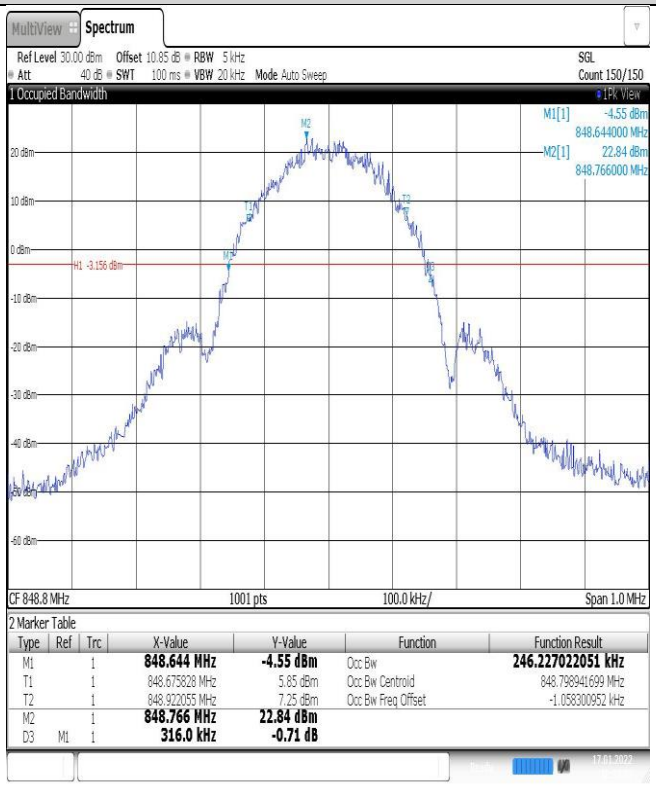
**RESULTS**

| Band | Channel | Occupied Bandwidth (MHz) | 26dB Bandwidth (MHz) | Limit (MHz) | Verdict |
|---|---|---|---|---|---|
| GPRS850 | 128 | **0.247** | 0.315 | --- | PASS |
| EGPRS850 | 251 | **0.234** | 0.285 | --- | PASS |
| GPRS1900 | 661 | **0.245** | 0.315 | --- | PASS |
| EGPRS1900 | 512 | **0.234** | 0.285 | --- | PASS |

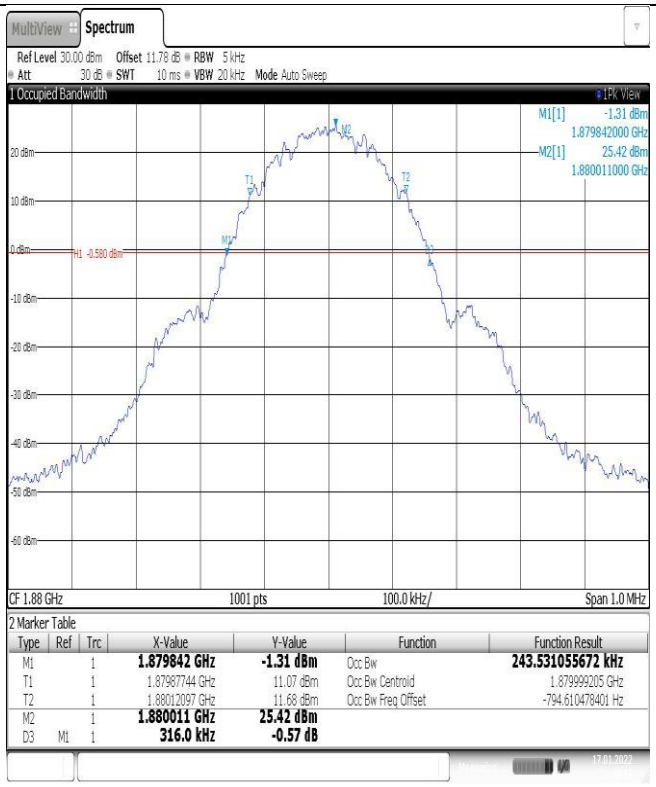
GPRS850-128-3-0.315




EGPRS850-251-8-0.316




GPRS1900-661-0-0.316

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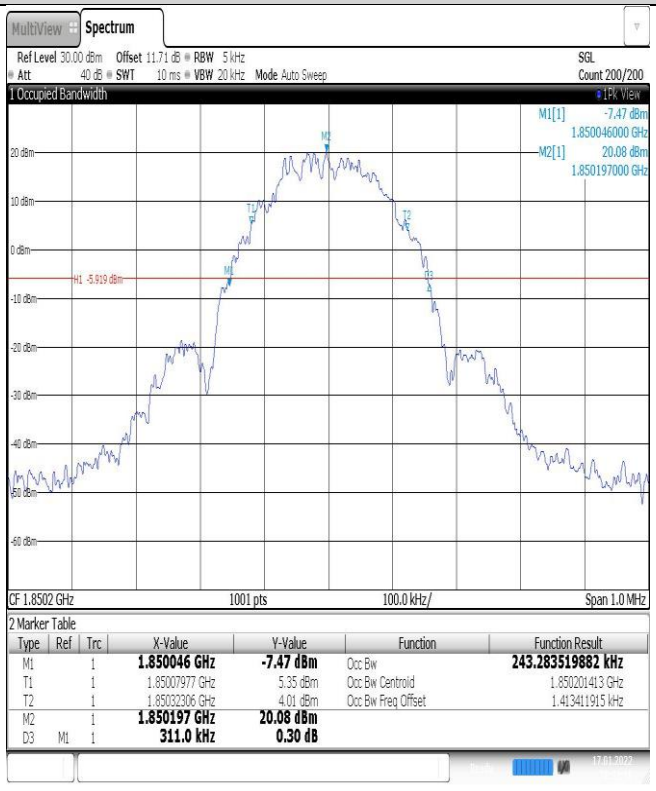
EGPRS1900-512-2-0.311

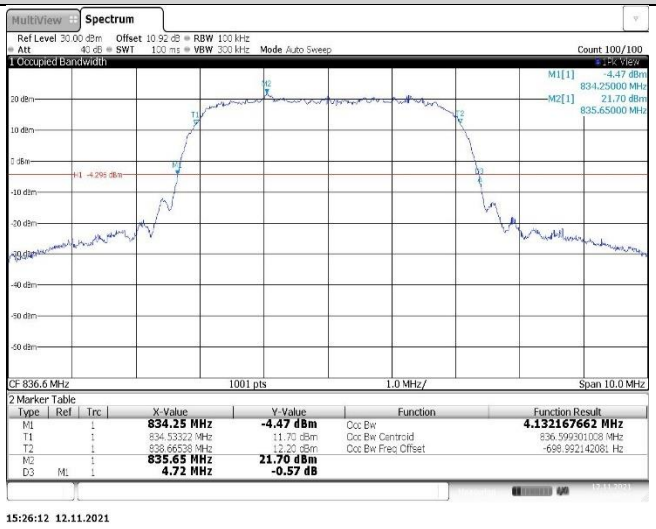



20:31:16 17.01.2022

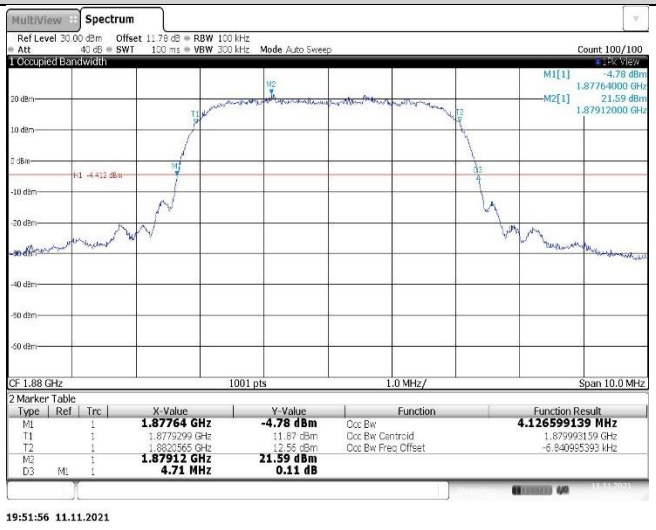
WCDMA

| Band | Channel | SubTest | Occupied Bandwidth (kHz) | 26dB Bandwidth (kHz) |
|---|---|---|---|---|
| Band2 | Mid | Rel | 4.132 | 4.720 |
| | Low | HSDPA | 4.127 | 4.710 |
| | High | HSUPA | **4.148** | 4.740 |
| Band4 | Mid | Rel | 4.118 | 4.710 |
| | Low | HSDPA | 4.126 | 4.710 |
| | Mid | HSUPA | **4.128** | 4.740 |
| Band5 | High | Rel | **4.134** | 4.720 |
| | Low | HSDPA | 4.132 | 4.740 |
| | High | HSUPA | 4.130 | 4.730 |

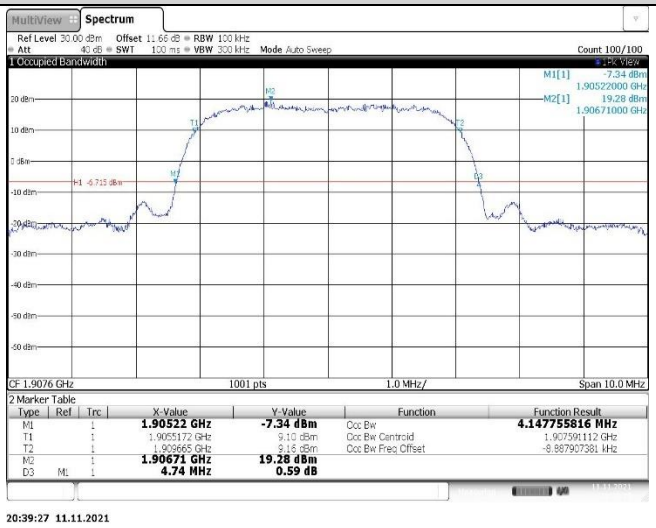
Band2-Rel



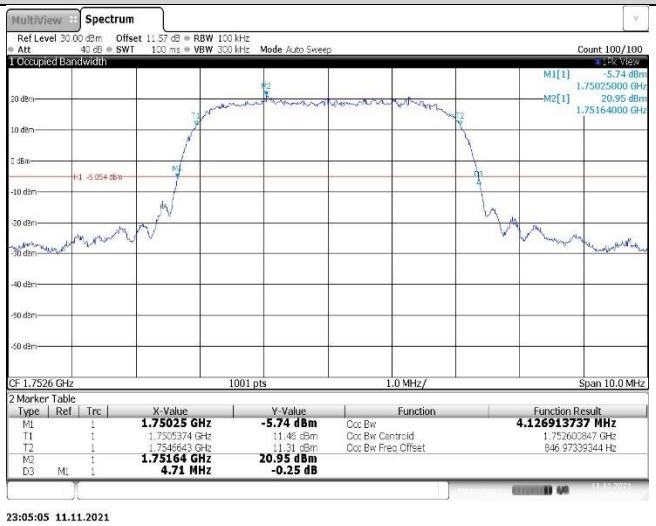

Band2-HSDPA



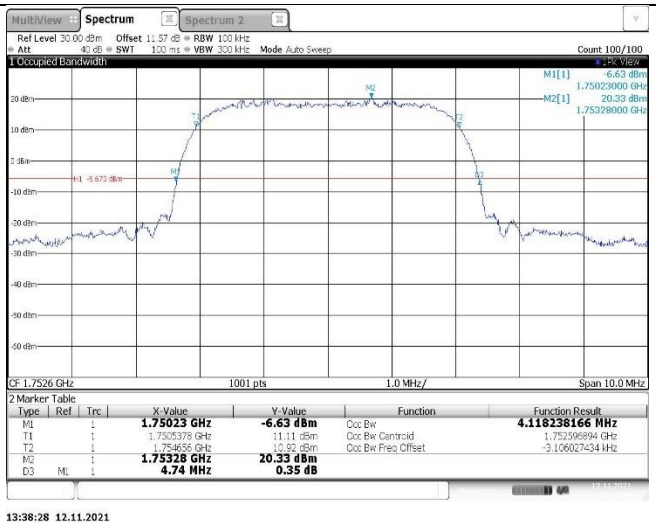
## Band2-HSUPA



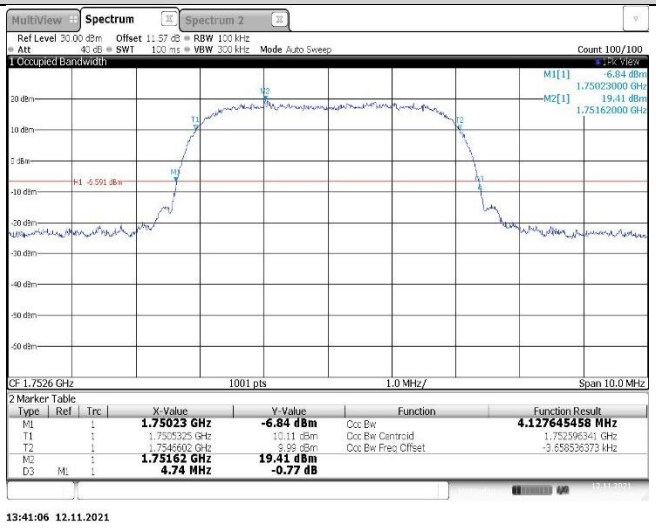

## Band4-HSDPA



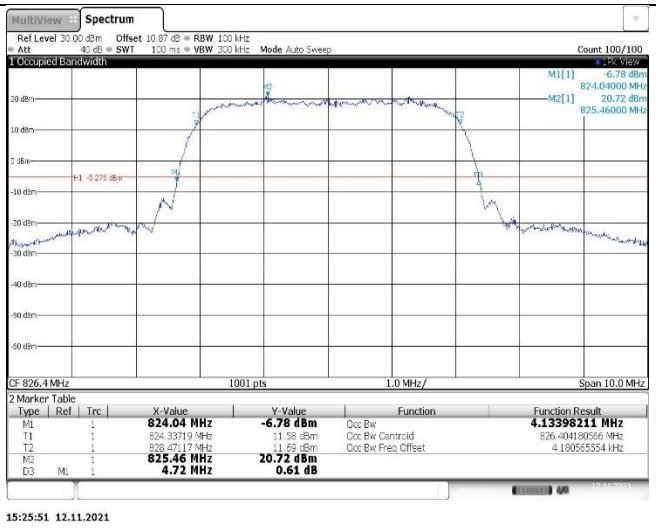

## Band4-Rel99



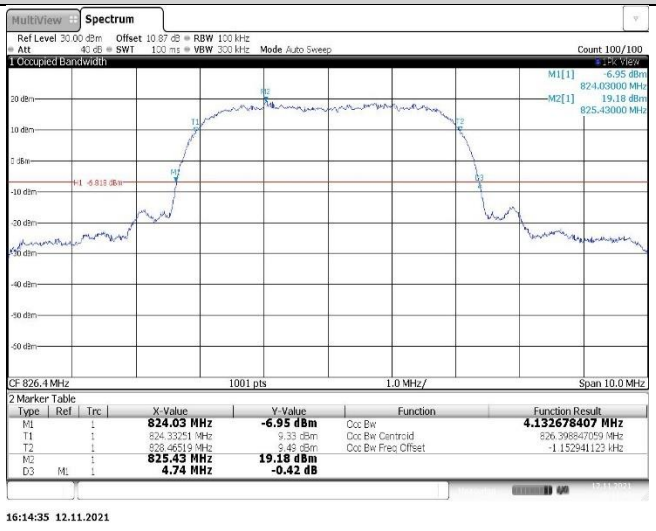

## Band4-HSUPA



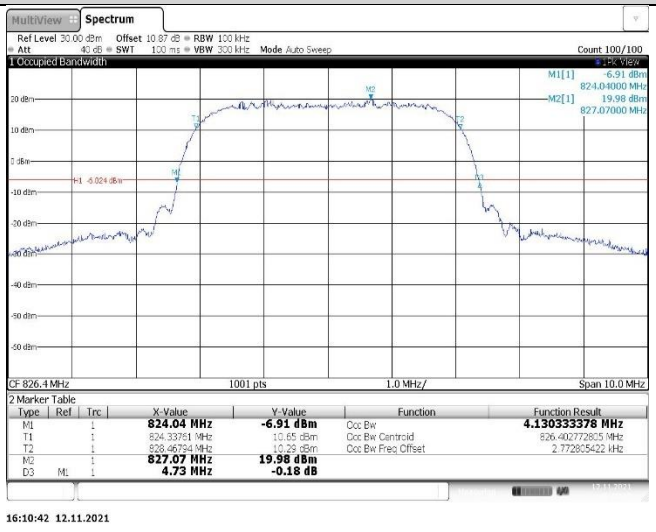

## Band5-Rel99




## Band5-HSDPA




## Band5-HSUPA



## 7.4. BAND EDGE EMISSIONS

**RULE PART(S)**

FCC §2.1051, §22.917, §24.238, §27.53, §90,
RSS-132, RSS-133,RSS-139

**LIMITS**

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

**TEST PROCEDURE**

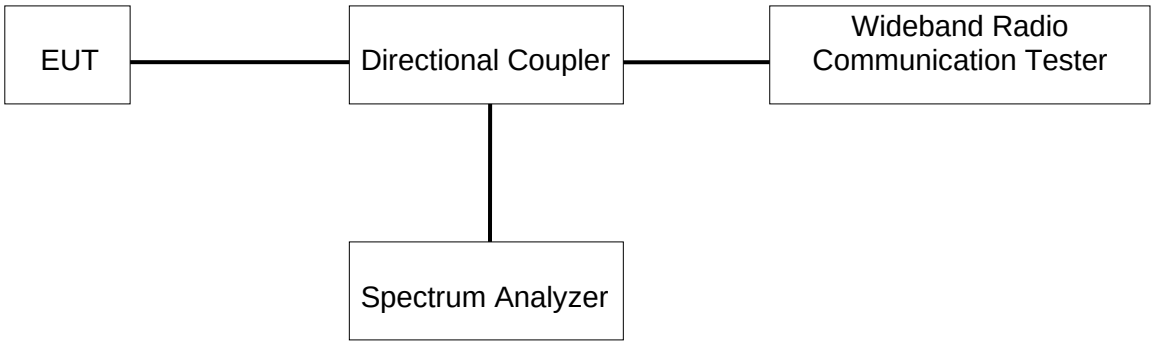
Refer to KDB 971168 D01 Power Meas License Digital Systems v03r01
The transmitter output was connected to a CMW500 Test Set and configured to operate at maximum power. The band edge emissions were measured at the required operating frequencies in each band on the Spectrum Analyzer.

a) Set the RBW = 1 ~ 1.5 % of OBW (Typically limited to a minimum RBW of 1% of the OBW)
b) Set VBW ≥ 3 × RBW;
c) Set span ≥ 1.5 times the OBW;
d) Sweep time = Auto;
e) Detector = RMS;
f) Ensure that the number of measurement points ≥ 2*Span/RBW;
g) Trace mode = Average (100);

Test procedure for LTE Band 41

Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed; for mobile digital stations, in the 1 megahertz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least two percent may be employed, except when the 1 megahertz band is 2495-2496 MHz, in which case a resolution bandwidth of at least one percent may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 megahertz or 1 percent of emission bandwidth, as specified; or 1 megahertz or 2 percent for mobile digital stations, except in the band 2495-2496 MHz). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power. With respect to television operations, measurements must be made of the separate visual and aural operating powers at sufficiently frequent intervals to ensure compliance with the rules.

**TEST SETUP**




**TEST ENVIRONMENT**

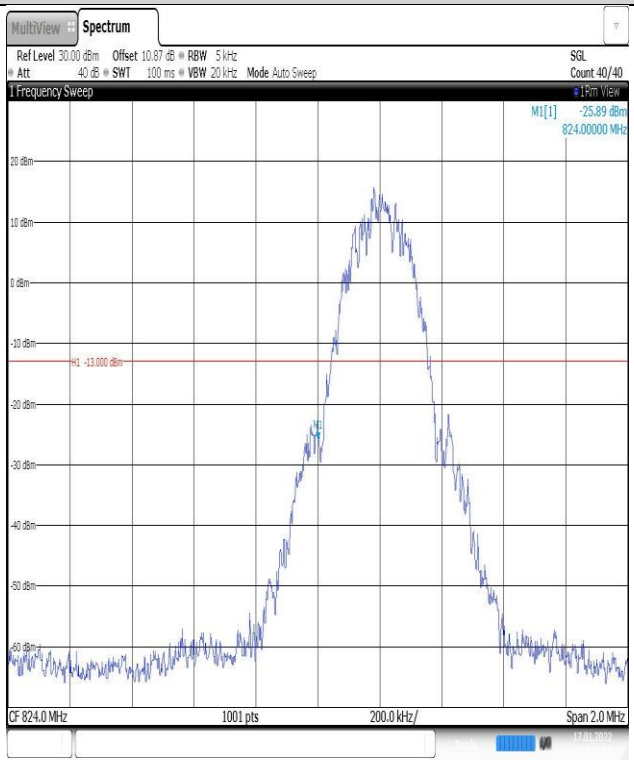
| | | | |
|---|---|---|---|
| Temperature | 22.4°C | Relative Humidity | 58.3% |
| Atmosphere Pressure | 101kPa | Test Voltage | / |

**RESULTS**

**GSM**

| Band | Channel | Freq (MHz) | Result (dBm) | Limit(dBm) | Verdict |
|---|---|---|---|---|---|
| GPRS850 | 128 | 824.00 | -23.14 | -13 | PASS |
| | 251 | 849.01 | -23.44 | -13 | PASS |
| EGPRS850 | 128 | 823.98 | -31.44 | -13 | PASS |
| | 251 | 849.04 | -30.13 | -13 | PASS |
| GPRS1900 | 512 | 1849.98 | -25.86 | -13 | PASS |
| | 810 | 1910.02 | -27.16 | -13 | PASS |
| EGPRS1900 | 512 | 1849.98 | -32.96 | -13 | PASS |
| | 810 | 1910.01 | -35.73 | -13 | PASS |

GPRS850-128-3

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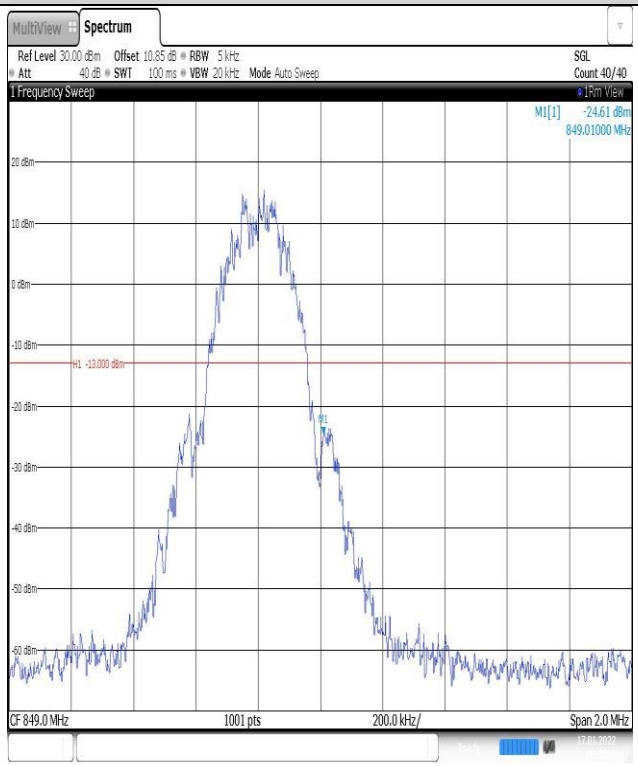
GPRS850-251-3

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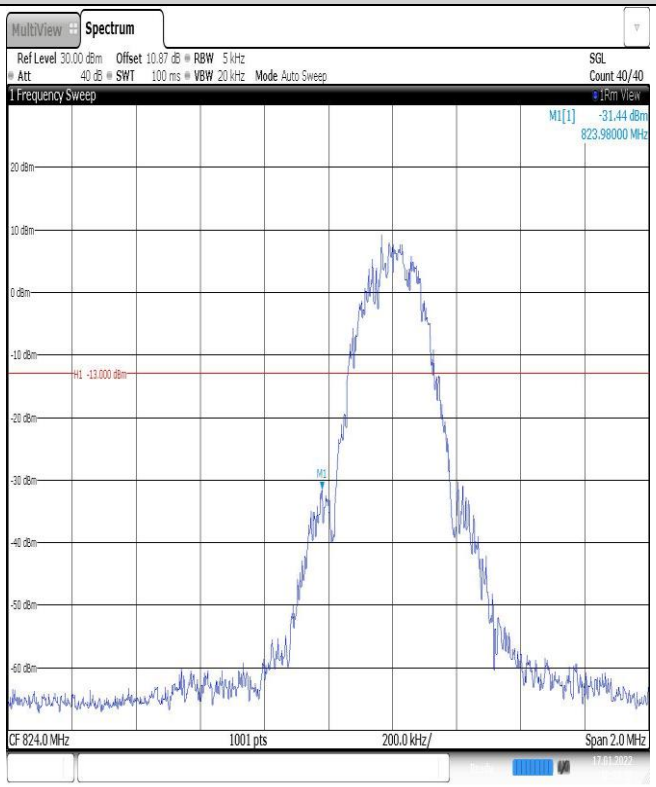
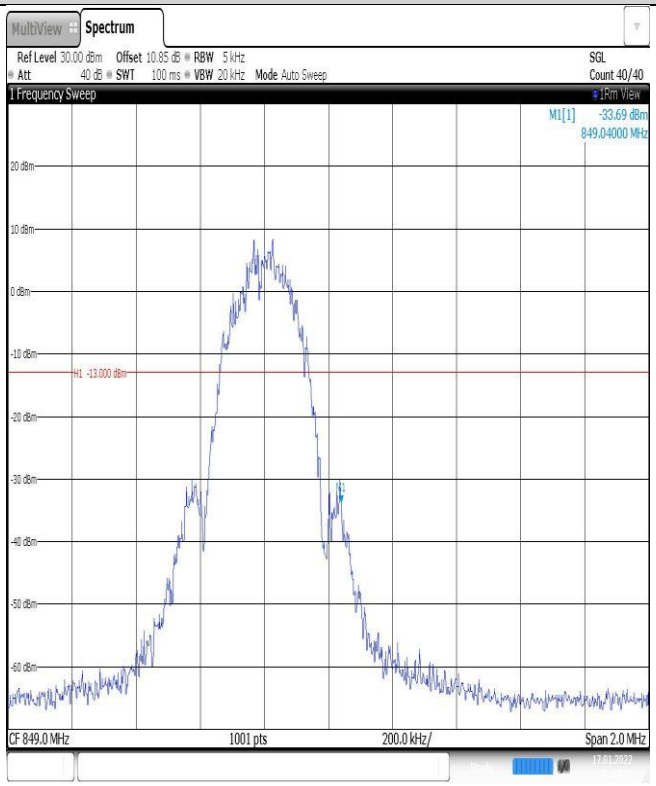
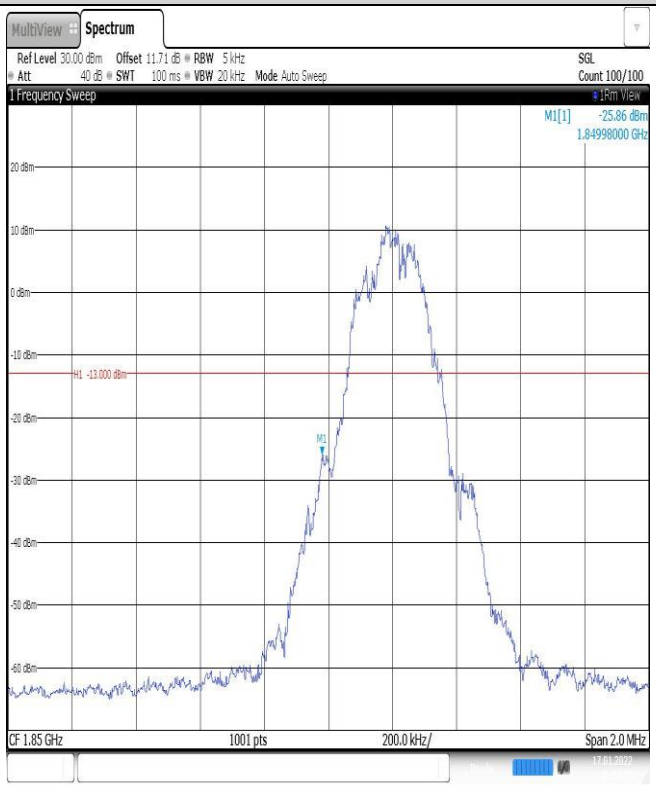
EGPRS850-128-8



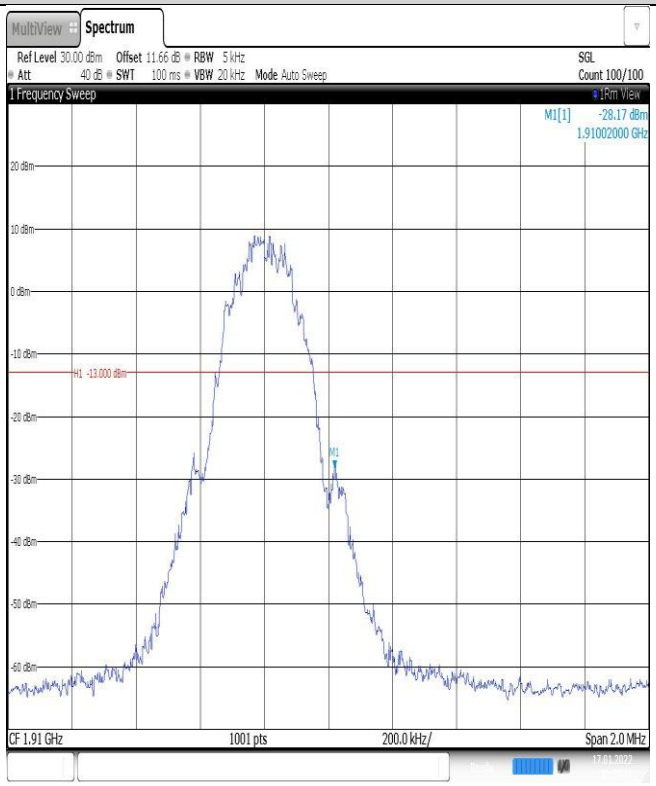

EGPRS850-251-8



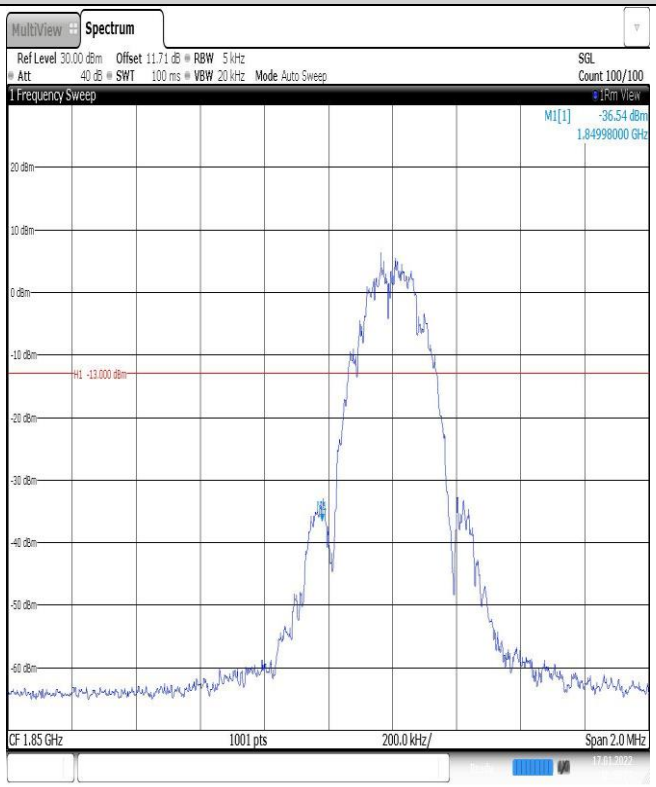
GPRS1900-512-0



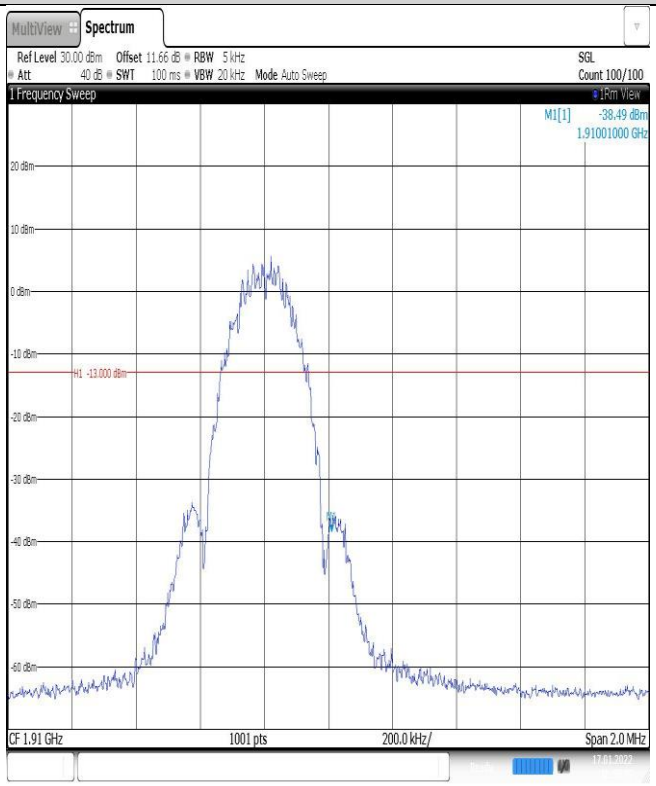

GPRS1900-810-0



EGPRS1900-512-2




EGPRS1900-810-2



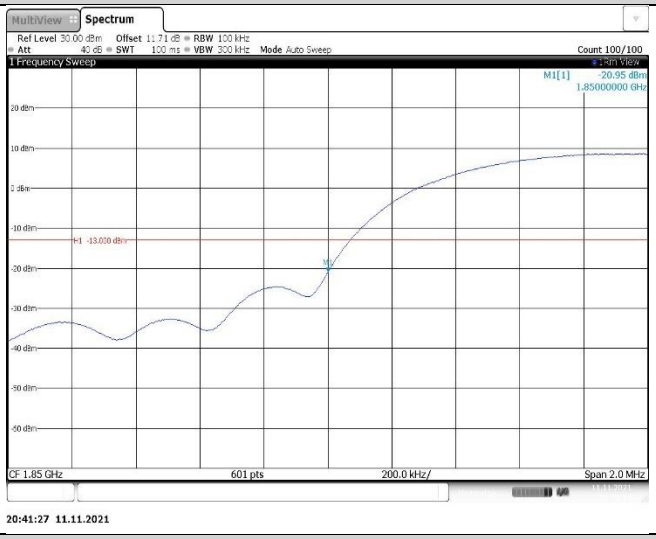
**WCDMA HSDPA**

| Band | Channel | SubTest | Frequency (MHz) | Result (dBm) | Limit(dBm) | Verdict |
|---|---|---|---|---|---|---|
| Band2 | 9262 | 1 | 1850.00 | -20.95 | -13 | PASS |
| | | 2 | 1850.00 | -20.45 | -13 | PASS |
| | | 3 | 1850.00 | -20.34 | -13 | PASS |
| | | 4 | 1850.00 | -20.35 | -13 | PASS |
| | 9538 | 1 | 1910.00 | -21.35 | -13 | PASS |
| | | 2 | 1910.00 | -19.49 | -13 | PASS |
| | | 3 | 1910.00 | -19.17 | -13 | PASS |
| | | 4 | 1910.00 | -19.11 | -13 | PASS |
| Band4 | 1312 | 1 | 1710.00 | -19.92 | -13 | PASS |
| | | 2 | 1710.00 | -20.03 | -13 | PASS |
| | | 3 | 1710.00 | -20.27 | -13 | PASS |
| | | 4 | 1710.00 | -20.47 | -13 | PASS |
| | 1513 | 1 | 1755.00 | -19.39 | -13 | PASS |
| | | 2 | 1755.00 | -20.12 | -13 | PASS |
| | | 3 | 1755.00 | -20.49 | -13 | PASS |
| | | 4 | 1755.00 | -20.62 | -13 | PASS |
| Band5 | 4132 | 1 | 824.00 | -20.92 | -13 | PASS |
| | | 2 | 824.00 | -19.96 | -13 | PASS |
| | | 3 | 824.00 | -19.55 | -13 | PASS |
| | | 4 | 824.00 | -19.43 | -13 | PASS |
| | 4233 | 1 | 849.00 | -19.15 | -13 | PASS |
| | | 2 | 849.00 | -19.57 | -13 | PASS |
| | | 3 | 849.00 | -19.49 | -13 | PASS |
| | | 4 | 849.00 | -19.66 | -13 | PASS |

**WCDMA HSUPA**

| Band | Channel | SubTest | Frequency (MHz) | Result (dBm) | Limit(dBm) | Verdict |
|---|---|---|---|---|---|---|
| Band2 | 9262 | 1 | 1850.00 | -20.74 | -13 | PASS |
| | | 2 | 1850.00 | -21.24 | -13 | PASS |
| | | 3 | 1850.00 | -20.95 | -13 | PASS |
| | | 4 | 1850.00 | -21.99 | -13 | PASS |
| | | 5 | 1850.00 | -19.95 | -13 | PASS |
| | 9538 | 1 | 1910.00 | -32.40 | -13 | PASS |
| | | 2 | 1910.00 | -32.78 | -13 | PASS |
| | | 3 | 1910.00 | -32.83 | -13 | PASS |
| | | 4 | 1910.17 | -34.56 | -13 | PASS |
| | | 5 | 1910.00 | -33.33 | -13 | PASS |
| Band4 | 1312 | 1 | 1710.00 | -20.14 | -13 | PASS |
| | | 2 | 1710.00 | -21.13 | -13 | PASS |
| | | 3 | 1710.00 | -20.75 | -13 | PASS |
| | | 4 | 1710.00 | -21.93 | -13 | PASS |
| | | 5 | 1710.00 | -19.89 | -13 | PASS |
| | 1513 | 1 | 1755.00 | -34.43 | -13 | PASS |
| | | 2 | 1755.00 | -34.79 | -13 | PASS |
| | | 3 | 1755.00 | -33.72 | -13 | PASS |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 1755.00 | -34.61 | -13 | PASS |
| | | 5 | 1755.00 | -34.44 | -13 | PASS |
| Band5 | 4132 | 1 | 824.00 | -20.68 | -13 | PASS |
| | | 2 | 824.00 | -21.10 | -13 | PASS |
| | | 3 | 824.00 | -20.70 | -13 | PASS |
| | | 4 | 824.00 | -21.59 | -13 | PASS |
| | | 5 | 824.00 | -19.94 | -13 | PASS |
| | 4233 | 1 | 849.00 | -31.42 | -13 | PASS |
| | | 2 | 849.00 | -31.83 | -13 | PASS |
| | | 3 | 849.00 | -31.88 | -13 | PASS |
| | | 4 | 849.00 | -33.32 | -13 | PASS |
| | | 5 | 849.00 | -32.03 | -13 | PASS |

| Band2-9262-1 |
| --- |
|  |
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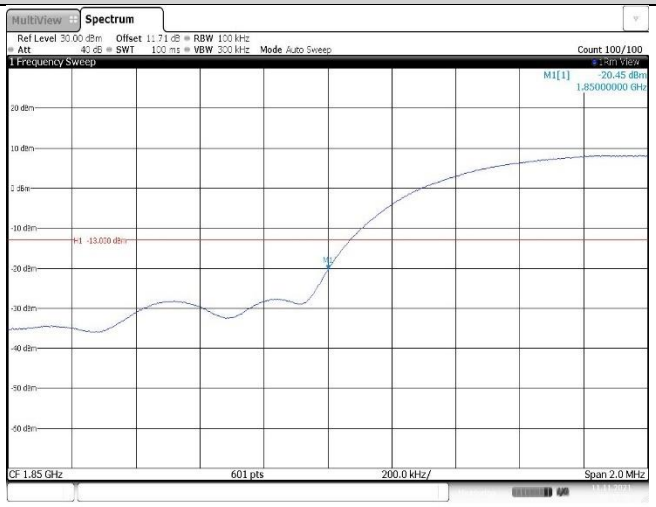
|  |
| Band2-9262-3 |
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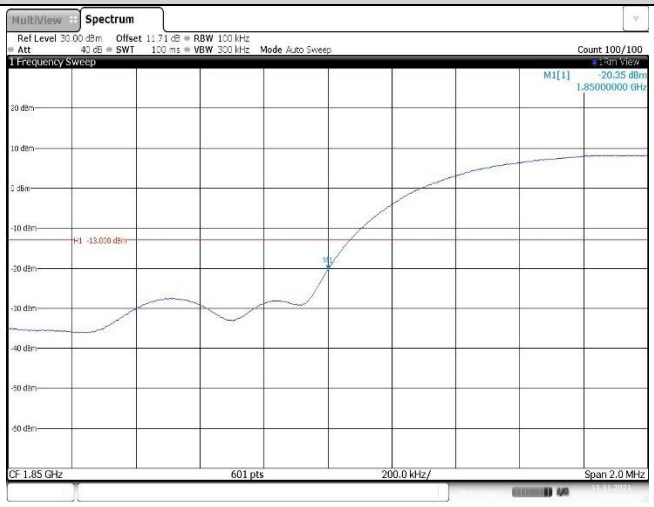
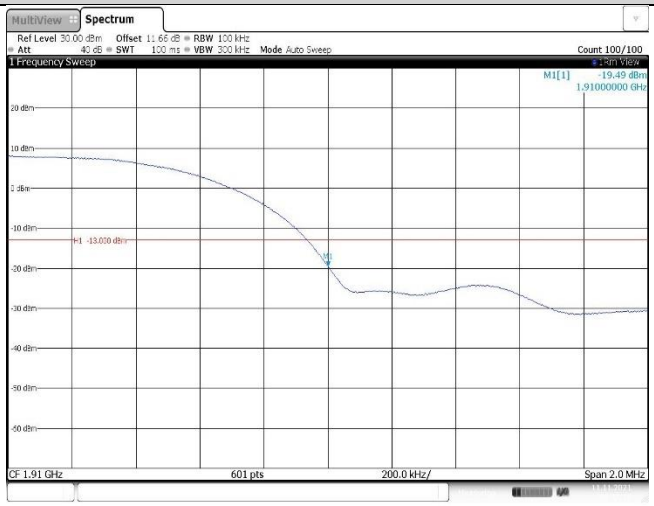
Band2-9262-4




Band2-9538-1


Band2-9538-2



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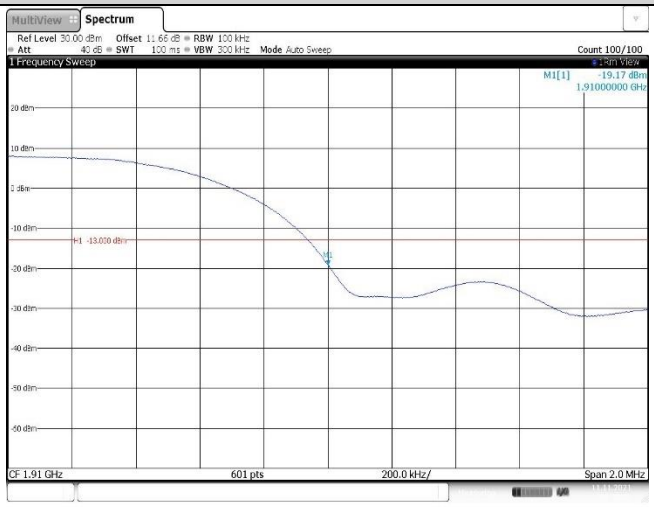
|  |
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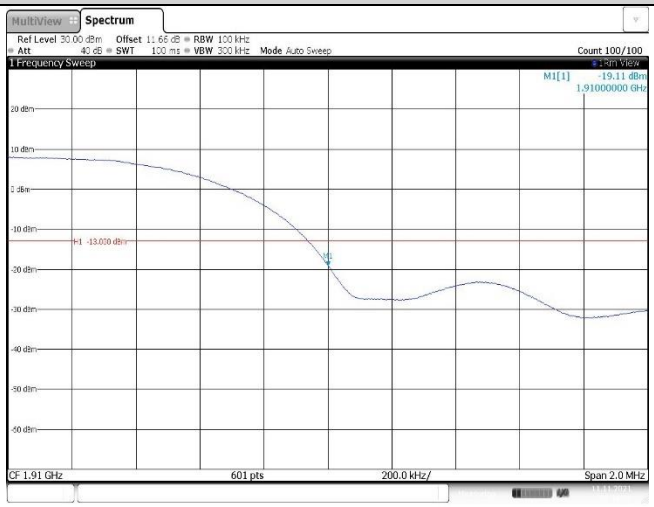
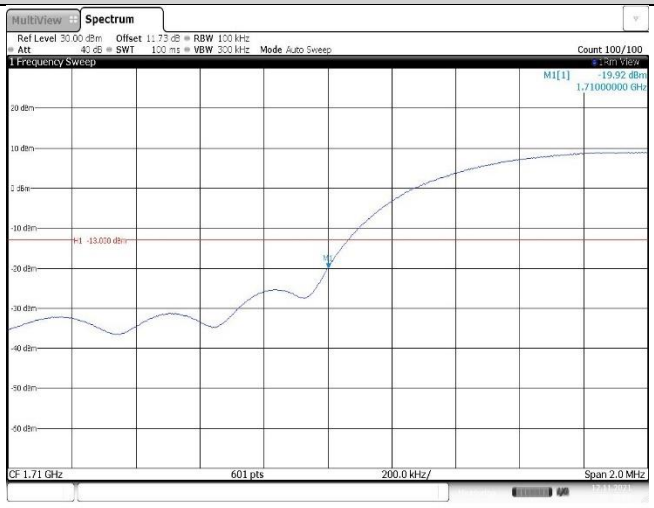
|  |
| Band4-1312-1 |
|  |

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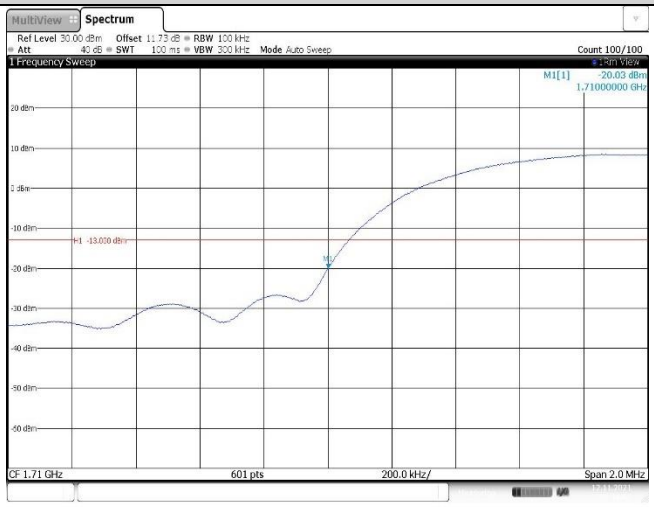


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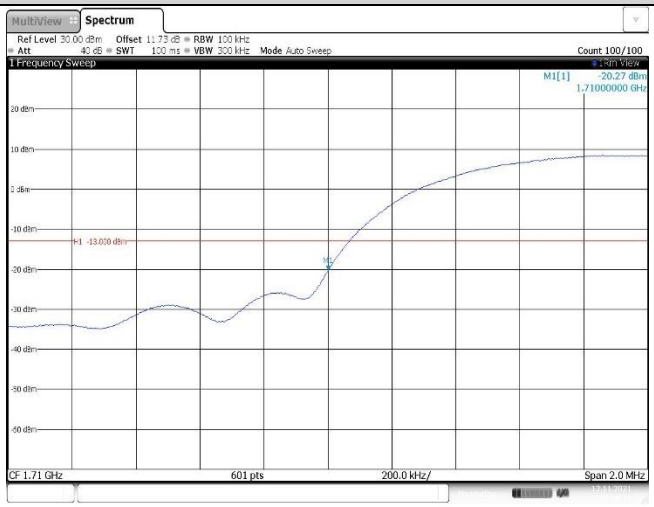


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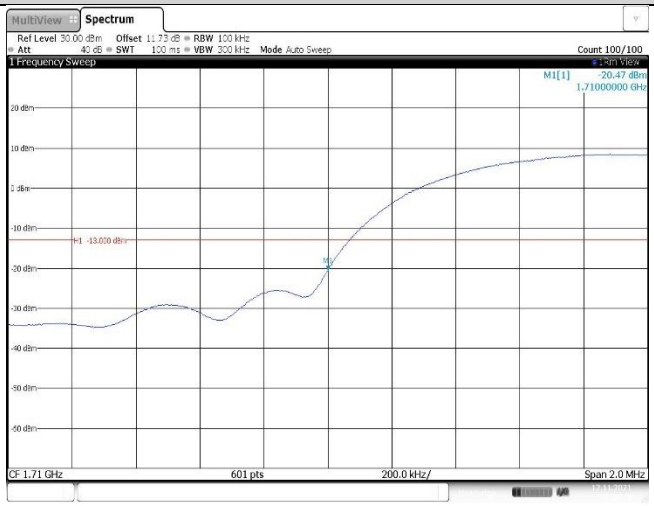

| Band4-1513-1 |
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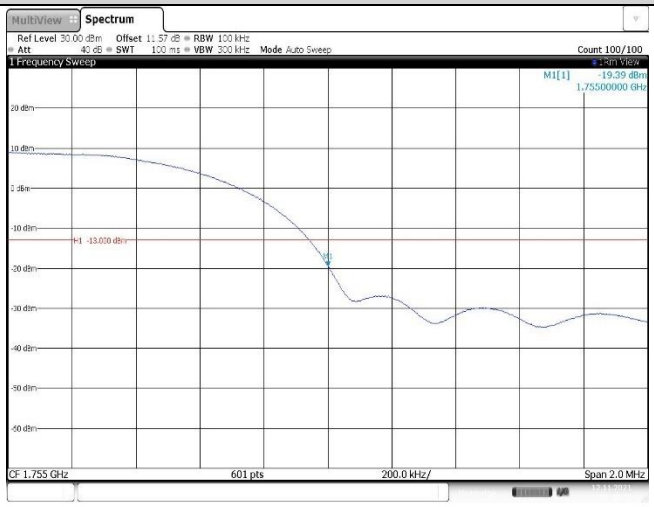
|  |
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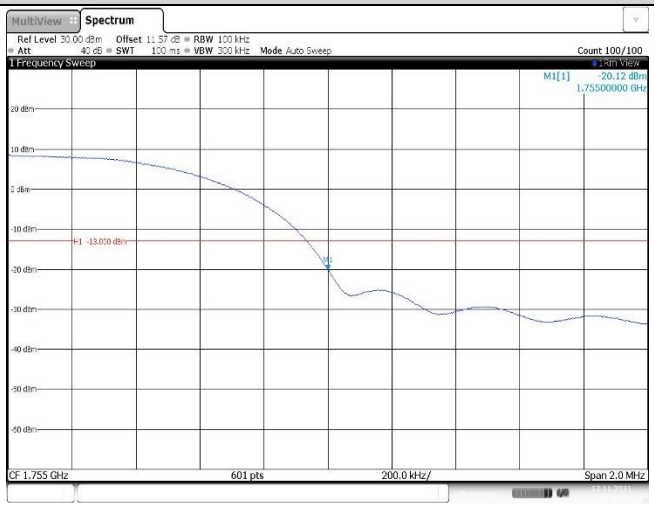
|  |
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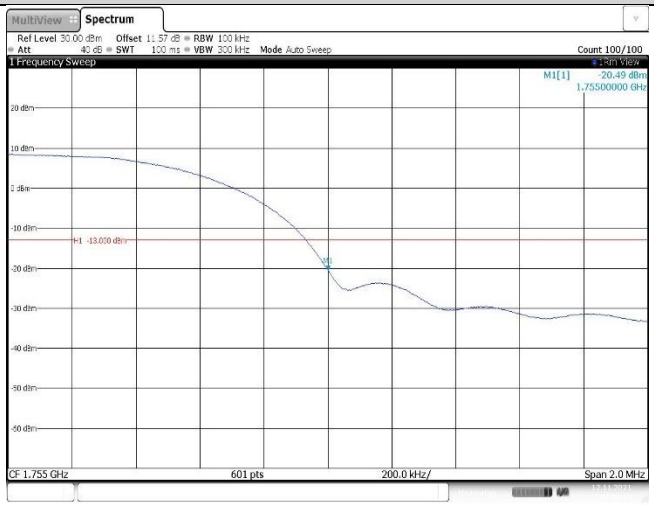
|  |

| Band4-1513-4 |
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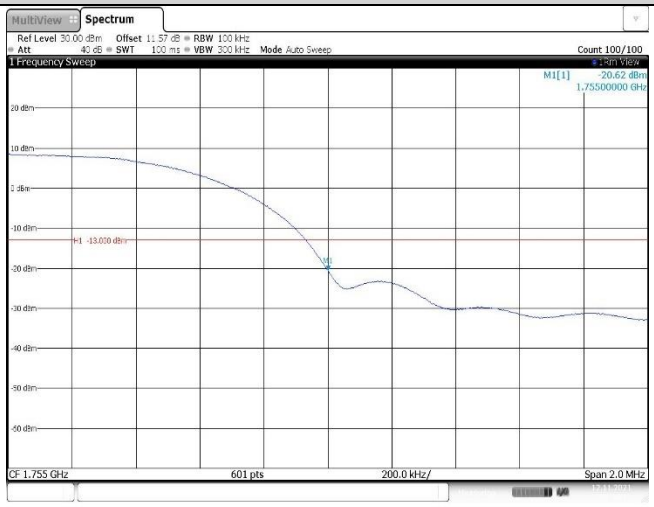
|  |
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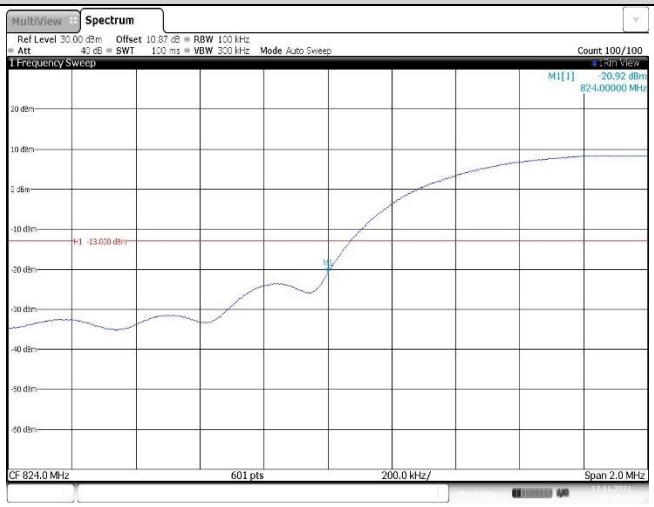
|  |
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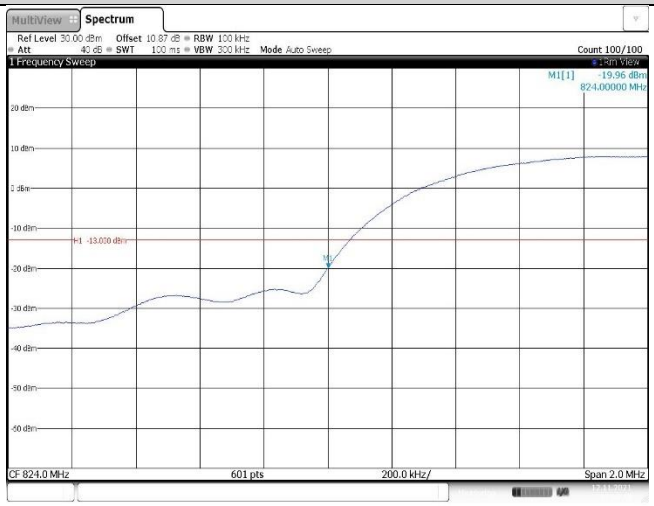
|  |

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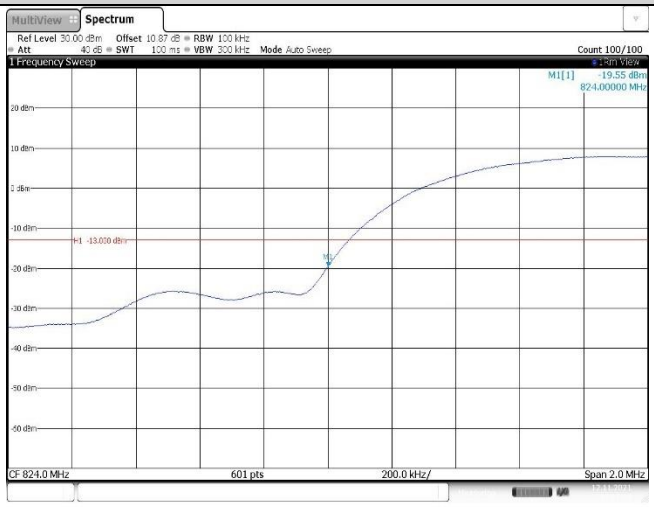
|  |
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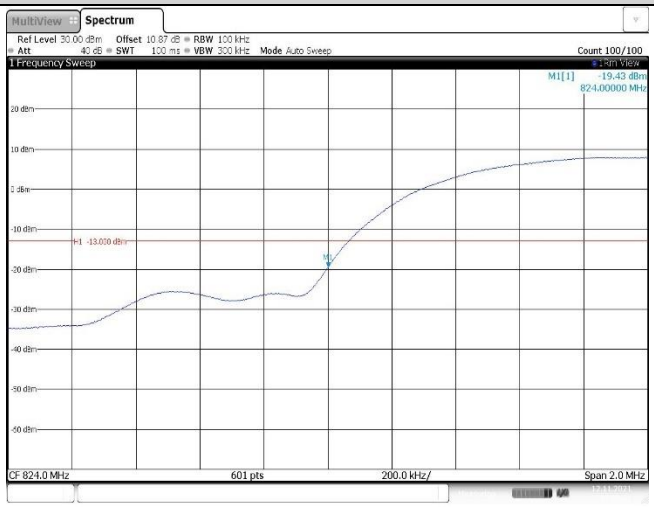
|  |
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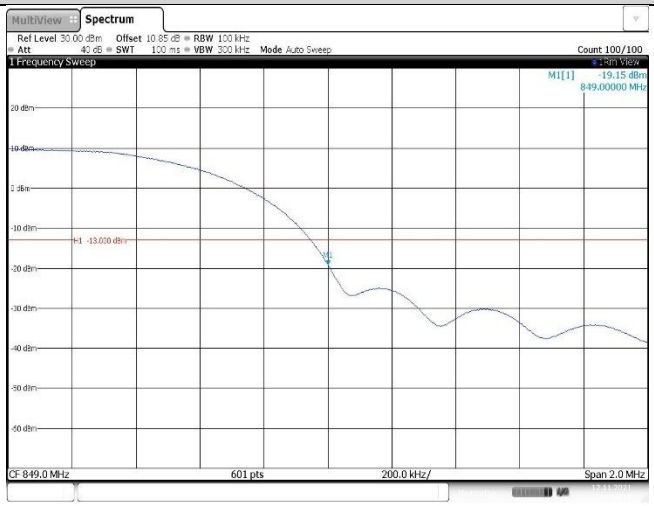
|  |

| Band5-4233-2 |
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| Band5-4233-3 |
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| Band5-4233-4 |
|  |

| Band2-9262-1 |
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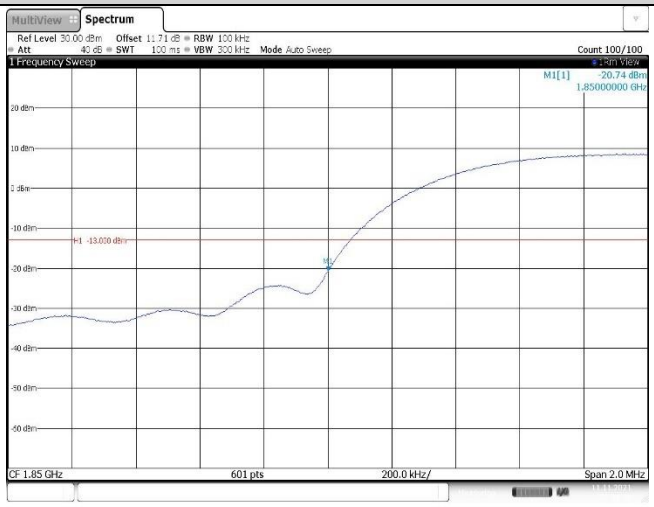
|  |
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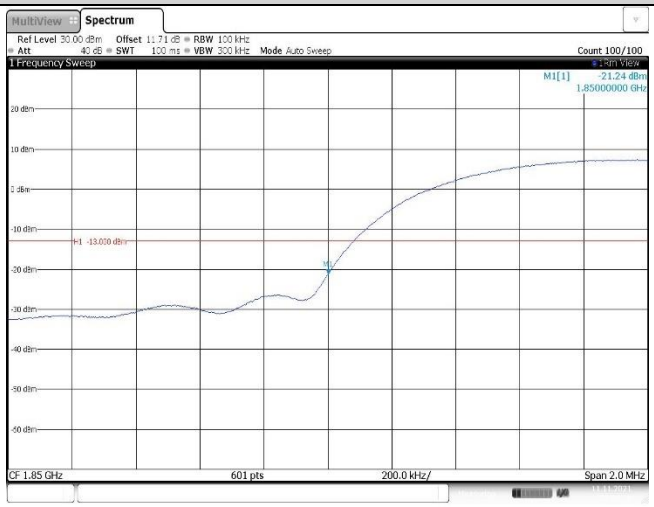
|  |
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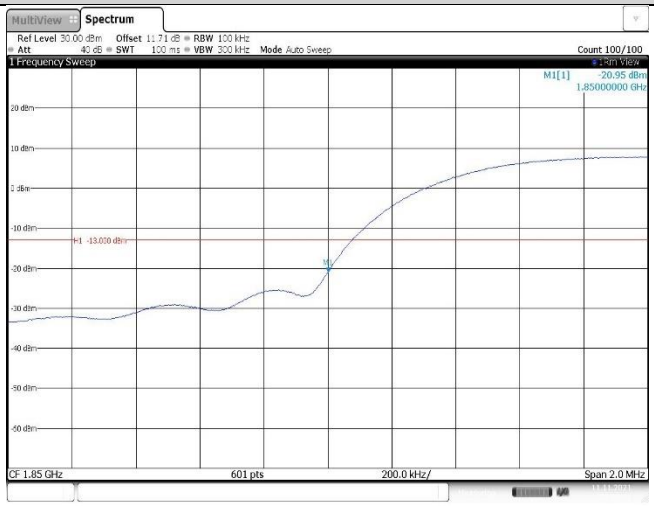
|  |

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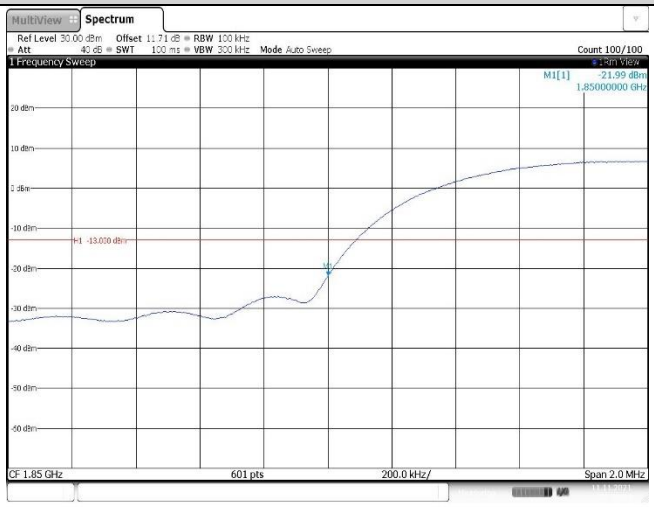


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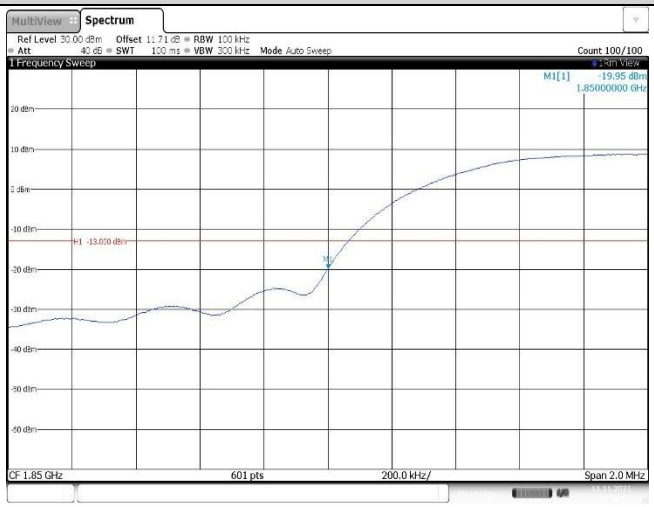
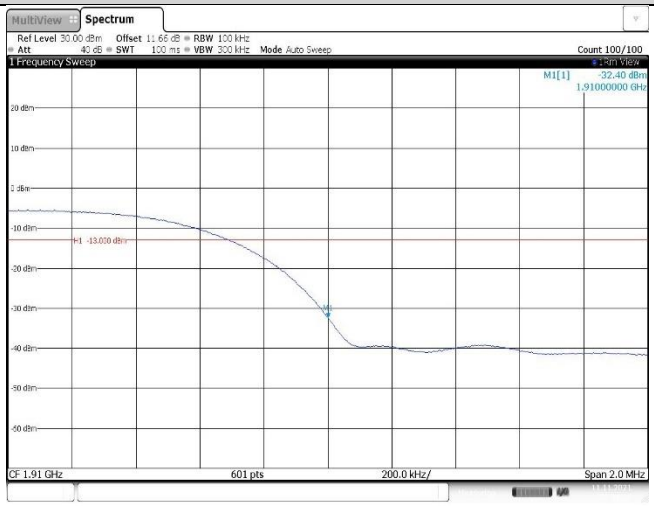



## Band2-9538-1



| Band2-9538-2 |
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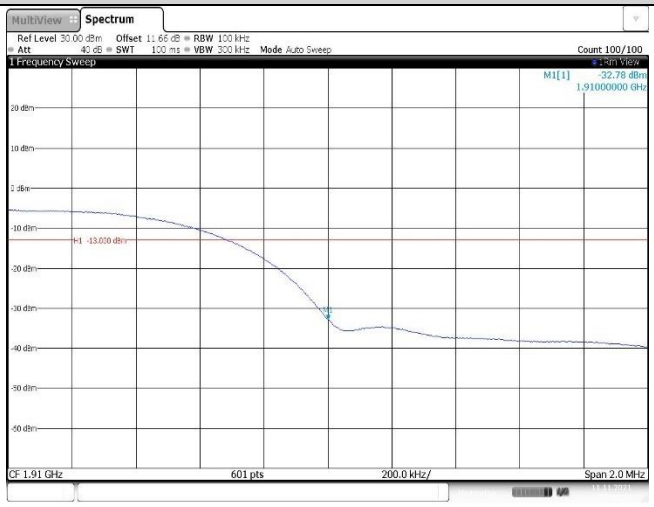
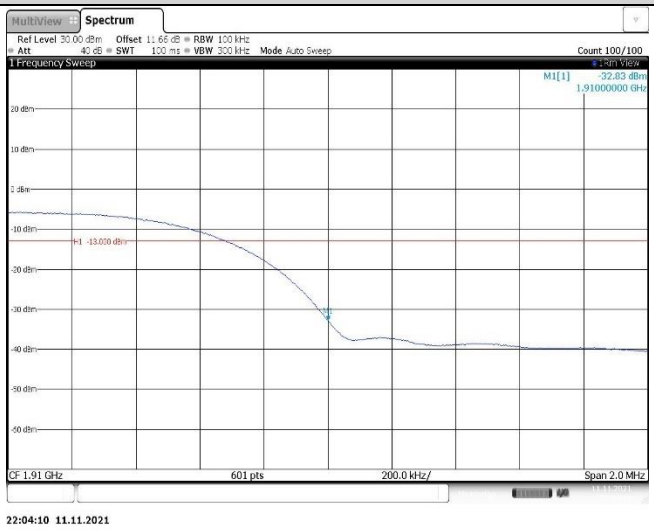
|  |
| Band2-9538-3 |
|  |
| Band2-9538-4 |
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| Band2-9538-5 |
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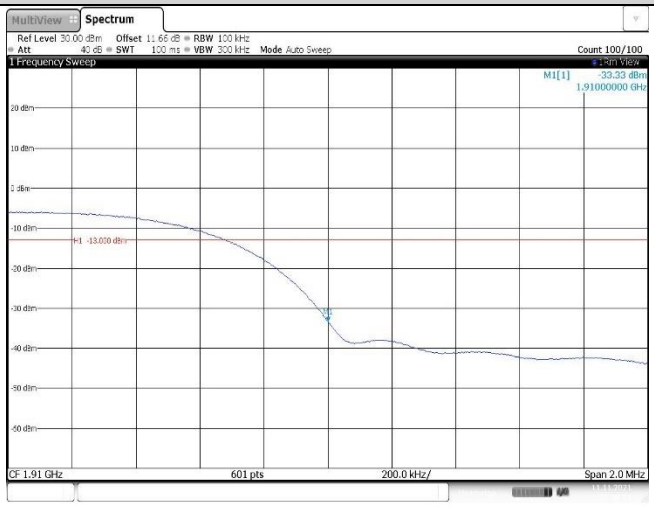
|  |
| Band4-1312-1 |
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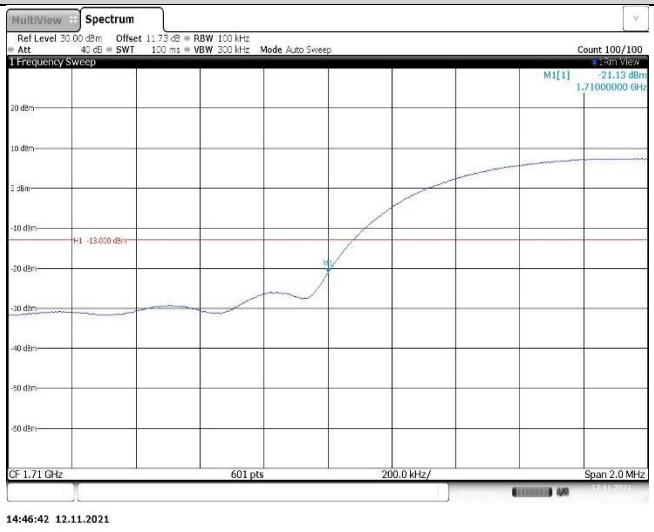
| Band4-1312-2 |
|  |

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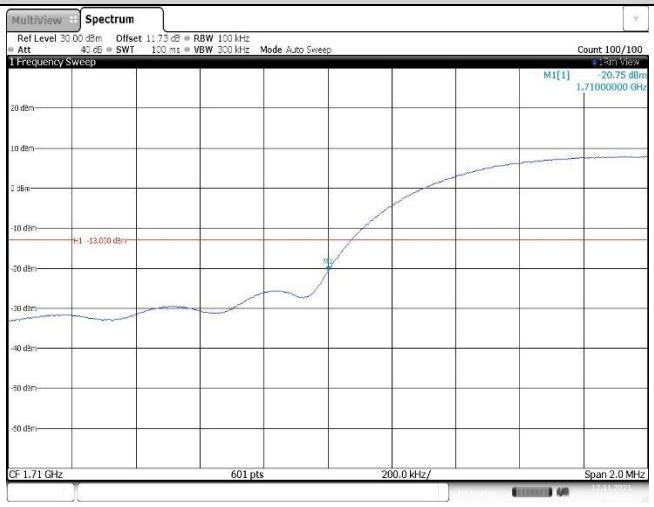


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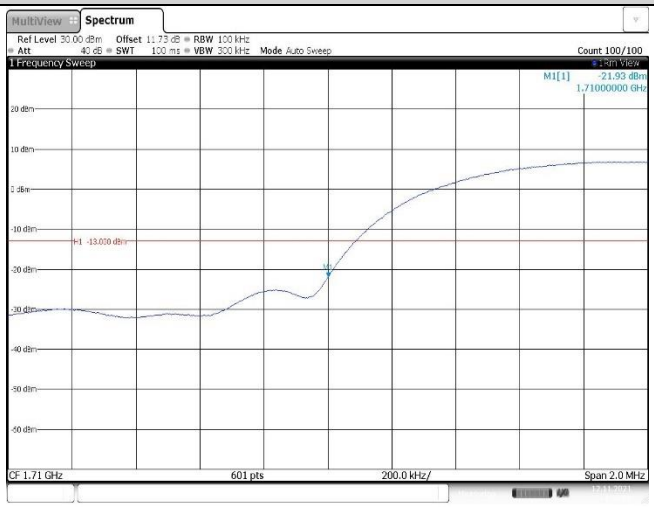


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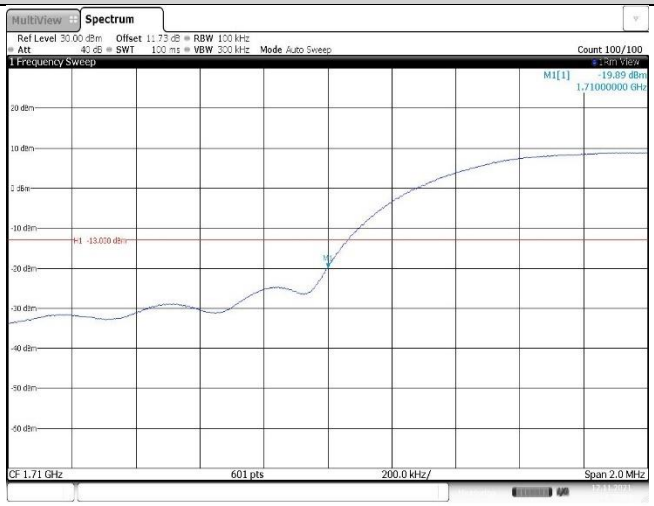


## Band4-1513-1

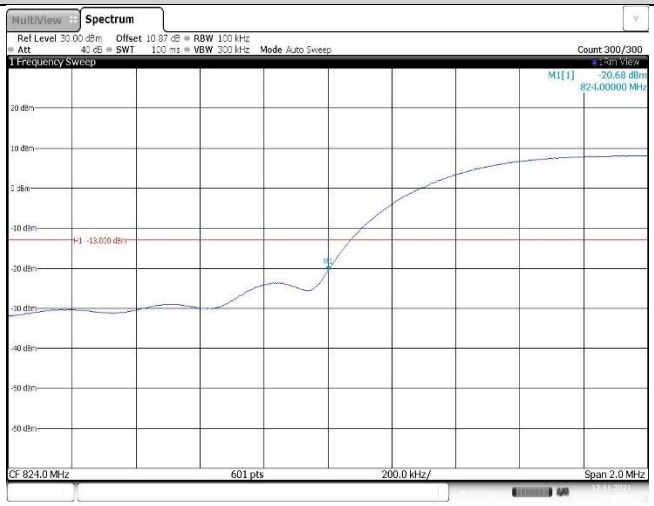

## Band4-1513-2


## Band4-1513-3

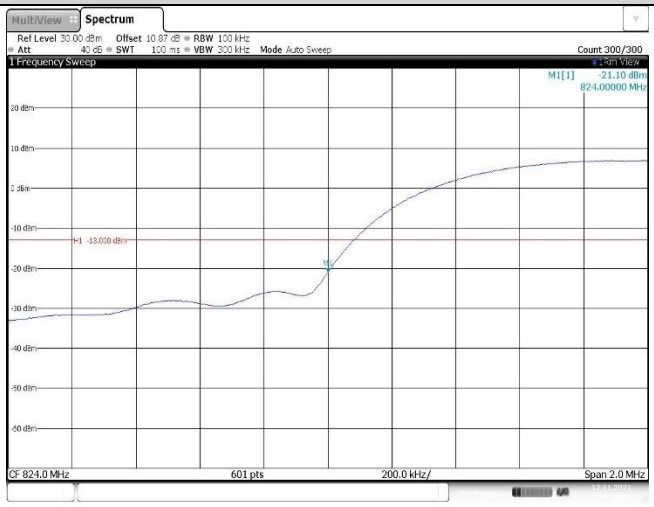
## Band4-1513-4


## Band4-1513-5

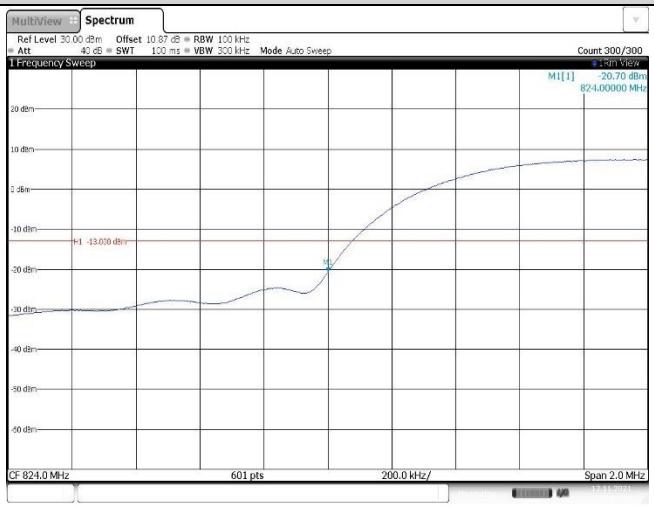

## Band5-4132-1



Band5-4132-2




Band5-4132-3




Band5-4132-4