

RF Test Report

Project Number: 4724254 **Proposal:** SUW-202101000320
Report Number: 4724254EMC18 **Revision Level:** 0
Client: Deere & Company

Equipment Under Test: JDLink R Modem - 4G
Model Number: MA4R
FCC ID: OV5-MA4R
IC ID: 11137A-MA4R

Applicable Standards: ANSI C63.26:2014
Part 2, Part 22(H), Part 24(E)
RSS-132 Issue 3
RSS-133 Issue 6
RSS-GEN, Issue 5

Report issued on: 18 April 2022

Test Result: Compliant




FOR THE SCOPE OF ACCREDITATION UNDER CERTIFICATE NUMBER: 3212.01

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Prepared by:


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Reviewed by:


_____ **Martin Taylor, Project Engineer**

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1 Summary of Test Results

| Reference Sections | | Test Description | Test Limit | Test Condition | Test Result |
|----------------------------------|--|---|---|----------------|-------------|
| FCC | IC | | | | |
| 2.1046 | RSS-GEN (6.12) | Conducted Output Power | N/A | Conducted | Compliant |
| 24.232(d) | RSS-132 (5.4) RSS-133 (6.4) | Peak-to-Average Ratio | <13 dB | | Compliant |
| 2.1049 22.917(a) 24.238(a) | RSS-GEN (6.7) RSS-133 (2.3) | Occupied Bandwidth | N/A | | Reported |
| 2.1051 22.917(a) 24.238(a) | RSS-132 (5.5) RSS-133 (6.5.1) | Band Edge / Conducted Spurious Emissions | < 43 +10log ₁₀ (P _[Watts]) at band edge and for all out of band emissions | | Compliant |
| 22.913(a)(5) | -- | Effective Radiated Power | < 7 Watts max ERP | Radiated | Compliant |
| -- | RSS-132 (5.4) | Equivalent Isotropically Radiated Power | < 11.5 Watts max EIRP | | Compliant |
| 24.232(c) | RSS-133 (6.4) SRSP-510 (5.1.2) | | < 2 Watts max EIRP | | Compliant |
| 2.1053 22.917(a) 24.238(a) | RSS-GEN (6.13) RSS-132 (5.5) RSS-133 (6.5.1) | Radiated Spurious Emissions | < 43 +10log ₁₀ (P _[Watts]) at band edge and for all out of band emissions | | Compliant |
| 2.1055 22.355 24.235 | RSS-GEN (6.11) RSS-132 (5.3) RSS-133 (6.3) | Frequency Stability | <2.5 ppm | | Compliant |

1.1 Modifications Required to Compliance

None

2 General Information

2.1 Client Information

Name: Deere & Company
Address: One John Deere Place
City, State, Zip, Country: Moline, IL 61265, USA

2.2 Test Laboratory

Name: SGS North America, Inc.
Address: 620 Old Peachtree Road NW, Suite 100
City, State, Zip, Country: Suwanee, GA 30024, USA

Accrediting Body: A2LA
Type of lab: Testing Laboratory
Certificate Number: 3212.01
Designation Number: US1126
CAB Identifier: US0186

2.3 General Information of EUT

Product Description: JDLINK R Modem - 4G
Model Number: MA4R
Serial Number: PCMA4A200091

Modes of Operation: GSM 850 / 1900

Antenna Type: External Proprietary
IMEI: 004401083921102

Sample Received Date: 10 April 2021
Dates of testing: 22 February – 30 March 2022

2.4 Description of Test Modes

The EUT was tested under normal operating conditions with a base station simulator directly connect to port C2. The base station simulator was set to control the EUT to output maximum power and operate in GSM Bands 850 and 1900. Using the base station simulator, the device was configured for maximum uplink transmit power.

3 RF Output Power

3.1 Test Result

| Test Description | Requirements | Test Result |
|------------------|-----------------------------------|-------------|
| RF Output Power | FCC Part 2.1046 RSS-GEN (6.12) | Reported |

3.2 Test Method

A radio link was established between EUT and Radio Communication Tester. The output power of the EUT was set to maximum value by using the maximum power setting on the Radio Communications Tester. The CMW500 was used to measure the output power.

The measurements were conducted at the low, middle, and high channel.

3.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 23.9 °C

Relative Humidity: 59.0%

Atmospheric Pressure: 97.9 kPa

3.4 Test Equipment

Test End Date: 3/31/2022

Tester: JOP

| Equipment | Model | Manufacturer | Asset Number | Cal Date | Cal Due Date |
|---------------------------------|--------------|-----------------------------|--------------|-------------|--------------|
| RF CABLE SMA TO SMA, 0.01-40GHZ | 084-0505-059 | TELEDYNE STORM MICROWAVE | 20108 | 16-Mar-2022 | 16-Mar-2023 |
| ATTENUATOR, 10DB | BW-S10W2 | MINI-CIRCUITS | 15034 | 7-Oct-2021 | 7-Oct-2022 |
| POWER SPLITTER | ZFRSC-123-S+ | MINI-CIRCUITS | B101739 | 8-Jul-2021 | 8-Jul-2022 |
| RF CABLE (TS8997) | 141 | HUBER & SUHNER | B095588 | 1-Jul-2021 | 1-Jul-2022 |
| WIDEBAND RADIO COMMUNICATION | CMW500 | ROHDE & SCHWARZ | B094874 | 13-Jan-2021 | 13-Jan-2023 |

3.5 Test Data

| Band | Uplink Channel | UL Freq (MHz) | Mode | Slots | Conducted Power (dBm) |
|------|----------------|---------------|------|-------|-----------------------|
| 850 | 128 | 824.2 | 1 | GPRS | 32.1 |
| 850 | 128 | 824.2 | 2 | GPRS | 29.79 |
| 850 | 128 | 824.2 | 3 | GPRS | 27.51 |
| 850 | 128 | 824.2 | 4 | GPRS | 26.12 |
| 850 | 190 | 836.6 | 1 | GPRS | 32.13 |
| 850 | 190 | 836.6 | 2 | GPRS | 29.76 |
| 850 | 190 | 836.6 | 3 | GPRS | 27.67 |
| 850 | 190 | 836.6 | 4 | GPRS | 26.23 |
| 850 | 251 | 848.8 | 1 | GPRS | 32.05 |
| 850 | 251 | 848.8 | 2 | GPRS | 29.88 |
| 850 | 251 | 848.8 | 3 | GPRS | 27.64 |
| 850 | 251 | 848.8 | 4 | GPRS | 26.2 |
| 850 | 128 | 824.2 | 1 | EGPRS | 31.84 |
| 850 | 128 | 824.2 | 2 | EGPRS | 29.74 |
| 850 | 128 | 824.2 | 3 | EGPRS | 27.45 |
| 850 | 128 | 824.2 | 4 | EGPRS | 26.16 |
| 850 | 190 | 836.6 | 1 | EGPRS | 32.16 |
| 850 | 190 | 836.6 | 2 | EGPRS | 29.74 |
| 850 | 190 | 836.6 | 3 | EGPRS | 27.66 |
| 850 | 190 | 836.6 | 4 | EGPRS | 26.22 |
| 850 | 251 | 848.8 | 1 | EGPRS | 32.09 |
| 850 | 251 | 848.8 | 2 | EGPRS | 29.98 |
| 850 | 251 | 848.8 | 3 | EGPRS | 27.76 |
| 850 | 251 | 848.8 | 4 | EGPRS | 26.3 |
| 1900 | 512 | 1850.2 | 1 | GPRS | 29.66 |
| 1900 | 512 | 1850.2 | 2 | GPRS | 26.81 |
| 1900 | 512 | 1850.2 | 3 | GPRS | 25.13 |
| 1900 | 512 | 1850.2 | 4 | GPRS | 23.87 |
| 1900 | 661 | 1880 | 1 | GPRS | 29.69 |
| 1900 | 661 | 1880 | 2 | GPRS | 27.27 |
| 1900 | 661 | 1880 | 3 | GPRS | 25.34 |
| 1900 | 661 | 1880 | 4 | GPRS | 24.17 |
| 1900 | 810 | 1909.8 | 1 | GPRS | 29.24 |
| 1900 | 810 | 1909.8 | 2 | GPRS | 26.79 |
| 1900 | 810 | 1909.8 | 3 | GPRS | 25 |
| 1900 | 810 | 1909.8 | 4 | GPRS | 23.79 |
| 1900 | 512 | 1850.2 | 1 | EGPRS | 29.7 |
| 1900 | 512 | 1850.2 | 2 | EGPRS | 26.97 |
| 1900 | 512 | 1850.2 | 3 | EGPRS | 25.17 |
| 1900 | 512 | 1850.2 | 4 | EGPRS | 23.97 |
| 1900 | 661 | 1880 | 1 | EGPRS | 29.68 |
| 1900 | 661 | 1880 | 2 | EGPRS | 27.32 |
| 1900 | 661 | 1880 | 3 | EGPRS | 25.33 |
| 1900 | 661 | 1880 | 4 | EGPRS | 24.2 |
| 1900 | 810 | 1909.8 | 1 | EGPRS | 29.27 |
| 1900 | 810 | 1909.8 | 2 | EGPRS | 26.79 |
| 1900 | 810 | 1909.8 | 3 | EGPRS | 25.03 |
| 1900 | 810 | 1909.8 | 4 | EGPRS | 23.86 |

GSM850 Max: 32.13dBm (1.633W)

GSM1900 Max: 29.69dBm (0.931W)

4 Peak to Average Ratio

4.1 Test Result

| Test Description | Requirements | Test Result |
|-----------------------|---|-------------|
| Peak to Average Ratio | FCC 24.232(d) RSS-132 (5.4) RSS-133 (6.4) | Compliant |

4.2 Test Method

KDB document 971168 D01 Power Meas License Digital Systems v03r01 was used to determine peak-to-average ratio. For the measurements, Clause 5.7.1 was used which defined the measurement method using the CCDF function of the spectrum analyzer. Measurements were recorded at the mid channels at the highest power.

4.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 23.9 °C

Relative Humidity: 59.0%

Atmospheric Pressure: 97.9 kPa

4.4 Test Equipment

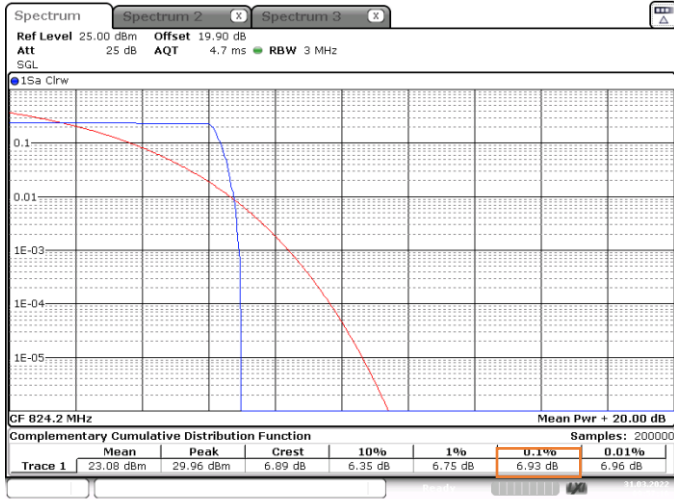
Test End Date: 3/31/2022

Tester: JOP

| Equipment | Model | Manufacturer | Asset Number | Cal Date | Cal Due Date |
|---------------------------------|--------------|-----------------------------|--------------|-------------|--------------|
| RF CABLE SMA TO SMA, 0.01-40GHZ | 084-0505-059 | TELEDYNE STORM MICROWAVE | 20108 | 16-Mar-2022 | 16-Mar-2023 |
| ATTENUATOR, 10DB | BW-S10W2 | MINI-CIRCUITS | 15034 | 7-Oct-2021 | 7-Oct-2022 |
| POWER SPLITTER | ZFRSC-123-S+ | MINI-CIRCUITS | B101739 | 8-Jul-2021 | 8-Jul-2022 |
| RF CABLE (TS8997) | 141 | HUBER & SUHNER | B095588 | 1-Jul-2021 | 1-Jul-2022 |
| WIDEBAND RADIO COMMUNICATION | CMW500 | ROHDE & SCHWARZ | B094874 | 13-Jan-2021 | 13-Jan-2023 |

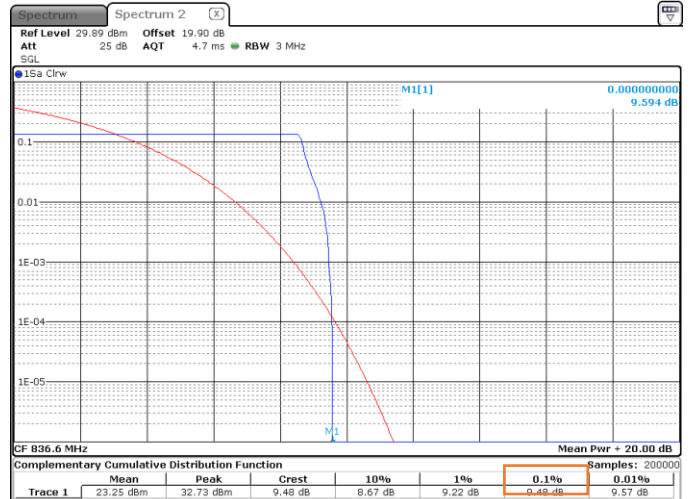
4.5 Test Data

GSM 850 GPRS Channel 128



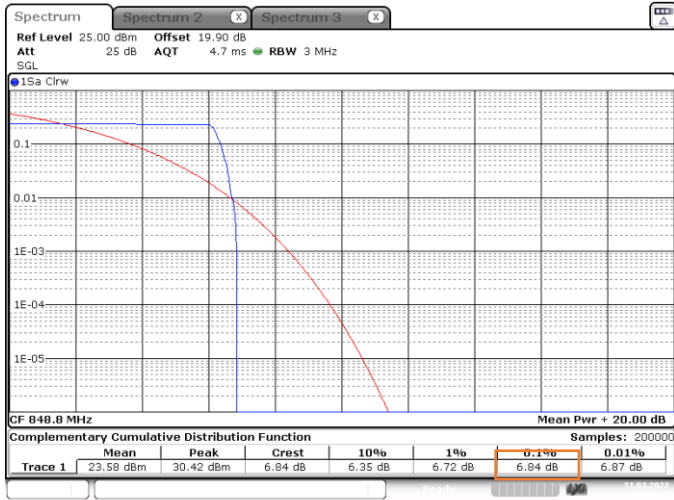
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GSM 850 GPRS Channel 190



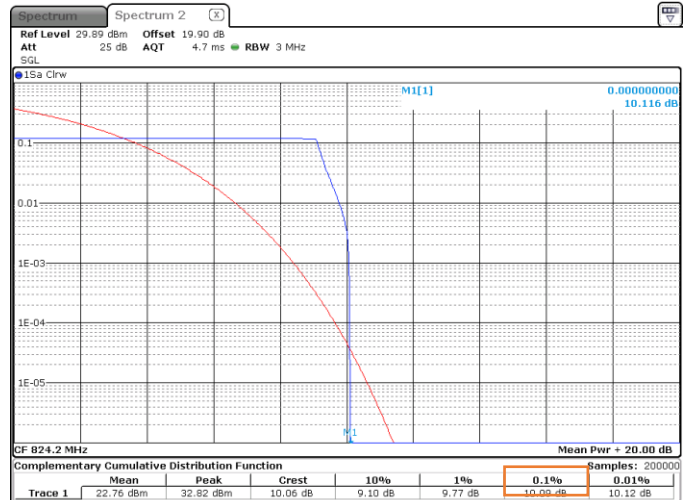
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GSM 850 GPRS Channel 251



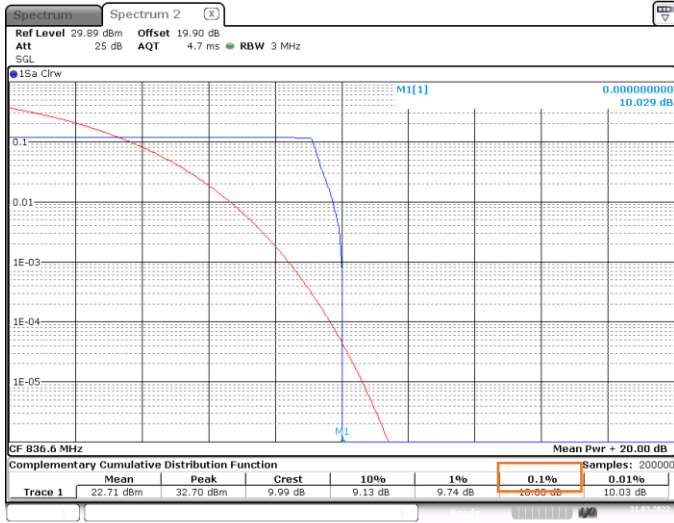
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GSM 850 EGPRS Channel 128

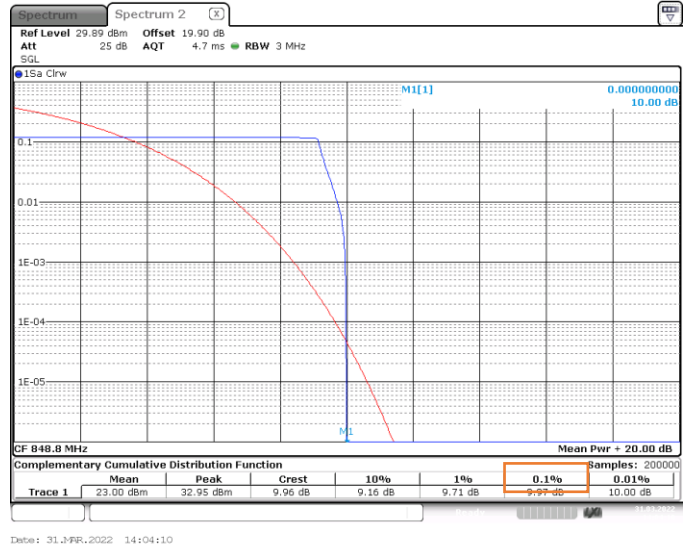


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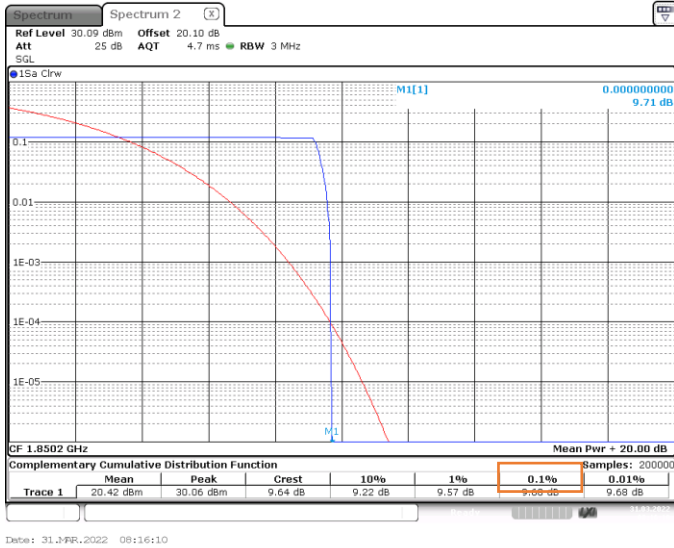
GSM 850 EGPRS Channel 190



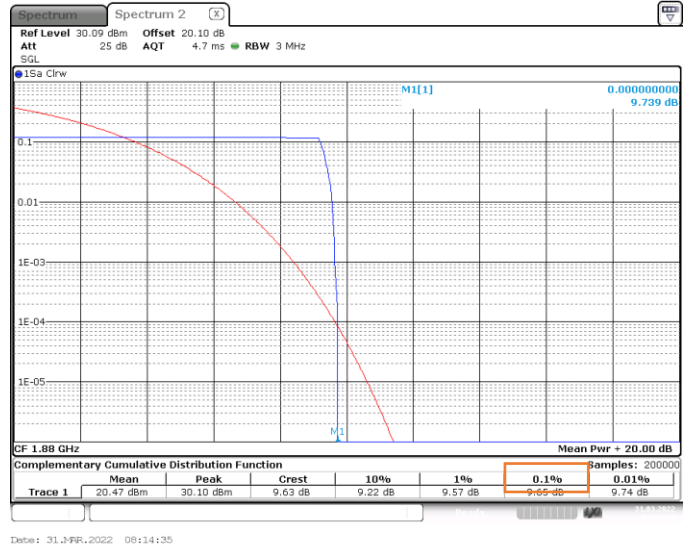
GSM 850 EGPRS Channel 251



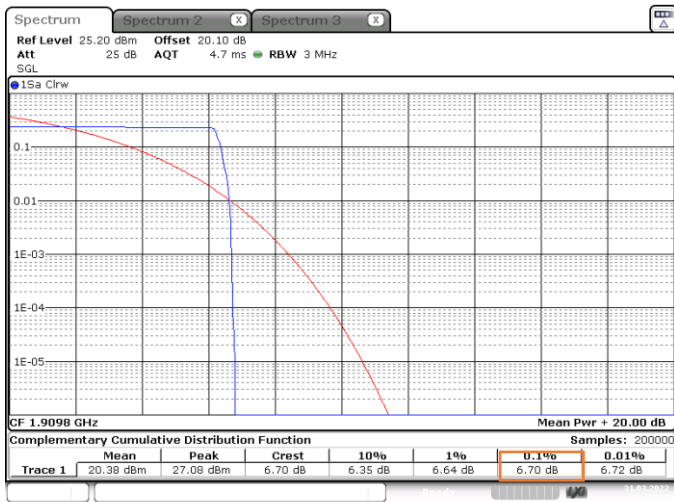
GSM 1900 GPRS Channel 512



GSM 1900 GPRS Channel 661

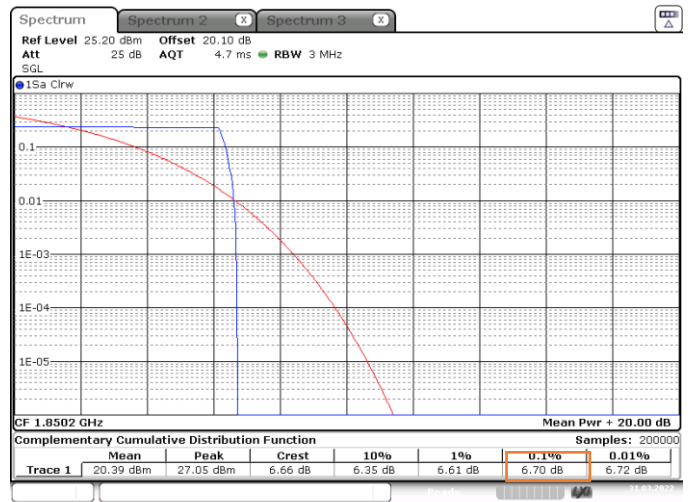


GSM 1900 GPRS Channel 810



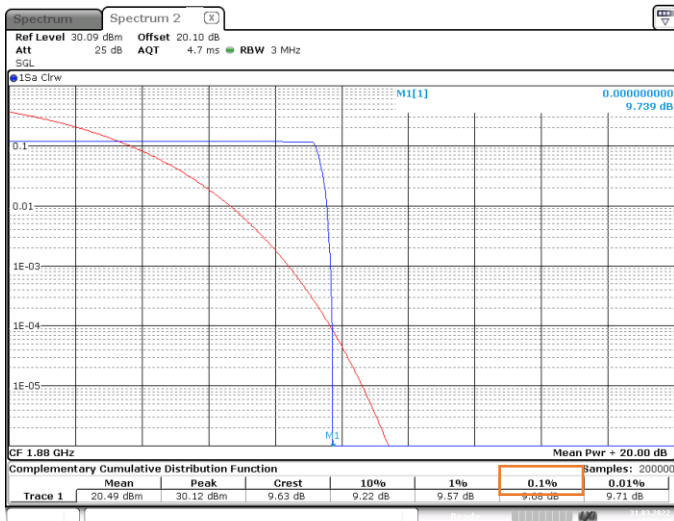
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GSM 1900 EGPRS Channel 512



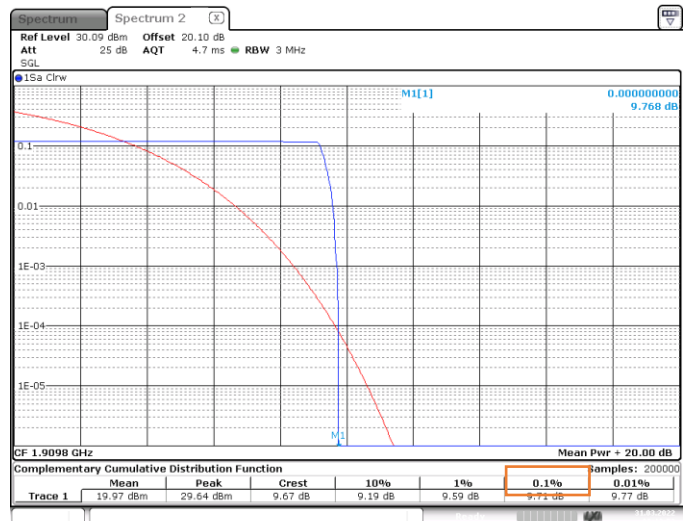
Date: 31-JPR,2022 09:49:25

GSM 1900 EGPRS Channel 661



Date: 31-JPR,2022 08:11:39

GSM 1900 EGPRS Channel 810



Date: 31-JPR,2022 08:12:52

5 Occupied Bandwidth

5.1 Test Result

| Test Description | Requirements | Test Result |
|--------------------|---|-------------|
| Occupied Bandwidth | FCC Part 2.1049 FCC Part 22.917(a) FCC Part 24.238(a) RSS-GEN (6.7) RSS-133 (2.3) | Reported |

5.2 Test Method

KDB document 971168 D01 Power Meas License Digital Systems v03r01, Clause 4 was used to determine the occupied measurement.

The 99% measurement function of the spectrum analyzer was used.

The measurement was conducted at the center channel of each band.

5.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 23.9 °C

Relative Humidity: 59.0%

Atmospheric Pressure: 97.9 kPa

5.4 Test Equipment

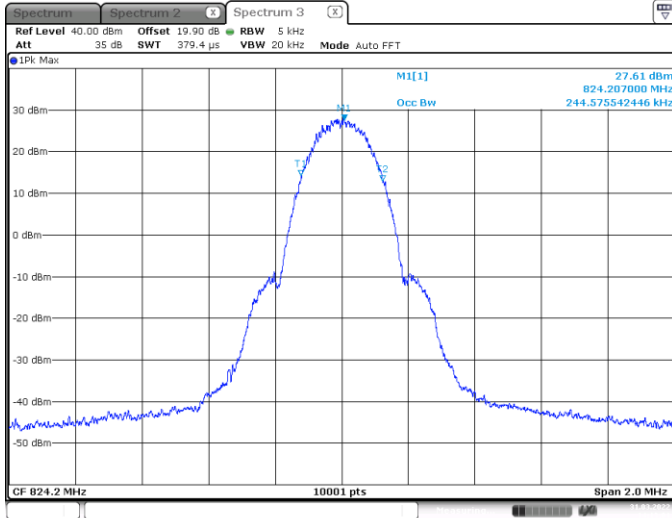
Test End Date: 3/31/2022

Tester: JOP

| Equipment | Model | Manufacturer | Asset Number | Cal Date | Cal Due Date |
|---------------------------------|--------------|-----------------------------|--------------|-------------|--------------|
| RF CABLE SMA TO SMA, 0.01-40GHZ | 084-0505-059 | TELEDYNE STORM MICROWAVE | 20108 | 16-Mar-2022 | 16-Mar-2023 |
| ATTENUATOR, 10DB | BW-S10W2 | MINI-CIRCUITS | 15034 | 7-Oct-2021 | 7-Oct-2022 |
| POWER SPLITTER | ZFRSC-123-S+ | MINI-CIRCUITS | B101739 | 8-Jul-2021 | 8-Jul-2022 |
| RF CABLE (TS8997) | 141 | HUBER & SUHNER | B095588 | 1-Jul-2021 | 1-Jul-2022 |
| WIDEBAND RADIO COMMUNICATION | CMW500 | ROHDE & SCHWARZ | B094874 | 13-Jan-2021 | 13-Jan-2023 |

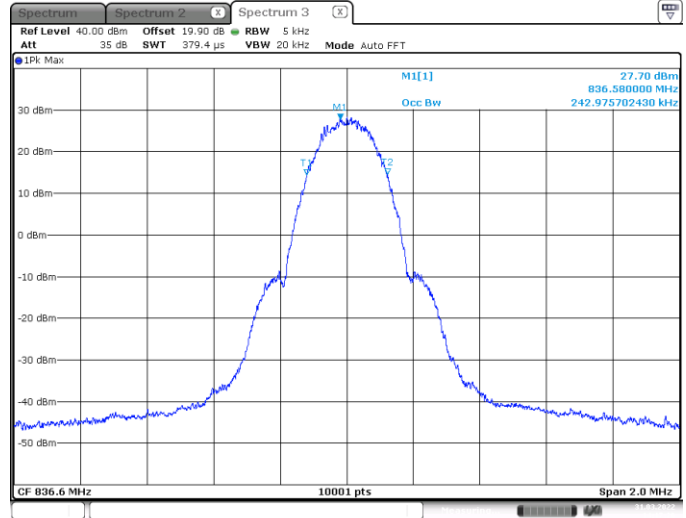
5.5 Test Data

GSM 850 GPRS Channel 128



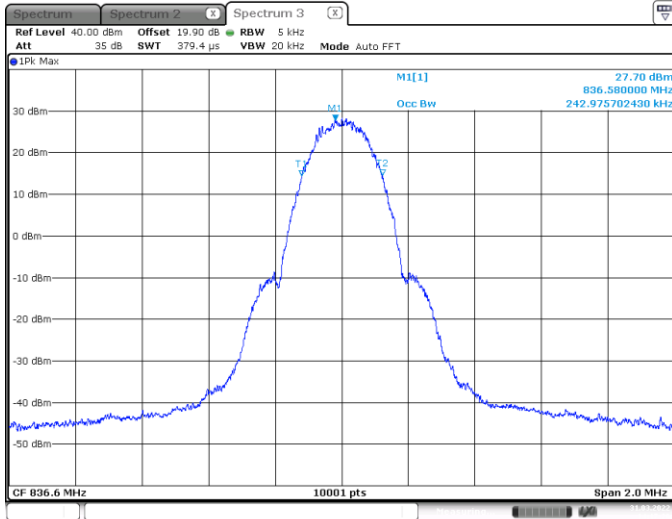
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GSM 850 GPRS Channel 190



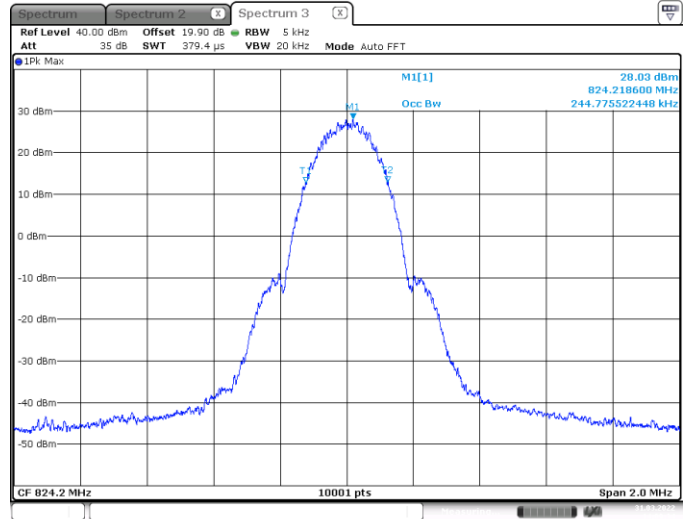
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GSM 850 GPRS Channel 251



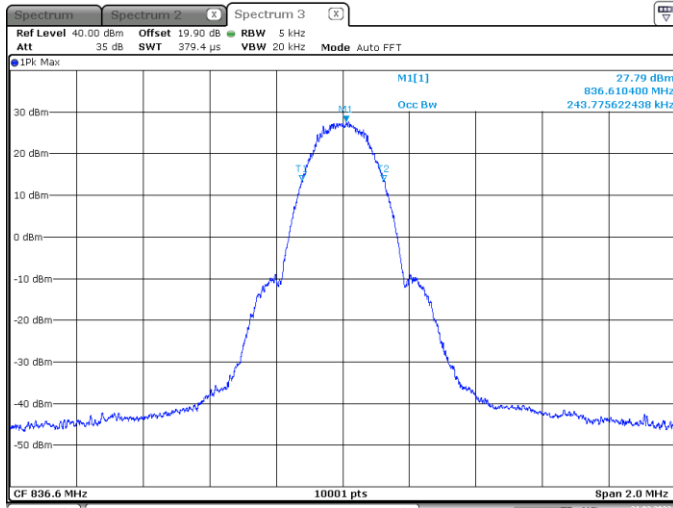
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GSM 850 EGPRS Channel 128



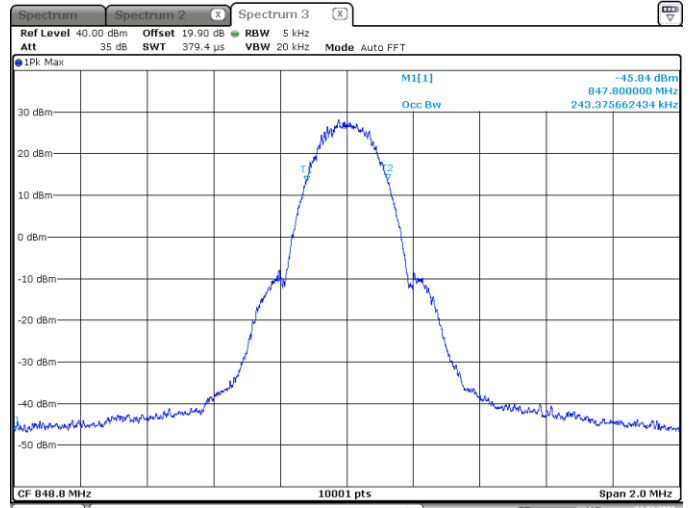
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GSM 850 EGPRS Channel 190



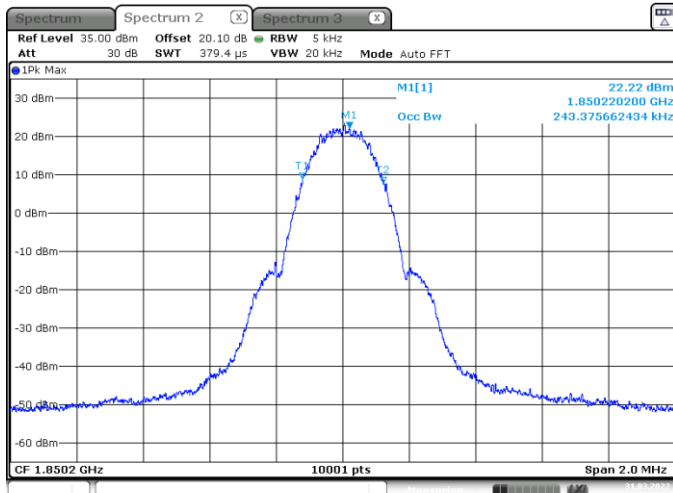
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GSM 850 EGPRS Channel 251



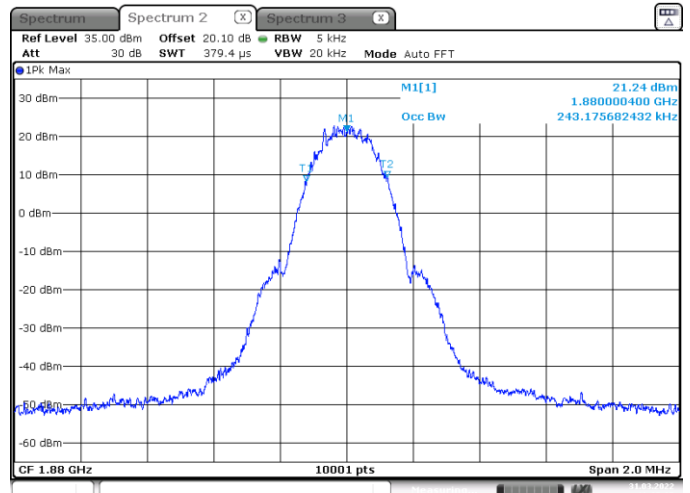
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GSM 1900 GPRS Channel 512



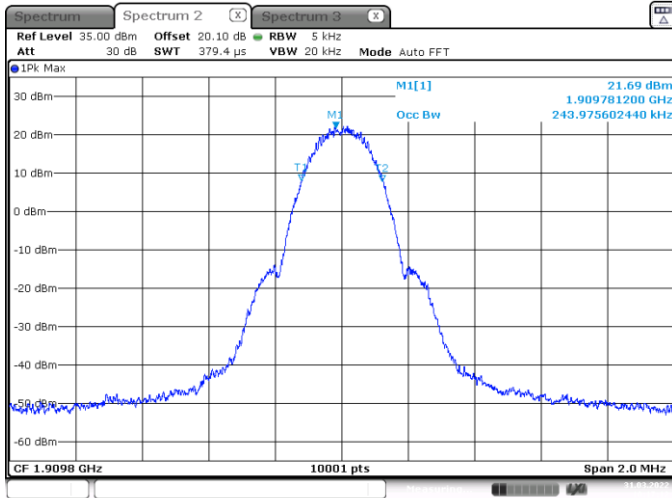
Date: 31-JPR, 2022 10:27:35

GSM 1900 GPRS Channel 661



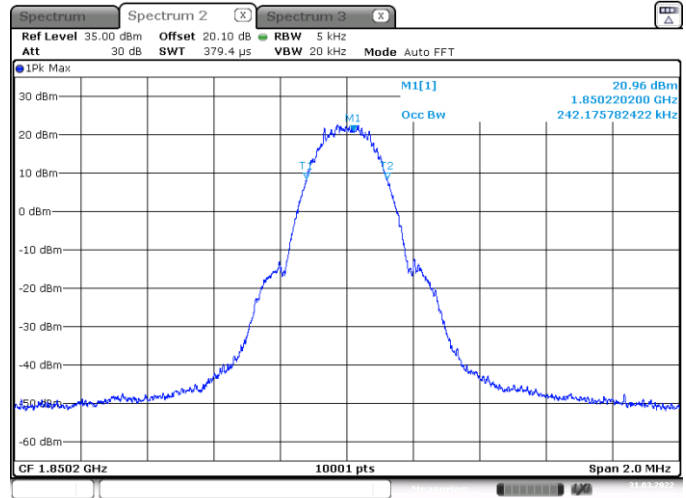
Date: 31-JPR, 2022 10:25:07

GSM 1900 GPRS Channel 810



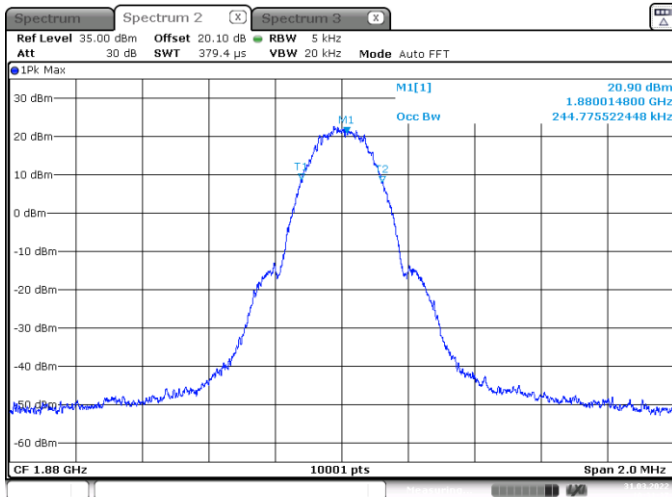
Date: 31-MAR-2022 10:17:13

GSM 1900 EGPRS Channel 512



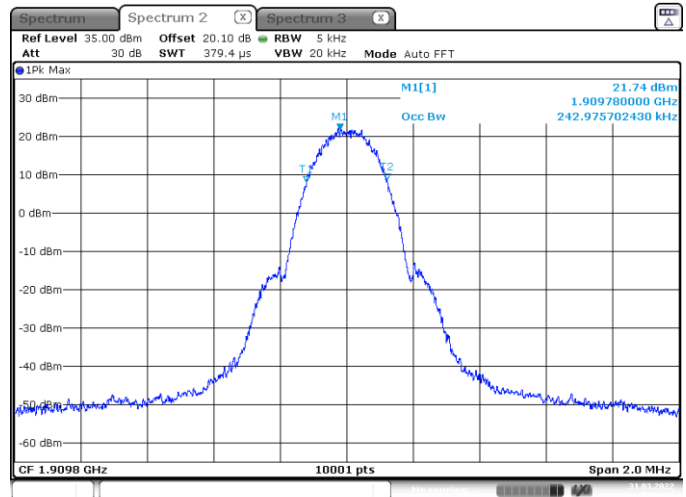
Date: 31-MAR-2022 10:30:34

GSM 1900 EGPRS Channel 661



Date: 31-MAR-2022 10:31:38

GSM 1900 EGPRS Channel 810



Date: 31-MAR-2022 10:32:41

6 Band Edge and Conducted Spurious Emissions

6.1 Test Result

| Test Description | Requirements | Test Result |
|--|--|-------------|
| Conducted spurious emissions and Band Edge | 2.1051 22.917(a) 24.238(a) RSS-132 (5.5) RSS-133 (6.5.1) | Compliant |

6.2 Test Method

KDB document 971168 D01 Power Meas License Digital Systems v03r01, Clause 6 was used to measure spurious emissions at the antenna terminals.

6.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 23.9 °C
Relative Humidity: 59.0%
Atmospheric Pressure: 97.9 kPa

6.4 Test Equipment

Test End Date: 3/31/2022

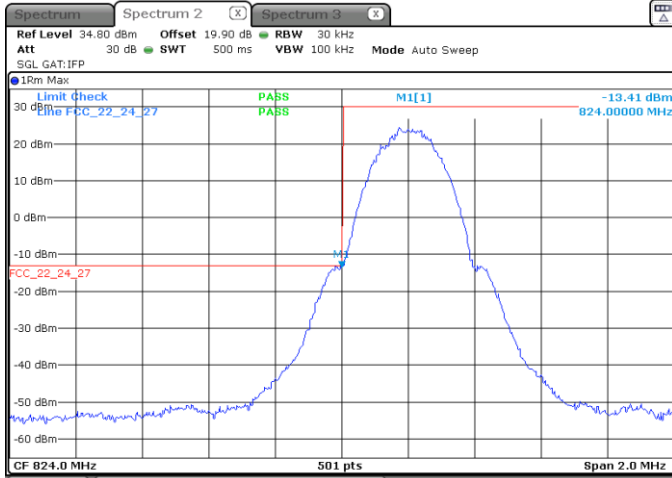
Tester: JOP

| Equipment | Model | Manufacturer | Asset Number | Cal Date | Cal Due Date |
|---------------------------------|--------------|-----------------------------|--------------|-------------|--------------|
| RF CABLE SMA TO SMA, 0.01-40GHZ | 084-0505-059 | TELEDYNE STORM MICROWAVE | 20108 | 16-Mar-2022 | 16-Mar-2023 |
| ATTENUATOR, 10DB | BW-S10W2 | MINI-CIRCUITS | 15034 | 7-Oct-2021 | 7-Oct-2022 |
| POWER SPLITTER | ZFRSC-123-S+ | MINI-CIRCUITS | B101739 | 8-Jul-2021 | 8-Jul-2022 |
| RF CABLE (TS8997) | 141 | HUBER & SUHNER | B095588 | 1-Jul-2021 | 1-Jul-2022 |
| WIDEBAND RADIO COMMUNICATION | CMW500 | ROHDE & SCHWARZ | B094874 | 13-Jan-2021 | 13-Jan-2023 |

6.5 Test Data – Band Edge

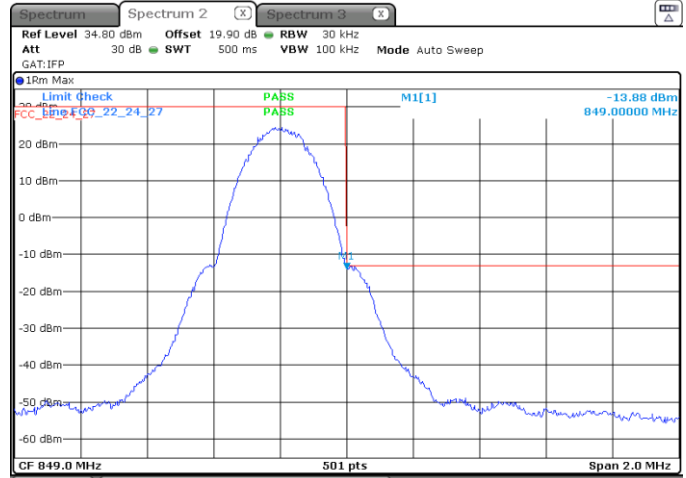
GSM 850 - GPRS

Lower Band Edge (Channel 128, 824.2 MHz)



Date: 31-JPR,2022 11:25:04

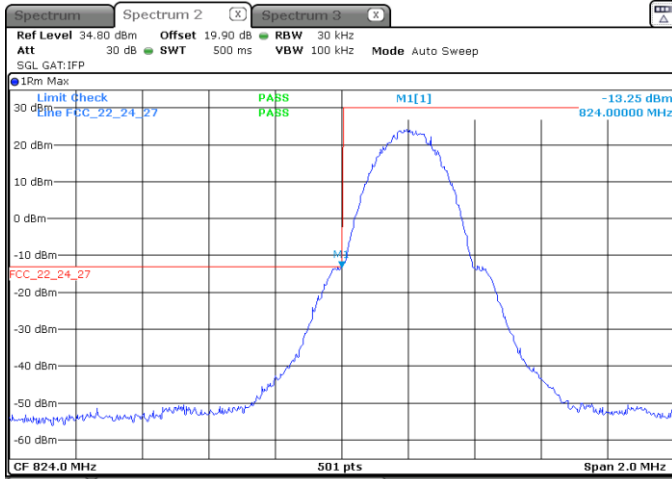
Upper Band Edge (Channel 251, 848.8 MHz)



Date: 31-JPR,2022 11:20:15

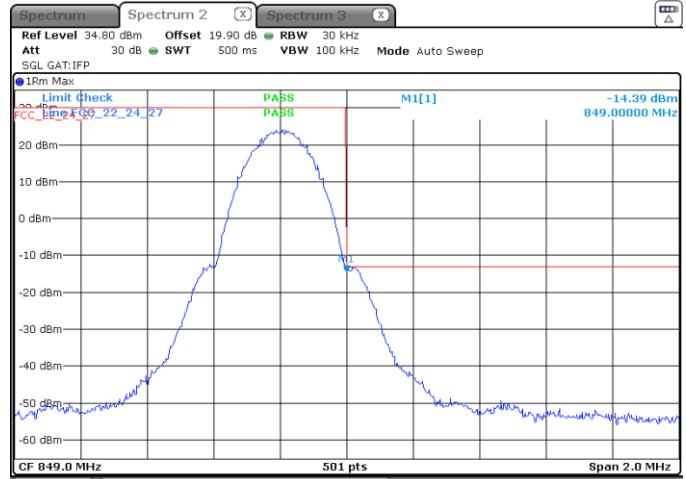
GSM 850 - EGPRS

Lower Band Edge (Channel 128, 824.2 MHz)



Date: 31-JPR,2022 11:24:09

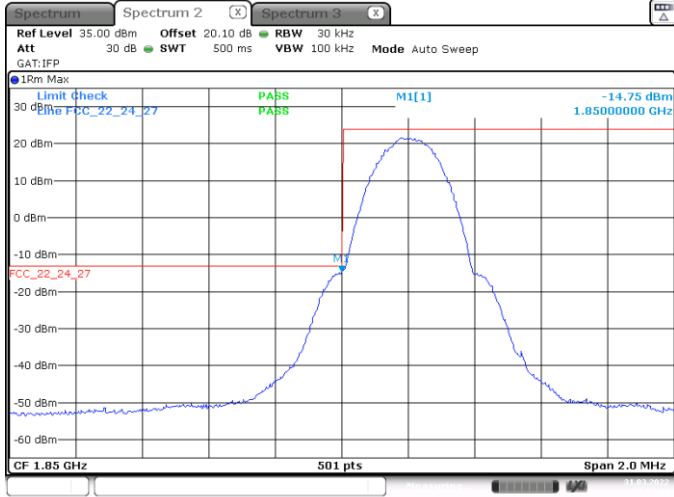
Upper Band Edge (Channel 251, 848.8 MHz)



Date: 31-JPR,2022 11:22:18

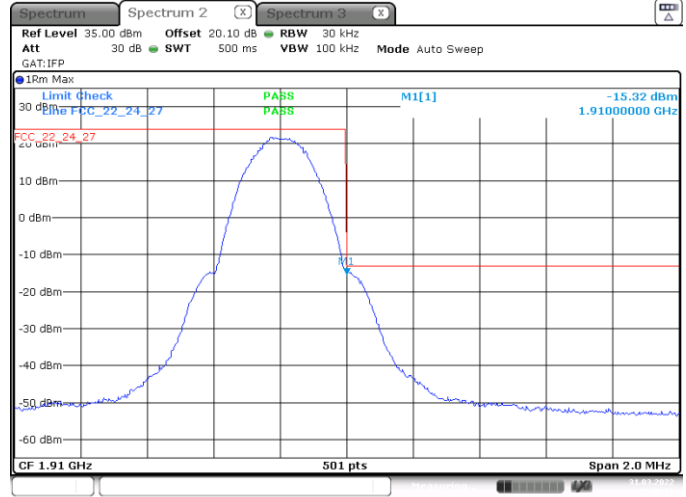
GSM1900 – GPRS

Lower Band Edge (Channel 512, 1850.2 MHz)



Date: 31-MAR-2022 10:54:04

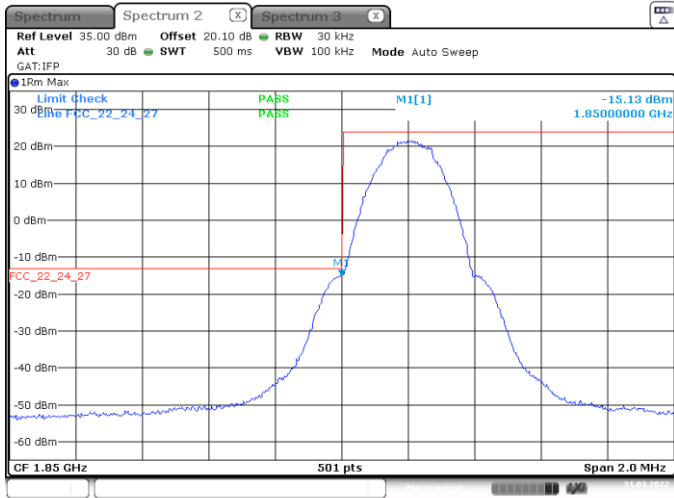
Upper Band Edge (Channel 810, 1909.8 MHz)



Date: 31-MAR-2022 10:48:14

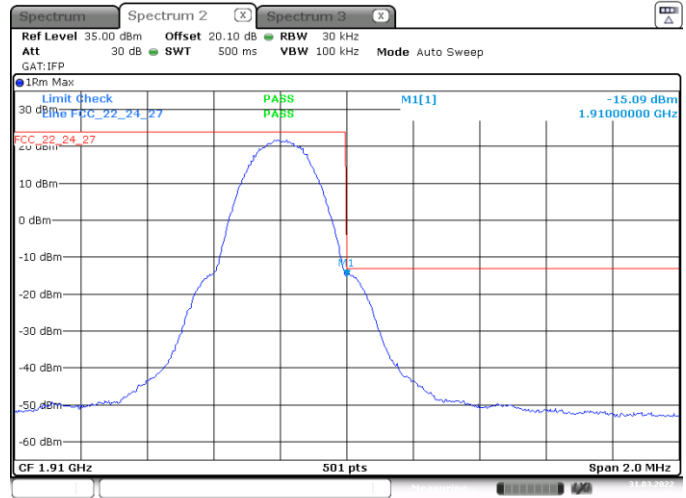
GSM1900 - EGPRS

Lower Band Edge (Channel 512, 1850.2 MHz)



Date: 31-MAR-2022 10:52:41

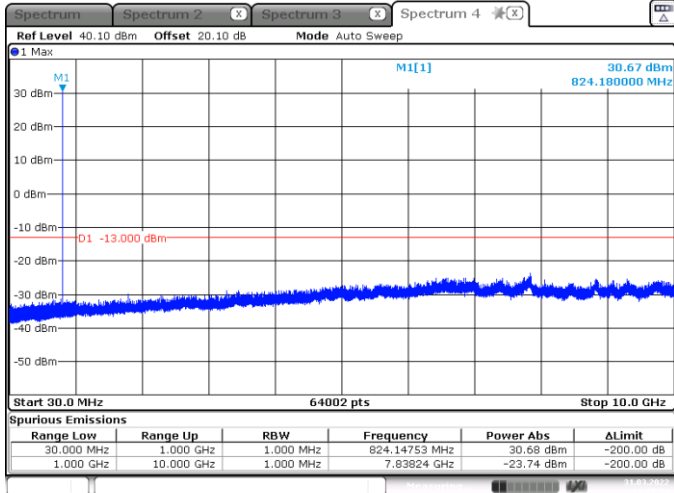
Upper Band Edge (Channel 810, 1909.8 MHz)



Date: 31-MAR-2022 10:44:59

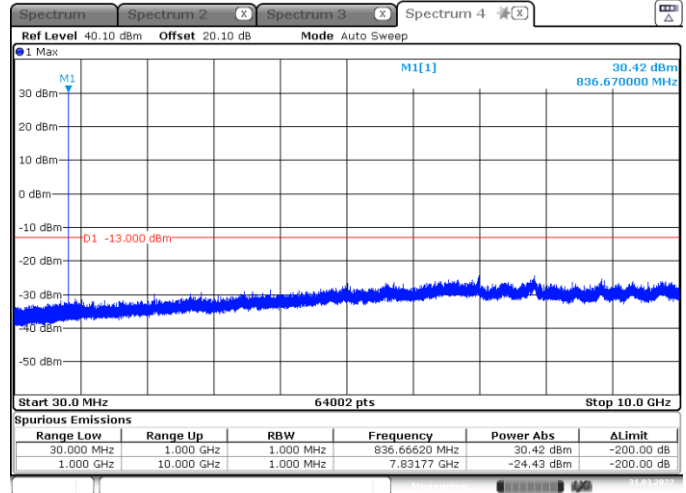
6.6 Test Data - Conducted Spurious Emissions

GSM 850 GPRS Channel 128



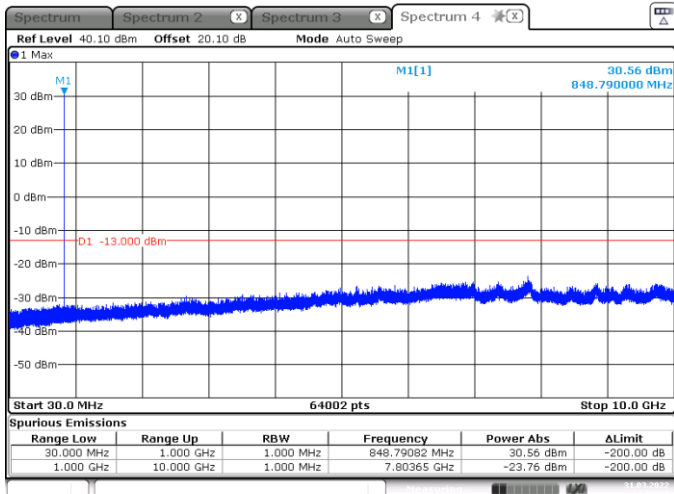
Date: 31-JPR, 2022 11:47:54

GSM 850 GPRS Channel 190



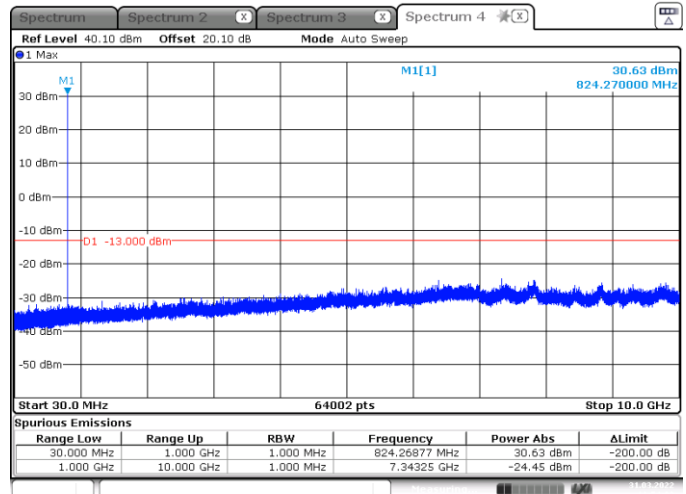
Date: 31-JPR, 2022 11:49:05

GSM 850 GPRS Channel 251



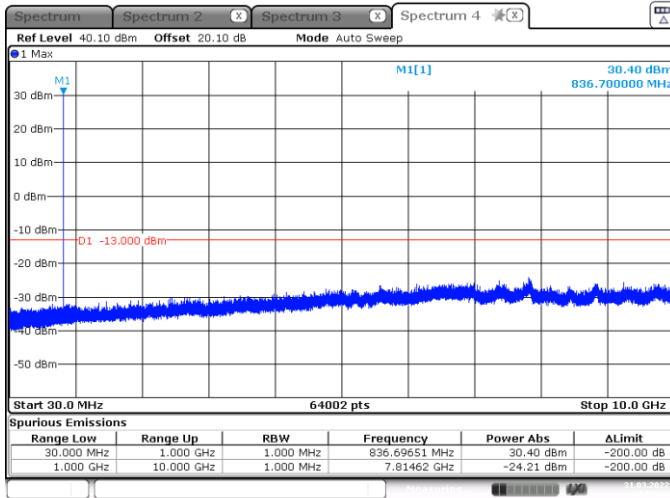
Date: 31-JPR, 2022 11:50:28

GSM 850 EGPRS Channel 128



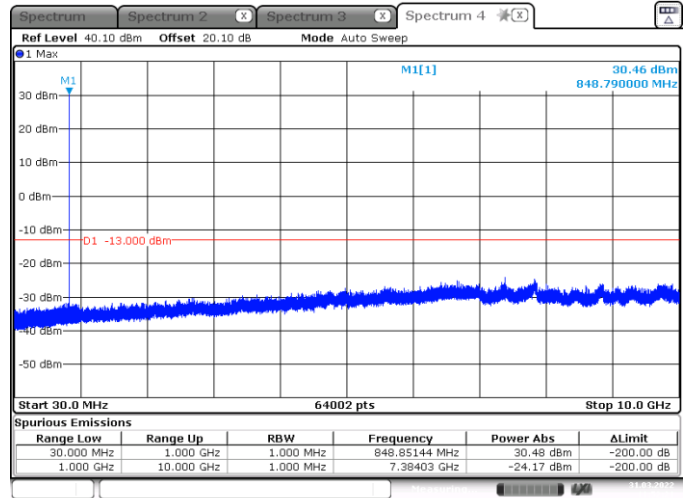
Date: 31-JPR, 2022 11:54:03

GSM 850 EGPRS Channel 190



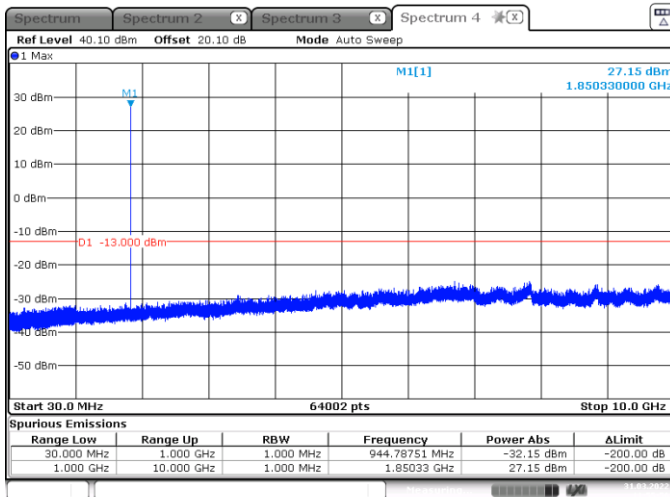
Date: 31.JAN.2022 11:53:13

GSM 850 EGPRS Channel 251



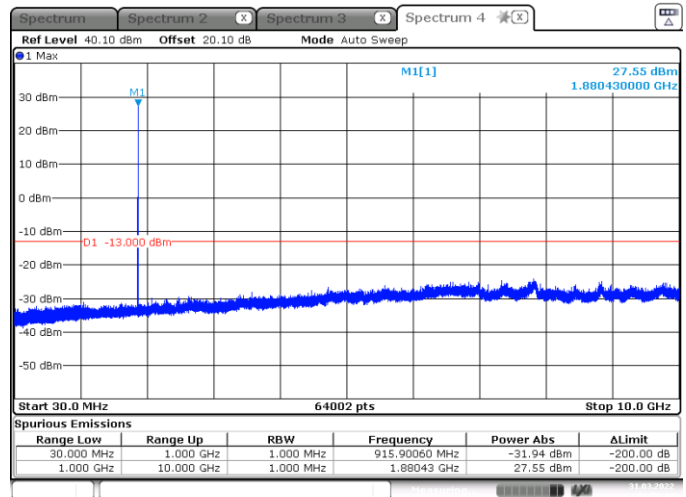
Date: 31.JAN.2022 11:52:21

GSM 1900 GPRS Channel 512



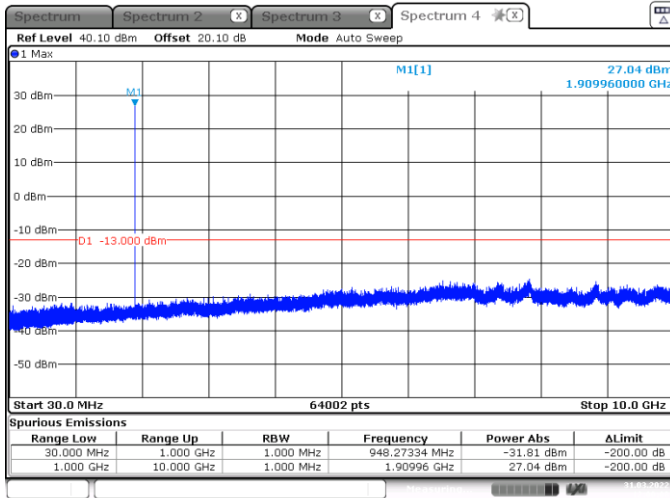
Date: 31.JAN.2022 11:55:57

GSM 1900 GPRS Channel 661



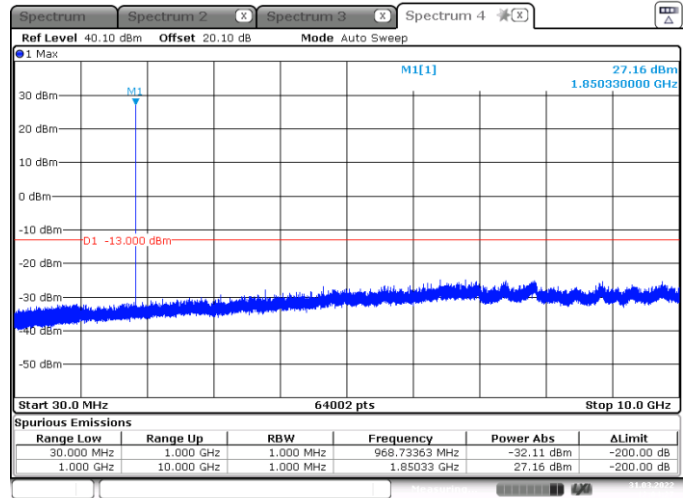
Date: 31.JAN.2022 11:59:14

GSM 1900 GPRS Channel 810



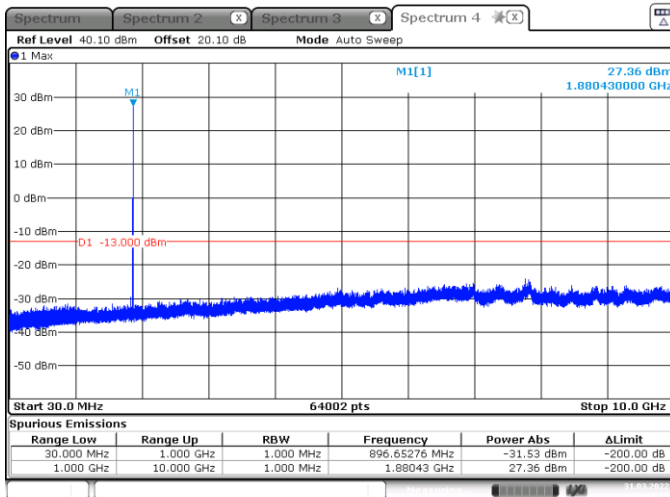
Date: 31.JAN.2022 12:00:08

GSM 1900 EGPRS Channel 512



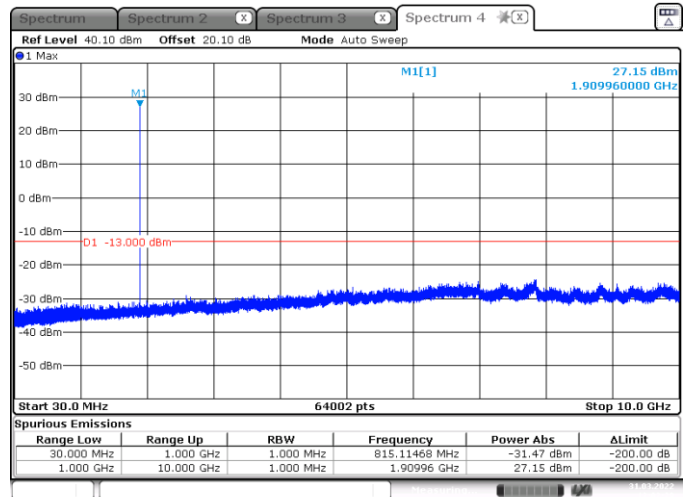
Date: 31.JAN.2022 12:04:28

GSM 1900 EGPRS Channel 661



Date: 31.JAN.2022 12:03:28

GSM 1900 EGPRS Channel 810



Date: 31.JAN.2022 12:02:29

7 Effective Radiated Power

7.1 Test Result

| Test Description | Requirements | Test Result |
|------------------------------------|---|-------------|
| Effective Radiated Power | FCC Part 22.913(a)(5) | Compliant |
| Effective Isotropic Radiated Power | 24.232(c) RSS-132 (5.4) RSS-133 (6.4) | Compliant |

7.2 Test Method

For ERP/EIRP calculations, the highest antenna gain was used for each band.

7.3 Test Site

SGS EMC Laboratory, Suwanee, GA

7.4 Test Equipment

None

7.5 Test Data

| Band | Max Power dBm | Antenna Gain dBd/dBi | Cable Loss, dB | ERP/EIRP (dBm) | ERP/EIRP | | Result | |
|------------------|------------------|----------------------------|-------------------|-------------------|------------|------|--------|------|
| | | | | | Limit, dBm | | FCC | IC |
| | | | | | FCC | IC | | |
| GSM850 / 824.2 | 32.1 | -0.26 | 0 | 31.84 | 38.5 | 38.5 | PASS | PASS |
| GSM850 / 836.6 | 32.13 | -0.26 | 0 | 31.87 | 38.5 | 38.5 | PASS | PASS |
| GSM850 / 848.8 | 32.09 | -0.26 | 0 | 31.83 | 38.5 | 38.5 | PASS | PASS |
| GSM1900 / 1850.2 | 29.7 | 2.31 | 0 | 32.01 | 33 | 33 | PASS | PASS |
| GSM1900 / 1880 | 29.69 | 2.31 | 0 | 32 | 33 | 33 | PASS | PASS |
| GSM1900 / 1909.8 | 29.27 | 2.31 | 0 | 31.58 | 33 | 33 | PASS | PASS |

8 Radiated Spurious Emissions

8.1 Test Result

| Test Description | Specifications | | Test Result |
|-----------------------------|--|--|-------------|
| Radiated Spurious Emissions | FCC Part 2.1053 FCC Part 22.917(a) FCC Part 24.238(a) ANSI/TIA-603-C-2004 | RSS-GEN (6.13) RSS-132 (5.5) RSS-133 (6.5) | Compliant |

8.2 Test Method

The levels of the carrier and the various conducted spurious and harmonics frequencies are measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB. Compliance is based on the use of a spectrum analyzer employing a resolution bandwidth of 1 MHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of a least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emissions 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.

The EUT was manipulated through each of its three orthogonal axes with the measurement oriented in both vertical and horizontal polarizations.

A radio link was established between EUT and Radio Communications Tester via direct connection with a coaxial cable. The output power of the EUT was set to maximum value by using the maximum power setting on the Radio Communications Tester. The measurements were conducted at the low, middle, and high channels in BC0/BC1 in the worst-case operating mode.

8.3 Test Site

10m Absorber Lined Shielded Enclosure (ALSE), Suwanee, GA

Environmental Conditions

Temperature: 22.3 °C
Relative Humidity: 36.2 %
Atmospheric Pressure: 97.31 kPa

8.4 Test Equipment

Test End Date: 24-Mar-2022
25-Mar-2022

Tester: AB/ZH

| Equipment | Model | Manufacturer | Asset Number | Cal Date | Cal Due Date |
|-------------------------------|-------------|--------------------------|--------------|-------------|--------------|
| ANTENNA, DRG HORN (MEDIUM) | 3117 | ETS LINDGREN | B079699 | 15-Jul-2020 | 15-Jul-2022 |
| RF CABLE, NM TO NM. | 90-195-276 | TELEDYNE STORM MICROWAVE | 21020 | 16-Mar-2022 | 16-Mar-2023 |
| LOW NOISE AMPLIFIER | TS-PR18 | ROHDE & SCHWARZ | B094463 | 7-Jul-2021 | 7-Jul-2022 |
| RF CABLE | 104PE | HUBER & SUHNER | B079793 | 24-Aug-2021 | 24-Aug-2022 |
| EMI TEST RECEIVER | ESU40 | ROHDE & SCHWARZ | B079629 | 21-Jun-2021 | 21-Jun-2022 |
| ANTENNA, BILOG | CBL 6143A | TESEQ | B085931 | 27-Feb-2022 | 27-Feb-2024 |
| N to N RF Cable | C12-N1N1-27 | MEGAPHASE | 22001 | 10-Jan-2022 | 10-Jan-2023 |
| RF CABLE NM TO NF, 0.01-18GHZ | 90-213-118 | TELEDYNE STORM MICROWAVE | 20117 | 17-Feb-2022 | 17-Feb-2023 |
| RF CABLE NM TO NM, 0.01- | 90-195-079 | TELEDYNE STORM MICROWAVE | 20123 | 14-Feb-2022 | 14-Feb-2023 |
| RF CABLE | UCOFLEX 10 | HUBER & SUHNER | B108523 | 26-Aug-2021 | 26-Aug-2022 |
| LOW NOISE AMPLIFIER | ZKL-2+ | MINI-CIRCUITS | B079800 | 18-Oct-2021 | 18-Oct-2022 |
| EMI TEST RECEIVER | ESU8 | ROHDE & SCHWARZ | B085759 | 9-Jul-2021 | 9-Jul-2022 |

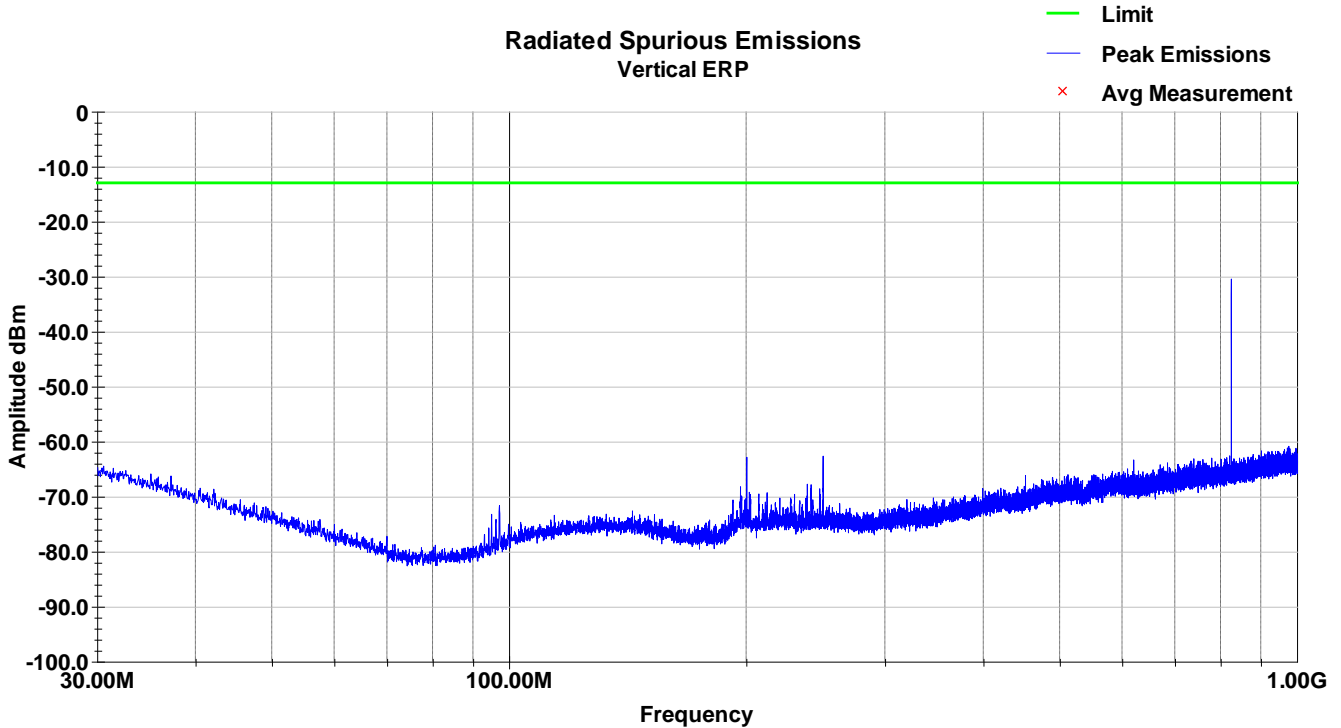
Software:

“RSE 30-1000 MHz T7 220318” TILE! profile dated 07October 2020

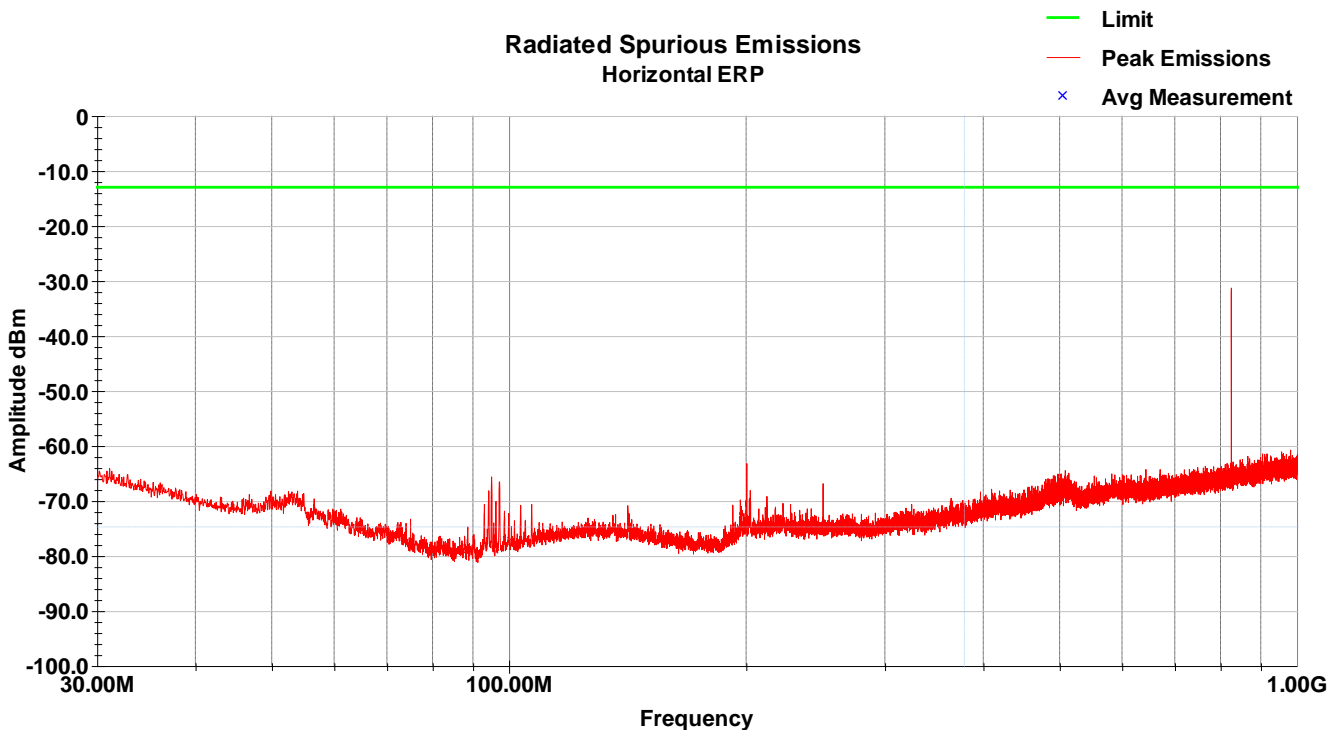
“RSE 1-18 GHz T7 210212” TILE! profile dated 02 February 2021

8.5 Test Data – GSM 850

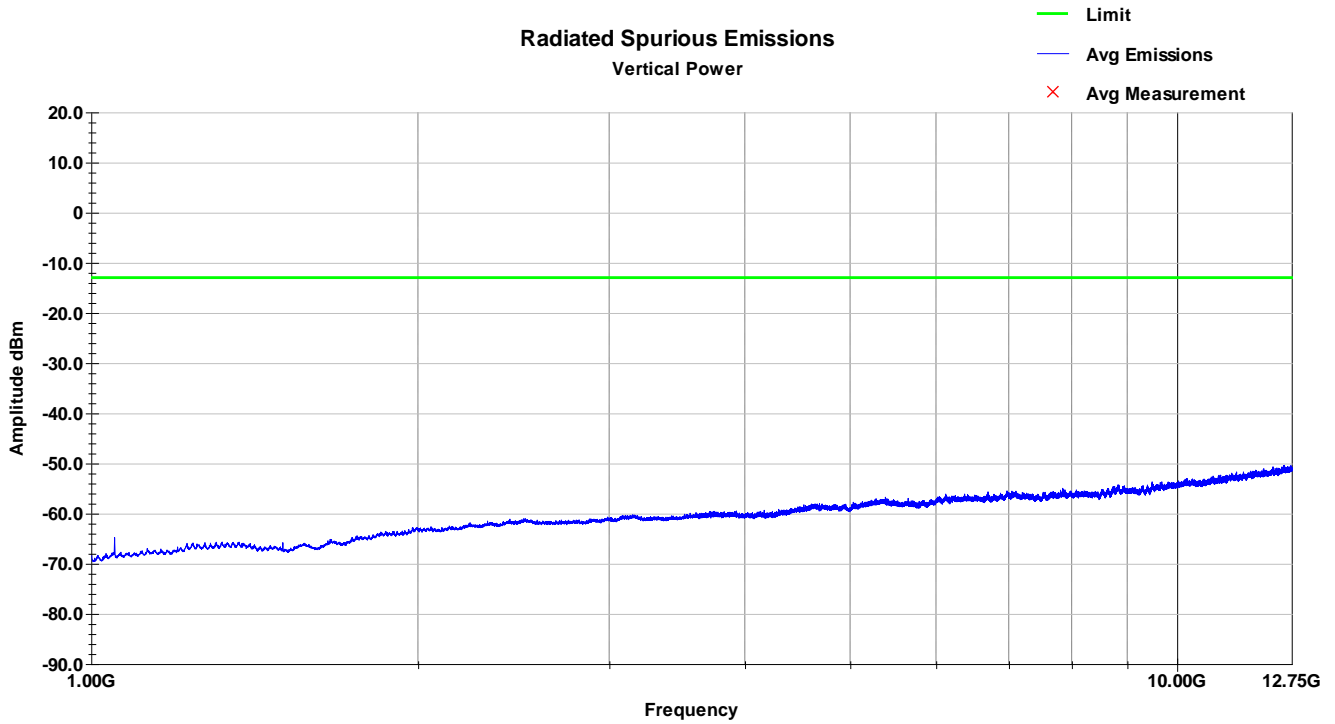
GSM 850 – LCH – 30-1000MHz – Vertical



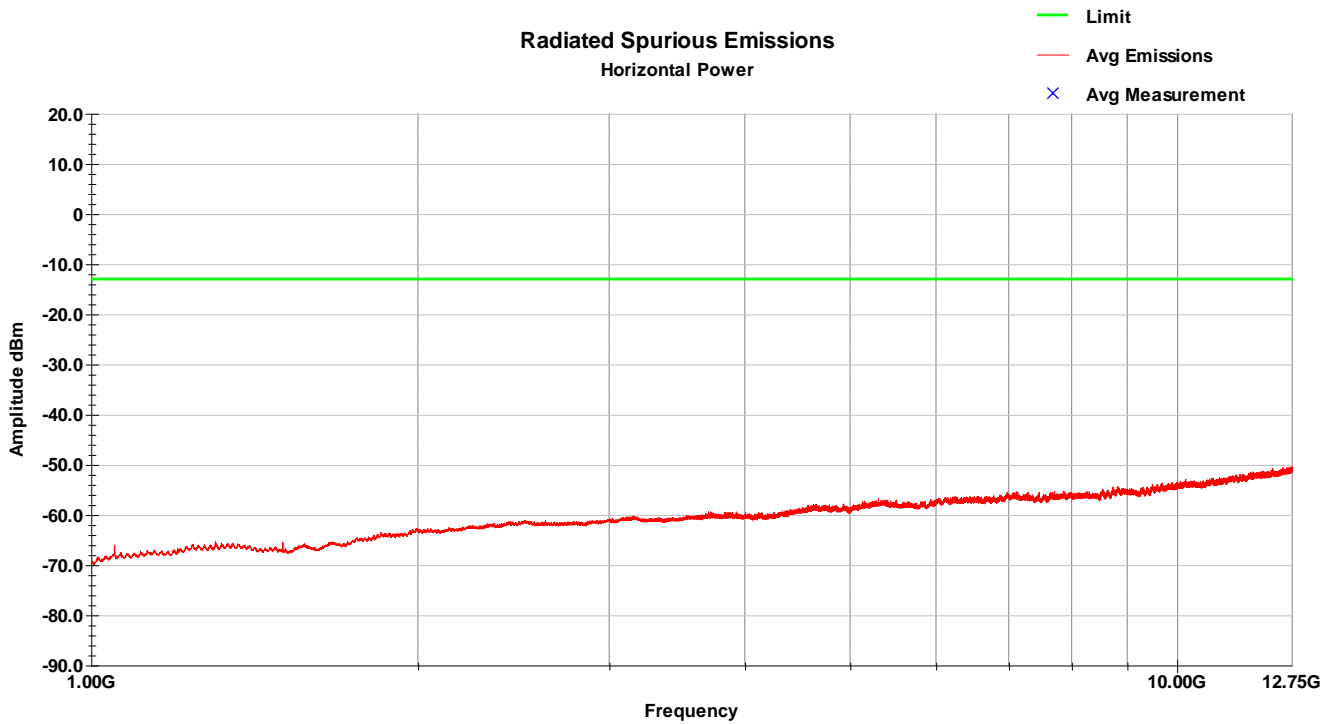
GSM 850 – LCH – 30-1000MHz – Horizontal



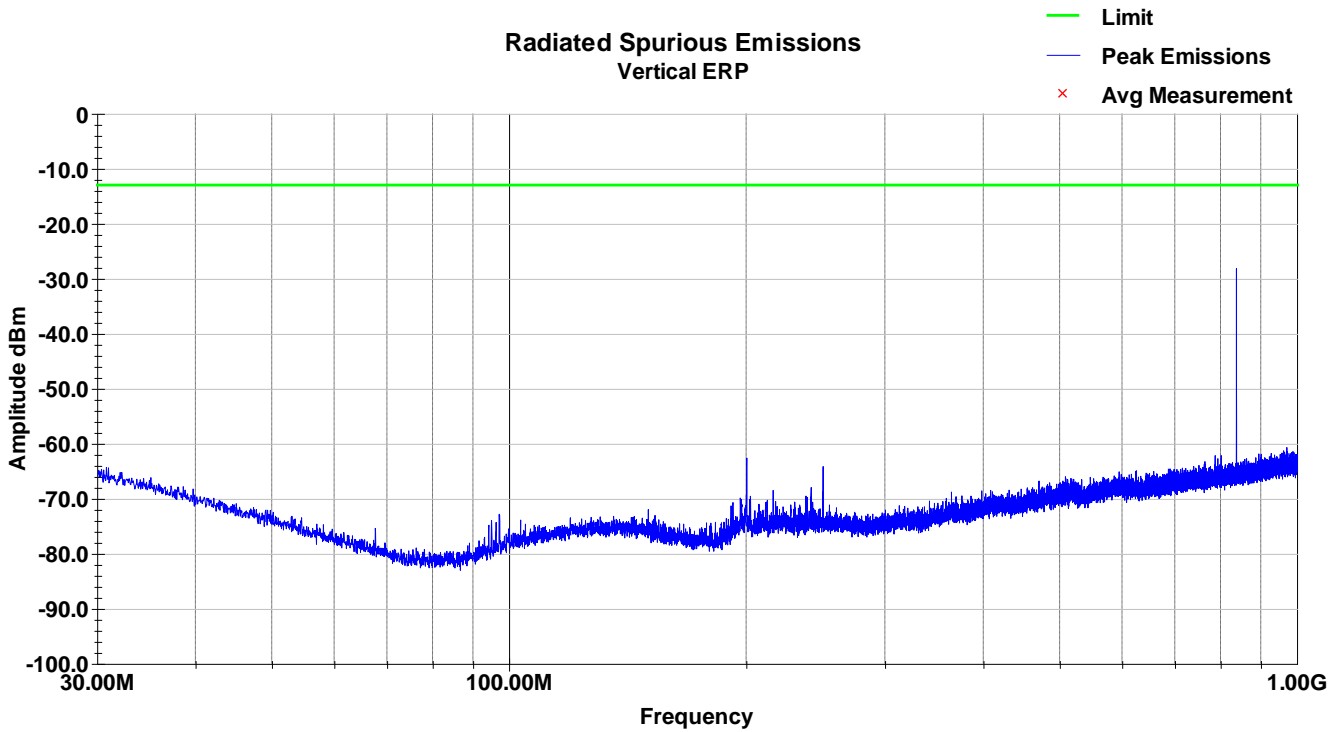
GSM 850 – LCH – 1-12.75GHz – Vertical



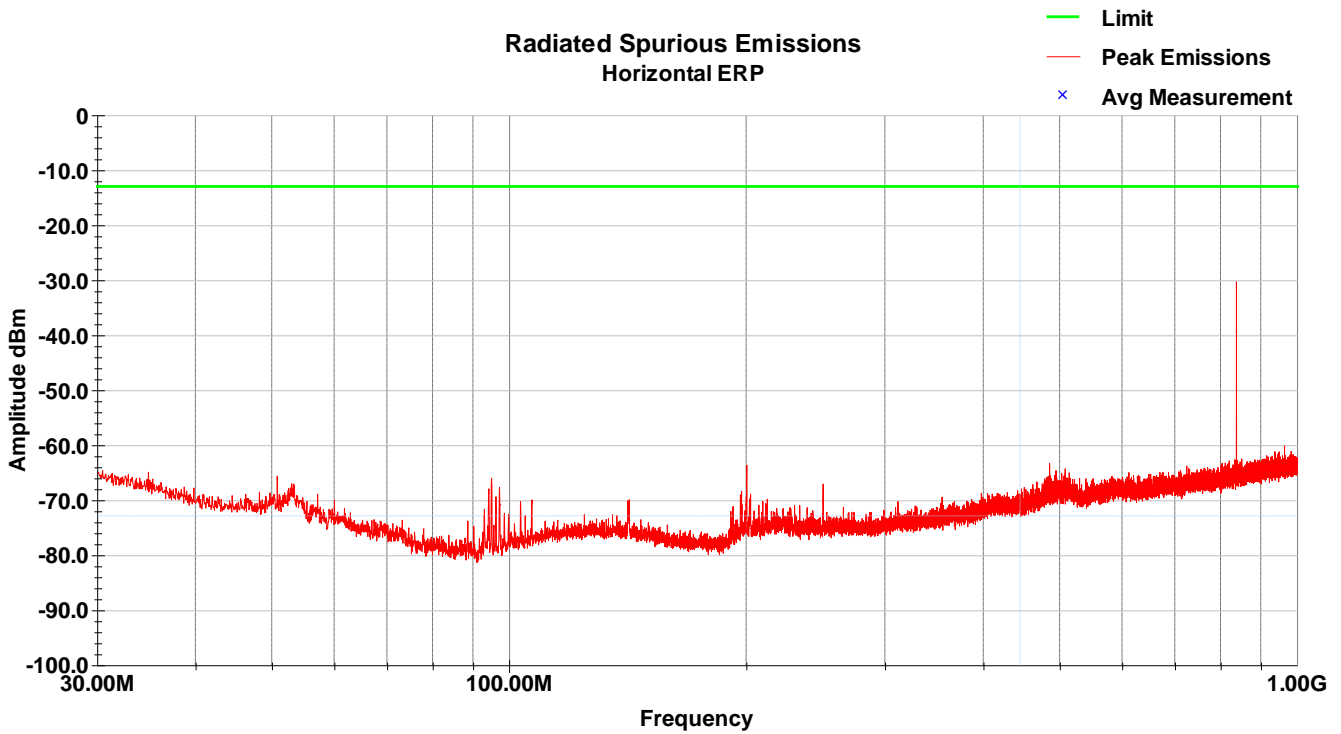
GSM 850 – LCH – 1-12.75G Hz – Horizontal



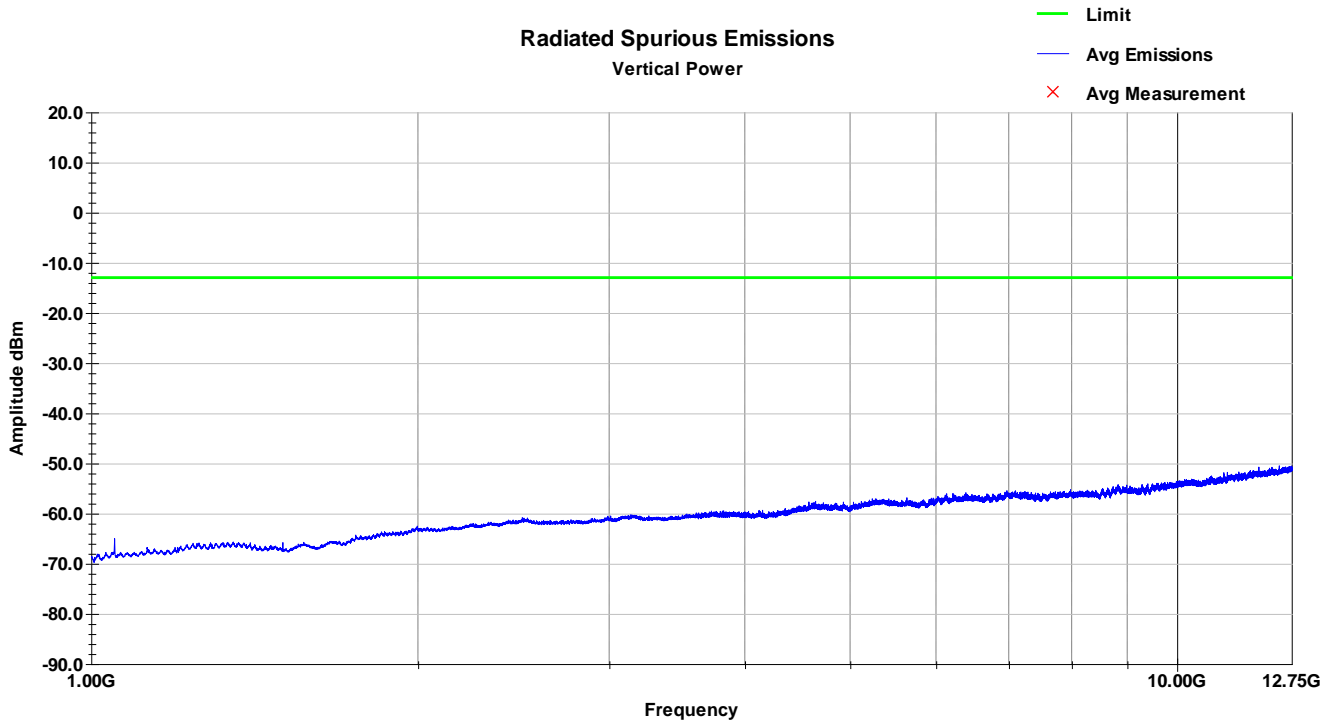
GSM 850 – MCH – 30-1000MHz – Vertical



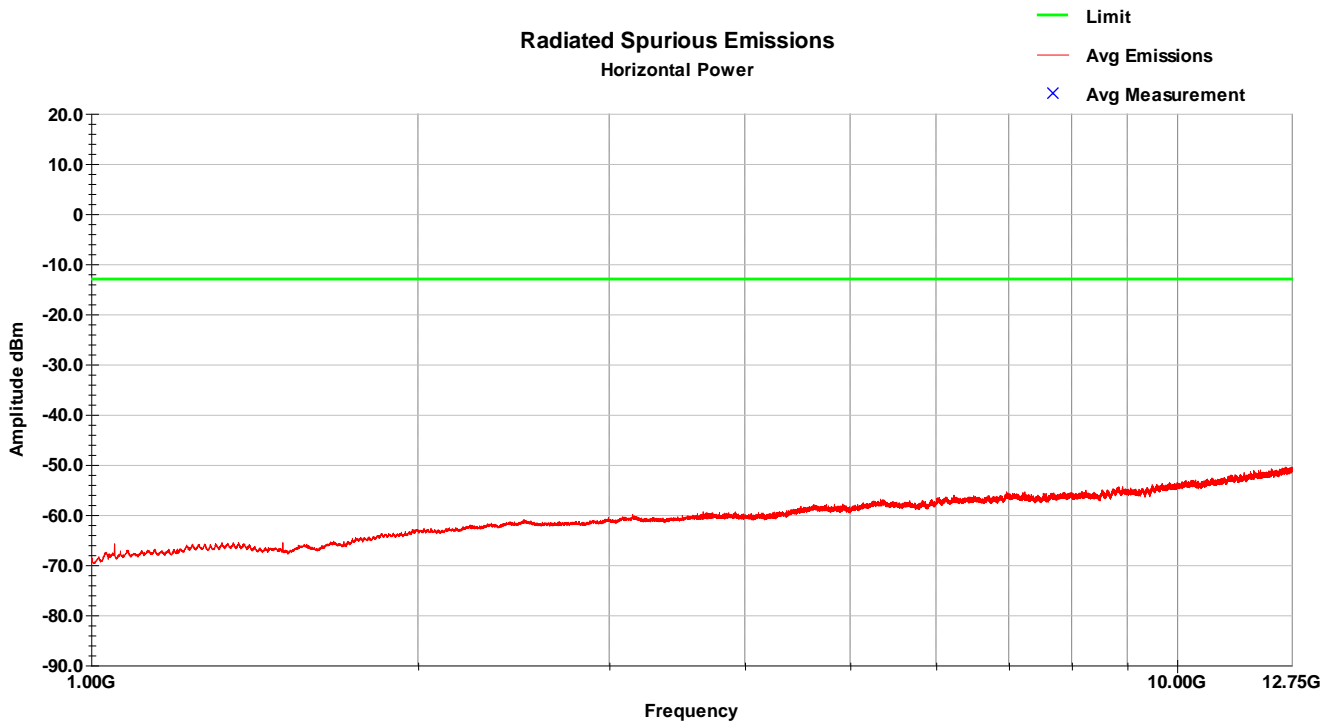
GSM 850 – MCH – 30-1000MHz – Horizontal



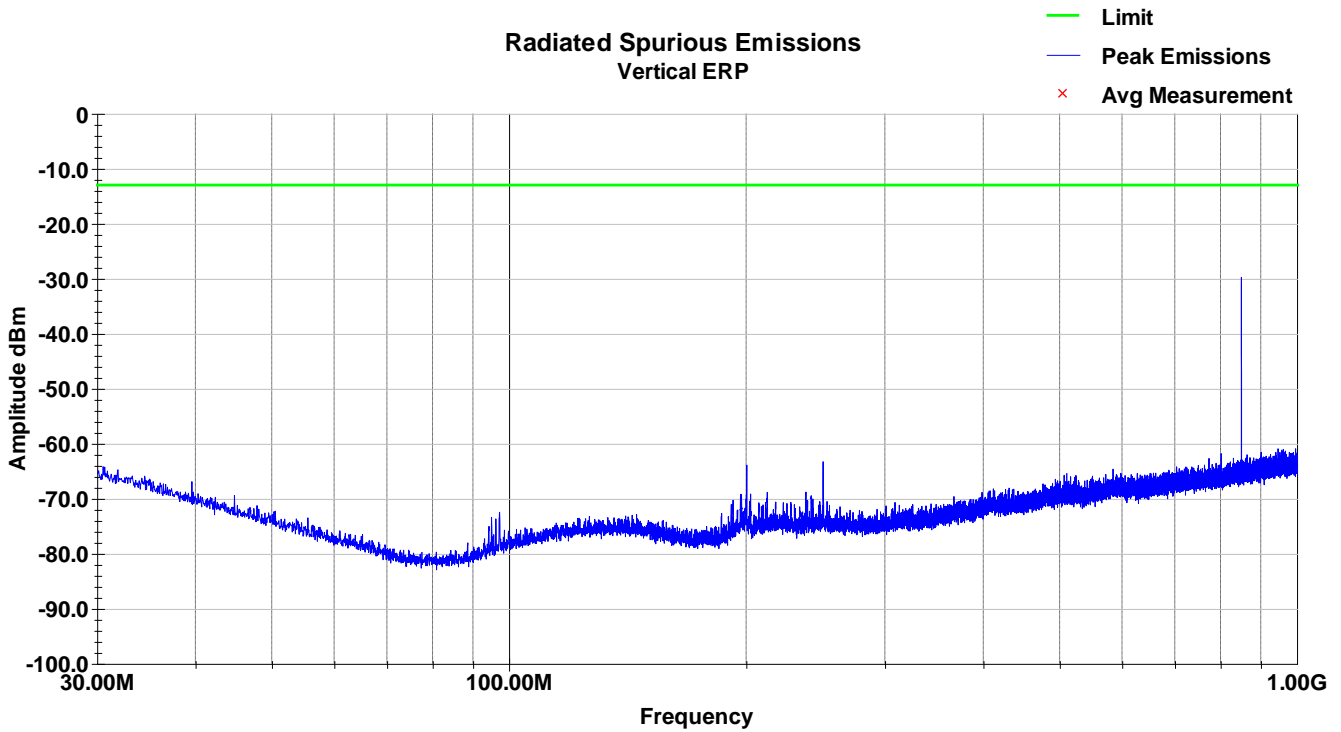
GSM 850 – MCH – 1-18GHz – Vertical



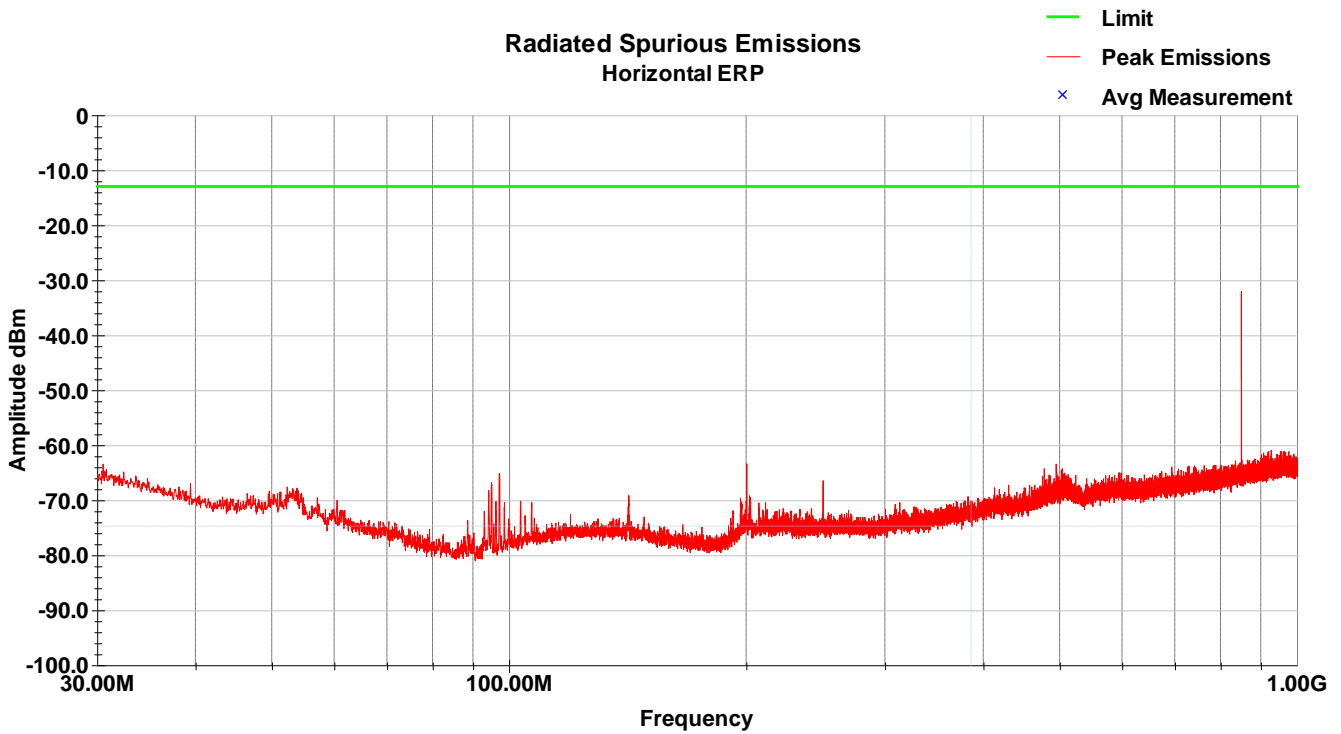
GSM 850 – MCH – 1-18G Hz – Horizontal



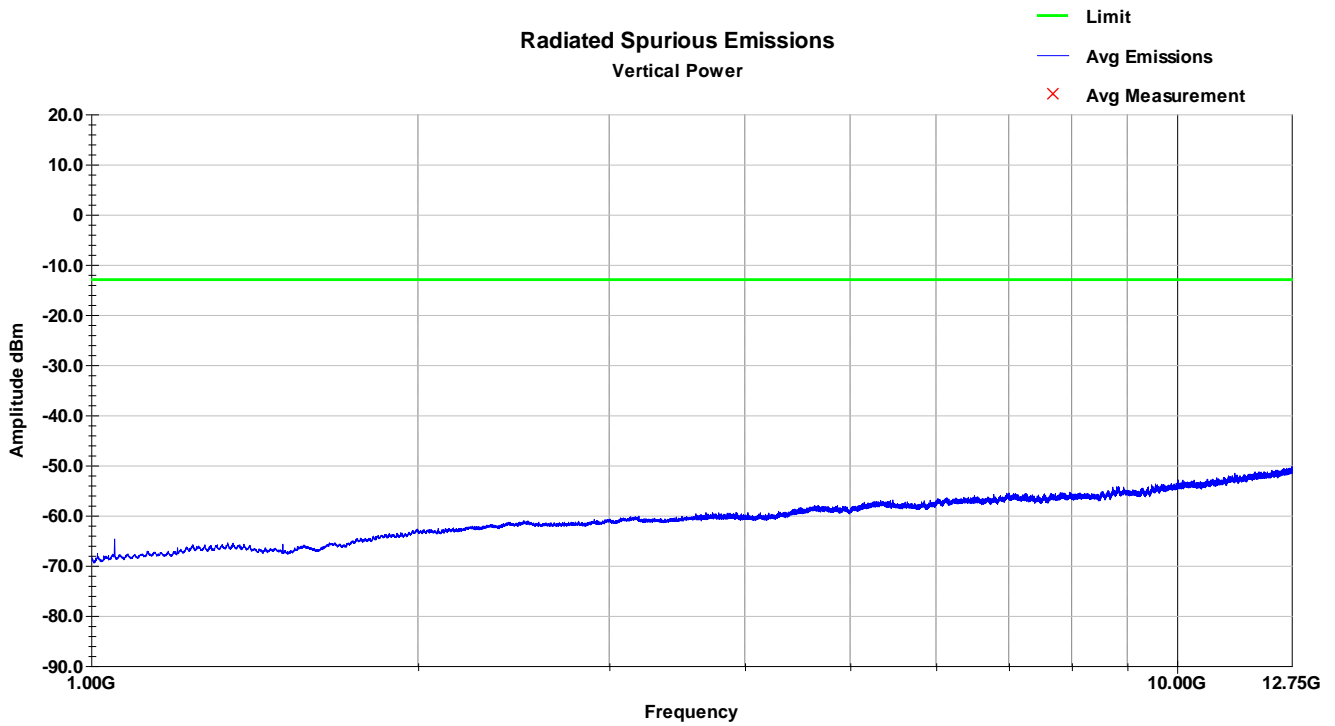
GSM 850 – HCH – 30-1000MHz – Vertical



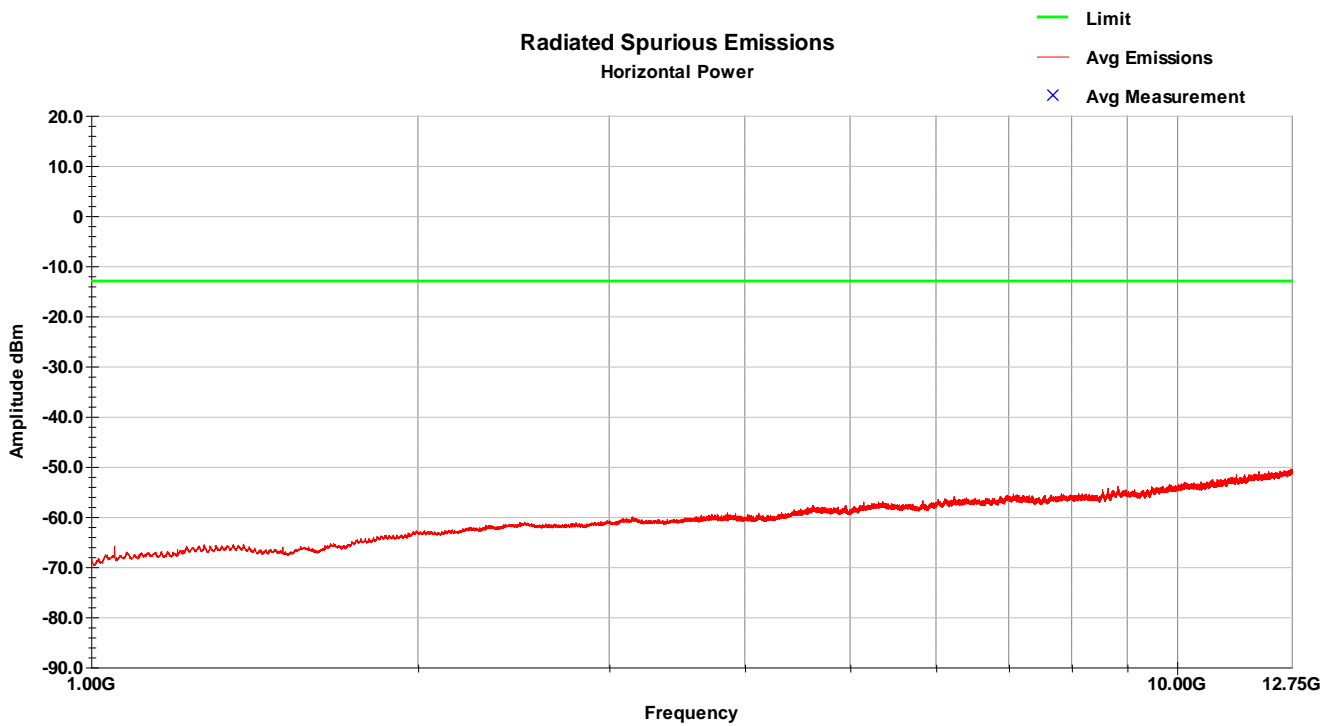
GSM 850 – HCH – 30-1000MHz – Horizontal



GSM 850 – HCH – 1-18GHz – Vertical



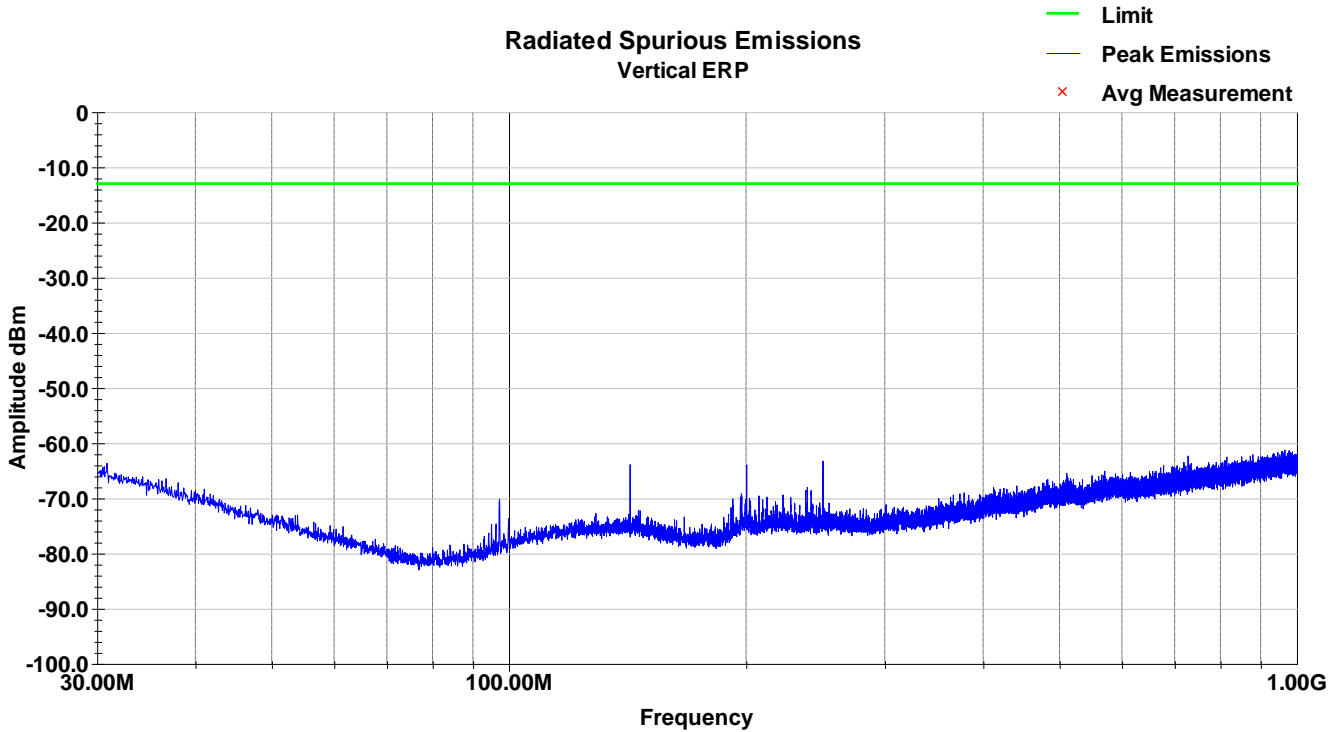
GSM 850 – HCH – 1-18G Hz – Horizontal



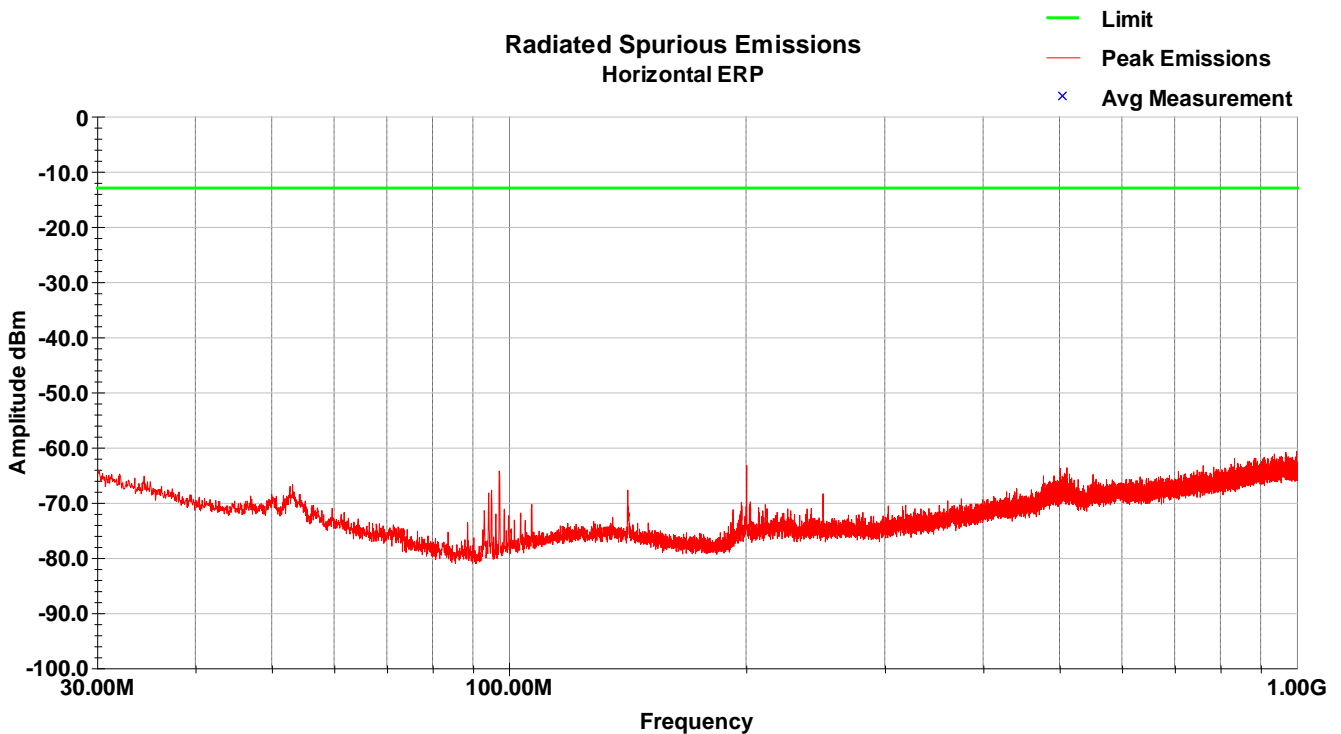
No emissions associated with the radio were detected other than the fundamental

8.6 Test Data – GSM 1900

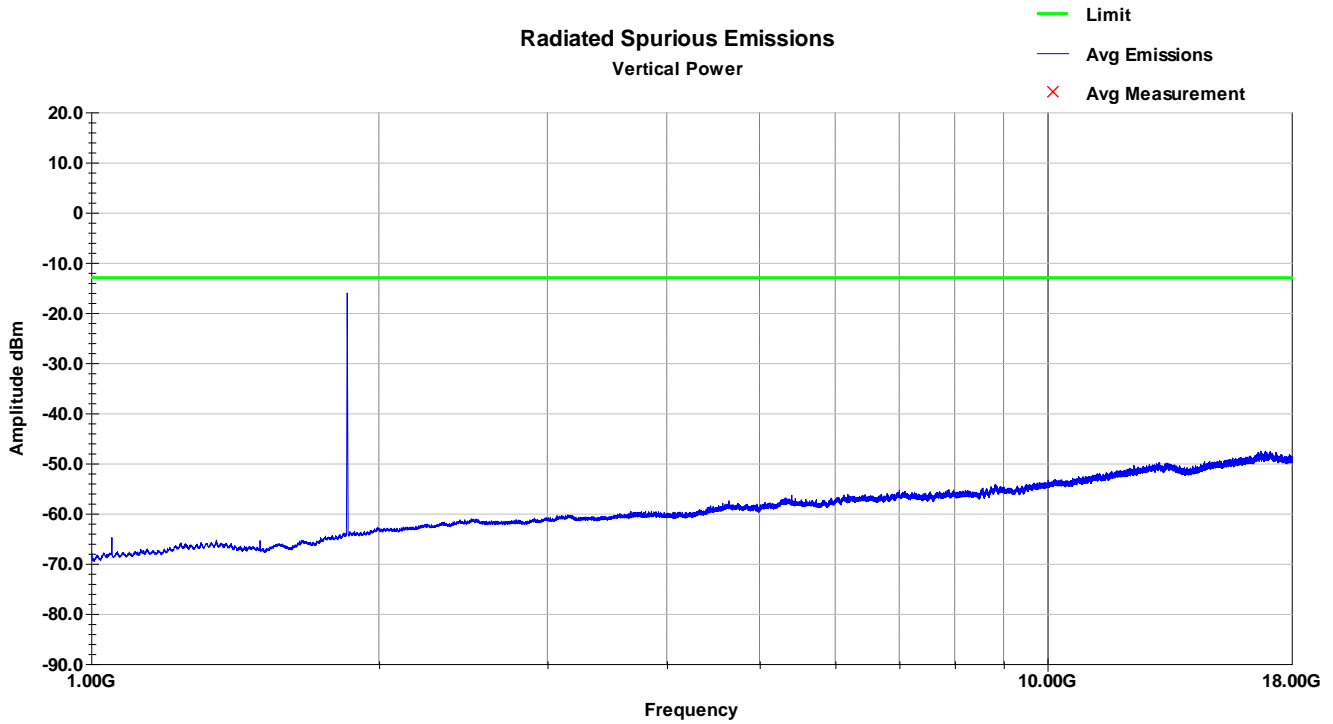
GSM 1900 – LCH – 30-1000MHz – Vertical



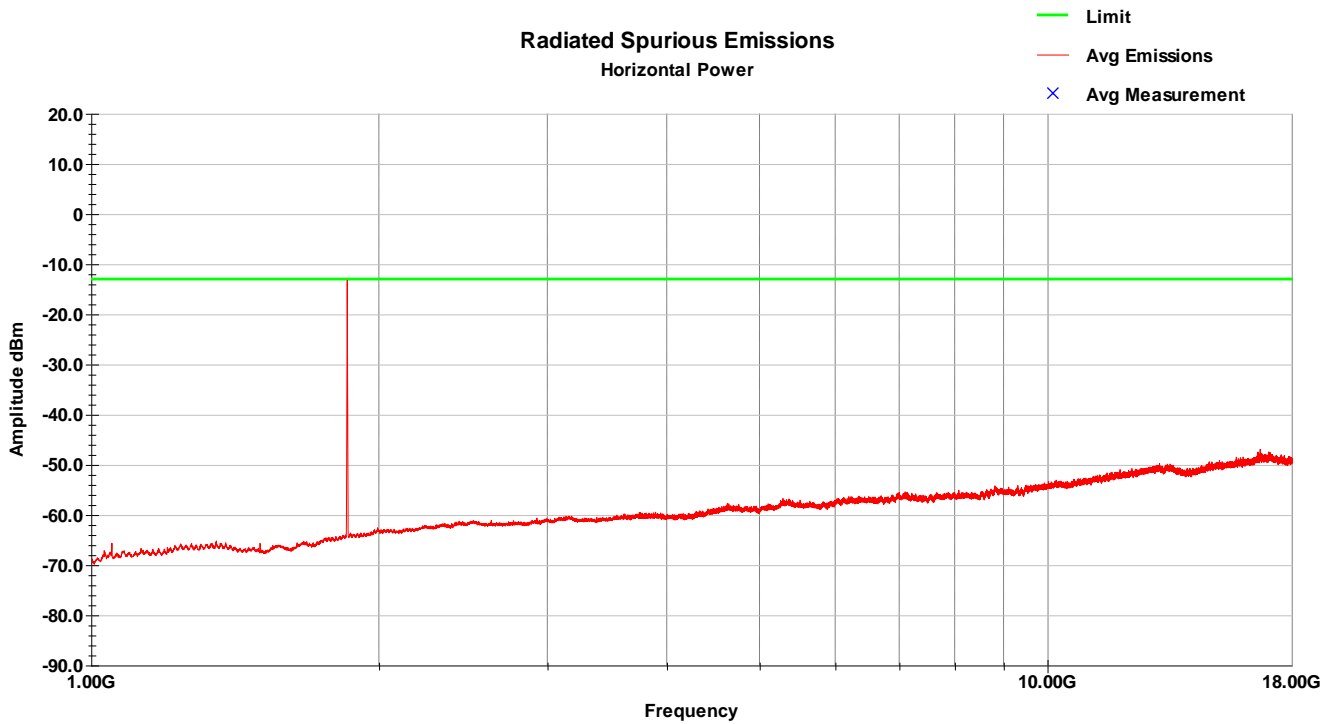
GSM 1900 – LCH – 30-1000MHz – Horizontal



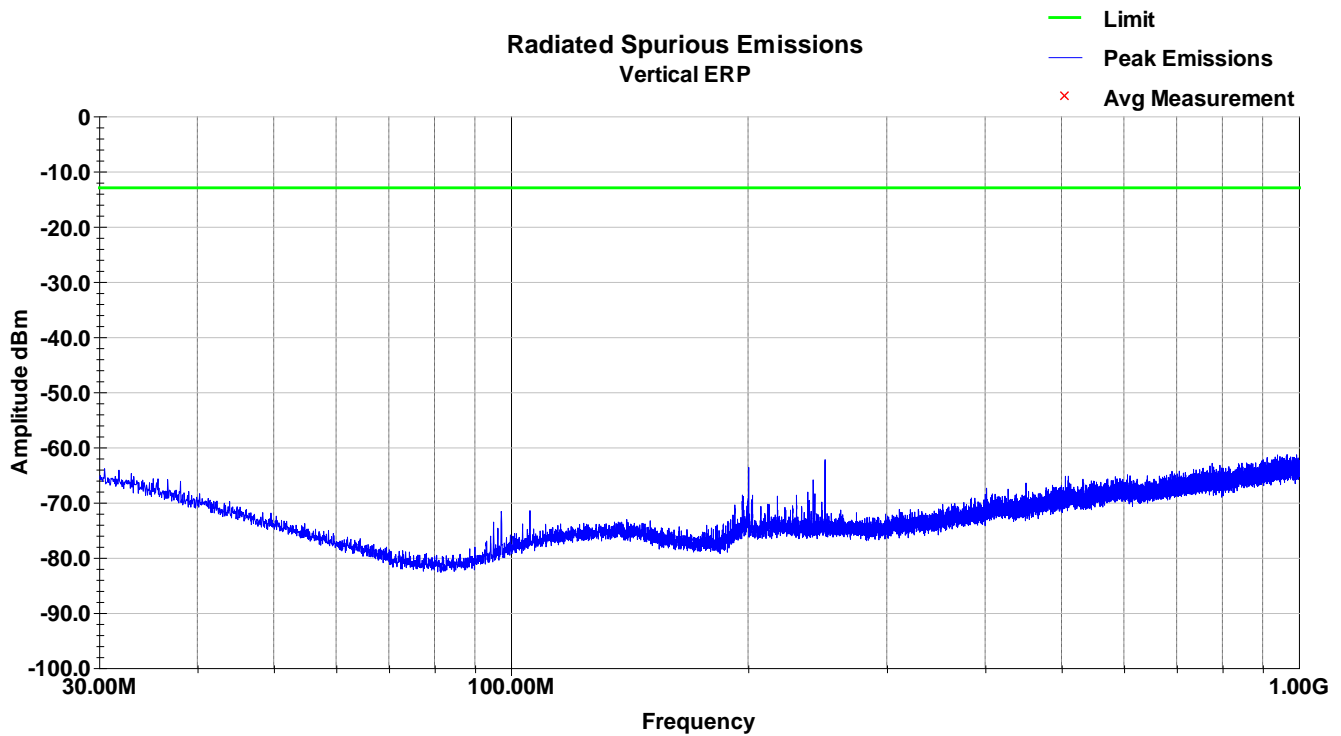
GSM 1900 – LCH – 1-18GHz – Vertical



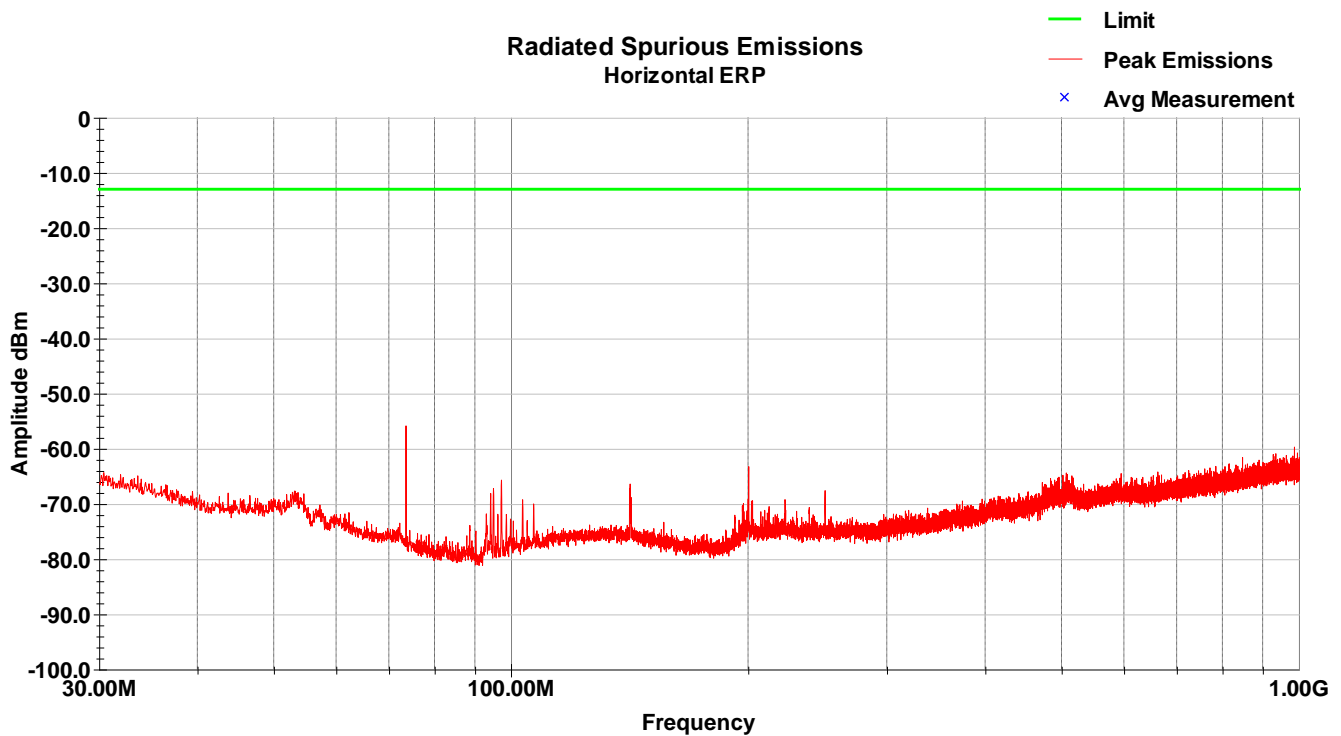
GSM 1900 – LCH – 1-18G Hz – Horizontal



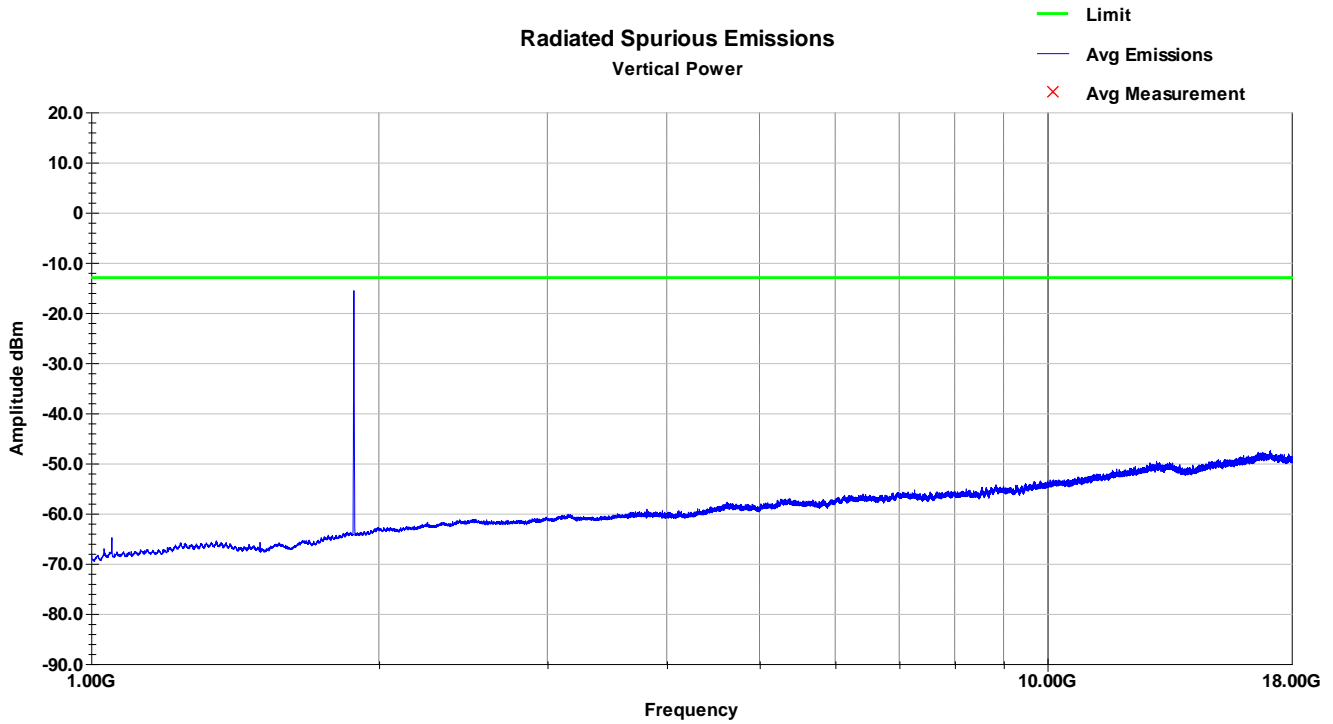
GSM 1900 – MCH – 30-1000MHz – Vertical



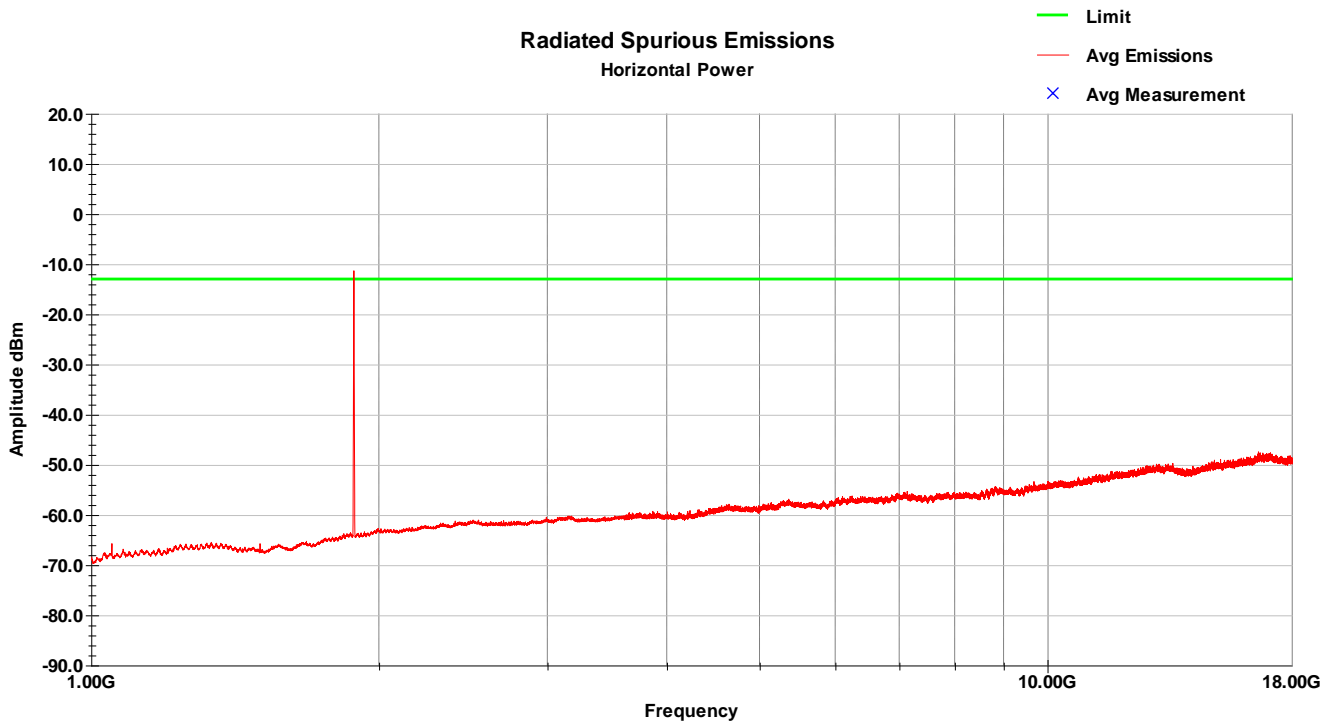
GSM 1900 – MCH – 30-1000MHz – Horizontal



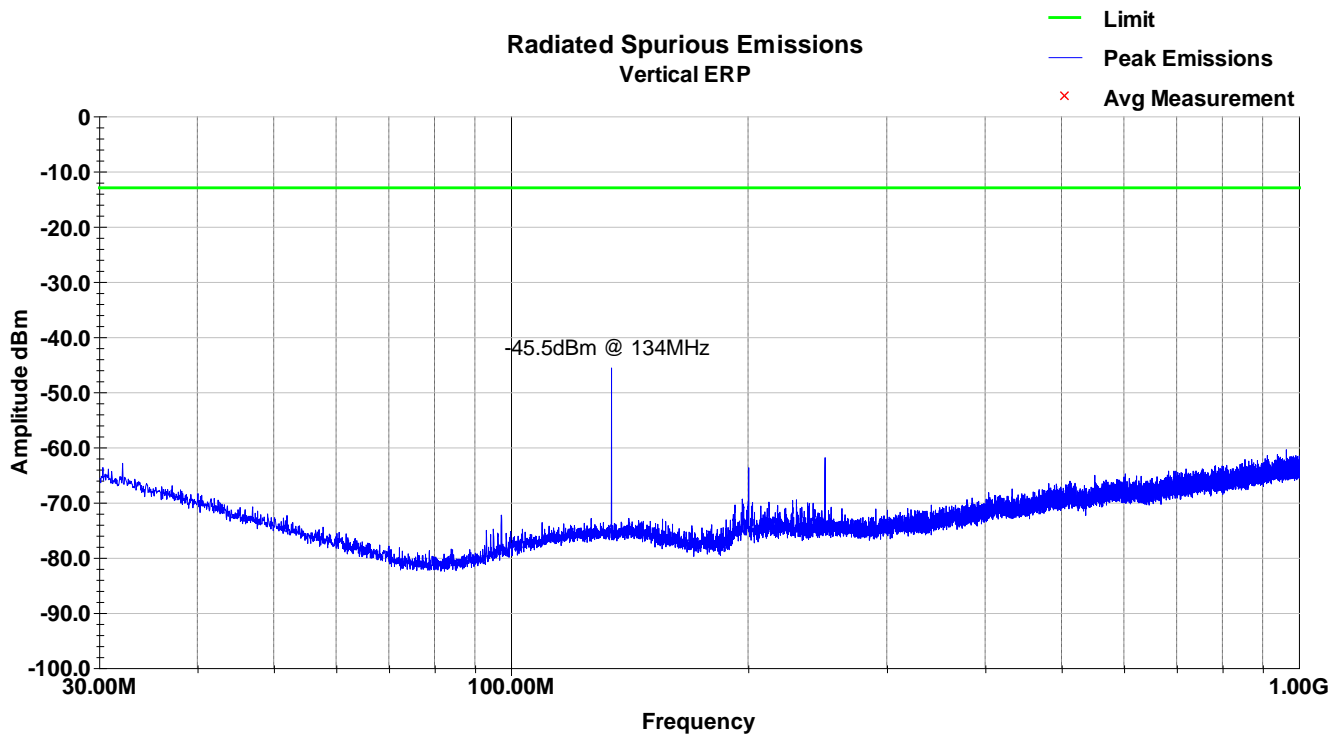
GSM 1900 – MCH – 1-18GHz – Vertical



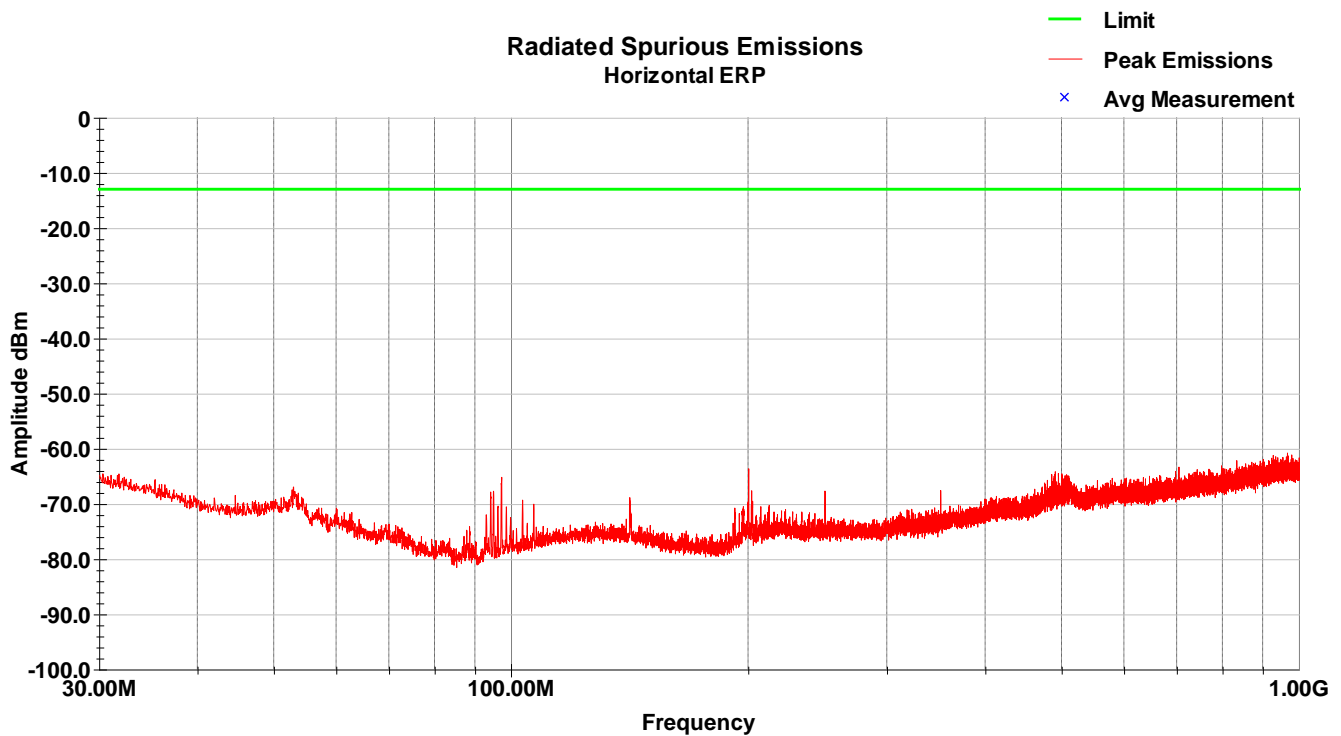
GSM 1900 – MCH – 1-18G Hz – Horizontal



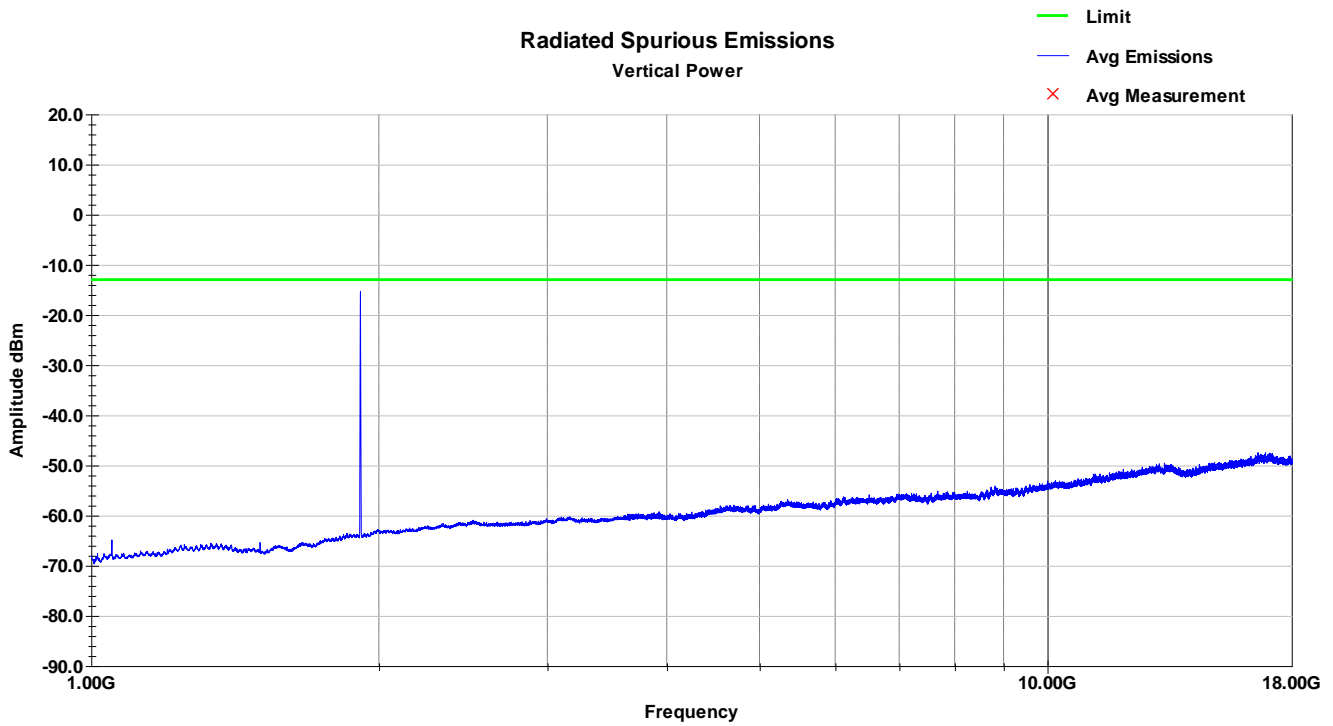
GSM 1900 – HCH – 30-1000MHz – Vertical



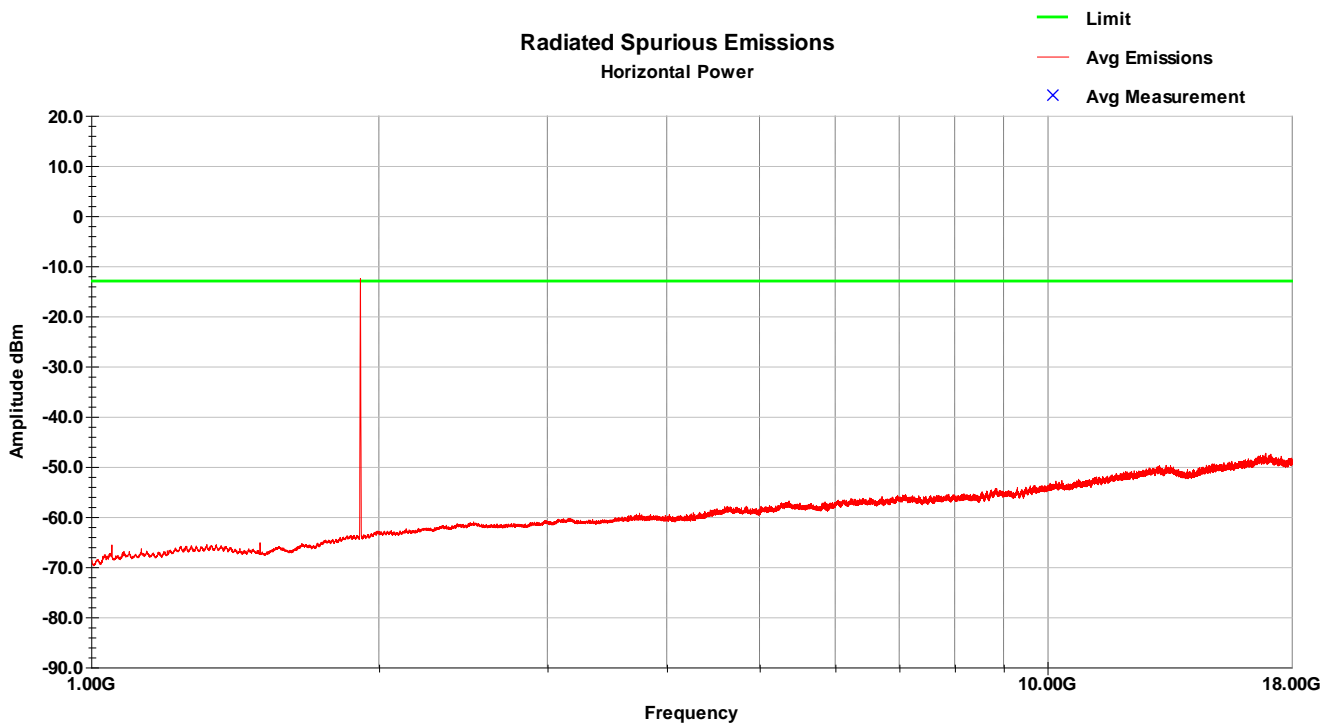
GSM 1900 – HCH – 30-1000MHz – Horizontal



GSM 1900 – HCH – 1-18GHz – Vertical



GSM 1900 – HCH – 1-18G Hz – Horizontal



No emissions associated with the radio were detected other than the fundamental

9 Frequency Stability

9.1 Test Result

| Test Description | Requirements | Test Result |
|---------------------|---|-------------|
| Frequency Stability | FCC Part 2.1055 FCC Part 22.355 FCC Part 24.235 RSS-GEN (6.11) RSS-132 (5.3) RSS-133 (6.3) | Compliant |

9.2 Test Method

The EUT was placed inside the Environmental Chamber and was left inside chamber to stabilize to set temperature for minimum of thirty minutes before any measurements were made. The EUT was tested at BC0 channel 190 and BC1 channel 661.

9.3 Test Site

SGS EMC Laboratory, Suwanee, GA

9.4 Test Equipment

Test End Date: 1/31/2022

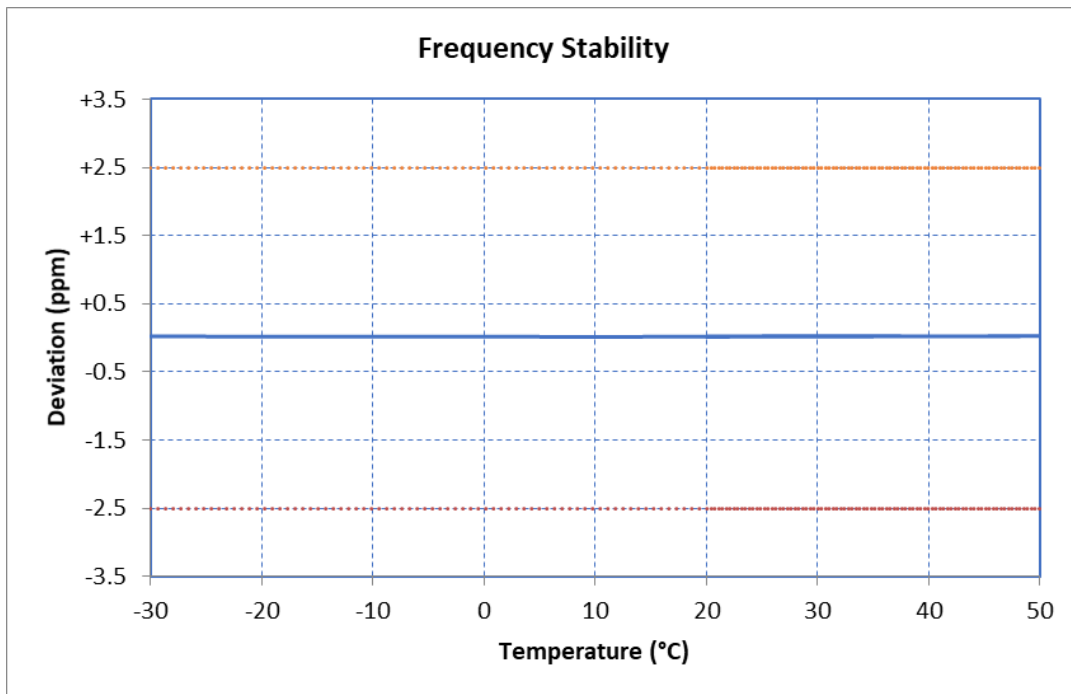
Tester: JOP

| Equipment | Model | Manufacturer | Asset Number | Cal Date | Cal Due Date |
|---------------------------------|--------------|-----------------|--------------|-------------|--------------|
| RF CABLE SMA TO SMA, 0.01-40GHZ | 084-0505-059 | TELEDYNE STORM | 20107 | 16-Mar-2022 | 16-Mar-2023 |
| MULTIMETER | 87V | FLUKE | B079677 | 18-Aug-2021 | 18-Aug-2022 |
| WIDEBAND RADIO COMMUNICATION | CMW500 | ROHDE & SCHWARZ | B094874 | 13-Jan-2021 | 13-Jan-2023 |
| ENVIRONMENTAL TEST CHAMBER | T2RC | TENNEY | B094877 | CNR | CNR |

9.5 Test Data

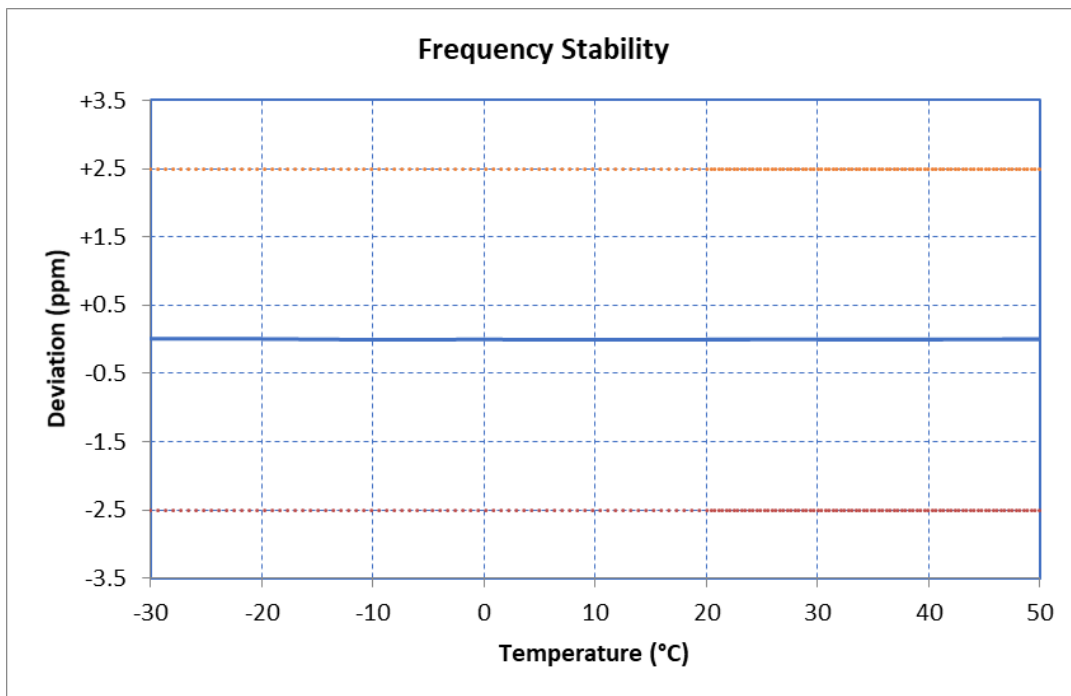
GSM 850, Channel 190 (836.6MHz)

| Voltage % | Power V _{DC} | Temp °C | Frequency Hz | Freq Dev Hz | Freq Dev ppm | Deviation % |
|-----------|-----------------------|-----------|--------------|-------------|--------------|-------------|
| 100% | 12.00 | +20 (Ref) | 836,600,017 | +17 | +0.02 | +0.000002 |
| 100% | 12.00 | -30 | 836,600,018 | +18 | +0.02 | +0.000002 |
| 100% | 12.00 | -20 | 836,600,016 | +16 | +0.02 | +0.000002 |
| 100% | 12.00 | -10 | 836,600,017 | +17 | +0.02 | +0.000002 |
| 100% | 12.00 | 0 | 836,600,016 | +16 | +0.02 | +0.000002 |
| 100% | 12.00 | +10 | 836,600,012 | +12 | +0.01 | +0.000001 |
| 100% | 12.00 | +20 | 836,600,017 | +17 | +0.02 | +0.000002 |
| 100% | 12.00 | +30 | 836,600,022 | +22 | +0.03 | +0.000003 |
| 100% | 12.00 | +40 | 836,600,019 | +19 | +0.02 | +0.000002 |
| 100% | 12.00 | +50 | 836,600,021 | +21 | +0.02 | +0.000002 |
| 100% | 12.00 | +55 | 836,600,021 | +21 | +0.03 | +0.000003 |
| 115% | 13.80 | +20 | 836,600,014 | +14 | +0.02 | +0.000002 |
| 85% | 10.20 | +20 | 836,600,012 | +12 | +0.01 | +0.000001 |



GSM 1900, Channel 661 (1880MHz)

| Voltage % | Power V _{DC} | Temp °C | Frequency Hz | Freq Dev Hz | Freq Dev ppm | Deviation % |
|-----------|-----------------------|-----------|---------------|-------------|--------------|-------------|
| 100% | 12.00 | +20 (Ref) | 1,880,000,017 | +17 | +0.01 | +0.000001 |
| 100% | 12.00 | -30 | 1,880,000,038 | +38 | +0.02 | +0.000002 |
| 100% | 12.00 | -20 | 1,880,000,031 | +31 | +0.02 | +0.000002 |
| 100% | 12.00 | -10 | 1,880,000,011 | +11 | +0.01 | +0.000001 |
| 100% | 12.00 | 0 | 1,880,000,019 | +19 | +0.01 | +0.000001 |
| 100% | 12.00 | +10 | 1,880,000,011 | +11 | +0.01 | +0.000001 |
| 100% | 12.00 | +20 | 1,880,000,017 | +17 | +0.01 | +0.000001 |
| 100% | 12.00 | +30 | 1,880,000,017 | +17 | +0.01 | +0.000001 |
| 100% | 12.00 | +40 | 1,880,000,015 | +15 | +0.01 | +0.000001 |
| 100% | 12.00 | +50 | 1,880,000,027 | +27 | +0.01 | +0.000001 |
| 100% | 12.00 | +55 | 1,880,000,025 | +25 | +0.01 | +0.000001 |
| 115% | 13.80 | +20 | 1,880,000,016 | +16 | +0.01 | +0.000001 |
| 85% | 10.20 | +20 | 1,880,000,018 | +18 | +0.01 | +0.000001 |



10 Revision History

| Revision Level | Description of changes | Revision Date |
|----------------|------------------------|---------------|
| 0 | Initial release | 18 April 2022 |
| | | |
| | | |
| | | |
| | | |
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