

Globalstar Tri-Mode Portable User Terminal (TMP UT) Antenna Port Narrowband Conducted Out-of-Band Emissions Test Report

1.0 Introduction

This test report documents the test results obtained by Qualcomm in measuring the Tri-Mode Portable User Terminal out-of-band narrowband conducted emissions (1559-1605 MHz) at the antenna port, per the preceding test plan. This report and the data it presents demonstrates compliance of the TMP UT with the FCC Part 25 out-of-band emissions (OOBE) limits specified in 47 CFR Ch. 1 (10-1-98 Edition), Part 1, Section 25.213 (b), and (per Report and Order FCC 98-338, adopted 12-17-98) Section 25.200 (c).

Sufficient margins were seen with respect to all CDMA signal out-of-band emissions in the radionavigation band (1559-1605 MHz) and the global positioning satellite (GPS) subband within that band (1574.397-1576.443 MHz) to demonstrate compliance with the applicable narrowband OOB Emissions limits.

2.0 Test Measurement Considerations

Emissions were measured at the coaxial transmit output port of the UT antenna, using a modified UT antenna, short lengths of coaxial cable, RF power splitter/divider, and a step attenuator, as described in the Globalstar UT Antenna Port Conducted Narrowband Out-of-Band Emissions (OOBE) Test Plan.

The correction factors for the test instrumentation and cable losses and the other test methodology correction factors described in the Test Plan were applied against the FCC out-of-band emissions limits to derive the measurement bandwidth dependent test limits to which the measured emissions were compared.

3.0 Test Results

Calibration measurement test results showing the combined test instrumentation and cable losses are presented in Table 1 and Figure 1. Measurements of narrowband OOB Emissions were performed using 2 bandwidths, 1 kHz and 300 Hz; the latter in successive 3 MHz frequency spans. Table 2 presents the loss-corrected conservative lower-bound OOB Emissions test limits in each frequency band using the measured loss correction factors from Table 1. Plots of the measured antenna port OOB Emissions are presented in Appendix A. Table 3 presents the calibration data for the test instruments employed.

The OOB Emissions test data for the lowest frequency channel, Channel 1 (center frequency 1610.73 MHz) shows only very low emissions, with greater than 25 dB margin with respect to the test limits at all frequencies from 1559 to 1605 MHz.

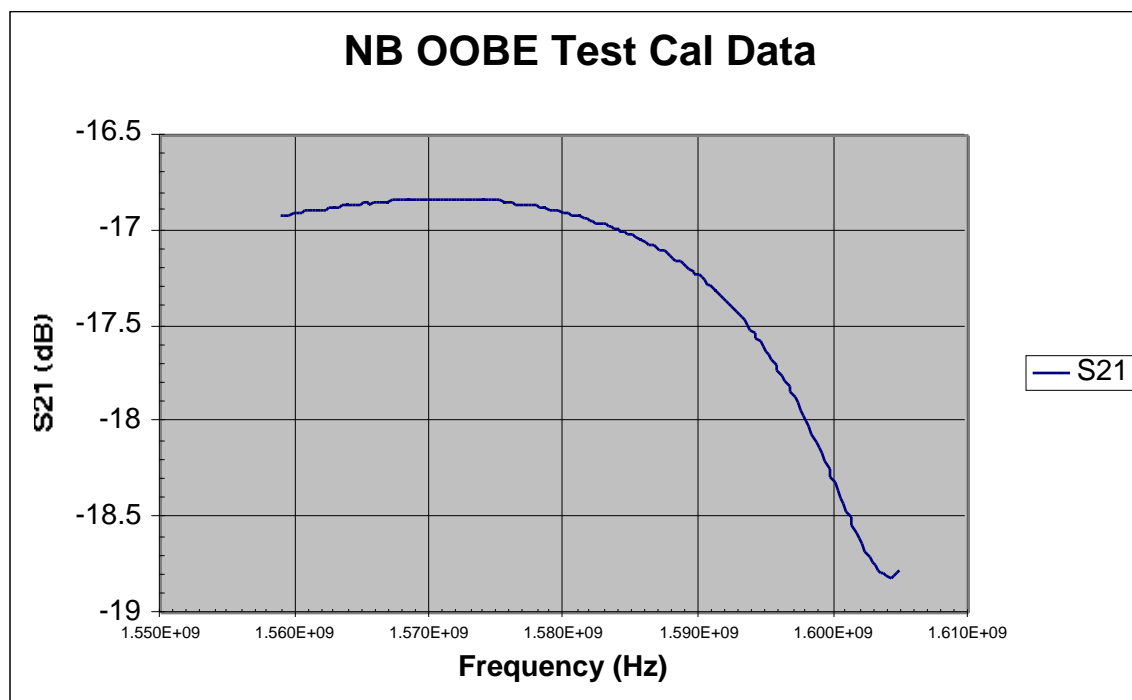
GS TMP UT FCC Part 25 OOB Test Report

Table 1. Loss Calibration Measurement: Combined Splitter, Attenuators, Notch Filter and Cable Losses

Insertion Loss

| Frequency (MHz) | S21 (dB) |
|--------------------|-------------|
| 1559 | -16.9 |
| 1562 | -16.9 |
| 1565 | -16.9 |
| 1568 | -16.8 |
| 1571 | -16.8 |
| 1574 | -16.8 |
| 1577 | -16.9 |
| 1580 | -16.9 |
| 1583 | -17.0 |
| 1586 | -17.1 |
| 1589 | -17.2 |
| 1592 | -17.4 |
| 1595 | -17.6 |
| 1598 | -18.0 |
| 1601 | -18.4 |
| 1604 | -18.8 |
| 1605 | -18.8 |

Figure 1. Network Analyzer S21 Plot of Combined Slitter, Attenuators, Filter , and Cable Losses (1559-1605 MHz).



GS TMP UT FCC Part 25 OOB Emissions Test Report

Table 2. Loss-Corrected FCC OOB Emissions Test Limits

[Corrected Limit (dBm) = Norm. Limit (dBW) + BW Corr. Factor (dB) + Splitter, Attenuator and Additional Cable Losses Corr. Factor (dB) + 30 dB]

| Frequency Range (MHz) | FCC Pt. 25 Limits (dBW) | Spectrum Analyzer Meas.BW (Hz) | Bandwidth Correction Factor (dB) | Filter + Splitter+ Atten + Cable Loss Corr. Factor (dB) | Corrected FCC Pt. 25 OOB Meas. Limits (dBm) |
|-----------------------|-------------------------|--------------------------------|----------------------------------|---|---|
| Conducted | dBW/700 Hz | | | | |
| 1559-1590 | -80 | 1000 | 1.5 | -16.9 to -17.3 | -65.4 to -65.8 |
| 1590-1605 | -80 | 1000 | 1.5 | -17.3 to -18.8 | -65.8 to -67.3 |
| | | | | | |
| 1559 - 1562 | -80 | 300 | -3.7 | -16.9 | -70.6 |
| 1562 - 1565 | -80 | 300 | -3.7 | -16.9 | -70.6 |
| 1565 - 1568 | -80 | 300 | -3.7 | -16.8 | -70.5 |
| 1598 - 1571 | -80 | 300 | -3.7 | -16.8 | -70.5 |
| 1571 - 1574 | -80 | 300 | -3.7 | -16.8 | -70.5 |
| 1574 - 1577 | -80 | 300 | -3.7 | -16.9 | -70.6 |
| 1577 - 1580 | -80 | 300 | -3.7 | -16.9 | -70.6 |
| 1580 - 1583 | -80 | 300 | -3.7 | -17.0 | -70.7 |
| 1583 - 1586 | -80 | 300 | -3.7 | -17.1 | -70.8 |
| 1586 - 1589 | -80 | 300 | -3.7 | -17.2 | -70.9 |
| 1589 - 1592 | -80 | 300 | -3.7 | -17.4 | -71.1 |
| 1592 - 1595 | -80 | 300 | -3.7 | -17.6 | -71.3 |
| 1595 - 1598 | -80 | 300 | -3.7 | -18.0 | -71.7 |
| 1598 - 1601 | -80 | 300 | -3.7 | -18.4 | -72.1 |
| 1601 - 1604 | -80 | 300 | -3.7 | -18.8 | -72.5 |
| 1604 - 1605 | -80 | 300 | -3.7 | -18.8 | -72.5 |
| | | | | | |
| Radiated (1) | dBW/600 Hz | | | | |
| 1574.397-1576.443 | -85 | 1000 | 2.2 | -16.9 | -69.7 |
| 1574.397-1576.443 | -85 | 300 | -3.0 | -16.9 | -74.9 |

(1) Equivalent Conducted Limit for 5 dB Out-of-Band Antenna Gain

Table 4. OOB Emissions Test Instrumentation Calibration Data Record

| Test Instrument | Manuf. Model No. | Serial No. | Last Cal | Cal Due |
|-------------------------------------|--------------------------------------|------------------------------|----------|----------|
| Spectrum Analyzer (9 kHz – 6.5 GHz) | HP 8595 E | 2287 K 36631 | 10-19-98 | 10-19-99 |
| Network Analyzer (30 kHz – 6 GHz) | HP 8753 D | K 72063 | 6-14-99 | 6-14-00 |
| RF Power Splitter (0.5 – 18 GHz) | Narda Model 4426-2 | 02164 | N/A | N/A |
| Channel 1 Notch Filter | Lorch Microwave 6CN-1610.73/X2-SM/SM | 1221-17131-1610 29971 S/N Y2 | N/A | N/A |
| Globalstar UT Tester | Anritsu MT 8803G | K 73709 | N/A | N/A |

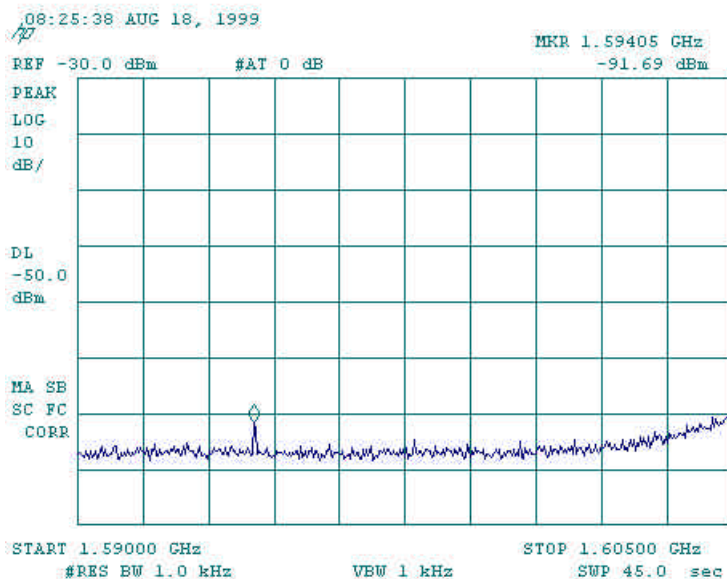
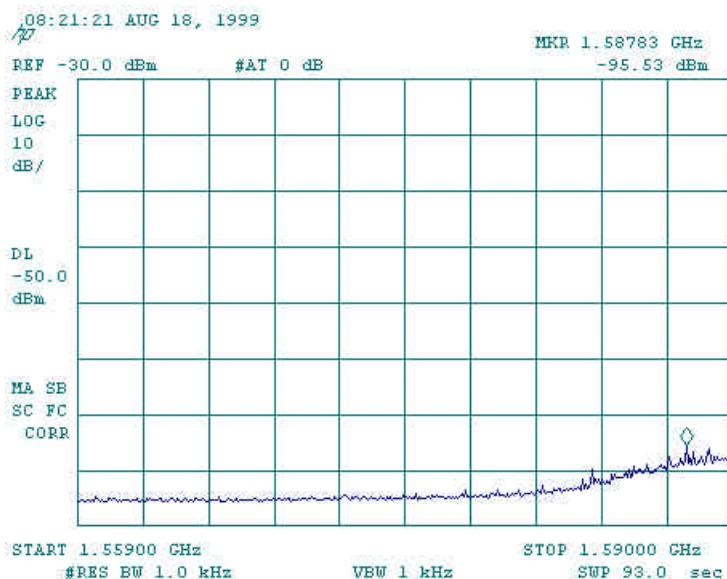
GS TMP UT FCC Part 25 OOB Test Report

Appendix A. Narrowband OOB Measurements

| | |
|------------------------|---|
| Date/Time | 8/18/99 9:02:11 AM |
| Title | Part 25 OOB Retest for G* Tri Mode |
| Job Number | 99060 |
| Test Name | CE 1559 MHz - 1605 MHz |
| EUT Name | G* Tri Mode with charger |
| EUT Model Number | GSP-1600 |
| EUT Serial Number | N106B8BWM |
| Analyzer Model Number | HP8595E |
| Analyzer Serial Number | 2287 |
| Site Description | Bench Test: TX Ch. 1, RX Ch.7. Anritsu settings: ref sig. 27 dBm, beam sig. -60 dBm, S2001, 9600 bps. SA shows 26.44 dBm TX power, after correcting for 3.97 dB in-band loss. |
| Operator Name | Suzanne Galati |

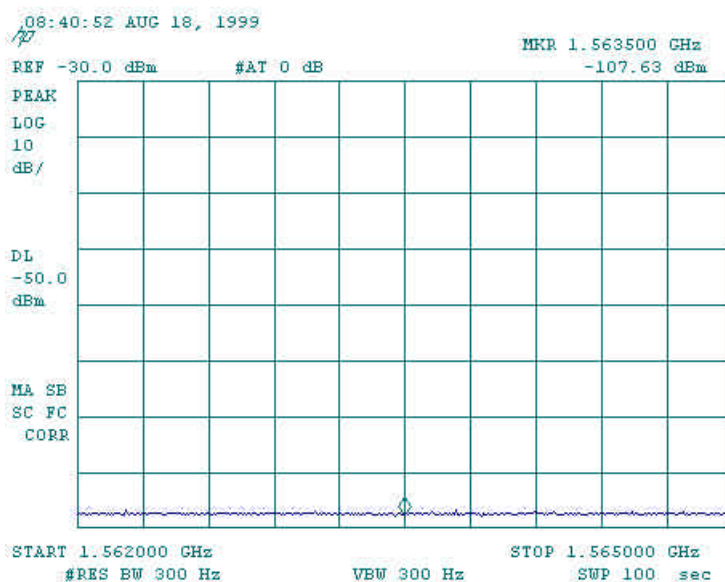
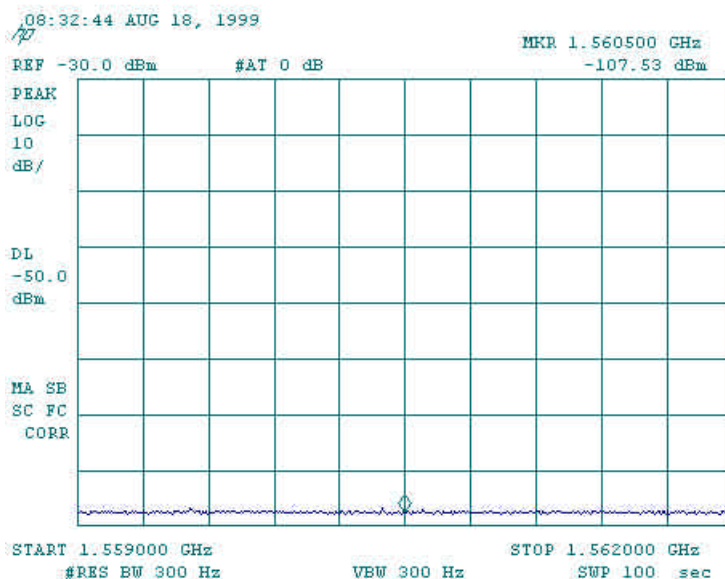
GS TMP UT FCC Part 25 OOB Test Report

1 kHz Bandwidth:

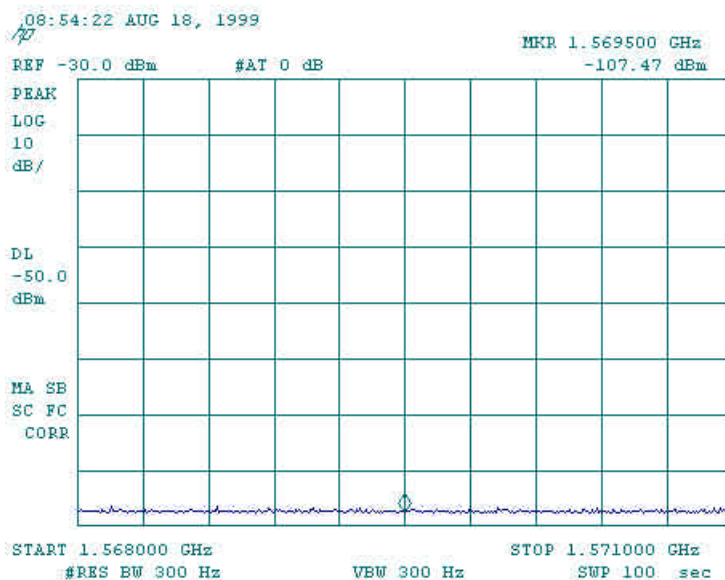
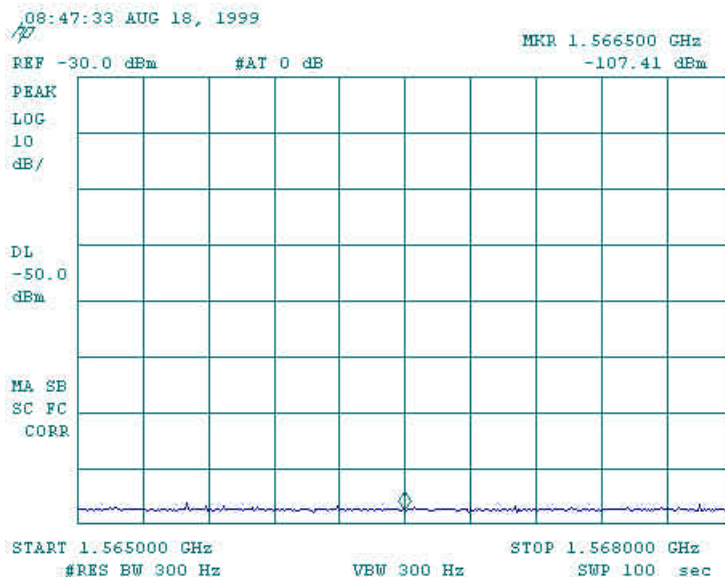


GS TMP UT FCC Part 25 OOB Test Report

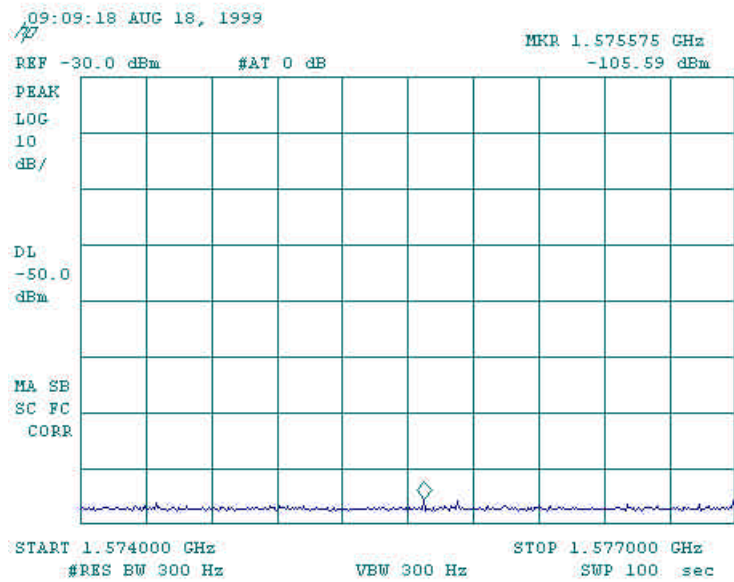
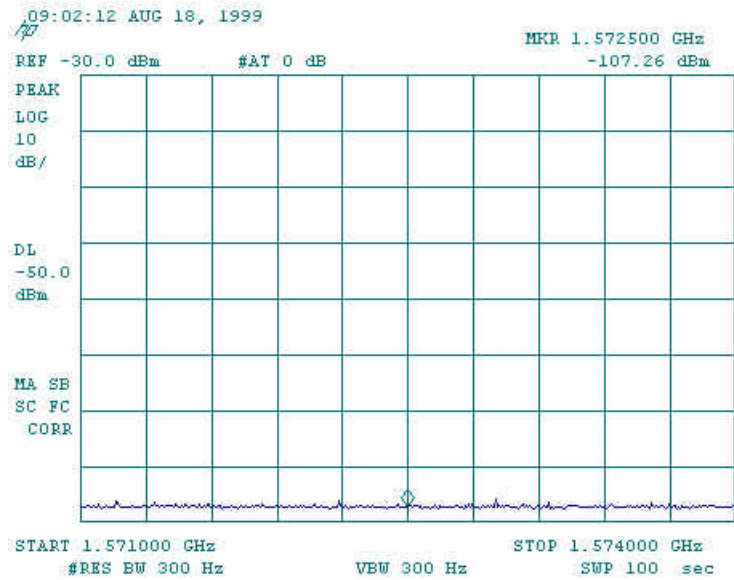
300 Hz Bandwidth:



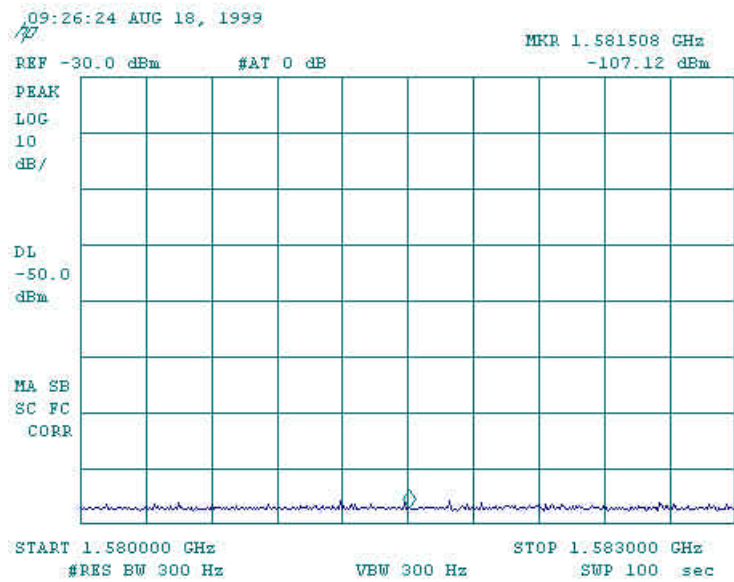
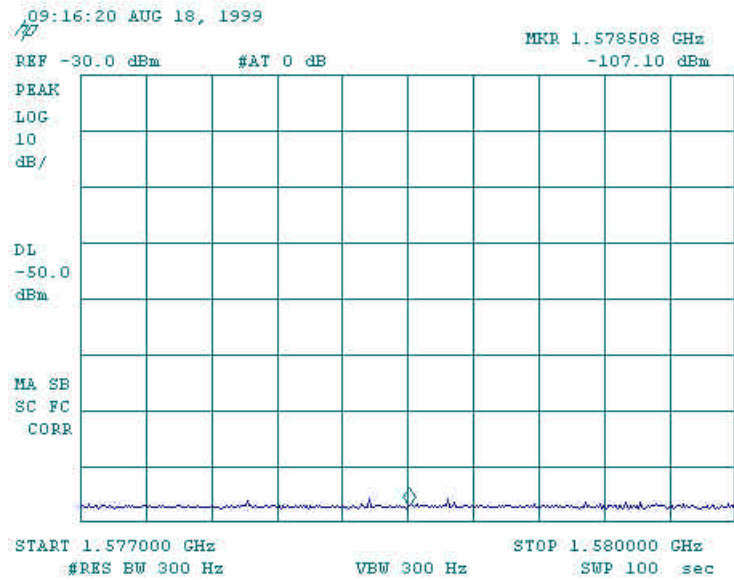
GS TMP UT FCC Part 25 OOB Test Report



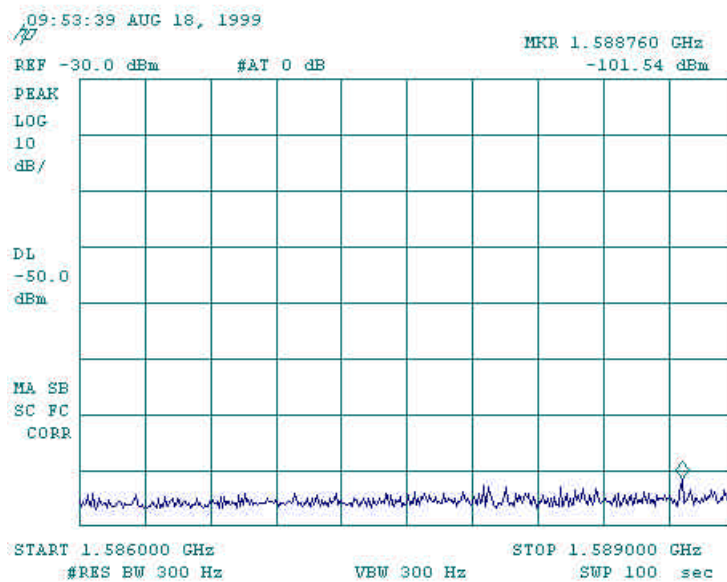
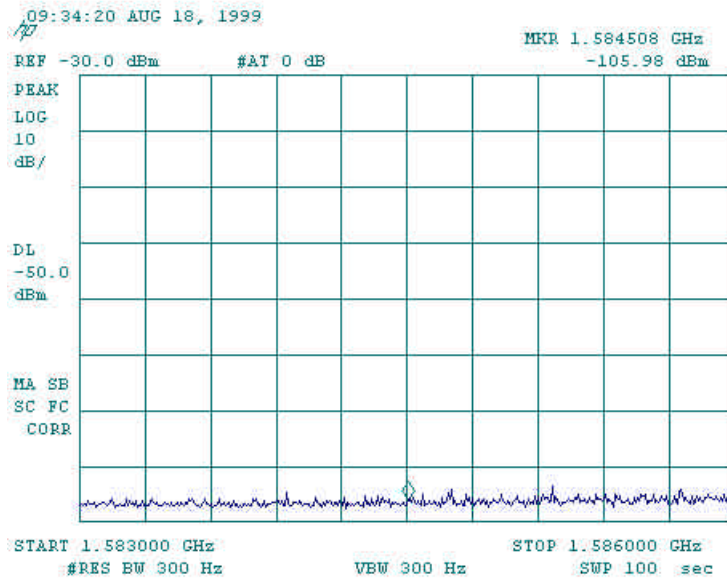
GS TMP UT FCC Part 25 OOB Test Report



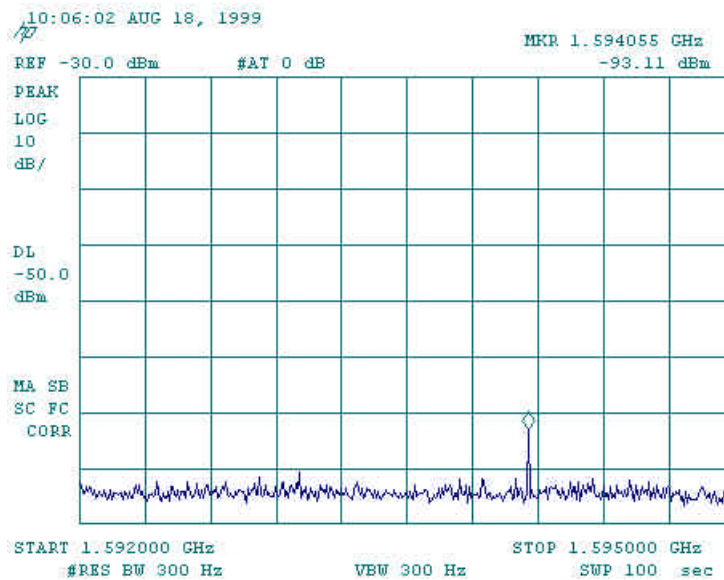
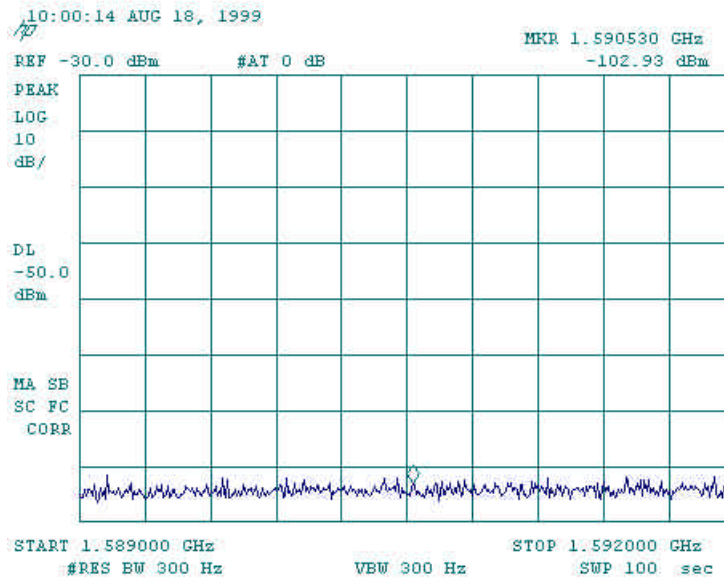
GS TMP UT FCC Part 25 OBE Test Report



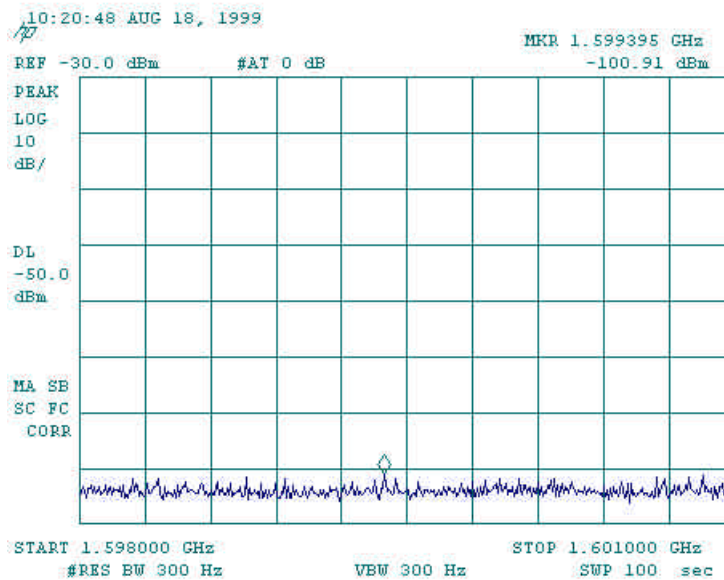
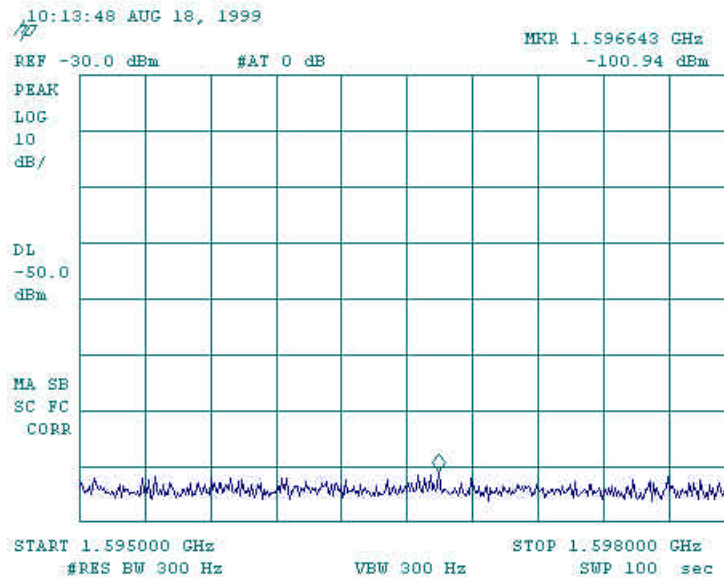
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