

Globalstar Portable User Terminal Car Kit (CK) 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 Car Kit 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 Car Kit 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 OOBE 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. Measurements of narrowband OOBE were performed using 2 bandwidths, 1 kHz and 300 Hz; the latter in successive 3 MHz frequency spans. Table 2 presents the OOB antenna gain and loss-corrected conservative lower-bound OOBE test limits in each frequency band using the measured loss correction factors from Table 1. Plots of the measured antenna port OOBE are presented in Appendix A. (Note that the plot display line values do not include the nominal OOB antenna gain correction factor of 5 dB.) Table 3 presents the calibration data for the test instruments employed.

The OOBE test data for the lowest frequency channel, Channel 1 (center frequency 1610.73 MHz) shows only very low emissions, with greater than 10 dB margin with respect to the test limits at all frequencies from 1559 to 1605 MHz.

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

| Insertion Loss | |
|-----------------------|------------|
| Frequency | S21 |
| (MHz) | (dB) |
| 1559 | -17.1 |
| 1562 | -17.1 |
| 1565 | -17.1 |
| 1568 | -17.0 |
| 1571 | -17.0 |
| 1574 | -17.0 |
| 1577 | -17.0 |
| 1580 | -17.0 |
| 1583 | -17.1 |
| 1586 | -17.2 |
| 1589 | -17.3 |
| 1592 | -17.5 |
| 1595 | -17.7 |
| 1598 | -18.1 |
| 1601 | -18.6 |
| 1604 | -19.0 |
| 1605 | -19.3 |

Table 2. Loss-Corrected FCC OOBE 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 OOBE Meas. Limits (dBm) |
|-----------------------|-------------------------|---------------------------------|----------------------------------|---|--|
| Radiated | dBW/700 Hz | | | | |
| 1559 - 1605 | -80 | 1000 | 1.5 | -17.1 to -19.3 | -65.6 to -67.8 |
| 1559 - 1605 | -80 | 300 | -3.7 | -17.1 to -19.3 | -70.8 to -73.0 |
| | | | | | |
| Conducted (1) | dBW/700 Hz | | | | |
| 1559-1590 | -85 | 1000 | 1.5 | -17.1 to -17.4 | -70.6 to -70.9 |
| 1590-1605 | -85 | 1000 | 1.5 | -17.4 to -19.3 | -70.9 to -72.8 |
| | | | | | |
| 1559 - 1562 | -85 | 300 | -3.7 | -17.1 | -75.8 |
| 1562 - 1565 | -85 | 300 | -3.7 | -17.1 | -75.8 |
| 1565 - 1568 | -85 | 300 | -3.7 | -17.1 | -75.7 |
| 1598 - 1571 | -85 | 300 | -3.7 | -17.0 | -75.7 |
| 1571 - 1574 | -85 | 300 | -3.7 | -17.0 | -75.7 |
| 1574 - 1577 | -85 | 300 | -3.7 | -17.0 | -75.7 |
| 1577 - 1580 | -85 | 300 | -3.7 | -17.0 | -75.7 |
| 1580 - 1583 | -85 | 300 | -3.7 | -17.1 | -75.8 |
| 1583 - 1586 | -85 | 300 | -3.7 | -17.2 | -75.8 |
| 1586 - 1589 | -85 | 300 | -3.7 | -17.3 | -76.0 |
| 1589 - 1592 | -85 | 300 | -3.7 | -17.5 | -76.1 |
| 1592 - 1595 | -85 | 300 | -3.7 | -17.7 | -76.4 |
| 1595 - 1598 | -85 | 300 | -3.7 | -18.1 | -76.8 |
| 1598 - 1601 | -85 | 300 | -3.7 | -18.6 | -77.2 |
| 1601 - 1604 | -85 | 300 | -3.7 | -19.0 | -77.7 |
| 1604 - 1605 | -85 | 300 | -3.7 | -19.3 | -77.9 |

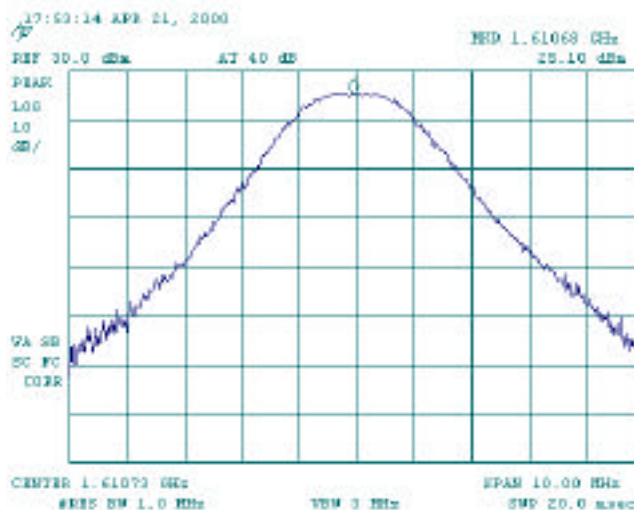
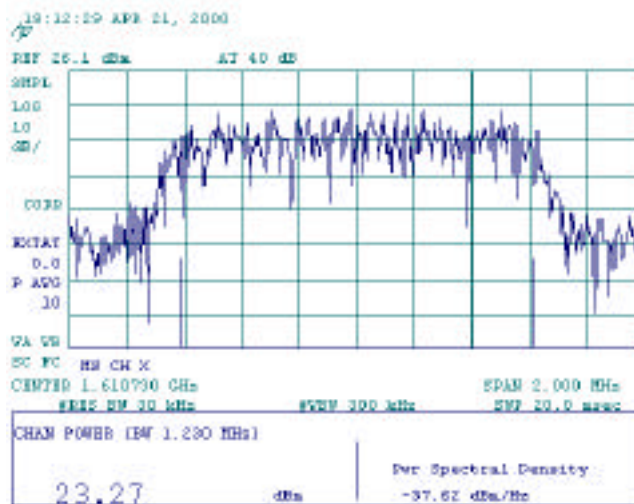
(1) Equivalent Conducted Limit for 5 dB Out-of-Band Antenna Gain

Table 3. OOBE Test Instrumentation Calibration Data Record

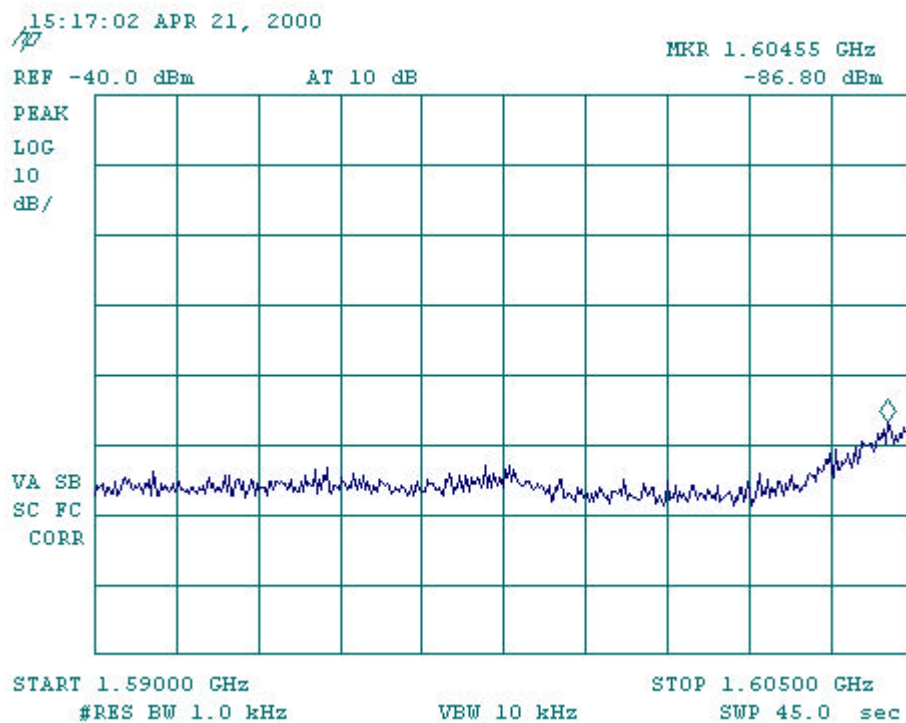
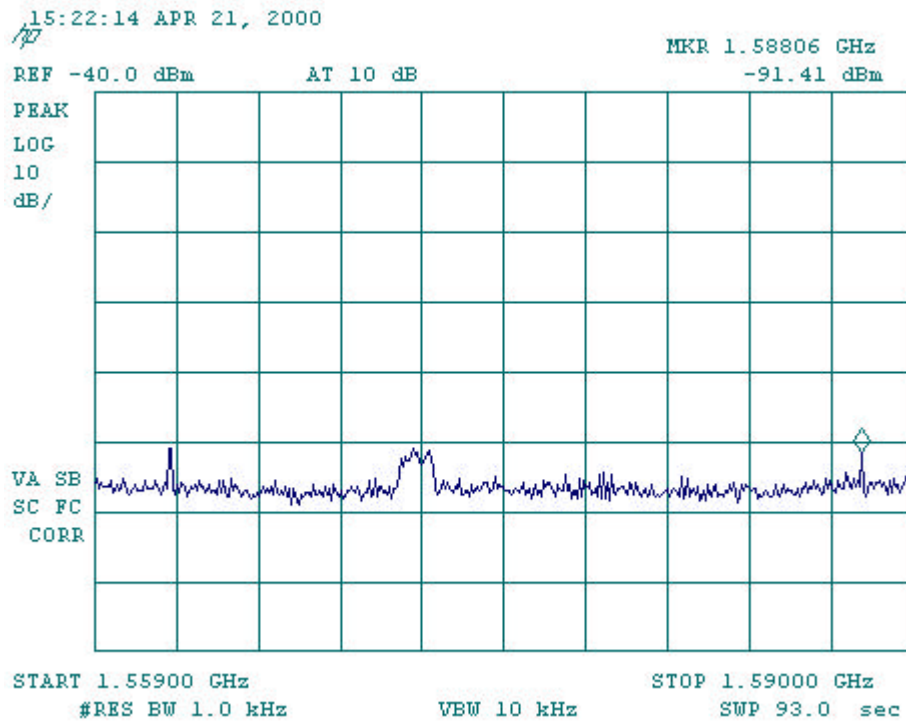
| Test Instrument | Manuf. Model No. | Serial No. | Last Cal | Cal Due |
|-------------------------------------|--------------------------------------|------------------------------|----------|----------|
| Spectrum Analyzer (9 kHz – 6.5 GHz) | HP 8595 E | 3639 A 02287 | 11-9-99 | 11-9-00 |
| Network Analyzer (30 kHz – 6 GHz) | HP 8753 D | 3410 A 04157 | 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 | MB 06986 | 01-21-00 | 01-21-01 |

Appendix A. Narrowband OOBE Measurements

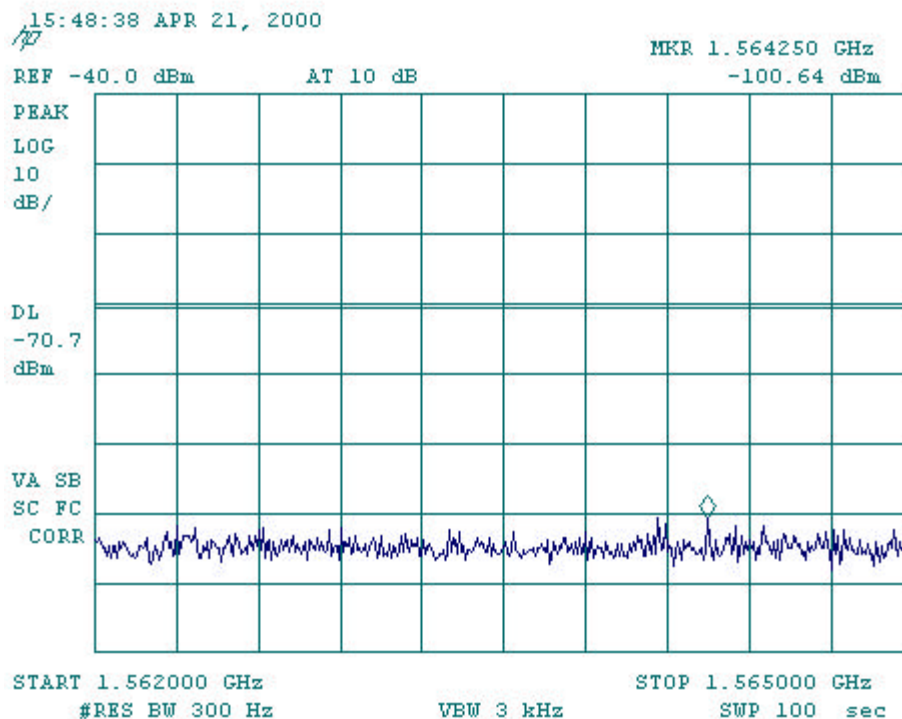
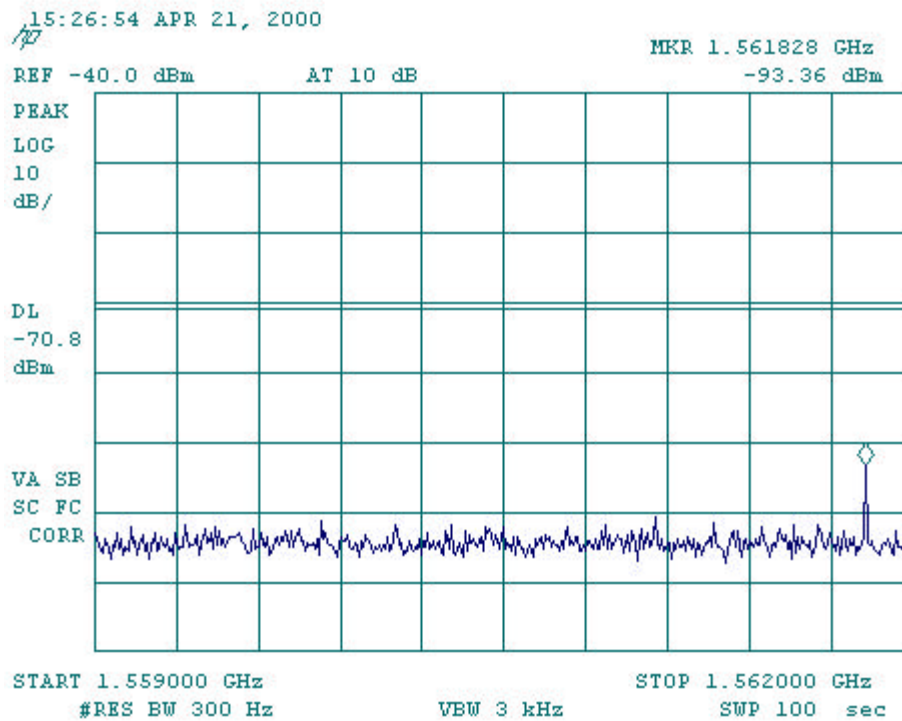
Date/Time 4/21/99 10:59:56 AM
 Title G* Carkit Part 25 OOBE
 Job Number 00036
 Test Name CE 1559 MHz - 1605 MHz
 EUT Name G* Carkit (full setup: mic, spkr, handset, cradle, mod. ODU)
 EUT Model Number GCK-1410
 EUT Serial Number ODU: ODU_00018, Tri Mode: N10728BPL, Gem #3:
 N1073273N
 Analyzer Model Number HP8595E (Spec. An), HP8753D (Net. An)
 Analyzer Serial Number 3639A02287 (Spec An), 3410A04157 (Net. An)
 Site Description 12V DC (with gnd), 1.0A, UT TX Ch. 1, RX Ch. 7, Anritsu: ref
 sig 31 dBm, beam sig -70 dBm, UT TX power on SA 23.27 dBm
 plus 4.6 dB loss = 27.87 dBm
 Operator Name Suzanne Galati

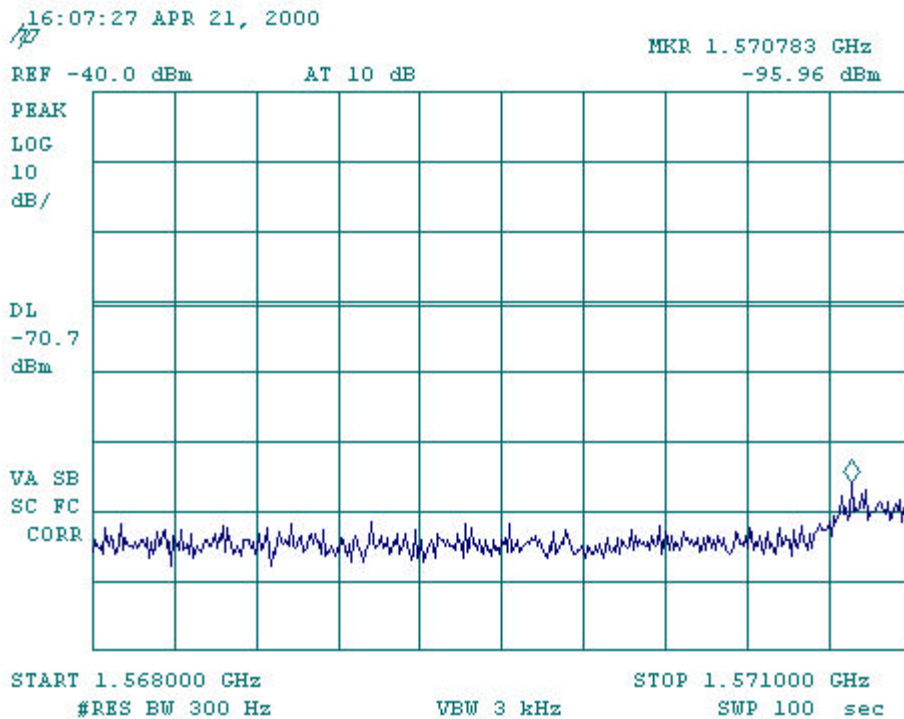
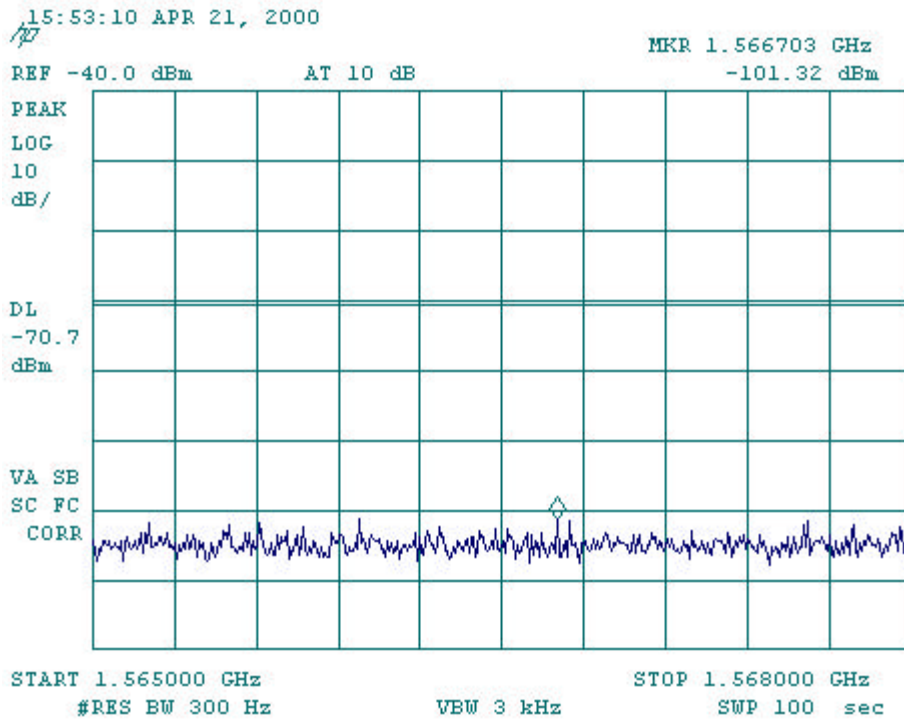


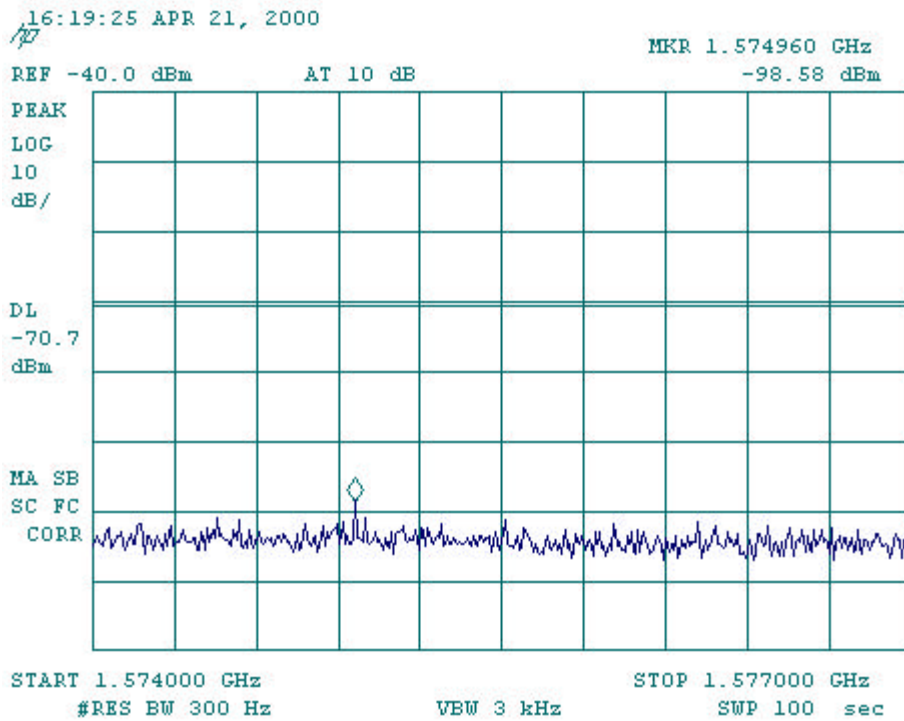
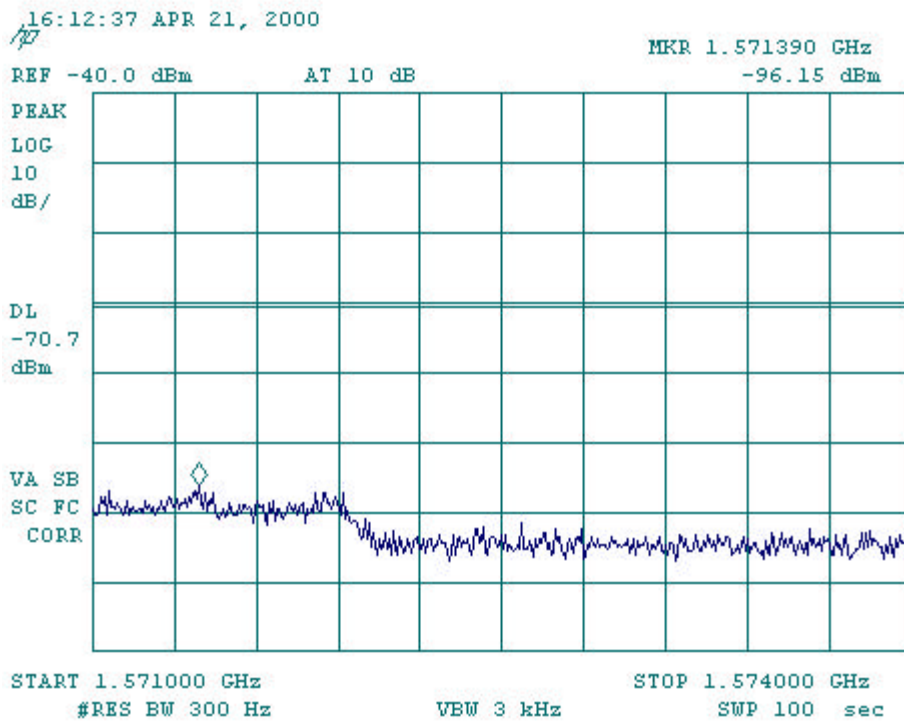
1 kHz Bandwidth:



300 Hz Bandwidth:







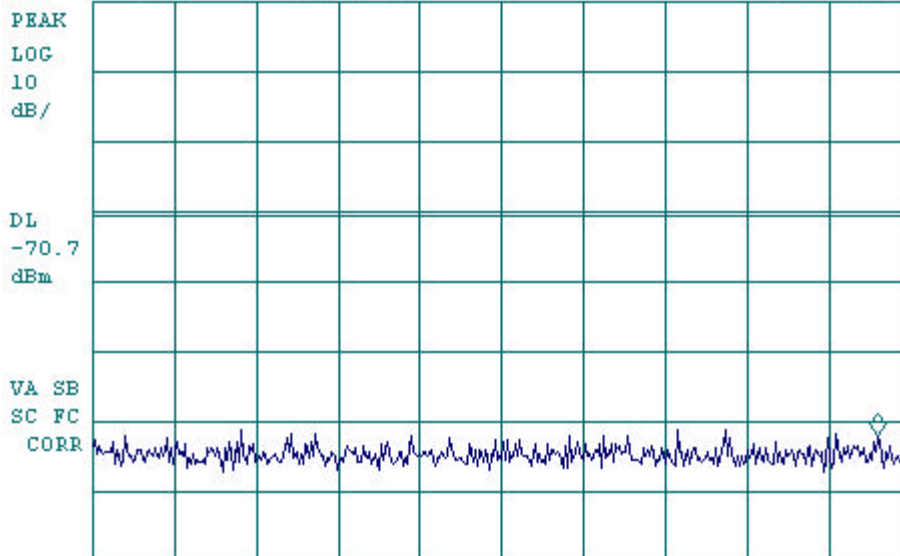
16:25:07 APR 21, 2000

AP

MKR 1.579880 GHz

REF -40.0 dBm AT 10 dB

-102.14 dBm



START 1.577000 GHz

STOP 1.580000 GHz

#RES BW 300 Hz

VBW 3 kHz

SWP 100 sec

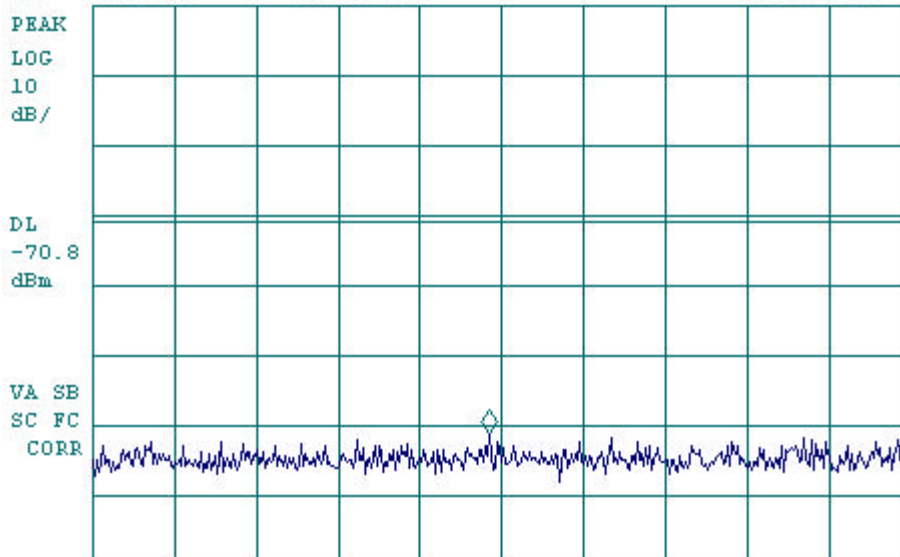
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AP

MKR 1.581455 GHz

REF -40.0 dBm AT 10 dB

-101.15 dBm



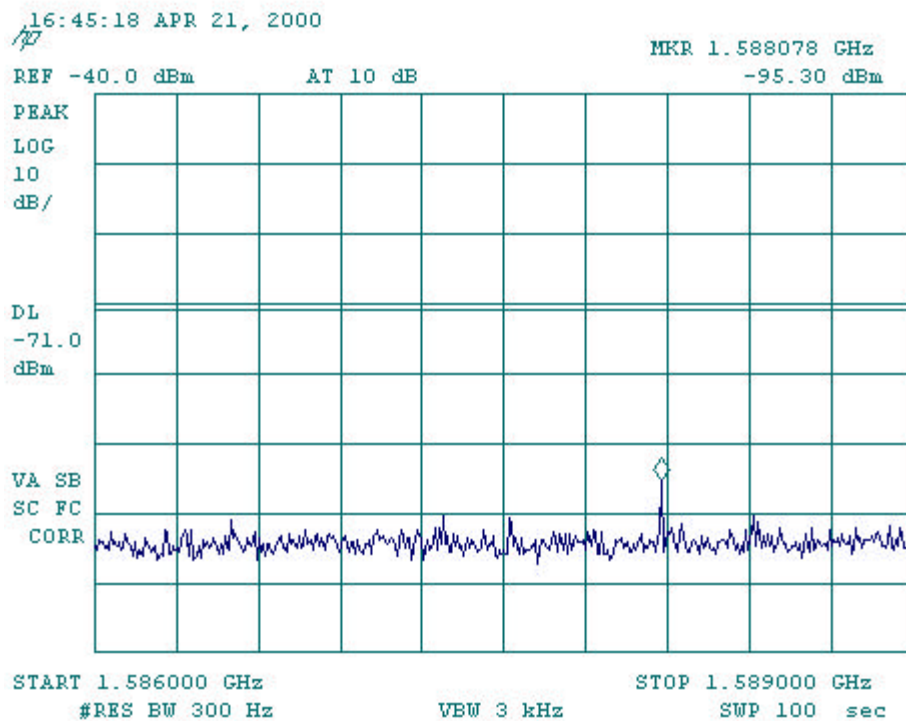
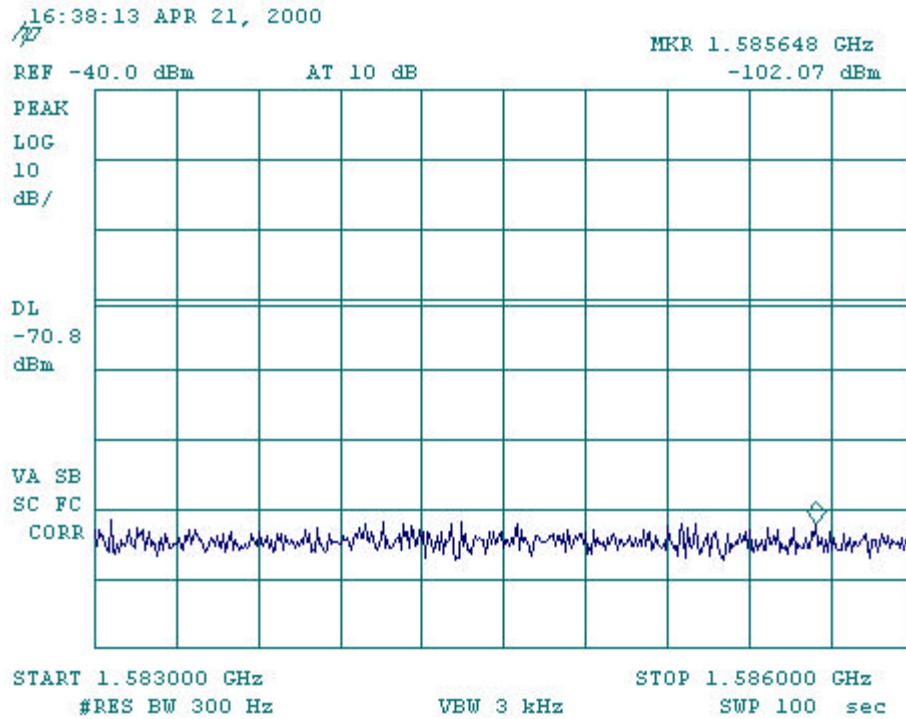
START 1.580000 GHz

STOP 1.583000 GHz

#RES BW 300 Hz

VBW 3 kHz

SWP 100 sec



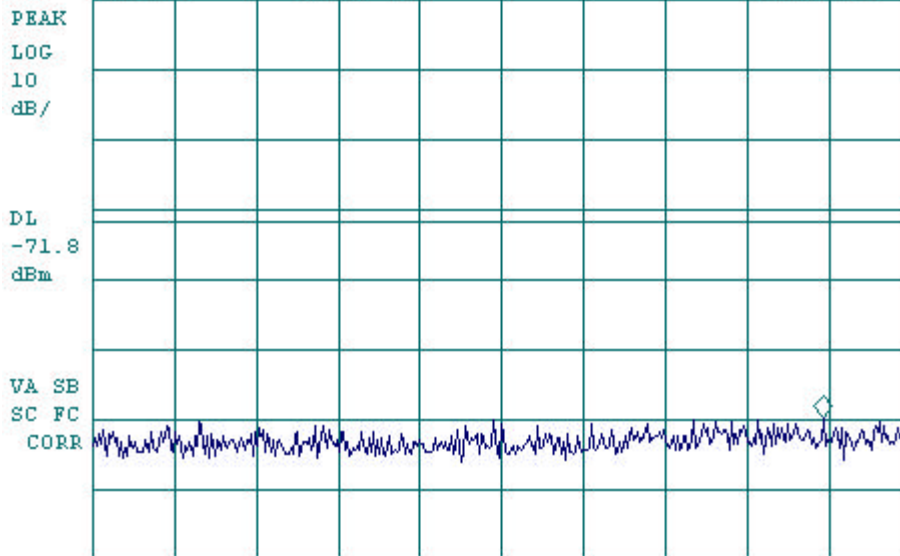
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MKR 1.597678 GHz

REF -40.0 dBm AT 10 dB

-99.81 dBm



START 1.595000 GHz
#RES BW 300 Hz

VBW 3 kHz

STOP 1.598000 GHz
SWP 100 sec

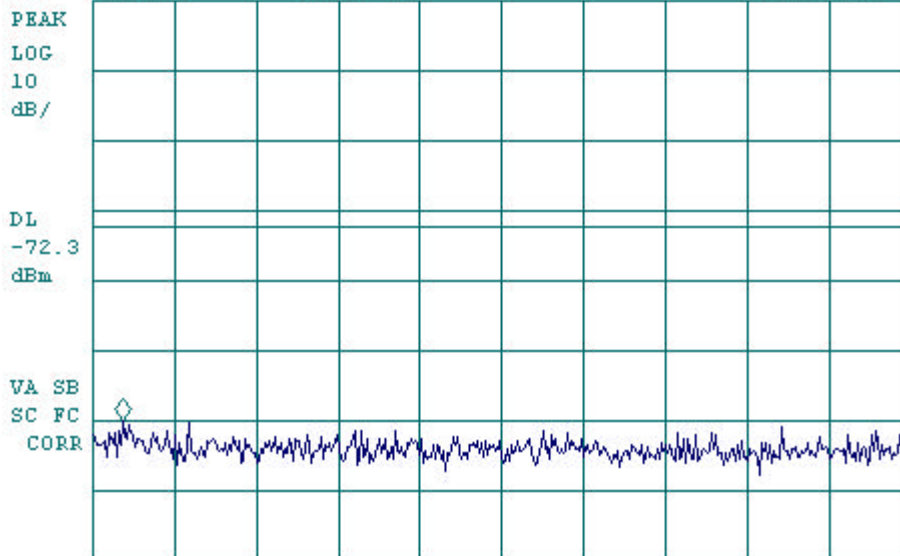
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MKR 1.598113 GHz

REF -40.0 dBm AT 10 dB

-100.09 dBm



START 1.598000 GHz
#RES BW 300 Hz

VBW 3 kHz

STOP 1.601000 GHz
SWP 100 sec

