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 and Figure 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 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. 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 15 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 (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).

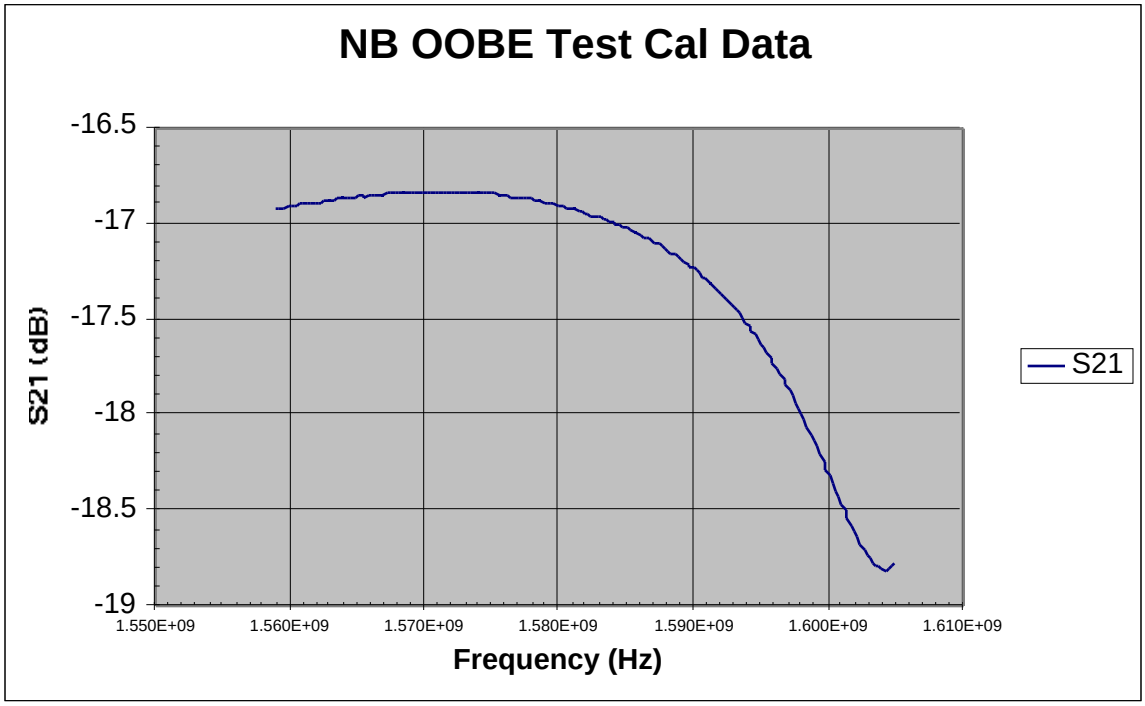


Table 2. Loss-Corrected FCC OOBE Emissions Test Limits

[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)
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

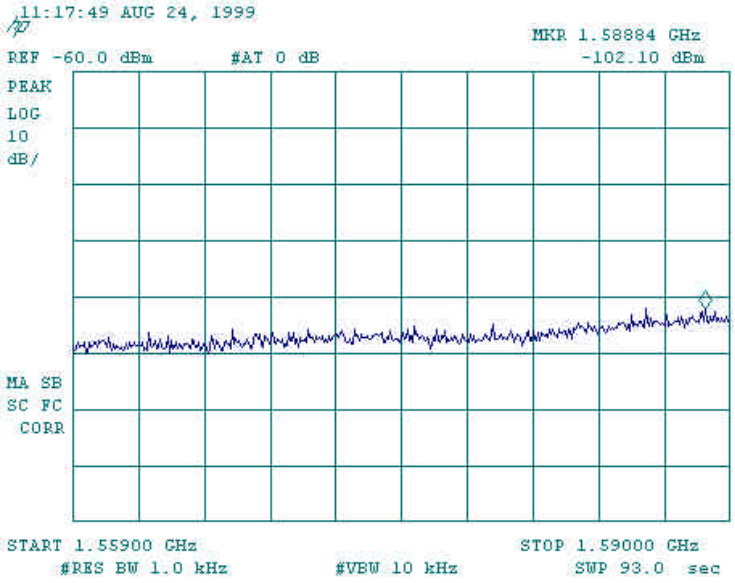
Table 4. OOBE Test Instrumentation Calibration Data Record

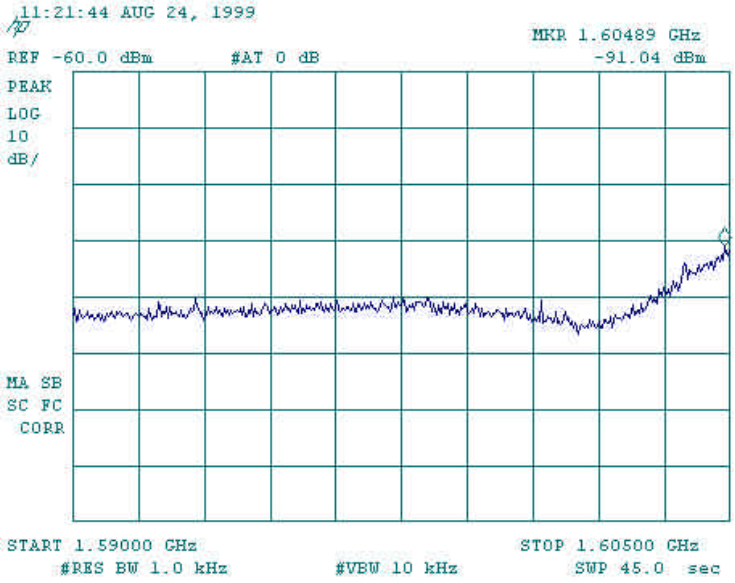
Test Instrument	Manuf. Model No.	Serial No.	Last Cal	Cal Due
Spectrum Analyzer (9 kHz – 6.5 GHz)	HP 8595 E	2287 K 36631	10-19-98	10-19-99
Network Analyzer (30 kHz – 6 GHz)	HP 8753 D	K 72063	6-14-99	6-14-00
RF Power Splitter (0.5 – 18 GHz)	Narda Model 4426-2	02164	N/A	N/A
Channel 1 Notch Filter	Lorch 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

Appendix A. Narrowband OOBE Measurements

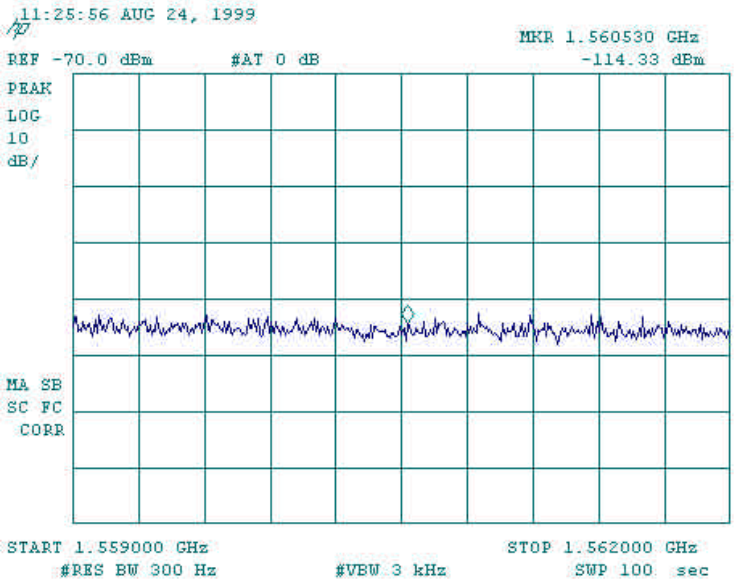
Date/Time	8/24/99 10:59:56 AM
Title	G* Carkit Part 25 OOBE Retest
Job Number	99062
Test Name	CE 1559 MHz - 1605 MHz
EUT Name	G* Carkit (full setup: mic, spkr, handset, cradle, mod. ODU)
EUT Model Number	
EUT Serial Number	ODU: N106457D6, Tri Mode: N1068XV7C, Gem #3: N1068P7VR
Analyzer Model Number	HP8595E
Analyzer Serial Number	2287
Site Description	12V DC (with gnd), 1.6A, UT TX Ch. 1, RX Ch. 7, Anritsu: ref sig 24 dBm, beam sig -114 dBm, UT TX power on SA 18.38 dBm (approx. 3.9 dB loss, 10 dB pad)
Operator Name	Suzanne Galati

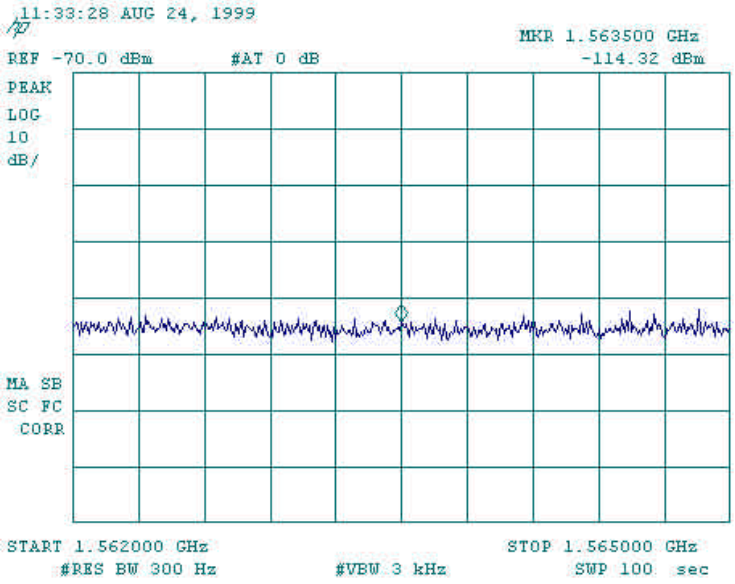
1 KHz Bandwidth:

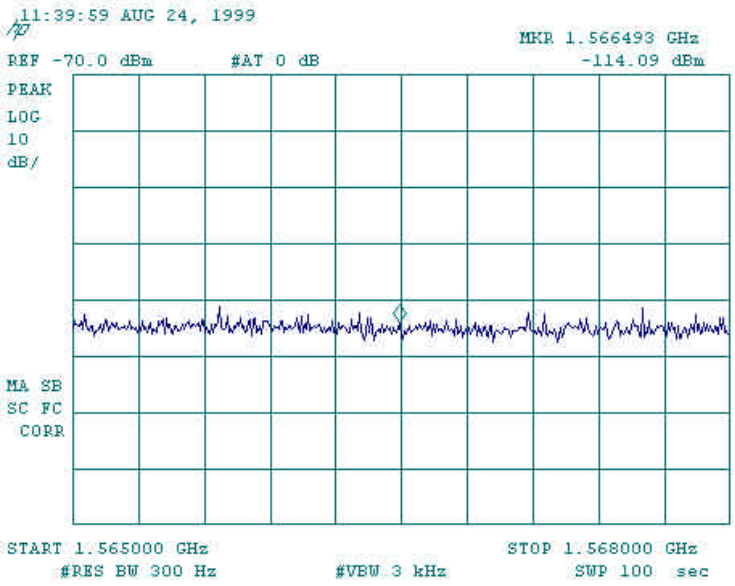




300 Hz Bandwidth:



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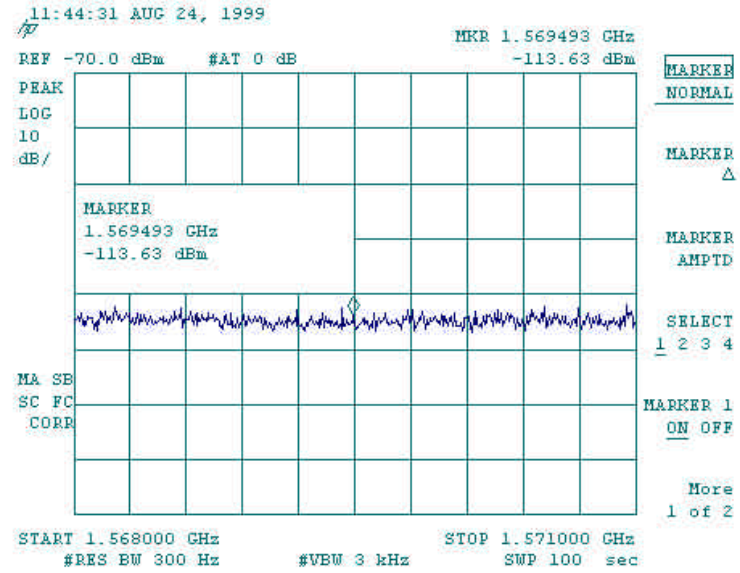
MKR 1.566493 GHz
REF -70.0 dBm
#AT 0 dB
-114.09 dBm
PEAK
LOG
10
dB/
MA SB
SC FC
CORR
START 1.565000 GHz
STOP 1.568000 GHz
#RES BW 300 Hz
#VBW 3 kHz
SWP 100 sec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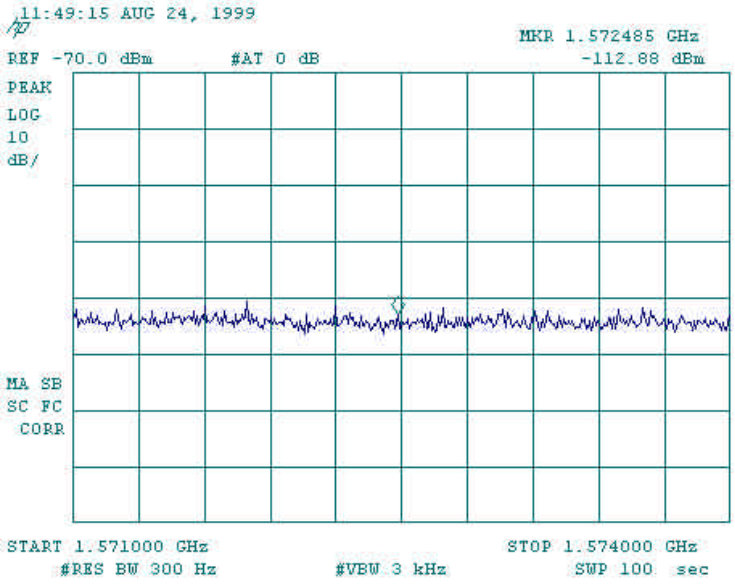
MKR 1.569493 GHz
REF -70.0 dBm
#AT 0 dB
-113.63 dBm
PEAK
LOG
10
dB/
MARKER
1.569493 GHz
-113.63 dBm
MA SB
SC FC
CORR
START 1.568000 GHz
STOP 1.571000 GHz
#RES BW 300 Hz
#VBW 3 kHz
SWP 100 sec
MARKER
NORMAL
MARKER
Δ
MARKER
AMPTD
SELECT
1 2 3 4
MARKER 1
ON OFF
More
1 of 2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MKR 1.572485 GHz
REF -70.0 dBm
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PEAK
LOG
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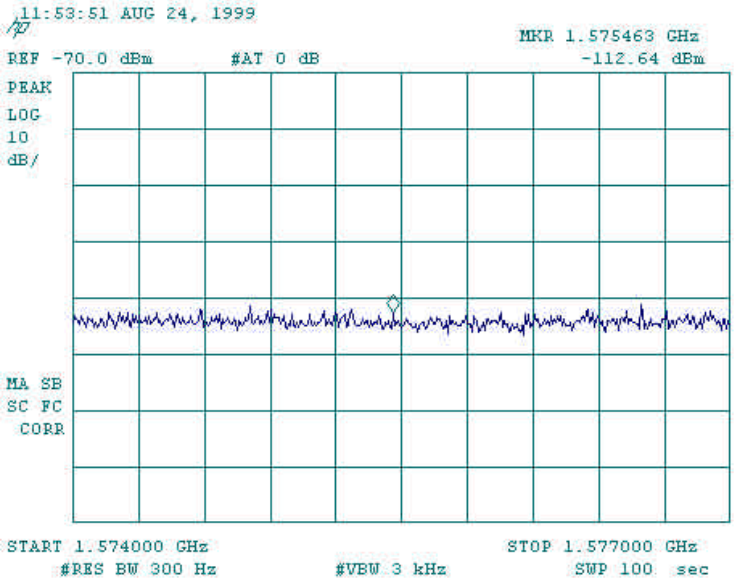
dB/
MA SB
SC FC
CORR
START 1.571000 GHz
STOP 1.574000 GHz
#RES BW 300 Hz
#VBW 3 kHz
SWP 100 sec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PEAK
LOG
10
dB/
MA SB
SC FC
CORR
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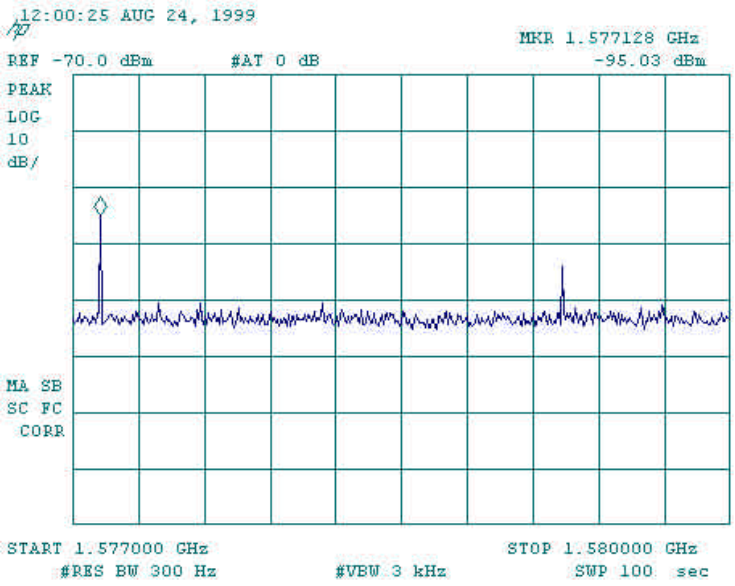
STOP 1.577000 GHz
#RES BW 300 Hz
#VBW 3 kHz
SWP 100 sec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PEAK
LOG
10
dB/
MA SB
SC FC
CORR
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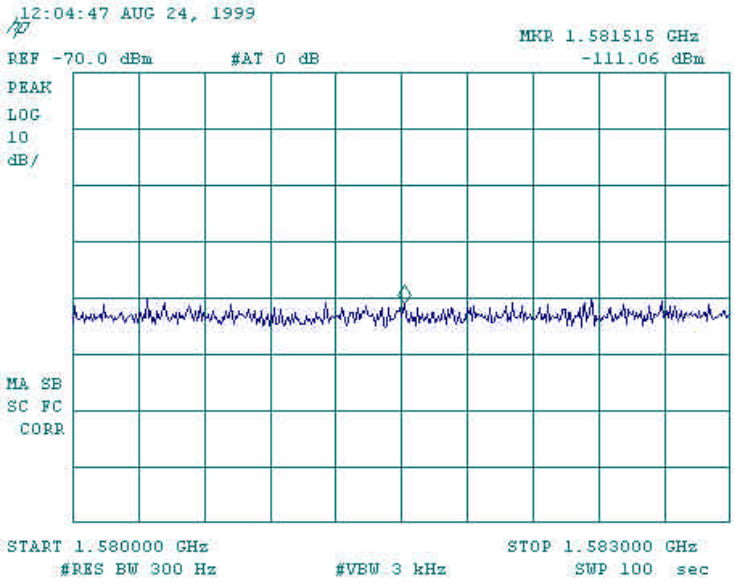
STOP 1.580000 GHz
#RES BW 300 Hz
#VBW 3 kHz
SWP 100 sec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PEAK
LOG
10
dB/
MA SB
SC FC
CORR
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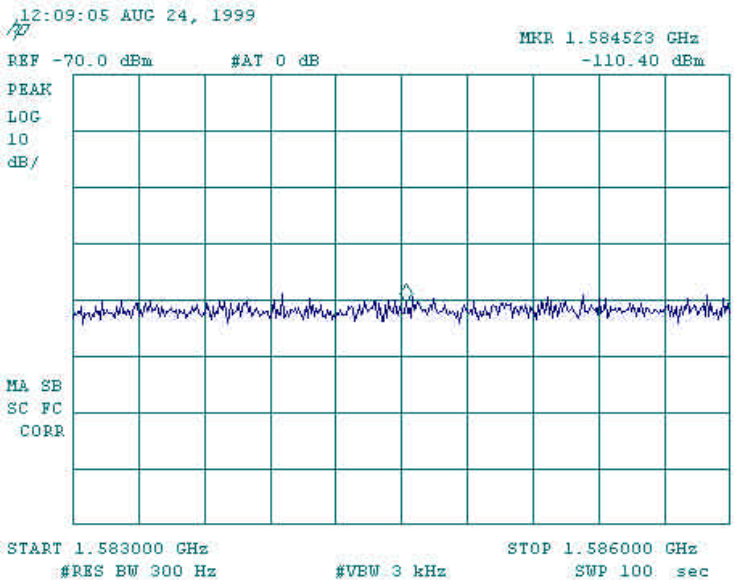
STOP 1.583000 GHz
#RES BW 300 Hz
#VBW 3 kHz
SWP 100 sec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LOG
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dB/
MA SB
SC FC
CORR
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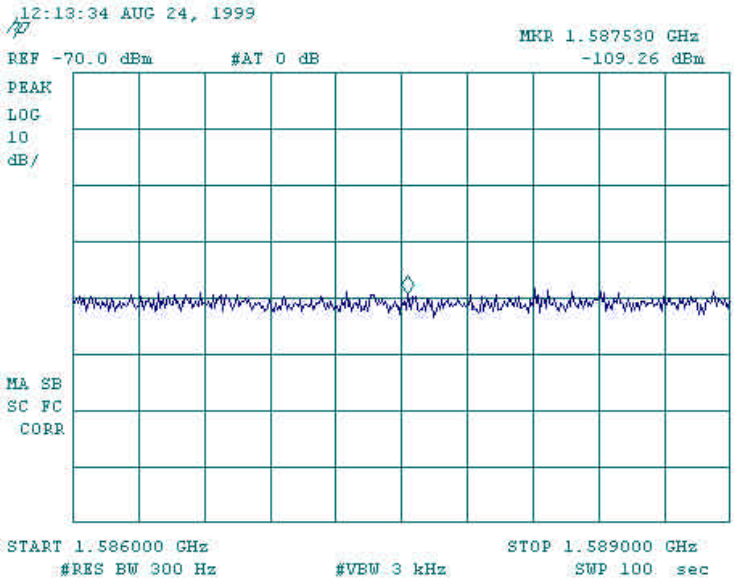
STOP 1.586000 GHz
#RES BW 300 Hz
#VBW 3 kHz
SWP 100 sec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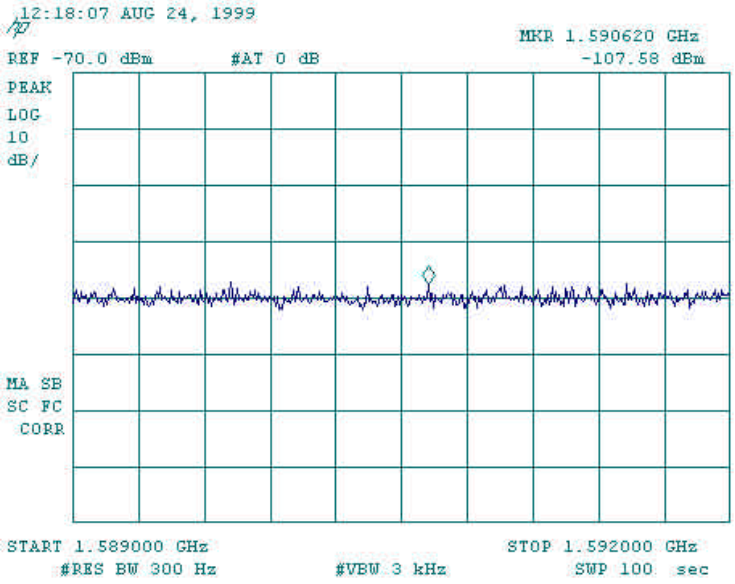
PEAK
LOG
10
dB/
MA SB
SC FC
CORR
START 1.586000 GHz
STOP 1.589000 GHz
#RES BW 300 Hz
#VBW 3 kHz
SWP 100 sec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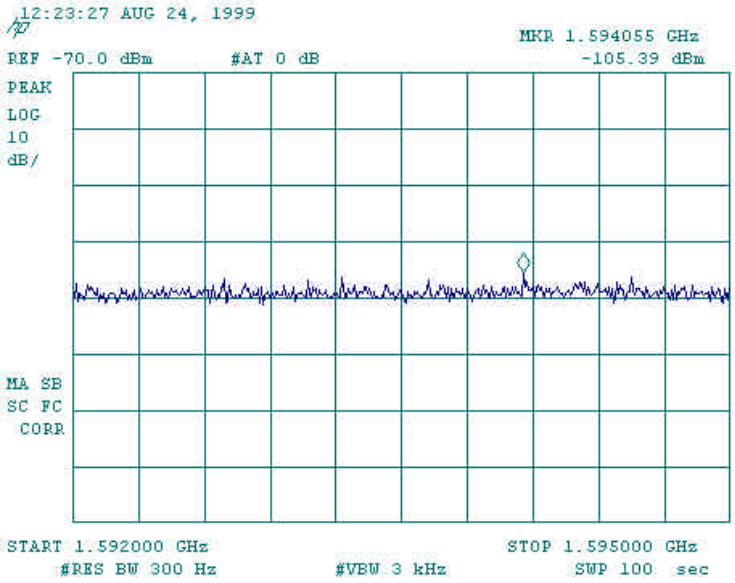
-107.58 dBm
PEAK
LOG
10
dB/
MA SB
SC FC
CORR
START 1.589000 GHz
STOP 1.592000 GHz
#RES BW 300 Hz
#VBW 3 kHz
SWP 100 sec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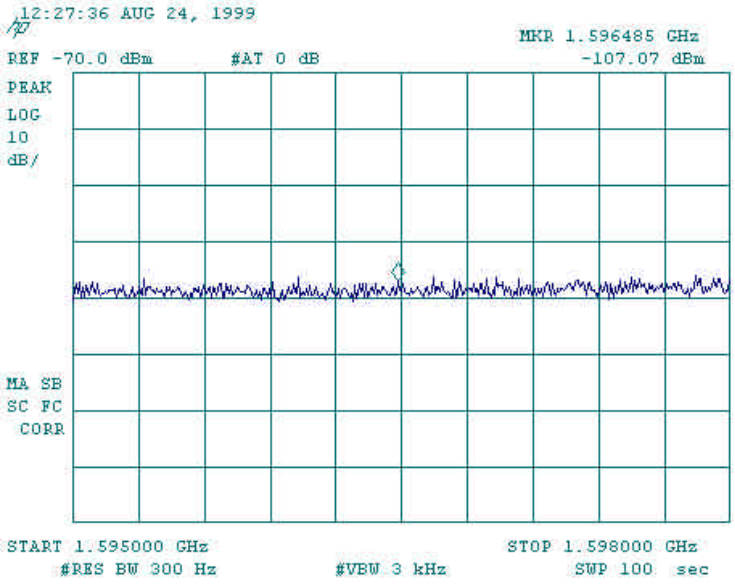
-105.39 dBm
PEAK
LOG
10
dB/
MA SB
SC FC
CORR
START 1.592000 GHz
STOP 1.595000 GHz
#RES BW 300 Hz
#VBW 3 kHz
SWP 100 sec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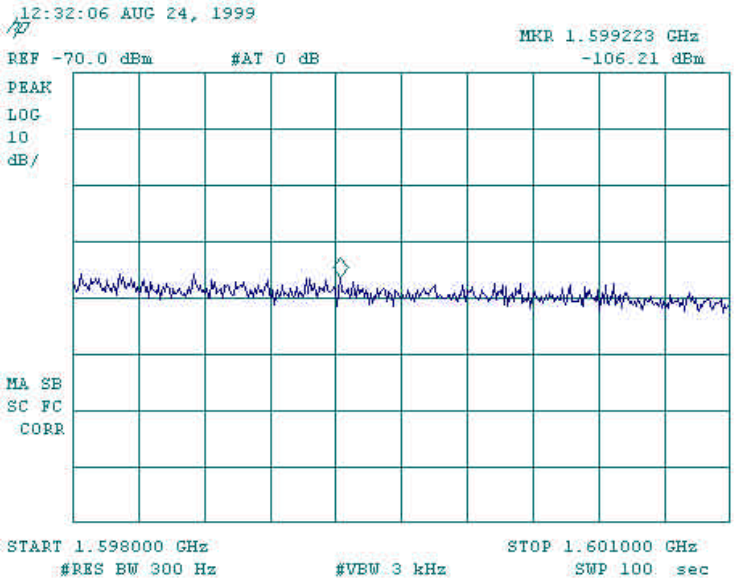
-107.07 dBm
PEAK
LOG
10
dB/
MA SB
SC FC
CORR
START 1.595000 GHz
STOP 1.598000 GHz
#RES BW 300 Hz
#VBW 3 kHz
SWP 100 sec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PEAK
LOG
10
dB/
MA SB
SC FC
CORR
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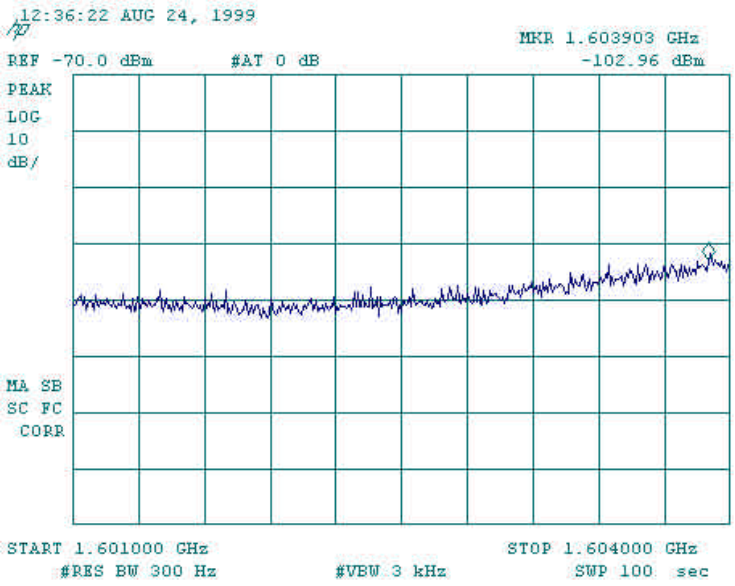
STOP 1.601000 GHz
#RES BW 300 Hz
#VBW 3 kHz
SWP 100 sec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PEAK
LOG
10
dB/
MA SB
SC FC
CORR
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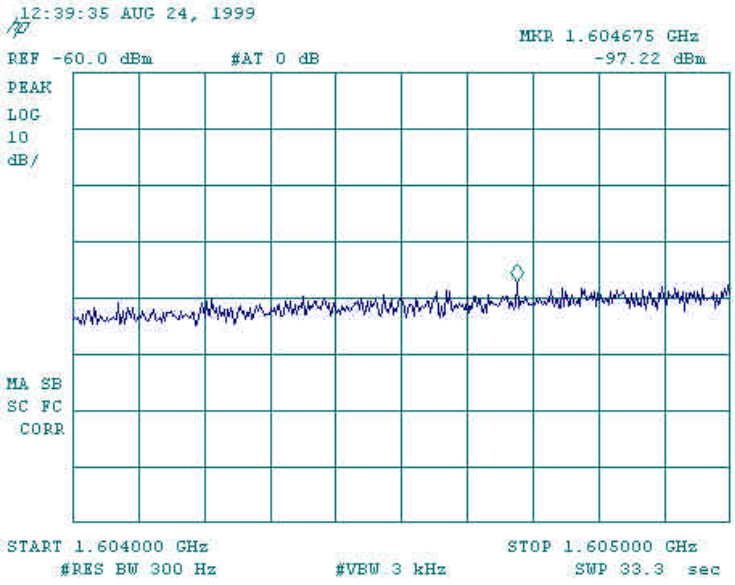
STOP 1.604000 GHz
#RES BW 300 Hz
#VBW 3 kHz
SWP 100 sec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PEAK
LOG
10
dB/
MA SB
SC FC
CORR
START 1.604000 GHz
STOP 1.605000 GHz
#RES BW 300 Hz
#VBW 3 kHz
SWP 33.3 sec