Exhibit 9 – Required Measurements

9.1 Test Procedure and Compliance Matrix

This section details the test procedures and the test results that are concurrent and beyond the individual LRU test procedures/results. The Rockwell Collins LRU test procedures have been amended to include the FCC requirements described in Parts 2 and 87 of FCC Rules and Regulations.

The table below identifies the applicable sections of this document and its relationship between the Parts 2 and 87 requirements. The test results are appended to the individual test sections.

FCC Part 2 Section	FCC Part 87 Section	Test Description Summary	Section
2.1046	87.131	RF Power Output	9.3
2.1047	87.141	Modulation Characteristics	9.4
2.1049	87.135	Occupied Bandwidth	9.5
2.1051	87.139	Spurious Emissions at Antenna Terminals, Intermodulation and Frequency Spectrum	9.6
2.1053	87.139	Field Strength of Spurious Radiation	9.7
2.1055	87.133	Frequency Stability	9.8
N/A	87.187 (q)	Priority and Preemption	9.9

Table 9.1.1 Test Requirements Matrix

9.2 Test Equipment

The test equipment listed in the following table was used to conduct the operational performance tests indicated herein and for collecting data except where show differently in individual sections of this report. The actual test setups for each test are described in the individual sections.

Item Description	Item Number	Manufacturer and Model
IP-PC		286 or equivalent
Logging PC		286 or equivalent
MIDU	CPN 622-8587-008	
SRT-2100	-	Rockwell Collins
Spectrum Analyzer	HP 8544	
Spectrum Analyzer	HP8566B	Or equivalent
Power Sensor	HP 8481A	Or equivalent
GES Simulator	622-9760-00x	
Translator Panel		Rockwell Collins Custom
30 dB pad, 25 Watt pad		
20 dB pad		
10 MHz high stability reference (stability > 19.2 PPB)		
30 dB pad, 25 Watt pad		
Qual Test rack or equivalent		
HP Power Meter		
SRT-2100 Qual test station or equivalent		Rockwell Collins Custom
PHASE NOISE MEASUREMENT SYSTEM	HP3048A	
PHASE NOISE INTERFACE	HP11848A	
DYNAMIC SIGNAL ANALYZER	HP3561A	
HP3048A SOFTWARE	VERSION:REV:A.02.00	
SYSTEM COMPUTER	HP98580B	
RF SIGNAL GENERATOR	HP8663	
BROADBAND AMPLIFIER	HP8447A	
PLOTTER	HP 7475A	
T1206 SATCOM SYSTEM DFIU	JCAIR T1206	

Table 9.2.1 Test Equipment

9.3 RF Power Output

9.3.1 FCC Requirements

The discussion and test results shown in this section address and meet the requirements of the following FCC requirements:

Section 2.1046 (a)

For transmissions other than simple sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the value of current and voltage on circuit elements specified in 2.1033 (c) (8). The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.

Section 2.1033 (c)(8)

The dc voltages applied to and dc currents into the several elements of the final radio frequency amplifying device for normal operation over the power range.

Section 87.131 Notes (1), (ii), (8)

(1) The power is measured at the transmitter output terminals and the type of power is determined according to the emission designator as follows:

(ii) Peak Envelope power (pX) for all emissions designators other than those referred to in paragraph (I) of this note.

(8) Power may not exceed 60 watts per carrier. The maximum EIRP may not exceed 2000 watts per carrier.

9.3.2 Test Procedures

None

9.3.3 RF Power Output Results

The SAT-2100 System output power to the antenna is equal to the power output from the High Power Amplifier (HPA) in SRT-2100, less the losses between the HPA and the antenna. These losses include cable loss, LAN/Diplexer loss, and other interconnection losses. They are installation dependent and are specified below:

Cable Loss = 1.70 dB maximum

LNA/Diplexer Loss = 0.8 dB maximum

Total HPA to Antenna Loss = 2.50dB maximum

Typical values for these losses measured are:

Cable Loss = 1.1 to 1.7 dB

LNA/Diplexer Loss = 0.5 to 0.8 dB

Total HPA to Antenna Loss = 1.6 to 2.5 dB

The HPA rated output power is 45 watts maximum for multiple carriers.

The DC supply voltages and typical DC current values for the HPA are listed in the table below.

DC Supply Voltage	Maximum DC Supply Current	Typical Measured DC Supply Current
+27 VDC	8.0 Amps	7.35 Amps
+15 VDC	1.0 Amps	0.53 Amps
-15 VDC	0.2 Amps	0.10 Amps
+5 VDC	0.3 Amps	0.12 Amps

Table 9.3.3 Voltages and Currents

9.4 Modulation Characteristics

The formatted data, described under Exhibit 2, is used to phase modulate a subcarrier signal. Binary phase shift keying (BPSK) modulation is used for all data rates less than 2400 bps and Quadrature phase shift keying (QPSK) is used for all data rates greater than 2400 bps.

For BPSK modulation, the subcarrier signal phase value is varied by -90 or 90 degrees depending on the formatted data bit being a 0 or a 1, respectively. For QPSK modulation the 4 states of each 2 bits of the formatted data is used to vary the subcarrier signal phase value by 45, 135, -135 or -45 degrees, according to a specified state/phase mapping. All modulation characteristics supported by SRT-2100 are indicated in the table below.

Refer to the corresponding photo of eye pattern and the constellation pattern of modulation characteristics shown.

9.4.1 FCC Requirements

The discussion and test results show in this section address and meet the requirements of the following FCC requirements. For generating the modulation signals, the SRT-2100 uses the same identical channel module elements and DSP SW as the SRT-2000. Since the same hardware is used for both the SRT2100 and SRT-2000, the results for the SRT-2000 Modulation Characteristics are -resubmitted here for reference.

Section 2.1047 (d)

A curve or equivalent data which shows that the equipment will meet the modulation requirements of the rules under which the equipment is to be licensed.

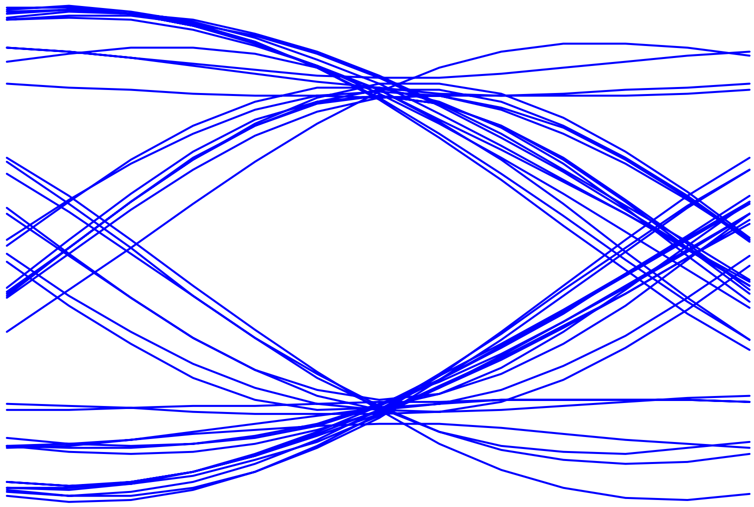
Section 87.141 (j)

Transmitters used as Aircraft earth stations must employ BPSK for transmissions rates up to and including 2400 bps, and QPSK for higher rates.

9.4.2 Modulation Characteristics Results

The SRT-2100 uses the same modules as the SRT-2000 for generating the modulation signals. The results for the SRT-2000 Modulation Characteristics are included here. See the following figures for Eye and Constellation plots and Timing Diagrams.

Figure	Description
9.4.1	Eye and Constellation Diagram for Data Rate of 600 bps - ABPSK
9.4.2	Timing Diagram for Data Rate of 600 bps - ABPSK
9.4.3	Eye and Constellation Diagram for Data Rate of 1200 bps - ABPSK
9.4.4	Timing Diagram for Data Rate of 1200 bps - AQPSK
9.4.5	Eye and Constellation Diagram for Data Rate of 8400 bps - AQPSK
9.4.6	Timing Diagram for Data Rate of 8400 bps - AQPSK
9.4.7	Eye and Constellation Diagram for Data Rate of 21000 bps - AQPSK
9.4.8	Timing Diagram for Data Rate of 21000 bps - AQPSK
9.4.9	Eye and Constellation Diagram for Data Rate of 10500 bps - AQPSK
9.4.10	Timing Diagram for Data Rate of 10500 bps - AQPSK



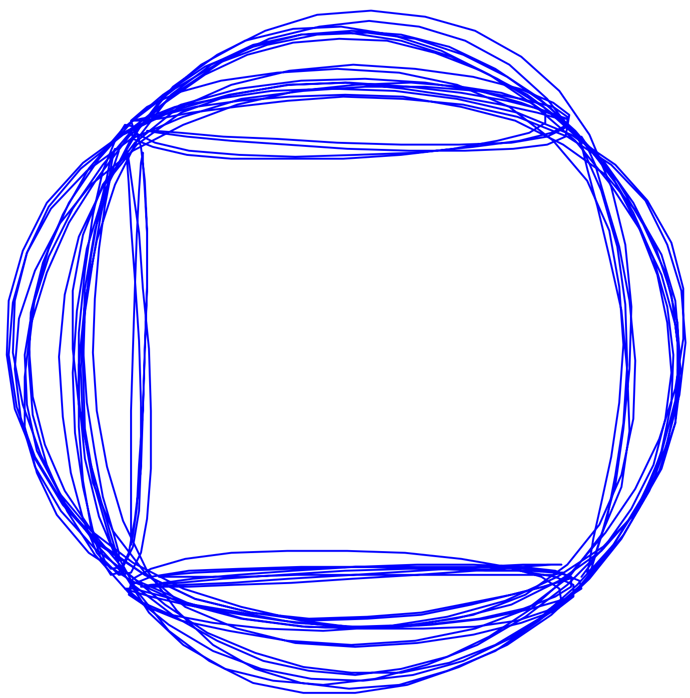


Figure 9.4.1. Eye and Constellation Diagram for Data Rate of 600 bps - ABPSK

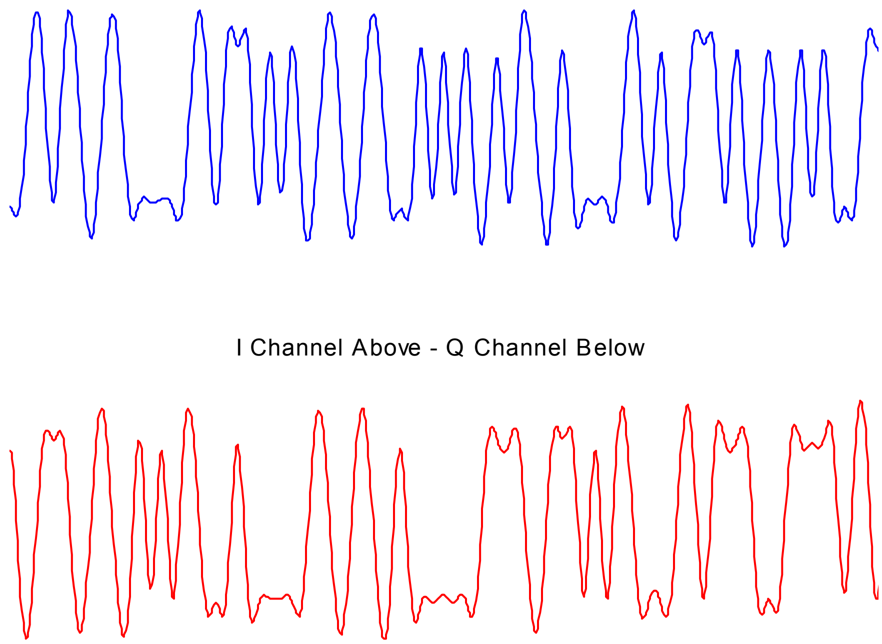
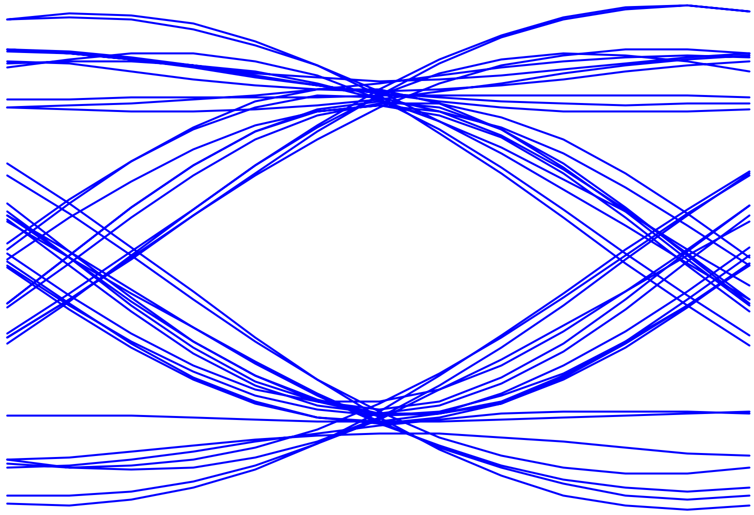


Figure.9.4.2. Timing Diagram for Data Rate of 600 bps - ABPSK



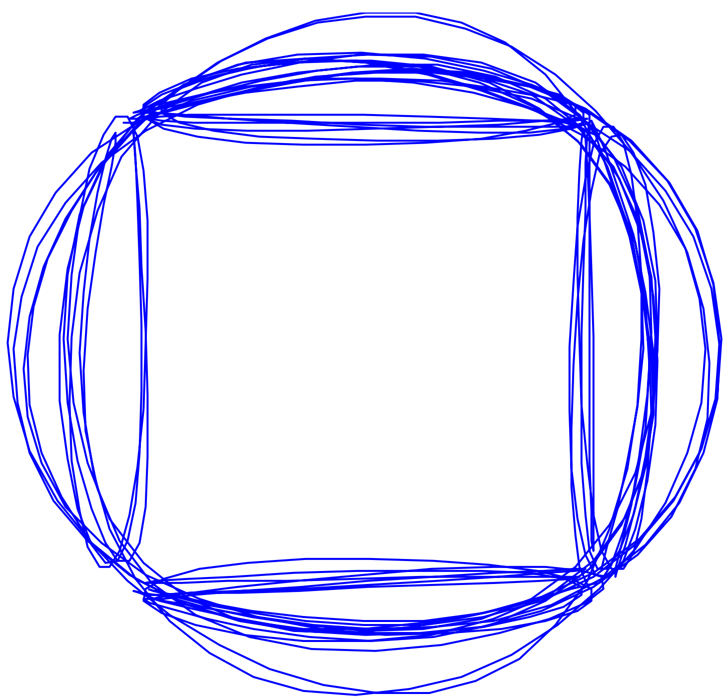


Figure 9.4.3. Eye and Constellation Diagram for Data Rate of 1200 bps - ABPSK

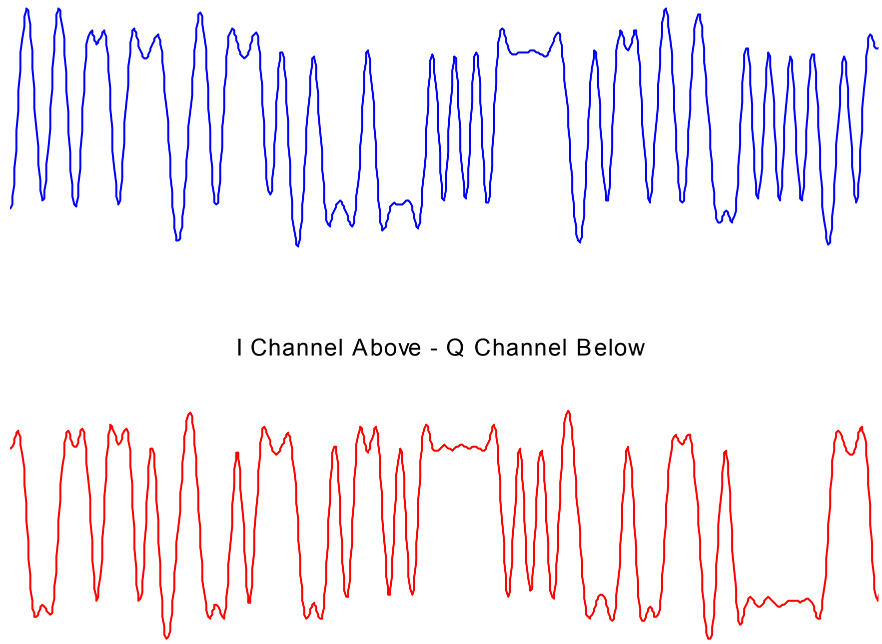
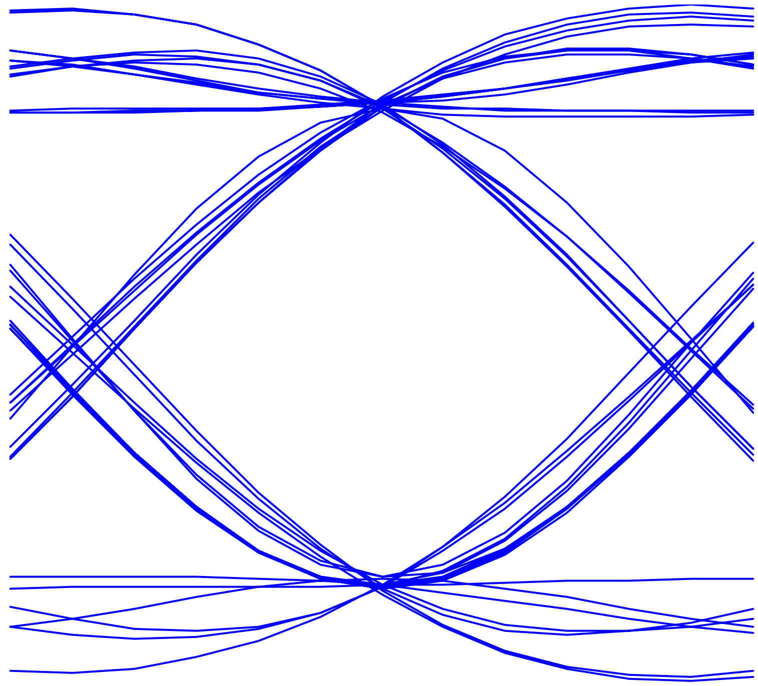


Figure 9.4.4. Timing Diagram for Data Rate of 1200 bps - ABPSK



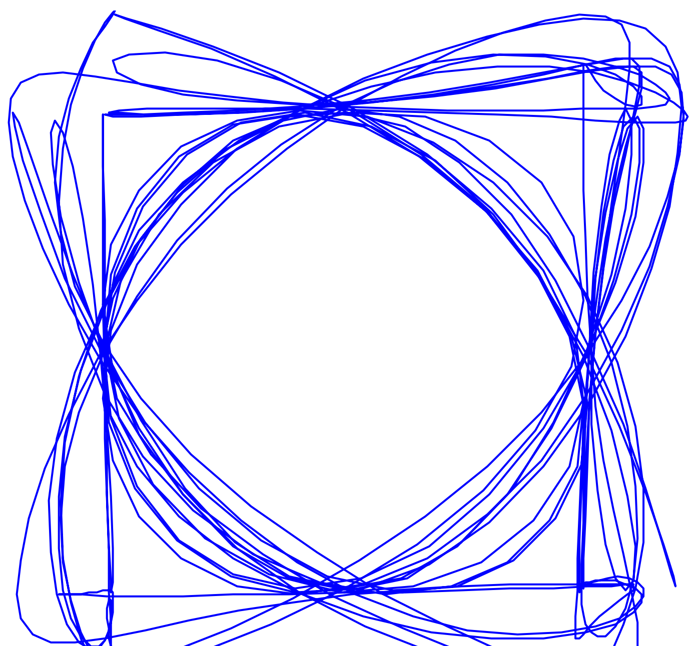


Figure 9.4.5. Eye and Constellation Diagram for Data Rate of 8400 bps - AQPSK

Figure 9.4.6. Timing Diagram for Data Rate of 8400 bps - AQPSK

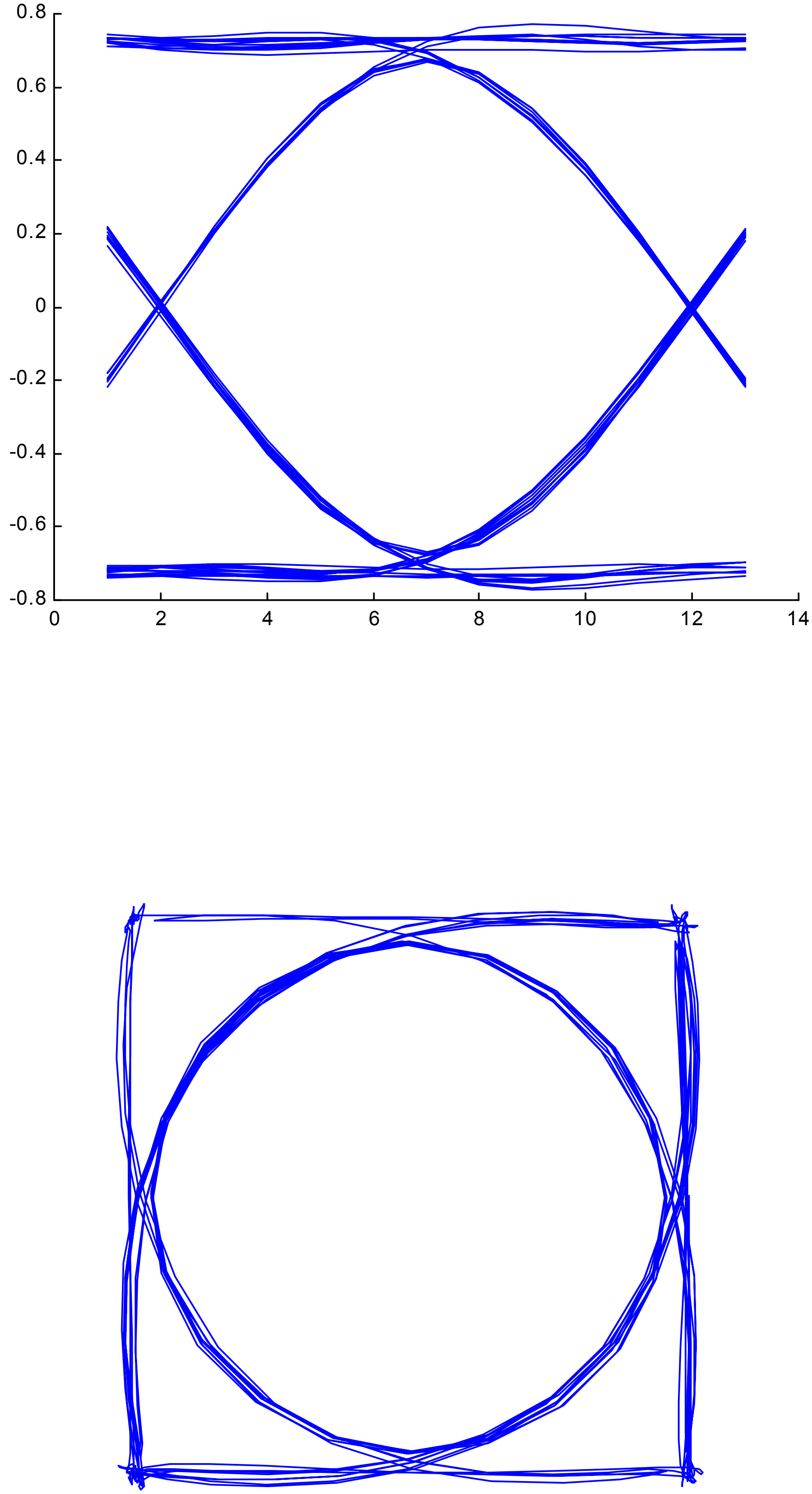


Figure 9.4.7. Eye and Constellation Diagram for Data Rate of 21000 bps - AQPSK

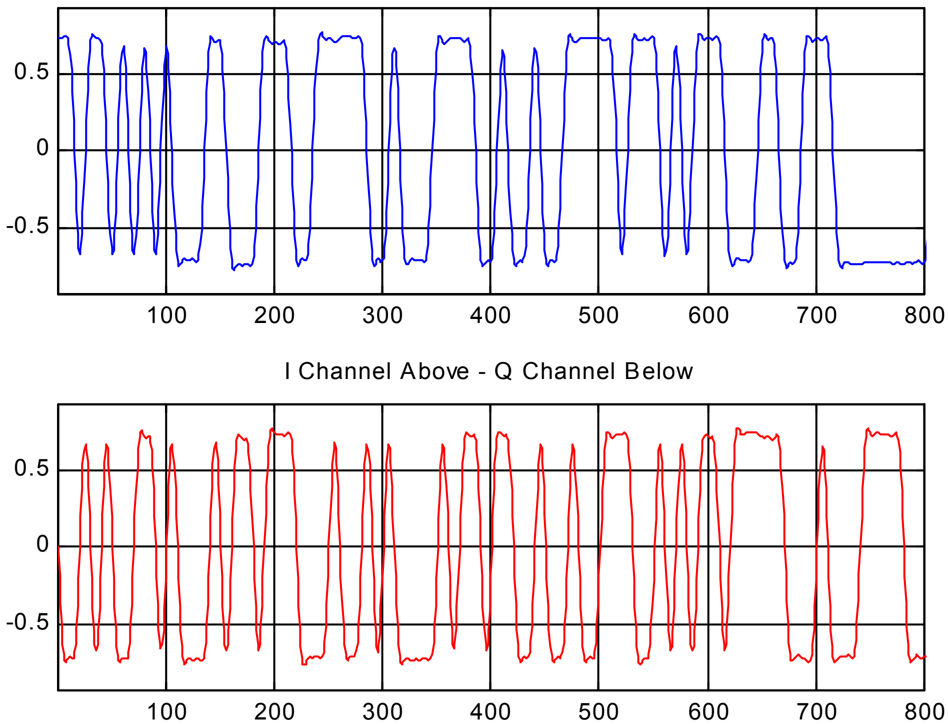


Figure 9.4.8. Timing Diagram for Data Rate of 21000 bps -AQPSK

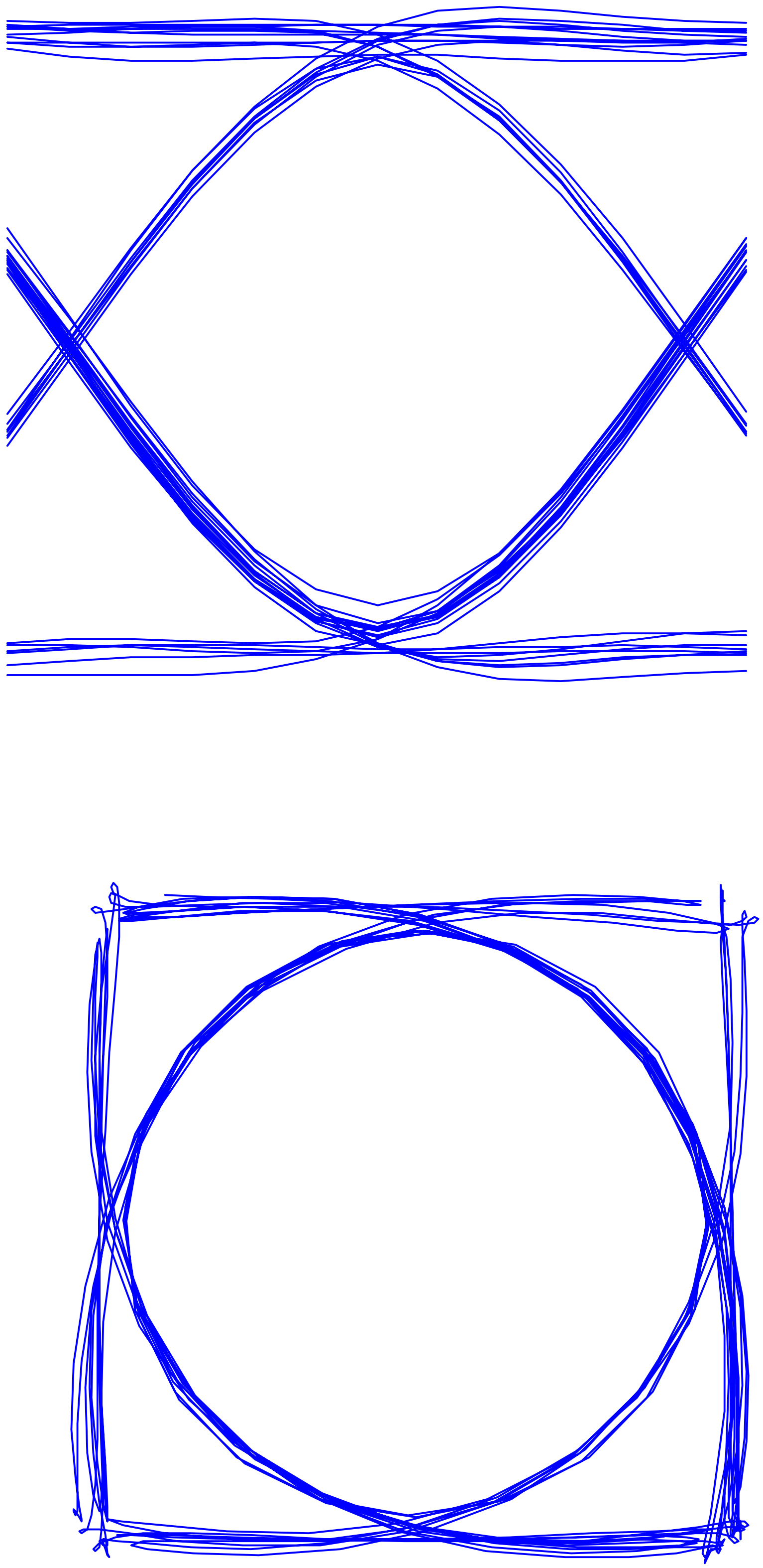


Figure 9.4.9 Eye and Constellation Diagram for Data Rate of 10500 bps AQPSK

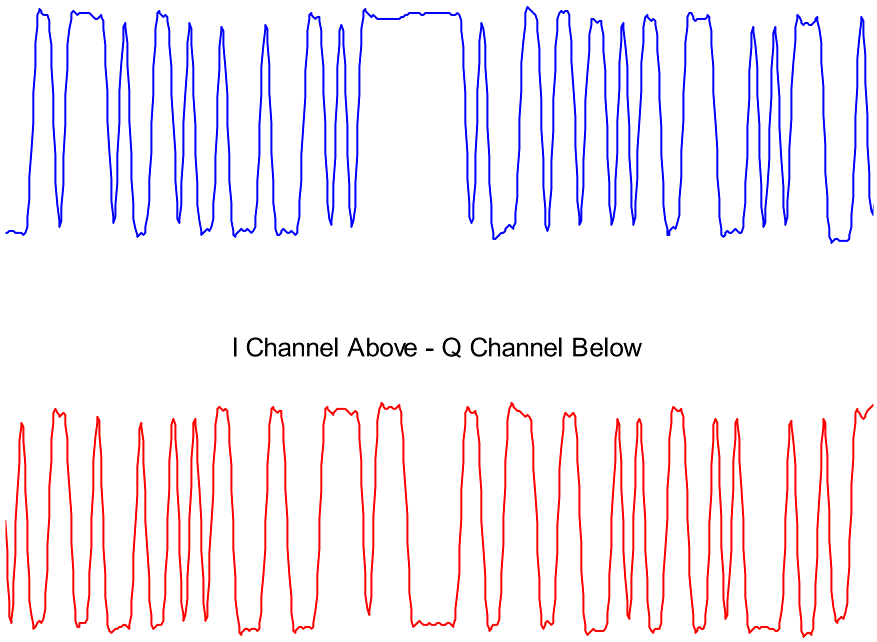


Figure 9.4.10. Timing Diagram for Data Rate of 10500 bps -AQPSK

9.5 Occupied Bandwidth

9.5.1 FCC Requirements

The discussion and test results shown in this section address and meet the requirements of the following FCC requirements:

Section 2.1049

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the following conditions as applicable.

Section 2.1049 (h)

Transmitters employing digital modulation techniques – when modulated by an input signal such that its amplitude and symbol rate represent the maximum rated conditions under which the equipment will be operated. The signal shall be applied through any filter networks, pseudo-random generators or other devices required in normal service. Additionally, the occupied bandwidth shall be shown for operation with any devices used for modifying the spectrum when such devices are operational at the discretion of the user.

Section 87.135 (a), (b), (c)

(a) - Occupied bandwidth is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are equal to 0.5 percent of the total mean power of a given emission.

(b) - The authorized bandwidth is the maximum occupied bandwidth authorized to be used by a station.

(c) - The necessary bandwidth for a given class of emission is the width of the frequency band which is just sufficient to ensure the transmission of information at the rate and with the quality required under specified conditions.

Section 87.137 (a)

The class of emissions, corresponding emission designators and authorized bandwidths for use by Aircraft Earth Stations are as follows:

Class of Emission	Emission Designator	Authorized Bandwidth (kilohertz)
G1D[1]	21K0G1D	25
G1E[1]	21K0G1E	25
G1W[1]	21K0G1W	25

[1]Lower values of necessary and authorized bandwidths are permitted

Table 9.5.1 Emissions Classes

9.5.2 Test Procedure and Test Results

The system was configured per figure below and the transmitted output signal was measured on the spectrum analyzer. The spectrum measurement was made for all data rates supported by SRT-2100, and shown in the table below.

The spectrum analyzer output results are included as test results.

In all cases the measured bandwidth falls within the 25 kHz limit authorized bandwidth specified in Section 87.137.

Figure 9.5.2 Occupied Bandwidth Test Setup

			Spectrum Analyzer Setting	
Data Rate (BPS)	Modulation Type	Symbol Rate (BPS)	Frequency Span	Resolution Band Width
600	A-BPSK	600	6.0 kHz	30 Hz
1200	A-BPSK	1200	12.0 kHz	100 Hz
10500	Q-BPSK	5250	52.5 kHz	150 Hz
8400	Q-BPSK	5600	56.0 kHz	150 Hz
21000	Q-BPSK	10500	105.0 kHz	300 Hz

Table 9.5.2.1 Spectrum Analyzer Setup

The following tables are a summary of the measured bandwidths for the data rate and the transmit power indicated.

Test Result Figure	**Data Rate**	**BW at Transmit Frequency 1626.5 MHz**	**BW at Transmit Frequency 1643.5 MHz**	**BW at Transmit Frequency 1660.5 MHz**
9.5.1 – 9.5.3	600 BPS	1.041 kHz	1.014 kHz	1.028 kHz
9.5.4-9.5.6	1200 BPS	1.641 kHz	1.664 kHz	1.667 kHz
9.5.7 – 9.5.9	8400 BPS	5.632 kHz	5.579 kHz	5.550 kHz
9.5.10 – 9.5.12	10500 BPS	8.876 kHz	8.990 kHz	8.976 kHz
9.5.13 – 9.5.15	21000 BPS	17.57 kHz	17.43 kHz	17.47 kHz

Table 9.5.2.2 Bandwidth Occupancy Test Results 45 Watts

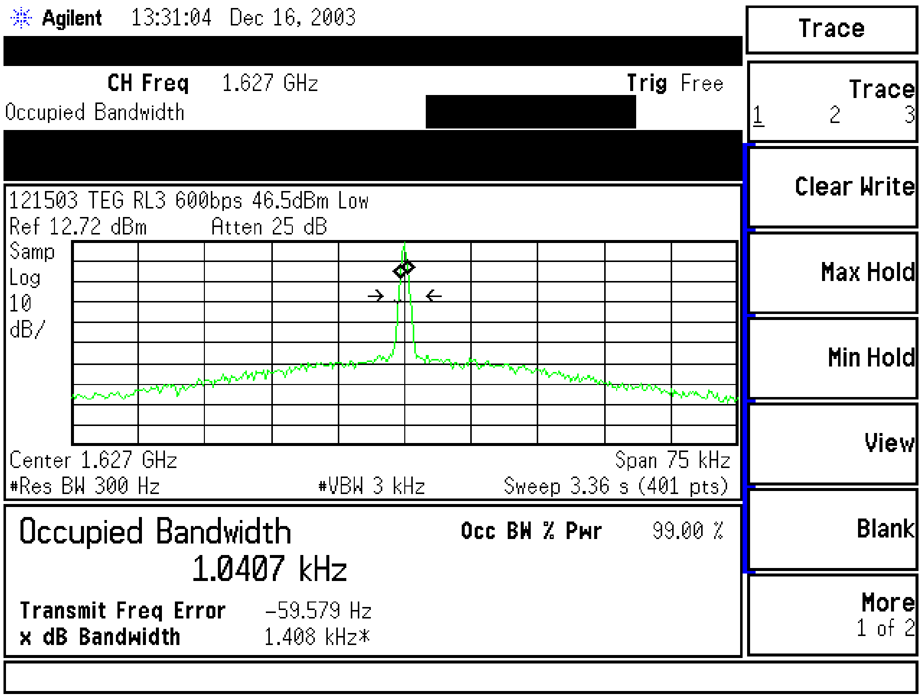


Figure 9.5.2.1. Occupied BW - 600 bps - Low Band - 45 Watts

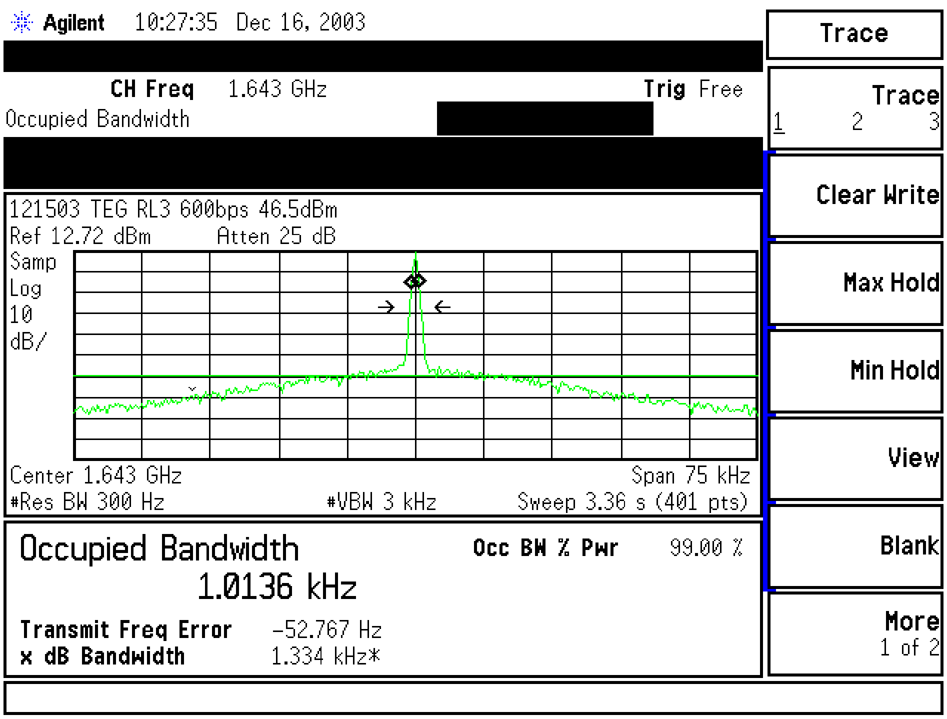


Figure 9..5.2.2. Occupied BW - 600 bps – Mid Band - 45 Watts

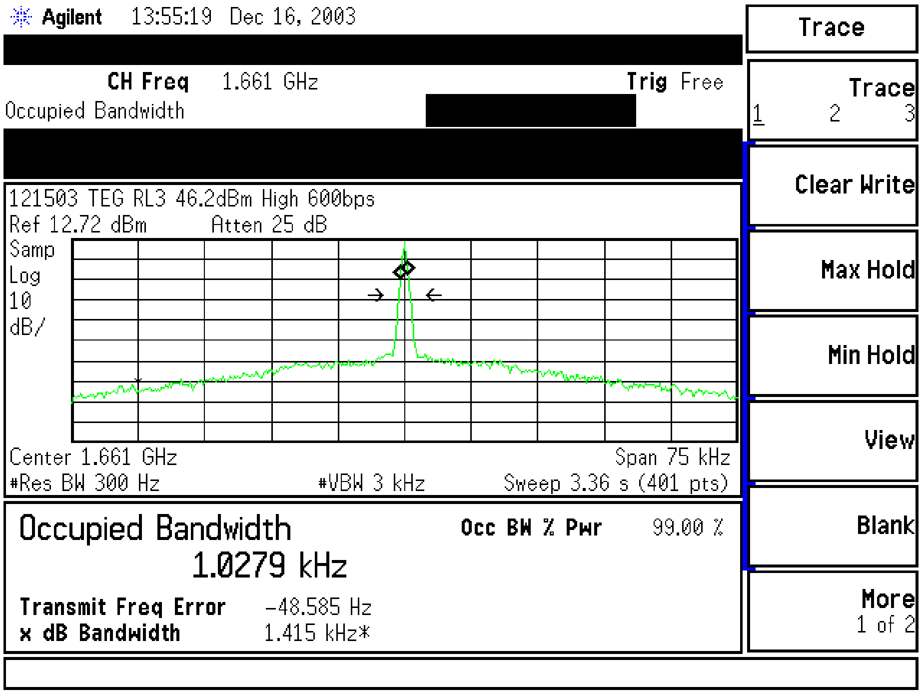


Figure 9.5.2.3. Occupied BW - 600 bps - High Band - 45 Watts

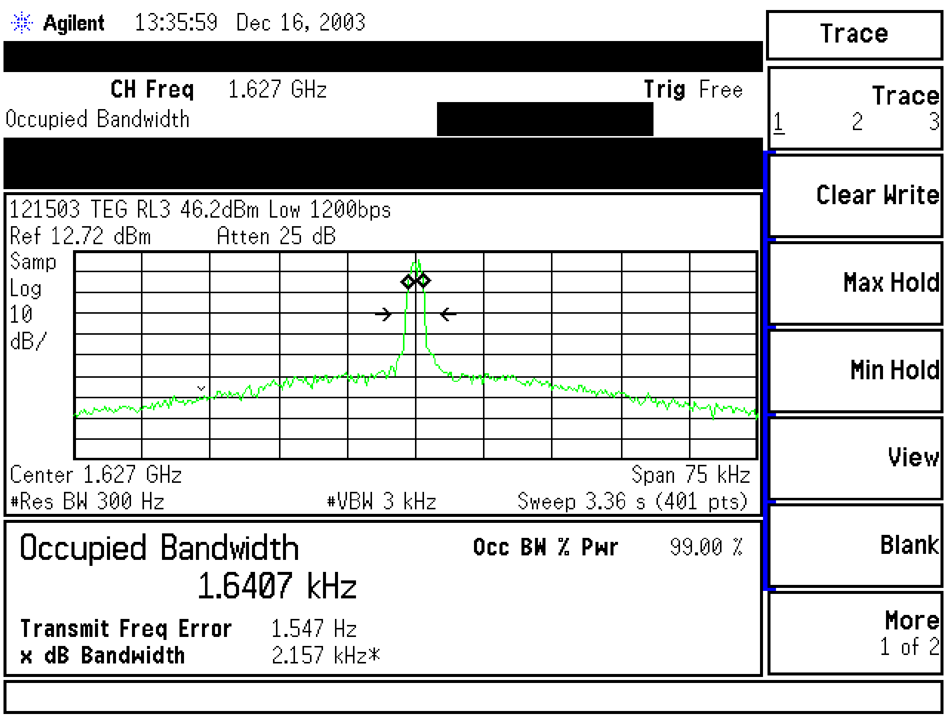


Figure 9.5.2.4. Occupied BW - 1200 bps - Low Band - 45 Watts

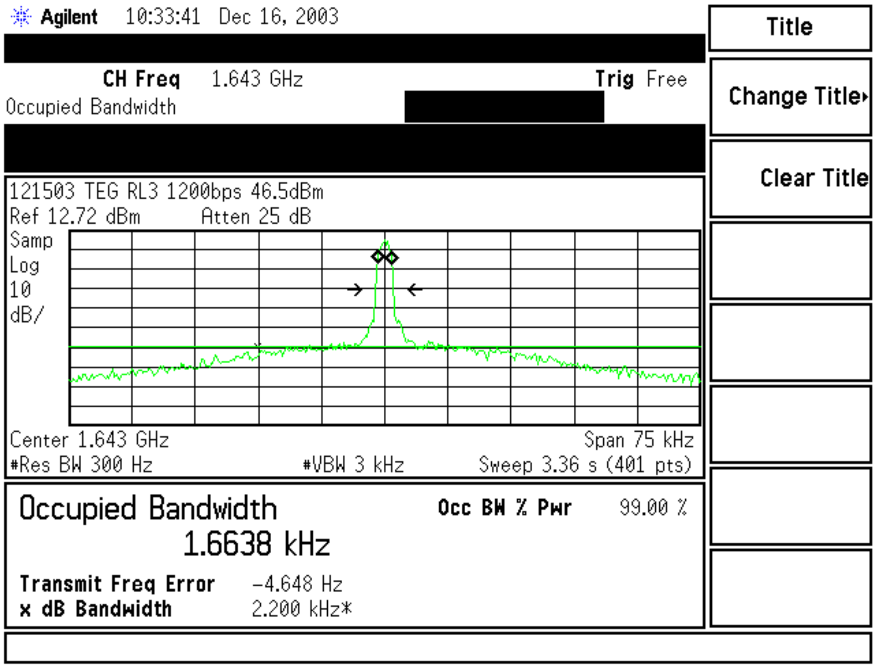


Figure 9.5.2.5. Occupied BW - 1200 bps - Mid Band - 45 Watts

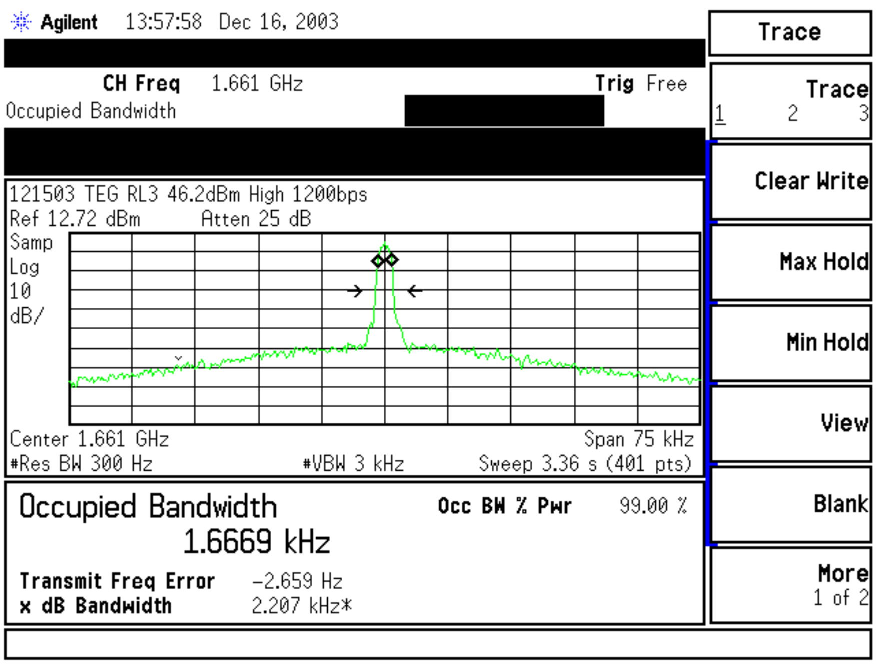


Figure 9.5.2.6. Occupied BW - 1200 bps - High Band - 45 Watts

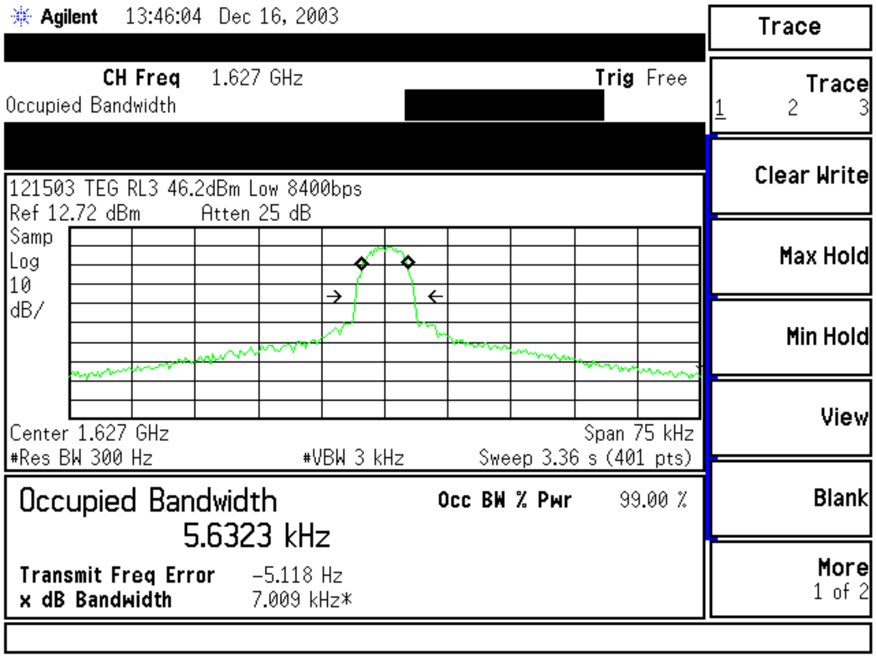


Figure 9.5.2.7. Occupied BW - 8400 bps - Low Band - 45 Watts

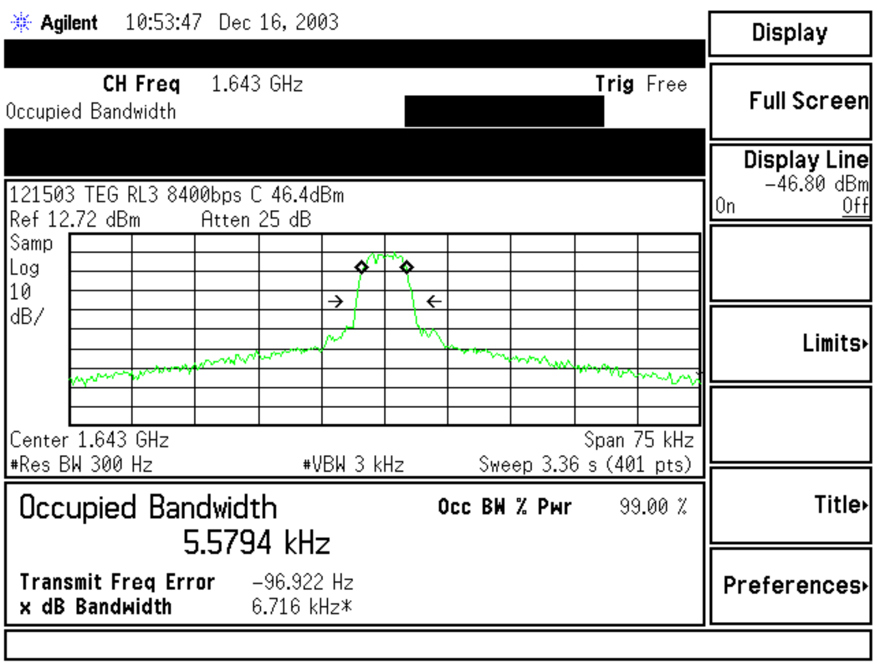


Figure 9.5.2.8. Occupied BW - 8400 bps -Mid Band - 45 Watts

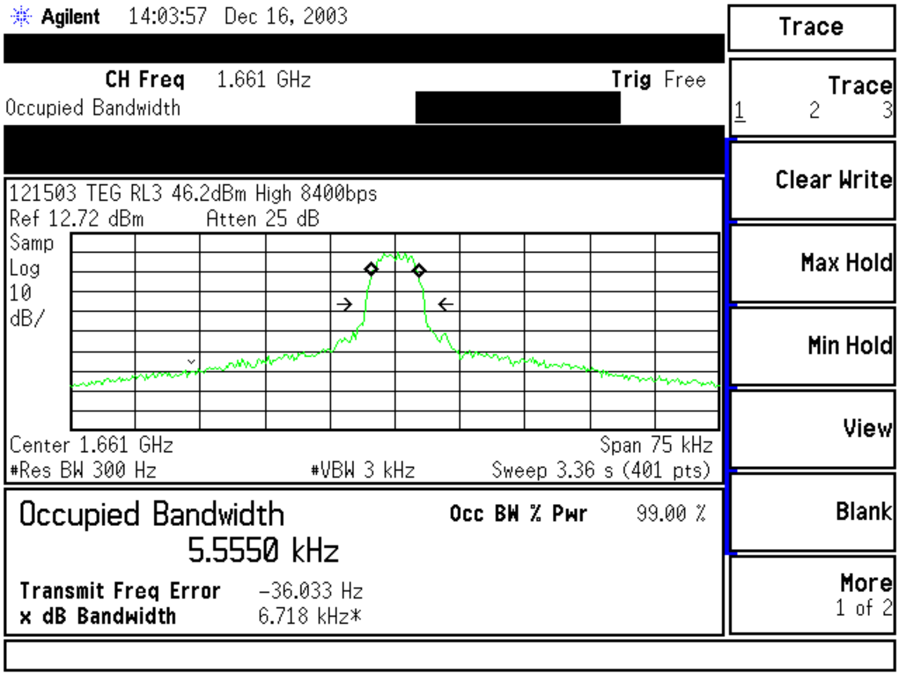


Figure 9.5.2.9. Occupied BW - 8400 bps - High Band - 45 Watts

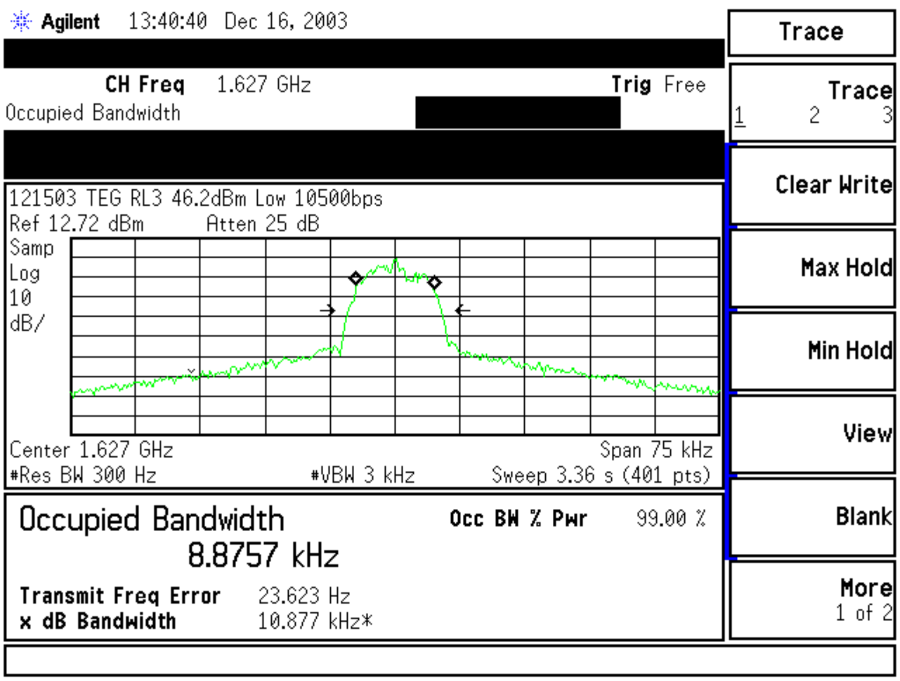


Figure 9.5.2.10. Occupied BW - 10500 bps - Low Band - 45 Watts

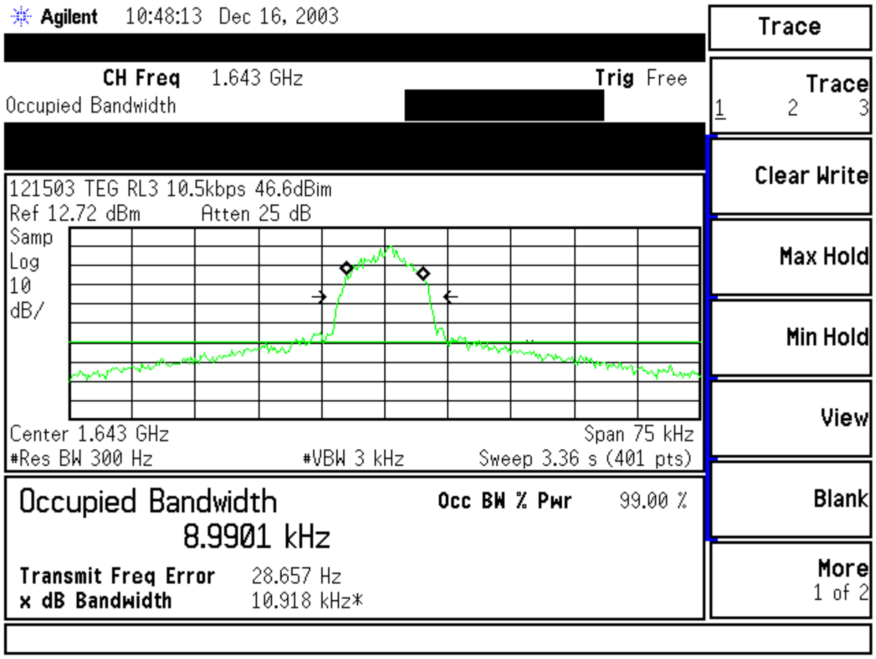


Figure 9.5.2.11. Occupied BW - 10500 bps - Mid Band - 45 Watts

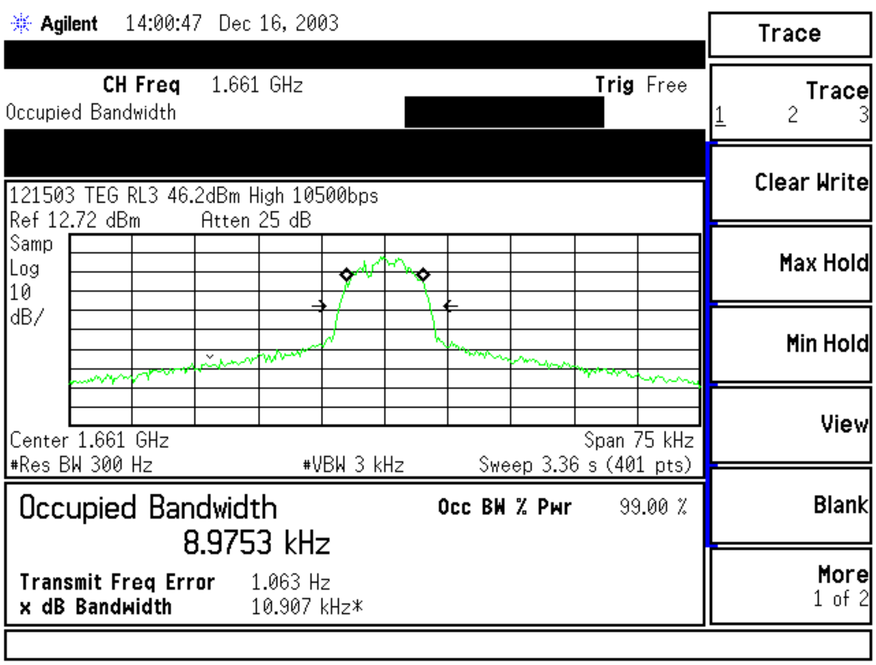


Figure 9.5.2.12. Occupied BW - 10500 bps - High Band - 45 Watts

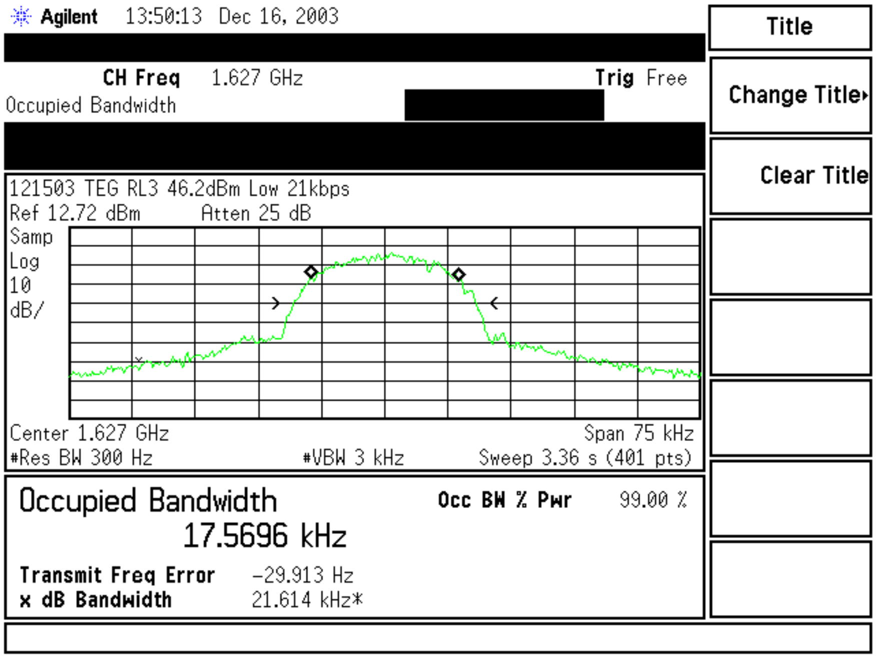


Figure 9.5.2.13. Occupied BW - 21000 bps - Low Band - 45 Watts

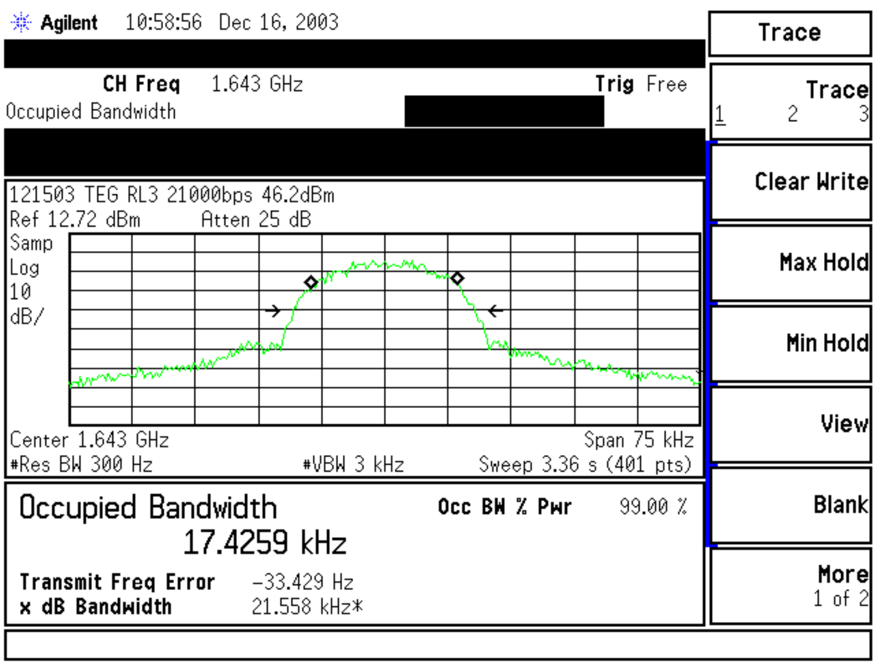


Figure 9.5.2.14. Occupied BW - 2100 bps - Mid Band - 45 Watts

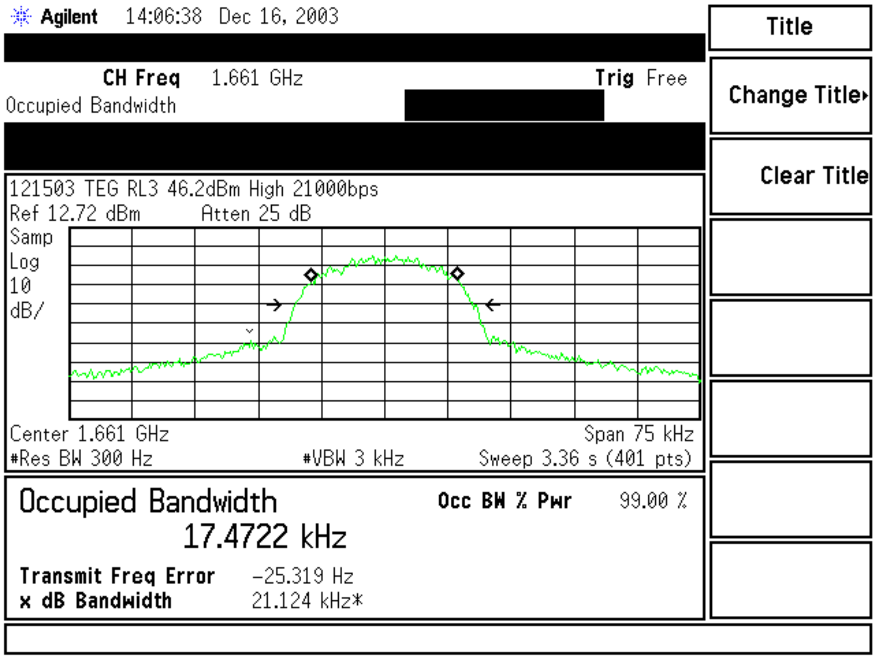


Figure 9.5.2.15. Occupied BW - 21000 bps - High Band - 45 Watts

9.6 Spurious Emissions at Antenna Terminals, Intermodulation and Frequency Spectrum

9.6.1 FCC Requirements

The discussion and test results show in this section address and meet the requirements of the following FCC requirements.

Section 2.1051

The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emissions that can be detected when the equipment is operated under the conditions specified in Section 2.1049 (old 2.989) as appropriate. The magnitude of spurious emissions attenuated more than 20 dB below the permissible values need not be specified.

Section 2.1057 (a) (1)

In all of the measurements set forth in Section 2.1051 and 2.1053, the spectrum shall be investigated from the lowest radio frequency signal generated in the equipment, without going below 9 kHz, up to:
At least the tenth harmonic of the highest fundamental frequency or to 50 GHz, whatever is lower (if the equipment operates below 10 GHz).

Section 87.139 (i)(1), (2), (3), (4)

(i) – In case of conflict with other provisions of Section 87.139, the provisions of this paragraph shall govern for aircraft earth stations. When using G1D, G1E, or G1W emissions in the 1646.5 – 1660.5 MHz frequency band, the emissions must be attenuated as shown below.

(1) - At rated output power, while transmitting a modulated single carrier, the composite spurious and noise output shall be attenuated below the mean power of the transmitter, pY, by at least:

Frequency (MHz)	Attenuation (dB)[1]
.005 – 1559	83 or (65 + $10\log_{10}$(pY)), whichever is greater
1559 – 18000	55 or (37 + $10\log_{10}$(pY))[2], whichever is greater

[1] these values are expressed in dB below the carrier referenced to a 4 kHz bandwidth and relative to the maximum emission envelope level.

[2] excluding the frequency band of +/- 35 kHz or +/- 4.00 x Symbol Rate, about the carrier frequency, whichever is the greater exclusion.

(2) – For transmitters rated at 60 watts or less:
When transmitting two unmodulated carriers, each 3 dB below the rated power, the mean power of any intermodulation products must be at least 24 dB below the mean power of either carrier.

(3) - The transmitter emission limit is a function of the modulation type and the Symbol Rate (SR). Symbol Rate is expressed in symbols per second.

(4) - While transmitting a single modulated signal at the rated output power of the transmitter, the emissions must be attenuated below the maximum emission level by at least:

Frequency Offset (normalized to SR)	Attenuation (dB)
+/- 0.75 x SR	0
+/- 1.40 x SR	20
+/- 2.80 x SR	40
+/- 4.00 x SR or +/- 35 kHz Which ever is greater.	F_m

Where:
F_m = 55 or (37 + $10\log_{10}$(pY)), whichever is greater
SR = Symbol Rate
SR = 1 x channel rate for BPSK
SR = 0.5 x channel rate for QPSK
The mask shall be defined by drawing straight lines through the above points.

9.6.2 Spurious Emissions Test Procedure

Spurious Emissions at the Antenna Terminal

The SRT-2100 system spurious emissions measurements were made at the output of the LNA/Diplexer. Since the system's rated power is less than 45 watts (pY) or 16.53 dBW, the spurious emissions must be attenuated by 83 dB from .005 MHz to 1559 MHz and by 55 dB from 1559 MHz to 18000 MHz.

The test conditions below were developed to verify compliance with these requirements.

Test Conditions for Spurious Emissions

Test Condition	Data Rate (BPS)	Carrier Frequency
1	600	1643.5 MHz
2	1200	1643.5 MHz
3	8400	1643.5 MHz
4	10500	1643.5 MHz
5	21000	1626.5 , 1643.5, 1660.5 MHz

The figure below shows the set up for this test.

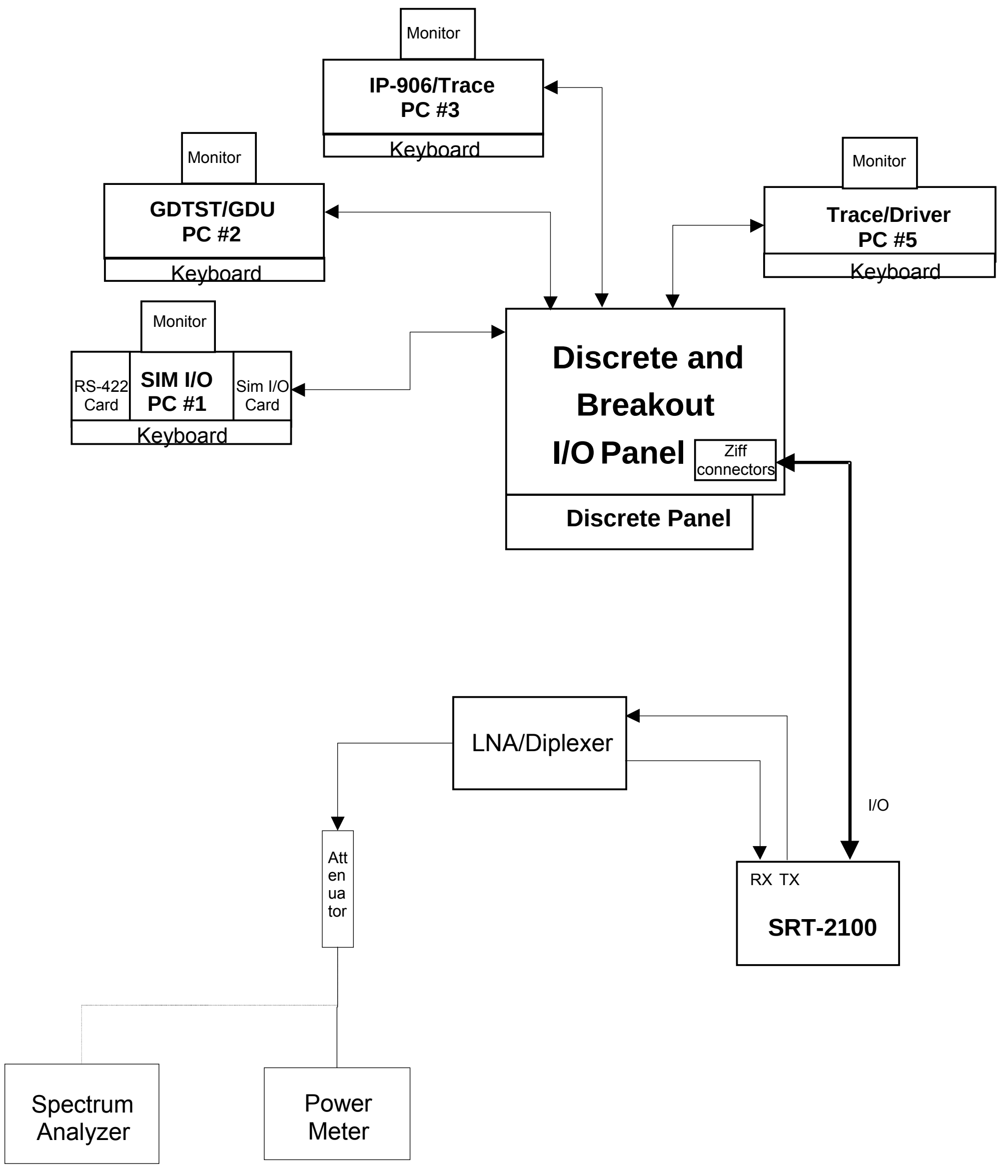


Figure 9.6.2 Spurious Emissions at the Antenna Terminal Setup

For each test condition in the above table, spectrum analyzer measurements were made according to the spectrum analyzer configuration per table below.

Figure No.	Frequency	Bit Rate (bps)	Frequency Span	Resolution Bandwidth
9.6.5.1	1.6435 GHz	600	100 kHz	3 kHz
9.6.5.2	1.6435 GHz	600	1 MHz	3 kHz
9.6.5.3	1.6435 GHz	600	10 MHz	30 kHz
9.6.5.4	1.6435 GHz	600	100-MHz	100 kHz
9.6.5.5	1.6435 GHz	600	1.5 - 2.56 GHz	10 kHz
9.6.5.6	1.6435 GHz	600	2.0 – 22.6 GHz	100 kHz
9.6.5.7	1.6435 GHz	600	1.0 – 1.56 GHz	10 kHz
9.6.5.8	1.6435 GHz	600	0 – 1.0 GHz	10 kHz
9.6.5.9	1.6435 GHz	1200	100 kHz	3 kHz
9.6.5.10	1.6435 GHz	1200	1 MHz	3 kHz
9.6.5.11	1.6435 GHz	1200	10 MHz	30 kHz
9.6.5.12	1.6435 GHz	1200	100-MHz	100 kHz
9.6.5.13	1.6435 GHz	1200	1.5 - 2.56 GHz	10 kHz
9.6.5.14	1.6435 GHz	1200	2.0 – 22.6 GHz	100 kHz
9.6.5.15	1.6435 GHz	1200	1.0 – 1.56 GHz	10 kHz
9.6.5.16	1.6435 GHz	1200	0 – 1.0 GHz	10 kHz
9.6.5.17	1.6435 GHz	8400	100 kHz	3 kHz
9.6.5.18	1.6435 GHz	8400	1 MHz	3 kHz
9.6.5.19	1.6435 GHz	8400	10 MHz	30 kHz
9.6.5.20	1.6435 GHz	8400	100-MHz	100 kHz
9.6.5.21	1.6435 GHz	8400	1.5 - 2.56 GHz	10 kHz
9.6.5.22	1.6435 GHz	8400	2.0 – 22.6 GHz	100 kHz
9.6.5.23	1.6435 GHz	8400	1.0 – 1.56 GHz	10 kHz
9.6.5.24	1.6435 GHz	8400	0 – 1.0 GHz	10 kHz
9.6.5.25	1.6435 GHz	10500	100 kHz	3 kHz
9.6.5.26	1.6435 GHz	10500	1 MHz	3 kHz
9.6.5.27	1.6435 GHz	10500	10 MHz	30 kHz

9.6.5.28	1.6435 GHz	10500	100-MHz	100 kHz
9.6.5.29	1.6435 GHz	10500	1.5 - 2.56 GHz	10 kHz
9.6.5.30	1.6435 GHz	10500	2.0 – 22.6 GHz	100 kHz
9.6.5.31	1.6435 GHz	10500	1.0 – 1.56 GHz	10 kHz
9.6.5.32	1.6435 GHz	10500	0 – 1.0 GHz	10 kHz
9.6.5.33	1.6435 GHz	21000	100 kHz	3 kHz
9.6.5.34	1.6435 GHz	21000	1 MHz	3 kHz
9.6.5.35	1.6435 GHz	21000	10 MHz	30 kHz
9.6.5.36	1.6435 GHz	21000	100-MHz	100 kHz
9.6.5.37	1.6435 GHz	21000	1.5 - 2.56 GHz	10 kHz
9.6.5.38	1.6435 GHz	21000	2.0 – 22.6 GHz	100 kHz
9.6.5.39	1.6435 GHz	21000	1.0 – 1.56 GHz	10 kHz
9.6.5.40	1.6435 GHz	21000	0 – 1.0 GHz	10 kHz
9.6.5.41	1.6270 GHz	21000	100 kHz	3 kHz
9.6.5.42	1.6270 GHz	21000	1 MHz	3 kHz
9.6.5.43	1.6270 GHz	21000	10 MHz	30 kHz
9.6.5.44	1.6270 GHz	21000	100-MHz	100 kHz
9.6.5.45	1.6270 GHz	21000	1.5 - 2.56 GHz	10 kHz
9.6.5.46	1.6270 GHz	21000	2.0 – 22.6 GHz	100 kHz
9.6.5.47	1.6270 GHz	21000	1.0 – 1.56 GHz	10 kHz
9.6.5.48	1.6270 GHz	21000	0 – 1.0 GHz	10 kHz
9.6.5.49	1.6605 GHz	21000	100 kHz	3 kHz
9.6.5.50	1.6605 GHz	21000	1 MHz	3 kHz
9.6.5.51	1.6605 GHz	21000	10 MHz	30 kHz
9.6.5.52	1.6605 GHz	21000	100-MHz	100 kHz
9.6.5.53	1.6605 GHz	21000	1.5 - 2.56 GHz	10 kHz
9.6.5.54	1.6605 GHz	21000	2.0 – 22.6 GHz	100 kHz
9.6.5.55	1.6605 GHz	21000	1.0 – 1.56 GHz	10 kHz
9.6.5.56	1.6605 GHz	21000	0 – 1.0 GHz	10 kHz

The spectrum analyzer measures signal power in a particular “resolution bandwidth” as it sweeps across the selected frequency band and plots the data.

If a wider bandwidth is used, more power is in that band and the point plotted is higher in amplitude. Section 87.139 (i) (1) footnote 1 states that “these values are expressed in dB below the carrier referenced to a 4kHz bandwidth and relative to the maximum emission envelope level.” Since some scans in the table above are taken with a 3 kHz resolution bandwidth, they contain 75% of the power that a 4kHz bandwidth measurement would have. Therefore, the correction factor in dB is

$10\log_{10}(4/3) = 1.25$ dB.

9.6.3 Intermodulation Test Procedures

The intermodulation products of two unmodulated carriers were measured when the SRT-2100 was configured to output 22.5 watts of power in each carrier. This test was repeated with high-, mid-, and low-band frequencies and with representative frequency separations (10 kHz, 100 kHz, 1 MHz and 14 MHz). For each Intermodulation test condition spectrum analyzer measurements were made according to the spectrum analyzer configuration per table below.

Figure No.	Frequency	Frequency Span	Resolution BW / Video BW
9.6.6.1	10 kHz - Low	200 k Hz	1 kHz / 300 Hz
9.6.6.2	100 kHz - Low	2 MHz	10 kHz / 10 kHz
9.6.6.3	1 MHz - Low	20 MHz	100 KHz / 100 KHz
9.6.6.4	14 MHz - Low	280 MHz	1 MHz / 10 kHz
9.6.6.5	10 kHz - Mid	200 k Hz	1 kHz / 300 Hz
9.6.6.6	100 kHz - Mid	2 MHz	10 kHz / 10 kHz
9.6.6.7	1 MHz - Mid	20 MHz	100 KHz / 100 KHz
9.6.6.8	14 MHz - Mid	280 MHz	1 MHz / 10 kHz
9.6.6.9	10 kHz - High	200 k Hz	1 kHz / 300 Hz
9.6.6.10	100 kHz - High	2 MHz	10 kHz / 10 kHz
9.6.6.11	1 MHz - High	20 MHz	100 KHz / 100 KHz
9.6.6.12	14 MHz - High	280 MHz	1 MHz / 10 kHz

Table 9.6.3 Intermodulation Spectrum Analyzer Setup

9.6.4 Per Carrier Transmit Spectrum Test Procedure

1. Connect a HP 8566 spectrum analyzer to the SRT Transmit output monitoring port as shown in Figure 9.9.1. Using IP-906 501 block file, request a frequency in the middle of the transmit band (1643.5 MHz).
2. Perform the following for each channel rate/modulation type :
3. Set the spectrum analyzer span and resolution bandwidth as given below.

			Plot 1 Spectrum Analyzer		Plot 2 Spectrum Analyzer	
Bit Rate	Mod Type	Symbol Rate	Span	Res BW	Span	Res BW
600	A-BPSK	600	6.0 kHz	30 Hz	70 kHz	300 Hz
1200	A-BPSK	1200	12.0 kHz	100 Hz	70 kHz	300 Hz
10500	Q-BPSK	5250	52.5 kHz	150 Hz	-	-
8400	Q-BPSK	5600	56.0 kHz	150 Hz	-	-
21000	Q-BPSK	10500	105.0 kHz	300 Hz	-	-

Table 9.6.4 Spectrum Analyzer Setup for Frequency Spectrum

4. Using IP-906, set the SRT-2100 to transmit an un-modulated continuous carrier at 40 Watts output.
5. On the spectrum analyzer tuned to the carrier frequency do a peak search, marked to center frequency, marker to reference level.
6. The carrier should now be centered and the carrier peak adjusted to the reference level.
7. Using IP-906, set the SRT-2100 to transmit a continuous signal at the ”channel rates/modulation types” given in the above table.
8. Average the output spectrum for at least 20 sweeps.
9. Set display such that only the averaged spectrum appears.
10. Plot spectrum and label with symbol rate.
11. For symbol rates of 600 and 1200 repeat with spectrum analyzer set to 70 kHz span and 300 Hz resolution bandwidth. Average the output at least 20 sweeps.
12. Set display such that only the averaged spectrum appears.
13. Plot and label with symbol rate.
14. Indicate Pass of Fail on the data sheet.

15. Repeat Steps 2 to 13

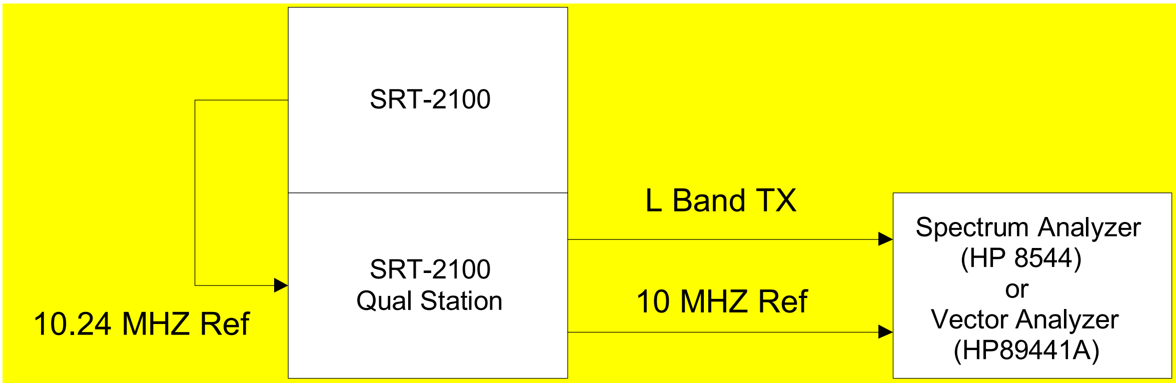


Figure 9.6.4 Per Carrier Spectrum Test Setup

9.6.5 Spurious Emissions at Antenna Terminals Results

No spurious or harmonic emissions were found to be out of the specifications. See attached plots.

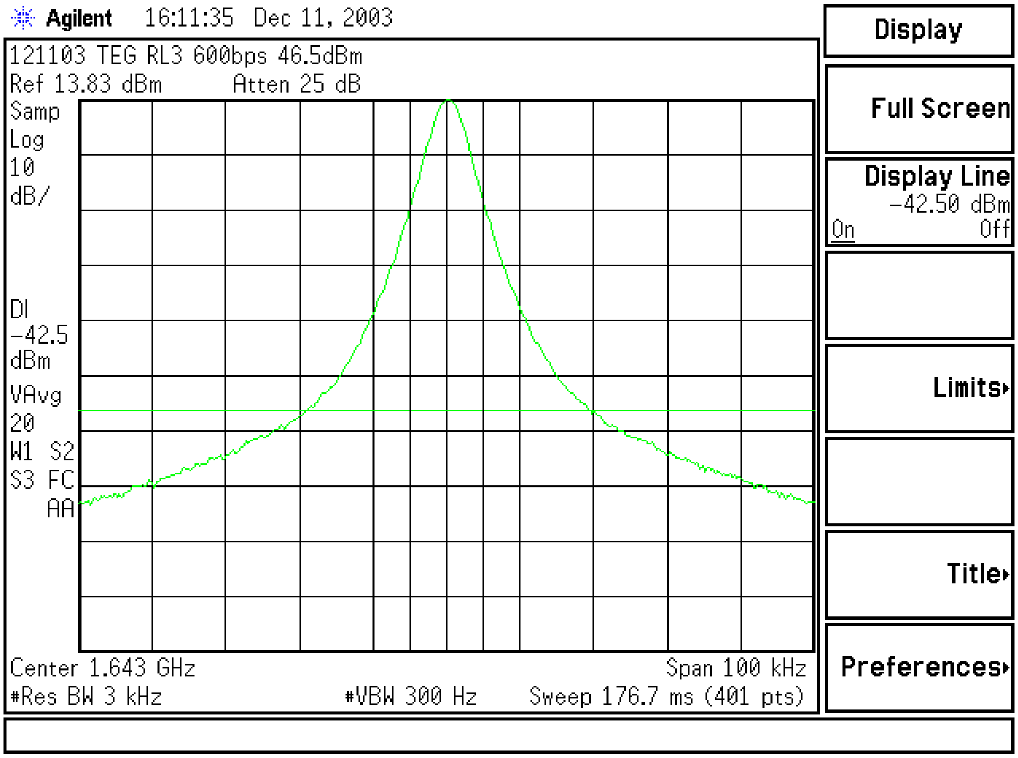


Figure 9.6.5.1. Spurious 600 bps - Mid Band – 100 kHz Span

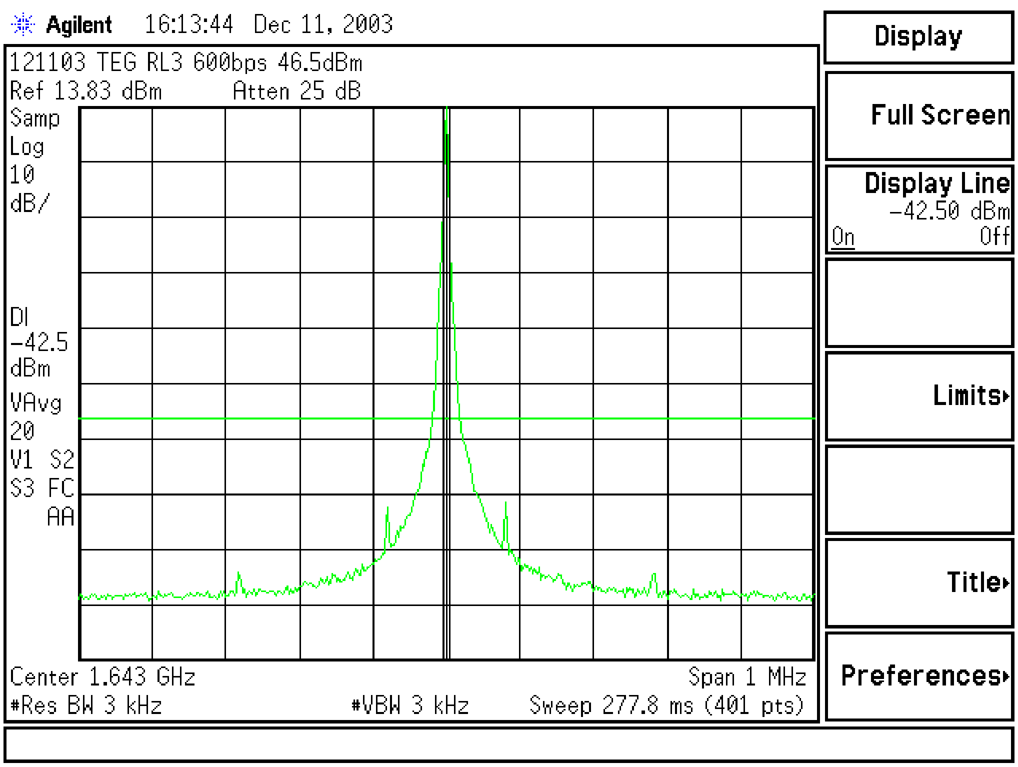


Figure 9.6.5.2 Spurious 600 bps - Mid Band - 1 MHz Span

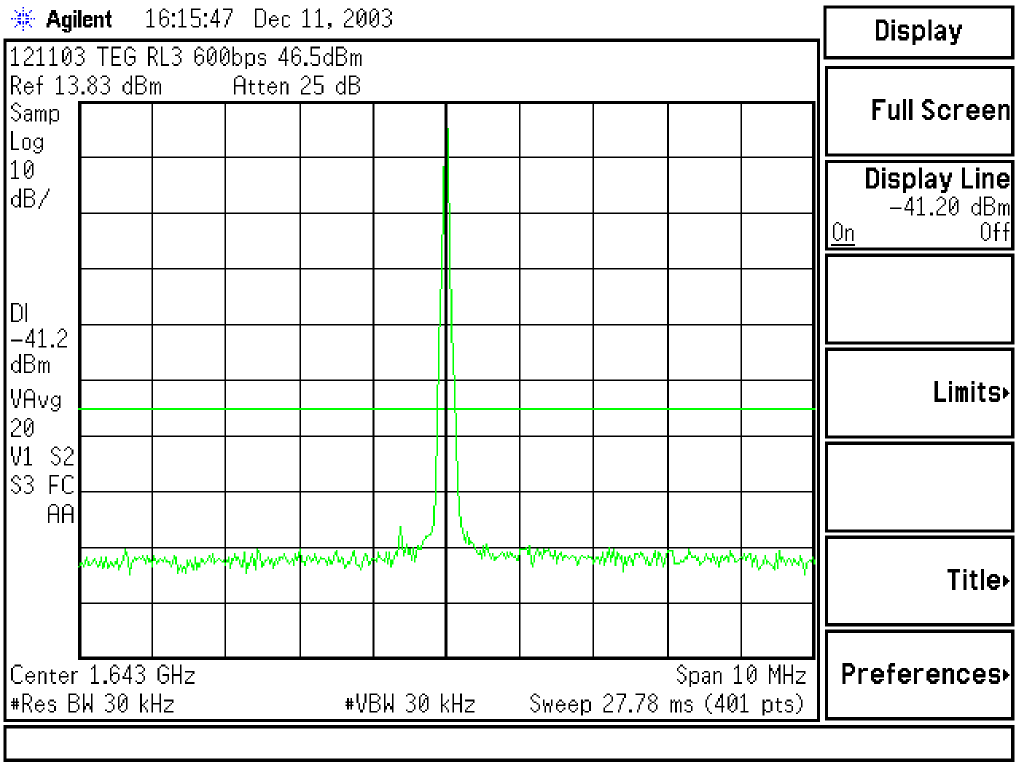


Figure 9.6.5.3. Spurious 600 bps - Mid Band - 10 MHz Span

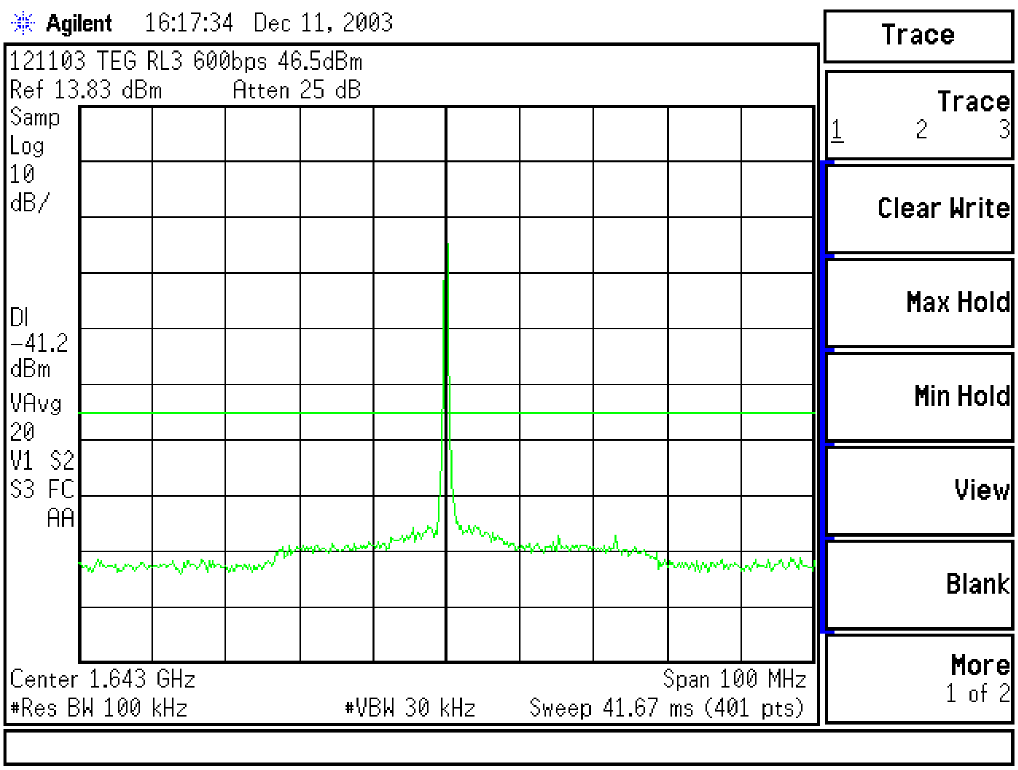


Figure 9.6.5.4. Spurious 600 bps - Mid band - 100 MHz Span

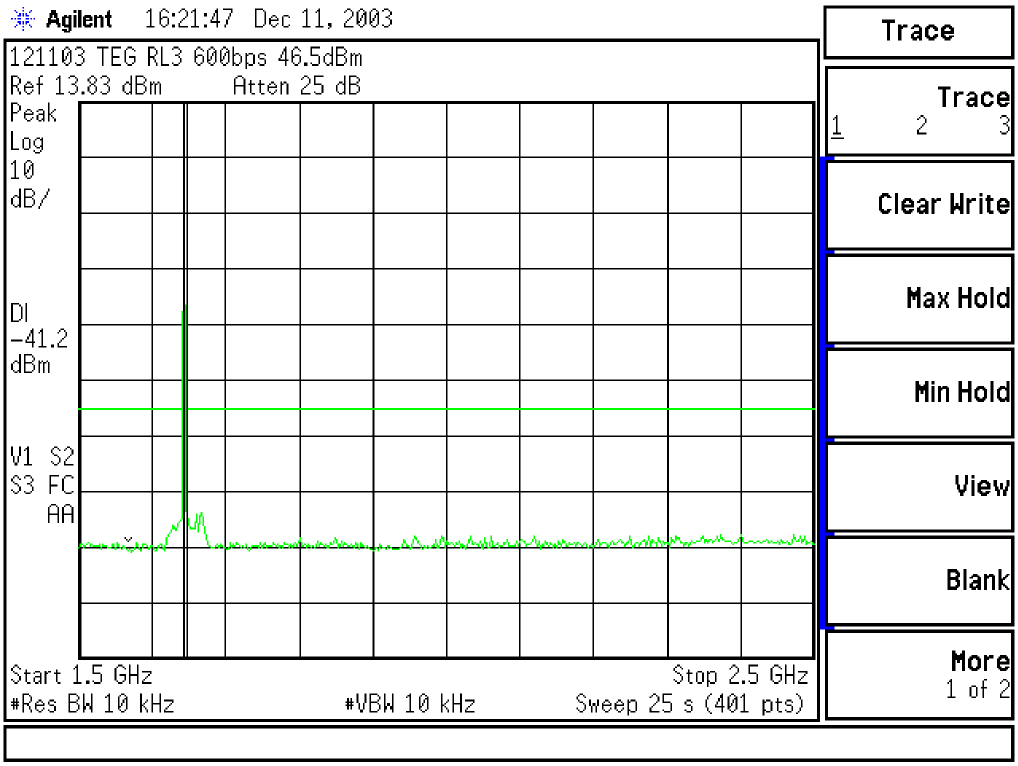


Figure 9.6.5.5. Spurious 600 bps - Mid Band - 1.5 - 2.5 GHHz

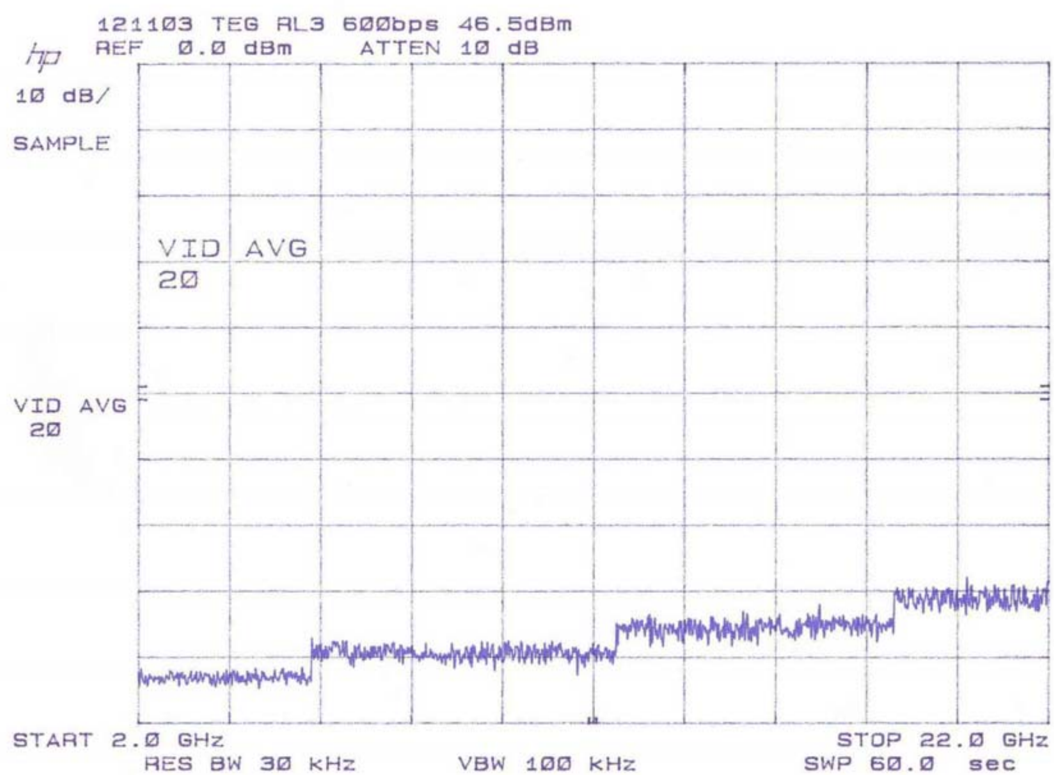


Figure 9.5.6.6. Spurious 600 bps - Mid Band - 2.0 - 22.0 GHz

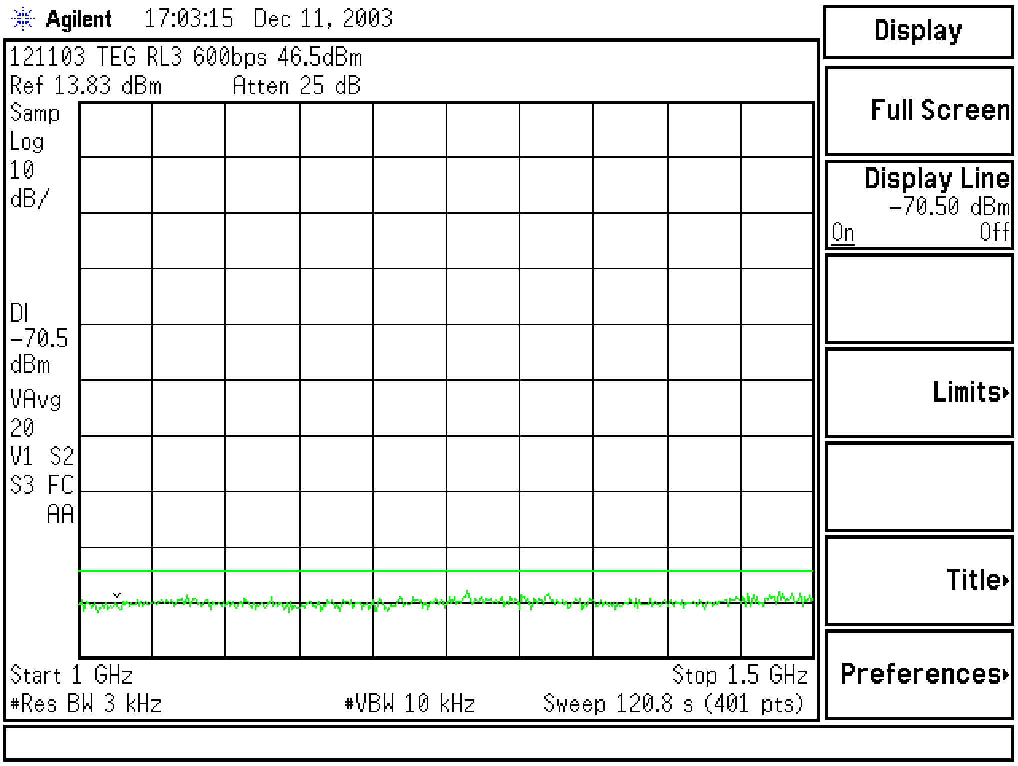


Figure 9.5.6.7. Spurious 600 bps - Mid Band - 1.0 to 1.5 GHz

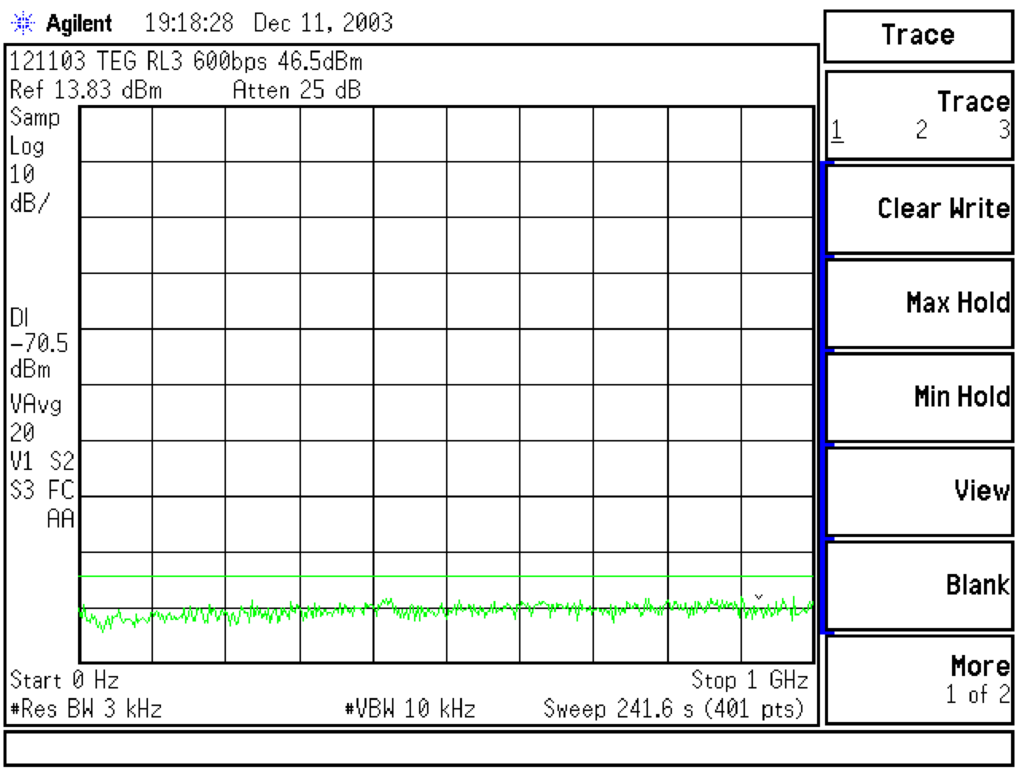


Figure 9.6.5.8. Spurious 600 bps - Mid Band - 0 - 1.0 GHz

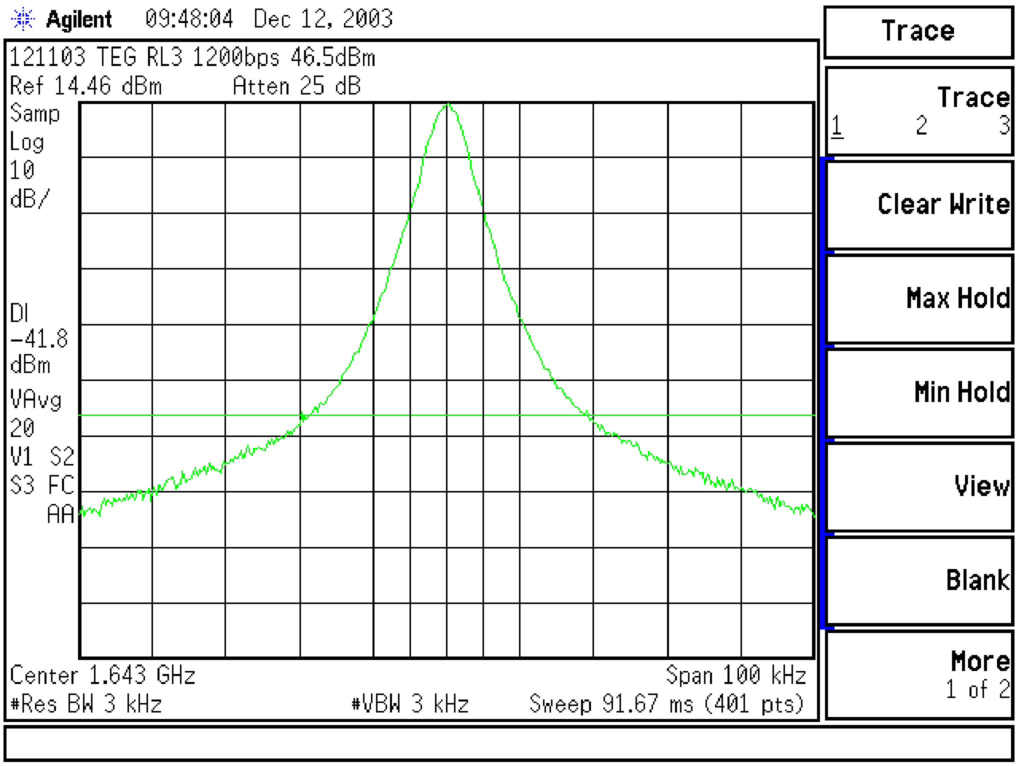


Figure 9.6.5.9. Spurious 1200 bps - Mid Band - 100 kHz Span

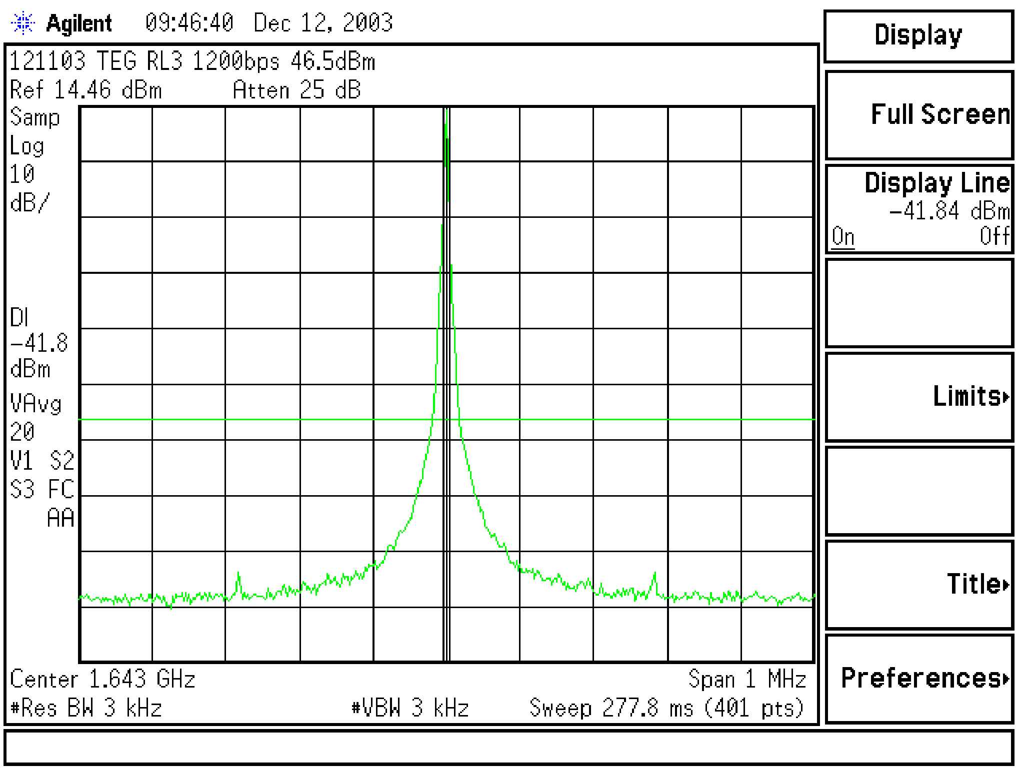


Figure 9.6.5.10. Spurious 1200 bps - Mid Band - 1 MHz Span

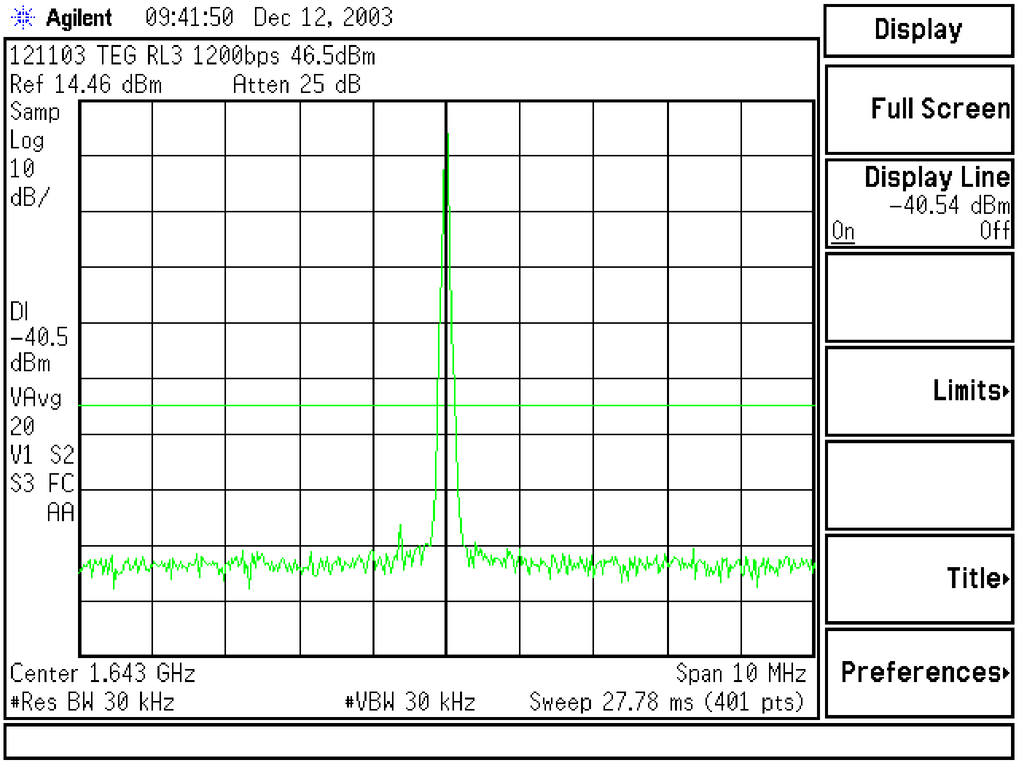


Figure 9.6.5.11. Spurious 1200 bps Mid Band 10 MHz Span

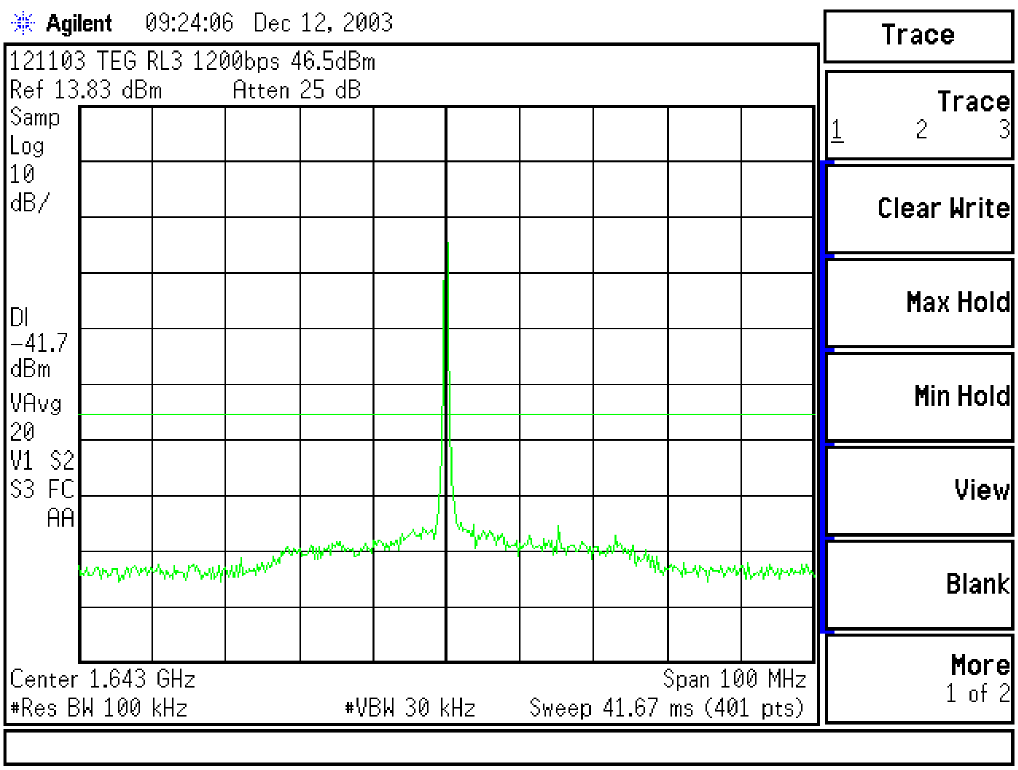


Figure 9.6.5.12. Spurious 1200 bps Mid Band 100 MHz Span

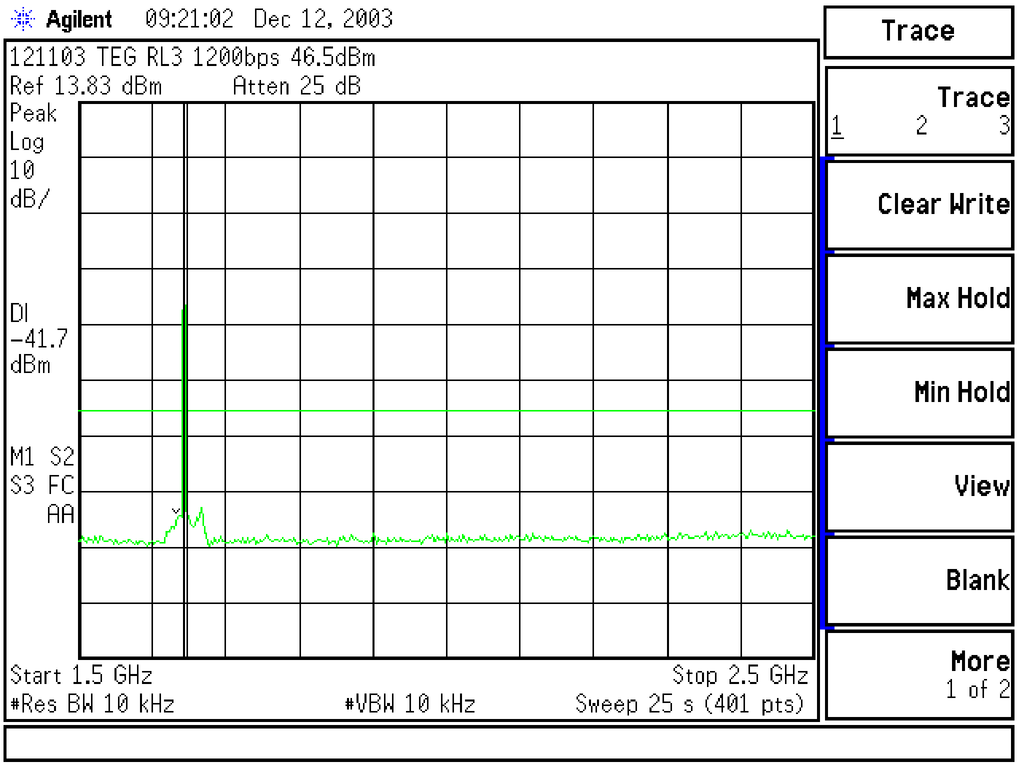


Figure 9.6.5.13. Spurious 1200 bps Mid Band 1.5 - 2.5 GHz

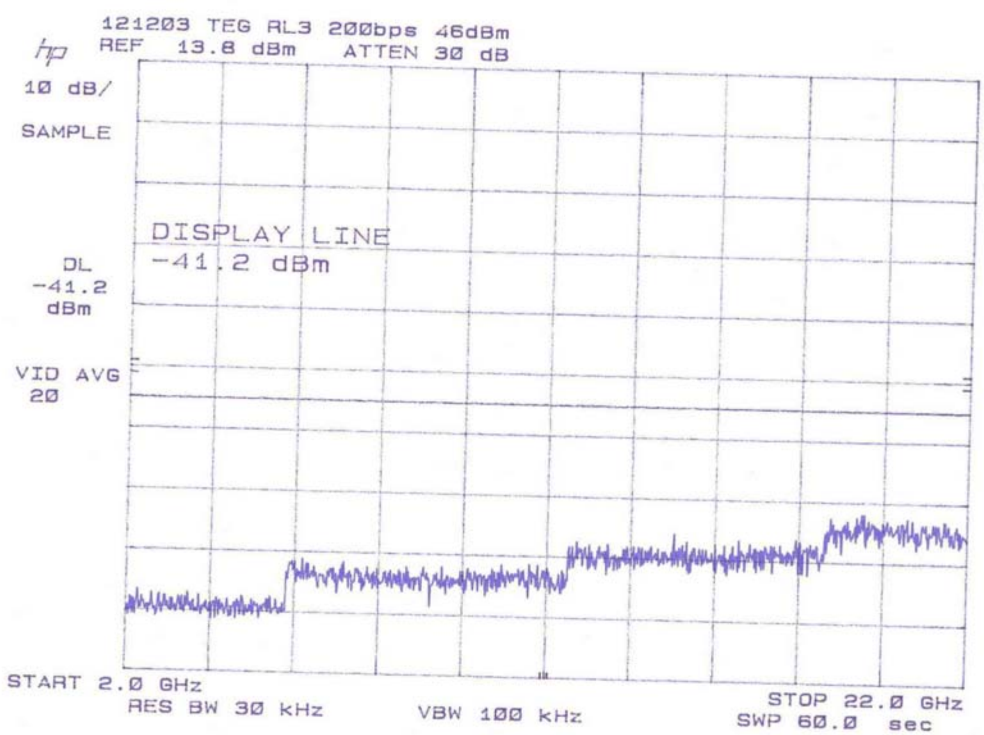


Figure 9.6.5.14. Spurious 1200 bps Mid Band 2.0 - 22.0 GHz

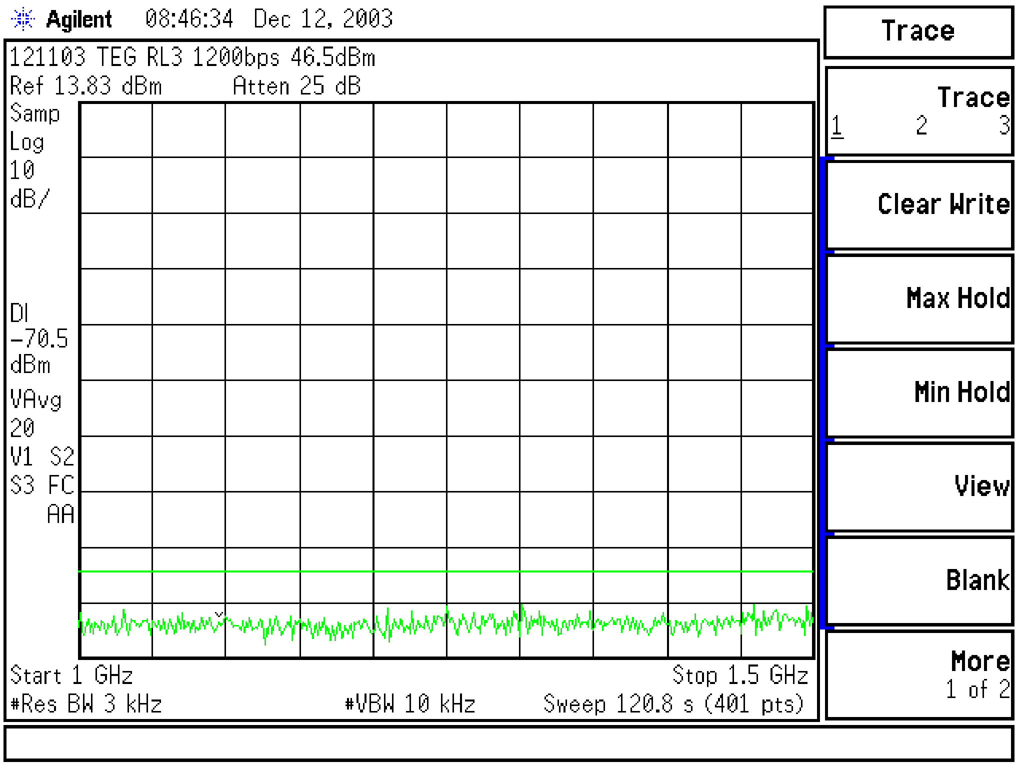


Figure 9.6.5.15. Spurious 1200 bps Mid Band 1.0 - 1.5 GHz

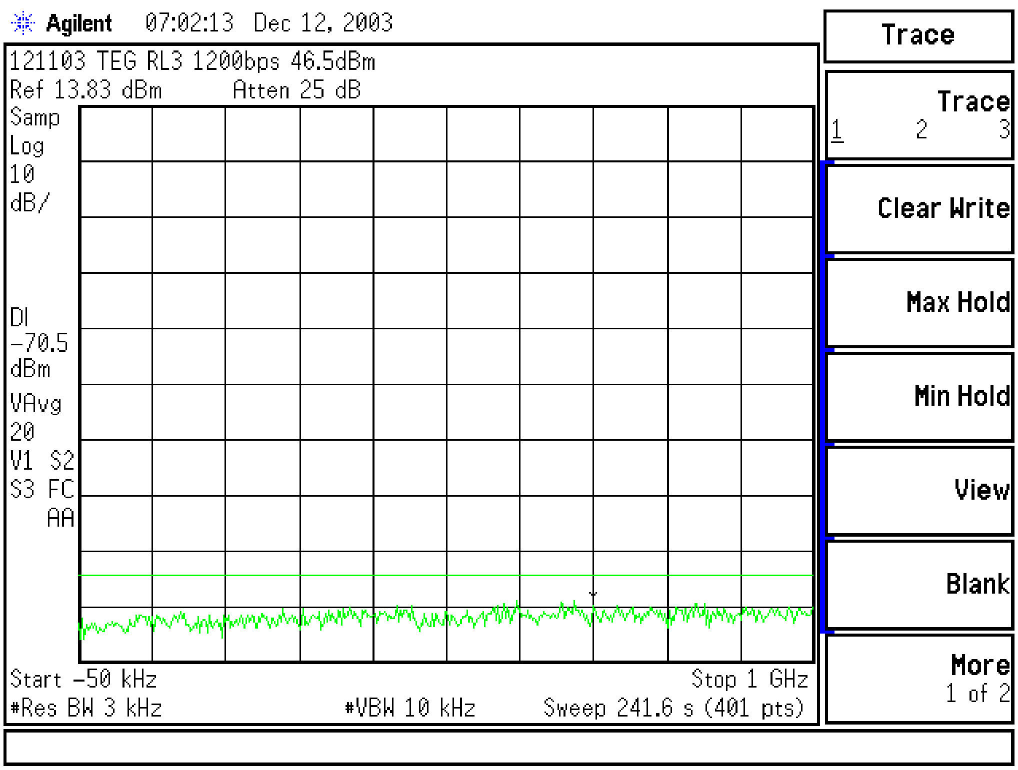


Figure 9.6.5.16. Spurious 1200 bps Mid Band 0 - 1.0 GHz

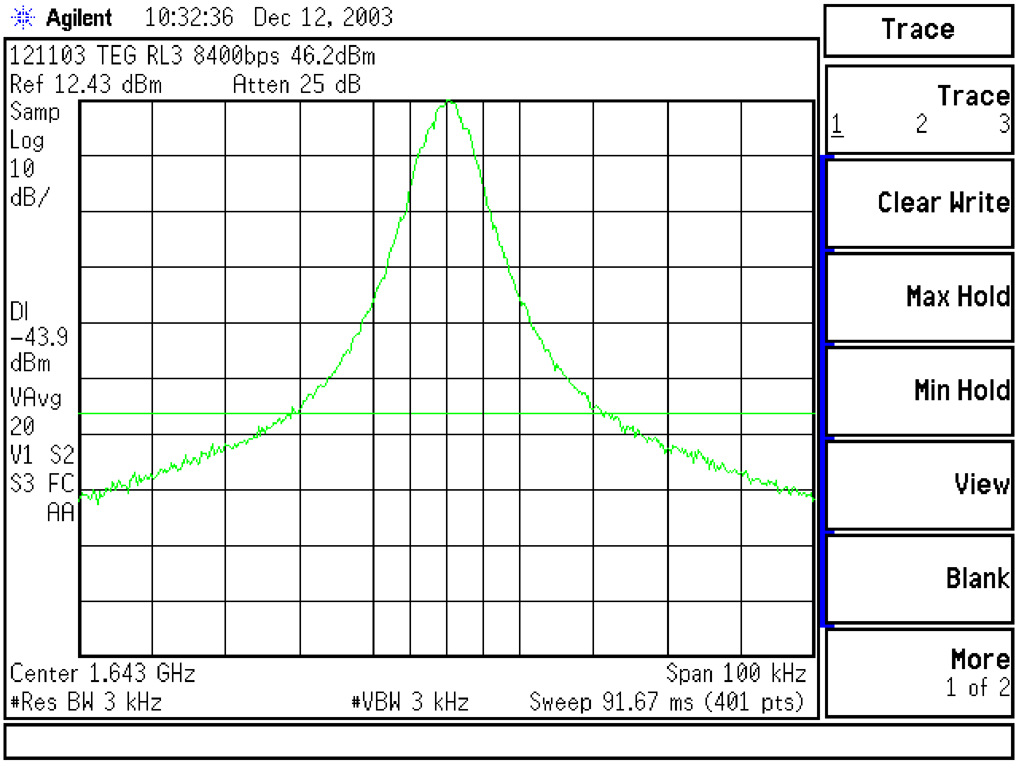


Figure 9.6.5.17. Spurious 8400 bps - Mid Band - 100 kHz Span

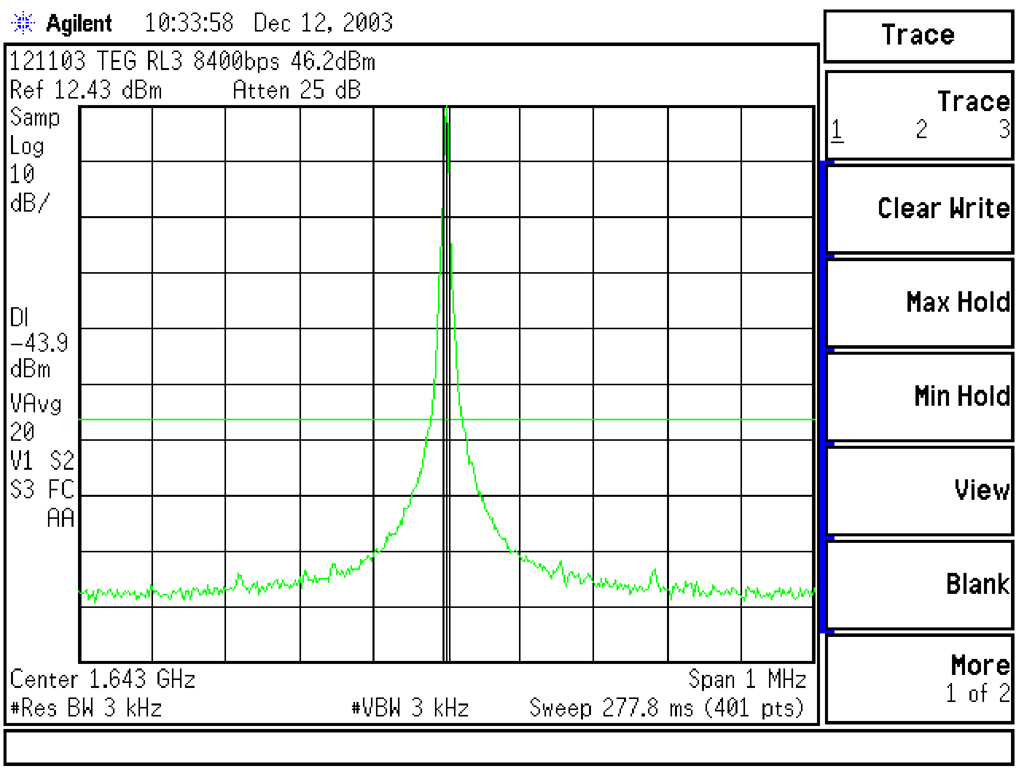


Figure 9.6.5.18. Spurious 8400 bps Mid Band 1 MHz Span

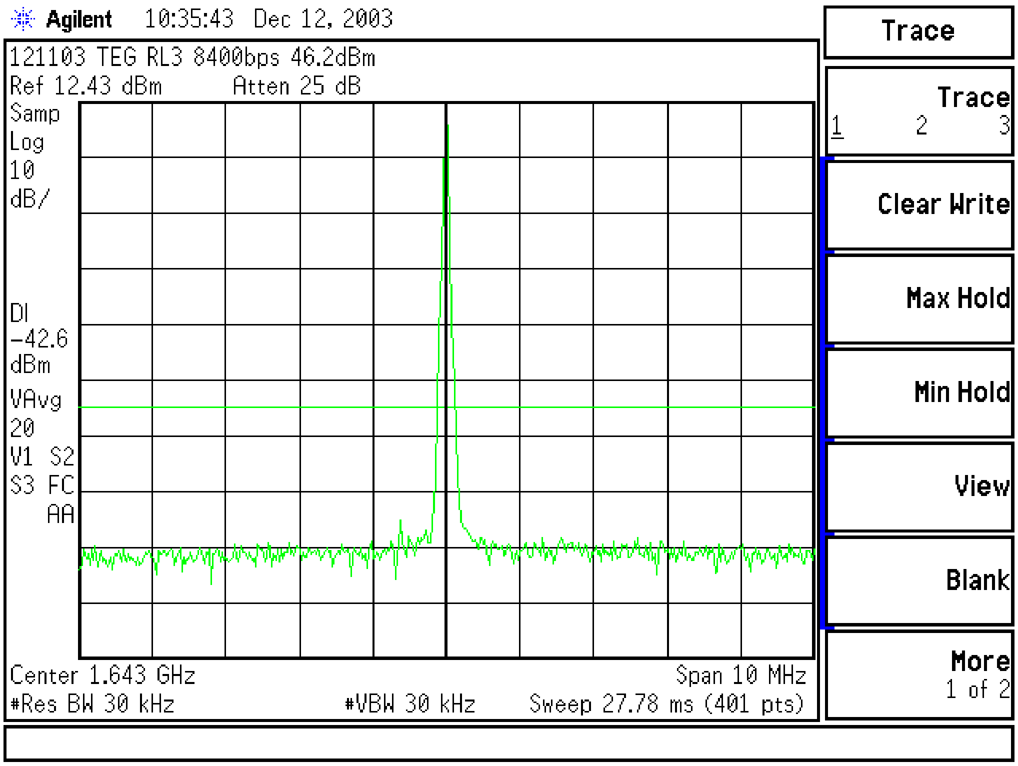


Figure 9.6.5.19. Spurious 8400 bps Mid Band 10 MHz Span

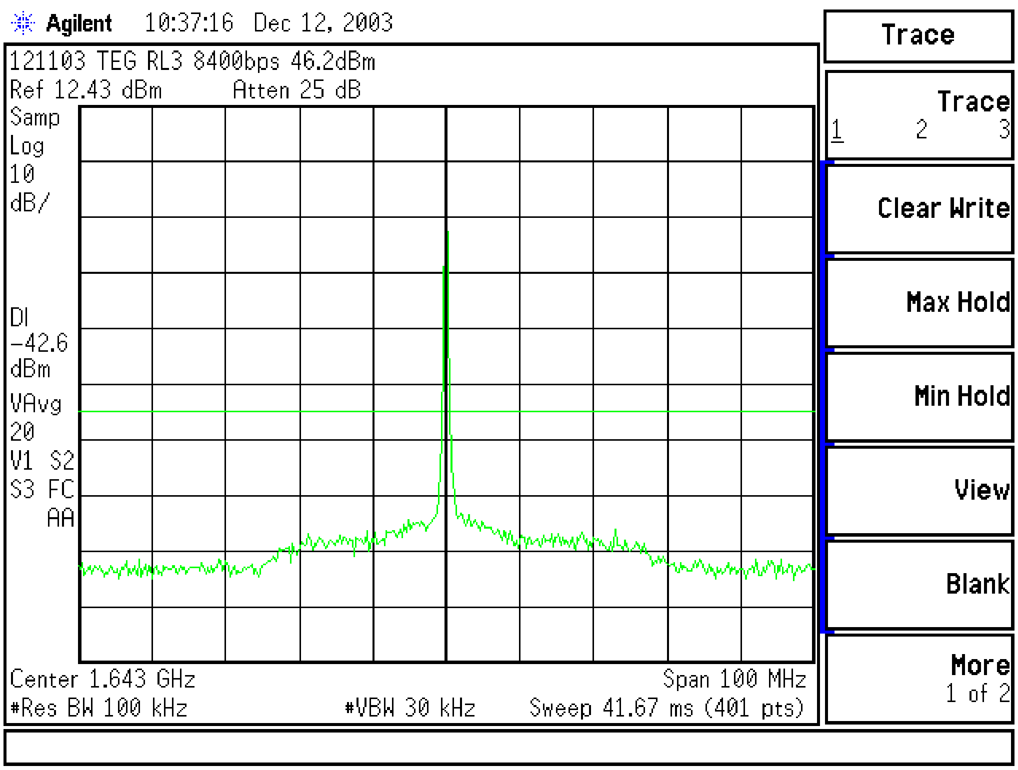


Figure 9.6.5.20. Spurious 8400 bps Mid Band 100 MHz Span

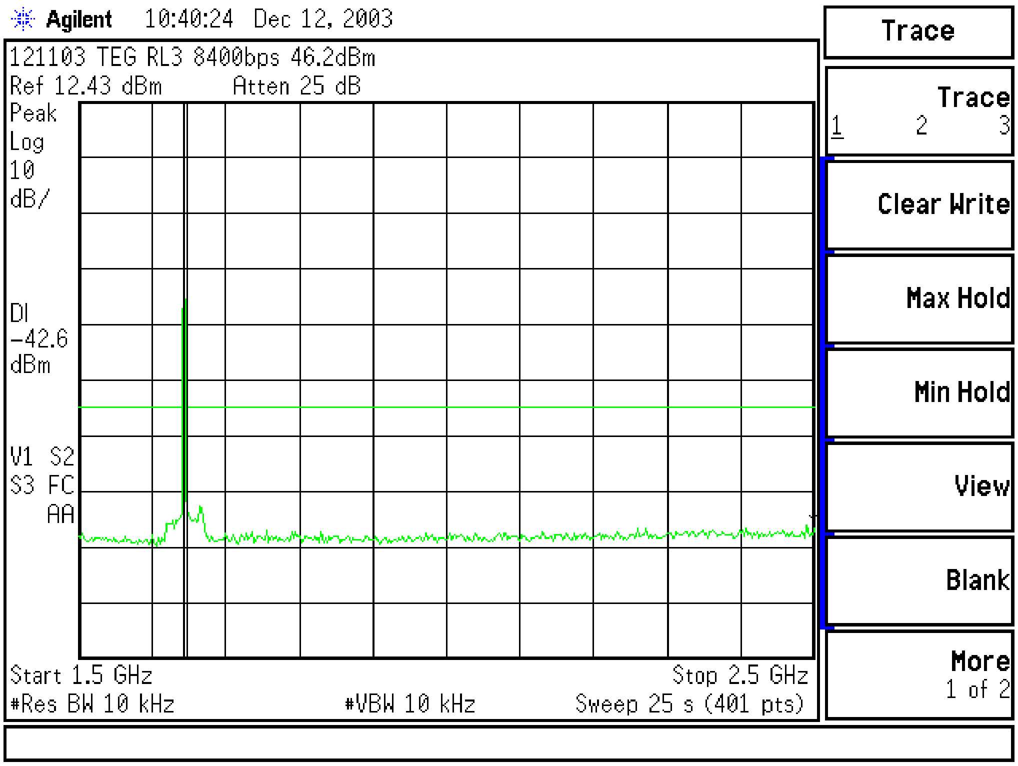


Figure 9.6.5.21. Spurious 8400 bps Mid Band 1.5 - 2.5 GHz

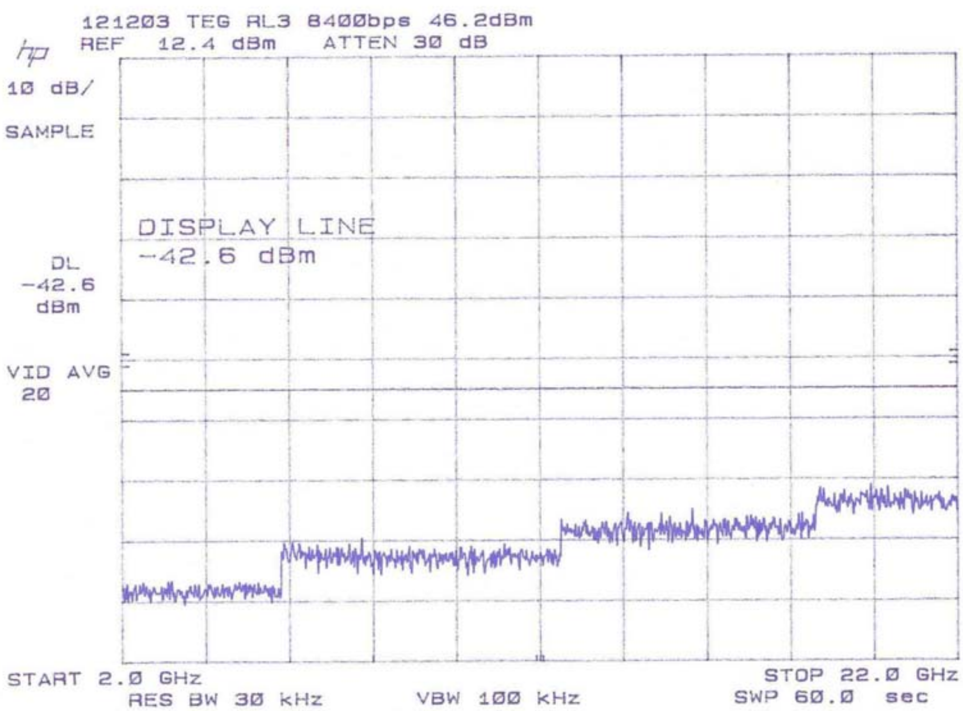


Figure 9.6.5.22. Spurious 8400 bps Mid Band 2.0 - 22.0 GHz

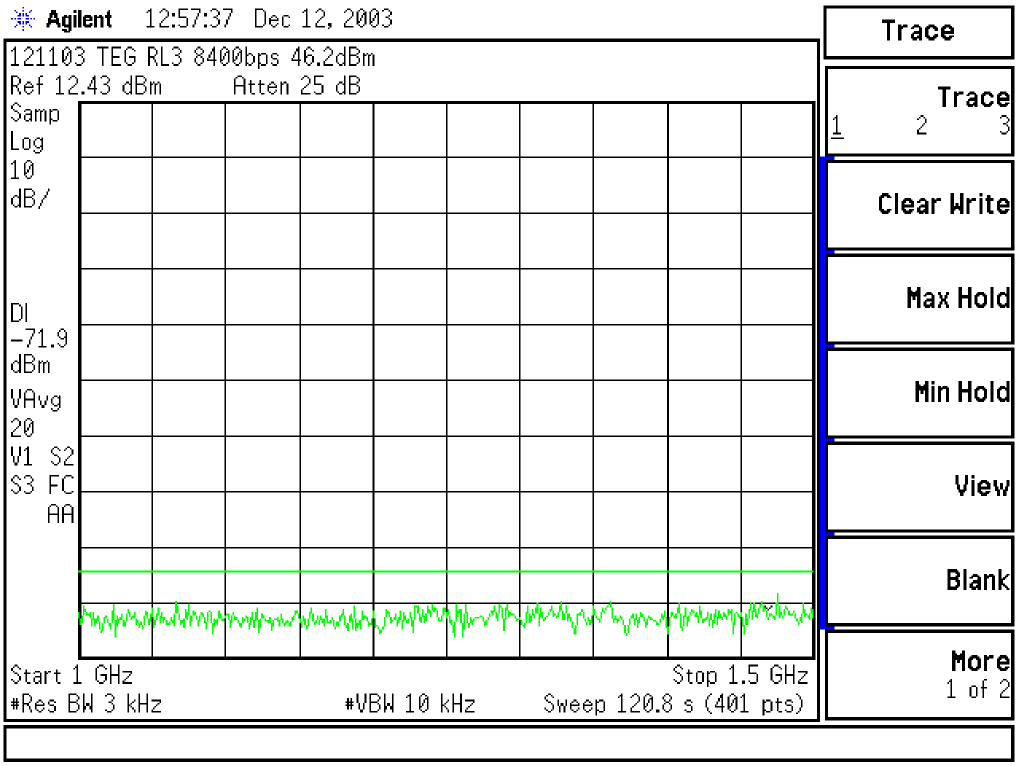


Figure 9.6.5.23. Spurious 8400 bps Mid Band 1.0 - 1.5 GHz

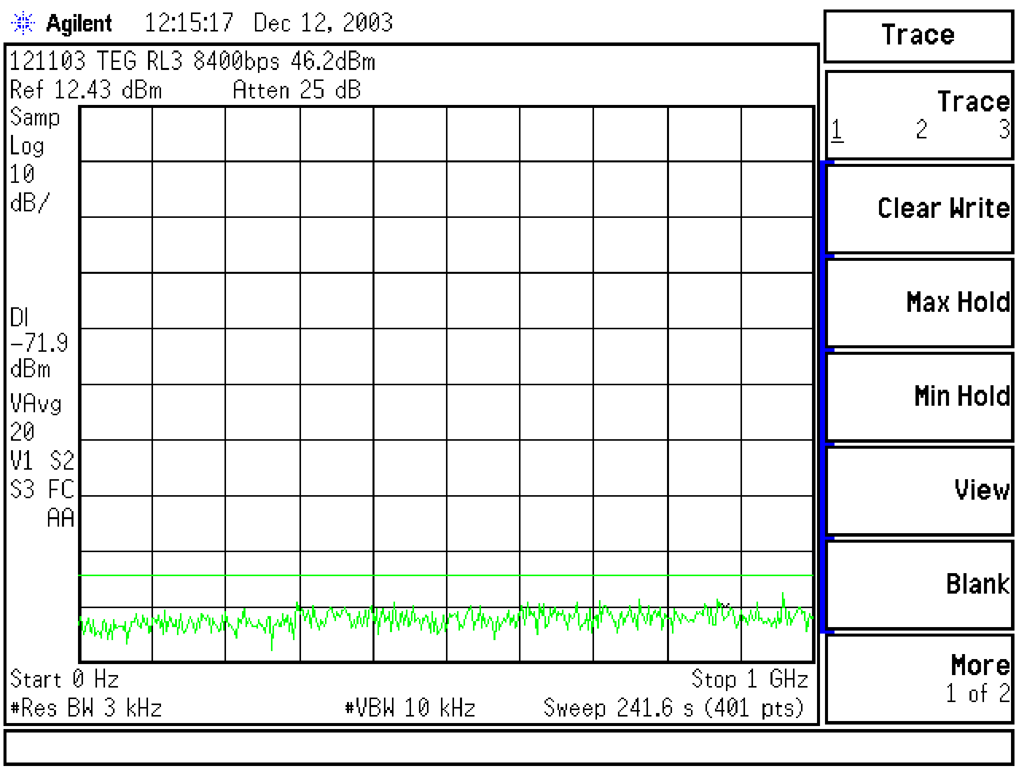


Figure 9.6.5.24. Spurious 8400 bps Mid Band 0 - 1.0 GHz

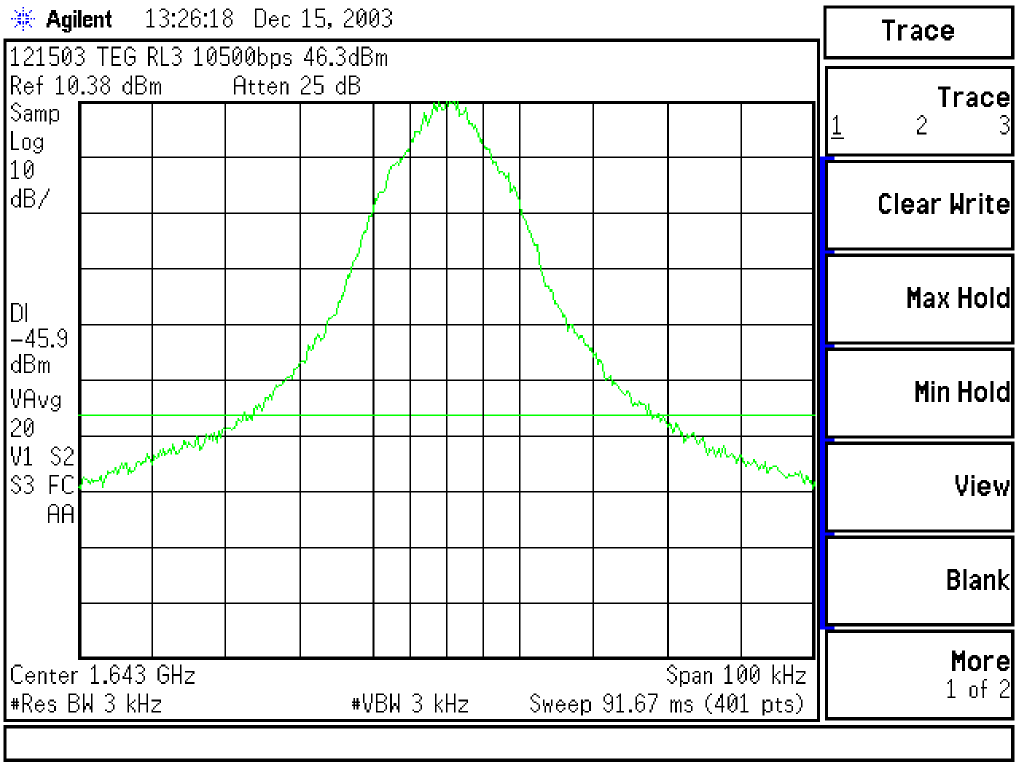


Figure 9.6.5.25. Spurious 10500 bps - Mid Band - 100 kHz

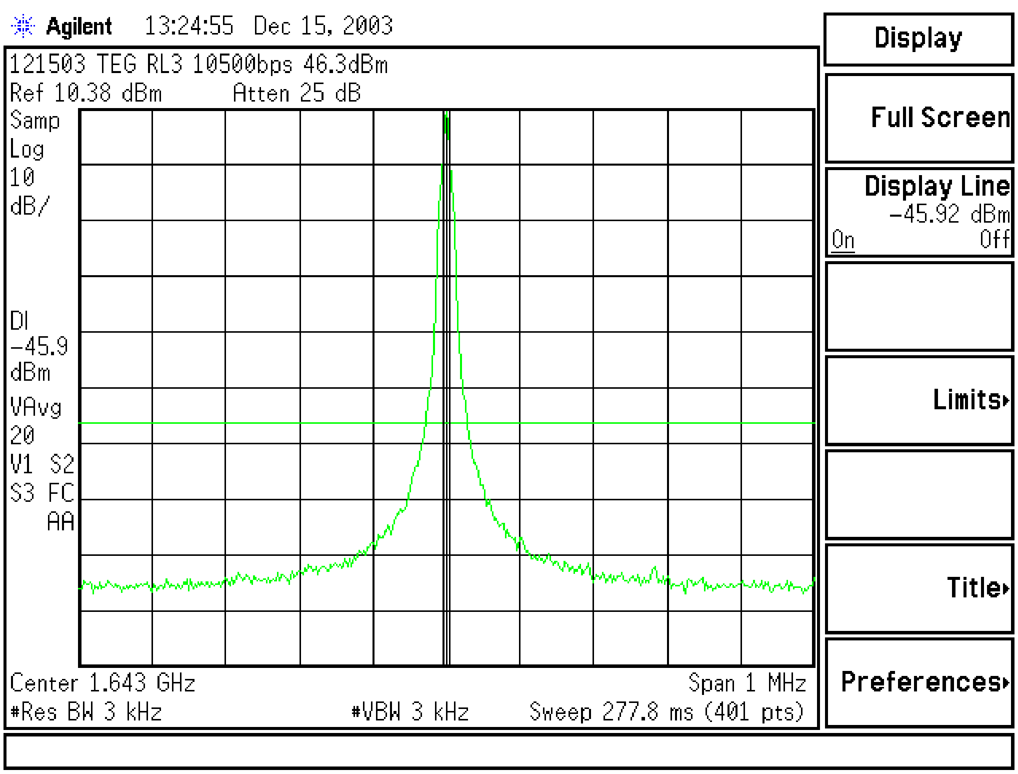


Figure 9.6.5.26. Spurious 10500 bps Mid Band 1 MHz

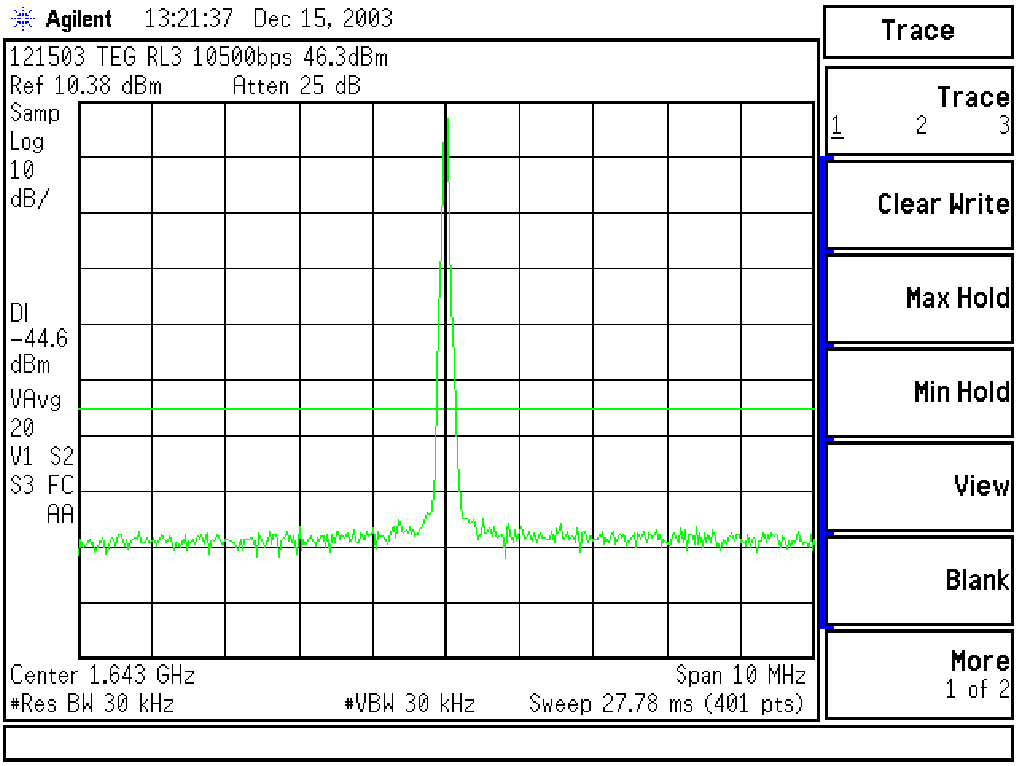


Figure 9.6.5.27. Spurious 10500 bps Mid Band 10 MHz Span

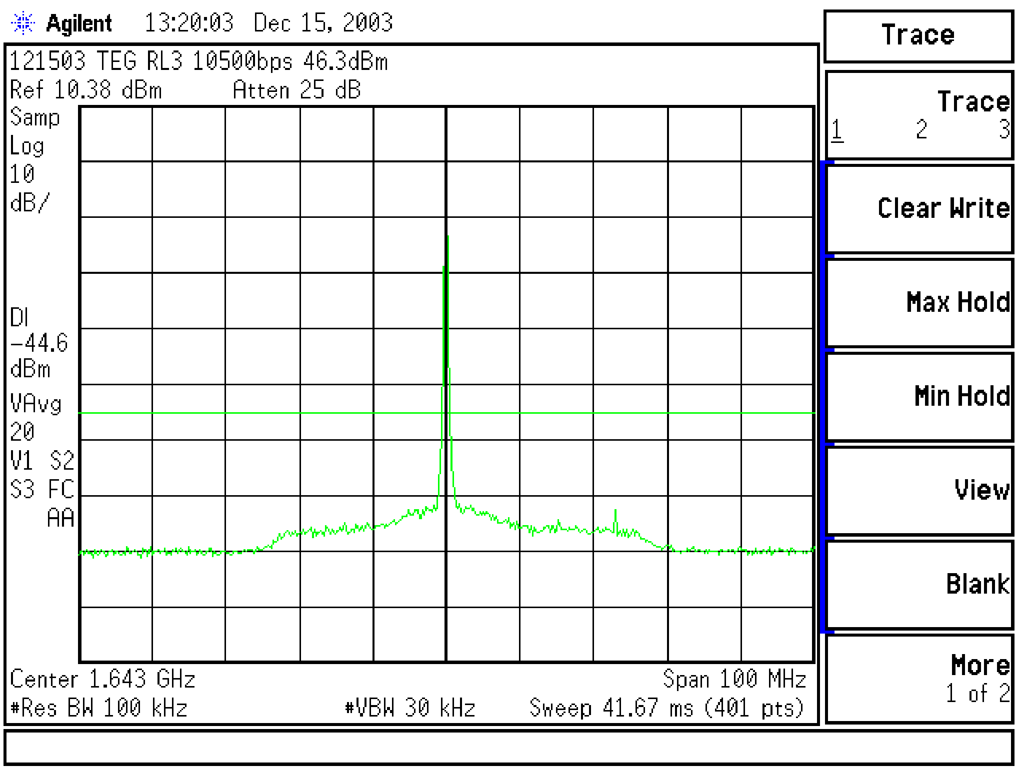


Figure 9.6.5.28. Spurious 10500 bps Mid Band 100 MHz Span

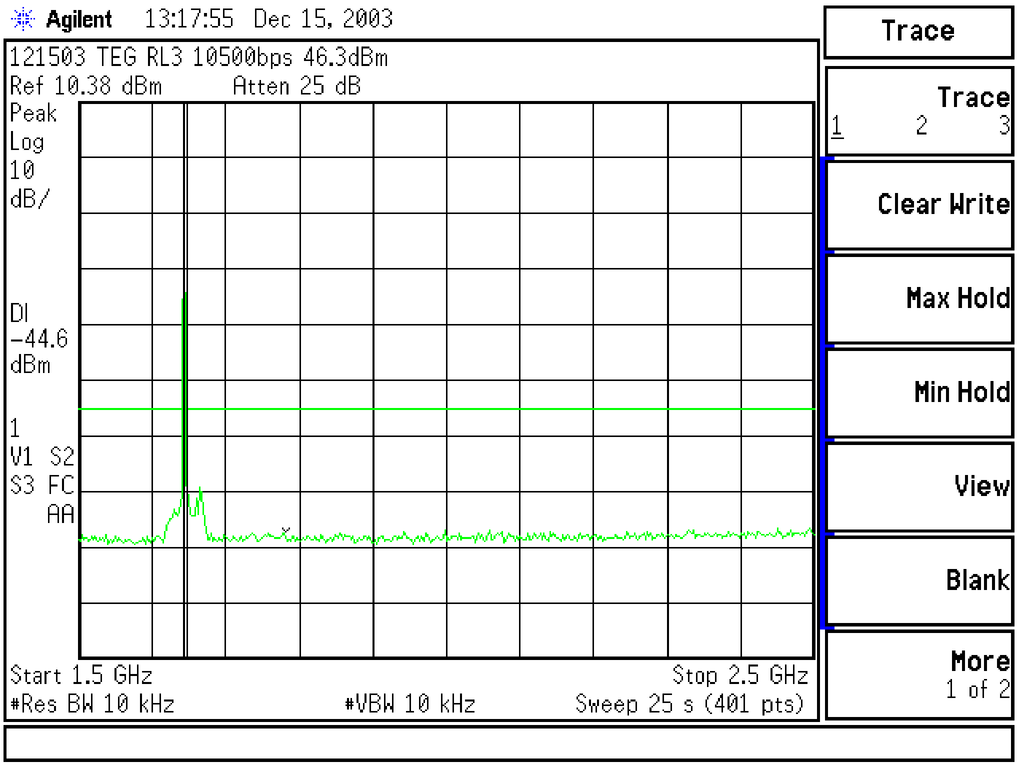


Figure 9.6.5.29. Spurious 10500 bps Mid Band 1.5 - 2.5 GHz

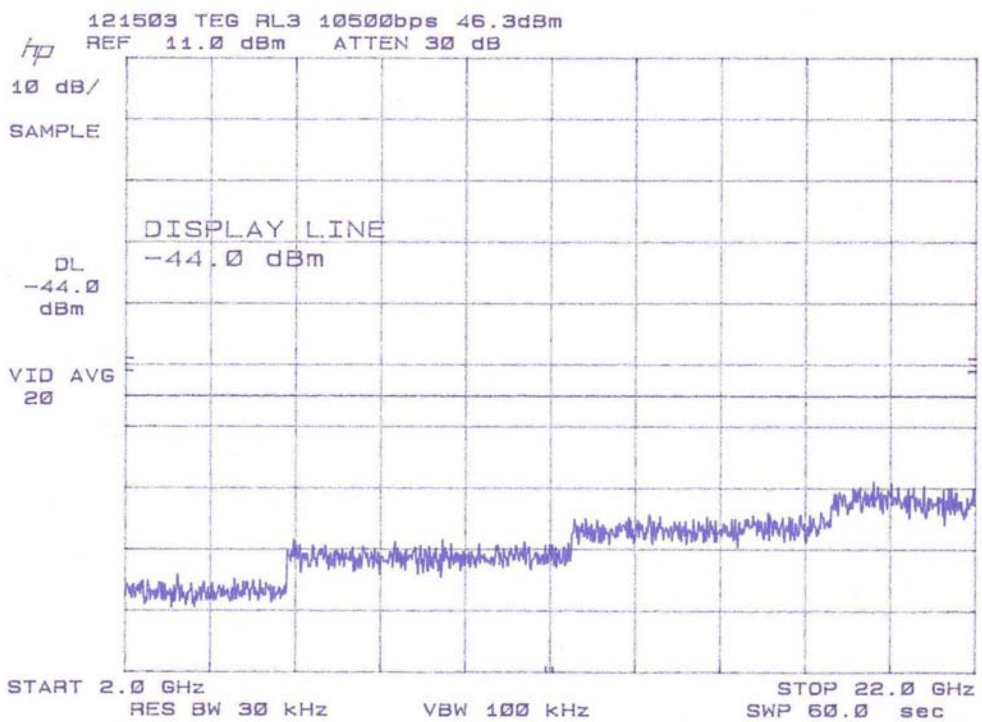


Figure 9.6.5.30. Spurious 10500 bps Mid Band 2.0 - 22.0 GHz

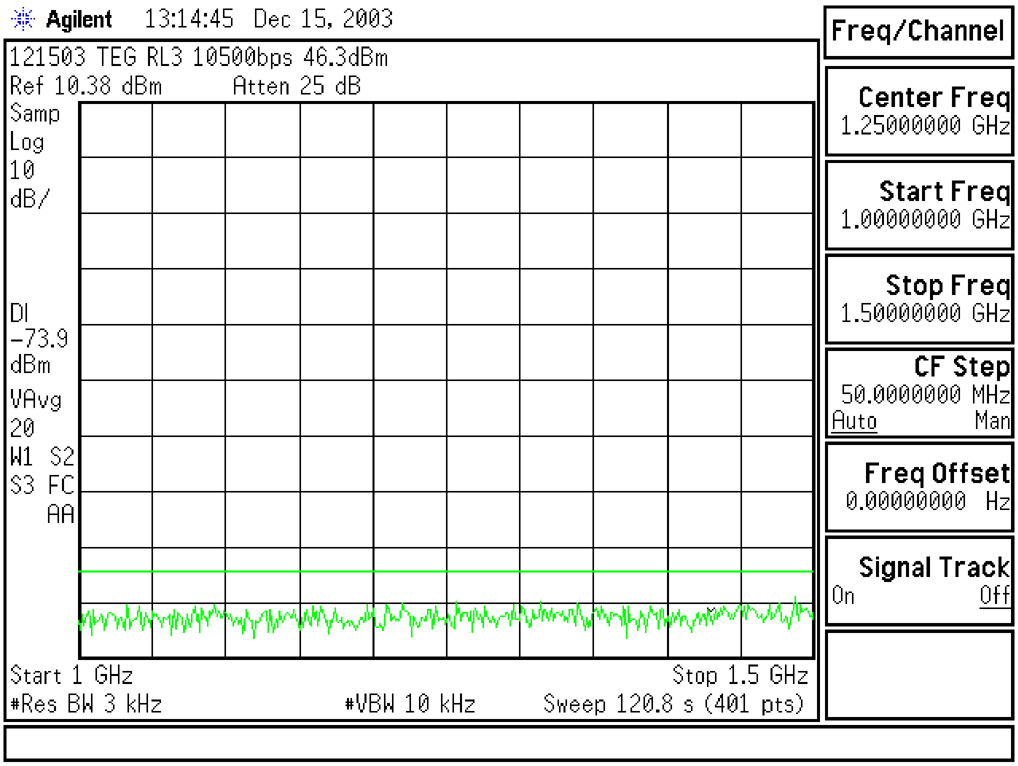


Figure 9.6.5.31. Spurious 10500 bps Mid Band 1.0 - 1.5 GHz

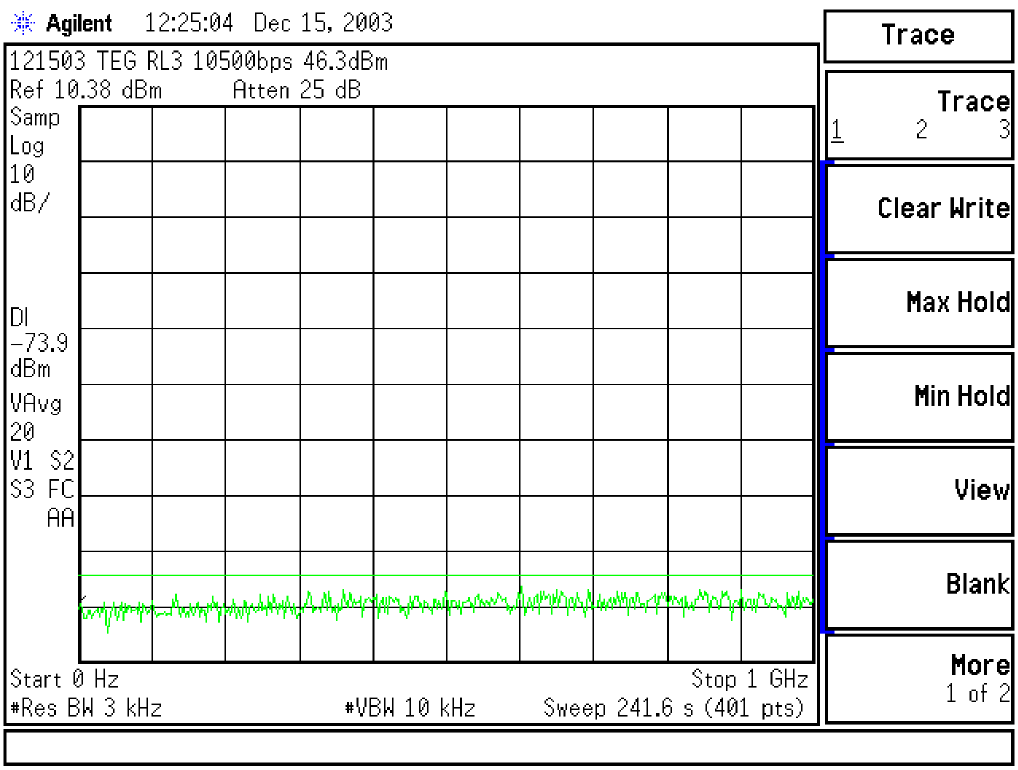


Figure 9.6.5.32. Spurious 10500 bps Mid Band 0 - 1.0 GHz

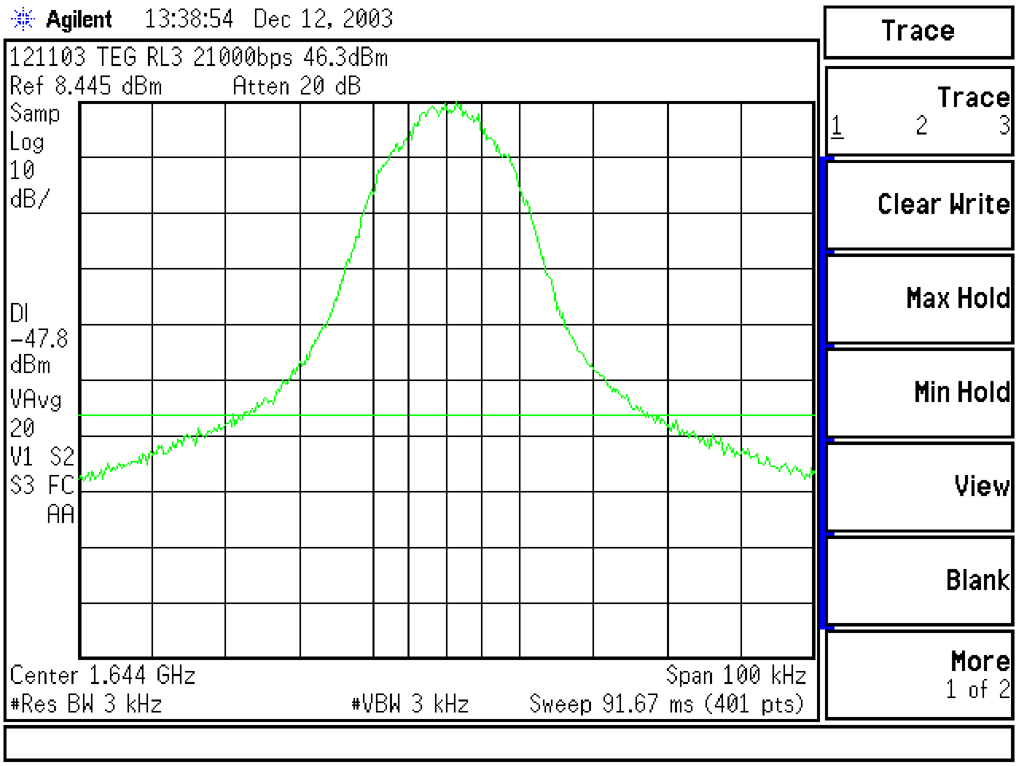


Figure 9.6.5.33. Spurious 21000 bps - Mid Band - 100 kHz Span

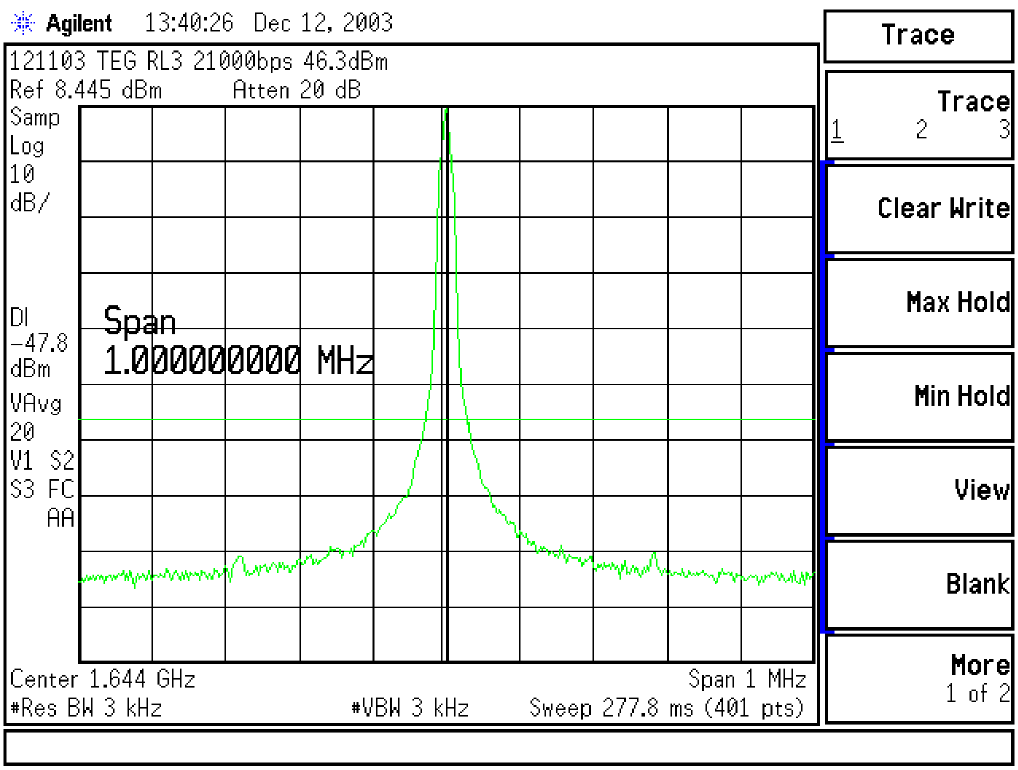


Figure 9.6.5.34. Spurious 21000 bps Mid Band 1 MHz Span

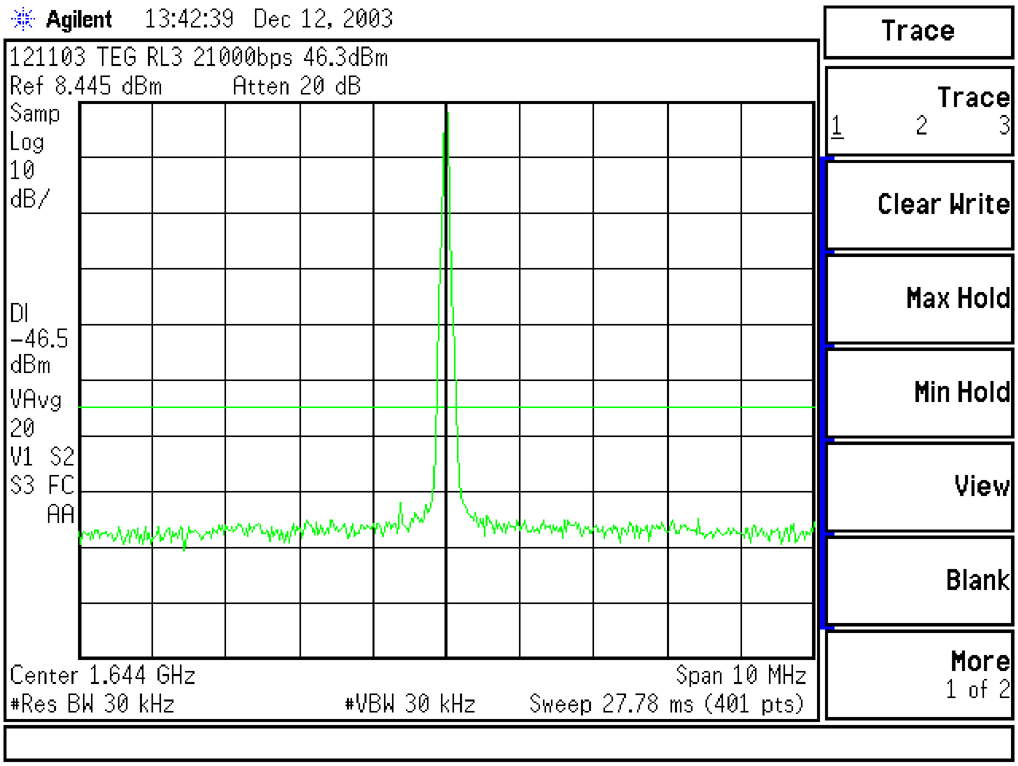


Figure 9.6.5.35. Spurious 21000 bps Mid Band 10 MHz Span

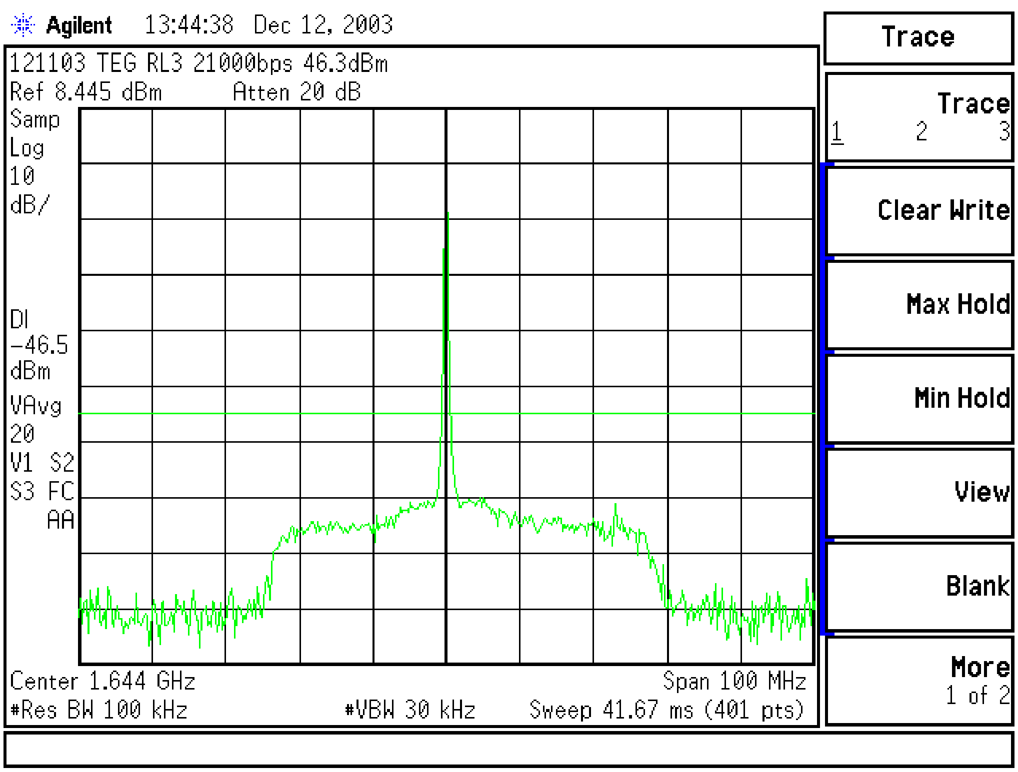


Figure 9.6.5.36. Spurious 21000 bps Mid Band 100 MHz Span

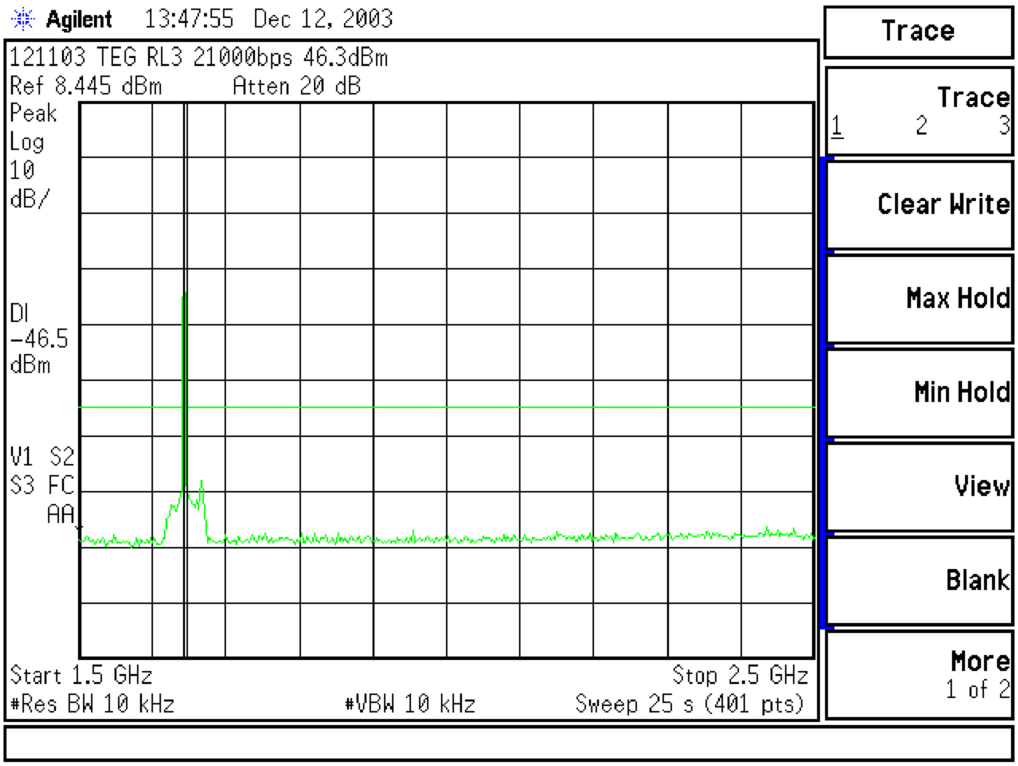


Figure 9.6.5.37. Spurious 21000 bps Mid Band 1.5 - 2.5 GHz

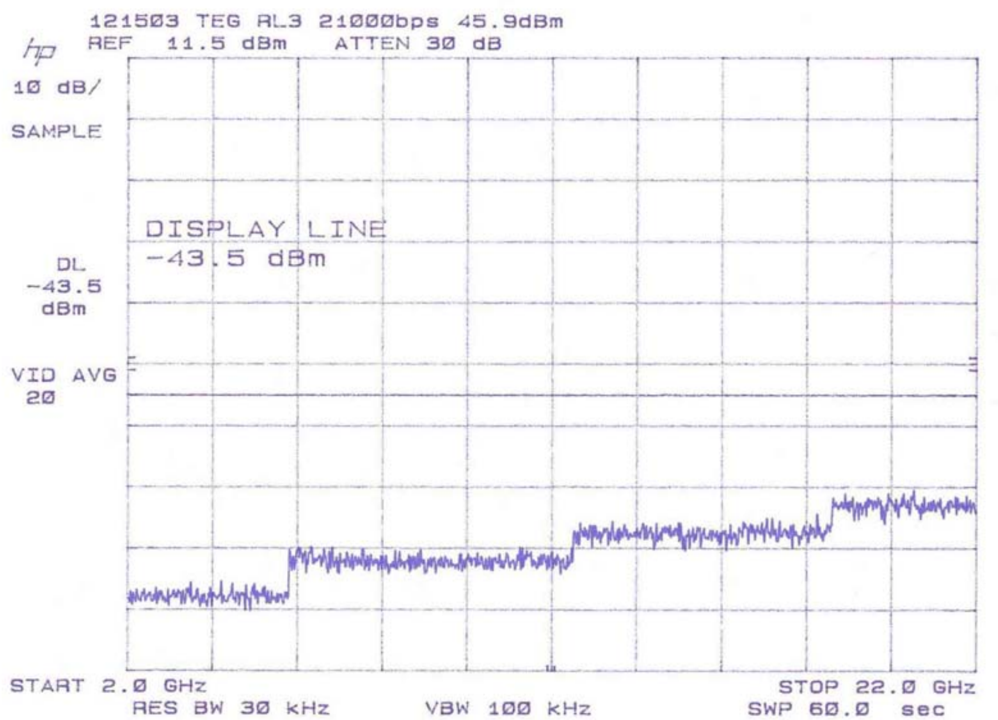


Figure 9.6.5.38. Spurious 21000 bps Mid Band 2.0 - 22.0 GHz

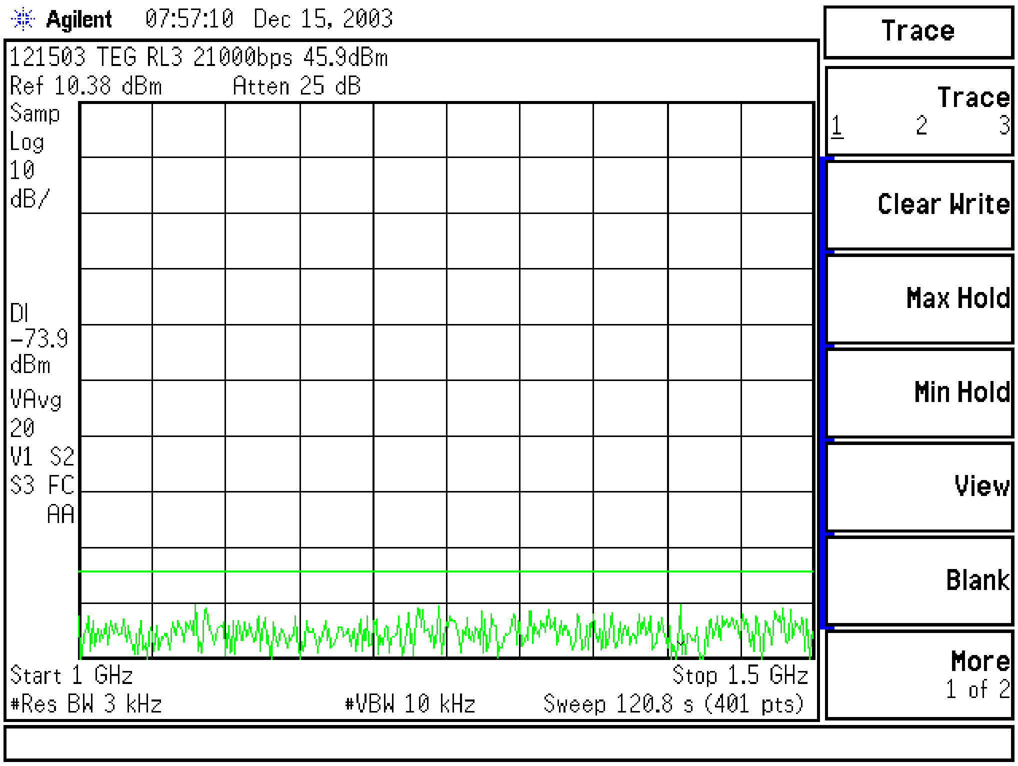


Figure 9.6.5.39. Spurious 21000 bps Mid Band 1.0 - 1.5 GHz

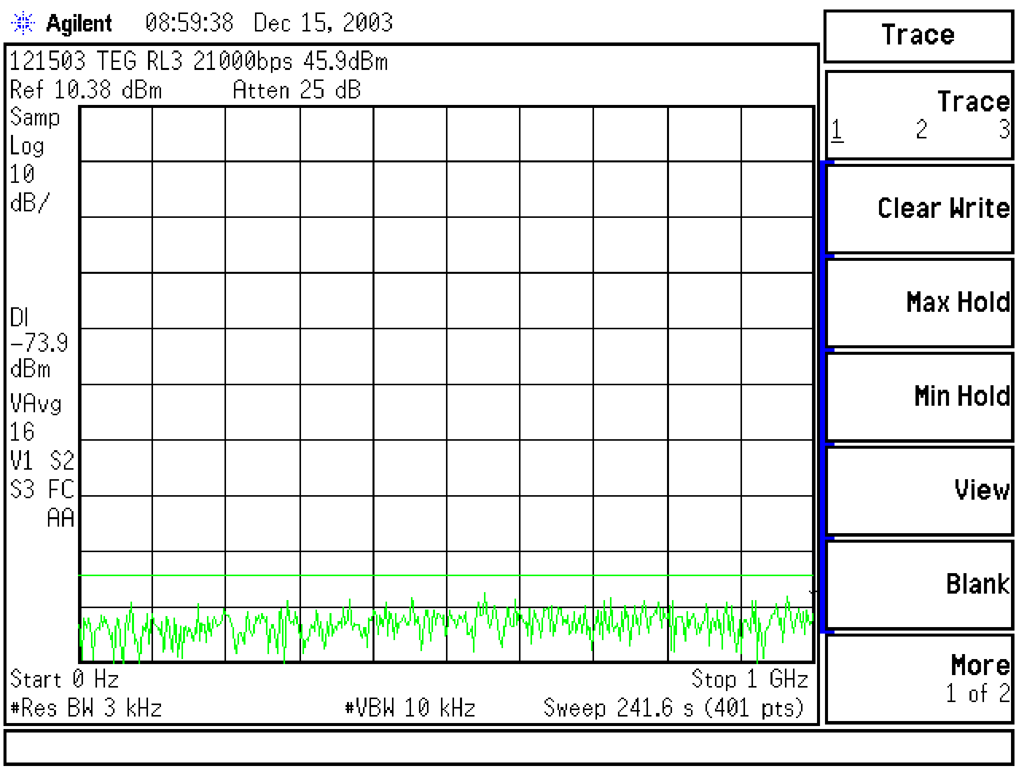


Figure 9.6.5.40. Spurious 21000 bps Mid Band 0 - 1.0 GHz

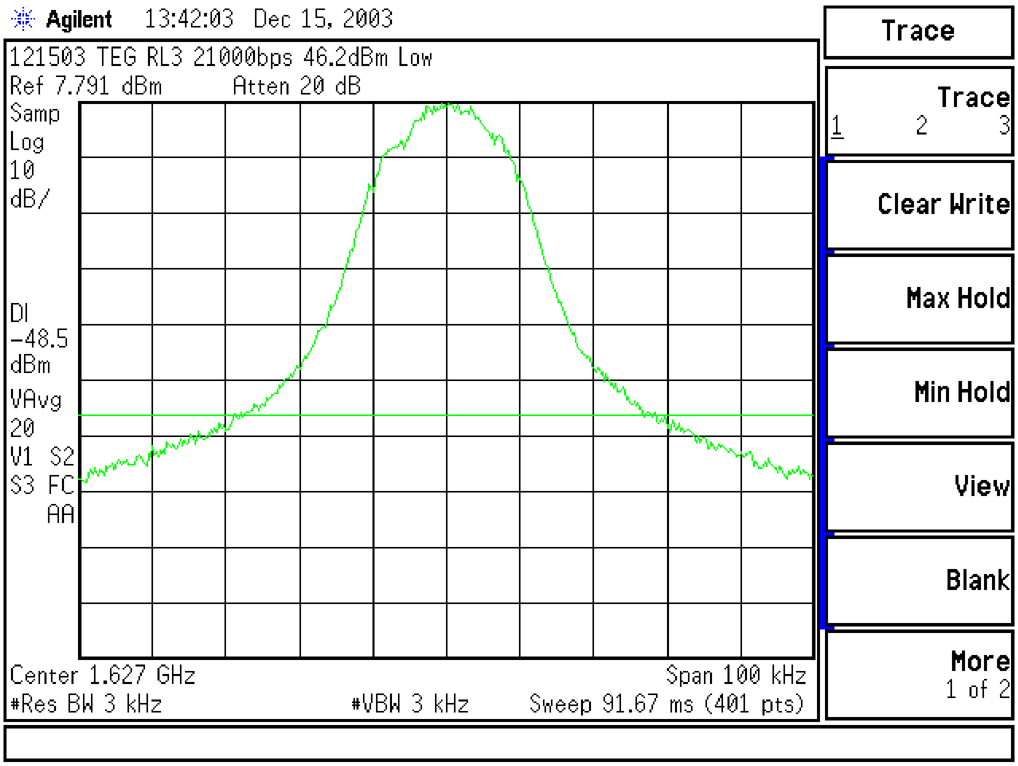


Figure 9.6.5.41. Spurious 21000 bps - Low Band - 100 kHz Span

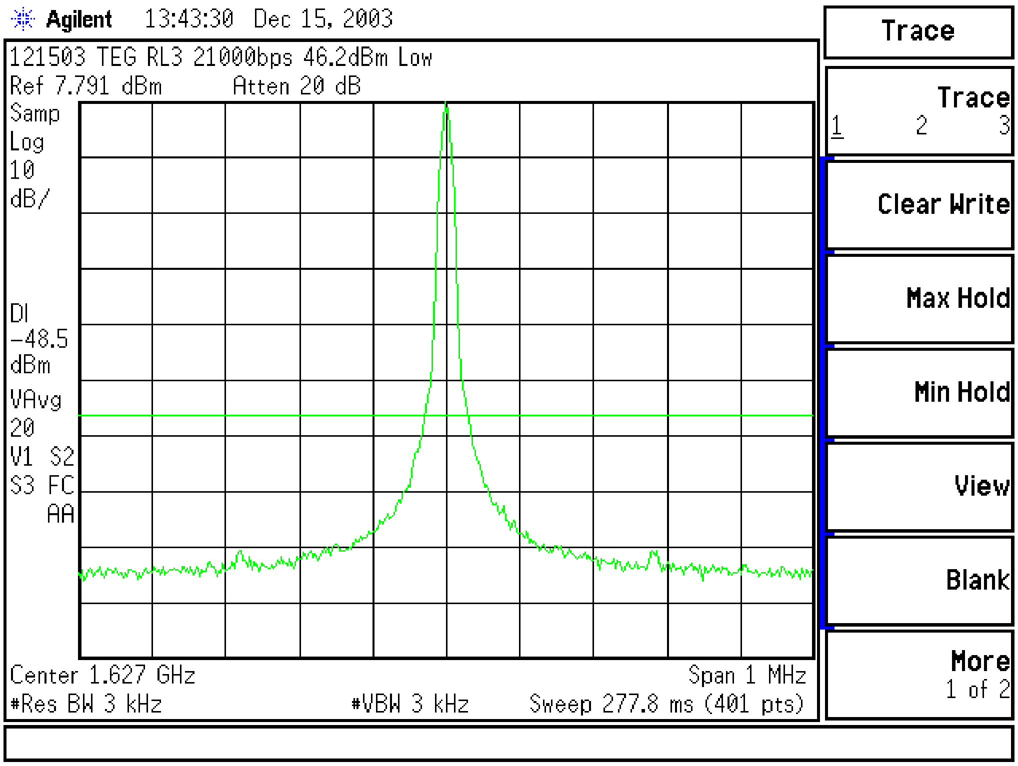


Figure 9.6.5.42. Spurious 21000 bps Low Band 1 MHz Span

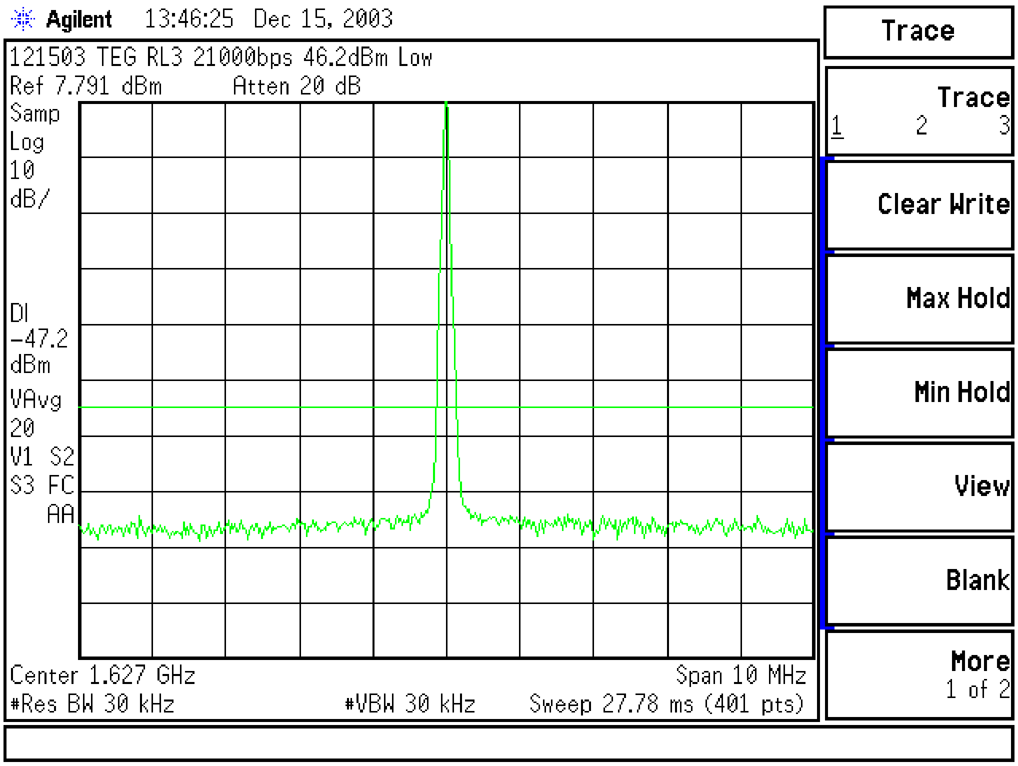


Figure 9.6.5.43. Spurious 21000 bps Low Band 10 MHz Span

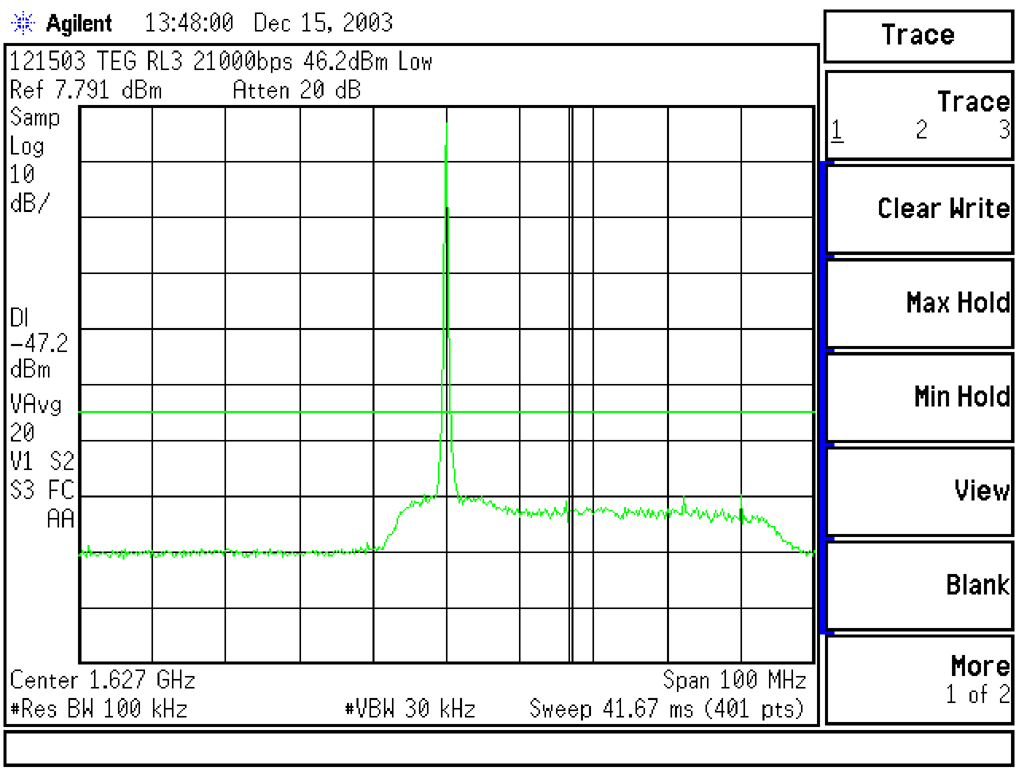


Figure 9.6.5.44. Spurious 21000 bps Low Band 100 MHz Span

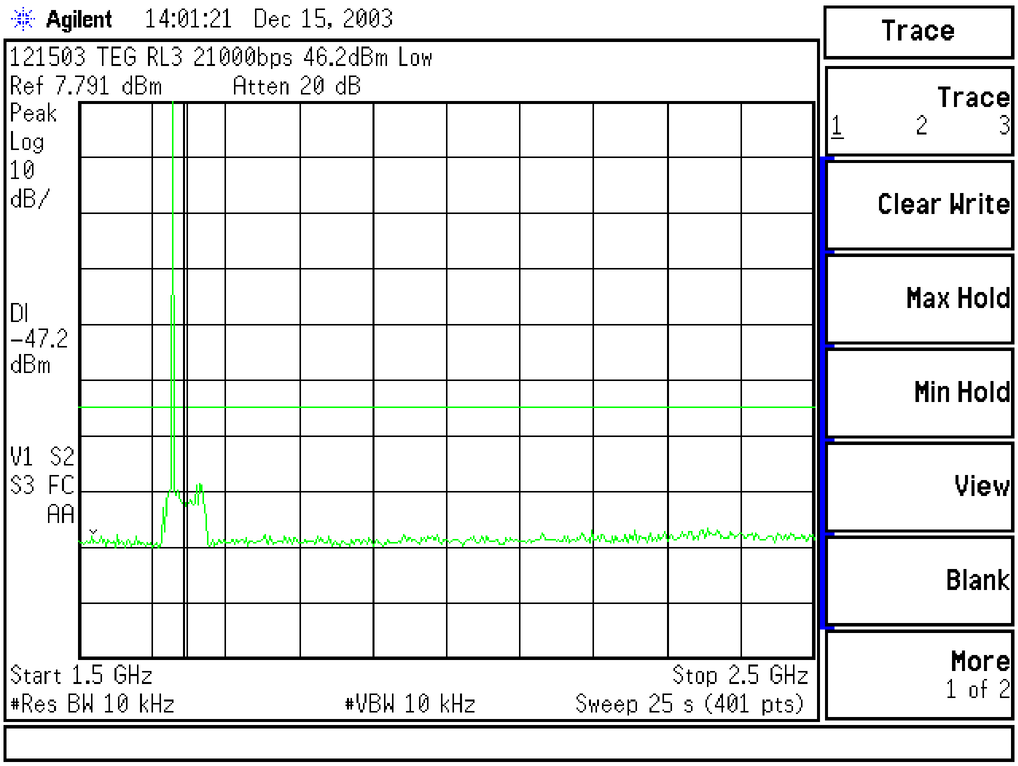


Figure 9.6.5.45. Spurious 21000 bps Low Band 1.5 - 2.5 GHz

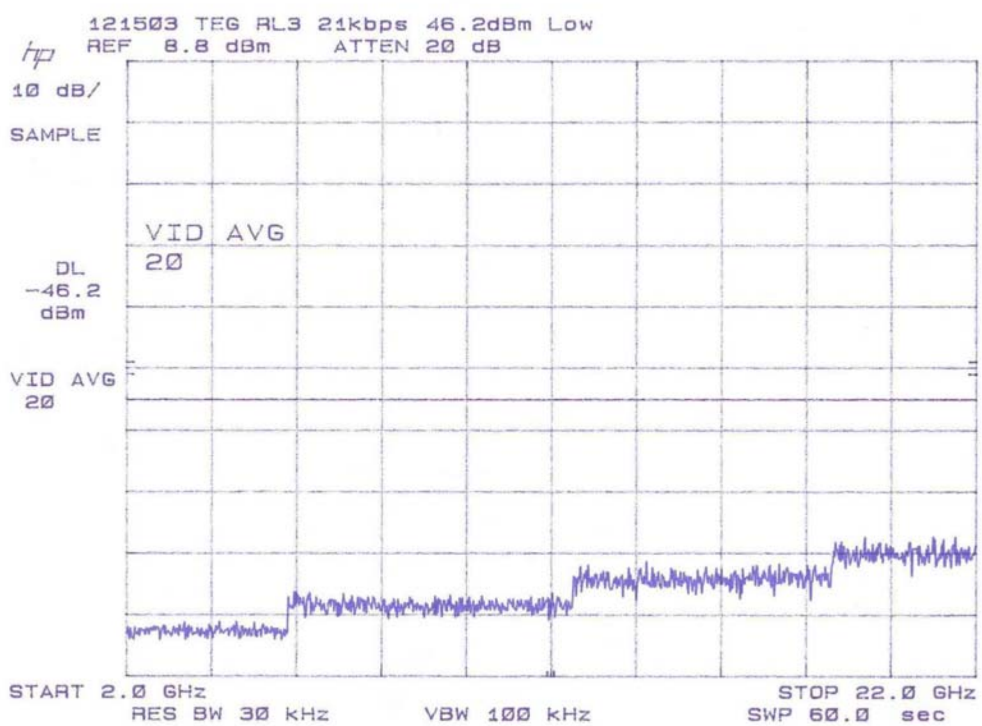


Figure 9.6.5.46. Spurious 21000 bps Low Band 2.0 - 22 GHz

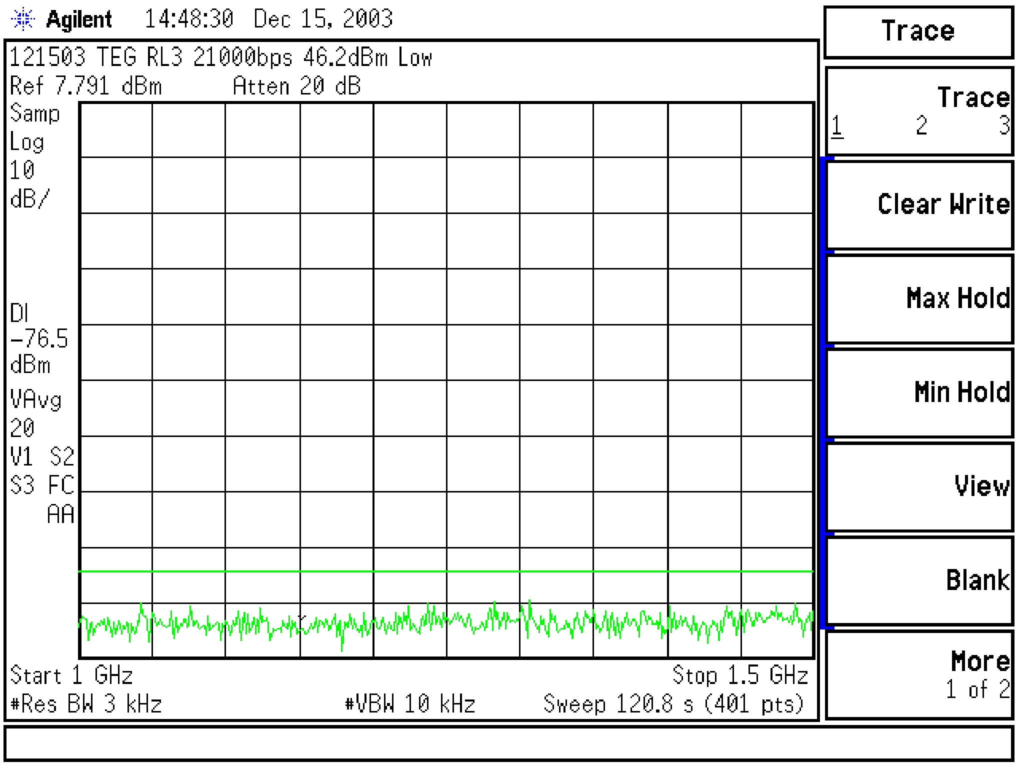


Figure 9.6.5.47. Spurious 21000 bps Low Band 1.0 - 1.5 GHz

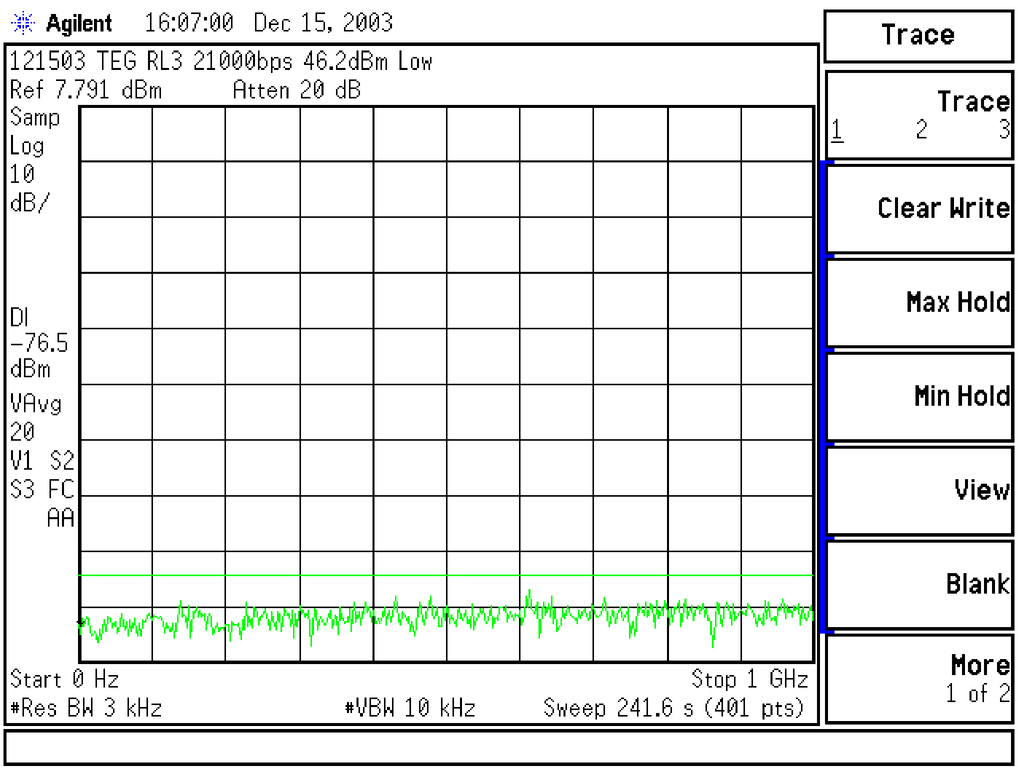


Figure 9.6.5.48. Spurious 21000 bps Low Band 0 - 1.0 GHz

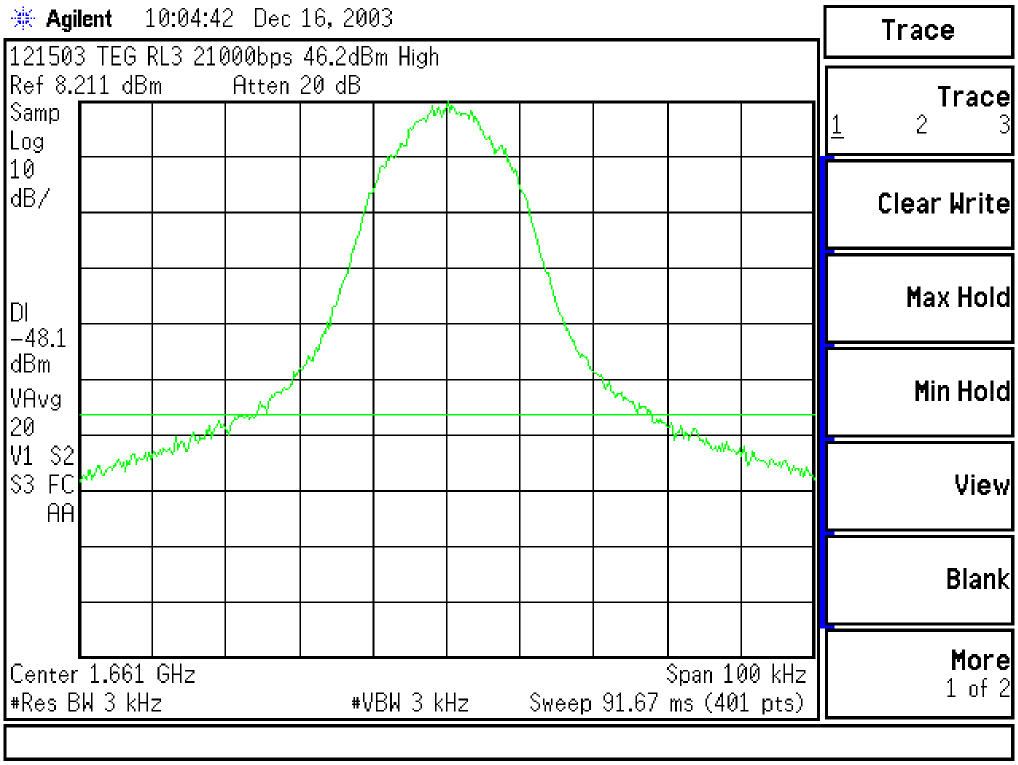


Figure 9.6.5.49. Spurious 21000 bps - High Band - 100 kHz Span

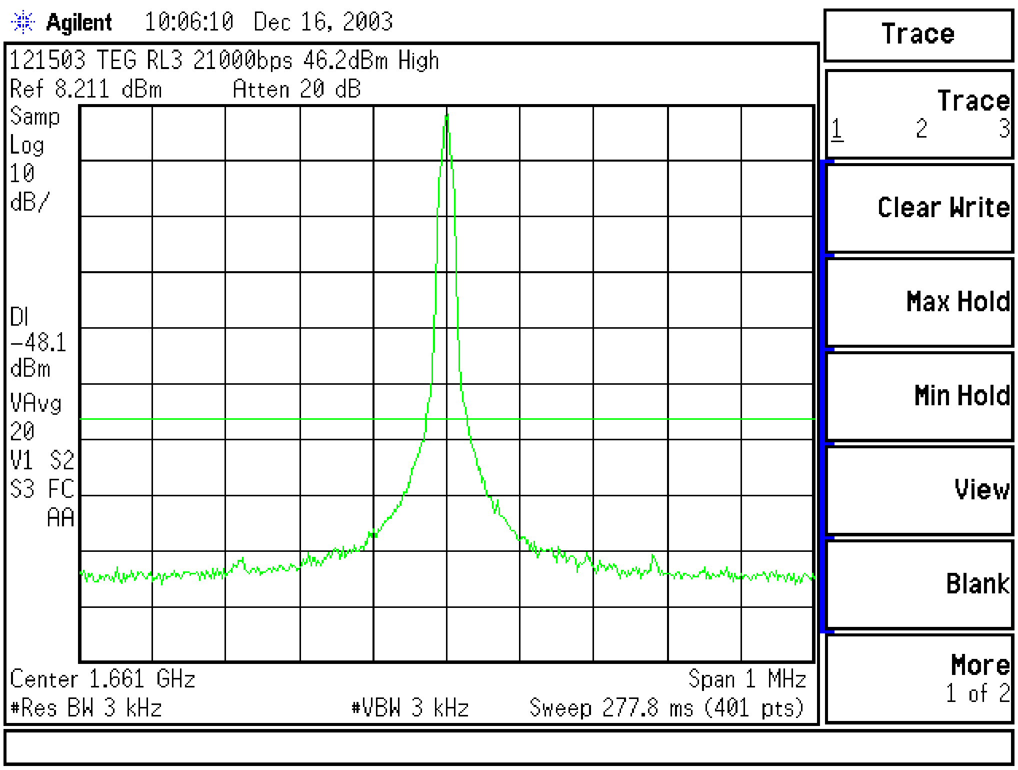


Figure 9.6.5.50. Spurious 21000 bps High Band 1 MHz Span

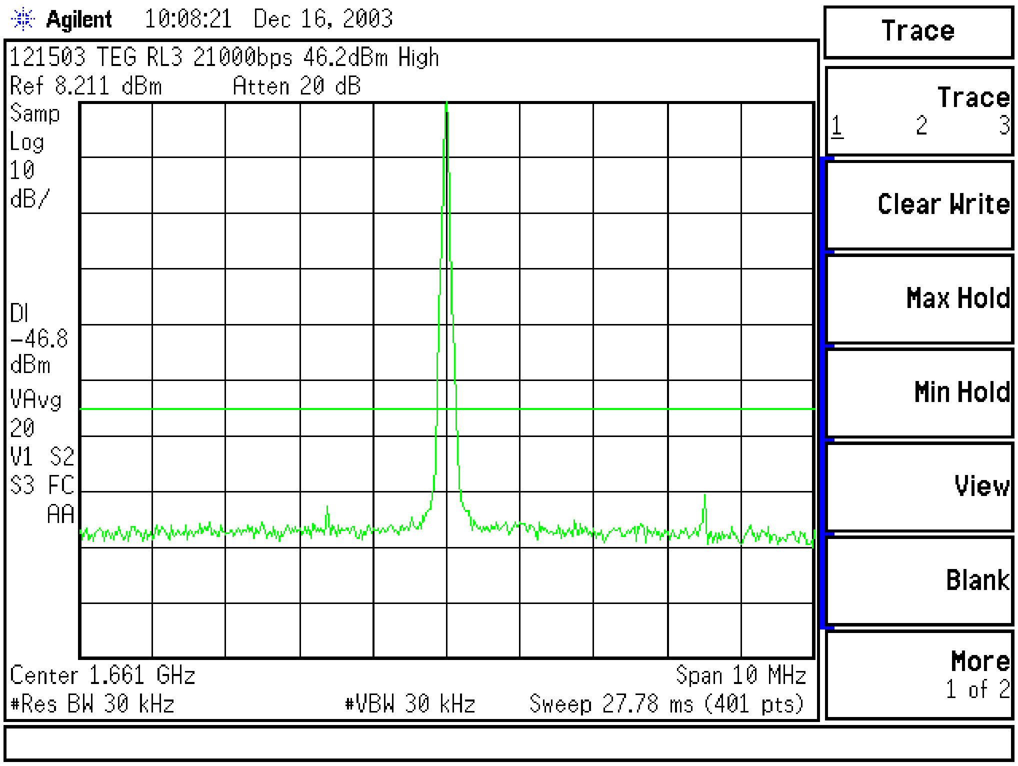


Figure 9.6.5.51. Spurious 21000 bps High Band 10 MHz Span

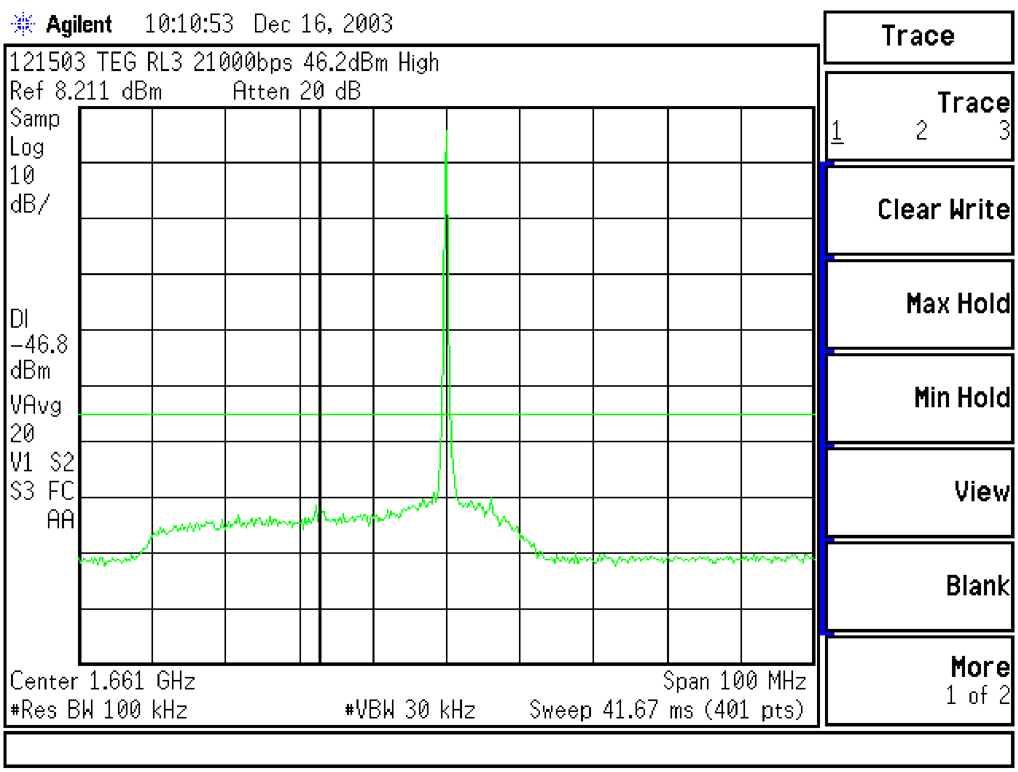


Figure 9.6.5.52. Spurious 21000 bps High Band 100 MHz Span

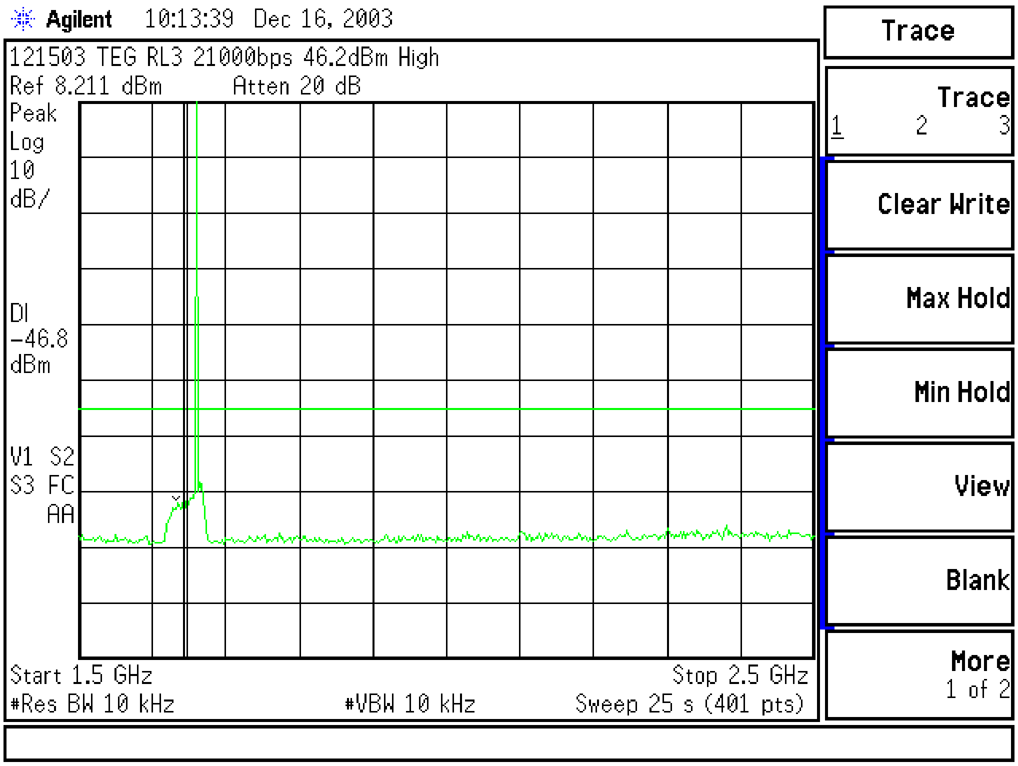


Figure 9.6.5.53. Spurious 21000 bps High Band 1.5 - 2.5 GHz

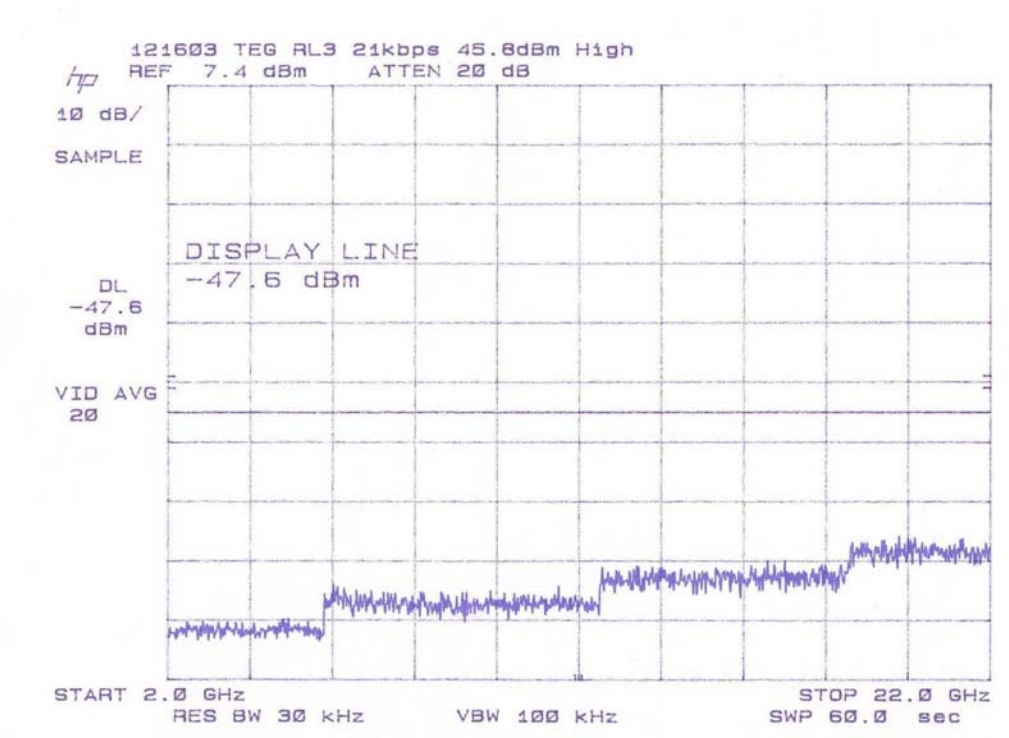


Figure 9.6.5.54. Spurious 21000 bps High Band 2.0 - 22.0 GHz

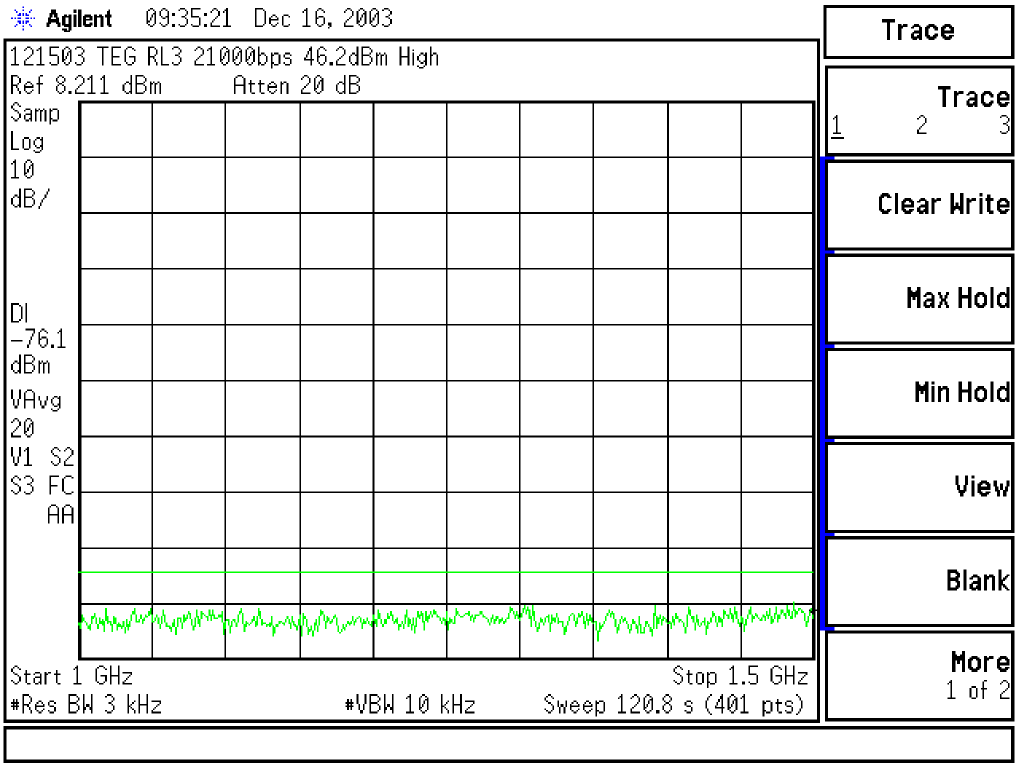


Figure 9.6.5.55. Spurious 21000 bps High Band 1.0 - 1.5 GHz

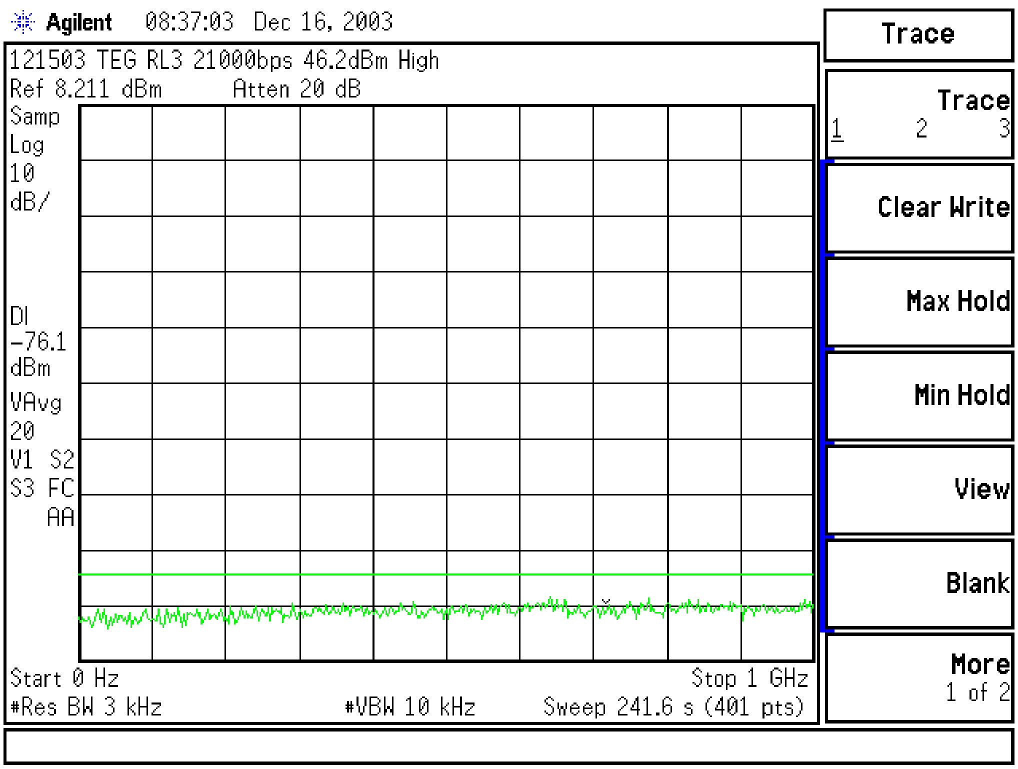


Figure 9.6.5.56. Spurious 21000 bps High Band 0 - 1.5 GHz

9.6.6 Intermodulation Test Results

The intermodulation products of two unmodulated carriers were measured when the SRT-2100 was configured to output 22.5 watts of power in each carrier. This test was repeated with high-, mid-, and low-band frequencies and with representative frequency separations. The results, summarized below, indicate that intermodulation is better than 24dBc for all test cases. All table entries are the intermodulation values.

Frequency Separation	High Band Carrier Frequency (1660 MHz)	Mid Band Carrier Frequency (1643 MHz)	Low Band Carrier Frequency (1627 MHz)
10 kHz	-28.39	-29.65	-24.15
100 kHz	-33.24	-34.74	-25.22
1 MHz	-35.96	-35.55	-29.76
14 MHz	-36.54	-39.40	-33.20

Table 9.6.6 Intermodulation Test Results

The following spectrum analyzer plots show the intermodulation product component values shown in the above table.

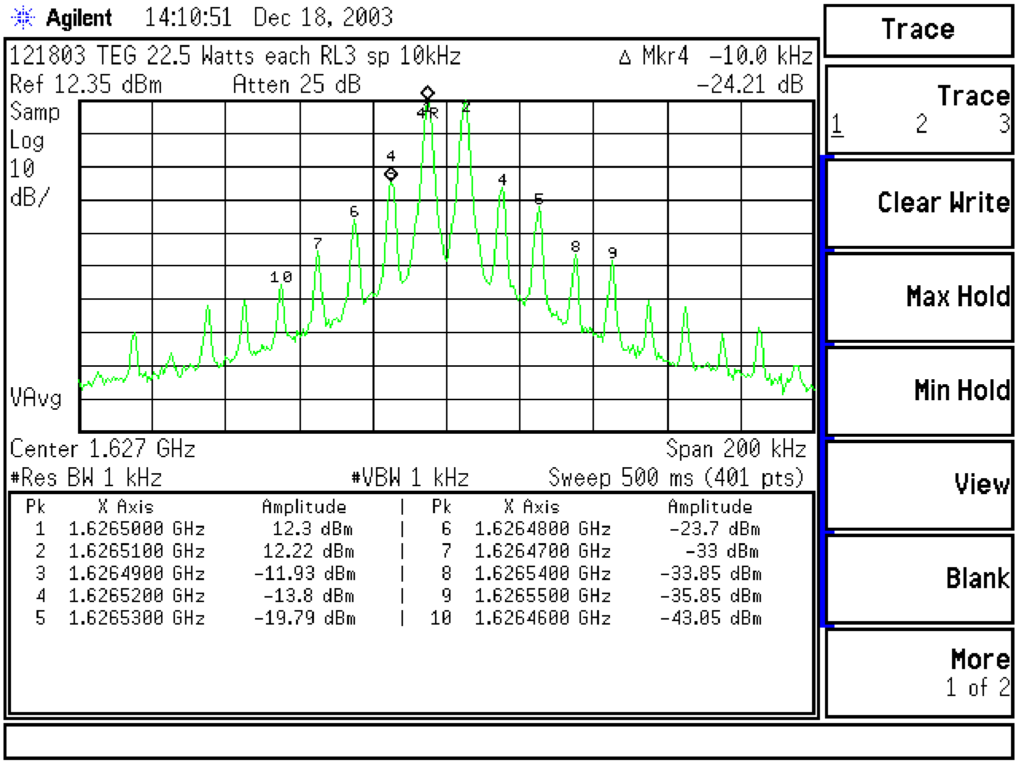


Figure 9.6.6.1. Intermodulation - Low Band - 10 kHz Spacing

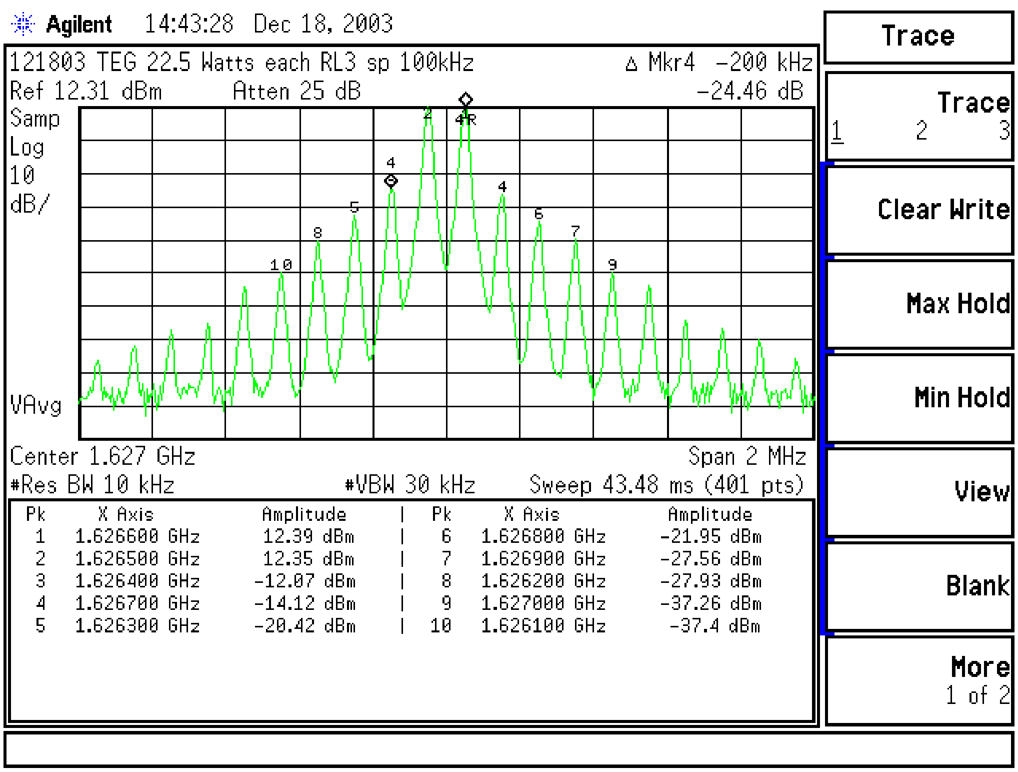


Figure 9.6.6.2. Intermodulation Low Band 100 kHz Spacing

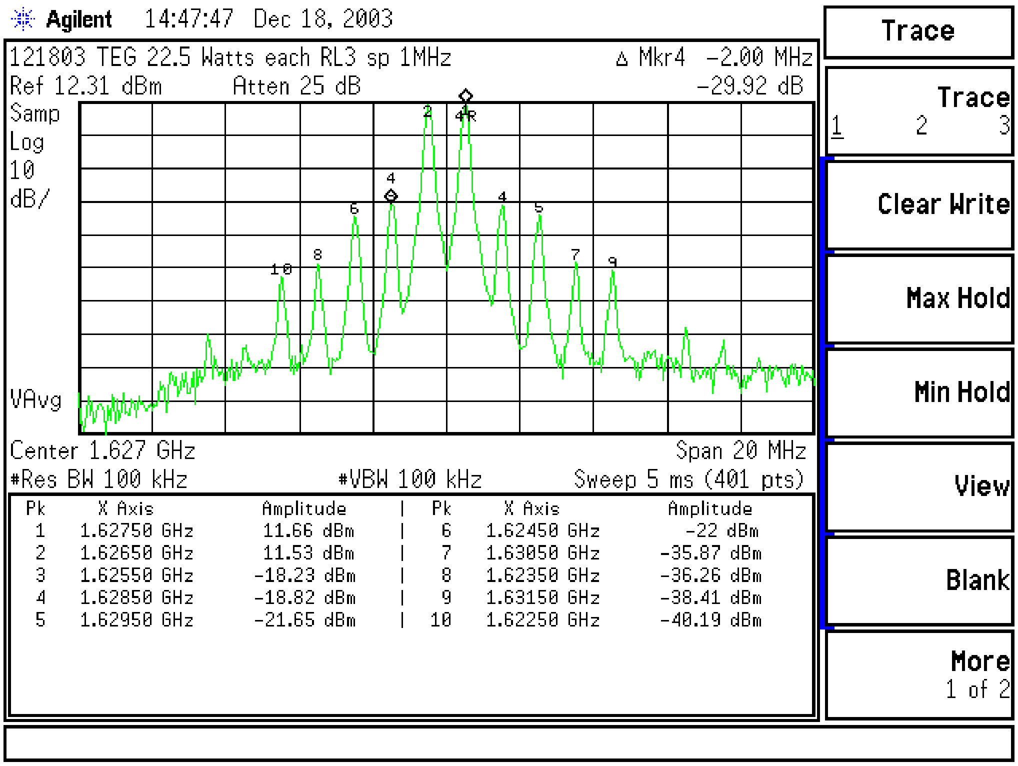


Figure 9.6.6.3. Intermodulation Low Band 1 MHz Spacing

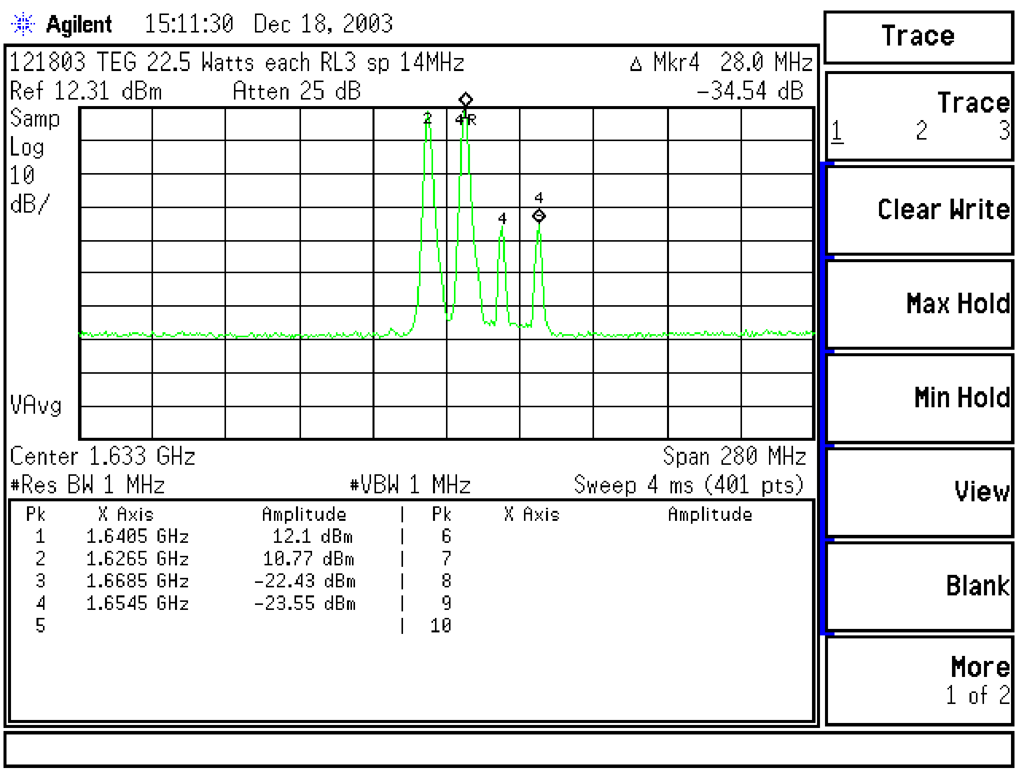


Figure 9.6.6.4. Intermodulation Low Band 14 MHz Spacing

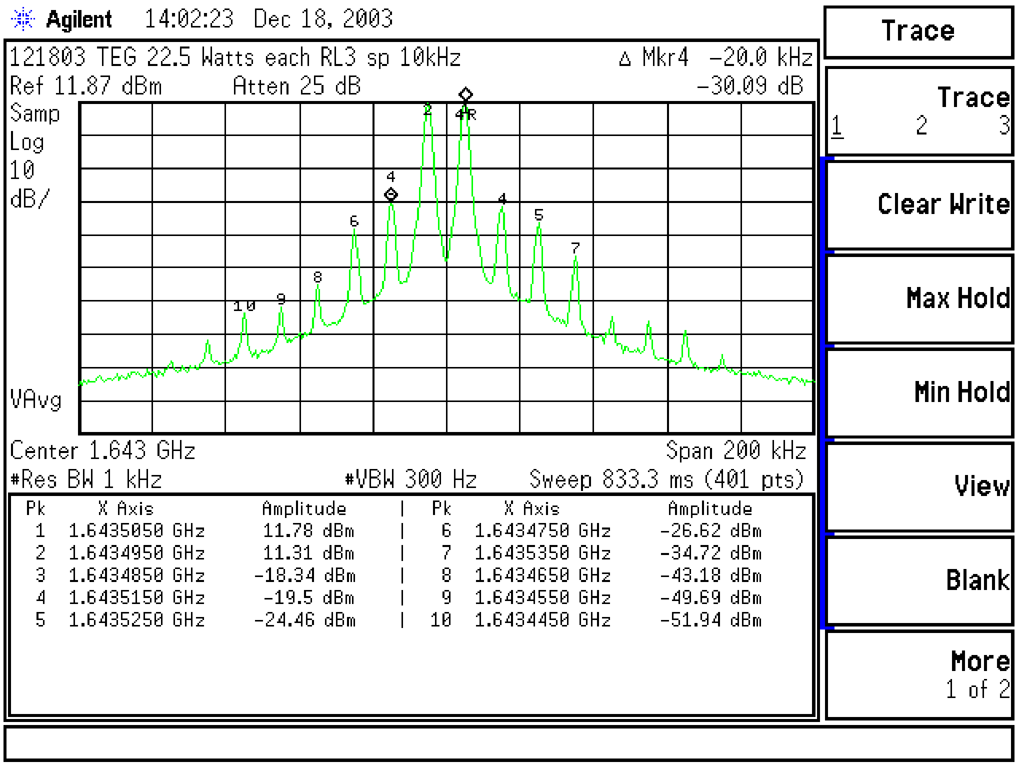


Figure 9.6.6.5. Intermodulation - Mid Band - 10 kHz Spacing

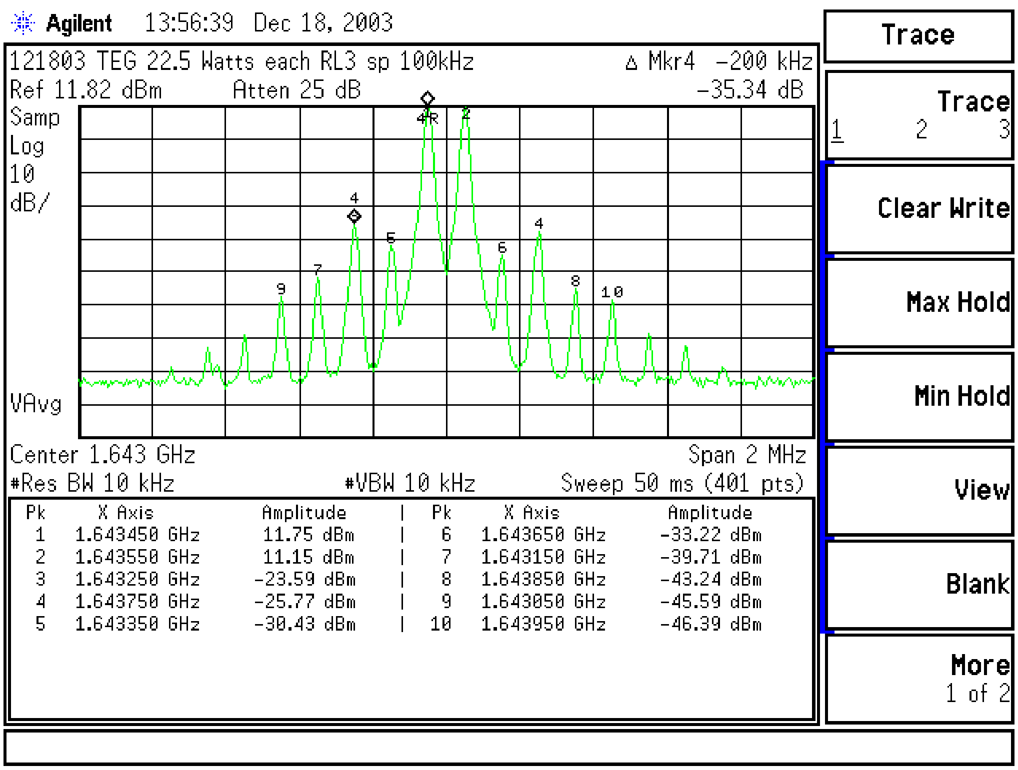


Figure 9.6.6.6. Intermodulation Mid Band 100 kHz Spacing

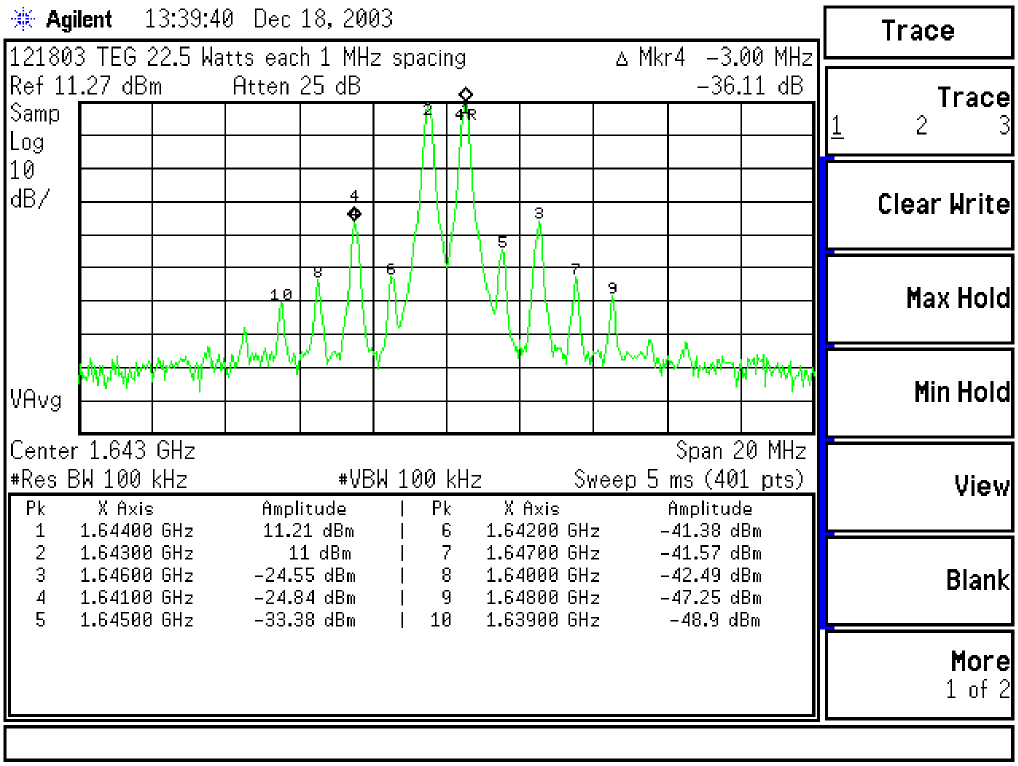


Figure 9.6.6.7. Intermodulation Mid Band 1 MHz Spacing

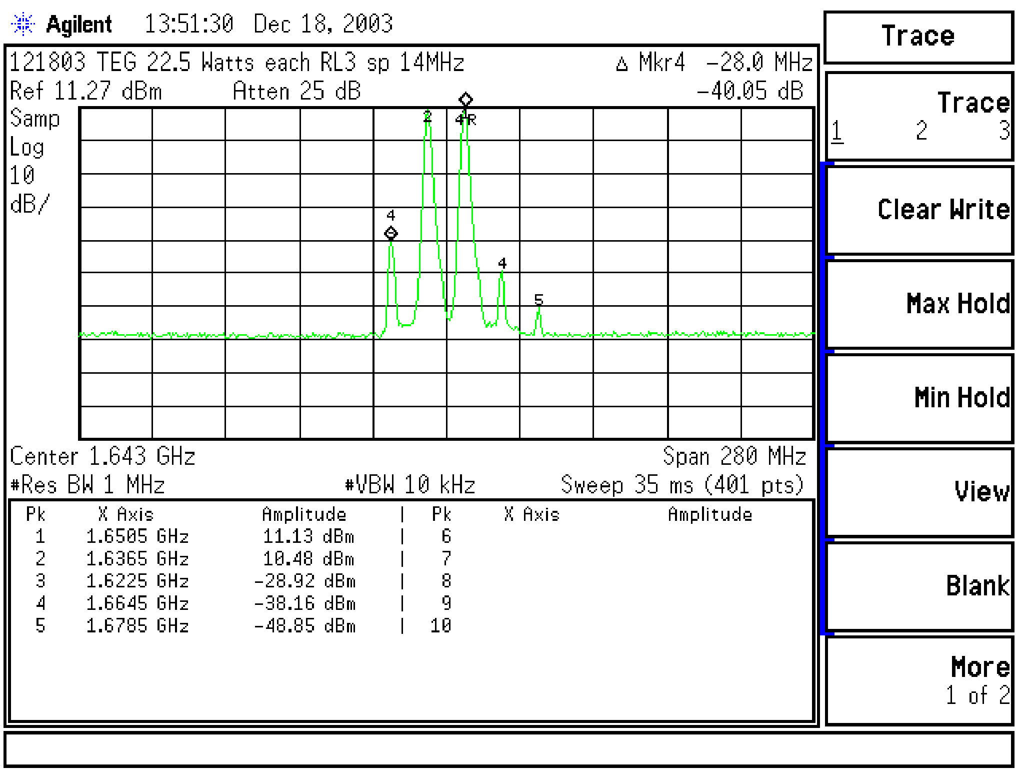


Figure 9.6.6.8. Intermodulation Mid Band 14 MHz Spacing

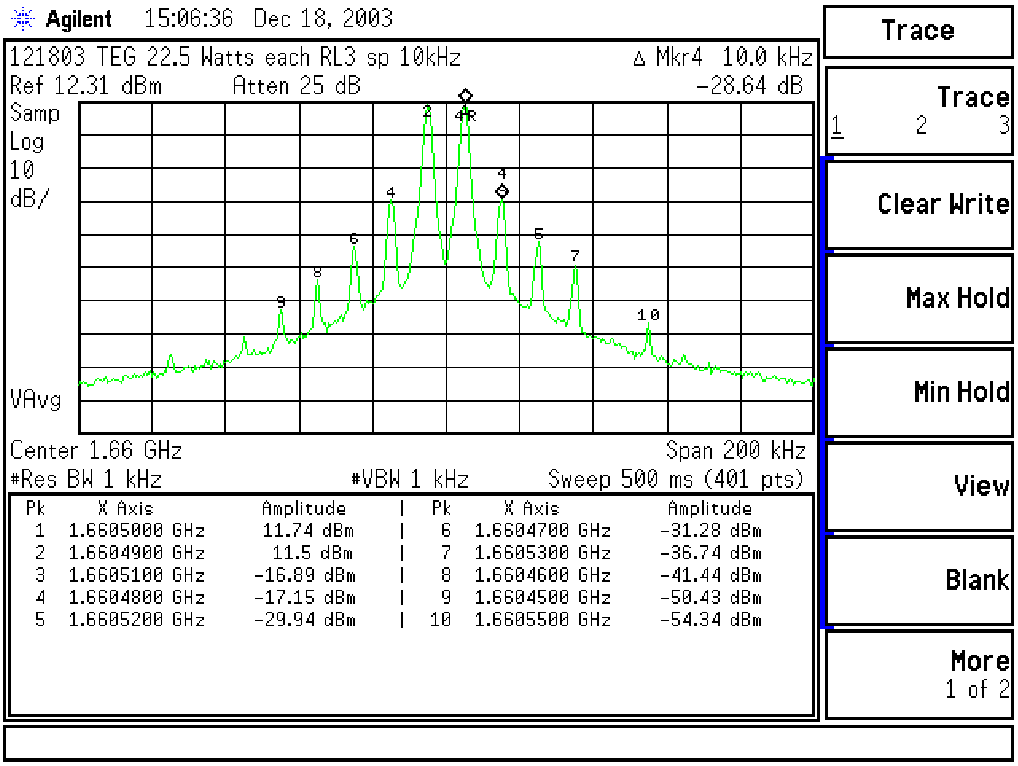


Figure 9.6.6.9. Intermodulation - High Band - 10 kHz Spacing

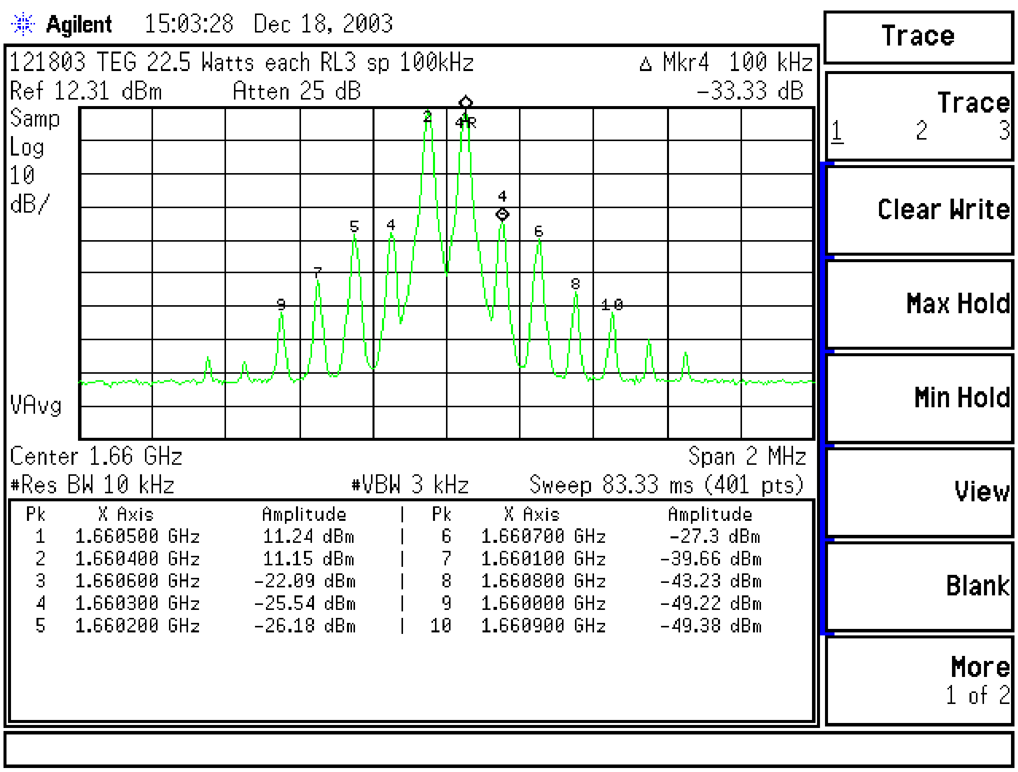


Figure 9.6.6.10. Intermodulation High Band 100 kHz Spacing

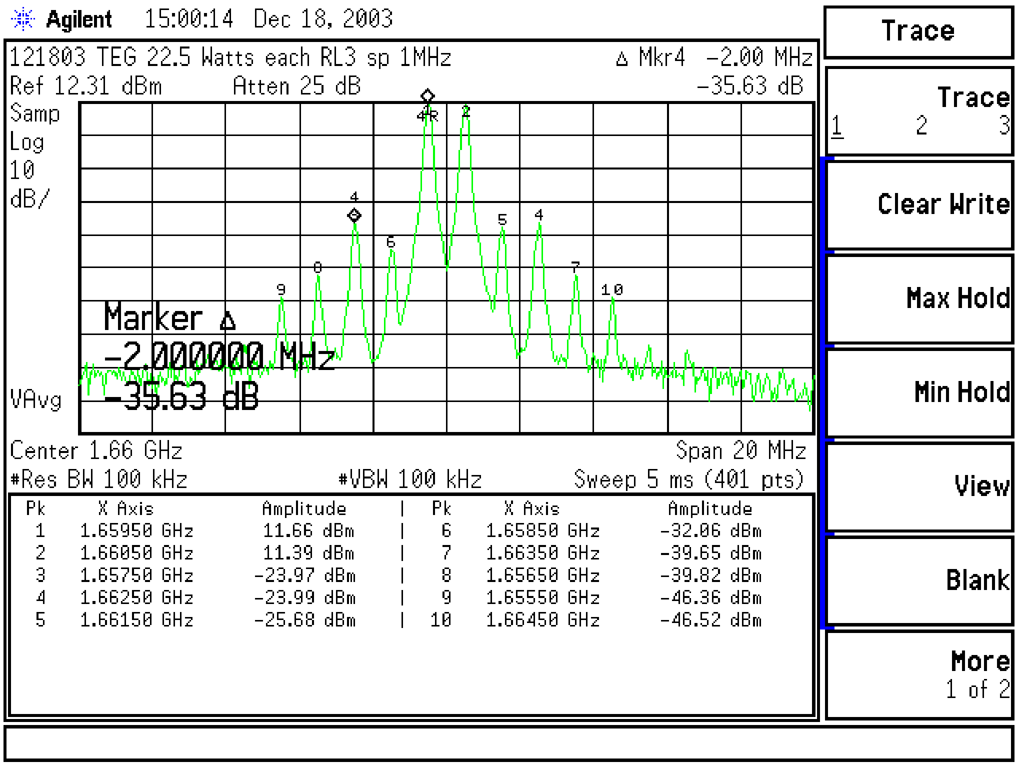


Figure 9.6.6.11. Intermodulation High Band 1 MHz Spacing

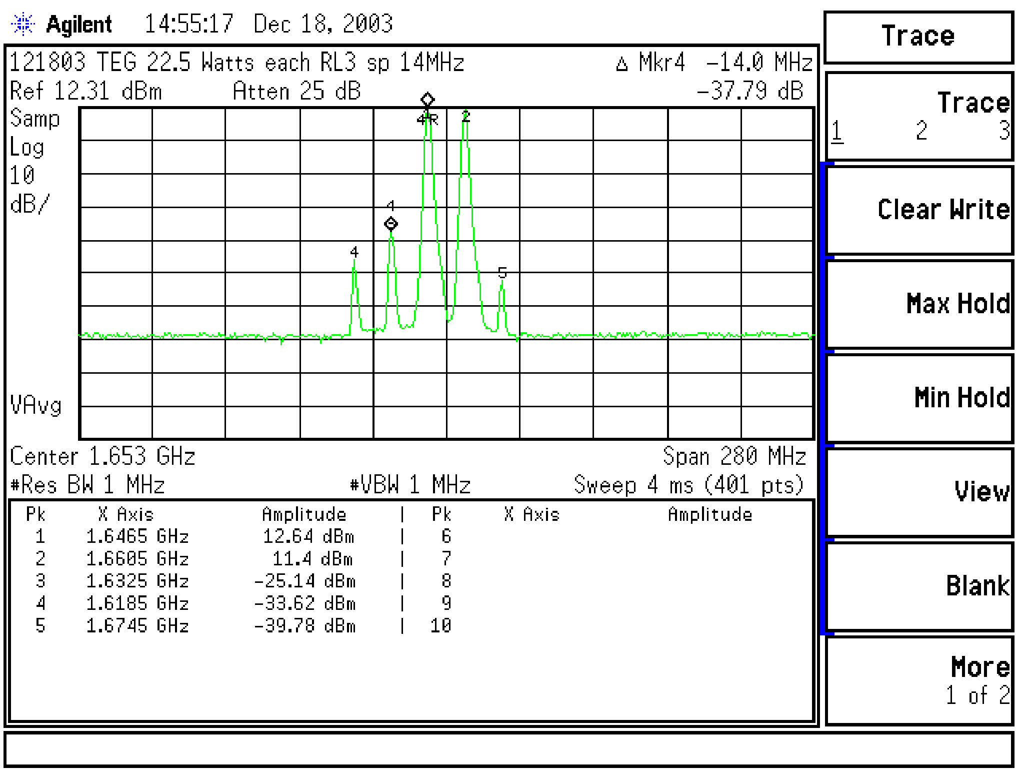


Figure 9.6.6.12. Intermodulation High Band 14 MHz Spacing

9.6.7 Frequency Spectrum Results

All signals were within the specifications for Frequency Spectrum. See attached plots.

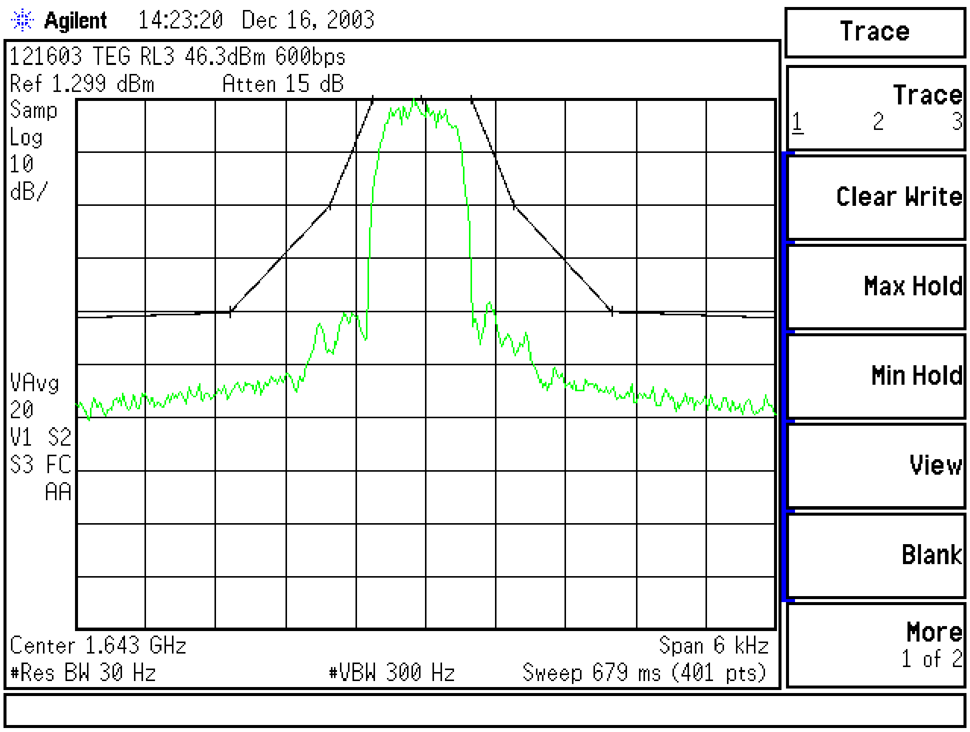


Figure 9.6.7.1. Frequency Spectrum 600 bps 6.0 kHz Span

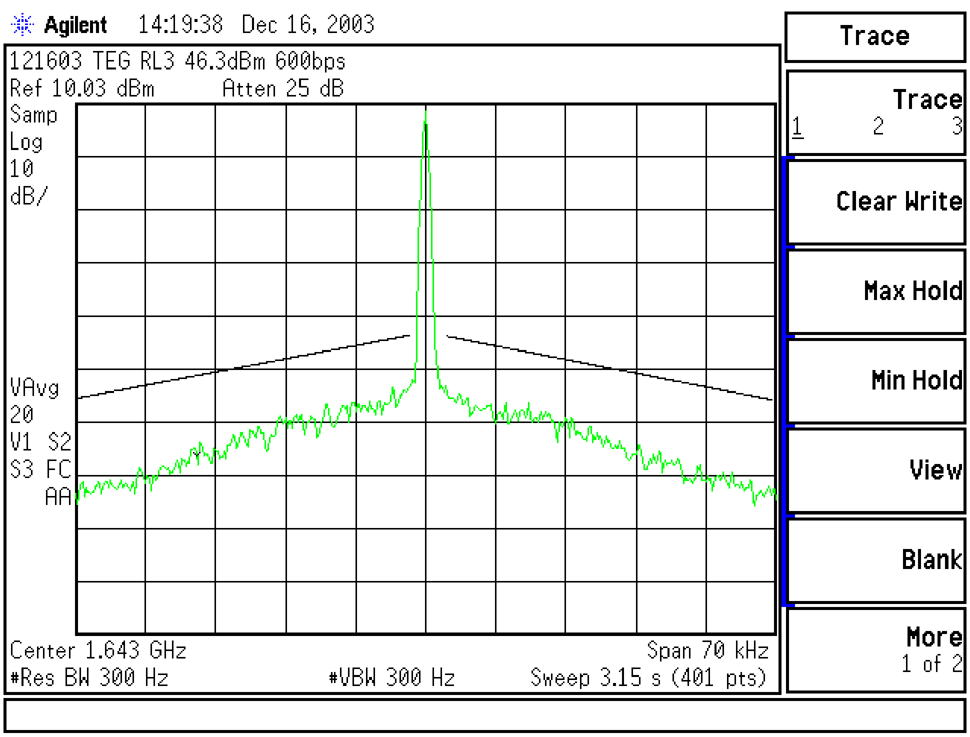


Figure 9.6.7.2Frequency Spectrum 600 bps 70 kHz Span

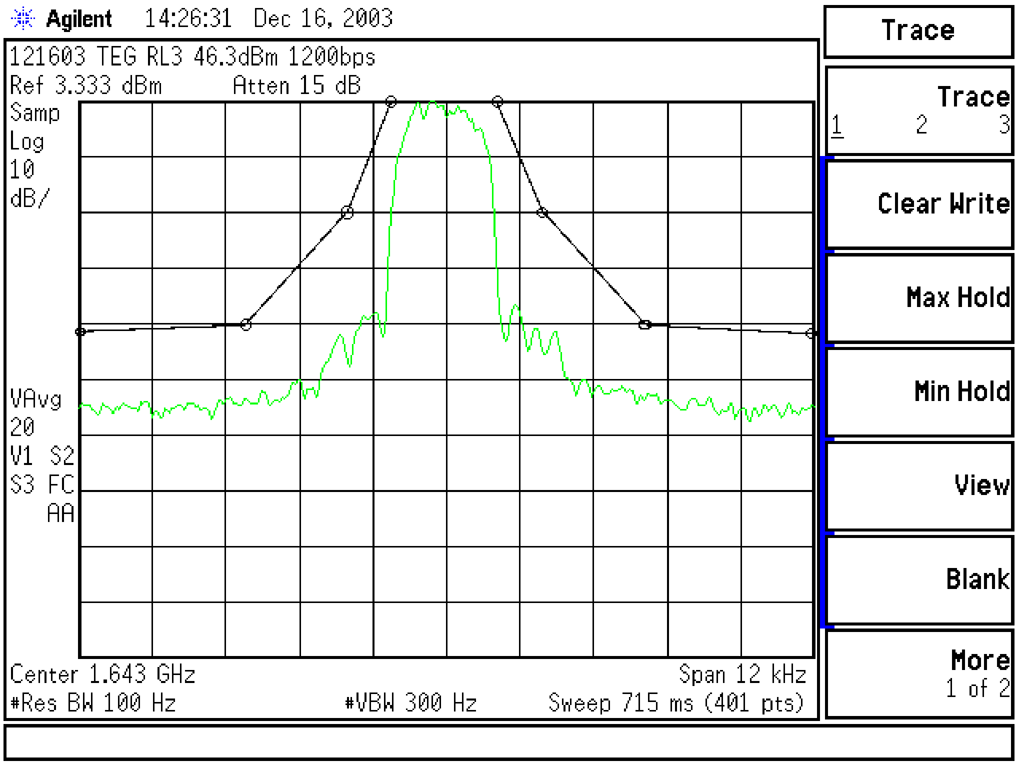


Figure 9.6.7.3. Frequency Spectrum 1200 bps 12 kHz Span

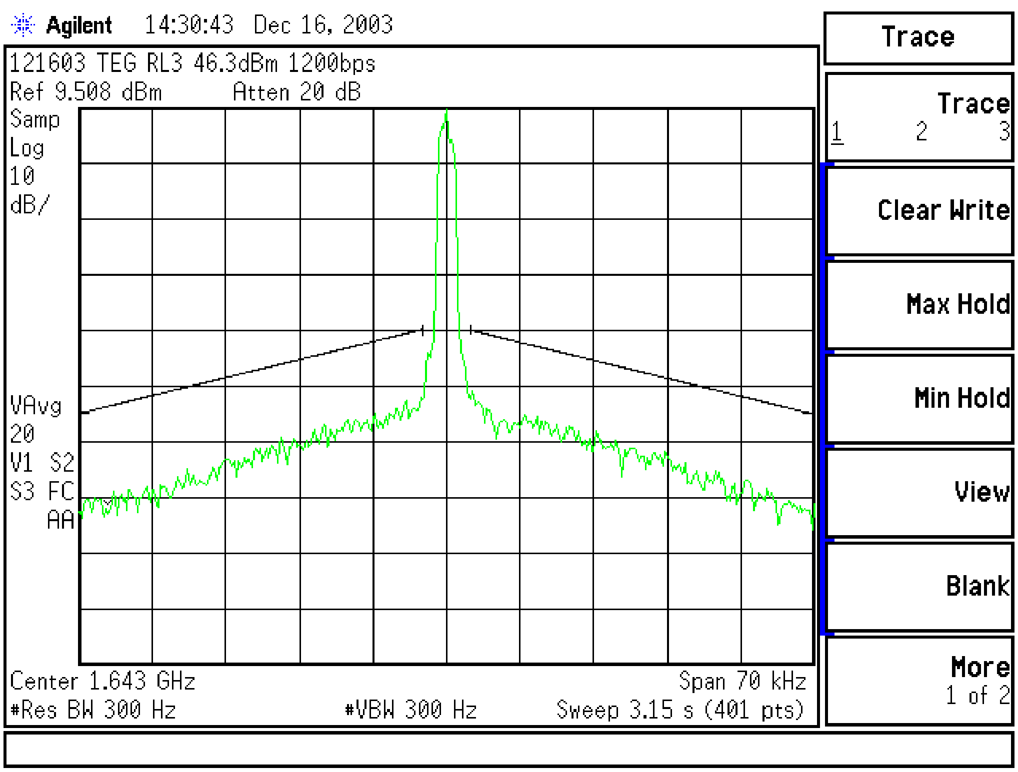


Figure 9.6.7.4. Frequency Spectrum 1200 bps 70 kHz Span

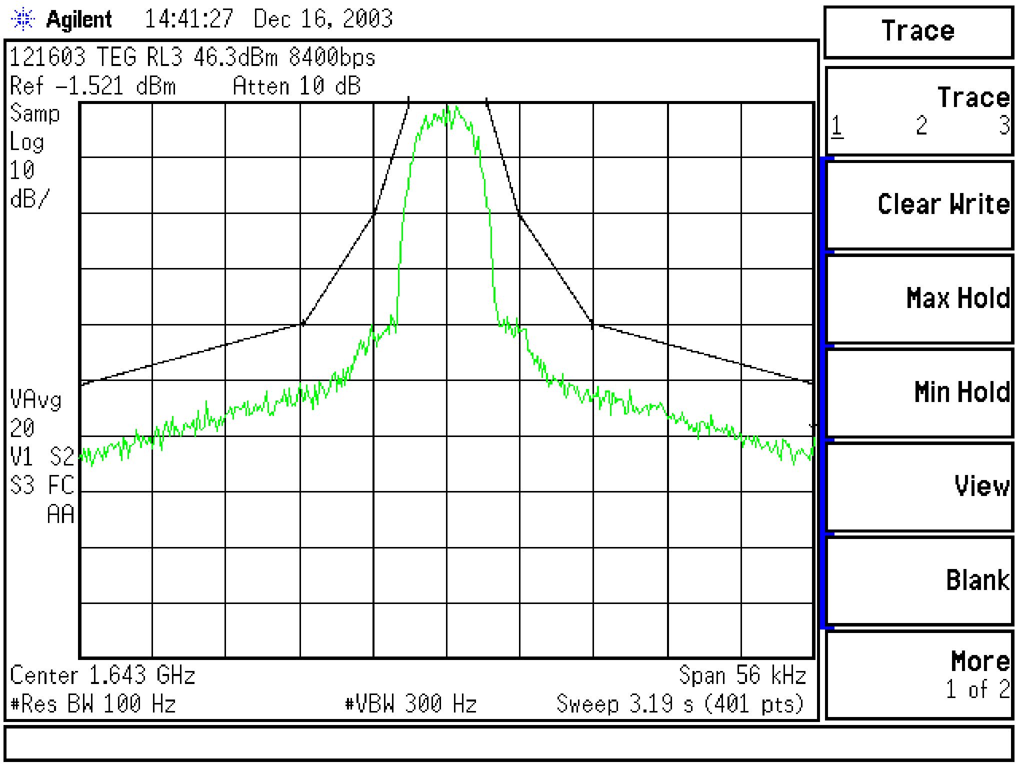


Figure 9.6.7.5. Frequency Spectrum 8400 bps 56.0 kHz Span

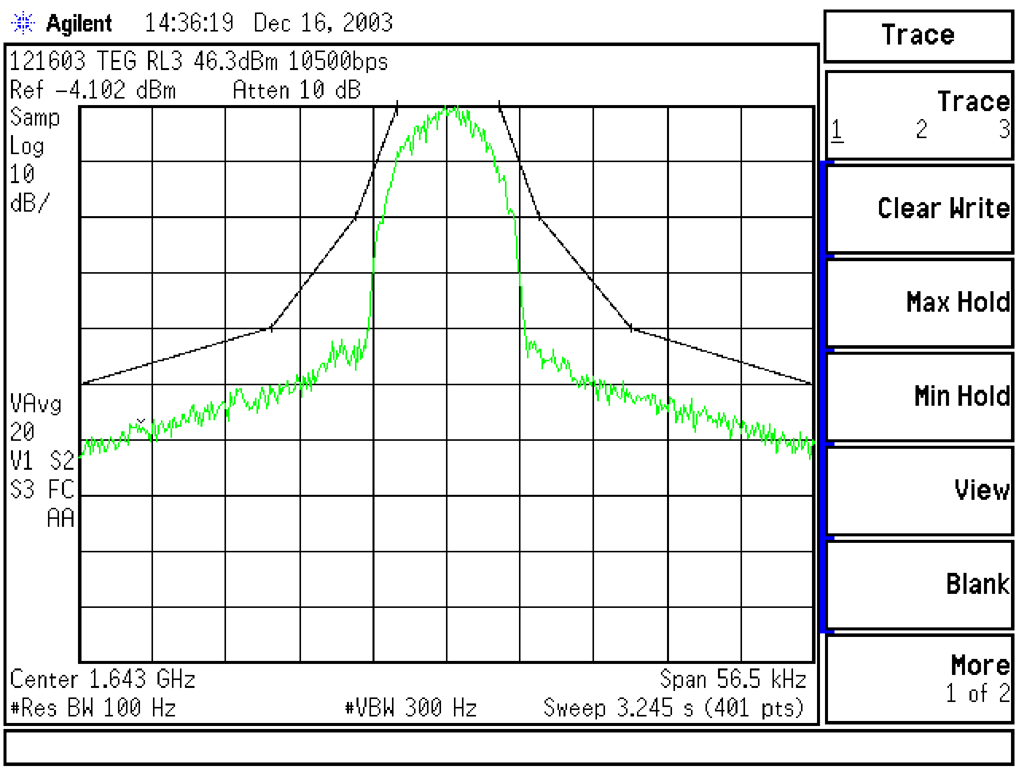


Figure 9.6.7.6. Frequency Spectrum 10500 bps 56.5 kHz Span

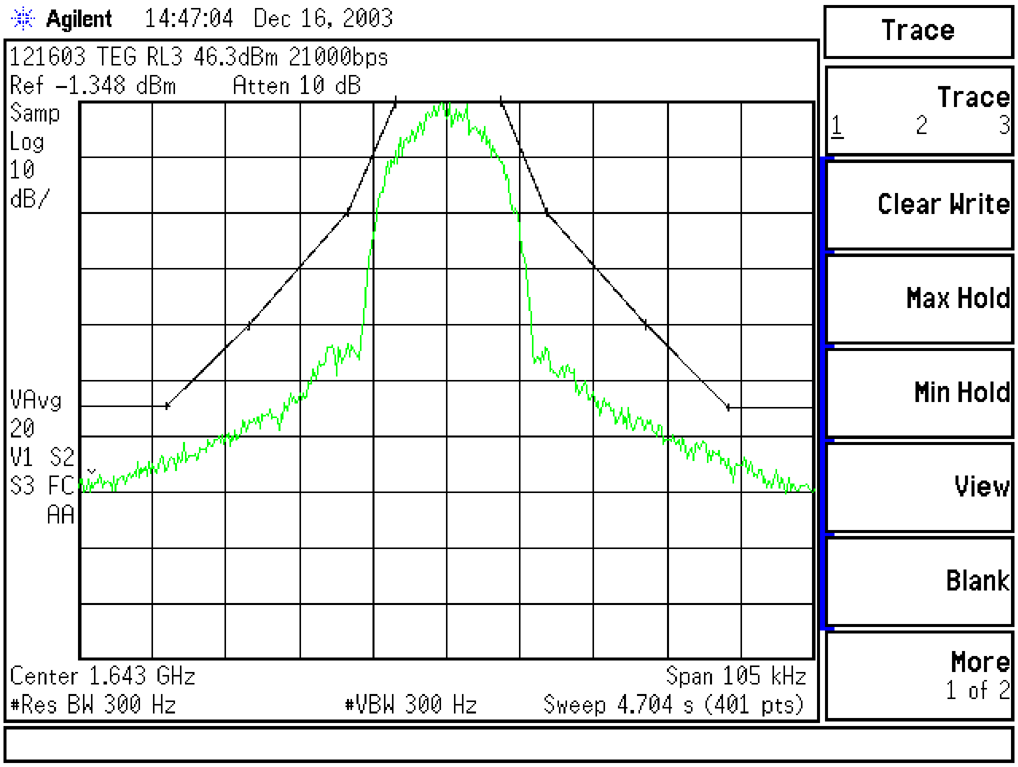


Figure 9.6.7.7. Frequency Spectrum 21000 bps 105 kHz Span

9.7 Field Strength of Spurious Radiation

9.7.1 FCC Requirements

This discussion and test results shown in this section address and meet the requirements of the following FCC requirements.

Section 2.1053 (a) (b) (2) (3)

(**a). ** Measurements shall be made to detect spurious emissions that may be *radiated* directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emissions. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible reflections, which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with reference to the radiated power output of the transmitter, assuming all emissions are radiated from halfwave dipole antenna.

(b). The measurements specified in paragraph (a) of this section shall be made for all equipment:
(2) Operating on frequencies higher than 25 MHz
(3) All equipment where the antenna is an integral part of, and attached directly to the transmitter.

Section 87.139 (i)(1)

(i) – In case of conflict with other provisions of Section 87.139, the provisions of this paragraph shall govern for aircraft earth stations. When using G1D, G1E, or G1W emissions in the 1646.5 – 1660.5 MHz frequency band, the emissions must be attenuated as shown below.

(1) - At rated output power, while transmitting a modulated single carrier, the composite spurious and noise output shall be attenuated below the mean power of the transmitter, pY, by at least:

Frequency (MHz)	Attenuation (dB)[1]
.005 – 1559	83 or (65 + $10\log_{10}$(pY)), whichever is greater
1559 – 18000	55 or (37 + $10\log_{10}$(pY))[2], whichever is greater

[1] these values are expressed in dB below the carrier referenced to a 4 kHz bandwidth and relative to the maximum emission envelope level.
[2] excluding the frequency band of +/- 35 kHz or +/- 4.00 x Symbol Rate, about the carrier frequency, whichever is the greater exclusion.

9.7.2 Test Procedures

The following procedure is derived from DO-160D, Section 21 and adapted for testing the requirements of section 87.139(i) of FCC Part 87. While RTCA DO-160D does not specify testing above 6 GHz, the same setup and methodology were used to measure radiated emissions up to 18 GHz.

Test Equipment
The following test equipment (or equivalent) shall be used to perform this test:

Equipment	Manufacturer and Model Number	Frequency Range (Bandwidth)
Active whip	RVA-30	10 kHz to 30 MHz
Biconical	EMCO 3104C	25 MHz to 200 MHz
Conical Log Spiral	Stoddart 93490-1	200 MHz to 1 GHz
Double Ridged Guide	EMCO 3115	1 GHz to 18 GHz
Calibrated Cable	RG-400, Adams Russell	NA
LISN	Fischer, FCC-LISN-DO-160	100 kHz - 400 MHz
10 μf Capacitor	Solar 6512-106R	N/A
Spectrum Analyzer	Hewlett Packard, 8566B w/OPT 462	100 Hz - 22 GHz
Preselector	HP 85685A	20 Hz - 2 GHz
Printer	HP Laser Jet	NA
Computer	Gateway	NA
Bus Extender	HP 37204	NA

Conditions
1. Set up the radiated emissions test equipment as shown in Figure 9.7.1.
2. Unit operation during radiate emissions measurements will exercise I/O discretes, ARINC 429 buses and the RS-422 antenna bus via loop-back. In addition, all four analog audio circuits and the CEPT-E1 circuit will be tested using loop-backs through individual channel modules. An RF loop-back through a channel module will be performed to check the transmit and receive path, and a CW carrier will be enabled for monitoring.

Measurements
1. Measure and record emissions over the range from 150 kHz to 18,000 MHz using the automated emissions measurement system.
2. Change antennas as required.

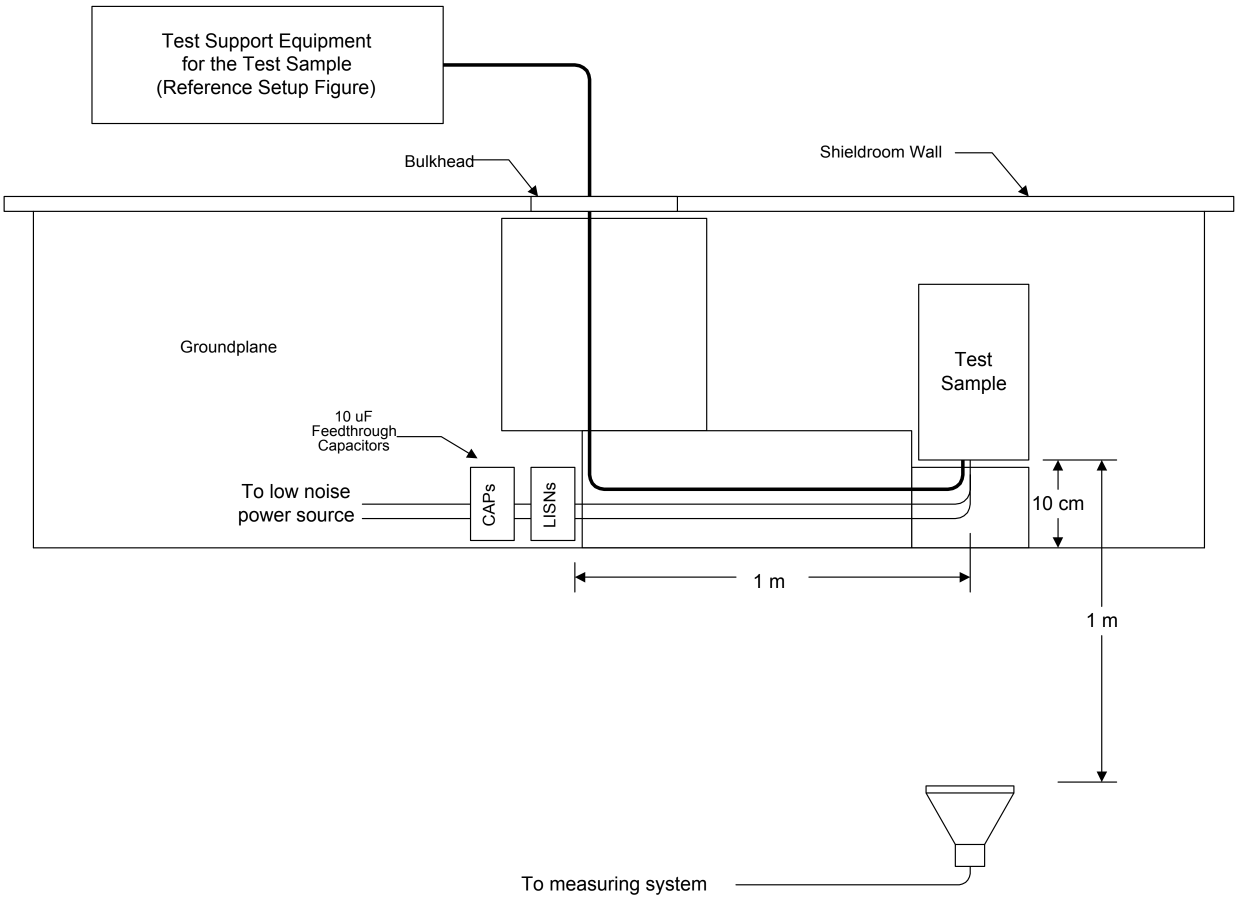


Figure 9.7.2 Typical Test Setup for DO-160D, Paragraph 21.4 Radiated RF Interference

Notes:

1. Terminate all LISN monitor output terminals with 50 ohms.
2. DC Bond resistance between the groundplane and enclosure shall not exceed 2.5 milliohms.
3. The lengths of the power leads from the test sample to the LISNs shall not exceed 1 meter.
4. Excess interconnect cable bundle length will be zigzagged at the back of the test bench, approximately 5 cm above the ground plane. At least 1 meter of EUT cable is to be 10 cm from the front of the test bench and parallel to its front edge.

Reference Field Level Calculations
According to Section 87.139 (I), the radiated spurious emissions are to be attenuated to the same degree as the spurious emissions at the antenna terminals. A reference field level was calculated for comparison with the measured narrow-band data and based on these requirements. The following assumptions were made for these calculations:

1. The intended transmitted signal is radiated through a dipole antenna at 1-meter distance from the point at which the measurements are made.
2. This distance is sufficiently greater than the distance at which the radial component of the E-field is negligible.
3. The peak power available at the dipole antenna is calculated with maximum cable loss at the rated output power. This power would be 16.53 dBW (45 watts) – 2.5 dB (cable loss) = 14.03 dBW (25.29 watts).
4. The duty cycle of the operation is 100%.
5. Section 87.139(i) attenuation requirement is 83 dB.
6. The calculation proceeded as follow:

For a half-wave dipole antenna in free space, in the direction of maximum radiation, the field strength is

$$E = (49.2 * P_t)^{0.5 / R}$$

Where

R = distance in meters
P_t = transmitted power in watts

For a distance of R = 1 meter and the transmitted power of 23.29 watts, the field strength is calculated to be:

$E = (49.2 * 25.29)^{0.5 / 1} = 35.27$ Volts/meter = $35.27 * 10^6$ Micro-Volts/meter = 150.95 dBuV/meter.

The maximum field strength of the radiated spurious component is then:

150.95 dBuV/M - 83 dB = 67.95 dBuV/M (.005 – 1559 MHz) and 150.95 dBuV/M – 55 dB = 95.95 dBuV/M (1559 – 18000 MHz).

9.7.3 Field Strength of Spurious Radiation Results

The following data show that all spurious emissions are lower than the limit indicated above. Note that the limit indicated on the plots limits placed by the RE102.44 measurement procedure used to plot the data and is not the FCC limit. As per the limits above, they are 67.95 dBuV/M (.005 – 1559 MHz and 95.95 dBuV/M (1559 – 18000 MHz)

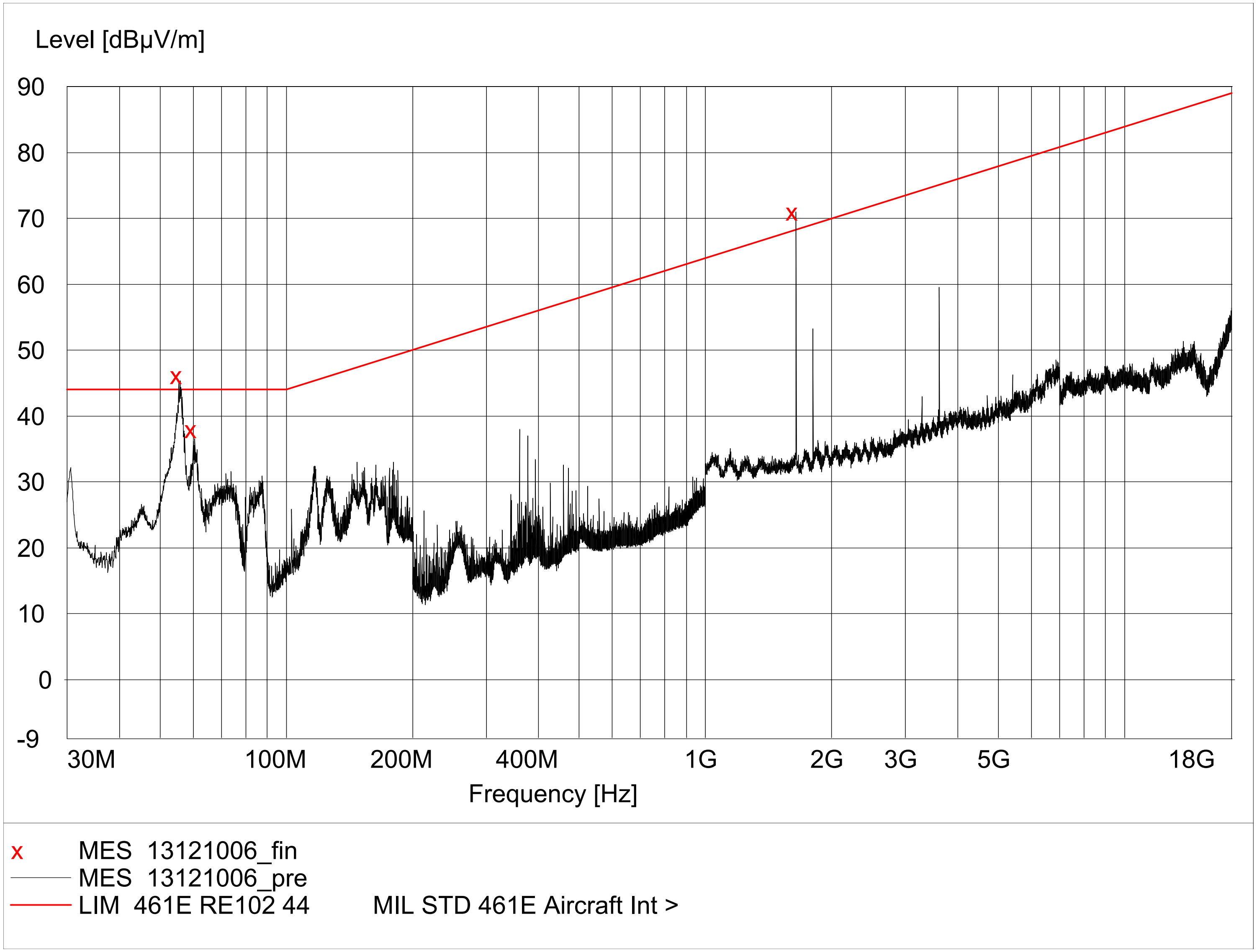


Figure 9.7.3.1. SRT-2100 Horizontal Emissions

Figure 9.7.3.2. SRT-2100 Vertical Emissions

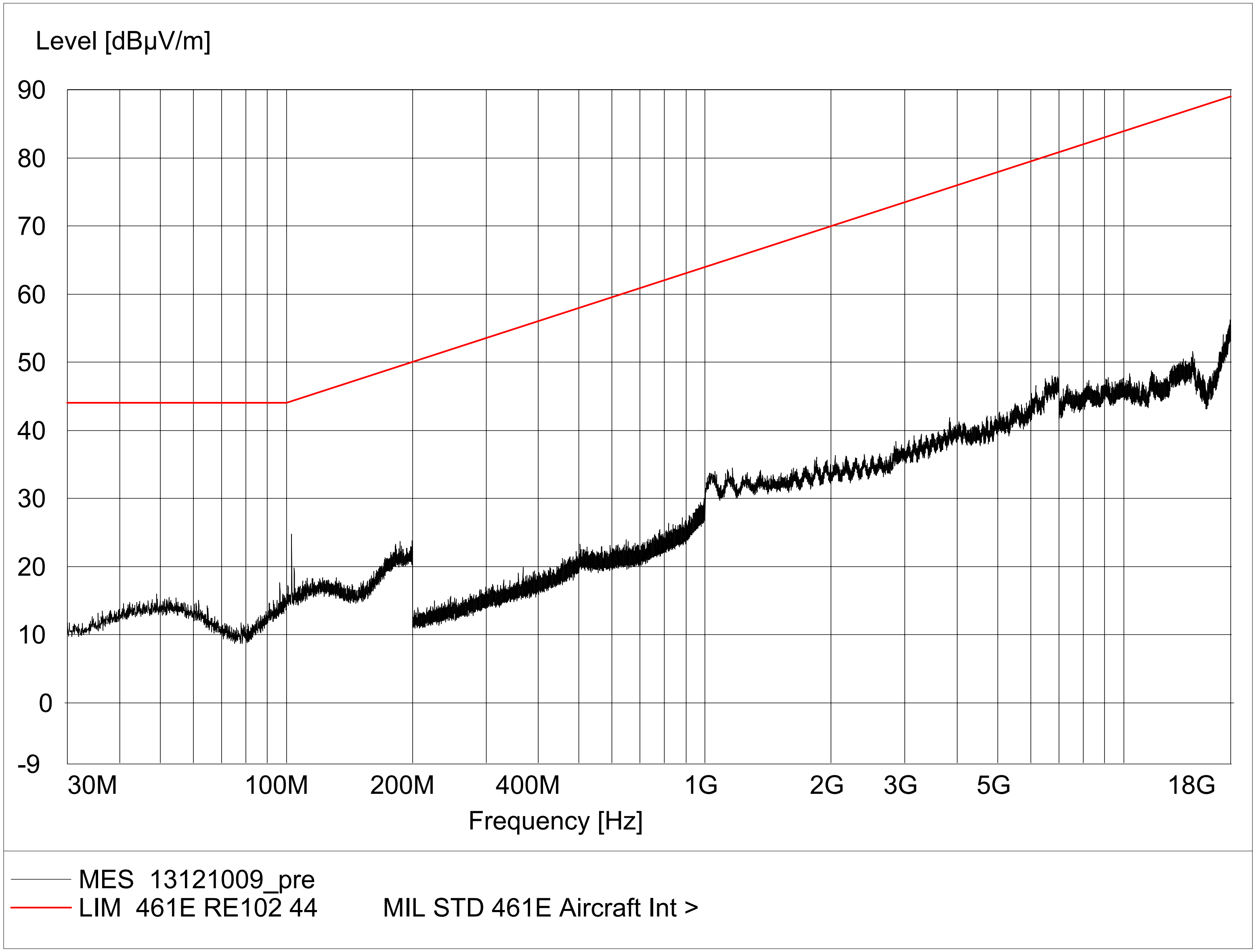


Figure 9.7.3.3. SRT-2100 Horizontal Ambient

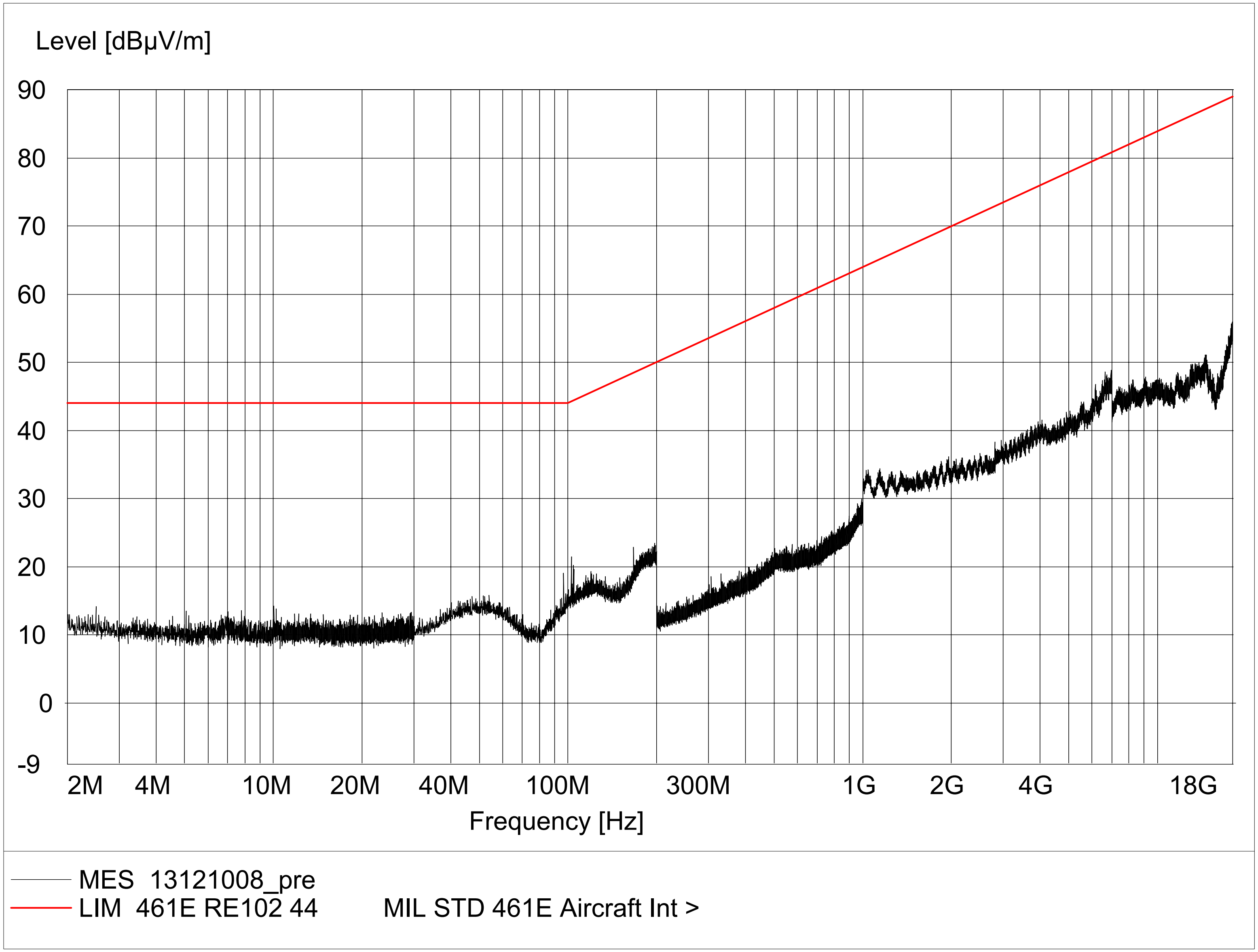


Figure 9.7.3.4. SRT-2100 Vertical Ambient

9.8 Frequency Stability

9.8.1 FCC Requirements

The discussion and test results in this section address and meet the requirements of the following FCC requirements:

Section 2.1055 (a) (2), (b), (d) (1) (3)

(a) (2) The frequency stability shall be measured with variation of ambient temperature from –20 to +50 centigrade for equipment licensed for use aboard aircraft in the Aviation Services under part 87 of FCC Code of Federal Regulations Title 47.

(b) The frequency measurements shall be made at the extremes and at intervals of not more than 10 0 centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement. The short term transient effects on the frequency of the transmitter due to keying shall be shown.

(d) (1) (3) The frequency stability shall be measured with variation of primary supply voltage of 85 to 115 percent of the nominal value. The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided.

Section 87.133

The carrier frequency of each station must be maintained within these tolerances:

Frequency band (lower limit exclusive, upper limit inclusive), and categories of stations	Tolerance
Band – 470 to 2450 MHz Aircraft Earth Station	 320 Hz[1]

[1] For purposes of certification, a tolerance of 160 Hz applies to the reference oscillator of the AES transmitter. This is a bench test.

9.8.2 Test Procedures

Test Equipment

Quantity	Item	Description
1	HP8566B1	Spectrum analyzer
1	Test pallet with IP & EM monitoring functions	

1	30 dB pad, 25 Watt pad
1	20 dB pad
1	10 MHz high stability reference (stability > 19.2 PPB)
1	Temperature chamber
1	400 Hz Variable Transformer

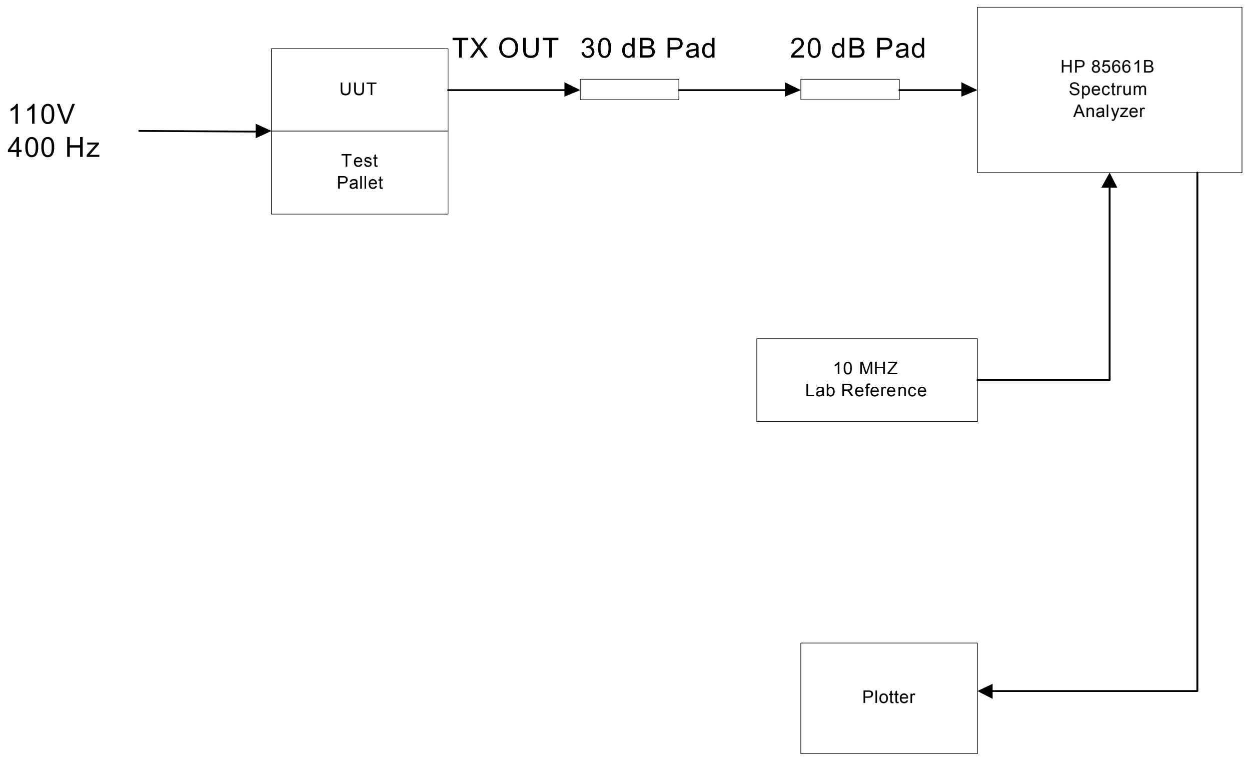


Figure 9.8.2 Frequency Stability Setup

Frequency Drift vs. Temperature (FCC)

1. Place UUT and mount in temperature chamber. Connect UUT and test equipment as shown in Figure 1. Place the UUT in maintenance mode.
2. Bring up an unmodulated carrier from the UUT at 1660.5 MHz. Set the channel module attenuator to 14 dB. Adjust to the RFU attenuator so that the HPA out put power level is at least 2 Watts.
3. Adjust the spectrum analyzer as follows: center frequency = 1660.5 MHz, span = 1 kHz, resolution bandwidth = 10 Hz, video bandwidth = 30 Hz.
4. Bring ambient temperature of UUT up to 50 degrees C. Allow temperature of unit to stabilize.
5. Place marker of spectrum analyzer on peak, plot data and record data on data sheet.
6. Reduce ambient temperature of UUT by 10 degrees C. Allow temperature of unit to stabilize.
7. Place marker of spectrum analyzer on peak, plot data and record data on data sheet.
8. Repeat Steps 6 and 7 until data for –20 degrees C is taken.

9.8.3 Frequency Stability Results

The SRT-2100 uses the same HSR as the SRT-2000. The results for Frequency Stability for the SRT-2000 are included here.

FCC Frequency Stability Data – AC Power

UUT Type SRT-2000 **UUT S/N E5**
Engineer G. M. Reyes **Date 3/19/99**

Temperature and Voltage Variation

Carrier Frequency 1660.500000 MHz

Low voltage (L): 85 x 115 VAC = 97.8 VAC, 400 Hz
Nominal Voltage (N): 1x115 VAC, 400 Hz
High Voltage (H): 1.15 x 115 VAC = 132.3 VAC, 400 Hz

Temp (°C)	Voltage (AC, 400Hz)	Measured Frequency (Hz)	Expected Carrier - Measured Carrier (Hz)	Pass/Fail
+50	L	1660500037	37	P
	N	1660500037	37	P
	H	1660500037	37	P
+40	L	1660500037	37	P
	N	1660500038	38	P
	H	1660500039	39	P
+30	L	1660500040	40	P
	N	1660500039	39	P
	H	1660500040	40	P
+20	L	1660500038	38	P
	N	1660500038	38	P
	H	1660500038	38	P
+10	L	1660500039	39	P
	N	1660500039	39	P
	H	1660500038	38	P
0	L	1660500043	43	P
	N	1660500044	44	P
	H	1660500043	43	P
-10	L	1660500048	48	P
	N	1660500048	48	P
	H	1660500048	48	P
-20	L	1660500040	40	P
	N	1660500038	38	P
	H	1660500039	39	P

Table 9.8.3.1 Frequency Stability AC Powered

UUT passes if the frequency deviation between expected carrier and measured carrier is within ± 160Hz.

FCC Frequency Stability Data – DC Power

UUT Type SRT-2000 **UUT S/N** E5
Engineer G. M. Reyes **Date** 3/29/99

Temperature and Voltage Variation

Carrier Frequency 1660.500000 MHz

Low voltage .85 x 28 VDC = 23.8 VDC
Nominal Voltage = 28 VDC
High Voltage = 1.15 x 28 VDC = 32.2 VDC

Temp (°C)	Input DC Voltage	Measured Frequency (Hz)	Expected Carrier - Measured Carrier (Hz)	Pass/Fail
+50	L	1660500016	16	P
	N	1660500021	21	P
	H	1660500016	16	P
+40	L	1660500017	17	P
	N	1660500017	17	P
	H	1660500016	16	P
+30	L	1660500015	15	P
	N	1660500015	15	P
	H	1660500014	14	P
+20	L	1660500014	14	P
	N	1660500014	14	P
	H	1660500014	14	P
+10	L	1660500012	12	P
	N	1660500012	12	P
	H	1660500012	12	P
0	L	1660500016	16	P
	N	1660500016	16	P
	H	1660500016	16	P
-10	L	1660500021	21	P
	N	1660500021	21	P
	H	1660500021	21	P
-20	L	1660500014	14	P
	N	1660500015	15	P
	H	1660500015	15	P

Table 9.8.3.2 Frequency Stability DC Powered

UUT passes if the frequency deviation between expected carrier and measured carrier is within ± 160Hz.

9.9 Priority and Preemption

The SRT-2100 AES dedicates one of its available channels to a continuous data link capability with the GES to which it is logged on. This data channel continuously monitors the GES P channel signal, and transmits R or T channel messages to the GES. Transmission is based on need to respond to GES requests, to request channel assignments (as may be required to place air to ground calls) or to transmit data from the onboard data link sources. GES to AES call requests are made on the P channel – providing information such as C channel frequency selection and the priority of the call. AES to GES calls are initiated by the AES on the R channel – providing call priority and destination information. In return, when accepted by GES, AES is provided a C channel frequency assignment.

The priority, which is assigned to each call, as it originates, provides the basis for handling of the call within the AES and GES. These priorities are established and the requirements for their use are defined in Inmarsat System Definition Manual. Inmarsat also specifies a number of protocol tests, which must be completed to verify that the AES complies with the priority and preemption requirements. For AES to GES calls, the pilot specifies the nature (priority) of the call as a part of the call set up procedure. If the AES resources are exhausted, the pilot is prompted to select whether to preempt a lower priority call (cabin call), or have the call queued until resources are available. This operation is in “real time” in the sense that the pilot makes the decision at the time that the call is placed. If he elects to queue the call, he can later use the preempt feature if the situation warrants. Selection of the preemption feature will terminate one of cabin calls which is in progress and will make that channel resource available for the call. For GES to AES calls, the pilot involvement is not practical. As an upcoming call request is made to the AES, the SRT-2100 system processor examines the status of the channel modules to determine if any channel is available for assignment. The processor also examines the status of the cockpit lines to determine their availability. If the incoming call priority is “Cockpit Safety” or greater and a cockpit line is available and all channel modules are in use, one of the cabin calls will be terminated and that channel module resource will be used to complete the call. If the cockpit line(s) are busy and the incoming call is of greater priority than one of calls currently placed, that call will be terminated and the resources used for the incoming call. In the event that call has the same or lower priority than the cockpit calls already placed, it will be rejected by the AES.

9.9.1 FCC Requirements

The discussion and test results shown in this section address and meet the requirements of the following FCC requirements:

Section 87.187 (q)

In the frequency bands 1549.500-1558.500 MHz and 1651.000-1660.000 MHz, the Aeronautical Mobile-Satellite requirements that cannot be accommodated in the distress and safety frequency bands 1544.0-1545.0 MHz and 1645-1646.5 MHz shall have priority access with real-time preemptive capability for communications in the Mobile-Satellite Service.

Section 87.189 (e)

Transmission of public correspondence must be suspended when such operation will delay or interfere with message pertaining to safety of life and property or regularity of flight, or when ordered by the captain of the aircraft.

9.9.2 Test Procedures

(A) To verify the ability of the AES to preempt a cabin call with a higher priority cockpit call when sufficient resources are not available.

(B) To verify the ability of the GES to preempt a cabin call with a higher priority cockpit call when sufficient resources are not available.

This test is performed at ambient temperature.

9.9.3 Test Equipment List

Quality	Item
1	SRT-2100
1	CIU-906
1	MCDU
1	Over-The-Air Test Station or equivalent
1-2	Cabin Telephones
1-3	Ground Telephones
1	Logging Trace PC

9.9.4 Test Procedures Air-to-Ground and Ground-to-Air

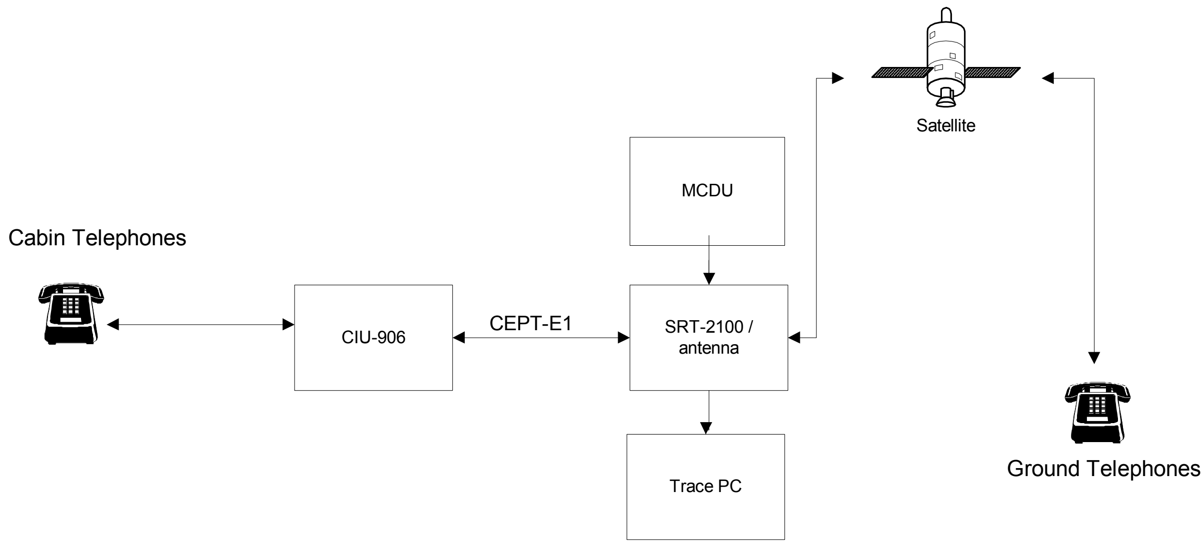


Figure 9.9.4.1 Priority and Preemption Setup

Air-to-Ground Procedures

1. Setup the equipment as shown in Figure 9.9.4.1.
2. Make sure that cabin calls are enabl4ed on the AES
3. Allow the SRT to log-on to the GES
4. Set the priority 4 to/from cockpit discretes to zero, to prevent APC calls from being placed to or from the cockpit interface.
5. Place enough telephone calls from the cabin to exhaust all available channel modules in the SRT-2100.
6. Place a priority 3 cockpit air-to-ground call on the MCDU.
7. Press ***PREEMPT** on the MCDU for the cockpit call
8. Observe that a cabin call is disconnected, and the cockpit call placed in real time.
9. Record results on datasheet.

Ground-to-Air Procedures

1. Setup the equipment as shown in Figure 9.9.4.1.
2. Make sure that cabin calls are enabl4ed on the AES
3. Allow the SRT to log-on to the GES
4. Set the priority 4 to/from cockpit discretes to zero, to prevent APC calls from being placed to or from the cockpit interface.
5. Place enough telephone calls from ground to exhaust all available channel modules in the SRT-2100.
6. Place a priority 3 call from another ground telephone to the AES with a predetermined number to the cockpit.

7. Observe that a cabin call is disconnected, and the call in step 5 is routed to the cockpit.
8. Record results on datasheet.

9.9.5 Priority and Preemption Results

Air-to-Ground Preemption Demonstrated (Pass/Fail)__<PASS>

Ground-to-Air Preemption Demonstrated (Pass/Fail)__<PASS>