Exhibit 7. The data required by Sections 2.1046 through 2.1057 inclusive, measured in accordance with the procedures set out in Section 2.1041. (2.1033 (c) (14))

1. Block Diagram of the RTA-8XX Receiver/Transmitter/Antenna.

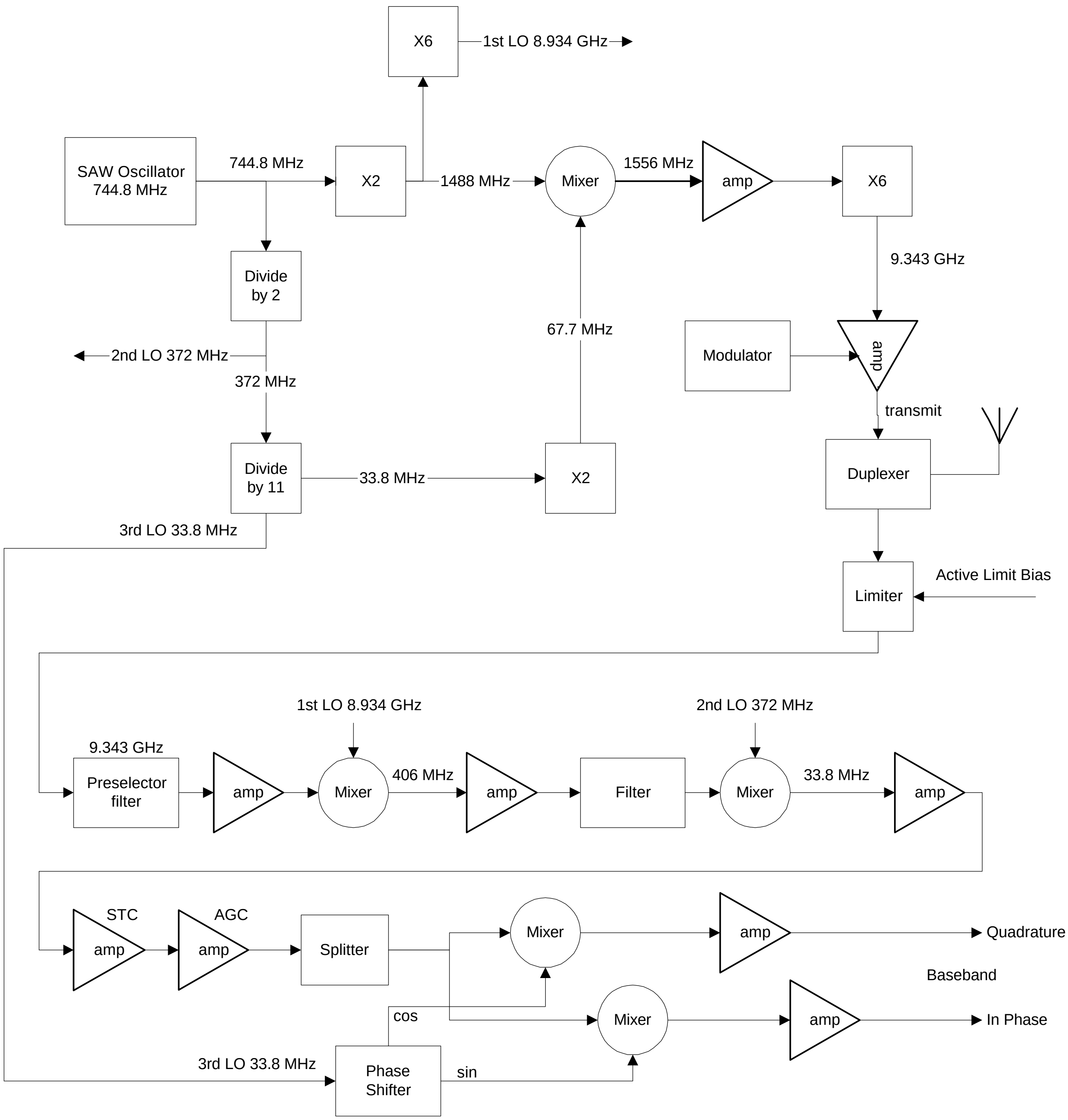


Figure 18 shows the detailed block diagram of the RF portion of the RTA-8XX.

Figure 18. RTA-8XX RF Section Block Diagram

2. RTA-8XX RF Power Output (2.1046)
The equipment used for the RF Power Output test is shown in Table 9.

Table 9. Test Equipment used for RF Power Output Test

Equipment	Manufacturer/Model Number
Control/Indicator	Rockwell Collins WXI-711
Power Supply	Harrison 6291A
Waveguide to Coax Adapter	HP X281A
Attenuator	Weinschel 10 dB and 20 dB
Peak Power Meter	HP 8900C

Procedure

The RTA-8XX was connected to the power meter by removing the antenna and replacing it with a waveguide/coax adapter. The scan and tilt drive motors were disconnected. The power supply was set to +27.5 Volts and the indicator was set to the 50 nm range.

Setup

The test setup is shown in Figure 19.

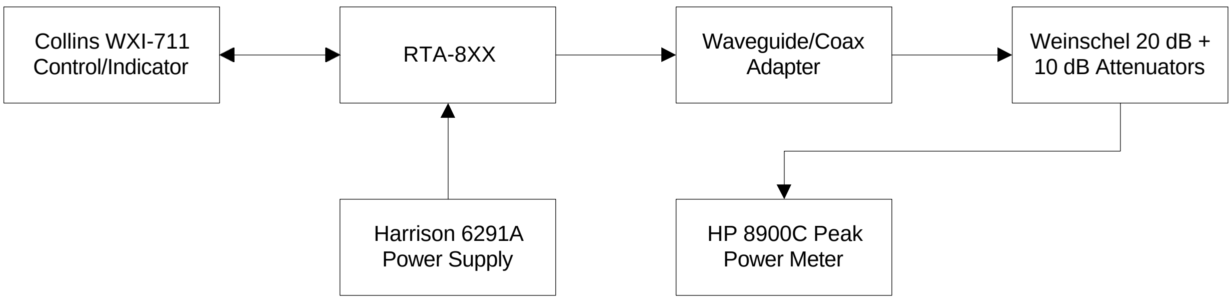


Figure 19. Test Setup for RF Power Output Test

Requirement

Measure RF Power at Antenna Terminal.

Measured

The final X-band power amplification stage amplifies the transmit injection signal (9.343 GHz) from +10 dBm to +44.5 dBm. The output power does not change with pulse width. This is done in a custom H-FET based hybrid module. The modulator is external to the hybrid and is of standard PC board technology with standard components. The modulator regulates 11.6 V dc to 10 V dc and supplies the current pulse for the power amplifier of 16 Amperes maximum. The amplifiers are also biased on with –5.0 V dc via the modulator.

During receive time the RF injection is removed from the power amplifier input and the modulation pulse is not present. This gives very good isolation between the transmitter and the receiver.

3. RTA-8XX Occupied Bandwidth (2.1049)
The equipment used for the occupied bandwidth test is shown in Table 10.

Table 10. Test Equipment Used for Occupied Bandwidth Tests

Equipment	Manufacturer/Model Number
Control/Indicator	Rockwell Collins WXI-711
Power Supply	Harrison 6291A
Spectrum Analyzer	HP 8563E
Printer	HP Thinkjet
Waveguide to Coax Adapter	HP X281A
Attenuator	Weinschel 10 dB and 20 dB

Procedure

The RTA-8XX was operated in several modes to measure the occupied bandwidth. The highest possible pulse repetition frequency (PRF) and narrowest pulse width to the slowest PRF and longest pulse width were encompassed. Refer to modulation characteristics on page 68 for pulse rate and pulse width discussion.

The spectrum analyzer can automatically measure occupied bandwidth. The measurements were made with the desired occupied bandwidth set to 99.5%. Each of the occupied bandwidth measurements are shown in Figures 21 through 24 and are submitted for completeness.

Setup

The test setup is shown in Figure 20.

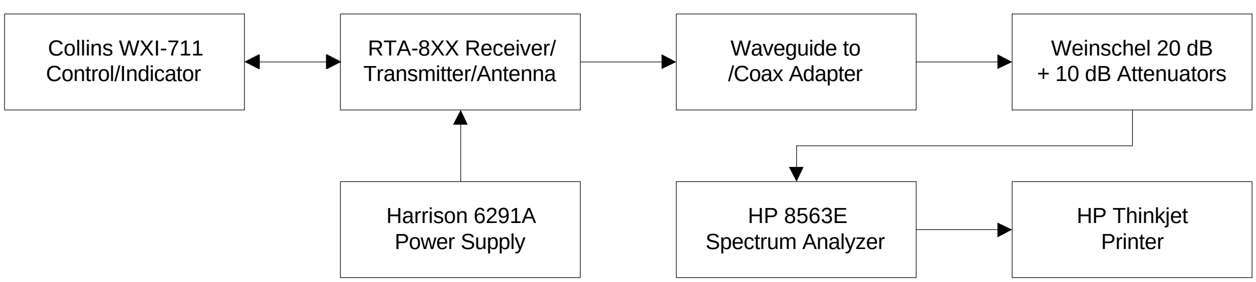


Figure 20. Occupied Bandwidth Test Setup.

Requirement – “To be specified on License” per 87.135, note 9.

Measured – 99.5% Occupied Bandwidth on Spectrum Analyzer

Table 11. RTA-8XX Occupied Bandwidth Measurement Results

Mode	99.5% Occupied Bandwidth	Refer to Figure
5 nmi – MAP	6.217 MHz	21
10 nmi – WX	3.175 MHz	22
25 nmi – WX	1.393 MHz	23
50 nmi – WX	708.3 kHz	24
100 nmi – WX	708.3 kHz	25
200 nmi – WX	375.8 kHz	26
300 nmi – WX	375.8 kHz	27

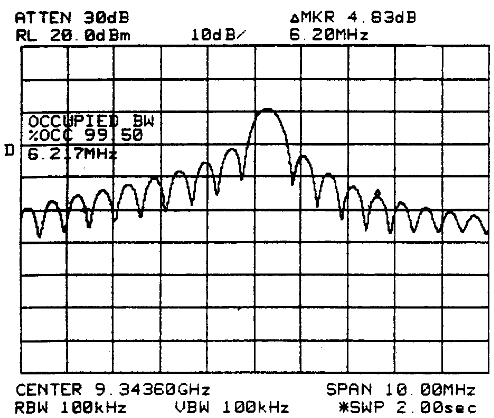


Figure 21. 5 NM MAP Mode

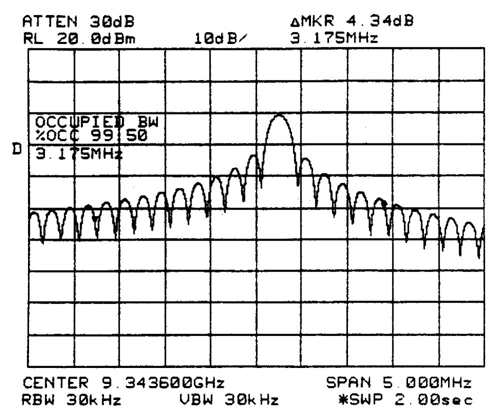


Figure 22. 10 NM WX Mode

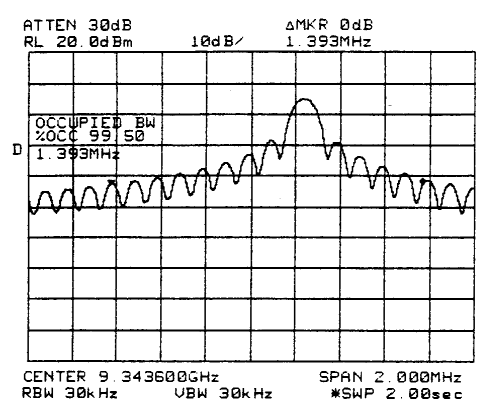


Figure 23. 25 NM WX Mode

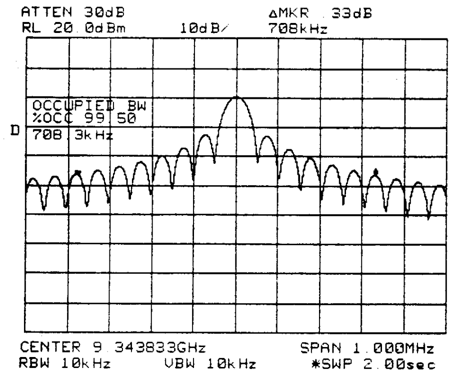


Figure 24. 50 NM WX Mode

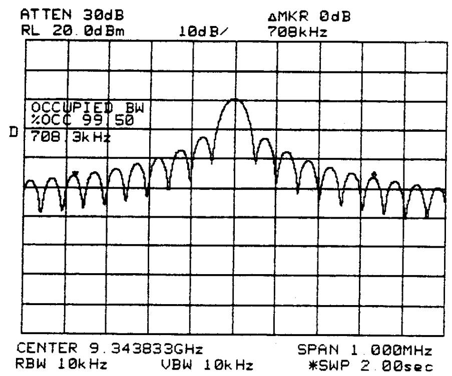


Figure 25. 100 NM WX Mode

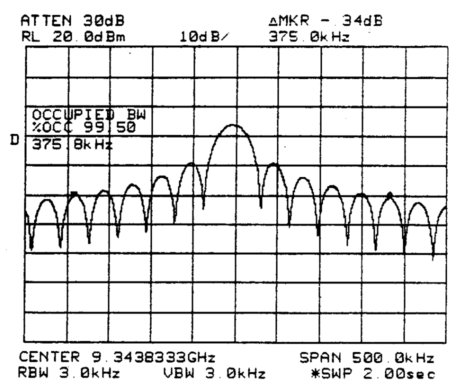


Figure 26. 200 NM WX Mode

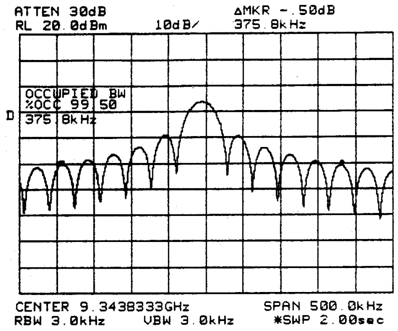


Figure 27. 300 NM WX Mode

4. RTA-8XX Modulation Characteristics (2.1047)
The RTA-8XX Weather Radar System uses six different pulse widths and four different pulse repetition frequency (PRF) patterns depending on range and mode selected. This results in nine possible combinations of pulse widths and pulse patterns.

Pulse Widths

The transmitted primary pulse width is selected by both range and mode of operation. The modulator contains circuitry to prevent the pulse width from exceeding 30 µs and the pulse rate exceeding 1500 pulses per second. Table 12 shows the pulse width used with the various ranges and modes.

Table 12. Pulse Widths for RTA-8XX Ranges and Modes

Range (nautical miles)	Mode	Pulse Width (in microseconds)
300	WX	28.8
	Map	28.8
200	WX	28.8
	Map	28.8
100	WX	19.2
	Map	19.2
50	WX	19.2
	Map	9.6
25	WX	9.6
	Map	4.8
10	WX	4.8
	Map	2.4
5	WX	2.4
	Map	1.7

Pulse Patterns

The following graphs (Figure 28 to Figure 31) show the average time between each transmitted pulse in milliseconds unless otherwise noted. The pulses are dithered in time to reduce on channel interference seen by the operator. Dithering also makes oscilloscope patterns of the pulse train next to impossible to view. The pulse pattern is controlled by the range selected and is independent of mode. See Table 12 for pulse widths in each range.

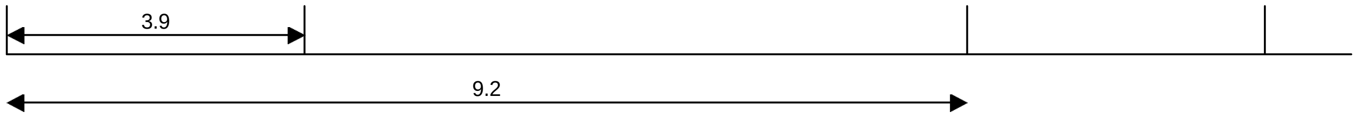


Figure 28. Pulse Pattern for 300 NMI Range (Equivalent PRF of 256 PPS)

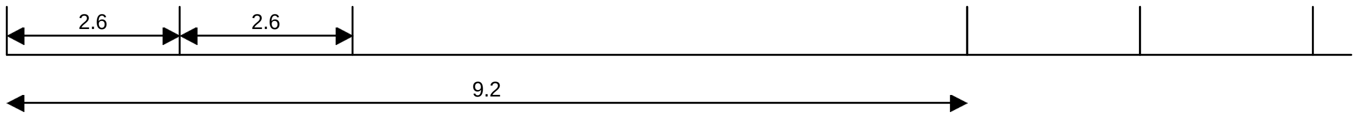


Figure 29. Pulse Pattern for 200 and 100 NMI Ranges (Equivalent PRF of 385 PPS)

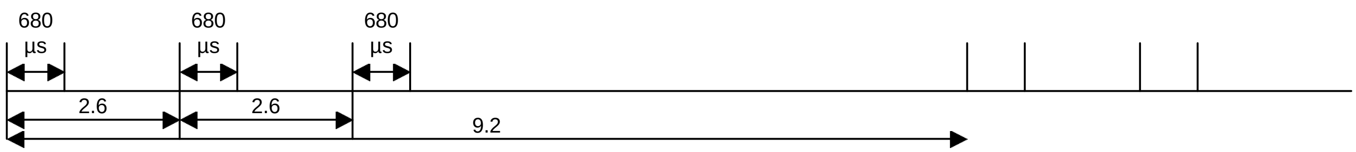


Figure 30. Pulse Pattern for 50 NMI Range (Equivalent PRF of 1.5 kHz)

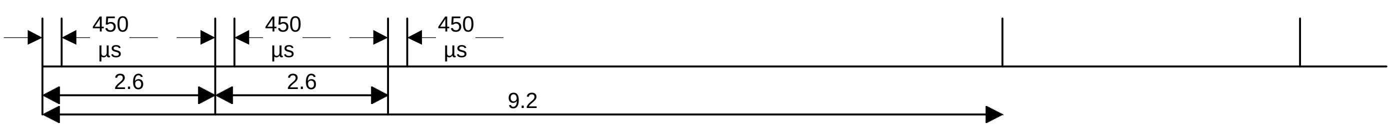


Figure 31. Pulse Pattern for 25, 10, and 5 NMI Ranges (Equivalent PRF of 2.2 kHz))

5. Spurious Emissions at Antenna Terminal (2.1051)
The equipment used for the Spurious Emissions at the Antenna Terminal test is shown in Table 13.

Table 13. Test Equipment Used for Spurious Emissions Test

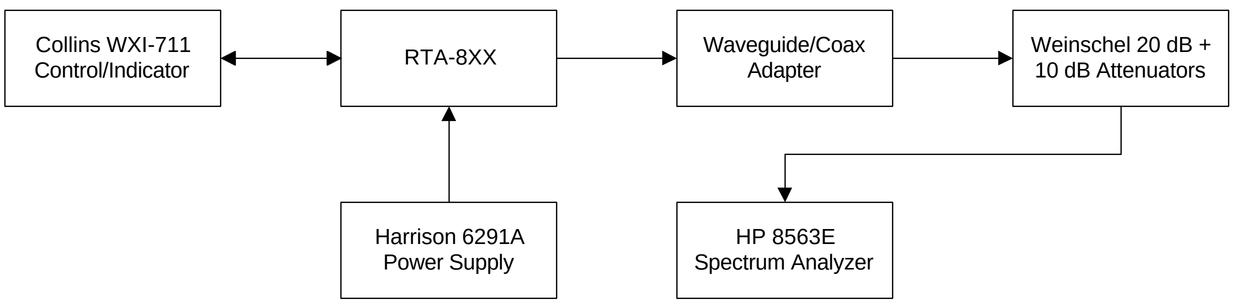
Control/Indicator	Rockwell Collins WXI-711
Power Supply	Harrison 6291A
Spectrum Analyzer	HP 8563E
Waveguide/Coax Adapted	HP X281A
Attenuator	Weinschel 10 dB and 20 dB
26.5 to 40 GHz Harmonic Mixer	HP 11970A

Procedure

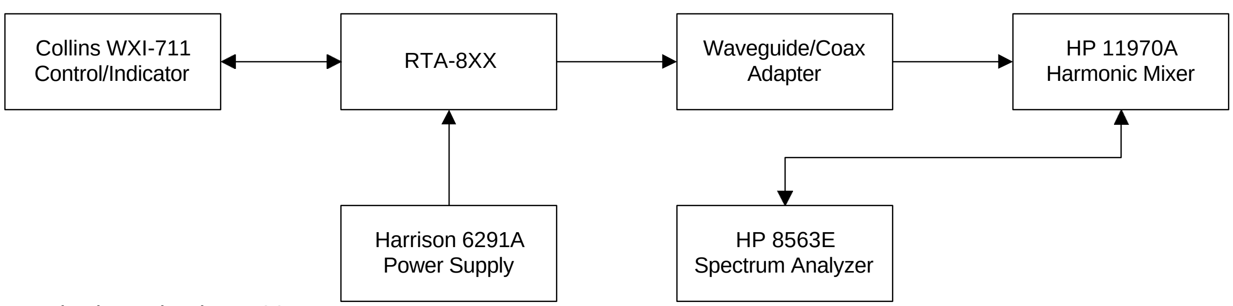
The antenna was removed from the assembly and the scan and tilt motors were disconnected to measure the spurious emissions at the antenna port. Since the antenna terminal is X-Band waveguide (WR-90), frequencies below the cutoff frequency (7 GHz) were not measured. The three modes used in this test where: 5nm MAP, 50 nm WX, and 300 nm WX.

Setup

0 to 26.5 GHz Setup



26.5 to 40 GHz Setup



The test setup is shown in Figure 32.

Figure32. Test Setup for Spurious Emissions at Antenna Terminal Test

Requirements:

Table 14 lists the requirements for the Spurious Emissions Test.

Table14. Spurious Emission Test Requirements (87.139.a.3)

From 14.0158 GHz to 18.6877 GHz	-25 dBc (dB relative to carrier level)
From 18.6878 GHz to 32.7032 GHz	-35 dBc
Over 32.7035 GHz	-40 dBc
Worst case	43 + 10 log (P_{tx}) dB

$P_{tx\text{-}peak}$ = 28.18 Watts or 14.5 dBW in all ranges.

$P_{tx\text{-}average}$ = 10 log (28.18 Watts * Average Duty Cycle) dBW.

FCC Limit (dBc) = 43 + $P_{tx\text{-}average}$

Absolute Limit (avg) = $P_{tx\text{-}average}$ (dBm) – FCC Limit (dBc) = -13 dBm average (in all ranges)

Absolute Limit (avg) = $10^{-13/10}$ = .0501 mW

Absolute Limit (peak) = 10*log(.0501mW / Average Duty Cycle)

Table15. Spurious Emission Test Requirements

Test Condition	**$P_{tx\text{-}average}$ (dBW)**	**FCC Limit (dBc)**	**Absolute Limit (average)**	**Absolute Limit (peak)**
5 nmi MAP	-15.5	27.5	-13.0 dBm	17.0 dBm
50 nmi WX	-4.4	38.6	-13.0 dBm	5.9 dBm
300 nmi WX	-7.7	35.3	-13.0 dBm	9.2 dBm

Results

There were no frequencies where the spurious level relative to the transmitter power output was within 20 dB of the FCC limit. The spectrum was checked to 40 GHz in all of the above three ranges. This range includes the fundamental to the fourth harmonic.

6. Frequency Stability (2.1055)
The block diagram shown in Figure 18 gives the frequency plan of the RTA-8XX. From that is can be seen that the frequency stability of the RTA-8XX is solely dependant on the SAW oscillator. An analysis of the SAW oscillator follows.

SAW Oscillator output frequency f_{osc} = 744.80 MHz.

SAW Oscillator frequency tolerance = 744.80 MHz ± 100 kHz = 744.70 to 744.90 MHz.

Frequency tolerance of transmitted frequency = f_{osc} * (138/11) ± 100 kHz * (138/11) = 9343.855 ± 1.255 MHz

Frequency drift = f_{osc} * $(T/5.8)^2$.

The turnover temperature of the SAW oscillator is room ambient (20 ºC) and assuming the frequency measured at ambient is nominal at 9343.849 MHz then the calculated frequency drift is:

Calculated frequency drift at –55 ºC = 744.80 * $(75/5.8)^2$ * (138/11) = 1.5624 MHz.

Calculated frequency drift at +70 ºC = 744.80 * $(50/5.8)^2$ * (138/11) = 694.4 kHz.

Table 16. Equipment Used for Frequency Stability Test

Equipment	Manufacturer and Model Number
Control/Indicator	Rockwell Collins WXI-711
Power Supply	Harrison 6291A
Spectrum Analyzer	HP 8563E
Waveguide to Coax Adapter	HP X281A
Attenuator	Weinschel 10 dB and 20 dB
Temperature Chamber	Thermotron SM-8C Mini-max.

Procedure

All frequency stability tests were conducted using the 50 nmi range in WX mode. The antenna was removed and drive circuits disconnected to enable the test set to be connected to the receiver/transmitter.

Temperature Test

The RTA-8XX was placed in a temperature chamber with all other equipment outside at ambient. The test unit was operated using 27.5-V dc primary power and the temperature varied from –55 ºC to +70 ºC. The RTA-8XX frequency was measured on the Spectrum Analyzer. Sufficient time was allowed to stabilize the unit after the chamber reached the desired temperature. Data was taken in 10 degree (or less) steps.

Voltage Test

The unit was operated on the bench at ambient temperature. The line voltage was varied from 85% to 115% of 27.5 V dc (23.3 V dc to 31.7 V dc).

Test Equipment Setup

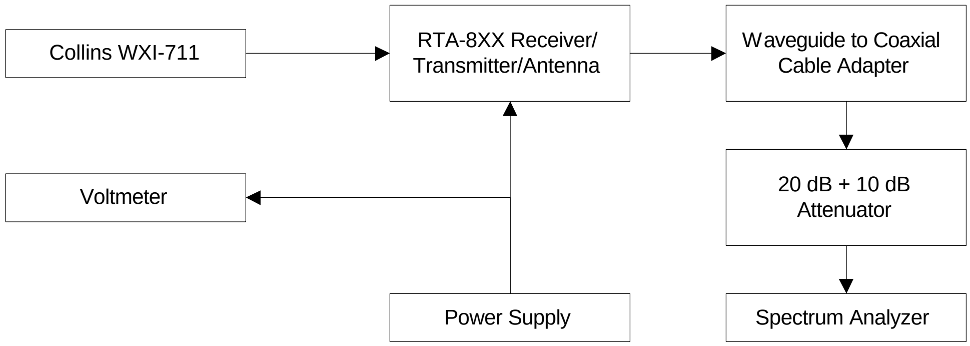


Figure 33. Frequency Stability Test Setup

Requirement

Per 87.133 note 9, “Where specific frequencies are not assigned to radar stations, the bandwidth occupied by the emissions of such stations must be maintained within the band allocated to the service and the indicated tolerance (1250 ppm) does not apply.”

Measured Results

Temperature range - -55 ºC to +70 ºC in 10 degree steps Results are listed in Table 17. Input voltage varied from 85% to 115% of 27.5 V dc. Results are listed in Table 18.

Table 17. Temperature Vs. Transmitted Frequency

Temperature (ºC)	Frequency (Spectrum Analyzer) (GHz)
-55	9342.577
-50	9342.742
-40	9343.025
-30	9343.238
-20	9343.458
-10	9343.635
0	9343.757
10	9343.832
20	9343.875
30	9343.827
40	9343.721
50	9343.582
60	9343.374
70	9343.120

Table 18. Input Voltage Vs. Transmitted Frequency

Line Voltage (V)	Frequency (IFR) (GHz)
23.3	9343.740
24.0	9343.740
26.0	9343.740
28.0	9343.740
30.0	9343.740
31.7	9343.740

7. Field Strength of Spurious Radiation (2.1053)

The equipment used for the Field Strength of Spurious Radiation test is listed in Table 19.

Table 19. Test Equipment Used for Field Strength of Spurious Radiation Test

Equipment	Manufacturer/Model Number
Control/Indicator	Rockwell Collins WXI-711
28V DC Power Supply	Harrison 6291A
Monopole Ant. (100 Hz – 30 MHz)	A.H. Systems SAS-200/550-1
Biconical Antenna (20 MHz – 300 MHz)	A.H. Systems SAS-200/540
Bilog Antenna (30 MHz – 1 GHz)	Chase CLB6111B
Log Periodic Antenna (200 MHz – 1.6 GHz)	A.H. Systems SAS-200/512
Double Ridge Waveguide Horn (1 GHz – 18 GHz)	Electro-Metrics RGA-180
Gain Horn (18 GHz – 26.5 GHz)	Narda 638
Gain Horn (26 GHz – 40 GHz)	Narda V637
Pre-Amplifier (1 GHz – 26.5 GHz)	HP 8449B
Spectrum Analyzer	Advantest R3271A
Harmonic Mixer	HP 11970A
LISN	Solar 6338-5-TS-50-N

Procedure

The RTA-8XX was tested for spurious radiation from the assembly, control leads, and power lines. The antenna was attached and the scan and tilt motors were operating. The 50 nm range in weather mode was used to represent normal operation. The test antennas were placed one meter away from the unit under test. The frequencies from 150 kHz to 40 GHz were monitored for spurious signals. The measured responses were plotted and then compared to the carrier (9.343 GHz) power referenced to a half-wave dipole.

Setup

The test setup for the Field Strength of Spurious Radiation test is shown in Figure 34.

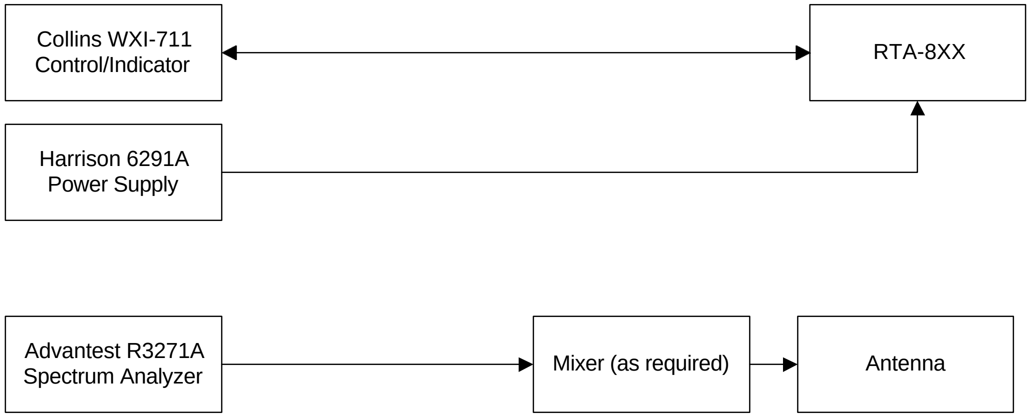


Figure 34. Test Setup for Field Strength of Spurious Radiation Test.

Requirement

FCC Limit (dBc) = $43 + 10*\log(P_{tx\text{-}average})$

Limit (Watts) = $P_{tx\text{-}average} * 10^{-(\text{FCC Limit (dBc)}/10)}$

This level is converted to a field strength value “E” based on a dipole radiator:

$E^2 = (30*G*L)/R$

Where: G = 1.64 (dipole gain)

L = Limit (Watts)

R = 1 meter (Test distance)

E = Field strength (volts/meter)

Therefore (using the 300nm range as an example (.6% Duty Cycle) & 44.5 dBm peak power):

$P_{tx\text{-}average}$ = .170 Watts average

FCC Limit (dBc) = 43 + 10*log(.17) = 35.3 dBc average

Limit (Watts) = $.17 * 10^{-(35.3/10)}$ = 50.12 µW average

$E^2 = 30 * 1.64 * (50.12*10^{-6}) = 2.465*10^{-3}$

E (V/m) = $(2.465*10^{-3})^{1/2}$ = 49657 µV/m average

E (dBµV/m) = 20 * log(49657 µV/m) = ***93.92 dBmV/m***

Since the FCC Limit is average power, and the receiver used to detect the radiated power is a peak power reading instrument, the FCC Limit must be converted to peak power, which can be accomplished in two ways. The first method is to simply convert the average limit to peak by taking it out of dB, squaring it, divide by the duty cycle, and convert it back to dB. The second method is to take the difference (in dB) between peak power and average power at a given duty cycle (.006 for the 300nm range in this case) and add it to the average limit in dBµV/m.

Method 1

Limit (average) = 93.92 dBμV/m

Limit (average) = $10^{(93.92/20)}$ = 49659 μV/m

Limit (peak) = 49659^2 / .006 = .411*10^{12} μV/m

Limit (peak) = 10 log (.411*10^{12} μV/m) = ***116.1 dBmV/m***

Method 2

Limit (average) = 93.92 dBμV/m

Peak Power (mW) = $10^{(44.5/10)}$ = 28183 mW

Average Power (mW) = 28183 mW * .006 = 169.1 mW

Average Power (dBm) = 10 log (169.1 mW) = 22.28 dBm

Difference (dB) = 44.5 dBm(peak) – 22.28 dBm(average) = 22.22 dB

Limit (peak) = 93.92 dBμV/m + 22.22 dB = ***116.1 dBmV/m***

Table 20. Requirements for Field Strength of Spurious Radiation Test

Mode	Peak Power (dBm)	Average Power (dBm)	Difference (dB)	Peak Limit (dBμV/m)
5nm MAP	44.5	14.5	30	123.92
5nm WX	44.5	17.5	27	120.92
10nm WX	44.5	19.3	25.2	119.12
25nm WX	44.5	22.3	22.2	116.12
50nm WX	44.5	25.6	18.9	***112.82***
100nm WX	44.5	22.3	22.2	116.12
200nm WX	44.5	24.0	20.5	114.42
300nm WX	44.5	22.3	22.2	116.12

Table 20 lists the requirements for the Field Strength of Spurious Radiation Test. Note that the 50nm range has the lowest Peak Limit of all the ranges and modes, 112.82 dBμV/m. The RTA-8XX will be tested to that limit (112.82 dBμV/m) in order to ensure that every range will not exceed its own individual limit.

Measured

There were no spurious emissions that were within 20 dB of the Limit, or greater than 92.82 dBμV/m. Spectrum plots are included for the entire frequency range tested, see Figures 35 through 54.

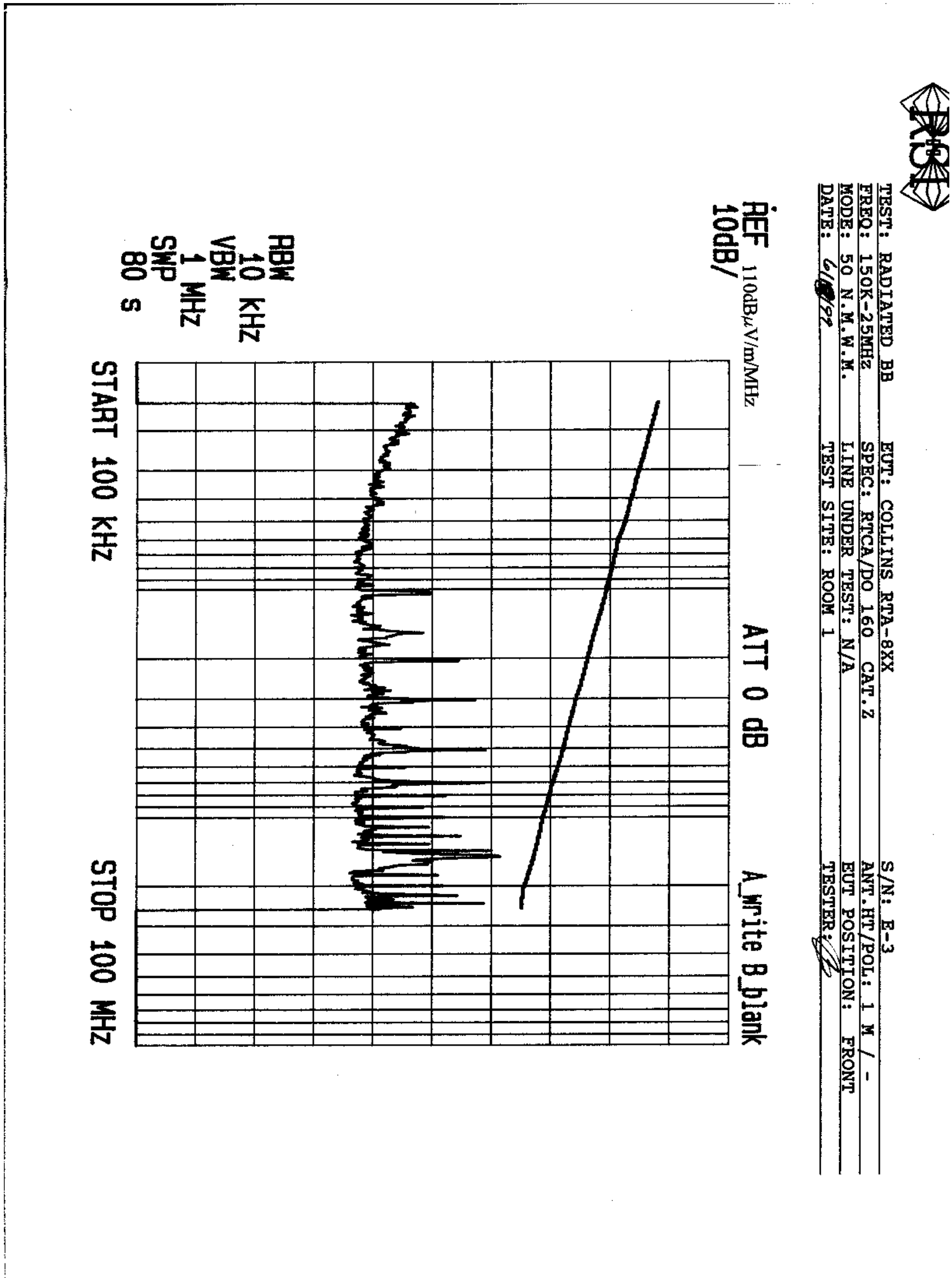


Figure 35 - Radiated Broadband 150kHz – 25 MHz

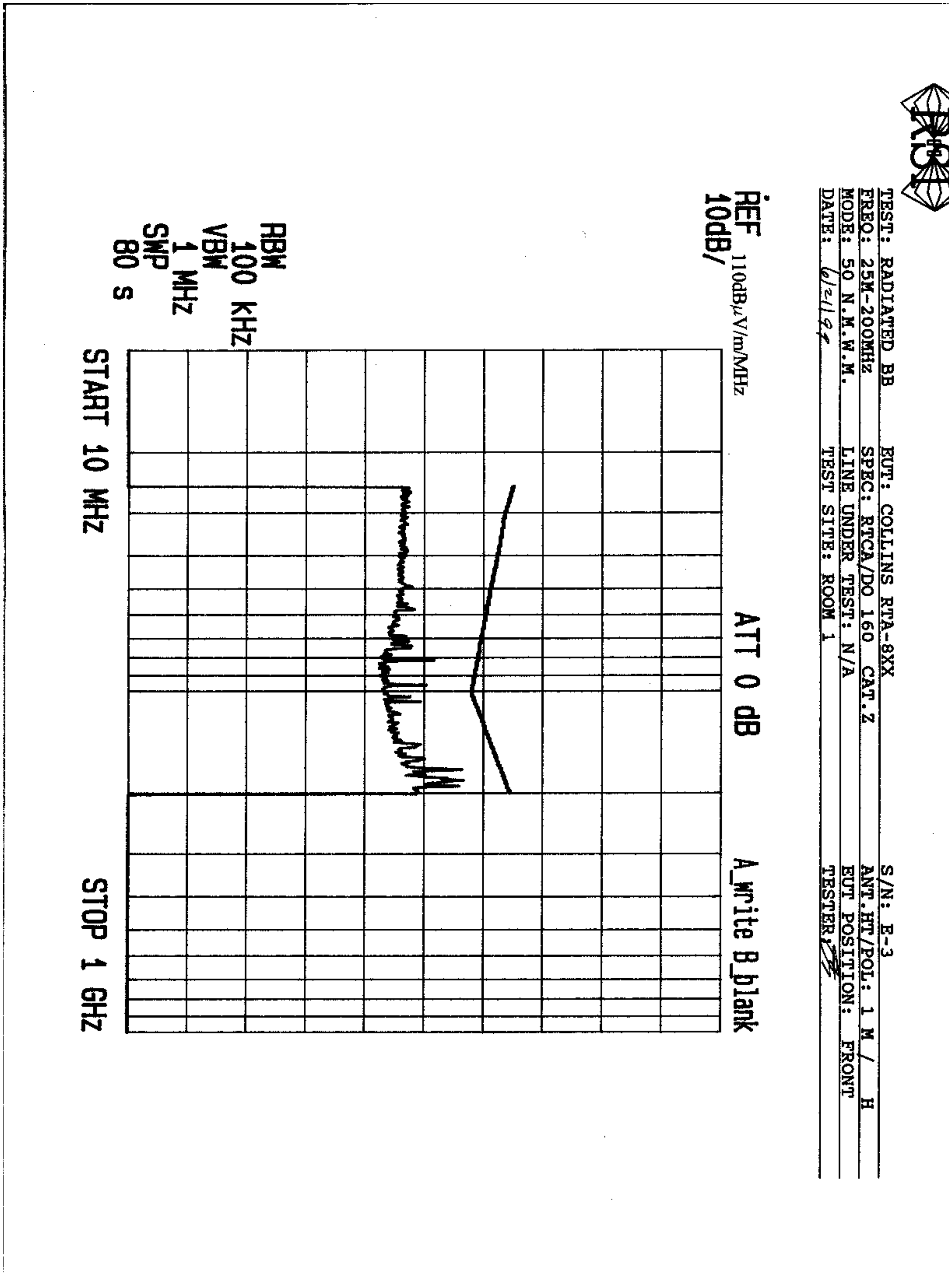


Figure 36 - Radiated Broadband 25 MHz – 200 MHz Horizontal

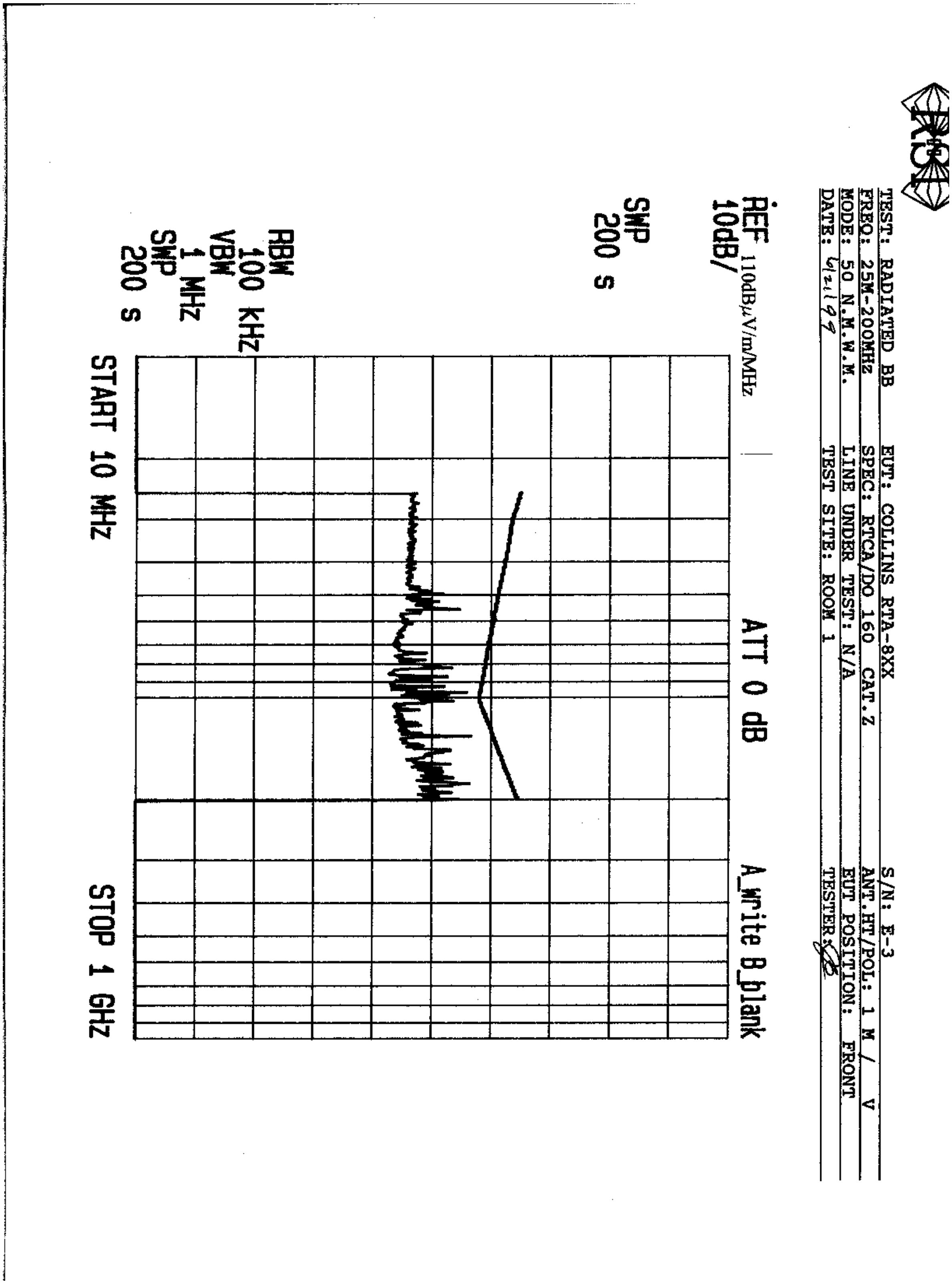


Figure 37 - Radiated Broadband 25 MHz – 200 MHz Vertical

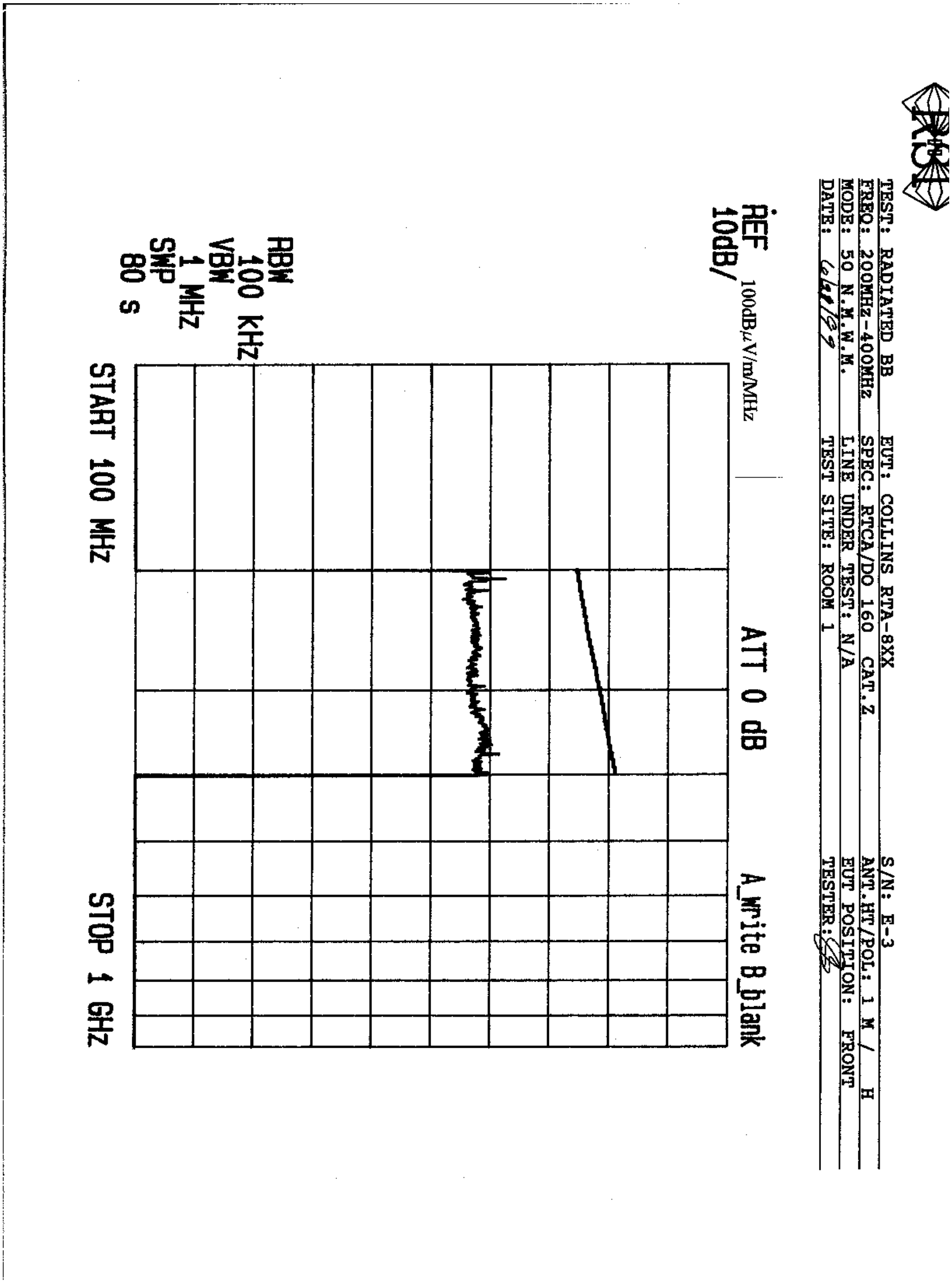


Figure 38 - Radiated Broadband 200 MHz – 400 MHz Horizontal

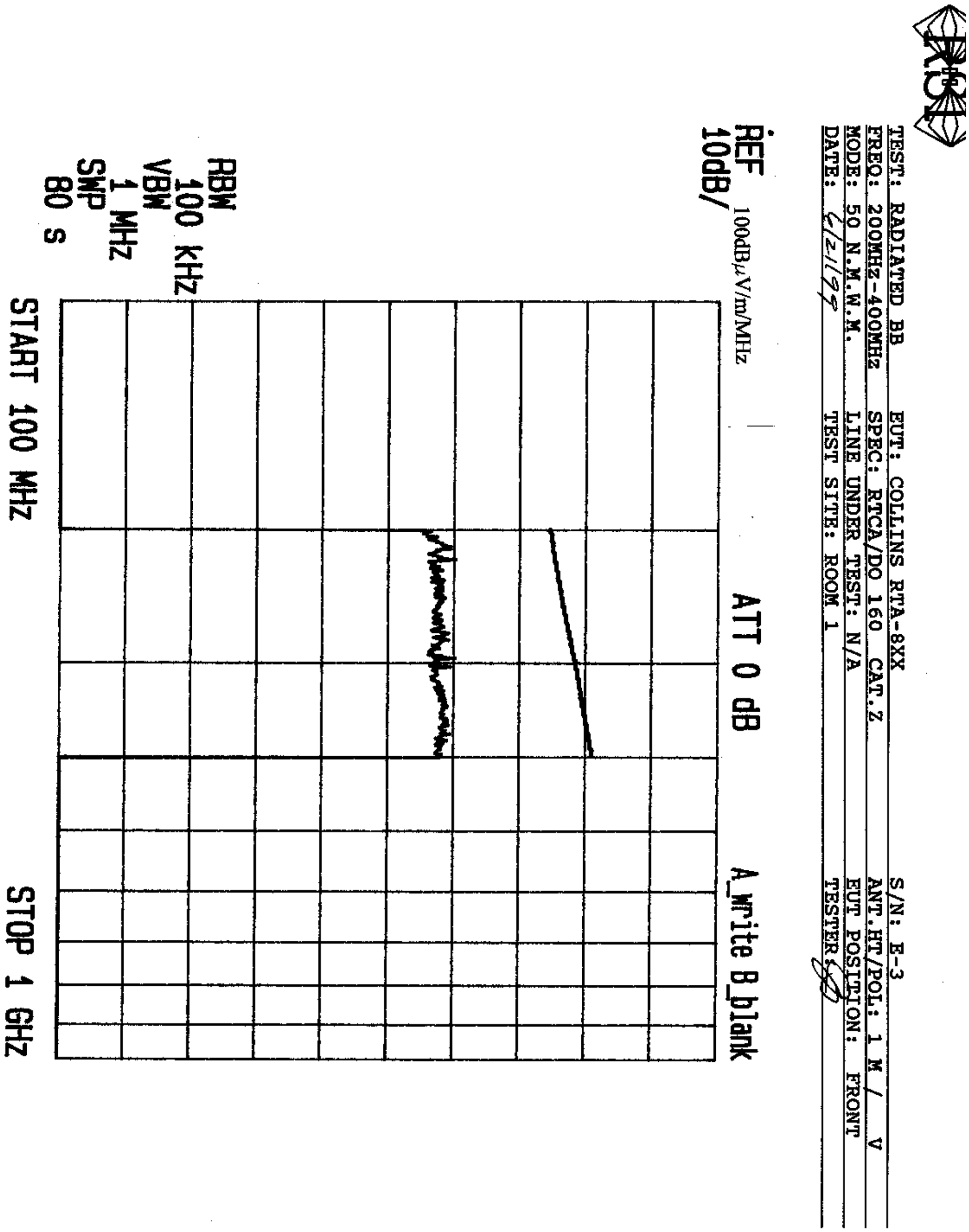


Figure 39 – Radiated Broadband 200 MHz - 400 MHz Vertical

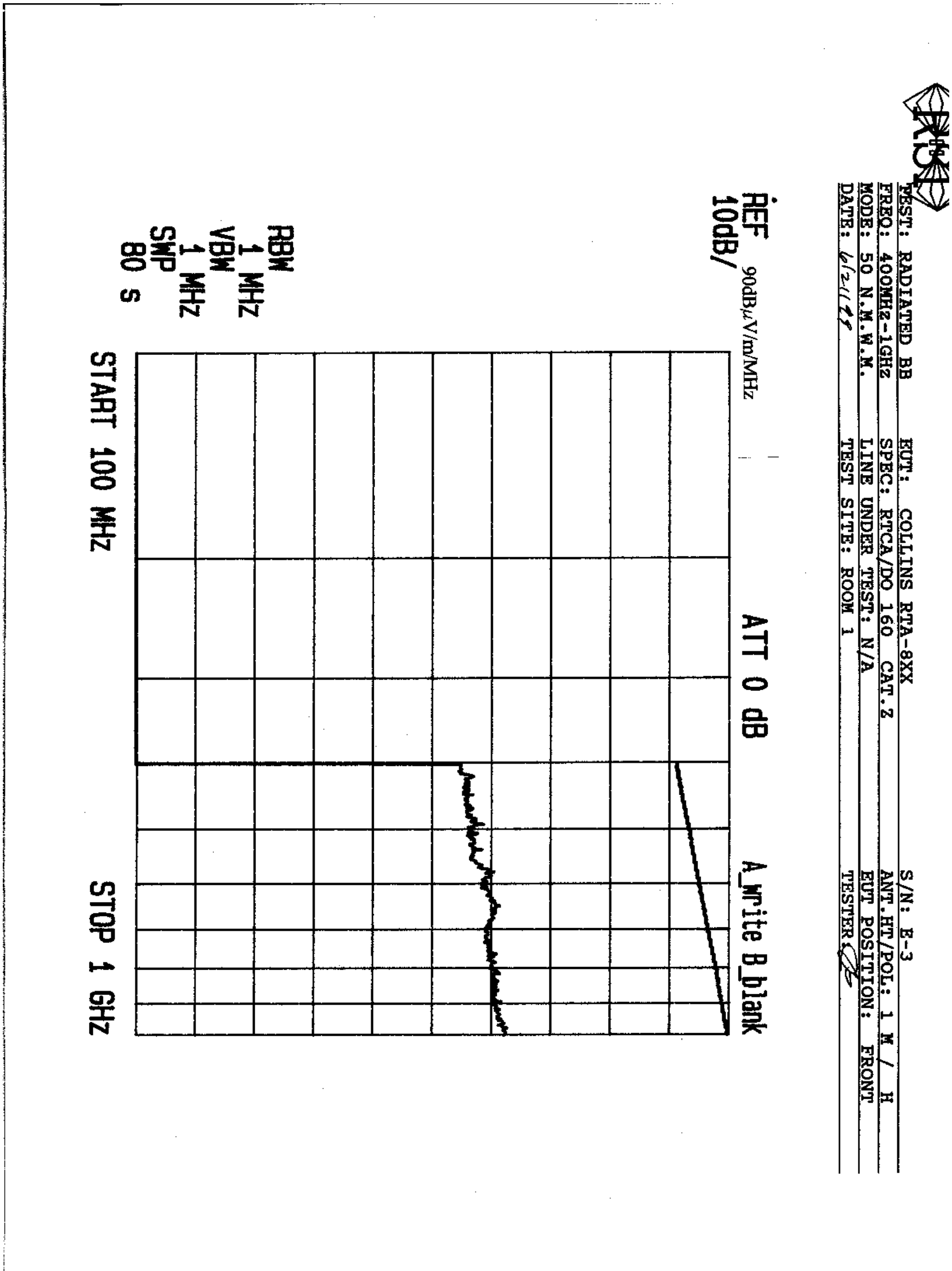


Figure 40 – Radiated Broadband 400 MHz – 1 GHz Horizontal

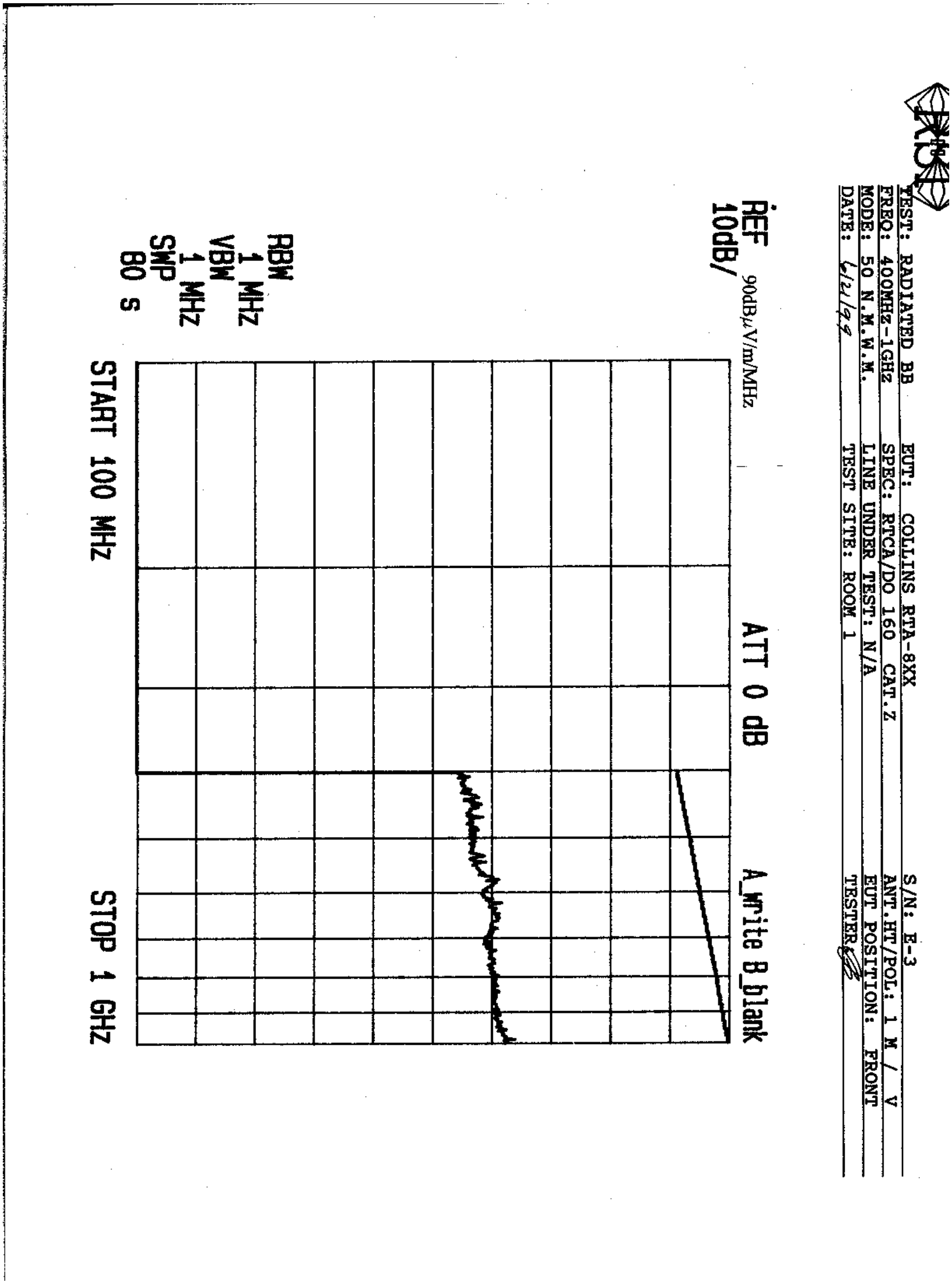


Figure 41 – Radiated Broadband 400 MHz – 1 GHz Vertical

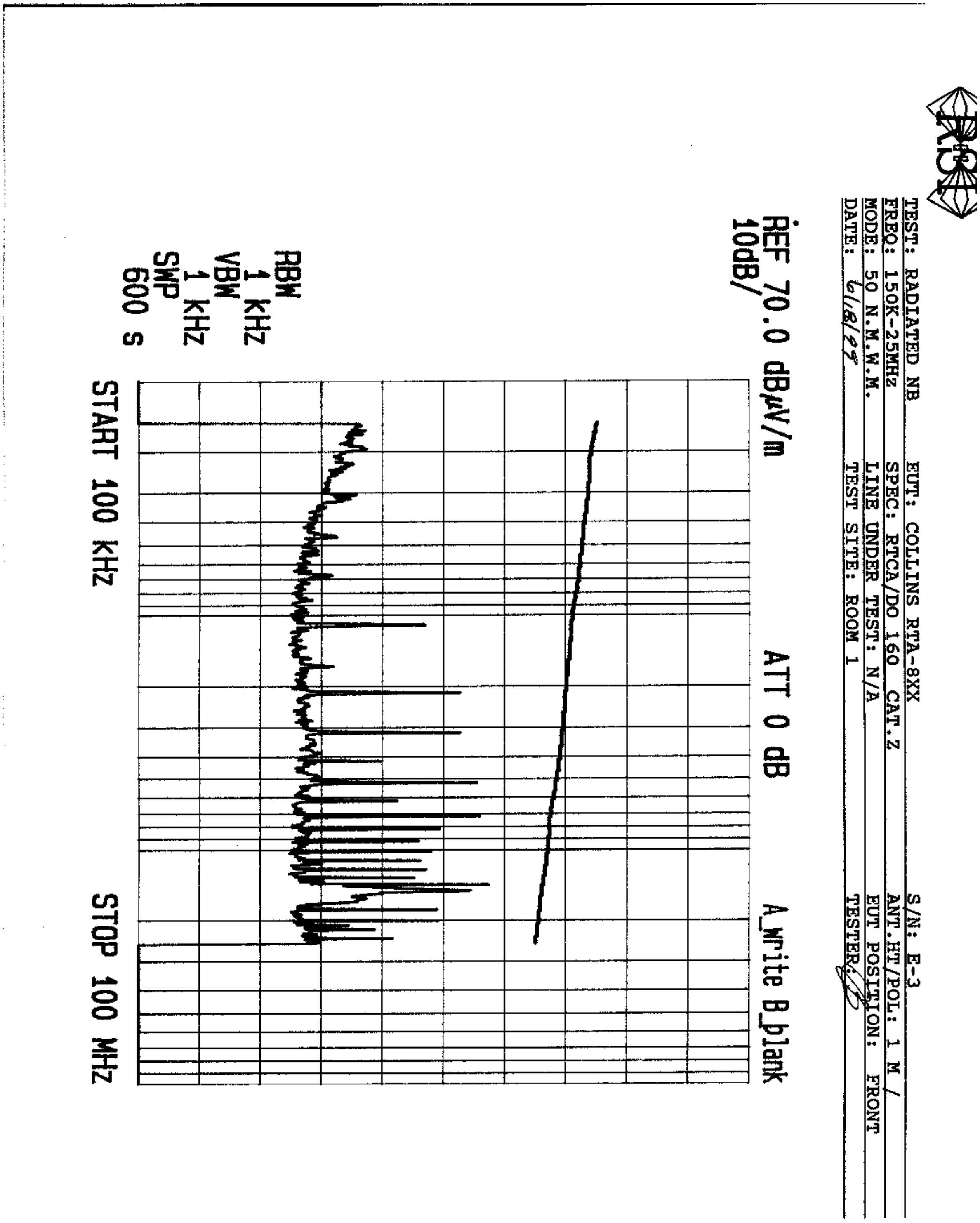


Figure 42 – Radiated Narrowband 150 kHz – 25 MHz

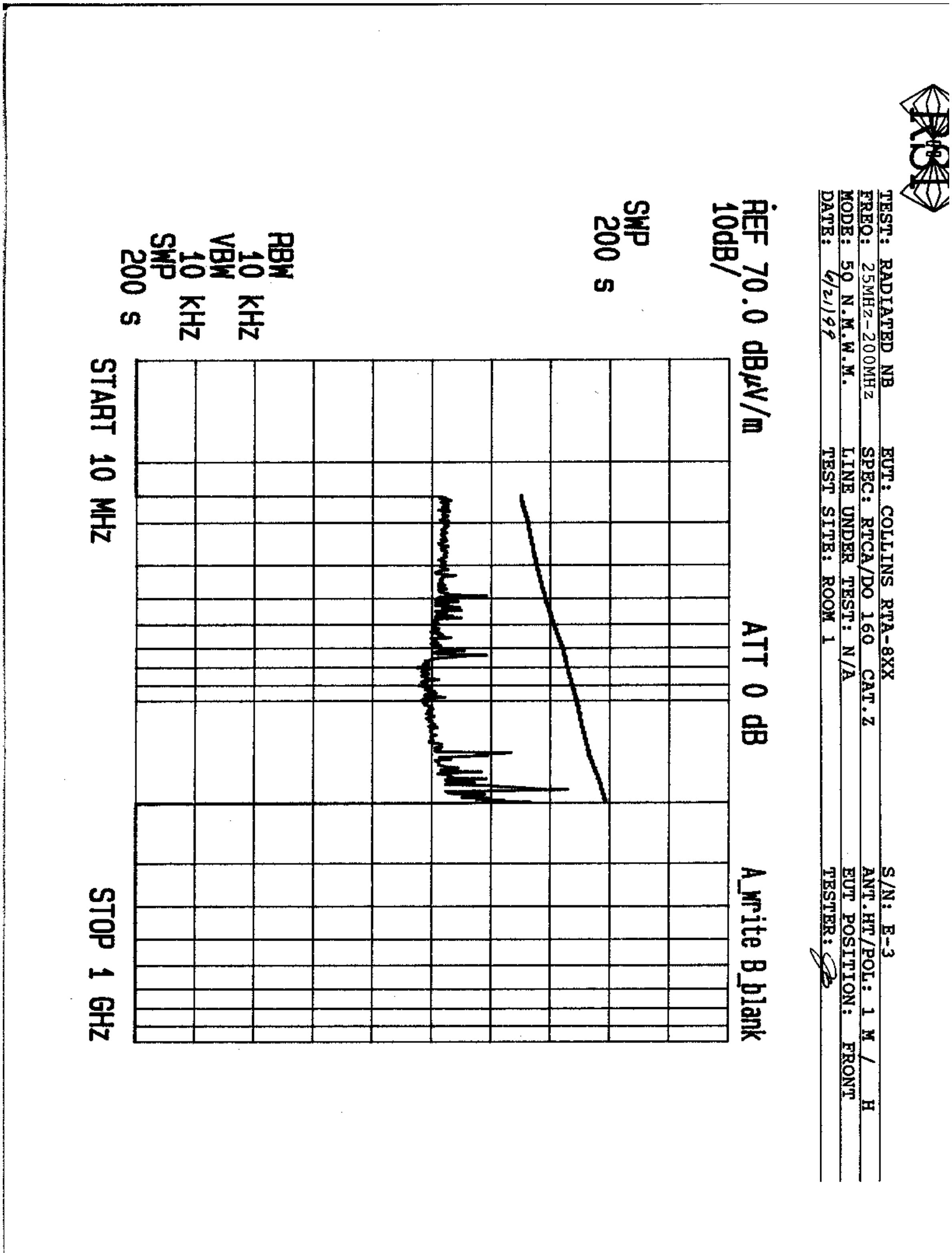


Figure 43 – Radiated Narrowband 25 MHz – 200 MHz Horizontal

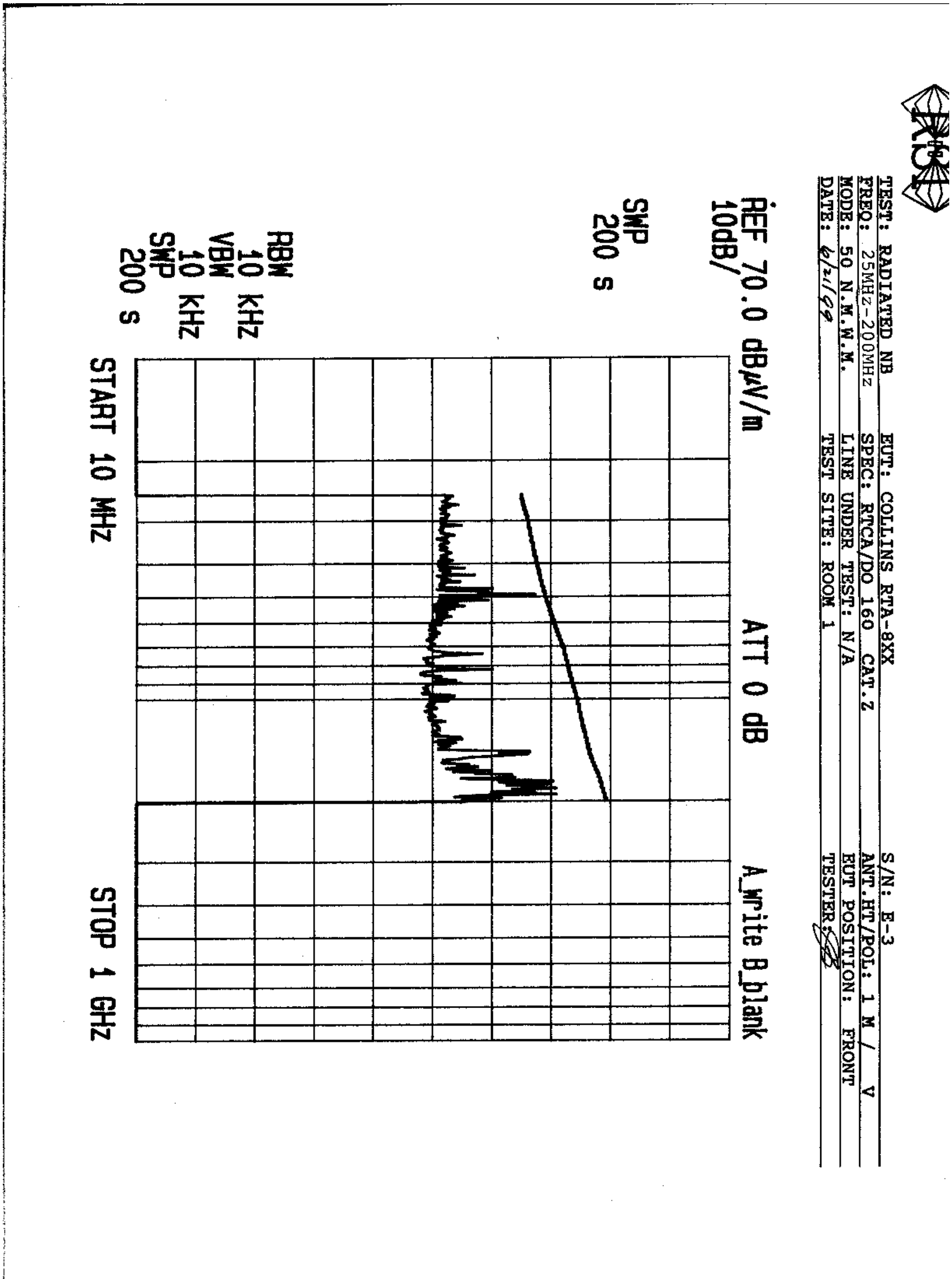


Figure 44 – Radiated Narrowband 25 MHz – 200 MHz Vertical

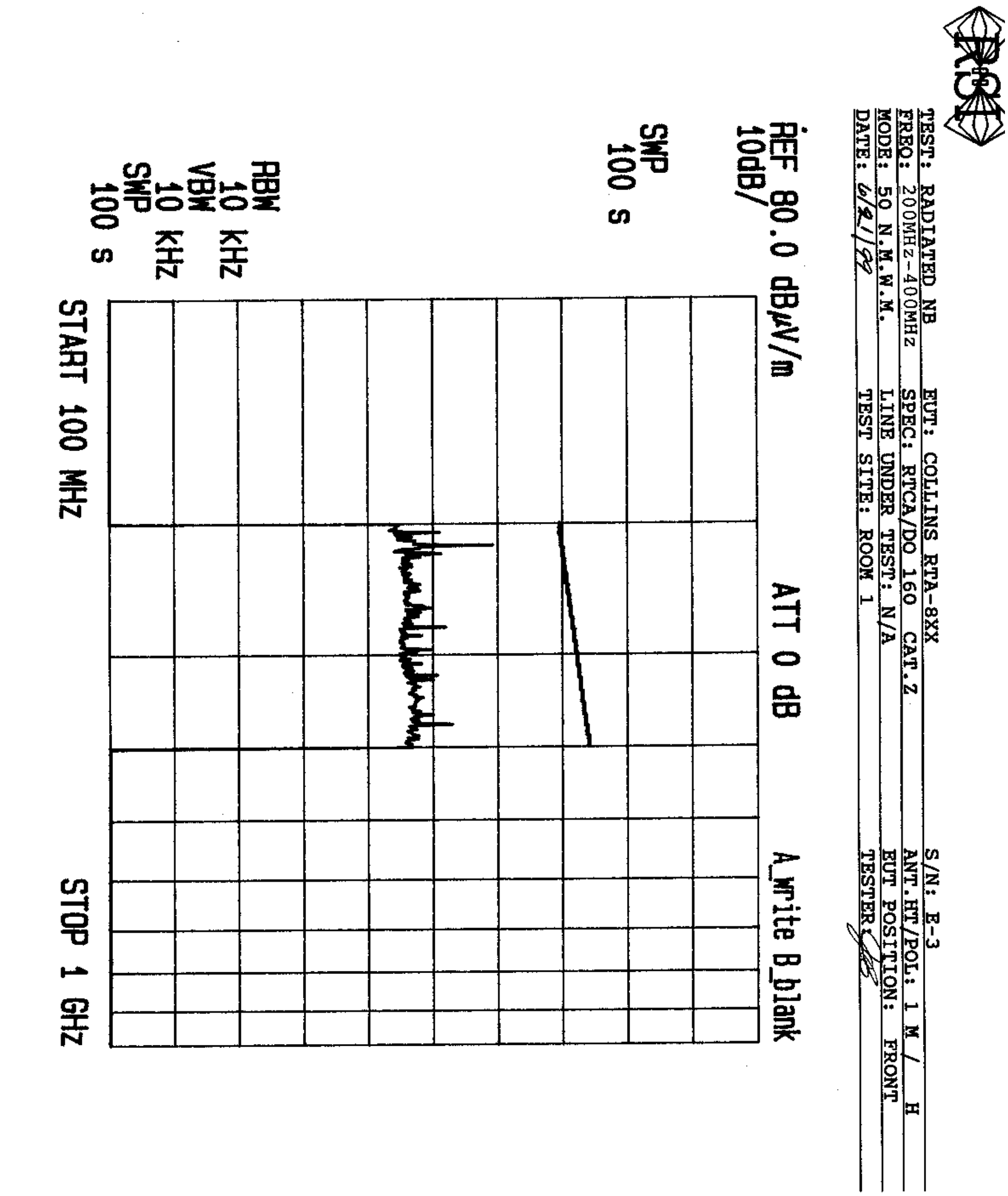


Figure 45 – Radiated Narrowband 200 MHz – 400 MHz Horizontal

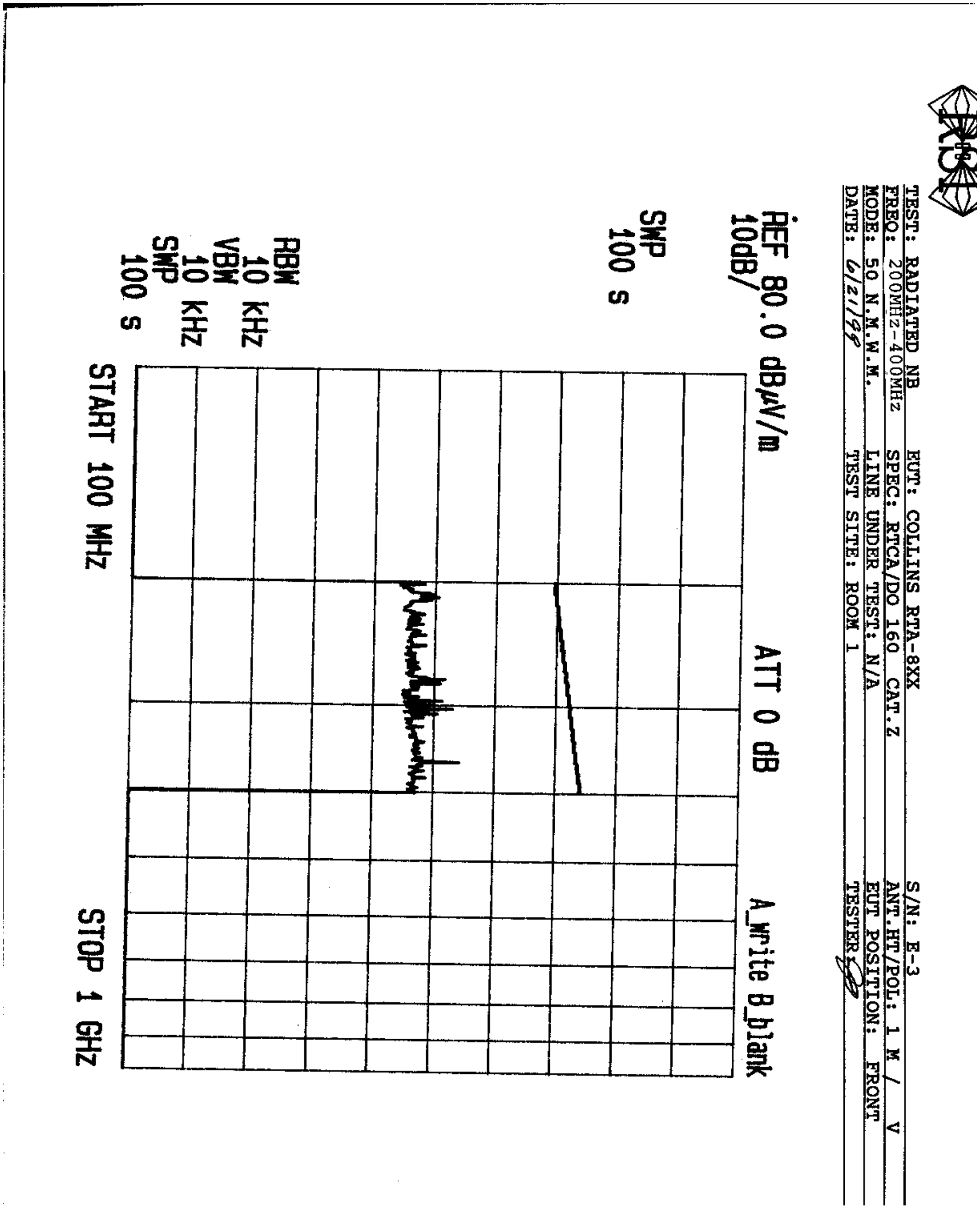


Figure 46 – Radiated Narrowband 200 MHz – 400 MHz Vertical

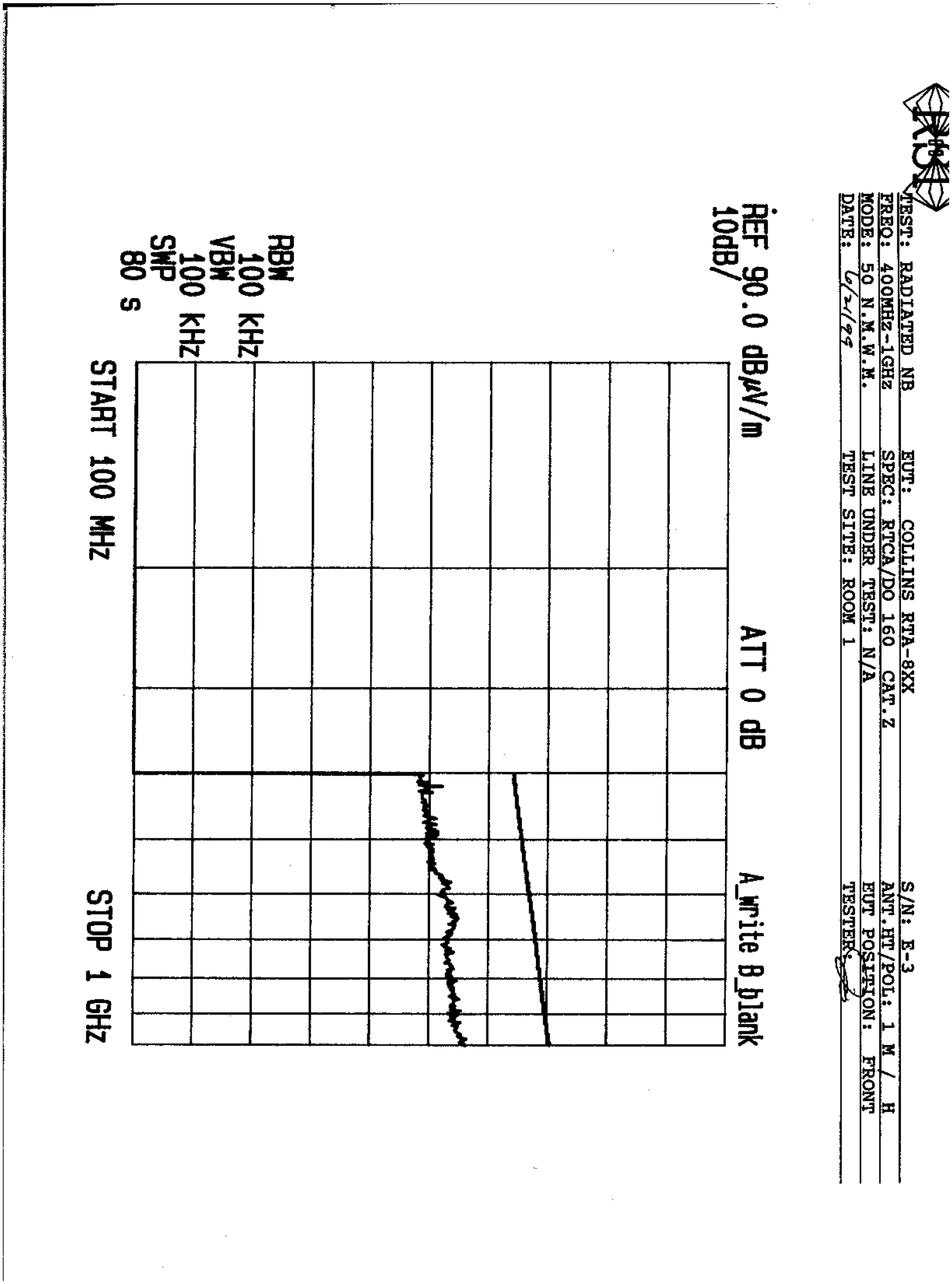


Figure 47 – Radiated Narrowband 400 MHz – 1 GHz Horizontal

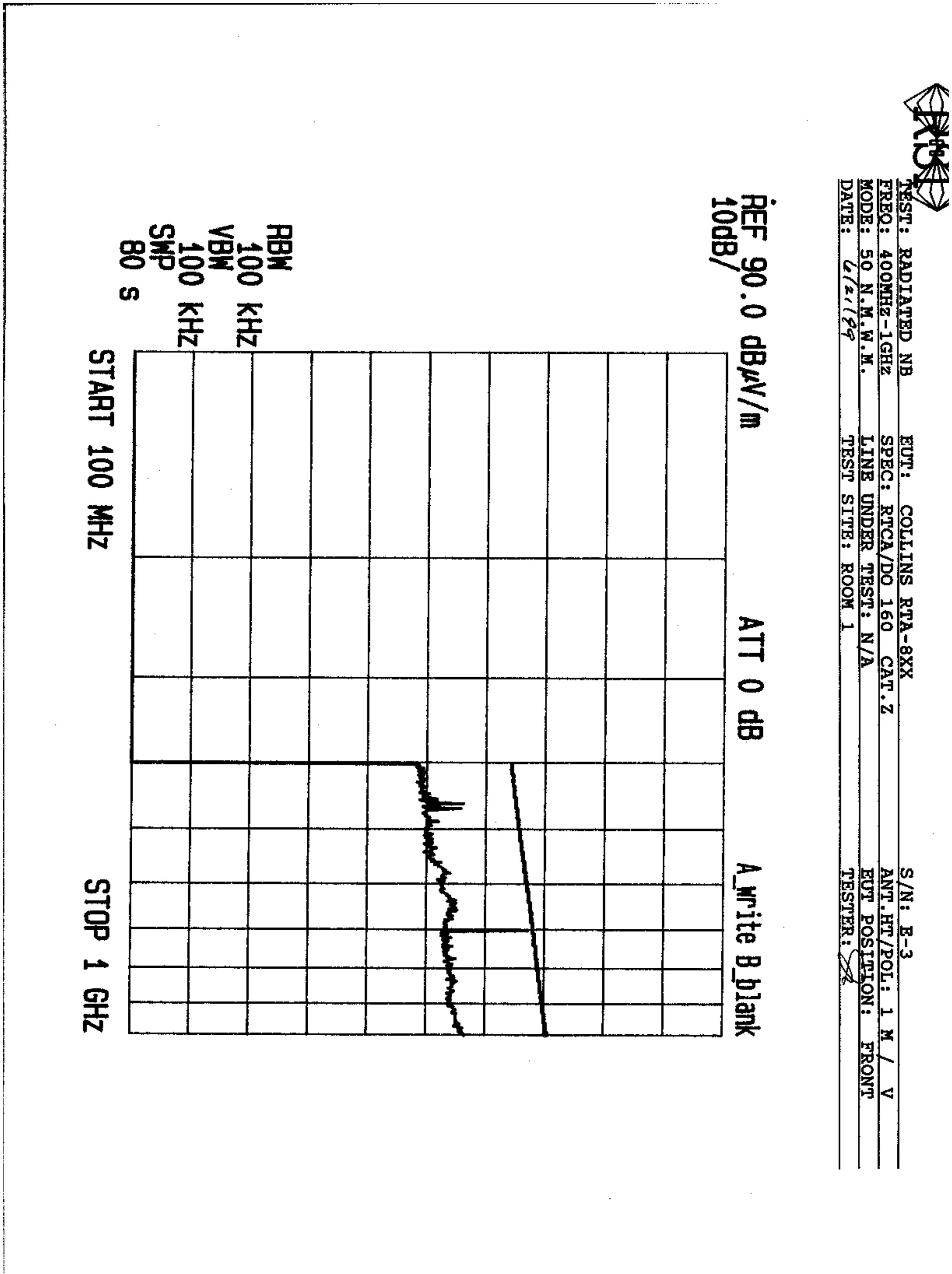


Figure 48 – Radiated Narrowband 400 MHz – 1 GHz Vertical

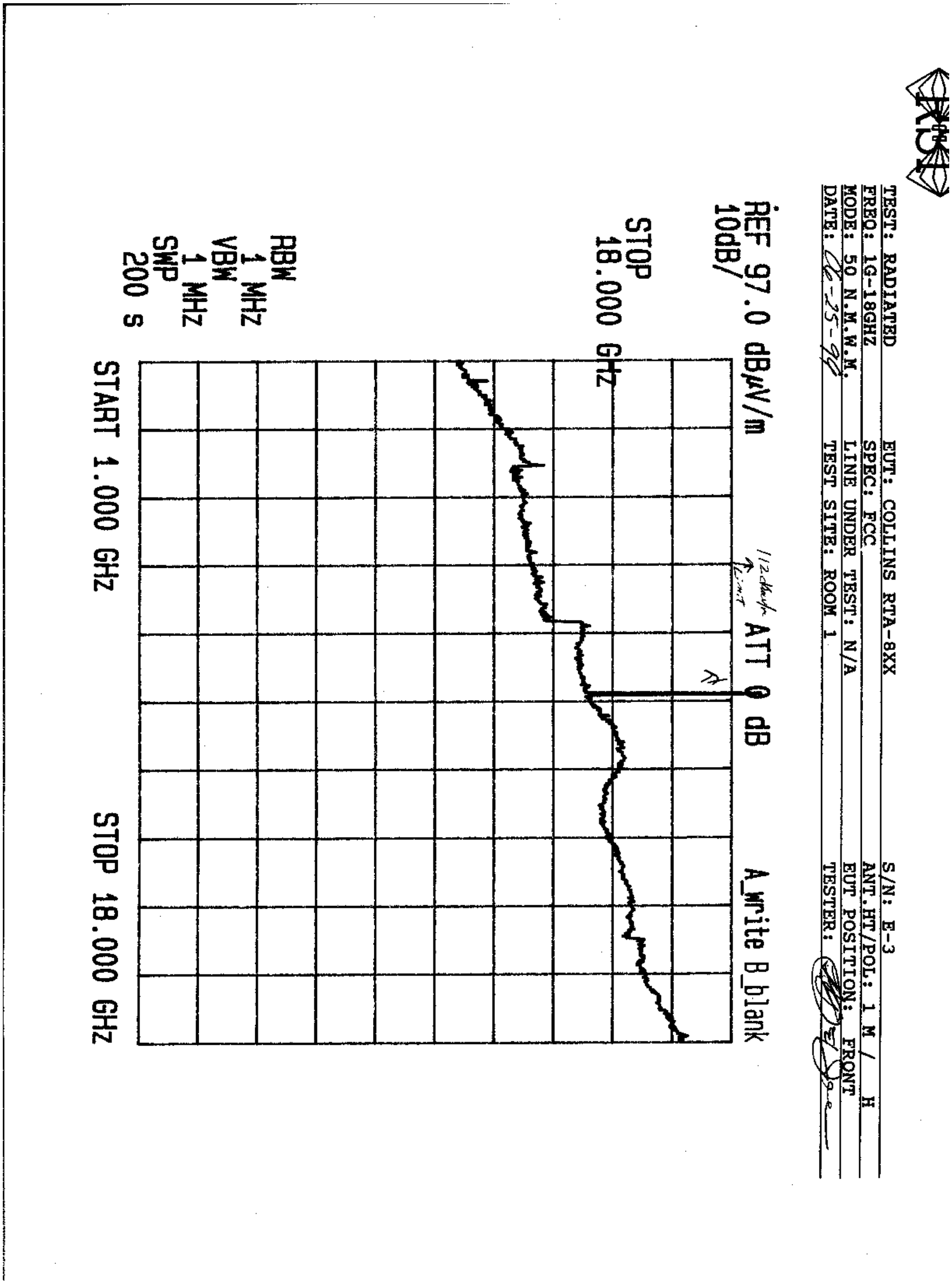


Figure 49 – Radiated Narrowband 1 GHz – 18 GHz Horizontal

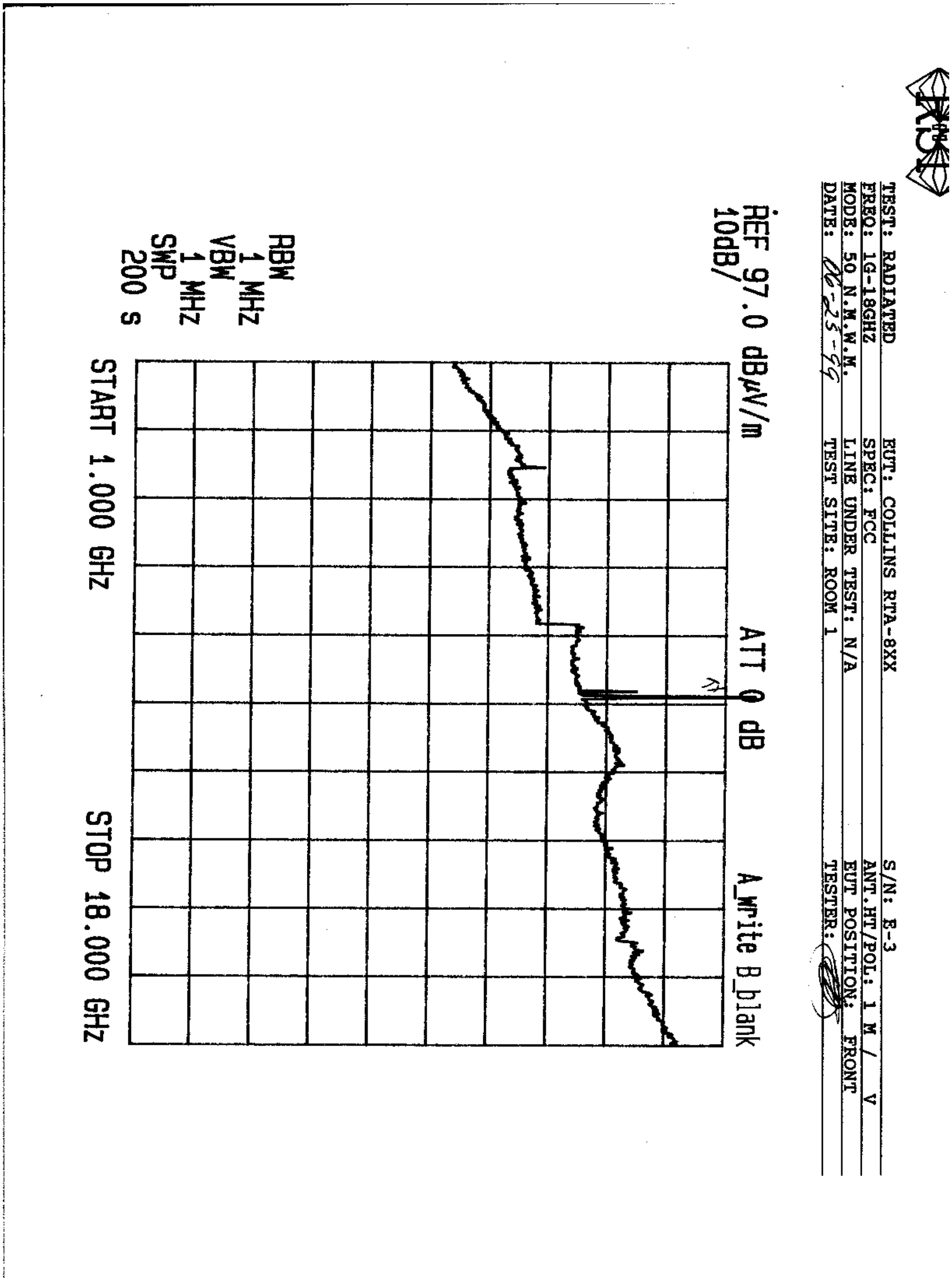


Figure 50 – Radiated Narrowband 1 GHz – 18 GHz Vertical

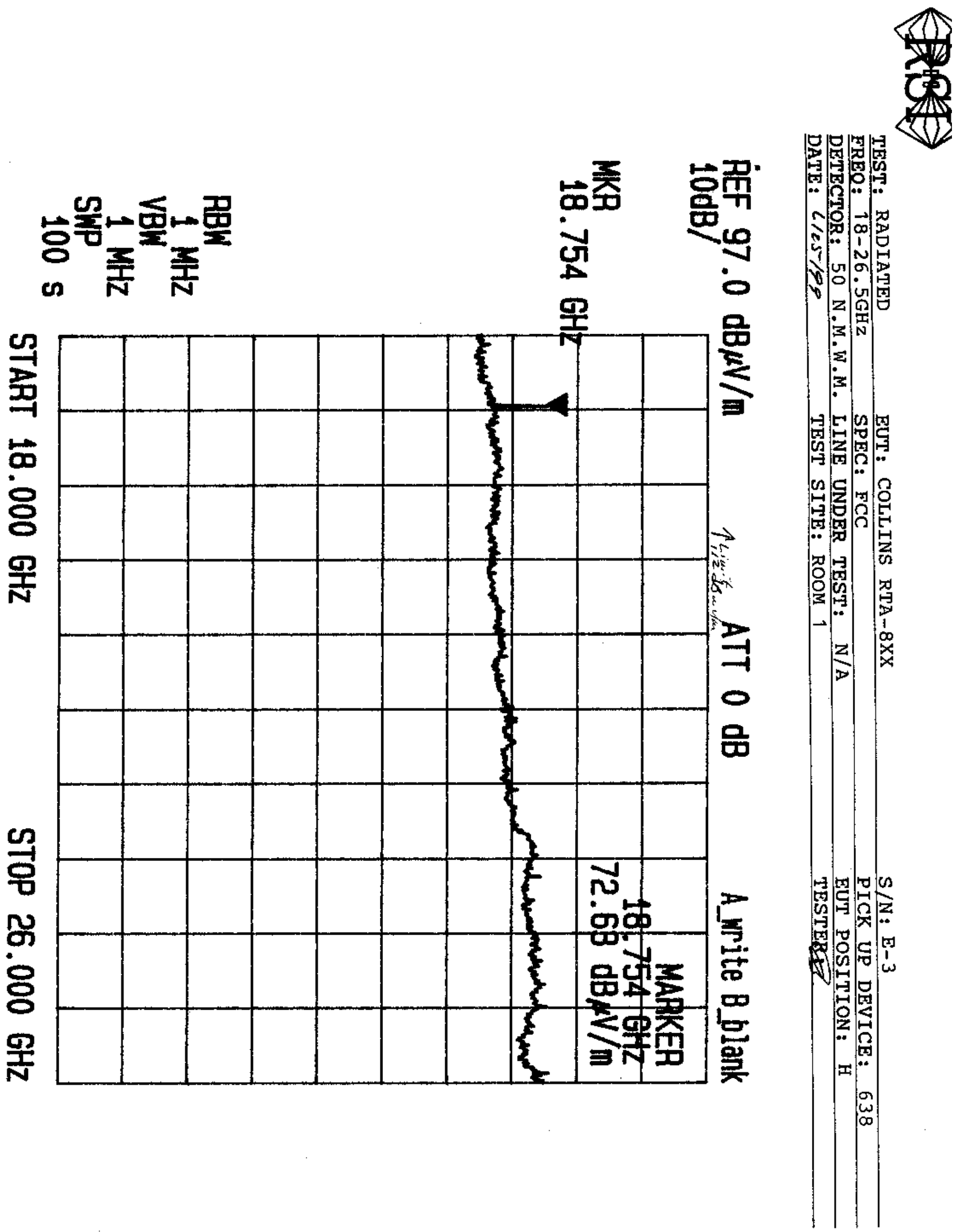


Figure 51 – Radiated Narrowband 18 GHz – 26 GHz Horizontal

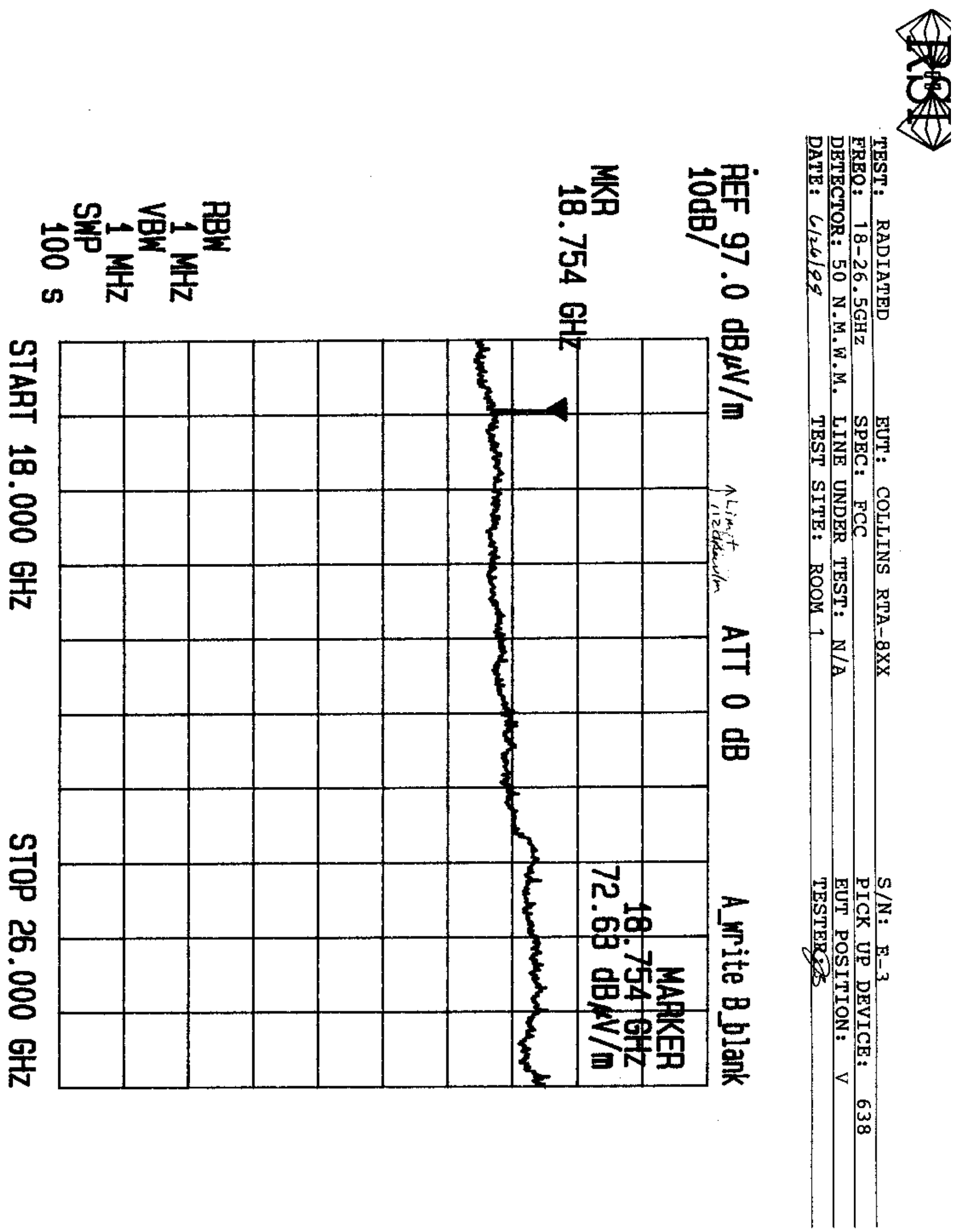


Figure 52 – Radiated Narrowband 18 GHz – 26 GHz Vertical

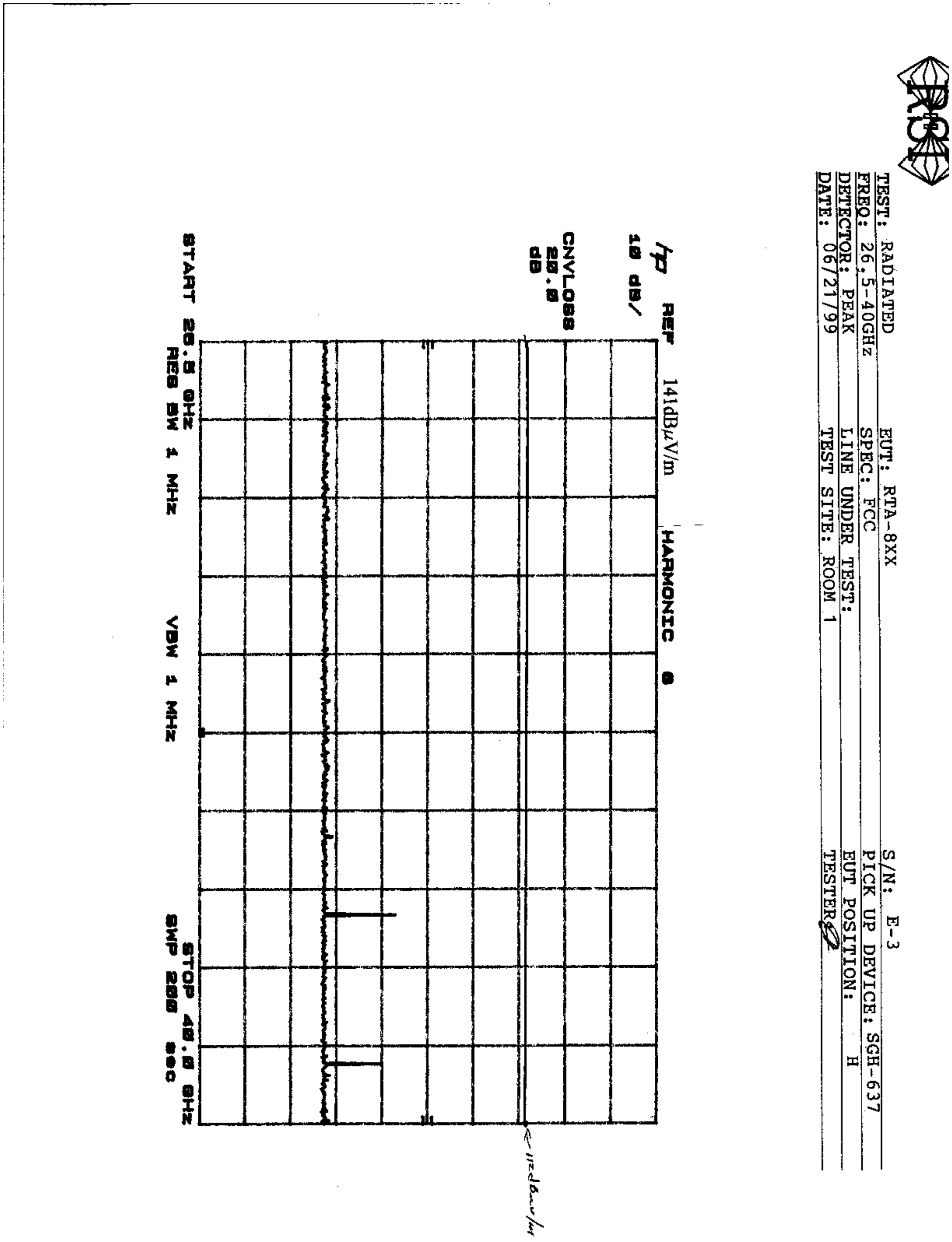


Figure 53 – Radiated Narrowband 26 GHz – 40 GHz Horizontal

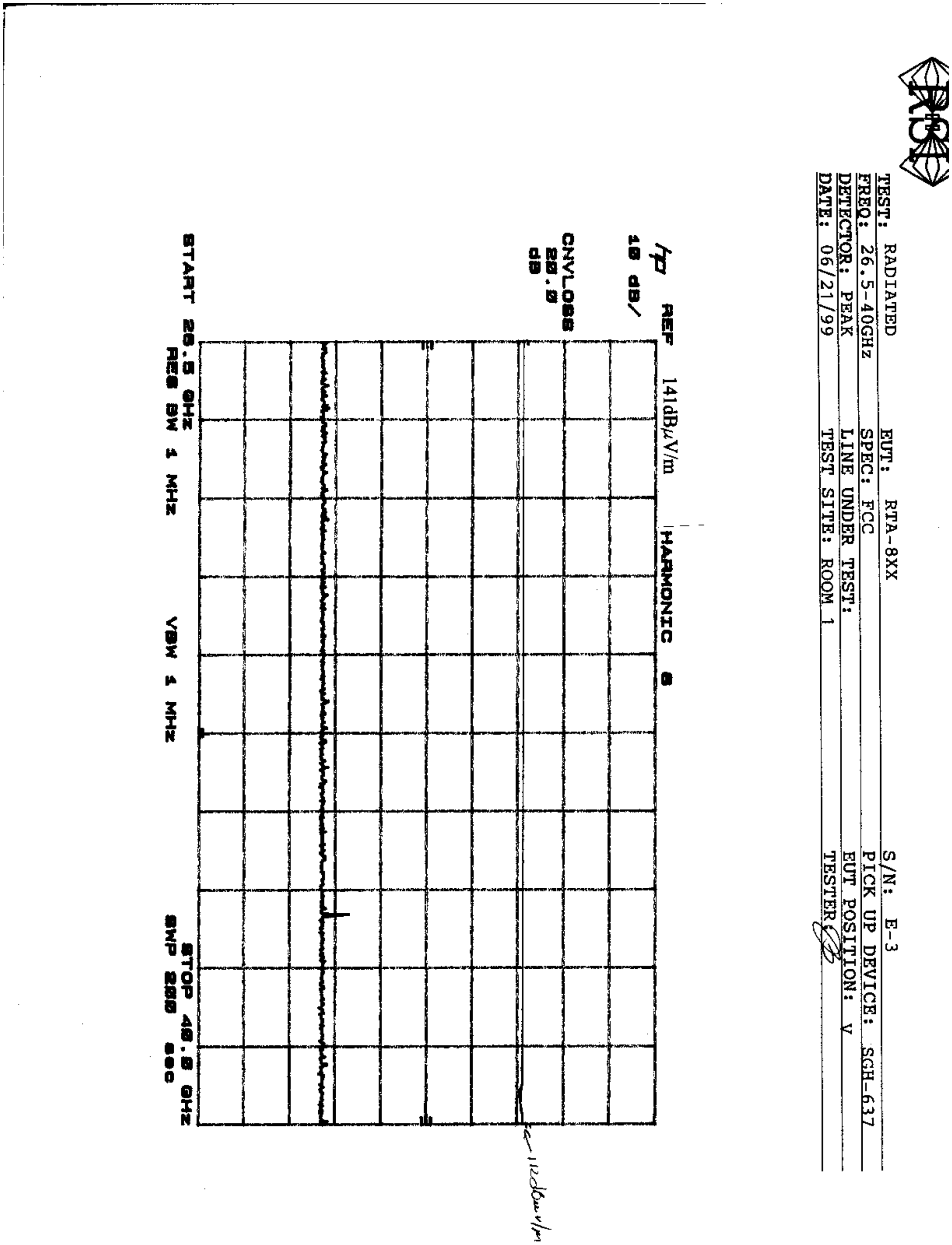


Figure 54 – Radiated Narrowband 26 GHz – 40 GHz Vertical