10.0 FREQUENCY STABILITY - PART 2.1055a **(Temperature)**

The frequency stability was measured from -30° to +50° centigrade at intervals of 10° centigrade throughout the range. Prior to each frequency measurement, the equipment was left alone for a sufficient period of time (approximately 30 minutes or more) to allow the components of the Highway Information System DRTXM2 Transmitter oscillator circuitry to stabilize. The following information was taken:

FREQUENCY STABILITY FOR TEMPERATURE VARIATION IN MHz:

-30°	1.610045
-20°	1.61004
-10°	1.61004
0°	1.61004
+10°	1.61004
+20°	1.61003
+30°	1.61003
+40°	1.610015
+50°	1.61002

Worst Case Variance:

3 Hz

As stated in Part 90.242 (b)(2) the Frequency Tolerance of 100 Hz shall be maintained. Per Frank Coperich of the FCC this takes precedence over Section 90.213.

Frequency Tolerance: = **100 Hz**

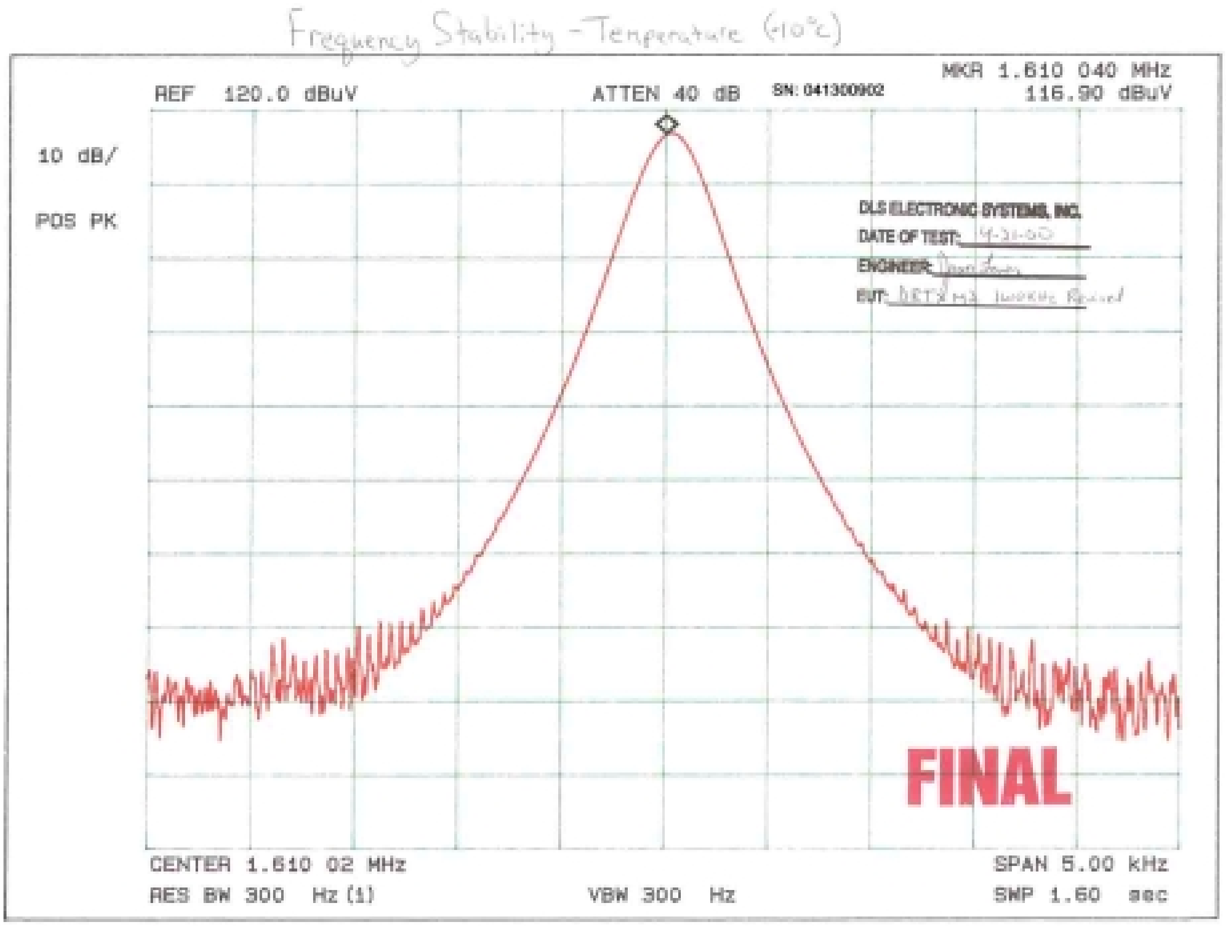
Margin: = **97.00 Hz**

This is well within the specified limits.

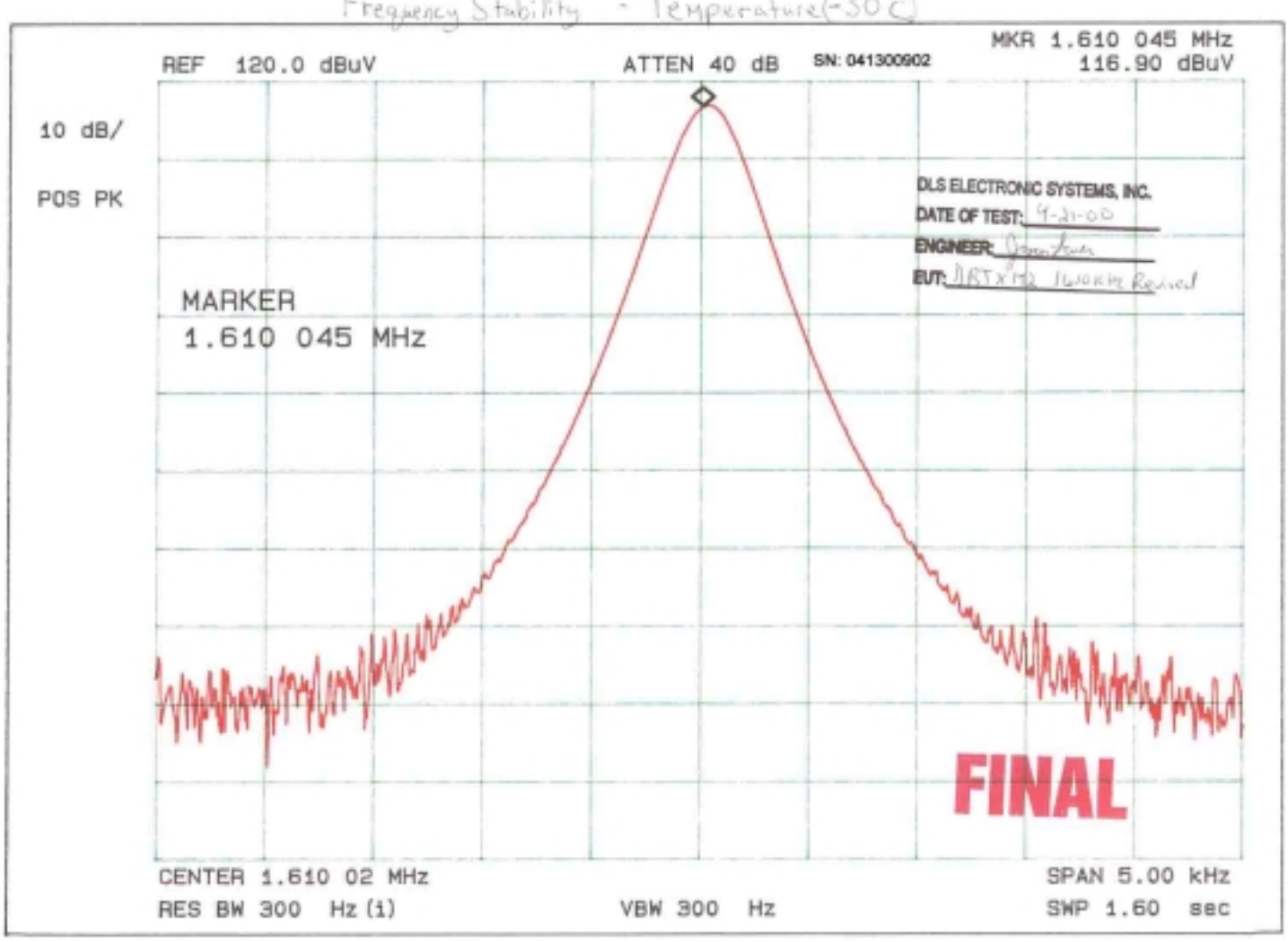
GRAPHS TAKEN FOR FREQUENCY

STABILITY WHEN VARYING THE TEMPERATURE

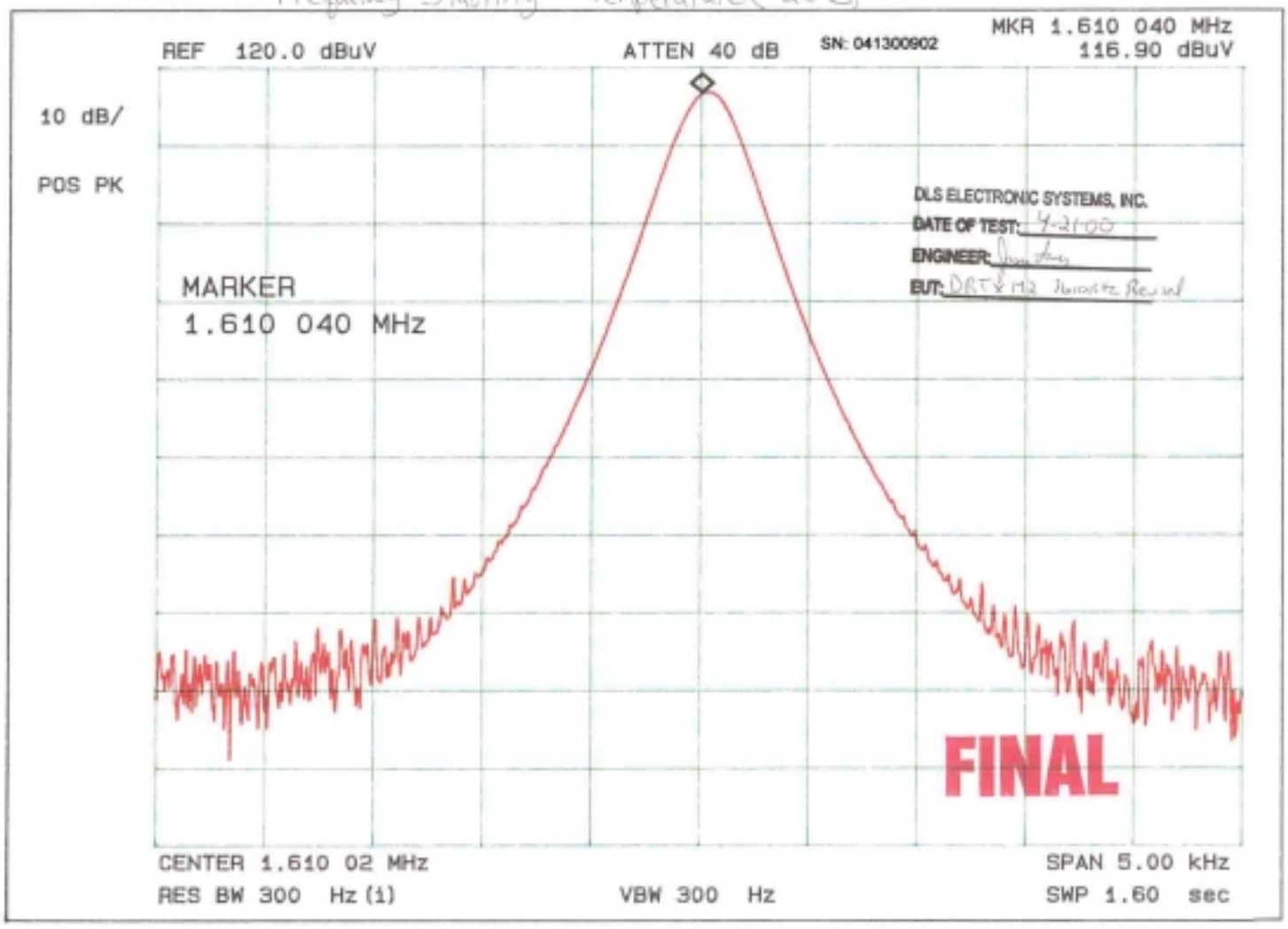
PART 2.1055A


Frequency Stability - Temperature
MKR 1.610 040 MHz
116.90 dBuV
REF 120.0 dBuV
ATTEN 40 dB
SN: 041300902
10 dB/
POS PK
DLS ELECTRONIC SYSTEMS, INC.
DATE OF TEST:
ENGINEER:
EUT:
FINAL
CENTER 1.610 02 MHz
SPAN 5.00 kHz
RES BW 300 Hz (1)
VBW 300 Hz
SWP 1.60 sec

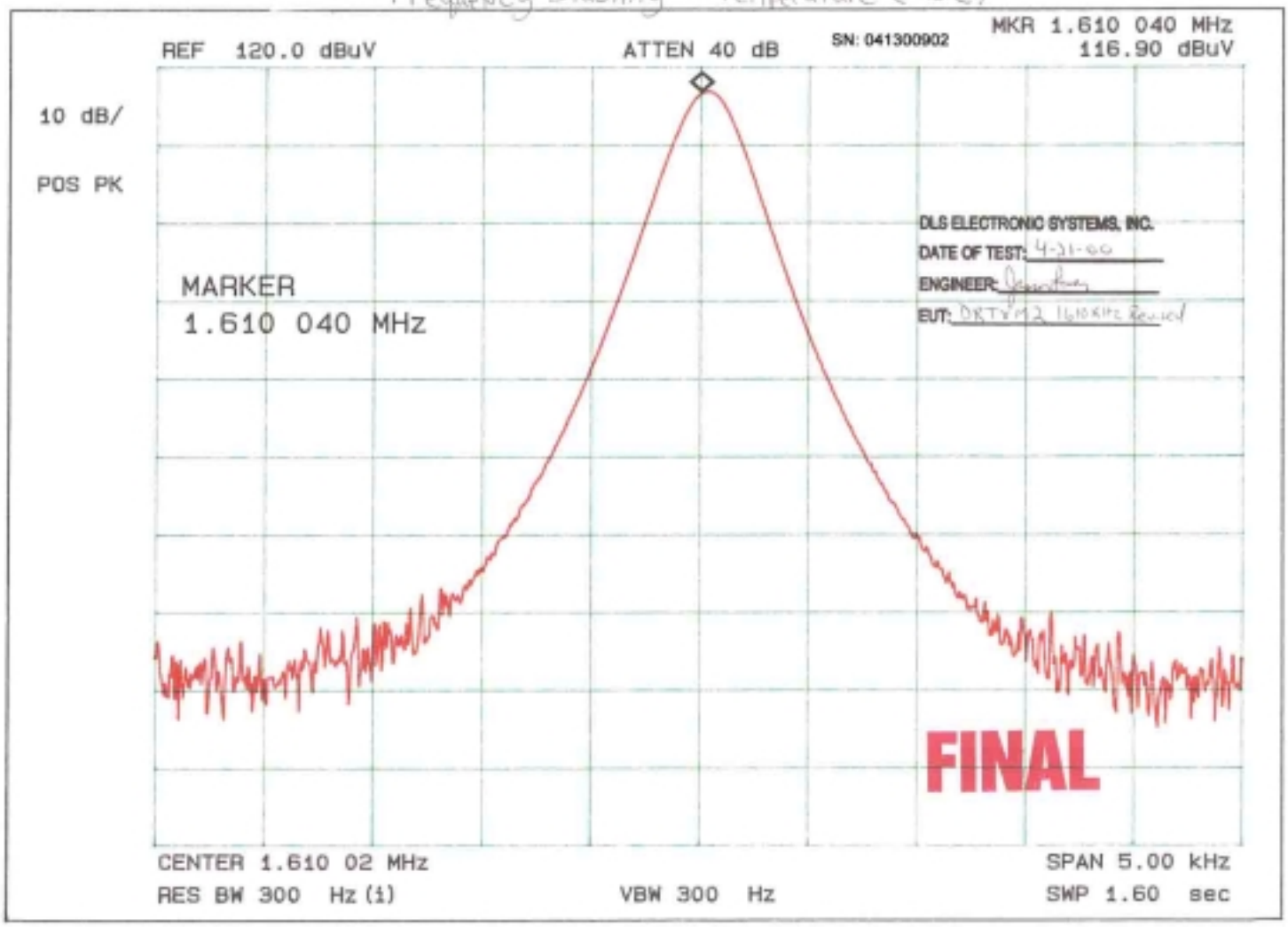
Frequency Stability - Temperature(-30°C)



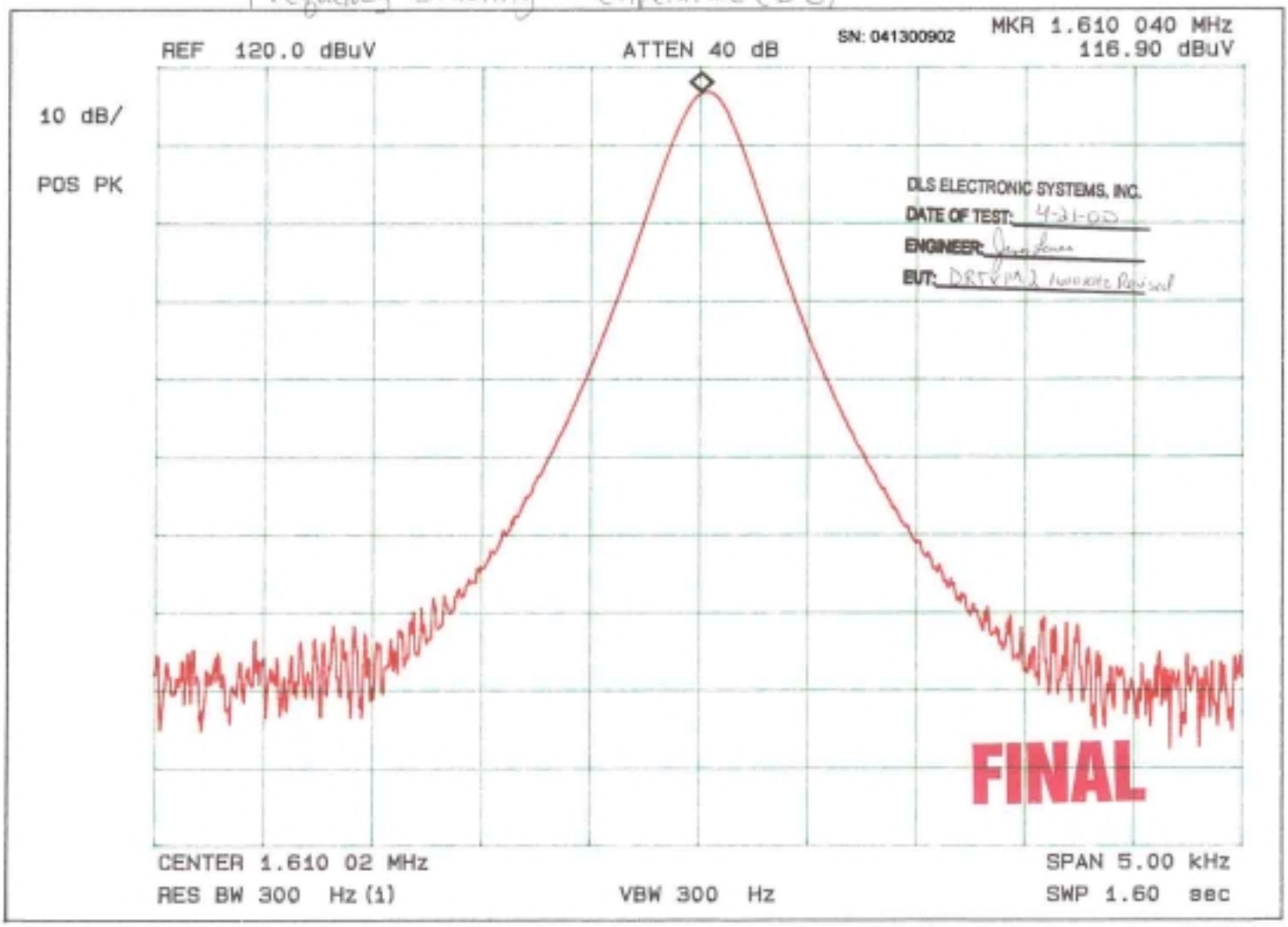
Frequency Stability - Temperature (-20°C)



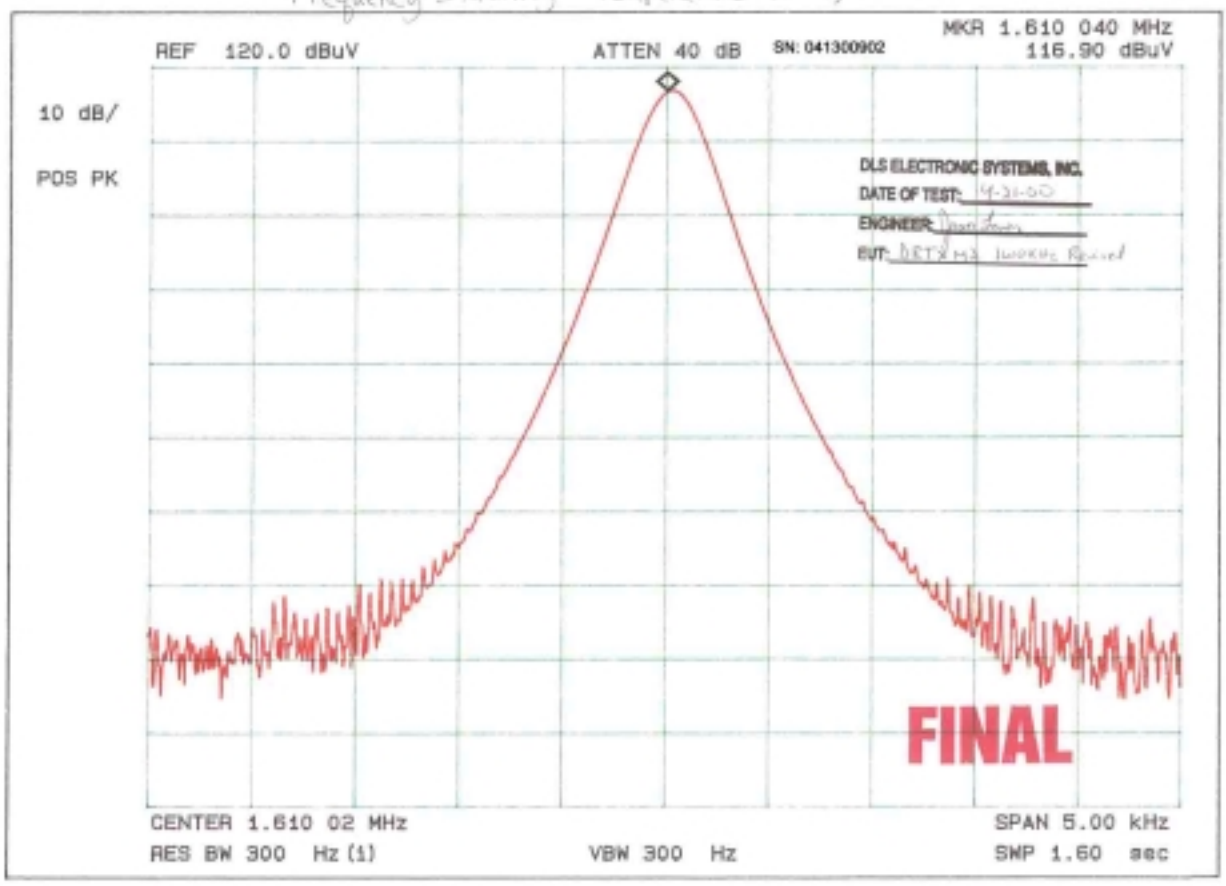
Frequency Stability - Temperature (-10°C)



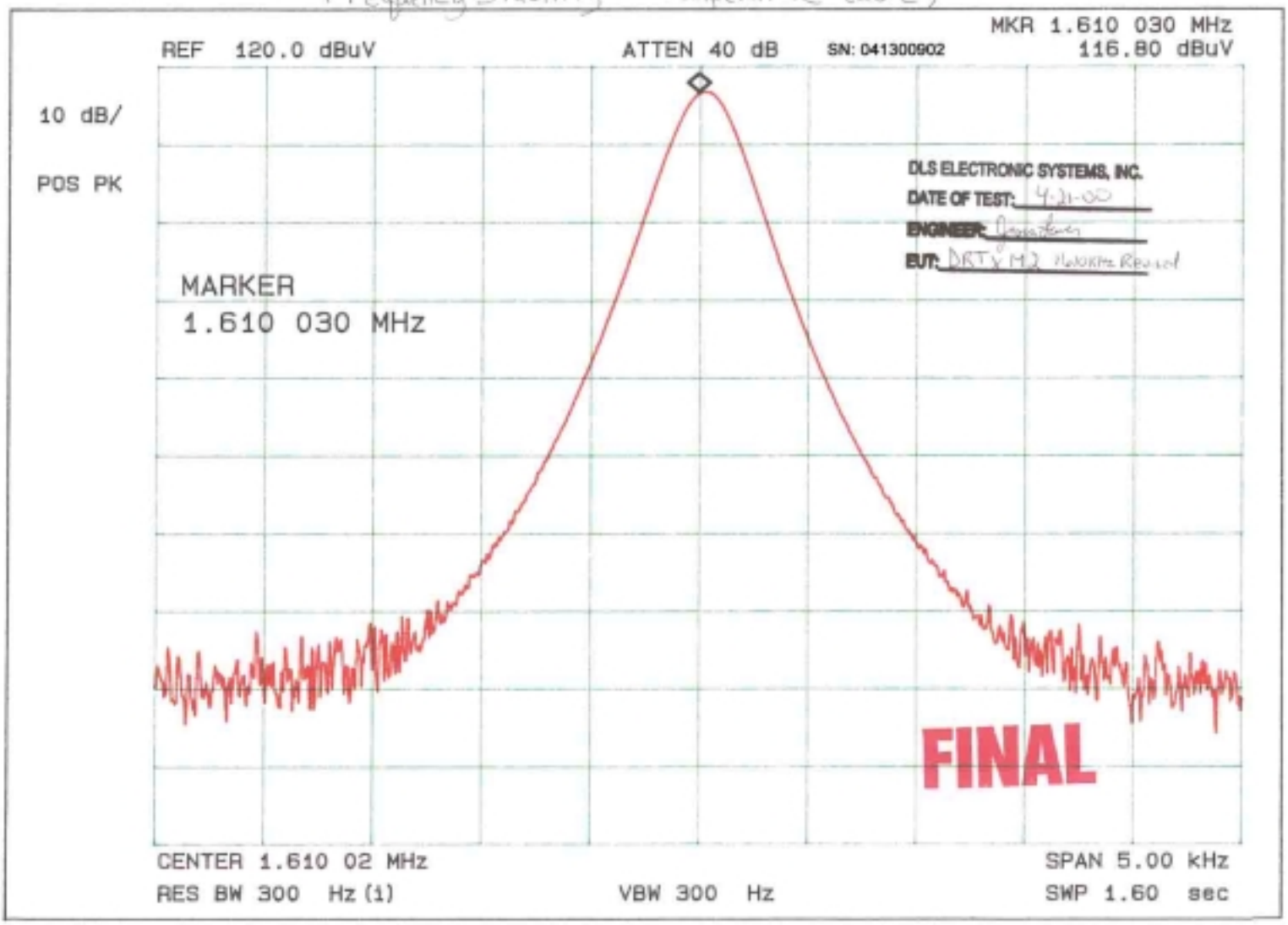
Frequency Stability - Temperature (0°C)



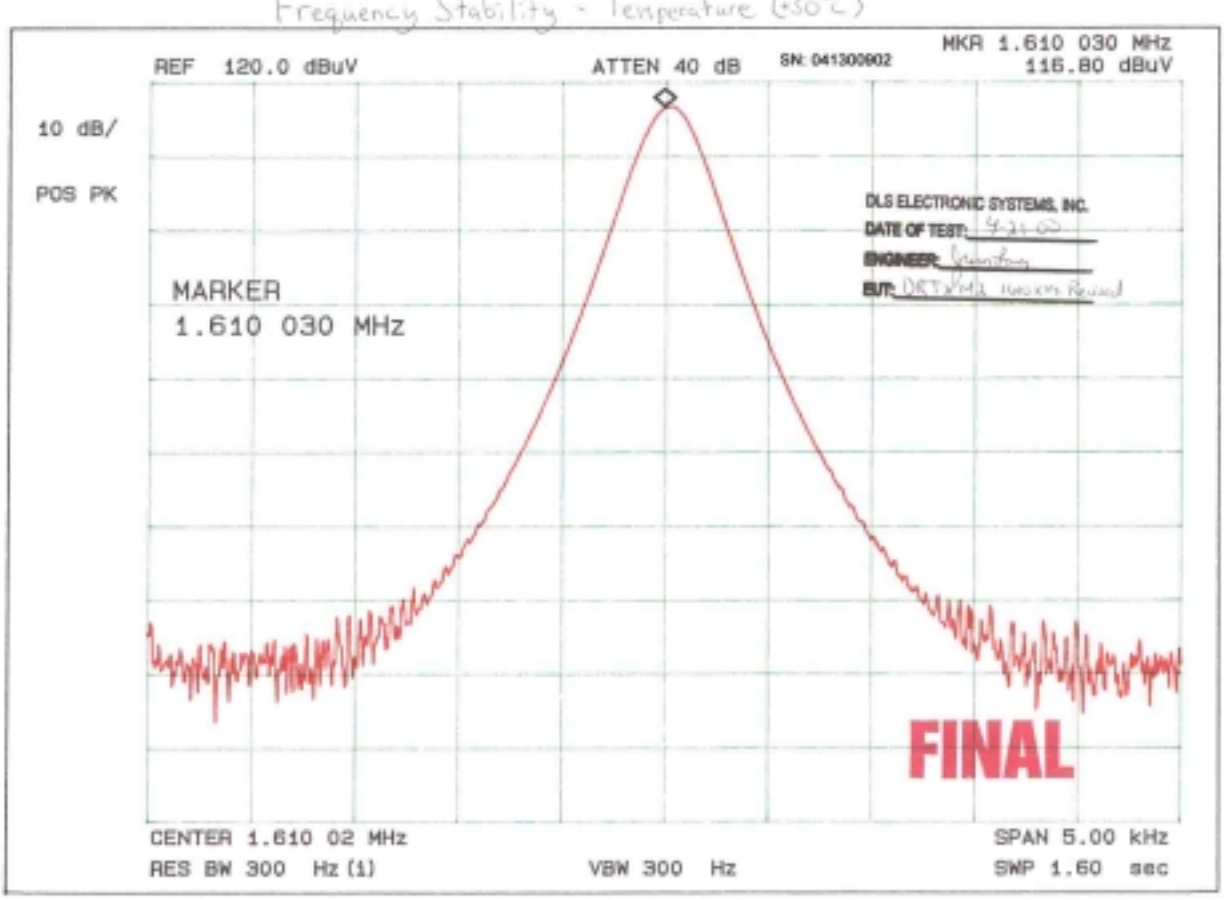
Frequency Stability - Temperature (+10°C)



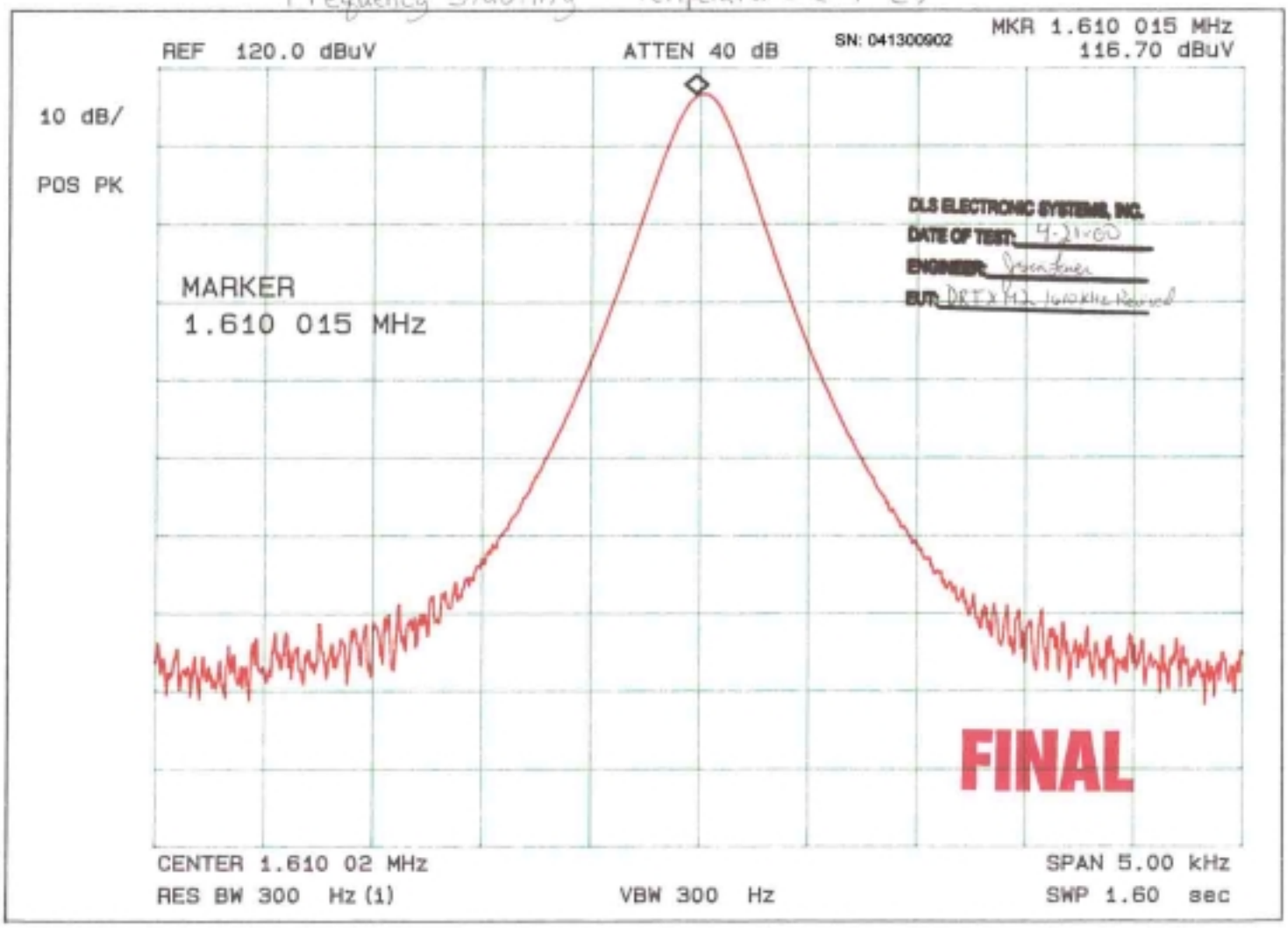
Frequency Stability - Temperature (+20°C)



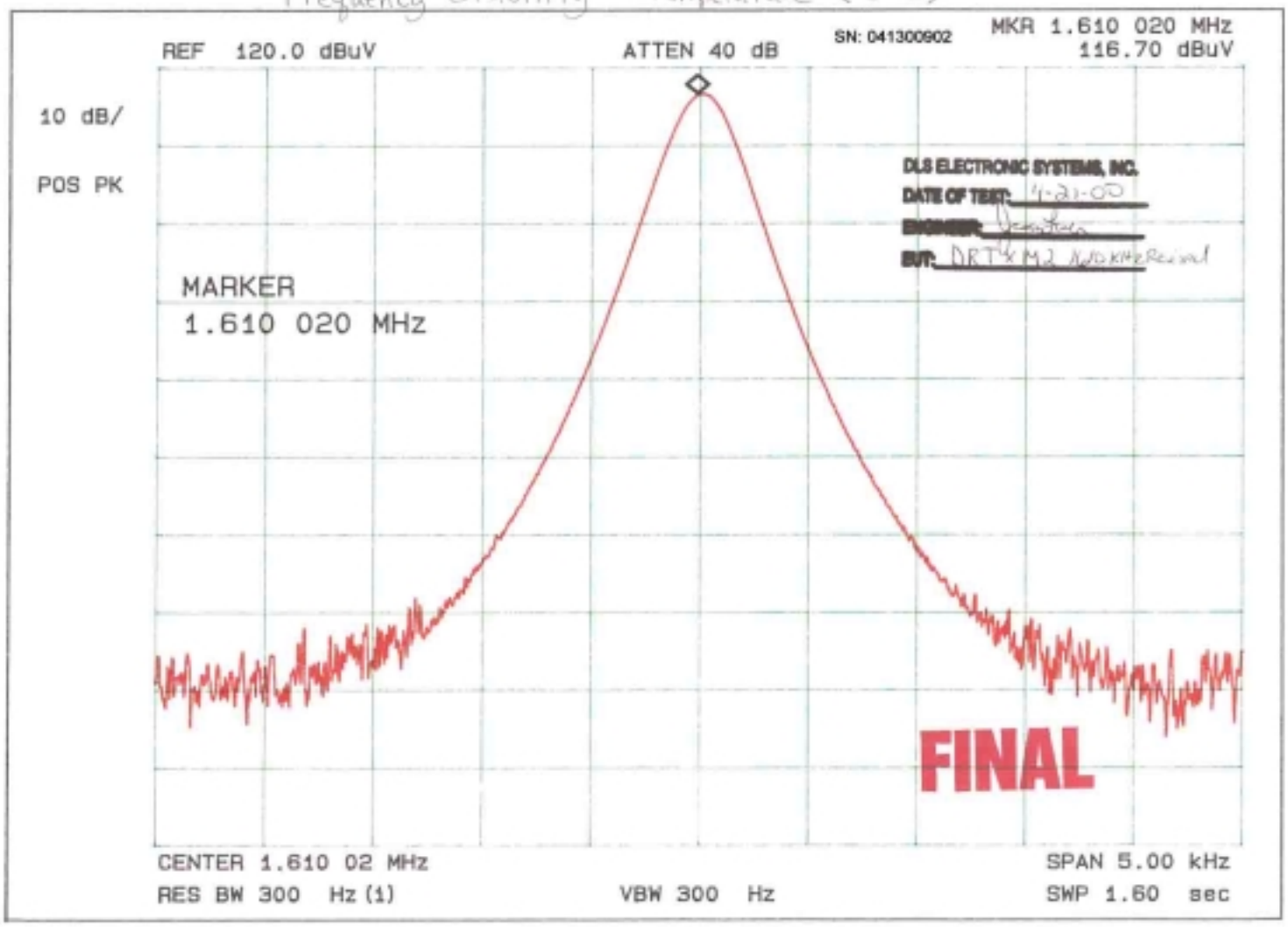
Frequency Stability - Temperature (+30°C)



Frequency Stability - Temperature (+40°C)



Frequency Stability - Temperature (+50°c)



11.0 FREQUENCY STABILITY - PART 2.1055 (d)(1) **(Voltage)**

The frequency stability of Highway Information System DRTXM2 Transmitter was measured by varying the primary supply voltage from 85% to 115% of nominal value.

FREQUENCY STABILITY FOR VOLTAGE VARIATION:

From 100% to 85% = 2 Hz
From 100% to 115% = 1 Hz

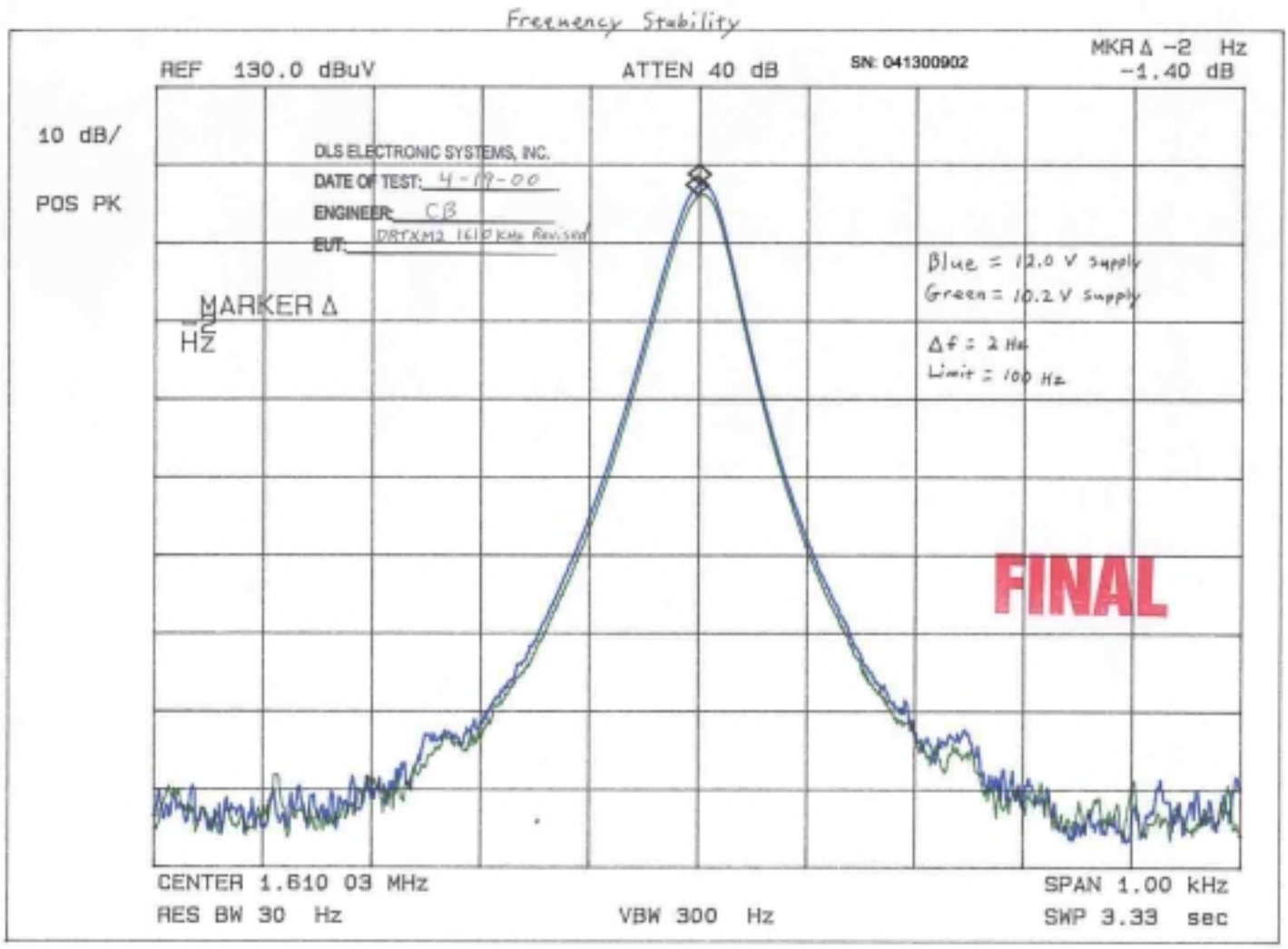
•

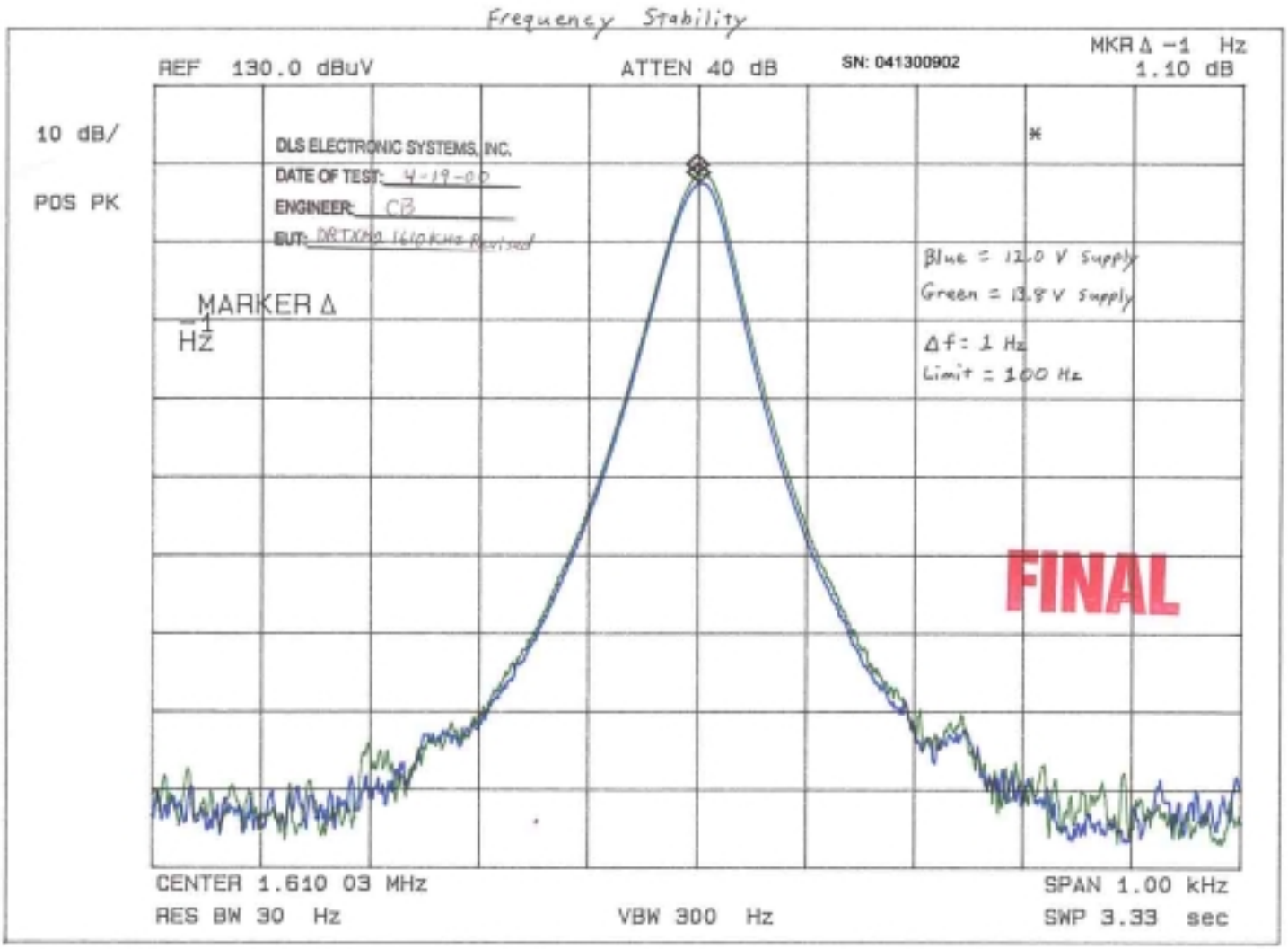
GRAPHS TAKEN FOR FREQUENCY

STABILITY WHEN VARYING THE

PRIMARY SUPPLY VOLTAGE

PART 2.1055d


Freeuency Stability
REF 130.0 dBuV
ATTEN 40 dB
SN: 041300902
MKR Δ -2 Hz
-1.40 dB
10 dB/
POS PK
DLS ELECTRONIC SYSTEMS, INC.
DATE OF TEST: 4-19-00
ENGINEER: CB
EUT: DRTXM2 1610 kHz Revised
MARKER Δ
HZ
Blue = 12.0 V supply
Green = 10.2 V supply
Δf = 2 Hz
Limit = 100 Hz
FINAL
CENTER 1.610 03 MHz
RES BW 30 Hz
VBW 300 Hz
SPAN 1.00 kHz
SWP 3.33 sec


Frequency Stability
REF 130.0 dBuV
ATTEN 40 dB
SN: 041300902
MKR Δ -1 Hz
1.10 dB
10 dB/
POS PK
DLS ELECTRONIC SYSTEMS, INC.
DATE OF TEST: 4-19-00
ENGINEER: CB
EUT: ORTXMA 1610KHz Revised
MARKER Δ
-1
HZ
Blue = 12.0 V Supply
Green = 13.8 V Supply
Δf: 1 Hz
Limit = 100 Hz
FINAL
CENTER 1.610 03 MHz
SPAN 1.00 kHz
RES BW 30 Hz
VBW 300 Hz
SWP 3.33 sec

12.0 PHOTO INFORMATION AND TEST SET-UP

The test set-up can be seen on the accompanying photo page.

Item 0 Highway Information System DRTXM2 Transmitter
FCC ID#: NA SN: 2810

Item 1

Item 2

Item 3

Item 4

Item 5

Item 6

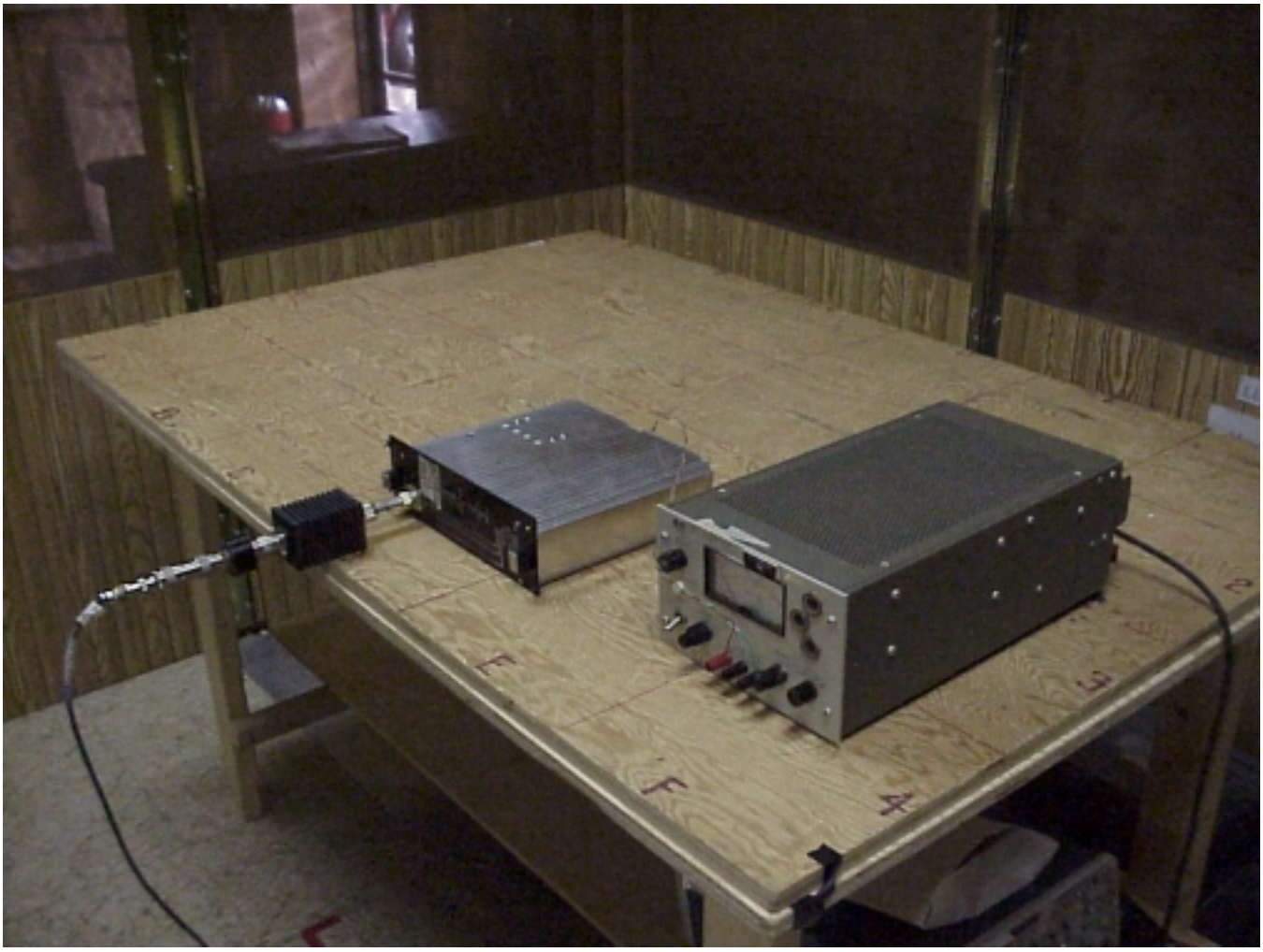
Item 7

Item 8

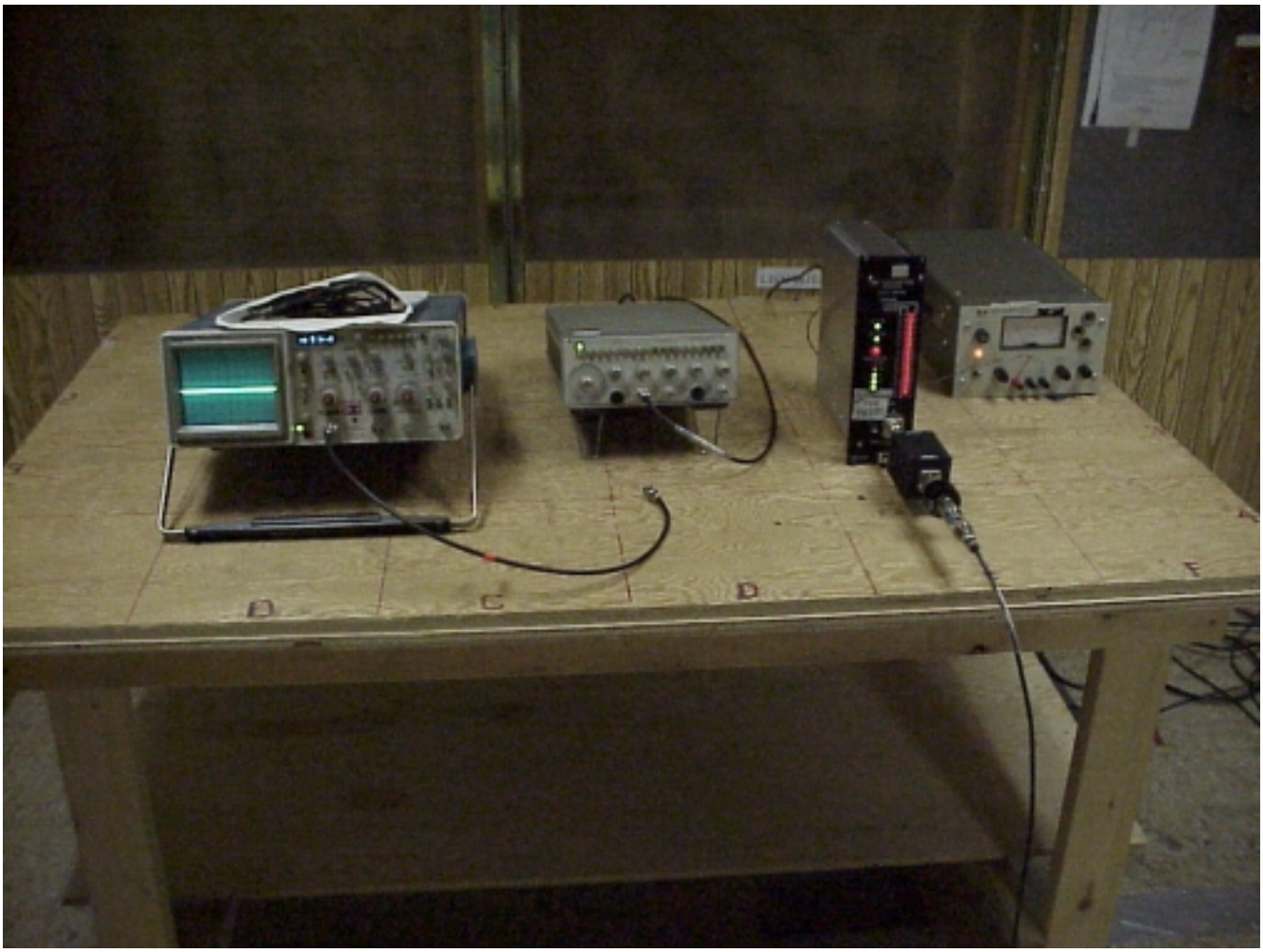
Item 9

Item 10

13.0 PHOTOS TAKEN DURING TESTING.



13.0 PHOTOS TAKEN DURING TESTING



14.0 CHANGE INFORMATION

The following changes were implemented during the testing and must be incorporated into the production units to ensure compliance.

Change 1. Turned rotary switch to reduce output power from 11.77 watts to 8.93 watts.

Change 2.

Change 3.

Change 4.

Change 5.

14.0 CHANGE INFORMATION (CON'T)

Change 6.

Change 7.

Change 8.

Change 9.

Change 10.

NOTE:

Tested without the rack that it is normally installed in.

The responsibility of implementing the changes listed in this report is accepted or I certify that no changes were made

by _____ _____
Signature Title

for _____ _____
Company Name Date

15.0 RESULTS OF TESTS

The emission test results can be seen on pages at the end of this report. Data sheets indicating the emission measurements can also be found with this report.

16.0 CONCLUSION

It was found that the Highway Information System DRTXM2 Transmitters (all four transmitters, two with the old RF filter design, S/N 041300902 & 051900907 two with the new RF filter design) **meets** the requirements for conducted spurious emissions as specified in the FCC "Rules and Regulations", Part 90, Private Land Mobile Services, Subpart J, Sections 90.205 to 90.210 & 90.242 for Travelers' Information Stations, operating in the 530 kHz to 1700 kHz Frequency Band.

The 530 kHz and 1610 kHz transmitters with the new RF filter design (SN: 041300902 &) significantly reduces the conducted spurious emissions relative to the performance of the 1610 kHz transmitter with the old filter design (SN: 022699786).

This test report relates only to the items tested and contains the following number of pages:

Text:	29 pages
Data Summary:	2 pages
Charts:	27 pages

TABLE 1 - EQUIPMENT LIST

Test Equipment	Manufacturer/ Description	Model Number	Serial Number	Frequency Range	Cal Due Date
*Spectrum Analyzer	Hewlett/ Packard	8566B	2240A 02041	25 Hz –22 GHz	10/00
Quasi-Peak Adapter	Hewlett/ Packard	85650A	2043A 00121	10 kHz – 1 GHz	10/00
***Spectrum Analyzer	Hewlett/ Packard	8591A	3009A 00700	9 kHz- 1.8 GHz	3/01

*Firmware Version 29.9.86 Software Version 85864C Rev A
**Firmware Version 14.1.85 Software Version 85864C Rev A
***Firmware Version 5.1.3 Software Version 82301-12029 Rev C

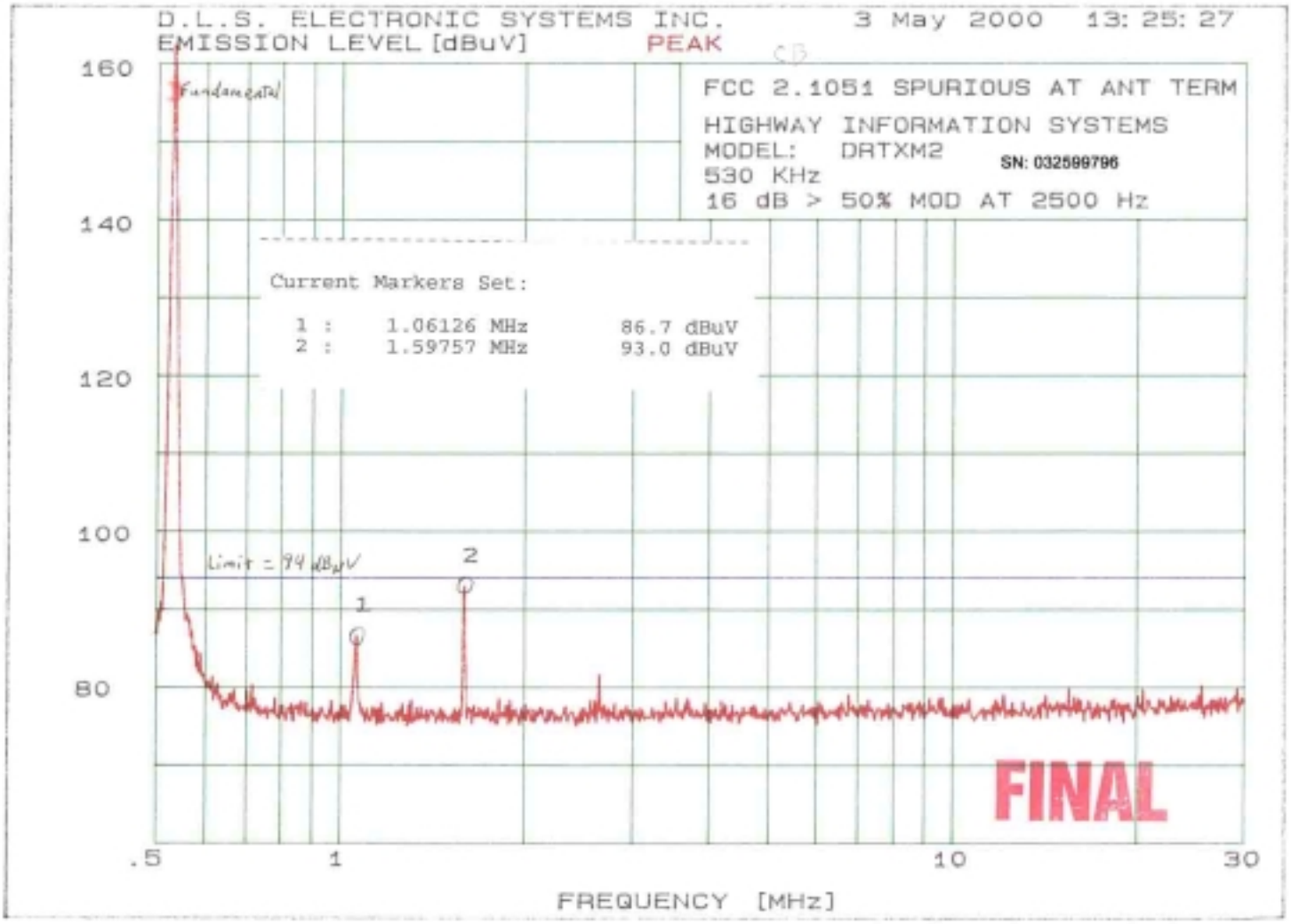
APPENDIX A

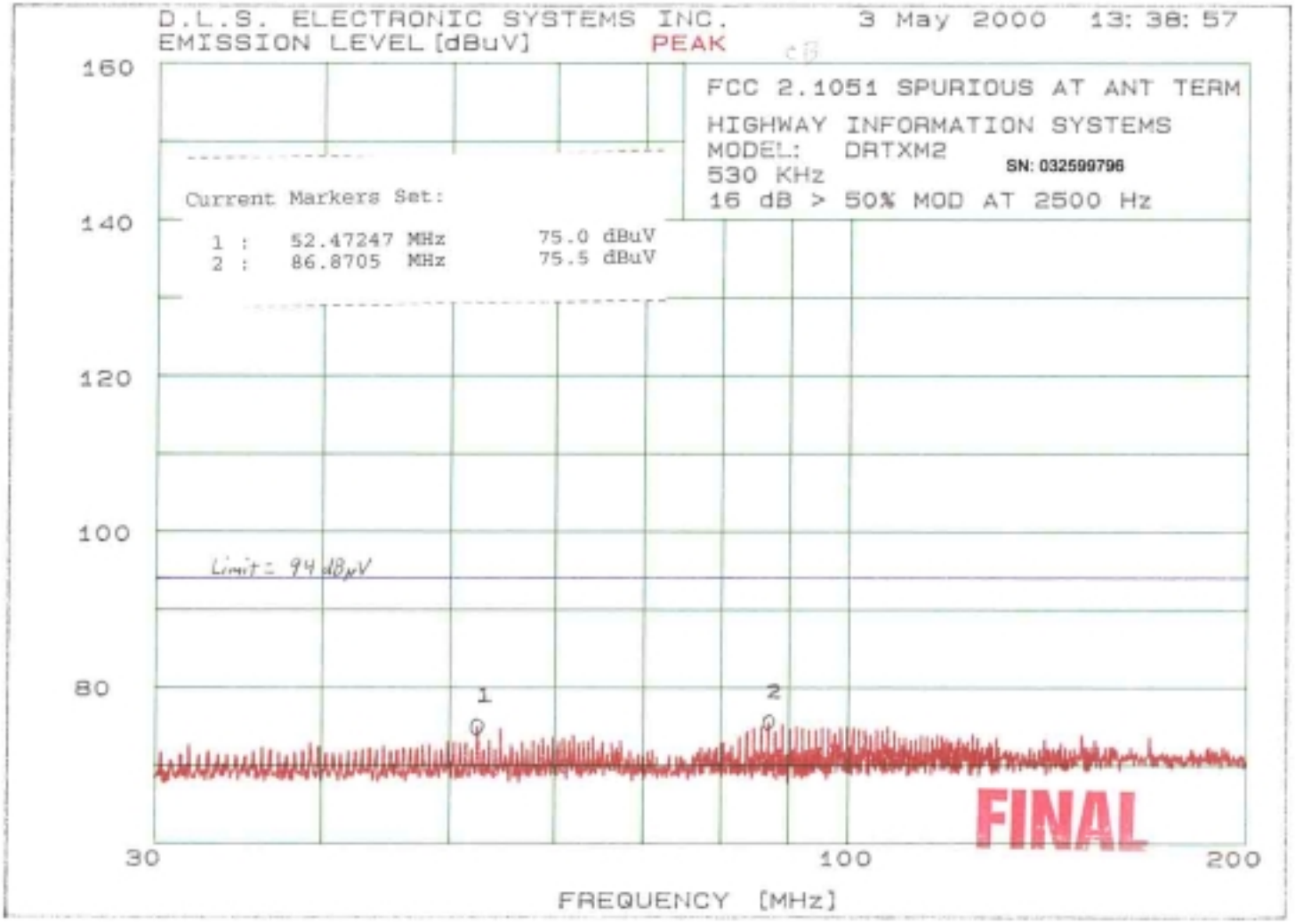
CONDUCTED EMISSION GRAPHS TAKEN FOR

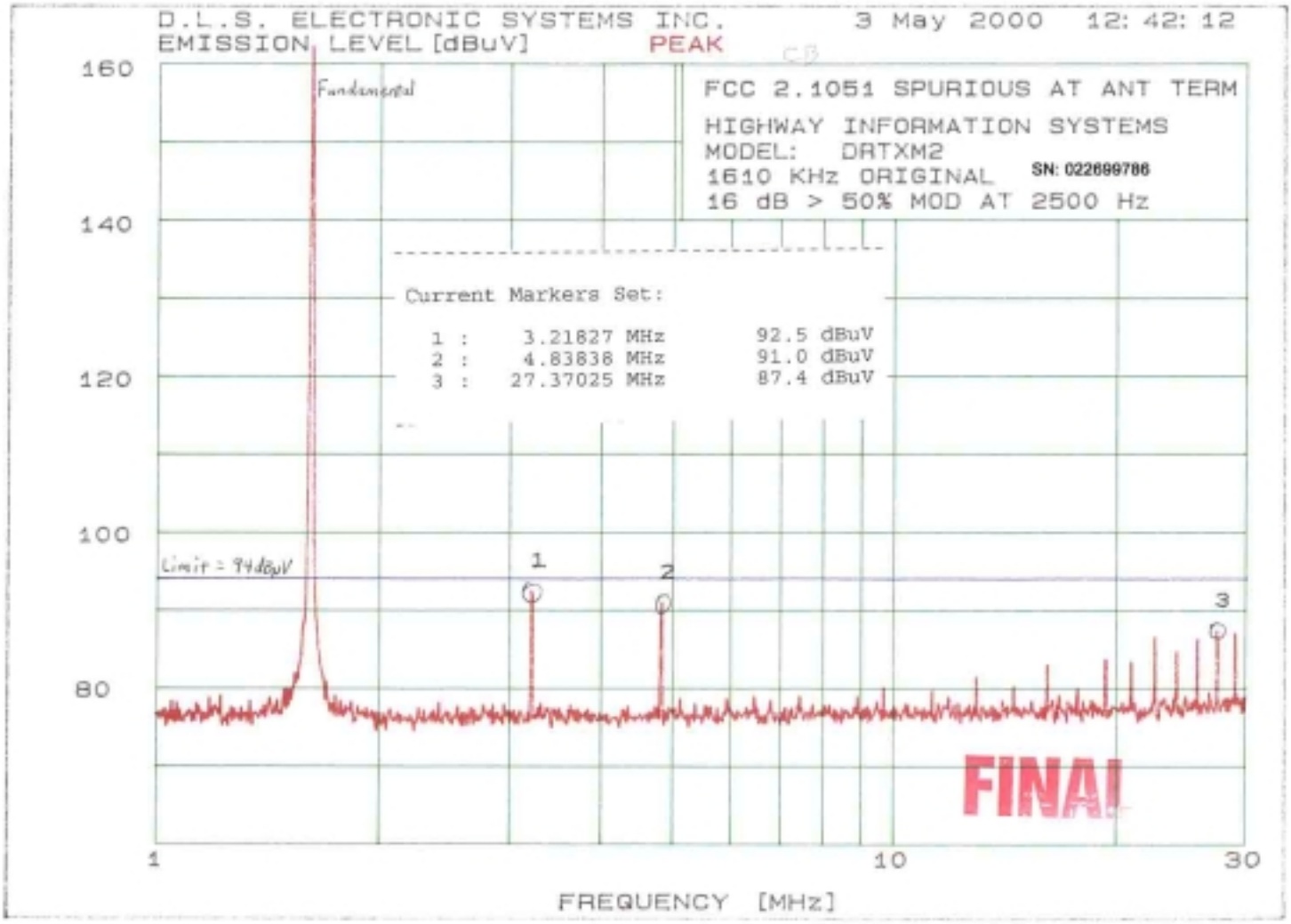
SPURIOUS EMISSION MEASUREMENTS MADE

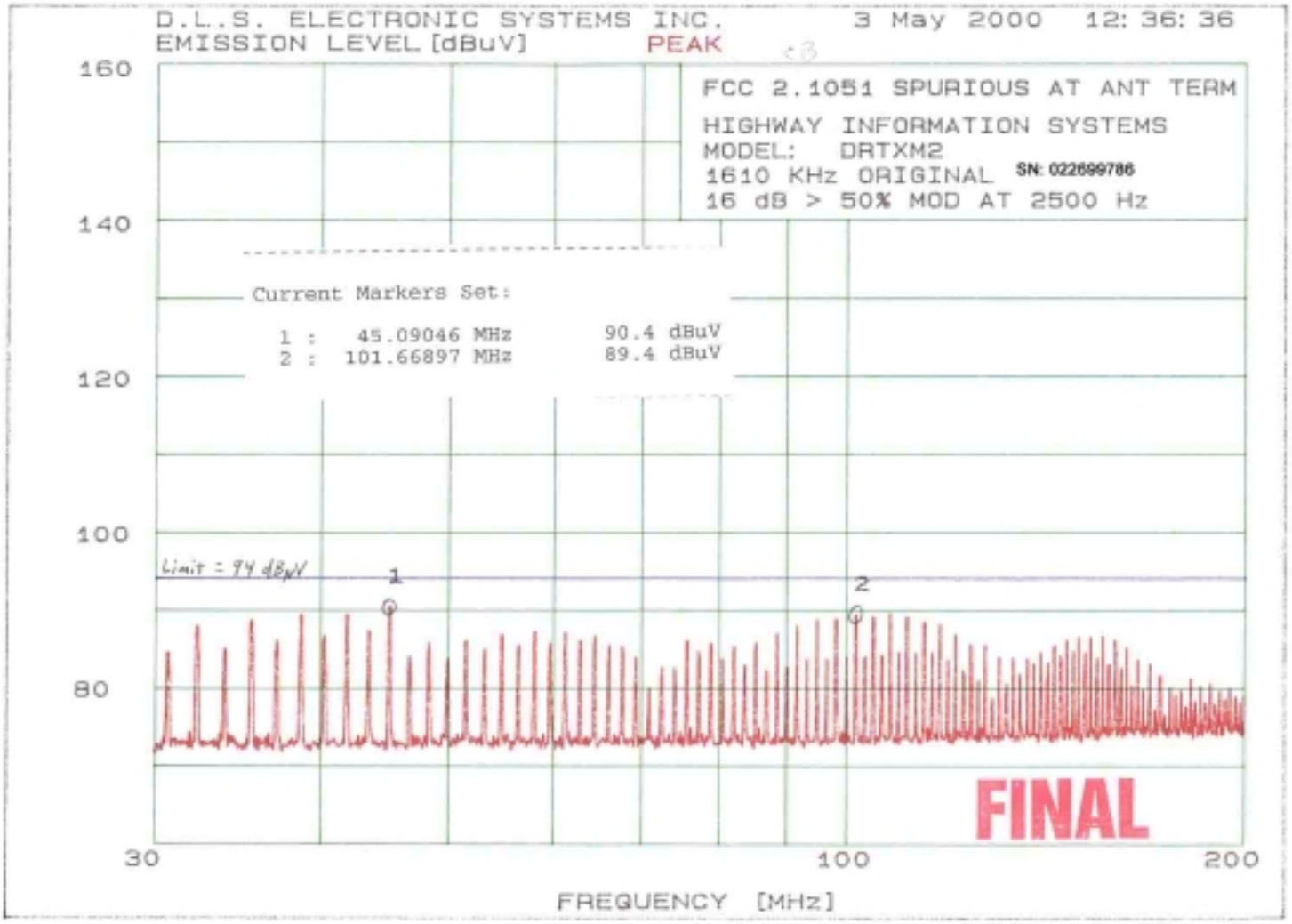
AT THE ANTENNA TERMINALS

OLD FILTER DESIGN


D.L.S. ELECTRONIC SYSTEMS INC.
3 May 2000 13:25:27
EMISSION LEVEL [dBuV]
PEAK
FCC 2.1051 SPURIOUS AT ANT TERM
HIGHWAY INFORMATION SYSTEMS
MODEL: DRTXM2
SN: 032599796
530 KHz
16 dB > 50% MOD AT 2500 Hz
Current Markers Set:
1 : 1.06126 MHz 86.7 dBuV
2 : 1.59757 MHz 93.0 dBuV
Fundamental
Limit = 94 dBuV
1
2
160
140
120
100
80
.5
1
10
30
FREQUENCY [MHz]
FINAL


D.L.S. ELECTRONIC SYSTEMS INC.
3 May 2000 13:38:57
EMISSION LEVEL [dBuV]
PEAK
FCC 2.1051 SPURIOUS AT ANT TERM
HIGHWAY INFORMATION SYSTEMS
MODEL: DRTXM2
SN: 032599796
530 KHz
16 dB > 50% MOD AT 2500 Hz
Current Markers Set:
1 : 52.47247 MHz 75.0 dBuV
2 : 86.8705 MHz 75.5 dBuV
Limit = 94 dBuV
160
140
120
100
80
30
100
200
FREQUENCY [MHz]
FINAL


D.L.S. ELECTRONIC SYSTEMS INC.
3 May 2000 12: 42: 12
EMISSION LEVEL [dBuV]
PEAK
FCC 2.1051 SPURIOUS AT ANT TERM
HIGHWAY INFORMATION SYSTEMS
MODEL: DRTXM2
1610 KHz ORIGINAL
SN: 022699786
16 dB > 50% MOD AT 2500 Hz
Current Markers Set:
1 : 3.21827 MHz 92.5 dBuV
2 : 4.83838 MHz 91.0 dBuV
3 : 27.37025 MHz 87.4 dBuV
Fundamental
Limit = 94dBuV
160
140
120
100
80
1
10
30
FREQUENCY [MHz]
FINAL


D.L.S. ELECTRONIC SYSTEMS INC.
3 May 2000 12: 36: 36
EMISSION LEVEL [dBuV]
PEAK
FCC 2.1051 SPURIOUS AT ANT TERM
HIGHWAY INFORMATION SYSTEMS
MODEL: DRTXM2
1610 KHz ORIGINAL
SN: 022699786
16 dB > 50% MOD AT 2500 Hz
Current Markers Set:
1 : 45.09046 MHz 90.4 dBuV
2 : 101.66897 MHz 89.4 dBuV
Limit = 94 dBuV
160
140
120
100
80
30
100
200
FREQUENCY [MHz]
FINAL