Figure 5aa
Spurious Emissions at Antenna Terminals
Low Channel, Analog (12.5 kHz)

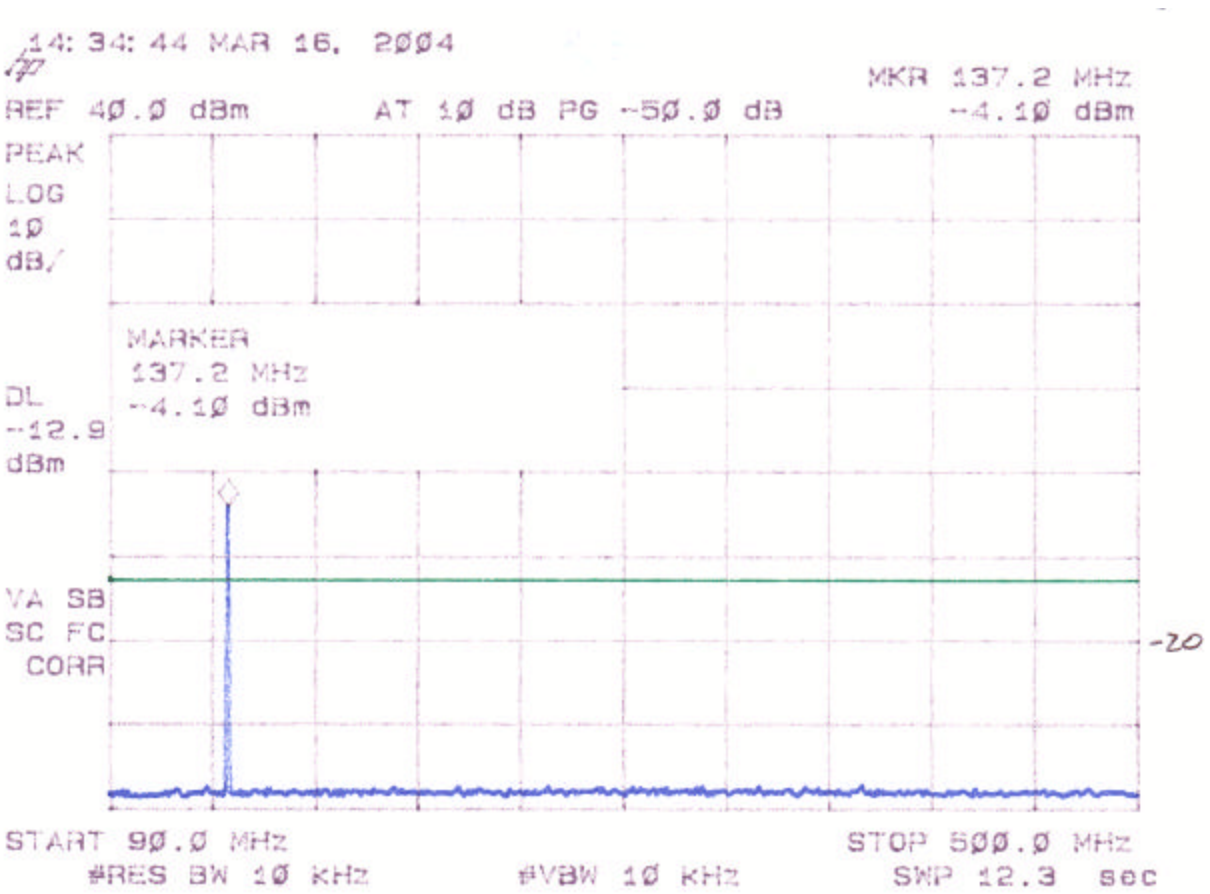


Figure 5bb
Spurious Emissions at Antenna Terminals
Low Channel, Analog (12.5 kHz)

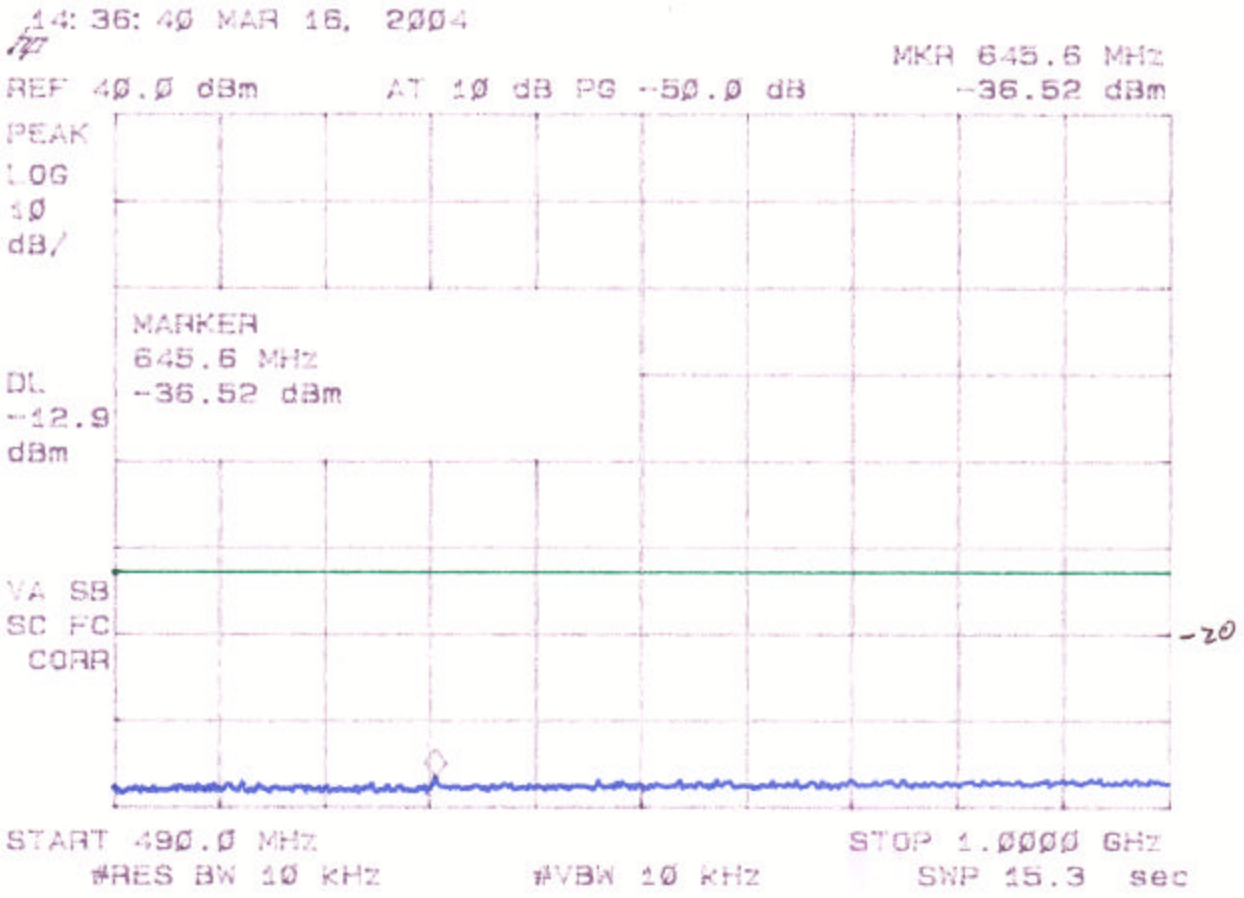


Figure 5cc
Spurious Emissions at Antenna Terminals
Low Channel, Analog (12.5 kHz)

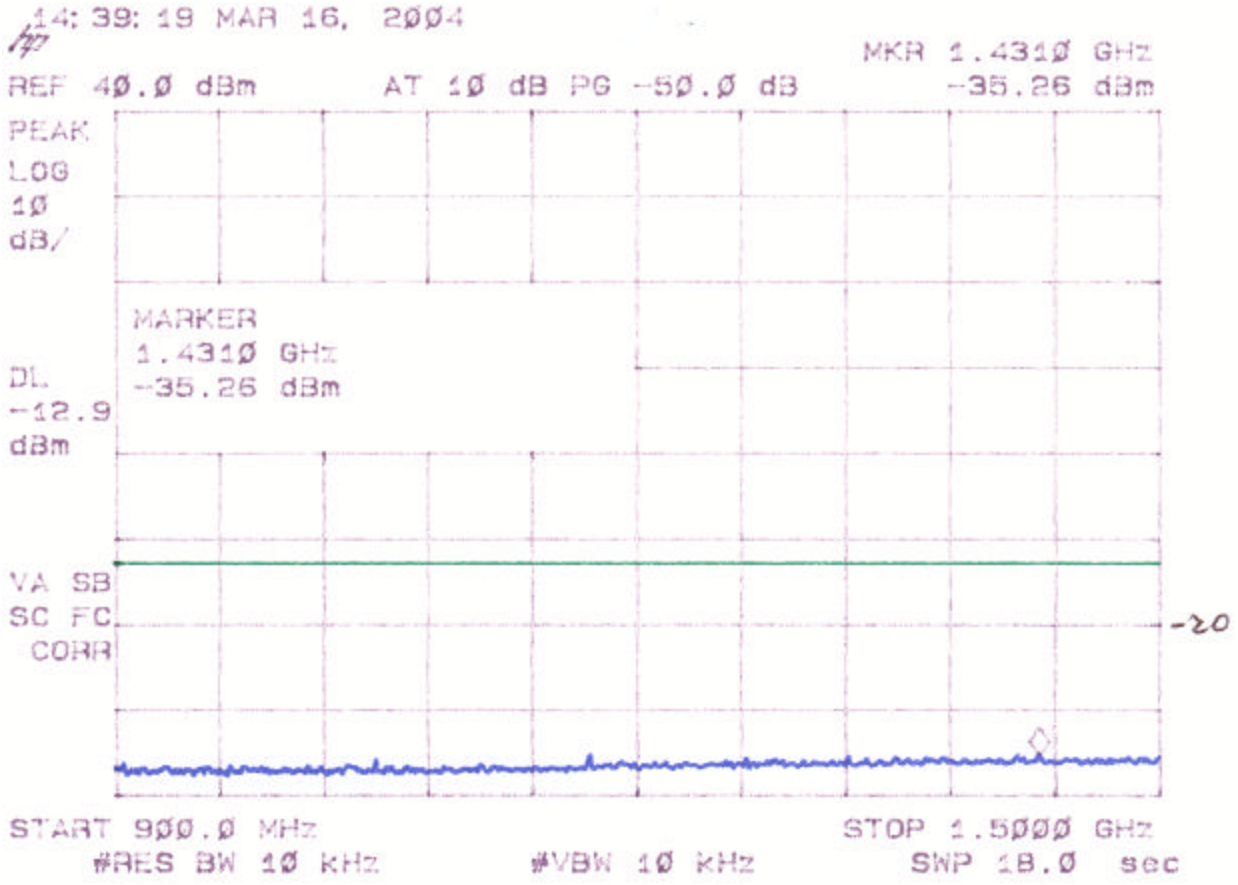


Figure 5dd
Spurious Emissions at Antenna Terminals
Low Channel, Analog (12.5 kHz)

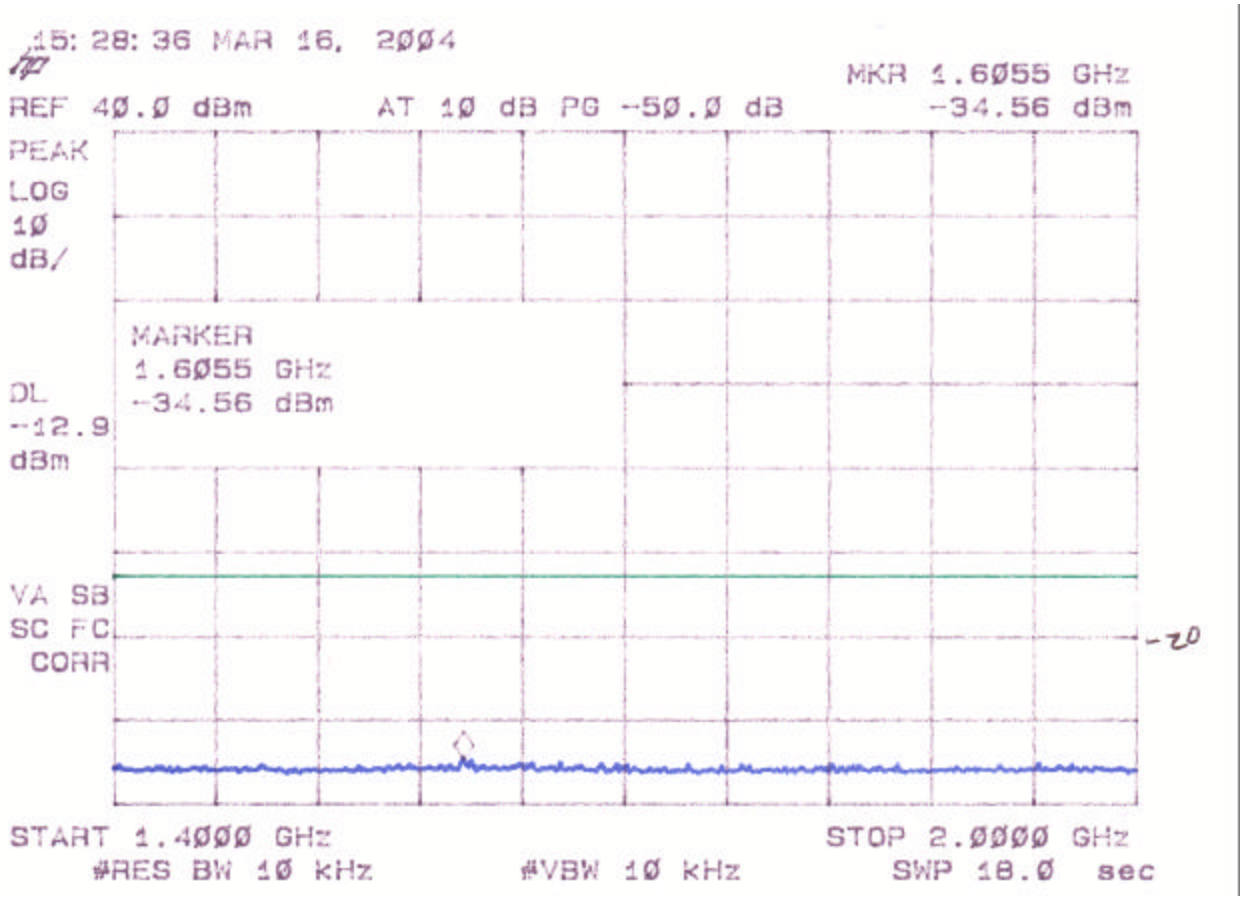


Figure 5ee
Spurious Emissions at Antenna Terminals
Low Channel, Analog (25 kHz)

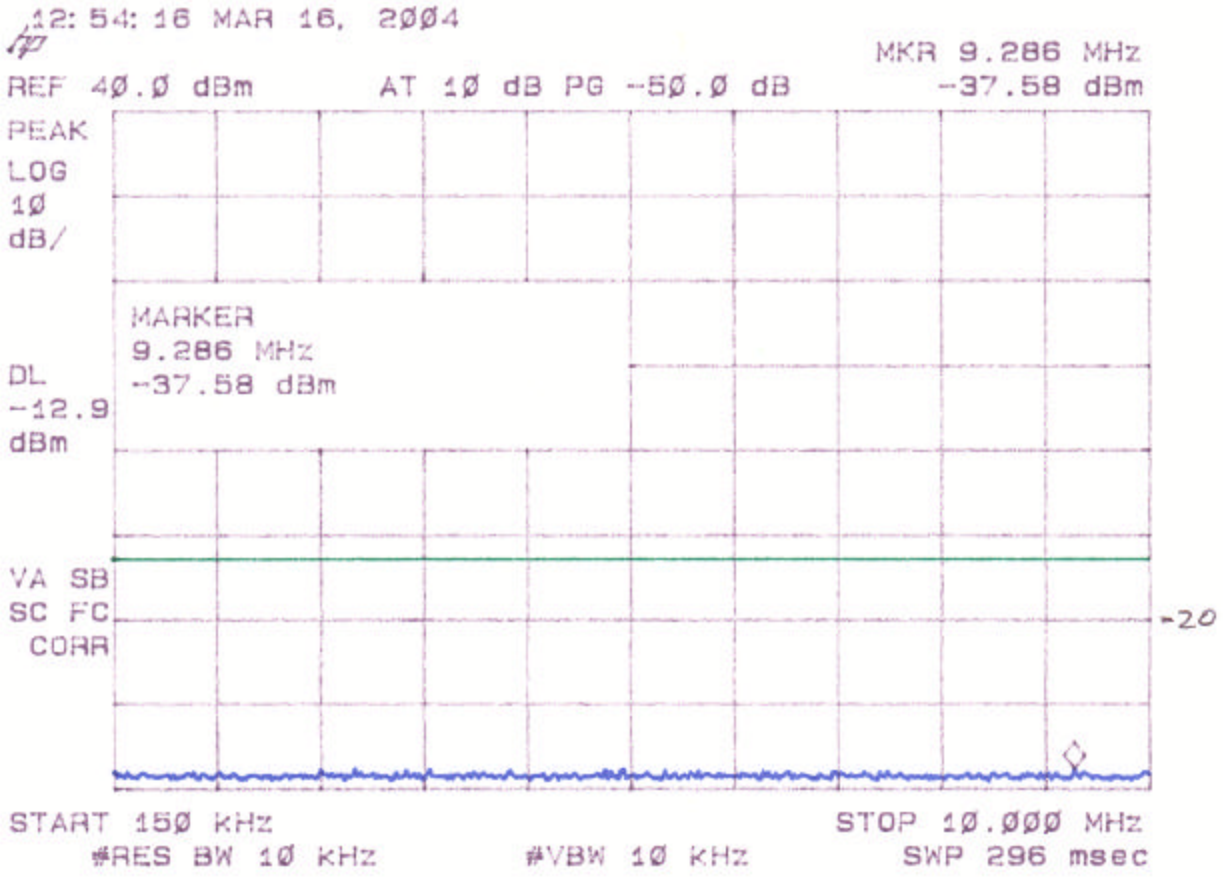


Figure 5ff
Spurious Emissions at Antenna Terminals
Low Channel, Analog (25 kHz)

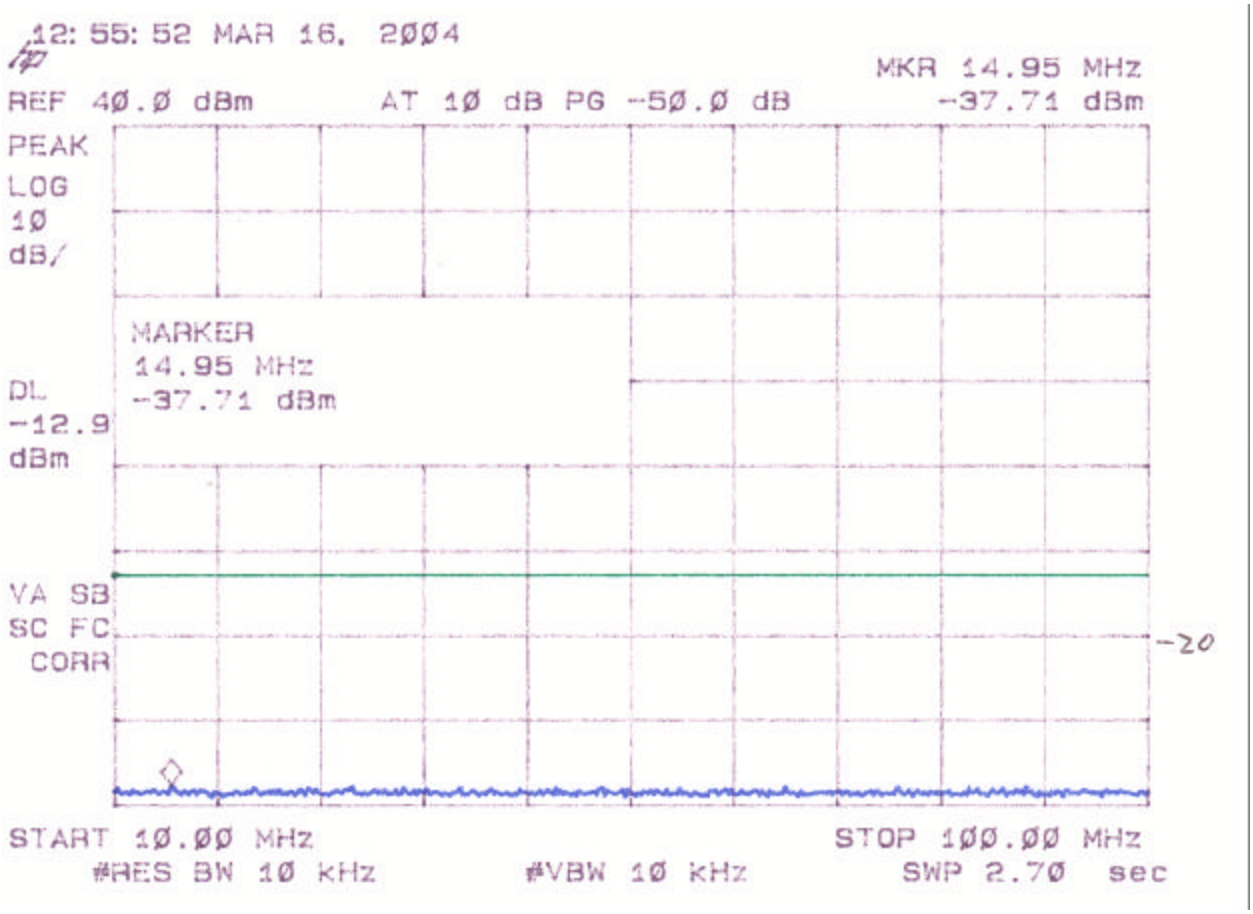


Figure 5gg
Spurious Emissions at Antenna Terminals
Low Channel, Analog (25 kHz)

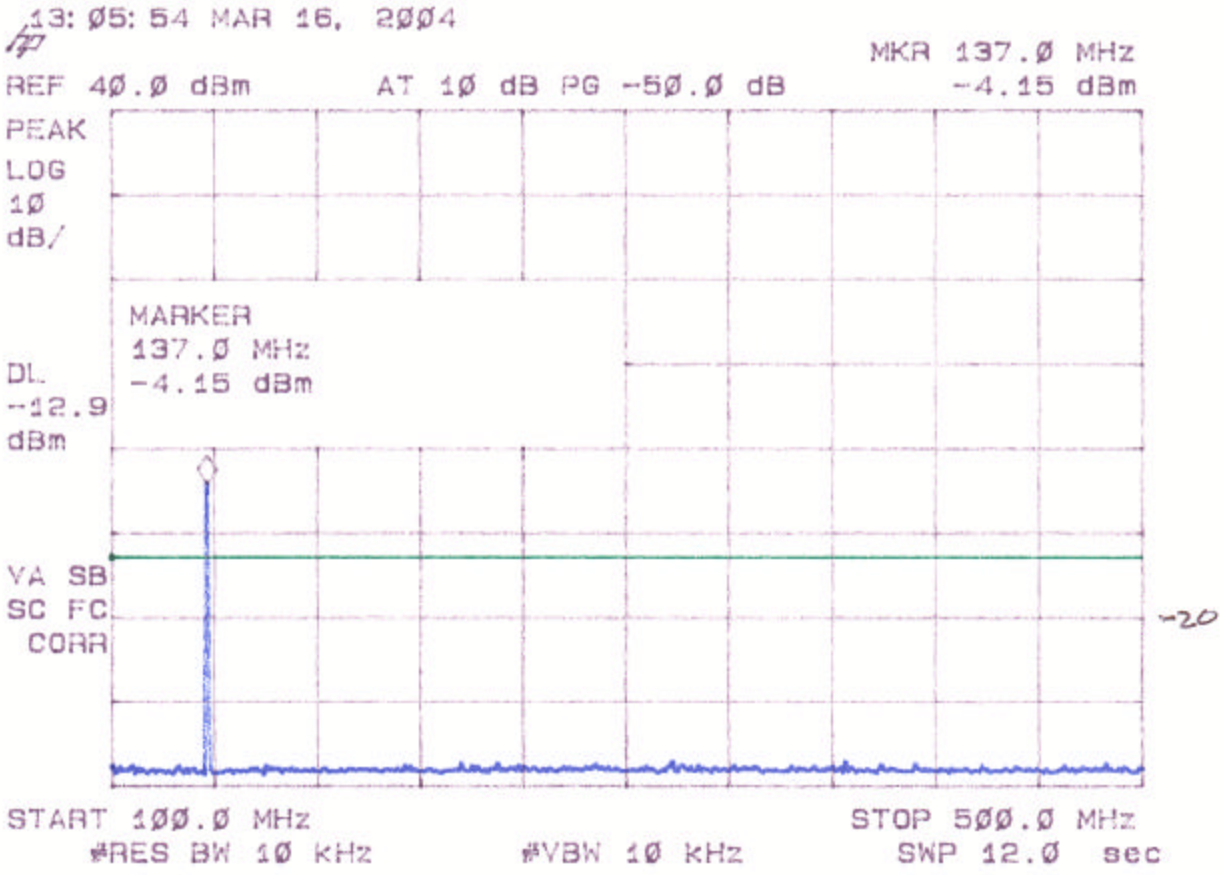


Figure 5hh
Spurious Emissions at Antenna Terminals
Low Channel, Analog (25 kHz)

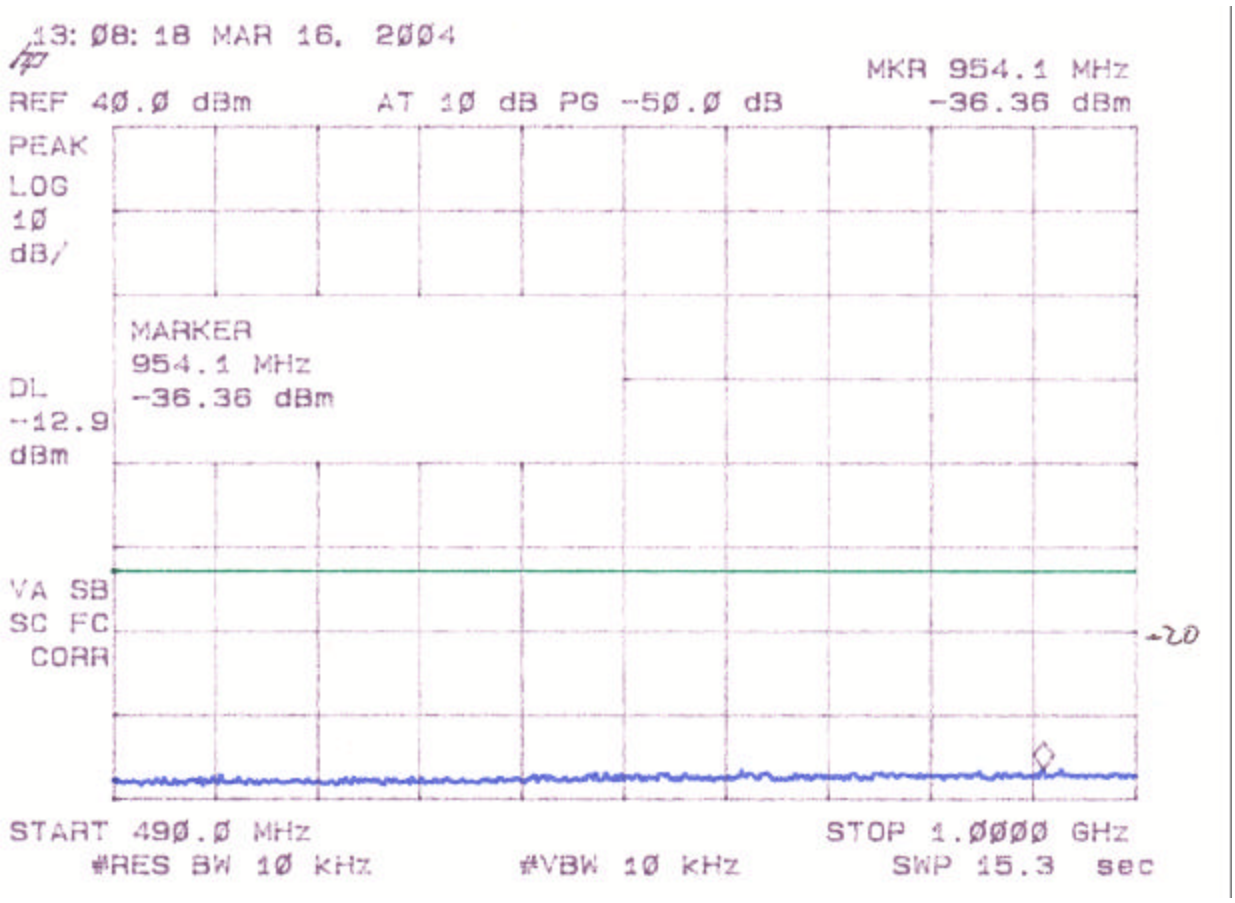


Figure 5ii
Spurious Emissions at Antenna Terminals
Low Channel, Analog (25 kHz)

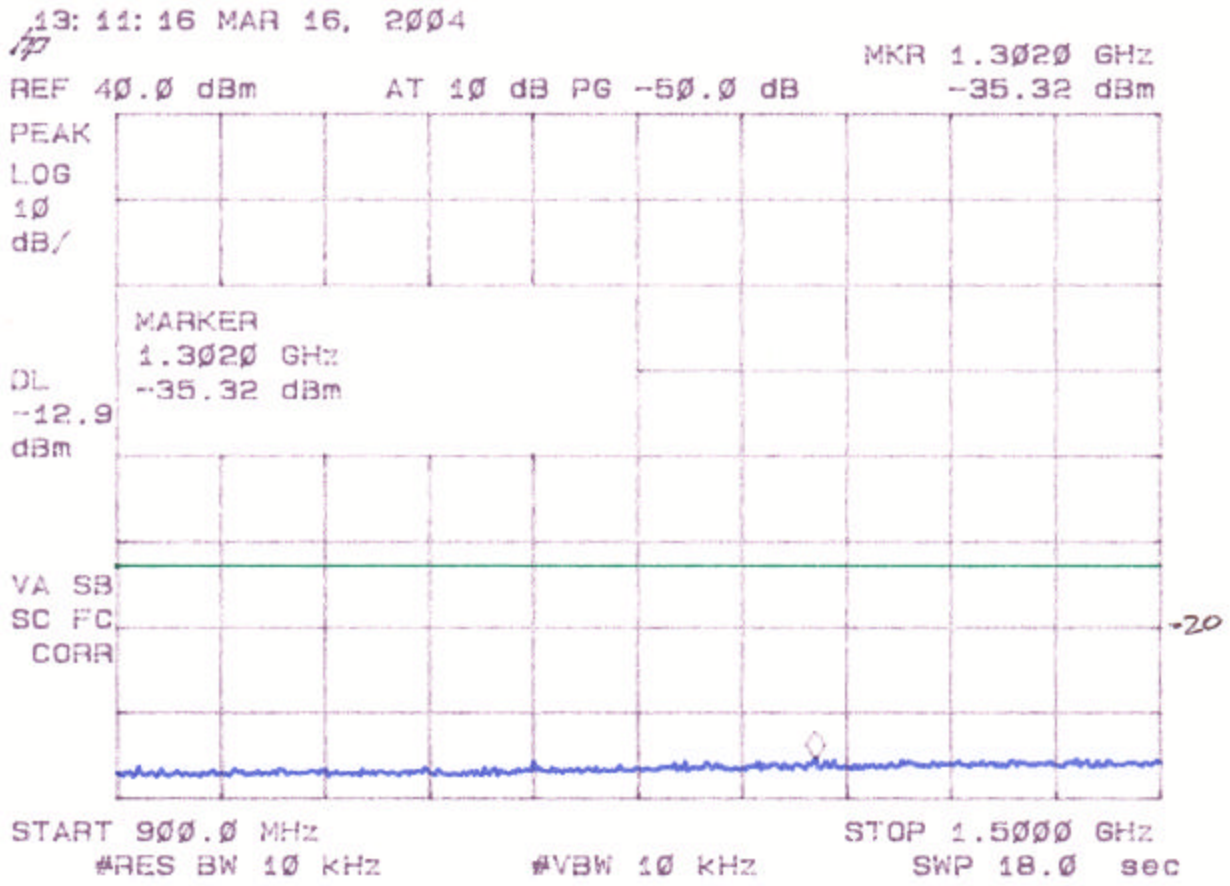
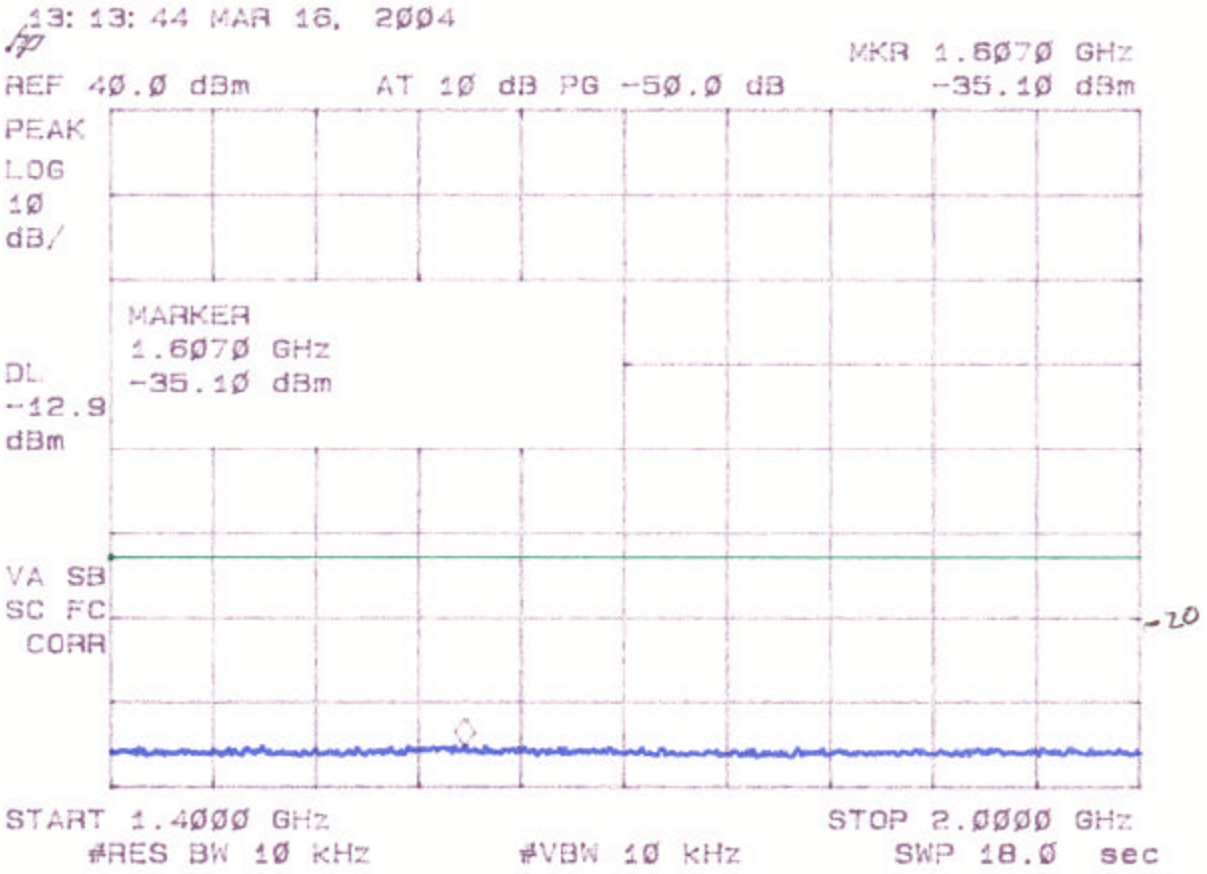


Figure 5jj
Spurious Emissions at Antenna Terminals
Low Channel, Analog (25 kHz)



2.10 Field Strength of Spurious Radiation (FCC Section 2.1053)

Spurious emissions were evaluated from 30 MHz to 1.8 GHz at an EUT to antenna distance of 3 meters. The EUT was tested modulated by its own internal sources. The EUT was placed on an open area test site and the spurious emissions tested with the antenna terminated with a 50 Ohm load as stipulated by EIT/TIA-603:2001 section 2.2.12. Measurements for 30 to 1000 MHz were made with the analyzer's bandwidth at 10 kHz and video bandwidth set to 300 kHz. The EUT's emissions were recreated with a signal generator and transmit antenna and the power recorded by the substitution method. Measurements above 1 GHz were made with the analyzer's resolution bandwidth set to 1 MHz.

FCC Minimum Standard

<u>FCC Part 22.359, 74.462, and 90.210 (25 kHz bandwidth only)</u>

On any frequency removed from the center of the assigned channel by more than 250 percent at least:

Low: $43 + 10 \log (P_{Watts}) = 43 + 10 \log (6.15) = 50.9$ dB
Middle: $43 + 10 \log (P_{Watts}) = 43 + 10 \log (6.05) = 50.8$ dB
High: $43 + 10 \log (P_{Watts}) = 43 + 10 \log (6.05) = 50.8$ dB

<u>FCC Part 90.210 (12.5 kHz Bandwidth only)</u>

On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 12.5 kHz at least:

Low: $50 + 10 \log (P_{Watts}) = 50 + 10 \log (6.15) = 57.9$ dB
Middle: $50 + 10 \log (P_{Watts}) = 50 + 10 \log (6.05) = 57.8$ dB
High: $50 + 10 \log (P_{Watts}) = 50 + 10 \log (6.05) = 57.8$ dB

NOTE: In general, the worse case attenuation requirement shown above was applied.

FIELD STRENGTH OF SPURIOUS RADIATION

Table 4a

Test Date: March 23, 2004
UST Project: 04-0043
Customer: RELM Wireless Incorporated
Model: DPHX51

Substitution Method Results

Low Channel

EUT Frequency (MHz)	EUT Measured Power (dBm)	Substitution Antenna (dBm)	Antenna Gain (dBi)	Cable Loss (dB)	Output Power (dBm)	Output Power Limit (dBm)	Margin (dB)
272.17	-65.42	-41.2	1.6	0.35	-39.95	-20.01	-19.94
408.28	-78.46	-50.5	1.6	0.45	-49.25	-20.01	-29.34
544.4	-86.42	-55.8	-0.4	0.55	-56.75	-20.01	-36.74
680.498	-86.41	-51.0	-0.9	0.63	-52.53	-20.01	-32.52

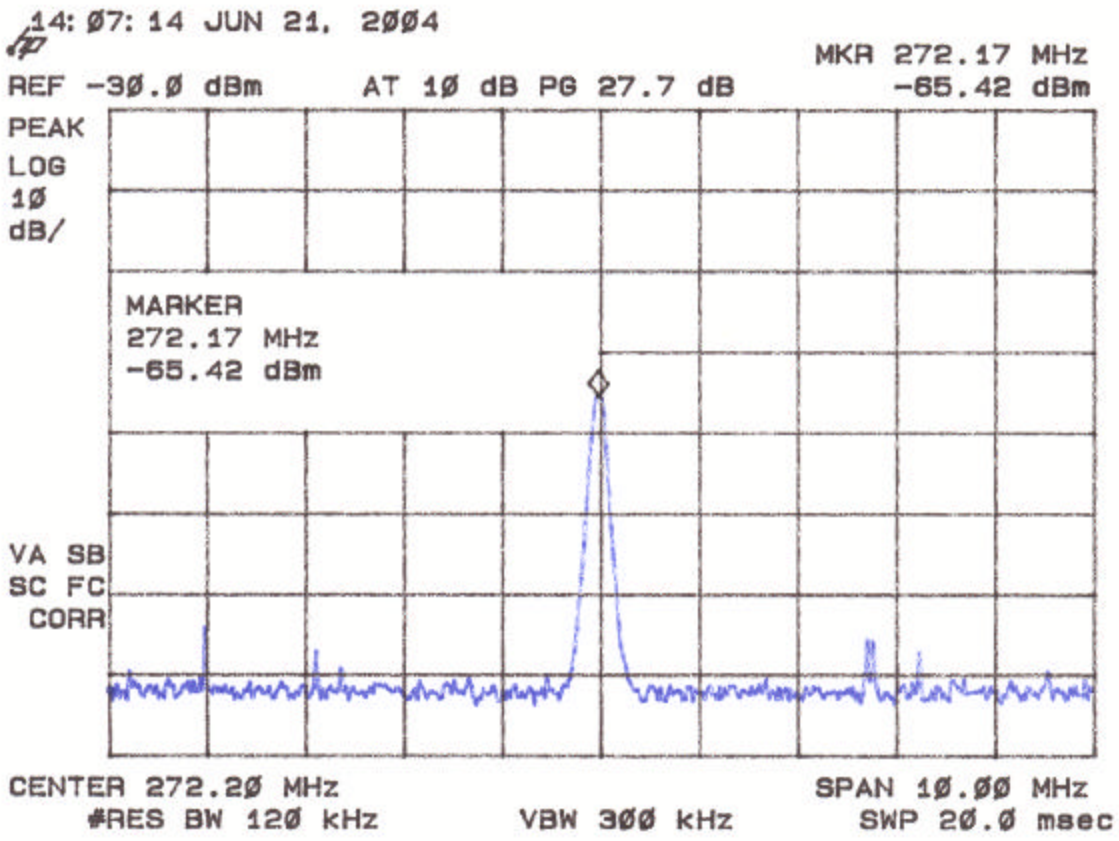
LIMITS (Part 22, 78, and 90) = -20.01 dBm
50+ 10 Log(6.15 (power in watts)) = 57.9 (dB) below the fundamental
6.15W = +37.89 dBm
37.89 dBm – 57.9dB = -20.01 dBm

SAMPLE CALCULATIONS:
Substitution Antenna (dBm) + Antenna Gain (dBi) – Cable Loss (dB) = Output Power (dBm)
-41.2 (dBm) + 1.6 (dBi) – 0.35 (dB) = -39.93 (dBm)

Tested by
Signature: _____ **Name:** **David Blethen**

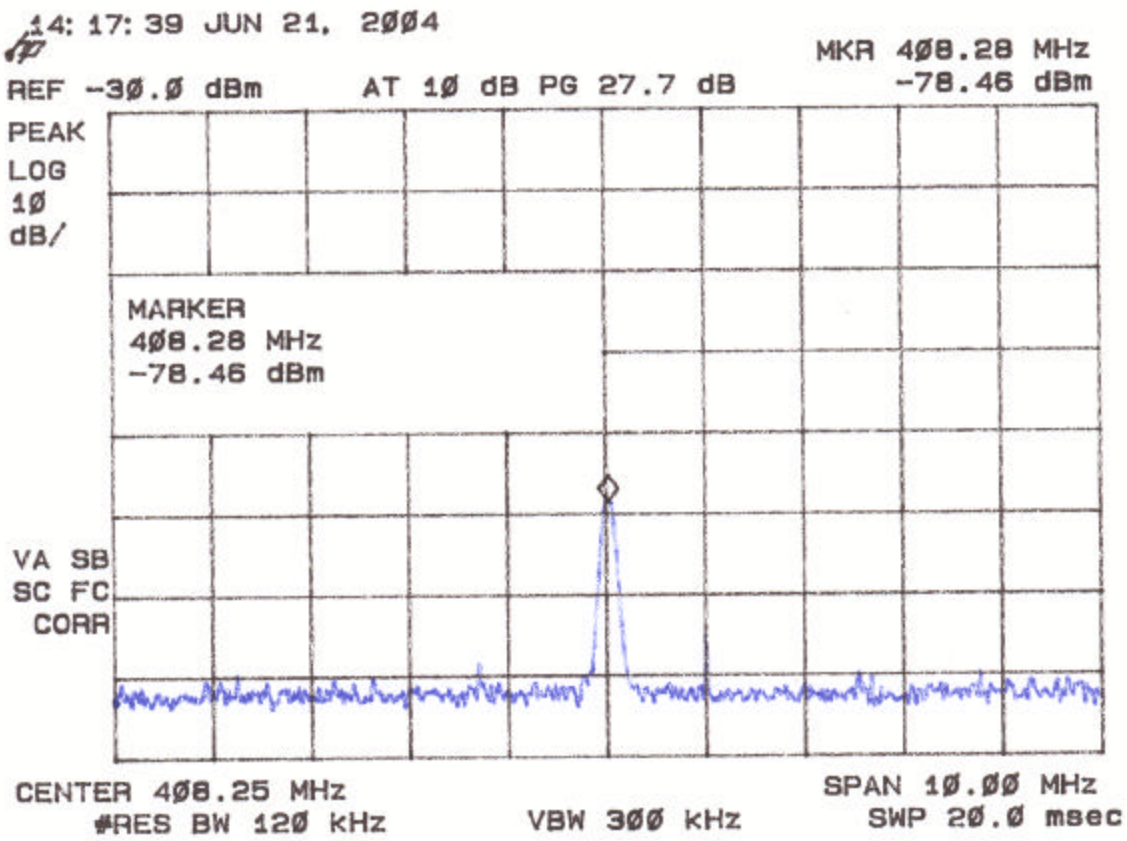
FIELD STRENGTH OF SPURIOUS RADIATION

Figure 6a – (Low Channel)



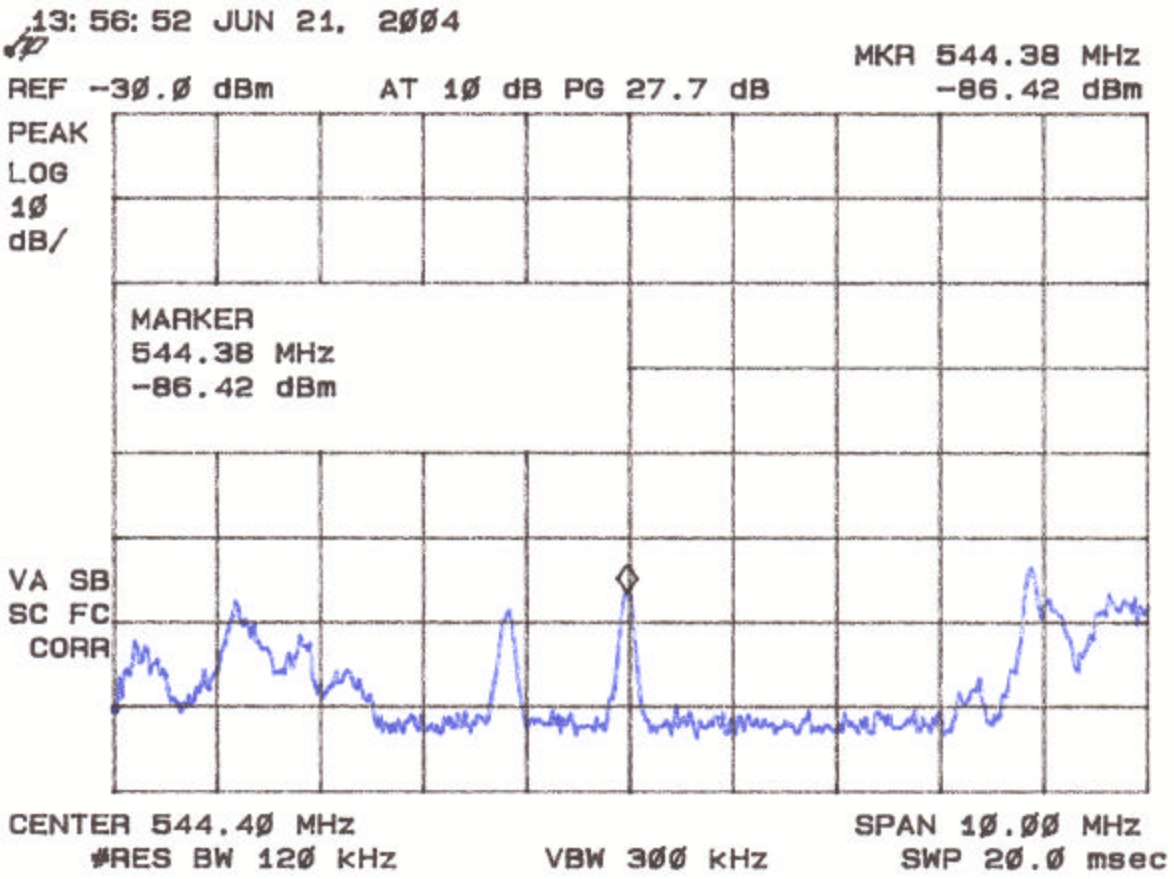
FIELD STRENGTH OF SPURIOUS RADIATION

Figure 6b – (Low Channel)

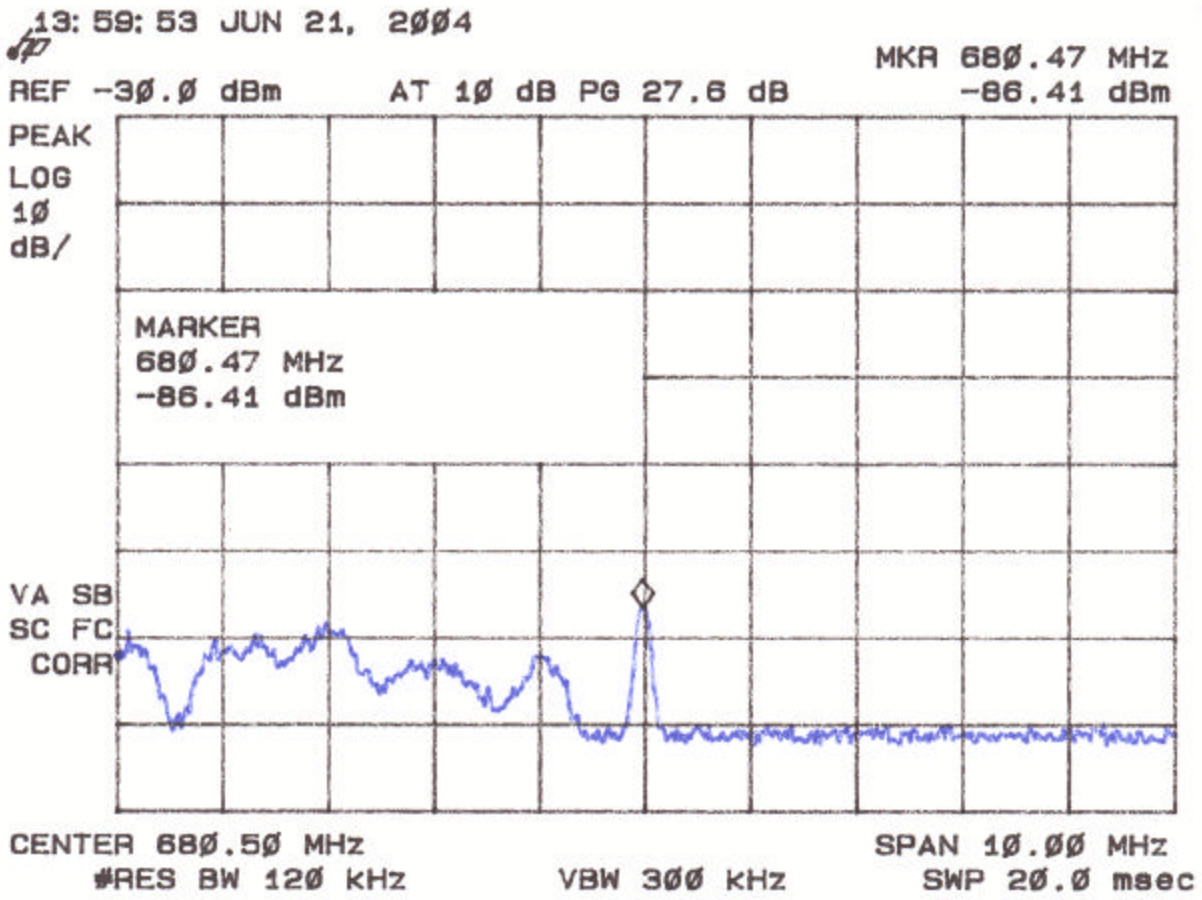


FIELD STRENGTH OF SPURIOUS RADIATION

Figure 6c – (Low Channel)



FIELD STRENGTH OF SPURIOUS RADIATION
Figure 6d – (Low Channel)



FIELD STRENGTH OF SPURIOUS RADIATION

Table 4b

Test Date: **March 23, 2004**
UST Project: **04-0043**
Customer: **RELM Wireless Incorporated**
Model: **DPHX51**

Mid Channel

EUT Frequency (MHz)	EUT Measured Power (dBm)	Substitution Antenna (dBm)	Antenna Gain (dBi)	Cable Loss (dB)	Output power (dBm)	Output power limit (dBm)	Margin (dB)
310.18	-69.7	-41.5	1.5	0.38	-40.38	--19.98	-20.40
465.28	-75.35	-46.2	1.1	0.49	-45.59	-19.98	-25.61
620.3	-74.25	-45.9	-0.6	0.59	-47.09	-19.98	-27.11
775.5	-85.28	-49.7	-1.3	0.68	-51.68	-19.98	-31.7

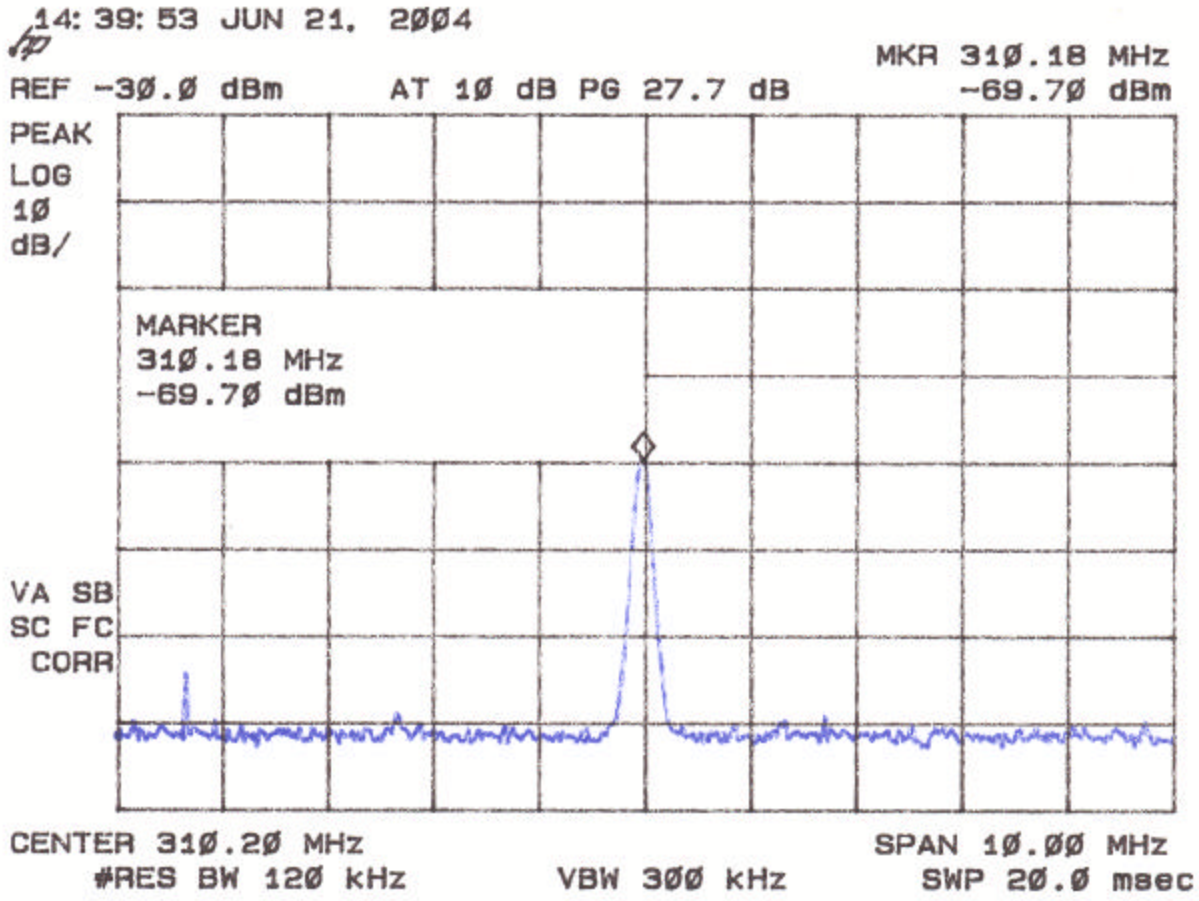
LIMITS (Part 22, 78, and 90) = -19.98 dBm
50+ 10 Log(6.05 (power in watts)) = 57.8 (dB) below the fundamental
6.05W = +37.82 dBm
37.82 dBm – 57.8dB = -19.98 dBm

SAMPLE CALCULATIONS:
Substitution Antenna (dBm) + Antenna Gain (dBi) – Cable Loss (dB) = Output Power (dBm)
-41.5 (dBm) + 1.5 (dBi) – 0.38 (dB) = -40.38 (dBm)

Tested by
Signature: _____ **Name:** **David Blethen**

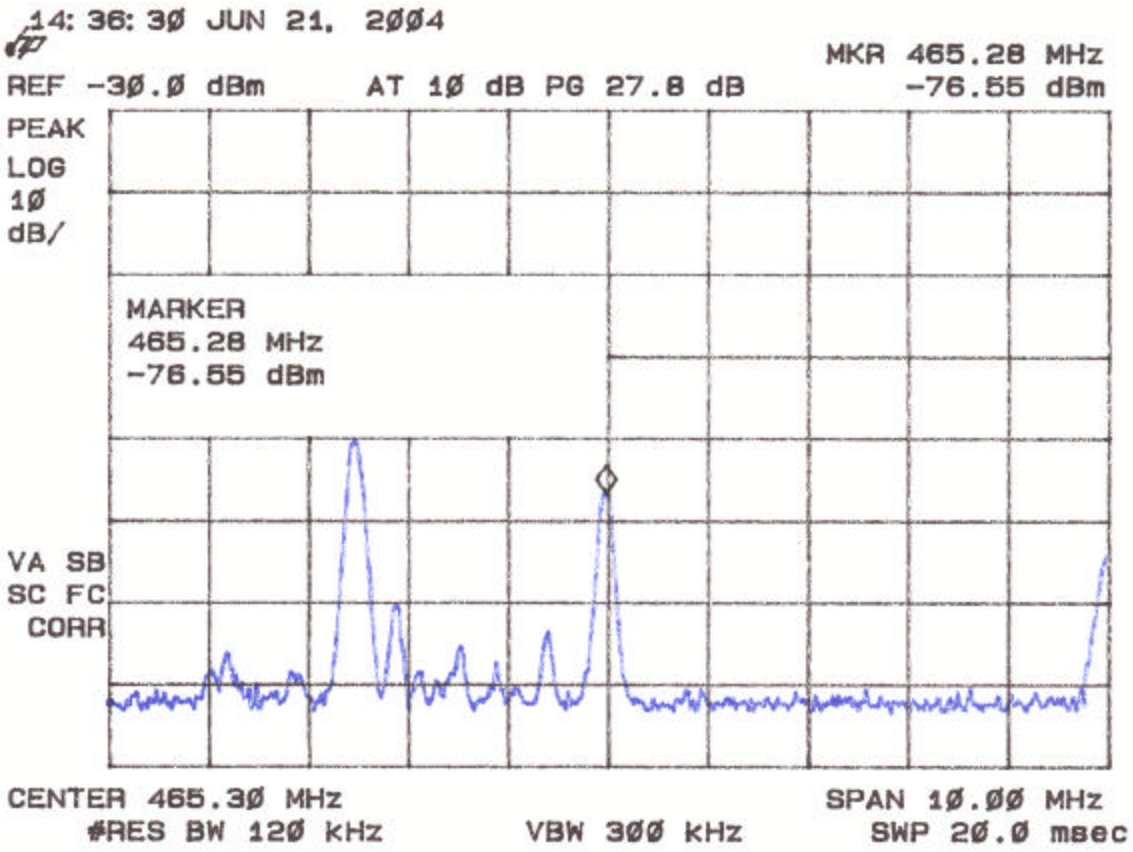
FIELD STRENGTH OF SPURIOUS RADIATION

Figure 7a – (Middle Channel)



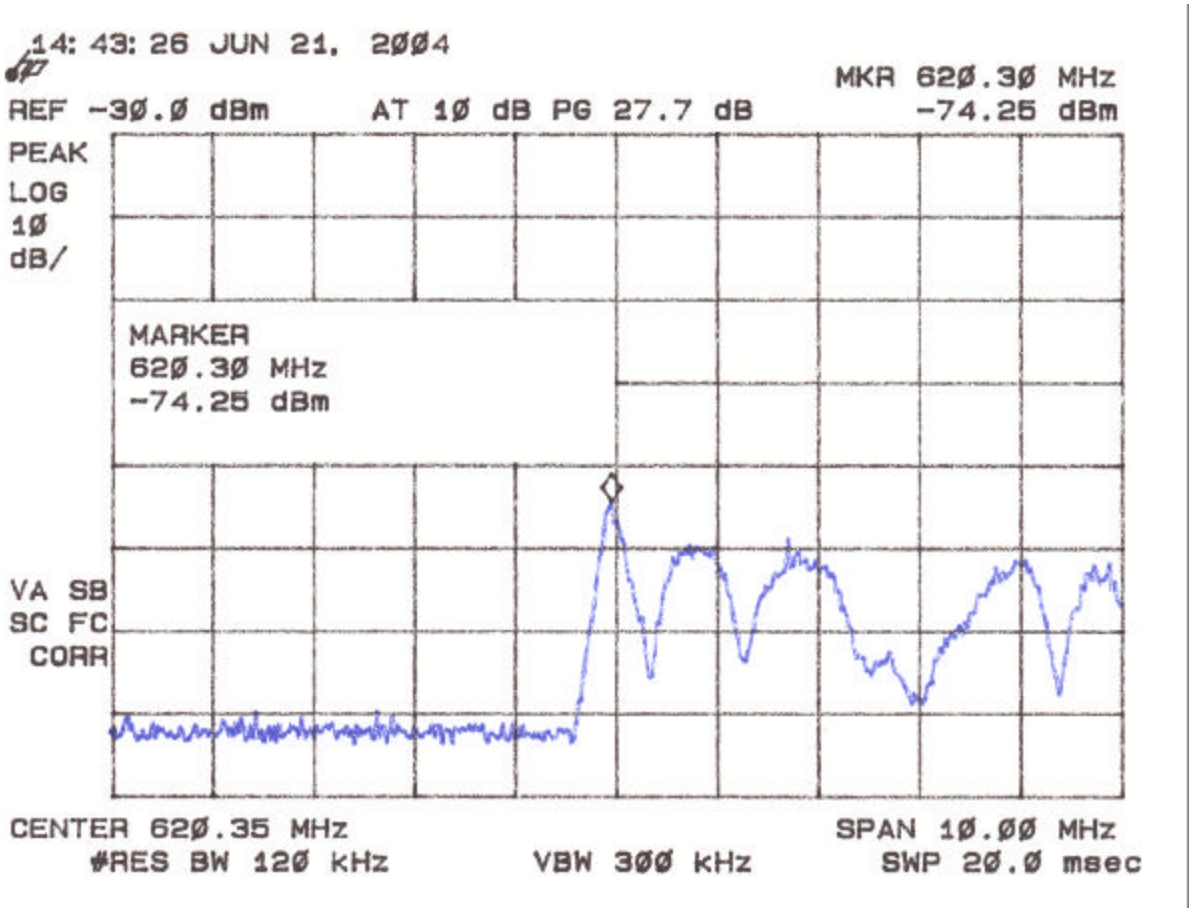
FIELD STRENGTH OF SPURIOUS RADIATION

Figure 7b – (Middle Channel)



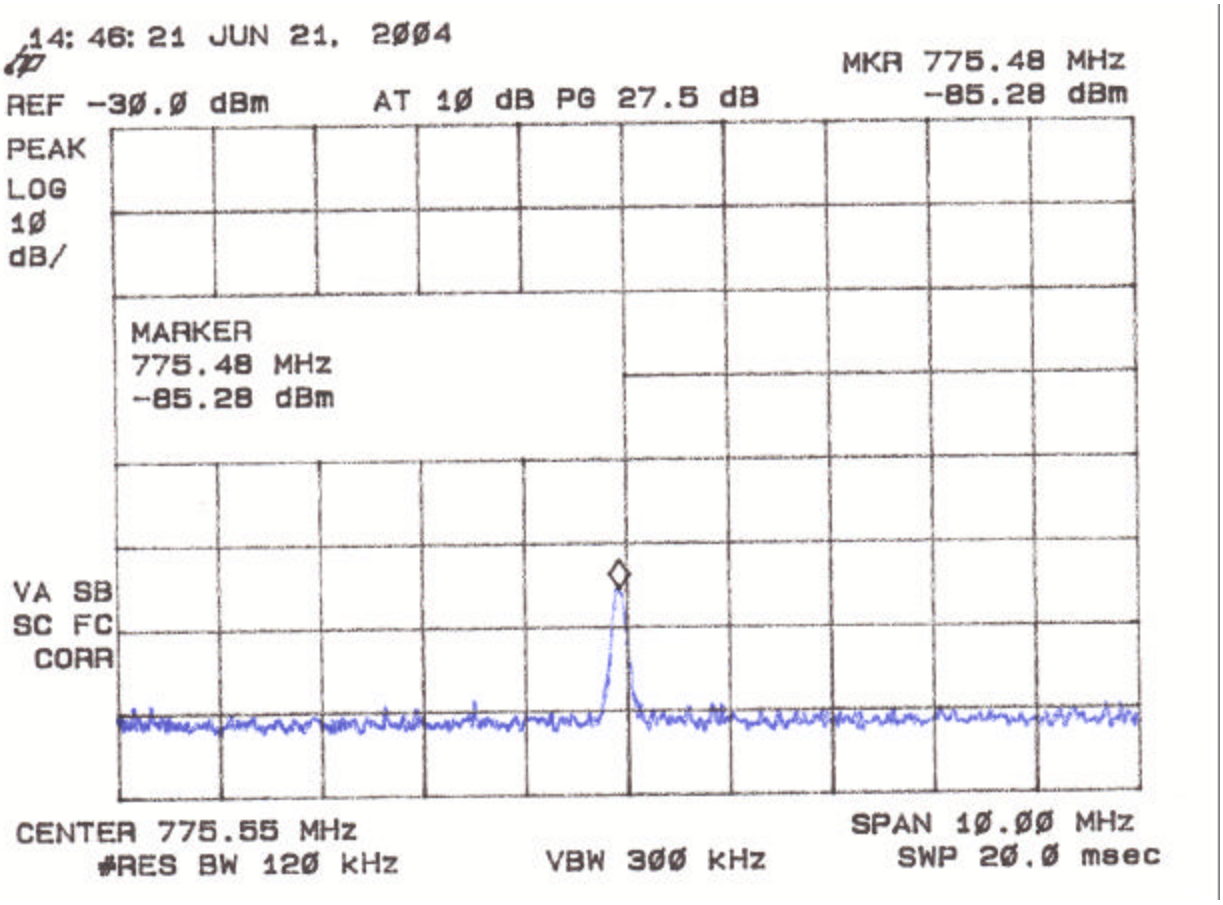
FIELD STRENGTH OF SPURIOUS RADIATION

Figure 7c – (Middle Channel)



FIELD STRENGTH OF SPURIOUS RADIATION

Figure 7d – (Middle Channel)



FIELD STRENGTH OF SPURIOUS RADIATION

Table 4c

Test Date: **March 23, 2004**
UST Project: **04-0043**
Customer: **RELM Wireless Incorporated**
Model: **DPHX51**

High Channel

EUT Frequency (MHz)	EUT Measured Power (dBm)	Substitution Antenna (dBm)	Antenna Gain (dBi)	Cable Loss (dB)	Output power (dBm)	Output power limit (dBm)	Margin (dB)
347.75	-72.99	-45.2	1.8	0.4	-43.8	-19.98	-23.82
521.08	-78.83	-49.7	-0.4	0.53	-50.03	-19.98	-30.65
695.55	-79.76	-47.2	-0.8	0.6	-48.6	-19.98	-28.6

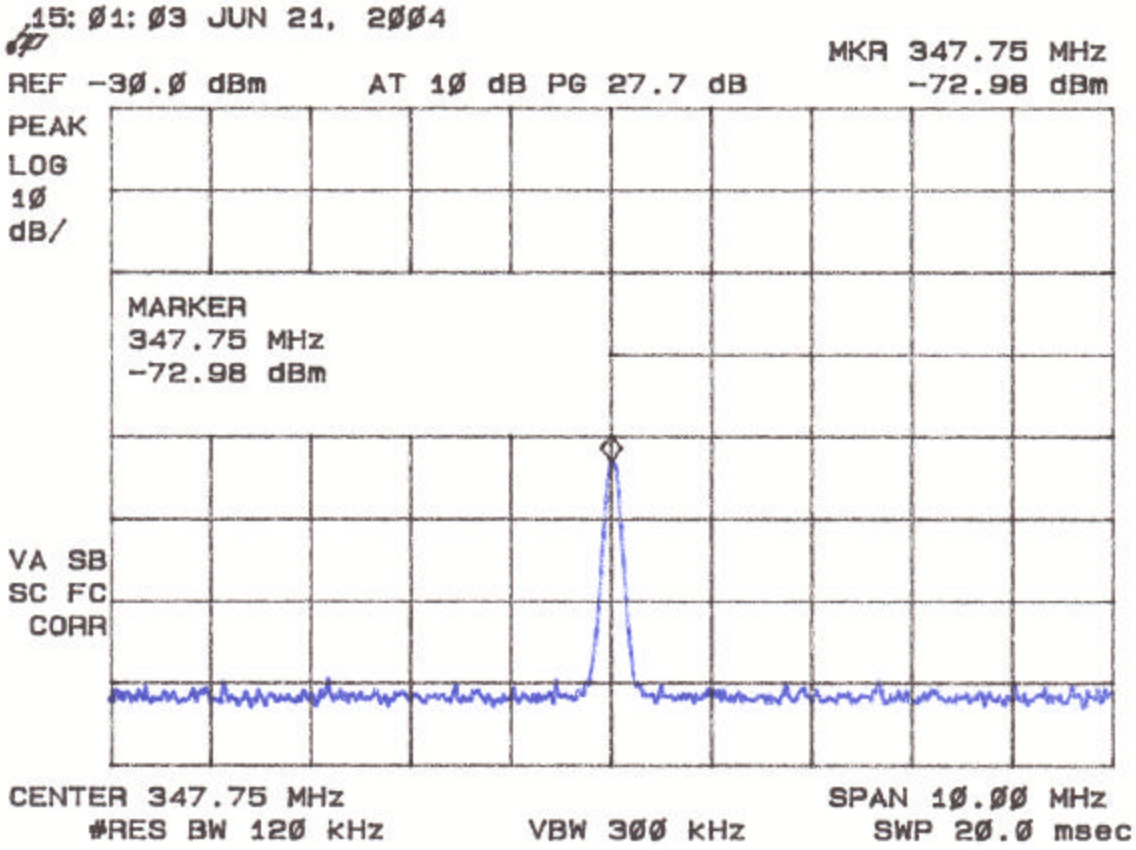
LIMITS (Part 22, 78, and 90) = -19.98 dBm
50+ 10 Log(6.05 (power in watts)) = 57.8 (dB) below the fundamental
6.05W = +37.82 dBm
37.82 dBm – 57.8dB = -19.98 dBm

SAMPLE CALCULATIONS:
Substitution Antenna (dBm) + Antenna Gain (dBi) – Cable Loss (dB) = Output Power (dBm)
-72.99 (dBm) + 1.8 (dBi) – 0.4 (dB) = -43.8 (dBm)

Tested by
Signature: _____ **Name:** **David Blethen**

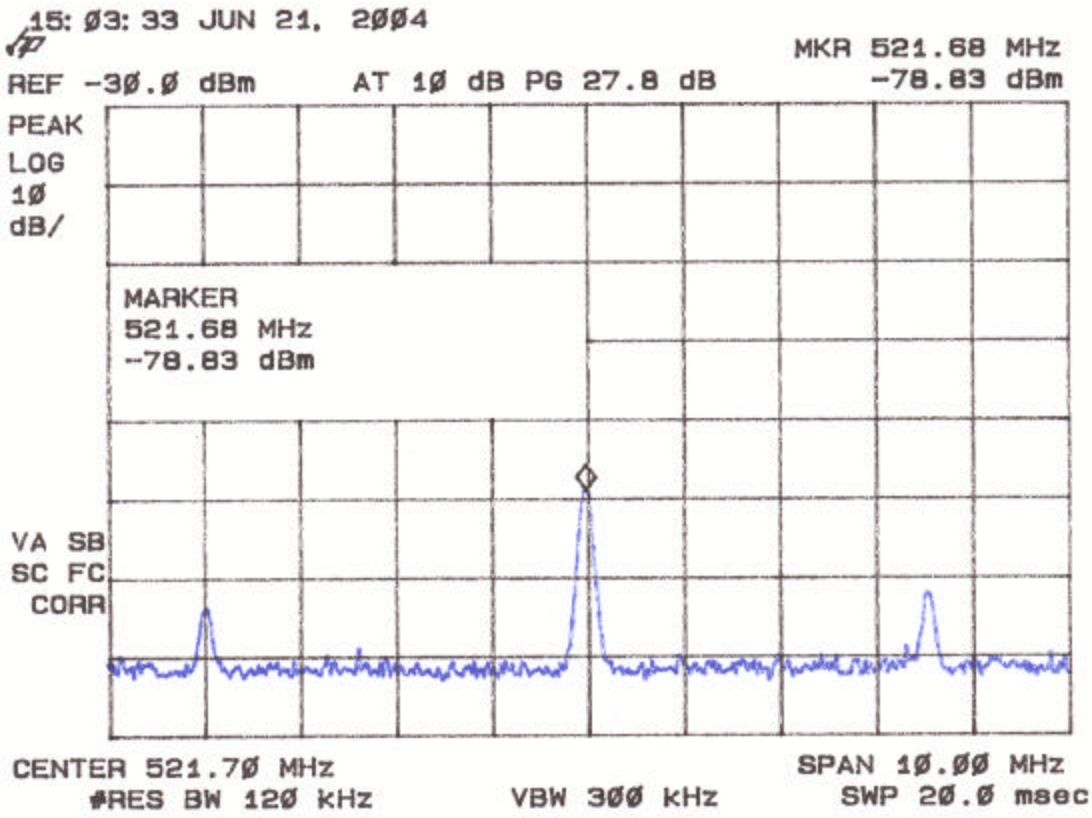
FIELD STRENGTH OF SPURIOUS RADIATION

Figure 8a – (High Channel)



FIELD STRENGTH OF SPURIOUS RADIATION

Figure 8b – (High Channel)



FIELD STRENGTH OF SPURIOUS RADIATION

Figure 8c – (High Channel)

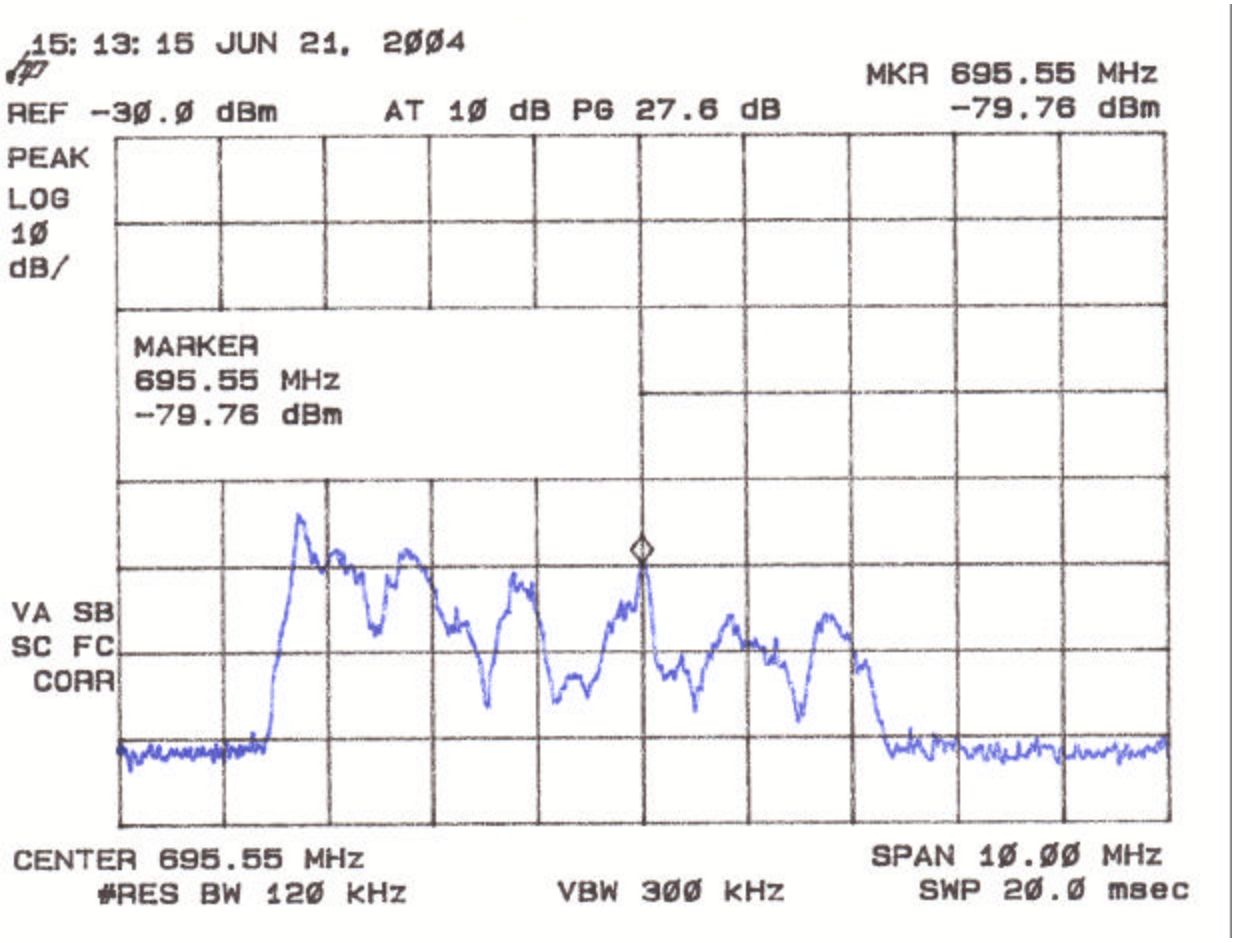


TABLE 5a. RADIATED EMISSIONS DATA
CLASS B

Test Date: March 23, 2004
UST Project: 04-0043
Customer: RELM Wireless Incorporated
Model: DPHX51

Measurements > 1 GHz

FREQ. (GHz)	TEST DATA (dBm) @ 3m	AMP GAIN (dB)	ANT. FACTOR (dB)	CABLE LOSS (dB)	RESULTS (uV/m) @ 3m	FCC LIMITS (uV/m) @ 3m
No Emissions Detected Within This Range						

Tested by
Signature: _____ **Name:** David Blethen

TABLE 5b. RADIATED EMISSIONS DATA
CLASS B

Test Date: March 23, 2004
UST Project: 04-0043
Customer: RELM Wireless Incorporated
Model: DPHX51

Measurements > 1 GHz

FREQ. (GHz)	TEST DATA (dBm) @ 3m	AMP GAIN (dB)	ANT. FACTOR (dB)	CABLE LOSS (dB)	RESULTS (uV/m) @ 3m	FCC LIMITS (uV/m) @ 3m
No Emissions Detected Within This Range						

Tested by
Signature: _____ **Name:** David Blethen

TABLE 5c. RADIATED EMISSIONS DATA
CLASS B

Test Date: March 23, 2004
UST Project: 04-0043
Customer: RELM Wireless Incorporated
Model: DPHX51

Measurements > 1 GHz

FREQ. (GHz)	TEST DATA (dBm) @ 3m	AMP GAIN (dB)	ANT. FACTOR (dB)	CABLE LOSS (dB)	RESULTS (uV/m) @ 3m	FCC LIMITS (uV/m) @ 3m
No Emissions Detected Within This Range						

Tested by
Signature: _____ **Name:** David Blethen

2.11 Frequency Stability (FCC Section 2.1055)
2.12 Transient Frequency Behavior (FCC Section 90.214)

Provided By Relm Wireless Incorporated in separate document (04-0043.Relm Tests.PDF)