MEASUREMENT/TECHNICAL REPORT

COMPANY NAME: **Radio Systems Corporation**

MODEL: **PPT101**

FCC ID: **KE3PPT101**

DATE: **August 19, 1998**

This report concerns (check one): Original grant_X__

Class II change_____

Equipment type: **Low Power Transmitter**

Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? yes_____ No_X_

If yes, defer until:_____
date

__N.A.___ agrees to notify the Commission by__N.A._____
date

of the intended date of announcement of the product so that the grant can be issued on that date.

Report prepared by:

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Alpharetta, GA 30004

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GENERAL INFORMATION

GENERAL INFORMATION

Product Description

The Equipment Under Test (EUT) is a Radio Systems Corporation, 303.8 Multibutton Transmitter, Model PPT101. The EUT is part of a system including a dog collar receiver.

Related Submittal(s)/Grant(s)

The EUT will be used with two dog collar receivers also being submitted under the FCC ID: KE3BDT200 and KE3VC200.

SECTION 2

TESTS AND MEASUREMENTS

TESTS AND MEASUREMENTS

Configuration of Tested System

The sample was tested per ANSI C63.4, Methods of Measurement from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (1992). Conducted and radiated emissions data were taken with the test receiver or spectrum analyzer's resolution bandwidth adjusted to 9 kHz and 120 kHz, respectively. All measurements are peak unless stated otherwise. The video filter associated with the spectrum analyzer was off throughout the evaluation process. Interconnecting cables were manipulated as necessary to maximize emissions. A block diagram of the tested system is shown in Figure 1. Test configuration photographs for spurious and fundamental emissions are shown in Figure 2.

Since the EUT is a hand held device, it was placed into a continuous mode of transmit and rotated about all 3 axis to obtain worse case results.

Test Facility

Testing was performed at US Tech's measurement facility at 3505 Francis Circle, Alpharetta, GA. This site has been fully described and submitted to the FCC, and accepted in their letter marked 31040/SIT. Additionally this site has also been fully described and submitted to Industry Canada (IC), and has been approved under file number IC2982.

Test Equipment

Table 2 describes test equipment used to evaluate this product.

Modifications

No modifications were made to bring the EUT into compliance with FCC Part 15, Class B Requirements:

FIGURE 1

TEST CONFIGURATION

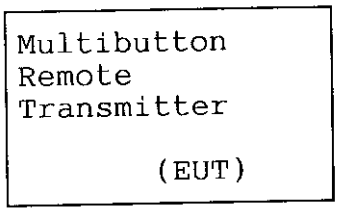


TABLE 1

EUT and Peripherals

PERIPHERAL MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	FCC ID:	CABLES P/D
Multibutton Remote Transmitter Radio Systems Corporation (EUT)	PPT101	None	KE3PPT101 (Pending)	None

TABLE 2

TEST INSTRUMENTS

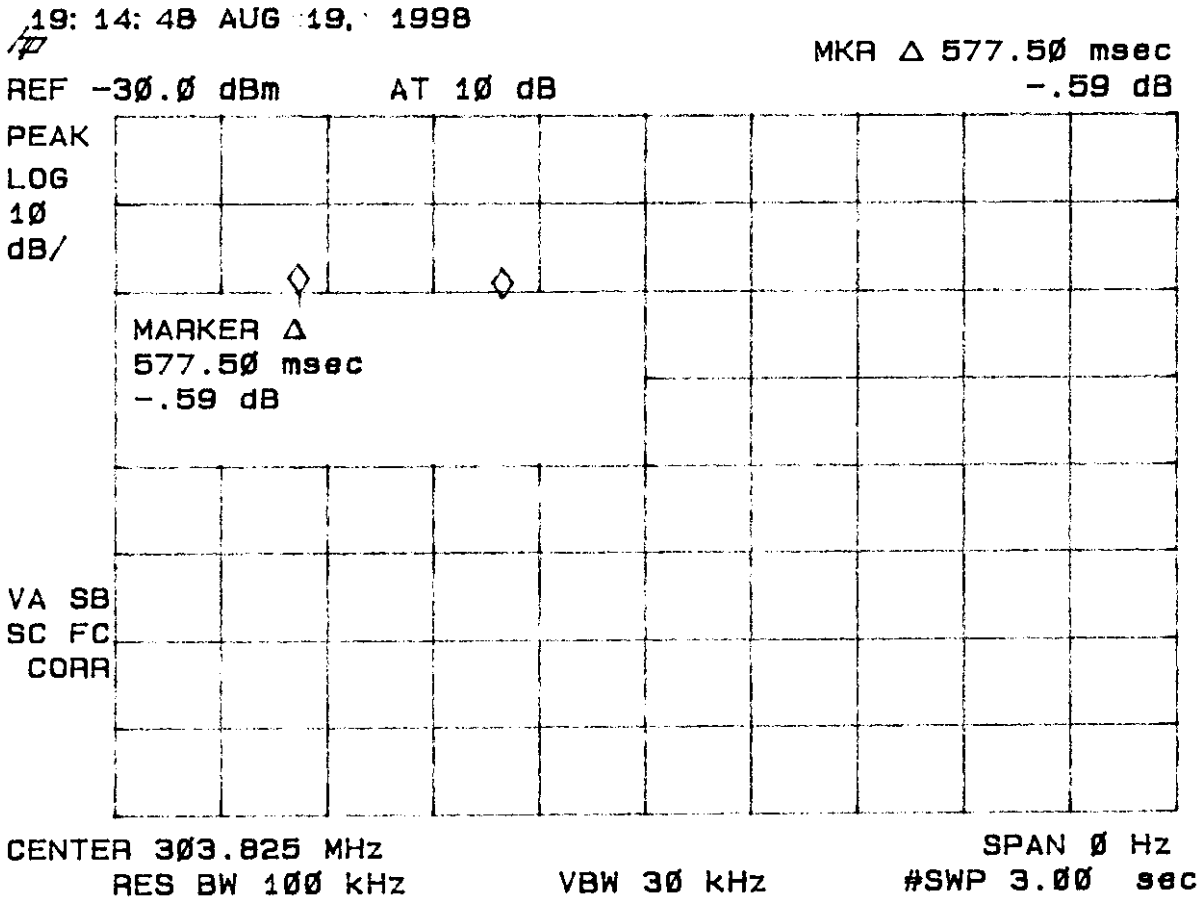
TYPE	MANUFACTURER	MODEL	SN.
SPECTRUM ANALYZER	HEWLETT-PACKARD	8593E	3205A00124
SPECTRUM ANALYZER	HEWLETT-PACKARD	8558B	2332A09900
S A DISPLAY	HEWLETT-PACKARD	853A	2404A02387
COMB GENERATOR	HEWLETT-PACKARD	8406A	1632A01519
RF PREAMP	HEWLETT-PACKARD	8447D	1937A03355
RF PREAMP	HEWLETT-PACKARD	8449B	3008A00480
HORN ANTENNA	EMCO	3115	3723
ROBERTS ANTENNAS	COMPLIANCE DESIGN	A100	167
BICONICAL ANTENNA	EMCO	3110	9307-1431
LOG PERIODIC ANTENNA	EMCO	3146	9110-3600
LISN	SOLAR ELE.	8012-50	N/A
THERMOMETER	FLUKE	52	5215250
MULTIMETER	FLUKE	85	53710469
FUNCTION GENERATOR	TEKTRONIX	CFG250	CFG250TW15059
PLOTTER	HEWLETT-PACKARD	7475A	2325A65394
BILOG	CHASE	CBL6112A	2238

Periodic Operation (47 CFR 15.231(a1))

A transmitter manually activated must automatically deactivate within not more than 5 seconds of being released. The transmitter is a 3 button transmitter. The EUT continues to transmit while each button is being pressed. The EUT ceases transmission almost immediately upon being released and appears to finish the set of 11 packets being transmitted. Therefore the longest period of time the transmitter should take to deactivate is 578 msec as shown in Figure 3.

FIGURE 3

Periodic Operation 15.231(a)(c1)



Field Strength of Fundamental Emission (47 CFR 15.231b)

Measurements were made using a peak detector. Field strength of the peak fundamental emission is shown in Table 3 and Figure 4.

Duty Cycle Correction During 100 msec:

Each packet period (56.5 msec) contains 1 long (1.5 msec), 2 medium (1.0 msec), and 4 short (500 msec) pulses, therefore the transmit duty cycle would be considered 5.55 msec per 56.5 msec = 9.8% duty cycle. Figures 3 and 5a through 5c show the characteristics of the pulse train for one of these functions.

Duty Cycle Correction = 20 log(.098) = -20.2dB

Field strength of the average fundamental emission is shown in Table 4.

TABLE 3

FIELD STRENGTH OF FUNDAMENTAL EMISSION

Test Date: July 23, 1998
UST Project: 98-109
Customer: Radio Systems Corporation
Model: PPT101

FREQ. (MHz)	TEST DATA (dBm) @ 3m	ANTENNA FACTOR + CABLE ATTENUATION	RESULTS (uV/m) @ 3m	PEAK FCC LIMITS (uV/m) @ 3m
303.8	-33.1	18.8	43,303.2	55,750

SAMPLE CALCULATIONS:

RESULTS uV/m @ 3m = Antilog ((-33.1 + 18.8 + 107)/20) = 43,303.2
CONVERSION FROM dBm TO dBuV = 107 dB

Test Results Reviewed By: _____ **Name: Tim R. Johnson**

FIGURE 4

FIELD STRENGTH OF FUNDAMENTAL EMISSION 15.231(b)

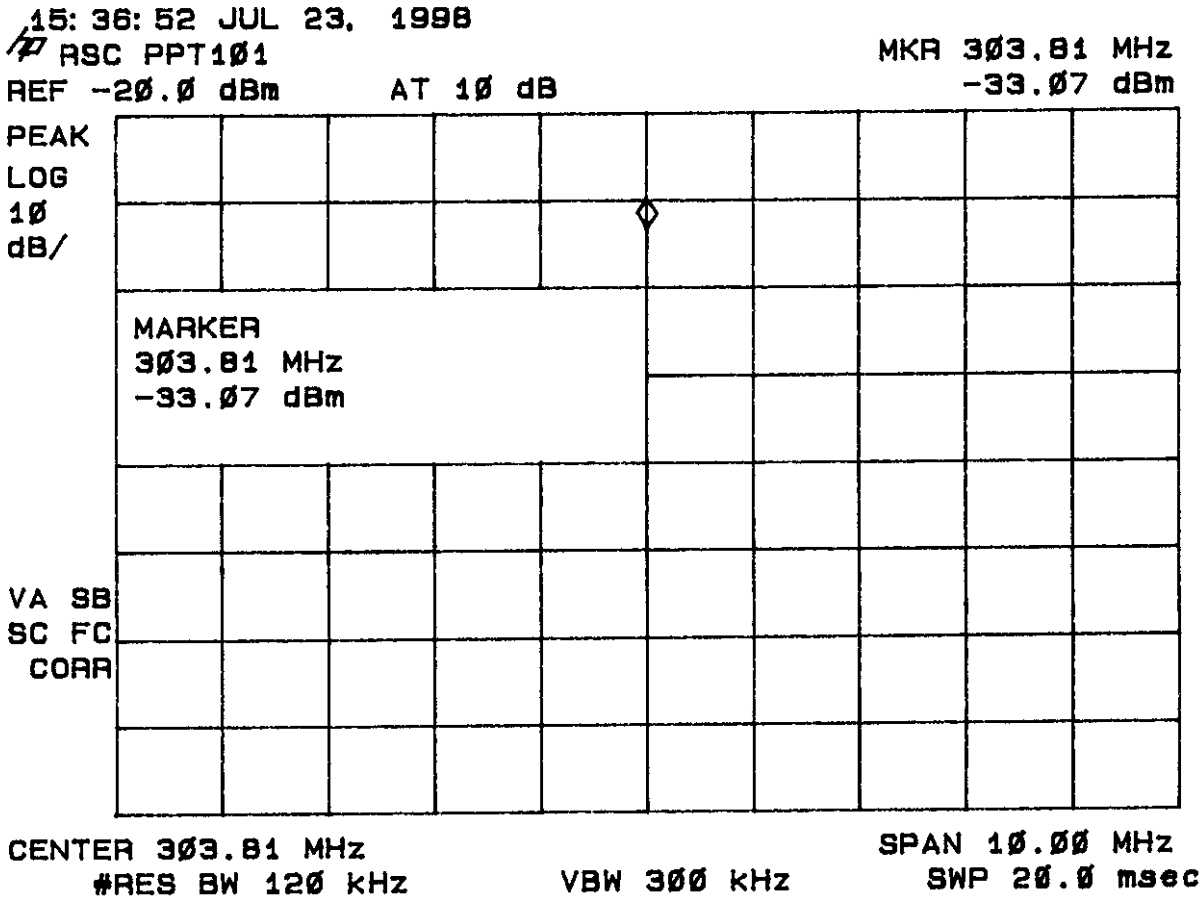


FIGURE 5a

DUTY CYCLE CHARACTERISTICS

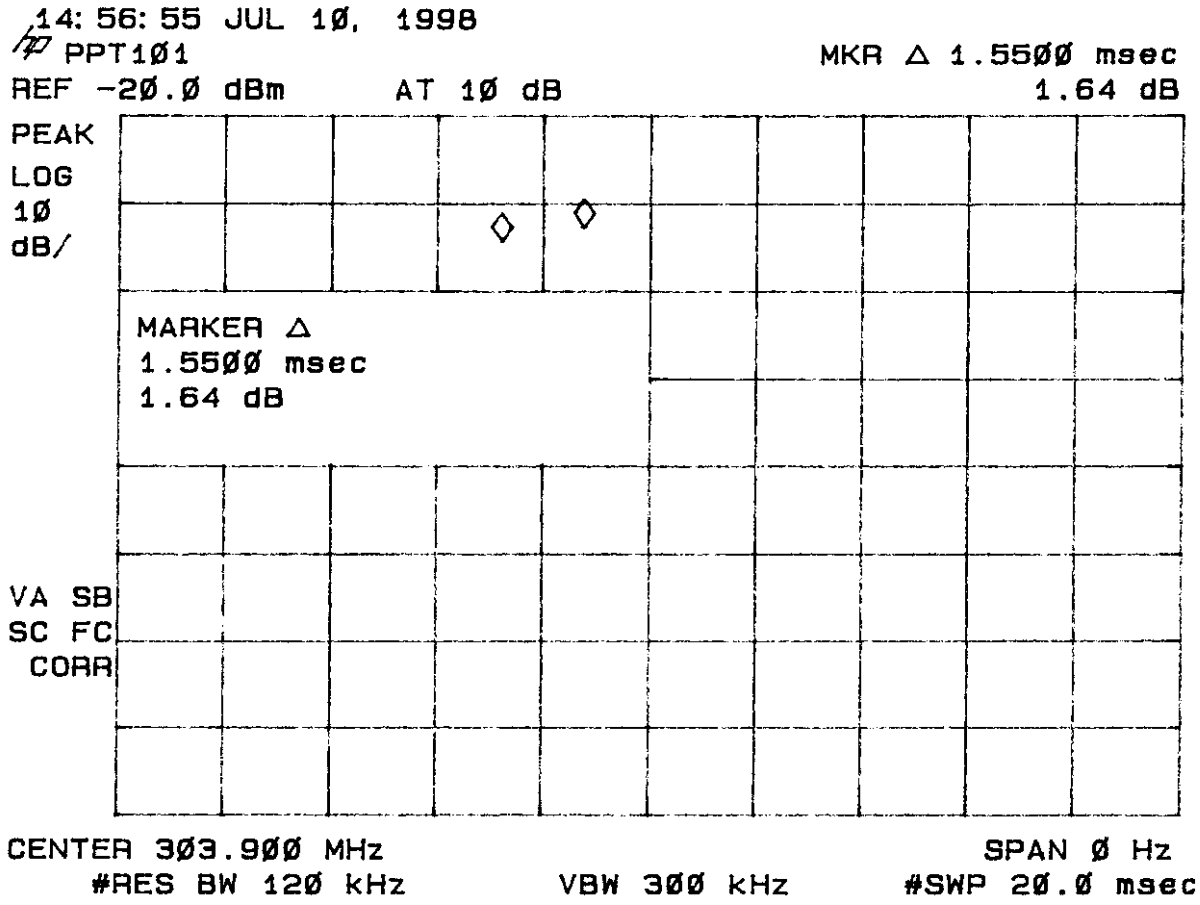


FIGURE 5b

DUTY CYCLE CHARACTERISTICS

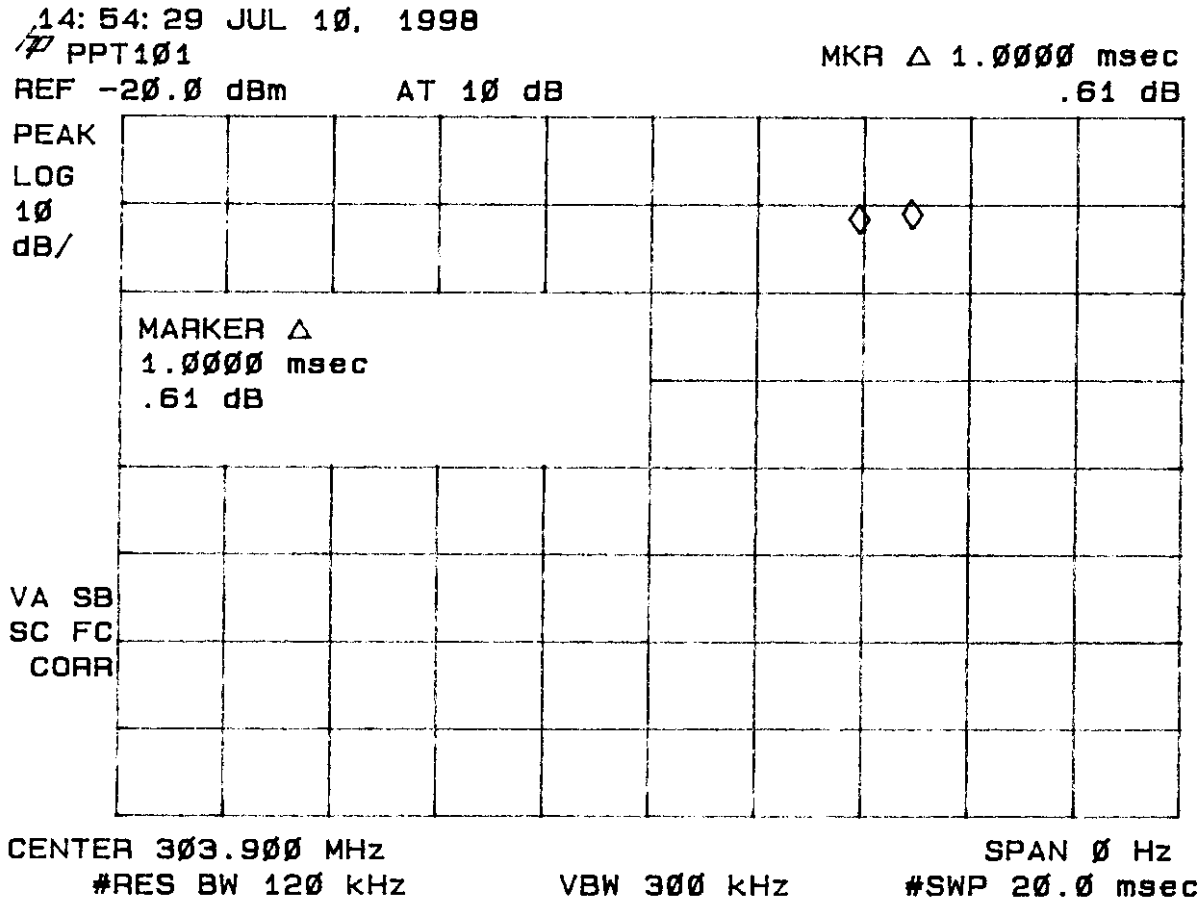


FIGURE 5c

DUTY CYCLE CHARACTERISTICS

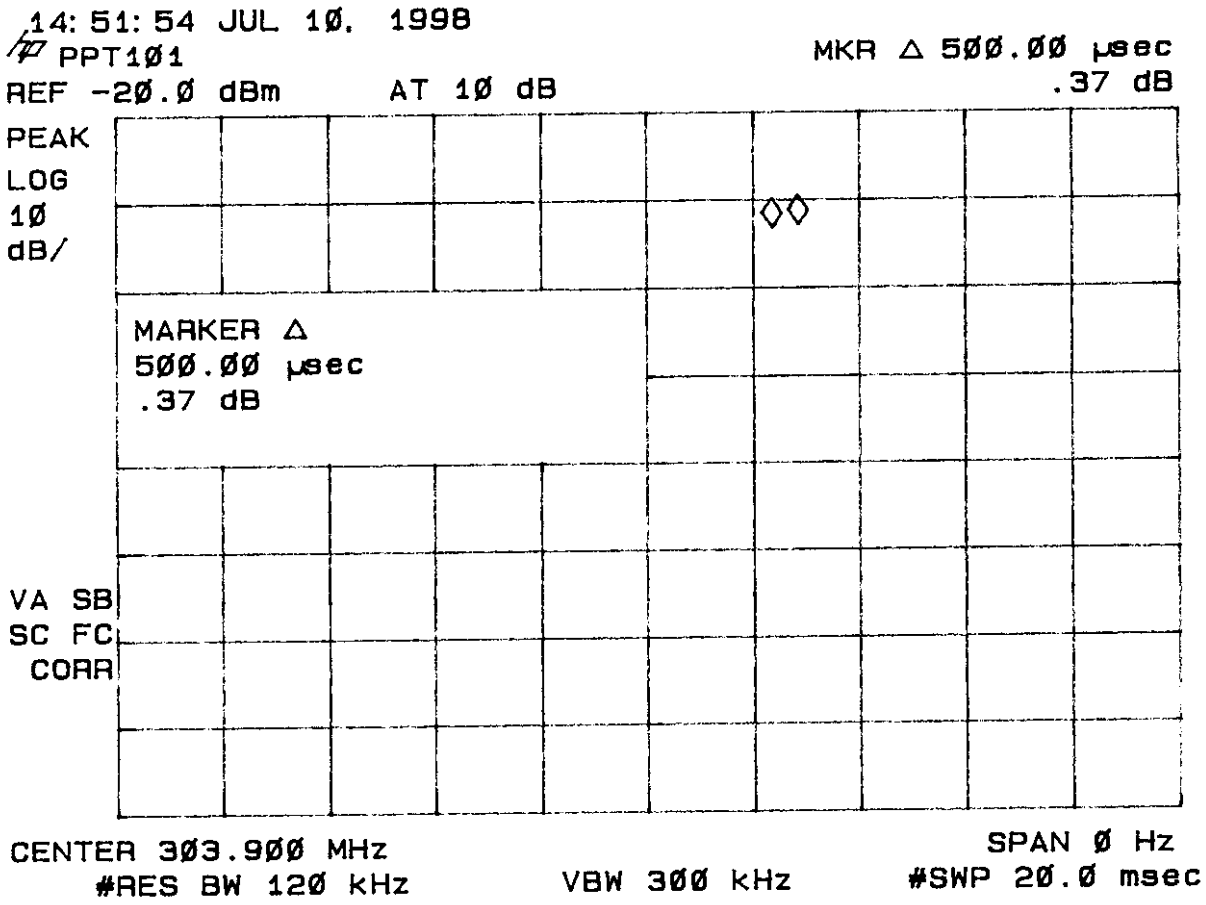


TABLE 4

FIELD STRENGTH OF FUNDAMENTAL EMISSION

Test Date: July 23, 1998
UST Project: 98-109
Customer: Radio Systems Corporation
Model: PPT101

FREQ. (MHz)	TEST DATA (dBm) @ 3m*	ANTENNA FACTOR + CABLE ATTENUATION	RESULTS (uV/m) @ 3m	AVERAGE FCC LIMITS (uV/m) @ 3m
303.8	-53.3	18.8	4,231.7	5,575

* Adjusted by duty cycle = 20 log(.098) = -20.2 dB

SAMPLE CALCULATIONS:

RESULTS uV/m @ 3m = Antilog ((-53.3 + 18.8 + 107)/20) = 4,231.7
CONVERSION FROM dBm TO dBuV = 107 dB

Test Results Reviewed By: _____ Name: Tim R. Johnson

Field Strength Of Spurious Emissions (47 CFR 15.231b)

Measurements were made using a peak detector. Field strength of Spurious Emissions are shown in Table 5 and Figures 6. For comparison to the average limits, duty cycle corrections were made as given in the previous section. Any emission less than 1000 MHz and falling within the restricted bands of 15.205 were not adjusted for averaging and the limits of 15.209 were applied.

TABLE 5a

FIELD STRENGTH OF SPURIOUS EMISSIONS

Test Date: July 23, 1998
UST Project: 98-109
Customer: Radio Systems Corporation
Model: PPT101

FREQ. (MHz.)	TEST DATA (dBm) @ 3m	ANTENNA FACTOR + CABLE ATTENUATION - AMP GAIN	RESULTS (uV/m) @ 3m	PEAK FCC LIMITS (uV/m) @ 3m
206.8	-85.7	14.9	64.4	5575
315.7	-85.9	18.9	100.3	5575
400.9**	-86.3	20.3	112.6	200
485.1	-91.3	22.8	83.8	5575
607.8	-64.4	25.4	2511.9	5575
911.5	-64.9	30.9	4450.4	5575
1215.5**	-30.0	-6.4	3403.6	5000
1519.3**	-43.7	-5.5	773.4	5000
1823.3	-45.2	-3.7	805.6	5575

** Denotes restricted band of operation

SAMPLE CALCULATIONS:

RESULTS uV/m @ 3m = Antilog ((-85.7 + 14.9 + 107)/20) = 64.4
CONVERSION FROM dBm TO dBuV = 107 dB

Test Results Reviewed By: _____ Name: Tim R. Johnson

TABLE 5b

FIELD STRENGTH OF SPURIOUS EMISSIONS

Test Date: July 23, 1998
UST Project: 98-109
Customer: Radio Systems Corporation
Model: PPT101

FREQ. (MHz.)	TEST DATA (dBm) @ 3m	ANTENNA FACTOR + CABLE ATTENUATION - AMP GAIN	RESULTS (uV/m) @ 3m	AVERAGE FCC LIMITS (uV/m) @ 3m
206.8	-105.9	14.9	6.3	557.5
315.7	-106.1	18.9	9.8	557.5
400.9**	-106.5	20.3	11.0	200.0
485.1	-111.5	22.8	8.2	557.5
607.8	-84.6	25.4	245.5	557.5
911.5	-85.1*	30.9	434.9	557.5
1215.5**	-50.2	-6.4	332.6	500.0
1519.3**	-63.9	-5.5	75.6	500.0
1823.3	-65.4	-3.7	78.7	557.5

* Adjusted by duty cycle = 20 log (.098) = -20.2 dB

** Denotes restricted band of operation

SAMPLE CALCULATIONS:

RESULTS uV/m @ 3m = Antilog ((-105.9 + 14.9 + 107)/20) = 6.3
CONVERSION FROM dBm TO dBuV = 107 dB

Test Results Reviewed By: _____ Name: Tim R. Johnson

FIGURE 6a

SPURIOUS EMISSIONS 15.231(b)

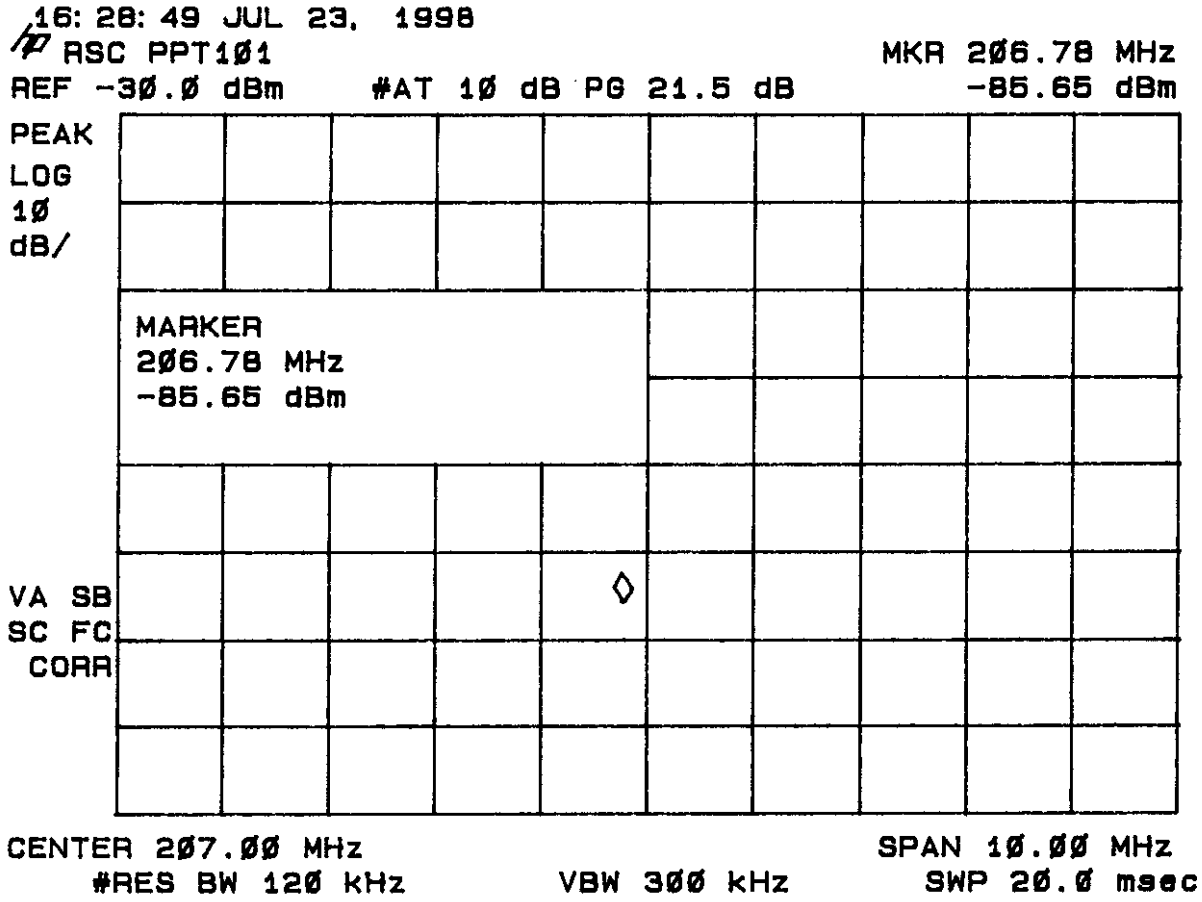


FIGURE 6b

SPURIOUS EMISSIONS 15.231(b)

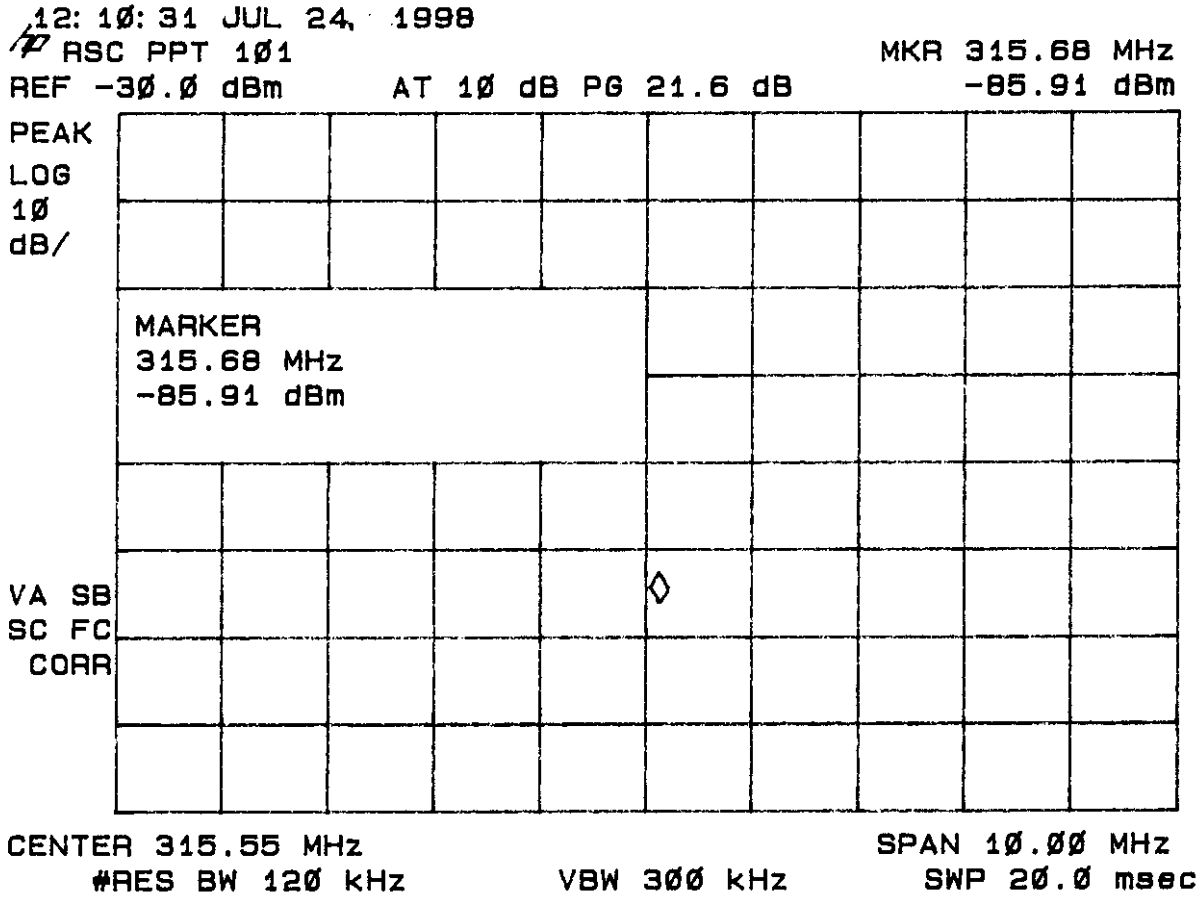


FIGURE 6c

SPURIOUS EMISSIONS 15.231(b)

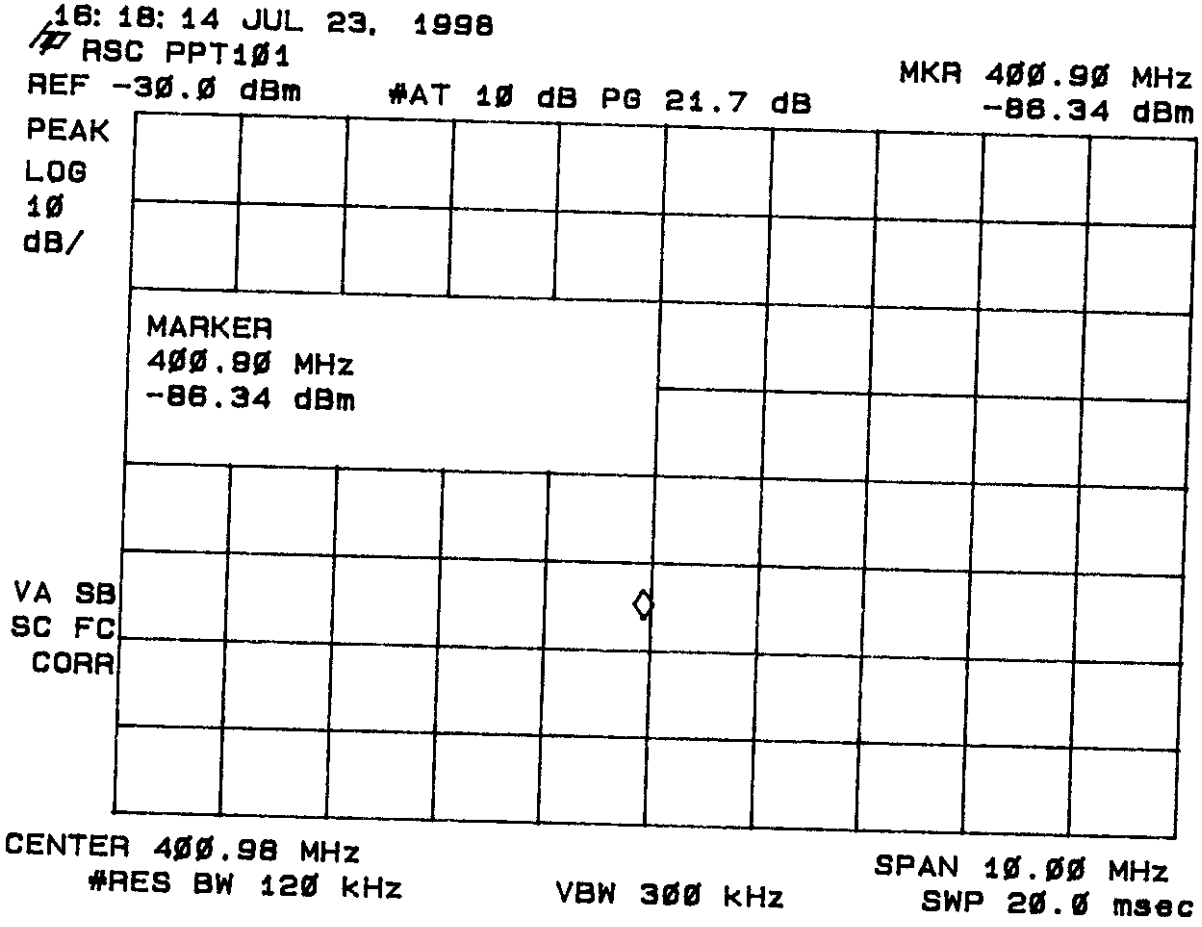


FIGURE 6d

SPURIOUS EMISSIONS 15.231(b)

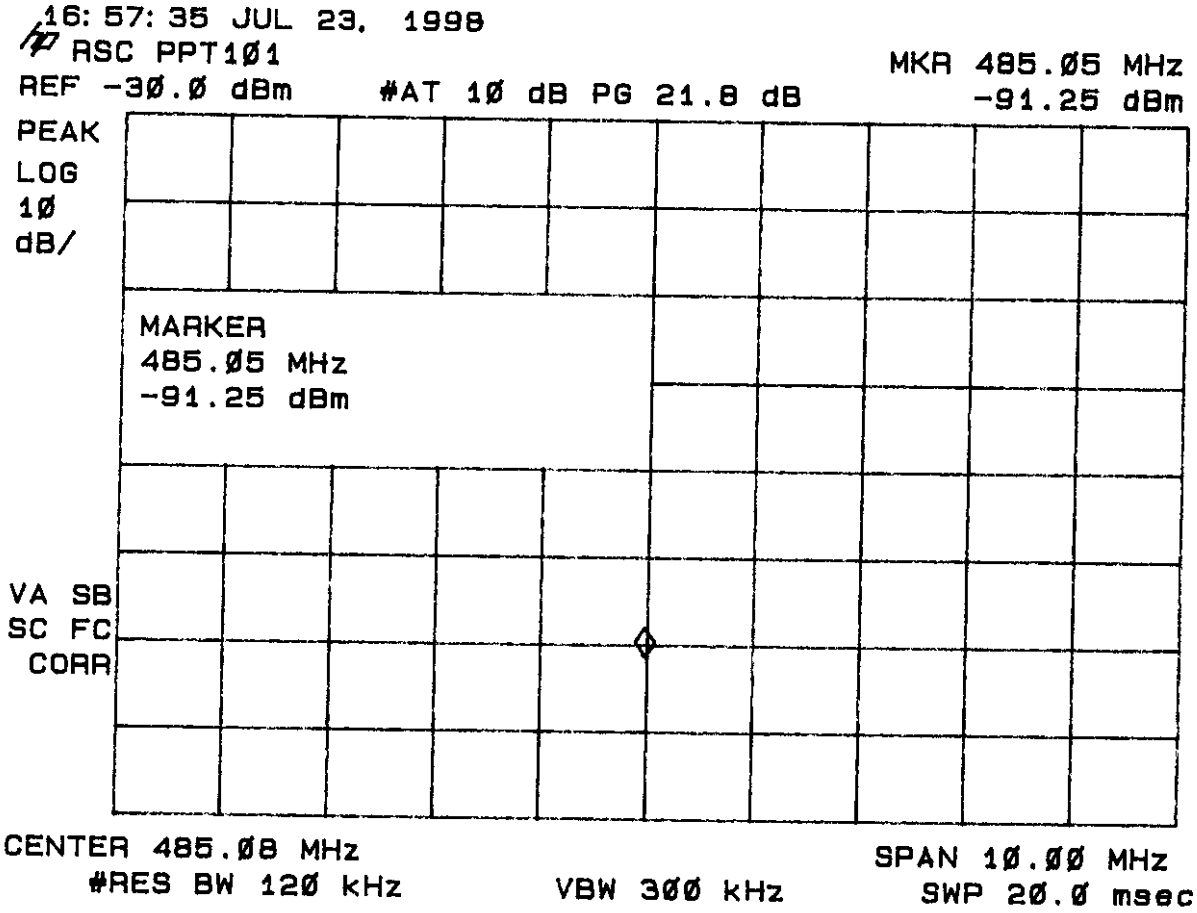


FIGURE 6e

SPURIOUS EMISSIONS 15.231(b)

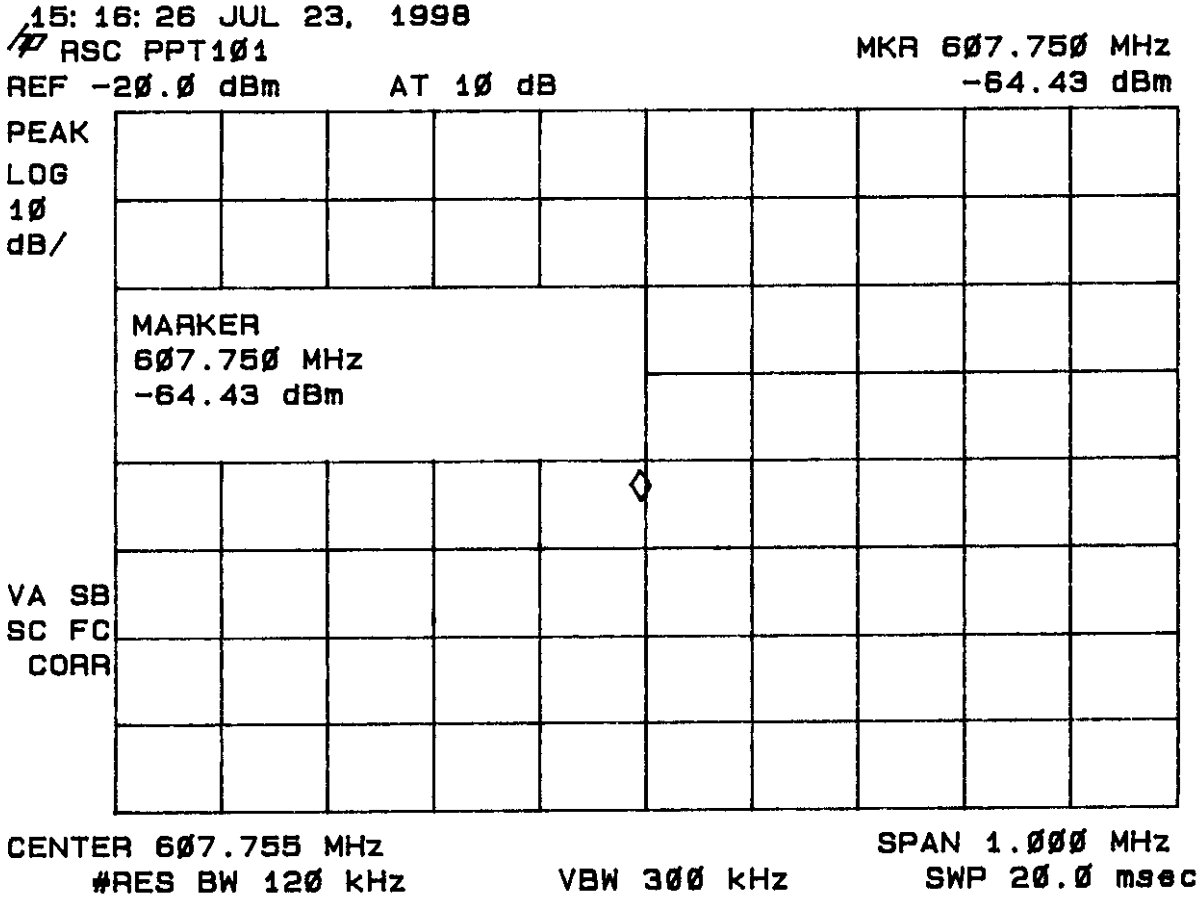


FIGURE 6f

SPURIOUS EMISSIONS 15.231(b)

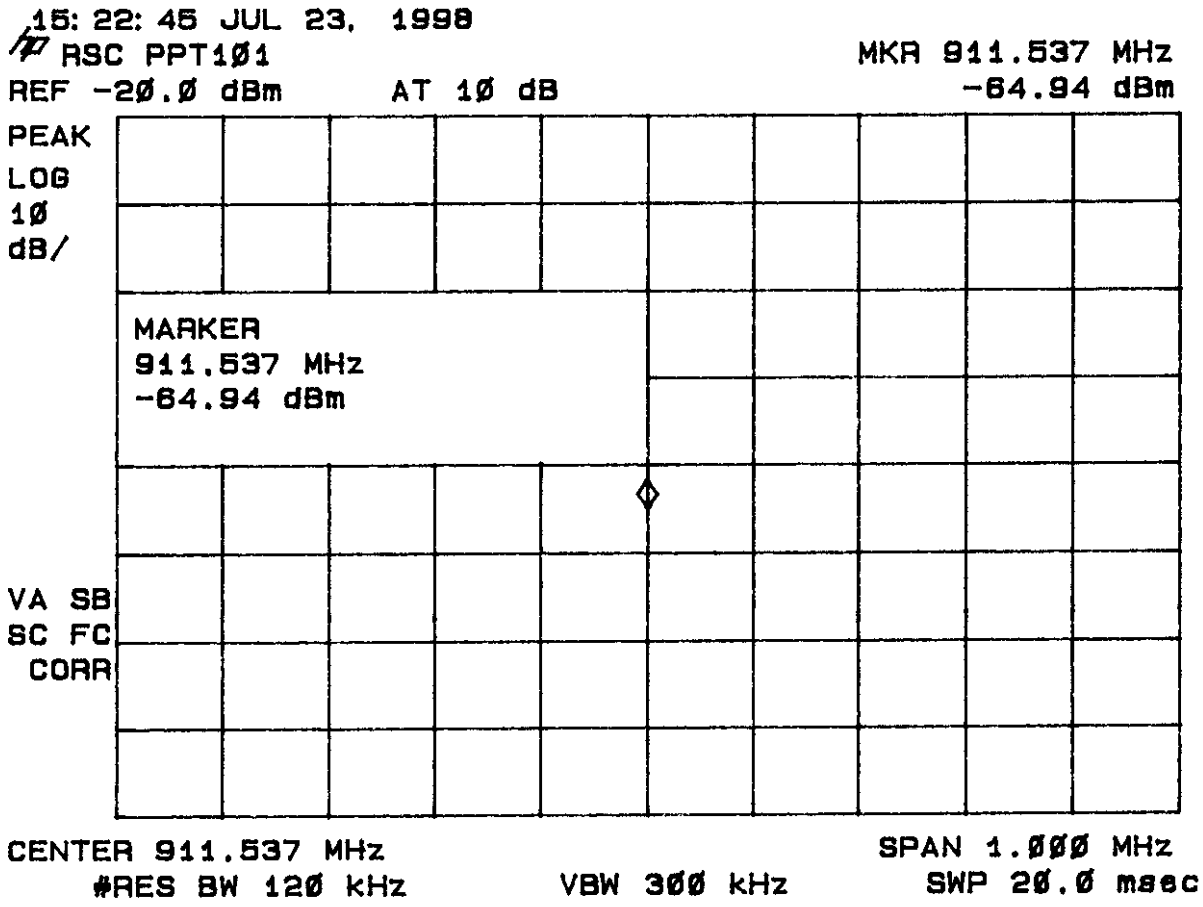


FIGURE 6g

SPURIOUS EMISSIONS 15.231(b)

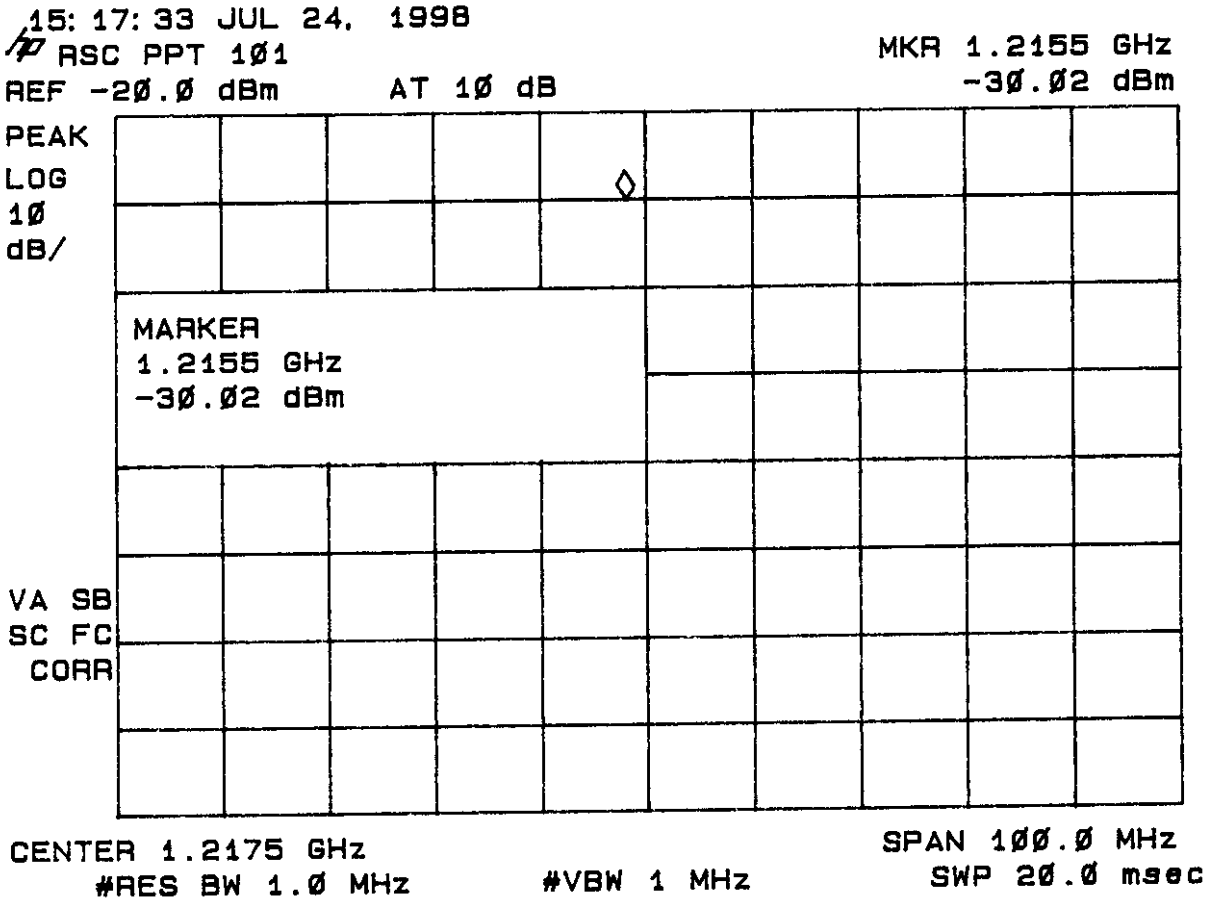


FIGURE 6h

SPURIOUS EMISSIONS 15.231(b)

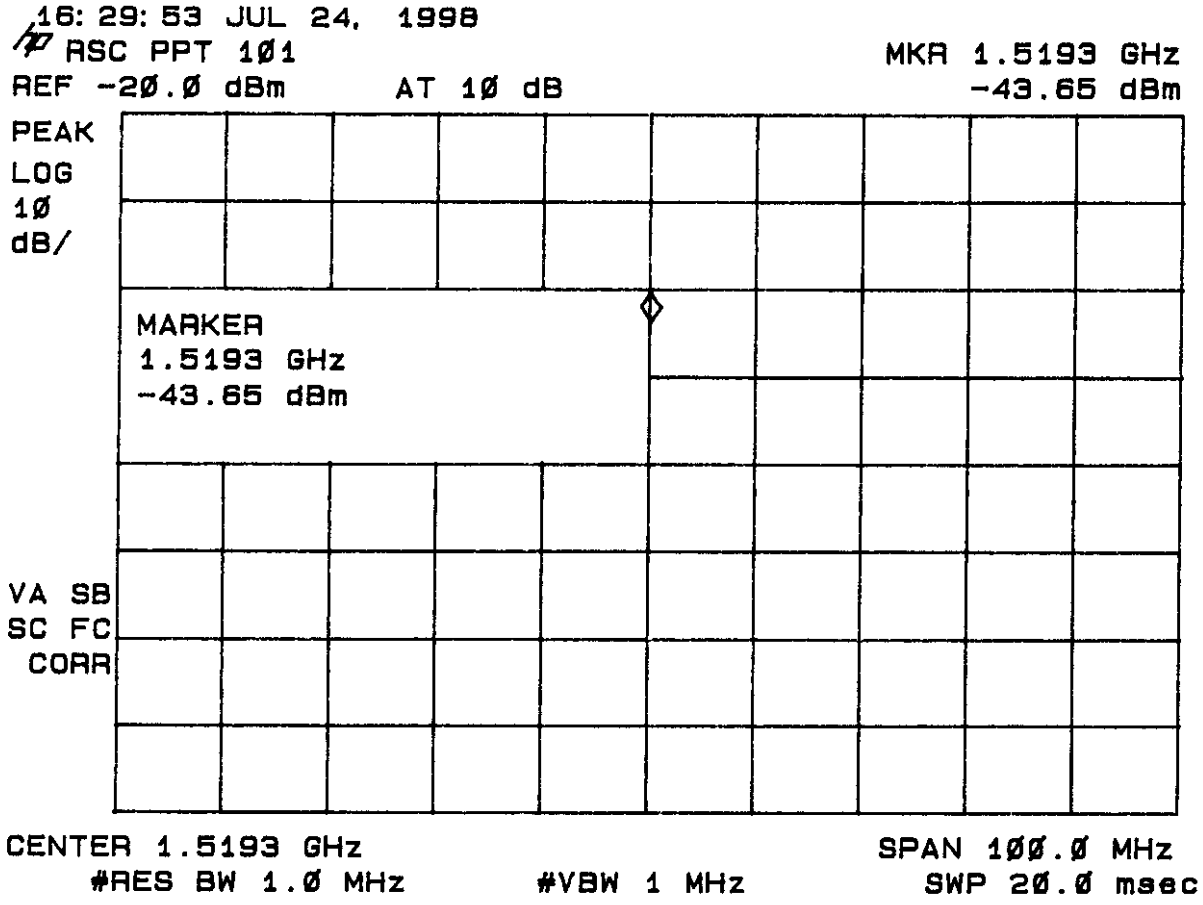
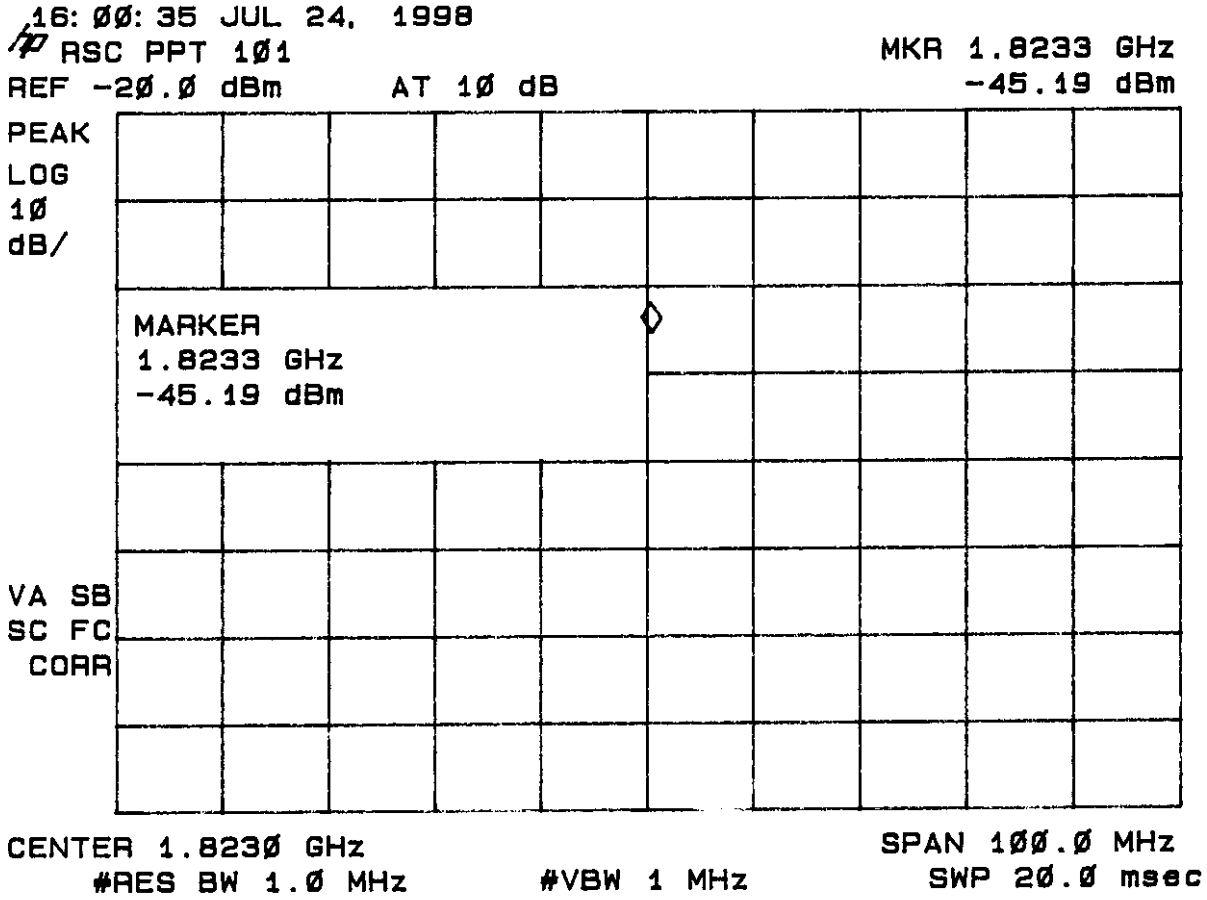


FIGURE 6i

SPURIOUS EMISSIONS 15.231(b)



20 dB Bandwidth of Fundamental Emission (47 CFR 15.231c)

The peak 20 dB bandwidth measurement of the fundamental emission is shown in Table 6 and Figure 7.

TABLE 6

20 dB BANDWIDTH OF FUNDAMENTAL EMISSION

Test Date: July 30, 1998
UST Project: 98-109
Customer: Radio Systems Corporation
Model: PPT101

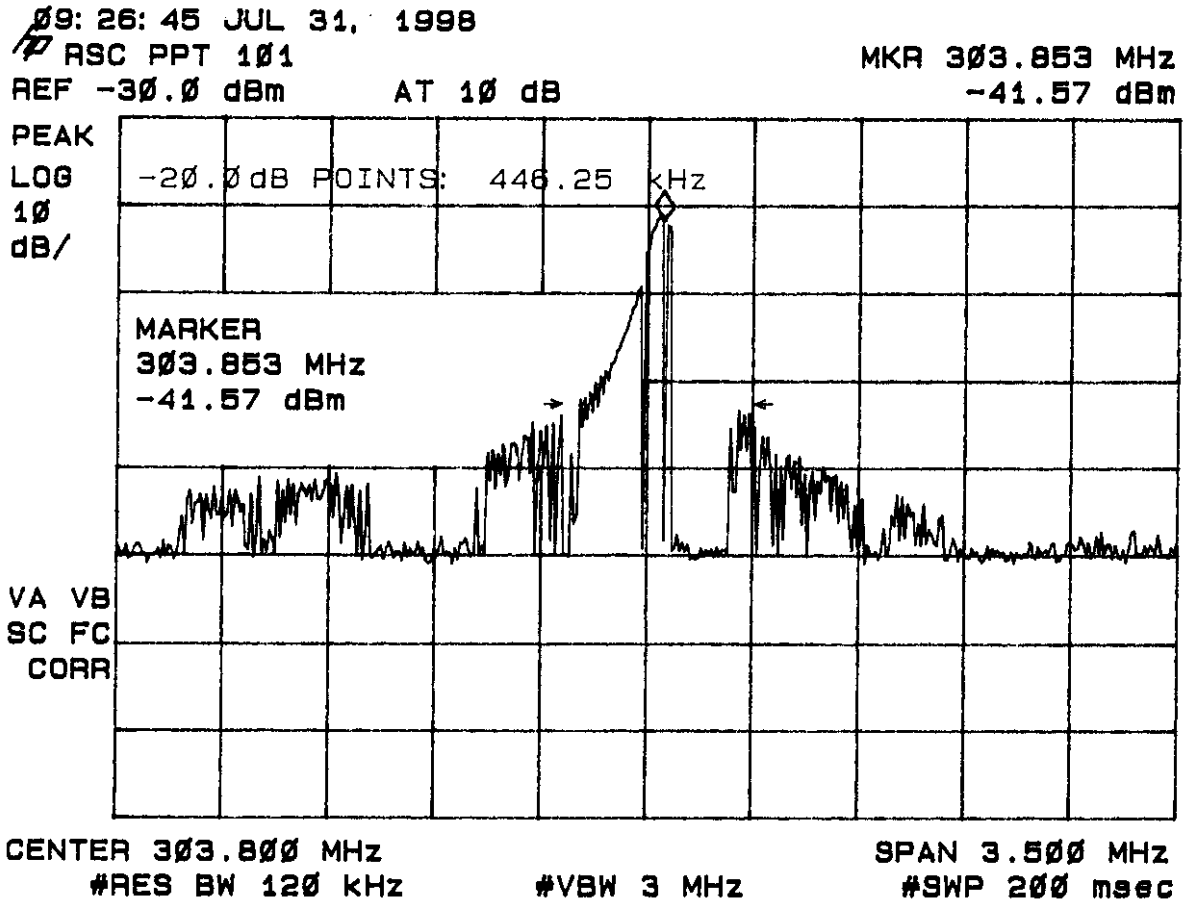
FREQUENCY (MHz)	20 dB BANDWIDTH (KHz)	FCC LIMITS (KHz)
303.8	446.30	759.5

FCC Limit = (0.25%) (Center Frequency) = (0.0025)(303.8) = 759.5 KHz

Test Results Reviewed By: _____ **Name:** Tim R. Johnson

FIGURE 7

20 dB BANDWIDTH OF FUNDAMENTAL EMISSION 15.231(c)



Frequency Tolerance of Carrier Signal (47 CFR 15.231d)

The EUT does not operate in the 40.66 - 40.70 MHz band, therefore frequency tolerance measurements were deemed unnecessary.

TABLE 7

CLASS B
RADIATED EMISSIONS

Test Date: July 30, 1998
UST Project: 98-109
Customer: Radio Systems Corporation
Model: PPT101

FREQ. (MHz)	TEST DATA (dBm) @ 3m	ANTENNA FACTOR + CABLE ATTENUATION	RESULTS (uV/m) @ 3m	FCC LIMITS (uV/m) @ 3m
NO EMISSIONS DETECTED WITHIN 10 dB OF THE FCC LIMITS				

Test Results Reviewed By: _____ **Name:** Tim R. Johnson

Radiated Emissions (47 CFR 15.109a)

Radiated emissions were evaluated from 30 to 1000 MHz. Measurements were made with the analyzer's bandwidth set to 120 kHz. Emissions are shown in Table 7.

Power Line Conducted Emissions (47 CFR 15.107a)

The EUT is operated by internal battery power only, therefore power line conducted emissions was deemed unnecessary.