2.9 Peak Radiated Spurious Emission in the Frequency Range 30 -25000 MHz (FCC Section 15.247(c))

The EUT was hop-stopped and when possible placed into a continuous transmit mode of operation. A preliminary scan was performed on the EUT to determine frequencies that were caused by the transmitter portion of the product. Significant emissions that fell within restricted bands were then measured on an OAT's site. Radiated measurements below 1 GHz were tested with a RBW = 120 kHz. Radiated measurements above 1 GHz were measured using a RBW = VBW = 1 MHz. The results of peak radiated spurious emissions falling within restricted bands are given in Table 4a (low), Table 4b, (mid), Table 4c (high) and Figure 5a-5c (low), Figure 5d (mid) and Figure 5e (high).

Figure 5a
Peak Radiated Spurious Emission 15.247(c) Low

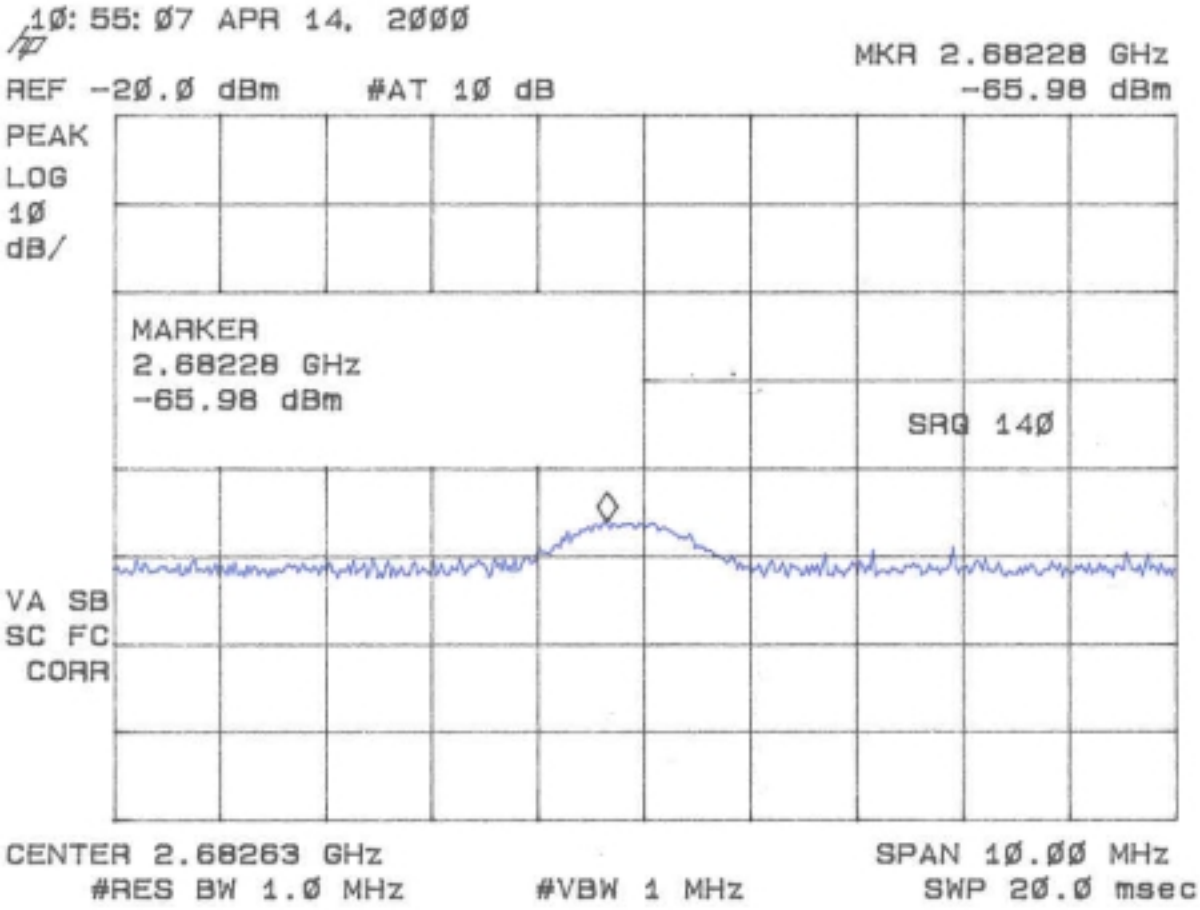


Figure 5b
Peak Radiated Spurious Emission 15.247(c) Low

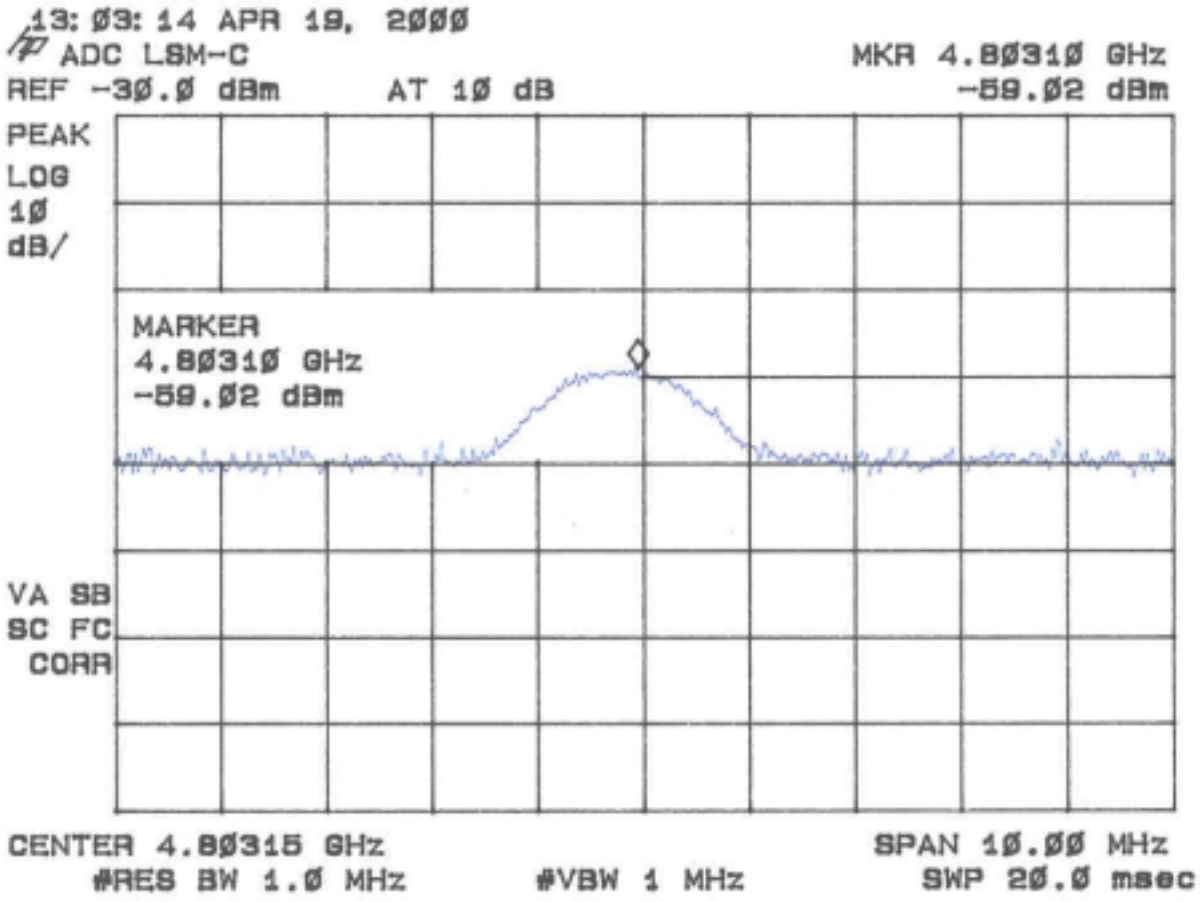


Figure 5c
Peak Radiated Spurious Emission 15.247(c) Low

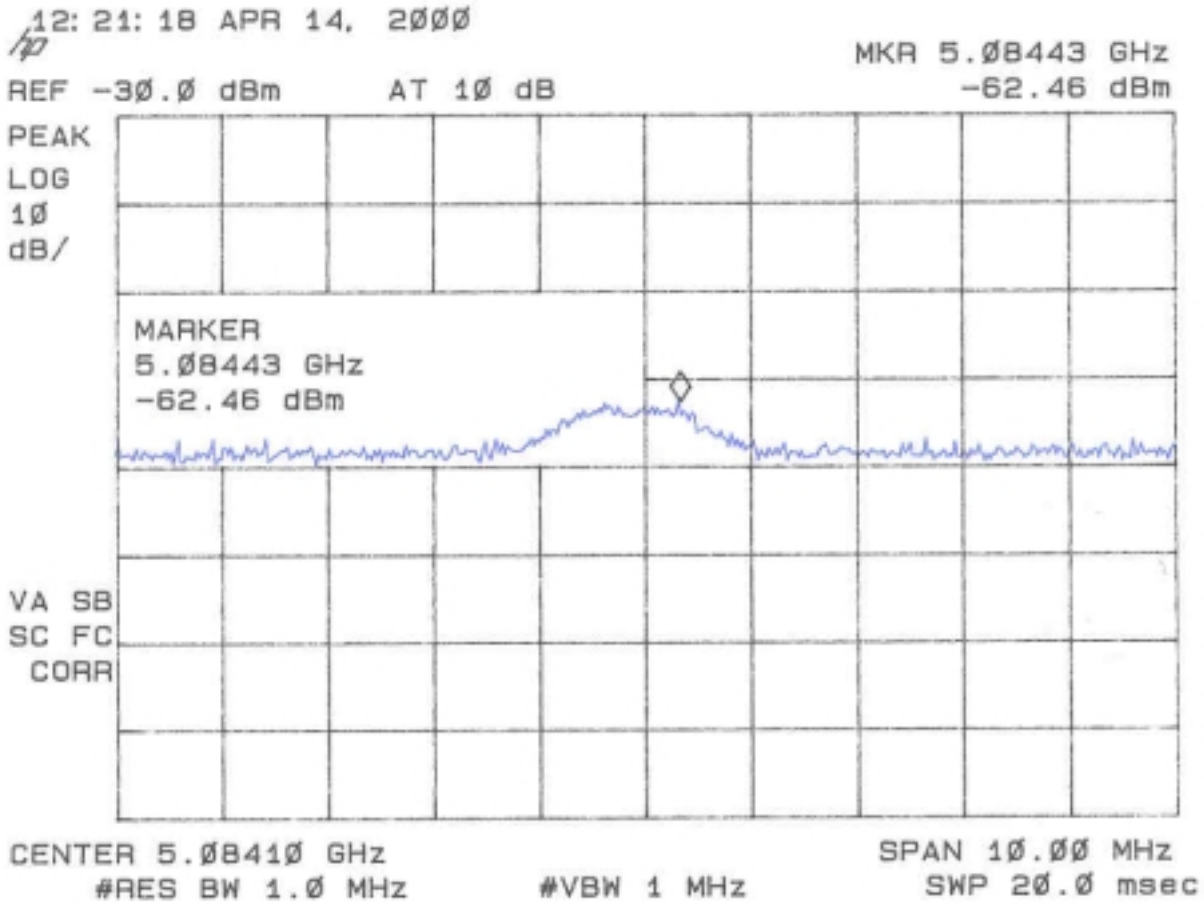


Figure 5d
Peak Radiated Spurious Emission 15.247(c) Mid

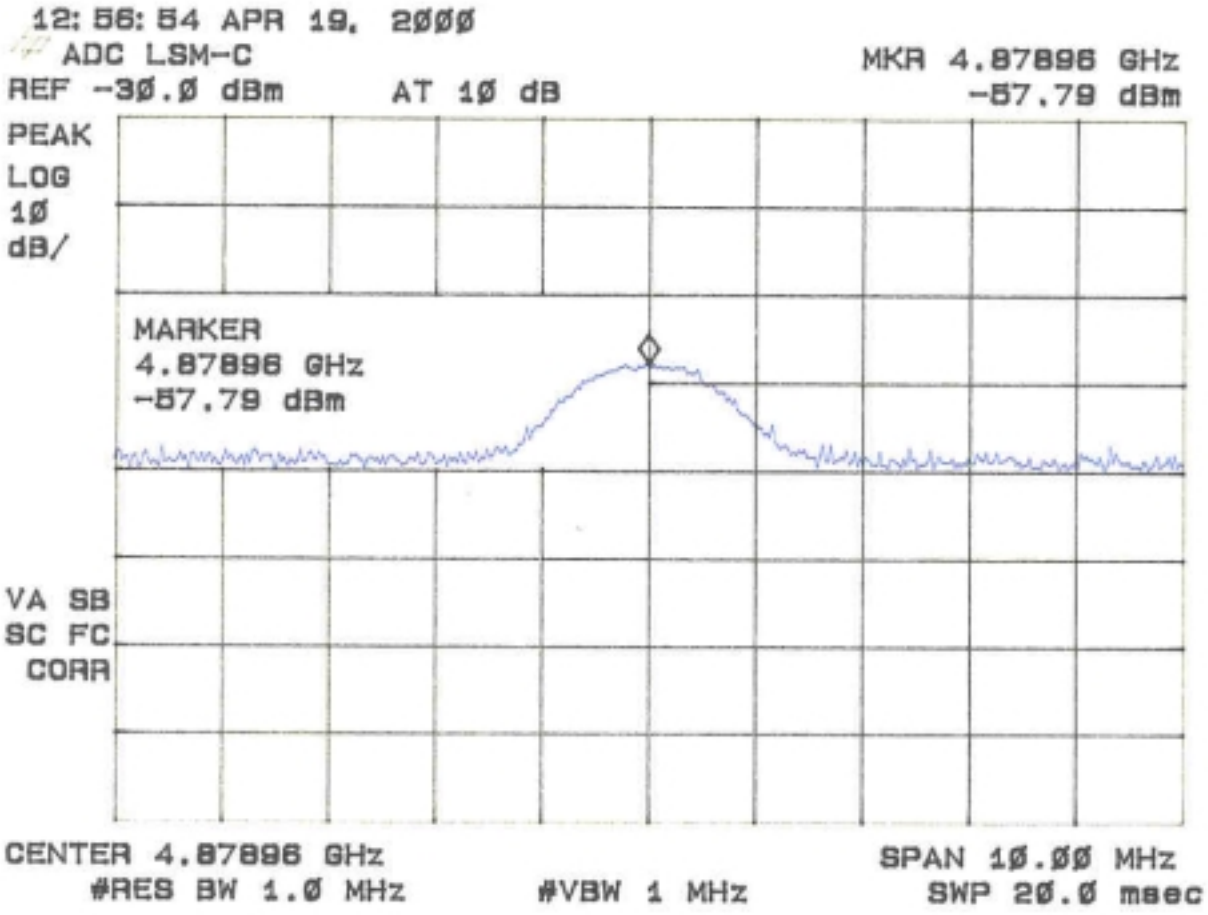


Figure 5e
Peak Radiated Spurious Emission 15.247(c) High

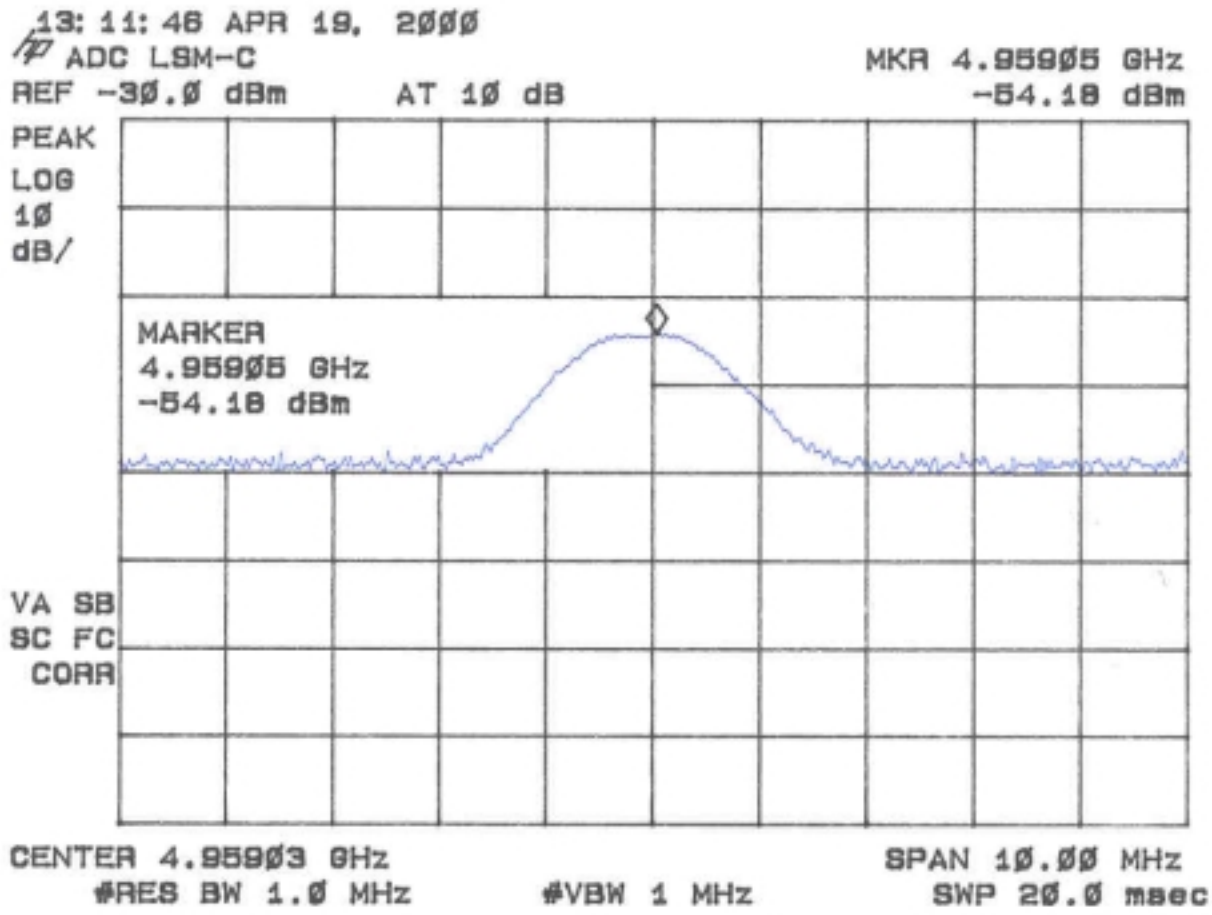


TABLE 4a PEAK RADIATED SPURIOUS EMISSIONS (Low)

Freq. (GHz)	Test Data* (dBm) @3m	Amp. Gain (dB)	Antenna Factor (dB)	Cable Loss (dB)	Results (uV/m) @3m	FCC Limits (uV/m) @3m
2.68238	-75.4**	-	31.2	4.1	2202.9	5000
4.80310	-58.0	34.2	35.6	7.9	735.9	5000
5.08443	-61.5	34.1	35.2	8.3	559.2	5000

TABLE 4b PEAK RADIATED SPURIOUS EMISSIONS (Mid)

Freq. (GHz)	Test Data* (dBm) @3m	Amp. Gain (dB)	Antenna Factor (dB)	Cable Loss (dB)	Results (uV/m) @3m	FCC Limits (uV/m) @3m
4.87898	-59.9	34.1	34.8	8.1	614.9	5000

TABLE 4c PEAK RADIATED SPURIOUS EMISSIONS (High)

Freq. (GHz)	Test Data* (dBm) @3m	Amp. Gain (dB)	Antenna Factor (dB)	Cable Loss (dB)	Results (uV/m) @3m	FCC Limits (uV/m) @3m
4.9591	-53.2	34.1	35.0	8.3	1409.1	5000

*** = Data adjusted by + 1 dB for high pass filter**

**** = Data taken at 1 meter, without amplifier and high pass filter to achieve proper dynamic range. Therefore this reading has been adjusted by –9.54 for 1 to 3 meter correction.**

SAMPLE CALCULATION:
RESULTS (uV/m @ 3m) = Antilog ((-58.0 - 34.2 + 34.6 + 7.9 + 107)/20) = 735.9
CONVERSION FROM dBm TO dBuV = 107 dB

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

2.10 Average Spurious Emission in the Frequency Range 30 - 25000 MHz (FCC Section 15.247(c))

The results of average radiated spurious emissions falling within restricted bands are given in Table 5a (low), Table 5b, (mid), Table 5c (high) and Figure 6a-6c (low), Figure 6d (mid) and Table 6e (high).

Figure 6a
Average Radiated Spurious Emission 15.247(c) Low

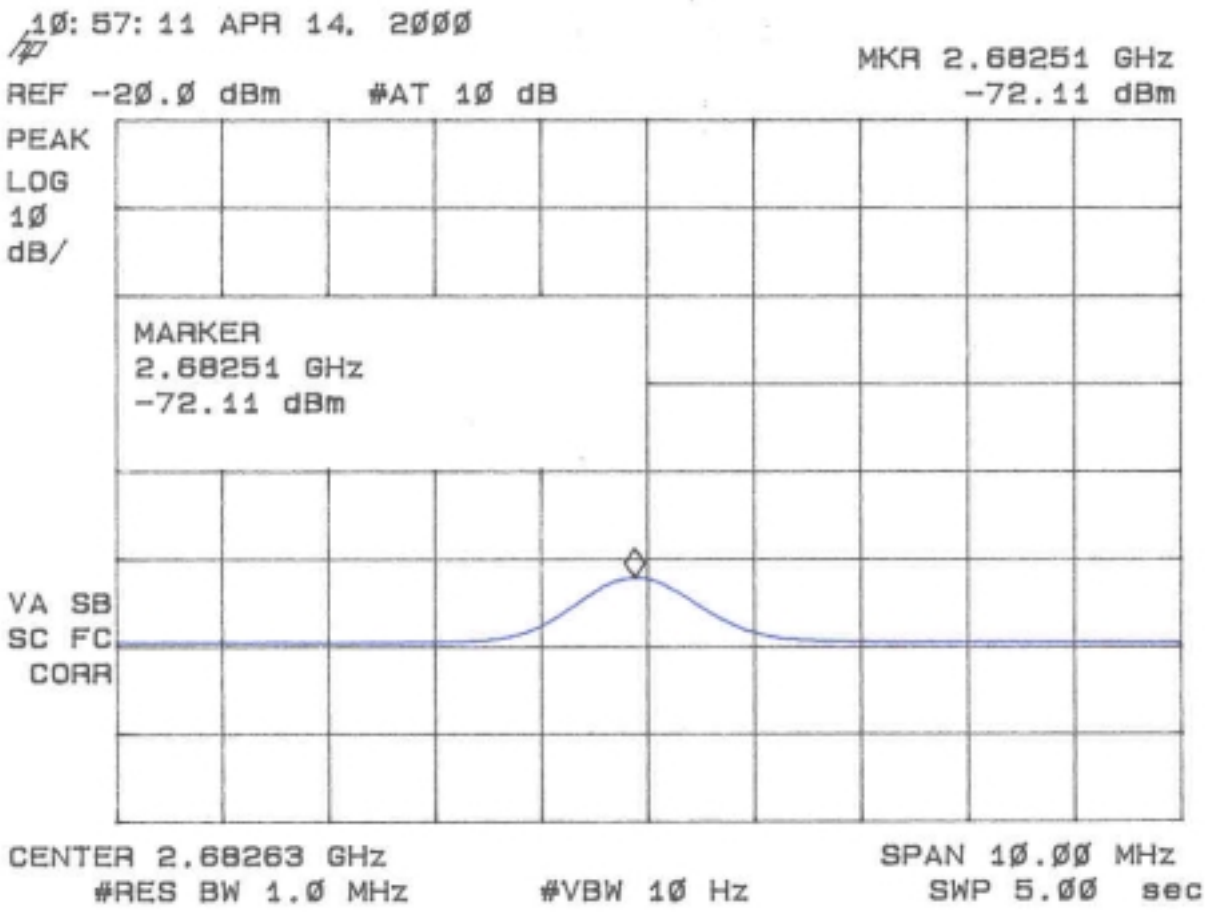


Figure 6b
Average Radiated Spurious Emission 15.247(c) Low

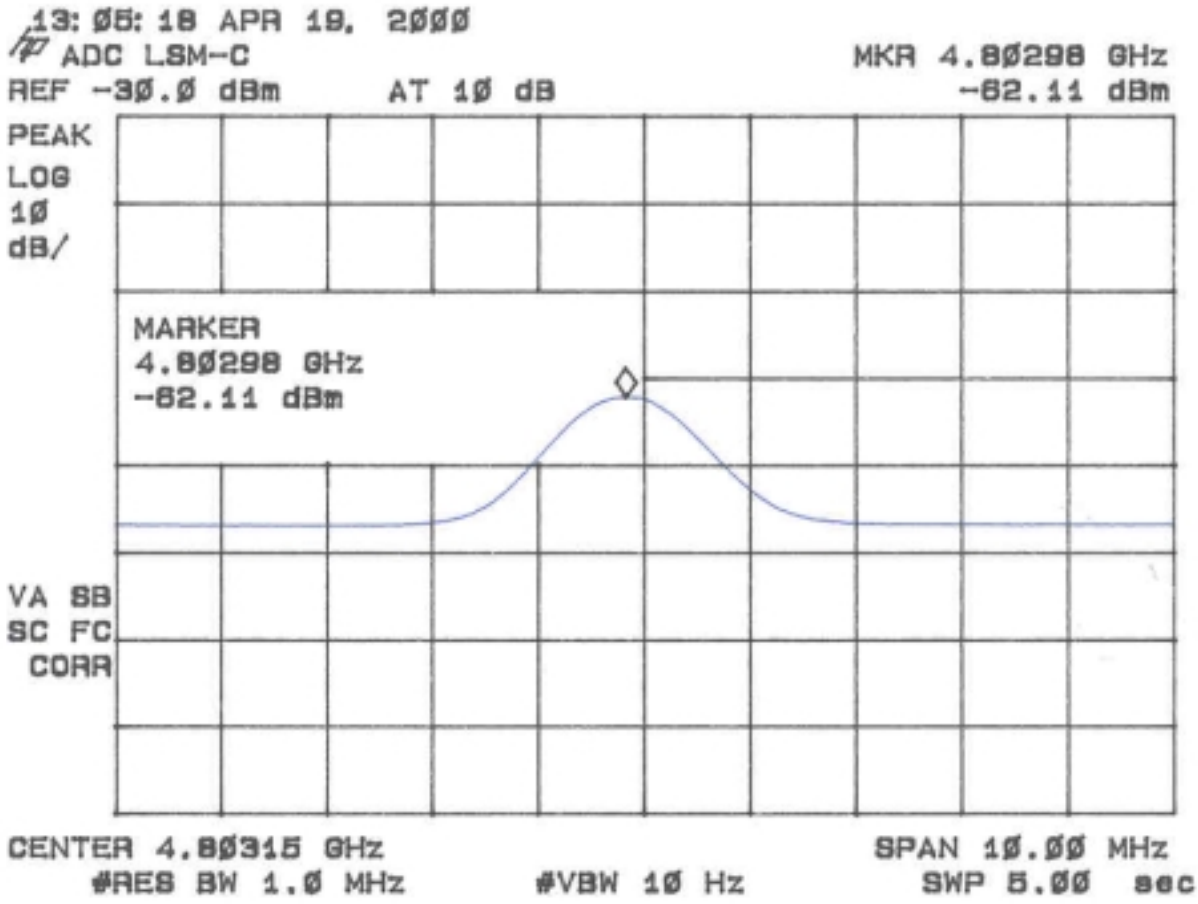


Figure 6c
Average Radiated Spurious Emission 15.247(c) Low

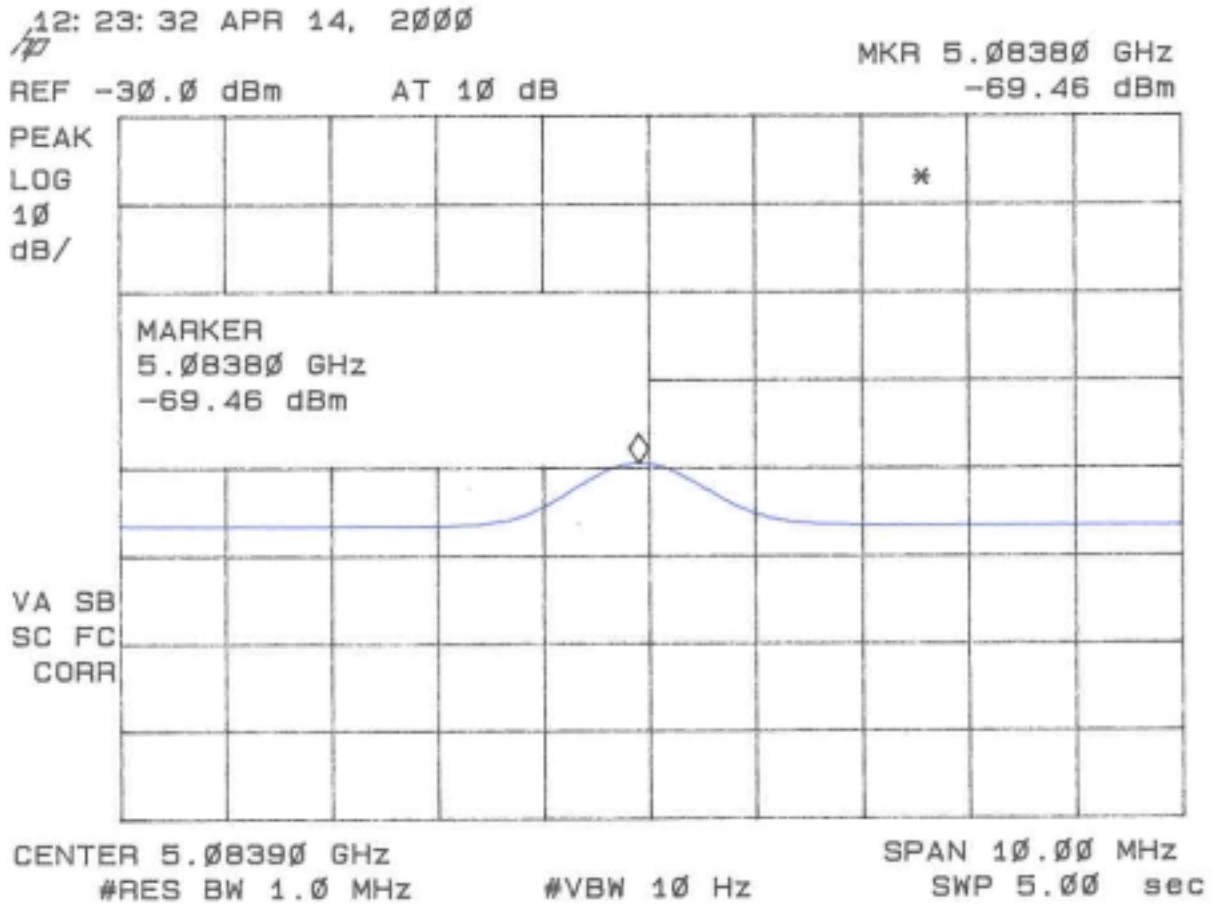


Figure 6d
Average Radiated Spurious Emission 15.247(c) Mid

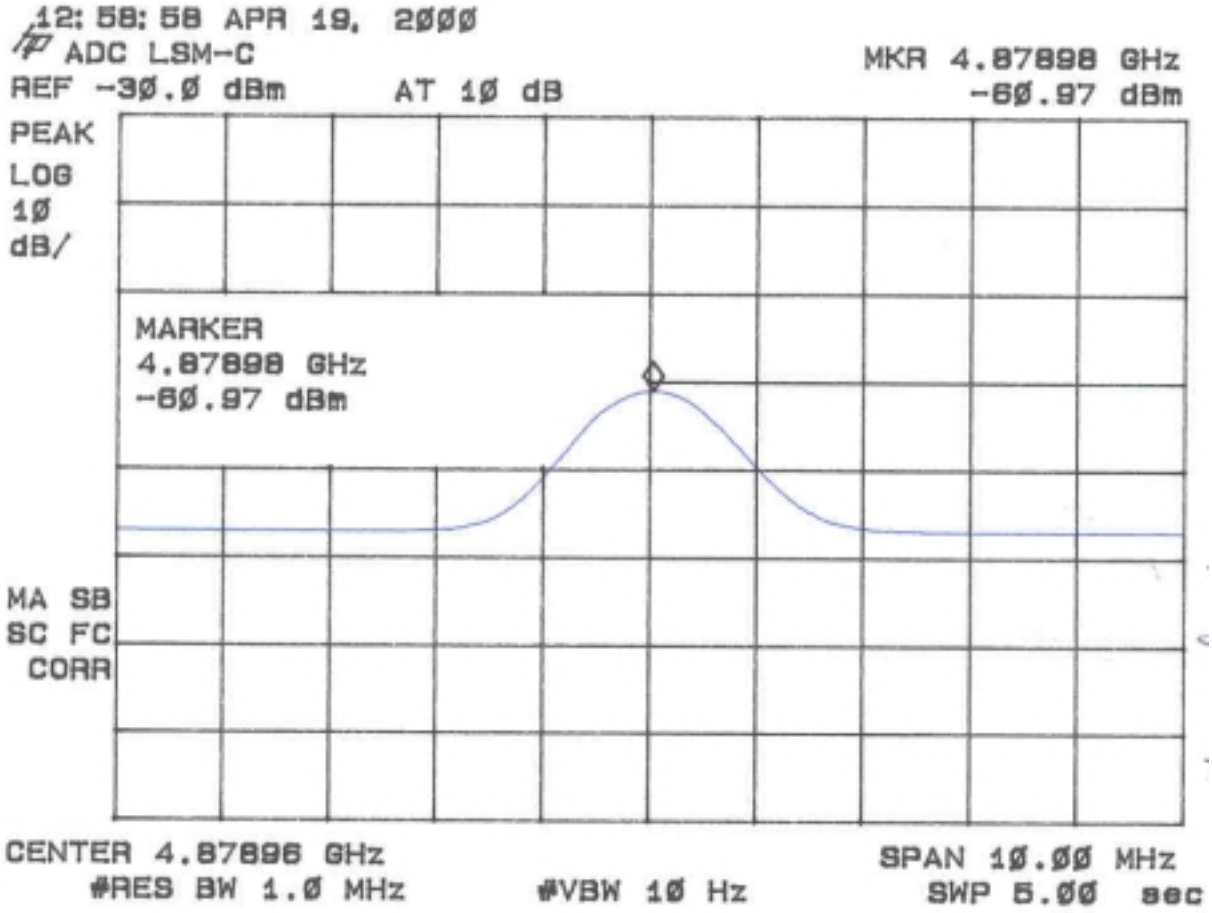


Figure 6e
Average Radiated Spurious Emission 15.247(c) High

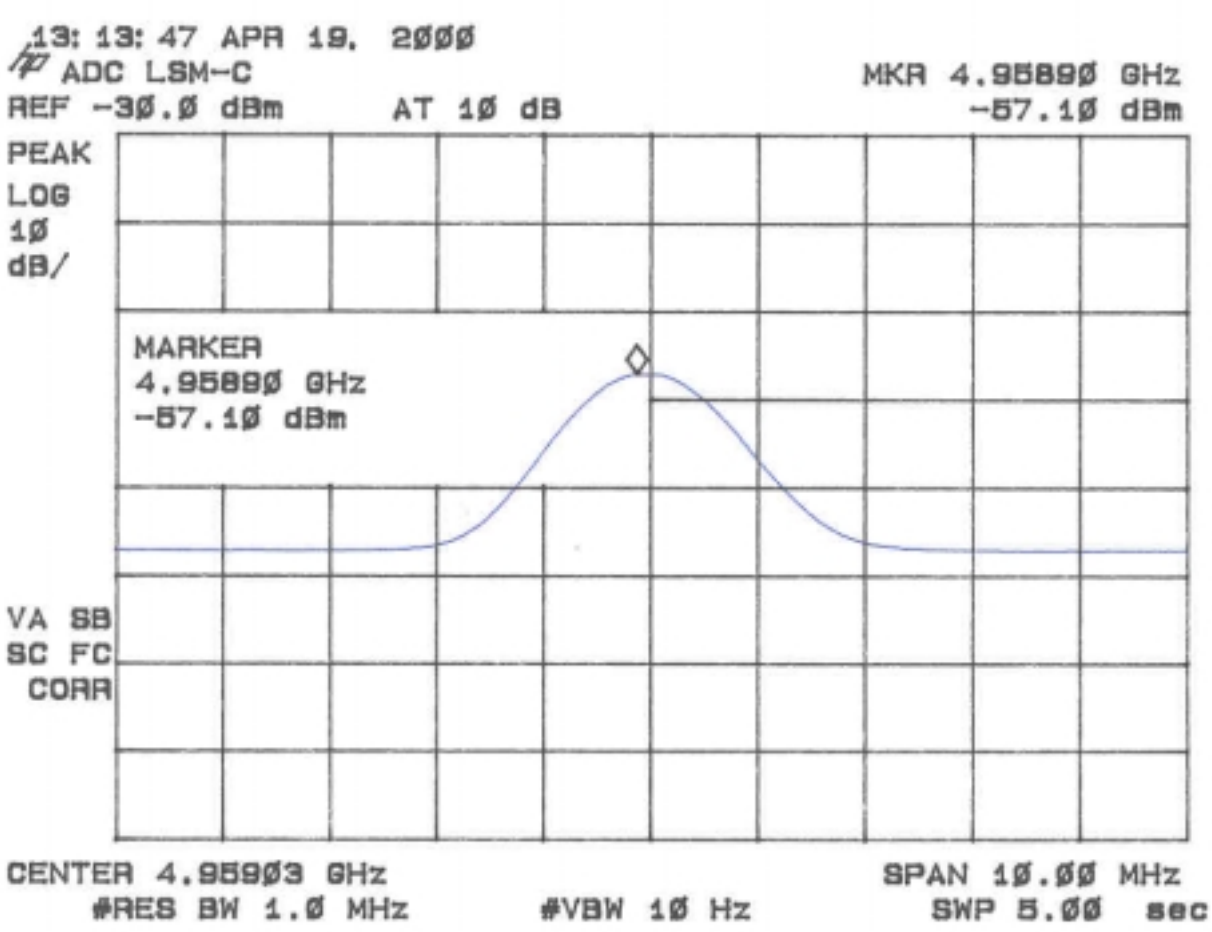


TABLE 5a AVERAGE RADIATED SPURIOUS EMISSIONS (Low)

Freq. (GHz)	Test Data* (dBm) @3m	Amp. Gain (dB)	Antenna Factor (dB)	Cable Loss (dB)	Results (uV/m) @3m	FCC Limits (uV/m) @3m
2.68238	-49.9	-	31.2	4.1	2.4	500
4.80310	-79.8	34.2	35.6	7.9	66.8	500
5.08443	-87.2	34.1	35.2	8.3	28.8	500

TABLE 5b AVERAGE RADIATED SPURIOUS EMISSIONS (Mid)

Freq. (GHz)	Test Data* (dBm) @3m	Amp. Gain (dB)	Antenna Factor (dB)	Cable Loss (dB)	Results (uV/m) @3m	FCC Limits (uV/m) @3m
4.87898	-78.6	34.1	34.8	8.1	72.4	500

TABLE 5c AVERAGE RADIATED SPURIOUS EMISSIONS (High)

Freq. (GHz)	Test Data* (dBm) @3m	Amp. Gain (dB)	Antenna Factor (dB)	Cable Loss (dB)	Results (uV/m) @3m	FCC Limits (uV/m) @3m
4.9591	-74.8	34.1	35.0	8.3	117.5	500

*** = Data adjusted by + 1dB for high pass filter and 20 log (0.14) = –17.1 dB for worse case duty cycle.**

**** = Data taken at 1 meter, without amplifier and high pass filter to achieve proper dynamic range. Therefore this reading has been adjusted by –9.54 for 1 to 3 meter correction.**

SAMPLE CALCULATION:

RESULTS (uV/m @ 3m) =
Antilog ((-79.8 - 34.2 + 35.6 + 7.9 + 107)/20) = 66.8
CONVERSION FROM dBm TO dBuV = 107 dB

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

2.11 20 dB Bandwidth per FCC Section 15.247(a)(1)(ii)

The antenna port was connected to a spectrum analyzer that was set for a 50 Ω impedance with the RBW = approximately 1/100 of the manufacturers claimed RBW or greater, and a VBW > RBW. The results of the 20 dB bandwidth test are given in Table 6 and Figure 7a through 7c. The channel separation is shown in Figure 7d.

TABLE 6
20 dB BANDWIDTH

Test Date: **April 20, 2000**
UST Project: **00-0002**
Customer: **ADC Broadband Communications**
Model: **Local Status Monitor Controller (LSMC-01)**

Frequency (GHz)	20 dB Bandwidth (MHz)	Maximum FCC Limit (MHz)
2.4015	0.273	1.0
2.4405	0.273	1.0
2.4795	0.273	1.0

(Measured Channel Separation)

Frequency of Channel Separation (kHz)	Minimum FCC Limit (kHz)
1000.0	273.0

Note: The minimum channel separation limit is 25 kHz or the 20 dB bandwidth, whichever is greater

Tester
Signature: _____ **Name:** **Tim R. Johnson**

Figure 7a.
20 dB Bandwidth per FCC Section 15.247(a)(1)(ii) (low)

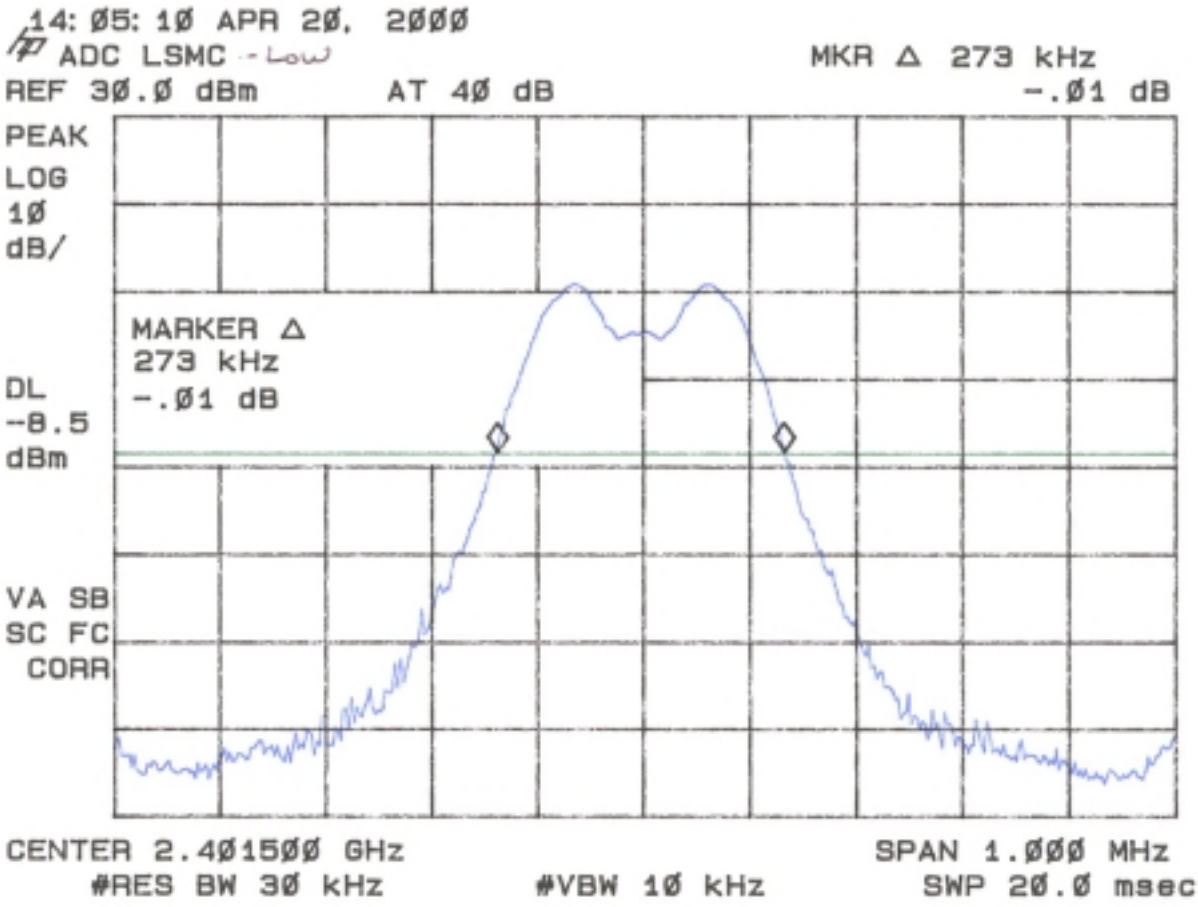


Figure 7b.
20 dB Bandwidth per FCC Section 15.247(a)(1)(ii) (Mid)

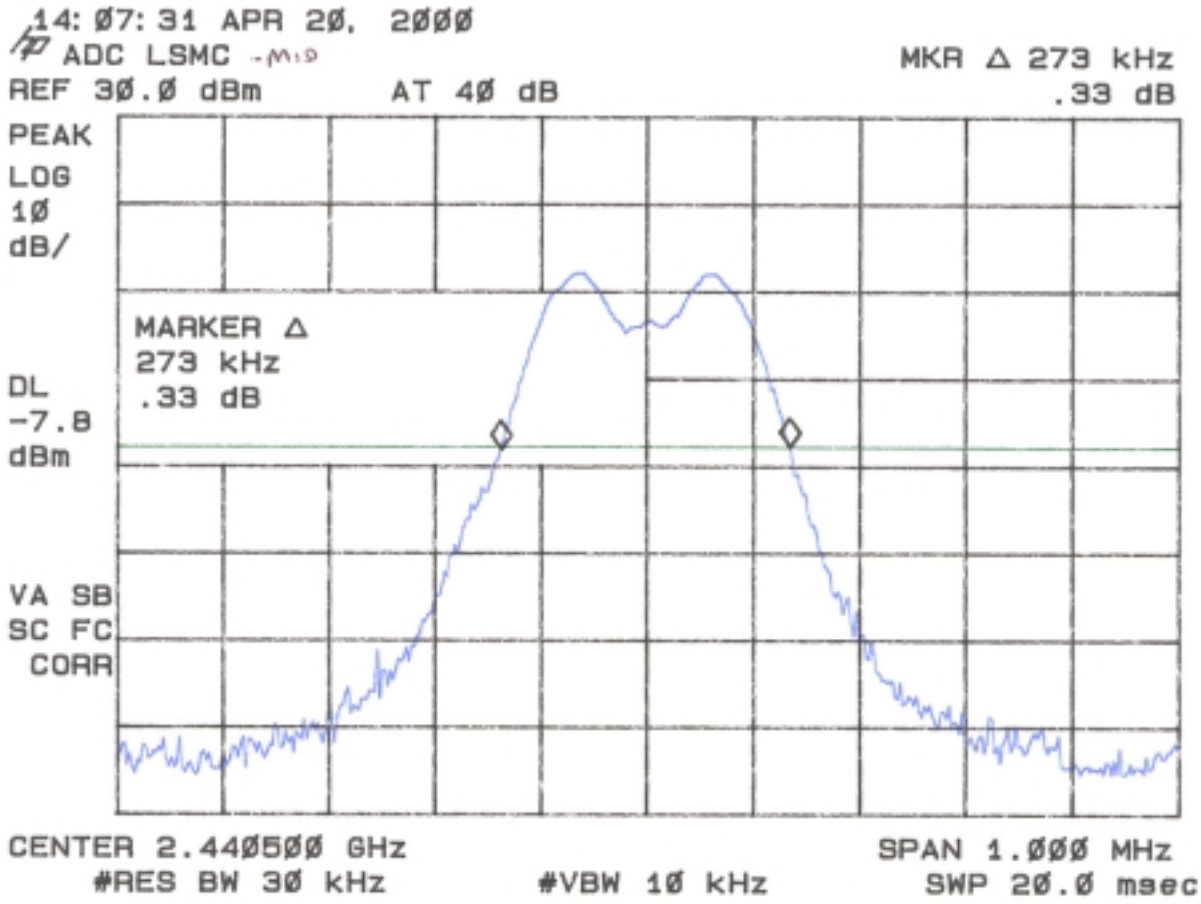


Figure 7c.
20 dB Bandwidth per FCC Section 15.247(a)(1)(ii) (High)

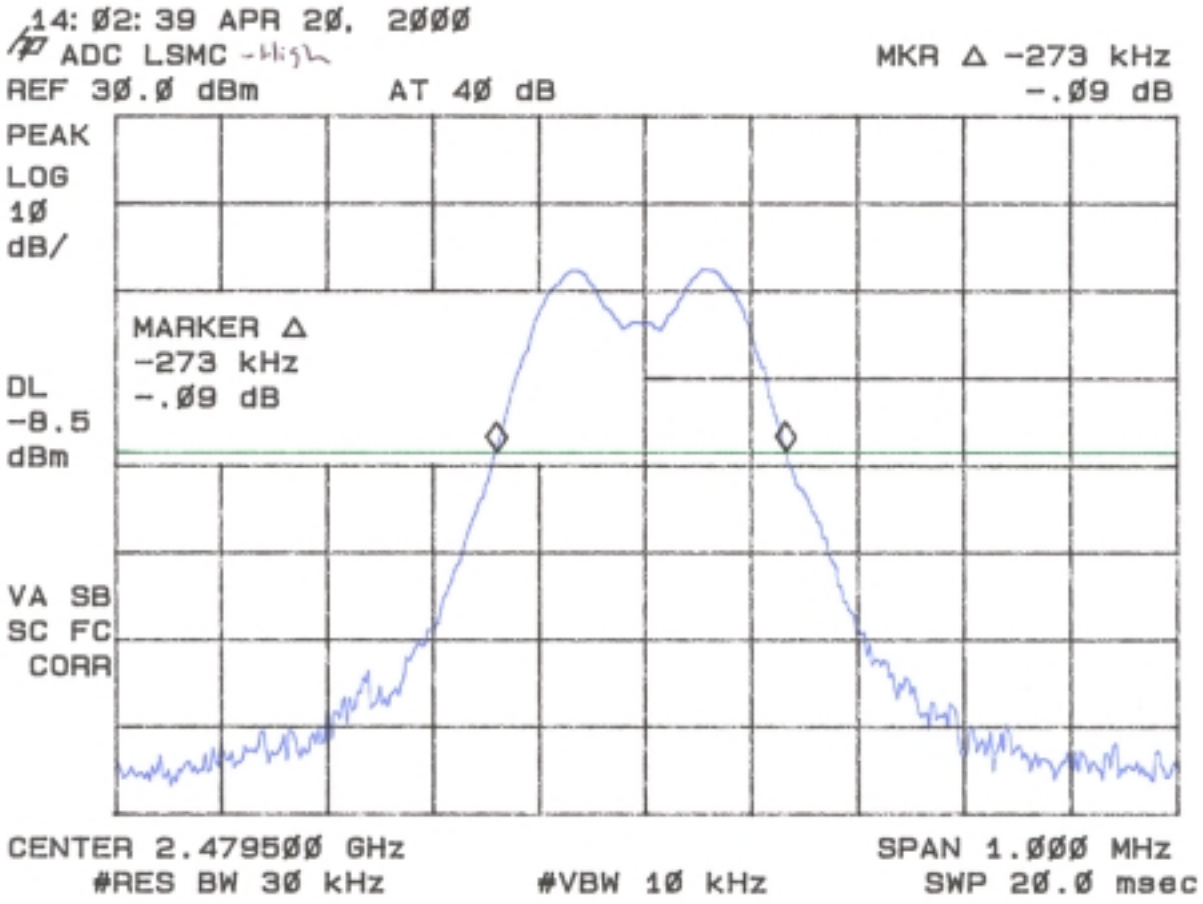
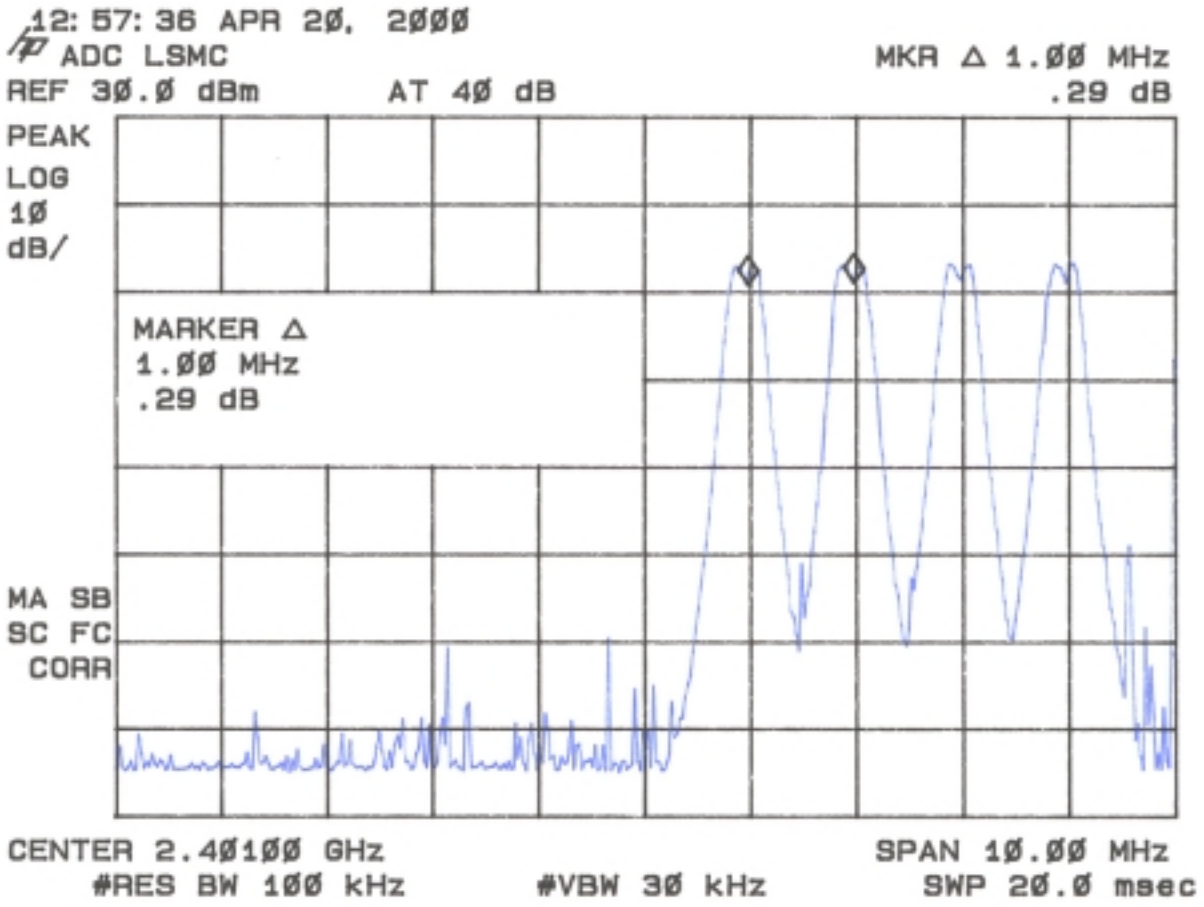


Figure 7d.
Channel Separation per FCC Section 15.247(a)(1)



2.12 Number of Hopping Channels FCC Section 15.247(a)(1)(ii)

The transmitter was placed into a typical frequency hopping mode of operation. The 2400 – 2483.5 MHz band was centered on the screen and the RBW and VBW chosen such that the individual channels could be discerned. The trace capture time was a minimum of 5 minutes.

The results of this test are given in Table 7 and Figure 8.

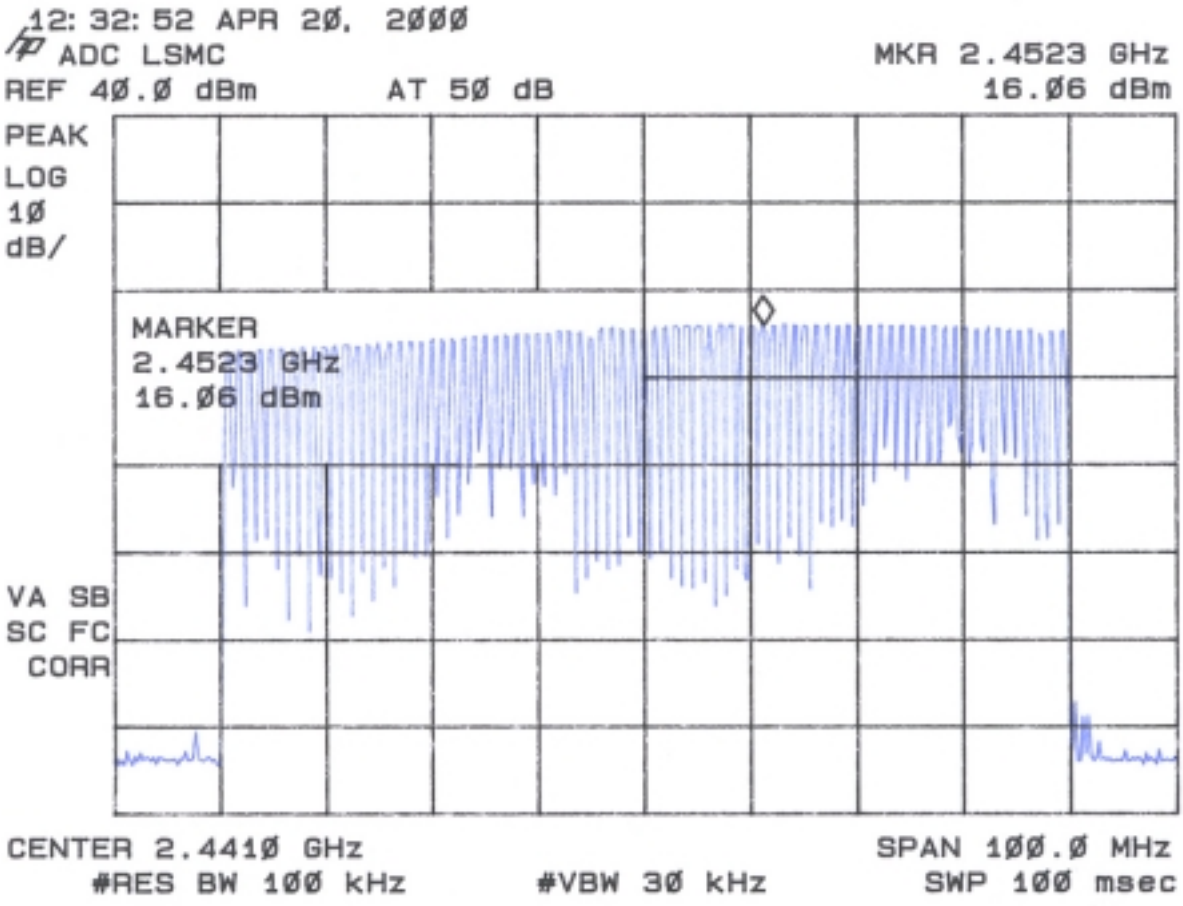
TABLE 7
NUMBER OF HOPPING CHANNELS

Test Date: **April 20, 2000**
UST Project: **00-0002**
Customer: **ADC Broadband Communications**
Model: **Local Status Monitor Controller (LSMC-01)**

Number of Hopping Frequencies Measured	FCC Limit (Minimum Number of Channels)
79	75

Tester Signature: _____ **Name:** **Tim R. Johnson**

Figure 8
Number of Hopping Channels FCC Section 15.247(a)(1)(ii)



2.13 Average Time of Occupancy per Channel FCC Section 15.247(a)(1)(ii)

The transmitter was placed into a typical worse case frequency hopping mode of operation (while EUT downloads data to RF amplifier). Characteristics of the time of occupancy were measured for a typical low, mid, and high channel within the 2400 – 2483.5 MHz band.

The results of this test are given in Table 8 and Figure 9a-9d.

TABLE 8
AVERAGE TIME OF OCCUPANCY PER CHANNEL

Test Date: **April 20, 2000**
UST Project: **00-0002**
Customer: **ADC Broadband Communications**
Model: **Local Status Monitor Controller (LSMC-01)**

Measured Worse Case Average Time of Occupancy per Channel During 30 Seconds Period (seconds)	FCC Limit seconds (per 30 seconds of time)
0.204	0.4

Tester
Signature: _____ **Name:** **Tim R. Johnson**

Figure 9a
Average Time of Occupancy per Channel FCC Section 15.247(a)(1)(ii)
Downloading Data

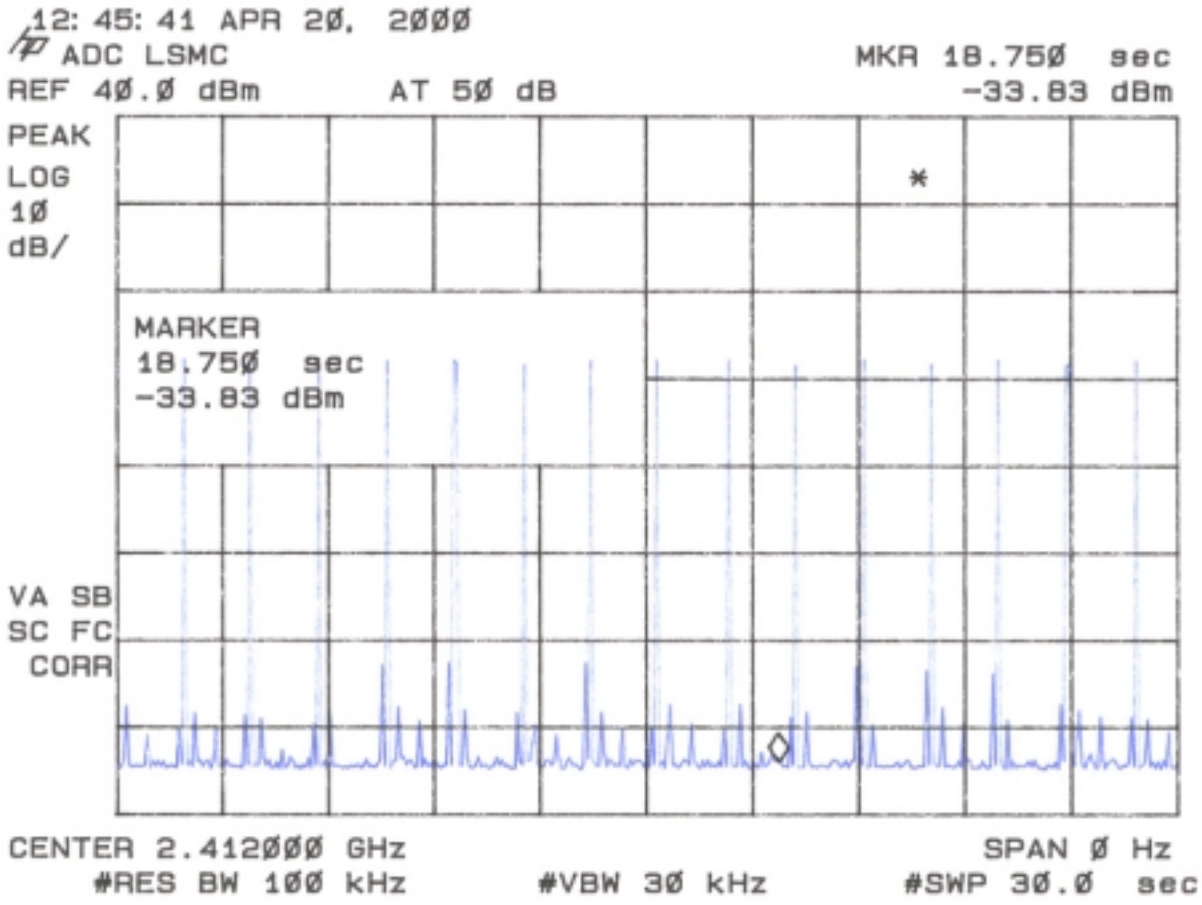


Figure 9b
Average Time of Occupancy per Channel FCC Section 15.247(a)(1)(ii)
Downloading Data

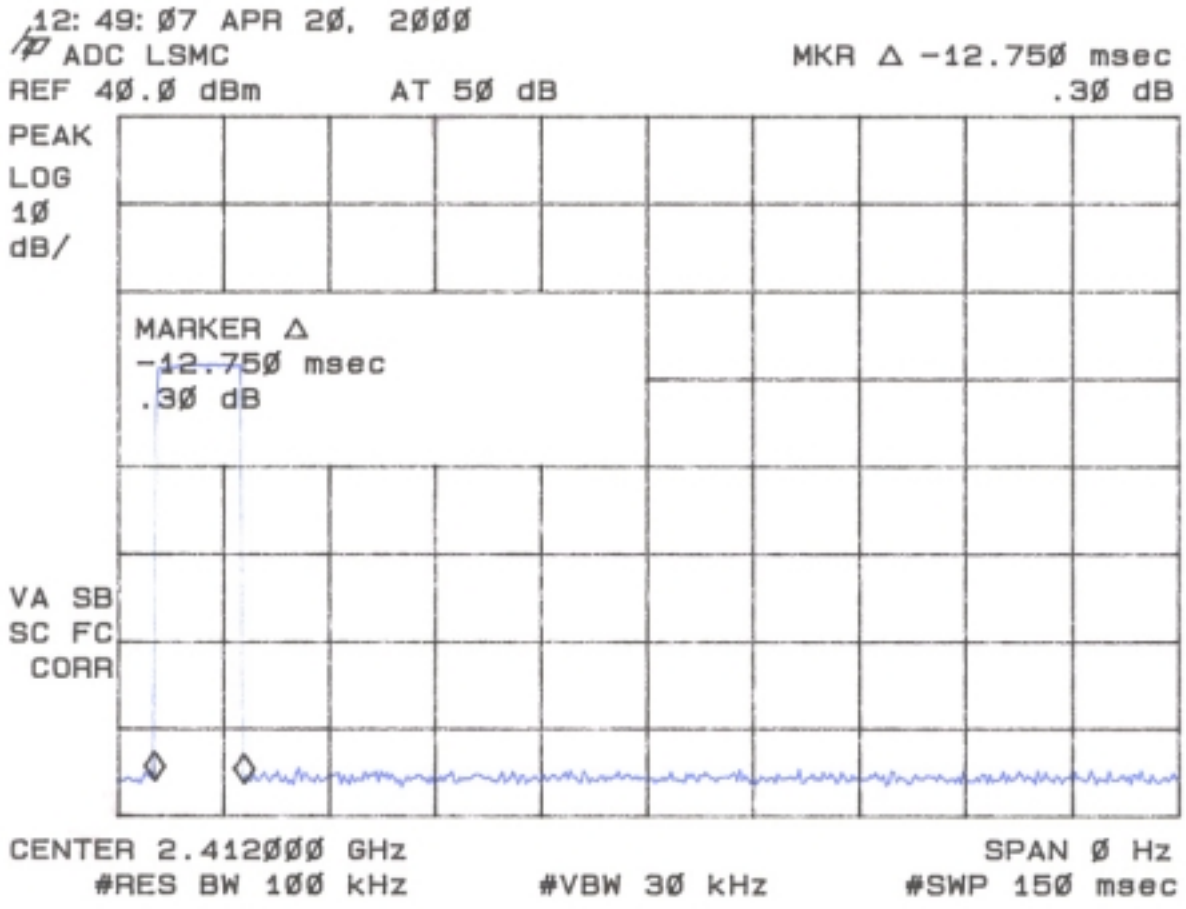


Figure 9c
Average Time of Occupancy per Channel FCC Section 15.247(a)(1)(ii)
Pinging Mode

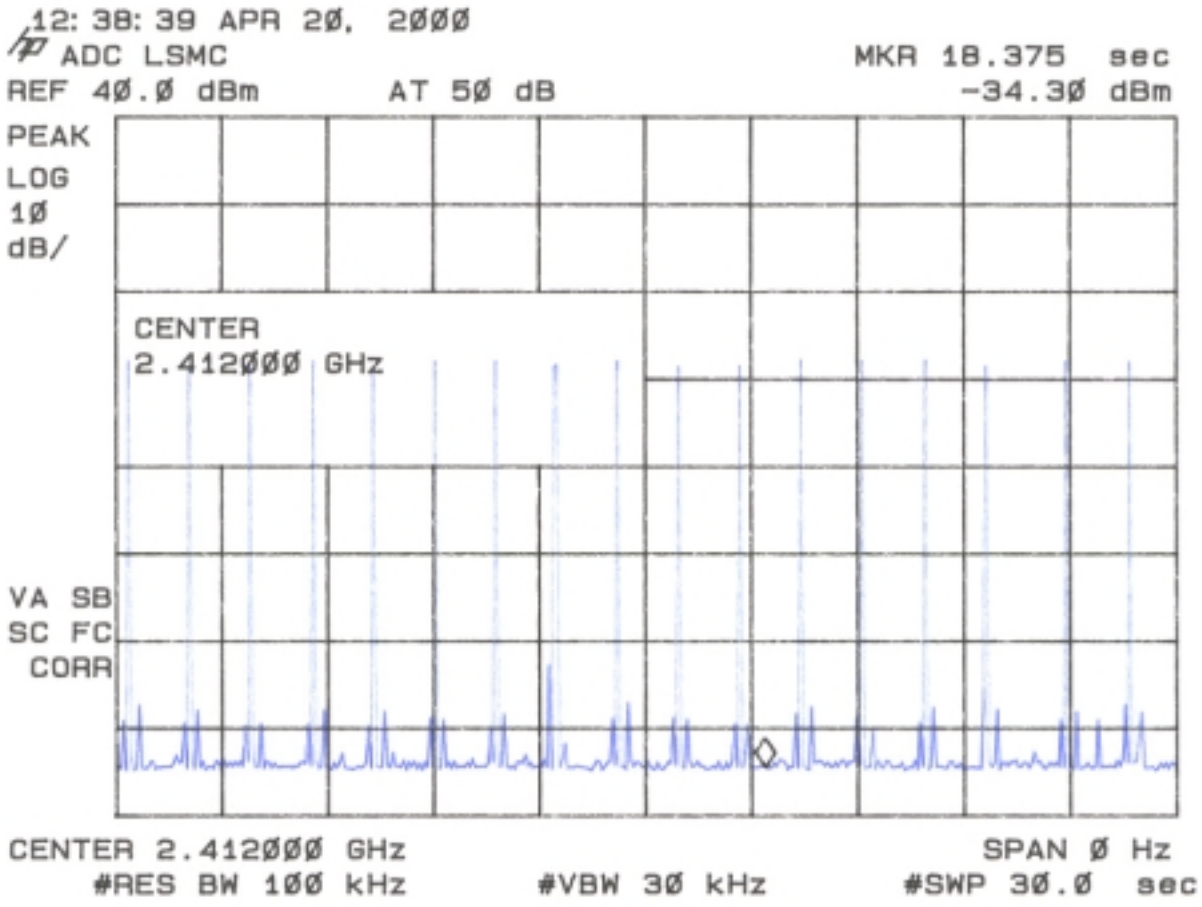
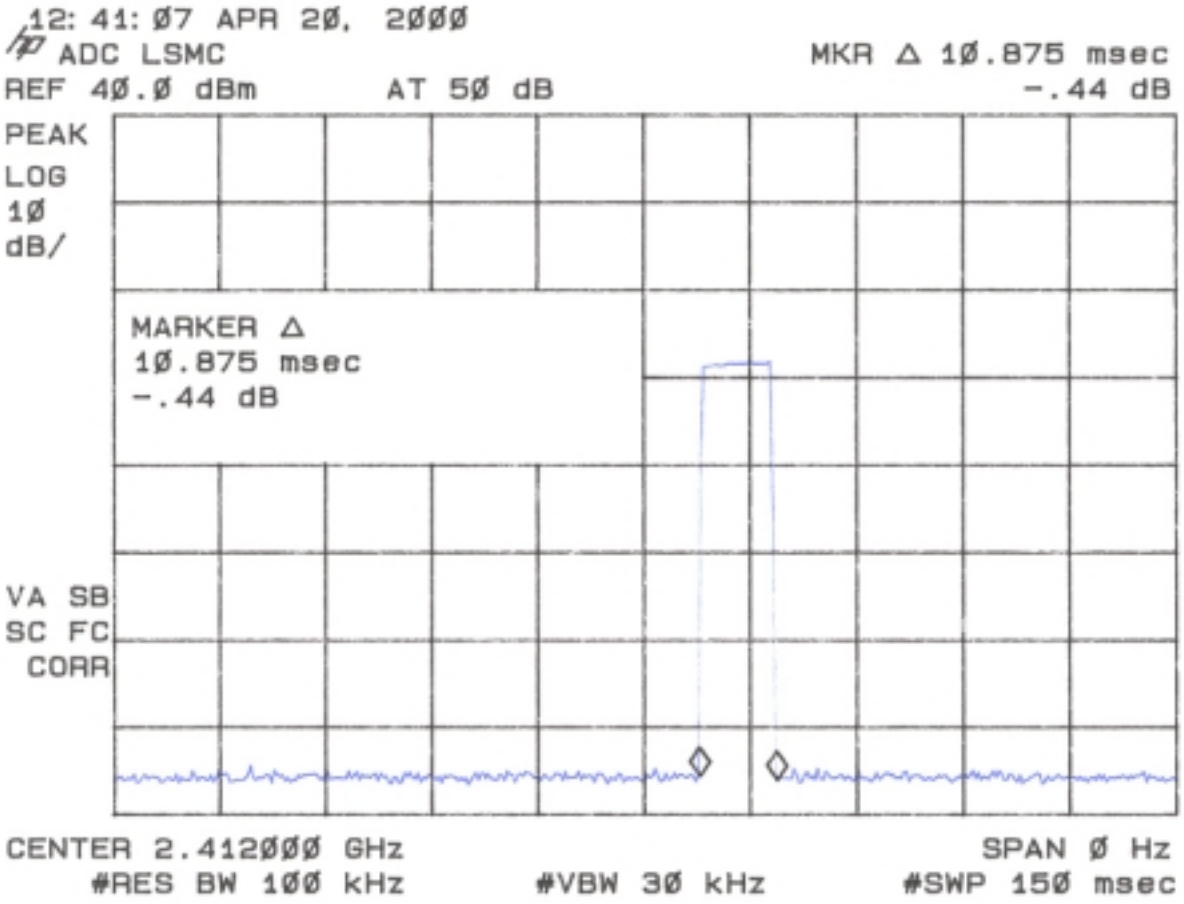


Figure 9d
Average Time of Occupancy per Channel FCC Section 15.247(a)(1)(ii)
Pinging Mode



2.14 Power Line Conducted Emissions for Transmitter FCC Section 15.207

The conducted voltage measurements have been carried out in accordance with FCC Section 15.207, with a spectrum analyzer connected to a LISN and the EUT placed into a continuous mode of transmit. The results are given in Table 9.

TABLE 9. CONDUCTED EMISSIONS DATA (Transmit Mode)
CLASS B

Test Date: February 23, 2000
UST Project: 00-0002
Customer: ADC Broadband Communications
Product: Local Status Monitor Controller (LSMC-01)

FREQUENCY (MHz)	TEST DATA (dBm) PHASE	TEST DATA (dBm) NEUTRAL	RESULTS (uV) PHASE	RESULTS (uV) NEUTRAL	FCC LIMITS (uV)	MARGIN BELOW LIMIT (dB) PHASE	MARGIN BELOW LIMIT (dB) NEUTRAL
The EUT is designed for use under battery power, or DC power from a vehicle power source. The EUT is not designed for use off of AC powered adapters, therefore conducted emissions were considered not applicable.							

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

2.15 Radiated Emissions for Digital Device (47 CFR 15.109a)

Radiated emissions were evaluated from 30 to 5000 MHz while the EUT was placed into a Receive mode of operation. Measurements were made with the analyzer's bandwidth set to 120 kHz measurements made less than 1 GHz and 1 MHz for measurements made greater than or equal to 1 GHz. The results for less than 1 GHz are shown in Table 10a and Table 10b.

The EUT was tested in two different configurations. One while attached to a simulated LST and operating off of a battery, the second was attached to a DC power supply simulating a charge mode condition off of a car battery.

TABLE 10a. RADIATED EMISSIONS DATA
(Digital Device)

CLASS A

Test Date: February 24, 2000
UST Project: 00-0002
Customer: ADC Broadband Communications
Product: Local Status Monitor Controller (LSMC-01)

NOTE: EUT Tested in Receive Mode with simulated LST

Frequency (MHz)	Receiver Reading (dBm) @3m	Correction Factor (dB)	Corrected Reading (uV/m)	FCC Limit (uV/m) @10m
125.8	-81.0*	14.1	30.4	150.0
128.0	-79.5*	14.3	37.0	150.0
252.0	-76.5*	16.2	64.9	210.0
277.0	-79.0*	17.5	56.2	210.0
302.0	-81.0*	18.2	48.6	210.0
304.0	-84.0	18.3	34.8	210.0
327.0	-80.5*	19.3	58.5	210.0
377.0	-83.0	20.2	48.8	210.0
456.0	-81.5*	21.7	68.8	210.0
532.0	-87.6*	23.5	41.9	210.0

* = Quasi-Peak Measurement.

SAMPLE CALCULATION:

RESULTS (uV/m @ 10m) =
Antilog ((-81.0 + 14.1 -10.46 + 107)/20) = 30.4
CONVERSION FROM dBm TO dBuV = 107 dB
CONVERSION FROM 3m to 10m = -10.46 dB

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

TABLE 10b. RADIATED EMISSIONS DATA
(Digital Device)

CLASS B

Test Date: March 7, 2000
UST Project: 00-0002
Customer: ADC Broadband Communications
Product: Local Status Monitor Controller (LSMC-01)

NOTE: EUT Tested During a Charge Mode of Operation

Frequency (MHz)	Receiver Reading (dBm) @3m	Correction Factor (dB)	Corrected Reading (uV/m)	FCC Limit (uV/m) @3m
33.7	-86.0	14.6	60.3	100.0
66.3	-86.0	11.5	42.3	100.0
79.2	-86.0	11.7	43.1	100.0
144.0	-86.0	15.2	64.4	150.0
208.0	-81.5*	15.3	109.3	150.0
240.0	-84.0	15.7	85.7	200.0

* = Quasi-Peak Measurement

SAMPLE CALCULATION:

RESULTS (uV/m @ 3m) =
Antilog ((-86.0 + 14.6 + 107)/20) = 60.3
CONVERSION FROM dBm TO dBuV = 107 dB

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

2.16 Power Line Conducted Emissions for Digital Device and Receiver FCC Section 15.107

The conducted voltage measurements have been carried out in accordance with FCC Section 15.107, with a spectrum analyzer connected to a LISN and the EUT placed into an idle condition or a continuous mode of receive. The results are given in Table 11.

TABLE 11. CONDUCTED EMISSIONS DATA (DIGITAL DEVICE & RECEIVE MODE) CLASS A

Test Date: February 23, 2000
UST Project: 00-0002
Customer: ADC Broadband Communications
Product: Local Status Monitor Controller (LSMC-01)

FREQUENCY (MHz)	TEST DATA (dBm) PHASE	TEST DATA (dBm) NEUTRAL	RESULTS (uV) PHASE	RESULTS (uV) NEUTRAL	FCC LIMITS (uV)	MARGIN BELOW LIMIT (dB) PHASE	MARGIN BELOW LIMIT (dB) NEUTRAL
The EUT is designed for use under battery power, or DC power from a vehicle power source. The EUT is not designed for use off of AC powered adapters, therefore conducted emissions were considered not applicable.							

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