Field Strength Of Spurious Emissions (47 CFR 95.1115(b))

Measurements were made using a peak detector. Field strength of Spurious Emissions are shown in Tables 4a through 4b and Figures 3a through 3b. For comparison to the average limits, duty cycle corrections were made as shown below.

Both Radios were checked (one radio with patch antennas and the other with monopoles). The results from each radio were similar, but preliminary data showed that the Radio with the monopole antennas to be worse case. Therefore all results shown are for the radio configured with the monopole antennas (for a low and high channel).

Duty Cycle Correction During 100 msec:

The system is designed that the system hops at 35 msec per channel. The system will only be on one channel in any 100 msec period of time. During this 35 msec per channel, each transmitter is allotted only a small duration of this period (5 msec max).

Therefore the worse case duty cycle is:

Duty Cycle Correction = 20 log (0.05) = -26.0 dB

TABLE 4a

FIELD STRENGTH OF SPURIOUS EMISSIONS

Test Date: October 3, 2000
UST Project: 01-0406
Customer: VitalCom, Inc.
Model: DR-10000

Peak Measurements (Low Channel)

FREQ. (MHz.)	TEST DATA (dBm) @ 1m	ANTENNA FACTOR + CABLE ATTENUATION	RESULTS (uV/m) @ 3m	PEAK FCC LIMITS (uV/m) @ 3m
1.215	-69.6	28.7	672.9	5000

Peak Measurements (High Channel)

FREQ. (MHz.)	TEST DATA (dBm) @ 1m	ANTENNA FACTOR + CABLE ATTENUATION	RESULTS (uV/m) @ 3m	PEAK FCC LIMITS (uV/m) @ 3m
1.226	-70.2	28.7	628.1	5000

*** - To achieve better dynamic range, all measurements were made a 1 meter**

SAMPLE CALCULATIONS:

RESULTS uV/m @ 3m = Antilog ((-69.6 – 9.54 + 28.7 + 107)/20) = 672.9
CONVERSION FROM dBm TO dBuV = 107 dB
CONVERSION FROM 1m TO 3m = 20 log (1/3) = -9.54 dB

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

TABLE 4b

FIELD STRENGTH OF SPURIOUS EMISSIONS

Test Date: October 3, 2000
UST Project: 01-0406
Customer: VitalCom, Inc.
Model: DR-10000

Average Measurements (Low Channel)

FREQ. (MHz.)	TEST DATA (dBm) @ 1m	ANTENNA FACTOR + CABLE ATTENUATION	RESULTS (uV/m) @ 3m	AVERAGE FCC LIMITS (uV/m) @ 3m
1.215	-95.6	28.7	33.7	500

Average Measurements (High Channel)

FREQ. (MHz.)	TEST DATA (dBm) @ 1m	ANTENNA FACTOR + CABLE ATTENUATION	RESULTS (uV/m) @ 3m	AVERAGE FCC LIMITS (uV/m) @ 3m
1.226	-96.2	28.7	31.5	500

*** - To achieve better dynamic range, all measurements were made a 1 meter**
**** - Readings adjusted by duty cycle = 20 log (0.05) = -26.0 dB**

SAMPLE CALCULATIONS:

RESULTS uV/m @ 3m = Antilog ((-95.6 – 9.54 + 28.7 + 107)/20) = 33.7
CONVERSION FROM dBm TO dBuV = 107 dB

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

FIGURE 3a

SPURIOUS EMISSIONS 15.242(c)

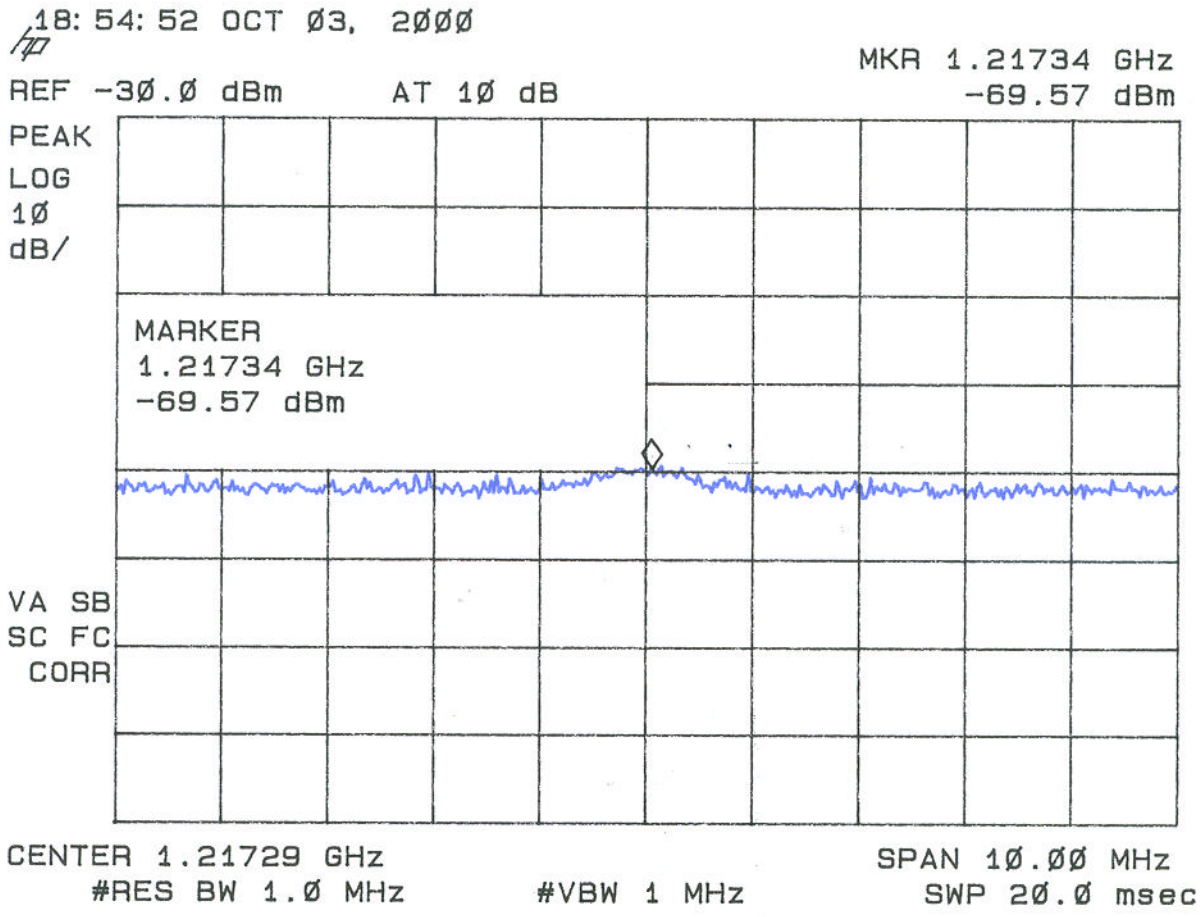
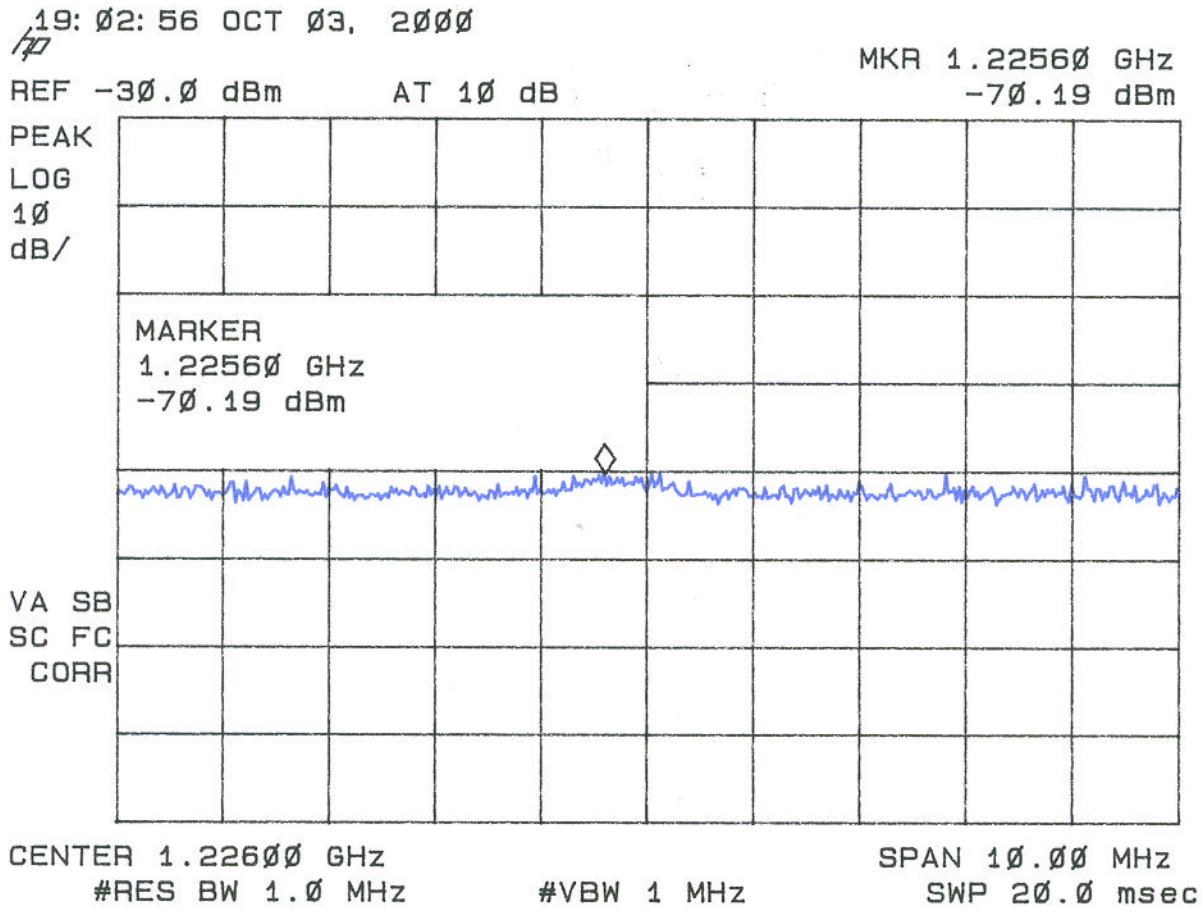


FIGURE 3b

SPURIOUS EMISSIONS 15.242(c)



Radiated Digital Device Emissions (47 CFR 15.109a)

Radiated emissions were evaluated from 30 MHz to 6.5 GHz with the EUT set to a receive mode of operation. Measurements were made with the analyzer's bandwidth set to 120 kHz for measurements below 1 GHz and 1 MHz for measurements above greater than or equal to 1 GHz. Results of these emissions are shown in Tables 5a and 5b.

TABLE 5a

CLASS A
RADIATED EMISSIONS

Test Date: June 17, 2000
UST Project: 01-0406
Customer: VitalCom, Inc.
Model: DR-10000

Measurements 30 MHz – 1 GHz

FREQ. (MHz)	TEST DATA (dBm) @ 10m	ANTENNA FACTOR + CABLE ATTEN.	RESULTS (uV/m) @ 10m	LIMITS (uV/m) @ 10m	MARGIN BELOW LIMIT (dB)
240.0	-84.1	14.7	76.0	210.0	8.8
400.0	-85.9*	19.6	108.4	210.0	5.7
420.0	-85.9*	20.3	117.8	210.0	5.0
440.0	-84.8*	20.9	142.2	210.0	3.4
450.0	-89.3*	21.1	87.1	210.0	7.6
520.0	-89.3*	23.0	108.4	210.0	5.7
540.0	-88.4	23.2	122.7	210.0	4.7

*** = Quasi-Peak Measurement**

SAMPLE CALCULATIONS:

RESULTS uV/m @ 10m =
Antilog ((-84.1 + 14.7 + 107)/20) = 76.0
CONVERSION FROM dBm TO dBuV = 107 dB

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

TABLE 5b

CLASS A
RADIATED EMISSIONS

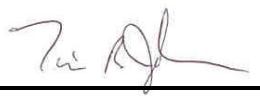
Test Date: October 3, 2000
UST Project: 01-0406
Customer: VitalCom, Inc.
Model: DR-10000

Peak Measurements >1 GHz

FREQ. (GHz)	TEST DATA (dBm) @ 3m	AMP GAIN (dB)	ANT. FACTOR (dB)	CABLE LOSS (dB)	RESULTS (uV/m) @ 10m	FCC LIMITS (uV/m) @ 10m	MARGIN BELOW LIMIT (dB)
1.000	-47.8	35.9	25.2	2.3	111.4	300.0	8.6
1.064	-55.8	35.8	25.7	2.4	44.8	300.0	16.7
1.620	-53.7	35.2	27.5	3.1	81.7	300.0	11.3
3.248	-55.9	34.8	32.1	4.7	135.5	300.0	6.9

SAMPLE CALCULATIONS:

RESULTS uV/m @ 10m =
Antilog ((-47.8 - 35.9 + 25.2 + 2.3 -10.46 + 107)/20) = 111.4
CONVERSION FROM dBm TO dBuV = 107 dB
CONVERSION FROM 3m to 10m = -10.46

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

Power Line Conducted Emissions for Digital Device, Transmitter, 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 6.

TABLE 6

CONDUCTED EMISSIONS DATA

CLASS B

Test Date: October 8, 2000
UST Project: 01-0406
Customer: VitalCom, Inc.
Model: DR-10000

FREQ. (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
0.72	-71.8	-69.6	57.5	74.1	250.0	12.8	10.6
4.1	-67.1	-70.8	98.9	64.6	250.0	8.1	11.8
6.3	-69.7	-69.0	73.3	79.4	250.0	10.7	10.0
15.6	-67.6	-71.4	93.3	60.3	250.0	8.6	12.4
26.6	-63.9	-68.9	142.9	80.4	250.0	4.9	9.9
26.8	-65.0	-68.4	125.9	85.1	250.0	6.0	9.4

SAMPLE CALCULATIONS:

RESULTS uV =
Antilog ((-71.8 + 107)/20) = 57.5
CONVERSION FROM dBm TO dBuV = 107 dB

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

Emissions Type (47 CFR Section 95.631(i), 95.1115(c), and 95.1117)

A wireless medical telemetry device may transmit any emission type appropriate for communications in this service, except for video and voice. Waveforms such as electrocardiograms (ECG's) are not considered video.

Basic Description of Transmitter Emissions
The EUT utilizes spread spectrum (frequency hopping) type technology and GFSK (Gaussian filtered, Frequency Shift Keying) as its modulation approach.

Frequency Stability (47 CFR Section 95.1115(e))

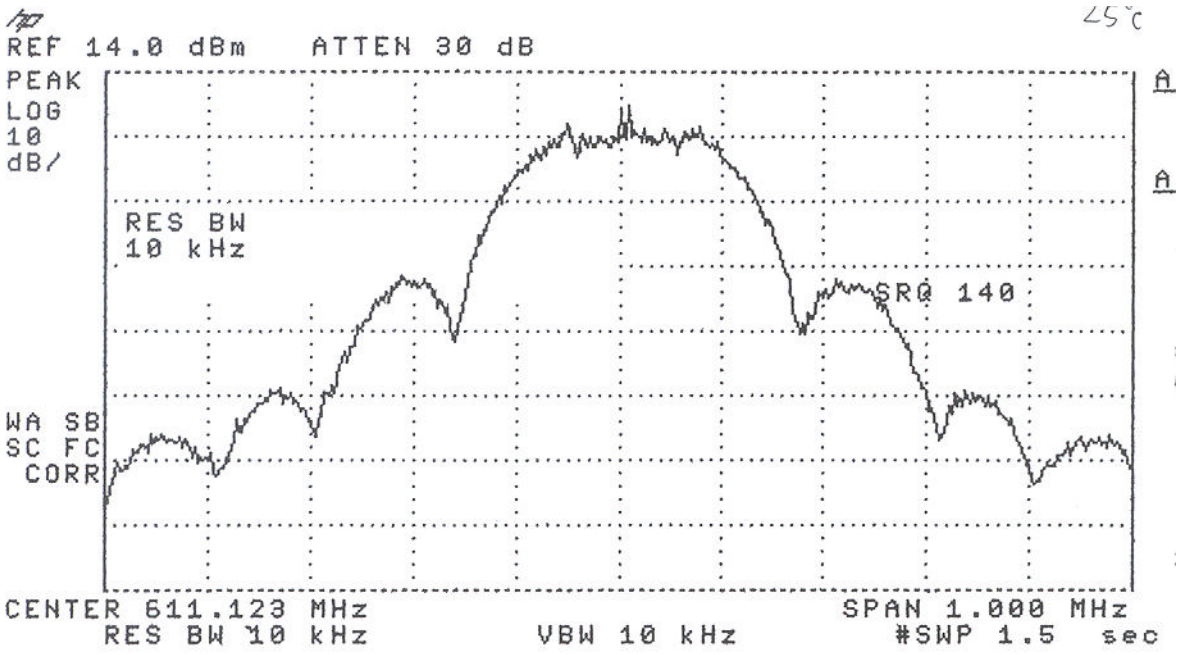
Manufacturers of wireless medical telemetry devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all of the manufacturer's specified conditions.

According to the manufacturer, the frequency drift of the transmitter is +/- 30 ppm over a temperature range of –20 to + 70 degrees C. This value was determined by the crystal used (manufacturers data) to stabilize the frequency synthesizer. The +/- 30 ppm corresponds to an actual frequency drift of +/- 18.33 kHz.

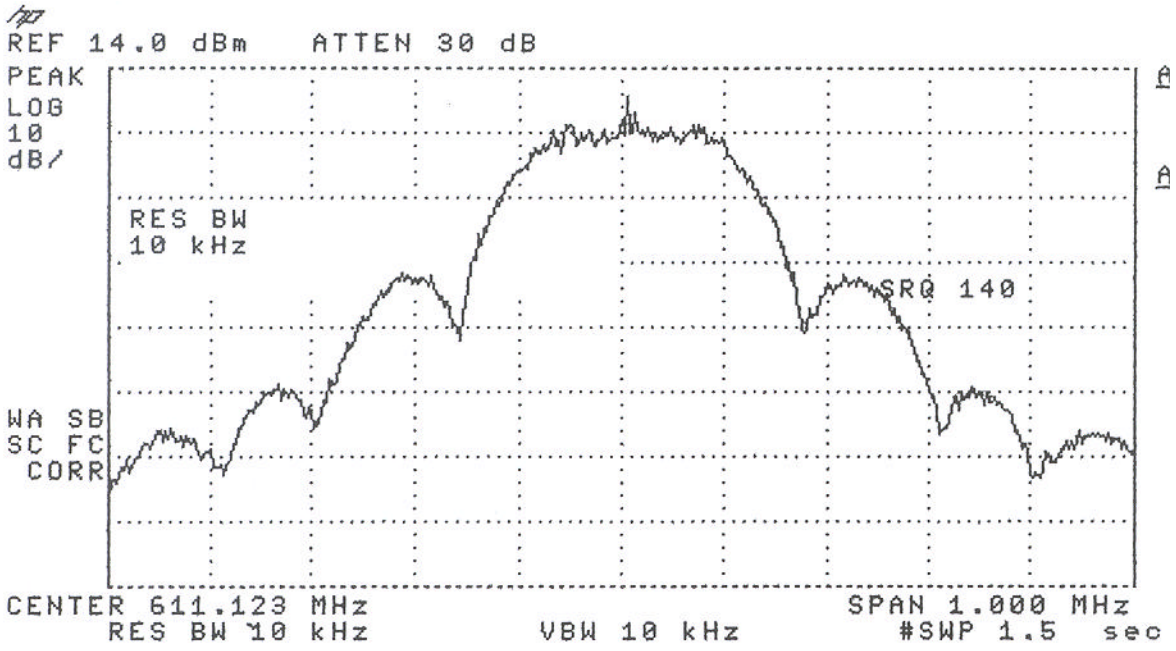
The following plots were provided by the manufacturer to show the fundamental under various conditions.

1) 25 degrees C temperature with supply voltage set to 85% of nominal
2) 25 degrees C temperatore with supply voltage set to 115% of nominal
3) nominal supply voltage and –20 degrees C
4) nominal supply voltage and –10 degrees C
5) nominal supply voltage and 0 degrees C
6) nominal supply voltage and 10 degrees C
7) nominal supply voltage and 20 degrees C
8) nominal supply voltage and 30 degrees C
9) nominal supply voltage and 40 degrees C
10) nominal supply voltage and 50 degrees C

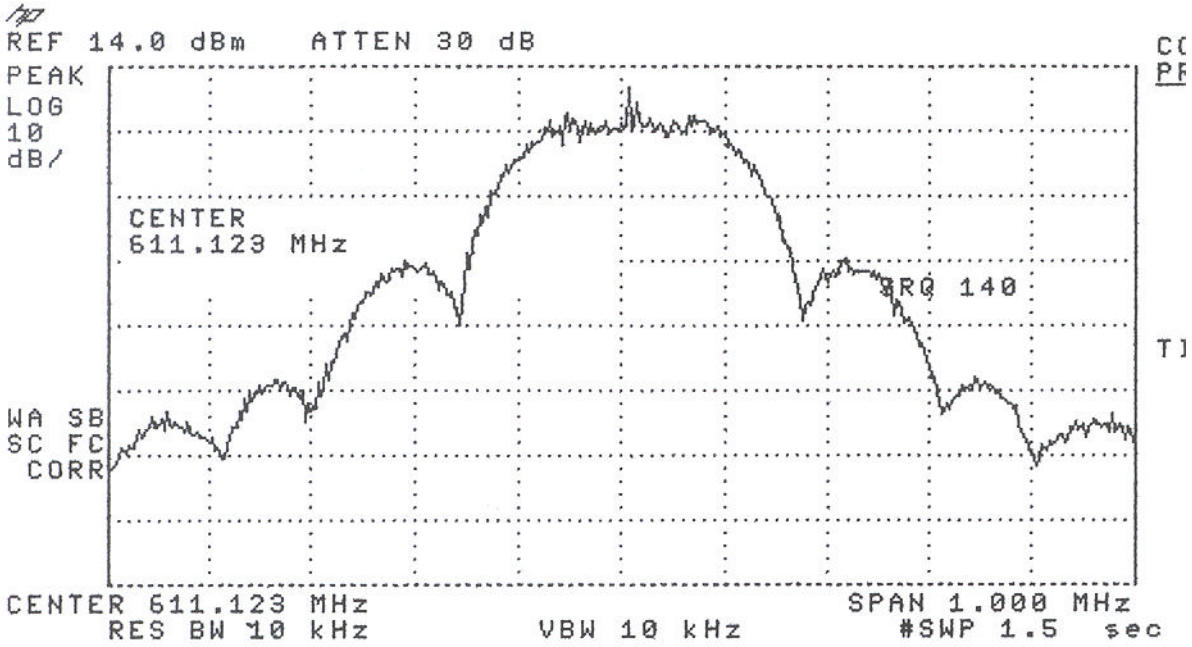
PLOT 1
(25 degrees C temperature with supply voltage set to 85% of nominal)



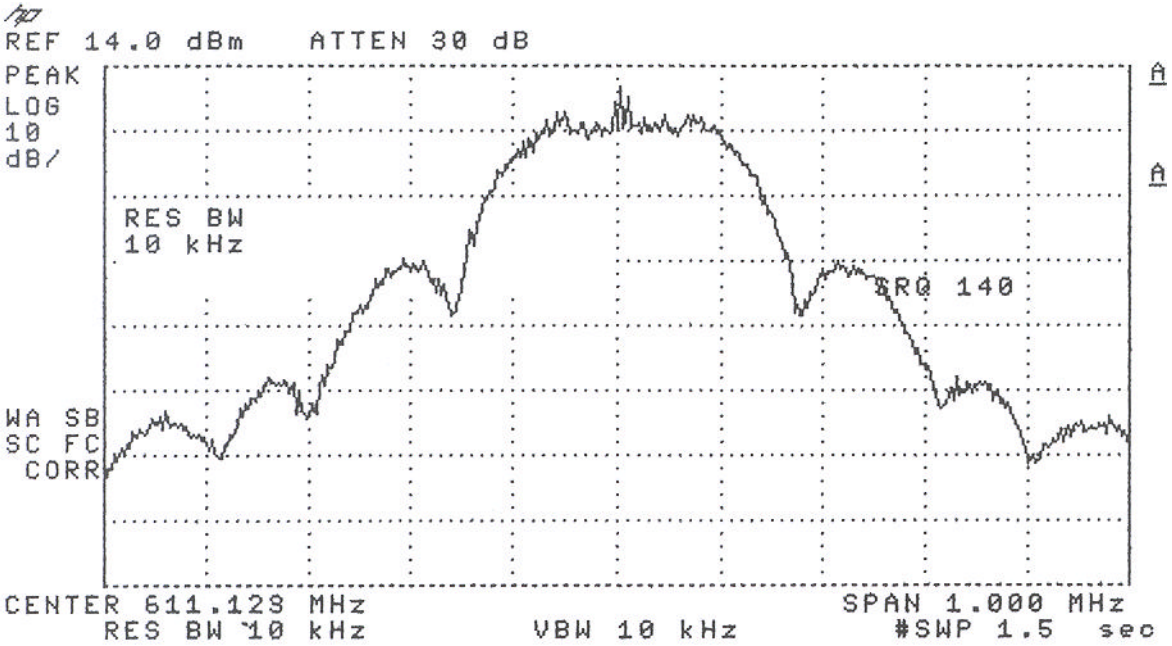
PLOT 2
(25 degrees C temperatore with supply voltage set to 115% of nominal)



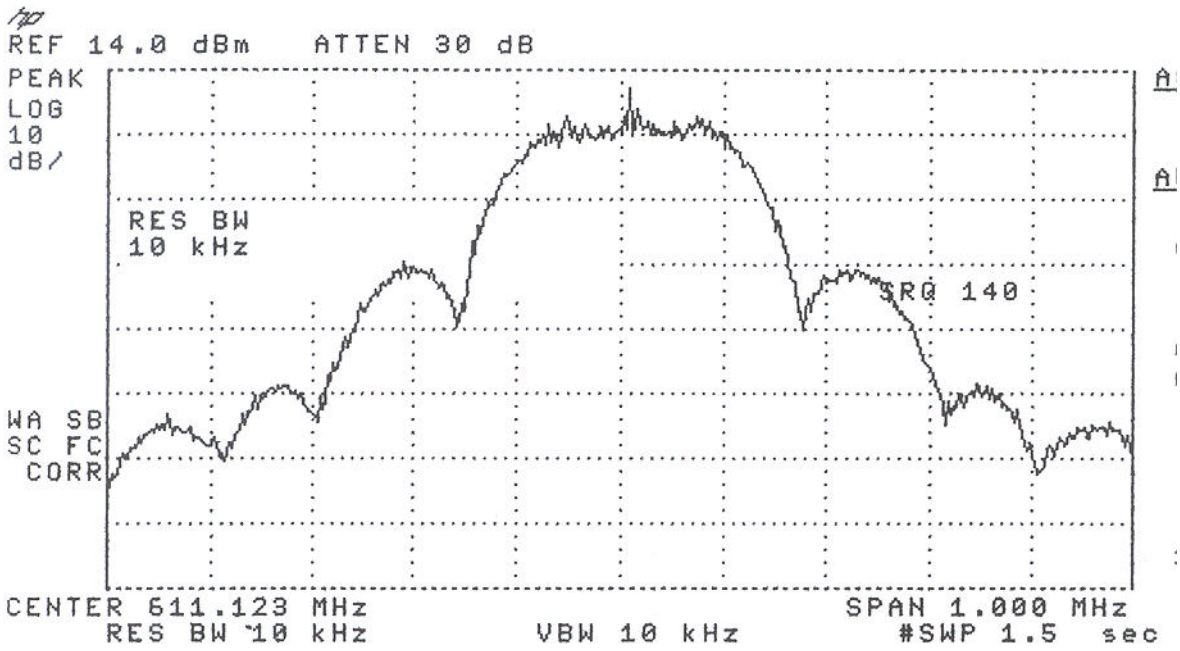
PLOT 3
(nominal supply voltage and –20 degrees C)



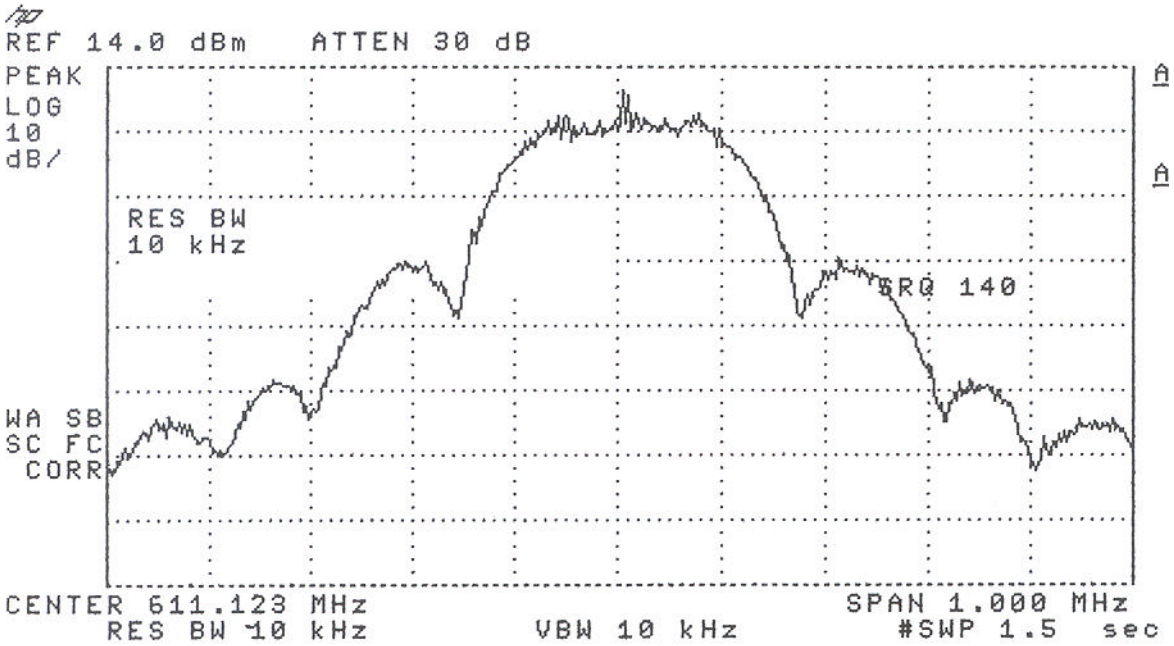
PLOT 4
(nominal supply voltage and –10 degrees C)



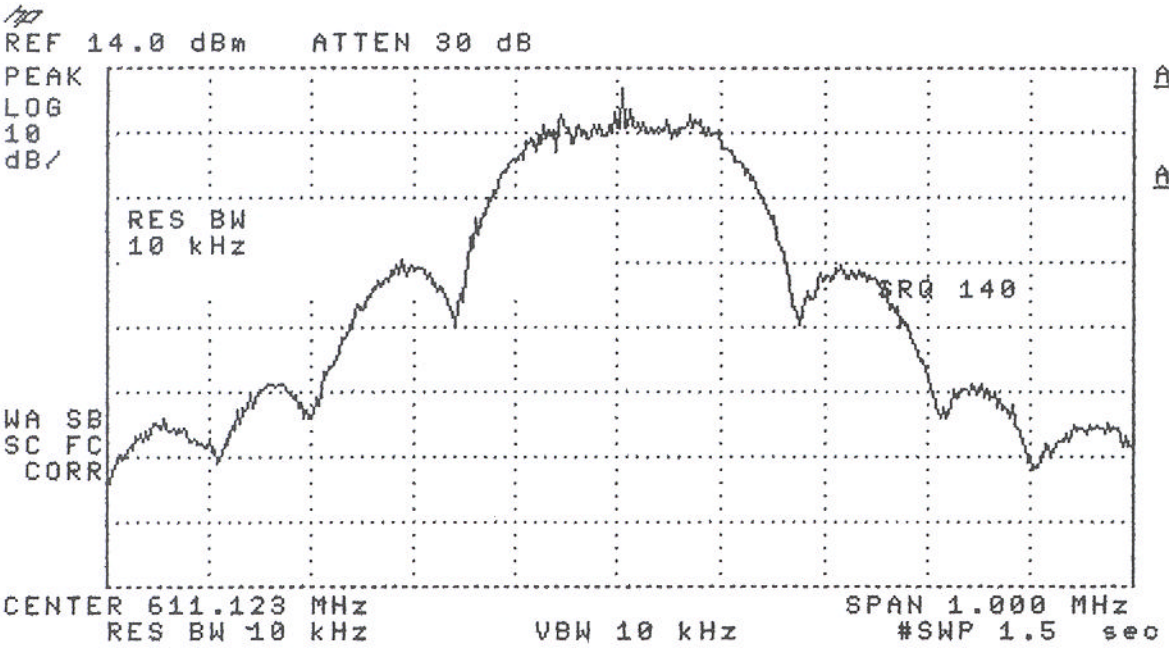
PLOT 5
(nominal supply voltage and 0 degrees C)



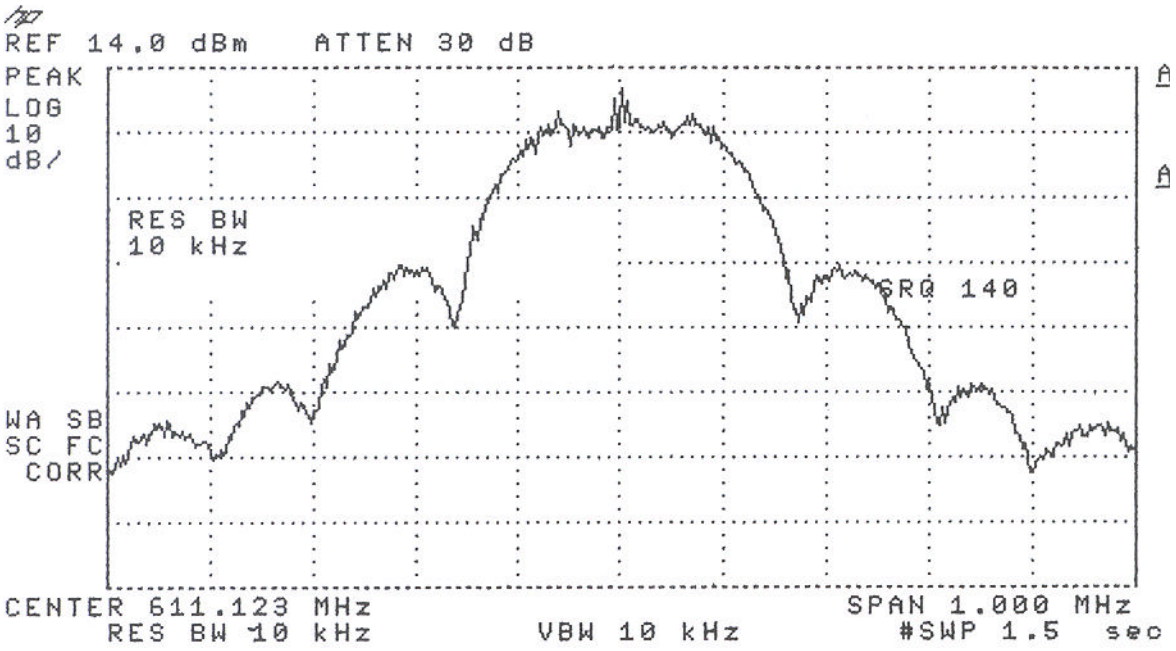
PLOT 6
(nominal supply voltage and 10 degrees C)



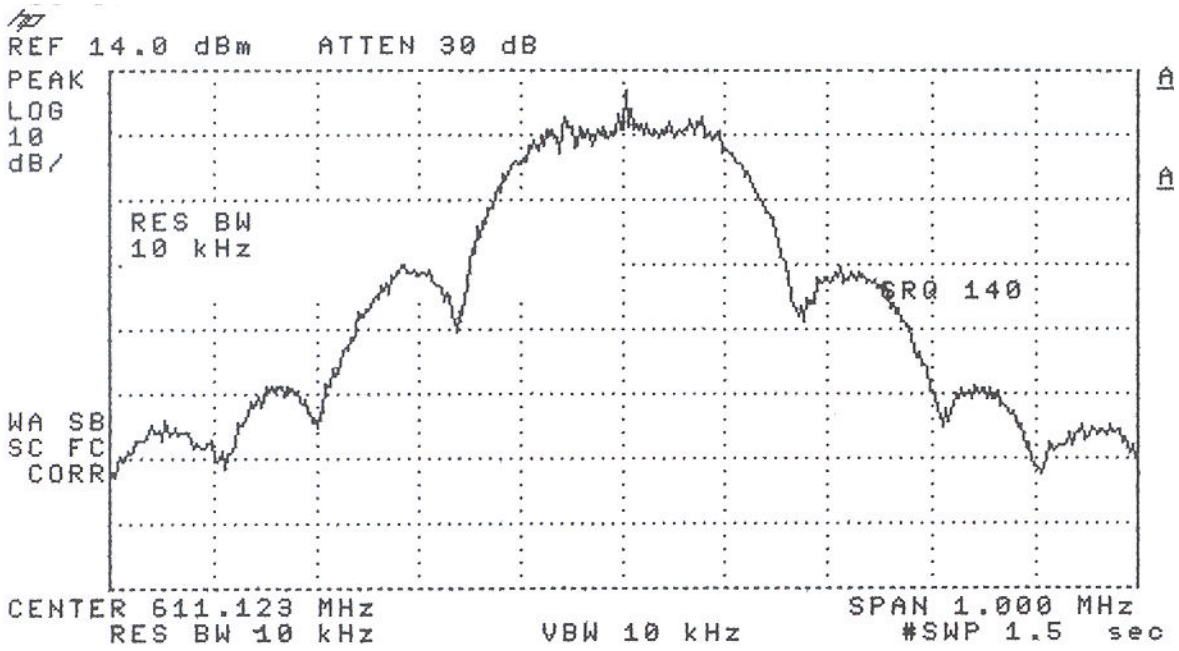
PLOT 7
(nominal supply voltage and 20 degrees C)



PLOT 8
(nominal supply voltage and 30 degrees C)



PLOT 9
(nominal supply voltage and 40 degrees C)



PLOT 10
(nominal supply voltage and 50 degrees C)