FCC Test Report

FCC Part 22 & 24 / RSS 132 & 133

FOR:

Optical Scan Voting Machine with GSM

MODEL #: Model 100

Election Systems & Software
11208 John Galt Blvd
Omaha, NE 68137
USA

FCC ID: UBR-ESSM100A

TEST REPORT #: EMC_ ELECT_001_06002_Model_100 _FCC22_24
DATE: 6/15/06

ilac-MRA ACCREDITED Certificate # 2135.01

Deutscher Akkreditierungs Rat DAR
TTI-P-G 081/94-A0
Accredited according to
ISO/IEC 17025

Bluetooth™
Bluetooth Qualification Test Facility (BQTF)

CTIA Authorized Testing Laboratory

FCC listed# 101450

IC recognized # 3925

***CETECOM* Inc.**
411 Dixon Landing Road ◆ Milpitas, CA 95035 ◆ U.S.A.
Phone: + 1 (408) 586 6200 ◆ Fax: + 1 (408) 586 6299 ◆ E-mail: info@cetecomusa.com ◆ http://www.cetecom.com
CETECOM Inc. is a Delaware Corporation with Corporation number: 2113686
Board of Directors: Dr. Harald Ansorge, Dr. Klaus Matkey, Hans Peter May

Table of Contents

1 Assessment

The following is in compliance with the applicable criteria specified in FCC rules Parts 2, and 24 of Title 47 of the Code of Federal Regulations and in compliance with the applicable criteria specified in Industry Canada rules RSS132 and RSS133.

Company	Description	Model #
Election Systems & Software	**Optical Scan Voting Machine with GSM**	**Model 100**

2006-06-15
Lothar Schmidt
Test Lab Manager

The test results of this test report relate exclusively to the test item specified in Identification of the Equipment under Test. The CETECOM Inc. USA does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of the CETECOM Inc USA.

2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the EMC Test Report

Company Name:	CETECOM Inc.
Department:	EMC
Address:	411 Dixon Landing Road Milpitas, CA 95035 U.S.A.
Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
Responsible Test Lab Manager:	Lothar Schmidt
Responsible Project Leader:	Pete Krebill
Date of test:	06/06/06 - 06/07/06

2.2 Identification of the Client

Applicant's Name:	**Election Systems & Software**
Street Address:	**935 Stewart DR.**
City/Zip Code	**Omaha, NE 68137**
Countr	**USA**
Contact Person:	**Mike Dvorak**
Phone No.	**402 938 1323**
Fax:	**402 593 8107**
e-mail:	Mmdvorak@essvote.com

2.3 Identification of the Manufacturer

Manufacturer's Name:	**Election Systems & Software**
Manufacturers Address:	**935 Stewart DR.**
City/Zip Code	**Omaha, NE 68137**
Country	**USA**

3 Equipment under Test (EUT)

3.1 Identification of the Equipment under Test

Marketing Name:	**Model 100**
Description:	**Optical Scan Voting Machine**
Model No:	**100**
FCC ID:	**UBR-ESSM100A**
Frequency Range:	**824.2 MHz – 848.8 MHz** **1850.2 MHz – 1909.8 MHz**
Type(s) of Modulation:	**GMSK**
Number of Channels:	**124 for 850 band** **299 for 1900 band**
Antenna Type:	**INTERNAL**
Output Power:	**0.137 mW (21.37 dBm) ERP for 850 band** **0.818 mW (29.13 dBm) EIRP for 1900 band**

4 Subject of Investigation

The objective of the measurements done by Cetecom Inc. was to measure the performance of the EUT as specified by requirements listed in FCC rules Parts 2, 22 and 24 of Title 47 of the Code of Federal Regulations and Industry Canada rules RSS132 and RSS133.

The Model 100 incorporates a pre approved GSM module therefore this report only contains results for radiated measurements. For the conducted results refer to the module report.

5 Measurements

5.1 RF Power Output

5.1.1 FCC 2.1046 Measurements required: RF power output.

Power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on circuit elements as specified. The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.

5.1.2 Limits:

5.1.2.1 FCC 22.913 (a) Effective radiated power limits.

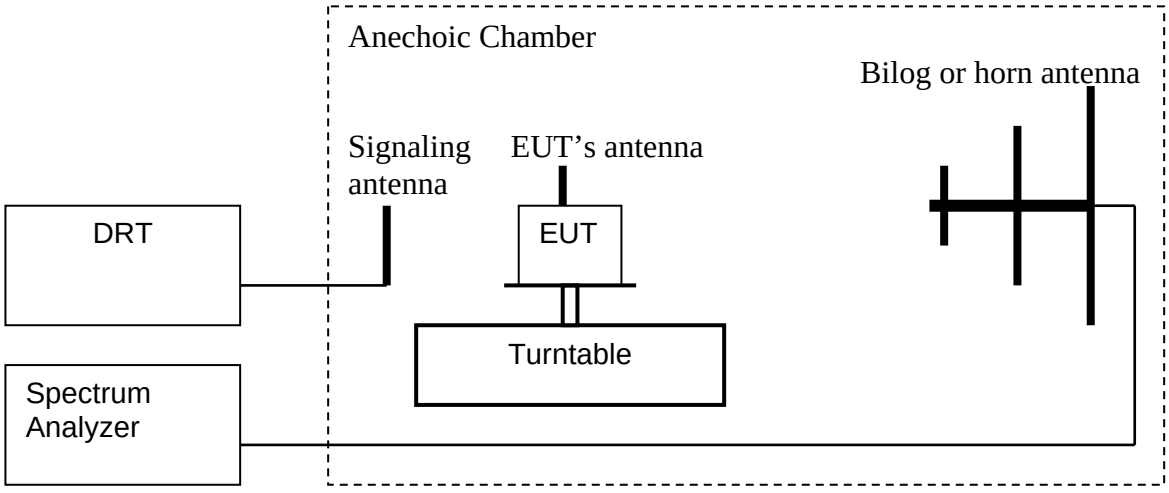
The effective radiated power (ERP) of mobile transmitters must not exceed 7 Watts.

5.1.2.2 FCC 24.232 (b)(c) Power limits.

(b) Mobile/portable stations are limited to 2 Watts effective isotropic radiated power (EIRP).
(c) Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms equivalent voltage. The measurement results shall be properly adjusted for any limitations, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, sensitivity, etc., so as to obtain a true peak measurement over the full bandwidth of the channel.

5.1.3 Radiated Output Power Measurement procedure:

Based on TIA-603C 2004
2.2.17.2 Effective Radiated Power (ERP) or Effective Isotropic Radiated Power (EIRP)



1. Connect the equipment as shown in the above diagram with the EUT's antenna in a vertical orientation.

2. Adjust the settings of the Digital Radiocommunication Tester (DRT) to set the EUT to its maximum power at the required channel.
3. Set the spectrum analyzer to the channel frequency. Set the analyzer to measure peak hold with the required settings.
4. Rotate the EUT 360°. Record the peak level in dBm (**LVL**).
5. Replace the EUT with a vertically polarized half wave dipole or known gain antenna. The center of the antenna should be at the same location as the center of the EUT's antenna.
6. Connect the antenna to a signal generator with known output power and record the path loss in dB (**LOSS)**. **LOSS** = Generator Output Power (dBm) – Analyzer reading (dBm).
7. Determine the ERP using the following equation:
   ERP (dBm) = **LVL** (dBm) + **LOSS** (dB)
8. Determine the EIRP using the following equation:
   EIRP (dBm) = **ERP** (dBm) + 2.15 (dB)
9. Measurements are to be performed with the EUT set to the low, middle and high channel of each frequency band.

(**note:** Steps 5 and 6 above are performed prior to testing and **LOSS** is recorded by test software. Steps 3, 4, 7 and 8 above are performed with test software.)

Spectrum analyzer settings:
Res B/W: 3 MHz
Vid B/W: 3 MHz

5.1.4 ERP Results 850 MHz band:

Frequency (MHz)	Effective Radiated Power (dBm)
824.2	21.37
836.6	20.43
848.8	20.40

5.1.5 EIRP Results 1900 MHz band:

Frequency (MHz)	Effective Isotropic Radiated Power (dBm)
1850.2	28.14
1880.0	28.57
1909.8	29.13

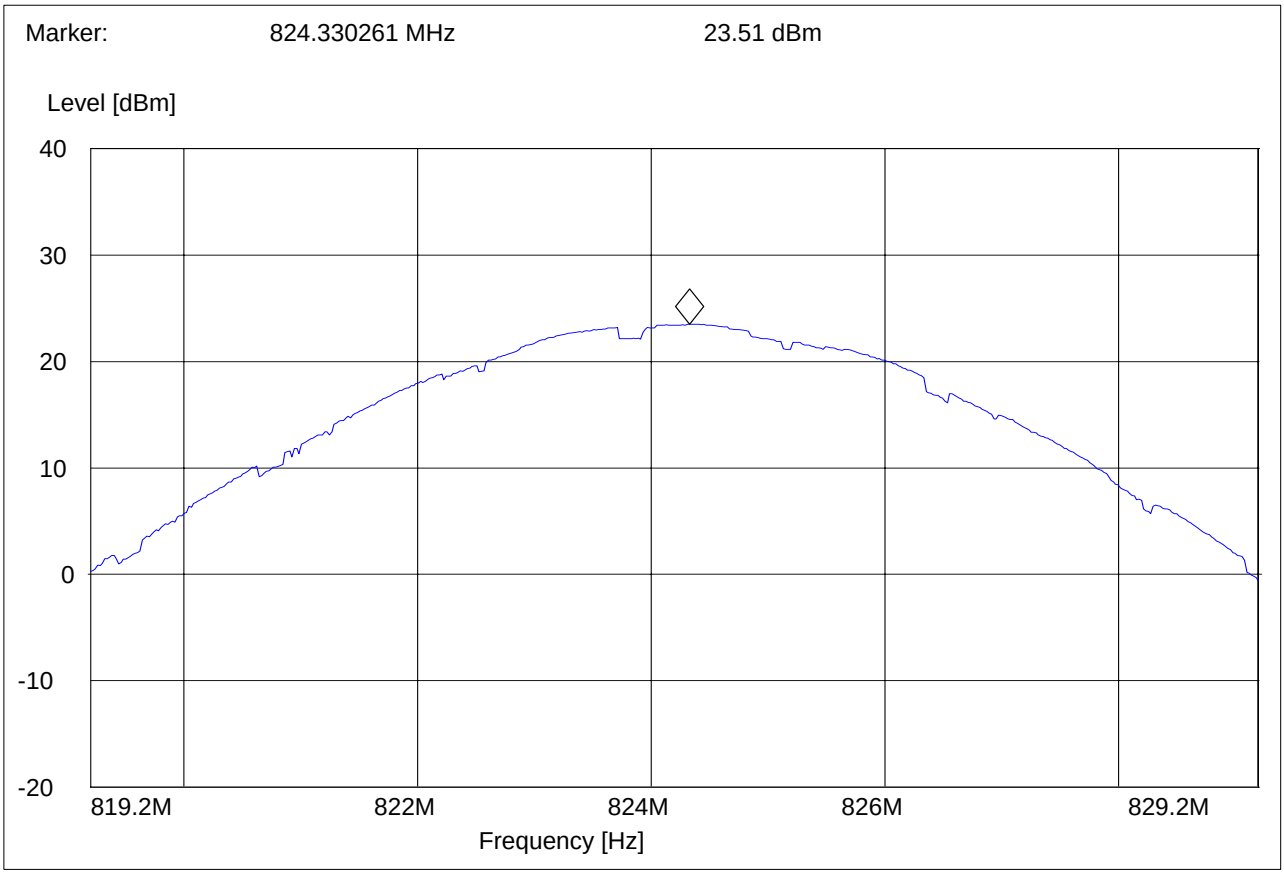
EIRP (GSM-850) **§22.913(a)**
CHANNEL 128

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT / Description: Model 100 Wireless Ballot box with SEMC GR48
Customer:          Election Systems
Operating Mode:    FCC22 CH128
Antenna:           V
EUT:               H
Test Engineer:     PETER
Voltage:           AC
Sweep:             EIRP 850 CH128 V
```

SWEEP TABLE: "EIRP 850 CH 128 V"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
819.2 MHz	829.2 MHz	MaxPeak MaxPeak	Coupled	3 MHz	DUMMY-DBM



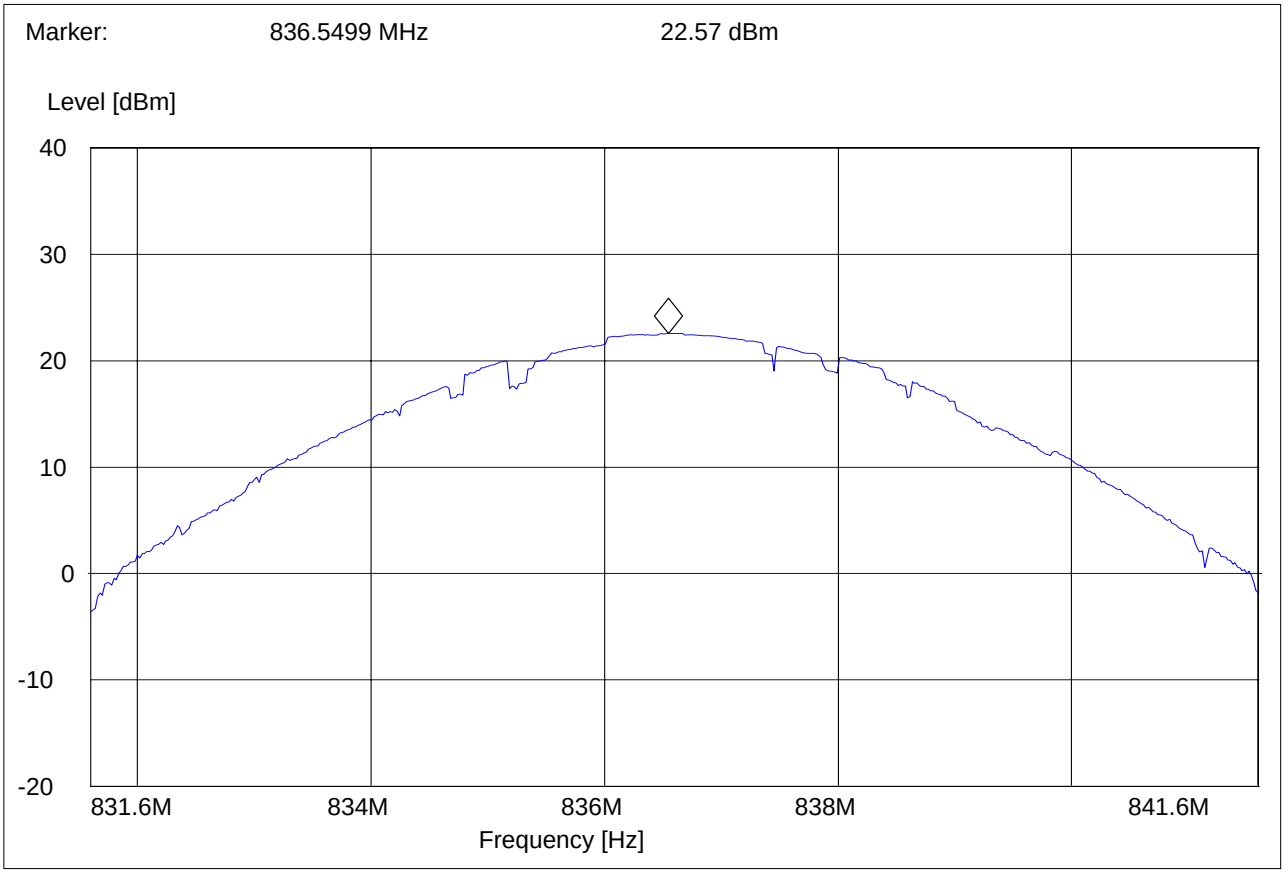
EIRP (GSM-850) **§22.913(a)**
CHANNEL 190

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT / Description: Model 100 Wireless Ballot box with SEMC GR48
Customer:          Election Systems
Operating Mode:    FCC22 CH190
Antenna:           V
EUT:               H
Test Engineer:     PETER
Voltage:           AC
Sweep:             EIRP 850 CH190 V
```

SWEEP TABLE: "EIRP 850 CH 190 V"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
831.6 MHz	841.6 MHz	MaxPeak MaxPeak	Coupled	3 MHz	DUMMY-DBM



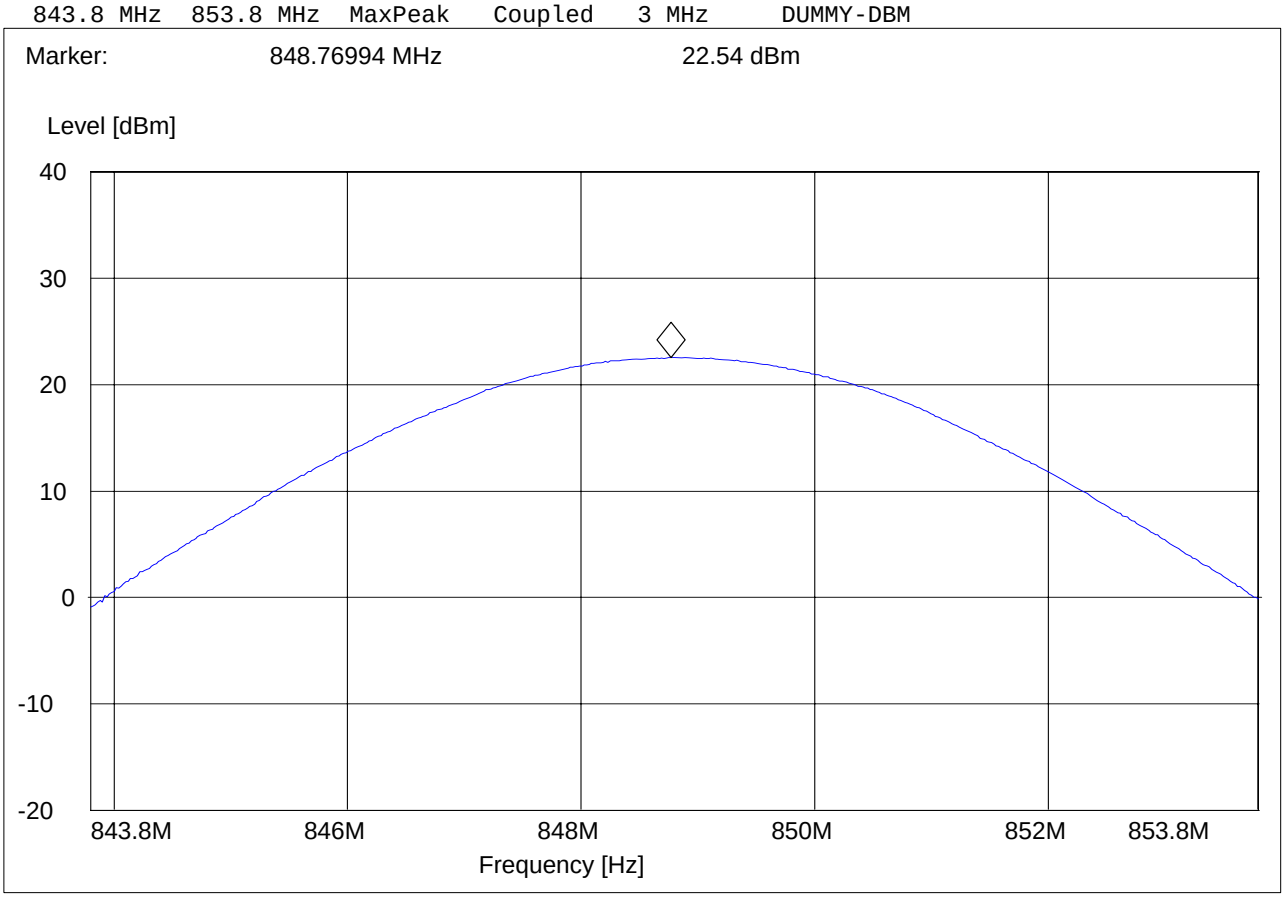
EIRP (GSM-850) **§22.913(a)**
CHANNEL 251

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT / Description: Model 100 Wireless Ballot box with SEMC GR48
Customer:          Election Systems
Operating Mode:    FCC22 CH251
Antenna:           V
EUT:               H
Test Engineer:     PETER
Voltage:           AC
Sweep:             EIRP 850 CH251 V
```

SWEEP TABLE: "EIRP 850 CH 251 V"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
843.8 MHz	853.8 MHz	MaxPeak	Coupled	3 MHz	DUMMY-DBM



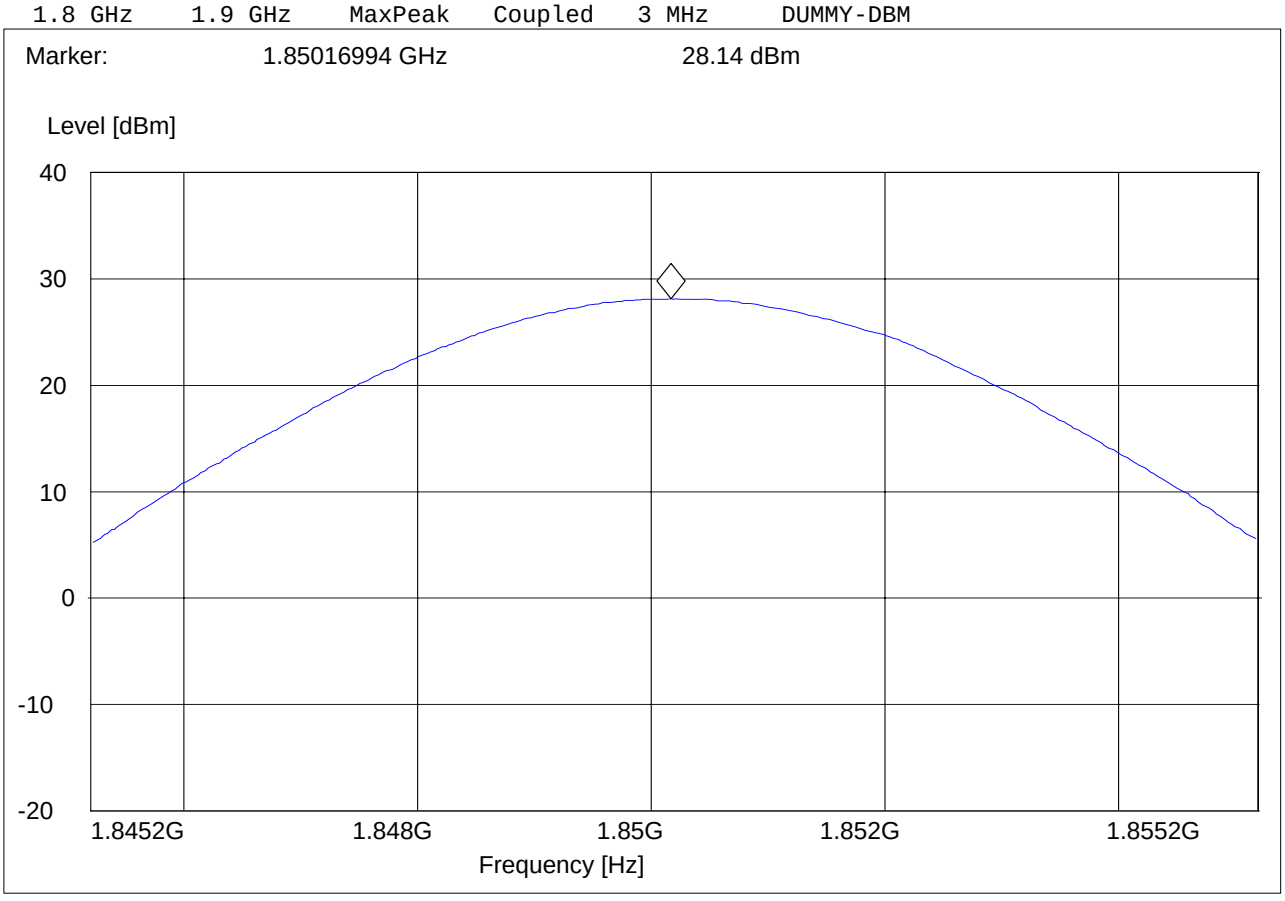
EIRP (PCS-1900) **§24.232(b)**
CHANNEL 512

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT / Description: Model 100 Wireless Ballot box with SEMC GR48
Customer:          Election Systems
Operating Mode:    FCC24
Antenna:           V
EUT:               H
Test Engineer:     PETER
Voltage:           AC
Sweep:             EIRP 1900 CH512
```

SWEEP TABLE: "EIRP 1900 CH512"

```
Short Description:            EIRP PCS 1900 for channel-512
Start      Stop       Detector  Meas.     IF        Transducer
Frequency  Frequency            Time      Bandw.
1.8 GHz    1.9 GHz    MaxPeak   Coupled   3 MHz     DUMMY-DBM
```



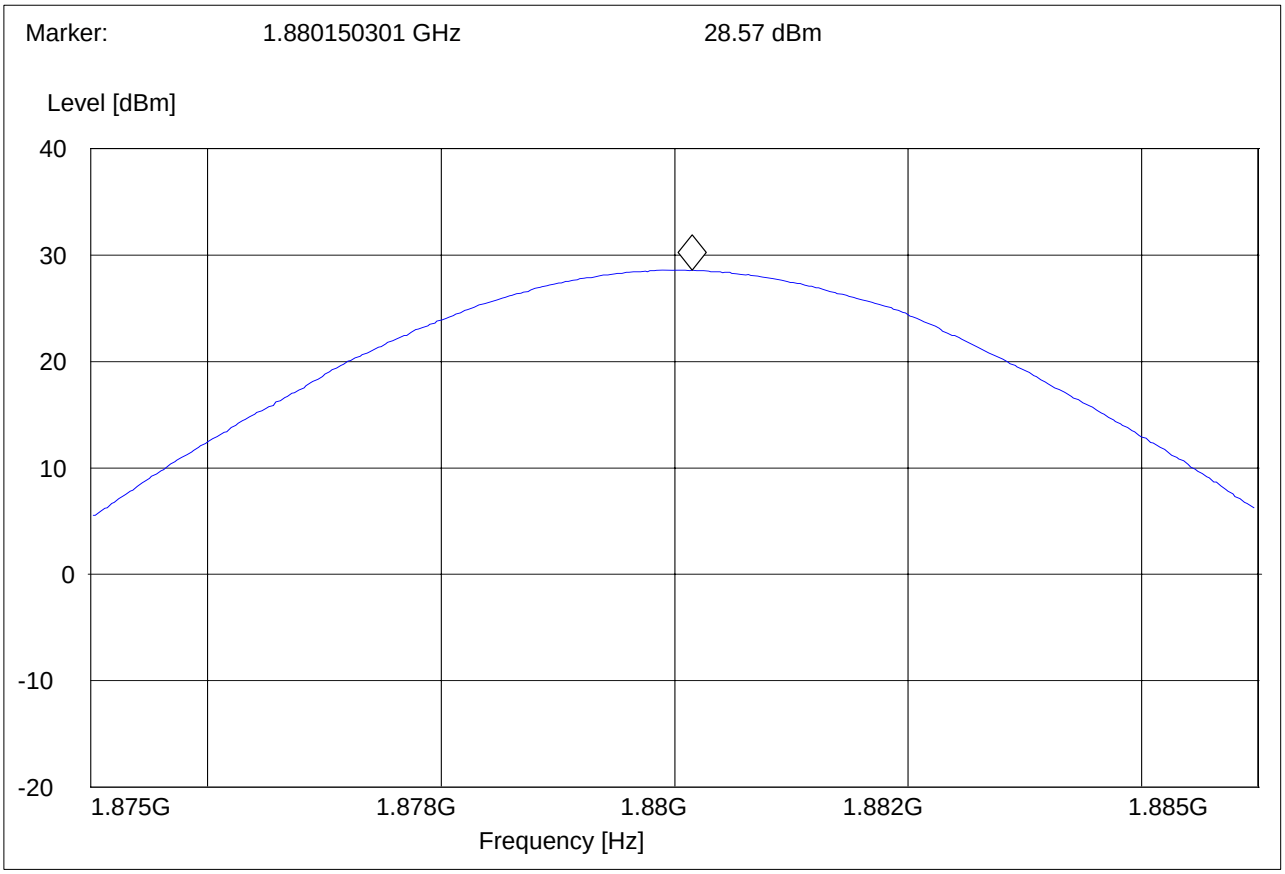
EIRP (PCS-1900) **§24.232(b)**
CHANNEL 661

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT / Description: Model 100 Wireless Ballot box with SEMC GR48
Customer:          Election Systems
Operating Mode:    FCC24
Antenna:           V
EUT:               H
Test Engineer:     PETER
Voltage:           AC
Sweep:             EIRP 1900 CH661
```

SWEEP TABLE: "EIRP 1900 CH661"

```
Short Description:              EIRP PCS 1900 for channel-661
Start      Stop       Detector  Meas.     IF        Transducer
Frequency  Frequency             Time      Bandw.
1.9 GHz    1.9 GHz    MaxPeak   Coupled   3 MHz     DUMMY-DBM
                      MaxPeak
```



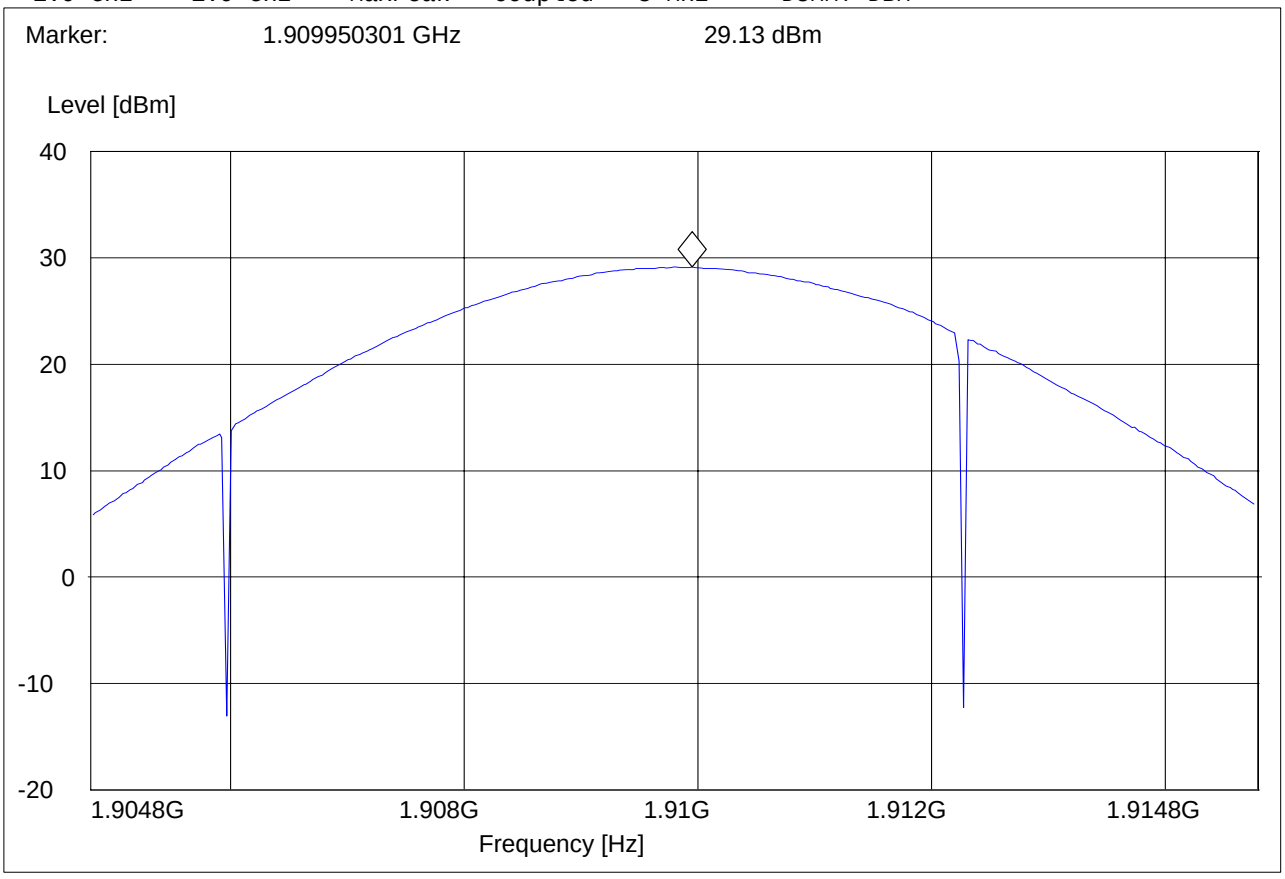
EIRP (PCS-1900) **§24.232(b)**
CHANNEL 810

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT / Description: Model 100 Wireless Ballot box with SEMC GR48
Customer:          Election Systems
Operating Mode:    FCC24
Antenna:           V
EUT:               H
Test Engineer:     PETER
Voltage:           AC
Sweep:             EIRP 1900 CH810
```

SWEEP TABLE: "EIRP 1900 CH810"

```
Short Description:            EIRP PCS 1900 for channel-810
Start      Stop       Detector  Meas.     IF        Transducer
Frequency  Frequency            Time      Bandw.
1.9 GHz    1.9 GHz    MaxPeak   Coupled   3 MHz     DUMMY-DBM
```



5.2 Spurious Emissions Radiated

5.2.1 FCC 2.1053 Measurements required: Field strength of spurious radiation.

(a) Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission.

5.2.2 Limits:

5.2.2.1 FCC 22.917 Emission limitations for cellular equipment.

The rules in this section govern the spectral characteristics of emissions in the Cellular Radiotelephone Service.

(a) *Out of band emissions*. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

(b) *Measurement procedure.* Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (*i.e.* 100 kHz of 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

FCC 24.238 Emission limitations for Broadband PCS equipment.

The rules in this section govern the spectral characteristics of emissions in the Broadband Personal Communications Service.

(a) *Out of band emissions*. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

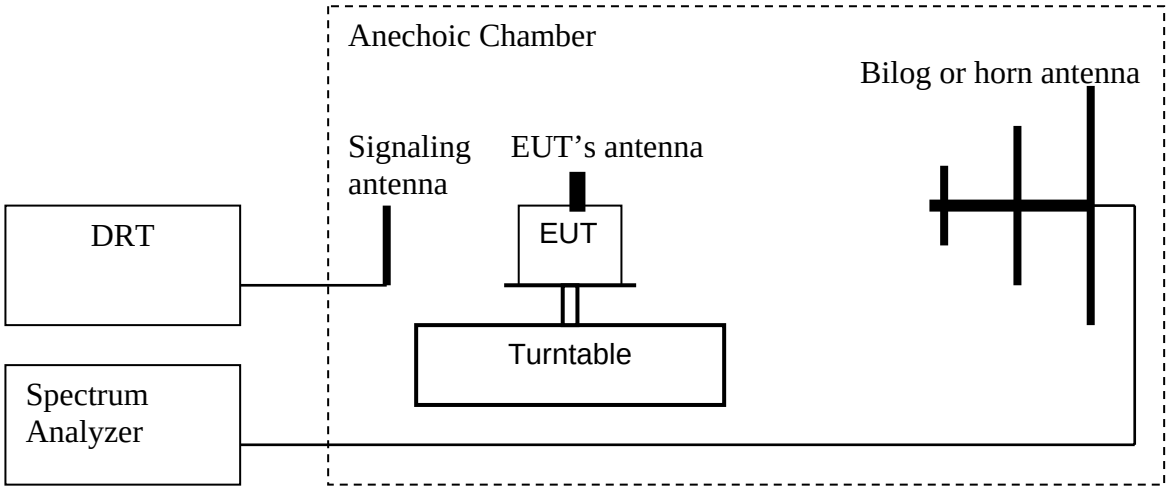
(b) Measurement procedure. Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required

measurement bandwidth (*i.e.* 100 kHz of 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

5.2.3 Radiated out of band measurement procedure:

Based on TIA-603C 2004

2.2.12 Unwanted emissions: Radiated Spurious



1. Connect the equipment as shown in the above diagram with the EUT's antenna in a horizontal orientation.
2. Adjust the settings of the Digital Radiocommunication Tester (DRT) to set the EUT to its maximum power at the required channel.
3. Set the spectrum analyzer to measure peak hold with the required settings.
4. Place the measurement antenna in a horizontal orientation. Rotate the EUT 360°. Raise the measurement antenna up to 4 meters in 0.5 meters increments and rotate the EUT 360° at each height to maximize all emissions. Measure and record all spurious emissions (**LVL**) up to the tenth harmonic of the carrier frequency.
5. Replace the EUT with a horizontally polarized half wave dipole or known gain antenna. The center of the antenna should be at the same location as the center of the EUT's antenna.
6. Connect the antenna to a signal generator with known output power and record the path loss in dB (**LOSS)**. **LOSS** = Generator Output Power (dBm) – Analyzer reading (dBm).
7. Determine the level of spurious emissions using the following equation: **Spurious** (dBm) = **LVL** (dBm) + **LOSS** (dB):
8. Repeat steps 4, 5 and 6 with all antennas vertically polarized.
9. Determine the level of spurious emissions using the following equation: **Spurious** (dBm) = **LVL** (dBm) + **LOSS** (dB):
10. Measurements are to be performed with the EUT set to the low, middle and high channel of each frequency band.

(**note:** Steps 5 and 6 above are performed prior to testing and **LOSS** is recorded by test software. Steps 3, 4 and 7 above are performed with test software.)

Spectrum analyzer settings:

Res B/W: 1 MHz
Vid B/W: 1 MHz

Measurement Survey:

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the GSM-850 & PCS-1900 bands. It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of the GSM-850 & PCS-1900 band into any of the other blocks respectively. The equipment must still, however, meet emissions requirements with the carrier at all frequencies over which it is capable of operating and it is the manufacturer's responsibility to verify this.

RESULTS OF RADIATED TESTS GSM-850:

Harmonics	Tx ch-128 Freq. (MHz)	Level (dBm)	Tx ch-190 Freq. (MHz)	Level (dBm)	Tx ch-251 Freq. (MHz)	Level (dBm)
2	**1648.4**	NF	**1673.2**	NF	**1697.6**	NF
3	**2472.6**	NF	**2509.8**	NF	**2546.4**	NF
4	**3296.8**	NF	**3346.4**	NF	**3395.2**	NF
5	**4121**	NF	**4183**	NF	**4244**	NF
6	**4945.2**	NF	**5019.6**	NF	**5092.8**	NF
7	**5769.4**	NF	**5856.2**	NF	**5941.6**	NF
8	**6593.6**	NF	**6692.8**	NF	**6790.4**	NF
9	**7417.8**	NF	**7529.4**	NF	**7639.2**	NF
10	**8242**	NF	**8366**	NF	**8488**	NF
NF = NOISE FLOOR						

RADIATED SPURIOUS EMISSIONS (GSM-850)
TX: 30MHz - 1GHz
Spurious emission limit –13dBm
Antenna: vertical

Note:

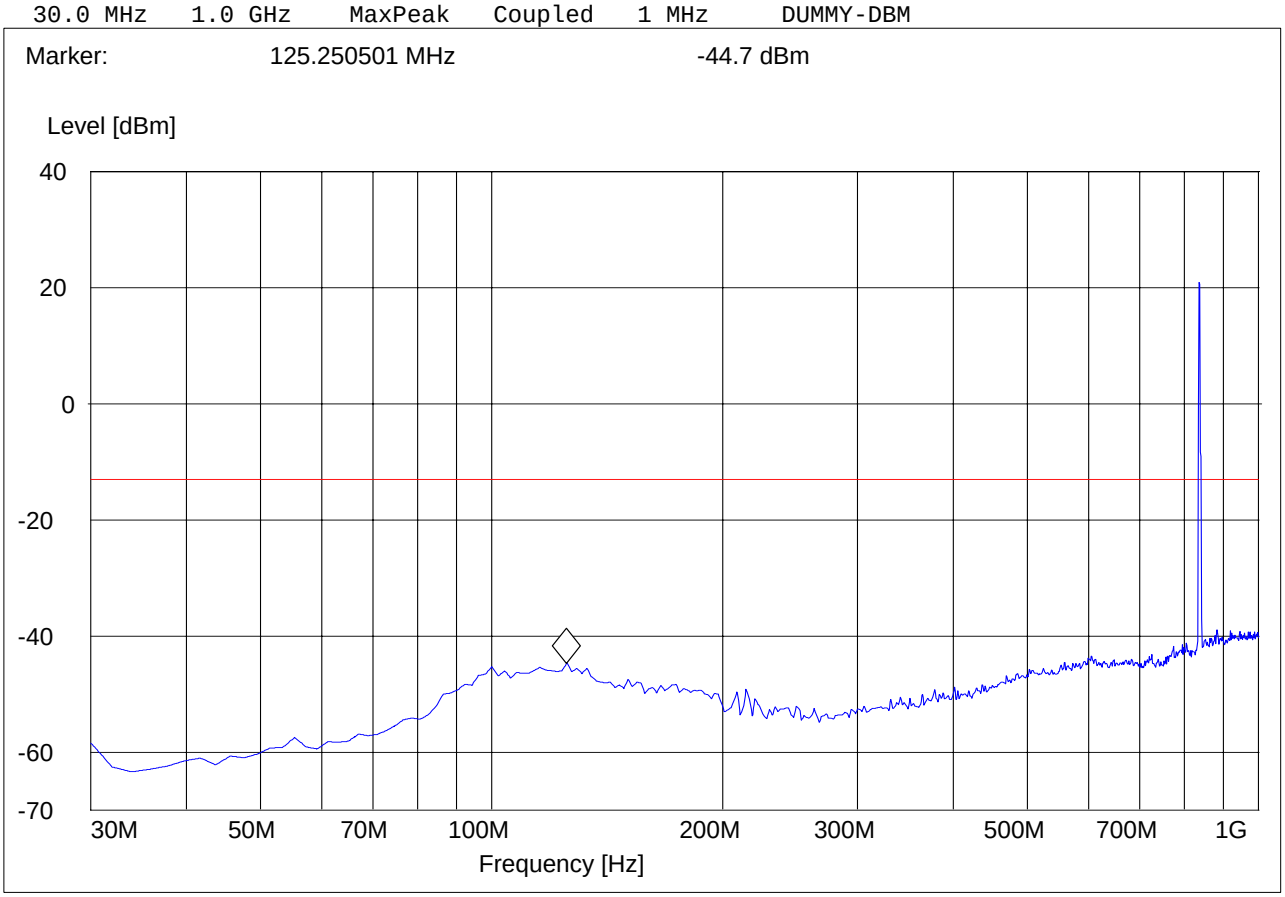
1.The peak above the limit line is the carrier freq.
2.This plot is valid for horizontal/vertical, low, mid & high channels (worst-case plot)

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT / Description: Model 100 Wireless Ballot box with SEMC GR48
Customer:          Election Systems
Operating Mode:    FCC22 CH190
Antenna:           V
EUT:               H
Test Engineer:     PETER
Voltage:           AC
Sweep:             FCC24 SPUR 30M-1G_V
```

SWEEP TABLE: "FCC 24 Spur 30M-1G_V"

```
Short Description:            FCC 24 30MHz-1GHz
Start      Stop       Detector  Meas.     IF        Transducer
Frequency  Frequency            Time      Bandw.
30.0 MHz   1.0 GHz    MaxPeak   Coupled   1 MHz     DUMMY-DBM
```



RADIATED SPURIOUS EMISSIONS (GSM-850)

Tx @ 824.2MHz: 1GHz – 1.58GHz

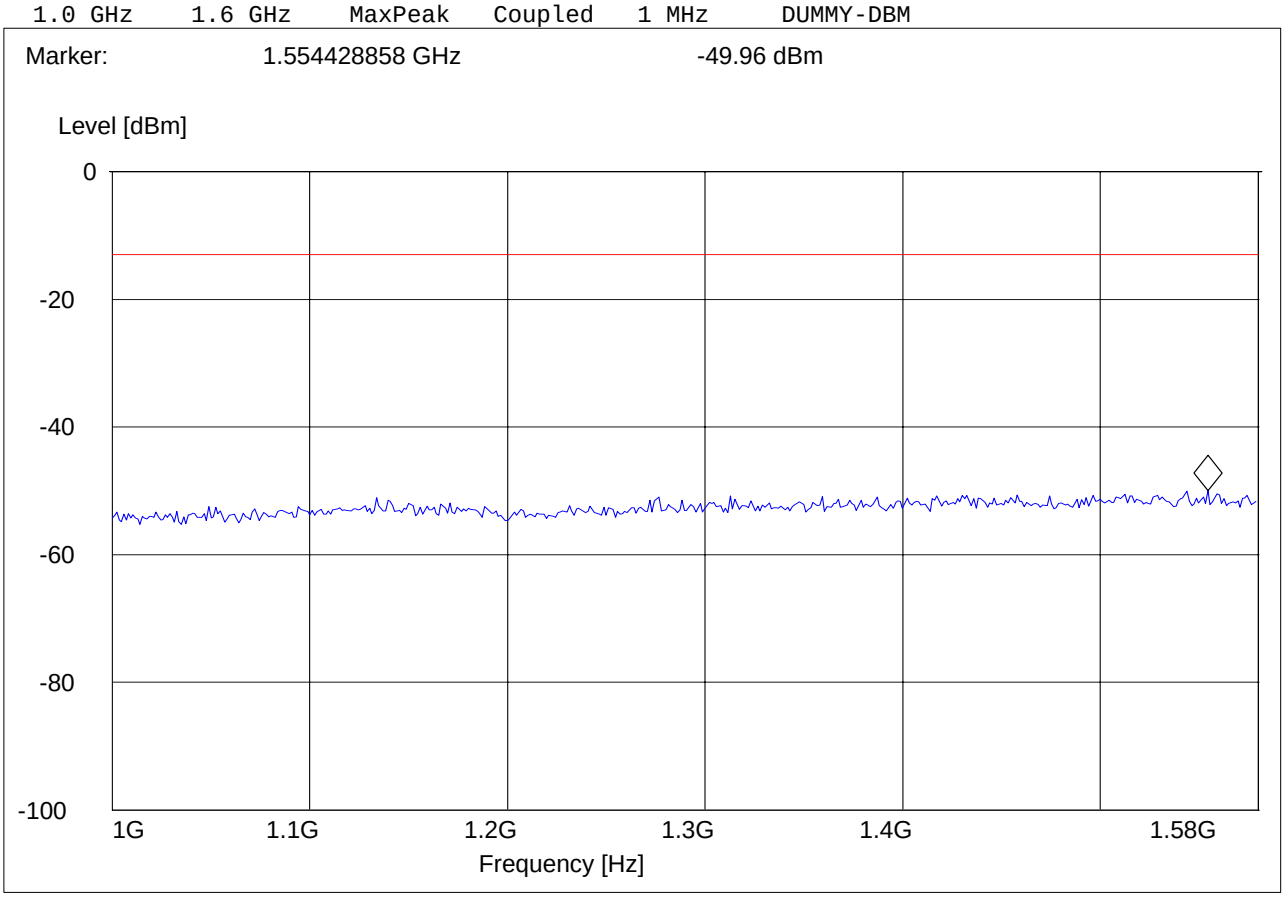
Spurious emission limit –13dBm

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT / Description: Model 100 Wireless Ballot box with SEMC GR48
Customer:          Election Systems
Operating Mode:    FCC22 CH128
Antenna:           V
EUT:               H
Test Engineer:     PETER
Voltage:           AC
Sweep:             FCC22 1-1.58G
```

SWEEP TABLE: "FCC 22Spuri 1-1.58G"

```
  Short Description:            FCC  24 1GHz-8GHz
  Start      Stop       Detector  Meas.     IF        Transducer
  Frequency  Frequency            Time      Bandw.
  1.0 GHz    1.6 GHz    MaxPeak   Coupled   1 MHz     DUMMY-DBM
```



RADIATED SPURIOUS EMISSIONS (GSM-850)

Tx @ 824.2MHz: 1.58GHz – 3GHz

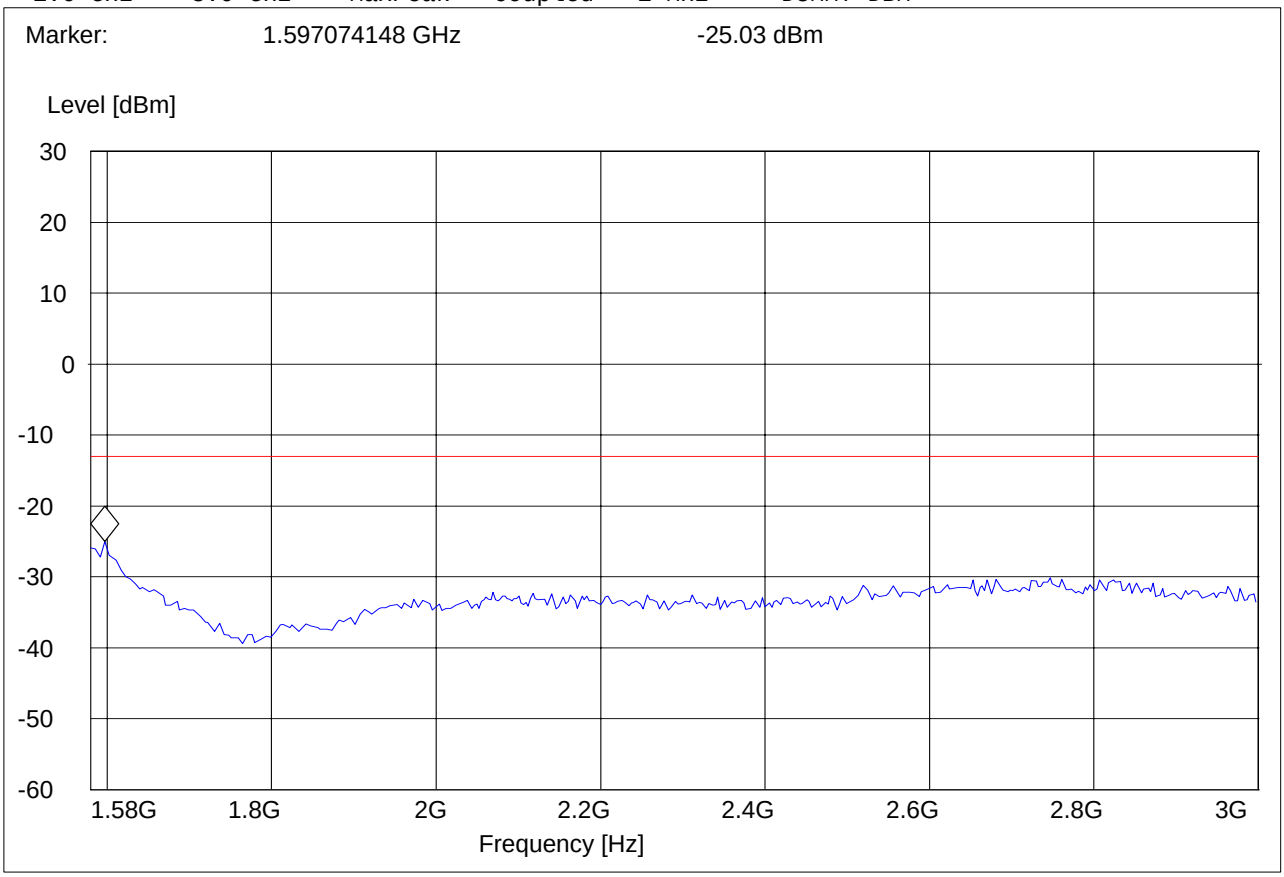
Spurious emission limit –13dBm

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT / Description: Model 100 Wireless Ballot box with SEMC GR48
Customer:          Election Systems
Operating Mode:    FCC22 CH128
Antenna:           V
EUT:               H
Test Engineer:     PETER
Voltage:           AC
Sweep:             FCC22 1.58-3G
```

SWEEP TABLE: "FCC 22Spuri 1.58-3G"

```
Short Description:            FCC  24 1GHz-8GHz
Start      Stop       Detector  Meas.     IF        Transducer
Frequency  Frequency            Time      Bandw.
1.6 GHz    3.0 GHz    MaxPeak   Coupled   1 MHz     DUMMY-DBM
```



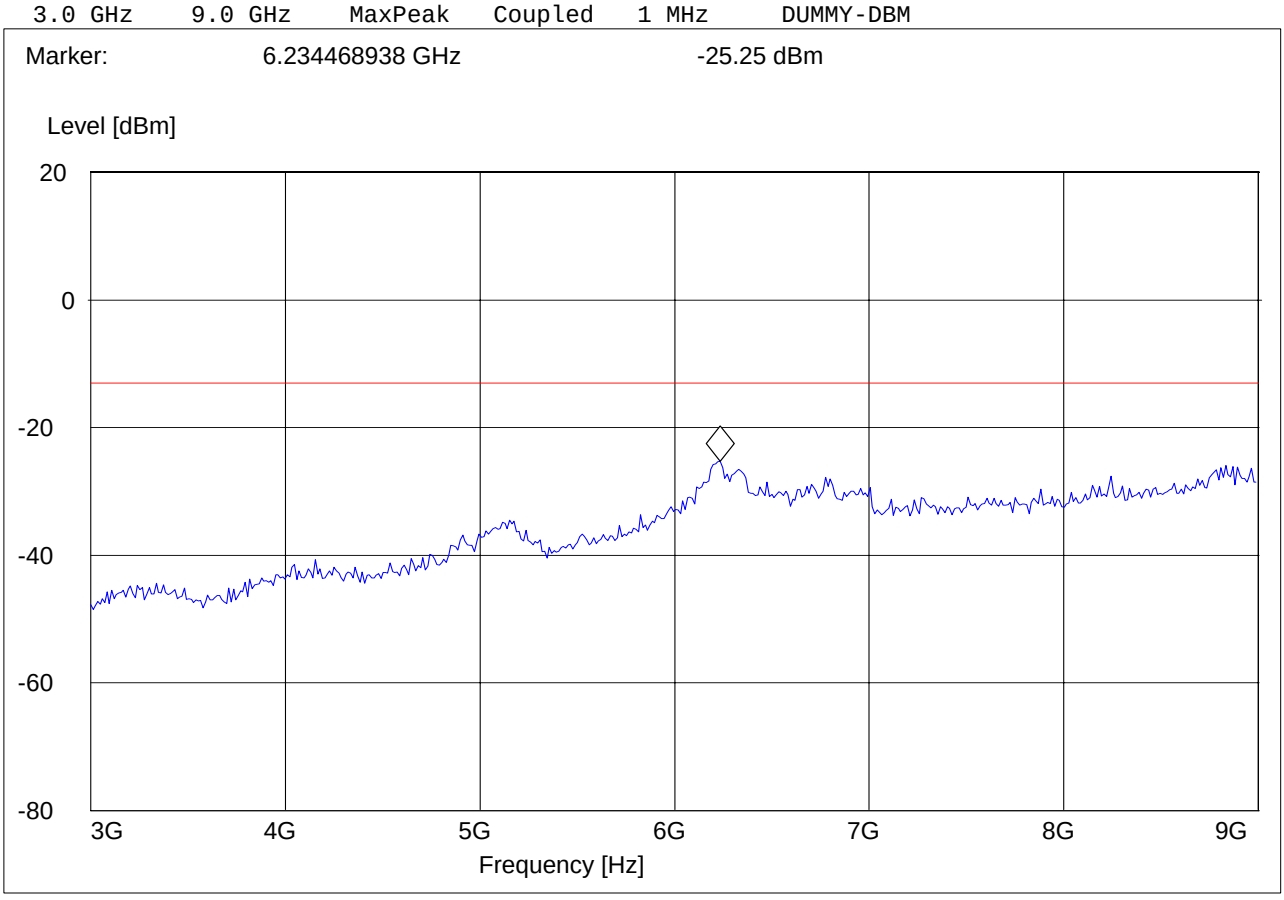
RADIATED SPURIOUS EMISSIONS (GSM-850)
Tx @ 824.2MHz: 3GHz – 9GHz
Spurious emission limit –13dBm

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT / Description: Model 100 Wireless Ballot box with SEMC GR48
Customer:          Election Systems
Operating Mode:    FCC22 CH128
Antenna:           V
EUT:               H
Test Engineer:     PETER
Voltage:           AC
Sweep:             FCC22 3-9G
```

SWEEP TABLE: "FCC 22Spuri 3-9G"

```
Short Description:            FCC  24 1GHz-8GHz
Start      Stop       Detector  Meas.     IF        Transducer
Frequency  Frequency            Time      Bandw.
3.0 GHz    9.0 GHz    MaxPeak   Coupled   1 MHz     DUMMY-DBM
```



RADIATED SPURIOUS EMISSIONS (GSM-850)

Tx @ 836.6MHz: 1GHz – 1.58GHz

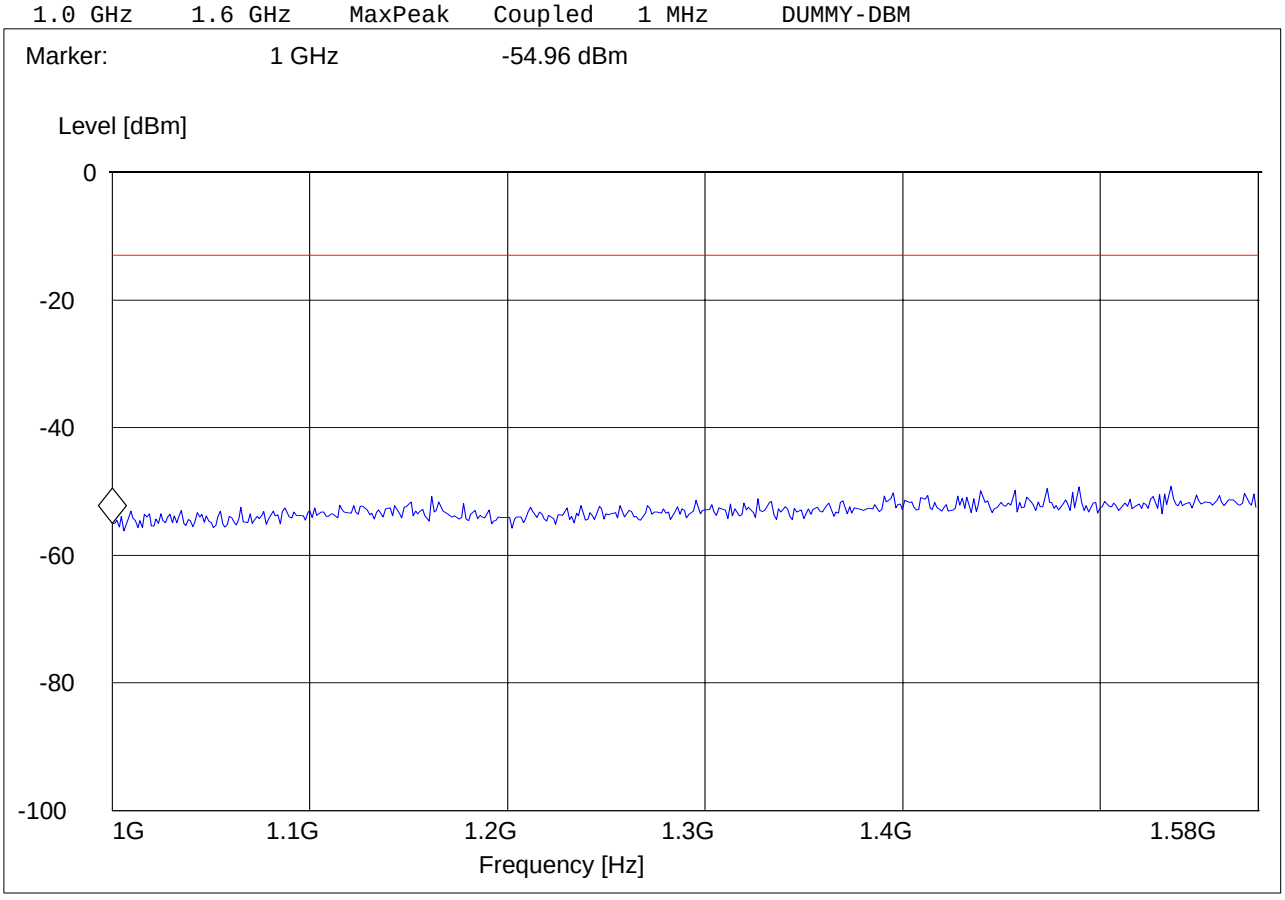
Spurious emission limit –13dBm

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT / Description: Model 100 Wireless Ballot box with SEMC GR48
Customer:          Election Systems
Operating Mode:    FCC22 CH190
Antenna:           V
EUT:               H
Test Engineer:     PETER
Voltage:           AC
Sweep:             FCC22 1-1.58G
```

SWEEP TABLE: "FCC 22Spuri 1-1.58G"

```
Short Description:            FCC  24 1GHz-8GHz
Start      Stop       Detector  Meas.     IF        Transducer
Frequency  Frequency            Time      Bandw.
1.0 GHz    1.6 GHz    MaxPeak   Coupled   1 MHz     DUMMY-DBM
```



RADIATED SPURIOUS EMISSIONS (GSM-850)

Tx @ 836.6MHz: 1.58GHz – 3GHz

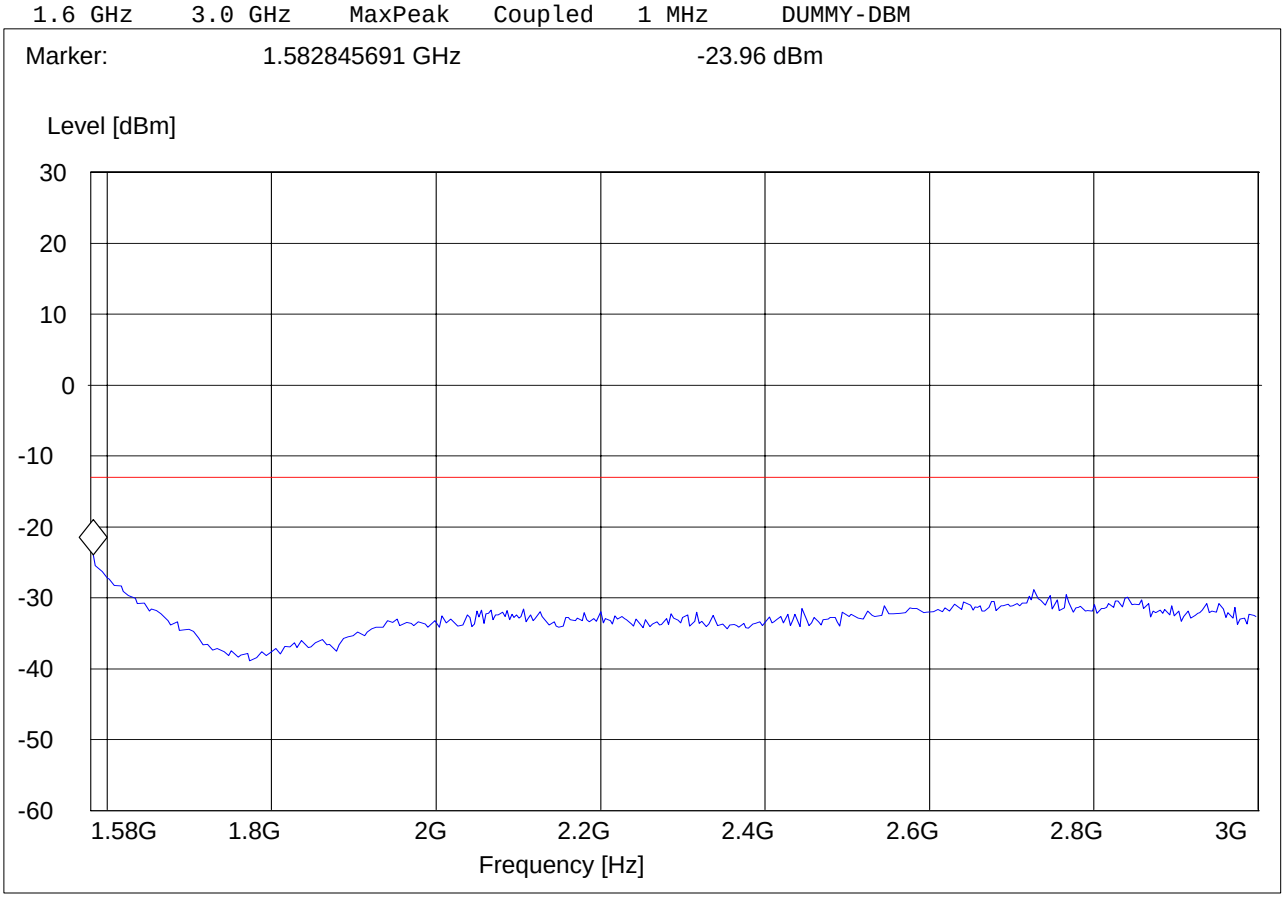
Spurious emission limit –13dBm

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT / Description: Model 100 Wireless Ballot box with SEMC GR48
Customer:          Election Systems
Operating Mode:    FCC22 CH190
Antenna:           V
EUT:               H
Test Engineer:     PETER
Voltage:           AC
Sweep:             FCC22 1.58-3G
```

SWEEP TABLE: "FCC 22Spuri 1.58-3G"

```
Short Description:            FCC  24 1GHz-8GHz
Start      Stop       Detector  Meas.     IF        Transducer
Frequency  Frequency            Time      Bandw.
1.6 GHz    3.0 GHz    MaxPeak   Coupled   1 MHz     DUMMY-DBM
```



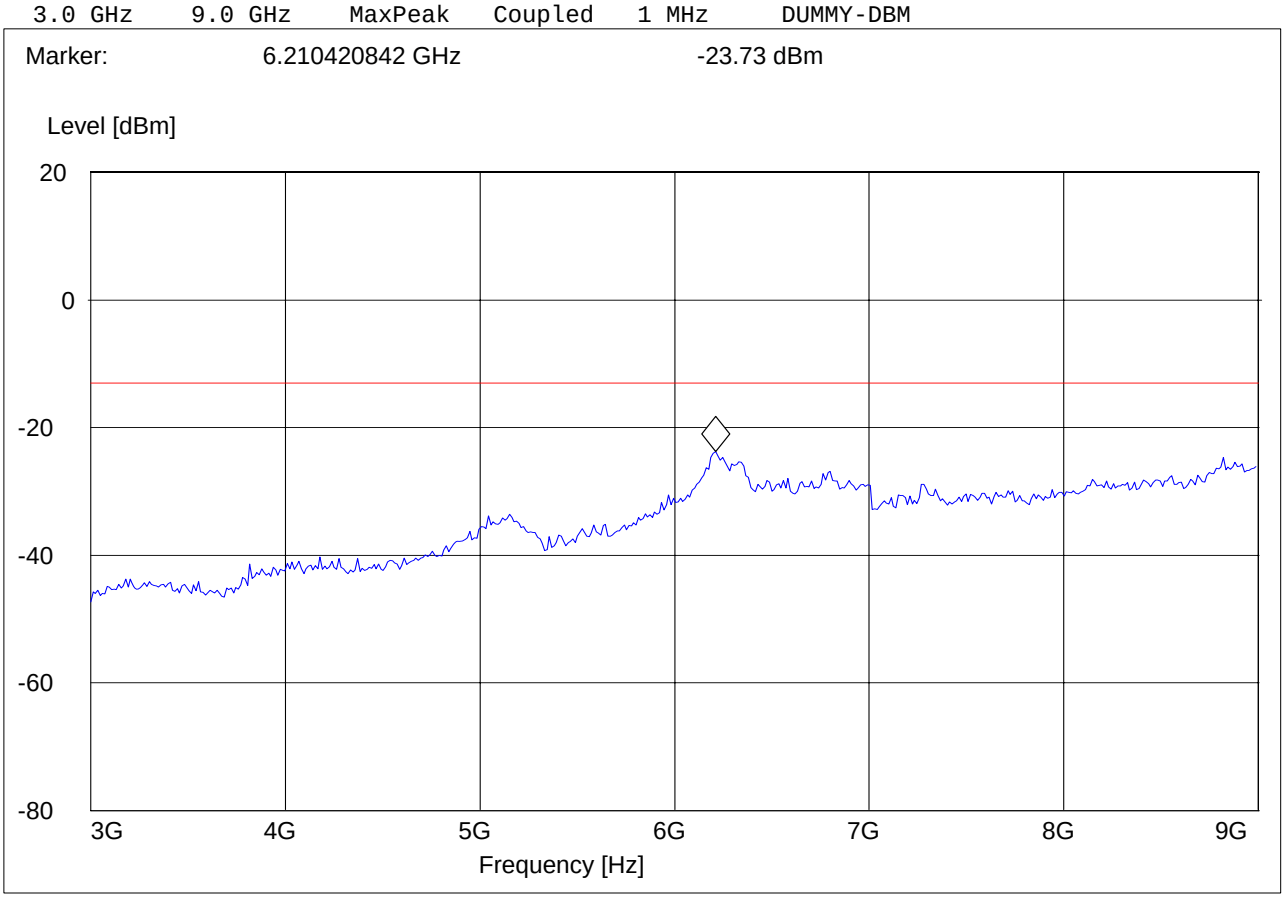
RADIATED SPURIOUS EMISSIONS (GSM-850)
Tx @ 836.6MHz: 3GHz – 9GHz
Spurious emission limit –13dBm

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT / Description: Model 100 Wireless Ballot box with SEMC GR48
Customer:          Election Systems
Operating Mode:    FCC22 CH190
Antenna:           V
EUT:               H
Test Engineer:     PETER
Voltage:           AC
Sweep:             FCC22 3-9G
```

SWEEP TABLE: "FCC 22Spuri 3-9G"

```
Short Description:            FCC  24 1GHz-8GHz
Start      Stop       Detector  Meas.     IF        Transducer
Frequency  Frequency            Time      Bandw.
3.0 GHz    9.0 GHz    MaxPeak   Coupled   1 MHz     DUMMY-DBM
```



RADIATED SPURIOUS EMISSIONS (GSM-850)

Tx @ 848.8MHz: 1GHz – 1.58GHz

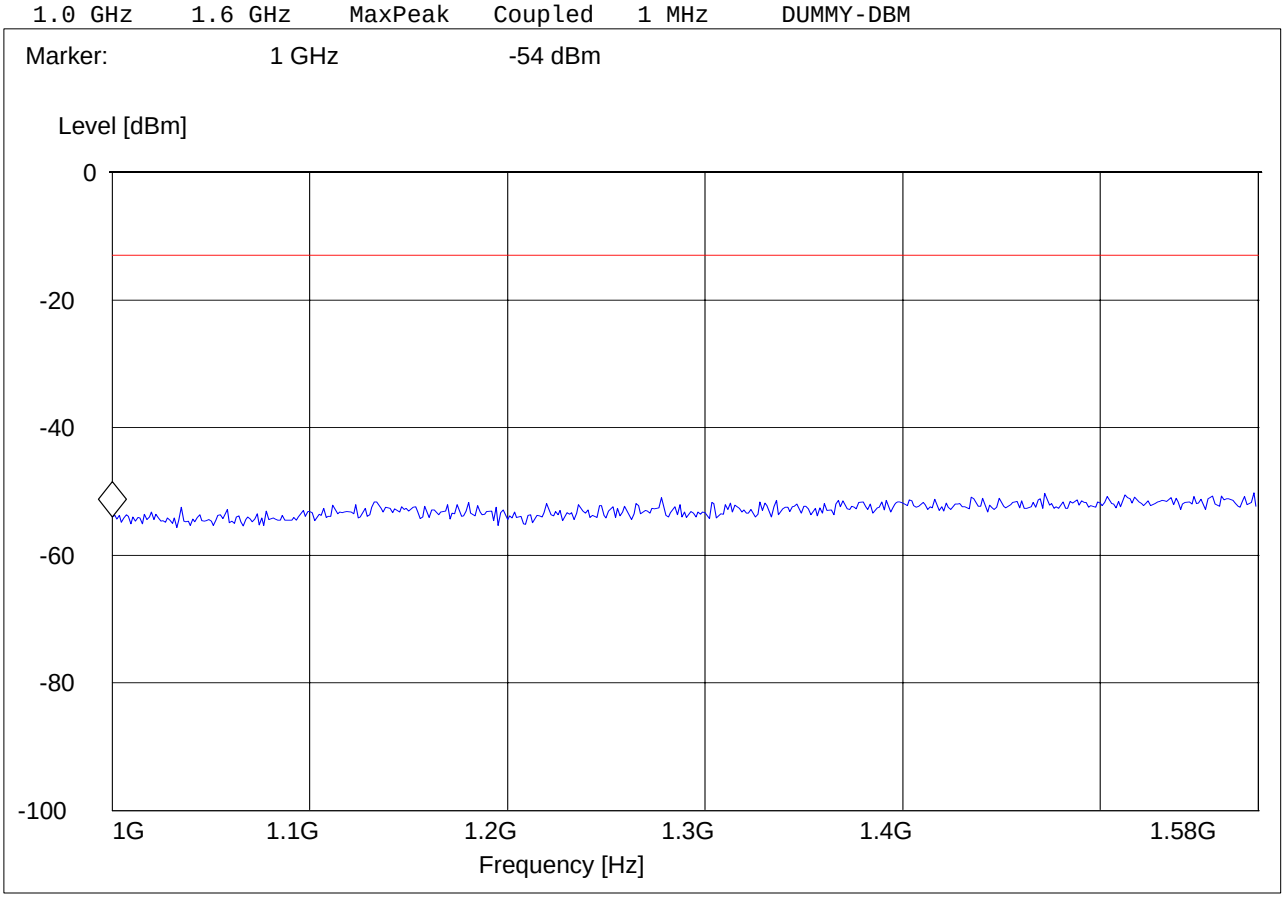
Spurious emission limit –13dBm

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT / Description: Model 100 Wireless Ballot box with SEMC GR48
Customer:          Election Systems
Operating Mode:    FCC22 CH251
Antenna:           V
EUT:               H
Test Engineer:     PETER
Voltage:           AC
Sweep:             FCC22 1-1.58G
```

SWEEP TABLE: "FCC 22Spuri 1-1.58G"

```
Short Description:            FCC  24 1GHz-8GHz
Start      Stop       Detector  Meas.     IF        Transducer
Frequency  Frequency            Time      Bandw.
1.0 GHz    1.6 GHz    MaxPeak   Coupled   1 MHz     DUMMY-DBM
```



RADIATED SPURIOUS EMISSIONS (GSM-850)

Tx @ 848.8MHz: 1.58GHz – 3GHz

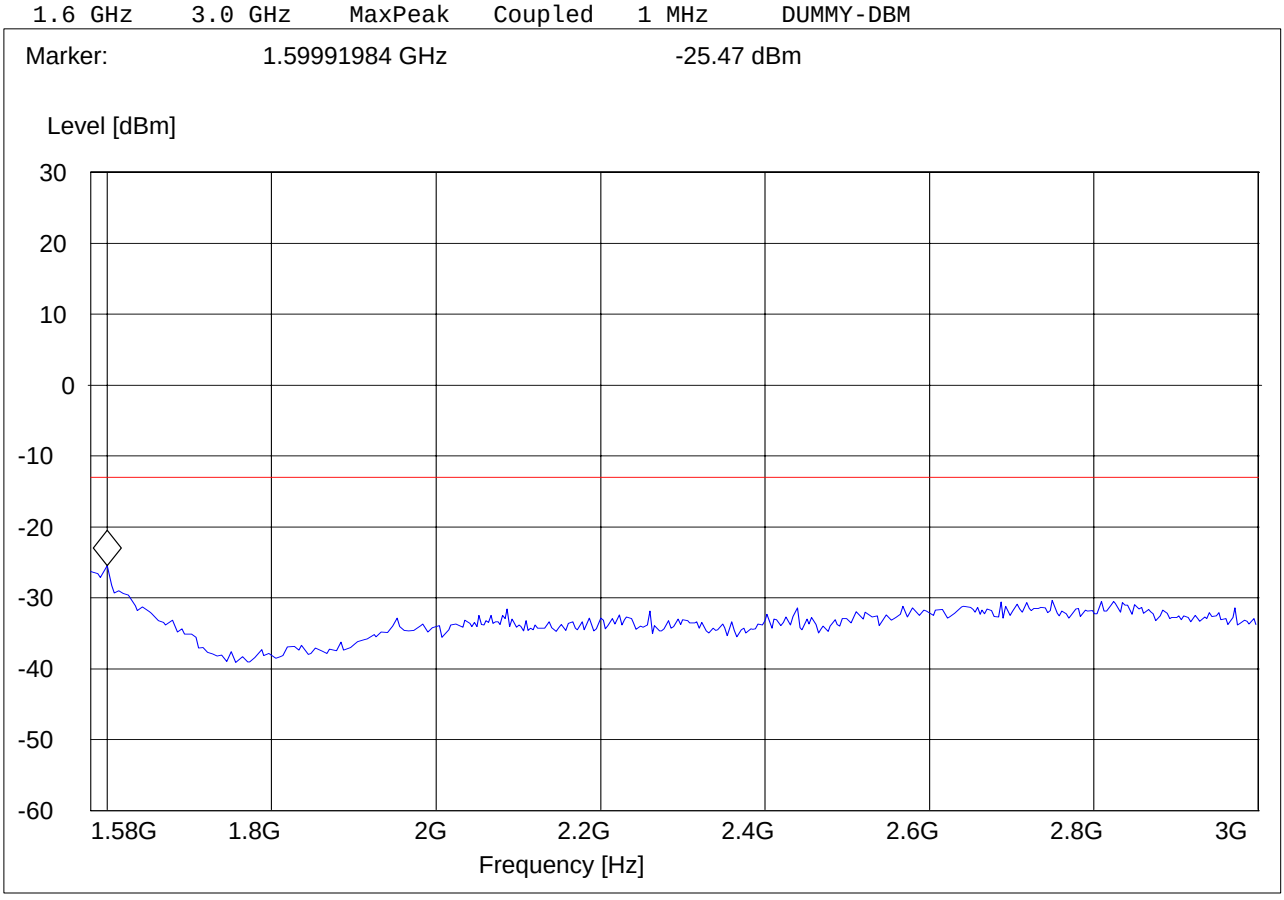
Spurious emission limit –13dBm

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT / Description: Model 100 Wireless Ballot box with SEMC GR48
Customer:          Election Systems
Operating Mode:    FCC22 CH251
Antenna:           V
EUT:               H
Test Engineer:     PETER
Voltage:           AC
Sweep:             FCC22 1.58-3G
```

SWEEP TABLE: "FCC 22Spuri 1.58-3G"

```
Short Description:            FCC  24 1GHz-8GHz
Start      Stop       Detector  Meas.     IF        Transducer
Frequency  Frequency            Time      Bandw.
1.6 GHz    3.0 GHz    MaxPeak   Coupled   1 MHz     DUMMY-DBM
```



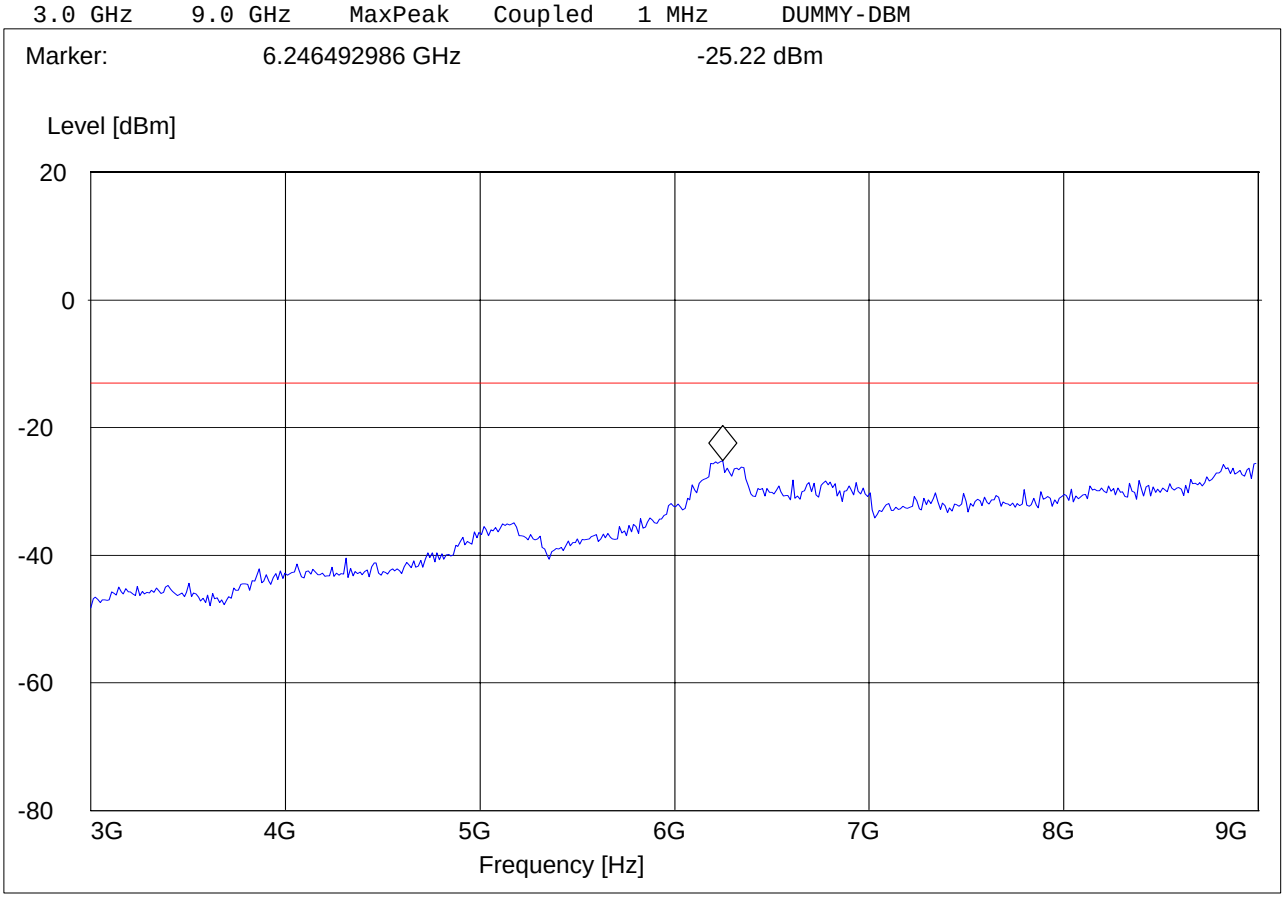
RADIATED SPURIOUS EMISSIONS (GSM-850)
Tx @ 848.8MHz: 3GHz – 9GHz
Spurious emission limit –13dBm

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT / Description: Model 100 Wireless Ballot box with SEMC GR48
Customer:          Election Systems
Operating Mode:    FCC22 CH251
Antenna:           V
EUT:               H
Test Engineer:     PETER
Voltage:           AC
Sweep:             FCC22 3-9G
```

SWEEP TABLE: "FCC 22Spuri 3-9G"

```
Short Description:            FCC  24 1GHz-8GHz
Start      Stop       Detector  Meas.     IF        Transducer
Frequency  Frequency            Time      Bandw.
3.0 GHz    9.0 GHz    MaxPeak   Coupled   1 MHz     DUMMY-DBM
```



RESULTS OF RADIATED TESTS PCS-1900:

Harmonic	Tx ch-512 Freq.(MHz)	Level (dBm)	Tx ch-661 Freq. (MHz)	Level (dBm)	Tx ch-810 Freq. (MHz)	Level (dBm)
2	**3700.4**	NF	**3760**	NF	**3819.6**	NF
3	**5550.6**	NF	**5640**	NF	**5729.4**	NF
4	**7400.8**	NF	**7520**	NF	**7639.2**	NF
5	**9251**	NF	**9400**	NF	**9549**	NF
6	**11101.2**	NF	**11280**	NF	**11458.8**	NF
7	**12951.4**	NF	**13160**	NF	**13368.6**	NF
8	**14801.6**	NF	**15040**	NF	**15278.4**	NF
9	**16651.8**	NF	**16920**	NF	**17188.2**	NF
10	**18502**	NF	**18800**	NF	**19098**	NF
NF = NOISE FLOOR						

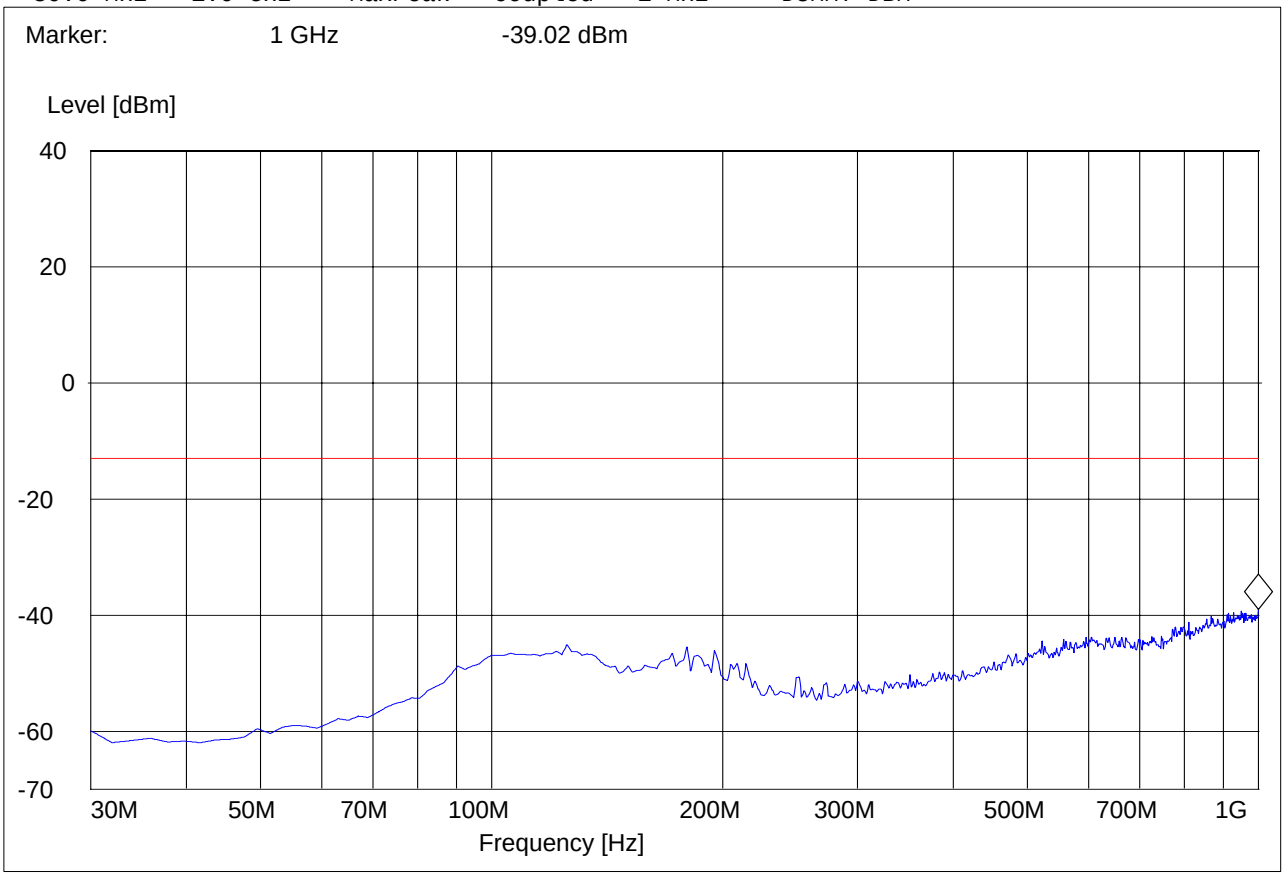
RADIATED SPURIOUS EMISSIONS(PCS 1900)
TX: 30MHz - 1GHz
Spurious emission limit –13dBm
Antenna: vertical
Note: This plot is valid for low, mid & high channels (worst-case plot)

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT / Description: Model 100 Wireless Ballot box with SEMC GR48
Customer:          Election Systems
Operating Mode:    FCC24, CH512
Antenna:           V
EUT:               H
Test Engineer:     ED
Voltage:           AC
Sweep:             FCC 24 SPURI 30M-1G_V
```

SWEEP TABLE: "FCC 24 Spur 30M-1G_V"

```
Short Description:            FCC 24 30MHz-1GHz
Start      Stop       Detector  Meas.     IF        Transducer
Frequency  Frequency            Time      Bandw.
30.0 MHz   1.0 GHz    MaxPeak   Coupled   1 MHz     DUMMY-DBM
```



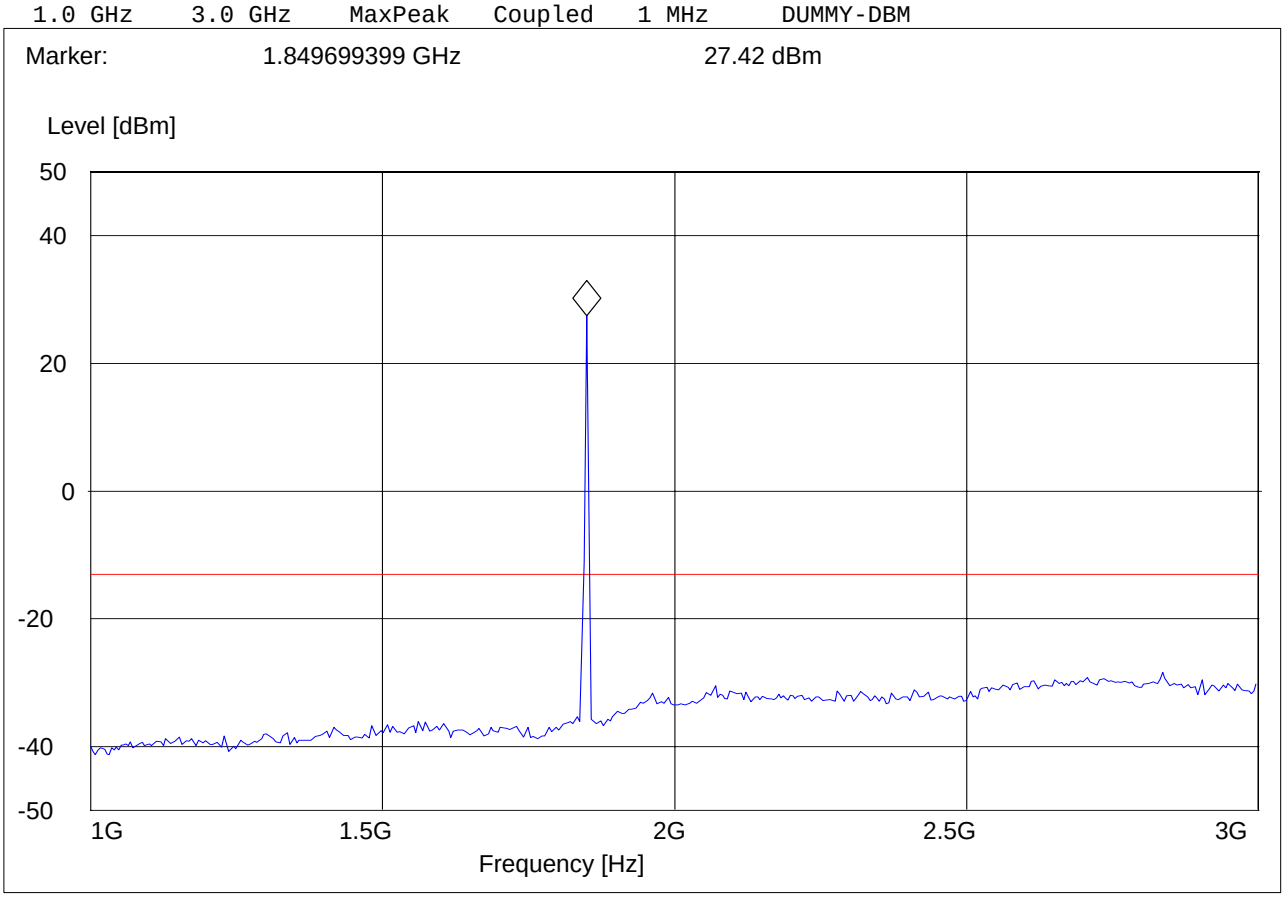
RADIATED SPURIOUS EMISSIONS(PCS 1900)
Tx @ 1850.2MHz: 1GHz – 3GHz
Spurious emission limit –13dBm
Note: The peak above the limit line is the carrier freq. at ch-512.

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT / Description: Model 100 Wireless Ballot box with SEMC GR48
Customer:          Election Systems
Operating Mode:    FCC24, CH512
Antenna:           V
EUT:               H
Test Engineer:     ED
Voltage:           AC
Sweep:             FCC 24SPURI 1-3G   (marker on BS)
```

SWEEP TABLE: "FCC 24Spuri 1-3G"

```
Short Description:            FCC  24 1GHz-8GHz
Start      Stop       Detector  Meas.     IF        Transducer
Frequency  Frequency            Time      Bandw.
1.0 GHz    3.0 GHz    MaxPeak   Coupled   1 MHz     DUMMY-DBM
```



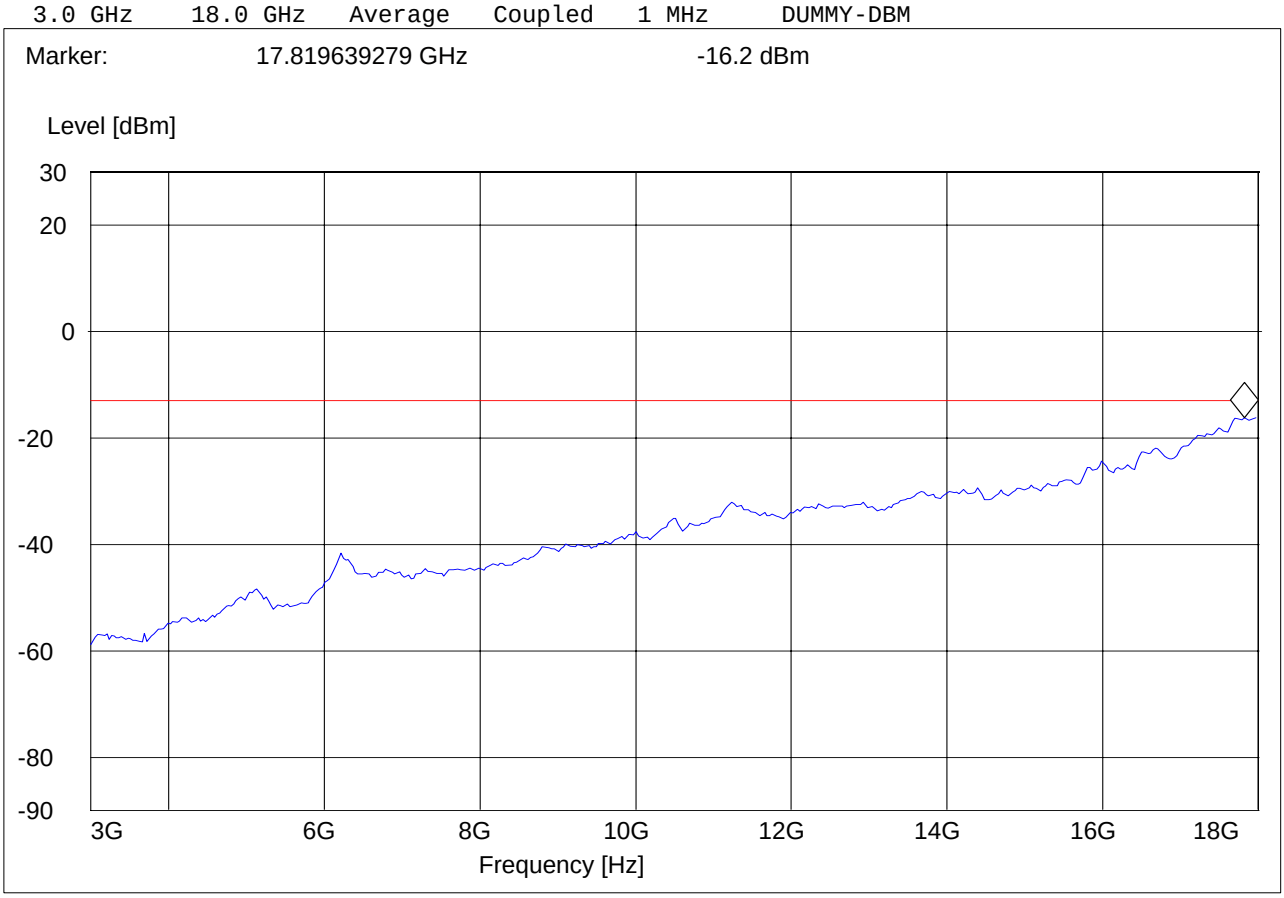
RADIATED SPURIOUS EMISSIONS(PCS 1900)
Tx @ 1850.2MHz: 3GHz – 18GHz
Spurious emission limit –13dBm

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT / Description: Model 100 Wireless Ballot box with SEMC GR48
Customer:          Election Systems
Operating Mode:    FCC24, CH512
Antenna:           V
EUT:               H
Test Engineer:     ED
Voltage:           AC
Sweep:             FCC 24SPURI 3-18G
```

SWEEP TABLE: "FCC 24Spuri 3-18G"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
3.0 GHz	18.0 GHz	Average	Coupled	1 MHz	DUMMY-DBM



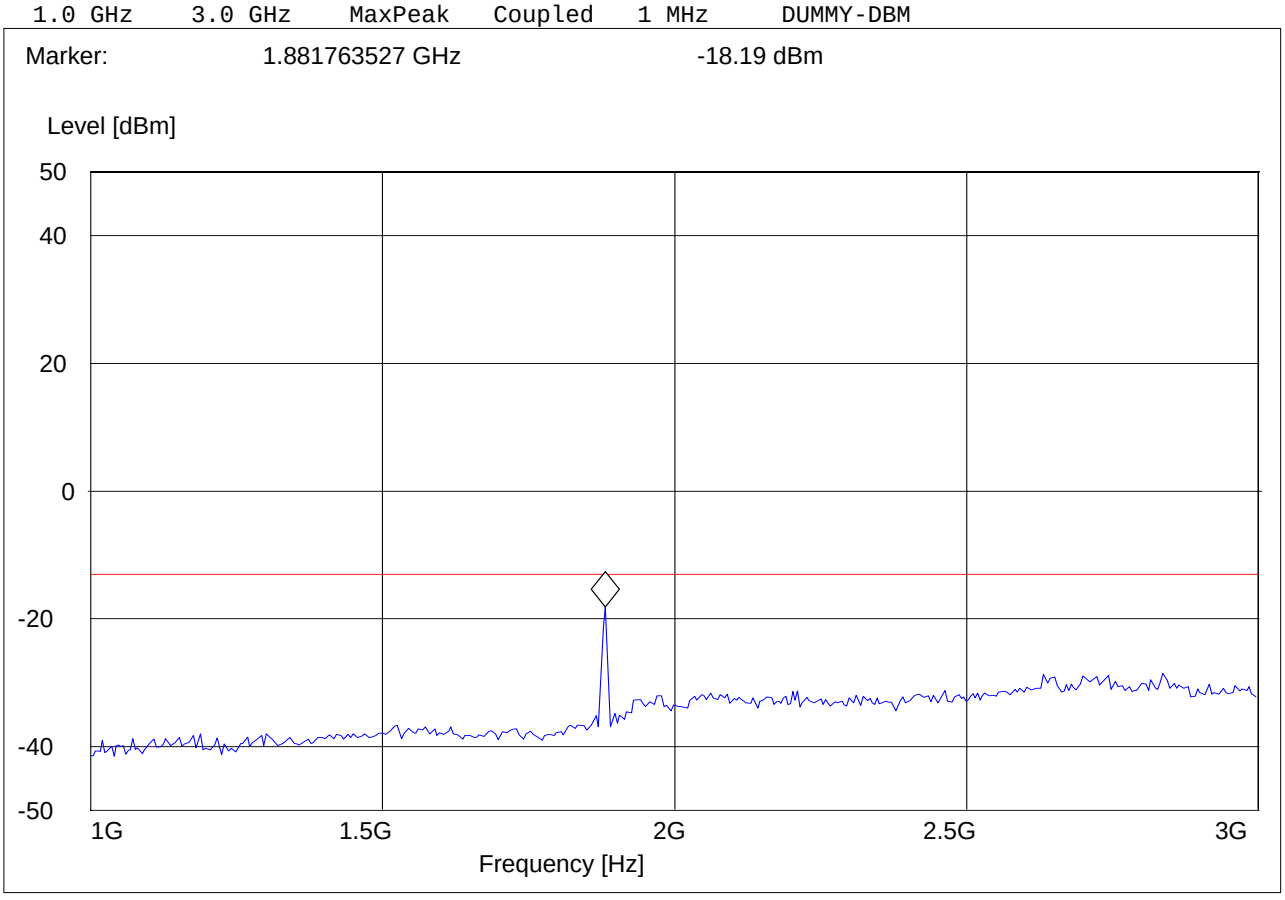
RADIATED SPURIOUS EMISSIONS(PCS 1900)
Tx @ 1880.0MHz: 1GHz – 3GHz
Spurious emission limit –13dBm
Note: The peak above the limit line is the carrier freq. at ch-661.

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT / Description: Model 100 Wireless Ballot box with SEMC GR48
Customer:          Election Systems
Operating Mode:    FCC24, CH661
Antenna:           V
EUT:               H
Test Engineer:     ED
Voltage:           AC
Sweep:             FCC 24SPURI 1-3G
```

SWEEP TABLE: "FCC 24Spuri 1-3G"

```
Short Description:            FCC  24 1GHz-8GHz
Start      Stop       Detector  Meas.     IF        Transducer
Frequency  Frequency            Time      Bandw.
1.0 GHz    3.0 GHz    MaxPeak   Coupled   1 MHz     DUMMY-DBM
```



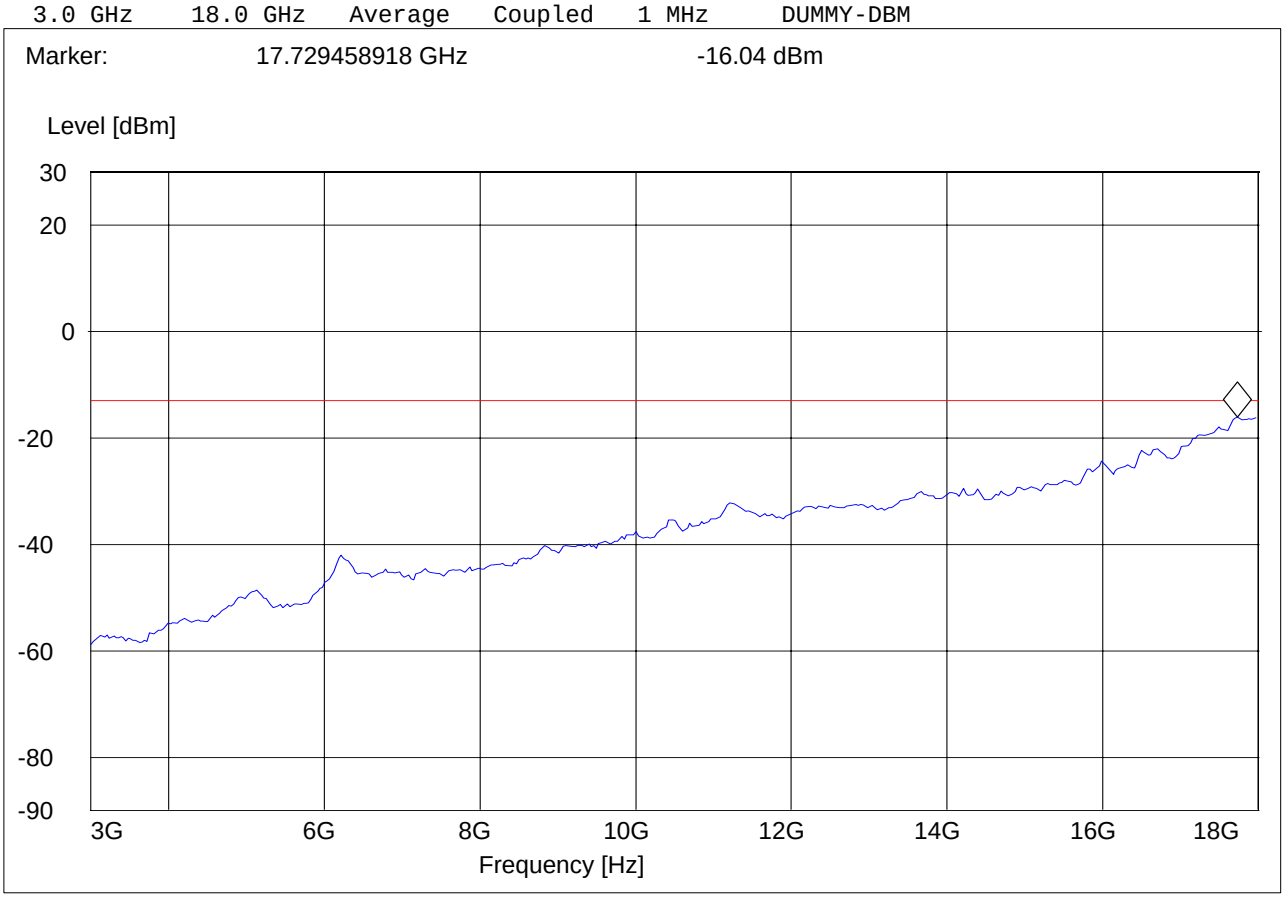
RADIATED SPURIOUS EMISSIONS(PCS 1900)
Tx @ 1880.0MHz: 3GHz – 18GHz
Spurious emission limit –13dBm

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT / Description: Model 100 Wireless Ballot box with SEMC GR48
Customer:          Election Systems
Operating Mode:    FCC24, CH661
Antenna:           V
EUT:               H
Test Engineer:     ED
Voltage:           AC
Sweep:             FCC 24SPURI 3-18G
```

SWEEP TABLE: "FCC 24Spuri 3-18G"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
3.0 GHz	18.0 GHz	Average	Coupled	1 MHz	DUMMY-DBM



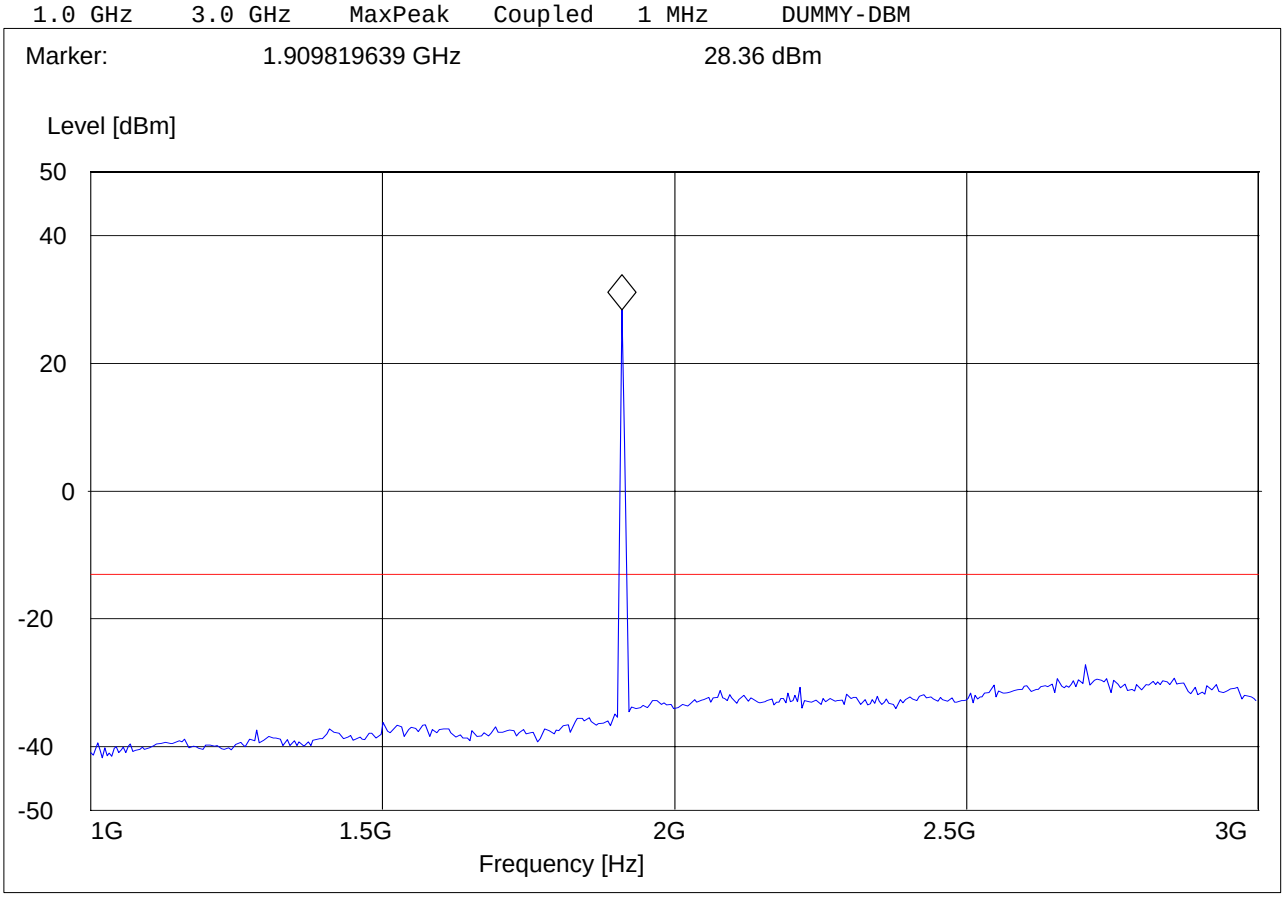
RADIATED SPURIOUS EMISSIONS(PCS 1900)
Tx @ 1909.8MHz: 1GHz – 3GHz
Spurious emission limit –13dBm
Note: The peak above the limit line is the carrier freq. at ch-810.

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT / Description: Model 100 Wireless Ballot box with SEMC GR48
Customer:          Election Systems
Operating Mode:    FCC24, CH810
Antenna:           V
EUT:               H
Test Engineer:     PETER
Voltage:           AC
Sweep:             FCC SPUR 1-3G
```

SWEEP TABLE: "FCC 24Spuri 1-3G"

```
Short Description:            FCC  24 1GHz-8GHz
Start      Stop       Detector  Meas.     IF        Transducer
Frequency  Frequency            Time      Bandw.
1.0 GHz    3.0 GHz    MaxPeak   Coupled   1 MHz     DUMMY-DBM
```



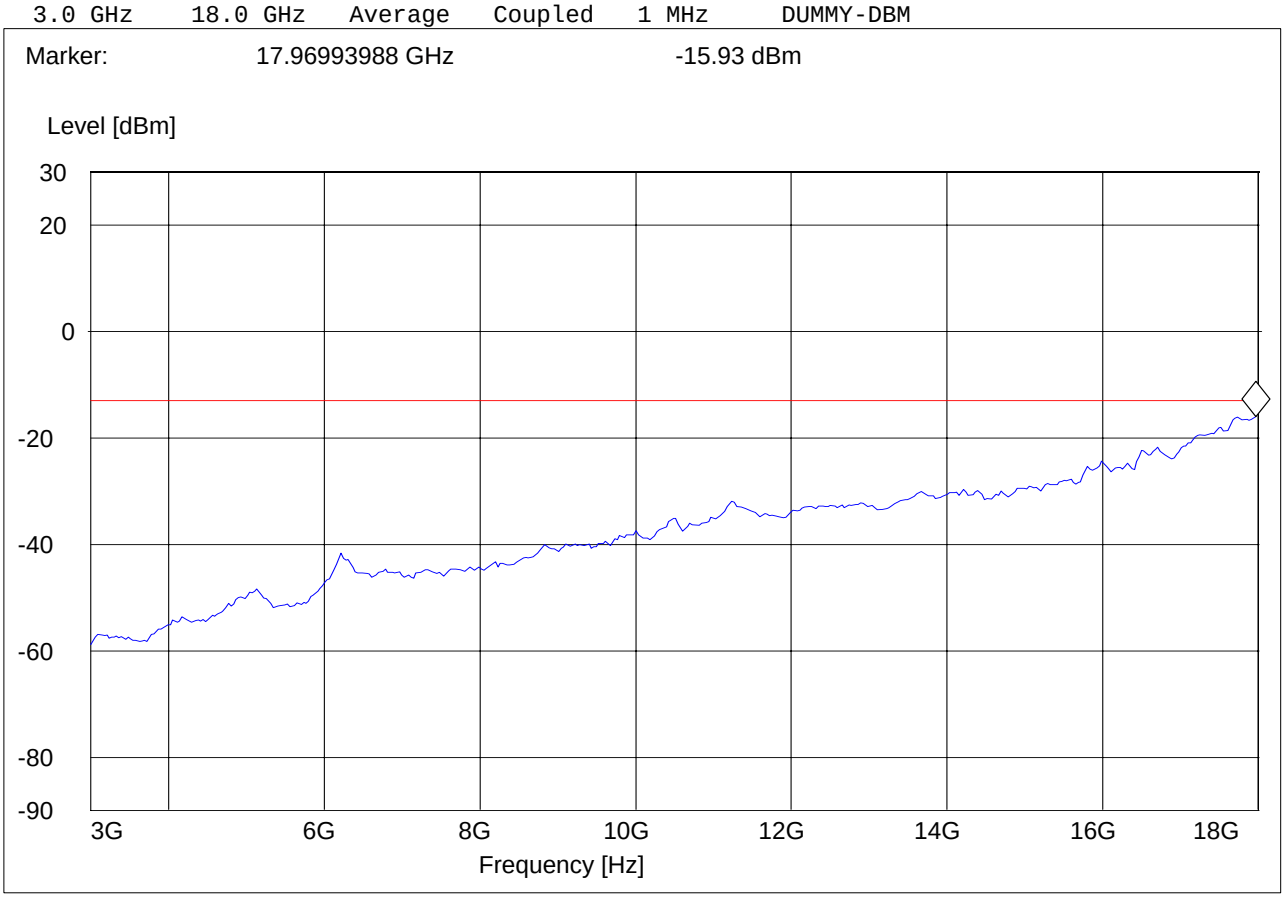
RADIATED SPURIOUS EMISSIONS(PCS 1900)
Tx @ 1909.8MHz: 3GHz – 18GHz
Spurious emission limit –13dBm

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT / Description: Model 100 Wireless Ballot box with SEMC GR48
Customer:          Election Systems
Operating Mode:    FCC24, CH810
Antenna:           V
EUT:               H
Test Engineer:     ED
Voltage:           AC
Sweep:             FCC 24SPURI 3-18G
```

SWEEP TABLE: "FCC 24Spuri 3-18G"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
3.0 GHz	18.0 GHz	Average	Coupled	1 MHz	DUMMY-DBM



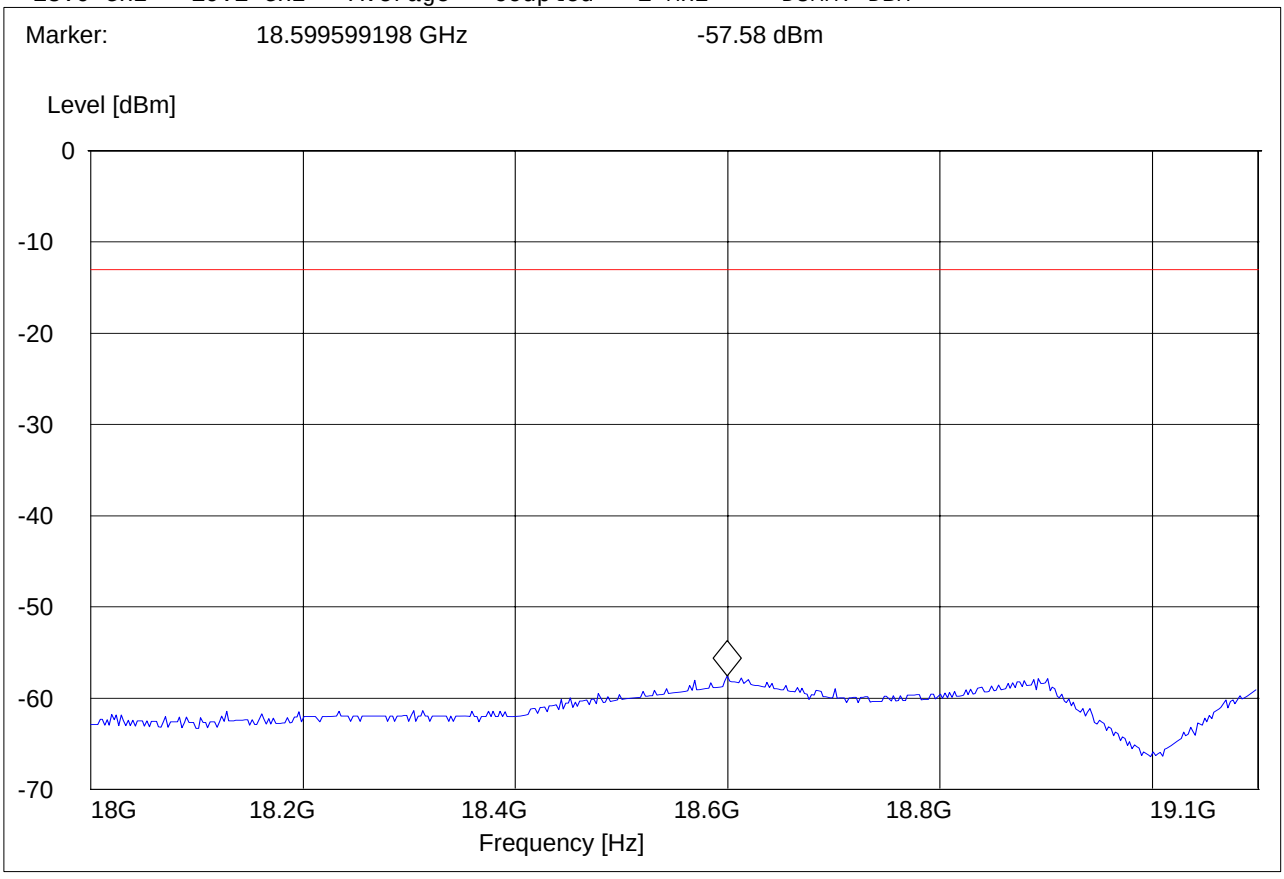
RADIATED SPURIOUS EMISSIONS(PCS 1900)
18GHz – 19.1GHz
Spurious emission limit –13dBm
Note: This plot is valid for low, mid & high channels (worst-case plot)

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT / Description: Model 100 Wireless Ballot box with SEMC GR48
Customer:          Election Systems
Operating Mode:    FCC24, CH810
Antenna:           V
EUT:               H
Test Engineer:     ED
Voltage:           AC
Sweep:             FCC 24 SPURI 18-19.1G_V
```

SWEEP TABLE: "FCC 24spuri 18-19.1G"

```
Short Description:            FCC 24 18GHz-19.1GHz
Start      Stop       Detector  Meas.     IF        Transducer
Frequency  Frequency            Time      Bandw.
18.0 GHz   19.1 GHz   Average   Coupled   1 MHz     DUMMY-DBM
```



6 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

No	Instrument/Ancillary	Type	Manufacturer	Serial No.	Cal Due	Interval
01	Spectrum Analyzer	ESIB 40	Rohde & Schwarz	100107	May 2007	1 year
02	Spectrum Analyzer	FSEM 30	Rohde & Schwarz	100017	August 2007	1 year
03	Signal Generator	SMY02	Rohde & Schwarz	836878/011	May 2007	1 year
04	Power-Meter	NRVD	Rohde & Schwarz	0857.8008.02	May 2007	1 year
05	Biconilog Antenna	3141	EMCO	0005-1186	June 2007	1 year
06	Horn Antenna (1-18GHz)	SAS-200/571	AH Systems	325	June 2007	1 year
07	Horn Antenna (18-26.5GHz)	3160-09	EMCO	1240	June 2007	1 year
08	Power Splitter	11667B	Hewlett Packard	645348	n/a	n/a
09	Climatic Chamber	VT4004	Voltsch	G1115	May 2007	1 year
10	High Pass Filter	5HC2700	Trilithic Inc.	9926013	n/a	n/a
11	High Pass Filter	4HC1600	Trilithic Inc.	9922307	n/a	n/a
12	Pre-Amplifier	JS4-00102600	Miteq	00616	May 2007	1 year
13	Power Sensor	URV5-Z2	Rohde & Schwarz	DE30807	May 2007	1 year
14	Digital Radio Comm. Tester	CMD-55	Rohde & Schwarz	847958/008	May 2007	1 year
15	Universal Radio Comm. Tester	CMU 200	Rohde & Schwarz	832221/06	May 2007	1 year
16	LISN	ESH3-Z5	Rohde & Schwarz	836679/003	May 2007	1 year
17	Loop Antenna	6512	EMCO	00049838	July 2007	2 years

7 References

Title 47—Telecommunication, CHAPTER I--FEDERAL COMMUNICATIONS COMMISSION,
PART 2--FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS October 1**,** 2001.

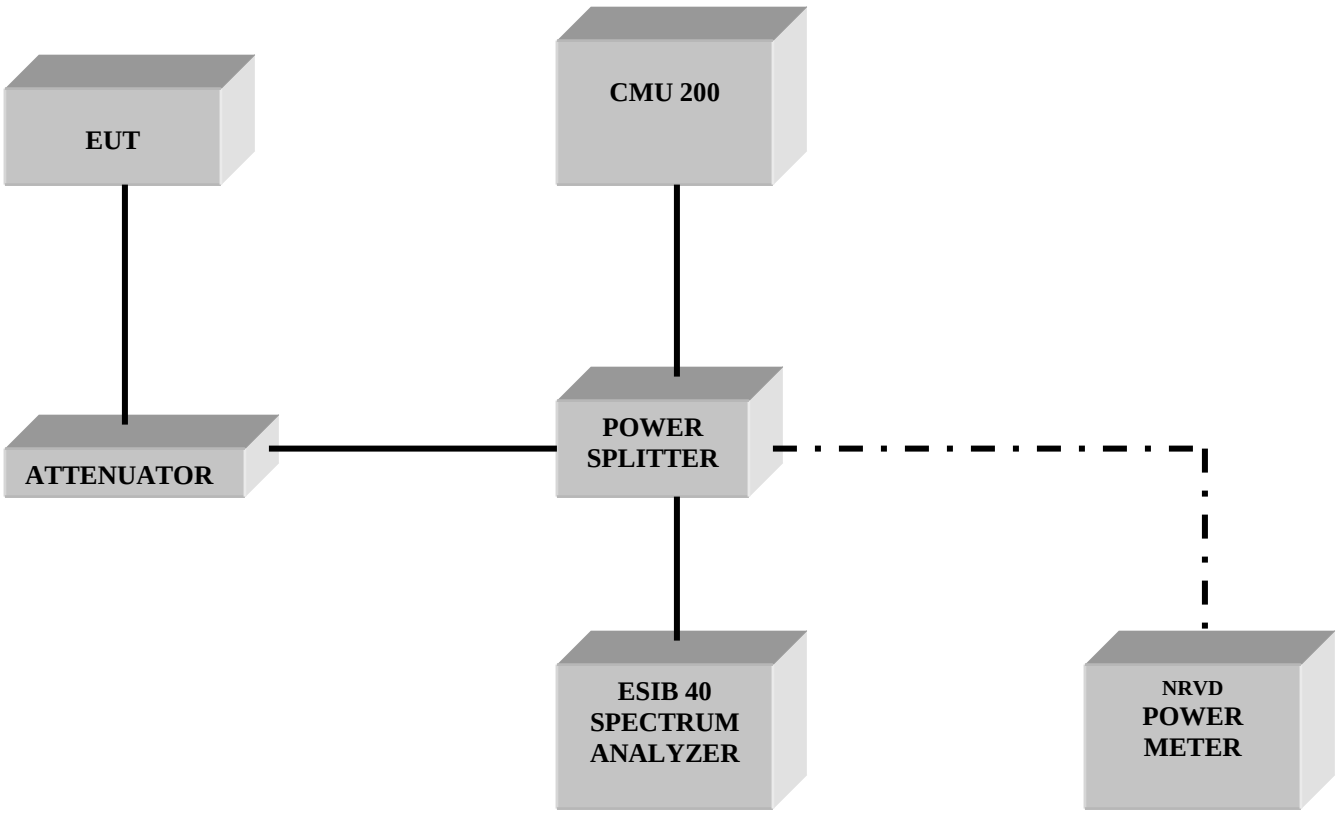
FCC Report and order 02-229 September 24, 2002.

Title 47—Telecommunication, CHAPTER I--FEDERAL COMMUNICATIONS COMMISSION,
PART 24 PERSONAL COMMUNICATIONS SERVICES October 1, 1998.

ANSI / TIA-603-C-2004 Land Mobile FM or PM Communications Equipment Measurement and Performance Standard November 7, 2002.

8 BLOCK DIAGRAMS

Conducted Testing



Radiated Testing