

GE Security, Inc.

**GE Security, Inc.
Wireless Multipurpose Panic Button
B4Z-781A-PANIC
Certification**

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| 07/28/04 5:12 PM | FCC ID: B4Z-781A-PANIC | Page 1 of 19 |
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GE Security, Inc.

**Wireless Multipurpose Panic Button
B4Z-781A-PANIC**

07/28/04

**GE Security, Inc.
1275 Red Fox Road
Arden Hills, MN 55112
(651) 777-2690**

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| FCC_REPT.DOC 07/28/04 5:12 PM | FCC ID: B4Z-781A-PANIC | Page 2 of 19 |
|----------------------------------|------------------------|--------------|

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|--|----|
| 1. INTRODUCTION | 4 |
| 2. STATEMENT OF COMPLIANCE | 4 |
| 3. LAB MEASUREMENTS DISCUSSION / TEST NOTES | 7 |
| 3.1 Test Notes | 7 |
| 3.1.1 Transmissions shall cease within 5 seconds of activation [§15.231(a)(2)] | 7 |
| 3.1.2 Supervisory Calculation [§15.231(a)(3)] | 9 |
| 3.1.3 Duty Cycle Correction Factor [§15.231(b)(2) and §15.35(c)] | 9 |
| 3.1.4 Bandwidth Measurement [§15.231(c)] | 12 |
| 3.1.5 Emissions Measurements | 16 |
| 3.1.5.1 Radiated Emissions Summary | 16 |
| 3.1.5.2 FCC Emissions Calculation | 16 |
| 3.1.5.2.1 Terms | 16 |
| 3.1.5.2.2 Example Calculation | 17 |
| 3.1.5.3 Radiated Emissions | 17 |
| 3.1.5.4 Forbidden Bands | 18 |

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1. Introduction

This device wirelessly transmits panic alarms to alert appropriate personnel. A reed switch is also in the device so that the appropriate personnel can acknowledge the alarm. The power for the transmitter is supplied from one CR2032 coin lithium battery. The transmitter's frequency is controlled by a Crystal device, and is not adjustable by the user. The device measures approximately 1.5" in length, 1.25" in width and 0.5" in height. The unit weighs about 0.4 ounces.

We are requesting Certification under FCC Rules, Part 15, Subpart C, Paragraph 15.231.

Please send comments/suggestions on the report format to john.bergman@ge.com.

Grantee Code: B4Z

2. Statement of Compliance

§2.907

Certification

This is an application for certification

§2.911

Application

- a) This is an application and has been filed electronically with form 731.
- b) All information required has been supplied.
- c) The applicant has signed the application (electronically).
- d) The technical data has been signed.
(See Radiated Emissions)
- e) Applicant signature block on electronic form 731 completed by officer of the company or authorized company personnel.
- f) The appropriate fee has been paid electronically with VISA on
//**.

§2.915

Grant

This application demonstrates that all applicable technical standards have been met and a grant of this application will serve the public interest.

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| FCC_REPT.DOC 07/28/04 5:12 PM | FCC ID: B4Z-781A-PANIC | Page 4 of 19 |
|----------------------------------|------------------------|--------------|

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§2.925

Label

Each piece of equipment for which authorization will be granted will be uniquely identified with "FCC ID: B4Z-781A-PANIC." The required statement will appear with the FCC ID on the product and, although not required, in the installation instructions. See Exhibit A, PDF file *id_label.pdf*

§2.947

Measurement Procedure

- a) The measurement procedure follows ANSI C63.4 procedure. Procedural notes are contained in the laboratory report.
- d) A list of test equipment used is contained in the laboratory report.

§2.948

Description of Measurement Facilities

Measurements were performed at TUV Testing Services Open Test Site. The FCC keeps a full description of the measurement facilities on file. TUV's acceptance and approval is dated as December 5, 1993 in a letter received from the FCC.

The address of the test facility is:

TUV Product Service
19035 Wild Mountain Road
Taylors Falls, MN 55084-1758

Phone: 651-638-0297
Contact: Joel Schneider
Test Engineer in Charge

See Exhibit F, PDF file *test_pho.pdf* for sketch of measurement setup

§2.1033

Application for Certification

- a) Form 731 has been electronically filed on **/**/**. Items that did not apply were left blank.
- b) This technical report contains the following information where applicable.
 - 1) Full name and mailing address of manufacturer and applicant for certification:
GE Security, Inc.
1275 Red Fox Road
Arden Hills, MN 55112
 - 2) FCC Identifier: B4Z-781A-PANIC

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|----------------------------------|------------------------|--------------|
| FCC_REPT.DOC 07/28/04 5:12 PM | FCC ID: B4Z-781A-PANIC | Page 5 of 19 |
|----------------------------------|------------------------|--------------|

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- 3) Copy of installation instructions:
See Exhibit G, PDF file: *user_man.pdf*
- 4) Brief Description of circuit functions and device operation:
See Exhibit I, PDF file *op_desc.pdf*
See Exhibit D, PDF file *schemat.pdf* for schematics (page 1) and parts placement (page 2) diagrams.
- 5) Block Diagram
See Exhibit C, PDF file *block.pdf*.
- 6) Report of the measurements of radiation and conducted emissions:
See Exhibit E, PDF file *emissions_tuv.pdf*
- 7) Photographs
External:
See Exhibit B, PDF file *extern.pdf*
Internal:
See Exhibit H, PDF file *intern.pdf*
- 8) Peripheral or Accessory devices:
This is not applicable to device in this application.
- 9) Transition Rules
This application is not pursuant to the transition rules of §15.37
- 10) Emergency Broadcast decoding:
This is not applicable to device in this application.
- 11) Application for direct sequence spread spectrum devices...
This is not applicable to device in this application.
- 12) Application for scanning receivers...
This is not applicable to device in this application.
- c) Composite Systems
This is not applicable to device in this application.

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3. Lab Measurements Discussion / Test Notes

3.1 Test Notes

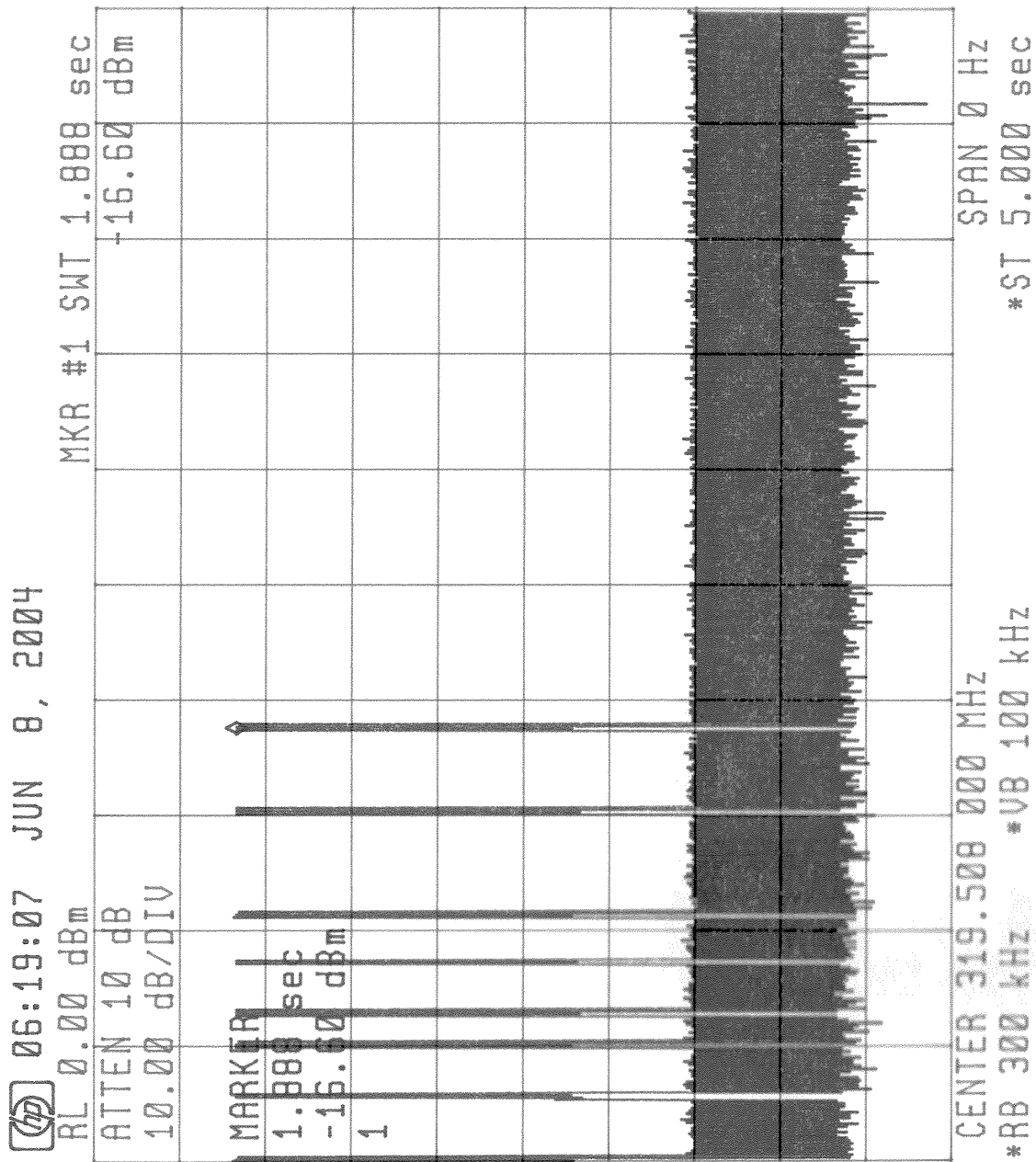
3.1.1 Transmissions shall cease within 5 seconds of activation [**§15.231(a)(2)**]

Alarm transmissions consist of 8 packets. The packet duration is, at most, 30 mS, see **Duty Cycle Correction Factor** [§15.231(b)(2) and §15.35(c)]. The time between packets random between 100 mS and 450 mS so the length of the longest transmission is:

$$8*30\text{mS} + 7*450\text{mS} = 3.39 \text{ seconds.}$$

The following plot shows an 8-packet transmission that concludes in less than 5 seconds.

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| 07/28/04 5:12 PM | FCC ID: B4Z-781A-PANIC | Page 7 of 19 |
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3.1.2 Supervisory Calculation [§15.231(a)(3)]

As permitted, this device may transmit three packets for supervision purposes. The inter-packet delay is a random time between 100 mS and 450 mS. The packet itself may be as long as 30 ms depending on the data sent. The longest time to conclude a supervisory transmission is then:

$$3 * 30 \text{ mS} + 2 * 450 \text{ mS} = 990 \text{ mS}$$

3.1.3 Duty Cycle Correction Factor [§15.231(b)(2) and §15.35(c)]

The transmitter employs amplitude modulation and transmits 61 bits. The packet begins with an “ON” time of 854 μ S, each bit has an “ON” time of 122 μ S, and one bit has an additional 244 μ S. The total “ON” time of a single packet is:

$$854 \mu\text{S} + 61 * 122 \mu\text{S} + 244 \mu\text{S} = 8.54 \text{ mS}.$$

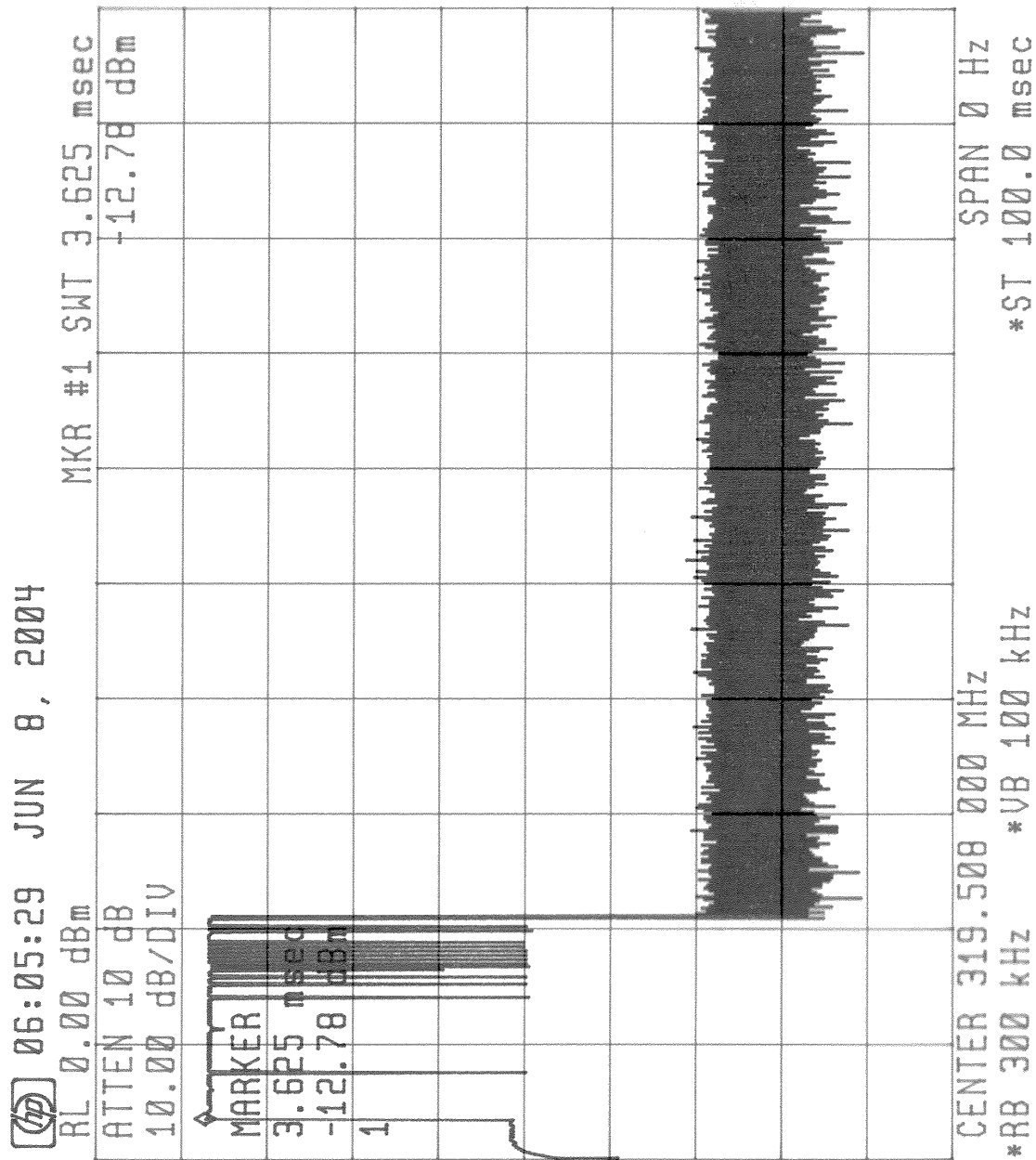
Only one packet is sent in any given 100 mS window for a duty cycle correction factor of:

$$20 * \text{LOG}(8.54/100) = -21.4 \text{ dB}$$

The maximum allowed correction factor is -20.0 dB.

The following plots show:

1. Single packet in 100 mS window.
2. Expanded view of a packet with a duration of 26 mS



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3.1.4 Bandwidth Measurement [§15.231(c)]

Bandwidth Measurements were made in peak mode, using a Hewlett Packard Spectrum Analyzer, model number 70000.

The spectrum analyzer 20 dB skirt bandwidth is 1.8 KHz.

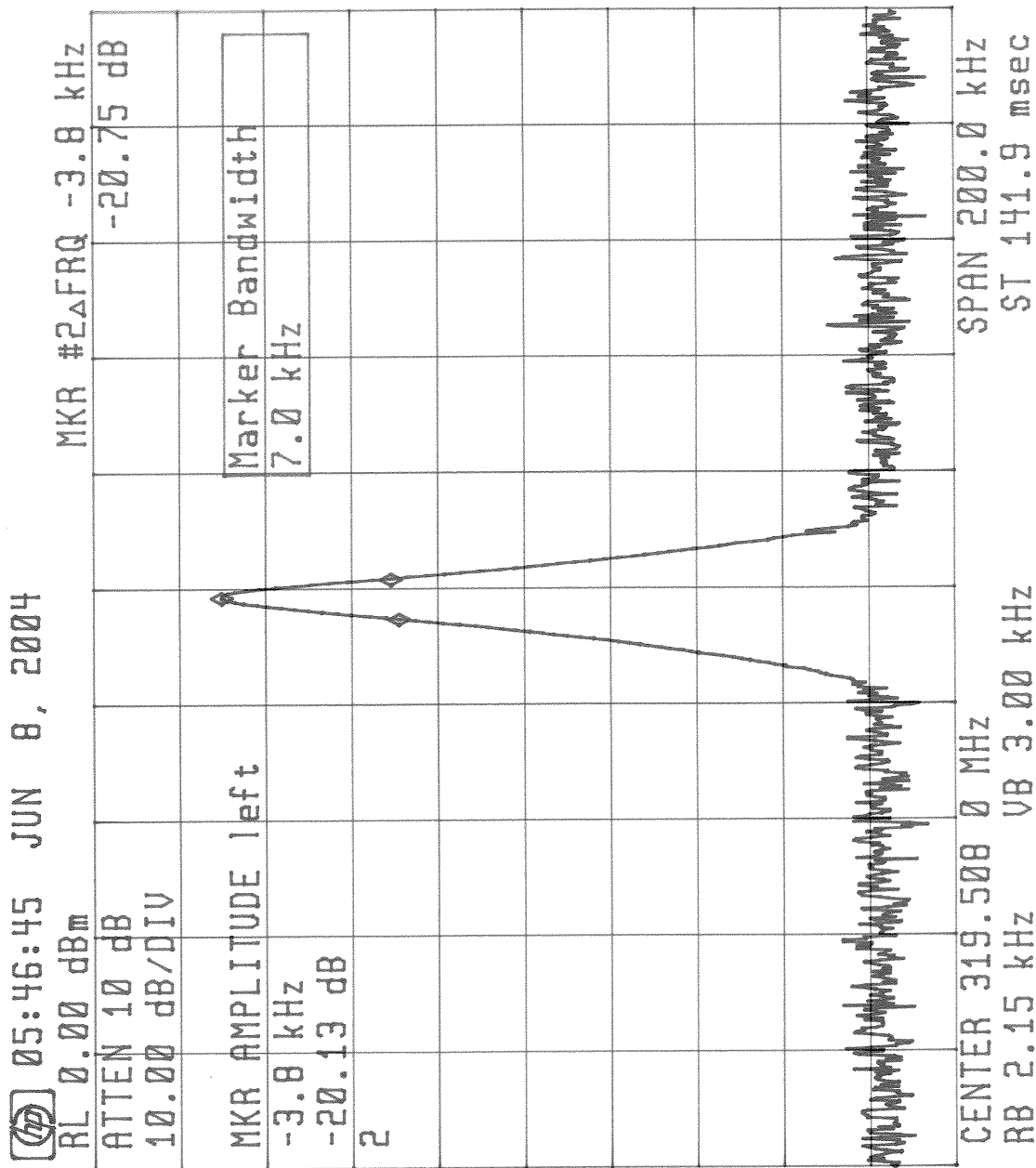
The allowed 20 dB bandwidth is 0.25% of center frequency.

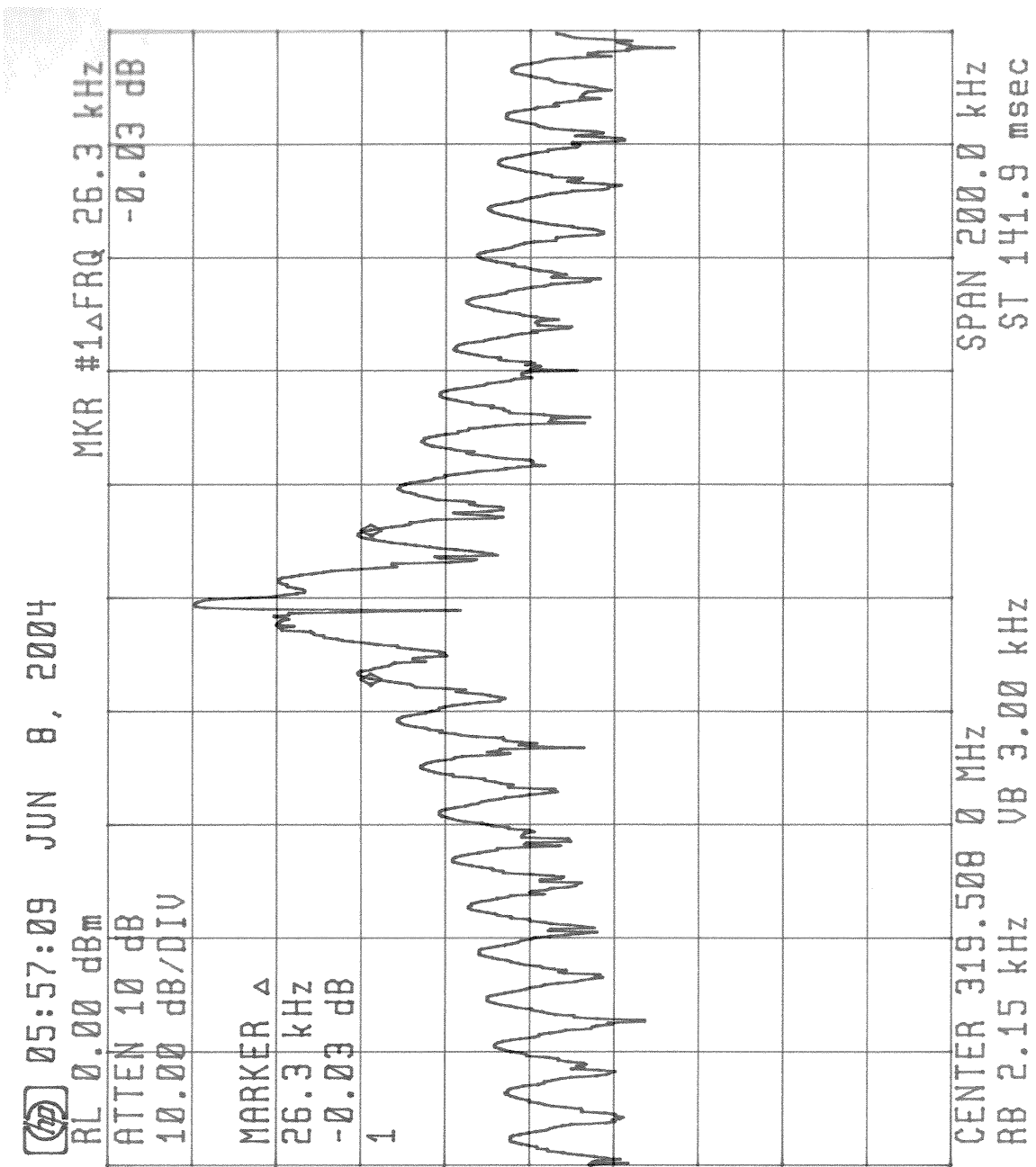
Estimated signal bandwidth = Measured signal bandwidth - analyzer bandwidth.

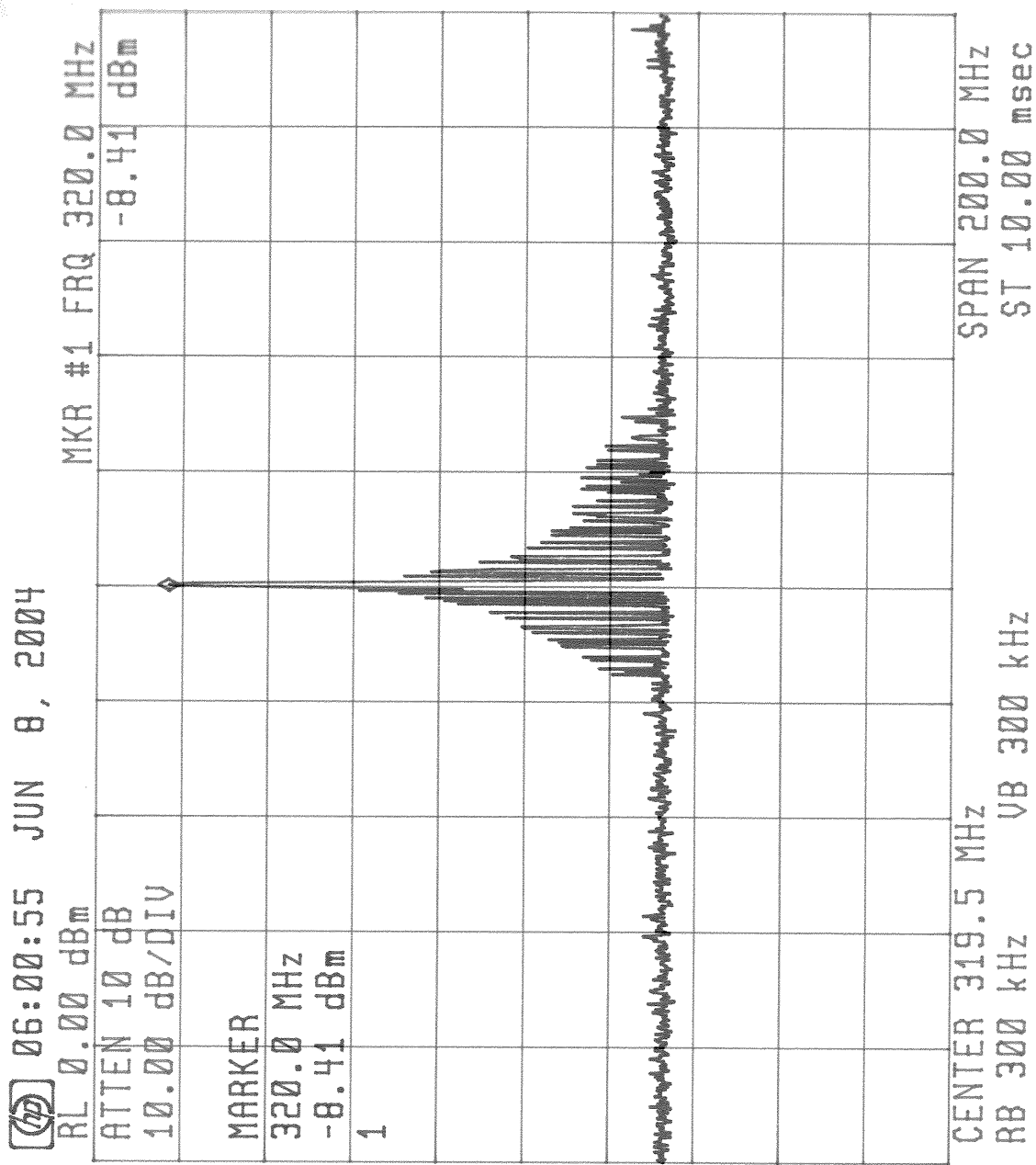
| Center Frequency MHz | Measured 20 dB Bandwidth in KHz | Estimated 20 dB signal Bandwidth in KHz | FCC allowed 20 dB Bandwidth in KHz |
|-------------------------|---------------------------------------|---|--|
| 319.508 | 26.3 | 24.5 | 799 |

The following three plots show:

1. Bandwidth of carrier without modulation
2. Bandwidth of signal with modulation, 200 KHz span
3. Bandwidth of signal with modulation, 200 MHz span







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3.1.5 Emissions Measurements

3.1.5.1 Radiated Emissions Summary

The Wireless SAW micro panic transmitter passes FCC Rules Part 15, Subpart C, Paragraph 15.231. The highest fundamental radiated emission was 13.3 dB below the FCC limit at 319.5 MHz. The highest spurious emission measurement was 18.47 dB below the FCC limit at 532.5 MHz. This highest forbidden band spur was 45.65 dB below the FCC limit at 1065 MHz.

3.1.5.2 FCC Emissions Calculation

3.1.5.2.1 Terms

| Term | Abbreviation | Units | Description |
|-----------------------|--------------|------------|--|
| Analyzer Reading | AR | dB μ V | The power reading read directly from the analyzer without any correction for cabling or receive antenna. |
| Duty Cycle Correction | DC | dB | Correction for averaging measurement, see Duty Cycle Correction Factor [§15.231(b)(2) and §15.35(c)] |
| Antenna Factor | AF | dB | Calibration factor for measurement antenna which converts from dB μ V measured with antenna to the field strength received by the antenna in dB μ V/M. |
| Cable Loss | CL | dB | Amount of power lost in cable (and connectors, if any) between antenna and analyzer |
| Pre-Amp | PA | dB | Gain in pre-amp |
| Attenuator Loss | AL | dB | Attenuator factor which corrects for the fundamental attenuator which prevents the Pre-Amp from creating harmonics from the fundamental. |

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3.1.5.2.2 Example Calculation

AR = 99.3 dB μ V

AF = 13.9 dB

CL = 3.8 dB

DC = 20 dB

PA = 26.2 dB

AL = 0.3 dB

The field strength for comparison to FCC limits is found to be:

$$AR + AF + CL - DC - PA = 99.3 + 13.9 + 3.8 - 20 - 26.2 + 0.3 = 71.1 \text{ dB}\mu\text{V/M}$$

Alternatively, the $AR + AF + CL - PA + AL$ is compared to the FCC limit + DC. This number is often written to the right of measurement data on the test results. For example, the FCC limit for ITI transmitters at 319.5 MHz is approximately 95.9 dB μ V/M. The limit from §15.231(b) with linear interpolation yields a limit, without consideration for duty cycle, of approximately 75.9 dB μ V/M.

To convert to μ V/M the following equation is used:

$$\mu\text{V/M} = \text{INVLOG}(\text{dB}\mu\text{V/M} / 20)$$

For the above example, 71.1 dB μ V/M is 3,589.219 μ V/M

3.1.5.3 Radiated Emissions

The highest fundamental emission along with the three highest spurious and restricted band emissions are listed below as per ANSI C63.4 paragraph 10.1.8.2. Emissions from 0.009 MHz to the tenth harmonic were measured as per FCC Rules Part 15, Subpart C, Paragraph 15.33(a). Emission limits were derived from §15.231(b).

| Frequency | Analyzer Reading | Duty Cycle Correction | Cable Loss | Antenna Factor | Pre-Amp | Attenuator Loss | Field Strength | Field Strength | FCC Limit |
|-----------|------------------|-----------------------|------------|----------------|---------|-----------------|----------------|----------------|-----------|
| MHz | dB μ V | dB | dB | dB | dB | dB | dB μ V/M | μ V/M | μ V/M |
| 319.5 | 67 | 20 | 1.5 | 14.1 | 0 | 0 | 62.6 | 1,349 | 6,229 |
| 426 | 35.85 | 20 | 1.71 | 16.92 | 0 | 0 | 34.48 | 53 | 1,250 |
| 532.5 | 36.9 | 20 | 1.93 | 18.6 | 0 | 0 | 37.43 | 74 | 500 |
| 639 | 34 | 20 | 2.1 | 20 | 0 | 0 | 36.1 | 64 | 1,250 |
| 745.5 | 33.2 | 20 | 2.32 | 21.79 | 0 | 0 | 37.31 | 73 | 500 |

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3.1.5.4 Forbidden Bands

Noise floor of spectrum analyzer with antenna factors and duty cycle correction converted to $\mu\text{V}/\text{M}$ at approximately one meter.

All measurements were taken with an HP 8566B Spectrum Analyzer. The bandwidth was 100 KHz for measurements below 1000 MHz. The bandwidth was 1 MHz for measurements above 1000 MHz. The video filter was off.

The noise floor measurements are summarized in the table below. See also the test data included in this report.

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| Frequency Range | | | | | | | | | |
|-----------------|------------|---------------------|-----------------|----------------|----------------|----------------|----------------|--|--|
| Low Limit | High Limit | Noise Floor Reading | Duty Cycle Corr | Field Strength | Field Strength | FCC Limit @ 3M | FCC Limit @ 1M | | |
| MHz | MHz | dBuV | dB | dBuV/M | uV/M | uV/M | uV/M | | |
| 0.09000 | 0.11000 | N/A | 20 | N/A | N/A | 2400/F | | | |
| 0.49500 | 0.50500 | N/A | 20 | N/A | N/A | 2400/F | | | |
| 2.13750 | 2.19050 | N/A | 20 | N/A | N/A | 30 | 90 | | |
| 4.12500 | 4.12800 | N/A | 20 | N/A | N/A | 30 | 90 | | |
| 4.17725 | 4.17775 | N/A | 20 | N/A | N/A | 30 | 90 | | |
| 4.20725 | 4.20775 | N/A | 20 | N/A | N/A | 30 | 90 | | |
| 6.21500 | 6.21800 | N/A | 20 | N/A | N/A | 30 | 90 | | |
| 6.26775 | 6.26825 | N/A | 20 | N/A | N/A | 30 | 90 | | |
| 6.31175 | 6.31225 | N/A | 20 | N/A | N/A | 30 | 90 | | |
| 8.29100 | 8.29400 | N/A | 20 | N/A | N/A | 30 | 90 | | |
| 8.36200 | 8.36600 | N/A | 20 | N/A | N/A | 30 | 90 | | |
| 8.37625 | 8.38675 | N/A | 20 | N/A | N/A | 30 | 90 | | |
| 8.41425 | 8.41475 | N/A | 20 | N/A | N/A | 30 | 90 | | |
| 12.29000 | 12.29300 | N/A | 20 | N/A | N/A | 30 | 90 | | |
| 12.51975 | 12.52025 | N/A | 20 | N/A | N/A | 30 | 90 | | |
| 12.57675 | 12.57725 | N/A | 20 | N/A | N/A | 30 | 90 | | |
| 13.36000 | 13.41000 | N/A | 20 | N/A | N/A | 30 | 90 | | |
| 16.42000 | 16.42300 | N/A | 20 | N/A | N/A | 30 | 90 | | |
| 16.69475 | 16.69525 | N/A | 20 | N/A | N/A | 30 | 90 | | |
| 16.80425 | 16.80475 | N/A | 20 | N/A | N/A | 30 | 90 | | |
| 25.50000 | 25.67000 | N/A | 20 | N/A | N/A | 30 | 90 | | |
| 37.50000 | 38.25000 | N/A | 20 | N/A | N/A | 100 | 300 | | |
| 73.00000 | 74.60000 | N/A | 20 | N/A | N/A | 100 | 300 | | |
| 74.80000 | 75.20000 | N/A | 20 | N/A | N/A | 100 | 300 | | |
| 108.00000 | 121.94000 | N/A | 20 | N/A | N/A | 150 | 450 | | |
| 123.00000 | 138.00000 | N/A | 20 | N/A | N/A | 150 | 450 | | |
| 149.90000 | 150.05000 | N/A | 20 | N/A | N/A | 150 | 450 | | |
| 156.52475 | 156.52525 | N/A | 20 | N/A | N/A | 150 | 450 | | |
| 156.70000 | 156.90000 | N/A | 20 | N/A | N/A | 150 | 450 | | |
| 162.01250 | 167.17000 | N/A | 20 | N/A | N/A | 150 | 450 | | |
| 167.72000 | 173.20000 | N/A | 20 | N/A | N/A | 150 | 450 | | |
| 240.0 | 285.0 | N/A | 20 | N/A | N/A | 200 | 600 | | |
| 322.0 | 335.4 | N/A | 20 | N/A | N/A | 200 | 600 | | |
| 399.9 | 410.0 | N/A | 20 | N/A | N/A | 200 | 600 | | |
| 608.0 | 614.0 | N/A | 20 | N/A | N/A | 200 | 600 | | |
| 960.0 | 1240.0 | 44.81 | 20 | 24.8 | 17.4 | 500 | 1500 | | |
| 1300.0 | 1427.0 | 50.88 | 20 | 30.9 | 35.0 | 500 | 1500 | | |
| 1435.0 | 1626.5 | 47.53 | 20 | 27.5 | 23.8 | 500 | 1500 | | |
| 1645.5 | 1646.5 | N/A | 20 | N/A | N/A | 500 | 1500 | | |
| 1660.0 | 1710.0 | 45.59 | 20 | 25.6 | 19.0 | 500 | 1500 | | |
| 1718.8 | 1722.2 | N/A | 20 | N/A | N/A | 500 | 1500 | | |
| 2200.0 | 2300.0 | 45.98 | 20 | 26.0 | 19.9 | 500 | 1500 | | |
| 2310.0 | 2390.0 | 47.49 | 20 | 27.5 | 23.7 | 500 | 1500 | | |
| 2483.5 | 2500.0 | N/A | 20 | N/A | N/A | 500 | 1500 | | |
| 2655.0 | 2900.0 | 49.36 | 20 | 29.4 | 29.4 | 500 | 1500 | | |
| 3260.0 | 3267.0 | N/A | 20 | N/A | N/A | 500 | 1500 | | |
| 3332.0 | 3339.0 | N/A | 20 | N/A | N/A | 500 | 1500 | | |
| 3345.8 | 3358.0 | N/A | 20 | N/A | N/A | 500 | 1500 | | |
| 3600.0 | 4400.0 | N/A | 20 | N/A | N/A | 500 | 1500 | | |