# TEST REPORT

**Report Number: 3089413ATL-003**
**Project Number: 3089413**
**Feburary 28, 2006**

**Testing performed on the**

**Personal Help Button (PHB)**
**Model Number: SX319**

**to**

**FCC Part 15.231**

**For Lifeline Systems**

| **Test Performed by:** | **Test Authorized by:** |
|---|---|
| Intertek ETL Semko | Lifeline Systems |
| 1950 Evergreen Blvd, Suite 100 | 111 Lawrence Street |
| Duluth, GA 30096 | Framingham, Massachusetts 01702-8156 |

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**Reviewed by:** Date: 02/27/2006
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Reviewer

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# 1 Summary of Tests

**MODEL: SX319**
**FCC ID: BDZ319BD**

| TEST | FCC REFERENCE | RESULTS |
|---|---|---|
| Radiated Emission | 15.231(b) | **Complies** |
| Out of Band Radiated Emission | 15.231(b) | **Complies** |
| AC Conducted Emission | 15.207 | **Not Required** |
| 20 dB Bandwidth | 15.231(c) | **Complies** |
| Automatic deactivation | 15.231 (a) (1) | **Complies** |
| Frequency Tolerance | 15.231(d) | **Not Required** |
| Antenna Requirement | 15.203 | **Complies** |

## 2 General Description

### 2.1 Product Description

The test results in this report pertain only to the item(s) tested.

The following description of the Personal Help Button (PHB) was supplied by Intertek:

The EUT remotely controls a base station which can call for help in a medical situation.

**Overview of the EUT**

| | |
|---|---|
| Applicant | Lifeline Systems<br>111 Lawrence Street<br>Framingham, Massachusetts 01702-8156 |
| Trade Name & Model No. | Personal Help Button (PHB) / SX319 |
| FCC Identifier | BDZ319BD |
| Use of product | Remote Control |
| Transmitter activation | [ x] Manual and automatically deactivate within 5 seconds of being released<br>[ ] Periodic transmissions |
| Frequency Range (MHz) | 319.5 |
| Antenna Requirement | The EUT uses a permanently connected antenna. |
| Manufacturer name & address | Lifeline Systems<br>111 Lawrence Street<br>Framingham, Massachusetts 01702-8156 |
| EUT type | Production |
| EUT received date: | Feburary 10, 2006 |
| Operating condition: | Good |

### 2.2 Related Submittal(s) Grants

This report is for use with an application for certification of a low power transmitter. One transmitter is included in the application.

### 2.3 Test Methodology

Radiated emissions measurements were performed according to the procedures in ANSI C63.4 (2003). Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the **"Data Sheet"** of this Application. All other measurements were made in accordance with the procedures in part 2 of CFR 47.

2.4 Test Facility

The Duluth 10-meter chamber site is located at 1950 Evergreen Blvd., Suite 100, Duluth, Georgia. The test site is a 10-meter semi-anechoic chamber. The site meets the characteristics of CISPR 16-1: 1993 and ANSI C63.4: 2003. For measurements, a remotely controlled flush-mount metal-top turntable is used to rotate the EUT a full 360 degrees. A remote controlled non-conductive antenna mast is used to scan the antenna height from one to four meters.

The A2LA accreditation code for this site is 121624 under certificate number 1455.01.

## 3 System Test Configuration

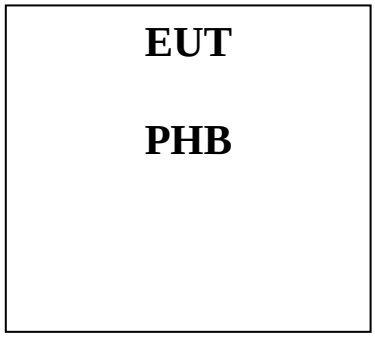
3.1 Support Equipment

No support equipment was needed for this evaluation.

3.2 Cabling

No cables were needed for this evaluation.

3.3 Block Diagram of Test Setup



### 3.4 Justification

For emissions testing, the test procedures described in American National Standards Institute C63.4-2003 were employed. The equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it).

The EUT was configured to transmit full power.

### 3.5 Software Exercise Program

No special software was required. For emissions testing, a sample was provided that would transmit continuously while the button was depressed.

### 3.6 Mode of Operation during Test

The EUT was set to transmit continuously during testing.

### 3.7 Modifications Required for Compliance

No modifications were installed by Intertek during compliance testing in order to bring the product into compliance (Please note that this does not include changes made specifically by Lifeline Systems prior to compliance testing)

### 3.8 Additions, deviations and exclusions from standards

No additions, deviations or exclusions from the standard were made.

# 4 Measurement Results

## 4.1 Radiated Emission

FCC Rule 15.231(b)

### 4.1.1 Procedure

For radiated emission measurements, the EUT is attached to a styro-foam block and placed on a wooden table. The signal is maximized through rotation and placement in the three orthogonal axes.

During the test the EUT is rotated and the antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters.

Radiated emissions are taken at 3 meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance. All readings are extrapolated back to the equivalent 3-meter reading using inverse scaling with distance.

Radiated emission measurements were performed from 30 MHz to 4000 MHz.

Analyzer resolution is:

100 kHz or greater for frequencies 1000 MHz and below,

1 MHz for frequencies above 1000 MHz.

The Peak value of the Field Strength was measured. The Average value was obtained from the Peak by subtracting the Duty Cycle Correction Factor.

Data is included of the worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

### 4.1.2 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation is as follows:

FS = RA + AF + CF - AG - DC

Where FS = Field Strength in dB (μV/m)

RA = Receiver Amplitude (including preamplifier) in dB (μV)

CF = Cable Attenuation Factor in dB

AF = Antenna Factor in dB(1/m)

AG = Amplifier Gain in dB

DC = Duty Cycle (Average Factor)

4.1.3 Test Result

The following data list the significant emission frequencies, the limit and the margin of compliance. The EUT was scanned from 30 MHz to 4 GHz. There were no other radiated emissions within 20 dB of the limit.

*Table 4-1: Radiated Emissions – Fundamental & Spurious Emissions*

**Date:** 2-24-2006 **Limit:** FCC15 Class B-3m
**Frequency Range (MHz):** 30-1000 **Test Distance (m):** 3
**Input power:** Battery **Modifications for compliance (y/n):** n

| A | A | B | C | D | E | F | G | H | I | J |
|---|---|---|---|---|---|---|---|---|---|---|
| **EUT Axis Orientation** | **Ant. Pol. (V/H)** | **Frequency MHz** | **Reading dB(uV)** | **Antenna Factor dB(1/m)** | **Cable Loss dB** | **Pre-amp Factor dB** | **Average Factor (dB)** | **Net dB(uV/m)** | **3m Limit dB(uV/m)** | **Margin dB** |
| Z | H | 319.500 | 81.4 | 14.2 | 2.7 | 27.9 | 20.0 | 50.4 | 75.9 | -25.5 |
| Y | H | 319.500 | 92.4 | 14.2 | 2.7 | 27.9 | 20.0 | 61.4 | 75.9 | -14.5 |
| X | H | 319.500 | 94.1 | 14.2 | 2.7 | 27.9 | 20.0 | 63.1 | 75.9 | -12.8 |
| | **Calculations** | | H=C+D+E-F-G | | J=H-G | | | | | |

Note: X-axis is worst-case orientation.

**Date:** 2-24-2006 **Limit:** FCC15 Class B-3m
**Frequency Range (MHz):** 30-4000 **Test Distance (m):** 3
**Input power:** Battery **Modifications for compliance (y/n):** n

| | A | B | C | D | E | F | G | H | I | J |
|---|---|---|---|---|---|---|---|---|---|---|
| | **Ant. Pol. (V/H)** | **Frequency MHz** | **Reading dB(uV)** | **Antenna Factor dB(1/m)** | **Cable Loss dB** | **Pre-amp Factor dB** | **Duty Cycle Factor (dB)** | **Net dB(uV/m)** | **3m Limit dB(uV/m)** | **Margin dB** |
| | h | 239.645 | 63.3 | 11.2 | 2.7 | 27.9 | 20.0 | 29.2 | 55.9 | -26.6 |
| | h | 319.500 | 96.5 | 14.2 | 3.2 | 27.9 | 20.0 | 66.0 | 75.9 | -9.9 |
| | h | 399.400 | 55.9 | 16.3 | 3.2 | 27.9 | 20.0 | 27.6 | 55.9 | -28.3 |
| | h | 798.818 | 55.5 | 20.7 | 5.2 | 27.7 | 20.0 | 33.7 | 55.9 | -22.2 |
| * | V | 1438.000 | 56.3 | 24.4 | 6.0 | 32.9 | 20.0 | 33.7 | 54.0 | -20.3 |
| * | V | 1517.000 | 57.9 | 25.6 | 6.0 | 33.0 | 20.0 | 36.5 | 54.0 | -17.5 |
| * | V | 1597.000 | 48.1 | 25.6 | 6.0 | 33.0 | 20.0 | 26.7 | 54.0 | -27.3 |
| * | V | 1677.000 | 49.1 | 25.6 | 6.0 | 33.0 | 20.0 | 27.8 | 54.0 | -26.2 |
| | H | 1757.000 | 47.0 | 25.7 | 6.0 | 33.0 | 20.0 | 25.7 | 55.9 | -30.2 |
| | H | 1870.000 | 45.6 | 27.1 | 6.0 | 33.0 | 20.0 | 25.7 | 55.9 | -30.2 |
| | H | 1918.000 | 48.4 | 27.6 | 6.0 | 33.0 | 20.0 | 29.0 | 55.9 | -26.9 |
| | H | 1997.000 | 41.9 | 27.6 | 6.0 | 33.0 | 20.0 | 22.5 | 55.9 | -33.4 |
| | H | 2076.000 | 47.7 | 27.9 | 9.0 | 33.0 | 20.0 | 31.6 | 55.9 | -24.3 |
| | H | 2157.000 | 45.6 | 27.9 | 9.0 | 33.0 | 20.0 | 29.5 | 55.9 | -26.4 |
| | H | 2396.000 | 43.6 | 27.9 | 9.0 | 33.0 | 20.0 | 27.5 | 55.9 | -28.3 |
| | **Calculations** | | G=C+D+E-F | | I=G-H | | | | | |

* denotes frequency is located in a restricted band

## 4.2 AC Line Conducted Emission

FCC Rule 15.207

### 4.2.1 Measurement Procedure

Measurements are carried out using quasi-peak and average detector receivers in accordance with CISPR 16. An AMN is required to provide defined impedance at high frequencies across the power feed at the point of measurement of terminal voltage and also to provide isolation of the circuit under test from the ambient noise on the power lines. An AMN as defined in CISPR 16 shall be used.

The EUT is located so that the distance between the boundary of the EUT and the closest surface of the AMN is 0.8m.

Where a flexible mains cord is provided by the manufacturer, this shall be 1m long or if in excess of 1m, the excess cable is folded back and forth as far as possible so as to form a bundle not exceeding 0.4m in length.

The EUT is arranged and connected with cables terminated in accordance with the product specification.

Conducted disturbance is measured between the phase lead and the reference ground, and between the neutral lead and the reference ground. Both measured values are reported.

The EUT, where intended for tabletop use, is placed on a table whose top is 0.8m above the ground plane. A vertical, metal reference plane is placed 0.4m from the EUT. The vertical metal reference-plane is at least 2m by 2m. The EUT shall be kept at least 0.8m from any other metal surface or other ground plane not being part of the EUT. The table is constructed of non-conductive materials. Its dimensions are 1m by 1.5m, but may be extended for larger EUT.

Floor standing EUTs are placed on a horizontal metal ground plane and isolated from the ground plane by 3 to 12 mm of insulating material. The metal ground plane extends at least 0.5m beyond the boundaries of the EUT and has minimum dimensions of 2m by 2m.

Equipment setup for conducted disturbance tests followed the guidelines of ANSI C63.4: 2003

### 4.2.2 Test Result

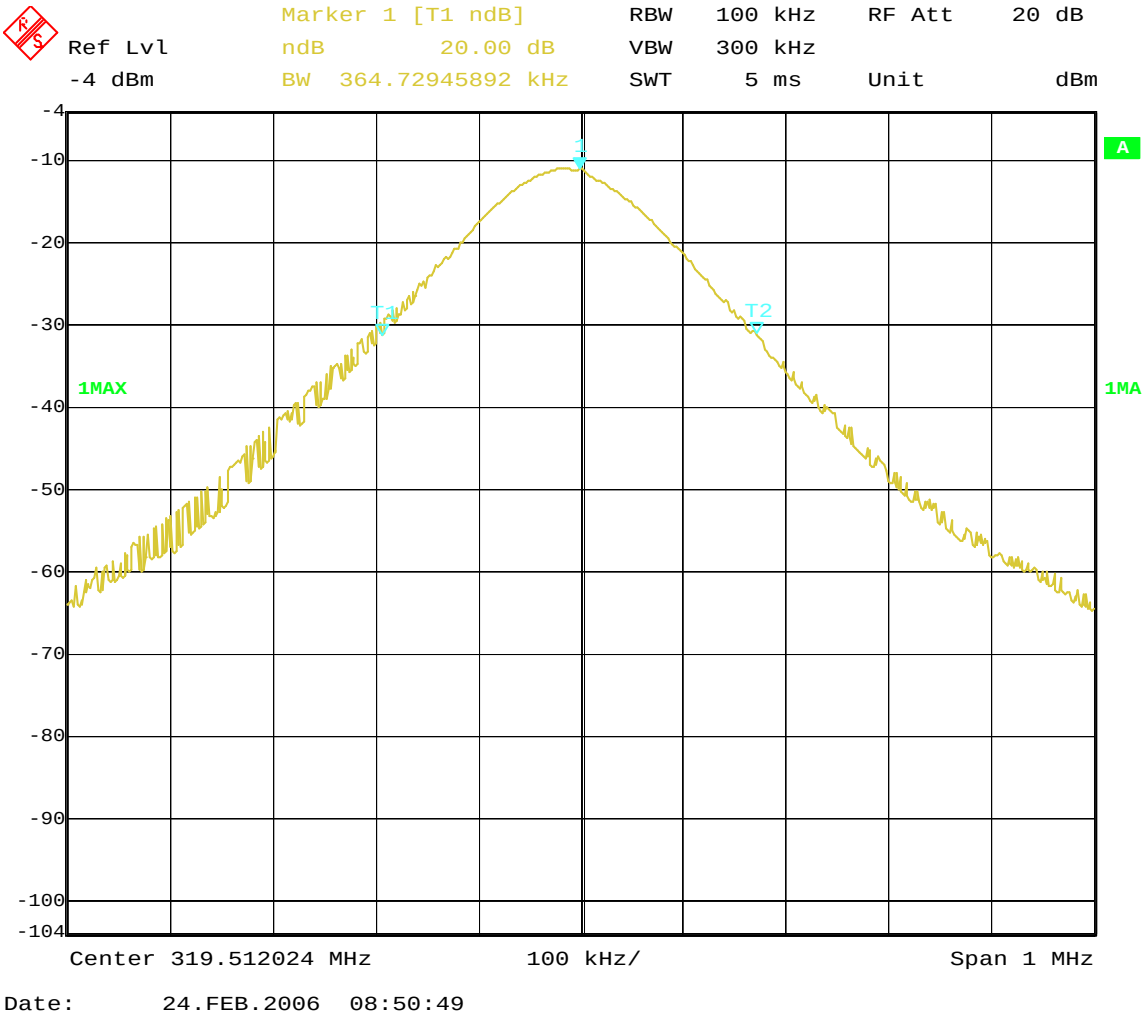
**This test was not required as the EUT is battery powered and does not connect to the ac mains.**

## 4.3 Occupied Bandwidth Plot

FCC Rule 15.231(c)

The following plots show the occupied bandwidth the transmitter. The widest occupied bandwidth at 20 dB down is 364.73 kHz, which is 0.11% of the fundamental frequency.

*Figure 4-1: Bandwidth plot*

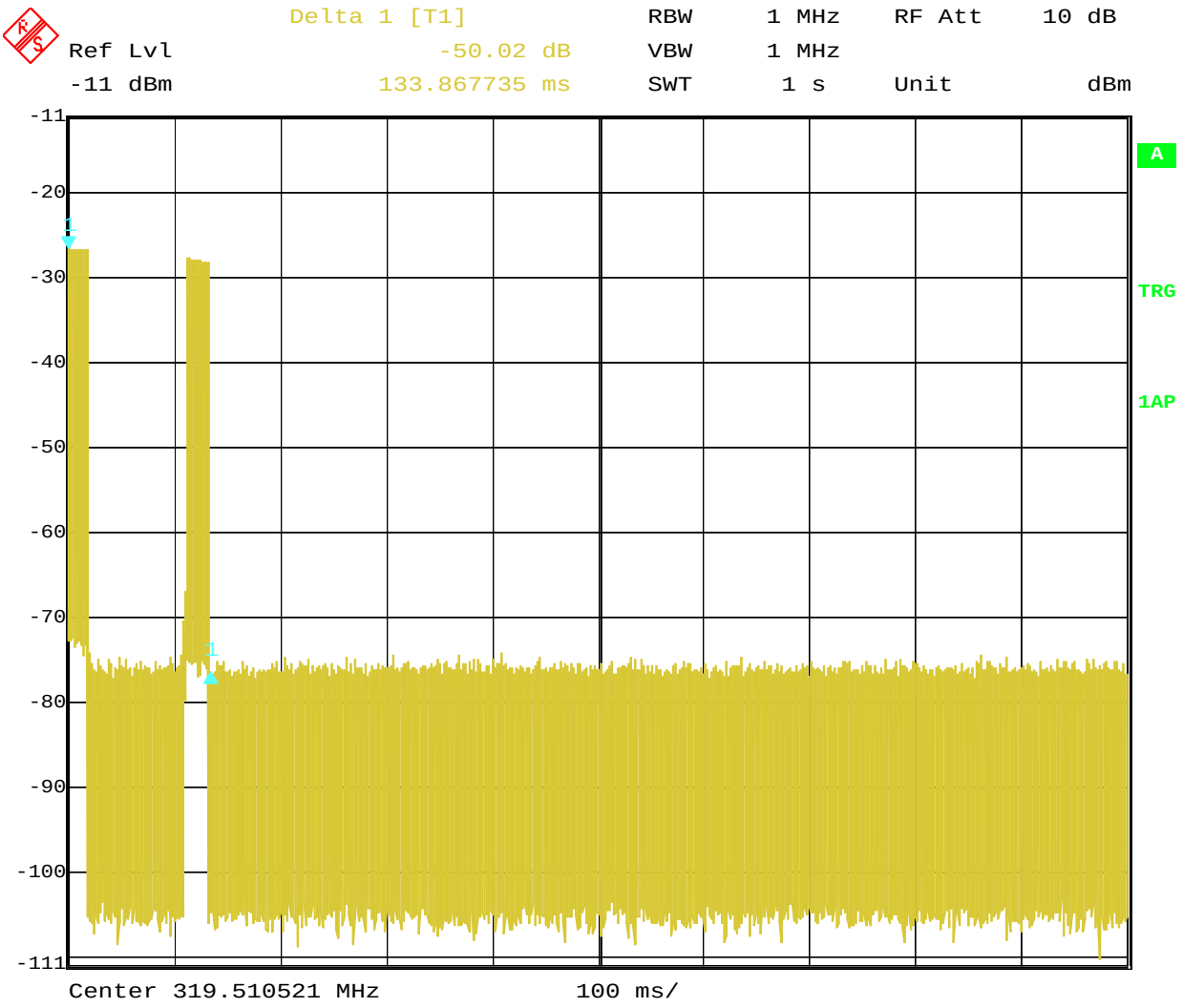


## 4.4 Automatic Transmitter Deactivation With in 5 Seconds

FCC Part 15.231 (a) (1)

The following plot shows that, with a near instantaneous activation/de-activation of the transmitter's manual operation, the transmitter automatically ceases to transmit within 5 seconds.

*Figure 4-2: Deactivation Plot*



4.5 Transmitter Duty Cycle Calculation and Measurements

The following plots show the Duty Cycle (DC) of the transmission signal. Since the pertinent standard limits the peak-to-average limit ratio to 20 dB. A 20 dB Duty Cycle Correction Factor was used for all measurements.

Duty Cycle is defined as the maximum 'ON' time within the total sequence period divided by that period (milliseconds).

The number of 'ON' pulses within the 19 ms pulse sequence cycle is 60 as shown in Figure 4-2 and 4-3. Of the 60 pulses in the sequence, there is one large 'ON' pulse width of 977.96 us, one medium 'ON' pulse of 488.97 us, and 58 small 'ON' pulses of 128.26 us each. Plots illustrating cycle width of each pulse can be found in Figures 4-4, 4-5, and 4-6. Therefore, the Duty Cycle Correction Factor was calculated as follows:

20 * Log (Duty Cycle) = 20*LOG (((58*128.256 uS) + 977.956 uS + 488.978 uS)/ 19 ms)= 29.33 dB

*Figure 4-3: Output – Pulse Train Width – 100 ms sweep*

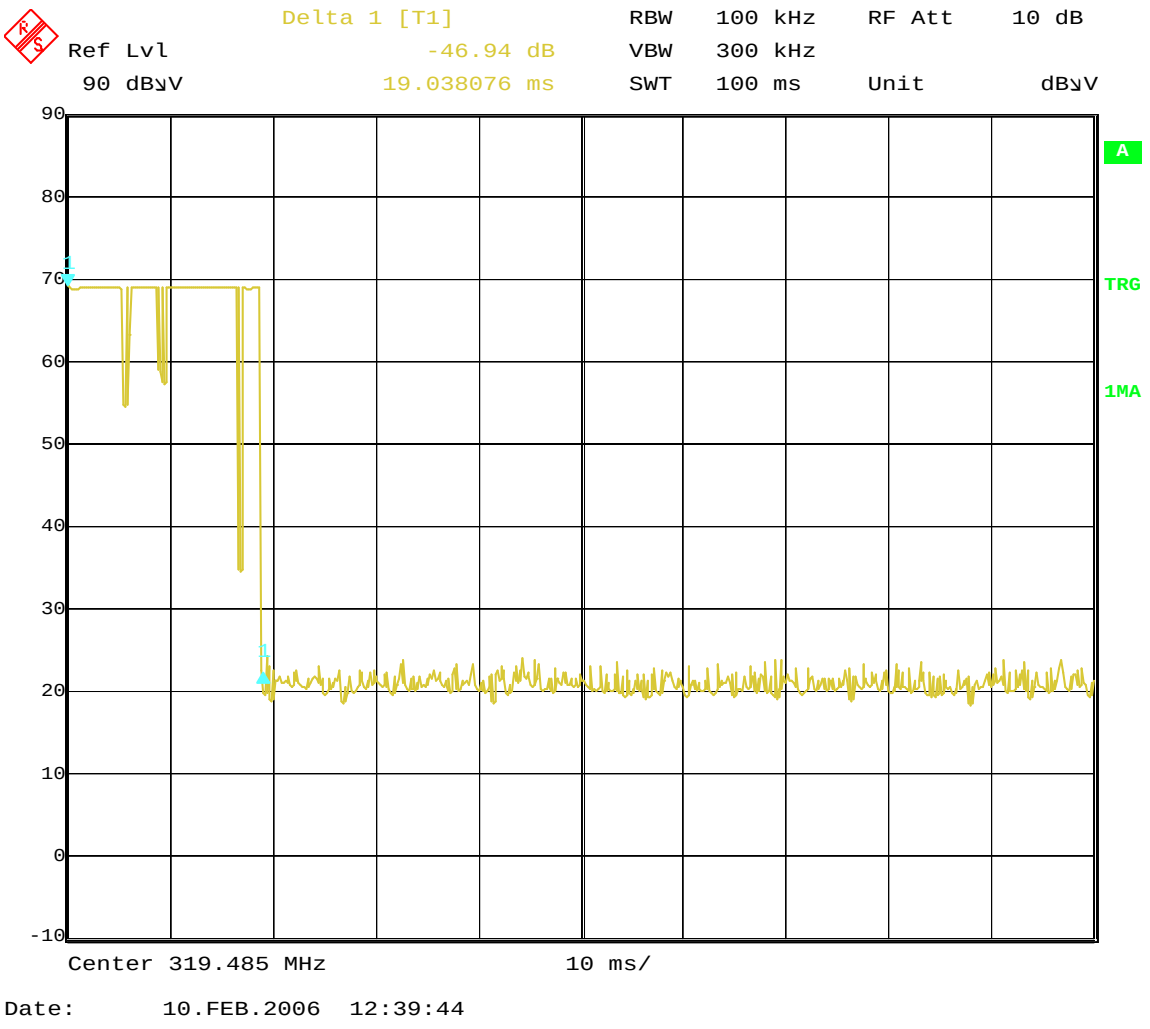


*Figure 4-4: Output – Pulse Train Width – 19 ms sweep*

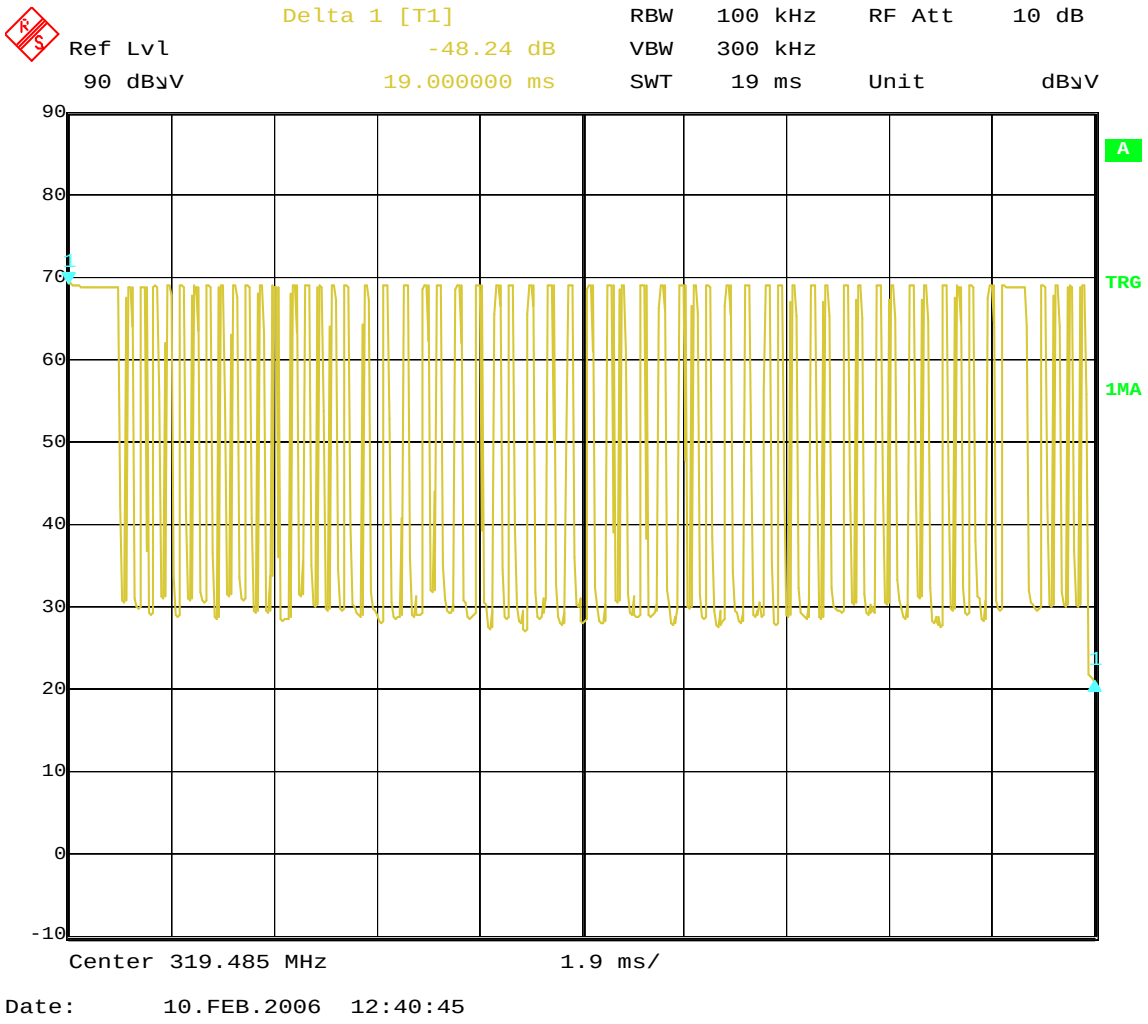


*Figure 4-5: Output – Larget ON cycle width*

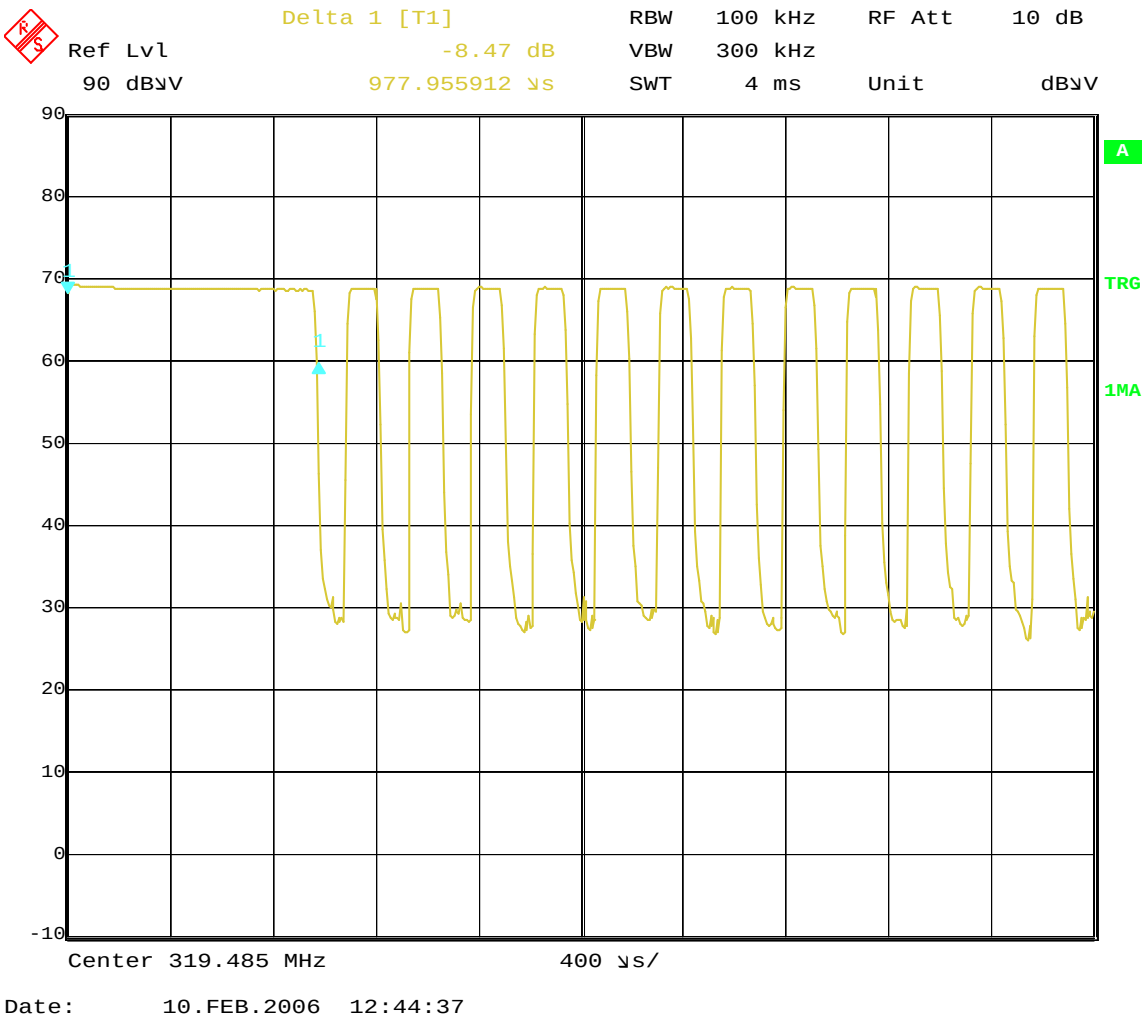


*Figure 4-6: Output – Medium ON Cycle Width*

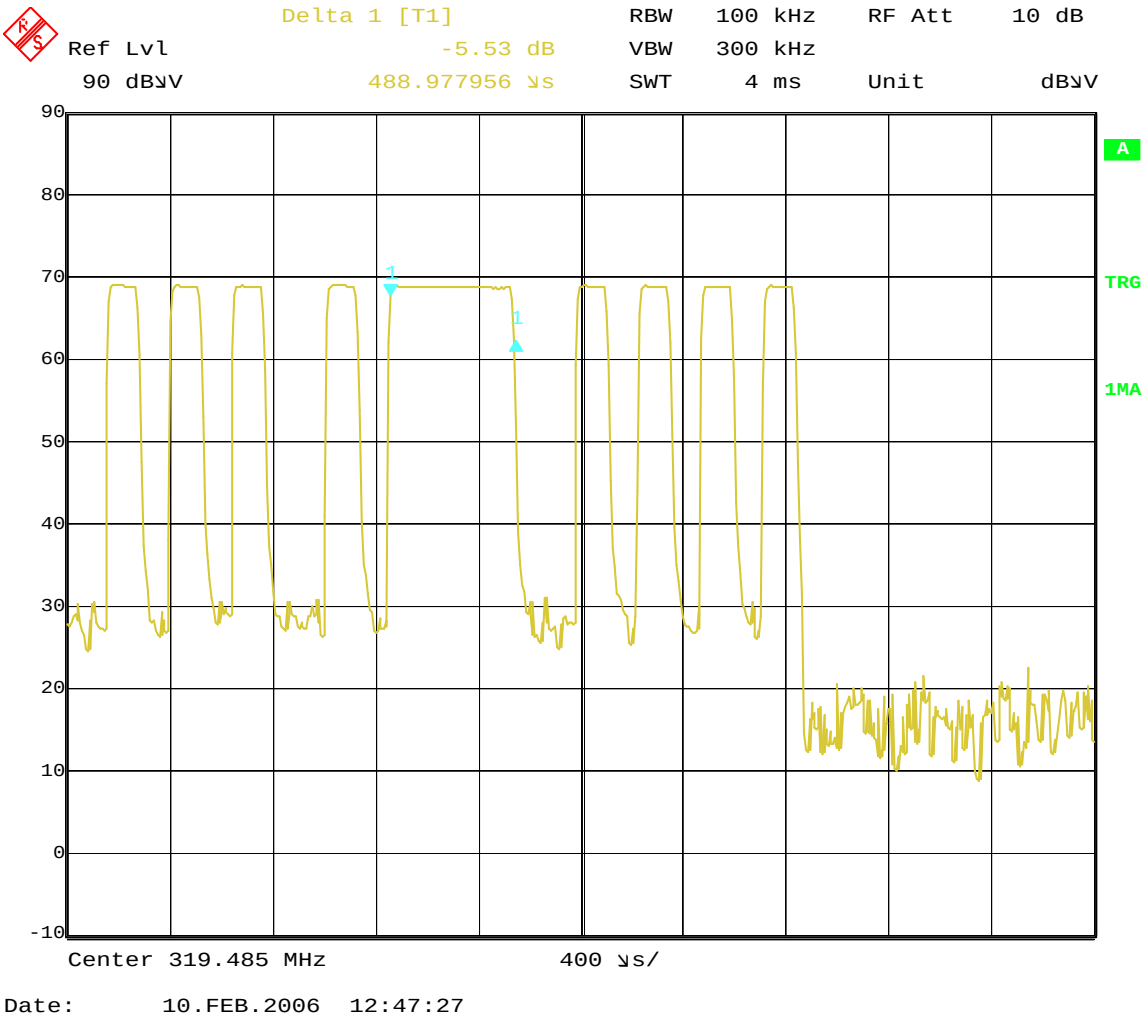
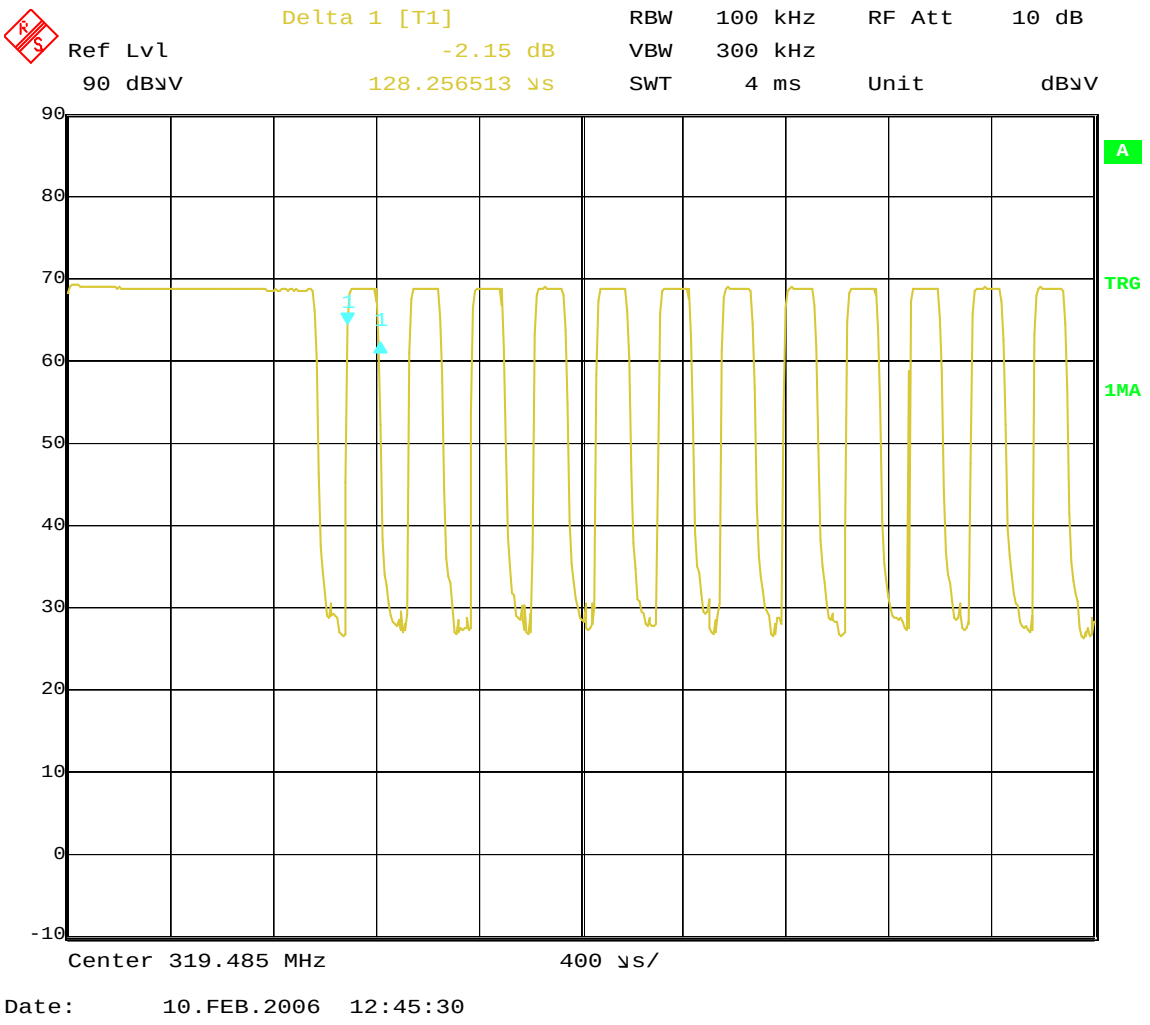


*Figure 4-7: Output – Small ON Cycle Width*



## 5 Antenna Requirement

| | |
|---|---|
| X | The transmitter uses a permanently connected antenna. |
| | The antenna is affixed to the EUT using a unique connector, which allows for replacement of a broken antenna, but does NOT use a standard antenna jack or electrical connector. |
| | The EUT requires professional installation. |

Please refer to the attached documentation for details.

## 6 List of test equipment

| Equipment | Manufacturer | Model Number | Serial Number | Cal. Interval | Cal. Due |
|---|---|---|---|---|---|
| EMI Receiver | Hewlett-Packard | 8546A | 3650A00362 | 1 yr | 01/05/2007 |
| RF Filter Section | Hewlett-Packard | 85460A | 3704A00331 | 1 yr | 01/05/2007 |
| Spectrum Analyzer | Rohode & Schwarz | FSEK 30 | 100353 | 1 yr | 01/03/2007 |
| Amplifier | Miteq | JS4-00102600-29-7P | 015533 | 1 yr | 01/09/2007 |
| Antenna | Schnaffner-Chase | CBL6112B | 2622 | 1 yr | 08/30/2006 |
| Horn Antenna | EMCO | 3115 | 9208-3919 | 1 yr | 03/11/2006 |
| Cable | Megaphase | G919-NKNK-394 | MP3 | 1 yr | 05/11/2006 |
| Cable | Pasternack | RG214/U | E01 | 1 yr | 05/11/2006 |
| Cable | Huber-Suhner | Sucoflex 104PEA | E11 | 1 yr | 05/11/2006 |
| Cable | Huber-Suhner | Sucoflex 104PE | E08 | 1 yr | 05/13/2006 |
| Cable | Huber-Suhner | Sucoflex 104PEA | E05 | 1 yr | 05/12/2006 |
| Cable | Megaphase | TM18 NKNK 118 | E202 | 1 yr | 05/12/2006 |

## 7 Document History

| Report Number | Writer Initials | Date | Change |
|---|---|---|---|
| 3089413ATL-003 | CDC | Feburary 28, 2006 | Original document |
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