# ENGINEERING TEST REPORT

## SmartFob Transmitter B
## Model No.: SF2TXB

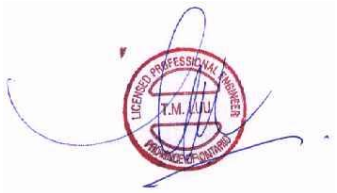
## FCC ID: OD5-SF2TXB

*Applicant:*
**Cansec Systems Ltd.**
*3105 Unity Drive, Unit 9*
*Mississauga, Ontario*
*CANADA L5L 4L2*

***In Accordance With***

**FEDERAL COMMUNICATIONS COMMISSION (FCC)**
**Part 15, Subpart C, Section 15.231**
**Momentarily Operation at 418 MHz**

**UltraTech's File No.: CSC-037F15C231**

| | |
|---|---|
| This Test report is Issued under the Authority of<br>Tri M. Luu, Professional Engineer,<br>Vice President of Engineering<br>UltraTech Group of Labs<br><br>Date: July 24, 2008 |  |
| Report Prepared by: Dharmajit Solanki<br><br>Issued Date: July 24, 2008 | Tested by: Hung Trinh, RFI Technician<br><br>Test Dates: June 28, 2008 |

- *The results in this Test Report apply only to the sample(s) tested, and the sample tested is randomly selected.*
- *This report must not be used by the client to claim product endorsement by NVLAP or any agency of the US Government.*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# TABLE OF CONTENTS

**EXHIBIT 1. INTRODUCTION ..... 1**

1.1. SCOPE ..... 1
1.2. RELATED SUBMITTAL(S)/GRANT(S) ..... 1
1.3. NORMATIVE REFERENCES ..... 1

**EXHIBIT 2. PERFORMANCE ASSESSMENT ..... 2**

2.1. CLIENT INFORMATION ..... 2
2.2. EQUIPMENT UNDER TEST (EUT) INFORMATION ..... 2
2.3. EUT'S TEHNICAL SPECIFICATIONS ..... 3
2.4. LIST OF EUT'S PORTS ..... 3
2.5. ANCILLARY EQUIPMENT ..... 3
2.6. GENERAL TEST SETUP ..... 3

**EXHIBIT 3. EUT OPERATION CONDITIONS AND CONFIGURATIONS DURING TESTS ..... 4**

3.1. CLIMATE TEST CONDITIONS ..... 4
3.2. OPERATIONAL TEST CONDITIONS & ARRANGEMENT FOR TESTS ..... 4

**EXHIBIT 4. SUMMARY OF TEST RESULTS ..... 5**

4.1. LOCATION OF TESTS ..... 5
4.2. APPLICABILITY & SUMMARY OF EMC EMISSIONS TEST RESULTS ..... 5
4.3. MODIFICATIONS INCORPORATED IN THE EUT FOR COMPLIANCE PURPOSES ..... 5

**EXHIBIT 5. MEASUREMENTS, EXAMINATIONS & TEST DATA FOR EMC EMISSIONS ..... 6**

5.1. TEST PROCEDURES ..... 6
5.2. MEASUREMENT UNCERTAINTIES ..... 6
5.3. MEASUREMENT EQUIPMENT USED ..... 6
5.4. METHOD OF MEASUREMENTS ..... 6
5.5. ESSENTIAL/PRIMARY FUNCTIONS AS DECLARED BY THE MANUFACTURER ..... 6
5.6. PERIODIC OPERATION PROVISIONS [§15.231(A)] ..... 7
5.7. TRANSMITTER RADIATED EMISSIONS @ 3 METERS – FUNDAMENTAL, HARMONIC & SPURIOUS EMISSIONS [§15.231(B), 15.209 & 15.205] ..... 8
5.8. EMISSION BANDWIDTH [§15.231(C)] ..... 13
5.9. UNINTENTIONAL RADIATED SPURIOUS EMISSIONS [15.109(A)] ..... 15

**EXHIBIT 6. MEASUREMENT UNCERTAINTY ..... 17**

6.1. RADIATED EMISSION MEASUREMENT UNCERTAINTY ..... 17

# EXHIBIT 1. INTRODUCTION

## 1.1. SCOPE

| | |
|---|---|
| **Reference:** | FCC Part 15, Subpart C, Section 15.231 |
| **Title:** | Telecommunication - Code of Federal Regulations, CFR 47, Part 15 |
| **Purpose of Test:** | To gain FCC Certification Authorization for Section 15.231- Momentarily Operation at 418 MHz. |
| **Test Procedures:** | Both conducted and radiated emissions measurements were conducted in accordance with American National Standards Institute ANSI C63.4 - American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz. |
| **Environmental Classification:** | Residential |

## 1.2. RELATED SUBMITTAL(S)/GRANT(S)

None.

## 1.3. NORMATIVE REFERENCES

| Publication | Year | Title |
|---|---|---|
| FCC CFR Parts 0-15 | 2007 | Code of Federal Regulations – Telecommunications |
| ANSI C63.4 | 2003 | American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 KHz to 40 GHz |
| CISPR 22<br>EN 55022 | 2006<br>2006 | Information Technology Equipment - Radio Disturbance Characteristics – Limits and Methods of Measurement |
| CISPR 16-1-1 | 2003 | Specification for radio disturbance and immunity measuring apparatus and methods.<br>Part 1-1: Measuring Apparatus |
| CISPR 16-2-1 | 2004 | Specification for radio disturbance and immunity measuring apparatus and methods.<br>Part 2-1: Conducted disturbance measurement |

# EXHIBIT 2. PERFORMANCE ASSESSMENT

## 2.1. CLIENT INFORMATION

| APPLICANT | |
|---|---|
| **Name:** | Cansec Systems Ltd. |
| **Address:** | 3105 unity Drive, Unit 9<br>Mississauga, Ontario<br>Canada L5L 4L2 |
| **Contact Person:** | Mr. Richard Sipura<br>Phone #: 905-820-2404 x229<br>Fax #: 905-820-0301<br>Email Address: richard.sipura@cansec.com |

| MANUFACTURER | |
|---|---|
| **Name:** | Cansec Systems Ltd. |
| **Address:** | 3105 unity Drive, Unit 9<br>Mississauga, Ontario<br>Canada L5L 4L2 |
| **Contact Person:** | Mr. Richard Sipura<br>Phone #: 905-820-2404 x229<br>Fax #: 905-820-0301<br>Email Address: richard.sipura@cansec.com |

## 2.2. EQUIPMENT UNDER TEST (EUT) INFORMATION

The following information (with the exception of the Date of Receipt) has been supplied by the applicant.

| | |
|---|---|
| **Product Name:** | SmartFob Transmitter B |
| **Model Name or Number:** | SF2TXB |
| **Serial Number:** | Test Sample |
| **Type of Equipment:** | Low Power Transmitter |
| **Power Input Source:** | 3V battery |
| **Primary User Functions of EUT:** | Access Control |

## 2.3. EUT'S TEHNICAL SPECIFICATIONS

| Transmitter | |
|---|---|
| **Equipment Type:** | Mobile |
| **Intended Operating Environment:** | Residential |
| **RF Output Power Rating:** | 60.8 dBµV/m Avg E-field @ 3 meters |
| **Operating Frequency Range:** | 418 MHz |
| **Duty Cycle:** | 25.07% |
| **20 dB Bandwidth:** | 10.1 kHz |
| **Modulation Type:** | Pulse Width Modulation with encoding code |
| **Antenna Type:** | Integral antenna, housed inside the enclosure. |
| **Antenna Description:** | Type: Part of the PCB<br>Frequency Range: 418 MHz |

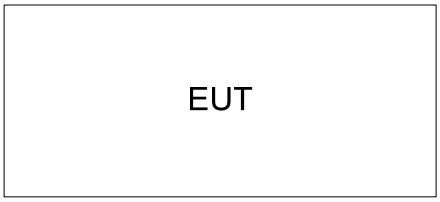
## 2.4. LIST OF EUT'S PORTS

None

## 2.5. ANCILLARY EQUIPMENT

None

## 2.6. GENERAL TEST SETUP



# EXHIBIT 3. EUT OPERATION CONDITIONS AND CONFIGURATIONS DURING TESTS

## 3.1. CLIMATE TEST CONDITIONS

The climate conditions of the test environment are as follows:

| | |
|---|---|
| Temperature: | 23°C |
| Humidity: | 55% |
| Pressure: | 102 kPa |
| Power Input Source: | 3V Battery |

## 3.2. OPERATIONAL TEST CONDITIONS & ARRANGEMENT FOR TESTS

| | |
|---|---|
| **Operating Modes:** | The EUT was set to transmit in burst mode continuously by means of special setting for testing purpose only. |
| **Special Test Software:** | None |
| **Special Hardware Used:** | None |
| **Transmitter Test Antenna:** | The EUT is tested with the antenna fitted in a manner typical of normal intended use as integral antenna equipment. |

| **Transmitter Test Signal** | |
|---|---|
| **Frequency** | 418 MHz |

# EXHIBIT 4. SUMMARY OF TEST RESULTS

## 4.1. LOCATION OF TESTS

All of the measurements described in this report were performed at Ultratech Group of Labs located in the city of Oakville, Province of Ontario, Canada.

Radiated Emissions were performed at the Ultratech's 3-10 TDK Semi-Anechoic Chamber situated in the Town of Oakville, province of Ontario. This test site been calibrated in accordance with ANSI C63.4, and found to be in compliance with the requirements of Sec. 2.948 of the FCC Rules. The descriptions and site measurement data of the Oakville 3-10 TDK Semi-Anechoic Chamber has been filed with FCC office (FCC File No.: 31040/SIT 1300B3) and Industry Canada office (Industry Canada File No.: IC2049A-3). Calibration site expiry date for IC is May 17, 2009.

## 4.2. APPLICABILITY & SUMMARY OF EMC EMISSIONS TEST RESULTS

| FCC Sections | Test Requirements | Compliance (Yes/No) |
|---|---|---|
| 15.203 | Antenna requirement (Permanently attached antenna used with this device) | Yes |
| 15.231(a) | Provisions of FCC 15.231 | Yes |
| 15.231(b) | Transmitter Radiated Emissions - Fundamental, Harmonic and Spurious | Yes |
| 15.231(c) | 20 dB Bandwidth | Yes |
| 15.107(a) | AC Power Line Conducted Emissions Measurements (Transmit & Receive) | N/A (battery operated device) |
| 15.109(a) | Unintentional Radiated Emissions | Yes |

## 4.3. MODIFICATIONS INCORPORATED IN THE EUT FOR COMPLIANCE PURPOSES

None.

# EXHIBIT 5. MEASUREMENTS, EXAMINATIONS & TEST DATA FOR EMC EMISSIONS

## 5.1. TEST PROCEDURES

This section contains test results only. Details of test methods and procedures can be found in Ultratech Test Procedures, File # ULTR P001-2004 and ANSI C63.4.

## 5.2. MEASUREMENT UNCERTAINTIES

The measurement uncertainties stated were calculated in accordance with requirements of UKAS Document NIS 81 with a confidence level of 95%. Please refer to Exhibit 7 for Measurement Uncertainties.

## 5.3. MEASUREMENT EQUIPMENT USED

The measurement equipment used complied with the requirements of the Standards referenced in the Methods & Procedures ANSI C64.3, FCC 15.209 and CISPR 16-1.

## 5.4. METHOD OF MEASUREMENTS

The measurements were performed in accordance with Ultratech Test Procedures, File # ULTR P001-2004 and ANSI C63.4.

## 5.5. ESSENTIAL/PRIMARY FUNCTIONS AS DECLARED BY THE MANUFACTURER

The essential function of the EUT is access control; to open the garage door.

## 5.6. PERIODIC OPERATION PROVISIONS [§15.231(a)]

### 5.6.1. Engineering Analysis

| FCC PROVISIONS | ANALYSIS ON COMPLIANCE |
|---|---|
| The intentional radiator restricted to the transmission of a control signal such as those used with alarm systems, door openers, remote switches, etc. Continuous transmissions, voice, video and the radio control of toys are not permitted. | Access Control |
| A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released. | Complies as declared by manufacturer. |
| A Transmitter Bctivated automatically shall cease transmission within 5 seconds after activation. | No automatic activation. |
| Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions do not exceed more than two seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does not exceed 2 seconds per hour. | N/A |
| Intentional Radiators which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm, may operate during the pendency of the alarm condition. | N/A |

## 5.7. TRANSMITTER RADIATED EMISSIONS @ 3 METERS – FUNDAMENTAL, HARMONIC & SPURIOUS EMISSIONS [§15.231(b), 15.209 & 15.205]

### 5.7.1. Limits

The RF radiated emissions measured at 3 Meters distance shall not exceed the field strength below:

| Fundamental Frequency (MHz) | Field Strength of Fundamental (microvolts/meter) | Field Strength of Spurious Emission (microvolts/meter) |
|---|---|---|
| 260 - 470 | [1] 3,750 to 12,500 | [1] 375 to 1,250 |

[1] Linear interpolation.

**Field Strength of Fundamental Limit @ 418 MHz = 80.3 dBµV/m**
**Field Strength of Spurious Limit (outside restricted bands) = 60.3 dBµV/m**

Emissions within the restricted bands specified in §15.205(a) shall not exceed the general radiated emission limits specified in §15.209(a).

**47 CFR 15.205(a) - Restricted Frequency Bands**

| MHz | MHz | MHz | GHz |
|---|---|---|---|
| 0.090–0.110 | 16.42–16.423 | 399.9–410 | 4.5–5.15 |
| 0.495–0.505 | 16.69475–16.69525 | 608–614 | 5.35–5.46 |
| 2.1735–2.1905 | 16.80425–16.80475 | 960–1240 | 7.25–7.75 |
| 4.125–4.128 | 25.5–25.67 | 1300–1427 | 8.025–8.5 |
| 4.17725–4.17775 | 37.5–38.25 | 1435–1626.5 | 9.0–9.2 |
| 4.20725–4.20775 | 73–74.6 | 1645.5–1646.5 | 9.3–9.5 |
| 6.215–6.218 | 74.8–75.2 | 1660–1710 | 10.6–12.7 |
| 6.26775–6.26825 | 108–121.94 | 1718.8–1722.2 | 13.25–13.4 |
| 6.31175–6.31225 | 123–138 | 2200–2300 | 14.47–14.5 |
| 8.291–8.294 | 149.9–150.05 | 2310–2390 | 15.35–16.2 |
| 8.362–8.366 | 156.52475–156.52525 | 2483.5–2500 | 17.7–21.4 |
| 8.37625–8.38675 | 156.7–156.9 | 2655–2900 | 22.01–23.12 |
| 8.41425–8.41475 | 162.0125–167.17 | 3260–3267 | 23.6–24.0 |
| 12.29–12.293 | 167.72–173.2 | 3332–3339 | 31.2–31.8 |
| 12.51975–12.52025 | 240–285 | 3345.8–3358 | 36.43–36.5 |
| 12.57675–12.57725 | 322–335.4 | 3600–4400 | Above 38.6 |
| 13.36–13.41 | | | |

**47 CFR 15.209(a) - Field Strength Limits within Restricted Frequency Bands**

| Frequency (MHz) | Field Strength Limits (microvolts/m) | Distance (Meters) |
|---|---|---|
| 0.009 - 0.490 | 2,400 / F (KHz) | 300 |
| 0.490 - 1.705 | 24,000 / F (KHz) | 30 |
| 1.705 - 30.0 | 30 | 30 |
| 30 – 88 | 100 | 3 |
| 88 – 216 | 150 | 3 |
| 216 – 960 | 200 | 3 |
| Above 960 | 500 | 3 |

### 5.7.2. Method of Measurements

Refer to ULTRATECH Test Procedures, File # ULTR P001-2004 and ANSI C63.4.

Note: Because the EUT employs pulsed operation, the unit was modified for continuous operation and the readings were corrected by subtraction the peak-average correction factor derived from the appropriate duty cycle calculation. See §15.35 (c).

### 5.7.3. Test Equipment List

| Test Instruments | Manufacturer | Model No. | Serial No. | Frequency Range |
|---|---|---|---|---|
| Spectrum Analyzer | Rohde & Schwarz | FSEK30 | 100077 | 20 Hz – 40 GHz |
| RF Amplifier | Hewlett Packard | 8447F | 2944A04098 | 0.1 MHz to 1300 MHz |
| RF Amplifier | Hewlett Packard | 8449B | 3008A00769 | 1 GHz to 26.5 GHz |
| Biconilog Antenna | EMCO | 3142 | 1005 | 30 MHz to 2 GHz |
| Horn Antenna | EMCO | 3115 | 6570 | 1 GHz – 18 GHz |
| High Pass Filter | Mini Circuit | SHP-800 | 10425 | Cut off 415 MHz |

### 5.7.4. Test Data

| Frequency (MHz) | Peak E-Field @3m (dBµV/m) | Average E-Field @3m (dBµV/m) | Antenna Plane (V/H) | §15.231(b) Limits @ 3m (dBµV/m) | §15.209 (a) Limits @ 3m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| 418.00 | 71.16 | 59.1 | V | 80.3 | -- | -21.2 |
| 418.00 | 72.80 | 60.8 | H | 80.3 | -- | -19.5 |
| 836.00 | 51.32 | 39.3 | V | 60.3 | 46.0 | -21.0 |
| 836.00 | 52.56 | 40.5 | H | 60.3 | 46.0 | -19.7 |
| 1254.00 | 52.79 | 40.8 | V | 60.3 | 54.0 | -19.5 |
| 1254.00 | 53.97 | 42.0 | H | 60.3 | 54.0 | -18.3 |
| 1672.00* | 51.27 | 39.3 | V | 60.3 | 54.0 | -14.7 |
| 1672.00* | 51.68 | 39.7 | H | 60.3 | 54.0 | -14.3 |

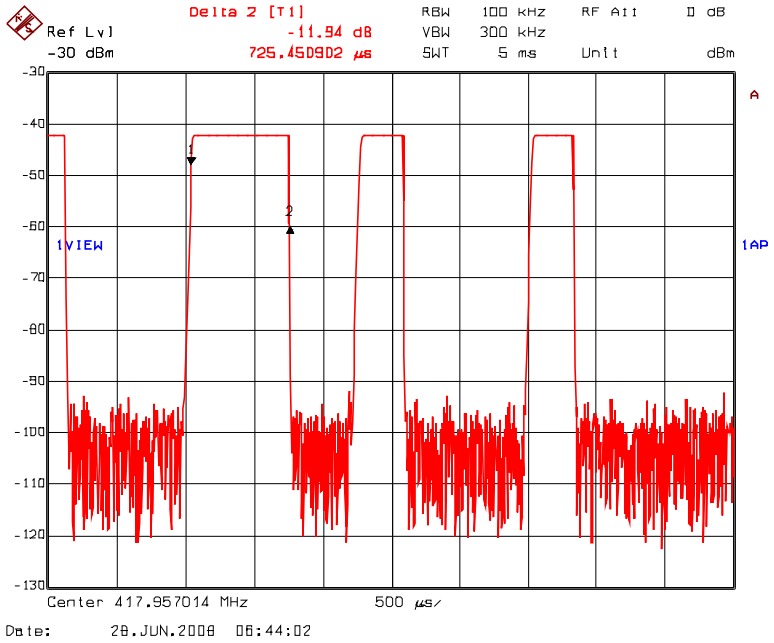
- The emissions were scanned from 30 MHz to 4.5 GHz at 3 meters distance and all spurious and harmonic emissions were recorded. The Average value of the measured emissions were compared with the limits as per Sec 15.231(b)(2).
- The transmitter was placed in three different orthogonal positions for searching maximum field strength level.
- The peak-average correction factor was obtained from the duty cycle calculation. See the Remarks below for details.

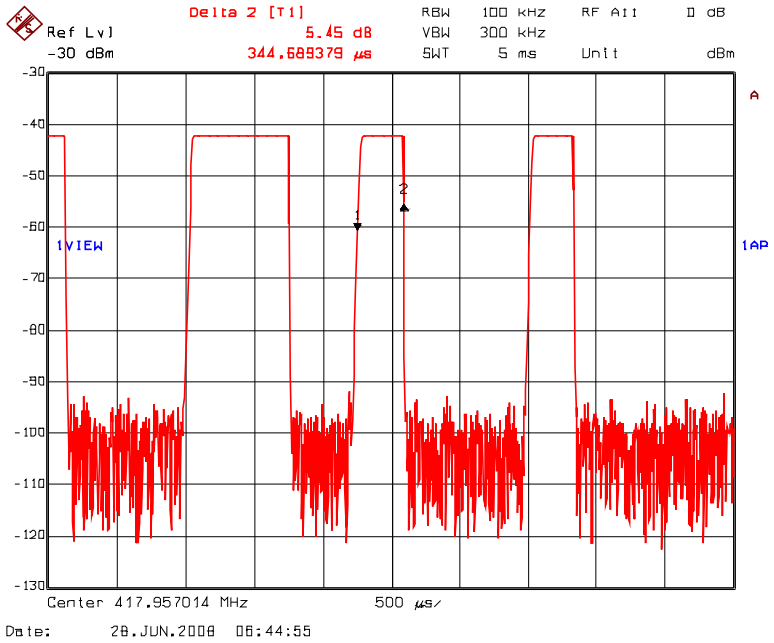
*Emissions within restricted band.

**Remarks**:

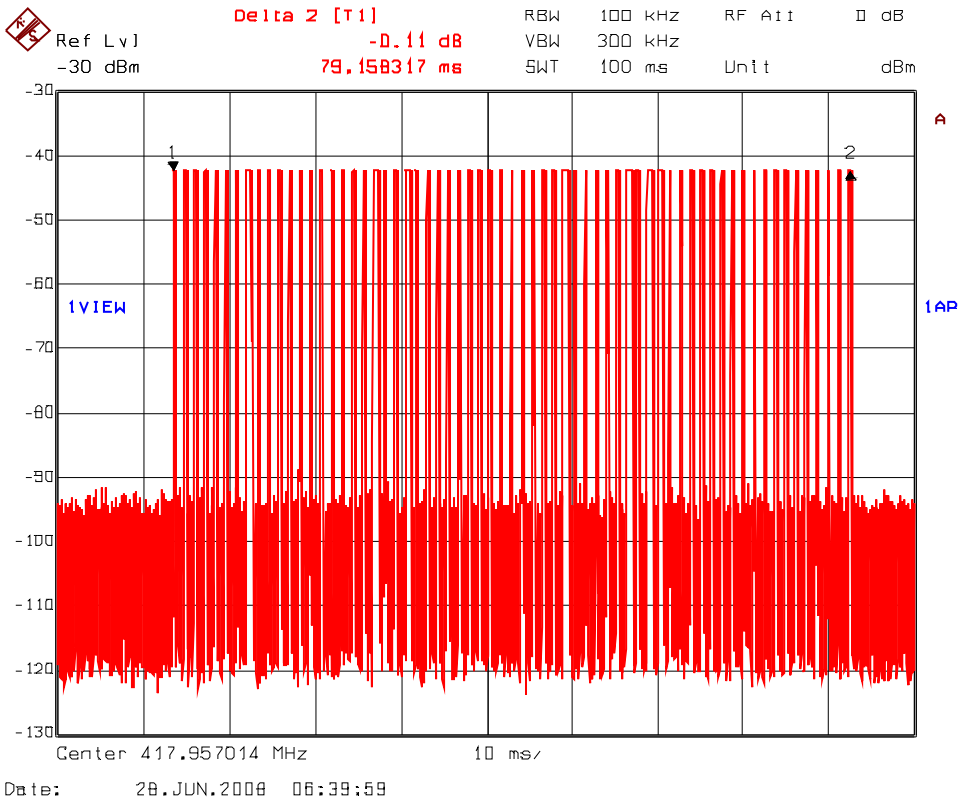
- Txon = 25.07ms
- Duty cycle = Txon/100 = 0.251
- **Peak-to-Average Factor = 20*log (0.251) = -12.0 dB**

## Pulse Widths = 725.45µs & 344.7µs



**Duty Cycle in 100ms:** (7 x 725.45 us)+(58 x 344.69 us) = 5.07815 + 19.99202 ms = 25.07017 ms
**Duty Cycle Factor** = 20*log(0.2507017) = -12.016854 dB



## 5.8. EMISSION BANDWIDTH [§15.231(c)]

### 5.8.1. Limits

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

### 5.8.2. Method of Measurements

Refer to ULTRATECH Test Procedures, File # ULTR P001-2004, §15.231(c) & ANSI C63.4.

The transmitter output was loosely coupled to the spectrum analyzer through a receiving antenna and the bandwidth of the fundamental frequency was measured with the spectrum analyzer with the resolution bandwidth of the spectrum analyzer set per ANSI C63.4.

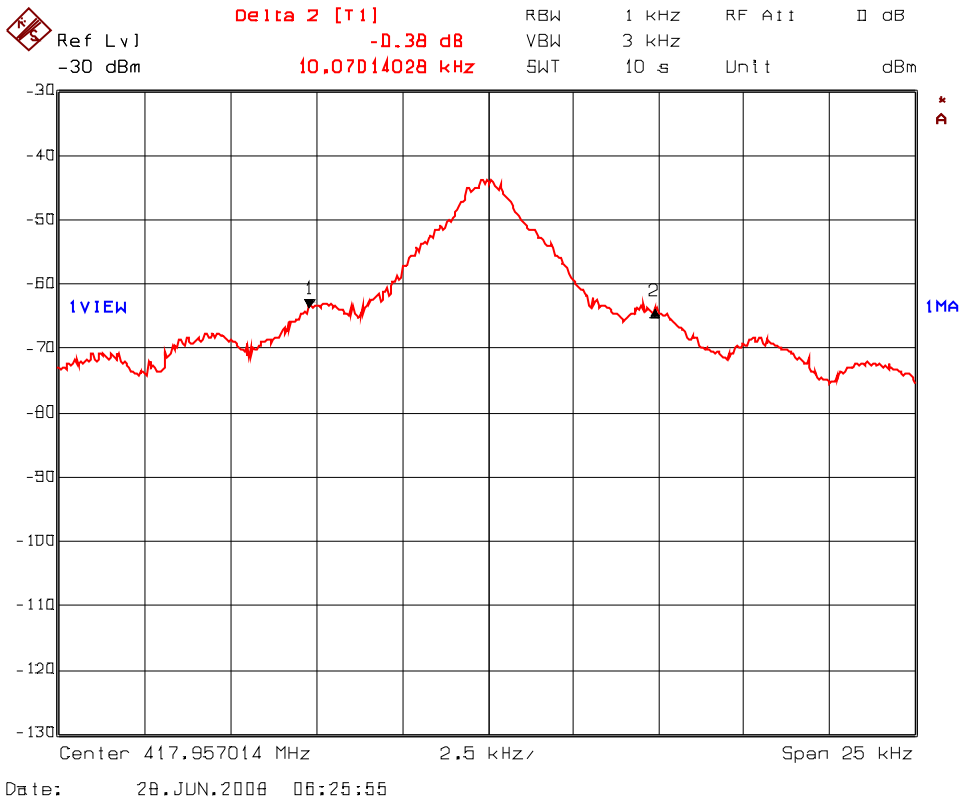
### 5.8.3. Test Equipment List

| Test Instruments | Manufacturer | Model No. | Serial No. | Frequency Range |
|---|---|---|---|---|
| Spectrum Analyzer | Rohde & Schwarz | FSEK30 | 100077 | 20 Hz – 40 GHz |

### 5.8.4. Test Data

| Frequency (MHz) | 20 dB Bandwidth (kHz) | Maximum Limit (kHz) | Pass/Fail |
|---|---|---|---|
| 418 | 10.07 | 1045 | Pass |

## 20 dB Bandwidth
## Test Frequency: 418 MHz



## 5.9. UNINTENTIONAL RADIATED SPURIOUS EMISSIONS [15.109(A)]

### 5.9.1. Limits

The equipment shall meet the limits of the following table:

| Test Frequency Range (MHz) | Limits @3m (dBμV/m) | EMI Detector Used | Measuring Bandwidth (kHz) |
|---|---|---|---|
| 30 – 88 | 40.0 | Quasi-Peak | RBW = 120 kHz, VBW ≥ 120 kHz |
| 88 – 216 | 43.5 | Quasi-Peak | RBW = 120 kHz, VBW ≥ 120 kHz |
| 216 – 960 | 46.0 | Quasi-Peak | RBW = 120 kHz, VBW ≥ 120 kHz |
| Above 960 | 54.0 | Average | RBW = 1 MHz, VBW ≥ 1MHz |

### 5.9.2. Method of Measurements

Refer to ULTRATECH Test Procedures, File # ULTR P001-2004, RSS-210, Issue 7 and ANSI C63.4.

The EUT shall be investigated from the lowest radio frequency signal generated or used in the device, without going below the lowest frequency for which a radiated emission limit is specified, up to the frequency shown in the following table:

| Highest frequency generated or used in the device or on which the device operates or tunes (MHz) | Upper frequency of measurement range (MHz) |
|---|---|
| Below 1.705 | 30 |
| 1.705 - 108 | 1000 |
| 108 – 500 | 2000 |
| 500 -1000 | 5000 |
| Above 1000 | $5^{th}$ harmonic of the highest frequency or 40 GHz, whichever is lower |

### 5.9.3. Test Equipment List

| Test Instruments | Manufacturer | Model No. | Serial No. | Frequency Range |
|---|---|---|---|---|
| Spectrum Analyzer | Rohde & Schwarz | FSEK30 | 100077 | 20 Hz – 40 GHz |
| RF Amplifier | Hewlett Packard | 8447F | 2944A04098 | 0.1 MHz to 1300 MHz |
| RF Amplifier | Hewlett Packard | 8449B | 3008A00769 | 1 GHz to 26.5 GHz |
| Biconilog Antenna | EMCO | 3142 | 1005 | 30 MHz to 2 GHz |
| Horn Antenna | EMCO | 3115 | 6570 | 1 GHz – 18 GHz |

### 5.9.4. Test Data

- The emissions were scanned from 30 MHz to 2 GHz of the receiver and no spurious emissions were found.

# EXHIBIT 6. MEASUREMENT UNCERTAINTY

The measurement uncertainties stated were calculated in accordance with the requirements of NIST Technical Note 1297 and NIS 81 (1994).

## 6.1. RADIATED EMISSION MEASUREMENT UNCERTAINTY

| CONTRIBUTION (Radiated Emissions) | PROBABILITY DISTRIBUTION | UNCERTAINTY (± dB) | |
|---|---|---|---|
| | | 3 m | 10 m |
| Antenna Factor Calibration | Normal (k=2) | ±1.0 | ±1.0 |
| Cable Loss Calibration | Normal (k=2) | ±0.3 | ±0.5 |
| EMI Receiver specification | Rectangular | ±1.5 | ±1.5 |
| Antenna Directivit | Rectangular | +0.5 | +0.5 |
| Antenna factor variation with height | Rectangular | ±2.0 | ±0.5 |
| Antenna phase center variation | Rectangular | 0.0 | ±0.2 |
| Antenna factor frequency interpolation | Rectangular | ±0.25 | ±0.25 |
| Measurement distance variation | Rectangular | ±0.6 | ±0.4 |
| Site imperfections | Rectangular | ±2.0 | ±2.0 |
| Mismatch: Receiver VRC $\Gamma_1$ = 0.2<br>Antenna VRC $\Gamma_R$ = 0.67(Bi) 0.3 (Lp)<br>Uncertainty limits 20Log(1±$\Gamma_1\Gamma_R$) | U-Shaped | +1.1<br>-1.25 | ±0.5 |
| System repeatability | Std. Deviation | ±0.5 | ±0.5 |
| Repeatability of EUT | | - | - |
| Combined standard uncertainty | Normal | +2.19 / -2.21 | +1.74 / -1.72 |
| Expanded uncertainty U | Normal (k=2) | +4.38 / -4.42 | +3.48 / -3.44 |

Calculation for maximum uncertainty when 3m biconical antenna including a factor of k=2 is used:

$U = 2u_c(y) = 2x(+2.19) = +4.38$ dB And $U = 2u_c(y) = 2x(-2.21) = -4.42$ dB