UltraTech
Group of Labs

31040/SIT

C-1376

46390-2049

200093-0

00-034

SL2-IN-E-1119R

3000 Bristol Circle,
Oakville, Ontario,
Canada L6H 6G4

Tel.: (905) 829-1570
Fax.: (905) 829-8050

Website: www.ultratech-labs.com
Email: vic@ultratech-labs.com

Mar. 07, 2006

TIMCO ENGINEERING INC.
P.O. Box 370
849 N.W. State Road 45
Newberry, Florida
USA 32669

Subject:	**Certification Application under FCC Part 15, Subpart C, Para. 15.231, Momentarily Operation in 433.93 MHz.**
Applicant:	**Litens Automotive Partnership**
Product:	**HoodExpress**
Model No.:	**HXP01**
FCC ID:	**TVC-HXP01**

Dear Sir/Madam,

As appointed agent for **Litens Automotive Partnership**, we would like to submit this application for FCC Certification of the above product. Please review all required documents uploaded to TIMCO Upload Web Site.

If you have any queries, please do not hesitate to contact us.

Yours truly,

Tri Minh Luu, P. Eng.,
V.P., Engineering

Encl

UltraTech
Group of Labs

31040/SIT

C-1376

46390-2049

200093-0

00-034

SL2-IN-E-1119R

3000 Bristol Circle,
Oakville, Ontario,
Canada L6H 6G4

Tel.: (905) 829-1570
Fax.: (905) 829-8050

Website: www.ultratech-labs.com
Email: vic@ultratech-labs.com

Mar. 07, 2006

Litens Automotive Partnership
150 Courtland Avenue
Concord, Ontario
Canada, L4K 3T6

Attn.: **Mr. Stan Staniewicz**

Subject: **Certification Application under FCC Part 15, Subpart C, Para. 15.231, Momentarily Operation in 433.93 MHz.**

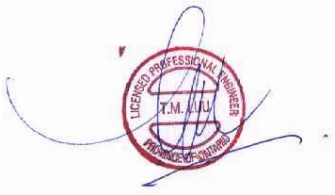
Product: **HoodExpress**
Model No.: **HXP01**
FCC ID: **TVC-HXP01**

Dear Mr. Staniewicz,

The product sample, as provided by you, has been tested and found to comply with **FCC PART 15, Subpart C, FCC Part 15, Subpart C, Para. 15.231, Momentarily Operation in 433.93 MHz.**

Enclosed you will find copies of the engineering report. If you have any queries, please do not hesitate to contact us.

Yours truly,



Tri Minh Luu, P. Eng.,
V.P., Engineering

Encl

ENGINEERING TEST REPORT

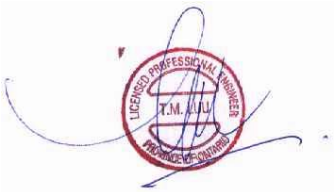
HoodExpress
Model No.: HXP01

FCC ID: TVC-HXP01

Applicant: **Litens Automotive Partnership**
150 Courtland Avenue
Concord, Ontario
Canada, L4K 3T6

In Accordance With
FEDERAL COMMUNICATIONS COMMISSION (FCC)
PART 15, SUBPART C, SEC. 15.231
Momentarily Operated Transmitters in 433.93 MHz

UltraTech's File No.: LTNS-001FCC15

This Test report is Issued under the Authority of Tri M. Luu, Professional Engineer, Vice President of Engineering UltraTech Group of Labs Date: Mar. 07, 2006	
Report Prepared by: Tri Luu, P.Eng. Issued Date: Mar. 07, 2006	Tested by: Hung Trinh, RFI Technologist Test Dates: Mar. 02, 2006

- *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.*

UltraTech

3000 Bristol Circle, Oakville, Ontario, Canada, L6H 6G4
Tel.: (905) 829-1570 Fax.: (905) 829-8050
Website: www.ultratech-labs.com Email: vic@ultratech-labs.com, Email: tri.luu@sympatico.ca

TABLE OF CONTENTS

- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

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 a Low Power Transmitter operating in the frequency band 433.93 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 • Light-industry, Commercial • Industry

1.2. RELATED SUBMITAL(S)/GRANT(S)

None

1.3. NORMATIVE REFERENCES

Publication	YEAR	Title
FCC CFR Parts 0-19	2005	Code of Federal Regulations – Telecommunication
ANSI C63.4	2004	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
FCC Public Notice DA 00-1407	2000	Part 15 Unlicensed Modular Transmitter Approval
CISPR 22 +A1 EN 55022	2003-04-10 2004-10-14 2003	Limits and Methods of Measurements of Radio Disturbance Characteristics of Information Technology Equipment
CISPR 16-1-1	2003	Specification for radio disturbance and immunity measuring apparatus and methods. Part 1-1: Measuring Apparatus
CISPR 16-2-1	2003	Specification for radio disturbance and immunity measuring apparatus and methods. Part 2-1: Conducted disturbance measurement
CISPR 16-2-3	2003	Specification for radio disturbance and immunity measuring apparatus and methods. Part 2-3: Radiated disturbance measurement

EXHIBIT 2: PERFORMANCE ASSESSMENT

2.1. CLIENT INFORMATION

APPLICANT:	
Name:	Litens Automotive Partnership
Address:	150 Courtland Avenue Concord, Ontario Canada, L4K 3T6
Contact Person:	Mr. Stan Staniewicz Phone #: 905-760-9177 x 217 Fax #: 905-760-9187 Email Address: stan.staniewicz@litens.com

MANUFACTURER:	
Name:	Litens Automotive Partnership
Address:	150 Courtland Avenue Concord, Ontario Canada, L4K 3T6
Contact Person:	Mr. Stan Staniewicz Phone #: 905-760-9177 x 217 Fax #: 905-760-9187 Email Address: stan.staniewicz@litens.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.

Brand Name	Litens Automotive Partnership
Product Name	HoodExpress
Model Name or Number	HXP01
Serial Number	Pre-production
Type of Equipment	Momentarily operated Transmitter
Input Power Supply Type	3 V Battery

2.3. EUT'S TECHNICAL SPECIFICATIONS

TRANSMITTER	
Equipment Type:	▪ Portable
Intended Operating Environment:	▪ Residential ▪ Commercial, light industry & heavy industry
Power Supply Requirement:	3 V Battery
Maximum Average E-Field @3m:	69.68 dBµV/m @ 3m
Operating Frequency Range:	433.93 MHz
RF Output Impedance:	50 Ohms
Channel Spacing:	N/A
Duty Cycle:	33.4 %
20 dB Bandwidth:	8.45 kHz
Modulation Type:	Pulse modulation
Emission Designation:	8K45P0N
Oscillator Frequencies:	433.93 MHz
Antenna Connector Type:	• Integral (the antenna component is soldered onto the radio printed circuit board and located inside the enclosure)

2.4. LIST OF EUT'S PORTS

N/A

2.5. ANCILLARY EQUIPMENT

N/A

EXHIBIT 3: EUT OPERATING CONDITIONS AND CONFIGURATIONS DURING TESTS

3.1. CLIMATE TEST CONDITIONS

The climate conditions of the test environment are as follows:

Temperature:	21°C
Humidity:	51%
Pressure:	102 kPa
Power input source:	3 V Battery

3.2. OPERATIONAL TEST CONDITIONS & ARRANGEMENT FOR TESTS

Operating Modes:	Transmit 433.93 MHz
Special Test Software:	N/A
Special Hardware Used:	Specially set for to transmit continuously for testing purpose only
Transmitter Test Antenna:	The EUT is tested with the antenna fitted in a manner typical of normal intended use as an integral antenna equipment.

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.

- AC Powerline Conducted Emissions were performed in UltraTech's shielded room, 16'(L) by 12'(W) by 12'(H).

- 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.: IC2049-1). Last Date of Site Calibration: June. 20, 2005.

4.2. APPLICABILITY & SUMMARY OF EMC EMISSION TEST RESULTS

FCC PARAGRAPH.	TEST REQUIREMENTS	COMPLIANCE (YES/NO)
15.203	Antenna Requirement	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) & 15.207(a)	AC Power Conducted Emissions	Not applicable for battery operated device.

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 ANSI C63.4 and ULTR-P001-2004.

5.2. MEASUREMENT UNCERTAINTIES

The measurement uncertainties stated were calculated in accordance with requirements of UKAS Document LAB 34 with a confidence level of 95%. Please refer to Exhibit 6 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 C63.4 and CISPR 16-1.

5.4. ANTENNA REQUIREMENTS @ FCC CFR 47, PARA 15.203

5.4.1. Limits

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

N**otes**: This requirement does not apply to carrier current devices operated under the provisions of @ 15.211, 15.213, 15.217, 17.219 or 15.221.

5.4.2. Method of Measurements

Refer to Exhibit 7, Sec. 7.2 of this test report & ANSI C63.4

5.4.3. Engineering Analysis

Internal integral antenna component mounted on the printed circuit board.

5.5. PROVISIONS OF FCC 15.231(A) FOR PERIODIC TRANSMITTERS

5.5.1. Engineering Analysis

FCC Rules	FCC PROVISSIONS	ANALYSIS ON COMPLIANCE
15.23(a)	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. Data is permitted to be sent with a control signal. The following conditions shall be met to comply with the provisions for this periodic operation:	The EUT is used as a remote switch
15.231(a)(1)	A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.	Comply
15.231(a)(2)	A transmitter activated automatically shall cease transmission within 5 seconds after activation.	N/A
15.231(a)(3)	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 does 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 two seconds per hour.	N/A
15.231(a)(4)	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

5.6. TRANSMITTER RADIATED EMISSIONS @ 3 METERS, FCC CFR 47, PARA. 15.231(B), 15.209 & 15.205

5.6.1. Limits

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

Fundamental Frequency (MHz)	Average Field Strength Limits (μV/m)	
	Fundamental	Harmonic/Spurious
260 - 470 MHz	3750 - 12,500	375 - 1250

[Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 260-470 MHz, uV/m at 3 meters = 41.6667(F) - 7083.3333. The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.]

(1) The above field strength limits are specified at a distance of 3 meters. The tighter limits apply at the band edges.

(2) Intentional radiators operating under the provisions of this Section shall demonstrate compliance with the limits on the field strength of emissions, as shown in the above table, based on the average value of the measured emissions. As an alternative, compliance with the limits in the above table may be based on the use of measurement instrumentation with a CISPR quasi-peak detector. The specific method of measurement employed shall be specified in the application for equipment authorization. If average emission measurements are employed, the provisions in Section 15.35 for averaging pulsed emissions and for limiting peak emissions apply. Further, compliance with the provisions of Section 15.205 shall be demonstrated using the measurement instrumentation specified in that section.

(3) The limits on the field strength of the spurious emissions in the above table are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in Section 15.209, whichever limit permits a higher field strength.

Remarks:

- Applies to harmonics/spurious emissions that fall in the restricted bands listed in Section 15.205. The maximum permitted average field strength is listed in Section 15.209.
- **@ FCC CFR 47, Para. 15.237(c)** - The emission limits as specified above are based on measurement instrument employing an average detector. The provisions in **@15.35** for limiting peak emissions apply.

FCC CFR 47, Part 15, Subpart C, Para. 15.205(a) - Restricted Frequency Bands

MHz	MHz	MHz	GHz
0.090 - 0.110	162.0125 - 167.17	2310 - 2390	9.3 - 9.5
0.49 - 0.51	167.72 - 173.2	2483.5 - 2500	10.6 - 12.7
2.1735 - 2.1905	240 - 285	2655 - 2900	13.25 - 13.4
8.362 - 8.366	322 - 335.4	3260 - 3267	14.47 - 14.5
13.36 - 13.41	399.9 - 410	3332 - 3339	14.35 - 16.2
25.5 - 25.67	608 - 614	3345.8 - 3358	17.7 - 21.4
37.5 - 38.25	960 - 1240	3600 - 4400	22.01 - 23.12
73 - 75.4	1300 - 1427	4500 - 5250	23.6 - 24.0
108 - 121.94	1435 - 1626.5	5350 - 5460	31.2 - 31.8
123 - 138	1660 - 1710	7250 - 7750	36.43 - 36.5
149.9 - 150.05	1718.8 - 1722.2	8025 - 8500	Above 38.6
156.7 - 156.9	2200 - 2300	9000 - 9200	

FCC CFR 47, Part 15, Subpart C, Para. 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

5.6.2. Method of Measurements

Refer to Ultratech Test Procedures, File # ULTR P001-2004 and ANSI C63.4 for measurement methods

5.6.3. Test Equipment List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
Spectrum Analyzer/ EMI Receiver	Rohde & Schawrz	FSEK20/B4/B21	834157/005	9 kHz – 40 GHz with external mixer
Peak Power Meter & Peak Power Sensor	Hewlett Packard	8900 8481A	2131A00124 2551A01965	0.1-18 GHz 50 Ohms Input
Microwave Amplifier	Hewlett Packard	HP 83017A		1 GHz to 26.5 GHz
Active Loop Antenna	EMCO	6507	8906-1167	1 kHz – 30 MHz
Log Periodic/Bow-Tie Antenna	EMCO	3143	1029	20 - 1000 MHz
Horn Antenna	EMCO	3155	9701-5061	1 GHz – 18 GHz

5.6.4. Photograph of Test Setup

Please refer to Photographs # 1 through #3 in Annex 1 for Measurements data

5.6.5. Test Data

Duty Cycle Measurements: 33.38 % or Peak-Average Conversion factor = -9.53 dB
Please refer o the Plots # 1(a), (b) & (c) for detailed measurements

The emissions were scanned from 10 MHz to 10th harmonic of the highest oscillator frequency (5 GHz) and all emissions less 20 dB below the limits were recorded.

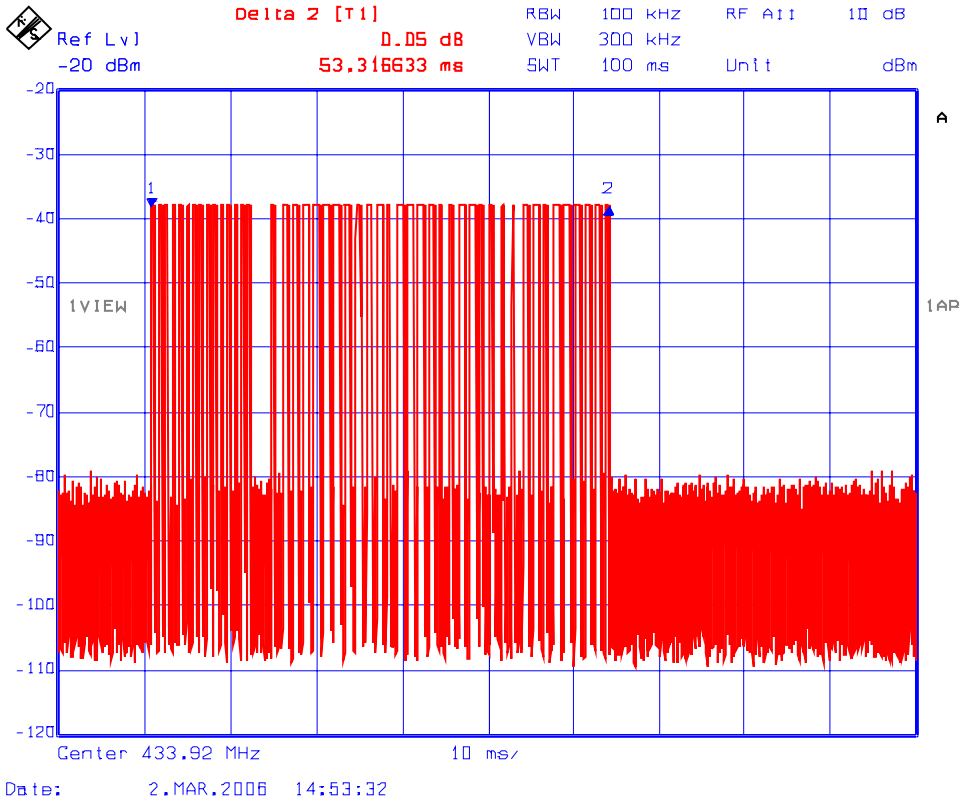
Note:

- For portable transmitter was placed in three different orthogonal position for searching maximum field strength level.
- In the restricted band per FCC 15.205: Limit (2) per 15.209 is applied
- Outside the restricted band per FCC 15.205: Limit (1) per FCC 15.231 or Limit (2) per 15.209 whichever allows higher field strength emission, is applied.

FREQUENCY (MHz)	Peak E-FIELD @3m (dBuV/m)	Avergae E-FIELD @3m (dBuV/m)	DETECTOR USED (H/V)	ANTENNA PLANE (dBuV/m)	Average (1) LIMIT @3m (dBuV/m)	Restricted (2) Band Limits @3m (dB)	MARGIN (Pass/Fail)
433.93	79.21	69.68	V	80.8	46.0	-11.1	PASS
433.93	77.51	67.98	H	80.8	46.0	-12.8	PASS
867.86	54.43	44.90	V	60.8	46.0	-15.9	PASS
867.86	53.78	44.25	H	60.8	46.0	-16.6	PASS
1301.79	50.81	41.28	V	60.8	54.0	-12.7	PASS
1301.79	48.65	39.12	H	60.8	54.0	-14.9	PASS
1735.72	63.34	53.81	V	60.8	54.0	-7.0	PASS
1735.72	59.82	50.29	H	60.8	54.0	-10.5	PASS
2169.65	52.99	43.46	V	60.8	54.0	-17.4	PASS
2169.65	52.54	43.01	H	60.8	54.0	-17.8	PASS
2603.58	44.24	34.71	V	60.8	54.0	-26.1	PASS
2603.58	44.21	34.68	H	60.8	54.0	-26.1	PASS

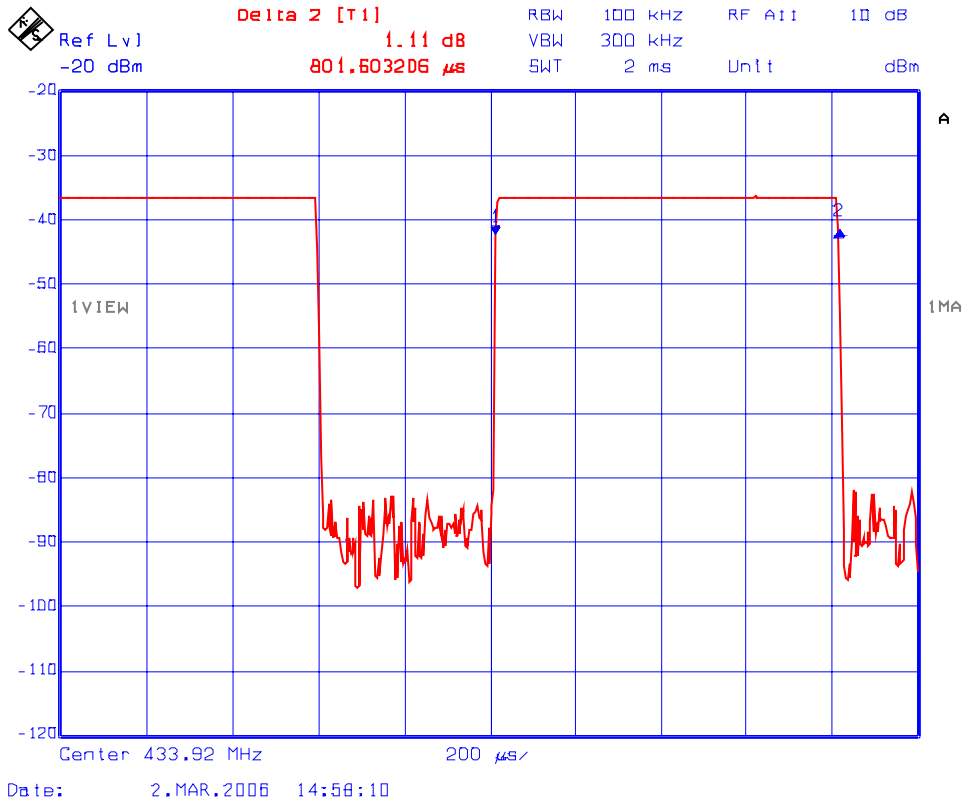
Figure 1(a): Duty Cycle – Number of Pulses

Duty Cycle factor: (15 x 408.82 µs) + (34 x 801.60 µs)/ 100= 0.3338 => 20 log (0.3338)= -9.53 dB



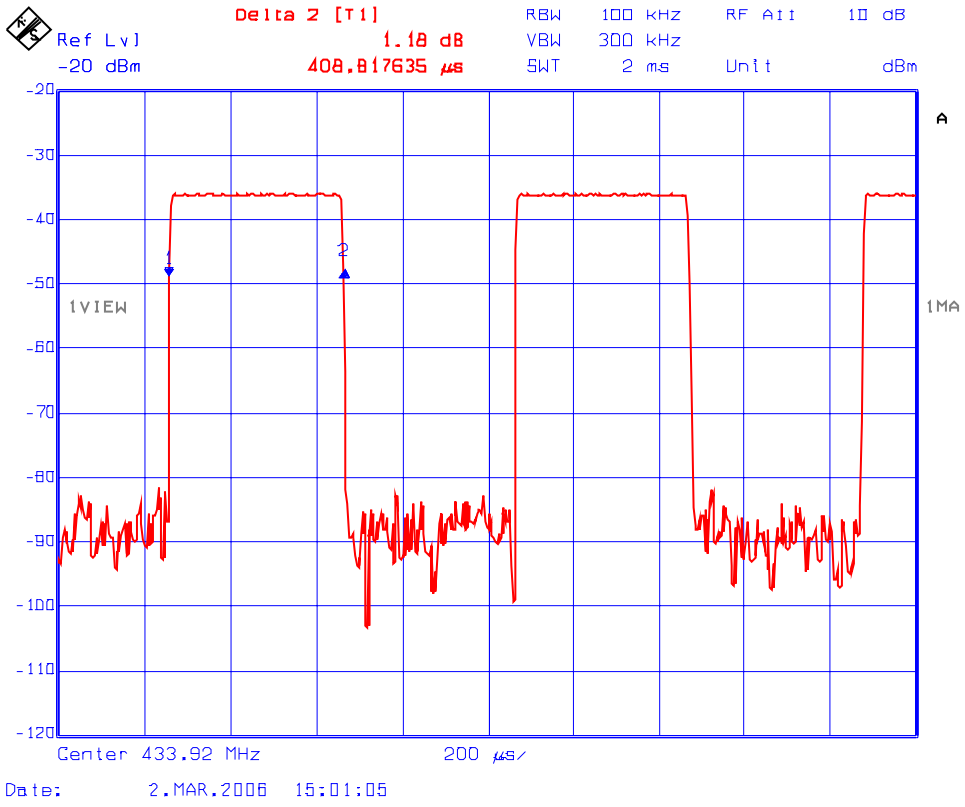
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Figure 1(b): Duty Cycle Pulse Width #1



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Figure 1(c): Duty Cycle Pulse Width #2



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

5.7. 20 DB BANDWIDTH @ FCC CFR 47, PARA. 15.231(C)

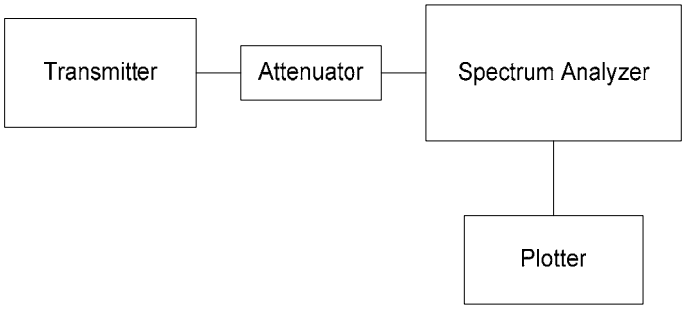
5.7.1. Limits

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. Bandwidth is determined at the points 20 dB down from the modulated carrier.

5.7.2. Method of Measurements

Refer to Ultratech Test Procedures, File # ULTR P001-2004 and ANSI C63.4 for measurement methods

5.7.3. Test Arrangement



5.7.4. Test Equipment List

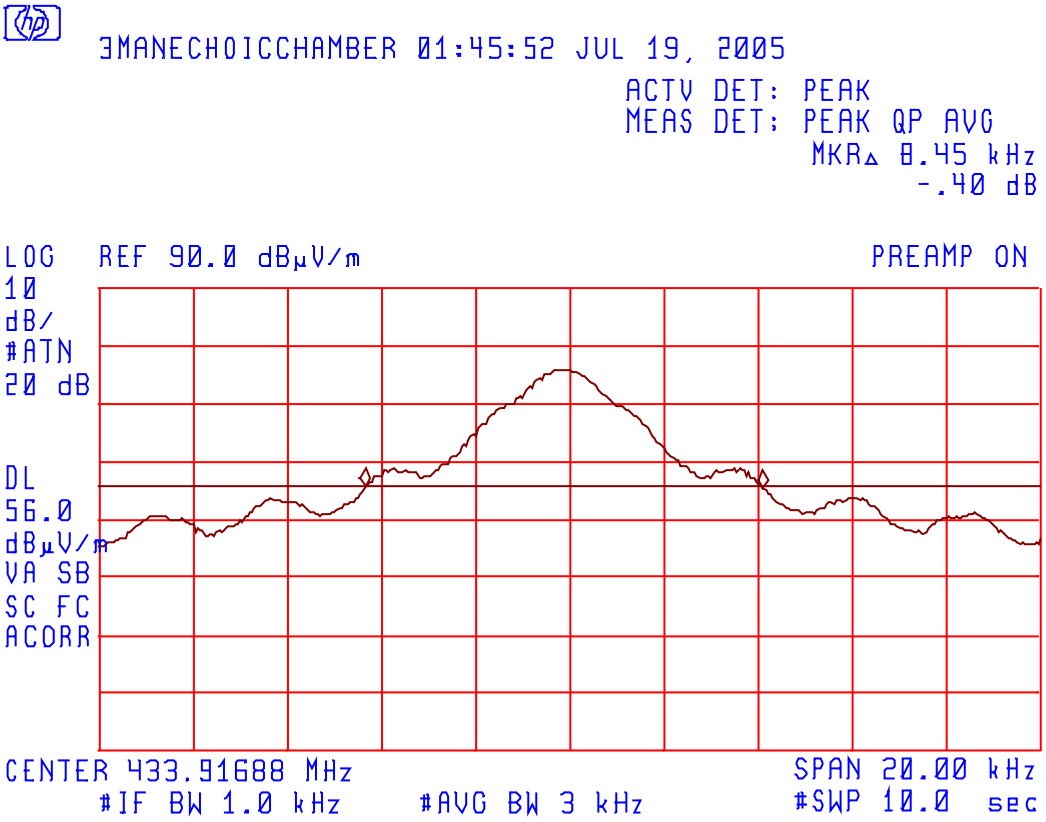
Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
Spectrum Analyzer/ EMI Receiver	Rohde & Schawrz	FSEK20/B4/B21	834157/005	9 kHz – 40 GHz with external mixer

5.7.5. Test Data

CHANNEL FREQUENCY (MHz)	20 dB Bandwidth (KHz)
433.93	8.45 kHz

Please refer to Plot #2 for detailed measurements

Plot #2: 20 dB Bandwidth Measurement



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

EXHIBIT 6: MEASUREMENT UNCERTAINTY

The measurement uncertainties stated were calculated in accordance with the requirements of NIST Technical Note 1297 and LAB 34

6.1. LINE CONDUCTED EMISSION MEASUREMENT UNCERTAINTY

CONTRIBUTION (Line Conducted)	PROBABILITY DISTRIBUTION	UNCERTAINTY (dB)	
		9-150 kHz	0.15-30 MHz
EMI Receiver specification	Rectangular	±1.5	±1.5
LISN coupling specification	Rectangular	±1.5	±1.5
Cable and Input Transient Limiter calibration	Normal (k=2)	±0.3	±0.5
Mismatch: Receiver VRC Γ_1 = 0.03 LISN VRC Γ_R = 0.8(9 kHz) 0.2 (30 MHz) Uncertainty limits 20Log(1±$\Gamma_1\Gamma_R$)	U-Shaped	±0.2	±0.3
System repeatability	Std. deviation	±0.2	±0.05
Repeatability of EUT	--	--	--
Combined standard uncertainty	Normal	±1.25	±1.30
Expanded uncertainty U	Normal (k=2)	±2.50	±2.60

Sample Calculation for Measurement Accuracy in 450 kHz to 30 MHz Band:

$$u_c(y) = \sqrt{\sum_{I=1}^{m} u_i^2(y)} = \pm \sqrt{(1.5^2 + 1.5^2)/3 + (0.5/2)^2 + (0.05/2)^2 + 0.35^2} = \pm 1.30 \text{ dB}$$

$$U = 2u_c(y) = \pm 2.6 \text{ dB}$$

6.2. 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 Directivity	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 Γ_1 = 0.2 Antenna VRC Γ_R = 0.67(Bi) 0.3 (Lp) Uncertainty limits 20Log(1±$\Gamma_1\Gamma_R$)	U-Shaped	+1.1 -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