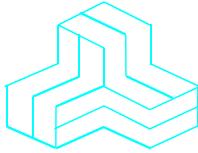


ENGINEERING TEST REPORT



**1way (Car Remote Control)
Model No.: TST-WK05-4**

FCC ID: EZSDEMT25

Applicant:
DEI Headquarters Inc.
*One Viper Way
Vista, CA
USA 92083-7853*

In Accordance With

**FEDERAL COMMUNICATIONS COMMISSION (FCC)
Part 15, Subpart C, Section 15.231
Momentarily Operation at 434 MHz**

UltraTech's File No.: ATR-048F15C231

This Test report is Issued under the Authority of
Tri M. Luu, Professional Engineer,
Vice President of Engineering
UltraTech Group of Labs

Date: July 11, 2008



Report Prepared by: JaeWook Choi

Tested by: Hung Trinh, RFI Technician

Issued Date: July 11, 2008

Test Dates: July 3, 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.*

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@ultratech-labs.com



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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 434 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 EN 55022	2006 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. Part 1-1: Measuring Apparatus
CISPR 16-2-1	2004	Specification for radio disturbance and immunity measuring apparatus and methods. Part 2-1: Conducted disturbance measurement

EXHIBIT 2. PERFORMANCE ASSESSMENT

2.1. CLIENT INFORMATION

APPLICANT	
Name:	DEI Headquarters Inc.
Address:	One Viper Way Vista, CA USA 92083-7853
Contact Person:	Mr. Minas Minassian Phone #: (760) 598-6200 Ex 1231 Fax #: (760) 598-6400 Email Address: minas.minassian@directed.com

MANUFACTURER	
Name:	Trilogix Electronic Manufacturing
Address:	2109 St-Regis Street, Dollard des Ormeaux, Quebec, Canada, H9B 2M9
Contact Person:	Mr. Frank Panarello Tel.: (514)684-9250 Fax: (514)684-5857 Email: admin@trilogix.ca

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:	1way (Car Remote Control)
Model Name or Number:	TST-WK05-4
Serial Number:	Test Sample
Type of Equipment:	Low Power Transmitter
Power Input Source:	3V battery
Primary User Functions of EUT:	Remote Car Starter

2.3. EUT'S TECHNICAL SPECIFICATIONS

Transmitter	
Equipment Type:	Mobile
Intended Operating Environment:	Residential
RF Output Power Rating:	63.8 dB μ V/m Avg E-field @ 3 meters
Operating Frequency Range:	434 MHz
Duty Cycle:	55.21 %
20 dB Bandwidth:	6.97 kHz
Modulation Type:	ASK
Antenna Connector Type:	Integral antenna, housed inside the enclosure.
Antenna Description:	Type: Part of the PCB Frequency Range: 434 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:	22°C
Humidity:	51%
Pressure:	102 kPa
Power Input Source:	3 V 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	434 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)	Power Line Conducted Emissions Measurements (Transmit & Receive)	N/A (battery operated device)
15.109(a)	Radiated Emissions for Digital device	Yes
15.111(a)	Receiver Antenna Power Conducted Emissions Non-Integral Antenna Port	N/A (Integral Antenna)

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 to remotely start a car engine and lock/unlock doors via RF link.

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

5.6.1. Engineering Analysis

FCC PROVISIONS	ANALYSIS ON COMPLIANCE
<p>§15.231(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.</p>	<p>Remote Control</p>
<p>§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.</p>	<p>Complies as declared by manufacturer.</p>
<p>§15.231(a)(2): A transmitter activated automatically shall cease transmission within 5 seconds after activation.</p>	<p>No automatic activation</p>
<p>§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 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.</p>	<p>N/A</p>
<p>§15.231(a)(4): Internal 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.</p>	<p>N/A</p>
<p>§15.231(a)(5): Transmission of set-up information for security systems may exceed the transmission duration limits in paragraphs (a)(1) and (a)(2) of this section, provided such transmission are under the control of a professional installer and do not exceed ten seconds after a manually operated switch is releases or a transmitter is activated automatically. Such set-up information may include data.</p>	<p>N/A</p>

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 @ 434 MHz = 78.5 dBµV/m

Field Strength of Spurious Limit (outside restricted bands) = 58.5 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	3142C	00026873	30 MHz to 2 GHz
Horn Antenna	EMCO	3115	6570	1 GHz – 18 GHz
High Pass Filter	Mini Circuit	SHP-800	10425	Cut off 710 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)
434.00	67.63	62.5	V	80.8	--	-18.4
434.00	68.93	63.8	H	80.8	--	-17.0
868.00	56.52	51.4	V	60.8	46.0	-9.5
868.00	61.25	56.1	H	60.8	46.0	-4.7
1302.00	48.45	43.3	V	60.8	54.0	-10.7*
1302.00	48.51	43.4	H	60.8	54.0	-10.6*
1736.00	54.20	49.0	V	60.8	54.0	-11.8
1736.00	55.77	50.6	H	60.8	54.0	-10.2
2170.00	42.75	37.6	V	60.8	54.0	-23.2
2170.00	45.28	40.1	H	60.8	54.0	-21.6
3038.00	45.35	40.2	V	60.8	54.0	-20.7
3038.00	47.40	42.2	H	60.8	54.0	-20.6
3906.00	47.34	42.2	V	60.8	54.0	-11.8*
3906.00	46.06	40.9	H	60.8	54.0	-11.8*
4340.00	45.76	40.6	V	60.8	54.0	-13.1*
4340.00	47.40	42.2	H	60.8	54.0	-13.4*

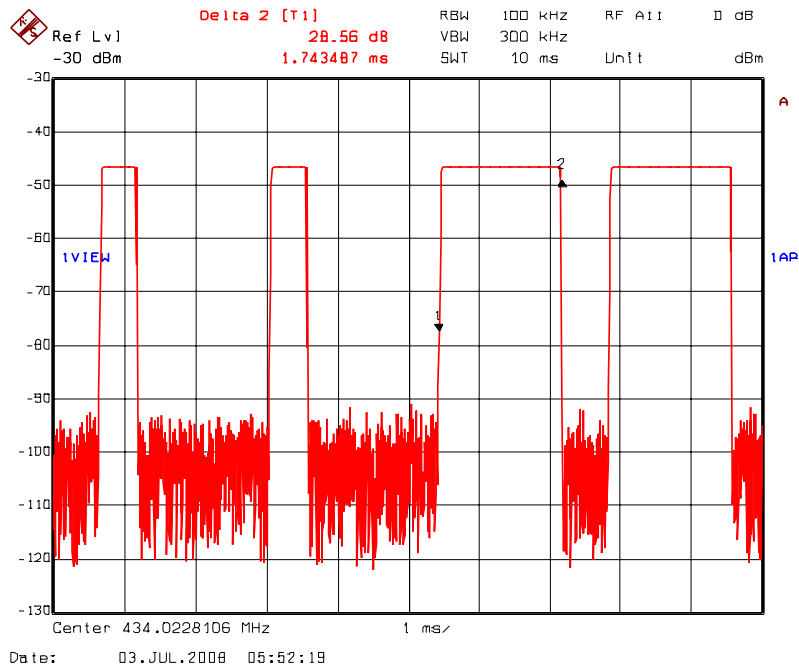
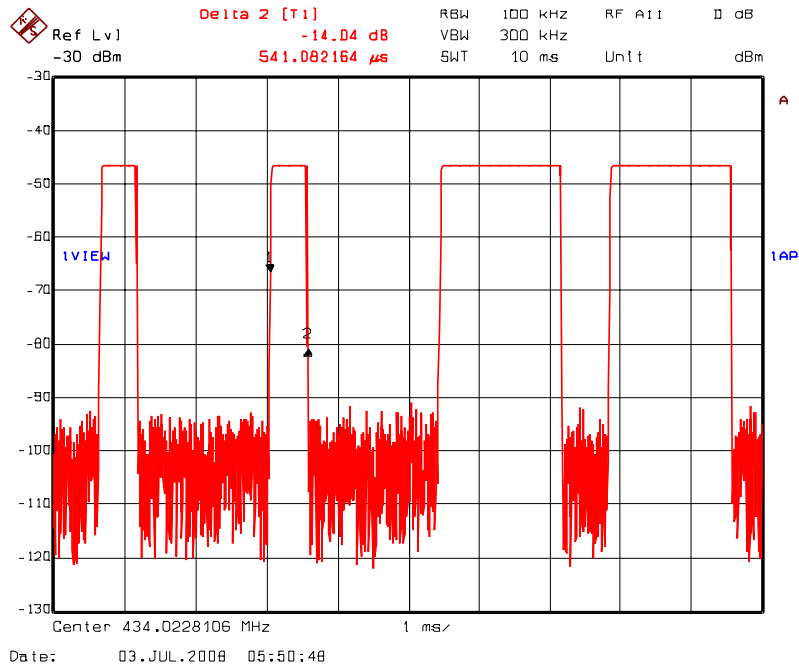
- The emissions were scanned from 30 MHz to 5 GHz at 3 meters distance and all spurious and harmonic emissions were recorded. The Average value of the measured emissions were compared with the limits as per Sec 15.231(b)(2).
- The transmitter was placed in three different orthogonal positions for searching 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 = 55.21 ms
- Duty cycle = Txon/100 = 0.5521
- **Peak-to-Average Factor** = 20*log (0.5521) = -5.16dB

Pulse Widths = short pulse 541.08µs & long pulse 1.74ms



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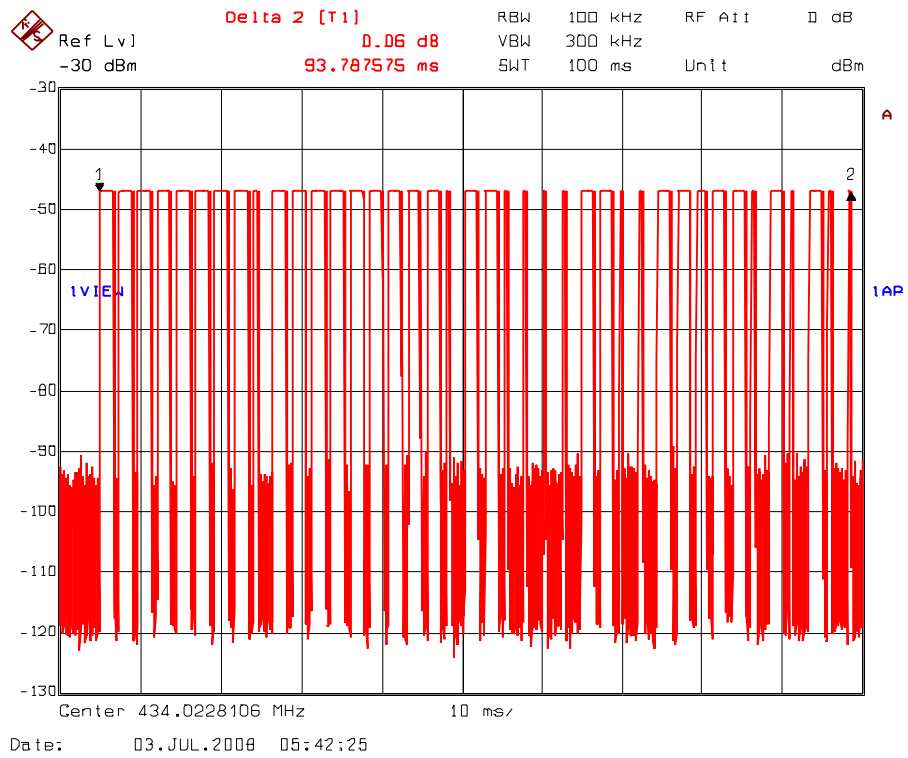
3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4
Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: <http://www.ultratech-labs.com>

File #: ATR-048F15C231

July 11, 2008

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

Duty Cycle in 100ms: $(28 \times 1.74\text{ms}) + (12 \times 541.08\mu\text{s}) = 48.72\text{ms} + 6.49\text{ms} = 55.21\text{ms}$
Duty Cycle Factor = $20 \times \log(0.5521) = -5.16\text{dB}$



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3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4
Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: <http://www.ultratech-labs.com>

File #: ATR-048F15C231

July 11, 2008

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

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.

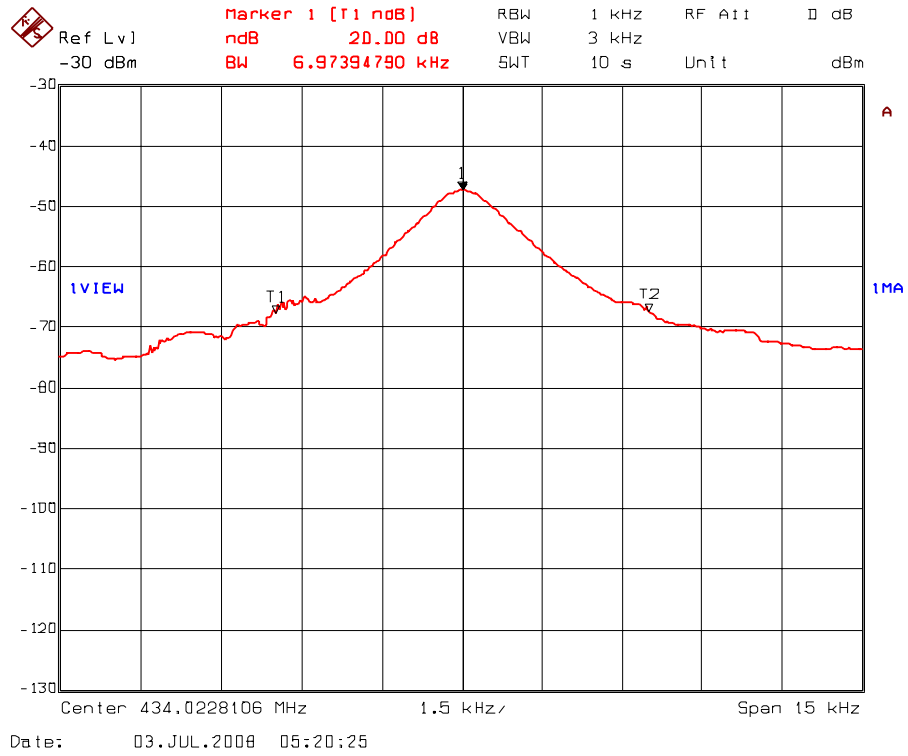
5.8.3. Test Equipment List

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
434	6.97	1085	Pass

20 dB Bandwidth
Test Frequency: 434 MHz



ULTRATECH GROUP OF LABS

3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4
Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: <http://www.ultratech-labs.com>

File #: ATR-048F15C231

July 11, 2008

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

5.9. SPURIOUS EMISSIONS FROM CLASS B UNINTENTIONAL RADIATORS (DIGITAL DEVICE) [15.109(A)]

5.9.1. Limits

The equipment shall meet the limits of the following table:

Test Frequency Range (MHz)	Limits @3m (dB μ V/m)	EMI Detector Used	Measuring Bandwidth (kHz)
30 – 88	40.0	Quasi-Peak	RBW = 120 kHz, VBW \geq 120 kHz
88 – 216	43.5	Quasi-Peak	RBW = 120 kHz, VBW \geq 120 kHz
216 – 960	46.0	Quasi-Peak	RBW = 120 kHz, VBW \geq 120 kHz
Above 960	54.0	Average	RBW = 1 MHz, VBW \geq 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	3142C	00026873	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 2GHz 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 (\pm 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 $\Gamma_1 = 0.2$ Antenna VRC $\Gamma_R = 0.67$ (Bi) 0.3 (Lp) Uncertainty limits $20\text{Log}(1 \pm \Gamma_1 \Gamma_R)$	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:

$$U = 2u_c(y) = 2x(+2.19) = +4.38 \text{ dB} \quad \text{And} \quad U = 2u_c(y) = 2x(-2.21) = -4.42 \text{ dB}$$