L.S. Compliance, Inc.
W66 N220 Commerce Court
Cedarburg, WI 53012
262.375.4400 FAX: 262.375.4248

Compliance Testing of:

"Turn On" Transmitter

Prepared For:

Dukane Corporation
Attn.: Mr. Dan Kramer
2900 Dukane Drive
St. Charles, IL 60174

Test Report Number:

303485 TX c

Test Dates:

January 12th – 21st and March 5th, 2004

Table of Contents

1. L.S. Compliance in Review

Brief Review of
L.S. Compliance
Accreditations and Listing's

As an EMC Testing Laboratory, our Accreditation and Assessments are recognized through the following:

A2LA – American Association for Laboratory Accreditation

Accreditation based on ISO/IEC 17025 : 1999
with Electrical (EMC) Scope of Accreditation
A2LA Certificate Number: **1255.01**

Federal Communications Commission (FCC) – USA

Listing of 3 Meter Semi-Anechoic Chamber based on Title 47 CFR – Part 2.948
FCC Registration Number: **90756**

Listing of 3 and 10 meter OATS based on Title 47CFR – Part 2.948
FCC Registration Number: **90757**

Industry Canada

On file, 3 Meter Semi-Anechoic Chamber based on RSS-212 – Issue 1
File Number: **IC 3088-A**

On file, 3 and 10 Meter OATS based on RSS-212 – Issue 1
File Number: **IC 3088**

U. S. Conformity Assessment Body (CAB) Validation

Validated by the European Commission as a **U. S. Competent Body** operating under the U. S. /EU, Mutual Recognition Agreement (MRA) operating under the European Union Electromagnetic Compatibility –Council Directive 89/336/EEC, Article 10.2.
Date of Validation: **January 16, 2001**

Validated by the European Commission as a **U.S. Notified Body** operating under the U.S./EU, Mutual Recognition Agreement (MRA) operating under the European Union Telecommunication Equipment – Council Directive 99/5/EC, Annex V.

Date of Validation: **November 20, 2002**
Notified Body Identification Number: **1243**

2. A2LA Certificate of Accreditation

THE AMERICAN
ASSOCIATION
FOR LABORATORY
ACCREDITATION

ACCREDITED LABORATORY

A2LA has accredited

L.S. COMPLIANCE, INC.
Cedarburg, WI

for technical competence in the field of

Electrical Testing

The accreditation covers the specific tests and types of tests listed on the agreed scope of accreditation. This laboratory meets the requirements of ISO/IEC 17025 - 1999 "General Requirements for the Competence of Testing and Calibration Laboratories" and any additional program requirements in the identified field of testing. Testing and calibration laboratories that comply with this International Standard also operate in accordance with ISO 9001 or ISO 9002 (1994).

Presented this 26th day of March 2003.

President
For the Accreditation Council
Certificate Number 1255.01
Valid to January 31, 2005

For tests or types of tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

3. A2LA Scope of Accreditation

American Association for Laboratory Accreditation

SCOPE OF ACCREDITATION TO ISO/IEC 17025-1999

L.S. COMPLIANCE, INC.
W66 N220 Commerce Court
Cedarburg, WI 53012
James Blaha Phone: 262 375 4400

ELECTRICAL (EMC)

Valid to: January 31, 2005 Certificate Number: 1255-01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following tests:

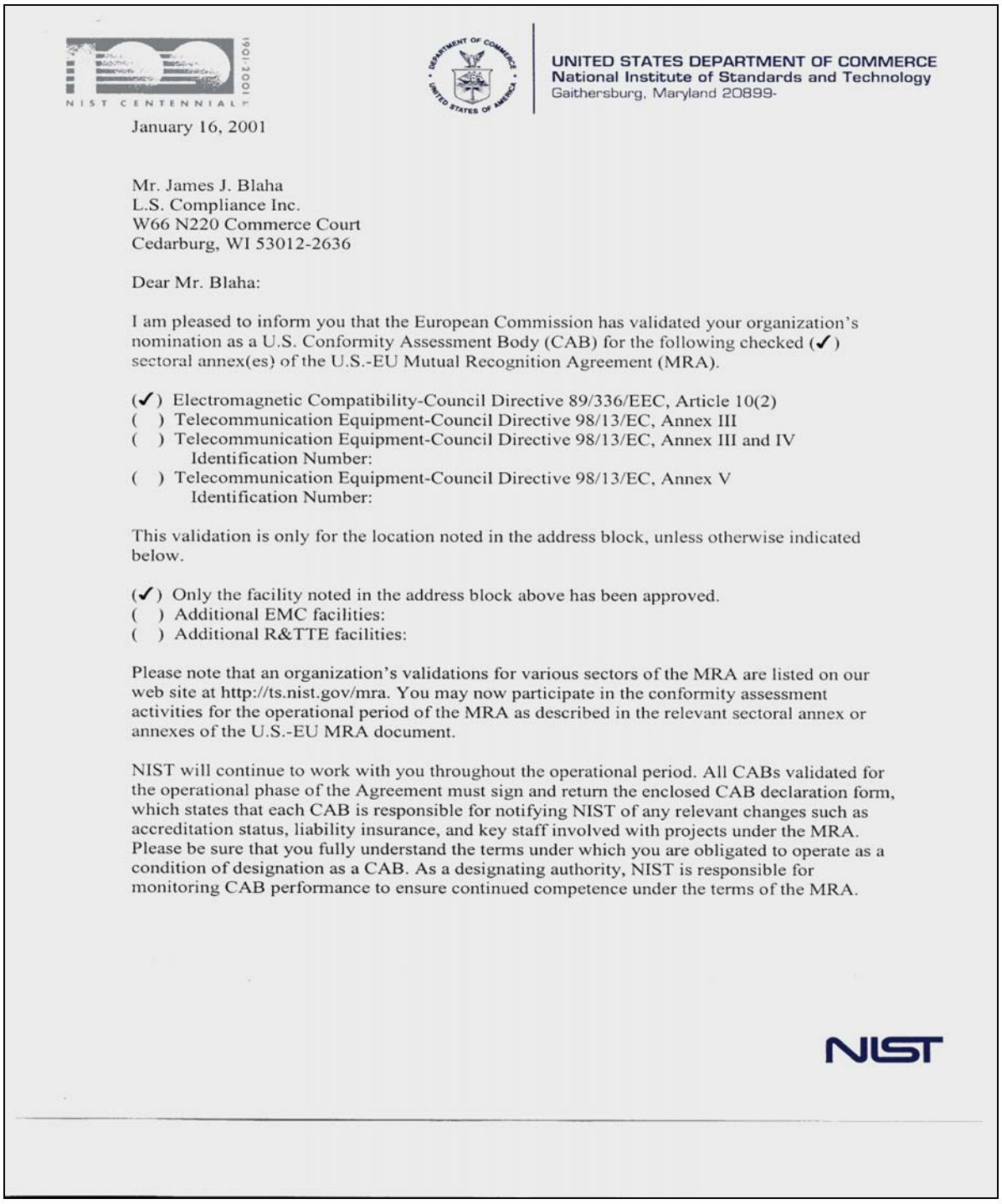
Test	Test Method(s)
Emissions	
Conducted	
Continuous/Discontinuous	Code of Federal Regulations (CFR) 47, FCC Method Parts 15, 18 using ANSI C63.4; EN: 55011, 55022, 50081-1, 50081-2; CISPR: 11, 12, 14-1, 22; CNS 13438
Radiated	Code of Federal Regulations (CFR) 47, FCC Method Parts 15, 18 using ANSI C63.4; EN: 55011, 55022, 50081-1, 50081-2; CISPR: 11, 12, 14-1, 22; CNS 13438
Current Harmonics	IEC 61000-3-2; EN 61000-3-2
Voltage Fluctuations & Flicker	IEC 61000-3-3; EN 61000-3-3
Immunity	EN: 50082-1, 50082-2 EN 61000-6-2 CISPR: 14-2, 24
Conducted Immunity	
Fast Transients/Burst	IEC 61000-4-4; EN 61000-4-4
Surge	IEC: 61000-4-5; ENV 50142; EN 61000-4-5
RF Fields	IEC: 61000-4-6; ENV 50141; EN 61000-4-6
Voltage Dips/Interruptions	IEC 61000-4-11; EN 61000-4-11

Roxanne M. Robinson

(A2LA Cert. No. 1255-01) 05/13/03 Page 1 of 2

5301 Buckeystown Pike, Suite 350 • Frederick, MD 21704-8373 • Phone: 301-644 3248 • Fax: 301-662 2974

4. Validation Letter – U. S. Competent Body for EMC Directive 89/336/EEC



UNITED STATES DEPARTMENT OF COMMERCE
National Institute of Standards and Technology
Gaithersburg, Maryland 20899-

January 16, 2001

Mr. James J. Blaha
L.S. Compliance Inc.
W66 N220 Commerce Court
Cedarburg, WI 53012-2636

Dear Mr. Blaha:

I am pleased to inform you that the European Commission has validated your organization's nomination as a U.S. Conformity Assessment Body (CAB) for the following checked (✓) sectoral annex(es) of the U.S.-EU Mutual Recognition Agreement (MRA).

(✓) Electromagnetic Compatibility-Council Directive 89/336/EEC, Article 10(2)
( ) Telecommunication Equipment-Council Directive 98/13/EC, Annex III
( ) Telecommunication Equipment-Council Directive 98/13/EC, Annex III and IV
Identification Number:
( ) Telecommunication Equipment-Council Directive 98/13/EC, Annex V
Identification Number:

This validation is only for the location noted in the address block, unless otherwise indicated below.

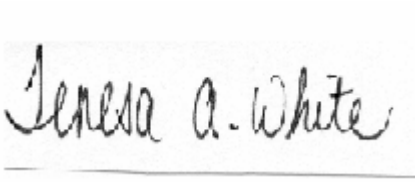
(✓) Only the facility noted in the address block above has been approved.
( ) Additional EMC facilities:
( ) Additional R&TTE facilities:

Please note that an organization's validations for various sectors of the MRA are listed on our web site at http://ts.nist.gov/mra. You may now participate in the conformity assessment activities for the operational period of the MRA as described in the relevant sectoral annex or annexes of the U.S.-EU MRA document.

NIST will continue to work with you throughout the operational period. All CABs validated for the operational phase of the Agreement must sign and return the enclosed CAB declaration form, which states that each CAB is responsible for notifying NIST of any relevant changes such as accreditation status, liability insurance, and key staff involved with projects under the MRA. Please be sure that you fully understand the terms under which you are obligated to operate as a condition of designation as a CAB. As a designating authority, NIST is responsible for monitoring CAB performance to ensure continued competence under the terms of the MRA.

NIST

5. Signatures



Prepared By: **April 2, 2004**

Teresa A. White, Document Coordinator **Date**

Tested By: **April 2, 2004**

Abtin Spantman, EMC Engineer **Date**

Approved By: **April 2, 2004**

Kenneth L. Boston, EMC Lab Manager **Date**
PE # 31926 Licensed Professional Engineer
Registered in the State of Wisconsin, United States

6. Product and General Information

Manufacturer:	Dukane Corporation
Model No.:	Turn On
Serial No.:	04
Test Frequency & Voltage:	6 VDC, 433.92 MHz

Environmental Conditions in the Test Lab:

Temperature:	20-25° C
Atmospheric Pressure:	86 kPa - 106 kPa
Humidity:	30-60%

7. Introduction

On January 12th through 21st and March 5th, 2004 a series of Radiated Emissions tests were performed on one sample of the Dukane Corporation "Turn On" Transmitter, Serial Number 04, here forth referred to as the "Equipment Under Test" or "EUT". This product operates at a frequency of 433.92 MHz, by means of amplitude-shift-keying (ASK) of binary encoded data.

These tests were performed using the test procedure outlined in ANSI C63.4, 2001 for intentional radiators, and in accordance with the limits set forth in FCC Part 15.231 for a periodic operation of a low power transmitter.

8. Purpose

The tests were performed in order to determine the compliance of the EUT with limits contained in various provisions of Title 47CFR, FCC Part 15, including: 15.35, 15.205, 15.209 and 15.231(b).

All Radiated Emission tests were performed to measure the emissions in the frequency bands described later in this report, and to determine whether said emissions are below the limits established by the aforementioned standards.

These tests were performed in accordance with the procedures described in the American National Standard for methods of measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (ANSI C63.4, 2001).

Also used as a reference for the EMI Receiver specification is the International Special Committee on Radio Interference – CISPR 16-1, 2002.

9. Product Description

This is a system for controlling a device on a vehicle with an onboard battery, such as an automobile. The system consists of a portable transmitter and a receiver. A portable wireless remote control unit sends a coded message to a receiving unit. The receiving unit, upon detecting a valid signal, provides onboard battery voltage to a remote location. This voltage is toggled on or off, when the receiving unit detects a valid signal. The receiving unit is wired to the vehicle's onboard battery, and provides an output signal that can be used to control an apparatus, such as a light.

The transmitter operates on 6 VDC, as provided by two type "CR2032" coin-cell batteries. The transmitter sends only one data train upon the activation of any of the momentary keys.

10. Test Requirments

The EUT was tested for Radiated Emissions, and for compliance with the limits set forth by Title 47 CFR, FCC Parts 15.35, 15.205, 15.209, 15.231(a), 15.231(b) and 15.231(c) for manually operated periodic transmitters, as well as for compliance with Industry Canada RSS-210, for low power license-exempt radio-communication devices.

11. Summary of Test Report

The Equipment Under Test (EUT) was found to MEET the requirements as described within the specifications of Title 47 CFR, FCC Part 15.231 and Industry Canada RSS-210, Section 6.1 for a low power transmitter.

12. Radiated Emissions Test

Test Setup

The EUT was operated within the 3 Meter FCC listed Semi-Anechoic Chamber, located at L.S. Compliance, Inc., in Cedarburg, Wisconsin. The EUT was placed on an 80cm high, non-conductive pedestal, which was centered on a flush-mounted 2m diameter metal turntable. The EUT was configured to run in a continuous transmit mode during the 15.231(a) and 15.231(b) measurements. The EUT was then returned to normal operation for testing of the data packet length and occupied bandwidth. The EUT was powered using the on-board "CR2032" batteries. The batteries were checked and replaced as needed to maintain proper voltage during the test.

Test Procedure

The fundamental and spurious (harmonic) emissions of the transmitter were tested for compliance to Title 47 CFR, FCC Part 15.231(b) limits for manually operated and non-periodic devices.

The EUT was tested from the lowest frequency generated by the transmitter (without going below 9 kHz) to the 10^{th} harmonic of the fundamental frequency generated by the device. The appropriate limits were also observed when the fundamental or spurious signals were located within any of the restricted bands as described in FCC Part 15.205(a).

The EUT was placed on an 80cm high non-conductive pedestal, with the Antenna Mast placed 3 m from the EUT. A Biconical Antenna was used to measure emissions from 30 MHz to 300 MHz, a Log Periodic Antenna was used to measure emissions from 300 MHz to 1000 MHz, and a Double Ridged Waveguide Horn Antenna was used to measure emissions above 1 GHz.

The EUT was programmed to operate in a continuous transmit mode. The resultant signals from the fundamental harmonics and spurious signals were maximized by rotating the turntable 360 degrees, and by raising and lowering the Antenna between 1 and 4 meters. The EUT was also given different orientations to determine the maximum signal levels, using both horizontal and vertical antenna polarities.

Test Results

No significant emissions were found, aside from the transmitter fundamental and harmonics. The unit was scanned for emissions over the range of 30 MHz to 5000 MHz to establish compliance with FCC Parts 15.231 and 15.205 while in a continuous transmit mode At frequencies below the fundamental, no spurious signals, other than the noise floor of the system, could be found within 20 dB of the limits. A numeric list of measured emissions appears in the Data Chart(s) of this report.

Occupied Bandwidth

In addition to measuring the levels of Radiated Emissions, the Occupied Bandwidth of the transmitter was measured. In accordance with FCC Part 15.231(c), the 20 dB bandwidth of the transmitted signal should be within a window of 0.25% of the center carrier frequency. The resolution bandwidth was set to the closest available filter setting on the HP 8546A EMI Receiver, that corresponded to 5% of the allowable bandwidth determined in the calculation mentioned above, without going below the resolution bandwidth of 10 kHz, as dictated in ANSI C63.4, 2001, Section 13.1.7.

The sample was activated to transmit in a continuous (normal) mode and was placed on the aforementioned test configuration within the 3 Meter Chamber. The transmitted signal was received on a Log Periodic Antenna and provided to the HP 8546A EMI Receiver, where the fundamental frequency was displayed, and a plot of the Occupied Bandwidth was produced. Results can be seen in Appendix A of this report.

The EUT tested had a bandwidth of approximately 53 kHz when measured at 20dB below the fundamental peak.

Test Equipment Utilized

A list of the test equipment used for the Radiated Emissions tests can be found in Appendix B of this report. All equipment is calibrated and used according to the operation manuals supplied by the manufacturers. All antenna calibrations were performed at a N.I.S.T. traceable site, and the resultant correction factors were entered into the HP 8546A EMI Receiver software database.

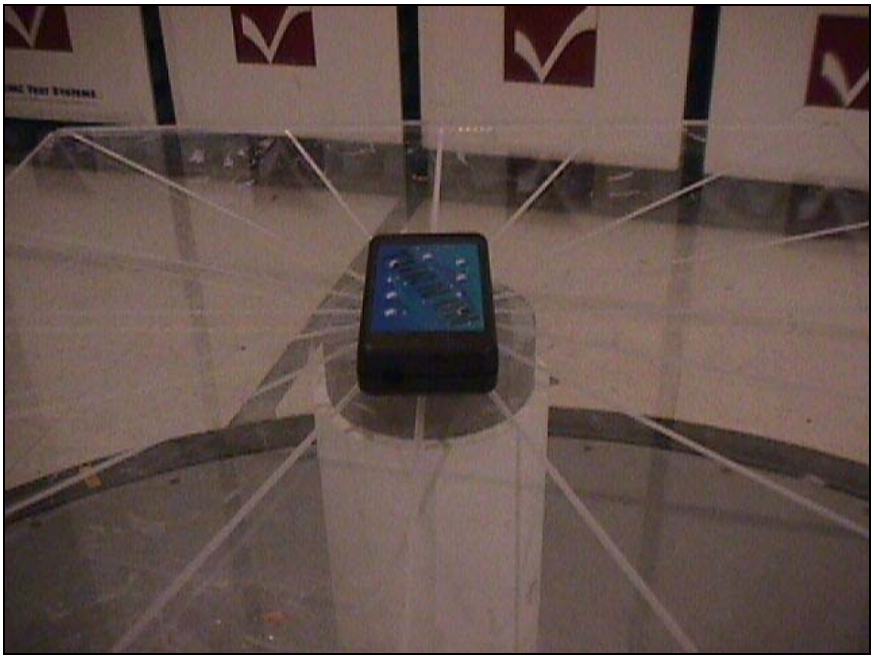
The connecting cables used were also measured for loss using a calibrated Signal Generator and the HP 8546A EMI Receiver. The resulting loss factors were entered into the HP 8546A EMI Receiver database. This allowed for automatic change in the antenna correction factor. The resulting data taken from the HP 8546A EMI Receiver is an actual reading and can be entered into the database as a corrected meter reading.

When a reading is taken using the Peak Detector, a duty cycle correction factor can be applied for conversion to an average reading. This operation can be used when measuring short-duration bursts of data transmission, under FCC Part 15.231.

The resultant average reading can then be compared to the appropriate limit in order to determine compliance with the limits. The HP 8546A EMI Receiver was operated with a bandwidth of 120 kHz when receiving signals below 1 GHz, and with a bandwidth of 1 MHz when receiving signals above 1 GHz, in accordance with CISPR 16.

The Peak Detector was used for all measurements.

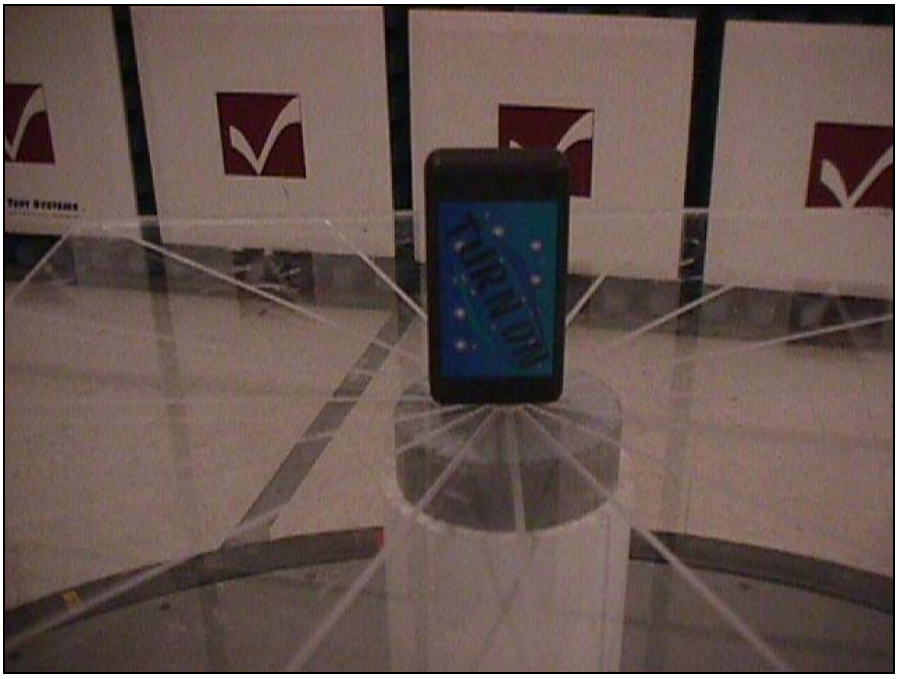
Photo(s) of Radiated Emission Test Setup



View of the EUT in Horizontal Orientation
This Orientation had the Highest Fundamental Emissions Measured.

View of the EUT in the Side Orientation

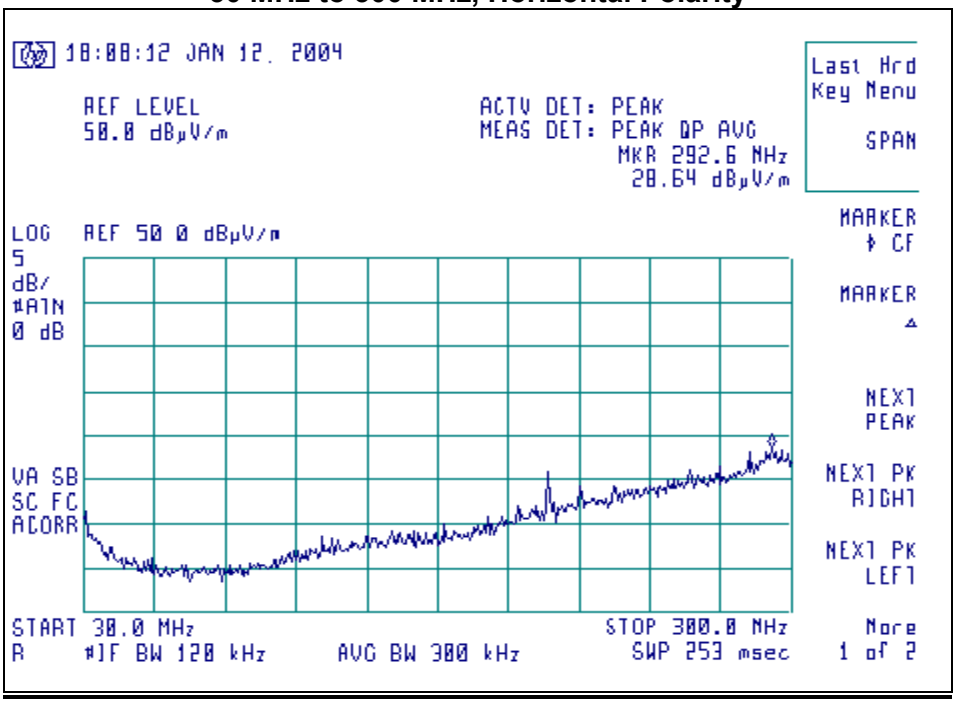
Photo(s) of Radiated Emission Test Setup (continued)



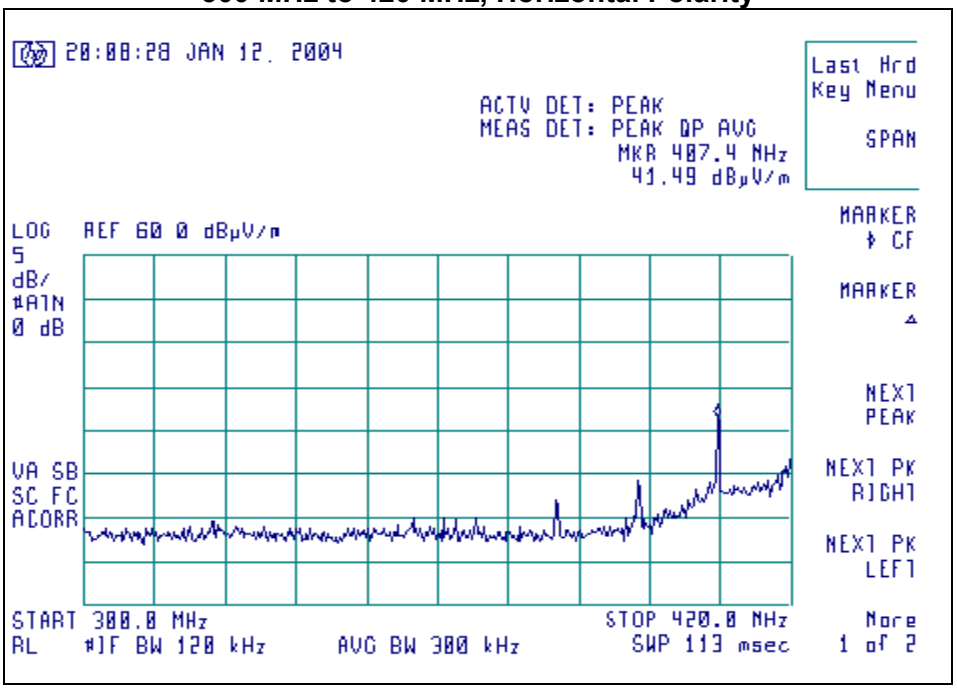
View of the EUT in the Vertical Orientation

Signature Scans of Radiated Emissions

30 MHz to 300 MHz, Horizontal Polarity

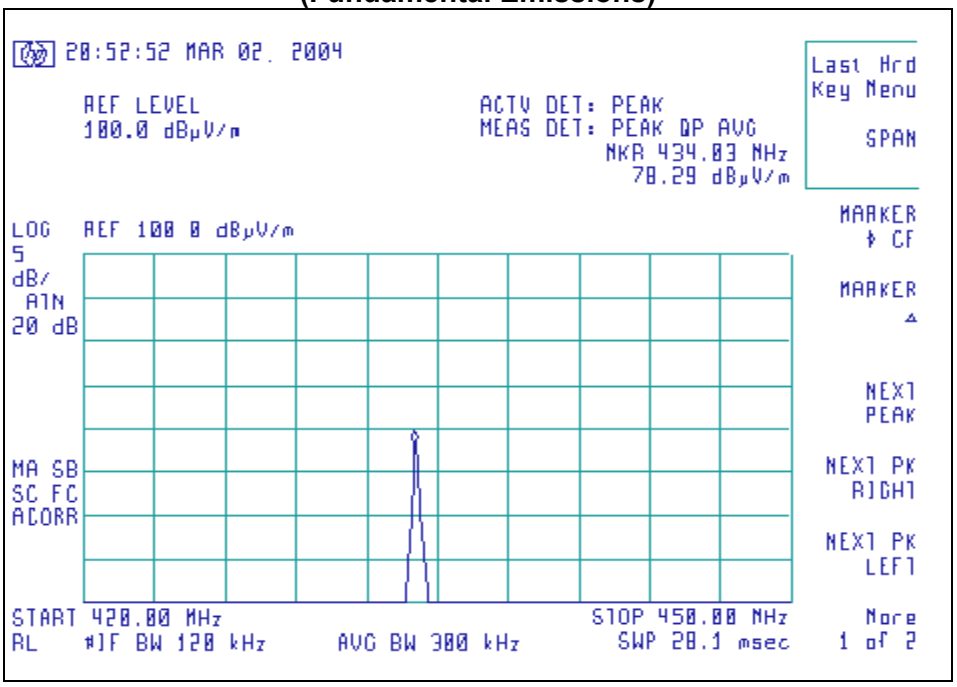


300 MHz to 420 MHz, Horizontal Polarity

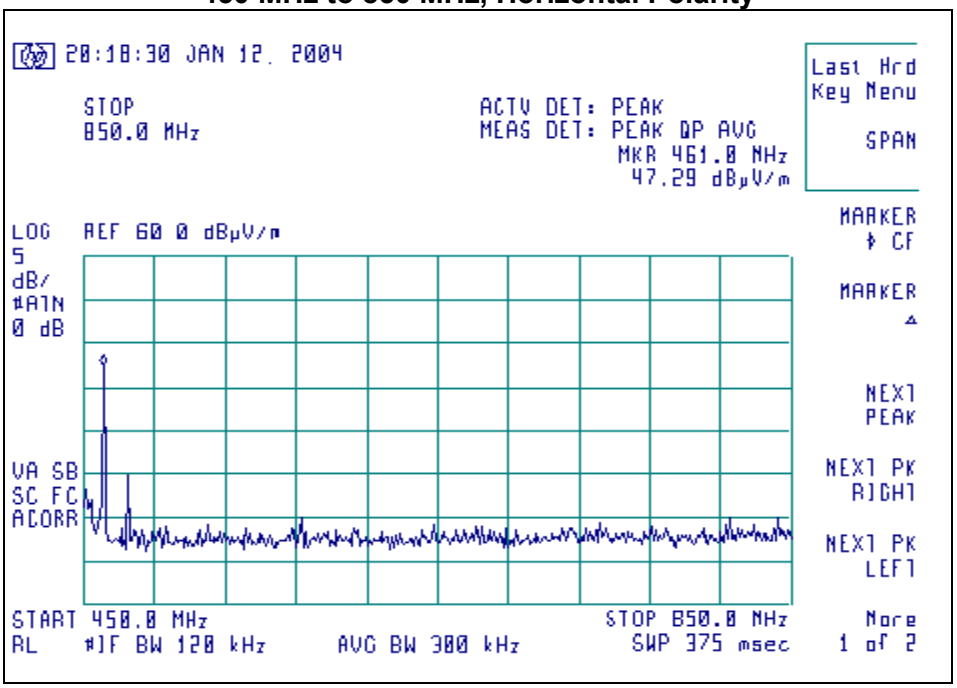


Signature Scans of Radiated Emissions (continued)

420 MHz to 450 MHz, Horizontal Polarity
(Fundamental Emissions)

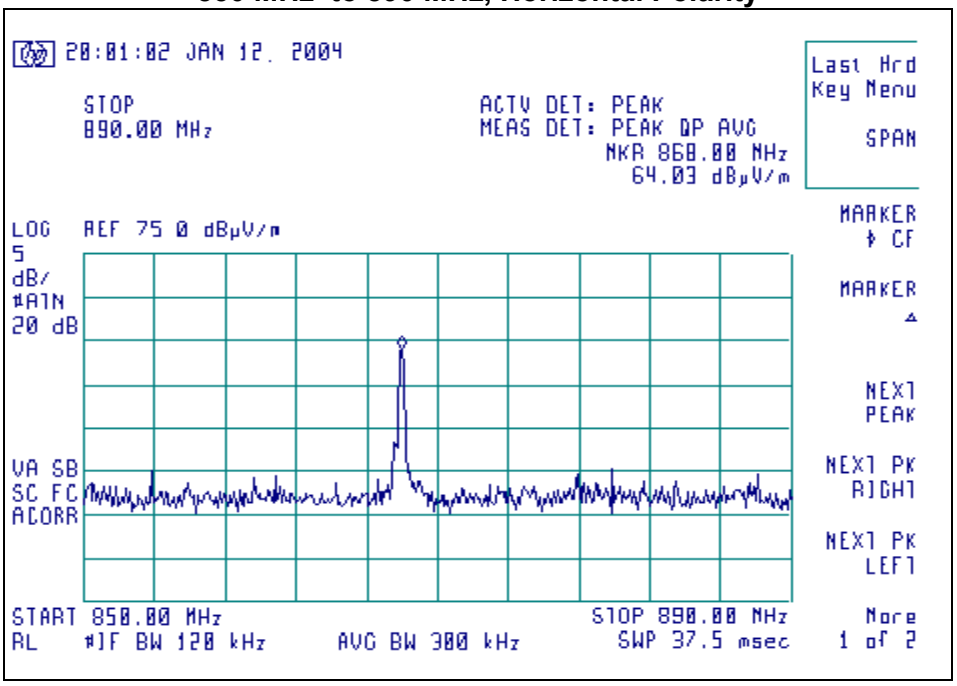


450 MHz to 850 MHz, Horizontal Polarity

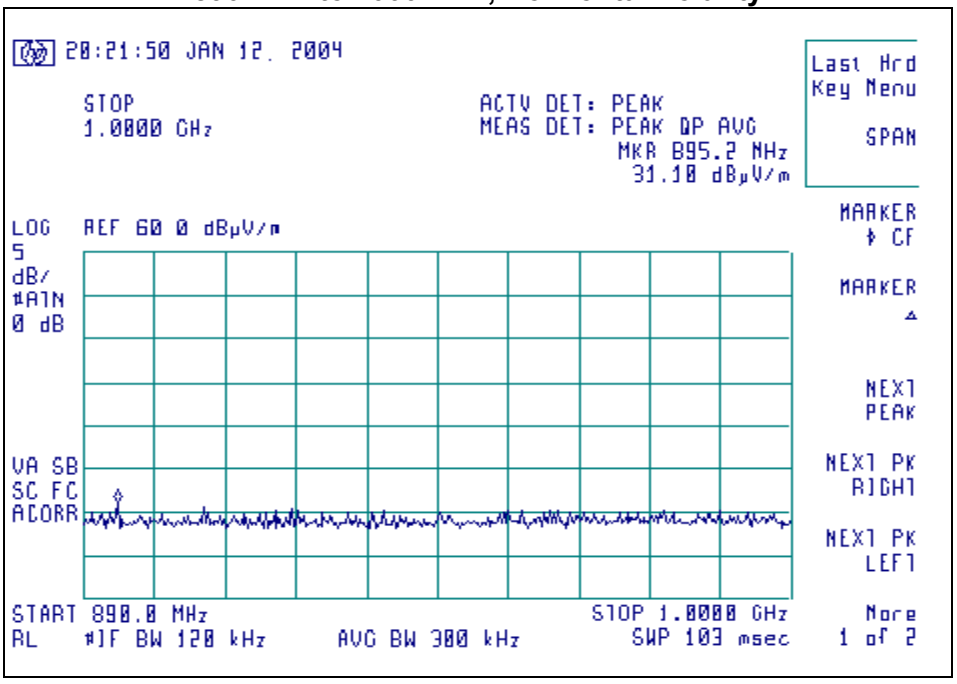


Signature Scans of Radiated Emissions (continued)

850 MHz to 890 MHz, Horizontal Polarity

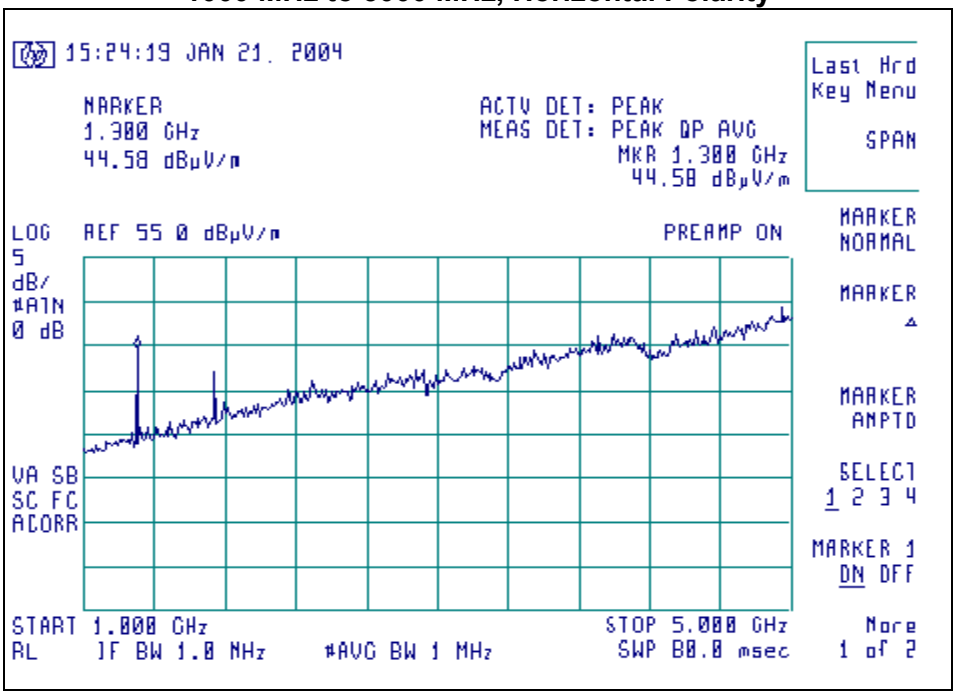


890 MHz to 1000 MHz, Horizontal Polarity

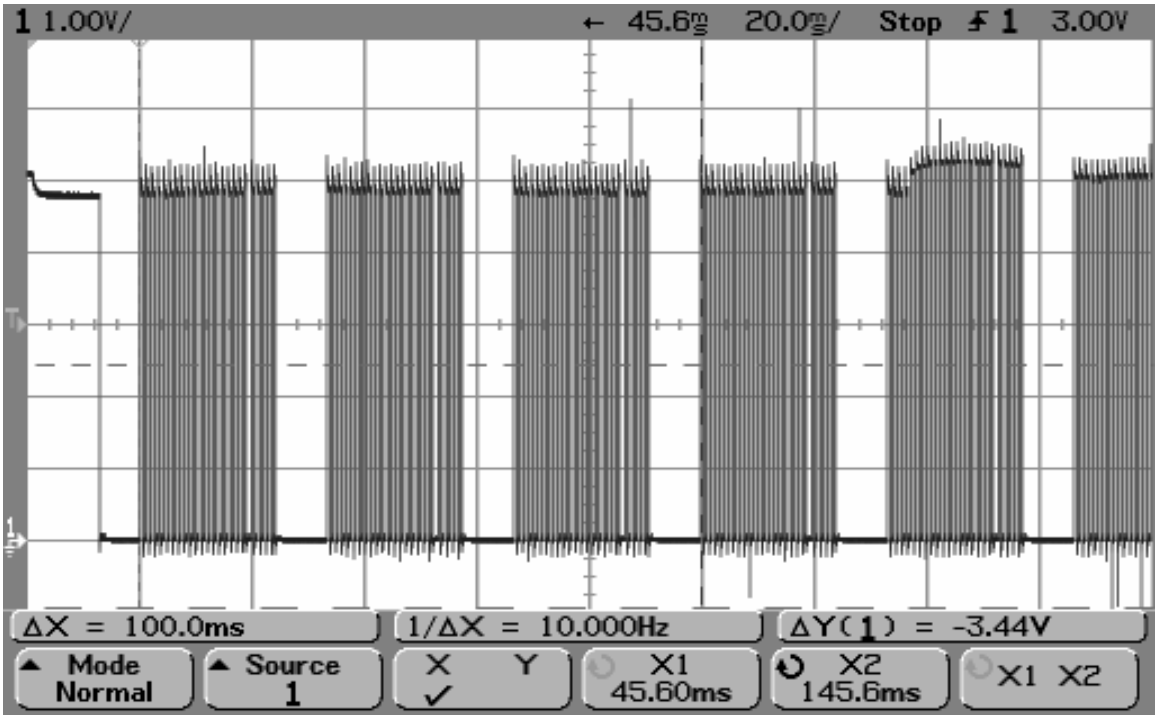


Signature Scans of Radiated Emissions (continued)

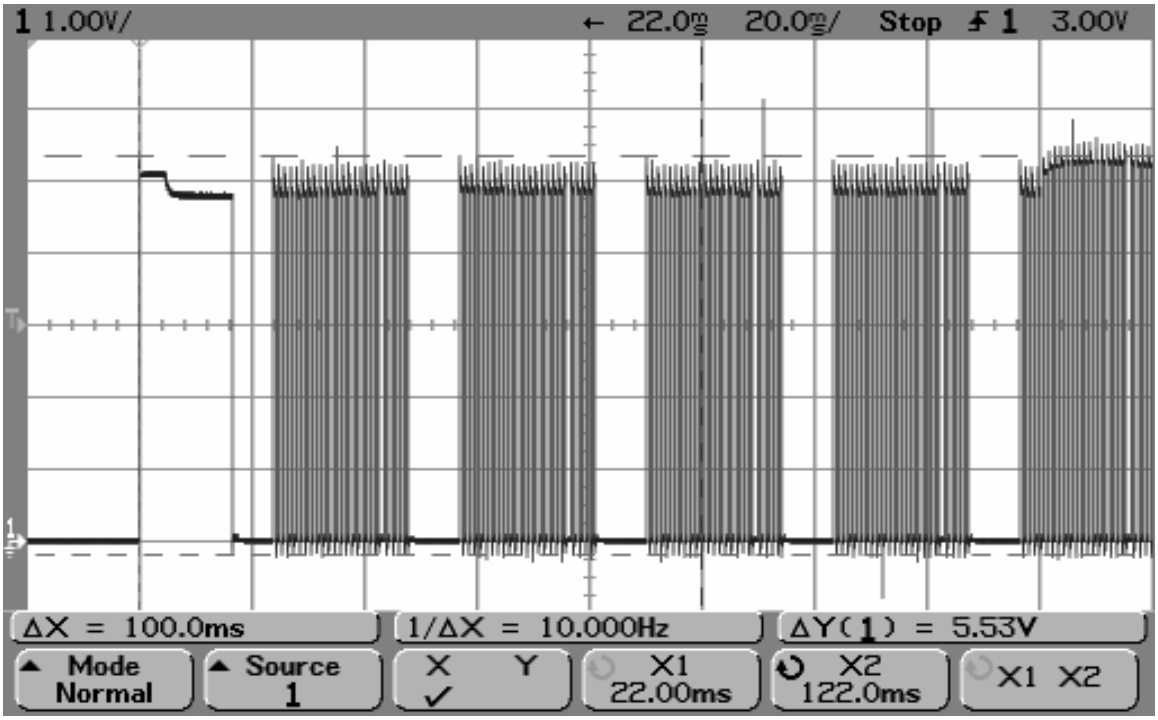
1000 MHz to 5000 MHz, Horizontal Polarity



Data Packet Detail - Radiated Emissions

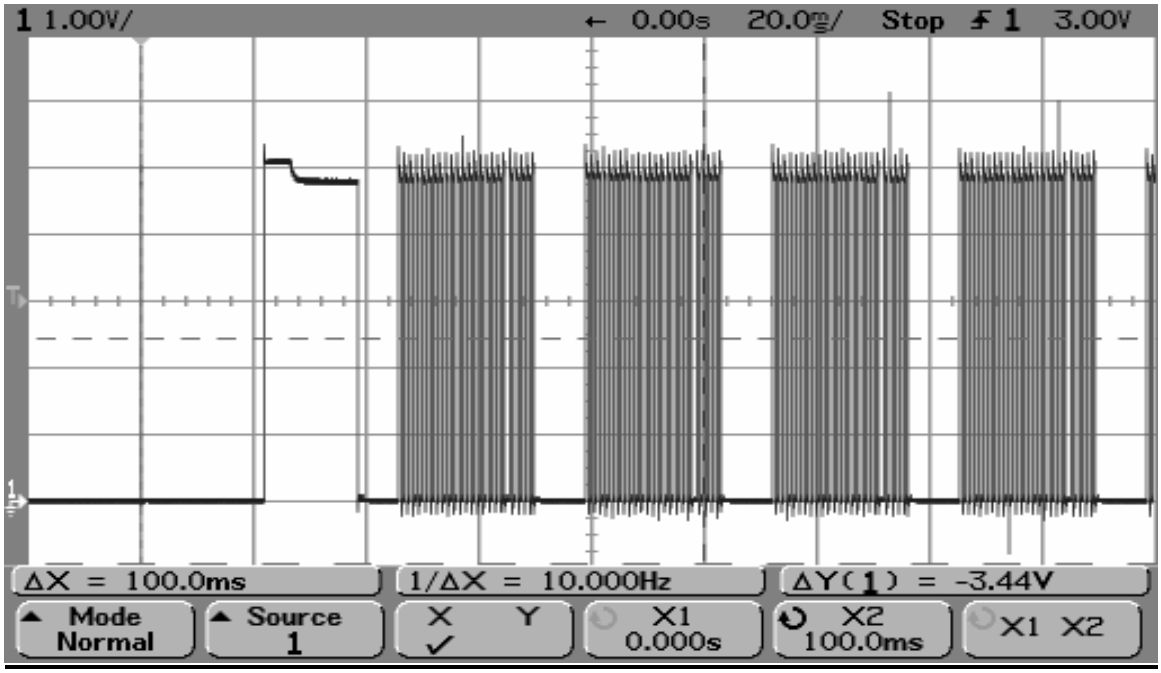


Case Study #1, with the 100ms window occupied by repetitive data packets, offering 8.4 dB of relaxation



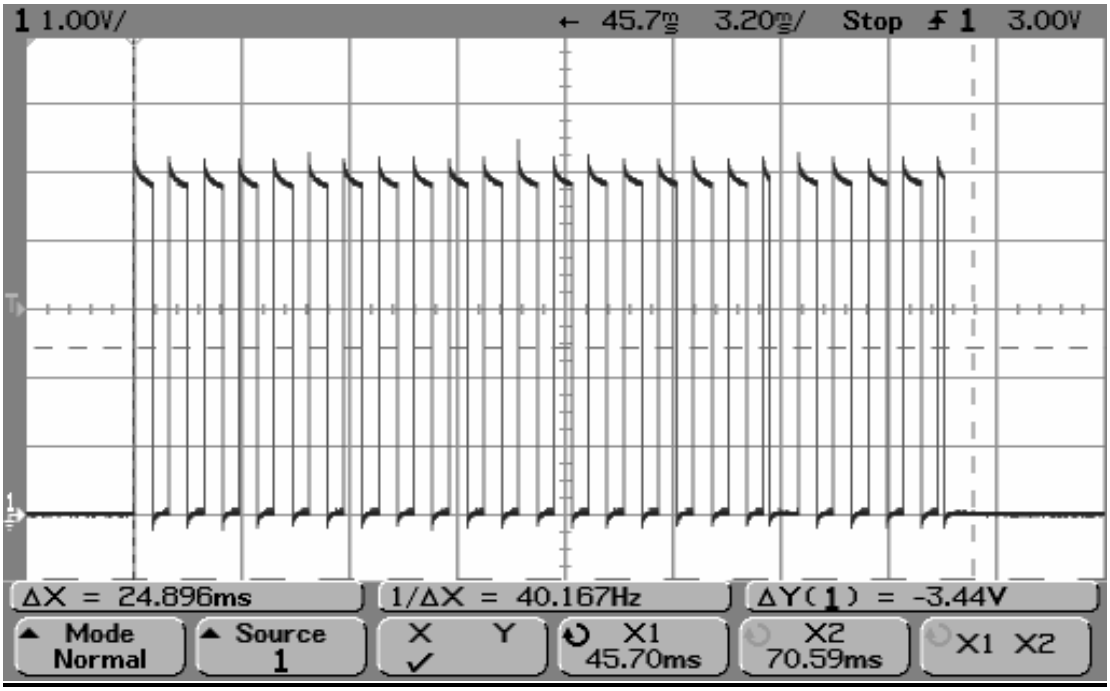
Case Study #2, with the 100ms window occupied by wake-up pulse and data packets, offering 7.4 dB of relaxation (worst-case relaxation)

Data Packet Detail - Radiated Emissions (continued)

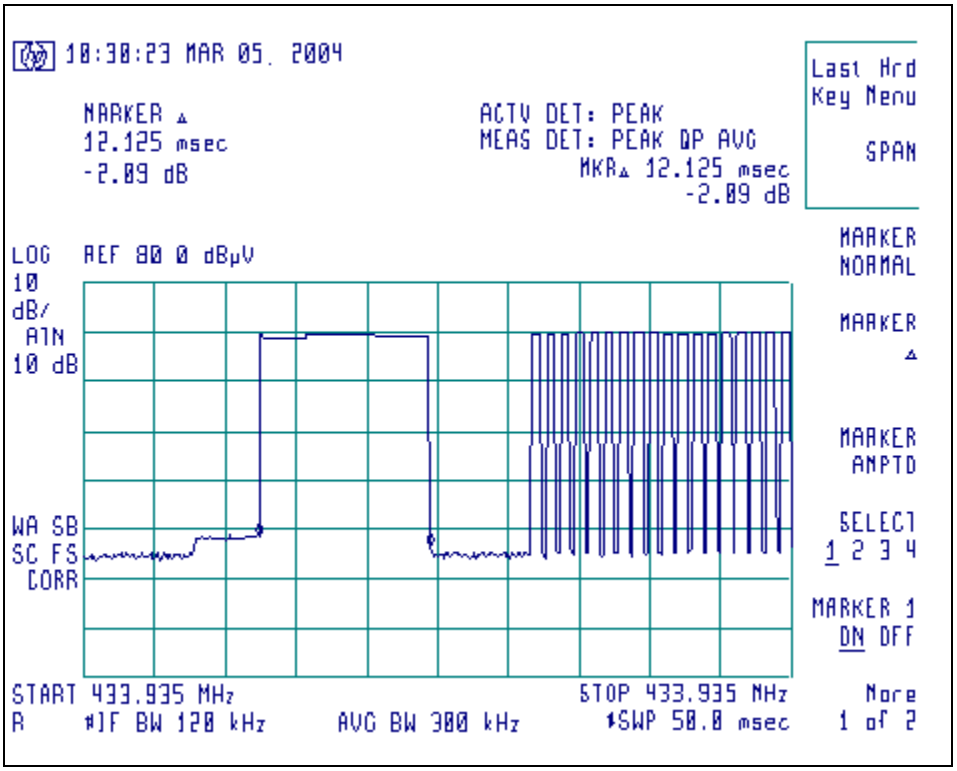


Case Study #3, with the 100ms window occupied by the I.C. turn-on pulse, in addition to the wake-up pulse and the data packets, offering 10.3dB of relaxation

Data Packet Detail - Radiated Emissions (continued)

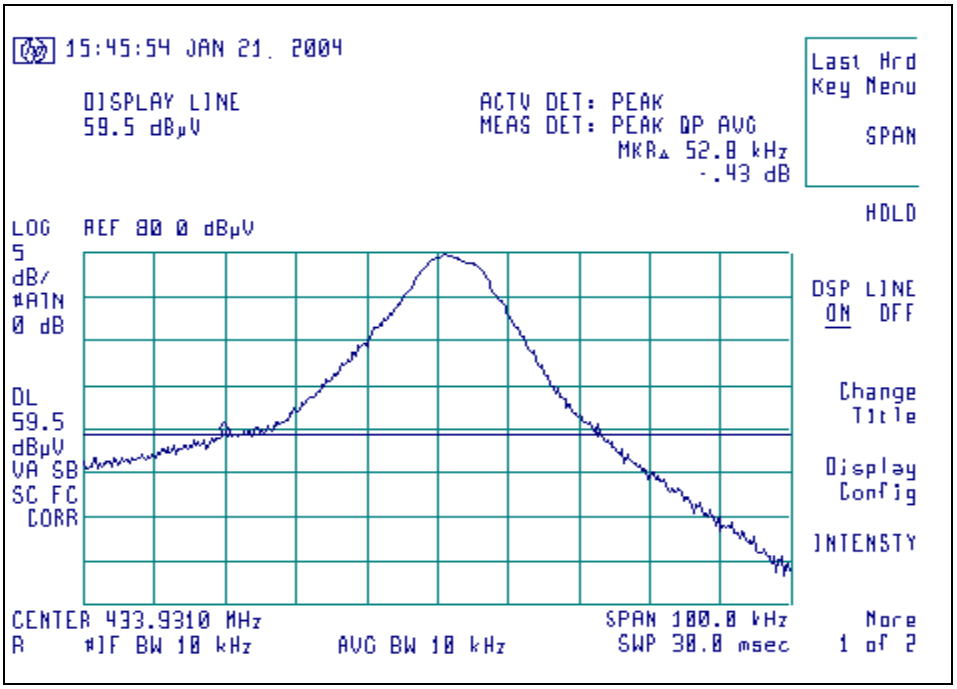


Screen Capture showing data packet duration



Screen capture of demodulated data from the EMI Receiver showing 12.12ms on-air time for the 'turn-on' pulse for the Micrel I.C.

Occupied Bandwidth



53 kHz Occupied Bandwidth at -20 dBc, During Typical Transmit Cycle

Radiated Emissions Data Chart

3 Meter Measurements of Electromagnetic Radiated Emissions
Within the 3 Meter FCC Listed Semi-Anechoic Chamber
Test Standard: FCC Parts 15.205, 15.209 and 15.231(b)
Frequency Range Inspected: 30 MHz to 5000 MHz

Manufacturer:	Dukane Corporation						
Date(s) of Test:	January 12th – 21st, 2004						
Test Engineer:	Abtin Spantman						
Model #:	"Turn On"						
Serial #:	04						
Voltage:	6 VDC						
Distance:	3.0 Meters						
Configuration:	CW Continuous Transmit						
Detectors Used:		√	Peak		Quasi-Peak		Average

Environmental Conditions in the Lab:
Temperature: 20 – 25°C
Atmospheric Pressure: 86 kPa – 106 kPa
Relative Humidity: 30 – 60 %

Test Equipment Used:
EMI Measurement Instrument: HP8546A
Biconical Antenna: EMCO #93110B
Log Periodic Antenna: EMCO #93146
Horn Antenna: EMCO #3115

The table depicts the level of significant radiated emissions found:

Frequency (MHz)	Antenna Polarity	Height (m)	Azimuth (Degree)	EMI Meter Reading (dBµ V/m)	Duty Cycle Allowance (dB)	Corrected Reading (dBµV/m)	15.231(b) Limit (dBµV/m)	Margin (dB)
54.2	V	1.00	135	24.6	7.4	17.2	60.8	43.6
379.7	H	1.00	80	34.4	7.4	27.0	60.8	33.8
393.3	H	1.00	80	36.4	7.4	29.0	60.8	31.8
406.8	H	1.00	280	43.0	7.4	35.6	46.0	10.4
433.9	H	1.00	285	80.0	7.4	72.6	80.8	8.2
447.5	H	1.00	265	53.0	7.4	45.6	60.8	15.2
461.1	H	1.00	80	49.3	7.4	41.9	60.8	18.9
474.6	H	1.00	80	39.9	7.4	32.5	60.8	28.3
867.9	V	1.20	185	64.1	7.4	56.7	60.8	4.1
1302	H	1.15	230	45.5	7.4	38.1	54.0	15.9
1736	H	1.20	230	44.6	7.4	37.2	60.8	23.6
2604	H	1.00	190	44.9	7.4	37.5	60.8	23.3

Note: A Peak Detector was used for all measurements. No significant emissions were noted beyond the sixth harmonic.

APPENDIX A

Calculations

Manufacturer: Dukane Corporation
Description: "Turn-On" Transmitter
Serial: 04

CALCULATION OF RADIATED EMISSIONS LIMITS FOR FCC PARTS 15.209, and 15.231(b) (260-470 MHz)

FIELD STRENGTH OF FUNDAMENTAL FREQUENCIES:
The calculation involves a linear interpolation of 3750 to 12500 µV/m over 260-470 MHz, where field strength of the fundamental frequency (f_0) when $260 \leq f_0 \leq 470$ MHz, can be found by: $3750 + 41.6667 (f_0 - 260)$, where f_0 is in MHz.

FIELD STRENGTH OF SPURIOUS/HARMONIC FREQUENCIES:
The spurious and harmonic emissions are subject to the limits expressed in FCC Parts 15.205 and 15.209, if within the restricted bands and dictated by the following calculation elsewhere.

The calculation involves a linear interpolation of 375 to 1250 µV/m over 260 to 470 MHz, where field strength of the harmonic frequencies ($2f_0$, $3f_0$…) when $260 \leq f_0 \leq 470$ MHz, can be found by: $375 + 4.1667(f_0 - 260)$, where f_0 is in MHz.

At fundamental frequency f_0 = 433.92 MHz

Fundamental Limit: $3750 + 41.6667 (433.92 - 260) = 10{,}996.67$
Harmonic Limit: $375 + 4.1667 (433.92 - 260) = 1{,}099.67$ µV/m @ 3m

Frequency (MHz)	Fundamental Limit (µV/m @ 3m)	Fundamental Limit (dBµV/m @ 3m)	Harmonic Limit (µV/m @3m)	Harmonic Limit (dBµV/m @ 3m)
433.92	10,996.67	80.8	1,099.67	60.8

Appendix B
DUTY CYCLE CORRECTION

For a graphical presentation of the data packets from the transmitter, refer to the Data Packet Detail – Radiated Emissions in this report. These images were captured on an oscilloscope, while probing the data line, feeding into the transmitter. The transmitter was functioning in normal operating mode, and activated by pressing one of the transmit buttons.

Average (Relaxation) Factor

Average Factor = 20 * Log_{10} (Worst Case EUT On-time over 100 ms time window)

The transmitter unit is normally in a sleep mode, and wakes up when a button is pressed. Upon pressing a button, the information is encoded in an OOK format and presented as the modulation source to the transmitter IC. Six packets are transmitted per button activation. If the button is held in a depressed position, the transmitter will send only the six packets, then stops. This will allow the device to meet the deactivation requirement within 5 seconds, required by 15.231.a.1.

The transmission sequence starts with a 16.6ms wake-up pulse, followed by 7.25ms of quiet. The wake-up pulse is followed by a maximum of 6 data packets. Each data packet contains 24 binary data bits. A binary '1' is 552μs, and a binary '0' is 180μs, with a total period of 1.04ms. There is a "Guard-time" of 8.28ms between each data packet. There are a maximum of 22 binary '1's in a data packet.

Per measurements, the wake-up time of the Micrel I.C. is approximately 4.5ms, so the 'wake-up' pulse is actually transmitting for an 'on-air' time of approximately 12 milliseconds.

Case Study #1) If the 100ms window is over the data packets:
Word1 + 8.28ms space + word2 + 8.28ms space + word3 + 8.28ms + 0.28ms of word4 =>
22*0.552ms+2*0.18ms+22*0.552+2*0.18ms+22*0.552ms+2*0.18ms+0.28ms=37.792ms
Relaxation=20*log(37.792ms/100ms)=-8.452db

Case Study #2) If the 100ms window starts at the beginning:
16.6ms wake-up + 7.25ms + word1 + 8.28ms space + word2 + 8.28ms space +9.298 bits of word3=> (16.6-4.5)ms+22*0.552+2*0.18+22*0.552+2*0.18+9.298*0.552=42.24ms
Relaxation=20*log(42.24ms/100ms)=-7.485db

Case Study #3) If the 100ms window starts at the beginning:
Note that if the 203μs beginning IC turn-on pulse is added, to the 100ms window, then more than 20ms of quiet time lapses before the turn-on pulse, so the case study will not be the worst case analysis.

Case Study #2, with the turn-on pulse in the 100ms window is considered as the worst case on-air time, and hence used for relaxation calculations, yielding a relaxation factor of 7.48 dB.

Average Factor = 20 * Log_{10} (42.2 / 100 ms) = -7.49

A relaxation factor of 7.4 dB is utilized for this product.

OCCUPIED BANDWIDTH CALCULATIONS

FCC Part 15.231(c) states that the bandwidth of a manually operated device shall be no wider than 0.25% of the center frequency for devices operating between 70 MHz and 900 MHz.

Said bandwidth is determined at the -20 dB reference to peak carrier points.

Refer to the set of screen captures in this report, which show the actual Occupied Bandwidth of the transmitters as measured, as being 52.8 kHz.

For this device, operating at a center frequency of 433.92 MHz, the allowed Occupied Bandwidth is calculated to be: 433.92 MHz X 0.0025 = 1.084 MHz

APPENDIX C - Test Equipment List

Asset #	Manufacturer	Model #	Serial #	Description	Date	Due
AA960007	EMCO	3115	6907	Horn Antenna	11/14/03	11/14/04
AA960008	EMCO	3816/2NM	9701-1057	Line Impedance Stabilization	9/03/03	9/19/04
AA960014	Fischer	FCC-801-M3-25	148	Coupler/De-coupler Network	9/03/03	9/03/04
AA960015	Fischer	F-120-9B	27	Bulk Current Injection Probe	9/02/03	9/02/04
AA960016	Haefely Trench	093 506-1	083 874-03	EFT Capacitive Clamp	Note 1	Note 1
AA960020	Solar	9230-1		Radiating Loop for RS101	Note 1	Note 1
AA960021	Solar	7334-1	965308	Mag. Field Loop Sensor	9/02/03	9/02/04
AA960023	Werlatone	C3910	5167	Directional Coupler 40 dB	Note 1	Note 1
AA960024	Pasternack	100 Watt	PE 7021-6	DC-1.5 GHz Attenuator	Note 1	Note 1
AA960031	HP	119474A	3107A01708	Transient Limiter	Note 1	Note 1
AA960050	Chase	CBL6140A	1106	Bilog Antenna	Note 1	Note 1
AA960054	Giga-Tronics	80301A	1830164	Power Sensor	10/04/03	10/04/04
AA960061	Solar	9229-1		Loop Sensor for RS101	9/02/03	9/02/04
AA960067	Fischer	FCC-LISN-50-100-4-01	9901	100 A (4 line) LISN	9/02/03	9/02/04
AA960071	Fischer	FCC-801-M-4-63A	9902	Coupler/De-coupler Network	9/04/03	9/04/04
AA960074	Fischer	F2031-32mm	361	EM Injection Clamp	1/03/03	1/03/04
AA960076	Fischer	F201-32mm	347	Absorbing Clamp	1/03/03	1/03/04
AA960077	EMCO	93110B	9702-2918	Biconical Antenna	9/02/03	9/02/04
AA960078	EMCO	93146	9701-4855	Log-Periodic Antenna	9/02/03	9/02/04
AA960080	Fischer	FCC-801-M3-63A	9906	Coupler/De-coupler Network	1/29/03	1/29/04
AA960081	EMCO	3115	6907	Double Ridge Horn Antenna	2/03/03	2/03/04
AA960082	Wandel & Golt.	EMC-20	E-0016	EM Radiation Meter & Probe	2/03/03	2/03/04
CC00122C	HP	331A	914-03669	Distortion Analyzer	Note 1	Note 1
CC00181C	HP	33120A	US36013549	Arb. Wave Form Generator	9/03/03	9/03/04
CC00221C	Agilent	E4407B	US39160256	Spectrum Analyzer	11/04/03	11/04/04
CC00284C	Agilent	E4421B	MY41000402	Signal Generator	4/27/03	4/27/04
EE960003	Amplifier Res.	100W 1000M1A	19821	100 Watt Amp	Note 1	Note 1
EE960005	Giga-Tronics	8542C	1831450	Dual Channel Power Meter	10/01/03	10/01/04
EE960006	Haefely Trench	PESD 1600	H604079	ESD Gun	9/04/03	9/04/04
EE960007	Haefely Trench	Pline 1610	083732-19	Line Fluctuation Generator	9/04/03	9/04/04
EE960008	Haefely Trench	DEC1A	083 793-09	De-Coupling Network	Note 1	Note 1
EE960009	Haefely Trench	IPC-2	083 811-07	Coupling Network	Note 1	Note 1
EE960010	Haefely Trench	P-Surge-4	083061-08	Power Surge Generator	9/04/03	9/04/04
EE960011	Haefely Trench	PEFT 4010	080-981-07	EFT/Burst Generator	9/03/03	9/03/04
EE960013	HP	8546A	3617A00320	Receiver RF Section	9/04/03	9/04/04
EE960014	HP	85460A	3448A00296	Receiver Pre-Selector	9/04/03	9/04/04
EE960015	HP	6843A	3531A-00145	AC Power Source/Analyzer	Note 1	Note 1
EE960016	Marconi	2024	112120/044	Signal Generator	1/31/03	1/31/04
EE960041	Stanford	SR760	41018	Spectrum Analyzer	9/03/03	9/03/04
EE960042	Haefely Trench	MAG 100.1	O8013610	Magnetic Susceptibility Loop	Note 1	Note 1
EE960052	Amplifier Res.	5SIG4	25582	5 Watt Amp	Note 1	Note 1

Note 1 - Equipment calibrated within a traceable system.

APPENDIX C - Test Equipment List (continued)

Asset #	Manufacturer	Model #	Serial #	Description	Date	Due
EE960055	Amplifier Res.	75A250	21952	75 Watt Amp	Note 1	Note 1
EE960067	HP	8648A	3636A02735	Signal Generator	9/30/03	9/30/04
EE960144	Voltech	Standard 555	IB71/6968	Precision Power Analyzer	10/30/02	10/30/04
EE960145	Voltech	PMi	OO934644	Impedance Network	9/04/03	9/04/04
N/A	Narda	3203B-10	3202B10	Directional Coupler 10 dB	Note 1	Note 1

Note 1 - Equipment calibrated within a traceable system.

Table of Expanded Uncertainty Values, (K=2) for Specified Measurements

Measurement Type	Particular Configuration	Uncertainty Values
Radiated Emissions	3 – Meter chamber, Biconical Antenna	4.24 dB
Radiated Emissions	3-Meter Chamber, Log Periodic Antenna	4.8 dB
Radiated Emissions	10-Meter OATS, Biconical Antenna	4.18 dB
Radiated Emissions	10-Meter OATS, Log Periodic Antenna	3.92 dB
Conducted Emissions	Shielded Room/EMCO LISN	1.60 dB
Radiated Immunity	3 Volts/Meter in 3-Meter Chamber	1.128 Volts/Meter
Conducted Immunity	3 Volts level	1.0 V