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PCTC
Product Compliance Test Center
2476 Swedesford Road, Malvern, PA 19355

ELECTROMAGNETIC INTERFERENCE TEST REPORT

Doc. 20051010R / Project No. 1250

TEST STANDARD: USA 47 CFR PART 15

A3929 Nursery Unit
FCC ID: M6YA3929A3930

GRACO CHILDREN'S PRODUCTS
EXTON, PA

TEST DATE: October 14 to 18, 2005
ISSUE: October 31, 2005

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Certificate No: 1028.01

REPORT APPLICABILITY

The results of this test, as documented in this report, can be considered to be applicable to the following hardware package, or equivalent component model numbers. This is based on the configuration of the hardware tested and the population of components in the test configuration.

Graco Model Number	DESCRIPTION
A3929	Nursery unit (**with** Parent Finder Button)
A3930	Nursery unit (**without** Parent Finder Button)

Open Area Test Site Registration Number

FCC: 91047
IC: 3442

PREFACE

This report documents product testing conducted to verify compliance of the specified EUT with applicable standards and requirements as identified herein. EUT, test instrument configurations, test procedures and recorded data are generally described in this report. The reader is referred to the applicable test standards for detailed procedures. The following table summarizes the test results obtained during this evaluation.

SUMMARY

The Graco Children's Products, model A3929 Nursery Unit (FCC ID: M6YA3929A3930 and IC: 6162A-39293930) was tested to the standards listed below, and found to have the following characteristics:

TEST	STANDARD	REQUIREMENT	RESULT
Radiated Emissions - Intentional Radiation	FCC Part 15C, Section 15.247 and Section 15.205	Emissions up to 10 Harmonics in the Restricted Bands	Below Max. Permissible limit
Radiated Emissions - Unintentional Radiation	FCC Part 15C, Section 15.209 FCC Part 15B, Class B	30 MHz – 5 GHz	Below Max. Permissible limit
Conducted Emissions - AC Power lines	FCC Part 15C, Section 15.207 FCC Part 15B, Class B	150 KHz - 30 MHz	Below Max. Permissible limit
Conducted Emissions - Antenna Port	FCC Part 15C, Section 15.247	Operating Band 902 MHz – 928 MHz	Below Max. Permissible limit

EUT Modifications

The following modifications were made on the A3929 Nursery Unit to meet the EMI requirements:

- Added (2) 100 pF capacitors between the 3.3V supply line and ground (Samsung part #CL21C101JBNC).
- Added 12 ohm resistor in series with antenna (Hong Kong Resistor part #RCT0312RF)
- Added 4 pF capacitor between output of SAW filter and ground (Samsung part #CL10C4R0CBNC)
- Added 100 pF capacitor between VCO data input and ground (Samsung part #CL21C101JBNC).
- Added shield cover over RF circuit (custom stamped metal part).

MEASUREMENT UNCERTAINTY				
Measurement Type	Measurement Dist	Frequency Range	Measurement Limit	Expanded Combined Uncertainty
Radio Disturbance	10 meters	30 MHz to 1 GHz	Class A	4.3 dB
Radio Disturbance	10 meters	30 MHz to 1 GHz	Class B	5.0 dB
Radio Disturbance	3 meters	30 MHz to 1 GHz	Class B	4.3 dB
Conducted Disturbance	N/A	150 kHz to 30 MHz	Class A or B	3.6 dB

As all values of uncertainty are less than the CISPR 16-4:2002 recommendations, no adjustments to measured data presented in this report are required.

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1.0 Description of the Equipment Under Test (EUT)

Equipment Identification	Nursery Unit (Child Unit)
Model Number	A3929
ID Number	C-EP2-2
Manufacturer	Graco Children's Products 150 Oaklands Boulevard Exton, PA 19341
Technical Contact	Craig Desrosiers
Condition Received	Acceptable for Test
Date Received	9/11/2005
Sample Type	Preproduction Unit
Equipment Classification	Intentional Radiator, Unlicensed Low power Transmitter
Unisys Test Personnel	Itamar Gonen Dipak Patel

Unless otherwise noted in the individual test results sections, testing was performed on the EUT configured as follows.

1.1 General Description

The model A3929 and A3930 Nursery Units are 915 MHz digital modulation FSK audio transmitters. They are designed to pick up audio in the baby's room and transmit it to a receiver Parent Unit. The Nursery Unit operates with 3-AAA (1.5V-LR03) batteries or Graco supplied 120 volts AC adaptor (Graco model U060020D11 AC Adaptor).

A3929 and A3930 Nursery Units are identical units except, the A3929 Nursery Unit has an additional Parent Finder feature, which is designed to allow someone to easily locate a missing Parent Unit.

The Nursery Unit has six channels which are selected by pressing a momentary pushbutton switch. The channel frequencies are:

Channel 0 - 909.524 MHz
Channel 1 - 911.572 MHz
Channel 2 - 913.620 MHz
Channel 3 - 915.668 MHz
Channel 4 - 917.716 MHz
Channel 5 - 919.764 MHz

1.1.1 Transmit Frequency Drift Control

The Nursery Unit incorporates a line regulator. The transmit frequency drift with supply voltage is directly related to the line regulation of the AUK S5233M low dropout regulator used to provide the 3.3 V supply to the voltage controlled oscillator (VCO).

3.3 V regulator worst case line regulation (voltage input to regulator changes by 9 V) = 5 mV
VCO supply voltage sensitivity = 3.3 MHz/volt
Worst case frequency drift = 5 mV * 3.3 MHz/volt = 16.5 kHz
% deviation = 16.5 kHz / 915 MHz = 0.002%

1.1.2 Graco imonitor Digital Baby Monitor Family

The models A3929 and A3930 Nursery Units are part of the Graco models 2795 and 2791 imonitor Digital Baby Monitor, respectively as identified below:

<u>Graco model 2795 imonitor Digital Baby Monitor includes</u>:
One (1) A3929 Nursery Unit
Two (2) A3940 Parent Units
Two (2) Docking Stations
Three (3) U060020D11 AC Adaptors

<u>Graco model 2791 imonitor Digital Baby Monitor includes</u>:
One (1) A3930 Nursery Unit
One (1) A3940 Parent Unit
One (1) Docking Station
Two (2) U060020D11 AC Adaptors

Photo 1: A3929 Nursery Unit – Front/Side View

Photo 2: A3929 Nursery Unit – Rear/Side View

Photo 3: A3929 Nursery Unit with its AC Adaptor, View 1

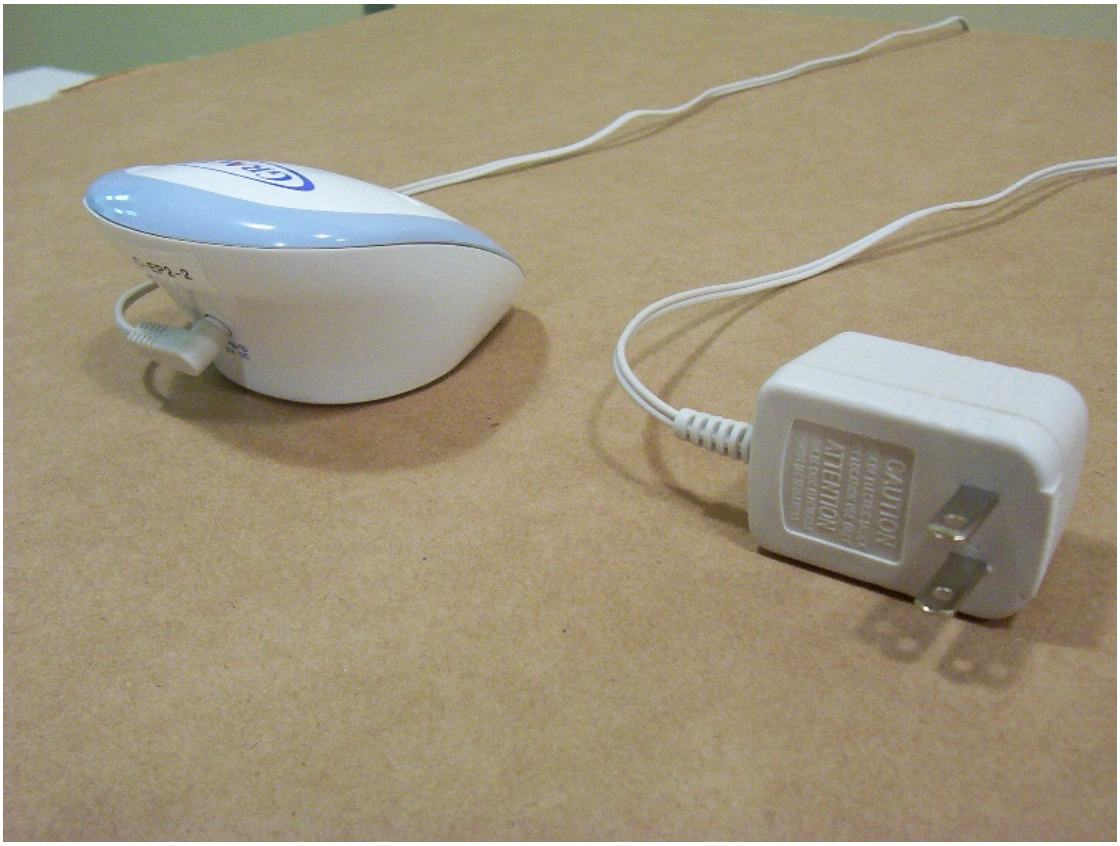


Photo 4: A3929 Nursery Unit with its AC Adaptor, View 2

1.2 Test Configurations

Testing was carried out on a single EUT configuration. The EUT was placed on a wooden table of 80 cm height.

Detailed EUT Hardware Listing

The A3929 Nursery Unit has a permanently attached antenna. The detail of hardware tested is listed below:

Description	Manufacturer	Manufacturer's Model Number/Part Number
PC Board*	Graco Children's Products	PB-29766
Voltage Controlled Oscillator (VCO)	Taisaw	TV0114B
Microprocessor	Cypress	CY8C24223A-24SXI
AC Adaptor	Graco Children's Products	U060020D11

* There is only one PCB in the Nursery Unit. The PCB assemblies for A3929 and A3930 are nearly identical. The differences are: A3929 has an additional pushbutton switch (SW3) and pull-up resistor (R42) installed. The PCB revision is 1.9. The PCB part number is PB-29766.

Test Support Items

The following device was used to verify the EUT operation.

Description	Manufacturer	Model Number	ID Number
Parent Unit	Graco Children's Products	A3940	P-EP2-3

1.3 Rationale for the Chosen Configuration

The tested configuration of the EUT represents actual deliverable hardware. The model A3929 Nursery Unit has an additional feature of parent finder button as compare to the model A3930.

1.4 EUT Modifications

The following modifications were made on the A3929 Nursery Unit to meet the EMI requirements:

- Added (2) 100 pF capacitors between the 3.3V supply line and ground (Samsung part #CL21C101JBNC).
- Added 12 ohm resistor in series with antenna (Hong Kong Resistor part #RCT0312RF)
- Added 4 pF capacitor between output of SAW filter and ground (Samsung part #CL10C4R0CBNC)
- Added 100 pF capacitor between VCO data input and ground (Samsung part #CL21C101JBNC).
- Added shield cover over RF circuit (custom stamped metal part).

2.0 Operation of the EUT During Testing

Unless otherwise noted in the individual test results sections, testing was performed on the EUT as follows.

2.1 General

Climatic Environment

The following were the ambient conditions in the laboratory during testing:
Temperature: 22° C ± 5° C
Relative Humidity 50% ± 10% RH

Input Power

The A3929 Nursery Unit was powered with 6 DC volts which it received from the Graco model U060020D11 AC adaptor. The AC adaptor was supplied with input AC power at 120 VAC/60 Hz.

2.2 Operating Mode

During the emissions testing, the A3929 Nursery Unit was operated for continuous transmit mode of operation. The communication was checked using the Graco model A3940 Parent Unit (used as support item). As per the FCC rules, the testing was performed with operating the A3929 Nursery Unit at three fundamental transmission frequencies (Low, Medium and High) as identified below:

Channel 0 - 909.524 MHz (Low TX)
Channel 2 - 913.620 MHz (Medium TX)
Channel 5 - 919.764 MHz (High TX)

2.3 Rationale for the Chosen Mode of Operation

The selected mode of operation simulated the actual transmit application of the EUT, operating at the selected three frequencies as per FCC rules, therefore it was considered as an appropriate operating mode for the EMI evaluation. As compared to A3930 Nursery unit, the A3929 Nursery Unit has an additional Parent Finder feature, which is designed to allow someone to easily locate a missing Parent Unit. This Parent Finder button transmits specific data to the parent unit as long as the button is pressed down. The basic packet structure does not change, so there is no obvious spectrum change during this time. Therefore it is not considered as a separate mode of operation that needs to be tested.

3.0 Applicable Requirements, Methods and Procedures

3.1 Applicable Requirements

The results of the measurement of the radio disturbance characteristics of the EUT described herein may be applied and, where appropriate, provide a presumption of compliance to one or more of the following requirements or to other requirement at the discretion of the client, regulatory agencies, or other entities.

USA

47 CFR, Part 15, Radio Frequency Devices,
- Subpart B, "Unintentional Radiators".
- Subpart C, "Intentional Radiators".

Canada

Industry Canada (IC) Spectrum Management and Telecommunication, Radio Standards Specifications:
- RSS-Gen, "General Requirements and Information for the Certification of Radiocommunication Equipment". Issue 1, September 2005.
- RSS-210, "Low Power License – Exempt Radiocommunication Devices (All Frequency Bands): Category I equipment", Issue 6, September 2005.

3.2 Basic Test Methods and Procedures

The applicable regulatory product family or generic standards require that radio disturbance/interference tests be performed in accordance with the following:

- C63.4, 2003 "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in The Range of 9 kHz to 40 GHz".

3.3 Deviations Or Exclusions From The Requirements And Standards

There were no deviations or exclusions from the requirements and standards.

4.0 Test Results

4.1 Radiated Emissions

4.1.1 Radiated Emissions Test Procedure

Radiated Emissions 30 MHz – 1000 MHz

Initial measurements, for the purpose of identifying suspect emissions from the equipment under test, were performed by dividing the test frequency range into the following twenty bands:

Band	Frequency Range	Band	Frequency Range	Band	Frequency Range
1)	30 - 40 MHz	8)	108 - 148 MHz	15)	570 - 670 MHz
2)	40 - 50 MHz	9)	148 - 165 MHz	16)	670 - 770 MHz
3)	50 - 88 MHz	10)	165 - 200 MHz	17)	770 - 855 MHz
4)	88 - 93 MHz	11)	200 - 300 MHz	18)	855 - 875 MHz
5)	93 - 98 MHz	12)	300 - 450 MHz	19)	875 - 892 MHz
6)	98 - 103 MHz	13)	450 - 470 MHz	20)	892 - 1000 MHz
7)	103 - 108 MHz	14)	470 - 570 MHz		

Each of these bands was monitored on a spectrum analyzer display while the turntable was initially positioned at the reference 0 degree point. A mast mounted broadband antenna was located at a distance of 3/10 meters (as applicable) from the periphery of the EUT(s). The antenna was set to a height of 1 meter, for the vertical polarity and a height of 2.5 meters, for horizontal polarity for these suspect emission scans. All emissions with amplitudes 8 dB or less below the appropriate regulatory limit were identified and saved for later source identification and investigation. This initial suspect identification procedure was repeated for turntable positions of 90, 180 and 270 degrees.

The source of questionable emissions was verified by powering off the EUT(s). Those emissions remaining were removed from the suspect list. Valid suspect emissions were then maximized through cable manipulation. The highest six signals or all within 4 dB of the limit, identified during this initial investigation, were then maximized by rotating the turntable through a complete 360 degrees of azimuth and then raising the antenna from 1 to 4 meters of elevation with the turntable positioned at the angle of maximum signal level. When the EUT(s) azimuth, antenna height and polarization that produced the maximum indication were found, the emission amplitude and frequency were remeasured to obtain maximum peak and quasi-peak field strength. The frequencies and amplitudes of RFI emissions are recorded in this report in units derived as follows:

Field Strength (dBuV/m) = meter reading (dBuV) + antenna factor (dB/m)+ Cable Loss (dB)

Radiated Emissions above 1 GHz

The required test frequency range above 1 GHz, was scanned manually by placing a Double Ridged Guide antenna at a distance of 3 meters from the perimeter of the equipment under test. Emissions were monitored using EMI Test Receiver ESIB 40 set for a 1 MHz bandwidth with rotating the turntable through a complete 360 degrees of azimuth. Both horizontal and vertical antenna polarities were investigated for suspect emissions. The support equipment and test item(s) were powered off in turn to determine the source of the emissions. The test procedure described above for 30 –1000 MHz was observed to maximize the emissions. The measurements were made with both peak and average detectors. The field strengths were recorded as follows:

Field Strength (dBuV/m) = Meter reading (dBuV) + Correction Factor*

* Correction Factor includes Antenna Factor (dB/m) + Cable Loss (dB) – Amplifier Gain (dB)

4.1.2 Radiated Emissions Test Results (10/14/05 – 10/15/05)

4.1.2.1 Radiated Emissions - Intentional Radiator

Restricted Bands FCC Part 15.205 – Radiated Emissions Test

All Harmonics and spurs emissions found in the restricted bands (FCC 15.205) up to the 10th Harmonics of the fundamental transmission frequency are recorded and compared with the limit specified by FCC Part 15.209 as below. Radiated emissions measurements were made at a test distance of 3-meters.

A3929 Nursery Unit Operating at Low Tx Frequency

Freq (GHz)	EUT Az	Ant Ht	Ant Pol	CF dB	PK (dBuV/m)	AV (dBuV/m)	PK Limit	AV Limit	Delta PK	Delta AV
3.64022445	138	328	H	1.28	52.91	45.99	74	54	-21.09	-8.01
8.19044088	117	317	V	7.31	59.64	52.48	74	54	-14.36	-1.52
8.19044088	100	330	V	7.31	53.91	44.91	74	54	-20.09	-9.09
9.100470942	100	338	H	9.23	61.02	53.86	74	54	-12.98	-0.14
9.100470942	100	338	V	9.23	58.56	50.71	74	54	-15.44	-3.29

A3929 Nursery Unit Operating at Mid Tx Frequency

Freq (GHz)	EUT Az	Ant Ht	Ant Pol	CF dB	PK (dBuV/m)	AV (dBuV/m)	PK Limit	AV Limit	Delta PK	Delta AV
3.6562245	100	360	H	1.28	53.34	46.8	74	54	-20.66	-7.2
8.226799	100	25	H	7.31	59.93	52.73	74	54	-14.07	-1.27
8.2263123	111	56	V	7.31	55.16	46.63	74	54	-18.84	-7.37
9.140917836	100	66	H	9.23	60.76	53.37	74	54	-13.24	-0.63
9.14034068	103	298	V	9.23	58.29	50.16	74	54	-15.71	-3.84

A3929 Nursery Unit Operating at High Tx Frequency

Freq (GHz)	EUT Az	Ant Ht	Ant Pol	CF dB	PK (dBuV/m)	AV (dBuV/m)	PK Limit	AV Limit	Delta PK	Delta AV
3.68030261	150	0	H	1.28	53.19	46.43	74	54	-20.81	-7.57
8.28058141	100	322	H	7.31	59.23	51.79	74	54	-14.77	-2.21
8.28054133	100	310	V	7.31	57.93	50.05	74	54	-16.07	-3.95
9.20064128	100	58	H	9.23	59.64	51.25	74	54	-14.36	-2.75
9.200554108	123	293	V	9.23	59.5	51.23	74	54	-14.5	-2.77

Overall Results: All the detected EUT signals in the restricted bands are under the 3 meter limit specified in FCC Part 15, Section 15.209.

4.1.2.2 Radiated Emissions - Unintentional Radiator

Emission scan for detection of spurious and unintentional radiation was performed. The recorded levels are compared with the applicable limit specified in FCC Part 15, Section 15.209 which is the same limit as FCC Part 15 specified for Class B digital devices for the test measurement frequency spectrum. Measurement scan was performed for the frequency range of 30 MHz to 5 GHz, at the test distance of 3 meters. Testing was performed with the A3929 Nursery Unit Operating at each of the selected transmitting frequencies (Low Tx, Mid Tx and high Tx). The results of the measurements are presented below:

30 MHz – 5000 MHz

No unintentional emissions found. Therefore noise floor measurements were recorded as below:

Freq	Pk	Q-Pk	Avg	Ant Pol	EUT Angle	Ht	CF	Limit (QP/AV)	Delta
[MHz]	[dBuV/m]	[dBuV/m]	[dBuV/m]		[deg]	[cm]	[dB]	[dBuV/m]	[dB]
30.000	32.28	26.63	-	V	1	100	18.66	40	-13.37
350.00	22.65	16.5	-	V	1	100	17.46	46	-29.5
800.00	31.38	26.15	-	V	1	100	25.61	46	-19.85
1500.00	37.77	-	25.61	V	1.00	100.00	-0.39	54.00	-28.39
3000.00	44.82	-	32.97	V	1.00	100.00	10.33	54.00	-21.03
5000.00	53.41	-	40.59	V	1.00	100.00	18.28	54.00	-13.41

Freq	PK	AV	Q-Pk	CF	PK	AV	QP	Delta	Delta	Delta
(MHz)	(dBuV/m)	(dBuV/m)	[dBuV/m]	dB	Limit	Limit	Limit	PK	AV	QP
30.00	32.28	-	26.63	18.66	*	*	40	-	-	-13.37
350.00	22.65	-	16.5	17.46	*	*	46	-	-	-29.50
800.00	31.38	-	26.15	25.61	*	*	46	-	-	-19.85
1500.0	37.77	25.61	-	-0.39	74	54	*	-36.23	-28.39	-
3000.0	44.82	32.97	-	10.33	74	54	*	-29.18	-21.03	-
5000.0	53.41	40.59	-	18.28	74	54	*	-20.59	-13.41	-

*: No applicable limit

Overall Results: All the EUT signals, spurious and unintentional radiation, are under the 3 meter limit specified by FCC Part 15, Class B digital devices and FCC Part 15, Section 15.209.

Test Setups

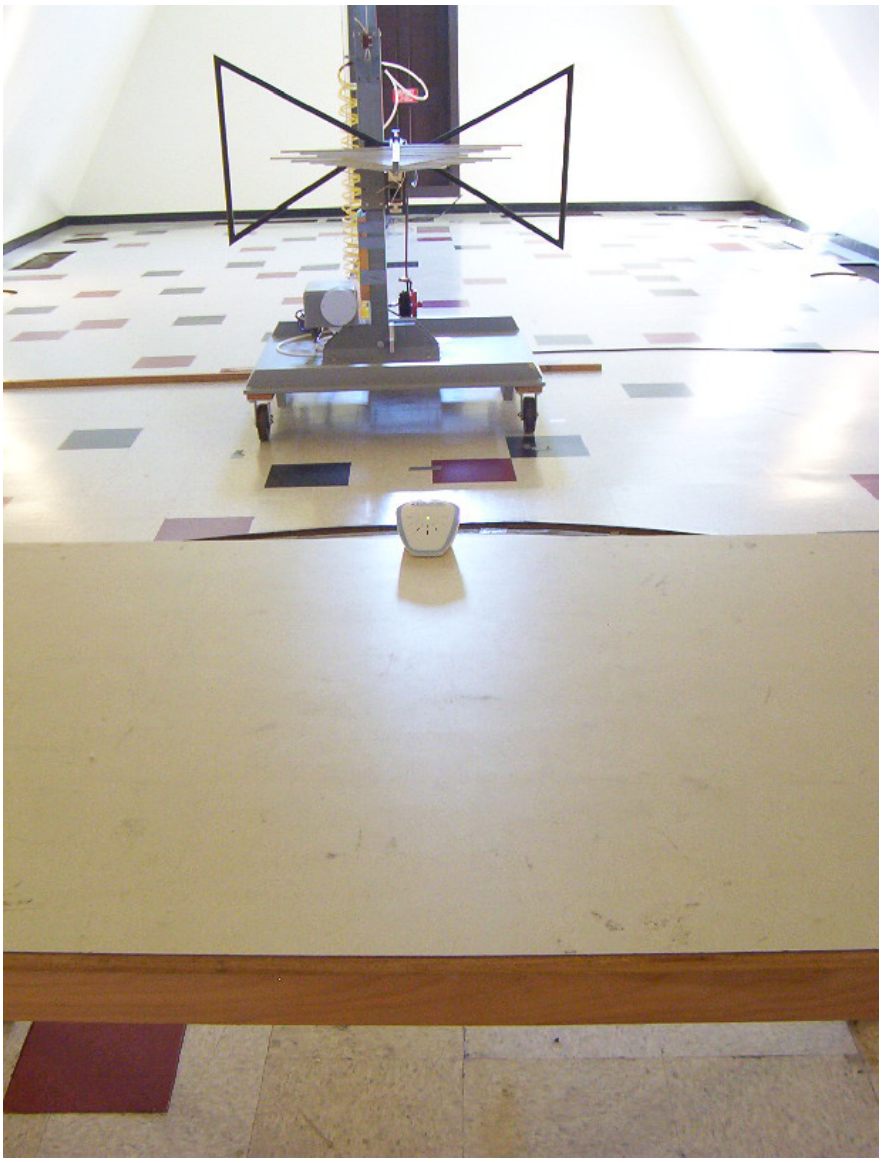


Photo 5: Radiated Emission Test Setup – Front View

Photo 6: Radiated Emission Test Setup– Front View

4.2 AC Power Lines Conducted Emissions

4.2.1 Conducted Emission Test Procedure

Peak amplitude terminal voltage emissions at the AC power line input to the Graco model U060020D11 AC Adaptor, were measured with a receiver, using a peak detector and the appropriate CISPR bandwidth, connected to the RF output of a 50 Ohm, 50 microhenry Line Impedance Stabilization Network (LISN) installed in each power line. Peak detector emission data measurements were made over the frequency range from 150 kHz to 30 MHz while the EUT(s) was operating as described in paragraph 2.2.

Note: For speed and convenience, a receiver employing a peak detector was used to sweep through and record the spectrum. As a tool to judge compliance of the emissions, the peak detector sweep is displayed and graphed against the appropriate average limit. This type of measurement is valid given that the peak reading will always be greater than or equal to the average or quasi-peak reading. From the Peak detector emission data plot, the top six (6) emissions or any other peak emissions that exceed the average limit, or are found to be within 1 dB of the average limit, are re-measured using receiver with the detector function first set to quasi-peak and then to average. These measurements are recorded and presented in the table format below the peak emission graph.

The amplitudes of emissions measured on the AC power lines of the EUT(s) are recorded in this report in units derived as follows:

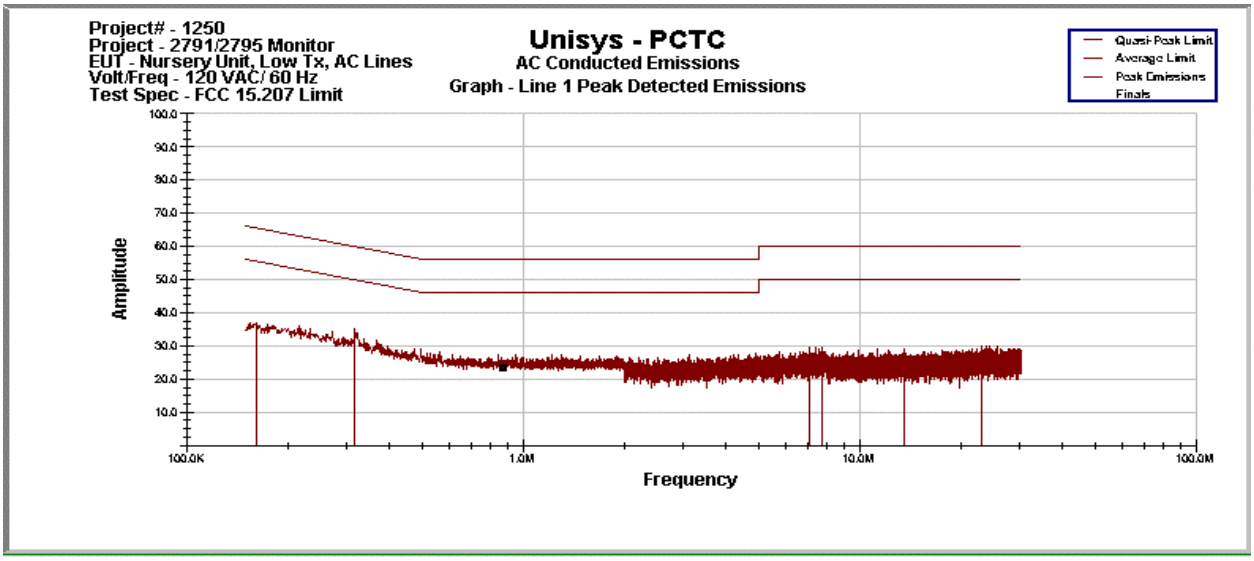
Conducted Emission (dBuV) = Meter reading (dBuV)+ Correction Factor*

* Correction Factor = Cable Loss (dB) + LISN factor (dB) + Limiter Loss (dB).
.

4.2.2 Conducted Emissions Test Results (10/17/2005)

The conducted emissions recorded on the EUT AC power cord, displayed against the limits for FCC 15.207 (same as FCC Class B Conducted Emission limit) devices are below:

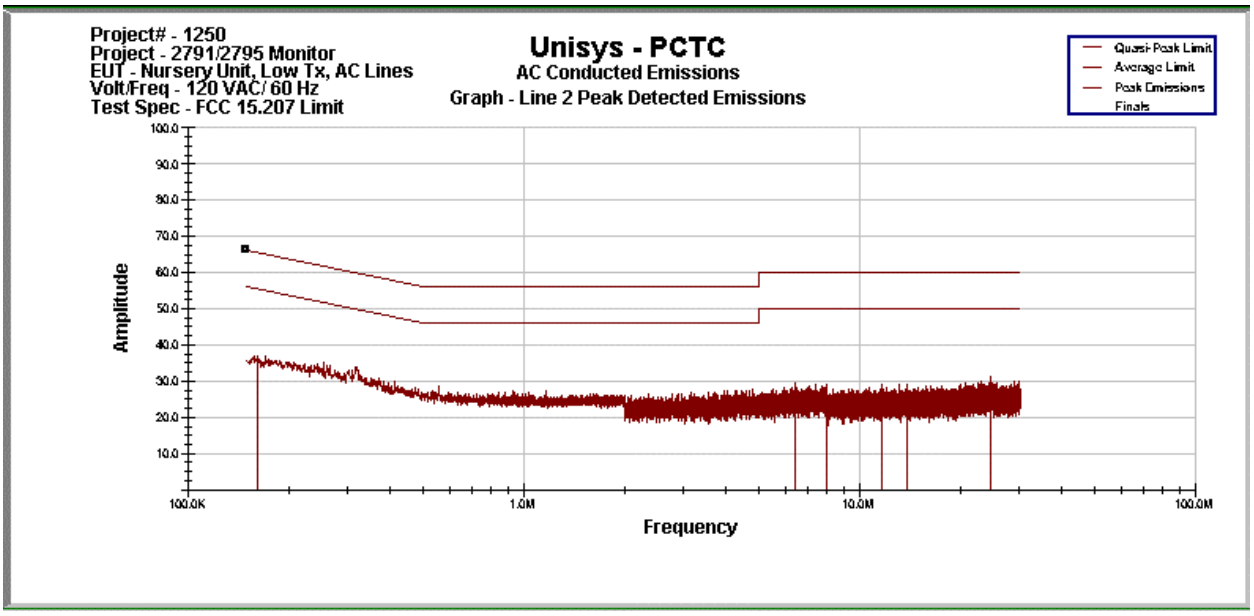
A3929 Nursery Unit – Low Tx, Line 1



Unisys - PCTC
Line 1 Conducted Emissions
11:31:26 AM, Monday, October 17, 2005

	1	2	3	4	5	6	7
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor
162.000 KHz	26.05	55.66	-29.61	31.48	65.66	-34.18	13.067
316.000 KHz	24.13	51.26	-27.13	29.80	61.26	-31.46	10.554
7.090 MHz	16.55	50.00	-33.45	21.09	60.00	-38.91	10.208
7.745 MHz	17.04	50.00	-32.96	21.50	60.00	-38.50	10.219
13.572 MHz	15.69	50.00	-34.31	20.34	60.00	-39.66	10.331
22.897 MHz	17.07	50.00	-32.93	21.60	60.00	-38.40	10.722
Project# - 1250							
Project - 2791/2795 Monitor							
EUT - Nursery Unit, Low Tx, AC Lines							
Volt/Freq - 120 VAC/ 60 Hz							
Test Spec - FCC 15.207 Limit							

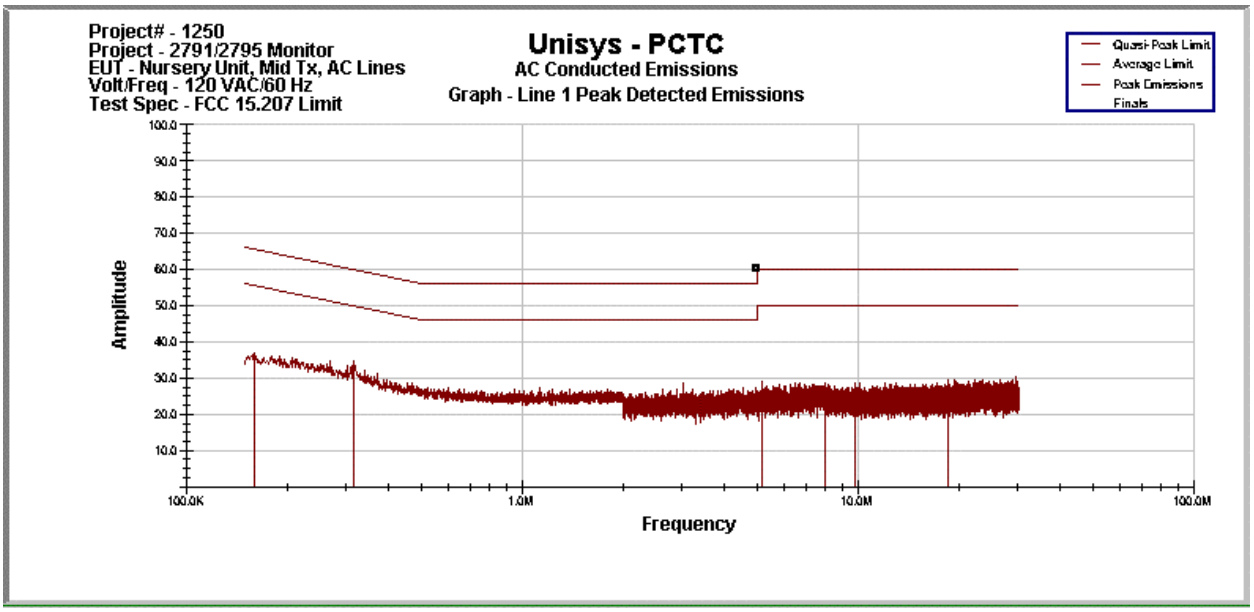
A3929 Nursery Unit – Low Tx, Line 2



Unisys - PCTC
Line 2 Conducted Emissions
11:37:53 AM, Monday, October 17, 2005

	1	2	3	4	5	6	7
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor
162.000 KHz	25.927	55.657	-29.730	31.126	65.657	-34.531	13.067
6.411 MHz	15.979	50.000	-34.021	20.651	60.000	-39.349	10.195
7.976 MHz	17.165	50.000	-32.835	21.893	60.000	-38.107	10.224
11.670 MHz	15.572	50.000	-34.428	19.834	60.000	-40.166	10.293
13.819 MHz	15.771	50.000	-34.229	20.346	60.000	-39.654	10.336
24.420 MHz	17.350	50.000	-32.650	22.091	60.000	-37.909	10.808
Project# - 1250							
Project - 2791/2795 Monitor							
EUT - Nursery Unit, Low Tx, AC Lines							
Volt/Freq - 120 VAC/ 60 Hz							
Test Spec - FCC 15.207 Limit							

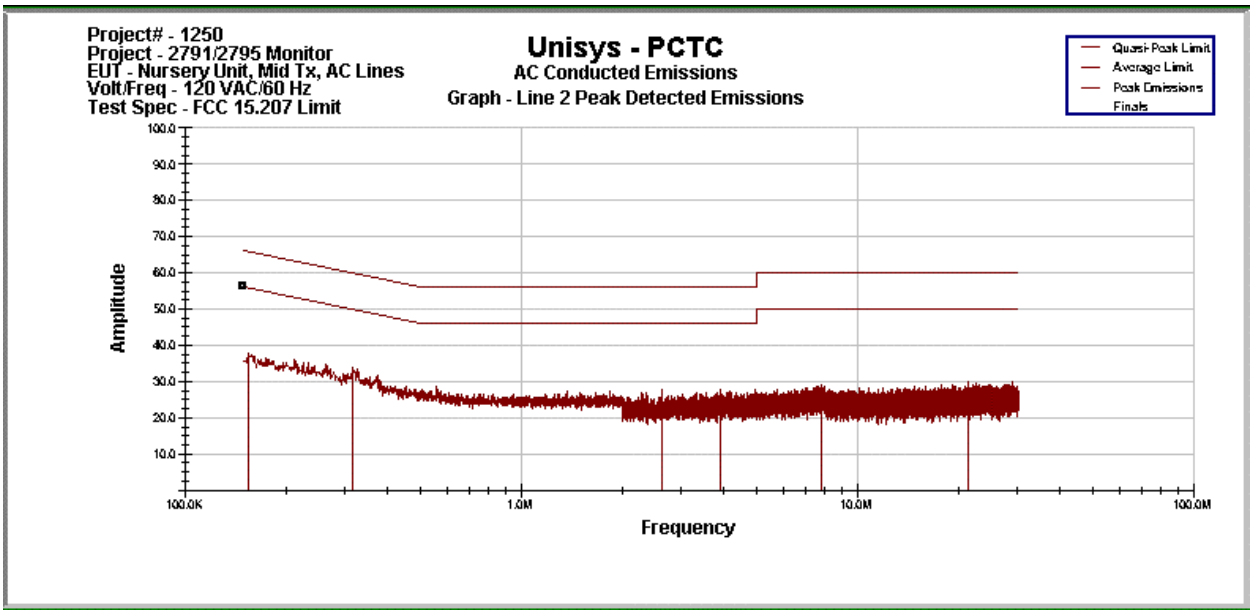
A3929 Nursery Unit – Mid Tx, Line 1



Unisys - PCTC
Line 1 Conducted Emissions
11:54:24 AM, Monday, October 17, 2005

	1	2	3	4	5	6	7
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor
159.000 KHz	27.38	55.74	-28.37	32.89	65.74	-32.86	13.183
315.000 KHz	22.97	51.29	-28.32	28.61	61.29	-32.67	10.554
5.195 MHz	15.40	50.00	-34.60	20.18	60.00	-39.82	10.174
7.973 MHz	17.03	50.00	-32.97	21.89	60.00	-38.11	10.224
9.816 MHz	15.41	50.00	-34.59	19.80	60.00	-40.20	10.257
18.575 MHz	16.08	50.00	-33.92	20.51	60.00	-39.49	10.503
Project# - 1250							
Project - 2791/2795 Monitor							
EUT - Nursery Unit, Mid Tx, AC Lines							
Volt/Freq - 120 VAC/60 Hz							
Test Spec - FCC 15.207 Limit							

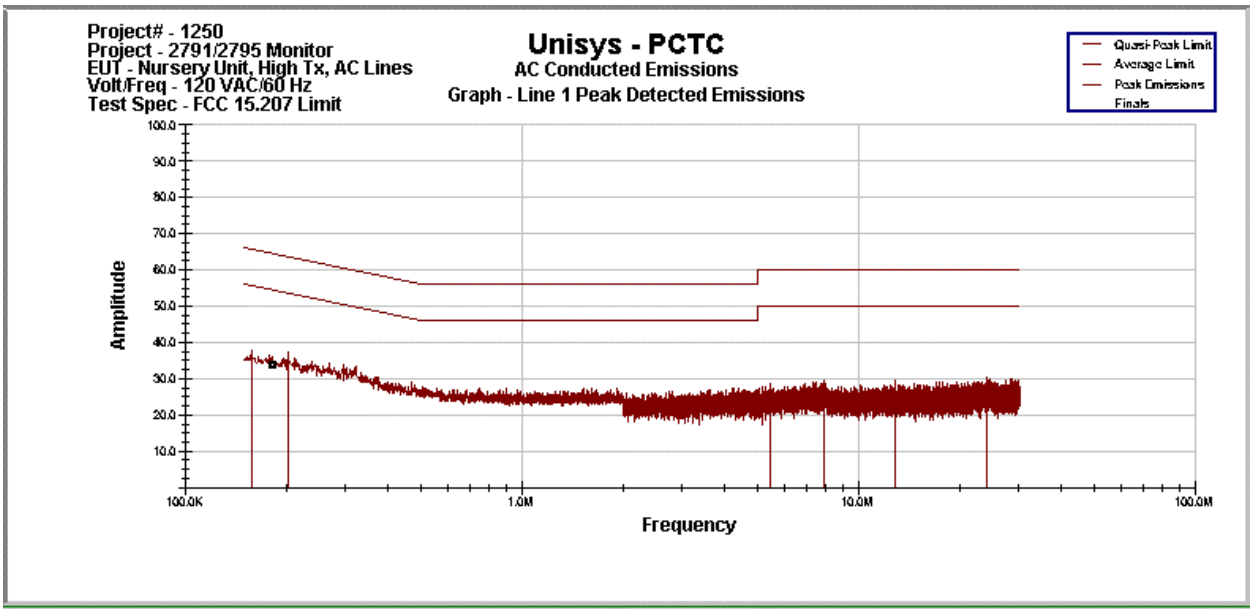
A3929 Nursery Unit – Mid Tx, Line 2



Unisys - PCTC
Line 2 Conducted Emissions
11:59:27 AM, Monday, October 17, 2005

	1	2	3	4	5	6	7
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor
154.000 KHz	26.007	55.886	-29.879	31.252	65.886	-34.633	13.376
316.000 KHz	24.509	51.257	-26.748	30.257	61.257	-31.000	10.554
2.626 MHz	14.262	46.000	-31.738	18.627	56.000	-37.373	10.110
3.927 MHz	14.865	46.000	-31.135	19.181	56.000	-36.819	10.138
7.802 MHz	16.958	50.000	-33.042	21.504	60.000	-38.496	10.220
21.354 MHz	16.700	50.000	-33.300	21.091	60.000	-38.909	10.636
Project# - 1250							
Project - 2791/2795 Monitor							
EUT - Nursery Unit, Mid Tx, AC Lines							
Volt/Freq - 120 VAC/60 Hz							
Test Spec - FCC 15.207 Limit							

A3929 Nursery Unit – High Tx, Line 1

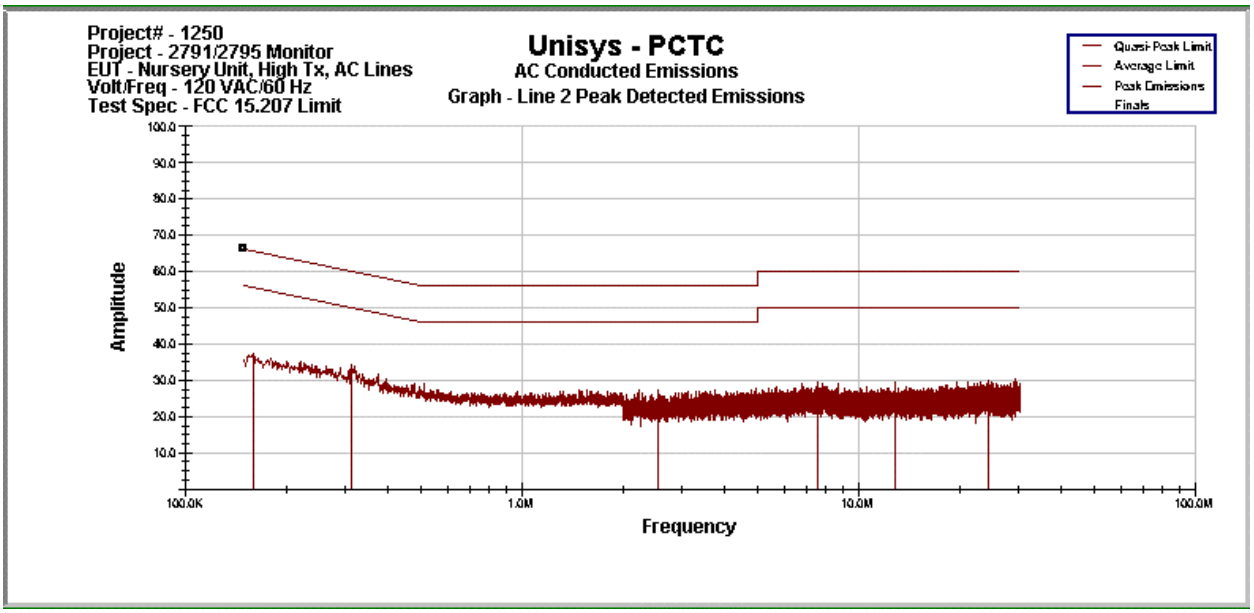


Unisys - PCTC
Line 1 Conducted Emissions
01:18:54 PM, Monday, October 17, 2005

	1	2	3	4	5	6	7
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor
157.000 KHz	26.78	55.80	-29.02	32.01	65.80	-33.79	13.260
202.000 KHz	24.26	54.51	-30.25	29.62	64.51	-34.89	11.565
5.464 MHz	15.60	50.00	-34.40	19.72	60.00	-40.28	10.178
7.904 MHz	17.05	50.00	-32.95	21.89	60.00	-38.11	10.222
12.802 MHz	15.66	50.00	-34.34	20.33	60.00	-39.67	10.316
24.058 MHz	17.32	50.00	-32.68	22.07	60.00	-37.93	10.787

Project# - 1250
Project - 2791/2795 Monitor
EUT - Nursery Unit, High Tx, AC Lines
Volt/Freq - 120 VAC/60 Hz
Test Spec - FCC 15.207 Limit

A3929 Nursery Unit – High Tx, Line 2



Unisys - PCTC
Line 2 Conducted Emissions
01:28:57 PM, Monday, October 17, 2005

	1	2	3	4	5	6	7
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor
159.000 KHz	28.004	55.743	-27.738	33.465	65.743	-32.278	13.183
310.000 KHz	20.913	51.429	-30.516	26.117	61.429	-35.312	10.556
2.525 MHz	14.262	46.000	-31.738	18.627	56.000	-37.373	10.110
7.547 MHz	16.787	50.000	-33.213	21.499	60.000	-38.501	10.216
12.876 MHz	15.674	50.000	-34.326	20.327	60.000	-39.673	10.318
24.185 MHz	17.324	50.000	-32.676	22.077	60.000	-37.923	10.794
Project# - 1250							
Project - 2791/2795 Monitor							
EUT - Nursery Unit, High Tx, AC Lines							
Volt/Freq - 120 VAC/60 Hz							
Test Spec - FCC 15.207 Limit							

Overall Results: All conducted emissions measured on the input AC power lines of the Graco model U060020D11 AC Adaptor, supplying DC power to the A3929 Nursery Unit, are below the FCC 15.207 limit.

Test Setup

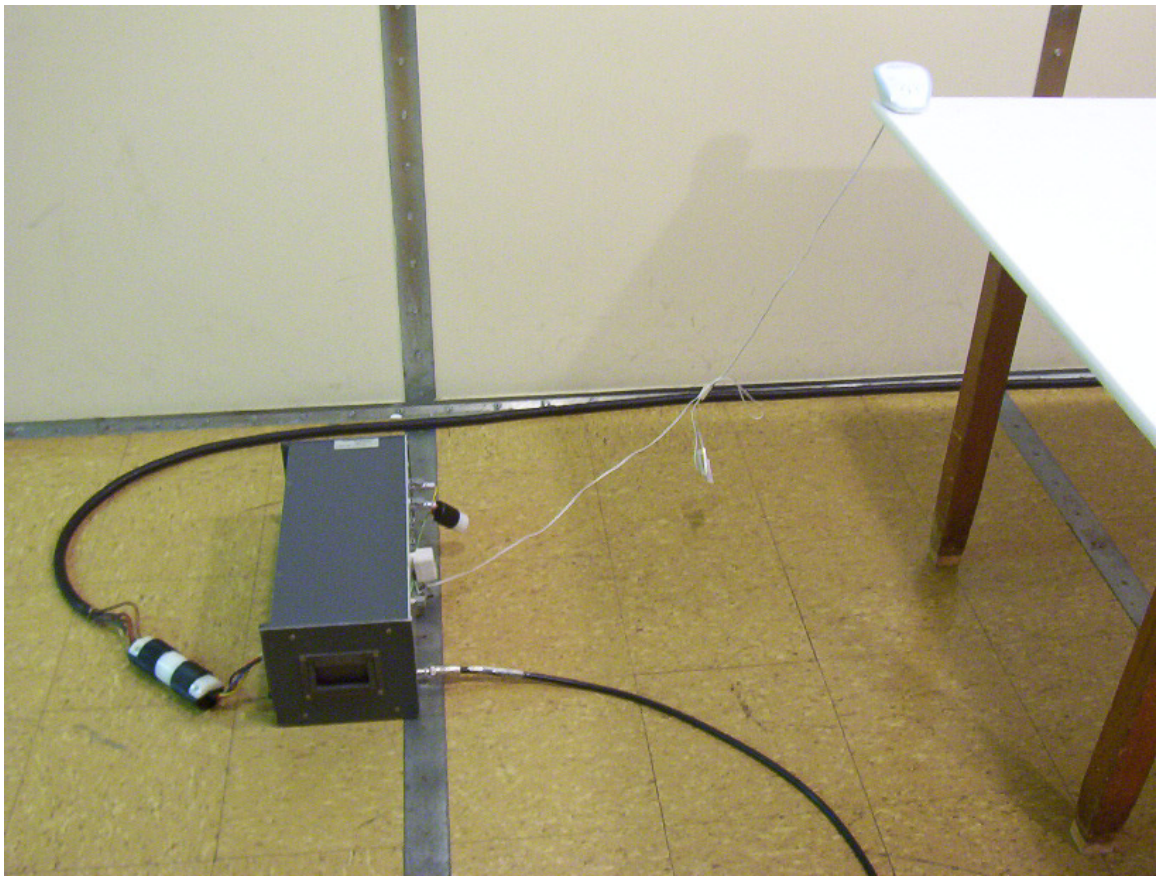


Photo 7: Conducted Emission Test Setup, Nursery Unit – Front View

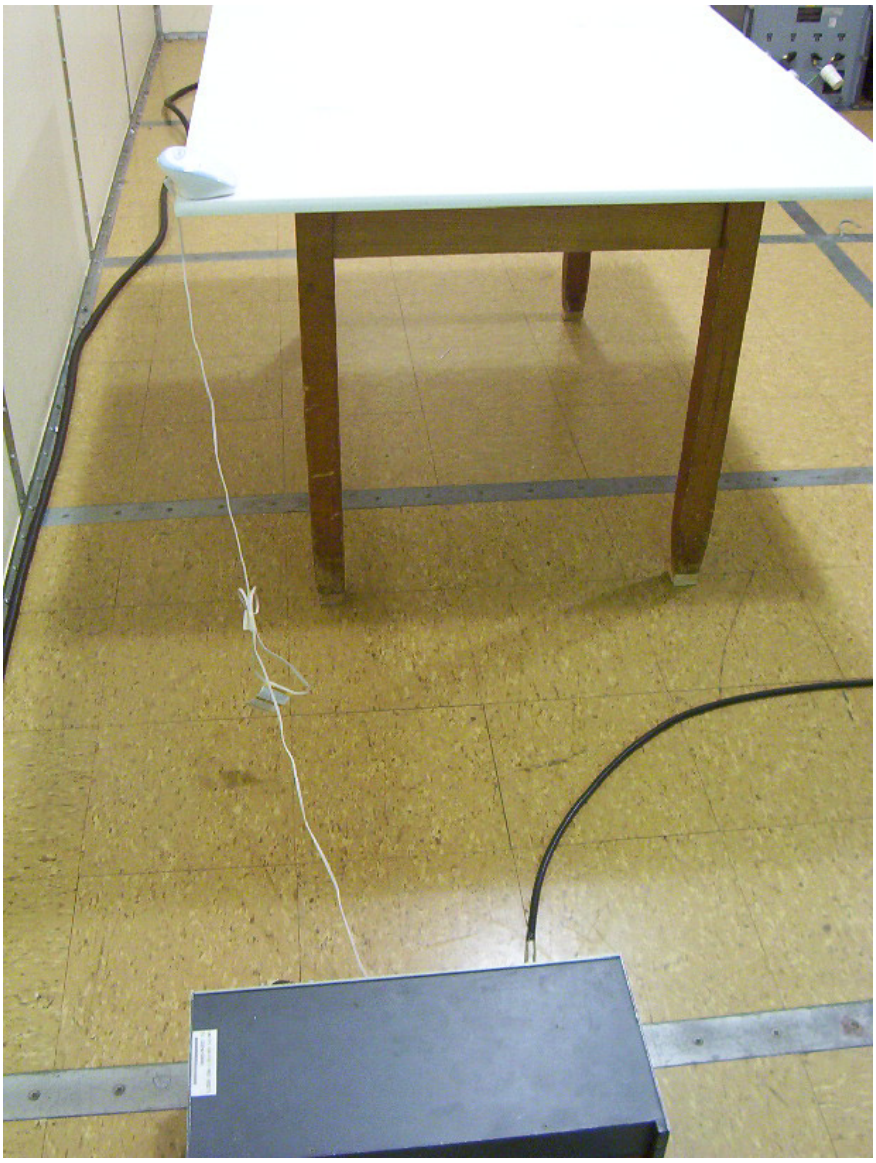


Photo 8: Conducted Emission Test Setup, Nursery Unit – Side View

4.3 Antenna Port Conducted Measurements (10/18/05)

4.3.1 6 dB Bandwidth Measurements (15.247 (a) (2))

As per FCC Section 15.247 (a) (2), systems using digital modulation techniques in the 902-928 MHz band are required to have a 6 dB bandwidth of 500 kHz or greater. The Nursery unit antenna port was connected directly to the spectrum analyzer through a suitable attenuator. Measurement of 6 dB bandwidth was made with spectrum analyzer's resolution bandwidth (RBW) set to 100 kHz and the frequency span of 2.5 MHz. Measurements for the fundamental transmission frequencies of following channels were made

Channel 0 - 909.524 MHz (Low TX)
Channel 2 - 913.620 MHz (Medium TX)
Channel 5 - 919.764 MHz (High TX)

The 6 dB Bandwidth of the EUT emission at the low, mid, and high fundamental operating frequencies was found at least 806 kHz, which is well above the 500 kHz minimum 6 dB bandwidth requirements.

Overall Results: The A3929 Nursery Unit met the 6 dB Bandwidth requirements FCC Part 15, Section 15.247.

4.3.2 Power Output Requirements (15.247 (b) (3))

For systems using digital modulation and that are operating in the 902-928MHz band, the peak output power limit is 1 Watt (30 dBm). The A3929 Nursery Unit antenna port was connected directly to the spectrum analyzer through a suitable attenuator. The measurements were made with setting the resolution bandwidth greater than 6 dB bandwidth of the emission. The following table shows the result peak power measurements at the selected fundamental transmit frequencies:

Transmit Frequency (MHz)	Receiver Measured Voltage Level (dBuV)	Correction Factor (dB)	Corrected Voltage Level (dBuV)	Corrected Power Output (dBm)	FCC Power Output Limit (dBm)
909.524 (Low TX)	89.48	30.55	120.03	13.03	30
913.620 (Medium TX)	89.36	30.55	119.91	12.91	30
919.764 (High TX)	89.60	30.55	120.15	13.15	30

Overall Results: The A3929 Nursery Unit conducted peak power output was below the limit specified in FCC Part 15, Section 15.247.

4.3.3 Harmonics/Spurious Emissions Requirements (15.247 (d))

This test was performed with the Nursery Unit antenna port connected directly to the spectrum analyzer through a suitable attenuator. Measurements made with a peak detector and a 100 kHz RBW. Measurement scan was performed for the frequency range of 30 MHz to 10 GHz. The purpose of this test is to demonstrate that all Harmonics of the Fundamental Frequency and Spurious Emissions from the EUT are 20 dB below from the highest emission level within the authorized band.

120.15 dBuV was found to be the highest peak emission level within the authorized operating band of 902 MHz to 928 MHz.

Low Tx

Frequency	Receiver level	CF	Corrected Level	Maximum Limit	Peak Delta Margin
(GHz)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)
1.820	29.84	30.67	60.51	100.15	-59.64
8.190	28.79	31.79	60.58	100.15	-59.57
9.100	26.83	31.83	58.66	100.15	-61.49

Mid Tx

Frequency	Receiver level	CF	Corrected Level	Maximum Limit	Peak Delta Margin
(GHz)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)
1.828	30.39	30.67	61.06	100.15	-59.09
8.226	29.26	31.79	61.05	100.15	-59.1
9.141	26.05	31.83	57.88	100.15	-62.27

High Tx

Frequency	Receiver level	CF	Corrected Level	Maximum Limit	Peak Delta Margin
(GHz)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)
1.840	27.68	30.67	58.35	100.15	-61.8
8.282	28.82	31.79	60.61	100.15	-59.54
9.202	24.5	31.83	56.33	100.15	-63.82

Overall Results: All Harmonics and Spurious Emissions are more than 20 dB down from the highest emissions level (120.15 dBuV) within the authorized band.

4.3.4 Power Spectral Density Requirements (15.247 (e))

This test was performed with the Nursery unit antenna port connected directly to the spectrum analyzer through a suitable attenuator. It was found that the EUT spectral line spacing was indeterminant. The peak power density normalized to a 1 Hz noise power bandwidth is recorded in the test result table below. A 35 dB correction was added for 3 kHz.

Measurements were made for all the three selected operating test frequencies – Low TX, Mid TX and High TX.

The limit for power spectral density is 8 dBm.

The test results are presented below:

Transmit Frequency	Peak Receiver level	Atten. CF	3 KHz CF	Corrected Level	Maximum Limit	Delta Margin
(MHz)	(dBm/Hz)	(dB)	(dB)	(dBmHz)	(dBm)	(dBm)
909.524 (Low TX)	-60.28	30.55	35	5.27	8	-2.73
913.620 (Medium TX)	-60.39	30.55	35	5.16	8	-2.84
919.764 (High TX)	-60.32	30.55	35	5.23	8	-2.77

Overall Results: The A3929 Nursery Unit met the power spectral density requirements specified in FCC Part 15, Section 15.247.

4.3.5 RF Safety - Maximum Permitted Exposure (15.247 (i))

The A3929 Nursery unit has the antenna with 0 dBi nominal Antenna Gain. Therefore the numeric antenna gain is 1 (0 dBi=10 log (numeric gain))

Based on the FCC OET Bulletin 65, Edition 97-01, power density at a distance of 20 cm was calculated as below:

S=PG/4PiR^2

Where:
S=Power Density (mW/cm^2)
P=Power input to Antenna (mW)
G=Antenna Numeric Gain
R=Distance from center of Radiation Antenna (cm)

Tx Freq	Antenna Gain (dBi)	Antenna Gain (Numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (mW/cm^2)	*Limit of Power Density (mW/cm^2)
Low Tx	0	1	13.03	20.09	0.003996	909/1500=0.606
Mid Tx	0	1	12.91	19.54	0.003887	913/1500=0.608
High Tx	0	1	13.15	20.65	0.004108	919/1500=0.612

*Limit for General Population/Uncontrolled Exposure =F/1500 between 300 MHz and 1500MHz, as per FCC Part 15, Section 1.1310.

Overall Results: The A3929 Nursery Unit met the Maximum Permitted Exposure (MPE) requirements specified in FCC Part 15, Section 15.247.

Appendix A – Test Equipment

Description	Freq Range (Hz)	Model Number	Manufacturer	ID / SN	Last Cal Date
EMI Test Receiver/Analyzer	20 Hz – 40 GHz	ESIB 40	Rohde & Schwarz	C-062	12/7/2004
Antenna	25M - 2G	LPB-2520/A	ARA	B965	9/26/2005
Antenna	1G – 18G	96001	EATON	U926	5/12/2005
High Pass Filter	1.5G-18G	6HC1500/18000-3-KK	Trilithic Inc.	A088	11/1/2004
Controller, Tower and Turntable	NA	2090	EMCO	B812	NA
Amplifier	1G – 40G	NSP4000-44	Miteq	B827	9/14/2005
EMI Test Receiver/Analyzer	20 Hz – 26.5 GHz	ESIB 26	Rohde & Schwarz	C232	3/18/2005
Filter, Bandpass	0.15M - 30M	NA	Unisys	NA	NA
Limiter, Pulse	DC - 30M	ESH3-Z2	Polarad	NA	NA
LISN	9k - 30M	MN 2053	Chase	U775	9/21/2004*

* extended to 10/18/05