Standards Council of Canada
Accredited Laboratory
Scope of Accreditation 75

Conseil canadien des normes
Laboratoire accrédité
Portée d'accréditation 75

TM

Test Report:	2W04794
Applicant:	Digital Security Controls Ltd. 3301 Langstaff Road Concord Ontario L4K 4L2
Equipment Under Test: (EUT)	UA352 Rev 01X3
FCC ID:	F5302RF5501433
In Accordance With:	**FCC 47 CFR Part 15, Subpart B: 1999, Including R&O 989-80, Class B Certification**
Tested By:	Nemko Canada Inc. 303 River Road, R.R. 5 Ottawa, Ontario K1V 1H2
Authorized By:	J. Harrington, RF Group Manager
Date:	24 July 2002
Total Number of Pages:	23

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Section 1. Summary of Test Results

General:

All measurements are traceable to national standards.

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 15, Subpart B for Class B Digital Devices.

These tests were conducted using measurement procedures of CISPR 22: 1997-11.

The equipment was tested for conducted emissions from 0.15 MHz to 30 MHz using a 50 microhenry line impedance stabilization network (L.I.S.N.) as described in CISPR 22: 1997-11. Peripheral equipment was also operated through a 50 microhenry L.I.S.N.

Abstract:

Name Of Test	Para. No.	Results
Conducted Emissions	R&O 989-80, 15.107	Complied
Radiated Emissions	15.109	Complied

THIS TEST REPORT APPLIES ONLY TO THE ITEM(S) TESTED.

Test Performed By: _____ Date: 24 July 2002

Kevin Carr, EMC Specialist

Measurement Uncertainty

Accuracy of Measurement

The measurement uncertainty was calculated using the methods described in NAMAS document NIS81 May 1994, with the confidence level of 95%.

Radiated Measurements

OATS #1 (A) 3 meter [UN9902B]

Contribution	Distribution	Uncertainty (+/-)
Field Strength Variation	Random	0.2089 dBµV^2
Measurement Equipment	Normal	0.3275 dBµV^2
Measurement Equipment	Rectangular	0.4167 dBµV^2
Total Combined Uncertainty		0.9762 dBµV^2

Expanded Uncertainty @ 95% Confidence = ± 2.0013 dBmV

OATS #1 (B) 10 meter [UN9906B]

Contribution	Distribution	Uncertainty (+/-)
Field Strength Variation	Random	0.1388 dBµV^2
Measurement Equipment	Normal	0.3275 dBµV^2
Measurement Equipment	Rectangular	0.4167 dBµV^2
Total Combined Uncertainty		0.9694 dBµV^2

Expanded Uncertainty @ 95% Confidence = ± 1.926 dBmV

OATS #2 (B) 3 meter [UN9912B]

Contribution	Distribution	Uncertainty (+/-)
Field Strength Variation	Random	0.4516 dBµV^2
Measurement Equipment	Normal	0.3275 dBµV^2
Measurement Equipment	Rectangular	0.4167 dBµV^2
Total Combined Uncertainty		1.0935 dBµV^2

Expanded Uncertainty @ 95% Confidence = ± 2.2417 dBmV

Radiated Measurements, continued

OATS #2 (C) 10 meter [UN9917B]

Contribution	Distribution	Uncertainty (+/-)
Field Strength Variation	Random	0.1211 dBµV^2
Measurement Equipment	Normal	0.3275 dBµV^2
Measurement Equipment	Rectangular	0.4167 dBµV^2
Total Combined Uncertainty		0.9302 dBµV^2

Expanded Uncertainty @ 95% Confidence = ± 1.9069 dBmV

Conducted Measurements

Shielded Room #1 [UN9920]

Contribution	Distribution	Uncertainty (+/-)
Amplitude Variation	Random	0.0400 dBµV^2
Measurement Equipment	Normal	0.7500 dBµV^2
Measurement Equipment	Rectangular	0.2500 dBµV^2
Total Combined Uncertainty		1.0198 dBµV^2

Expanded Uncertainty @ 95% Confidence = ± 2.0396 dBmV

Section 2. Equipment Under Test (EUT)

Brand Name:	RF5501-433
Manufacturer:	Digital Security Controls Ltd.
Model No.:	UA352, Rev. 01X3
Serial No.:	None
Date Received In Laboratory:	2 July 2002
Nemko Identification No.:	2

☒ Production Unit ☐ Pre-Production Unit

Description of EUT

The RF5501-433 is a combination RF Receiver and ICON keypad. It combines the function of our existing RF receiver with our existing ICON keypad.

Modifications Incorporated in EUT

The EUT was not modified from what is described by the brand name and unique type identification stated above.

Theory of Operation

The RF5501-433 allows the user to access the security system as they would be able to from any other keypad on the system. The RF5501-433 is able to receive the signals from our wireless devices and decode them for the control panel.

Justification

The EUT was configured for testing as per typical installation. Position and bundling of cables were investigated to establish maximum amplitude of emissions.

The following combinations were investigated to establish worst case configuration:

(1) The EUT was tested as per normal operation

(2) The EUT contains a 13.225625MHz crystal.

(3) To generate the Local Osc. frequency, the EUT incorporates the following multiplication factor, 6.6128125MHz x 64. The Local Osc. Frequency is 423.22MHz.

Exercise Program

The EUT exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to typical use. The software used during testing was Ver. 5

Exercise Mode:

(1) The EUT was tested in a armed, away state.

Section 3. Equipment Configuration

Equipment Configuration List:

Item	Description	FCC ID	Model No.	Serial No.	Rev.
(A)	EUT, LCD keypad and Receiver	F5302RF5501433	UA352	None	01X3
(B)	Control Card		PC5010	None	06MA
(C)	DC Feed and Ring-Up Unit		CLI-043	FA000194	

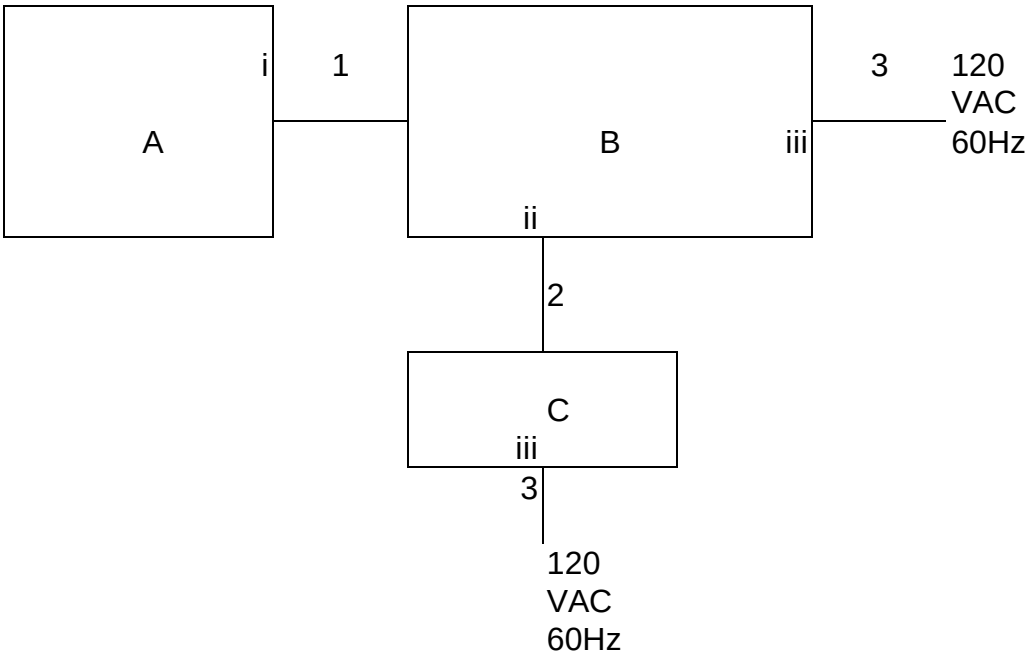
Equipment Ports:

Item	Description	Number
(i)	Comm. Buss	1
(ii)	POTS Port	1
(iii)	AC Port	1

Inter-Connection Cables:

Item	Description	Length (m)
(1)	4-Conducter, 22AWG, UTP	2.0
(2)	4-Conducter POTS Cable, UTP	2.0
(3)	Standard North American Power Cord	2.0

Configuration of the Equipment Under Test (EUT)



Section 4. Conducted Emissions

Para. No.: R&O 989-80, 15.107

Test Performed By: Kevin Carr	**Date of Test: 2 July 2002**

Test Conditions: Test Voltage: 120VAC
Temperature: 23°C
Humidity: 51%

Minimum Standard:

Frequency Range MHz	Limits for Conducted Disturbance at a Mains Ports of Class B		
	Quasi-Peak Limits dB (μV)	Average Limits dB (μV)	Required
0.15 to 0.5	66 to 56	56 to 46	☒
0.5 to 5	56	46	☒
5 to 30	60	50	☒

Notes:
The lower limit shall apply at the transition frequency.
The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz for Class B

Test Results: Complied. See attached graphs and table.

Measurement Data: See attached graphs and table.

Method Of Measurement: (Procedure CISPR 22: 1997-11)

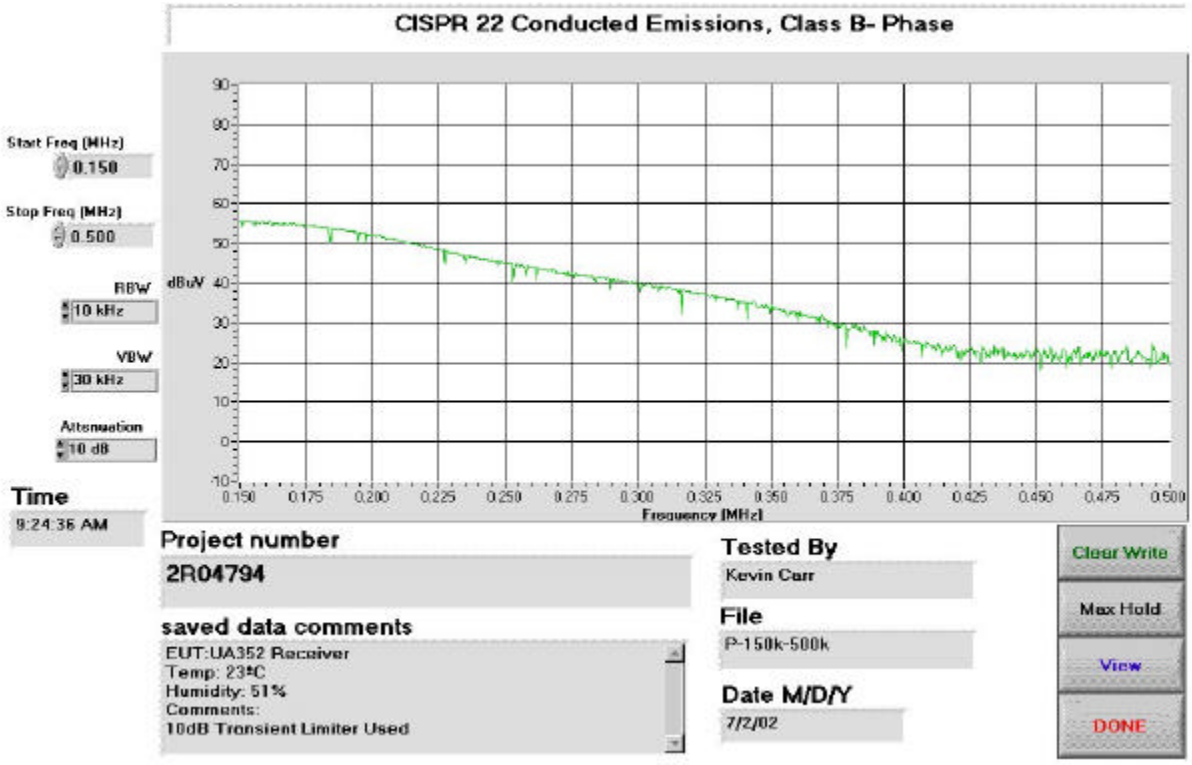
Measurements were made using a spectrum analyzer with 10 kHz RBW, Peak detector. Any emissions that were close to the limit were measured using a test receiver with 10 kHz bandwidth, CISPR Quasi-Peak detector.

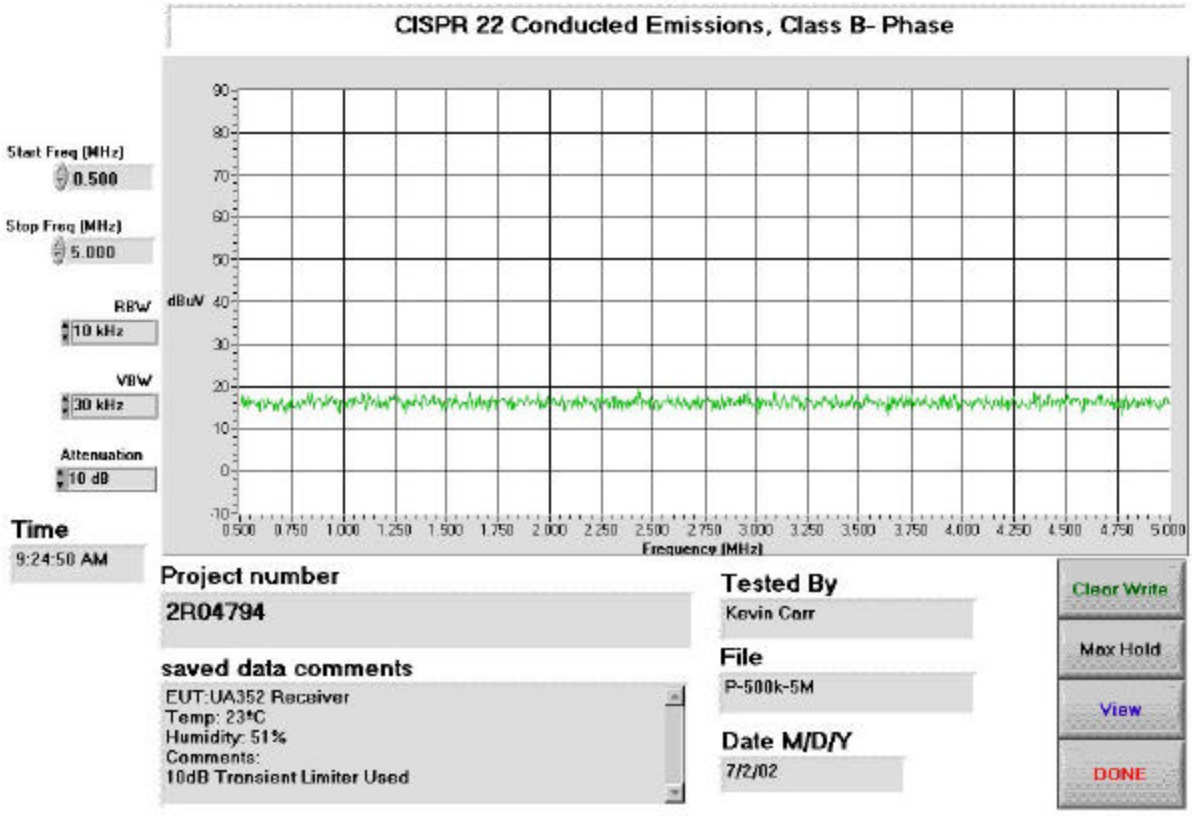
All emissions within 10 dB of limit have been recorded.

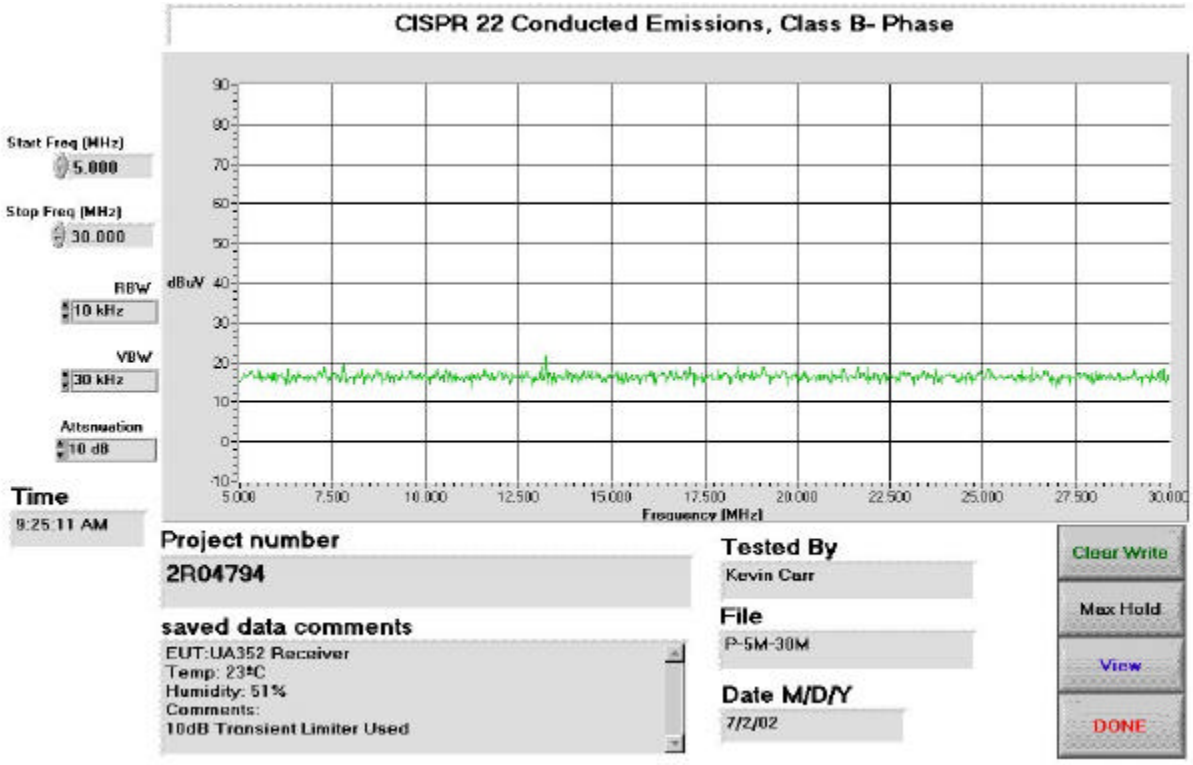
Measurement Data

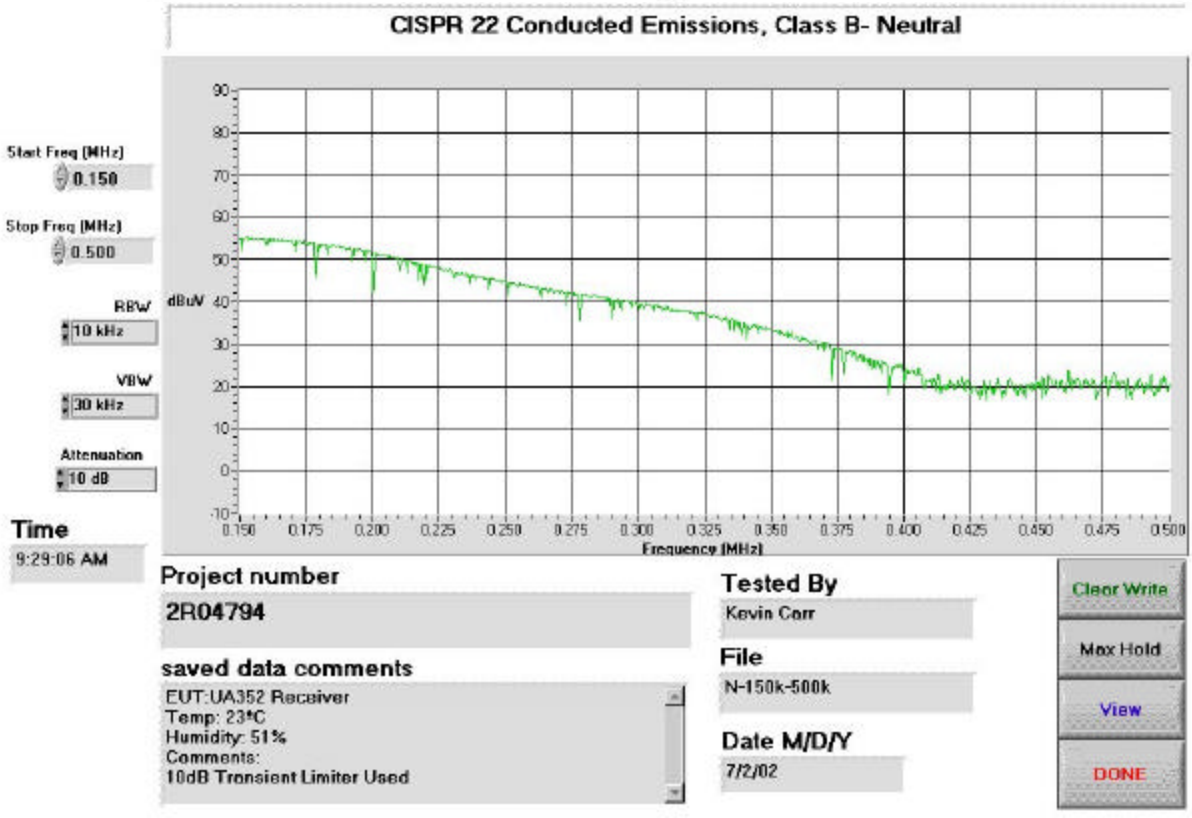
Test Data:

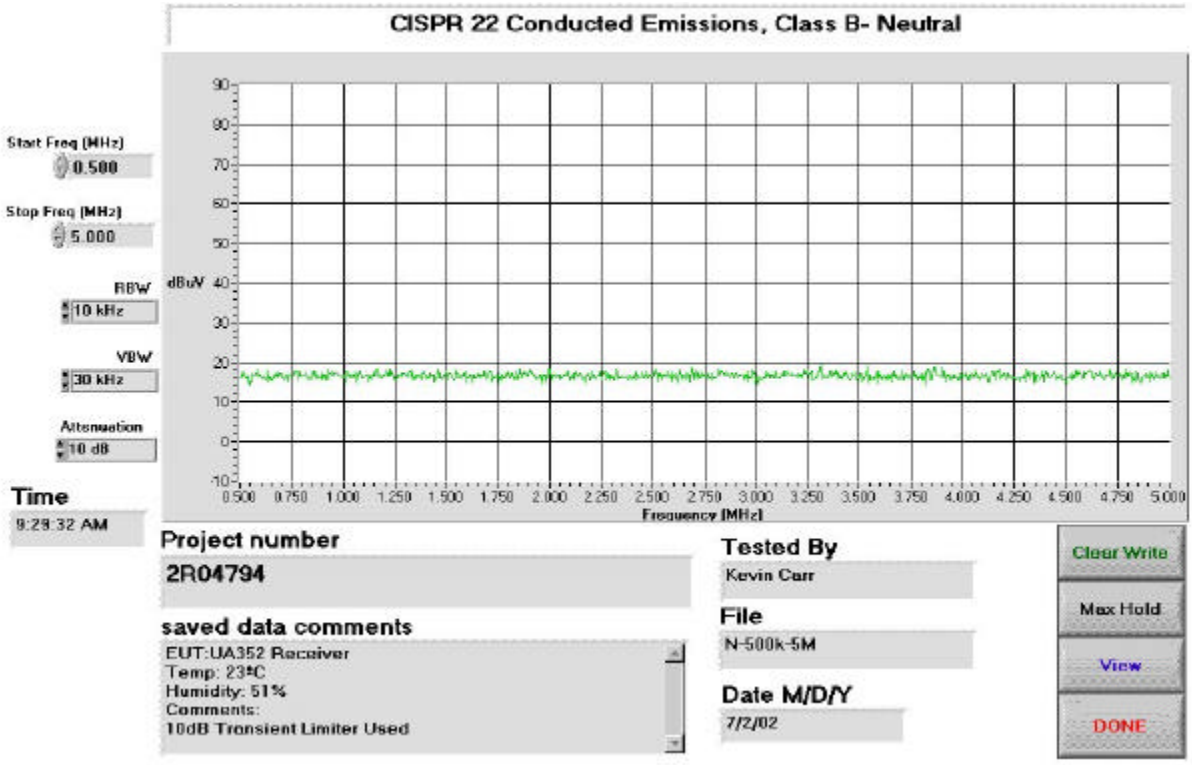
Tested as per Table Top ☒				**Tested as per Floor Standing** ☐		
The top six emissions within 20 dB of the limit have been recorded/plotted.						
No.	Conductor	Frequency (MHz)	Detector	Level (dBµV)	Limit (dBµV)	Margin (dB)
1	Phase	0.150	Quasi-Peak	54.2	66.0	11.8
			Average	10.2	56.0	45.8
2	Phase	0.180	Quasi-Peak	54.0	64.5	10.5
			Average	9.3	54.5	45.2
3	Phase	0.200	Quasi-Peak	52.8	63.6	10.8
			Average	40.0	53.6	13.6
4	Neutral	0.150	Quasi-Peak	55.0	66.0	11.0
			Average	9.8	56.0	46.2
5	Neutral	0.180	Quasi-Peak	53.7	64.5	10.8
			Average	9.3	54.5	45.2
6	Neutral	0.200	Quasi-Peak	52.7	63.6	10.9
			Average	22.1	53.6	31.5
Notes:						

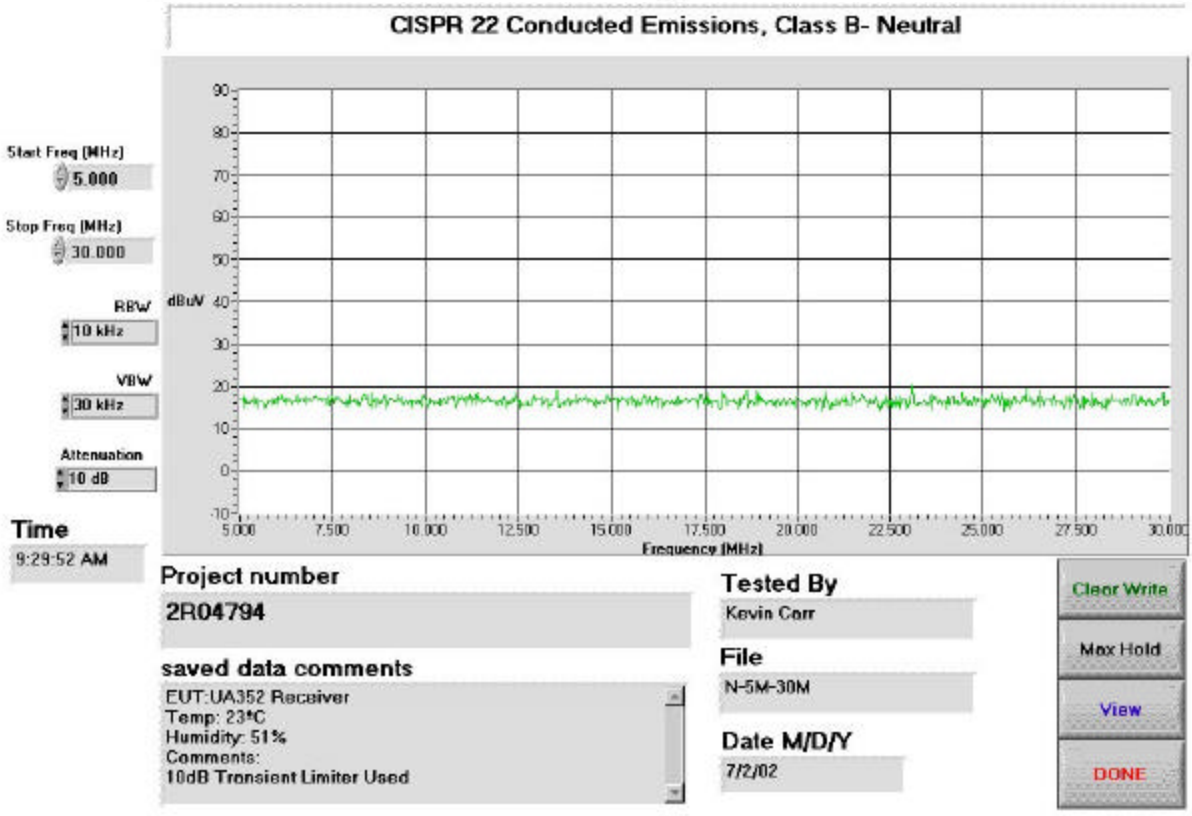

CISPR 22 Conducted Emissions, Class B- Phase
Start Freq (MHz)
0.150
Stop Freq (MHz)
0.500
RBW
10 kHz
VBW
30 kHz
Attenuation
10 dB
Time
9:24:36 AM
dBuV
Frequency (MHz)
Project number
2R04794
saved data comments
EUT:UA352 Receiver
Temp: 23°C
Humidity: 51%
Comments:
10dB Transient Limiter Used
Tested By
Kevin Carr
File
P-150k-500k
Date M/D/Y
7/2/02
Clear Write
Max Hold
View
DONE


CISPR 22 Conducted Emissions, Class B- Phase
Start Freq (MHz)
0.500
Stop Freq (MHz)
5.000
RBW
10 kHz
VBW
30 kHz
Attenuation
10 dB
Time
9:24:50 AM
dBuV
Frequency (MHz)
Project number
2R04794
saved data comments
EUT:UA352 Receiver
Temp: 23°C
Humidity: 51%
Comments:
10dB Transient Limiter Used
Tested By
Kevin Carr
File
P-500k-5M
Date M/D/Y
7/2/02
Clear Write
Max Hold
View
DONE


CISPR 22 Conducted Emissions, Class B- Phase
Start Freq (MHz)
5.000
Stop Freq (MHz)
30.000
RBW
10 kHz
VBW
30 kHz
Attenuation
10 dB
dBuV
Frequency (MHz)
Time
9:25:11 AM
Project number
2R04794
Tested By
Kevin Carr
File
P-5M-30M
Date M/D/Y
7/2/02
saved data comments
EUT:UA352 Receiver
Temp: 23°C
Humidity: 51%
Comments:
10dB Transient Limiter Used
Clear Write
Max Hold
View
DONE

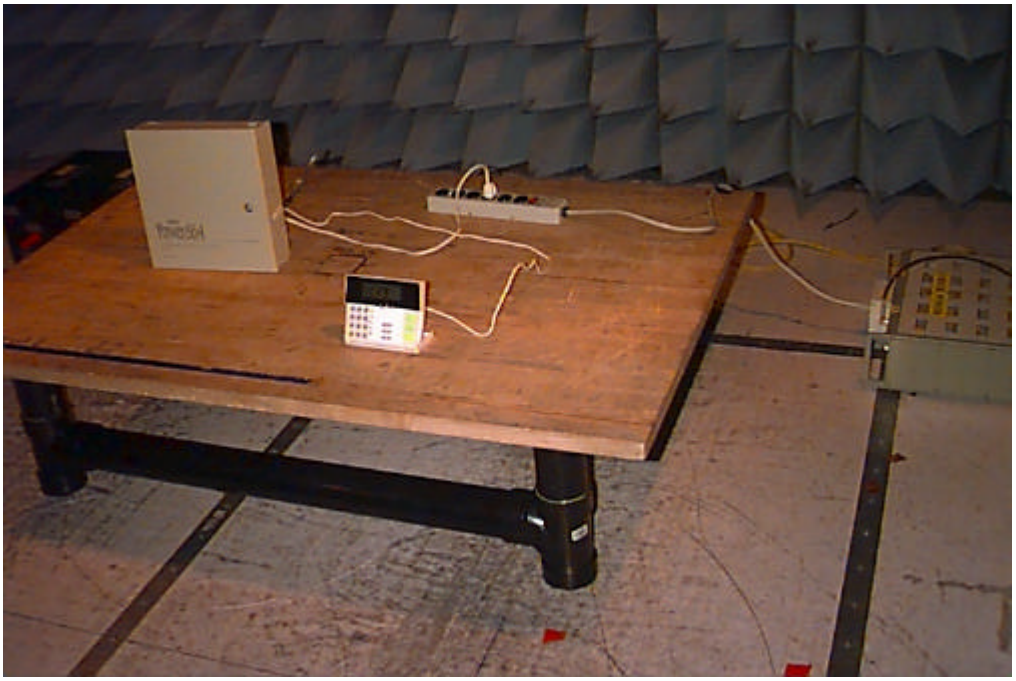

CISPR 22 Conducted Emissions, Class B- Neutral
Start Freq (MHz)
0.150
Stop Freq (MHz)
0.500
RBW
10 kHz
VBW
30 kHz
Attenuation
10 dB
dBuV
Frequency (MHz)
Time
9:29:06 AM
Project number
2R04794
Tested By
Kevin Carr
File
N-150k-500k
Date M/D/Y
7/2/02
saved data comments
EUT:UA352 Receiver
Temp: 23°C
Humidity: 51%
Comments:
10dB Transient Limiter Used
Clear Write
Max Hold
View
DONE


CISPR 22 Conducted Emissions, Class B- Neutral
Start Freq (MHz)
0.500
Stop Freq (MHz)
5.000
RBW
10 kHz
VBW
30 kHz
Attenuation
10 dB
dBuV
Frequency (MHz)
Time
9:28:32 AM
Project number
2R04794
Tested By
Kevin Carr
File
N-500k-5M
Date M/D/Y
7/2/02
saved data comments
EUT:UA352 Receiver
Temp: 23°C
Humidity: 51%
Comments:
10dB Transient Limiter Used
Clear Write
Max Hold
View
DONE

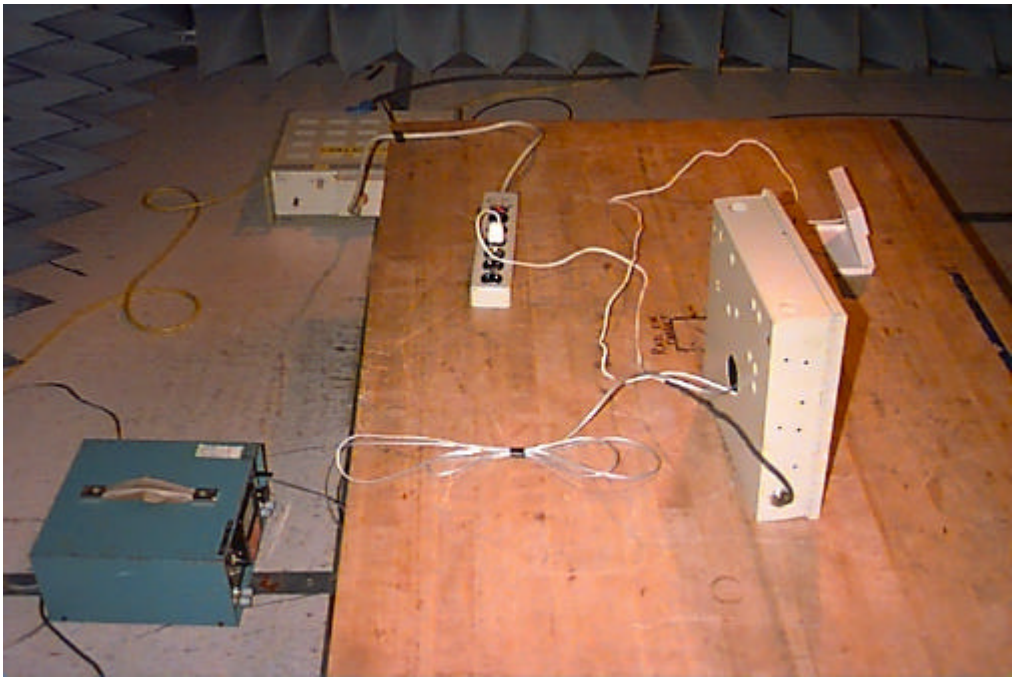

CISPR 22 Conducted Emissions, Class B- Neutral
Start Freq (MHz)
5.000
Stop Freq (MHz)
30.000
RBW
10 kHz
VBW
30 kHz
Attenuation
10 dB
dBuV
Frequency (MHz)
Time
9:29:52 AM
Project number
2R04794
Tested By
Kevin Carr
File
N-5M-30M
Date M/D/Y
7/2/02
saved data comments
EUT:UA352 Receiver
Temp: 23°C
Humidity: 51%
Comments:
10dB Transient Limiter Used
Clear Write
Max Hold
View
DONE

Conducted Photographs

Front View



Side View



Section 5. Radiated Emissions

Para. No.: 15.109

Test Performed By: Kevin Carr	**Date of Test: 2 July 2002**

Test Conditions: Test Voltage: 120VAC
Temperature: 33°C
Humidity: 65%

Minimum Standard:

Frequency (MHz)	**Maximum Field Strength at 3m**	
	µV/m	**dBµV/m**
30 - 88	100	40.0
88 - 216	150	43.5
216 - 960	200	46.0
Above 960	500	54.0

Test Results: Complied. The worst-case emission level was 29.5dBµV/m @ 3m at 66.13 MHz. This was 10.5dB below the specification limit.

Measurement Data:

The equipment was prescanned in a shielded room using a spectrum analyzer and broadband antenna. A list of frequencies was compiled for investigation in the open field. The equipment was then moved to an open area test site where amplitude measurements were made at a distance of 3 meters. The bandwidth was set to 120 kHz and the detector function was CISPR Quasi-Peak. Any emission within 3 dB of the specification limit is re-measured using a reference tuned dipole antenna per ANSI C63.4.

Emissions detected above 1 GHz were measured with horn antenna and low noise pre-amplifier at a distance of 3 meters.

The spectrum was investigated from 30MHz up to the frequency shown in the following table.

Highest Frequency Generated or Used in the Device Which the Device Operates or Tunes (MHz)	**Upper Frequency of Measurement Range (MHz)**
Below 1.075	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.

The highest operational frequency used in the EUT was 432.22 MHz.
The top six (6) emissions within 20 dB of the limit have been recorded.

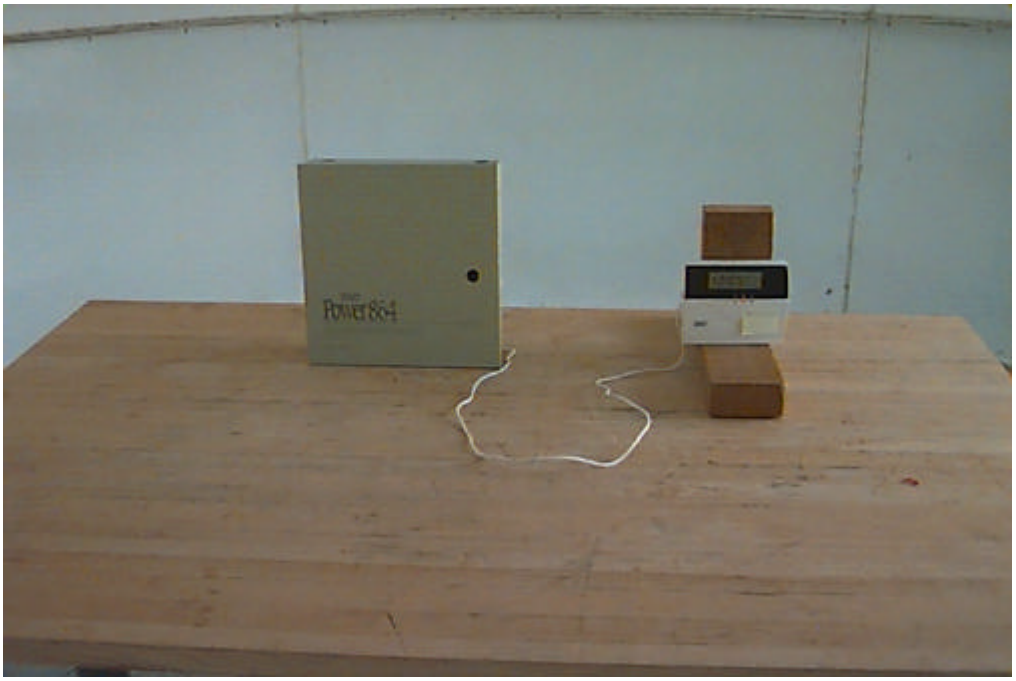
Test Data - Radiated Emissions

Test Distance (meters) : 3		**Range: a**		**Receiver: esvp**			**RBW(kHz): 120**		**Detector: CISPR Q-PEAK**	
No.	**Freq. (MHz)**	**Ant.**	**Pol (V/H)**	**RCVD Signal (dBµV/m)**	**Ant. Factor (dB)****	**Amp. Gain (dB)*****	**Dist. Corr. (dB)**	**Field Strength (dBµV/m)**	**Limit (dBµV/m)**	**Margin (dB)**
1	46.0	B/C1	V	16.9	12			28.9	40	11.1
2	47.95	B/C1	V	15.4	11.7			27.1	40	12.9
3	52.9	B/C1	V	12.3	11			23.3	40	16.7
4	53.249	B/C1	V	15.4	10.9			26.3	40	13.7
5	66.13	B/C1	H	19.6	9.9			29.5	40	10.5
6	423.22	L/P1	V	14.5	19			33.5	46	12.5

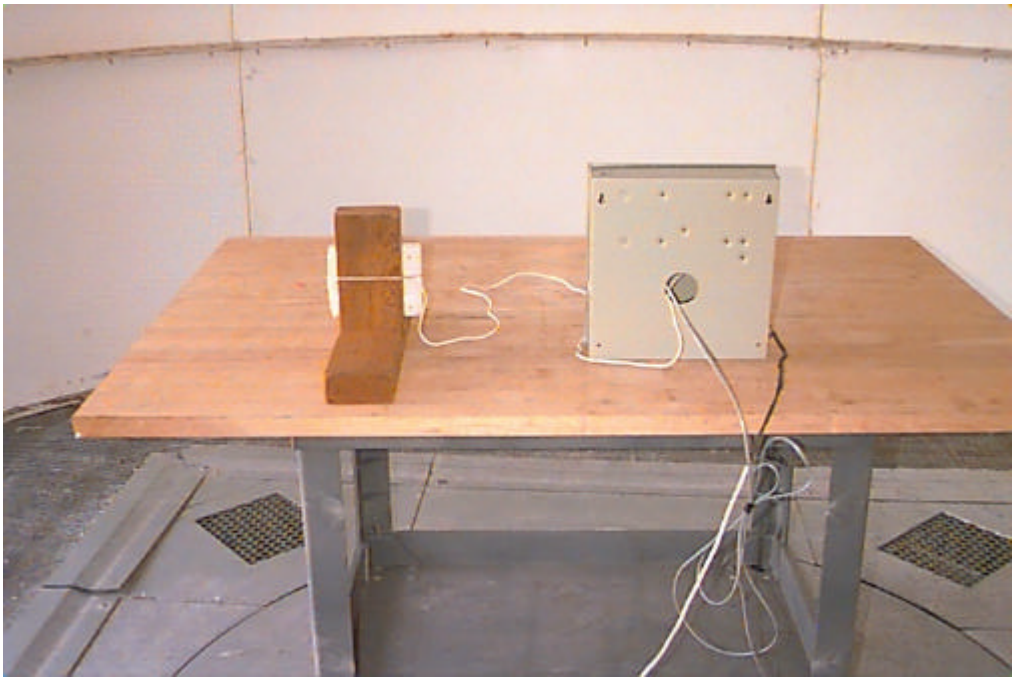
Notes:
B/C = Biconical, BL = Bilog, L/P = Log-Periodic, H = Horn, D/P = Dipole, E/D = EMCO Dipole
* Re-measured using dipole antenna.
** Includes cable loss when amplifier is not used.
*** Includes cable loss.
( ) Denotes failing emission level.
N.D. = Not Detected

Radiated Photographs

Front View



Rear View



Section 6. Sample Calculations

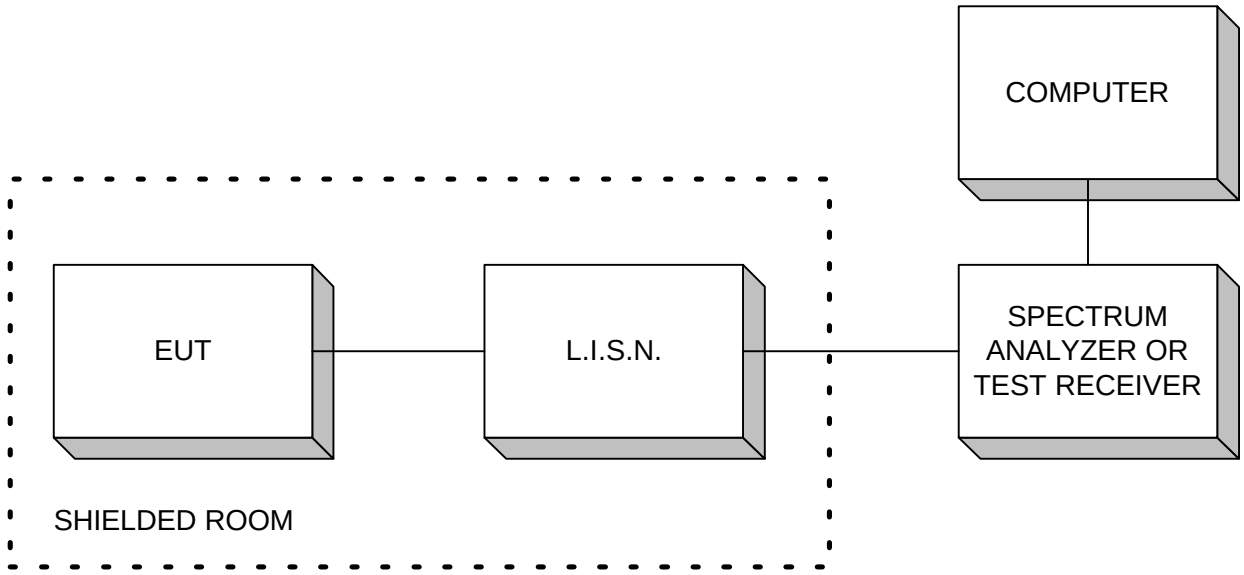
Radiated Emissions

Emissions were measured at a distance of 3 meters and corrected for antenna factor and cable loss.

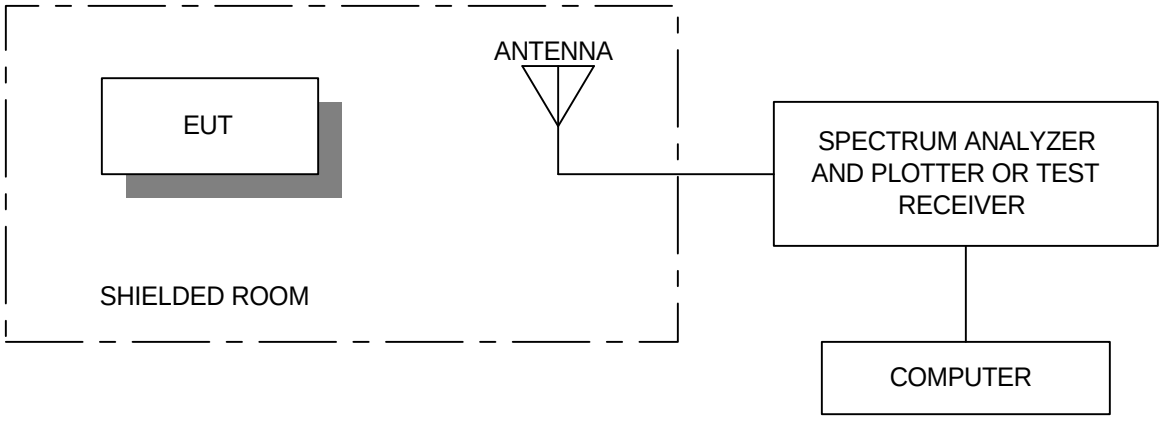
i.e. Received Signal = 25 dBµV @ 100 MHz
Antenna Factor & Cable Loss = 9.8 dB
Field Intensity = 25 + 9.8 = 34.8 dBµV/m @ 3 m

Section 7. Block Diagrams

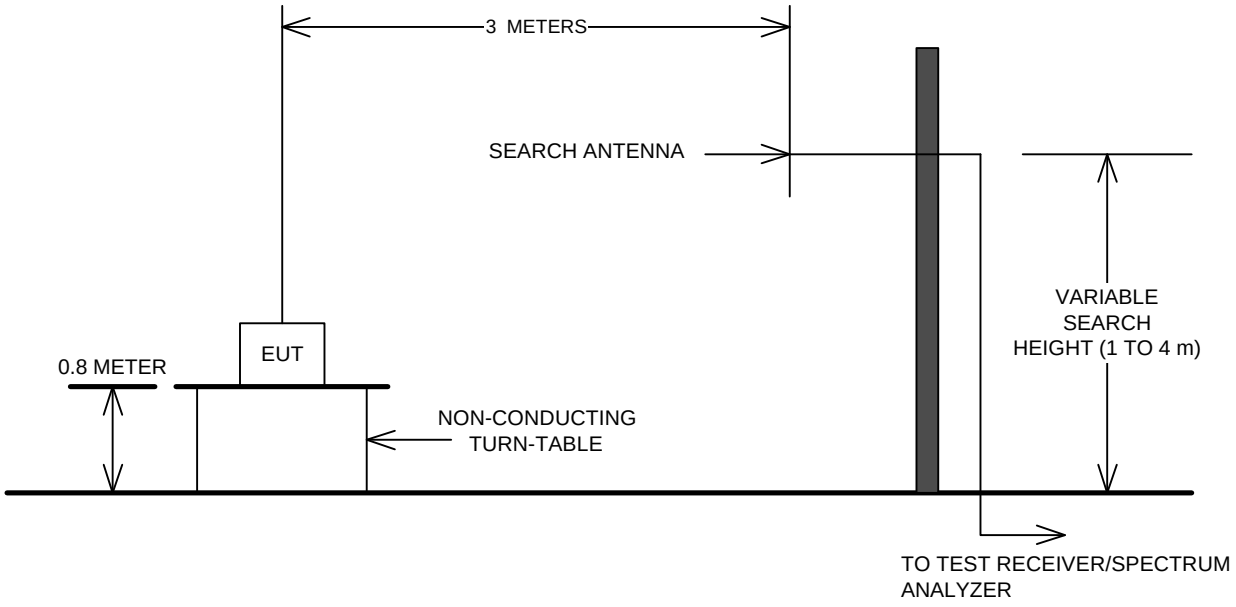
Conducted Emissions



Radiated Prescan



Outdoor Test Site For Radiated Emissions



The spectrum was searched up to 1GHz or the 5th harmonic of the highest oscillator frequency, which ever was higher, up to a maximum of 40GHz.

Section 8. Test Equipment List

Equipment List – Conducted Emissions - Anechoic Chamber

CAL Cycle	Equipment	Manufacturer	Model No.	Asset/Serial No.	Last Cal.	Next Cal.
1 Year	LISN	EMCO	4825/2	FA001545	Oct. 09/01	Oct. 09/02
1 Year	LISN(peripheral)	Tegam	95300-50	FA000986	Oct. 22/01	Oct. 22/02
1 Year	LISN(peripheral)	Tegam	95300-50	FA000986	Oct. 22/01	Oct. 22/02
1 Year	Receiver	Rohde & Schwarz	ESH3	FA000208	Mar. 07/02	Mar. 07/03
1 Year	Spectrum Analyzer	Hewlett-Packard	8566B	FA001309	Nov. 27/01	Nov. 27/02
1 Year	Spectrum Analyzer Display	Hewlett-Packard	85662A	FA001309	Nov. 27/01	Nov. 27/02
1 Year	Quasi-Peak Adapter	Hewlett-Packard	85650A	FA000801	Nov. 27/01	Nov. 27/02
1 Year	Transient Limiter	Hewlett-Packard	1194 7A	FA000975	Oct. 19/01	Oct. 19/02

Equipment List – Prescan for Radiated Emissions - Anechoic Chamber

CAL Cycle	Equipment	Manufacturer	Model No.	Asset/Serial No.	Last Cal.	Next Cal.
1 Year	Spectrum Analyzer	Hewlett-Packard	8566B	FA001309	Nov. 27/01	Nov. 27/02
1 Year	Spectrum Analyzer Display	Hewlett-Packard	85662A	FA001309	Nov. 27/01	Nov. 27/02
1 Year	Spectrum Analyzer	Hewlett-Packard	8564E	FA001367	Mar. 06/02	Mar. 06/03
1 Year	Quasi-Peak Adapter	Hewlett-Packard	85650A	FA000801	Nov. 27/01	Nov. 27/02
	Bilog Antenna	Schaffner	CBL6612B	FA001503	NCR	NCR
1 Year	Horn Antenna #2	EMCO	3115	FA000825	Dec. 01/01	Dec. 01/02
NCR	0.1 – 1300 MHz Amplifier	Hewlett Packard	8447D	FA001748	NCR	NCR
1 Year	1.0 – 2.0 GHz Amplifier	JCA	12-400	FA001498	June. 04/02	June. 04/03

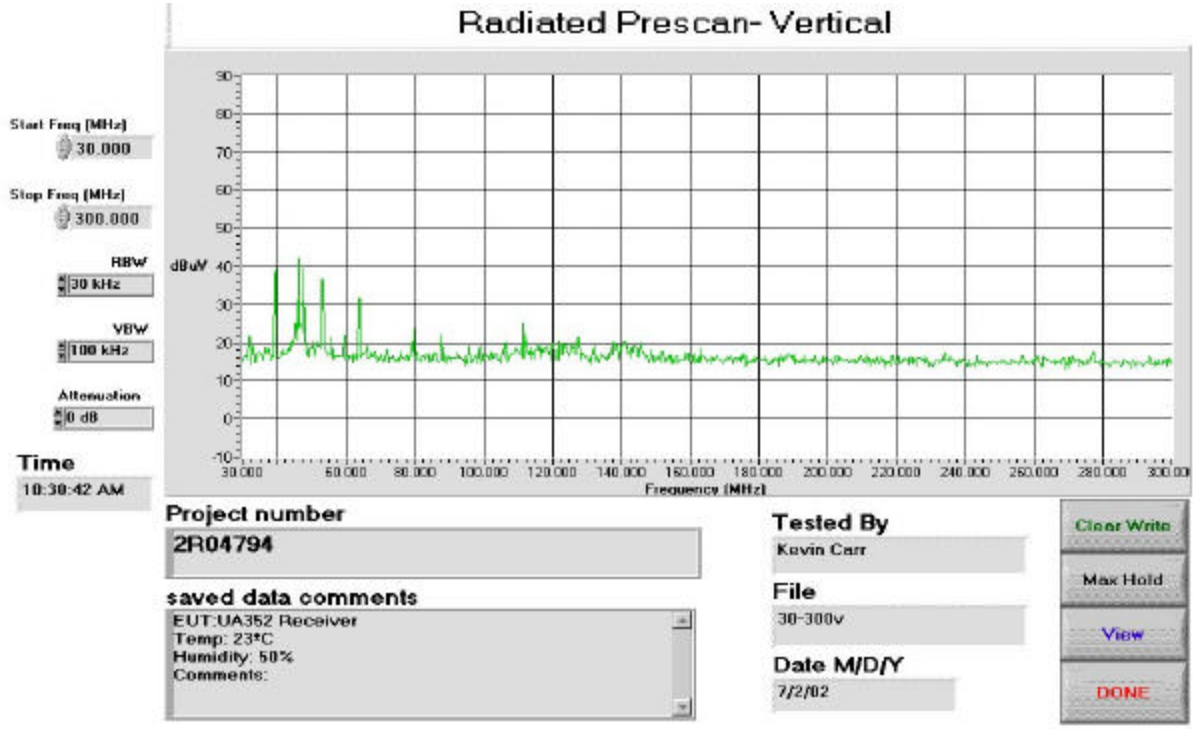
Equipment List - Radiated Emissions

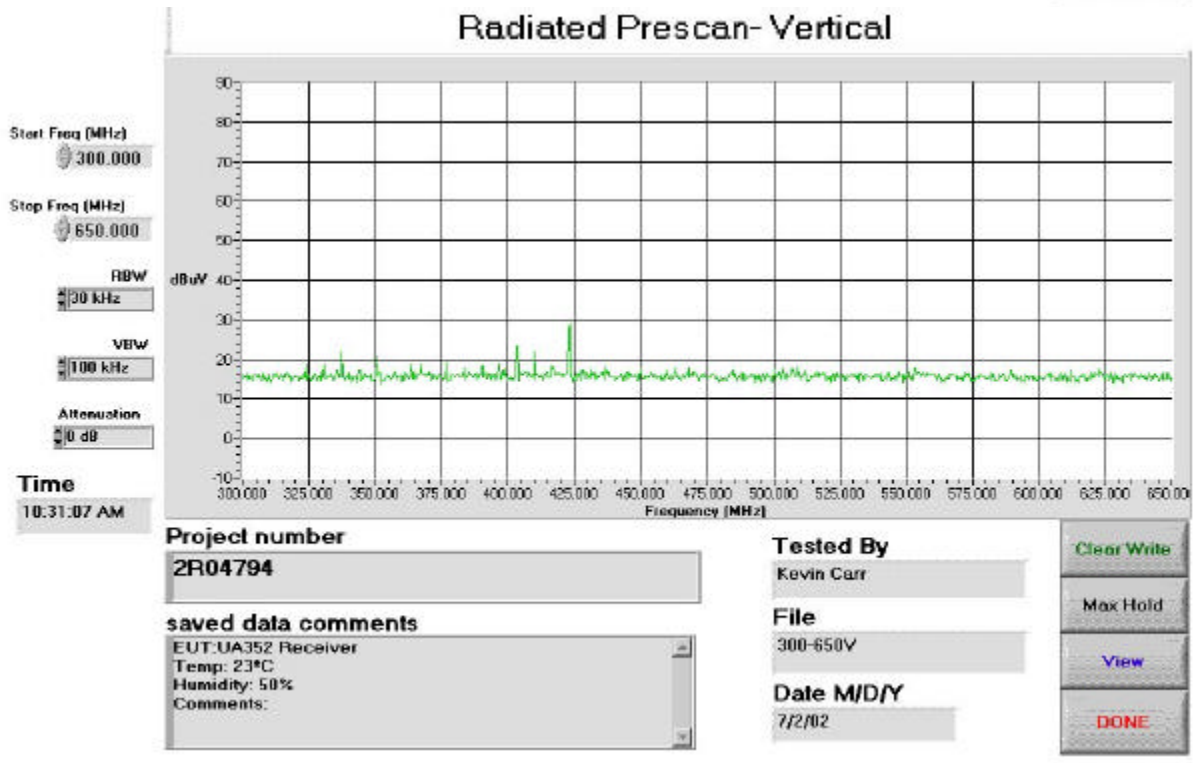
CAL Cycle	Equipment	Manufacturer	Model No.	Asset/Serial No.	Last Cal.	Next Cal.
1 Year	Receiver	Rohde & Schwarz	ESVP	FA000871	Sept. 19/01	Sept. 19/02
1 Year	Spectrum Analyzer	Hewlett-Packard	8564E	FA001367	Mar. 06/02	Mar. 06/03
1 Year	Biconical (1) Antenna	EMCO	3109	FA000805	Aug. 22/01	Aug. 22/02
1 Year	Horn Antenna #2	EMCO	3115	FA000825	Dec. 01/01	Dec. 01/02
1 Year	Log Periodic Antenna #1	EMCO	LPA-25	FA000477	Aug. 28/01	Aug. 28/02
1 Year	1.0 – 2.0 GHz Amplifier	JCA	12-400	FA001498	June. 04/02	June. 04/03

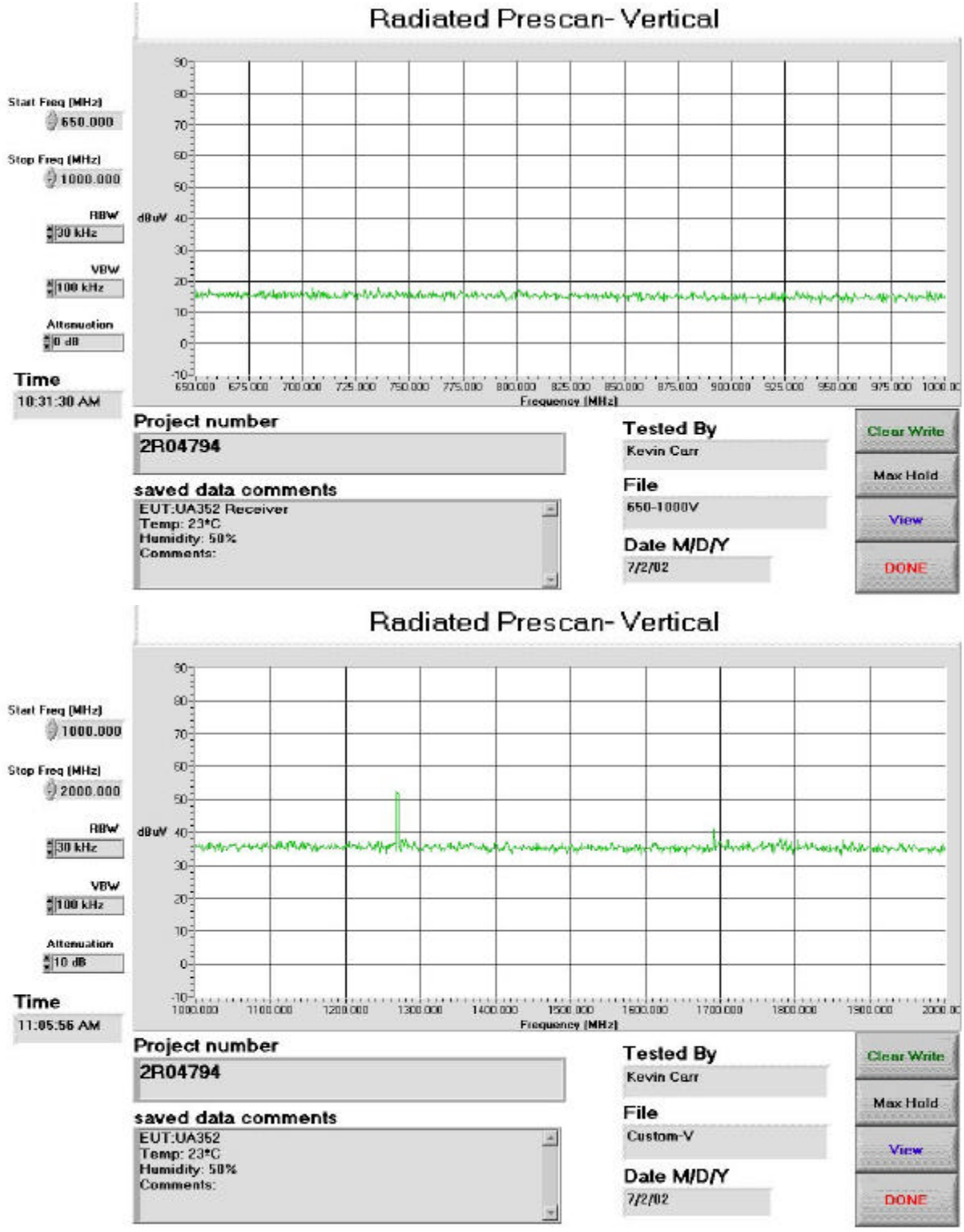
Annex A

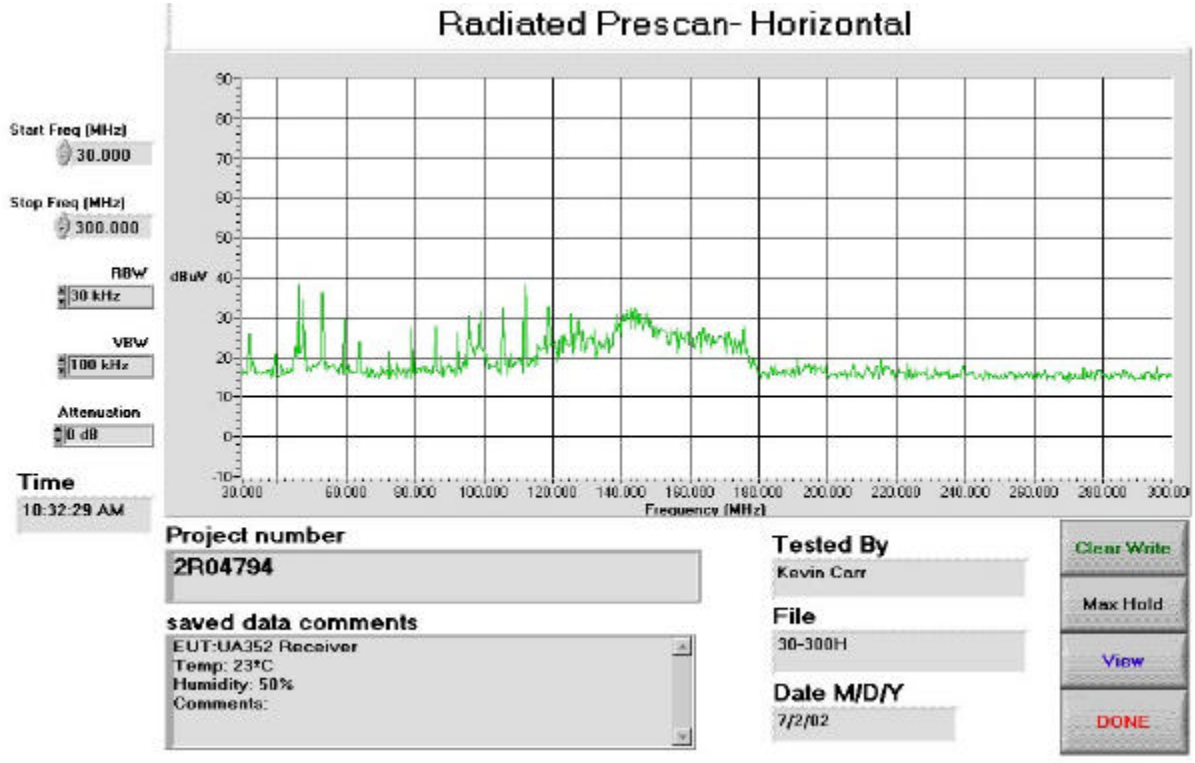
Prescans For Engineering Evaluation Only

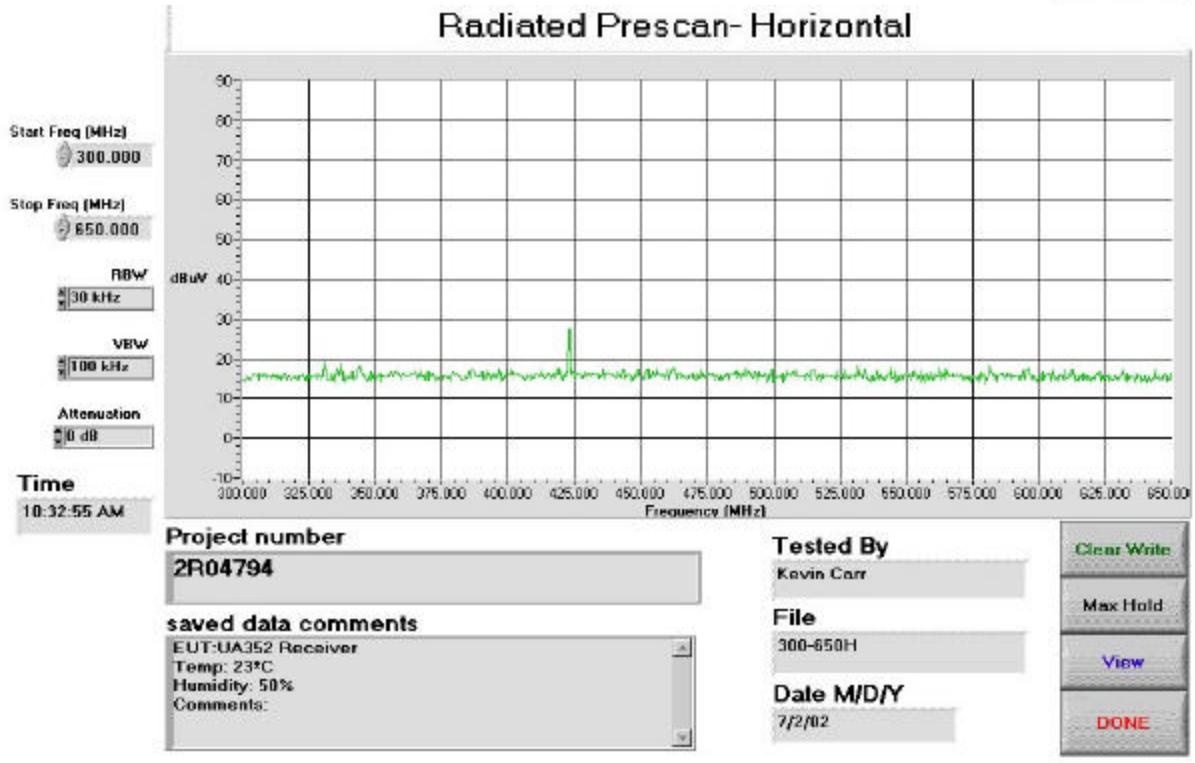
Prescan Data

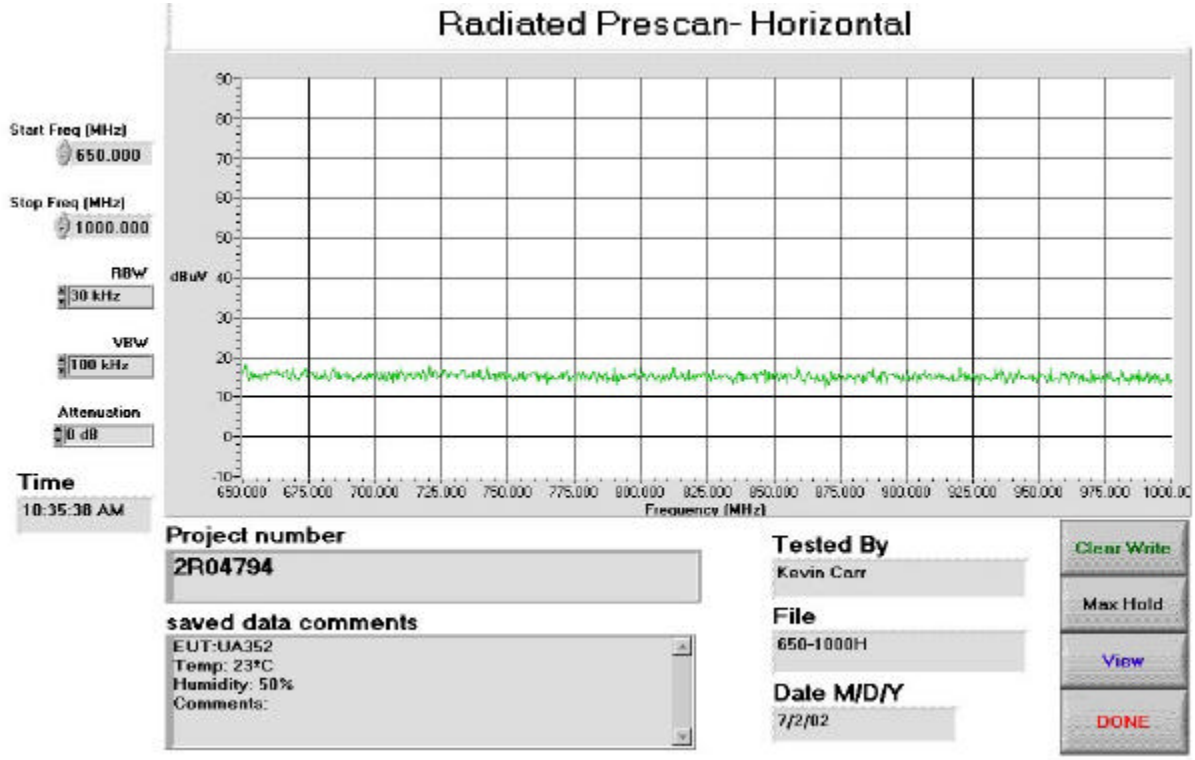


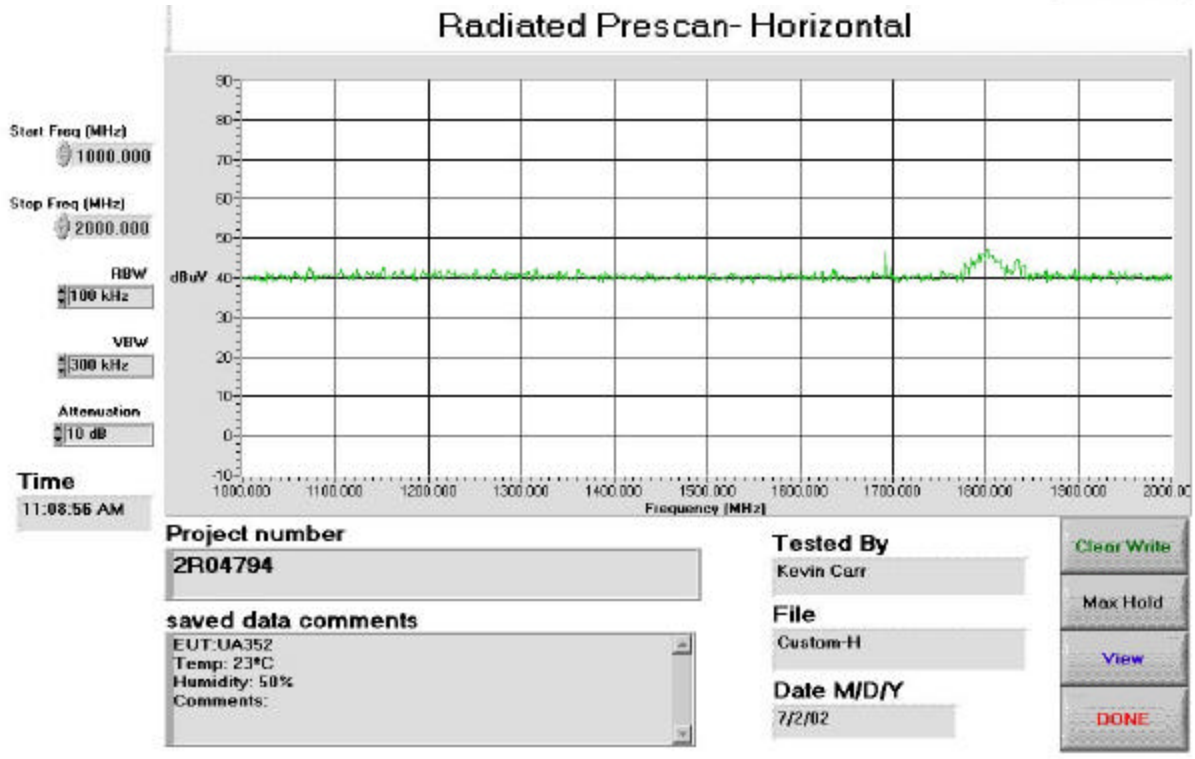



Radiated Prescan- Vertical
Start Freq (MHz)
650.000
Stop Freq (MHz)
1000.000
RBW
30 kHz
VBW
100 kHz
Attenuation
0 dB
Time
10:31:30 AM
dBuV
Frequency (MHz)
Project number
2R04794
saved data comments
EUT:UA352 Receiver
Temp: 23*C
Humidity: 50%
Comments:
Tested By
Kevin Carr
File
650-1000V
Date M/D/Y
7/2/02
Clear Write
Max Hold
View
DONE
Radiated Prescan- Vertical
Start Freq (MHz)
1000.000
Stop Freq (MHz)
2000.000
RBW
30 kHz
VBW
100 kHz
Attenuation
10 dB
Time
11:05:56 AM
dBuV
Frequency (MHz)
Project number
2R04794
saved data comments
EUT:UA352
Temp: 23*C
Humidity: 50%
Comments:
Tested By
Kevin Carr
File
Custom-V
Date M/D/Y
7/2/02
Clear Write
Max Hold
View
DONE


Radiated Prescan- Horizontal
Start Freq (MHz)
30.000
Stop Freq (MHz)
300.000
RBW
30 kHz
VBW
100 kHz
Attenuation
0 dB
Time
10:32:29 AM
dBuV
Frequency (MHz)
Project number
2R04794
saved data comments
EUT:UA352 Receiver
Temp: 23°C
Humidity: 50%
Comments:
Tested By
Kevin Carr
File
30-300H
Date M/D/Y
7/2/02
Clear Write
Max Hold
View
DONE


Radiated Prescan- Horizontal
Start Freq (MHz)
300.000
Stop Freq (MHz)
650.000
RBW
30 kHz
VBW
100 kHz
Attenuation
0 dB
Time
10:32:55 AM
dBuV
Frequency (MHz)
Project number
2R04794
saved data comments
EUT:UA352 Receiver
Temp: 23°C
Humidity: 50%
Comments:
Tested By
Kevin Carr
File
300-650H
Date M/D/Y
7/2/02
Clear Write
Max Hold
View
DONE


Radiated Prescan- Horizontal
Start Freq (MHz)
650.000
Stop Freq (MHz)
1000.000
RBW
30 kHz
VBW
100 kHz
Attenuation
0 dB
Time
10:35:38 AM
dBuV
Frequency (MHz)
Project number
2R04794
saved data comments
EUT:UA352
Temp: 23°C
Humidity: 50%
Comments:
Tested By
Kevin Carr
File
650-1000H
Date M/D/Y
7/2/02
Clear Write
Max Hold
View
DONE


Radiated Prescan- Horizontal
Start Freq (MHz)
1000.000
Stop Freq (MHz)
2000.000
RBW
100 kHz
VBW
300 kHz
Attenuation
10 dB
Time
11:08:56 AM
dBuV
Frequency (MHz)
Project number
2R04794
saved data comments
EUT:UA352
Temp: 23°C
Humidity: 50%
Comments:
Tested By
Kevin Carr
File
Custom-H
Date M/D/Y
7/2/02
Clear Write
Max Hold
View
DONE