EMC Test Report: EDCS - 280281

For

Pegasus UNII 3 Outdoor Wireless Bridge

per

CFR47 Part 15:2002

Cisco Systems

EMC Laboratory

170 West Tasman Drive

San Jose, CA 95134

ACCREDITED

Certificate Number : 1178-01

Author: Michael Vanbrunt

Approved By:

Title:

This test report has been electronically authorized and archived using the CISCO Engineering Document Control system.

Section 1: Overview

1.1 Test Summary

The samples assessed fully complied with the requirements of the standards listed below:

Emissions:
CFR47 Part 15:2002

Immunity:
N/A

Notes:

1) Where a specification listed on the front cover of this report has deviations from the basic standards listed above, the additional technical requirements of the specification were also assessed.
2) Where appropriate, Cisco may have substituted a later revision of a basic standard to those referenced in the specification on the front sheet of this test report. This decision was based upon improved test methodology and repeatability and/or where the newer revision represented a more stringent test.
3) Where relevant, testing has been carried out to the requirements of both EN and IEC Specifications. This was possible because of the similarities of the test methods involved and the Cisco EMC test procedures.
4) For Radiated and Conducted emissions results refer to section 2.9 for measurement uncertainty considerations
5) Where testing has been performed to EN61000-4-3, additional measurements were conducted to establish the field strength at a 40cm height in both the horizontal and vertical antenna polarities (applies to floor standing EUT's only). This field strength data can be found in Cisco document ENG-72588.

Section 2: Assessment Information

2.1 General

This report contains an assessment of an apparatus against Electromagnetic Compatibility Standards based upon tests carried out on the samples submitted.

This report must not be used to claim product certification, approval, or endorsement by A2LA, NIST, or any agency of the federal Government.

This report may contain data that are not covered by the A2LA accreditation (Certificate number 1178-01). Please refer to Appendix F for further details.

With regard to this assessment, the following points should be noted:

a) The results contained in this report relate only to the items tested and were obtained in the period between the date of the initial assessment and the date of issue of the report. Manufactured products will not necessarily give identical results due to production and measurement tolerances.

b) The apparatus was set up and exercised using the configuration and modes of operation defined in this report only.

c) Where relevant, the apparatus was only assessed using the susceptibility criteria defined in this report and the Test Assessment Plan (TAP).

d) All testing was performed under the following environmental conditions:

Temperature	15°C to 35°C (54°F to 95°F)
Atmospheric Pressure	860mbar to 1060mbar (25.4" to 31.3")
Humidity	10% to 75*%

*[Where applicable] For ESD testing the humidity limits used were 30% to 60% and for EFT/B tests the humidity limits used were 25% to 75%.

e) All AC testing was performed at one or more of the following supply voltages:
110V (+/-10%) 60Hz
220V (+/-10%) 50 or 60Hz

f) Cisco Systems Inc.,are accredited by the American Association for Laboratory Accreditation (A2LA). For the specific scope of accreditation under certificate number 1178-01.see appendix F for further details.

This report must not be reproduced except in full, without written approval of Cisco Systems.

2.2 Date of Initial Assessment

21-Oct-2002

2.3 Report Issue Date

Cisco uses an electronic system to issue, store and control the revision of test reports. This system is called the Engineering Document Control System (EDCS). The actual report issue date is embedded into the original file on EDCS. Any copies of this report, either electronic or paper, that are not on EDCS must be considered uncontrolled

2.4 Testing facilities

This assessment was performed by:

Testing Laboratory

Cisco Systems, Inc.,
170 West Tasman Drive
San Jose, CA 95134,
USA

Test Engineers

Jose Aguirre

2.5 Equipment Assessed (EUT)

Pegasus UNII 3 Outdoor Wireless

Bridge

2.6 EUT Description

N/A

2.7 Scope of Assessment

Tests have been performed in accordance with the relevant Test and Assessment Plan (TAP), a copy of which is contained in Appendix H of this report, and the relevant Cisco EMC compliance test procedures (ENG-23438). This test report may not cover all of the tests highlighted in the test plan.

2.8 Units of Measurement

The unit of measurements defined in the appendices are reported in specific terms, these are test dependent. Where radiated measurements are concerned these are defined at a particular distance. Basic voltage measurements are defined in dBuV and current in dBuA.

As an example, the basic calculation for all measurements are as follows:

Level = Raw [dBuV] + Cable Loss [dB] + Factors [dB]

The components of factors are dependent upon the exact test configurations [see test equipment lists for further details] and may include:-

Antenna Factors, Pre Amplifier Gain, LISN Loss, Pulse Limiter Loss, Current Probe Factors.

Note: to convert the results from dBuV/m to uV/m use the following formula:-

Level in uV/m = Common Antilogarithm [(X dBuV/m)/20] = Y uV/m

2.9 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Radiated emissions (expanded uncertainty, confidence interval 95%)

10kHz - 30 MHz	+/- 2.8 dB (E Field)
10kHz - 30 MHz	+/- 2.8 dB (H Field)
30 MHz - 300 MHz	+/- 3.8 dB
300 MHz - 1000 MHz	+/- 4.3 dB
1 GHz - 10 GHz	+/- 4 dB
10 GHz - 18GHz	+/- 8.3 dB
18GHz - 26.5GHz	+/- 4.1 dB
26.5GHz - 40GHz	+/- 3.9 dB

Conducted emissions (expanded uncertainty, confidence interval 95%)

9 kHz - 150 kHz	+/- 4.1 dB (using LISN)
10 kHz - 30 MHz	+/- 2.6 dB (using Current Probe)
150 kHz - 30 MHz	+/- 3.4 dB (using LISN)
150 kHz - 30 MHz	+/- 3.1 dB (using CDN)
150 kHz - 30 MHz	Under Consideration (Using CVP-1)

A product is considered to comply with a requirement if the nominal measured value is below the limit line. The product is considered to not be in compliance in case the nominal measured value is above the limit line. For further explanation refer to Cisco Systems Inc Measurement Uncertainty Document: ENG-4001 8

2.10 Report Template Revision No.

Revision: CRA 5.0

Section 3: Results Summary

The following tables summarize the results and details the assessment in terms of:

- The test type.
- The specification and class or level applied.
- The mode of operation of the sample assessed.

3.1 Test Result Summary

Refer to section 4.2 and 4.3 for Mode and System details.

Conducted emissions

Test Number	Basic Standard	Freq Range	Test Details / Comments	Mode	Systems Tested	Result
6264	CFR47 Part 15:2002 **Applied to:** AC Power Line **Class:** B	0.15-30MHz	Test procedure must follow ANSI C63.4 and U.S line voltages must be used (e.g 110V 60Hz).	1	1	Pass

Note : Refer to section 2.9 for measurement uncertainty considerations

Radiated emissions

Test Number	Basic Standard	Freq Range	Test Details / Comments	Mode	Systems Tested	Result
6277	CFR47 Part 15:2002 **Applied to:** Enclosure **Class:** B	30MHz-xGHz	x = See the "Clock/ Sensitive frequencies used by the EUT" section of this TAP	1	1	Pass

Note : Refer to section 2.9 for measurement uncertainty considerations

Section 4: Sample Details

Note: Each sample was evaluated to ensure that its condition was suitable to be used as a test sample prior to the commencement of testing. Please also refer to the “Justification for worst Case test Configuration” section of this report for further details on the selection of EUT samples.

4.1 Sample Details

Sample Number	Equipment Details	Serial Number	Part Number
S01	Power Supply	34-1915-04	PSM60U-480KP
S02	OutDoor Unit	Proto 1	AR-PWRING-BLR1
S03	Pegasus	064501A	AIR-BR1400
S04	Power Supply	34-1916-01	PSM60U-480KP
S05	Outdoor Uit	Proto 2	AR-PWRING-BLR1
S06	Pegasus	064501F	AIR-BR1400
S07	Laptop	78-rdf93	2645
S08	Laptop	78-PHRW6	2366

4.2 System Details

System #	Description	Samples
1	EUT	S01, S02, S03 and S07
2	Support	S04, S05, S06 and S08

4.3 Mode of Operation Details

Mode#	Description	Comments
1	Chariot Software	Chariot Software

Section 5: Modifications

5.1 Sample Modifications Performed During Assessment

No modifications were performed during assessment.

Appendix A: Formal Emission Test Results

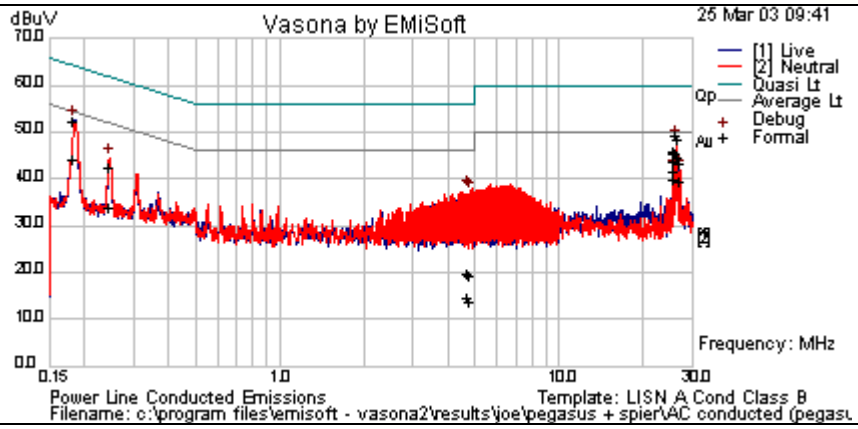
Conducted emissions

Test Number: 6264				
Basic Standard	**Applied to**	**Class**	**Freq Range**	**Test Details / Comments**
CFR47 Part 15:2002	AC Power Line	B	0.15- 30MHz	Test procedure must follow ANSI C63.4 and U.S line voltages must be used (e.g 110V 60Hz).
Operating Mode	**Mode :** 1, Chariot Software			
Power Input	110v (+/-10%), 60Hz			
Overall Result	Pass			
Comments	No further comments			
Deviation	There were no deviations from the specification			

System Number	**Description**	**Samples**	**System under test**	**Support equipment**
1	EUT	S01, S02, S03 and S07	☑	☐
2	Support	S04, S05, S06 and S08	☐	☑

Subtest Number: 6264 - 1	**Subtest Date:** 25-Mar-2003
Engineer	Jose Aguirre
Lab Information	Building P, Shield Room 1
Subtest Results	
Line Under Test	Live and Neutral
Transducer	LISN
Subtest Result	Pass
Comments on the above Test Results	AC Mains

Graphical Test Results
Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements

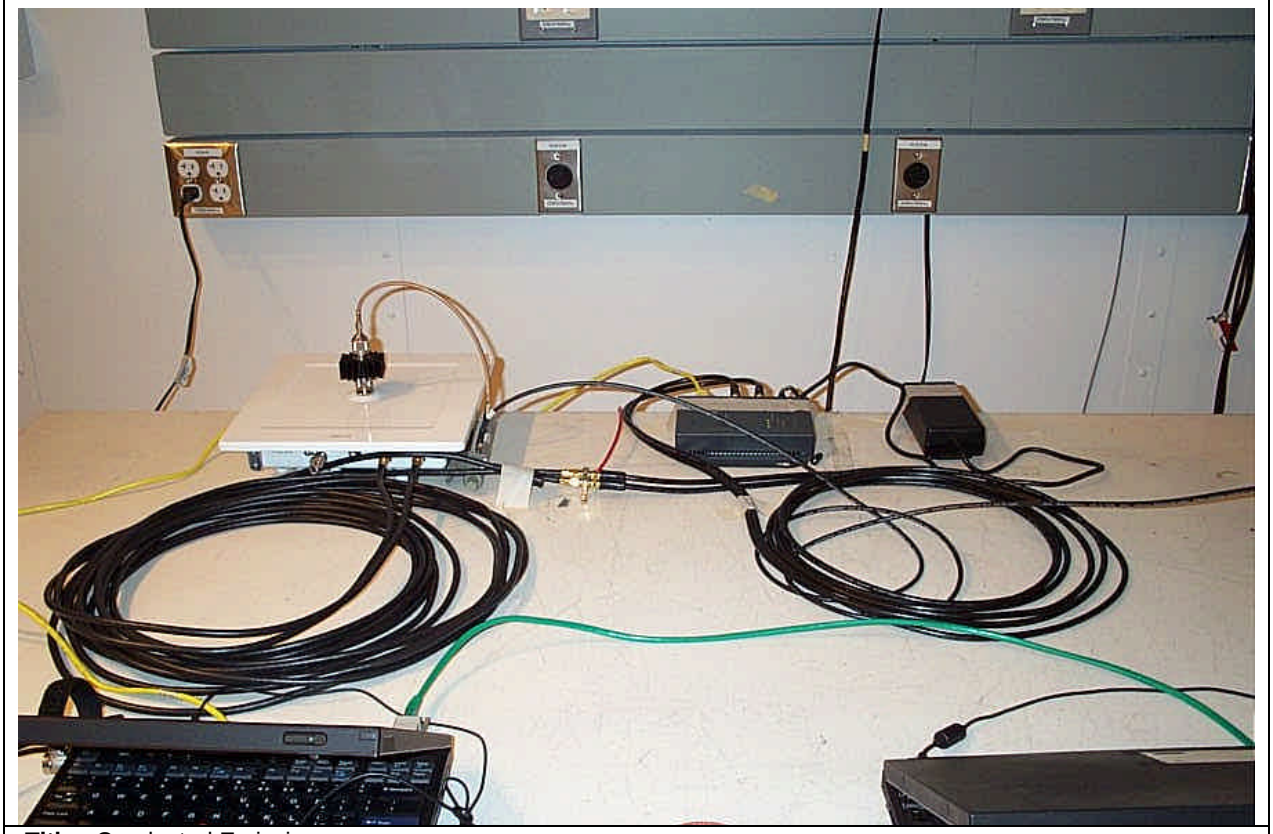


Title: Conducted Emissions

Test Results Table

Frequency MHz	Raw dBuV	Cable Loss dB	Factors dB	Level dBuV	Type	Line	Limit dBuV	Margin dB	Pass /Fail	Comments
26.488	22	20.5	0.6	43.2	Av	N	50	-6.8	Pass	
26.55	21.2	20.6	0.7	42.4	Av	L	50	-7.6	Pass	
25.877	18.5	20.5	0.6	39.7	Av	N	50	-10.3	Pass	
26	18.3	20.5	0.6	39.4	Av	N	50	-10.6	Pass	
25.694	16.5	20.5	0.6	37.7	Av	N	50	-12.3	Pass	
0.184	21.7	20.2	0.1	42	Av	L	54.3	-12.3	Pass	
27.16	16.3	20.6	0.7	37.6	Av	N	50	-12.4	Pass	
26.488	26	20.5	0.6	47.2	Qp	N	60	-12.8	Pass	
26.55	25	20.6	0.7	46.2	Qp	L	60	-13.8	Pass	
0.184	29.8	20.2	0.1	50.1	Qp	L	64.3	-14.2	Pass	
25.877	22.5	20.5	0.6	43.7	Qp	N	60	-16.3	Pass	
26	22.2	20.5	0.6	43.4	Qp	N	60	-16.6	Pass	
25.694	20.5	20.5	0.6	41.6	Qp	N	60	-18.4	Pass	
27.16	20	20.6	0.7	41.2	Qp	N	60	-18.8	Pass	
0.246	11.6	20.1	0.1	31.8	Av	N	51.9	-20.1	Pass	
0.246	20.1	20.1	0.1	40.3	Qp	N	61.9	-21.6	Pass	
4.72	-7.6	20	0.1	12.5	Av	N	46	-33.5	Pass	
4.842	-8.3	20	0.1	11.8	Av	N	46	-34.2	Pass	
4.72	-2.3	20	0.1	17.8	Qp	N	56	-38.2	Pass	
4.842	-2.9	20	0.1	17.2	Qp	N	56	-38.8	Pass	

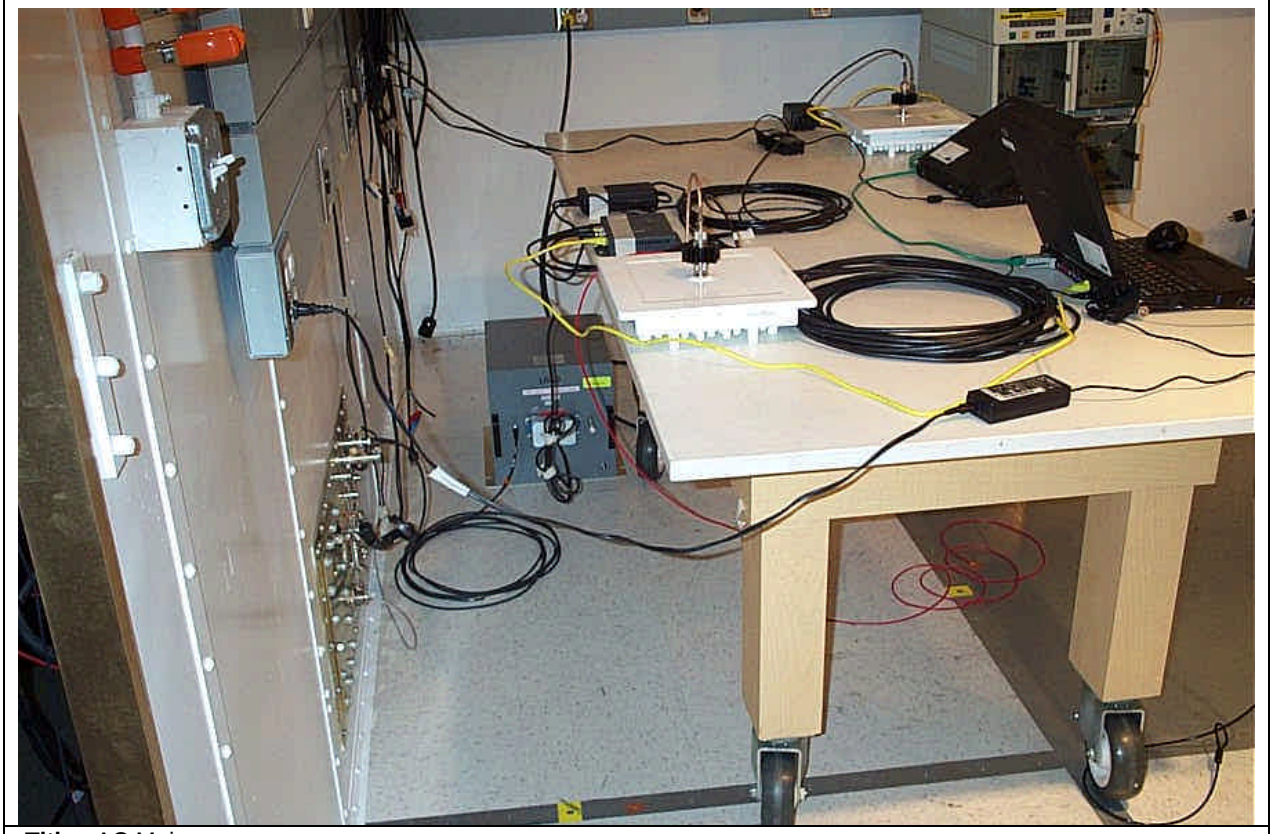
Physical Test arrangement Photograph:



Title: Conducted Emissions

Comments on the above Photograph:

Tabletop setup



Title: AC Mains

Comments on the above Photograph:

Conducted Emissions

Radiated emissions

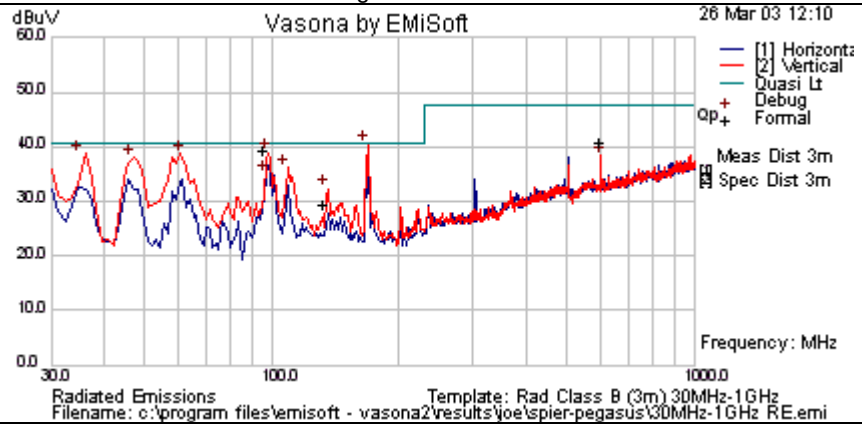
Test Number: 6277				
Basic Standard	**Applied to**	**Class**	**Freq Range**	**Test Details / Comments**
CFR47 Part 15:2002	Enclosure	B	30MHz- 2GHz	x = See the "Clock/ Sensitive frequencies used by the EUT" section of this TAP
Operating Mode	**Mode :** 1, Chariot Software			
Power Input	110v (+/-10%), 60Hz			
Overall Result	Pass			
Comments	No further comments			
Deviation	There were no deviations from the specification			

System Number	**Description**	**Samples**	**System under test**	**Support equipment**
1	EUT	S01, S02, S03 and S07	☑	☐
2	Support	S04, S05, S06 and S08	☐	☑

Subtest Number: 6277 - 1	**Subtest Date:** 26-Mar-2003
Engineer	Jose Aguirre
Lab Information	Building P, 10m Anechoic
Subtest Results	
Subtest Title	30MHz to 1GHZ
Subtest Result	Pass
Comments on the above Test Results	No further comments

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Title: Radiated Emissions, 30MHz-1GHz

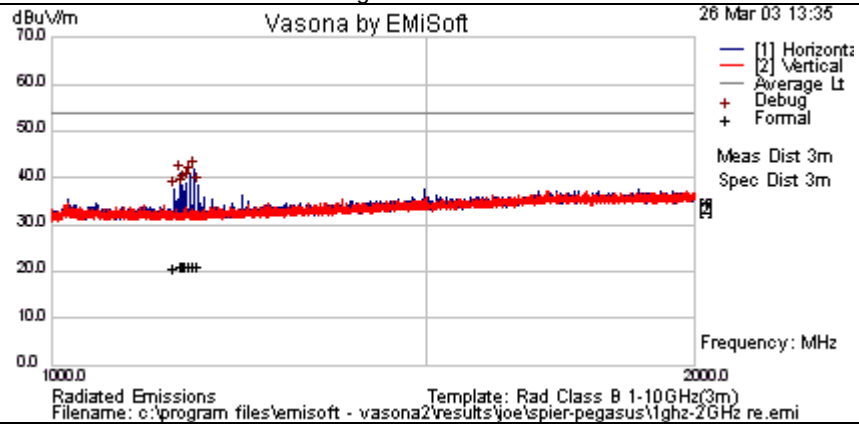
Test Results Table

Frequency MHz	Raw dBuV	Cable Loss dB	AF dB	Level dBuV	Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
45.755	26.5	0.5	11	37.9	Qp	V	98	347	40.5	-2.6	Pass	
95.798	26.7	0.8	9.9	37.4	Qp	H	309	233	40.5	-3.1	Pass	
165.123	26.6	1.1	9.5	37.1	Qp	V	102	161	40.5	-3.4	Pass	
34.663	21.7	0.4	14.5	36.6	Qp	V	259	171	40.5	-3.9	Pass	
60.243	30.6	0.6	5.2	36.5	Qp	V	139	164	40.5	-4	Pass	
96.36	25.6	0.8	10	36.3	Qp	V	128	291	40.5	-4.2	Pass	
106.725	22.7	0.9	11.2	34.8	Qp	V	98	217	40.5	-5.7	Pass	
600.058	16.8	2	20.3	39	Qp	V	154	13	47.5	-8.5	Pass	
133.128	14.1	1	12.5	27.5	Qp	V	98	255	40.5	-13	Pass	

Subtest Number: 6277 - 2	**Subtest Date:** 26-Mar-2003
Engineer	Jose Aguirre
Lab Information	Building P, 10m Anechoic
Subtest Results	
Subtest Title	1GHz-2GHz
Subtest Result	Pass
Comments on the above Test Results	No further comments

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



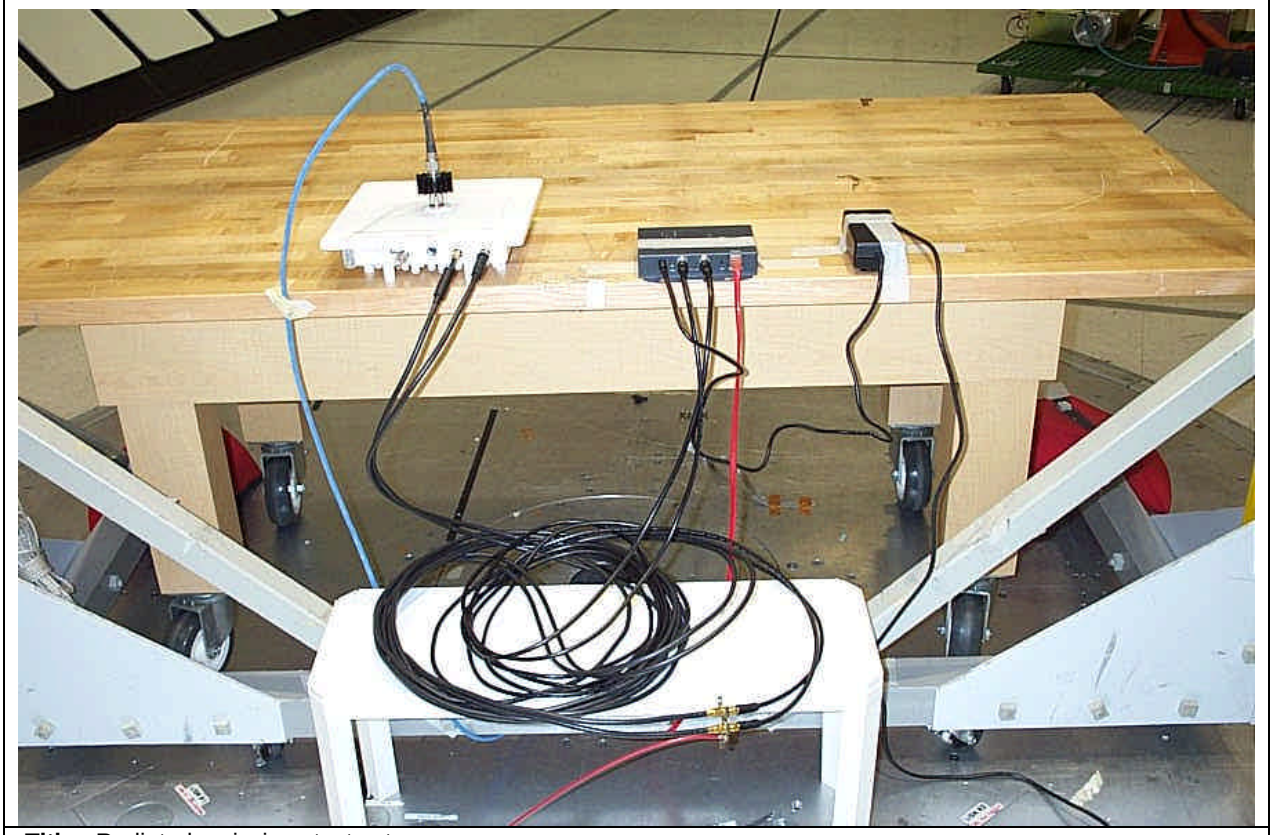
Title: Radiated Emissions

Test Results Table

Frequency MHz	Raw dBuV	Cable Loss dB	AF dB	Level dBuV/m	Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
1170.157	34	2.7	-17.8	18.9	Av	H	98	348	54	-35.1	Pass	
1160.46	34.1	2.7	-17.9	18.9	Av	H	194	291	54	-35.1	Pass	
1164.747	34	2.7	-17.9	18.9	Av	H	238	248	54	-35.1	Pass	
1149.88	34.1	2.7	-17.9	18.9	Av	H	131	87	54	-35.1	Pass	

Frequency MHz	Raw dBuV	Cable Loss dB	AF dB	Level dBuV/m	Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
1152.765	34	2.7	-17.9	18.8	Av	H	256	123	54	-35.2	Pass	
1164.635	34	2.7	-17.9	18.8	Av	H	267	284	54	-35.2	Pass	
1150.546	34	2.7	-17.9	18.8	Av	H	126	99	54	-35.2	Pass	
1155.624	33.9	2.7	-17.9	18.7	Av	H	295	273	54	-35.3	Pass	
1140.126	34	2.7	-17.9	18.7	Av	H	192	329	54	-35.3	Pass	

Physical Test arrangement Photograph:



Title: Radiated emissions test setup

Comments on the above Photograph:

TEST Setup

Appendix B: Formal Immunity Test Results

(All immunity tests are not in the scope of accreditation)

No Immunity test results included in this report.

Appendix C: Abbreviation Key and Definitions

The following table defines abbreviations used within this test report.

Abbreviation	Description	Abbreviation	Description
EMC	Electro Magnetic Compatibility	°F	Degrees Fahrenheit
EMI	Electro Magnetic Interference	°C	Degrees Celsius
EUT	Equipment Under Test	Temp	Temperature
ITE	Information Technology Equipment	S/N	Serial Number
TAP	Test Assessment Schedule	Qty	Quantity
ESD	Electro Static Discharge	emf	Electromotive force
EFT	Electric Fast Transient	rms	Root mean square
EDCS	Engineering Document Control System	QP	Quasi Peak
Config	Configuration	Av	Average
CIS#	Cisco Number (unique identification number for Cisco test equipment)	Hz	Hertz
Cal	Calibration	kHz	KiloHertz ($1x10^3$)
EN	European Norm	MHz	MegaHertz ($1x10^6$)
IEC	International Electrotechnical Commission	GHz	GigaHertz ($1x10^9$)
CISPR	International Special Committee on Radio Interference	H	Horizontal
CDN	Coupling/Decoupling Network	V	Vertical
LISN	Line Impedance Stabilization Network	dB	decibel
PE	Protective Earth	V	Volt
GND	Ground	kV	KiloVolt ($1x10^3$)
L1	Line 1	µV	MicroVolt ($1x10^{-6}$)
L2	Line2	A	Amp
AC	Alternating Current	µA	MicroAmp ($1x10^{-6}$)
DC	Direct Current	mS	Milli Second ($1x10^{-3}$)
RAW	Uncorrected measurement value, as indicated by the measuring device	µS	Micro Second ($1x10^{-6}$)
RF	Radio Frequency	µS	Micro Second ($1x10^{-6}$)
SLCE	Signal Line Conducted Emmisions	m	Meter
Meas dist	Measurement distance	Spec dist	Specification distance
N/A or NA	Not Applicable		

Appendix D: Radiated Emissions Test Procedure

The following is a summary of the actual test procedure used by Cisco Systems (**Doc No:** ENG-36583)

Pre-Assessment

The object of the Pre-Assessment Testing is to identify emissions which must be evaluated against the specification limit, under conditions called out in the applicable specification. During this type of testing the repeatability of the test setup and the worst-case layout of the EUT are also determined..

1. Arrange the EUT in the chamber as defined in the configuration section of ENG-36583, the TAP and the appropriate specification.
2. Where the EUT cannot be configured in accordance with the specification then carry out the following:
    i. Set the equipment up as close as possible to the requirements.
    ii. Note within the log book any deviations from the ard.
    iii. Use only non metallic supports.
    iv. Ensure that the set up used is repeatable.
    v. Evaluate the effect of the configuration upon the test results.
3. Set the antenna to EUT distance to the appropriate test distance.
4. An initial scan of the frequency ranges should be undertaken to ensure that all emissions emanate from the EUT and are not ambients (from mobile phones, support equipment etc).
5. The EUT should be evaluated in the mode(s) of operation defined in the TAP.
6. Measure the emissions profile of the EUT over the required frequency range using the Automated test software
7. Once an initial preview scan has been performed the emissions profile of the EUT should be maximized in accordance with the specification.
8. Repeat the preview scan after maximizing (unless the overhead cable rack has been utilized). Compare the results with the initial scan to ensure that the worst case profile has been obtained. *IMPORTANT* If the obtained profiles are considerably different an investigation should be undertaken to ensure that there is not an intermittent problem with the EUT or its cabling.
9. If the obtained profiles are similar all emissions within 6dB of the test specification should be identified for formal measurements. If the test software is used to do this then the results must be confirmed manually. Where there are <6 emissions within 6dB of the specification, the worst six emissions should be identified.
10. Where the frequencies of emissions are close together care must be taken to ensure that the actual worst case emission has been chosen for the formal measurement. This can usually only be confirmed by

maximizing the emission profile. If in doubt identify both (or all) suspect emissions near the center frequency identified by the preview software.

11. During testing the overload indicator of the test Rx should be monitored to ensure that the testing is valid. Where an overload condition is suspected this can normally be confirmed by the use of an external attenuator or the Rx linearity function.

12. If no signals are within 20dB of the specification limit no formal measurements are required. If this happens the equipment setup should be re-checked to ensure that that it has not developed a fault. When testing to CNS13438 the worst 6 emissions should be recorded regardless

13. Repeat the preceding for the remaining Modes and Configurations defined by the TAP or until a worst case configuration has been obtained. Plots must be made of the worst case emission profile for inclusion in the test report. Plots may also be taken of other representative profiles.

Formal Testing:
The object of Formal/Final measurements is to formally measure the emissions highlighted during the pre-assessment phase against the appropriate specification limits. Maximization of the configuration of the EUT should not be performed during this phase as maximizing the profile at one frequency may change the profile at another and as such invalidate the preview results

1. In the **worst case configuration** each emission identified in the pre-assessment phase should be measured against the appropriate specification limit with the appropriate detector:

    i. Quasi-Peak detector for emissions from 30 MHz to 1GHz

    ii. Peak detector and average detector for emissions above 1GHz

2. Fine Tune the frequency of the emission.

3. The emissions should be observed for a sufficient period of time to allow the EUT to undergo a full exercising routine.

4. Maximize the amplitude of the emission by rotating the EUT, changing the antenna polarity and scanning the receive antenna height.

5. If the the emission varies in amplitude with respect to the specification limit, the emission should be observed for at least 15 seconds and the highest reading shall be recorded, with the exception of any brief isolated high reading.

6. During testing the overload indicator of the test Rx should be monitored to ensure that the testing is valid., Where an overload condition is suspected this can normally be confirmed by the use of external attenuation or the Rx linearity function.

7. If the EUT fails to meet the specification, investigations should be undertaken to ensure that the EUT has sufficient isolation from it's support equipment and/ or ambient interference.

8. Above 1GHz Emissions that do not meet the average specification limit with a peak detector should be compared against the peak limit and re-measured with an Average detector.

9. Repeat steps 2 to 8 on the remaining emissions identified in the pre-assessment phase.
10. Record all relevant data in the eRAT.

Appendix E: Conducted Emissions Test Procedure

The following is a summary of the actual test procedure used by Cisco Systems (**Doc No:** ENG-36541)

Pre-Assessment

The object of the Pre-Assessment Testing is to identify emissions which must be evaluated against the specification limit, under conditions called out in the applicable standard. During this type of testing the repeatability of the test setup and the worst-case layout of the EUT are also determined..

1. Arrange the EUT in the chamber as defined in the configuration section of ENG-36541, the TAP and the appropriate Specification
2. If drive/support equipment is located outside of the shielded enclosure, care must be taken to adequately filter cables coming into the chamber to reduced any potential ambient noise.
3. An initial investigation should be undertaken to ensure that ambient interference from external sources or support equipment are not affecting the measured results of the EUT.
4. The EUT should be connected to the LISN via an appropriate length of mains power cord as defined in the Specification.
5. Investigations should be made to assess possible effects of I/O cables on the measured emission profile. Such investigations should remain within the boundaries of acceptable configurations defined in the Specification. The main purpose of this investigation is to check for cabling problems and for repeatability. I/O cables should not come within 80cm of the LISN (AMN) This information should be recorded in JLS.
6. Ensure that there is a pulse limiter in the measurement path to the input of the spectrum analyser. Ensure that unused ports of the LISN are terminated in 50 ohms.
7. The emission profile of the EUT should be measured across the required frequency range.
8. Maximize the emission profile of the EUT over the entire frequency range.The following issues should be considered during the maximization process:
   i. Cable placement and EUT location (within the boundaries of the Specification)
   ii. EUT operating modes (allow for full EUT Cycle times)
9. Once the maximum configuration has been discovered, the emission profile should be compared with the most stringent limit from the appropriate Specification.
10. If no signals are within 20dB of the Specification limit no formal measurements are required. If this happens the equipment setup should be re-checked to ensure that that it has not developed a fault. When testing to CNS13438 the worst 6 emissions should be recorded regardless.
11. Make a Plot of the entire emission profile.
12. Repeat steps 9 to 11on the remaining lines.

13. Identify all emissions that fail to meet the most stringent limit. These emissions should be formally measured.

14. Where the emission profile meets the most stringent limit, the six worst case emissions should be identified for formal measurements. If the emission profile is broadband in Nature (i.e switch mode PSU noise) it may be necessary to identify more than 6 emissions to adequately assess the EUT.

Formal Testing:

The object of Formal/Final measurements is to formally measure the emissions highlighted during the pre-assessment phase against the appropriate Specification limits.

1. Each emission identified in the pre-assessment phase should be measured against the appropriate Specification limit with a Quasi-Peak detector.

2. The emissions should be observed for a sufficient period of time to allow the EUT to undergo a full exercising routine.

3. Where the emission varies in amplitude with respect to the Specification limit the emission should be observed for an extended time period (normally 15 seconds). The highest level observed within this 15 second period should be recorded with the exception of any brief isolated transients.

4. If the EUT meets the most stringent limit (e.g the average limit) with the Quasi-Peak detector, measurements with an average detector are not necessary.

5. If the EUT fails to meet the most stringent limit with the Quasi-Peak detector the emission should be measured with an Average detector.

6. Repeat the measurements on all available power supply conductors.

7. If the results are within 3dB of the Specification when measured at 120V 60HZ AC measurements should also be performed at 100V 60/50Hz AC to satisfy VCCI requirements.

8. If the EUT fails to meet the Specification, investigations should be undertaken to ensure that the EUT has sufficient isolation from it's support equipment and/ or ambient interference.

9. If the EUT fails to meet the CFR47 limit, investigations should be undertaken to determine if the emission is a broadband in nature. If the difference between the results obtained with the average detector and the results obtained with quasi peak detector are >6dB the emission is deemed to be broadband and the quasi peak reading can be reduced by a factor of 13dB.

Appendix F: Scope of Accreditation: A2LA certificate number 1178-01

The Cisco Systems Scope of Accreditation for EMC testing can be found on the following webpage:

http://www.a2la2.net/scopepdf/1178-01.pdf

Summary:

NEBS	GR-1089(excluding 4.6,5, & 6)
EMC/EMI	CISPR 22
	EN 55022
	CNS 13438
	CFR 47 , FCC Method Part 15 using ANSI C63.4

Appendix G: Test Equipment Used to perform the test

Equip#	Manufacturer/ Model	Description	Last Cal	Next Due	Test Number(s)
004883	EMC Test Systems/ 3115	Double Ridge Guide Horn Antenna	04-MAR-2003	04-MAR-2004	[6277]
005077	Omega/ CT485B-110V-G-AL	Temp/Humidity Recorder	07-FEB-2003	07-FEB-2004	[6264]
005518	Schaffner-Chase/ CBL6112B	Bilog Antenna	05-JUL-2002	05-JUL-2003	[6277]
005678	Hewlett Packard/ E7401A	Spectrum Analyzer	08-AUG-2002	08-AUG-2003	[6264]
005681	Hewlett Packard/ E7405A	Spectrum Analyzer	30-AUG-2002	30-AUG-2003	[6277]
005683	Hewlett Packard/ 85460A	RF Filter Section	30-MAY-2002	30-MAY-2003	[6277]
005685	Hewlett Packard/ 85462A	EMI Receiver Section	30-MAY-2002	30-MAY-2003	[6277]
006324	Lufft/ 5063-33W	Thermo-Hydrometer	22-OCT-2002	22-OCT-2003	[6277]
007704	Fischer Custom Communications/ FCC-LISN-50/250-50-2-01	LISN	30-AUG-2002	30-AUG-2003	[6264]
008320	Times Microwave Systems/ M17/75	3 ft RG-214 Cable	03-DEC-2002	03-DEC-2003	[6277]
008447	NSA 10m Chamber/ NSA 10m Chamber	NSA 10m Chamber	29-JAN-2003	29-JAN-2004	[6277]
018313	Heweltt Packard/ 8447D	RF Preamplifier	10-JAN-2003	10-JAN-2004	[6277]
018719	Rohde & Schwarz/ ESCS30	EMI Test Receiver, 9kHz-2.75GHz	19-AUG-2002	19-AUG-2003	[6264]
018727	Miteq/ AFS33-01001800-25-NC-44	Preamplifier, 1-18GHz, 46 dB Nom. Gain	04-AUG-2002	04-AUG-2003	[6277]
019210	TTE/ H7585-150K-50-21378	High Pas Filter,Fo=150kHz	10-JAN-2003	10-JAN-2004	[6264]
020771	Fischer Custom Communications/ FCC-450B-2.4-N	Instrumentation Limiter	29-JUL-2002	29-JUL-2003	[6264]
020913	Fischer Custom Communications/ FCC-LISN-PA-NEMA-5-15	AC Adapter	30-AUG-2002	30-AUG-2003	[6264]
021116	Micro-Coax/ UFB311A-0-3540-520520	RF Coaxial Cable, to 18GHz, 354 in	23-AUG-2002	23-AUG-2003	[6277]
021602	Coleman/ RG223	BNC 10ft cable	15-NOV-2002	15-NOV-2003	[6264]
023835	Colemen/ RG223	25ft BNC Cable	24-JAN-2003	24-JAN-2004	[6264]

025644	Micro-Coax/ UFB311A-1-3150-504504	RF Coaxial Cable, to 18GHz, 315 in	24-NOV-2002	24-NOV-2003	[6277]
025656	Micro-Coax/ UFB311A-1-0840-504504	RF Coaxial Cable, to 18GHz, 84 in	24-NOV-2002	24-NOV-2003	[6277]

Appendix H: Test and Assessment Plan

EMC Test Plan

EMC-3200

Code Name :

Systems to be Tested : Pegasus UNII 3 Outdoor Wireless Bridge

Cisco Systems
EMC Laboratory
170 West Tasman Drive
San Jose, CA 95134

Revision 1.0
Date 15-Apr-2003
Author Michael Vanbrunt
TAP Template Revision Number 4.0

Overview

N/A

Product Description

N/A

This EMC testing is intended to cover:

☑	Worldwide compliance	☑	Exclude Taiwan
☐	GR1089		
☐	Limited markets and/or Customer requirements. See Comments below.		
Comments:N/A			

Testing will be performed:

☑	Internally	Cisco testing facility
☐	Externally	Third Party testing facility

Specific Test Laboratory Requirements

Ensure that the Test Laboratory meets the following requirements (where appropriate)

BSMI	Designated laboratory
Australia New Zealand Singapore	ISO Guide 17025 accredited laboratory [i.e. NVLAP, A2LA] or equivalent
USA DOC Process	NVLAP, A2LA (Note : The DOC process is for Class B PC peripherals only.)
VCCI	VCCI Listed laboratory
Customer requirements (e.g. GR1089)	Customer recoginzed laboratory

Equipment Classification (see EDCS-5770)

	Equipment Type	Requirements	
☑	Telecommunication Network Equipment	EN300386:2001 EN50082-1:1992 EN50082-1:1997 EN61000-6-1:2001	EN55022 :1998 CISPR22 : 1997 EN61000-3-2 :2000 EN61000-3-3: 1995
☐	Cable Equipment	EN300386:2001 EN55024: 1998 EN50082-1:1992 EN50082-1:1997 EN61000-6-1:2001	EN55022 :1998 CISPR22 : 1997 EN61000-3-2 :2000 EN61000-3-3: 1995
☑	ITE/TTE/LAN Equipment	EN55024: 1998 EN50082-1:1992 EN50082-1:1997 CISPr24: 1997 EN61000-6-1:2001	EN55022 :1998 CISPR22 : 1997 EN61000-3-2 :2000 EN61000-3-3: 1995
☑	Radio	EN55103-2 EN50082-1:1992 EN50082-1:1997 EN61000-6-1:2001	EN55103-1 EN61000-3-2 :2000 EN61000-3-3: 1995
☐	Central Office Equipment [USA Only]	GR1089:1997:issue2:rev1:1999 Applicable only if the product requires NEBS compliance	

Emissions Classification

☐	Class A (e.g. central office, non-domestic)
☑	Class B (e.g. non- central office, domestic)

Immunity Classification

☑	Country Requirements (normal levels)
☐	Quality Levels (Higher than required for worldwide market access)

Power/ Interface Details

☑	AC	☑ 60 Hz	☑ 50 Hz	
		☑ Single Phase	☐ 3 Phase Delta	☐ 3 Phase Y (star)
☑	DC			
☐	Battery Powered			

☑	Signal Port		
☑	Telecom Port	☑ Indoor Cables	☐ Outdoor Cables
☑	RF Port	☑ Indoor Cables	☑ Outdoor Cables
☐	Functional Earth Port		
☐	Analog interfaces supporting Telephony services		
☐	Digital interfaces supporting Telephony services		
☐	Acoustic Transducer (e.g. Handset, speaker)		

Chassis

☐	Desktop (Table Top)
☑	Rackmounted / Floorstanding
☐	Magnetic media (hard drives etc)
☑	Wall Mounted

Applicable Specifications testing required

Conducted emissions

Basic Standard	Applied to	Class	Freq Range	Test Details / Comments
CISPR22:1997 [EN55022:1998]	Telecomm Ports	B	0.15- 30MHz	This test requires Voltage and/ or Current measurements
CISPR22:1997 [EN55022:1998]	AC Power Line	B	0.15- 30MHz	Also assess the EUT against AS/NZS3548:1995 and VCCI: V-3/2000.04 requirements
EN300386:2001	DC Power Line	N/A	0.15- 30MHz	DC conducted Emissions
CISPR22:1997 [EN55022:1998]	RF Ports	B	0.15- 30MHz	This test requires Voltage and/ or Current measurements
CFR47 Part 15:2002	AC Power Line	B	0.15- 30MHz	Test procedure must follow ANSI C63.4 and U.S line voltages must be used (e.g 110V 60Hz).

Radiated emissions

Basic Standard	Applied to	Class	Freq Range	Test Details / Comments
CFR47 Part 15:2002	Enclosure	B	30MHz- xGHz	x = See the "Clock/ Sensitive frequencies used by the EUT" section of this TAP
CISPR22:1997 [EN55022:1998]	Enclosure	B	30MHz- 1GHz	Also assess the EUT against AS/NZS3548:1995 and VCCI: V-3/2000.04 requirements

Harmonics emissions

Basic Standard	Applied to	Class	Test Details / Comments
EN61000-3-2:2000	AC Power Line	N/A	The A limit would normally apply to Cisco products.

Voltage fluctuations and flicker

Basic Standard	Applied to	Class	Test Details / Comments
EN61000-3-3:1995	AC Power Line	N/A	N/A

Conducted RF immunity

Basic Standard	Applied to	Level	Freq Range	Applied Signal	Criteria	Test Details / Comments
EN61000-4-6:1996 [incl AMD1]	RF Ports	2	0.15- 80MHz	3V emf	A	Modulation :1kHz 80% AM
EN61000-4-6:1996 [incl AMD1]	Telecomm Ports	2	0.15- 80MHz	3V emf	A	Modulation :1kHz 80% AM
EN61000-4-6:1996 [incl AMD1]	Signal Ports	2	0.15-80MHz	3V emf	A	Modulation :1kHz 80% AM
EN61000-4-6:1996 [incl AMD1]	DC Power Line	2	0.15-80MHz	3V emf	A	Modulation :1kHz 80% AM
EN61000-4-6:1996 [incl AMD1]	AC Power Line	2	0.15-80MHz	3V emf	A	Modulation :1kHz 80% AM

Radiated RF immunity

Basic Standard	Applied to	Level	Freq Range	Applied Signal	Criteria	Test Details / Comments
EN61000-4-3:1996 [incl AMD 1 & 2]	Enclosure	N/A	800-960MHz	10V/m	A	From EN300386:2001. Modulation :1kHz 80% AM
EN61000-4-3:1996 [incl AMD 1 & 2]	Enclosure	N/A	80-1000MHz	3V/m	A	Modulation :1kHz 80% AM
EN61000-4-3:1996 [Incl AMD 1 & 2]	Enclosure	N/A	1.4- 2GHz	10V/m	A	Modulation :1kHz 80% AM

ESD immunity

Basic Standard	Applied to	Level	Applied Discharge		Criteria	Test Details / Comments
			Air	Contact		
EN61000-4-2:1995 [incl AMD1 + AMD2]	Enclosure	3	8kV	6kV	B	N/A

EFT/B immunity

Basic Standard	Applied to	Level	Applied Disturbance	Criteria	Test Details / Comments
EN61000-4-4:1995	AC Power Line	2	1kV	B	TrTh=5/50ns, Rep. Freq=5kHz, Burst Period=15ms, Burst Duration=300mS
EN61000-4-4:1995	RF Ports	2	0.5kV	B	TrTh=5/50ns, Rep. Freq=5kHz, Burst Period=15ms, Burst Duration=300mS
EN61000-4-4:1995	Telecomm Ports	2	0.5kV	B	TrTh=5/50ns, Rep. Freq=5kHz, Burst Period=15ms, Burst Duration=300mS
EN61000-4-4:1995	Signal Ports	2	0.5kV	B	TrTh=5/50ns, Rep. Freq=5kHz, Burst Period=15ms, Burst Duration=300mS
EN61000-4-4:1995	DC Power Line	2	1kV	B	TrTh=5/50ns, Rep. Freq=5kHz, Burst Period=15ms, Burst Duration=300mS

Surge immunity

Basic Standard	Applied to	Applied Disturbance		Waveform	Criteria	Test Details / Comments
		Line-Line	Line-Gnd			
EN61000-4-5:1995	Signal Ports Indoor		0.5kV	1.2/50- 8/20uS	B	Unbalanced conductors = Each Line - ground : Balanced conductors = All Lines - ground :Screened conductors = Chassis - Ground
EN61000-4-5:1995	DC Power Line	0.5kV	0.5kV	1.2/50- 8/20uS	B	Line to Line and Line to Gnd.
EN61000-4-5:1995	AC Power Line	1kV	2kV	1.2/50- 8/20uS	B	Line to Line and Line to Gnd. Apply the surges at 0, 90 and 270 degree phase angles.
EN61000-4-5:1995	Telecomm Ports Indoor		0.5kV	1.2/50- 8/20uS	B	Unbalanced conductors = Each Line - ground : Balanced conductors = All Lines - ground :Screened conductors =

						Chassis - Ground
EN61000-4-5:1995	RF Ports Outdoor		1kV	1.2/50- 8/20uS	B	Unbalanced conductors = Each Line - ground : Balanced conductors = All Lines - ground : Screened conductors = Chassis - Ground
EN61000-4-5:1995	RF Ports Indoor		0.5kV	1.2/50- 8/20uS	B	Unbalanced conductors = Each Line - ground : Balanced conductors = All Lines - ground : Screened conductors = Chassis - Ground

Voltage dips and short interruptions

Basic Standard	Applied to	Applied Disturbance	Criteria	Test Details / Comments
EN61000-4-11:1994 [Incl AMD1]	AC Power Line	Various	B & C	30% for 10ms [B], 60% for 100ms [C], >95% for 5s [C], >95% for 10ms [B], 30% for 500ms [B]

Customer Additional Specifications

Conducted emissions

Basic Standard	Applied to	Class	Freq Range	Test Details / Comments
CNS13438:1997	AC Power Line	A	0.15- 30MHz	Class A products must be evaluated at 220V[60Hz] as well as 110V [60Hz]

Radiated emissions

Basic Standard	Applied to	Class	Freq Range	Test Details / Comments
CNS13438:1997	Enclosure	A	30MHz- 1GHz	Class A products must be evaluated at 220V[60Hz] as well as 110V [60Hz]

Applicable Specifications testing not required

N/A

Test configuration description:

N/A

Justification of the worst case test configuration and mode of operation:

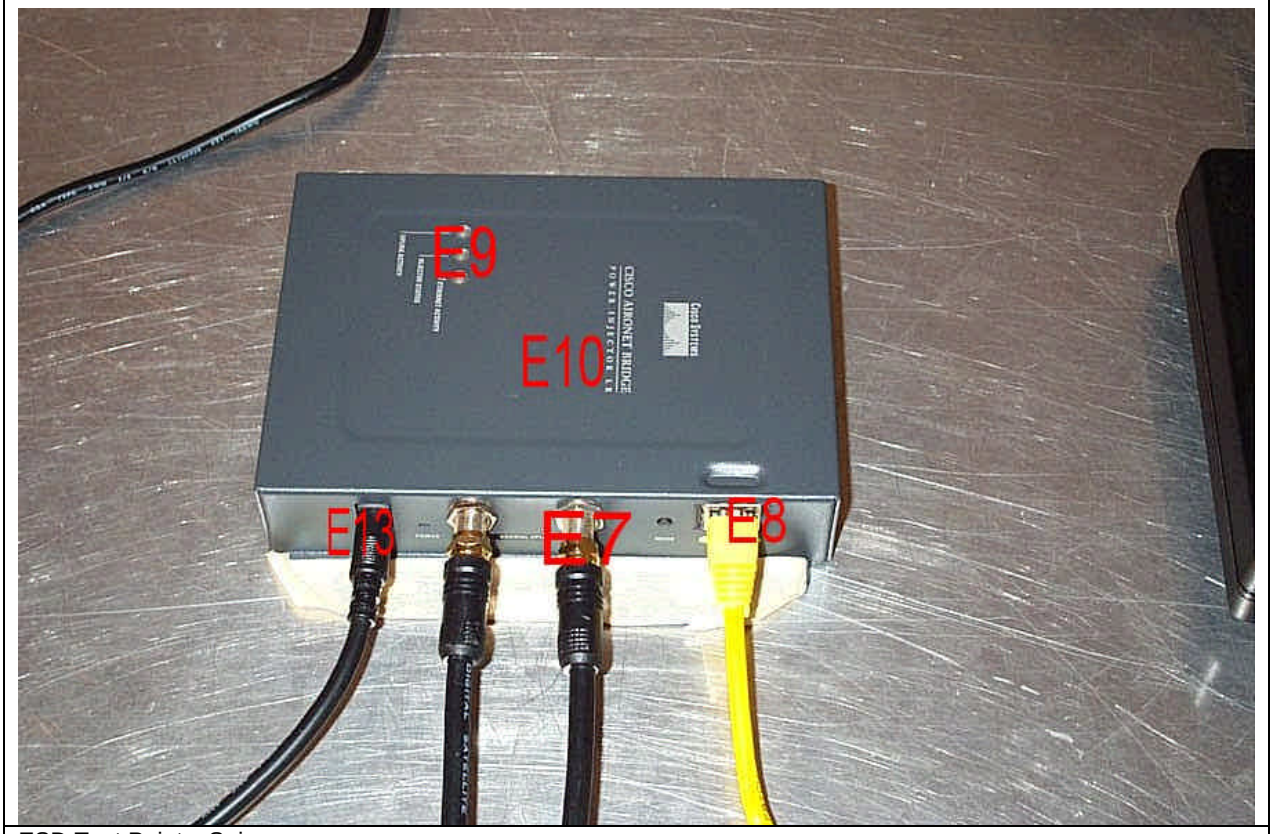
N/A

Cabling Details and Block Diagram (VCCI)

Cable Letter	Connection	Manufacturer	Length	Shield	Remarks
N/A	N/A	N/A	N/A	N/A	N/A

ESD Test Points

Point : E18

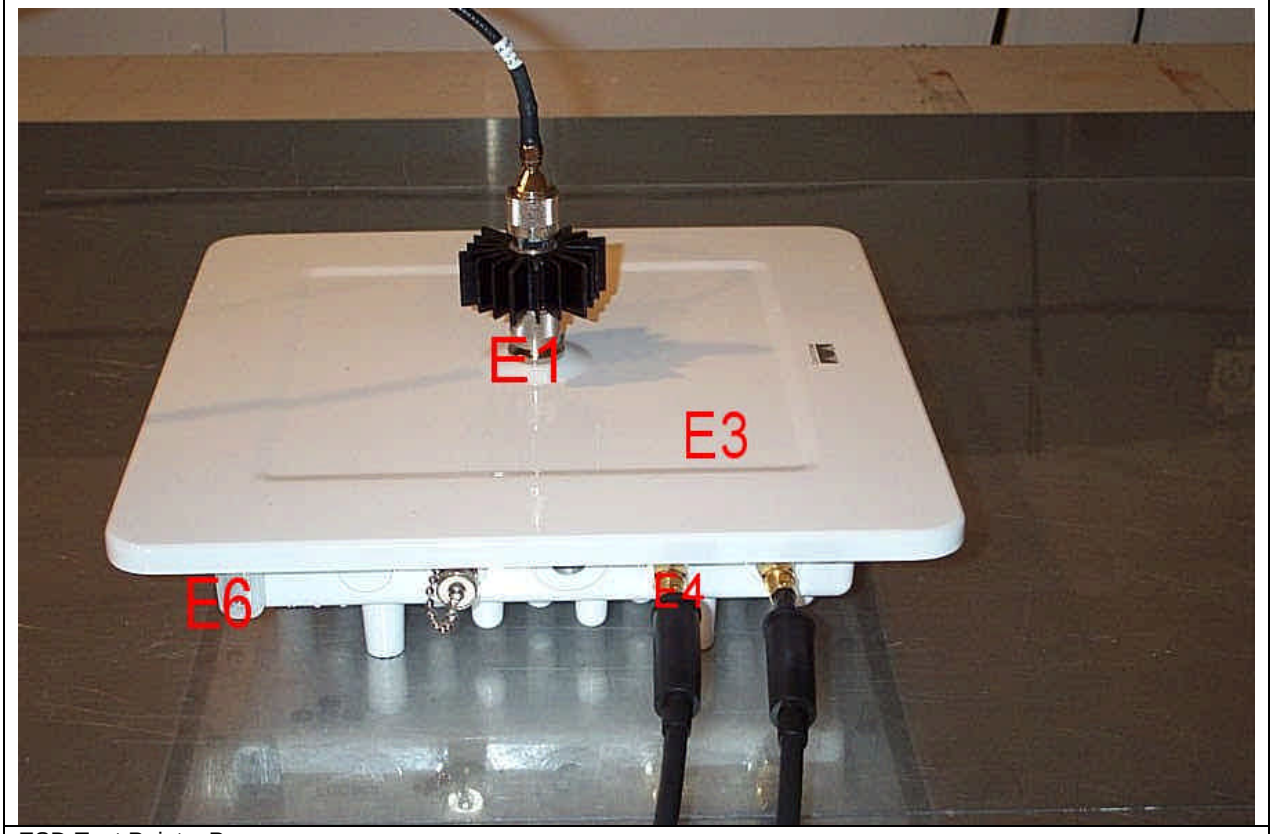


ESD Test Points: Spier

Point : E19

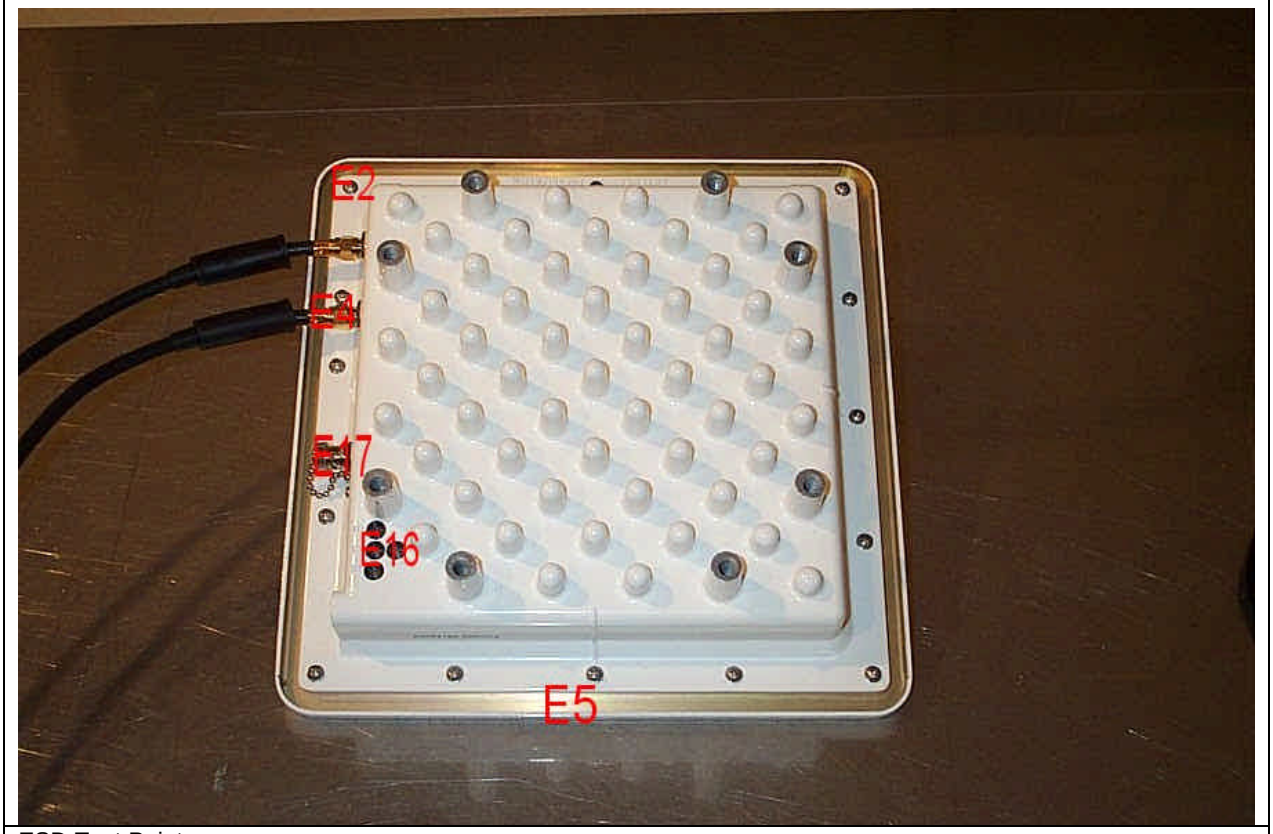
ESD Test Points: Spier power supply

Point : E20



ESD Test Points: Pegasus

Point : E21



ESD Test Points: pegasus

ESD Points	Description
E1	RF connector
E2	Screw
E3	Top Lid
E4	Antenna Connector
E5	Edge of chassis
E6	Grounding point
E7	spier RF connector
E8	Spier RJ45 Ethernet connector
E9	Spier LED
E10	Spier Top Lid center point
E11	Horizontal Coupling Plain
E12	Vertical Coupling Plain
E13	Air- DC connector on Spier
E14	Air- IEC connector on power supply
E15	Air- power supply housing

E16	LED
E17	service

Clock/Sensitive frequencies used by the EUT:

Frequency (MHz)	Description
N/A	N/A

Note(s)

Radiated and Conducted Immunity :

1. **EN55024 :** For Telecommunications terminal equipment (TTE) having an analogue or digital interface an additional comprehensive functional test shall be carried out at the following frequencies. : 0.2 MHz; 1.0 MHz; 7.1 MHz; 13.56 MHz; 21.0 MHz; 27.12 MHz; 40.68 MHz; 80.0 MHz; 120.0 MHz; 160.0 MHz; 230.0 MHz; 434.0 MHz; 460.0 MHz; 600.0 MHz; 863.0 MHz and 900.0 MHz.

2. **EN300386:2001 :** During immunity testing using continuous phenomena, the following selected frequencies shall be investigated in addition to the sweep: 0.2 MHz; 1.0 MHz; 7.1 MHz; 13.56 MHz; 21.0 MHz; 27.12 MHz; 40.68 MHz; 80.0 MHz; 120.0 MHz; 160.0 MHz; 230.0 MHz; 434.0 MHz; 460.0 MHz; 600.0 MHz; 863.0 MHz and 900.0 MHz.

Performance Criteria:

Criteria A	
Description	
Monitoring Method	
Criteria B	
Description	
Monitoring Method	
Criteria C	
Description	
Monitoring Method	
Criteria R	
Description	
Monitoring Method	