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Electromagnetic Emissions Test Report and Application for Grant of Equipment Authorization pursuant to

FCC Part 15 Subpart C, Section 15.209

on the Asyst Technologies, Inc. Transmitter Model: AdvanTag ATR-9180

FCC ID: PMQATR9180

GRANTEE: Asyst Technologies, Inc.
46897 Bayside Parkway
Fremont, CA 94538

TEST SITE: Elliott Laboratories, Inc.
684 W. Maude Ave
Sunnyvale, CA 94086

REPORT DATE: February 29, 2008

FINAL TEST DATE: February 1, February 4 and February 5, 2008

AUTHORIZED SIGNATORY: _____
Mark Hill
Staff Engineer

A2LA ACCREDITED
Testing Cert #2016-01

REVISION HISTORY

Rev #	Date	Comments	Modified By
1	June 16, 2008	Initial Release	David Guidotti

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SCOPE

An electromagnetic emissions test has been performed on the Asyst Technologies, Inc. model AdvanTag ATR-9180 pursuant to the following rules:

FCC Part 15 Subpart C, Section 15.209

Conducted and radiated emissions data has been collected, reduced, and analyzed within this report in accordance with measurement guidelines set forth in the following reference standards and as outlined in Elliott Laboratories test procedures:

ANSI C63.4:2003

The intentional radiator above has been tested in a simulated typical installation to demonstrate compliance with the relevant Industry Canada performance and procedural standards.

Final system data was gathered in a mode that tended to maximize emissions by varying orientation of EUT, orientation of power and I/O cabling, antenna search height, and antenna polarization.

Every practical effort was made to perform an impartial test using appropriate test equipment of known calibration. All pertinent factors have been applied to reach the determination of compliance.

The test results recorded herein are based on a single type test of the Asyst Technologies, Inc. model AdvanTag ATR-9180 and therefore apply only to the tested sample. The sample was selected and prepared by Tou Vang of Asyst Technologies, Inc.

OBJECTIVE

The primary objective of the manufacturer is compliance with the regulations outlined in the previous section.

Prior to marketing in the USA, all unlicensed transmitters and transceivers require certification. Receive-only devices operating between 30 MHz and 960 MHz are subject to either certification or a manufacturer's declaration of conformity, with all other receive-only devices exempt from the technical requirements.

Certification is a procedure where the manufacturer submits test data and technical information to a certification body and receives a certificate or grant of equipment authorization upon successful completion of the certification body's review of the submitted documents. Once the equipment authorization has been obtained, the label indicating compliance must be attached to all identical units, which are subsequently manufactured.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product which may result in increased emissions should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different line filter, different power supply, harnessing or I/O cable changes, etc.).

STATEMENT OF COMPLIANCE

The tested sample of Asyst Technologies, Inc. model AdvanTag ATR-9180 complied with the requirements of the following regulations:

FCC Part 15 Subpart C

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product which may result in increased emissions should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different line filter, different power supply, harnessing or I/O cable changes, etc.).

TEST RESULTS SUMMARY

DEVICES OPERATING UNDER THE GENERAL LIMITS

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.209	RSS 210 Table 3	Transmitter Fundamental Signal Emissions, 134 kHz	8.0dBµV/m (2.5µV/m) @ 0.134MHz	Refer to table in limits section	Complies (-17.1dB)
15.209	RSS 210 Table 3	Transmitter Radiated Spurious Emissions, 0.1-30 MHz	6.5dBµV/m (2.1µV/m) @ 0.669MHz	Refer to table in limits section	Complies (-26.2dB)

GENERAL REQUIREMENTS APPLICABLE TO ALL BANDS

FCC Rule Part	RSS Rule part	Description	Measured Value / Comments	Limit / Requirement	Result (margin)
15.203	-	RF Connector	External Antenna using standard BNC. System is professionally installed.	Refer to standard	Complies
15.207	RSS GEN Table 2	AC Conducted Emissions	45.9dBµV @ 0.199MHz	Refer to standard	Complies (- 7.8 dB)

MEASUREMENT UNCERTAINTIES

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level and were calculated in accordance with UKAS document LAB 34.

Measurement Type	Frequency Range (MHz)	Calculated Uncertainty (dB)
Conducted Emissions	0.15 to 30	± 2.4
Radiated Emissions	0.015 to 30	± 3.0
Radiated Emissions	30 to 1000	± 3.6
Radiated Emissions	1000 to 40000	± 6.0

EQUIPMENT UNDER TEST (EUT) DETAILS

GENERAL

The Asyst Technologies, Inc. model AdvanTag ATR-9180 is a one antenna reader with built in multiplexer that is designed to read and write to the MicroTag embedded in semiconductor (wafer cassettes, pods, FOUPs, reticle boxes and etc). Since the EUT would be placed on a table top during operation, the EUT was treated as table-top equipment during testing to simulate the end-user environment. The electrical rating of the EUT is 100-240 Volts, 50-60 Hz, 1.0 Amps.

The sample was received on February 1, 2008 and tested on February 1, February 4 and February 5, 2008. The EUT consisted of the following component(s):

Manufacturer	Model	Description	Serial Number	FCC ID
Asyst Technologies	AdvanTag 9180	134kHz RFID Reader	N/A	PMQATR9180

ANTENNA SYSTEM

The EUT has an external stick antenna, manufactured by Asyst Technology, part number 9701-2879-03. The antenna is connected to the ATR-9180 via a BNC connector. Asyst declares that this product is to be professionally installed and therefore the system meets the requirements of 15.203. The antenna gain is 0dBi.

ENCLOSURE

The EUT enclosure is primarily constructed of Plastic. It measures approximately 11.5cm wide by 7.5cm deep by 2.5cm high.

MODIFICATIONS

The EUT did not require modifications during testing in order to comply with emissions specifications.

SUPPORT EQUIPMENT

The following equipment was used as local support equipment for emissions testing:

Manufacturer	Model	Description	Serial Number	FCC ID
Asyst Technology	9701-2879-03	Antenna	N/A	-

The following equipment was used as remote support equipment for emissions testing:

Manufacturer	Model	Description	Serial Number	FCC ID
Compaq	Armada	Laptop	A04449	DoC

EUT INTERFACE PORTS

The I/O cabling configuration during emissions testing was as follows:

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
Ethernet	Unterminated	Cat 5	Unshielded	1.5
Remote I/O	Unterminated	Cat 5	Unshielded	1.5
RS232 Comm	Laptop	Serial	Shielded	3.0
Antenna	Antenna	BNC	Shielded	1.0
Power / Can	AC Mains	AC/DC Adapter	2 Wire	1.0

EUT OPERATION

During emissions testing the EUT reading from Antenna and writes to laptop. This communication can be observed via laptop or LED on top of the EUT.

TEST SITE

GENERAL INFORMATION

Final test measurements were taken on February 1, February 4 and February 5, 2008 at the Elliott Laboratories Open Area Test Site #Chamber 2, OATS 1 and Chamber 4 or semi anechoic chamber #Chamber 2, OATS 1 and Chamber 4 located at 684 West Maude Avenue, Sunnyvale, California or 41039 Boyce Road, Fremont, California Pursuant to section 2.948 of the FCC's Rules and section 3.3 of RSP-100, construction, calibration, and equipment data has been filed with the Commission.

ANSI C63.4:2003 recommends that ambient noise at the test site be at least 6 dB below the allowable limits. Ambient levels are below this requirement with the exception of predictable local TV, radio, and mobile communications traffic. The test site contains separate areas for radiated and conducted emissions testing. Considerable engineering effort has been expended to ensure that the facilities conform to all pertinent requirements of ANSI C63.4:2003.

CONDUCTED EMISSIONS CONSIDERATIONS

Conducted emissions testing is performed in conformance with ANSI C63.4:2003. Measurements are made with the EUT connected to the public power network through a nominal, standardized RF impedance, which is provided by a line impedance stabilization network, known as a LISN. A LISN is inserted in series with each current-carrying conductor in the EUT power cord.

RADIATED EMISSIONS CONSIDERATIONS

The FCC has determined that radiation measurements made in a shielded enclosure are not suitable for determining levels of radiated emissions. Radiated measurements are performed in an open field environment or in a semi-anechoic chamber. The test sites are maintained free of conductive objects within the CISPR defined elliptical area incorporated in ANSI C63.4:2003 guidelines and meet the Normalized Site Attenuation (NSA) requirements of ANSI C63.4:2003.

MEASUREMENT INSTRUMENTATION

RECEIVER SYSTEM

An EMI receiver as specified in CISPR 16-1 is used for emissions measurements. The receivers used can measure over the frequency range of 9 kHz up to 2000 MHz. These receivers allow both ease of measurement and high accuracy to be achieved. The receivers have Peak, Average, and CISPR (Quasi-peak) detectors built into their design so no external adapters are necessary. The receiver automatically sets the required bandwidth for the CISPR detector used during measurements. If the repetition frequency of the signal being measured is below 20Hz, peak measurements are made in lieu of Quasi-Peak measurements.

For measurements above the frequency range of the receivers, a spectrum analyzer is utilized because it provides visibility of the entire spectrum along with the precision and versatility required to support engineering analysis. Average measurements above 1000MHz are performed on the spectrum analyzer using the linear-average method with a resolution bandwidth of 1 MHz and a video bandwidth of 10 Hz, unless the signal is pulsed in which case the average (or video) bandwidth of the measuring instrument is reduced to onset of pulse desensitization and then increased.

INSTRUMENT CONTROL COMPUTER

The receivers utilize either a Rohde & Schwarz EZM Spectrum Monitor/Controller or contain an internal Spectrum Monitor/Controller to view and convert the receiver measurements to the field strength at an antenna or voltage developed at the LISN measurement port, which is then compared directly with the appropriate specification limit. This provides faster, more accurate readings by performing the conversions described under Sample Calculations within the Test Procedures section of this report. Results are printed in a graphic and/or tabular format, as appropriate. A personal computer is used to record all measurements made with the receivers.

The Spectrum Monitor provides a visual display of the signal being measured. In addition, the controller or a personal computer run automated data collection programs which control the receivers. This provides added accuracy since all site correction factors, such as cable loss and antenna factors are added automatically.

LINE IMPEDANCE STABILIZATION NETWORK (LISN)

Line conducted measurements utilize a fifty microhenry Line Impedance Stabilization Network as the monitoring point. The LISN used also contains a 250 uH CISPR adapter. This network provides for calibrated radio frequency noise measurements by the design of the internal low pass and high pass filters on the EUT and measurement ports, respectively.

FILTERS/ATTENUATORS

External filters and precision attenuators are often connected between the receiving antenna or LISN and the receiver. This eliminates saturation effects and non-linear operation due to high amplitude transient events.

ANTENNAS

A loop antenna is used below 30 MHz. For the measurement range 30 MHz to 1000 MHz either a combination of a biconical antenna and a log periodic or a bi-log antenna is used. Above 1000 MHz, horn antennas are used. The antenna calibration factors to convert the received voltage to an electric field strength are included with appropriate cable loss and amplifier gain factors to determine an overall site factor, which is then programmed into the test receivers or incorporated into the test software.

ANTENNA MAST AND EQUIPMENT TURNTABLE

The antennas used to measure the radiated electric field strength are mounted on a non-conductive antenna mast equipped with a motor-drive to vary the antenna height. Measurements below 30 MHz are made with the loop antenna at a fixed height of 1m above the ground plane.

ANSI C63.4:2003 specifies that the test height above ground for table mounted devices shall be 80 centimeters. Floor mounted equipment shall be placed on the ground plane if the device is normally used on a conductive floor or separated from the ground plane by insulating material from 3 to 12 mm if the device is normally used on a non-conductive floor. During radiated measurements, the EUT is positioned on a motorized turntable in conformance with this requirement.

INSTRUMENT CALIBRATION

All test equipment is regularly checked to ensure that performance is maintained in accordance with the manufacturer's specifications. All antennas are calibrated at regular intervals with respect to tuned half-wave dipoles. An exhibit of this report contains the list of test equipment used and calibration information.

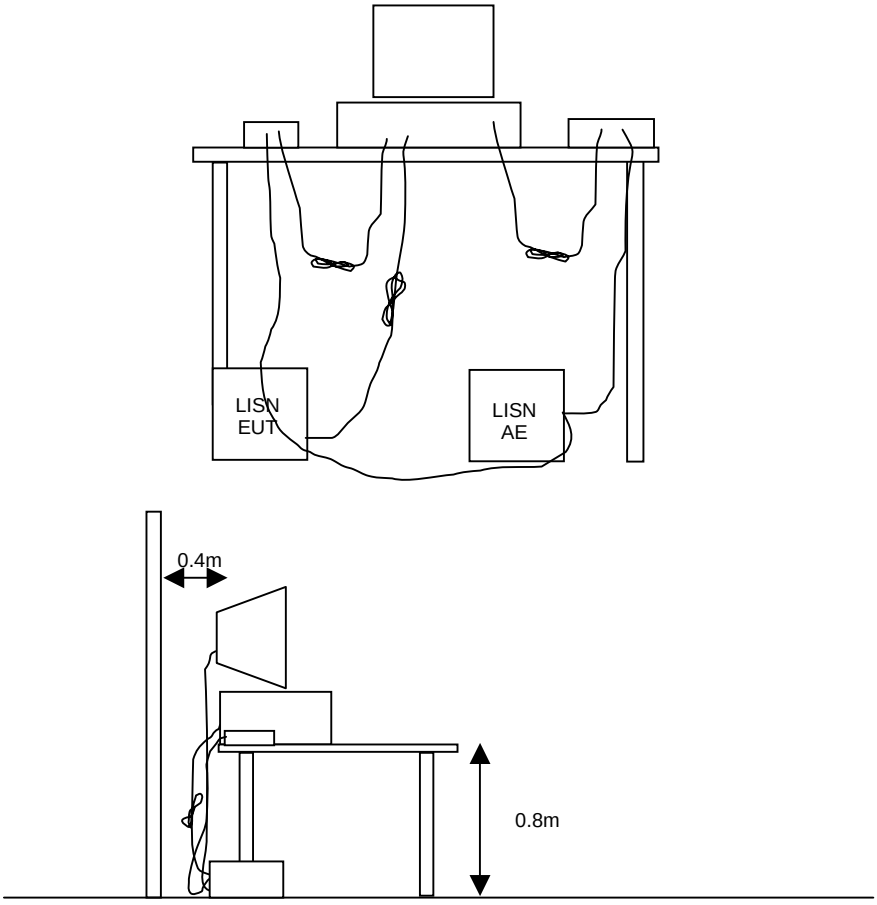
TEST PROCEDURES

EUT AND CABLE PLACEMENT

The regulations require that interconnecting cables be connected to the available ports of the unit and that the placement of the unit and the attached cables simulate the worst case orientation that can be expected from a typical installation, so far as practicable. To this end, the position of the unit and associated cabling is varied within the guidelines of ANSI C63.4:2003, and the worst-case orientation is used for final measurements.

CONDUCTED EMISSIONS

Conducted emissions are measured at the plug end of the power cord supplied with the EUT. Excess power cord length is wrapped in a bundle between 30 and 40 centimeters in length near the center of the cord. Preliminary measurements are made to determine the highest amplitude emission relative to the specification limit for all the modes of operation. Placement of system components and varying of cable positions are performed in each mode. A final peak mode scan is then performed in the position and mode for which the highest emission was noted on all current carrying conductors of the power cord.

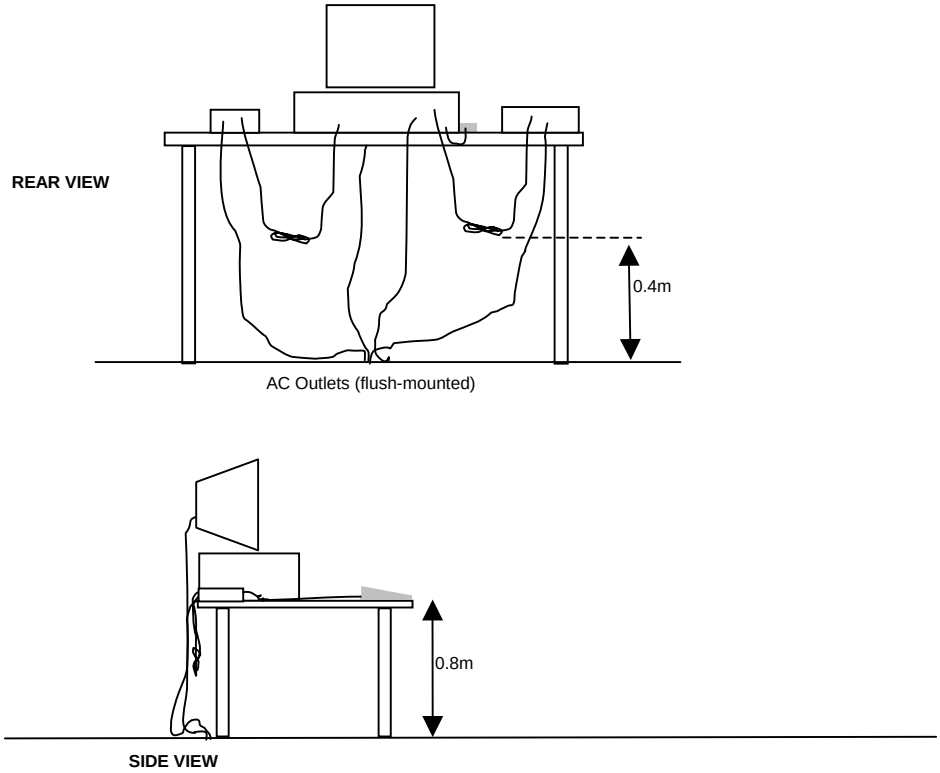


A preliminary scan of the radiated emissions is performed in which all significant EUT frequencies are identified with the system in a nominal configuration. At least two scans are performed, one scan for each antenna polarization (horizontal and vertical; loop parallel and perpendicular to the EUT). During the preliminary scans, the EUT is rotated through 360˚, the antenna height is varied (for measurements above 30 MHz) and cable positions are varied to determine the highest emission relative to the limit. Preliminary scans may be performed in a fully anechoic chamber for the purposes of identifying the frequencies of the highest emissions from the EUT.

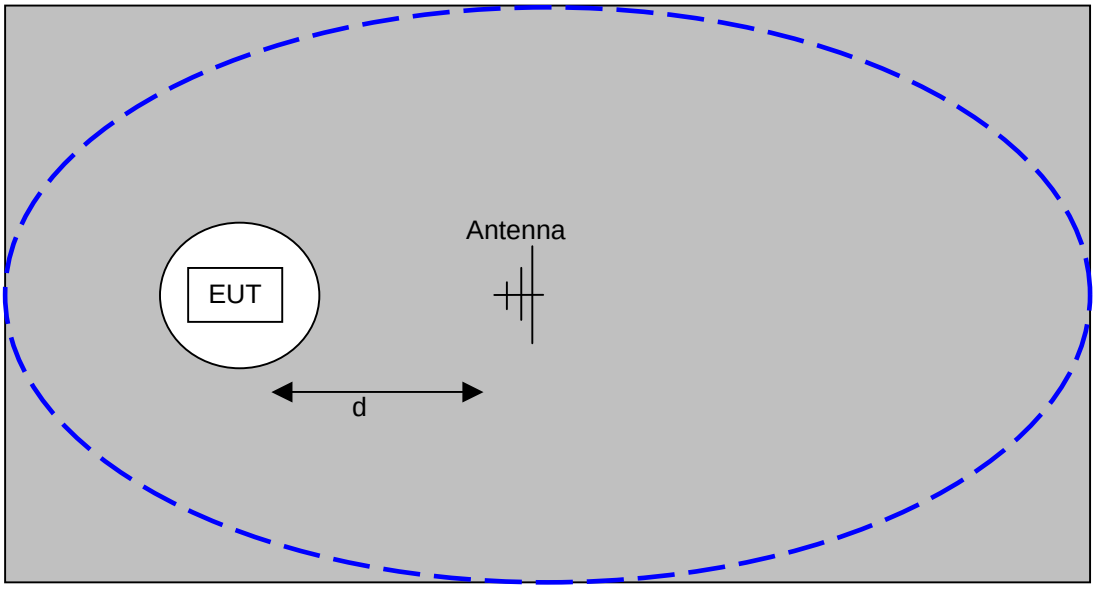
A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

Final maximization is a phase in which the highest amplitude emissions identified in the spectral search are viewed while the EUT azimuth angle is varied from 0 to 360 degrees relative to the receiving antenna. The azimuth, which results in the highest emission is then maintained while varying the antenna height from one to four meters (for measurements above 30 MHz, measurements below 30 MHz are made with the loop antenna at a fixed height of 1m). The result is the identification of the highest amplitude for each of the highest peaks. Each recorded level is corrected in the receiver using appropriate factors for cables, connectors, antennas, and preamplifier gain.

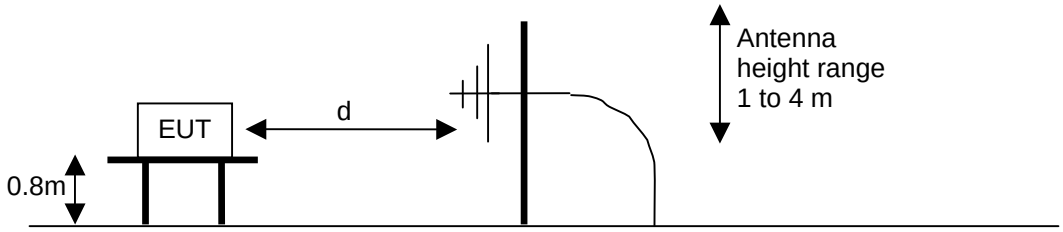
When testing above 18 GHz, the receive antenna is located at 1meter from the EUT and the antenna height is restricted to a maximum of 2.5 meters.



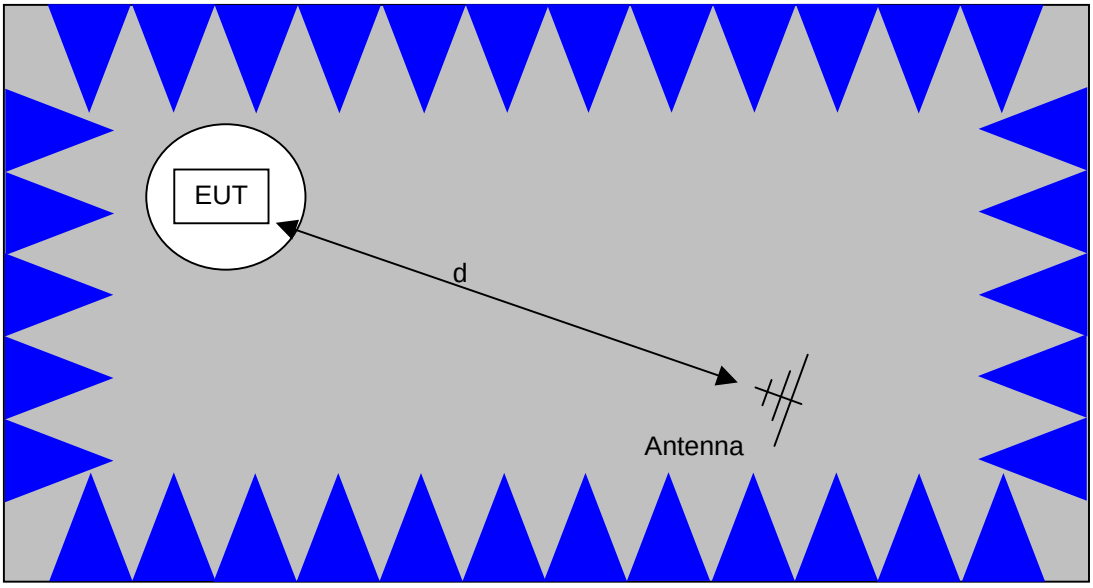
Typical Test Configuration for Radiated Field Strength Measurements



The ground plane extends beyond the ellipse defined in CISPR 16 / CISPR 22 / ANSI C63.4 and is large enough to accommodate test distances (d) of 3m and 10m. Refer to the test data tables for the actual measurement distance.

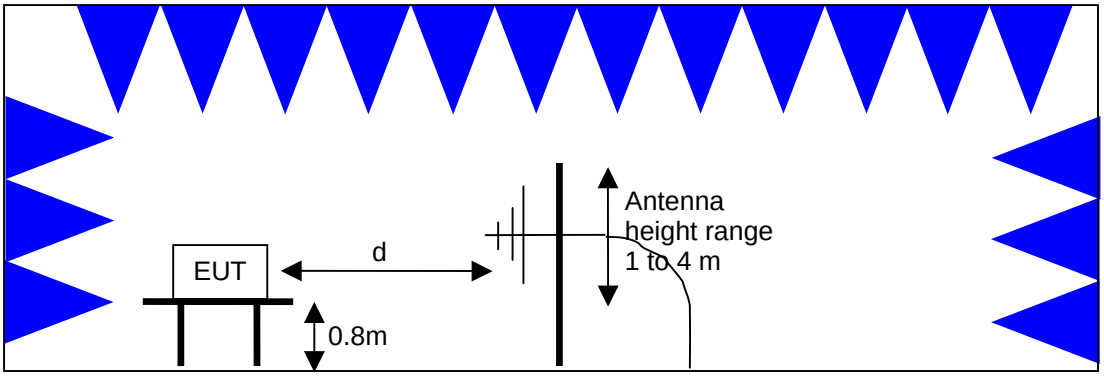


Test Configuration for Radiated Field Strength Measurements
OATS- Plan and Side Views



The anechoic materials on the walls and ceiling ensure compliance with the normalized site attenuation requirements of CISPR 16 / CISPR 22 / ANSI C63.4 for an alternate test site at the measurement distances used.

Floor-standing equipment is placed on the floor with insulating supports between the unit and the ground plane.



Test Configuration for Radiated Field Strength Measurements
Semi-Anechoic Chamber, Plan and Side Views

BANDWIDTH MEASUREMENTS

The 6dB, 20dB and/or 26dB signal bandwidth is measured in using the bandwidths recommended by ANSI C63.4. When required, the 99% bandwidth is measured using the methods detailed in RSS GEN.

The limits for conducted emissions are given in units of microvolts, and the limits for radiated emissions are given in units of microvolts per meter at a specified test distance. Data is measured in the logarithmic form of decibels relative to one microvolt, or dB microvolts (dBuV). For radiated emissions, the measured data is converted to the field strength at the antenna in dB microvolts per meter (dBuV/m). The results are then converted to the linear forms of uV and uV/m for comparison to published specifications.

For reference, converting the specification limits from linear to decibel form is accomplished by taking the base ten logarithm, then multiplying by 20. These limits in both linear and logarithmic form are as follows:

CONDUCTED EMISSIONS SPECIFICATION LIMITS: FCC 15.207; FCC 15.107(a), RSS GEN

The table below shows the limits for the emissions on the AC power line from an intentional radiator and a receiver.

Frequency (MHz)	Average Limit (dBuV)	Quasi Peak Limit (dBuV)
0.150 to 0.500	Linear decrease on logarithmic frequency axis between 56.0 and 46.0	Linear decrease on logarithmic frequency axis between 66.0 and 56.0
0.500 to 5.000	46.0	56.0
5.000 to 30.000	50.0	60.0

GENERAL TRANSMITTER RADIATED EMISSIONS SPECIFICATION LIMITS

The table below shows the limits for the spurious emissions from transmitters that fall in restricted bands[1] (with the exception of transmitters operating under FCC Part 15 Subpart D and RSS 210 Annex 9), the limits for all emissions from a low power device operating under the general rules of RSS 310 (tables 3 and 4), RSS 210 (table 2) and FCC Part 15 Subpart C section 15.209.

Frequency Range (MHz)	Limit (uV/m)	Limit (dBuV/m @ 3m)
0.009-0.490	$2400/F_{KHz}$ @ 300m	$67.6-20*\log_{10}(F_{KHz})$ @ 300m
0.490-1.705	$24000/F_{KHz}$ @ 30m	$87.6-20*\log_{10}(F_{KHz})$ @ 30m
1.705 to 30	30 @ 30m	29.5 @ 30m
30 to 88	100 @ 3m	40 @ 3m
88 to 216	150 @ 3m	43.5 @ 3m
216 to 960	200 @ 3m	46.0 @ 3m
Above 960	500 @ 3m	54.0 @ 3m

[1] The restricted bands are detailed in FCC 15.203, RSS 210 Table 1 and RSS 310 Table 2

SAMPLE CALCULATIONS - CONDUCTED EMISSIONS

Receiver readings are compared directly to the conducted emissions specification limit (decibel form) as follows:

$$R_r - S = M$$

where:

R_r = Receiver Reading in dBuV

S = Specification Limit in dBuV

M = Margin to Specification in +/- dB

SAMPLE CALCULATIONS - RADIATED EMISSIONS

Receiver readings are compared directly to the specification limit (decibel form). The receiver internally corrects for cable loss, preamplifier gain, and antenna factor. The calculations are in the reverse direction of the actual signal flow, thus cable loss is added and the amplifier gain is subtracted. The Antenna Factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements.

A distance factor, when used for electric field measurements above 30MHz, is calculated by using the following formula:

$$F_d = 20*LOG_{10} (D_m/D_s)$$

where:

F_d = Distance Factor in dB

D_m = Measurement Distance in meters

D_s = Specification Distance in meters

For electric field measurements below 30MHz the extrapolation factor is either determined by making measurements at multiple distances or a theoretical value is calculated using the formula:

$$F_d = 40*LOG_{10} (D_m/D_s)$$

Measurement Distance is the distance at which the measurements were taken and Specification Distance is the distance at which the specification limits are based. The antenna factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements.

The margin of a given emission peak relative to the limit is calculated as follows:

$$R_c = R_r + F_d$$

and

$$M = R_c - L_s$$

where:

R_r = Receiver Reading in dBuV/m

F_d = Distance Factor in dB

R_c = Corrected Reading in dBuV/m

L_s = Specification Limit in dBuV/m

M = Margin in dB Relative to Spec

SAMPLE CALCULATIONS - FIELD STRENGTH TO EIRP CONVERSION

Where the radiated electric field strength is expressed in terms of the equivalent isotropic radiated power (eirp), or where a field strength measurement of output power is made in lieu of a direct measurement, the following formula is used to convert between eirp and field strength at a distance of 3m from the equipment under test:

$$E = \frac{1000000 \sqrt{30 P}}{3} \quad \text{microvolts per meter}$$

where P is the eirp (Watts)

EXHIBIT 1: Test Equipment Calibration Data

1 Page

Radiated Emissions, 30 - 1,000 MHz, 01-Feb-08
Engineer: Marquess Lewis

Manufacturer	Description	Model #	Asset #	Cal Due
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1538	25-Aug-08
Hewlett Packard	Preamplifier, 100 kHz - 1.3 GHz	8447E	1606	07-Feb-08
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	1657	03-May-08

Conducted Emissions - AC Power Ports, 05-Feb-08
Engineer: Suhaila Khushzad

Manufacturer	Description	Model #	Asset #	Cal Due
Elliott Laboratories	LISN, FCC / CISPR	LISN-4, OATS	362	18-Jul-08
Hewlett Packard	Spectrum Analyzer 30 Hz -40 GHz, SV (SA40) Red	8564E (84125C)	1148	24-Aug-08
Rohde & Schwarz	Test Receiver, 9 kHz-2750 MHz	ESCS 30	1337	21-Sep-08

Radiated and Spurious Emissions, 04-Feb-08
Engineer: Suhaila Khushzad

Manufacturer	Description	Model #	Asset #	Cal Due
EMCO	Magnetic Loop Antenna, 10 kHz-30 MHz	6502	1299	05-Jan-09
Rohde & Schwarz	Test Receiver, 9 kHz-2750 MHz	ESCS 30	1337	21-Sep-08

EXHIBIT 2: Test Measurement Data

15 Pages

Elliott	EMC Test Data

Client:	Asyst Technologies Inc.	Job Number:	J70591
Model:	AdvenTag ATR-9180	T-Log Number:	T70624
		Account Manager:	Sheareen Washington
Contact:	Tou Vang		
Emissions Standard(s):	FCC 15.209	Class:	-
Immunity Standard(s):	-	Environment:	-

EMC Test Data

For The

Asyst Technologies Inc.

Model

AdvenTag ATR-9180

Date of Last Test: 3/31/2008

Client:	Asyst Technologies Inc.	Job Number:	J70591
Model:	AdvenTag ATR-9180	T-Log Number:	T70624
		Account Manger:	Sheareen Washington
Contact:	Tou Vang		
Emissions Standard(s):	FCC 15.209	Class:	-
Immunity Standard(s):	-	Environment:	-

EUT INFORMATION

The following information was collected during the test session(s).

General Description

The EUT is a one antenna reader with built in multiplexer that is designed to read and write to the MicroTag embedded in semiconductor (wafer cassettes, pods, FOUPs, reticle boxes and etc). Since the EUT would be placed on a table top during operation, the EUT was treated as table-top equipment during testing to simulate the end-user environment. The electrical rating of the EUT is 100-240 Volts , 50-60 Hz, 1.0 Amps.

Equipment Under Test

Manufacturer	Model	Description	Serial Number	FCC ID
Asyst Technologies	AdvanTag 9180	RFID Tag Reader	N/A	PMQATR9180

EUT Enclosure

The EUT enclosure is primarily constructed of Plastic. It measures approximately 11.5cm wide by 7.5cm deep by 2.5cm high.

Modification History

Mod. #	Test	Date	Modification
1			
2			
3			

Modifications applied are assumed to be used on subsequent tests unless otherwise stated as a further modification.

Client:	Asyst Technologies Inc.	Job Number:	J70591
Model:	AdvenTag ATR-9180	T-Log Number:	T70624
		Account Manger:	Sheareen Washington
Contact:	Tou Vang		
Emissions Standard(s):	FCC 15.209	Class:	-
Immunity Standard(s):	-	Environment:	-

Test Configuration #1

The following information was collected during the test session(s).

Local Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
Asyst Technologies	9701-2879-03	Antenna	Not serialized	-

Remote Support Equipment

Manufacturer	Model	Description	Property Number	FCC ID
Compaq	Armada	Laptop	A04449	DoC

Cabling and Ports

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
Ethernet	Unterminated	Cat 5	Unshielded	1.5
Remote I/O	Unterminated	Cat 5	Unshielded	1.5
RS232 Comm	Laptop	Serial	Shielded	3.0
Antenna	Antenna	BNC	Shielded	1.0
Power / Can	AC Mains	AC/DC Adapter	2 Wire	1.0

Note - the Can bus on the EUT is not supported by the product. Only power is provided to the product via this interface.

EUT Operation During Emissions Tests

During emissions testing the EUT reading from Antenna and writes to laptop. This communication can be observed via laptop or LED on top of the EUT.

Client:	Asyst Technologies Inc.	Job Number:	J70591
Model:	AdvenTag ATR-9180	T-Log Number:	T70624
		Account Manager:	Sheareen Washington
Contact:	Tou Vang		
Standard:	FCC 15.209	Class:	-

Conducted Emissions - Power Ports

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 2/5/2008 14:21
Test Engineer: Suhaila Khushzad
Test Location: SVOATS #1
Config. Used: 1
Config Change: None
EUT Voltage: 230V/50Hz & 120/60Hz

General Test Configuration

The EUT was located on a wooden table, 40 cm from a vertical coupling plane and 80cm from the LISN. A second LISN was used for all local support equipment. Remote support equipment was located approximately 30 meters from the test area.

Ambient Conditions:

Temperature: 13.3 °C
Rel. Humidity: 36 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	CE, AC Power, 230V/50Hz	Class B	Pass	47.5dBµV @ 0.205MHz (-5.9dB)
2	CE, AC Power,120V/60Hz	Class B	Pass	45.9dBµV @ 0.199MHz (-7.8dB)

Modifications Made During Testing

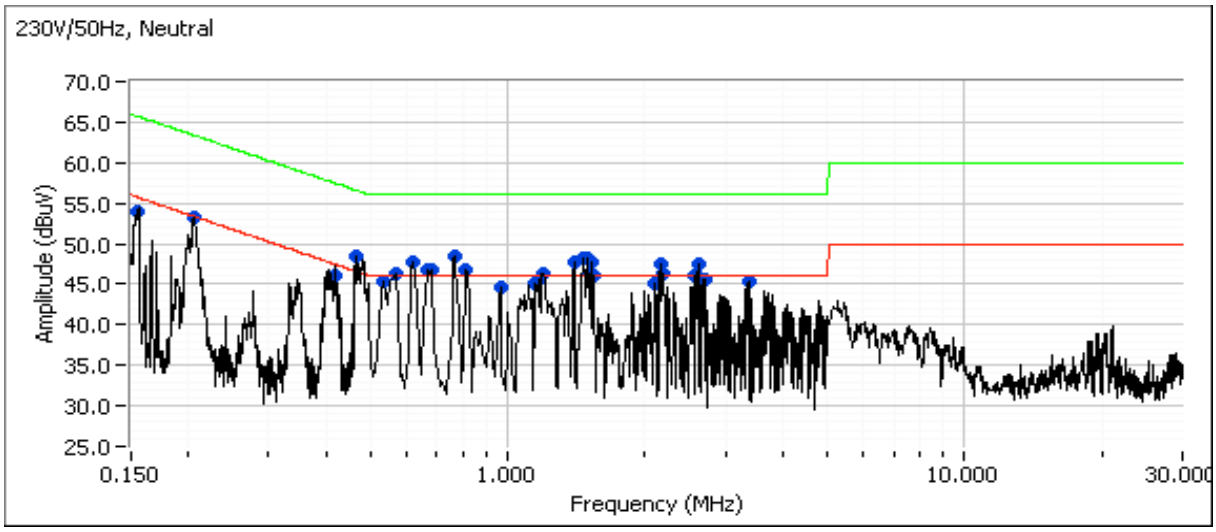
No modifications were made to the EUT during testing

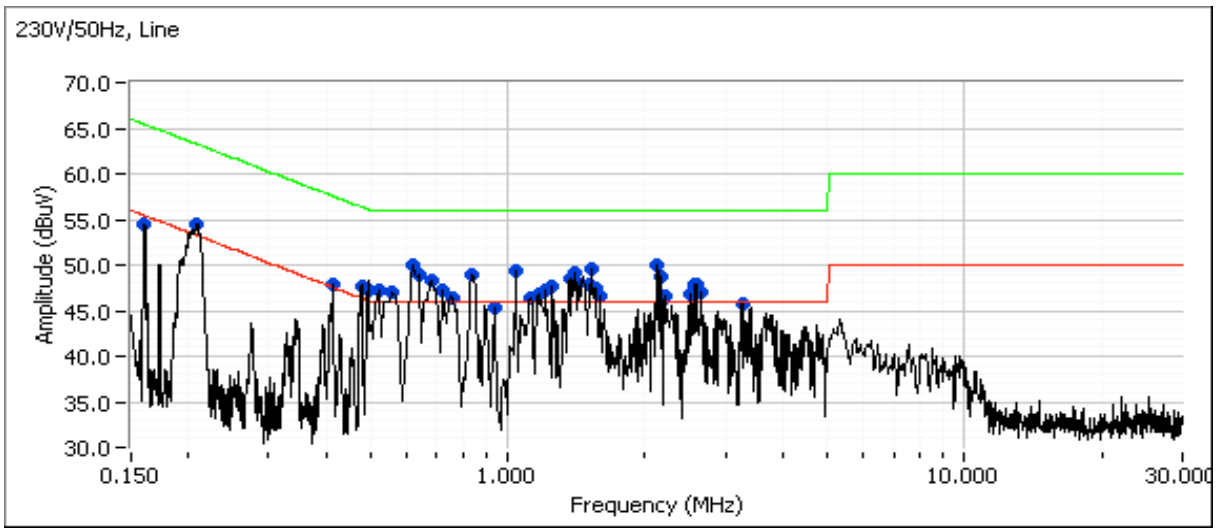
Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	Asyst Technologies Inc.	Job Number:	J70591
Model:	AdvenTag ATR-9180	T-Log Number:	T70624
		Account Manager:	Sheareen Washington
Contact:	Tou Vang		
Standard:	FCC 15.209	Class:	-

Run # 1: AC Power Port Conducted Emissions, 0.15 - 30MHz, 230V/50Hz
Transmit Mode





Run # 1 Con't On Next Page

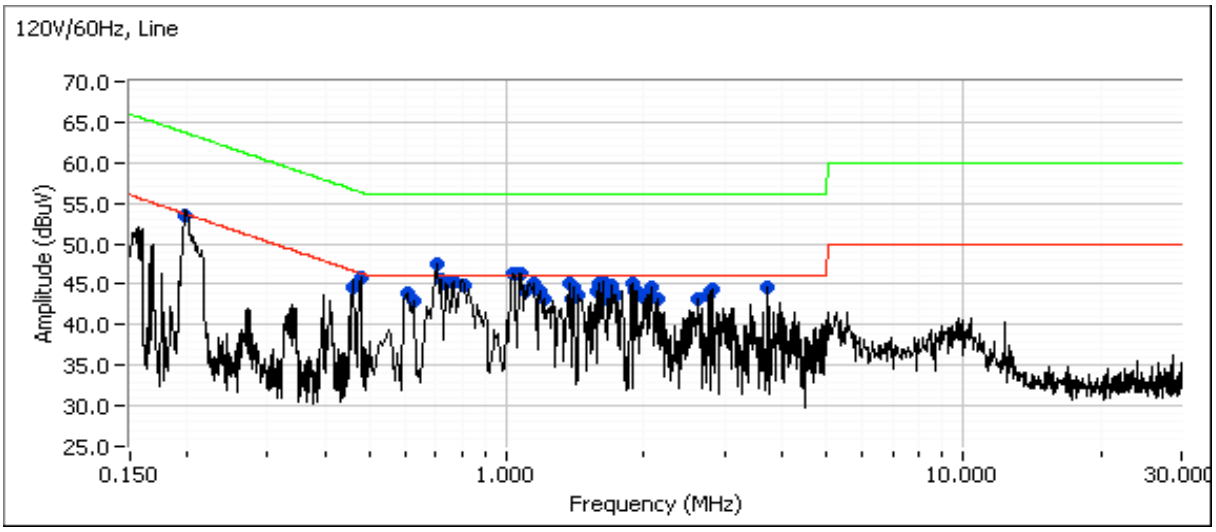
Client:	Asyst Technologies Inc.	Job Number:	J70591
Model:	AdvenTag ATR-9180	T-Log Number:	T70624
		Account Manager:	Sheareen Washington
Contact:	Tou Vang		
Standard:	FCC 15.209	Class:	-

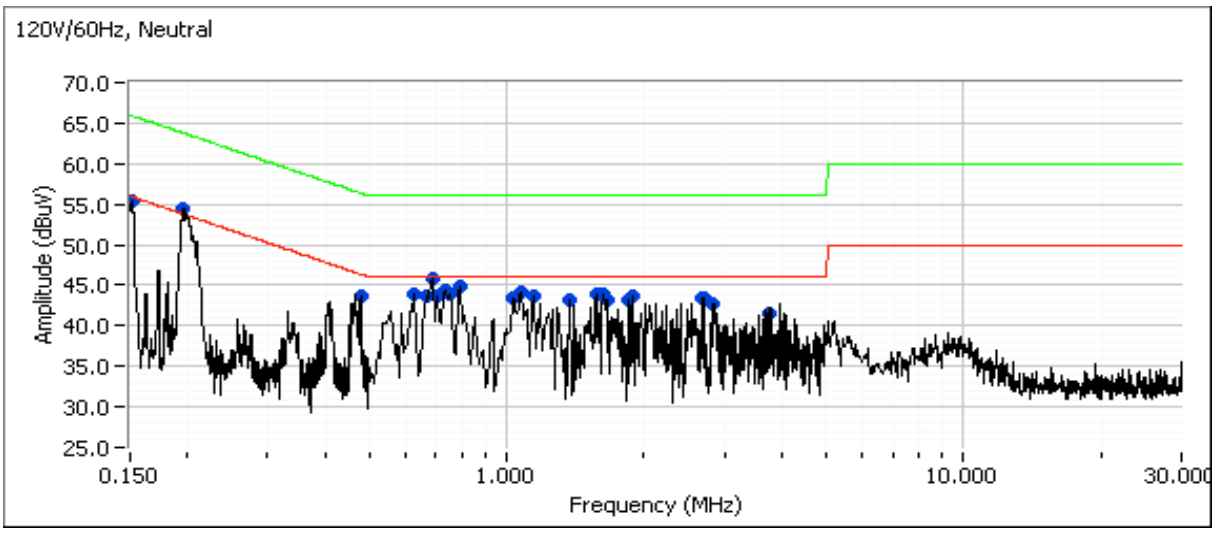
Run # 1: AC Power Port Conducted Emissions, 0.15 - 30MHz, 230V/50Hz
Transmit Mode
Final quasi-peak and average readings

Frequency	Level	AC	Class B		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
0.205	47.5	Neutral	53.4	-5.9	AVG	
0.209	47.1	Line	53.2	-6.1	AVG	
0.561	48.2	Line	56.0	-7.8	QP	
0.613	47.7	Line	56.0	-8.3	QP	
1.407	47.1	Line	56.0	-8.9	QP	
0.562	47.0	Neutral	56.0	-9.0	QP	
0.479	37.4	Line	46.4	-9.0	AVG	
0.530	46.9	Line	56.0	-9.1	QP	
1.392	46.9	Line	56.0	-9.1	QP	
0.613	36.6	Line	46.0	-9.4	AVG	
0.531	46.3	Neutral	56.0	-9.7	QP	
0.836	46.3	Line	56.0	-9.7	QP	
1.425	46.3	Line	56.0	-9.7	QP	
0.479	46.6	Line	56.4	-9.8	QP	
0.673	46.2	Line	56.0	-9.8	QP	
0.629	46.1	Neutral	56.0	-9.9	QP	
1.543	46.1	Line	56.0	-9.9	QP	
0.209	53.2	Line	63.2	-10.0	QP	
1.527	46.0	Line	56.0	-10.0	QP	
1.458	45.9	Neutral	56.0	-10.1	QP	
1.373	45.9	Line	56.0	-10.1	QP	
1.392	45.8	Neutral	56.0	-10.2	QP	
0.413	37.4	Line	47.6	-10.2	AVG	
1.505	45.8	Line	56.0	-10.2	QP	
0.494	45.8	Line	56.1	-10.3	QP	
0.561	35.7	Line	46.0	-10.3	AVG	
0.929	45.6	Line	56.0	-10.4	QP	
0.766	45.4	Line	56.0	-10.6	QP	
1.257	45.3	Line	56.0	-10.7	QP	
0.205	52.4	Neutral	63.4	-11.0	QP	
1.547	45.0	Neutral	56.0	-11.0	QP	
1.524	44.9	Neutral	56.0	-11.1	QP	
1.593	44.9	Line	56.0	-11.1	QP	
0.797	44.8	Neutral	56.0	-11.2	QP	
0.636	44.8	Line	56.0	-11.2	QP	
1.218	44.7	Line	56.0	-11.3	QP	
1.564	44.7	Line	56.0	-11.3	QP	

Client:	Asyst Technologies Inc.	Job Number:	J70591
Model:	AdvenTag ATR-9180	T-Log Number:	T70624
		Account Manager:	Sheareen Washington
Contact:	Tou Vang		
Standard:	FCC 15.209	Class:	-

Run #2: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz
Transmit Mode





Run # 2 Con't On Next Page

Client:	Asyst Technologies Inc.	Job Number:	J70591
Model:	AdvenTag ATR-9180	T-Log Number:	T70624
		Account Manager:	Sheareen Washington
Contact:	Tou Vang		
Standard:	FCC 15.209	Class:	-

Run #2: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz
Transmit Mode
Final quasi-peak and average readings

Frequency	Level	AC	Class B		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
0.199	45.9	Line	53.7	-7.8	AVG	
0.199	53.1	Line	63.7	-10.6	QP	
0.763	43.3	Line	56.0	-12.7	QP	
0.695	43.2	Line	56.0	-12.8	QP	
0.739	43.0	Line	56.0	-13.0	QP	
0.721	42.8	Line	56.0	-13.2	QP	
0.625	42.2	Line	56.0	-13.8	QP	
1.104	42.2	Line	56.0	-13.8	QP	
1.155	42.2	Line	56.0	-13.8	QP	
0.692	42.1	Neutral	56.0	-13.9	QP	
1.070	42.0	Line	56.0	-14.0	QP	
1.060	41.9	Line	56.0	-14.1	QP	
0.662	41.8	Neutral	56.0	-14.2	QP	
0.740	41.8	Neutral	56.0	-14.2	QP	
0.603	41.7	Line	56.0	-14.3	QP	
1.183	41.6	Line	56.0	-14.4	QP	
0.804	41.5	Line	56.0	-14.5	QP	
0.736	41.5	Neutral	56.0	-14.5	QP	
1.213	41.4	Line	56.0	-14.6	QP	
1.594	41.4	Line	56.0	-14.6	QP	
0.623	41.3	Neutral	56.0	-14.7	QP	
1.572	41.1	Line	56.0	-14.9	QP	
1.631	41.0	Line	56.0	-15.0	QP	
1.026	40.9	Line	56.0	-15.1	QP	
1.598	40.7	Line	56.0	-15.3	QP	
0.739	30.6	Line	46.0	-15.4	AVG	
0.603	30.5	Line	46.0	-15.5	AVG	
0.800	40.3	Neutral	56.0	-15.7	QP	
1.668	40.2	Line	56.0	-15.8	QP	
1.148	40.2	Neutral	56.0	-15.8	QP	
1.660	40.2	Neutral	56.0	-15.8	QP	
1.376	40.1	Line	56.0	-15.9	QP	
1.075	40.0	Neutral	56.0	-16.0	QP	
1.630	39.9	Neutral	56.0	-16.1	QP	
0.804	29.8	Line	46.0	-16.2	AVG	
0.662	29.8	Neutral	46.0	-16.2	AVG	
2.039	39.7	Line	56.0	-16.3	QP	

Client:	Asyst Technologies Inc.	Job Number:	J70591
Model:	AdvenTag ATR-9180	T-Log Number:	T70624
		Account Manager:	Sheareen Washington
Contact:	Tou Vang		
Standard:	FCC 15.209	Class:	-

Radiated Emissions

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 2/4/2008
Test Engineer: Suhaila Khushzad
Test Location: Chamber #2
Config. Used: 1
Config Change: None
EUT Voltage: 120V/60Hz

General Test Configuration

The EUT and any local support equipment were located on the turntable for radiated emissions testing. Remote support equipment was located out side of chamber.

The test distance and extrapolation factor (if used) are detailed under each run description.

Note, **preliminary** testing indicates that the emissions were maximized by orientation of the EUT and elevation of the measurement antenna. **Maximized** testing indicated that the emissions were maximized by orientation of the EUT, elevation of the measurement antenna, and manipulation of the EUT's interface cables.

Ambient Conditions:

Temperature: 12.8 °C
Rel. Humidity: 36 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
2	0.100 - 30 MHz (Fundamental)	FCC 15.209	Pass	8.0dBµV/m (2.5µV/m) @ 0.134MHz (-17.1dB)
2	0.100 - 30 MHz (TX Spurious Emissions)	FCC 15.209	Pass	6.5dBµV/m (2.1µV/m) @ 0.669MHz (-26.2dB)

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

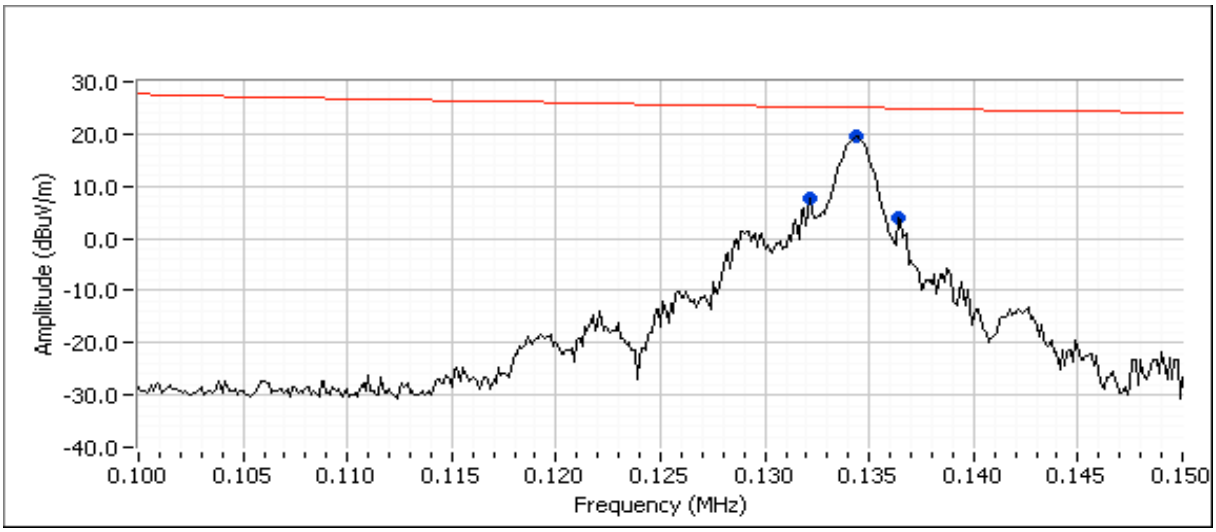
No deviations were made from the requirements of the standard.

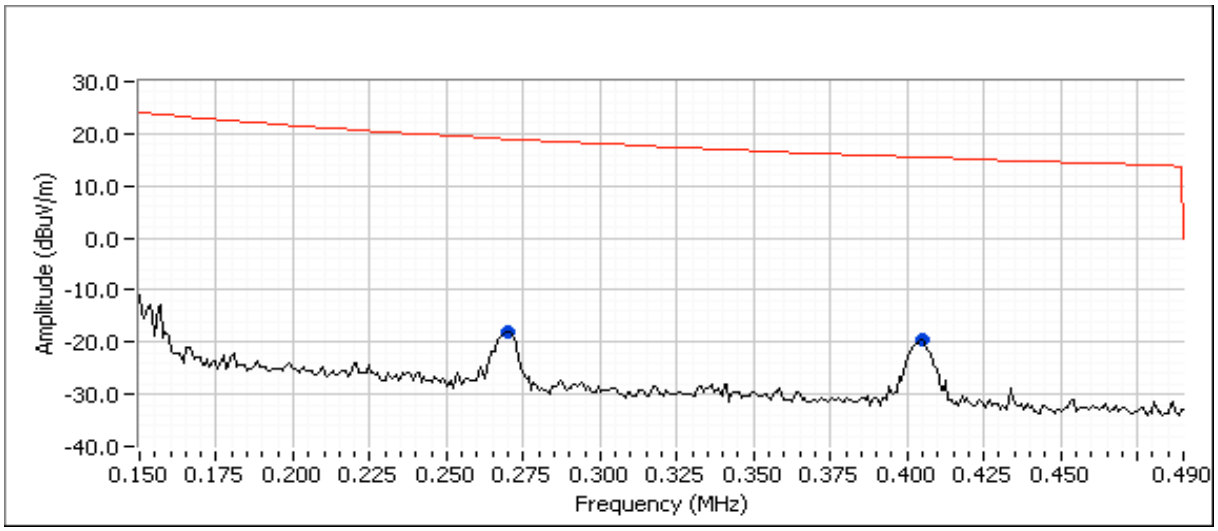
Client:	Asyst Technologies Inc.	Job Number:	J70591
Model:	AdvenTag ATR-9180	T-Log Number:	T70624
		Account Manager:	Sheareen Washington
Contact:	Tou Vang		
Standard:	FCC 15.209	Class:	-

Run #1: Radiated Emissions, 0.100 - 30 MHz, FCC 15.209

Frequency Range	Test Distance	Limit Distance	Extrapolation Factor
0.009 - 0.490 MHz	3	300	-80.0
0.490 - 1.705 MHz	3	30	-40.0

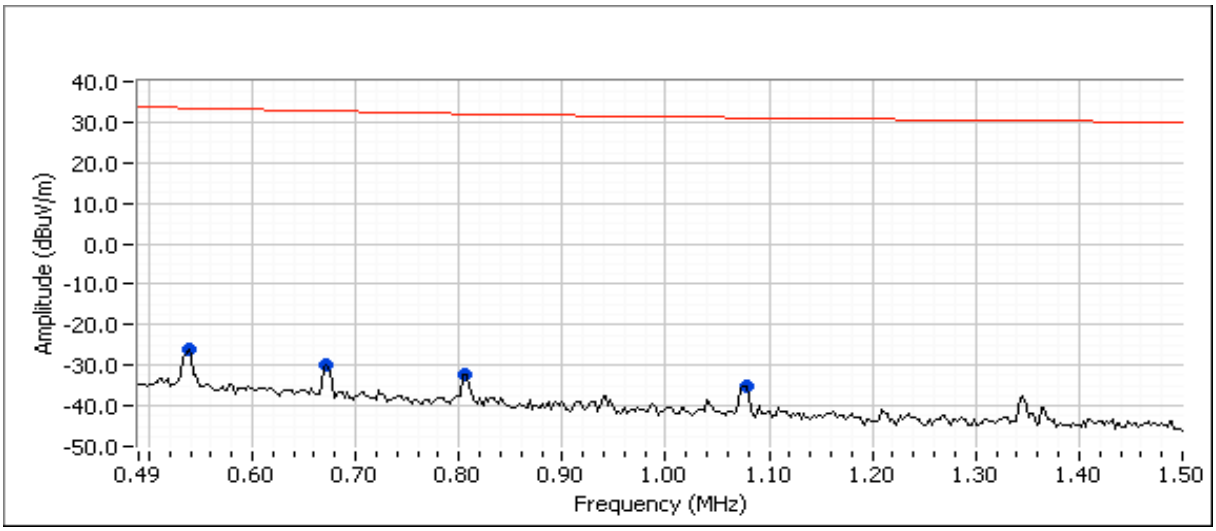
Note - the extrapolation factor is based on 40log(test distance/limit distance) as permitted by FCC 15.31





Client:	Asyst Technologies Inc.	Job Number:	J70591
Model:	AdvenTag ATR-9180	T-Log Number:	T70624
		Account Manager:	Sheareen Washington
Contact:	Tou Vang		
Standard:	FCC 15.209	Class:	-

Run #1: Radiated Emissions, 0.100 - 30 MHz, FCC 15.209



Preliminary readings

Frequency	Level	Pol	FCC 15.209		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
0.134	19.4	H	25.0	-5.6	Peak	277	1.7	Fundamental
0.269	-18.1	H	19.0	-37.1	Peak	274	1.7	
0.403	-19.5	H	15.5	-35.0	Peak	256	1.7	
0.537	-26.1	H	33.5	-59.6	Peak	288	1.7	
0.669	-29.4	H	32.7	-62.1	Peak	280	1.7	
0.805	-30.5	H	32.1	-62.6	Peak	285	1.7	
1.076	-34.3	H	31.1	-34.3	Peak	293	1.7	
1.346	-38.0	H	30.3	-68.3	Peak	293	1.7	

Note 1:	The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, with a peak limit 20dB above the average limit.

Client:	Asyst Technologies Inc.	Job Number:	J70591
Model:	AdvenTag ATR-9180	T-Log Number:	T70624
		Account Manager:	Sheareen Washington
Contact:	Tou Vang		
Standard:	FCC 15.209	Class:	-

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 2/4/2008
Test Engineer: Suhaila Khushzad
Test Location: OATS #2
Config. Used: 1
Config Change: None
EUT Voltage: 120V/60Hz

Run # 2: Radiated Emissions, 0.100 - 30 MHz, FCC 15.209

Frequency Range	Test Distance	Limit Distance	Extrapolation Factor
0.009 - 0.490 MHz	3	300	-80.0
0.490 - 1.705 MHz	3	30	-40.0

Note - the extrapolation factor is based on 40log(test distance/limit distance) as permitted by FCC 15.31
Maximized readings (includes manipulation of EUT interface cables)

Frequency	Level	Pol	FCC 15.209		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
0.134	8.0	Open	25.1	-17.1	PK	274	1.0	Fundamental
0.134	2.6	Closed	25.1	-22.5	PK	274	1.0	Fundamental
0.669	6.5	Open	32.7	-26.2	PK	194	1.0	
0.269	-19.8	Open	19.0	-38.8	PK	360	1.0	
0.403	-23.9	Open	15.5	-39.4	PK	99	1.0	
1.346	-17.5	Open	30.3	-47.8	PK	20	1.0	
0.805	-20.0	Open	32.1	-52.1	PK	125	1.0	
1.076	-22.3	Open	31.1	-53.4	PK	0	1.0	
0.537	-24.8	Open	33.5	-58.3	PK	5	1.0	

Note 1:	The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, with a peak limit 20dB above the average limit.
Note 2:	All measurements taken with a test receiver with an IF bandwidth setting of 10kHz.

Client:	Asyst Technologies Inc.	Job Number:	J70591
Model:	AdvenTag ATR-9180	T-Log Number:	T70624
		Account Manager:	Sheareen Washington
Contact:	Tou Vang		
Standard:	FCC 15.209	Class:	-

Radiated Emissions

(Elliott Laboratories Fremont Facility, Semi-Anechoic Chamber)

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 2/1/2008
Test Engineer: Marquess Lewis
Test Location: Fremont Chamber #4

Config. Used: 1
Config Change: None
EUT Voltage: 230V/50Hz

General Test Configuration

The EUT and any local support equipment were located on the turntable for radiated emissions testing. Any remote support equipment was located outside the semi-anechoic chamber. Any cables running to remote support equipment where routed through metal conduit and when possible passed through a ferrite clamp upon exiting the chamber.

The test distance and extrapolation factor (if applicable) are detailed under each run description.

Note, **preliminary** testing indicates that the emissions were maximized by orientation of the EUT and elevation of the measurement antenna. **Maximized** testing indicated that the emissions were maximized by orientation of the EUT, elevation of the measurement antenna, and manipulation of the EUT's interface cables.

Ambient Conditions:

Temperature: 25 °C
Rel. Humidity: 34 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
2	RE, 30 - 1000 MHz, Maximized Emissions	Class A	Pass	27.5dBµV/m @ 208.078MHz (-12.5dB)

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

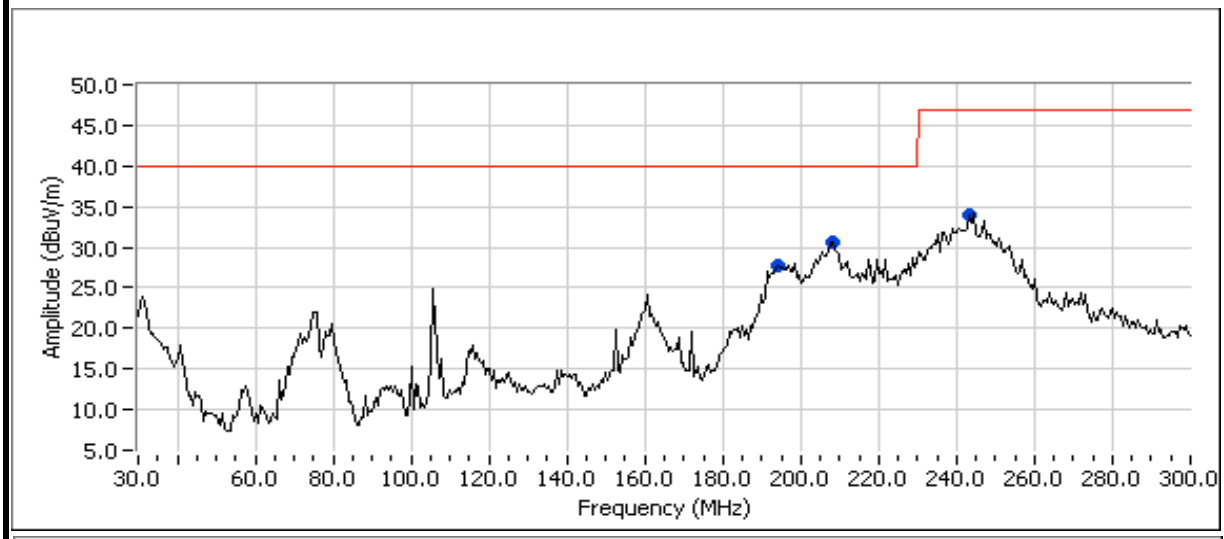
Client:	Asyst Technologies Inc.	Job Number:	J70591
Model:	AdvenTag ATR-9180	T-Log Number:	T70624
		Account Manager:	Sheareen Washington
Contact:	Tou Vang		
Standard:	FCC 15.209	Class:	-

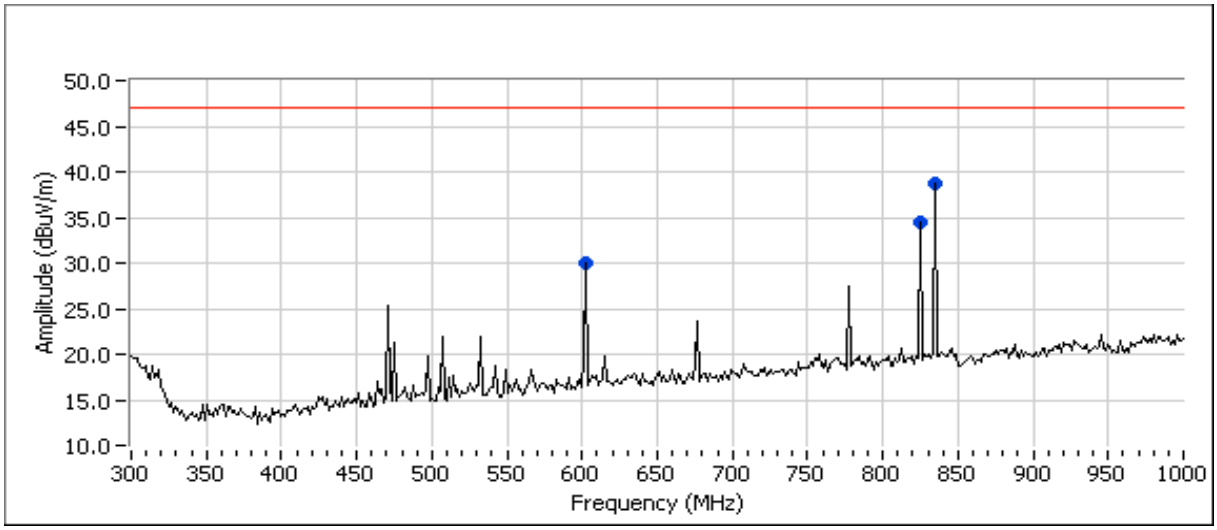
Run #1: Preliminary Radiated Emissions, 30 - 1000 MHz

Frequency Range	Test Distance	Limit Distance	Extrapolation Factor
30 - 1000 MHz	5	10	-6.0

EUT and Test Configuration Details (Engineering Evaluation Tests Only):

Please include pertinent information for the configuration tested and copy down to each run, modifying as appropriate





Client:	Asyst Technologies Inc.	Job Number:	J70591
Model:	AdvenTag ATR-9180	T-Log Number:	T70624
		Account Manager:	Sheareen Washington
Contact:	Tou Vang		
Standard:	FCC 15.209	Class:	-

Preliminary peak readings captured during pre-scan

Frequency	Level	Pol	Class A		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
194.373	27.8	V	40.0	-12.2	Peak	210	1.0	
208.078	30.5	V	40.0	-9.5	Peak	115	1.0	
243.981	34.0	V	47.0	-13.0	Peak	0	1.0	
603.267	30.1	H	47.0	-16.9	Peak	249	1.0	
821.021	34.4	V	47.0	-12.6	Peak	145	1.5	
832.525	38.7	V	47.0	-8.3	Peak	148	1.5	

Preliminary quasi-peak readings (no manipulation of EUT interface cables)

Frequency	Level	Pol	Class A		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
243.981	30.6	V	47.0	-16.4	QP	0	1.0	
208.078	27.5	V	40.0	-12.5	QP	116	1.0	
821.021	17.4	V	47.0	-29.6	QP	146	1.5	
832.525	18.0	V	47.0	-29.0	QP	148	1.5	
194.373	23.5	V	40.0	-16.5	QP	211	1.0	
603.267	29.2	H	47.0	-17.8	QP	250	1.0	

Run #2: Maximized Readings From Run #1

Maximized quasi-peak readings (includes manipulation of EUT interface cables)

Frequency Range	Test Distance	Limit Distance	Extrapolation Factor
30 - 1000 MHz	5	10	-6.0

Frequency	Level	Pol	Class A		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
208.078	27.5	V	40.0	-12.5	QP	116	1.0	
243.981	30.6	V	47.0	-16.4	QP	0	1.0	
194.373	23.5	V	40.0	-16.5	QP	211	1.0	
603.267	29.2	H	47.0	-17.8	QP	250	1.0	
832.525	18.0	V	47.0	-29.0	QP	148	1.5	
821.021	17.4	V	47.0	-29.6	QP	146	1.5	

EXHIBIT 3: Photographs of Test Configurations

4 Pages

EXHIBIT 4: Proposed FCC ID Label & Label Location

EXHIBIT 5: Detailed Photographs of Asyst Technologies, Inc. Model AdvanTag ATR-9180Construction

4 Pages

EXHIBIT 6: Operator's Manual for Asyst Technologies, Inc. Model AdvanTag ATR-9180

66 Pages

EXHIBIT 7: Block Diagram of Asyst Technologies, Inc. Model AdvanTag ATR-9180

1 Page

EXHIBIT 8: Schematic Diagrams for Asyst Technologies, Inc. Model AdvanTag ATR-9180

2 Pages

EXHIBIT 9: Theory of Operation for Asyst Technologies, Inc. Model AdvanTag ATR-9180

26 Pages