

***Electromagnetic Emissions Test Report
and
Application for a Class II Permissive Change
pursuant to
Industry Canada RSS-Gen Issue 2 / RSS 210 Issue 7
FCC Part 15 Subpart B (Receivers)
FCC Part 15 Subpart C***

***on the
GE MDS LLC
Transmitter
Model: Mercury 900***

UPN: 3738A-MERCURY9
FCC ID: E5MDS-MERCURY900

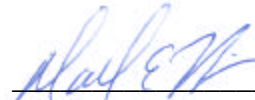
GRANTEE: GE MDS LLC
175 Science Parkway
Rochester, NY 14620

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

REPORT DATE: August 13, 2007

FINAL TEST DATE: July 26, August 8 and August 9, 2007

AUTHORIZED SIGNATORY:



Mark E. Hill
Staff Engineer



2016-01

Elliott Laboratories, Inc. is accredited by the A2LA, certificate number 2016-01, to perform the test(s) listed in this report. This report shall not be reproduced, except in its entirety, without the written approval of Elliott Laboratories, Inc.

REVISION HISTORY

Revision #	Date	Comments	Modified By
1	August 17, 2007	Initial Release	David Guidotti

TABLE OF CONTENTS

COVER PAGE.....	1
REVISION HISTORY.....	2
TABLE OF CONTENTS	3
SCOPE.....	5
OBJECTIVE.....	6
STATEMENT OF COMPLIANCE.....	6
TEST RESULTS SUMMARY.....	7
DIGITAL TRANSMISSION SYSTEMS (902 – 928 MHZ) – ADDITION OF THE 1.75 MHZ BANDWIDTH	7
DIGITAL TRANSMISSION SYSTEMS (902 – 928 MHZ) – ADDITION OF 17.4 DBI PANEL ANTENNA	8
GENERAL REQUIREMENTS APPLICABLE TO ALL BANDS.....	9
MEASUREMENT UNCERTAINTIES	9
EQUIPMENT UNDER TEST (EUT) DETAILS	10
GENERAL.....	10
OTHER EUT DETAILS	10
ANTENNA SYSTEM	10
ENCLOSURE	10
MODIFICATIONS.....	10
SUPPORT EQUIPMENT.....	11
EUT INTERFACE PORTS	11
EUT OPERATION	11
TEST SITE.....	12
GENERAL INFORMATION.....	12
CONDUCTED EMISSIONS CONSIDERATIONS.....	12
RADIATED EMISSIONS CONSIDERATIONS	12
MEASUREMENT INSTRUMENTATION.....	13
RECEIVER SYSTEM.....	13
INSTRUMENT CONTROL COMPUTER.....	13
LINE IMPEDANCE STABILIZATION NETWORK (LISN).....	13
FILTERS/ATTENUATORS.....	14
ANTENNAS.....	14
ANTENNA MAST AND EQUIPMENT TURNTABLE.....	14
INSTRUMENT CALIBRATION.....	14

TABLE OF CONTENTS (Continued)

TEST PROCEDURES	15
EUT AND CABLE PLACEMENT	15
CONDUCTED EMISSIONS.....	15
RADIATED EMISSIONS	15
RADIATED EMISSIONS	16
BANDWIDTH MEASUREMENTS	17
SPECIFICATION LIMITS AND SAMPLE CALCULATIONS	17
GENERAL TRANSMITTER RADIATED EMISSIONS SPECIFICATION LIMITS	18
RECEIVER RADIATED SPURIOUS EMISSIONS SPECIFICATION LIMITS.....	18
OUTPUT POWER LIMITS – DIGITAL TRANSMISSION SYSTEMS.....	19
TRANSMIT MODE SPURIOUS RADIATED EMISSIONS LIMITS – FHSS AND DTS SYSTEMS.....	19
SAMPLE CALCULATIONS - CONDUCTED EMISSIONS.....	20
SAMPLE CALCULATIONS - RADIATED EMISSIONS	20
SAMPLE CALCULATIONS - FIELD STRENGTH TO EIRP CONVERSION	21
EXHIBIT 1: Test Equipment Calibration Data	1
EXHIBIT 2: Test Measurement Data	2

SCOPE

An electromagnetic emissions test has been performed on the GE MDS LLC model Mercury 900 pursuant to the following rules:

Industry Canada RSS-Gen Issue 2
RSS 210 Issue 7 "Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment"
FCC Part 15 Subpart C

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 GE MDS LLC model Mercury 900 and therefore apply only to the tested sample. The sample was selected and prepared by Dennis McCarthy of GE MDS LLC.

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.

Prior to marketing in Canada, Class I transmitters, receivers and transceivers require certification. Class II devices are required to meet the appropriate technical requirements but are exempt from certification 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 GE MDS LLC model Mercury 900 complied with the requirements of the following regulations:

- Industry Canada RSS-Gen Issue 2
- RSS 210 Issue 7 "Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment"
- FCC Part 15 Subpart B (Receivers)
- 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**DIGITAL TRANSMISSION SYSTEMS (902 – 928 MHz) – Addition of the 1.75 MHz Bandwidth**

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.247(a)	RSS 210 A8.2	Digital Modulation	Systems uses OFDM techniques	-	Complies
15.247 (a) (2)	RSS 210 A8.2 (1)	6dB Bandwidth	1.567 MHz	>500kHz	Complies
	RSP100	99% Bandwidth	1.96 MHz	Information only	Complies
15.247 (b) (3)	RSS 210 A8.2 (4)	Output Power, 902 – 928 MHz (Omni Antenna)	26.9 dBm (0.490 Watts) EIRP = 2.45 W ^{Note 1}	1Watt, EIRP limited to 4 Watts.	Complies
15.247 (b) (3)	RSS 210 A8.2 (4)	Output Power, 902 – 928 MHz (Yagi Antenna)	24.8 dBm (0.302 Watts) EIRP = 3.98 W ^{Note 1}	1Watt, EIRP limited to 4 Watts.	Complies
15.247 (b) (3)	RSS 210 A8.2 (4)	Output Power, 902 – 928 MHz (Panel Antenna)	18.6 dBm (0.0724 Watts) EIRP = 3.98 W ^{Note 1}	1Watt, EIRP limited to 4 Watts.	Complies
15.247(d)	RSS 210 A8.2 (2)	Power Spectral Density	7.9 dBm / 3kHz	8dBm/3kHz	Complies
15.247(c)	RSS 210 A8.5	Antenna Port Spurious Emissions 30MHz – 9.28 GHz	All spurious emissions < -20dBc	< -30dBc ^{Note 2}	Complies
15.247(c) / 15.209	RSS 210 A8.5 Table 2, 3	Radiated Spurious Emissions 30MHz – 9.28 GHz Note 3	49.2dBμV/m (288.4μV/m) @ 2742.1MHz (-4.8dB)	15.207 in restricted bands, all others < -30dBc ^{Note 2}	Complies

Note 1: EIRP calculated using antenna gain of 7 dBi (Omni), 11.2 dBi (Yagi), 17.4 dBi (Panel) for the highest EIRP system.

Note 2: Limit of -30dBc used because the power was measured using the UNII test procedure (maximum power averaged over a transmission burst).

Note 3: Performed with worst case antenna from 3.5 MHz testing, at maximum power setting.

DIGITAL TRANSMISSION SYSTEMS (902 – 928 MHz) – Addition of 17.4 dBi Panel Antenna

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.247(a)	RSS 210 A8.2	Digital Modulation	Systems uses OFDM techniques	-	N/A – Note 3
15.247 (a) (2)	RSS 210 A8.2 (1)	6dB Bandwidth	-	>500kHz	N/A – Note 3
	RSP100	99% Bandwidth	-	Information only	N/A – Note 3
15.247 (b) (3)	RSS 210 A8.2 (4)	Output Power, 902 – 928 MHz	17.9 dBm (0.0617Watts) EIRP = 3.388 W ^{Note 1}	1Watt, EIRP limited to 4 Watts.	Complies
15.247(d)	RSS 210 A8.2 (2)	Power Spectral Density	-	8dBm/3kHz	N/A – Note 3
15.247(c)	RSS 210 A8.5	Antenna Port Spurious Emissions 30MHz – 9.28 GHz	-	< -30dBc ^{Note 2}	N/A – Note 3
15.247(c) / 15.209	RSS 210 A8.5 Table 2, 3	Radiated Spurious Emissions 30MHz – 9.28 GHz	48.5dBμV/m (266.1μV/m) @ 2776.7MHz (-5.5dB)	15.207 in restricted bands, all others <-30dBc ^{Note 2}	Complies

Note 1: EIRP calculated using antenna gain of 17.4 dBi for the highest EIRP system.

Note 2: Limit of -30dBc used because the power was measured using the UNII test procedure (maximum power averaged over a transmission burst).

Note 3: Not applicable for the Permissive Change to add the new antenna.

GENERAL REQUIREMENTS APPLICABLE TO ALL BANDS

FCC Rule Part	RSS Rule part	Description	Measured Value / Comments	Limit / Requirement	Result (margin)
15.203	-	RF Connector	Reverse Polarity		Complies
15.109	RSS GEN 7.2.3 Table 1	Receiver spurious emissions	43.4dB μ V/m (147.9 μ V/m) @ 958.994MHz (-2.6dB)		Complies (- 2.6 dB)
15.207	RSS GEN Table 2	AC Conducted Emissions	-	Refer to standard	N/A – Note 1
15.247 (b) (5) 15.407 (f)	RSS 102	RF Exposure Requirements	Refer to MPE calculations in Exhibit 11, RSS 102 declaration and User Manual statements.	Refer to OET 65, FCC Part 1 and RSS 102	Complies
	RSP 100 RSS GEN 7.1.5	User Manual		Statement required regarding non-interference	Complies
	RSP 100 RSS GEN 7.1.5	User Manual		Statement required regarding detachable antenna	Complies

Note 1: Not applicable for the Permissive Change to add the new antenna or the bandwidth change.

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 GE MDS LLC model Mercury 900 is a Wireless Data Transceiver that is designed to Transmit and Receive. Normally, the EUT would be placed on a tabletop during operation. The EUT was, therefore, placed in this position during emissions testing to simulate the end user environment. The electrical rating of the EUT is +10 to 30vdc 3 amps Max.

The sample was received on July 26, 2007 and tested on July 26, August 8 and August 9, 2007. The EUT consisted of the following component(s):

Manufacturer	Model	Description	Serial Number	FCC ID
GE MDS LLC	Mercury 900	Half Duplex Data transceiver operating in the License free ISM 902-928 MHz band	-	E5MDS-MERCURY900

OTHER EUT DETAILS

The object of this project is to: (1) Add 1.75MHz Bandwidth operation and (2) Add a new 17.4 dBi Panel antenna

ANTENNA SYSTEM

The EUT requires professional installation and therefore is exempt from the requirement of 15.203. The output power is configured for each antenna to ensure the EIRP does not exceed 4 Watts, and the output power at the rf connector cannot exceed the maximum value reported in this test data. Radiated emissions were measured with the output power set to maximum and with the EUT antennas connected via a short length of cable, with negligible loss at the fundamental frequency.

ENCLOSURE

The EUT enclosure is primarily constructed of cast aluminum. It measures approximately 18 cm wide by 10 cm deep by 4 cm 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
TopWard	3603D	DC Power Supply	-	-
Dell	-	Laptop Computer	Asset #: 1754	-

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)
Serial Port	USB Port Laptop	Multiconductor	Shielded	2.0
DC Power	DC Power Supply	2-wire	Unshielded	2.0

EUT OPERATION

The EUT was configured to continuously transmit on the noted frequency and channel. The bandwidth and the output power was also selectable.

TEST SITE

GENERAL INFORMATION

Final test measurements were taken on July 26, August 8 and August 9, 2007 at the Elliott Laboratories Open Area Test Site # or semi anechoic chamber # 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.

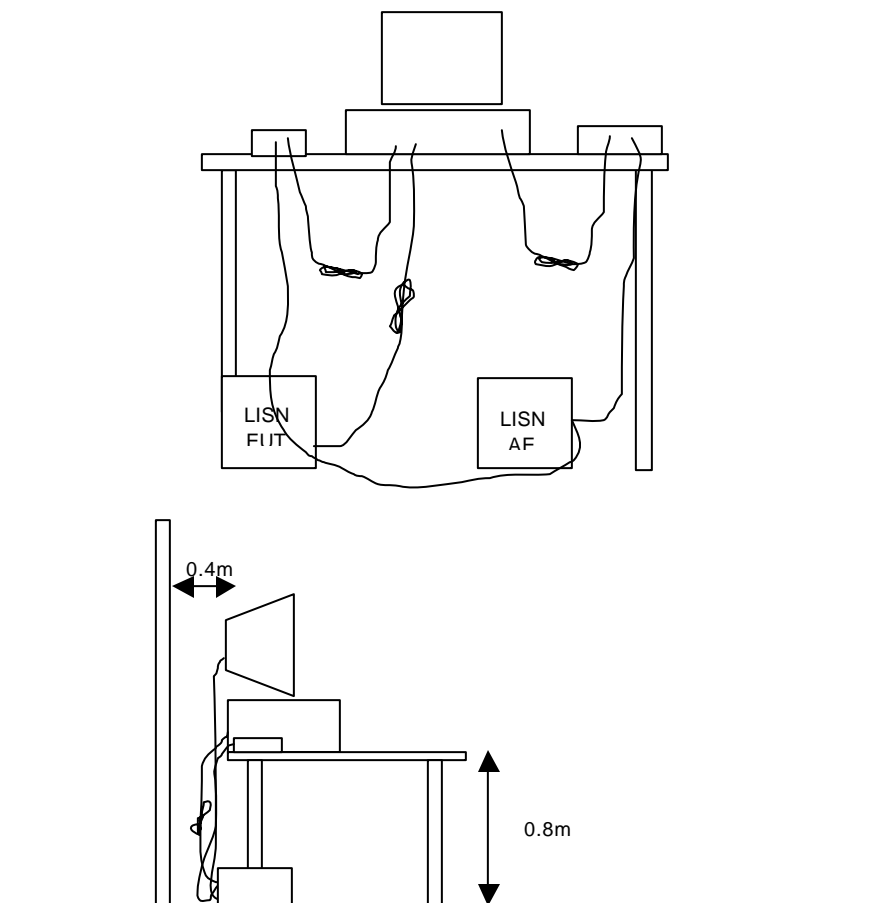
TEST PROCEDURES

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.



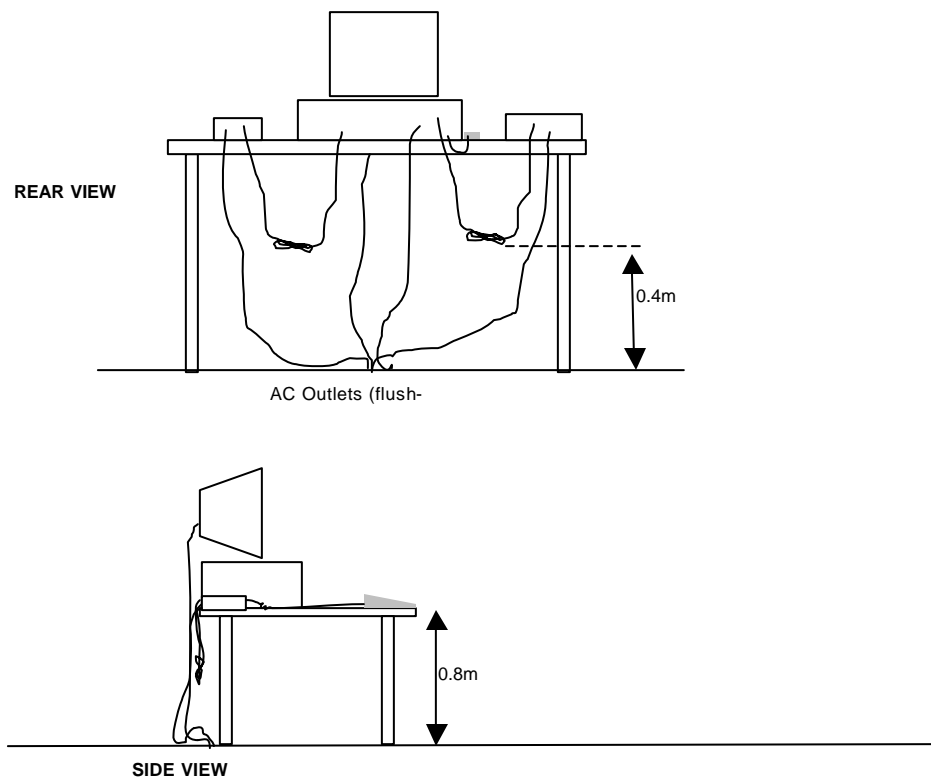
RADIATED EMISSIONS

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

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.

SPECIFICATION LIMITS AND SAMPLE CALCULATIONS

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:

GENERAL TRANSMITTER RADIATED EMISSIONS SPECIFICATION LIMITS

The table below shows the limits for the spurious emissions from transmitters that fall in restricted bands¹ (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	$2400/F_{\text{KHz}} @ 300\text{m}$	$67.6-20*\log_{10}(F_{\text{KHz}}) @ 300\text{m}$
0.490-1.705	$24000/F_{\text{KHz}} @ 30\text{m}$	$87.6-20*\log_{10}(F_{\text{KHz}}) @ 30\text{m}$
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

RECEIVER RADIATED SPURIOUS EMISSIONS SPECIFICATION LIMITS

The table below shows the limits for the spurious emissions from receivers as detailed in FCC Part 15.109, RSS 210 Table 2, RSS GEN Table 1 and RSS 310 Table 3. Note that receivers operating outside of the frequency range 30 MHz – 960 MHz are exempt from the requirements of 15.109.

Frequency Range (MHz)	Limit (uV/m @ 3m)	Limit (dBuV/m @ 3m)
30 to 88	100	40
88 to 216	150	43.5
216 to 960	200	46.0
Above 960	500	54.0

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

OUTPUT POWER LIMITS – DIGITAL TRANSMISSION SYSTEMS

The table below shows the limits for output power and output power density. Where the signal bandwidth is less than 20 MHz the maximum output power is reduced to the power spectral density limit plus 10 times the log of the bandwidth (in MHz).

Operating Frequency (MHz)	Output Power	Power Spectral Density
902 – 928	1 Watt (30 dBm)	8 dBm/3kHz

The maximum permitted output power is reduced by 1dB for every dB the antenna gain exceeds 6dBi.

TRANSMIT MODE SPURIOUS RADIATED EMISSIONS LIMITS – FHSS and DTS SYSTEMS

The limits for unwanted (spurious) emissions from the transmitter falling in the restricted bands are those specified in the general limits sections of FCC Part 15 and RSS 210. All other unwanted (spurious) emissions shall be at least 20dB below the level of the highest in-band signal level (30dB if the power is measured using the sample detector/power averaging method).

SAMPLE CALCULATIONS - CONDUCTED EMISSIONS

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

$$R_T - S = M$$

where:

R_T = 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:

$$F_d = 20 * \text{LOG}_{10} (D_m/D_s)$$

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:

$$F_d = 40 * \text{LOG}_{10} (D_m/D_s)$$

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

Transmitter Specific Tests, 25-Jul-07**Engineer: David Bare**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FMT (SA40) Blue	8564E (84125C)	1393	09-Jan-08

Radiated Emissions, 30 - 9300 MHz, 27-Jul-07**Engineer: Rafael Varelas**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
EMCO	Antenna, Horn, 1-18 GHz	3115	487	24-May-08
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	870	15-Nov-07
Hewlett Packard	High Pass filter, 1.5 GHz (Red System)	P/N 84300-80037 (84125C)	1154	09-Sep-07
Hewlett Packard	EMC Spectrum Analyzer, 9 KHz - 22 GHz	8593EM	1319	18-May-08
Rohde & Schwarz	Test Receiver, 0.009-2750 MHz	ESN	1332	21-Nov-07
EMCO	Log Periodic Antenna, 0.2-2 GHz	3148	1404	30-Mar-08

Antenna Conducted Emissions, 30 - 10,000 MHz, 09-Aug-07**Engineer: Rafael Varelas**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
Hewlett Packard	SpecAn 9 kHz - 40 GHz, (SA40) Purple	8564E (84125C)	1771	11-Aug-07
Rohde & Schwarz	Attenuator, 20 dB , 50 • , 10W, DC-18 GHz	20dB, 10W, Type N	1795	12-Feb-08

Transmitter Specific Tests, 14-Aug-07**Engineer: Mark Hill**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FMT (SA40) Blue	8564E (84125C)	1393	09-Jan-08

EXHIBIT 2: Test Measurement Data

29 Pages



EMC Test Data

Client:	GE MDS LLC	Job Number:	J68558
Model:	Mercury 900™-R	T-Log Number:	T68717
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy		
Emissions Standard(s):	FCC 15.247 / RSS-210	Class:	-
Immunity Standard(s):	-	Environment:	Radio

EMC Test Data

For The

GE MDS LLC

Model

Mercury 900™-R

Date of Last Test: 7/26/2007



EMC Test Data

Client:	GE MDS LLC	Job Number:	J68558
Model:	Mercury 900™-R	T-Log Number:	T68717
		Account Manger:	Susan Pelzl
Contact:	Dennis McCarthy		
Emissions Standard(s):	FCC 15.247 / RSS-210	Class:	-
Immunity Standard(s):	-	Environment:	Radio

EUT INFORMATION

*The following information was collected during the test session(s).
The client agreed to provide the following information after the test session(s).*

General Description

The EUT is a Wireless Data Transceiver that is designed to Transmit and Receive. Normally, the EUT would be placed on a tabletop or rack mounted during operation. The EUT was, therefore, placed in this position during emissions testing to simulate the end user environment. The electrical rating of the EUT is +10 to 30vdc 3 amps Max.

Equipment Under Test

Manufacturer	Model	Description	Serial Number	FCC ID
GE MDS LLC	Mercury 900	Half Duplex Data transceiver operating in the License free ISM 902-928 MHz band	-	E5MDS-MERCURY900

EUT Antenna (Intentional Radiators Only)

The object of this project is to: (1) Add 1.75MHz Bandwidth operation and (2) Add a new 17.4 dBi Panel antenna

The EUT requires professional installation and therefore is exempt from the requirement of 15.203. The output power is configured for each antenna to ensure the EIRP does not exceed 4 Watts, and the output power at the rf connector cannot exceed the maximum value reported in this test data. Radiated emissions were measured with the output power set to maximum and with the EUT antennas connected via a short length of cable, with negligible loss at the fundamental frequency.

EUT Enclosure

The EUT enclosure is primarily constructed of cast aluminum . It measures approximately 18 cm wide by 10 cm deep by 4 cm high.



EMC Test Data

Client:	GE MDS LLC	Job Number:	J68558
Model:	Mercury 900™-R	T-Log Number:	T68717
		Account Manger:	Susan Pelzl
Contact:	Dennis McCarthy		
Emissions Standard(s):	FCC 15.247 / RSS-210	Class:	-
Immunity Standard(s):	-	Environment:	Radio

Test Configuration #1

*The following information was collected during the test session(s).
The client agreed to provide the following information after the test session(s).*

Local Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
TopWard	3603D	DC Power Supply	-	-
Dell	-	Laptop Computer	Asset #: 1754	-

Remote Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
-	-	-	-	-

Cabling and Ports

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
Serial Port	USB Port Laptop	Multiconductor	Shielded	2.0
DC Power	DC Power Supply	2-wire	Unshielded	2.0

EUT Operation During Emissions Tests

The EUT was configured to continuously transmit on the noted frequency and channel. The bandwidth and the output power was also selectable.



EMC Test Data

Client:	GE MDS LLC	Job Number:	J68558
Model:	Mercury 900™-R	T-Log Number:	T68717
Contact:	Dennis McCarthy	Account Manager:	Susan Pelzl
Standard:	FCC 15.247 / RSS-210	Class:	N/A

RSS 210 and FCC 15.247 Receive-Mode 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: 7/26/2007 Config. Used: 1
Test Engineer: Rafael Varelas Config Change: None
Test Location: SVOATS #2 EUT Voltage: 15Vdc

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

Ambient Conditions: Temperature: 15 °C
 Rel. Humidity: 83 %

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	RE, 30 - 7500 MHz - Spurious Emissions	FCC Part 15.209 / 15.247(c)	Pass	43.4dBμV/m (147.9μV/m) @ 958.994MHz (-2.6dB)

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.



EMC Test Data

Client:	GE MDS LLC	Job Number:	J68558
Model:	Mercury 900™-R	T-Log Number:	T68717
Contact:	Dennis McCarthy	Account Manager:	Susan Pelzl
Standard:	FCC 15.247 / RSS-210	Class:	N/A

Run #1: Radiated Spurious Emissions, 30 - 7500 MHz. - Receiver Spurious Emissions

Frequency Range	Test Distance	Limit Distance	Extrapolation Factor
30 - 7500 MHz	3	3	0.0

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
958.994	43.4	H	46.0	-2.6	QP	5	3.1	EUT at 915 MHz
969.994	43.5	H	54.0	-10.5	QP	10	3.1	EUT at 926 MHz
958.994	32.7	V	46.0	-13.3	QP	15	1.0	EUT at 915 MHz
944.999	32.2	V	46.0	-13.8	QP	165	1.0	EUT at 904 MHz
944.999	32.0	H	46.0	-14.0	QP	205	1.0	EUT at 904 MHz
969.994	34.7	V	54.0	-19.3	QP	10	1.0	EUT at 926 MHz

Note 2: All receiver-related emissions above 1GHz were 20dB or more below the limit.



EMC Test Data

Client:	GE MDS LLC	Job Number:	J68558
Model:	Mercury 900™-R	T-Log Number:	T68717
Contact:	Dennis McCarthy	Account Manager:	Susan Pelzl
Standard:	FCC 15.247 / RSS-210	Class:	N/A

RSS 210 and FCC 15.247 Radiated Spurious 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: 7/26/2007 Config. Used: 1
Test Engineer: Rafael Varelas Config Change: None
Test Location: SVOATS #2 EUT Voltage: 15Vdc

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

Ambient Conditions: Temperature: 15 °C
 Rel. Humidity: 83 %

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	RE, 30 - 9300 MHz - Spurious Emissions	FCC Part 15.209 / 15.247(c)	Pass	48.5dBμV/m (266.1μV/m) @ 2776.7MHz (-5.5dB)

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.



EMC Test Data

Client:	GE MDS LLC	Job Number:	J68558
Model:	Mercury 900™-R	T-Log Number:	T68717
Contact:	Dennis McCarthy	Account Manager:	Susan Pelzi
Standard:	FCC 15.247 / RSS-210	Class:	N/A

Run #1: Radiated Spurious Emissions, 30 - 9300 MHz

Run #1a: Low Channel @ 904 MHz
Channel 0, 3.5MHz BW, Setting = 20

Fundamental

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
904.000	106.5	V	-	-	PK	15	1.8	RBW=VBW=100KHz
904.000	118.6	H	-	-	PK	350	1.0	RBW=VBW=100KHz

Spurious Emissions

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
Setting = 30								
1807.510	71.0	V	-	-	AVG	360	1.5	Non-restricted
1807.510	82.5	V	-	-	PK	360	1.5	Non-restricted
2711.090	53.8	V	54.0	-0.2	AVG	31	1.2	
2711.090	67.8	V	74.0	-6.2	PK	31	1.2	
3615.800	56.3	V	54.0	2.3	AVG	128	1.0	
3615.800	75.2	V	74.0	1.2	PK	128	1.0	
Setting = 20								
960.000	38.9	h	46.0	-7.1	QP	185	1.3	Ambient
960.000	36.4	v	46.0	-9.6	QP	135	1.1	Ambient
3616.450	30.7	V	54.0	-23.3	AVG	128	1.0	
3616.450	47.6	V	74.0	-26.4	PK	128	1.0	
1807.740	75.9	V	98.6	-22.7	PK	0	1.0	Non-restricted
2710.540	40.6	V	54.0	-13.4	AVG	267	1.0	
2710.540	57.1	V	74.0	-16.9	PK	267	1.0	
4515.760	29.3	V	54.0	-24.7	AVG	0	1.0	
4515.760	39.7	V	74.0	-34.3	PK	0	1.0	
5423.710	31.3	V	54.0	-22.7	AVG	158	1.0	
5423.710	41.8	V	74.0	-32.2	PK	158	1.0	
6328.240	32.1	V	54.0	-21.9	AVG	161	1.0	
6328.240	43.7	V	74.0	-30.3	PK	161	1.0	
7232.660	33.8	V	54.0	-20.2	AVG	220	1.0	
7232.660	45.0	V	74.0	-29.0	PK	220	1.0	



EMC Test Data

Client:	GE MDS LLC	Job Number:	J68558
Model:	Mercury 900™-R	T-Log Number:	T68717
Contact:	Dennis McCarthy	Account Manager:	Susan Pelzi
Standard:	FCC 15.247 / RSS-210	Class:	N/A

Run #1a: Continued

1807.460	71.1	H	98.6	-27.5	PK	138	1.0	Non-restricted
2711.810	36.8	H	54.0	-17.2	AVG	355	1.9	
2711.810	49.4	H	74.0	-24.6	PK	355	1.9	
3614.990	29.3	H	54.0	-24.7	AVG	110	1.0	
3614.990	39.7	H	74.0	-34.3	PK	110	1.0	
4520.730	29.3	H	54.0	-24.7	AVG	184	1.0	
4520.730	40.3	H	74.0	-33.7	PK	184	1.0	
5423.900	31.3	H	54.0	-22.7	AVG	160	1.0	
5423.900	41.6	H	74.0	-32.4	PK	160	1.0	

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20dB below the level of the fundamental and measured in 100kHz.

Note 2: Measured to 5th harmonic and verified all other hamonics to be 20dB or more below the limit.

Run #1b: Center Channel @ 915 MHz

Channel 3, 3.5MHz BW, Setting = 20

Fundamental

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
915.000	106.4	V	-	-	PK	10	1.3	RBW=VBW=100KHz
915.000	118.7	H	-	-	PK	355	1.0	RBW=VBW=100KHz

Spurious Emissions

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2745.310	47.6	V	54.0	-6.4	AVG	332	1.3	
2745.150	47.3	H	54.0	-6.7	AVG	358	1.5	
960.000	38.7	h	46.0	-7.3	QP	175	1.4	Ambient
960.000	36.1	v	46.0	-9.9	QP	155	1.0	Ambient
2745.310	60.1	V	74.0	-13.9	PK	332	1.3	
2745.150	60.0	H	74.0	-14.0	PK	358	1.5	
3659.790	30.7	H	54.0	-23.3	AVG	163	1.7	
3659.790	50.1	H	74.0	-23.9	PK	163	1.7	
4575.360	29.7	H	54.0	-24.3	AVG	230	1.0	
4575.630	29.7	V	54.0	-24.3	AVG	115	1.0	
3658.850	29.4	V	54.0	-24.6	AVG	105	1.0	
3658.850	43.3	V	74.0	-30.7	PK	105	1.0	
4575.360	41.1	H	74.0	-32.9	PK	230	1.0	
4575.630	40.6	V	74.0	-33.4	PK	115	1.0	

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20dB below the level of the fundamental and measured in 100kHz.

Note 2: Measured to 5th harmonic and verified all other hamonics to be 20dB or more below the limit.



EMC Test Data

Client:	GE MDS LLC	Job Number:	J68558
Model:	Mercury 900™-R	T-Log Number:	T68717
Contact:	Dennis McCarthy	Account Manager:	Susan Pelzi
Standard:	FCC 15.247 / RSS-210	Class:	N/A

Run #1c: High Channel @ 926 MHz
Channel 6, 3.5MHz BW, Setting = 20

Fundamental

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
926.000	105.3	V	-	-	PK	0	1.1	RBW=VBW=100KHz
926.000	118.2	H	-	-	PK	355	1.0	RBW=VBW=100KHz

Spurious Emissions

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2776.730	48.5	H	54.0	-5.5	AVG	26	1.3	
960.000	38.1	h	46.0	-7.9	QP	170	1.3	Ambient
2776.690	45.4	V	54.0	-8.6	AVG	331	1.0	
2776.730	64.4	H	74.0	-9.6	PK	26	1.3	
960.000	35.4	v	46.0	-10.6	QP	145	1.0	Ambient
2776.690	60.9	V	74.0	-13.1	PK	331	1.0	
4628.900	29.9	H	54.0	-24.1	AVG	94	1.0	
4628.680	29.9	H	54.0	-24.1	AVG	145	1.0	
3705.440	28.7	V	54.0	-25.3	AVG	130	1.0	
3704.160	28.6	H	54.0	-25.4	AVG	200	1.0	
4628.900	41.9	H	74.0	-32.1	PK	94	1.0	
4628.680	40.3	H	74.0	-33.7	PK	145	1.0	
3705.440	39.2	V	74.0	-34.8	PK	130	1.0	
3704.160	38.8	H	74.0	-35.2	PK	200	1.0	

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20dB below the level of the fundamental and measured in 100kHz.

Note 2: Measured to 5th harmonic and verified all other hamonics to be 20dB or more below the limit.



EMC Test Data

Client:	GE MDS LLC	Job Number:	J68558
Model:	Mercury 900™-R	T-Log Number:	T68717
Contact:	Dennis McCarthy	Account Manager:	Susan Pelzl
Standard:	FCC 15.247 / RSS-210	Class:	N/A

RSS 210 and FCC 15.247 Radiated Spurious 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: 8/8/2007
Test Engineer: Rafael Varelas
Test Location: SVOATS #2

Config. Used: 1
Config Change: None
EUT Voltage: 15Vdc

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

Ambient Conditions:
Temperature: 16 °C
Rel. Humidity: 80 %

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1 (Yagi Antenna)	RE, 30 - 9300 MHz - Spurious Emissions	FCC Part 15.209 / 15.247(c)	Pass	49.2dBμV/m (288.4μV/m) @ 2742.1MHz (-4.8dB)

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.



EMC Test Data

Client:	GE MDS LLC	Job Number:	J68558
Model:	Mercury 900™-R	T-Log Number:	T68717
Contact:	Dennis McCarthy	Account Manager:	Susan Pelzi
Standard:	FCC 15.247 / RSS-210	Class:	N/A

Run #1: Radiated Spurious Emissions, 30 - 9300 MHz. Yagi Antenna

Run #1a: Low Channel @ 904 MHz
Channel 0, 1.75MHz BW, Setting = 20

Fundamental

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
903.000	112.5	V	-	-	PK	45	1.7	RBW=VBW=100KHz
903.000	117.2	H	-	-	PK	360	1.6	RBW=VBW=100KHz

Spurious Emissions

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
1805.600	82.7	V	97.2	-14.5	PK	266	1.0	Non-restricted
1805.690	79.7	H	97.2	-17.5	PK	126	1.0	Non-restricted
2709.520	35.8	V	54.0	-18.2	AVG	136	1.7	
2709.520	55.8	V	74.0	-18.2	PK	136	1.7	
2708.900	55.5	H	74.0	-18.5	PK	125	1.0	
2708.900	35.1	H	54.0	-18.9	AVG	125	1.0	
3611.400	31.9	H	54.0	-22.1	AVG	0	1.0	
3612.810	31.9	V	54.0	-22.1	AVG	0	1.0	
4514.690	30.9	H	54.0	-23.1	AVG	360	1.0	
4513.770	30.9	V	54.0	-23.1	AVG	360	1.0	
3612.810	43.9	V	74.0	-30.1	PK	0	1.0	
3611.400	43.1	H	74.0	-30.9	PK	0	1.0	
4514.690	41.9	H	74.0	-32.1	PK	360	1.0	
4513.770	41.6	V	74.0	-32.4	PK	360	1.0	

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20dB below the level of the fundamental and measured in 100kHz.

Note 2: Measured to 5th harmonic and verified all other harmonics to be 20dB or more below the limit.



EMC Test Data

Client:	GE MDS LLC	Job Number:	J68558
Model:	Mercury 900™-R	T-Log Number:	T68717
Contact:	Dennis McCarthy	Account Manager:	Susan Pelzl
Standard:	FCC 15.247 / RSS-210	Class:	N/A

Run #1b: Center Channel @ 914 MHz
Channel 6, 1.75MHz BW, Setting = 20

Fundamental

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
914.000	108.1	V	-	-	PK	50	1.8	RBW=VBW=100KHz
914.000	114.3	H	-	-	PK	360	1.6	RBW=VBW=100KHz

Spurious Emissions

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2742.050	49.2	V	54.0	-4.8	AVG	269	1.9	
2743.000	47.3	H	54.0	-6.7	AVG	206	1.9	
2742.050	62.0	V	74.0	-12.0	PK	269	1.9	
2743.000	61.7	H	74.0	-12.3	PK	206	1.9	
1827.840	80.7	V	94.3	-13.6	PK	267	1.0	
1827.950	79.6	H	94.3	-14.7	PK	111	1.0	
3654.520	34.5	V	54.0	-19.5	AVG	320	1.0	
3654.680	32.9	H	54.0	-21.1	AVG	360	1.0	
4569.560	30.9	H	54.0	-23.1	AVG	0	1.0	
4569.850	30.8	V	54.0	-23.2	AVG	335	1.0	
3654.520	45.6	V	74.0	-28.4	PK	320	1.0	
4569.560	43.8	H	74.0	-30.2	PK	0	1.0	
3654.680	43.6	H	74.0	-30.4	PK	360	1.0	
4569.850	42.3	V	74.0	-31.7	PK	335	1.0	

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20dB below the level of the fundamental and measured in 100kHz.

Note 2: Measured to 5th harmonic and verified all other hamonics to be 20dB or more below the limit.



EMC Test Data

Client:	GE MDS LLC	Job Number:	J68558
Model:	Mercury 900™-R	T-Log Number:	T68717
Contact:	Dennis McCarthy	Account Manager:	Susan Pelzl
Standard:	FCC 15.247 / RSS-210	Class:	N/A

Run #1c: High Channel @ 927 MHz
Channel 13, 1.75MHz BW, Setting = 20

Fundamental

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
927.000	109.2	V	-	-	PK	95	1.8	RBW=VBW=100KHz
927.000	114.5	H	-	-	PK	310	1.3	RBW=VBW=100KHz

Spurious Emissions

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2780.610	42.8	H	54.0	-11.2	AVG	217	1.5	
2781.220	42.4	V	54.0	-11.6	AVG	133	1.1	
2781.220	62.2	V	74.0	-11.8	PK	133	1.1	
2780.610	62.0	H	74.0	-12.0	PK	217	1.5	
1853.640	80.5	V	94.5	-14.0	PK	272	1.0	Non-restricted
1853.440	78.2	H	94.5	-16.3	PK	69	1.3	Non-restricted
3707.740	53.5	H	74.0	-20.5	PK	243	1.0	
3707.740	33.0	H	54.0	-21.0	AVG	243	1.0	
3709.080	31.7	V	54.0	-22.3	AVG	360	1.0	
4634.430	31.5	H	54.0	-22.5	AVG	10	1.0	
4633.540	31.5	V	54.0	-22.5	AVG	0	1.0	
3709.080	43.3	V	74.0	-30.7	PK	360	1.0	
4633.540	42.5	V	74.0	-31.5	PK	0	1.0	
4634.430	42.4	H	74.0	-31.6	PK	10	1.0	

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20dB below the level of the fundamental and measured in 100kHz.

Note 2: Measured to 5th harmonic and verified all other hamonics to be 20dB or more below the limit.

Client:	GE MDS LLC	Job Number:	J68558
Model:	Mercury 900™-R	T-Log Number:	T68717
Contact:	Dennis McCarthy	Account Manager:	Susan Pelzi
Standard:	FCC 15.247 / RSS-210	Class:	N/A

FCC 15.247 DTS - Power, Bandwidth and Spurious Emissions

Test Specifics

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: See Individual Run
 Test Engineer: See Individual Run
 Test Location: See Individual Run

Config. Used: 1
 Config Change: None
 EUT Voltage: 15VDC

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

When measuring the conducted emissions from the EUT's antenna port, the antenna port of the EUT was connected to the spectrum analyzer or power meter via a suitable attenuator to prevent overloading the measurement system. All measurements are corrected to allow for the external attenuators used.

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	Antenna Port Conducted Emissions	15.247(a)	Pass	Out of band all more than -30dBc
2a	6dB Bandwidth	15.247(a)	Pass	1.567 MHz
2b	99% bandwidth	RSS GEN	Pass	1.96 MHz
3	Output Power (Max)	15.247(b)	Pass	36dBm (3.98 W)
3	Output Power (Min)	15.247(b)	Pass	33.7dBm (2.34 W)
4	Power Spectral Density (PSD)	15.247(d)	Pass	7.9 dBm/3kHz

Modifications Made During Testing:

Modifications are detailed under each run description.

Deviations From The Standard

No deviations were made from the requirements of the standard.



EMC Test Data

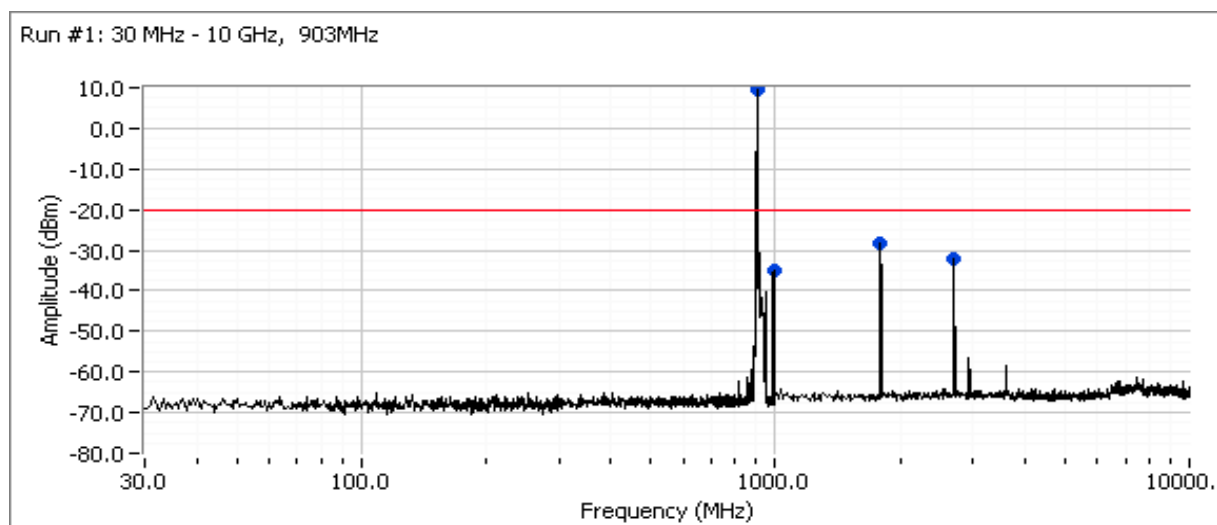
Client:	GE MDS LLC	Job Number:	J68558
Model:	Mercury 900™-R	T-Log Number:	T68717
Contact:	Dennis McCarthy	Account Manager:	Susan Pelzi
Standard:	FCC 15.247 / RSS-210	Class:	N/A

Run #1: Antenna Conducted Spurious Emissions, 30 - 10,000 MHz.

Scans made using RBW=VB=100 KHz. The limit line in the plot is not the FCC limit and should be ignored. The limit line was set 30dB below the highest in-band signal level, based on the use of power averaging for the power measurements.

All measurements made with power setting of 30dBm

Run #1a: Antenna Conducted Spurious Emissions, 30 - 10,000 MHz, EUT at 903 MHz



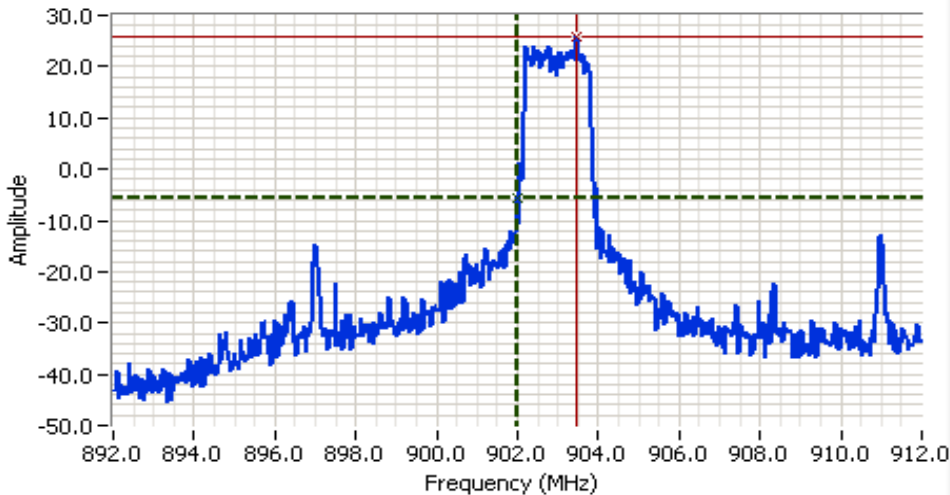
Frequency MHz	Level dBm	Port	FCC 15.247/RSS 210 Limit	Margin	Detector Pk/QP/Avg	Comments
902.612	14.8	RF Port	-	-	Peak	
1806.030	-38.4	RF Port	-15.2	-23.2	Peak	

Note 1: The limit was set 30dB below the level of the fundamental.



EMC Test Data

Client:	GE MDS LLC	Job Number:	J68558
Model:	Mercury 900™-R	T-Log Number:	T68717
Contact:	Dennis McCarthy	Account Manager:	Susan Pelzi
Standard:	FCC 15.247 / RSS-210	Class:	N/A



Analyzer Settings

HP8564E,EMI
CF: 902.00 MHz
SPAN:20.00 MHz
RB 100 kHz
VB 100 kHz
Detector POS
Att 40
RL Offset 10.00
Sweep Time 50.0ms
Ref Lvl:32.60DBM

Comments

-30dBc Bandedge
TX 903 MHz
PWR: 30dBm

Cursor 1	902.000	-5.57	
Cursor 2	903.467	25.93	

Delta Freq. 1.467

Delta Amplitude 31.50



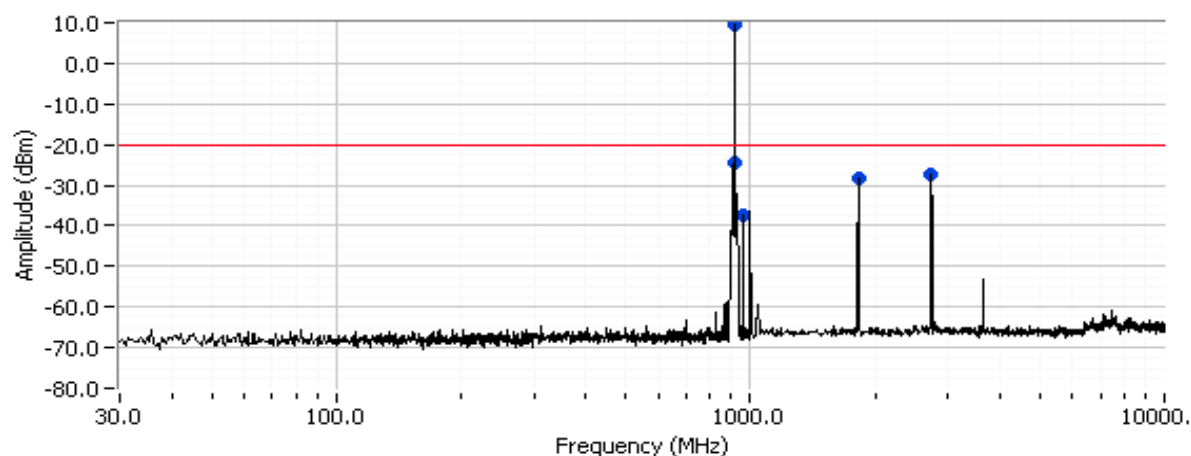


EMC Test Data

Client:	GE MDS LLC	Job Number:	J68558
Model:	Mercury 900™-R	T-Log Number:	T68717
Contact:	Dennis McCarthy	Account Manager:	Susan Pelzi
Standard:	FCC 15.247 / RSS-210	Class:	N/A

Run #1b: Antenna Conducted Spurious Emissions, 30 - 10,000 MHz, EUT at 914 MHz

Run #1: 30 MHz - 10 GHz, 914MHz



Frequency MHz	Level dBm	Port	FCC 15.247/RSS 210 Limit	Margin	Detector Pk/QP/Avg	Comments
913.975	15.5	RF Port	-	-	Peak	Fundamental
2741.850	-29.0	RF Port	-14.5	-14.5	Peak	

Note 1: The limit was set 30dB below the level of the fundamental.

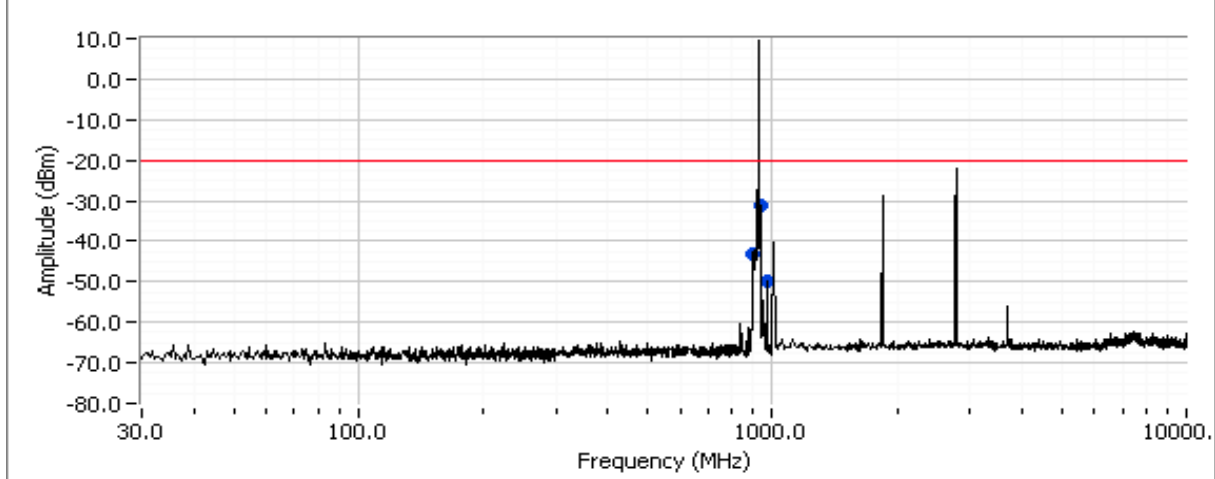


EMC Test Data

Client:	GE MDS LLC	Job Number:	J68558
Model:	Mercury 900™-R	T-Log Number:	T68717
Contact:	Dennis McCarthy	Account Manager:	Susan Pelzi
Standard:	FCC 15.247 / RSS-210	Class:	N/A

Run #1c: Antenna Conducted Spurious Emissions, 30 - 10,000 MHz, EUT at 927 MHz

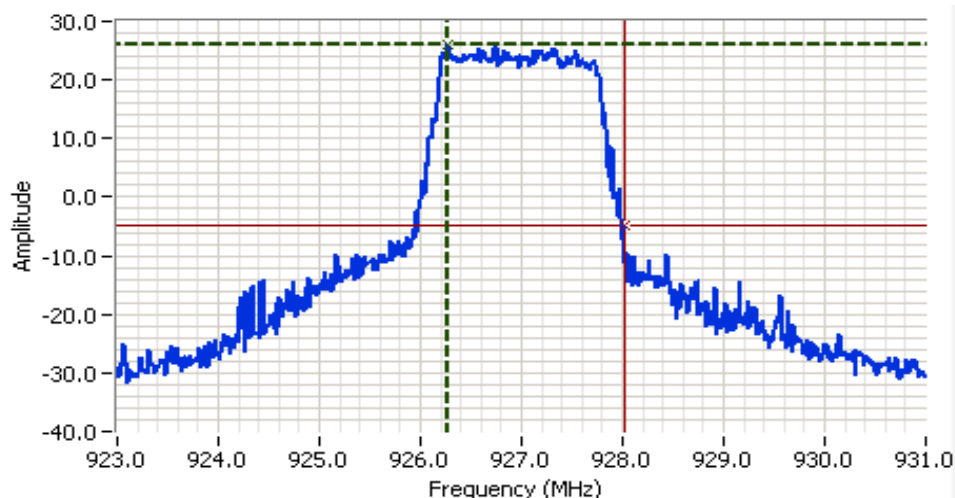
Run #1: 30 MHz-10GHz, 927 MHz, 30dBm



Frequency MHz	Level dBm	Port	FCC 15.247/RSS 210 Limit	Margin	Detector Pk/QP/Avg	Comments
927.583	15.5	RF Port	0.0	15.5	Peak	Fundamental
2780.790	-24.2	RF Port	-14.5	-9.7	Peak	Worst Case Emission

Note 1: The limit was set 30dB below the level of the fundamental.

Client:	GE MDS LLC	Job Number:	J68558
Model:	Mercury 900™-R	T-Log Number:	T68717
Contact:	Dennis McCarthy	Account Manager:	Susan Pelzi
Standard:	FCC 15.247 / RSS-210	Class:	N/A





Analyzer Settings

HP8564E,EMI
 CF: 927.00 MHz
 SPAN:8.000 MHz
 RB 100 kHz
 VB 100 kHz
 Detector P05
 Att 40
 RL Offset 10.00
 Sweep Time 50.0ms
 Ref Lvl:32.60DBM

Comments

-30dBc Bandedge
 TX: 927 MHz
 PWR: 30dBm

Cursor 1	926.280	26.10	
Cursor 2	928.013	-4.73	

Delta Freq. 1.733
 Delta Amplitude 30.83



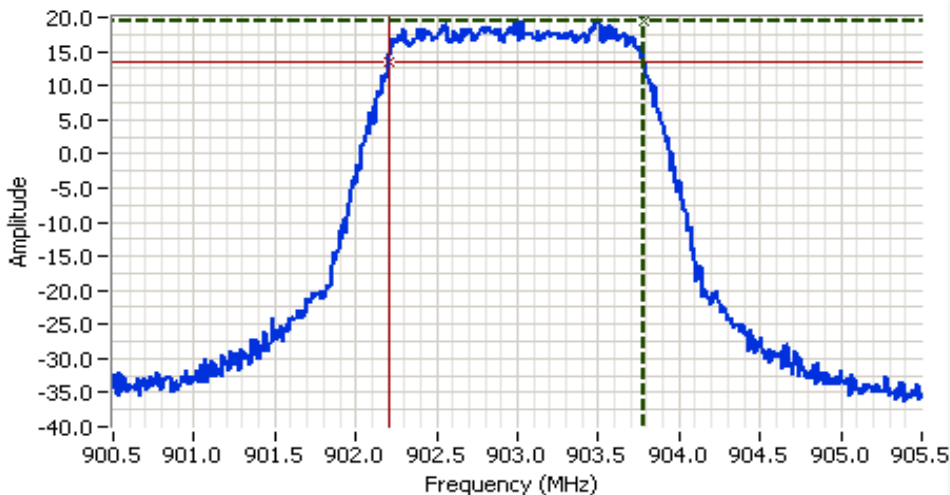
EMC Test Data

Client:	GE MDS LLC	Job Number:	J68558
Model:	Mercury 900™-R	T-Log Number:	T68717
Contact:	Dennis McCarthy	Account Manager:	Susan Pelzi
Standard:	FCC 15.247 / RSS-210	Class:	N/A

Run #2: Signal Bandwidth

Run #2a: 6dB Bandwidth

Frequency (MHz)	Resolution Bandwidth	6dB Signal Bandwidth
903	100kHz	1.567
914	100kHz	1.583
927	100kHz	1.575



Analyzer Settings

HP8564E
CF: 903.00 MHz
SPAN:5.000 MHz
RB 100 kHz
VB 3.000 MHz
Detector POS
Att 20
RL Offset 20.00
Sweep Time 50.0ms
Ref Lvl:28.00DBM

Comments

6dB Bandwidth

Cursor 1	903.775	19.50	↕	↔	🔒
Cursor 2	902.208	13.50	↕	↔	🔒

Delta Freq. 1.567

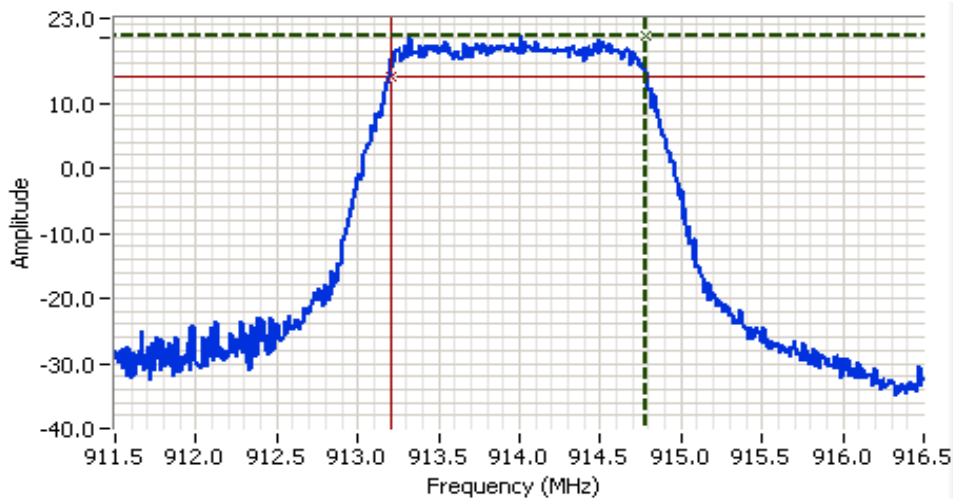
Delta Amplitude 6.00





EMC Test Data

Client:	GE MDS LLC	Job Number:	J68558
Model:	Mercury 900™-R	T-Log Number:	T68717
Contact:	Dennis McCarthy	Account Manager:	Susan Pelzi
Standard:	FCC 15.247 / RSS-210	Class:	N/A



Analyzer Settings

HP8564E
CF: 914.00 MHz
SPAN:5.000 MHz
RB 100 kHz
VB 3.000 MHz
Detector POS
Att 20
RL Offset 20.00
Sweep Time 50.0ms
Ref Lvl:28.00DBM

Comments

6dB Bandwidth

Cursor 1 914.783 20.17
Cursor 2 913.200 14.17

Delta Freq. 1.583

Delta Amplitude 6.00



Analyzer Settings

HP8564E
CF: 927.00 MHz
SPAN:5.000 MHz
RB 100 kHz
VB 3.000 MHz
Detector POS
Att 20
RL Offset 20.00
Sweep Time 50.0ms
Ref Lvl:28.00DBM

Comments

6dB Bandwidth

Cursor 1 927.792 19.67
Cursor 2 926.217 13.67

Delta Freq. 1.575

Delta Amplitude 6.00



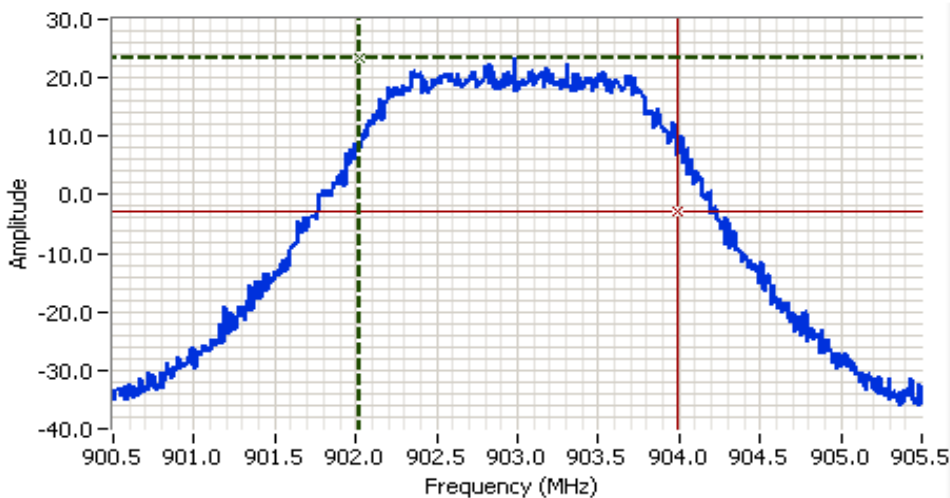


EMC Test Data

Client:	GE MDS LLC	Job Number:	J68558
Model:	Mercury 900™-R	T-Log Number:	T68717
Contact:	Dennis McCarthy	Account Manager:	Susan Pelzi
Standard:	FCC 15.247 / RSS-210	Class:	N/A

Run #2b: 99% Bandwidth

Frequency (MHz)	Resolution Bandwidth	99% Signal Bandwidth
903	300kHz	1.97
914	300kHz	1.97
927	300kHz	1.96



Analyzer Settings

HP8564E,EMI
CF: 903.00 MHz
SPAN:5.000 MHz
RB 300 kHz
VB 1.000 MHz
Detector POS
Att 30
RL Offset 10.00
Sweep Time 50.0ms
Ref Lvl:30.20DBM

Comments

99% power bandwidth
1.972 MHz

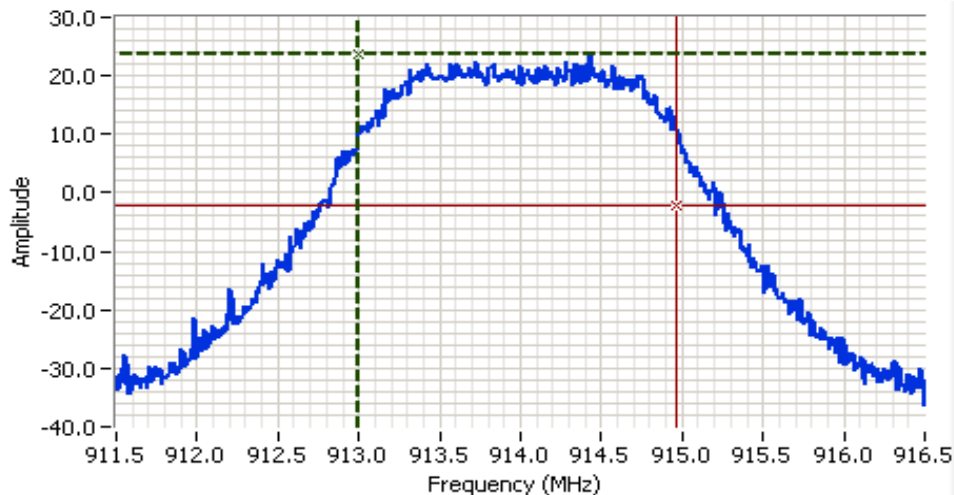
Cursor 1	902.022	23.20	
Cursor 2	903.994	-2.80	

Delta Freq. 1.972

Delta Amplitude 26.00



Client:	GE MDS LLC	Job Number:	J68558
Model:	Mercury 900™-R	T-Log Number:	T68717
Contact:	Dennis McCarthy	Account Manager:	Susan Pelzi
Standard:	FCC 15.247 / RSS-210	Class:	N/A



Analyzer Settings

HP8564E,EMI
CF: 914.00 MHz
SPAN:5.000 MHz
RB 300 kHz
VB 1.000 MHz
Detector POS
Att 30
RL Offset 10.00
Sweep Time 50.0ms
Ref Lvl:30.20DBM

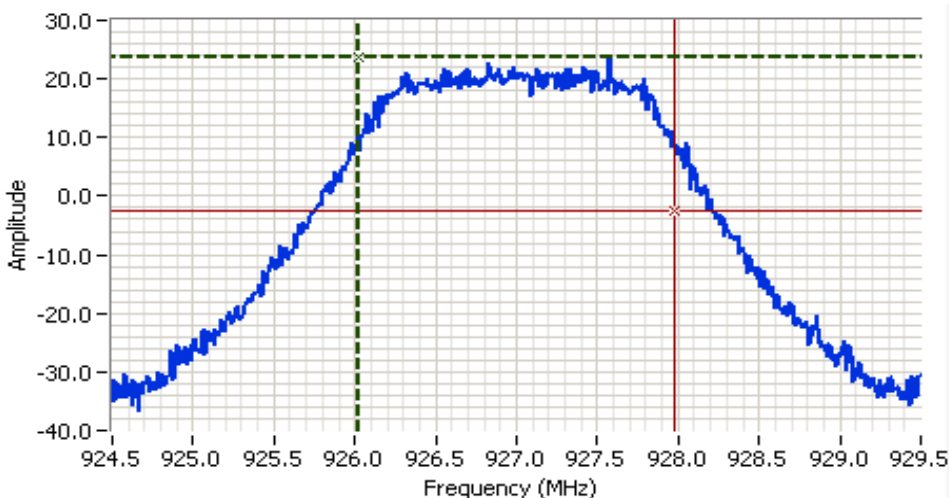
Comments

99% power bandwidth
1.972 MHz

Cursor 1 912.998 23.70
Cursor 2 914.969 -2.30

Delta Freq. 1.972

Delta Amplitude 26.00



Analyzer Settings

HP8564E,EMI
CF: 927.00 MHz
SPAN:5.000 MHz
RB 300 kHz
VB 1.000 MHz
Detector POS
Att 30
RL Offset 10.00
Sweep Time 50.0ms
Ref Lvl:30.20DBM

Comments

99% power bandwidth
1.955 MHz

Cursor 1 926.022 23.53
Cursor 2 927.978 -2.47

Delta Freq. 1.955

Delta Amplitude 26.00





EMC Test Data

Client:	GE MDS LLC	Job Number:	J68558
Model:	Mercury 900™-R	T-Log Number:	T68717
Contact:	Dennis McCarthy	Account Manager:	Susan Pelzi
Standard:	FCC 15.247 / RSS-210	Class:	N/A

Run #3: Output Power

The output power is set by the professional installer to ensure the EIRP does not exceed 4 Watts, based on the effective gain of the antenna assembly (antenna + feed cable). The maximum output power at the rf connector is shown in the first table.

Date of Test: 8/14/2007

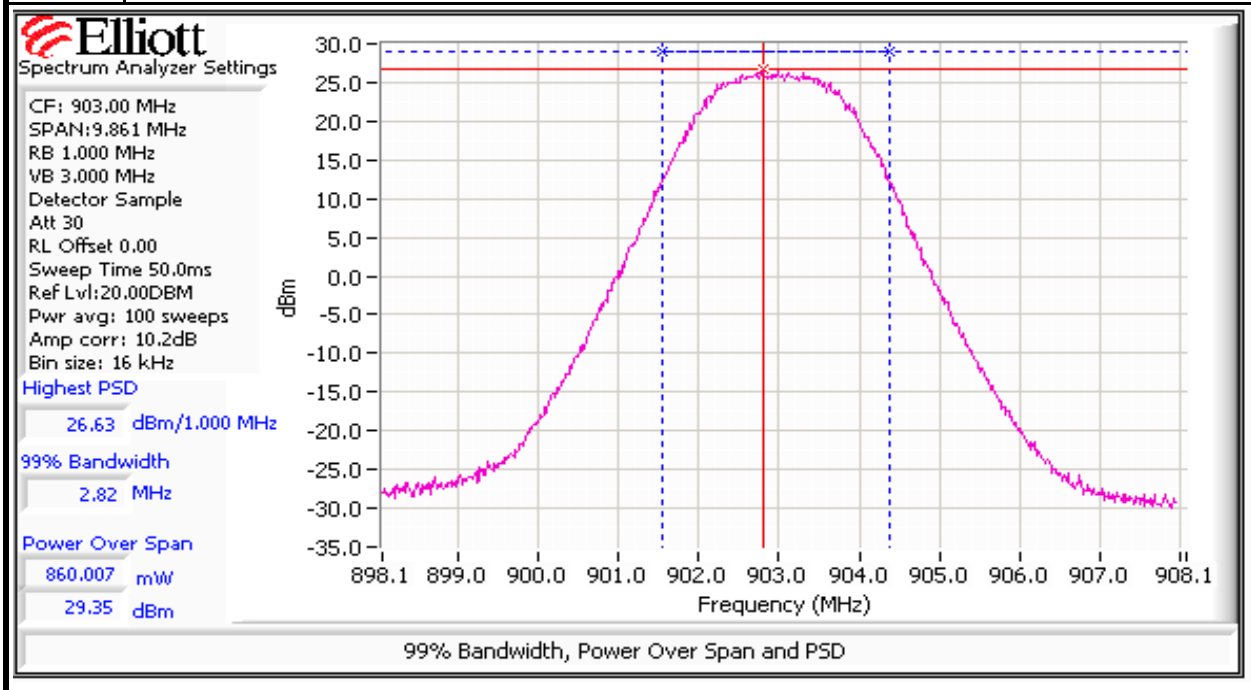
Test Engineer: Mark Hill

Test Location: Chamber#2

Power Setting	Freq (MHz)	Pwr at RF port (dBm)	Req Cable Loss (db)	Pwr at Ant (dBm)	Ant	Ant Gain (dBi)	EIRP	
							dBm	W
30	903	29.4	10.8	18.6	Panel	17.4	36	3.98
30	914	29.3	10.8	18.5	Panel	17.4	35.9	3.89
30	927	29.2	10.8	18.4	Panel	17.4	35.8	3.80
30	903	29.4	2.5	26.9	Omni	7.0	33.9	2.45
30	914	29.3	2.5	26.8	Omni	7.0	33.8	2.40
30	927	29.2	2.5	26.7	Omni	7.0	33.7	2.34
30	903	29.4	4.6	24.8	Yagi	11.2	36	3.98
30	914	29.3	4.6	24.7	Yagi	11.2	35.9	3.89
30	927	29.2	4.6	24.6	Yagi	11.2	35.8	3.80

Note 1

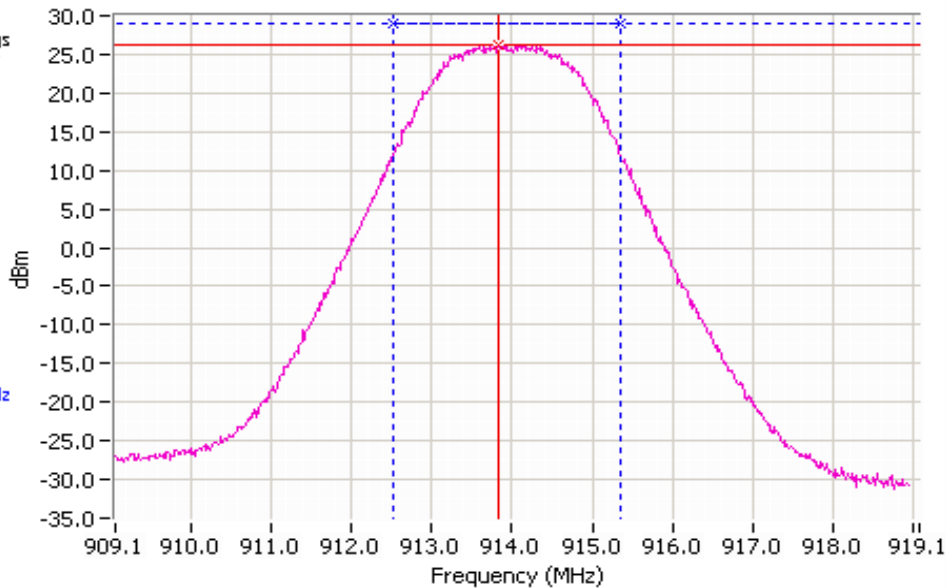
Req Cable Loss = minimum db loss of cable that would be required to be used between the RF port of the radio and the antenna in order to comply with the 36 dBm EIRP limit or the PSD requirement.



Client:	GE MDS LLC	Job Number:	J68558
Model:	Mercury 900™-R	T-Log Number:	T68717
Contact:	Dennis McCarthy	Account Manager:	Susan Pelzi
Standard:	FCC 15.247 / RSS-210	Class:	N/A

Elliott Spectrum Analyzer Settings

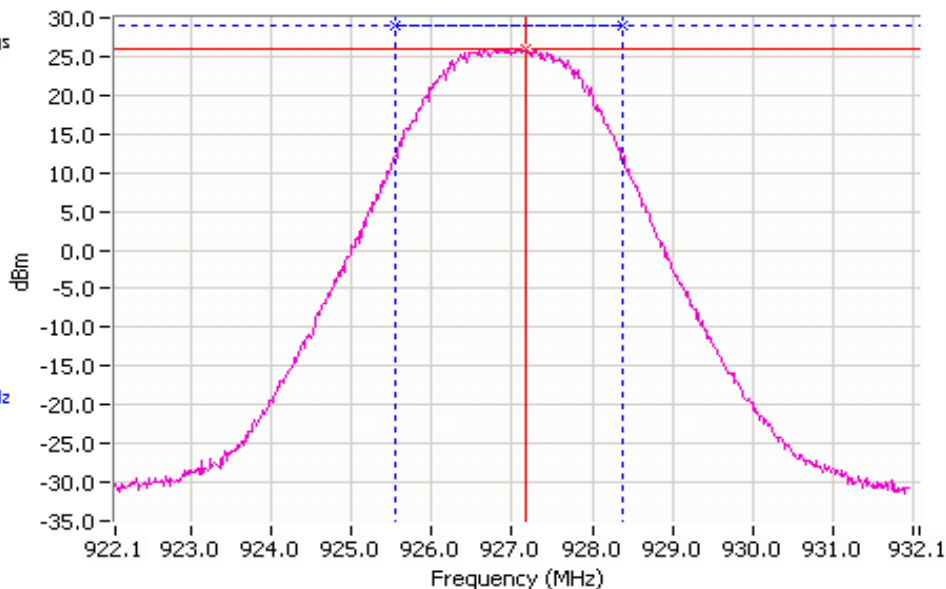
CF: 914.00 MHz
 SPAN: 9.861 MHz
 RB 1.000 MHz
 VB 3.000 MHz
 Detector Sample
 Att 30
 RL Offset 0.00
 Sweep Time 50.0ms
 Ref Lvl: 20.00DBM
 Pwr avg: 100 sweeps
 Amp corr: 10.2dB
 Bin size: 16 kHz
 Highest PSD
 26.23 dBm/1.000 MHz
 99% Bandwidth
 2.82 MHz
 Power Over Span
 855.033 mW
 29.32 dBm



99% Bandwidth, Power Over Span and PSD

Elliott Spectrum Analyzer Settings

CF: 927.00 MHz
 SPAN: 9.861 MHz
 RB 1.000 MHz
 VB 3.000 MHz
 Detector Sample
 Att 30
 RL Offset 0.00
 Sweep Time 50.0ms
 Ref Lvl: 20.00DBM
 Pwr avg: 100 sweeps
 Amp corr: 10.2dB
 Bin size: 16 kHz
 Highest PSD
 26.09 dBm/1.000 MHz
 99% Bandwidth
 2.82 MHz
 Power Over Span
 821.909 mW
 29.15 dBm



99% Bandwidth, Power Over Span and PSD



EMC Test Data

Client:	GE MDS LLC	Job Number:	J68558
Model:	Mercury 900™-R	T-Log Number:	T68717
Contact:	Dennis McCarthy	Account Manager:	Susan Pelzi
Standard:	FCC 15.247 / RSS-210	Class:	N/A

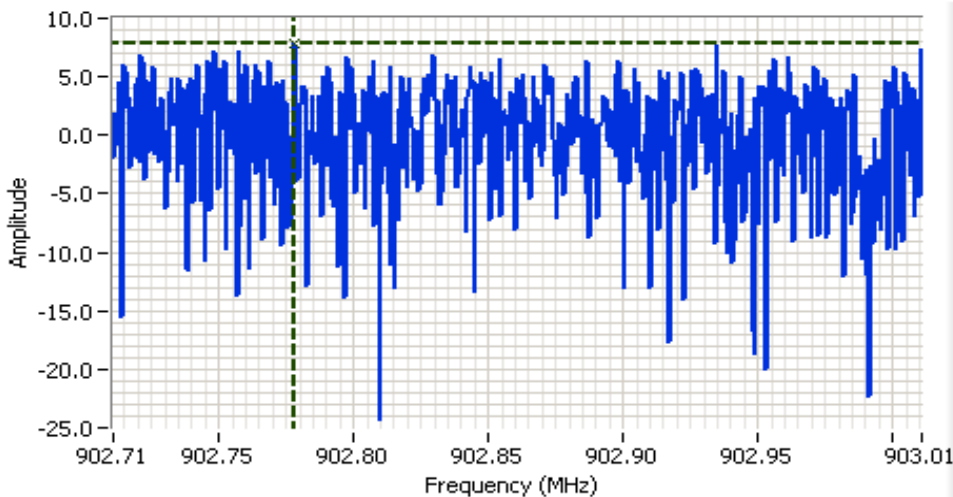
Run #4: Power Spectral Density

Power set to worse case power at antenna (omni) from Power measurements above

Operating Frequency (MHz)	Freq. @ PPSD	Res BW	P.S.D. (dBm/3kHz)
903	902.778	3kHz	7.9
914	913.62	3kHz	7.9
927	927.115	3kHz	7.0

Note 1: Freq. @ PPSD: Frequency of the Peak Power Spectral Density (PPSD)

Note 2: Power spectral density measured using RB=3 kHz, VB=10kHz.



Analyzer Settings

HP8564E,EMI
CF: 902.86 MHz
SPAN:300 kHz
RB 3 kHz
VB 10 kHz
Detector Sample
Att 30
RL Offset 9.00
Sweep Time 100.0s
Ref Lvl:29.20DBM

Comments

903 MHz, PSD
Note level corrected
min cable loss between
RF port and antenna
operation

Cursor 1 902.778 7.87

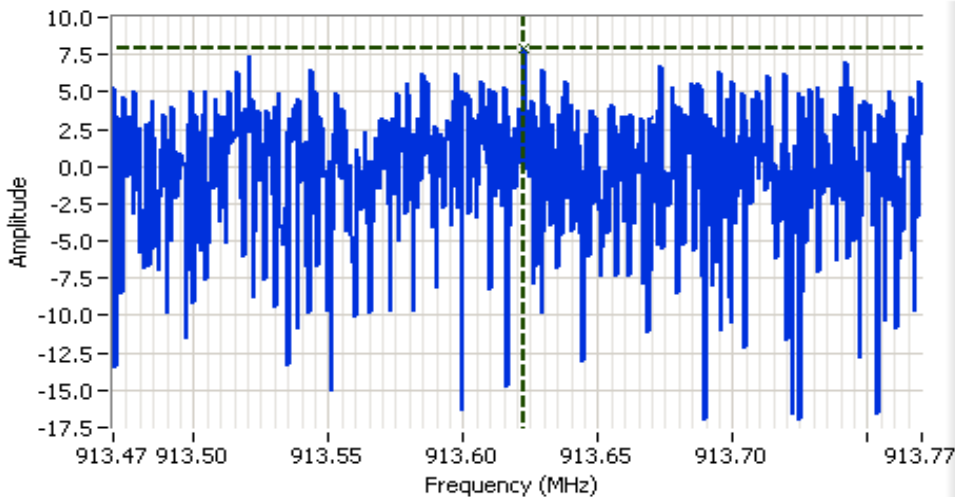
0.000 0.00





EMC Test Data

Client:	GE MDS LLC	Job Number:	J68558
Model:	Mercury 900™-R	T-Log Number:	T68717
Contact:	Dennis McCarthy	Account Manager:	Susan Pelzi
Standard:	FCC 15.247 / RSS-210	Class:	N/A



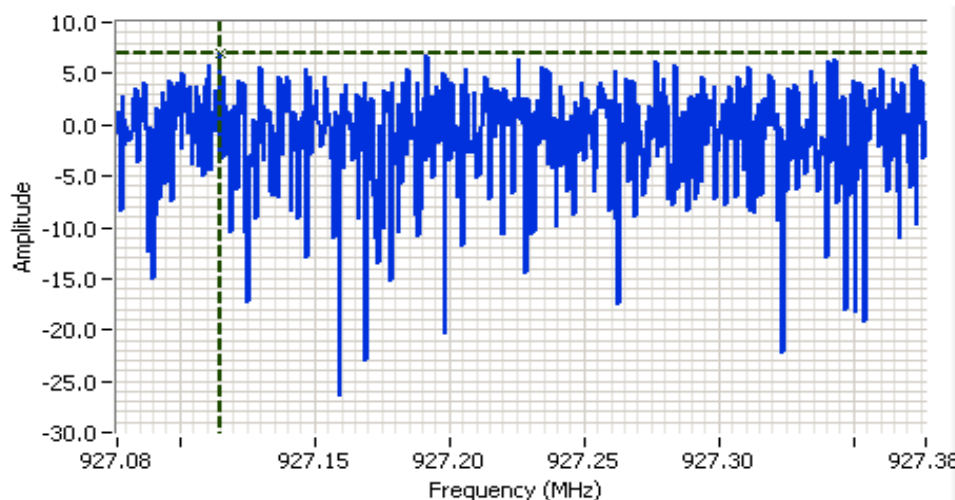
Analyzer Settings

HP8564E,EMI
CF: 913.62 MHz
SPAN:300 kHz
RB 3 kHz
VB 10 kHz
Detector Sample
Att 30
RL Offset 8.00
Sweep Time 100.0s
Ref Lvl:27.70DBM

Comments

914 MHz, PSD
Note level corrected
min cable loss between
RF port and antenna
operation

Cursor 1 913.622 7.87
0.000 0.00



Analyzer Settings

HP8564E,EMI
CF: 927.23 MHz
SPAN:300 kHz
RB 3 kHz
VB 10 kHz
Detector Sample
Att 30
RL Offset 8.00
Sweep Time 100.0s
Ref Lvl:27.70DBM

Comments

927 MHz, PSD
Note level corrected
min cable loss between
RF port and antenna
operation

Cursor 1 927.115 7.03
0.000 0.00





EMC Test Data

Client:	GE MDS LLC	Job Number:	J68558
Model:	Mercury 900™-R	T-Log Number:	T68717
Contact:	Dennis McCarthy	Account Manager:	Susan Pelzl
Standard:	FCC 15.247 / RSS-210	Class:	N/A

RSS 210 and FCC 15.247 (DTS) Antenna Port Measurements Power

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: 7/25/2007
Test Engineer: David Bare
Test Location: Chamber #2

Config. Used: 1
Config Change: None
EUT Voltage: 15Vdc

General Test Configuration

The EUT was connected to the spectrum analyzer or power meter via a suitable attenuator. All measurements were made on a single chain.

All measurements have been corrected to allow for the external attenuators used.

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	Output Power	15.247(b)	Pass	

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.



EMC Test Data

Client:	GE MDS LLC	Job Number:	J68558
Model:	Mercury 900™-R	T-Log Number:	T68717
Contact:	Dennis McCarthy	Account Manager:	Susan Pelzi
Standard:	FCC 15.247 / RSS-210	Class:	N/A

Run #1: Output Power

Power Setting ²	Frequency (MHz)	Output Power (dBm) ¹	mW	Antenna Gain (dBi)	Result	EIRP ^{Note 3} dBm	W	Output Power (dBm) ⁴	mW
20	915	17.9	61.7	17.4	Pass	35.3	3.388		

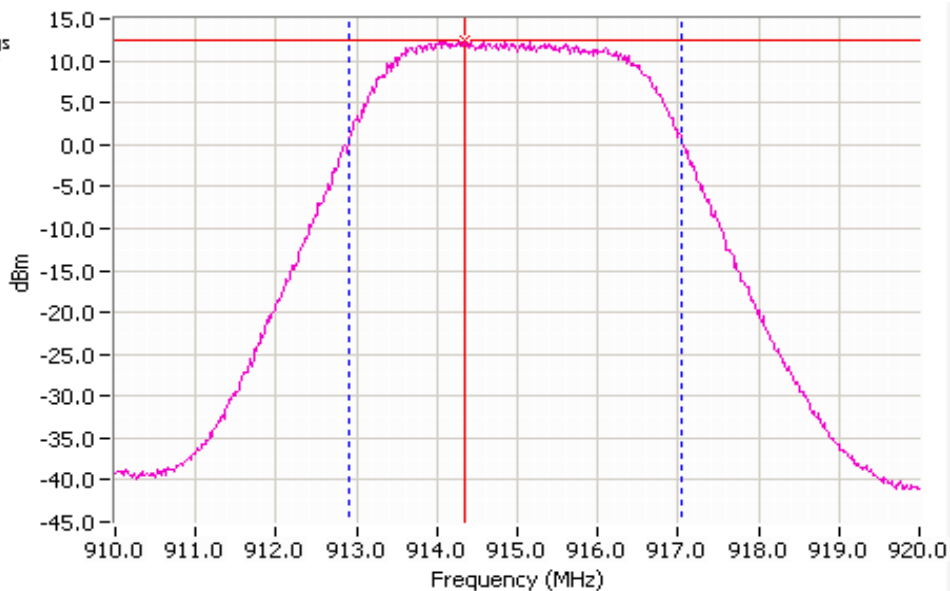
Note 1:	Output power measured using a spectrum analyzer (see plots below): RBW=1MHz, VB=1 MHz, sample detector, power averaging on (transmitted signal was continuous) and power integration over 10 MHz The output power limit is 30dBm.
Note 2:	Power setting - the software power setting used during testing, included for reference only.
Note 3:	EIRP limited to 36dBm (4W)
Note 4:	Based on the radiated field strength, only the center channel was checked.



CF: 915.00 MHz
SPAN: 10.000 MHz
RB 1.000 MHz
VB 1.000 MHz
Detector Sample
Att 30
RL Offset 0.00
Sweep Time 50.0ms
Ref Lvl: 20.00DBM
Pwr avg: 100 sweeps
Amp corr: 10.8dB
Bin size: 17 kHz

Power Over Span

62.018 mW
17.93 dBm



Average Power Over Span