EMC Test Report
Application for Grant of Equipment Authorization
Industry Canada RSS-Gen Issue 3 / RSS 210 Issue 8
FCC Part 15 Subpart C

Model: Transnet-SF9

IC CERTIFICATION #:	101D-SF9
FCC ID:	E5MDS-SF9
APPLICANT:	GE MDS LLC 175 Science Parkway Rochester, NY 14620
TEST SITE(S):	Elliott Laboratories 41039 Boyce Road. Fremont, CA. 94538-2435
IC SITE REGISTRATION #:	2845B-3; 2845B-4, 2845B-5, 2845B-7
REPORT DATE:	February 25, 2011
FINAL TEST DATES:	June 28 and 30 and December 8, 2010 and January 18, 19, 20 and 24, 2011

AUTHORIZED SIGNATORY:

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A2LA ACCREDITED
Testing Cert #2016.01

REVISION HISTORY

Rev#	Date	Comments	Modified By
-	02-25-2011	First release	

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SCOPE

An electromagnetic emissions test has been performed on the GE MDS LLC model Transnet-SF9, pursuant to the following rules:

Industry Canada RSS-Gen Issue 3
RSS 210 Issue 8 "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
FHSS test procedure DA 00-0705A1, March 2000

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.

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 Transnet-SF9 complied with the requirements of the following regulations:

Industry Canada RSS-Gen Issue 3
RSS 210 Issue 8 "Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment"
FCC Part 15 Subpart C

Maintenance of compliance is the responsibility of the manufacturer. Any modifications to the product should be assessed to determine their potential impact on the compliance status of the device with respect to the standards detailed in this test report.

The test results recorded herein are based on a single type test of GE MDS LLC model Transnet-SF9 and therefore apply only to the tested sample. The sample was selected and prepared by Dennis McCarthy of GE MDS LLC.

DEVIATIONS FROM THE STANDARDS

No deviations were made from the published requirements listed in the scope of this report.

TEST RESULTS SUMMARY

FREQUENCY HOPPING SPREAD SPECTRUM (902 – 928 MHz, 50 channels or more)

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.247 (a) (1)	RSS 210 A8.1 (1)	20dB Bandwidth	158 kHz	Channel spacing > 20dB bandwidth / 25kHz	Complies
		Channel Separation	200 kHz		Complies
15.247 (a) (1) (i)	RSS 210 A8.1 (3)	Number of Channels	Minimum 64, maximum 128	50 or more	Complies
15.247 (a) (1) (i)	RSS 210 A8.1 (3)	Channel Dwell Time	337.3 milliseconds per 20 seconds	<0.4 second within a 20 second period	Complies
15.247 (a) (1)	RSS 210 A8.1 (1)	Channel Utilization	All channels are used equally - refer to the operational description for full explanation	All channels shall, on average, be used equally	Complies
15.247 (b) (3)	RSS 210 A8.4 (1)	Output Power For antennas up to 6dBi	29.7 dBm (0..933 Watts) EIRP = 3.715 W Note 1	1Watt, EIRP < 4 Watts	Complies
15.247 (b) (3)	RSS 210 A8.4 (1)	Output Power (10dBd Yagi)	23.7 dBm (0..234 Watts) EIRP = 3.890451 W Note 1	1Watt, EIRP < 4 Watts	Complies
15.247 (b) (3)	RSS 210 A8.4 (1)	Output Power (7dBd Monopole)	26.7 dBm (0.468 Watts) EIRP = 3.890 W Note 1	1Watt, EIRP < 4 Watts	Complies
15.247 (c)	RSS 210 A8.5	Antenna Port Spurious Emissions 30MHz – 9.28 GHz	All spurious emissions < -20dBc	< -20dBc	Complies
15.247 (c) 15.209	RSS 210 A8.5 Table 2, 3	Radiated Spurious Emissions 30MHz – 9.28 GHz Mono	53.1dBµV/m @ 7320.1MHz (-0.9dB)	15.207 in restricted bands, all others < -20dBc	Complies
15.247 (c) 15.209	RSS 210 A8.5 Table 2, 3	Radiated Spurious Emissions 30MHz – 9.28 GHz Yagi	50.8dBµV/m @ 7320.0MHz (-3.2dB)	15.207 in restricted bands, all others < -20dBc	Complies
15.247 (a) (1)	RSS 210 A8.1(2)	Receiver bandwidth	Refer to operational description	Shall match the channel bandwidth	Complies
Note 1: EIRP calculated using antenna gain of 6, 9.2 and 12.2 dBi with appropriate setting of output power.					

GENERAL REQUIREMENTS APPLICABLE TO ALL BANDS

FCC Rule Part	RSS Rule part	Description	Measured Value / Comments	Limit / Requirement	Result (margin)
15.203	-	RF Connector	Professional Install	Professional Install or unique or integral antenna required	Complies
15.207	RSS GEN Table 2	AC Conducted Emissions	55.0dBµV @ 0.235MHz (-7.3dB)	Refer to page 18	Complies
15.109	RSS GEN 7.2.3 Table 1	Receiver spurious emissions	43.0dBµV/m @ 400.01MHz (-3.0dB)	Refer to page 19	Complies
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	Refer to Manual	Statement required regarding non-interference	Complies
-	RSP 100 RSS GEN 7.1.5	User Manual	Refer to Manual	Statement for products with detachable antenna	Complies
-	RSP 100 RSS GEN 4.4.1	99% Bandwidth	230 kHz	Information only	N/A

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	Measurement Unit	Frequency Range	Expanded Uncertainty
RF power, conducted (power meter)	dBm	25 to 7000 MHz	± 0.52 dB
RF power, conducted (Spectrum analyzer)	dBm	25 to 7000 MHz	± 0.7 dB
Conducted emission of transmitter	dBm	25 to 26500 MHz	± 0.7 dB
Conducted emission of receiver	dBm	25 to 26500 MHz	± 0.7 dB
Radiated emission (substitution method)	dBm	25 to 26500 MHz	± 2.5 dB
Radiated emission (field strength)	dBµV/m	25 to 1000 MHz	± 3.6 dB
		1000 to 40000 MHz	± 6.0 dB
Conducted Emissions (AC Power)	dBµV	0.15 to 30 MHz	± 2.4 dB

EQUIPMENT UNDER TEST (EUT) DETAILS

GENERAL

The GE MDS LLC model Transnet-SF9 is a frequency hopping radio module that is designed to used in other equipment to provide a radio function. Since the EUT could be placed in any position in an end product, the EUT was treated as table-top equipment during testing to simulate the end-user environment. The electrical rating of the EUT is 3.3VDC.

The sample was received on June 28, 2010 and tested on June 28 and 30 and December 8, 2010 and January 18, 19, 20 and 24, 2011. The EUT consisted of the following component(s):

Company	Model	Description	Serial Number	FCC ID
GE MDS LLC	Transnet-SF9	FHSS Radio Module	PreProduction	E5MDS-SF9

OTHER EUT DETAILS

List any items from the test log.

ANTENNA SYSTEM

The EUT antenna is either a monopole with gains up to 7 dBd or a Yagi with gains up to 10 dBd. The EUT is professionally installed, thereby meeting the requirements of FCC 15.203.

ENCLOSURE

The EUT does not have an enclosure as it is designed to be installed within the enclosure of a host computer or system.

MODIFICATIONS

No modifications were made to the EUT during the time the product was at Elliott.

SUPPORT EQUIPMENT

The following equipment was used as support equipment for testing:

Company	Model	Description	Serial Number	FCC ID
Power Designs	6150D	DC Power Supply	902012	N/A
Gateway	Solo	Laptop Computer	184	DoC

No remote support equipment was used during testing.

EUT INTERFACE PORTS

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

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
Serial	Laptop Serial	twisted pair	Unshielded	1.5
DC Power	DC Power Supply	2 wire	Unshielded	1.5
DC Power Supply AC	AC Mains	3 wire	Unshielded	1.5
Laptop DC Power In	AC/DC adapter	multiconductor	shielded	1
AC/DC Adapter	AC Mains	2 wire	Unshielded	1

EUT OPERATION

During testing, the EUT was set to transmit continuously or in receive mode as required for the test performed.

TEST SITE

GENERAL INFORMATION

Final test measurements were taken at the test sites listed below. 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 and with industry Canada.

Site	Registration Numbers		Location
	FCC	Canada	
Chamber 3	769238	2845B-3	41039 Boyce Road Fremont, CA 94538-2435
Chamber 4	211948	2845B-4	
Chamber 5	211948	2845B-5	
Chamber 7	A2LA accreditation	2845B-7	

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. The test site(s) contain 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 16-1-1 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.

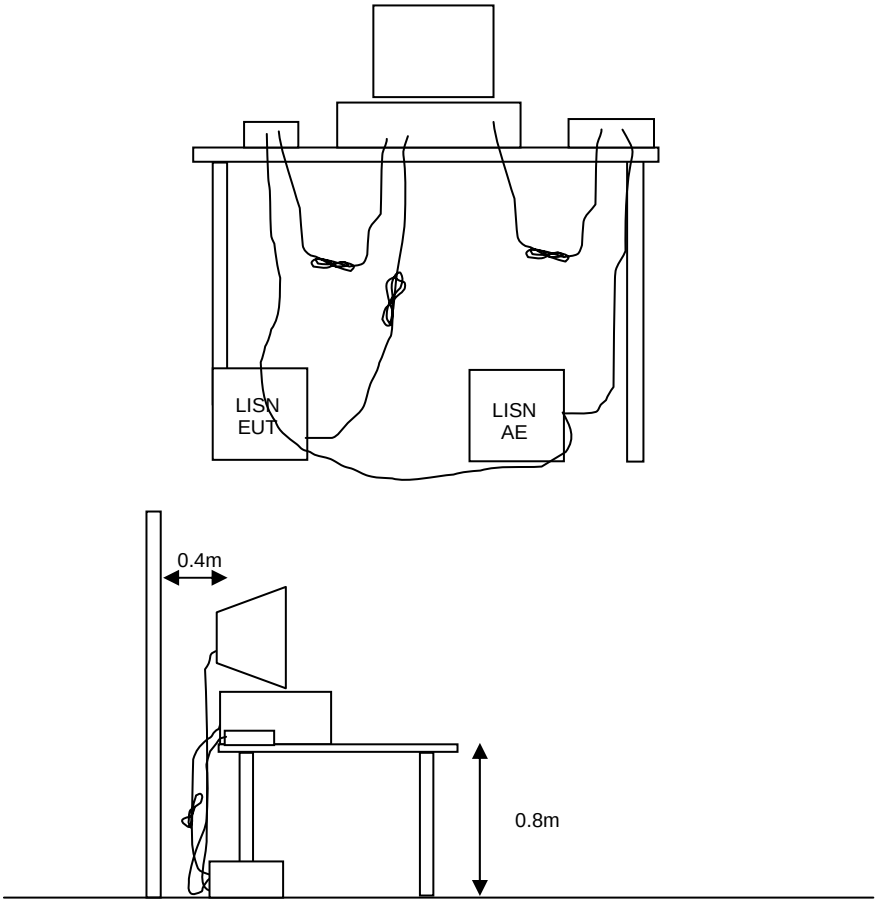


Figure 1 Typical Conducted Emissions Test Configuration

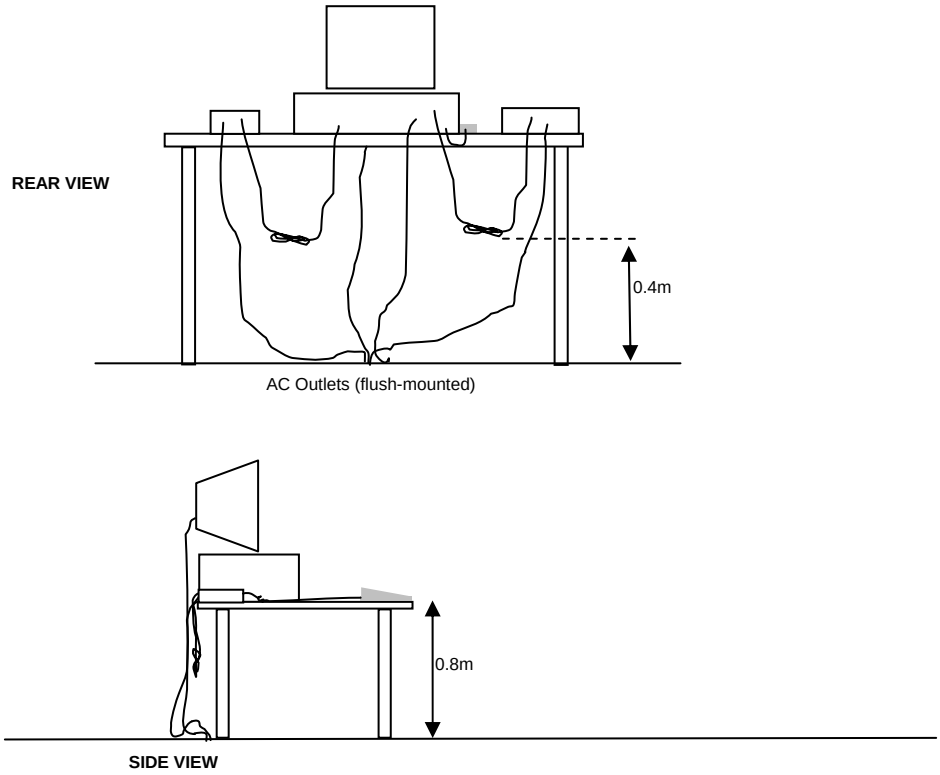
RADIATED EMISSIONS

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.

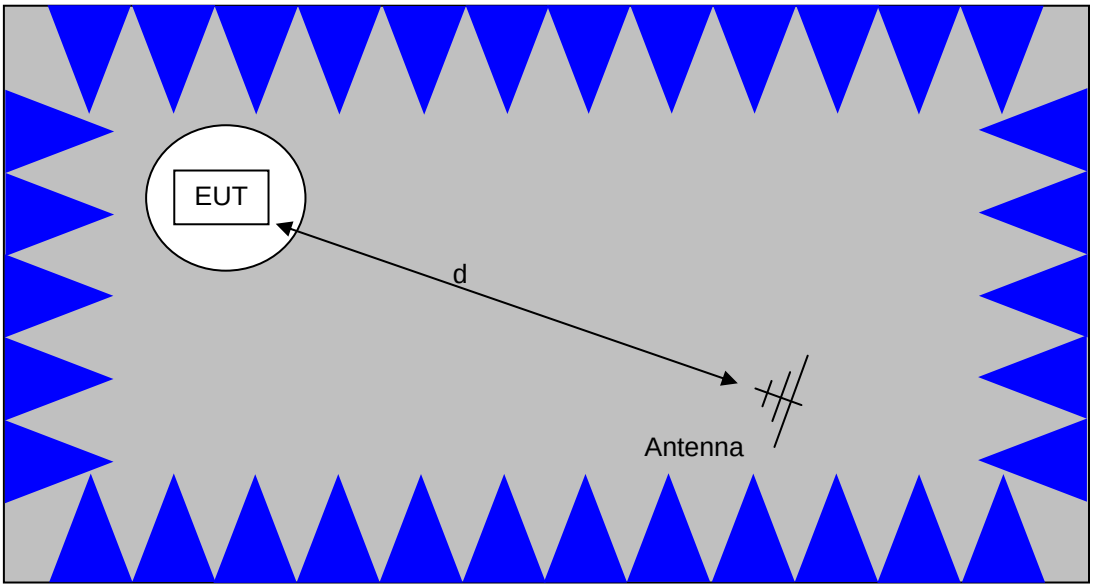
A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

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.

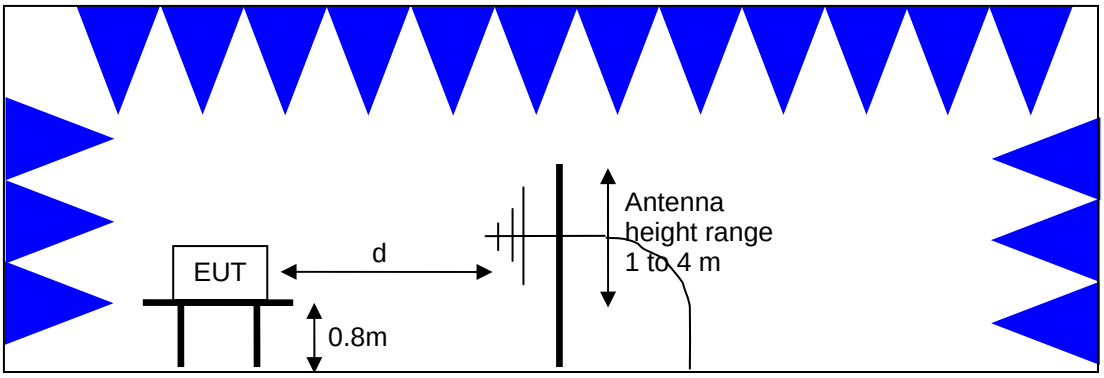


Typical Test Configuration for Radiated Field Strength Measurements



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.

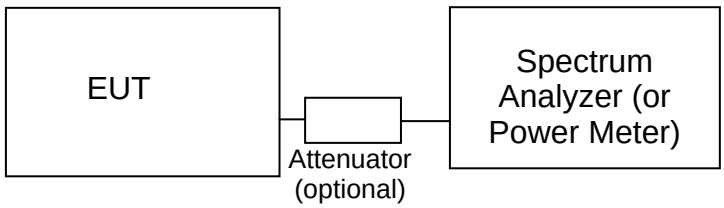
Floor-standing equipment is placed on the floor with insulating supports between the unit and the ground plane.



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

CONDUCTED EMISSIONS FROM ANTENNA PORT

Direct measurements of power, bandwidth and power spectral density are performed, where possible, with the antenna port of the EUT connected to either the power meter or spectrum analyzer via a suitable attenuator and/or filter. These are used to ensure that the front end of the measurement instrument is not overloaded by the fundamental transmission.



Test Configuration for Antenna Port Measurements

Measurement bandwidths (video and resolution) are set in accordance with the relevant standards and Elliott's test procedures for the type of radio being tested. When power measurements are made using a resolution bandwidth less than the signal bandwidth the power is calculated by summing the power across the signal bandwidth using either the analyzer channel power function or by capturing the trace data and calculating the power using software. In both cases the summed power is corrected to account for the equivalent noise bandwidth (ENBW) of the resolution bandwidth used.

If power averaging is used (typically for certain digital modulation techniques), the EUT is configured to transmit continuously. Power averaging is performed using either the built-in function of the analyzer or, if the analyzer does not feature power averaging, using external software. In both cases the average power is calculated over a number of sweeps (typically 100). When the EUT cannot be configured to continuously transmit then either the analyzer is configured to perform a gated sweep to ensure that the power is averaged over periods that the device is transmitting or power averaging is disabled and a max-hold feature is used.

If a power meter is used to make output power measurements the sensor head type (peak or average) is stated in the test data table.

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:

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

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 – FHSS SYSTEMS

The table below shows the limits for output power based on the number of channels available for the hopping system.

Operating Frequency (MHz)	Number of Channels	Output Power
902 – 928	≥ 50	1 Watt (30 dBm)
902 – 928	25 to 49	0.25 Watts (24 dBm)
2400 – 2483.5	≥ 75	1 Watt (30 dBm)
2400 – 2483.5	< 75	0.125 Watts (21 dBm)
5725 – 5850	75	1 Watt (30 dBm)

The maximum permitted output power is reduced by 1dB for every dB the antenna gain exceeds 6dBi. Fixed point-to-point applications using the 5725 – 5850 MHz band are not subject to this restriction.

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:

$$R_r - S = M$$

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 d (meters) from the equipment under test:

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

where P is the eirp (Watts)

For a measurement at 3m the conversion from a logarithmic value for field strength (dBuV/m) to an eirp power (dBm) is -95.3dB.

Appendix A Test Equipment Calibration Data

Radio Antenna Port (Power and Spurious Emissions), 28-Jun-10

Manufacturer	Description	Model	Asset #	Cal Due
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	4/14/2011
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1538	10/15/2010
Rohde & Schwarz	Attenuator, 20 dB , 50 ohm, 10W, DC-18 GHz	20dB, 10W, Type N	1556	2/5/2011

Conducted Emissions - AC Power Ports, 30-Jun-10

Manufacturer	Description	Model	Asset #	Cal Due
EMCO	LISN, 10 kHz-100 MHz	3825/2	1292	3/12/2011
Rohde & Schwarz	Pulse Limiter	ESH3 Z2	1593	5/27/2011
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1630	3/31/2011

Radiated Emissions, 30 - 1,000 MHz, 01-Jul-10

Manufacturer	Description	Model	Asset #	Cal Due
Hewlett Packard	Preamplifier, 100 kHz - 1.3 GHz	8447E	1606	4/29/2011
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	1657	5/28/2012
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1756	3/16/2011

Radiated Emissions, 1,000 - 9,500 MHz, 12-Aug-10

Manufacturer	Description	Model	Asset #	Cal Due
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	785	5/26/2011
Hewlett Packard	SpecAn 30 Hz -40 GHz, SV (SA40) Red	8564E (84125C)	1148	7/12/2011
EMCO	Antenna, Horn, 1-18 GHz (SA40-Blu)	3115	1386	9/2/2010
Hewlett Packard	High Pass filter, 1.5 GHz (Purple System)	P/N 84300-80037 (84125C)	1769	11/4/2010

Radiated Emissions, 30 - 2,800 MHz, 24-Aug-10

Manufacturer	Description	Model	Asset #	Cal Due
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	1549	6/4/2011
EMCO	Antenna, Horn, 1-18 GHz	3115	1561	6/22/2012
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1630	3/31/2011

Radiated Emissions, 2,900 - 9,300 MHz, 09-Sep-10

Manufacturer	Description	Model	Asset #	Cal Due
Hewlett Packard	SpecAn 9 KHz-26.5 GHz, Non-Program	8563E	284	1/29/2011
Hewlett Packard	High Pass filter, 1.5 GHz (Blu System)	P/N 84300-80037 (84125C)	1389	5/4/2011
EMCO	Antenna, Horn, 1-18 GHz	3115	1561	6/22/2012
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	2199	1/11/2011

Radiated Emissions, 1000 - 9,400MHz, 09-Dec-10

Manufacturer	Description	Model	Asset #	Cal Due
EMCO	Antenna, Horn, 1-18GHz	3115	868	6/8/2012
Hewlett Packard	SpecAn 30 Hz -40 GHz, SV (SA40) Red	8564E (84125C)	1148	7/12/2011
Hewlett Packard	High Pass filter, 1.5 GHz (Purple System)	P/N 84300-80037 (84125C)	1769	11/29/2011
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	2199	1/11/2011

Tx Radiated Spurious, 23-Dec-10

Manufacturer	Description	Model	Asset #	Cal Due
EMCO	Antenna, Horn, 1-18 GHz (SA40-Red)	3115	1142	8/2/2012
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	4/14/2011
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	1780	11/23/2011

Radiated Emissions, 1000 - 9400 MHz, FHSS, 28-Dec-10

Manufacturer	Description	Model	Asset #	Cal Due
EMCO	Antenna, Horn, 1-18GHz	3115	868	6/8/2012
Hewlett Packard	SpecAn 30 Hz -40 GHz, SV (SA40) Red	8564E (84125C)	1148	7/12/2011
Hewlett Packard	High Pass filter, 1.5 GHz (Purple System)	P/N 84300-80037 (84125C)	1769	11/29/2011
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	2199	1/11/2011

, 17-Jan-11

Manufacturer	Description	Model	Asset #	Cal Due
EMCO	Antenna, Horn, 1-18 GHz (SA40-Red)	3115	1142	8/2/2012
Hewlett Packard	High Pass filter, 1.5 GHz (Purple System)	P/N 84300-80037 (84125C)	1769	11/29/2011
Hewlett Packard	SpecAn 9 kHz - 40 GHz, (SA40) Purple	8564E (84125C)	1771	8/26/2011
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	1780	11/23/2011

Radiated Emissions, 30 - 10,000 MHz, 18-Jan-11

Manufacturer	Description	Model	Asset #	Cal Due
EMCO	Antenna, Horn, 1-18 GHz	3115	487	7/6/2012
Hewlett Packard	High Pass filter, 1.5 GHz (Blu System)	P/N 84300-80037 (84125C)	1389	5/4/2011
Hewlett Packard	SpecAn 9 kHz - 40 GHz, (SA40) Purple	8564E (84125C)	1771	8/26/2011
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	1780	11/23/2011

Radiated Emissions, 30 - 10,000 MHz, 19-Jan-11

Manufacturer	Description	Model	Asset #	Cal Due
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	263	12/8/2011
EMCO	Antenna, Horn, 1-18GHz	3115	868	6/8/2012
Hewlett Packard	EMC Spectrum Analyzer, 9 KHz - 22 GHz	8593EM	1319	11/22/2011
Rohde & Schwarz	Test Receiver, 9 kHz-2750 MHz	ESCS 30	1337	11/24/2011
Hewlett Packard	High Pass filter, 1.5 GHz (Blu System)	P/N 84300-80037 (84125C)	1389	5/4/2011
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	4/14/2011
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	1548	6/24/2012
Com-Power Corp.	Preamplifier, 30-1000 MHz	PAM-103	2234	5/19/2011

Radio Antenna Port & RE, 30-2800 MHz, 20-Jan-11

Manufacturer	Description	Model	Asset #	Cal Due
Hewlett Packard	SpecAn 30 Hz -40 GHz, SV	8564E (84125C)	1148	7/12/2011

	(SA40) Red			
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	1549	6/4/2011
Hewlett Packard	Preamplifier, 100 kHz - 1.3 GHz	8447E	1606	4/29/2011
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1756	3/16/2011

Bandwidth and Spurious, 24-Jan-11

Manufacturer	Description	Model	Asset #	Cal Due
Hewlett Packard	SpecAn 9 KHz-26.5 GHz, Non-Program	8563E	284	1/29/2011

Appendix B Test Data

T79794 34 Pages

Client:	GE MDS LLC	Job Number:	J79098
Model:	Transnet-SF9	T-Log Number:	T79794
		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

Transnet-SF9

Date of Last Test: 1/24/2011

Client:	GE MDS LLC	Job Number:	J79098
Model:	Transnet-SF9	T-Log Number:	T79794
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy		
Standard:	FCC 15.247, RSS-210	Class:	N/A

Radiated Spurious Emissions, Receiver

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: 1/19/2011 & 1/20/11
Test Engineer: John Caizzi
Test Location: FT7 & FT3

Config. Used: 1
Config Change: None
EUT Voltage: 3.3VDC

General Test Configuration

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

The measurement antenna was located 3 meters from the EUT.

Ambient Conditions:

Temperature: 21 °C
Rel. Humidity: 41 %

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	Conducted Spurious Emissions Receive Mode 30 - 2800 MHz	15.111(a), RSS-GEN	Pass	-65.6dBµV @ 816.83MHz (-8.6dB)
3	Radiated Spurious Emissions Receive Mode 30 - 2800 MHz	FCC 15.109, RSS-GEN Table 1	Pass	43.0dBµV/m @ 400.01MHz (-3.0dB)

Modifications Made During Testing

No modifications were made to the EUT during testing

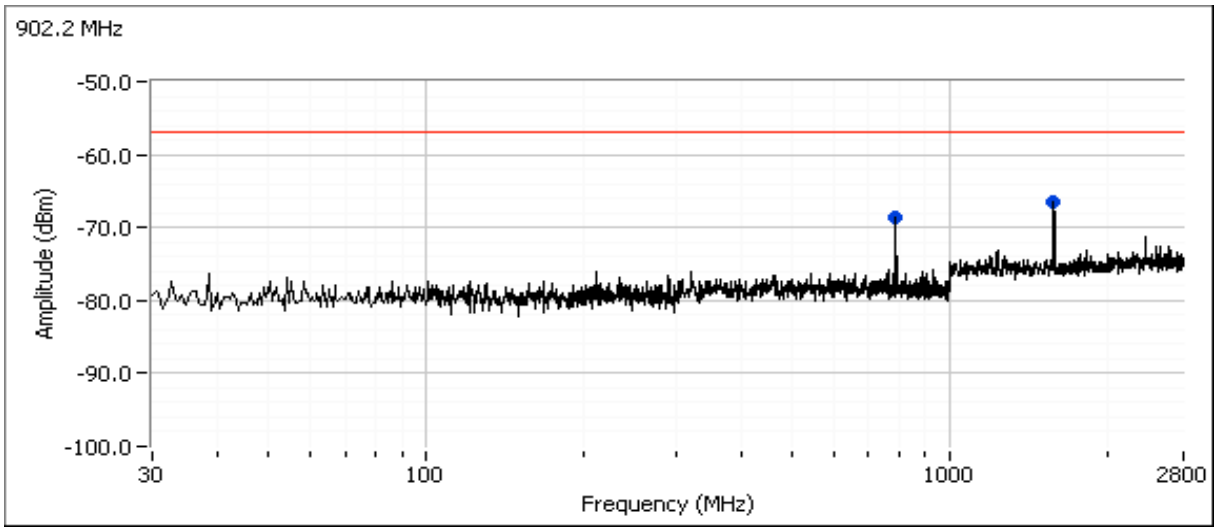
Deviations From The Standard

No deviations were made from the requirements of the standard.

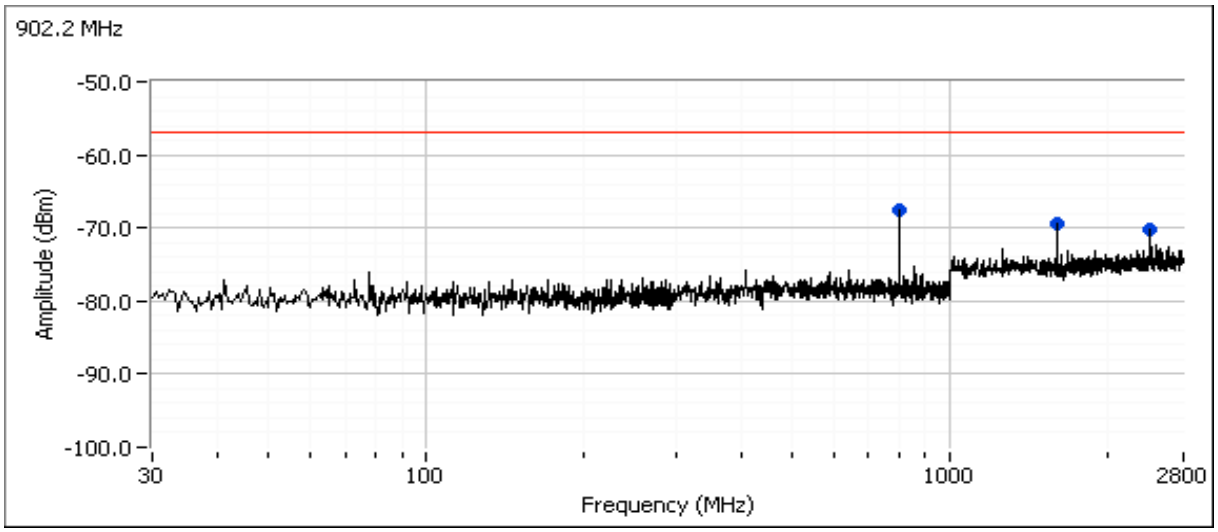
Client:	GE MDS LLC	Job Number:	J79098
Model:	Transnet-SF9	T-Log Number:	T79794
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy		
Standard:	FCC 15.247, RSS-210	Class:	N/A

Run #1: RF Port Conducted Emissions, 30 - 2800MHz

Graph - low channel at 902.2 MHz

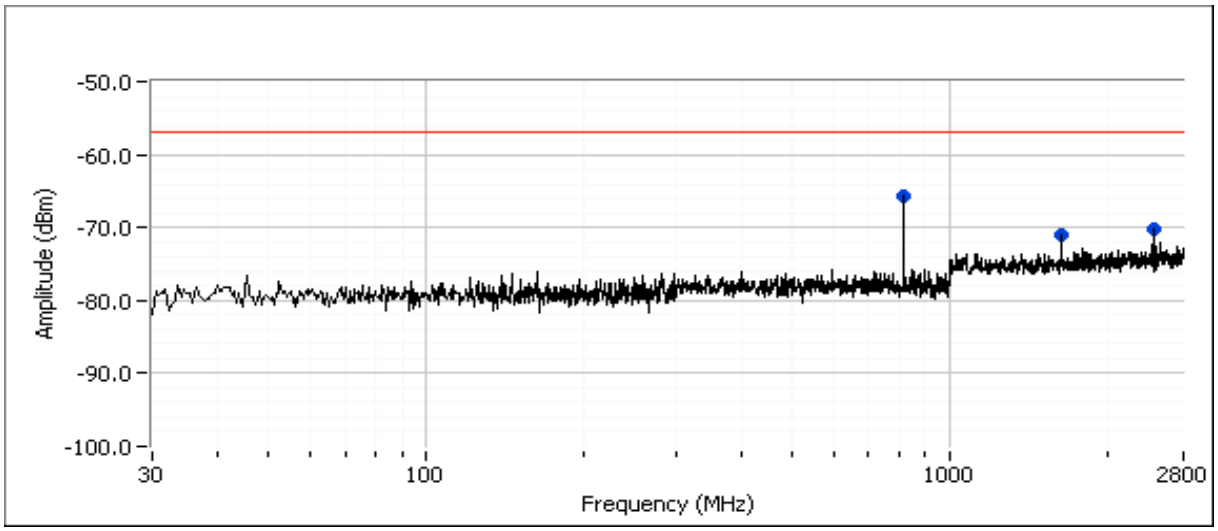


Graph - middle channel at 915 MHz



Client:	GE MDS LLC	Job Number:	J79098
Model:	Transnet-SF9	T-Log Number:	T79794
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy		
Standard:	FCC 15.247, RSS-210	Class:	N/A

Graph - high channel at 927.6 MHz

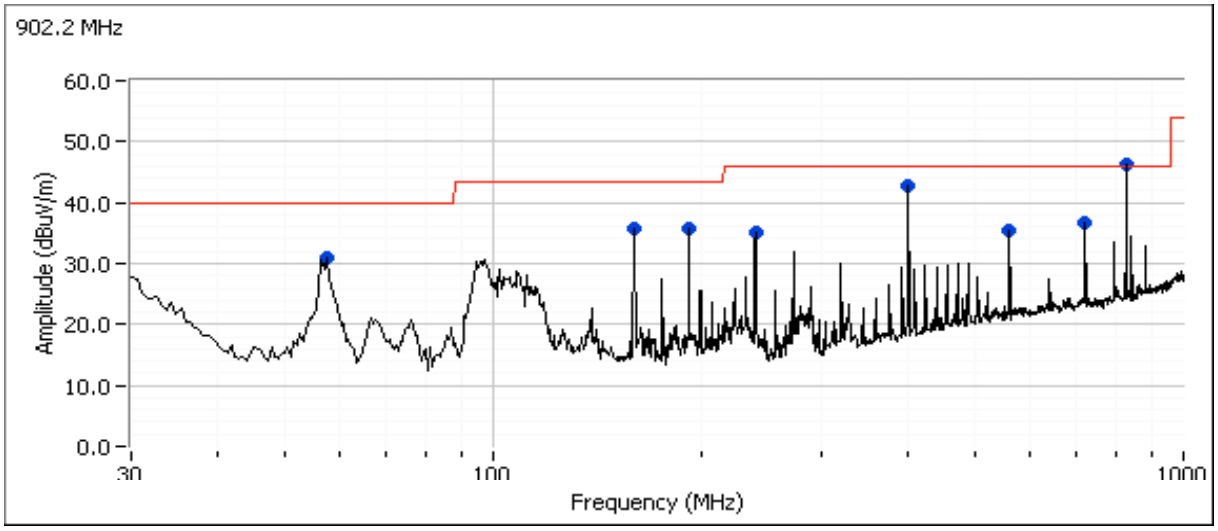


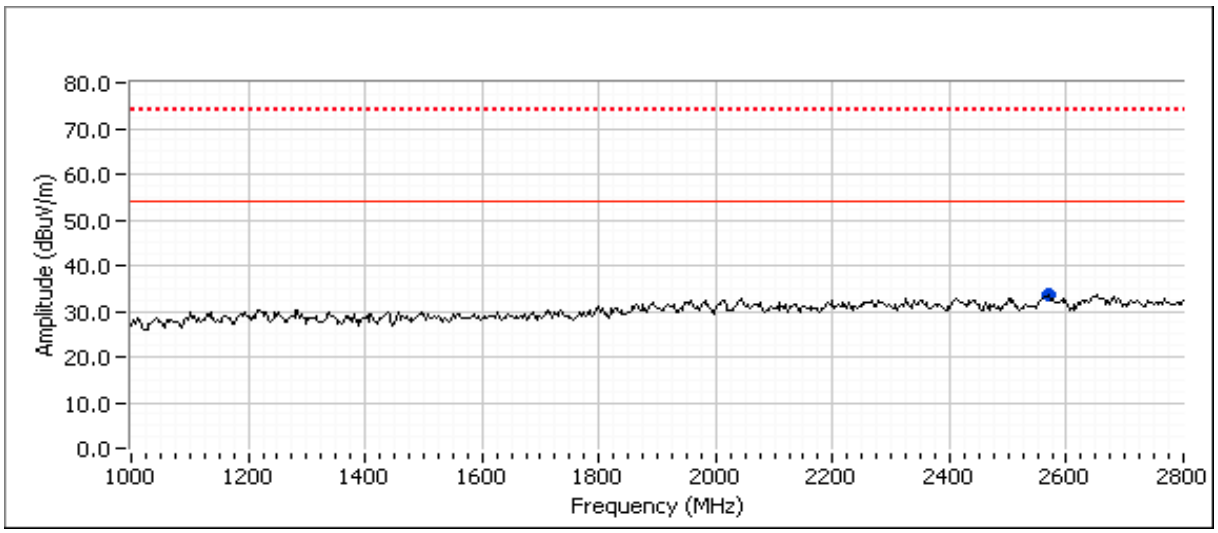
Frequency MHz	Level dBµV	Port	15.111(a) Limit	15.111(a) Margin	Detector QP/Ave	Azimuth degrees	Height meters	Comments	Channel
791.167	-68.6	RF	-57.0	-11.6	Peak				902.2
1582.000	-66.5	RF	-57.0	-9.5	Peak				902.2
804.000	-68.1	RF	-57.0	-11.1	Peak				915
1609.000	-69.5	RF	-57.0	-12.5	Peak				915
2413.000	-70.3	RF	-57.0	-13.3	Peak				915
816.833	-65.6	RF	-57.0	-8.6	Peak				927.6
1633.000	-71.0	RF	-57.0	-14.0	Peak				927.6
2452.000	-70.1	RF	-57.0	-13.1	Peak				927.6

Client:	GE MDS LLC	Job Number:	J79098
Model:	Transnet-SF9	T-Log Number:	T79794
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy		
Standard:	FCC 15.247, RSS-210	Class:	N/A

Run #2: Preliminary Radiated Spurious Emissions, Receive Mode, 30 - 2800 MHz
Test performed with RF Port with highest gain antenna only as antenna port power tests were performed above.
Measurements made at 3m

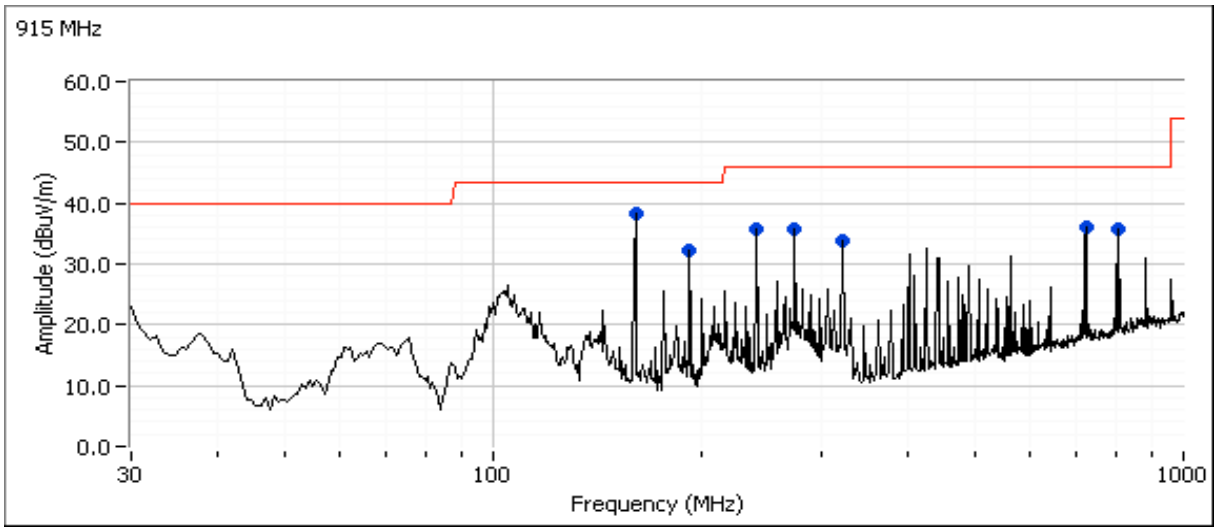
Graph - low channel at 902.2 MHz

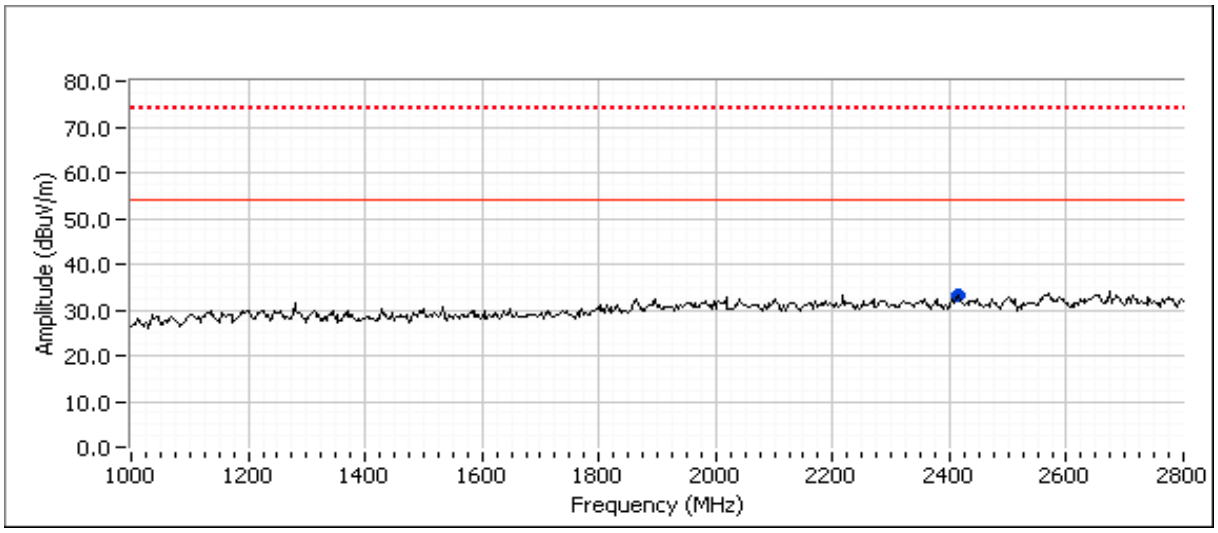




Client:	GE MDS LLC	Job Number:	J79098
Model:	Transnet-SF9	T-Log Number:	T79794
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy		
Standard:	FCC 15.247, RSS-210	Class:	N/A

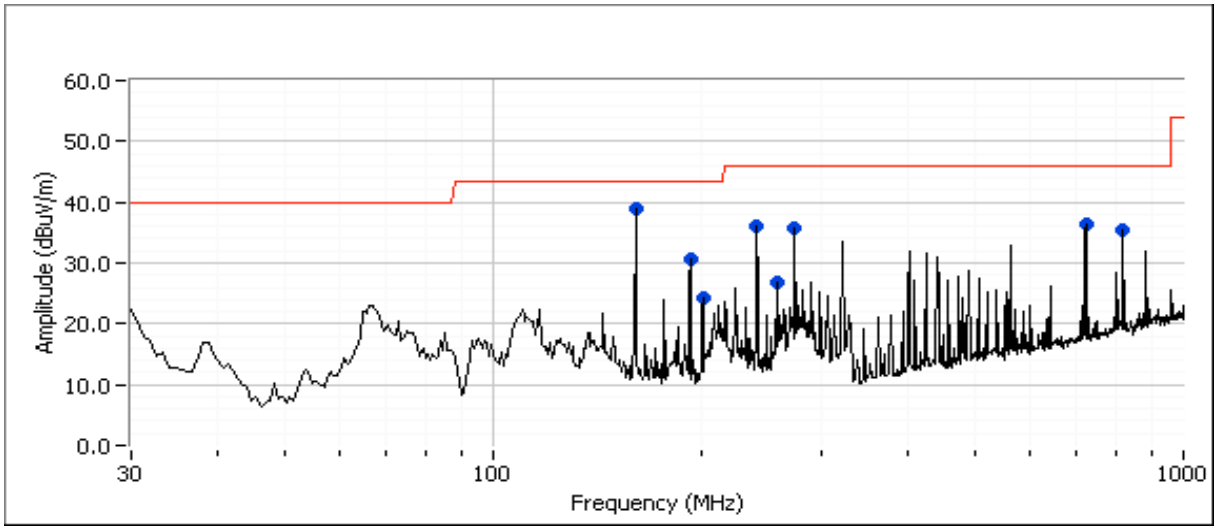
Graph - middle channel at 915 MHz

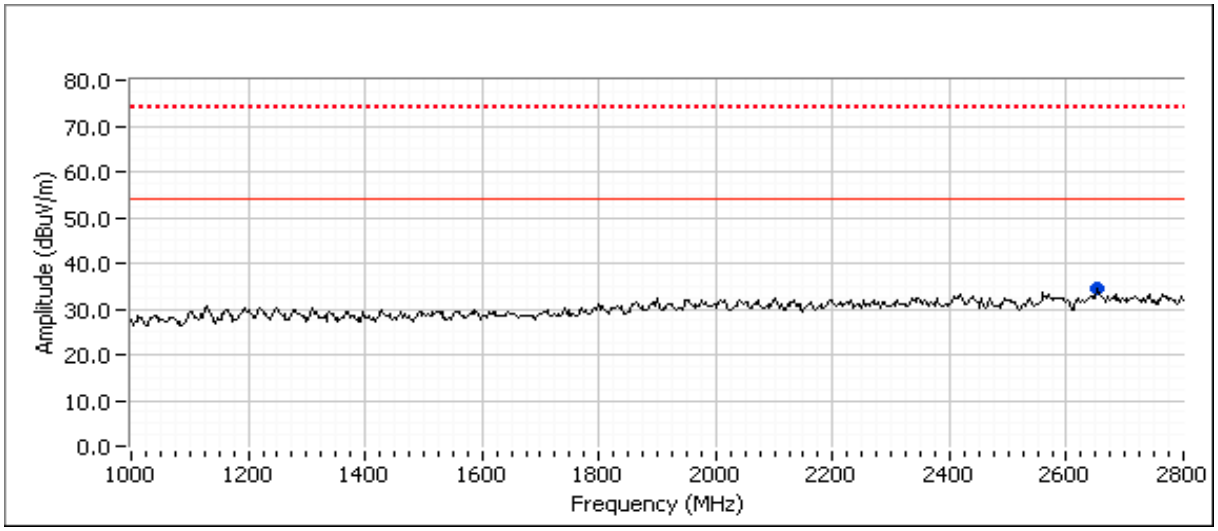




Client:	GE MDS LLC	Job Number:	J79098
Model:	Transnet-SF9	T-Log Number:	T79794
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy		
Standard:	FCC 15.247, RSS-210	Class:	N/A

Graph - high channel at 927.6 MHz





Client:	GE MDS LLC	Job Number:	J79098
Model:	Transnet-SF9	T-Log Number:	T79794
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy		
Standard:	FCC 15.247, RSS-210	Class:	N/A

Results Table - All channels

Frequency	Level	Pol	RSS-GEN		Detector	Azimuth	Height	Comments	Channel
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters		Frequency
160.001	38.9	V	43.5	-4.6	Peak	54	1.0		927.6
720.048	36.5	H	46.0	-9.5	Peak	52	1.0		927.6
239.992	36.1	V	46.0	-9.9	Peak	86	1.0		927.6
271.998	35.9	V	46.0	-10.1	Peak	86	1.0		927.6
816.953	35.3	H	46.0	-10.7	Peak	37	2.0		927.6
191.987	30.6	H	43.5	-12.9	Peak	126	1.5		927.6
201.450	*24.2*	*V*	*43.5*	*-19.3*	*Peak*	*188*	*1.0*		927.6
257.475	*26.7*	*V*	*46.0*	*-19.3*	*Peak*	*81*	*1.0*		927.6
160.001	38.3	V	43.5	-5.2	Peak	54	1.0		915
720.048	36.2	H	46.0	-9.8	Peak	45	1.0		915
239.992	35.9	V	46.0	-10.1	Peak	89	1.0		915
804.336	35.8	H	46.0	-10.2	Peak	141	1.0		915
271.990	35.7	V	46.0	-10.3	Peak	98	1.0		915
191.988	32.1	V	43.5	-11.4	Peak	76	1.0		915
321.000	*33.7*	*H*	*46.0*	*-12.3*	*Peak*	*119*	*1.0*		915
827.455	*46.3*	*V*	*46.0*	*0.3*	*Peak*	*151*	*3.5*	*Cell phone*	902.2
400.011	42.7	H	46.0	-3.3	Peak	30	1.0		902.2
192.004	35.8	V	43.5	-7.7	Peak	143	1.0		902.2
160.006	35.7	H	43.5	-7.8	Peak	68	2.0		902.2
57.170	30.9	V	40.0	-9.1	Peak	163	1.0		902.2
720.009	36.6	H	46.0	-9.4	Peak	95	1.0		902.2
560.016	35.4	H	46.0	-10.6	Peak	173	1.5		902.2
240.481	*35.2*	*H*	*46.0*	*-10.8*	*Peak*	*56*	*1.0*		902.2
2413.000	*33.4*	*V*	*54.0*	*-20.6*	*Peak*	*290*	*1.0*		902.2
2569.000	*33.5*	*H*	*54.0*	*-20.5*	*Peak*	*358*	*1.0*		915
2560.000	*23.8*	*H*	*49.5*	*-25.7*	*Peak*	*161*	*1.6*		927.6

Client:	GE MDS LLC	Job Number:	J79098
Model:	Transnet-SF9	T-Log Number:	T79794
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy		
Standard:	FCC 15.247, RSS-210	Class:	N/A

Run #3: Radiated Spurious Emissions, Receive Mode: Final Field Strength Measurements

Frequency	Level	Pol	RSS-GEN		Detector	Azimuth	Height	Comments	Channel
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters		Frequency
160.001	38.4	V	43.5	-5.1	QP	62	1.00		927.6
720.010	38.1	H	46.0	-7.9	QP	60	1.19		927.6
239.992	34.9	V	46.0	-11.1	QP	91	1.00		927.6
816.903	34.4	H	46.0	-11.6	QP	39	1.98		927.6
271.998	34.3	V	46.0	-11.7	QP	92	1.00		927.6
191.997	30.1	H	43.5	-13.4	QP	130	1.75		927.6
160.001	38.1	V	43.5	-5.4	QP	62	1.00		915
719.998	37.3	H	46.0	-8.7	QP	60	1.13		915
240.002	35.8	V	46.0	-10.2	QP	93	1.00		915
272.000	35.0	V	46.0	-11.0	QP	92	1.00		915
804.306	34.6	H	46.0	-11.4	QP	147	1.00		915
191.998	31.4	V	43.5	-12.1	QP	81	1.00		915
400.011	43.0	H	46.0	-3.0	QP	35	1.00		927.6
192.004	36.0	V	43.5	-7.5	QP	146	1.00		927.6
160.006	35.8	H	43.5	-7.7	QP	61	1.75		927.6
720.009	37.1	H	46.0	-8.9	QP	92	1.00		927.6
560.016	36.0	H	46.0	-10.0	QP	173	1.43		927.6
57.170	25.2	V	40.0	-14.8	QP	162	1.00		927.6
2413.000	*33.4*	*V*	*54.0*	*-20.6*	*Peak*	*290*	*1.0*		*902.2*
2569.000	*33.5*	*H*	*54.0*	*-20.5*	*Peak*	*358*	*1.0*		*915*
2560.000	*23.8*	*H*	*49.5*	*-25.7*	*Peak*	*161*	*1.6*		*927.6*

Client:	GE MDS LLC	Job Number:	J79098
Model:	Transnet-SF9	T-Log Number:	T79794
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy		
Standard:	FCC 15.247, RSS-210	Class:	-

Conducted 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: 6/30/2010
Test Engineer: Mark Hill
Test Location: FT Chamber #5

Config. Used: 1
Config Change: -
Host Unit Voltage 120V, 60 Hz

General Test Configuration

For tabletop equipment, the EUT was located on a wooden table inside the semi-anechoic chamber, 40 cm from a vertical coupling plane and 80cm from the LISN. A second LISN was used for all local support equipment.

Ambient Conditions:

Temperature: 21 °C
Rel. Humidity: 40 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	CE, AC Power,120V/60Hz	15.207(a)	Pass	55.0dBµV @ 0.235MHz (-7.3dB)

Modifications Made During Testing

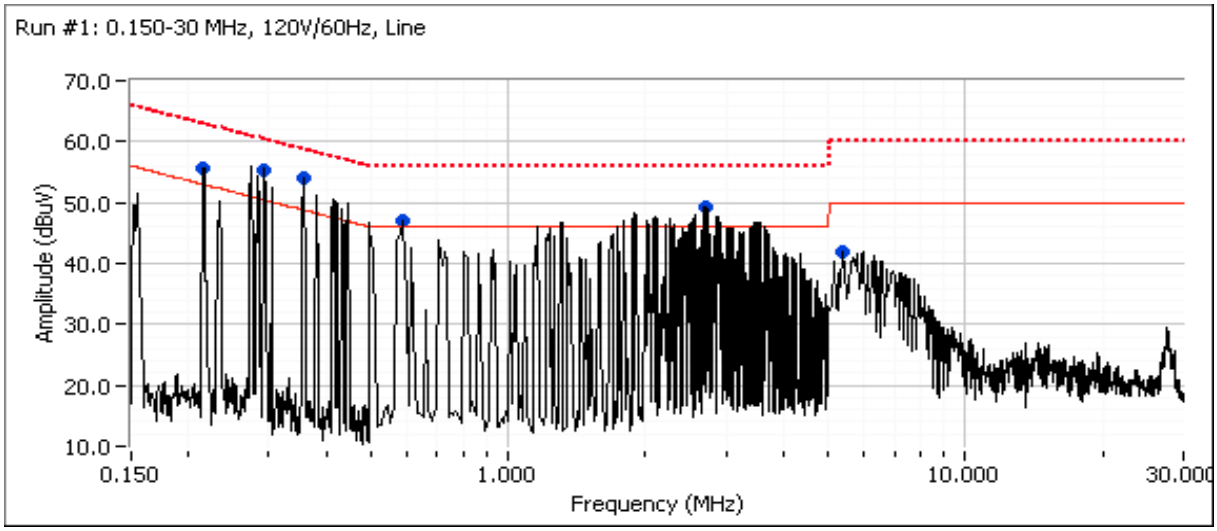
No modifications were made to the EUT during testing

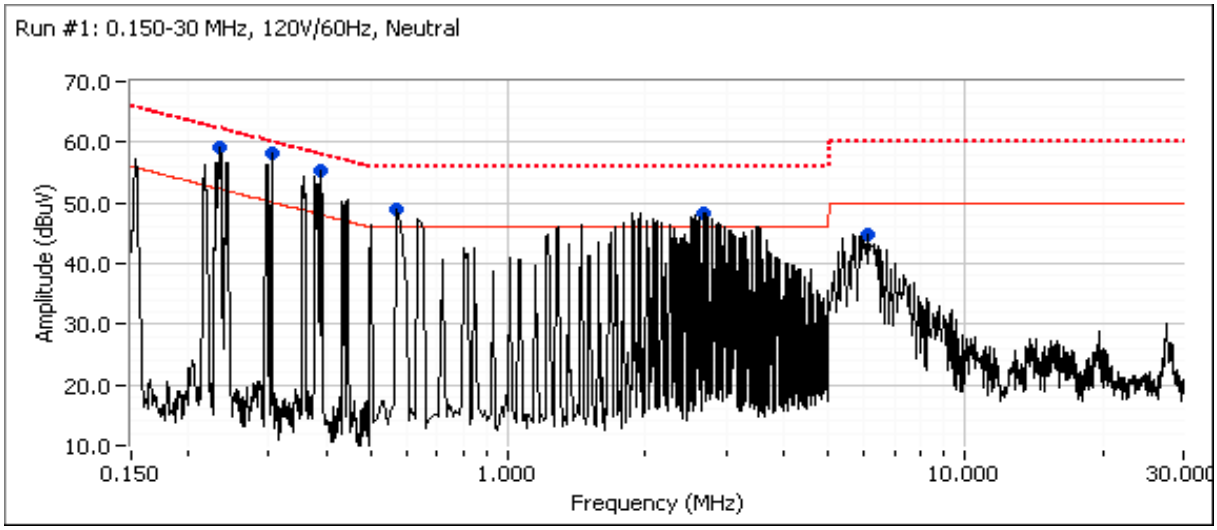
Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	GE MDS LLC	Job Number:	J79098
Model:	Transnet-SF9	T-Log Number:	T79794
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy		
Standard:	FCC 15.247, RSS-210	Class:	-

Run #1: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz (performed on support power supply)





Client:	GE MDS LLC	Job Number:	J79098
Model:	Transnet-SF9	T-Log Number:	T79794
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy		
Standard:	FCC 15.247, RSS-210	Class:	-

Final quasi-peak and average readings

Frequency	Level	AC	Class B		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
0.235	55.0	Neutral	62.3	-7.3	QP	QP (1.00s)
0.305	52.6	Neutral	60.1	-7.5	QP	QP (1.00s)
0.154	58.2	Neutral	65.8	-7.6	QP	QP (1.00s)
0.391	49.4	Neutral	58.0	-8.6	QP	QP (1.00s)
0.293	50.9	Line 1	60.4	-9.5	QP	QP (1.00s)
0.358	48.8	Line 1	58.8	-10.0	QP	QP (1.00s)
0.216	49.8	Line 1	63.0	-13.2	QP	QP (1.00s)
0.565	42.7	Neutral	56.0	-13.3	QP	QP (1.00s)
5.416	36.6	Line 1	50.0	-13.4	AVG	AVG (0.10s)
2.704	41.0	Line 1	56.0	-15.0	QP	QP (1.00s)
0.595	40.6	Line 1	56.0	-15.4	QP	QP (1.00s)
2.697	40.3	Neutral	56.0	-15.7	QP	QP (1.00s)
6.172	31.7	Neutral	50.0	-18.3	AVG	AVG (0.10s)
5.416	41.6	Line 1	60.0	-18.4	QP	QP (1.00s)
6.172	36.1	Neutral	60.0	-23.9	QP	QP (1.00s)
0.305	24.3	Neutral	50.1	-25.8	AVG	AVG (0.10s)
0.391	21.5	Neutral	48.0	-26.5	AVG	AVG (0.10s)
0.235	25.4	Neutral	52.3	-26.9	AVG	AVG (0.10s)
0.358	21.0	Line 1	48.8	-27.8	AVG	AVG (0.10s)
0.154	27.9	Neutral	55.8	-27.9	AVG	AVG (0.10s)
0.293	22.3	Line 1	50.4	-28.1	AVG	AVG (0.10s)
0.565	16.6	Neutral	46.0	-29.4	AVG	AVG (0.10s)
0.216	21.6	Line 1	53.0	-31.4	AVG	AVG (0.10s)
2.697	14.4	Neutral	46.0	-31.6	AVG	AVG (0.10s)
0.595	14.4	Line 1	46.0	-31.6	AVG	AVG (0.10s)
2.704	14.1	Line 1	46.0	-31.9	AVG	AVG (0.10s)

Note 1: All peak emissions that exceeded the average limit in the scan were evaluated to confirm compliance with the average limit. Worse case results shown in table above.

Client:	GE MDS LLC	Job Number:	J79098
Model:	Transnet-SF9	T-Log Number:	T79794
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy		
Standard:	FCC 15.247, RSS-210	Class:	N/A

RSS 210 and FCC 15.247 (FHSS) 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.

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing. All remote support equipment was located approximately 30 meters from the EUT with all I/O connections running on top of the groundplane or routed in overhead in the GR-1089 test configuration.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT. The EUT's monopole antenna was oriented vertically as it would be in use.

Ambient Conditions:

Temperature: 15-25 °C
Rel. Humidity: 35-50 %

Summary of Results - Device Operating in the 900 MHz Band

Run #		Channel	Power Setting	Measured Power	Test Performed	Limit	Result / Margin
1a		low	30	29.7	Radiated Emissions, 30 MHz-9.3GHz	FCC Part 15.209 / 15.247(c)	53.0dBµV/m @ 8119.8MHz (-1.0dB)
1b		center	30	29.7	Radiated Emissions, 30 MHz-9.3GHz	FCC Part 15.209 / 15.247(c)	53.1dBµV/m @ 7320.1MHz (-0.9dB)
1c		high	30	29.6	Radiated Emissions, 30 MHz-9.3GHz	FCC Part 15.209 / 15.247(c)	51.9dBµV/m @ 7420.9MHz (-2.1dB)

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.

Antenna Type and Gain

Monopole, 7dBd

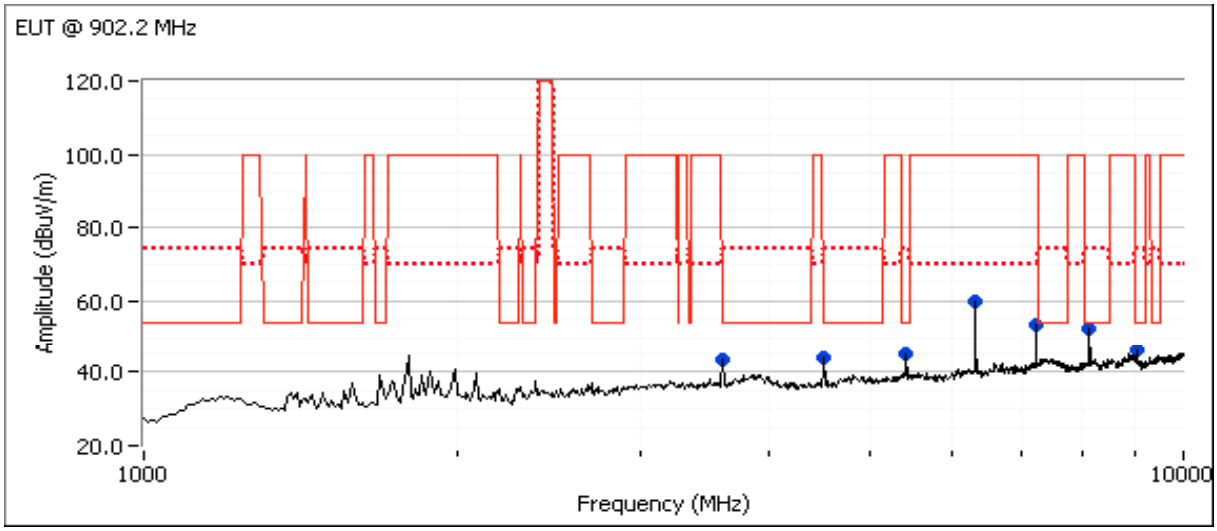
Client:	GE MDS LLC	Job Number:	J79098
Model:	Transnet-SF9	T-Log Number:	T79794
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy		
Standard:	FCC 15.247, RSS-210	Class:	N/A

Run #1: Radiated Spurious Emissions, 30 - 10000 MHz.
Date of Test: 1/18/2011 & 1/19/11
Test Engineer: David Bare & John Caizzi
Test Location: Chamber #4 & Chamber #7

Run #1a: Low Channel @ 902.2 MHz

Fundamental emission level @ 3m in 100kHz RBW:		dBµV/m
Limit for emissions outside of restricted bands:	-20	dBµV/m

Limit is -20dBc (Peak power measurement)



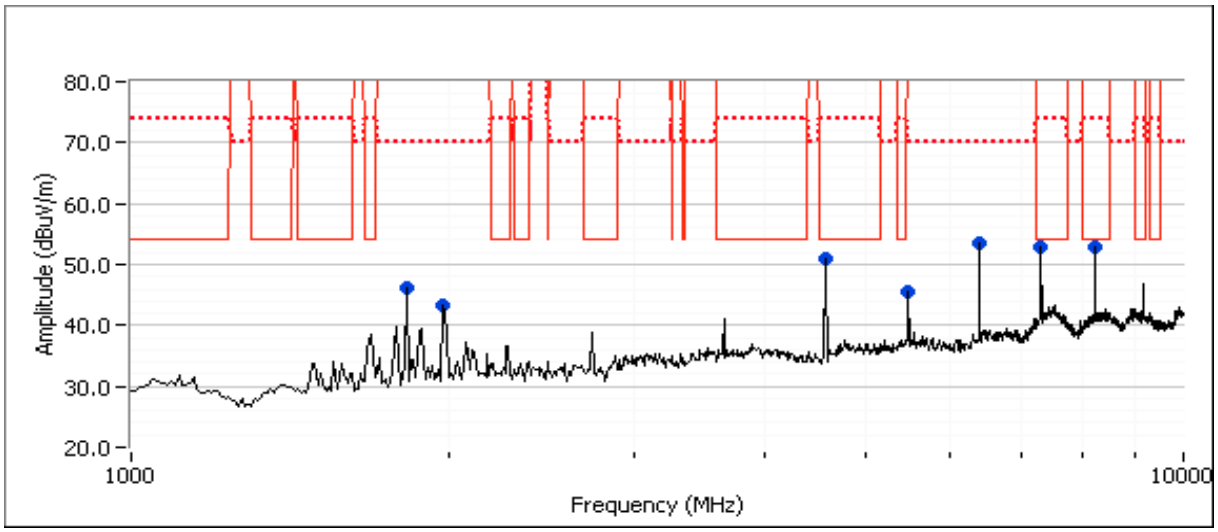
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
8119.830	53.0	H	54.0	-1.0	AVG	261	1.0	RB 1 MHz;VB 10 Hz;Pk
8119.840	55.8	H	74.0	-18.2	PK	261	1.0	RB 1 MHz;VB 3 MHz;Pk
8119.840	48.3	V	54.0	-5.7	AVG	124	1.0	RB 1 MHz;VB 10 Hz;Pk
8119.810	53.4	V	74.0	-20.6	PK	124	1.0	RB 1 MHz;VB 3 MHz;Pk
9021.970	40.8	V	54.0	-13.2	AVG	283	1.6	RB 1 MHz;VB 10 Hz;Pk
9022.010	49.7	V	74.0	-24.3	PK	283	1.6	RB 1 MHz;VB 3 MHz;Pk
5413.300	43.3	H	54.0	-10.7	AVG	85	1.0	RB 1 MHz;VB 10 Hz;Pk
5413.360	48.7	H	74.0	-25.3	PK	85	1.0	RB 1 MHz;VB 3 MHz;Pk
5413.230	49.8	V	54.0	-4.2	AVG	102	1.2	RB 1 MHz;VB 10 Hz;Pk
5413.250	52.7	V	74.0	-21.3	PK	102	1.2	RB 1 MHz;VB 3 MHz;Pk

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.

Client:	GE MDS LLC	Job Number:	J79098
Model:	Transnet-SF9	T-Log Number:	T79794
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy		
Standard:	FCC 15.247, RSS-210	Class:	N/A

Run #1b: Center Channel @ 915 MHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
8238.330	*52.9*	*H*	*54.0*	*-1.1*	*Peak*	*208*	*1.0*	
7322.500	*52.8*	*H*	*54.0*	*-1.2*	*Peak*	*189*	*1.0*	
4565.830	*51.1*	*H*	*54.0*	*-2.9*	*Peak*	*163*	*1.0*	
6399.170	*53.4*	*H*	*70.0*	*-16.6*	*Peak*	*192*	*1.0*	
1825.000	*46.2*	*V*	*70.0*	*-23.8*	*Peak*	*91*	*1.0*	
5482.500	*45.6*	*H*	*70.0*	*-24.4*	*Peak*	*184*	*1.0*	
1980.830	*43.4*	*V*	*70.0*	*-26.6*	*Peak*	*225*	*1.0*	
7320.070	53.1	H	54.0	-0.9	AVG	190	1.00	
7320.030	55.6	H	74.0	-18.4	PK	190	1.00	
4575.050	52.8	H	54.0	-1.2	AVG	166	1.00	
4575.010	53.8	H	74.0	-20.2	PK	166	1.00	
8235.060	50.2	V	54.0	-3.8	AVG	305	1.0	
8234.900	53.7	V	74.0	-20.3	PK	305	1.0	
8235.010	52.8	H	54.0	-1.2	AVG	210	1.0	
8234.900	55.8	H	74.0	-18.2	PK	210	1.0	



Client:	GE MDS LLC	Job Number:	J79098
Model:	Transnet-SF9	T-Log Number:	T79794
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy		
Standard:	FCC 15.247, RSS-210	Class:	N/A

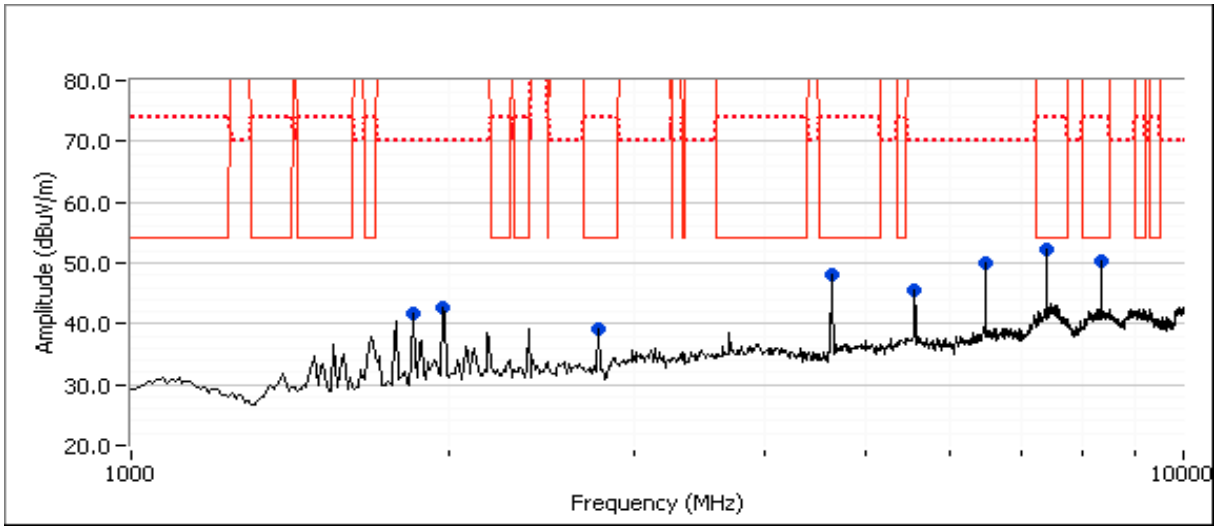
Run #1c: High Channel @ 927.6 MHz

Fundamental emission level @ 3m in 100kHz RBW:		dBµV/m
Limit for emissions outside of restricted bands:	-20	dBµV/m

Limit is -20dBc (Peak power measurement)

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
7421.670	*52.2*	*H*	*54.0*	*-1.8*	*Peak*	*202*	*1.0*	
8349.170	*50.4*	*H*	*54.0*	*-3.6*	*Peak*	*348*	*1.0*	
4630.000	*48.1*	*H*	*54.0*	*-5.9*	*Peak*	*210*	*1.3*	
2778.330	*39.3*	*V*	*54.0*	*-14.7*	*Peak*	*113*	*1.3*	
6490.830	*50.1*	*H*	*70.0*	*-19.9*	*Peak*	*194*	*1.0*	
5555.830	*45.5*	*H*	*70.0*	*-24.5*	*Peak*	*184*	*1.0*	
1980.830	*42.7*	*V*	*70.0*	*-27.3*	*Peak*	*224*	*1.0*	
1852.500	*41.6*	*V*	*70.0*	*-28.4*	*Peak*	*100*	*1.0*	
7420.870	51.9	H	54.0	-2.1	AVG	206	1.00	
7420.790	55.0	H	74.0	-19.0	PK	206	1.00	
4638.030	49.2	H	54.0	-4.8	AVG	224	1.32	
4638.030	51.6	H	74.0	-22.4	PK	224	1.32	
8348.440	49.9	H	54.0	-4.1	AVG	350	1.00	
8348.590	53.3	H	74.0	-20.7	PK	350	1.00	

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.



Client:	GE MDS LLC	Job Number:	J79098
Model:	Transnet-SF9	T-Log Number:	T79794
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy		
Standard:	FCC 15.247, RSS-210	Class:	N/A

RSS 210 and FCC 15.247 (FHSS) 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.

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing. All remote support equipment was located approximately 30 meters from the EUT with all I/O connections running on top of the groundplane or routed in overhead in the GR-1089 test configuration.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT. Preliminary tests showed that polarization of the EUT's Yagi antenna had negligible effect on spurious emissions amplitudes. Final measurements were made with the Yagi horizontally polarized.

Ambient Conditions:

Temperature: 15-25 °C
Rel. Humidity: 35-50 %

Summary of Results - Device Operating in the 900 MHz Band

Run #		Channel	Power Setting	Measured Power	Test Performed	Limit	Result / Margin
1a		low	30	29.7	Radiated Emissions, 30 MHz-9.3GHz	FCC Part 15.209 / 15.247(c)	48.7dBµV/m @ 8119.9MHz (-5.3dB)
1b		center	30	29.7	Radiated Emissions, 30 MHz-9.3GHz	FCC Part 15.209 / 15.247(c)	50.8dBµV/m @ 7320.0MHz (-3.2dB)
1c		high	30	29.6	Radiated Emissions, 30 MHz-9.3GHz	FCC Part 15.209 / 15.247(c)	50.5dBµV/m @ 7420.8MHz (-3.5dB)

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.

Antenna Type and Gain

Yagi, 10dBd

Client:	GE MDS LLC	Job Number:	J79098
Model:	Transnet-SF9	T-Log Number:	T79794
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy		
Standard:	FCC 15.247, RSS-210	Class:	N/A

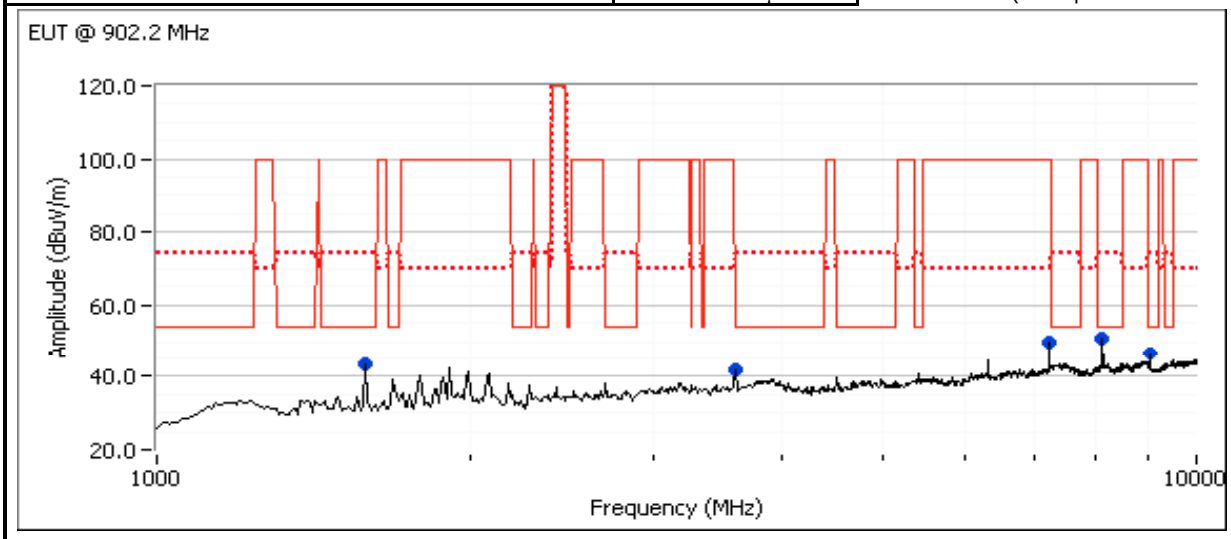
Run #1: Radiated Spurious Emissions, 30 - 10000 MHz.

Date of Test: 1/18/2011
Test Engineer: David Bare
Test Location: Chamber #4

Run #1a: Low Channel @ 902.2 MHz

Fundamental emission level @ 3m in 100kHz RBW:		dBµV/m
Limit for emissions outside of restricted bands:	-20	dBµV/m

Limit is -20dBc (Peak power measurement)



Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
8119.850	48.7	V	54.0	-5.3	AVG	22	1.8	RB 1 MHz;VB 10 Hz;Pk
8119.670	53.3	V	74.0	-20.7	PK	22	1.8	RB 1 MHz;VB 3 MHz;Pk
9022.070	45.5	V	54.0	-8.5	AVG	352	1.4	RB 1 MHz;VB 10 Hz;Pk
9022.050	52.1	V	74.0	-21.9	PK	352	1.4	RB 1 MHz;VB 3 MHz;Pk
8119.850	43.0	H	54.0	-11.0	AVG	123	1.3	RB 1 MHz;VB 10 Hz;Pk
8119.830	49.9	H	74.0	-24.1	PK	123	1.3	RB 1 MHz;VB 3 MHz;Pk

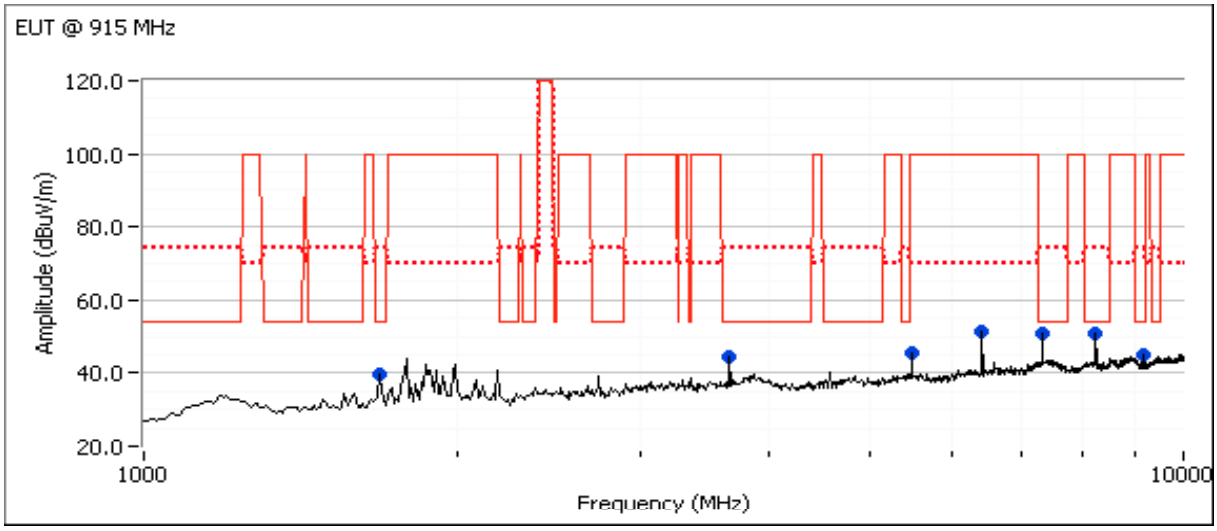
Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20dB below the level of the fundamental and measured in 100kHz.
Note 2:	Signal is not in a restricted band but the more stringent restricted band limit was used.

Client:	GE MDS LLC	Job Number:	J79098
Model:	Transnet-SF9	T-Log Number:	T79794
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy		
Standard:	FCC 15.247, RSS-210	Class:	N/A

Run #1b: Center Channel @ 915 MHz

Fundamental emission level @ 3m in 100kHz RBW:		dBµV/m
Limit for emissions outside of restricted bands:	-20	dBµV/m

Limit is -20dBc (Peak power measurement)



Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
7320.010	50.8	V	54.0	-3.2	AVG	188	1.8	RB 1 MHz;VB 10 Hz;Pk
7319.900	54.4	V	74.0	-19.6	PK	188	1.8	RB 1 MHz;VB 3 MHz;Pk
8235.060	50.1	V	54.0	-3.9	AVG	30	2.1	RB 1 MHz;VB 10 Hz;Pk
8235.090	54.1	V	74.0	-19.9	PK	30	2.1	RB 1 MHz;VB 3 MHz;Pk
9150.080	45.1	V	54.0	-8.9	AVG	0	1.5	RB 1 MHz;VB 10 Hz;Pk
9150.360	51.9	V	74.0	-22.1	PK	0	1.5	RB 1 MHz;VB 3 MHz;Pk
3660.020	38.9	V	54.0	-15.1	AVG	51	1.3	RB 1 MHz;VB 10 Hz;Pk
3660.230	45.6	V	74.0	-28.4	PK	51	1.3	RB 1 MHz;VB 3 MHz;Pk

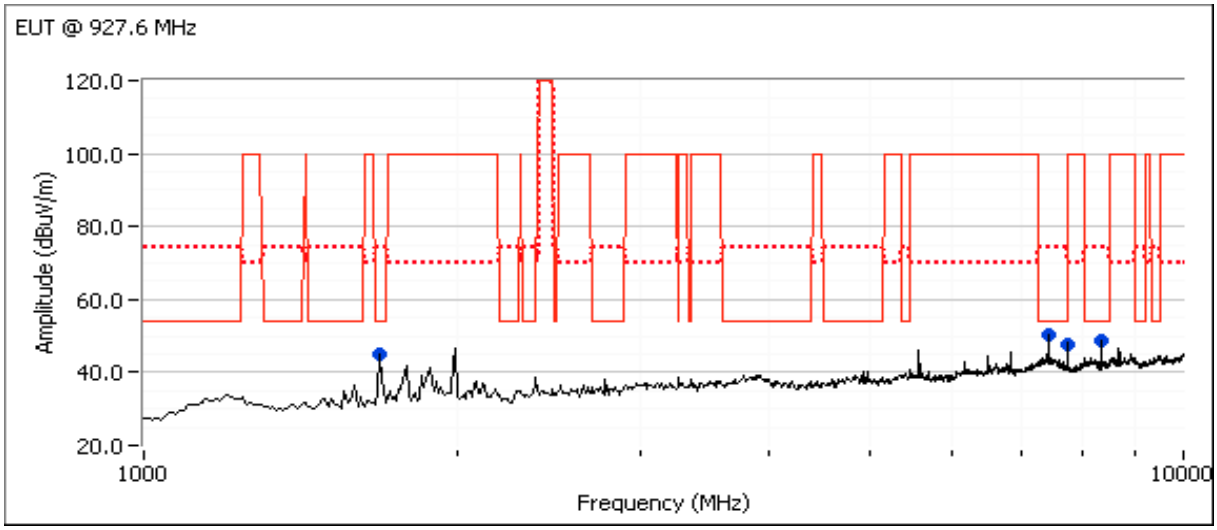
Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20dB below the level of the fundamental and measured in 100kHz.
Note 2:	Signal is not in a restricted band but the more stringent restricted band limit was used.

Client:	GE MDS LLC	Job Number:	J79098
Model:	Transnet-SF9	T-Log Number:	T79794
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy		
Standard:	FCC 15.247, RSS-210	Class:	N/A

Run #1c: High Channel @ 927.6 MHz

Fundamental emission level @ 3m in 100kHz RBW:		dBµV/m
Limit for emissions outside of restricted bands:	-20	dBµV/m

Limit is -20dBc (Peak power measurement)



Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
7420.830	50.5	V	54.0	-3.5	AVG	194	1.8	RB 1 MHz;VB 10 Hz;Pk
7420.850	54.4	V	74.0	-19.6	PK	194	1.8	RB 1 MHz;VB 3 MHz;Pk
7744.780	45.8	V	54.0	-8.2	AVG	205	1.3	RB 1 MHz;VB 10 Hz;Pk
7744.550	51.4	V	74.0	-22.6	PK	205	1.3	RB 1 MHz;VB 3 MHz;Pk
8348.420	48.6	V	54.0	-5.4	AVG	315	1.6	RB 1 MHz;VB 10 Hz;Pk
8348.640	52.7	V	74.0	-21.3	PK	315	1.6	RB 1 MHz;VB 3 MHz;Pk
7420.830	41.7	H	54.0	-12.3	AVG	306	1.5	RB 1 MHz;VB 10 Hz;Pk
7421.010	49.8	H	74.0	-24.2	PK	306	1.5	RB 1 MHz;VB 3 MHz;Pk
7744.790	36.2	H	54.0	-17.8	AVG	342	1.5	RB 1 MHz;VB 10 Hz;Pk
7744.710	47.9	H	74.0	-26.1	PK	342	1.5	RB 1 MHz;VB 3 MHz;Pk
8348.440	42.8	H	54.0	-11.2	AVG	121	1.0	RB 1 MHz;VB 10 Hz;Pk
8348.710	50.8	H	74.0	-23.2	PK	121	1.0	RB 1 MHz;VB 3 MHz;Pk

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:	Signal is not in a restricted band but the more stringent restricted band limit was used.

Client:	GE MDS LLC	Job Number:	J79098
Model:	Transnet-SF9	T-Log Number:	T79794
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy		
Standard:	FCC 15.247, RSS-210	Class:	N/A

FCC 15.247 FHSS - Power, Bandwidth and 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.

General Test Configuration

The EUT and all local support equipment were located on a bench for emissions testing.

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.

Unless stated otherwise the EUT was operating such that it constantly hopped on either the low, center or high channels.

Ambient Conditions:

Temperature:	21 °C
Rel. Humidity:	40 %

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	Output Power	15.247(b)	Pass	29.7 dBm (0.933 W)
2	20dB Bandwidth	15.247(a)	Pass	158 kHz
2	99% bandwidth	15.247(a)	Pass	230 kHz
3	30 - 10000 MHz - Conducted Spurious Emissions	FCC Part 15.247(c)	Pass	No emissions within 20dB of the limit

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.

Antenna Type and Gain

Monopole, 4.8dBd

Client:	GE MDS LLC	Job Number:	J79098
Model:	Transnet-SF9	T-Log Number:	T79794
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy		
Standard:	FCC 15.247, RSS-210	Class:	N/A

Run #1: Output Power

Date of Test: 1/18/2011
Test Engineer: John Cazzi
Test Location: FT Chamber #4

For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels.

Maximum antenna gain: 6 dBi

Setting	Channel	Frequency (MHz)	Res BW	Output Power (dBm)	Output Power (W)	EIRP (W)
30	Low	902.2	1 MHz	29.7	0.933	3.715
30	Mid	915.0	1 MHz	29.7	0.933	3.715
30	High	927.6	1 MHz	29.6	0.912	3.631

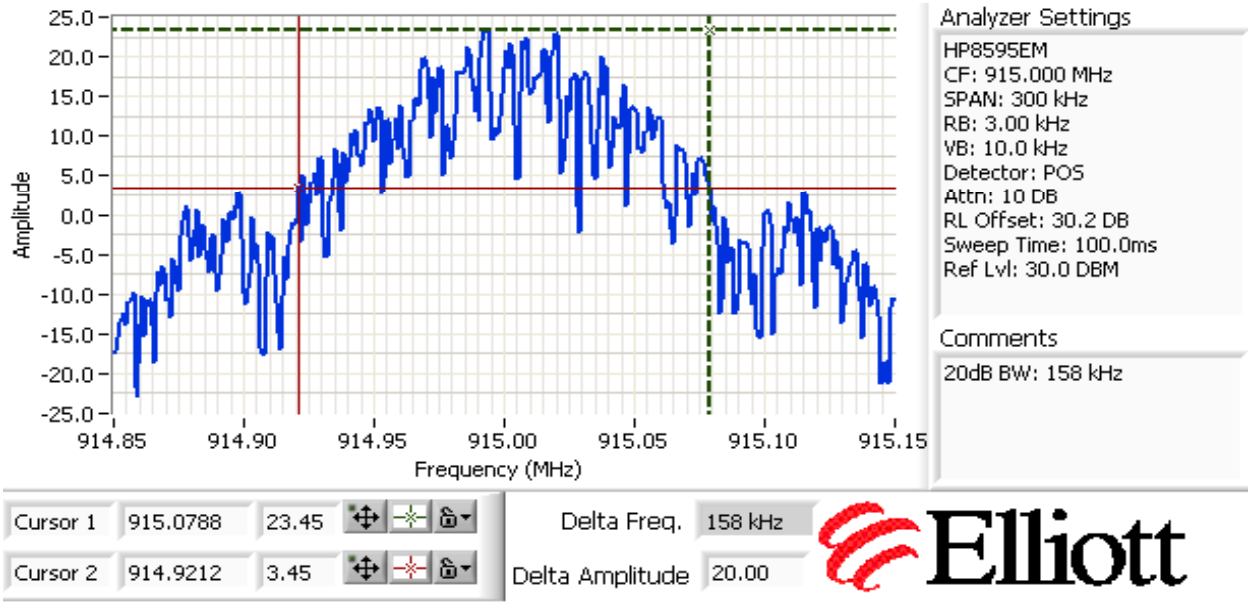
Client:	GE MDS LLC	Job Number:	J79098
Model:	Transnet-SF9	T-Log Number:	T79794
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy		
Standard:	FCC 15.247, RSS-210	Class:	N/A

Run #2: Bandwidth

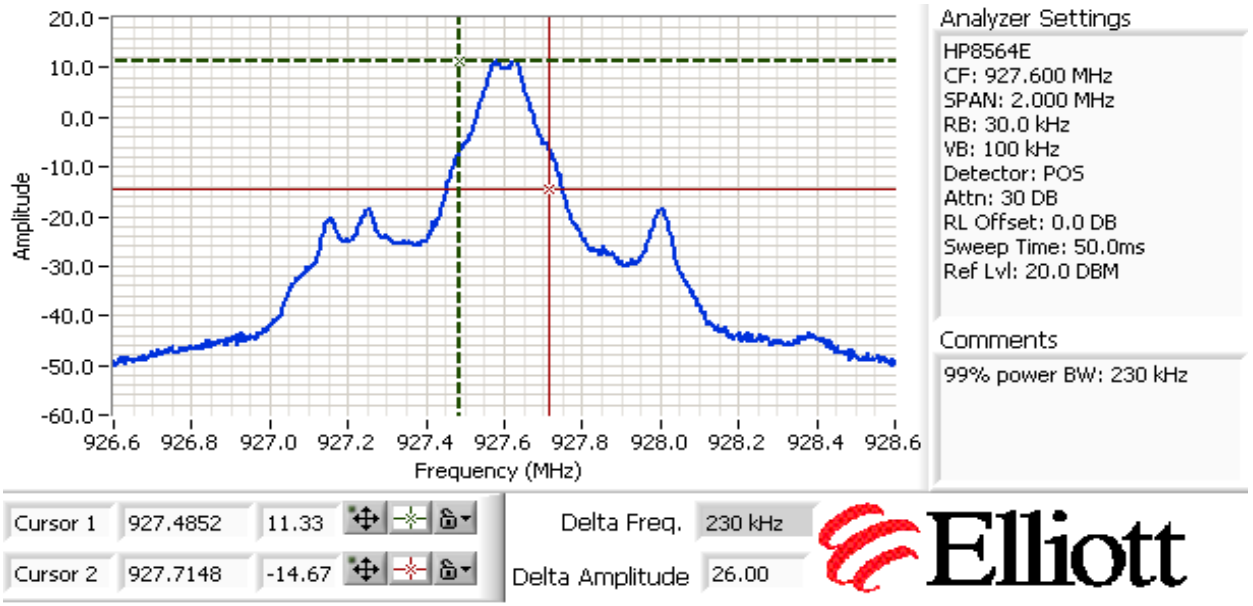
Date of Test: 1/20/2011
Test Engineer: John Caizzi
Test Location: FT3

Channel	Frequency (MHz)	Resolution Bandwidth	20dB Bandwidth (kHz)	Resolution Bandwidth	99% Bandwidth (kHz)
Low	902.2	3 kHz	150	30 kHz	220
Mid	915	3 kHz	158	30 kHz	220
High	927.6	3 kHz	157	30 kHz	230

Note 1:	20dB bandwidth measured using RB = 3 kHz, VB = 10 kHz (VB > RB)
Note 2:	99% bandwidth measured using RB = 30 kHz, VB = 100 kHz (VB >=3RB)



Client:	GE MDS LLC	Job Number:	J79098
Model:	Transnet-SF9	T-Log Number:	T79794
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy		
Standard:	FCC 15.247, RSS-210	Class:	N/A

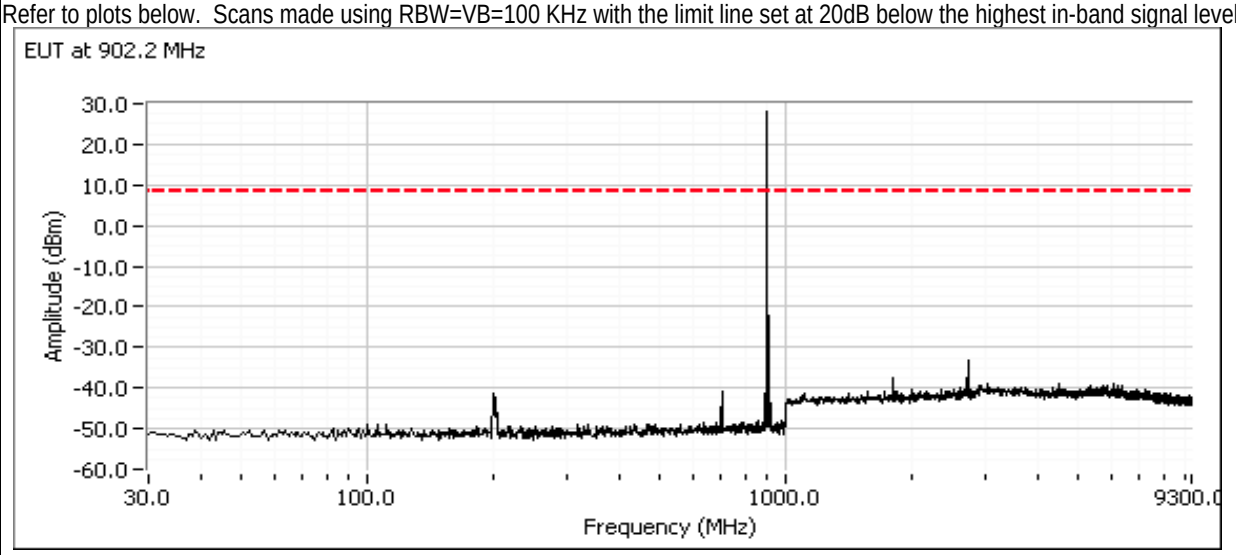


Run #3: Antenna Conducted Spurious Emissions, 30 - 10000 MHz.

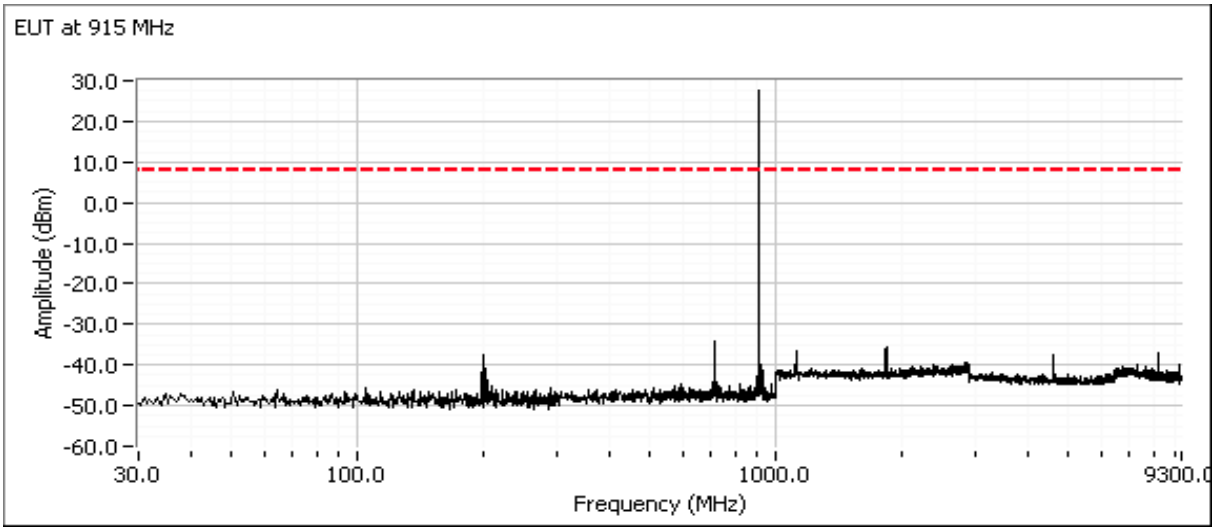
Date of Test: 1/24/2011 Test Location: Chamber #2

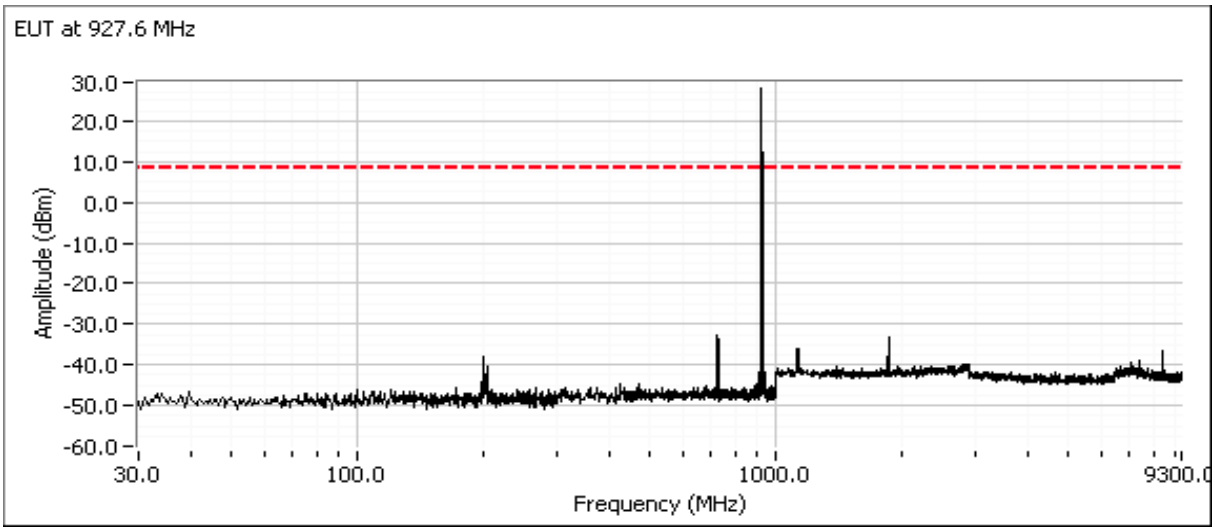
Test Engineer: David Bare

Refer to plots below. Scans made using RBW=VB=100 KHz with the limit line set at 20dB below the highest in-band signal level.



Client:	GE MDS LLC	Job Number:	J79098
Model:	Transnet-SF9	T-Log Number:	T79794
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy		
Standard:	FCC 15.247, RSS-210	Class:	N/A





Client:	GE MDS LLC	Job Number:	J79098
Model:	Transnet-SF9	T-Log Number:	T79794
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy		
Standard:	FCC 15.247, RSS-210	Class:	N/A

FCC 15.247 FHSS - Power, Bandwidth and 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.

General Test Configuration

The EUT and all local support equipment were located on a bench for emissions testing.

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.

Unless stated otherwise the EUT was operating such that it constantly hopped on either the low, center or high channels.

Ambient Conditions:

Temperature:	20-25 °C
Rel. Humidity:	30-40 %

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	30 - 10000 MHz - Conducted Spurious Emissions	FCC Part 15.247(c)	Pass	No emissions within 20dB of the limit
2	Output Power	15.247(b)	Pass	23.7 dBm (0.234 W)
3	Channel Occupancy	15.247(a)	Pass	
3	Number of Channels	15.247(a)	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.

Antenna Type and Gain

Yagi, 10dBd

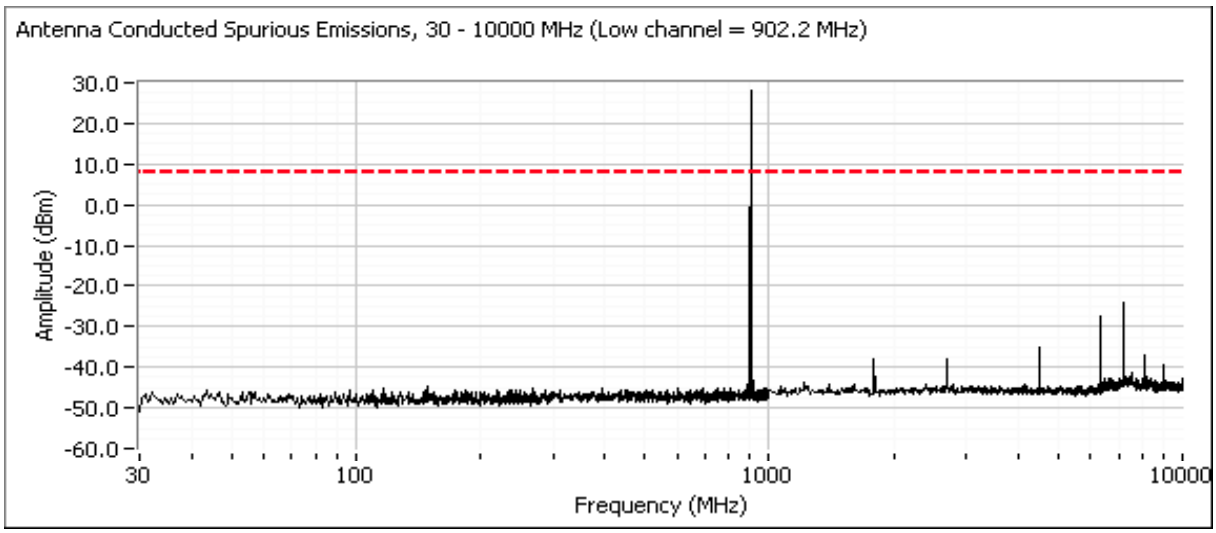
Client:	GE MDS LLC	Job Number:	J79098
Model:	Transnet-SF9	T-Log Number:	T79794
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy		
Standard:	FCC 15.247, RSS-210	Class:	N/A

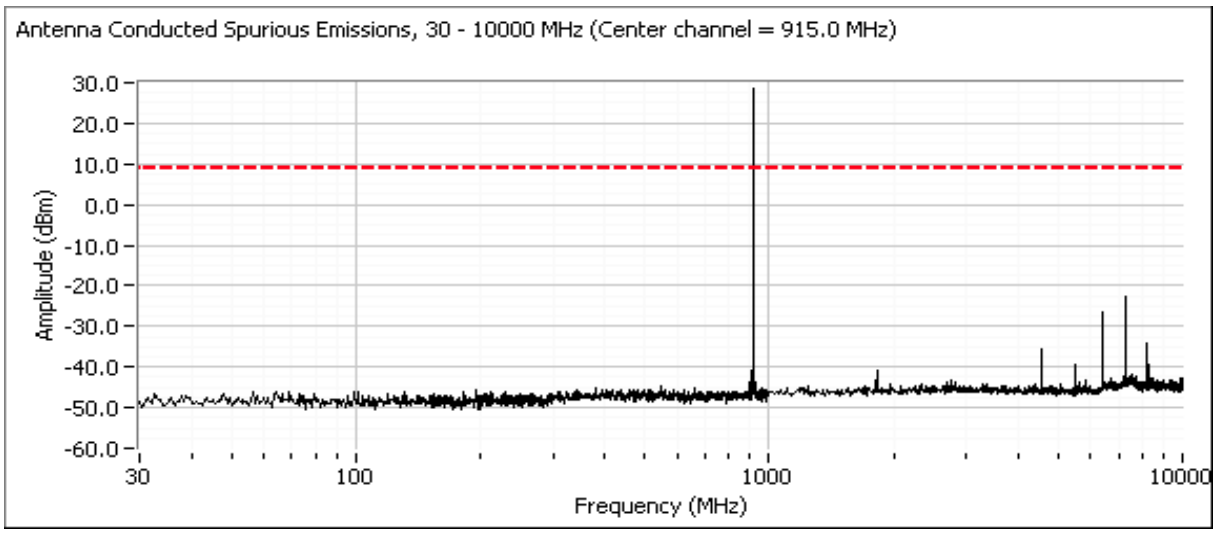
Run #1: Antenna Conducted Spurious Emissions, 30 - 10000 MHz.

Date of Test: 6/28/2010 Test Location: Chamber #4

Test Engineer: Mehran Birgani

Refer to plots below. Scans made using RBW=VB=100 KHz with the limit line set at 20dB below the highest in-band signal level.





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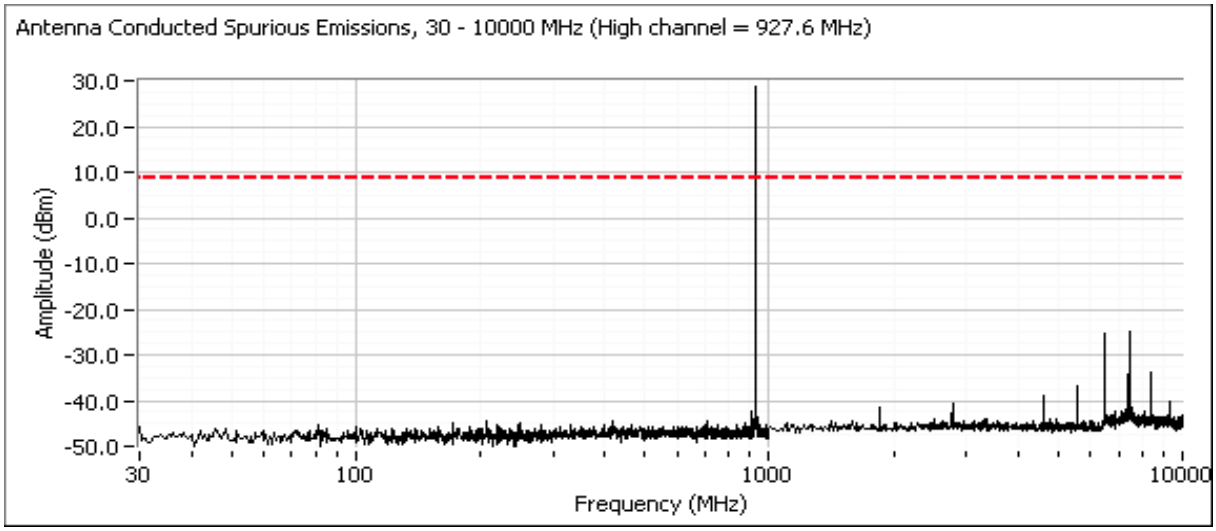
Model:	Transnet-SF9	T-Log Number:	T79794
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy		
Standard:	FCC 15.247, RSS-210	Class:	N/A



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Model:	Transnet-SF9	T-Log Number:	T79794
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy		
Standard:	FCC 15.247, RSS-210	Class:	N/A

Run #2: Output Power

Date of Test: 6/28/2010
Test Engineer: Mehran Birgani
Test Location: FT Chamber #4

For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels.

Maximum antenna gain: 10 dBd
Maximum antenna gain: 12.2 dBi

Setting	Channel	Frequency (MHz)	Res BW	Output Power (dBm)	Output Power (W)	EIRP (W)
23	Low	902.2	1 MHz	23.7	0.234	3.890
23	Mid	915.0	1 MHz	23.7	0.234	3.890
23	High	927.6	1 MHz	23.5	0.224	3.715

Client:	GE MDS LLC	Job Number:	J79098
Model:	Transnet-SF9	T-Log Number:	T79794
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy		
Standard:	FCC 15.247, RSS-210	Class:	N/A

Run #3: Channel Occupancy, Spacing and Number of Channels

Date of Test: 6/28/2010
Test Engineer: Mehran Birgani
Test Location: FT Chamber #4

For frequency hopping systems operating in the 902-928 MHz band:
If the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period.
The channel dwell time is calculated from the transmit time on a channel multiplied by the number of times a channel could be used in the 20 second period (i.e. 20s divided by the time between successive hops, rounded up to the closest integer), unless the time between successive hops exceeds 20s in which case the channel dwell time is the transmit time on a channel.

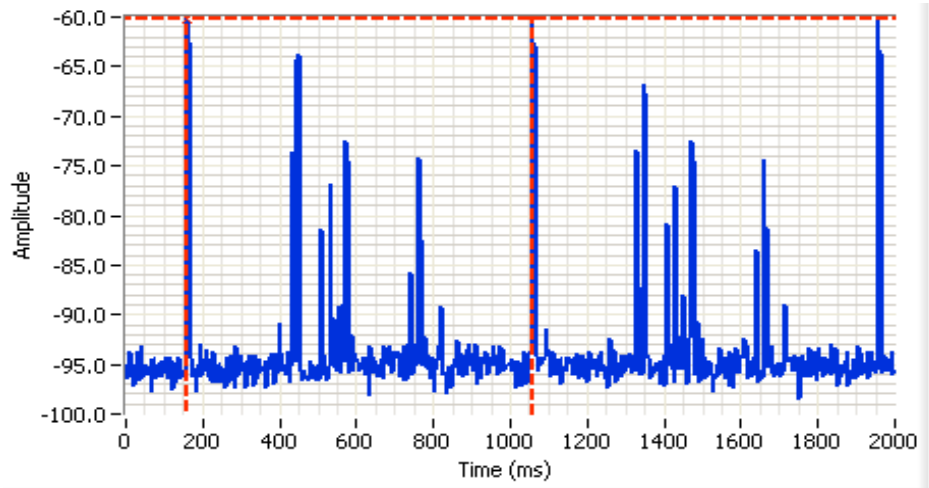
Hoptime 7 setting

Maximum 20dB bandwidth:	158	kHz	Pass
Channel spacing:	200	kHz	Pass
Transmission time per hop:	14.0	ms	Calculated based on 64 channels
The time between successive hops on a channel:	898.2	ms	
Number of channels (N):	64		Pass
Channel dwell time in 20 seconds:	322.8	ms	Pass

Hoptime 28 setting

Maximum 20dB bandwidth:	158	kHz	Pass
Channel spacing:	200	kHz	Pass
Transmission time per hop:	56.2	ms	Calculated based on 64 channels
The time between successive hops on a channel:	3597.9	ms	
Number of channels (N):	64		Pass
Channel dwell time in 20 seconds:	337.3	ms	Pass

Client:	GE MDS LLC	Job Number:	J79098
Model:	Transnet-SF9	T-Log Number:	T79794
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy		
Standard:	FCC 15.247, RSS-210	Class:	N/A



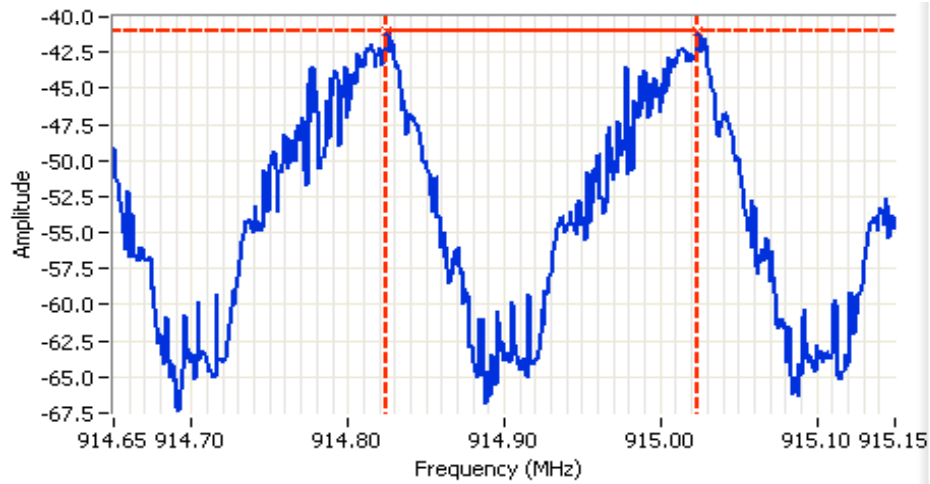
Analyzer Settings

HP8564E,EMICF: 914.900 MHz
SPAN: 0.000 MHz
RB: 10.0 kHz
VB: 30.0 kHz
Detector: POS
Attn: 10 DB
RL Offset: 0.0 DB
Sweep Time: 2.0s
Ref Lvl: -57.4 DBM

Comments

Channel Occupancy:
898.2ms between successive hops on the same channel

Cursor 1	160.0000	-60.15	Delta Time (ms)	898.20	Elliott
Cursor 2	1058.2011	0.00	Delta Amplitude	60.15	



Analyzer Settings

HP8564E,EMICF: 914.900 MHz
SPAN: 500 kHz
RB: 10.0 kHz
VB: 30.0 kHz
Detector: POS
Attn: 10 DB
RL Offset: 0.0 DB
Sweep Time: 50.0ms
Ref Lvl: 0.0 DBM

Comments

Channel Spacing: 200kHz

Cursor 1	915.0242	-41.00	Delta Freq.	200 kHz	Elliott
Cursor 2	914.8245	-41.00	Delta Amplitude	0.00	

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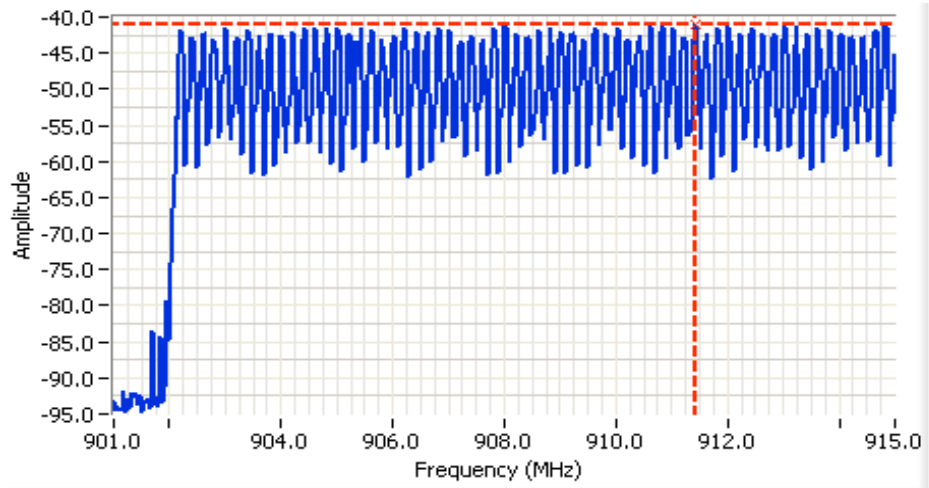
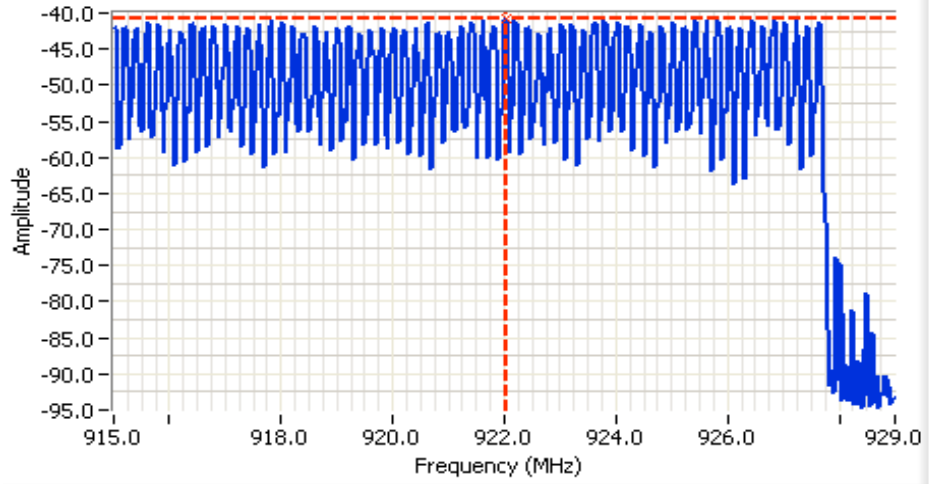


Analyzer Settings
Rohde&Schwarz,ESI
CF: 908.000 MHz
SPAN: 14.000 MHz
RB: 30.0 kHz
VB: 10.0 kHz
Detector: POS
Attn: 10 DB
RL Offset: 0.0 DB
Sweep Time: 120.0ms
Ref Lvl: -20.0 DBM

Comments
Number of channels:
64 channels between
901-915 MHz

Cursor 1	911.4369	-41.13
	0.0000	0.00

Elliott



Analyzer Settings
Rohde&Schwarz,ESI
CF: 922.000 MHz
SPAN: 14.000 MHz
RB: 30.0 kHz
VB: 10.0 kHz
Detector: POS
Attn: 10 DB
RL Offset: 0.0 DB
Sweep Time: 120.0ms
Ref Lvl: -20.0 DBM

Comments
Number of channels:
64 channels between
915-929 MHz

Cursor 1	922.0421	-40.84
	0.0000	0.00

Elliott

Client:	GE MDS LLC	Job Number:	J79098
Model:	Transnet-SF9	T-Log Number:	T79794
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy		
Standard:	FCC 15.247, RSS-210	Class:	N/A

FCC 15.247 FHSS - Power, Bandwidth and 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.

General Test Configuration

The EUT and all local support equipment were located on a bench for emissions testing.

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.

Unless stated otherwise the EUT was operating such that it constantly hopped on either the low, center or high channels.

Ambient Conditions:

Temperature:	20-25 °C
Rel. Humidity:	30-40 %

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	Output Power	15.247(b)	Pass	26.7 dBm (0.468 W)

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.

Antenna Type and Gain

Monopole, 7dBd

Client:	GE MDS LLC	Job Number:	J79098
Model:	Transnet-SF9	T-Log Number:	T79794
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy		
Standard:	FCC 15.247, RSS-210	Class:	N/A

Run #1: Output Power

Date of Test: 6/28/2010
Test Engineer: Mehran Birgani
Test Location: FT Chamber #4

For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels.

Maximum antenna gain: 7 dBd
Maximum antenna gain: 9.2 dBi

Setting	Channel	Frequency (MHz)	Res BW	Output Power (dBm)	Output Power (W)	EIRP (W)
26	Low	902.2	1 MHz	26.7	0.468	3.890
26	Mid	915.0	1 MHz	26.7	0.468	3.890
26	High	927.6	1 MHz	26.5	0.447	3.715