

***Electromagnetic Emissions Test Report
and
Application for Grant of Equipment Authorization
pursuant to
FCC Part 15, Subpart C (15.247) DTS Specifications,
FCC Part 15, Subpart E (UNII Devices) and
Industry Canada RSS 210 Issue 5 (LELEAN Devices)
on the Microwave Data Systems
Model: MDS5800-2***

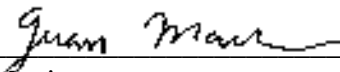
FCC ID: E5MDS-5800-2
UPN: 3738A-58002

GRANTEE: Microwave Data Systems
175 Science Parkway
Rochester, NY 14620

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

REPORT DATE: July 12, 2005

FINAL TEST DATE: May 9, May 10, May 11, June 29
and June 30, 2005

AUTHORIZED SIGNATORY: 
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Senior EMC Engineer



2016-01

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DECLARATIONS OF COMPLIANCE

Equipment Name and Model:
MDS5800-2

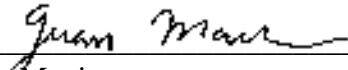
Manufacturer:
Microwave Data Systems
175 Science Parkway
Rochester, NY 14620

Tested to applicable standards:
RSS-210, Issue 5, November 2001 (Low Power License-Exempt Radiocommunication Devices)
FCC Part 15.247 (DTS)
FCC Part 15 Subpart E (UNII Devices)

Measurement Facility Description Filed With Department of Industry:

Departmental Acknowledgement Number: IC2845 **SV1** Dated July 30, 2001
Departmental Acknowledgement Number: IC2845 **SV3** Dated July 30, 2001

I declare that the testing was performed or supervised by me; that the test measurements were made in accordance with the above mentioned departmental standards (through the use of ANSI C63.4:2003 as detailed in section 5.3 of RSS-210, Issue 5); and that the equipment performed in accordance with the data submitted in this report.

Signature	
Name	Juan Martinez
Title	Senior EMC Engineer
Company	Elliott Laboratories Inc.
Address	684 W. Maude Ave Sunnyvale, CA 94086 USA

Date: July 12, 2005

Maintenance of compliance with the above standards 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.).

TABLE OF CONTENTS

COVER PAGE.....1

DECLARATIONS OF COMPLIANCE.....2

TABLE OF CONTENTS3

SCOPE.....4

OBJECTIVE.....4

SUMMARY OF RESULTS.....5

 MEASUREMENT UNCERTAINTIES6

EQUIPMENT UNDER TEST (EUT) DETAILS7

 GENERAL.....7

 OTHER EUT DETAILS7

 ENCLOSURE7

 MODIFICATIONS.....7

 SUPPORT EQUIPMENT.....8

 EUT INTERFACE PORTS8

 EUT OPERATION DURING TESTING.....8

 ANTENNA REQUIREMENTS.....8

TEST SITE.....9

 GENERAL INFORMATION.....9

 CONDUCTED EMISSIONS CONSIDERATIONS.....9

 RADIATED EMISSIONS CONSIDERATIONS9

MEASUREMENT INSTRUMENTATION.....10

 RECEIVER SYSTEM.....10

 INSTRUMENT CONTROL COMPUTER.....10

 LINE IMPEDANCE STABILIZATION NETWORK (LISN).....10

 POWER METER11

 FILTERS/ATTENUATORS.....11

 ANTENNAS.....11

 ANTENNA MAST AND EQUIPMENT TURNTABLE.....11

 INSTRUMENT CALIBRATION.....11

TEST PROCEDURES12

 EUT AND CABLE PLACEMENT12

 CONDUCTED EMISSIONS.....12

 RADIATED EMISSIONS12

 CONDUCTED EMISSIONS FROM ANTENNA PORT13

 CONDUCTED EMISSIONS FROM ANTENNA PORT13

SPECIFICATION LIMITS AND SAMPLE CALCULATIONS14

 FCC 15.407 (A)AND RSS 210 (O) OUTPUT POWER LIMITS15

 FCC 15.407 (A) OUTPUT POWER LIMITS15

 RS-210 6.2.2(Q1) OUTPUT POWER LIMITS.....16

 RSS 210 (O) AND FCC 15.247 TRANSMIT MODE SPURIOUS RADIATED EMISSIONS LIMITS16

 RS 210 (Q1) AND FCC 15E TRANSMIT MODE SPURIOUS RADIATED EMISSIONS LIMITS17

 RS 210 TABLE 3 RECEIVE MODE SPURIOUS RADIATED EMISSIONS LIMITS.....18

 FCC 15.205 AC POWER PORT CONDUCTED EMISSIONS LIMITS.....19

 RSS-210 SECTION 6.6 AC POWER PORT CONDUCTED EMISSIONS LIMITS19

 SAMPLE CALCULATIONS - CONDUCTED EMISSIONS.....20

 SAMPLE CALCULATIONS - RADIATED EMISSIONS21

 EXHIBIT 1: Test Equipment Calibration Data1

 EXHIBIT 2: Test Data Log Sheets.....2

SCOPE

An electromagnetic emissions test has been performed on the Microwave Data Systems model MDS5800-2 pursuant to Subparts C and E of Part 15 of FCC Rules for Unlicensed National Information Infrastructure (UNII) devices and RSS-210 Issue 5 for licence-exempt local area network (LELAN) devices. Conducted and radiated emissions data has been collected, reduced, and analyzed within this report in accordance with measurement guidelines set forth in ANSI C63.4:2003 as outlined in Elliott Laboratories test procedures.

The intentional radiator above has been tested in a simulated typical installation to demonstrate compliance with the relevant FCC 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 Microwave Data Systems model MDS5800-2 and therefore apply only to the tested sample. The sample was selected and prepared by Dennis McCarthy of Microwave Data Systems

OBJECTIVE

The primary objective of the manufacturer is compliance with Subparts C and E of Part 15 of FCC Rules for the radiated and conducted emissions of intentional radiators. Certification of these devices is required as a prerequisite to marketing as defined in Part 2 the FCC Rules.

Certification is a procedure where the manufacturer or a contracted laboratory makes measurements and submits the test data and technical information to the FCC. The FCC issues a grant of equipment authorization upon successful completion of their 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.

SUMMARY OF RESULTS

FCC Part 15 Section	RSS 210 Section	Description	Measured Value	Comments	Result
15.247(a)	6.2.2(o)(b)	Digital Modulation	Systems uses OFDM techniques	System must utilize a digital transmission technology	Complies
15.247 (a) (2)	6.2.2(o)(b)	6dB Bandwidth	24.8 MHz	Minimum allowed is 500kHz	Complies
	RSP 100	99% Bandwidth	26 MHz	For information only	Complies
15.247 (b) (3) 15.247	6.2.2(o)(b)	Output Power, 5725 - 5850 MHz	22.5 dBm (0.178 Watts) EIRP = 1024 W	Point-point applications: can use antennas greater then 6dBi without reduction in power.	Complies
15.247(d)	6.2.2(o)(b)	Power Spectral Density	-0.72 dBm / MHz	Maximum permitted is 8dBm/3kHz	Complies
15.247(c)	6.2.2(o)(e1)	Antenna Port Spurious Emissions – 30MHz – 40 GHz	All spurious emissions < -20dBc	All spurious emissions < -20dBc.	Complies
15.247(c) / 15.209		Radiated Spurious Emissions – 30MHz – 40 GHz	53.8 dBuV/m @ 11536.5MHz (-0.2dB)	Emissions in restricted bands must meet the radiated emissions limits detailed in 15.207. All others must be < -20dBc	Complies
15.207		AC Conducted Emissions	DC operated		N/A
	6.6	AC Conducted Emissions	DC operated		N/A
15.247 (b) (5)		RF Exposure Requirements	MPE Calculation		
15.203		RF Connector	Standard N-type	Professionally installed system	Complies

EIRP calculated using antenna gain of dBi (37.6) for the highest EIRP point-to-point system.

FCC Part 15 Section	RSS 210 Section	Description	Comments	Result
Operation in the 5.25 – 5.35 GHz Band Note: The device is not restricted to indoor use only, therefore the spectral density of spurious emissions in the 5.15 – 5.25 GHz band were limited to the power spectral limit of –27dBm/MHz as detailed in FCC 15.407(b)(2) and RSS 210 6.2.2 q1 (ii)				
		Maximum Antenna Gain	37.6 dBi, detachable 23 dBi, Internal	COMPLIES
15.407(a) (2)	6.2.2 q1 (ii)	Bandwidth	26MHz (26-dB & 99%)	N/A
15.407(a) (2)	6.2.2 q1 (ii)	Output Power	6.8 dBm (23 dBi) -7.6 dBm (37.6 dBi)	COMPLIES
15.407(a) (2))	6.2.2 q1 (ii)	Power Spectral Density	-6dBm/MHz (23 dBi) -24.2dBm/MHz (37.6 dBi)	COMPLIES
15.407(b) (2)	6.2.2 q1 (ii)	Spurious Emissions above 1GHz	59.1 dBuV/m @ 10,515.21 MHz (-14.9dB)	COMPLIES

General requirements for all bands				
	6.2.2 q(iv)(a)	Digital Modulation	Digital Modulation is used, refer to the "Theory of Operations" (Exhibit 9) for a detailed explanation.	COMPLIES
	6.2.2 q(iv)(b)	Peak Spectral Density		COMPLIES
15.407(a)(6)		Peak Excursion Ratio		COMPLIES
	6.2.2 q(iv)(c)	Channel Selection	The device was tested on the following channels: 54, 66, 57, 56, & 71. These channels represent the highest, lowest and center channels available with the operating band.	N/A
15.407 (c)	6.2.2 q(iv)(d)	Automatic Discontinuation of Operation in the absence of information to transmit	Operation is discontinued in the absence of information to transmit, refer to the "Theory of Operations" in Exhibit 9 for a detailed explanation.	COMPLIES
15.407 (g)	6.2.2 q(iv)(e)	Frequency Stability	Frequency stability is +/- 20 ppm, refer to the "Theory of Operations" in Exhibit 9 for a detailed analysis.	COMPLIES
	6.2.2 q(iv)(g)	User Manual information	All relevant statements have been included in the user's manuals. Refer to Exhibit 6 for details	COMPLIES
15.407 (f)	6.2.2 q(iv)(g)	RF Exposure Requirements	Refer to MPE calculations in Exhibit 11	COMPLIES
15.407(b) / 15.207	6.6	AC Conducted Emissions	DC operated	N/A

MEASUREMENT UNCERTAINTIES

ISO Guide 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	30 to 1000	± 3.6

EQUIPMENT UNDER TEST (EUT) DETAILS**GENERAL**

The Microwave Data Systems model MDS5800-2 is a UNII radio which is designed to provide Point to point fixed outdoor radio which is designed to provide wireless internet and network environments.

The sample was received on May 9, 2005 and tested on May 9, May 10, May 11, June 29 and June 30, 2005. The EUT consisted of the following component(s):

Manufacturer	Model	Description	Serial Number	FCC ID
Microwave Data Systems	ODU5300MEDML	ODU	1367022	E5MDS-5800-2
Microwave Data Systems	ODU5300MIDML	ODU	1367621	E5MDS-5800-2
Microwave Data Systems	ODU5800MEDML	ODU	1367936	E5MDS-5800-2
Microwave Data Systems	UDO5300 MIDML	ODU	1367934	E5MDS-5800-2
Microwave Data Systems	SDIDUPHDID	IDU	42050001	E5MDS-5800-2

OTHER EUT DETAILS

None

ENCLOSURE

The IDU EUT enclosure is primarily constructed of fabricated sheet steel. It measures approximately 24 cm wide by 44 cm deep by 4 cm high.

The ODU EUT enclosure is primarily constructed of cast aluminum. It measures approximately 37 cm wide by 7 cm deep by 39 cm high.

MODIFICATIONS

The EUT require following modifications during testing in order to comply with the emission specifications:

IDU - Added copper tape to left rear seam between rear vertical plate and cover.

SUPPORT EQUIPMENT

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

Manufacturer/Model/Description	Serial Number	FCC ID Number
Kepeco 48VDC Supply	-	-

No equipment was used as remote support equipment for emissions testing:

EUT INTERFACE PORTS

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

IDU

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
User 10/100 1	Terminated	CAT 5	Shielded	5
User 10/100 2	Terminated	CAT 5	Shielded	5
VOW	Terminated	CAT 5	Shielded	5
AUX	Terminated	CAT 5	Shielded	5
E1/T1 1	Terminated	CAT 5	Shielded	5
E1/T1 2	Terminated	CAT 5	Shielded	5
E1/T1 3-16	Terminated	Multiwire	Shielded	
ODU	IF port on ODU	Coax	Shielded	2
-48V in	DC supply	2 wire	Unshielded	2

ODU

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
IF Out	ODU port on IDU	Coax	Shielded	2
BNC	Terminated	-	-	-
Antenna	Terminated	-	-	-

EUT OPERATION DURING TESTING

During digital emissions testing the EUT was in receive mode

ANTENNA REQUIREMENTS

The EUT internal antenna is a 23dBi directional antenna.

The EUT external antenna is a 37.6dBi directional antenna.

EUT has a standard N-type connector and will be professionally installed

TEST SITE

GENERAL INFORMATION

Final test measurements were taken on May 9, May 10, May 11, June 29 and June 30, 2005 at the Elliott Laboratories Open Area Test Site #1 & 3 located at 684 West Maude Avenue, Sunnyvale, California. The test site contains separate areas for radiated and conducted emissions testing. Pursuant to section 2.948 of the Rules, construction, calibration, and equipment data has been filed with the Federal Communications Commission. In accordance with Industry Canada rules detailed in RSS 210 Issue 5 and RSS-212, construction, calibration, and equipment data for the test sites have been filed with the Federal Communications Commission.

The FCC 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 FCC requirements.

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. The test site is maintained free of conductive objects within the CISPR defined elliptical area incorporated in ANSI C63.4:2003 guidelines.

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.

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.

INSTRUMENT CONTROL COMPUTER

The receivers utilize either a Rohde and 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.

POWER METER

A power meter and **peak** power sensor are used for all direct output power measurements from transmitters as they provide a broadband indication of the power output.

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 biconical antenna is used to cover the range from 30 MHz to 300 MHz and a log periodic antenna is utilized from 300 MHz to 1000 MHz. Narrowband tuned dipole antennas are used over the entire 30 to 1000 MHz range for precision measurements of field strength. Above 1000 MHz, a horn antenna is used. The antenna calibration factors are included in site factors programmed into the test receivers.

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.

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 FCC requires 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

Radiated emissions measurements are performed in two phases as well. A preliminary scan of emissions is conducted in which all significant EUT frequencies are identified with the system in a nominal configuration. At least two scans are performed from 30 MHz up to the frequency required by the regulation specified on page 1. One or more of these is with the antenna polarized vertically while the one or more of these is with the antenna polarized horizontally. During the preliminary scans, the EUT is rotated through 360°, the antenna height is varied and cable positions are varied to determine the highest emission relative to the limit.

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. 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. Emissions which have values close to the specification limit may also be measured with a tuned dipole antenna to determine compliance.

CONDUCTED EMISSIONS FROM ANTENNA PORT

Direct measurements are performed 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.

Measurement bandwidths (video and resolution) are set in accordance with FCC procedures for the type of radio being tested.

SPECIFICATION LIMITS AND SAMPLE CALCULATIONS

The limits for conducted emissions from the AC power port are given in units of microvolts, the limits for radiated electric field emissions are given in units of microvolts per meter at a specified test distance and the output power limits are given in terms of Watts, milliwatts or dBm. 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.

Where the radiated electric field strength is expressed in terms of the equivalent isotropic radiated power (eirp) the following formula is used to determine the field strength limit in terms of microvolts per meter at a distance of 3m from the equipment under test:

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

where P is the eirp (Watts)

For reference, converting the voltage and electric field strength specification limits from linear to decibel form is accomplished by taking the base ten logarithm, then multiplying by 20. Conversion of power specification limits from linear units (in milliwatts) to decibel form (in dBm) is accomplished by taking the base ten logarithm, then multiplying by 10.

FCC 15.407 (a) and RSS 210 (o) OUTPUT POWER LIMITS

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 Watts (30 dBm)	8 dBm/3kHz
2400 – 2483.5	1 Watts (30 dBm)	8 dBm/3kHz
5725 – 5850	1 Watts (30 dBm)	8 dBm/3kHz

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.

FCC 15.407 (a) OUTPUT POWER LIMITS

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
5150 - 5250	50mW (17 dBm)	4 dBm/MHz
5250 - 5350	250 mW (24 dBm)	11 dBm/MHz
5725 – 5825	1 Watts (30 dBm)	17 dBm/MHz

For system using antennas with gains exceeding 6dBi, the output power and power spectral density limits are reduced by 1dB for every dB the antenna gain exceeds 6dBi.

Fixed point-to-point applications using the 5725 – 5825 MHz band may use antennas with gains of up to 23dBi without this limitation. If the gain exceeds 23dBi then the output power limit of 1 Watt is reduced by 1dB for every dB the gain exceeds 23dBi.

RS-210 6.2.2(q1) OUTPUT POWER LIMITS

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
5150 - 5250	200mW (23 dBm)	10 dBm/MHz
5250 - 5350	250 mW (24 dBm)	11 dBm/MHz
5725 – 5825	1 Watts (30 dBm)	17 dBm/MHz

For system using antennas with gains exceeding 6dBi, the output power and power spectral density limits are reduced by 1dB for every dB the antenna gain exceeds 6dBi.

Fixed point-to-point applications using the 5725 – 5825 MHz band may use antennas with gains of up to 23dBi without this limitation. If the gain exceeds 23dBi then the output power limit of 1 Watt is reduced by 1dB for every dB the gain exceeds 23dBi.

RSS 210 (o) AND FCC 15.247 TRANSMIT MODE SPURIOUS RADIATED EMISSIONS LIMITS

The limits for unwanted (spurious) emissions from the transmitter falling in the restricted bands detailed in Part 15.205 and for all spurious emissions from the receiver are:

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

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).

RS 210 (q1) and FCC 15E TRANSMIT MODE SPURIOUS RADIATED EMISSIONS LIMITS

The table below shows the limits for unwanted (spurious) emissions falling in the restricted bands detailed in Part 15.205 and Industry Canada RSS-210 Table 2.

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

The table below shows the limits for unwanted (spurious) emissions outside of the restricted bands above 1GHz.

Operating Frequency (MHz)	EIRP Limit (dBm)	Equivalent Field Strength At 3m (dBuV/m)
5150 - 5250	-27 dBm	68.3 dBuV/m
5250 - 5350	-27 dBm (note 1)	68.3 dBuV/m
5725 - 5825	-27 dBm (note 2)	68.3 dBuV/m
	-17 dBm (note 3)	78.3 dBuV/m

Note 1: If operation is restricted to indoor use only then emissions in the band 5.15 – 5.25 GHz must meet the power spectral density limits for the intentional signals detailed in RSS 210 and FCC Subpart E for devices operating in the 5.15 – 5.25 GHz band.

Note 2: Applies to spurious signals separated by more than 10 MHz from the allocated band.

Note 3: Applies to spurious signals within 10 MHz of the allocated band.

RS 210 Table 3 RECEIVE MODE SPURIOUS RADIATED EMISSIONS LIMITS

The table below shows the limits for unwanted (spurious) emissions from the receiver as detailed in table 3 of RSS 210:

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
960 to 1610	500	54.0
Above 1610	1000	60.0

FCC 15.205 AC POWER PORT CONDUCTED EMISSIONS LIMITS

The table below shows the limits for emissions on the AC power line as detailed in FCC Part 15.205.

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

RSS-210 SECTION 6.6 AC POWER PORT CONDUCTED EMISSIONS LIMITS

The table below shows the limits for emissions on the AC power line as detailed in Industry Canada RSS-210 section 6.6.

Frequency Range (MHz)	Limit (uV)	Limit (dBuV)
0.450 to 30.000	250	48

SAMPLE CALCULATIONS - CONDUCTED EMISSIONS

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

$$R_r = C$$

and

$$C - S = M$$

where:

R_r = Receiver Reading in dBuV

C = Corrected 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, is calculated by using the following formula:

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

where:

$$F_d = \text{Distance Factor in dB}$$

$$D_m = \text{Measurement Distance in meters}$$

$$D_s = \text{Specification Distance in meters}$$

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:

$$R_r = \text{Receiver Reading in dBuV/m}$$

$$F_d = \text{Distance Factor in dB}$$

$$R_c = \text{Corrected Reading in dBuV/m}$$

$$L_s = \text{Specification Limit in dBuV/m}$$

$$M = \text{Margin in dB Relative to Spec}$$

EXHIBIT 1: Test Equipment Calibration Data

1 Page

Radiated Emissions, 30 - 2,000 MHz, 09-May-05

Engineer: Chris Byleckie

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
EMCO	Biconical Antenna, 30-300 MHz	3110B	801	09-Jul-05
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	870	13-Jan-06
Filtek	High Pass Filter, 1GHz	HP12/1000-5BA	957	26-Mar-06
EMCO	Horn Antenna, D. Ridge 1-18GHz	3115	1242	19-Oct-06
Hewlett Packard	EMC Spectrum Analyzer, 9KHz - 22GHz	8593EM	1319	28-Mar-06
Rohde & Schwarz	Test Receiver, 9kHz-2750MHz	ESCS 30	1337	12-Jan-06
EMCO (ETS-Lindgren)	Log Periodic Antenna, 0.2-2 GHz	3148	1595	01-Jun-05

Radiated Emissions, 1000 - 40,000MHz, 11-May-05

Engineer: Chris Byleckie

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
EMCO	Horn antenna, D. Ridge 1-18GHz (SA40 system antenna)30Hz sunnyvale	3115	1142	11-Jun-06
Hewlett Packard	Microwave EMI test system (SA40, 30Hz - 40GHz), Sunnyvale	84125C	1149	11-Jun-05
EMCO	Horn antenna, 18-26.5 GHz (SA40 30Hz)	3160-09 (84125C)	1150	11-Jun-05
EMCO	Horn antenna, 26.5-40 GHz (SA40 30 Hz)	3160-10 (84125C)	1151	11-Jun-05
Hewlett Packard	High Pass filter, 8.2GHz	P/N 84300-80039	1156	28-Apr-06

Radiated Emissions, 30 - 1,000 MHz, 30-Jun-05

Engineer: Yu Chien Ho

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
EMCO	Biconical Antenna, 30-300 MHz	3110B	801	09-Jul-05
Rohde & Schwarz	Test Receiver, 9kHz-2750MHz	ESCS 30	1337	12-Jan-06
EMCO	Log Periodic Antenna, 0.2-2 GHz	3148	1347	03-Nov-05

EXHIBIT 2: Test Data Log Sheets

ELECTROMAGNETIC EMISSIONS

TEST LOG SHEETS

AND

MEASUREMENT DATA

T58711 69 Pages



EMC Test Data

Client:	Microwave Data Systems	Job Number:	J59373
Model:	MDS5800-2	T-Log Number:	T59711
		Account Manager:	Esther Zhu
Contact:	Dennis McCarthy		
Emissions Spec:	FCC 15.247 / 15.401	Class:	Radio
Immunity Spec:		Environment:	

EMC Test Data

For The

Microwave Data Systems

Model

MDS5800-2

Date of Last Test: 6/30/2005



EMC Test Data

Client:	Microwave Data Systems	Job Number:	J59373
Model:	MDS5800-2	T-Log Number:	T59711
		Account Manager:	Esther Zhu
Contact:	Dennis McCarthy		
Emissions Spec:	FCC 15.247 / 15.401	Class:	Radio
Immunity Spec:	Enter immunity spec on cover	Environment:	

EUT INFORMATION

General Description

The EUT is a Point to point fixed outdoor radio which is designed to provide wireless internet and network environments. Normally, the EUT would be fix mounted on permanent outdoor structures. The EUT was, therefore, treated as table-top equipment during testing. The electrical rating of the EUT is -48VDC, 2 Amps.

Equipment Under Test

Manufacturer	Model	Description	Serial Number	FCC ID
Microwave Data	ODU5300MEDML	ODU	1367022	
Microwave Data	ODU5300MIDML	ODU	1367621	
Microwave Data	ODU5800MEDML	ODU	1367936	
Microwave Data	UDO5300 MIDML	ODU	1367934	
Microwave Data	SDIDUPHDID	IDU	42050001	

EUT Antenna

The EUT internal antenna is a 23dBi directional antenna.
The EUT external antenna is a 37.6dBi directional antenna.

EUT Enclosure

The IDU EUT enclosure is primarily constructed of fabricated sheet steel. It measures approximately 24 cm wide by 44 cm deep by 4 cm high.
The ODU EUT enclosure is primarily constructed of cast aluminum. It measures approximately 37 cm wide by 7 cm deep by 39 cm high.

Modification History

Mod. #	Test	Date	Modification

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



EMC Test Data

Client:	Microwave Data Systems	Job Number:	J59373
Model:	MDS5800-2	T-Log Number:	T59711
Contact:	Dennis McCarthy	Account Manager:	Esther Zhu
Emissions Spec:	FCC 15.247 / 15.401	Class:	Radio
Immunity Spec:	Enter immunity spec on cover	Environment:	

Test Configuration #1

Local Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
Kepeco		48VDC supply		

Remote Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
None				

IDU Interface Cabling and Ports

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
User 10/100 1	Terminated	CAT 5	Shielded	5
User 10/100 2	Terminated	CAT 5	Shielded	5
VOW	Terminated	CAT 5	Shielded	5
AUX	Terminated	CAT 5	Shielded	5
E1/T1 1	Terminated	CAT 5	Shielded	5
E1/T1 2	Terminated	CAT 5	Shielded	5
E1/T1 3-16	Terminated	Multiwire	Shielded	
ODU	IF port on ODU	Coax	Shielded	2
-48V in	DC supply	2 wire	Unshielded	2

ODU Interface Cabling and Ports

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
IF Out	ODU port on IDU	Coax	Shielded	2
BNC	Terminated	-	-	-
Antenna	Terminated	-	-	-

Note: The Serial/Alarm and the two 10/100 ports were not connected as the manufacturer stated that these are for configuration purpose and therefore would not normally be connected.

EUT Operation During Emissions Tests

During digital emissions testing the EUT was in receive mode



EMC Test Data

Client:	Microwave Data Systems	Job Number:	J59373
Model:	MDS5800-2	T-Log Number:	T59711
Contact:	Dennis McCarthy	Account Manager:	Esther Zhu
Spec:	FCC 15.247 / 15.401	Class:	Radio

Radiated 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: 6/30/2005	Config. Used: #1
Test Engineer: Yu-Chien Ho	Config Change: None
Test Location: SVOATS #1	EUT Voltage: -48Vdc

General Test Configuration

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

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

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

Note, for testing above 1 GHz, the FCC specifies the limit as an average measurement. In addition, the FCC states that the peak reading of any emission above 1 GHz, can not exceed the average limit by more than 20 dB.

Ambient Conditions:	Temperature:	18.3 °C
	Rel. Humidity:	81 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	RE, 30 -1000 MHz, Preliminary Scan	EN 55022 A	Pass	42.0dB μ V/m @ 500.0MHz (-5.0dB)
2	RE, 30 - 1000MHz, Maximized Emissions	EN 55022 A	Pass	42.0dB μ V/m @ 500.0MHz (-5.0dB)
3	RE, 1000 - 18000MHz, Maximized Emissions	RSS-210	Pass	47.8dB μ V/m (245.2 μ V/m) @ 11461.7MHz (-12.2dB)

Modifications Made During Testing:

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.



EMC Test Data

Client:	Microwave Data Systems	Job Number:	J59373
Model:	MDS5800-2	T-Log Number:	T59711
Contact:	Dennis McCarthy	Account Manager:	Esther Zhu
Spec:	FCC 15.247 / 15.401	Class:	Radio

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

Measurements taken 10 meter distance.

Frequency MHz	Level dBµV/m	Pol v/h	EN 55022 A		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
500.000	42.0	h	47.0	-5.0	QP	275	1.8	
250.000	41.0	v	47.0	-6.0	QP	44	1.1	
500.000	41.0	v	47.0	-6.0	QP	360	1.0	
750.000	40.0	v	47.0	-7.0	QP	98	1.5	
750.000	39.0	h	47.0	-8.0	QP	245	2.4	
250.000	35.4	h	47.0	-11.6	QP	122	3.8	
50.000	23.8	v	40.0	-16.2	QP	0	1.0	
375.000	29.6	h	47.0	-17.4	QP	151	1.2	
375.000	29.5	v	47.0	-17.5	QP	234	1.0	
140.040	21.1	v	40.0	-18.9	QP	307	1.0	
480.000	26.5	v	47.0	-20.5	QP	284	1.0	
480.000	24.8	h	47.0	-22.2	QP	324	2.3	
140.040	12.1	h	40.0	-27.9	QP	360	2.0	
50.000	11.6	h	40.0	-28.4	QP	0	2.0	

Run #2: Maximized Readings From Run #1

Measurements taken 10 meter distance.

Frequency MHz	Level dBµV/m	Pol v/h	EN 55022 A		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
500.000	42.0	h	47.0	-5.0	QP	275	1.8	
250.000	41.0	v	47.0	-6.0	QP	44	1.1	
500.000	41.0	v	47.0	-6.0	QP	360	1.0	
750.000	40.0	v	47.0	-7.0	QP	98	1.5	
750.000	39.0	h	47.0	-8.0	QP	245	2.4	
250.000	35.4	h	47.0	-11.6	QP	122	3.8	



EMC Test Data

Client:	Microwave Data Systems	Job Number:	J59373
Model:	MDS5800-2	T-Log Number:	T59711
Contact:	Dennis McCarthy	Account Manager:	Esther Zhu
Spec:	FCC 15.247 / 15.401	Class:	Radio

Run #3: Radiated Spurious Emissions, 1000 - 18,000 MHz. Low Channel @ 5731 MHz, Rx mode

Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15.247		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
11461.67	47.8	V	60.0	-12.2	AVG	361	1.0	
11461.67	60.7	V	80.0	-19.3	PK	361	1.0	
17228.54	38.6	V	60.0	-21.4	AVG	266	1.0	
17228.54	50.1	V	80.0	-29.9	PK	266	1.0	
11461.61	37.7	H	60.0	-22.3	AVG	226	1.6	
11461.61	49.8	H	80.0	-30.3	PK	226	1.6	
17229.82	38.9	H	60.0	-21.1	AVG	315	1.0	
17229.82	50.6	H	80.0	-29.4	PK	315	1.0	



EMC Test Data

Client:	Microwave Data Systems	Job Number:	J59373
Model:	MDS5800-2	T-Log Number:	T59711
		Account Manager:	Esther Zhu
Contact:	Dennis McCarthy		
Spec:	FCC 15.247 / 15.401	Class:	N/A

FCC Part 15 Subpart E Tests

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: 5/9/2005 & 5/10/2005
 Test Engineer: Chris Byleckie/Jmartinez
 Test Location: SVOATS #1
 Config. Used: 1
 Config Change: Only the IDU to ODU coax was connected
 EUT Voltage: -48Vdc

General Test Configuration

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 and cables used.

Ambient Conditions: Temperature: 18 °C
 Rel. Humidity: 45 %

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	Output Power	15.407(a) (1), (2)	Pass	-7.6 dBm
1	Power Spectral Density (PSD)	15.407(a) (1), (2)	Pass	-24.2dBm/MHz
1	26dB Bandwidth	15.407	Pass	> 20 MHz
1	20 dB Bandwidth	RSS 210	Pass	> 20 MHz
2	Peak Excursion Envelope	15.407(a) (6)	Pass	Peak to average excursion < 13dB
3	Antenna Conducted - Out of Band Spurious	15.407(b)	Pass	All emissions below the 27dBm/MHz 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.



EMC Test Data

Client:	Microwave Data Systems	Job Number:	J59373
Model:	MDS5800-2	T-Log Number:	T59711
Contact:	Dennis McCarthy	Account Manager:	Esther Zhu
Spec:	FCC 15.247 / 15.401	Class:	N/A

Run #1: Bandwidth, Output Power and Power Spectral Density

Antenna Gain: 37.6 dBi

Frequency (MHz)	Bandwidth (note 1) MHz			Output Power (note 2) dBm		Power (Watts)	PSD (FCC - note 3) dBm/MHz		PSD (RSS210 - note 4) dBm/MHz Peak
	20dB	26dB	99%	Measured	Limit		Measured	Limit	
5257	13.8	12.7	14.0	-7.6	-7.6	0.00017	-25.0	-20.6	-19.1
5270	26.0	28.0	25.8	-9.5	-7.6	0.00011	-25.0	-20.6	-23.7
5280	18.0	19.8	17.9	-8.0	-7.6	0.00016	-27.0	-20.6	-20.5
5330	25.0	27.1	25.1	-8.3	-7.6	0.00015	-24.2	-20.6	-22.3
5343	12.0	13.0	12.0	-7.8	-7.6	0.00017	-24.2	-20.6	-18.5

Note 1 Bandwidth measured using RBW = 300kHz.

Note 2 Output power measured using a spectrum analyzer with:
RBW=1MHz, VB=3 MHz, sample detector, max hold (60 seconds) and power integration over 30 MHz.

Note 3 Measurement of peak power spectral density was made using RBW = 1MHz, VBW = 3MHz. The value is taken from the peak excursion plots.

Note 4 Peak excursion - maximum difference between the trace used for the power measurement (RB=1MHz, VB=3MHz, sample detector, power average of 100 sweeps) and that for a peak power measurement (RB=1MHz, VB=3MHz).

Note 5 For RSS210 the measured value for peak PSD must not be average value (peak power divided by 99% bandwidth) by more than 6dB without reducing the limit for output power.

Note 6 Measurement of peak power spectral density was made using RBW = 1MHz, VBW = 3MHz. The average value is the peak output power divided by the 99% bandwidth. For RSS210 the measured value must not exceed the average value by more than 6dB without reducing the limit for output power.



EMC Test Data

Client:	Microwave Data Systems	Job Number:	J59373
Model:	MDS5800-2	T-Log Number:	T59711
Contact:	Dennis McCarthy	Account Manager:	Esther Zhu
Spec:	FCC 15.247 / 15.401	Class:	N/A



Spectrum Analyzer Settings

CF: 5257.0MHz
SPAN: 20.0MHz
RB 1.0MHz
VB 3.0MHz
Detector Sample
Att 10
RL Offset 0.00
Sweep Time 2.0ms
Ref Lvl: 0.00DBM

Highest PSD

-16.57 dBm/1.0MHz

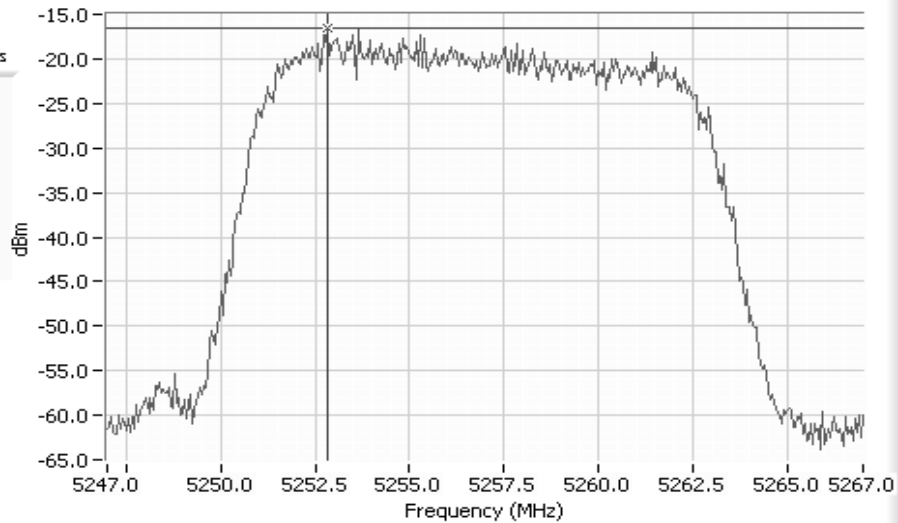
99% Bandwidth (MHz)

14.00

Power Over Span

0.173 mW

-7.61 dBm



5257 Mhz Peak Power (100 Sample Averaging)

Close Window

Max Level

5252.85

-16.57



Spectrum Analyzer Settings

CF: 5270.0MHz
SPAN: 50.0MHz
RB 1.0MHz
VB 3.0MHz
Detector Sample
Att 10
RL Offset 0.00
Sweep Time 2.0ms
Ref Lvl: 0.00DBM

Highest PSD

-21.26 dBm/1.0MHz

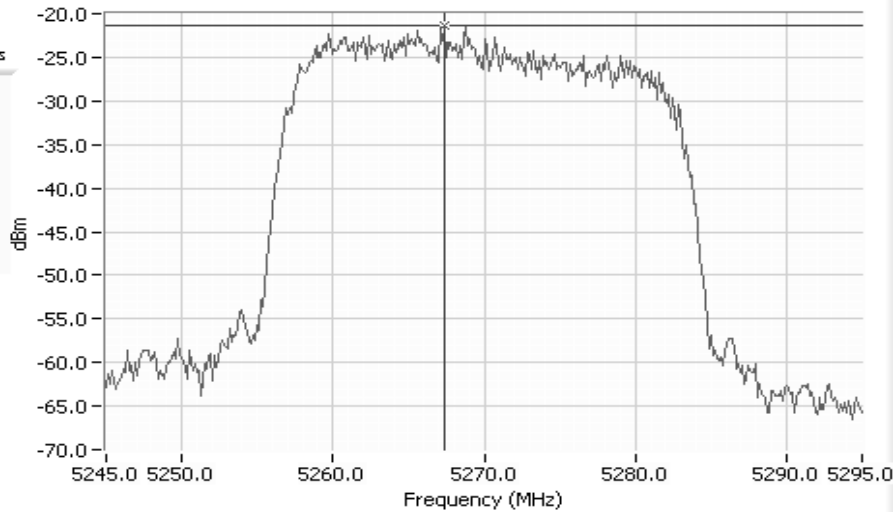
99% Bandwidth (MHz)

26.00

Power Over Span

0.111 mW

-9.54 dBm



5270 Mhz Peak Power (100 Sample Averaging)

Close Window

Max Level

5267.37

-21.26





EMC Test Data

Client: Microwave Data Systems	Job Number: J59373
Model: MDS5800-2	T-Log Number: T59711
Contact: Dennis McCarthy	Account Manager: Esther Zhu
Spec: FCC 15.247 / 15.401	Class: N/A



Spectrum Analyzer Settings

CF: 5280.0MHz
SPAN: 50.0MHz
RB 1.0MHz
VB 3.0MHz
Detector Sample
Att 10
RL Offset 0.00
Sweep Time 2.0ms
Ref Lvl: 0.00DBM

Highest PSD

-18.21 dBm/1.0MHz

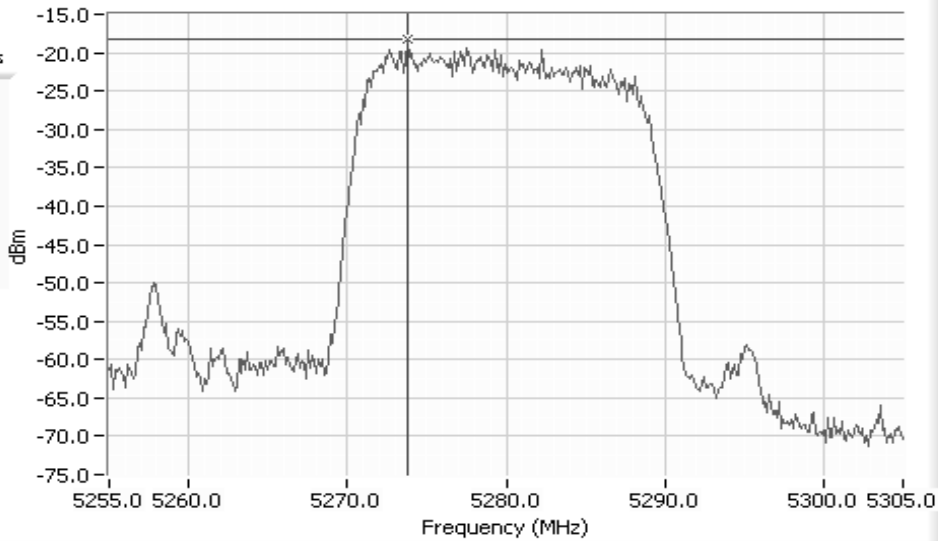
99% Bandwidth (MHz)

18.00

Power Over Span

0.158 mW

-8.01 dBm



Close Window

Max Level

5273.75

-18.21



Spectrum Analyzer Settings

CF: 5330.0MHz
SPAN: 50.0MHz
RB 1.0MHz
VB 3.0MHz
Detector Sample
Att 10
RL Offset 0.00
Sweep Time 50.0ms
Ref Lvl: -10.00DBM

Highest PSD

-20.33 dBm/1.0MHz

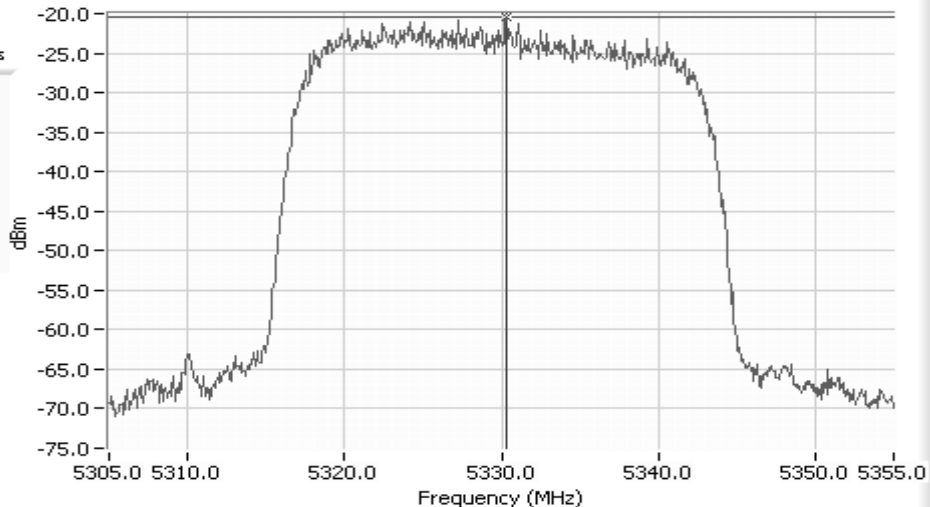
99% Bandwidth (MHz)

25.00

Power Over Span

0.146 mW

-8.36 dBm



Close Window

Max Level

5330.33

-20.33





EMC Test Data

Client: Microwave Data Systems	Job Number: J59373
Model: MDS5800-2	T-Log Number: T59711
Contact: Dennis McCarthy	Account Manager: Esther Zhu
Spec: FCC 15.247 / 15.401	Class: N/A



Spectrum Analyzer Settings

CF: 5343.0MHz
SPAN: 20.0MHz
RB 1.0MHz
VB 3.0MHz
Detector Sample
Att 10
RL Offset 0.00
Sweep Time 50.0ms
Ref Lvl: -10.00DBM

Highest PSD

-17.17 dBm/1.0MHz

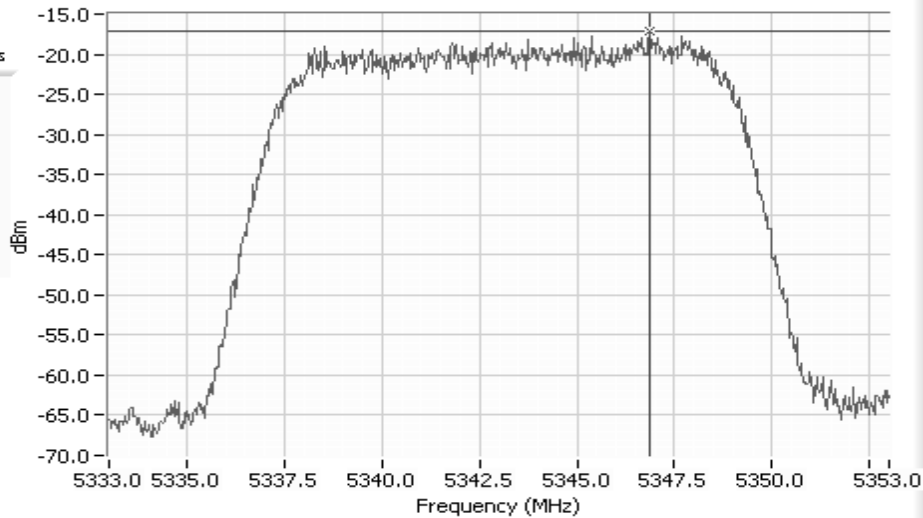
99% Bandwidth (MHz)

12.00

Power Over Span

0.168 mW

-7.75 dBm



5343 MHz Peak Power (100 sample sweeps)

Close Window



Max Level

5346.87

-17.17

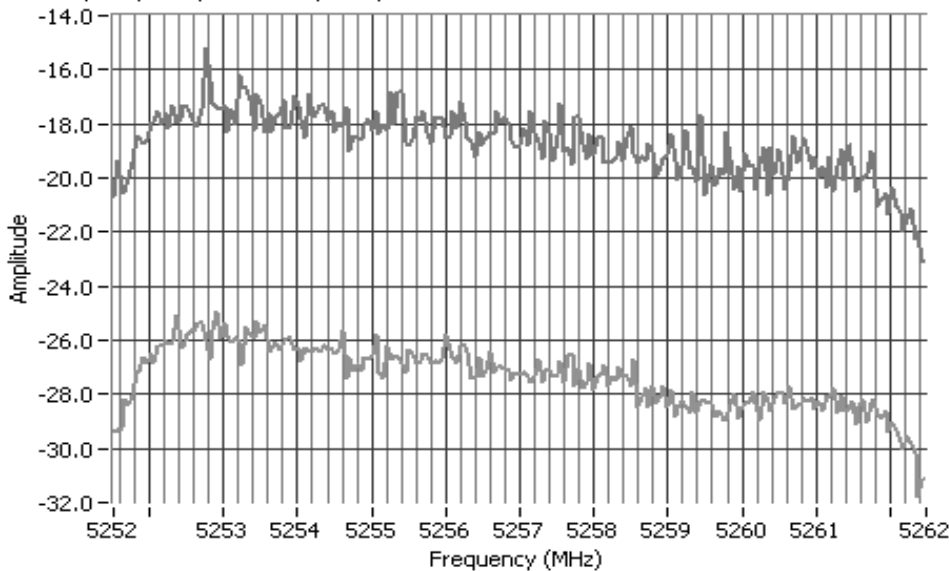


Client: Microwave Data Systems	Job Number: J59373
Model: MDS5800-2	T-Log Number: T59711
Contact: Dennis McCarthy	Account Manager: Esther Zhu
Spec: FCC 15.247 / 15.401	Class: N/A

Run #2: Peak Excursion Measurement

Plots Showing Peak Excursion

Sampled (Plot 0) and Peak (Plot 1) Traces



Plot 0

Plot 1

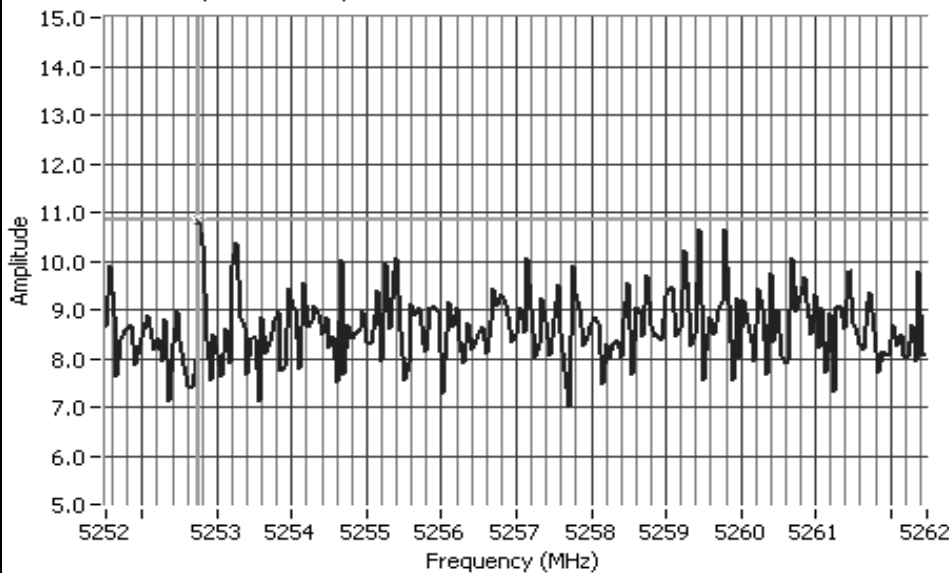
Settings for plot 0

CF: 5257.0MHz
 SPAN:20.0MHz
 RB 1.0MHz
 VB 3.0MHz
 Detector Sample
 Att 10
 RL Offset 0.00

Settings for plot 1

CF: 5257.0MHz
 SPAN:20.0MHz
 RB 1.0MHz
 VB 3.0MHz
 Detector POS
 Att 10
 RL Offset 0.00

Peak Excursion (Plot 1 - Plot 0)



Peak PSD (Plot 0)

-24.96 dBm/1.0MHz

Peak PSD (Plot 1)

-15.17 dBm/1.0MHz

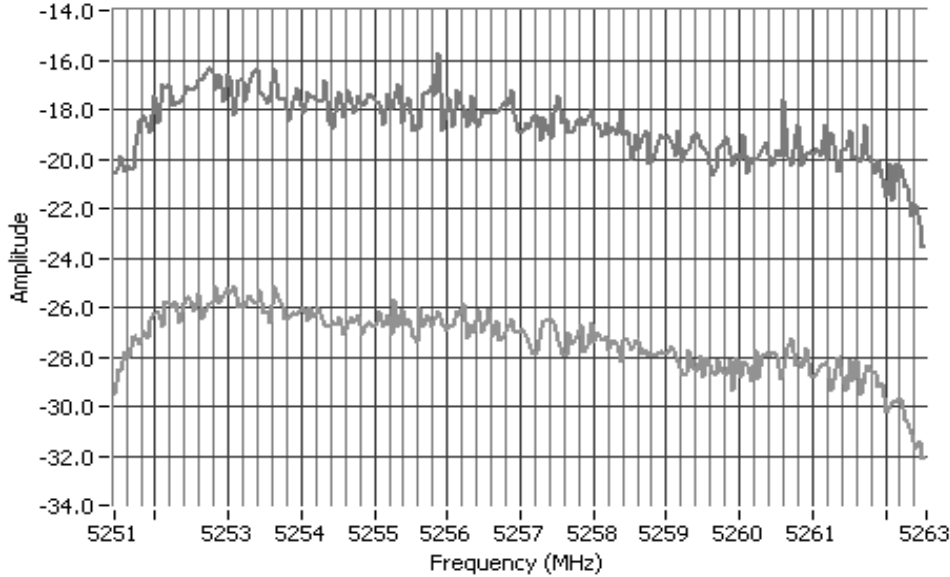
Maximum Peak Excursion (dB)

10.85

Peak Excursion Measurement 5257 MHz

Client: Microwave Data Systems	Job Number: J59373
Model: MDS5800-2	T-Log Number: T59711
Contact: Dennis McCarthy	Account Manager: Esther Zhu
Spec: FCC 15.247 / 15.401	Class: N/A

Sampled (Plot 0) and Peak (Plot 1) Traces



Plot 0

Plot 1

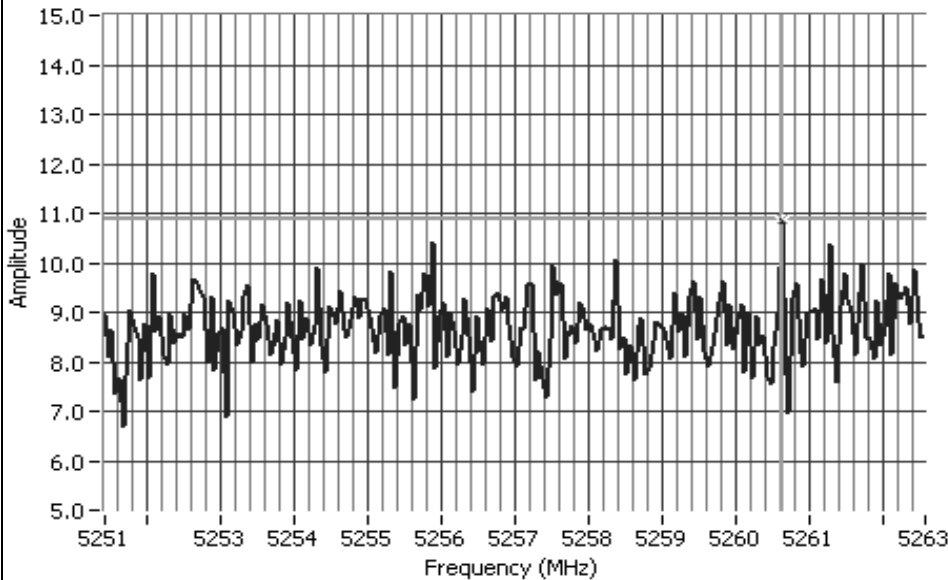
Settings for plot 0

CF: 5257.0MHz
 SPAN:20.0MHz
 RB 1.0MHz
 VB 3.0MHz
 Detector Sample
 Att 10
 RL Offset 0.00

Settings for plot 1

CF: 5257.0MHz
 SPAN:20.0MHz
 RB 1.0MHz
 VB 3.0MHz
 Detector POS
 Att 10
 RL Offset 0.00

Peak Excursion (Plot 1 - Plot 0)



Peak PSD (Plot 0)

-25.11 dBm/1.0MHz

Peak PSD (Plot 1)

-15.7E dBm/1.0MHz

Maximum Peak Excursion (dB)

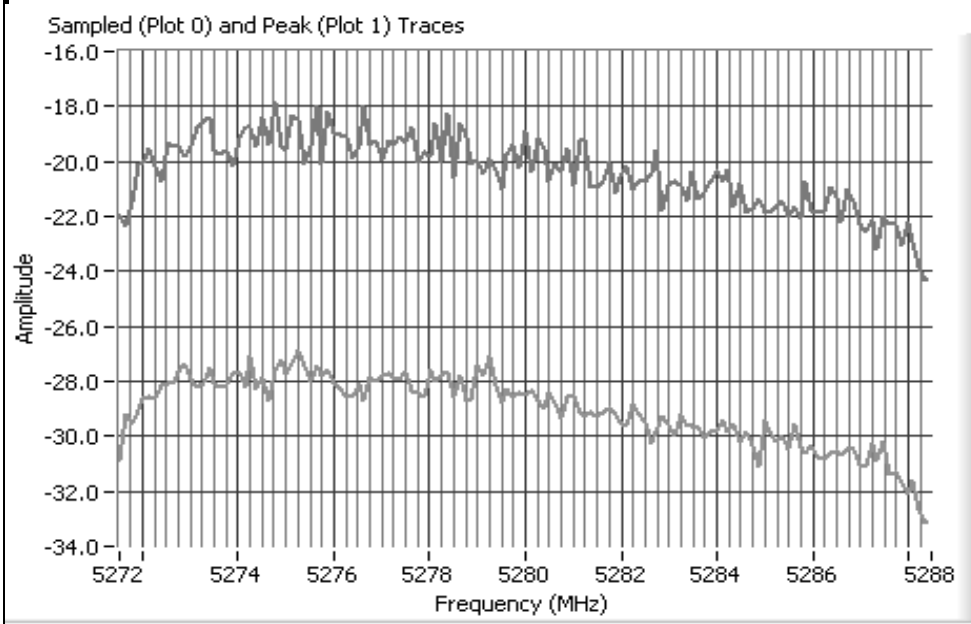
10.87

Peak Excursion Measurement 5280 MHz



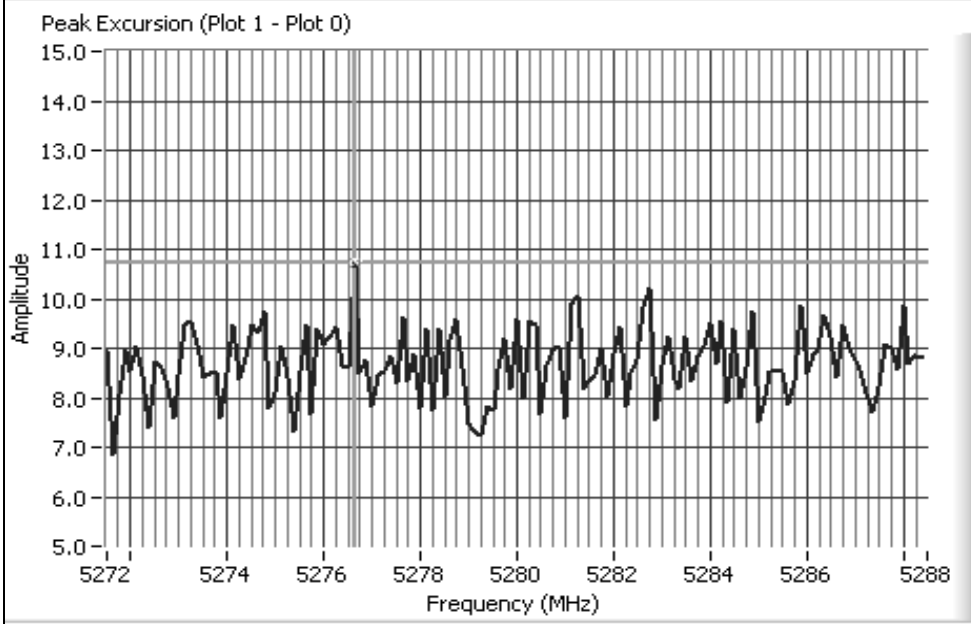
EMC Test Data

Client: Microwave Data Systems	Job Number: J59373
Model: MDS5800-2	T-Log Number: T59711
Contact: Dennis McCarthy	Account Manager: Esther Zhu
Spec: FCC 15.247 / 15.401	Class: N/A



Settings for plot 0
CF: 5280.0MHz
SPAN:50.0MHz
RB 1.0MHz
VB 3.0MHz
Detector Sample
Att 10
RL Offset 0.00

Settings for plot 1
CF: 5280.0MHz
SPAN:50.0MHz
RB 1.0MHz
VB 3.0MHz
Detector POS
Att 10
RL Offset 0.00



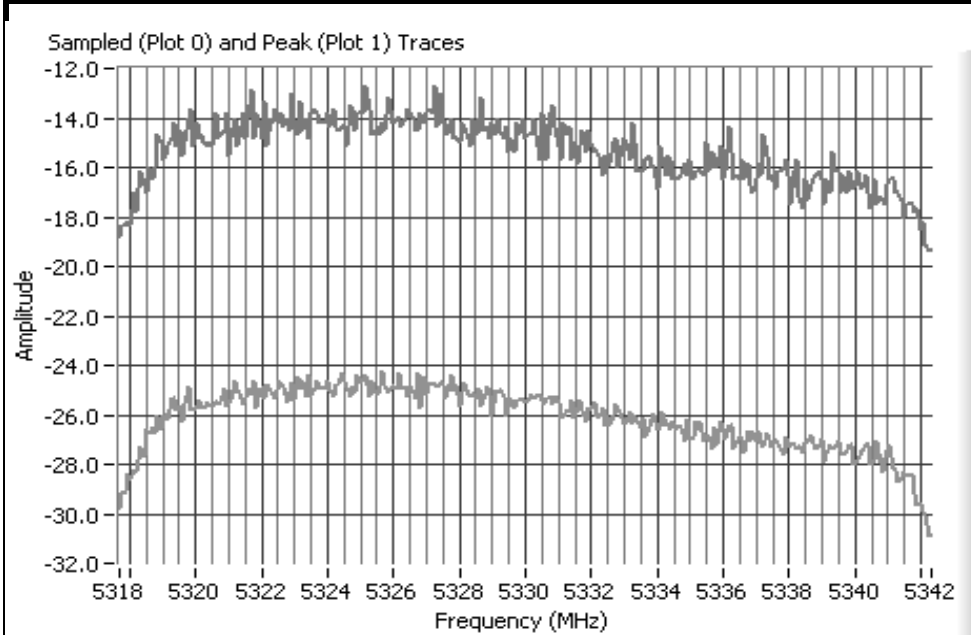
Peak PSD (Plot 0)
-26.90 dBm/1.0MHz

Peak PSD (Plot 1)
-17.87 dBm/1.0MHz

Maximum Peak Excursion (dB)
10.74

Peak Excursion Measurement 5280 MHz

Client: Microwave Data Systems	Job Number: J59373
Model: MDS5800-2	T-Log Number: T59711
Contact: Dennis McCarthy	Account Manager: Esther Zhu
Spec: FCC 15.247 / 15.401	Class: N/A



Plot 0

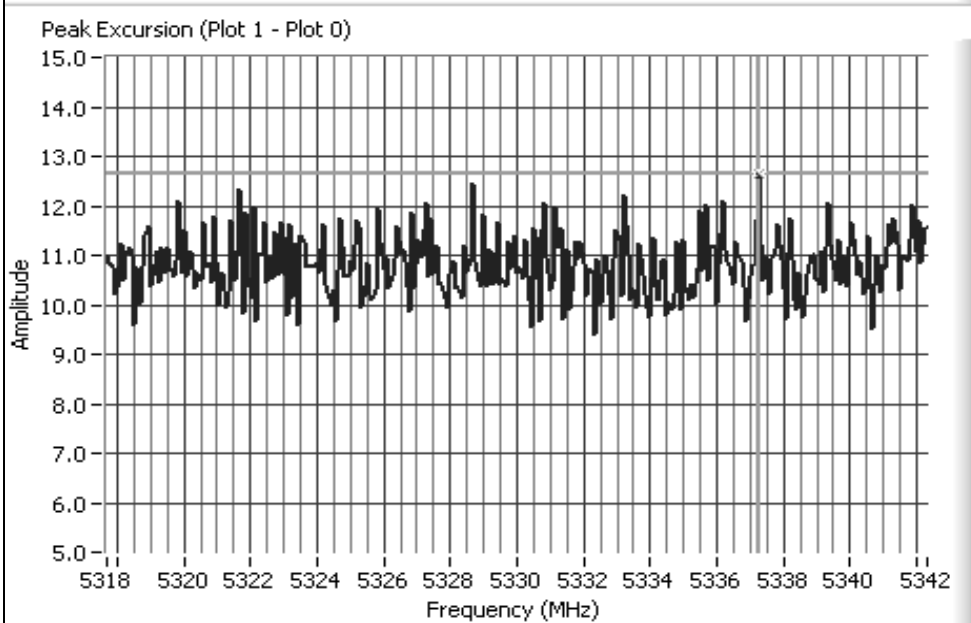
Plot 1

Settings for plot 0

- CF: 5330.0MHz
- SPAN:50.0MHz
- RB 1.0MHz
- VB 3.0MHz
- Detector Sample
- Att 10
- RL Offset 0.00

Settings for plot 1

- CF: 5330.0MHz
- SPAN:50.0MHz
- RB 1.0MHz
- VB 3.0MHz
- Detector POS
- Att 10
- RL Offset 0.00



Peak PSD (Plot 0)

-24.25 dBm/1.0MHz

Peak PSD (Plot 1)

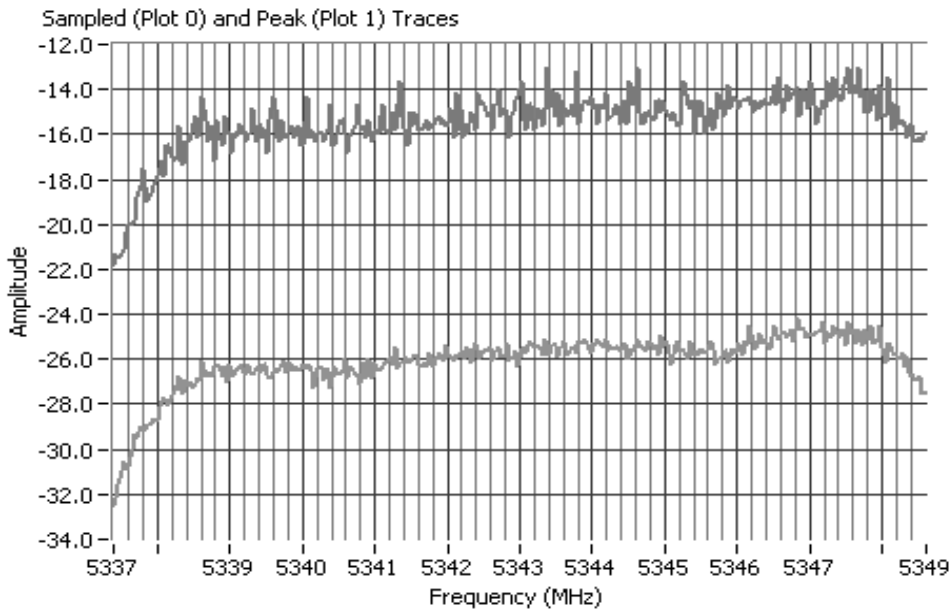
-12.67 dBm/1.0MHz

Maximum Peak Excursion (dB)

12.65

Peak Excursion Measurement 5330 MHz

Client: Microwave Data Systems	Job Number: J59373
Model: MDS5800-2	T-Log Number: T59711
Contact: Dennis McCarthy	Account Manager: Esther Zhu
Spec: FCC 15.247 / 15.401	Class: N/A



Plot 0

Plot 1

Settings for plot 0

CF: 5343.0MHz
 SPAN:20.0MHz
 RB 1.0MHz
 VB 3.0MHz
 Detector Sample
 Att 10
 RL Offset 0.00

Settings for plot 1

CF: 5343.0MHz
 SPAN:20.0MHz
 RB 1.0MHz
 VB 3.0MHz
 Detector POS
 Att 10
 RL Offset 0.00

Peak PSD (Plot 0)

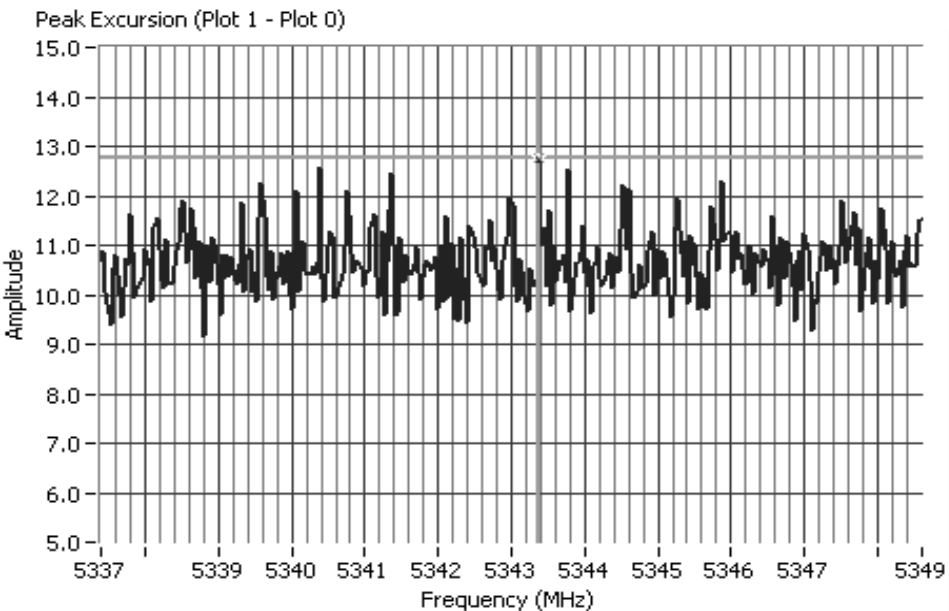
-24.18 dBm/1.0MHz

Peak PSD (Plot 1)

-13.00 dBm/1.0MHz

Maximum Peak Excursion (dB)

12.78



Peak Excursion Measurement 5343 Mhz



EMC Test Data

Client:	Microwave Data Systems	Job Number:	J59373
Model:	MDS5800-2	T-Log Number:	T59711
Contact:	Dennis McCarthy	Account Manager:	Esther Zhu
Spec:	FCC 15.247 / 15.401	Class:	N/A

Run #3: Out Of Band Spurious Emissions - Antenna Conducted

The antenna gain of the radios integral antenna is 37.6dBi. The EIRP limit is -27dBm/MHz for all out of band signals that do not fall in restricted bands. A limit of -64.6 dBm was, therefore, used for signals not in restricted bands and close to the intentional band with the assumption that the antenna gain was equal to 37.6 within 100 MHz of the upper and lower band edges. For signals removed from the band edge by more than 100MHz, radiated measurements were made (refer to run #6) if the signal amplitude exceeded -74.6dBm.

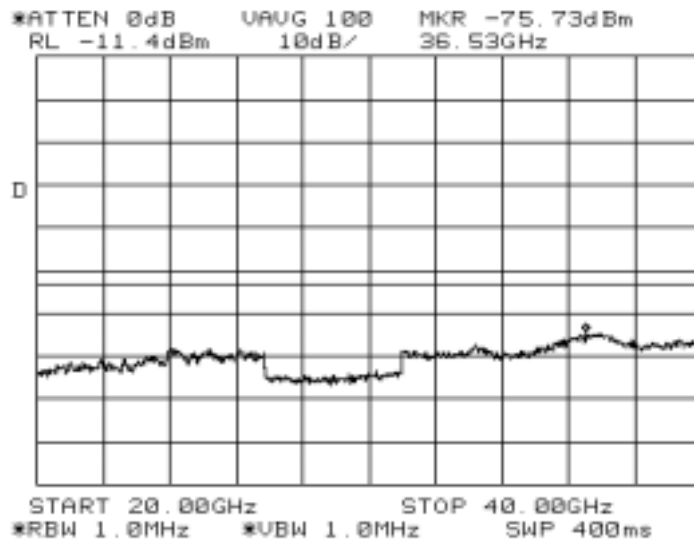
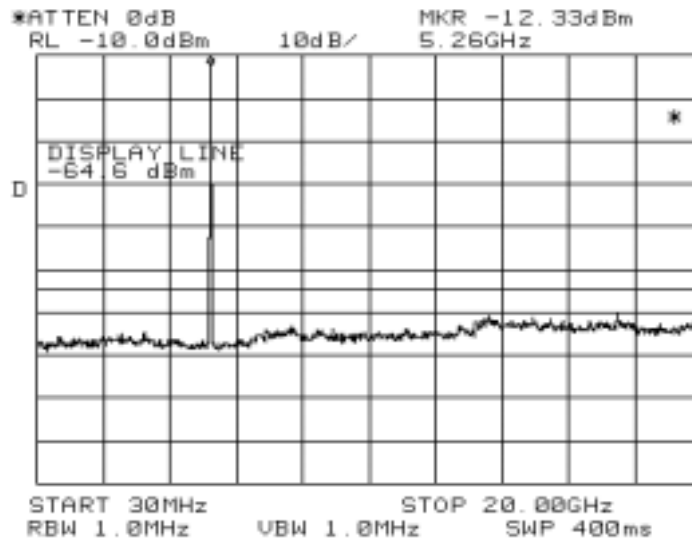
Channel	Frequency (MHz)	Notes	Graph reference #s
	5257	All out of band signals in any 1MHz bandwidth must be > 64.6dBm/MHz	400
	5270		401
	5280		402
	5330		403
	5343		404

Note 1:	Signal is in a restricted band.
Note 2:	Signal is not in restricted band. Limit is -27dBm eirp. As the signal strength is significantly lower than -27dBm no field strength measurements required.
Note 3:	Signal is not in restricted band. Limit is -27dBm eirp. Although the signal strength is significantly lower than -27dBm field strength measurements were made (refer to run #6)
Note 4:	All spurious signals in this frequency band measured during digital device radiated emissions test.

Client:	Microwave Data Systems	Job Number:	J59373
Model:	MDS5800-2	T-Log Number:	T59711
Contact:	Dennis McCarthy	Account Manager:	Esther Zhu
Spec:	FCC 15.247 / 15.401	Class:	N/A

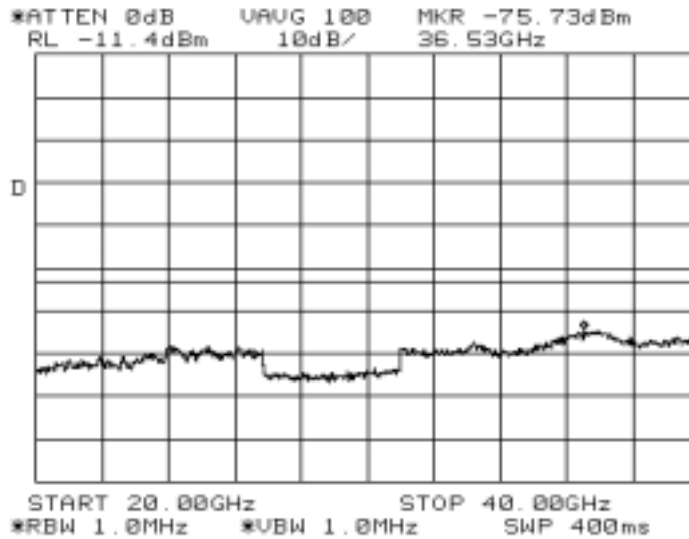
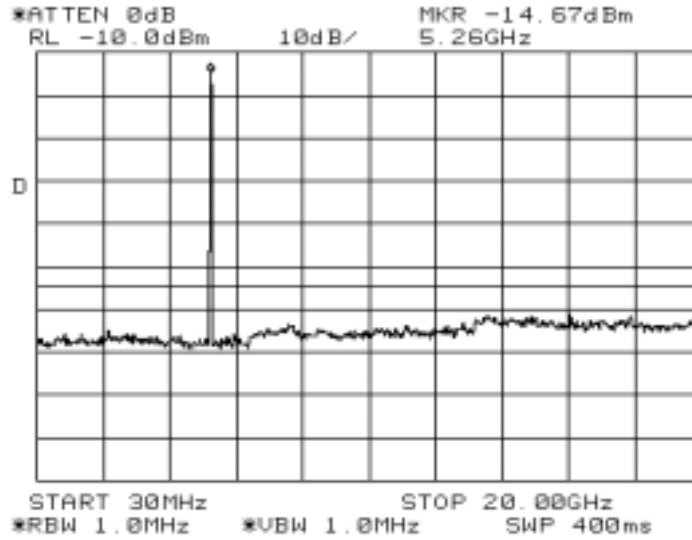
Plots Showing Out-Of-Band Emissions (RBW=VBW=1MHz)

Plot# 400



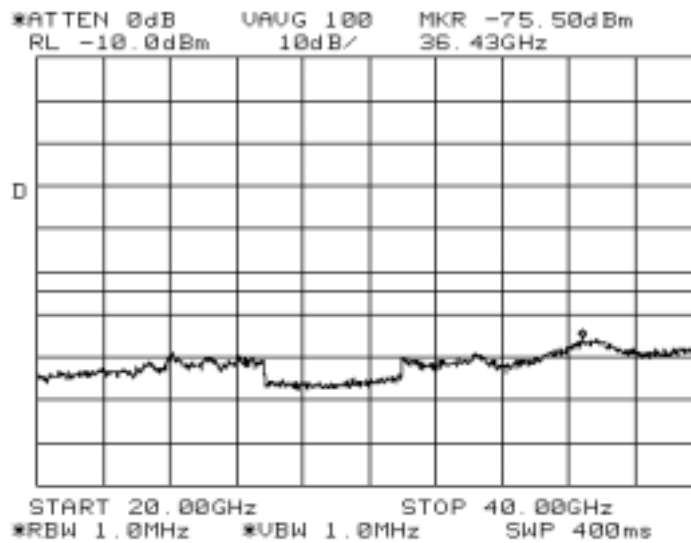
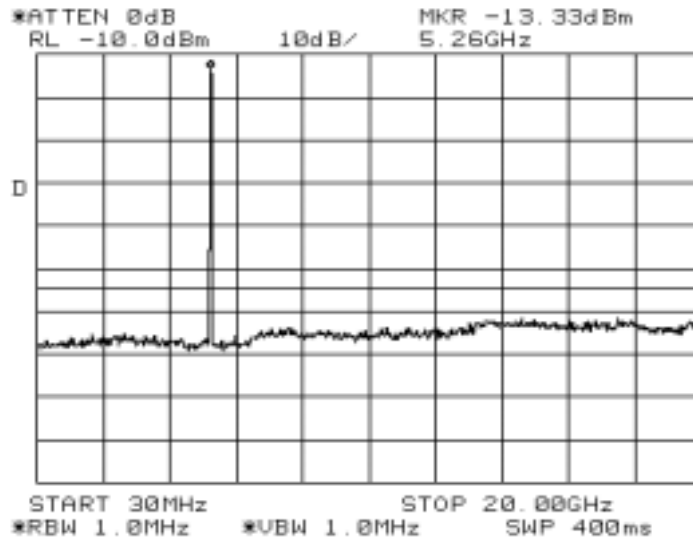
Client:	Microwave Data Systems	Job Number:	J59373
Model:	MDS5800-2	T-Log Number:	T59711
Contact:	Dennis McCarthy	Account Manager:	Esther Zhu
Spec:	FCC 15.247 / 15.401	Class:	N/A

Plot# 401



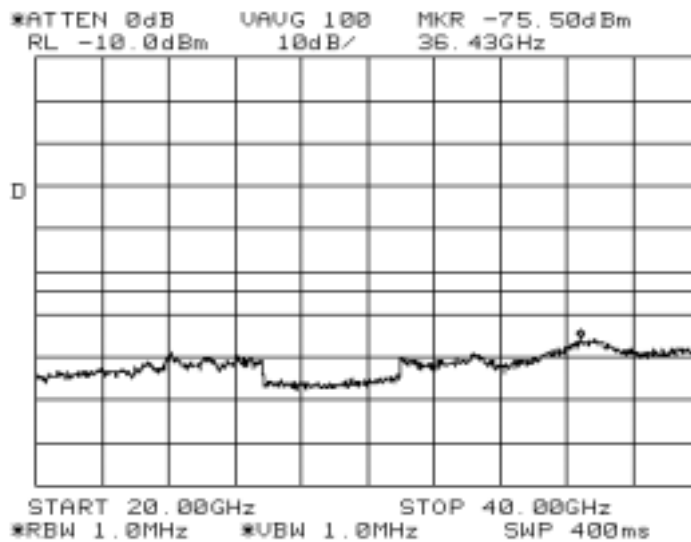
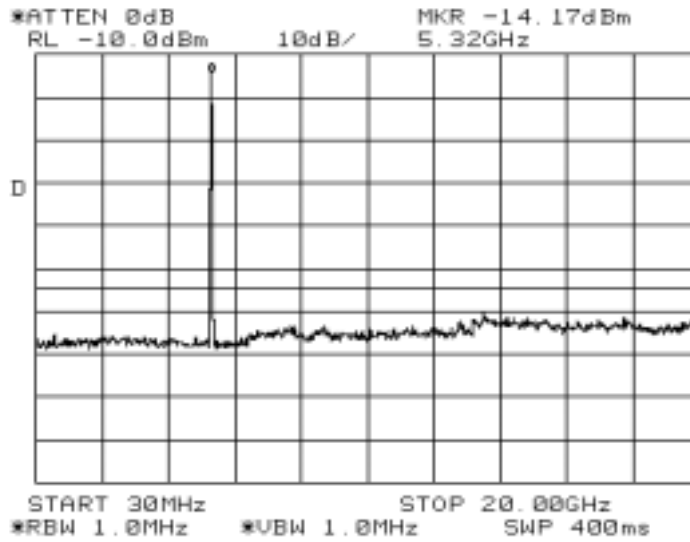
Client:	Microwave Data Systems	Job Number:	J59373
Model:	MDS5800-2	T-Log Number:	T59711
Contact:	Dennis McCarthy	Account Manager:	Esther Zhu
Spec:	FCC 15.247 / 15.401	Class:	N/A

Plot# 402



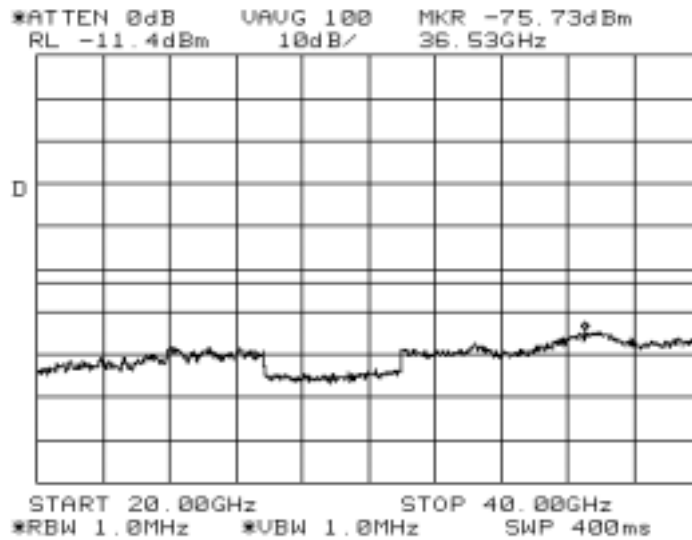
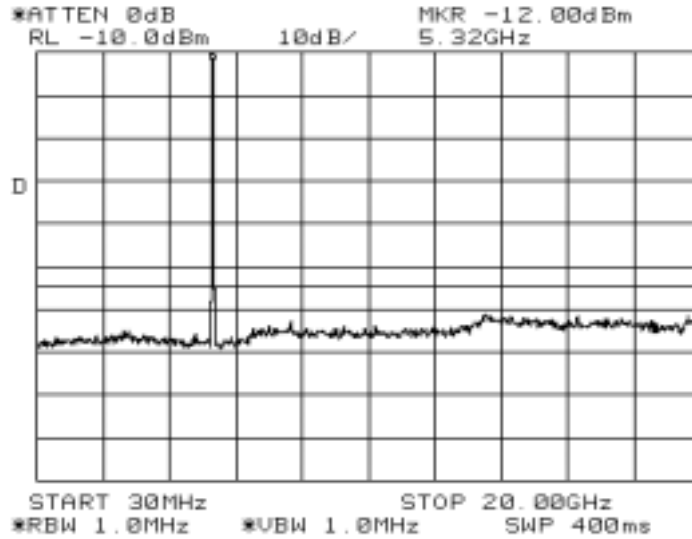
Client:	Microwave Data Systems	Job Number:	J59373
Model:	MDS5800-2	T-Log Number:	T59711
Contact:	Dennis McCarthy	Account Manager:	Esther Zhu
Spec:	FCC 15.247 / 15.401	Class:	N/A

Plot# 403



Client:	Microwave Data Systems	Job Number:	J59373
Model:	MDS5800-2	T-Log Number:	T59711
Contact:	Dennis McCarthy	Account Manager:	Esther Zhu
Spec:	FCC 15.247 / 15.401	Class:	N/A

Plot# 404





EMC Test Data

Client:	Microwave Data Systems	Job Number:	J59373
Model:	MDS5800-2	T-Log Number:	T59711
Contact:	Dennis McCarthy	Account Manager:	Esther Zhu
Spec:	FCC 15.247 / 15.401	Class:	N/A

FCC Part 15 Subpart E Tests

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: 6/29/2005
 Test Engineer: Juan Martinez
 Test Location: SVOATS #1
 Config. Used: 1
 Config Change: None
 EUT Voltage: -48Vdc

General Test Configuration

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 and cables used.

Ambient Conditions: Temperature: 21 °C
 Rel. Humidity: 48 %

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	Output Power	15.407(a) (1), (2)	Pass	6.8 dBm
1	Power Spectral Density (PSD)	15.407(a) (1), (2)	Pass	-6dBm/MHz
1	26dB Bandwidth	15.407	Pass	> 26 MHz
1	20 dB Bandwidth	RSS 210	Pass	> 20 MHz
2	Peak Excursion Envelope	15.407(a) (6)	Pass	Peak to average excursion < 13dB
3	Antenna Conducted - Out of Band Spurious	15.407(b)	Pass	All emissions below the 27dBm/MHz 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.



EMC Test Data

Client:	Microwave Data Systems	Job Number:	J59373
Model:	MDS5800-2	T-Log Number:	T59711
Contact:	Dennis McCarthy	Account Manager:	Esther Zhu
Spec:	FCC 15.247 / 15.401	Class:	N/A

Run #1: Bandwidth, Output Power and Power Spectral Density

Antenna Gain: 23 dBi

Frequency (MHz)	Bandwidth (note 1) MHz			Output Power (note 2) dBm		Power (Watts)	PSD (FCC - note 3) dBm/MHz		PSD (RSS210 - note 4) dBm/MHz	
	20dB	26dB	99%	Measured	Limit		Measured	Limit	Avg	Peak
5270	26.0	25.7	26.0	6.2	7.0	0.00417	-6.2	-6.0	-7.9	
5330	26.0	25.8	26.0	6.8	7.0	0.00481	-6.7	-6.0	-7.3	
5257	11.9	11.9	12.0	3.3	7.0	0.00214	-6.2	-6.0	-7.5	
5270	11.9	11.8	12.0	2.7	7.0	0.00188	-6.6	-6.0	-8.1	
5280	11.9	11.9	12.0	1.8	7.0	0.00151	-7.2	-6.0	-9.0	
5330	12.9	12.8	13.0	4.0	7.0	0.00251	-6.0	-6.0	-7.1	
5343	12.0	11.8	12.0	3.3	7.0	0.00211	-6.3	-6.0	-7.5	

Note 1 Bandwidth measured using RBW = 300kHz.

Note 2 Output power measured using a spectrum analyzer with:
RBW=1MHz, VBW=3MHz, sample detector, power averaging on and power integration over 13 MHz

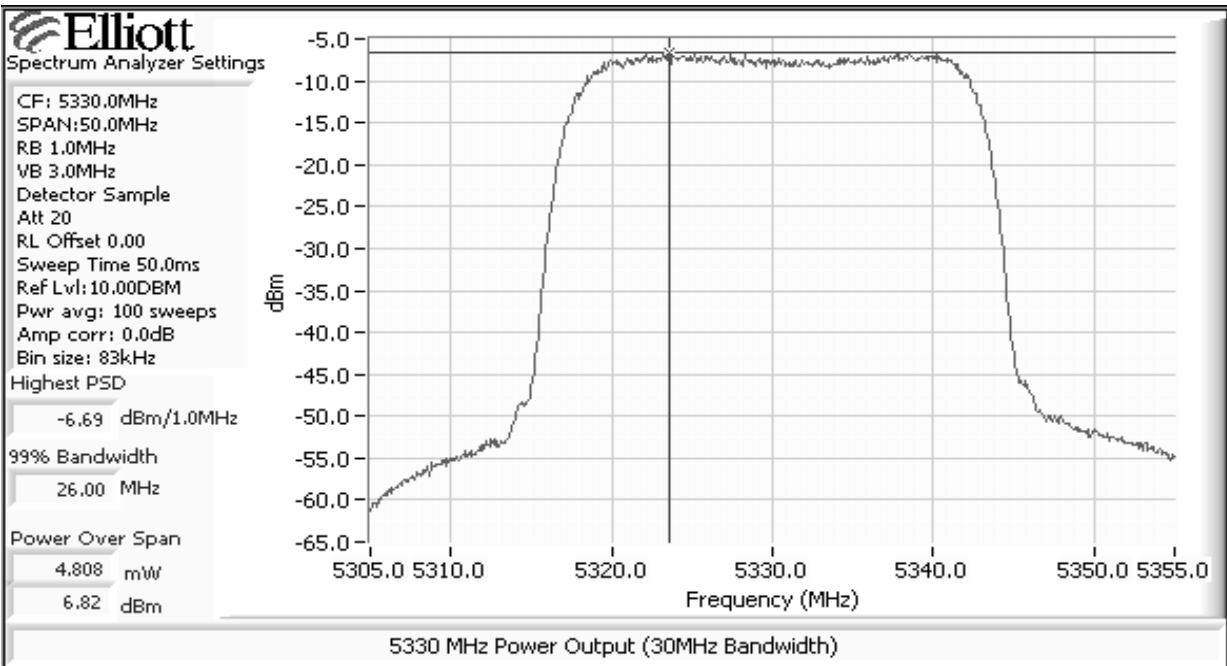
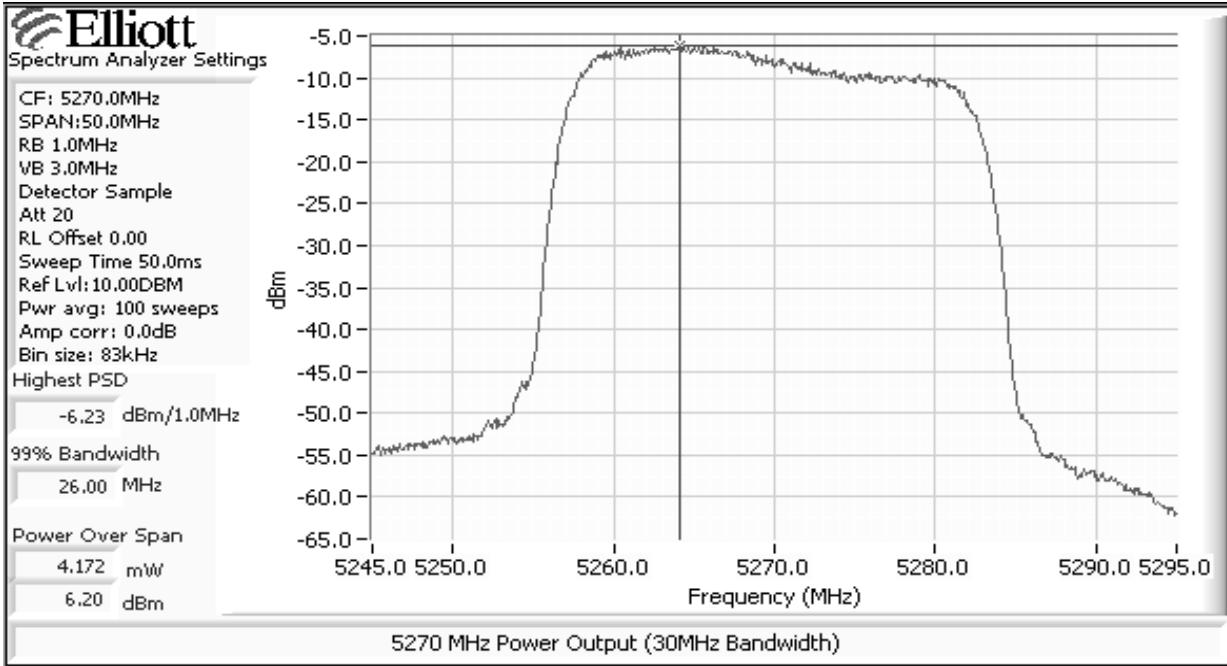
Note 3 Measurement of peak power spectral density was made using RBW = 1MHz, VBW = 3MHz. The value is taken from the peak excursion plots.

Note 4 Measurement of peak power spectral density was made using RBW = 1MHz, VBW = 3MHz. The average value is the peak output power divided by the 99% bandwidth. For RSS-210 the measured value must not exceed the average value by more than 6dB without reducing the limit for output power.



EMC Test Data

Client: Microwave Data Systems	Job Number: J59373
Model: MDS5800-2	T-Log Number: T59711
Contact: Dennis McCarthy	Account Manager: Esther Zhu
Spec: FCC 15.247 / 15.401	Class: N/A





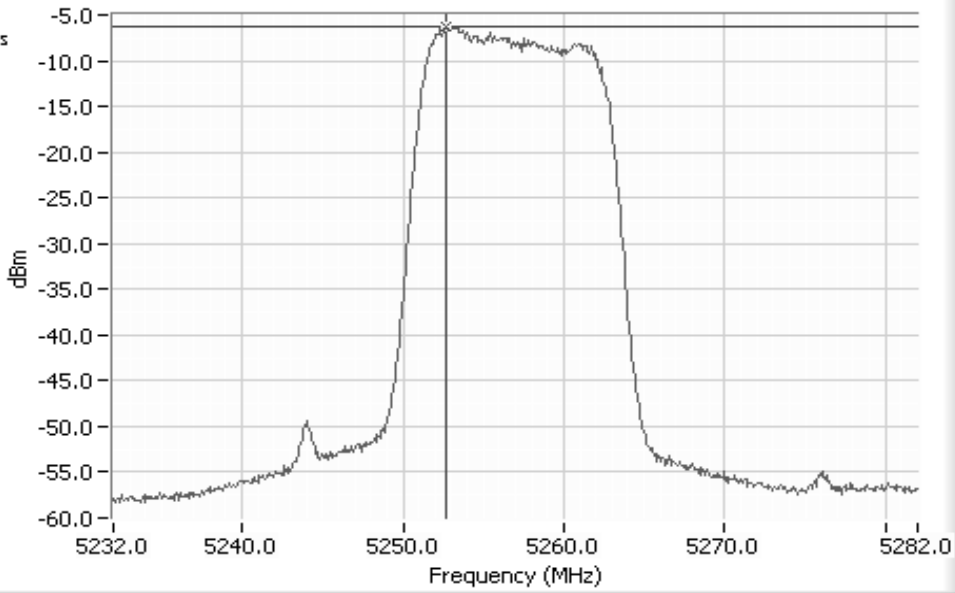
EMC Test Data

Client: Microwave Data Systems	Job Number: J59373
Model: MDS5800-2	T-Log Number: T59711
Contact: Dennis McCarthy	Account Manager: Esther Zhu
Spec: FCC 15.247 / 15.401	Class: N/A



Spectrum Analyzer Settings

CF: 5257.0MHz
SPAN:50.0MHz
RB 1.0MHz
VB 3.0MHz
Detector Sample
Att 30
RL Offset 0.00
Sweep Time 50.0ms
Ref Lvl:20.00DBM
Pwr avg: 100 sweeps
Amp corr: 0.0dB
Bin size: 83kHz
Highest PSD
-6.22 dBm/1.0MHz
99% Bandwidth
12.00 MHz
Power Over Span
2.143 mW
3.31 dBm

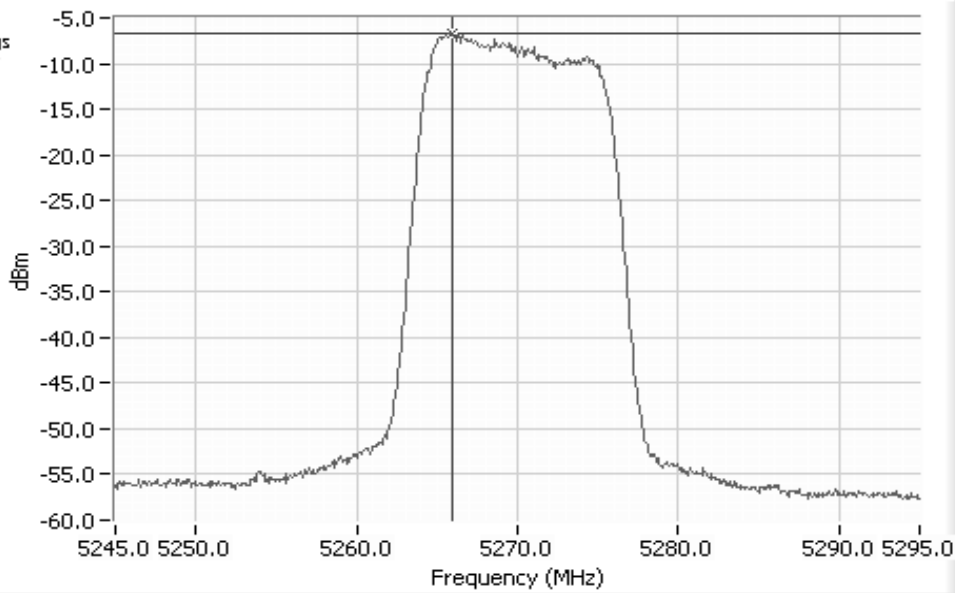


5257 MHz (Power Output)



Spectrum Analyzer Settings

CF: 5270.0MHz
SPAN:50.0MHz
RB 1.0MHz
VB 3.0MHz
Detector Sample
Att 30
RL Offset 0.00
Sweep Time 50.0ms
Ref Lvl:20.00DBM
Pwr avg: 100 sweeps
Amp corr: 0.0dB
Bin size: 83kHz
Highest PSD
-6.64 dBm/1.0MHz
99% Bandwidth
12.00 MHz
Power Over Span
1.877 mW
2.74 dBm



5270 MHz (Power Output)



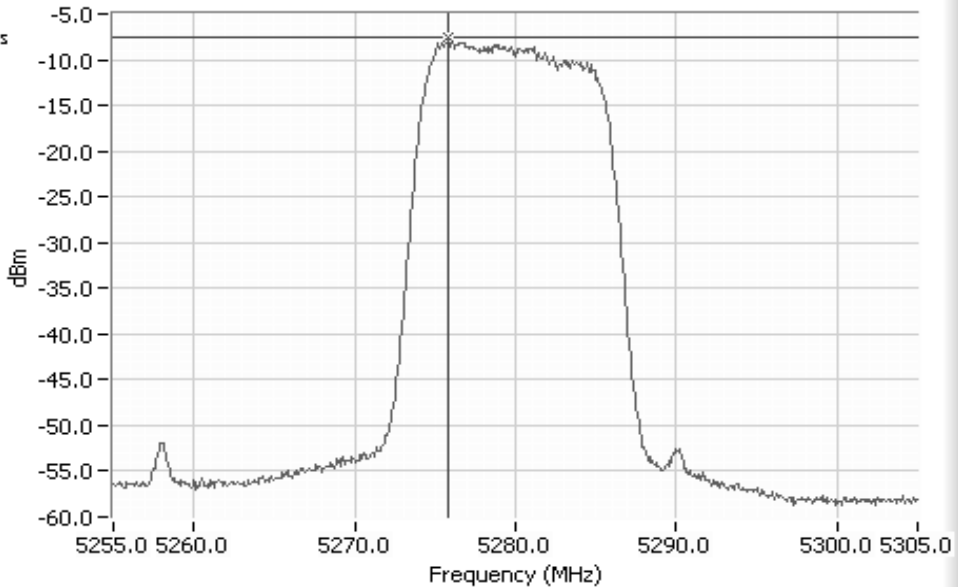
EMC Test Data

Client: Microwave Data Systems	Job Number: J59373
Model: MDS5800-2	T-Log Number: T59711
Contact: Dennis McCarthy	Account Manager: Esther Zhu
Spec: FCC 15.247 / 15.401	Class: N/A



Spectrum Analyzer Settings

CF: 5280.0MHz
SPAN:50.0MHz
RB 1.0MHz
VB 3.0MHz
Detector Sample
Att 30
RL Offset 0.00
Sweep Time 50.0ms
Ref Lvl:20.00DBM
Pwr avg: 100 sweeps
Amp corr: 0.0dB
Bin size: 83kHz
Highest PSD
-7.65 dBm/1.0MHz
99% Bandwidth
12.00 MHz
Power Over Span
1.513 mW
1.80 dBm

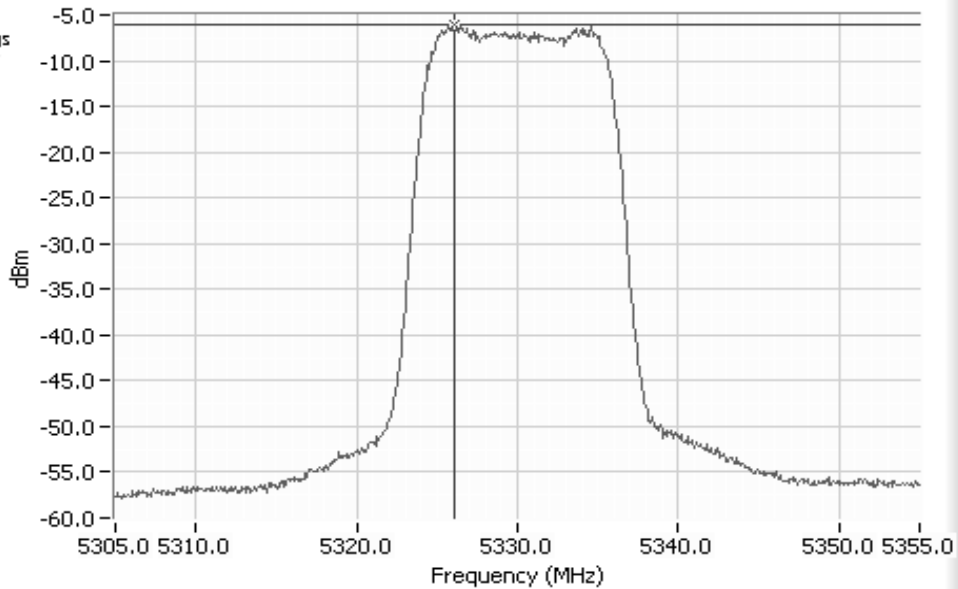


5280 MHz (Power Output)



Spectrum Analyzer Settings

CF: 5330.0MHz
SPAN:50.0MHz
RB 1.0MHz
VB 3.0MHz
Detector Sample
Att 30
RL Offset 0.00
Sweep Time 50.0ms
Ref Lvl:20.00DBM
Pwr avg: 100 sweeps
Amp corr: 0.0dB
Bin size: 83kHz
Highest PSD
-6.04 dBm/1.0MHz
99% Bandwidth
13.00 MHz
Power Over Span
2.514 mW
4.00 dBm



5330 MHz (Power Output)



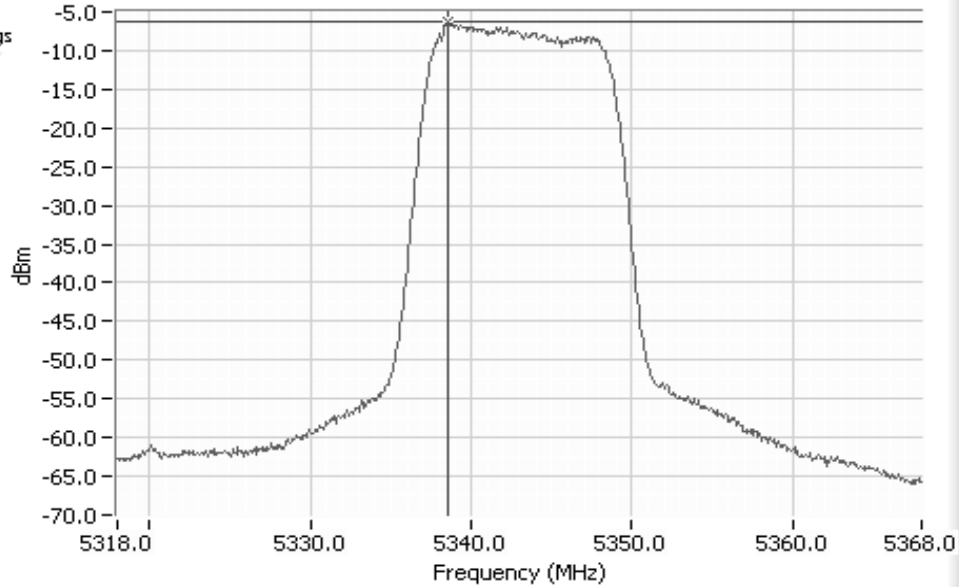
EMC Test Data

Client: Microwave Data Systems	Job Number: J59373
Model: MDS5800-2	T-Log Number: T59711
Contact: Dennis McCarthy	Account Manager: Esther Zhu
Spec: FCC 15.247 / 15.401	Class: N/A



Spectrum Analyzer Settings

CF: 5343.0MHz
SPAN: 50.0MHz
RB 1.0MHz
VB 3.0MHz
Detector Sample
Att 20
RL Offset 0.00
Sweep Time 50.0ms
Ref Lvl: 10.00DBM
Pwr avg: 100 sweeps
Amp corr: 0.0dB
Bin size: 83kHz
Highest PSD
-6.33 dBm/1.0MHz
99% Bandwidth
12.00 MHz
Power Over Span
2.115 mW
3.25 dBm



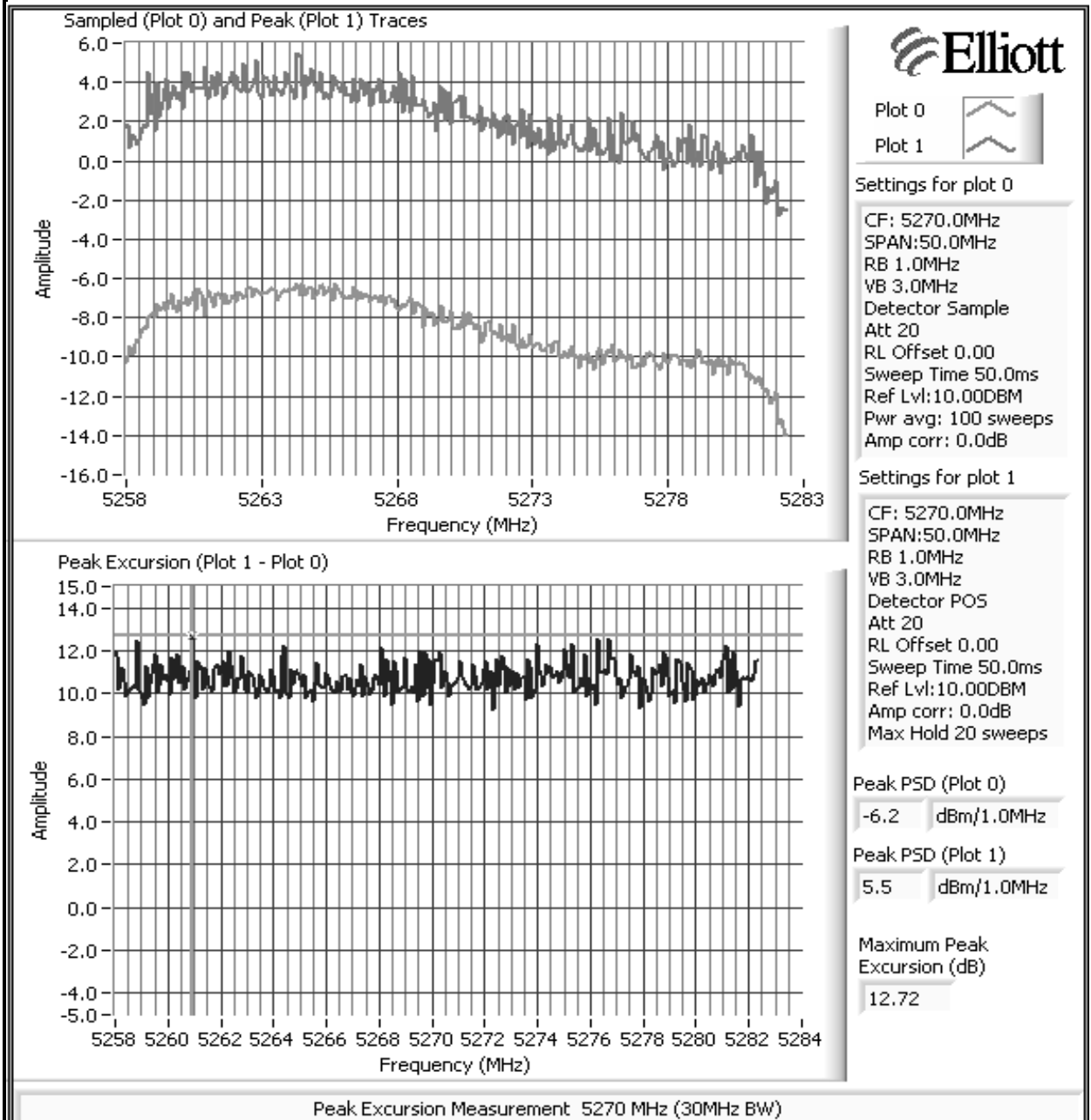
5343 MHz (Power Output)



EMC Test Data

Client: Microwave Data Systems	Job Number: J59373
Model: MDS5800-2	T-Log Number: T59711
Contact: Dennis McCarthy	Account Manager: Esther Zhu
Spec: FCC 15.247 / 15.401	Class: N/A

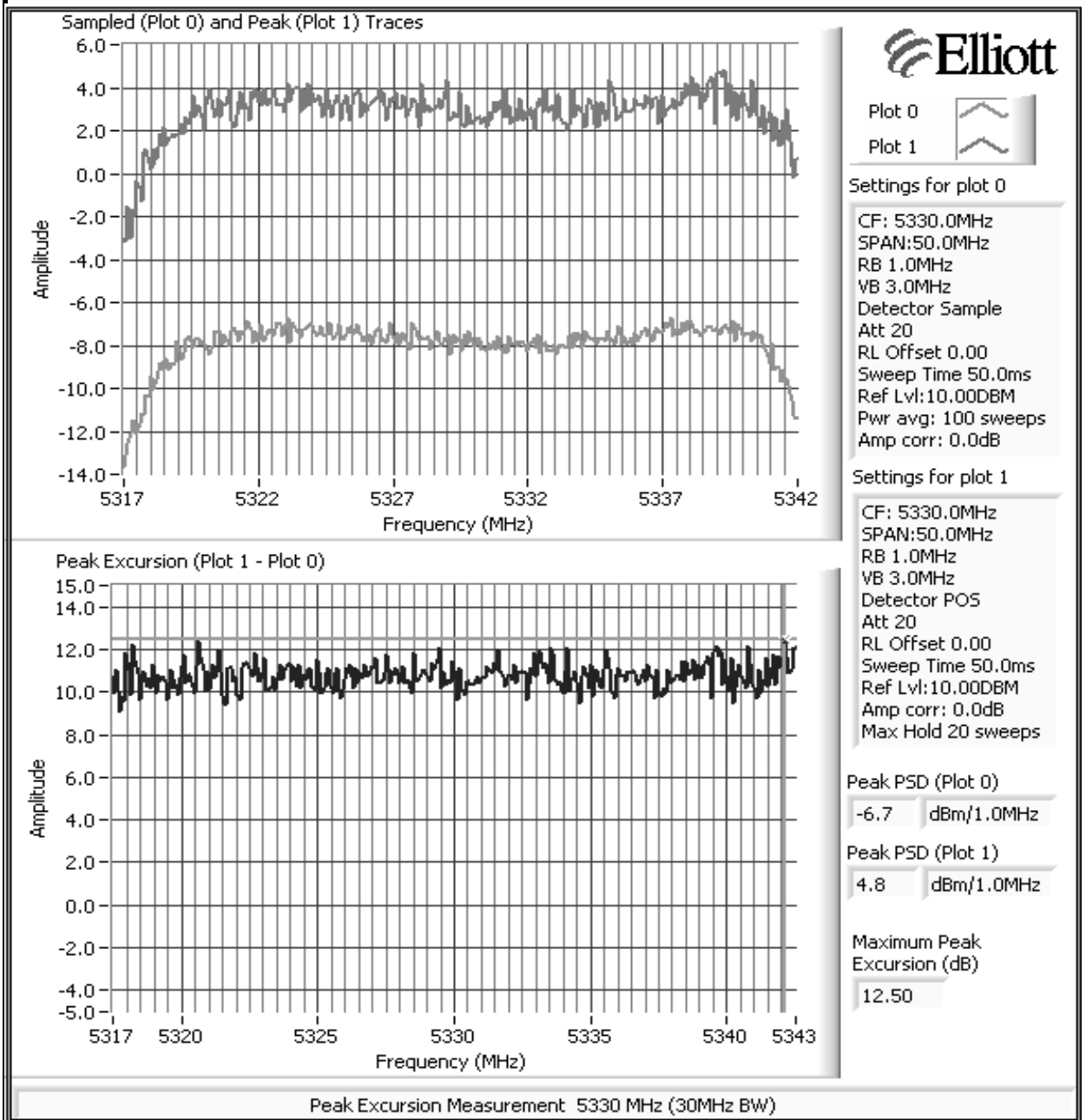
Run #2: Peak Excursion Measurement



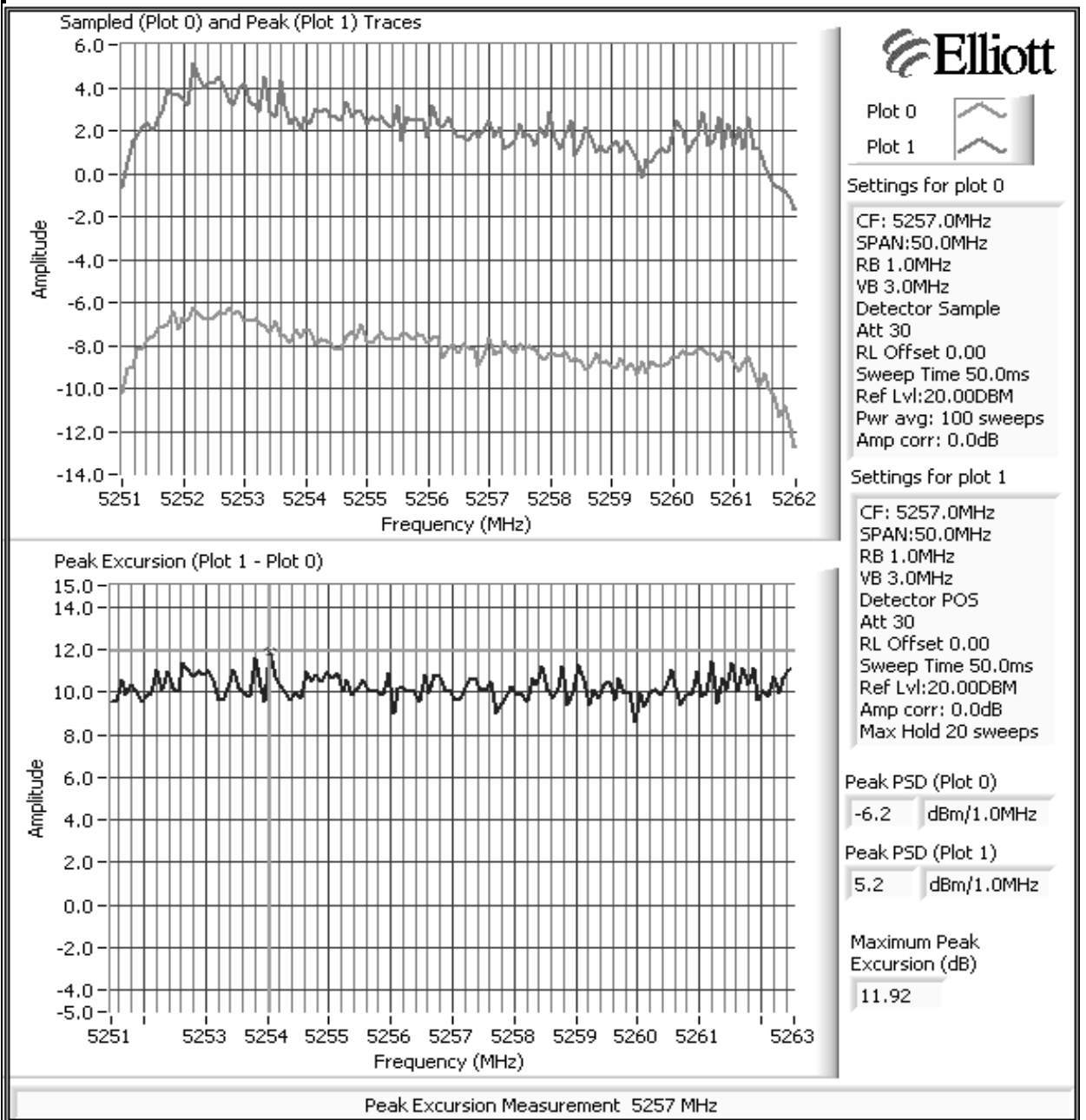


EMC Test Data

Client: Microwave Data Systems	Job Number: J59373
Model: MDS5800-2	T-Log Number: T59711
Contact: Dennis McCarthy	Account Manager: Esther Zhu
Spec: FCC 15.247 / 15.401	Class: N/A



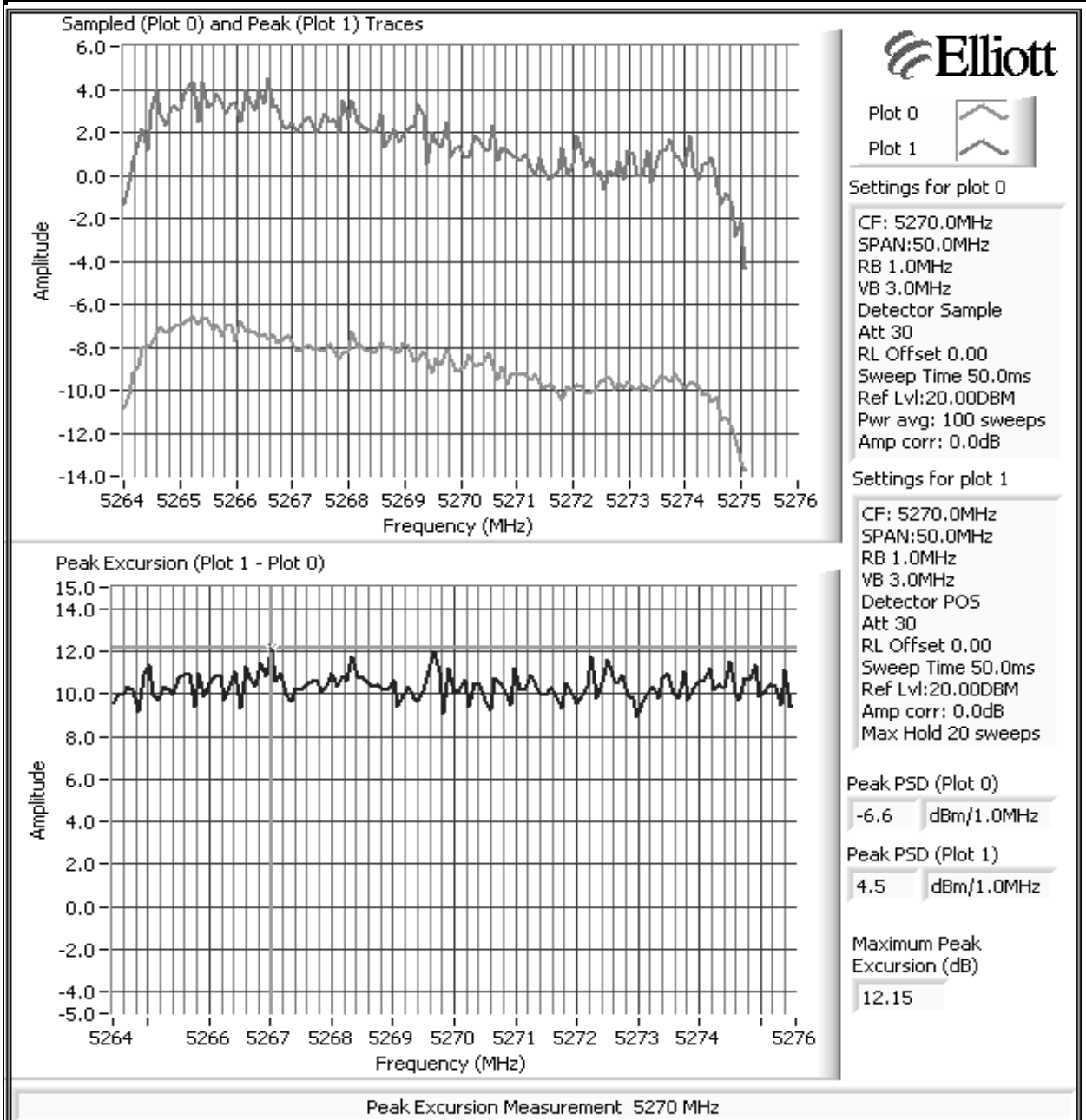
Client: Microwave Data Systems	Job Number: J59373
Model: MDS5800-2	T-Log Number: T59711
Contact: Dennis McCarthy	Account Manager: Esther Zhu
Spec: FCC 15.247 / 15.401	Class: N/A





EMC Test Data

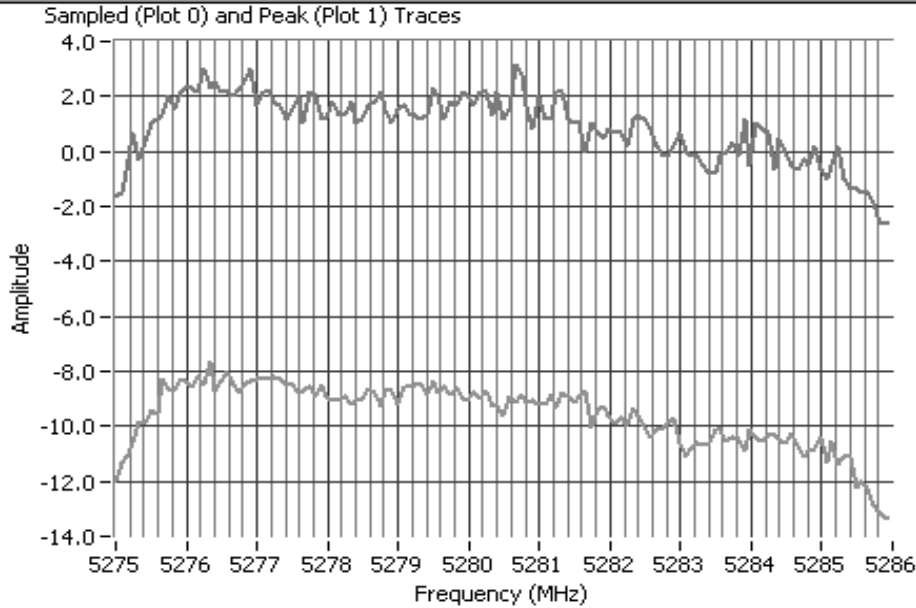
Client: Microwave Data Systems	Job Number: J59373
Model: MDS5800-2	T-Log Number: T59711
Contact: Dennis McCarthy	Account Manager: Esther Zhu
Spec: FCC 15.247 / 15.401	Class: N/A







EMC Test Data

Client: Microwave Data Systems	Job Number: J59373
Model: MDS5800-2	T-Log Number: T59711
Contact: Dennis McCarthy	Account Manager: Esther Zhu
Spec: FCC 15.247 / 15.401	Class: N/A



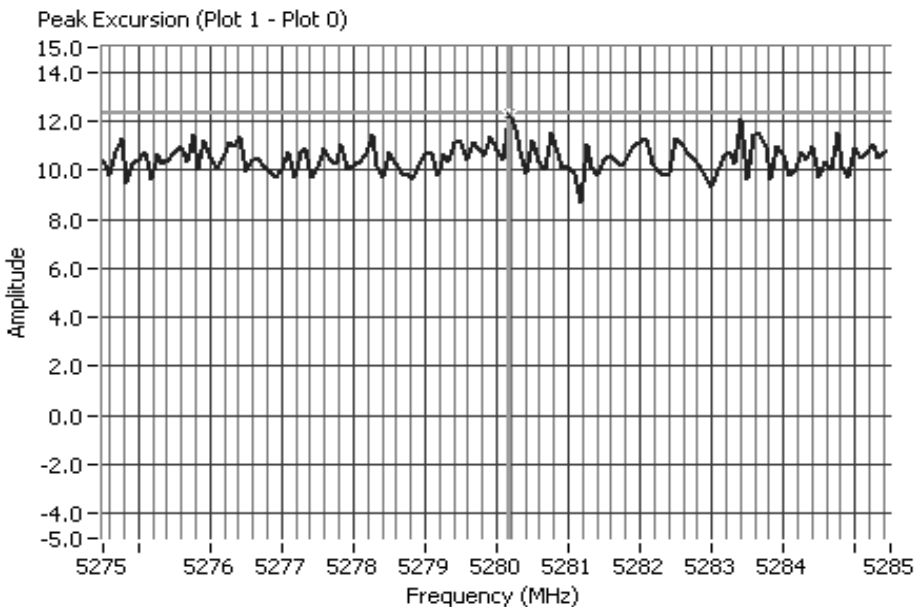
Plot 0 
Plot 1 

Settings for plot 0

CF: 5280.0MHz
SPAN:50.0MHz
RB 1.0MHz
VB 3.0MHz
Detector Sample
Att 30
RL Offset 0.00
Sweep Time 50.0ms
Ref Lvl:20.00DBM
Pwr avg: 100 sweeps
Amp corr: 0.0dB

Settings for plot 1

CF: 5280.0MHz
SPAN:50.0MHz
RB 1.0MHz
VB 3.0MHz
Detector POS
Att 30
RL Offset 0.00
Sweep Time 50.0ms
Ref Lvl:20.00DBM
Amp corr: 0.0dB
Max Hold 20 sweeps



Peak PSD (Plot 0)

-7.7 dBm/1.0MHz

Peak PSD (Plot 1)

3.2 dBm/1.0MHz

Maximum Peak Excursion (dB)

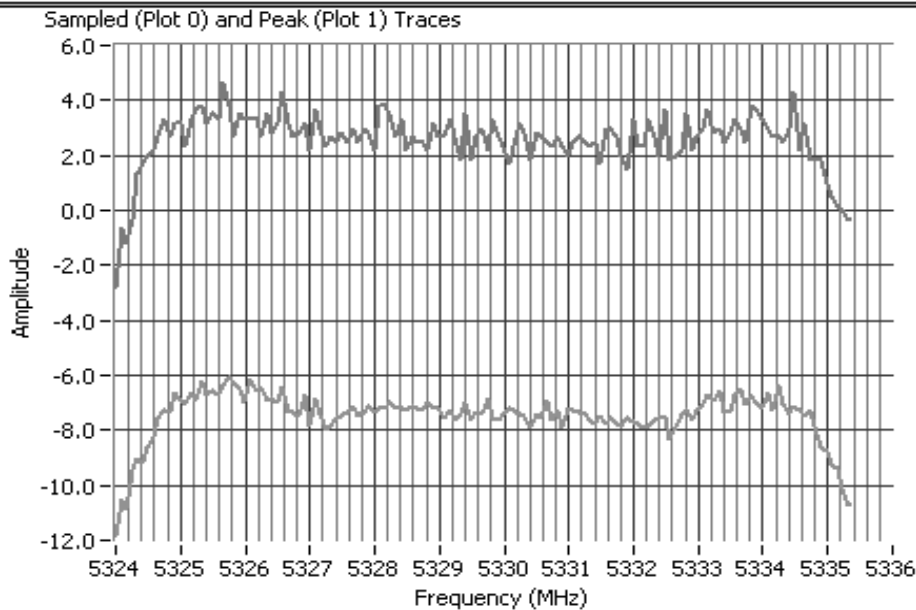
12.31

Peak Excursion Measurement 5280 MHz



EMC Test Data

Client: Microwave Data Systems	Job Number: J59373
Model: MDS5800-2	T-Log Number: T59711
Contact: Dennis McCarthy	Account Manager: Esther Zhu
Spec: FCC 15.247 / 15.401	Class: N/A



Plot 0

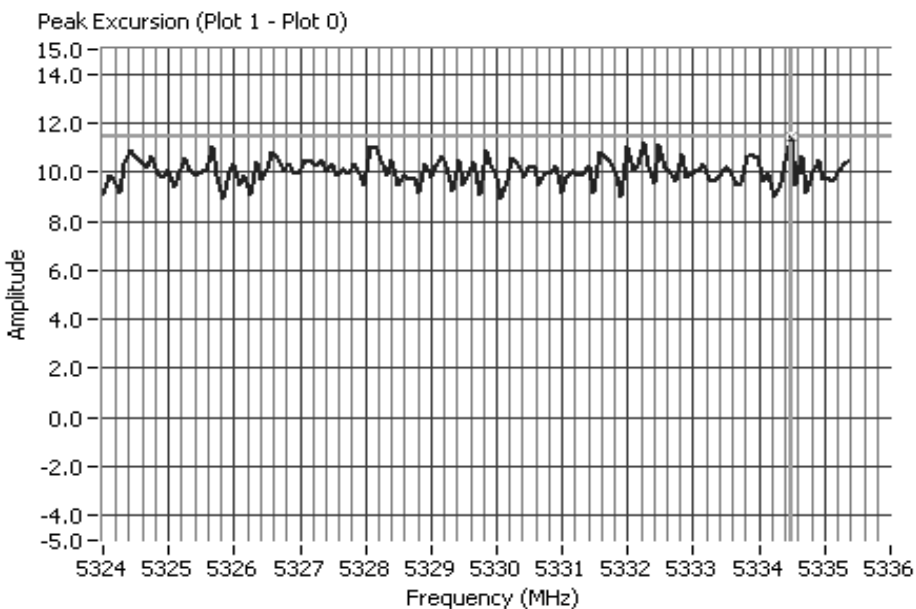
Plot 1

Settings for plot 0

CF: 5330.0MHz
SPAN:50.0MHz
RB 1.0MHz
VB 3.0MHz
Detector Sample
Att 30
RL Offset 0.00
Sweep Time 50.0ms
Ref Lvl:20.00DBM
Pwr avg: 100 sweeps
Amp corr: 0.0dB

Settings for plot 1

CF: 5330.0MHz
SPAN:50.0MHz
RB 1.0MHz
VB 3.0MHz
Detector POS
Att 30
RL Offset 0.00
Sweep Time 50.0ms
Ref Lvl:20.00DBM
Amp corr: 0.0dB
Max Hold 20 sweeps



Peak PSD (Plot 0)

-6.0 dBm/1.0MHz

Peak PSD (Plot 1)

4.7 dBm/1.0MHz

Maximum Peak Excursion (dB)

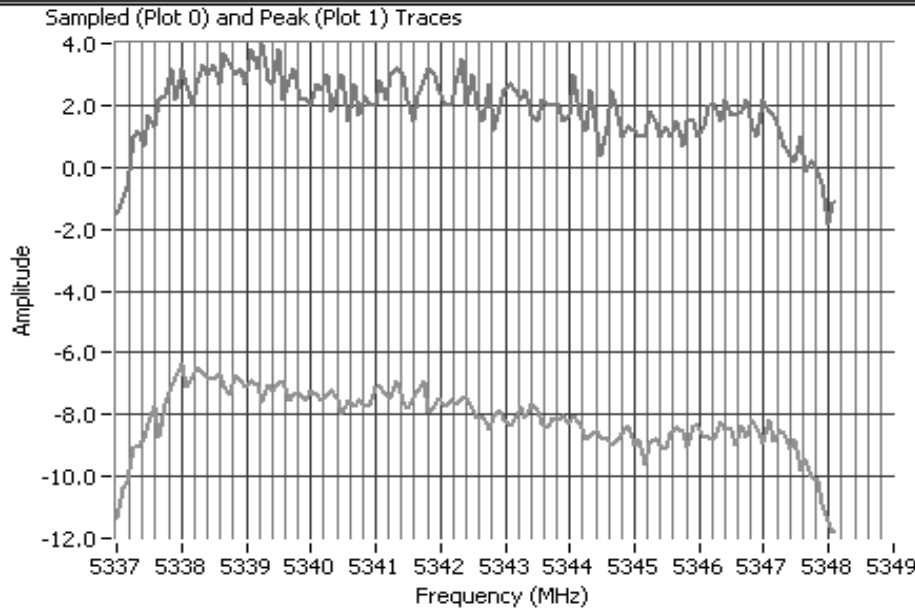
11.46



Peak Excursion Measurement 5330 MHz



EMC Test Data

Client: Microwave Data Systems	Job Number: J59373
Model: MDS5800-2	T-Log Number: T59711
Contact: Dennis McCarthy	Account Manager: Esther Zhu
Spec: FCC 15.247 / 15.401	Class: N/A



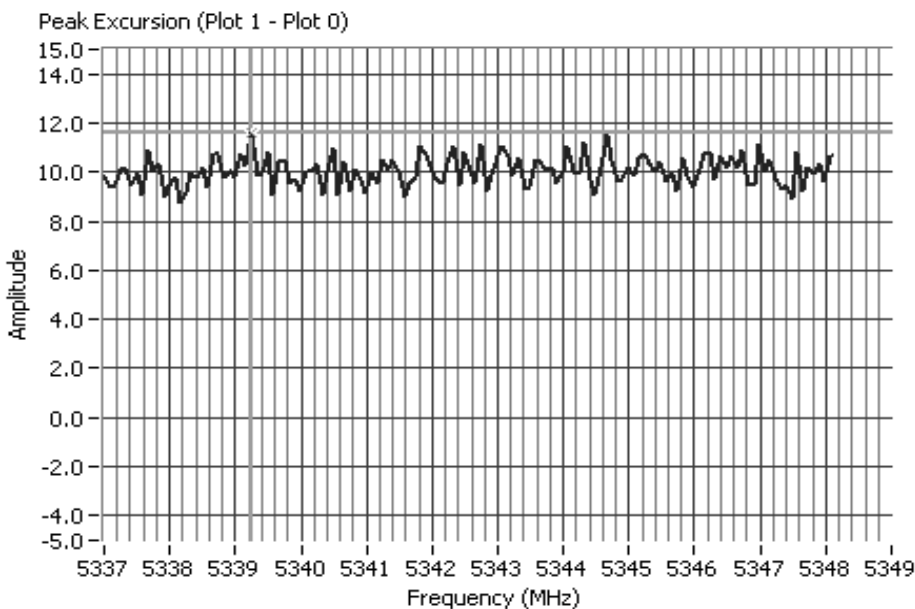
Plot 0 
Plot 1 

Settings for plot 0

CF: 5343.0MHz
SPAN:50.0MHz
RB 1.0MHz
VB 3.0MHz
Detector Sample
Att 20
RL Offset 0.00
Sweep Time 50.0ms
Ref Lvl:10.00DBM
Pwr avg: 100 sweeps
Amp corr: 0.0dB

Settings for plot 1

CF: 5343.0MHz
SPAN:50.0MHz
RB 1.0MHz
VB 3.0MHz
Detector POS
Att 20
RL Offset 0.00
Sweep Time 50.0ms
Ref Lvl:10.00DBM
Amp corr: 0.0dB
Max Hold 20 sweeps



Peak PSD (Plot 0)

-6.3 dBm/1.0MHz

Peak PSD (Plot 1)

4.0 dBm/1.0MHz

Maximum Peak Excursion (dB)

11.58

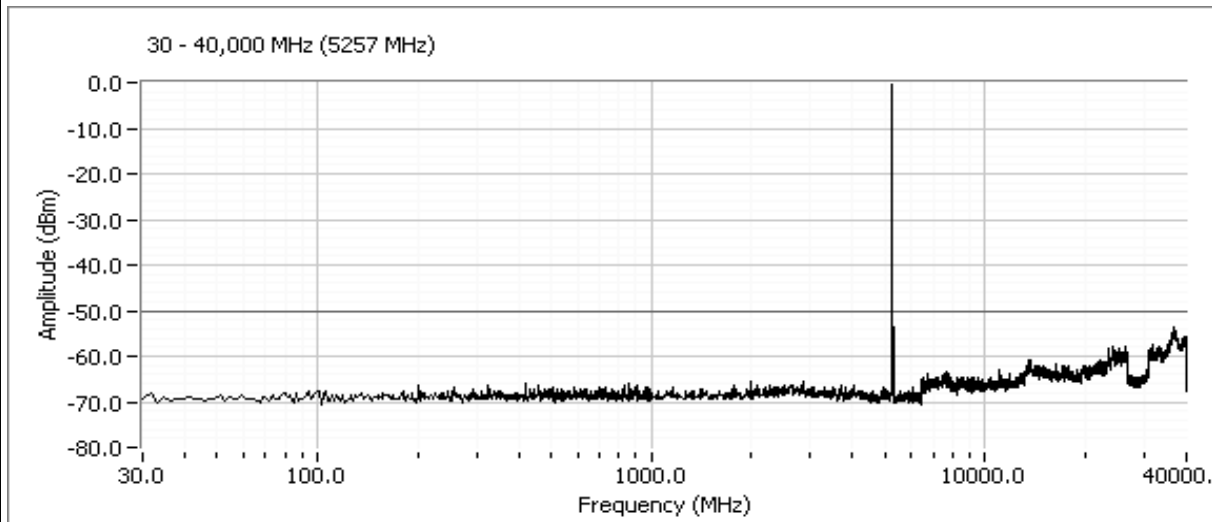
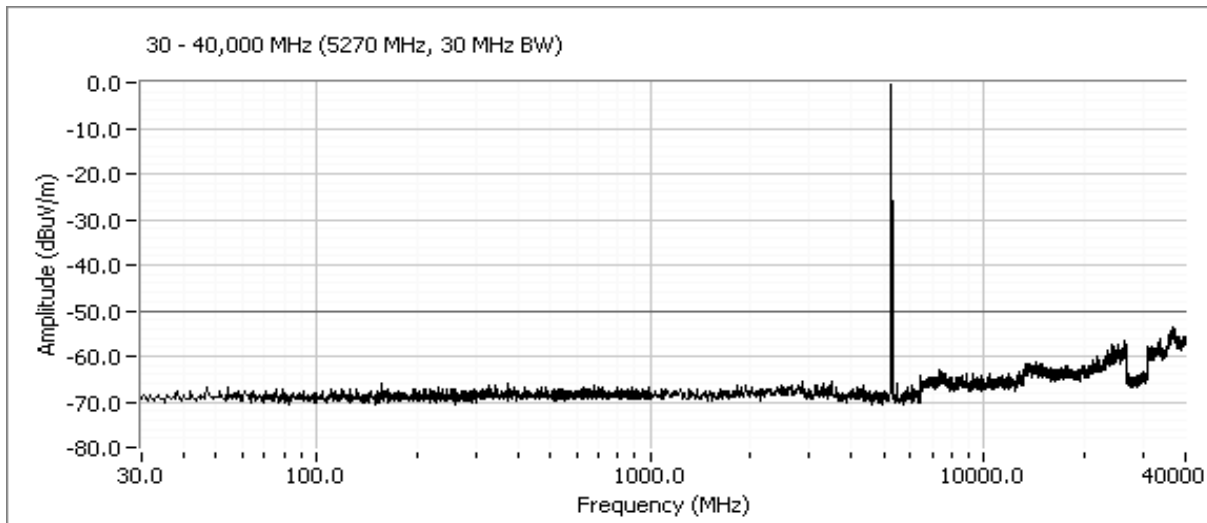
Peak Excursion Measurement 5343 MHz

Client:	Microwave Data Systems	Job Number:	J59373
Model:	MDS5800-2	T-Log Number:	T59711
Contact:	Dennis McCarthy	Account Manager:	Esther Zhu
Spec:	FCC 15.247 / 15.401	Class:	N/A

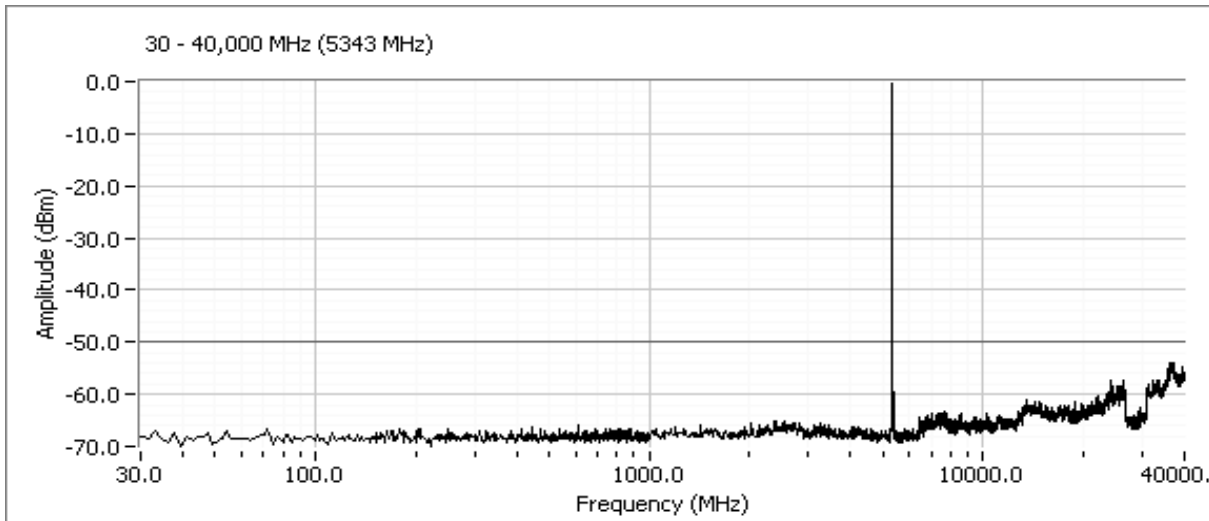
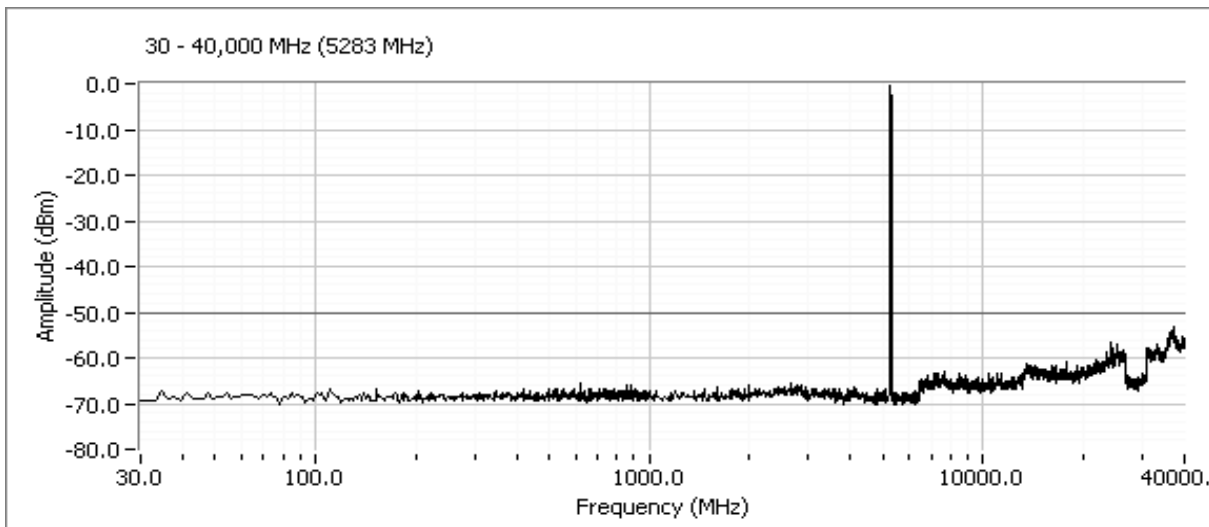
Run #3: Out Of Band Spurious Emissions - Antenna Conducted

The antenna gain of the radios integral antenna is 23dBi. The EIRP limit is -27dBm/MHz for all out of band signals that do not fall in restricted bands. A limit of -50 dBm was, therefore, used for signals not in restricted bands and close to the intentional band with the assumption that the antenna gain was equal to 23 within 100 MHz of the upper and lower band edges. For signals removed from the band edge by more than 100MHz, radiated measurements were made if the signal amplitude exceeded -57dBm.

Plots Showing Out-Of-Band Emissions (RBW=VBW=1MHz)



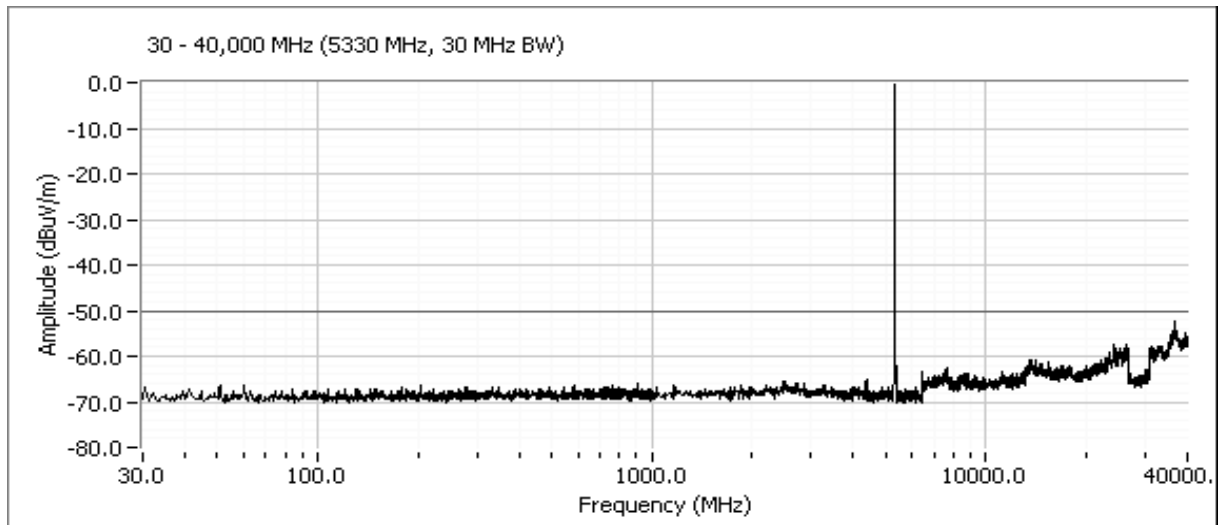
Client:	Microwave Data Systems	Job Number:	J59373
Model:	MDS5800-2	T-Log Number:	T59711
Contact:	Dennis McCarthy	Account Manager:	Esther Zhu
Spec:	FCC 15.247 / 15.401	Class:	N/A





EMC Test Data

Client:	Microwave Data Systems	Job Number:	J59373
Model:	MDS5800-2	T-Log Number:	T59711
Contact:	Dennis McCarthy	Account Manager:	Esther Zhu
Spec:	FCC 15.247 / 15.401	Class:	N/A



Note 1:	Signal is in a restricted band.
Note 2:	Signal is not in restricted band. Limit is -27dBm eirp. As the signal strength is significantly lower than -27dBm no field strength measurements required.
Note 3:	Signal is not in restricted band. Limit is -27dBm eirp. Although the signal strength is significantly lower than -27dBm field strength measurements were made (refer to run #6)
Note 4:	All spurious signals in this frequency band measured during digital device radiated emissions test.
Note 5:	Signal is within 10MHz of the 5.725 or 5.825 Band edge. Limit is -17dBm EIRP



EMC Test Data

Client:	Microwave Data Systems	Job Number:	J59373
Model:	MDS5800-2	T-Log Number:	T59711
Contact:	Dennis McCarthy	Account Manager:	Esther Zhu
Spec:	FCC 15.247 / 15.401	Class:	N/A

Radiated Emissions - Internal Antenna

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: 6/29/2005	Config. Used: 1
Test Engineer: Juan Martinez	Config Change: None
Test Location: SVOATS #1	EUT Voltage: -48Vdc

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 routed overhead.

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

Ambient Conditions:

Temperature:	21 °C
Rel. Humidity:	48 %

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1a - c	RE, 30 - 40,000 MHz - Spurious Emissions	FCC Part 15.209 / 15.247(c)	Pass	59.1dBuV/m (900.5 uV/m) @ 10515.21 MHz (-14.9dB)

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

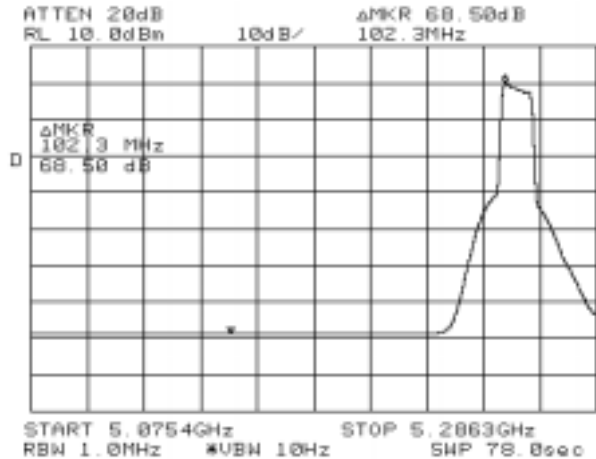
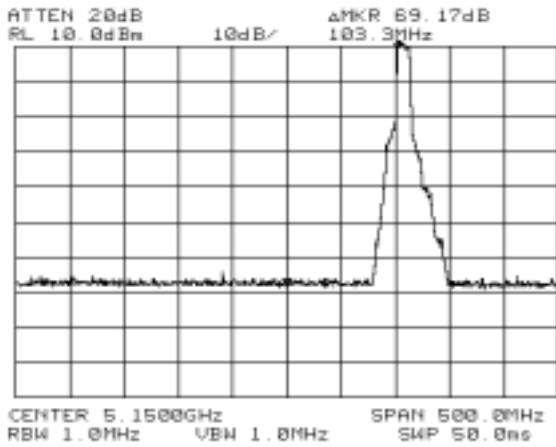
Client: Microwave Data Systems	Job Number: J59373
Model: MDS5800-2	T-Log Number: T59711
Contact: Dennis McCarthy	Account Manager: Esther Zhu
Spec: FCC 15.247 / 15.401	Class: N/A

Run #1a: Radiated Spurious Emissions, 1000 - 40000 MHz. Low Channel @ 5257 MHz 7dBm

	H	V	
Fundamental emission level @ 3m in 1MHz RBW:	112.72	88.9	Peak Measurement (RB=VB=1MHz)
Fundamental emission level @ 3m in 1MHz RBW:	102.1	77.8	Average Measurement (RB=1MHz, VB=10Hz)
Delta Marker - Peak	69.17 dB		
Delta Marker - Average	68.5 dB		
Calculated Band-Edge Measurement:	43.55 dBuV/m		Peak
Calculated Band-Edge Measurement:	33.6 dBuV/m		Average

Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBuV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5150.000	43.6	-	74.0	-30.5	Pk	0	1.2	Note 2
5150.000	33.6	-	54.0	-20.4	Avg	0	1.2	Note 2





EMC Test Data

Client:	Microwave Data Systems	Job Number:	J59373
Model:	MDS5800-2	T-Log Number:	T59711
Contact:	Dennis McCarthy	Account Manager:	Esther Zhu
Spec:	FCC 15.247 / 15.401	Class:	N/A

Other Spurious Radiated Emissions:

Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15E		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
10513.97	37.8	V	54.0	-16.2	AVG	187	1.0	
10513.97	51.5	V	74.0	-22.5	PK	187	1.0	
15769.59	34.4	V	54.0	-19.6	AVG	29	1.0	
15769.59	45.6	V	74.0	-28.5	PK	29	1.0	
10515.21	38.0	H	54.0	-16.0	AVG	9	1.0	
10515.21	59.1	H	74.0	-14.9	PK	9	1.0	
15772.50	34.6	H	54.0	-19.4	AVG	224	1.0	
15772.50	45.8	H	74.0	-28.2	PK	224	1.0	

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set to -27dBm/MHz (-68dB μ V/m).

Note 2: Band-edge measurement calculated from the fundamental field strength (peak or average) minus the band edge delta marker measurement.

**Run #1b: Radiated Spurious Emissions, 1000 - 40000 MHz. Center Channel @ 5283 MHz
7dBm**

Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15.247		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
10567.36	37.3	H	54.0	-16.7	AVG	219	1.0	
10567.36	49.1	H	74.0	-24.9	PK	219	1.0	
15824.34	34.8	H	54.0	-19.2	AVG	51	1.6	
15824.34	46.6	H	74.0	-27.4	PK	51	1.6	
15849.33	34.5	V	54.0	-19.5	AVG	76	1.0	
15849.33	46.1	V	74.0	-27.9	PK	76	1.0	
10565.10	37.2	V	54.0	-16.8	AVG	0	1.0	
10565.10	48.7	V	74.0	-25.3	PK	0	1.0	

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set to -27dBm/MHz (-68dB μ V/m).



EMC Test Data

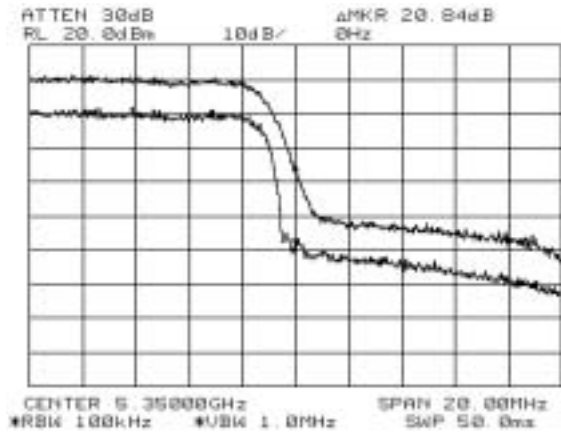
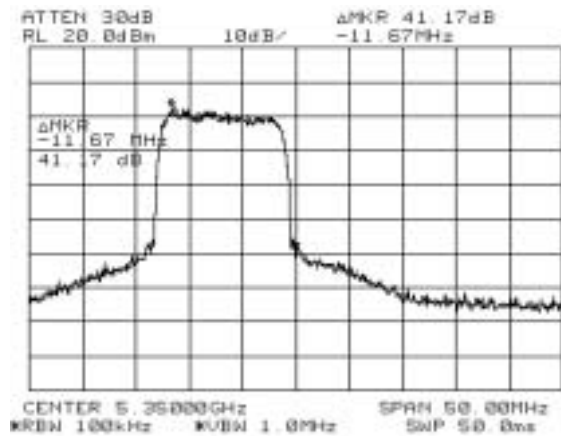
Client: Microwave Data Systems	Job Number: J59373
Model: MDS5800-2	T-Log Number: T59711
Contact: Dennis McCarthy	Account Manager: Esther Zhu
Spec: FCC 15.247 / 15.401	Class: N/A

Run #1c: Radiated Spurious Emissions, 1000 - 40000 MHz. High Channel @ 5343 MHz 7dBm

	H	V	
Fundamental emission level @ 3m in 1MHz RBW:	118	-	Peak Measurement (RB=VB=1MHz)
Fundamental emission level @ 3m in 1MHz RBW:	106	-	Average Measurement (RB=1MHz, VB=10Hz)
Delta Marker - Peak	62 dB		
Delta Marker - Average	62 dB		
Calculated Band-Edge Measurement:	56 dBuV/m		Peak
Calculated Band-Edge Measurement:	44 dBuV/m		Average

Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBuV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5350.000	56.0	-	74.0	-18.0	Pk	0	1.1	Note 2
5350.000	44.0	-	54.0	-10.0	Avg	0	1.1	Note 2





EMC Test Data

Client:	Microwave Data Systems	Job Number:	J59373
Model:	MDS5800-2	T-Log Number:	T59711
Contact:	Dennis McCarthy	Account Manager:	Esther Zhu
Spec:	FCC 15.247 / 15.401	Class:	N/A

Other Spurious Radiated Emissions:

Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15.247		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
10685.25	38.2	V	54.0	-15.8	AVG	0	1.0	
10685.25	49.7	V	74.0	-24.3	PK	0	1.0	
15968.63	36.9	V	54.0	-17.1	AVG	86	1.0	
15968.63	48.2	V	74.0	-25.8	PK	86	1.0	
10684.95	38.4	H	54.0	-15.7	AVG	115	1.0	
10684.95	50.1	H	74.0	-23.9	PK	115	1.0	
15968.01	37.1	H	54.0	-16.9	AVG	48	1.0	
15968.01	48.6	H	74.0	-25.4	PK	48	1.0	

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set to -27dBm/MHz (~68dBuV/m).
Note 2:	Band-edge measurement calculated from the fundamental field strength (peak or average) minus the band edge delta marker measurement.

Client:	Microwave Data Systems	Job Number:	J59373
Model:	MDS5800-2	T-Log Number:	T59711
Contact:	Dennis McCarthy	Account Manager:	Esther Zhu
Spec:	FCC 15.247 / 15.401	Class:	N/A

Radiated 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: 5/11/2005	Config. Used: 1
Test Engineer: Chris Byleckie	Config Change: None
Test Location: SVOATS #3	EUT Voltage: -48Vdc

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.

Ambient Conditions:

Temperature:	18 °C
Rel. Humidity:	56 %

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1a - c	RE, 1000 - 40000 MHz - Spurious Emissions	FCC Part 15.209 / 15.E	Pass	66.2dBµV/m (2041.7µV/m) @ 5250.0MHz (-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.



EMC Test Data

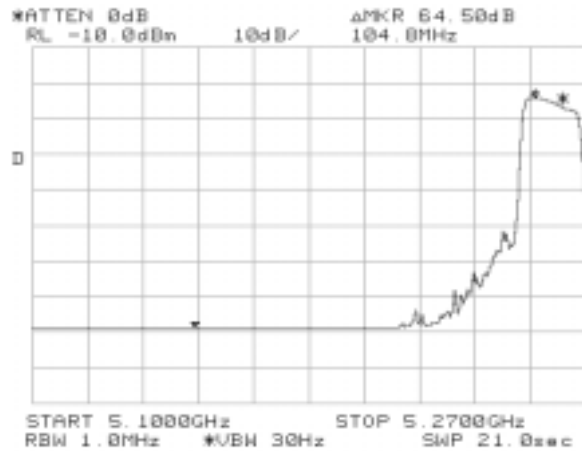
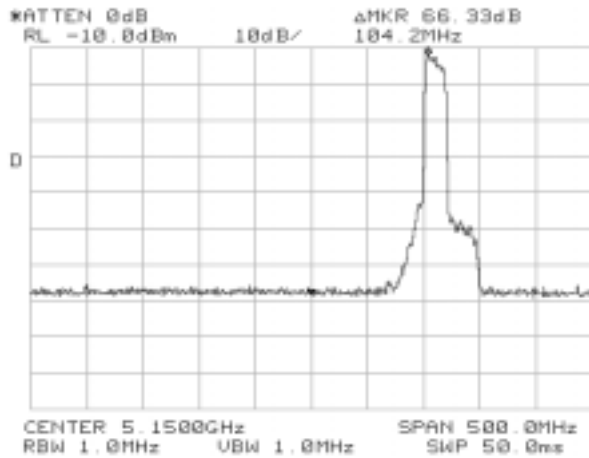
Client:	Microwave Data Systems	Job Number:	J59373
Model:	MDS5800-2	T-Log Number:	T59711
Contact:	Dennis McCarthy	Account Manager:	Esther Zhu
Spec:	FCC 15.247 / 15.401	Class:	N/A

Run #1a: Radiated Spurious Emissions, 1000 - 40000 MHz. Low Channel @ 5257 MHz

	H	V	
Fundamental emission level @ 3m in 1MHz RBW:	106.71	84.88	Peak Measurement (RB=VB=1MHz)
Fundamental emission level @ 3m in 1MHz RBW:	96.31	74.5	Average Measurement (RB=1MHz, VB=10Hz)
Delta Marker - Peak	66.3 dB		
Delta Marker - Average	64.5 dB		
Calculated Band-Edge Measurement:	40.41 dBuV/m		Peak
Calculated Band-Edge Measurement:	31.81 dBuV/m		Average

Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBuV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5150.000	40.4	-	74.0	-33.6	Pk	0	1.2	Note 2
5150.000	31.8	-	54.0	-22.2	Avg	0	1.2	Note 2





EMC Test Data

Client:	Microwave Data Systems	Job Number:	J59373
Model:	MDS5800-2	T-Log Number:	T59711
Contact:	Dennis McCarthy	Account Manager:	Esther Zhu
Spec:	FCC 15.247 / 15.401	Class:	N/A

Other Spurious Radiated Emissions:

Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15E		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
5250.00	66.2	h	68.3	-2.1	AVG	0	1.2	
15772.38	50.5	H	54.0	-3.5	AVG	0	1.0	Noise Floor
15770.58	49.5	V	54.0	-4.5	PK	0	1.0	Noise Floor
5250.00	48.3	v	68.3	-20.0	PK	0	1.0	
15770.58	38.1	V	74.0	-35.9	AVG	0	1.0	Noise Floor
15772.38	38.1	H	74.0	-35.9	AVG	0	1.0	Noise Floor

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set to -27dBm/MHz (~68dB μ V/m).

Note 2: Band-edge measurement calculated from the fundamental field strength (peak or average) minus the band edge delta marker measurement.

Run #1b: Radiated Spurious Emissions, 1000 - 40000 MHz. Center Channel @ 5283 MHz

Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15E		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
15848.64	38.0	H	54.0	-16.1	AVG	0	1.0	Noise Floor
15848.41	37.9	V	54.0	-16.1	AVG	0	1.0	Noise Floor
15848.64	50.1	H	74.0	-23.9	PK	0	1.0	Noise Floor
15848.41	49.6	V	74.0	-24.4	PK	0	1.0	Noise Floor

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set to -27dBm/MHz (~68dB μ V/m).



EMC Test Data

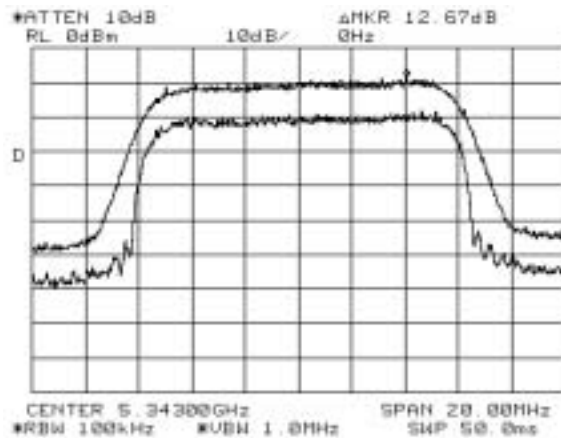
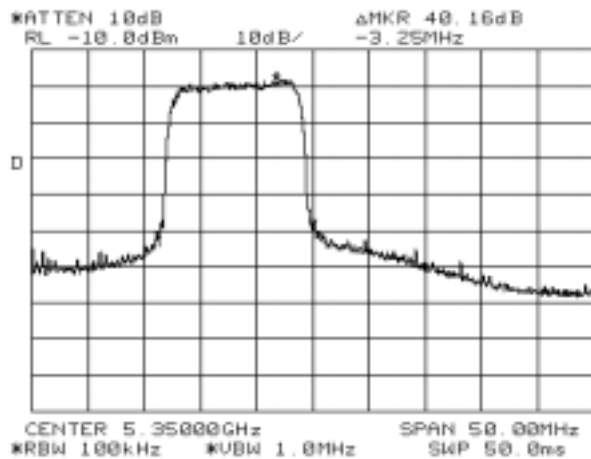
Client:	Microwave Data Systems	Job Number:	J59373
Model:	MDS5800-2	T-Log Number:	T59711
Contact:	Dennis McCarthy	Account Manager:	Esther Zhu
Spec:	FCC 15.247 / 15.401	Class:	N/A

Run #1c: Radiated Spurious Emissions, 1000 - 40000 MHz. High Channel @ 5343 MHz

	H	V	
Fundamental emission level @ 3m in 1MHz RBW:	108.2	86.8	Peak Measurement (RB=VB=1MHz)
Fundamental emission level @ 3m in 1MHz RBW:	96.3	76.49	Average Measurement (RB=1MHz, VB=10Hz)
Delta Marker - Peak	52.83 dB		
Delta Marker - Average	52.83 dB		
Calculated Band-Edge Measurement:	55.37 dBuV/m		Peak
Calculated Band-Edge Measurement:	43.47 dBuV/m		Average

Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBuV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5350.000	55.4	-	74.0	-18.6	Pk	0	1.1	Note 2
5350.000	43.5	-	54.0	-10.5	Avg	0	1.1	Note 2



Other Spurious Radiated Emissions:

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBuV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
10687.77	41.6	H	54.0	-12.4	AVG	0	1.0	Noise Floor
10685.08	41.5	V	54.0	-12.5	AVG	0	1.0	Noise Floor
16029.14	40.0	V	54.0	-14.0	AVG	0	1.0	Noise Floor
16038.53	39.9	H	54.0	-14.1	AVG	0	1.0	Noise Floor
10685.08	54.0	V	74.0	-20.0	PK	0	1.0	Noise Floor
10687.77	52.4	H	74.0	-21.6	PK	0	1.0	Noise Floor
16029.14	50.9	V	74.0	-23.1	PK	0	1.0	Noise Floor
16038.53	50.5	H	74.0	-23.5	PK	0	1.0	Noise Floor



EMC Test Data

Client:	Microwave Data Systems	Job Number:	J59373
Model:	MDS5800-2	T-Log Number:	T59711
Contact:	Dennis McCarthy	Account Manager:	Esther Zhu
Spec:	FCC 15.247 / 15.401	Class:	N/A

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set to -27dBm/MHz (~68dBuV/m).

Note 2: Band-edge measurement calculated from the fundamental field strength (peak or average) minus the band edge delta marker measurement.



EMC Test Data

Client:	Microwave Data Systems	Job Number:	J59373
Model:	MDS5800-2	T-Log Number:	T59711
Contact:	Dennis McCarthy	Account Manager:	Esther Zhu
Spec:	FCC 15.247 / 15.401	Class:	N/A

FCC 15.247 DTS - Radiated Spurious Emissions, External Antenna

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: 6/29/2005	Config. Used: 1
Test Engineer: Juan Martinez	Config Change: None
Test Location: SVOATS #1	EUT Voltage: -48Vdc

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 routed overhead.

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

Ambient Conditions: Temperature: 21 °C
 Rel. Humidity: 48 %

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1a - c	RE, 30 - 40,000 MHz - Spurious Emissions	FCC Part 15.209 / 15.247(c)	Pass	52.3dBµ V/m (411.1µV/m) @ 11686.0MHz (-1.7dB)

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:	Microwave Data Systems	Job Number:	J59373
Model:	MDS5800-2	T-Log Number:	T59711
Contact:	Dennis McCarthy	Account Manager:	Esther Zhu
Spec:	FCC 15.247 / 15.401	Class:	N/A

Run #1a: Radiated Spurious Emissions, 30 - 40,000 MHz. Low Channel @ 5731 MHz

Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15.247		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
11461.42	37.2	V	54.0	-16.8	AVG	58	1.0	
11461.42	49.2	V	74.0	-24.8	PK	58	1.0	
17224.46	38.0	V	54.0	-16.0	AVG	238	1.4	
17224.46	49.5	V	74.0	-24.5	PK	238	1.4	
11461.75	37.2	H	54.0	-16.8	AVG	360	1.5	
11461.75	49.2	H	74.0	-24.8	PK	360	1.5	
17222.51	38.4	H	54.0	-15.6	AVG	20	1.0	
17222.51	50.2	H	74.0	-23.8	PK	20	1.0	

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

Run #1b: Radiated Spurious Emissions, 30 - 40,000 MHz. Center Channel @ 5768 MHz

Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15.247		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
11535.20	38.3	H	54.0	-15.7	AVG	216	1.0	
11535.20	50.1	H	74.0	-23.9	PK	216	1.0	
17303.47	39.2	H	54.0	-14.8	AVG	284	1.0	
17303.47	51.2	H	74.0	-22.8	PK	284	1.0	
11534.82	49.0	V	54.0	-5.1	AVG	191	1.0	
11534.82	62.3	V	74.0	-11.8	PK	191	1.0	
17301.73	45.7	V	54.0	-8.3	AVG	194	1.0	
17301.73	59.0	V	74.0	-15.0	PK	194	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.



EMC Test Data

Client:	Microwave Data Systems	Job Number:	J59373
Model:	MDS5800-2	T-Log Number:	T59711
Contact:	Dennis McCarthy	Account Manager:	Esther Zhu
Spec:	FCC 15.247 / 15.401	Class:	N/A

Run #1c: Radiated Spurious Emissions, 30 - 40,000 MHz. High Channel @ 5843 MHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
11686.01	52.3	V	54.0	-1.7	AVG	188	1.0	
11686.01	64.2	V	74.0	-9.8	PK	188	1.0	
17541.81	43.4	V	54.0	-10.6	AVG	192	1.0	
17541.81	58.7	V	74.0	-15.4	PK	192	1.0	
11685.14	39.1	H	54.0	-14.9	AVG	295	1.0	
11685.14	50.8	H	74.0	-23.2	PK	295	1.0	
17541.85	41.4	H	54.0	-12.6	AVG	27	1.0	
17541.85	54.2	H	74.0	-19.9	PK	27	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.



EMC Test Data

Client:	Microwave Data Systems	Job Number:	J59373
Model:	MDS5800-2	T-Log Number:	T59711
Contact:	Dennis McCarthy	Account Manager:	Esther Zhu
Spec:	FCC 15.247 / 15.401	Class:	N/A

FCC 15.247 DTS - Radiated Spurious Emissions, Internal Antenna

Test Specifics

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

Date of Test: 5/11/2005	Config. Used: 1
Test Engineer: Chris Byleckie	Config Change: None
Test Location: SVOATS #1	EUT Voltage: -48Vdc

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

Ambient Conditions: Temperature: 18 °C
 Rel. Humidity: 45 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1a-1c	RE, 1000 - 40000 MHz - Spurious Emissions In Restricted Bands	FCC Part 15.209 / 15.247(c)	Pass	53.6dBµV/m (479.2µV/m) @ 11685.7MHz (-0.4dB)

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:	Microwave Data Systems	Job Number:	J59373
Model:	MDS5800-2	T-Log Number:	T59711
Contact:	Dennis McCarthy	Account Manager:	Esther Zhu
Spec:	FCC 15.247 / 15.401	Class:	N/A

Run #1a: Radiated Spurious Emissions, 1000-40000 MHz. Low Channel @ 5731 MHz

Fpower - 146

Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15.247		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
11461.42	53.3	V	54.0	-0.7	AVG	182	1.1	
17191.64	51.9	V	54.0	-2.1	AVG	182	1.2	
11461.42	66.2	V	74.0	-7.8	PK	182	1.1	
17191.64	64.6	V	74.0	-9.4	PK	182	1.2	
17193.17	41.4	H	54.0	-12.6	AVG	180	1.0	
11460.71	39.8	H	54.0	-14.2	AVG	180	1.0	
17193.17	52.3	H	74.0	-21.7	PK	180	1.0	
11460.71	51.3	H	74.0	-22.8	PK	180	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

Run #1b: Radiated Spurious Emissions, 1000-40000 MHz. Middle Channel @ 5768 MHz

Fpower - 145

Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15.247		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
11536.33	53.1	V	54.0	-0.9	AVG	180	1.3	
17306.63	50.2	V	54.0	-3.8	AVG	180	1.2	
11536.33	65.4	V	74.0	-8.6	PK	180	1.3	
17306.63	62.7	V	74.0	-11.3	PK	180	1.2	
17306.98	42.1	H	54.0	-11.9	AVG	180	1.0	
11536.04	40.8	H	54.0	-13.2	AVG	180	1.0	
17306.98	53.3	H	74.0	-20.7	PK	180	1.0	
11536.04	52.1	H	74.0	-21.9	PK	180	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



EMC Test Data

Client:	Microwave Data Systems	Job Number:	J59373
Model:	MDS5800-2	T-Log Number:	T59711
Contact:	Dennis McCarthy	Account Manager:	Esther Zhu
Spec:	FCC 15.247 / 15.401	Class:	N/A

Run #1c: Radiated Spurious Emissions, 1000-40000 MHz. High Channel @ 5843 MHz

Fpower - 145

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
11685.68	53.6	V	54.0	-0.4	AVG	180	1.2	
17531.91	52.2	V	54.0	-1.8	AVG	180	1.3	
17531.91	66.9	V	74.0	-7.1	PK	180	1.3	
11685.68	65.6	V	74.0	-8.4	PK	180	1.2	
17532.19	44.4	H	54.0	-9.6	AVG	180	1.0	
11685.75	41.9	H	54.0	-12.1	AVG	180	1.0	
17532.19	55.7	H	74.0	-18.3	PK	180	1.0	
11685.75	53.2	H	74.0	-20.8	PK	180	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



EMC Test Data

Client:	Microwave Data Systems	Job Number:	J59373
Model:	MDS5800-2	T-Log Number:	T59711
		Account Manager:	Esther Zhu
Contact:	Dennis McCarthy		
Spec:	FCC 15.247 / 15.401	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: 5/10/2005	Config. Used: 1
Test Engineer: Jmartinez	Config Change: None
Test Location: SVOATS #1	EUT Voltage: -48Vdc

General Test Configuration

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.

Ambient Conditions:

Temperature:	18 °C
Rel. Humidity:	45 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	6dB Bandwidth	15.247(a)	Pass	> 500kHz
2	Output Power	15.247(b)	Pass	22.5dBm
3	Power Spectral Density (PSD)	15.247(d)	Pass	< 8dBm
4	Out of Band	15.247(c)	Pass	Refer to plots

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

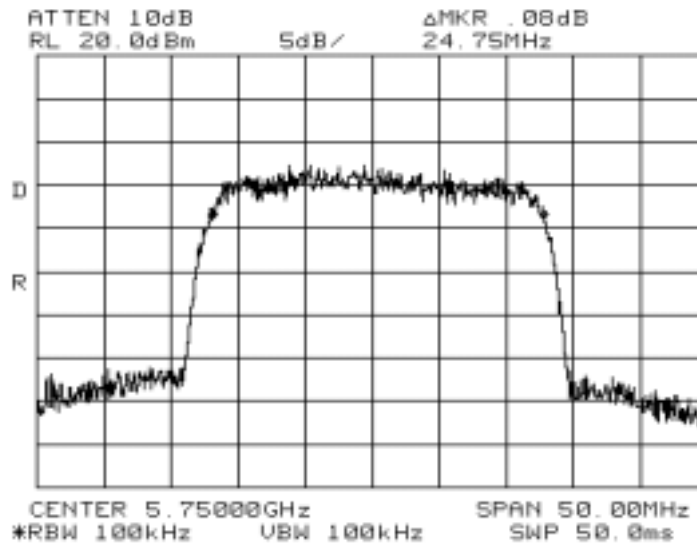
Client: Microwave Data Systems	Job Number: J59373
Model: MDS5800-2	T-Log Number: T59711
Contact: Dennis McCarthy	Account Manager: Esther Zhu
Spec: FCC 15.247 / 15.401	Class: N/A

Run #1: Signal Bandwidth

Channel	Frequency (MHz)	Resolution Bandwidth	6dB BW	99% BW (Note 1)	Graph reference #
A	5750	100kHz	24.8	26.0	101
1A	5733	100kHz	13.7	15.0	102
4A	5768	100kHz	11.0	12.0	103
B	5825	100kHz	24.1	26.0	104
4B	5843.7	100kHz	11.0	12.0	105

Note 1: 99% BW measurement results are under Run# 3.

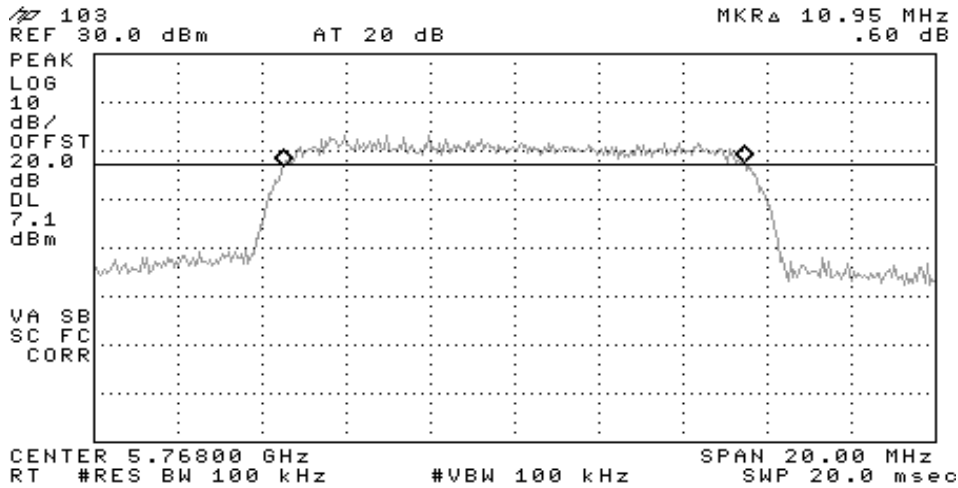
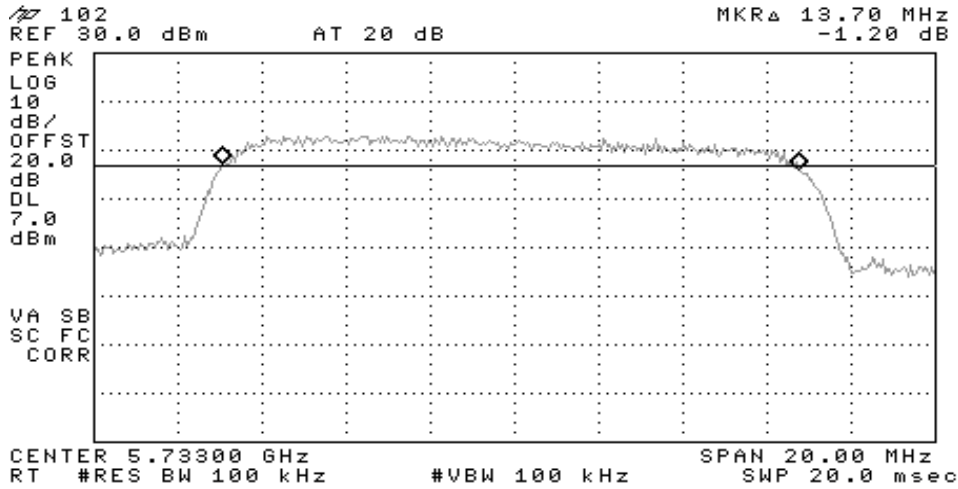
Plot# 101





EMC Test Data

Client: Microwave Data Systems	Job Number: J59373
Model: MDS5800-2	T-Log Number: T59711
Contact: Dennis McCarthy	Account Manager: Esther Zhu
Spec: FCC 15.247 / 15.401	Class: N/A





EMC Test Data

Client: Microwave Data Systems	Job Number: J59373
Model: MDS5800-2	T-Log Number: T59711
Contact: Dennis McCarthy	Account Manager: Esther Zhu
Spec: FCC 15.247 / 15.401	Class: N/A

Run #2: Output Power

Channel	Frequency (MHz)	Res BW	Peak Output Power	Graph reference #
A	5750	1MHz	21.8	201
1A	5733	1MHz	22.5	202
B	5825	1MHz	21.1	203
4A	5768	1MHz	21.8	204
4B	5768	1MHz	21.0	205



Spectrum Analyzer Settings

CF: 5750.0MHz
SPAN: 100.0MHz
RB 1.0MHz
VB 3.0MHz
Detector Sample
Att 20
RL Offset 20.00
Sweep Time 2.0ms
Ref Lvl: 30.00DBM

Highest PSD

8.90 dBm/1.0MHz

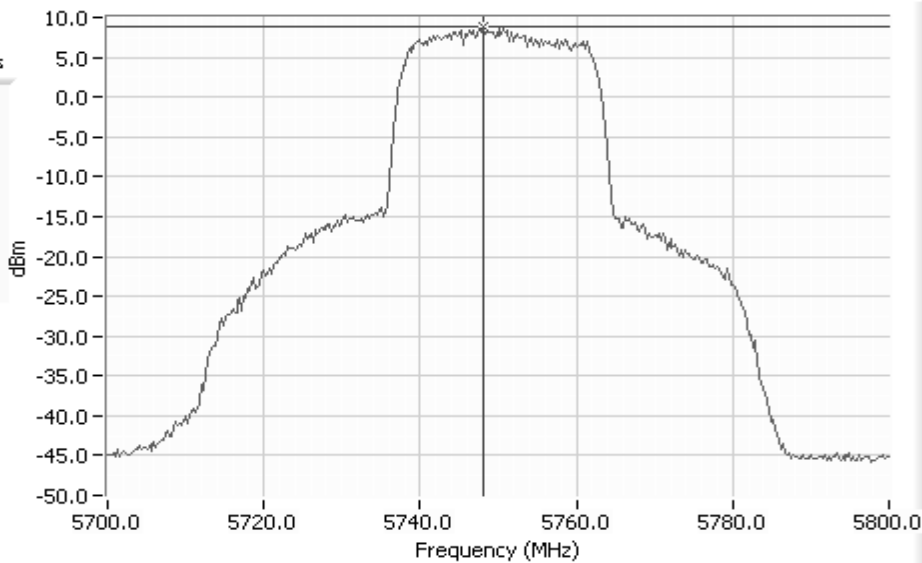
99% Bandwidth (MHz)

26.00

Power Over Span

149.642 mW

21.75 dBm



5750 MHz (100 sweep averaging) - Plot# 201

Close Window



Max Level

5748.00

8.90





EMC Test Data

Client: Microwave Data Systems	Job Number: J59373
Model: MDS5800-2	T-Log Number: T59711
Contact: Dennis McCarthy	Account Manager: Esther Zhu
Spec: FCC 15.247 / 15.401	Class: N/A



Spectrum Analyzer Settings

CF: 5733.0MHz
SPAN: 50.0MHz
RB 1.0MHz
VB 3.0MHz
Detector Sample
Att 20
RL Offset 20.00
Sweep Time 2.0ms
Ref Lvl: 30.00DBM

Highest PSD

12.11 dBm/1.0MHz

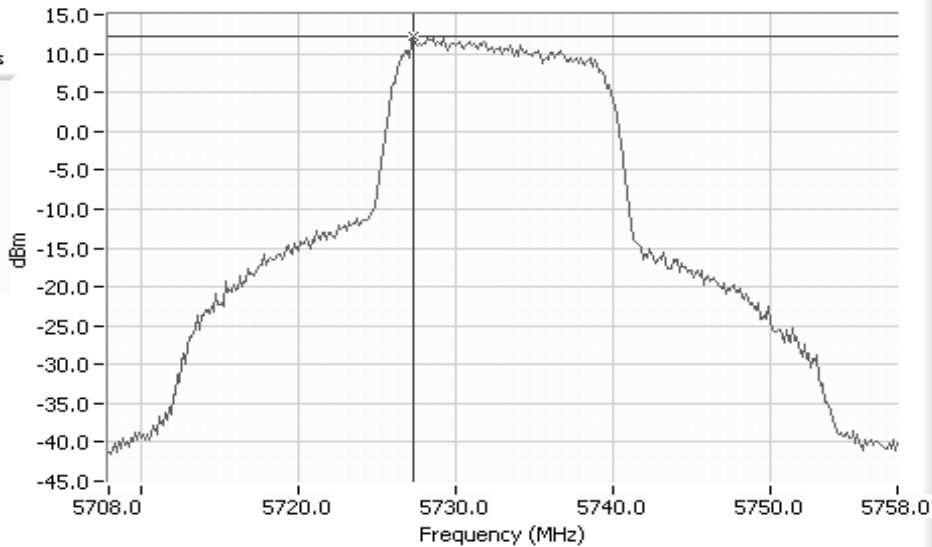
99% Bandwidth (MHz)

15.00

Power Over Span

176.853 mW

22.48 dBm



5733 MHz Peak Power (100 Sample Averaging) Plot# 202

Close Window

Max Level

5727.25

12.11



Spectrum Analyzer Settings

CF: 5825.0MHz
SPAN: 100.0MHz
RB 1.0MHz
VB 3.0MHz
Detector Sample
Att 20
RL Offset 20.00
Sweep Time 2.0ms
Ref Lvl: 30.00DBM

Highest PSD

7.80 dBm/1.0MHz

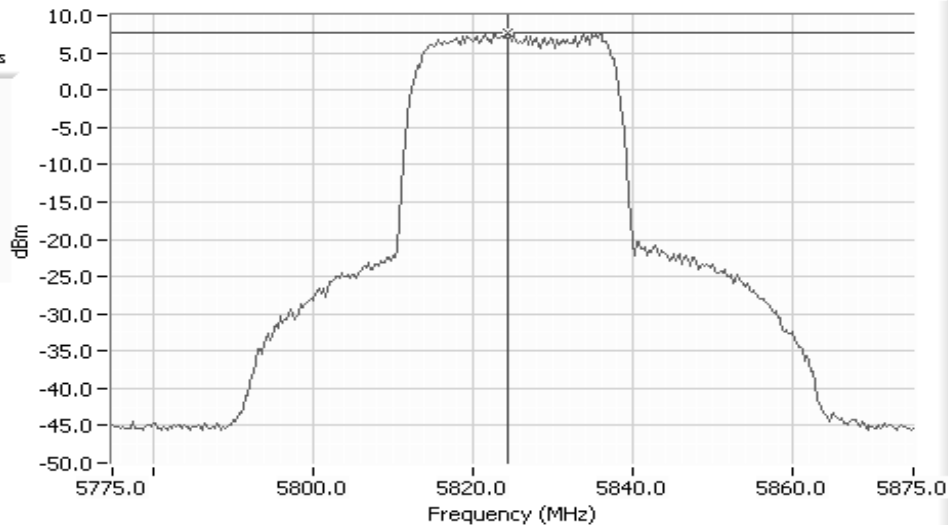
99% Bandwidth (MHz)

26.00

Power Over Span

128.679 mW

21.10 dBm



5825 MHz (100 sweep averaging) - Plot# 203

Close Window

Max Level

5824.25

7.80





EMC Test Data

Client: Microwave Data Systems	Job Number: J59373
Model: MDS5800-2	T-Log Number: T59711
Contact: Dennis McCarthy	Account Manager: Esther Zhu
Spec: FCC 15.247 / 15.401	Class: N/A



Spectrum Analyzer Settings

CF: 5768.0MHz
SPAN:50.0MHz
RB 1.0MHz
VB 3.0MHz
Detector Sample
Att 20
RL Offset 20.00
Sweep Time 2.0ms
Ref Lvl:30.00DBM

Highest PSD

11.83 dBm/1.0MHz

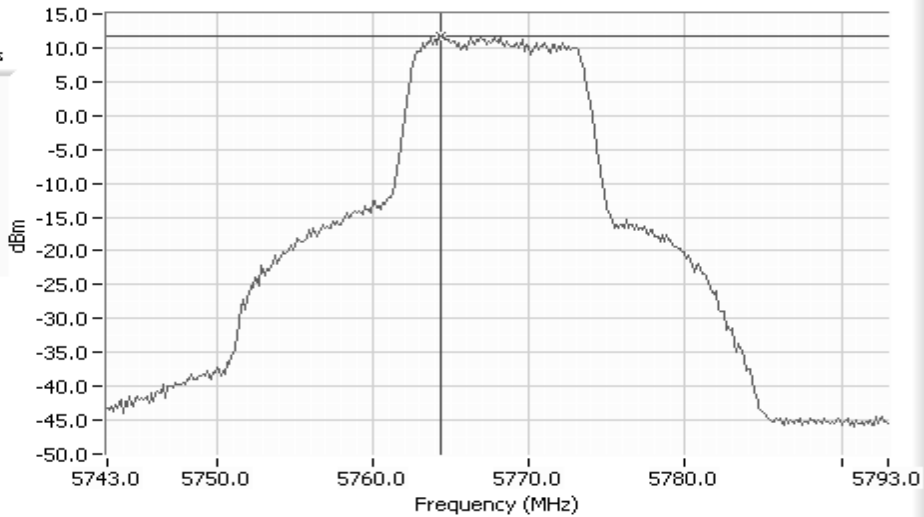
99% Bandwidth (MHz)

12.00

Power Over Span

151.498 mW

21.80 dBm



5768 MHz (100 sweep averaging) Plot# 204

Close Window

Max Level

5764.37

11.83



Spectrum Analyzer Settings

CF: 5843.7MHz
SPAN:50.0MHz
RB 1.0MHz
VB 3.0MHz
Detector Sample
Att 20
RL Offset 20.00
Sweep Time 2.0ms
Ref Lvl:30.00DBM

Highest PSD

10.66 dBm/1.0MHz

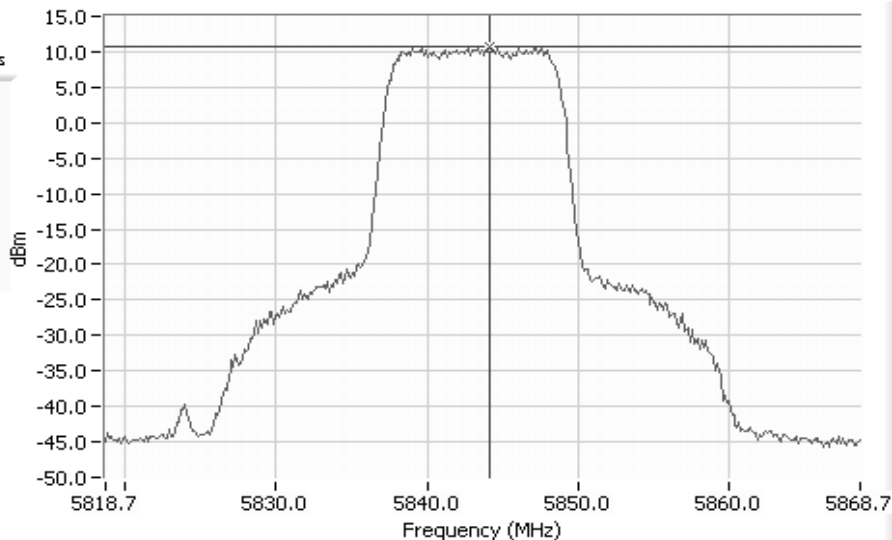
99% Bandwidth (MHz)

12.00

Power Over Span

126.594 mW

21.02 dBm



5843.7 MHz (100 sweep averaging) Plot# 205

Close Window

Max Level

5844.20

10.66



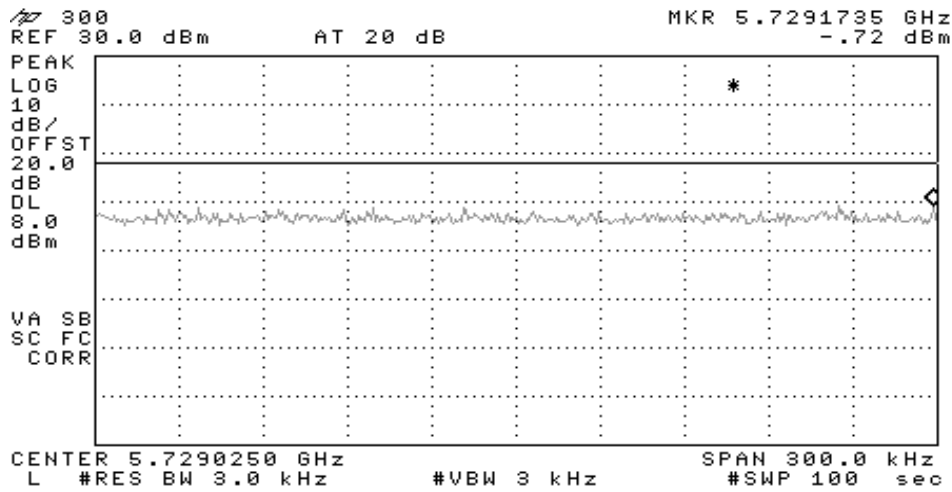


EMC Test Data

Client:	Microwave Data Systems	Job Number:	J59373
Model:	MDS5800-2	T-Log Number:	T59711
Contact:	Dennis McCarthy	Account Manager:	Esther Zhu
Spec:	FCC 15.247 / 15.401	Class:	N/A

Run #3: Power Spectral Density

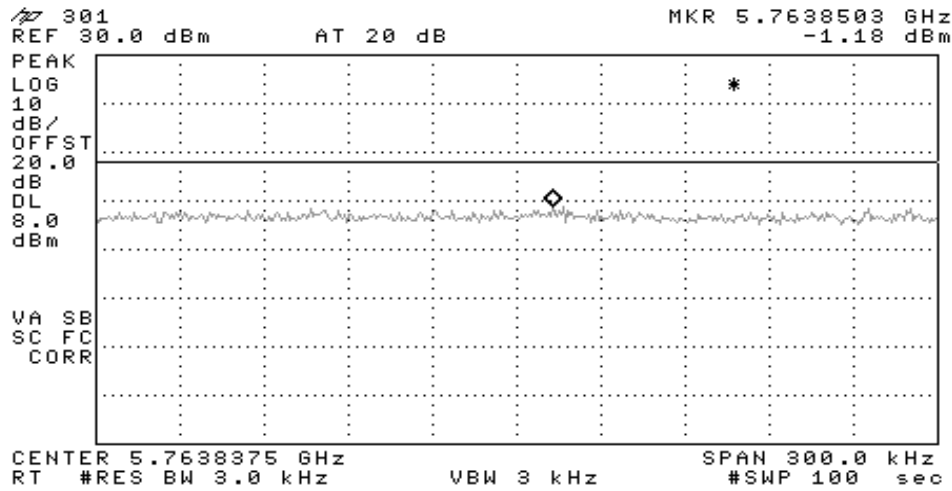
Channel	Frequency (MHz)	Res BW	P.S.D. (averaged over 1 second in a 3kHz bandwidth), dBm	Graph reference #
1A	5733	3kHz	-0.72	300
4A	5768	3kHz	-1.18	301
A	5750	3kHz	-4.83	302
B	5825	3kHz	-6.83	303
4B	5843.7	3kHz	-2.53	304



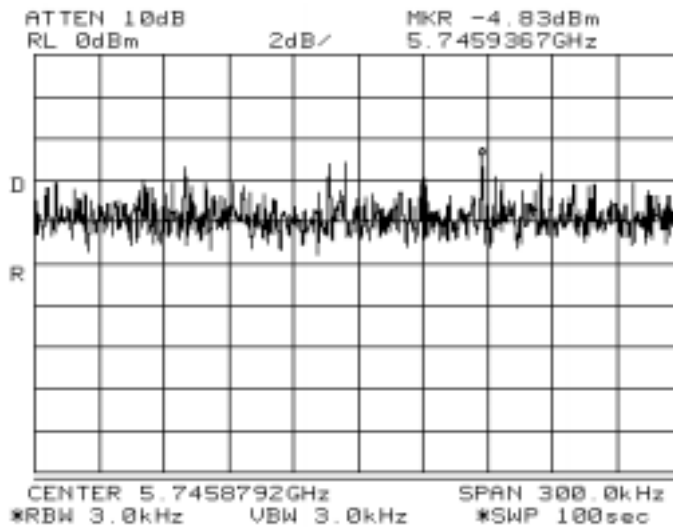


EMC Test Data

Client: Microwave Data Systems	Job Number: J59373
Model: MDS5800-2	T-Log Number: T59711
Contact: Dennis McCarthy	Account Manager: Esther Zhu
Spec: FCC 15.247 / 15.401	Class: N/A



Plot# 302

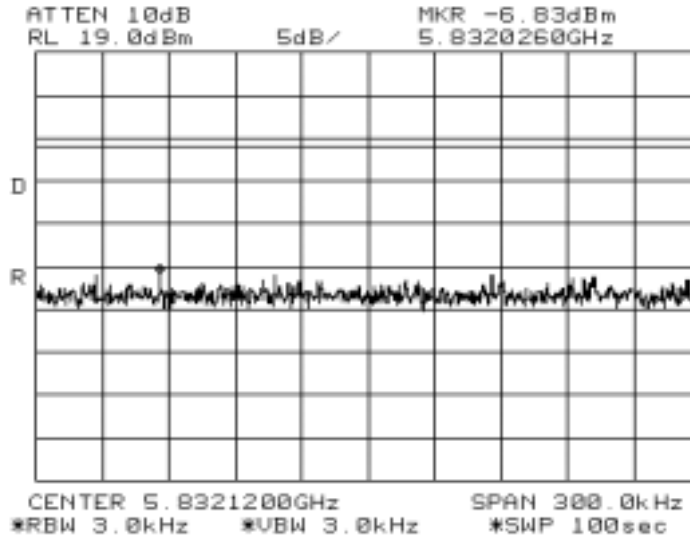




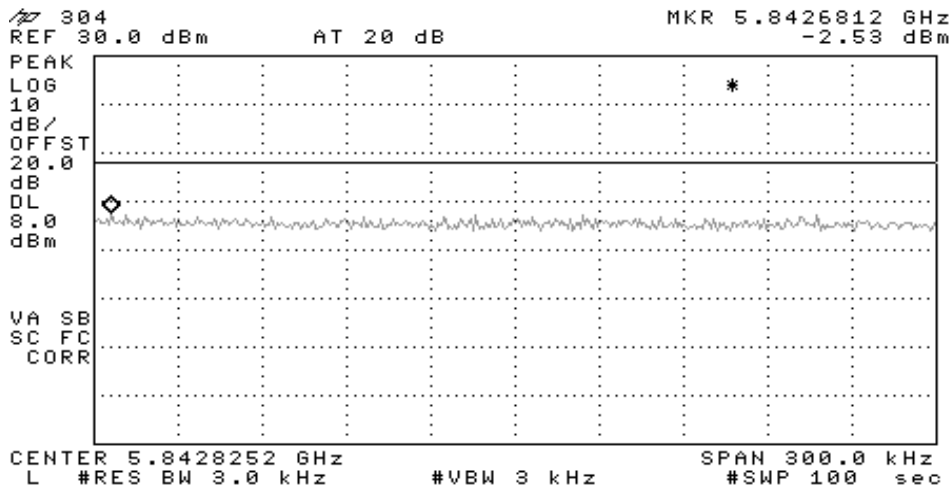
EMC Test Data

Client: Microwave Data Systems	Job Number: J59373
Model: MDS5800-2	T-Log Number: T59711
Contact: Dennis McCarthy	Account Manager: Esther Zhu
Spec: FCC 15.247 / 15.401	Class: N/A

Plot# 303



Plot# 304





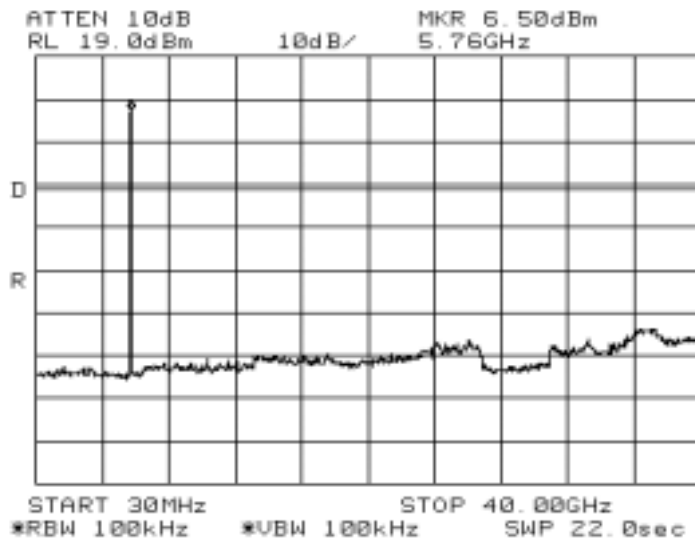
EMC Test Data

Client:	Microwave Data Systems	Job Number:	J59373
Model:	MDS5800-2	T-Log Number:	T59711
Contact:	Dennis McCarthy	Account Manager:	Esther Zhu
Spec:	FCC 15.247 / 15.401	Class:	N/A

Run #4: Out-of-band Conducted Spurious Emissions

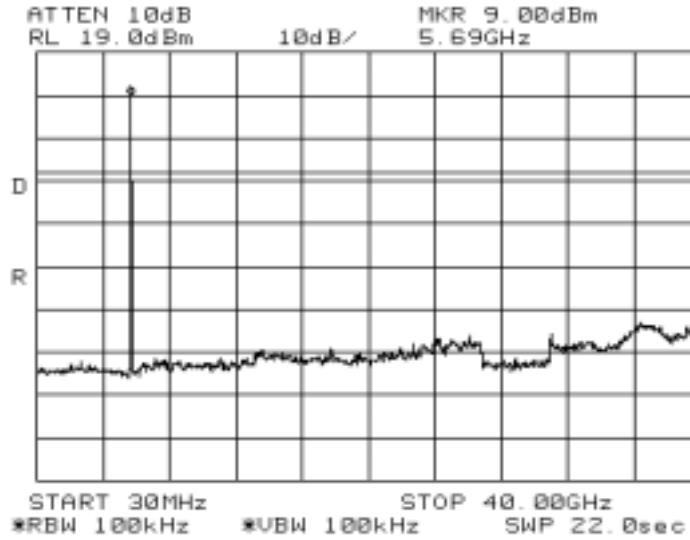
Channel	Frequency (MHz)	Notes	Graph reference #s
A	5750	All out of band signals in any 100kHz bandwidth were more than 20dB below the fundamental signal level.	400
1A	5733		401
B	5825		402
4B	5843.7		403
4A	5768		404

Plot# 400

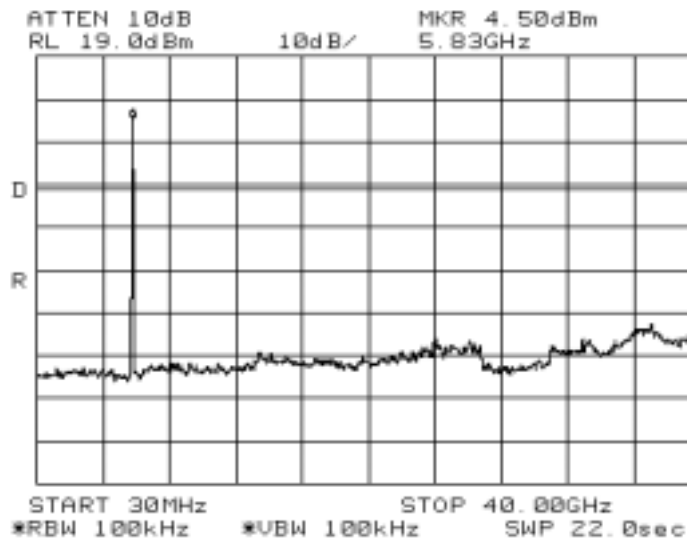


Client:	Microwave Data Systems	Job Number:	J59373
Model:	MDS5800-2	T-Log Number:	T59711
Contact:	Dennis McCarthy	Account Manager:	Esther Zhu
Spec:	FCC 15.247 / 15.401	Class:	N/A

Plot# 401

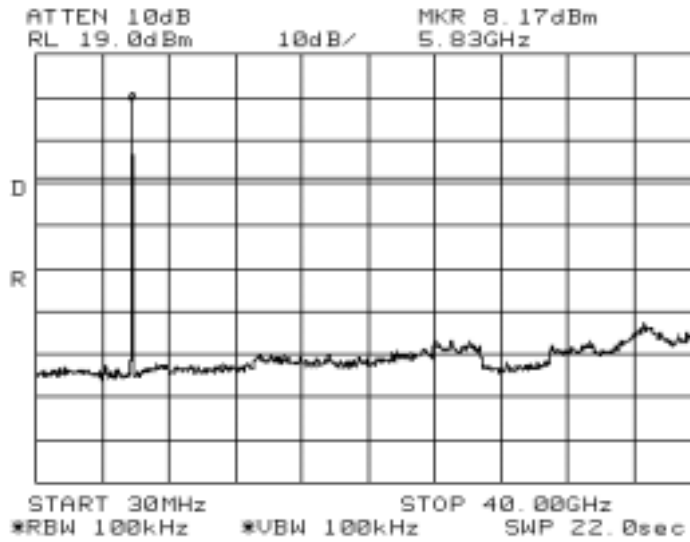


Plot# 402

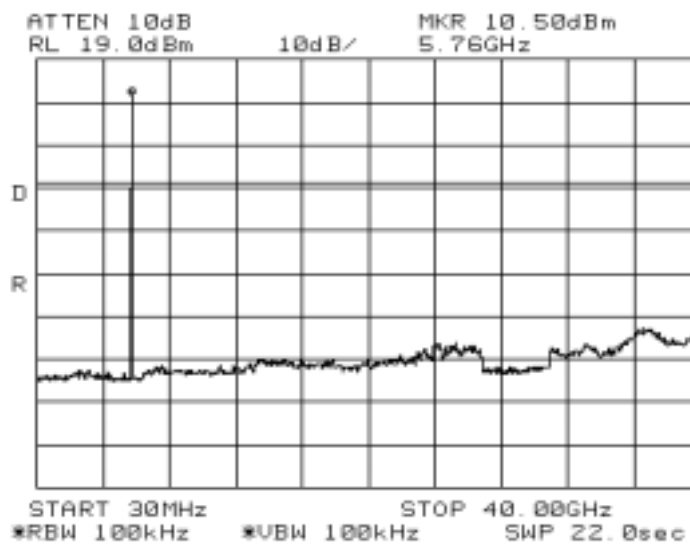


Client: Microwave Data Systems	Job Number: J59373
Model: MDS5800-2	T-Log Number: T59711
	Account Manager: Esther Zhu
Contact: Dennis McCarthy	
Spec: FCC 15.247 / 15.401	Class: N/A

Plot# 403



Plot# 404





EMC Test Data

Client:	Microwave Data Systems	Job Number:	J59373
Model:	MDS5800-2	T-Log Number:	T59711
Contact:	Dennis McCarthy	Account Manager:	Esther Zhu
Spec:	FCC 15.247 / 15.401	Class:	Radio

Radiated 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: 5/9/2005
 Test Engineer: Chris Byleckie
 Test Location: SVOATS #1

Config. Used: 1
 Config Change: None
 EUT Voltage: -48Vdc

General Test Configuration

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

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

Ambient Conditions: Temperature: 16 °C
 Rel. Humidity: 58 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	RE, 30 -1000 MHz, Preliminary Scan	EN55022 A	eval	Refer to individual runs
2	RE, 30 - 1000MHz, Maximized Emissions	EN55022 A	Pass	42.5dB μ V/m (133.4 μ V/m) @ 875.000MHz (-4.5dB)
3	RE, 1000 - 2000 MHz, Maximized Emissions	FCC A	Pass	41.3dB μ V/m (116.4 μ V/m) @ 1375.0MHz (-8.2dB)

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.

Removed paint from edges of card face plates to improve ground where the cards touch
 Extended the shielding of the E1/T1 3-16 all the way to the RJ45 connectors.



EMC Test Data

Client:	Microwave Data Systems	Job Number:	J59373
Model:	MDS5800-2	T-Log Number:	T59711
Contact:	Dennis McCarthy	Account Manager:	Esther Zhu
Spec:	FCC 15.247 / 15.401	Class:	Radio

Digital emissions scan was done on with one ODU since the digital circuitry is identical for all the ODUs

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

ODU530MEDML and IDU

Frequency MHz	Level dB μ V/m	Pol v/h	EN55022 A		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
875.000	42.5	V	47.0	-4.5	QP	146	1.0	Signal Substitution
750.000	41.8	H	47.0	-5.2	QP	268	1.0	
500.000	41.2	V	47.0	-5.8	QP	28	1.4	
125.006	32.2	V	40.0	-7.8	QP	163	1.0	
625.000	36.0	V	47.0	-11.0	QP	0	1.0	Signal Substitution
81.933	26.7	V	40.0	-13.3	QP	0	1.0	
375.000	31.8	V	47.0	-15.2	QP	23	1.0	Note 1
50.016	21.0	V	40.0	-19.0	QP	66	1.0	
112.650	10.7	V	40.0	-29.3	QP	0	1.0	

Note 1: IDU - Added copper tape to left rear seam between rear vertical plate and cover. Initial level was 54dB μ V/m

Run #2: Maximized Readings From Run #1

Frequency MHz	Level dB μ V/m	Pol v/h	EN55022 A		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
875.000	42.5	V	47.0	-4.5	QP	146	1.0	Signal Substitution
750.000	41.8	H	47.0	-5.2	QP	268	1.0	
500.000	41.2	V	47.0	-5.8	QP	28	1.4	
125.006	32.2	V	40.0	-7.8	QP	163	1.0	
625.000	36.0	V	47.0	-11.0	QP	0	1.0	Signal Substitution
81.933	26.7	V	40.0	-13.3	QP	0	1.0	

Run #3: Maximized readings, 1000 - 2000 MHz

Measurements made at 3m test distance and extrapolated to 10m using -10.5 correction factor.

Frequency MHz	Level dB μ V/m	Pol v/h	FCC Class A		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
1375.000	41.3	v	49.5	-8.2	Pk	350	1.0	Pk Reading average limit
1000.000	39.7	v	49.5	-9.8	Pk	8	1.0	Pk Reading average limit
1250.000	39.5	v	49.5	-10.0	Pk	0	1.0	Pk Reading average limit
1750.000	39.3	v	49.5	-10.2	Pk	0	1.0	Pk Reading average limit
1625.000	38.9	v	49.5	-10.6	Pk	0	1.0	Pk Reading average limit
1500.000	37.6	v	49.5	-11.9	Pk	175	1.0	Pk Reading average limit