





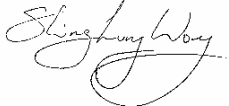
TEST REPORT FROM RADIO FREQUENCY INVESTIGATION LTD.

Test Of: Orthogon Systems
Gemini OS58XX


To: FCC Part 15.247

Test Report Serial No:
RFI/MPTB3/RP45840JD01A

Supersedes Test Report Serial No:
RFI/MPTB2/RP45840JD01A

This Test Report Is Issued Under The Authority Of Richard Jacklin, Operations Director: 	Checked By: 
Tested By:  pp	Release Version No: PDF01
Issue Date: 15 March 2004	Test Dates: 03 February 2004 to 04 February 2004

This report is issued in Adobe Acrobat portable document format (PDF). It is only a valid copy of the report if it is being viewed in PDF format with the following security options not allowed: Changing the document, Selecting text and graphics, Adding or changing notes and form fields. Furthermore, the date of creation must match the issue date stated above. This report may be copied in full. The results in this report apply only to the sample(s) tested.

Radio Frequency Investigation Ltd, Ewhurst Park, Ramsdell, Basingstoke, Hampshire, RG26 5RQ, ENGLAND. Tel: +44 (0) 1256 851193 Fax: +44 (0) 1256 851192	Registered in England, No. 211 7901. Registered Office: Ewhurst Park, Ramsdell, Basingstoke, Hampshire RG26 5RQ	
---	---	---

RADIO FREQUENCY INVESTIGATION LTD

Operations Department

Test Of: Orthogon Systems

Gemini OS58XX

To: FCC Part 15.247

TEST REPORT

S.No. RFI/MPTB3/RP45840JD01A

Page 2 of 74

Issue Date: 15 March 2004

This page has been left intentionally blank.

Test Of: Orthogon Systems
Gemini OS58XX
To: FCC Part 15.247

Table of Contents

1. Client Information.....	4
2. Equipment Under Test (EUT)	5
3. Methods And Procedures.....	10
4. Deviations From The Test Specification	11
5. Operation Of The EUT During Testing	12
6. Summary Of Test Results.....	14
7. Measurements, Examinations And Derived Results.....	15
8. Test Results – Full Power.....	16
9. Test Results – Reduced Power	51
10. Measurement Methods	66
11. Measurement Uncertainty	72
Appendix 1. Test Equipment Used	73

Test Report Serial No: RFI/MPTB3/RP45840JD01A

Supersedes Test Report Serial No: RFI/MPTB2/RP45840JD01A

Test Of: Orthogon Systems

Gemini OS58XX

To: FCC Part 15.247

1. Client Information

Company Name:	Orthogon Systems
Address:	Unit 1A, Linhay Business Park Eastern Road Ashburton Devon TQ13 7UP
Contact Name:	Clem Fisher

Test Of: Orthogon Systems
 Gemini OS58XX
 To: FCC Part 15.247

2. Equipment Under Test (EUT)

The following information (with the exception of the Date of Receipt) has been supplied by the client:

2.1. Identification Of Equipment Under Test (EUT)

Description:	Outdoor Unit
Brand Name:	Gemini
Model Name or Number:	OS58XX
Serial Number	00:03:01
Country of Manufacture:	UK
System FCC ID:	QWP58XX-S
Date of Receipt:	03 February 2004

Description:	Indoor Unit
Brand Name:	Gemini
Model Name or Number:	OS58XX
Serial Number:	14
Country of Manufacture:	UK
Date of Receipt:	03 February 2004

Description:	System Power Supply
Brand Name:	Hitron Electronics Corporation
Model Name or Number:	HES51-48010
Serial Number:	0053
Country of Manufacture:	Taiwan
Date of Receipt:	03 February 2004

Test Of: Orthogon Systems
Gemini OS58XX
To: FCC Part 15.247

2.2. Description Of EUT

The Gemini 58XX is a point to point Ethernet Bridge radio equipment operating in the band 5725 MHz to 5850 MHz (USA band limits).

There are 3 parts to the equipment.

Outdoor Unit, which comprises of an electronics enclosure and an integral, dual polarised antenna. The ODU contains all the main electronic components in the system and generates all the RF frequencies. It has two antenna ports one for the vertical antenna and one for the horizontal antenna. The equipment may be operated in BPSK, QPSK, 16QAM, 64QAM or Acquisition modulation modes, which are selected via software control. All modes of modulation use the same hardware.

Indoor Unit, which provides an interface box between the ODU, the power supply and the customer's LAN network. This unit comprises basically of connectors, some LEDs and filters.

A mains power supply adapter from an external supplier provides all the DC supply for the rest of the system.

The system is connected by CAT5 cables, which may be screened or unshielded.

The Gemini OS58XX is available in two versions. The first is fitted with an integral antenna and the second is a connectorised version for use with external antennas and is fitted with a cover plate containing two N type connectors. The fundamental product is otherwise identical in both versions – the version to be shipped is decided on the basis of current production orders.

2.3. Modifications Incorporated In EUT

During the course of testing the EUT was not modified.

Test Of: Orthogon Systems
 Gemini OS58XX
 To: FCC Part 15.247

2.4. Additional Information Related To Testing

Power Supply Requirement:	Nominal 110 V, 60 Hz AC Mains Supply		
Intended Operating Environment:	Indoor Unit & Power Supply:- intended for protected indoor environments only Outdoor Unit:- intended for unprotected outdoor environments		
Equipment Category:	Fixed Transmitter		
Type of Unit:	Wireless Ethernet Bridge		
Interface Ports:	Ethernet 10/100baseT via RJ45 connector to external network CAT5 Interconnects between RJ45s in system		
Transmit Frequency Range	5731 MHz to 5844 MHz		
Full Power Transmit Channels Tested	Channel ID	Channel Number	Channel Frequency (MHz)
	Bottom	1	5734
	Middle	10	5788
	Top	19	5842
Reduced Power Transmit Channels Tested	Channel ID	Channel Number	Channel Frequency (MHz)
	Bottom	0	5731
	Top	20	5844
Highest Fundamental Frequency	5844 MHz		
Highest Unintentionally Generated Frequency	5844 MHz		
Occupied Bandwidth	10.5 MHz		
Antenna Gain	23 dBi		
Full Power Transmit Channels Maximum Peak Output Power	26.1 dBm		
Reduced Power Transmit Channels Maximum Peak Output Power	25.3 dBm		

Test Of: Orthogon Systems
 Gemini OS58XX
 To: FCC Part 15.247

2.5. Support Equipment

The following support equipment was used to exercise the EUT during testing:

Description:	Laptop
Brand Name:	Compaq
Model Name or Number:	Armada E700, U98.003.C.00
Serial Number:	1J0DC64D014
Cable Length And Type:	CAT5, 1.5 m
Connected to Port:	Customer RJ45 on Indoor Unit

Description:	Slave Outdoor Unit
Brand Name:	Gemini
Model Name or Number:	OS58XX Outdoor Unit
Serial Number:	00:02:D4
Cable Length And Type:	Coax, 1.5 m
Connected to Port:	EUT RF Port (via attenuators)

Description:	Slave Indoor Unit
Brand Name:	Gemini
Model Name or Number:	OS58XX Indoor Unit
Serial Number:	0126
Cable Length And Type:	N/A, connected to Slave Outdoor Unit
Connected to Port:	N/A, connected to Slave Outdoor Unit

Description:	Slave System Power Supply
Brand Name:	Hitron Electronics Corporation
Model Name or Number:	HES51-48010
Serial Number:	0033
Cable Length And Type:	N/A, connected to Slave Indoor Unit
Connected to Port:	N/A, connected to Slave Indoor Unit

Test Of: Orthogon Systems
Gemini OS58XX
To: FCC Part 15.247

Support Equipment – Continued

Description:	Fixed Attenuator
Brand Name:	Weinschel
Model Name or Number:	24-30-12
Serial Number:	BJ6926
Cable Length And Type:	N/A
Connected to Port:	In line between EUT RF Port and Slave RF Port

Description:	Variable Attenuator
Brand Name:	Midwest Microwave
Model Name or Number:	CVA-LP92-30-SMA-79
Serial Number:	34078
Cable Length And Type:	N/A
Connected to Port:	In line between EUT RF Port and Slave RF Port

Test Of: Orthogon Systems
 Gemini OS58XX
 To: FCC Part 15.247

3. Methods And Procedures

Reference:	FCC Part 15 Subpart C: 2002 (Section 15.247)
Title:	Code of Federal Regulations, Part 15 (47CFR15) Radio Frequency Devices
Comments:	A description of the test facility used for this test is on file with, and has been accepted by, the Federal Communications Commission as required by Section 2.948 of Federal Rules.
Purpose of Test:	To determine whether the equipment complied with the requirements of the specification for the purposes of certification.

The methods and procedures used were as detailed in:

ANSI C63.2 (1987)

Title: American National Standard for Instrumentation - Electromagnetic noise and field strength.

ANSI C63.4 (2001)

Title: American National Standard Methods of Measurement of Electromagnetic Emissions from Low Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

ANSI C63.5 (1988)

Title: American National Standard for the Calibration of antennas used for Radiated Emission measurements in Electromagnetic Interference (EMI) control.

ANSI C63.7 (1988)

Title: American National Standard Guide for Construction of Open Area Test Sites for performing Radiated Emission Measurements.

CISPR 16-1: (1999)

Title: Specification For Radio Disturbance and Immunity Measuring Apparatus and Methods. Part 1: Radio Disturbance and Immunity Measuring Apparatus.

DA00-705 (2000)

Title: Filing and Frequency Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

3.1. Definition Of Measurement Equipment

The measurement equipment used complied with the requirements of the standards referenced in the Methods & Procedures section above. Appendix 1 contains a list of the test equipment used.

Test Of: Orthogon Systems

Gemini OS58XX

To: FCC Part 15.247

4. Deviations From The Test Specification

None.

Test Of: Orthogon Systems**Gemini OS58XX****To: FCC Part 15.247**

5. Operation Of The EUT During Testing

5.1. Operating Conditions

The EUT was tested in a normal laboratory environment.

During testing, the EUT was powered by a nominal 110V, 60 Hz AC Mains power supply

5.2. Operating Modes

The EUT was tested in the following operating modes, unless otherwise stated.

Operating as the Master unit on a link configured in Symmetric Data Mode

FULL POWER TRANSMIT TESTS

Band Edge Conducted Emissions tests were performed with the EUT set to BPSK, QPSK, 16QAM, 64QAM and Acquisition modulation modes alternately on both the vertical and horizontal ports on the bottom and top channels.

Peak Output Power and Peak Power Spectral Density tests were performed with the EUT set to BPSK, QPSK, 16QAM, 64QAM and Acquisition modulation modes alternately on both the vertical and horizontal ports on the bottom, middle and top full power channels.

6 dB bandwidth tests were performed with the EUT set to BPSK, QPSK, 16QAM, 64QAM and Acquisition modulation modes alternately on the vertical port on the middle channel only.

After investigation of all the different modulation modes and both antenna polarisations tests of Conducted Spurious Emissions were performed with the EUT set to BPSK modulation mode and on the vertical antenna port i.e. the worst case. Preliminary conducted spurious pre-scan tests were performed on the middle channel of the EUT. Final measurements were then performed on the bottom, middle and top channels if an emission was identified.

AC mains conducted emissions were performed at full power on the middle channel of the assigned frequency block, with the software set to the BPSK modulation mode.

REDUCED POWER TRANSMIT TESTS

Band Edge Conducted Emissions tests were performed with the EUT set to BPSK, QPSK, 16QAM, 64QAM and Acquisition modulation modes alternately on both the vertical and horizontal ports on the bottom and top reduced power channels (Note: these are the only channels running at the reduced power level).

Peak Output Power and Peak Power Spectral Density tests were performed with the EUT set to BPSK, QPSK, 16QAM, 64QAM and Acquisition modulation modes alternately on both the vertical and horizontal ports on the bottom and top reduced power channels. (Note: these are the only channels running at the reduced power level).

5.3. Configuration And Peripherals

The EUT was tested in the following configuration:

Outdoor Unit (Master) connected to the Indoor Unit supplied by the system power supply. The Outdoor Unit was connected via attenuation to a Slave Outdoor Unit to establish a data link.

Test Of: Orthogon Systems
 Gemini OS58XX
 To: FCC Part 15.247

5.4. Power Levels and Operating Channels Testing Rationale

As already stated in the description of the EUT the Gemini OS58XX is available in two versions. One an integral antenna version and one a connectorised version for use with external antennas which is fitted with a cover plate containing two N type connectors. The fundamental product is otherwise identical in both versions.

As the RF path is identical for both versions conducted tests were, therefore, performed on one version of the product i.e. connectorised version.

As part of the approval submission, the lower and upper channel centre frequencies have to be defined. In this case, there are two types of lower and upper edge channels, full power and reduced power.

	Lower Channel Frequency (MHz)	Upper Channel Frequency (MHz)
Full Power Edge Channels	5734	5842
Reduced Power Edge Channels	5731	5844

The reduction in the maximum allowed power applicable to the Reduced Power Edge Channels is 5 dB. This provides a significant reduction in spectral regrowth by operating the RF power amplifiers well into their linear region.

The regulations define the out of band emissions in FCC Part 15.247 (c) as below

“In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power,.....”

The band allowed for operation is 5725 MHz to 5850 MHz. The lower band edge was checked with the equipment operating at the lowest channel and vice versa. The testing performed to demonstrate that the equipment meets the requirement was split into two phases:

Full Power Edge Channels

The measurement performed was to measure the frequency domain response (Max Peak Detector and Max Hold) with the mandated 100 kHz bandwidth. The reference marker was set to the peak of the signal and the power at 5725 MHz or 5850 MHz measured relative to the peak of the signal. The limit of -20 dBc was applied.

Reduced Power Edge Channels

In this case the measurement was performed as above for all the normal operating modes. However in the Acquisition Mode (initial installation only for the Master end of the link, when the Slave terminal is not responding) the specification levels for the test were taken from those noted at the closest Full Power Edge Channels. For example, when testing the channel at 5731 MHz, the peak and -20 dBc levels were taken from the measurements of the equipment operating at 5734 MHz.

This is justified on the basis that the specification defines the limit for the measurement as ‘at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power’.

Test Of: Orthogon Systems
 Gemini OS58XX
 To: FCC Part 15.247

6. Summary Of Test Results

Full Power

Range Of Measurements	Specification Reference	Port Type	Compliance Status
*AC Mains Conducted Emissions	C.F.R. 47 FCC Part 15: 2002 Section 15.207	AC Mains Terminals	Complied
Transmitter Minimum 6 dB Bandwidth	C.F.R. 47 FCC Part 15: 2002 Section 15.247(a)(2)	Antenna Terminals	Complied
Transmitter Peak Power Spectral Density	C.F.R. 47 FCC Part 15: 2002 Section 15.247(d)	Antenna Terminals	Complied
Transmitter Maximum Peak Output Power	C.F.R. 47 FCC Part 15: 2002 Section 15.247(b)(3)	Antenna Terminals	Complied
Transmitter Conducted Emissions	C.F.R. 47 FCC Part 15: 2002 Section 15.247 (c)	Antenna Terminals	Complied
Transmitter Band Edge Conducted Emissions	C.F.R. 47 FCC Part 15: 2002 Section 15.247(c)	Antenna Terminals	Complied

Reduced Power

Range Of Measurements	Specification Reference	Port Type	Compliance Status
Transmitter Maximum Peak Output Power	C.F.R. 47 FCC Part 15: 2002 Section 15.247(b)(3)	Antenna Terminals	Complied
Transmitter Band Edge Conducted Emissions	C.F.R. 47 FCC Part 15: 2002 Section 15.247(c)	Antenna Terminals	Complied

**Note: The results for AC Mains Conducted Emissions were taken from previous test report RFI/MPTB2/RP45349JD01A*

6.1. Location Of Tests

All the measurements described in this report were performed at the premises of Radio Frequency Investigation Ltd, Ewhurst Park, Ramsdell, Basingstoke, Hampshire, RG26 5RQ, England.

Test Of: Orthogon Systems

Gemini OS58XX

To: FCC Part 15.247

7. Measurements, Examinations And Derived Results

7.1. General Comments

7.1.1. This section contains test results only. Details of the test methods and procedures can be found in Section 10 of this report.

7.1.2. Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to Section 11 for details of measurement uncertainties.

Test Of: Orthogon Systems
Gemini OS58XX
To: FCC Part 15.247

8. Test Results – Full Power

8.1. AC Mains Conducted Emissions: Section 15.207

8.1.1. The EUT was configured as for AC conducted emissions measurements as described in section 10 of this report.

8.1.2. Tests were performed to identify the maximum emissions levels on the AC mains line of the EUT.

Quasi-Peak Detector Measurements on Live and Neutral Lines

Frequency (MHz)	Line	Q-P Level (dB μ V)	Q-P Limit (dB μ V)	Margin (dB)	Result
0.15127	Live	42.31	65.93	23.62	Complied
0.21782	Neutral	40.89	62.90	22.01	Complied
0.43406	Neutral	37.06	57.17	20.11	Complied
0.57896	Neutral	35.05	56.00	20.95	Complied
1.01116	Neutral	31.45	56.00	24.55	Complied
4.68775	Neutral	37.19	56.00	18.81	Complied
20.3815	Neutral	37.97	60.00	22.03	Complied

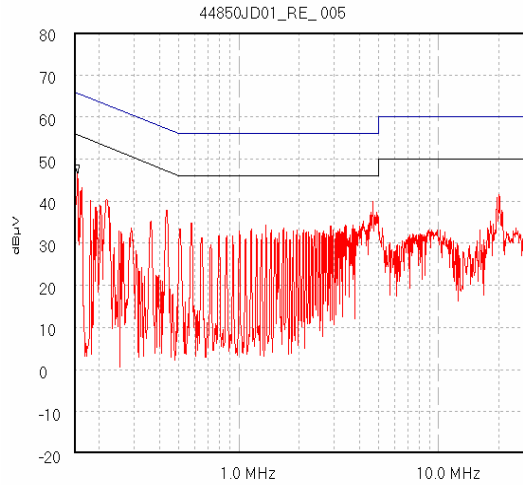
Average Detector Measurements on Live and Neutral Lines

Frequency (MHz)	Line	Q-P Level (dB μ V)	Q-P Limit (dB μ V)	Margin (dB)	Result
0.15127	Live	32.66	55.93	23.27	Complied
0.21782	Neutral	34.69	52.90	18.21	Complied
0.43406	Neutral	35.21	47.17	11.96	Complied
0.57896	Neutral	32.74	46.00	13.26	Complied
1.01116	Neutral	27.89	46.00	18.11	Complied
4.68775	Neutral	36.07	46.00	9.93	Complied
20.3815	Neutral	35.03	50.00	14.97	Complied

**Note: The results for AC Mains Conducted Emissions were taken from previous test report RFI/MPTB2/RP45349JD01A. As the system (power supply, Indoor Unit and Outdoor Unit) are identical in terms of hardware these results also apply to the system detailed and tested in this report.*

Test Of: Orthogon Systems
Gemini OS58XX
To: FCC Part 15.247

AC Mains Conducted Emissions: Section 15.207 (Continued)



— Trace 1
— FCC_QP — FCC_Av

Start 150.0 kHz; Stop 30.0 MHz - Log Scale
Ref 80 dBµV; Ref Offset 0.0 dB; 10 dB/div
RBW 9.0 kHz; VBW 10.0 kHz; Att 10 dB; Swp 1.94 S
Peak 155.393 kHz, 46.54 dBµV
Limit/Mask: FCC_QP; FCC_Av.; Limit Test Passed
24/04/2003 10:57:20

Test Of: Orthogon Systems
 Gemini OS58XX
 To: FCC Part 15.247

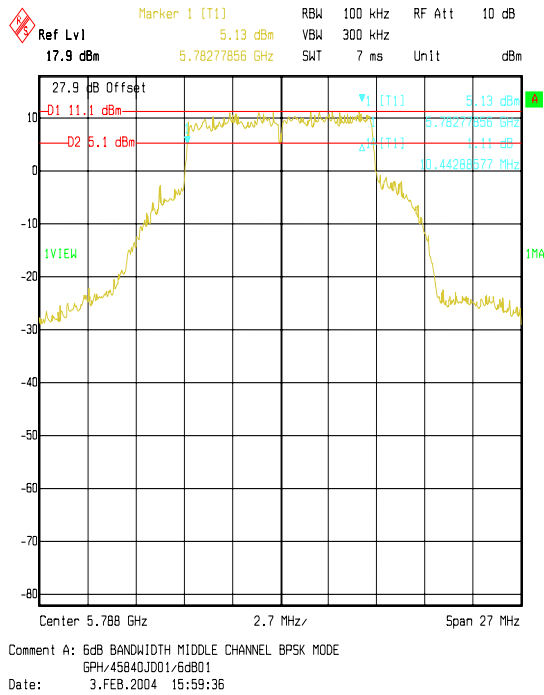
8.2.Transmitter 6 dB Bandwidth: Section 15.247(a)(2)

8.2.1. The EUT was configured as for transmitter minimum bandwidth measurements as described in Section 10 of this report.

8.2.2. Tests were performed to identify the 6 dB bandwidth of the fundamental signal.

Results: BPSK

Channel	Transmitter 6 dB Bandwidth (MHz)	Limit (MHz)	Margin (MHz)	Result
Middle	10.443	≥ 0.5	9.943	Complied



Test Of: Orthogon Systems
 Gemini OS58XX
 To: FCC Part 15.247

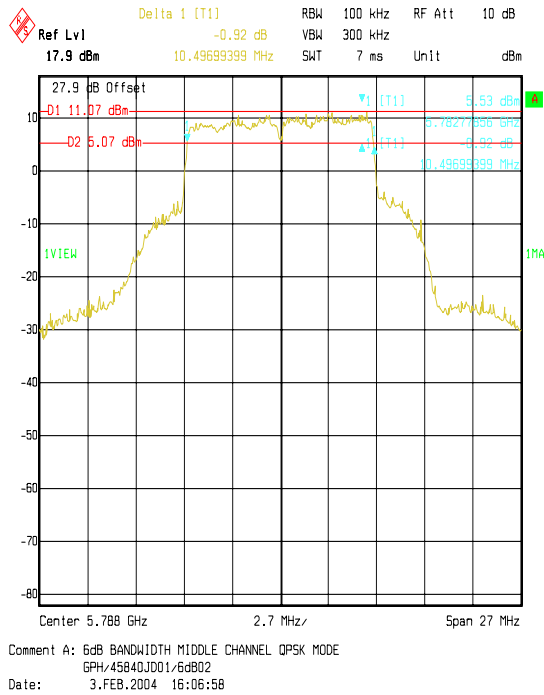
Transmitter 6 dB Bandwidth: Section 15.247(a)(2) (Continued)

8.2.3. The EUT was configured as for transmitter minimum bandwidth measurements as described in Section 10 of this report.

8.2.4. Tests were performed to identify the 6 dB bandwidth of the fundamental signal.

Results: QPSK

Channel	Transmitter 6 dB Bandwidth (MHz)	Limit (MHz)	Margin (MHz)	Result
Middle	10.497	≥ 0.5	9.997	Complied



Test Of: Orthogon Systems
 Gemini OS58XX
 To: FCC Part 15.247

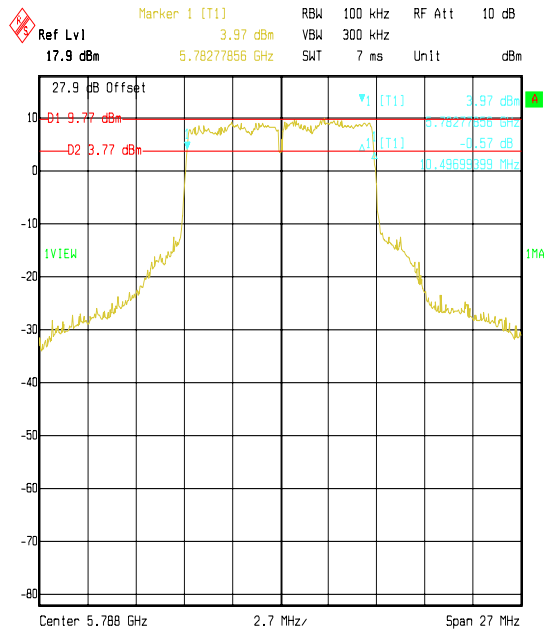
Transmitter 6 dB Bandwidth: Section 15.247(a)(2) (Continued)

8.2.5. The EUT was configured as for transmitter minimum bandwidth measurements as described in Section 10 of this report.

8.2.6. Tests were performed to identify the 6 dB bandwidth of the fundamental signal.

Results: 16QAM

Channel	Transmitter 6 dB Bandwidth (MHz)	Limit (MHz)	Margin (MHz)	Result
Middle	10.497	≥ 0.5	9.997	Complied



Comment A: 6dB BANDWIDTH MIDDLE CHANNEL 16QAM MODE
 GPH/45840JD01/6dB03
 Date: 3.FEB.2004 16:15:06

Test Of: Orthogon Systems
 Gemini OS58XX
 To: FCC Part 15.247

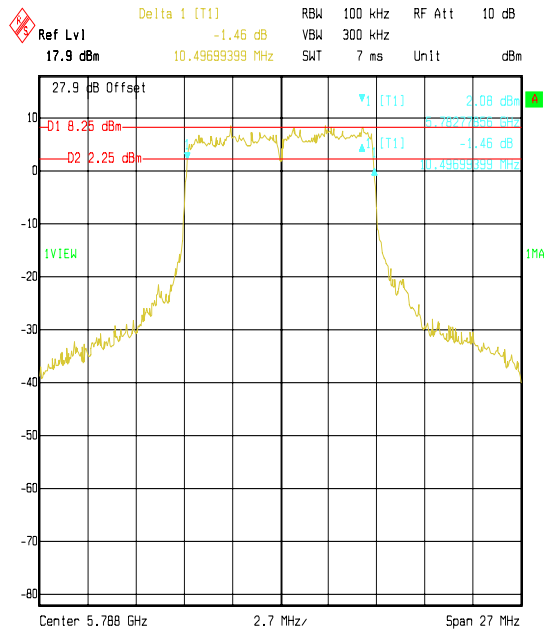
Transmitter 6 dB Bandwidth: Section 15.247(a)(2) (Continued)

8.2.7. The EUT was configured as for transmitter minimum bandwidth measurements as described in Section 10 of this report.

8.2.8. Tests were performed to identify the 6 dB bandwidth of the fundamental signal.

Results: 64QAM

Channel	Transmitter 6 dB Bandwidth (MHz)	Limit (MHz)	Margin (MHz)	Result
Middle	10.497	≥ 0.5	9.997	Complied



Comment A: 6dB BANDWIDTH MIDDLE CHANNEL 64QAM MODE
 GPH/45840JD01/6dB04
 Date: 3.FEB.2004 16:20:32

Test Of: Orthogon Systems
 Gemini OS58XX
 To: FCC Part 15.247

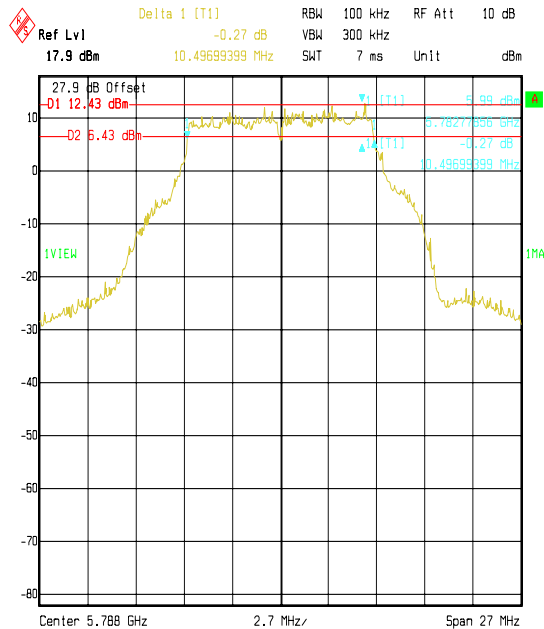
Transmitter 6 dB Bandwidth: Section 15.247(a)(2) (Continued)

8.2.9. The EUT was configured as for transmitter minimum bandwidth measurements as described in Section 10 of this report.

8.2.10. Tests were performed to identify the 6 dB bandwidth of the fundamental signal.

Results: Acquisition

Channel	Transmitter 6 dB Bandwidth (MHz)	Limit (MHz)	Margin (MHz)	Result
Middle	10.497	≥ 0.5	9.997	Complied



Comment A: 6dB BANDWIDTH MIDDLE CHANNEL ACQUISITION MODE
 GPH/45840JD01/6dB05
 Date: 3.FEB.2004 16:27:43

Test Of: Orthogon Systems
 Gemini OS58XX
 To: FCC Part 15.247

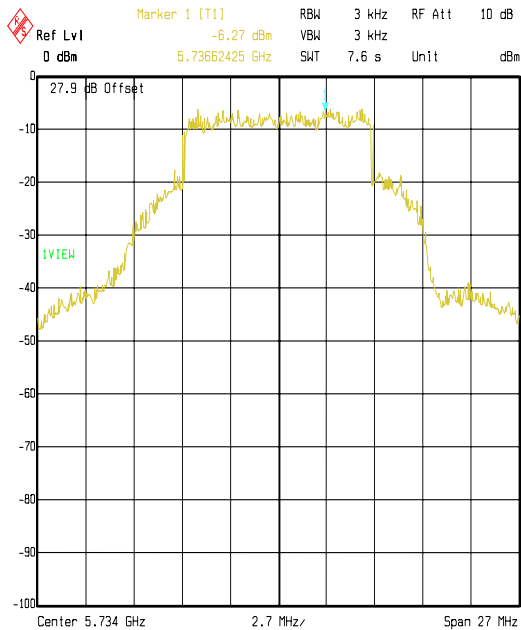
8.3.Transmitter Peak Power Spectral Density: Section 15.247(d)

8.3.1. The EUT was configured as for transmitter peak power spectral density measurements as described in Section 10 of this report.

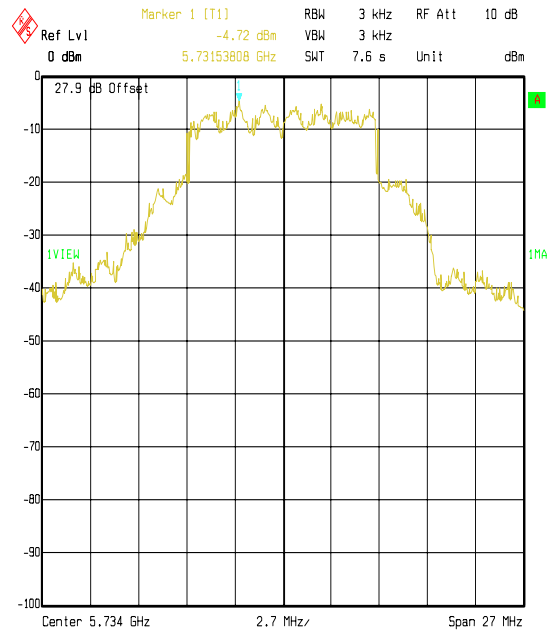
8.3.2. Tests were performed to identify the maximum peak power spectral density of the Fundamental.

Results: BPSK

Channel	Antenna Polarity	Output Power (dBm/3 kHz)	Limit (dBm/3 kHz)	Margin (dB)	Result
Bottom	Horiz.	-6.3	8.0	14.3	Complied
Bottom	Vert.	-4.7	8.0	12.7	Complied
Middle	Horiz.	-5.2	8.0	13.2	Complied
Middle	Vert.	-5.5	8.0	13.5	Complied
Top	Horiz.	-7.3	8.0	15.3	Complied
Top	Vert.	-6.9	8.0	14.9	Complied



Comment A: PEAK POWER SPECTRAL DENSITY BOTTOM CHANNEL
 BPSK MODE HORIZONTAL POLARISATION@GPH/45840JD01/PPSD01
 Date: 4.FEB.2004 9:40:37

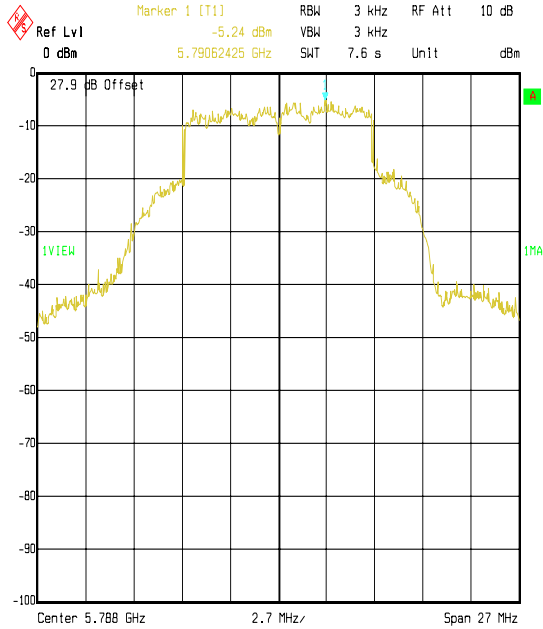


Comment A: PEAK POWER SPECTRAL DENSITY BOTTOM CHANNEL
 BPSK MODE VERTICAL POLARISATION@GPH/45840JD01/PPSD27
 Date: 4.FEB.2004 11:18:21

Operations Department

Test Of: Orthogon Systems
 Gemini OS58XX
 To: FCC Part 15.247

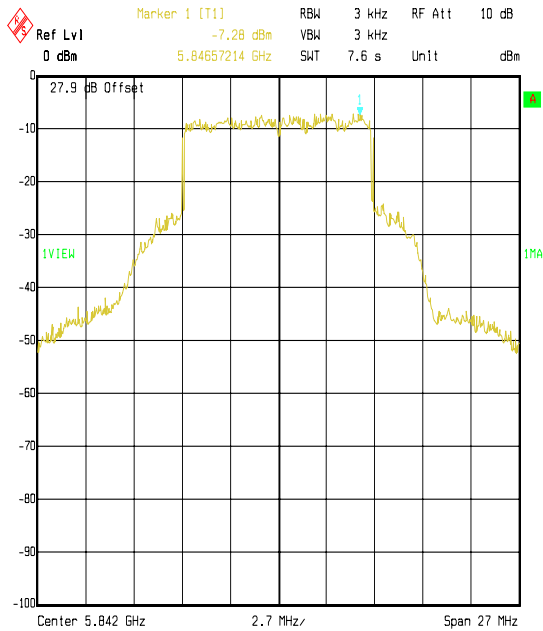
Transmitter Peak Power Spectral Density: Section 15.247(d) (Continued)



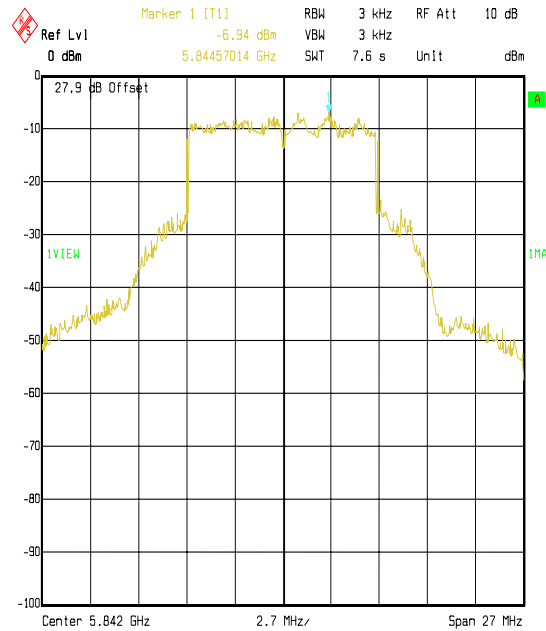
Comment A: PEAK POWER SPECTRAL DENSITY MIDDLE CHANNEL
 BPSK MODE HORIZONTAL POLARISATION@GPH/45840JD01/PPSD07
 Date: 4.FEB.2004 10:02:05



Comment A: PEAK POWER SPECTRAL DENSITY MIDDLE CHANNEL
 BPSK MODE VERTICAL POLARISATION@GPH/45840JD01/PPSD24
 Date: 4.FEB.2004 11:08:05



Comment A: PEAK POWER SPECTRAL DENSITY TOP CHANNEL
 BPSK MODE HORIZONTAL POLARISATION@GPH/45840JD01/PPSD14
 Date: 4.FEB.2004 10:22:12



Comment A: PEAK POWER SPECTRAL DENSITY TOP CHANNEL
 BPSK MODE VERTICAL POLARISATION@GPH/45840JD01/PPSD17
 Date: 4.FEB.2004 10:42:31

Test Of: Orthogon Systems
 Gemini OS58XX
 To: FCC Part 15.247

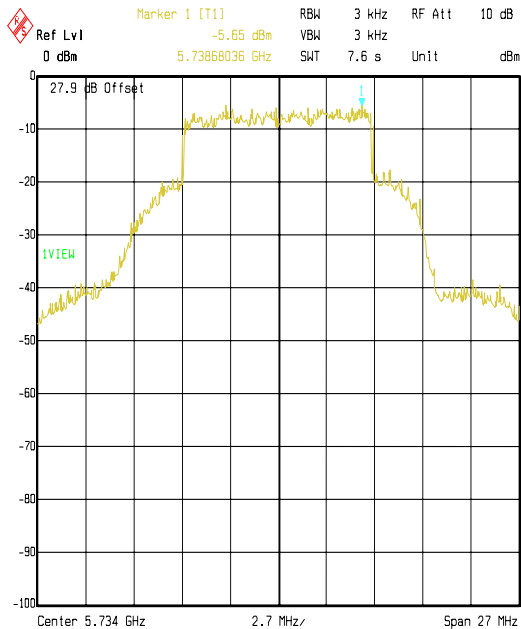
Transmitter Peak Power Spectral Density: Section 15.247(d) (Continued)

8.3.3. The EUT was configured as for transmitter peak power spectral density measurements as described in Section 10 of this report.

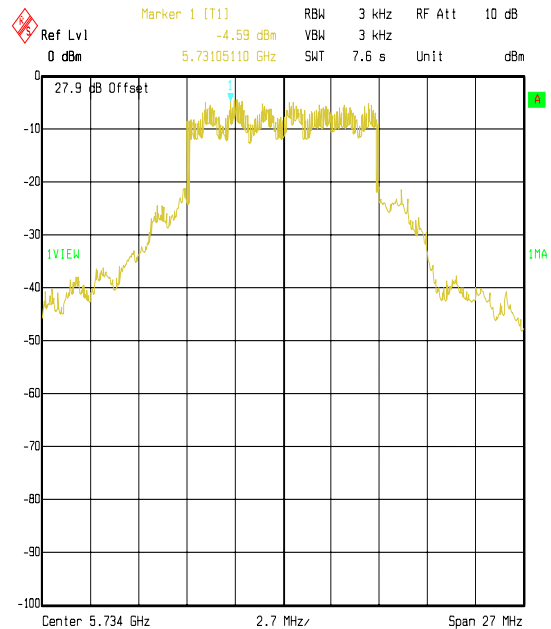
8.3.4. Tests were performed to identify the maximum peak power spectral density of the Fundamental.

Results: QPSK

Channel	Antenna Polarity	Output Power (dBm/3 kHz)	Limit (dBm/3 kHz)	Margin (dB)	Result
Bottom	Horiz.	-5.6	8.0	13.6	Complied
Bottom	Vert.	-4.6	8.0	12.6	Complied
Middle	Horiz.	-4.6	8.0	12.6	Complied
Middle	Vert.	-4.7	8.0	12.7	Complied
Top	Horiz.	-5.2	8.0	13.2	Complied
Top	Vert.	-5.5	8.0	13.5	Complied



Comment A: PEAK POWER SPECTRAL DENSITY BOTTOM CHANNEL
 QPSK MODE HORIZONTAL POLARISATION@GPH/45840JD01/PPSD02
 Date: 4.FEB.2004 9:37:43

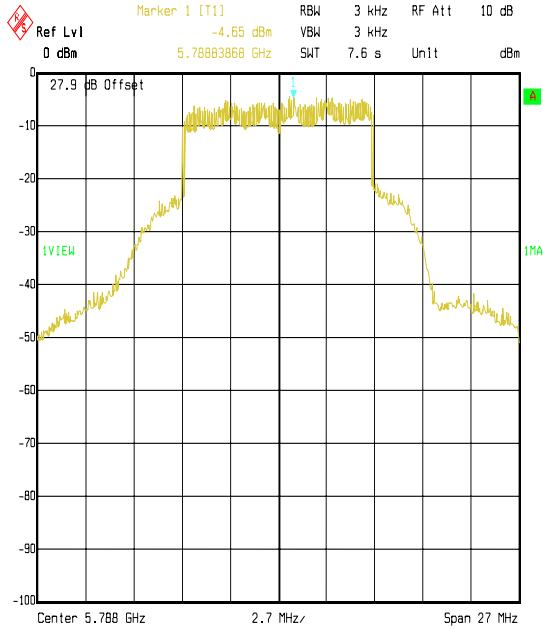


Comment A: PEAK POWER SPECTRAL DENSITY BOTTOM CHANNEL
 QPSK MODE VERTICAL POLARISATION@GPH/45840JD01/PPSD02B
 Date: 4.FEB.2004 11:20:32

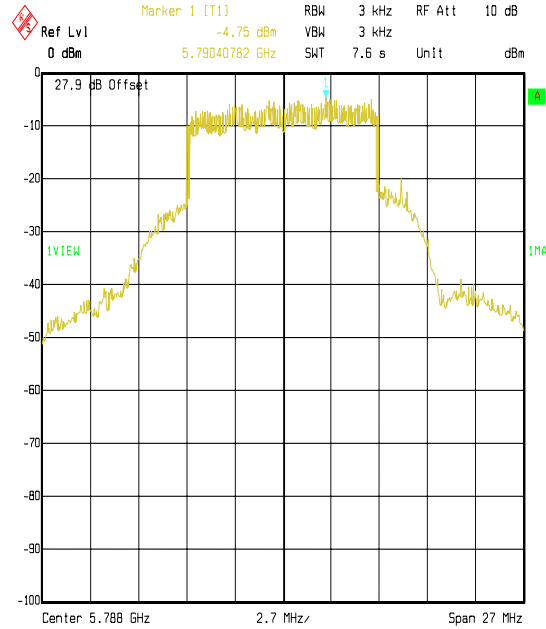
Operations Department

Test Of: Orthogon Systems
Gemini OS58XX
To: FCC Part 15.247

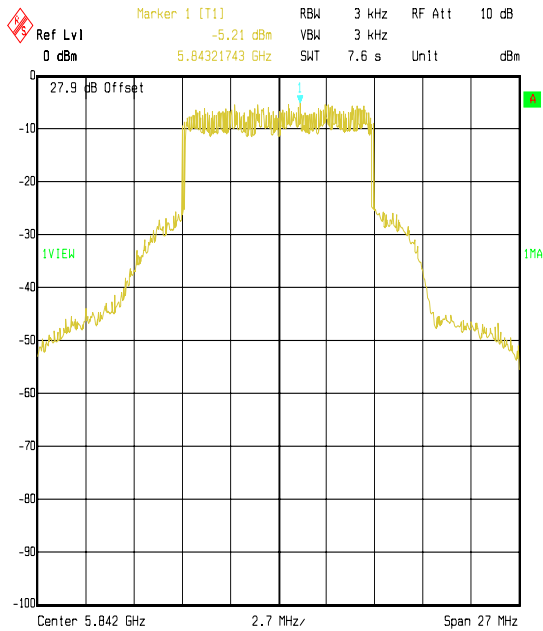
Transmitter Peak Power Spectral Density: Section 15.247(d) (Continued)



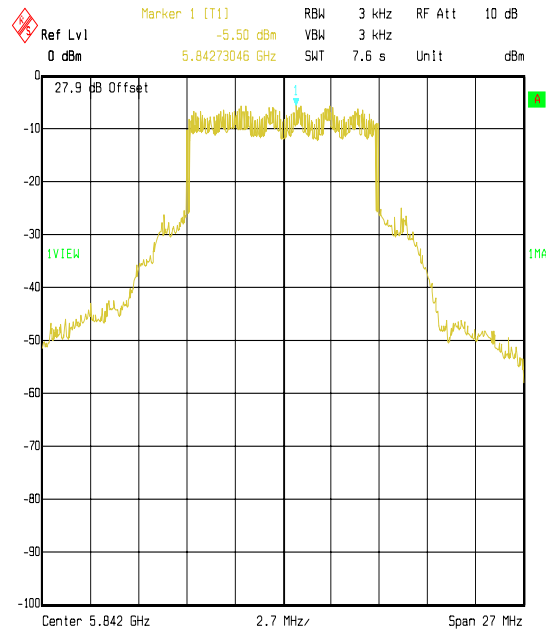
Comment A: PEAK POWER SPECTRAL DENSITY MIDDLE CHANNEL
QPSK MODE HORIZONTAL POLARISATION@GPH/45840JD01/PPSD08
Date: 4.FEB.2004 10:04:51



Comment A: PEAK POWER SPECTRAL DENSITY MIDDLE CHANNEL
QPSK MODE VERTICAL POLARISATION@GPH/45840JD01/PPSD23
Date: 4.FEB.2004 11:05:57



Comment A: PEAK POWER SPECTRAL DENSITY TOP CHANNEL
QPSK MODE HORIZONTAL POLARISATION@GPH/45840JD01/PPSD13
Date: 4.FEB.2004 10:19:41



Comment A: PEAK POWER SPECTRAL DENSITY TOP CHANNEL
QPSK MODE VERTICAL POLARISATION@GPH/45840JD01/PPSD18
Date: 4.FEB.2004 10:44:48

Test Of: Orthogon Systems
 Gemini OS58XX
 To: FCC Part 15.247

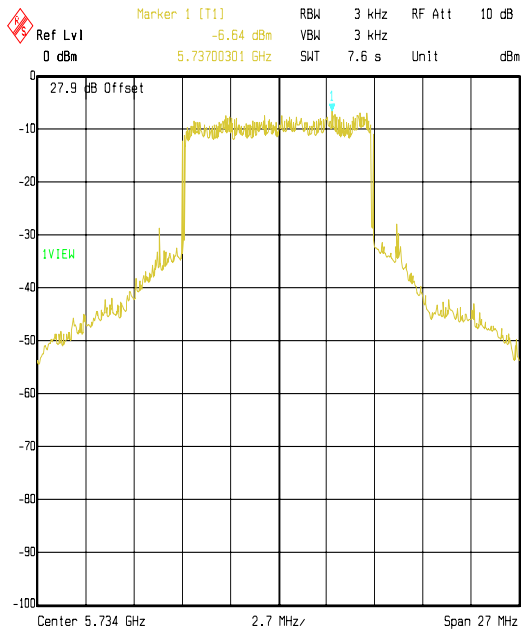
Transmitter Peak Power Spectral Density: Section 15.247(d) (Continued)

8.3.5. The EUT was configured as for transmitter peak power spectral density measurements as described in Section 10 of this report.

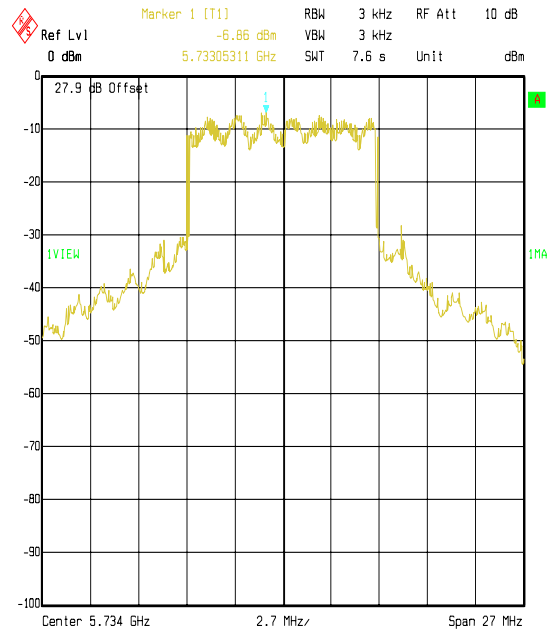
8.3.6. Tests were performed to identify the maximum peak power spectral density of the Fundamental.

Results: 16QAM

Channel	Antenna Polarity	Output Power (dBm/3 kHz)	Limit (dBm/3 kHz)	Margin (dB)	Result
Bottom	Horiz.	-6.6	8.0	14.6	Complied
Bottom	Vert.	-6.9	8.0	14.9	Complied
Middle	Horiz.	-6.7	8.0	14.7	Complied
Middle	Vert.	-7.2	8.0	15.2	Complied
Top	Horiz.	-6.9	8.0	14.9	Complied
Top	Vert.	-6.9	8.0	14.9	Complied



Comment A: PEAK POWER SPECTRAL DENSITY BOTTOM CHANNEL
 16QAM MODE HORIZONTAL POLARISATION@GPH/45840JD01/PP5D03
 Date: 4.FEB.2004 9:42:53



Comment A: PEAK POWER SPECTRAL DENSITY BOTTOM CHANNEL
 16QAM MODE VERTICAL POLARISATION@GPH/45840JD01/PP5D29
 Date: 4.FEB.2004 11:23:23

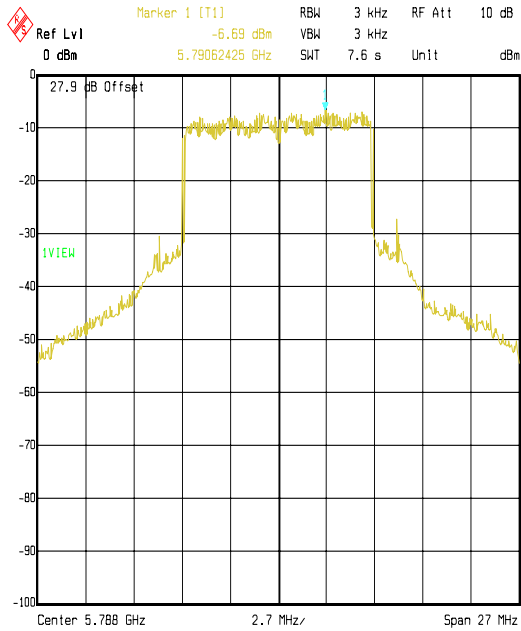
Operations Department

Test Of: Orthogon Systems

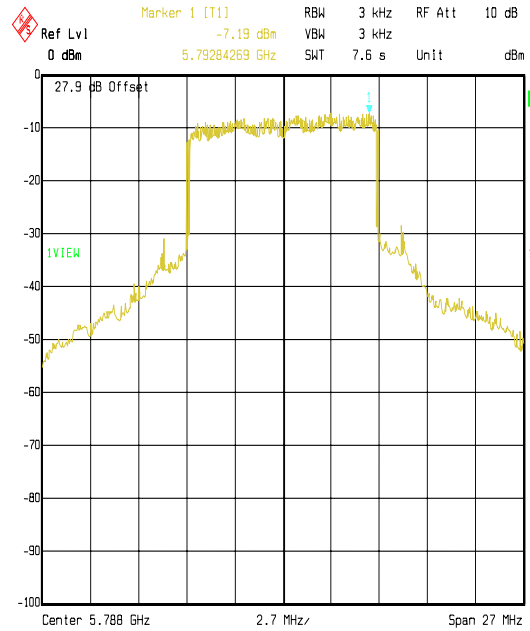
Gemini OS58XX

To: FCC Part 15.247

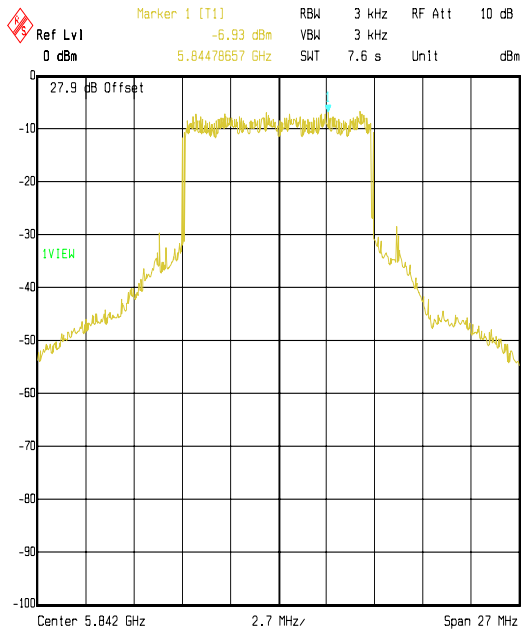
Transmitter Peak Power Spectral Density: Section 15.247(d) (Continued)



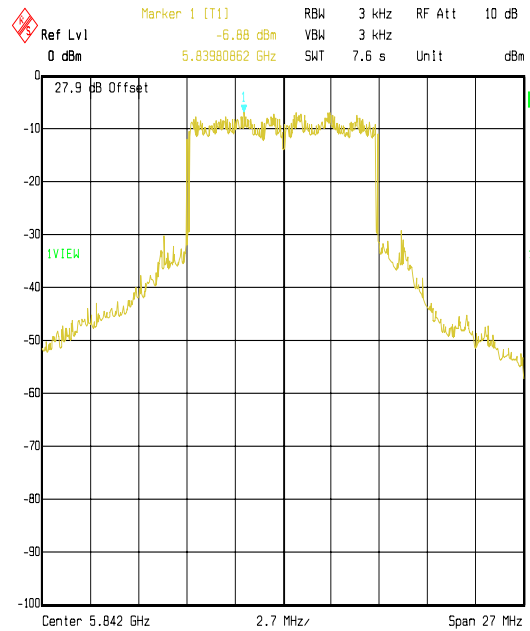
Comment A: PEAK POWER SPECTRAL DENSITY MIDDLE CHANNEL
 16QAM MODE HORIZONTAL POLARISATION@GPH/45840JD01/PPSD09
 Date: 4.FEB.2004 10:08:27



Comment A: PEAK POWER SPECTRAL DENSITY MIDDLE CHANNEL
 16QAM MODE VERTICAL POLARISATION@GPH/45840JD01/PPSD22
 Date: 4.FEB.2004 11:03:14



Comment A: PEAK POWER SPECTRAL DENSITY TOP CHANNEL
 16QAM MODE HORIZONTAL POLARISATION@GPH/45840JD01/PPSD12
 Date: 4.FEB.2004 10:17:27



Comment A: PEAK POWER SPECTRAL DENSITY TOP CHANNEL
 16QAM MODE VERTICAL POLARISATION@GPH/45840JD01/PPSD19
 Date: 4.FEB.2004 10:47:10

Test Of: Orthogon Systems
 Gemini OS58XX
 To: FCC Part 15.247

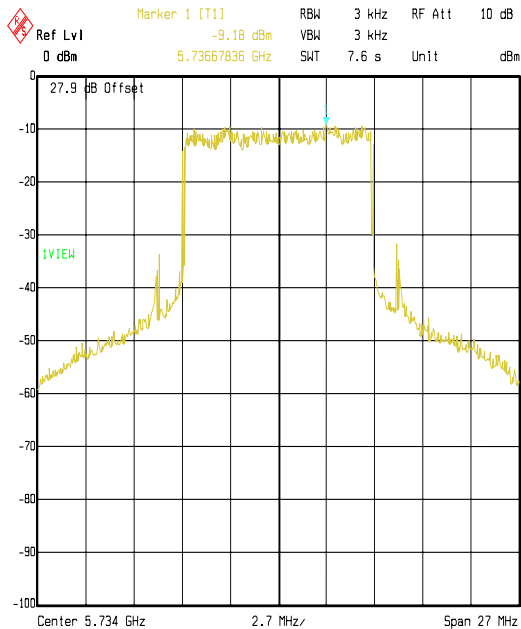
Transmitter Peak Power Spectral Density: Section 15.247(d) (Continued)

8.3.7. The EUT was configured as for transmitter peak power spectral density measurements as described in Section 10 of this report.

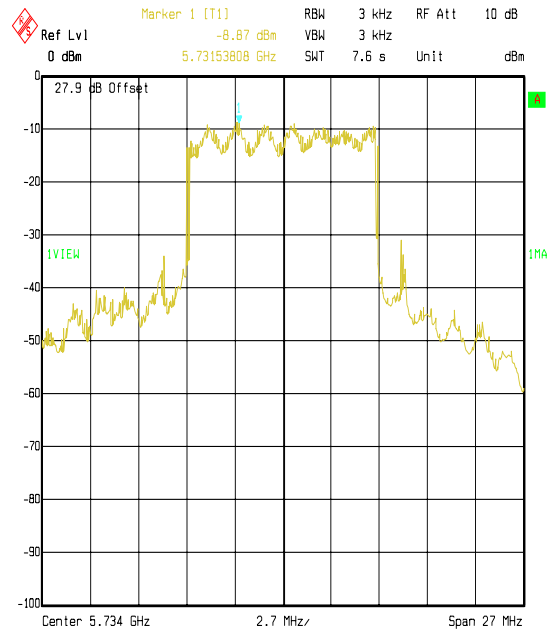
8.3.8. Tests were performed to identify the maximum peak power spectral density of the Fundamental.

Results: 64QAM

Channel	Antenna Polarity	Output Power (dBm/3 kHz)	Limit (dBm/3 kHz)	Margin (dB)	Result
Bottom	Horiz.	-9.2	8.0	17.2	Complied
Bottom	Vert.	-8.9	8.0	16.9	Complied
Middle	Horiz.	-8.7	8.0	16.7	Complied
Middle	Vert.	-9.3	8.0	17.3	Complied
Top	Horiz.	-9.0	8.0	17.0	Complied
Top	Vert.	-9.1	8.0	17.1	Complied



Comment A: PEAK POWER SPECTRAL DENSITY BOTTOM CHANNEL
 64QAM MODE HORIZONTAL POLARISATION@GPH/45840JD01/PPSD04
 Date: 4.FEB.2004 9:46:14



Comment A: PEAK POWER SPECTRAL DENSITY BOTTOM CHANNEL
 64QAM MODE VERTICAL POLARISATION@GPH/45840JD01/PPSD30
 Date: 4.FEB.2004 11:26:05

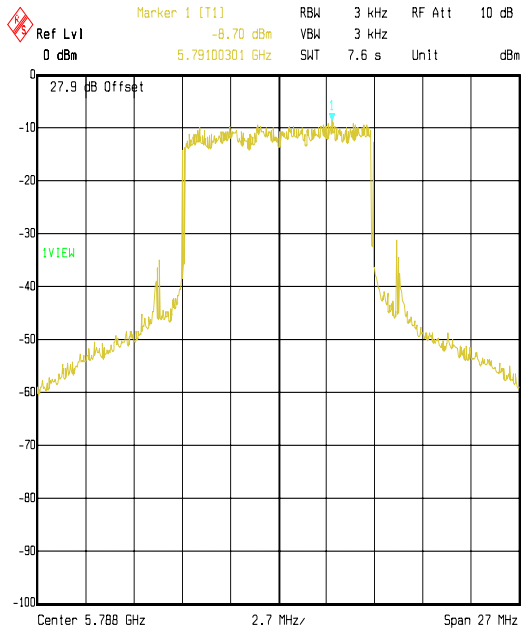
Operations Department

Test Of: Orthogon Systems

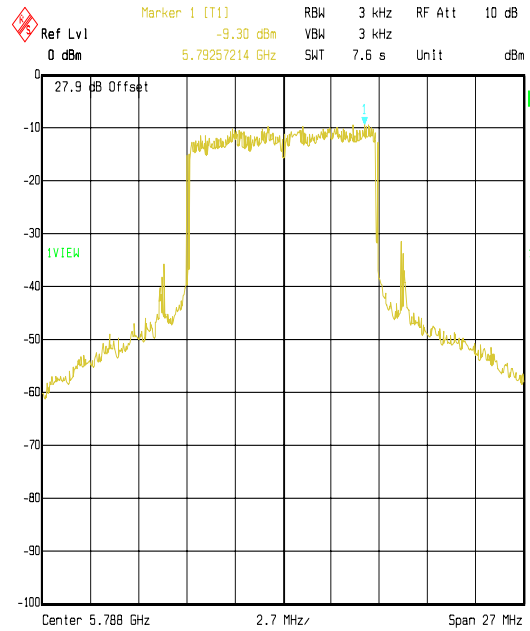
Gemini OS58XX

To: FCC Part 15.247

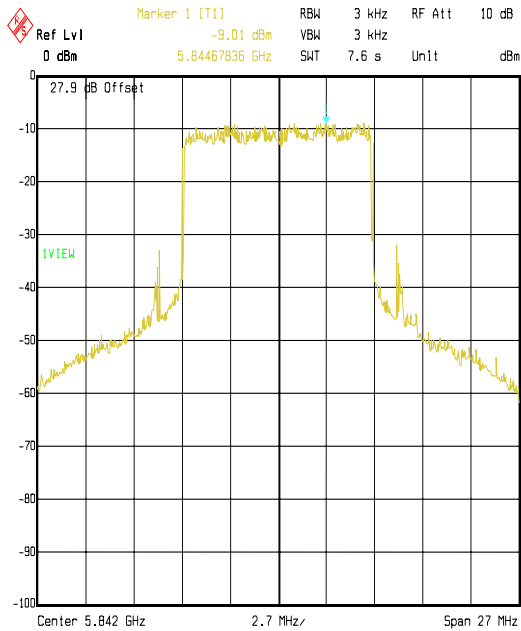
Transmitter Peak Power Spectral Density: Section 15.247(d) (Continued)



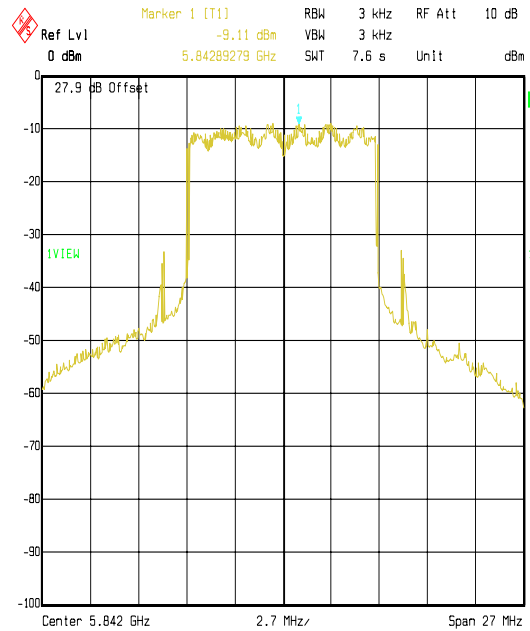
Comment A: PEAK POWER SPECTRAL DENSITY MIDDLE CHANNEL
 64QAM MODE HORIZONTAL POLARISATION@GPH/45840JD01/PPSD10
 Date: 4.FEB.2004 10:10:44



Comment A: PEAK POWER SPECTRAL DENSITY MIDDLE CHANNEL
 64QAM MODE VERTICAL POLARISATION@GPH/45840JD01/PPSD21
 Date: 4.FEB.2004 10:53:02



Comment A: PEAK POWER SPECTRAL DENSITY TOP CHANNEL
 64QAM MODE HORIZONTAL POLARISATION@GPH/45840JD01/PPSD11
 Date: 4.FEB.2004 10:15:28



Comment A: PEAK POWER SPECTRAL DENSITY TOP CHANNEL
 64QAM MODE VERTICAL POLARISATION@GPH/45840JD01/PPSD20
 Date: 4.FEB.2004 10:50:14

Operations Department

Test Of: Orthogon Systems
 Gemini OS58XX
 To: FCC Part 15.247

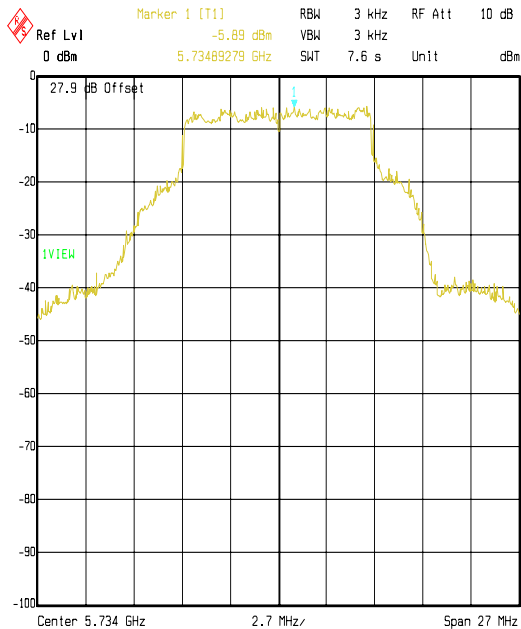
Transmitter Peak Power Spectral Density: Section 15.247(d) (Continued)

8.3.9. The EUT was configured as for transmitter peak power spectral density measurements as described in Section 10 of this report.

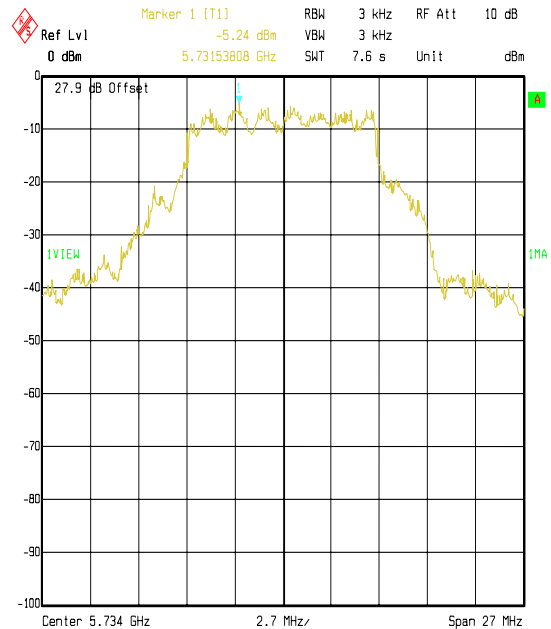
8.3.10. Tests were performed to identify the maximum peak power spectral density of the Fundamental.

Results: Acquisition

Channel	Antenna Polarity	Output Power (dBm/3 kHz)	Limit (dBm/3 kHz)	Margin (dB)	Result
Bottom	Horiz.	-5.9	8.0	13.9	Complied
Bottom	Vert.	-5.2	8.0	13.2	Complied
Middle	Horiz.	-5.6	8.0	13.6	Complied
Middle	Vert.	-5.6	8.0	13.6	Complied
Top	Horiz.	-7.7	8.0	15.7	Complied
Top	Vert.	-7.3	8.0	15.3	Complied



Comment A: PEAK POWER SPECTRAL DENSITY BOTTOM CHANNEL
 ACQ MODE HORIZONTAL POLARISATION/45840JD01/PPSD05
 Date: 4.FEB.2004 9:54:08



Comment A: PEAK POWER SPECTRAL DENSITY BOTTOM CHANNEL
 ACQ MODE VERTICAL POLARISATION/45840JD01/PPSD26
 Date: 4.FEB.2004 11:12:29

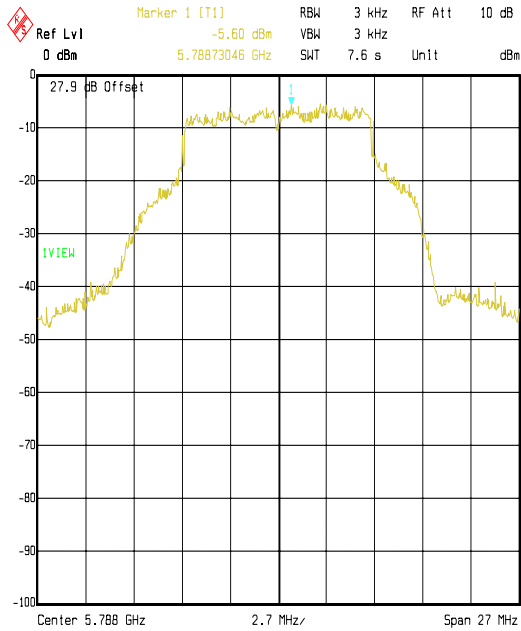
Operations Department

Test Of: Orthogon Systems

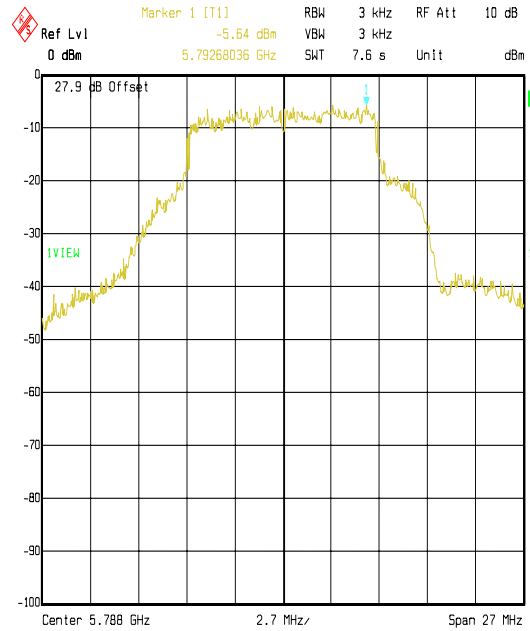
Gemini OS58XX

To: FCC Part 15.247

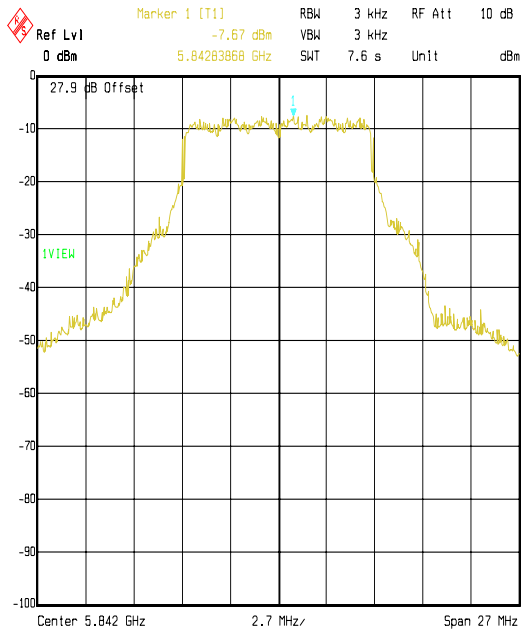
Transmitter Peak Power Spectral Density: Section 15.247(d) (Continued)



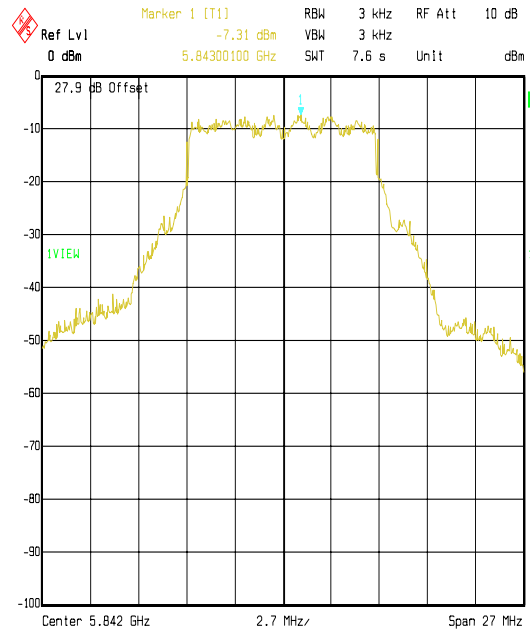
Comment A: PEAK POWER SPECTRAL DENSITY MIDDLE CHANNEL
 ACQ MODE HORIZONTAL POLARISATION@GPH/45840JDD1/PPSD06
 Date: 4.FEB.2004 9:58:12



Comment A: PEAK POWER SPECTRAL DENSITY MIDDLE CHANNEL
 ACQ MODE VERTICAL POLARISATION@GPH/45840JDD1/PPSD25
 Date: 4.FEB.2004 11:10:22



Comment A: PEAK POWER SPECTRAL DENSITY TOP CHANNEL
 ACQ MODE HORIZONTAL POLARISATION@GPH/45840JDD1/PPSD15
 Date: 4.FEB.2004 10:25:01



Comment A: PEAK POWER SPECTRAL DENSITY TOP CHANNEL
 ACQ MODE VERTICAL POLARISATION@GPH/45840JDD1/PPSD16
 Date: 4.FEB.2004 10:39:54

Test Of: Orthogon Systems
Gemini OS58XX
To: FCC Part 15.247

8.4. Transmitter Maximum Peak Output Power: Section 15.247(b)(3)

8.4.1. The EUT was configured as for transmitter peak output power measurements as described in Section 10 of this report.

8.4.2. Tests were performed to identify the transmitter maximum peak output power of the EUT.

Results: BPSK

Channel	Antenna Polarity (H/V)	Peak Output Power (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	Horiz.	25.3	27.0	1.7	Complied
Bottom	Vert.	24.8	27.0	2.2	Complied
Middle	Horiz.	25.4	27.0	1.6	Complied
Middle	Vert.	25.1	27.0	1.9	Complied
Top	Horiz.	25.7	27.0	1.3	Complied
Top	Vert.	25.5	27.0	1.5	Complied

Note: Limit reduced by 3 dB as co-existence vertical and horizontal antenna may transmit simultaneously.

Note: The Peak Output Power was measured with the AC supply voltage to the EUT varied between 85% and 115% of the nominal value of 110 Volts i.e. 93.5 and 126.5 Volts. The variation of the input AC supply voltage to the EUT had no effect on the Peak Output Power and results were identical for all three test voltages. Consequently the results given in the above table are valid for all three test voltages (93.5 Volts, 110 Volts and 126.5 Volts).

Test Of: Orthogon Systems
 Gemini OS58XX
 To: FCC Part 15.247

Transmitter Maximum Peak Output Power: Section 15.247(b)(3) (Continued)

8.4.3. The EUT was configured as for transmitter peak output power measurements as described in Section 10 of this report.

8.4.4. Tests were performed to identify the transmitter maximum peak output power of the EUT.

Results: QPSK

Channel	Antenna Polarity (H/V)	Peak Output Power (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	Horiz.	25.2	27.0	1.8	Complied
Bottom	Vert.	24.7	27.0	2.3	Complied
Middle	Horiz.	25.4	27.0	1.6	Complied
Middle	Vert.	24.8	27.0	2.2	Complied
Top	Horiz.	25.6	27.0	1.4	Complied
Top	Vert.	25.5	27.0	1.5	Complied

Note: Limit reduced by 3 dB as co-existence vertical and horizontal antenna may transmit simultaneously.

Note: The Peak Output Power was measured with the AC supply voltage to the EUT varied between 85% and 115% of the nominal value of 110 Volts i.e. 93.5 and 126.5 Volts. The variation of the input AC supply voltage to the EUT had no effect on the Peak Output Power and results were identical for all three test voltages. Consequently the results given in the above table are valid for all three test voltages (93.5 Volts, 110 Volts and 126.5 Volts).

Test Of: Orthogon Systems
 Gemini OS58XX
 To: FCC Part 15.247

Transmitter Maximum Peak Output Power: Section 15.247(b)(3) (Continued)

8.4.5. The EUT was configured as for transmitter peak output power measurements as described in Section 10 of this report.

8.4.6. Tests were performed to identify the transmitter maximum peak output power of the EUT.

Results: 16QAM

Channel	Antenna Polarity (H/V)	Peak Output Power (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	Horiz.	25.3	27.0	1.7	Complied
Bottom	Vert.	24.8	27.0	2.2	Complied
Middle	Horiz.	25.5	27.0	1.5	Complied
Middle	Vert.	25.2	27.0	1.8	Complied
Top	Horiz.	26.1	27.0	0.9	Complied
Top	Vert.	25.8	27.0	1.2	Complied

Note: Limit reduced by 3 dB as co-existence vertical and horizontal antenna may transmit simultaneously.

Note: The Peak Output Power was measured with the AC supply voltage to the EUT varied between 85% and 115% of the nominal value of 110 Volts i.e. 93.5 and 126.5 Volts. The variation of the input AC supply voltage to the EUT had no effect on the Peak Output Power and results were identical for all three test voltages. Consequently the results given in the above table are valid for all three test voltages (93.5 Volts, 110 Volts and 126.5 Volts).

Test Of: Orthogon Systems
 Gemini OS58XX
 To: FCC Part 15.247

Transmitter Maximum Peak Output Power: Section 15.247(b)(3) (Continued)

8.4.7. The EUT was configured as for transmitter peak output power measurements as described in Section 10 of this report.

8.4.8. Tests were performed to identify the transmitter maximum peak output power of the EUT.

Results: 64QAM

Channel	Antenna Polarity (H/V)	Peak Output Power (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	Horiz.	25.4	27.0	1.6	Complied
Bottom	Vert.	24.6	27.0	2.4	Complied
Middle	Horiz.	25.6	27.0	1.4	Complied
Middle	Vert.	25.1	27.0	1.9	Complied
Top	Horiz.	25.8	27.0	1.2	Complied
Top	Vert.	25.5	27.0	1.5	Complied

Note: Limit reduced by 3 dB as co-existence vertical and horizontal antenna may transmit simultaneously.

Note: The Peak Output Power was measured with the AC supply voltage to the EUT varied between 85% and 115% of the nominal value of 110 Volts i.e. 93.5 and 126.5 Volts. The variation of the input AC supply voltage to the EUT had no effect on the Peak Output Power and results were identical for all three test voltages. Consequently the results given in the above table are valid for all three test voltages (93.5 Volts, 110 Volts and 126.5 Volts).

Test Of: Orthogon Systems
 Gemini OS58XX
 To: FCC Part 15.247

Transmitter Maximum Peak Output Power: Section 15.247(b)(3) (Continued)

8.4.9. The EUT was configured as for transmitter peak output power measurements as described in Section 10 of this report.

8.4.10. Tests were performed to identify the transmitter maximum peak output power of the EUT.

Results: Acquisition

Channel	Antenna Polarity (H/V)	Peak Output Power (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	Horiz.	25.2	27.0	1.8	Complied
Bottom	Vert.	24.7	27.0	2.3	Complied
Middle	Horiz.	25.3	27.0	1.7	Complied
Middle	Vert.	25.0	27.0	2.0	Complied
Top	Horiz.	25.6	27.0	1.4	Complied
Top	Vert.	25.4	27.0	1.6	Complied

Note: Limit reduced by 3 dB as co-existence vertical and horizontal antenna may transmit simultaneously.

Note: The Peak Output Power was measured with the AC supply voltage to the EUT varied between 85% and 115% of the nominal value of 110 Volts i.e. 93.5 and 126.5 Volts. The variation of the input AC supply voltage to the EUT had no effect on the Peak Output Power and results were identical for all three test voltages. Consequently the results given in the above table are valid for all three test voltages (93.5 Volts, 110 Volts and 126.5 Volts).

Operations Department

Test Of: Orthogon Systems
 Gemini OS58XX
 To: FCC Part 15.247

8.5. Transmitter Conducted Emissions: Section 15.247(c)

8.5.1. The EUT was configured as for transmitter conducted emissions measurements as described in Section 10 of this report.

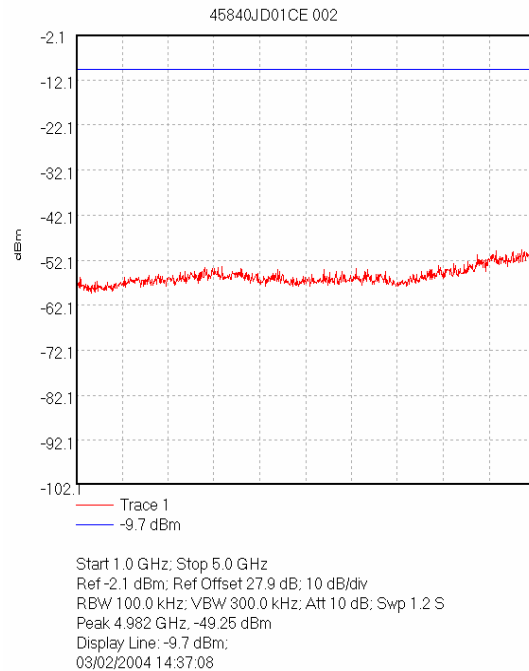
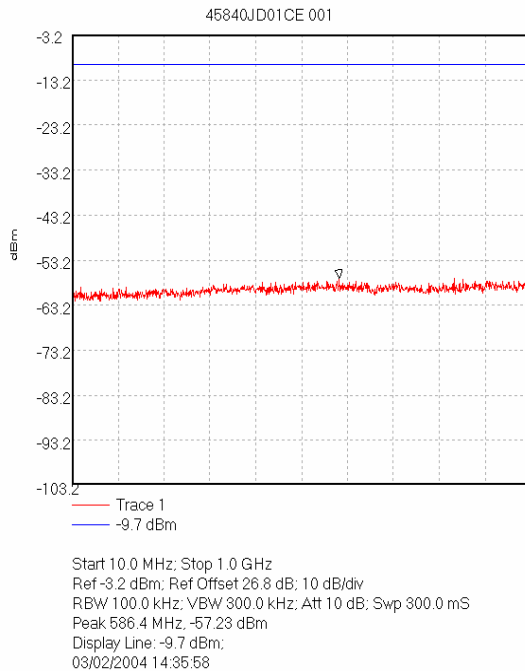
8.5.2. Tests were performed to identify the maximum transmitter conducted emission levels.

8.5.3. The limit lines shown in the plots below are set to a level 20 dB below the measured highest fundamental peak power.

Result: Middle Channel

Frequency (GHz)	Peak Emission Level (dBm)	Peak Emission Level (dBc)	Limit (dBc)	Margin (dB)	Result
*24.16	-42.7	-53.0	-20.0	33.0	Complied

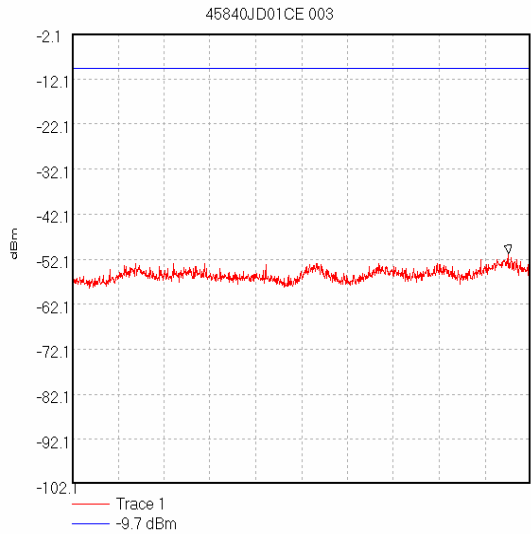
**Note: No spurious emissions were detected above the noise floor of the measuring receiver; therefore, the highest peak noise floor reading of the measuring receiver was recorded as shown in the table above.*



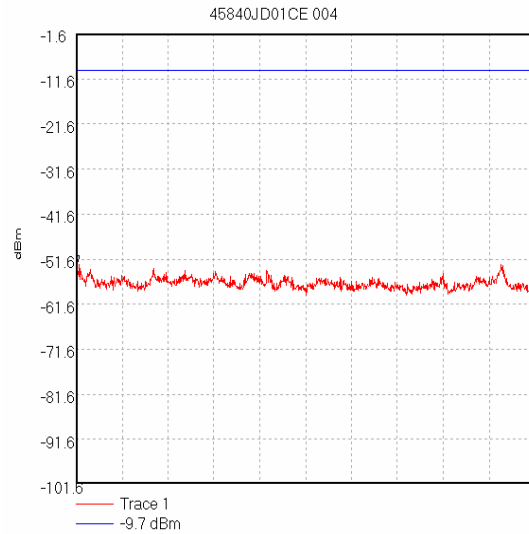
Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Test Of: Orthogon Systems
Gemini OS58XX
To: FCC Part 15.247

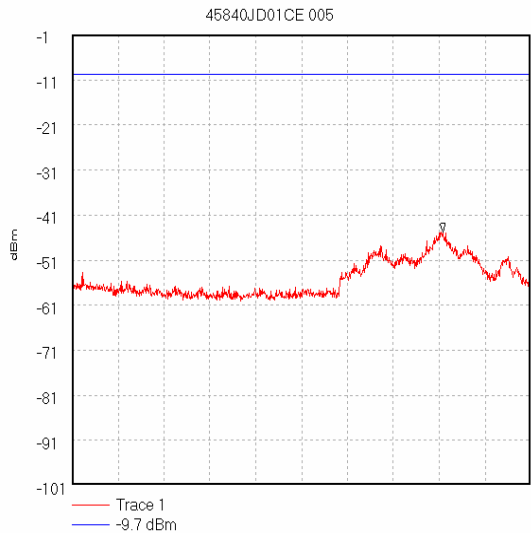
Transmitter Conducted Emissions: Section 15.247(c) (Continued)



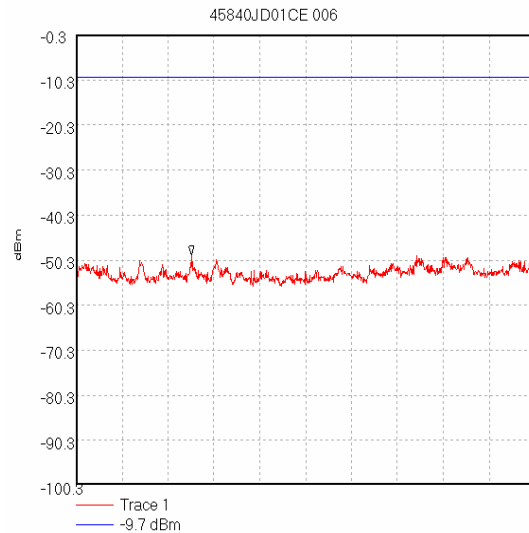
Start 5.0 GHz; Stop 5.725 GHz
Ref -2.1 dBm; Ref Offset 27.9 dB; 10 dB/div
RBW 100.0 kHz; VBW 300.0 kHz; Att 10 dB; Swp 220.0 mS
Peak 5.69 GHz; -50.9 dBm
Display Line: -9.7 dBm;
03/02/2004 14:38:57



Start 5.85 GHz; Stop 10.0 GHz
Ref -1.6 dBm; Ref Offset 28.4 dB; 10 dB/div
RBW 100.0 kHz; VBW 300.0 kHz; Att 10 dB; Swp 1.26 S
Peak 5.855 GHz; -52.76 dBm
Display Line: -9.7 dBm;
03/02/2004 14:40:08



Start 10.0 GHz; Stop 15.0 GHz
Ref -1 dBm; Ref Offset 29.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 300.0 kHz; Att 10 dB; Swp 1.5 S
Peak 14.044 GHz; -44.7 dBm
Display Line: -9.7 dBm;
03/02/2004 14:41:24

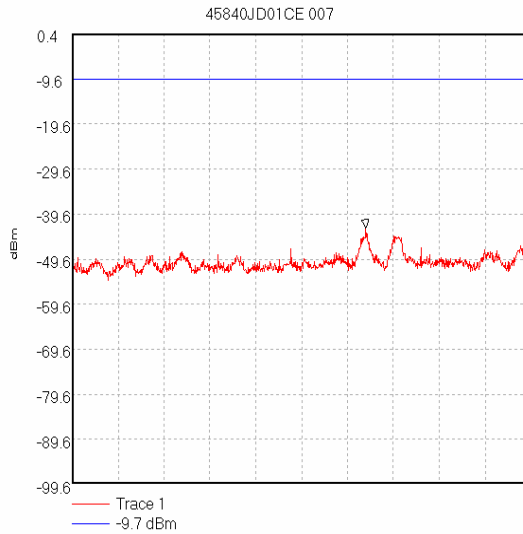


Start 15.0 GHz; Stop 20.0 GHz
Ref -0.3 dBm; Ref Offset 29.7 dB; 10 dB/div
RBW 100.0 kHz; VBW 300.0 kHz; Att 10 dB; Swp 1.5 S
Peak 16.261 GHz; -49.18 dBm
Display Line: -9.7 dBm;
03/02/2004 14:42:58

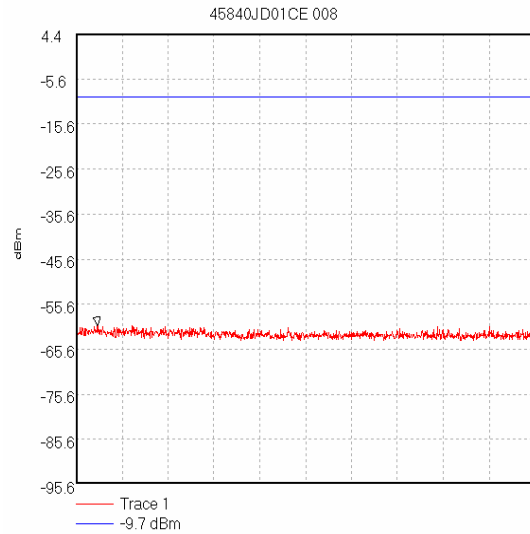
Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Test Of: Orthogon Systems
Gemini OS58XX
To: FCC Part 15.247

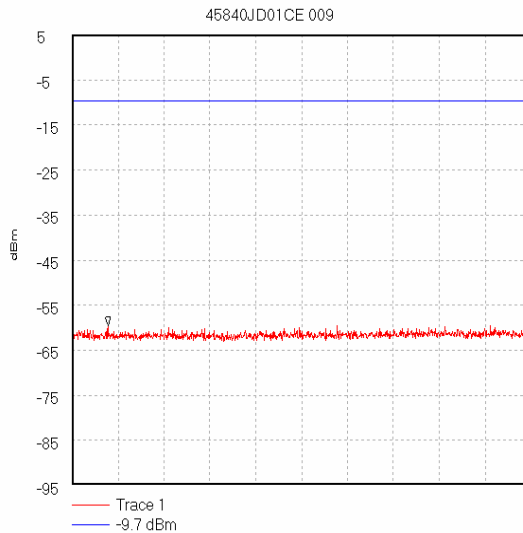
Transmitter Conducted Emissions: Section 15.247(c) (Continued)



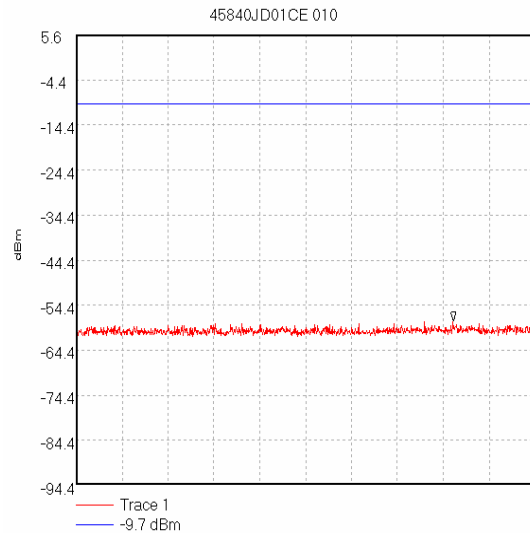
Start 20.0 GHz; Stop 26.5 GHz
Ref 0.4 dBm; Ref Offset 30.4 dB; 10 dB/div
RBW 100.0 kHz; VBW 300.0 kHz; Att 10 dB; Swp 1.96 S
Peak 24.16 GHz, -42.69 dBm
Display Line: -9.7 dBm;
03/02/2004 14:45:01



Start 26.5 GHz; Stop 30.0 GHz
Ref 4.4 dBm; Ref Offset 34.4 dB; 10 dB/div
RBW 100.0 kHz; VBW 300.0 kHz; Att 0 dB; Swp 1.06 S
Peak 26.663 GHz, -60.35 dBm
Display Line: -9.7 dBm;
03/02/2004 15:14:17



Start 30.0 GHz; Stop 35.0 GHz
Ref 5 dBm; Ref Offset 35.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 300.0 kHz; Att 0 dB; Swp 1.5 S
Peak 30.389 GHz, -59.57 dBm
Display Line: -9.7 dBm;
03/02/2004 15:16:20



Start 35.0 GHz; Stop 40.0 GHz
Ref 5.6 dBm; Ref Offset 35.6 dB; 10 dB/div
RBW 100.0 kHz; VBW 300.0 kHz; Att 0 dB; Swp 1.5 S
Peak 39.111 GHz, -57.98 dBm
Display Line: -9.7 dBm;
03/02/2004 15:18:10

Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Test Of: Orthogon Systems
Gemini OS58XX
To: FCC Part 15.247

8.6. Transmitter Band Edge Conducted Emissions: Section 15.247(c)

8.6.1. The EUT was configured as for transmitter conducted emissions measurements as described in Section 10 of this report.

8.6.2. Tests were performed to identify the maximum conducted band edge emissions levels.

8.6.3. The limit lines shown in the plots overleaf are set to a level 20 dB below the highest fundamental peak power measured in a 100 kHz Resolution Bandwidth (taken from the corresponding plot) of the channels closest to the lower and upper band edge.

Result: BPSK

Frequency (MHz)	Antenna Polarity (H/V)	Peak Emission Level (dBm)	Peak Emission Level (dBc)	Limit (dBc)	Margin (dB)	Result
5725	Horiz.	-20.2	-31.5	-20.0	11.5	Complied
5850	Horiz.	-18.2	-27.9	-20.0	7.9	Complied
5725	Vert.	-18.5	-30.0	-20.0	10.0	Complied
5850	Vert.	-20.0	-29.7	-20.0	9.7	Complied

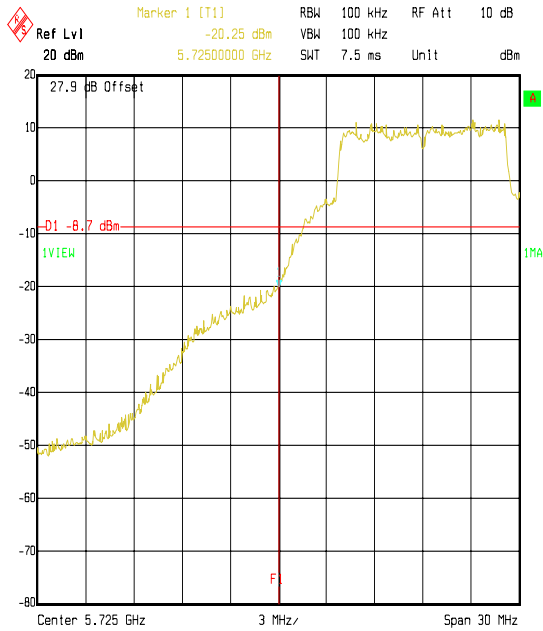
Operations Department

Test Of: Orthogon Systems

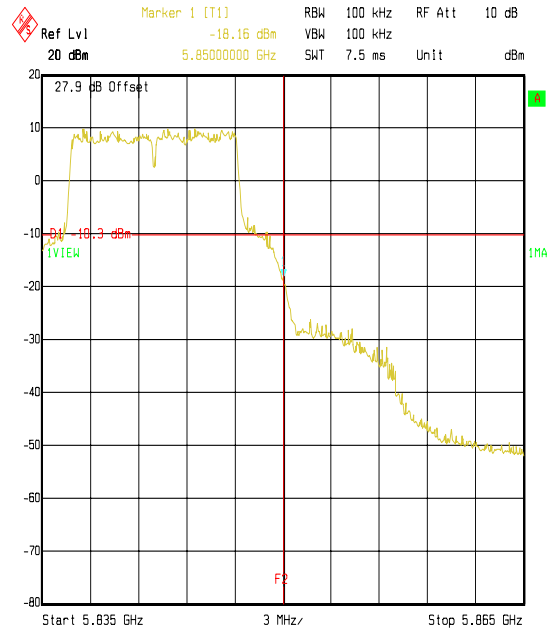
Gemini OS58XX

To: FCC Part 15.247

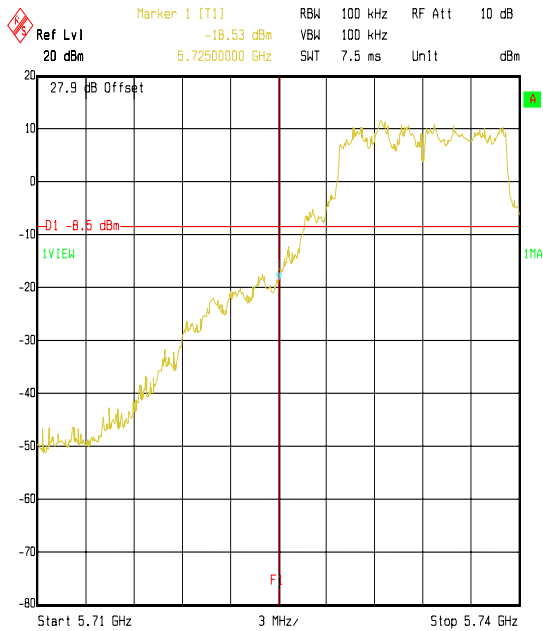
Transmitter Band Edge Conducted Emissions: Section 15.247(c) (Continued)



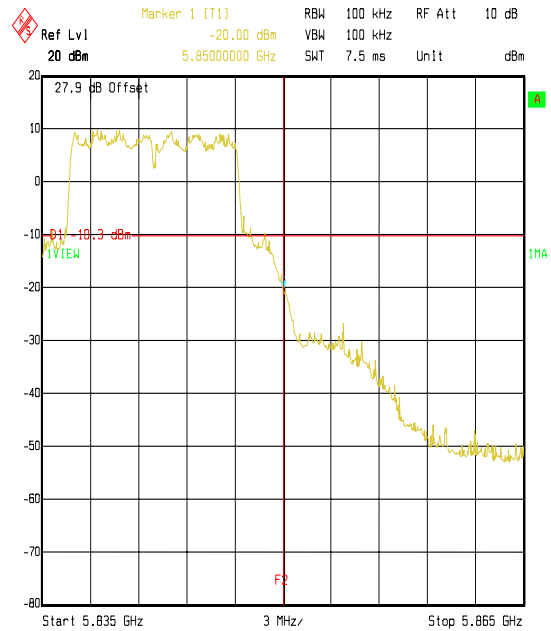
Comment A: LOWER BAND EDGE EMISSIONS BOTTOM CHANNEL
 BPSK MODE HORIZONTAL POLARISATION GPH/45840JD01/CBE07
 Date: 4.FEB.2004 13:50:41



Comment A: UPPER BAND EDGE EMISSIONS TOP CHANNEL
 BPSK MODE HORIZONTAL POLARISATION GPH/45840JD01/CBE14
 Date: 4.FEB.2004 14:17:58



Comment A: LOWER BAND EDGE EMISSIONS BOTTOM CHANNEL
 BPSK MODE VERTICAL POLARISATION GPH/45840JD01/CBE01
 Date: 4.FEB.2004 12:38:19



Comment A: UPPER BAND EDGE EMISSIONS TOP CHANNEL
 BPSK MODE VERTICAL POLARISATION GPH/45840JD01/CBE17
 Date: 4.FEB.2004 14:33:17

Test Of: Orthogon Systems
Gemini OS58XX
To: FCC Part 15.247

Transmitter Band Edge Conducted Emissions: Section 15.247(c) (Continued)

8.6.4. The EUT was configured as for transmitter conducted emissions measurements as described in Section 10 of this report.

8.6.5. Tests were performed to identify the maximum conducted band edge emissions levels.

8.6.6. The limit lines shown in the plots overleaf are set to a level 20 dB below the highest fundamental peak power measured in a 100 kHz Resolution Bandwidth (taken from the corresponding plot) of the channels closest to the lower and upper band edge.

Result: QPSK

Frequency (MHz)	Antenna Polarity (H/V)	Peak Emission Level (dBm)	Peak Emission Level (dBc)	Limit (dBc)	Margin (dB)	Result
5725	Horiz.	-22.2	-32.3	-20.0	12.3	Complied
5850	Horiz.	-19.4	-28.6	-20.0	8.6	Complied
5725	Vert.	-18.9	-28.8	-20.0	8.8	Complied
5850	Vert.	-19.3	-28.6	-20.0	8.6	Complied

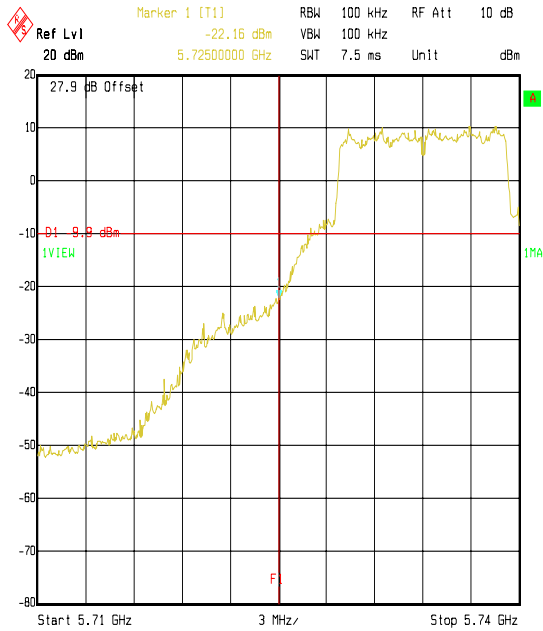
Operations Department

Test Of: Orthogon Systems

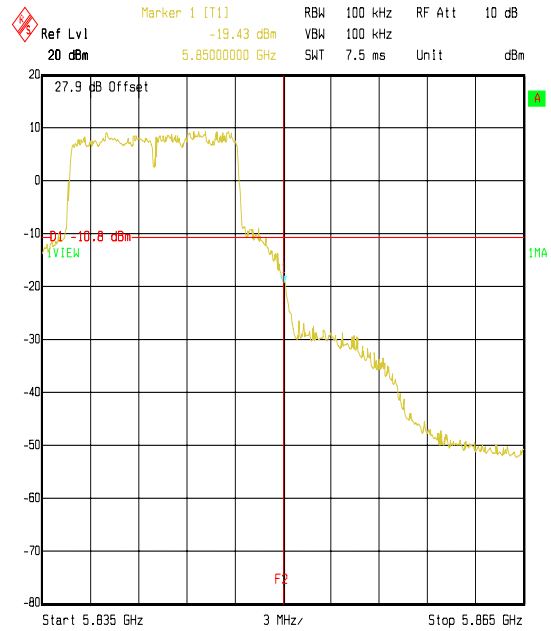
Gemini OS58XX

To: FCC Part 15.247

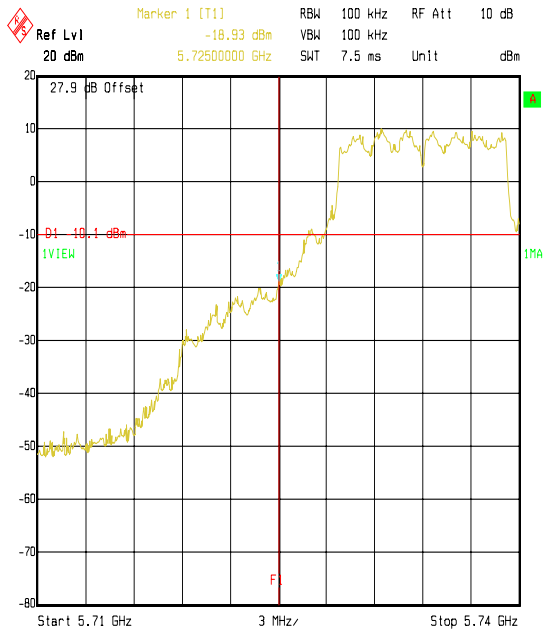
Transmitter Band Edge Conducted Emissions: Section 15.247(c) (Continued)



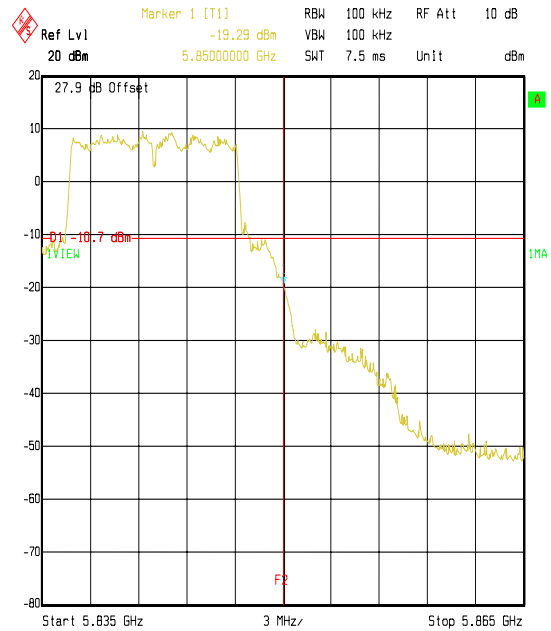
Comment A: LOWER BAND EDGE EMISSIONS BOTTOM CHANNEL
 QPSK MODE HORIZONTAL POLARISATION GPH/45840JD01/CBE08
 Date: 4.FEB.2004 13:53:29



Comment A: UPPER BAND EDGE EMISSIONS TOP CHANNEL
 QPSK MODE HORIZONTAL POLARISATION GPH/45840JD01/CBE13
 Date: 4.FEB.2004 14:14:09



Comment A: LOWER BAND EDGE EMISSIONS BOTTOM CHANNEL
 QPSK MODE VERTICAL POLARISATION GPH/45840JD01/CBE02
 Date: 4.FEB.2004 12:42:47



Comment A: UPPER BAND EDGE EMISSIONS TOP CHANNEL
 QPSK MODE VERTICAL POLARISATION GPH/45840JD01/CBE18
 Date: 4.FEB.2004 14:36:00

Test Of: Orthogon Systems
 Gemini OS58XX
 To: FCC Part 15.247

Transmitter Band Edge Conducted Emissions: Section 15.247(c) (Continued)

8.6.7. The EUT was configured as for transmitter conducted emissions measurements as described in Section 10 of this report.

8.6.8. Tests were performed to identify the maximum conducted band edge emissions levels.

8.6.9. The limit lines shown in the plots overleaf are set to a level 20 dB below the highest fundamental peak power measured in a 100 kHz Resolution Bandwidth (taken from the corresponding plot) of the channels closest to the lower and upper band edge.

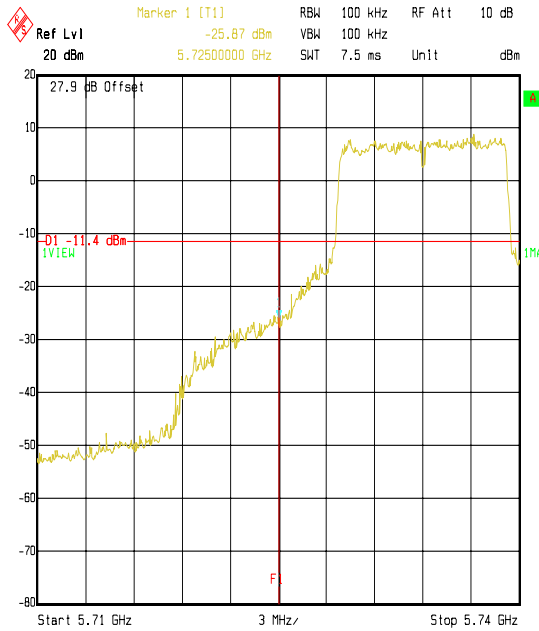
Result: 16QAM

Frequency (MHz)	Antenna Polarity (H/V)	Peak Emission Level (dBm)	Peak Emission Level (dBc)	Limit (dBc)	Margin (dB)	Result
5725	Horiz.	-25.9	-34.5	-20.0	14.5	Complied
5850	Horiz.	-22.8	-31.8	-20.0	11.8	Complied
5725	Vert.	-21.3	-29.6	-20.0	9.6	Complied
5850	Vert.	-24.8	-33.7	-20.0	13.7	Complied

Operations Department

Test Of: Orthogon Systems
 Gemini OS58XX
 To: FCC Part 15.247

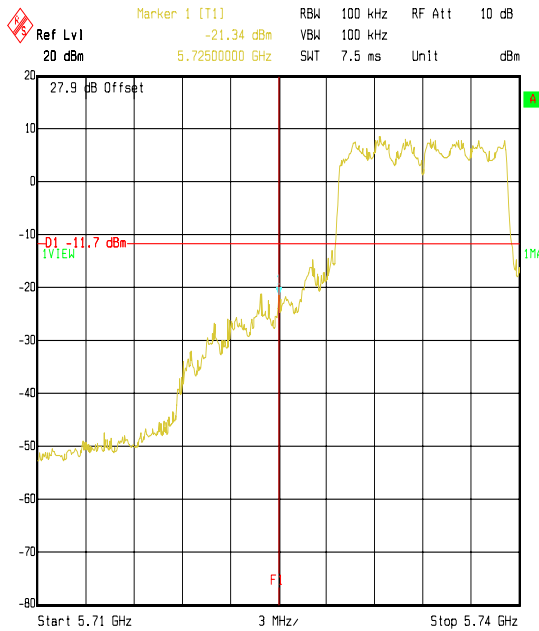
Transmitter Band Edge Conducted Emissions: Section 15.247(c) (Continued)



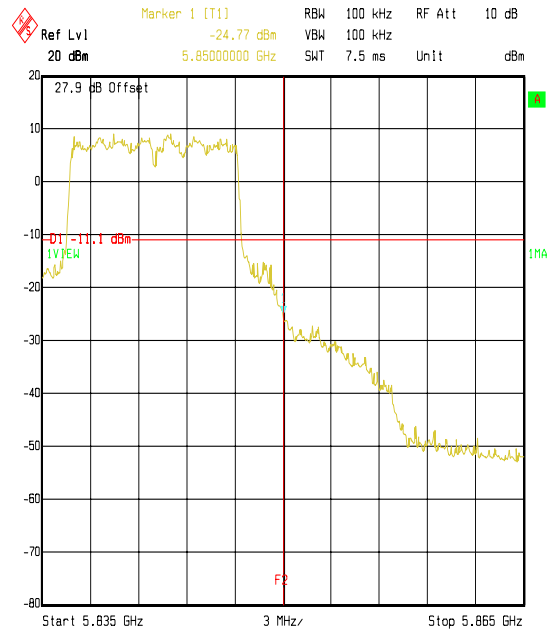
Comment A: LOWER BAND EDGE EMISSIONS BOTTOM CHANNEL
 16QAM MODE HORIZONTAL POLARISATION GPH/45840JD01/CBE09
 Date: 4.FEB.2004 13:56:08



Comment A: UPPER BAND EDGE EMISSIONS TOP CHANNEL
 16QAM MODE HORIZONTAL POLARISATION GPH/45840JD01/CBE12
 Date: 4.FEB.2004 14:11:36



Comment A: LOWER BAND EDGE EMISSIONS BOTTOM CHANNEL
 16QAM MODE VERTICAL POLARISATION GPH/45840JD01/CBE03
 Date: 4.FEB.2004 12:46:41



Comment A: UPPER BAND EDGE EMISSIONS TOP CHANNEL
 16QAM MODE VERTICAL POLARISATION GPH/45840JD01/CBE19
 Date: 4.FEB.2004 14:39:16

Test Of: Orthogon Systems
 Gemini OS58XX
 To: FCC Part 15.247

Transmitter Band Edge Conducted Emissions: Section 15.247(c) (Continued)

8.6.10. The EUT was configured as for transmitter conducted emissions measurements as described in Section 10 of this report.

8.6.11. Tests were performed to identify the maximum conducted band edge emissions levels.

8.6.12. The limit lines shown in the plots overleaf are set to a level 20 dB below the highest fundamental peak power measured in a 100 kHz Resolution Bandwidth (taken from the corresponding plot) of the channels closest to the lower and upper band edge.

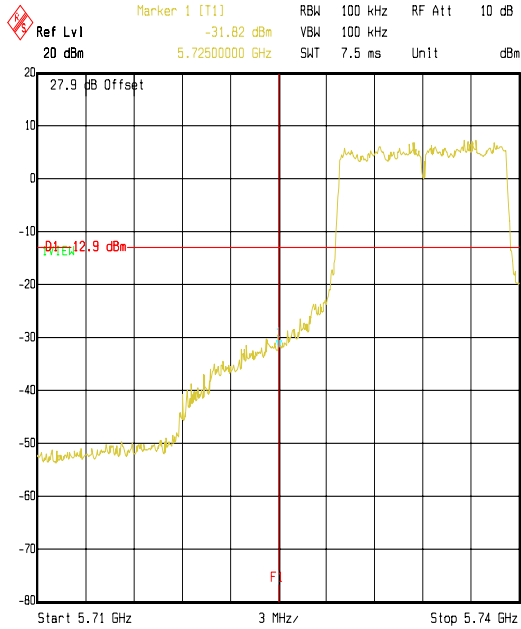
Result: 64QAM

Frequency (MHz)	Antenna Polarity (H/V)	Peak Emission Level (dBm)	Peak Emission Level (dBc)	Limit (dBc)	Margin (dB)	Result
5725	Horiz.	-31.8	-38.9	-20.0	18.9	Complied
5850	Horiz.	-28.9	-36.2	-20.0	16.2	Complied
5725	Vert.	-30.1	-36.8	-20.0	16.8	Complied
5850	Vert.	-31.7	-38.8	-20.0	18.8	Complied

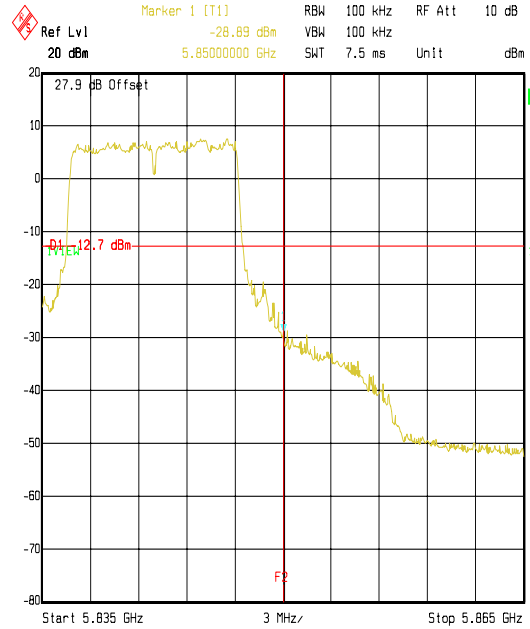
Operations Department

Test Of: Orthogon Systems
Gemini OS58XX
To: FCC Part 15.247

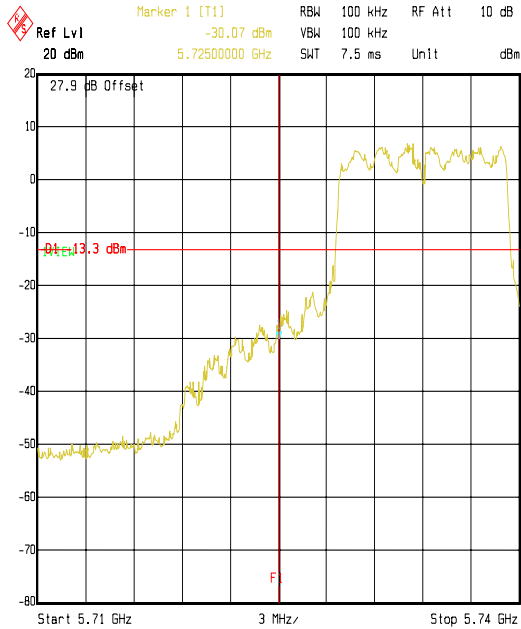
Transmitter Band Edge Conducted Emissions: Section 15.247(c) (Continued)



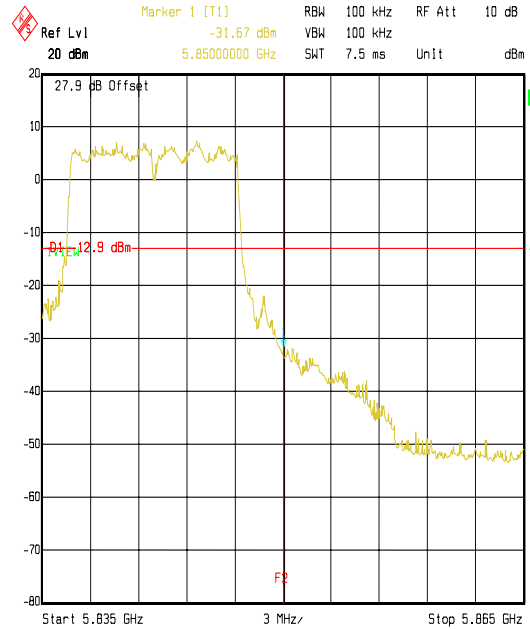
Comment A: LOWER BAND EDGE EMISSIONS BOTTOM CHANNEL
64QAM MODE HORIZONTAL POLARISATION GPH/45840JD01/CBE10
Date: 4.FEB.2004 13:58:18



Comment A: UPPER BAND EDGE EMISSIONS TOP CHANNEL
64QAM MODE HORIZONTAL POLARISATION GPH/45840JD01/CBE11
Date: 4.FEB.2004 14:08:50



Comment A: LOWER BAND EDGE EMISSIONS BOTTOM CHANNEL
64QAM MODE VERTICAL POLARISATION GPH/45840JD01/CBE04
Date: 4.FEB.2004 12:52:09



Comment A: UPPER BAND EDGE EMISSIONS TOP CHANNEL
64QAM MODE VERTICAL POLARISATION GPH/45840JD01/CBE20
Date: 4.FEB.2004 14:41:51

Test Of: Orthogon Systems
Gemini OS58XX
To: FCC Part 15.247

Transmitter Band Edge Conducted Emissions: Section 15.247(c) (Continued)

8.6.13. The EUT was configured as for transmitter conducted emissions measurements as described in Section 10 of this report.

8.6.14. Tests were performed to identify the maximum conducted band edge emissions levels.

8.6.15. The limit lines shown in the plots overleaf are set to a level 20 dB below the highest fundamental peak power measured in a 100 kHz Resolution Bandwidth (taken from the corresponding plot) of the channels closest to the lower and upper band edge.

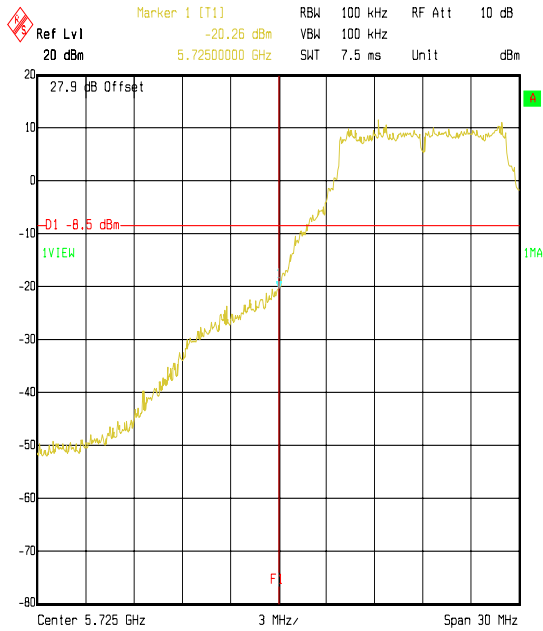
Result: Acquisition

Frequency (MHz)	Antenna Polarity (H/V)	Peak Emission Level (dBm)	Peak Emission Level (dBc)	Limit (dBc)	Margin (dB)	Result
5725	Horiz.	-20.3	-31.8	-20.0	11.8	Complied
5850	Horiz.	-18.8	-28.6	-20.0	8.6	Complied
5725	Vert.	-19.8	-30.8	-20.0	10.8	Complied
5850	Vert.	-19.6	-29.4	-20.0	9.4	Complied

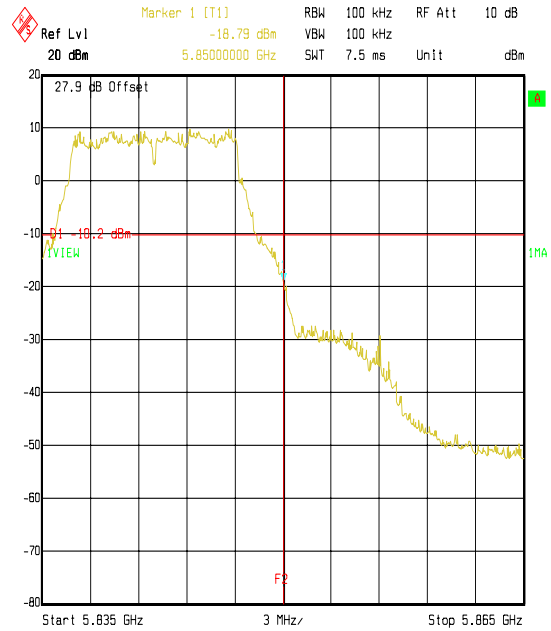
Operations Department

Test Of: Orthogon Systems
 Gemini OS58XX
 To: FCC Part 15.247

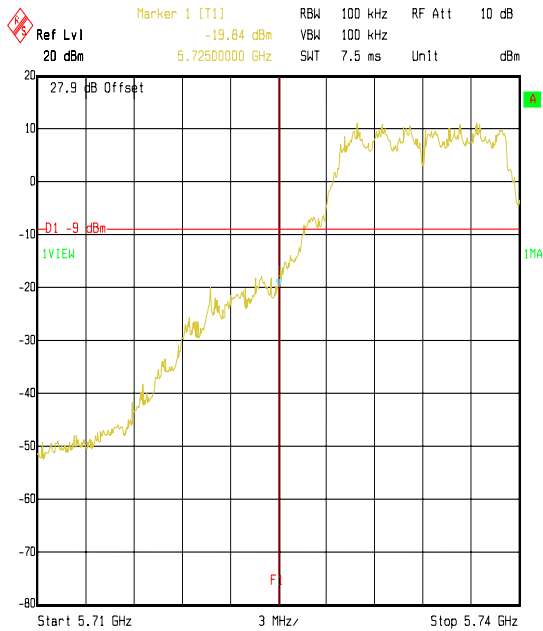
Transmitter Band Edge Conducted Emissions: Section 15.247(c) (Continued)



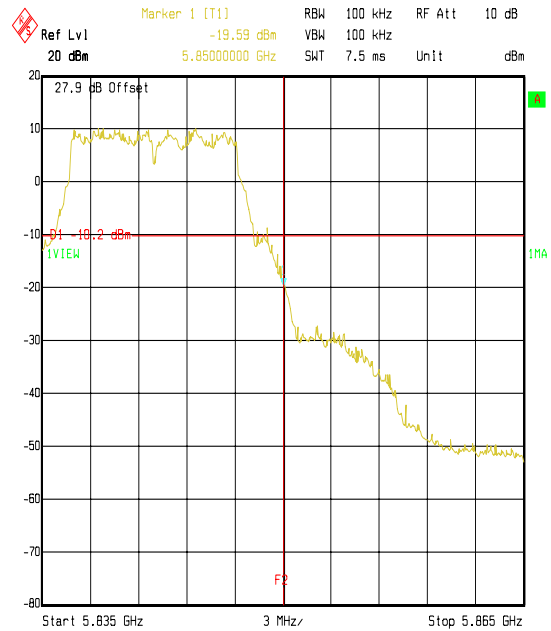
Comment A: LOWER BAND EDGE EMISSIONS BOTTOM CHANNEL
 ACQ MODE HORIZONTAL POLARISATION GPH/45840JD01/CBE06
 Date: 4.FEB.2004 13:46:21



Comment A: UPPER BAND EDGE EMISSIONS TOP CHANNEL
 ACQ MODE HORIZONTAL POLARISATION GPH/45840JD01/CBE15
 Date: 4.FEB.2004 14:20:28



Comment A: LOWER BAND EDGE EMISSIONS BOTTOM CHANNEL
 ACQ MODE VERTICAL POLARISATION GPH/45840JD01/CBE05
 Date: 4.FEB.2004 12:54:40



Comment A: UPPER BAND EDGE EMISSIONS TOP CHANNEL
 ACQ MODE VERTICAL POLARISATION GPH/45840JD01/CBE16
 Date: 4.FEB.2004 14:29:54

Test Of: Orthogon Systems
 Gemini OS58XX
 To: FCC Part 15.247

9. Test Results – Reduced Power

9.1. Transmitter Maximum Peak Output Power: Section 15.247(b)(3)

9.1.1. The EUT was configured as for transmitter peak output power measurements as described in Section 10 of this report.

9.1.2. Tests were performed to identify the transmitter maximum peak output power of the EUT.

Results: BPSK

Channel	Antenna Polarity (H/V)	Peak Output Power (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	Horiz	25.2	27.0	1.8	Complied
Bottom	Vert.	24.2	27.0	2.8	Complied
Top	Horiz.	25.1	27.0	1.9	Complied
Top	Vert.	24.6	27.0	2.4	Complied

Note: Limit reduced by 3 dB as co-existence vertical and horizontal antenna may transmit simultaneously.

Note: The Peak Output Power was measured with the AC supply voltage to the EUT varied between 85% and 115% of the nominal value of 110 Volts i.e. 93.5 and 126.5 Volts. The variation of the input AC supply voltage to the EUT had no effect on the Peak Output Power and results were identical for all three test voltages. Consequently the results given in the above table are valid for all three test voltages (93.5 Volts, 110 Volts and 126.5 Volts).

Test Of: Orthogon Systems
 Gemini OS58XX
 To: FCC Part 15.247

Transmitter Maximum Peak Output Power: Section 15.247(b)(3) (Continued)

9.1.3. The EUT was configured as for transmitter peak output power measurements as described in Section 10 of this report.

9.1.4. Tests were performed to identify the transmitter maximum peak output power of the EUT.

Results: QPSK

Channel	Antenna Polarity (H/V)	Peak Output Power (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	Horiz	25.1	27.0	1.9	Complied
Bottom	Vert.	24.2	27.0	2.8	Complied
Top	Horiz.	24.9	27.0	2.1	Complied
Top	Vert.	24.2	27.0	2.8	Complied

Note: Limit reduced by 3 dB as co-existence vertical and horizontal antenna may transmit simultaneously.

Note: The Peak Output Power was measured with the AC supply voltage to the EUT varied between 85% and 115% of the nominal value of 110 Volts i.e. 93.5 and 126.5 Volts. The variation of the input AC supply voltage to the EUT had no effect on the Peak Output Power and results were identical for all three test voltages. Consequently the results given in the above table are valid for all three test voltages (93.5 Volts, 110 Volts and 126.5 Volts).

Test Of: Orthogon Systems
Gemini OS58XX
To: FCC Part 15.247

Transmitter Maximum Peak Output Power: Section 15.247(b)(3) (Continued)

9.1.5. The EUT was configured as for transmitter peak output power measurements as described in Section 10 of this report.

9.1.6. Tests were performed to identify the transmitter maximum peak output power of the EUT.

Results: 16QAM

Channel	Antenna Polarity (H/V)	Peak Output Power (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	Horiz	25.3	27.0	1.7	Complied
Bottom	Vert.	24.2	27.0	2.8	Complied
Top	Horiz.	25.0	27.0	2.0	Complied
Top	Vert.	24.3	27.0	2.7	Complied

Note: Limit reduced by 3 dB as co-existence vertical and horizontal antenna may transmit simultaneously.

Note: The Peak Output Power was measured with the AC supply voltage to the EUT varied between 85% and 115% of the nominal value of 110 Volts i.e. 93.5 and 126.5 Volts. The variation of the input AC supply voltage to the EUT had no effect on the Peak Output Power and results were identical for all three test voltages. Consequently the results given in the above table are valid for all three test voltages (93.5 Volts, 110 Volts and 126.5 Volts).

Test Of: Orthogon Systems
 Gemini OS58XX
 To: FCC Part 15.247

Transmitter Maximum Peak Output Power: Section 15.247(b)(3) (Continued)

9.1.7. The EUT was configured as for transmitter peak output power measurements as described in Section 10 of this report.

9.1.8. Tests were performed to identify the transmitter maximum peak output power of the EUT.

Results: 64QAM

Channel	Antenna Polarity (H/V)	Peak Output Power (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	Horiz	25.2	27.0	1.8	Complied
Bottom	Vert.	24.2	27.0	2.8	Complied
Top	Horiz.	25.0	27.0	2.0	Complied
Top	Vert.	24.2	27.0	2.8	Complied

Note: Limit reduced by 3 dB as co-existence vertical and horizontal antenna may transmit simultaneously.

Note: The Peak Output Power was measured with the AC supply voltage to the EUT varied between 85% and 115% of the nominal value of 110 Volts i.e. 93.5 and 126.5 Volts. The variation of the input AC supply voltage to the EUT had no effect on the Peak Output Power and results were identical for all three test voltages. Consequently the results given in the above table are valid for all three test voltages (93.5 Volts, 110 Volts and 126.5 Volts).

Test Of: Orthogon Systems
Gemini OS58XX
To: FCC Part 15.247

Transmitter Maximum Peak Output Power: Section 15.247(b)(3) (Continued)

9.1.9. The EUT was configured as for transmitter peak output power measurements as described in Section 10 of this report.

9.1.10. Tests were performed to identify the transmitter maximum peak output power of the EUT.

Results: Acquisition

Channel	Antenna Polarity (H/V)	Peak Output Power (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	Horiz	24.9	27.0	2.1	Complied
Bottom	Vert.	24.2	27.0	2.8	Complied
Top	Horiz.	24.8	27.0	2.2	Complied
Top	Vert.	24.2	27.0	2.8	Complied

Note: Limit reduced by 3 dB as co-existence vertical and horizontal antenna may transmit simultaneously.

Note: The Peak Output Power was measured with the AC supply voltage to the EUT varied between 85% and 115% of the nominal value of 110 Volts i.e. 93.5 and 126.5 Volts. The variation of the input AC supply voltage to the EUT had no effect on the Peak Output Power and results were identical for all three test voltages. Consequently the results given in the above table are valid for all three test voltages (93.5 Volts, 110 Volts and 126.5 Volts).

Test Of: Orthogon Systems
Gemini OS58XX
To: FCC Part 15.247

9.2. Transmitter Band Edge Conducted Emissions: Section 15.247(c)

9.2.1. The EUT was configured as for transmitter conducted emissions measurements as described in Section 10 of this report.

9.2.2. Tests were performed to identify the maximum conducted band edge emissions levels.

9.2.3. The limit lines shown in the plots overleaf are set to a level 20 dB below the highest fundamental peak power measured in a 100 kHz Resolution Bandwidth (taken from the corresponding plot) of the channels closest to the lower and upper band edge.

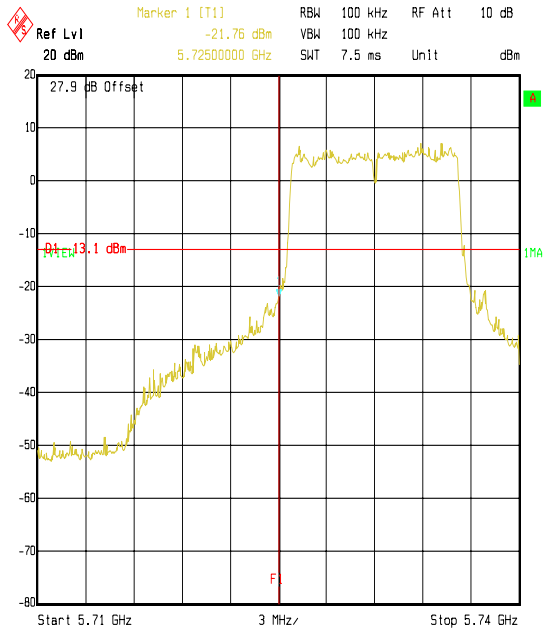
Result: BPSK

Frequency (MHz)	Antenna Polarity (H/V)	Peak Emission Level (dBm)	Peak Emission Level (dBc)	Limit (dBc)	Margin (dB)	Result
5725	Horiz.	-21.8	-28.7	-20.0	8.7	Complied
5850	Horiz.	-23.3	-28.6	-20.0	8.6	Complied
5725	Vert.	-20.9	-28.2	-20.0	8.2	Complied
5850	Vert.	-26.0	-30.9	-20.0	10.9	Complied

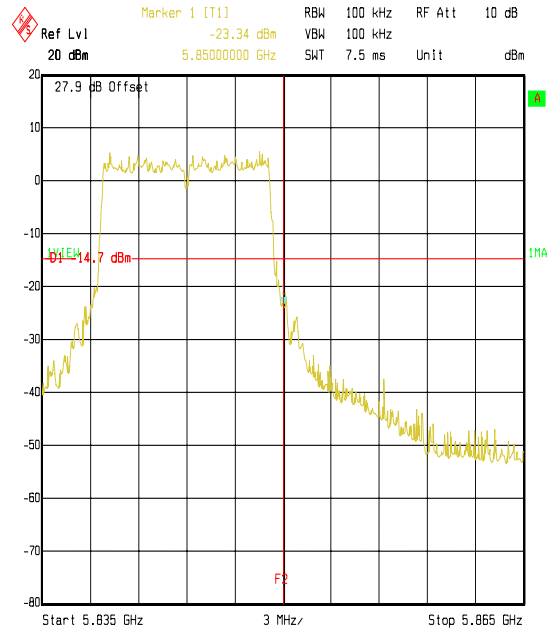
Operations Department

Test Of: Orthogon Systems
 Gemini OS58XX
 To: FCC Part 15.247

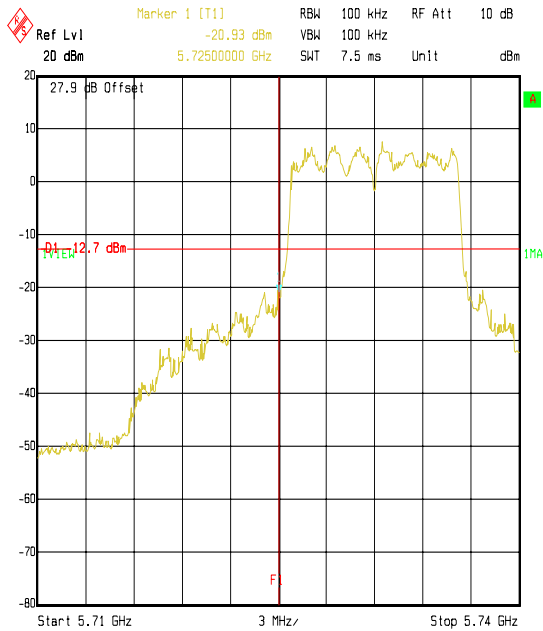
Transmitter Band Edge Conducted Emissions: Section 15.247(c) (Continued)



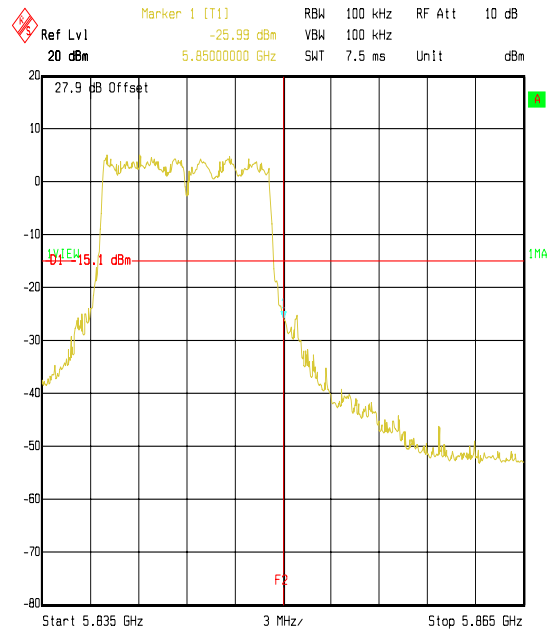
Comment A: LOWER BAND EDGE EMISSIONS REDUCED POWER BOTTOM CHANNEL
 BPSK MODE HORIZONTAL POLARISATION GPH/45840JD01/CBE13RP
 Date: 4.FEB.2004 16:13:24



Comment A: UPPER BAND EDGE EMISSIONS REDUCED POWER TOP CHANNEL
 BPSK MODE HORIZONTAL POLARISATION GPH/45840JD01/CBE07RP
 Date: 4.FEB.2004 15:34:54



Comment A: LOWER BAND EDGE EMISSIONS REDUCED POWER BOTTOM CHANNEL
 BPSK MODE VERTICAL POLARISATION GPH/45840JD01/CBE20RP
 Date: 4.FEB.2004 16:32:32



Comment A: UPPER BAND EDGE EMISSIONS REDUCED POWER TOP CHANNEL
 BPSK MODE VERTICAL POLARISATION GPH/45840JD01/CBE01RP
 Date: 4.FEB.2004 15:03:11

Test Of: Orthogon Systems
 Gemini OS58XX
 To: FCC Part 15.247

Transmitter Band Edge Conducted Emissions: Section 15.247(c) (Continued)

9.2.4. The EUT was configured as for transmitter conducted emissions measurements as described in Section 10 of this report.

9.2.5. Tests were performed to identify the maximum conducted band edge emissions levels.

9.2.6. The limit lines shown in the plots overleaf are set to a level 20 dB below the highest fundamental peak power measured in a 100 kHz Resolution Bandwidth (taken from the corresponding plot) of the channels closest to the lower and upper band edge.

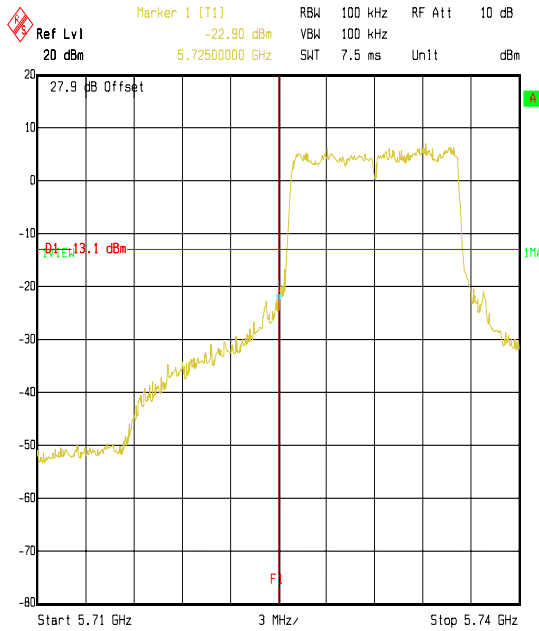
Result: QPSK

Frequency (MHz)	Antenna Polarity (H/V)	Peak Emission Level (dBm)	Peak Emission Level (dBc)	Limit (dBc)	Margin (dB)	Result
5725	Horiz.	-22.9	-29.8	-20.0	9.8	Complied
5850	Horiz.	-24.7	-29.3	-20.0	9.3	Complied
5725	Vert.	-20.9	-28.6	-20.0	8.6	Complied
5850	Vert.	-26.2	-31.1	-20.0	11.1	Complied

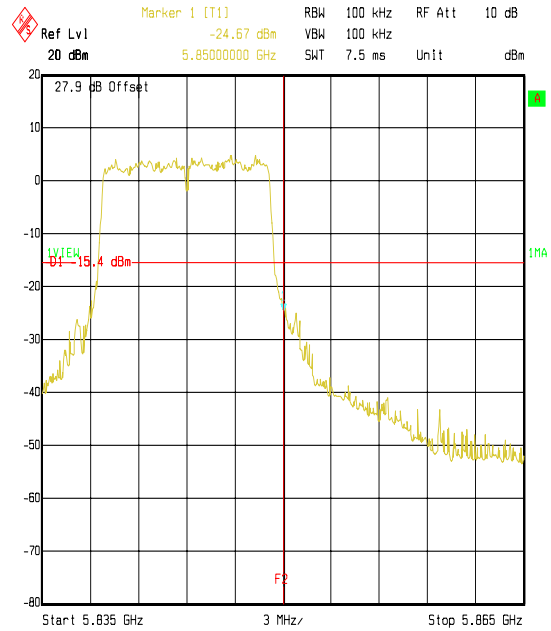
Operations Department

Test Of: Orthogon Systems
 Gemini OS58XX
 To: FCC Part 15.247

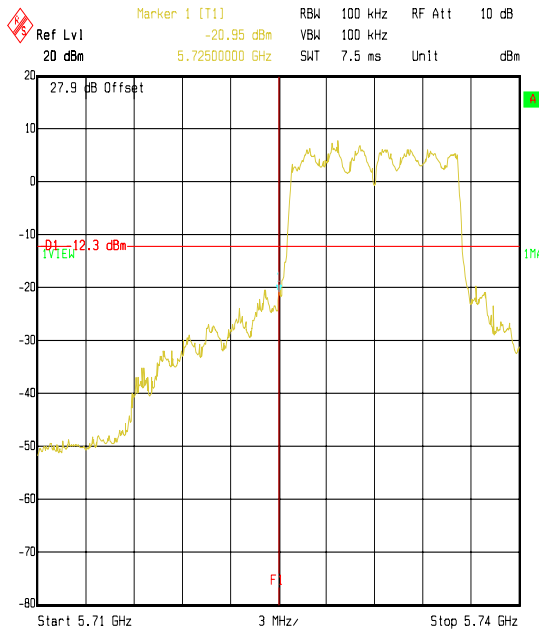
Transmitter Band Edge Conducted Emissions: Section 15.247(c) (Continued)



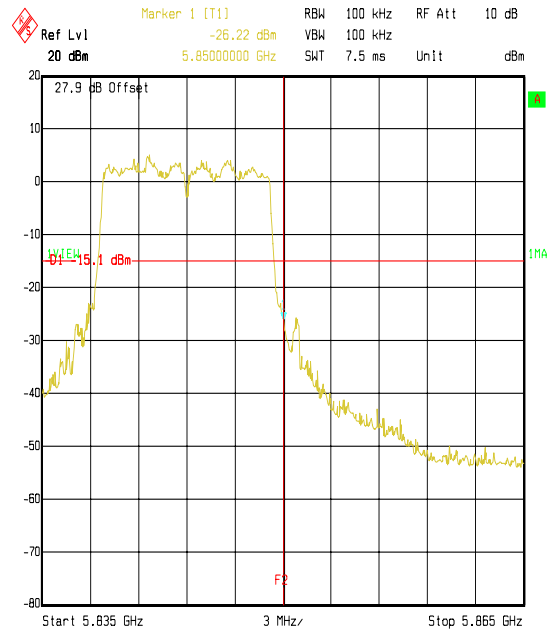
Comment A: LOWER BAND EDGE EMISSIONS REDUCED POWER BOTTOM CHANNEL
 QPSK MODE HORIZONTAL POLARISATION GPH/45840JDD1/CBE14RP
 Date: 4.FEB.2004 16:15:34



Comment A: UPPER BAND EDGE EMISSIONS REDUCED POWER TOP CHANNEL
 QPSK MODE HORIZONTAL POLARISATION GPH/45840JDD1/CBE08RP
 Date: 4.FEB.2004 15:37:13



Comment A: LOWER BAND EDGE EMISSIONS REDUCED POWER BOTTOM CHANNEL
 QPSK MODE VERTICAL POLARISATION GPH/45840JDD1/CBE19RP
 Date: 4.FEB.2004 16:30:03



Comment A: UPPER BAND EDGE EMISSIONS REDUCED POWER TOP CHANNEL
 QPSK MODE VERTICAL POLARISATION GPH/45840JDD1/CBE02RP
 Date: 4.FEB.2004 15:05:34

Test Of: Orthogon Systems
 Gemini OS58XX
 To: FCC Part 15.247

Transmitter Band Edge Conducted Emissions: Section 15.247(c) (Continued)

9.2.7. The EUT was configured as for transmitter conducted emissions measurements as described in Section 10 of this report.

9.2.8. Tests were performed to identify the maximum conducted band edge emissions levels.

9.2.9. The limit lines shown in the plots overleaf are set to a level 20 dB below the highest fundamental peak power measured in a 100 kHz Resolution Bandwidth (taken from the corresponding plot) of the channels closest to the lower and upper band edge.

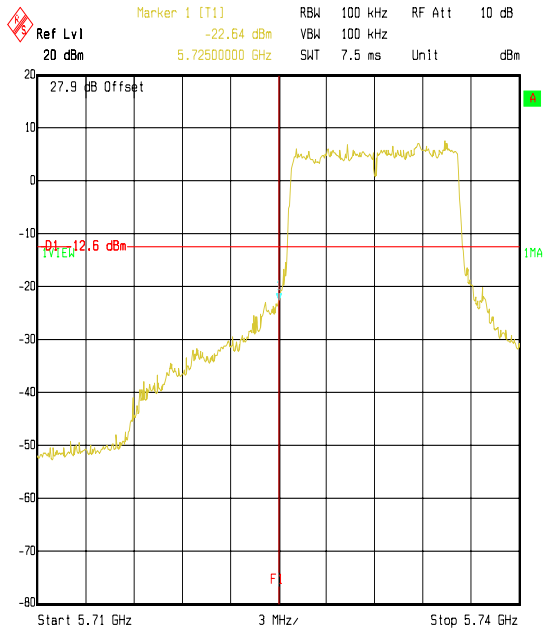
Result: 16QAM

Frequency (MHz)	Antenna Polarity (H/V)	Peak Emission Level (dBm)	Peak Emission Level (dBc)	Limit (dBc)	Margin (dB)	Result
5725	Horiz.	-22.6	-30.0	-20.0	10.0	Complied
5850	Horiz.	-24.3	-29.2	-20.0	9.2	Complied
5725	Vert.	-23.6	-31.1	-20.0	11.1	Complied
5850	Vert.	-26.0	-30.9	-20.0	10.9	Complied

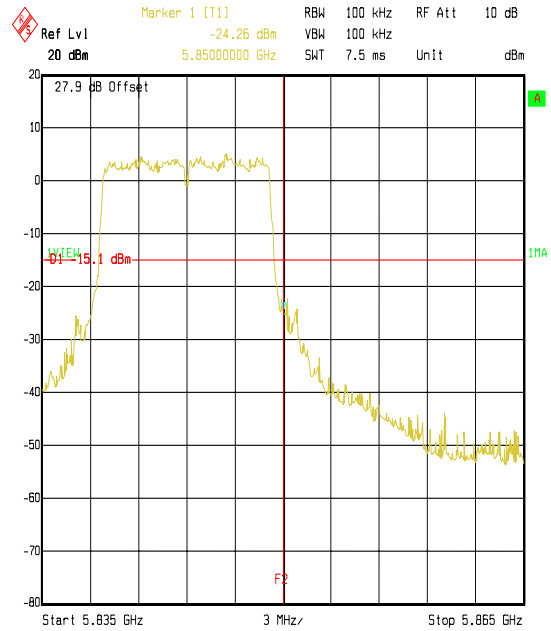
Operations Department

Test Of: Orthogon Systems
Gemini OS58XX
To: FCC Part 15.247

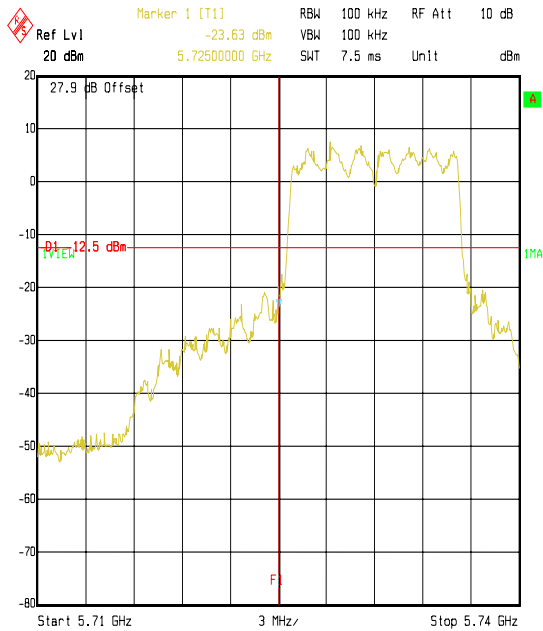
Transmitter Band Edge Conducted Emissions: Section 15.247(c) (Continued)



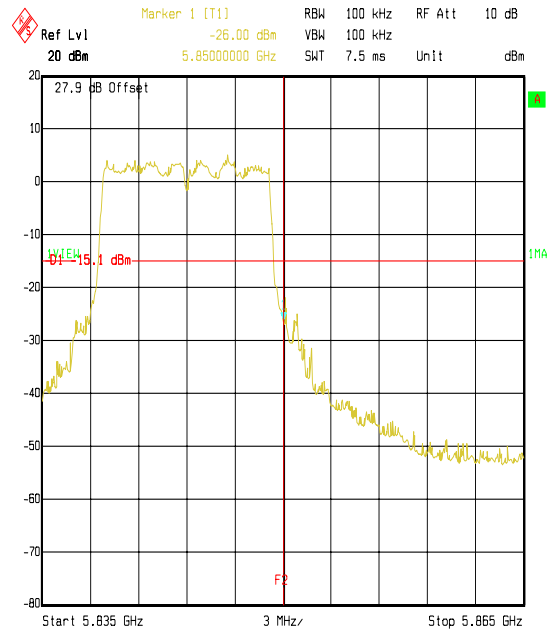
Comment A: LOWER BAND EDGE EMISSIONS REDUCED POWER BOTTOM CHANNEL
16QAM MODE HORIZONTAL POLARISATION GPH/45840JD01/CBE15RP
Date: 4.FEB.2004 16:18:42



Comment A: UPPER BAND EDGE EMISSIONS REDUCED POWER TOP CHANNEL
16QAM MODE HORIZONTAL POLARISATION GPH/45840JD01/CBE09RP
Date: 4.FEB.2004 15:39:22



Comment A: LOWER BAND EDGE EMISSIONS REDUCED POWER BOTTOM CHANNEL
16QAM MODE VERTICAL POLARISATION GPH/45840JD01/CBE18RP
Date: 4.FEB.2004 16:26:28



Comment A: UPPER BAND EDGE EMISSIONS REDUCED POWER TOP CHANNEL
16QAM MODE VERTICAL POLARISATION GPH/45840JD01/CBE03RP
Date: 4.FEB.2004 15:09:11

Test Of: Orthogon Systems
Gemini OS58XX
To: FCC Part 15.247

Transmitter Band Edge Conducted Emissions: Section 15.247(c) (Continued)

9.2.10. The EUT was configured as for transmitter conducted emissions measurements as described in Section 10 of this report.

9.2.11. Tests were performed to identify the maximum conducted band edge emissions levels.

9.2.12. The limit lines shown in the plots overleaf are set to a level 20 dB below the highest fundamental peak power measured in a 100 kHz Resolution Bandwidth (taken from the corresponding plot) of the channels closest to the lower and upper band edge.

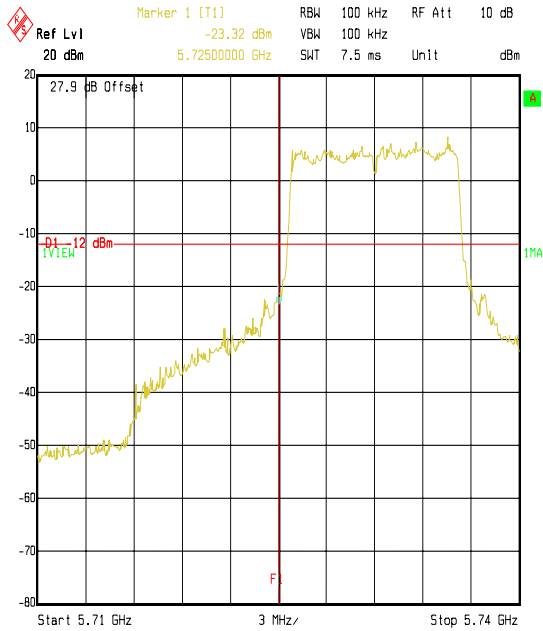
Result: 64QAM

Frequency (MHz)	Antenna Polarity (H/V)	Peak Emission Level (dBm)	Peak Emission Level (dBc)	Limit (dBc)	Margin (dB)	Result
5725	Horiz.	-23.3	-31.3	-20.0	11.3	Complied
5850	Horiz.	-25.4	-30.0	-20.0	10.0	Complied
5725	Vert.	-22.6	-29.8	-20.0	9.8	Complied
5850	Vert.	-25.3	-29.8	-20.0	9.8	Complied

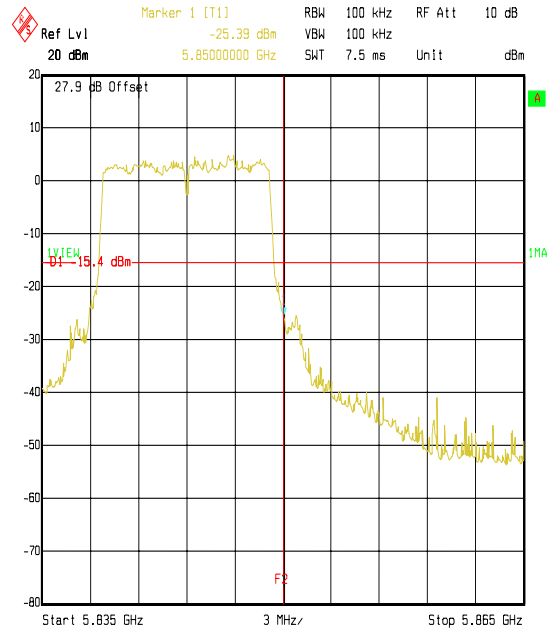
Operations Department

Test Of: Orthogon Systems
 Gemini OS58XX
 To: FCC Part 15.247

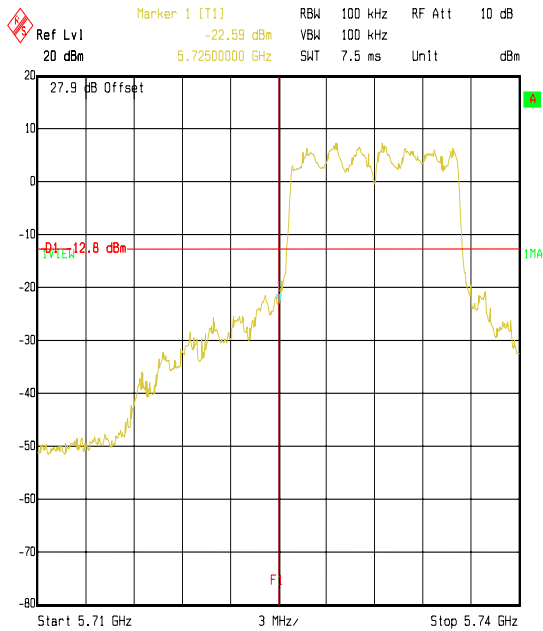
Transmitter Band Edge Conducted Emissions: Section 15.247(c) (Continued)



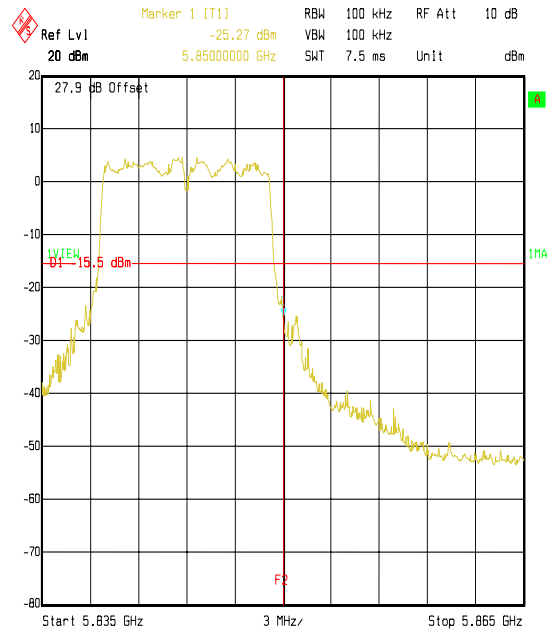
Comment A: LOWER BAND EDGE EMISSIONS REDUCED POWER BOTTOM CHANNEL
 64QAM MODE HORIZONTAL POLARISATION GPH/45840JD01/CBE16RP
 Date: 4.FEB.2004 16:21:06



Comment A: UPPER BAND EDGE EMISSIONS REDUCED POWER TOP CHANNEL
 64QAM MODE HORIZONTAL POLARISATION GPH/45840JD01/CBE10RP
 Date: 4.FEB.2004 15:41:04



Comment A: LOWER BAND EDGE EMISSIONS REDUCED POWER BOTTOM CHANNEL
 64QAM MODE VERTICAL POLARISATION GPH/45840JD01/CBE17RP
 Date: 4.FEB.2004 16:24:38



Comment A: UPPER BAND EDGE EMISSIONS REDUCED POWER TOP CHANNEL
 64QAM MODE VERTICAL POLARISATION GPH/45840JD01/CBE04RP
 Date: 4.FEB.2004 15:11:58

Test Of: Orthogon Systems
 Gemini OS58XX
 To: FCC Part 15.247

Transmitter Band Edge Conducted Emissions: Section 15.247(c) (Continued)

9.2.13. The EUT was configured as for transmitter conducted emissions measurements as described in Section 10 of this report.

9.2.14. Tests were performed to identify the maximum conducted band edge emissions levels.

9.2.15. The limit lines shown in the plots overleaf are set to a level 20 dB below the highest fundamental peak power measured in a 100 kHz Resolution Bandwidth of the full power channels operating in Acquisition Mode (in the corresponding antenna polarisation) closest to the lower and upper band edge.

Result: Acquisition

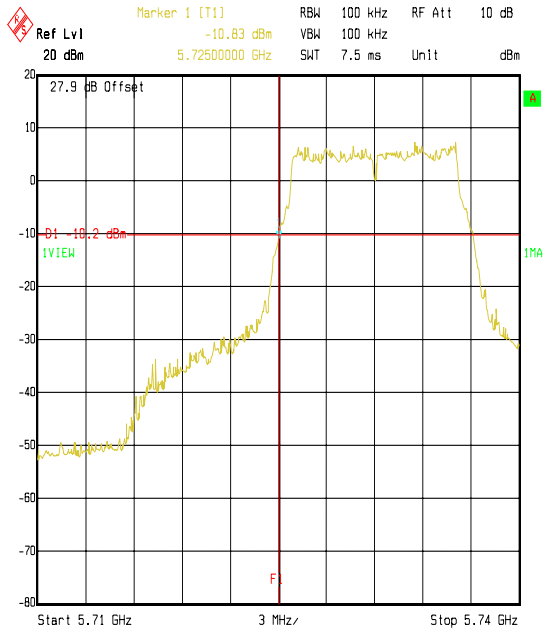
Frequency (MHz)	Antenna Polarity (H/V)	Peak Emission Level (dBm)	Peak Emission Level (dBc)	Limit (dBc)	Margin (dB)	Result
5725	Horiz.	-10.8	-22.3	-20.0*	2.3	Complied
5850	Horiz.	-12.3	-22.1	-20.0*	2.1	Complied
5725	Vert.	-10.9	-21.9	-20.0*	1.9	Complied
5850	Vert.	-13.6	-23.4	-20.0*	3.4	Complied

Note: The -20 dBc limit was derived from the highest in band emission of the full power channels operating in Acquisition mode closest to the band edges and not the highest in band emission of the reduced power channels shown in the following graphs.

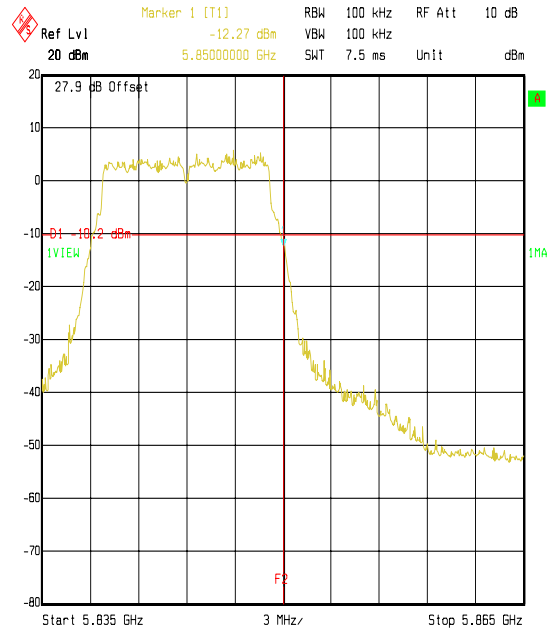
Operations Department

Test Of: Orthogon Systems
 Gemini OS58XX
 To: FCC Part 15.247

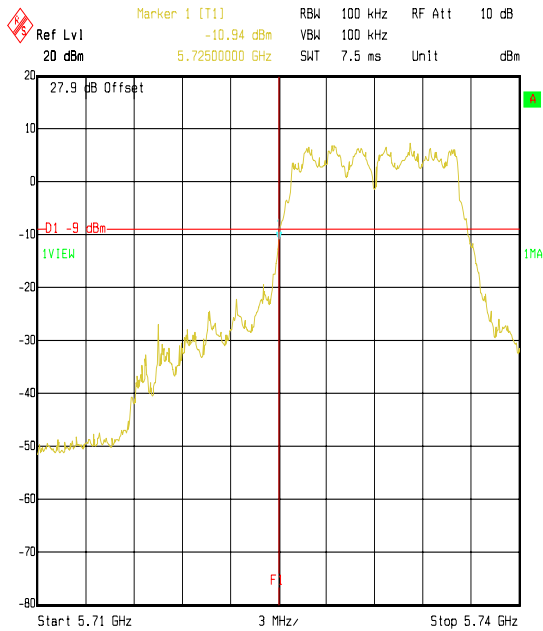
Transmitter Band Edge Conducted Emissions: Section 15.247(c) (Continued)



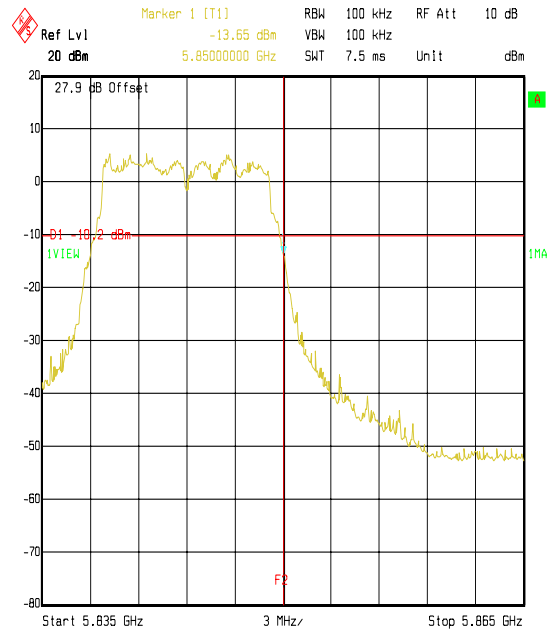
Comment A: LOWER BAND EDGE EMISSIONS REDUCED POWER BOTTOM CHANNEL
 ACQ MODE HORIZONTAL POLARISATION GPH/45840JD01/CBE12RP
 Date: 4.FEB.2004 16:08:37



Comment A: UPPER BAND EDGE EMISSIONS REDUCED POWER TOP CHANNEL
 ACQ MODE HORIZONTAL POLARISATION GPH/45840JD01/CBE0GRP
 Date: 4.FEB.2004 15:31:18



Comment A: LOWER BAND EDGE EMISSIONS REDUCED POWER BOTTOM CHANNEL
 ACQ MODE VERTICAL POLARISATION GPH/45840JD01/CBE11RP
 Date: 4.FEB.2004 16:04:49



Comment A: UPPER BAND EDGE EMISSIONS REDUCED POWER TOP CHANNEL
 ACQ MODE VERTICAL POLARISATION GPH/45840JD01/CBE0SRP
 Date: 4.FEB.2004 15:22:18

Note: Plot GPH/45840JD01/CBE12RP above incorrectly shows the -20 dBc limit line as -10.2 dBm, it should have been -8.5 dBm. It is confirmed that the positioning of the limit line has no bearing on the measurement and the level recorded at the band edge is correct.

Test Of: Orthogon Systems
 Gemini OS58XX
 To: FCC Part 15.247

10. Measurement Methods

10.1. AC Mains Conducted Emissions

AC mains conducted emissions measurements were performed in accordance with the standard, against appropriate limits for each detector function.

The test was performed in a shielded enclosure with the equipment arranged as detailed in the standard on a wooden bench using the floor of the screened enclosure as the ground reference plane and with the EUT powered via a 115V 60 Hz AC mains supply.

Initial measurements in the form of swept scans covering the entire measurement band were performed in order to identify frequencies on which the EUT was generating interference. In order to minimise the time taken for these swept measurements, a Peak detector was used in conjunction with the appropriate detector IF measuring bandwidths (see table below). Repetitive scans were performed to allow for emissions with low repetition rates, and the duty cycle of the EUT. The test configuration was the same for the initial scans as for the final measurements.

Following the initial scans, a graph was produced giving an overview of the emissions from the EUT plotted against the appropriate specification limit. A tolerance line was set 6 dB below the specification limit and levels above the tolerance line were re-tested (at individual frequencies) using the appropriate detector function.

The test equipment settings for conducted emissions measurements were as follows:

Receiver Function	Initial Scan	Final Measurements
Detector Type:	Peak	Quasi-Peak (CISPR)*
Mode:	Max Hold	Not applicable
Bandwidth:	9 kHz	9 kHz
Amplitude Range:	100 dB	100 dB
Measurement Time:	Not applicable	> 1 s
Observation Time:	Not applicable	> 15 s
Step Size:	Continuous sweep	Not applicable
Sweep Time:	Coupled	Not applicable

* In some instances an Average detector function may also have been used.

Test Of: Orthogon Systems

Gemini OS58XX

To: FCC Part 15.247

10.2. Conducted Antenna Port Emissions

Conducted antenna port emissions measurements were performed using a 100 kHz bandwidth in accordance with the standard against the appropriate limits.

Prior to testing being performed a suitable RF attenuator and cable were calibrated for the required frequency range. For each measurement range the calibrated level of the attenuator and cable were entered as an offset into the spectrum analyser to compensate for the losses in the measurement set up.

Initial measurements covering the entire measurement band in the form of swept scans were performed in order to identify frequencies on which the EUT was generating interference. This determined the frequencies on which final measurements were necessary. To make the final measurements a peak detector was used in conjunction with the appropriate detector IF measuring bandwidth.

Repetitive scans were performed to allow for emissions with low repetition rates.

Scans were performed to the upper frequency limits as stated in 15.33(a)(1)

Final measurements were performed on the worst-case configuration as described in Part 15.31(i) for conducted emissions.

Test Of: Orthogon Systems

Gemini OS58XX

To: FCC Part 15.247

10.3. Minimum 6 dB Bandwidth

The EUT and spectrum analyser were configured as for conducted antenna port emissions measurements.

Prior to testing being performed a suitable RF attenuator and cable were calibrated for the required frequencies. For each frequency the calibrated level of the attenuator and cable were entered as an offset into the spectrum analyser to compensate for the losses in the measurement set up.

To determine the occupied bandwidth, a resolution bandwidth of 100 kHz was used, which is approximates to 1% of the 6 dB bandwidth. A video bandwidth of 300 kHz was used. The analyser was set to a span of greater than twice the 6 dB bandwidth and for a maximum hold scan to capture the profile of the signal. The peak level was then determined, and a reference established 6 dB below the peak level. The bandwidth was determined at the points where the 6 dB reference crossed the profile of the emission.

Test Of: Orthogon Systems

Gemini OS58XX

To: FCC Part 15.247

10.4. Spectral Power Density

The EUT and spectrum analyser were configured as for conducted antenna port emissions measurements.

Prior to testing being performed a suitable RF attenuator and cable were calibrated for the required frequencies. For each frequency the calibrated level of the attenuator and cable were entered as an offset into the spectrum analyser to compensate for the losses in the measurement set up.

Prior to the measurement being taken the spectrum analyser was tuned to the fundamental frequency of the EUT.

A resolution bandwidth of 3 kHz was selected and the analyser was set to a span of greater than twice the 6 dB bandwidth. The trace was max held and a reading was taken at the peak point of the trace.

Test Of: Orthogon Systems

Gemini OS58XX

To: FCC Part 15.247

10.5. Peak Output Power

The EUT was configured as for conducted antenna port emissions measurements.

Prior to testing being performed a suitable RF attenuator and cable were calibrated for the required frequencies. For each frequency to be measured, the calibrated level of the attenuator and cable were entered as an offset into the wideband peak power meter to compensate for the measurement set up.

To determine the transmitter output power, the EUT was operated at maximum power and a result was obtained using a wideband peak power meter.

Test Of: Orthogon Systems
Gemini OS58XX
To: FCC Part 15.247

10.6. Band Edge Compliance of RF Conducted Emissions

The EUT and spectrum analyser were configured as for conducted antenna port emissions measurements.

Prior to testing being performed a suitable RF attenuator and cable were calibrated for the required frequencies. For each frequency the calibrated level of the attenuator and cable were entered as an offset into the spectrum analyser to compensate for the losses in the measurement set up.

To determine band edge compliance, the analyser resolution bandwidth and video bandwidth were set to 100 kHz. The sweep was set to auto and the detector to peak. The span of the analyser was set wide enough to show the entire peak of the transmission. The trace was set to max hold and a trace was produced.

A plot of the upper band edge of the allocated frequency band was produced. A marker was set to the level of the highest in band emission and then a limit line was set to a level 20 dB below this. The marker was then placed on the emission at the band edge. The level of the band edge emission was then compared with the -20 dBc limit. The above procedure was then repeated for the lower band edge.

This procedure was repeated for all tests on the channels operating at full power closest to the band edges and the channels operating at reduced power in modulation modes except for tests of band edge compliance of the channels operating closest to the band edges at reduced power in Acquisition Mode. In this mode of operation the limit was set to 20 dB below the highest in band emission of the full power channels operating in Acquisition Mode in the corresponding antenna polarisation closest to the band edges.

Test Of: Orthogon Systems
 Gemini OS58XX
 To: FCC Part 15.247

11. Measurement Uncertainty

11.1. No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently, the result of a measurement is only an approximation to the value of the measurand (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

11.2. The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

11.3. The uncertainty of the result may need to be taken into account when interpreting the measurement results.

11.4. The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor, such that a confidence level of approximately 95% is maintained. For the purposes of this document "approximately" is interpreted as meaning "effectively" or "for most practical purposes".

Measurement Type	Range	Confidence Level (%)	Calculated Uncertainty
AC Conducted Spurious Emissions	0.15 MHz to 30.0 MHz	95%	+/- 3.25 dB
Transmitter Maximum Peak Output Power	Not applicable	95%	+/- 0.46 dB
Conducted Emissions Antenna Port	30 MHz to 40 GHz	95%	+/- 1.2 dB
Spectral Power Density	Not applicable	95%	+/- 1.2 dB
Minimum Bandwidth	Not applicable	95%	+/- 0.12 %

11.5. The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty, the published guidance of the appropriate accreditation body is followed.

Test Of: Orthogon Systems

Gemini OS58XX

To: FCC Part 15.247

Appendix 1. Test Equipment Used

RFI No.	Instrument	Manufacturer	Type No.	Serial No.
A003	ESH3-Z2 Pulse Limiter	Rohde & Schwarz	ESH3-Z2	357 881/052
A067	LISN	Rohde & Schwarz	ESH3-Z5	890603/002
A1363	6 dB attenuator	Atlantic	AA40-06	1
A1365	20 dB attenuator	Atlantic	AA40-20	1
C1006	Cable	Rosenberger	FA147A1020M20 209	001
G085	Generator	Hewlett Packard	83650L	3614A00104
M051	Multimeter	Fluke	75	52571394
M069	ESMI Spectrum Analyser / Receiver	Rohde & Schwarz	ESMI	829 808/007 (DU) / 827 063/008 (RU)
M090	Test Receiver	Rohde & Schwarz	ESBI	DU:838494/005 RU:836833/001
M1123	RF Power Meter	Boonton	4531	138201
M127	Spectrum Analyser	Rohde & Schwarz	FSEB 30	842 659/016
M152	WG22 Mixer	Rohde & Schwarz	FS-Z16	None
S003	Power Control	Zen	E08	736699

NB In accordance with UKAS requirements, all the measurement equipment is on a calibration schedule.

Test Of: Orthogon Systems

Gemini OS58XX

To: FCC Part 15.247

Appendix 2. Test Configuration Drawings

This appendix contains the following drawing:

Drawing Reference Number	Title
DRG\EMICON	Test configuration for measurement of conducted emissions

