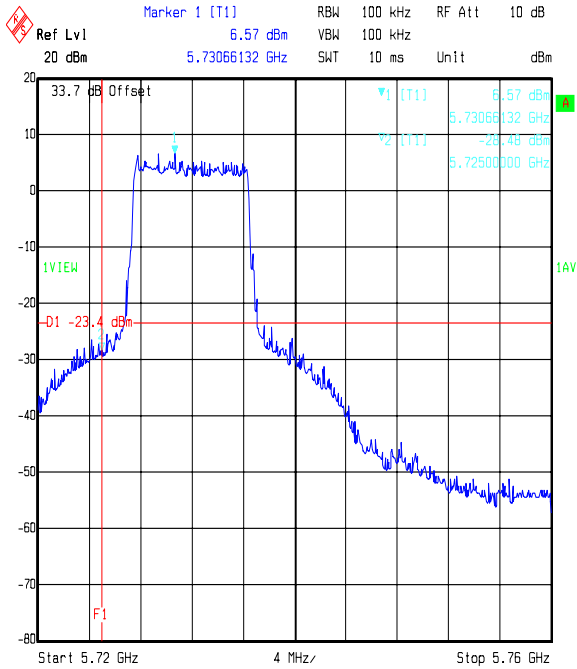


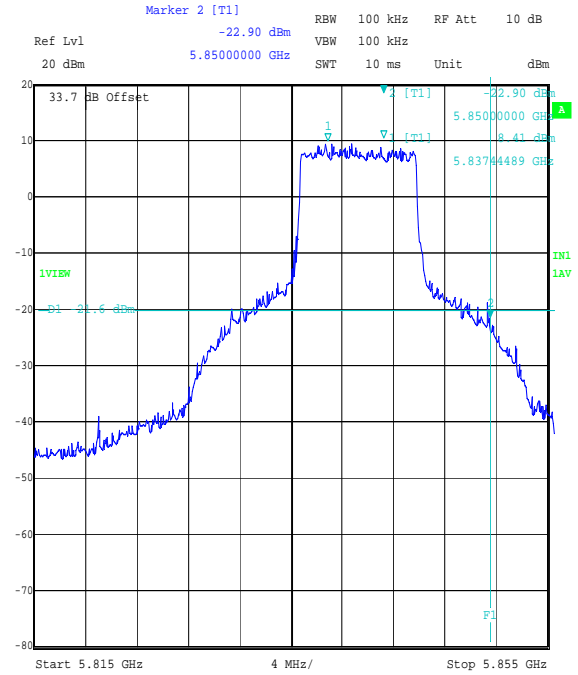
Test of: Orthogon Systems.  
 PTP58600  
 To: FCC Part 15.247: 2006

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

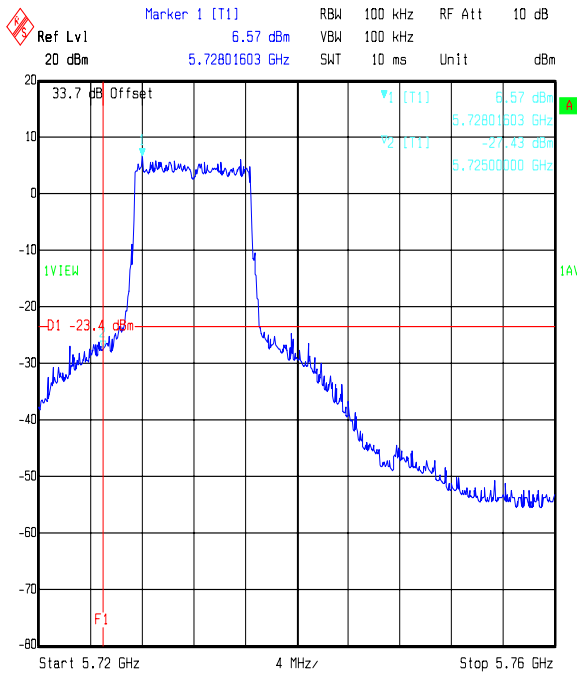
**Results: BPSK (10 MHz channel width)**



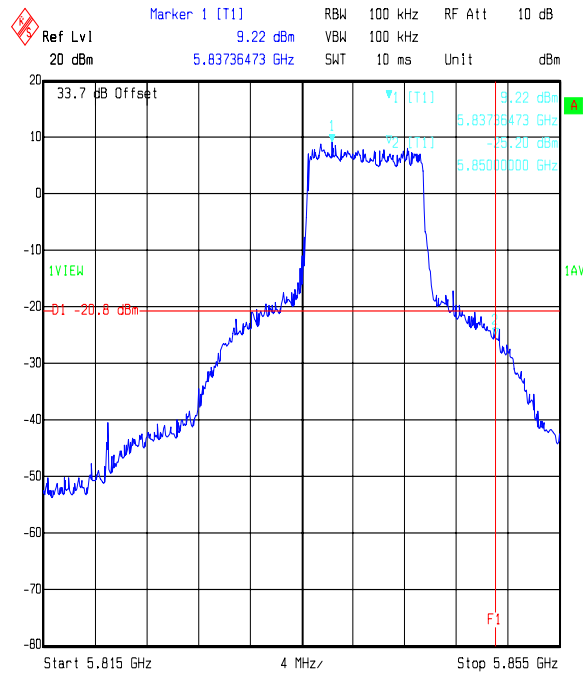
Title: 49169JD01  
 Comment A: BOTTOM BAND EDGE H PORT 10 MHZ CHANNEL BPSK 23dBm  
 Date: 04.JUN.2007 16:17:13



Title: 49169JD01  
 Comment A: UPPER BAND EDGE H PORT 10 MHZ CHANNEL BPSK  
 Date: 13.JUN.2007 08:34:43



Title: 49169JD01  
 Comment A: BOTTOM BAND EDGE V PORT 10 MHZ CHANNEL BPSK 23dBm  
 Date: 04.JUN.2007 16:15:33



Title: 49169JD01  
 Comment A: UPPER BAND EDGE V PORT 10 MHZ CHANNEL BPSK  
 Date: 04.JUN.2007 15:30:00

Test of: Orthogon Systems.  
PTP58600  
To: FCC Part 15.247: 2006

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

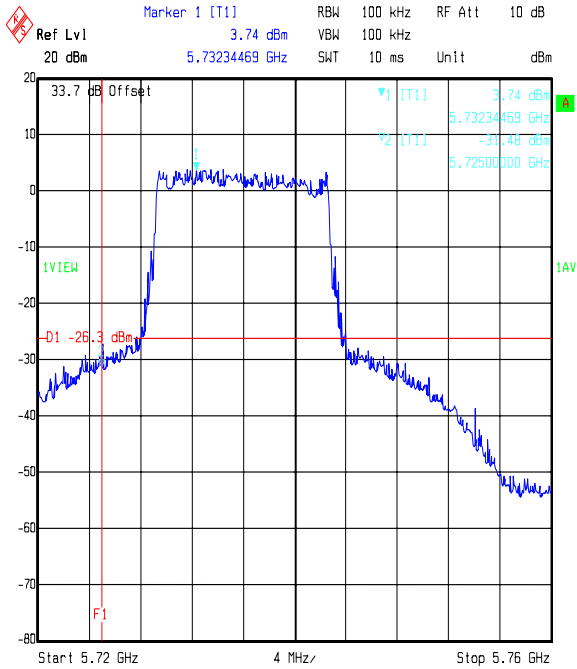
**Results: BPSK (15 MHz channel width)**

Frequency (MHz)	Antenna Port	Emission Level (dBm)	Emission Level (dBc)	Limit (dBc)	Margin (dB)	Result
5725	Horizontal	-31.5	-35.2	-30.0	5.2	Complied
5850	Horizontal	-24.9	-31.1	-30.0	1.1	Complied
5725	Vertical	-30.0	-34.3	-30.0	4.3	Complied
5850	Vertical	-27.3	-33.8	-30.0	3.8	Complied

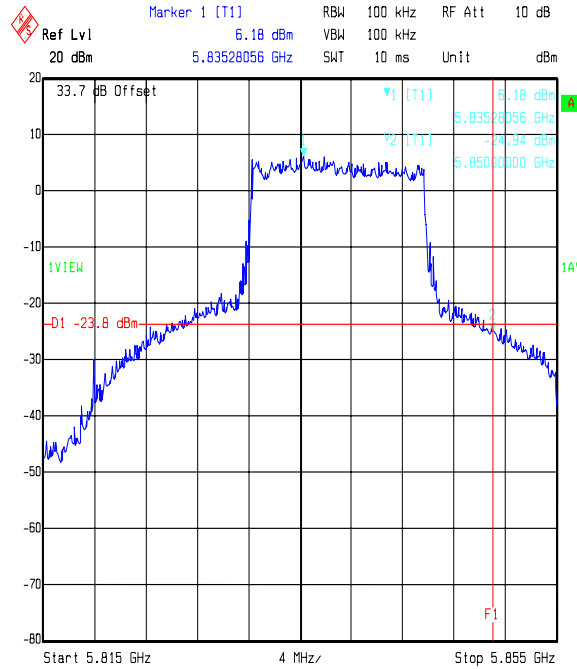
Test of: Orthogon Systems.  
 PTP58600  
 To: FCC Part 15.247: 2006

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

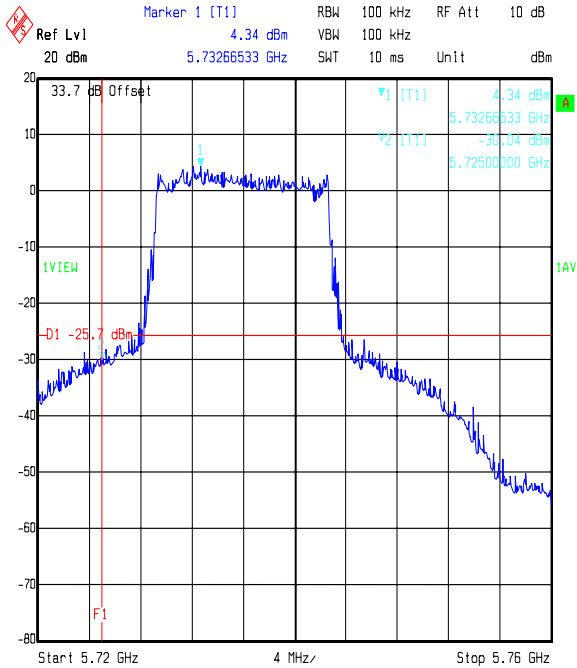
**Results: BPSK (15 MHz channel width)**



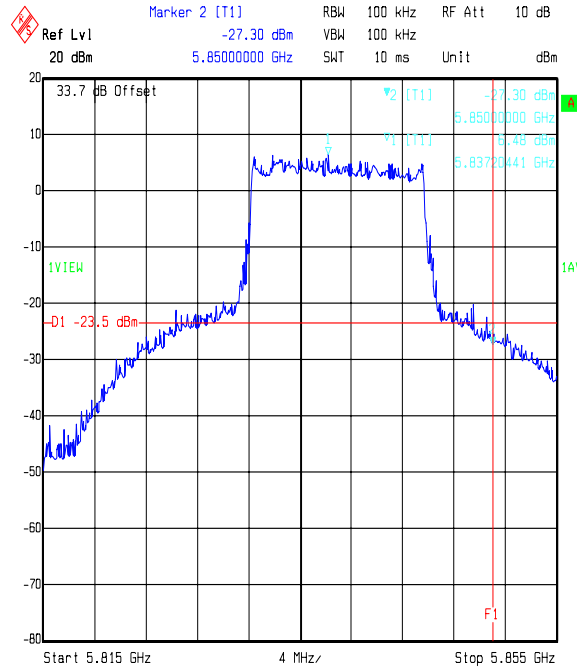
Title: 49169J001  
 Comment A: BOTTOM BAND EDGE H PORT 15 MHz CHANNEL BPSK 23dBm  
 Date: 04.JUN.2007 16:31:04



Title: 49169J001  
 Comment A: UPPER BAND EDGE H PORT 15 MHz CHANNEL BPSK  
 Date: 04.JUN.2007 17:04:14



Title: 49169J001  
 Comment A: BOTTOM BAND EDGE V PORT 15 MHz CHANNEL BPSK  
 Date: 04.JUN.2007 16:47:14



Title: 49169J001  
 Comment A: UPPER BAND EDGE V PORT 15 MHz CHANNEL BPSK  
 Date: 04.JUN.2007 16:52:22

Test of: Orthogon Systems.  
PTP58600  
To: FCC Part 15.247: 2006

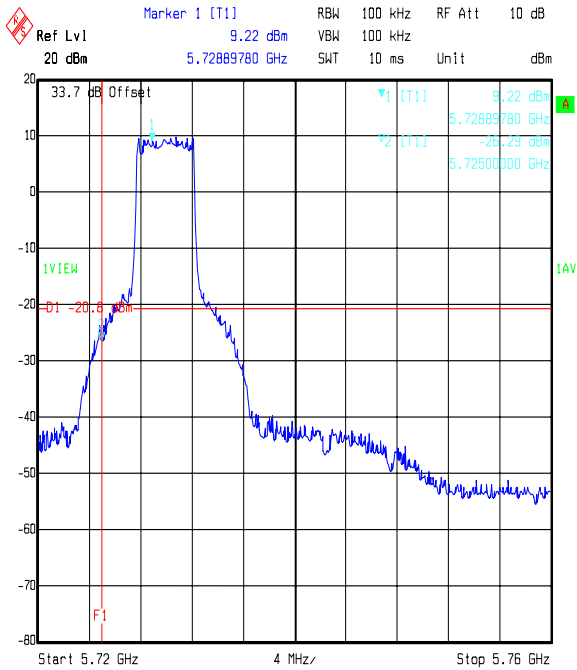
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**Transmitter Band Edge Conducted Emissions: Section 15.247(c) (Continued)****Results: QPSK (5 MHz channel width)**

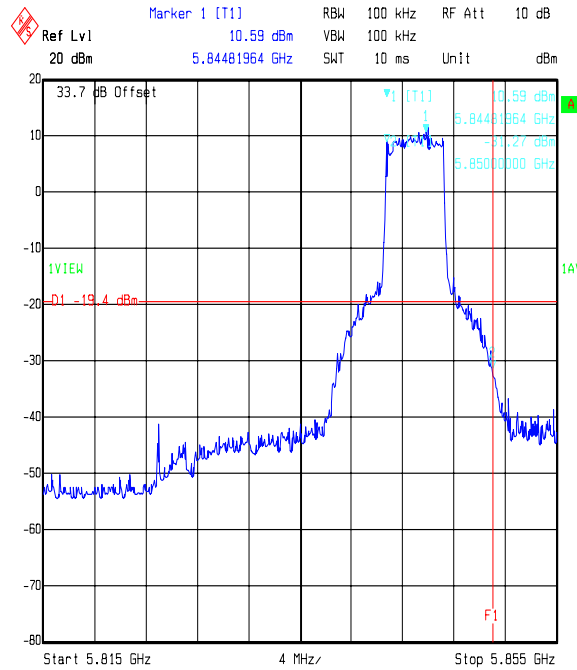
Frequency (MHz)	Antenna Port	Emission Level (dBm)	Emission Level (dBc)	Limit (dBc)	Margin (dB)	Result
5725	Horizontal	-26.3	-35.5	-30.0	5.5	Complied
5850	Horizontal	-31.3	-41.9	-30.0	11.9	Complied
5725	Vertical	-24.1	-34.4	-30.0	4.4	Complied
5850	Vertical	-28.6	-38.9	-30.0	8.9	Complied

Test of: Orthogon Systems.  
 PTP58600  
 To: FCC Part 15.247: 2006

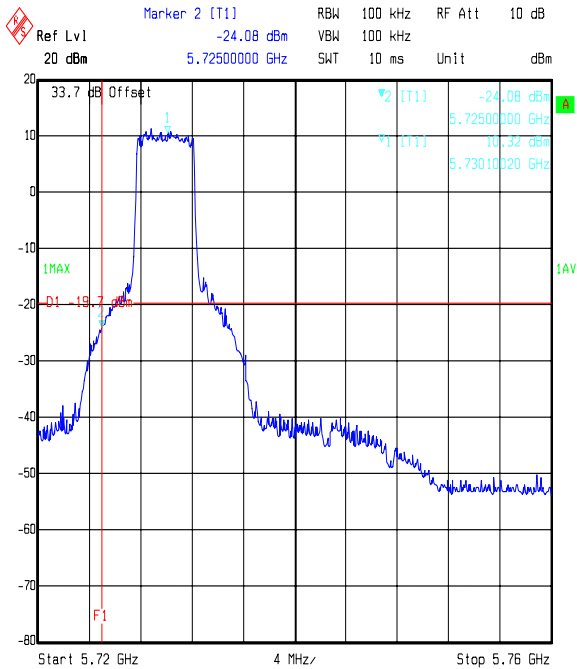
**Transmitter Band Edge Conducted Emissions: Section 15.247(c) (Continued)**



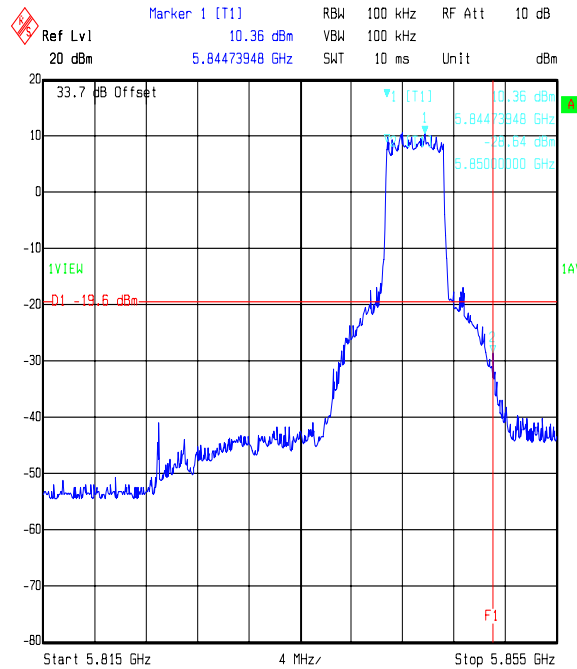
Title: 49169JD01  
 Comment A: LOWER BAND EDGE H PORT 5 MHZ CHANNEL QPSK  
 Date: 04.JUN.2007 14:59:22



Title: 49169JD01  
 Comment A: UPPER BAND EDGE H PORT 5 MHZ CHANNEL QPSK  
 Date: 04.JUN.2007 15:10:51



Title: 49169JD01  
 Comment A: LOWER BAND EDGE V PORT 5 MHZ CHANNEL QPSK  
 Date: 04.JUN.2007 14:29:06



Title: 49169JD01  
 Comment A: UPPER BAND EDGE V PORT 5 MHZ CHANNEL QPSK  
 Date: 04.JUN.2007 15:19:36

Test of: Orthogon Systems.  
PTP58600  
To: FCC Part 15.247: 2006

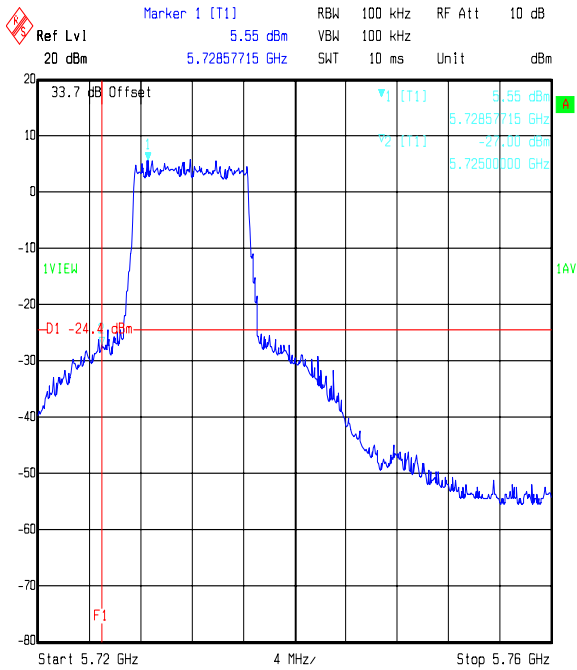
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**Transmitter Band Edge Conducted Emissions: Section 15.247(c) (Continued)****Results: QPSK (10 MHz channel width)**

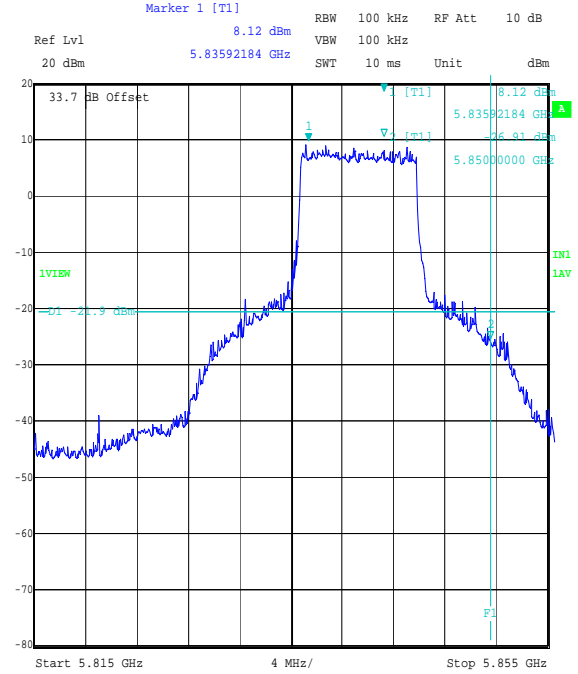
Frequency (MHz)	Antenna Port	Emission Level (dBm)	Emission Level (dBc)	Limit (dBc)	Margin (dB)	Result
5725	Horizontal	-27.0	-32.6	-30.0	2.6	Complied
5850	Horizontal	-26.9	-35.0	-30.0	5.0	Complied
5725	Vertical	-26.9	-32.7	-30.0	2.7	Complied
5850	Vertical	-30.2	-37.7	-30.0	7.7	Complied

Test of: Orthogon Systems.  
 PTP58600  
 To: FCC Part 15.247: 2006

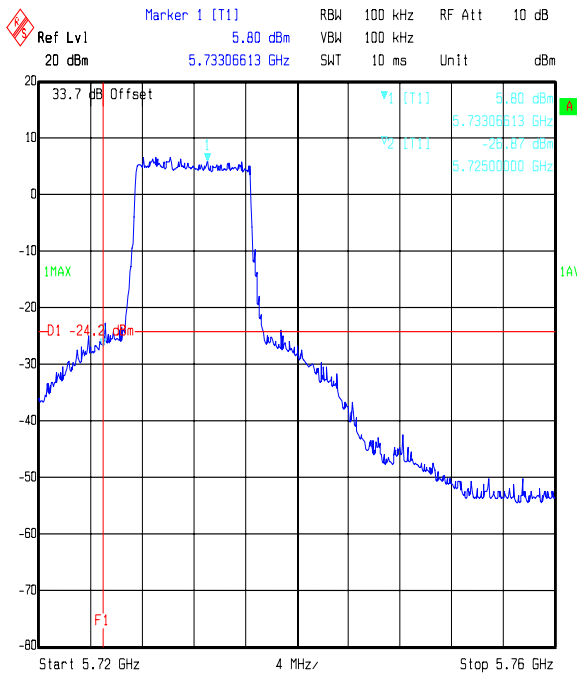
**Transmitter Band Edge Conducted Emissions: Section 15.247(c) (Continued)**



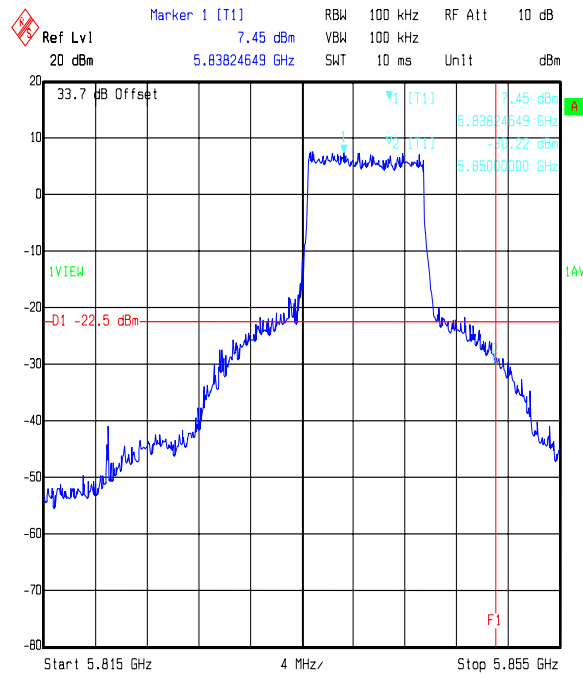
Title: 49169JD01  
 Comment A: BOTTOM BAND EDGE H PORT 10 MHz CHANNEL QPSK 23dBm  
 Date: 04.JUN.2007 16:18:47



Title: 49169JD01  
 Comment A: UPPER BAND EDGE H PORT 10 MHz CHANNEL QPSK  
 Date: 13.JUN.2007 08:48:29



Title: 49169JD01  
 Comment A: BOTTOM BAND EDGE V PORT 10 MHz CHANNEL QPSK 23dBm  
 Date: 04.JUN.2007 16:13:38



Title: 49169JD01  
 Comment A: UPPER BAND EDGE V PORT 10 MHz CHANNEL QPSK  
 Date: 04.JUN.2007 15:31:58

Test of: Orthogon Systems.  
PTP58600  
To: FCC Part 15.247: 2006

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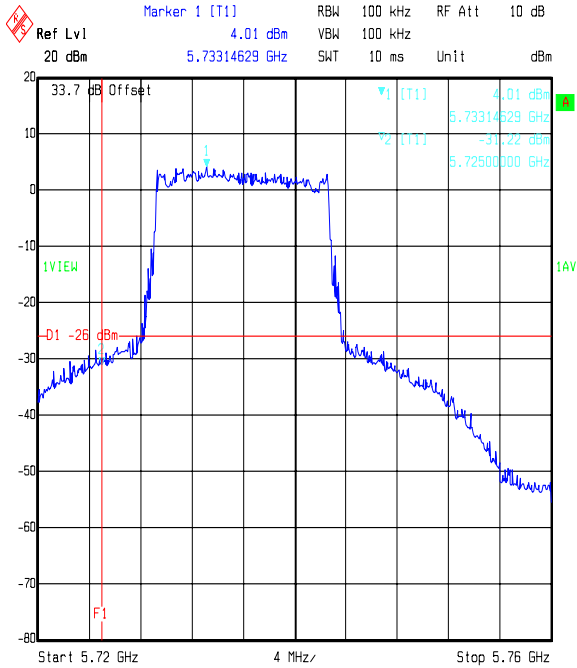
**Transmitter Band Edge Conducted Emissions: Section 15.247(c) (Continued)****Results: QPSK (15 MHz channel width)**

Frequency (MHz)	Antenna Port	Emission Level (dBm)	Emission Level (dBc)	Limit (dBc)	Margin (dB)	Result
5725	Horizontal	-31.2	-35.2	-30.0	5.2	Complied
5850	Horizontal	-28.4	-34.0	-30.0	4.0	Complied
5725	Vertical	-30.6	-34.8	-30.0	4.8	Complied
5850	Vertical	-30.9	-36.0	-30.0	6.0	Complied

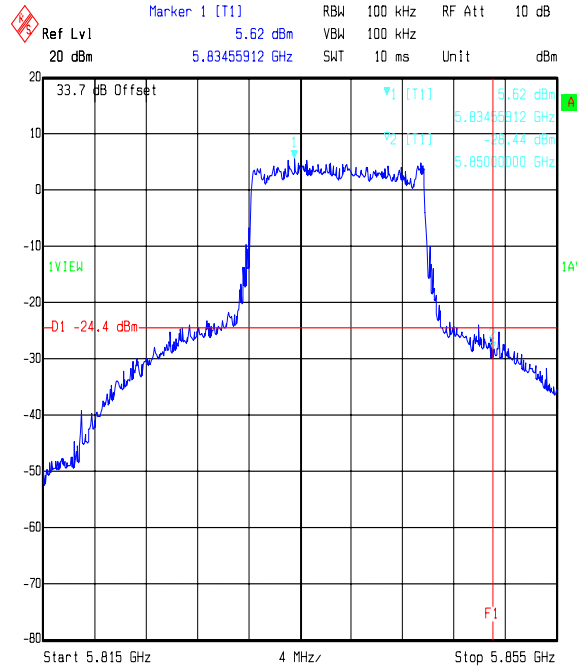


Test of: Orthogon Systems.  
 PTP58600  
 To: FCC Part 15.247: 2006

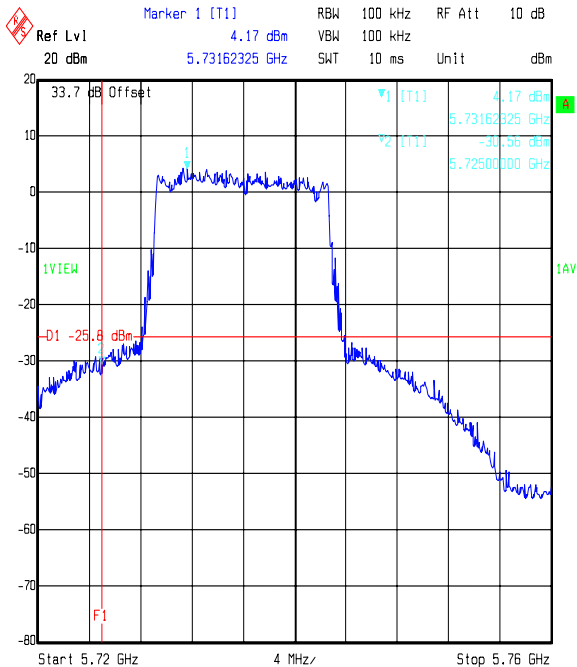
**Transmitter Band Edge Conducted Emissions: Section 15.247(c) (Continued)**



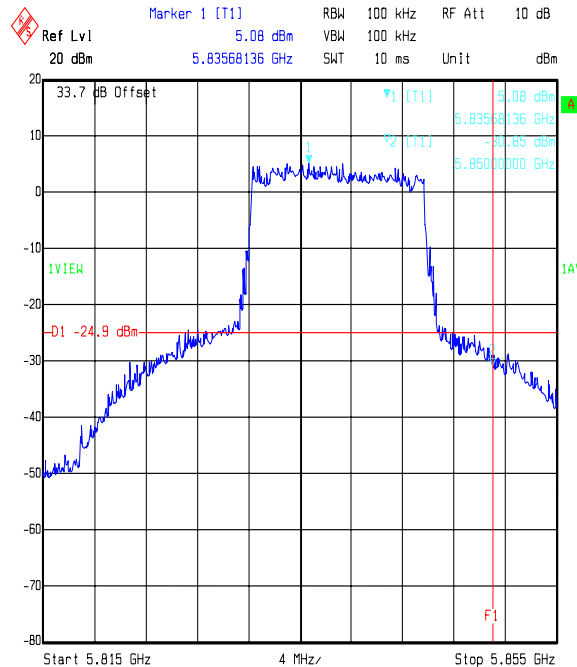
Title: 49169J001  
 Comment A: BOTTOM BAND EDGE H PORT 15 MHz CHANNEL QPSK 23dBm  
 Date: 04.JUN.2007 16:34:05



Title: 49169J001  
 Comment A: UPPER BAND EDGE H PORT 15 MHz CHANNEL QPSK  
 Date: 04.JUN.2007 17:02:45



Title: 49169J001  
 Comment A: BOTTOM BAND EDGE V PORT 15 MHz CHANNEL QPSK  
 Date: 04.JUN.2007 16:46:06



Title: 49169J001  
 Comment A: UPPER BAND EDGE V PORT 15 MHz CHANNEL QPSK  
 Date: 04.JUN.2007 16:54:10

Test of: Orthogon Systems.  
PTP58600  
To: FCC Part 15.247: 2006

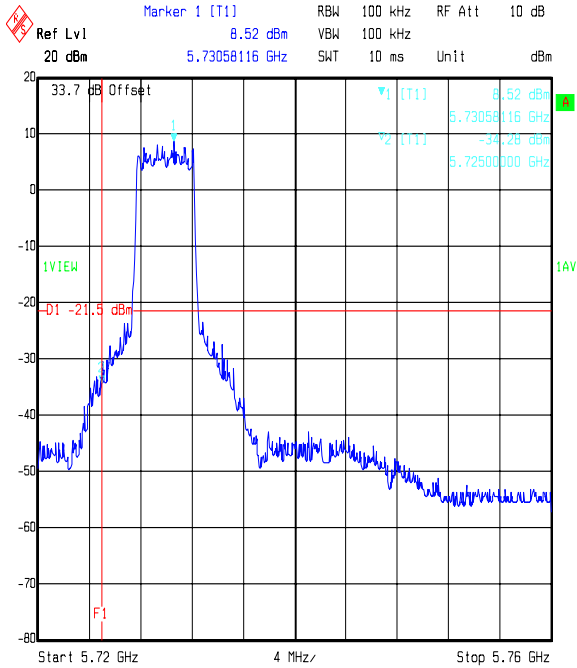
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**Transmitter Band Edge Conducted Emissions: Section 15.247(c) (Continued)****Results: 16QAM (5 MHz channel width)**

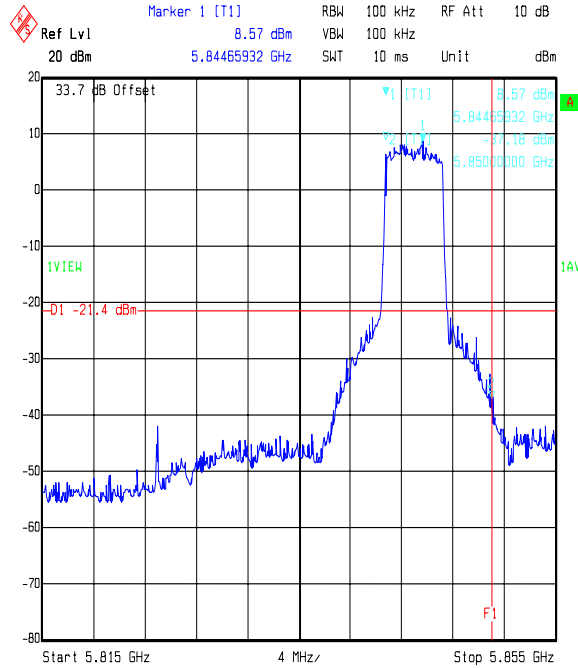
Frequency (MHz)	Antenna Port	Emission Level (dBm)	Emission Level (dBc)	Limit (dBc)	Margin (dB)	Result
5725	Horizontal	-34.3	42.8	-30.0	12.8	Complied
5850	Horizontal	-37.2	45.8	-30.0	15.8	Complied
5725	Vertical	-30.8	40.3	-30.0	10.3	Complied
5850	Vertical	-35.7	44.5	-30.0	14.5	Complied

Test of: Orthogon Systems.  
 PTP58600  
 To: FCC Part 15.247: 2006

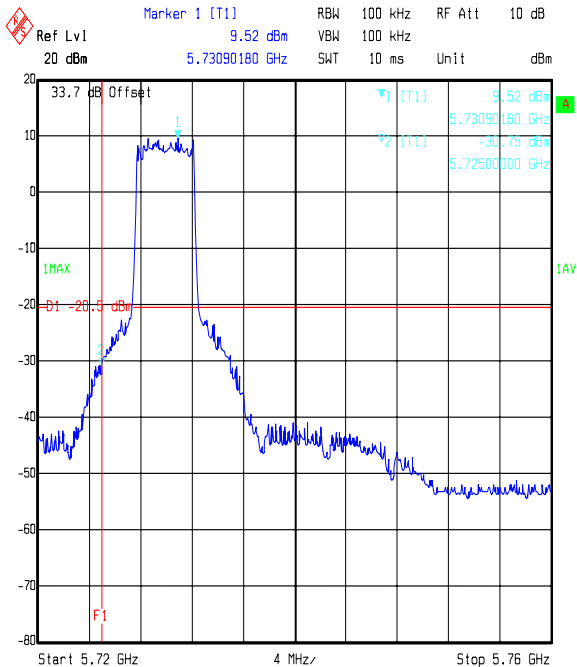
**Transmitter Band Edge Conducted Emissions: Section 15.247(c) (Continued)**



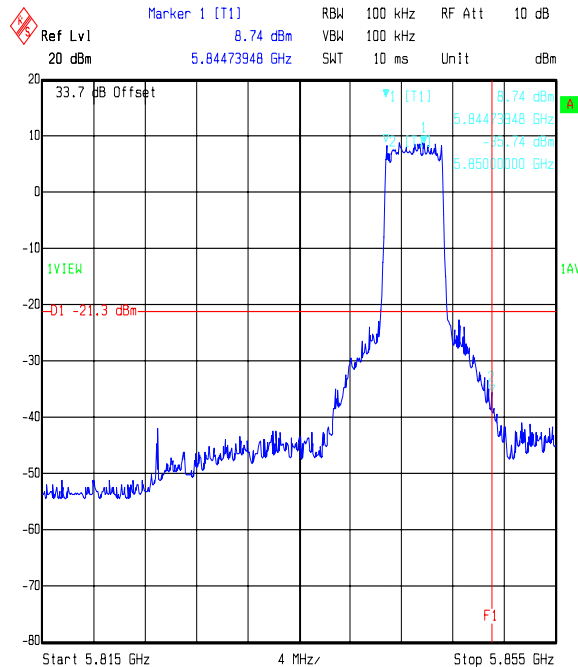
Title: 49169JD01  
 Comment A: LOWER BAND EDGE H PORT 5 MHZ CHANNEL 16 QAM  
 Date: 04.JUN.2007 15:01:03



Title: 49169JD01  
 Comment A: UPPER BAND EDGE H PORT 5 MHZ CHANNEL 16QAM  
 Date: 04.JUN.2007 15:12:43



Title: 49169JD01  
 Comment A: LOWER BAND EDGE V PORT 5 MHZ CHANNEL 16QAM  
 Date: 04.JUN.2007 14:30:57



Title: 49169JD01  
 Comment A: UPPER BAND EDGE V PORT 5 MHZ CHANNEL 16QAM  
 Date: 04.JUN.2007 15:21:06

Test of: Orthogon Systems.  
PTP58600  
To: FCC Part 15.247: 2006

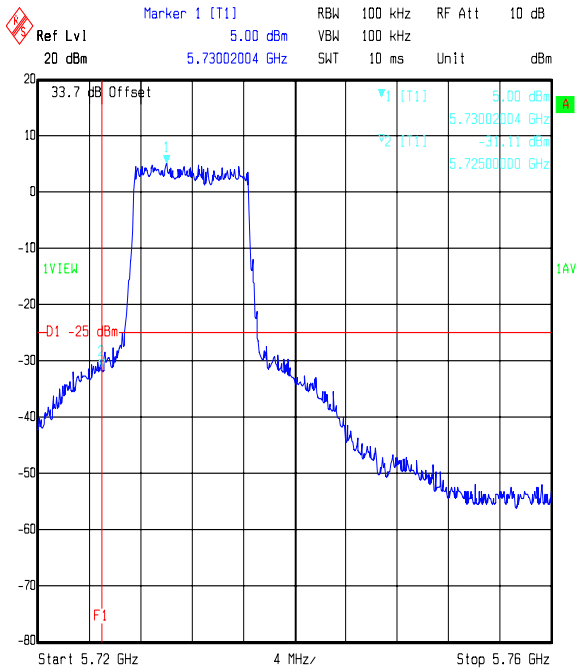
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**Transmitter Band Edge Conducted Emissions: Section 15.247(c) (Continued)****Results: 16QAM (10 MHz channel width)**

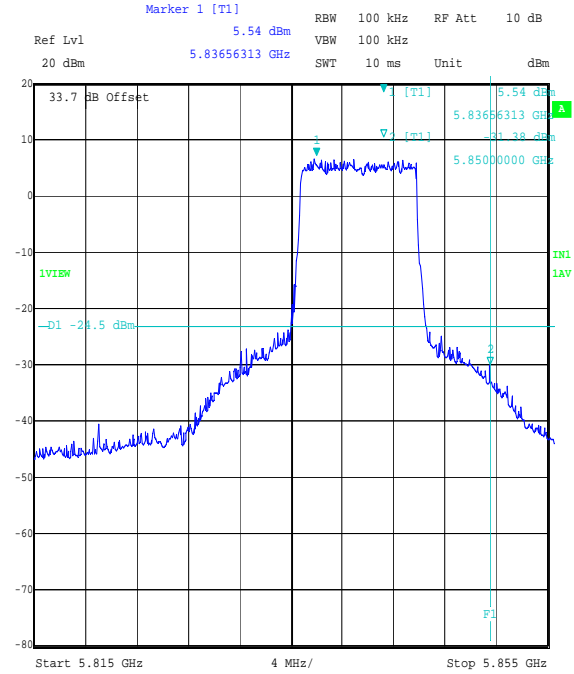
Frequency (MHz)	Antenna Port	Emission Level (dBm)	Emission Level (dBc)	Limit (dBc)	Margin (dB)	Result
5725	Horizontal	-31.1	-36.1	-30.0	6.1	Complied
5850	Horizontal	-31.4	-36.9	-30.0	6.9	Complied
5725	Vertical	-28.9	-34.1	-30.0	4.1	Complied
5850	Vertical	-36.7	-42.7	-30.0	12.7	Complied

Test of: Orthogon Systems.  
PTP58600  
To: FCC Part 15.247: 2006

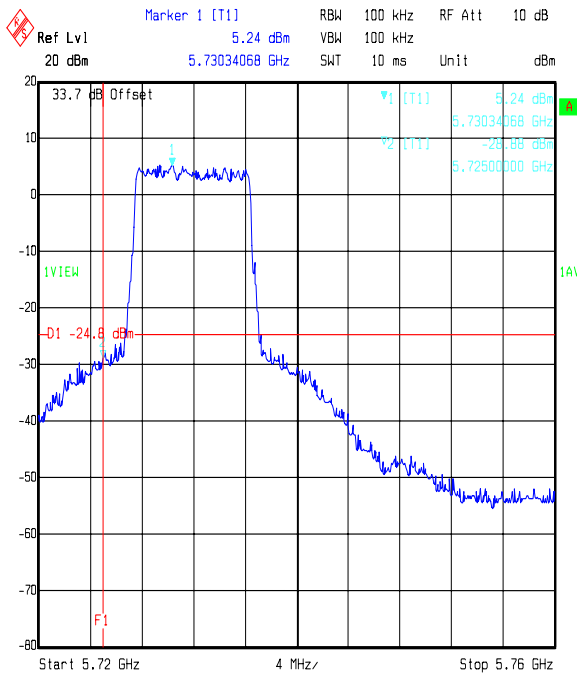
Transmitter Band Edge Conducted Emissions: Section 15.247(c) (Continued)



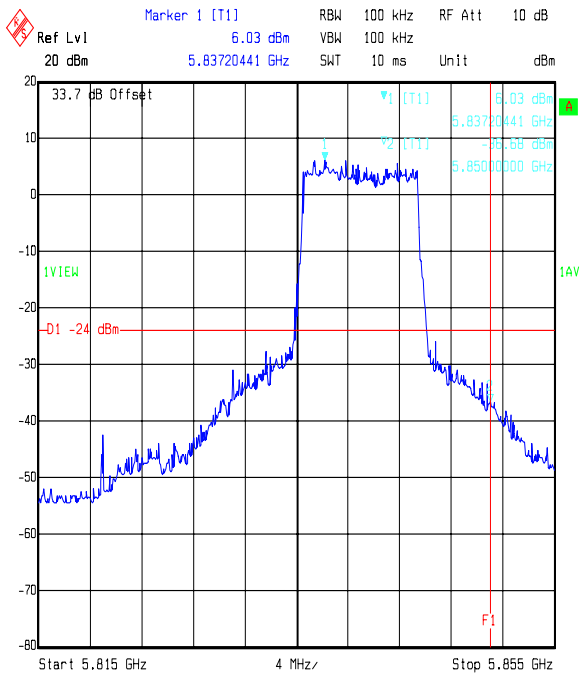
Title: 49169JD01  
Comment A: BOTTOM BAND EDGE H PORT 10 MHz CHANNEL 16QAM  
Date: 04.JUN.2007 15:59:09



Title: 49169JD01  
Comment A: UPPER BAND EDGE H PORT 10 MHz CHANNEL 16QAM  
Date: 13.JUN.2007 09:04:43



Title: 49169JD01  
Comment A: BOTTOM BAND EDGE V PORT 10 MHz CHANNEL 16QAM  
Date: 04.JUN.2007 16:06:19



Title: 49169JD01  
Comment A: UPPER BAND EDGE V PORT 10 MHz CHANNEL 16QAM  
Date: 04.JUN.2007 15:33:45

Test of: Orthogon Systems.  
PTP58600  
To: FCC Part 15.247: 2006

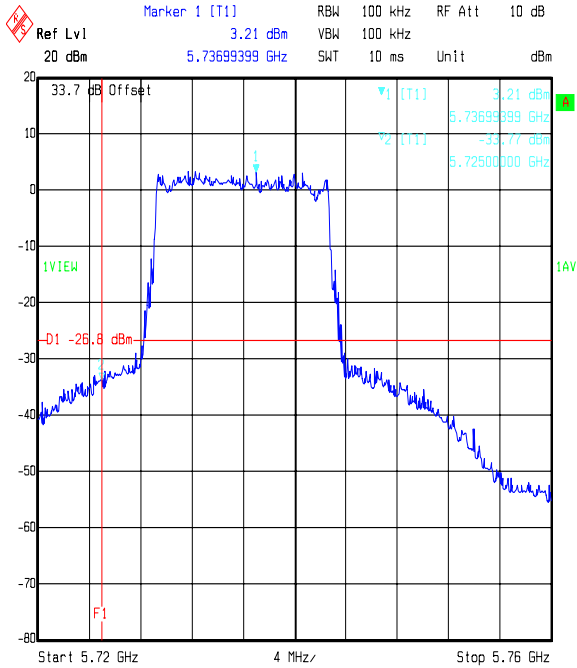
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**Transmitter Band Edge Conducted Emissions: Section 15.247(c) (Continued)****Results: 16QAM (15 MHz channel width)**

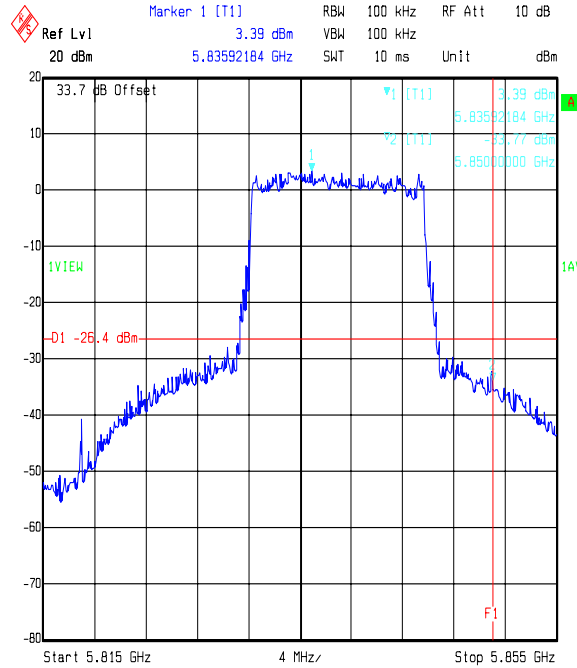
Frequency (MHz)	Antenna Port	Emission Level (dBm)	Emission Level (dBc)	Limit (dBc)	Margin (dB)	Result
5725	Horizontal	-33.8	-37.0	-30.0	7.0	Complied
5850	Horizontal	-33.8	-37.2	-30.0	7.2	Complied
5725	Vertical	-34.9	-38.0	-30.0	8.0	Complied
5850	Vertical	-37.0	-41.7	-30.0	11.7	Complied

Test of: Orthogon Systems.  
 PTP58600  
 To: FCC Part 15.247: 2006

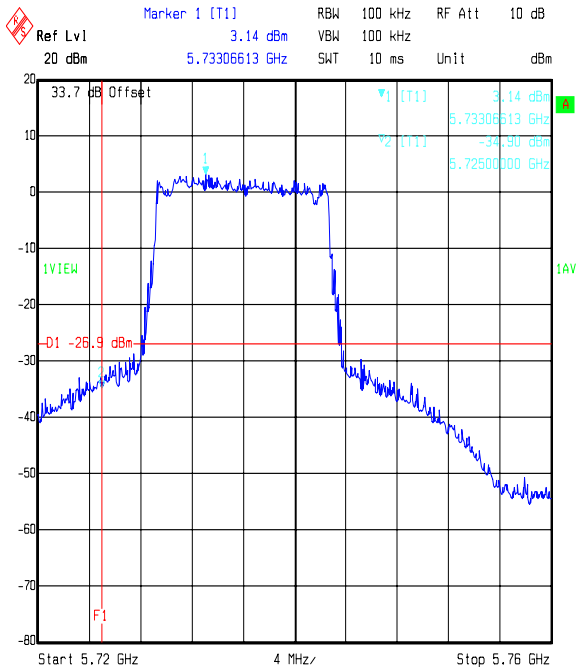
**Transmitter Band Edge Conducted Emissions: Section 15.247(c) (Continued)**



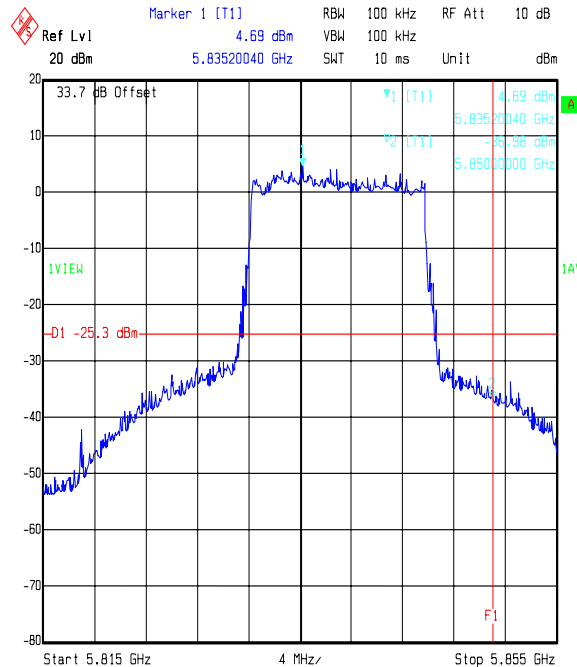
Title: 49169JD01  
 Comment A: BOTTOM BAND EDGE H PORT 15 MHZ CHANNEL 16QAM  
 Date: 04.JUN.2007 16:39:08



Title: 49169JD01  
 Comment A: UPPER BAND EDGE H PORT 15 MHZ CHANNEL 16QAM  
 Date: 04.JUN.2007 17:01:31



Title: 49169JD01  
 Comment A: BOTTOM BAND EDGE V PORT 15 MHZ CHANNEL 16QAM  
 Date: 04.JUN.2007 16:44:14



Title: 49169JD01  
 Comment A: UPPER BAND EDGE V PORT 15 MHZ CHANNEL 16QAM  
 Date: 04.JUN.2007 16:56:45

Test of: Orthogon Systems.  
PTP58600  
To: FCC Part 15.247: 2006

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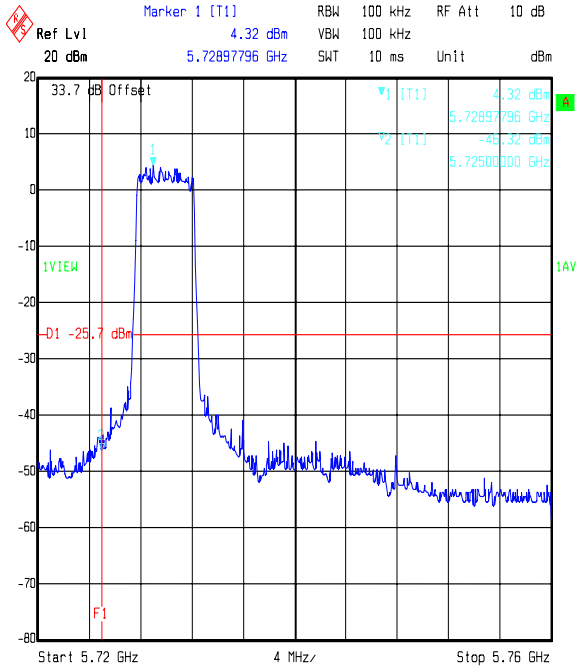
**Transmitter Band Edge Conducted Emissions: Section 15.247(c) (Continued)****Results: 64QAM (5 MHz channel width)**

Frequency (MHz)	Antenna Port	Emission Level (dBm)	Emission Level (dBc)	Limit (dBc)	Margin (dB)	Result
5725	Horizontal	-46.3	-50.6	-30.0	20.6	Complied
5850	Horizontal	-40.5	-44.6	-30.0	14.6	Complied
5725	Vertical	-43.5	-48.7	-30.0	18.7	Complied
5850	Vertical	-39.6	-44.1	-30.0	14.1	Complied

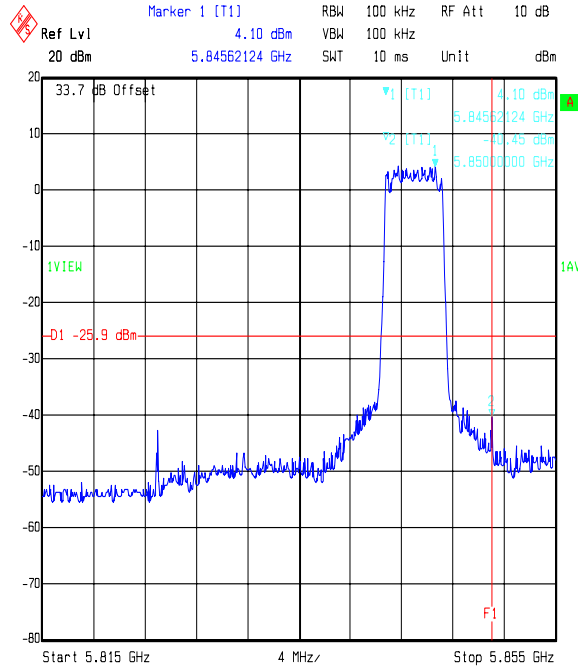


Test of: Orthogon Systems.  
 PTP58600  
 To: FCC Part 15.247: 2006

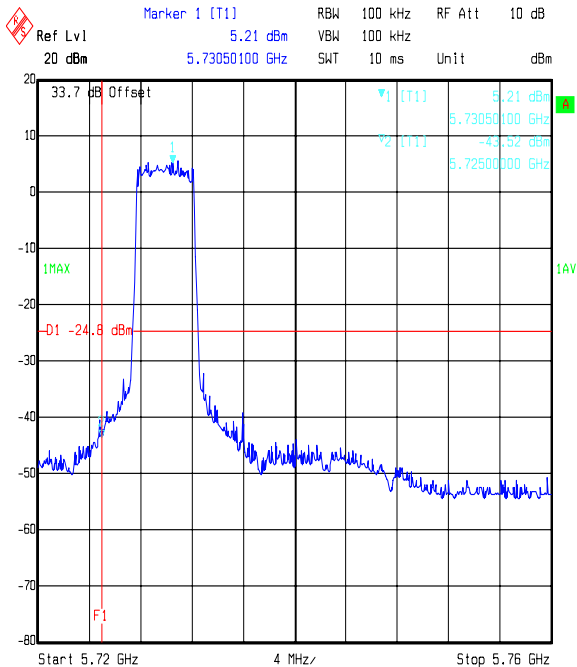
**Transmitter Band Edge Conducted Emissions: Section 15.247(c) (Continued)**



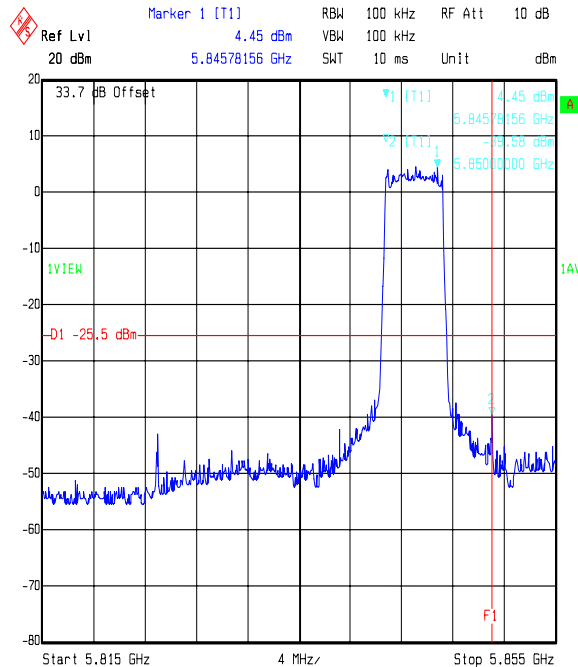
Title: 49169JD01  
 Comment A: LOWER BAND EDGE H PORT 5 MHZ CHANNEL 64 QAM  
 Date: 04.JUN.2007 15:02:29



Title: 49169JD01  
 Comment A: UPPER BAND EDGE H PORT 5 MHZ CHANNEL 64QAM  
 Date: 04.JUN.2007 15:14:39



Title: 49169JD01  
 Comment A: LOWER BAND EDGE V PORT 5 MHZ CHANNEL 64QAM  
 Date: 04.JUN.2007 14:33:07



Title: 49169JD01  
 Comment A: UPPER BAND EDGE V PORT 5 MHZ CHANNEL 64QAM  
 Date: 04.JUN.2007 15:23:02

Test of: Orthogon Systems.  
PTP58600  
To: FCC Part 15.247: 2006

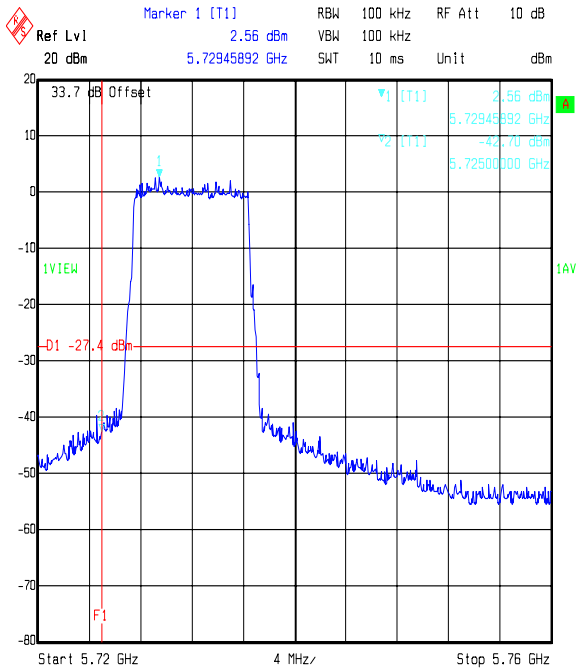
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**Transmitter Band Edge Conducted Emissions: Section 15.247(c) (Continued)****Results: 64QAM (10 MHz channel width)**

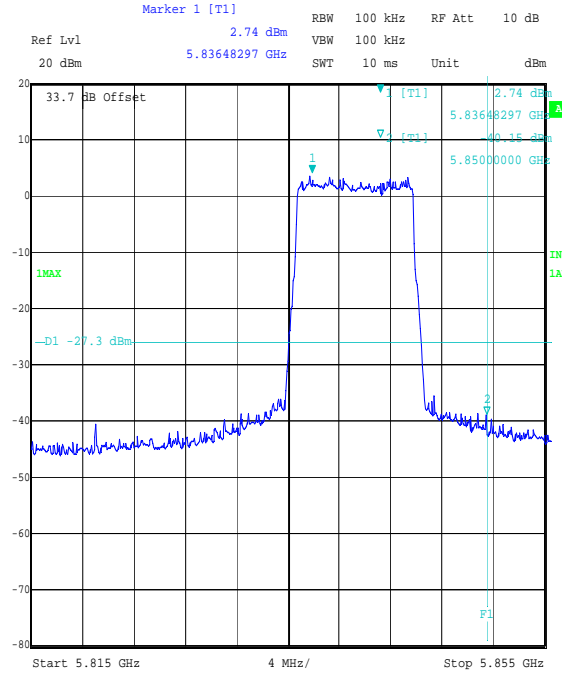
Frequency (MHz)	Antenna Port	Emission Level (dBm)	Emission Level (dBc)	Limit (dBc)	Margin (dB)	Result
5725	Horizontal	-42.7	-45.3	-30.0	15.3	Complied
5850	Horizontal	-40.2	-42.9	-30.0	12.9	Complied
5725	Vertical	-43.1	-44.9	-30.0	14.9	Complied
5850	Vertical	-46.6	-49.7	-30.0	19.7	Complied

Test of: Orthogon Systems.  
 PTP58600  
 To: FCC Part 15.247: 2006

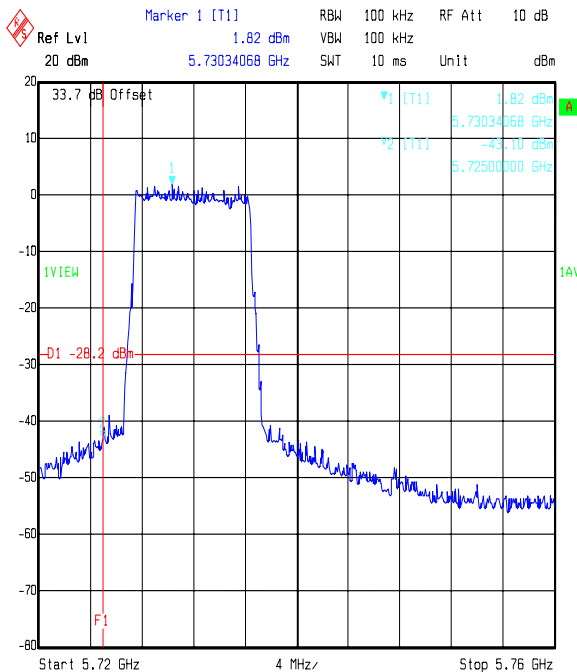
**Transmitter Band Edge Conducted Emissions: Section 15.247(c) (Continued)**



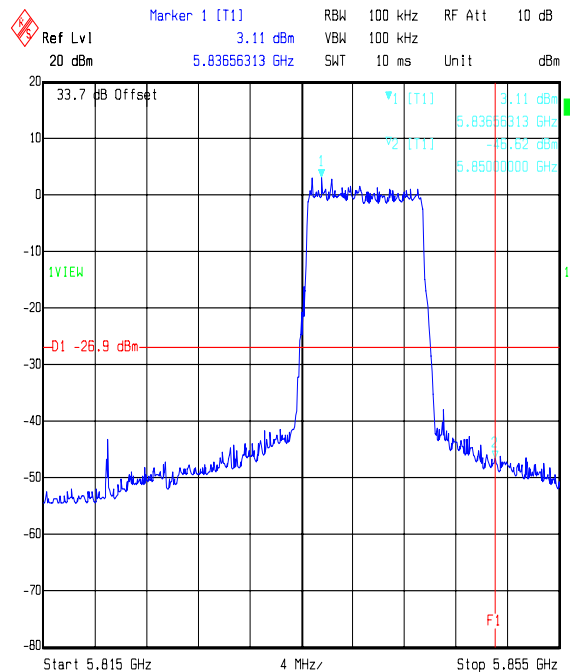
Title: 49169JD01  
 Comment A: BOTTOM BAND EDGE H PORT 10 MHz CHANNEL 64QAM  
 Date: 04.JUN.2007 16:01:44



Title: 49169JD01  
 Comment A: UPPER BAND EDGE H PORT 10 MHz CHANNEL 64QAM  
 Date: 13.JUN.2007 09:18:32



Title: 49169JD01  
 Comment A: BOTTOM BAND EDGE V PORT 10 MHz CHANNEL 64QAM  
 Date: 04.JUN.2007 16:04:08



Title: 49169JD01  
 Comment A: UPPER BAND EDGE V PORT 10 MHz CHANNEL 64QAM  
 Date: 04.JUN.2007 15:35:13

Test of: Orthogon Systems.  
PTP58600  
To: FCC Part 15.247: 2006

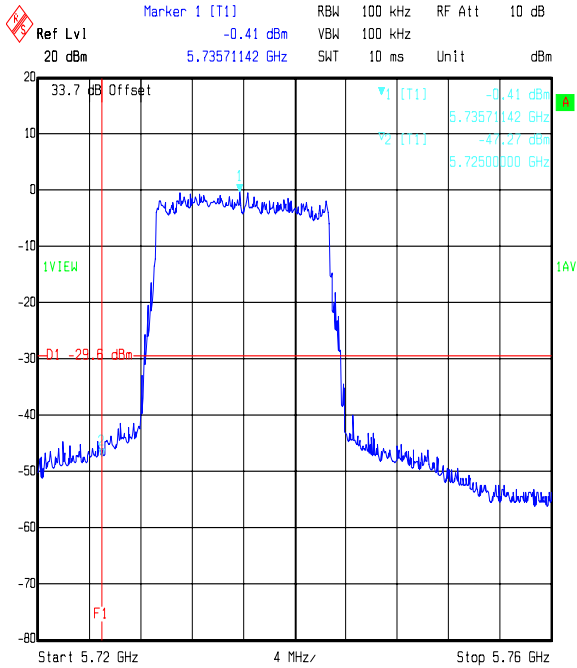
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**Transmitter Band Edge Conducted Emissions: Section 15.247(c) (Continued)****Results: 64QAM (15 MHz channel width)**

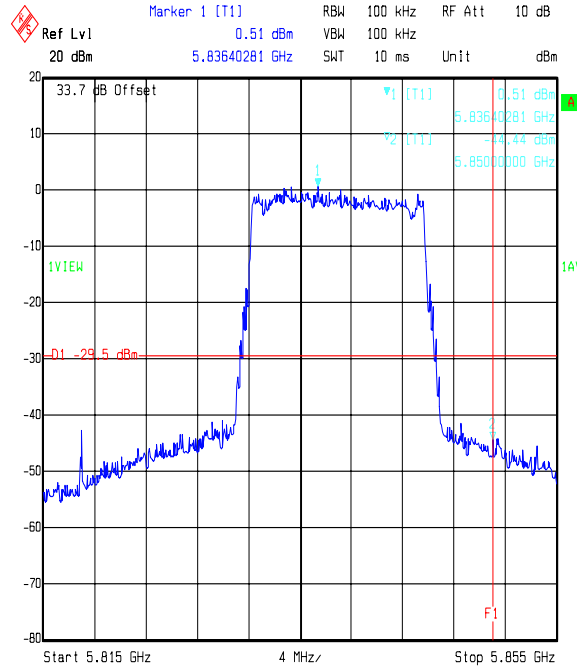
Frequency (MHz)	Antenna Port	Emission Level (dBm)	Emission Level (dBc)	Limit (dBc)	Margin (dB)	Result
5725	Horizontal	-47.3	-47.7	-30.0	17.7	Complied
5850	Horizontal	-44.4	-44.9	-30.0	14.9	Complied
5725	Vertical	-45.7	-46.8	-30.0	16.8	Complied
5850	Vertical	-48.7	-49.4	-30.0	19.4	Complied

Test of: Orthogon Systems.  
 PTP58600  
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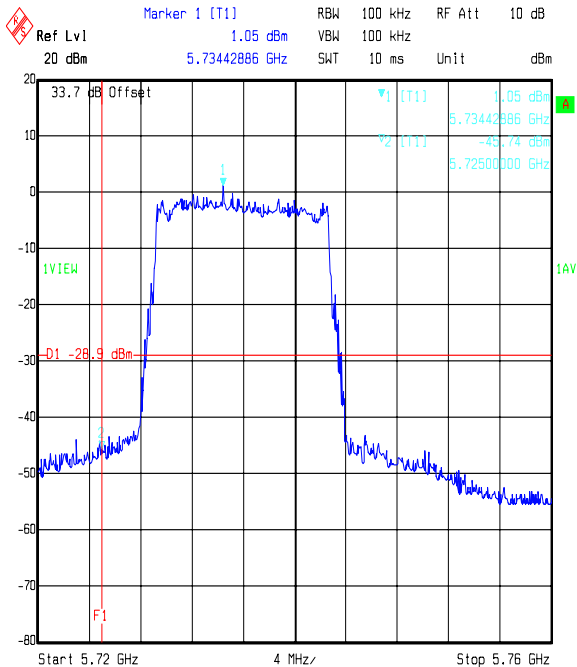
**Transmitter Band Edge Conducted Emissions: Section 15.247(c) (Continued)**



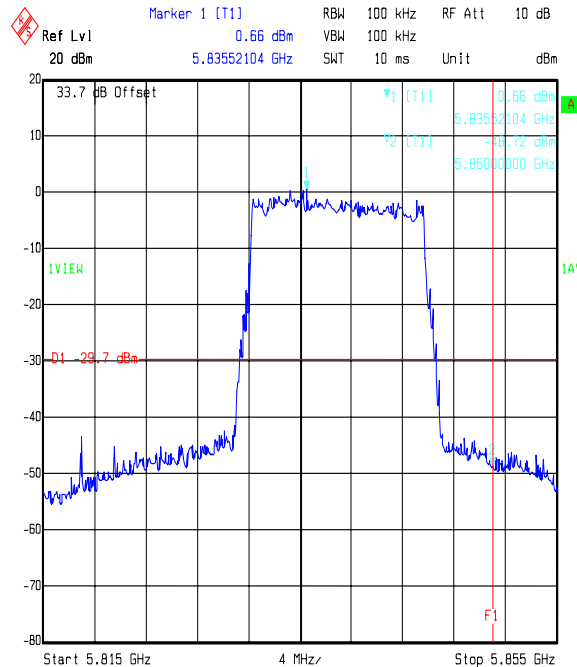
Title: 49169JD01  
 Comment A: BOTTOM BAND EDGE H PORT 15 MHZ CHANNEL 64QAM  
 Date: 04.JUN.2007 16:41:21



Title: 49169JD01  
 Comment A: UPPER BAND EDGE H PORT 15 MHZ CHANNEL 64QAM  
 Date: 04.JUN.2007 17:00:12



Title: 49169JD01  
 Comment A: BOTTOM BAND EDGE V PORT 15 MHZ CHANNEL 64QAM  
 Date: 04.JUN.2007 16:43:09



Title: 49169JD01  
 Comment A: UPPER BAND EDGE V PORT 15 MHZ CHANNEL 64QAM  
 Date: 04.JUN.2007 16:58:09

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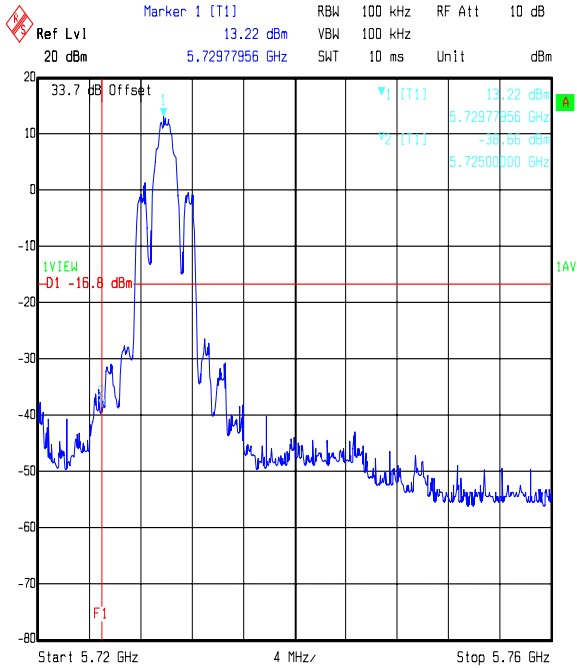
**Transmitter Band Edge Conducted Emissions: Section 15.247(c) (Continued)**

**Results: Acquisition (5 MHz channel width)**

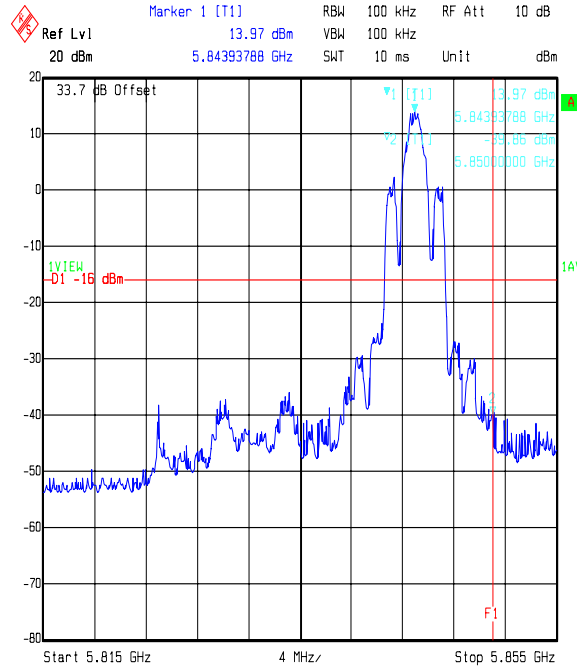
Frequency (MHz)	Antenna Port	Emission Level (dBm)	Emission Level (dBc)	Limit (dBc)	Margin (dB)	Result
5725	Horizontal	-38.7	-51.9	-30.0	21.9	Complied
5850	Horizontal	-39.9	-53.9	-30.0	23.9	Complied
5725	Vertical	-38.8	-52.1	-30.0	22.1	Complied
5850	Vertical	-40.0	-53.9	-30.0	23.9	Complied

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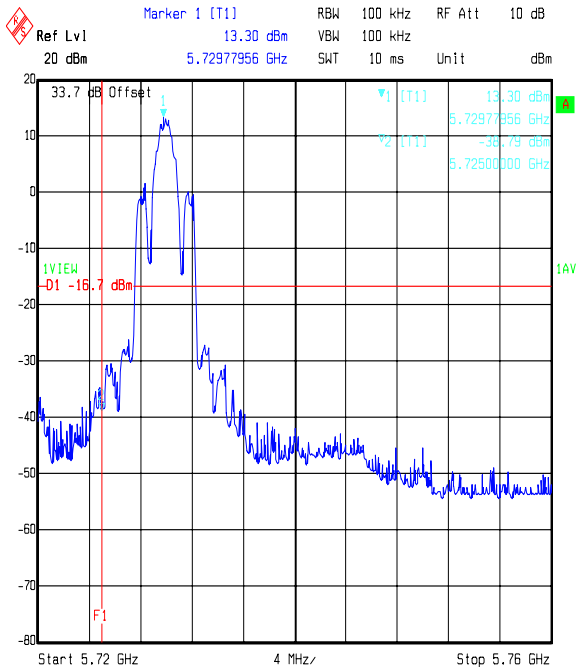
**Transmitter Band Edge Conducted Emissions: Section 15.247(c) (Continued)**



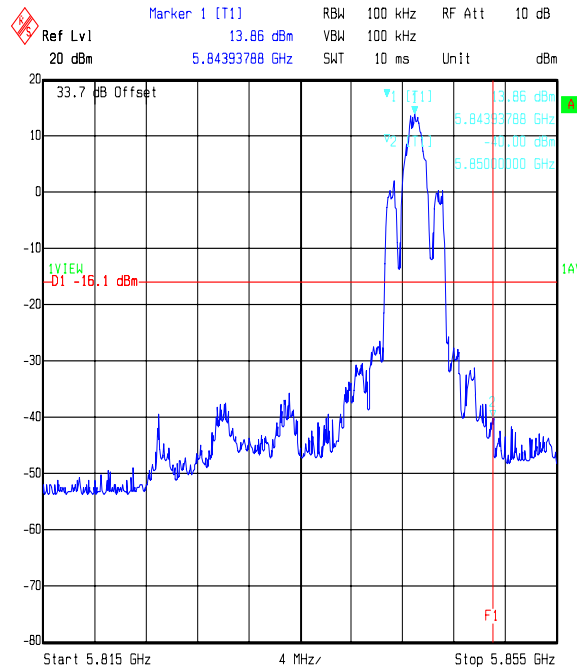
Title: 49169JD01  
 Comment A: LOWER BAND EDGE H PORT 5 MHz CHANNEL ACQUISITION MODE  
 Date: 04.JUN.2007 17:35:35



Title: 49169JD01  
 Comment A: UPPER BAND EDGE H PORT 5 MHz CHANNEL ACQUISITION MODE  
 Date: 04.JUN.2007 17:29:19



Title: 49169JD01  
 Comment A: LOWER BAND EDGE V PORT 5 MHz CHANNEL ACQUISITION MODE  
 Date: 04.JUN.2007 17:34:20



Title: 49169JD01  
 Comment A: UPPER BAND EDGE V PORT 5 MHz CHANNEL ACQUISITION MODE  
 Date: 04.JUN.2007 17:31:32

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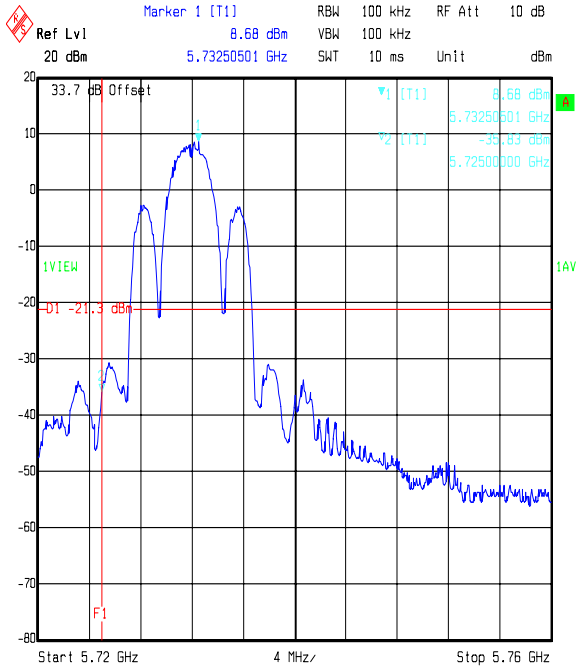
**Transmitter Band Edge Conducted Emissions: Section 15.247(c) (Continued)****Results: Acquisition (10 MHz channel width)**

Frequency (MHz)	Antenna Port	Emission Level (dBm)	Emission Level (dBc)	Limit (dBc)	Margin (dB)	Result
5725	Horizontal	-35.8	-44.5	-30.0	14.5	Complied
5850	Horizontal	-42.3	-51.0	-30.0	21.0	Complied
5725	Vertical	-34.8	-43.8	-30.0	13.8	Complied
5850	Vertical	-41.6	-50.6	-30.0	20.6	Complied

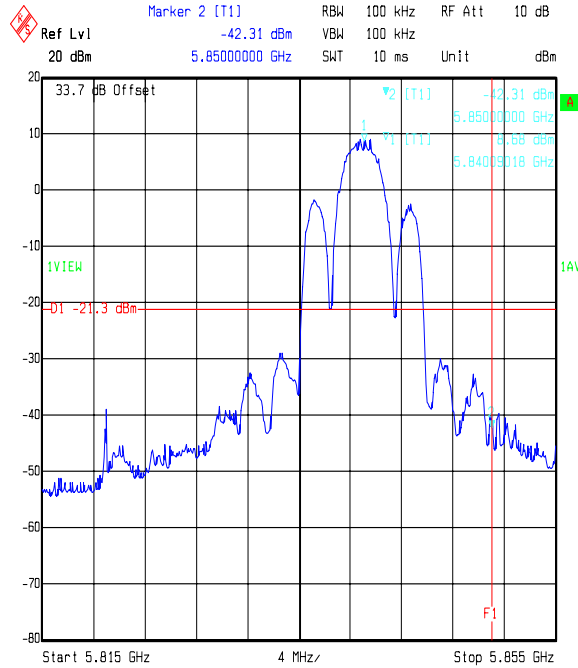


Test of: Orthogon Systems.  
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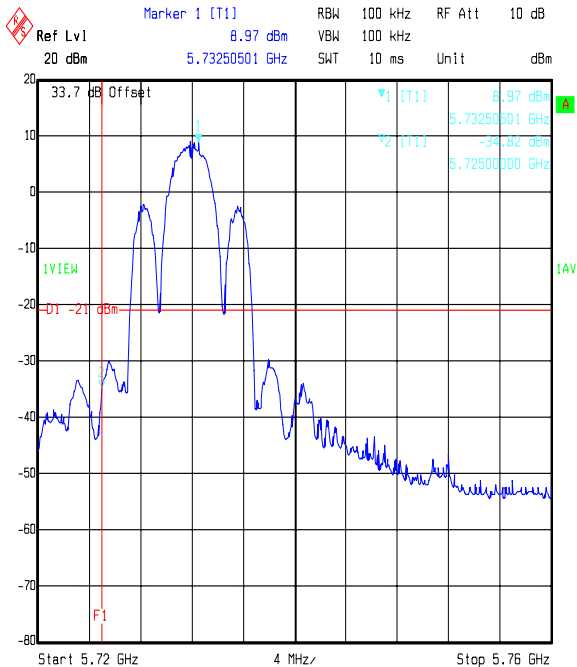
**Transmitter Band Edge Conducted Emissions: Section 15.247(c) (Continued)**



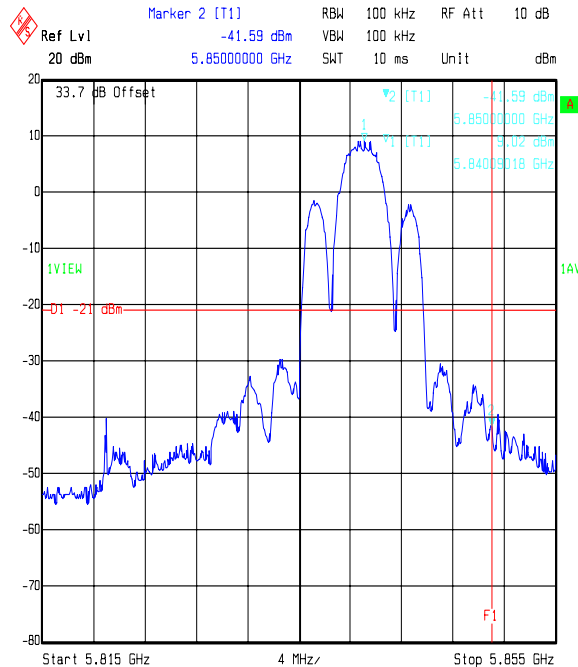
Title: 49169JD01  
 Comment A: LOWER BAND EDGE H PORT 10 MHZ CHANNEL ACQUISITION MODE  
 Date: 04.JUN.2007 17:19:18



Title: 49169JD01  
 Comment A: UPPER BAND EDGE H PORT 10 MHZ CHANNEL ACQUISITION MODE  
 Date: 04.JUN.2007 17:25:17



Title: 49169JD01  
 Comment A: LOWER BAND EDGE V PORT 10 MHZ CHANNEL ACQUISITION MODE  
 Date: 04.JUN.2007 17:21:35



Title: 49169JD01  
 Comment A: UPPER BAND EDGE V PORT 10 MHZ CHANNEL ACQUISITION MODE  
 Date: 04.JUN.2007 17:24:14

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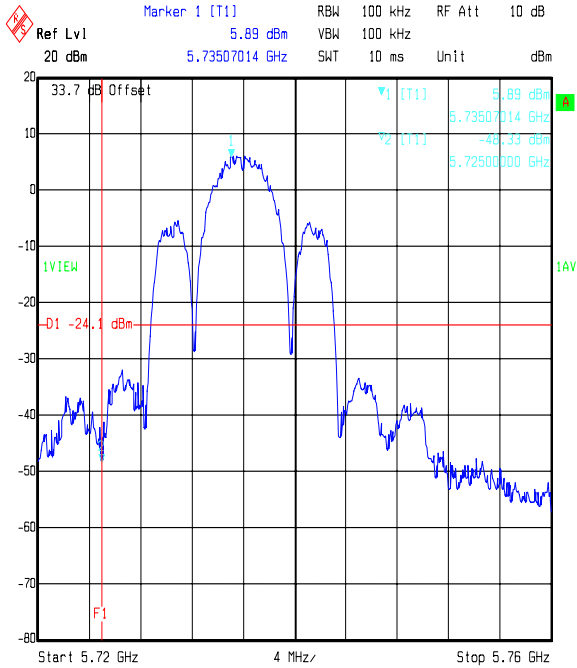
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**Transmitter Band Edge Conducted Emissions: Section 15.247(c) (Continued)****Results: Acquisition (15 MHz channel width)**

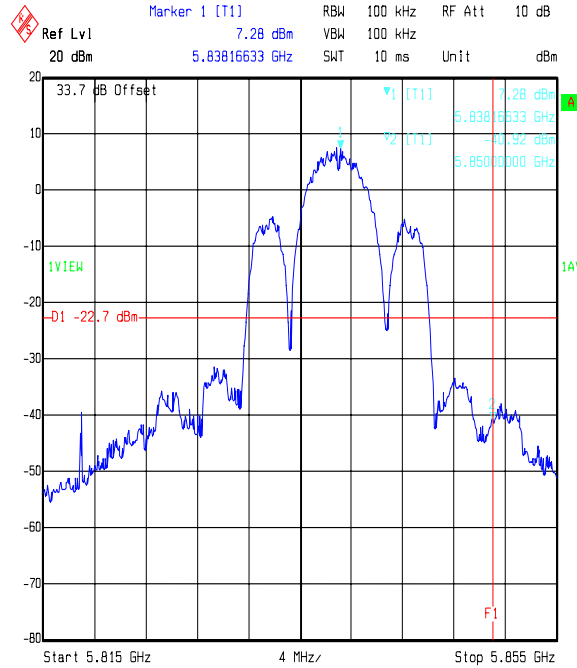
Frequency (MHz)	Antenna Port	Emission Level (dBm)	Emission Level (dBc)	Limit (dBc)	Margin (dB)	Result
5725	Horizontal	-48.3	-54.2	-30.0	24.2	Complied
5850	Horizontal	-40.9	-48.2	-30.0	18.2	Complied
5725	Vertical	-38.1	-46.0	-30.0	16.0	Complied
5850	Vertical	-40.9	-48.9	-30.0	18.9	Complied

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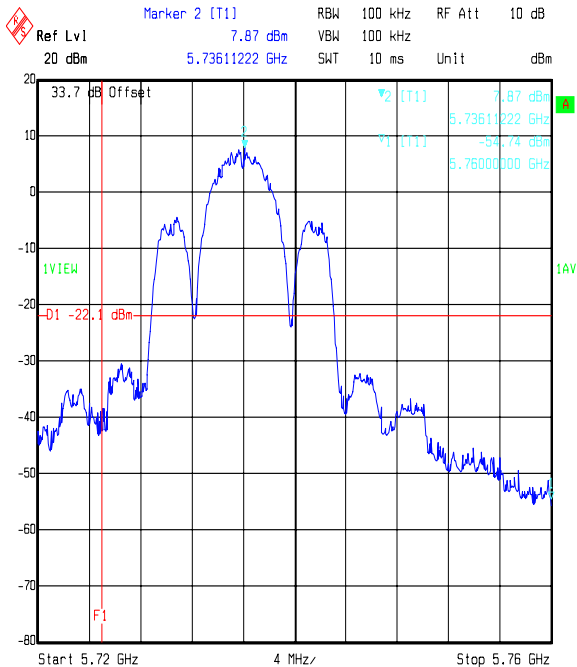
**Transmitter Band Edge Conducted Emissions: Section 15.247(c) (Continued)**



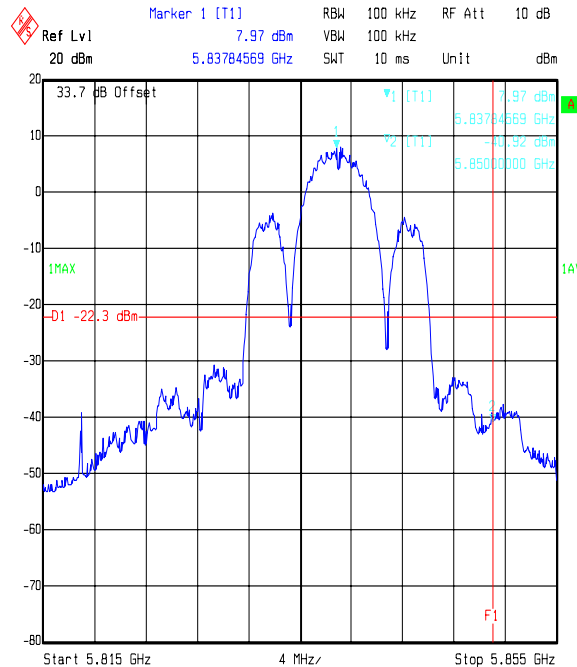
Title: 49169J001  
 Comment A: LOWER BAND EDGE H PORT 15 MHZ CHANNEL ACQUISITION MODE  
 Date: 04.JUN.2007 17:15:03



Title: 49169J001  
 Comment A: UPPER BAND EDGE H PORT 15 MHZ CHANNEL ACQUISITION MODE  
 Date: 04.JUN.2007 17:07:17



Title: 49169J001  
 Comment A: LOWER BAND EDGE V PORT 15 MHZ CHANNEL ACQUISITION MODE  
 Date: 04.JUN.2007 17:13:14



Title: 49169J001  
 Comment A: UPPER BAND EDGE V PORT 15 MHZ CHANNEL ACQUISITION MODE  
 Date: 04.JUN.2007 17:09:09

Test of: Orthogon Systems.  
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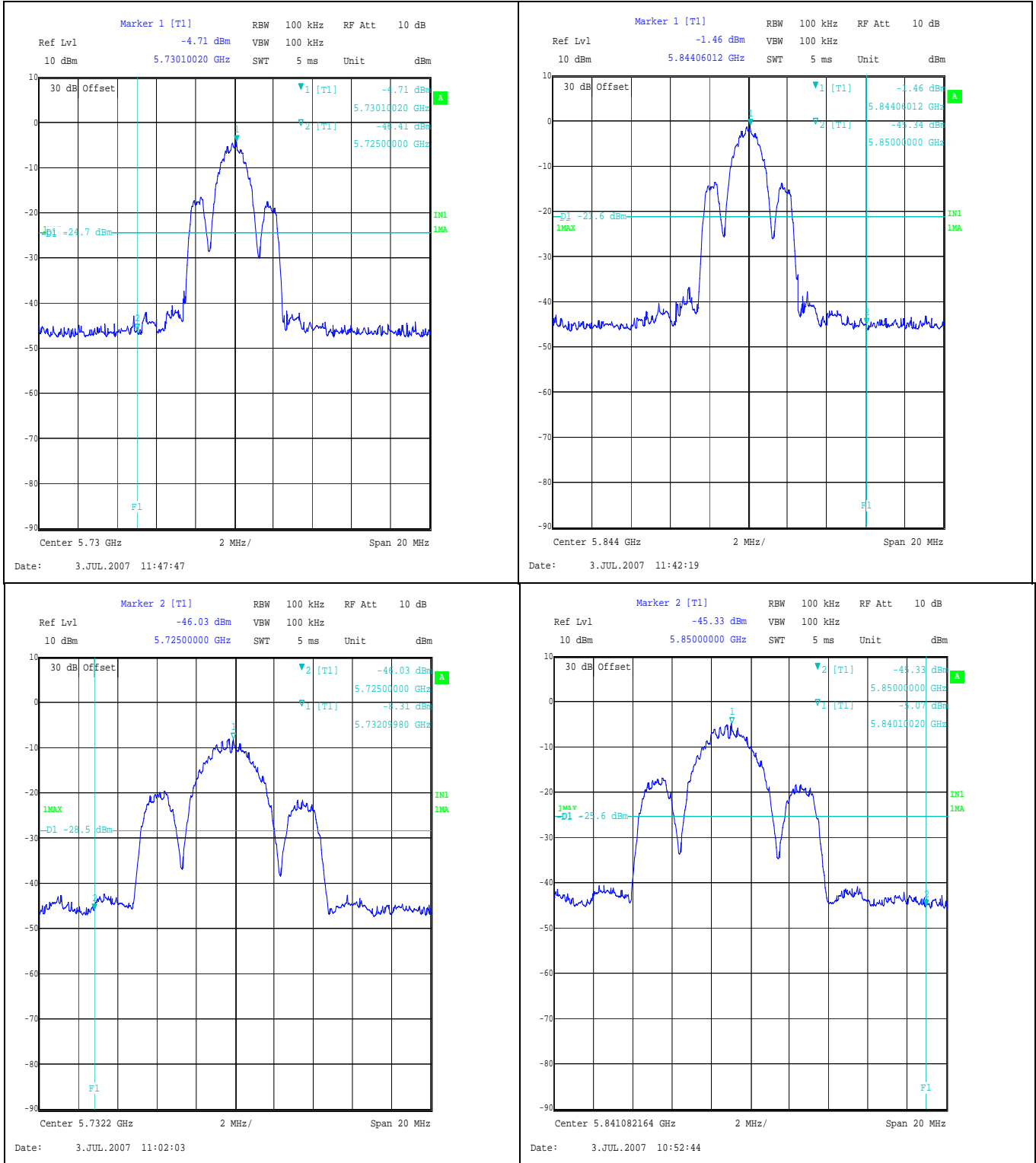
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**Transmitter Band Edge Radiated Emissions: Section 15.247(c) (Continued)****Results: Acquisition Mode**

Frequency (MHz)	Bandwidth	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
5725	5MHz	-46.4	-24.7	21.7	Complied
5850	5MHz	-45.3	-21.6	23.7	Complied
5725	10MHz	-46.0	-28.5	17.5	Complied
5850	10MHz	-45.3	-25.6	19.7	Complied
5725	15MHz	-45.8	-31.4	14.4	Complied
5850	15MHz	-45.7	-27.0	18.7	Complied

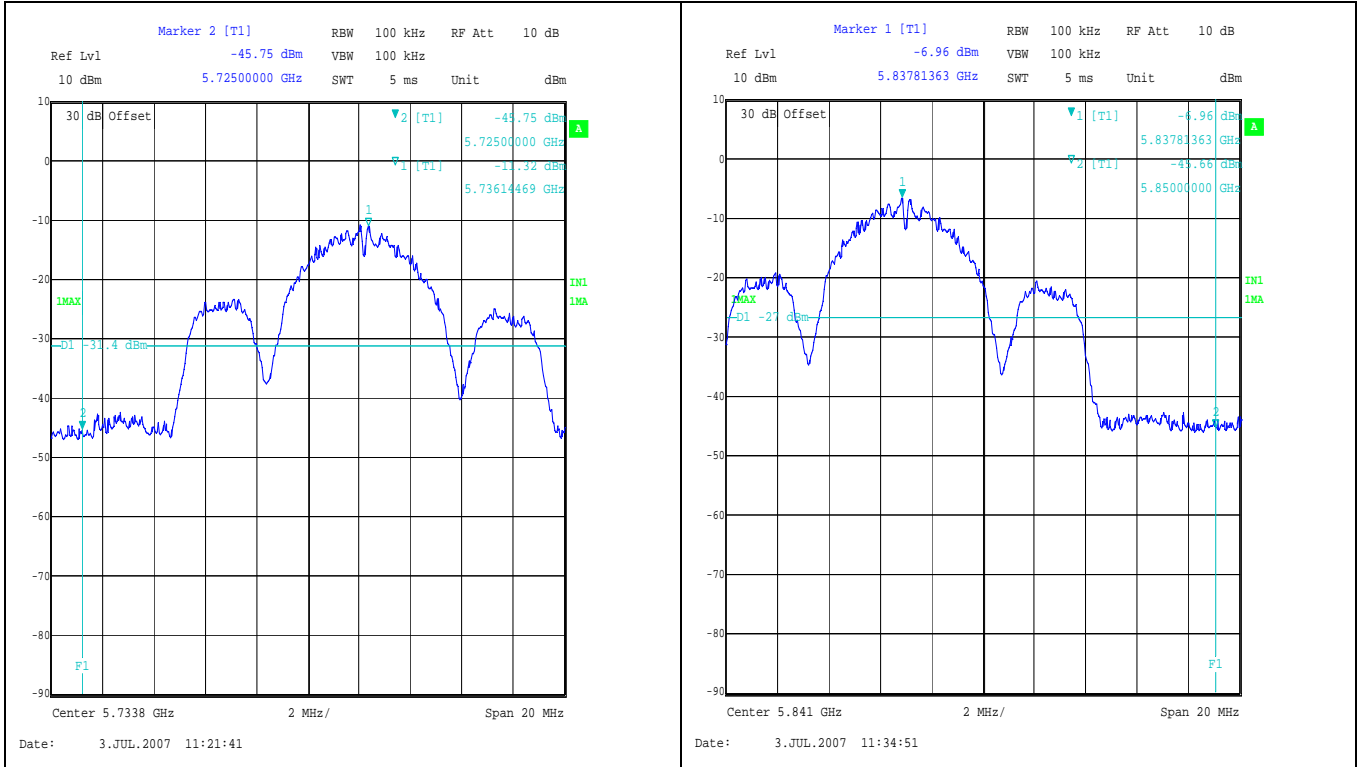
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**Transmitter Band Edge Radiated Emissions: Section 15.247(c) (Continued)**



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**Transmitter Band Edge Radiated Emissions: Section 15.247(c) (Continued)**



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## **8. Measurement Uncertainty**

8.1. 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.

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

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

8.4. 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 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
6 dB/20 dB Bandwidth	Not applicable	95%	+/- 0.12 %
Radiated Spurious Emissions	30 MHz to 1000 MHz	95%	+/- 5.26 dB
Radiated Spurious Emissions	1 GHz to 40 GHz	95%	+/- 1.78 dB

8.5. 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.

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## **9. Measurement Methods**

### **9.1. 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. The EUT was powered with 115V 60 Hz AC mains supplied via a Line Impedance Stabilisation Network (LISN).

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:

<b>Receiver Function</b>	<b>Initial Scan</b>	<b>Final Measurements</b>
Detector Type:	Peak	Quasi-Peak (CISPR)/Average
Mode:	Max Hold	Not applicable
Bandwidth:	10 kHz*	9 kHz*
Amplitude Range:	60 dB	20 dB
Measurement Time:	Not applicable	> 1 s
Observation Time:	Not applicable	> 15 s
Step Size:	Continuous sweep	Not applicable
Sweep Time:	Coupled	Not applicable



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## **9.2. Radiated Emissions**

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

Initial measurements covering the entire measurement band in the form of swept scans in a shielded enclosure were performed in order to identify frequencies on which the EUT was generating interference. This determined the frequencies on which the EUT should be re-measured in full on the open area test site. In order to minimise the time taken for the swept measurements, a Peak detector was used in conjunction with the appropriate detector IF measuring bandwidth (see table below). Repetitive scans were performed to allow for emissions with low repetition rates.

The initial scans were performed using an antenna height of 1.5 m and a measurement distance of 3 m. Following the initial scans, graphs were produced giving an overview of the emissions from the EUT plotted against the appropriate specification limit. Any emission within 20 dB of the limit were then measured on the open area test site, except in cases where the noise floor was within 20 dB of the limit, in these cases the highest point of the noise floor was measured.

Where an emission fell inside a restricted band, measurements were made at the appropriate test distance using a measuring receiver with a Quasi-Peak detector for measurements below 1000 MHz and an Average and Peak detector for measurements above 1000 MHz. A peak detector was used for all other measurements.

For the final measurements the EUT was arranged on a non-conducting turn table on a standard test site compliant with ANSI C63.4 – 2003 Clause 5.4.

All measurements on the open area test site were performed using broadband antennas.

On the open area test site, at each frequency where a signal was to be measured, the trace was maximised by rotating a turntable through 360°. The angle at which the maximum signal was observed was locked out. For frequencies below 1000 MHz the test antenna was varied in height between 1 m and 4 m in order to further maximise the target emission.

For frequencies above 1000 MHz where a horn antenna was used, height searching was performed to locate the optimal height of the horn with respect to the EUT. At this point the horn was locked off and the turntable was again rotated through 360° to maximise the target signal. It should be noted that the received signal from the EUT would diminish very quickly after it exits the beam width of the horn antenna, for this reason it may not be necessary to fully height search with the horns.

At this point, any signals found to be between the limit and a level 6 dB below it were further maximised by changing the configuration of the EUT, e.g. re-routing cables to peripherals and moving peripherals with respect to the EUT.

Scans were performed to the upper frequency limits as stated in Section 15.33

The final field strength was determined as the indicated level in dB $\mu$ V plus cable loss and antenna factor.

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**Radiated Emissions (Continued)**

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

<b>Receiver Function</b>	<b>Initial Scan</b>	<b>Final Measurements Below 1 GHz</b>	<b>Final Measurements Above 1 GHz</b>
Detector Type:	Peak	Quasi-Peak (CISPR)	Peak / Average
Mode:	Max Hold	Not applicable	Max Hold
Bandwidth:	(120 kHz < 1 GHz) (1 MHz > 1 GHz)	120 kHz	1 MHz
Amplitude Range:	100 dB	100 dB	100 dB
Step Size:	Continuous sweep	Not applicable	Not applicable
Sweep Time:	Coupled	Not applicable	Not applicable

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### **9.3. 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 an average detector was used in conjunction with the appropriate detector IF measuring bandwidth.

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.

### **9.4. Minimum 6 dB Bandwidth**

The EUT and spectrum analyser were configured 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 6 dB bandwidth, a resolution bandwidth of 50 kHz, 100 kHz or 200 kHz was used, which is approximates to 1% of the 6 dB bandwidth. A video bandwidth of 1 MHz 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.

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### **9.5. Transmitter 20 dB Bandwidth**

The EUT and spectrum analyser was configured for transmitter radiated emissions measurements.

To determine the occupied bandwidth, a resolution bandwidth of 50 kHz, 100 kHz or 200 kHz was used, which is greater than 1% of the 20 dB bandwidth. A video bandwidth of at least the same value was used. The analyser was set for a maximum hold scan to capture the profile of the signal. The peak level was then determined, and a reference line was drawn 20 dB below the peak level. The bandwidth was determined at the points where the 20 dB reference crossed the profile of the emission.

### **9.6. Spectral Power Density**

The EUT and spectrum analyser were configured 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.

An average detector was used for the measurement, then the level was taken of the highest average power in any 3 kHz band.

### **9.7. Peak Output Power**

The EUT was configured 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 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 thermal power sensor and a power meter.

A spectrum analyser was used to measure the duty cycle of the transmit signal and then a level was added to the power meter reading, calculated using the following formula:  $10 \log (1 / \text{Duty Cycle})$

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### Appendix 1. Test Equipment Used

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval (Months)
A028	Horn Antenna	Eaton	91888-2	304	08 Jun 2006	36
A031	Horn Antenna	Eaton	91889-2	557	08 Jun 2006	36
A1069	LISN	Rohde & Schwarz	ESH3-Z5	837469/012	09 Feb 2007	12
A1391	Attenuator	Huber + Suhner	757987	6810.17.B	Cal before use	-
A1392	Attenuator	Huber + Suhner	757456	6820.17.B	Cal before use	-
A1396	Attenuator	Huber + Suhner	757987	6810.17.B	Cal before use	-
A174	Coaxial Adapter	Flann Microwave	22094-KF20	211	Cal before use	-
A1785	Pre-amplifier	Farran Technology	FLNA-28-30	FTL 6483	03 Aug 2006	12
A203	Horn Antenna	Flann Microwave	22240-20	343	21 Jul 2006	36
A253	Horn Antenna	Flann Microwave	12240-20	128	17 Nov 2006	36
A254	Horn Antenna	Flann Microwave	14240-20	139	17 Nov 2006	36
A255	Horn Antenna	Flann Microwave	16240-20	519	17 Nov 2006	36
A256	Horn Antenna	Flann Microwave	18240-20	400	17 Nov 2006	36
A436	Horn Antenna	Flann	20240-20	330	24 Apr 2006	36
A553	Bi-log Antenna	Chase	CBL6111A	1593	01 Nov 2006	12
C055	Cable	RFI	None	None	05 Jun 2007	12
C1083	Cable	Rosenberger	001	2799	Cal before use	-
C1165	Cable	Rosenberger	FA210A1020 007070	43189-1	05 Jun 2007	12
C1167	Cable	Rosenberger	FA210A1030 007070	43190-01	05 Jun 2007	12
C1191	Cable	Rosenberger	FA210A1015 M3030	27141-06	Cal before use	-
C1192	Cable	Rosenberger	FA210A1015 M3030	27141-07	31 May 2007	12
C1193	Cable	Utiflex	FA147A1015 M2020A	BUA02C 0154	Cal before use	-
C1265	Cable	Rosenberger	FA210A1020 007070	49317-01	Cal before use	-
C1268	Cable	Rosenberger	FA210A0075 008080	49356-1	Cal before use	-
C363	Cable	Rosenberger	RG142	None	Cal before use	-

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**Test Equipment Used (Continued)**

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval (Months)
M1124	Spectrum Analyser	Rohde & Schwarz	ESIB26	100046K	08 Sep 2006	12
M1229	Digital Multimeter	Fluke	179	87640015	20 Apr 2007	12
M1242	Spectrum Analyser	Rohde & Schwarz	FSEM30	845986_022	08 Sep 2006	12
M1263	EMI Test Receiver	Rohde & Schwarz	ESIB7	100265	25 Jan 2007	12
M127	Spectrum Analyser	Rohde & Schwarz	FSEB 30	842 659/016	07 Aug 2006	12
M1273	Test Receiver	Rhode & Schwarz	ESIB 26	100275	20 Feb 2007	12
M1390	Harmonic Mixer	Farran Technology	WHMP 28	FTL1677B	03 Aug 2006	12
S0520	Power Supply	GW instek	GPC-3030	E835141	Cal before use	-
S0529	DC Power Supply	ISO-Tech	IPS2302A	504E005G2	Cal before use	-
S0539	AC Power Supply	Kikusui	PCR 1000L	13010170	Cal before use	-
S202	3m OATS	RFI	2	S202-15011990	17 Nov 2006	12
S207	PMR Bench Site	RFI	7	None	Not calibrated	-
S209	Screened Room	RFI	9	None	Not calibrated	-
S212	Screened Room	RFI	12	None	Not calibrated	-

**NB** In accordance with UKAS requirements, all the measurement equipment is on a calibration schedule. All equipment was within calibration at the time of the test.

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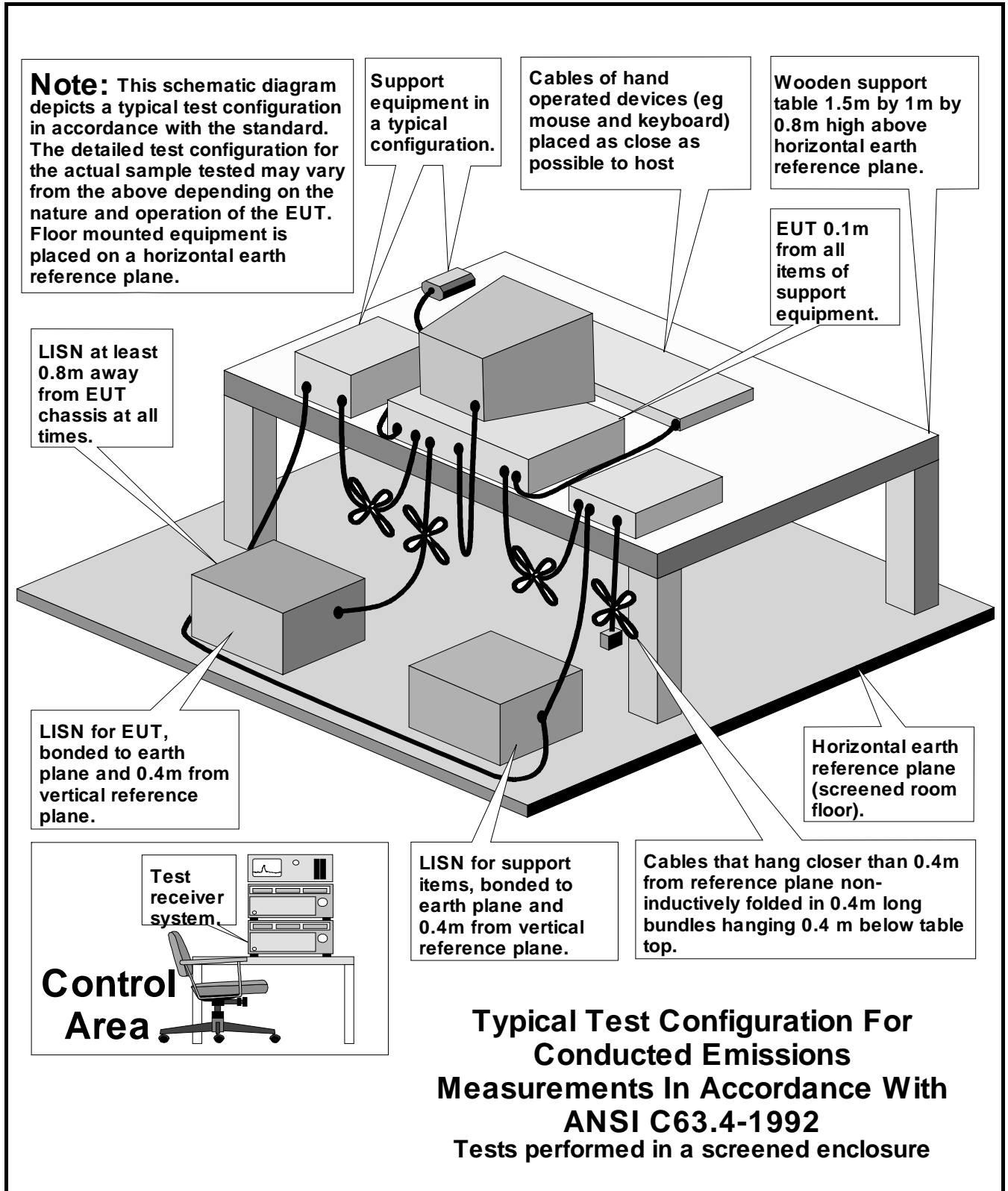
## **Appendix 2. Test Configuration Drawings**

This appendix contains the following drawings:

<b>Drawing Reference Number</b>	<b>Title</b>
DRG\49169JD01\EMICON	Test configuration for measurement of conducted emissions.
DRG\49169JD01\EMIRAD	Test configuration for measurement of radiated emissions.

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DRG\49169JD01\EMICON

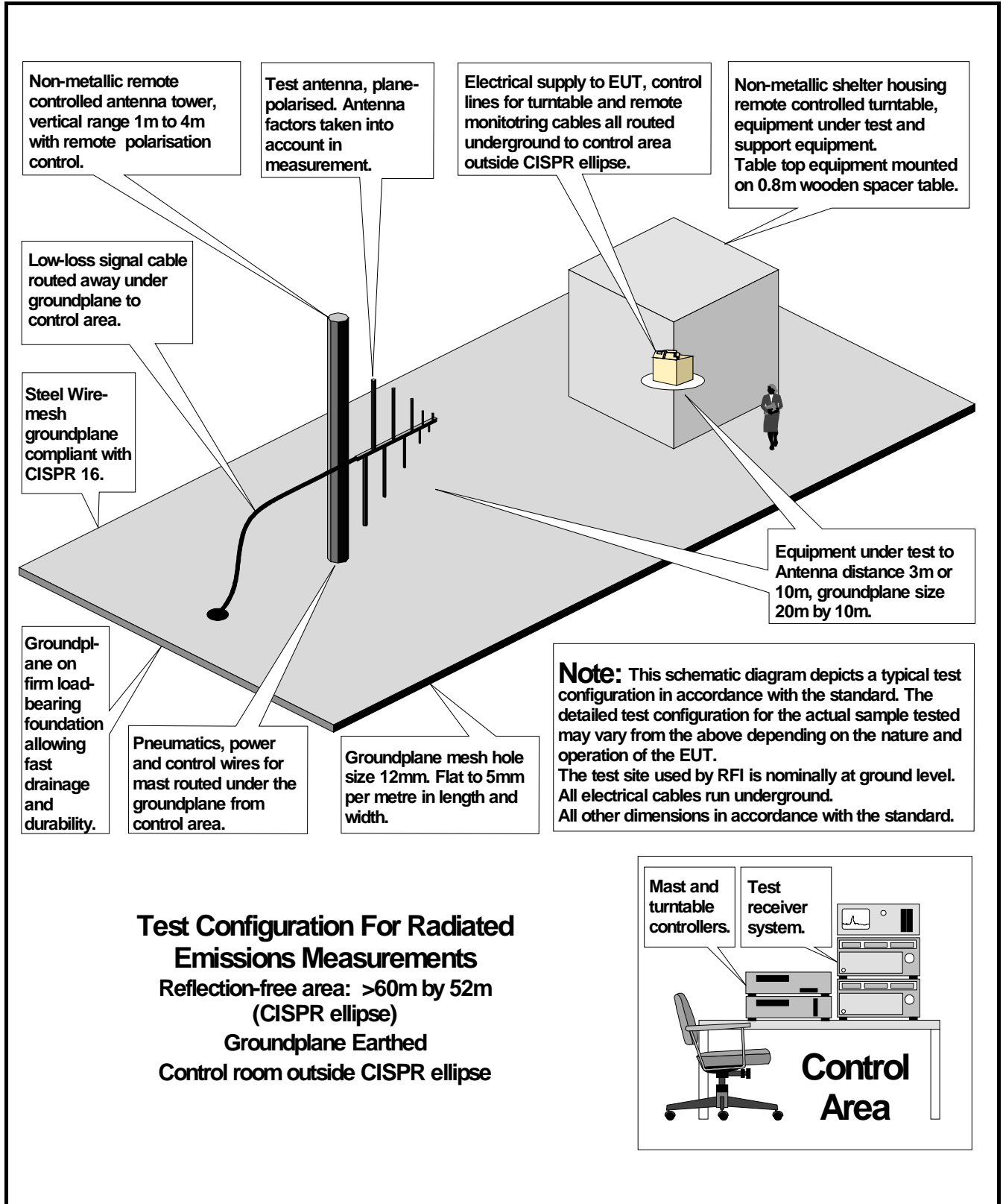


Note: This diagram is also applicable for the latest version of ANSI C63.4-2003



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DRG\49169JD01\EMIRAD



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