TEST REPORT
FROM
RFI GLOBAL SERVICES LTD

Test Of: IPWireless UK Ltd
UE P1D Model: KF

To: FCC Part 27

Test Report Serial No:
RFI/MPTE1/RP47147JD01A

Supersedes Test Report Serial No:
RFI/MPTB3/RP45298JD05A

This Test Report Is Issued Under The Authority Of Andrew Brown, Operations Manager: **pp**	
Tested By: Steven Wong	**Checked By: Tony Henriques**
Report Copy No: PDF01	
Issue Date: 22 April 2005	**Test Dates: 08 September 2003 to 12 September 2003 and 11 April 2005**

This test report was produced at the request of the client to demonstrate compliance with the requirements of FCC Part 27 and supersedes the original test report that was issued against the requirements of FCC Parts 21 and 74.

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1. Client Information

Company Name:	IPWireless (UK) Ltd.
Address:	Unit 7 Greenways Business Park Bellinger Close Chippenham Wilts SN15 1BN
Contact Name:	Mr P. Warburg

2. Equipment Under Test (EUT)

The following information has been supplied by the client:

2.1. Identification Of Equipment Under Test (EUT)

Brand Name:	Wireless Broadband Modem
Model Name or Number:	KF
Serial Number:	KF3D442013H21
Country of Manufacture:	UK
FCC ID Number:	PKTP1DKF1

Brand Name:	Phihong PSU
Model Name or Number:	PSC05R-050 (IP)
Serial Number:	C31603026A1
Country of Manufacture:	Taiwan

2.2. Description Of EUT

The equipment under test is a wireless broadband modem; the modem provides high-speed internet access when used with a host computer.

2.3. Modifications Incorporated In EUT

During the course of testing the EUT has not been modified.

2.4. Additional Information Related To Testing

Power Supply Requirement:	Nominal 110V, 60 Hz, AC Mains Supply		
Intended Operating Environment:	Residential, Commercial, Light Industry		
Equipment Category:	Miscellaneous Wireless Communications Services		
Type of Unit:	Wireless Broadband Modem		
Interface Ports:	USB Port Mains 110 VAC Input Antenna Port		
Transmit Frequency Range	2.506 GHz to 2.680 GHz		
Band Edges	2.500 GHz and 2.690 GHz		
Transmit Channels Tested	**Channel ID**	**Channel Number**	**Channel Frequency (MHz)**
	Bottom	N/A	2506
	Middle	N/A	2596
	Top	N/A	2680
Receive Frequency Range	2.506 GHz to 2.680 GHz		
Receive Channels Tested	**Channel ID**	**Channel Number**	**Channel Frequency (MHz)**
	Bottom	N/A	2506
	Middle	N/A	2596
	Top	N/A	2680
Highest Fundamental Frequency	2680 MHz		
Highest Oscillator Frequency	2300 MHz		
Maximum Power Output (EIRP)	26.0 dBm (24 dBm conducted, 2.0 dBi antenna gain)		

2.5. Support Equipment

The following support equipment was supplied by the applicant and used to exercise the EUT during testing:

Description:	Laptop PC
Brand Name:	Sony Vaio
Model Name or Number:	PCG-Z505HSK
Serial Number:	28305733 3350053
Cable Length and Type	2 m
Connected to Port:	USB

Description:	External Power supply for Laptop	
Brand Name:	Sony	
Model Name or Number:	PCGA-ACX1	
Serial Number:	0004-A-0632772P	
Cable Length and Type	2 m Mains Cable	1.8 m 2 core
Connected to Port:	AC I/P	DC O/P

3. Test Specification, Methods and Procedures

3.1. Test Specification

Reference:	FCC Part 27: 2004: Sections 27.50, 27.53 and 27.54
Title:	Code of Federal Regulations, Part 27 (47CFR) Subpart C Miscellaneous Wireless Communications Services
Purpose of Test:	To determine whether the equipment complied with the requirements of the specification for the purposes of certification.

3.2. Methods And Procedures

The methods and procedures used were as detailed in:

ANSI/TIA-603-B-2003
Land Mobile Communications Equipment, Measurements and Performance Standards.

ANSI C63.2 (1996)
Title: American National Standard for Instrumentation - Electromagnetic noise and field strength.

ANSI C63.4 (2003)
Title: American National Standard for Methods of Measurement of Radio-Noise Emissions from Low Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

ANSI C63.5 (1998)
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.

3.3. 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.

4. Deviations From The Test Specification

None

5. Operation of The EUT During Testing

5.1. Operating Modes

The EUT was tested in the following operating modes:

Transmitter Modes:

For all conducted antenna port tests, except the Spurious emission band edge, the EUT was transmitting at full power on bottom, middle and top channels on all 15 timeslots. For the Spurious emissions band edge the transmitter was at full power for 5 of the 15 time slots, typical of normal operation. In normal use the transmitter would not exceed 5 of the 15 time slots used, as being a TDD system, it must receive information in order to maintain the link.

For radiated tests, the EUT was transmitting at full power on bottom, middle and top channels on 15 timeslots.

Receiver Modes:

Testing was performed with the EUT receiving on all timeslots.

5.2. Configuration and Peripherals

The EUT was tested in the following configuration:

All tests were performed with an external AC adaptor connected to 110 VAC, 60 Hz, AC Mains supply, and the USB port connected to a laptop PC

Appendix 3 contains a schematic diagram of the test configuration.

6. Summary Of Test Results

Receive Mode

Range of Measurements	Specification Reference	Port Type	Compliancy Status
AC Conducted Spurious Emissions (150 kHz to 30 MHz)	CFR 47: 2004 FCC Part 15 Section 15.107	AC Mains	Complied
Receive Mode Spurious Emissions	CFR 47: 2004 FCC Part 15 Section 15.109	Enclosure	Complied

Transmit Mode

Range of Measurements	Specification Reference	Port Type	Compliancy Status
Transmitter Carrier Output Power and EIRP	CFR 47: 2004 FCC Part 2.1046, Part 27.50	Antenna Terminals	Complied
Frequency Stability (Temperature Variation)	CFR 47: 2004 FCC Part 2.1055, Part 27.54	Antenna Terminals	Complied
Frequency Stability (Voltage Variation)	CFR 47: 2004 FCC Part 2.1055, Part 27.54	Antenna Terminals	Complied
Occupied Bandwidth	CFR 47: 2004 FCC Part 2.1049	Antenna Terminals	Complied
Conducted Spurious Emissions at Band Edges	CFR 47: 2004 FCC Part 2.1051, Part 27.53	Antenna Terminals	Complied
Conducted Spurious Emissions	CFR 47: 2004 FCC Part 2.1051, Part 27.53	Antenna Terminals	Complied
Radiated Spurious Emissions	CFR 47: 2004 FCC Part 2.1053, Part 27.53	Antenna	Complied
Radiated Spurious Emissions at Band Edges	CFR 47: 2004 FCC Part 2.1053, Part 27.53	Antenna	Complied

6.1. Location of Tests

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

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 Appendix 2 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 8 for details of measurement uncertainties.

7.1.3. Additional testing was performed, as necessary, on 11th April 2005 to allow the EUT to demonstrate compliance with the requirements of Part 27.53 *Emission limits* subsection (l) (4) (4) which states: *For mobile digital stations, the attenuation factor shall be not less than 43 + 10 log (P) dB* (≡ -13 dBm) *at the channel edge and 55 + 10 log (P) dB* (≡ -25 dBm) *at 5.5 MHz from the channel edges*. The spurious emissions limit greater than 5.5 MHz away from the channel edge (-25 dBm) is tougher than the original requirement in Parts 21 and 74 therefore some additional testing was necessary in order to demonstrated compliance against Part 27.53.

7.2. Standby AC Conducted Spurious Emissions: Part 15.107

7.2.1. The EUT was configured as for AC conducted emissions measurements as described in section 9 of this report.

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

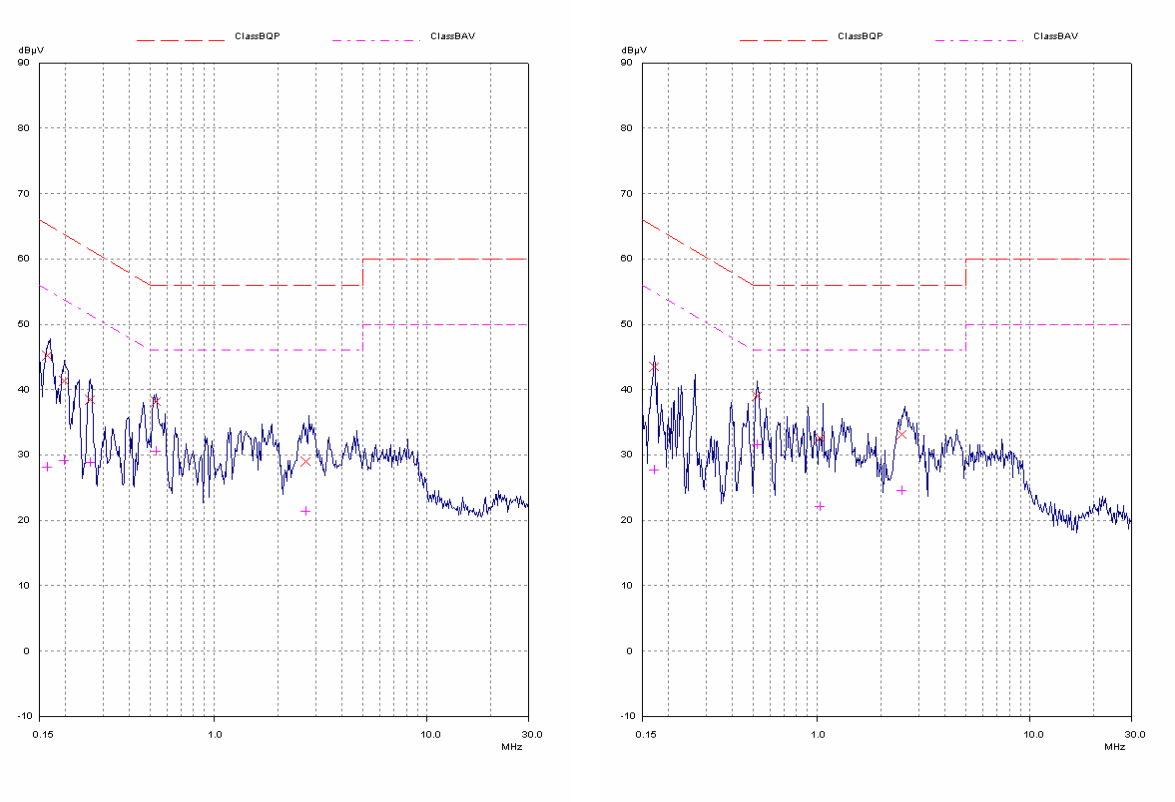
Results: Quasi-Peak Detector Measurements on Live and Neutral Lines

Frequency (MHz)	Line	Q-P Level (dBμV)	Q-P Limit (dBμV)	Margin (dB)	Result
0.164	Live	45.22	65.24	20.02	Complied
0.170	Neutral	43.43	64.94	21.51	Complied
0.521	Neutral	39.06	56.00	16.94	Complied
0.529	Live	38.15	56.00	17.85	Complied
2.485	Neutral	33.14	56.00	22.86	Complied

Results: Average Detector Measurements on Live and Neutral Lines

Frequency (MHz)	Line	Av. Level (dBμV)	Av. Limit (dBμV)	Margin (dB)	Result
0.164	Live	28.07	55.24	27.17	Complied
0.170	Neutral	27.68	54.94	27.26	Complied
0.521	Neutral	31.54	46.00	14.46	Complied
0.529	Live	30.63	46.00	15.37	Complied
2.485	Neutral	24.54	46.00	21.46	Complied

Receive AC Conducted Spurious Emissions (Continued)



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

7.3. Receiver Radiated Emissions - 30 MHz to 1.0 GHz: Part 15.109

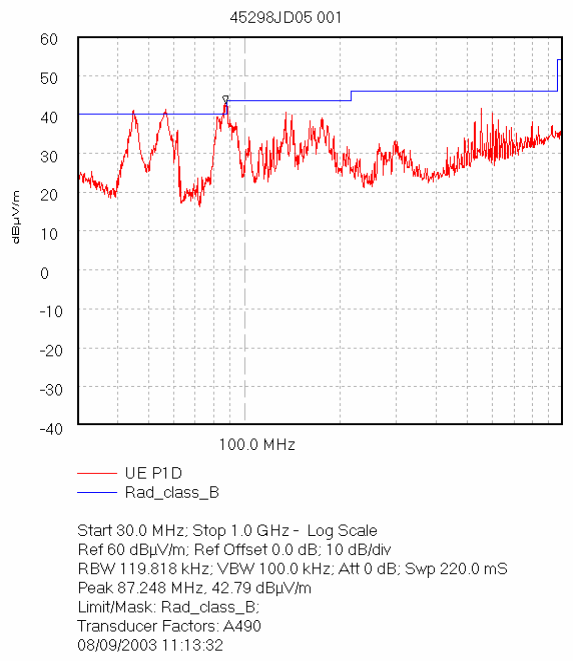
7.3.1. The EUT was configured as for receiver-radiated emissions testing as described in section 9 of this report.

7.3.2. Tests were performed to identify the maximum receiver or standby radiated emissions levels.

Results:

Frequency (MHz)	Ant. Pol.	Q-P Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
44.97	Vert.	26.2	40.0	13.8	Complied
45.319	Vert.	23.6	40.0	16.4	Complied
57.24	Vert.	23.1	40.0	16.9	Complied
54.80	Vert.	23.4	40.0	16.6	Complied
85.69	Vert.	20.9	40.0	19.1	Complied
87.18	Vert.	19.2	40.0	20.8	Complied
88.64	Vert.	23.5	40.0	16.5	Complied
134.98	Vert.	25.3	43.5	18.2	Complied
552.94	Vert.	39.0	43.5	4.5	Complied

Receiver Radiated Emissions - 30 MHz to 1.0 GHz (Continued)



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

7.4. Receiver Radiated Emission – 1 GHz to 12.5 GHz: Part 15.109

7.4.1. The EUT was configured as for receiver-radiated emissions testing as described in section 9 of this report.

7.4.2. Tests were performed to identify the maximum receiver or standby radiated emissions levels.

Results:

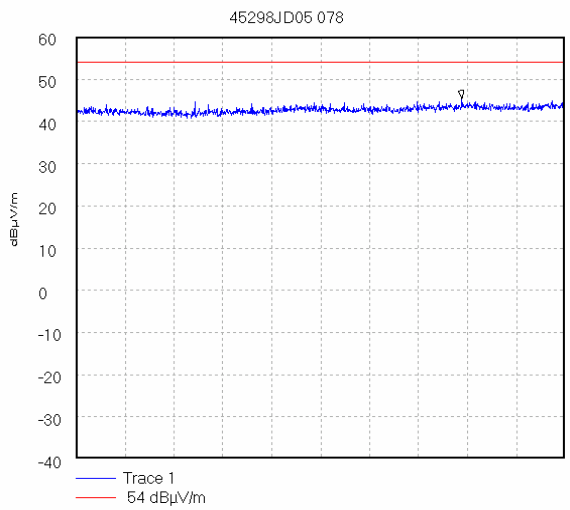
Highest Average Level:

Frequency (MHz)	Antenna Polarity (H/V)	Average Detector level (dBμV)	Antenna factor (dB)	Cable loss (dB)	Actual Average Level (dBμV/m)	Average Limit (dBμV/m)	Average Margin (dB)	Result
2067.0	Vert.	14.2	20.5	1.4	36.1	54.0	17.9	Complied

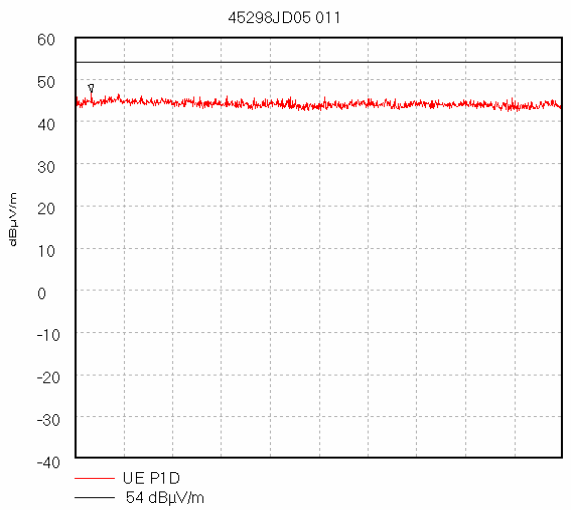
Highest Peak Level:

Frequency (MHz)	Antenna Polarity (H/V)	Peak Detector level (dBμV)	Antenna factor (dB)	Cable loss (dB)	Actual Peak Level (dBμV/m)	Peak Limit (dBμV/m)	Peak Margin (dB)	Result
2067.0	Vert.	25.0	20.5	1.4	46.9	74.0	27.1	Complied

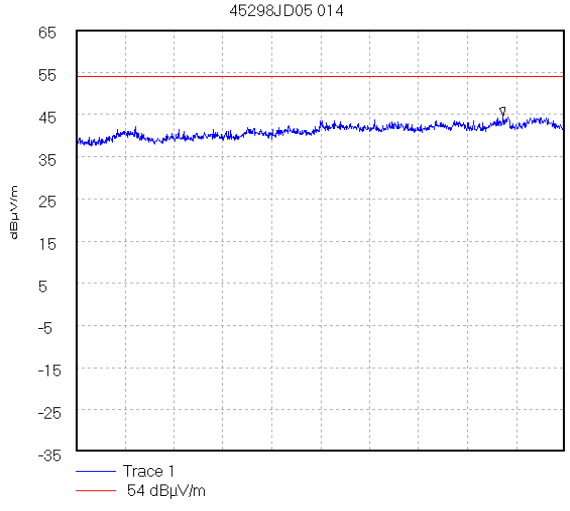
Receiver Radiated Emission – 1 GHz to 12.5 GHz (Continued)



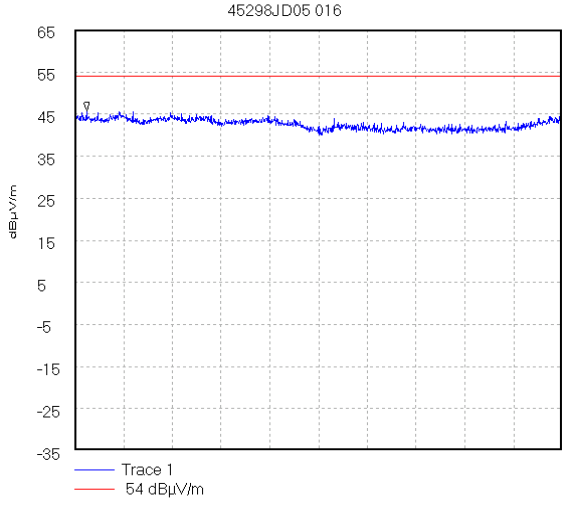
Start 1.0 GHz; Stop 2.0 GHz
Ref 60 dBµV/m; Ref Offset 0.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 1.78889 GHz, 45.38 dBµV/m
Display Line: 54 dBµV/m;
Transducer Factors: A027_1to2horn_3m
10/09/2003 14:24:17



Start 2.0 GHz; Stop 4.0 GHz
Ref 60 dBµV/m; Ref Offset 0.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 2.067 GHz, 46.88 dBµV/m
Display Line: 54 dBµV/m;
Transducer Factors: 2 to 4
08/09/2003 14:36:16



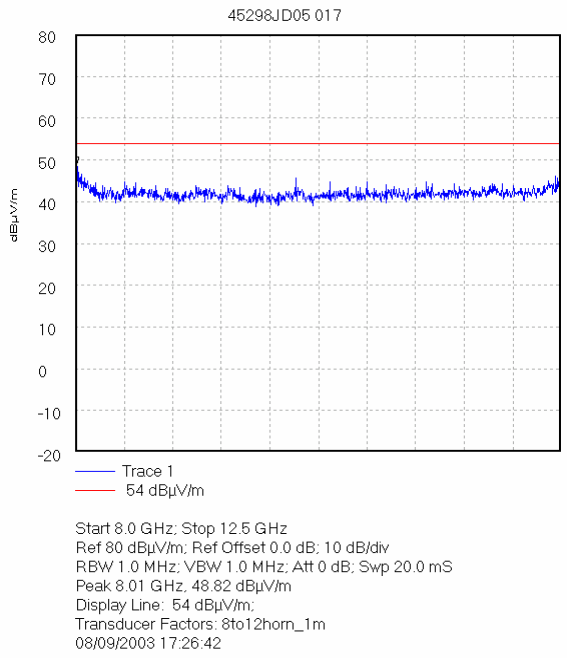
Start 4.0 GHz; Stop 6.0 GHz
Ref 65 dBµV/m; Ref Offset 0.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 5.747 GHz, 44.59 dBµV/m
Display Line: 54 dBµV/m;
Transducer Factors: 4to6horn_1m
08/09/2003 16:45:40



Start 6.0 GHz; Stop 8.0 GHz
Ref 65 dBµV/m; Ref Offset 0.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 6.049 GHz, 45.73 dBµV/m
Display Line: 54 dBµV/m;
Transducer Factors: 6to8horn_1m
08/09/2003 16:52:33

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

Receiver Radiated Emission – 1 GHz to 12.5 GHz (Continued)



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

7.5. Transmitter Carrier Output Power and Effective Isotropic Radiated Power (EIRP): Part 2.1046 and Part 27.50

7.5.1. The EUT was configured as for conducted RF output power and Effective Isotropic Radiated Power (EIRP) as described in section 9 of this report.

7.5.2. The effective isotropic radiated power (EIRP) was calculated by adding the manufacturer's declared antenna gain to the figure measured for conducted RF output power.

Results EIRP

Channel	Measured Frequency (MHz)	Conducted RF O/P Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	2506.00	23.9	2.0	25.9	33.0	7.1	Complied
Middle	2596.00	23.9	2.0	25.9	33.0	7.1	Complied
Top	2680.00	23.7	2.0	25.7	33.0	7.3	Complied

7.6. Transmitter Frequency Stability: (Temperature Variation): Parts 2.1055 and Part 27.54

7.6.1. The EUT was configured as for frequency stability measurements as described in Section 9 of this report.

7.6.2. Tests were performed to identify the maximum frequency error of the EUT with variations in ambient temperature.

Results:

Bottom Channel (2506 MHz)

Temperature (ºC)	Measured Frequency (MHz)	Frequency Error (Hz)
-30	2506.000937	937
-20	2506.000115	115
-10	2506.000200	200
0	2506.000487	487
10	2506.000247	247
20	2506.000227	227
30	2506.000767	767
40	2506.001207	1207
50	2506.000340	340

Middle Channel (2596 MHz)

Temperature (ºC)	Measured Frequency (MHz)	Frequency Error (Hz)
-30	2596.000590	590
-20	2596.000103	103
-10	2595.999567	-433
0	2596.000487	487
10	2595.999700	-300
20	2596.000197	197
30	2596.000223	223
40	2596.001152	1152
50	2596.000007	007

Transmitter Frequency Stability: (Temperature Variation) (Continued)

Top Channel (2680 MHz)

Temperature (ºC)	Measured Frequency (MHz)	Frequency Error (Hz)
-30	2680.000723	723
-20	2680.000147	147
-10	2679.999556	-444
0	2680.000514	514
10	2679.999687	-313
20	2680.000233	233
30	2680.000223	223
40	2680.000130	130
50	2679.999990	-10

As can be seen from the frequency stability results above, the fundamental emissions at the highest and lowest operating frequencies of the EUT (in addition to the fundamental emission at the centre of the operating band) stay, under all test conditions, within the authorised bands of operation i.e. 2496 MHz to 2690 MHz. The EUT is, therefore, compliant.

7.7. Transmitter Frequency Stability: (Voltage Variation) Parts 2.1055 and Part 27.54

7.7.1. The EUT was configured as for frequency stability measurements as described in section 9 of this report.

7.7.2. Tests were performed to identify the maximum frequency error of the EUT with variations in nominal operating voltage.

Results:

Bottom Channel (2506 MHz)

Supply Voltage (VAC)	Measured Frequency (MHz)	Frequency Error (Hz)
93.5	2506.001175	1175
126.5	2506.001167	1167

Middle Channel (2596 MHz)

Supply Voltage (VAC)	Measured Frequency (MHz)	Frequency Error (Hz)
93.5	2596.001217	1217
126.5	2596.001217	1217

Top Channel (2680 MHz)

Supply Voltage (VAC)	Measured Frequency (MHz)	Frequency Error (Hz)
93.5	2680.001267	1267
126.5	2680.001258	1258

As can be seen from the frequency stability results above, the fundamental emissions at the highest and lowest operating frequencies of the EUT (in addition to the fundamental emission at the centre of the operating band) stay, under all test conditions, within the authorised bands of operation i.e. 2496 MHz to 2690 MHz. The EUT is, therefore, compliant.

7.8. Transmitter Occupied Bandwidth: Part 2.1049

7.8.1. The EUT was configured as for Occupied Bandwidth measurements as described in section 9 of this report.

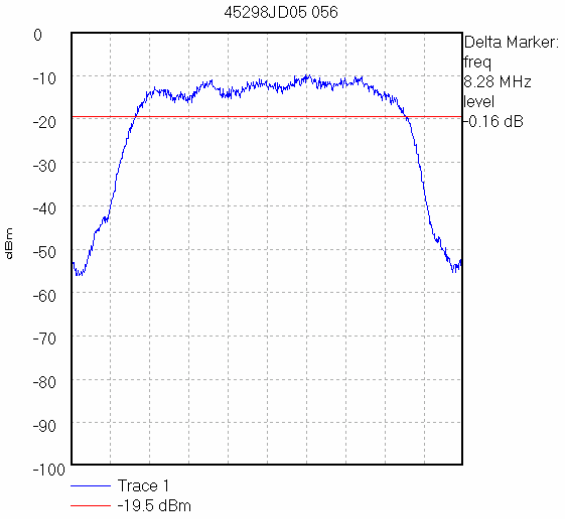
7.8.2. Tests were performed to identify the maximum bandwidth occupied by the fundamental frequency of the EUT.

Results:

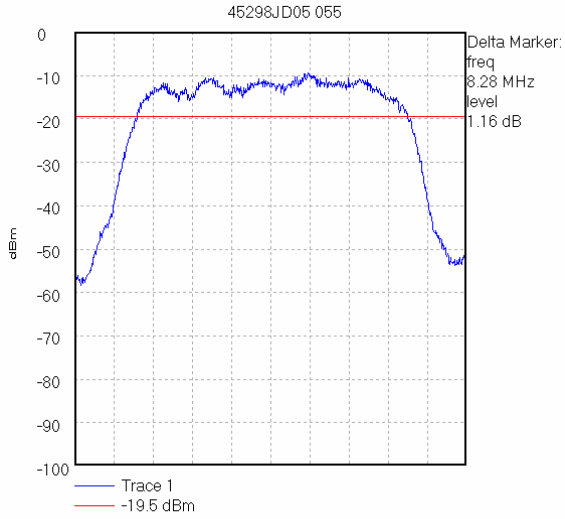
Channel	Frequency (MHz)	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
Bottom	2506	300	1000	8.280
Middle	2596	300	1000	8.280
Top	2680	300	1000	8.360

Transmitter Occupied Bandwidth (Continued)

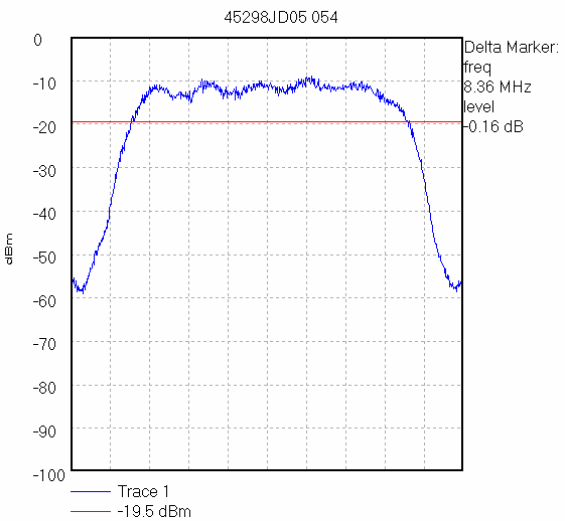
Plot 45298JD05 56, bottom channel, Plot 45298JD05 55 middle channel, Plot 45298JD05 54 top channel



Start 2.5 GHz; Stop 2.512 GHz
Ref 0 dBm; Ref Offset 0.0 dB; 10 dB/div
RBW 300.0 kHz; VBW 1.0 MHz; Att 10 dB; Swp 50.0 mS
Marker ,
Delta 8.28 MHz, -0.16 dBm
Display Line: -19.5 dBm; ; Limit Test Passed
09/09/2003 17:14:43



Start 2.59 GHz; Stop 2.602 GHz
Ref 0 dBm; Ref Offset 0.0 dB; 10 dB/div
RBW 300.0 kHz; VBW 1.0 MHz; Att 10 dB; Swp 50.0 mS
Marker ,
Delta 8.28 MHz, 1.16 dBm
Display Line: -19.5 dBm; ; Limit Test Passed
09/09/2003 17:00:25



Start 2.674 GHz; Stop 2.686 GHz
Ref 0 dBm; Ref Offset 0.0 dB; 10 dB/div
RBW 300.0 kHz; VBW 1.0 MHz; Att 10 dB; Swp 50.0 mS
Marker ,
Delta 8.36 MHz, -0.16 dBm
Display Line: -19.5 dBm; ; Limit Test Passed
09/09/2003 16:57:16

The occupied bandwidth is measured using the internal OBW function of the measurement analyser. The analyser automatically configures the measurement bandwidths to make an accurate measurement. The vital data is reported in the upper right portion of the screen. See attached graphs.

7.9. Transmitter Conducted Emissions (Channel Edge): Part 2.1051 & Part 27.53

7.9.1. The EUT was configured as for conducted emissions measurements as described in Section 9 of this report.

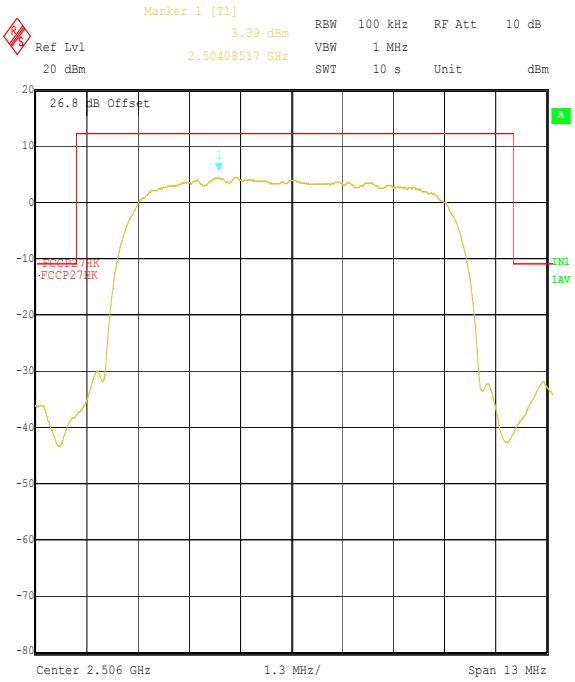
7.9.2. Tests were performed to determine compliance with the out of band power requirements at frequencies adjacent to the channel occupied by the fundamental frequency of the EUT.

Results:

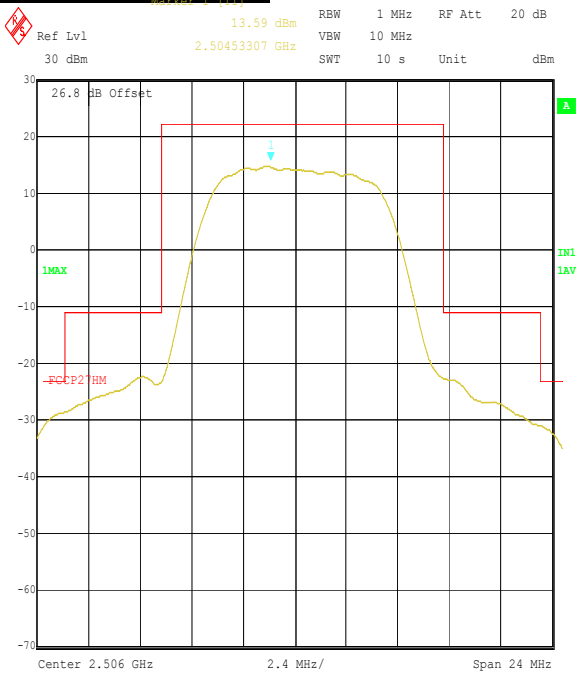
Results are presented graphically in the following graphs. As can be seen from the plots the EUT complies with the requirements of relevant part of the regulations.

Test Of: IPWireless UK Ltd
UE P1D Model: KF
To: FCC Part 27

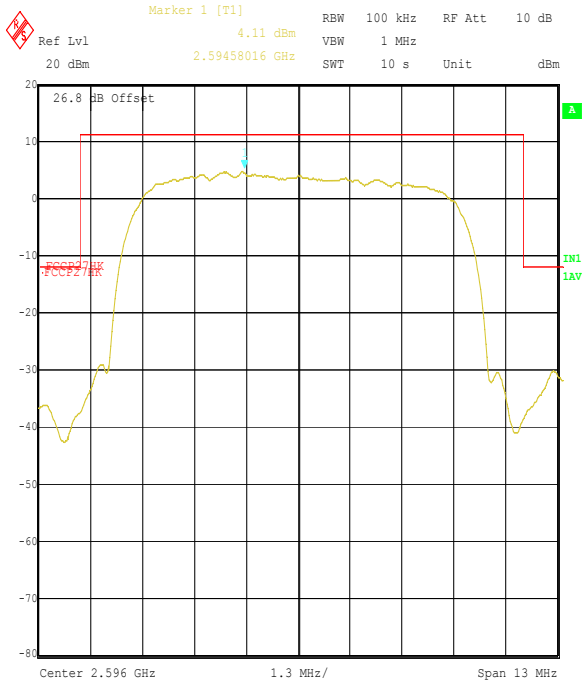
Transmitter Conducted Emissions (Channel Edge) (Continued)



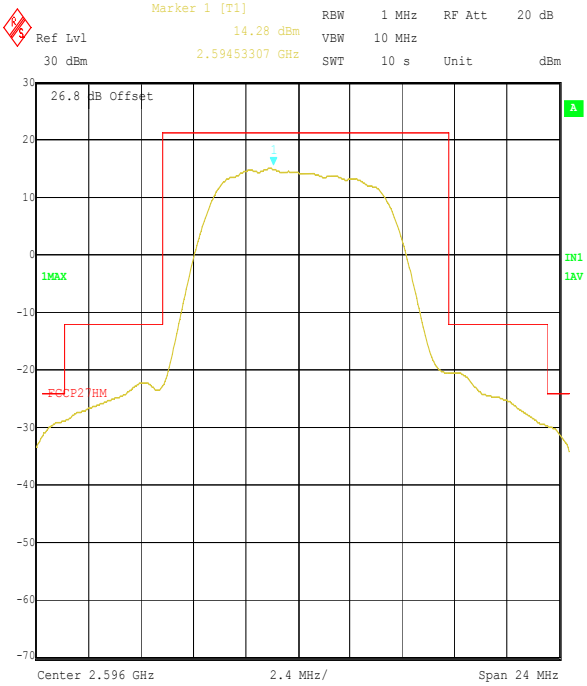
Title: IPWireless EUT:KF. FCC P27 Channel Edge Conducted Emissions
Comment A: 47147JD01 High Chip Rate Bottom Channel
Date: 11.APR.2005 12:05:19



Title: IPWireless EUT:KF. FCC P27 Channel Edge Conducted Emissions
Comment A: 47147JD01 High Chip Rate Bottom Channel
Date: 11.APR.2005 12:04:22

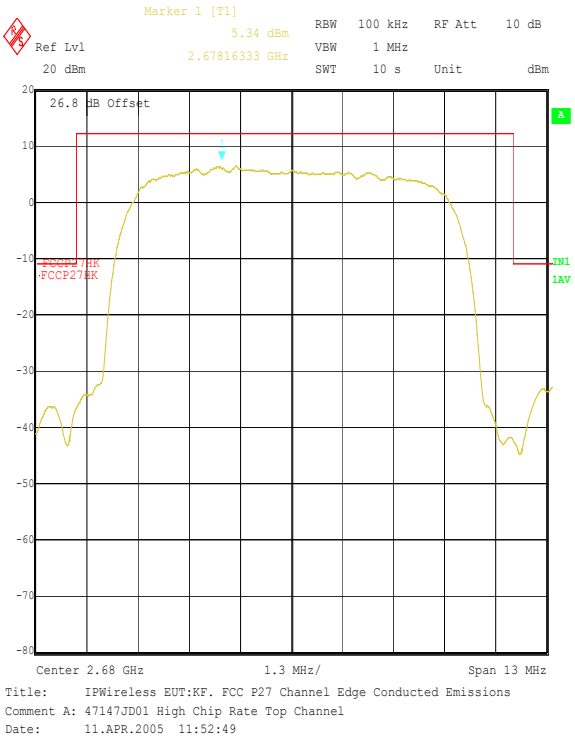


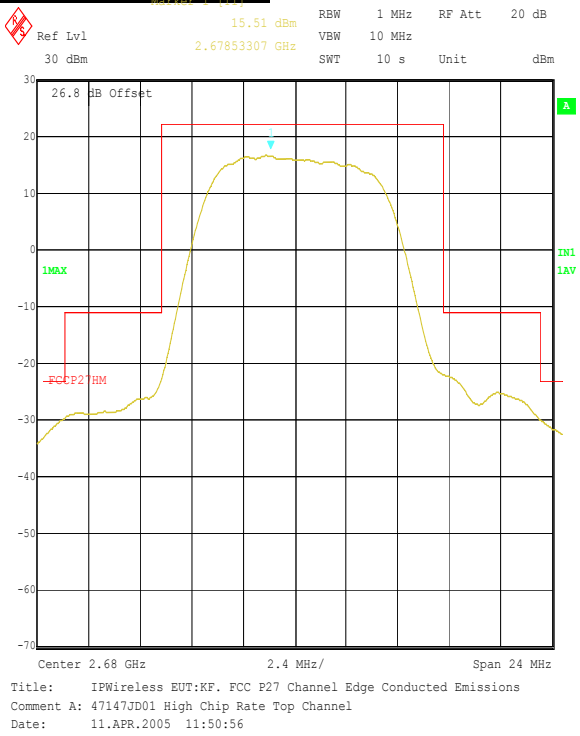
Title: IPWireless EUT:KF. FCC P27 Channel Edge Conducted Emissions
Comment A: 47147JD01 High Chip Rate Middle Channel
Date: 11.APR.2005 11:54:19



Title: IPWireless EUT:KF. FCC P27 Channel Edge Conducted Emissions
Comment A: 47147JD01 High Chip Rate Middle Channel
Date: 11.APR.2005 11:55:50

Transmitter Conducted Emissions (Channel Edge) (Continued)





Note: The frequency lines shown closest to the centre frequency in the above plots that demonstrate measurements in a 1 MHz RBW were the channel edge frequencies plus 1 MHz. They were placed at these frequencies to demonstrate compliance with the requirement that emissions greater than 1 MHz away from the channel edge be measured in a 1 MHz bandwidth.

7.10. Transmitter Conducted Emissions at Band Edges: Parts 2.1051 and 27.53

7.10.1. The EUT was configured as for conducted emissions measurements as described in section 9 of this report.

7.10.2. Tests were performed to identify the maximum emissions level at the edges of the 2500 MHz to 2690 MHz frequency band that the EUT will operate over.

Results:

Bottom Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
2498.5	-39.9	-13.0	26.9	Complied

Top Band Edge

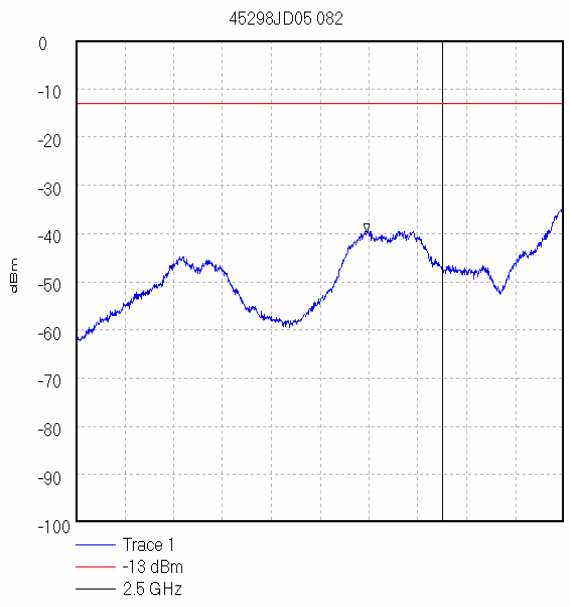
Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
2690.25	-50.8	-13.0	37.8	Complied

Note(s):

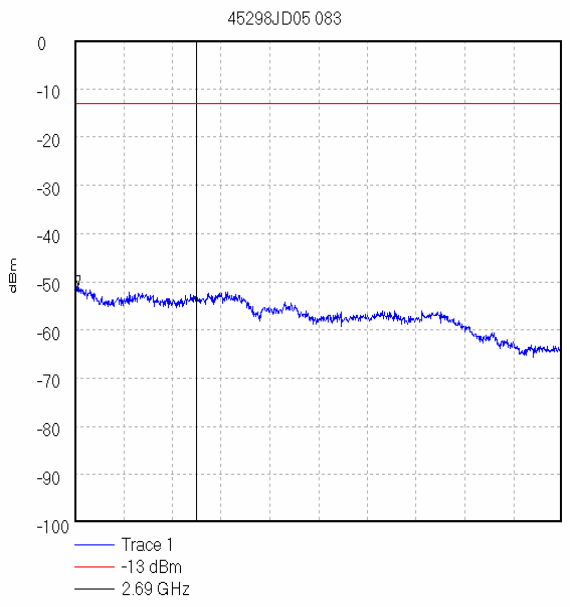
1. *The limit is calculated according to FCC Section 27.53(l)(4) as follows: 55 + 10log(P) where P is the transmitter power in Watts.*

2. *The 55 + 10log(P) limit applies because the test frequencies closest to the lower and upper band edges are 2506 MHz and 2680 MHz respectively. These are 12 MHz channels and as the respective band edges of 2500 MHz and 2690 MHz are less than 5.5 MHz from the edges of these channels.*

Transmitter Conducted Emissions at Band Edges (Continued)



Start 2.4925 GHz; Stop 2.5025 GHz
Ref 0 dBm; Ref Offset 22.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 300.0 kHz; Att 10 dB; Swp 20.0 mS
Marker 2.49846 GHz, -39.89 dBm
Display Line: -13 dBm; ; Limit Test Passed
22/09/2003 09:52:41



Start 2.6875 GHz; Stop 2.6975 GHz
Ref 0 dBm; Ref Offset 22.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 300.0 kHz; Att 10 dB; Swp 20.0 mS
Peak 2.68757 GHz, -50.78 dBm
Display Line: -13 dBm; ; Limit Test Passed
22/09/2003 09:55:25

7.11. Transmitter Conducted Emissions: Parts 2.1051 and 27.53

7.11.1. The EUT was configured as for conducted emissions measurements as described in section 9 of this report.

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

Result: Bottom Channel

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
2495.0	-29.4	-25.0	4.4	Complied
2517.0	-33.2	-25.0	8.2	Complied
5000.0	-31.8	-25.0	6.8	Complied

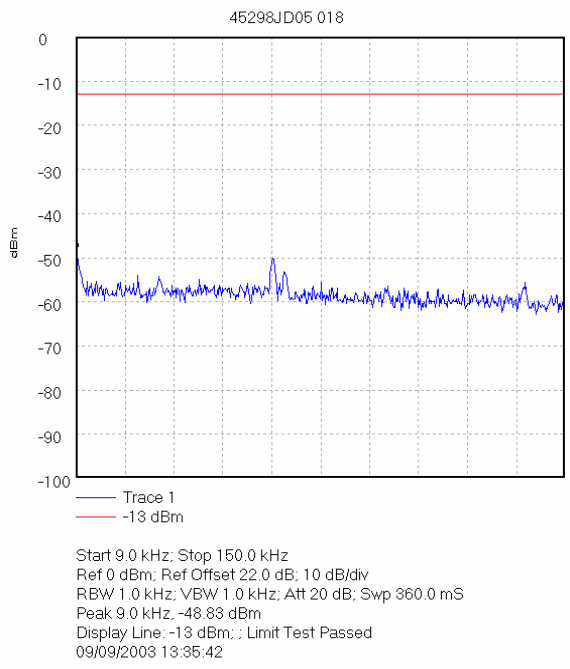
Result: Middle Channel

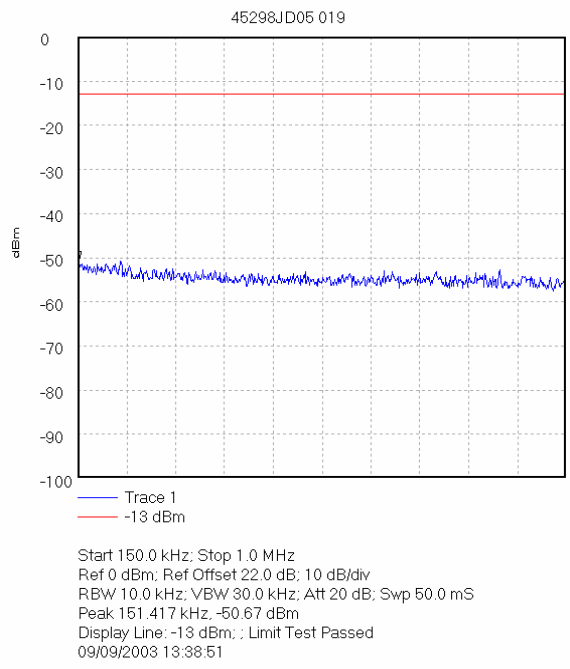
Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
2585.0	-29.7	-25.0	4.7	Complied
2607.0	-31.0	-25.0	6.0	Complied
5182.0	-28.0	-25.0	3.0	Complied

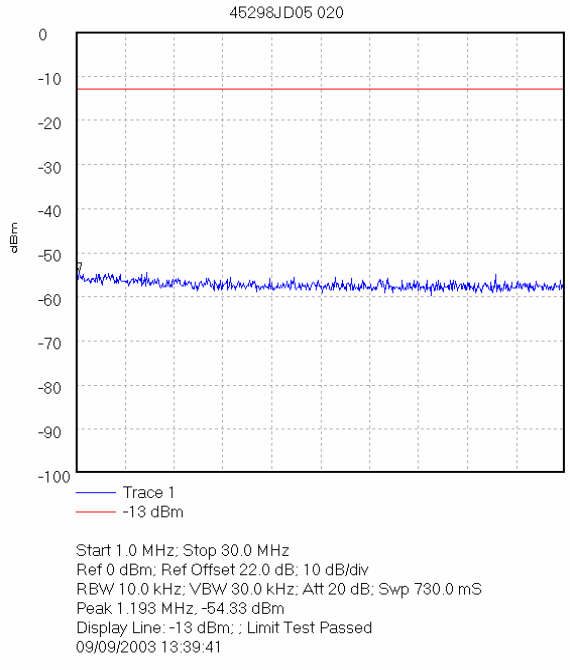
Result: Top Channel

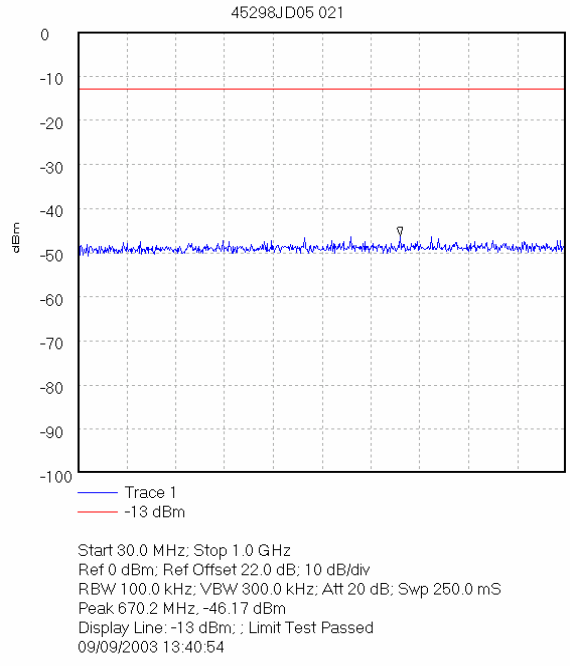
Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
2669.0	-30.8	-25.0	5.8	Complied
2691.0	-32.0	-25.0	7.0	Complied
5344.0	-25.3	-25.0	0.3	Complied

Transmitter Conducted Emissions (Continued)



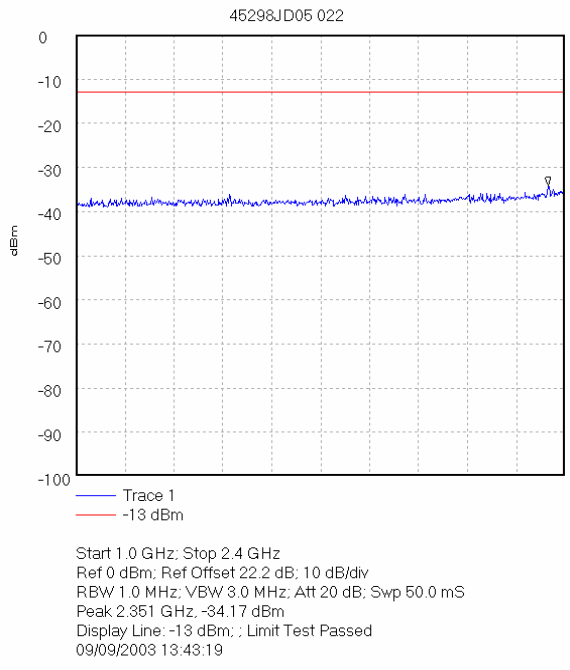


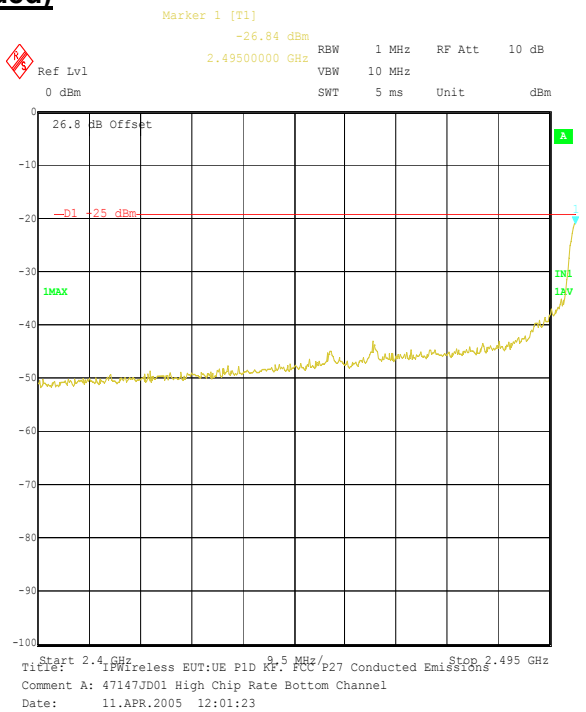


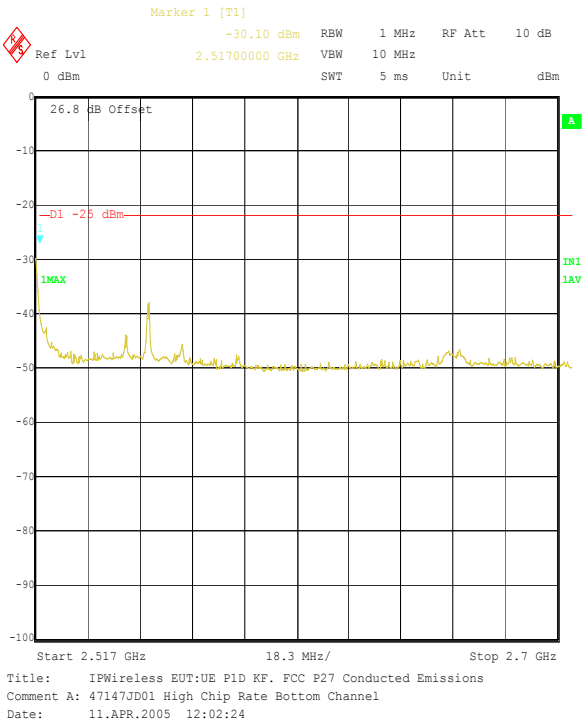


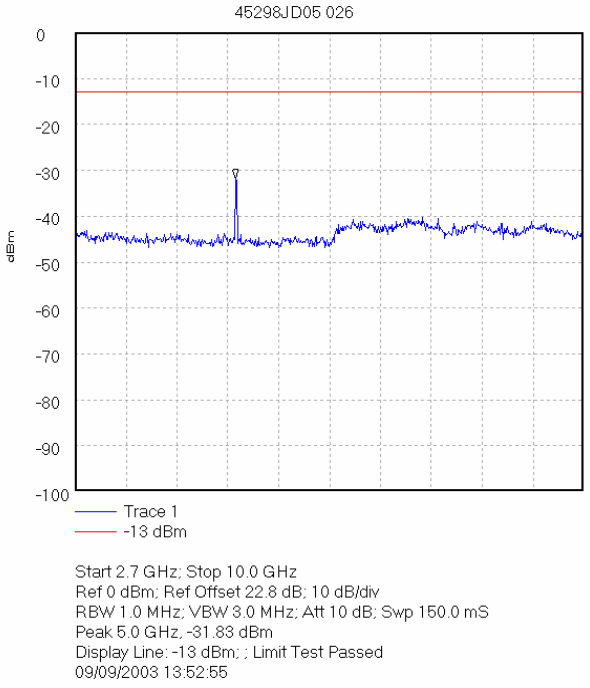
Note: these plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables. The limit shown in the above plots was the limit used for testing according to Part 21.908, the limit for Part 27.53 for emissions greater than 5.5 MHz away from the channel edge is -25 dBm. It is confirmed that the position of the limit line on the plot has no bearing on the measurement result.

Transmitter Conducted Emissions (Continued)



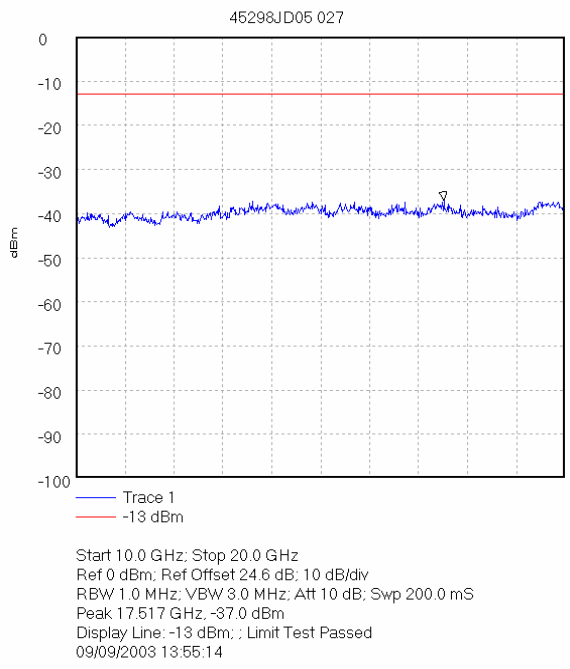


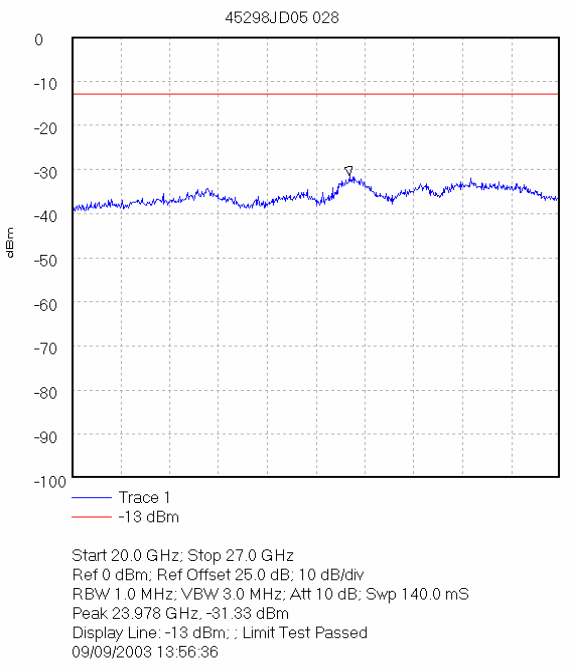


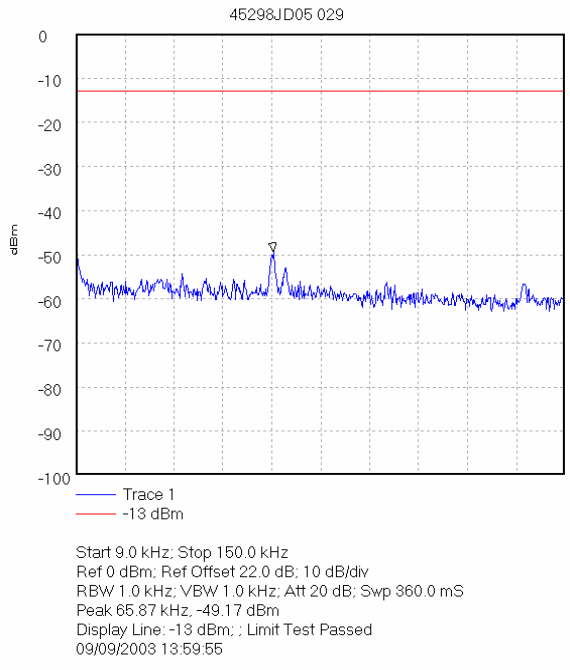


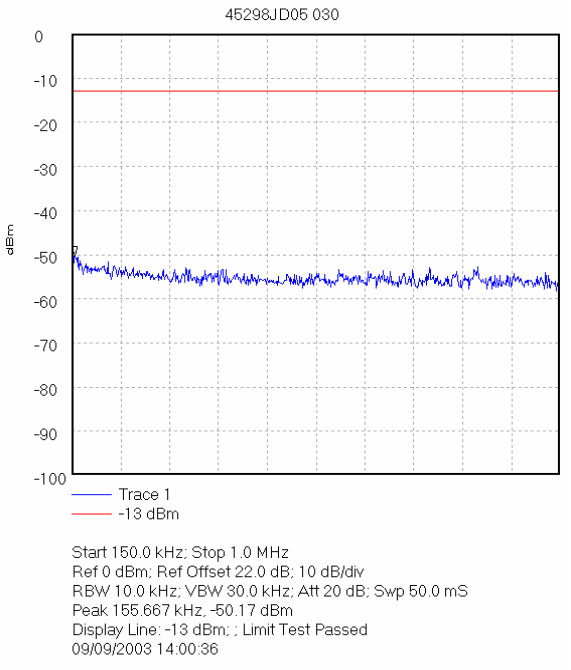
Note: these plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables. The limit shown in some of the above plots was the limit used for testing according to Part 21.908, the limit for Part 27.53 for emissions greater than 5.5 MHz away from the channel edge is -25 dBm. It is confirmed that the position of the limit line on the plot has no bearing on the measurement result.

Transmitter Conducted Emissions (Continued)



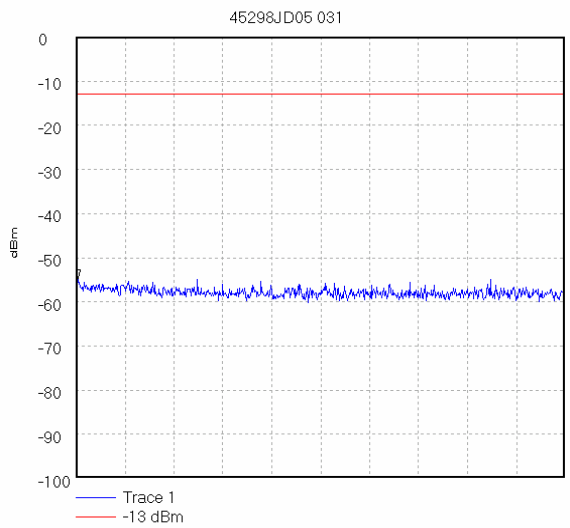


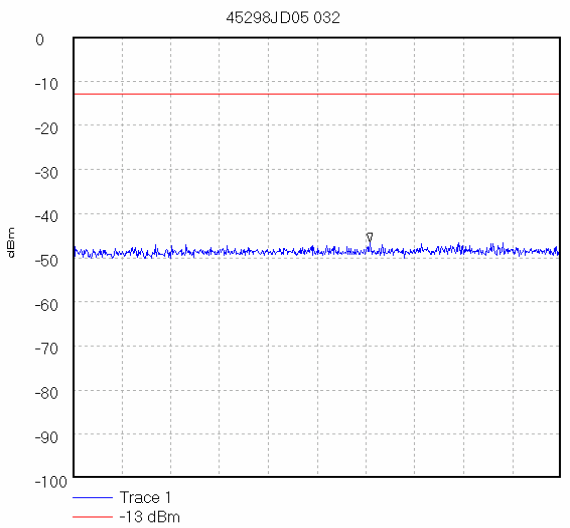


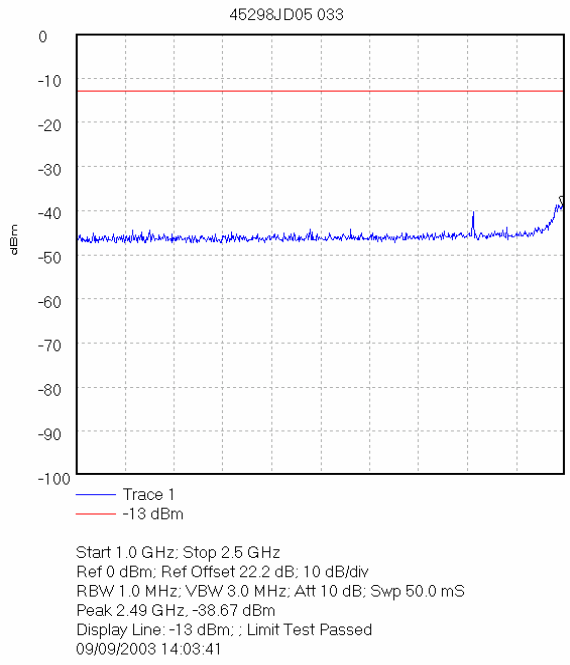


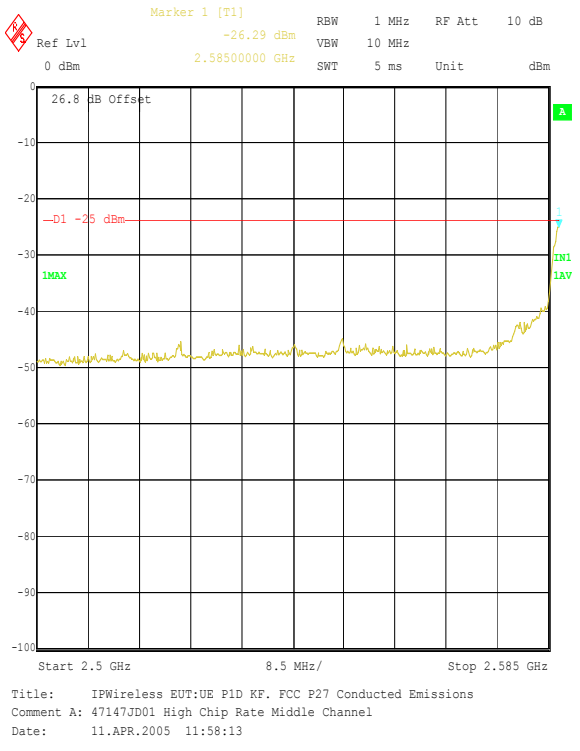
Note: these plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables. The limit shown in the above plots was the limit used for testing according to Part 21.908, the limit for Part 27.53 for emissions greater than 5.5 MHz away from the channel edge is -25 dBm. It is confirmed that the position of the limit line on the plot has no bearing on the measurement result.

Transmitter Conducted Emissions (Continued)



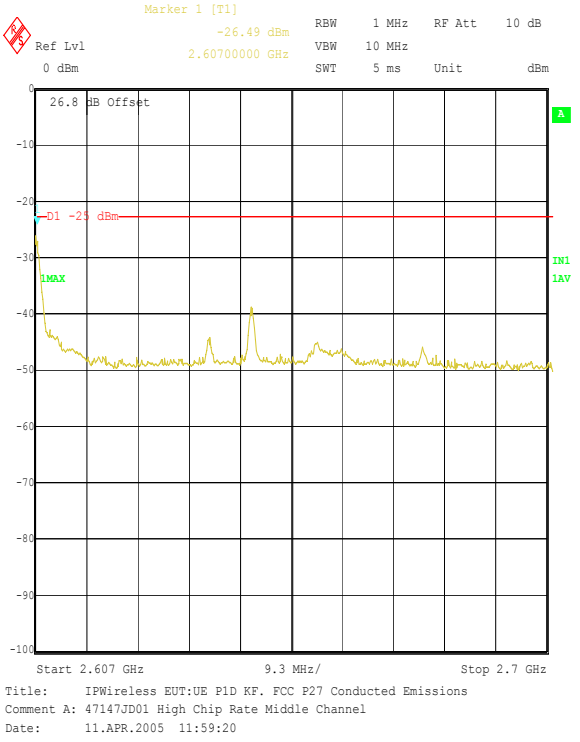




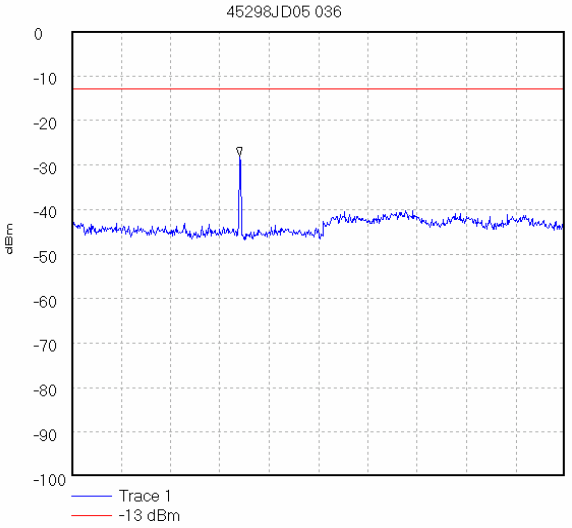


Note: these plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables. The limit shown in some of the above plots was the limit used for testing according to Part 21.908, the limit for Part 27.53 for emissions greater than 5.5 MHz away from the channel edge is -25 dBm. It is confirmed that the position of the limit line on the plot has no bearing on the measurement result.

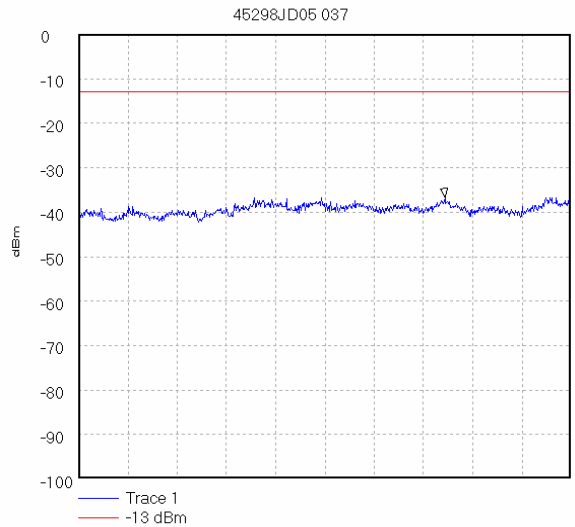
Transmitter Conducted Emissions (Continued)



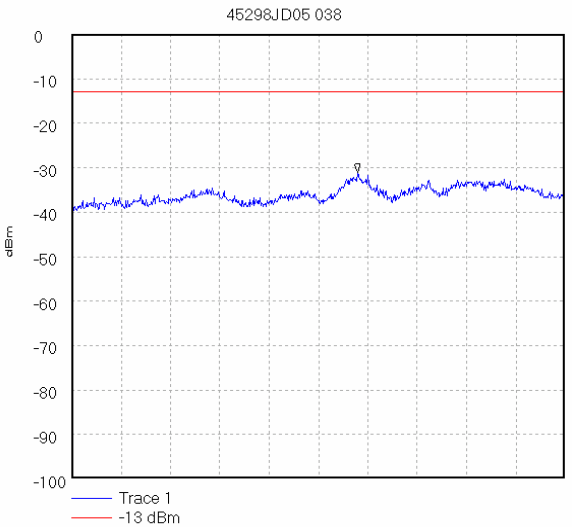
Title: IPWireless EUT:UE P1D KF. FCC P27 Conducted Emissions
Comment A: 47147JD01 High Chip Rate Middle Channel
Date: 11.APR.2005 11:59:20



Start 2.7 GHz; Stop 10.0 GHz
Ref 0 dBm; Ref Offset 23.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 3.0 MHz; Att 10 dB; Swp 150.0 mS
Peak 5.182 GHz, -28.0 dBm
Display Line: -13 dBm; ; Limit Test Passed
09/09/2003 14:07:14



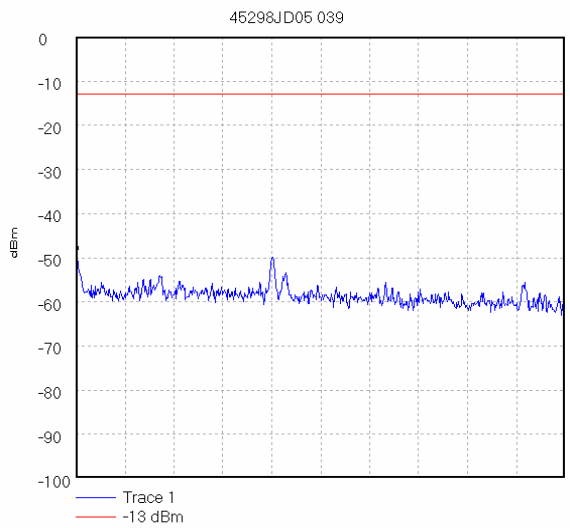
Start 10.0 GHz; Stop 20.0 GHz
Ref 0 dBm; Ref Offset 25.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 3.0 MHz; Att 10 dB; Swp 200.0 mS
Peak 17.433 GHz, -36.67 dBm
Display Line: -13 dBm; ; Limit Test Passed
09/09/2003 14:09:27



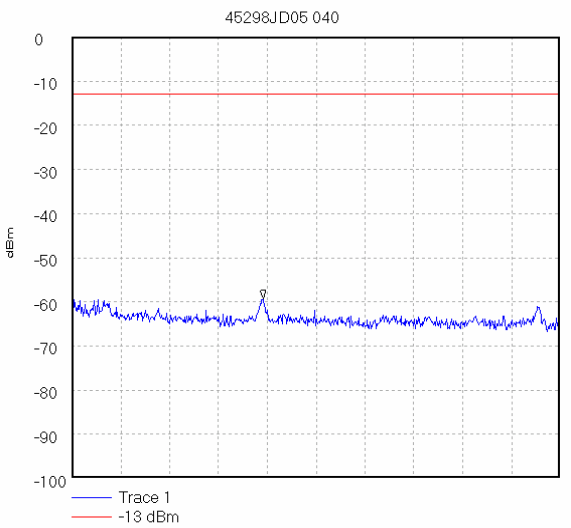
Start 20.0 GHz; Stop 27.0 GHz
Ref 0 dBm; Ref Offset 25.4 dB; 10 dB/div
RBW 1.0 MHz; VBW 3.0 MHz; Att 10 dB; Swp 140.0 mS
Peak 24.06 GHz, -31.0 dBm
Display Line: -13 dBm; ; Limit Test Passed
09/09/2003 14:10:29

Note: these plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables. The limit shown in some of the above plots was the limit used for testing according to Part 21.908, the limit for Part 27.53 for emissions greater than 5.5 MHz away from the channel edge is -25 dBm. It is confirmed that the position of the limit line on the plot has no bearing on the measurement result.

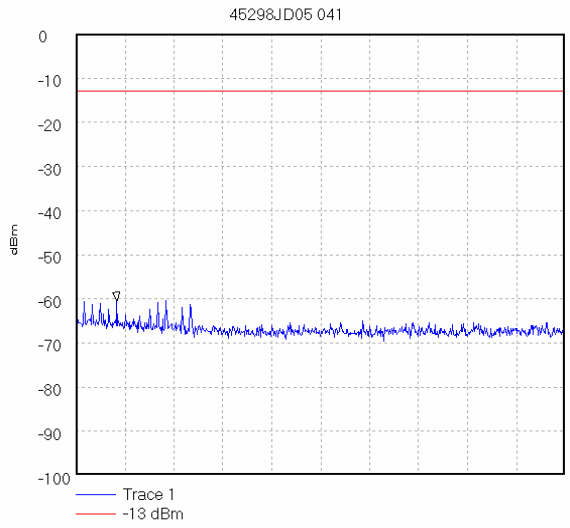
Transmitter Conducted Emissions (Continued)



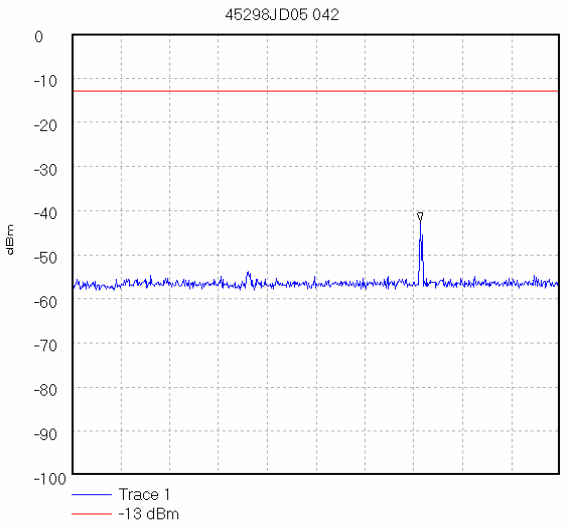
Start 9.0 kHz; Stop 150.0 kHz
Ref 0 dBm; Ref Offset 22.0 dB; 10 dB/div
RBW 1.0 kHz; VBW 1.0 kHz; Att 20 dB; Swp 360.0 mS
Peak 9.0 kHz, -49.5 dBm
Display Line: -13 dBm; ; Limit Test Passed
09/09/2003 14:12:27



Start 150.0 kHz; Stop 1.0 MHz
Ref 0 dBm; Ref Offset 22.0 dB; 10 dB/div
RBW 10.0 kHz; VBW 30.0 kHz; Att 10 dB; Swp 50.0 mS
Peak 482.917 kHz, -59.33 dBm
Display Line: -13 dBm; ; Limit Test Passed
09/09/2003 14:13:46



Start 1.0 MHz; Stop 30.0 MHz
Ref 0 dBm; Ref Offset 22.0 dB; 10 dB/div
RBW 10.0 kHz; VBW 30.0 kHz; Att 10 dB; Swp 730.0 mS
Peak 3.417 MHz, -60.5 dBm
Display Line: -13 dBm; ; Limit Test Passed
09/09/2003 14:14:47

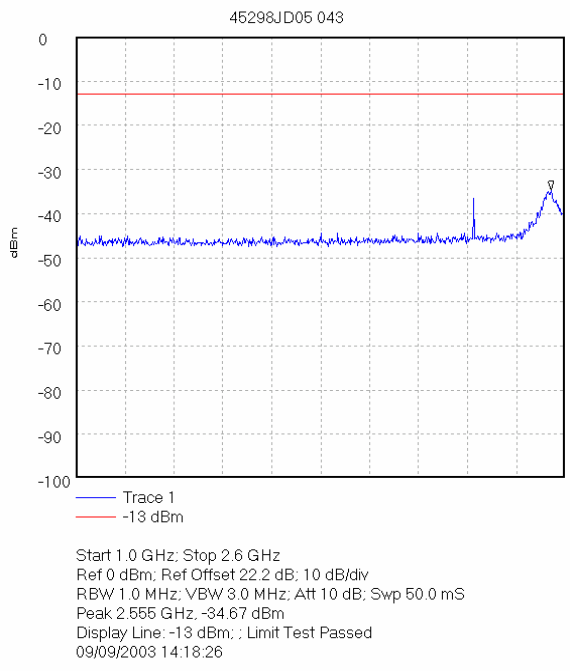


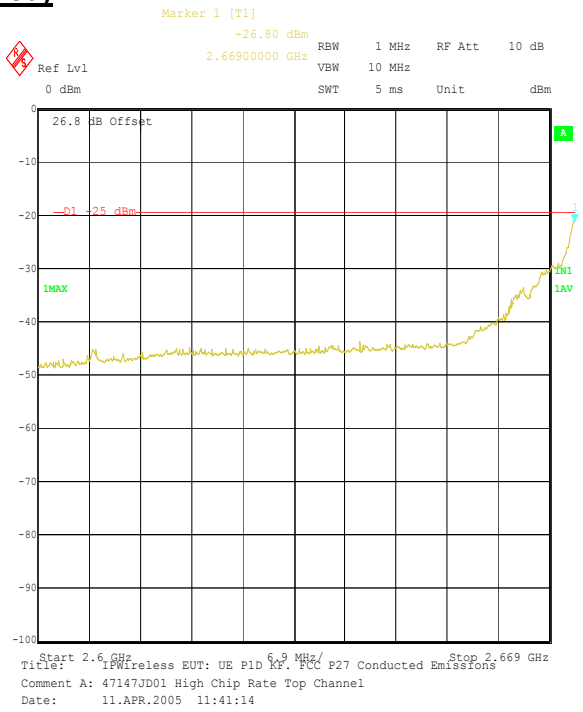
Start 30.0 MHz; Stop 1.0 GHz
Ref 0 dBm; Ref Offset 22.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 300.0 kHz; Att 10 dB; Swp 250.0 mS
Peak 721.933 MHz, -42.5 dBm
Display Line: -13 dBm; ; Limit Test Passed
09/09/2003 14:17:03

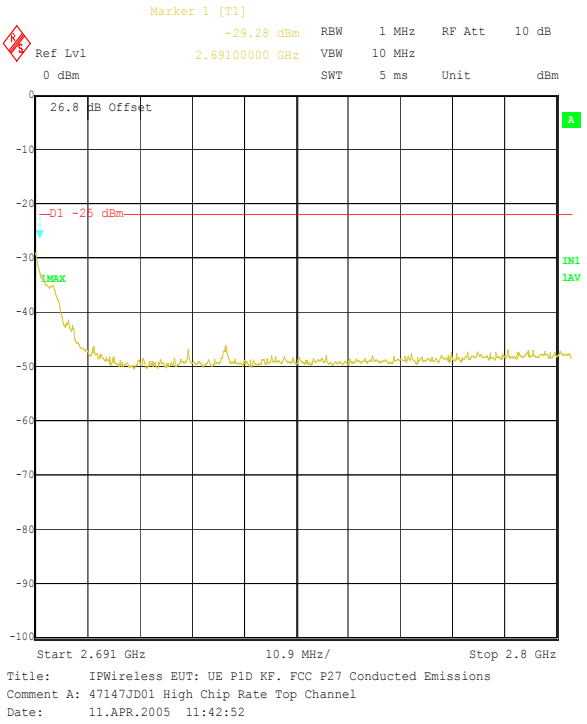
Note: these plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables. The limit shown in the above plots was the limit used for testing according to Part 21.908, the limit for Part 27.53 for emissions greater than 5.5 MHz away from the channel edge is -25 dBm. It is confirmed that the position of the limit line on the plot has no bearing on the measurement result.

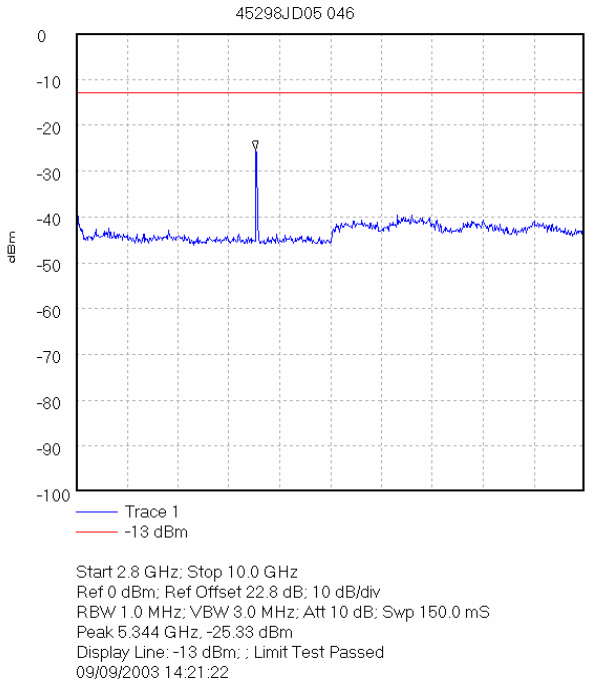
Test Of: IPWireless UK Ltd
UE P1D Model: KF
To: FCC Part 27

Transmitter Conducted Emissions (Continued)



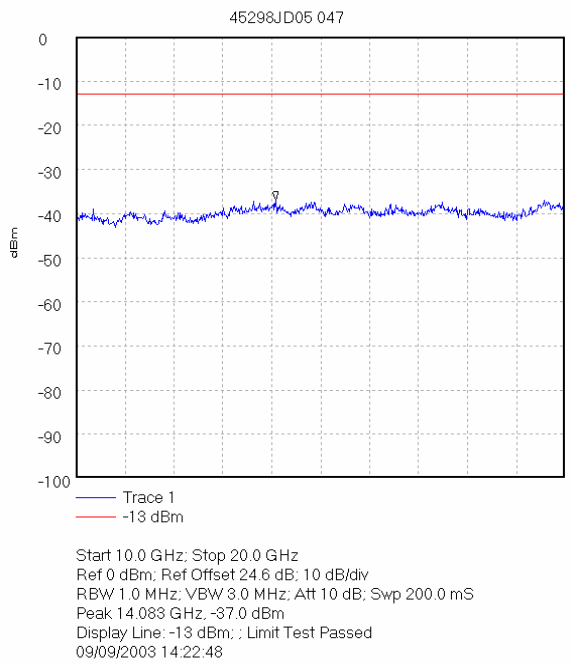


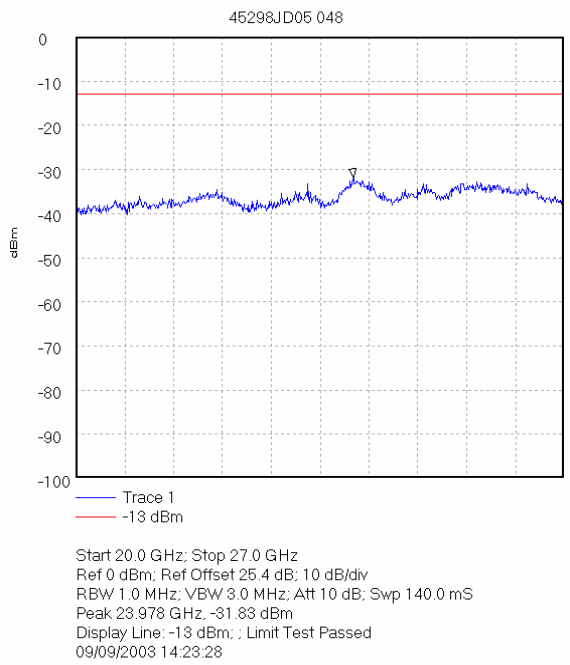




Note: these plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables. The limit shown in some of the above plots was the limit used for testing according to Part 21.908, the limit for Part 27.53 for emissions greater than 5.5 MHz away from the channel edge is -25 dBm. It is confirmed that the position of the limit line on the plot has no bearing on the measurement result.

Transmitter Conducted Emissions (Continued)





Note: these plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables. The limit shown in the above plots was the limit used for testing according to Part 21.908, the limit for Part 27.53 for emissions greater than 5.5 MHz away from the channel edge is -25 dBm. It is confirmed that the position of the limit line on the plot has no bearing on the measurement result.

7.12. Transmitter Radiated Emissions: Part 2.1053 and Part 27.53

7.12.1. The EUT was configured as for transmitter-radiated emissions testing as described in section 9 of this report.

7.12.2. Tests were performed to identify the maximum transmitter radiated emission levels.

Results: Bottom Channel

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1092.0	-37.1	-25.0	12.1	Complied
2532.8	-46.4	-25.0	21.4	Complied
2556.2	-37.5	-25.0	12.5	Complied
5015.6	-39.2	-25.0	14.2	Complied
7528.9	-44.2	-25.0	19.2	Complied

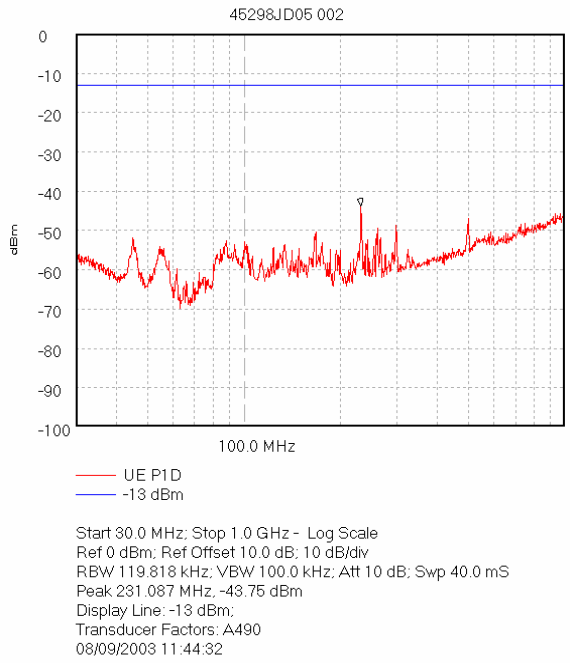
Results: Middle Channel

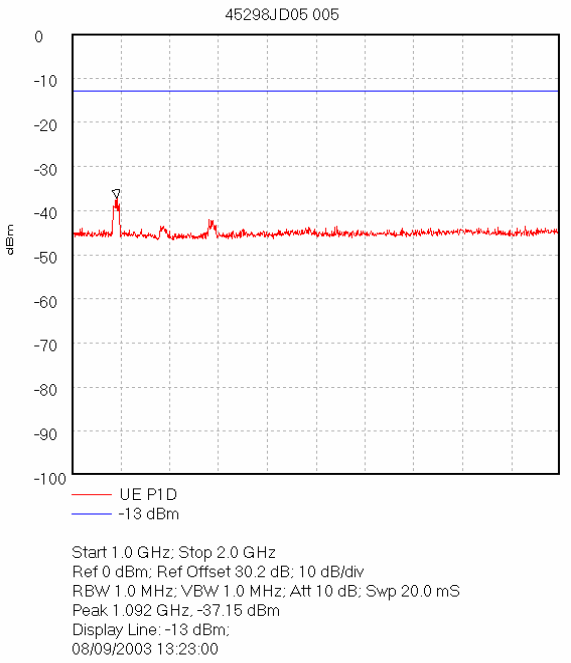
Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1096.0	-38.0	-25.0	13.0	Complied
2477.7	-47.5	-25.0	22.5	Complied
2646.1	-37.2	-25.0	12.2	Complied
5195.6	-33.6	-25.0	8.6	Complied

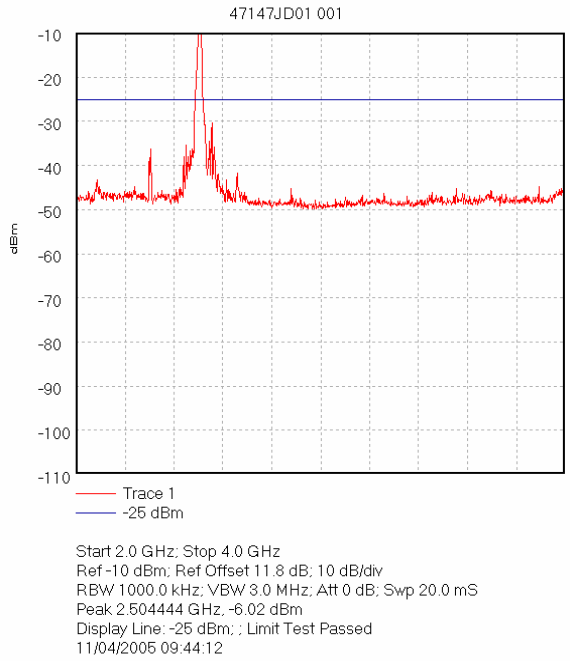
Results: Top Channel

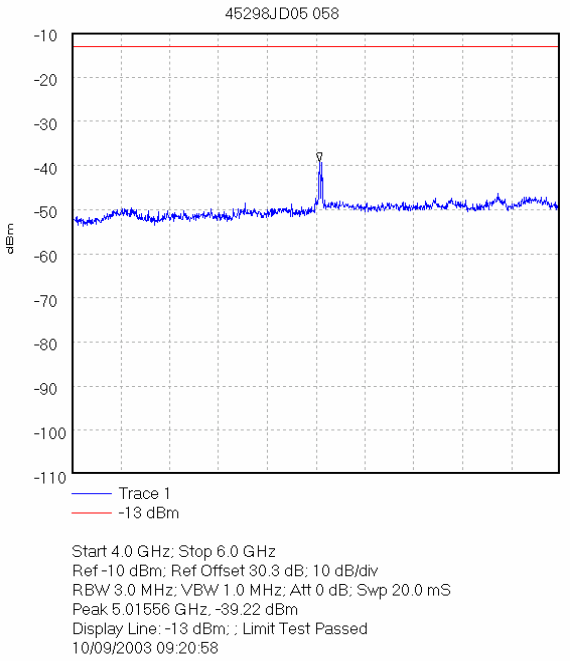
Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1091.0	-35.7	-25.0	10.7	Complied
2544.5	-48.4	-25.0	23.4	Complied
2618.3	-44.9	-25.0	19.9	Complied
5362.2	-31.2	-25.0	6.2	Complied

Transmitter Radiated Emissions (Continued)



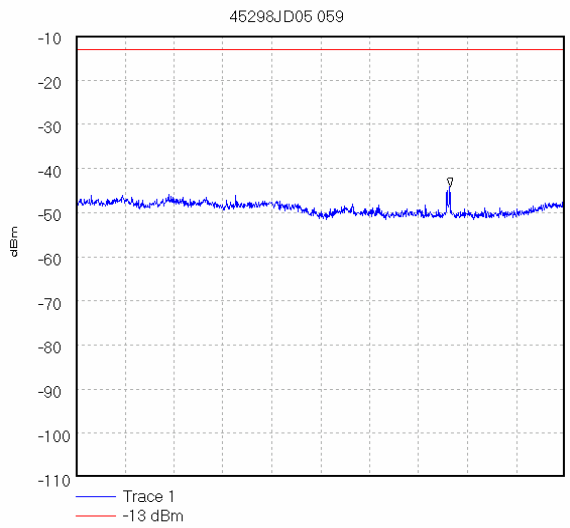




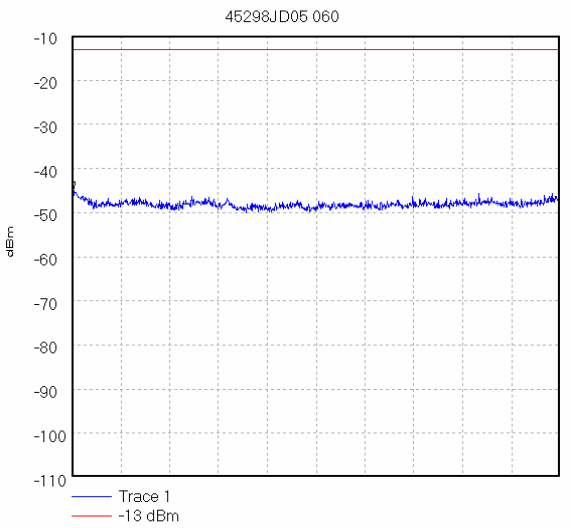


Note: these plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables. The limit shown in some of the above plots was the limit used for testing according to Part 21.908, the limit for Part 27.53 for emissions greater than 5.5 MHz away from the channel edge is -25 dBm. It is confirmed that the position of the limit line on the plot has no bearing on the measurement result.

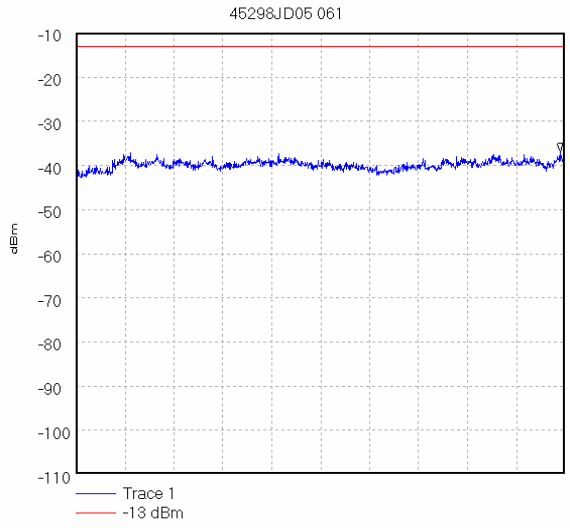
Transmitter Radiated Emissions (Continued)



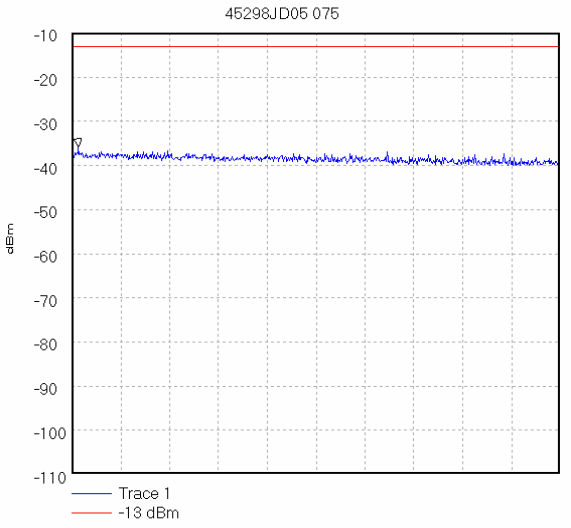
Start 6.0 GHz; Stop 8.0 GHz
Ref -10 dBm; Ref Offset 32.8 dB; 10 dB/div
RBW 3.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 7.52889 GHz, -44.2 dBm
Display Line: -13 dBm; ; Limit Test Passed
10/09/2003 09:25:51



Start 8.0 GHz; Stop 12.5 GHz
Ref -10 dBm; Ref Offset 36.1 dB; 10 dB/div
RBW 3.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 8.01 GHz, -44.94 dBm
Display Line: -13 dBm; ; Limit Test Passed
10/09/2003 09:29:39



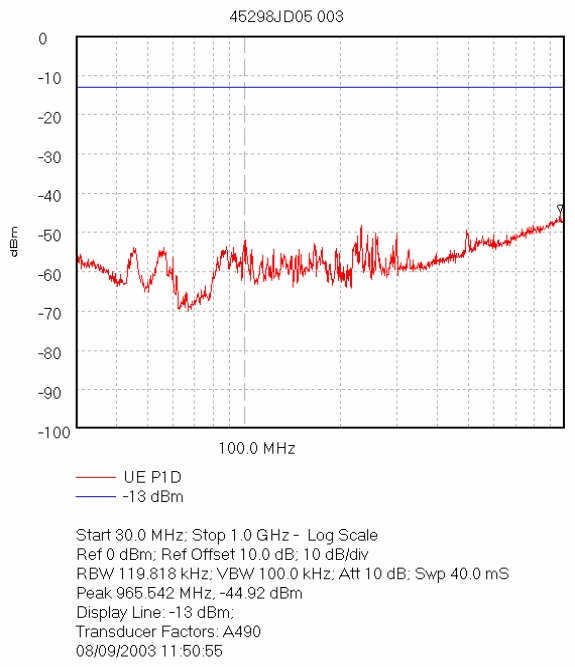
Start 12.5 GHz; Stop 18.0 GHz
Ref -10 dBm; Ref Offset 41.0 dB; 10 dB/div
RBW 3.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 40.0 mS
Peak 17.945 GHz, -36.94 dBm
Display Line: -13 dBm; ; Limit Test Passed
10/09/2003 09:33:02

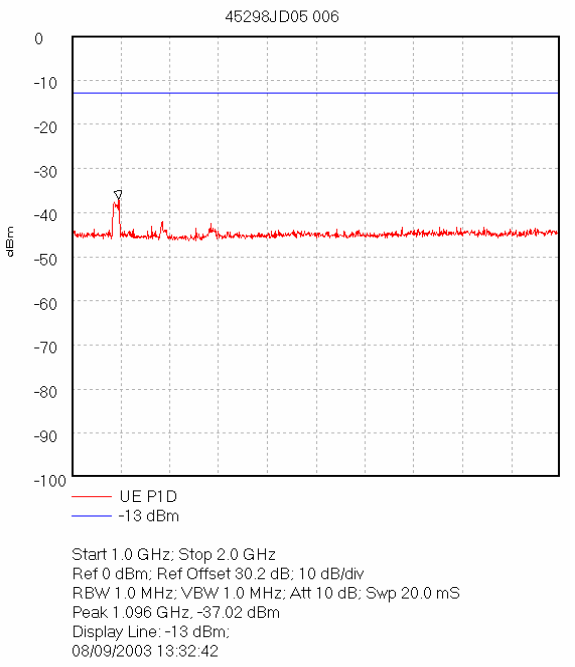


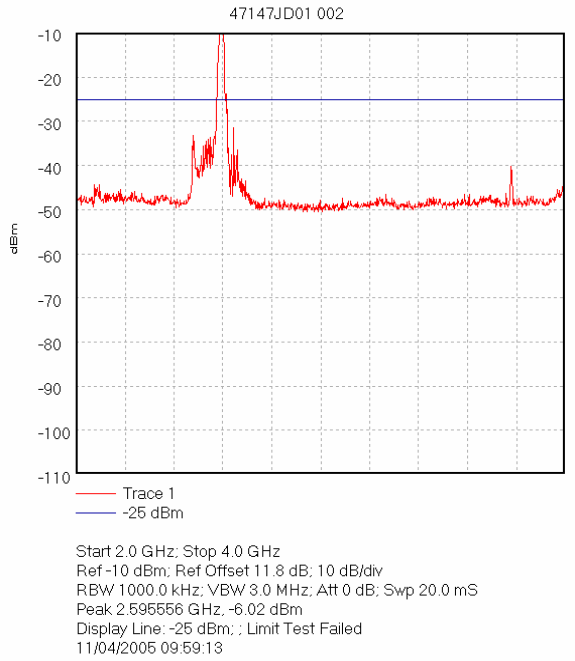
Centre 26.75 GHz; Span 500.0 MHz
Ref -10 dBm; Ref Offset 35.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 50.0 mS
Peak 26.50667 GHz, -35.83 dBm
Display Line: -13 dBm; ; Limit Test Passed
10/09/2003 11:51:22

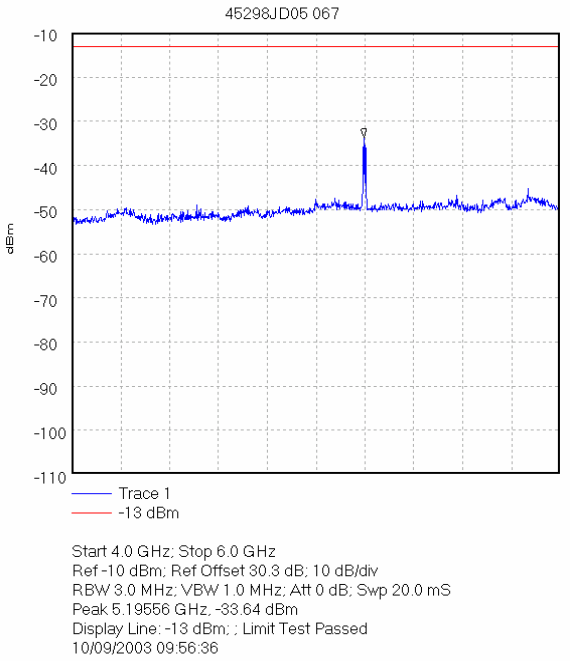
Note: these plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables. The limit in the above plots was the limit used for testing according to Part 21.908, the limit for Part 27.53 for emissions greater than 5.5 MHz away from the channel edge is -25 dBm. It is confirmed that the position of the limit line on the plot has no bearing on the measurement result.

Transmitter Radiated Emissions (Continued)



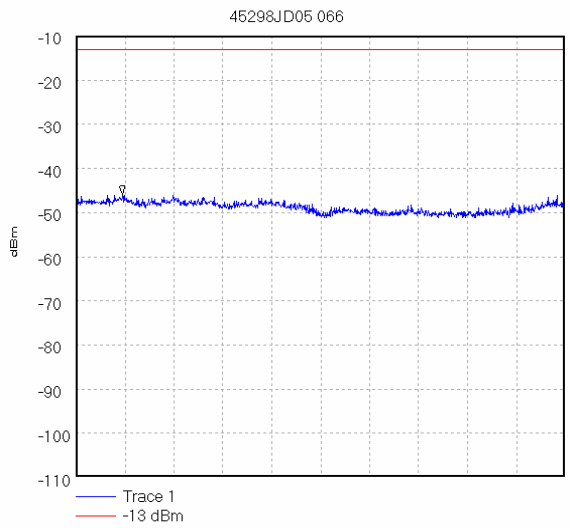


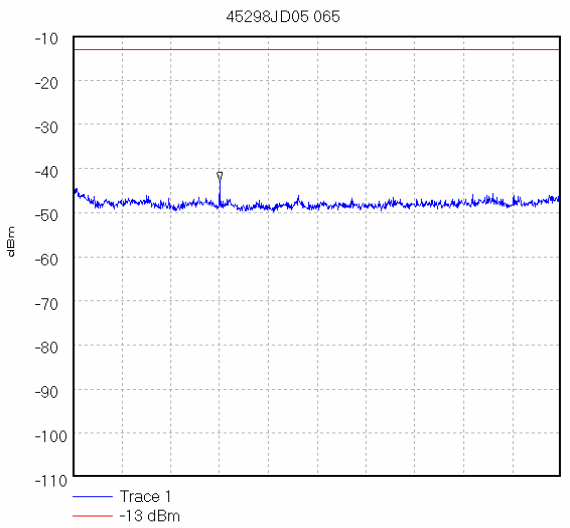


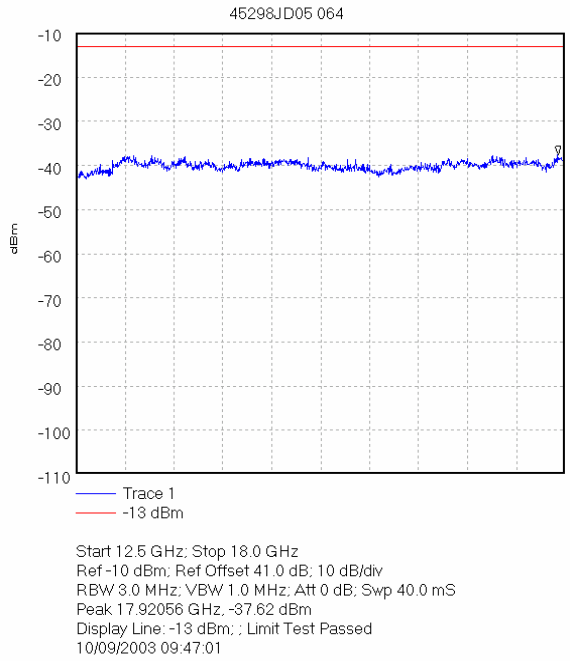


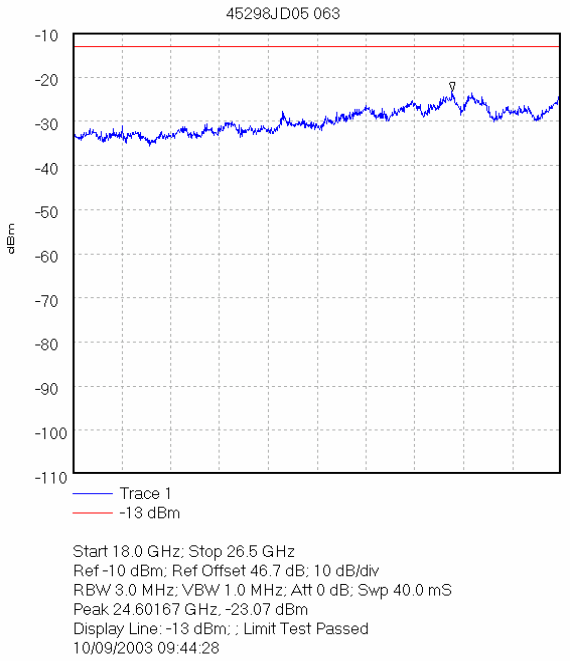
Note: these plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables. The limit shown in some of the above plots was the limit used for testing according to Part 21.908, the limit for Part 27.53 for emissions greater than 5.5 MHz away from the channel edge is -25 dBm. It is confirmed that the position of the limit line on the plot has no bearing on the measurement result.

Transmitter Radiated Emissions (Continued)



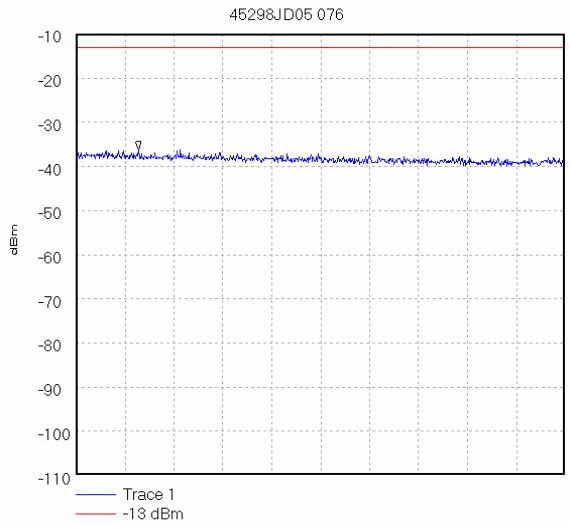


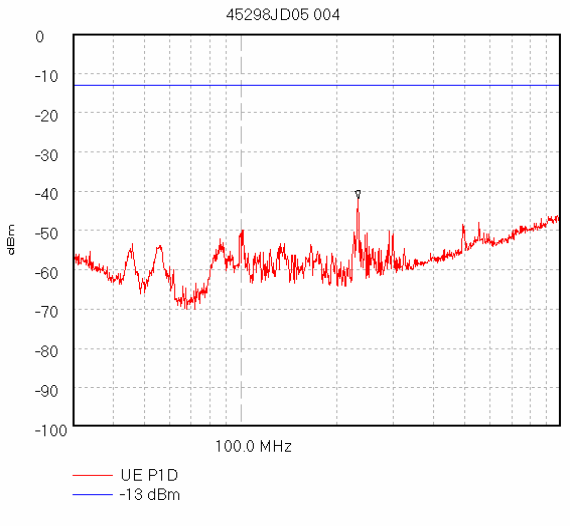


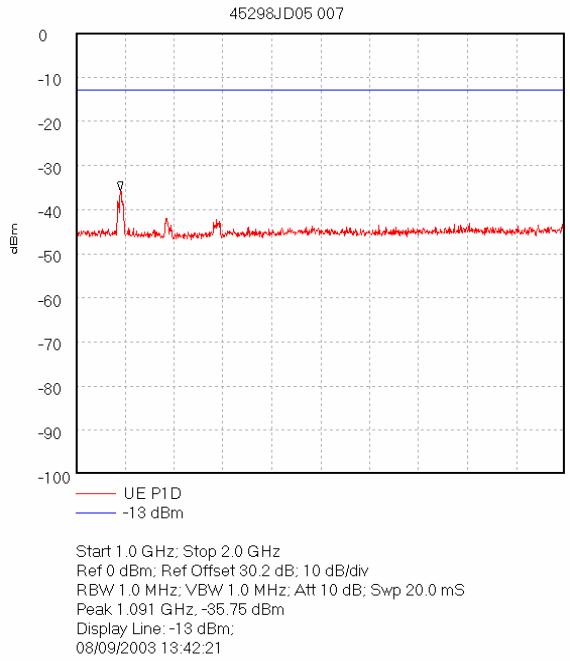


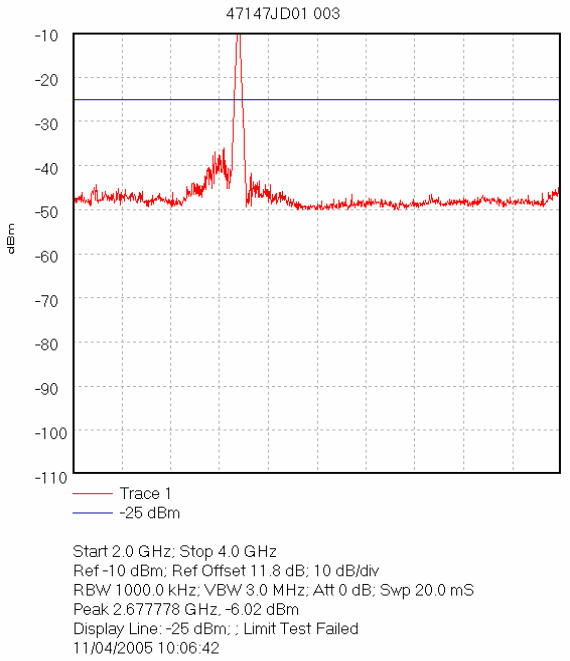
Note: these plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables. The limit shown in the above plots was the limit used for testing according to Part 21.908, the limit for Part 27.53 for emissions greater than 5.5 MHz away from the channel edge is -25 dBm. It is confirmed that the position of the limit line on the plot has no bearing on the measurement result.

Transmitter Radiated Emissions (Continued)



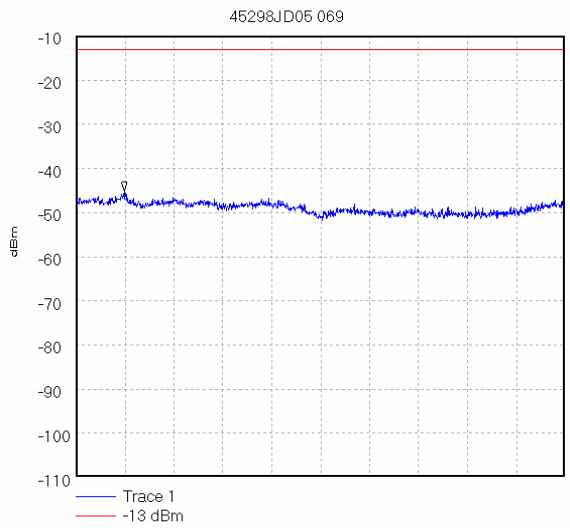


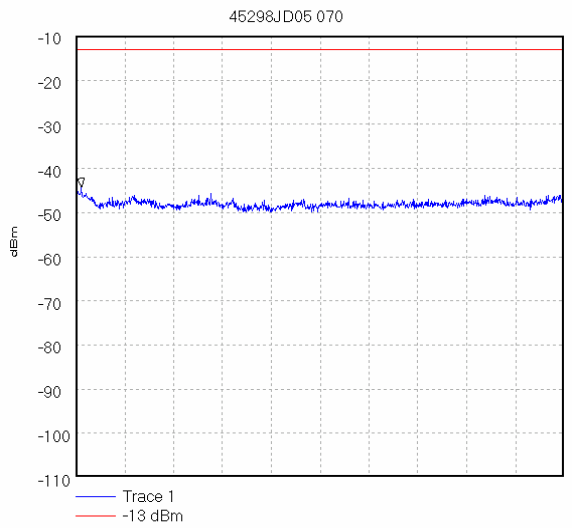


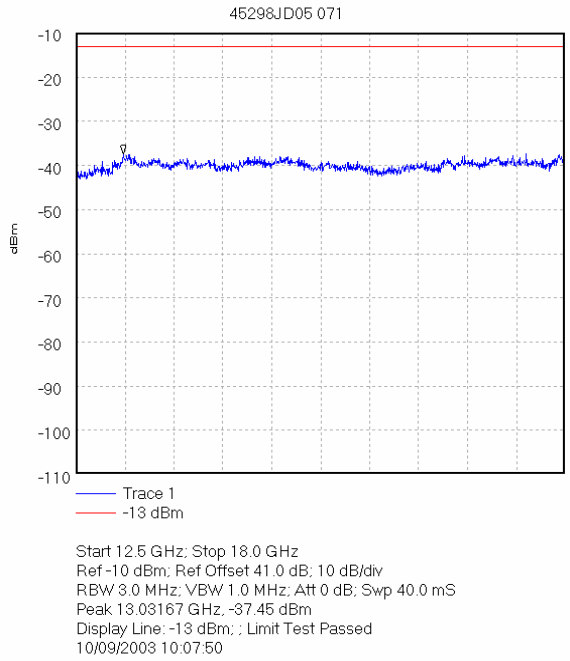


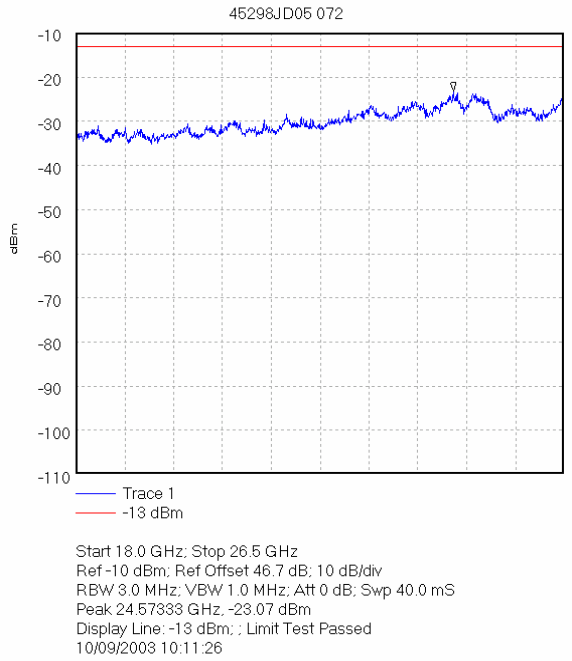
Note: these plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables. The limit shown in some of the above plots was the limit used for testing according to Part 21.908, the limit for Part 27.53 for emissions greater than 5.5 MHz away from the channel edge is -25 dBm. It is confirmed that the position of the limit line on the plot has no bearing on the measurement result.

Transmitter Radiated Emissions (Continued)



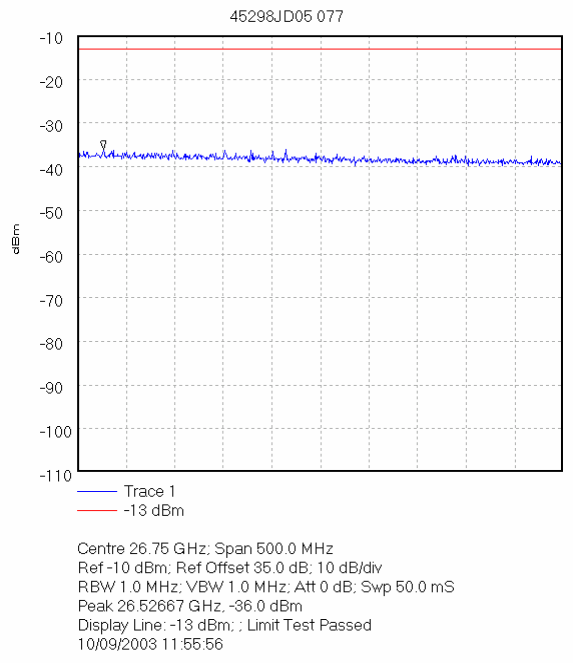






Note: these plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables. The limit shown in the above plots was the limit used for testing according to Part 21.908, the limit for Part 27.53 for emissions greater than 5.5 MHz away from the channel edge is -25 dBm. It is confirmed that the position of the limit line on the plot has no bearing on the measurement result.

Transmitter Radiated Emissions (Continued)



Note: these plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables. The limit shown in the above plot was the limit used for testing according to Part 21.908, the limit for Part 27.53 for emissions greater than 5.5 MHz away from the channel edge is -25 dBm. It is confirmed that the position of the limit line on the plot has no bearing on the measurement result.

7.13. Transmitter Radiated Emissions at Band Edges: Part 2.1053 & Part 27.53

7.13.1. The EUT was configured as for transmitter radiated emissions testing described in Appendix 2 of this report.

7.13.2. Tests were performed to identify the maximum emissions level at the edges of the 2500 – 2686 MHz frequency band that the EUT will operate over.

Results:

Bottom Band Edge

Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
2498.48	-27.5	-13.0	14.5	Complied

Top Band Edge

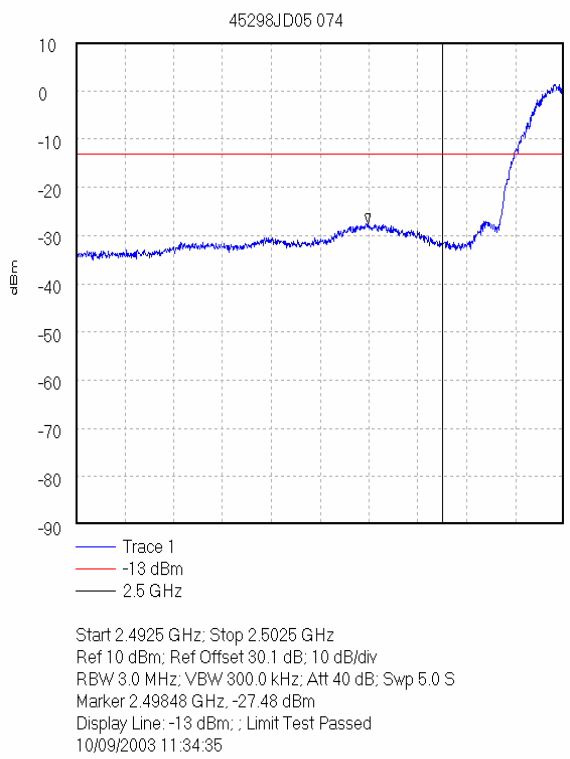
Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
2690.39	-40.2	-13.0	27.2	Complied

Note(s):

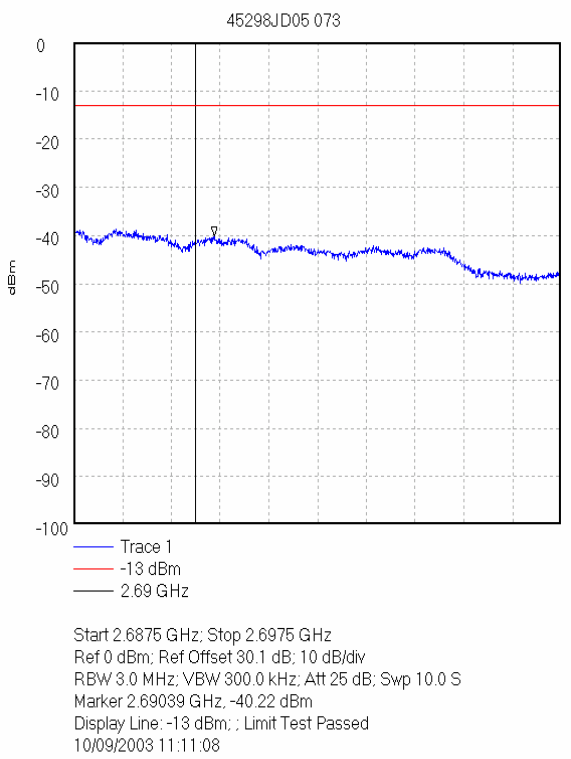
1. *The limit is calculated according to FCC Section 27.53(l)(2) as follows: 43 + 10log(P) where P is the transmitter power in Watts.*

2. *The 43 + 10log(P) limit applies because the test frequencies closest to the lower and upper band edges are 2506 MHz and 2680 MHz respectively. These are 12 MHz channels and as the respective band edges of 2500 MHz and 2690 MHz are less than 5.5 MHz from the edges of these channels.*

Transmitter Radiated Emissions at Band Edges (Continued) Part 2.1053, 21.908 and 74.936



Start 2.4925 GHz; Stop 2.5025 GHz
Ref 10 dBm; Ref Offset 30.1 dB; 10 dB/div
RBW 3.0 MHz; VBW 300.0 kHz; Att 40 dB; Swp 5.0 S
Marker 2.49848 GHz, -27.48 dBm
Display Line: -13 dBm; ; Limit Test Passed
10/09/2003 11:34:35



Start 2.6875 GHz; Stop 2.6975 GHz
Ref 0 dBm; Ref Offset 30.1 dB; 10 dB/div
RBW 3.0 MHz; VBW 300.0 kHz; Att 25 dB; Swp 10.0 S
Marker 2.69039 GHz, -40.22 dBm
Display Line: -13 dBm; ; Limit Test Passed
10/09/2003 11:11:08

8. Measurement Uncertainty

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.

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

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

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
Carrier Output Power	Not applicable	95%	+/- 0.46 dB
AC Conducted Spurious Emissions	0.15 MHz to 30.0 MHz	95%	+/- 3.25 dB
Effective Isotropic Radiated Power (EIRP)	Not applicable	95%	+/- 1.78 dB
Frequency Stability	Not applicable	95%	+/- 0.01 ppm
Occupied Bandwidth	1850 to 1910 MHz	95%	+/- 0.12 %
Radiated Spurious Emissions	30.0 MHz to 1000.0 MHz	95%	+/- 5.26 dB
Radiated Spurious Emissions	1.0 GHz to 26.0 GHz	95%	+/- 1.78 dB
Spectrum Mask	Up to 26.5 GHz (Amplitude)	95%	+2.6 / -1.9 dB

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.

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 110V 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:

Receiver Function	Initial Scan	Final Measurements
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

9.2. Receiver Radiated Emissions

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

Initial pre-scans covering the entire measurement band from the lowest generated frequency declared up to 5 times the highest unintentionally generated frequency were performed within a screened chamber in order to identify frequencies on which the EUT was generating interference. This determined the frequencies from the EUT which required further examination. In order to minimise the time taken for the swept measurements, a peak detector was used in conjunction with the appropriate detector measuring bandwidth (see table below). Repetitive scans were performed to allow for emissions with low repetition rates, and for the duty cycle of the EUT.

The initial scans were performed using an antenna height of 1.5 m and a measurement distance of 3 m. A limit line was set to the specification limit. Levels within 20 dB of this limit were measured where possible, on occasion, the receiver noise floor came within the 20 dB boundary. On these occasions, the system noise floor may have been recorded.

An open area test site using the appropriate test distance and measuring receiver with a Quasi-Peak detector was used for measurements below 1000 MHz, for measurements above 1000 MHz average and peak detectors were used.

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.

On the open area test site, at each frequency where a signal was found, the levels were maximised by initially rotating the turntable through 360° and then varying the antenna height between 1 m and 4 m in the horizontal polarisation. 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. The procedure was repeated for the vertical polarisation.

The final field strength was determined as the indicated level in dBμV plus cable loss and antenna factor.

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

Receiver Function	**Initial Scan**	**Final Measurements Below 1 GHz**	**Final Measurements Above 1 GHz**
Detector Type:	Peak	Quasi-Peak (CISPR)	Peak/Average
Mode:	Max Hold	Not applicable	Not applicable
Bandwidth:	(120 kHz < 1 GHz) (1 MHz > 1 GHz)	120 kHz	1 MHz (If Applicable)
Amplitude Range:	60 dB	20 dB	20 dB (typical)
Step Size:	Continuous sweep	Not applicable	Not applicable
Sweep Time:	Coupled	Not applicable	Not applicable

9.3. Conducted RF Output Power & Effective Isotropic Radiated Power (EIRP)

There are no conducted power limits specified in Part 27, therefore measurements were performed as a requirement of Part 2.1046.

The levels obtained were also used in conjunction with spurious attenuation measurements where the results are based on the conducted carrier power (P).

The EUT's antenna port was connected to a wideband power meter with an average power head via suitable attenuation.

The total loss of the cables & attenuators were measured and entered as a reference level offset into the power meter to correct for these losses.

The EUT was set to a specified channel and the transmitter set to operate at full power.

This test was carried out on the bottom, middle and top channels.

In order to obtain an EIRP measurement the manufacturer's declared antenna gain was added to the measured conducted RF output power.

9.4. Frequency Stability

The EUT was situated within an environmental test chamber and its antenna port was connected to a spectrum analyser via suitable cables and RF attenuators.

Measurements were performed with the EUT operating under extremes of temperature in 10 degree increments within the range -30 to 50°C.

Measurements were also performed at voltage extremes by varying the primary supply voltage from 85% to 115% of the nominal value.

The requirement was to determine the frequency stability of the device under specified environmental operating conditions and ensure they remained within specified operating parameters.

Measurements were made on the top, middle and bottom channels.

The EUT was switched off for a minimum of 30 minutes between each stage of testing while the environmental chamber stabilised at the next temperature within the stated temperature range.

Once the environmental chamber had reached thermal equilibrium, the nominal frequency of the EUT was measured and recorded.

The reported data shows the nominal frequency drift and its margin from the declared frequency.

9.5. Occupied Bandwidth

The EUT was connected to a spectrum analyser enabled with an occupied bandwidth function via its antenna port.

Measurements were performed to determine the occupied bandwidth in accordance with FCC Part 2.1049. The occupied bandwidth was measured from the fundamental emission at the bottom, middle and top channels.

The occupied bandwidth was measured using the built in occupied bandwidth function of the Rohde and Schwarz FSEB or ESIB spectrum analyser. It was set to measure the bandwidth where 99% of the signal power was contained. The analyser automatically configures the measurement bandwidths to make an accurate measurement based on the channel bandwidth and channel spacing of the EUT.

9.6. Conducted Emissions

Spurious emission measurements at the antenna port were performed from the lowest declared frequency to 10 times the highest EUT fundamental frequency.

A spectrum analyser was connected to the antenna port of the EUT via a suitable cable and RF attenuator. The total loss of both the cable and the attenuator were measured and entered as a reference level offset into the measuring receiver to correct for the losses.

The frequency band described above was investigated with the transmitter operating at full power on the bottom, middle and top channels. Any spurious emissions noted were then measured.

The recorded emission level was then calculated as a spurious attenuation level using the following formula as described in TIA-EIA-603B.

$$dB = 10 \log_{10} \left(\frac{TX\ power\ in\ watts}{0.001} \right) - \text{spurious level (dBm)}$$

The limit in the standard states that, for mobile digital stations, emissions shall be attenuated by at least 43 + 10 log (P) dB at the channel edge and by at least 55+10 log (P)dB at frequencies greater than 5.5 MHz from the channel edge below the transmitter power (P), where (P) is the maximum measured fundamental power in Watts for the channel under test. These calculations always give absolute levels of -13 dBm and -25 dBm respectively and, therefore, the limit is either
-13 dBm or -25 dBm. The frequency band described above was investigated with the transmitter operating at full power. Any spurious observed were then recorded and compared to the appropriate limit.

It should be noted that FCC Part 27.53 states that in the 1 MHz bands immediately outside and adjacent to the applicants declared frequency block may be measured using a resolution bandwidth of at least 1% of the emission bandwidth. The resolution bandwidth used was 100 kHz which exceeded the 1% value for both the 3.84 Mcps and 7.68 Mcps chip rates.

For the measurements of emissions at the channel edge, plots of the spectral distribution including the fundamental frequency were recorded using a spectrum analyser for the EUT transmitting on bottom, middle and top channels. The method is in accordance with the measurement method detailed in Part 27.53 for measurements in the 1 MHz bands immediately outside and adjacent to the channel edge. A resolution bandwidth of 100 kHz was used.

The test equipment settings for conducted antenna port measurements were as follows:

Receiver Function	**Settings**
Detector Type:	Average
Mode:	Max Hold
Bandwidth:	As shown in the plots
Amplitude Range:	100 dB
Sweep Time:	Coupled

9.7. Transmitter Radiated Emissions

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

Initial pre-scans covering the entire measurement band from the lowest generated frequency declared up to 10 times the highest fundamental frequency were performed in order to identify frequencies on which the EUT was generating spurious emissions. This determined the frequencies from the EUT that required further examination. Repetitive scans were performed to allow for emissions with low repetition rates, and for the duty cycle of the EUT.

The initial scans were performed using an antenna height of 1.5 m and a measurement distance of 3 m, below 4 GHz; above 4 GHz a 1 m measurement distance was used. A limit line was set to the specification limit. Levels within 20 dB of this limit were measured where possible, on occasion; the receiver noise floor came within the 20 dB boundary. On these occasions, the system noise floor may have been recorded.

An open area test site using the appropriate test distance and spectrum analyser with an average detector was used for final measurements.

On the open area test site, at each frequency where a signal was found, the levels were maximised by initially rotating the turntable through 360° and then varying the antenna height between 1 m and 4 m in the horizontal polarisation. 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. The procedure was repeated for the vertical polarisation.

Once the final amplitude (maximised) had been obtained and noted, the EUT was replaced by a substitution antenna, and a substitution method applied. The substitution antennas used were a horn antenna for measurements greater then or equal to 1 GHz and a dipole for measurements below 1 GHz. The centre of the substitution antenna was set to approximately the same centre location as the EUT. The substitution antenna was set to the horizontal polarity. The substitution antenna was matched into a signal generator using a 6 dB or greater attenuator. The signal generator was tuned to the EUT's frequency under test.

The test antenna was then raised and lowered to obtain a maximum reading on the spectrum analyser. The level of the signal generator output was then adjusted until the maximum recorded EUT level was observed. The signal generator level was noted. This procedure was repeated with both test antenna and substitution antenna vertically polarised. The EIRP was calculated as:-

EIRP = Signal Generator Level - Cable Loss + Antenna Gain

Once the EIRP was obtained, the difference between it and the level of the fundamental emission for the EIRP of the channel under test was noted at the spurious attenuation level in dBc. The following formula was used as described in TIA_EIA_603B

$$dB = 10 \log_{10} \left(\frac{TX\ power\ in\ watts}{0.001} \right) - \text{spurious level (dBm)}$$

Transmitter Radiated Emissions (Continued)

The limit in the standard states that, for mobile digital stations, emissions shall be attenuated by at least 43 + 10 log (P) dB at the channel edge and by at least 55+10 log (P)dB at frequencies greater than 5.5 MHz from the channel edge below the transmitter power (P), where (P) is the maximum measured fundamental power in Watts for the channel under test. These calculations always give absolute levels of -13 dBm and -25 dBm respectively and, therefore, the limit is either
-13 dBm or -25 dBm. The frequency band described above was investigated with the transmitter operating at full power. Any spurious observed were then recorded and compared to the appropriate limit.

Appendix 1. Test Equipment Used

RFI No.	Instrument	Manufacturer	Type No.	Serial No.
A003	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	357 881/052
A027	Horn Antenna	Eaton	9188-2	301
A031	Horn Antenna	Eaton	91889-2	557
A075	Attenuator	Narda	769-20	02878
A090	Attenuator	Narda	743-60	01057
A1009	WG14 to SMA adapter	Flann	14094-SF40	40
A1037	Bilog Antenna	Chase EMC Ltd	CBL6112B	2413
A145	Attenuator	Narda	NONE	NONE
A201	Horn Antenna	Flann	20240-20	266
A203	Horn Antenna	Flann	22240-20	343
A253	Horn Antenna	Flann	12240-20	128
A254	Horn Antenna	Flann	14240-20	139
A255	Horn Antenna	Flann	16240-20	519
A256	Horn Antenna	Flann	18240-20	400
A259	Bilog Antenna	Chase	CBL6111	1513
A392	Attenuator	Suhner	6803.17.B	None
A435	Horn Antenna	Flann	22240-20	400
A490	Bilog Antenna	Chase	CBL6111A	1590
A649	LISN	Rohde & Schwarz	ESH3-Z5	825562/008
C1068	Cable	Rosenberger	001	001
C1078	Cable	Rosenberger	FA210A1030 M5050	28464-2

Test Equipment Used (Continued)

RFI No.	Instrument	Manufacturer	Type No.	Serial No.
C1079	Cable	Rosenberger	FA210A1010 M5050	28462-1
C1082	Cable	Rosenberger	FA210A1020 M5050	28463-1
C160	Cable	Rosenberger	UFA210A-1-1181-70x70	None
C172	Cable	Rosenberger	UFA210A-1-1181-70x70	None
C202	Cable	Rosenberger	UFA 210A-1-1180-70X70	1543
C341	Cable	Andrews	None	None
C342	Cable	Andrews	None	None
C344	Cable	Rosenberger	UFA210A-1-1181-70x70	1934
C363	Cable	Rosenberger	RG142	None
C364	Cable	Rosenberger	RG142	None
C457	Cable	Rosenberger	RG142XX-002-RFIB	C457-10081998
C461	Cable	Rosenberger	UFA210A-1-1182-704704	98H0305
C468	Cable	Rosenberger	UFA210A-1-3937-504504	98L0440
E011	Environmental Chamber	Design Environmental	WIR3-40	11-96-A2103
G013	SMHU Signal Generator	Rohde & Schwarz	SMHU	894 055/003
G020	Rack Power Amplifier	Spitzenberger Spies	EP4500/B	5233
G085	Generator	Hewlett Packard	83650L	3614A00104
M023	Test Receiver	Rohde & Schwarz	ESVP	872 991/027
M072	Spectrum Analyser	Rohde & Schwarz	FSM	862 967/010 (RU) 863 912/048 (DU)
M084	Power Meter	Rohde & Schwarz	NRVS	864268/006
M090	Receiver / Spectrum Analyser System	Rohde & Schwarz	ESBI	DU:838494/005 RU:836833/001

Test Equipment Used (Continued)

RFI No.	Instrument	Manufacturer	Type No.	Serial No.
M127	Spectrum Analyser	Rohde & Schwarz	FSEB 30	842 659/016
M139	Digital Multimeter	Fluke	11	65830028
M281	Power Meter	Hewlett Packard	E4418A (EPM441A)	GB37170210-01
M283	Power Sensor	Hewlett Packard	8487A	3318A03241
S201	Site 1	RFI	1	
S202	Site 2	RFI	2	S202-15011990

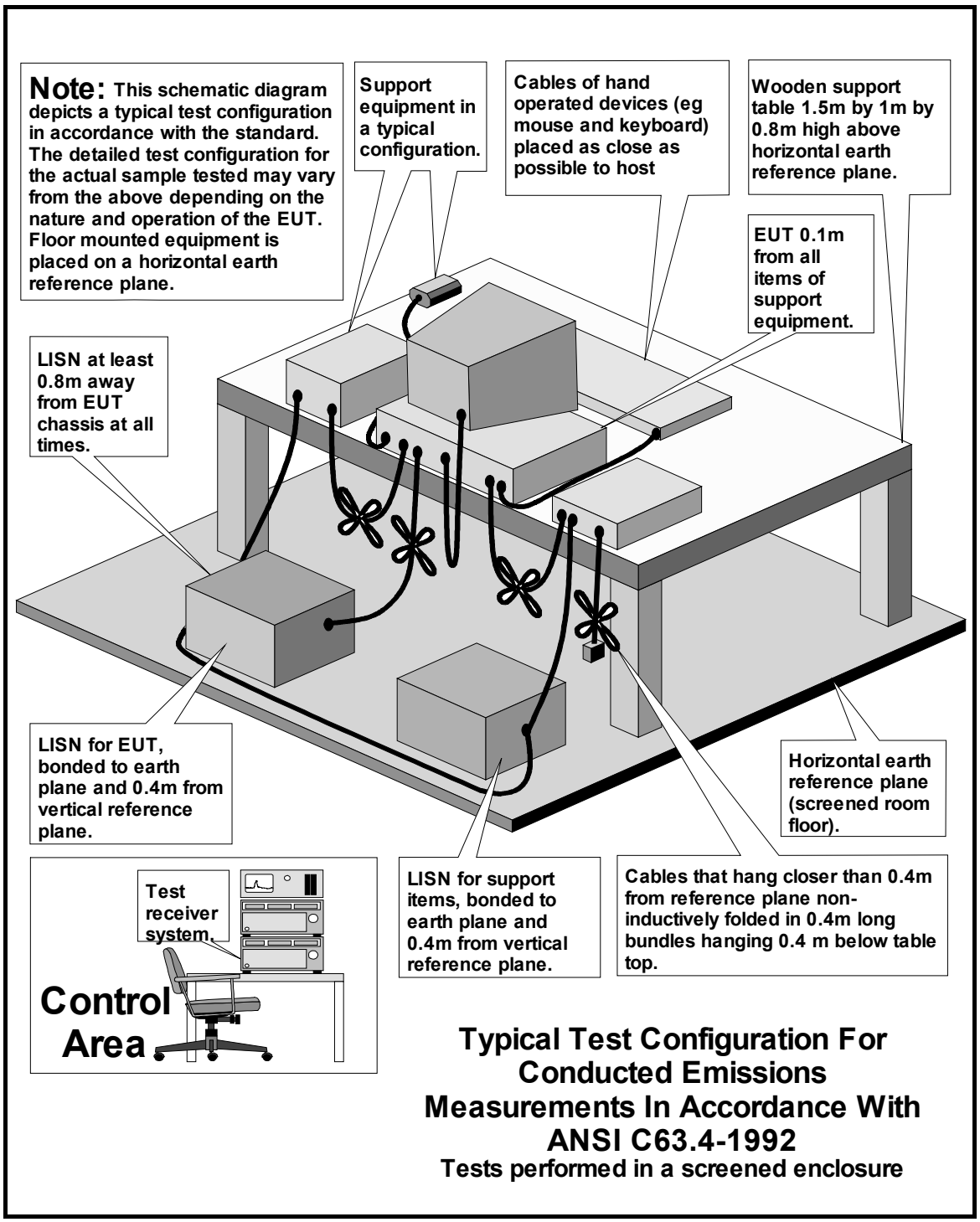
NB In accordance with UKAS requirements, all the measurement equipment is on a calibration schedule.

Appendix 2. Test Configuration Drawings

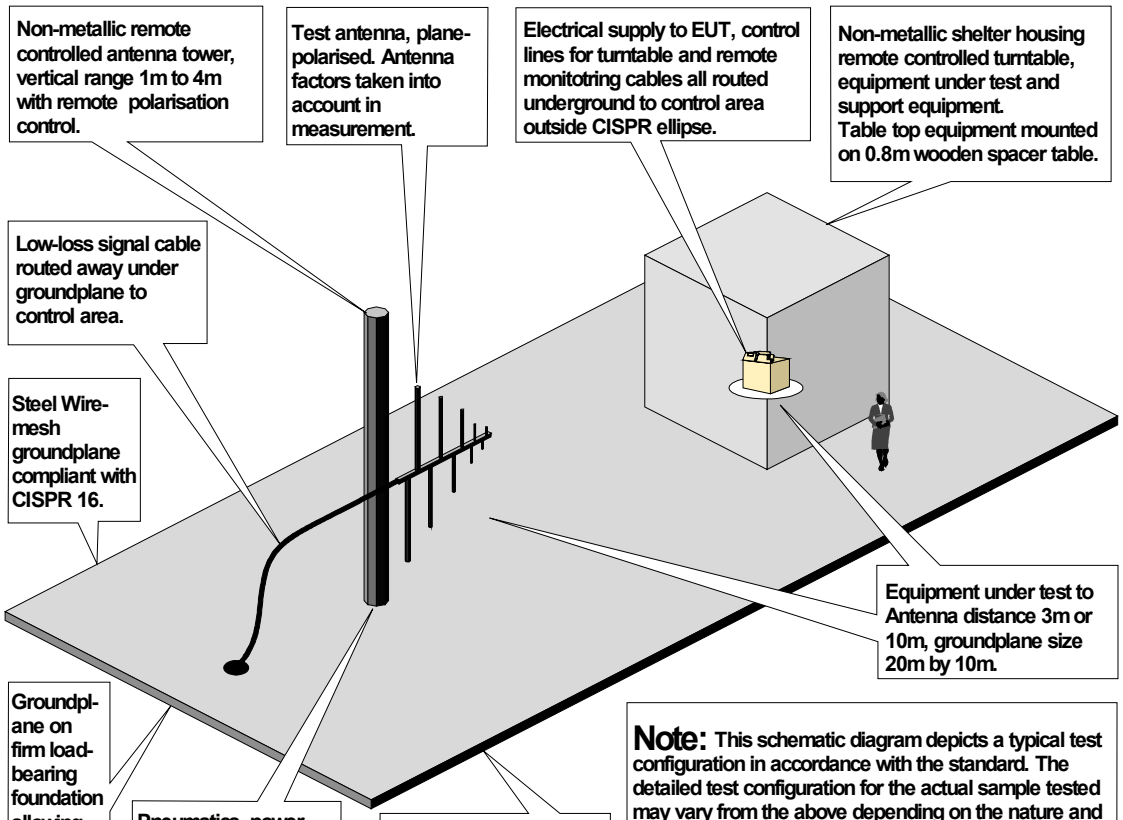
This Appendix contains the following drawings:

Drawing Reference Number	Title
DRG\47147JD01\EMICON	Test configuration for measurement of conducted emissions
DRG\47147JD01\EMIRAD	Test configuration for measurement of radiated emissions

DRG\47147JD01\EMICON



DRG\47147JD01\EMIRAD



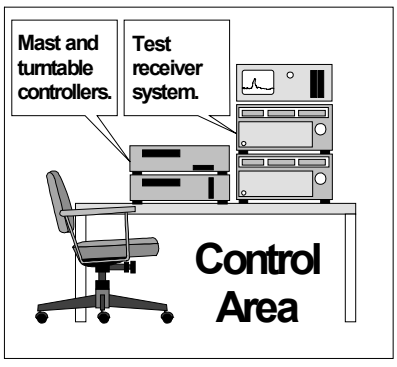
Note: This schematic diagram depicts a typical test configuration in accordance with the standard. The detailed test configuration for the actual sample tested may vary from the above depending on the nature and operation of the EUT.
The test site used by RFI is nominally at ground level.
All electrical cables run underground.
All other dimensions in accordance with the standard.

Test Configuration For Radiated Emissions Measurements

Reflection-free area: >60m by 52m (CISPR ellipse)

Groundplane Earthed

Control room outside CISPR ellipse



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