TEST REPORT
FROM
RFI GLOBAL SERVICES LTD

Test of: IPWireless (UK) Ltd
2.5 GHz UE P1D Modem, Model: KF

To: FCC Part 27: 2006 Subpart C

Test Report Serial No:
RFI/RPTE2/RP49364JD01A

Supersedes Test Report Serial No:
RFI/RPTE1/RP49364JD01A

This Test Report Is Issued Under The Authority Of Steve Flooks, Service Leader RPG: 	
Checked By: Steve Flooks 	**Report Copy No: PDF01**
Issue Date: 10 January 2008	**Test Dates: 23 August 2007 to 30 August 2007**

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Registered in England and Wales. Company number:2117901

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1. Client Information

Company Name:	IPWireless (UK) Ltd
Address:	Unit 7 Greenways Business Park Bellinger Close Chippenham Wiltshire SN15 1BN UK
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)

Description:	Wireless Broadband Modem
Brand Name:	IPWireless
Model Name or Number:	KF
Serial Number:	KF1A730001010
FCC ID Number:	PKTP1DKF2
Country of Manufacture:	UK
Date of Receipt:	23 August 2007

Brand Name:	AC/DC Power Adaptor
Model Name or Number:	I.T.E Power Supply
Unique Type Identification:	PSC05R-050 (IP)
Serial Number:	P60701677A1
Country of Manufacture:	China
Date of Receipt:	23 August 2007

2.2. Description of EUT

The unit under test is a 2.5 GHz wireless broadband modem.

2.3. Modifications Incorporated in EUT

During the course of testing the EUT was not modified.

2.4. Additional Information Related to Testing

Power Supply Requirement:	Nominal 110 V, 60 Hz AC Mains Supply Internal 3.7 V DC backup battery	
Intended Operating Environment:	Residential, Commercial, Light Industry and Heavy Industry	
Equipment Category:	Broadband Radio Access Network	
Type of Unit:	Portable (Standalone battery powered device)	
Chip Rate:	7.68 Mcps	
Bandwidth:	10 MHz	
Modulation Type:	QPSK	
Channel Spacing:	200 kHz	
Duty Cycle:	33%	
Highest Fundamental Frequency:	2.6846 GHz	
Antenna Type:	Integral	
Antenna Gain:	2 dBi	
Interface Ports:	Data Port	
Transmitter Output Power:	+24 dBm	
Transmit Frequency Range:	2501.4 to 2684.6 MHz	
Transmit Channels Tested:	**Channel ID**	**Channel Frequency (MHz)**
	Bottom	2501.4
	Middle	2593.0
	Top	2684.6
Receive Frequency Range:	2501.4 to 2684.6 MHz	
Receive Channels Tested:	**Channel ID**	**Channel Frequency (MHz)**
	Bottom	2501.4
	Middle	2593.0
	Top	2684.6

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
Model Name or Number:	Vaio
Serial Number:	None stated
Cable Length and Type	1.8m, USB
Connected to Port:	Data

3. Test Specification, Methods and Procedures

3.1. Test Specification

Reference:	FCC Part 27: 2006
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.

Reference:	FCC Part 15: 2006 Class B
Title:	Code of Federal Regulations, Part 15 (47CFR) Radio Frequency Devices: Digital Devices.
Comments:	A description of the test facility used for this test is on file with, and has been accepted by, the Federal Communications Commission as required by Section 2.948 of Federal Rules.

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.

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

There were no deviations from the test specification.

5. Operation of the EUT During Testing

5.1. Operating Modes

The EUT was tested in the following operating modes:

For all conducted antenna port tests, the EUT was transmitting at full power on bottom, middle or top channels as per the test requirement. The 15 timeslot frame was configured with 5 timeslots assigned to transmit and the remaining 10 timeslots assigned to receive using the high chip rate. This was considered to be the worst case configuration.

For all radiated tests, the EUT was transmitting at full power on bottom, middle or top channels as per the test requirement. The 15 timeslot frame was configured with 5 timeslots assigned to transmit and the remaining 10 timeslots assigned to receive using the high chip rate. This was considered to be the worst case configuration. The antenna port was terminated in a 50Ω load.

The EUT was configured in continuous transceive mode, therefore the receiver was active during all tests.

5.2. Configuration and Peripherals

The EUT was tested in the following configuration:

An AC/DC power adaptor was used to supply DC power to the EUT.

The frequency stability under voltage extremes was performed by connecting a power supply to the battery terminals of the device as this was deemed the most erroneous test condition.

The data port was connected to a laptop during setup and was left connected to allow data flow to simulate normal operational use.

6. Summary of Test Results

Range of Measurements	Specification Reference	Port Type	Compliancy Status
Idle Mode AC Conducted Spurious Emissions (150 kHz to 30 MHz)	FCC Part 15.107	AC Mains	Complied
Idle Mode Spurious Emissions	FCC Part 15.109	Enclosure	Complied
EIRP	FCC Part 27.50	Enclosure	Complied
Frequency Stability (Temperature Variation)	FCC Part 2.1055, Part 27.54	Antenna Terminals	Complied
Frequency Stability (Voltage Variation)	FCC Part 2.1055, Part 27.54	Antenna Terminals	Complied
Occupied Bandwidth	FCC Part 2.1049	Antenna Terminals	Complied
Conducted Spurious Emissions, Band Edge and Channel Edge	FCC Part 2.1051, Part 27.53	Antenna Terminals	Complied
Conducted Spurious Emissions	FCC Part 2.1051, Part 27.53	Antenna Terminals	Complied
Radiated Spurious Emissions	FCC Part 2.1051, Part 27.53	Enclosure	Complied
Radiated Spurious Emissions at Band Edge	FCC Part 2.1051, Part 27.53	Enclosure	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, UK.

7. Measurements, Examinations And Derived Results

7.1. General Comments

This section contains test results only. Details of the test methods and procedures can be found in Appendix 2 of this report.

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.

7.2. Test Results

7.2.1. Idle Mode AC Conducted Spurious Emissions

The EUT was configured for AC conducted emissions measurements, as described in Appendix 2 of this report.

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

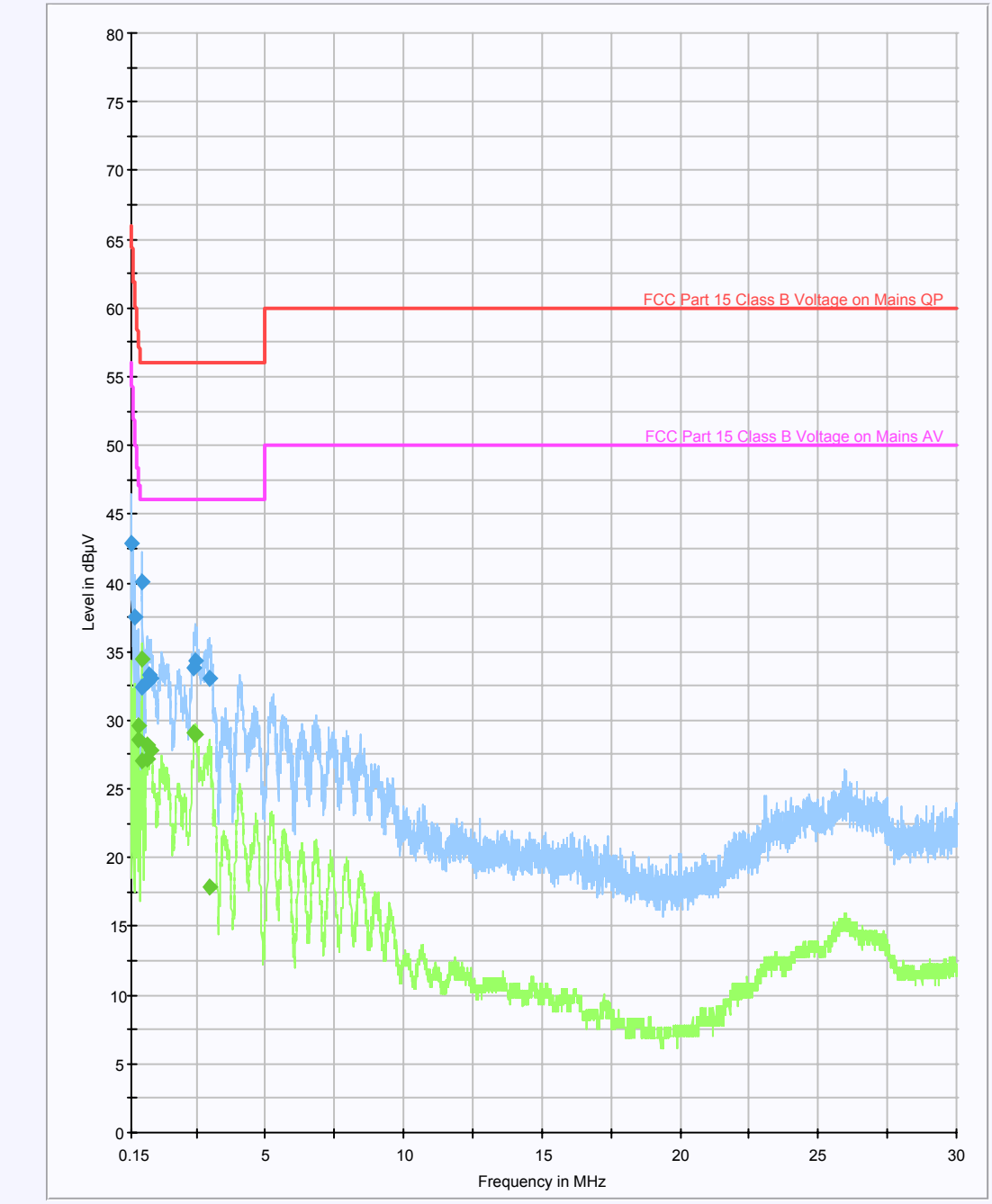
Results: Quasi-Peak Detector Measurements on Live and Neutral Lines

Frequency (MHz)	Line	Quasi Peak Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
0.166000	Live	42.8	65.2	22.4	Complied
0.266000	Live	37.5	61.2	23.7	Complied
0.534000	Live	40.0	56.0	16.0	Complied
0.566000	Neutral	32.4	56.0	23.6	Complied
0.702000	Neutral	32.7	56.0	23.3	Complied
0.762000	Neutral	33.4	56.0	22.6	Complied
0.858000	Neutral	33.1	56.0	22.9	Complied
2.402000	Neutral	33.8	56.0	22.2	Complied
2.458000	Neutral	34.3	56.0	21.7	Complied
2.982000	Live	33.0	56.0	23.0	Complied

Results: Average Detector Measurements on Live and Neutral Lines

Frequency (MHz)	Line	Average Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
0.398000	Live	29.6	47.9	18.3	Complied
0.430000	Neutral	28.5	47.3	18.8	Complied
0.534000	Live	34.5	46.0	11.5	Complied
0.566000	Neutral	27.0	46.0	19.0	Complied
0.730000	Neutral	28.2	46.0	17.8	Complied
0.738000	Neutral	27.2	46.0	18.8	Complied
0.858000	Neutral	27.8	46.0	18.2	Complied
2.414000	Neutral	29.1	46.0	16.9	Complied
2.486000	Neutral	29.0	46.0	17.0	Complied
2.974000	Neutral	17.9	46.0	28.1	Complied

Idle Mode AC Conducted Spurious Emissions (Continued)



7.2.2. Radiated Emissions (Idle Mode): 30 MHz to 1.0 GHz

The EUT was configured for receiver-radiated emissions testing, as described in Appendix 2 of this report.

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

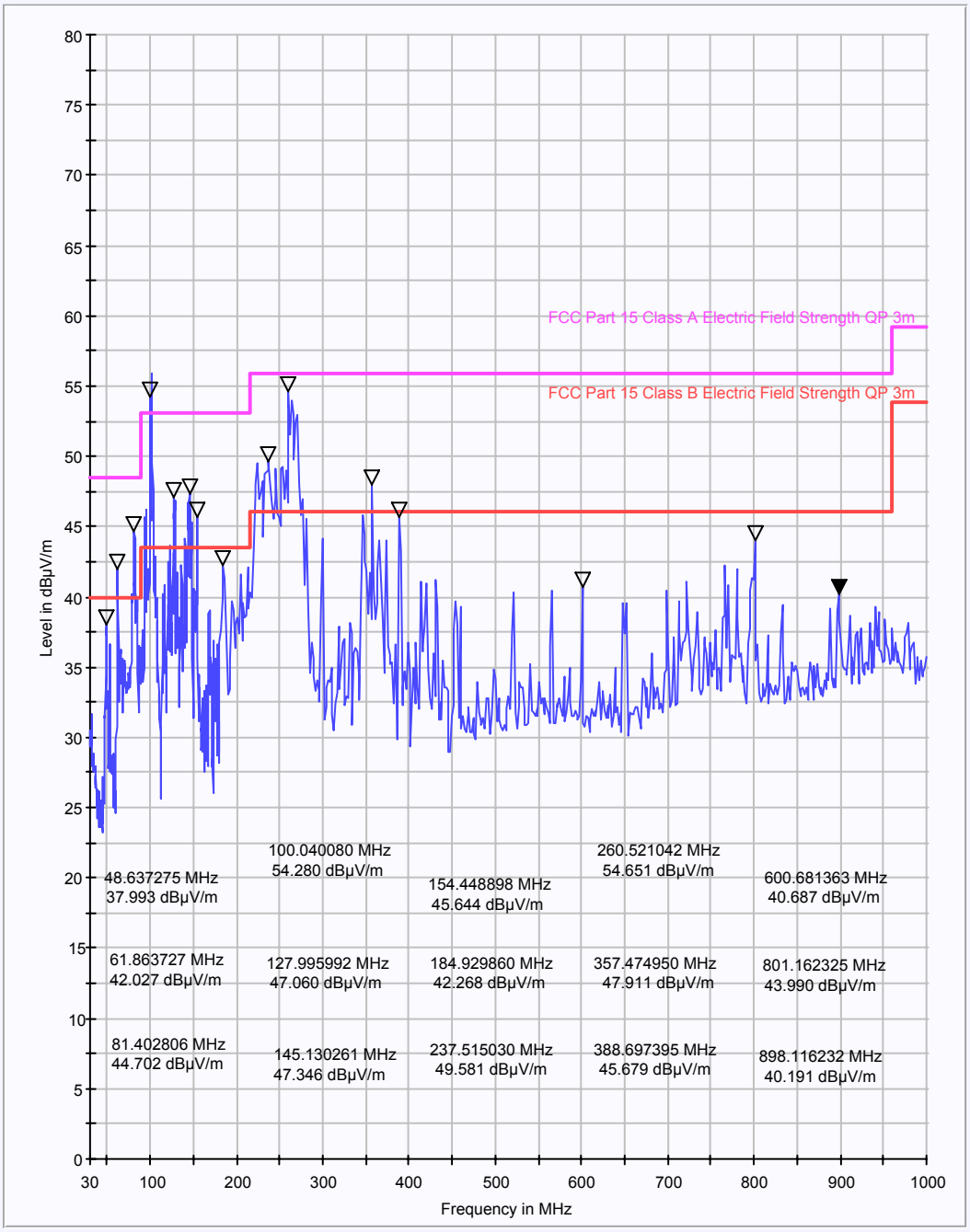
Results:

Frequency (MHz)	Antenna Polarity	Quasi Peak Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
48.647	Vertical	22.0	40.0	18.0	Complied
61.864	Vertical	18.3	40.0	21.7	Complied
81.444	Vertical	22.8	40.0	17.2	Complied
100.040	Vertical	41.0	43.5	3.5	Complied
127.996	Vertical	28.9	43.5	14.6	Complied
145.130	Vertical	31.3	43.5	12.2	Complied
154.449	Vertical	30.0	43.5	13.5	Complied
184.930	Horizontal	28.1	43.5	15.4	Complied
237.515	Horizontal	36.9	46.0	9.1	Complied
260.521	Vertical	30.0	46.0	16.0	Complied
357.475	Vertical	31.3	46.0	14.7	Complied
389.083	Vertical	33.2	46.0	12.8	Complied
600.000	Vertical	32.2	46.0	13.8	Complied
801.162	Horizontal	30.1	46.0	15.9	Complied
898.116	Horizontal	32.8	46.0	13.2	Complied

Notes(s):

1. *An ambient signal was also present at 100.040 MHz, which contributed to the amplitude of the measured level shown.*

Radiated Emissions (Idle Mode): 30 MHz to 1.0 GHz (Continued)



7.2.3. Receiver Radiated Emission (Idle Mode): 1 GHz to 20 GHz

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

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

Results:

Highest Peak Level:

Frequency (MHz)	Antenna Polarity	Peak Detector Level (dBμV)	Transducer Factor	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
1064.128	Vertical	70.6	9.9	60.7	74.0	13.3	Complied
1096.192	Vertical	67.7	9.9	57.8	74.0	16.2	Complied
1168.337	Vertical	56.8	8.5	48.3	74.0	25.7	Complied
1204.409	Vertical	56.7	8.5	48.2	74.0	25.8	Complied
1332.665	Vertical	56.7	9.1	47.6	74.0	26.4	Complied
2392.786	Vertical	58.0	6.5	51.5	74.0	22.5	Complied

Highest Average Level:

Frequency (MHz)	Antenna Polarity	Average Detector Level (dBμV)	Transducer Factor	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
1064.128	Vertical	46.3	9.9	36.4	54.0	17.6	Complied
1096.192	Vertical	47.2	9.9	37.3	54.0	16.7	Complied
1168.337	Vertical	56.8	8.5	48.3*	54.0	5.7	Complied
1204.409	Vertical	56.7	8.5	48.2*	54.0	5.8	Complied
1332.665	Vertical	56.7	9.1	47.6*	54.0	6.4	Complied
2392.786	Vertical	58.0	6.5	51.5*	54.0	2.5	Complied

Note(s):

1. *Results marked with a '*' indicate that the level shown is a peak level against an average limit. These measurements were noise floor values.*

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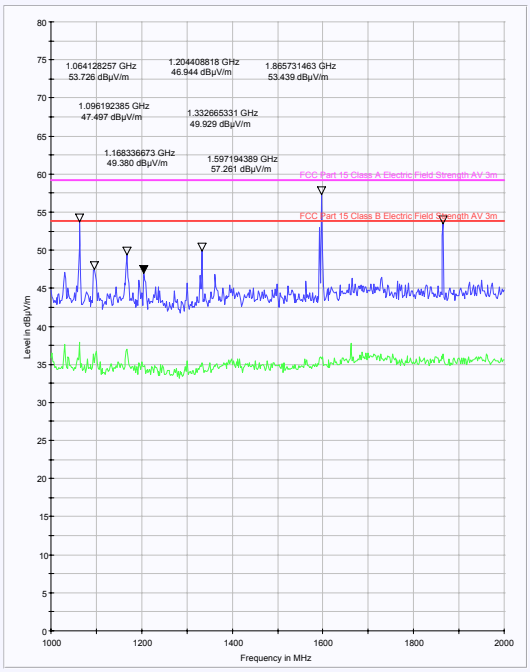
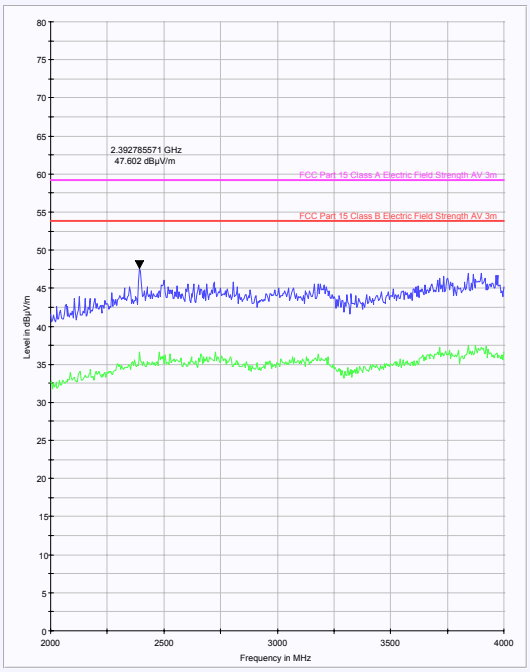
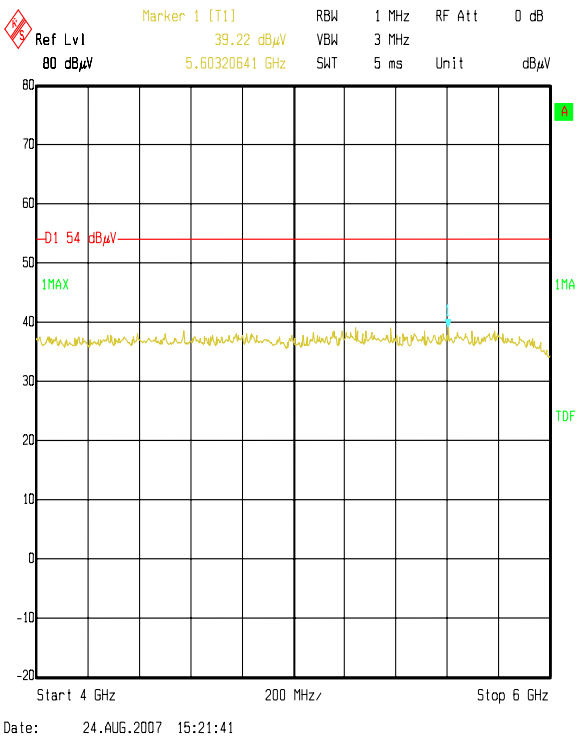
Receiver Radiated Emission (Idle Mode): 1 GHz to 20 GHz (Continued)







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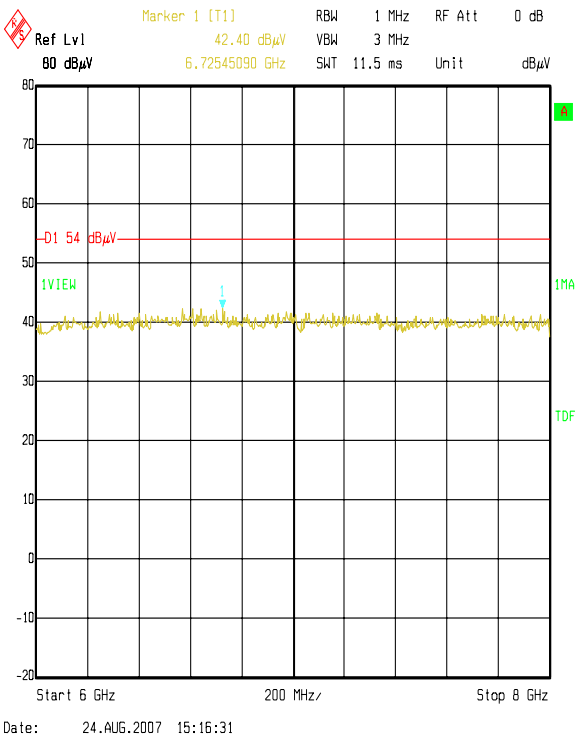

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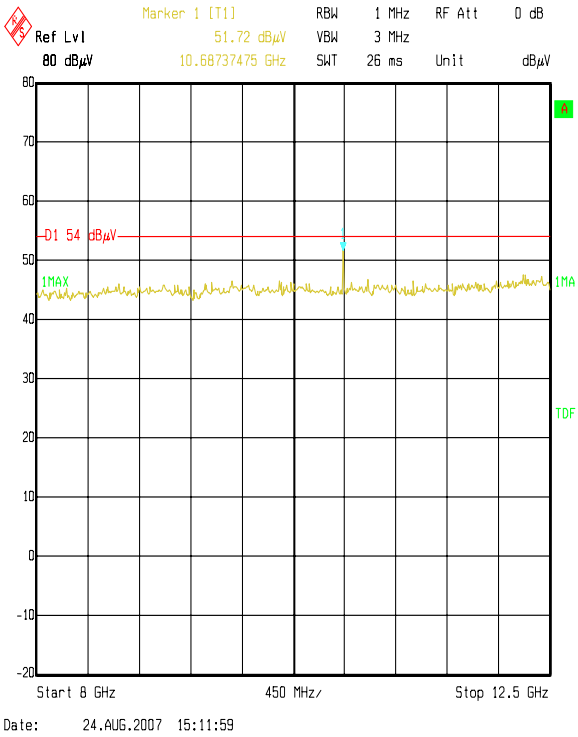
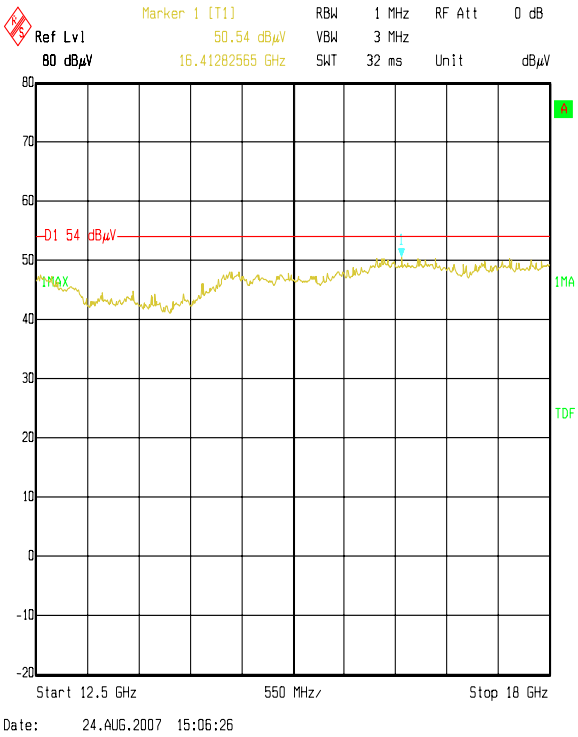
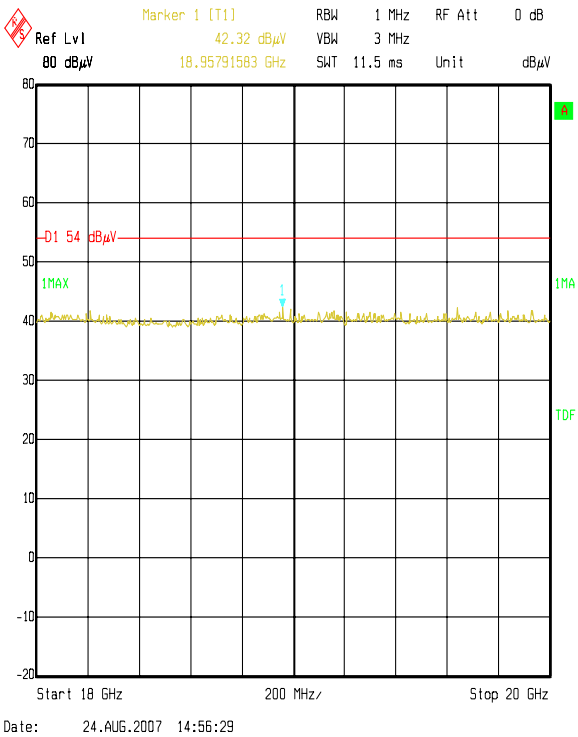
Receiver Radiated Emission (Idle Mode): 1 GHz to 20 GHz (Continued)







7.2.4. Equivalent Isotropic Radiated Power (EIRP):

The EUT was configured for conducted RF output power, as described in Appendix 2 of this report.

Channel	Frequency (MHz)	EIRP (dBm)	Limit EIRP (dBm)	Margin (dB)	Result
Bottom	2501.4	26.0	33.0	7.0	Complied
Middle	2593.0	26.2	33.0	6.8	Complied
Top	2684.6	26.2	33.0	6.8	Complied

7.2.5. Transmitter Frequency Stability - Temperature Variation

The EUT was configured for frequency stability measurements, as described in Appendix 2 of this report. Channel edge and carrier centre frequency measurements were made.

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

Results:

Transmitter Frequency Stability - Temperature Variation (Continued)

Bottom Channel – Carrier Centre

Temp (ºC)	Measured Frequency (MHz)	Frequency Error (kHz)
-30	2501.399481	-1.000
-20	2501.400303	0.000
-10	2501.400139	0.000
0	2501.399986	0.000
10	2501.400023	0.000
20	2501.400752	0.000
30	2501.401072	-0.053
40	2501.400331	0.680
50	2501.399729	1.170

Middle Channel – Carrier Centre

Temp (ºC)	Measured Frequency (MHz)	Frequency Error (kHz)
-30	2592.999384	0.000
-20	2593.000264	0.000
-10	2593.000089	10.000
0	2592.999984	16.000
10	2593.000271	13.000
20	2593.000772	0.000
30	2593.001152	-0.050
40	2593.000451	0.630
50	2592.999709	1.150

Transmitter Frequency Stability - Temperature Variation (continued)

Top Channel – Carrier Centre

Temp (ºC)	Measured Frequency (MHz)	Frequency Error (kHz)
-30	2684.599376	7.000
-20	2684.600245	0.000
-10	2684.600090	0.000
0	2684.599996	0.000
10	2684.600271	0.000
20	2684.600892	0.000
30	2684.601172	-0.070
40	2684.600451	0.770
50	2684.599709	1.150

7.2.6. Transmitter Frequency Stability – Voltage Variation

The EUT was configured for frequency stability measurements, as described in Appendix 2 of this report.

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

Bottom Channel – Carrier Centre

Voltage	Measured Frequency (MHz)	Frequency Error (kHz)
3.4	2501.402600	2.600
3.7	2501.400120	0.120

Middle Channel – Carrier Centre

Voltage	Measured Frequency (MHz)	Frequency Error (kHz)
3.4	2593.000174	0.174
3.7	2593.000180	0.180

Top Channel – Carrier Centre

Voltage	Measured Frequency (MHz)	Frequency Error (kHz)
3.4	2684.600200	0.200
3.7	2684.600210	0.210

7.2.7. Transmitter Occupied Bandwidth

The EUT was configured for Occupied Bandwidth measurements, as described in Appendix 2 of this report.

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	2501.4	100	300	8.2365
Middle	2593.0	100	300	8.2665
Top	2684.6	100	300	8.2665

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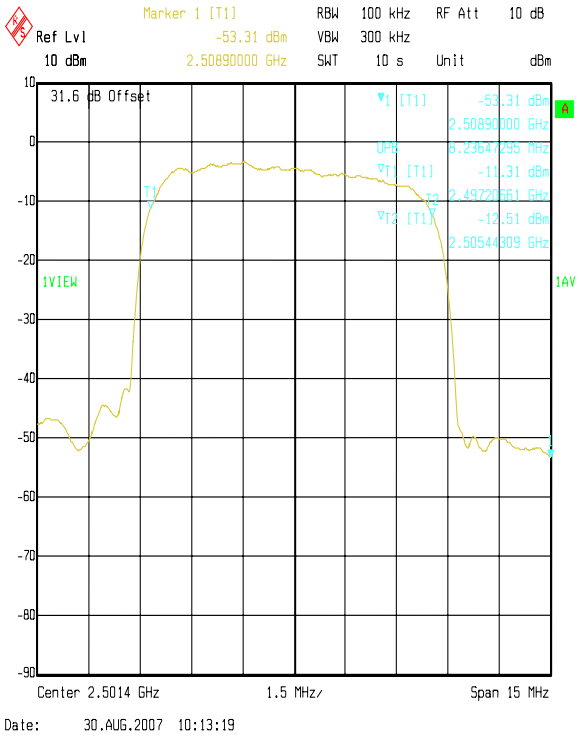
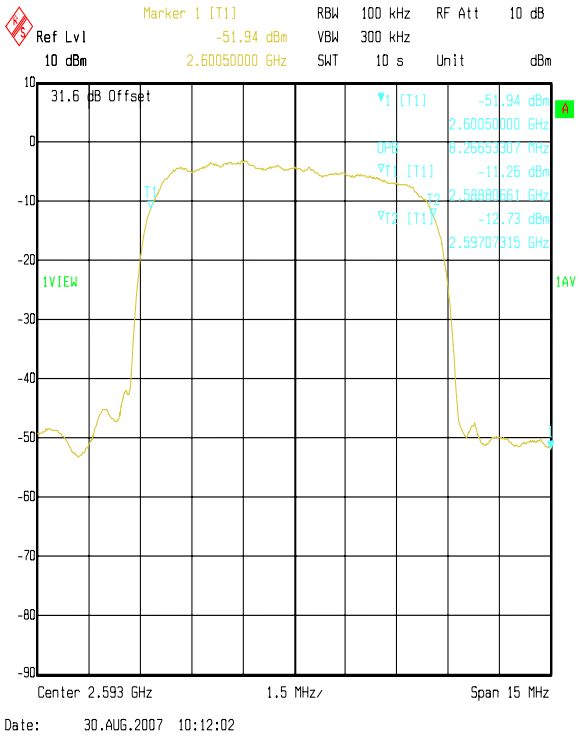
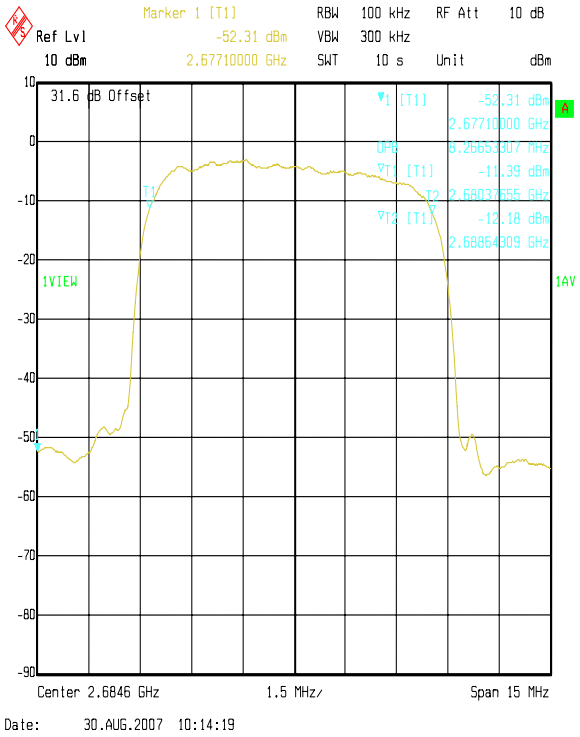
Transmitter Occupied Bandwidth (Continued)







7.2.8. Transmitter Conducted Emissions- Band Edge and Channel Edge

The EUT was configured for conducted emissions measurements, as described in Appendix 2 of this report.

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.

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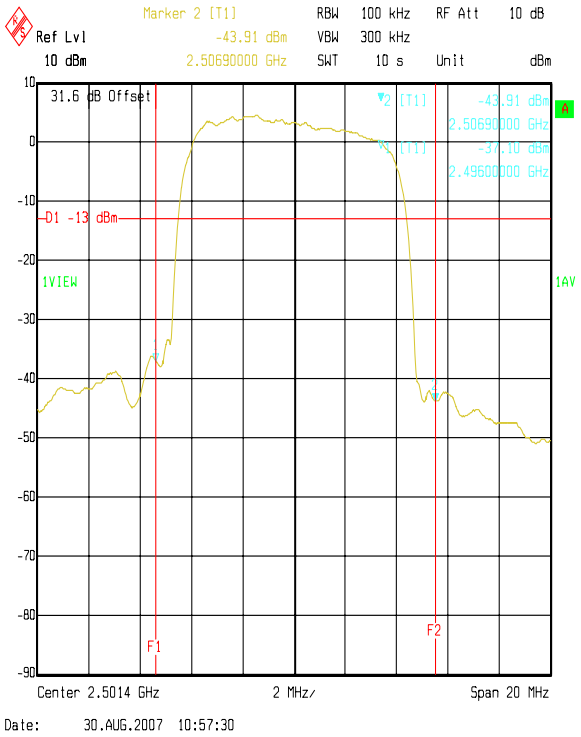
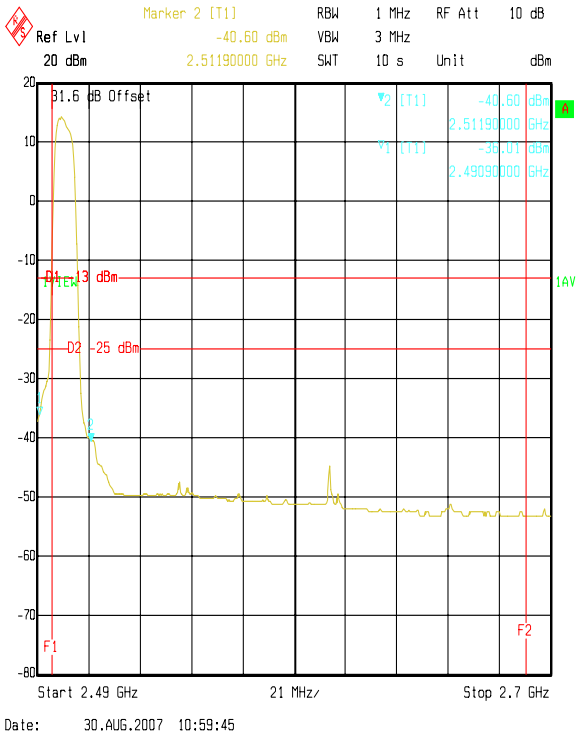
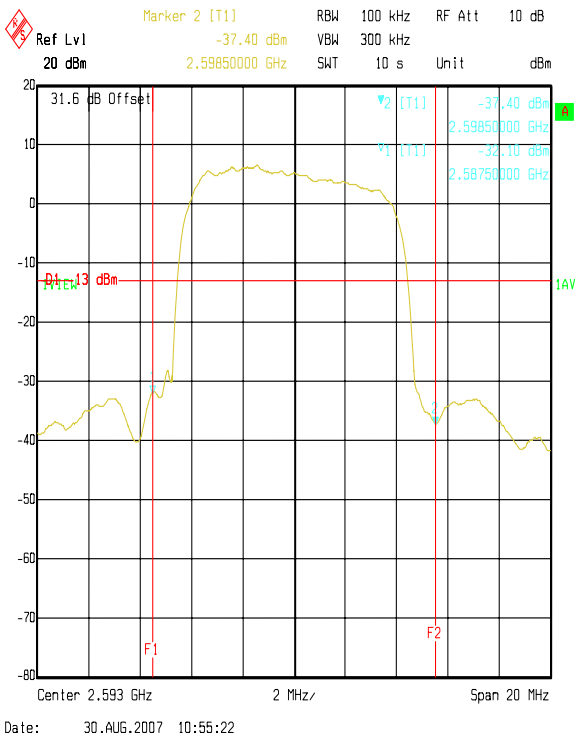
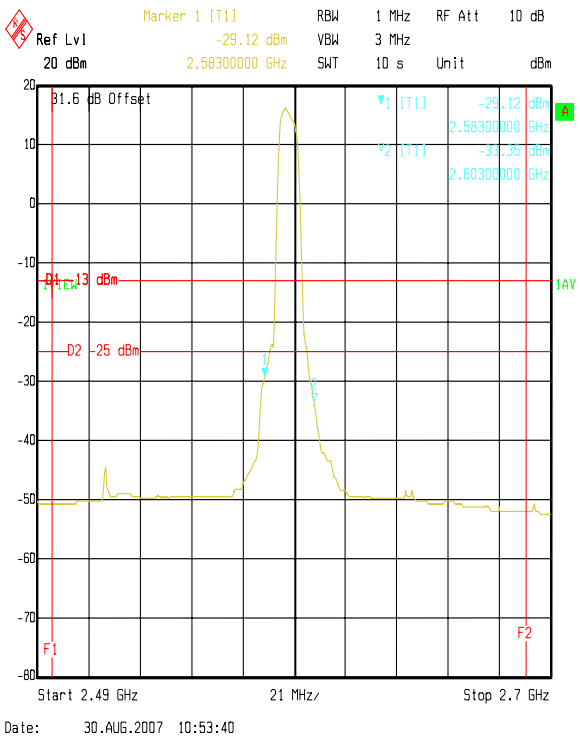
Transmitter Conducted Emissions - Channel Edge (Continued)

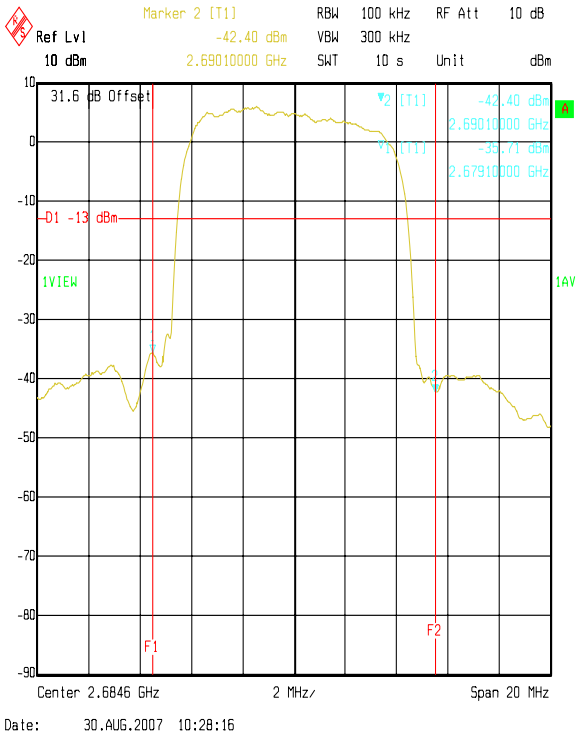


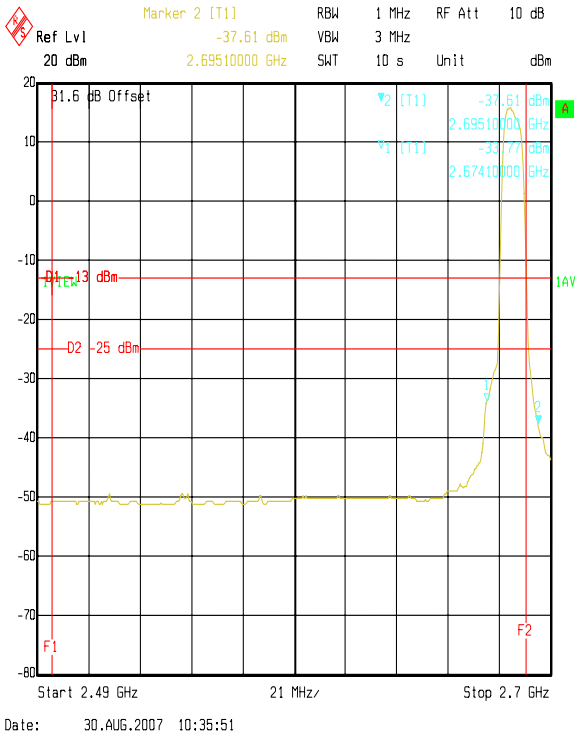






Transmitter Conducted Emissions - Channel Edge (Continued)





7.2.9. Transmitter Conducted Emissions at Band Edges

Results:

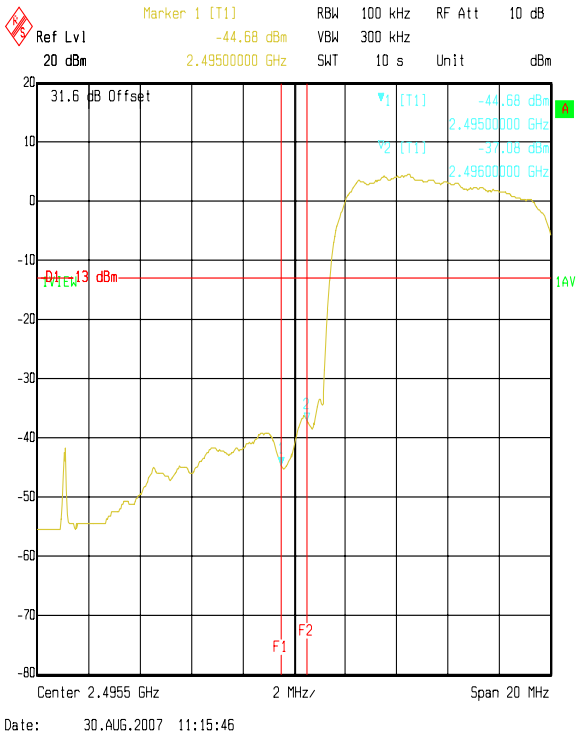
Bottom Band Edge

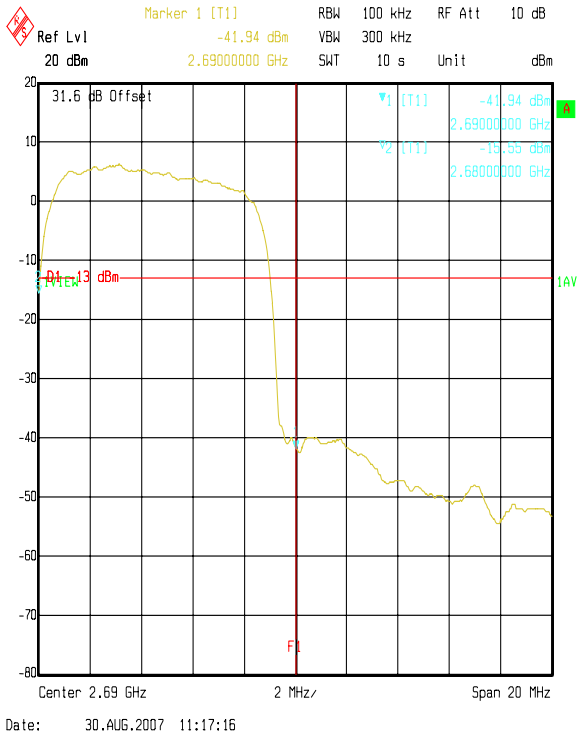
Frequency (MHz)	Spurious Emission (dBm)	Limit (dBm)	Margin (dB)	Result
2496	-37.1	-13.0	24.1	Complied

Top Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
2690	-41.9	-13.0	28.9	Complied

Transmitter Conducted Emissions - Band Edge (Continued)





7.2.10. Transmitter Conducted Emissions

The EUT was configured for conducted emissions measurements, as described in Appendix 2 of this report.

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

Result: Bottom Channel

Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
2879.1	-45.5	-25.0	20.5	Complied

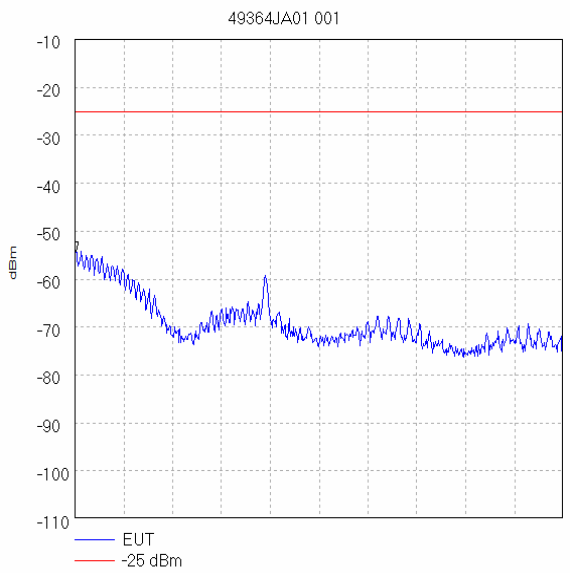
Result: Middle Channel

Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1933.3	-39.5	-25.0	14.5	Complied

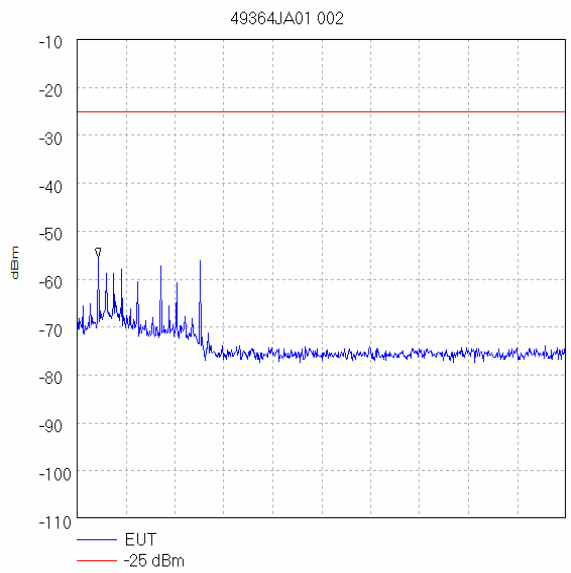
Result: Top Channel

Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1926.7	-37.7	-25.0	12.7	Complied
2064.7	-38.4	-25.0	13.4	Complied
2305.9	-33.5	-25.0	8.5	Complied
5358.3	-43.8	-25.0	18.8	Complied

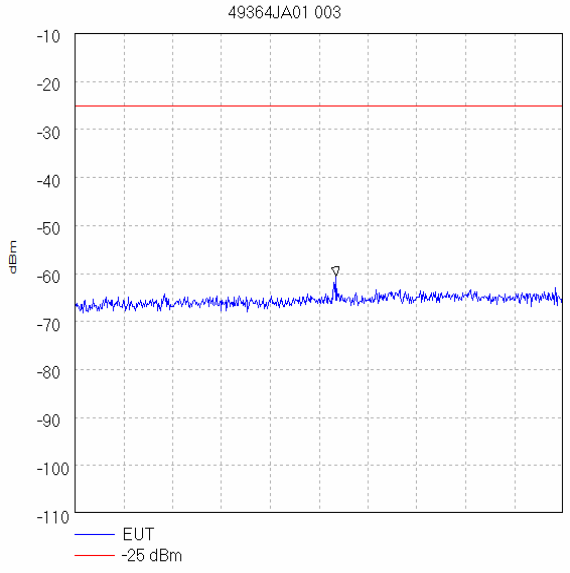
Transmitter Conducted Emissions – Bottom Channel (Continued)



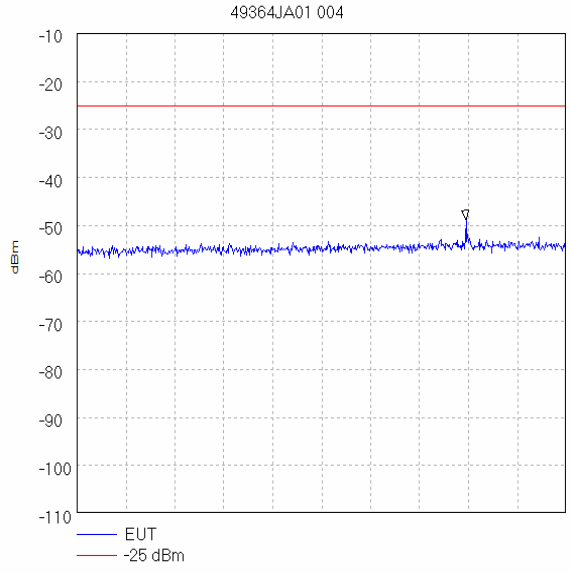
Start 9.0 kHz; Stop 150.0 kHz
Ref -10 dBm; Ref Offset 33.0 dB; 10 dB/div
RBW 1.0 kHz; VBW 1.0 kHz; Att 0 dB; Swp 360.0 mS
Peak 9.235 kHz, -54.17 dBm
Display Line: -25 dBm; ; Limit Test Passed
Tested by jxh 30/08/2007 13:28:45



Start 150.0 kHz; Stop 30.0 MHz
Ref -10 dBm; Ref Offset 33.0 dB; 10 dB/div
RBW 10.0 kHz; VBW 10.0 kHz; Att 0 dB; Swp 750.0 mS
Peak 1.4435 MHz, -55.5 dBm
Display Line: -25 dBm; ; Limit Test Passed
Tested by jxh 30/08/2007 13:29:50

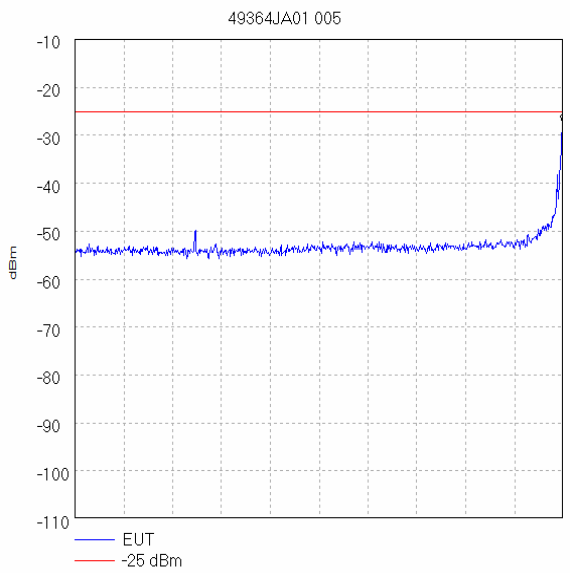


Start 30.0 MHz; Stop 1.0 GHz
Ref -10 dBm; Ref Offset 33.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 250.0 mS
Peak 548.95 MHz, -60.5 dBm
Display Line: -25 dBm; ; Limit Test Passed
Tested by jxh 30/08/2007 13:30:40

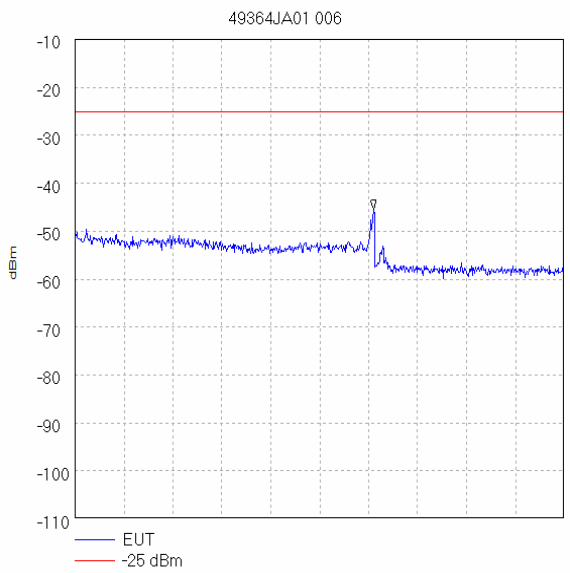


Start 1.0 GHz; Stop 2.0 GHz
Ref -10 dBm; Ref Offset 33.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 50.0 mS
Peak 1.795 GHz, -48.83 dBm
Display Line: -25 dBm; ; Limit Test Passed
Tested by jxh 30/08/2007 13:31:31

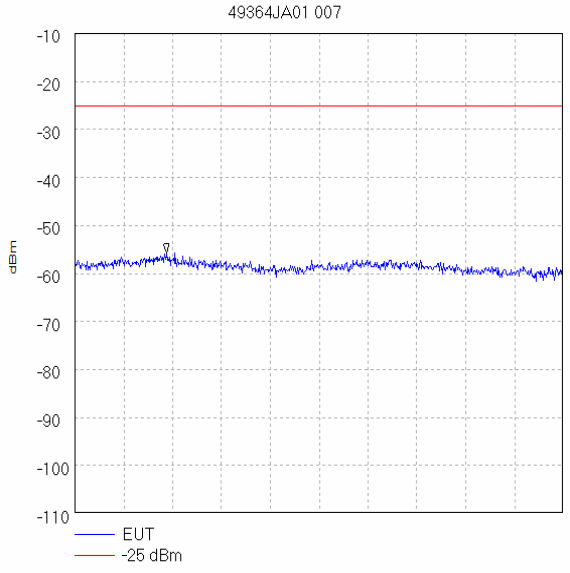
Transmitter Conducted Emissions – Bottom Channel (Continued)



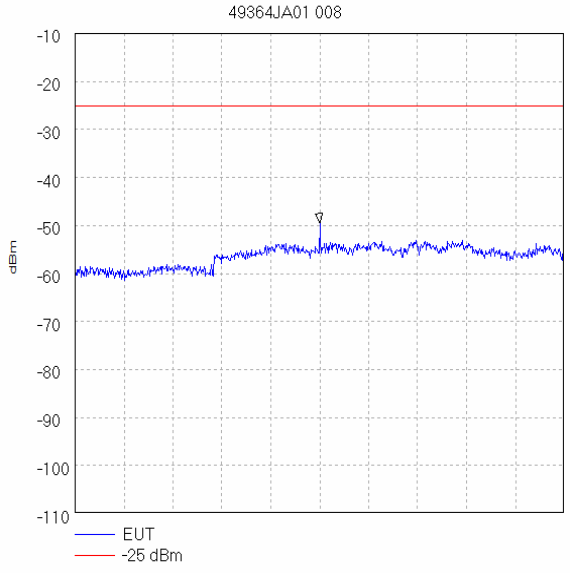
Start 2.0 GHz; Stop 2.495 GHz
Ref -10 dBm; Ref Offset 33.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 50.0 mS
Peak 2.495 GHz, -27.67 dBm
Display Line: -25 dBm; ; Limit Test Passed
Tested by jxh 30/08/2007 13:32:06



Start 2.69 GHz; Stop 3.0 GHz
Ref -10 dBm; Ref Offset 33.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 50.0 mS
Peak 2.8791 GHz, -45.5 dBm
Display Line: -25 dBm; ; Limit Test Passed
Tested by jxh 30/08/2007 13:34:01

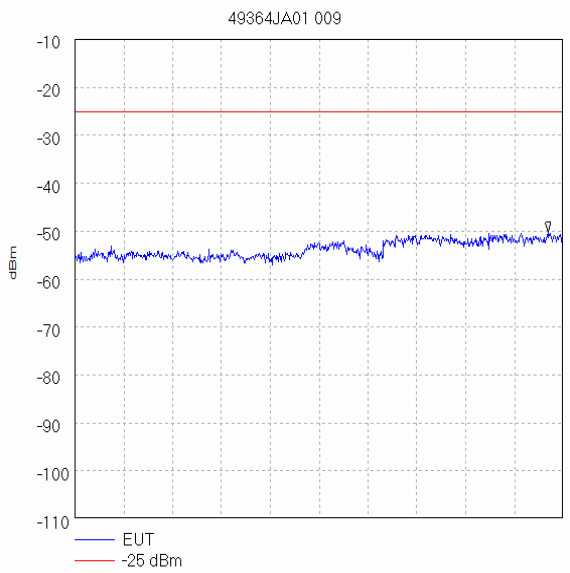


Start 3.0 GHz; Stop 5.0 GHz
Ref -10 dBm; Ref Offset 33.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 50.0 mS
Peak 3.376667 GHz, -55.67 dBm
Display Line: -25 dBm; ; Limit Test Passed
Tested by jxh 30/08/2007 13:34:32

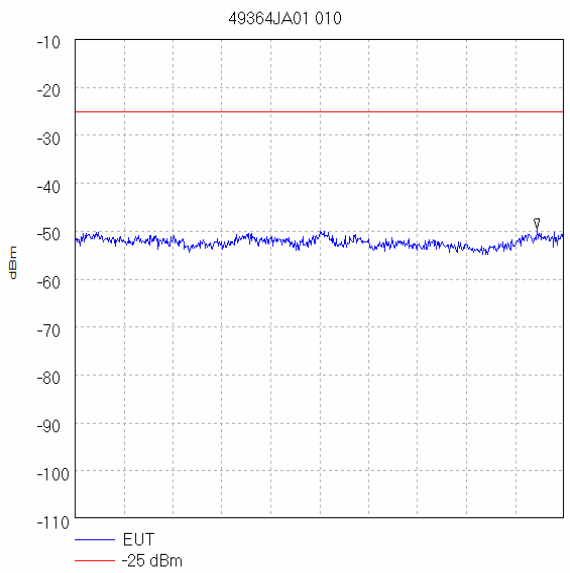


Start 5.0 GHz; Stop 10.0 GHz
Ref -10 dBm; Ref Offset 33.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 100.0 mS
Peak 7.5 GHz, -49.5 dBm
Display Line: -25 dBm; ; Limit Test Passed
Tested by jxh 30/08/2007 13:35:41

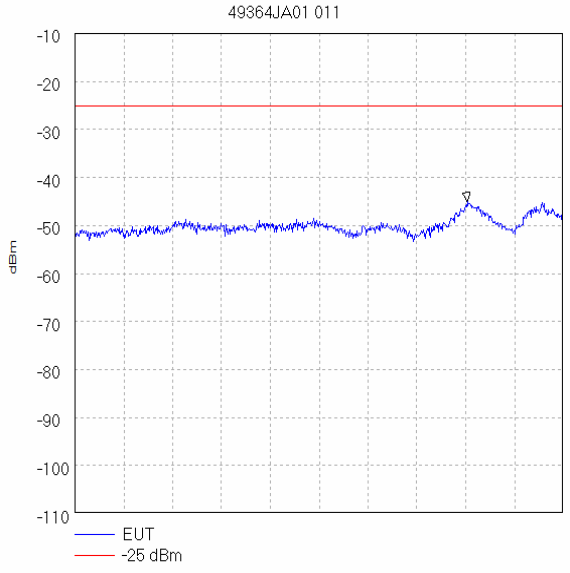
Transmitter Conducted Emissions – Bottom Channel (Continued)



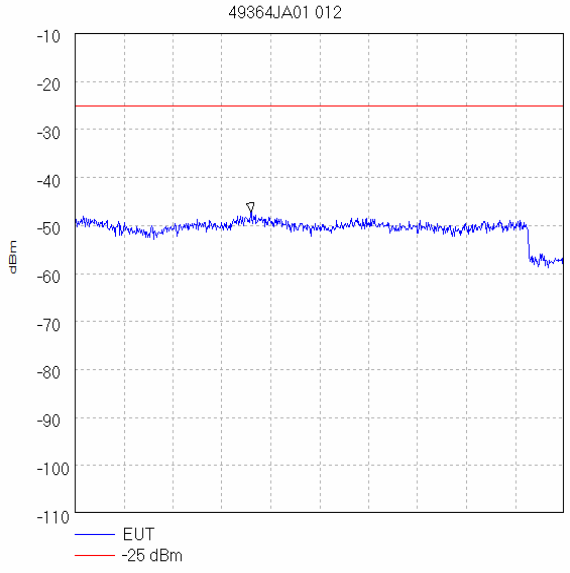
Start 10.0 GHz; Stop 15.0 GHz
Ref -10 dBm; Ref Offset 33.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 100.0 mS
Peak 14.841667 GHz, -50.17 dBm
Display Line: -25 dBm; ; Limit Test Passed
Tested by jxh 30/08/2007 13:36:53



Start 15.0 GHz; Stop 20.0 GHz
Ref -10 dBm; Ref Offset 33.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 100.0 mS
Peak 19.725 GHz, -49.5 dBm
Display Line: -25 dBm; ; Limit Test Passed
Tested by jxh 30/08/2007 13:37:29

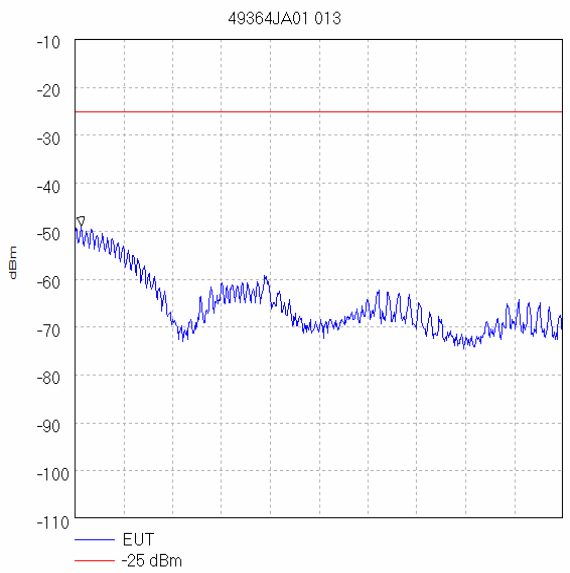


Start 20.0 GHz; Stop 25.0 GHz
Ref -10 dBm; Ref Offset 33.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 100.0 mS
Peak 24.016667 GHz, -45.0 dBm
Display Line: -25 dBm; ; Limit Test Passed
Tested by jxh 30/08/2007 13:37:58

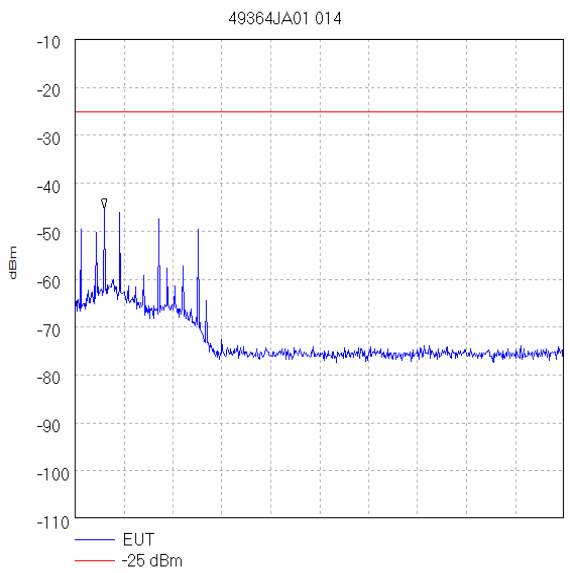


Start 25.0 GHz; Stop 27.0 GHz
Ref -10 dBm; Ref Offset 33.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 50.0 mS
Peak 25.72 GHz, -47.17 dBm
Display Line: -25 dBm; ; Limit Test Passed
Tested by jxh 30/08/2007 13:38:40

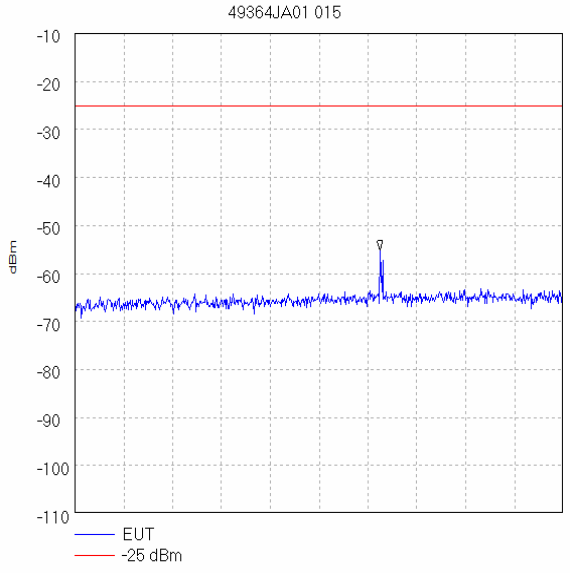
Transmitter Conducted Emissions – Middle Channel (Continued)



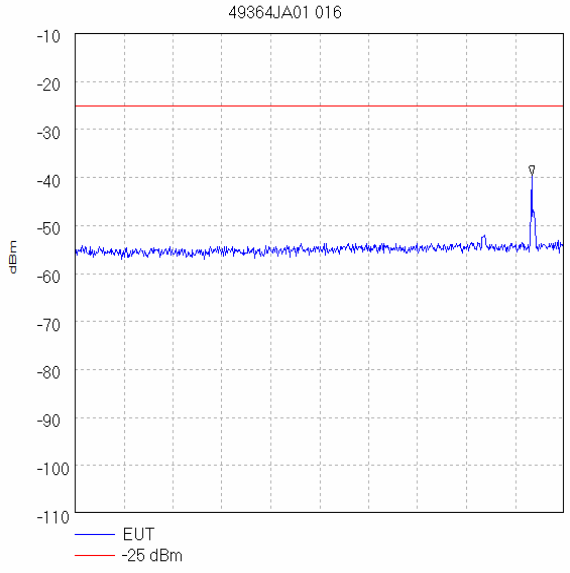
Start 9.0 kHz; Stop 150.0 kHz
Ref -10 dBm; Ref Offset 33.0 dB; 10 dB/div
RBW 1.0 kHz; VBW 1.0 kHz; Att 0 dB; Swp 360.0 mS
Peak 10.88 kHz, -49.0 dBm
Display Line: -25 dBm; ; Limit Test Passed
Tested by jxh 30/08/2007 13:40:09



Start 150.0 kHz; Stop 30.0 MHz
Ref -10 dBm; Ref Offset 33.0 dB; 10 dB/div
RBW 10.0 kHz; VBW 10.0 kHz; Att 0 dB; Swp 750.0 mS
Peak 1.941 MHz, -45.33 dBm
Display Line: -25 dBm; ; Limit Test Passed
Tested by jxh 30/08/2007 13:41:49

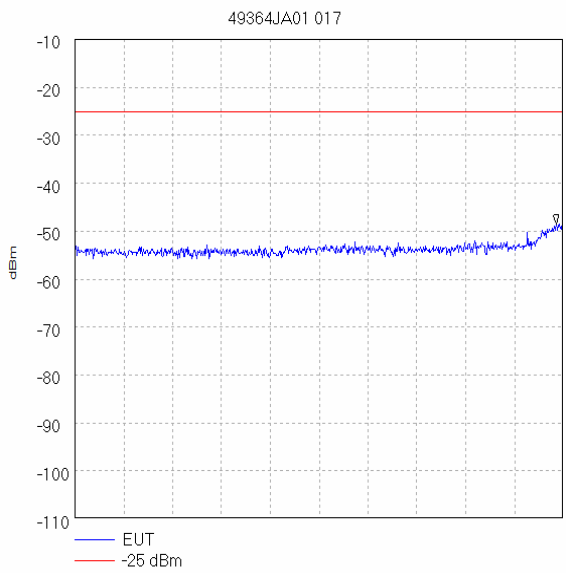


Start 30.0 MHz; Stop 1.0 GHz
Ref -10 dBm; Ref Offset 33.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 250.0 mS
Peak 636.25 MHz, -55.17 dBm
Display Line: -25 dBm; ; Limit Test Passed
Tested by jxh 30/08/2007 13:42:45

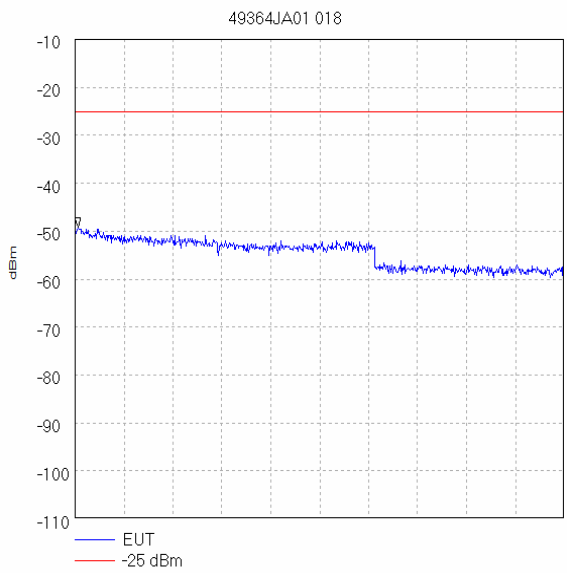


Start 1.0 GHz; Stop 2.0 GHz
Ref -10 dBm; Ref Offset 33.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 50.0 mS
Peak 1.933333 GHz, -39.5 dBm
Display Line: -25 dBm; ; Limit Test Passed
Tested by jxh 30/08/2007 13:43:20

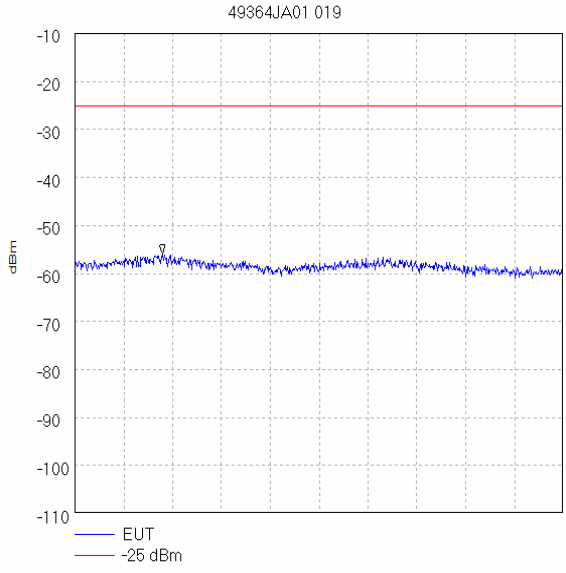
Transmitter Conducted Emissions – Middle Channel (Continued)



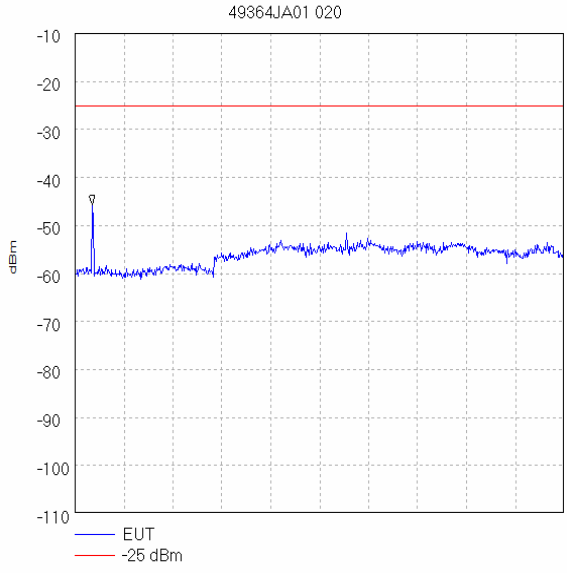
Start 2.0 GHz; Stop 2.496 GHz
Ref -10 dBm; Ref Offset 33.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 50.0 mS
Peak 2.48856 GHz, -48.5 dBm
Display Line: -25 dBm; ; Limit Test Passed
Tested by jxh 30/08/2007 13:43:54



Start 2.69 GHz; Stop 3.0 GHz
Ref -10 dBm; Ref Offset 33.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 50.0 mS
Peak 2.692067 GHz, -49.17 dBm
Display Line: -25 dBm; ; Limit Test Passed
Tested by jxh 30/08/2007 13:45:31

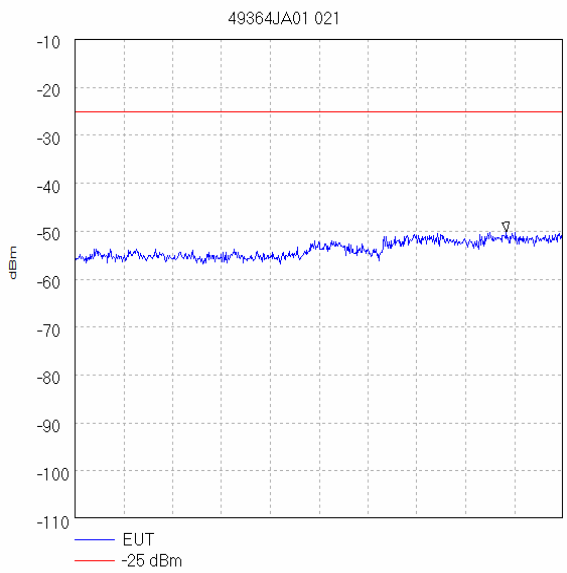


Start 3.0 GHz; Stop 5.0 GHz
Ref -10 dBm; Ref Offset 33.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 50.0 mS
Peak 3.36 GHz, -56.0 dBm
Display Line: -25 dBm; ; Limit Test Passed
Tested by jxh 30/08/2007 13:45:53

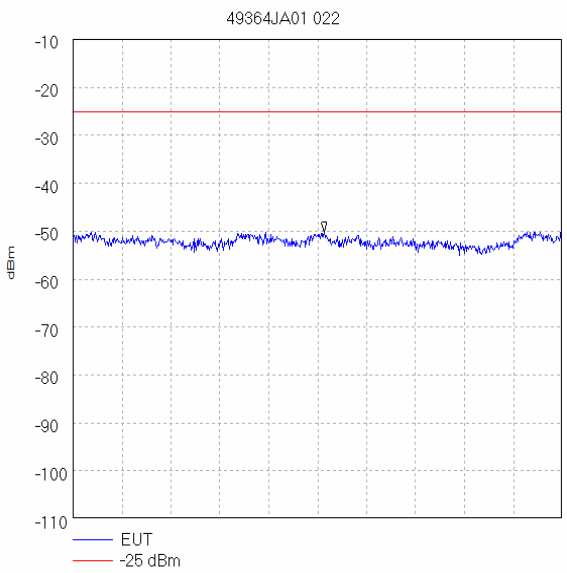


Start 5.0 GHz; Stop 10.0 GHz
Ref -10 dBm; Ref Offset 33.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 100.0 mS
Peak 5.175 GHz, -45.67 dBm
Display Line: -25 dBm; ; Limit Test Passed
Tested by jxh 30/08/2007 13:47:07

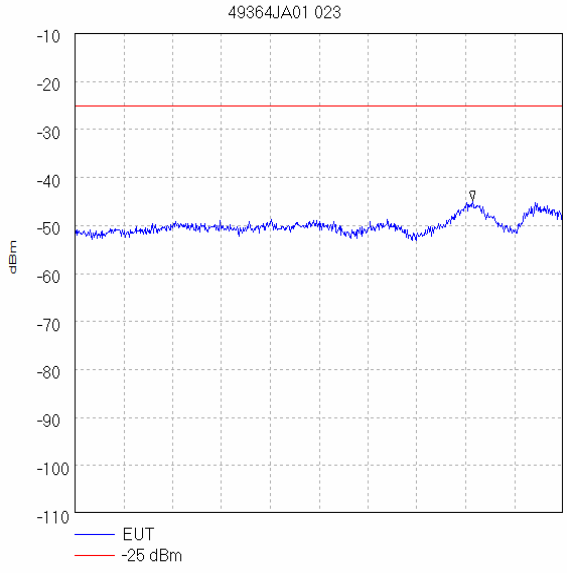
Transmitter Conducted Emissions – Middle Channel (Continued)



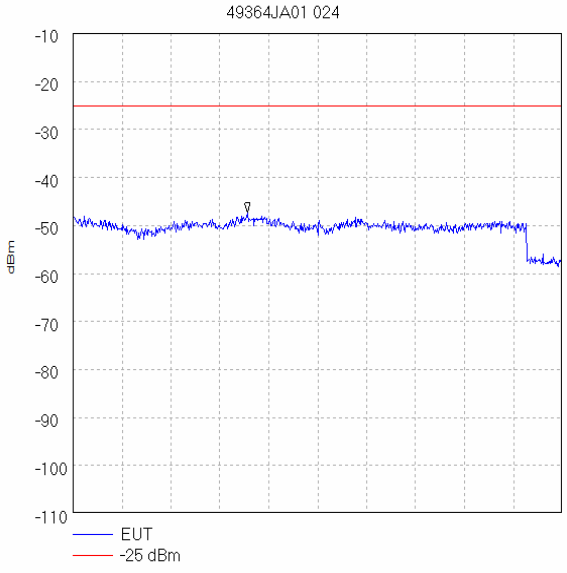
Start 10.0 GHz; Stop 15.0 GHz
Ref -10 dBm; Ref Offset 33.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 100.0 mS
Peak 14.416667 GHz, -50.17 dBm
Display Line: -25 dBm; ; Limit Test Passed
Tested by jxh 30/08/2007 13:48:29



Start 15.0 GHz; Stop 20.0 GHz
Ref -10 dBm; Ref Offset 33.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 100.0 mS
Peak 17.566667 GHz, -50.17 dBm
Display Line: -25 dBm; ; Limit Test Passed
Tested by jxh 30/08/2007 13:49:20

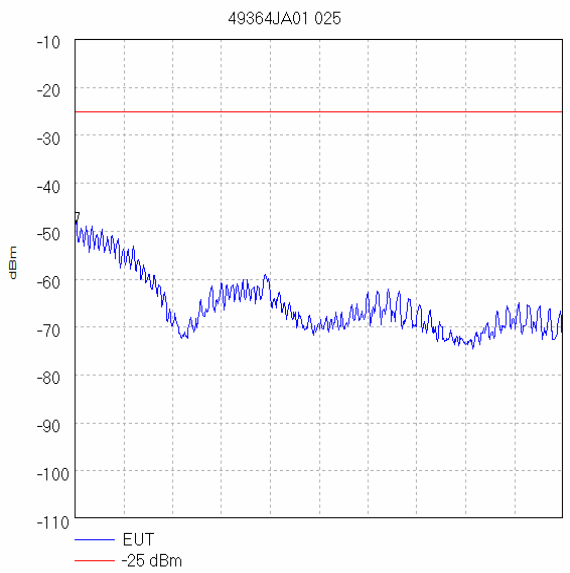


Start 20.0 GHz; Stop 25.0 GHz
Ref -10 dBm; Ref Offset 33.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 100.0 mS
Peak 24.075 GHz, -44.83 dBm
Display Line: -25 dBm; ; Limit Test Passed
Tested by jxh 30/08/2007 13:49:44

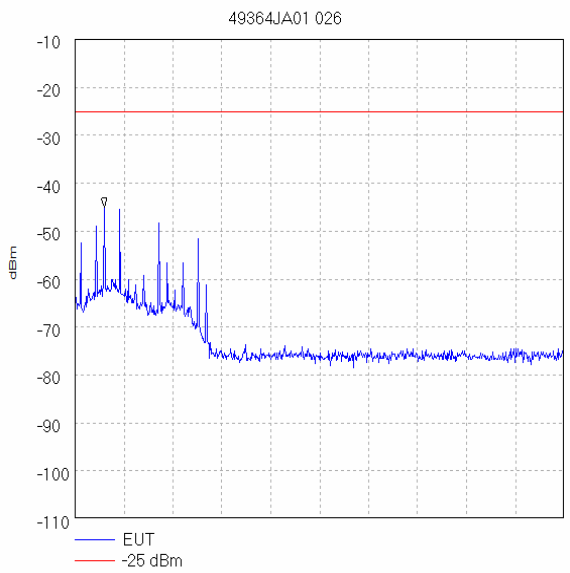


Start 25.0 GHz; Stop 27.0 GHz
Ref -10 dBm; Ref Offset 33.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 50.0 mS
Peak 25.713333 GHz, -47.33 dBm
Display Line: -25 dBm; ; Limit Test Passed
Tested by jxh 30/08/2007 13:50:36

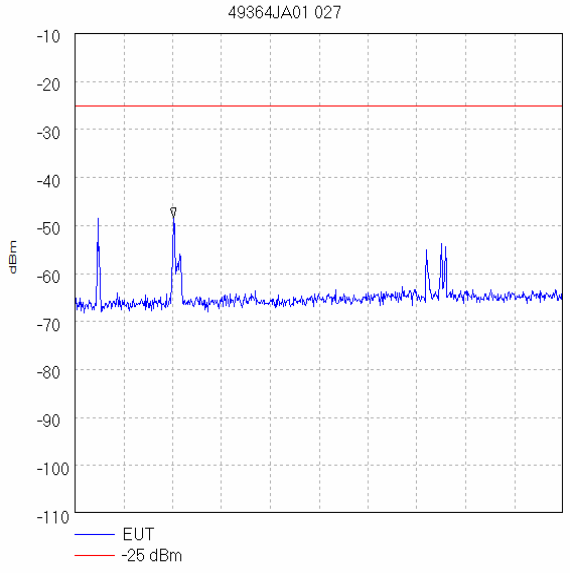
Transmitter Conducted Emissions – Top Channel (Continued)



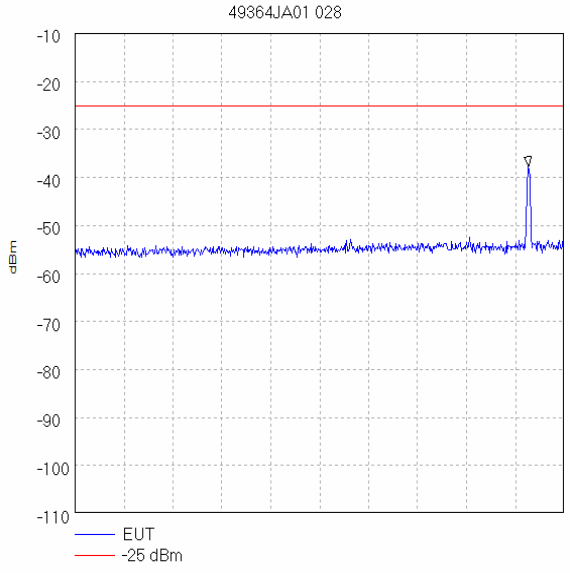
Start 9.0 kHz; Stop 150.0 kHz
Ref -10 dBm; Ref Offset 33.0 dB; 10 dB/div
RBW 1.0 kHz; VBW 1.0 kHz; Att 0 dB; Swp 360.0 mS
Peak 9.47 kHz, -48.17 dBm
Display Line: -25 dBm; ; Limit Test Passed
Tested by jxh 30/08/2007 13:53:03



Start 150.0 kHz; Stop 30.0 MHz
Ref -10 dBm; Ref Offset 33.0 dB; 10 dB/div
RBW 10.0 kHz; VBW 10.0 kHz; Att 0 dB; Swp 750.0 mS
Peak 1.941 MHz, -45.0 dBm
Display Line: -25 dBm; ; Limit Test Passed
Tested by jxh 30/08/2007 13:55:33

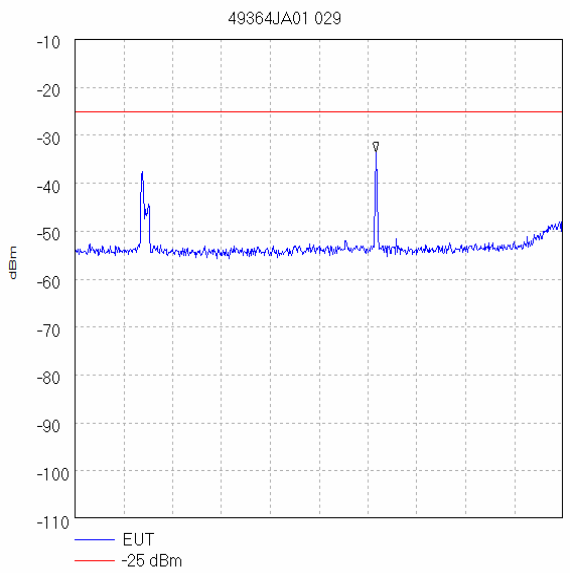


Start 30.0 MHz; Stop 1.0 GHz
Ref -10 dBm; Ref Offset 33.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 250.0 mS
Peak 225.616667 MHz, -48.33 dBm
Display Line: -25 dBm; ; Limit Test Passed
Tested by jxh 30/08/2007 13:57:02

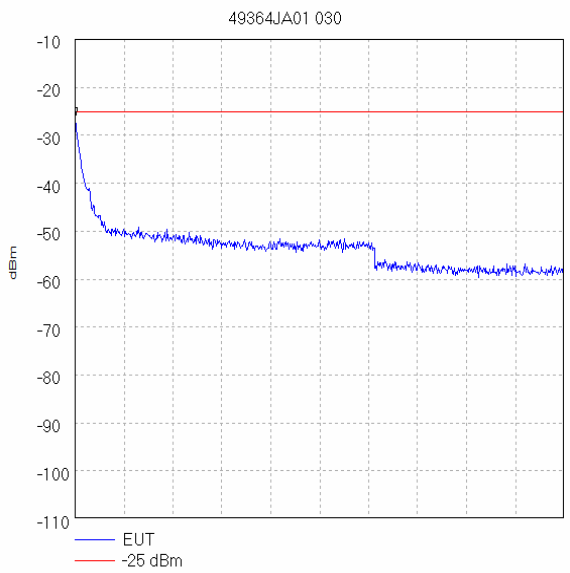


Start 1.0 GHz; Stop 2.0 GHz
Ref -10 dBm; Ref Offset 33.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 50.0 mS
Peak 1.926667 GHz, -37.67 dBm
Display Line: -25 dBm; ; Limit Test Passed
Tested by jxh 30/08/2007 13:59:00

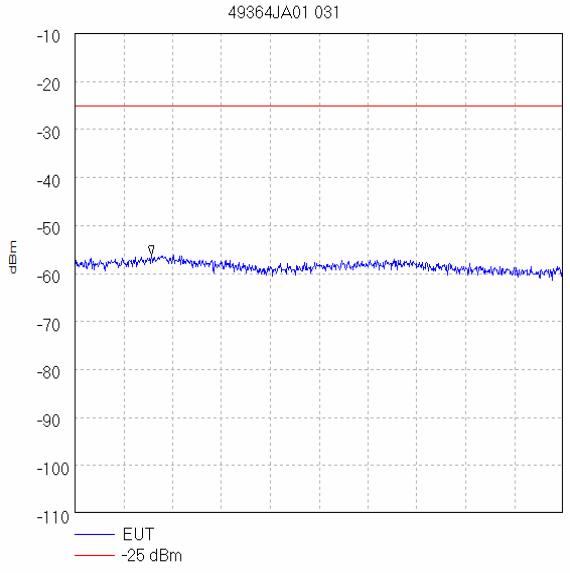
Transmitter Conducted Emissions – Top Channel (Continued)



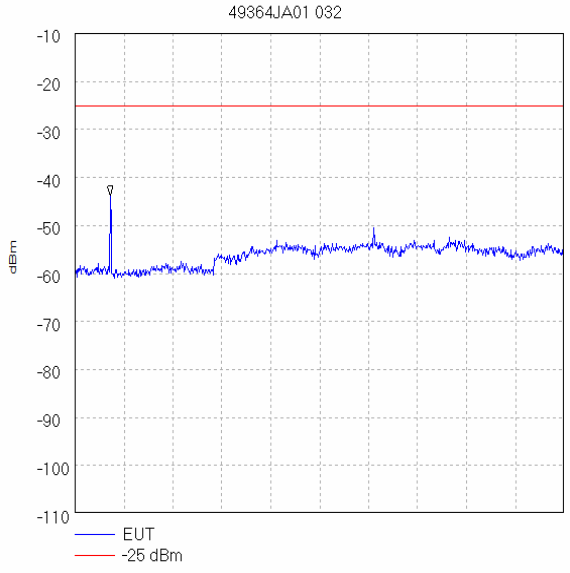
Start 2.0 GHz; Stop 2.496 GHz
Ref -10 dBm; Ref Offset 33.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 50.0 mS
Peak 2.305867 GHz, -33.5 dBm
Display Line: -25 dBm; ; Limit Test Passed
Tested by jxh 30/08/2007 14:00:54



Start 2.69 GHz; Stop 3.0 GHz
Ref -10 dBm; Ref Offset 33.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 50.0 mS
Peak 2.69 GHz, -26.33 dBm
Display Line: -25 dBm; ; Limit Test Passed
Tested by jxh 30/08/2007 14:04:03

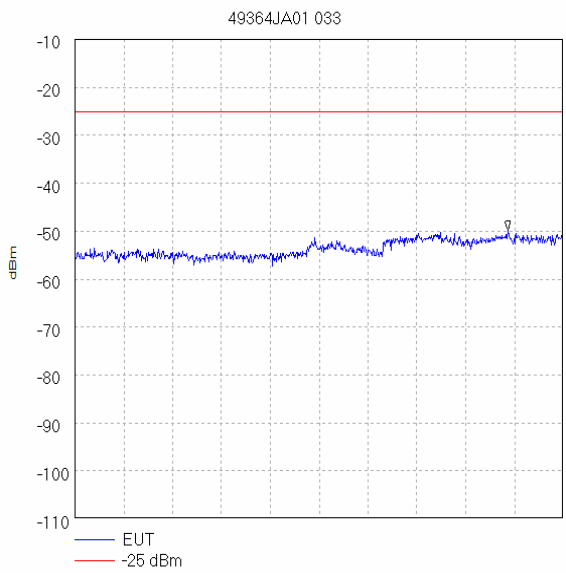


Start 3.0 GHz; Stop 5.0 GHz
Ref -10 dBm; Ref Offset 33.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 50.0 mS
Peak 3.313333 GHz, -56.17 dBm
Display Line: -25 dBm; ; Limit Test Passed
Tested by jxh 30/08/2007 14:05:17

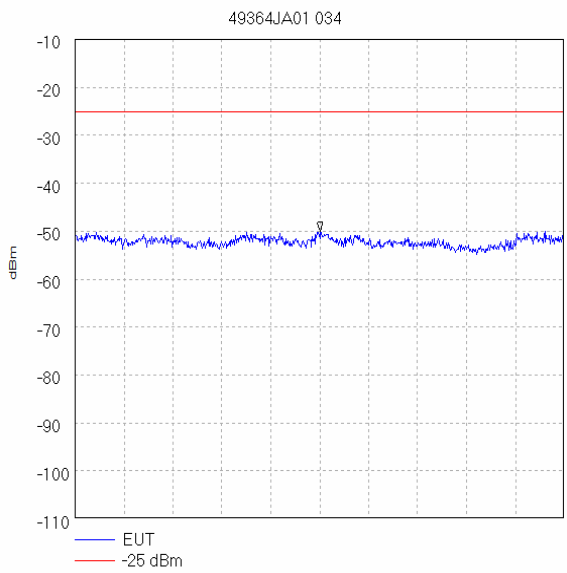


Start 5.0 GHz; Stop 10.0 GHz
Ref -10 dBm; Ref Offset 33.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 100.0 mS
Peak 5.358333 GHz, -43.83 dBm
Display Line: -25 dBm; ; Limit Test Passed
Tested by jxh 30/08/2007 14:06:31

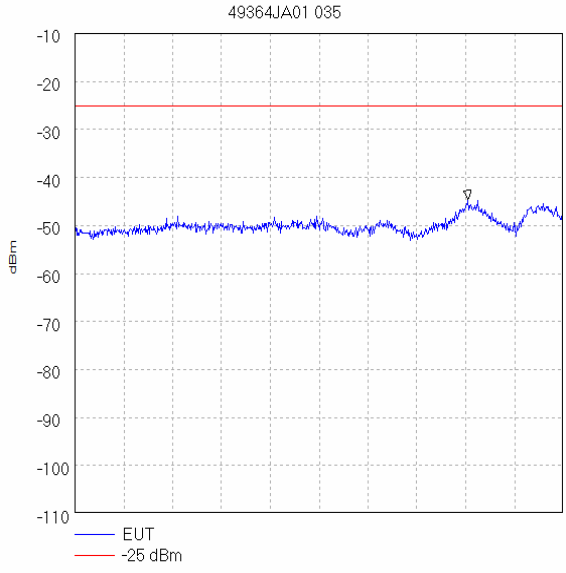
Transmitter Conducted Emissions – Top Channel (Continued)



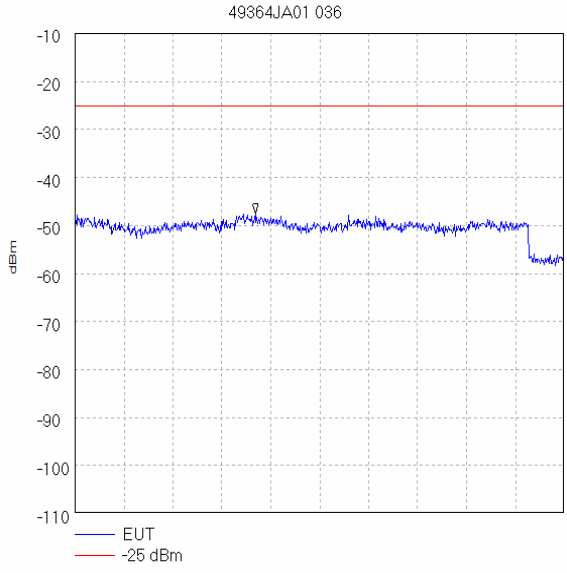
Start 10.0 GHz; Stop 15.0 GHz
Ref -10 dBm; Ref Offset 33.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 100.0 mS
Peak 14.433333 GHz, -49.83 dBm
Display Line: -25 dBm; ; Limit Test Passed
Tested by jxh 30/08/2007 14:07:12



Start 15.0 GHz; Stop 20.0 GHz
Ref -10 dBm; Ref Offset 33.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 100.0 mS
Peak 17.508333 GHz, -50.0 dBm
Display Line: -25 dBm; ; Limit Test Passed
Tested by jxh 30/08/2007 14:08:00



Start 20.0 GHz; Stop 25.0 GHz
Ref -10 dBm; Ref Offset 33.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 100.0 mS
Peak 24.025 GHz, -44.5 dBm
Display Line: -25 dBm; ; Limit Test Passed
Tested by jxh 30/08/2007 14:08:39



Start 25.0 GHz; Stop 27.0 GHz
Ref -10 dBm; Ref Offset 33.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 50.0 mS
Peak 25.736667 GHz, -47.5 dBm
Display Line: -25 dBm; ; Limit Test Passed
Tested by jxh 30/08/2007 14:09:08

7.2.11. Transmitter Radiated Emissions

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

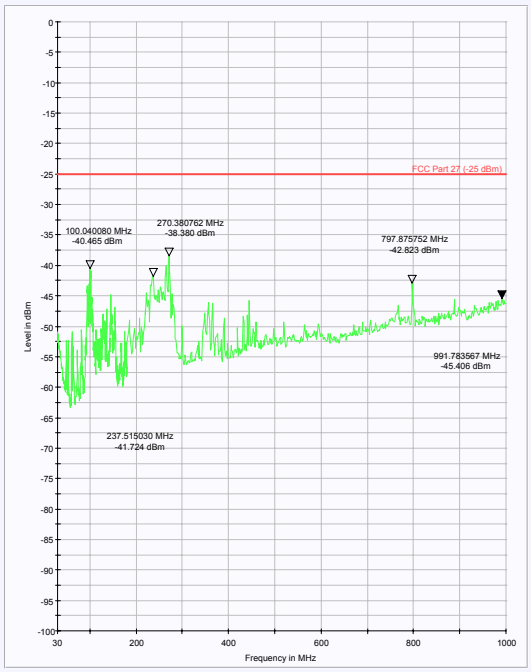
Tests were performed to identify the maximum transmitter radiated emission levels.

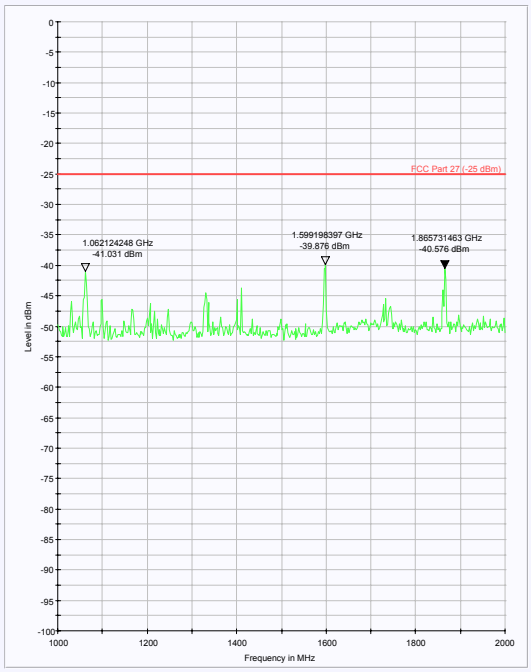
Results:

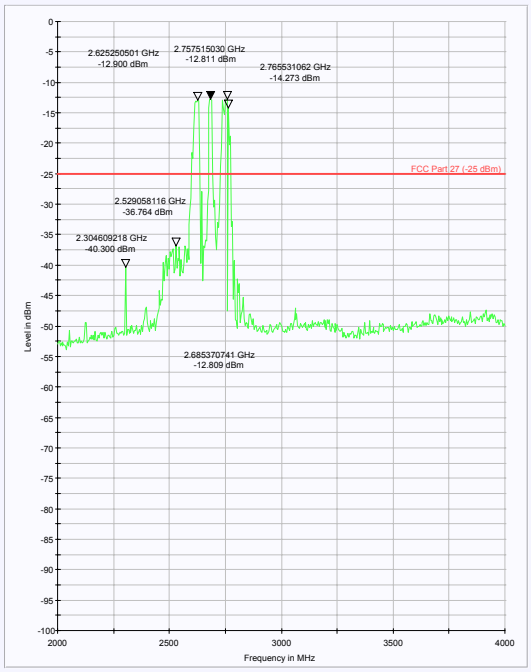
Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
100.040	-56.4	-25.0	31.4	Complied
237.515	-60.5	-25.0	35.5	Complied
270.381	-65.3	-25.0	40.3	Complied
797.876	-63.9	-25.0	38.9	Complied
991.784	-68.3	-25.0	43.3	Complied
1089.579	-56.4	-25.0	31.4	Complied
1599.198	-59.3	-25.0	34.3	Complied
1869.545	-37.9	-25.0	12.9	Complied
2304.928	-47.5	-25.0	22.5	Complied
2529.058	-53.2	-25.0	28.2	Complied
2625.251	-36.2	-25.0	11.2	Complied
2757.515	-33.7	-25.0	8.7	Complied
2765.531	-37.2	-25.0	12.2	Complied
5369.200	-40.8	-25.0	15.8	Complied

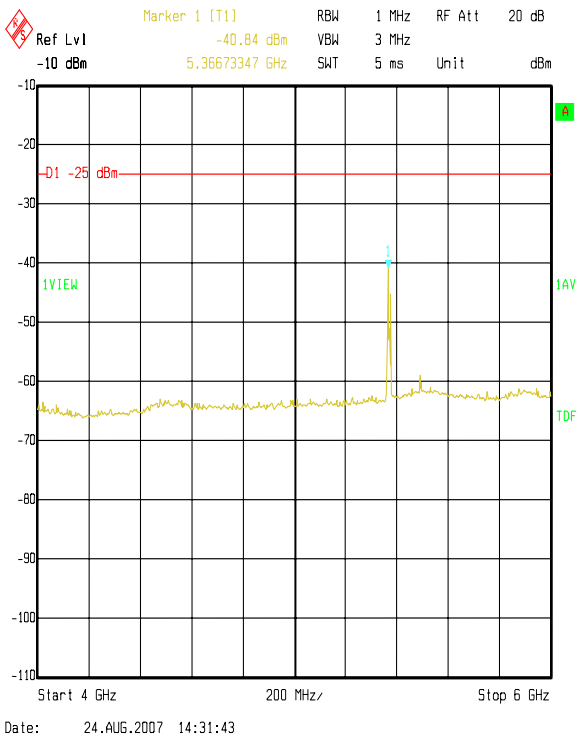
Test Of: **IPWireless (UK) Ltd**
2.5 GHz UE P1D Modem, Model: KF
To: **FCC Part 27: 2006 Subpart C**

Transmitter Radiated Emissions (Continued)



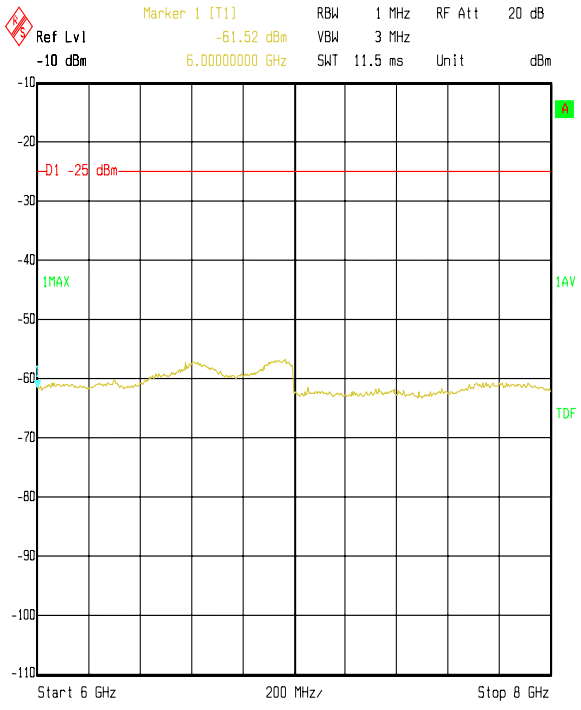


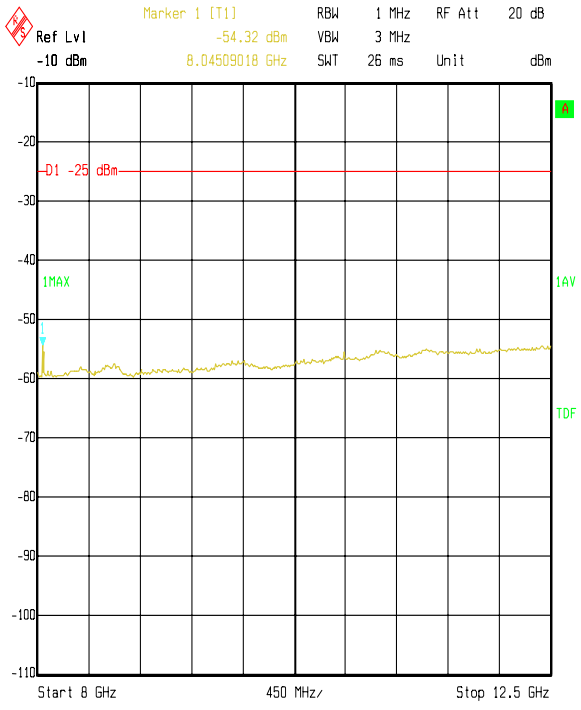


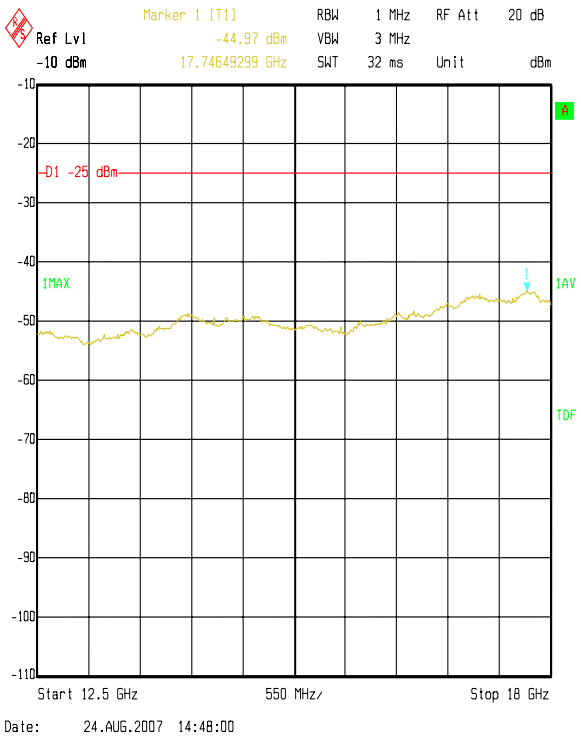


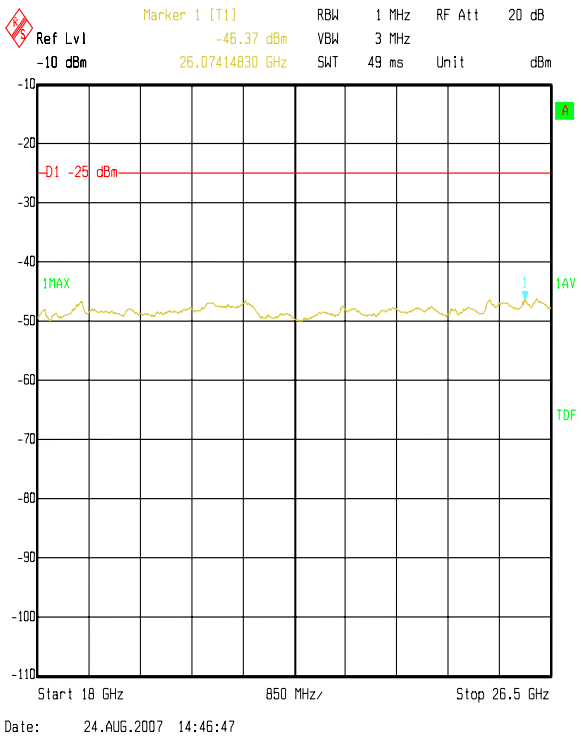
Test Of: **IPWireless (UK) Ltd**
2.5 GHz UE P1D Modem, Model: KF
To: **FCC Part 27: 2006 Subpart C**

Transmitter Radiated Emissions (Continued)

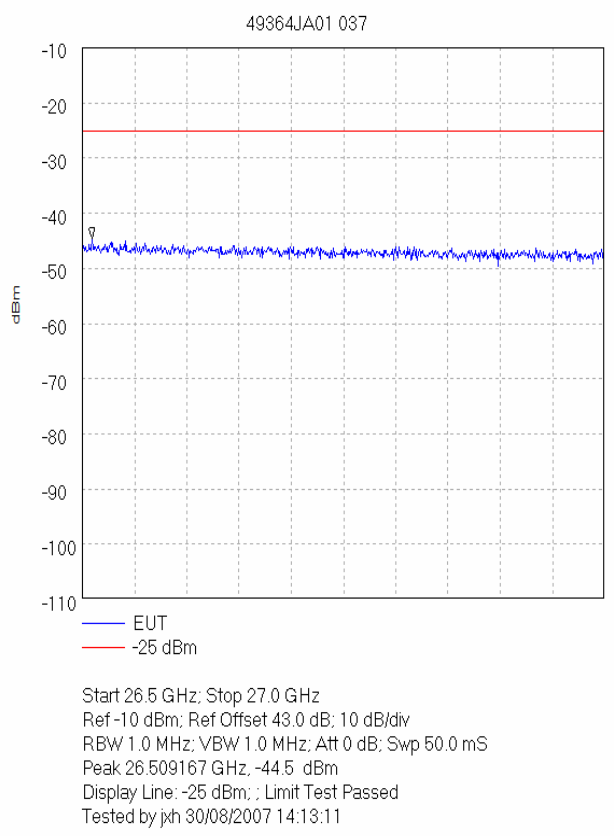








Transmitter Radiated Emissions (Continued)



7.2.12. Transmitter Radiated Emissions at Band Edges

Results:

Measured with a 300 kHz resolution bandwidth:

Bottom Band Edge

Frequency (MHz)	Spurious Emission (dBm)	Limit (dBm)	Margin (dB)	Result
2496	-38.0	-13.0	25.0	Complied

Top Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
2690	-43.3	-13.0	22.9	Complied

Results:

Measured with a 1 MHz resolution bandwidth:

Bottom Band Edge

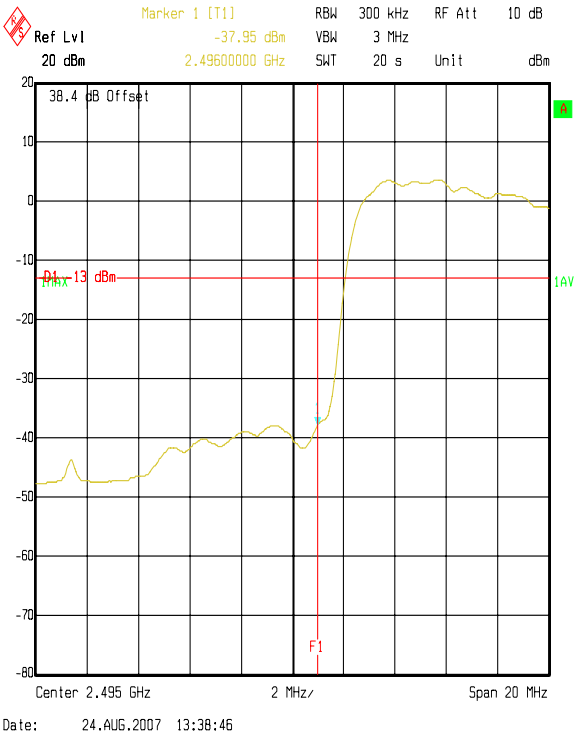
Frequency (MHz)	Spurious Emission (dBm)	Limit (dBm)	Margin (dB)	Result
2496	-18.7	-13.0	5.7	Complied

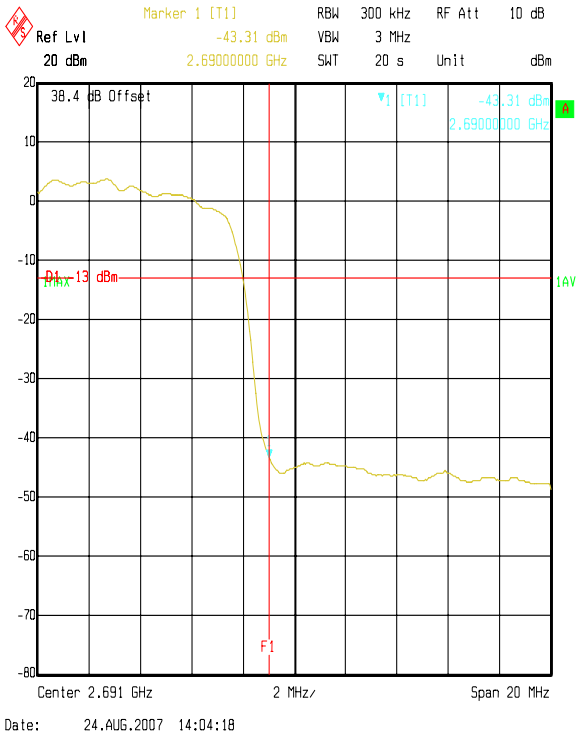
Top Band Edge

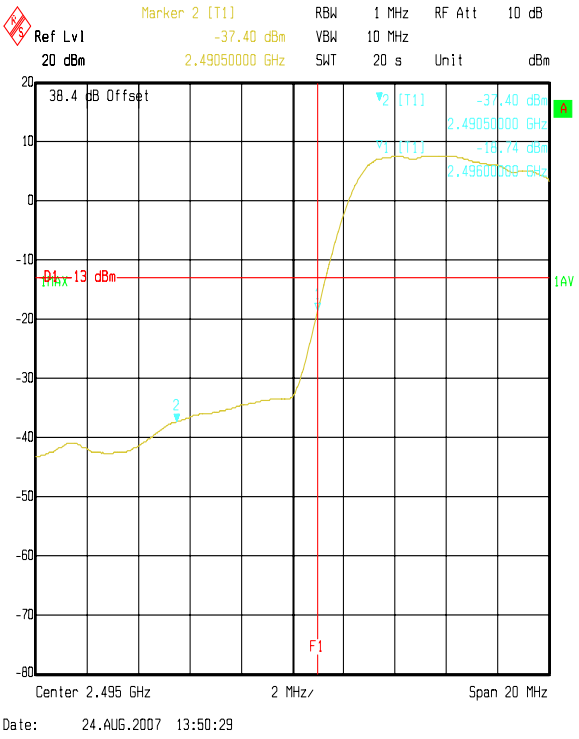
Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
2690	-17.4	-13.0	4.4	Complied

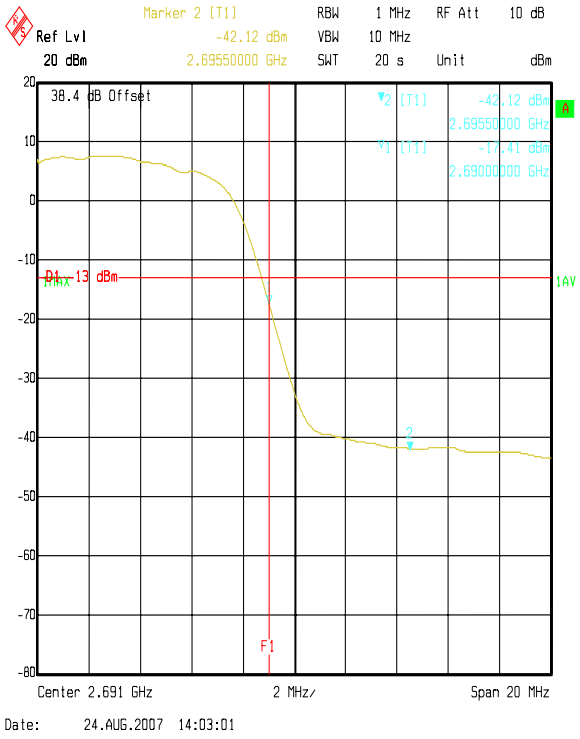
Test Of: IPWireless (UK) Ltd
2.5 GHz UE P1D Modem, Model: KF
To: FCC Part 27: 2006 Subpart C

Transmitter Radiated Emissions at Band Edges (Continued)









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
Frequency Stability	Not applicable	95%	± 20 Hz
Occupied Bandwidth	Not applicable	95%	± 0.12 %
Conducted Emissions	9 kHz to 26 GHz	95%	± 1.2 dB
Radiated Spurious Emissions	30 MHz to 1000 MHz	95%	± 5.26 dB
Radiated Spurious Emissions	1 GHz to 26 GHz	95%	± 1.78 dB
AC Conducted Spurious Emissions	0.15 MHz to 30 MHz	95%	± 3.25 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.

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
A088	Variac	Zenith	Y20-HM	9029	Cal before use	-
A1037	Bilog Antenna	Chase EMC Ltd	CBL6112B	2413	20 Sep 2006	12
A1140	Attenuator	Hewlett Packard	8493A	0536	31 May 2007	12
A1421	Attenuator	Narda	4779-10	8712	31 May 2007	12
A1534	Preamplifier	Hewlett Packard	8449B OPT H02	3008A0040	Cal before use	-
A1738	Attenuator	Atlantic Microwave	BBS40-10	R1379	31 May 2007	12
A1830	Pulse Limiter	Rhode & Schwarz	ESH3-Z2	100668	08 Jan 2007	12
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
A259	Bilog Antenna	Chase	CBL6111	1513	13 Mar 2007	12
A436	Horn Antenna	Flann Microwave	20240-20	330	24 Apr 2006	36
C1165	Cable	Rosenberger	FA210A1020007070	43189-1	05 Jun 2007	12
C1192	Cable	Rosenberger	FA210A1015M3030	27141-07	31 May 2007	12
C1198	Cable	Utiflex	FA147A1015M2020	3502 27138-4	04 Jun 2007	12
C160	Cable	Rosenberger	UFA210A-1-1181-70x70	None	Cal before use	-
C348	Cable	Rosenberger	UFA210A-1-1181-70x70	2993	Cal before use	-
C363	Cable	Rosenberger	RG142	None	Cal before use	-
E013	Thermal Chamber	Sanyo	ATMOS chamber	None	Cal before use	-
M1242	Spectrum Analyser	Rohde & Schwarz	FSEM30	845986/022	08 Sep 2006	12
M1253	Spectrum Analyser	Hewlett Packard	8564E	3442A00262	30 Oct 2006	12

Test Equipment Used (Continued)

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval (Months)
M1263	Test Receiver	Rohde & Schwarz	ESIB7	100265	25 Jan 2007	12
M127	Spectrum Analyser	Rohde & Schwarz	FSEB 30	842 659/016	15 Aug 2007	12
M166	Environment Meter	EuroCom	None	None	19 Apr 2007	12
M281	Power Meter	Hewlett Packard	E4418A (EPM441A)	GB37170210-01	06 Jun 2007	12
M283	Power Sensor	Hewlett Packard	8487A	3318A03241	08 Jun 2007	12
S201	OATS	RFI	1	None	25 May 2007	12
S202	OATS	RFI	2	S202-15011990	17 Nov 2006	12
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 calibrated at the time of the test.

Appendix 2. Measurement Methods

A2.1. 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 110 V, 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

A2.2. 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

A2.3. Equivalent Isotropic Radiated Power (EIRP)

ERP measurements were performed in accordance with the standard, against appropriate limits.

The EIRP was measured with the EUT arranged on a non-conducting turn table on a standard test site compliant with ANSI C63.4 – 2003 Clause 5.4. The transmitter was fitted with an integral antenna; as such all radiated tests were performed with the unit operating into the integral antenna.

The level of the EIRP was measured using a spectrum analyser.

The test antenna was positioned in the horizontal plane. The EUT was oriented in the X plane. The test antenna was then raised and lowered until a maximum peak was observed. The turntable was then rotated through 360 degrees and the maximum peak reading obtained. The height search was then repeated to take into consideration the new angular position of the turntable. The maximum reading observed was then recorded. This procedure was then repeated with the EUT oriented in the Y and Z planes. The highest reading taken in all 3 planes was recorded. The entire procedure was then repeated with the test antenna set in the vertical polarity.

Once the final amplitude (maximised) had been obtained, the EUT was substituted with a substitution antenna. 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 PAD. 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 ERP was calculated as:-

EIRP = Signal Generator Level - Cable Loss + Antenna Gain + Dipole Reference

A2.4. 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°C to +50°C.

Measurements were also performed at voltage extremes by varying the voltage at the battery terminal between the nominal value and the lower end point cut off voltage. The nominal value is the value of a fully charged battery.

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 environmental chamber was stabilised at each temperature within the stated temperature range for 30 minutes before testing commenced.

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 or channel edge.

A2.5. 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.

A2.6. 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 emissions shall be attenuated by not less than 43 + 10 log (P) dB at the channel edge and 55 + 10 log (P) dB at 5.5 MHz from the channel edges, where (P) is the maximum measured fundamental power in Watts for the channel under test. These calculations give absolute levels of -13 dBm and -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 limit. The margin between emission and limit is recorded and should always be positive to indicate compliance.

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 the 7.68 Mcps chip rate.

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(l) for measurements in the 1 MHz bands immediately outside and adjacent to the channel edge. A resolution bandwidth of 1 MHz was used.

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

Receiver Function	Settings
Detector Type:	Average
Mode:	Max Hold
Bandwidth:	1 MHz >1 GHz
Bandwidth:	100 kHz <1 GHz
Bandwidth:	10 kHz <30 MHz
Bandwidth:	1 kHz <150 kHz
Amplitude Range:	100 dB
Sweep Time:	Coupled

A2.7. 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 metres and a measurement distance of 3 metres, below 4 GHz; above 18 GHz a 1 metre measurement distance was used, above 26.5 GHz a 0.3 metre 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 emissions shall be attenuated by not less than 43 + 10 log (P) dB at the channel edge and 55 + 10 log (P) dB at 5.5 MHz from the channel edges, where (P) is the maximum measured fundamental power in Watts for the channel under test. These calculations give absolute levels of -13 dBm and -25 dBm.

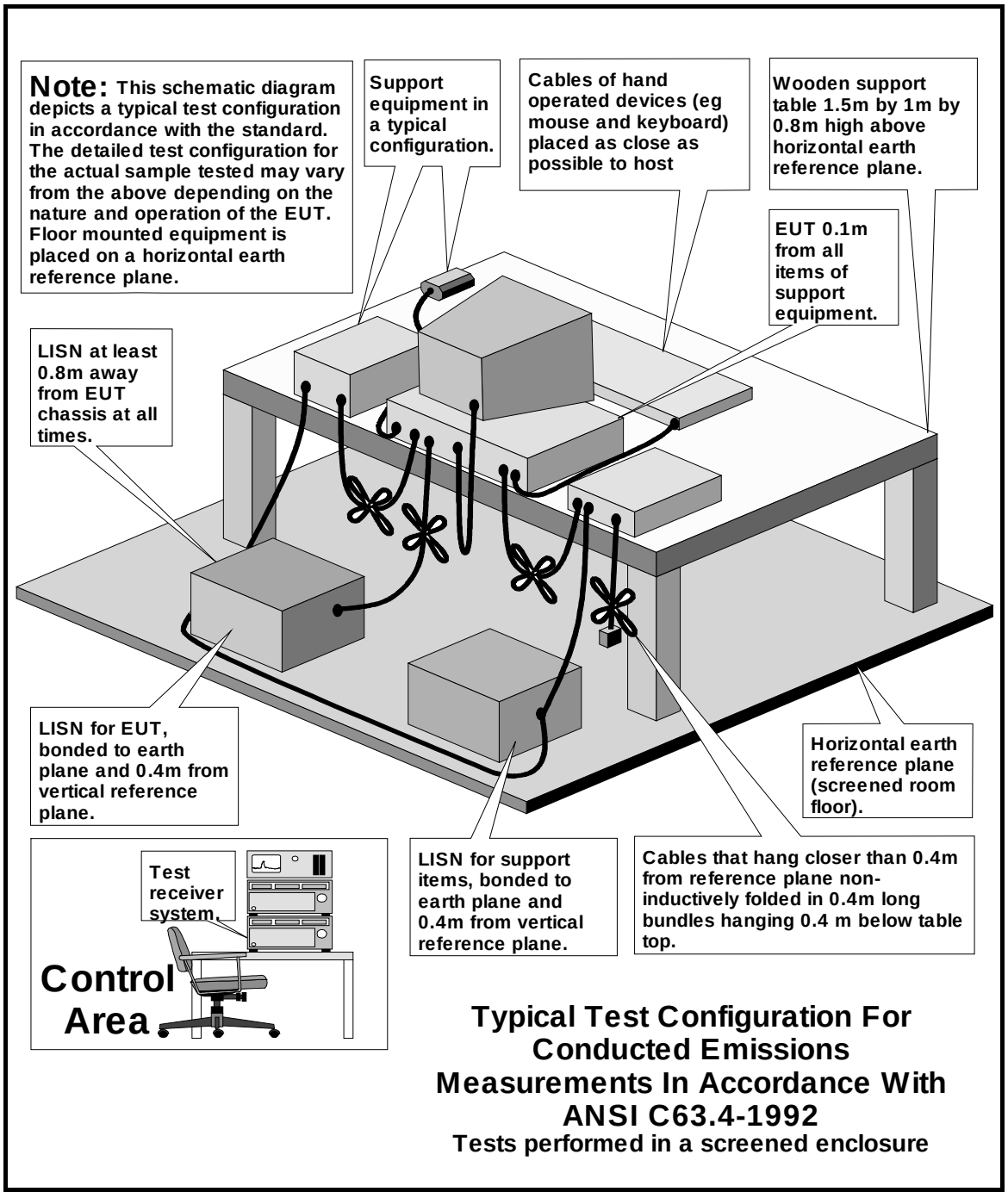
The frequency band described above was investigated with the transmitter operating at full power. Any spurious observed were then recorded and compared to the limit. The margin between emission and limit is recorded and should always be positive to indicate compliance.

Appendix 3. Test Configuration Drawings

This Appendix contains the following drawings:

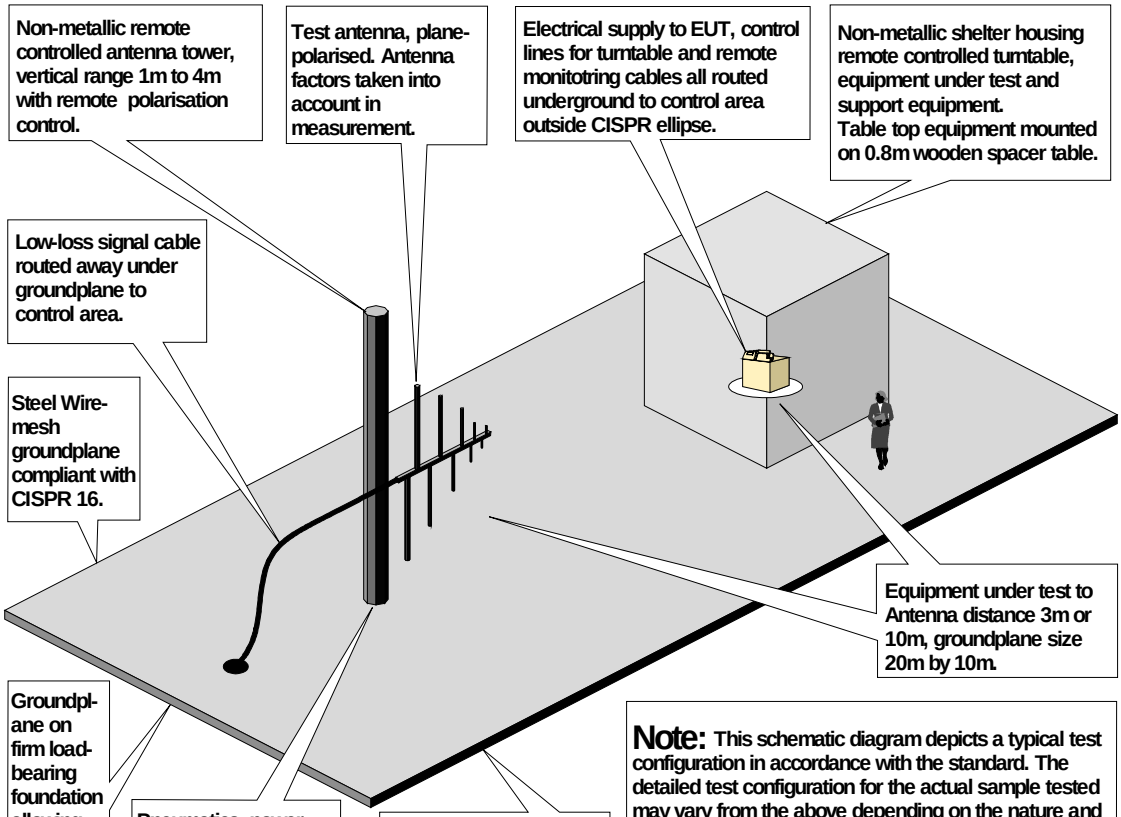
Drawing Reference Number	Title
DRG\49364JD01\EMICON	Test configuration for measurement of conducted emissions
DRG\49364JD01\EMIRAD	Test configuration for measurement of radiated emissions

DRG\49364JD01\EMICON



This diagram is also valid for the latest version of ANSI C63.4-2003

DRG\49364JD01\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